

Hardware Maintenance Manual

Lenovo
ThinkStation



Lenovo

ThinkStation P5 Gen 2

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Contents

About this manual iii

Chapter 1. Product overview 1

Front view	1
Rear view	2
Expansion modules	4
Storage configuration.	4
Memory configuration	5
PCIe configuration	6

Chapter 2. Safety requirements for hardware maintenance 8

General safety requirements	8
Electrical safety requirements	9
Safety inspection guide.	10
Handle devices that are sensitive to electrostatic discharge	11
Important danger warning in multiple languages	12

Chapter 3. Diagnostics and troubleshooting 35

Overall procedure	35
Diagnostic tools.	36
Hardware scan in Vantage	36
ThinkStation Diagnostics solution	37
Lenovo UEFI diagnostic tool	37
Advanced diagnostic tools.	38
Symptom-to-CRU/FRU index	38
LED indicators for troubleshooting.	39
POST error codes	40
Beep symptoms.	41
Storage drive boot error.	42
Power supply problems	42
Miscellaneous error conditions	43
Undetermined problems	44
Call Lenovo	45
Before contacting Lenovo support.	45
Find the serial number	46
Lenovo Customer Support Center	46

Chapter 4. Hardware replacement 48

Before hardware replacement	48
Service tools	48
Screw list	51
CRU/FRU definition	52
CRU list	54
FRU list	55

Look up a part	55
Prerequisites for hardware replacement	55
System board illustration	57
External options.	58
ID badge	58
ThinkStation logo badge	59
Keys and key bracket	59
Side cover	60
Lock for the side cover	62
Top cover	63
PCIe components	64
PCIe bracket	64
PCIe top retention holder and supercapacitor module	65
Half-length PCIe cards	67
Full-length PCIe card and extender	68
PCIe cable connection	70
Graphics card support bracket	73
BMC card	74
USB4 PCIe card and cables	75
4-port serial PCIe card and cable	76
Storage components.	77
HDD and its bracket	77
HDD fan	78
Optional HDD and its bracket.	79
Optional HDD cage	80
Optional HDD cage holder.	81
Flex bay fan	83
15-in-1 media card reader module.	83
M.2 SSD enclosure and SSD	85
M.2 SSD enclosure tray and cable.	87
Flex bay cage	88
Flex bay cover	89
Flex bay dummy cover	90
SSD in M.2 SSD PCIe adapter	92
On-board SSD and its heat sink kit	95
On-board SSD holder.	98
Memory components	99
Memory fan duct	99
Memory fans	100
Memory module	101
Power components	102
Power supply unit assembly	103
1000-watt PSU cover.	104
1000-watt power distribution board and bracket	104
Front panel I/O assembly	105

Front fan	107
Rear fan	107
TCM card	108
VROC key	109
Think LED cable and holder	110
Internal speaker.	111
Wi-Fi card and shield.	112
Wi-Fi antennas	113
COM board and cable	114
Cover presence switch	115
Thermal sensor	116
Coin-cell battery	116
CPU, CPU carrier, and CPU heat sink	117
System board	120

Chapter 5. Supplemental instructions124

UEFI BIOS	124
What is UEFI BIOS	124
Enter the UEFI BIOS menu.	124
Navigate the UEFI BIOS menu	124
UEFI BIOS passwords	125
Update the UEFI BIOS	126
BIOS recovery	127

Clear CMOS position	127
Clear CMOS	127
Recover from a BIOS update failure	128
BMC card (for selected models)	128
What is BMC	128
BMC card overview	128
Get started with BMC.	129
BMC remote management console	130
Manage the BMC password	130
Update the BMC firmware	130
RAID	131
RAID overview	131
Important notes before configuring RAID	131
Configure RAID with RSTe.	132
Configure RAID with VROC	133
Configure RAID with the RAID card	134

Appendix A. Important notice for Quebec consumers137

Appendix B. Self-help resource138

Appendix C. Notices and trademarks.141

About this manual

This manual contains hardware maintenance instructions for the product listed in the following table.

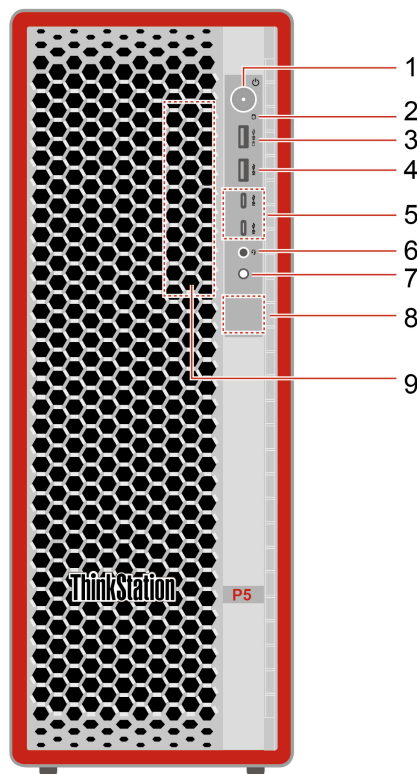
Model name	Machine types (MT)
ThinkStation P5 Gen 2	30KB, 30KC, 30KD, 30KE, 30KF, 30KG, 30KH, and 30KJ

Important:

- Hardware or software configurations vary by machine type. Some statements or illustrations in this manual may differ slightly from your computer.
- It is recommended that the computer be repaired by trained service technicians.
- For customers electing to service the computer on their own, it is still recommended to contact Lenovo Customer Support Center for guidance. See “Call Lenovo” on page 45. Depending on the complexity of the repair, it may be recommended to have a Lenovo-authorized service provider repair the computer.
- Before servicing a computer, be sure to follow all instructions carefully and read all the information under Chapter 2 “Safety requirements for hardware maintenance” on page 8 and “Before hardware replacement” on page 48.

Chapter 1. Product overview

Front view



Item	Description	Item	Description
1	Power button with indicator	2	Storage indicator
3	USB-A connector (USB 10Gbps, Always On)*	4	USB-A connector (USB 10Gbps)*
5	USB-C® connectors (USB 10Gbps)*	6	Combo audio jack
7	Diagnostic panel button	8	Diagnostic panel
9	Front-access storage bay*		

* for selected models

Statement on USB transfer rate

Depending on many factors such as the processing capability of the host and peripheral devices, file attributes, and other factors related to system configuration and operating environments, the actual transfer rate using the various USB connectors on this device will vary and will be slower than the data rate listed in the connector name for each corresponding device.

Power indicator

Shows the system status of your computer.

- **On:** The computer is starting up or working.
- **Off:** The computer is off or in hibernation mode.
- **Blinking slowly:** The computer is in sleep mode.

Storage indicator

The storage indicator blinks when a storage drive is under reading or writing.

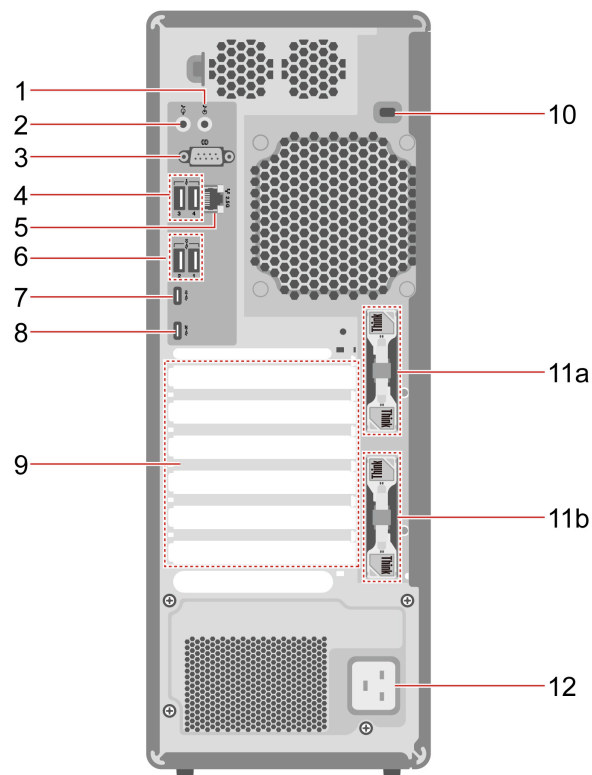
Always On USB feature

A USB connector with a battery icon  supports the Always On USB feature. With the Always On USB feature enabled, the connector can charge a USB-compatible device when the computer is in sleep mode (S3), in hibernate mode (S4), or even off (S5).

To enable the Always On USB feature, do the following:

1. Turn on or restart the computer. When the logo screen is displayed, press F1 or Fn+F1 to enter the UEFI BIOS menu.
2. Click **Devices** → **USB Setup** → **USB Charging Port in S4/S5** to enable the Always On USB feature.

Rear view



Item	Description	Item	Description
1	Audio line-in connector	2	Audio line-out connector
3	Serial connector*	4	USB-A connectors (Hi-Speed USB)
5	2.5-Gbps Ethernet connector with indicators	6	USB-A connectors (USB 10Gbps)
7	USB-C connector (USB 10Gbps)	8	USB-C connector (USB 20Gbps)
9	PCIe card area	10	Security-lock slot
11a	Key-nest for the side cover*	11b	Key-nest for the M.2 solid-state drive (SSD) enclosures*
12	Power connector		

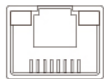
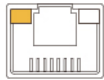
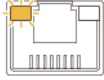
* for selected models

Serial connector

Connect an external modem, a serial printer, or other devices that use a serial connector.

2.5-Gbps Ethernet connector indicators

There are two LED indicators on the Ethernet connector that display the following statuses.

LED status	Indication
	The Ethernet connection is not established yet.
	A 10-Mbps or 100-Mbps Ethernet connection is established and ready for data transfer.
	A 10-Mbps or 100-Mbps Ethernet connection is actively transferring data.
	A 1-Gbps Ethernet connection is established and ready for data transfer.
	A 1-Gbps Ethernet connection is actively transferring data.
	A 2.5-Gbps Ethernet connection is established and ready for data transfer.
	A 2.5-Gbps Ethernet connection is actively transferring data.

PCIe card area

Depending on the model, the video output connectors in the PCIe card area might be HDMI™ connectors, DisplayPort™ connectors, Mini DisplayPort™ connectors, or USB-C connectors (USB4 40Gbps). The maximum output resolution is 7680 × 4320 pixels at 165 Hz.

Note: The actual resolution of external displays may vary by the connected display device, the cable being used, and the number of displays connected.

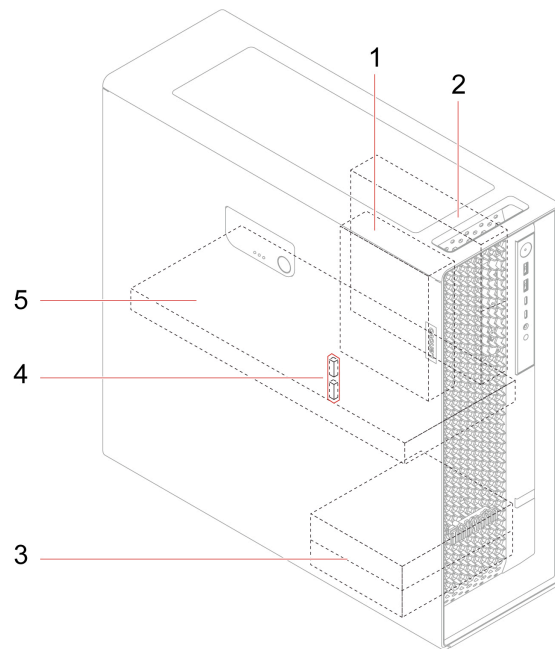
Expansion modules

You can boost your computer's capabilities by adding devices to the expansion modules. This section outlines the available modules for this product.

Storage configuration

The system features multiple spaces for high-performance storage configuration, offering the flexibility to choose the best fit for your needs.

Supported type



Location	Name	Drive support
4	Onboard M.2 slots	Up to 2 × 4TB M.2 Gen 5 SSDs (2280 or 22110)
2	Front-access storage bay*	Up to 2 × 4TB M.2 Gen 5 SSDs (2280)
5	M.2 SSD PCIe adapter*	Up to 4 × 4TB M.2 Gen 5 SSDs (2242, 2260, 2280, 22110)
3	Internal SATA drive bays	Up to 2 × 12TB 3.5 SATA3 HDDs
1	3rd SATA drive bay*	Up to 1 × 12TB 3.5 SATA3 HDD

* for selected models

Note: Although multiple M.2 dimensions can be installed, the only drives qualified by Lenovo are 2280.

Hardware requirements

The following mechanical or thermal parts are required for the storage configuration.

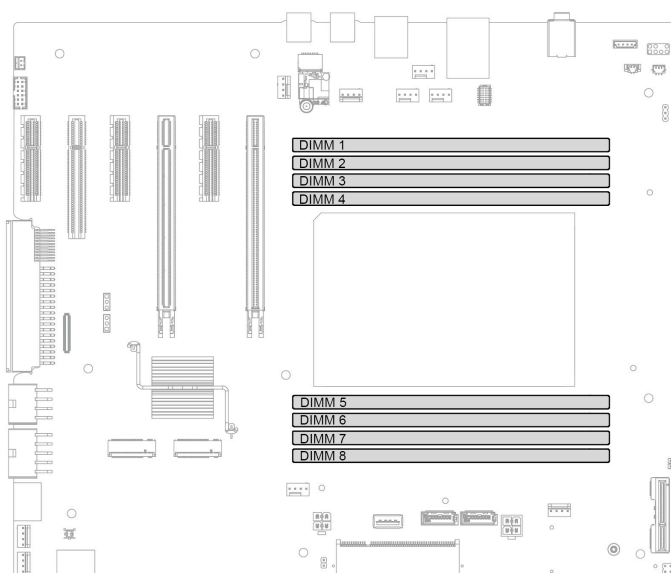
Name	Required parts for the drive installation
Onboard M.2 slots	On-board SSD heat sink kit
Front-access storage bay*	- Flex bay fan - Flex bay cage - M.2 SSD enclosure tray - M.2 SSD enclosures - M.2 SSD enclosure cable - Flex bay cover - Key to the SSD enclosure lock
M.2 SSD PCIe adapter*	- Available PCIe x16 slot - M.2 SSD PCIe adapter
Internal SATA drive bays	- HDD fan - HDD bracket - SATA data cable - SATA power cable
3rd SATA drive bay*	- Optional HDD cage - Optional HDD cage holder - Optional HDD bracket - SATA data cable - SATA power cable - Flex bay cage - Flex bay fan

Notes:

- Some parts may be included in the system for selected models.
- For part information and installation instructions, refer to the hardware replacement section.

Memory configuration

The system board features eight memory slots across four channels, supporting high-capacity modules to handle demanding workloads.



Supported type

- Type: DDR5 ECC RDIMM (Double data rate 5, error correction code, registered dual in-line memory module)
- Capacity: 16 GB, 32 GB, 64 GB, or 128 GB per module
- Quantity: 1, 2, 4, or 8

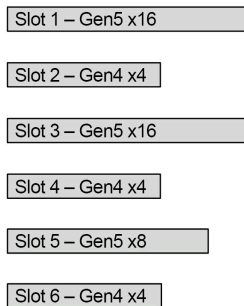
Configuration rules

- Multiple modules in one system must be identical in type and capacity.
- Modules must be installed only in the quantities, slots, and sequence specified below.

Quantity	Slot and order
1	DIMM 3
2	DIMM 3, 8
4	DIMM 3, 6, 1, 8
8	DIMM 3, 6, 1, 8, 4, 5, 2, 7

PCIe configuration

The system provides six onboard PCIe slots, supporting a wide range of high-performance expansion cards.



Supported type

- Graphics card such as NVIDIA RTX Pro or NVIDIA GeForce graphics card
- Storage adapter such as ThinkStation M.2 SSD PCIe adapter
- RAID adapter such as Broadcom 940-8i RAID card
- Ethernet adapter such as Intel E610-T4 Ethernet Adapter
- ThinkStation BMC card
- Additional PCIe devices such as NVIDIA RTX Pro Sync board, 4-port serial adapter, and dual PS/2 PCIe adapter

Note: PCIe options can vary by system power, thermal capacity, and mechanical layout.

Configuration rules

- Always ensure that the CPU power capability and PSU wattage are sufficient before planning the graphics card configuration. If unsure, contact Lenovo.
- Ensure at least one graphics card is installed. If multiple cards are installed, they must be identical.
- Populate the PCIe slots in the following priority order.

1. PCIe Gen 5 x16 slot (Slot 3)
 2. PCIe Gen 5 x16 slot (Slot 1)
 3. PCIe Gen 5 x8 slot (Slot 5)
 4. PCIe Gen 4 x4 slot (Slot 2)
 5. PCIe Gen 4 x4 slot (Slot 4)
 6. PCIe Gen 4 x4 slot (Slot 6)
- Install the following PCIe cards (if present) only in their designated slots.

PCIe card	Slot
NVIDIA GeForce graphics cards	Slot 1
– Intel E610-T4 Ethernet Adapter	Slot 5
– BMC card	
USB4 PCIe card	Slot 6

Chapter 2. Safety requirements for hardware maintenance

General safety requirements

Meet the following requirements on environment, personnel and outfit, and operation to ensure general safety:

Environment requirements

Observe good housekeeping in the area of the machine during and after maintenance.

Personnel and outfit requirements

- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, about 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing, because metal objects are good electrical conductors.
- Wear safety glasses when you are hammering, drilling, soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.

Operation requirements

- Before you start the machine, ensure that no one is in a hazardous position.
- Do not perform any action that causes personal injury or that makes the equipment unsafe.
- Keep your tool case away from walk areas so that other people will not trip over it.
- When lifting any heavy object:
 1. Ensure that you can stand safely without slipping.
 2. Distribute the weight of the object equally between your feet.
 3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
 4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. Do not attempt to lift any object that weighs more than 16 kg (35 lb) or that you think is too heavy for you.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective. Reinstall all covers correctly.

CAUTION:



Keep fingers and other parts of your body away from hazardous, moving parts. If you suffer an injury, seek medical care immediately. Never remove the cover on a power supply or any part that has the following 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.

CAUTION:



Avoid contact with hot components inside the computer. During operation, some components become hot enough to burn the skin. Before you open the computer cover, turn off the computer, disconnect the power, and wait approximately 10 minutes for the components to cool.

Electrical safety requirements

To ensure electrical safety, meet the following requirements on environment, outfit, and operation when working on the computer:

Environment requirements

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.

Outfit requirements

- Do not use worn or broken tools and testers.
- Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges (ESD). Do not use this type of mat to protect yourself from electrical shock.

Operation requirements



CAUTION:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the computer covers, unless instructed otherwise in the installation and configuration procedures.

- Disconnect all power before:
 - Performing a mechanical inspection
 - Working near power supplies
 - Removing or installing Field Replaceable Units (FRUs) or Customer Replaceable Units (CRUs)
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine:
 - Power supply units
 - Pumps
 - Blowers and fans

- Motor generators

This practice ensures the correct grounding of the units.

- Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.
- Observe the special safety precautions when you work with very high voltages. Instructions for these precautions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, power off the wall box that supplies power to the machine and lock the wall box in the off position.
- Never assume that power has been disconnected from a circuit. First, check that it has been powered off.
- Avoid touching live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
 - Ensure that another person, familiar with the power-off controls, is nearby. That person must be there to switch off the power, if necessary.
 - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

CAUTION:

An electrical shock can occur only when there is a complete circuit. By observing the above rule, you may prevent a current from passing through your body.

- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.
- If an electrical accident occurs:
 - Use caution; do not become a victim yourself.
 - Switch off power.
 - Send another person to get medical aid.

Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem. Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock)
- Explosive hazards, such as a damaged CRT face or a bulging capacitor
- Mechanical hazards, such as loose or missing hardware

To determine whether there are any potentially unsafe conditions, use the following checklist at the beginning of every service task. Begin the checks with the power off and the power cord disconnected:

- Before removing the cover:
 1. Check exterior covers for damage (loose, broken, or sharp edges).

2. Power off the computer. Disconnect the power cord. Check the power cord for:
 - a. A third-wire ground connector 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.
 - b. The power cord should be the authorized type specified for your computer.
 - c. Insulation must not be frayed or worn.
- After removing the cover:
 1. Check for any obvious alterations. Use good judgment as to the safety of any alterations.
 2. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
 3. Check for worn, frayed, or pinched cables.
 4. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handle devices that are sensitive to electrostatic discharge

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Static electricity, although harmless to you, can seriously damage computer components and options. It is necessary to protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.
 - Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
 - Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
 - Use the round ground-prong of the ac plug on ac-operated computers.

Note: The use of a grounding system is desirable but not required to protect against ESD damage.

- Avoid contact with other people while handling the part.
- Prevent others from touching the options and other computer components.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Limit your movement. Movement can cause static electricity to build up around you.
- Do not place the part on the computer cover or other metal surface.
- Always handle computer components and options carefully. Hold PCI/PCIe cards, memory modules, system boards, and CPUs only by the edges. Never touch any exposed circuitry.

- Touch the static-protective package containing the part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity from the package and your body before you install or replace a new part.
- Do not open the static-protective package containing the new part until the defective part has been removed and you are ready to install the new part. Static electricity, although harmless to you, can seriously damage computer components and options.
- Keep the parts in protective packages until they are inserted into the product.
- When possible, remove the new part from the static-protective package, and install it directly in the computer without setting the part down. When this is not possible, place the static-protective package on a smooth and level surface and place the part on the package.

Important danger warning in multiple languages

The safety notices in this section are provided in the following languages:

- English
- Arabic
- Brazilian/Portuguese
- Chinese (simplified)
- Chinese (traditional)
- French
- German
- Hebrew
- Italian
- Korean
- Spanish

English



DANGER

Electrical current from power, telephone and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **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.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following tables when installing, moving, or opening covers on this product or attached devices.**

To Connect	To Disconnect
1. Turn everything OFF. 2. First, attach all cables to devices. 3. Attach signal cables to connectors. 4. Attach power cords to outlet. 5. Turn device ON.	1. Turn everything OFF. 2. First, remove power cords from outlet. 3. Remove signal cables from connectors. 4. Remove all cables from devices.



CAUTION:

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.



CAUTION:

When laser products (such as CD-ROMs, DVD-ROM 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.



DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following:

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.



CAUTION:

Use safe practices when lifting.



≥18 kg (37 lb)



≥32 kg (70.5 lb)

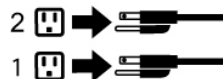


≥55 kg (121.2 lb)



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.



Arabic



خطر

التيار الكهربائي الموجود بمصدر الطاقة أو أجهزة التليفون أو أسلاك الاتصالات يشكل خطورة.

لتنقادي مخاطر الصدمات الكهربائية:

لا تحاول توصيل أو فصل أي أسلاك أو القيام بعمليات تركيب أو صيانة أو إعادة توصيف لهذا المنتج أثناء وجود عاصفة كهربائية.

يجب توصيل كل أسلاك الكهرباء في مخارج كهرباء ذات توصيلات أسلاك وتوصيلات أرضية صحيحة

يجب توصيل أي جهاز سيتم الحاقه بهذا المنتج في مخارج كهرباء ذات توصيلات أسلاك صحيحة.

وإن أمكن يجب استخدام يد واحدة فقط في توصيل أو فصل أسلاك الإشارة.

لا تحاول تشغيل أي جهاز إذا كان هناك أثر لحرق أو مياه أو تلف بالمكونات

يجب فصل أسلاك الكهرباء وأنظمة الاتصالات وشبكات الاتصال وأجهزة المسود الملحقة قبل فتح أغطية الجهاز، مالم يتم طلب خلاف ذلك في التعليمات الخاصة بالتركيب والتوصيف.

قم بتوصيل وفصل الأسلاك كما هو موضح في الجدول التالي وذلك عند القيام بعمليات التركيب أو النقل أو فتح أغطية هذا المنتج أو الأجهزة الملحقة.

للتوصيل:	للفصل:
قم بإيقاف كل شيء.	قم بإيقاف كل شيء.
أولاً، قم بتوصيل كل الأسلاك بالأجهزة.	أولاً، قم بفصل كل أسلاك الكهرباء من المخرج.
قم بتوصيل أسلاك الإشارة في لموصلات.	قم بفصل أسلاك الإشارة من الموصلات.
قم بتوصيل أسلاك الكهرباء في المخارج.	قم بفصل كل الأسلاك من الأجهزة.
قم بتشغيل الجهاز.	



تنبيه :

إذا كان النظام الخاص يستخدم معه بطارية ليثيوم قم باستبدالها بنفس النوع الذي تم صنعته من خلال نفس المصنع. تحتوي البطارية على مادة الليثيوم ويمكن أن تنفجر في حالة عدم استخدامها أو التعامل معها بطريقة صحيحة أو عند التخلص منها بطريقة خطأ.

لا تقم بـ:

- القاء البطارية أو غمرها في الماء
- تسخينها أعلى من ١٠٠ درجة مئوية (٢١٢ ° فهرنهايت)
- بتصليحها أو فكها

تخلص من البطارية طبقاً للقانون أو النظام المحلي .



تنبيه :
أثناء تركيب منتجات ليزر (مثل CD-ROMs أو وحدة تشغيل DVD أو أجهزة Fiber Optic أو وحدات الارسل) يجب مراعاة الآتي:

لا تنزع الأغطية. قد ينتج عن نزع أغطية منتج الليزر انفجار أشعة الليزر شديدة الخطورة.
لا يوجد أجزاء يمكن تغييرها داخل الجهاز. قد ينتج عن استخدام تحكمات أو تعديلات أو عمل أي تصرفات أخرى تخالف ما هو محدد هنا إلى انفجار أشعة شديدة الخطورة.



خطر

تحتوي بعض منتجات الليزر على الفئة دايود ليزر مدمج من الفئة Class 3A أو Class 3B. يجب مراعاة الآتي .

أشعة الليزر عند الفتح. لا تحقق إلى الاشعاع و لا تنظر اليه مباشرة بواسطة أي أجهزة مرئية وتجنب التعرض المباشر للاشعاع .



تنبيه :
يجب استخدام ممارسات آمنة عند الرفع



≥18 kg (37 lb)



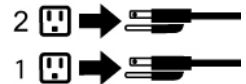
≥32 kg (70.5 lb)



≥55 kg (121.2 lb)



تنبيه :
لا يقر زر التحكم في التشغيل الموجود على الجهاز والمفتاح الكهربائي الموجود على لوحة التحكم بإيقاف التيار الكهربائي المار بالجهاز. قد يكون للجهاز أكثر من سلك كهربائي واحد. لايقاف التيار الكهربائي المار بالجهاز، تأكد من فصل جميع أسلاك الكهرباء من مصدر الكهرباء .



Brazilian Portuguese



PERIGO

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicações é perigosa.

Para evitar risco de choque elétrico:

- Não conecte nem desconecte nenhum cabo ou execute instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.
- Conecte todos os cabos de alimentação a tomadas elétricas corretamente instaladas e aterradas.
- Todo equipamento que for conectado a este produto deve ser conectado a tomadas corretamente instaladas.
- Quando possível, utilize apenas uma das mãos para conectar ou desconectar cabos de sinal.
- Nunca ligue nenhum equipamento quando houver evidência de fogo, água ou danos estruturais.
- Antes de abrir tampas de dispositivos, desconecte cabos de alimentação, sistemas de telecomunicação, redes e modems conectados, a menos que especificado de maneira diferente nos procedimentos de instalação e configuração.
- Conecte e desconecte os cabos conforme descrito na tabela apresentada a seguir ao instalar, mover ou abrir tampas deste produto ou de dispositivos conectados.

Para Conectar:	Para Desconectar:
1. DESLIGUE Tudo. 2. Primeiramente, conecte todos os cabos aos dispositivos. 3. Conecte os cabos de sinal aos conectores. 4. Conecte os cabos de alimentação às tomadas. 5. LIGUE os dispositivos.	1. DESLIGUE Tudo. 2. Primeiramente, remova os cabos de alimentação das tomadas. 3. Remova os cabos de sinal dos conectores. 4. Remova todos os cabos dos dispositivos.



CUIDADO:

Se o seu sistema possui um módulo com uma bateria de lítio, substitua-o apenas por um módulo do mesmo tipo e do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada ou descartada de maneira correta.

Não:

- Jogue ou coloque na água
- Aqueça a mais de 100°C (212°F)
- Conserte nem desmonte

Descarte a bateria conforme requerido pelas leis ou regulamentos locais.



PRECAUCIÓN:

Quando produtos a laser (como unidades de CD-ROMs, unidades de DVD-ROM, dispositivos de fibra ótica ou transmissores) estiverem instalados, observe o seguinte:

- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Não existem peças que podem ser consertadas no interior do dispositivo.
- A utilização de controles ou ajustes ou a execução de procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.

PERIGO

Alguns produtos a laser contêm diodo de laser integrado da Classe 3A ou da Classe 3B. Observe o seguinte:

Radiação a laser quando aberto. Não olhe diretamente para o feixe a olho nu ou com instrumentos ópticos e evite exposição direta ao feixe.



CUIDADO:

Utilize procedimentos de segurança para levantar equipamentos.



≥18 kg (37 lb)



≥32 kg (70.5 lb)

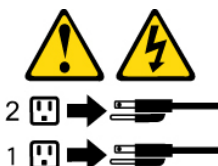


≥55 kg (121.2 lb)



CUIDADO:

O botão de controle de alimentação do dispositivo e o botão para ligar/desligar da fonte de alimentação não desligam a corrente elétrica fornecida ao dispositivo. O dispositivo também pode ter mais de um cabo de alimentação. Para remover toda a corrente elétrica do dispositivo, assegure que todos os cabos de alimentação estejam desconectados da fonte de alimentação.



Chinese (simplified)



危险

电源、电话和通信电缆中的电流是危险的。

为避免电击危险：

- 请勿在雷电期间连接或断开任何电缆的连接，或者对本产品进行安装、维护或重新配置。
- 将所有电源线连接到正确连线 and 妥善接地的电源插座。
- 将所有要连接到该产品的设备连接到正确连线的插座。
- 如果可能，请仅使用一只手来连接或断开信号电缆的连接。
- 切勿在有火、水、结构损坏迹象的情况下开启任何设备。
- 在打开设备外盖之前请断开已连接的电源线、远程通信系统、网络和调制解调器，除非在安装和配置过程中另有说明。
- 当安装、移动或打开该产品或连接设备的外盖时，请按照下表所述来连接或断开电缆的连接。

要连接	要断开连接
1. 切断所有电源。 2. 首先将所有电缆连接到设备。 3. 将信号电缆连接到接口。 4. 将电源线连接到插座。 5. 开启设备。	1. 切断所有电源。 2. 首先从插座上拔出电源线。 3. 从接口上拔出信号电缆。 4. 从设备上拔出所有电缆。



警告：
如果您的系统有包含锂电池的模块，请仅使用同一制造商生产的相同模块类型来替换该模块。
该电池中含有锂，如果使用、操作或处理不当，可能会发生爆炸。

切勿：

- 投入或浸入水中
- 加热到 100 °C (212 °F) 以上
- 维修或拆卸

请按照当地法令或条例的要求处理电池。



警告：
安装激光产品（例如 CD-ROM、DVD-ROM 驱动器、光纤设备或发射设备）时，
请注意以下声明：

- 请勿卸下外盖。卸下激光产品的外盖可能导致遭受激光辐射的危险。该设备内没有可维修的部件。
- 如果不按照此处指定的过程进行控制、调整或操作，则有可能导致遭受辐射的危险。



危險

某些激光产品包含嵌入式 3A 类或 3B 类激光二极管。请注意以下声明：

打开后有激光辐射。请勿注视光束，请勿直接用光学仪器查看，并请避免直接暴露在光束中。



警告：
抬起时请采取安全措施。



≥18 千克 (37 磅) ≥32 千克 (70.5 磅) ≥55 千克 (121.2 磅)



警告：
设备上的电源控制按钮和电源上的电源开关不会切断供给该设备的电流。该设备还可能有多条电源线。要切断该设备的所有电流，请确保所有电源线都与电源断开连接。



Chinese (traditional)



危險

電源、電話及通訊纜線上的電流都具有危險性。

若要避免觸電危險：

- 請勿在雷雨期間，連接或拔除纜線、執行安裝、維護或重新配置本產品。
- 將所有電源線連接到正確配線及接地的電源插座。
- 任何與本產品連接的設備都必須連接到配線妥當的電源插座。
- 請盡可能用單手連接或拔除信號線。
- 發生火災、水災或結構損害時，絕對不要開啟任何設備。
- 除非在安裝及配置程序中另有指示，否則在開啟裝置機蓋之前，請拔掉連接的電源線、電信系統、網路及數據機。
- 安裝、移動或開啟本產品或附屬裝置的機蓋時，請遵循下列說明連接及拔掉纜線。

連線	切斷連線
1. 關閉所有開關。 2. 首先，連接所有接線到裝置。 3. 連接信號線到接頭。 4. 連接電源線到插座。 5. 開啟裝置。	1. 關閉所有開關。 2. 首先，拔掉插座上的電源線。 3. 拔掉接頭上的信號線。 4. 拔掉裝置上所有接線。



警告：

如果您的系統中含有鋰電池模組，請僅使用同一家製造商所生產的相同模組進行更換。

如果未以正確方式使用、處理或棄置含鋰的電池，會有爆炸的危險。

請勿：

- 沾溼或浸入水中
- 置於 **100°C (212°F)** 以上的高溫環境
- 修理或拆開

請按照各地區有關廢棄電池的法令和規定處理舊電池。



警告：

- 請勿移除機蓋。移除雷射產品的機蓋，可能會導致暴露在危險的雷射輻射中。裝置內部並無可自行維修的零件。
- 利用或執行非本文中所指定的控制、調整及執行程序，可能會導致危險的輻射外洩。



危險

部分雷射產品含有內嵌式 **Class 3A** 或 **Class 3B** 雷射二極體。請注意下列事項：

在開啟光碟機時，會發生雷射輻射。請勿直視光束或用光學儀器直接檢視，並避免直接暴露在光束中。



警告：

搬運時請注意安全。

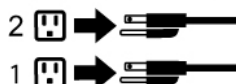


≥ 18 公斤 (37 磅) ≥ 32 公斤 (70.5 磅) ≥ 55 公斤 (121.2 磅)



警告：

裝置上的電源控制按鈕及電源供應器上的電源開關，無法關閉裝置所產生的電流。
該裝置可能有多條電源線。若要除去裝置流出的所有電流，請確認已切斷所有電源線的電源。



French



DANGER

Le courant électrique provenant de l'alimentation, du téléphone et des câbles de transmission peut présenter un danger.

