

HF-W2000 Model 68/65

INSTRUCTION MANUAL

[illegible]

- **Read safety instructions carefully, and ensure that you understand them before starting operations.**
- **Keep this manual at hand for reference.**

USER'S MANUAL

HITACHI INDUSTRIAL COMPUTER

HF-W2000 Model 68/65

INSTRUCTION MANUAL

Read and retain this manual.

- **Read safety instructions carefully, and ensure that you understand them before starting operations.**
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USER'S MANUAL

Preface

This manual is intended for operators of the HITACHI INDUSTRIAL COMPUTER HF-W2000 Model 68/65 (hereafter referred to as *this equipment*). It contains information about the operation and maintenance of various devices necessary for their routine work. This manual also describes the setup procedure of the following pre-installed OSs:

- Windows® 10 IoT Enterprise 2021 LTSC
- Windows® 11 IoT Enterprise LTSC 2024
- Windows Server® IoT 2022 Standard
- Windows Server® IoT 2025 Standard

In the following, *Windows® 10* refers to Windows® 10 IoT Enterprise 2021 LTSC, and *Windows® 11* refers to Windows® 11 IoT Enterprise LTSC 2024.

In addition, *Windows Server®* refers collectively to Windows Server® IoT 2022 Standard and Windows Server® IoT 2025 Standard. Specifically, *Windows Server® 2022* refers to Windows Server® IoT 2022 Standard, and *Windows Server® 2025* refers to Windows Server® IoT 2025 Standard.

Documentation structure

The documentation for the HITACHI INDUSTRIAL COMPUTER HF-W2000 Model 68/65 consists of the following:

- Safety instructions (included to the product)
- INSTRUCTION MANUAL (this manual)
- RAS FEATURES MANUAL (downloaded from the site given in the contact information on the following page)

Structure of this manual

This manual consists of the following:

Preface

Important notifications

Safety instructions

Precautions

Contents

Chapter 1 Getting started

Chapter 2 Operation

Chapter 3 Set up

Chapter 4 Precautions while the OS is running

Chapter 5 Specifications

Chapter 6 Inspection and maintenance

Chapter 7 Restoring the factory-shipped condition by using a recovery DVD

Chapter 8 Maintenance operations

Chapter 9 Troubleshooting

Chapter 10 Software RAID1

Appendix Handling of replaceable components

Repair Request Form and Statement of Received Goods

Revision history

First Edition, June 2025, WIN-62-5002

Second Edition, October 2025, WIN-62-5002-01

Contact information

Information about this product is available at the website below.

Inquiries about this product should also be made via the website.

URL: <https://www.hitachi-ip.co.jp/products/hfw/products/win/index.html>

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- DisplayPort and DisplayPort Certified Logo are registered trademarks of Video Electronics Standards Association.
- Magic Packet™ is a trademark or a registered trademark of Advanced Micro Devices, Inc.
- All other product names of software and hardware described in this manual that are not from Hitachi are registered trademarks, trademarks, or products of their respective owners.

Important notifications

Before exporting this product, verify all regulations of the Foreign Exchange and Foreign Trade Act, U.S. Export Administration Regulations, and other foreign export-related laws and regulations, and follow the necessary procedures.

If anything is unclear, contact a local sales representative.

- No part of this manual may be reproduced in any form or by any means without permission in writing from the publisher.
- The contents of this manual are subject to change (for the purpose of improvement) without prior notice.

NOTICE

Depending on the type of failure, important files might be lost when you use this equipment. Files can be lost as a result of power failure, user operational error, or failure of the equipment. Files cannot be recovered in such cases. To prevent such data loss, make it a routine to save your files and establish a systematic schedule for backing up files.

- Harmonic current standards

This equipment is compliant with the JIS C 61000-3-2 Harmonic Current Standard.

- VCCI notice

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio noise disturbance might arise. In such cases, corrective actions by the user might be required.

Note on storage capacity calculations

Memory capacities, memory requirements, file sizes, and storage requirements must be calculated according to the formula 2^n . The following examples show the results of such calculations.

1 KB (kilobyte) = 1,024 bytes (2^{10} bytes)

1 MB (megabyte) = 1,048,576 bytes (2^{20} bytes)

1 GB (gigabyte) = 1,073,741,824 bytes (2^{30} bytes)

1 TB (terabyte) = 1,099,511,627,776 bytes (2^{40} bytes)

Disk capacities must be calculated according to the formula 10^n . The following examples show the results of such calculations.

1 KB (kilobyte) = 1,000 bytes (10^3 bytes)

1 MB (megabyte) = 1,000² bytes (10^6 bytes)

1 GB (gigabyte) = 1,000³ bytes (10^9 bytes)

1 TB (terabyte) = 1,000⁴ bytes (10^{12} bytes)

Terms used in this manual

Terms used in this manual are defined as follows.

- Install: The action of installing software programs in the computer's HDD or SSD
- Setup: The action of setting an environment so that the software can be used in the computer
- Virtual machine: A virtual hardware environment provided by Virtual PC or Hyper-V®

Substituting terms

This manual describes the Windows® operating procedures. The operations *sign in* and *sign out* are replaced with *log on* and *log off* respectively depending on Windows® type. Substitute these terms while reading as required.



Safety instructions

- Information about safety warnings

Carefully read and fully understand the following safety precautions before operating the equipment.

- Operate the equipment by following the instructions and procedures described in this manual.
- In particular, follow the safety precautions displayed on the equipment or described in this manual. Failure to do so might result in personal injury and damage to properties including the equipment.
- Safety precautions are indicated by one of the following headings. A heading is a combination of a safety alert symbol and a word such as DANGER, WARNING, CAUTION, or NOTICE.



This is a safety alert symbol. This symbol is used to indicate potential hazards that might result in personal injury or death. Follow the instructions in the safety messages that follow this symbol to avoid possible injury or death.



DANGER: This heading is used to indicate imminent hazards that are highly likely to result in serious personal injury or death.



WARNING: This heading is used to indicate potential hazards that might result in serious personal injury or death.



CAUTION: This heading is used to indicate potential hazards that might result in moderate or minor personal injury.

NOTICE: This heading is used to indicate hazards that might result in damage not related to personal injury.

The heading NOTE is used to indicate a cautionary note about the handling or operation of the equipment.

- Do not perform any operations that are not described in the manual. If you find any problems with the equipment, contact your maintenance personnel.
- Carefully read this manual and fully understand the instructions and precautions before operating the equipment.
- Keep this manual nearby so that you are able to refer to it as needed.
- Although every effort has been made in this manual to specify the most complete and relevant precautions regarding the equipment, unexpected incidents might occur. When using the equipment, use your own judgment on matters related to safety, in addition to following the instructions herein.



Safety instructions (continued)

- Common safety precautions

Carefully read and fully understand the following safety precautions.



WARNING

- This equipment is not designed for use in a life-critical system that requires extreme safety. If the equipment might be used for this purpose, contact relevant sales representatives.
- In the case of smoke, a burning smell, or a similar problem, turn off the power to the equipment, disconnect the power cord from the outlet, and then contact your supplier or maintenance personnel. Using faulty equipment might result in a fire or electric shock.
- This equipment has built-in hard disk drives. Do not subject the equipment to impact, shock or vibration, as doing so might result in failure. Should you drop the equipment or damage its chassis, disconnect the power cord from the outlet and contact your maintenance personnel. Using faulty equipment might result in fire or electric shock. Do not subject the equipment to excessive impact when unpacking or carrying the equipment.
- Do not modify this equipment, as doing so might result in fire or electric shock. The manufacturer's cannot be held responsible for injury or other damages arising from user modification of the equipment.
- Do not operate this equipment without its dust filter, as doing so might cause fire. Furthermore, make sure you use a Hitachi brand dust filter.



Safety instructions (continued)



CAUTION

- If the equipment drops or is tipped over, personal injury might result. Pay full attention when transporting the equipment.
- Make sure you do not catch or hit your fingers when unpacking or carrying the equipment.
- Before you clean or replace the dust filter, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. Failure to do so might result in hand or finger injury.



Safety instructions (continued)

NOTICE

- Relying solely on this equipment does not provide sufficient system safety. To ensure sufficient safety of the system in the event of equipment failure, malfunction, or program defects, build in systemic protections (such as external protection and safety circuits) to facilitate measures against personal injury and other serious accidents.
- When installing or replacing hardware, wear an anti-static wrist strap to avoid damage from static electricity.
- When tightening or removing a screw, use a suitably sized screwdriver to avoid damaging the screw head. When tightening a screw, apply only moderate force along the axis of the screw to avoid stripping the thread.
- This equipment has been evaluated for use with the hardware specified in this manual. Accordingly, use only specified hardware when upgrading options or replacing components. If other hardware is used for upgrade or replacement, correct operation of the equipment cannot be guaranteed.
- Do not use the equipment in an environment subject to excessive dust or corrosive gas, as doing so might cause the equipment to fail.
- Avoid subjecting the equipment to shock when unpacking or carrying it. Doing so might cause the equipment to fail.
- Provide sufficient clearance around the air intake and exhaust at the front and rear of the equipment. Insufficient clearance might lead to excessive chassis interior temperature and subsequent failure or shortened life of the equipment. Furthermore, ensure that there is sufficient clearance for maintenance work at all times.



Safety instructions (continued)

- Use only the specified basic software. Operation with any other basic software is not guaranteed.
- Performing emergency shutdown (unplugging the power cord from the outlet or shutting off the circuit breaker without proper shutdown of the OS) might cause malfunction of the OS or applications or corruption of saved data. Never perform emergency shutdown unless you must stop the system immediately because of an error.
- Keep in mind that if the power supply is cut, the system might not be able to recover automatically.
- If you insert or access a disc (CD or DVD), system load might increase and subsequently affect running applications. Do not insert or access a disc during online operation (system operation).
- When disc (CD or DVD) access is complete, eject the disc from the DVD drive. Leaving a disc in the DVD drive might result in failure.
- Due to the slim design of the disc tray, the slide rails can be easily damaged, which might result in failure.
When inserting or removing a disc (CD or DVD) from the tray, support the tray with your hand.
- Leaving the disc tray open might result in failure.
Keep the disc tray closed when not in use.



Safety instructions (continued)

- Safety warnings in this manual

Safety warning indicated as WARNING

- Warning about the power supply unit (hazardous voltage)

Do not remove, disassemble, or modify the power supply unit, as doing so might cause serious injury or death from electric shock.

(Page 1-3)

- Use only the power cord provided with this equipment. Using any other cable might cause equipment failure, fire, or electric shock.

Before using this equipment at a voltage exceeding 125 V AC, ensure that the power cord is appropriate for the input voltage, and perform sufficient operational verification in advance.

- Make sure that the power outlet used to connect this equipment is properly earthed via a suitable ground pole. Furthermore, ensure that an earth leakage circuit breaker is installed.

Failure to take these measures might result in fire or electric shock.

- Do not use a two-prong plug without a ground pole, as doing so might result in electric shock or failure of the equipment.

(Page 1-13)

- Ensure that no excessive load is applied to the cables connected to the equipment during operation. Using the equipment while stress is placed on the cables may result in smoke generation or fire.

(Page 1-16)

- If an air intake or exhaust vent of the equipment is blocked, increased chassis interior temperature could lead to fire or equipment failure. Make sure you install the equipment with sufficient clearance around it.

(See *1.6.2 Installation*.)

