Lenovo

ThinkSystem ST250 V3
User Guide



Machine Type: 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

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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.

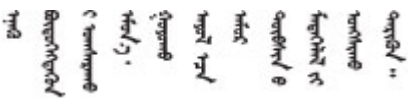
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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་སྐྱོང་མ་བྱས་གོང་། ·སྐྲ་ཐྱི་ཡིད་གཟབ· བྱ་འདྲ་མིན་ཡོད་པའི་འོད་སྣེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

ھەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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 227.

- **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” on page 45 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” on page 45 .
- 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, 10):
  - ThinkSystem RAID 545-8i PCIe Gen4 12Gb Adapter
- Hardware RAID (RAID level 0, 1, 10, 5):
  - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter
- Hardware RAID (RAID level 0, 1, 10, 5, 50, 6, 60):
  - ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter (with flash power module)
- Hardware RAID (RAID level 0, 1, 10, 5, 50, 6, 60, 1 Triple, 10 Triple):
  - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter (with flash power module)
  - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter (with flash power module)
- Software RAID (RAID level 0, 1, 5, 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 223.

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

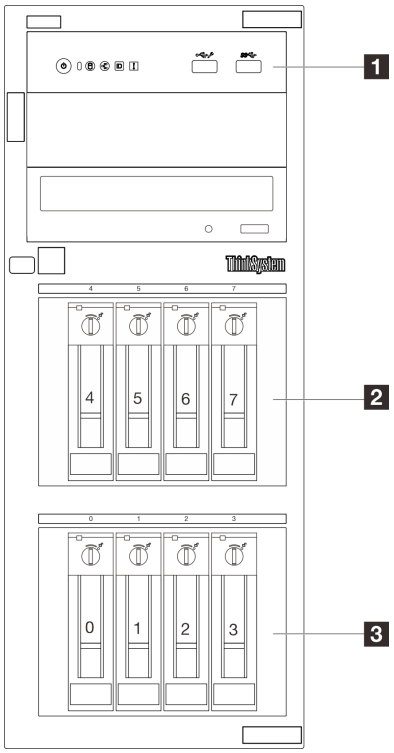


Figure 2. Front view of server models with eight 3.5-inch simple-swap drives bays

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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 227.

Six 3.5-inch simple-swap drives bays

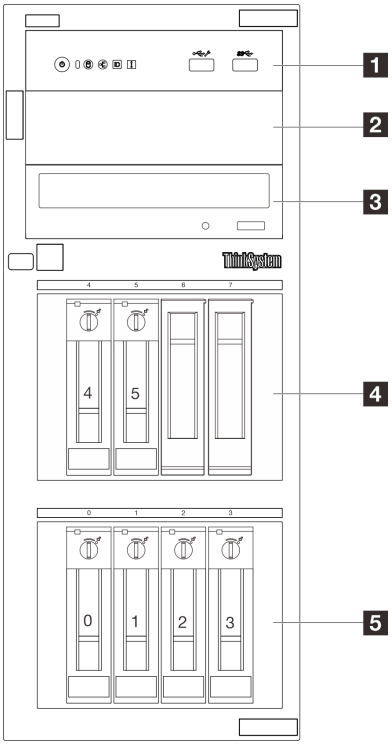


Figure 3. Front view of server models with six 3.5-inch simple-swap drives bays

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 227.

Eight 3.5-inch hot-swap drives bays

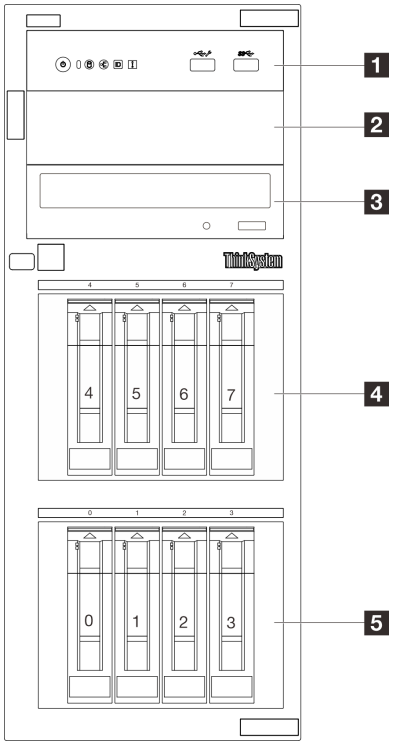


Figure 4. Front view of server models with eight 3.5-inch hot-swap drives bays

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 227.

Sixteen 2.5-inch hot-swap drives bays

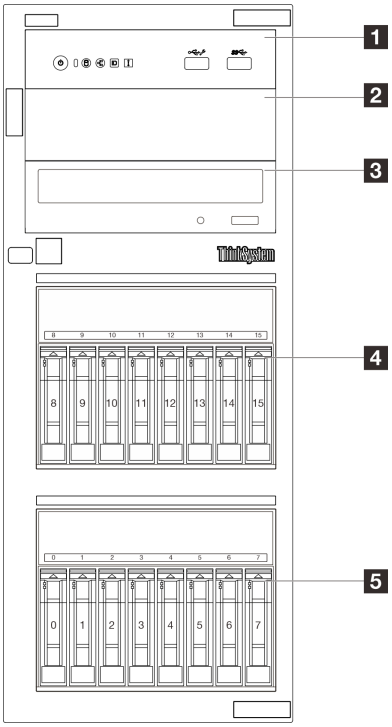


Figure 5. Front view of server models with sixteen 2.5-inch hot-swap drives bays

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 227.

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

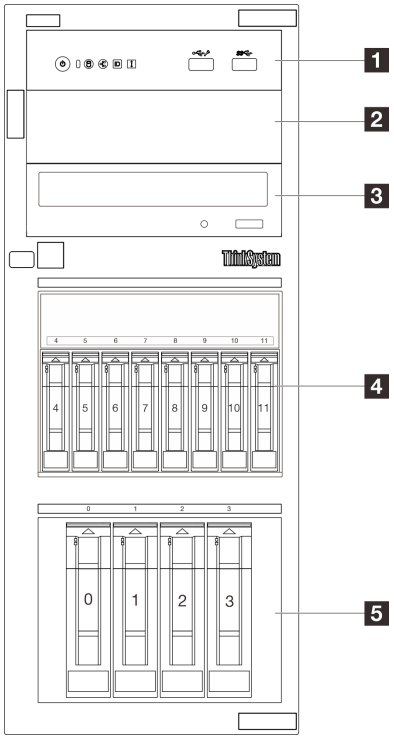


Figure 6. Front view of server models with four 3.5-inch hot-swap + eight 2.5-inch hot-swap drives bays

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 227.

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.

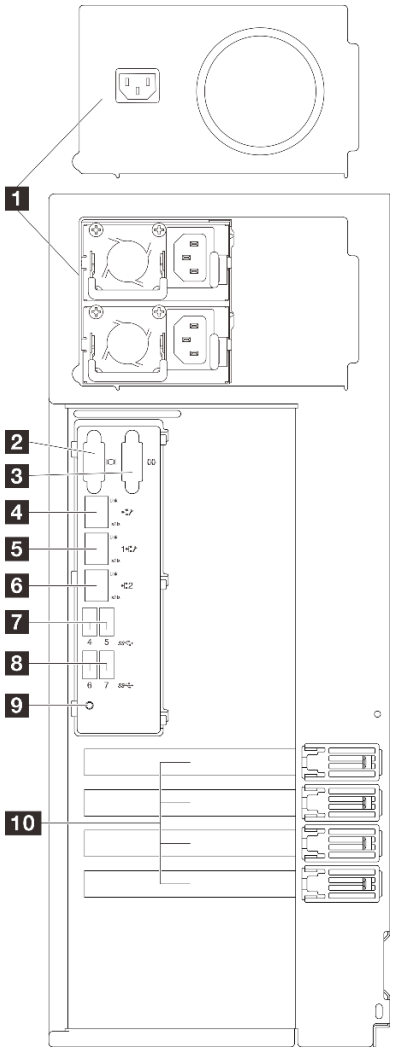


Figure 7. Rear view

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 230.

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 215
- "XCC system management port (10/100/1000 Mbps RJ-45) LEDs" on page 233

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 233. 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.

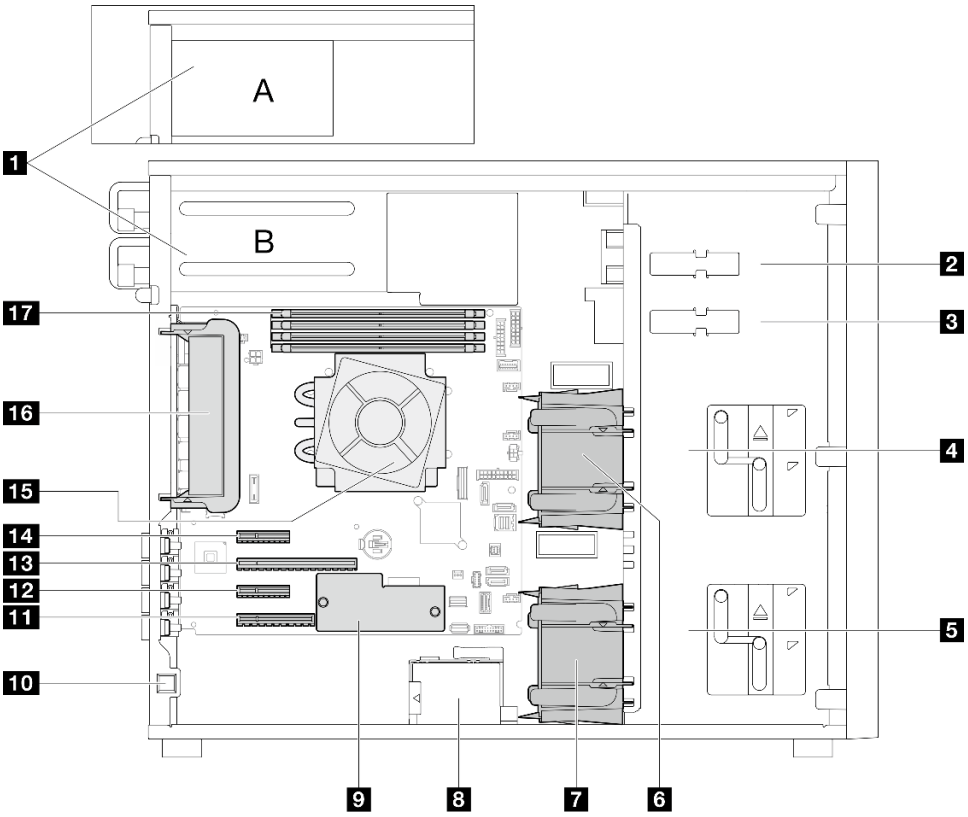


Table 8. Components on the server models side view

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.

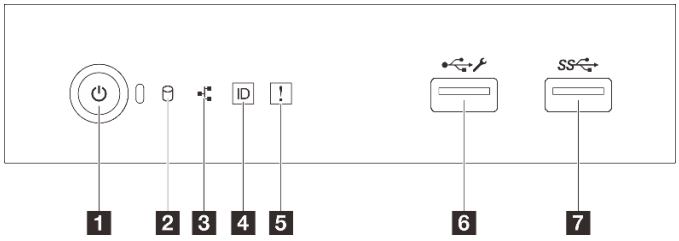


Figure 8. Front I/O module

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” on page 48 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.

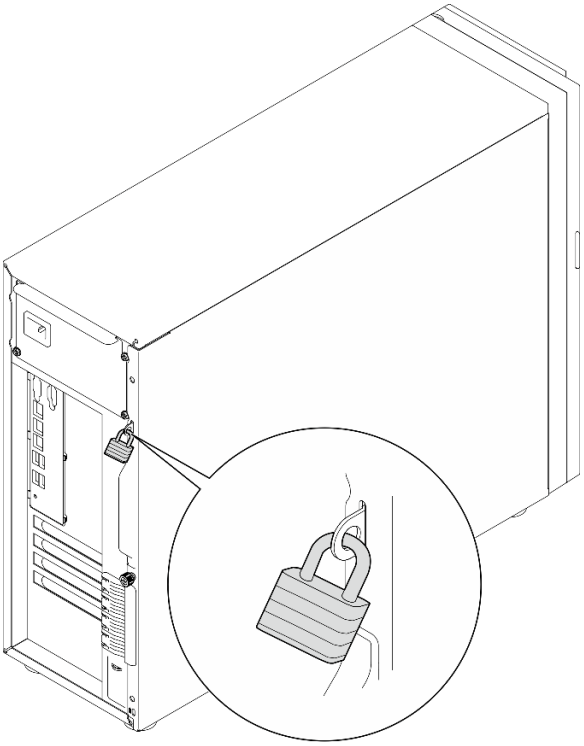


Figure 9. Padlock

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

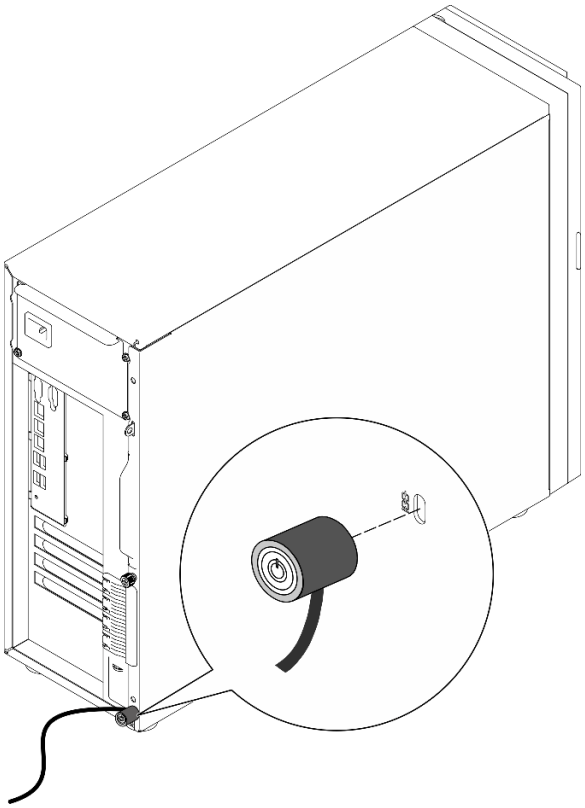


Figure 10. Kensington-style cable lock

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.

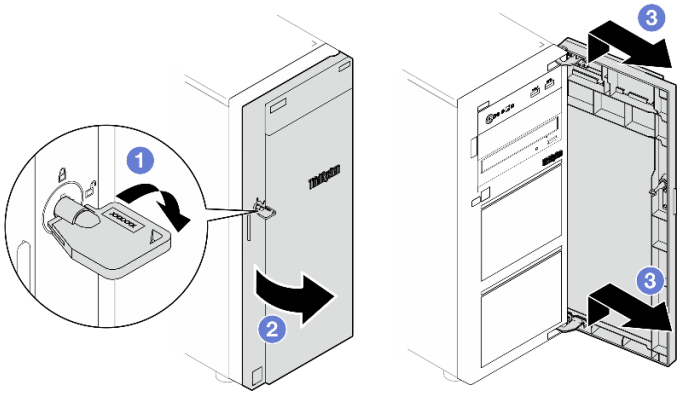


Figure 11. Front door lock

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 230.

System-board connectors

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

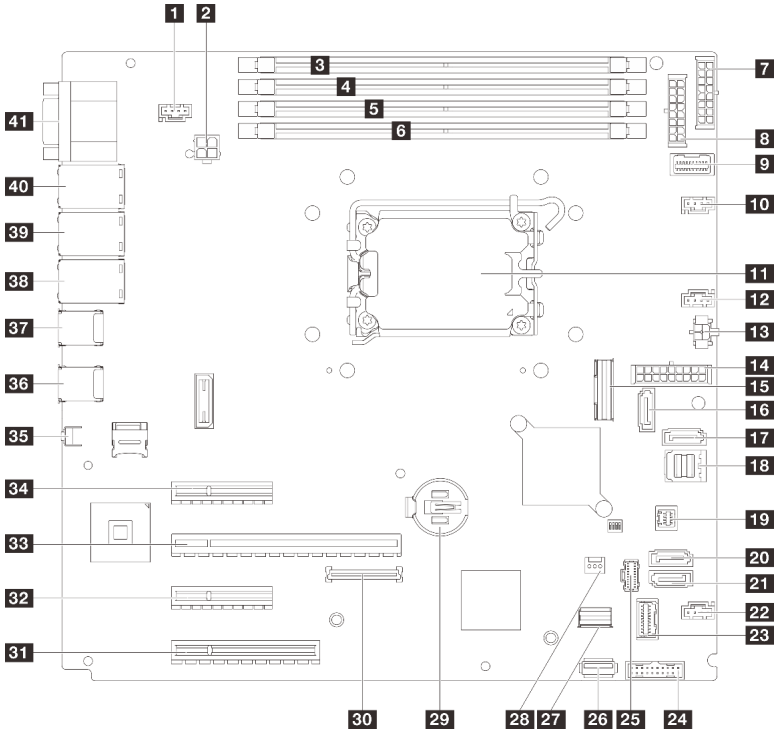


Figure 12. System-board connectors

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” on page 41
   - “Handling static-sensitive devices” on page 44
   - “Power off the server” on page 48
2. Any system-board-assembly 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.

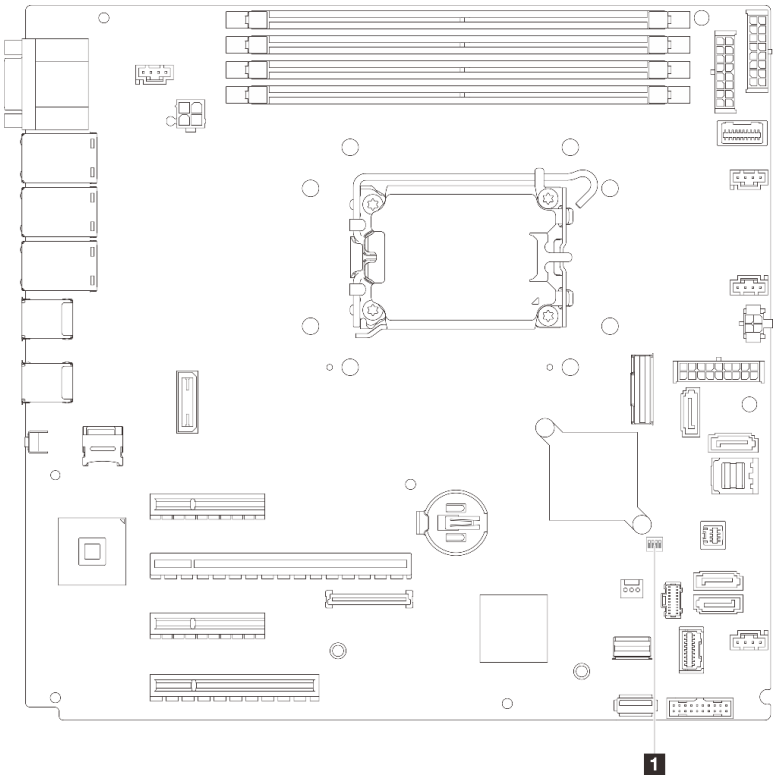


Figure 13. System-board switches

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 227.

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.

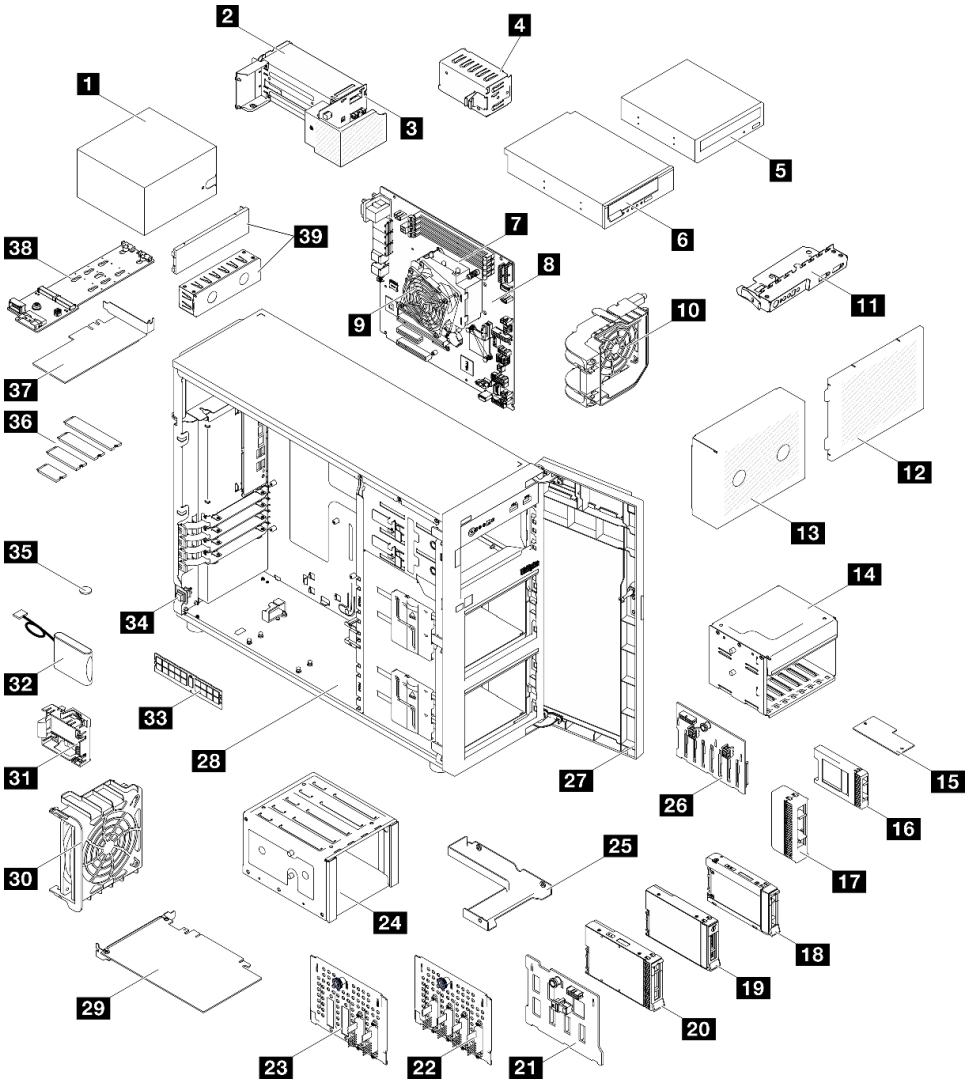


Figure 14. Server components

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 12. 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 12. 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 37 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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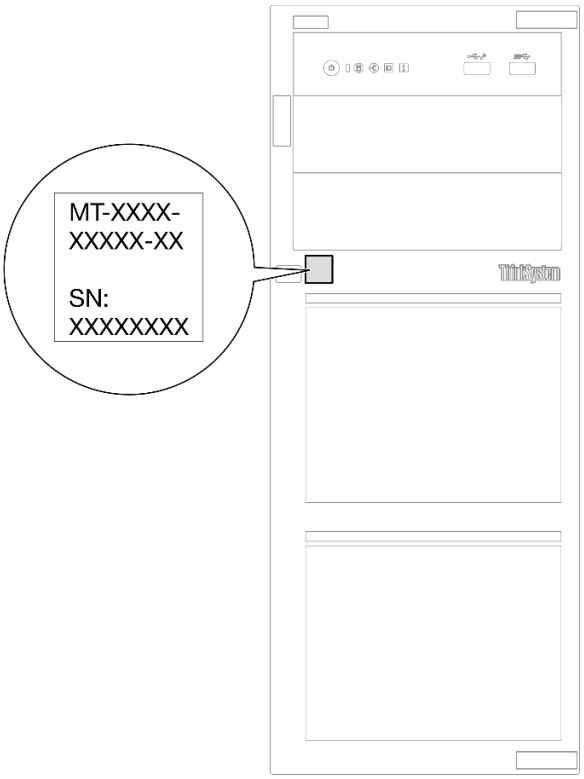


Figure 15. Location of the ID label

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.

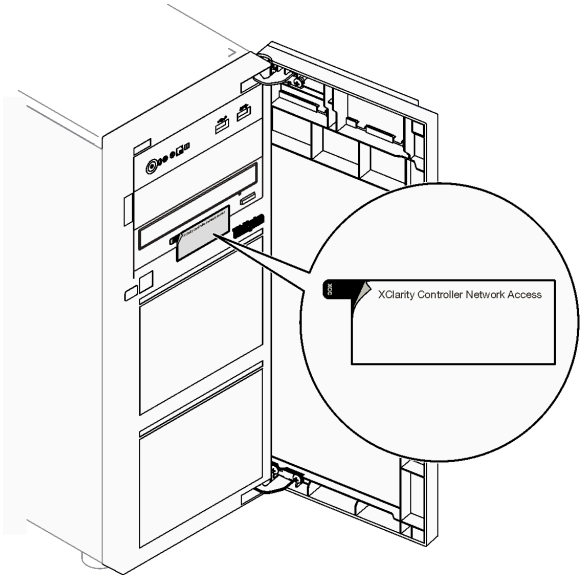


Figure 16. Location of XClarity Controller network access label

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.

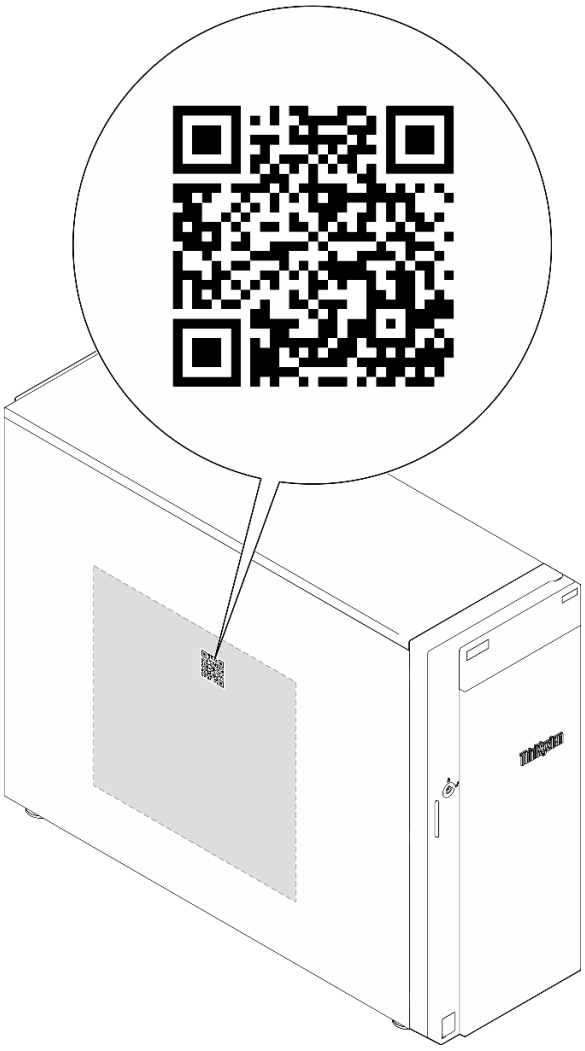


Figure 17. Service information QR code

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 35.
2. Install any required hardware or server options. See the related topics in Chapter 5 “Hardware replacement procedures” on page 41.
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” on page 152.
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 227

   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 227 for more information on the LED indications.

Configure the system

Complete the following procedures to configure the system. For detailed instructions, refer to Chapter 7 “System configuration” on page 215.

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. Hardware replacement procedures

This section provides installation and removal procedures for all serviceable system components. Each component replacement procedure references any tasks that need to be performed to gain access to the component being replaced.

Installation Guidelines

Before installing components in your server, read the installation guidelines.

Before installing optional devices, read the following notices carefully:

Attention: Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Read the safety information and guidelines to ensure your safety at work:
  - A complete list of safety information for all products is available at:

    https://pubs.lenovo.com/safety_documentation/
  - The following guidelines are available as well: “Working inside the server with the power on” on page 44 and “Handling static-sensitive devices” on page 44.
- Make sure the components you are installing are supported by your server.
  - For a list of supported optional components for the server, see https://serverproven.lenovo.com.
  - For the option package contents, see https://serveroption.lenovo.com/.
- 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.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/st250v3/7dce/downloads/driver-list/ to download firmware updates for your server.

  Important: Some cluster solutions require specific code levels or coordinated code updates. If the component is part of a cluster solution, verify the latest Best Recipe code level menu for cluster supported firmware and driver before you update the code.
- If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see “Update the firmware” on page 217.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
  - Make sure that you can stand steadily without slipping.
  - Distribute the weight of the object equally between your feet.

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  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board (system board assembly) and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- When replacing power supply units or fans, make sure to refer to redundancy rules for these components.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- Except PSU, orange on a component or a orange on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- PSU with a release tab is a hot-swap PSU. The color of the release tab does not affect the serviceability of the PSU.
- The red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

  Note: See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.
- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

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.

System reliability guidelines

Review the system reliability guidelines to ensure proper system cooling and reliability.

Make sure the following requirements are met:

- When the server comes with redundant power, a power supply must be installed in each power-supply bay.
- Adequate space around the server must be spared to allow server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the server cover before you turn the power on. Do not operate the server for more than 30 minutes with the server cover removed, for it might damage server components.
- Cabling instructions that come with optional components must be followed.
- A failed fan must be replaced within 48 hours after malfunction.
- A removed hot-swap fan must be replaced within 30 seconds after removal.
- A removed hot-swap drive must be replaced within two minutes after removal.
- A removed hot-swap power supply must be replaced within two minutes after removal.
- Every air baffle that comes with the server must be installed when the server starts (some servers might come with more than one air baffle). Operating the server with a missing air baffle might damage the processor.
- All processor sockets must contain either a socket cover or a processor with heat sink.
- When more than one processor is installed, fan population rules for each server must be strictly followed.

Working inside the server with the power on

You might need to keep the power on with the server cover removed to look at system information on the display panel or to replace hot-swap components. Review these guidelines before doing so.

Attention: The server might stop and data loss might occur when internal server components are exposed to static electricity. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding systems when working inside the server with the power on.

- Avoid loose-fitting clothing, particularly around your forearms. Button or roll up long sleeves before working inside the server.
- Prevent your necktie, scarf, badge rope, or hair from dangling into the server.
- Remove jewelry, such as bracelets, necklaces, rings, cuff links, and wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, in case they fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Review these guidelines before you handle static-sensitive devices to reduce the possibility of damage from electrostatic discharge.

Attention: Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Limit your movement to prevent building up static electricity around you.
- Take additional care when handling devices during cold weather, for heating would reduce indoor humidity and increase static electricity.
- Always use an electrostatic-discharge wrist strap or other grounding system, particularly when working inside the server with the power on.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least two seconds. This drains static electricity from the package and from your body.
- Remove the device from the package and install it directly into the server without putting it down. If it is necessary to put the device down, put it back into the static-protective package. Never place the device on the server or on any metal surface.
- When handling a device, carefully hold it by the edges or the frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Keep the device from others' reach to prevent possible damages.

Memory module installation rules and order

Memory modules must be installed in a specific order based on the memory configuration that you implement and the number of processors and memory modules installed in the server.

Supported type of memory modules

For information on the types of memory module supported by this server, see “Memory” section in “Technical specifications” on page 4.

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

Specific information about the required installation order of memory modules in your server based on the system configuration and memory mode that you are implementing is shown below.

Numbers and the location of memory module slots

This server comes with four memory module slots. The following illustration shows the location of the memory module slots on the system board:

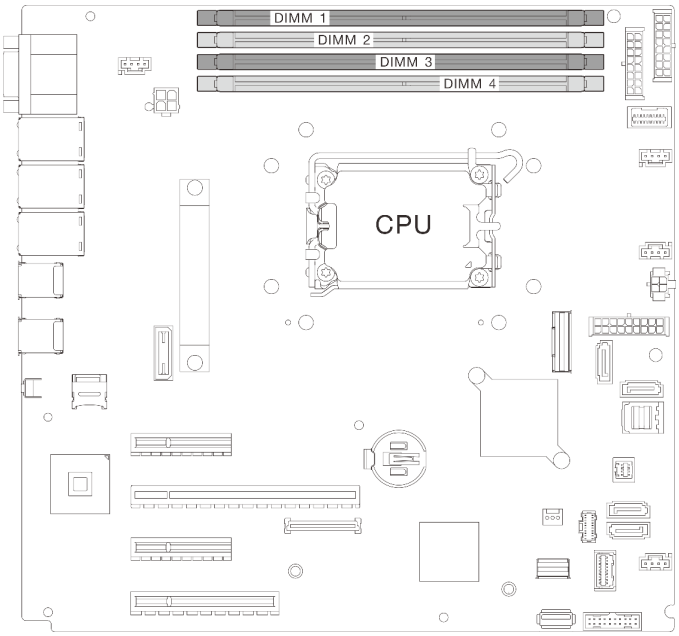


Figure 18. Memory modules and processors layout

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

Memory mode and installation order

- At least one DIMM is required for each processor. Install at least one DIMM per processor for good performance.
- Mix DIMMS speed and mix DIMM capacity across memory channels or in the same memory channel are supported.
- In each memory channel, populate the slot farthest from the processor (slot 0) first.
- A label on each DIMM identifies the DIMM type. This information is in the format **xxxxx *n*Rxxx PC4-xxxxx-xx-xx-xxx**. Where ***n*** indicates if the DIMM is single-rank (n=1) or dual-rank (n=2).
- 4800MHz memory is only supported with Intel Xeon® E-2400 series and Pentium® processors.

The memory-channel configuration table below shows the relationship between the processors, memory controllers, memory channels, and memory module slot numbers.

Table 13. Memory module installation sequence

Total memory module installed	Memory module slot number				Memory speed
	1	2	3	4	
One			√		• 1R: 4400MHz • 2R: 4400MHz
Two	√		√		
Three	√		√	√	• 1R: 4000MHz • 2R: 3600MHz
Four	√	√	√	√	

Technical rules for PCIe slots

PCIe adapters must be installed in a specific order in your server.

PCIe adapter installation rules and order

Installation priority	Component	PCIe slot priorities
1	GPU adapter	2
2	PCIe adapter for M.2 boot adapter	4
3	10GBASE-T 2-Port PCIe Ethernet Adapter	1, 4
4	RAID adapters / 8i HBA adapter	2, 4, 3
5	8e HBA adapter	2, 4, 3, 1
6	Ethernet adapters	1, 3, 4, 2

Notes:

- Performance may degrade when a x16 PCIe adapter is installed in a x8 PCIe slot.
- 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.
- ThinkSystem Intel X710-T4L 10GBASE-T 4-Port PCIe Ethernet Adapter can only be installed in PCIe slots 3, 4 and 2.
- Rules for GPU adapter:
  - GPU adapters can only be installed in **PCIe slot 2**. When GPU adapter is installed in PCIe slot 2, **make sure to keep PCIe slot 3 empty**.
  - The following GPU adapters can only be supported with Intel Xeon® E-2400 series and Pentium® processors.
    - ThinkSystem NVIDIA Quadro RTX A1000 next PCIe Active GPU
    - ThinkSystem NVIDIA RTX A400 4Gb PCIe Active GPU

Power on and power off the server

Follow the instructions in this section to power on and power off the server.

Power on the server

After the server performs a short self-test (power status LED flashes quickly) when connected to input power, it enters a standby state (power status LED flashes once per second).

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 227

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.

For information about powering off the server, see “Power off the server” on page 48.

Power off the server

The server remains in a standby state when it is connected to a power source, allowing the Lenovo XClarity Controller to respond to remote power-on requests. To remove all power from the server (power status LED off), you must disconnect all power cables.

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 227

To place the server in a standby state (power status LED flashes once per second):

Note: The Lenovo XClarity Controller can place the server in a standby state as an automatic response to a critical system failure.

- Start an orderly shutdown using the operating system (if supported by your operating system).
- Press the power button to start an orderly shutdown (if supported by your operating system).
- Press and hold the power button for more than 4 seconds to force a shutdown.

When in a standby state, the server can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the server, see “Power on the server” on page 48.

3.5-inch/2.5-inch drive cage replacement

Follow instructions in this section to remove and install the 3.5-inch/2.5-inch drive cage.

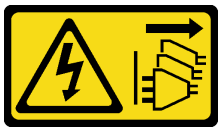
Remove the 3.5-inch/2.5-inch drive cage

Follow instructions in this section to remove the 3.5-inch/2.5-inch drive cage.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Make preparations for this task.

a. Remove the server cover. See "Remove the server cover" on page 156.

b. Remove the front door. See "Remove the front door" on page 85.

c. Remove the front bezel. See "Remove the front bezel" on page 83.

d. Remove all of the installed drives or drive bay fillers from the drive cage and set them aside on a static-protective surface. See "Remove a 2.5-/3.5-inch hot-swap drive" on page 64 or "Remove a simple-swap drive" on page 67.

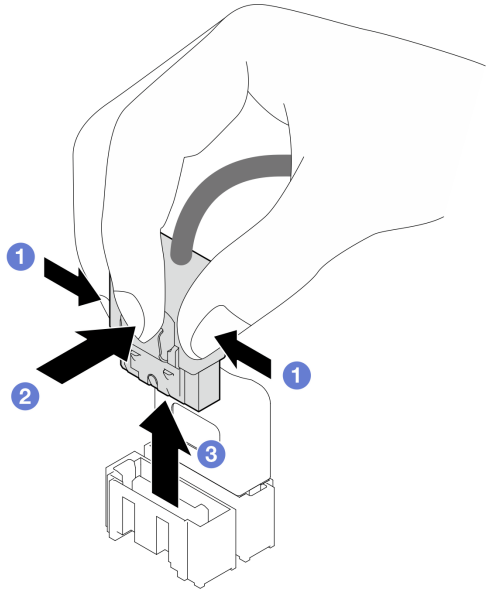
e. Remove the system fan. See "Remove the front system fan" on page 74.

Step 2. Disconnect the cables from the backplane or backplate.

Attention:

- Follow the instructions below to disconnect the cable from the SATA hard disk drive connector (especially SATA hard disk drive **4** and **5** connectors):
  1. ❶ Press on the sides of the connector on the cable with your thumb and middle finger.
  2. ❷ Release the latch with your index finger as illustrated.
  3. ❸ Carefully pull the cable out of the connector on the system board.

Figure 19. Disconnecting the cable from the SATA hard disk drive connector



- To avoid damaging the system board, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 183 when disconnecting cables from the system board.

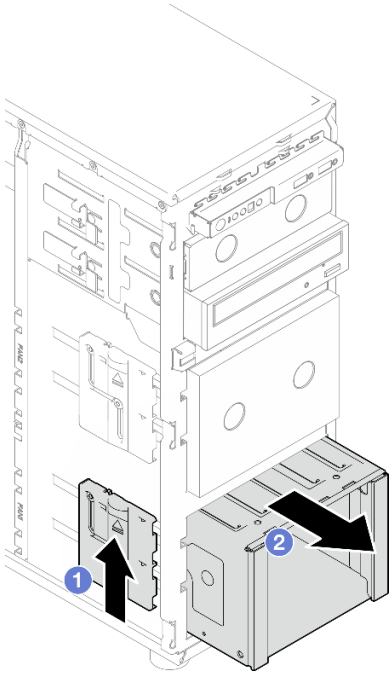
Step 3. Remove the drive cage from the chassis.

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

a. 1 Press and hold the drive cage release latch.

b. 2 Carefully slide the drive cage out of the chassis.

Figure 20. Removing the drive cage



Step 4. Remove the backplane or backplate. See “Remove the 3.5-inch/2.5-inch hot-swap drive backplane” on page 52 or “Remove the 3.5-inch simple-swap drive backplate” on page 56.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the 3.5-inch/2.5-inch drive cage

Follow instructions in this section to install the 3.5-inch/2.5-inch drive cage.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install the backplane or backplate. See “Install the 3.5-inch/2.5-inch hot-swap drive backplane” on page 55 or “Install the 3.5-inch simple-swap drive backplate” on page 59 .

Step 2. Slide the drive cage in until the release latch clicks into place.

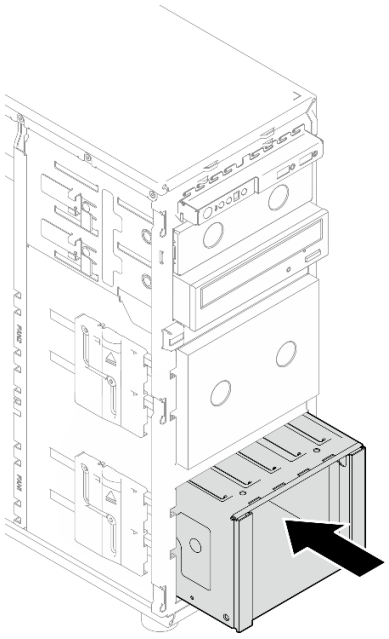


Figure 21. Installing the drive cage

After you finish

1. Install the system fan. See “Install the front system fan” on page 76.
2. Reinstall all the drives and drive bay fillers (if any) into the drive cage. See “Install a 2.5-/3.5-inch hot-swap drive” on page 65 or “Install a 2.5-inch drive into a 3.5-inch drive bay” on page 72.
3. Reconnect the cables to the backplane or backplate.
4. Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

3.5-inch/2.5-inch hot-swap drive backplane replacement

Follow instructions in this section to remove and install a 3.5-inch/2.5-inch hot-swap drive backplane.

This topic applies only to server models that have hot-swap drives installed.

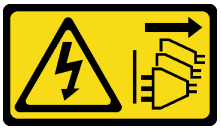
Remove the 3.5-inch/2.5-inch hot-swap drive backplane

Follow instructions in this section to remove the 3.5-inch/2.5-inch hot-swap drive backplane.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

Procedure

Step 1. Make preparations for this task.

a. Remove the server cover. See "Remove the server cover" on page 156.

b. Remove the front door. See "Remove the front door" on page 85.

c. Remove the front bezel. See "Remove the front bezel" on page 83.

d. Remove all of the installed drives or drive bay fillers from the drive cage and set them aside on a static-protective surface. See "Remove a 2.5-/3.5-inch hot-swap drive" on page 64 or "Remove a simple-swap drive" on page 67.