Pour éviter tout risque de choc électrique :

- Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.
- Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.
- Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.
- Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface.
- Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.
- Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).
- Lorsque vous installez, que vous déplacez, ou que vous manipulez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion	Déconnexion
1. Mettez les unités HORS TENSION. 2. Commencez par brancher tous les cordons sur les unités. 3. Branchez les câbles d'interface sur des connecteurs. 4. Branchez les cordons d'alimentation sur des prises. 5. Mettez les unités SOUS TENSION.	1. Mettez les unités HORS TENSION. 2. Débranchez les cordons d'alimentation des prises. 3. Débranchez les câbles d'interface des connecteurs. 4. Débranchez tous les câbles des unités.



ATTENTION:

Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et peut exploser en cas de mauvaise utilisation, de mauvaise manipulation ou de mise au rebut inappropriée.

Ne pas :

- la jeter à l'eau,
- l'exposer à des températures supérieures à 100°C,
- chercher à la réparer ou à la démonter.

Ne pas mettre la pile à la poubelle. Pour la mise au rebut, se reporter à la réglementation en vigueur.



ATTENTION:

Si des produits à laser (tels que des unités de CD-ROM, de DVD-ROM, des unités à fibres optiques, ou des émetteurs) sont installés, prenez connaissance des informations suivantes :

- Ne retirez pas le carter. En ouvrant l'unité de CD-ROM ou de DVD-ROM, vous vous exposez au rayonnement dangereux du laser. Aucune pièce de l'unité n'est réparable.
- Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent manuel.



DANGER

Certains produits à laser contiennent une diode à laser intégrée de classe 3A ou 3B. Prenez connaissance des informations suivantes:

Rayonnement laser lorsque le carter est ouvert. Evitez toute exposition directe au rayon laser. Evitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques.



ATTENTION:

Soulevez la machine avec précaution.



≥18 kg (37 lb)



≥32 kg (70.5 lb)

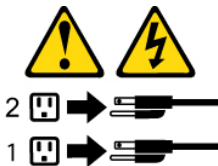


≥55 kg (121.2 lb)



ATTENTION:

L'interrupteur de contrôle d'alimentation de l'unité et l'interrupteur dubloc d'alimentation ne coupent pas le courant électrique alimentant l'unité. En outre, le système peut être équipé de plusieurs cordons d'alimentation. Pour mettre l'unité hors tension, vous devez déconnecter tous les cordons de la source d'alimentation.



German



VORSICHT

An Netz-, Telefon- und Datenleitungen können gefährliche Spannungen anliegen.

Aus Sicherheitsgründen:

- Bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.
- Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.

- Die Signalkabel nach Möglichkeit einhändig anschließen oder lösen, um einen Stromschlag durch Berühren von Oberflächen mit unterschiedlichem elektrischem Potenzial zu vermeiden.
- Geräte niemals einschalten, wenn Hinweise auf Feuer, Wasser oder Gebäudeschäden vorliegen.
- Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem Öffnen des Gehäuses zu unterbrechen, sofern in den Installations- und Konfigurationsprozeduren keine anders lautenden Anweisungen enthalten sind.
- Zum Installieren, Transportieren und Öffnen der Abdeckungen des Computers oder der angeschlossenen Einheiten die Kabel gemäß der folgenden Tabelle anschließen und abziehen.

Zum Anschließen der Kabel gehen Sie wie folgt vor	Zum Abziehen der Kabel gehen Sie wie folgt vor
1. Schalten Sie alle Einheiten AUS. 2. Schließen Sie erst alle Kabel an die Einheiten an. 3. Schließen Sie die Signalkabel an die Buchsen an. 4. Schließen Sie die Netzkabel an die Steckdose an. 5. Schalten Sie die Einheit EIN.	1. Schalten Sie alle Einheiten AUS. 2. Ziehen Sie zuerst alle Netzkabel aus den Netzsteckdosen. 3. Ziehen Sie die Signalkabel aus den Buchsen. 4. Ziehen Sie alle Kabel von den Einheiten ab.



ACHTUNG:

Enthält das System ein Modul mit einer Lithiumbatterie, dieses nur durch ein Modul desselben Typs und von demselben Hersteller ersetzen. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht:

- mit Wasser in Berührung bringen.
- über 100 C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.



ACHTUNG:

Bei der Installation von Lasergeräten (wie CD-ROM-Laufwerken, DVD- aufwerken, Einheiten mit Lichtwellenleitertechnik oder Sendern) Folgendes beachten:

- Die Abdeckungen nicht entfernen. Durch Entfernen der Abdeckungen des Lasergeräts können gefährliche Laserstrahlungen freigesetzt werden. Das Gerät enthält keine zu wartenden Teile.
- Werden Steuerelemente, Einstellungen oder Durchführungen von Prozeduren anders als hier angegeben verwendet, kann gefährliche Laserstrahlung auftreten.



VORSICHT

Einige Lasergeräte enthalten eine Laserdiode der Klasse 3A oder 3B. Beachten Sie Folgendes:

Laserstrahlung bei geöffneter Verkleidung. Nicht in den Strahl blicken. Keine Lupen oder Spiegel verwenden. Strahlungsbereich meiden.



ACHTUNG:

Arbeitsschutzrichtlinien beim Anheben der Maschine beachten.



≥18 kg



≥32 kg



≥55 kg



ACHTUNG:

Mit dem Netzschalter an der Einheit und am Netzteil wird die Stromversorgung für die Einheit nicht unterbrochen. Die Einheit kann auch mit mehreren Netzkabeln ausgestattet sein. Um die Stromversorgung für die Einheit vollständig zu unterbrechen, müssen alle zum Gerät führenden Netzkabel vom Netz getrennt werden.



Hebrew



זרם חשמלי המועבר בכבלי חשמל, טלפון ותקשורת הוא מסוכן.

כדי להימנע מסכנת התחשמלות:

- אל תחברו או תנתקו כבלים, ואל תבצעו פעולת התקנה, תחזוקה או שינוי תצורה במוצר זה במהלך סופת ברקים.
- חברו את כל כבלי החשמל לשקע חשמל מחווט ומוארק כהלכה.
- חברו כל ציוד שיחובר למוצר זה לשקעי חשמל מחוטים כהלכה.
- במידת האפשר, השתמשו ביד אחת בלבד לחיבור או לניתוק של כבלי אותות.
- לעולם אל תפעילו ציוד כלשהו כאשר יש עדות לנזק מבני או לנזק כתוצאה מאש או ממים.
- נתקו את כבלי החשמל, מערכות התקשורת, התקני הרשת והמודמים המחוברים לפני פתיחת כיסויי ההתקן, אלא אם הליכי ההתקנה וקביעת התצורה מורים אחרת.
- בעת התקנה, העברה או פתיחת כיסויים במוצר זה או בהתקנים המחוברים, חברו ונתקו את הכבלים כמתואר בטבלה שלהלן.

כדי לחבר	כדי לנתק
1. כבו הכל.	1. כבו הכל.
2. ראשית, חברו את כל הכבלים להתקנים.	2. ראשית, נתקו את כבלי החשמל מהשקעים.
3. חברו את כבלי האותות למחברים.	3. נתקו את כבלי האותות מהמחברים.
4. חברו את כבלי החשמל לשקעים.	4. הסירו את כל הכבלים מההתקנים.
5. הפעילו את ההתקן.	



זהירות:

אם המערכת כוללת מודול המכיל סוללת ליתיום, החליפו אותו רק במודול מאותו סוג ומתוצרת אותו יצרן. הסוללה מכילה ליתיום, ועלולה להתפוצץ אם לא משתמשים ומטפלים בה או משליכים אותה כראוי.

לעולם:

- אל תטבלו במים

- אל תחממו לטמפרטורה הגבוהה מ-100°C (212°F)

- אל תתקנו או תפרקו

השליכו את הסוללה כנדרש לפי התקנות והחוקים המקומיים.



זהירות:

בעת התקנת מוצרי ליזר (כגון כונני תקליטורים ו-DVD, התקני סיב אופטי או משדרים), שימו לב לאזהרות הבאות:

- אל תסירו את הכיסויים. הסרת הכיסויים של מוצר הלייזר עלולה לגרום לחשיפה לקרינת לייזר מסוכנת. אין חלקים ברי טיפול בתוך ההתקן.
- שינויים, שימוש בבקורות או ביצוע הליכים אחרים מאלה המתוארים כאן, עלולים לגרום לחשיפה לקרינה מסוכנת.



מוצרי ליזר מסוימים מכילים דיודת ליזר מסוג Class 3A או Class 3B. שימו לב לאזהרה הבאה:
כאשר הוא פתוח, המוצר פולט קרינת ליזר. אל תביטו ישירות בקרן, אל תביטו ישירות בעזרת ציוד אופטי, והימנעו מחשיפה לקרן.



זהירות:
השתמשו בהליכים
הנאותים בעת
הרמת הציוד.



≤ 18 ק"ג (37 ליב')



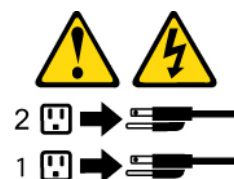
≤ 32 ק"ג (70.5 ליב')



≤ 55 ק"ג (121.2 ליב')



זהירות:
לחצן ההפעלה של ההתקן ומתג ההפעלה של ספק החשמל אינם מפסיקים את זרם החשמל המסופק להתקן.
בנוסף, ההתקן עשוי לכלול יותר מכבל חשמל אחד. כדי לסלק את כל הזרם החשמלי מההתקן,
ודאו שכל כבלי החשמל מנותקים ממקור החשמל.



Italian



PERICOLO

La corrente elettrica proveniente dai cavi di alimentazione, del telefono e di comunicazione può essere pericolosa.

Per evitare il rischio di scosse elettriche:

- Non collegare o scollegare qualsiasi cavo oppure effettuare l'installazione, la manutenzione o la riconfigurazione del prodotto durante un temporale.
- Collegare tutti i fili elettrici a una presa di alimentazione correttamente cablata e dotata di messa a terra.
- Collegare alle prese elettriche appropriate tutte le apparecchiature che verranno utilizzate per questo prodotto.
- Se possibile, utilizzare solo una mano per collegare o scollegare i cavi di segnale.
- Non accendere assolutamente apparecchiature in presenza di incendi, perdite d'acqua o danno strutturale.
- Scollegare i cavi di alimentazione, i sistemi di telecomunicazione, le reti e il modem prima di aprire i coperchi del dispositivo, salvo istruzioni contrarie relative alle procedure di installazione e configurazione.
- Collegare e scollegare i cavi come descritto nella seguente tabella quando vengono effettuate operazioni di installazione, spostamento o apertura dei coperchi di questo prodotto o delle unità collegate.

Per collegarsi	Per scollegarsi
1. SPEGNERE le apparecchiature. 2. Innanzitutto, collegare tutti i cavi alle unità. 3. Collegare i cavi di segnale ai connettori. 4. Collegare i cavi di alimentazione alla presa. 5. Accendere l'unità.	1. SPEGNERE le apparecchiature. 2. Innanzitutto, rimuovere i cavi di alimentazione dalla presa. 3. Rimuovere i cavi di segnale dai connettori. 4. Rimuovere tutti i cavi dalle unità.



ATTENZIONE:

Se sul sistema è presente un modulo che contiene una batteria al litio, sostituirlo solo con un tipo di modulo dello stesso tipo della stessa casa di produzione. La batteria contiene litio e può esplodere se usata, maneggiata o smaltita in modo non corretto.

Non:

- Gettare o immergere la batteria nell'acqua
- Riscaldarla ad una temperatura superiore ai 100 gradi C (212 gradi F)
- Smontarla, ricaricarla o tentare di ripararla

Le batterie usate vanno smaltite in accordo alla normativa in vigore (DPR 915/82 e successive disposizioni e disposizioni locali).



ATTENZIONE:

Quando vengono installati prodotti laser (quali CD-ROM, unità DVD-ROM, unità a fibre ottiche o trasmettenti), tener presente quanto segue:

- Non rimuovere gli sportelli. L'apertura di un'unità laser può determinare l'esposizione a radiazioni laser pericolose. All'interno dell'unità non vi sono parti su cui effettuare l'assistenza tecnica.
- L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.



PERICOLO

Alcune unità laser contengono un diodo laser di Classe 3A o Classe 3B. Tener presente quanto segue:

Aperto l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione al fascio.



ATTENZIONE:

Prestare attenzione nel sollevare l'apparecchiatura.



≥18 kg



≥32 kg

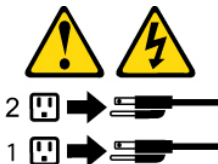


≥55 kg



ATTENZIONE:

Il pulsante di controllo dell'alimentazione presente sull'unità e l'interruttore dell'alimentatore non disattivano l'alimentazione corrente fornita all'unità. E' possibile che l'unità disponga di più cavi di alimentazione. Per disattivare l'alimentazione dall'unità, accertarsi che tutti i cavi di alimentazione siano scollegati dalla fonte di alimentazione.



Korean



위험

전원, 전화, 통신 케이블의 전류는 위험합니다.

감전의 위험을 피하려면 다음과 같이 하십시오.

- 번개가 치는 날에는 케이블을 연결 또는 분리하거나 본 제품을 설치, 보수, 재구성하지 마십시오.
- 모든 전원 코드는 올바르게 접지된 전기 콘센트에 연결하십시오.
- 본 제품에 연결될 장치는 올바르게 배선된 콘센트에 연결하십시오.
- 신호 케이블을 연결 또는 분리할 때 가능하면 한 손만을 사용하십시오.
- 불 또는 물로 인한 손상이나 구조적인 손상이 있을 경우 장치의 전원을 절대 켜지 마십시오.
- 설치 및 구성 과정에 별도의 지시 사항이 없는 경우, 장치의 덮개를 열기 전에 연결된 전원 코드, 원격 통신 시스템, 네트워크, 모뎀을 분리하십시오.
- 본 제품이나 연결된 장치를 설치, 이동하거나 덮개를 열 때 다음 표와 같은 순서로 케이블을 연결하거나 분리하십시오.

연결할 때:	분리할 때:
1. 모든 장치의 전원을 끄십시오. 2. 먼저 모든 케이블을 장치에 연결하십시오. 3. 커넥터에 신호 케이블을 연결하십시오. 4. 콘센트에 전원 코드를 연결하십시오. 5. 장치의 전원을 켜십시오.	1. 모든 장치의 전원을 끄십시오. 2. 먼저 콘센트에서 전원 코드를 분리하십시오. 3. 커넥터에서 신호 케이블을 분리하십시오. 4. 장치에서 모든 케이블을 분리하십시오.



주의:

사용자의 시스템이 리튬 배터리를 포함하는 모듈일 경우, 동일한 제조업체에서 동일한 모듈 유형으로 생산된 제품으로 교체하십시오. 배터리에는 리튬이 함유되어 있어 잘못 사용, 취급 또는 폐기할 경우 폭발의 위험이 있습니다.

사고를 방지하려면 다음 사항을 준수하십시오.

- 배터리를 물 속에 던지거나 침수시키지 마십시오.
- 100°C (212°F) 이상 가열하지 마십시오.
- 수리하거나 분해하지 마십시오.

배터리를 폐기할 때는 법령 또는 회사의 안전 수칙에 따라 폐기하십시오.



주의:

CD-ROM, DVD-ROM 장치, 광섬유 장치 또는 송신 장치와 같은 레이저 제품을 설치할 때, 다음과 같은 취급 주의사항을 참고하십시오.

- 덮개를 열지 마십시오. 덮개를 열면 레이저 복사 에너지에 노출될 위험이 있습니다. 장치 내부에는 사용자가 조정하거나 수리할 수 있는 부품이 없습니다.
- 규정된 것 이외의 절차 수행, 제어 조정 등의 행위로 인해 해로운 레이저 복사에 노출될 수 있습니다.



위험

일부 장비에는 임베디드 클래스 3A 또는 클래스 3B 레이저 다이오드가 있습니다. 다음 주의사항에 유의하십시오.

드라이브가 열리면 레이저 복사 에너지가 방출됩니다. 광선이 눈에 직접 쏘이지 않도록 하십시오. 나안 또는 광학 기구를 착용한 상태에서 광선을 직접 바라보지 않도록 하십시오.



주의:

제품을 들어 올릴 때
안전 규제를 따르십시오.



≥ 18 kg (37 lbs)



≥ 32 kg (70.5 lbs)

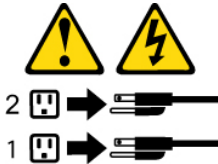


≥ 55 kg (121.2 lbs)



주의:

장치의 전원 제어 버튼 및 전원 공급 장치의 전원 스위치를 사용하여 장치에 공급되는 전기를 차단하지 마십시오. 장치는 둘 이상의 코드를 가지고 있을 수 있습니다. 장치에서 모든 전원을 차단하려면 콘센트에서 코드가 모두 분리되어 있는지 확인하십시오.



Spanish



PELIGRO

La corriente eléctrica procedente de cables de alimentación, teléfonos y cables de comunicación puede ser peligrosa.

Para evitar el riesgo de descarga eléctrica:

- No conecte ni desconecte los cables ni realice ninguna tarea de instalación, mantenimiento o reconfiguración de este producto durante una tormenta eléctrica.
- Conecte todos los cables de alimentación a tomas de corriente debidamente cableadas y conectadas a tierra.

- Cualquier equipo que se conecte a este producto también debe conectarse a tomas de corriente debidamente cableadas.
- Siempre que sea posible, utilice una sola mano para conectar o desconectar los cables de señal.
- No encienda nunca un equipo cuando hay señales de fuego, agua o daños estructurales.
- Desconecte los cables de alimentación, los sistemas de telecomunicaciones, las redes y los módems conectados antes de abrir las cubiertas de los dispositivos, a menos que se indique lo contrario en los procedimientos de instalación y configuración.
- Conecte y desconecte los cables, como se describe en la tabla siguiente, cuando instale, mueva o abra las cubiertas de este producto o de los dispositivos conectados.

Para conectar	Para desconectar
1. APÁGUELO todo. 2. En primer lugar, conecte todos los cables a los dispositivos. 3. Conecte los cables de señal a los conectores. 4. Enchufe los cables de alimentación a las tomas de corriente. 5. Encienda el dispositivo.	1. APÁGUELO todo. 2. En primer lugar, desenchufe los cables de alimentación de las tomas de corriente. 3. Desconecte los cables de señal de los conectores. 4. Desconecte todos los cables de los dispositivos.



PRECAUCIÓN:

Si su sistema dispone de un módulo que contiene una batería de litio, reemplácelo sólo con el mismo tipo de módulo, del mismo fabricante. La batería contiene litio y puede explotar si no se utiliza, manipula o desecha correctamente.

No debe:

- Arrojarla al agua o sumergirla en ella
- Exponerla a temperaturas superiores a 100°C (212°F)
- Repararla o desmontarla

Deshágase de la batería según especifiquen las leyes o normas locales.



PRECAUCIÓN:

Cuando haya productos láser (como unidades de CD-ROM, unidades de DVD, dispositivos de fibra óptica o transmisores) instalados, tenga en cuenta lo siguiente:

- No quite las cubiertas. Si quita las cubiertas del producto láser, podría quedar expuesto a radiación láser peligrosa. Dentro del dispositivo no existe ninguna pieza que requiera servicio técnico.
- Si usa controles o ajustes o realiza procedimientos que no sean los especificados aquí, podría exponerse a radiaciones peligrosas.



PELIGRO

Algunos productos láser tienen incorporado un diodo láser de clase 3A o clase 3B. Tenga en cuenta lo siguiente:

Cuando se abre, queda expuesto a radiación láser. No mire directamente al rayo láser, ni siquiera con instrumentos ópticos, y evite exponerse directamente al rayo láser.



PRECAUCIÓN:

Adopte procedimientos seguros al levantar el equipo.



≥18 kg



≥32 kg

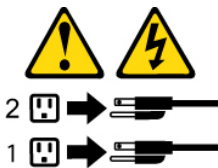


≥55 kg



PRECAUCIÓN:

El botón de control de alimentación del dispositivo y el interruptor de alimentación de la fuente de alimentación no desconectan la corriente eléctrica suministrada al dispositivo. Además, el dispositivo podría tener más de un cable de alimentación. Para suprimir toda la corriente eléctrica del dispositivo, asegúrese de que todos los cables de alimentación estén desconectados de la toma de corriente.



Chapter 3. Diagnostics and troubleshooting

Overall procedure

Use the following procedures as a guide in identifying and correcting problems.

Step 1. Quick diagnostics and troubleshooting:

- a. If a general error is reported by a program or operating system (OS), check the software documentation (like error messages, readme, or help guides) for instructions.
- b. Use an antivirus program to see if the computer has been infected by a virus. If the program detects a virus, remove the virus.
- c. Check if any necessary fixes or updates for software, OS, drivers, or UEFI BIOS are available. If yes, install them.
- d. Check all cable, power cord, and device connections.
- e. Check and ensure that all connected devices are enabled in the UEFI BIOS.
- f. Set all display controls to the middle position.
- g. Restart the computer and all connected devices.

Step 2. Further diagnostics and troubleshooting:

- a. Use diagnostic tools to narrow down the issue. See “Diagnostic tools” on page 36.
- b. Recover the OS if you suspect an OS issue. See Appendix B “Self-help resource” on page 138.
- c. Determine if any action or hardware replacement is required based on the symptoms in “Symptom-to-CRU/FRU index” on page 38
Turn to Chapter 4 “Hardware replacement” on page 48 for detailed replacement instructions.
- d. For undetermined problems, see “Undetermined problems” on page 44.

Step 3. If the diagnosing procedures above cannot help you isolate and repair the problems, save and print the log files and contact Lenovo for support. See “Call Lenovo” on page 45.

Notes:

- The diagnostic tests are intended to test only Lenovo products. The use of non-Lenovo products, prototype cards, or modified options can lead to false indications of errors and invalid system responses.
- The troubleshooting steps or the diagnostic tools might tell you that you need additional or updated device drivers or other software. For the latest drivers and technical updates, go to <https://support.lenovo.com>.
- **Be extremely careful during write operations such as copying, saving, or formatting.** The drives in the computer you are servicing might have been rearranged or the drive startup sequence changed. If you select an incorrect drive, data or programs might be overwritten.
- Due to the variety of hardware and software combinations that can be encountered, use the information listed in “Before contacting Lenovo support” on page 45 to assist you in problem determination.
- Comparing the configuration and software set-up between working and non-working systems will often lead to problem resolution. To eliminate confusion, identical systems are considered identical only if the following criteria are the same.
 - Same machine type and model
 - Same BIOS version
 - Same adapters/attachments in the same locations

- Same address jumpers/terminators/cabling
- Same software versions and levels
- Same Diagnostic Diskette and version
- Same configuration options set in the system
- Same setup for OS control files

Diagnostic tools

The following table lists some common diagnostic tools for Lenovo computers, including their running environments and brief introductions.

Table 1. Diagnostic tools

Diagnostic tool	Running environment	Brief introduction
Hardware scan in Vantage	Run in the OS.	The hardware scan feature in the Vantage application allows you to have a quick test of key hardware modules on the computer.
ThinkStation Diagnostics solution	Run in the firmware.	ThinkStation products with this solution can automatically detect issues and report issues in Windows notification area or, for selected models, on the front diagnostic panel.
Lenovo UEFI diagnostic tool	Run in the UEFI BIOS.	The Lenovo UEFI diagnostic tool enables you to test hardware modules, view system information, and check and recover bad sectors on internal storage devices during system startup.
Advanced diagnostic tools	Run in the OS or boot from USB.	If the computer does not have the diagnostic tools above, or if you want an extensive hardware test, you can download an advanced diagnostic tool from the Lenovo Support Web site.

Note: Tool availability may vary by model.

Hardware scan in Vantage

The hardware scan feature in the Vantage application allows you to have a quick test of key hardware modules on the computer.

To run the hardware scan:

- Step 1. Launch the Vantage app.
- Step 2. Click **Hardware scan** or **Support Services → Hardware scan**.
- Step 3. Choose one of the following ways to run the hardware scan:

Click **Refresh Modules** and check the list of hardware components currently available in the computer. Select **QUICK SCAN** to test all the hardware components detected.

Select **CUSTOMIZE** to choose one or several hardware components to be tested.

- Step 4. If any hardware failure is detected, the result varies depending on the warranty status and varies by country or region. Follow the on-screen instructions to resolve the issue.

ThinkStation Diagnostics solution

Systems with the ThinkStation Diagnostics solution can automatically detect issues and display error messages in the Windows notification area or, for some products, four-digit error codes on the front diagnostic panel.

To decode the errors, do one of the following.

- If the ThinkStation Diagnostics application can be launched in Windows properly:
 1. Launch the ThinkStation Diagnostics application by clicking the error message or application icon.
 2. Locate the related event and view the event log to find possible solutions.
 3. Record the four-digit error code in the application or on the diagnostic panel, then decode the error at <https://www.thinkworkstationsoftware.com/?view=codes>.

Note: You can download the ThinkStation Diagnostics application at: <https://pcsupport.lenovo.com/lenovodiagnosicsolutions/downloads>.

- If the display does not function:
 1. Scan the QR code on the diagnostic panel using a smartphone or manually access: <https://www.thinkworkstationsoftware.com/?view=codes>.
 2. Record the four-digit error code on the diagnostic panel, then decode the error at the website above.

For more information, go to <https://www.thinkworkstationsoftware.com/?view=diags>.

Lenovo UEFI diagnostic tool

The preloaded Lenovo UEFI diagnostic tool enables you to test and diagnose hardware modules in the computer during system startup.

To use the Lenovo UEFI diagnostic tool:

- Step 1. Turn on the computer.
- Step 2. When the logo screen is displayed, repeatedly press and release the F10 key.
- Step 3. When the home screen of the diagnostic tool appears, select a specific hardware module for targeted testing or select **RUN ALL** for a full test.

Note: Some tests may require user interaction. Follow the prompts carefully.

Table 2. Options on the home screen of the UEFI diagnostic tool

Category	Items
Tests	• Storage • Memory • CPU • Display • Motherboard • RAID • Optical
Tools	• System Information • Bad Block Recovery • Smart Information

Note: The options on the home screen might vary, depending on the hardware configuration and the corresponding protocol the BIOS supports.

Prepare a USB flash drive formatted in FAT32. After testing, select **View Log → Export Log** and save the log to the USB drive. You can view the log to find possible solutions or send the log to Lenovo for helps.

Advanced diagnostic tools

The advanced diagnostic tools is a suite of downloadable packages that can be run in different operating environments. These tools offer extended tests over various hardware modules. Depending on whether you can boot the Windows OS, select either of the following for diagnostics.

Use the advanced diagnostic tool (Windows version)

- Step 1. Go to <https://www.lenovo.com/diags>.
- Step 2. Select a Windows package that fits your scenario for download.
- Step 3. Double-click the downloaded file and complete the installation.
- Step 4. Launch the application and follow the on-screen instructions for diagnostics.

After testing, select **Export Log** to save the diagnostic result. You can view the log to find possible solutions or send the log to Lenovo for helps.

Use the advanced diagnostic tool (bootable versions for Linux/UEFI)

- Step 1. Prepare a USB flash drive (more than 2 GB) formatted in FAT32.

Note: Back up any important data on the USB drive, as it will be erased during the process.

- Step 2. Go to <https://support.lenovo.com/solutions/bootableusb>.
- Step 3. Follow the instructions to download a diagnostic package that fits your scenario, create the bootable USB drive, and run the diagnostic tool from the USB drive.

Note: For diagnostic packages, UEFI offers both x64 and ARM versions, while Linux offers only an x64 version.

- Step 4. When the home screen of the diagnostic tool appears, select a specific hardware module for targeted testing or select **RUN ALL** for a full test.

Note: Some tests may require user interaction. Follow the prompts carefully.

After testing, select **View Log → Export Log** and save the log to the USB drive. You can view the log to find possible solutions or send the log to Lenovo for helps.

For more information, go to <https://www.lenovo.com/diags>.

Symptom-to-CRU/FRU index

The Symptom-to-CRU/FRU index lists error symptoms and possible causes. The most likely cause is listed first. This index can also be used to help you decide which CRUs/FRUs are likely to need replacing next. If you are unable to correct the problem using this index, go to “Undetermined problems” on page 44.

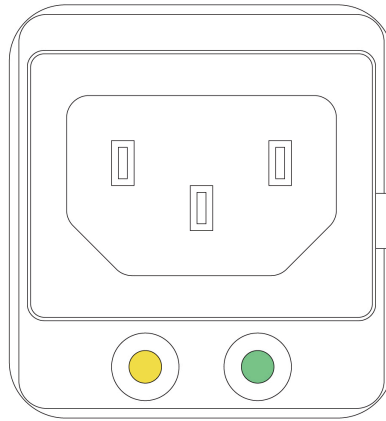
Notes:

- The Symptom-to-CRU/FRU index is not specific to any machine type and is applicable to all computers.
- If you have both an error message and an incorrect audio response, diagnose the error message first.
- If you cannot run the diagnostic tests or you get a diagnostic error code when running a test, but did receive a POST error message, diagnose the POST error message first.
- If you did not receive any error message, look for a description of the error symptoms in this index.

LED indicators for troubleshooting

The following LED indicators help you troubleshoot some power related issues.

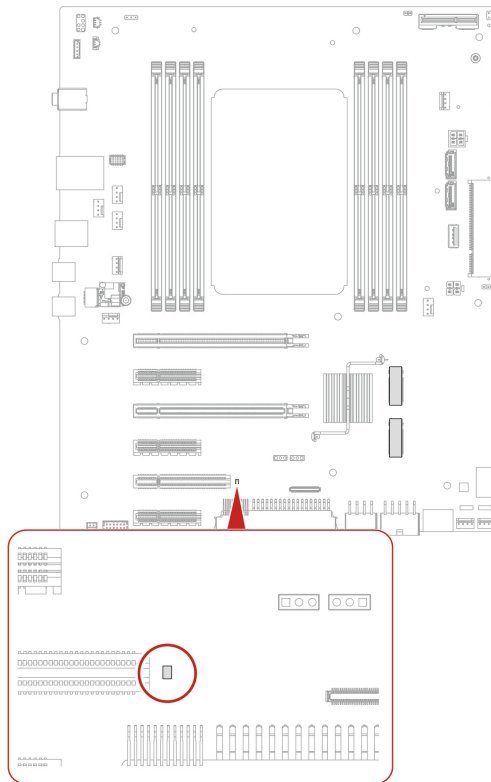
1000-watt power connector indicator



The power connector indicator on the rear panel shows the power status of your computer.

- **Off:** Power is unplugged.
- **Green indicator on:** Power is properly connected and functioning.
- **Yellow indicator on:** Power is improperly connected or not functioning. Check the power connection, power cord, power supply unit (PSU) assembly, or other power-related components.

PSU indicator



When power is connected, open the computer cover and use this indicator to verify PSU status.

- **On:** PSU is functioning.
- **Off:** PSU is not functioning. Follow the provided instructions to replace the PSU assembly or contact Lenovo for support.

POST error codes

Each time you turn on the system, it performs a series of tests that check the operation of the system and some options. This series of tests are called the *Power-On Self-Test*, or *POST*. POST checks the following operations:

- Some basic system-board operations
- Memory operation
- Video operation
- Whether the boot drive is working

If the POST detects a problem, an error code appears on the screen. If more than one error code is displayed, begin the diagnosis with the first error code. Whatever causes the first error code might also cause false error codes.

POST error code	POST error message	Description	Action
0135	• CPU fan failure • System fan failure • Power fan failure • Front fan failure • Rear fan failure • Auxiliary fan failure • ODD fan failure	This error message is displayed when a fan fails and the system might be overheating.	Press F10 to exit.
0162	Setup data integrity check failure	This error indicates the checksum of BIOS Setup data in NVRAM is bad.	In BIOS Setup, the “Save Changes and Exit” operation is needed in order to clear this error.
0164	Memory configuration change has occurred	This error message is displayed when the memory size is changed.	Press F10 to exit.
1762	Storage device configuration change has occurred	This error message is displayed when a hard disk drive change or an optical drive change has been made.	Press F10 to exit.
8998	Not enough shadow RAM resources for OPTION ROM, not all devices initialized. Suggest to remove some add-on cards, or change to UEFI mode in BIOS setup.	This error message is displayed when the shadow RAM resources for option ROM are insufficient.	If the legacy option ROM is insufficient, remove some add-in cards. For the system that supports UEFI, set UEFI as the first priority.
8999	Not enough PCIe/PCI MMIO resources. Currently only one video card is enabled. Remove some PCIe cards.	This error message is displayed when the PCIe/PCI MMIO (memory mapped input/output) resources are insufficient.	Remove some add-in cards.

Beep symptoms

Beep symptoms are tones or a series of tones separated by pauses (intervals without sound) during POST. The following table describes the beep symptoms.

Beep symptom	Error	CRU/FRU or Action
2 short beeps	Common POST error	See the detailed failure information in “POST error codes” on page 40.
3 short and 1 long beeps	DRAM memory error	Perform the following actions in order: 1. Make sure that the memory modules are properly seated in the memory slots. 2. Replace the memory modules. 3. Replace the system board.

Beep symptom	Error	CRU/FRU or Action
4 long beeps	Insufficient shadow RAM resources for option ROM (error code: 8998) or PCIe/PCI MMIO (memory mapped input/output) resources (error code: 8999)	See the detailed failure information in “POST error codes” on page 40.
2 long and 3 short beeps	Graphics card error	Perform the following actions in order: 1. Make sure that the graphics cards are properly seated in the slots. 2. Replace the graphics cards. 3. Replace the system board.