(Page 2-1)

- In the case of smoke, a burning smell, or a similar problem, unplug the power cord and contact your dealer or maintenance personnel. Using faulty equipment might result in fire or electric shock.

(Page 2-4) (Page 9-1)

- Make sure that you install a dust filter in the equipment. Failure to do so could lead to dust ingress and subsequent fire from a short-circuit.

(Page 6-1) (Page 6-22)



Safety instructions (continued)

- Before commencing work, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute. Failure to do so could result in electric shock or equipment failure.

(Page 6-8)

- Before installing or removing an extension board, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute. Installing or removing an extension board without shutting down the power might result in electric shock or fire.

(Page 6-10)

- Before installing or removing main memory, make sure you shut down the OS, unplug the power cord, and wait for at least one minute. Installing or removing main memory without shutting down the power might result in electric shock or fire.

(Page 6-14)



Safety instructions (continued)

Safety Warning Indicated as CAUTION

- Cautions about fans (rotating objects)
Only maintenance personnel are allowed to remove a fan. Attempting to remove a fan yourself exposes you to the risk of injury to hands or objects being caught in rotating parts.
(Page 1-3)
- If this equipment is stored at high temperature, be careful not to touch it with your bare hands.
Touching the equipment in this state might result in burns.
(Page 1-12)
- When installing the equipment vertically, make sure that you place it on a level surface and secure it with the provided vertical stand. Failure to secure the equipment with the vertical stand might result in it toppling and causing personal injury.
(Page 1-13) (Page 6-23)
- Before cleaning or replacing the dust filter, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute. Failure to do so might result in injury to the hands or fingers.
(Page 6-1)
- When installing or removing an extension board, avoid direct contact with parts inside the equipment. Some parts inside the equipment are hot and might cause burns if they are touched. Furthermore, touching such parts might result in failure of the equipment.
(Page 6-8)
- When you install the cover of the equipment, do not put your fingers inside the cover. If you do, your fingers may get caught and injured.
(Page 6-9)



Safety instructions (continued)

- When installing or removing an HDD or SSD, be careful of protruding parts.
(Page 6-17)
- When installing or removing a DVD drive, be careful of protruding parts.
(Page 6-21)
- This equipment uses a lithium battery. When replacing the lithium battery, make sure that you replace it with one specified by the manufacturer. Replacing it with an unspecified battery might result in battery leakage, bursting, explosion, fire, overheating, or gas generation.
- Do not use the battery with its (+) and (-) poles reversed. Charging or short-circuiting the battery might cause battery leakage, overheating, or explosion.
(Page 6-24)
- When installing or removing a jumper, avoid direct contact with parts inside the equipment. Some parts inside the equipment are hot and might cause burns if they are touched. Furthermore, touching such parts might result in failure of the equipment.
(Page 6-26)



Safety instructions (continued)

Safety Warning Indicated as “NOTICE”

- Depending on the type of failure, important files might be lost when you use this equipment. Files can be lost as a result of power failure, user operational error, or failure of the equipment. Files cannot be recovered in such cases. To prevent such data loss, make it a routine to save your files and establish a systematic schedule for backing up files.

(Page iii) (Page C-8)

- Before moving this equipment, make sure you shut down the OS, unplug the power cord, and wait for at least one minute. Failure to do so might cause failure of HDDs and/or other devices.
- When transporting or carrying the equipment, use the dedicated container and packing materials as used when the equipment was delivered. Use of a different container or packing materials might result in damage to the equipment.
- If the dedicated container is damaged or broken, do not use it to transport or carry the equipment. Doing so might result in damage to the equipment.
- Due to the property of inrush current restraint method with this equipment, inrush currents might increase than usual if the power is turned on before the power supply unit has sufficiently cooled off naturally after the power has been turned off. Before turning on the power again, wait at least one minute after you have turned off the power. If you do not, inrush current might affect the breaker connected to the equipment and also the life span of the equipment itself.

(Page C-1)

- Never hot-swap HDDs or SSDs. Doing so might result in failure of the equipment and HDDs or SSDs. For the A or S model, before replacing an HDD or SSD, make sure you shut down the OS, unplug the power cord, and wait for at least one minute.
- When using a USB port, check the orientation of the USB connector, and then insert the connector carefully. Failure to observe this precaution might result in damage to the USB port.
- Do not insert or remove a USB device during online operation of the system, as doing so might adversely affect running applications.
- If you insert or access a disc (CD or DVD), system load might increase and subsequently affect running applications. Do not insert or access a disc during online operation (system operation).

(Page 1-3)



Safety instructions (continued)

- Before you move this equipment, make sure you shut down the OS, unplug the power cord, and wait for at least one minute. Failure to do so might cause HDDs, SSDs, or other devices to fail.
- When transporting or carrying the equipment, use the dedicated container and packing materials used for initial delivery of the equipment. Use of a different container or packing materials might result in damage to the equipment.
- If the dedicated container is damaged or broken, do not use it to transport or carry the equipment. Doing so might result in damage to the equipment.

(Page 1-13)

- Do not route interface cables (such as those for a PC and other devices) near the power cord. Doing so might cause failure or malfunction of the equipment.
- Do not connect or disconnect an interface cable while the power for this equipment or a remote device is on. Doing so might cause failure of the equipment from a short-circuit between power supply and ground. If an interface cable becomes disconnected while the power for the equipment is on, shut down the OS, and then unplug the power cord from the outlet. Unplugging the power cord from the outlet without shutting down the OS might result in loss of important data.
- When connecting a cable for external contacts, make sure you connect it to the RAS external contact port (EXT). Relay load voltages as high as 40 V DC might be applied to such cables. Connecting such a cable to the wrong connector might cause failure of the equipment.

(Page 1-16)

- Performing emergency shutdown (unplugging the power cord or shutting off the circuit breaker without proper shutdown of the OS) might cause malfunction of the OS or applications, or corruption of saved data. Never perform emergency shutdown unless you must stop the system immediately because of an error.
- Keep in mind that if the power supply is cut, the system might not be able to recover automatically.

(Page 2-4)



Safety instructions (continued)

- If you insert or access a disc (CD or DVD), system load might increase and subsequently affect running applications. Do not insert or access a disc during online operation (system operation).
- When disc (CD or DVD) access is complete, eject the disc from the DVD drive. Leaving a disc in the DVD drive might result in failure.
- Leaving the disc tray open might result in failure.
Keep the disc tray closed when not in use.
- Do not use an optical disc that is unbalanced (such as one with labels attached), cracked, scratched, warped, or of a nonstandard shape. Use of such discs might cause abnormal sound, vibration might be generated and failure of the equipment might result.

(Page 2-5)



Safety instructions (continued)

- Before moving this equipment, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute. If you do not, the HDDs and other devices might fail.
- When transporting or carrying the equipment, use the dedicated container and packing materials as used when the equipment was delivered. Use of a different container or packing materials might result in damage to the equipment.
- If the dedicated container is damaged or broken, do not use it to transport or carry the equipment. Doing so might result in damage to the equipment.

(Page 6-1)

- If you wash a dust filter, dry it completely before re-attaching it to the equipment. Using the equipment with a dust filter that is not completely dry might result in failure of the equipment. Use only a neutral detergent to clean the dust filter. Use of other types of detergent might adversely affect dust filter function.

(Page 6-2)

- Before installing or removing an extension board, make sure that you disconnect all external cables, as failing to do so might result in equipment failure.

(Page 6-10)

- Always attach a slot cover to each unused slot and attach a connector cover to each unused connector. Otherwise, failure of the equipment might result.

(Page 6-13)



Safety instructions (continued)

- Make sure that you disconnect all external cables connected to the equipment before you install or remove main memory. Failure to do so might cause malfunction.

(Page 6-14)

- The orientation of a main memory module on a connector is fixed. When you install a main memory module, make sure that the orientation is correct. If the orientation is incorrect, failure of the equipment might result.
- Do not install main memory modules of different capacities in slots DIMM1 and DIMM2. Doing so might result in the modules not being recognized.

(Page 6-15)

- Put the HDD or SSD on a shock-absorbing material (such as an antistatic cushion) even for a temporary task. Placing an HDD or SSD directly on a hard surface (such as a desktop) might lead to data loss, shorter life, or failure of the drive as a result of shock.
- Never remove the screws on an HDD or SSD while the power to the unit is on. Never hot-swap HDDs or SSDs. If you do either of these, failure of the equipment or the drive might result.
- Before you replace an HDD or SSD, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute.
- Install or remove an HDD only if necessary (for example, in the case of HDD failure). Frequent installation or removal of HDDs or SSDs might cause equipment failure.
- Fully insert an HDD or SSD. Loose contacts or missing screws might result in failure.
- When installing an HDD or SSD, do not subject it and mounted HDDs or SSDs to impact. Subjecting an HDD or SSD to impact might damage it.

(Page 6-17)

- For the B/T model, before you install or remove an HDD or SSD, check the drive bay number carefully. If you install an HDD or SSD in a drive bay that has a different number to the drive bay you removed it from, the configuration information will be inconsistent, and the equipment might not be able to start or the data in the HDD or SSD might be lost.

(Page 6-18)

- Make sure that you do not apply too much force to the connector and top of the DVD drive. Doing so might result in failure of the DVD drive.

(Page 6-21)



Safety instructions (continued)

- A recovery DVD contains an image file of the factory-shipped hardware configuration. If the factory-shipped hardware configuration has been changed, the OS might not start after restoration work. Remove all external storage devices before you perform restoration work using a recovery DVD, and use the factory-shipped hardware configuration.

When a recovery DVD is used, all data in the system drive is deleted. Back up any important data beforehand.

(Page 7-1)

- Although this equipment features RAID1 and is thus more reliable than general systems, it is still vulnerable to some kinds of failure that causes the loss of data stored on the drives. Data loss is caused not only by mechanical failures, but also by unexpected power failures or operational errors. Data lost due to such causes cannot be restored. To prevent such data loss, schedule data backup operations as routine tasks. In addition, protect the power source from undesirable interruptions by using a UPS or other means.
- This equipment is evaluated assuming the use of the specific drive models authorized by the manufacturer. Replace drives by using only the specific items specified by the manufacturer. Failure to do so might result in existing data on the drive being lost. In addition, always observe the recommended replacement interval for drives (see *Appendix Handling of replaceable components*).
- Each unit of equipment has its own RAID1 configuration information (such as a serial number). Therefore, you cannot use drives by swapping them even between two different units of this equipment. If you attempt to do so, unexpected operation might result from inconsistencies in the configuration information or other reasons.
- Do not use a drive previously used in any model as a replacement drive. If you do, this equipment might not operate properly, or the data on the drives might be lost because of configuration information discrepancies or other reasons.
- For a replacement drive, use a brand-new (unused) drive or an initialized drive (see *10.6.7 Drive initialization feature*).
- Maintaining a RAID1 system requires a high level of expertise. User error might cause loss of data on drives.
- Make sure that drives installed in drive bays 1 and 2 have the same capacity. Do not install drives that have different capacities.