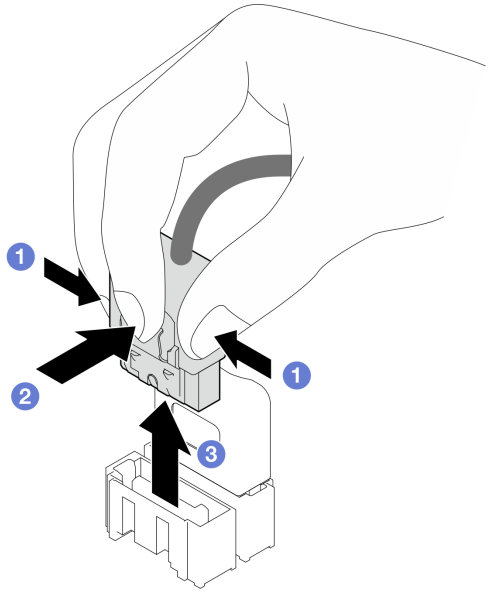
e. Remove the system fan. See "Remove the front system fan" on page 74.

Step 2. Disconnect the cables from the backplane.

Attention:

- Follow the instructions below to disconnect the cable from the SATA hard disk drive connector (especially SATA hard disk drive **4** and **5** connectors):
  1. ❶ Press on the sides of the connector on the cable with your thumb and middle finger.
  2. ❷ Release the latch with your index finger as illustrated.
  3. ❸ Carefully pull the cable out of the connector on the system board.

Figure 22. Disconnecting the cable from the SATA hard disk drive connector



- To avoid damaging the system board, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 183 when disconnecting cables from the system board.

Step 3. Remove the drive cage from the chassis. See “Remove the 3.5-inch/2.5-inch drive cage” on page 48.

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

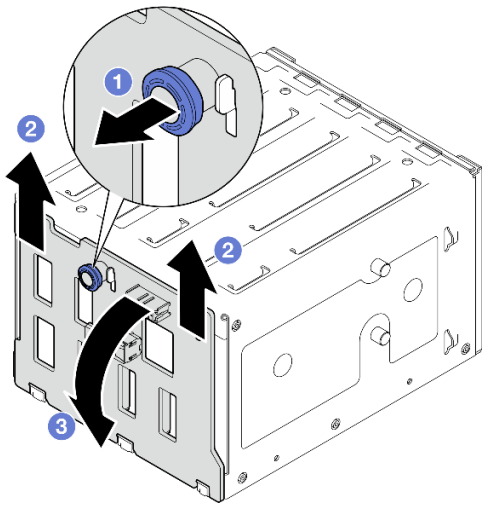
Step 4. Remove the hot-swap drive backplane.

a. ① Pull out the blue plunger that secures the backplane.

b. ② Slightly lift the backplane to disengage it from the drive cage.

c. ③ Remove the backplane from the drive cage.

Figure 23. Removing the hot-swap drive backplane



After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the 3.5-inch/2.5-inch hot-swap drive backplane

Follow instructions in this section to install the 3.5-inch/2.5-inch hot-swap drive backplane.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the slots on the backplane with the tabs on the drive cage, and insert the tabs into the slots.

Step 2. While pulling the plunger, slide down the backplane until it clicks into place; then, close the plunger to secure the backplane.

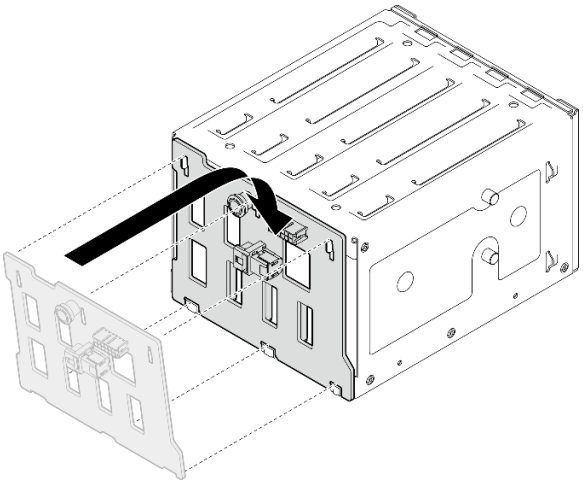


Figure 24. Installing the hot-swap drive backplane

After you finish

1. Reinstall the drive cage into the chassis. See “Install the 3.5-inch/2.5-inch drive cage” on page 51.
2. Reinstall all the hot-swap drives and drive bay fillers (if any) into the drive cage. See “Install a 2.5-/3.5-inch hot-swap drive” on page 65 or “Install a 2.5-inch drive into a 3.5-inch drive bay” on page 72.
3. Reconnect the cables to the backplane.
4. Install the system fan. See “Install the front system fan” on page 76.
5. Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

3.5-inch simple-swap drive backplate replacement

Follow instructions in this section to remove and install a 3.5-inch simple-swap drive backplate.

Note: This section applies only to server models that have 3.5-inch simple-swap drive backplates installed.

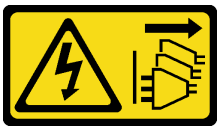
Remove the 3.5-inch simple-swap drive backplate

Follow instructions in this section to remove the 3.5-inch simple-swap drive backplate.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Make preparations for this task.

a. Remove the server cover. See "Remove the server cover" on page 156.

b. Remove the front door. See "Remove the front door" on page 85.

c. Remove the front bezel. See "Remove the front bezel" on page 83.

d. Remove all of the installed simple-swap drives and drive bay fillers from the drive cage and set them aside on a static-protective surface. See "Remove a simple-swap drive" on page 67 or "Remove a 2.5-inch drive from a 3.5-inch drive bay" on page 71.

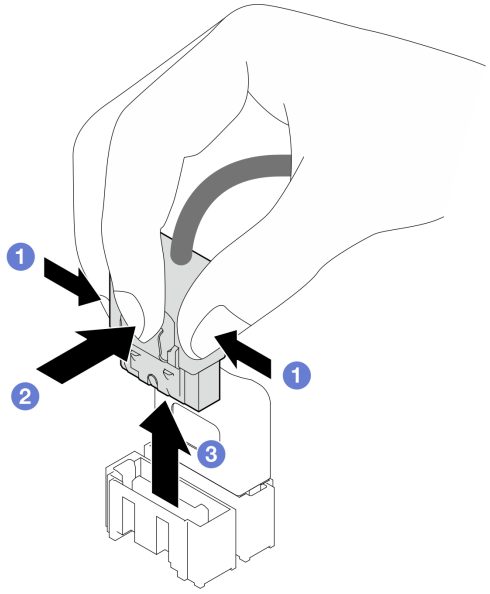
e. Remove the system fan. See "Remove the front system fan" on page 74.

Step 2. Disconnect the cables from the system board. See "Simple-swap drives cable routing" on page 198.

Attention:

- Follow the instructions below to disconnect the cable from the SATA hard disk drive connector (especially SATA hard disk drive **4** and **5** connectors):
  1. ❶ Press on the sides of the connector on the cable with your thumb and middle finger.
  2. ❷ Release the latch with your index finger as illustrated.
  3. ❸ Carefully pull the cable out of the connector on the system board.

Figure 25. Disconnecting the cable from the SATA hard disk drive connector



- To avoid damaging the system board, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 183 when disconnecting cables from the system board.

Step 3. Remove the drive cage from the chassis. See “Remove the 3.5-inch/2.5-inch drive cage” on page 48.

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

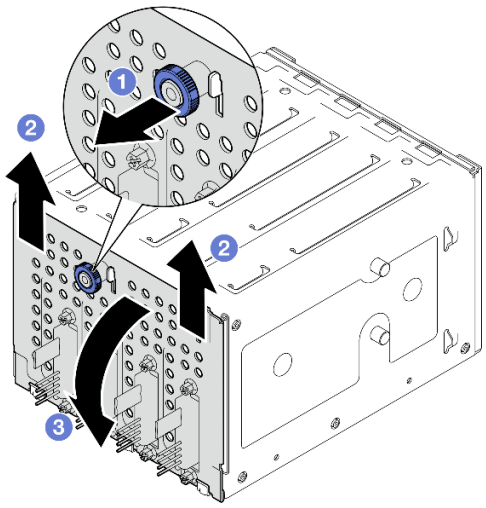
Step 4. Remove the simple-swap drive backplate.

a. Pull out the blue plunger that secures the backplate.

b. Slightly lift the backplate to disengage it from the drive cage.

c. Remove the backplate from the drive cage.

Figure 26. Removing the simple-swap drive backplate



After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the 3.5-inch simple-swap drive backplate

Follow instructions in this section to install the 3.5-inch simple-swap drive backplate.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Position the backplate on the drive cage so that the tabs on the drive cage are inserted into the corresponding slots on the backplate.

Step 2. Close the plunger to secure the backplate in place.

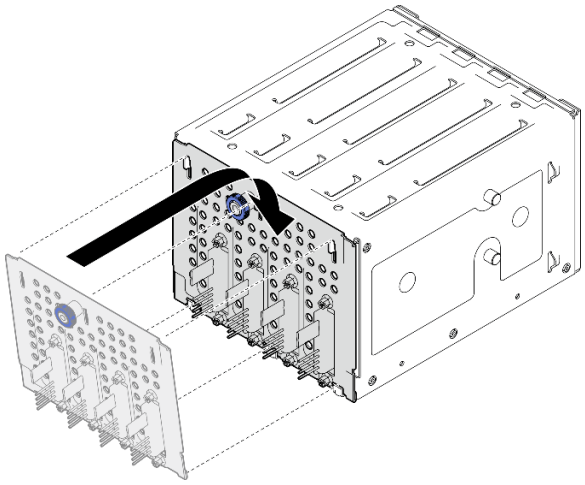


Figure 27. Installing the simple-swap drive backplate

After you finish

1. Reinstall the drive cage into the chassis. See “Install the 3.5-inch/2.5-inch drive cage” on page 51.
2. Reinstall all the simple-swap drives and drive bay fillers (if any) into the drive cage. See “Install a simple-swap drive” on page 69 or “Install a 2.5-inch drive into a 3.5-inch drive bay” on page 72.
3. Connect the backplate cables to the system board. See “Simple-swap drives cable routing” on page 198.
4. Install the system fan. See “Install the front system fan” on page 76.
5. Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

CMOS battery (CR2032) replacement

Follow instructions in this section to remove and install the CMOS battery (CR2032).

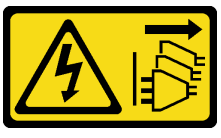
Remove the CMOS battery (CR2032)

Follow instructions in this section to remove the CMOS battery (CR2032).

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord.

To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S004**



CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

- **S005**



CAUTION:
The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.
- Do not make CMOS battery in contact with any metal surface during the replacement. Any contact with a metal surface can cause damages to the battery.
- When replacing the battery, you must replace it with another CMOS battery of the exact same type (CR2032) made by the same manufacturer.
- After you replace the battery, you must reconfigure the solution and reset the system date and time.

Procedure

Step 1. Remove the server cover. See "Remove the server cover" on page 156.

Step 2. Locate the CMOS battery on the system board. See "System-board connectors" on page 28 for more information.

Step 3. Remove the CMOS battery.

a. 1 Gently push on one side of the battery until it leaves the socket.

b. 2 Lift the battery out of the socket with your thumb and index finger.

Attention: Do not lift the battery with excessive force, as it may cause damages to the socket on the system board. Any damage to the socket may require replacing the system board.

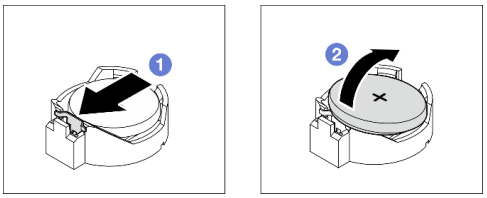


Figure 28. Removing the CMOS battery

After you finish

1. Install a new CMOS battery. See "Install the CMOS battery (CR2032)" on page 62.
2. Dispose the component with compliance to local regulations.

Demo video

Watch the procedure on Youtube

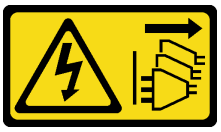
Install the CMOS battery (CR2032)

Follow instructions in this section to install the CMOS battery (CR2032).

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S004**



CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium

battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

- **S005**



CAUTION:
The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Do not make CMOS battery in contact with any metal surface during the replacement. Any contact with a metal surface can cause damages to the battery.
- When replacing the battery, you must replace it with another CMOS battery of the exact same type (CR2032) made by the same manufacturer.
- After you replace the battery, you must reconfigure the solution and reset the system date and time.

Procedure

Step 1. Follow any special handling and installation instructions that come with the CMOS battery.

Step 2. Locate the battery socket on the system board. See "System-board connectors" on page 28 for more information.

Step 3. Install the new CMOS battery into the server.

a. ❶ Orient the battery so that the positive (+) side faces up; then, tilt the battery to insert it into the socket.

b. ❷ Gently press the battery into the socket until it clicks in place.

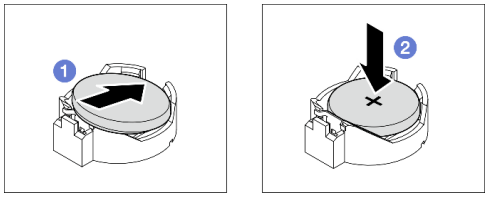


Figure 29. Installing the CMOS battery

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 180.

2. Use the Setup utility to set the date, time, and any passwords

Demo video

Watch the procedure on Youtube

Drive replacement

Follow instructions in this section to remove and install a 2.5-inch or 3.5-inch drive.

Remove a 2.5-/3.5-inch hot-swap drive

Follow instructions in this section to remove a 2.5-inch or 3.5-inch hot-swap drive.

About this task

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- If the server is installed in a rack, extend the server from the rack.
- Use the front door key to unlock the front door, and then open the front door.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Note: Make sure you have the drive bay fillers available if some drive bays will be left empty after the removal.

Procedure

Step 1. Locate the drive to be removed, and press the release button 1 to unlock the drive tray handle.

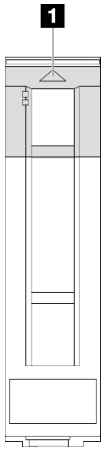
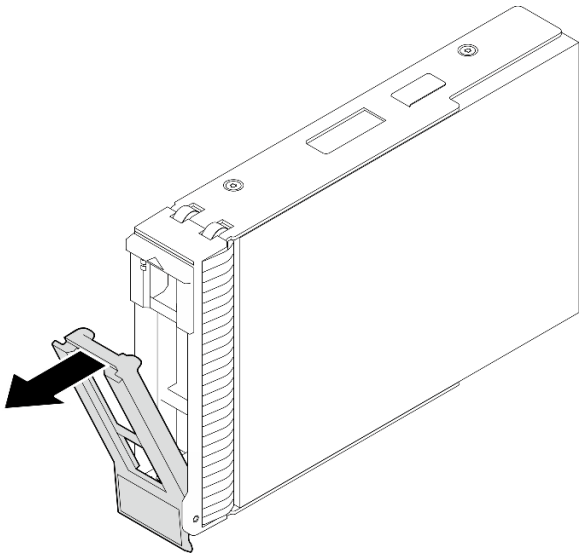


Figure 30. Unlocking the drive tray handle

Step 2. Grasp the tray handle and carefully slide the drive out of the drive bay.

Figure 31. Removing the hot-swap drive from the drive tray



After you finish

1. Install a new drive or drive filler into the vacant drive bay. See “Install a 2.5-/3.5-inch hot-swap drive” on page 65.

   Note: To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install a 2.5-/3.5-inch hot-swap drive

Follow instructions in this section to install a 2.5-inch or 3.5-inch hot-swap drive.

About this task

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Touch the static-protective package that contains the drive to any unpainted metal surface on the solution; then, remove the drive from the package and place it on a static-protective surface.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.

- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

The following notes describe the type of drives that the server supports and other information that you must consider when you install a drive. For a list of supported drives, see https://serverproven.lenovo.com.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- Depending on your server models, your server supports the following drive types:
  - Up to sixteen 2.5-inch hot-swap SATA/SAS drives
  - Up to eight 3.5-inch hot-swap SATA/SAS drives
  - Up to four 3.5-inch hot-swap SATA/SAS drives and eight 2.5-inch hot-swap SATA/SAS drives
- For a complete list of supported optional devices for the server, see https://serverproven.lenovo.com.
- The drive bays are numbered to indicate the installation order (starting from number “0”). Follow the installation order when you install a drive. See “Front view” on page 15 for more information.
- The drives in a single RAID array must be the same type, same size, and same capacity.

Procedure

Step 1. If a drive filler is installed in this drive bay, remove it first. Keep the drive filler in a safe place for future use.

Step 2. Make sure that the drive tray handle is in the open position. Slide the drive into the drive bay until it clicks in place.

Step 3. Rotate the drive handle to the fully closed position.

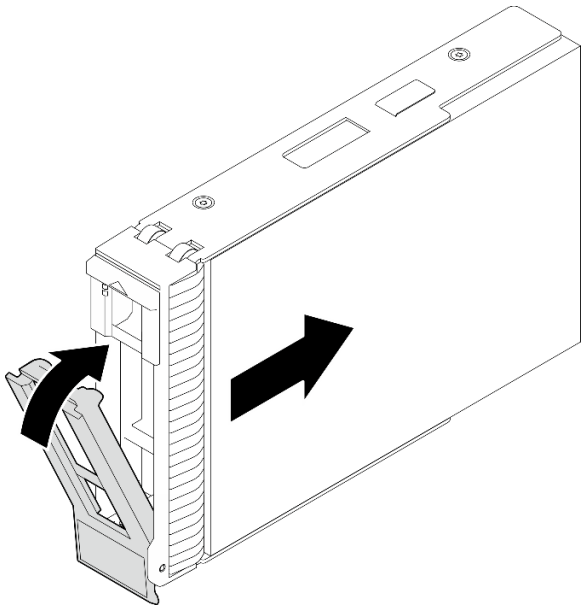


Figure 32. Installing the hot-swap drive

After you finish

1. If you have additional drives to install, do so now; if any of the drive bays is left empty, fill it with a drive bay filler.

2. Complete the parts replacement. See “Complete the parts replacement” on page 180.
3. Check the drive activity LED to verify that the drive is operating correctly. See “Front I/O module” on page 23 for details.
4. If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

Demo video

Watch the procedure on Youtube

Remove a simple-swap drive

Follow instructions in this section to remove a simple-swap drive.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is installed in a rack, extend the server from the rack.
- Use the front door key to unlock the front door, and then open the front door.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- If an NVMe drive is to be removed, it is recommended to disable it beforehand via the operating system.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

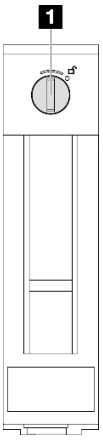
Note: Make sure you have the drive bay fillers available if some drive bays will be left empty after the removal.

Procedure

Step 1. Locate the simple-swap drive to be removed.

Step 2. Use a screwdriver to turn the tray handle lock 1 to the unlocked position. The tray handle opens automatically.

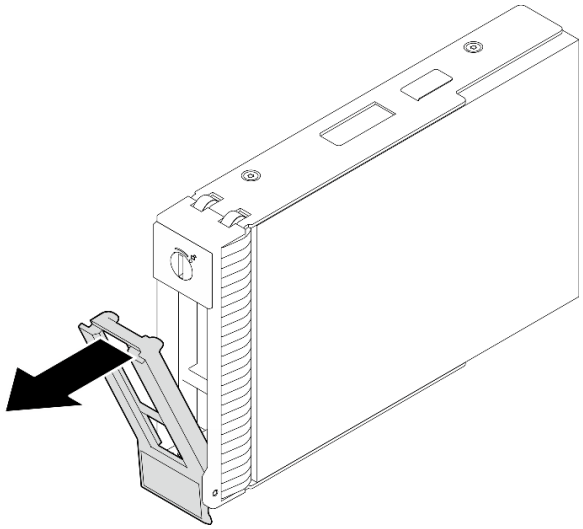
Figure 33. Unlocking the drive tray handle



Step 3. Pull the handle and carefully slide the simple-swap drive out of the chassis.

Note: Install a drive bay filler or replacement drive as soon as possible. See “Install a simple-swap drive” on page 69.

Figure 34. Removing the simple-swap drive



After you finish

1. Install a new drive or drive filler into the vacant drive bay. See “Install a simple-swap drive” on page 69.

   Note: To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.

2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install a simple-swap drive

Follow instructions in this section to install a simple-swap drive.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a simple-swap drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- If an NVMe drive is to be removed, it is recommended to disable it beforehand via the operating system.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

The following notes describe the type of drives that your server supports and other information that you must consider when you install a drive.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- Depending on your server models, your server supports the following drive types:
  - Up to four 3.5-inch simple-swap SATA drives
  - Up to two 3.5-inch simple-swap SATA drives and two NVMe drives
- For a complete list of supported drives and optional devices for the server, see: https://serverproven.lenovo.com
- The drive bays are numbered to indicate the installation order (starting from number “0”). Follow the installation order when you install a drive. See “Front view” on page 15 for more information.
- The drives in a single RAID array must be the same type, same size, and same capacity.

Procedure

Step 1. If the drive bay has a drive filler installed, remove it. Keep the drive filler in a safe place for future use.

Step 2. Ensure that the drive tray handle is in the open position. Align the drive with the guide rails in the bay; then, gently push the drive into the bay until the drive stops.

Step 3. Rotate the drive handle to the fully closed position to lock the drive in place.

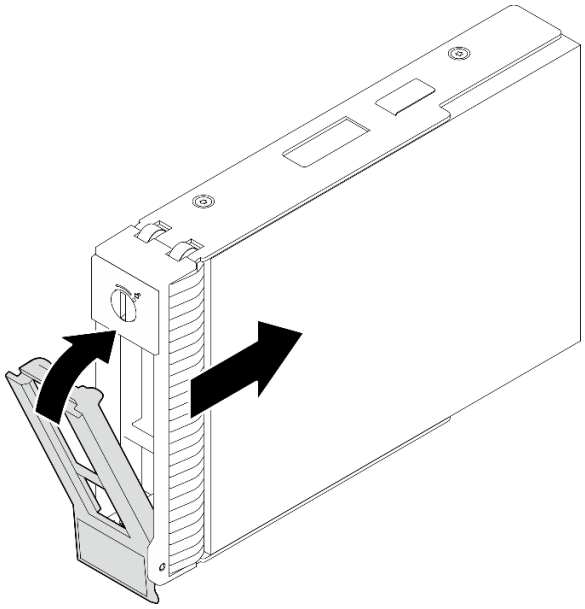


Figure 35. Installing the simple-swap drive

After you finish

1. If you have additional drives to install, do so now; if any of the drive bays is left empty, fill it with a drive bay filler.
2. Complete the parts replacement. See “Complete the parts replacement” on page 180.
3. Check the drive activity LED to verify that the drive is operating correctly. See “Front view” on page 15 for details.
4. If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

Demo video

Watch the procedure on Youtube

2.5-inch drive replacement from 3.5-inch drive bay

Follow instructions in this section to remove and install a 2.5-inch drive from a 3.5-inch drive bay.

The EMI integrity and cooling of the server are protected by having all drive bays covered or occupied. The number of the installed simple-swap disk drives in your server varies depending on the server model. The vacant bays are occupied by dummy trays. When you install a drive, save the removed dummy tray from the drive bay in case you later remove the drive and need the dummy tray to cover the place.

Attention: An unoccupied drive bay without any other protection might impact the EMI integrity and cooling of the server, which might result in overheating or component damage. To maintain the EMI integrity and cooling of the server, install a new drive as soon as you remove the failing one or the dummy tray.

Before you begin, review the following drive installation rules:

- Follow the order of the disk drive bays when installing a drive. See Chapter 2 “Server components” on page 15 to locate the disk drive bays in your server.
- For drives with different capacities, install the drive by following the order of the disk drive bays as well as the order from the lowest capacity to the highest capacity.

Remove a 2.5-inch drive from a 3.5-inch drive bay

Follow instructions in this section to remove a 2.5-inch drive from a 3.5-inch drive bay.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- Use the front door key to unlock the front door, and then open the front door.

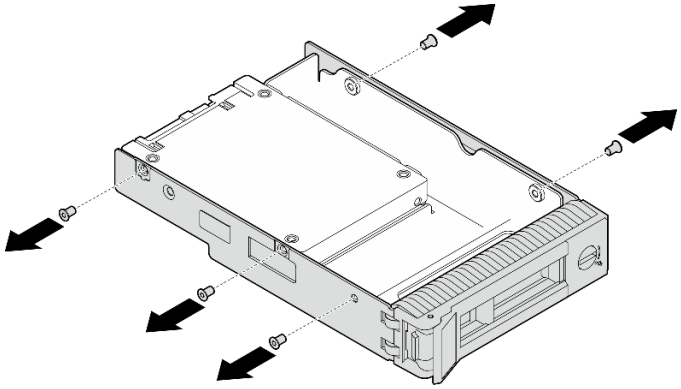
Procedure

Step 1. Locate the drive to be removed.

Step 2. Remove the 3.5-inch drive tray in which the 2.5-inch drive has been installed. See “Remove a simple-swap drive” on page 67.

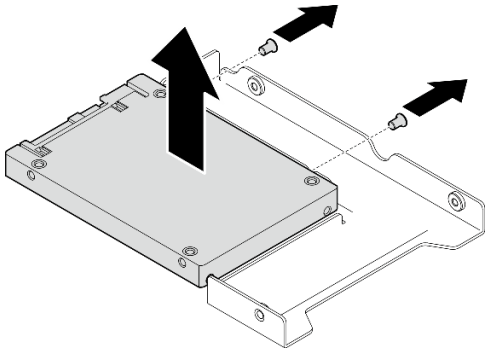
Step 3. Remove the five screws that secure the 2.5-inch drive and the drive adapter; then, remove the 2.5-inch drive and the drive adapter from the tray.

Figure 36. Removing the screws that secure the 2.5-inch drive and the drive adapter



Step 4. Remove the two screws that secure the 2.5-inch drive; then, lift the drive to remove it from the drive adapter.

Figure 37. Removing the 2.5-inch drive from the drive adapter



After you finish

If you are instructed to return the component or optional device, follow all of the packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

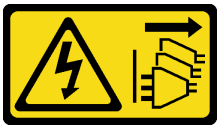
Install a 2.5-inch drive into a 3.5-inch drive bay

Follow instructions in this section to install a 2.5-inch drive into a 3.5-inch drive bay.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Position the 2.5-inch drive into the 2.5-inch to 3.5-inch drive adapter.

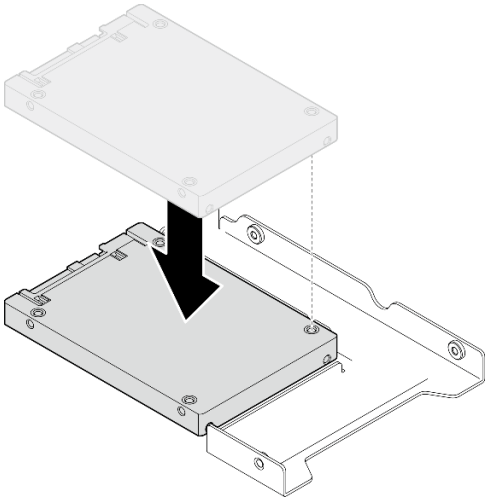


Figure 38. Positioning the 2.5-inch drive into the drive adapter

Step 2. Align the two screw holes in the drive with the corresponding holes in the drive adapter; then, secure the drive to the drive adapter with the two screws.

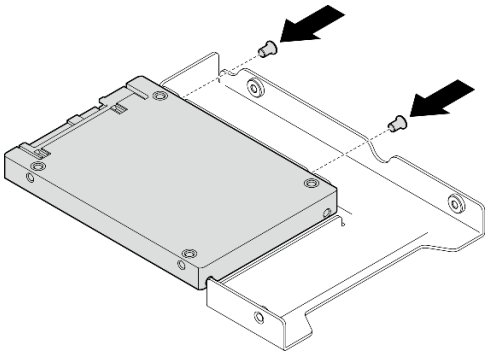


Figure 39. Installing the screws to secure the drive to the drive adapter

Step 3. Align the screw holes on the drive adapter and the drive with the corresponding holes in the tray; then, secure the drive adapter and the drive into the tray with the five screws.

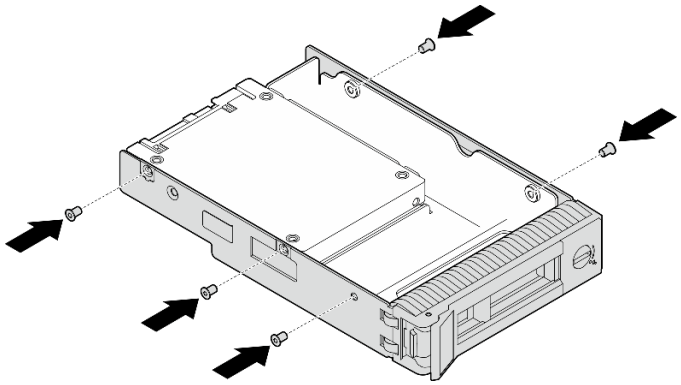


Figure 40. Installing the screws to secure the drive adapter and the drive to the drive tray

Step 4. Slide the tray into the drive bay from the front until it snaps into place, and then completely close the handle.

After you finish

1. If you have additional drives to install, do so now; if any of the drive bays is left empty, fill it with a drive bay filler.
2. Complete the parts replacement. See "Complete the parts replacement" on page 180.

Demo video

Watch the procedure on Youtube

Fan replacement

Follow instructions in this section to remove and install the front or rear fan.

Note: For processor fan replacement, see "Heat sink and fan module replacement" on page 91.

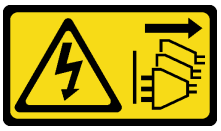
Remove the front system fan

Follow instructions in this section to remove the front system fan.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S009**



CAUTION:
To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **S017**



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Remove the server cover. See "Remove the server cover" on page 156.

Step 2. Disconnect the fan cable from the system board. See "System-board connectors" on page 28 for more information.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 6 "Internal cable routing" on page 183 when disconnecting cables from the system board.

Step 3. Remove the front system fan from the chassis.

a. ❶ Press the two tabs on the front system fan towards each other.

b. ❷ Carefully slide the fan out of the chassis.

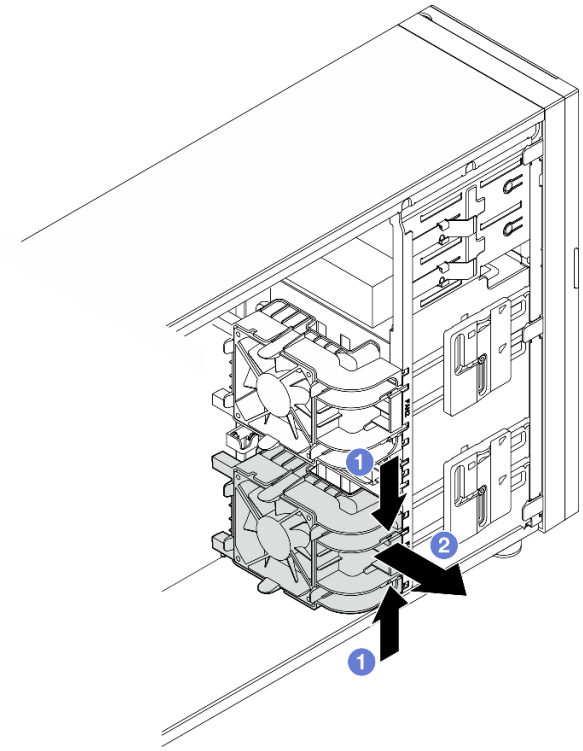


Figure 41. Removing the front system fan

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

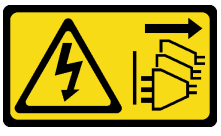
Install the front system fan

Follow instructions in this section to install the front system fan.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S009**



CAUTION:
To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **S017**



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the four tabs of the front system fan with the corresponding slots in the mounting area, and align the two posts of the fan with the corresponding slots in the inner side of the chassis.

Step 2. Carefully slide the front system fan into the chassis until it snaps into place.

Note: Make sure the cables do not interfere with the two posts of the front system fan.

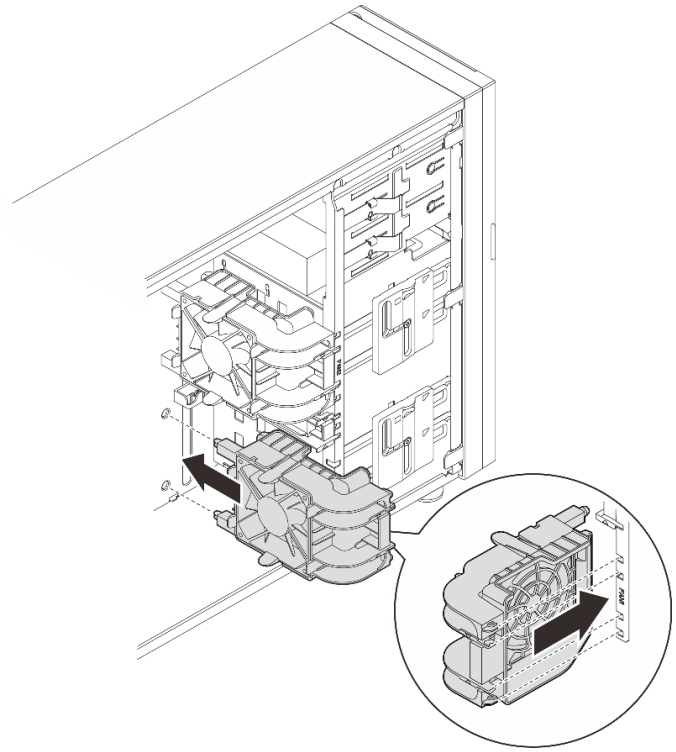


Figure 42. Installing the front system fan

Step 3. Connect the front system fan power cable to the Fan 1 or Fan 4 connector on the system board. See “Fan power cable routing” on page 190 for more information

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

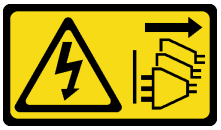
Remove the rear system fan

Follow instructions in this section to remove the rear system fan.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord.

To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S009**



CAUTION:
To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **S017**



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Remove the server cover. See "Remove the server cover" on page 156.

Step 2. Disconnect the fan cable from the system board. See "System-board connectors" on page 28 for more information.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 6 "Internal cable routing" on page 183 when disconnecting cables from the system board.

Step 3. Remove the rear system fan from the chassis.

a. ❶ Press the two tabs of the rear system fan towards each other.

b. ❷ Carefully slide the fan out of the chassis.

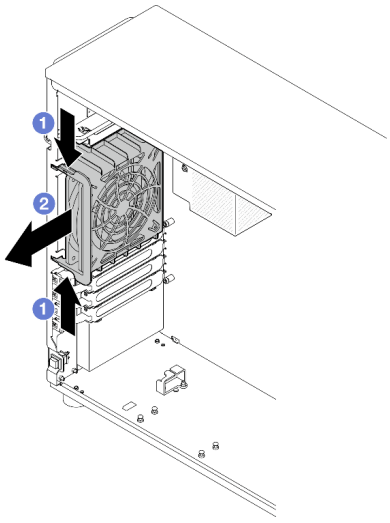


Figure 43. Removing the rear system fan

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

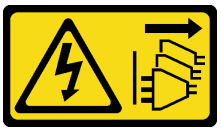
Install the rear system fan

Follow instructions in this section to install the rear system fan.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**

  CAUTION:
  The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S009**

CAUTION:
To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **S017**



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the four tips on the rear system fan with the corresponding slots in the mounting area.

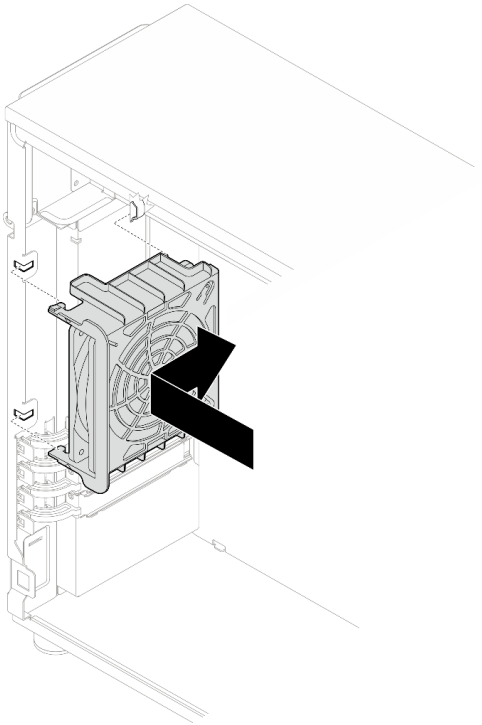


Figure 44. Positioning the rear system fan into the chassis

Step 2. Slide the rear system fan until it snaps into place. Ensure that all four tips on the fan are inserted into the corresponding slots as demonstrated.

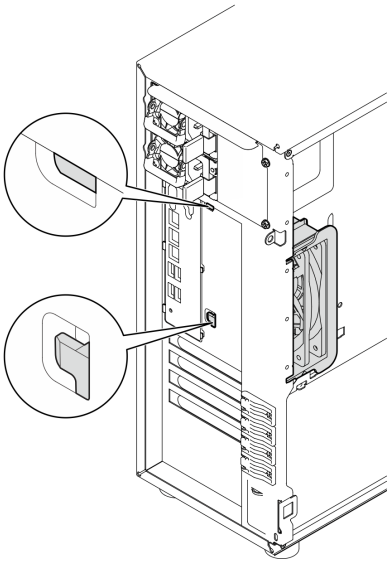


Figure 45. Installing the rear system fan

Step 3. Connect the fan power cable to the rear fan connector on the system board. See “System-board connectors” on page 28 for more information and “Fan power cable routing” on page 190.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

Front bezel replacement

Follow instructions in this section to remove and install the front bezel.

Remove the front bezel

Follow instructions in this section to remove the front bezel.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Make preparations for this task.
  a. Remove the server cover. See “Remove the server cover” on page 156.
  b. Remove the front door. See “Remove the front door” on page 85.

Step 2. Remove the front bezel.
  a. ❶ Lift the three plastic tabs to release left side of the bezel from the chassis.
  b. ❷ Pivot the bezel as shown to remove it from the chassis.

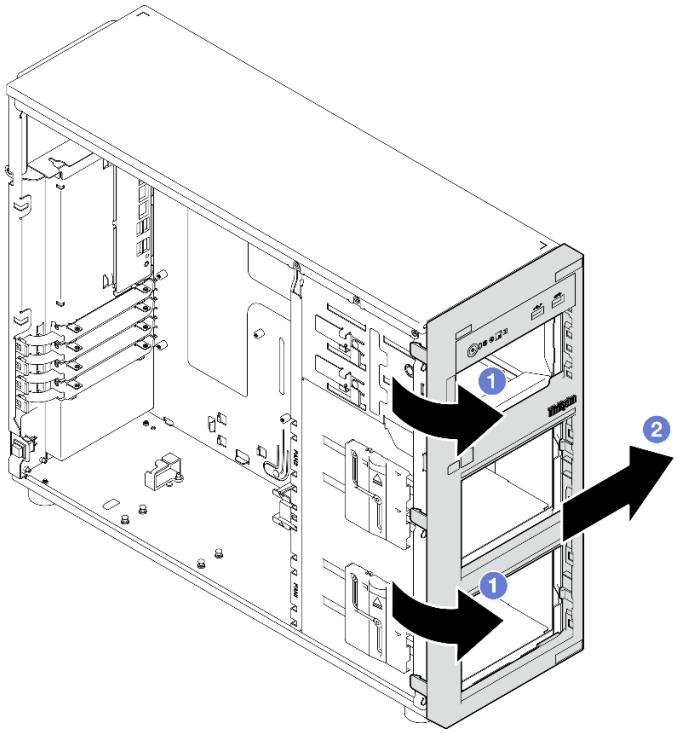


Figure 46. Removing the front bezel

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

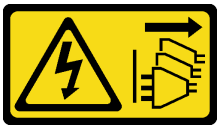
Install the front bezel

Follow instructions in this section to install the front bezel.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.

Procedure

Step 1. Install the front bezel.

a. 1 Align the three plastic tabs on the right side of the front bezel with the corresponding holes on the chassis.

b. 2 Pivot the front bezel and front door inward until the front bezel snaps into place on the left side.

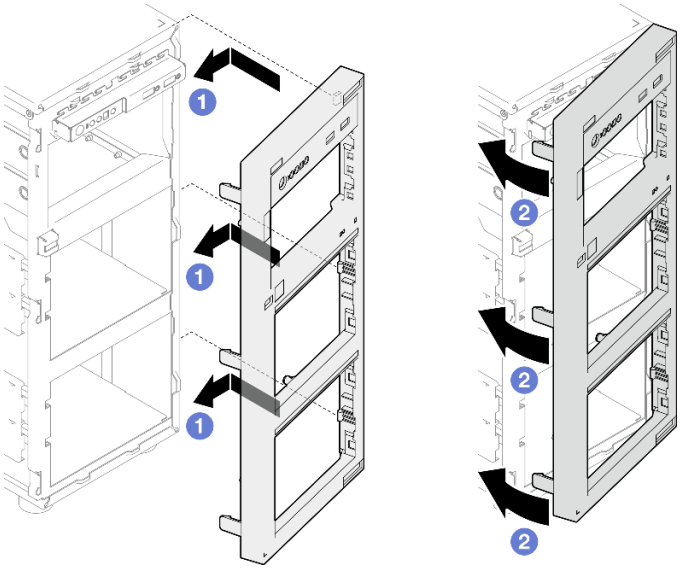


Figure 47. Installing the front bezel

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

Front door replacement

Follow instructions in this section to remove and install the front door.

Note: This section applies only to server models that have a front door installed.

Remove the front door

Follow instructions in this section to remove the front door.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Remove the front door.

a. ❶ Use the key in the material box to turn the cover lock to the unlocked position.

b. ❷ Open the front door.

c. ❸ Lift the front door slightly until you can completely remove it.