Storage drive boot error

A storage drive boot error can have the following causes.

Possible cause	CRU/FRU or Action
The start-up drive is not in the boot sequence in configuration.	Check the configuration and ensure that the start-up drive is in the boot sequence.
No operating system is installed on the boot drive.	Install an operating system on the boot drive.
The boot sector on the startup drive is corrupted.	The drive must be formatted. Do the following: 1. Attempt to back up the data on the failing storage drive. 2. Using the operating system programs, format the storage drive.
The drive is defective.	Replace the storage drive.

Power supply problems

If you suspect a power problem, use the following procedures.

Check/Verify	CRU/FRU or Action
Check the following for proper installation. • Power cord • On/Off switch connector • On/Off switch power supply connector • System board power supply connectors • CPU connection	Reseat connectors.
Check the power cord for continuity.	Power cord
Check the power-on switch for continuity.	Power-on switch

Miscellaneous error conditions

Message/Symptom	CRU/FRU or Action
Changing display colors	Display/Monitor
The computer will <i>not</i> power-off. See "Storage drive boot error" on page 42.	1. Power switch 2. System board 3. Riser card, if installed.
The computer will <i>not</i> RPL from server	1. Ensure that the network is in startup sequence as the first device or the first device after diskette. 2. Ensure that the network adapter is enabled for RPL. 3. Network adapter (Advise network administrator of new MAC address)
The computer will <i>not</i> perform a Wake On LAN® (if applicable)	1. Check the power supply and signal cable connections to the network adapter. 2. Ensure that the operating system settings are set to enable Wake on LAN. 3. Ensure that the Wake On LAN feature is enabled in Setup/Configuration. 4. Ensure that the network administrator is using the correct MAC address. 5. Ensure no interrupt or I/O address conflicts. 6. Network adapter (advise network administrator of new MAC address)
Dead computer. See "Storage drive boot error" on page 42.	1. Power supply 2. System board
Diskette drive in-use light remains on or does not light when drive is active.	1. Diskette drive 2. System board 3. Diskette drive cable
Blank screen except for flashing cursor.	1. System board 2. Primary hard disk drive 3. Hard disk drive cable
Incorrect memory size during POST	1. Run the memory tests. 2. Memory module 3. System board
"Insert a Diskette" icon appears with a known-good diagnostics diskette in the first 3.5-inch diskette drive.	1. System board 2. Diskette drive cable 3. Network adapter
Intensity or color varies from left to right of characters and color bars	1. Display 2. Video adapter (if present) 3. System board
No power or fan not running	1. See "Storage drive boot error" on page 42.

Message/Symptom	CRU/FRU or Action
Non-system disk or disk error-type message with a known-good diagnostic diskette.	1. Diskette drive 2. System board 3. Diskette drive cable
Other display symptoms not listed above (including blank or illegible display)	1. Display 2. System board
Power-on indicator or hard disk drive in-use light not on, but computer works correctly	1. Power switch/LED assembly 2. System board
Printer problems	1. Printer 2. System board
Program loads from the hard disk with a known-good diagnostics diskette in the first 3.5-inch diskette drive	1. Run the Setup Utility program and check the startup sequence. 2. Diskette drive 3. Diskette drive cable 4. System board 5. Power supply
RPL computer cannot access programs from its own hard disk.	1. If the network administrator is using LCCM Hybrid RPL, check the startup sequence: a. First device - network b. Second device - hard disk 2. Hard disk drive
RPL computer does not RPL from server	1. Check the startup sequence. 2. Check the network adapter LED status.
Serial or parallel connector device failure (system board connector)	1. External device self-test OK? 2. External device 3. Cable 4. System board
Serial or parallel connector device failure (adapter connector)	1. External device self-test OK? 2. External device 3. Cable 4. Alternate adapter 5. System board
Some or all keys on the keyboard do not work	1. Keyboard 2. Keyboard cable 3. System board

Undetermined problems

It is recommended that you take the steps below to isolate the failing CRU/FRU (if any) in the following situations:

- The diagnostic procedures above did not identify the device that has failed.
- The wrong devices are installed.
- The system simply is not operating.

Step 1. Verify that all attached devices are supported by the computer.

Step 2. Turn off the computer.

Step 3. Visually check each CRU/FRU for damage. Replace any damaged CRU/FRU.

Step 4. Remove or disconnect all of the following devices (if present).

- External devices (modem, printer, or mouse)
- Any adapters
- Memory modules
- Extended video memory
- External Cache
- External Cache RAM
- Solid-state drive
- Hard disk drive
- Diskette drive

Step 5. Turn on the computer to see whether the problem has been solved.

Step 6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU/CRU.

Step 7. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):

- System board
- Display assembly (if present)

Call Lenovo

If you have tried to correct the problem yourself and still need help, you can call Lenovo Customer Support Center.

Before contacting Lenovo support

Prepare the following information (especially those shown in **bold**) as much as possible before requesting assistance from Lenovo Service Support and Engineering functions.

- **Product name, machine type and model (MTM), and serial number (SN)**
- Failure symptom
 - **What is the problem?**
 - When and where does it happen (e.g., on single or multiple systems)?
 - **Is the problem continuous or intermittent?**
 - **Are there any error messages or codes?**
 - **Can the problem be reproduced? If yes, describe how.**
 - Has the current configuration ever worked before?
 - If it was working, what changed before the failure occurred?
 - Is this the original reported issue, or has it evolved?

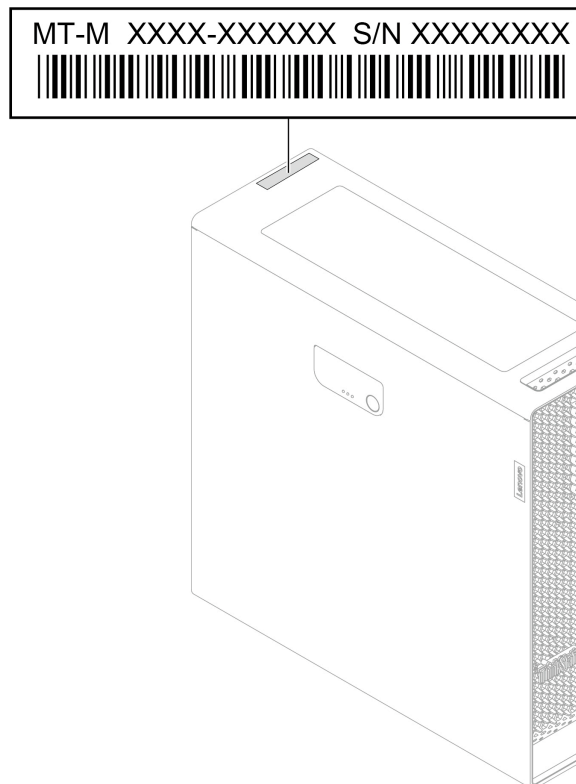
- Software information
 - **Operating system type and version**
 - **Software applications running at the time of failure (name and version)**
- Hardware information
 - BIOS version
 - Processor or hard disk drive upgrades information
 - Hardware configuration currently in use
- Diagnostics information
 - Did diagnostics indicate a failure?
 - What is the diagnostics type and version used?

Find the serial number

This topic helps you find the computer serial number.

You can find the serial number via one of the following.

- Open the Vantage app and navigate to **Dashboard** or **Device**.
- Check the machine-type and serial-number label on the computer (see illustration below).



Lenovo Customer Support Center

During the warranty period, you can call Lenovo Customer Support Center for help.

Telephone numbers

For a list of the Lenovo Support phone numbers for your country or region, go to:

<https://pcsupport.lenovo.com/supportphonenumberlist>

Note: Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

Chapter 4. Hardware replacement

Before hardware replacement

Carefully read this section before replacing or installing any hardware component.

Service tools

The following table lists all tools for servicing Lenovo products. Tools required to service a part are listed in the specific part disassembly topic. Prepare them before you service the product.

Table 3. Service tools

No.	Reference image	Tool name	Specification	Tool type
1		Screwdriver set	• PH0, PH00, PH1, PH01, PH02 • T5, T15, T20, T30 • SL3.0 (for ThinkEdge) Note: Use a screwdriver with the shank length more than 6 inches for desktop, workstation, smart device, and ThinkEdge products.	Common tool
2		Pry tool	N/A	Common tool
3		Tweezers	• Conductive • Isolated	Common tool
4		Suction cup	N/A	Common tool
5		Hexagonal socket	• For VGA: H5 mm or H4.8 mm • For Tiny antenna: H8 mm • For ThinkEdge: H10 mm	Common tool
6		Adjustable torque screwdriver	0.2 Nm to 4.0 Nm, Threadripper CPU, CAMM, etc.	Common tool

Table 3. Service tools (continued)

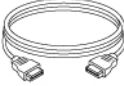
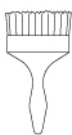
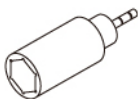
No.	Reference image	Tool name	Specification	Tool type
7		ESD mat	N/A	Common tool
8		USB flash drive	For Golden Key, Chrome Reloads, AutoPilot, etc	Common tool
9		USB-C to USB-A converter	N/A	Common tool
10		HDMI to HDMI cable	For systems with HDMI connector	Common tool
11		SIM card pin	For systems with 4G/5G WWAN SIM card	Common tool
12		Thermal pad	Thermal pads are typically used under the SSD/WWAN/IC in different thickness, the most common being 0.5 mm.	Consumable tool
13		Thermal interface materials	- Silicon grease Recommended thermal conductivity > 6W/mK, such as TC5888/TC5550/PTM7950/PTM7958. - Thermal gel/putty/gum Recommended type: XPG-0001/TC7006 Follow HMM-specific guidance.	Consumable tool
14		Acetate tape	N/A	Consumable tool

Table 3. Service tools (continued)

No.	Reference image	Tool name	Specification	Tool type
15		Polyimide tape	N/A	Consumable tool
16		Mylar tape	N/A	Consumable tool
17		Electrical tape	N/A	Consumable tool
18		Double-sided tape	N/A	Consumable tool
19		Conductive tape	N/A	Consumable tool
20		Eraser	N/A	Consumable tool
21		Cleaning wipes	N/A	Consumable tool
22		Touchpad jig (this might come with touchpad)	N/A	Consumable tool
23		Heat gun	N/A	Special tool

Table 3. Service tools (continued)

No.	Reference image	Tool name	Specification	Tool type
24		Brown brush	25 mm to 35 mm wide	Special tool
25		Contact cleaner spray	WD-40 Contact cleaner for battery connector	Special tool
26		Hexagonal socket	For Yoga AIO 7 27ACH6/Yoga AIO 7 27ARH6: H17 mm	Special tool

Screw list

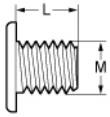
The following table includes the screw list of this product and the recommended screwdriver type.

Table 4. Screw list of this product and the recommended screwdriver type

Screw head type	Thread	Length (mm)	Color	Screwdriver type
Phillips head	M2	L3	Black	PH1
Phillips head	M2	L3.6	Silver	PH1
Phillips head	M2	L4.5	Black	PH1
Phillips head	M2	L6.5	Black	PH1
Phillips head	M3	L3	Silver	PH2
Phillips head	M3	L4	Silver	PH2
Phillips head	M3	L5	Black	PH2
Phillips head	M3	L5.5	Black	PH2
Phillips head	M3.5	L5	Black	PH2
Phillips head	#6-32	L5	Black	PH2
Torx head	M3	L3	Black	T15
Hex head	#4-40	7	Silver	H4.7

Notes:

- Thread specifications follow different notation systems depending on screw type. For metric screws, the value following “M” represents the screw’s diameter measured across the outer edges. For imperial screws (e.g., #6-32), the first number indicates the screw diameter, and the second number specifies the number of threads per inch (TPI). Screw length refers to the length of the shank and is measured from the underside of the head to the tip.



-  The Phillips head screw has a cross-shaped slot in the screw head.
-  The Torx head screw has a six-pointed star in the screw head.
-  The Hex head screw has a hexagonal head.

CRU/FRU definition

Your computer contains the following types of “Customer Replaceable Unit” (CRU)s and “Field Replaceable Unit” (FRU)s:

- **Self-service CRUs:** Refer to parts that can be replaced easily by customers themselves or by trained service technicians at an additional cost.
- **Optional-service CRUs:** Refer to parts that can be replaced by customers with a greater skill level. Trained service technicians can also provide service to replace the parts under the type of warranty designated for the customer’s product.
- **FRUs:** Refer to parts that are more complicated to replace and it is recommended that these parts should be replaced by trained service technicians. If customers elect to replace the FRU by themselves, we recommend that you ensure the correct instructions are carefully followed.

Important notes:

- **CRU/FRU statement:**
 - Each CRU/FRU is available for all types or models, unless otherwise specified.
 - **Replace a CRU/FRU only with another CRU/FRU of the correct model.** When you replace a CRU/FRU, ensure that the model of the product and the CRU/FRU part number are correct.
 - **A CRU/FRU should not be replaced because of a single unreproducible failure.** Single failures can occur for a variety of reasons that have nothing to do with a hardware defect, such as cosmic radiation, ESD, or software errors. Consider replacing a CRU/FRU only when a problem recurs. If you suspect that a CRU/FRU is defective, clear the error log and run the test again. If the error does not recur, do not replace the CRU/FRU.
 - **Be careful not to replace a nondefective CRU/FRU.**
 - When you need to return a CRU/FRU after servicing a computer, include the following information in the parts exchange form or parts return form that you attach to it:
 1. Name and phone number of service technician
 2. Date of service
 3. Date on which the machine failed
 4. Date of purchase
 5. Failure symptoms, error codes appearing on the display, and beep symptoms
 6. Procedure index and page number in which the failing CRU/FRU was detected
 7. Failing CRU/FRU name and part number
 8. Machine type, model number, and serial number
 9. Customer's name and address
- **CRU/FRU replacement strategy:**

Use the following strategy to prevent unnecessary expense for replacing and servicing parts:

 - If you are instructed to replace a part but the replacement does not correct the problem, reinstall the original part before you continue.

- Some computers have both a processor board and a system board. If you are instructed to replace either the processor board or the system board, and replacing one of them does not correct the problem, reinstall that board, and then replace the other one.
- If an adapter or a device consists of more than one part, any of the parts may be the cause of the error. Before replacing the adapter or device, remove the parts one by one to see if the symptoms change. Replace only the part that changed the symptoms.

- **CRU statement for customers:**

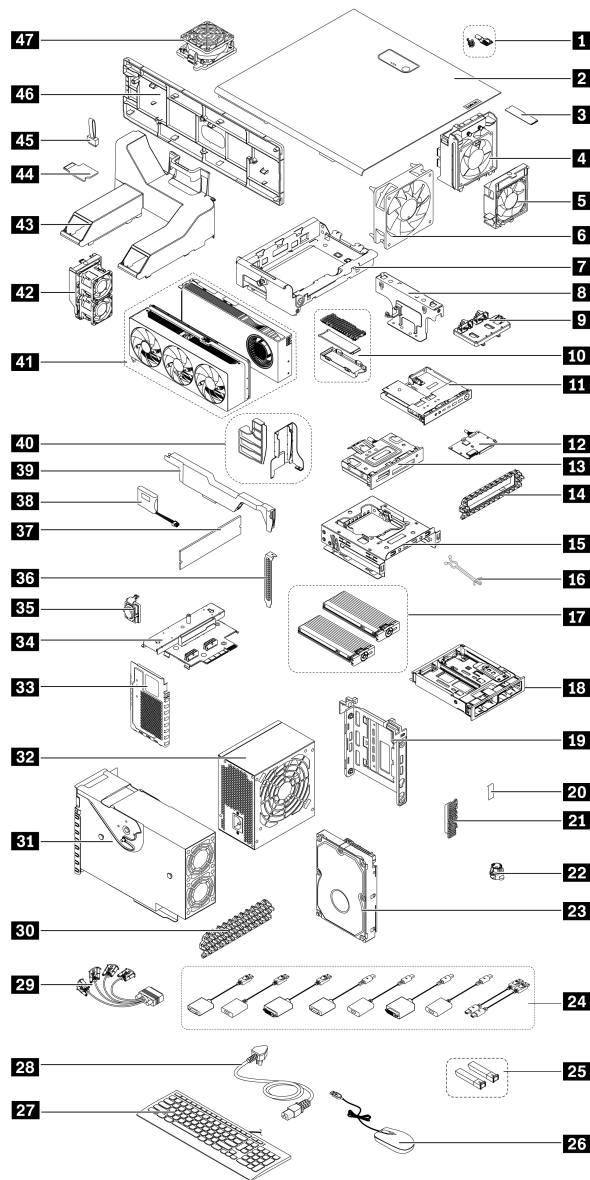
- You can resolve some problems with your product by replacing a CRU. *For self-service CRUs, installation is your responsibility. For optional-service CRUs, you can either install the CRU yourself or you can request that a Service Provider install the CRU according to the warranty service for your product.*

Important: For users in mainland China, users shall not perform maintenance on their own. Any faults or damage due to improper operation, modification, or failure to use parts provided by Lenovo are not covered by the warranty for this product. For product warranty information, refer to the warranty document provided with the product or go to the official Lenovo website at <https://newsupport.lenovo.com.cn>.

- If you intend on installing the CRU, Lenovo will ship the CRU to you. CRU information and replacement instructions are shipped with your product and are available from Lenovo at any time upon request.
- When you are required to return the defective CRU, (1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you might be charged for the replacement CRU if Lenovo does not receive the defective CRU within thirty (30) days of your receipt of the replacement CRU. See your Lenovo Limited Warranty documentation for full details.

CRU list

Exploded view



Part list

Self-service CRUs:

- 1 Lock and key kit for the side cover
- 2 Side cover
- 3 M.2 SSD*
- 4 Front fan
- 5 HDD fan*
- 6 Rear fan
- 7 Optional HDD cage*
- 8 Optional HDD cage holder*
- 9 On-board SSD holder
- 10 On-board SSD heat sink kit
- 14 Flex bay cover*
- 15 Flex bay cage*
- 16 USB4 PCIe card cable clip*
- 17 M.2 SSD enclosures*
- 18 M.2 SSD enclosure tray*
- 19 HDD bracket
- 20 ID badge
- 21 ThinkStation logo badge
- 22 Think LED holder
- 23 HDD*
- 24 Display adapters*
- 26 Mouse*
- 27 Keyboard*
- 28 Power cord
- 29 External 1-to-4 serial cable*
- 30 Flex bay dummy cover*
- 31 1000-watt power supply unit (PSU) assembly*
- 32 750-watt PSU assembly*
- 33 1000-watt PSU cover*
- 34 1000-watt power distribution board and bracket*
- 36 PCIe bracket
- 37 Memory module
- 38 Supercapacitor module*
- 39 PCIe top retention holder*
- 40 Customized PCIe extenders*
- 42 Memory fans
- 43 Memory fan duct
- 46 Top cover
- 47 Flex bay fan*

Optional-service CRUs:

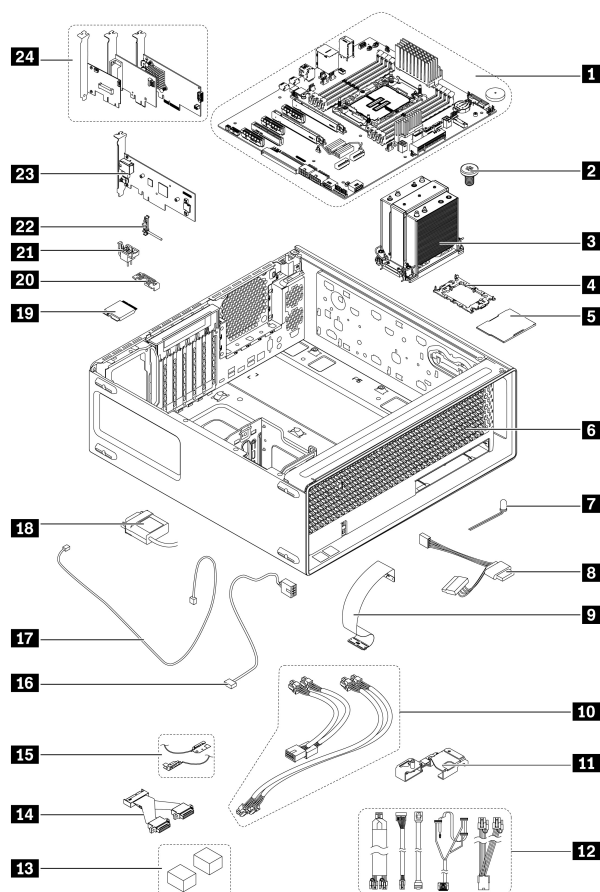
- 11 Front panel I/O assembly (with/without USB)
- 12 Media card reader with cable*
- 13 Media card reader box*
- 25 Fiber modules of some Ethernet adapter cards*
- 35 Internal speaker
- 41 PCIe cards (graphics cards only)*
- 44 Trusted Cryptography Module (TCM) card*
- 45 VROC key*

* for selected models

Note: The PCIe cards mentioned above refers only to the graphics cards, as they are the only Customer Replaceable Units (CRUs); other PCIe cards are not classified as CRUs.

FRU list

Exploded view



Part list

FRUs:

- 1 System board and coin-cell battery assembly
- 2 TCM card screw*
- 3 CPU heat sink
- 4 CPU carrier
- 5 CPU
- 6 Chassis
- 7 Think LED cable
- 8 4-port serial PCIe card cable*
- 9 BMC card cable*
- 10 PSU-to-graphics card cables*
- 11 Graphics card support bracket*
- 12 SATA power and data cables*
- 13 Support rubber on HDD*
- 14 M.2 SSD enclosure cable*
- 15 Wi-Fi antennas*
- 16 Supercapacitor cable*
- 17 HDD LED activity cable (for RAID card)*
- 18 COM board and cable*
- 19 Wi-Fi card*
- 20 Wi-Fi card shield*
- 21 Cover presence switch
- 22 Thermal sensor
- 23 BMC card*
- 24 PCIe card (excluding graphics cards)*

* for selected models

Look up a part

1. For more detailed CRU/FRU information, including part numbers, descriptions, and substitution part numbers, go to <https://support.lenovo.com/partslookup>.
2. Type the product name, the machine type or the serial number in the corresponding field to get a general CRU/FRU list.

Prerequisites for hardware replacement

General prerequisites

Before replacing any parts, make sure you have:

- Read *Generic Safety and Compliance Notices* and any safety requirements for hardware maintenance in this manual.
- Installed any necessary software fixes, drivers, and UEFI BIOS downloads. To access these, go to Lenovo Support Web site and select the entry for your product.

Prerequisites for opening computer covers



During operation, some components become hot enough to burn the skin. Before you open the computer cover, remove any media from the drives, turn off the computer and connected devices, disconnect power, remove all cables and locking devices, and wait approximately 10 minutes until the computer is cool.

Prerequisites for replacing parts with cables

Before reaching parts with cables, record the cable routing for future reference and then disconnect the cables from the system board.

Prerequisites for replacing internal storage drives

Attention: The internal storage drive is sensitive. Inappropriate handling might cause damage and loss of data. When handling the internal storage drive, observe the following guidelines:

- Replace internal storage drives only for repair. The internal storage drives are not designed for frequent changes or replacement.
- Before replacing an internal storage drive, make a backup copy of all the data that you want to keep, then perform a low-level format to erase all data.
- Be extremely careful during write operations such as copying, saving, or formatting. The drives in the computer you are servicing might have been rearranged or the drive startup sequence changed. If you select an incorrect drive, data or programs might be overwritten.
- Do not touch the contact edge of the internal storage drive. Otherwise, the internal storage drive might get damaged.
- Do not apply pressure or expose the drive to physical shocks or vibration. Place it on a soft surface, such as a cloth, for protection.

Prerequisites for replacing the power supply assembly (if supported)

Although there are no moving parts in the computer after the power cord has been disconnected, the following warnings are required for your safety.

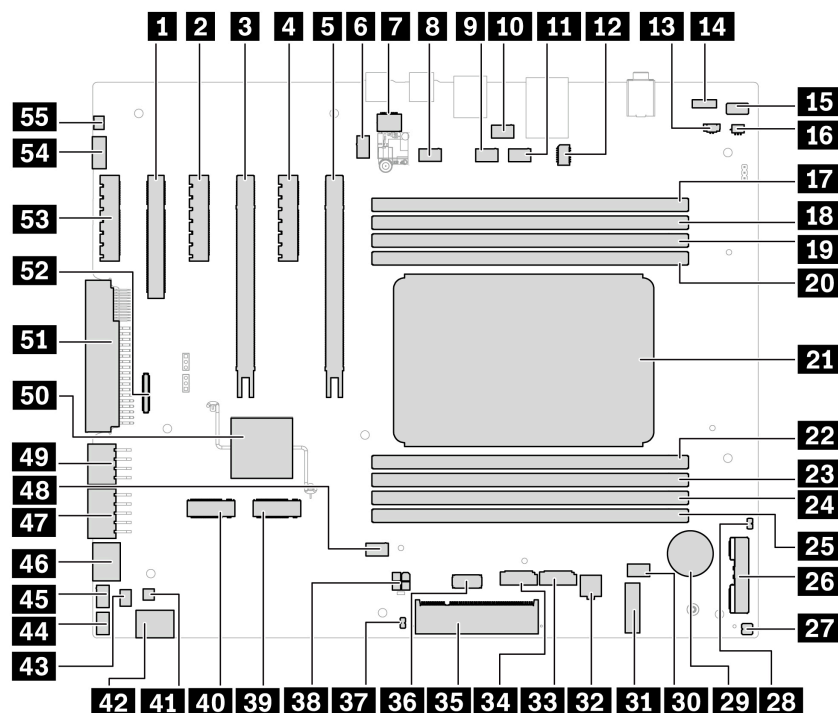


Keep fingers and other parts of your body away from hazardous, moving parts. If you suffer an injury, seek medical care immediately. Never remove the cover on a power supply or any part that has the following label attached.



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.

System board illustration



Item	Description	Item	Description
1	PCIe Gen 5 x8 slot (Slot 5)	2	PCIe Gen 4 x4 slot (Slot 4)
3	PCIe Gen 5 x16 slot (Slot 3)	4	PCIe Gen 4 x4 slot (Slot 2)
5	PCIe Gen 5 x16 slot (Slot 1)	6	CPU fan connector
7	Alternate TPM connector	8	Rear fan connector
9	Memory duct fan connector 2	10	Auxiliary fan connector 1
11	Memory duct fan connector 1	12	Internal COM connector
13	Speaker connector	14	VROC connector
15	Flex I2C connector	16	Cover presence switch connector
17	Memory slot (DIMM1)	18	Memory slot (DIMM2)
19	Memory slot (DIMM3)	20	Memory slot (DIMM4)
21	CPU socket	22	Memory slot (DIMM5)
23	Memory slot (DIMM6)	24	Memory slot (DIMM7)
25	Memory slot (DIMM8)	26	M.2 SSD enclosure cable connector
27	Thermal sensor connector	28	Power button connector
29	Coin-cell battery	30	Flex bay fan connector
31	M.2 Wi-Fi slot	32	Secondary SATA power connector
33	SATA data connector 4	34	SATA data connector 3

Item	Description	Item	Description
35	Front I/O panel slot	36	Internal USB 3.2 connector (for media card reader)
37	Drive-activity connector (for RAID card)	38	Primary SATA power connector
39	M.2 Gen 5 SSD slot 1	40	M.2 Gen 5 SSD slot 2
41	Think LED connector	42	SATA data connector 2
43	Clear CMOS jumper	44	Front fan connector
45	HDD fan connector	46	SATA data connector 1
47	10-pin MB power connector (for 750-watt PSU)	48	Auxiliary fan connector 2
49	8-pin CPU power connector (for 750-watt PSU)	50	PCH
51	Power distribution board slot (for 1000-watt PSU)	52	BMC connector
53	PCIe Gen 4 x4 slot (Slot 6)	54	I/O control connector (for USB4 PCIe card)
55	I/O power connector (for USB4 PCIe card)		

External options

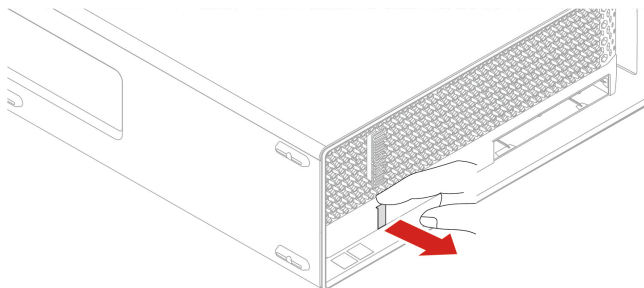
You can connect external options to your computer, such as external speakers, a printer, or a scanner. For some external options, you must install additional software in addition to making the physical connection. When installing an external option, see Chapter 1 “Product overview” on page 1 to identify the required connector. Then, use the instructions that come with the option to help you make the connection and install any required software or device drivers.

ID badge

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Pry up and remove the ID badge.



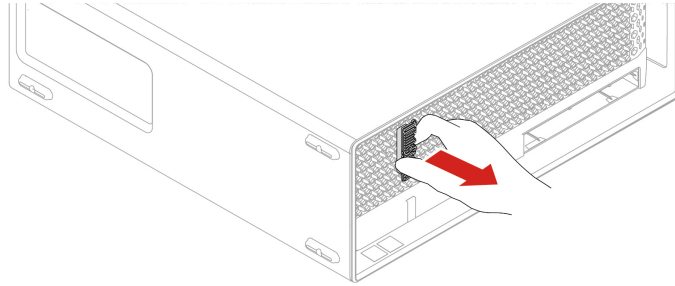
Step 2. Install the removed parts and cables in reverse order.

ThinkStation logo badge

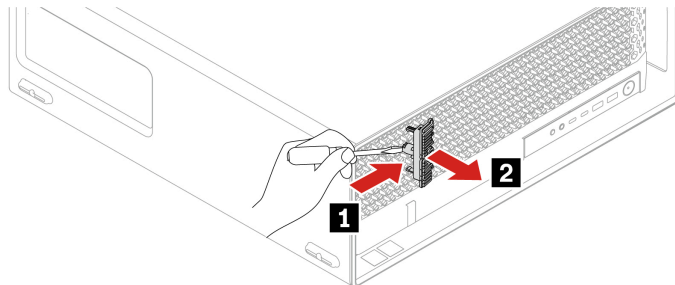
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Pull the ThinkStation logo forward to partially remove it from the slot.



Step 2. Gently press the tab to fully release and remove the logo badge.



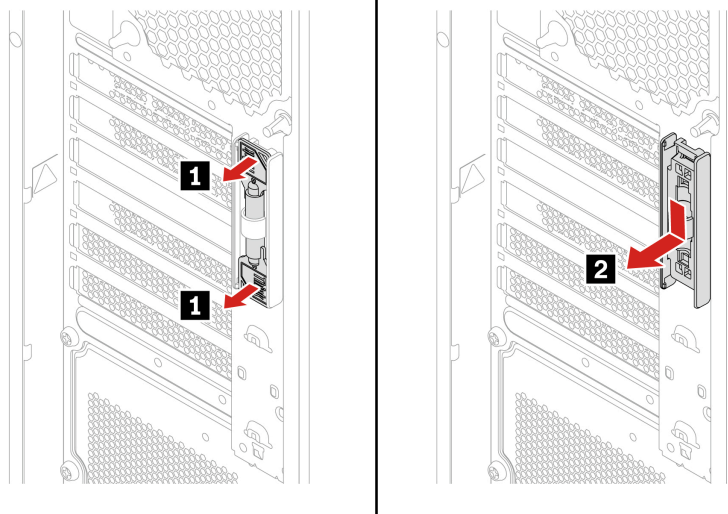
Step 3. Install the removed parts and cables in reverse order.

Keys and key bracket

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Pull the keys out of the key slots. Slide the key bracket off the chassis, if needed.



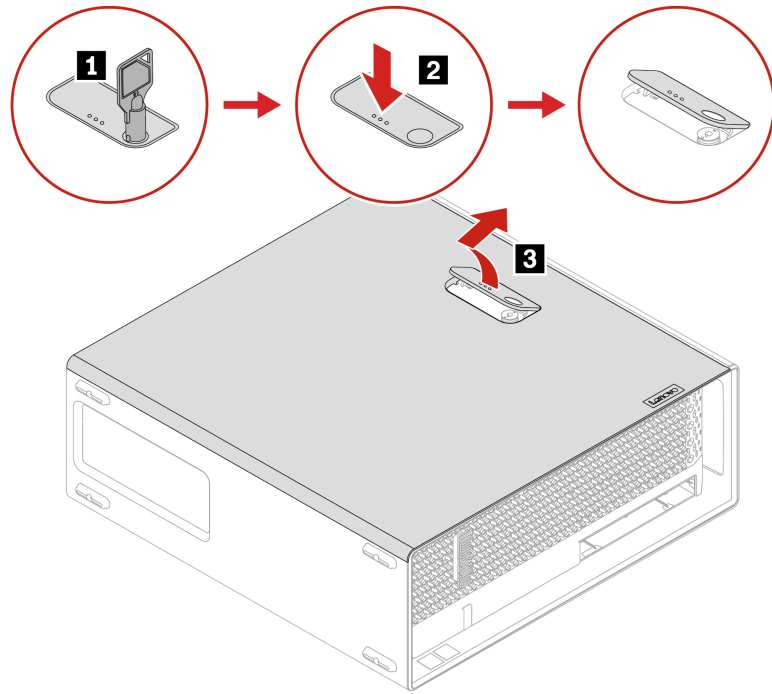
Step 2. Install the removed parts in reverse order.

Side cover

Before you start, read “Prerequisites for hardware replacement” on page 55.