(Page 10-1)



Safety instructions (continued)

- Never remove a drive when the drive status lamp for the drive is off. Doing so might corrupt the data stored on the drive.
- When replacing a drive, wear cotton gloves to prevent problems caused by static electricity. Failure to do so might result in corruption of the data stored on the drive.
- Verify correct procedures before starting work. Failure to follow the correct procedures might result in loss of data stored on a drive.
- Do not use a drive previously used in any model as a replacement drive. If you do, this equipment might not operate properly, or the data on the drives might be lost because of configuration information discrepancies or other reasons.
- Install drives securely. Loose contacts or missing screws might result in failure.
- During replacement, do not subject a drive that you are replacing or a drive that is already installed to excessive shock. Subjecting a drive to excessive shock might result in drive failure.
- Until rebuilding is complete, avoid shutting off the power to this equipment or installing and removing drives. Performing these actions might result in data on the drives being lost or a failure.

(Page 10-8)

- If you apply the offline drive recovery method to a drive that was set to offline by a means other than the RAS software, the drive might not be recovered, or might not work properly after recovery.
- Use the offline drive recovery method only for evaluation of this equipment. If you apply the offline drive recovery method to equipment actually used in the field (for example, a system in normal operation), malfunction such as data loss might result.
- A drive automatically set to offline by this equipment might have failed. Do not apply the offline drive recovery method to such a drive.
- A drive recovered by using the offline drive recovery method must not be used for equipment actually used in the field. If such a drive is used for equipment actually used in the field, problems such as data loss might result.

(Page 10-18)



Safety instructions (continued)

- When replacing a drive, wear cotton gloves to prevent problems caused by static electricity. Failure to do so might result in corruption of the data stored on the drive.
- Verify correct procedures before starting work. Failure to follow the correct procedures might result in loss of data stored on a drive.

(Page 10-19) (Page 10-20)

- When replacing a drive, wear cotton gloves to prevent damage from static electricity. Failure to do so might result in corruption of the data stored on the drive.
- Verify correct procedures before starting work. Failure to follow the correct procedures might result in loss of data stored on a drive.
- Do not use a drive previously used in any model as a replacement drive. If you do, this equipment might not operate properly, or the data on the drives might be lost because of configuration information discrepancies or other reasons.
- Do not replace both drives at the same time. Doing so might result in data corruption.
- Before you remove a drive for replacement, always make sure that the drive is set to offline in the Hardware status window. You might not be able to check the hardware status in some situations, such as when the OS has just started up. Do not replace a drive in such a situation. Doing so might result in a failure.

(Page 10-21)

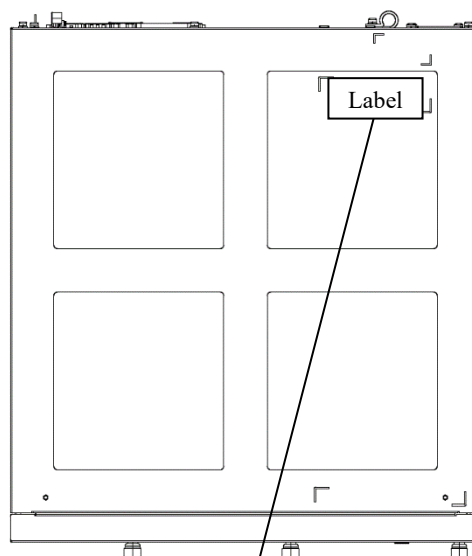
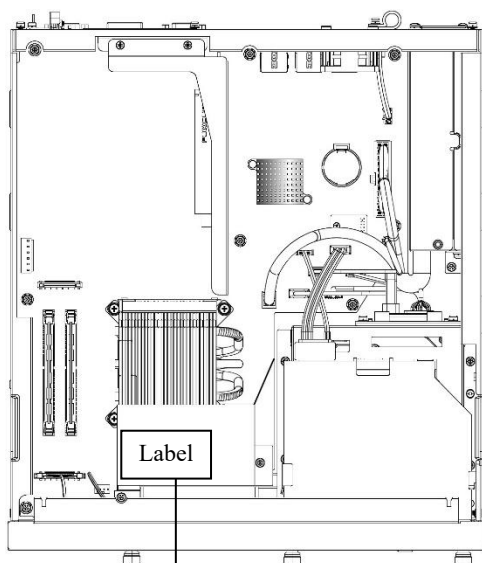
- Do not use a replaceable component for longer than the recommended replacement cycle. If you do, the component might cause the equipment to fail.

(Page A-1)

⚠ Safety instructions (continued)

• ⚠ WARNING labels

The WARNING labels are attached at the following positions on the equipment.



⚠ 警告 ⚠ WARNING ⚠ AVERTISSEMENT

危険な運動部品
危険な運動部品
危険な可動部
Hazardous
moving parts.
Pièces
mobiles
dangereuses.

手指和人体不要靠近。
手指和人體不要靠近。
可動部位に人体の一部を近づけないでください。
Keep body parts out of the
motion path.
Éloignez vos doigts et toutes les
autres parties de votre corps.

⚠ 警告 ⚠ WARNING

危険电压
危険電壓
危険電圧
Hazardous
voltage.
Tension électrique
dangereuse

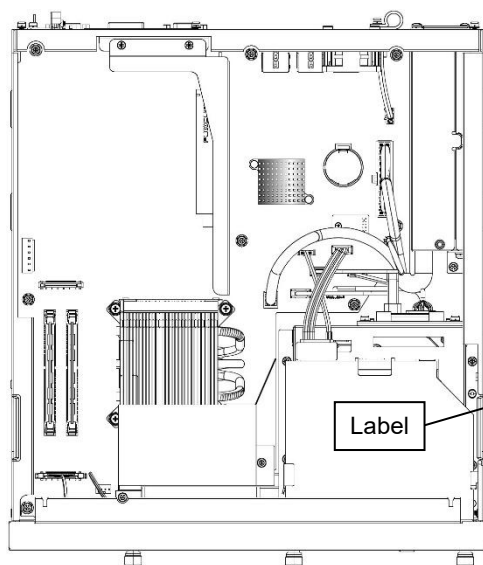
触电会导致死亡或重伤。揭开盖子前，请从插座拔掉电源线。
觸電會導致死亡或重傷。打開蓋子前，請從插座拔掉電源線。
感電による死亡または重傷の恐れがあります。
カバーを外す前に、電源ケーブルをコンセントから抜いてください。
Can cause death or severe injury.
Pull out power cord from the outlet before opening the cover.
Risque de mort ou de blessures graves en cas de choc électrique.
Avant d'ouvrir le couvercle, veuillez débrancher le câble de la prise.

Safety instructions (continued)

- Laser safety precaution

The DVD drive uses a laser.

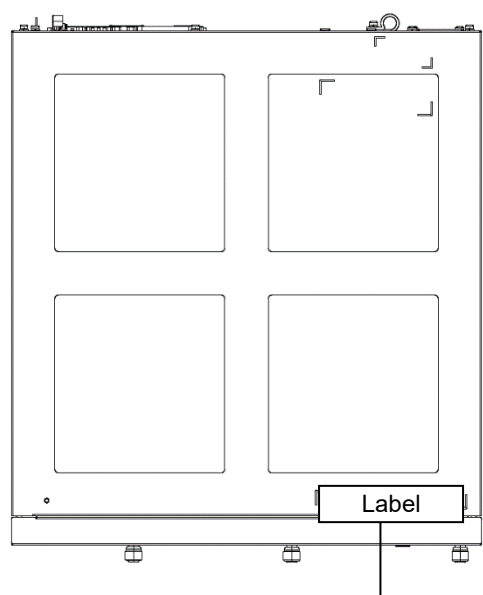
Do not look directly or indirectly into the laser beam, as doing so might cause visual impairment.



CLASS 3B VISIBLE AND INVISIBLE LASER
RADIATION WHEN OPEN AND INTERLOCKS
DEFEATED AVOID EXPOSURE TO THE BEAM.

- NOTICE label

The NOTICE label is attached at the following position on the equipment.




通知 NOTICE

当您更换驱动器设备的启动过程中，系统数据将被销毁。请参阅用户手册。
當您更換驅動器設備的啟動過程中，系統資料將被銷毀。請參閱使用者手冊。
裝置的電源が入った状態でドライブの挿抜を実施すると、システムデータ破壊にいたりますので、取扱説明書に従いドライブの交換を実施してください。
Drive replacement during startup of the device, corrupts the system data. See User's Manual.



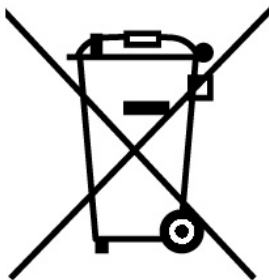
Safety instructions (continued)

-  Disposing the equipment

When disposing of equipment, issuance of an industrial waste management slip (manifest) is mandatory.
For more information, contact your local industrial waste association.

- Labeling based on the EU Battery Regulation 2023/1542

EU



This symbol mark is valid in countries inside the European Union. This symbol mark is specified in Article 13 of the *EU Battery Regulation, Labeling and Marking of Batteries*, and *Annex VI*.

This equipment is equipped with a lithium battery. When removing the battery, follow the instructions in the *6.5 Removing and installing the lithium battery*.

The European Union has separate collection systems for used batteries and accumulators. Process batteries and accumulators appropriately at a local collection/recycle center.

Precautions

1. Precautions about the equipment

NOTICE

- Before moving this equipment, make sure you shut down the OS, unplug the power cord, and wait for at least one minute. Failure to do so might cause failure of HDDs and/or other devices.
- When transporting or carrying the equipment, use the dedicated container and packing materials as used when the equipment was delivered. Use of a different container or packing materials might result in damage to the equipment.
- If the dedicated container is damaged or broken, do not use it to transport or carry the equipment. Doing so might result in damage to the equipment.
- Due to the property of inrush current restraint method with this equipment, inrush currents might increase than usual if the power is turned on before the power supply unit has sufficiently cooled off naturally after the power has been turned off. Before turning on the power again, wait at least one minute after you have turned off the power. If you do not, inrush current might affect the breaker connected to the equipment and also the life span of the equipment itself.

(1) Transporting the equipment

Required actions

- When transporting or carrying the equipment, use the dedicated container and packing materials as used when the equipment was delivered. When transporting or carrying the equipment in an enclosure, protect the equipment so that vibration or impact to the equipment is within limits.
- Keep the dedicated container and packing materials for reuse should the equipment need to be transported or carried.

(2) Interface cables

Precautions

- Do not pull on a cable with excessive force.
- To satisfy EMC standards (FCC, CE, VCCI), use shielded cables for interface cables (display interface cable, keyboard interface cable, and mouse interface cable) connected to the equipment.

Required actions

- Route cables neatly alongside this equipment so they do not catch on hands or feet.
- Inadvertent disconnection of the power cord during equipment operation might result in loss of critical data on an HDD or SSD.

(3) Connector

Precautions

- To ensure proper connection, insert connectors with the proper orientation and angle. Improper connection might result in failure or malfunction.
- Confirm that all the equipment's I/O cable connectors are secure.

(4) Power supply

(a) Power voltage

Required actions

- Confirm that the voltage of the power input to the equipment is within the specified range (100 to 240 VAC). If the voltage of the power input is close to the upper or lower limit of the specified range, you should treat it as a setting error of the input voltage and ask the manager of the power facility to inspect the voltage output by the facility.