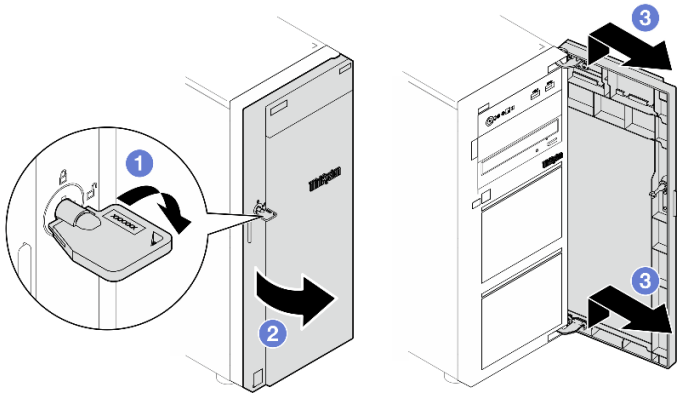


Figure 48. Removing the front door

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the front door

Follow instructions in this section to install the front door.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Before installing the front door, if the server comes with rubber blocks to cover the holes for installing the front door, remove the rubber blocks first. Store the rubber blocks in case that you later remove the front door and need the rubber blocks to cover the holes in the front bezel.

Procedure

Step 1. Install the front door.

a. ❶ Align the two hooks on the front door with the corresponding holes on the front bezel; then, move the front door in and down until it is secured in place by the hooks.

b. ❷ Close the front door.

c. ❸ Turn the cover lock to the locked position with the front door key.

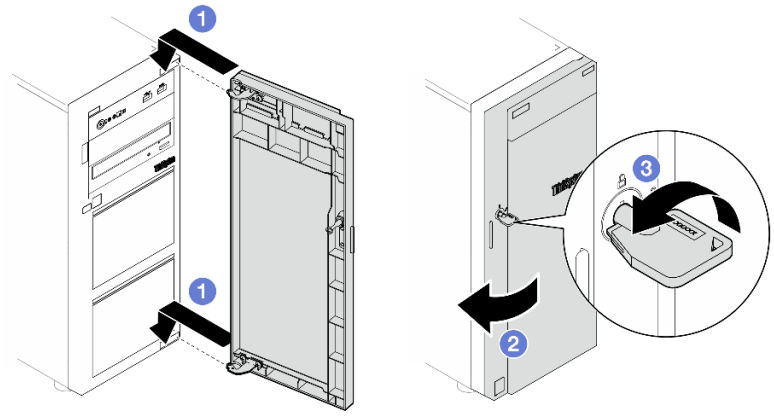


Figure 49. Installing the front door

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 180.

Demo video

Watch the procedure on Youtube

Front I/O module replacement

Follow instructions in this section to remove and install the front I/O module.

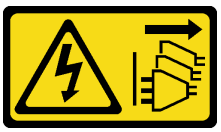
Remove the front I/O module

Follow instructions in this section to remove the front I/O module.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Make preparations for this task.

a. Remove the server cover. See “Remove the server cover” on page 156.

b. Remove the front door. See “Remove the front door” on page 85.

c. Remove the front bezel. See “Remove the front bezel” on page 83.

Step 2. Locate the front I/O module and disconnect the cables from the system board. See “System-board connectors” on page 28 for more information.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 183 when disconnecting cables from the system board.

Step 3. Remove the front I/O module.

a. ❶ Press the release tab in the direction as shown in the illustration.

b. ❷ Pivot the front I/O module outwards. Pull the cables out to completely remove the front I/O module from the chassis.

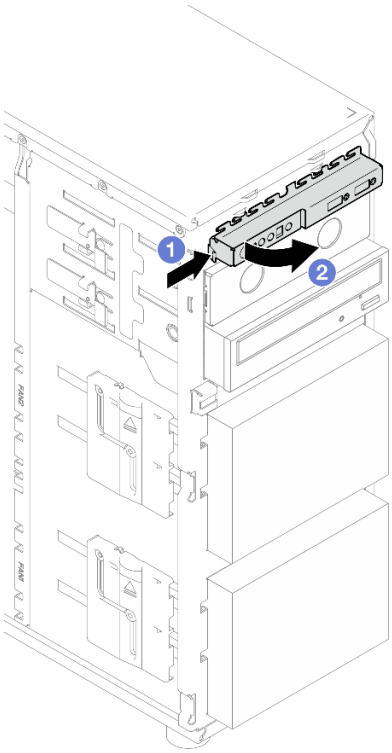


Figure 50. Removing the front I/O module

Step 4. Disconnect cables from the front I/O module.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the front I/O module

Follow instructions in this section to install the front I/O module.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord.

To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Connect cables to the new front I/O module, and route the cables through the corresponding hole on the chassis.

Step 2. Install the front I/O module.

a. 1 Align the tab on the top and on the right side of the front I/O module with the side of the corresponding hole in the chassis.

b. 2 Pivot the front I/O module in until it clicks into place.

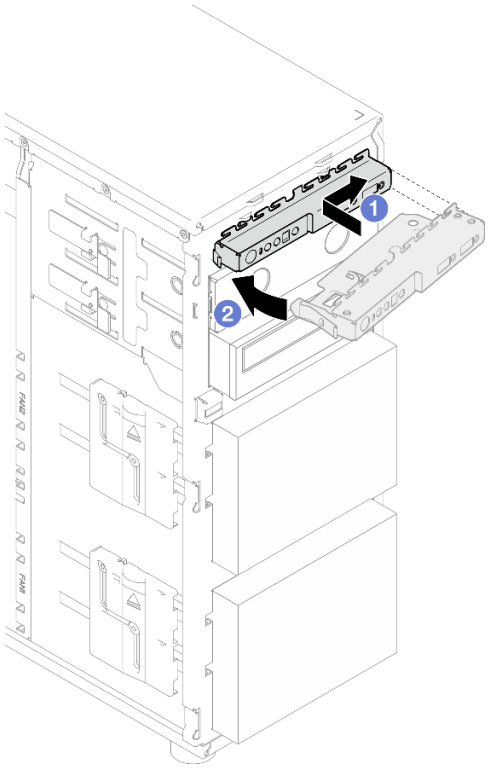


Figure 51. Installing the front I/O module

Step 3. Connect the respective cables to the front I/O module connector and the front USB connector on the system board. See “Front I/O module cable routing” on page 191 for more information.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

Heat sink and fan module replacement

Follow instructions in this section to remove and install the heat sink and fan module.

S033



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

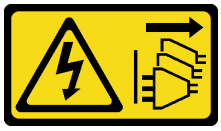
Remove the heat sink and fan module

Follow instructions in this section to remove the heat sink and fan module. This procedure must be executed by a trained technician

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**

  CAUTION:
  The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S009**

  CAUTION:
  To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **S014**

  CAUTION:

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

- **S017**



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Remove the server cover. See "Remove the server cover" on page 156.

CAUTION:
The heat sinks and processor could be very hot. To avoid from burning yourself, wait for a few minutes before removing the server cover after turning off the server.

Step 2. Disconnect the heat sink and fan module cable from the system board.

Step 3. Remove the heat sink and fan module.

Important:

1. Gently remove the four screws to avoid any possible damage to the system board.
2. Always keep the four screws attached to the heat sink and fan module.
3. Do not touch the thermal grease while handling the heat sink and fan module.

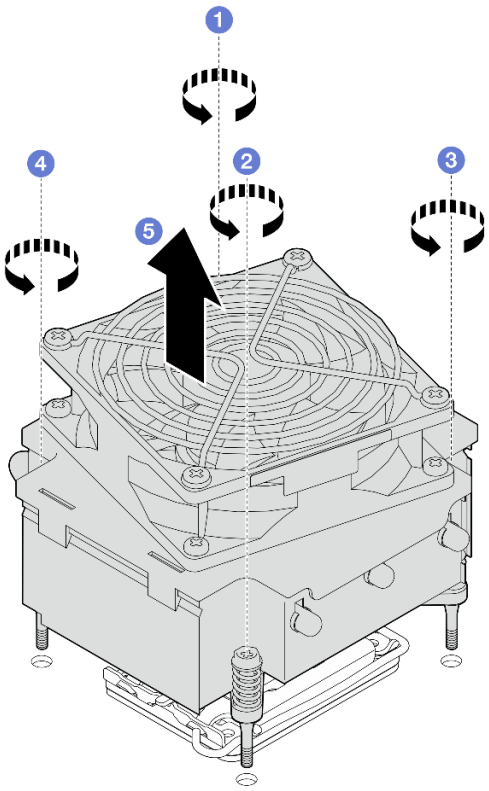


Figure 52. Removing the heat sink and fan module

a. 1 & 2 Loosen screw 1 and 2: First, partially loosen screw 1; then, fully loosen screw 2. Finally, fully loosen screw 1.

b. 3 & 4 Loosen screw 3 and 4: First, partially loosen screw 3; then, fully loosen screw 4. Finally, fully loosen screw 3.

c. 5 Lift evenly and remove the heat sink and fan module from the server.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

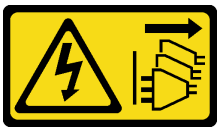
Install the heat sink and the fan module

Follow instructions in this section to install the heat sink and the fan module. This procedure must be executed by a trained technician.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S009**



CAUTION:
To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **S014**



CAUTION:
Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

- **S017**



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install the processor if one is not yet installed. See “Install the processor ” on page 143.

Step 2. Align the four screws on the heat sink and fan assembly with the corresponding screw holes on the system board.

Note: Make sure that the “Front” label is facing the front of the server.

Step 3. Install the heat sink and fan module.

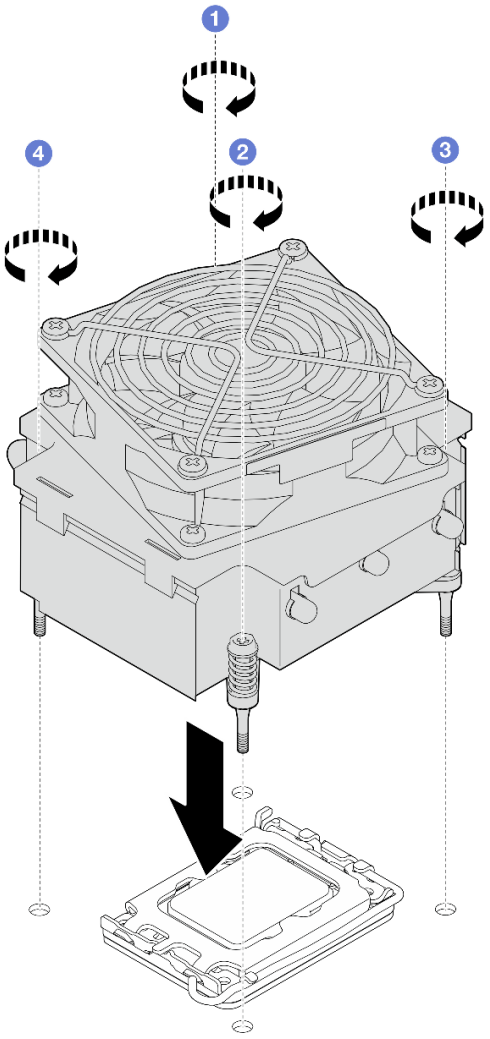


Figure 53. Installing the heat sink and the fan module

a. 1 & 2 Tighten screw 1 and 2: First, partially tighten screw 1; then, fully tighten screw 2. Finally, fully tighten screw 1.

b. 3 & 4 Tighten screw 3 and 4: First, partially tighten screw 3; then, fully tighten screw 4. Finally, fully tighten screw 3.

Step 4. Connect the fan power cable to the Fan 2 connector on the system board. See “Fan power cable routing” on page 190 for more information.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

Intrusion switch replacement

Follow instructions in this section to remove and install the intrusion switch. The intrusion switch informs you that the server cover is not properly installed or closed by creating an event in the system event log (SEL).

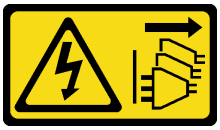
Remove the intrusion switch

Follow instructions in this section to remove the intrusion switch.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Remove the server cover. See “Remove the server cover” on page 156.

Step 2. Disconnect the cable of the intrusion switch from the system board. See “System-board connectors” on page 28 for more information.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 183 when disconnecting cables from the system board.

Step 3. Pinch the two tabs on the intrusion switch towards each other, and pull the intrusion switch out.

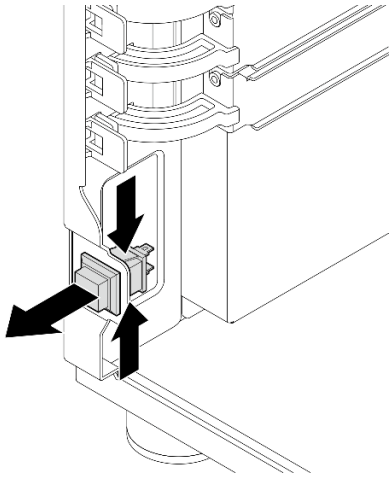


Figure 54. Removing the intrusion switch

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

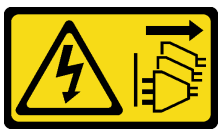
Install the intrusion switch

Follow instructions in this section to install the intrusion switch.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Push the intrusion switch in the slot until it clicks into place.

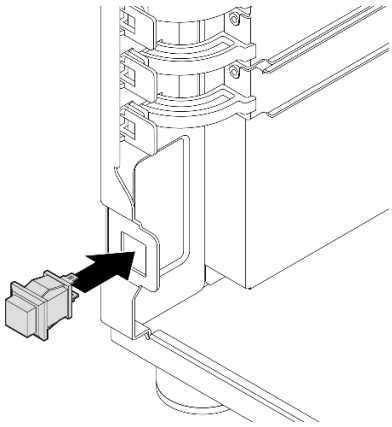


Figure 55. Installing the intrusion switch

Step 2. Connect the cable to the corresponding connector on the system board. See “Intrusion switch and RAID flash power module cable routing” on page 193 for more information.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

M.2 boot adapter replacement

Follow instructions in this section to remove and install the M.2 boot adapter.

Remove the M.2 boot adapter

Follow instructions in this section to remove the M.2 boot adapter.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Make preparations for this task.

a. Remove the server cover. See “Remove the server cover” on page 156.

b. Disconnect the M.2 boot adapter cables from the system board.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 183 when disconnecting cables from the system board.

c. Remove the PCIe adapter that secures the M.2 boot adapter. See “Remove the PCIe adapter” on page 120.

d. Remove all the M.2 drives from the M.2 boot adapter. See “Remove an M.2 drive” on page 104.

Step 2. Disconnect the cables from the M.2 boot adapter.

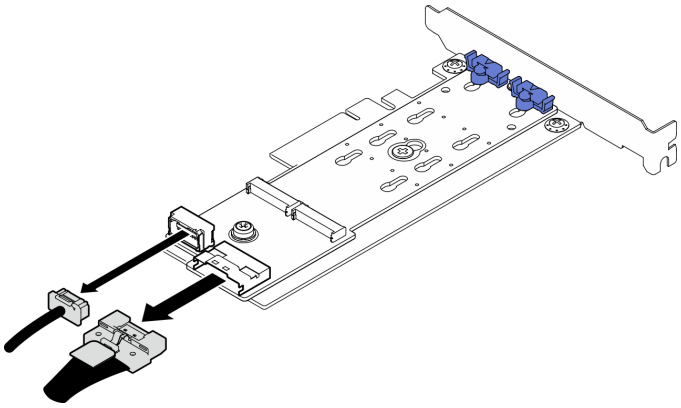


Figure 56. Disconnecting cable from ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit

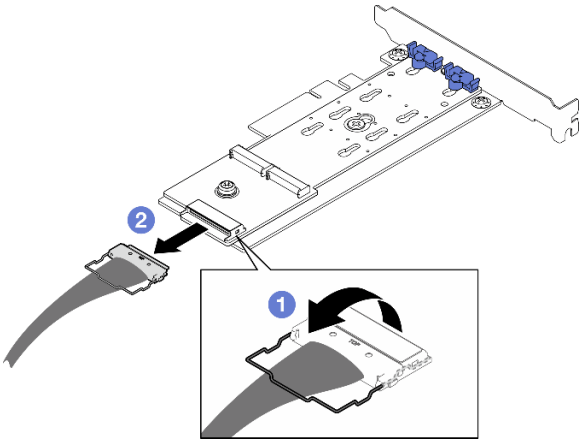


Figure 57. Disconnecting cable from ThinkSystem M.2 RAID B540i-2i SATA/NVMe Adapter

a. 1 Unhook the wire bail on the cable from the connector.

b. 2 Disconnect the cable from the M.2 boot adapter.

Step 3. Remove the M.2 boot adapter.

a. 1 Remove the screw that secures the M.2 boot adapter to the PCIe adapter.

b. 2 Loosen the captive screw on the M.2 boot adapter.

c. 3 Slightly slide the M.2 boot adapter as illustrated and carefully separate it from the PCIe adapter.

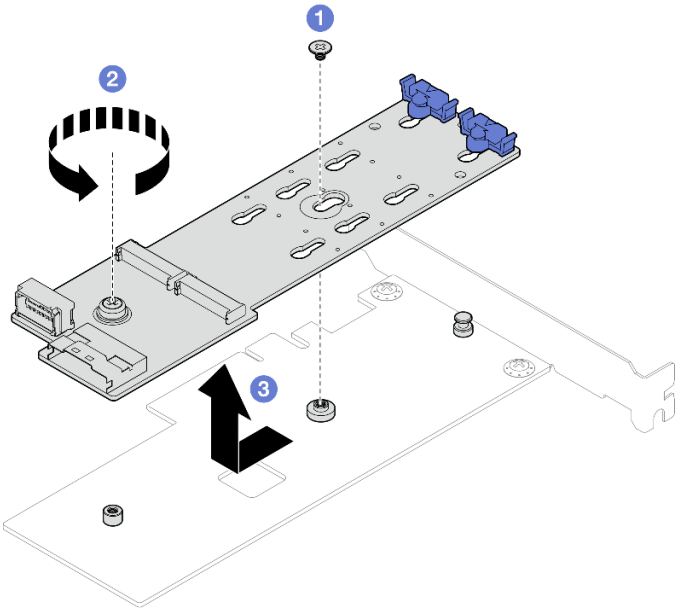


Figure 58. Removing the M.2 boot adapter

After you finish

1. Install another M.2 boot adapter if necessary, see “Install the M.2 boot adapter” on page 101. Otherwise, install a bracket to cover the vacancy on the chassis, and close the retainer.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the M.2 boot adapter

Follow instructions in this section to install the M.2 boot adapter.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

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.

Procedure

Step 1. Remove the screw on the back of the PCIe adapter.

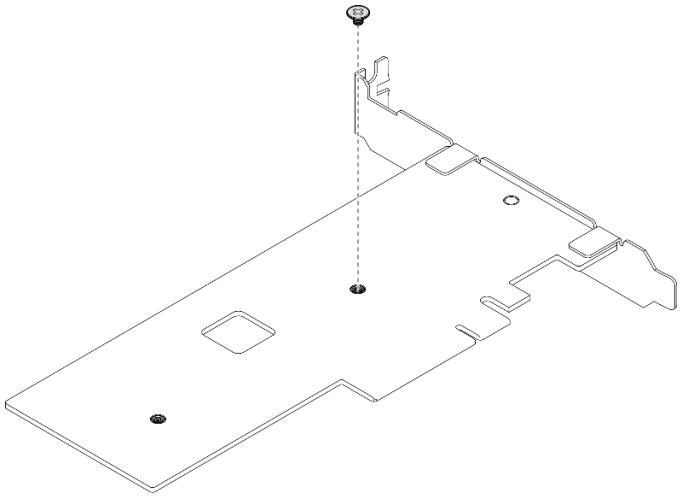


Figure 59. Removing the screw on the back of the PCIe adapter

Step 2. Secure the M.2 boot adapter to the PCIe adapter.

a. ❶ Align the M.2 boot adapter with the T-head pin on the PCIe adapter as illustrated, and slide it into place.

b. ❷ Tighten the captive screw on the M.2 boot adapter.

c. ❸ Tighten the screw to secure the M.2 boot adapter to the PCIe adapter.

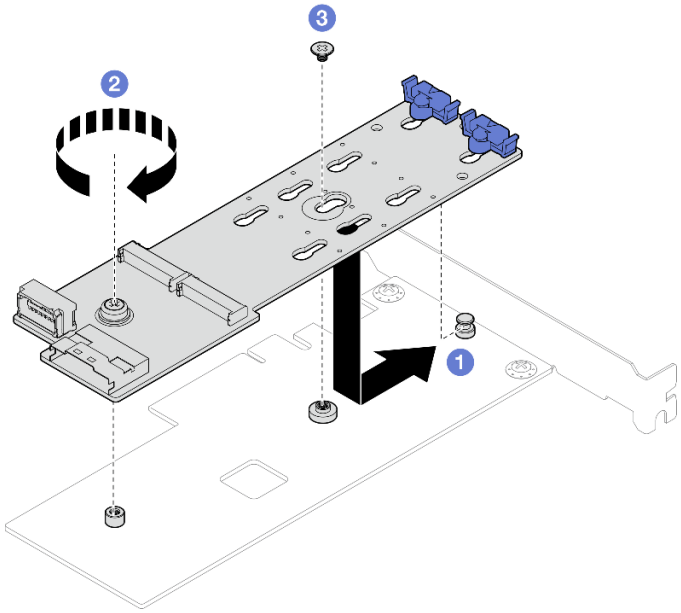


Figure 60. Securing the M.2 boot adapter to the PCIe adapter

Step 3. Connect the cables to the M.2 boot adapter.

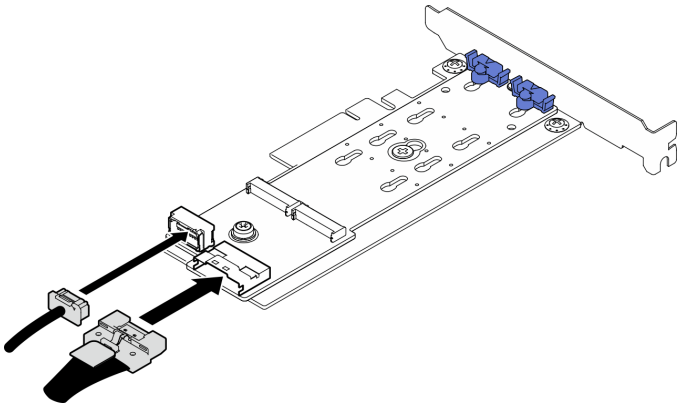


Figure 61. Connecting cable to ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit

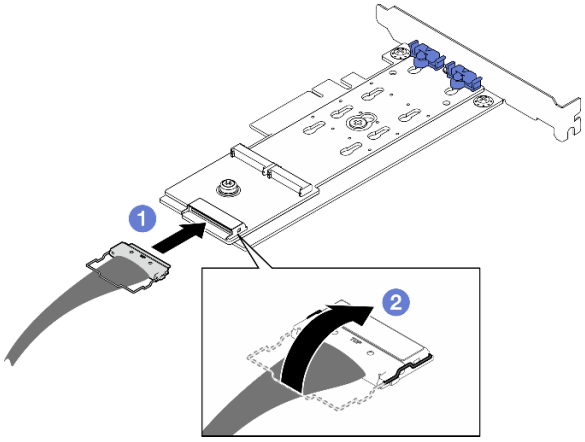


Figure 62. Connecting cable to ThinkSystem M.2 RAID B540i-2i SATA/NVMe Adapter

a. ❶ Connect the cable to the M.2 boot adapter.
b. ❷ Hook the wire bail on the cable onto the connector.

After you finish

1. Reinstall the M.2 drives to the M.2 boot adapter. See “Install an M.2 drive” on page 106.
2. Install the PCIe adapter that secures the M.2 boot adapter. See “Install the PCIe adapter” on page 122.

   Note: The M.2 boot adapter can only be installed in **PCIe slot 4**.
3. Connect the power cable and the signal cable to the system board. See “M.2 adapter cable routing” on page 192.
4. Install the server cover. See “Install the server cover” on page 158.
5. Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

M.2 drive replacement

Follow instructions in this section to remove and install the M.2 drive.

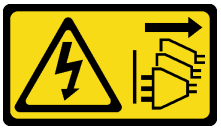
Remove an M.2 drive

Follow instructions in this section to remove an M.2 drive.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Remove the server cover. See “Remove the server cover” on page 156.

Step 2. Remove an M.2 drive.

a. ❶ Press both sides of the retainers.

b. ❷ Slide the retainer backwards to loosen the M.2 drive from the M.2 boot adapter.

c. ❸ Pivot the M.2 drive away from the M.2 boot adapter.

d. ❹ Pull the M.2 drive away from the connector at an angle.

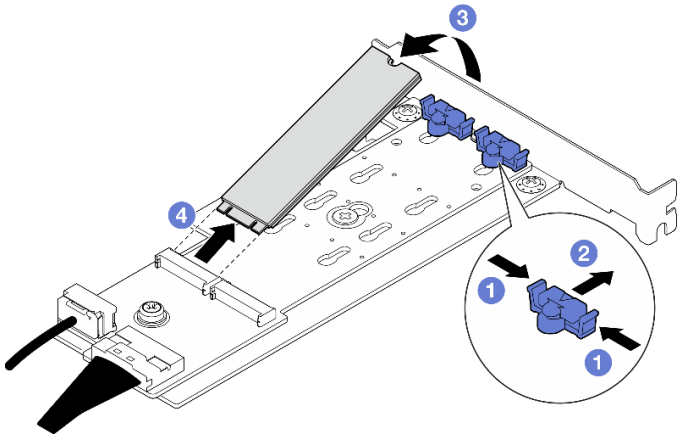


Figure 63. Removing an M.2 drive

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

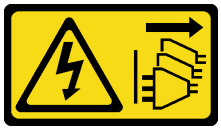
Adjust the retainer on the M.2 boot adapter

Follow instructions in this section to adjust the retainer on the M.2 boot adapter.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Before adjusting the retainer on the M.2 boot adapter, locate the correct keyhole that the retainer should be installed into to accommodate the particular size of the M.2 drive to be installed.

Note: The M.2 boot adapter might be different from the following illustrations, but the adjustment method is the same.

Step 2. Adjust the retainer on the M.2 boot adapter.

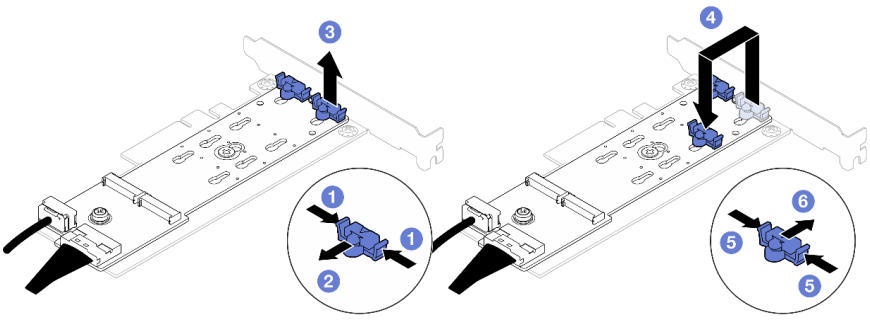


Figure 64. Adjusting the M.2 retainer

a. ❶ Press both sides of the retainers.
b. ❷ Move the retainer forward until it is in the large opening of the keyhole.
c. ❸ Take the retainer out of the keyhole.
d. ❹ Insert the retainer into the correct keyhole to accommodate the particular size of the M.2 drive to be installed.
e. ❺ Press both sides of the retainer.
f. ❻ Slide the retainer backwards until it is seated in place.

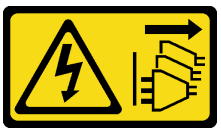
Install an M.2 drive

Follow instructions in this section to install an M.2 drive.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Locate the M.2 drive slot on the M.2 boot adapter.

Note: As ThinkSystem ST250 V3 supports two M.2 drives, install your M.2 drive in **slot 0** first.

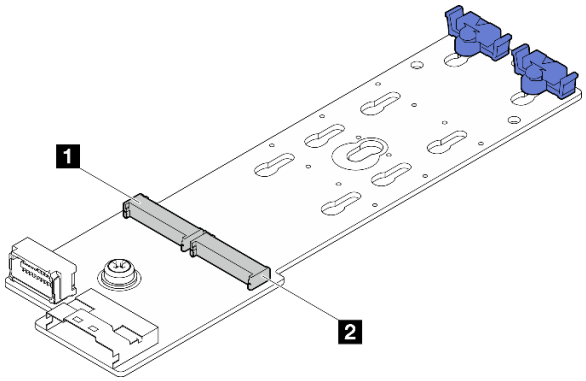


Figure 65. M.2 drive slots

Table 14. M.2 drive slot locations on M.2 boot adapter

1 M.2 drive slot 0	2 M.2 drive slot 1

Step 2. Install an M.2 drive.

a. 1 Insert the M.2 drive at an angle into the connector.

b. 2 Pivot the M.2 drive down until the notch catches on the lip of the retainer.

c. 3 Slide the retainer forward (towards the connector) to secure the M.2 drive into place.

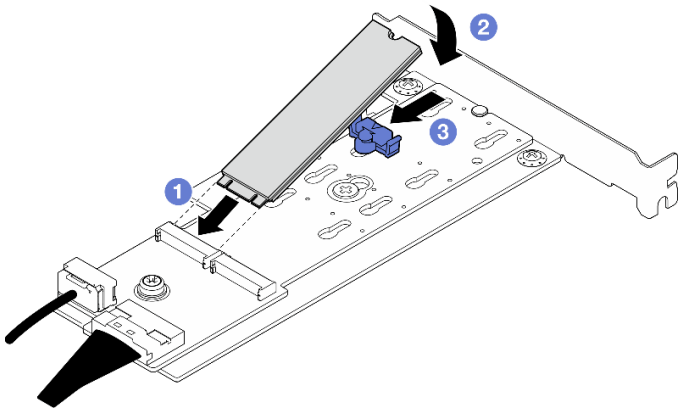


Figure 66. Installing an M.2 drive

After you finish

- Complete the parts replacement. See "Complete the parts replacement" on page 180.

Demo video

Watch the procedure on Youtube

Memory module replacement

Use the following procedures to remove and install a memory module.

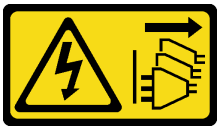
Remove a memory module

Follow instructions in this section to remove a memory module.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is installed in a rack, remove the server from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for "Handling static-sensitive devices" on page 44.
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
  - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
  - Handle memory modules with care: never bend, twist, or drop a memory module.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
  - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Procedure

Attention: Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Remove the server cover. See "Remove the server cover" on page 156.

Step 2. Determine which memory module to be removed from the server, and locate its corresponding connector on the system board.

The following illustration shows the location of memory module slots on the system board.

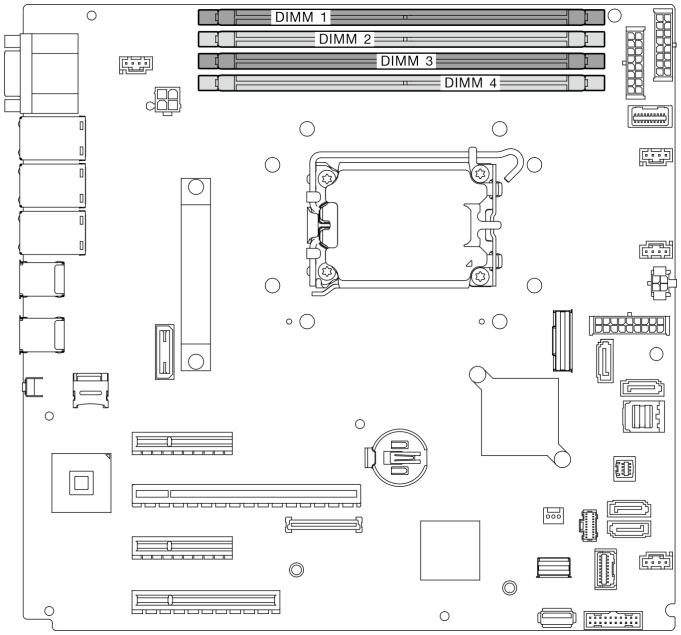


Figure 67. Memory module slots on the system board

Step 3. Open the retaining clips on each end of the memory module slot. If necessary, you can use a pointed tool to open the retaining clips due to space constraints. Pencils are not recommended as a tool as they may not be strong enough.

a. ❶ Place the tip of the tool in the recess on the top of the retaining clip.

b. ❷ Carefully rotate the retaining clip away from the memory module slot.

Attention:

- To avoid breaking the retaining clips or damaging the memory module slots, handle the clips gently.
- If necessary, you can use a pointed tool to open the retaining clips due to space constraints. Pencils are not recommended as a tool as they may not be strong enough.

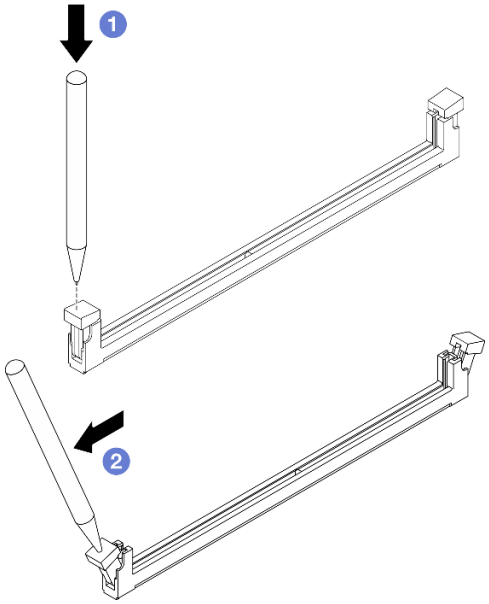


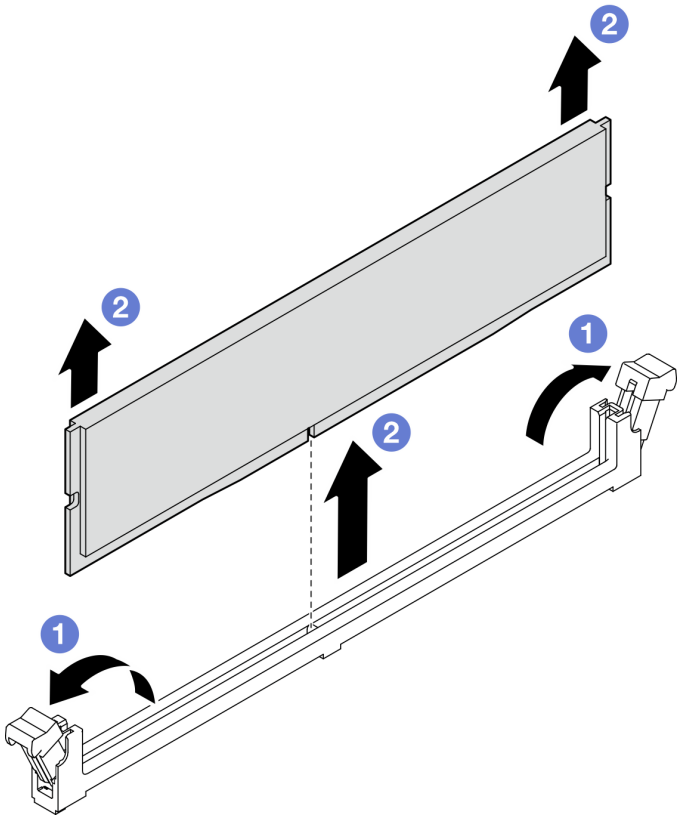
Figure 68. Opening retaining clips

Step 4. Remove the memory module.

a. ❶ Make sure the retaining clips are in the fully open position.

b. ❷ Pull the memory module out of the slot with both hands.

Figure 69. Removing a memory module



After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

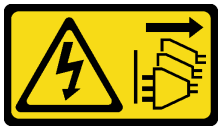
Install a memory module

Follow instructions in this section to install a memory module.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Make sure to adopt one of the supported configurations listed in “Memory module installation rules and order” on page 45.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines at “Handling static-sensitive devices” on page 44:
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
  - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
  - Handle memory modules with care: never bend, twist, or drop a memory module.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.

– Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Procedure

Attention: Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Locate the memory module slot on the system board.

The following illustration shows the location of memory module slots on the system board.

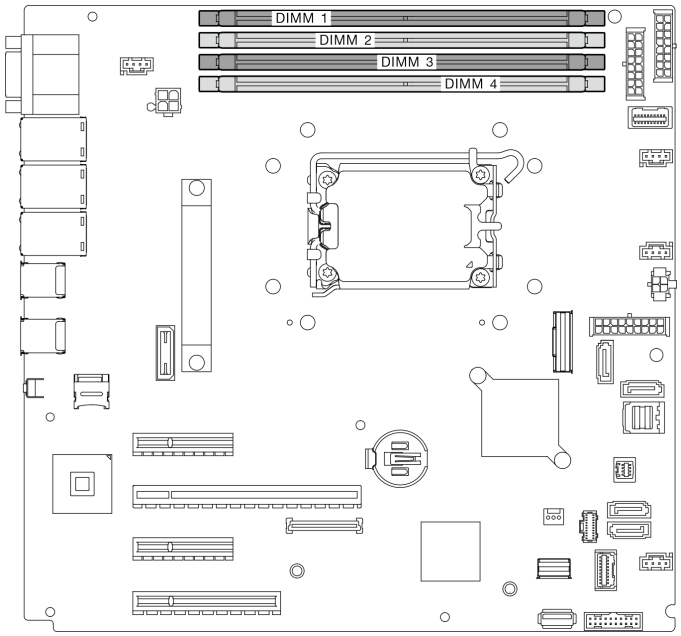


Figure 70. Memory module slots on the system board

Step 2. Open the retaining clips on each end of memory module slot.

a. ❶ Place the tip of tool in the recess on the top of the retaining clip.

b. ❷ Carefully rotate the retaining clip away from the memory module slot.

Attention:

- To avoid breaking the retaining clips or damaging the memory module slots, handle the clips gently.
- If necessary, you can use a pointed tool to open the retaining clips due to space constraints. Pencils are not recommended as a tool as they may not be strong enough.

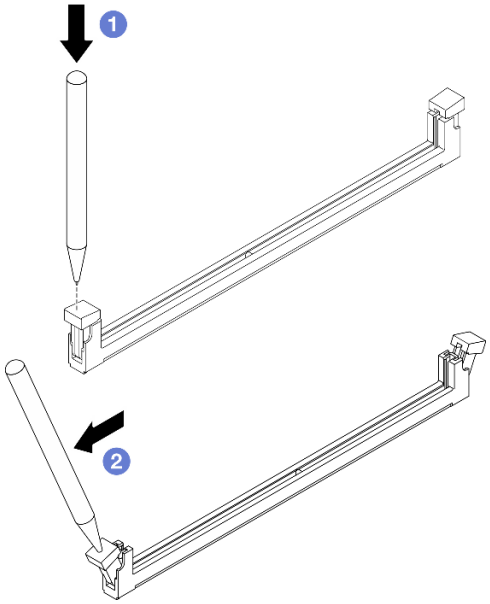


Figure 71. Opening retaining clips

Step 3. Touch the static-protective package that contains the memory module to any unpainted surface on the outside of the server. Then, remove the memory module from the package and place it on a static-protective surface.

Step 4. Install the memory module.

a. 1 Make sure that the retaining clips are in the fully open position. Align the keys on the memory module with the connector.

b. 2 Firmly press both ends of the memory module straight down into the connector until the retaining clips snap into the locked position.

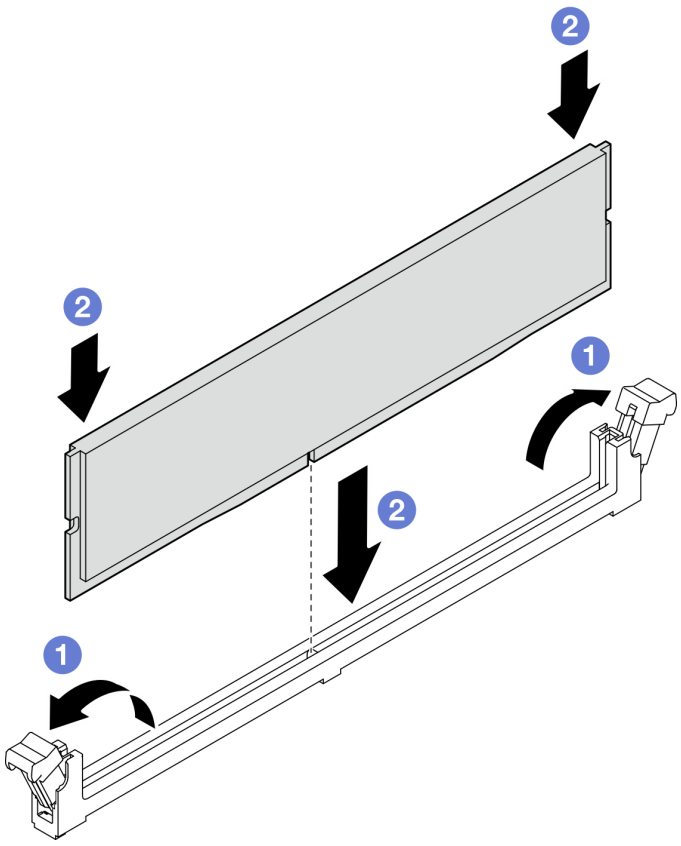


Figure 72. Installing a memory module

Note: If there is a gap between the memory module and the retaining clips, the memory module has not been correctly inserted. In this case, open the retaining clips, remove the memory module, and then reinsert it.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

Optical drive replacement

Follow instructions in this section to remove and install an optical drive.

Note: This section applies only to server models that have an optical drive installed.

Remove an optical drive

Follow instructions in this section to remove an optical drive.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S006**



CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

  - **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
  - **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.
- Use the front door key to unlock the front door, and then open the front door.

Procedure

Step 1. Remove the server cover. See “Remove the server cover” on page 156.