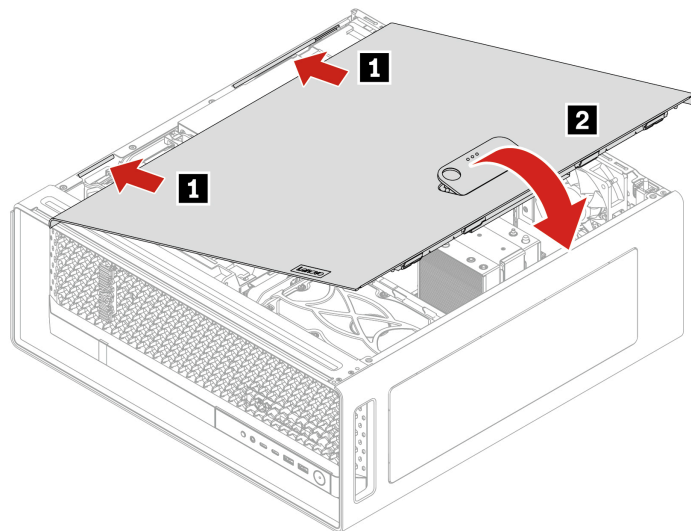
Replacement steps

- Step 1. Turn off the computer and remove all connected devices and cables.
- Step 2. Place a soft, clean towel or cloth on the desk or surface. Hold the computer sides and gently lay it down so that the computer cover is facing up.
- Step 3. Remove the side cover.
 - 1. Unlock the side cover lock, if available.
 - 2. Press to open the side cover handle and lift the handle to release the cover.
 - 3. Remove the side cover from the system.

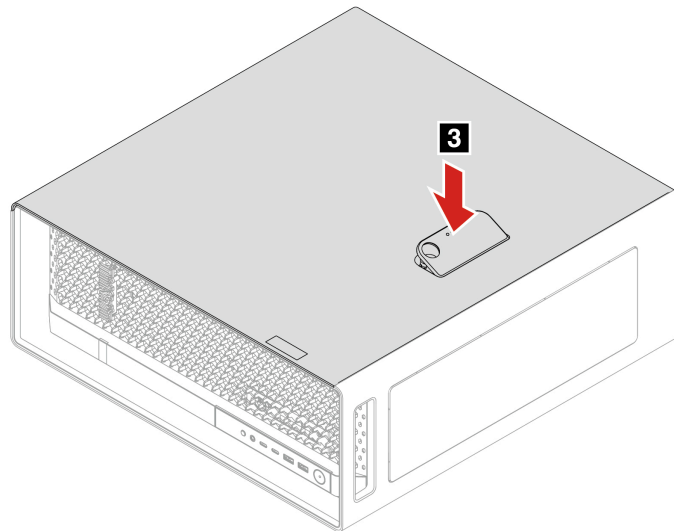


Step 4. Install the side cover.

1. Align the side cover with the system. Press the side cover until the latch secures it in place.



2. Press to close the side cover handle.



Step 5. Install other removed devices and cables in reverse order.

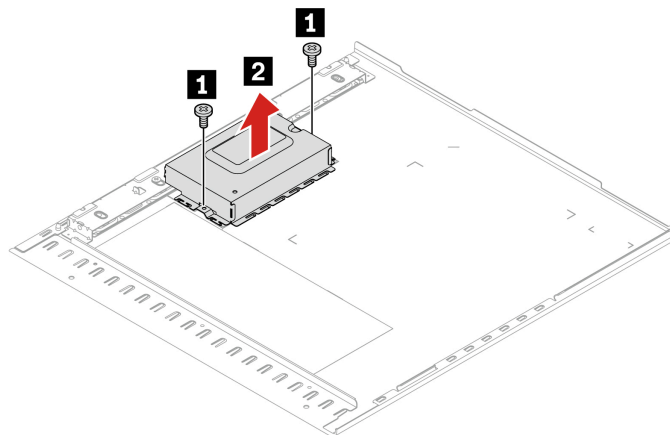
Lock for the side cover

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

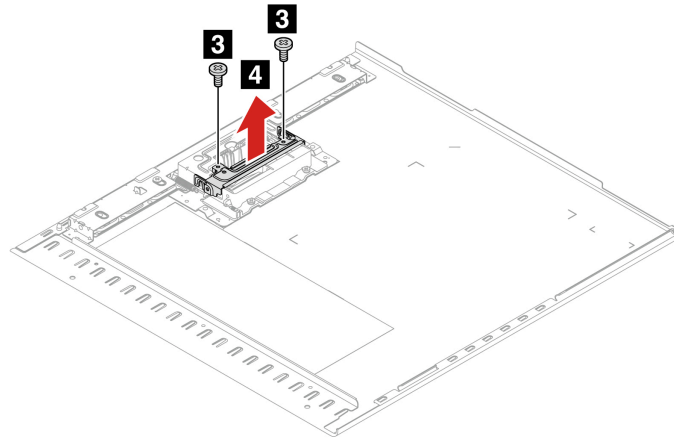
Step 1. Remove the “Side cover” on page 60.

Step 2. Remove two screws and remove the lock cover.



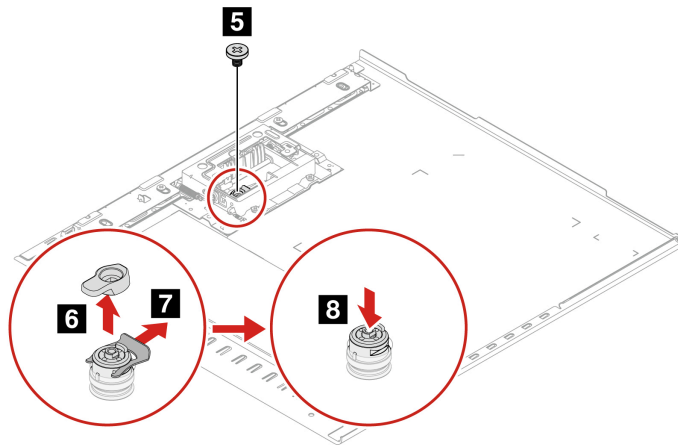
Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
1	M3	L3	5.0 ± 0.5	Silver	2

Step 3. Remove two screws and remove the bracket.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
3	M3	L3	5.0 ± 0.5	Silver	2

Step 4. Remove the screw securing the lock, take out the two support holders, and then detach the lock from the outside of the side cover.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
5	M2	L3.6	1.5 ± 0.2	Silver	1

Note: For models without a side cover lock, you need to remove the dummy lock before installing a lock.

Step 5. Install the removed parts and cables in reverse order.

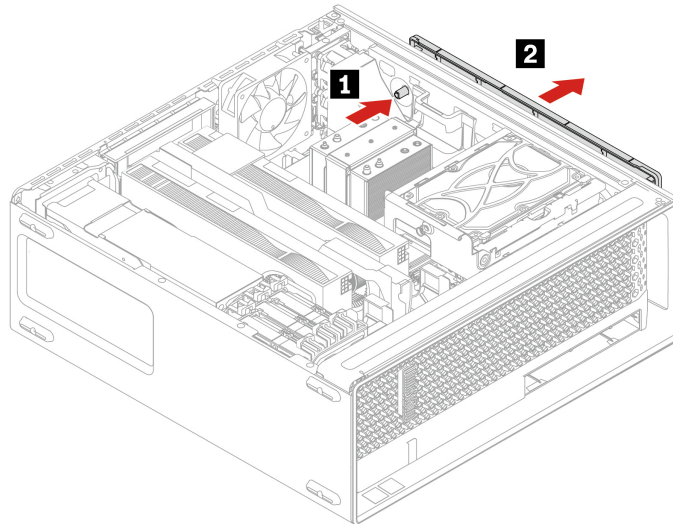
Top cover

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the “Side cover” on page 60.

Step 2. Press the tab inside the system to release the top cover and remove the cover from the system.



Step 3. Install the removed parts and cables in reverse order.

PCIe components

This section describes how to replace PCIe cards and their related components.

Note: Illustrations are provided as a reference for replacement steps. PCIe cards and related components may vary in appearance from those in your system.

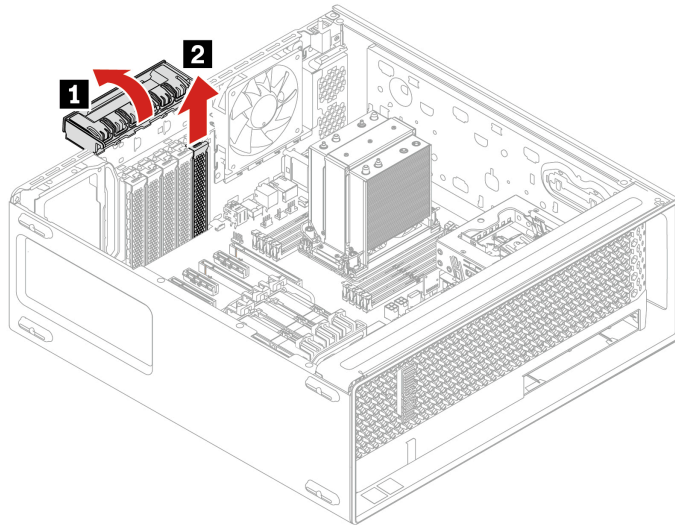
PCIe bracket

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the “Side cover” on page 60.

Step 2. Open the PCIe retaining latch and remove the PCIe bracket from the slot.



Step 3. Install the removed parts and cables in reverse order.

PCIe top retention holder and supercapacitor module

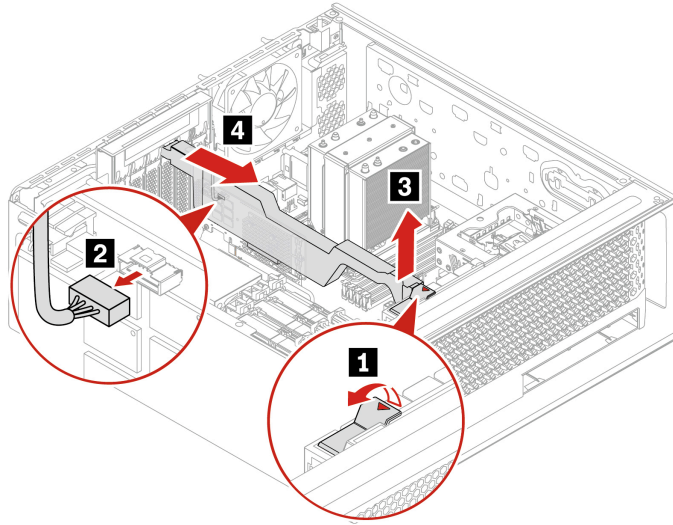
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the “Side cover” on page 60.

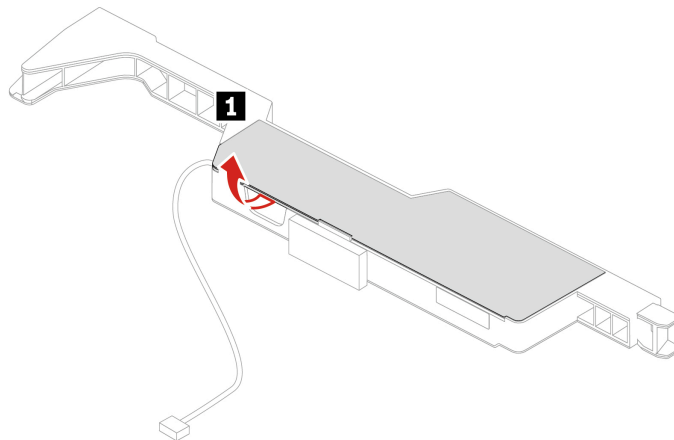
Step 2. Remove the PCIe top retention holder.

1. Open the latch to release the PCIe top retention holder.
2. Disconnect the supercapacitor cable from the **J14 connector** on the RAID card, if any.
3. Pivot the holder upward and lift it out of the system.

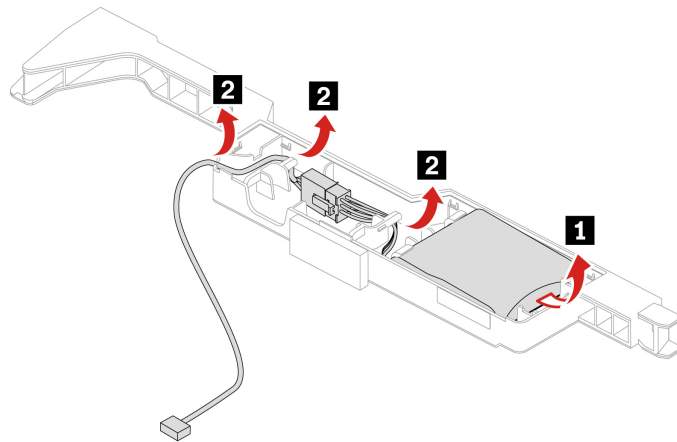


Step 3. Remove the supercapacitor module and cable.

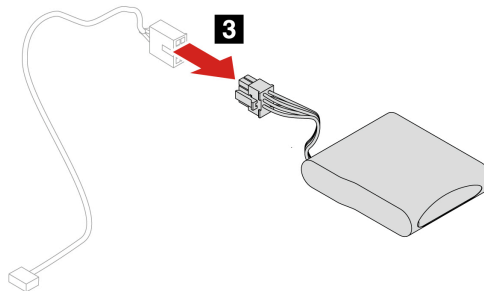
1. Pry open the PCIe top retention holder cover.



2. Remove the supercapacitor module and cable.



3. Disconnect the cable from the supercapacitor module.



Step 4. Install the removed parts and cables in reverse order.

Half-length PCIe cards

Before you start, read the following.

- “Prerequisites for hardware replacement” on page 55
- “PCIe configuration” on page 6
- “PCIe cable connection” on page 70

Replacement steps

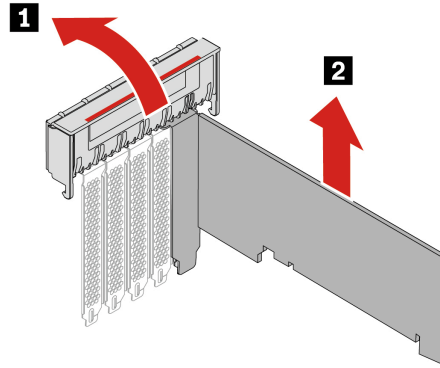
Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “PCIe top retention holder and supercapacitor module” on page 65

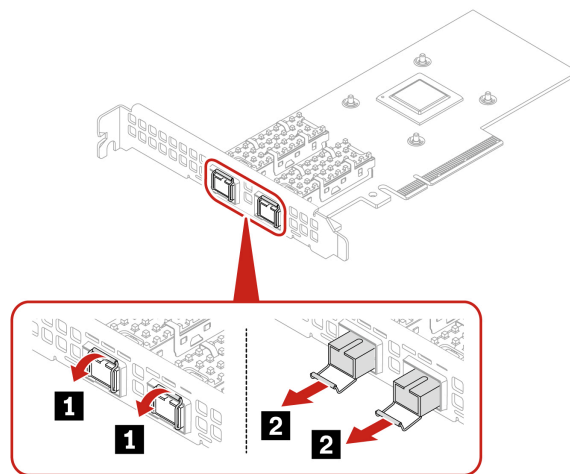
Step 2. Disconnect any cables connected to the PCIe card, if applicable.

Step 3. Pull open the PCIe retaining latch. Pull the PCIe card from the slot and lift it from the system.

Note: The card might fit tightly into the slot. If necessary, alternately move each side of the card a small amount until the card is removed from the slot.



Step 4. For some Ethernet adapters, the following fiber modules can be removed.



Step 5. Install the removed parts and cables in reverse order.

Full-length PCIe card and extender

Before you start, read the following.

- “Prerequisites for hardware replacement” on page 55
- “PCIe configuration” on page 6
- “PCIe cable connection” on page 70

Replacement steps

Step 1. Remove the following parts, if any, in order.

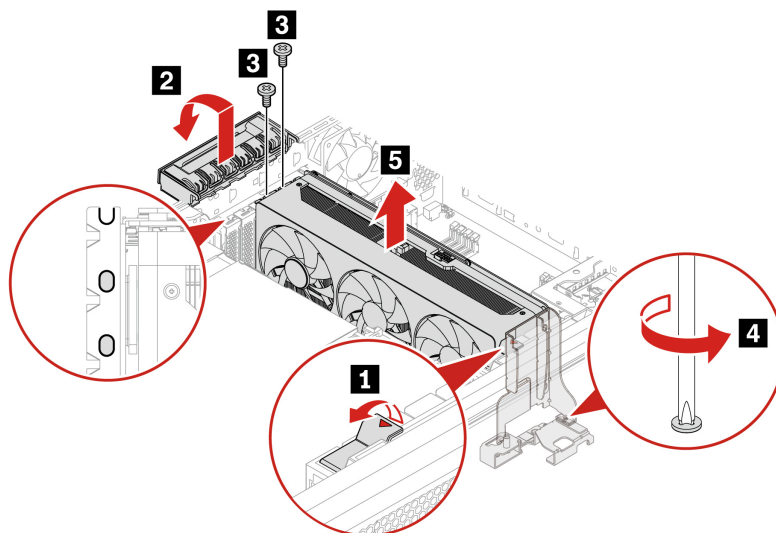
- “Side cover” on page 60
- “PCIe top retention holder and supercapacitor module” on page 65

Step 2. Disconnect any cables connected to the PCIe card (if available).

Step 3. Remove the PCIe card.

1. Pull open the PCIe retaining latches on both sides.
2. Remove or loosen any screws securing the PCIe card to the chassis (if available).
3. Pull the PCIe card from the slot and lift it from the system.

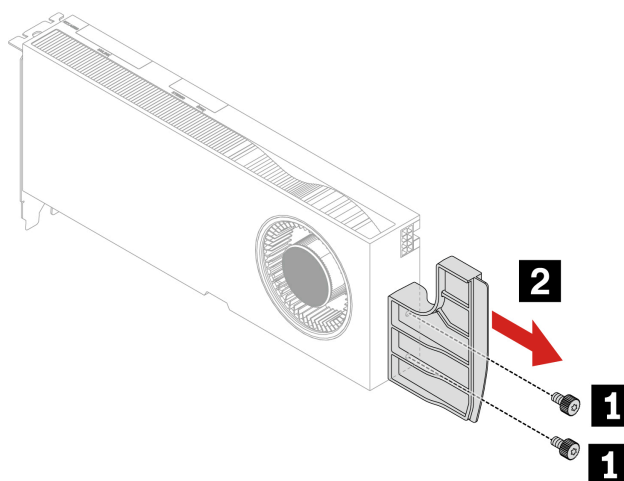
Note: The card might fit tightly into the slot. If necessary, alternately move each side of the card a small amount until the card is removed from the slot.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
3	M3.5	L5	5.0 ± 0.5	Black	2
4 (captive screw)	M3	L5	3.0 ± 0.5	Black	1

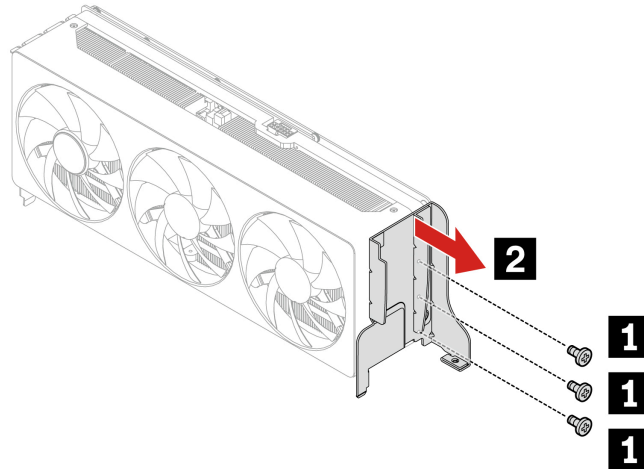
Step 4. Remove the customized PCIe extender (if available).

- For computer models with RTX Pro 4000 Blackwell, the graphics card and the PCIe card extender work as a CRU assembly. Do not try to remove the extender.
- For computer models with other graphics cards, the PCIe card extender is a customized CRU. You can remove it according to the following information.
 - Type-1



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
1	M3	L5.5	3.0 ± 0.25	Black	2

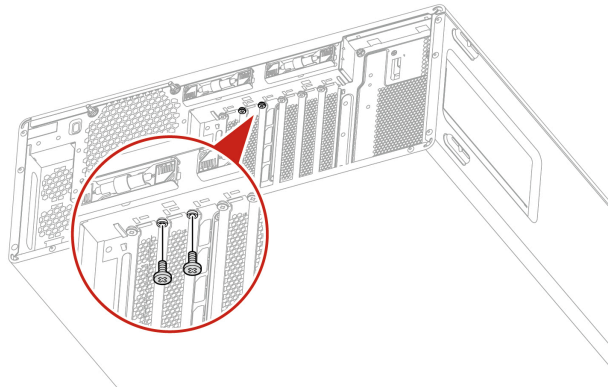
– Type-2



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
1	M3	L5	3.0 ± 0.5	Black	3

Step 5. Install the removed parts and cables in reverse order.

Note: For compatible models without a pre-installed GeForce 5080 PCIe card, you may need a PH2 screwdriver to access two screws above the second and third PCIe brackets on the rear panel, as the card doesn't include chassis mounting screws.



PCIe cable connection

Some PCIe cards require cabling to the system board. For connector locations, see “System board illustration” on page 57.

Some PCIe cards also require cabling to other system components. Follow the cable connection shown in the illustrations below.

Graphics card to 750-watt PSU

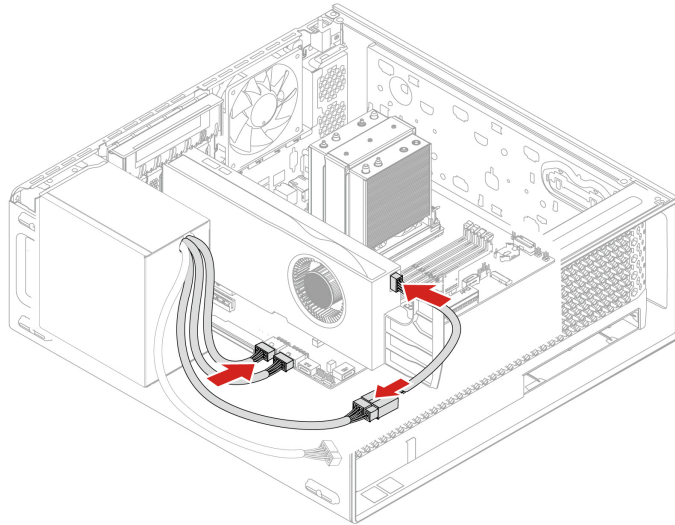


Figure 1. Cable connection for single graphics card and 750-watt PSU

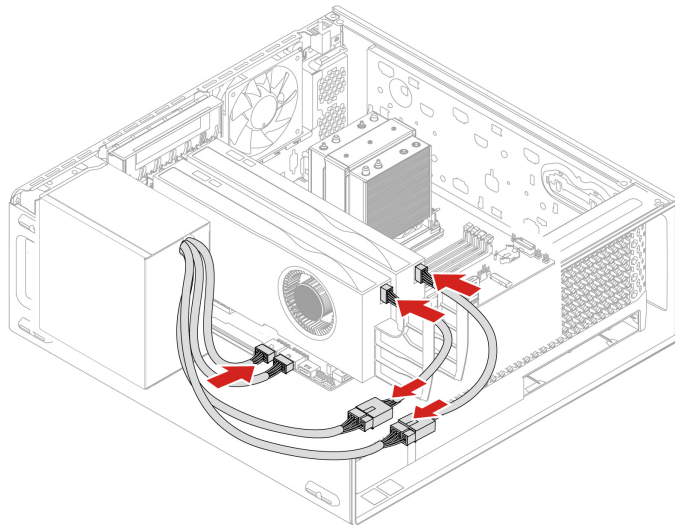
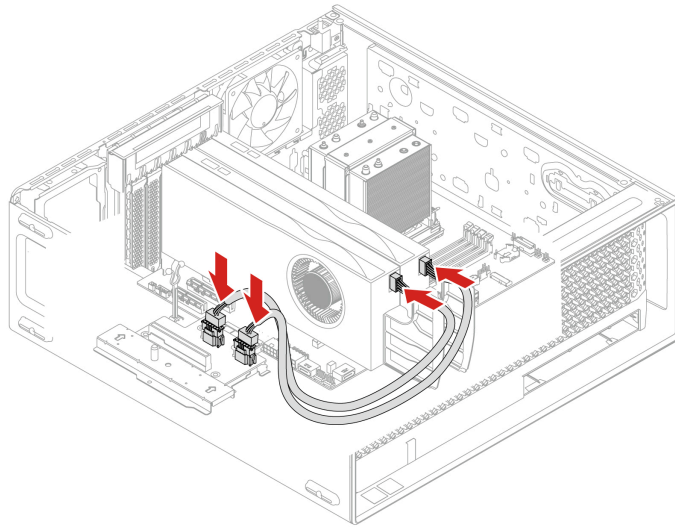
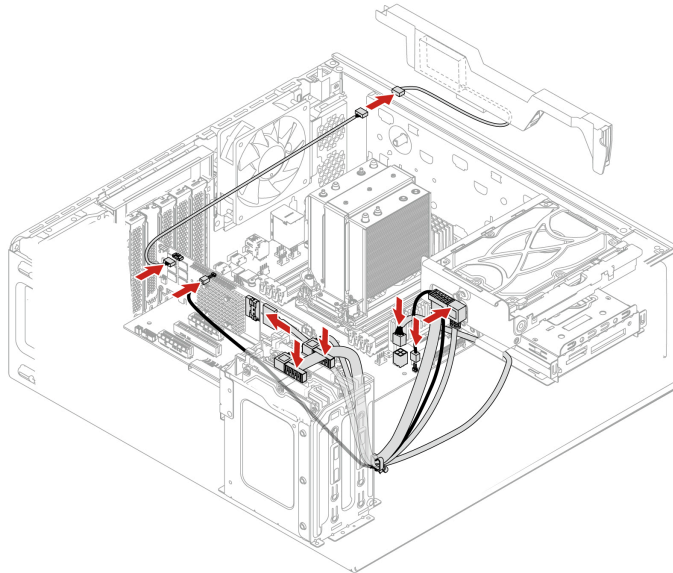


Figure 2. Cable connection for dual graphics cards and 750-watt PSU

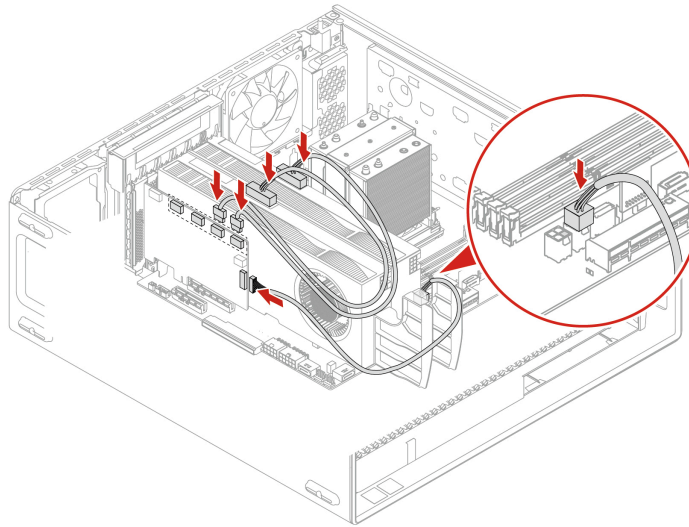
Graphics cards to the power distribution board of 1000-watt PSU



RAID card to HDDs, supercapacitor module, and system board



Sync card to graphics cards



Graphics card support bracket

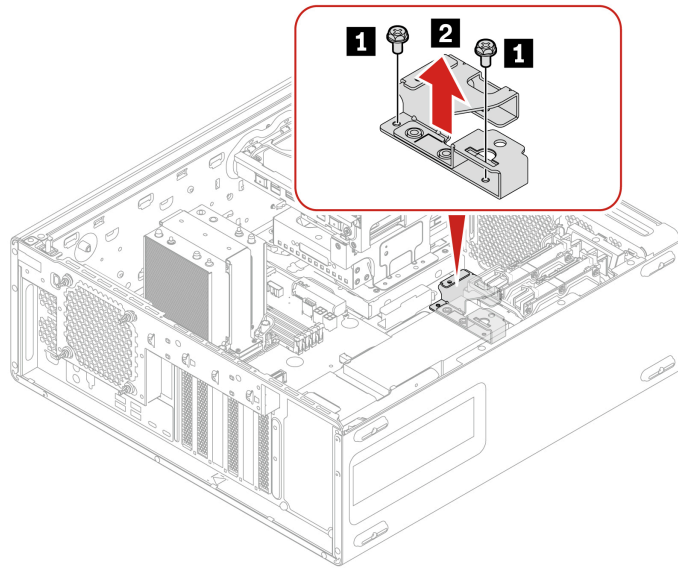
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “PCIe top retention holder and supercapacitor module” on page 65
- “Half-length PCIe cards” on page 67
- “Full-length PCIe card and extender” on page 68
- “HDD and its bracket” on page 77

Step 2. Remove two screws and lift the graphics card support bracket from the system.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
1	M3	L5	5 ± 0.5	Black	2

Step 3. Install the removed parts and cables in reverse order.

BMC card

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

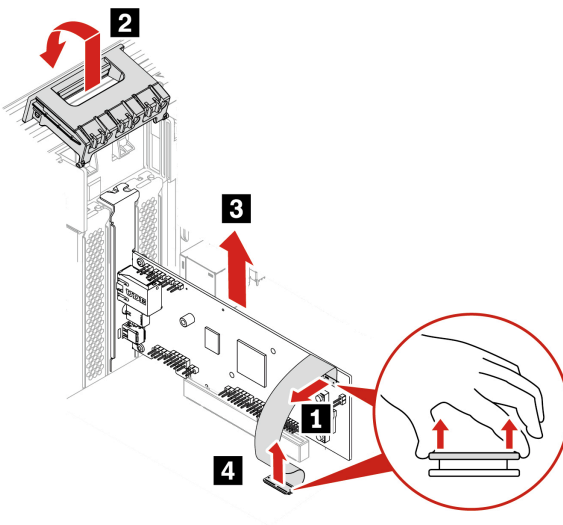
Step 1. Power down the system, disconnect all devices and power, then remove the “Side cover” on page 60.

Step 2. Remove the BMC card and cable.

1. Disconnect the BMC cable from the BMC card.
2. Pull open the PCIe retaining latch and carefully remove the BMC card.

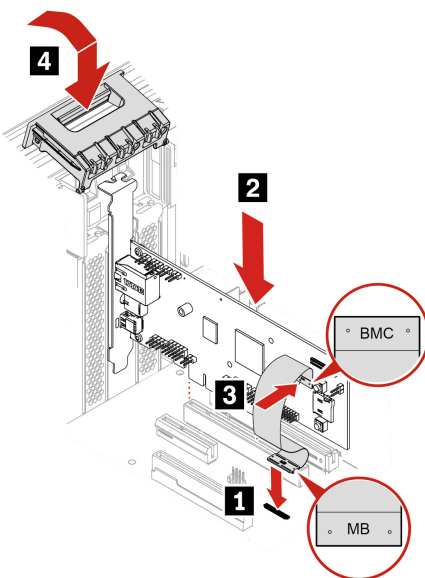
Note: The card might fit tightly into the slot. If necessary, alternately move each side of the card a small amount until the card is removed from the slot.

3. Disconnect the BMC cable from the system board.



Step 3. Install the BMC card and cable.

1. Connect the “MB” or “Main” end of the BMC cable to the system board.
2. Insert the BMC card into the PCIe Gen 5 x8 slot (Slot 5).
3. Connect the “BMC” end of the BMC cable to the BMC card.
4. Close the PCIe retaining latch to secure the card.



Step 4. Install other removed parts and cables in reverse order.

USB4 PCIe card and cables

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

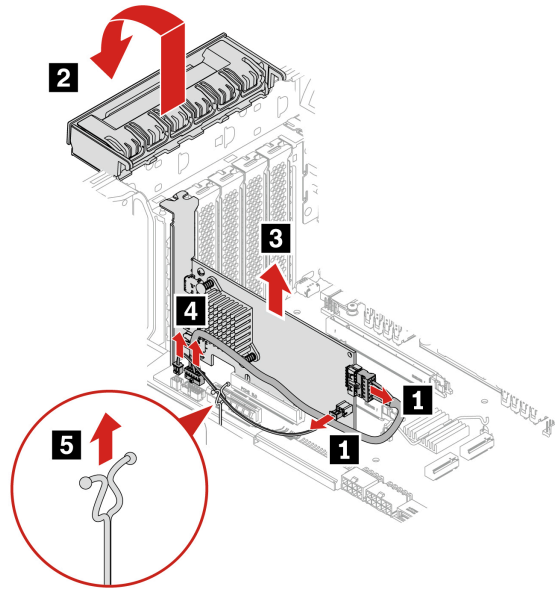
Step 1. Remove the “Side cover” on page 60.

Step 2. Remove the USB4 PCIe card, cables, and cable clip.

1. Disconnect the USB4 PCIe card cables from the card.
2. Pull open the PCIe retaining latch.
3. Pull the PCIe card from the PCIe Gen 4 x4 slot (Slot 6) and lift it from the system.

Note: The card might fit tightly into the slot. If necessary, alternately move each side of the card a small amount until the card is removed from the slot.

4. Disconnect the USB4 PCIe card cables from the system board.
5. Pull the cable clip upward to detach it from the system.



Step 3. Install the removed parts and cables in reverse order.

Note: For new card installations on models without a USB4 PCIe card, after installing the card and cables, enable **Intel Thunderbolt Technology** in the **Advanced** section of the UEFI BIOS menu.

4-port serial PCIe card and cable

Before you start, read “Prerequisites for hardware replacement” on page 55.