(b) Power cord

Precautions

- The power cord provided with the equipment is rated at 125 VAC. When using this equipment at over 125 VAC, prepare an appropriately rated power cord.
- Install D type grounding (previously known as Class III grounding) defined in the Technical Standard for Electrical Facilities of Japan to maintain normal operation of electronic circuits containing highly integrated LSIs and provide protection from abnormal voltages (due to lightning, for example).
- Use a power cord with a 2-prong plug and a grounding pole. (See *1.7 Hardware connections*.)
- Make sure you connect the power cord to an outlet that has a properly grounded neutral pole. Furthermore, ensure that an earth leakage circuit breaker is installed.
- If you use a power cord clamp to prevent accidental disconnection, leave sufficient slack in the cord to allow for disconnection in an emergency. Alternatively, install an emergency circuit breaker at the outlet side.
- Do not place objects on the power cord. Furthermore, do not install signal lines near the power cord.

(c) Turning the power on and off

Precautions

- Wait at least one minute before turning the power on again after turning it off. If you wait less than one minute, the equipment might not operate as specified by the BIOS power setting. (See 5.6 BIOS setup.)
- Do not turn off the power to the equipment or press the NMI switch during communication or while an optical disc or an HDD or SSD is being accessed.

Required actions

- Before connecting or disconnecting a peripheral, make sure both the equipment and the peripheral are turned off. Failure to follow this instruction might result in a malfunction or failure.
- Before turning on the equipment, turn on any necessary peripherals. When turning off the equipment, first turn off the equipment, and then turn off the peripherals.
- When you are not using the equipment, turn off the power. If you do not intend to use the equipment for a long time, unplug the power cord.
- Rugs, lap blankets, and other items made from materials prone to static buildup might cause malfunction of the equipment. Use a conductive rug or lap blanket resistant to static buildup.
- In the event of lightning strikes or poor power supply conditions, momentary power failure or voltage drops (and subsequent screen blackout) might occur. In such situations, turn off the power to the equipment and then turn it back on.

(5) Installation environment

Precautions

- When installing a commercially made device in an extension slot, make sure the specifications for the required environment for both the device and equipment are met. (See 1.6.1 Environment.)
- When installing an extension board in an extension slot or use a USB device, verify that the power consumption does not exceed the maximum current rating. (See 5.1 (9) Maximum current specifications.)
- For optimum long-term reliability of this equipment, use it with proper care in the appropriate environment.
- Do not use this equipment in the locations described below, as doing so might cause failure or shortened life of the equipment.

- A place subject to direct sunlight Close to a window
- A place subject to rapid changes in temperature or humidity ... Close to an air conditioner
- A place close to a device that generates electrical noise Close to an electric motor or generator
- A place close to a strong magnetic field Close to a magnet or an electro-magnetic device
- An environment subject to excessive dust
- A place subject to vibration
- An environment with corrosive gases present
- A place subject to vibration from loud sounds Close to a loud buzzer or alarm

- The following precautions pertain to the exterior of the equipment:
- Do not attach a heating device.
- For ease of maintenance work, make sure that the equipment can be moved easily; if anchored, ensure that the equipment can be removed easily.
- It is reported that zinc whiskers can cause a problem with the device. Do not use electro galvanized material anywhere in the vicinity of the equipment.

(A quote from the Technical Report of JEITA[#] ITR-1001 *Guideline of Facilities and Equipment for Information Systems*)

#: JEITA: Japan Electronics and Information Technology Industries Association

Location of whiskers: Whiskers can be produced by electro galvanized materials such as floor panels, stringers, posts, and seismic flat steel.

Phenomenon: Ingress of airborne zinc crystals (conductive whiskers) causes short-circuiting of PCBs and connector pins in electrical devices and equipment. The root cause is difficult and time-consuming to find because the symptom differs depending on the location of the short circuiting, and often, it is mistaken for a temporary issue.

Required actions

- If you mount the equipment in an enclosure or on a desk, temperature increase around the equipment needs to be taken into consideration.
- The system clock and other functions of the equipment remain activated by backup battery even when the power is off. Therefore, if you store the equipment at a temperature outside the operating temperature range, you might need to reconfigure system BIOS settings (including the clock settings) when you start using the equipment again. When you reconfigure system BIOS settings, follow the instructions in *5.6 BIOS setup*.

(6) Operating condition

Precautions

- Before moving the equipment, make sure that you disconnect the plug of the power cord from the outlet and wait at least one minute.
- When moving the equipment from outside to inside, wait for at least four hours before using the equipment to avoid moisture condensation.
- The equipment is made of precision electronics components. Do not subject the equipment to vibration or shock.
- Do not sit on the equipment or place anything on it.
- During normal operation, do not turn off the display. Set it into the standby mode instead.
- During normal operation, do not touch the keyboard or mouse until the logon screen is displayed when you turn on the equipment.

Required actions

- We recommend removing any dust buildup around the equipment (especially on the sides and underside, but also vents and front panel).

(7) Abnormal sounds

Specifications

- When the power is turned on, you might hear a low-frequency humming noise. This is caused by transient low-frequency vibrations of the chokes for suppressing high frequency noise or other components and does not affect the function or life span of the equipment.

(8) Warranty

Specifications

- The manufacturer cannot guarantee against damage to data or application software caused by hardware damage to the equipment.
- Use an operating system specified by the manufacturer. Operation with any other basic software is not guaranteed.
- This equipment is evaluated under the assumption that the hardware specified by the manufacturer is used. When installing or replacing hardware, use only hardware specified by the manufacturer. Operation of the equipment with non-specified hardware cannot be guaranteed.

2. Networks

Precautions

- When you receive a Magic Packet™ frame, verify that the standby lamp of the equipment is on. If you receive a Magic Packet™ frame when the power is about to be turned off after an OS shutdown, the equipment might restart without being turned off or Wake-on-LAN (WOL) might not function at all. (See *2.7.2 Turning on the power by using a LAN.*)
- This equipment is designed for 24-hour continuous operation, but is not guaranteed to operate continuously for 24 hours, nor is it guaranteed to operate in the event of a component failure or a problem caused by a malfunction of software (including Windows®), such as memory leaks. Use the equipment only after sufficient verification of operation with the equipment in your system.

Specifications

- Depending on the status of the network, Magic Packet™ frames might be lost. To avoid lost frames, set up the system so that Magic Packet™ frames can be propagated without loss. (See 2.7.2 *Turning on the power using the LAN.*)
- Even a network drive configured for reconnection at logon might fail to reconnect in some cases. If reconnection fails, log on again or use the `net use` command to re-establish connection.
For information about the `net use` command, see the Windows® help.
- If the settings of the hub and the network adapter do not match, the performance of the network adapter might be compromised, or the network adapter might not work properly. (See 2.8 *Setting up the LAN Interface.*)
- Electrical potential difference between units can generate heat. Therefore, do not use twisted-pair Ethernet cables (such as category 5 or STP cables) for network connections other than for those specified in 5.8.1 *Connector specifications (1) Motherboard (standard).*

3. Display screens

Specifications

- Before setting up the screen, terminate all running application software.
- Before changing connections to switch between single- and multi-display configurations, turn off the power to the equipment first. After that, change the connections of the display cables, turn the power back on, and then set up the screen configuration.
- When changing the connection configuration for the displays, reconfigure the screen settings accordingly.
- Depending on the application software, the screen might flicker and video playback might not be smooth.
- The multi-streaming function of DisplayPort (daisy-chaining) is not supported.
- If a display connected via DisplayPort is turned off, it will no longer be detected.

4. Hard Disk Drives (HDDs) and Solid State Drives (SSDs)

NOTICE

Depending on the type of failure, important files might be lost when you use this equipment. Files can be lost as a result of power failure, user operational error, or failure of the equipment. Files cannot be recovered in such cases. To prevent such data loss, make it a routine to save your files and establish a systematic schedule for backing up files.

(1) Handling hard disk drives or solid state drives

Precautions

- The access performance of the HDDs or SSDs differs depending on the equipment. Also note that HDD and SSD performance diminishes at higher and lower temperature extremes. Therefore, when using HDDs or SSDs, make sure access and performance at high and low temperatures are acceptable for your intended use.

Required actions

- Do not subject HDDs or SSDs to vibration or shock.
- Take preventive action against static electricity from the workbench and human contact.
- Hold an HDD or SSD by its edge or side brackets, and avoid touching the printed circuit board or connectors.
- When storing an HDD or SSD long-term, use an anti-static bag and dedicated box.

Specifications

- To modify partitions, delete the existing partitions first, and then re-create them.
- HDD and SSD capacity and performance are subject to change depending on components.

(2) Backing up files

Required actions

- Make sure the contents of all HDDs or SSDs are backed up periodically.
- Deleting a partition also deletes all files in that partition. Before deleting a partition, back up important files.

5. DVDs

(1) Handling the DVD drive

Precautions

- The DVD drive is susceptible to dust. Install the equipment in a place with minimal dust, and clean the areas around the equipment regularly.
When using insecticide sprays or similar chemicals, cover the equipment with a protective sheet beforehand.
- Do not subject the equipment to strong impact while the DVD drive is in use.
- Do not open the disc tray except to insert or eject a CD or DVD. Do not place foreign objects on the disc tray. Doing so might damage the DVD drive.
- When placing a CD or DVD, make sure it is properly set on the disc tray. If it is not, the disc tray might break.

Specifications

- Reading from or writing to a disc might not be possible depending on the type of CD or DVD. In such cases, use another CD or DVD.
- Reading from or writing to the CD or DVD might not be possible, depending on the condition of a CD or DVD (for example, whether it has scratches or dust, is deformed, or has copy protection enabled).
- Depending on the write quality of a CD or DVD or the read characteristics of the DVD drive, data that was written by other devices might not be readable on this equipment, and data that was written by this equipment might not be readable on other devices.

(2) Handling CDs or DVDs

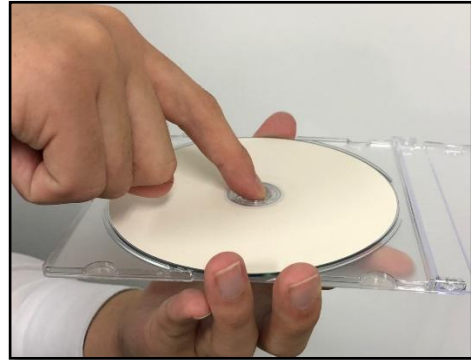
Precautions

- Do not use a silicone cloth nor use benzene, thinners, water, record cleaner, or anti-static liquids on a CD or DVD.
- Do not use a dryer to remove dust or moisture from a CD or DVD.
- Do not store a CD or DVD in a location of high temperature or humidity.
- Store a CD or DVD in a location that is not subject to direct sunlight, strong artificial light, or other such environmental effects.
- Do not fold or bend a CD or DVD.
- Do not write on or scratch the recording surface of a CD or DVD.
- Do not spin a CD or DVD on a stick inserted through its center hole.
- Do not attach stickers or other adhesive labels to a CD or DVD.

- To remove an optical disc from its case, hold both sides of the case (Picture 1), and press the center of the case (Picture 2) to remove the disc without putting stress on the disc.
Bending a disc during removal might result in subsequent read or write errors on the disc.



[Picture 1]



[Picture 2]

Required actions

- If a CD or DVD is dirty, use a soft, dry cloth to wipe from the center to the outer edge of the disc.