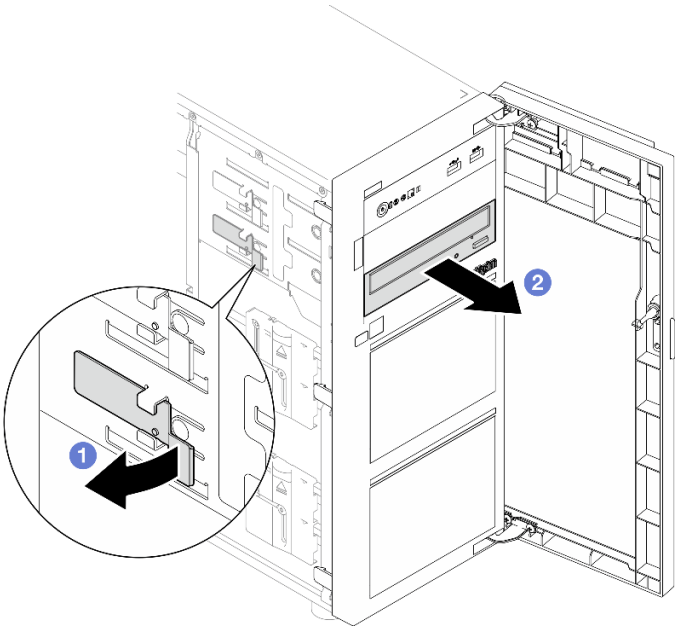
Step 2. Disconnect the cables from the rear of the optical drive.

Step 3. Remove the optical drive.

a. ❶ Gently pull the metal tab on the side of the chassis and push the optical drive outwards from the rear.

b. ❷ Carefully pull the optical drive out of the chassis.

Figure 73. Removing an optical drive



After you finish

1. Install one of the following:
   - Another optical drive or a tape drive. See “Install an optical drive” on page 116 or “Install a tape drive” on page 178.

     Note: A tape drive must be installed into the lower optical drive bay.
   - The optical drive filler cover to the chassis and the optical drive filler to the front bezel.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

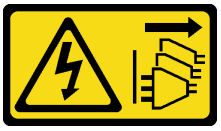
Install an optical drive

Follow instructions in this section to install an optical drive.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord.

To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S006**



CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. If necessary, remove the optical drive filler from the optical drive bay.

a. ❶ Press the tabs on the side of the optical drive filler of the optical drive bay.

b. ❷ Remove the optical drive filler as shown.

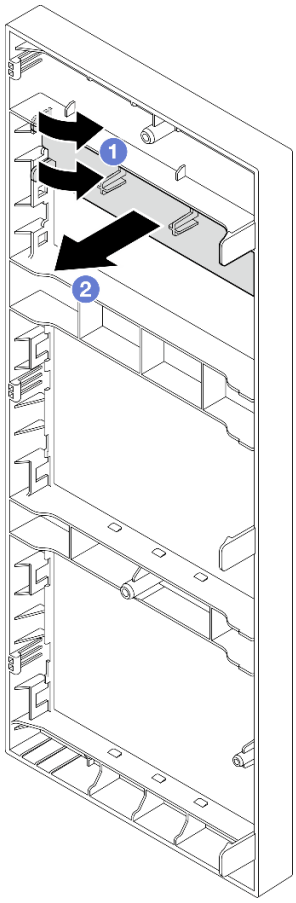


Figure 74. Removing the optical drive filler from the optical drive bay

Step 2. If necessary, insert two of your fingers into the holes in the optical drive filler cover and carefully pull the optical drive filler cover out of the chassis.

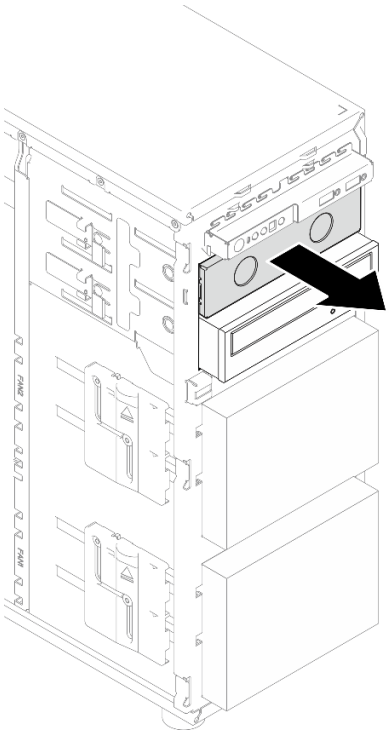


Figure 75. Removing the optical drive filler cover from the optical drive bay

Step 3. Install an optical drive.

a. ❶ Gently pull the metal tab on the side of the chassis, and insert the optical drive into the optical drive bay.

b. ❷ Release the tab and keep sliding the optical drive until it snaps into place.

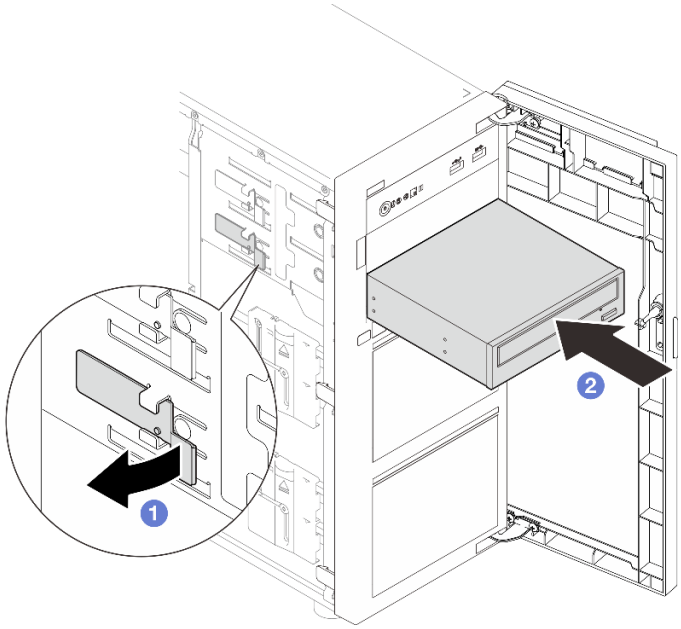


Figure 76. Installing an optical drive

Step 4. Connect the power cable and the signal cable to the rear of the optical drive. See “Optical/tape drives cable routing” on page 194.

Step 5. Save the removed optical drive filler cover from the chassis and the optical drive filler from the front bezel for future use.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

PCIe adapter replacement

Follow instructions in this section to remove and install a PCIe adapter.

Your server comes with four PCIe slots. Depending on your needs, you can install a PCIe adapter to obtain the corresponding function or remove the adapter if necessary. The PCIe adapter can be an Ethernet adapter, a host bus adapter, a RAID adapter, a graphics adapter, or any other supported PCIe adapters. PCIe adapters vary by type, but the installation and removal procedures are the same.

Note: For a list of the supported PCIe adapters, see:
https://serverproven.lenovo.com

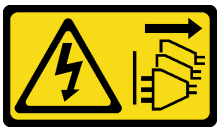
Remove the PCIe adapter

Follow instructions in this section to remove a PCIe adapter.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Notes:

- Depending on the specific type, your PCIe adapter might look different from the illustration in this section.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this section.

Procedure

Step 1. Make preparations for this task.

a. Remove the server cover. See "Remove the server cover" on page 156.

b. Remove the processor and the heat sink if necessary. See "Remove the processor" on page 142.

Step 2. Lay the server on its side for easier operation.

Step 3. Locate the PCIe adapter to be removed. If necessary, disconnect all the cables from the PCIe adapter.

Step 4. Remove a PCIe adapter.

a. 1 Open the retaining clip as illustrated.

b. 2 Grasp the PCIe adapter by its edges, and carefully pull it out of the slot.

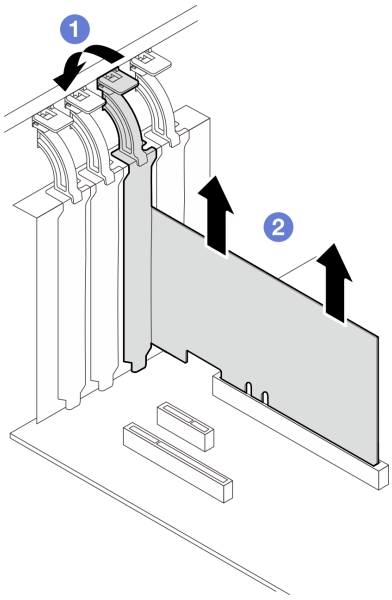


Figure 77. Removing a PCIe adapter

After you finish

1. Install another PCIe adapter if necessary. See "Install the PCIe adapter" on page 122. Otherwise, install a bracket to cover the slot.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

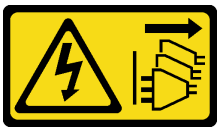
Install the PCIe adapter

Follow instructions in this section to install a PCIe adapter.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this section.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Notes:

- Depending on the specific type, your PCIe adapter might look different from the illustration in this section.
- GPU adapters can only be installed in **PCIe slot 2**. When GPU adapter is installed in PCIe slot 2, **make sure to keep PCIe slot 3 empty**.

Procedure

Step 1. Lay the server on its side for easier operation.

Step 2. Locate the applicable PCIe slot. See “Technical specifications” on page 4 to identify the different types of PCIe slots in your server.

Step 3. If a bracket is installed in the PCIe slot, remove it. Save the bracket for future use.

Step 4. Open the retaining clip, and position the PCIe adapter over the slot.

Step 5. Install a PCIe adapter.

Note: Ensure that you observe the installation rules and sequence in “Technical rules for PCIe slots” on page 47.

a. ❶ Carefully press the PCIe adapter straight down until it is seated in the slot.

b. ❷ Close the retaining clip to secure the PCIe adapter.

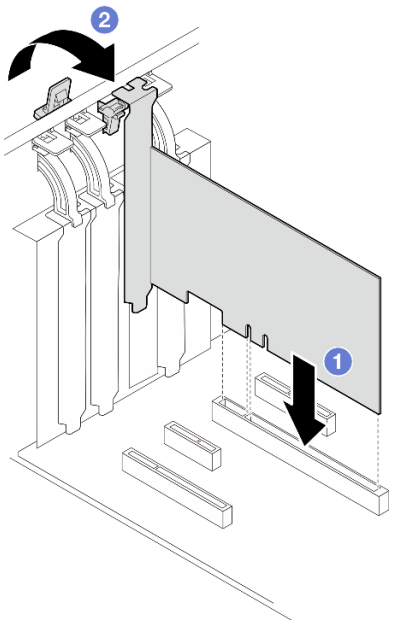


Figure 78. Installing a PCIe adapter

After you finish

- Depending on the type of the PCIe adapter, you might need to connect any required cables.
  - After installing RAID adapters, see Cable routing for hot-swap drives with hardware RAID to complete the corresponding cable routing.
  - After installing M.2 boot adapter, see "M.2 adapter cable routing" on page 192 to complete cable routing.
  - After installing the following RAID adapters, see "Intrusion switch and RAID flash power module cable routing" on page 193 to complete cable routing for the RAID flash power module.
    - ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter (with flash power module)
    - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter (with flash power module)
    - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter (with flash power module)
- Complete the parts replacement. See "Complete the parts replacement" on page 180.

Demo video

Watch the procedure on Youtube

Power distribution board replacement

Follow instructions in this section to remove and install the power distribution board.

Remove the power distribution board

Follow instructions in this section to remove the power distribution board of the hot-swap redundant power supply.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**

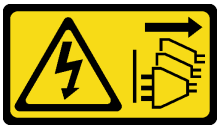


DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is installed in a rack, remove the server from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

Procedure

Step 1. Make preparations for this task.

a. Remove the server cover. See "Remove the server cover" on page 156.

b. Remove the hot-swap redundant power supply. See "Remove the hot-swap power supply unit" on page 134.

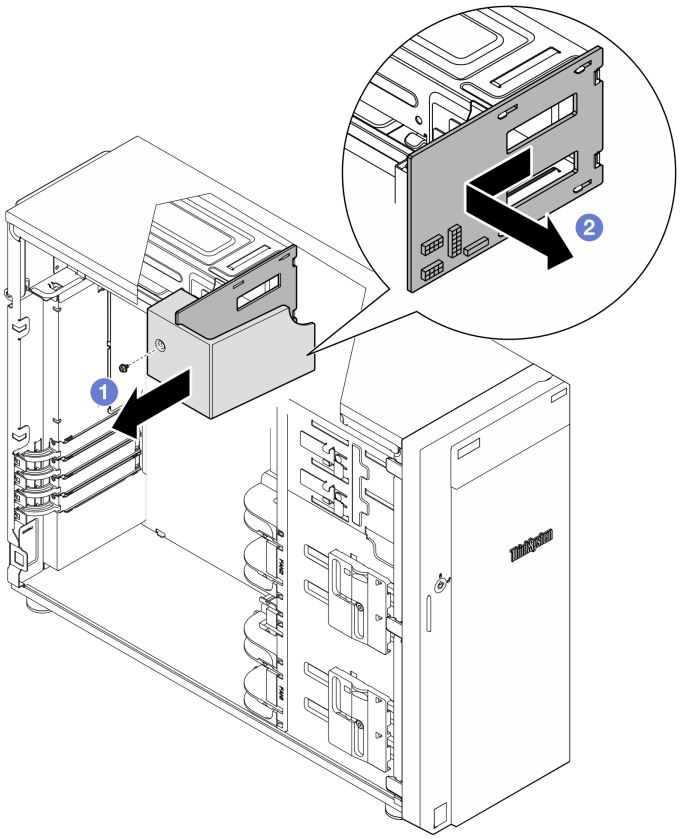
Step 2. Remove the power distribution board.

a. (1) Remove the screw that secures the power distribution board cover, and remove the cover from the chassis.

b. (2) Pull the power distribution board out.

Note: Carefully handle the power distribution board by its edges.

Figure 79. Removing the power distribution board of the hot-swap power supply



Step 3. Disconnect the power cables from the power distribution board.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the power distribution board

Follow instructions in this section to install the power distribution board of the hot-swap redundant power supply.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**

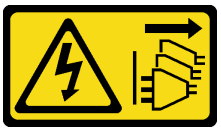


DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Lay the server on its side for easier operation.

Step 2. Hold the power distribution board by its edges, and align the slots on the board with the four tabs on the power supply cage; then, slide the power distribution board toward the power supply cage until it clicks into place..

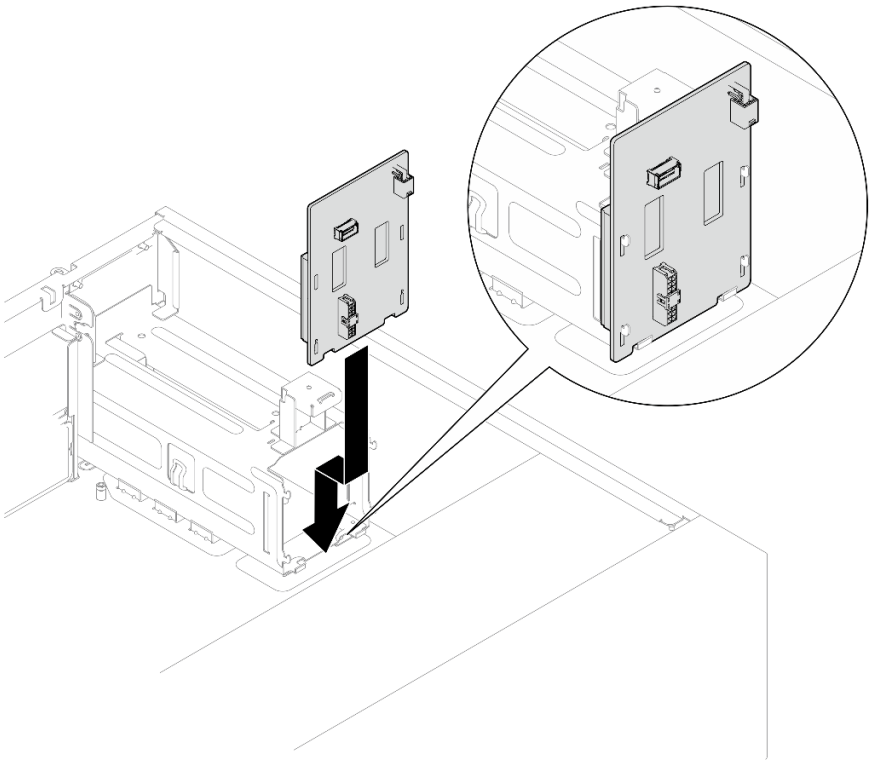


Figure 80. Installing the power distribution board of the hot-swap power supply

Step 3. Connect the power cables to the power distribution board; then, properly route the cables, and secure the cables with the cable clips.

Step 4. Align the slot on the power distribution board cover with the one on the power supply cage; then, secure the power distribution board cover with the screw.

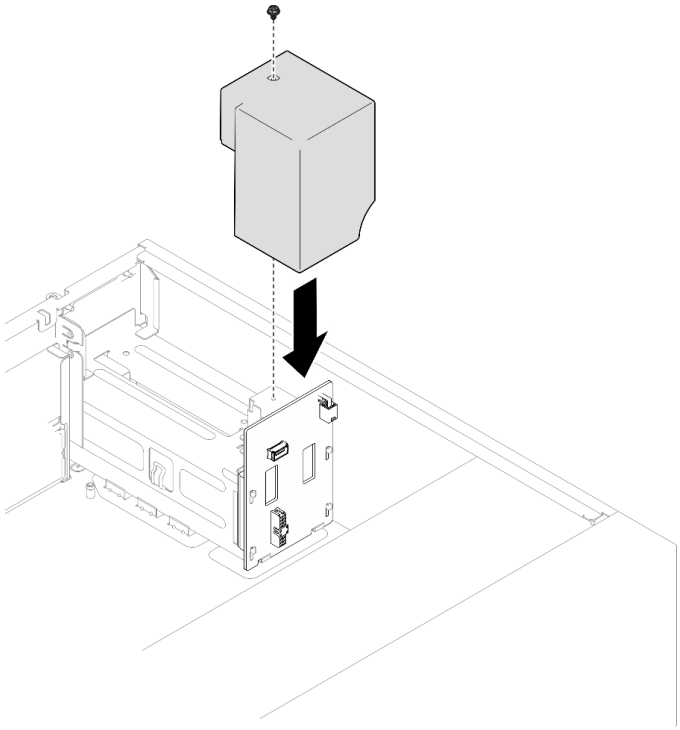


Figure 81. Installing the power distribution board cover

After you finish

- Connect the cables to the corresponding connector on the system board. See "Redundant power supplies cable routing" on page 197 for more information.
- Complete the parts replacement. See "Complete the parts replacement" on page 180.

Demo video

Watch the procedure on Youtube

Power supply replacement

Follow instructions in this section to remove and install a fixed or redundant power supply unit.

Remove the fixed power supply unit

Follow instructions in this section to remove the fixed power supply unit.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**



Figure 82. Fixed power supply label on the cover

The following tips describe the information that you must consider when you remove a power supply with dc input.

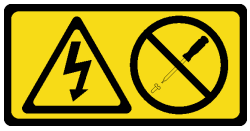
NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S035**



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached.

There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Remove the server cover. See “Remove the server cover” on page 156.

Step 2. Disconnect all cables on the fixed power supply from the system board.

Attention: To avoid damaging the system board, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 183 when disconnecting cables from the system board.

Step 3. Remove a fixed power supply.

a. 1 Remove the four screws at the rear of the chassis that secure the power supply.

b. 2 Push the fixed power supply from the rear until it is released from the metal retaining tab, and carefully lift the power supply out of the chassis.

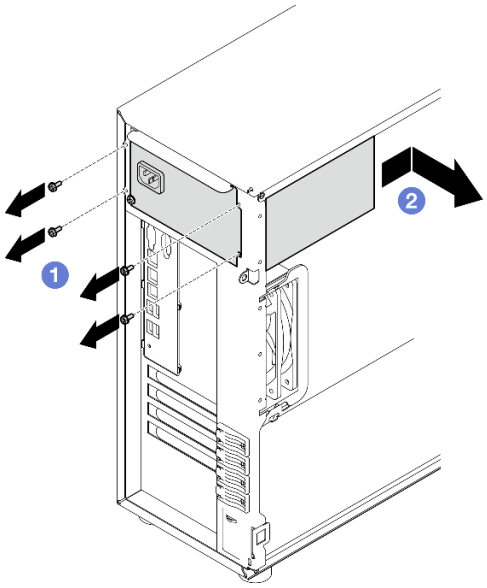


Figure 83. Removing a fixed power supply

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the fixed power supply unit

Follow instructions in this section to install the fixed power supply unit.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

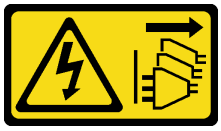


Figure 84. Fixed power supply label on the cover

The following tips describe the information that you must consider when you install a power supply with dc input.

NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

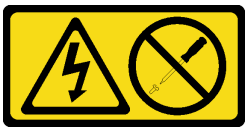
- **S002**



CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S035**



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install a fixed power supply bracket.

a. ❶ Align the tabs on the fixed power supply bracket with the corresponding holes on the chassis.

b. ❷ Pivot the fixed power supply bracket in until it snaps into place.

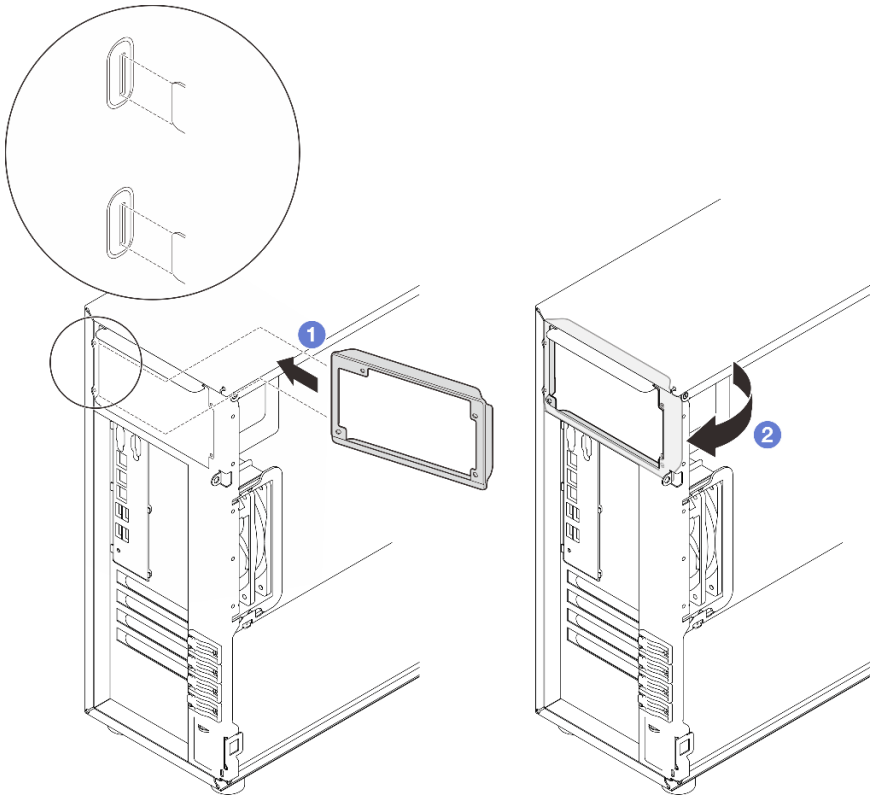


Figure 85. Installing a fixed power supply bracket

Step 2. Install a fixed power supply.

a. ❶ Slide the fixed power supply into the bay until it snaps into place. Make sure the four screw holes in the fixed power supply are aligned with the corresponding holes in the rear of the chassis.

b. ❷ Install the four screws to secure the fixed power supply in place.

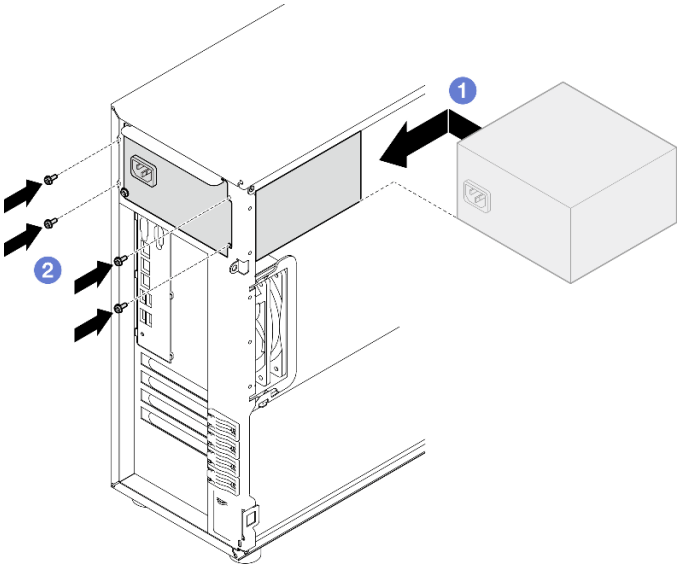


Figure 86. Installing a fixed power supply

After you finish

1. Connect all cables on the fixed power supply to corresponding connectors on the system board. See “Fixed power supply cable routing” on page 195.
2. Connect the power cable to the power supply and a properly grounded electrical outlet.
3. Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

Remove the hot-swap power supply unit

Follow instructions in this section to remove a hot-swap redundant power supply unit.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

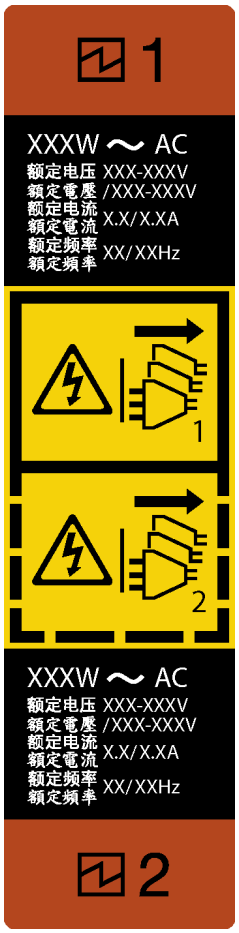
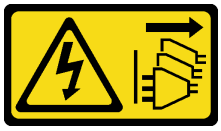


Figure 87. Hot-swap power supply label

NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

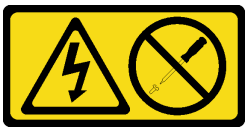
Attention: This type of power supply is hot-swap only when two power supplies are installed for redundancy. If only one power supply is installed, you must power off the server first before removing the power supply.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S035**



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- If the server is in a rack, pull back the cable management arm to gain access to the rear of the server and the power supply.

Procedure

Step 1. Locate the hot-swap power supply in the rear of your server and disconnect the power cord from the power supply. Keep the power cord in an ESD-safe place.

Step 2. Press the release latch in the direction as shown, and carefully pull the handle at the same time to slide the hot-swap power supply out of the chassis.

Note: PSU with a release tab is a hot-swap PSU. The color of the release tab does not affect the serviceability of the PSU.

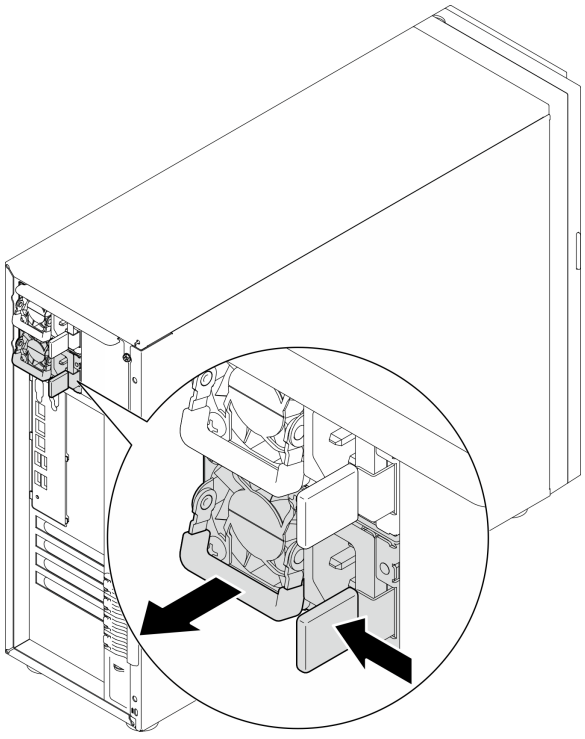


Figure 88. Removing a hot swap power supply

After you finish

1. Install a new power supply or install the power-supply filler to cover the power supply bay. See “Install the hot-swap power supply unit” on page 137.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the hot-swap power supply unit

Follow instructions in this section to install the hot-swap redundant power supply unit.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers’ warranty.

Attention: This type of power supply is hot-swap only when two power supplies are installed for redundancy. If only one power supply is installed, you must power off the server first before removing the power supply.

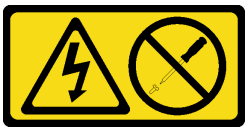
- **S002**



CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S035**



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

The following tips describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- The standard configuration comes with one power supply unit without hot-swap support. Hot-swap support and power redundancy requires two power supply units installed in the system.
- Power supply units in the chassis must have the same wattage, vendor, and part number (or alternate part number).
- If you are replacing the existing power supply with a new power supply of different wattage, attach the power information label that comes with this option onto the existing label near the power supply.

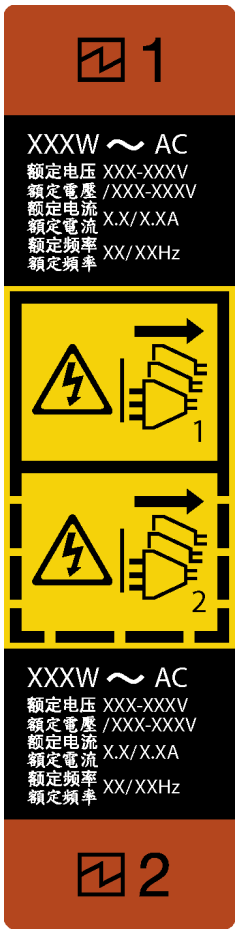


Figure 89. Hot-swap power supply label

- Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, go to:
  https://serverproven.lenovo.com

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Make preparations for this task.

a. Make sure that the power supply unit to be installed is the same as the installed ones. Otherwise, remove all existing power supply units and replace them all with the same power supply units.

Notes:

- Power supply units in the chassis must have the same wattage, vendor, and part number (or alternate part number).
- PSU with a release tab is a hot-swap PSU. The color of the release tab does not affect the serviceability of the PSU.

b. If there is a PSU filler installed, perform the following steps:

- 1 Press the latch on the PSU filler.
- 2 Pull the filler out of the PSU slot.

Important: During normal operation, each power supply bay must contain either a power supply or power supply filler for proper cooling.

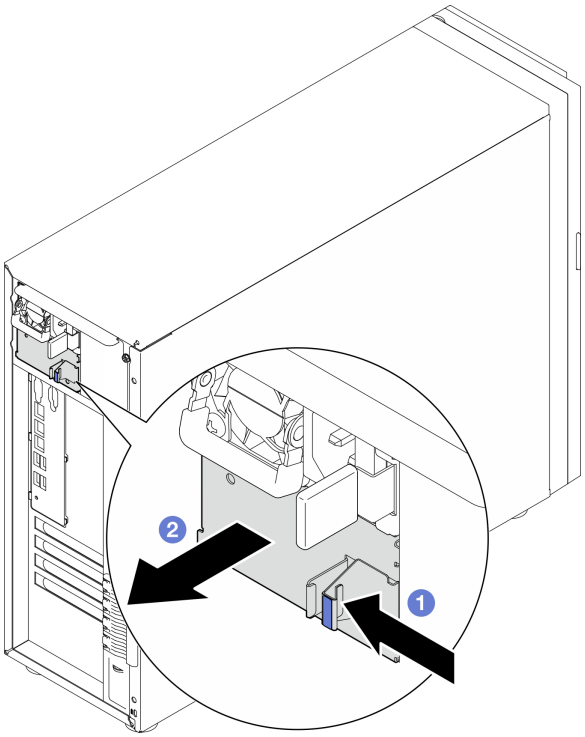


Figure 90. Removing a hot-swap power supply filler

Step 2. Make sure the label on the power supply is facing up and the release latch is on the right side as illustrated below, and then slide it into the chassis until it snaps into place.

Notes:

- If more than one power supply units are to be installed, start with the upper available power supply bay.

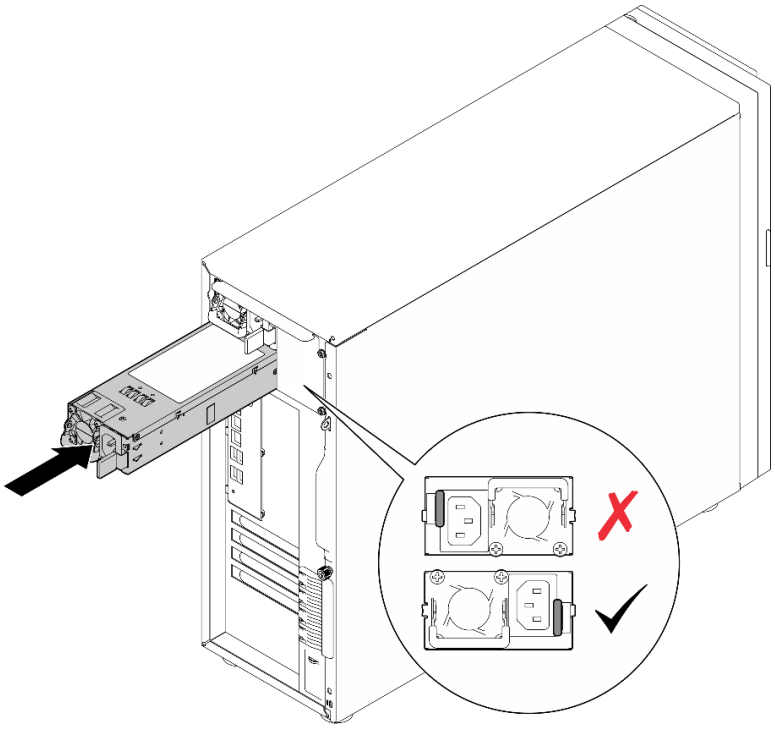


Figure 91. Installing a hot-swap power supply

After you finish

1. Connect the power cable to the power supply and a properly grounded electrical outlet.
2. Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

Processor replacement

Follow instructions in this section to remove and install a processor.

Attention: Before reusing a processor or heat sink, make sure you use Lenovo proven alcohol cleaning pad and thermal grease.

Important: The processor in your server can throttle, temporarily lowering speed to reduce heat output, in response to thermal conditions. In instances where the throttling period is of extremely short duration (100 ms or less), the only indication will be an entry in the event log. In these instances the event can be ignored and processor replacement is not required.

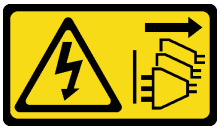
Remove the processor

Follow instructions in this section to remove the processor. This procedure must be executed by a trained technician.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Make preparations for this task.

a. Remove the server cover. See “Remove the server cover” on page 156.

b. Remove the heat sink and fan module if necessary. See “Remove the heat sink and fan module” on page 91.

Step 2. Remove the processor.

a. ❶ Gently pull the handle away from the processor retainer.

b. ❷ Lift the handle.

c. ❸ Lift the processor retainer to the fully open position as illustrated.

d. 3 Hold the processor by both sides and gently lift it away from the processor socket.

Notes:

1. Do not touch the gold contacts on the bottom of the processor.
2. Keep the processor socket clean from any object to prevent possible damages.

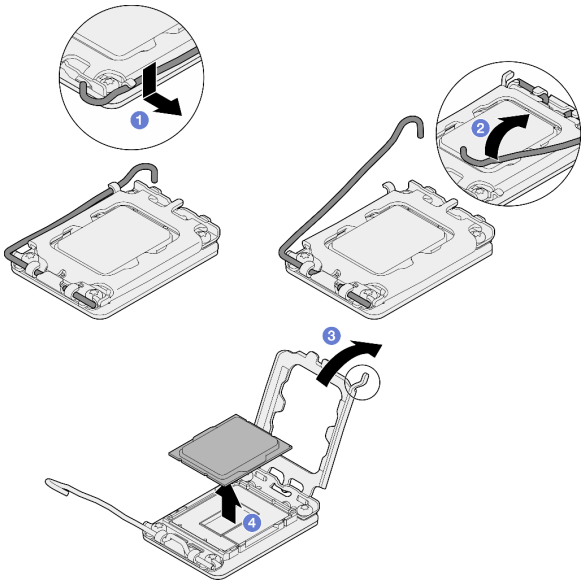


Figure 92. Opening the processor retainer

After you finish

1. Install a replacement unit. See “Install the processor ” on page 143.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the processor

Follow instructions in this section to install the processor. This procedure must be executed by a trained technician.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safety.
- Before reusing a processor that was removed from another system board, wipe the thermal grease from the processor with an alcohol cleaning pad, and dispose of the cleaning pad after all of the thermal grease is removed.

  Note: If you are applying new thermal grease on the top of the processor, make sure to do it after the alcohol has fully evaporated.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Hold the processor by both sides, and align the following:

1. Align 1 the small notches on the processor to 2 the tabs on the socket.
2. Align 3 the small triangle of the processor to 4 the beveled corner on the socket.

Then, gently lower the processor evenly into the socket.

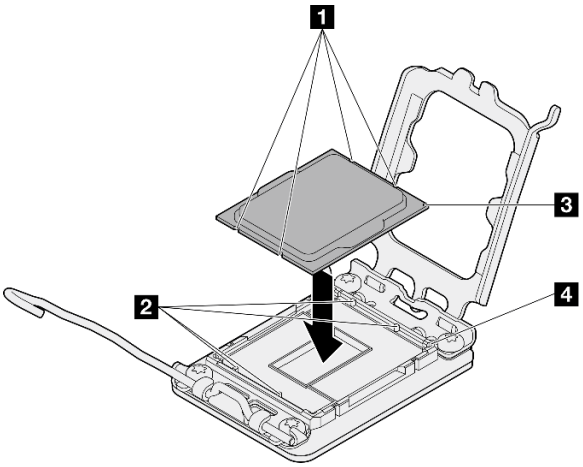


Figure 93. Installing the processor

Step 2. Close the processor retainer, and push the handle to the locked position.

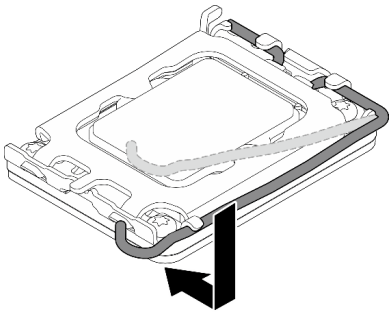


Figure 94. Closing the processor retainer

Step 3. Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

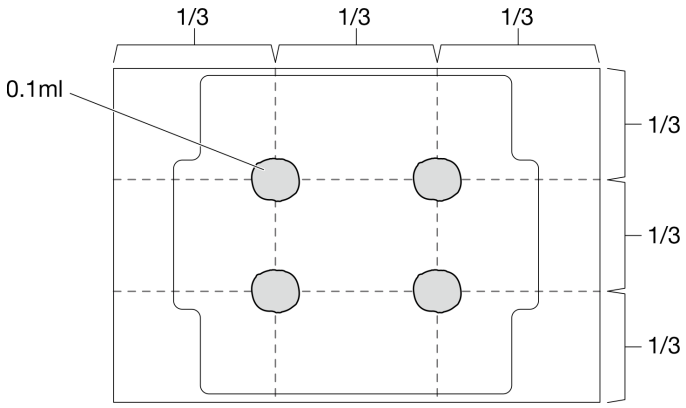


Figure 95. Proper shape of the thermal grease

After you finish

1. Reinstall the heat sink and fan assembly. See "Install the heat sink and the fan module" on page 93.
2. Complete the parts replacement. See "Complete the parts replacement" on page 180.

Demo video

Watch the procedure on Youtube

RAID flash power module replacement

Follow instructions in this section to remove and install the RAID flash power module (supercap).

Note: This topic applies only to server models that have RAID flash power modules installed.

The RAID flash power module protects the cache memory on the installed RAID adapter. You can purchase a RAID flash power module from Lenovo.

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

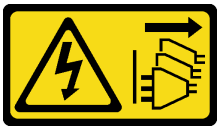
Remove a RAID flash power module

Follow instructions in this section to remove a RAID flash power module (supercap).

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.

Procedure

Step 1. Remove the server cover. See "Remove the server cover" on page 156.

Step 2. Disconnect the cable of the RAID flash power module from the RAID card.

Step 3. Remove the RAID flash power module and bracket assembly from the chassis.

Note: Your RAID flash power module might look slightly different from those shown in the illustrations.

a. ❶ Press the tab on the RAID flash power module bracket.

b. ❷ Remove the RAID flash power module and bracket assembly from the chassis.

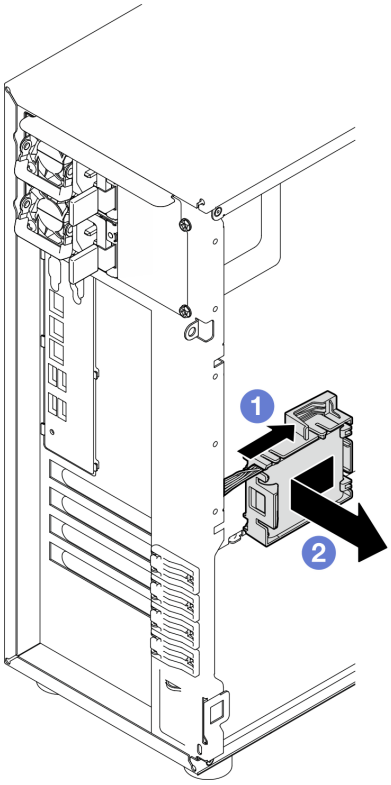


Figure 96. Removing the RAID flash power module and bracket assembly from the chassis

Step 4. Remove the RAID flash power module from the bracket.

a. 1 Gently pull the tab on the bracket.

b. 2 Remove the module from the bracket.