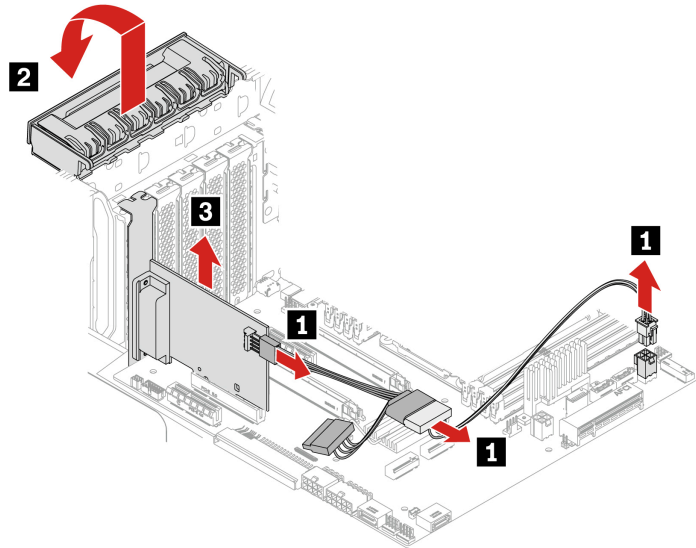
Replacement steps

Step 1. Remove the “Side cover” on page 60.

Step 2. Remove the 4-port serial PCIe card and cable.

1. Disconnect the 4-port serial PCIe card cable from the PCIe card and the SATA power cable.
2. Pull open the PCIe retaining latch.
3. Pull the PCIe card from the PCIe slot and lift it from the system.

Note: The card might fit tightly into the slot. If necessary, alternately move each side of the card a small amount until the card is removed from the slot.



Step 3. Install the removed parts and cables in reverse order.

Storage components

This section describes how to replace storage drives and their related components.

HDD and its bracket

Before you start, read “Prerequisites for hardware replacement” on page 55.

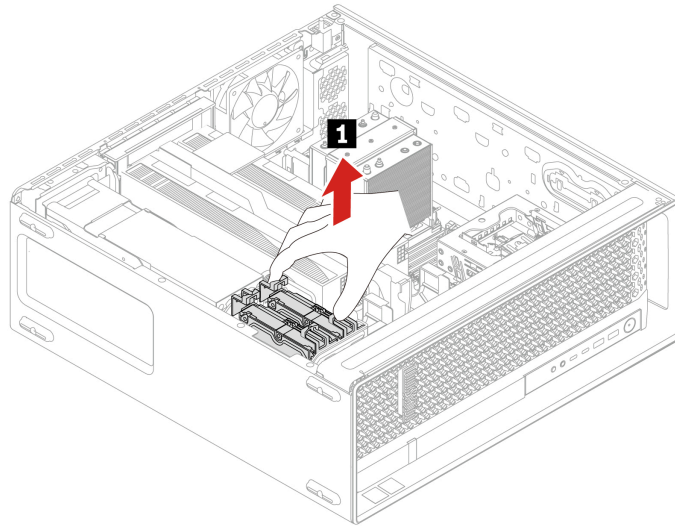
Replacement steps

Step 1. Remove the “Side cover” on page 60.

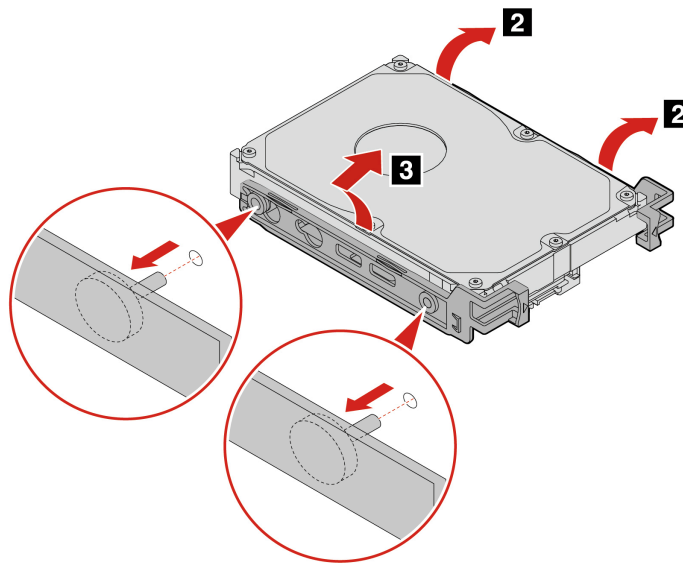
Step 2. Disconnect the SATA power and data cables from the HDD and the system board.

Note: If you need to replace the SATA power or data cable, you should also remove the “Full-length PCIe card and extender” on page 68 and “Front fan” on page 107 to gain full access.

Step 3. Squeeze the tabs on the HDD bracket and pull it from the bay.



Step 4. Remove the drive from the bracket by pulling the pins out of the holes in the side of the drive.



Step 5. Install the removed parts and cables in reverse order.

HDD fan

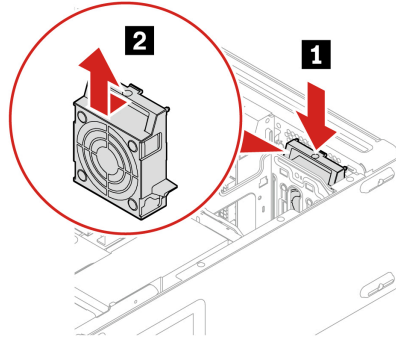
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the “Side cover” on page 60.

Step 2. Disconnect the HDD fan cable from the system board. For connector locations, see “System board illustration” on page 57.

Step 3. Tilt the fan to release it and lift the fan from the system.



Step 4. Install the removed parts and cables in reverse order.

Optional HDD and its bracket

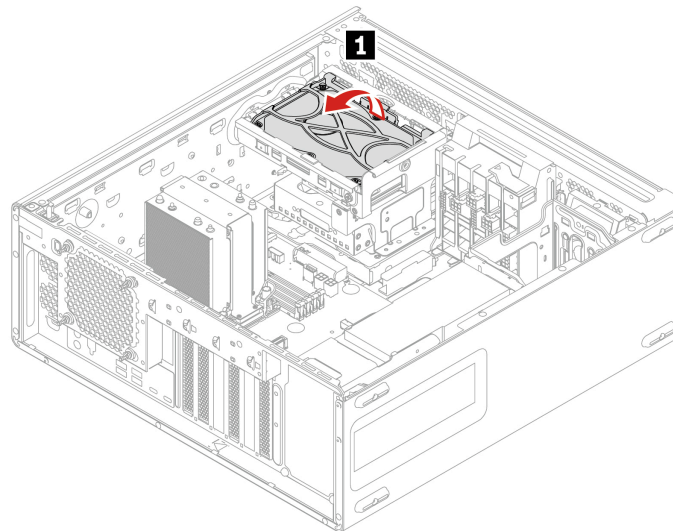
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

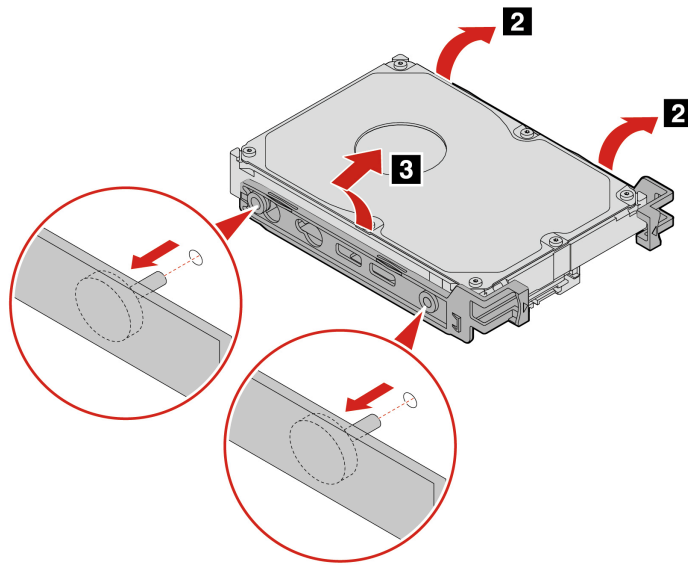
Step 1. Remove the “Side cover” on page 60.

Step 2. Disconnect the SATA power and data cables from the HDD and the system board.

Step 3. Remove the optional HDD and bracket.



Step 4. Remove the drive from the bracket by pulling the pins out of the holes in the side of the drive.



Step 5. Install the removed parts and cables in reverse order.

Optional HDD cage

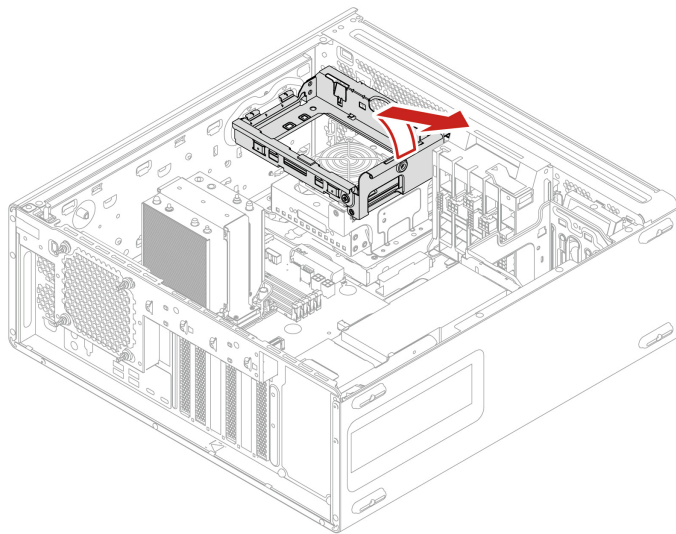
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

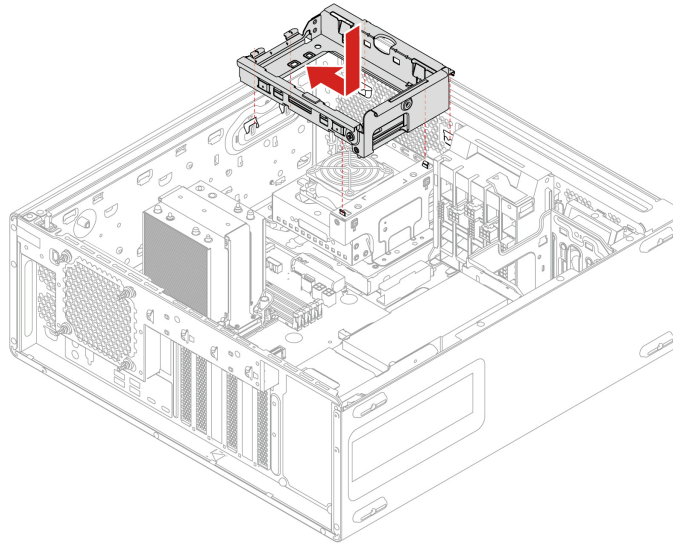
Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79

Step 2. Grab the handle with a red line and lift the optional HDD cage from the system.



Step 3. Align the optional HDD cage with the holes on the system and lower it into place.



Step 4. Install other removed parts and cables in reverse order.

Optional HDD cage holder

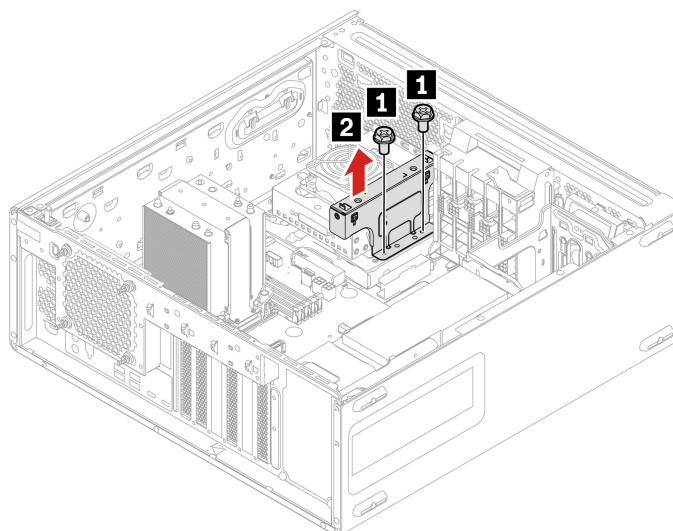
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80

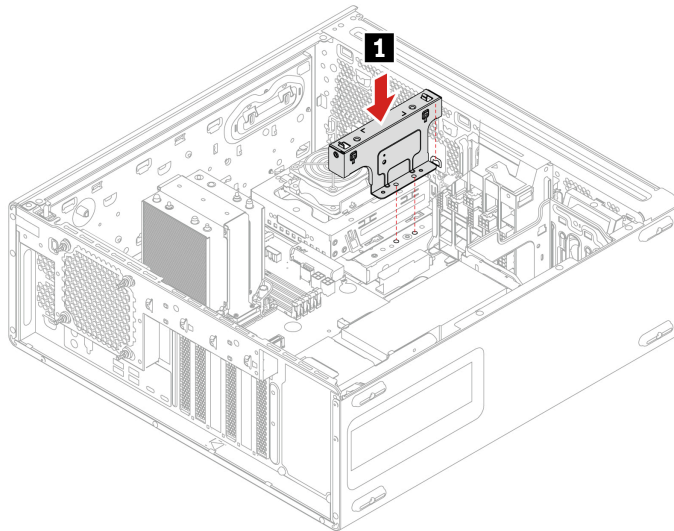
Step 2. Remove two screws and lift the optional HDD cage holder out of the system.



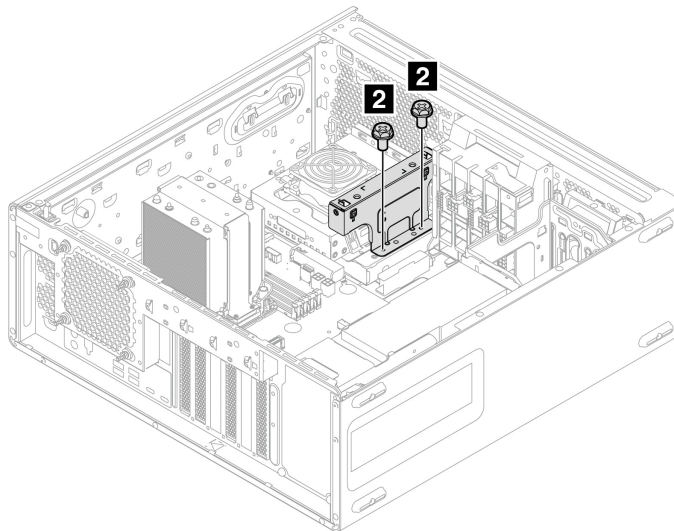
Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
1	M3	L5	5.0 ± 0.5	Black	2

Step 3. Install the optional HDD cage holder.

1. Align the holder with the two holes on the system and lower it into place.



2. Secure the holder with two screws.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
2	M3	L5	5.0 ± 0.5	Black	2

Step 4. Install other removed parts and cables in reverse order.

Flex bay fan

Before you start, read “Prerequisites for hardware replacement” on page 55.

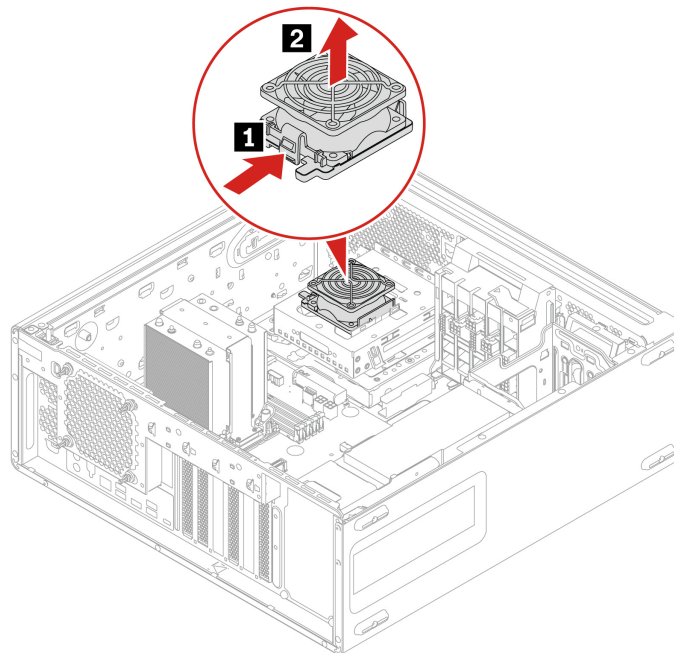
Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Optional HDD cage holder” on page 81

Step 2. Disconnect the fan cable from the system board. For connector locations, see “System board illustration” on page 57.

Step 3. Press the latch to release the flex bay fan and remove it.



Step 4. Install the removed parts and cables in reverse order.

15-in-1 media card reader module

Before you start, read “Prerequisites for hardware replacement” on page 55.

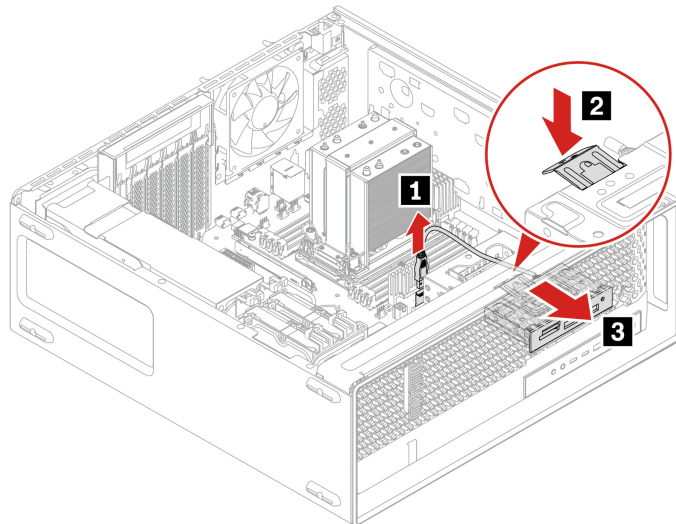
Replacement steps

Step 1. Remove the following parts, if any, in order.

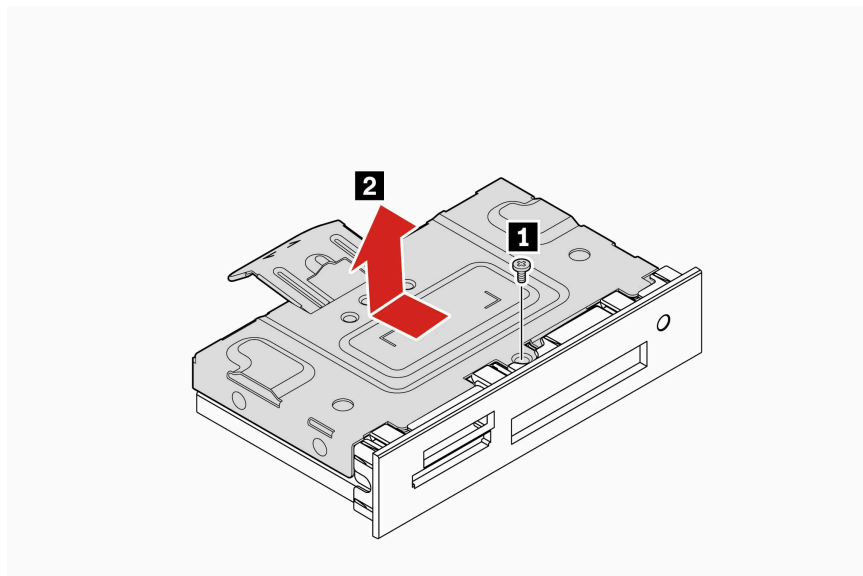
- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Optional HDD cage holder” on page 81

- “Flex bay fan” on page 83

- Step 2. Disconnect the media card reader (MCR) cable from the internal USB 3.2 connector on the system board. For connector locations, see “System board illustration” on page 57.
- Step 3. Press the clip to release the module and push it with the cable through the front of the system to remove it.

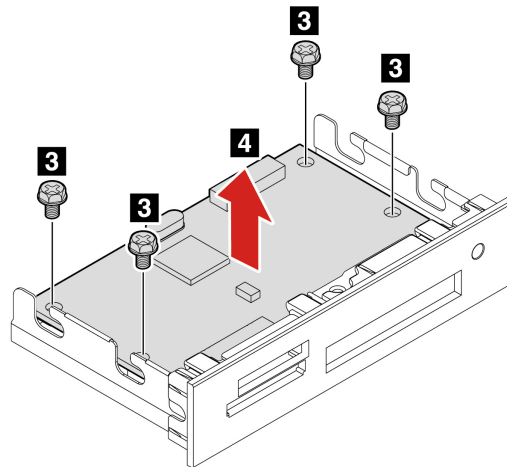


- Step 4. Remove one screw and then slide off the MCR box cover.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
1	M3	L4	3.0 ± 0.5	Silver	1

- Step 5. Remove four screws and remove the MCR with cable from the box.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
3	M3	L5	5.0 ± 0.5	Black	4

Step 6. Install the removed parts and cables in reverse order.

M.2 SSD enclosure and SSD

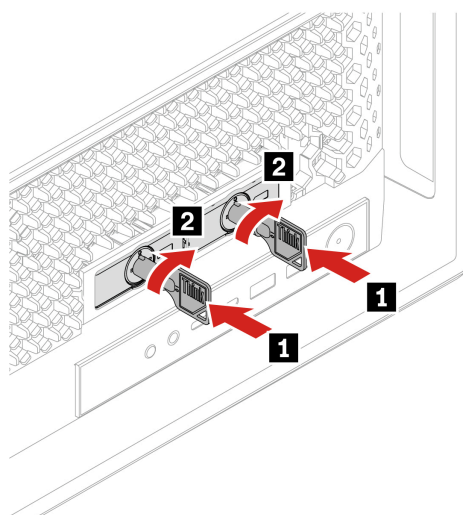
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

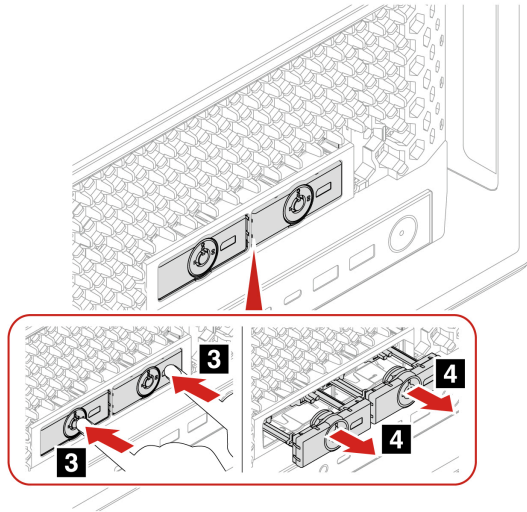
Step 1. Turn off the computer and back up all important data if necessary.

Step 2. Remove the M.2 SSD enclosure.

1. Unlock the M.2 SSD enclosure.

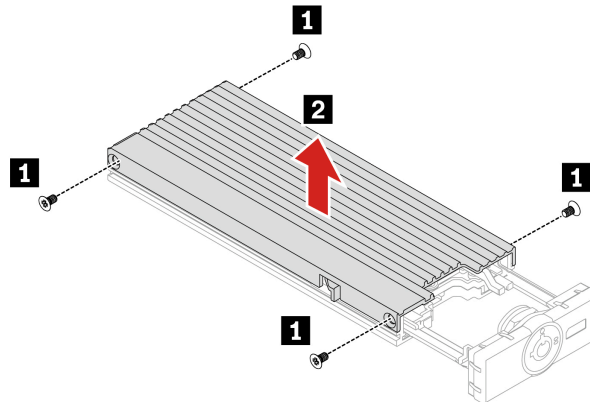


2. Press and eject the M.2 SSD enclosure.



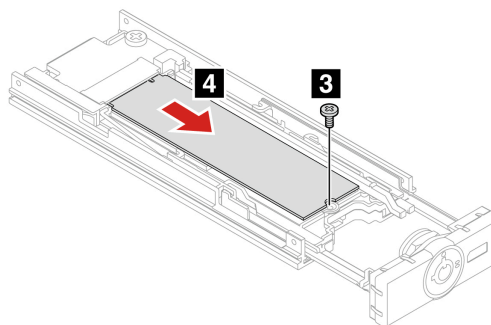
Step 3. Remove the SSD from the M.2 SSD enclosure.

1. Remove four screws and remove the enclosure cover.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
1	M2	L3.6	1.5 ± 0.2	Silver	4

2. Remove one screw and pull the SSD out of the enclosure.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
E	M2	L4.5	1.5 ± 0.2	Black	1

Step 4. Install the removed parts and cables in reverse order.

M.2 SSD enclosure tray and cable

Before you start, read “Prerequisites for hardware replacement” on page 55.

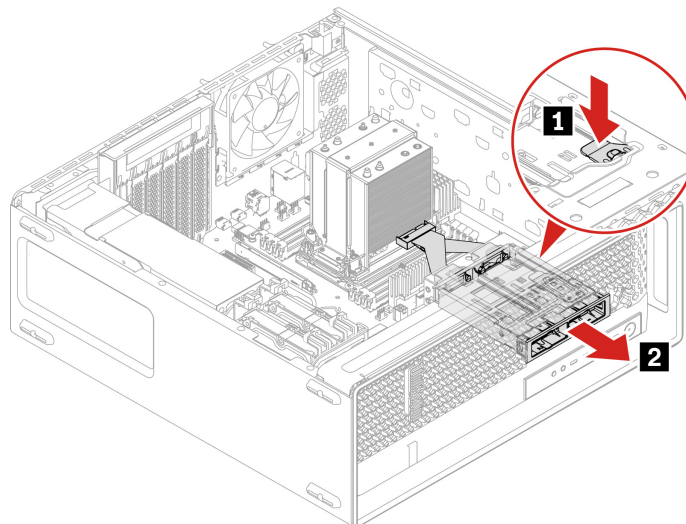
Replacement steps

Step 1. Remove the following parts, if any, in order.

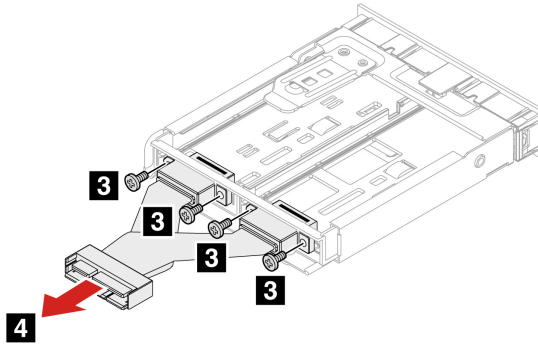
- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Optional HDD cage holder” on page 81
- “Flex bay fan” on page 83
- “M.2 SSD enclosure and SSD” on page 85

Step 2. Disconnect the M.2 SSD enclosure cable from the system board. For connector locations, see “System board illustration” on page 57.

Step 3. Press the clip to release the module and push it with the cable through the front of the system to remove it.



Step 4. Remove four screws and remove the cable from the tray.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
3	M2	L6.5	1.5 ± 0.5	Black	4

Step 5. Install the removed parts and cables in reverse order.

Flex bay cage

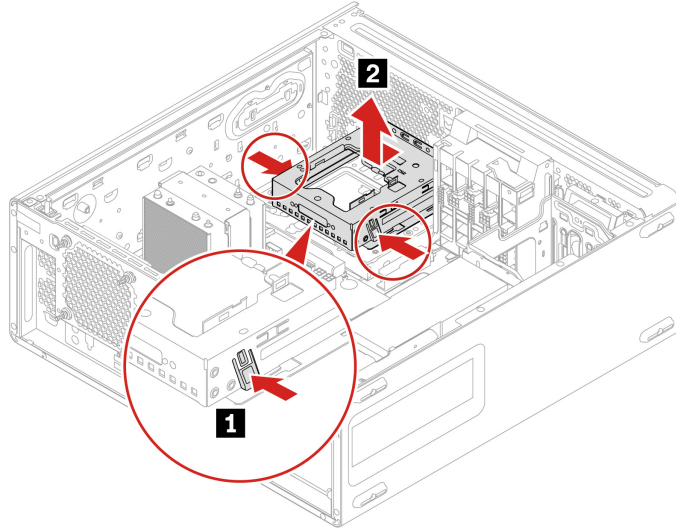
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

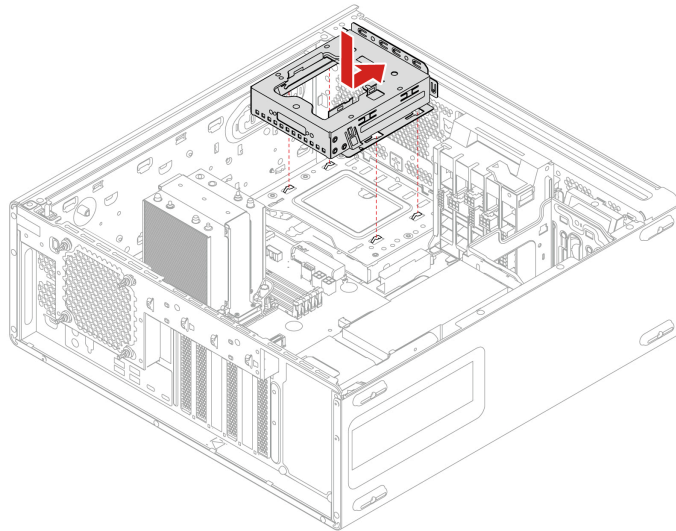
Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Optional HDD cage holder” on page 81
- “Flex bay fan” on page 83
- “15-in-1 media card reader module” on page 83
- “M.2 SSD enclosure tray and cable” on page 87
- “M.2 SSD enclosure and SSD” on page 85

Step 2. Press the two clips on both sides to release the flex bay cage. Then, remove the cage from the system.



Step 3. Align the cage with the four holes on the system, then slide it in until it locks into place.



Step 4. Install other removed parts and cables in reverse order.

Flex bay cover

Before you start, read “Prerequisites for hardware replacement” on page 55.

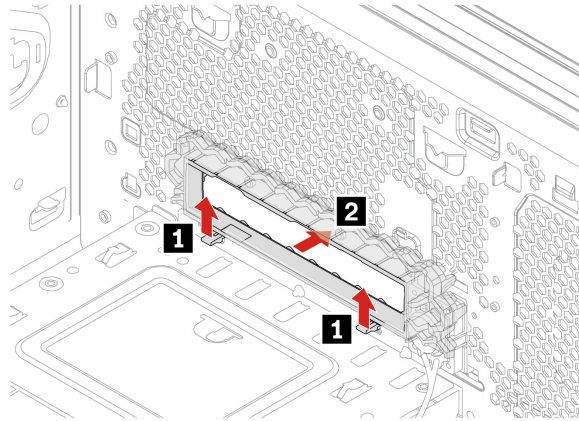
Replacement steps

Step 1. Remove the following parts, if any, in order.

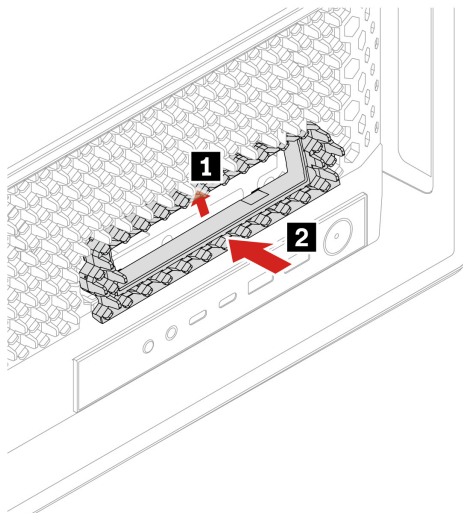
- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Optional HDD cage holder” on page 81
- “Flex bay fan” on page 83

- “15-in-1 media card reader module” on page 83
- “M.2 SSD enclosure tray and cable” on page 87
- “M.2 SSD enclosure and SSD” on page 85

Step 2. From inside the system, lift the two tabs to release the cover and push it out of the system.



Step 3. Align the upper edge of the cover to the system, then push the bottom of the cover until it clicks into place.



Step 4. Install other removed parts and cables in reverse order.

Flex bay dummy cover

Before you start, read “Prerequisites for hardware replacement” on page 55.

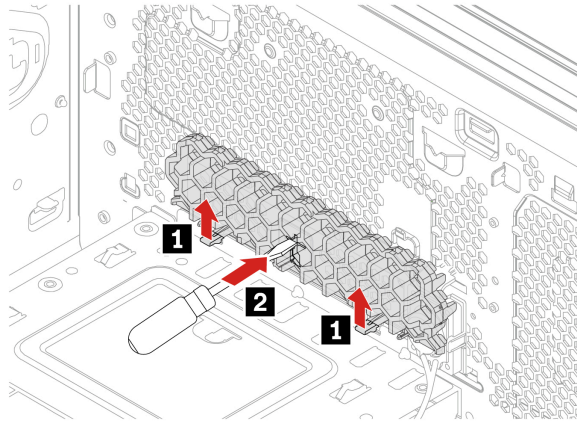
Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79

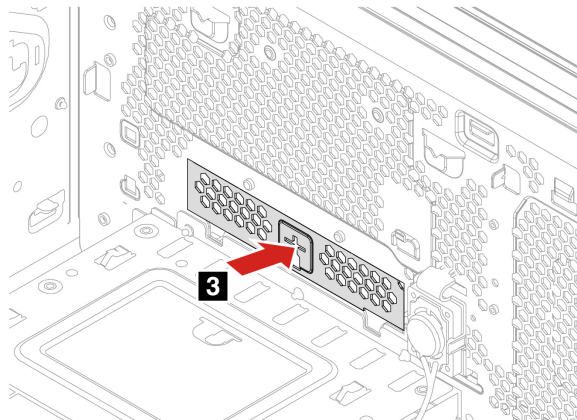
- “Optional HDD cage” on page 80
- “Optional HDD cage holder” on page 81
- “Flex bay fan” on page 83
- “15-in-1 media card reader module” on page 83
- “M.2 SSD enclosure tray and cable” on page 87
- “M.2 SSD enclosure and SSD” on page 85

Step 2. From inside the system, lift the two tabs to release the cover and push it out of the system.