6. USB devices

Precautions

- Test a USB device before using it. Never use a USB device for a mission-critical purpose.
- Do not connect a USB device during OS startup, as doing so might interfere with the startup.
- If you switch screens during OS startup while using a CPU/USB KVM switch, the OS might not start normally depending on the CPU/USB KVM switch type. When using a CPU/USB KVM switch, test its operation thoroughly.
- For USB 2.0 and USB 3.0, use a cable that does not exceed the specified length. Using longer cables might compromise transfer speed. Use a USB 2.0 or USB 3.0 cable appropriate for the device in use. Use of an inappropriate cable might compromise transfer speed or cause communication errors. For information about cable specifications, ask the manufacturer of the cable. (For details about cable length, see *5.8.3 External interface cable length specifications*.)

Required actions

- When using a USB port, check the orientation of the USB connector, and then insert the connector slowly to avoid damaging the USB port.
- When a USB device is inserted, removed, or accessed, the system load might increase. Before using a USB device during online operation (system operation), ensure that it will not affect the currently running application software.
- After cleaning a USB keyboard, check its connection to the equipment. A loose connection might prevent the system from recognizing the keyboard or interfere with system startup.

Specifications

- Operation with all USB devices cannot be guaranteed.
- Some USB devices do not conform to the USB specifications. If you turn off the main power while a non-compliant USB device is connected, the equipment might not start properly, and the clock settings might be corrupted. When selecting a USB device, test its operation thoroughly.

7. Extension boards

Required actions

- In using an extension board (PCI Express or PCI board), the user is responsible for determining that all board components meet operating temperature specifications.
- After installing an extension board, store the dummy bracket in a safe place.

8. Lithium batteries

Required actions

- This equipment uses a lithium battery. When disposing of the battery, observe all applicable local laws and regulations. For disposal overseas, follow the laws of the relevant country.

9. Optical mouse

Required actions

- Due to the nature of its optical sensor, an optical mouse might not work on transparent materials or light-reflecting materials (such as glass and mirrors). Avoid using an optical mouse on these materials, or purchase a commercially available optical mouse pad.
- An optical mouse might not work properly if its optical sensor is clouded by condensation or oil mist. If you are using an optical mouse in an environment where such situations might occur, take appropriate preventative measures.

10. BIOS settings

Specifications

- Provided that AC connection is maintained, BIOS settings are retained even if the backup battery runs out of power or is not installed. If the system is booted with AC disconnected, BIOS settings will return to their defaults (the OS always starts irrespective of the **After AC Power On** setting).
- If you perform an AC disconnection (such as by holding down the power switch for four or more seconds) without performing proper shutdown, the behavior of the system when power is restored might differ that after proper shutdown.
- The clock in the BIOS setup menu screen is for the purpose of configuring (not showing) the date and time. Hence, changes to the date are not reflected in this screen. If the actual date changes during setup, you must update the date setting. (See 5.6 *BIOS setup*.)
- When using the setup menu, the clock display might sometimes show a delay. After exiting the setup menu, verify that the clock is correct. (See 5.6 *BIOS setup*.)

11. Maintenance services

Specifications

- Microsoft® Windows®, device drivers, and commercially available application software might not be directly modifiable as a countermeasure for a particular failure. Instead, the manufacturer might offer a workaround as a countermeasure.
- Adding commercially available hardware to the equipment without notifying the manufacturer will completely void the warranty of the equipment.
- Some components used in the equipment (such as Intel Corporation LSIs) cannot be disassembled for failure analysis, as the manufacturer does not have the necessary rights.
- The price of this equipment does not include maintenance and support. When ordering the equipment, clearly state the desired maintenance support level in the maintenance contract, and pay the required maintenance fee as defined by the maintenance support level.

12. Windows® settings

(1) Applying hotfixes and other updates

Specifications

- Users are responsible for applying any necessary hotfixes, Windows Update, or the latest service packs. Verify system operation thoroughly to evaluate how any applied hotfixes, Windows Update, or service packs will affect the system.

(2) User account control

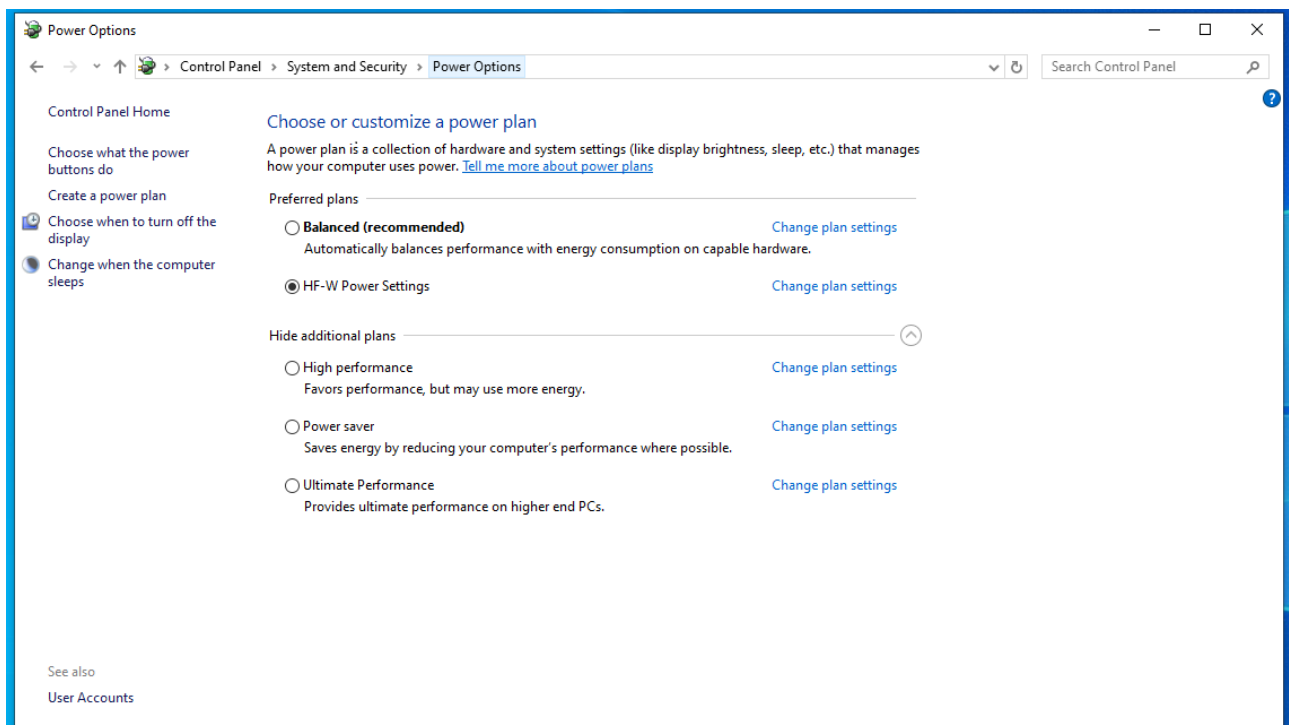
Specifications

- If User Account Control (UAC) is enabled in Windows® settings, the **User Account Control** dialog box might appear when executing applications or commands. In this case, click *Yes* or *Continue*.

(3) Setting the power options

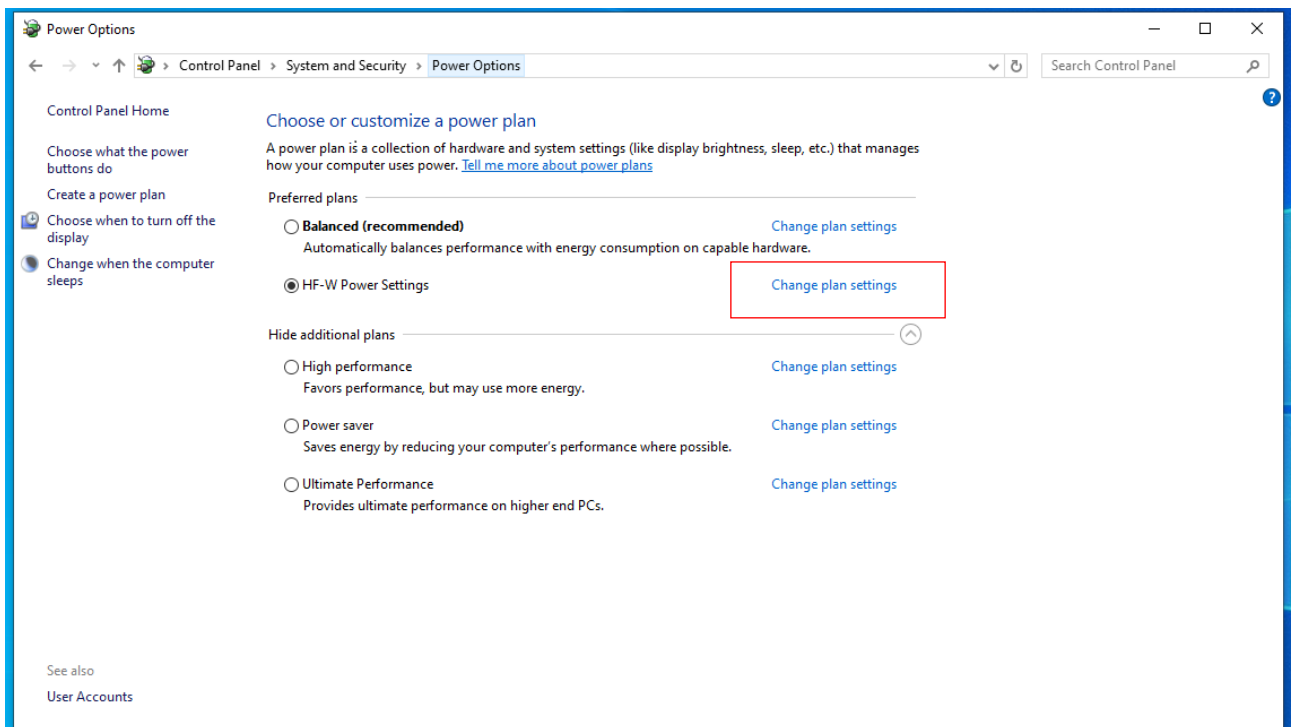
Required actions

- Do not change the factory default power plan setting **HF-W Power Settings**. Furthermore, do not change the **Turn off hard disk after** setting from 「0」. To verify the current power plan and **Turn off hard disk after** settings, follow the procedure below. (The image shown is an example using Windows® 10, but the same applies to other operating systems.)
 - Verifying the current power plan settings
 1. Open **Control Panel** and click **System and Security**.
 2. Click **Power Options**.
 3. The Power Options window appears.
 - Verify that the **HF-W Power Settings** radio button is selected under **Preferred plans**.