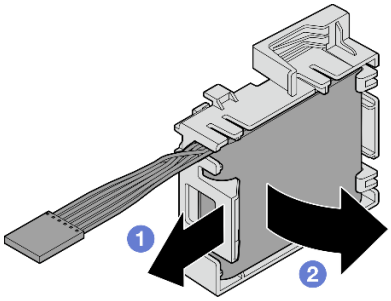


Figure 97. Removing the RAID flash power module from the bracket

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

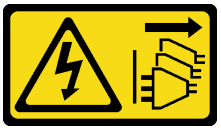
Install a RAID flash power module

Follow instructions in this section to install a RAID flash power module (supercap).

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Note: Your RAID flash power module might look slightly different from those shown in the illustrations.

Step 1. Install the RAID flash power module into the bracket.

a. ❶ Align the RAID flash power module with the bracket.

b. ❷ Rotate the other end of the module inward until it is secured in the bracket.

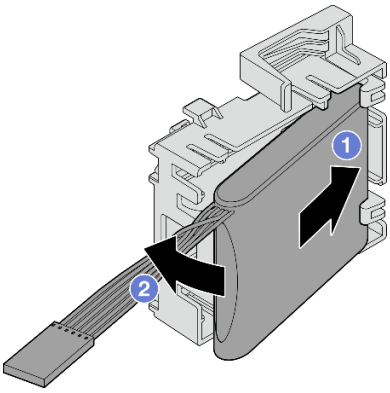


Figure 98. Installing the RAID flash power module into the bracket

Step 2. Position the RAID flash power module and bracket assembly onto the chassis, where the tabs on the bracket pass through the corresponding holes on the chassis. Move the assembly as shown until it is secured on the chassis.

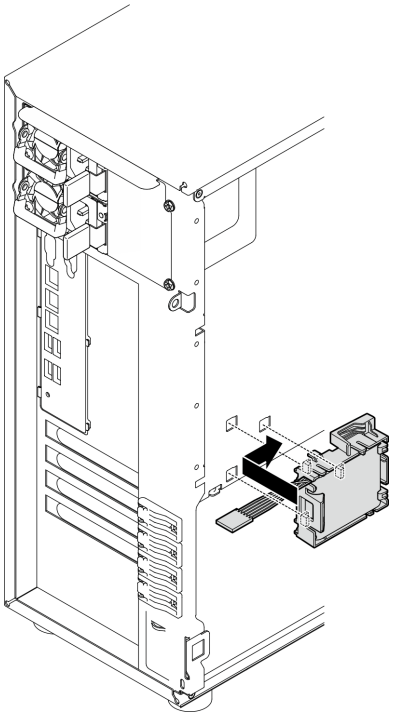
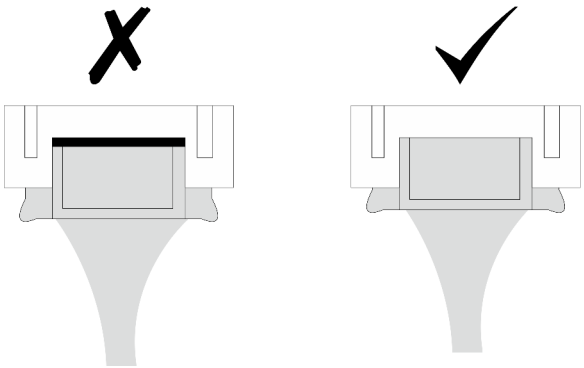


Figure 99. Installing the RAID flash power module and bracket assembly onto the chassis

Step 3. Connect the RAID flash power module cable to the RAID adapter. See "Intrusion switch and RAID flash power module cable routing" on page 193 for more information on the internal cable routing.

Notes: Make sure that the RAID flash power module cable connector is fully seated in place as illustrated when being plugged into the connector on the following RAID adapters:

- ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter (with flash power module)
- ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter (with flash power module)
- ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter (with flash power module)



After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 180.

Demo video

Watch the procedure on Youtube

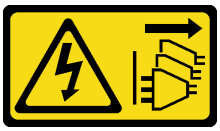
Server replacement

Follow instructions in this section to remove and install the server.

Remove the server from rack

Follow instructions in this section to remove ST250 V3 from the rack.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

About this task

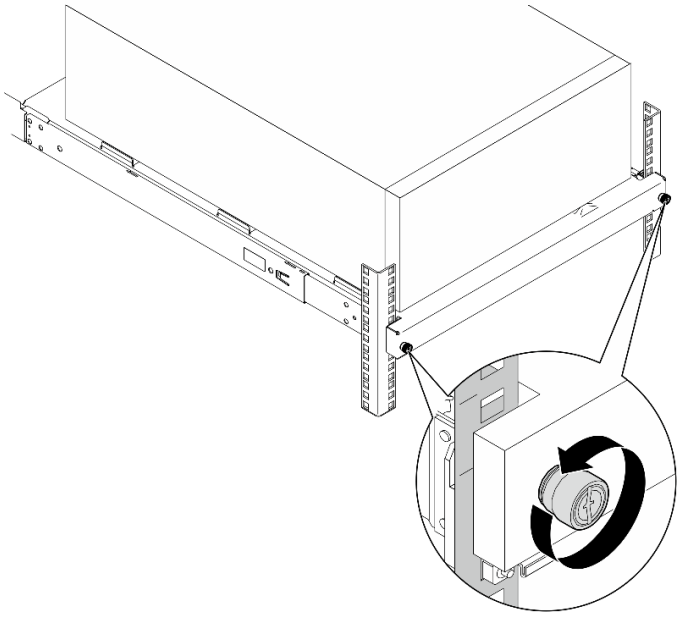
Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.

Procedure

Note: Your system might look slightly different from those shown in the illustrations.

Step 1. Remove the two M6 x 16 screws on the front of the rack cabinet.



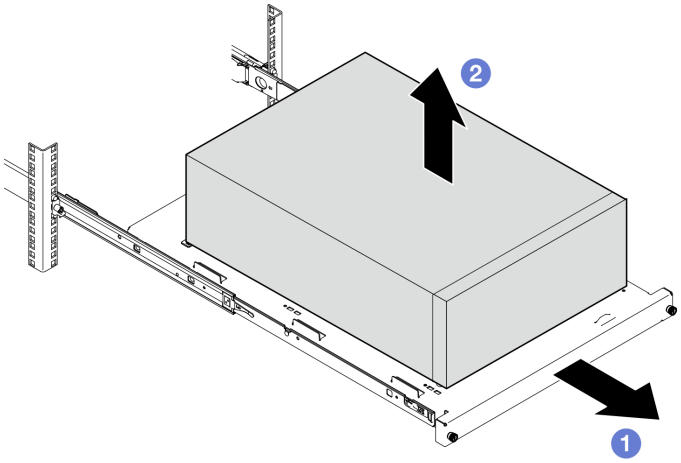
Step 2. Remove the server from the rails.

a. ❶ Slide and pull the rack server tray out of the rack cabinet.

b. ❷ Lift the server out of the tray.



CAUTION:
Use safe practices when lifting the server.



After you finish

1. Place the server on its side with the cover up.
2. To install the server to the rails, see "Install the server to rack" on page 152.

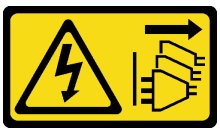
Demo video

Watch the procedure on Youtube

Install the server to rack

Follow instructions in this section to install ST250 V3 to the rack.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

About this task

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.

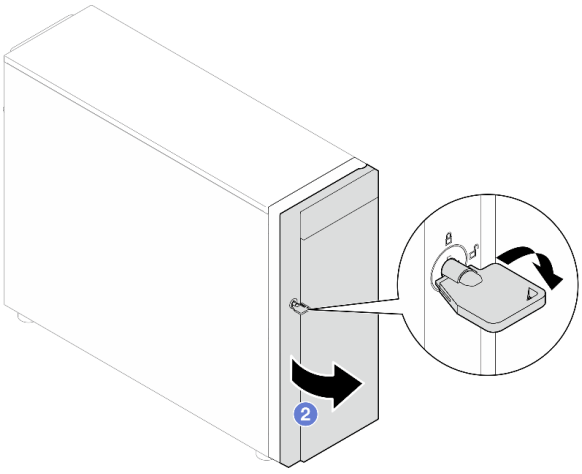
Procedure

Note: Your system might look slightly different from those shown in the illustrations.

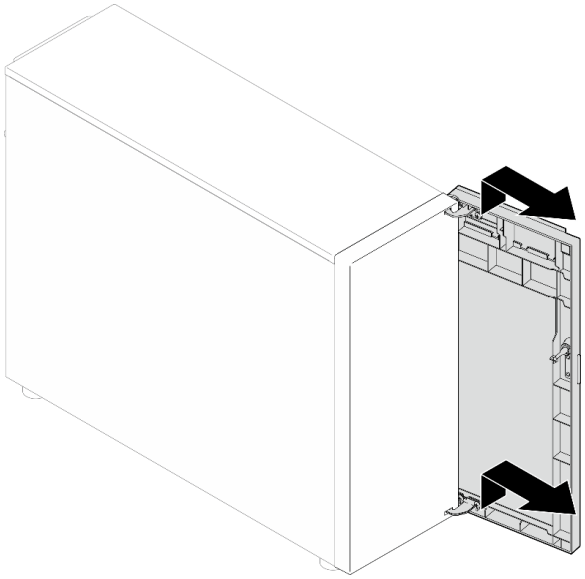
Step 1. Unlock ST250 V3 front door.

a. ❶ Slide and push the key into the corresponding hole on the front door and turn it clockwise to unlock the door.

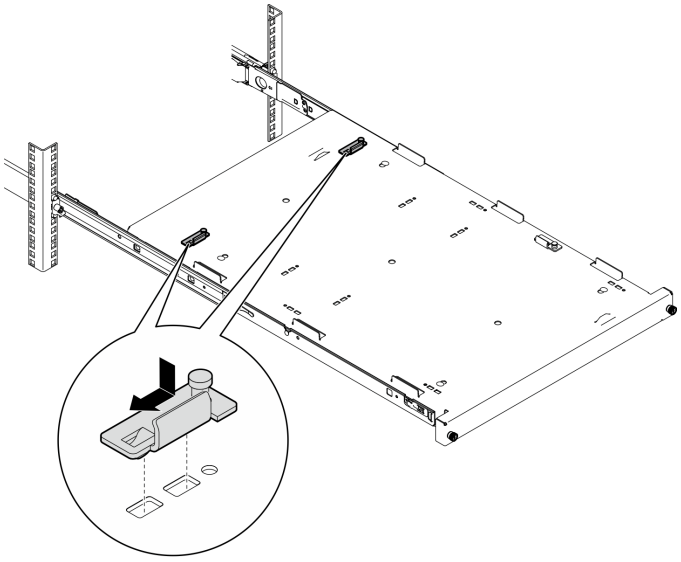
b. ❷ Open the front door.



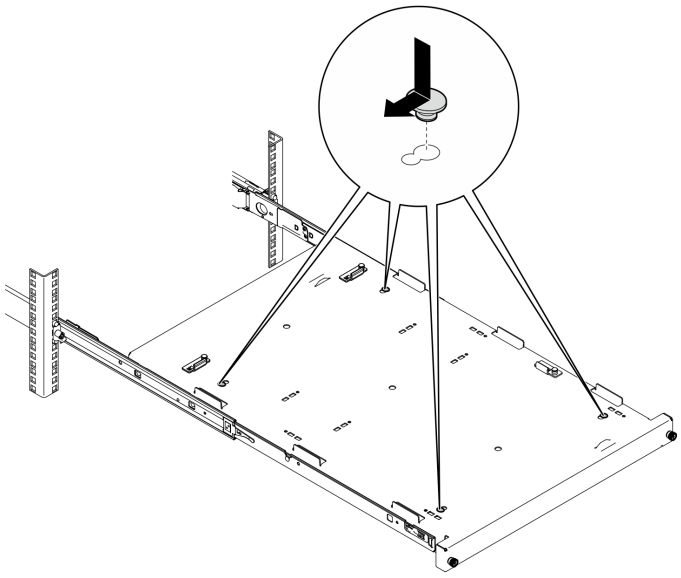
Step 2. Lift the front door to detach the hinge, and remove it from the server.



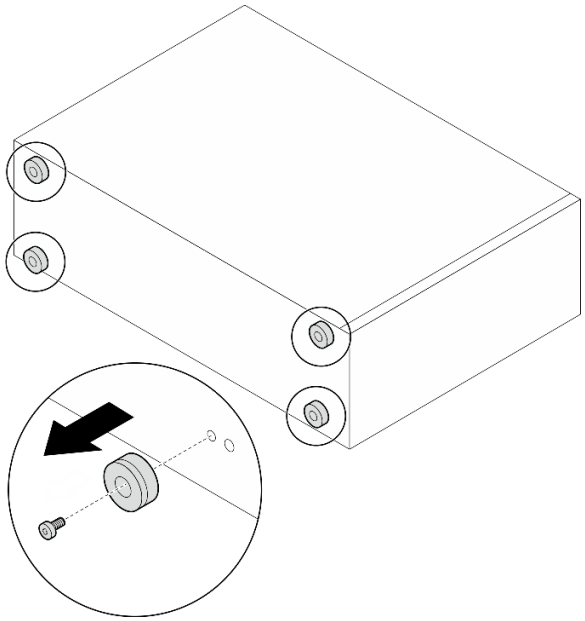
Step 3. Install the two brackets as illustrated.



Step 4. Install the four rubber safety pads as illustrated.



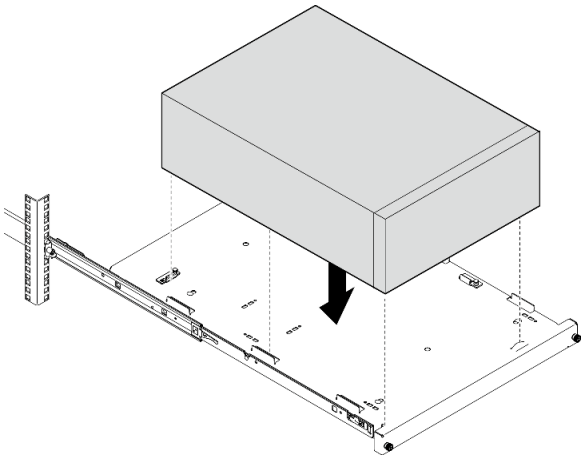
Step 5. Remove the four screws and feet from the server.



Step 6. Align the server with the brackets and the tab on the front of the tray; then, gently place the server on the tray.



CAUTION:
Use safe practices when lifting the server.

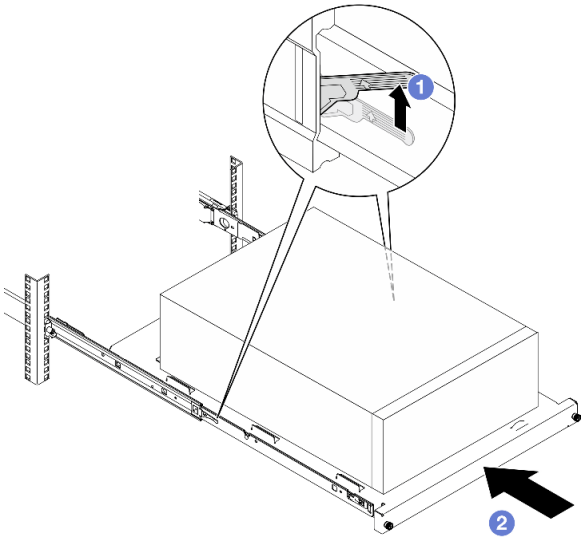


Step 7. Install the server into the rack cabinet.

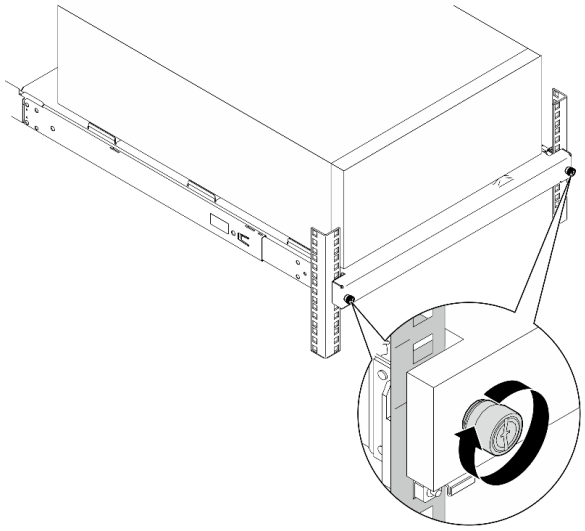
a. ❶ Lift the rail latches on both sides.

b. ❷ Gently slide and push the tray into the rack cabinet.

CAUTION:
To avoid hurting yourself, keep your hands from the latch area when the latches approach the outer rail.



Step 8. Secure the tray with two M6 x 16 screws to the front of the rack cabinet.



After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

Server cover replacement

Follow instructions in this section to remove and install the top cover.

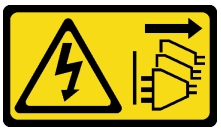
Remove the server cover

Follow instructions in this section to remove the top cover.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S014**



CAUTION:
Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 150.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

Procedure

Step 1. Remove the server cover.

a. ❶ Loosen the thumbscrew that secures the server cover with a screwdriver.

Note: The thumbscrew is an integrated part of the server cover. Do not try to remove it from the server cover.

b. ❷ Slide the server cover towards the rear of the server until the server cover is disengaged from the chassis.

c. ❸ Pivot the server cover outwards and remove it from the chassis. Place the cover on a flat clean surface.

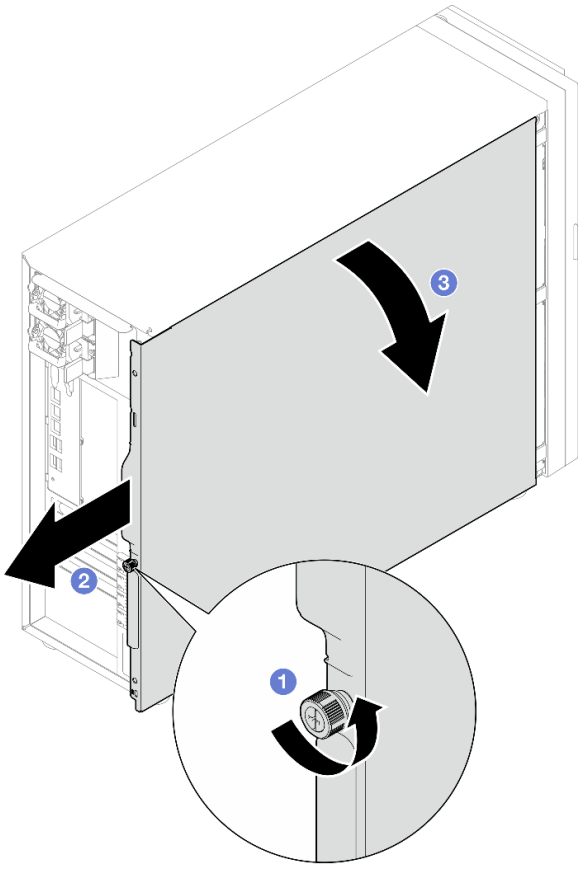


Figure 100. Removing the server cover

Attention: For proper cooling, always install the server cover before powering on the server. Operating the server without the cover properly installed might result in server component damage.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

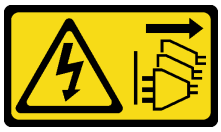
Install the server cover

Follow instructions in this section to install the top cover.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S014**



CAUTION:
Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

- **S033**



CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safely.
- Ensure that all adapters and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
- Ensure that all internal cables are correctly routed. See Chapter 6 "Internal cable routing" on page 183.
- If you are installing a new server cover, attach the service label to the inside of the new server cover first if necessary.

  Note: A new server cover comes without a service label attached. If you need a service label, order it together with the new server cover. The service label is free of charge.

Procedure

Step 1. Install the server cover.

a. ❶ Align the tabs on the server cover with the corresponding slots on the top edge of the chassis.

b. ❷ Pivot the server cover to close it.

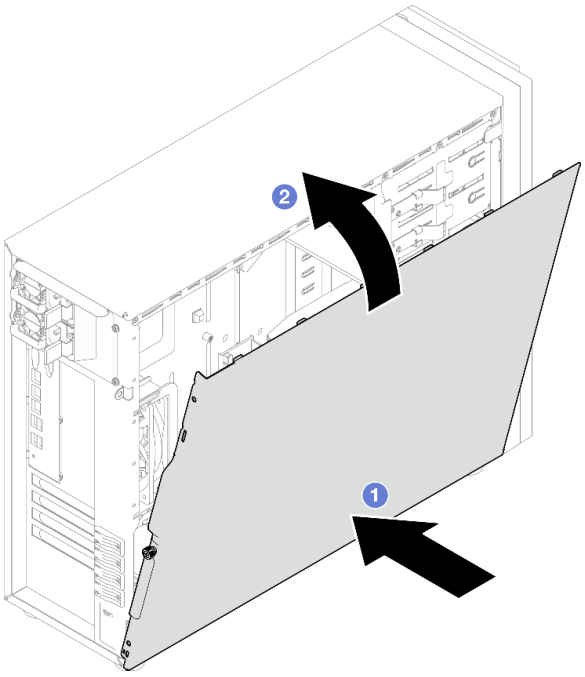


Figure 101. Positioning the server cover onto the chassis

Note: Before sliding the cover forward, ensure that all the tabs on the over align to the slots and engage the chassis properly.

Step 2. Secure the server cover to the chassis.

a. 1 Slide the server cover towards the front of the chassis until it stops.

b. 2 Tighten the thumbscrew with a screwdriver to secure the server cover.

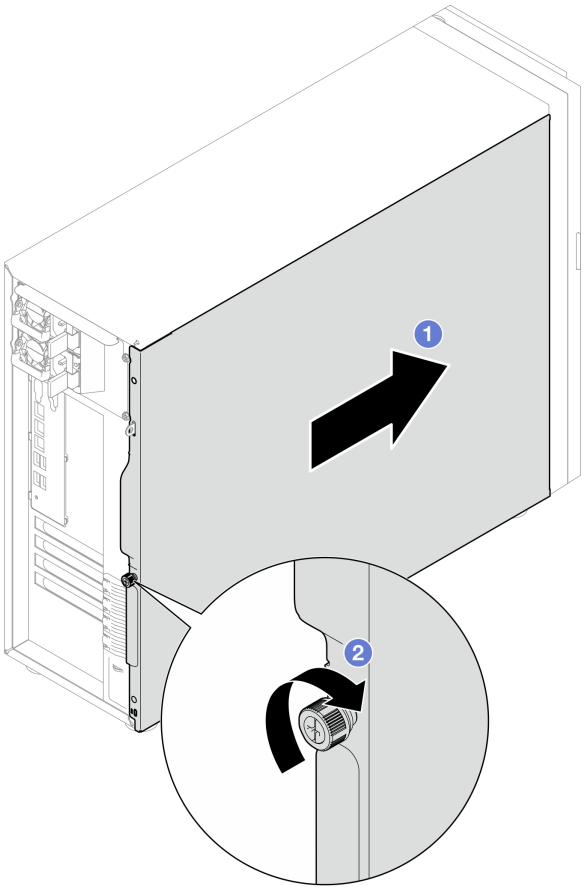


Figure 102. Securing the server cover to the chassis

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 180.

Demo video

Watch the procedure on Youtube

System board replacement (trained technician only)

Follow instructions in this section to remove and install the system board.

Important: This task must be operated by trained technicians.

CAUTION:
Hazardous moving parts. Keep fingers and other body parts away.



CAUTION:



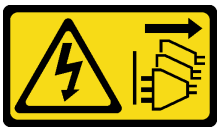
The heat sinks and processors might be very hot. Turn off the server and wait several minutes to let the server cool before removing the server cover.

Remove the firmware and RoT security module

Follow instructions in this section to remove the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

About this task

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- After replacing the firmware and RoT security module, update the firmware to the specific version supported by the server. Make sure that you have the required firmware or a copy of the pre-existing firmware before you proceed.
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 150.

Procedure

Step 1. Make preparation for this task.

a. Perform OneCLI commands or XCC actions to back up the UEFI and XCC settings. See https://pubs.lenovo.com/lxce-onecli/config_backup or https://pubs.lenovo.com/xcc2/NN1ia_c_backupthexcc.html.

b. Remove the server cover. See “Remove the server cover” on page 156.

c. If necessary, remove the PCIe adapters. See “Remove the PCIe adapter” on page 120.

Step 2. Remove the two screws that secure the Firmware and RoT security module to the system board, and remove the module.

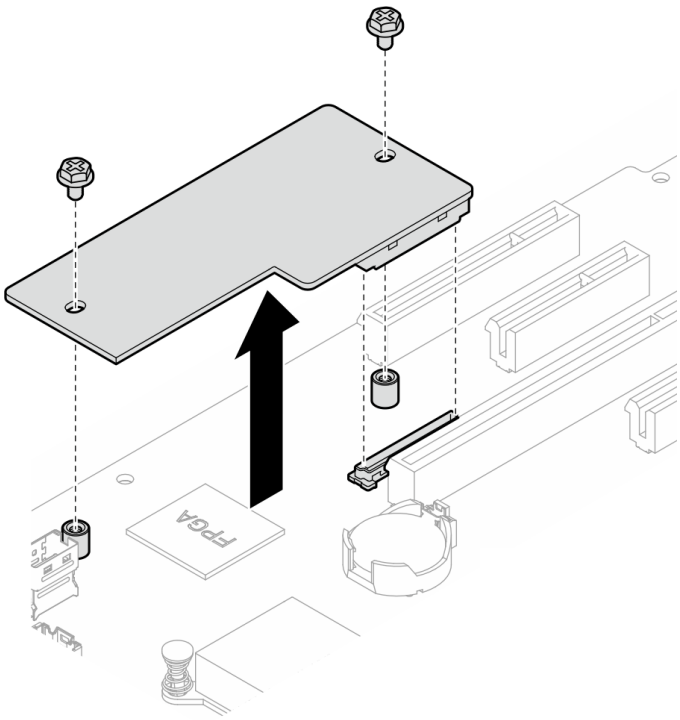


Figure 103. Firmware and RoT security module removal

After you finish

1. Install a replacement unit. See “Install the firmware and RoT security module” on page 163
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

Install the firmware and RoT security module

Follow instructions in this section to install the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

About this task

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.
- (Lenovo trained technicians only) After replacing the Firmware and RoT Security Module, update the UEFI, XCC and LXPM firmware to the specific version supported by the server. For detailed information on how to update the firmware, see https://support.lenovo.com/us/en/solutions/TT3485.

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 150.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/st250v3/7dce/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" on page 217 for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Step 2. Install the firmware and RoT security module to the server and tighten the two screws to secure the Firmware and RoT security module to the system board.

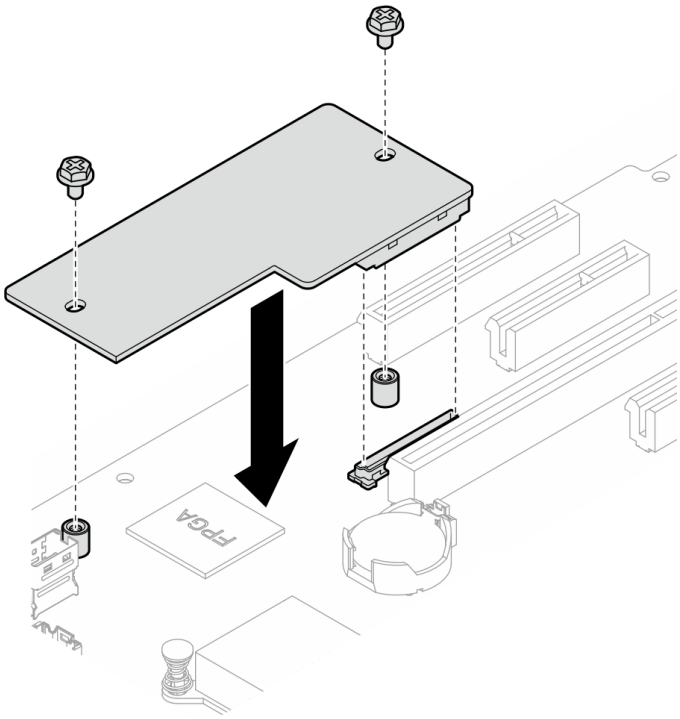


Figure 104. Firmware and RoT security module installation

Step 3. Connect cables to the system board. See “System-board connectors” on page 28

After you finish

1. Reinstall the PCIe adapter. See “Install the PCIe adapter” on page 122.
2. Reconnect all the cables that were removed. See Chapter 6 “Internal cable routing” on page 183.
3. Reinstall the server cover. See “Install the server cover” on page 158.
4. Complete the parts replacement. See “Complete the parts replacement” on page 180.
5. Update the UEFI, XCC and LXPM firmware to the specific version supported by the server. See https://support.lenovo.com/us/en/solutions/TT3485 (Lenovo service technicians only).
6. Perform OneCLI commands or XCC actions to restore the UEFI and XCC settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_restore_command or https://pubs.lenovo.com/xcc2/NN1ia_c_restorethexcc.html.
7. Set the TPM policy. See “Enable TPM” on page 165.
8. Optionally, do the following if needed:
   - Hide TPM. See “Hide/observe TPM” on page 167.
   - Update the TPM firmware. See “Update the TPM firmware” on page 168.
   - Enable UEFI Secure Boot. See “Enable UEFI Secure Boot” on page 175.

Demo video

Watch the procedure on Youtube

Enable TPM

The server supports Trusted Platform Module (TPM), Version 1.2 or Version 2.0.

Note: For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a Trusted Cryptographic Module (TCM) adapter or a TPM adapter (sometimes called a daughter card).

When a system board is replaced, you must make sure that the TPM policy is set correctly.

CAUTION:
Take special care when setting the TPM policy. If it is not set correctly, the system board can become unusable.

Set the TPM policy

By default, a replacement system board is shipped with the TPM policy set to **undefined**. You must modify this setting to match the setting that was in place for the system board that is being replaced.

There are two methods available to set the TPM policy:

- From Lenovo XClarity Provisioning Manager

  To set the TPM policy from Lenovo XClarity Provisioning Manager:

  1. Start the server and 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/.)
  2. If the power-on Administrator password is required, enter the password.
  3. From the System Summary page, click **Update VPD**.
  4. Set the policy to one of the following settings.
     - **NationZ TPM 2.0 enabled - China only**. Customers in the Chinese Mainland should choose this setting if a NationZ TPM 2.0 adapter is installed.
     - **TPM enabled - ROW**. Customers outside of the Chinese Mainland should choose this setting.
     - **Permanently disabled**. Customers in the Chinese Mainland should use this setting if no TPM adapter is installed.

     Note: Although the setting **undefined** is available as a policy setting, it should not be used.

- From Lenovo XClarity Essentials OneCLI

  Note: Please note that a Local IPMI user and password must be setup in Lenovo XClarity Controller for remote accessing to the target system.

  To set the TPM policy from Lenovo XClarity Essentials OneCLI:

  1. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked:
     `OneCli.exe config show IMM.TpmTcmPolicyLock --override --bmc <userid>:<password>@<ip_address>`

     Note: The IMM.TpmTcmPolicyLock value must be 'Disabled', which means TPM_TCM_POLICY is NOT locked and changes to the TPM_TCM_POLICY are permitted. If the return code is ‘Enabled’ then no changes to the policy are permitted. The planar may still be used if the desired setting is correct for the system being replaced.
  2. Configure the TPM_TCM_POLICY into XCC:
     - For customers in Chinese Mainland with no TPM, or customers that require to disable TPM:
       `OneCli.exe config set IMM.TpmTcmPolicy "NeitherTpmNorTcm" --override --bmc <userid>:<password>@<ip_address>`
     - For customers in Chinese Mainland that require to enable TPM:
       `OneCli.exe config set IMM.TpmTcmPolicy "NationZTPM20Only" --override --bmc <userid>:<password>@<ip_address>`

- For customers outside Chinese Mainland that require to enable TPM:
  `OneCli.exe config set IMM.TpmTcmPolicy "TpmOnly" --override --bmc <userid>:<password>@<ip_address>`

3. Issue reset command to reset system:
   `OneCli.exe misc ospower reboot --bmc <userid>:<password>@<ip_address>`
4. Read back the value to check whether the change has been accepted:
   `OneCli.exe config show IMM.TpmTcmPolicy --override --bmc <userid>:<password>@<ip_address>`

   Notes:

   - If the read back value is matched it means the TPM_TCM_POLICY has been set correctly.

     imm.TpmTcmPolicy is defined as below:

     - Value 0 use string “Undefined” , which means UNDEFINED policy.
     - Value 1 use string “NeitherTpmNorTcm”, which means TPM_PERM_DISABLED.
     - Value 2 use string “TpmOnly”, which means TPM_ALLOWED.
     - Value 4 use string “NationZTPM20Only”, which means NationZ_TPM20_ALLOWED.
   - Below 4 steps must also be used to ‘lock’ the TPM_TCM_POLICY when using OneCli/ASU commands:
5. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked , command as below:
   `OneCli.exe config show IMM.TpmTcmPolicyLock --override --bmc <userid>:<password>@<ip_address>`

   The value must be 'Disabled', it means TPM_TCM_POLICY is NOT locked and must be set.
6. Lock the TPM_TCM_POLICY:
   `OneCli.exe config set IMM.TpmTcmPolicyLock "Enabled" --override --bmc <userid>:<password>@<ip_address>`
7. Issue reset command to reset system, command as below:
   `OneCli.exe misc ospower reboot --bmc <userid>:<password>@<ip_address>`

   During the reset, UEFI will read the value from imm.TpmTcmPolicyLock, if the value is 'Enabled' and the imm.TpmTcmPolicy value is valid, UEFI will lock the TPM_TCM_POLICY setting.

   Note: The valid values for imm.TpmTcmPolicy include 'NeitherTpmNorTcm', 'TpmOnly', and 'NationZTPM20Only'.

   If the imm.TpmTcmPolicyLock is set as 'Enabled' but imm.TpmTcmPolicy value is invalid, UEFI will reject the 'lock' request and change imm.TpmTcmPolicyLock back to 'Disabled'.
8. Read back the value to check whether the ‘Lock’ is accepted or rejected. Command as below:
   `OneCli.exe config show IMM.TpmTcmPolicy --override --bmc <userid>:<password>@<ip_address>`

   Note: If the read back value is changed from 'Disabled' to 'Enabled' that means the TPM_TCM_POLICY has been locked successfully. There is no method to unlock a policy once it has been set other than replacing system board.

   imm.TpmTcmPolicyLock is defined as below:

   Value 1 uses string “Enabled" , which means lock the policy. Other values are not accepted.

Hide/observe TPM

TPM is enabled by default to encrypt data transfer for system operation. Optionally, you can disable TPM using Unified Extensible Firmware Interface (UEFI) or Lenovo XClarity Essentials OneCLI.

Using UEFI

For details, see “Hide TPM from OS” in *UEFI User Guide* at https://pubs.lenovo.com/uefi-overview/.

Using Lenovo XClarity Essentials OneCLI

To disable TPM, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

   To download Lenovo XClarity Essentials OneCLI, go to the following site:

   https://datacentersupport.lenovo.com/solutions/HT116433

2. Run the following command:

   `OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" -bmc <userid>:<password>@<ip_address>`

   where:

   - *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)
   - *<ip_address>* is the IP address of the BMC.

   Example:

```
D:\onecli>OneCli.exe config set UEFI.TrustedComputingGroup_TPMDevice "Disabled" --bmc USERID:PASSWORD@10.245.38.64
[1s]Certificate check finished [100%][=======================================================================>]
Start to connect BMC at 10.245.38.64 to apply config set
Invoking SET command ...
UEFI.TrustedComputingGroup_TPMDevice=Disabled
Changes completed successfully, but these changes will not take effect until next reboot.
Succeed.
```

3. Reboot the system.

If you want to enable TPM again, run the following command and reboot the system:
`OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" -bmc <userid>:<password>@<ip_address>`

Example:

```
D:\onecli>OneCli.exe config set UEFI.TrustedComputingGroup_TPMDevice "Enabled" --bmc USERID:PASSWORD@10.245.38.64
[1s]Certificate check finished [100%][=======================================================================>]
Start to connect BMC at 10.245.38.64 to apply config set
Invoking SET command ...
UEFI.TrustedComputingGroup_TPMDevice=Enabled
Changes completed successfully, but these changes will not take effect until next reboot.
Succeed.
```

Update the TPM firmware

Optionally, you can update the TPM firmware using Lenovo XClarity Essentials OneCLI.

Note: TPM firmware update is irreversible. After update, the TPM firmware cannot be downgraded to earlier versions.

TPM firmware version

Follow the procedure below to see the TPM firmware version:

From Lenovo XClarity Provisioning Manager

1. Start the server and 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/.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Trusted Platform Module → TPM 2.0 → TPM Firmware Version**.

Update the TPM firmware

To update the TPM firmware, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

   To download Lenovo XClarity Essentials OneCLI, go to the following site:

   https://datacentersupport.lenovo.com/solutions/HT116433

2. Run the following command:
   `OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version <x.x.x.x>" --bmc <userid>:<password>@<ip_address>`

   where:

   - *<x.x.x.x>* is the target TPM version.

     e.g. TPM 2.0 (7.2.1.0) -> TPM 2.0 (7.2.2.0):

     `OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version 7.2.2.0" --bmc <userid>:<password>@<ip_address>`

   - *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o).
   - *<ip_address>* is the IP address of the BMC.

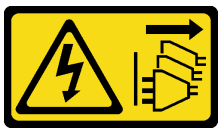
Remove the system board

Follow instructions in this section to remove the system board.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**

  CAUTION:
  The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S012**

  CAUTION:
  Hot surface nearby.

- **S017**



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- If the server is installed in a rack, remove the server from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

Procedure

Step 1. Make preparations for this task.

a. Record all system configuration information, such as Lenovo XClarity Controller IP addresses, vital product data, and the machine type, model number, serial number, Universally Unique Identifier, and asset tag of the server.

b. Save the system configuration to an external device with Lenovo XClarity Essentials.

c. Save the system event log to external media.

d. Remove the server cover. See “Remove the server cover” on page 156.

e. Remove the front and rear system fan. See “Remove the front system fan” on page 74 and “Remove the rear system fan” on page 78.

f. Remove the M.2 boot adapter. See “Remove the M.2 boot adapter” on page 98.

g. Remove the PCIe adapters. See “Remove the PCIe adapter” on page 120.

h. Label the slot number on each memory module, then remove all the memory modules from the system board and set them aside on a static-protective surface for reinstallation. See “Remove a memory module” on page 107.

i. Remove the heat sink and fan assembly. See “Remove the heat sink and fan module” on page 91.

j. Remove the processor. See “Remove the processor” on page 142.

k. Remove the Firmware and RoT security module. See “Remove the firmware and RoT security module” on page 162.

l. Make notes of where the cables are connected to the system board; then, disconnect all the cables.

Attention: Disengage all latches, cable clips, release tabs, or locks on cable connectors beforehand. Failing to release them before removing the cables will damage the cable connectors on the system board. Any damage to the cable connectors may require replacing the system board.

Step 2. Place the server on the side with the system board facing up.

Step 3. Remove the eight screws that secure the system board following the recommended numerical sequence shown in the illustration; then, carefully remove the system board out of the chassis.

Note: For reference, the torque required to fully loosen the screws is 0.5–0.6 newton-meters, 4.5–5.5 inch-pounds.

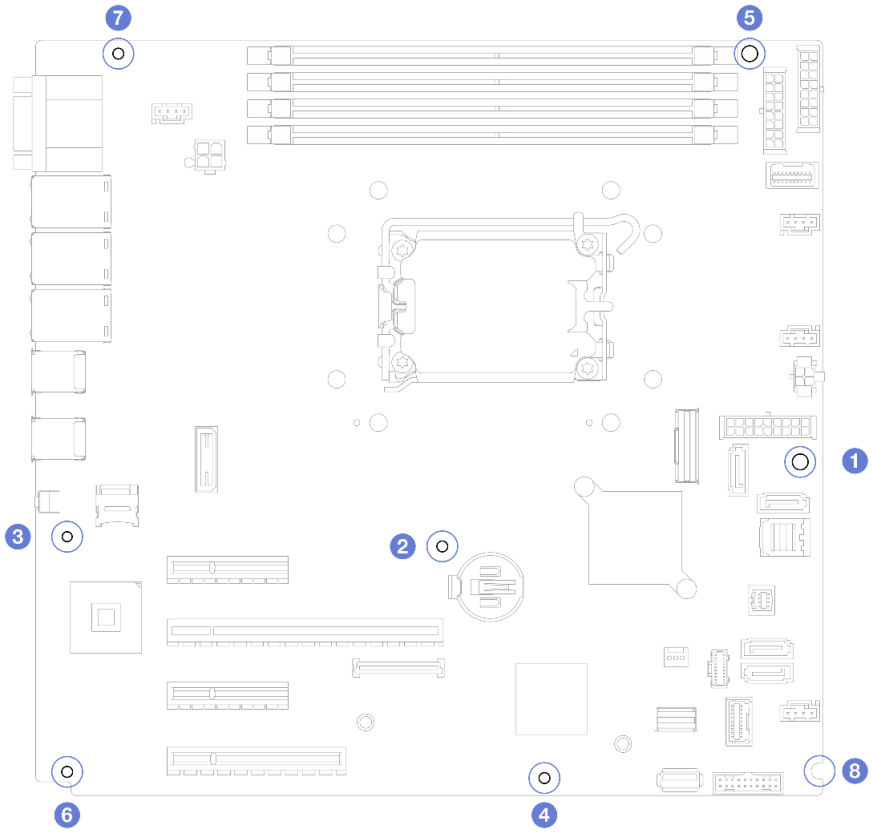


Figure 105. Removing the screws that secure the system board.

Step 4. Place the system board on a clean, flat, and static-protective surface.

After you finish

- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

  Important: Before you return the system board, make sure that you install the processor socket dust covers from the new system board. To replace a processor socket dust cover:

  1. Take a dust cover from the processor socket assembly on the new system board and orient it correctly above the processor socket assembly on the removed system board.
  2. Gently press down the dust cover legs to the processor socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the dust cover is securely attached.
  3. **Make sure** that the dust cover is securely attached to the processor socket assembly.