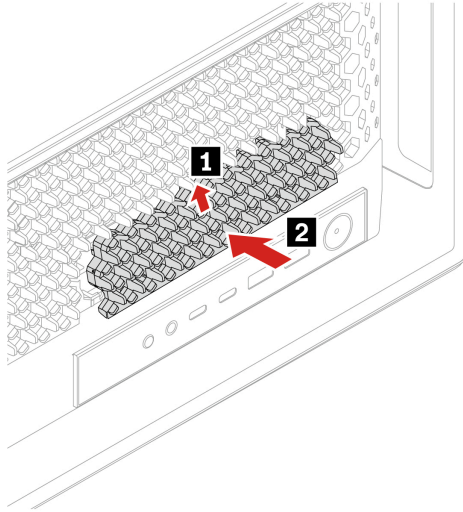


Step 3. Carefully press the metal insert out of the chassis, if needed.

Note: After removal, handle the new openings with care, as the edges may be sharp.



Step 4. Align the upper edge of the cover to the system, then push the bottom of the cover until it clicks into place.



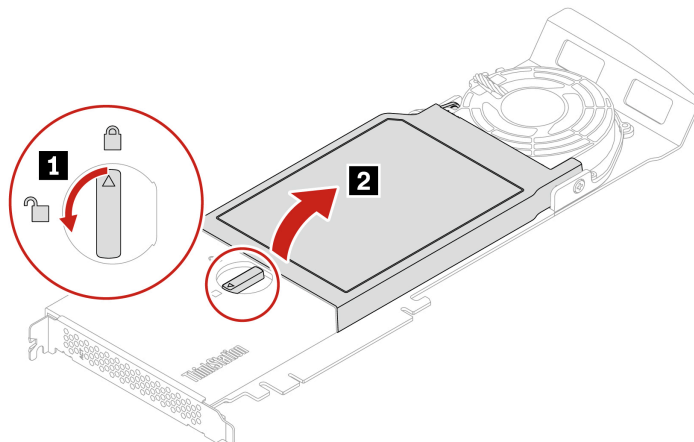
Step 5. Install other removed parts and cables in reverse order.

SSD in M.2 SSD PCIe adapter

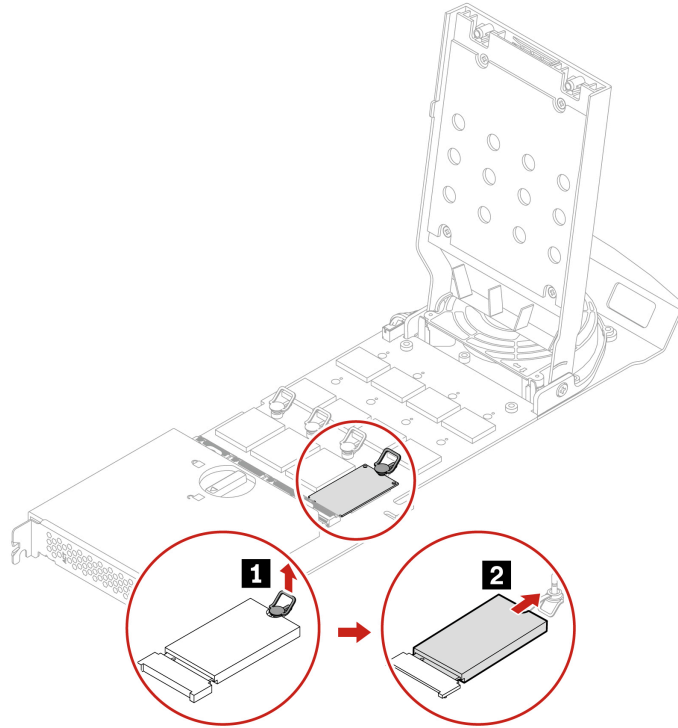
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

- Step 1. Remove the “Side cover” on page 60.
- Step 2. Remove the M.2 SSD PCIe adapter from the PCIe slot following the steps in “Full-length PCIe card and extender” on page 68.
- Step 3. Remove the SSD from the M.2 SSD PCIe adapter.
 - 1. Rotate the lock to the open position to open the cover.

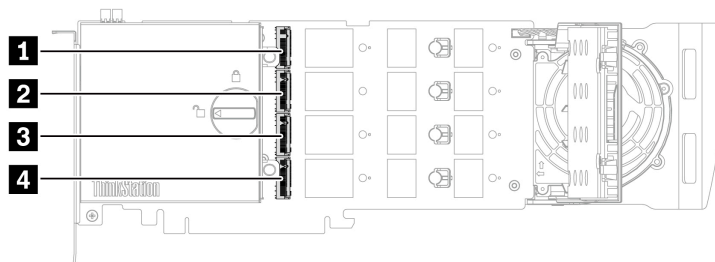


- 2. Pull the handle of the retention latch outward to release the M.2 SSD. Then, remove the M.2 SSD from the PCIe adapter.

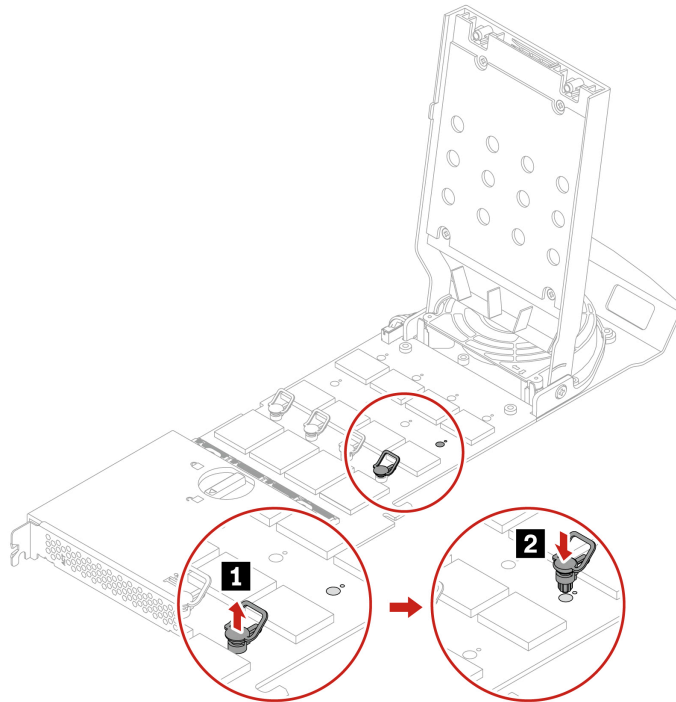


Step 4. Install the SSD into the M.2 SSD PCIe adapter.

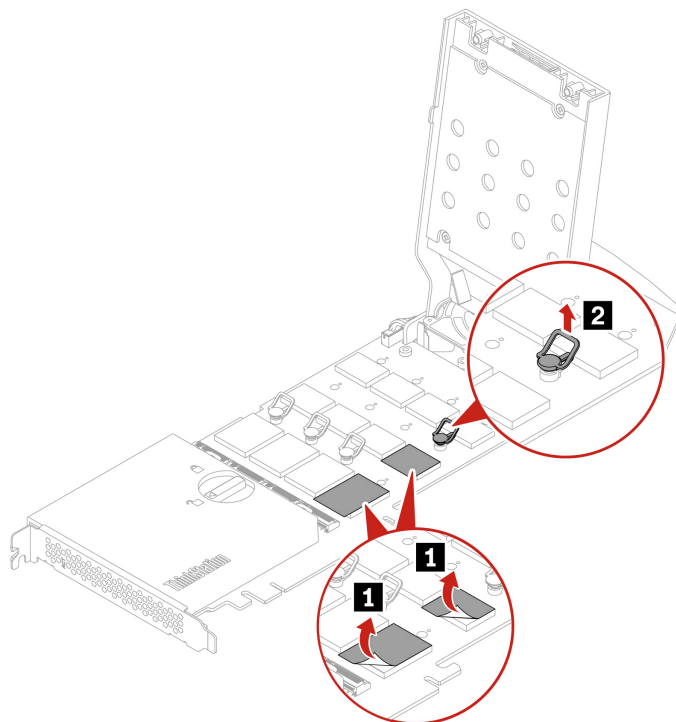
Note: Install M.2 SSDs in the following order as shown:



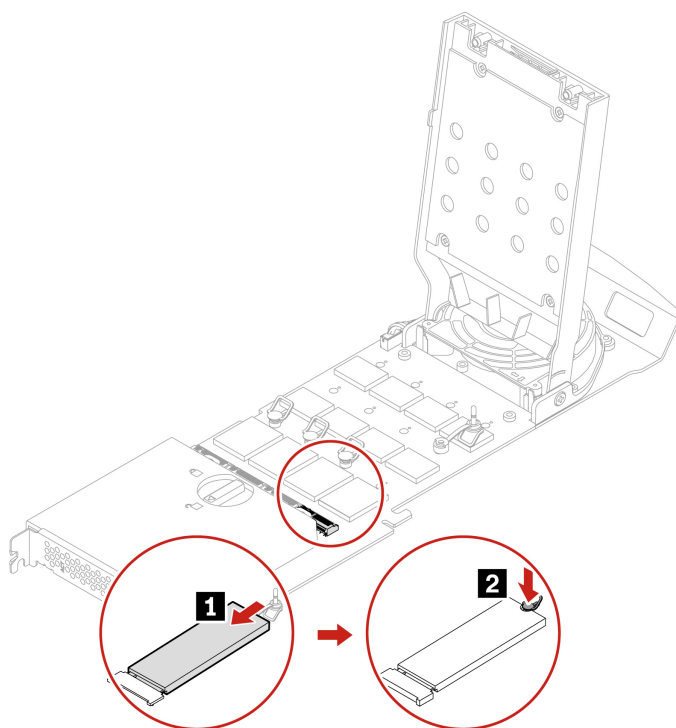
1. Adjust the location of the retention latch on the PCIe adapter to suit the length of the new M.2 SSD, if necessary.



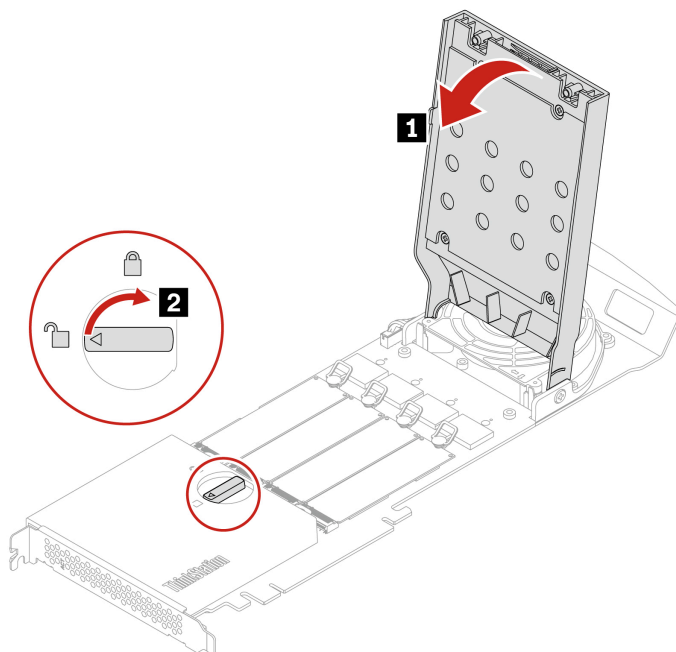
2. Remove the film from the thermal pad on which you want to install the M.2 SSD. Pull the handle of the retention latch outward to the open position.



3. Install a new M.2 SSD. Then, insert the plug of the retention latch into the hole to secure the new drive. Do not touch the circuit board of the M.2 SSD.



4. Rotate the lock to the closed position to close the cover.



Step 5. Install other removed parts and cables in reverse order.

On-board SSD and its heat sink kit

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the following parts, if any, in order.

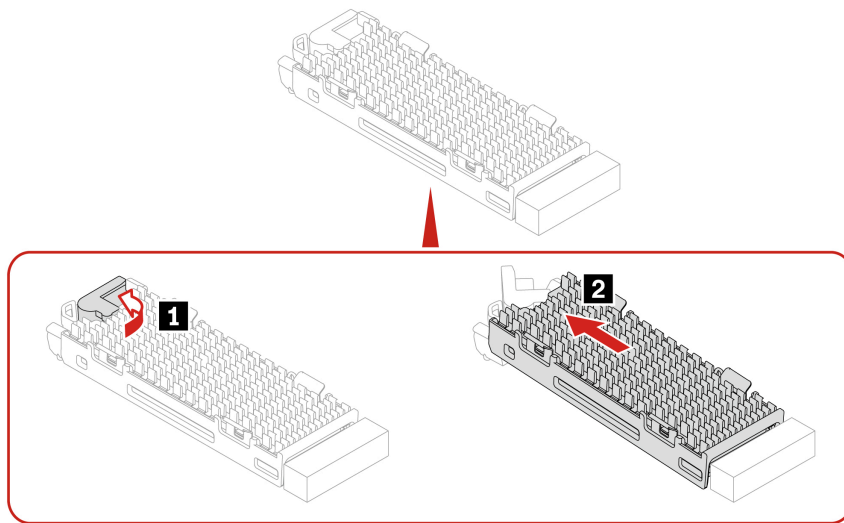
- “Side cover” on page 60
- “PCIe top retention holder and supercapacitor module” on page 65
- “Half-length PCIe cards” on page 67
- “Full-length PCIe card and extender” on page 68

Step 2. Remove the on-board SSD and its heat sink kit.

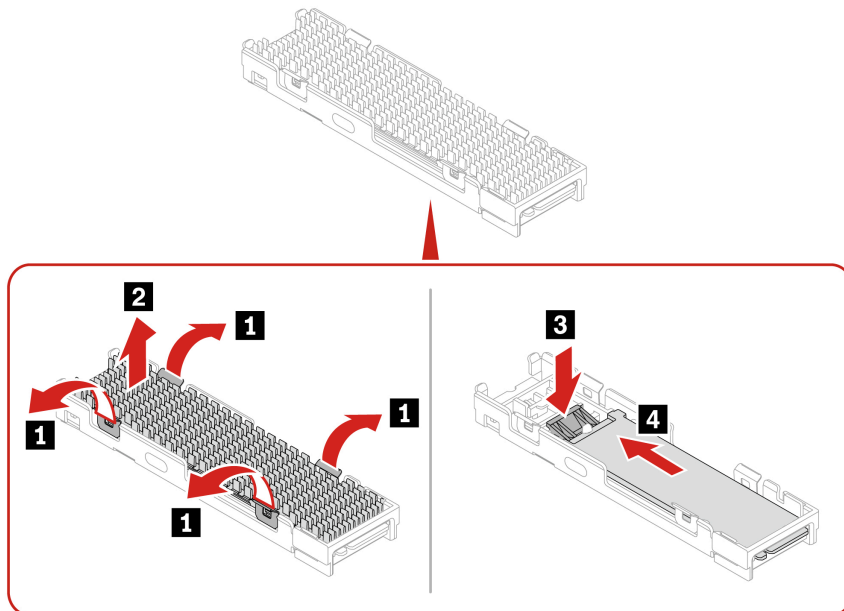
CAUTION:

Before you touch the heat sink, wait several minutes until the component is cool.

1. Rotate the tab to release the drive and pull it from the on-board M.2 SSD slot.

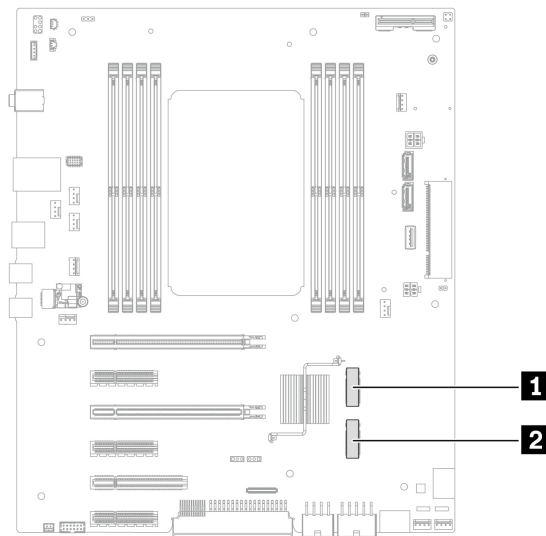


2. Pull open the tabs to remove the heat sink cover. Press the tab to release and remove the drive from the heat sink.

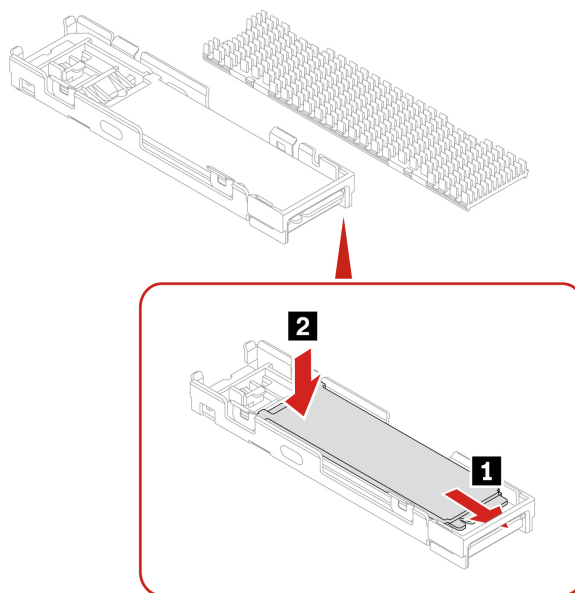


Step 3. Install the on-board SSD and its heat sink kit.

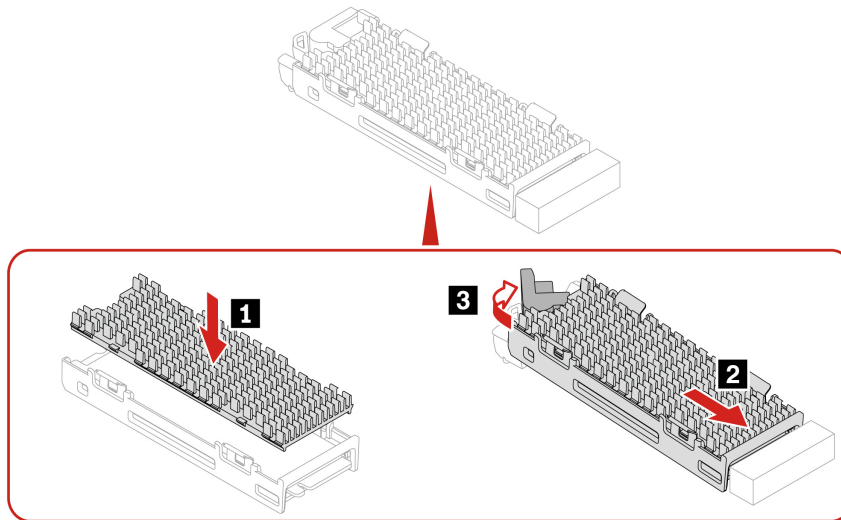
Note: Ensure to install the on-board M.2 SSDs in the following order.



1. Remove the protective film on the heat sink and thermal pad (if available).
2. Insert the SSD into the heat sink by aligning the drive edge with the slot.



3. Install the heat sink cover. Insert the drive into the on-board M.2 slot. Rotate the tab to secure it in place.



Step 4. Install other removed parts and cables in reverse order.

On-board SSD holder

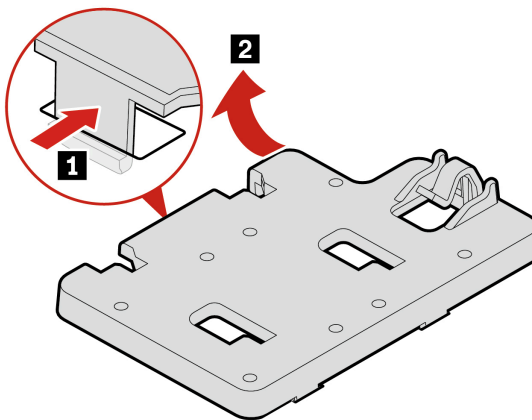
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

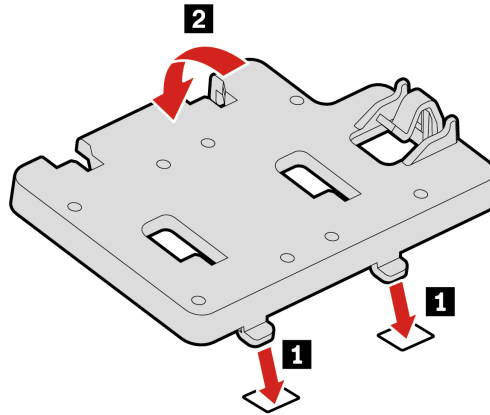
Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “PCIe top retention holder and supercapacitor module” on page 65
- “Half-length PCIe cards” on page 67
- “Full-length PCIe card and extender” on page 68
- “On-board SSD and its heat sink kit” on page 95

Step 2. Press the clip to release the SSD holder, then lift and remove it.



Step 3. Insert the SSD holder into the slot and press down until the clip locks it in place.



Step 4. Install other removed parts and cables in reverse order.

Memory components

This section describes how to replace memory modules and their related components.

Memory fan duct

Before you start, read “Prerequisites for hardware replacement” on page 55.

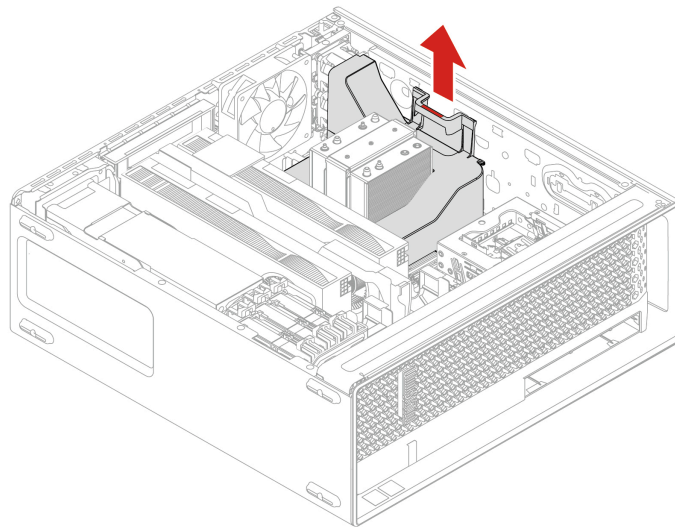
Replacement steps

Step 1. Remove the “Side cover” on page 60.

CAUTION:

Before you touch the memory fan duct, wait several minutes until the component is cool.

Step 2. Release the fan duct using the handle with a red line. Lift the duct from the system.



Step 3. Install the removed parts and cables in reverse order.

Memory fans

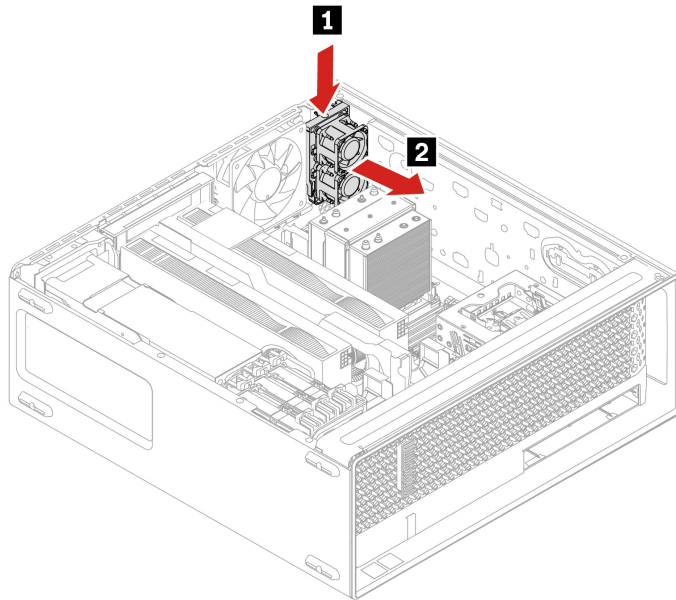
Before you start, read “Prerequisites for hardware replacement” on page 55.

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Memory fan duct” on page 99

Step 2. Disconnect the two memory fan cables from the system board. For connector locations, see “System board illustration” on page 57.

Step 3. Tilt the memory fan module to release it and lift it from the system.



Step 4. Install the removed parts and cables in reverse order.

Memory module

Before you start, read the following.

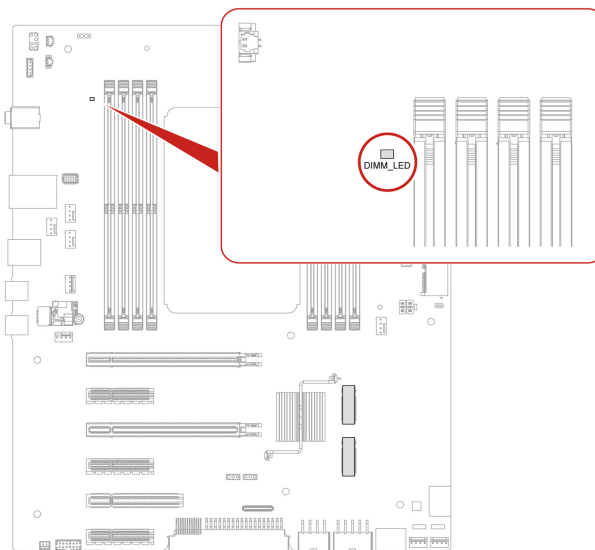
- “Prerequisites for hardware replacement” on page 55
- “Memory configuration” on page 5

Replacement steps

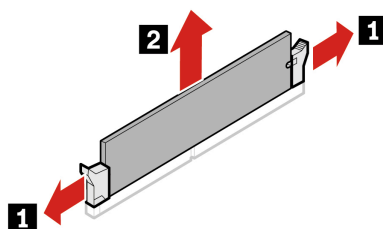
Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Memory fan duct” on page 99

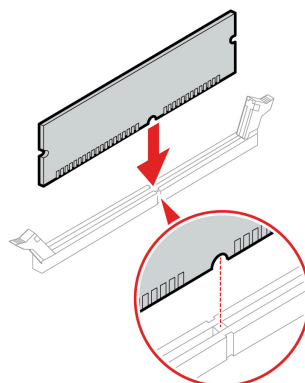
Step 2. Verify that the DIMM LED on the system board is off, and then wait at least one minute before removing or installing a module. It allows the system to be completely discharged of electricity.



Step 3. Press outward on the clips to release the memory module and remove it from the slot.



Step 4. Align the notch in the memory module with the tab in the slot. Press down on the module until the clips lock into place.



Step 5. Install other removed parts and cables in reverse order.

Power components

This section describes how to replace the power supply and its related components.

Power supply unit assembly

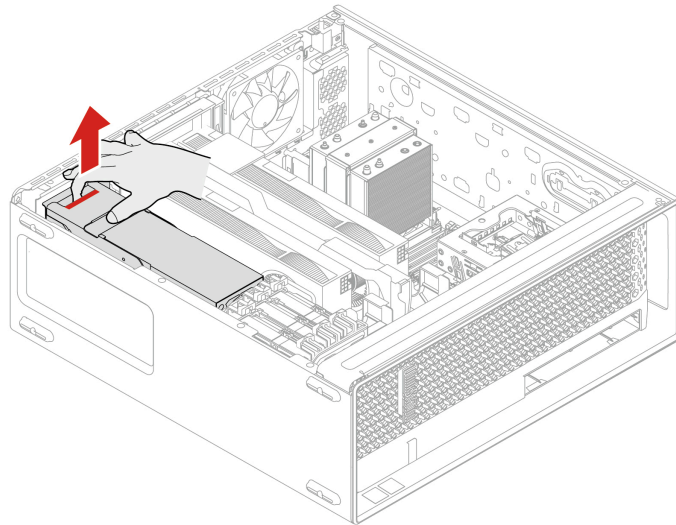
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

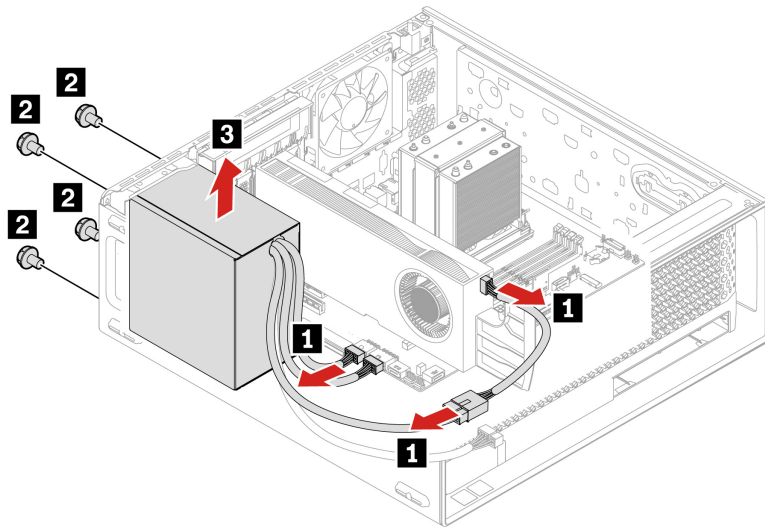
Step 1. Remove the “Side cover” on page 60.

Step 2. Remove the power supply unit (PSU) assembly.

- For the 1000-watt PSU, lift the lever and pull the power supply from the system.



- For the 750-watt PSU, disconnect the PSU cables from the system board and graphics cards (if any), remove four screws, and then remove the PSU with cable from the system.



Location	Thread	Length	Torque (lbf-in)	Color	Quantity
2	#6-32	5 mm	5.0 ± 0.5	Black	4

Step 3. Install the removed parts and cables in reverse order.

1000-watt PSU cover

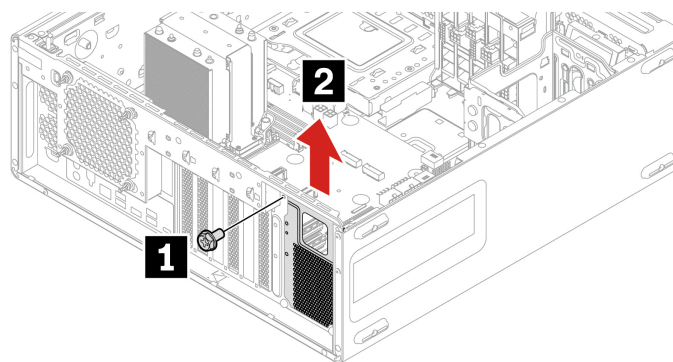
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Power supply unit assembly” on page 103

Step 2. Remove one screw from the PSU cover and lift it from the system.



Location	Thread	Length	Torque (lbf-in)	Color	Quantity
1	#6-32	5 mm	5.0 ± 0.5	Black	1

Step 3. Install the removed parts and cables in reverse order.

1000-watt power distribution board and bracket

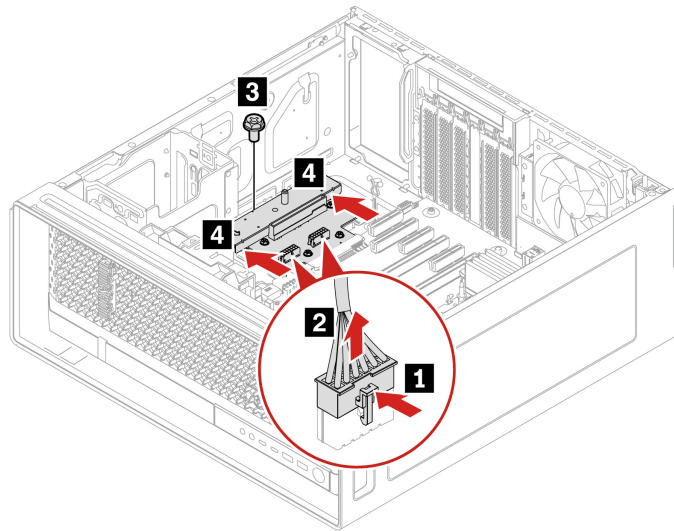
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the following parts, if any, in order.

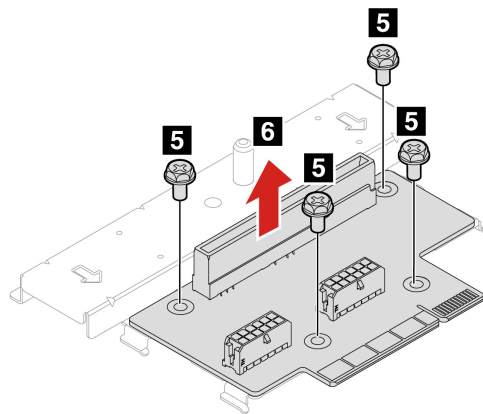
- “Side cover” on page 60
- “Power supply unit assembly” on page 103

Step 2. Disconnect any cables from the power distribution board. Remove one screw and slide the power distribution board away from the system board and remove it.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
3	M3	L5	5.0 ± 0.5	Black	1

Step 3. Remove four screws and remove the power distribution board from the bracket.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
5	M3	L5	5.0 ± 0.5	Black	4

Step 4. Install the removed parts and cables in reverse order.