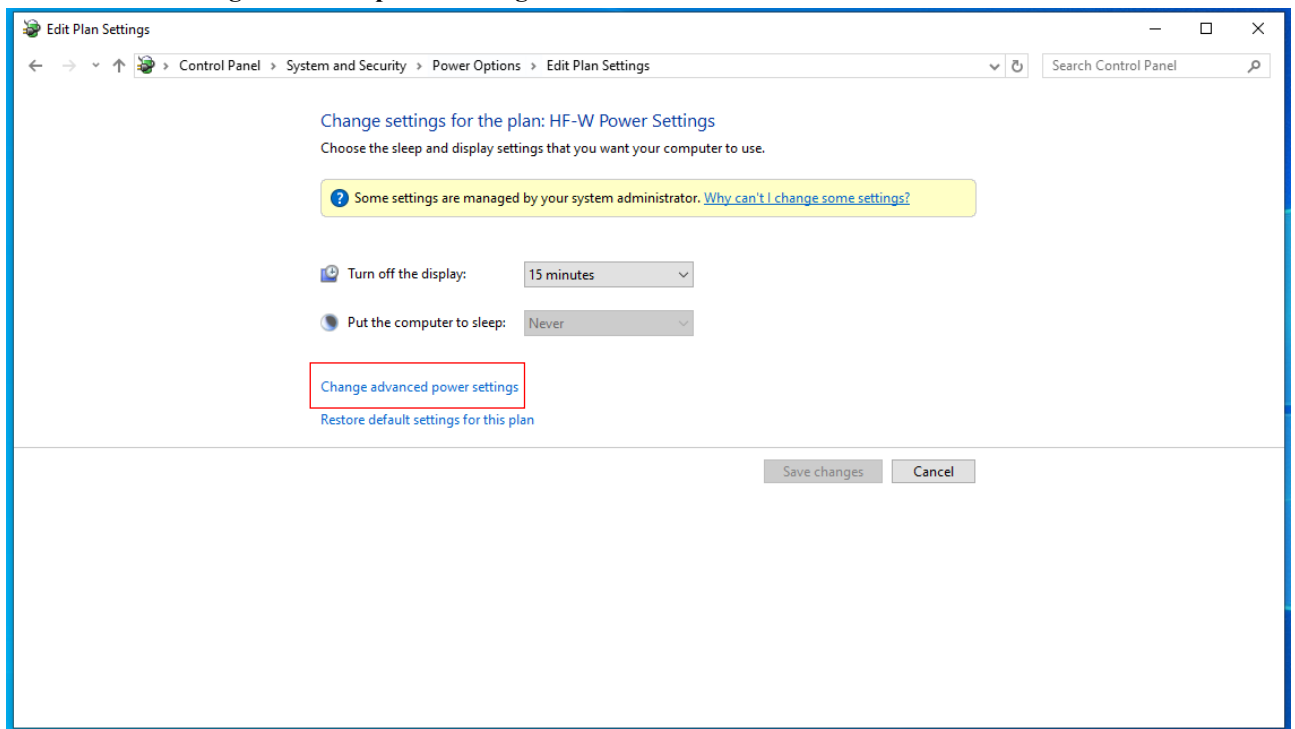
- Verifying the **Turn off hard disk after** setting

1. After following the procedure *Verifying the current power plan settings*, click **Change plan settings** next to **HF-W Power Settings**.



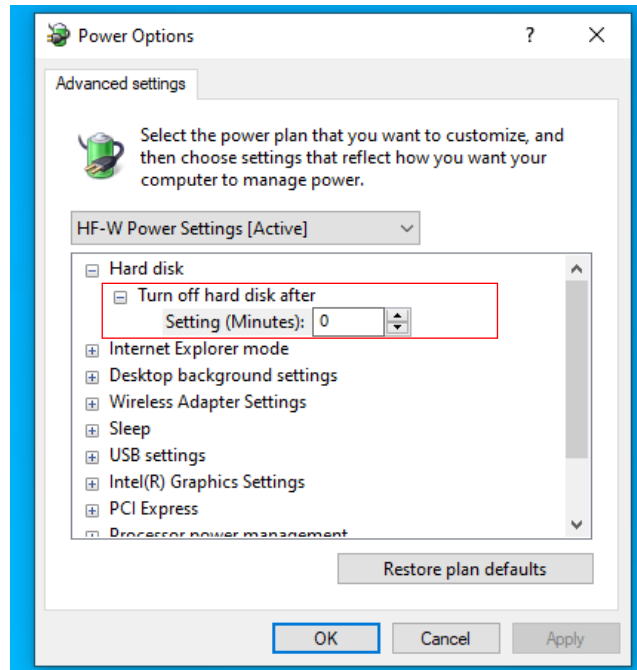
2. The Edit Plan Settings window appears.

- Click **Change advanced power settings**.



3. The **Advanced setting** tab of the **Power Options** dialog box appears.

- Verify that **Turn off hard disk after** is set to **0**.



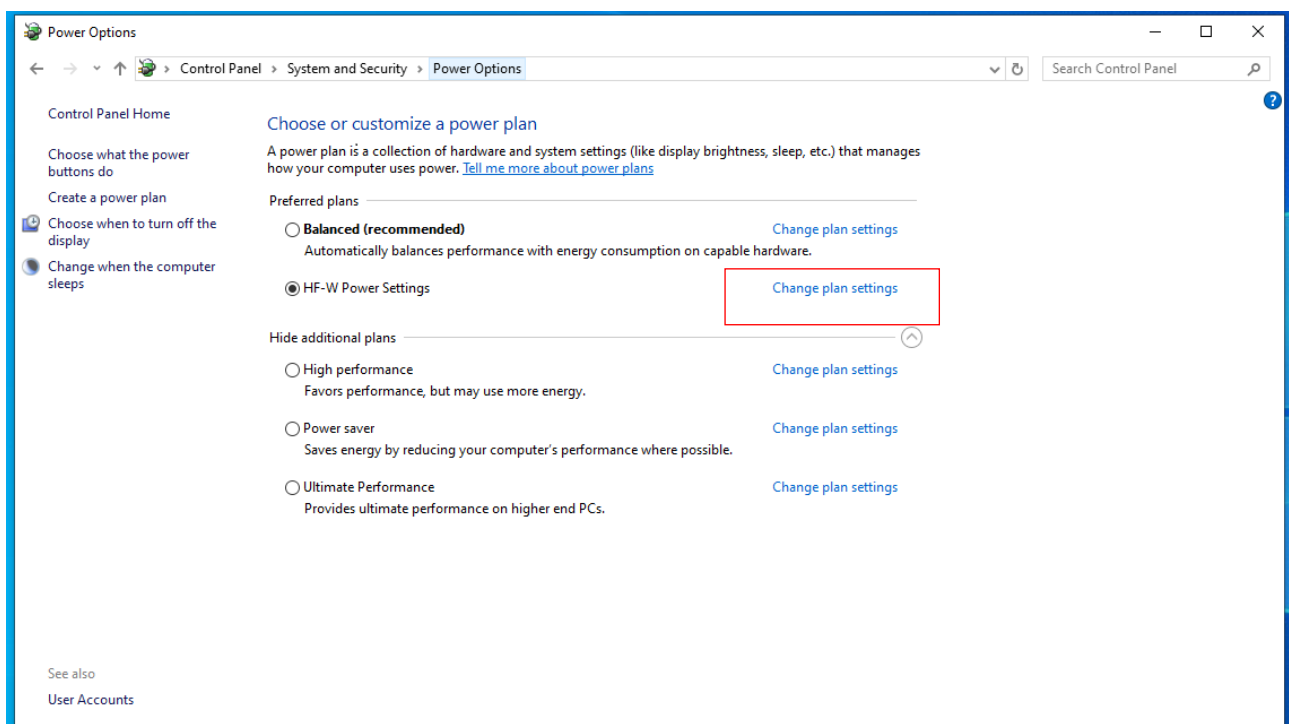
- If you have changed the settings from their factory defaults, restore factory default settings by following the procedure below.

1. Open **Control Panel** and click **System and Security**.

2. Click **Power Options**.

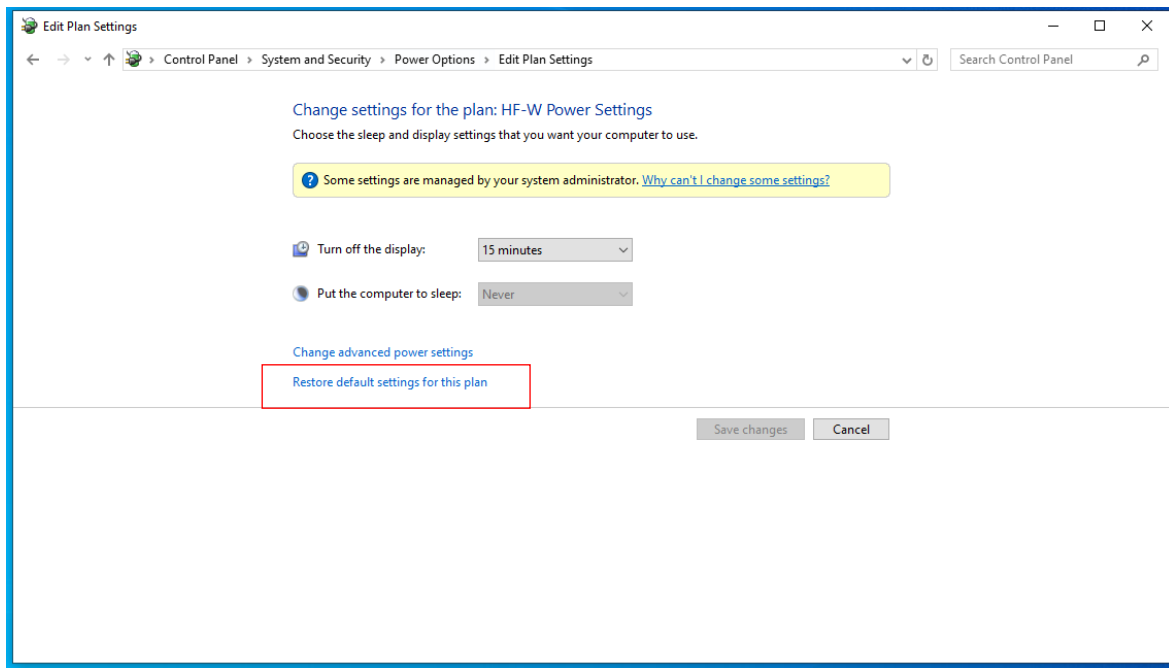
3. The Power Options window appears.

- Click **Change plan settings** next to **HF-W Power Settings** under the **Preferred plans**.



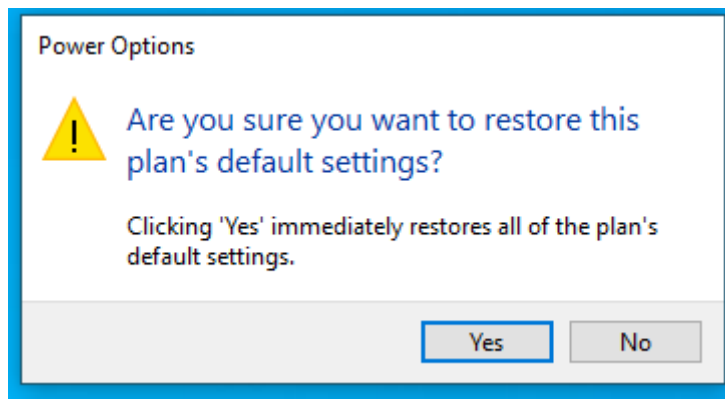
4. The Edit Plan Settings window appears.

- Click **Restore default settings for this plan**.



5. The following verification window appears.

- Click **Yes**.



13. Detection of single-bit errors in memory

Restrictions

- This equipment uses ECC (error checking and correction) memory. For this reason, any single-bit errors that occur in the memory are automatically corrected, thus, not impeding equipment operation. Furthermore, single-bit errors are detected at BIOS startup and by the RAS software.

Although users are notified of frequent single-bit errors, in very rare cases, single-bit errors might not be detected and users might not be notified.

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Chapter 1 Getting started

1.1 Scope

This manual is intended for operators of the HITACHI INDUSTRIAL COMPUTER HF-W2000 Model 68/65, and contains information about the operation and maintenance of various devices necessary for routine use.