Demo video

Watch the procedure on Youtube

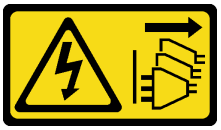
Install the system board

Follow instructions in this section to install the system board.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S012**



CAUTION:
Hot surface nearby.

- **S017**



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/st250v3/7dce/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 217 for more information on firmware updating tools.

Procedure

Attention: Before install the new system board, make sure that the power supply cage has been installed into the chassis to avoid damaging components on the system board.

Step 1. Note the orientation of the new system board, and carefully place it into the chassis. Ensure that the serial port on the system board is inserted into the corresponding slot, and the eight screw holes on the system board are aligned with the corresponding mounting studs on the chassis.

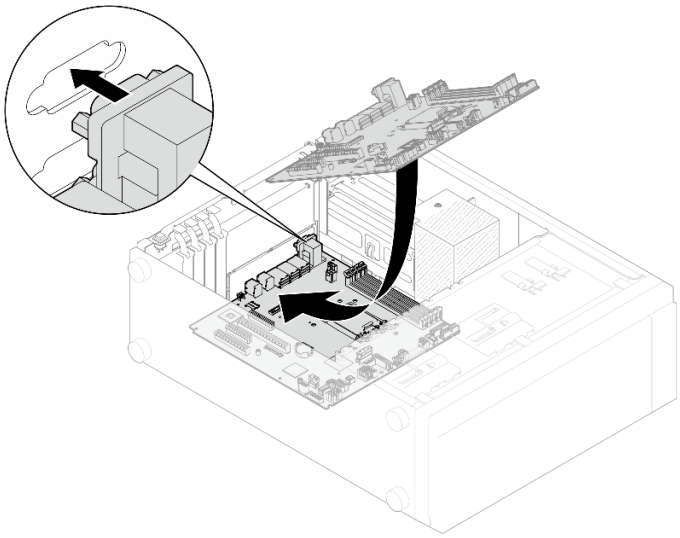


Figure 106. Installing the system board

Step 2. Secure the system board by tightening the eight screws in the sequence shown in the illustration.

Note: For reference, the torque required to fully tighten the screws is 0.5-0.6 newton-meters, 4.5-5.5 inch-pounds.

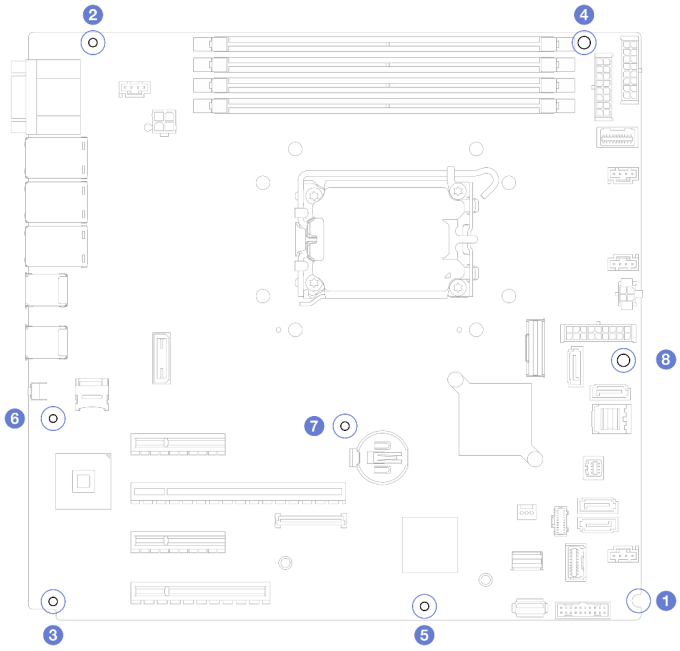


Figure 107. Tightening the screws to secure the system board

After you finish

1. Reconnect all the required cables to the same connectors on the system board as the defective system board. See Chapter 6 “Internal cable routing” on page 183.
2. Reinstall the Firmware and RoT security module. See “Install the firmware and RoT security module” on page 163.
3. Reinstall the processor. See “Install the processor ” on page 143.

4. Reinstall the heat sink and fan assembly. See “Install the heat sink and the fan module” on page 93.
5. Reinstall the memory module. See “Install a memory module” on page 111.
6. Reinstall the PCIe adapter. See “Install the PCIe adapter” on page 122.
7. Reinstall the M.2 adapter. See “Install the M.2 boot adapter” on page 101.
8. Reinstall the rear system fan. See “Install the rear system fan” on page 80.
9. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the server.
10. Reinstall the server cover. See “Install the server cover” on page 158.
11. If the sever was installed in a rack, reinstall the server into the rack. See “Install the server to rack” on page 152.
12. Reconnect the power cords and any cables that you removed.
13. Power on the server and any peripheral devices. See “Power on the server” on page 48.
14. Update the vital product data (VPD). See “Update the Vital Product Data (VPD)” on page 174.

    Machine type number and serial number can be found on the ID label, see “Identify the server and access the Lenovo XClarity Controller” on page 35.
15. If hiding TPM or updating TPM firmware is needed, see “Hide/observe TPM” on page 167 or “Update the TPM firmware” on page 168.
16. Optionally, enable UEFI Secure Boot. See “Enable UEFI Secure Boot” on page 175.

Demo video

Watch the procedure on Youtube

Update the Vital Product Data (VPD)

Use this topic to update the Vital Product Data (VPD).

- **(Required)** Machine type
- **(Required)** Serial number
- **(Required)** System model
- (Optional) Asset tag
- (Optional) UUID

Recommended tools:

- Lenovo XClarity Provisioning Manager
- Lenovo XClarity Essentials OneCLI commands

Using Lenovo XClarity Provisioning Manager

Steps:

1. Start the server and press the key according to the on-screen instructions. The Lenovo XClarity Provisioning Manager interface is displayed by default.
2. Click ⚙ on the top right corner of the Lenovo XClarity Provisioning Manager main interface.
3. Click **Update VPD**; then, follow on-screen instructions to update the VPD.