Front panel I/O assembly

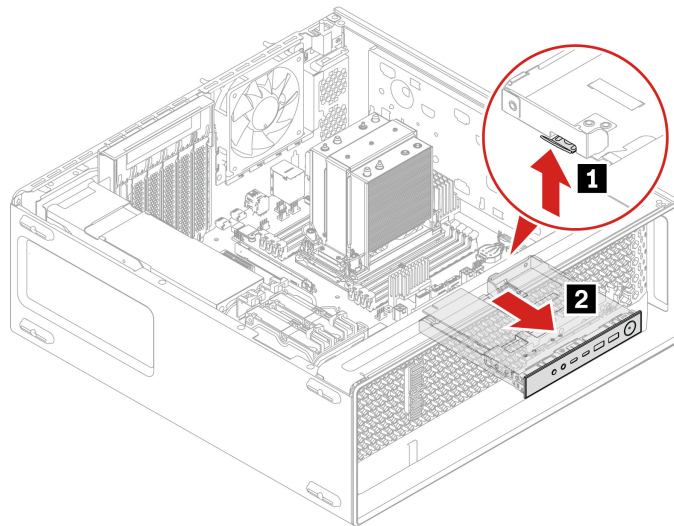
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

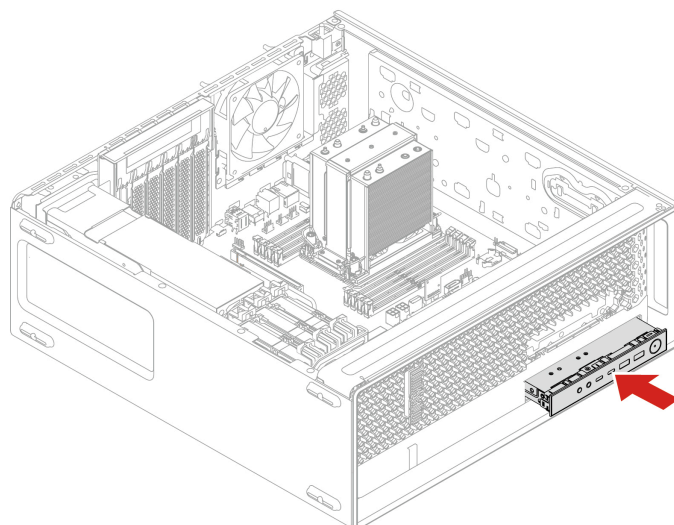
Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Optional HDD cage holder” on page 81
- “Flex bay fan” on page 83
- “15-in-1 media card reader module” on page 83
- “M.2 SSD enclosure tray and cable” on page 87
- “M.2 SSD enclosure and SSD” on page 85
- “Flex bay cage” on page 88

Step 2. Lift the release latch, push the front panel I/O assembly forward, and remove it from the system.



Step 3. Insert the assembly until it connects to the system board.



Step 4. Install other removed parts and cables in reverse order.

Front fan

Before you start, read “Prerequisites for hardware replacement” on page 55.

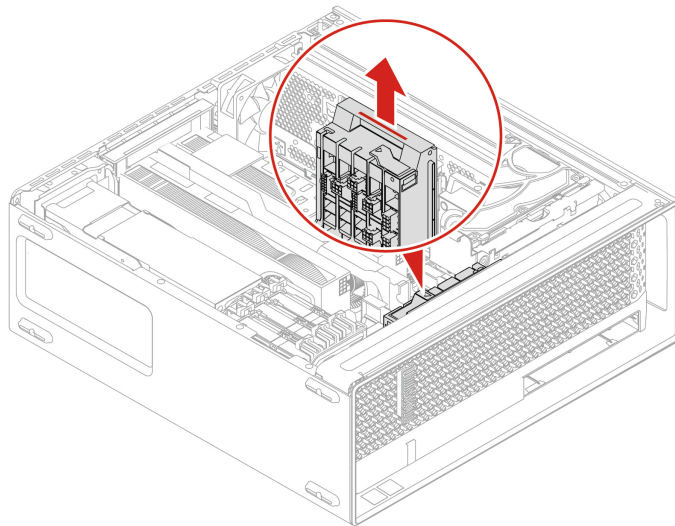
Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “PCIe top retention holder and supercapacitor module” on page 65
- “Half-length PCIe cards” on page 67
- “Full-length PCIe card and extender” on page 68

Step 2. Disconnect the fan cable from the system board and remove the cable from the guide. For connector locations, see “System board illustration” on page 57.

Step 3. Lift the fan from the system using the handle with a red line.



Step 4. Install the removed parts and cables in reverse order.

Rear fan

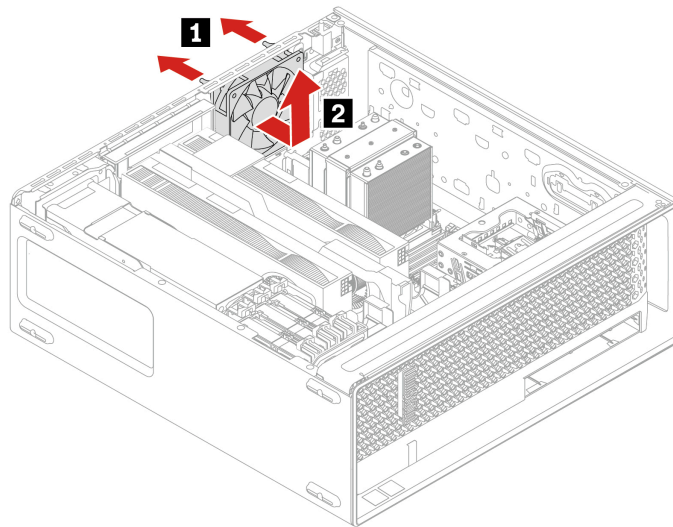
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

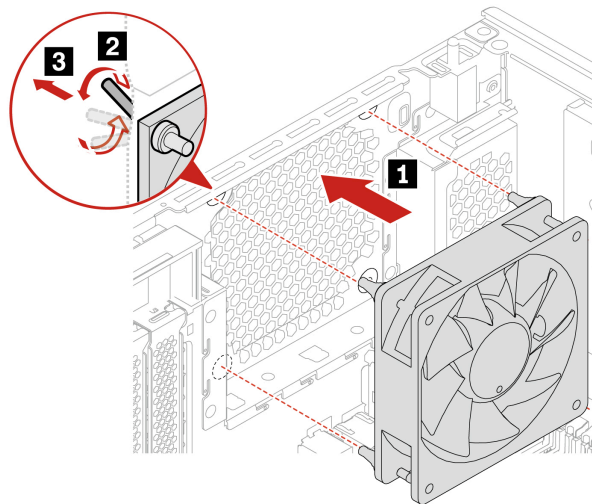
Step 1. Remove the “Side cover” on page 60.

Step 2. Disconnect the fan cable from the system board. For connector locations, see “System board illustration” on page 57.

Step 3. Stretch the four rubber pins from the rear panel to release the fan. Then, remove the fan from the system.



Step 4. Lower the fan into the chassis, using the holes in the rear of the system for alignment. Pull the four rubber pins through the holes to secure the fan in place. Connect the fan cable to the system board.



Step 5. Install other removed parts and cables in reverse order.

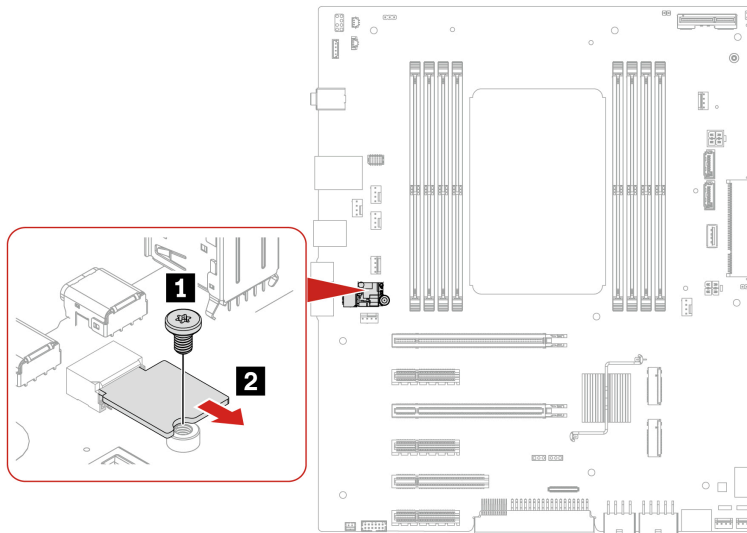
TCM card

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the “Side cover” on page 60.

Step 2. Use a T15 screwdriver to remove the screw and pull the TCM card out of the system.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
1	M3	L3	3 ± 0.5	Black	1

Step 3. Install the removed parts and cables in reverse order.

VROC key

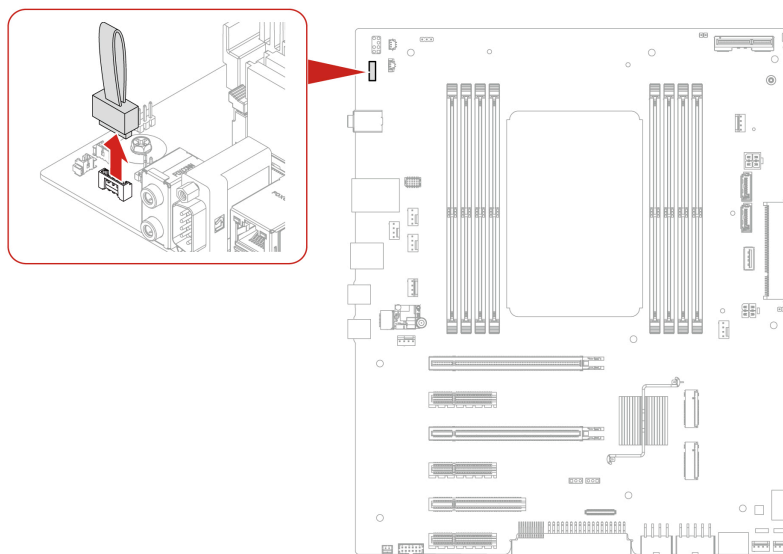
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Memory fan duct” on page 99
- “Memory fans” on page 100

Step 2. Remove the VROC key from the system.



Step 3. Install the removed parts and cables in reverse order.

Think LED cable and holder

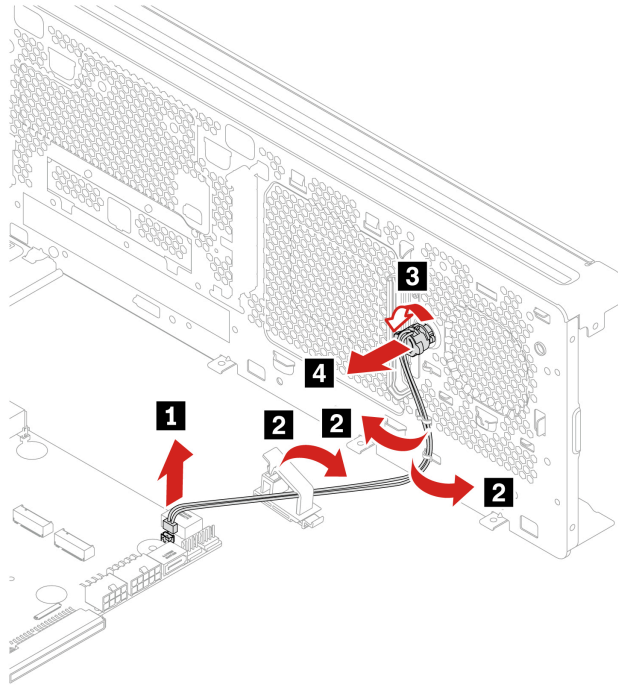
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

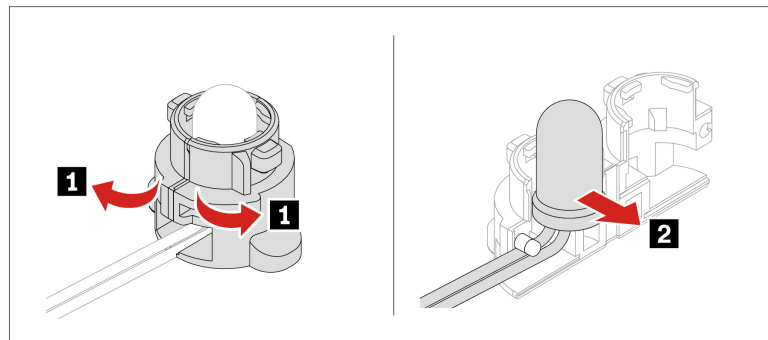
Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “PCIe top retention holder and supercapacitor module” on page 65
- “Half-length PCIe cards” on page 67
- “Full-length PCIe card and extender” on page 68
- “Front fan” on page 107

Step 2. Disconnect the Think LED cable from the system board. Remove the cable from the guides. Rotate the Think LED holder and remove it from the chassis.



Step 3. Open the Think LED holder and remove the Think LED.



Step 4. Install the removed parts and cables in reverse order.

Internal speaker

Before you start, read “Prerequisites for hardware replacement” on page 55.

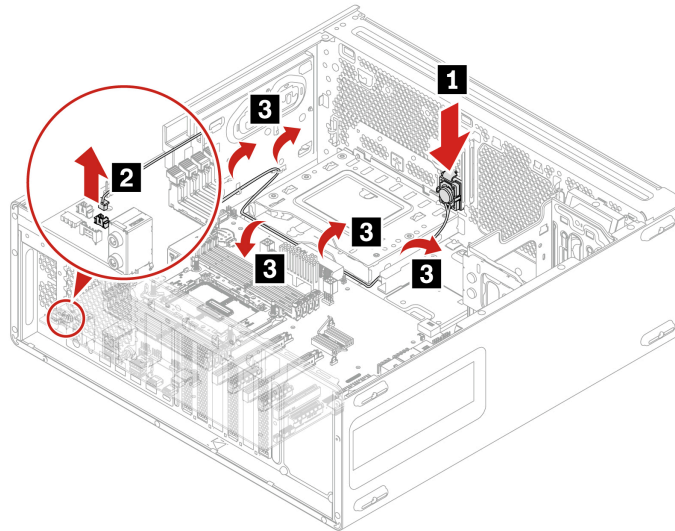
Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Optional HDD cage holder” on page 81

- “Flex bay fan” on page 83
- “15-in-1 media card reader module” on page 83
- “M.2 SSD enclosure tray and cable” on page 87
- “M.2 SSD enclosure and SSD” on page 85
- “Flex bay cage” on page 88
- “Front panel I/O assembly” on page 105

Step 2. Press and release the speaker from the system. Disconnect the speaker cable from the system board. Remove the cable from the guides and remove the speaker.



Step 3. Install the removed parts and cables in reverse order.

Wi-Fi card and shield

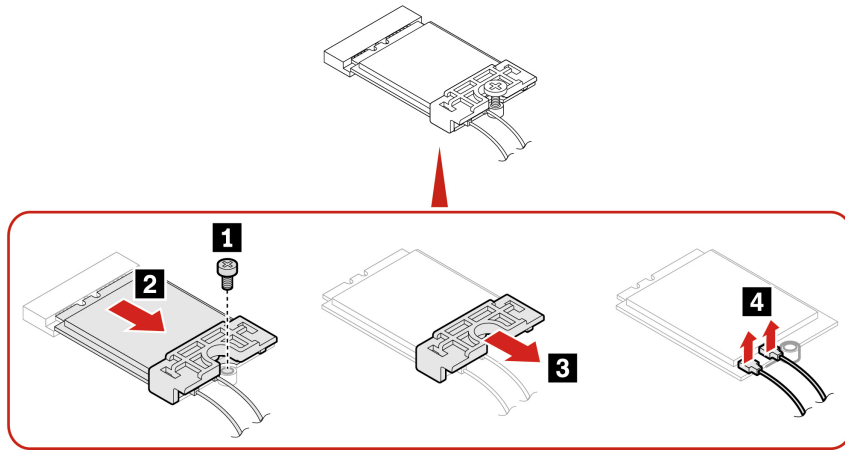
Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the “Side cover” on page 60.

Step 2. Remove the Wi-Fi card.

1. Remove one screw from the Wi-Fi card shield.
2. Remove the Wi-Fi card shield.
3. Disconnect the Wi-Fi antenna cables from the Wi-Fi card and remove the card from the slot.



Location	Thread (mm)	Length (mm)	Torque (lbf·in)	Color	Quantity
1	M2	L3	1.5 ± 0.2	Black	1

Step 3. Install the removed parts and cables in reverse order.

Note: During installation, ensure that you connect the gray cable to the connector labeled AUX on the card, and the black cable to the connector labeled MAIN.

Wi-Fi antennas

Before you start, read “Prerequisites for hardware replacement” on page 55.

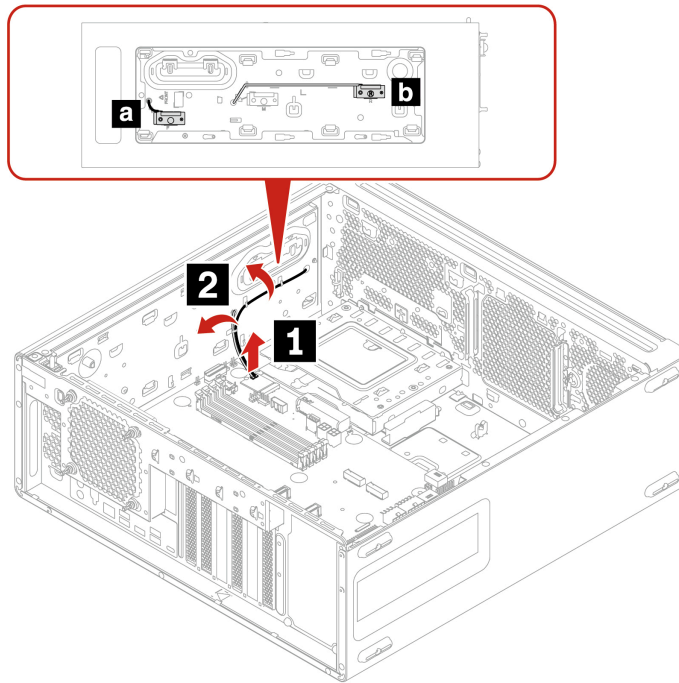
Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Top cover” on page 63
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Wi-Fi card and shield” on page 112

Step 2. Remove the Wi-Fi antennas.

1. Release the antennas from the cable guides.
2. Carefully pry up the antennas from the adhesive backing, pull the cables through the openings, and remove the antennas from the top of the system.



Step 3. Install the removed parts and cables in reverse order.

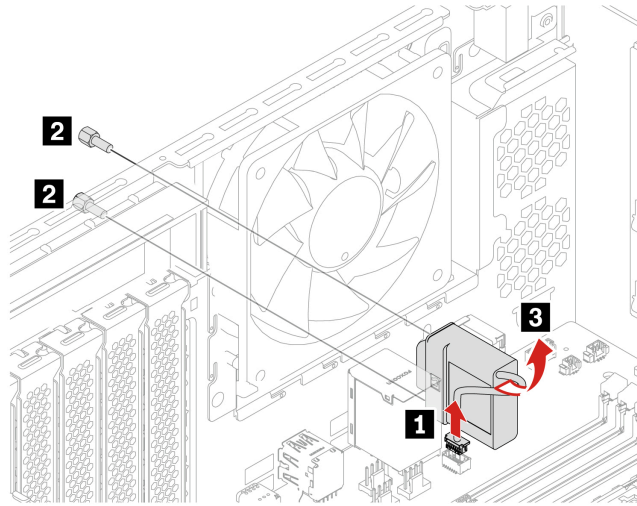
COM board and cable

Before you start, read “Prerequisites for hardware replacement” on page 55.

Replacement steps

Step 1. Remove the “Side cover” on page 60.

Step 2. Disconnect the COM board cable from the system board. Use an **H4.7 screwdriver** to remove the two screws securing the COM connector to the rear panel. Remove the COM board and cable from the system.



Location	Thread	Length (mm)	Torque (lbf-in)	Color	Quantity
2	#4-40	7	3 ± 0.5	Silver	2

Step 3. Install the removed parts and cables in reverse order.

Cover presence switch

Before you start, read “Prerequisites for hardware replacement” on page 55.

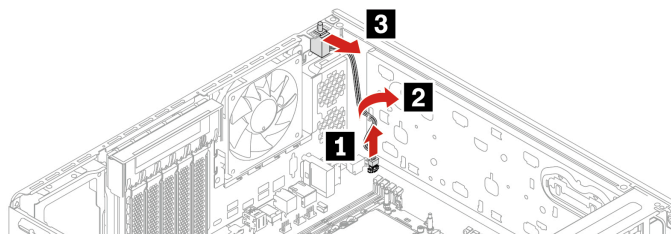
Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Memory fan duct” on page 99
- “Memory fans” on page 100

Step 2. Remove the cover presence switch.

1. Disconnect the cable from the system board and remove it from the guides.
2. Slide the switch from the socket and remove it.



Step 3. Install the removed parts and cables in reverse order.

Thermal sensor

Before you start, read “Prerequisites for hardware replacement” on page 55.

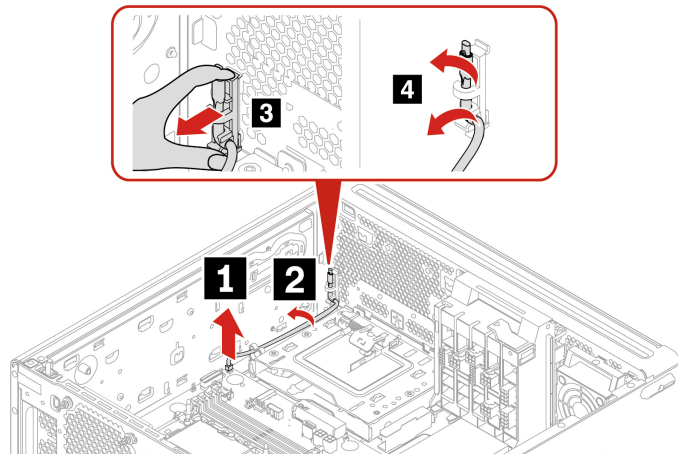
Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Flex bay fan” on page 83

Step 2. Remove the thermal sensor.

1. Disconnect the thermal sensor cable from the system board.
2. Press the retaining clip to release the thermal sensor and remove it.



Step 3. Install the removed parts and cables in reverse order.

Coin-cell battery

Before you start, read “Prerequisites for hardware replacement” on page 55.

About the coin-cell battery

The computer has a special type of memory that maintains the date, time, and settings for built-in features, such as parallel connector assignments (configurations). A coin-cell battery keeps this information active when you turn off the computer.

The coin-cell battery normally requires no charging or maintenance throughout its life; however, no coin-cell battery lasts forever. If the coin-cell battery fails, the date and time information is lost. An error message is displayed when you turn on the computer.

To dispose of the coin-cell battery, refer to the “Lithium coin-cell battery notice” in the *Safety and Warranty Guide*.

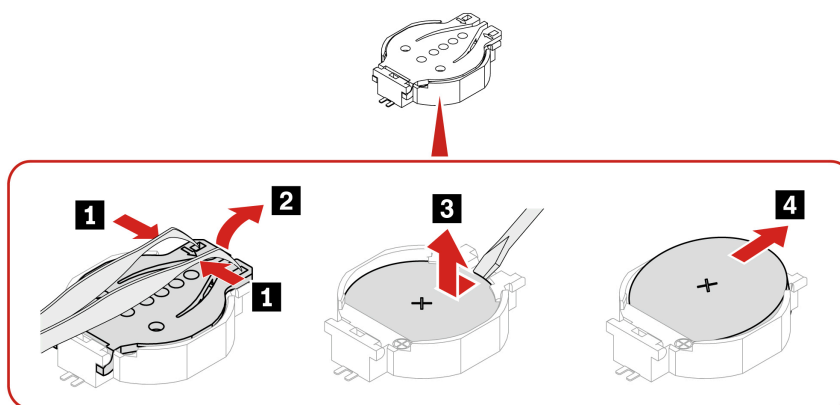
Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Memory fan duct” on page 99

Step 2. Locate the coin-cell battery based on the “System board illustration” on page 57.

Step 3. Use fingers or tweezers to squeeze the clips and lift the cover off the system. Gently pry up the coin-cell battery and lift it out of the holder.



Step 4. Install the removed parts and cables in reverse order.

After replacement

After installing a new coin-cell battery, reset the system date and time in the UEFI BIOS menu.

CPU, CPU carrier, and CPU heat sink

Before you start, read “Prerequisites for hardware replacement” on page 55.

Important notice for handling the CPU and CPU heat sink

-  Avoid contact with hot components inside the computer. During operation, some components become hot enough to burn the skin. Before you open the computer cover, turn off the computer, disconnect power, and wait approximately 10 minutes for the components to cool.
- Do not drop anything onto the CPU socket while it is exposed. The socket pins must be kept as clean as possible.
- The CPU is attached to the bottom of the heat sink. Do not touch the gold contacts on the bottom of the CPU. Touch only the edges of the CPU.
- Carefully loosen the captive screws securing the CPU heat sink to avoid any possible damage to the system board.
- The provided illustrations are for operational reference only. The actual machine may look different.

Replacement steps

Step 1. Remove the following parts, if any, in order.

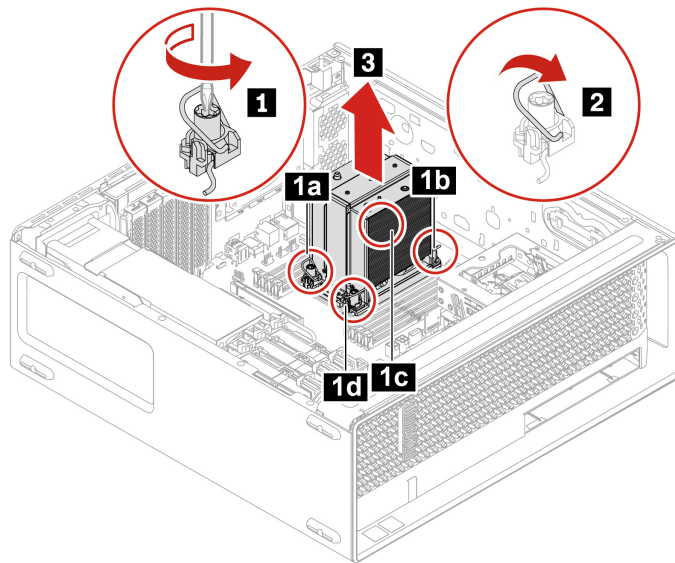
- “Side cover” on page 60

- “Memory fan duct” on page 99

Step 2. Disconnect the CPU fan cable from the system board.

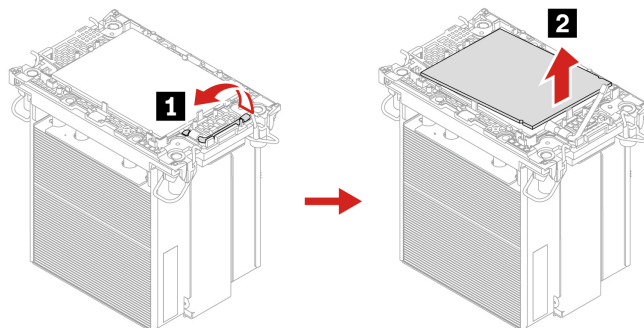
Step 3. Remove the CPU heat sink with CPU and CPU carrier.

1. Use a **T30 screwdriver (torque: 8 ± 0.8 lbf-in)** to carefully loosen the four captive screws in the following order.
 - a. Partially loosen screw **1a**, fully loosen screw **1b**, and then fully loosen screw **1a**.
 - b. Partially loosen screw **1c**, fully loosen screw **1d**, and then fully loosen screw **1c**.
2. Press upward on the locking clips of the four captive screws on the heat sink.
3. Gently twist the CPU heat sink to free it from the system board.

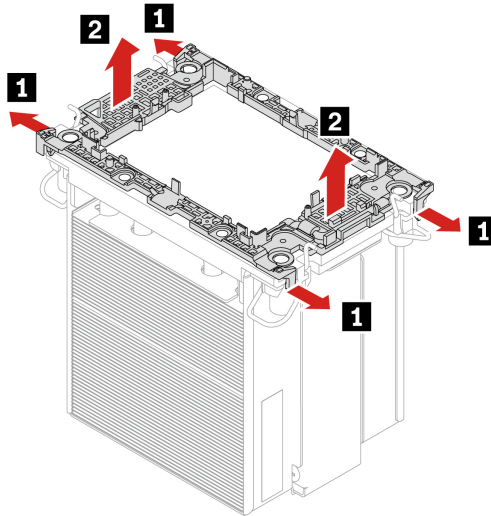


Step 4. Remove the CPU.

1. Rotate the lever to lift the edge of the CPU.
2. Hold the CPU by the edges and carefully remove it from the carrier.

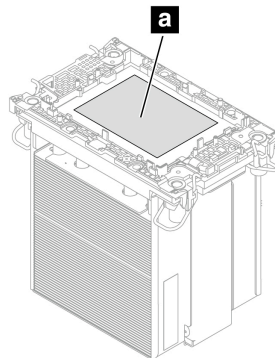


Step 5. Release the four corners of the CPU carrier and remove it from the heat sink.



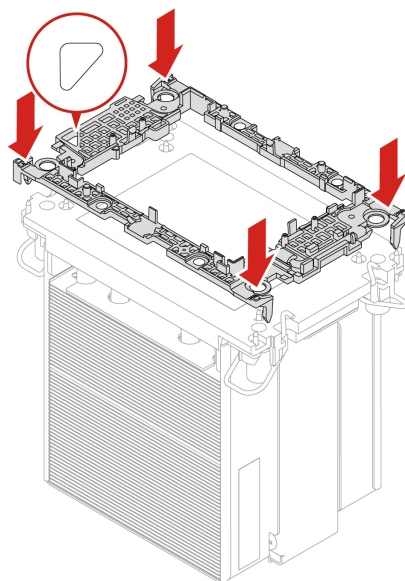
Step 6. Remove old thermal interface materials (TIMs) and apply new TIMs to the CPU heat sink as specified below. Either too much or too little application of grease can cause a thermal problem due to imperfect contact with a component.

Note: Some replacement parts may have factory-applied TIMs. If present, remove the protective film from the TIMs and check if the TIMs are intact and free of defects. If damaged or dried, clean and apply fresh TIMs per specifications below.



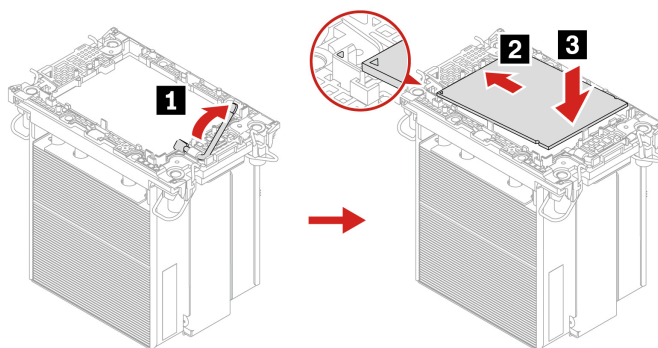
Type	Quantity	Area
TC-5622	2 g	a

Step 7. Align the CPU carrier with the heat sink and press down the corners.



Step 8. Install the CPU.

1. Press down the lever to the locked position.
2. Align the triangle marking in the corner of the CPU with the marking on the carrier.
3. Carefully lower the CPU onto the carrier until it is securely seated.



Step 9. Install the CPU heat sink with CPU and CPU carrier in reverse order. Connect the CPU fan cable to the system board. For connector locations, see “System board illustration” on page 57.

Step 10. Install other removed parts and cables in reverse order.

System board

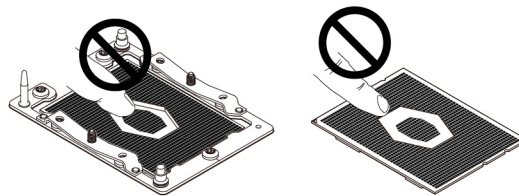
Before you start, read “Prerequisites for hardware replacement” on page 55.

Important notice for handling the system board

Some components mounted on a system board are very sensitive. Improper handling of a system board can cause damage to those components, and may cause a system malfunction. When handling a system board, follow these precautions:

- Do not drop, bend, or apply any excessive force to the system board.
- Avoid rough handling of any kind.

- Avoid bending a system board and hard pushing to prevent cracking at each BGA (Ball Grid Array) chipset.
- Do not touch the pins on the CPU socket or the gold contacts on the CPU.



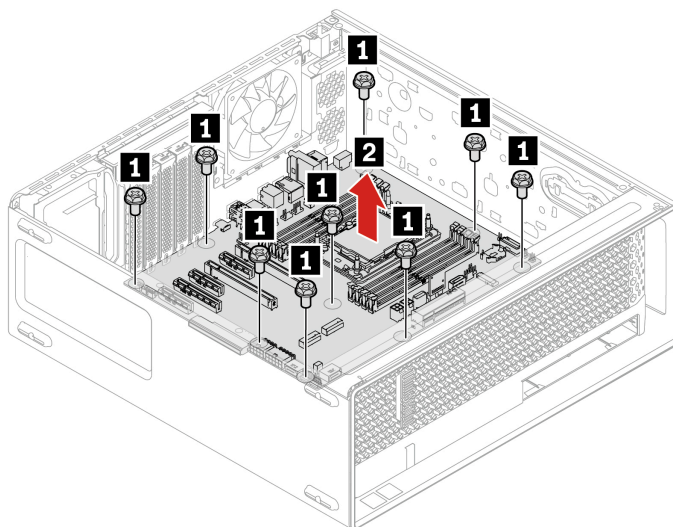
Replacement steps

Step 1. Remove the following parts, if any, in order.

- “Side cover” on page 60
- “Rear fan” on page 107
- “Memory fan duct” on page 99
- “Memory fans” on page 100
- “Memory module” on page 101
- “Optional HDD and its bracket” on page 79
- “Optional HDD cage” on page 80
- “Optional HDD cage holder” on page 81
- “Flex bay fan” on page 83
- “Flex bay cage” on page 88
- “15-in-1 media card reader module” on page 83
- “M.2 SSD enclosure tray and cable” on page 87
- “M.2 SSD enclosure and SSD” on page 85
- “Front panel I/O assembly” on page 105
- “Internal speaker” on page 111
- “Front fan” on page 107
- “HDD and its bracket” on page 77
- “HDD fan” on page 78
- “Power supply unit assembly” on page 103
- “Think LED cable and holder” on page 110
- “1000-watt power distribution board and bracket” on page 104
- “PCIe top retention holder and supercapacitor module” on page 65
- “Half-length PCIe cards” on page 67
- “Full-length PCIe card and extender” on page 68
- “On-board SSD and its heat sink kit” on page 95
- “BMC card” on page 74
- “Wi-Fi card and shield” on page 112
- “Thermal sensor” on page 116
- “CPU, CPU carrier, and CPU heat sink” on page 117

- “Cover presence switch” on page 115

- Step 2. Record the cable routing and cable connections, and then disconnect all cables from the system board. See “System board illustration” on page 57.
- Step 3. Remove nine screws and gently lift the system board.