After unpacking the equipment, verify that all items are present (according to the delivery list) and are undamaged.

If any items are missing or damaged, contact one of our sales representatives.

For information about RAS features, see the following manual:

- HF-W2000 Model 68/65 RAS FEATURES MANUAL (manual number WIN-63-0102)

1.2 Installing an extension board

User-prepared extension boards can be installed in this equipment.

For information about the installation procedure for and limitations on extension boards, see *6.4.4 Installing and removing an extension board*.

1.3 Role of the operator

To ensure proper long-term working order of the equipment, the following operations are required:

(1) Installing replaceable items

- When installing a replaceable item (such as an HDD or dust filter), follow the operating procedures given in the respective chapters.

(2) Taking the characteristics of the equipment into account

- See *1. Precautions about the equipment* in *Precautions*, and take the necessary actions considering the characteristics of the equipment.
- The instructions in this manual are the fundamental procedures that operators must follow.
- For information about, for example, using and cleaning the equipment, see the relevant chapters.

(3) Keeping the equipment in good condition

When using this equipment, operators must consider the following:

- Backing up files

See (2) *Backing up files* under *4. Hard Disk Drives (HDDs) and Solid State Drives (SSDs)* in *Precautions*.

- Unplugging the power cord and shutting down the power

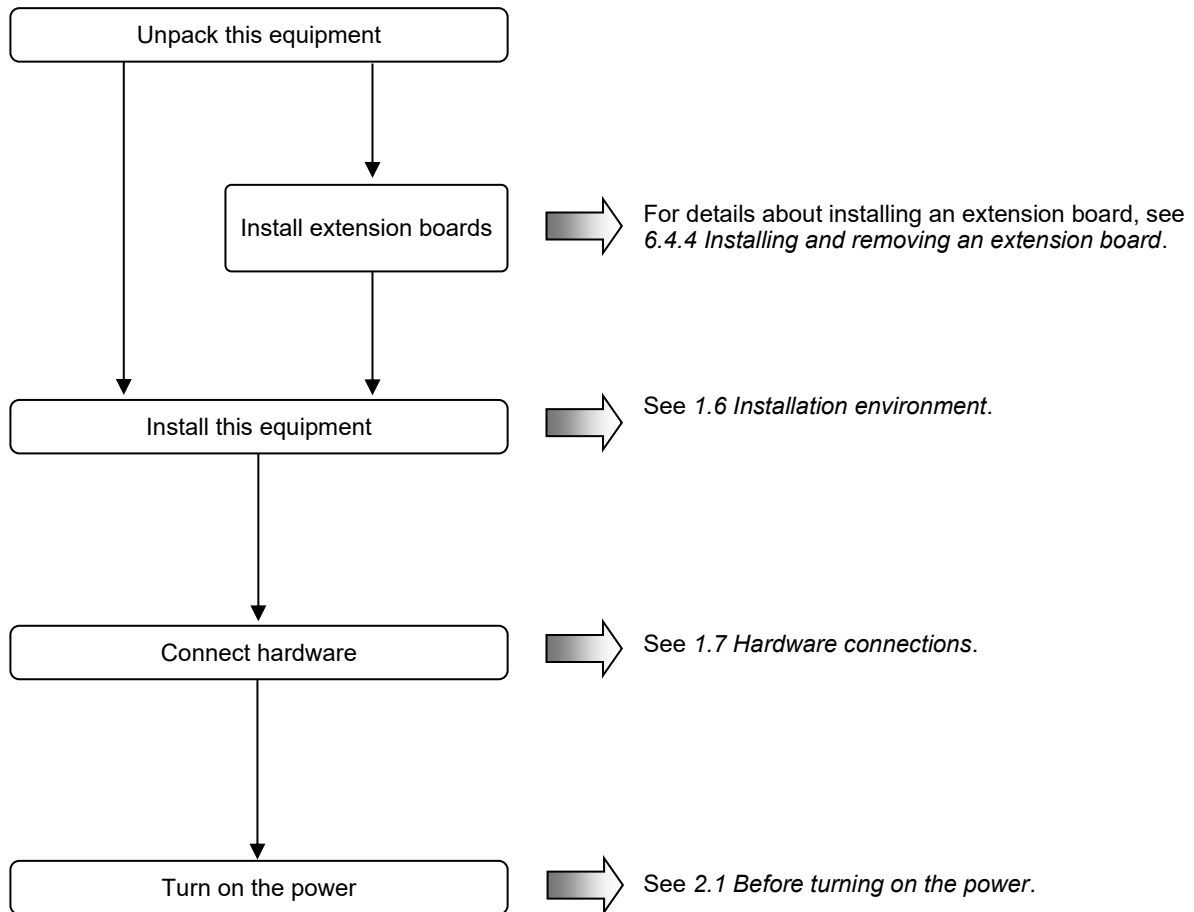
See (4) *Power supply* under *1. Precautions about the equipment* in *Precautions*.

(4) Maintaining the equipment

- For information about maintenance, see *6.1 Daily inspections* and *6.2 Periodic inspections*.

1.4 Workflow

The workflow for turning on the power to the equipment is as follows.



1.5 Name and function of each part



WARNING

Warning about the power supply unit (hazardous voltage):

Do not remove, disassemble, or modify the power supply unit, as doing so might cause serious injury or death from electric shock.



CAUTION

Caution about the fans (rotating objects):

Only maintenance personnel are allowed to remove a fan. Attempting to remove a fan yourself exposes you to the risk of injury to hands or objects being caught in rotating parts.

NOTICE

- Never hot-swap HDDs or SSDs. Doing so might result in failure of the equipment and HDDs or SSDs. For the A or S model, before replacing an HDD or SSD, make sure you shut down the OS, unplug the power cord, and wait for at least one minute.
- When using a USB port, check the orientation of the USB connector, and then insert the connector carefully. Failure to observe this precaution might result in damage to the USB port.
- Do not insert or remove a USB device during online operation of the system, as doing so might adversely affect running applications.
- If you insert or access a disc (CD or DVD), system load might increase and subsequently affect running applications. Do not insert or access a disc during online operation (system operation).

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- Parts related to the display and user operation

(1) Front view

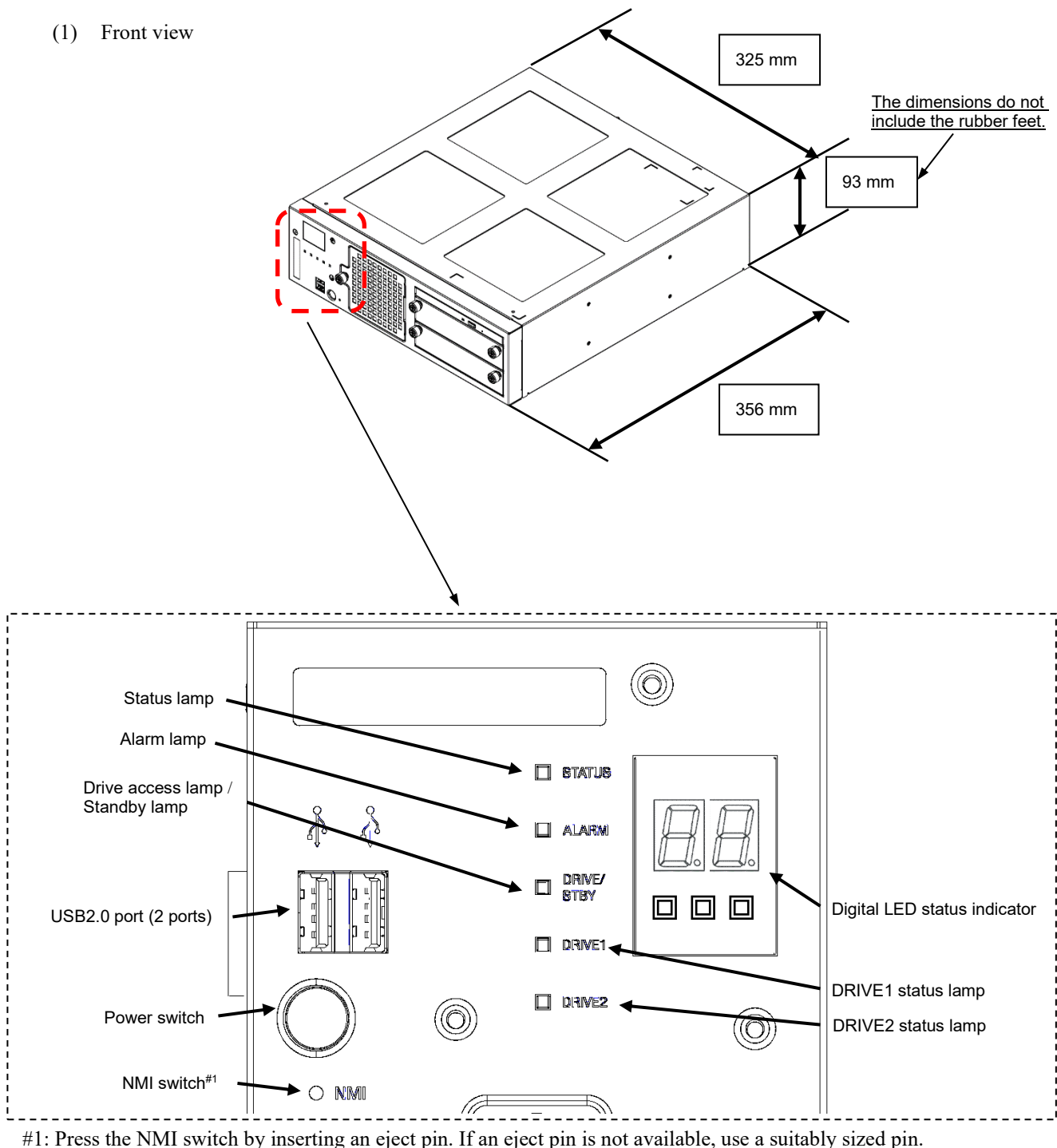
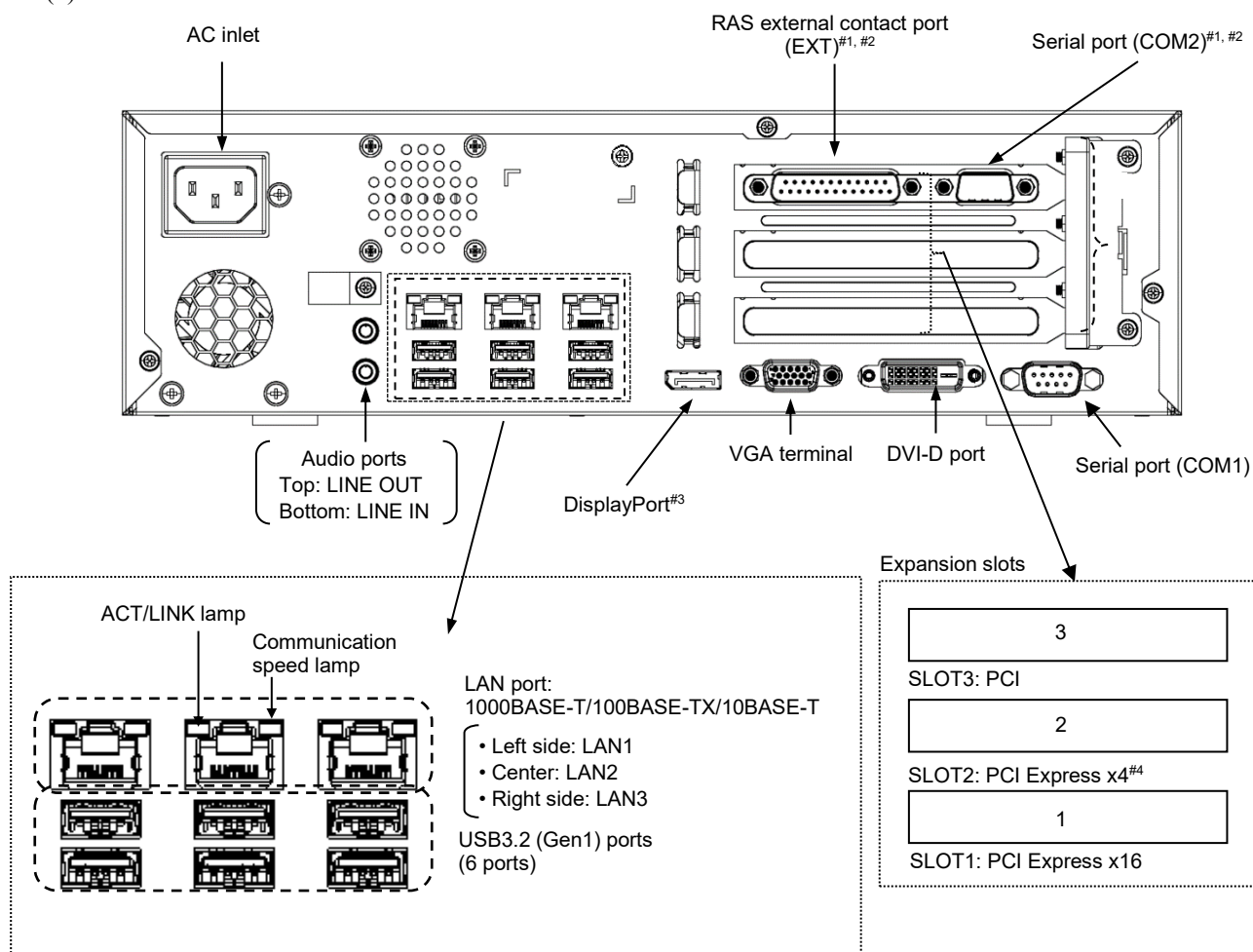