Using Lenovo XClarity Essentials OneCLI commands

- Updating **machine type**

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
```

- Updating **serial number**
```
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
```
- Updating **system model**
```
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]
```
- Updating **asset tag**
```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
```
- Updating **UUID**
```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]
```

Variable	Description
<m/t_model>	The server machine type and model number. Type `xxxxyyyyyy`, where `xxxx` is the machine type and `yyyyyy` is the server model number.
<s/n>	The serial number on the server. Type `zzzzzzzz` (length 8-10 characters), where `zzzzzzzz` is the serial number.
<system model>	The system model on the server. Type `system yyyyyyyy`, where *yyyyyyyy* is the product identifier.
<asset_tag>	The server asset tag number. Type `aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where `aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa` is the asset tag number.
[access_method]	The access method that you select to access the target server. • Online KCS (unauthenticated and user restricted): You can directly delete *[access_method]* from the command. • Online authenticated LAN: In this case, specify below LAN account information at the end of the OneCLI command: `--bmc-username` *<user_id>* `--bmc-password` *<password>* • Remote WAN/LAN: In this case, specify below XCC account information and IP address at the end of the OneCLI command: `--bmc` *<bmc_user_id>*:*<bmc_password>*`@`*<bmc_external_IP>* **Notes:** – *<bmc_user_id>* The BMC account name (1 of 12 accounts). The default value is USERID. – *<bmc_password>* The BMC account password (1 of 12 accounts).

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

  To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

1. Start the server and 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/.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Secure Boot Configuration → Secure Boot Setting**.
4. Enable Secure Boot and save the settings.

Note: If disabling UEFI secure boot is needed, select Disable in step 4.

- From Lenovo XClarity Essentials OneCLI

  To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

  1. Download and install Lenovo XClarity Essentials OneCLI.

     To download Lenovo XClarity Essentials OneCLI, go to the following site:

     https://datacentersupport.lenovo.com/solutions/HT116433

  2. Run the following command to enable Secure Boot:
     `OneCli.exe config set UEFI.SecureBootConfiguration_SecureBootSetting Enabled --bmc <userid>:<password>@<ip_address>`

     where:

     – *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)

     – *<ip_address>* is the IP address of the BMC.

     For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

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

  Note: If disabling UEFI secure boot is needed, run the following command:
  `OneCli.exe config set UEFI.SecureBootConfiguration_SecureBootSetting Disabled --bmc <userid>:<password>@<ip_address>`

Tape drive replacement

Follow instructions in this section to remove and install the tape drive.

Your server supports RDX and LTO tape drives.

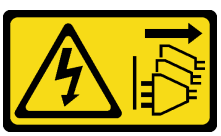
Remove a tape drive

Follow instructions in this section to remove a tape drive.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S006**



CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

  - **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
  - **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 48.
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a padlock.
- Use the front door key to unlock the front door, and then open the front door.

Procedure

Step 1. Remove the server cover. See "Remove the server cover" on page 156.

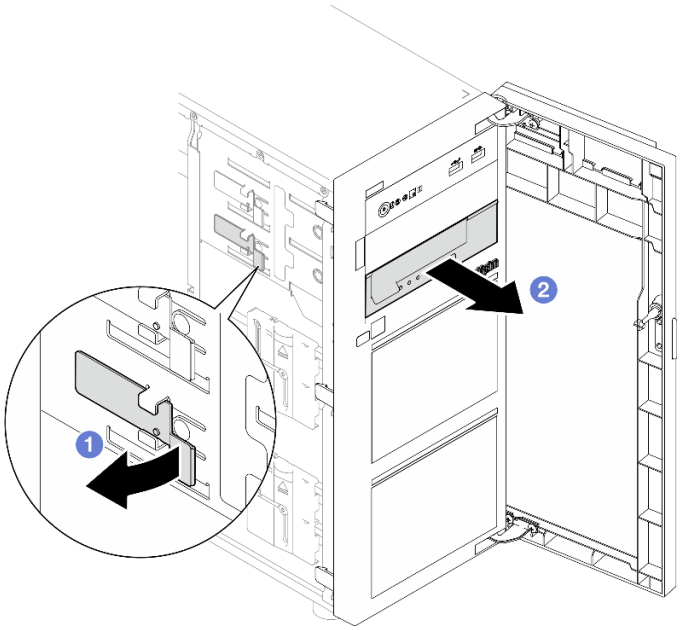
Step 2. Disconnect the cables from the rear of the tape drive.

Step 3. Remove a tape drive.

  a. 1 Gently pull and hold the metal tab on the side of the chassis and push the tape drive outward from the rear.

b. 2 Carefully pull the tape drive out of the chassis.

Figure 108. Removing a tape drive



After you finish

1. Install one of the following:
   - Another tape drive or an optical drive. See “Install a tape drive” on page 178 or “Install an optical drive” on page 116.
   - A drive filler in the vacant drive bay.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on Youtube

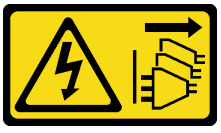
Install a tape drive

Follow instructions in this section to install a tape drive.

About this task

To avoid potential danger, read and follow the following safety statements.

- **S002**



CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S006**



CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

Attention:

- Read "Installation Guidelines" on page 41 and "Safety inspection checklist" on page 42 to ensure that you work safety.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. If a filler is installed in the drive bay, remove it first. Keep the drive filler in a safe place for future use.

Step 2. Install a tape drive.

Note: The tape drive must be installed into the lower optical drive bay.

a. ❶ Gently pull and hold the metal tab on the side of the chassis, and insert the tape drive into the lower drive bay.

b. ❷ Release the tab and then continue to slide the tape drive in until it snaps into place.

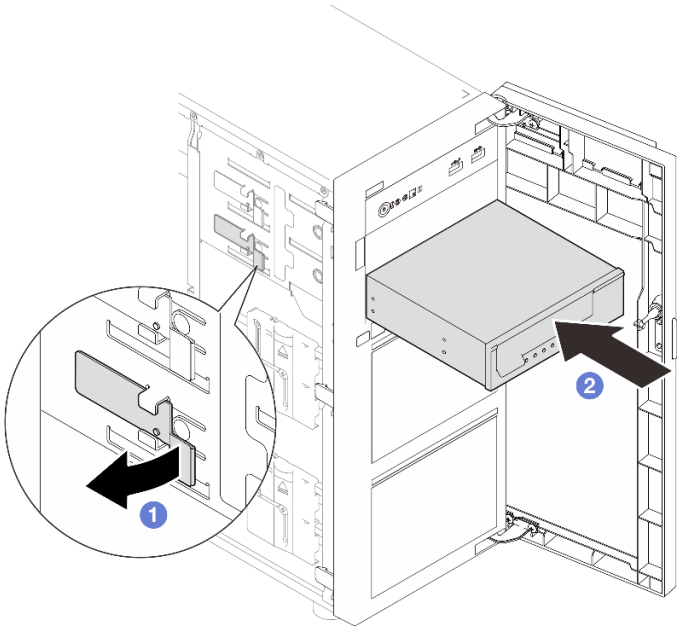


Figure 109. Installing a tape drive

Step 3. Connect the power and signal cables to the rear of the tape drive. See "Optical/tape drives cable routing" on page 194.

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 180.

Demo video

Watch the procedure on Youtube

Complete the parts replacement

Go through the checklist to complete parts replacement

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.
2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.
3. If necessary, reinstall the server cover. See "Install the server cover" on page 158.
4. If necessary, reinstall the front door. See "Install the front door" on page 86.
5. If necessary, reinstall the front bezel. See "Install the front bezel" on page 84.
6. If the sever was installed in a rack, reinstall the server into the rack. See "Install the server to rack" on page 152.
7. Reconnect the power cords and any cables that you removed.

   Attention: To avoid component damage, connect the power cords last.
8. Power on the server and any peripheral devices. See "Power on the server" on page 48.

9. Update the server configuration.
   - Download and install the latest device drivers: http://datacentersupport.lenovo.com.
   - Update the system firmware. See “Update the firmware” on page 217.
   - Update the UEFI configuration. See https://pubs.lenovo.com/uefi-overview/.
   - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See https://pubs.lenovo.com/lxpm-overview/ for the LXPM documentation compatible with your server.

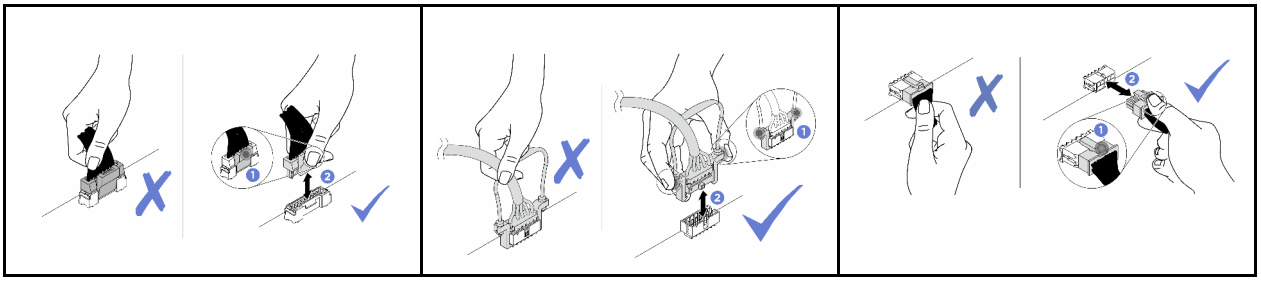
Chapter 6. Internal cable routing

See this section to do cable routing for specific components.

Attention: Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables from the system board. Failing to release them before removing the cables will damage the cable sockets on the system board, which are fragile. Strictly observe the following instructions to avoid damaging cable sockets on the system board. Any damage to the cable sockets might require replacing the system board.

- Connect cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.
- To disconnect cables from the system board, do as follows:
  1. Press and hold all latches, release tabs, or locks on cable connectors to release the cable connectors.
  2. Remove the cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.

     Note: The cable connectors might look different from those in the illustration, but the removal procedure is the same.



Identifying connectors

See this section to locate and identify the connectors on the electric boards.

Drive backplates/backplanes

See this section to locate the connectors in the drive backplates/backplanes.

Following are the drive backplate/backplanes that are supported by this server:

- **Simple-swap drive backplates**
  - “3.5-inch simple-swap backplate (Bay 0-3)” on page 184
  - “3.5-inch simple-swap backplate (Bay 4-7 without optical disk drive)” on page 184
  - “3.5-inch simple-swap backplate (Bay 4-5 with optical disk drive)” on page 185
- **Hot-swap drive backplanes**
  - “3.5-inch hot-swap backplane” on page 185
  - “2.5-inch hot-swap backplane” on page 186

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3.5-inch simple-swap backplate (Bay 0-3)

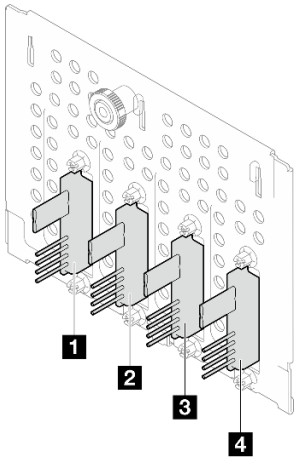


Table 15. 3.5-inch simple-swap backplate (Bay 0-3)

	Bay number in the lower drive cage
1 Signal/SATA connector	SATA 3
2 Signal/SATA connector	SATA 2
3 Signal/SATA connector	SATA 1
4 Signal/SATA connector	SATA 0

3.5-inch simple-swap backplate (Bay 4-7 without optical disk drive)

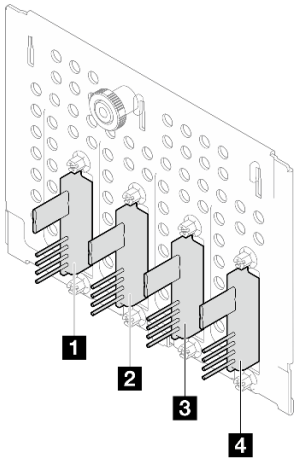


Table 16. 3.5-inch simple-swap backplate (Bay 4-7 without optical disk drive)

	Bay number in the lower drive cage
1 Signal/SATA connector	SATA 7 / NVMe 7
2 Signal/SATA connector	SATA 6 / NVMe 6
3 Signal/SATA connector	SATA 5
4 Signal/SATA connector	SATA 4

3.5-inch simple-swap backplate (Bay 4-5 with optical disk drive)

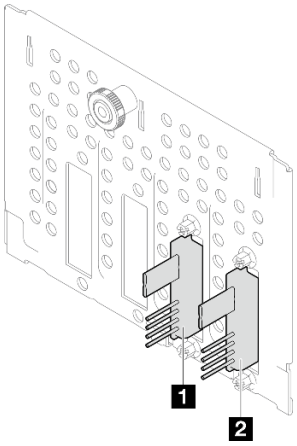


Table 17. 3.5-inch simple-swap backplate (Bay 4-5 with optical disk drive)

	Bay number in the lower drive cage
1 Signal/SATA connector	SATA 5
2 Signal/SATA connector	SATA 4

3.5-inch hot-swap backplane

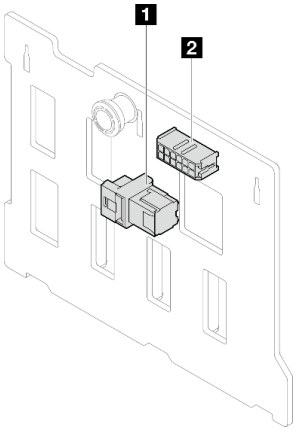


Table 18. 3.5-inch hot-swap backplane connectors

1 Power connector	2 SAS/SATA connector

2.5-inch hot-swap backplane

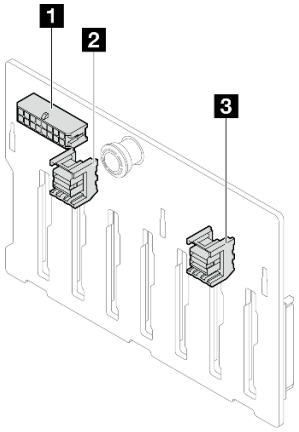


Table 19. 2.5-inch hot-swap backplane connectors

1 Power connector	3 SAS/SATA 0 connector
2 SAS/SATA 1 connector	

Power distribution board

See this section to locate the connectors in the power distribution board.

Power distribution board for hot-swap power supplies

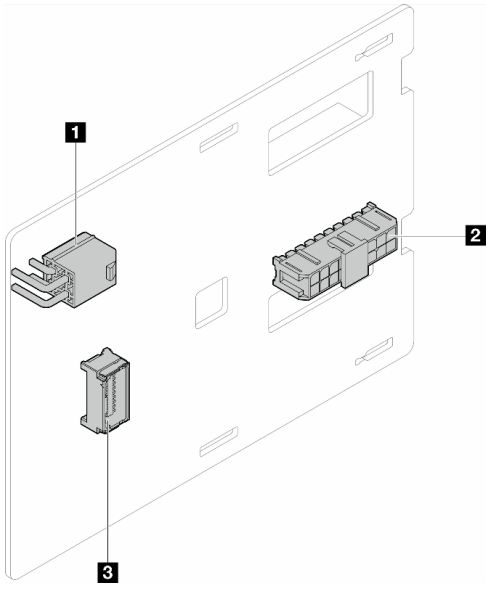


Figure 110. Power distribution board for hot-swap power supplies

Table 20. Power distribution board for hot-swap power supplies

1 Processor power connector	3 Side band connector
2 System power connector	

RAID adapters

The illustrations in this section identify the connectors on the RAID adapters.

Following are the RAID adapters that are supported by this server:

- "9350-8i" on page 187
- "940-8i" on page 187
- "4350/5350-8i" on page 188
- "9350-16i" on page 188

9350-8i

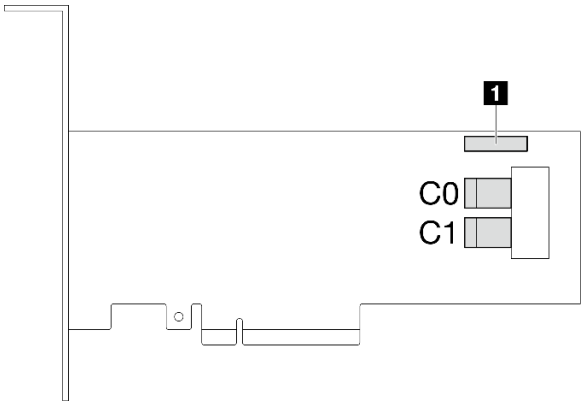


Figure 111. 9350-8i connectors

Table 21. 9350-8i connectors

1 RAID flash power module connector

940-8i

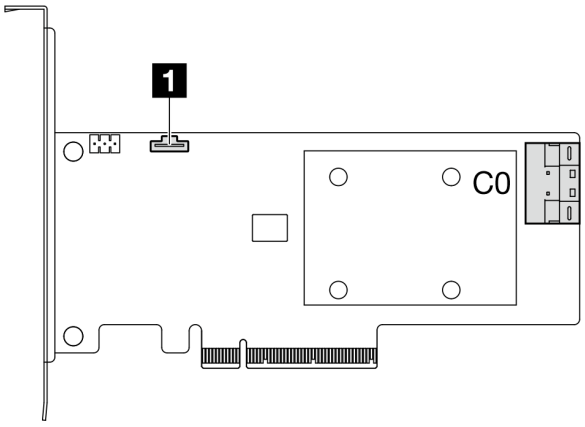


Figure 112. 940-8i connector

Table 22. 940-8i connector

1 RAID flash power module connector

4350/5350-8i

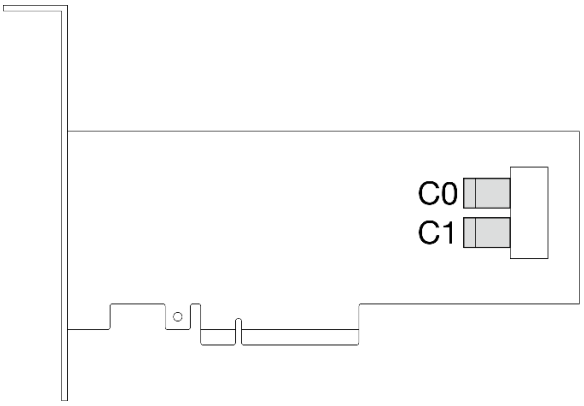


Figure 113. 4350/5350-8i connectors

9350-16i

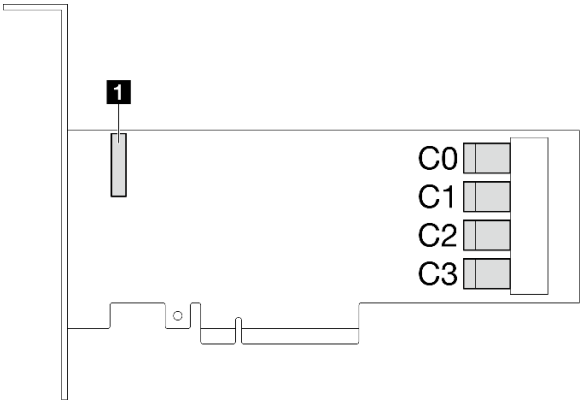


Figure 114. 9350-16i connectors

Table 23. 9350-16i connectors

1 RAID flash power module connector

System-board connectors for cable routing

The following illustrations show the internal connectors on the system board that are used for internal cable routing.

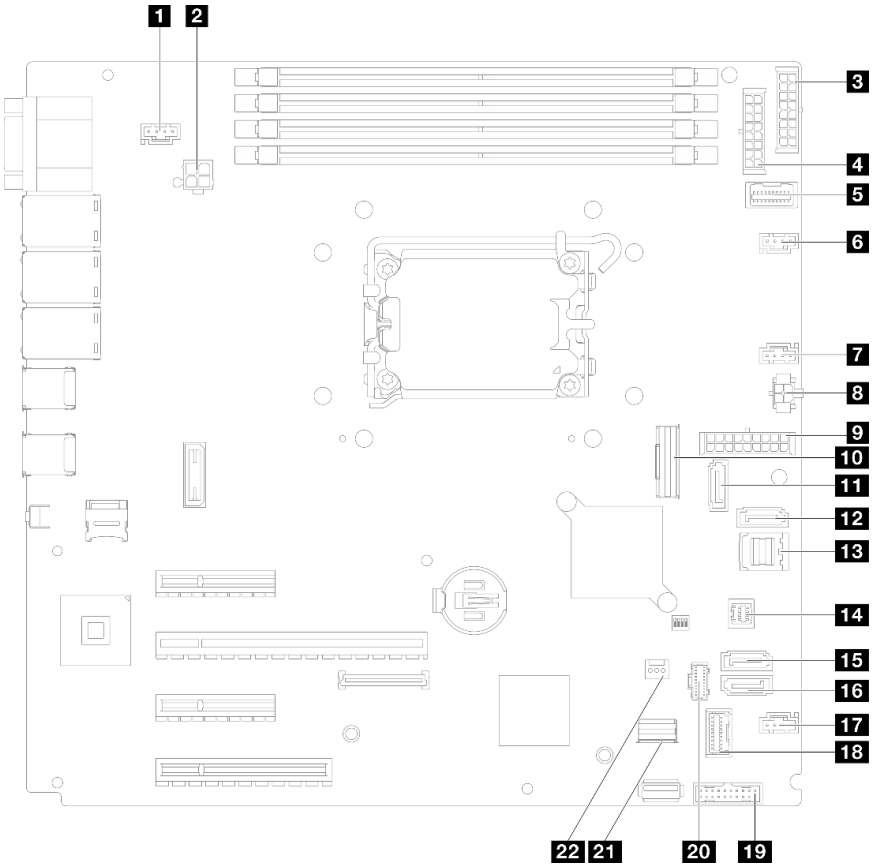


Figure 115. System-board connectors

Table 24. System board connectors

1 SYS_FAN3 connector	12 SATA 7
2 Processor power connector	13 SATA 0–3
3 BP2 power connector	14 SGPIO1 connector
4 BP1 power connector	15 SATA 5
5 Power distribution board side band connector	16 SATA 4
6 Fan1 connector	17 Fan4 connector
7 Fan2 connector	18 Front I/O module connector
8 Optical drive power connector	19 Front USB 3.0/2.0 header
9 System power connector	20 M.2 power connector
10 Slimline x8 connector	21 M.2 signal connector
11 SATA 6	22 Intrusion switch connector

Internal cable routing

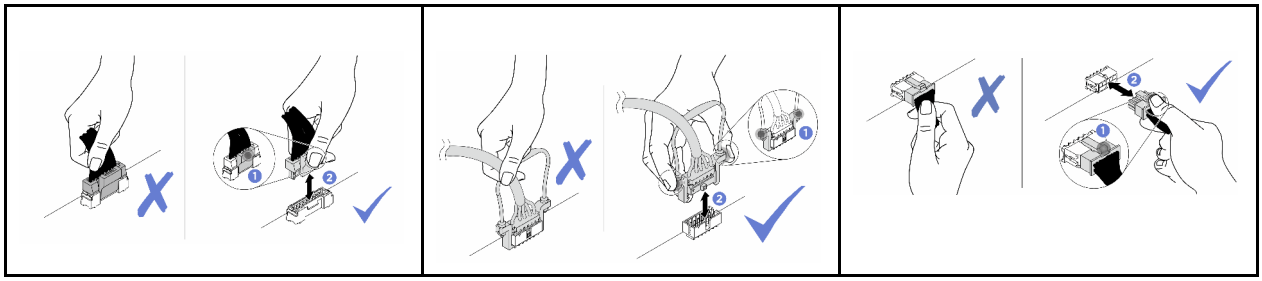
See this section to do cable routing for specific components.

Attention: Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables from the system board. Failing to release them before removing the cables will damage the cable sockets on

the system board, which are fragile. Strictly observe the following instructions to avoid damaging cable sockets on the system board. Any damage to the cable sockets might require replacing the system board.

- Connect cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.
- To disconnect cables from the system board, do as follows:
  1. Press and hold all latches, release tabs, or locks on cable connectors to release the cable connectors.
  2. Remove the cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.

     Note: The cable connectors might look different from those in the illustration, but the removal procedure is the same.



Fan power cable routing

Use the section to understand the internal routing and connectors for the fan power cables.

Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n

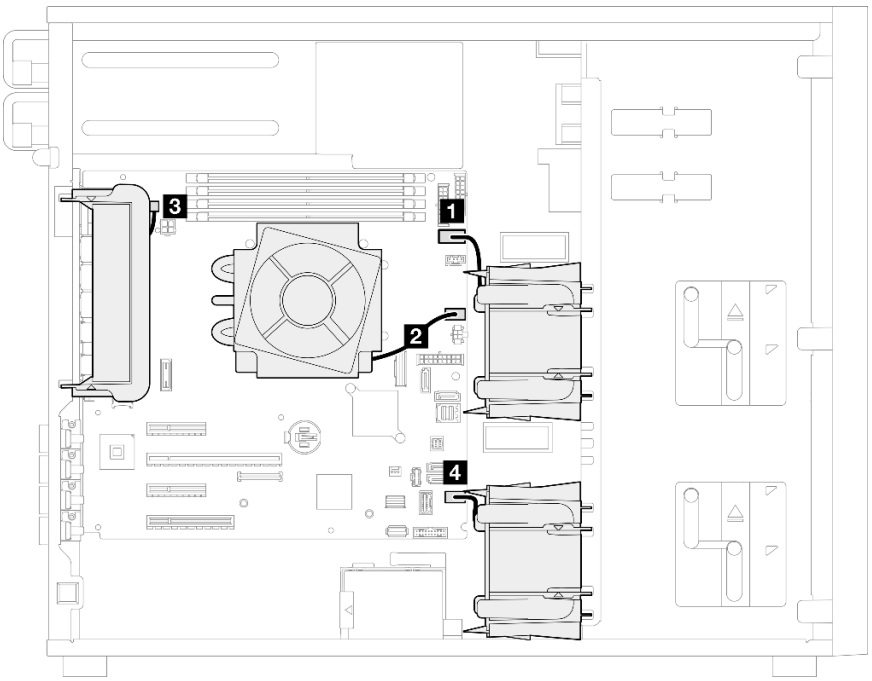


Figure 116. Fan power cable routing

Table 25. Location of fan power connectors on the system board

From	**To:** System board
1 Upper storage fan 1	Fan1 connector
2 Processor heat sink fan	Fan2 connector
3 Rear system fan	(Rear system fan) SYS_FAN3 connector
4 Lower storage fan 4	Fan4 connector

Front I/O module cable routing

Use the section to understand the cable routing for the front I/O module.

Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.

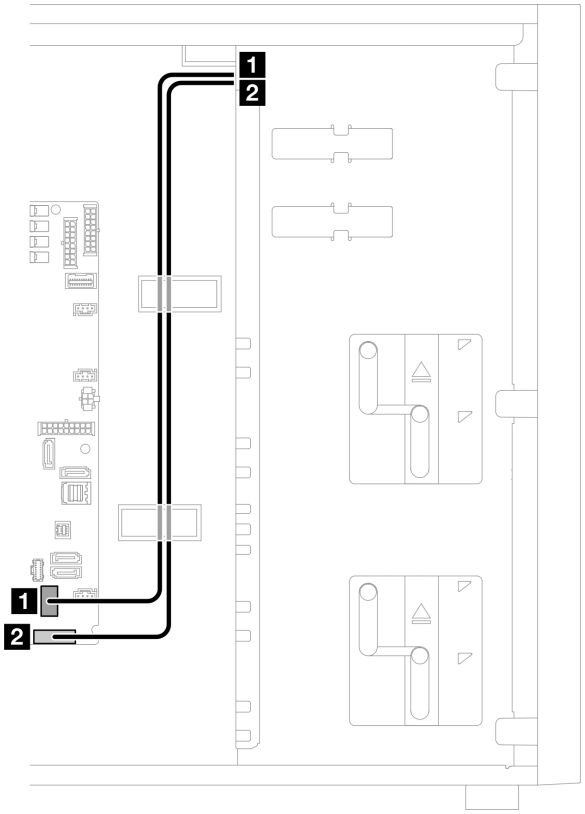


Figure 117. Cable routing for front I/O module

From	**To:** System board	**Cable**
1 Front I/O module	Front I/O module connector	630 mm
2 Front I/O module	Front USB connector	620 mm

M.2 adapter cable routing

Use this section to understand the cable routing for M.2 adapter.

Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n

ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit

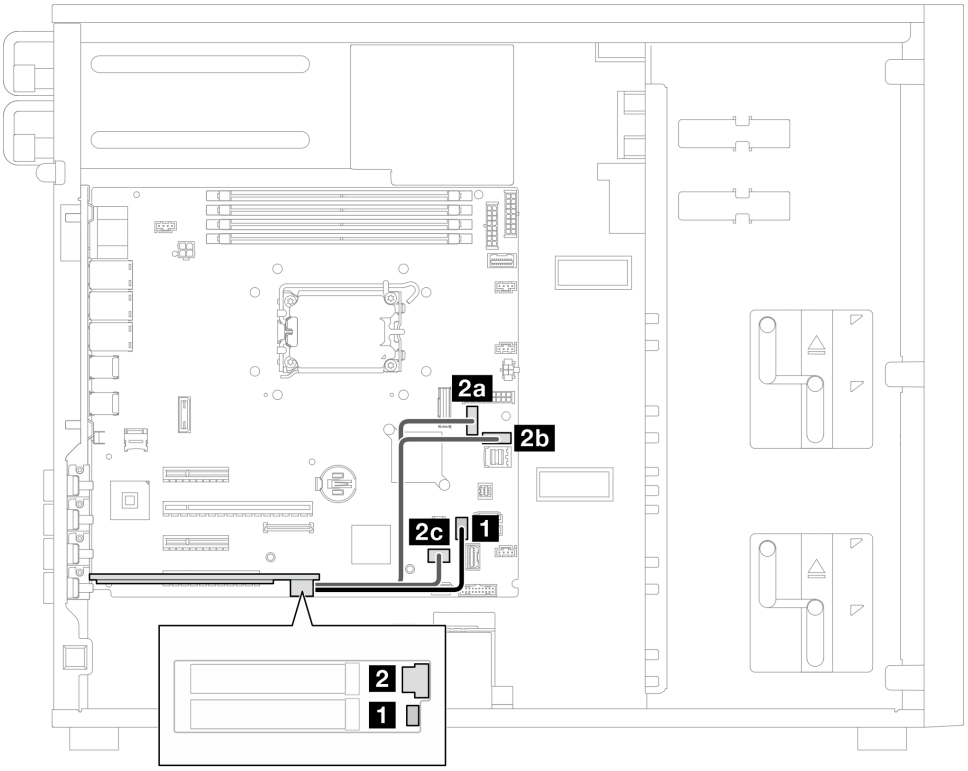


Figure 118. ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit

From	To: System board	Cable
1 M.2 boot adapter: power connector	M.2 power connector	130 mm
2 M.2 boot adapter: signal connector	• 2a SATA 6 • 2b SATA 7 • 2c M.2 signal connector	100/160/150 mm

ThinkSystem M.2 RAID B540i-2i SATA/NVMe Adapter

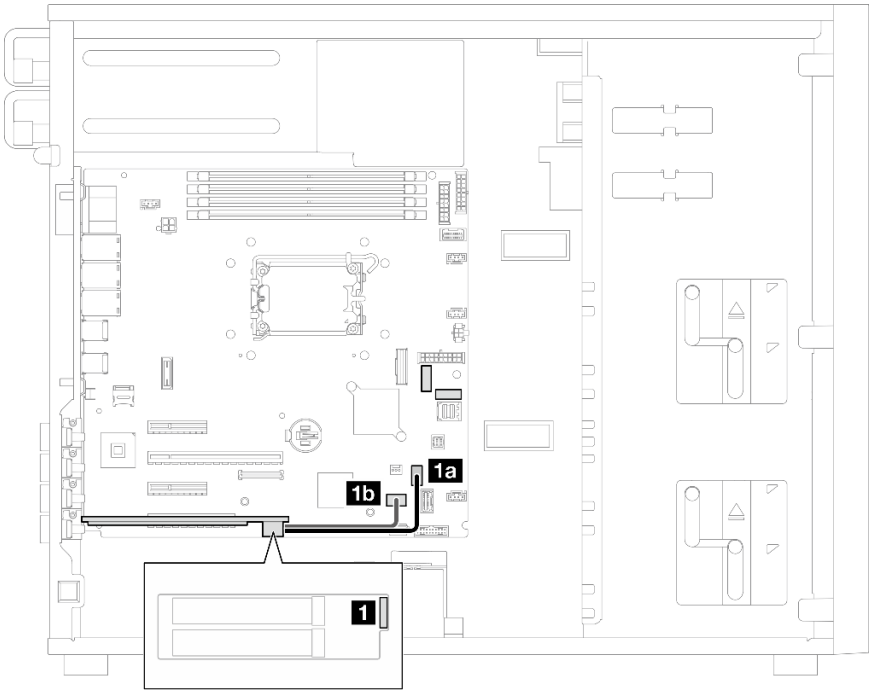


Figure 119. ThinkSystem M.2 RAID B540i-2i SATA/NVMe Adapter

From	To: System board	Cable
1 M.2 power and signal connector	1a M.2 power connector	130 mm
	1b M.2 signal connector	

Intrusion switch and RAID flash power module cable routing

Use this section to understand the cable routing for intrusion switch and RAID flash power module.

Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n

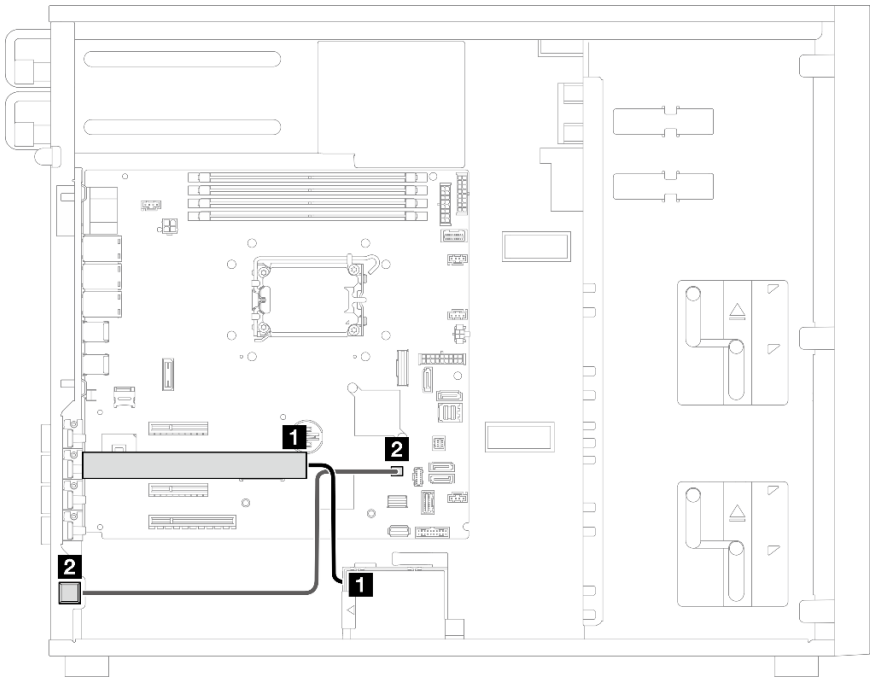


Figure 120. Cable routing for the intrusion switch and RAID flash power module

From	To: System board	Cable
1 Extension cable for RAID flash power module	Flash power module connector on the RAID adapter	330 mm
2 Intrusion switch	Intrusion switch connector	540 mm

Optical/tape drives cable routing

Use this section to understand the cable routing for server models with optical/tape drives.

Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.

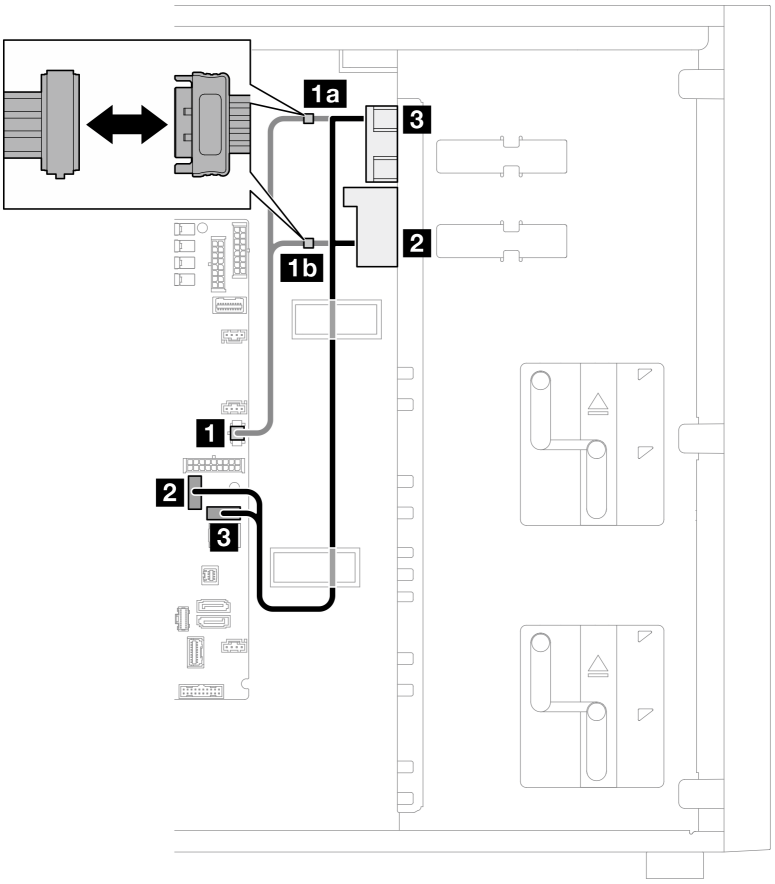


Figure 121. Cable routing for optical/tape drives

From	To: System board	Cable
1 ODD/Tape drive power connectors	1a 1b ODD/tape drive power connector	2x2 pin to 15pin/15pin (200 + 100 mm)
2 Lower ODD/Tape drive SATA connector	SATA 6	600/50 mm
3 Upper ODD/Tape drive SATA connector	SATA 7	

Fixed power supply cable routing

Use the section to understand the cable routing for the fixed power supply.

Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.

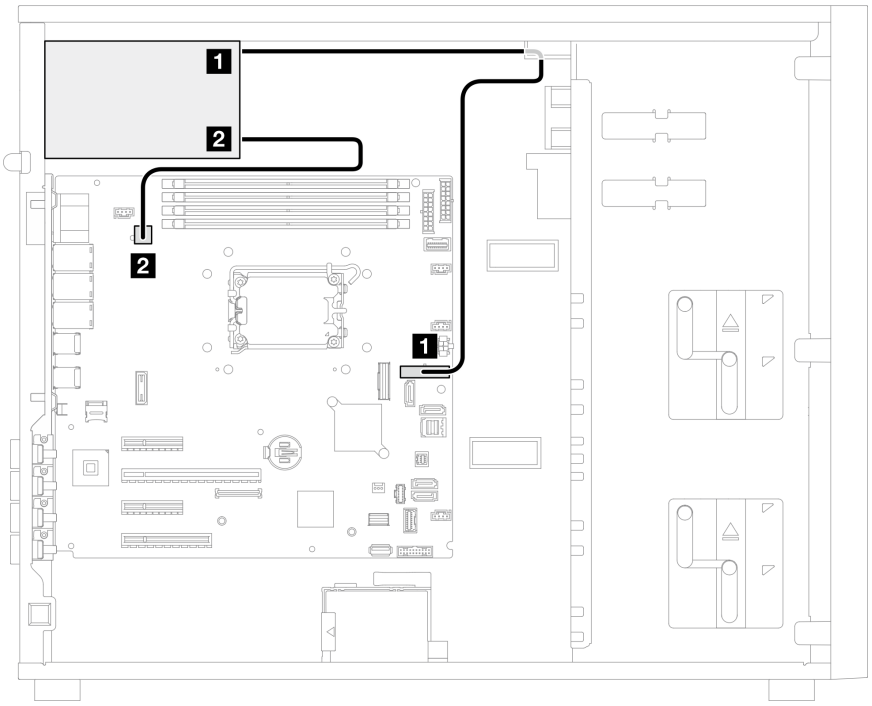


Figure 122. Cable routing for the fixed power supply

From	To: System board	Cable
1 System power connector	System power connector	2x5 pin to 2x9 pin, 200mm
2 Processor power connector	• 300W: Processor power connector • 500W: Processor power connector **Notes:** An extension cable is provided for 500W fixed power supply for connection, proceed the following steps to finish the connection: – Connect the PSU cable to the extension cable; then connect the extension cable to the processor power connector on the system board.	Extension cable, 50mm

Redundant power supplies cable routing

Use the section to understand the cable routing for the redundant power supplies.

Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n

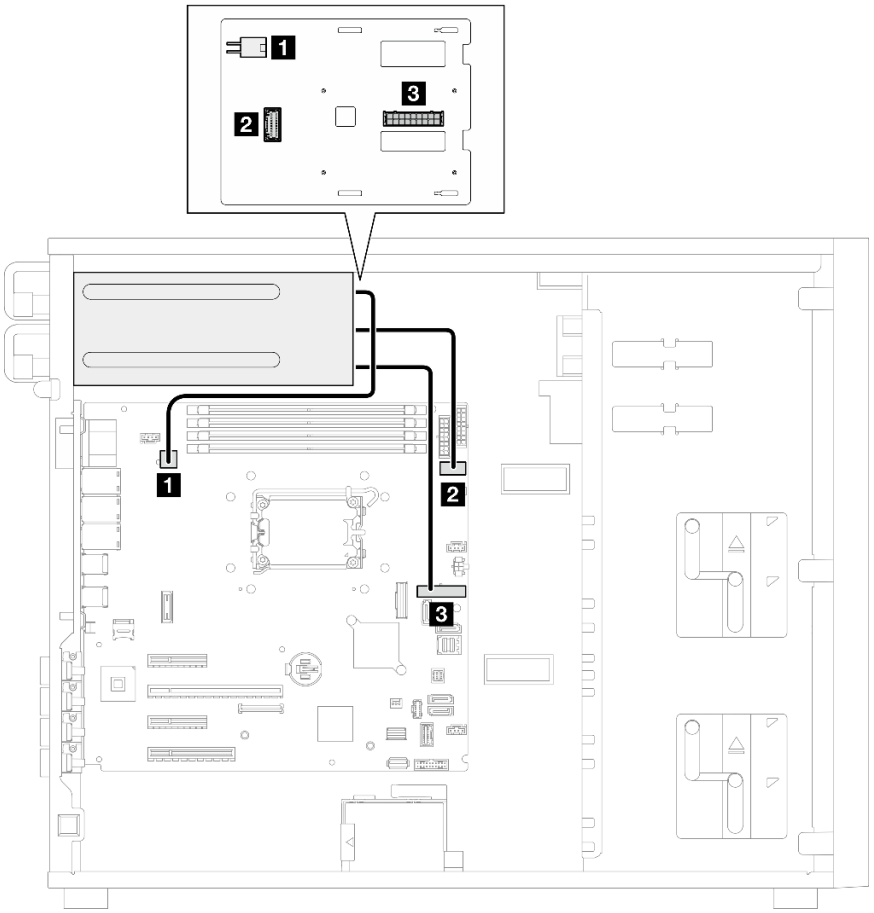


Figure 123. Cable routing for the redundant power supplies

From (Power distribution board)	**To:** System board	**Cable**
1 Processor power connector	Processor power connector	2x2 pin to 2x2 pin, 450mm
2 Side band connector	Power distribution board side band connector	PDB sideband, 320mm
3 System power connector	System power connector	2x9 pin to 2x9 pin, 440mm

Simple-swap drives cable routing

Use this section to understand the cable routing for server models with simple-swap drives.

See the configuration that is applied to the server.

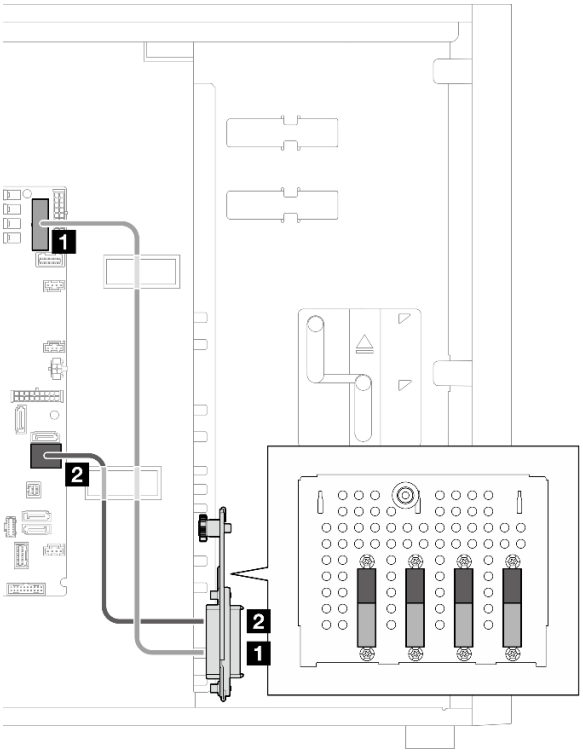
- “Four 3.5-inch SATA drives” on page 198
- “Eight 3.5-inch SATA drives” on page 199
- “Six SATA drives and two NVMe drives” on page 200
- “Six 3.5-inch SATA drives with ODD/tape drives” on page 200

Four 3.5-inch simple-swap drives

Use this section to understand the cable routing for server models with four 3.5-inch simple-swap drives (software RAID).

Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.



From	To: System board:
BP1	1 BP 1 power connector
	2 SATA 0-3

Eight 3.5-inch simple-swap drives

Use this section to understand the cable routing for server models with eight 3.5-inch simple-swap drives (software RAID).

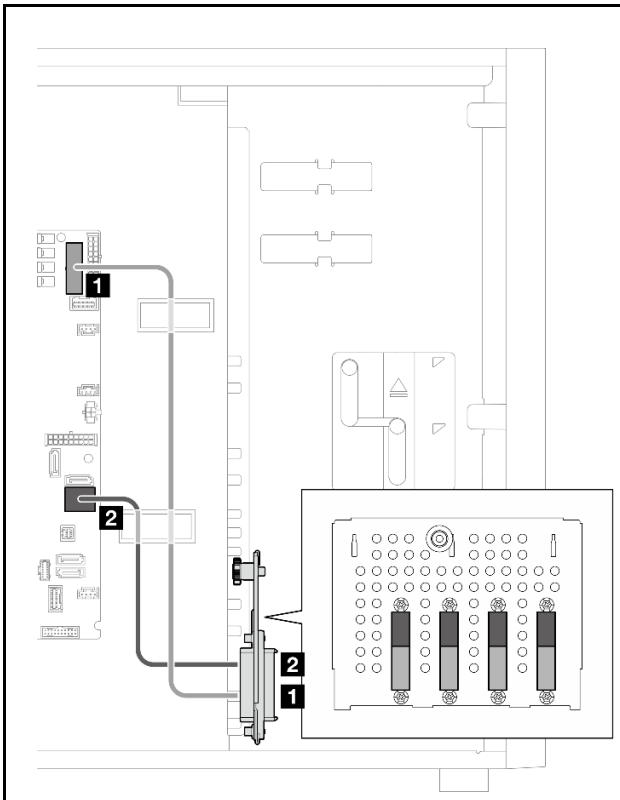
Notes:

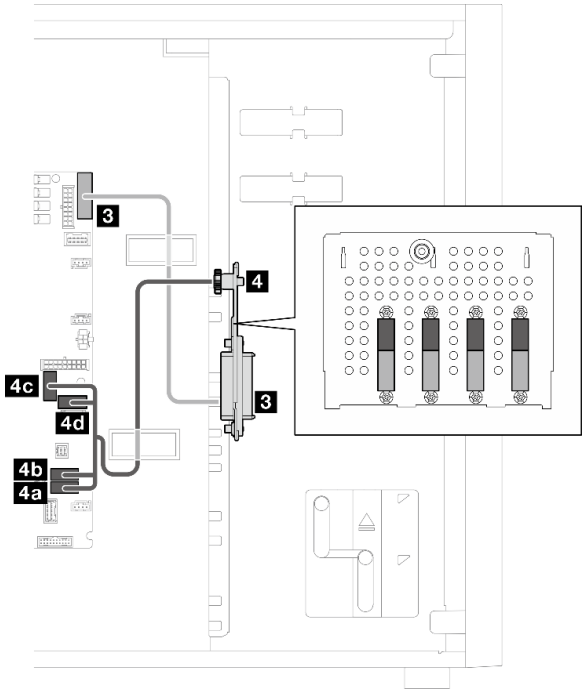
- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.

Following are the options available for this configuration:

- "Eight SATA drives" on page 199
- "Six SATA drives and two SATA/NVMe drives" on page 200

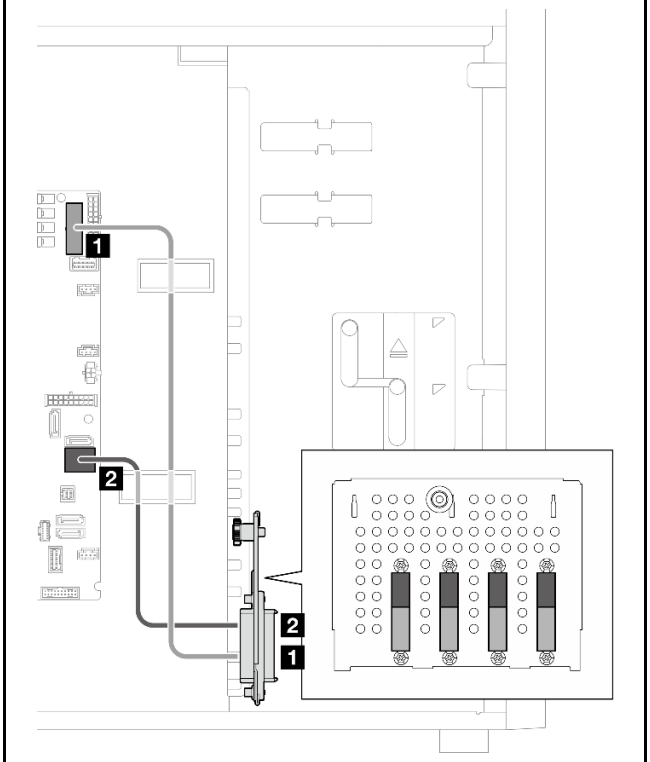
Eight SATA drives

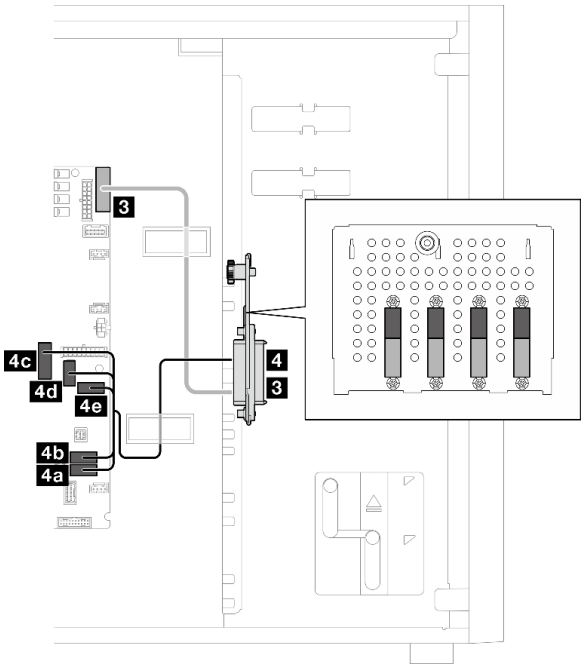




From	To: System board	From	To: System board
BP1	1 BP 1 power connector	BP2	3 BP 2 power connector
	2 SATA 0-3		• 4a SATA 4 • 4b SATA 5 • 4c SATA 6 • 4d SATA 7

Six SATA drives and two SATA/NVMe drives





From	To: System board	From	To: System board
BP1	1 BP 1 power connector	BP2	3 BP 2 power connector
	2 SATA 0-3		• 4a SATA 4 • 4b SATA 5 • 4c slimline x8 connector for NVMe • 4d SATA 6 • 4e SATA 7

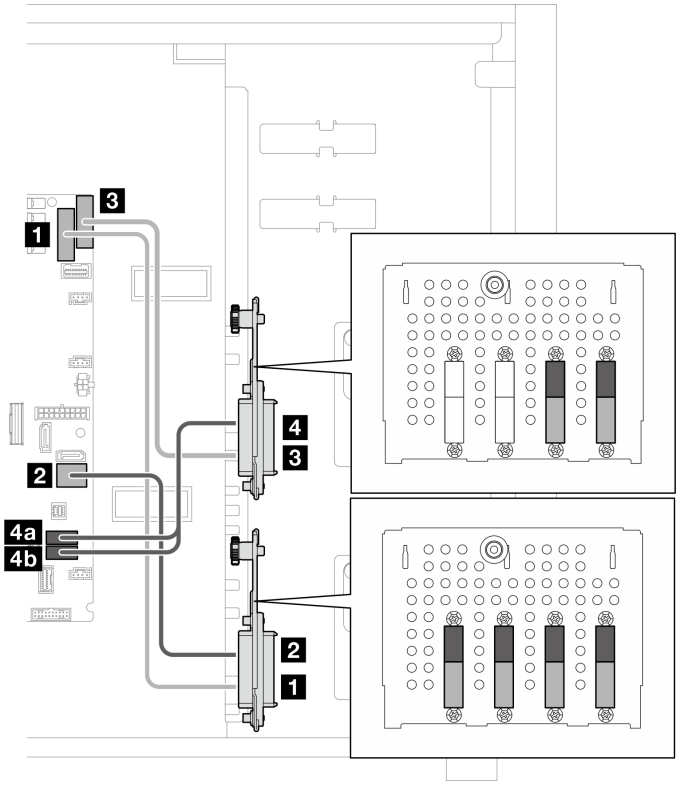
Six 3.5-inch simple-swap drives with ODD/tape drives

Use this section to understand the cable routing for server models with six 3.5-inch simple-swap drives and ODD/tape drives (software RAID).

Notes:

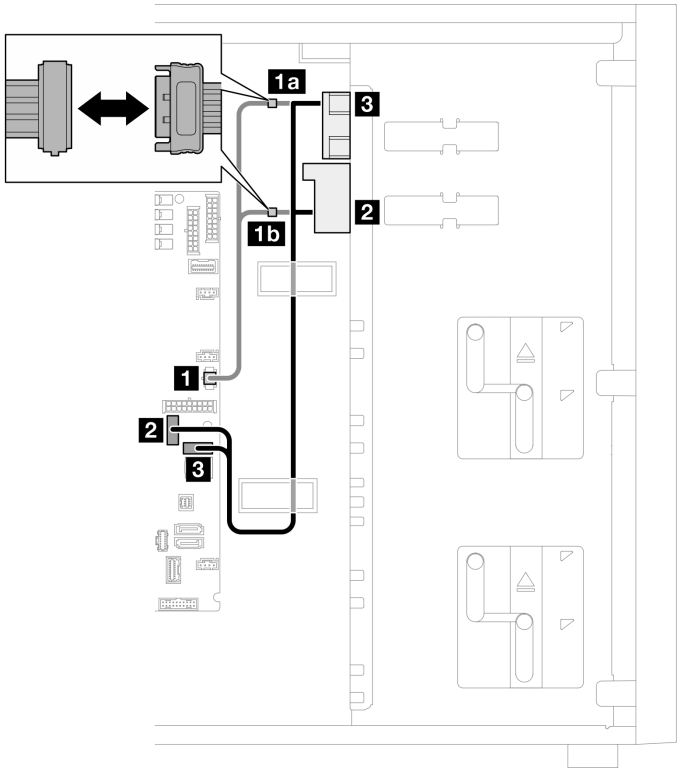
- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.

Table 26. Cable routing for six 3.5-inch simple-swap drives



From	To: System board
BP1	1 BP 1 power connector
	2 SATA 0-3
BP2	3 BP 2 power connector
	• 4a SATA 5 • 4b SATA 4

Table 27. Cable routing for optical/tape drives



From	**To:** System board	Cable
1 ODD/Tape drive power connectors	1a 1b ODD/tape drive power connector	2x2 pin to 15pin/15pin, 200 + 100mm
2 Lower ODD/Tape drive SATA connector	SATA 6	600/50mm
3 Upper ODD/Tape drive SATA connector	SATA 7	

Hot-swap drives cable routing

Use this section to understand the cable routing for server models with hot-swap drives.

See the configuration that is applied to the server.

- Software RAID
  - “Four 3.5-inch drives” on page 204
  - “Eight 3.5-inch drives” on page 206
  - “Eight 2.5-inch drives” on page 209
- Hardware RAID
  - “Four 3.5-inch drives with one 8i RAID adapter” on page 205
  - “Eight 3.5-inch drives with one 8i RAID adapter” on page 208
  - “Eight 2.5-inch drives with one 8i RAID adapter” on page 210
  - “Sixteen 2.5-inch drives with one 16i RAID adapter” on page 211
  - “Sixteen 2.5-inch drives with two 8i RAID adapters” on page 212
  - “Four 3.5-inch and eight 2.5-inch drives with one 16i RAID adapter” on page 213
  - “Four 3.5-inch and eight 2.5-inch drives with two 8i RAID adapters” on page 214

Four 3.5-inch hot-swap drives

Use this section to understand the cable routing for server models with four 3.5-inch hot-swap drives.

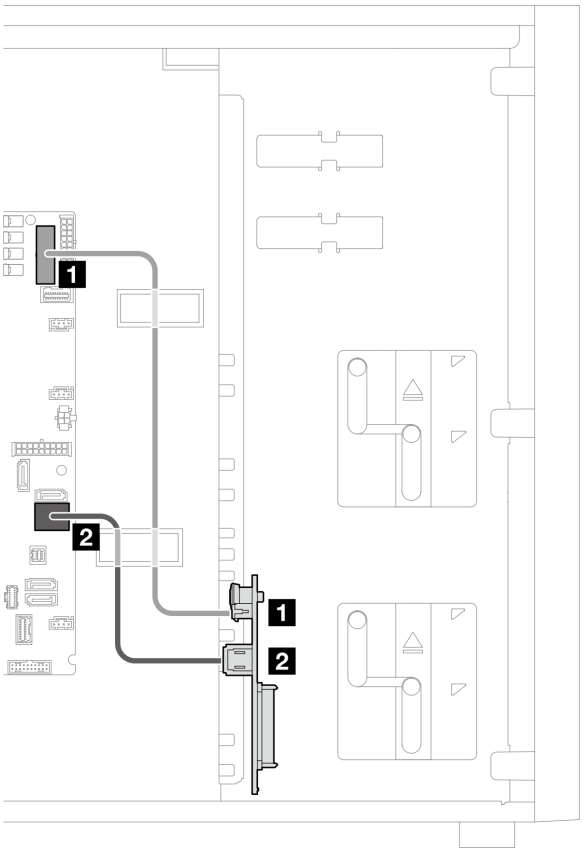
Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.

Following are the options available for this configuration:

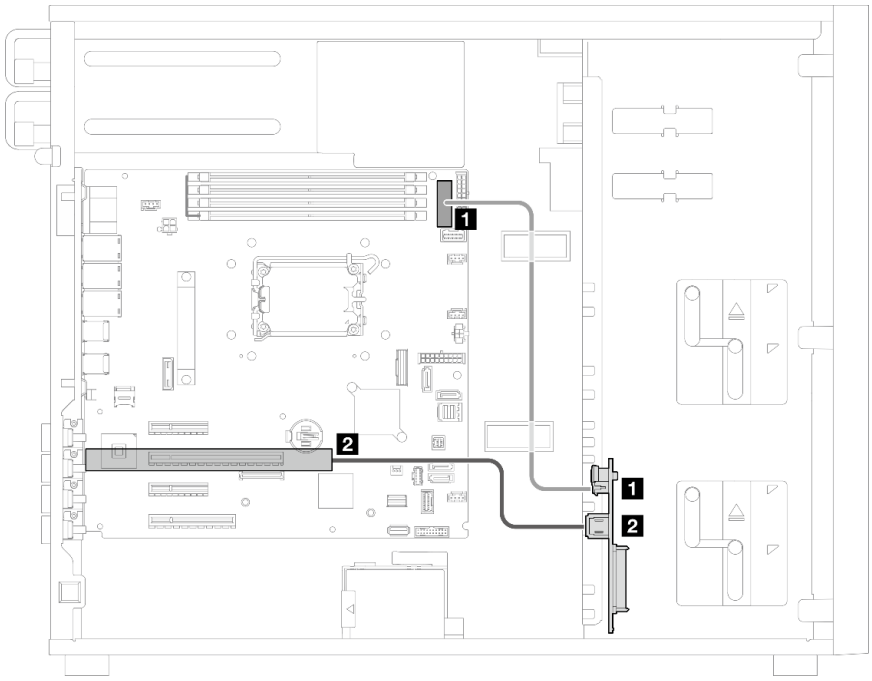
- “Software RAID” on page 204
- “8i RAID adapter” on page 205

Software RAID



From	To: System board	Cable
1 BP1 power connector	BP 1 power connector	2x8 pin to 2x6 pin (350mm)
2 BP1 SAS/SATA connector	SATA 0-3	300mm

8i RAID adapter



From	To	Cable
1 BP1 power connector	System board: BP 1 power connector	2x8 pin to 2x6 pin (350mm)
2 BP1 SAS/SATA connector	• Gen 4: C0 • Gen 3: C0	450mm

Eight 3.5-inch hot-swap drives

Use this section to understand the cable routing for server models with eight 3.5-inch hot-swap drives.

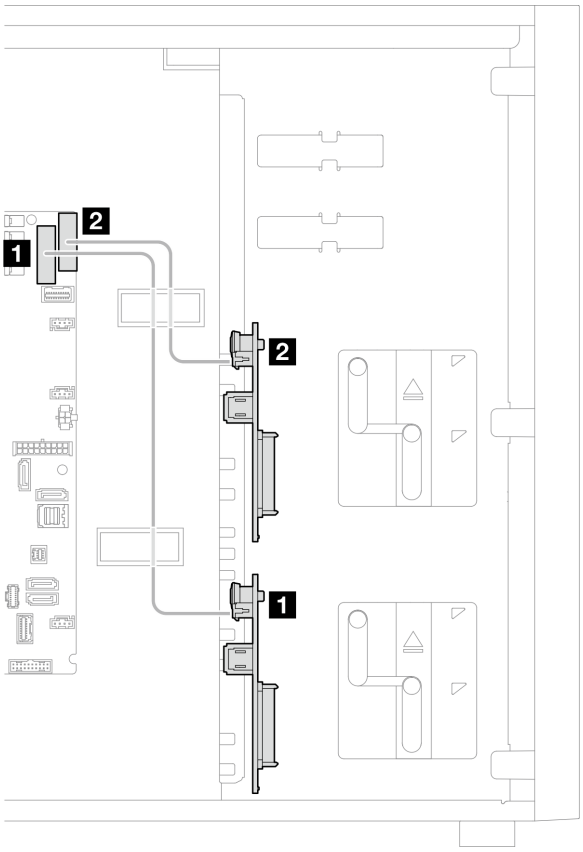
Notes:

- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.

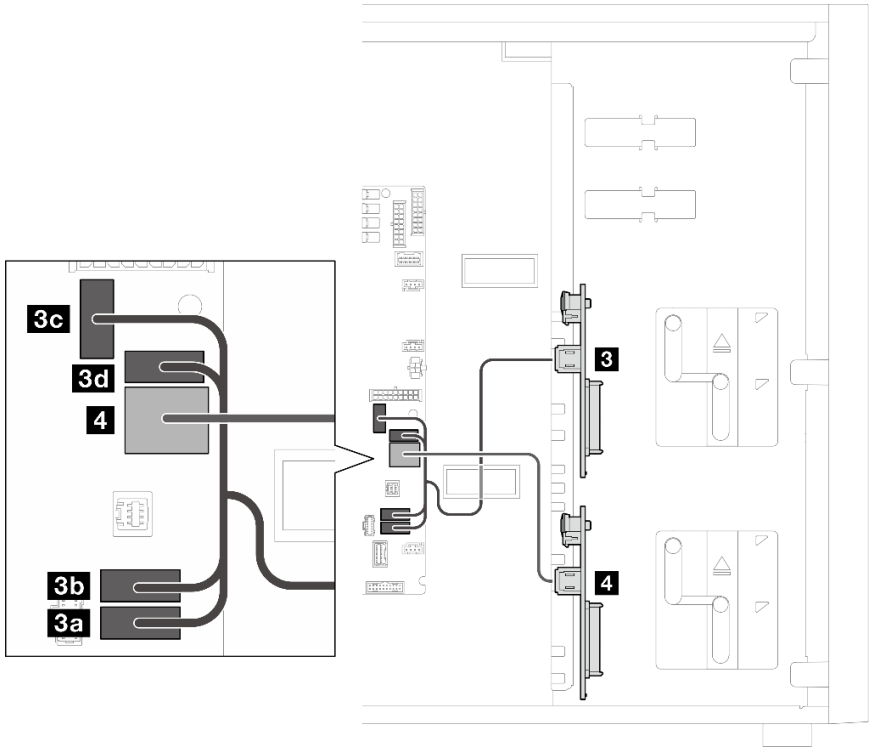
Following are the options available for this configuration:

- “Software RAID” on page 206
- “8i RAID adapter” on page 208

Software RAID

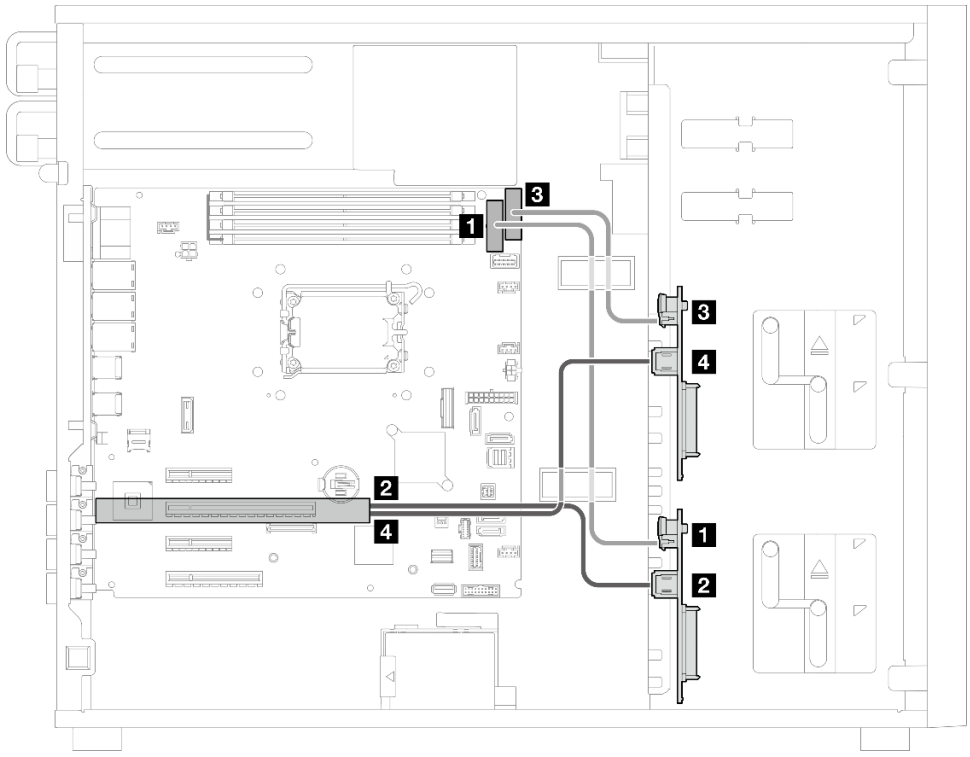


From	To: System board	Cable
1 BP1 power connector	BP 1 power connector	2x8 to 2x6 pin, 350mm
2 BP2 power connector	BP 2 power connector	310mm



From	To: System board	Cable
3 BP2 SAS/SATA connector	3a SATA 4 3b SATA 5 3c SATA 6 3d SATA 7	370/370/350/340/400mm
4 BP1 SAS/SATA connector	SATA 0-3	

8i RAID adapter



From	To	Cable
1 BP1 power connector	System board: BP 1 power connector	2x8 to 2x6 pin, 350 mm
2 BP1 SAS/SATA connector	• Gen 4: C0 • Gen 3: C0	• Gen 4: Y cable, 500/450 mm • Gen 3: 450 mm
3 BP2 power connector	System board: BP 2 power connector	310 mm
4 BP2 SAS/SATA connector	• Gen 4: C0 • Gen 3: C1	• Gen 4: Y cable, 500/450 mm • Gen 3: 500 mm

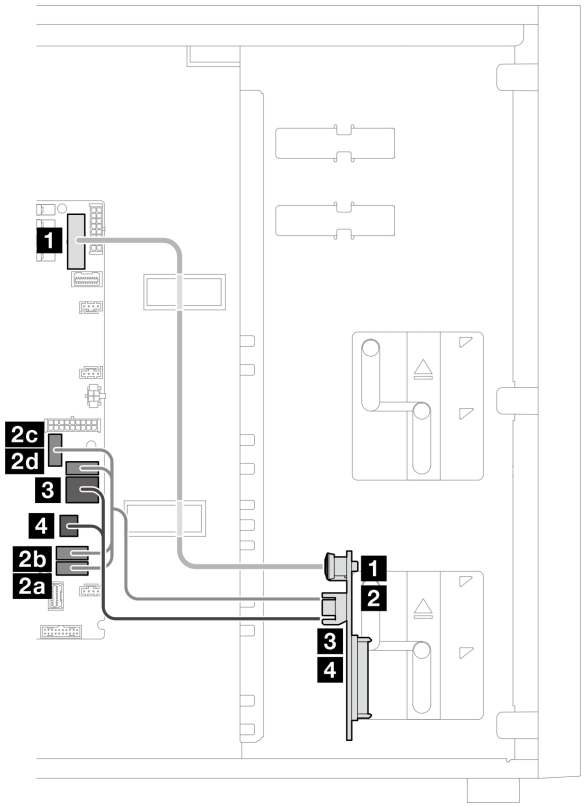
Eight 2.5-inch hot-swap drives

Use this section to understand the cable routing for server models with eight 2.5-inch hot-swap drives.

Notes:

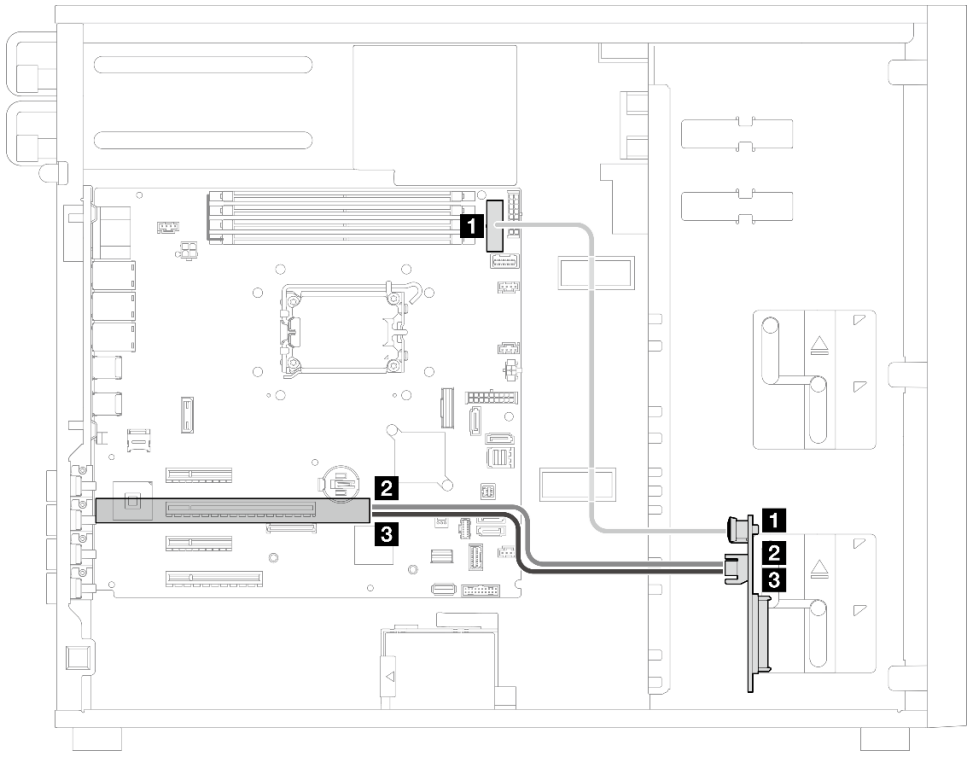
- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.
- "Software RAID" on page 209
- "8i RAID adapter" on page 210

Software RAID



From	To: System board	Cable
1 BP1 power connector	BP 1 power connector	2x8 to 2x8 pin, 350 mm
2 BP1 SAS/SATA 1 connector	• 2a SATA 4 • 2b SATA 5 • 2c SATA 6 • 2d SATA 7	Mini-SAS HD + 4xSATA + 2x4 pin + SGPIO to Mini-SAS HD*2 (370/370/350/340/360/400)
3 BP1 SAS/SATA 0 connector	SATA 0-3	
4 BP1	SGPIO1 connector	

8i RAID adapter



From	To	Cable
1 BP1 power connector	System board:BP 1 power connector	2x8 to 2x8 pin, 350mm
2 BP1 SAS/SATA 0 connector	• Gen 4: C0 • Gen 3: C0	• Gen 4: Y cable, 300/450mm • Gen 3: 450 mm
3 BP1 SAS/SATA 1 connector	• Gen 4: C0 • Gen 3: C1	• Gen 4: Y cable, 300/450mm • Gen 3: 400mm

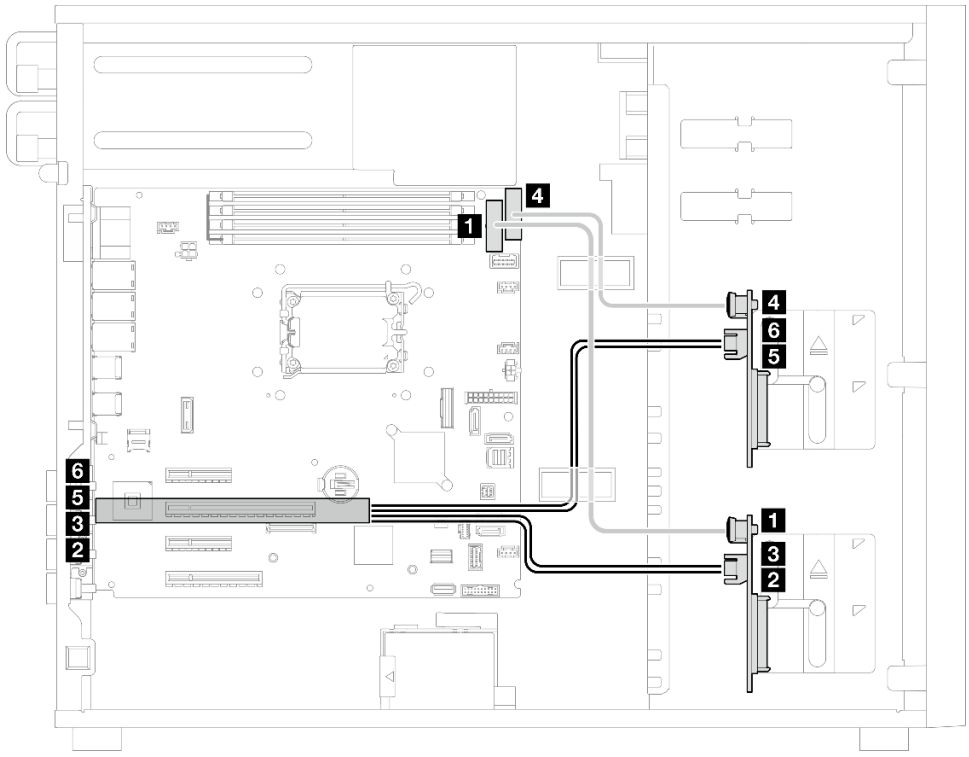
Sixteen 2.5-inch hot-swap drives

Use this section to understand the cable routing for server models with sixteen 2.5-inch hot-swap drives.

Notes:

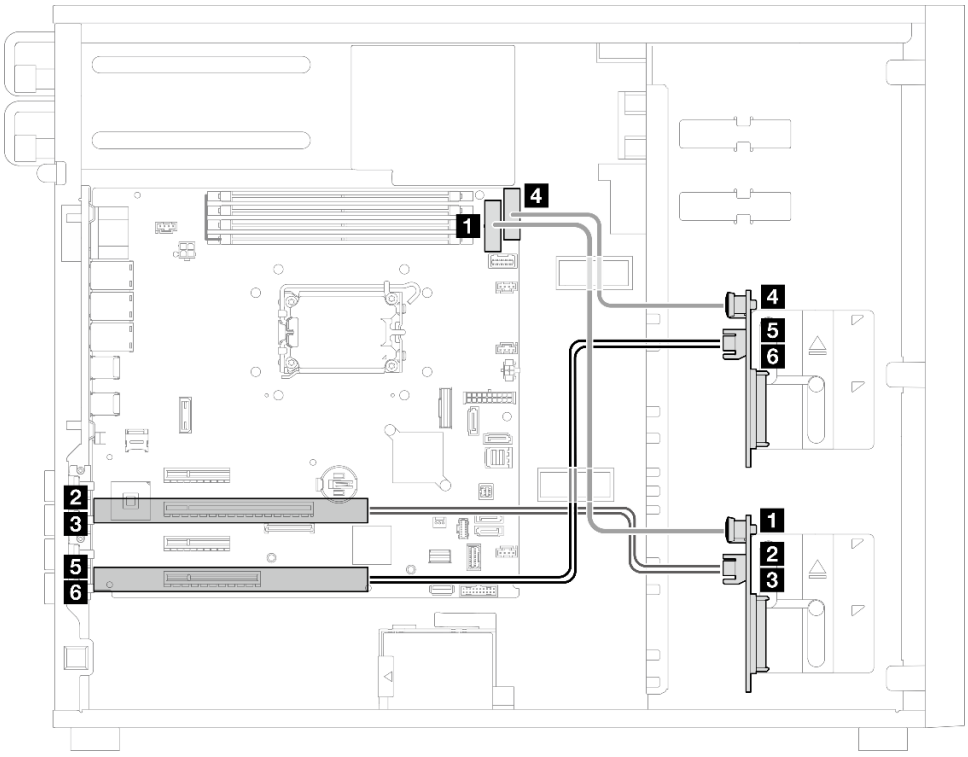
- Connections between connectors; 1↔1, 2↔2, 3↔3, ... n↔n
- When routing the cables, ensure that all cables are routed appropriately through the cable guides.
- “16i RAID adapter” on page 211
- “Two 8i RAID adapters” on page 212

16i RAID adapter



From	To	Cable
1 BP1 power connector	System board: BP 1 power connector	2x8 to 2x6 pin, 350mm
2 BP1 SAS/SATA 0 connector	• Gen 3: C0	450mm
3 BP1 SAS/SATA 1 connector	• Gen 3: C1	400mm
4 BP2 power connector	System board: BP 2 power connector	230mm
5 BP2 SAS/SATA 0 connector	• Gen 3: C2	500mm
6 BP2 SAS/SATA 1 connector	• Gen 3: C3	450mm, with 2.5'' SAS1 label

Two 8i RAID adapters



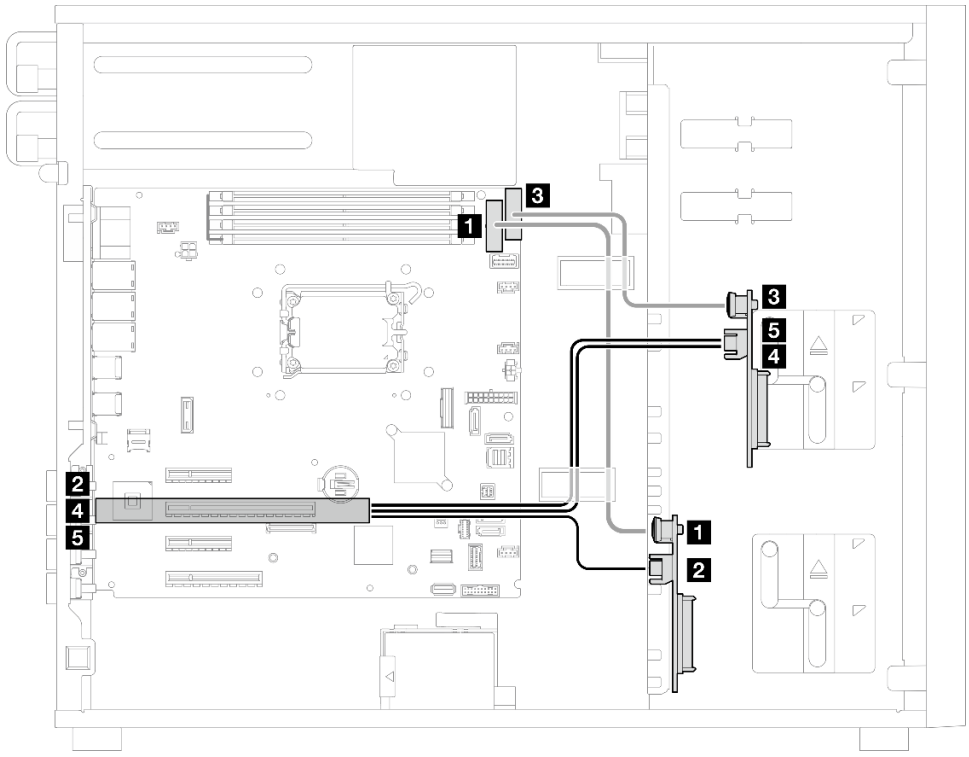
From	To	Cable
1 BP1 power connector	System board:BP 1 power connector	2x8 to 2x6 pin, 350mm
2 BP1 SAS/SATA 0 connector	• Gen 3: C0	450 mm
3 BP1 SAS/SATA 1 connector	• Gen 3: C1	400 mm
4 BP2 power connector	System board: BP 2 power connector	230 mm
5 BP2 SAS/SATA 0 connector	• Gen 3: C0	500 mm
6 BP2 SAS/SATA 1 connector	• Gen 3: C1	450 mm, with 2.5" SAS1 label

Four 3.5-inch and eight 2.5-inch hot-swap drives

Use this section to understand the cable routinGen for server models with four 3.5-inch and eiGen ht 2.5-inch hot-swap drives.

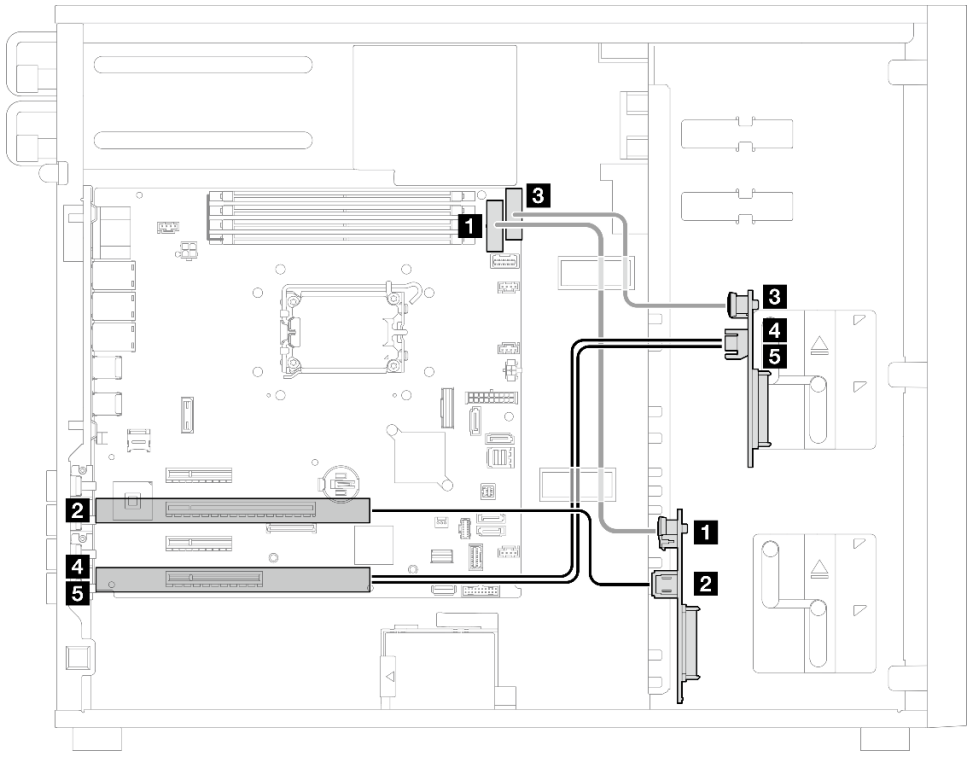
- “16i RAID adapter” on page 213
- “Two 8i RAID adapters” on page 214

16i RAID adapter



From	To: System board	Cable
1 BP1 power connector	System board BP 1 power connector	2x8 to 2x6 pin, 350 mm
2 BP1 SAS/SATA connector	• Gen 3: C0	450mm
3 BP2 power connector	System board BP 2 power connector	230mm
4 BP2 SAS/SATA 0 connector	• Gen 3: C1	500mm
5 BP2 SAS/SATA 1 connector	• Gen 3: C2	450mm, with 2.5'' SAS1 label

Two 8i RAID adapters



From	To	Cable
1 BP1 power connector	System board: BP 1 power connector	2x8 to 2x6 pin, 350mm
2 BP1 SAS/SATA connector	• Gen 3: C0, slot 2	450mm
3 BP2 power connector	System board: BP 2 power connector	230mm
4 BP2 SAS/SATA 0 connector	• Gen 3: C0, slot 4	500mm
5 BP2 SAS/SATA 1 connector	• Gen 3: C1, slot 4	450mm, with 2.5'' SAS1 label

Chapter 7. 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 35.
- 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.

Chapter 8. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo XClarity Controller event log.

Web resources

- **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.

- **Lenovo Data Center Forum**
  - Check https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at https://pubs.lenovo.com/st250-v3/st250_v3_user_guide.pdf.

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

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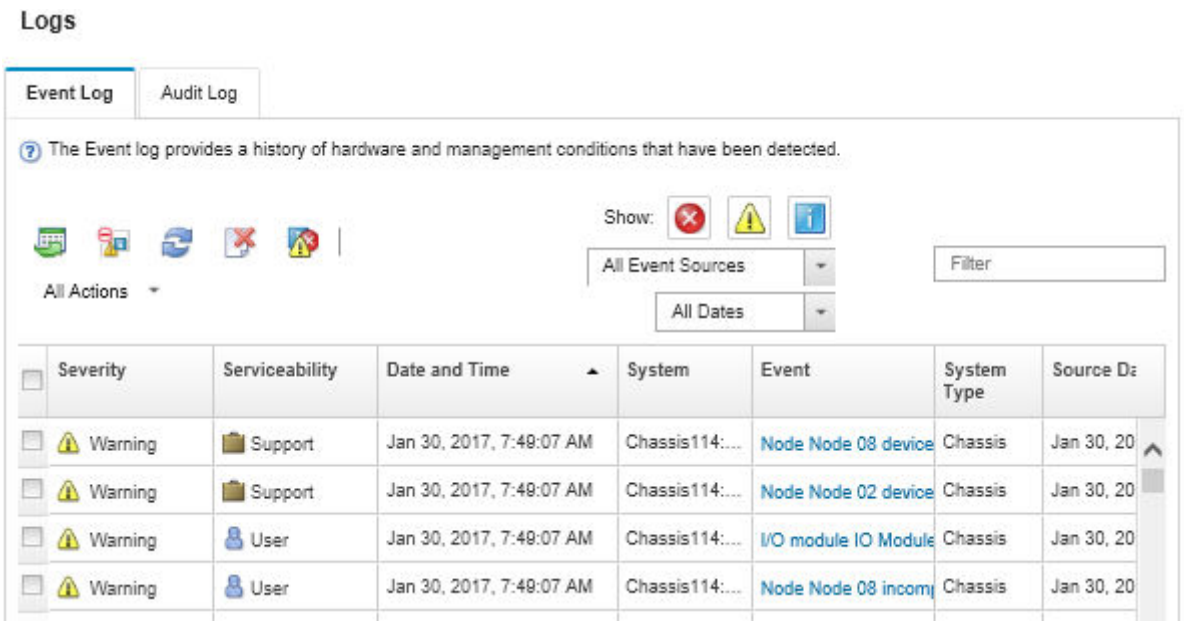


Figure 124. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

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

Lenovo XClarity Controller event log

The Lenovo XClarity Controller monitors the physical state of the server and its components using sensors that measure internal physical variables such as temperature, power-supply voltages, fan speeds, and component status. The Lenovo XClarity Controller provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

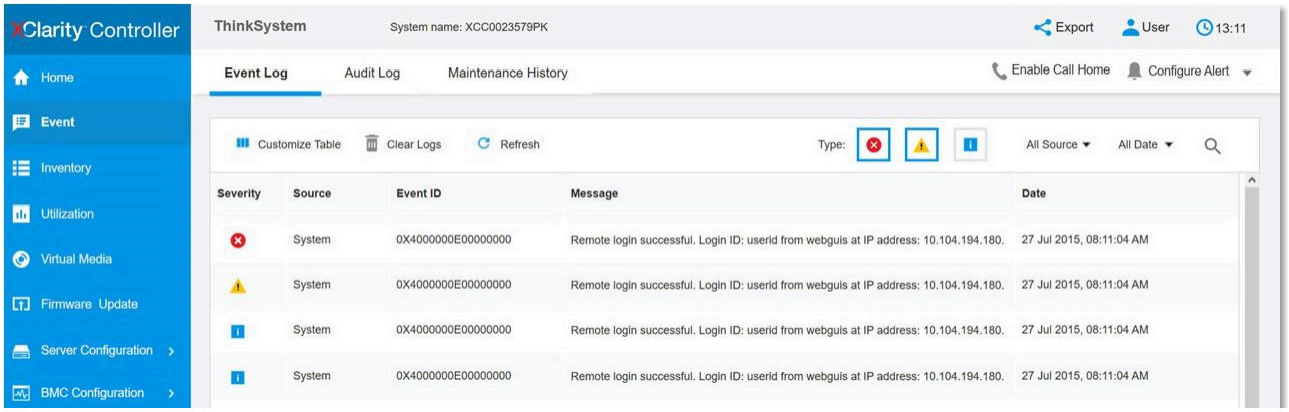


Figure 125. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:

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

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.

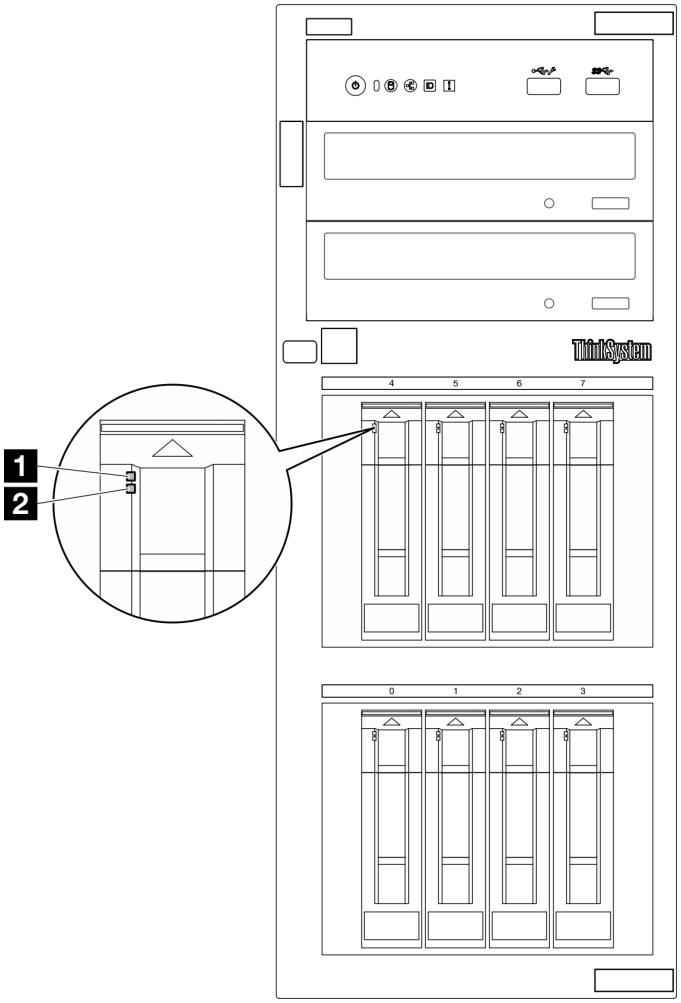


Figure 126. Drive LEDs

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 Chapter 2 “Server components” on page 15 for more information.

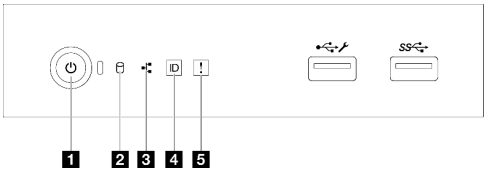


Figure 127. Front I/O module LEDs

Table 28. 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” on page 48 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

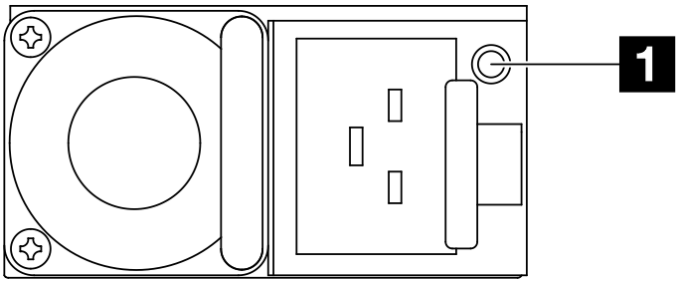


Figure 128. CRPS Power supply LED

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.

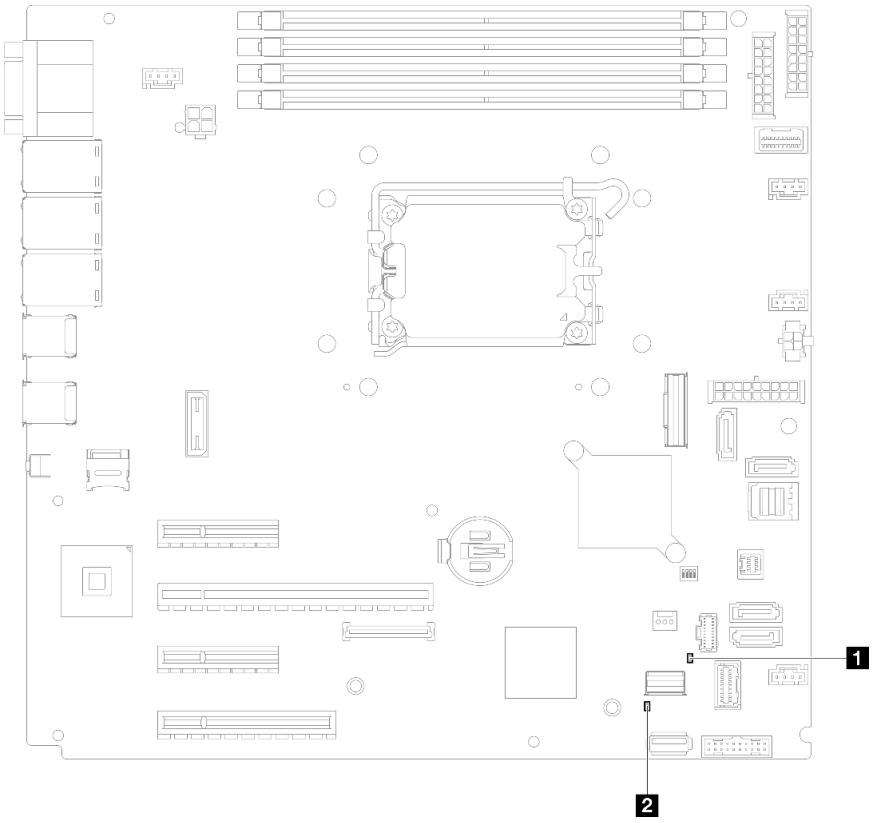


Figure 129. System-board LEDs

Table 29. 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).

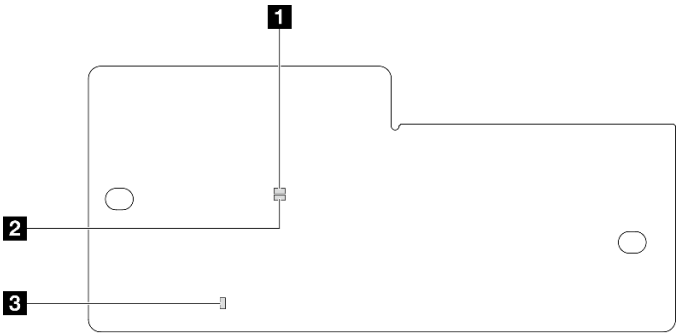


Figure 130. LEDs on the firmware and RoT security module

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

Table 30. 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 30. 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.

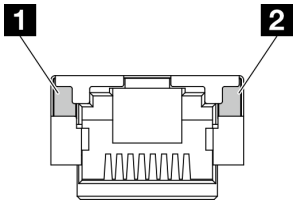


Figure 131. XCC system management port and Ethernet port LEDs

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.

General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices if applicable, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
   - Any external devices.

- Surge-suppressor device (on the server).
- Printer, mouse, and non-Lenovo devices.
- Each adapter.
- Hard disk drives.
- Memory modules until you reach the minimal configuration for debugging that is supported for the server.

  To determine the minimal configuration for your server, see “Minimal configuration for debugging” in “Technical specifications” on page 4.

4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

Note: Start with the event log of the application that is managing the server. For more information about event logs, see “Event logs” on page 225.

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimal configuration for debugging that is required for the server to start. To determine the minimal configuration for your server, see “Minimal configuration for debugging” in “Technical specifications” on page 4.

Step 4. Reconnect all AC power cords and turn on the server. If the server starts successfully, reseat the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimal configuration, replace the components in the minimal configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.

- Make sure that the cable rating is applicable for the network speed selected. For example, an SFP+ cable is only suitable for 10G operation. An SFP25 cable is needed for 25G operation. Likewise for Base-T operation, a CAT5 cable is required for 1G Base-T operation while a CAT6 cable is required for 10G Base-T operation.

Step 3. Set both the adapter port and the switch port to auto-negotiation. If auto-negotiation is not supported on one of the ports, try configuring both ports manually to match each other.

Step 4. Check the Ethernet controller LEDs on the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.

Although some adapters may vary, when installed vertically the adapter link LED is typically on the left of the port and the activity LED is typically on the right.

The server front panel LED is described in “Troubleshooting by system LEDs and diagnostics display” on page 227.

- The Ethernet link status LED is lit when the Ethernet controller receives a link indication from the switch. If the LED is off, there might be a defective connector or cable or a problem with the switch.
- The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Step 5. Check the Network activity LED on the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Network activity LED location is specified in “Troubleshooting by system LEDs and diagnostics display” on page 227.

Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.

Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the server and follow the suggested actions to resolve any event codes.
   - If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
   - If you are using some other management application, begin with the Lenovo XClarity Controller event log.

   For more information about event logs (see “Event logs” on page 225).
2. Review this section to find the symptoms that you are experiencing and follow the suggested actions to resolve the issue.
3. If the problem persists, contact support (see “Contacting Support” on page 255).

Intermittent problems

Use this information to solve intermittent problems.

- “Intermittent external device problems” on page 236
- “Intermittent KVM problems” on page 236
- “Intermittent unexpected reboots” on page 236

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Update the UEFI and XCC firmware to the latest versions.
2. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
3. For a USB device:
   a. Make sure that the device is configured correctly.

      Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
   b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the server. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another server.
3. Test the console breakout cable on a working server to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some uncorrectable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

   To check the POST watchdog time, restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **BMC Settings → POST Watchdog Timer**.
2. If the reset occurs after the operating system starts, do one of the followings:

- Enter the operating system when the system operates normally and set up operating system kernel dump process (Windows and Linux base operating systems will be using different method). Enter the UEFI setup menus and disable the feature, or disable it with the following OneCli command.
  `OneCli.exe config set SystemRecovery.RebootSystemOnNMI Disable --bmc XCC_USER:XCC_PASSWORD@XCC_IPAddress`
- Disable any automatic server restart (ASR) utilities, such as the Automatic Server Restart IPMI Application for Windows, or any ASR devices that are installed.

3. See the management controller event log to check for an event code that indicates a reboot. See "Event logs" on page 225 for information about viewing the event log. If you are using Linux base operating system, then capture all logs back to Lenovo support for further investigation.

Keyboard, mouse, KVM switch or USB-device problems

Use this information to solve problems related to a keyboard, mouse, KVM switch or USB-device problems.

- "All or some keys on the keyboard do not work" on page 237
- "Mouse does not work" on page 237
- "KVM switch problems" on page 237
- "USB-device does not work" on page 237

All or some keys on the keyboard do not work

1. Make sure that:
   - The keyboard cable is securely connected.
   - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

Mouse does not work

1. Make sure that:
   - The mouse cable is securely connected to the server.
   - The mouse device drivers are installed correctly.
   - The server and the monitor are turned on.
   - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

KVM switch problems

1. Make sure that the KVM switch is supported by your server.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the server, then replace the KVM switch.

USB-device does not work

1. Make sure that:
   - The correct USB device driver is installed.
   - The operating system supports USB devices.

2. Make sure that the USB configuration options are set correctly in system setup.

   Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Memory problems

See this section to resolve issues related to memory.

Common memory problems

- “Multiple memory modules in a channel identified as failing” on page 238
- “Displayed system memory is less than installed physical memory” on page 238
- “Invalid memory population detected” on page 239

Multiple memory modules in a channel identified as failing

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

Complete the following procedure to solve the problem.

1. Reseat the memory modules; then, restart the server.
2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the server. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.
3. Return the removed memory modules, one at a time, to their original connectors, restarting the server after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the server after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.
4. Replace the highest-numbered memory module of those identified; then, restart the server. Repeat as necessary.
5. Reverse the memory modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
6. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
7. (Trained technician only) Replace the system board (system board assembly).

Displayed system memory is less than installed physical memory

Complete the following procedure to solve the problem.

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Make sure that:
   - No error LEDs are lit. See “Troubleshooting by system LEDs and diagnostics display” on page 227.
   - No memory module error LEDs are lit on the system board.
   - Memory mirrored channel does not account for the discrepancy.
   - The memory modules are seated correctly.

- You have installed the correct type of memory module (see “Memory module installation rules and order” on page 45 for requirements).
- After changing or replacing a memory module, memory configuration is updated accordingly in the Setup Utility.
- All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
- There is no memory mismatch when the server is at the minimum memory configuration.

2. Reseat the memory modules, and then restart the server.
3. Check the POST error log:
   - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
   - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup Utility and enable the memory module.
4. Run memory diagnostics. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test → Advanced Memory Test**.
5. Reverse the modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
6. Re-enable all memory modules using the Setup Utility, and then restart the server.
7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technician only) Replace the system board (system board assembly).

Invalid memory population detected

If this warning message appears, complete the following steps:

```
Invalid memory population (unsupported DIMM population) detected. Please verify memory configuration is valid.
```

1. See “Memory module installation rules and order” on page 45 to make sure the present memory module population sequence is supported.
2. If the present sequence is indeed supported, see if any of the modules is displayed as “disabled” in Setup Utility.
3. Reseat the module that is displayed as “disabled,” and reboot the system.
4. If the problem persists, replace the memory module.

Monitor and video problems

Use this information to solve problems related to a monitor or video.

- “Incorrect characters are displayed” on page 239
- “Screen is blank” on page 240
- “Screen goes blank when you start some application programs” on page 240
- “The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 240
- “The wrong characters appear on the screen” on page 241

Incorrect characters are displayed

Complete the following steps:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Update the firmware” on page 217.

Screen is blank

Note: Make sure that the expected boot mode has not been changed from the UEFI to Legacy or vice versa.

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.
3. If the server is installed with the graphical adapters while turning on the server, the Lenovo logo is displayed on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
   - The server is turned on and there is power supplied to the server.
   - The monitor cables are connected correctly.
   - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct server is controlling the monitor, if applicable.
6. Make sure that the video output is not affected by corrupted server firmware; See “Update the firmware” on page 217.
7. If the problem remains, contact Lenovo Support.

Screen goes blank when you start some application programs

1. Make sure that:
   - The application program is not setting a display mode that is higher than the capability of the monitor.
   - You installed the necessary device drivers for the application.

The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

   Attention: Moving a color monitor while it is turned on might cause screen discoloration.

   Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

   Notes:

   a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).

   b. Non-Lenovo monitor cables might cause unpredictable problems.
2. Reseat the monitor cable.
3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:
   a. Monitor cable
   b. Video adapter (if one is installed)
   c. Monitor
   d. (Trained technician only) System board (system board assembly)

The wrong characters appear on the screen

Complete the following steps until the problem is solved:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Update the firmware” on page 217.

Network problems

Use this information to resolve issues related to networking.

- “Cannot wake server using Wake on LAN” on page 241
- “Could not log in using LDAP account with SSL enabled” on page 241

Cannot wake server using Wake on LAN

Complete the following steps until the problem is resolved:

1. If you are using the dual-port network adapter and the server is connected to the network using Ethernet 5 connector, check the system-error log or IMM2 system event log (see “Event logs” on page 225), make sure:
   a. Fan 3 is running in standby mode, if Emulex dual port 10GBase-T embedded adapter is installed.
   b. The room temperature is not too high (see “Specifications” on page 3).
   c. The air vents are not blocked.
   d. The air baffle is installed securely.
2. Reseat the dual-port network adapter.
3. Turn off the server and disconnect it from the power source; then, wait 10 seconds before restarting the server.
4. If the problem still remains, replace the dual-port network adapter.

Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

Observable problems

Use this information to solve observable problems.

- “Server hangs during the UEFI boot process” on page 242
- “The server immediately displays the POST Event Viewer when it is turned on” on page 242
- “Server is unresponsive (POST is complete and operating system is running)” on page 242
- “Server is unresponsive (POST failed and cannot start System Setup)” on page 243
- “Voltage planar fault is displayed in the event log” on page 243
- “Unusual smell” on page 243
- “Server seems to be running hot” on page 243
- “Cannot enter legacy mode after installing a new adapter” on page 244
- “Cracked parts or cracked chassis” on page 244

Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message `UEFI: DXE INIT` on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

https://datacentersupport.lenovo.com/solutions/ht506118

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

The server immediately displays the POST Event Viewer when it is turned on

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the system LEDs and diagnostics display.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

   You can view processor details from system setup.

   To determine if the processor is supported for the server, see https://serverproven.lenovo.com.
3. (Trained technician only) Make sure that processor 1 is seated correctly.
4. (Trained technician only) Remove processor 2 and restart the server.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
   a. (Trained technician only) Processor
   b. (Trained technician only) System board (system board assembly)

Server is unresponsive (POST is complete and operating system is running)

Complete the following steps until the problem is solved.

- If you are in the same location as the compute node, complete the following steps:
  1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
  2. If possible, log in to the compute node and verify that all applications are running (no applications are hung).
  3. Restart the compute node.
  4. If the problem remains, make sure that any new software has been installed and configured correctly.
  5. Contact your place of purchase of the software or your software provider.
- If you are accessing the compute node from a remote location, complete the following steps:
  1. Make sure that all applications are running (no applications are hung).
  2. Attempt to log out of the system and log back in.
  3. Validate the network access by pinging or running a trace route to the compute node from a command line.

a. If you are unable to get a response during a ping test, attempt to ping another compute node in the enclosure to determine whether it is a connection problem or compute node problem.
b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.

4. Restart the compute node remotely through the management interface.
5. If the problem remains, verify that any new software has been installed and configured correctly.
6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (POST failed and cannot start System Setup)

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board (system board assembly).

You can specify the number of consecutive restart attempts in System Setup. Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Recovery and RAS → POST Attempts → POST Attempts Limit**. Available options are 3, 6, 9, and disable.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See “Specifications” on page 3 for the minimally required number of processors and DIMMs.
2. Restart the system.
   - If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.
   - If the system does not restart, suspect the system board (system board assembly).

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see “Specifications” on page 3).
2. Make sure that the fans are installed correctly.
3. Update the UEFI and XCC to the latest versions.

4. Make sure that the fillers in the server are installed correctly (see Chapter 5 “Hardware replacement procedures” on page 41 for detailed installation procedures).
5. Use the IPMI command to ramp up the fan speed to the full fan speed to see whether the issue can be resolved.

   Note: The IPMI raw command should only be used by trained technician and each system has its own specific IPMI raw command.
6. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

Cracked parts or cracked chassis

Contact Lenovo Support.

Optional-device problems

Use this information to solve problems related to optional devices.

- “External USB device is not recognized” on page 244
- “PCIe adapter is not recognized or is not functioning” on page 244
- “Insufficient PCIe resources are detected.” on page 245
- “A Lenovo optional device that was just installed does not work.” on page 245
- “A Lenovo optional device that worked previously does not work now” on page 246

External USB device is not recognized

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Make sure that the proper drivers are installed on the compute node. See the product documentation for the USB device for information about device drivers.
3. Use the Setup utility to make sure that the device is configured correctly.
4. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the compute node.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Check the event log and resolve any issues related to the device.
3. Validate that the device is supported for the server (see https://serverproven.lenovo.com). Make sure that the firmware level on the device is at the latest supported level and update the firmware if applicable.
4. Make sure that the adapter is installed in a correct slot.

5. Make sure that the proper device drivers are installed for the device.
6. Resolve any resource conflicts if running legacy mode (UEFI). Check legacy ROM boot orders and modify the UEFI setting for MM config base.

   Note: Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.
7. Check http://datacentersupport.lenovo.com for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
8. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
9. Make sure that the PCIe adapter is installed with the supported operating system.

Insufficient PCIe resources are detected.

If you see an error message stating “Insufficient PCI Resources Detected,” complete the following steps until the problem is resolved:

1. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.
4. If the error recurs with the highest device resource setting (1GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.
7. Select **System Settings → Devices and I/O Ports → PCI 64–Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.
8. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
10. Contact Lenovo technical support.

A Lenovo optional device that was just installed does not work.

1. Make sure that:
   - The device is supported for the server (see https://serverproven.lenovo.com).
   - You followed the installation instructions that came with the device and the device is installed correctly.
   - You have not loosened any other installed devices or cables.
   - You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display 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/.) Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you have just installed.
3. Replace the device that you have just installed.
4. Reseat the cable connection and check there is no physical damage to the cable.
5. If there is any cable damage, then replace the cable.

A Lenovo optional device that worked previously does not work now

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. Reseat the cable connection and check if any physical parts have been damaged.
4. Replace the cable.
5. Reseat the failing device.
6. Replace the failing device.

Performance problems

Use this information to solve performance problems.

- "Network performance" on page 246
- "Operating system performance" on page 246

Network performance

Complete the following steps until the problem is solved:

1. Isolate which network is operating slowly (such as storage, data, and management). You might find it helpful to use ping tools or operating-system tools such as task manager or resource manager.
2. Check for traffic congestion on the network.
3. Update the NIC device driver, or the storage device controller device driver.
4. Use the traffic-diagnostic tools that are provided by the IO-module manufacturer.

Operating system performance

Complete the following steps until the problem is solved:

1. If you have recently made changes to the compute node (for example updated device drivers or installed software applications) remove the changes.
2. Check for any networking issues.
3. Check the operating system logs for performance related errors.
4. Check for events related to high temperatures and power issues as the compute node might be throttled to help with cooling. If it is throttled, reduce the workload on the compute node to help improve performance.
5. Check for events related to disabled DIMMs. If you do not have enough memory for the application workload, your operating system will have poor performance.
6. Ensure that the workload is not too high for the configuration.

Power on and power off problems

Use this information to resolve issues when powering on or powering off the server.

- "The power button does not work (server does not start)" on page 246
- "Server does not power on" on page 247

The power button does not work (server does not start)

Note: The power button will not function until approximately 1 to 3 minutes after the server has been connected to ac power to allow time for BMC to initialize.

Complete the following steps until the problem is resolved:

1. Make sure that the power button on the server is working correctly:
   a. Disconnect the server power cords.
   b. Reconnect the server power cords.
   c. Reseat the front operator panel cable, and then repeat steps 1a and 2b.
      - If the server starts, reseat the front operator panel.
      - If the problem remains, replace the front operator panel.
2. Make sure that:
   - The power cords are correctly connected to the server and to a working electrical outlet.
   - The LEDs on the power supply do not indicate a problem.
   - The Power button LED is lit on and is flashing slowly.
   - The push force is enough and with button force response.
3. If the power button LED is not lit on or is not flashing correctly, reseat all the power supplies and make sure AC LED on PSU rear side are lit on.
4. If you have just installed an optional device, remove it, and restart the server.
5. If the issue is still observed or without power button LED lit on, implement the minimum configuration to check whether any specific components lock the power permission. Replace the each power supply and check the power button function after installing the each one.
6. If everything is still done and the issue cannot be resolved, collect the failure information with system logs captured to Lenovo support.

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the power LED on the system board (system board assembly).
4. Check if AC power LED is lit on or the amber LED is lit on at the PSU rear side.
5. AC cycle the system.
6. Remove the CMOS battery for at least ten seconds, then, reinstall the CMOS battery.
7. Try to power on the system by IPMI command through XCC or by the power button.
8. Implement the minimum configuration (see “Technical specifications” on page 4).
9. Reseat all power supplies and make sure that AC LEDs on the PSU rear side are lit.
10. Replace the each power supply and check the power button function after installing the each one.
11. If the issue cannot be resolved by above actions, call service to review the issue symptom and see whether the system board (system board assembly) replacement is necessary.

Power problems

Use this information to resolve issues related to power.

System error LED is on and event log "Power supply has lost input" is displayed

To resolve the problem, ensure that:

1. The power supply is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.
3. Make sure that the power supply AC source is stable within the supported range.

4. Swap the power supply to see if the issue follows the power supply, if it follows the power supply, then replace the failing one.
5. Review the event log and see how the problem it is to follow the event log actions to resolved the problems.

Serial-device problems

Use this information to solve problems with serial ports or devices.

- "Number of displayed serial ports is less than the number of installed serial ports" on page 248
- "Serial device does not work" on page 248

Number of displayed serial ports is less than the number of installed serial ports

Complete the following steps until the problem is solved.

1. Make sure that:
   - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
   - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

1. Make sure that:
   - The device is compatible with the server.
   - The serial port is enabled and is assigned a unique address.
   - The device is connected to the correct connector (see "System-board connectors" on page 28).
2. Reseat the following components:
   a. Failing serial device.
   b. Serial cable.
3. Replace the following components:
   a. Failing serial device.
   b. Serial cable.
4. (Trained technician only) Replace the system board (system board assembly).

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
   - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

     Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.
   - The software is designed to operate on the server.
   - Other software works on the server.
   - The software works on another server.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.

3. Contact your place of purchase of the software.

Storage drive problems

Use this information to resolve issues related to the storage drives.

- “Server cannot recognize a drive” on page 249
- “Multiple drives fail” on page 250
- “Multiple drives are offline” on page 250
- “A replacement drive does not rebuild” on page 250
- “Green drive activity LED does not represent actual state of associated drive” on page 250
- “Yellow drive status LED does not represent actual state of associated drive” on page 250

Server cannot recognize a drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow drive status LED. If the LED is lit, it indicates a drive fault.
2. If the status LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the drive backplane.
3. Observe the associated green drive activity LED and the yellow status LED and perform corresponding operations in different situations:
   - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.
   - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
   - If neither LED is lit or flashing, check whether the drive backplane is correctly seated. For details, go to step 4.
   - If the green activity LED is flashing and the yellow status LED is lit, replace the drive.
4. Make sure that the drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.
6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
   - Replace the affected backplane signal cable.
   - Replace the affected backplane.
8. Run the diagnostics tests for the drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.

   Based on those tests:
   - If the backplane passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.

- Replace the backplane.
- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
- If the adapter fails the test, replace the adapter.

Multiple drives fail

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- Make sure that the device drivers and firmware for the drive and server are at the latest level.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

Multiple drives are offline

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- View the storage subsystem log for events related to the storage subsystem and resolve those events.

A replacement drive does not rebuild

Complete the following steps until the problem is solved:

1. Make sure that the drive is recognized by the adapter (the green drive activity LED is flashing).
2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings.

Green drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green drive activity LED does not flash when the drive is in use, run the diagnostics tests for the drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**
2. If the drive passes the test, replace the backplane.
3. If the drive fails the test, replace the drive.

Yellow drive status LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. Turn off the server.
2. Reseat the SAS/SATA adapter.
3. Reseat the backplane signal cable and backplane power cable.
4. Reseat the drive.
5. Power on the server and observe the activity of the drive LEDs.

Appendix A. Hardware disassembling for recycle

Follow the instructions in this section to recycle components with compliance with local laws or regulations.

Disassemble the server for chassis recycle

Follow the instructions in this section to disassemble the server before recycling the chassis.

About this task

Attention:

- Read “Installation Guidelines” on page 41 and “Safety inspection checklist” on page 42 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 48.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- If the server is installed in a rack, remove the server from the rack.
- Lay the server on its side for easier operation.

Step 1. Remove the front door. See “Remove the front door” on page 85.

Step 2. Remove all the installed drives and fillers. See “Remove a 2.5-/3.5-inch hot-swap drive” on page 64 or “Remove a simple-swap drive” on page 67.

Step 3. Remove the server cover. See “Remove the server cover” on page 156.

Step 4. Remove the front bezel. See “Remove the front bezel” on page 83.

Step 5. Remove the front I/O module. See “Remove the front I/O module” on page 88.

Step 6. Remove the optical drives and the tape drive. See “Remove an optical drive” on page 114 or “Remove a tape drive” on page 176.

Step 7. Remove the front and rear system fans. See “Remove the front system fan” on page 74 and “Remove the rear system fan” on page 78.

Step 8. Remove the 3.5-inch/2.5-inch drive cage. See “Remove the 3.5-inch/2.5-inch drive cage” on page 48.

Step 9. Remove the backplane or backplate. See “Remove the 3.5-inch/2.5-inch hot-swap drive backplane” on page 52 or “Remove the 3.5-inch simple-swap drive backplate” on page 56.

Step 10. Remove all the installed power supplies. See “Remove the hot-swap power supply unit” on page 134 or “Remove the fixed power supply unit” on page 128.

Step 11. Remove the power distribution board. See “Remove the power distribution board” on page 123.

Step 12. Remove all the M.2 drives from the M.2 boot adapter. See “Remove an M.2 drive” on page 104

Step 13. Remove the M.2 boot adapter. See “Remove the M.2 boot adapter” on page 98.

Step 14. Remove the RAID flash power module. See “Remove a RAID flash power module” on page 145.

Step 15. Remove all the installed PCIe adapters. See “Remove the PCIe adapter” on page 120.

Step 16. Remove the firmware and RoT security module. See “Remove the firmware and RoT security module” on page 162.

Step 17. Remove the intrusion switch. See “Remove the intrusion switch” on page 96.

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Step 18. Remove the memory modules that are installed on the system board. See “Remove a memory module” on page 107.

Step 19. Remove the heat sink and fan module. See “Remove the heat sink and fan module” on page 91.

Step 20. Remove the processor. See “Remove the processor” on page 142.

Step 21. Remove the system board. See “Remove the system board” on page 169.

After disassembling the server, recycle the unit in compliance with local regulations.

Appendix B. 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 Chapter 8 “Problem determination” on page 225 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 35.
- 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 C. 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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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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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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China Energy Label (CEL)

本产品的中国能效标识加施在服务器产品本体上。
中国能效标识中的配置类型Type 1、Type 2、Type 3分别对应能效等级1、2、3级的产品配置。同一规格型号下产品配置会有所不同。（此描述仅适用于中国能效范围内的产品）