Location	Thread (mm)	Length (mm)	Torque (lbf-in)	Color	Quantity
1	M3	L5	5 ± 0.5	Black	9

- Step 4. Install the system board, reconnect all cables to the system board firmly, and reinstall other removed parts in reverse order.

After replacement

Each computer has its unique SMBIOS (system management BIOS) data stored in the nonvolatile memory on the system board. This information is essential for using or servicing the computer. After you replace the system board, the original SMBIOS data such as the MTM, SN, and brand ID (product name) should be written back into the new system board.

- For service technicians, use the Golden Key U1 tool to write back the product information. Refer to <https://support.lenovo.com/solutions/ht102004> for instructions.

Note: In addition to writing the product information, ensure that the latest UEFI BIOS is loaded to the system board before you complete the service action.

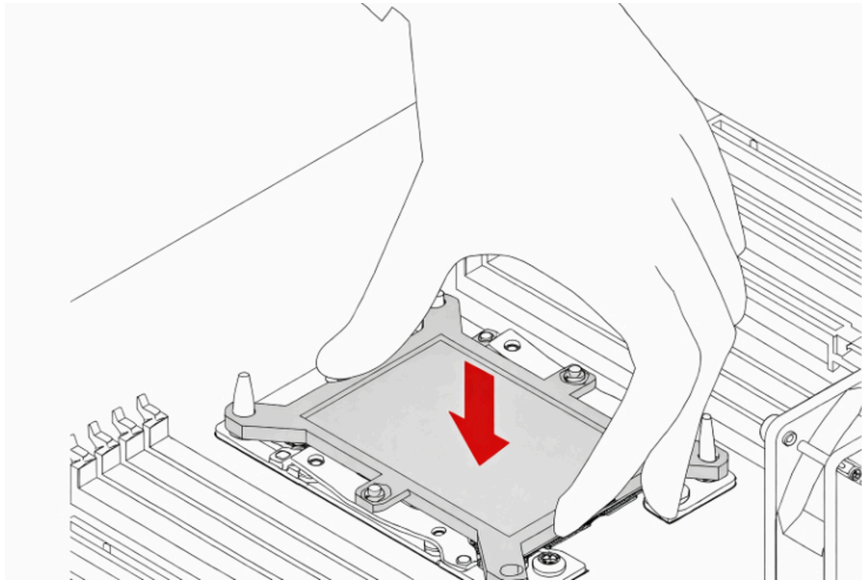
- For end users, download and install the latest BIOS package from Lenovo Support Web site to write back the product information. For the MTM and SN information of the product, see “Find the serial number” on page 46.

CAUTION:

Take extreme caution when entering the product information. Once written to the system board, the data becomes unalterable. If you are uncertain about any step, consult Lenovo Service before proceeding.

Note for returning a failing system board

The failing system board must be returned with a CPU socket cover to protect the pins during shipping and handling.



Notes:

- The actual socket cover might look slightly different from the illustration.
- If additional instructions are provided with the replacement part, follow them accordingly.

Chapter 5. Supplemental instructions

UEFI BIOS

What is UEFI BIOS

UEFI BIOS initializes the hardware components and loads the operating system and other programs. Your computer comes with a setup program with which you can change UEFI BIOS settings.

Note: The operating system settings might override any similar settings in UEFI BIOS.

Enter the UEFI BIOS menu

Turn on or restart the computer. When the logo screen is displayed, press F1 or Fn+F1 to enter the UEFI BIOS menu.

Note: If you have set UEFI BIOS passwords, enter the correct passwords when prompted.

Navigate the UEFI BIOS menu

Follow the on-screen instructions to navigate in the UEFI BIOS menu.

The table below introduces the available settings of the UEFI BIOS menu. You can follow the on-screen instruction to navigate in the UEFI BIOS menu.

Note: The UEFI BIOS menu might vary depending on system configurations.

Menu	Introduction
Main	This category provides the general product-related and firmware information including system summary, machine type, product serial number, UUID number, etc.
Devices	This category introduces how to configure various devices such as USB ports and audio controllers.
Advanced	This category provides advanced information about the computer such as the CPU features.
Power	This category introduces power and thermal management solutions.
Security	This category introduces various passwords, locks, and software to protect your computer.
Startup	This category introduces how to set the boot priority order.
Exit	This category introduces how to exit as you prefer.

To explore the detailed settings:

- For computers purchased in mainland China
You can contact Lenovo Customer Support Center as shown at <https://newsupport.lenovo.com.cn/contacts.html>.
- For computers purchased outside mainland China
You can go to Lenovo BIOS Simulator Center <https://download.lenovo.com/bsco/index.html> to explore the detailed settings by your product name.

Note: The Lenovo BIOS Simulator Center makes periodic updates of the settings. The UEFI BIOS simulator interface and description of settings might be different from that on your actual user interface.

UEFI BIOS passwords

You can set passwords in UEFI (Unified Extensible Firmware Interface) BIOS (Basic Input/Output System) to strengthen the security of your computer.

Password types

You can set a power-on password, supervisor password, system management password, or hard disk password in UEFI BIOS to prevent unauthorized access to your computer. However, you are not prompted to enter any UEFI BIOS password when your computer resumes from sleep mode.

- Power-on password

When a power-on password is set, you are prompted to enter a valid password each time the computer is turned on.

- Supervisor password

Setting a supervisor password deters unauthorized users from changing configuration settings. If you are responsible for maintaining the configuration settings of several computers, you might want to set a supervisor password.

When a supervisor password is set, you are prompted to enter a valid password each time you try to enter the BIOS menu.

If both the power-on password and supervisor password are set, you can enter either password. However, you must use your supervisor password to change any configuration settings.

- Hard disk password (for selected models)

Setting a hard disk password prevents unauthorized access to the data on the storage drive. When a hard disk password is set, you are prompted to enter a valid password each time you try to access the storage drive.

Note: After you set a hard disk password, your data on the storage drive is protected even if the storage drive is removed from one computer and installed in another.

- System management password (for selected models)

You can enable the system management password to have the same authority as the supervisor password to control security related features. To customize the authority of the system management password through the UEFI BIOS menu:

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Security → System Management Password Access Control**.
3. Follow the on-screen instructions.

If you have set both the supervisor password and the system management password, the supervisor password overrides the system management password.

Set, change, and remove a password

Before you start, print these instructions.

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Security**.
3. Depending on the password type, select **Set Supervisor Password**, **Set Power-On Password**, **Set System Management Password**, or **Hard Disk Password** and press Enter.
4. Follow the on-screen instructions to set, change, or remove a password.
5. Press F10 or Fn+F10 to save the changes and exit.

You should record your passwords and store them in a safe place. If you forget the passwords, contact a Lenovo-authorized service provider.

Note: If the hard disk password is forgotten, Lenovo cannot remove the password or recover data from the storage drive.

Update the UEFI BIOS

When you install a new program, device driver, or hardware component, you might need to update the UEFI BIOS.

Download and install the latest UEFI BIOS update package by one of the following methods:

From the Lenovo Support Web site

Follow the instructions to update the UEFI BIOS from the Lenovo Support Web site.

For computers purchased in mainland China

1. Go to <https://newsupport.lenovo.com.cn>.
2. Click **Download drivers and software**, and select or search product.
3. Follow the on-screen instructions to download and install the latest UEFI BIOS update package.

For computers purchased outside mainland China

1. Go to <https://pcsupport.lenovo.com> and select the entry for your computer.
2. Click **Drivers & Software → Manual Update → BIOS/UEFI**.
3. Follow the on-screen instructions to download and install the latest UEFI BIOS update package.

From the Vantage app

Follow the instructions to update the UEFI BIOS from the Vantage app.

- Step 1. Open the Vantage app, and then click **Device → System Update**.
- Step 2. If the latest UEFI BIOS update package is available, follow the on-screen instructions to download and install the package.

From the Windows Update

Follow the instructions to update the UEFI BIOS from the Windows Update.

- Step 1. Type **Settings** in the Windows search box and press Enter.
- Step 2. Click **Windows Update → Check for Updates**.
- Step 3. If a BIOS update package appears in your update list, click **Download or Install** to initiate the update.

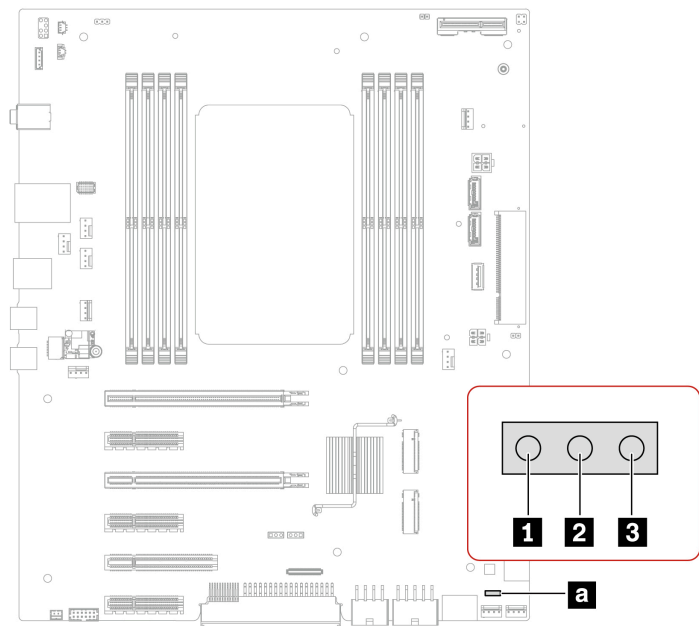
Remote update via Windows Remote Desktop

- Step 1. Establish a Remote Desktop Protocol (RDP) connection to the target computer.
- Step 2. Through the RDP interface, remotely update the UEFI BIOS using one of the following methods:
- “From the Vantage app” on page 126
 - “From the Lenovo Support Web site” on page 126
 - “From the Windows Update” on page 126

Step 3. After installation, the system will automatically reboot multiple times (around 20 minutes). The remote connection will terminate during reboots — reconnect after the final reboot to verify successful update.

BIOS recovery

Clear CMOS position



Item	Name	Jumper position
a	Clear CMOS jumper	• 1-2: Standard position • 2-3: Clear CMOS position

Clear CMOS

- Step 1. Remove all media from the drives. Turn off all connected devices and the computer.
- Step 2. Unplug all power cords. Remove any parts blocking the Clear CMOS jumper.
- Step 3. Move the jumper from the standard to the Clear CMOS position.
- Step 4. Reconnect power to the computer and monitor.
- Step 5. Power on the system. When the computer beeps, the recovery process begins (which takes a few minutes).
- Step 6. Press and hold the power button for around four seconds to power off.
- Step 7. Unplug the power cords. Move the jumper back to the standard position.
- Step 8. Reinstall all removed parts and reconnect power.
- Step 9. Power on the system. When the logo screen is displayed, press F1 or Fn+F1.
- Step 10. Ensure that the BIOS is restored to its factory default settings.

Note: For some products, a small number of special items in BIOS may not be reset automatically.

Recover from a BIOS update failure

Before you start, ensure to save the "IMAGEXXX.ROM" or "IMAGEXXX.cap" file in the BIOS update package to the root directory of your USB drive or disc.

- Step 1. Remove all media from the drives. Turn off all connected devices.
- Step 2. Insert the prepared USB drive or disc. Turn off the computer.
- Step 3. Unplug all power cords. Remove any parts blocking the Clear CMOS jumper.
- Step 4. Move the jumper from the standard to the Clear CMOS position.
- Step 5. Reconnect power to the computer and monitor.
- Step 6. Power on the system. When the computer beeps, the recovery process begins.
After a few minutes, the system will automatically shut down upon completion.
- Step 7. Unplug the power cords. Move the jumper back to the standard position.
- Step 8. Reinstall all removed parts and reconnect power.
- Step 9. Power on the system. When the logo screen is displayed, press F1 or Fn+F1.
- Step 10. Ensure that the BIOS is functioning properly and restored to its factory default settings.

Note: For some products, a small number of special items in BIOS may not be reset automatically.

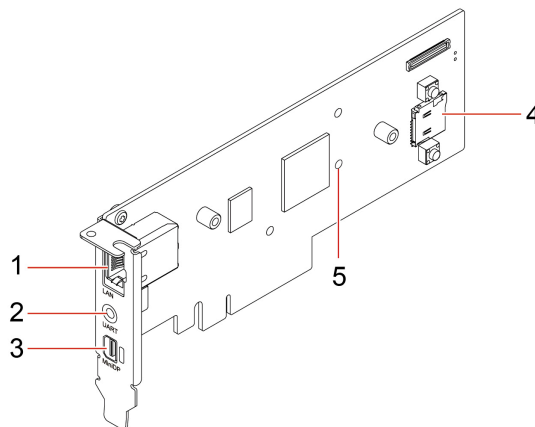
BMC card (for selected models)

This section provides information of the Baseboard Management Controller (BMC) card, including its functions, overview, setup, password management, and firmware update.

What is BMC

The Baseboard Management Controller (BMC) is a dedicated hardware component that enables out-of-band remote management of a system. Through a web-based interface, it allows administrators to monitor, configure, and troubleshoot systems remotely, even when the OS is offline or the machine is powered off. The BMC card is available for selected models.

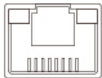
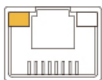
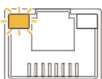
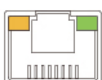
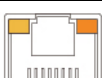
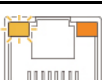
BMC card overview



Item	Name	Description
1	Ethernet connector with indicators	The Ethernet connector provides remote access to the host system's interface and supports data transfer speeds of 10, 100, or 1000 Mbps.
2	UART connector	The UART connector is disabled and reserved for future use.
3	Mini DisplayPort out connector	Serving as the BMC's video output connector, it supports a maximum output resolution of 1920 × 1200 pixels at 60 Hz.
4	MicroSD slot	You can install a microSD card (capacity up to 2 TB) in the microSD slot as local media of BMC.
5	Firmware LED indicator	It shows whether the firmware is functional (see details below).

Ethernet connector indicators

There are two LED indicators on the Ethernet connector that display the following statuses.

LED status	Indication
	The Ethernet is not connected yet.
	The 10-Mbps Ethernet is connected, ready for transferring data.
	The 10-Mbps Ethernet is transferring data.
	The 100-Mbps Ethernet is connected, ready for transferring data.
	The 100-Mbps Ethernet is transferring data.
	The 1000-Mbps Ethernet is connected, ready for transferring data.
	The 1000-Mbps Ethernet is transferring data.

Firmware LED behavior

When the LED status indicates , it means the firmware works well.

When the LED is off, it means the firmware does not work. To solve the problem, do the following:

1. Ensure that the cable is correctly connected to the BMC card and to the system board.
2. Ensure that the BMC card is correctly installed.
3. If the LED is still off, replace the BMC card with a new one.

Get started with BMC

This section describes how to set up and access the BMC.

Step 1. Connect your computer to a local network with an Ethernet cable through the Ethernet connector on the BMC card.

Note: Ensure that the host computer and client computers are in the same local area network.

Step 2. Connect the power cables and turn on your computer. Wait around three minutes for initial startup. The initial startup takes approximately three to four minutes, and subsequent startups take about one minute. Wait patiently while the power indicator blinks during startup.

Step 3. Obtain the dynamic IP address (for example: 10.176.7.xxx) from either the client BIOS or router port management interface.

Step 4. On the host computer, open a web browser and navigate to the IP address using the HTTPS protocol (for example: <https://10.176.7.xxx/#login>).

Step 5. For initial access, input the username (default: admin) and password (default: admin or PASSWORD!@), then change your password when prompted.

Step 6. Log in with your username and new password.
The BMC remote management console will appear, where you can access all settings, sensors, and features of the BMC.

BMC remote management console

The ThinkStation BMC remote management console offers various functions, including but not limited to the following. For details, refer to https://support.lenovo.com/docs/bmc_web_guide.

- View and monitor the following information:
 - Overall status
 - Relevant information of sensors
 - System inventory
- Access the following basic configurations:
 - Logs and reports
 - Configuration settings
- Access the following advanced configurations:
 - Video recording
 - Remote control
 - Virtual media configuration
 - Maintenance tasks, including backing up configuration items, restoring configuration files, updating firmware, and so on.

Manage the BMC password

You can manage BMC passwords in the following methods to prevent unauthorized access to your computer.

- UEFI BIOS
- The BMC remote management console
- IPMI command

Update the BMC firmware

You can update the BMC firmware to the latest depending on your needs.

- Step 1. Go to https://support.lenovo.com/docs/bmc_fw_ts_x576 and follow the on-screen instructions to select and download the corresponding firmware installation package.
- Step 2. Log in to the BMC remote management console on the host computer.
- Step 3. Click **Maintenance → Firmware Update** and select the latest firmware installation package you prepared.
The firmware will be updated automatically. Your BMC card will automatically restart when the firmware update is completed.

RAID

RAID overview

RAID (Redundant Array of Independent Disks) technology combines multiple storage drives into a single logical unit to improve performance, reliability, or both. Depending on your model, your system could support one or more of the following RAID technologies.

- **Rapid Storage Technology Enterprise (RSTe):** Chipset-based SATA RAID with enterprise features for reliable general storage.
- **Virtual RAID on CPU (VROC):** CPU-direct NVMe RAID for low-latency, high-throughput workloads.
- **Discrete RAID card:** Dedicated RAID processor improves performance. Optional CacheVault protects cached data during power loss.

The table below outlines the supported drive types, RAID levels, and strip sizes for each technology.

Technology	Drive type	RAID level	Strip size
RSTe	SATA HDDs	RAID 0, 1, 5	• RAID 1: 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB • RAID 5: 16 KB, 32 KB, 64 KB, or 128 KB
VROC	NVMe SSDs	• Basic key: RAID 0, 1, 10 • Premium key: RAID 0, 1, 5, 10	• RAID 0: 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB • RAID 5: 16 KB, 32 KB, 64 KB, or 128 KB • RAID 10: 4 KB, 8 KB, 16 KB, 32 KB, or 64 KB
RAID card	SATA HDDs	RAID 0, 1, 5	• RAID 0: 64 KB, 128 KB, 256 KB, 512 KB, or 1 MB • RAID 5: 64 KB, 128 KB, 256 KB, 512 KB, or 1 MB

RAID levels

- **RAID 0 (Striping):** Maximizes capacity and performance without data redundancy.
- **RAID 1 (Mirroring):** Provides data redundancy by duplicating data across drives with full fault tolerance.
- **RAID 5 (Parity):** Balances performance with redundancy using distributed parity; requires at least 3 drives.
- **RAID 10 (Striped mirrors):** Combines mirroring and striping for high performance and strong redundancy; requires at least 4 drives.

Important notes before configuring RAID

- Back up all important data before configuring RAID.
- Do not mix drives of different types or capacities within the same RAID array.

- RAID 0 does not support any data redundancy. Use RAID 0 with caution. If a drive in the RAID 0 array fails, the data will be lost, and there is no way to recover it.
- Microsoft Windows 11 does not support booting from traditional magnetic hard disk drives (HDDs).

Configure RAID with RSTe

Enable RAID

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Devices → Storage Setup** and press Enter.
3. Select **Configure SATA as** and press Enter. Then, select **RAID** and press Enter.
4. Press F10 or Fn+F10 to save the changes and exit.

Create a RAID volume

Attention: All the existing data stored on the selected drives will be erased while the RAID volume is being created.

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
 2. Select **Advanced → Intel(R) VROC SATA Controller** and press Enter.
 3. Select **Create RAID Volume** and press Enter. The Create RAID Volume window is displayed.
 4. Select and configure the options one by one.
 - a. **Name:** You can use the default name **Volume0** or type a preferred name for the RAID volume.
 - b. **RAID Level:** You can set the RAID level to one of the following:
 - **RAID0**
 - **RAID1**
 - **RAID5**
- Note:** Some of the RAID levels might not be displayed because the number of installed SATA storage drives varies.
- c. **Select Disks:** Select a storage drive and press Enter. Then, select **X** and press Enter to add it to a group.
 - d. **Strip Size** (if applicable): Select a strip size and press Enter.
 - e. **Capacity:** Customize the capacity of the RAID volume. The default RAID volume is the largest value.
5. Select **Create Volume** and press Enter to create a RAID volume.
 6. Exit the BIOS menu.

View the information about a RAID volume

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → Intel(R) VROC SATA Controller** and press Enter.
3. Under **RAID Volumes**, select a RAID volume and press Enter to view the detailed information.
4. Press F10 or Fn+F10 to save the changes and exit.

Delete a RAID volume

Attention: All the existing data stored on the selected drives will be erased after you delete RAID volumes.

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → Intel(R) VROC SATA Controller** and press Enter.

3. Under **RAID Volumes**, select the RAID volume that you want to delete and press Enter. The RAID VOLUME INFO window is displayed.
4. Select **Delete** under **Volume Actions** and press Enter. When prompted, select **Yes** and press Enter to confirm the deletion of the selected RAID volume.
5. Press F10 or Fn+F10 to save the changes and exit.

Configure RAID with VROC

Hardware requirements

A VROC key module is installed on the dedicated VROC header on the system board.

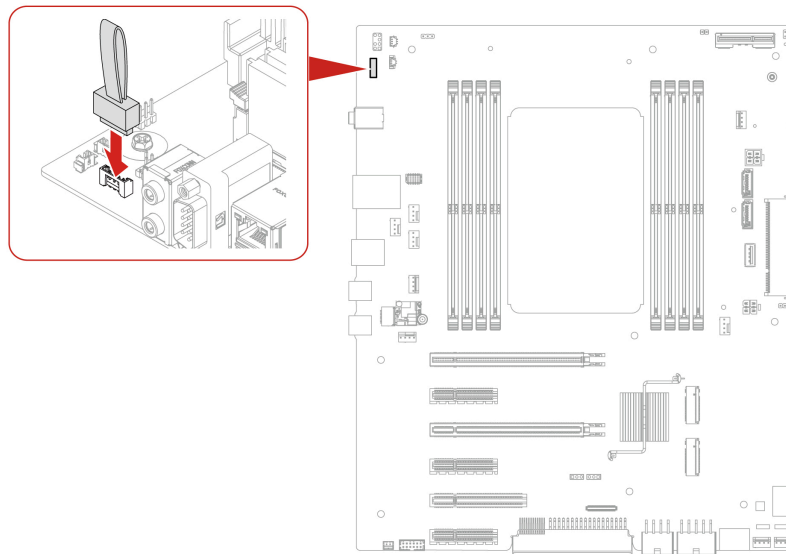


Figure 3. Install a VROC key to the system board

Enable RAID

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Devices → Storage Setup → Intel(R) VMD technology** and press Enter.
3. Select each menu item and press Enter. Then, select **Enabled** and press Enter.
4. Select an occupied M.2 solid-state drive slot as you need and press Enter. Then, select **VMD** and press Enter.
5. Press F10 or Fn+F10 to save the changes and exit.

Create a RAID volume

Attention: All the existing data stored on the selected drives will be erased while the RAID volume is being created.

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → Intel Virtual RAID on CPU** and press Enter.
3. Select **All Intel VMD Controllers** and press Enter.
4. Select **Create Volumes** and press Enter.
5. Select and configure the options one by one.

- a. **Name:** You can use the default name **Volume0** or type a preferred name for the RAID volume.
- b. **RAID Level:** You can set the RAID level to one of the following:

- **RAID0**
- **RAID1**
- **RAID10**
- **RAID5**

Note: Some of the RAID levels might not be displayed because the number of installed M.2 solid-state drives and the model of the upgrade key module vary.

- c. **Select Disks:** Select an M.2 solid-state drive and press Enter. Then, select **X** and press Enter to add it to a group.
 - d. **Stripe Size** (if applicable): Select a stripe size and press Enter.
 - e. **Capacity:** Customize the capacity of the RAID volume. The default RAID volume is the largest value.
6. Select **Create Volume** and press Enter to create a RAID volume.
 7. Exit the BIOS menu.

View the information about a RAID volume

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → Intel Virtual RAID on CPU** and press Enter.
3. Under **RAID Volumes**, select a RAID volume and press Enter to view the detailed information.
4. Press F10 or Fn+F10 to save the changes and exit.

Delete a RAID volume

Attention: All the existing data stored on the selected drives will be erased after you delete RAID volumes.

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → Intel Virtual RAID on CPU** and press Enter.
3. Select **Intel VROC Managed Volumes** and press Enter.
4. Under **Volume Actions**, select **Delete** and press Enter.
5. When prompted, select **Yes** and press Enter to confirm the deletion of the selected RAID volume.
6. Press F10 or Fn+F10 to save the changes and exit.

Configure RAID with the RAID card

Hardware requirements

- A compatible discrete RAID card is installed in your computer.
- Supercapacitor module is installed for cache protection.
- HDDs used for RAID configuration are installed and connected to the RAID card.

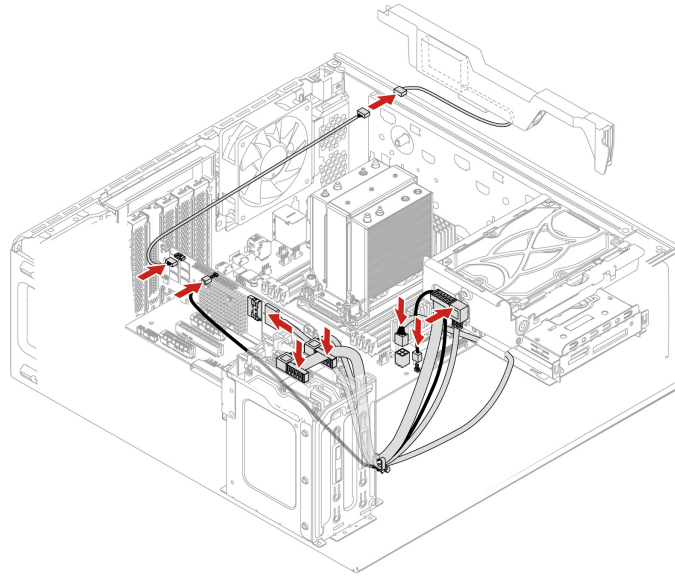


Figure 4. Cable routing for Broadcom 940-8i RAID card

Create a RAID volume

Attention: All the existing data stored on the selected drives will be erased while the RAID volume is being created.

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced** → **MegaRAID Configuration Utility** and press Enter.
3. Select **Main Menu** and press Enter.
4. Select **Configuration Management** and press Enter.
5. Select **Create Virtual Drive** and press Enter.
6. Select and configure the options one by one.
 - a. **Select RAID Level:** You can set the RAID level to one of the following:
 - **RAID0**
 - **RAID1**
 - **RAID5**
 - Note:** Some of the RAID levels might not be displayed because the number of installed storage drives and the model of the MegaRAID adapter vary.
 - b. **Select Drives From:** Select **Unconfigured capacity** or **Free capacity** depending on your needs and press Enter.
 - c. **Select Drives:** Select a storage drive and press Enter. After selecting all storage drives for creating the RAID volume, select **Apply Changes** and press Enter. When promoted, select **Confirm** and press Enter. Then, select **Yes** and press Enter to save the storage drive selection. Finally, select **OK** and press Enter.
 - d. **Virtual Drive Name:** You can type a preferred name for the volume name.
 - e. **Strip Size** (if applicable): Select a strip size and press Enter.
7. Select **Save Configuration** and press Enter. When promoted, select **Confirm** and press Enter. Then, select **Yes** and press Enter to confirm the creation of the RAID volume.
8. Press F10 or Fn+F10 to save the changes and exit.

View the information about a RAID volume

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → MegaRAID Configuration Utility** and press Enter.
3. Select **Main Menu** and press Enter.
4. Select **Virtual Drive Management** and press Enter.
5. Select a RAID volume and press Enter to view the detailed information.
6. Press F10 or Fn+F10 to save the changes and exit.

Virtual drive state

Virtual drive can be in one of the following states:

State	Display in the output of StorCLI commands	Virtual drive status
Optimal	optl	All members of the virtual drive are online.
Partially Degraded	Pdgd	The virtual drive is capable of sustaining more than one member drive's failure. Currently, only a RAID 6 or RAID 60 virtual drive can be partially degraded.
Degraded	dgrd	One or more member drives have failed. The virtual drive can no longer sustain a subsequent drive failure.
Offline	OfLn	One or more member drives have failed. Virtual drive data has lost.

CAUTION:

Continuously monitor the RAID volume status to save drives from undesired data loss. If there is any drive failure, remove the failing drive and install a new one.

Delete a RAID volume

Attention: All the existing data stored on the selected drives will be erased after you delete RAID volumes.

1. Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
2. Select **Advanced → MegaRAID Configuration Utility**.
3. Select **Main Menu** and press Enter.
4. Select **Virtual Drive Management** and press Enter.
5. Select the RAID volume that is not needed and press Enter.
6. Under **Operation**, select **Delete Virtual Drive** and press Enter.
7. Select **Go** and press Enter. When prompted, select **Confirm** and press Enter. Then, select **Yes** and press Enter to delete the RAID volume.
8. Press F10 or Fn+F10 to save the changes and exit.

Appendix A. Important notice for Quebec consumers

In regard to section 79.18 of Quebec's Regulation respecting the application of the Consumer Protection Act, Lenovo in no way guarantees the availability of (a) replacement parts; (b) repair services; and (c) information necessary to maintain or repair the goods. For up-to-date information on the technical support and parts available for your purchase, please consult <https://support.lenovo.com/ca/en>.

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Appendix B. Self-help resource

Find more information about your device through the following self-help resources.

Product information

- Product specifications: <https://psref.lenovo.com>
- Technical specifications for Lenovo workstations: <https://thinkstation-specs.com>

Lenovo Support resource

- Lenovo PC Technical Support web site: <https://pcsupport.lenovo.com>. You can obtain the following information and resources:
 - Drivers and software
 - Troubleshoot and diagnose
 - How to's
 - Guides and manuals
 - Warranty lookup
 - Parts lookup
 - Accessories
 - Contact us
 - Repair status check
 - Imaging and security resources
 - Glossary
- Lenovo Support phone numbers: <https://pcsupport.lenovo.com/supportphonenumber>
- Vantage app: Type **vantage** in the Windows search box. You can use the app to:
 - Configure device settings
 - Download and install UEFI BIOS, drivers, and firmware updates
 - Secure your device from outside threats
 - Diagnose hardware problems
 - Check the warranty status of your device
 - Access *User Guide* and helpful articles
- Lenovo communities:
 - Forums: <https://forums.lenovo.com>
 - Legion Gaming Community: <https://gaming.lenovo.com>
 - Lenovo EDU Community: <https://education.lenovo.com>
 - Lenovo Pro Community: <https://smbcommunity.lenovo.com>
- Troubleshooting tips: <https://www.lenovo.com/tips>

Service information

- Warranty lookup: <https://support.lenovo.com/warranty-lookup>. You can check the warranty status of your device.

- Repair status check: <https://support.lenovo.com/track-repair-status>. You can check the repair status of your device by repair ticket, serial number, or IMEI number.
- Parts lookup and purchase: <https://support.lenovo.com/parts-lookup>. You can find service parts by serial number or machine type.
- Lenovo BIOS Simulation Center: <https://download.lenovo.com/bsco/index.html>. You can explore the BIOS settings of your device.
- Additional services purchase: <https://pcsupport.lenovo.com/warrantyupgrade>. You can protect your device with extended warranty, Accidental Damage Protection, Premium Care & Support, and Vantage Smart Performance.

Product documentation

Documentation title	Information included	How to Access
<i>Setup Guide</i>	Initial setup and overview information	• Access the printed version from the product package. • Go to https://pcsupport.lenovo.com and search by the product name or serial number. Then, click Guides & Manuals.
<i>User Guide</i>	Instructions, guidance, resources, and contact information	• Scan the QR code in <i>Setup Guide</i>. • In Windows Start menu, click . • Type vantage in the Windows search box and press Enter. Then, find the <i>User Guide</i> in the app. • Go to https://pcsupport.lenovo.com and search by the product name or serial number. Then, click Guides & Manuals.
<i>Hardware Maintenance Manual</i>	Hardware diagnostic and replacement information for technicians	Go to https://pcsupport.lenovo.com and Search by the product name or serial number. Then, click Guides & Manuals .

Operating system support resource

- Windows help information
 - Type **get help** in the Windows search box
 - Use Windows Search
 - Microsoft Support Web site: <https://support.microsoft.com>
- Reset or restore Windows
 - Use Lenovo recovery options: <https://support.lenovo.com/HowToCreateLenovoRecovery>
 - Use Windows recovery options: Go to <https://pcsupport.lenovo.com> and search by the product name or serial number. Then, navigate to the troubleshooting menu to diagnose the operating system for recovery instructions.

Accessory information

- Purchase accessories: <https://www.lenovo.com/accessories>
- Service recommendation and accessory configurator: <https://smartfind.lenovo.com>
- Accessories and option compatibility matrix: <https://www.lenovo.com/accessoriesguide>

Legal and compliance information

- Product compliance: <https://www.lenovo.com/compliance>
- Legal information: <https://www.lenovo.com/us/en/legal>

- Regulatory documentation: Go to <https://pcsupport.lenovo.com> and search by the product name or serial number. Then, click **Guides & Manuals**.
 - *Safety and Warranty Guide*: Safety, warranty, recycling, and other information
 - *Generic Safety and Compliance Notices*: Compliance, accessibility, RoHS, and other information
 - *Regulatory Notice*: Regulatory notices for wireless modules

Lenovo responsibility

- Accessibility information: <https://www.lenovo.com/accessibility>
- Environment information: <https://www.lenovo.com/us/en/sustainability-operational-impact>
- Product security: <https://www.lenovo.com/us/en/product-security/landing/>

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- For computers purchased in mainland China
<https://newsupport.lenovo.com.cn>
- For computers purchased outside mainland China
<https://pcsupport.lenovo.com>

HEVC Standard

This product may support digital video coding under certain versions of HEVC (High Efficiency Video Coding) standard and, if so, may be covered by patents at <https://accessadvance.com/advance-patent-lists/>.



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