Figure 1-1 Name of each part (front view)

(2) Rear view



#1: An RAS external contact port and a serial port (COM2) are implemented on the optional RAS board.

#2: They are not explicitly marked as EXT or COM2 on the main unit.

#3: If a DisplayPort-connected display is turned off, it can no longer be detected.

#4: Although a PCI Express x16 connector is used, the internal connection is equivalent to PCI Express x4.

Figure 1-2 Name of each part (rear view)

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(3) Physical configuration inside the equipment

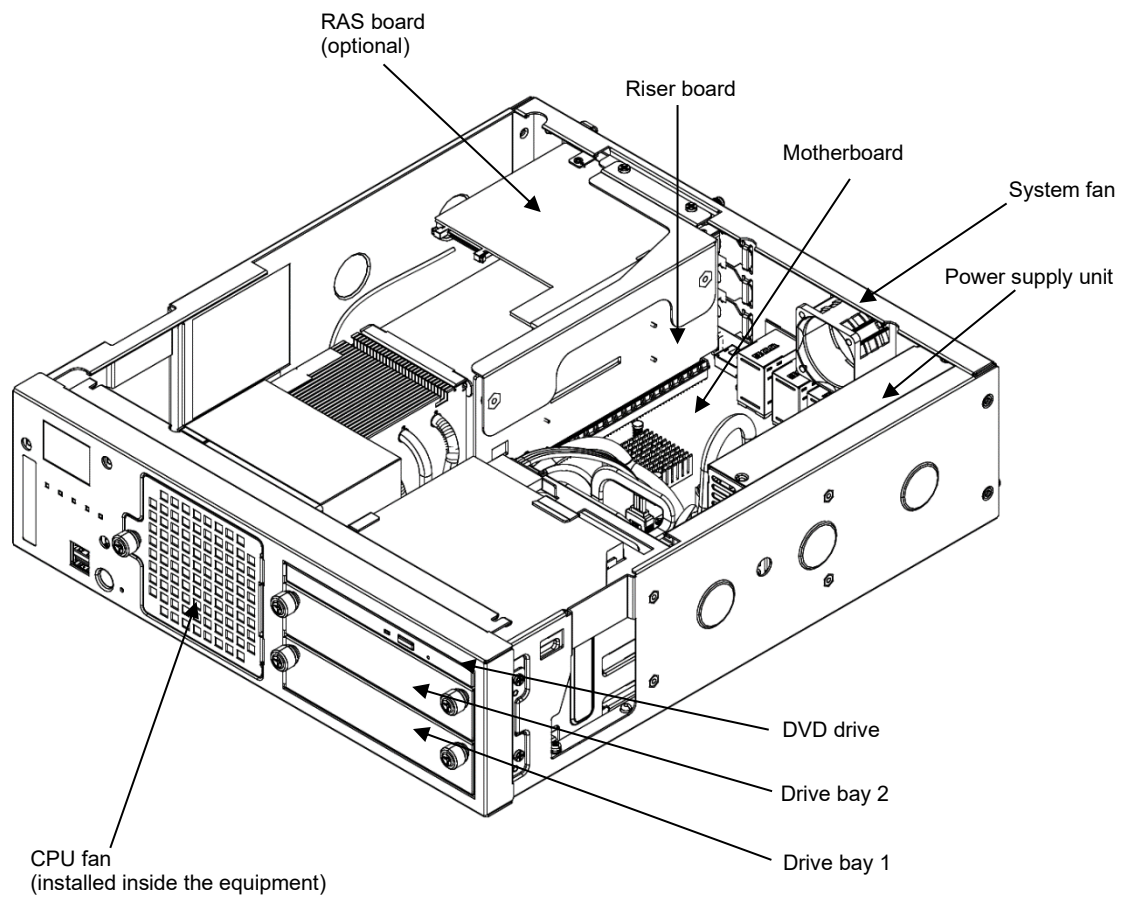


Figure 1-3 Physical configuration inside the equipment

Table 1-1 Function of each part (1/5)

Name	Function										
Power switch	Pressing this switch turns the power on. Holding down the switch for four seconds or more turns the power off and sets the system to standby mode. (emergencies only) (*)										
NMI switch (NMI)	Pressing this switch while the OS is running starts memory dump collection and displays a blue screen. In the default OS settings, the system will restart after memory dump collection.										
Status lamp (STATUS)	<table border="1"> <thead> <tr> <th>Lamp</th><th>Status</th></tr> </thead> <tbody> <tr> <td>Lit in green</td><td>The equipment is operating (RUN status).</td></tr> <tr> <td>Lit in red</td><td>The equipment is not operating (STOP status): <ul style="list-style-type: none"> • The equipment is starting up. • An equipment shutdown has started or an error stop occurred. • The equipment has stopped abnormally because of an error. • RAS software is not installed. </td></tr> <tr> <td>Off</td><td>The main power is off or the system is in standby mode.</td></tr> </tbody> </table>	Lamp	Status	Lit in green	The equipment is operating (RUN status).	Lit in red	The equipment is not operating (STOP status): <ul style="list-style-type: none"> • The equipment is starting up. • An equipment shutdown has started or an error stop occurred. • The equipment has stopped abnormally because of an error. • RAS software is not installed. 	Off	The main power is off or the system is in standby mode.		
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Off	The main power is off or the system is in standby mode.										
Alarm lamp (ALARM)	This lamp is lit in red if one of the following abnormalities is detected: <ul style="list-style-type: none"> • A fan inside the equipment has stopped. • The equipment interior temperature is abnormal. • A failure occurred in one of the mirrored disks (9 										
Drive access lamp / Standby lamp (DRIVE/STBY)	<table border="1"> <thead> <tr> <th>Lamp</th><th>Status</th></tr> </thead> <tbody> <tr> <td>Lit in orange</td><td>The equipment is in standby mode (only the auxiliary power is on).</td></tr> <tr> <td>Lit in green</td><td>The equipment is accessing an HDD, SSD, or DVD drive.</td></tr> <tr> <td>Off</td><td>The power is off or the equipment is operating.</td></tr> </tbody> </table>	Lamp	Status	Lit in orange	The equipment is in standby mode (only the auxiliary power is on).	Lit in green	The equipment is accessing an HDD, SSD, or DVD drive.	Off	The power is off or the equipment is operating.		
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Off	The power is off or the equipment is operating.										
DRIVE status lamps (DRIVE1: For drive bay 1 DRIVE2: For drive bay 2 (B/T model only)	<table border="1"> <thead> <tr> <th>Lamp</th><th>Status</th></tr> </thead> <tbody> <tr> <td>Off</td><td>No problems are detected.</td></tr> <tr> <td>Lit in red</td><td>An HDD is offline (the power of the HDD/SSD is off).</td></tr> <tr> <td>Blinking red (either one)</td><td>Rebuild (copy) is in progress. Only the lamp of the copy destination HDD/SSD blinks.</td></tr> <tr> <td>Blinking red (both)</td><td>Both HDD/SSD 1 and 2 are offline.</td></tr> </tbody> </table>	Lamp	Status	Off	No problems are detected.	Lit in red	An HDD is offline (the power of the HDD/SSD is off).	Blinking red (either one)	Rebuild (copy) is in progress. Only the lamp of the copy destination HDD/SSD blinks.	Blinking red (both)	Both HDD/SSD 1 and 2 are offline.
Lamp	Status										
Off	No problems are detected.										
Lit in red	An HDD is offline (the power of the HDD/SSD is off).										
Blinking red (either one)	Rebuild (copy) is in progress. Only the lamp of the copy destination HDD/SSD blinks.										
Blinking red (both)	Both HDD/SSD 1 and 2 are offline.										

(*) Normally, no power is supplied to the USB ports while the device is in standby mode. However, it has been observed that if a USB device is connected after the device has entered standby mode by pressing the power switch for more than 4 seconds, power may be supplied to the connected USB port.

1. Getting started

Table 1-1 Function of each part (2/5)

Name	Function
AC inlet	This is used when connecting a power cord.
Power supply unit	This is a power supply module with a wide-range input voltage (100 to 240 V AC).
Audio port (LINE IN)	This is the audio line input.
Audio port (LINE OUT)	This is the audio line output.
Serial port (COM1) (9 pins: RS-232C)	This connector is used to connect a device that uses a serial interface, such as a modem. (See 5.8.1 Connector specifications.)
Serial port (COM2) ^{#1} (9 pins: RS-232C) (Optional)	This connector is used to connect a device that uses a serial interface, such as a modem. (See 5.8.1 Connector specifications.)
RAS external contact port (EXT) ^{#1} (25 pins: DI/DO) (Optional)	This connector is used to connect external contacts. (See 5.8.1 Connector specifications.)
VGA terminal	This is used to connect a cable from the analog interface of a display. (See 5.8.1 Connector specifications.)
DVI-D port	This is used to connect a cable from the digital interface of a display. (See 5.8.1 Connector specifications.)
DisplayPort	This is used to connect a cable from the digital interface of a display. (See 5.8.1 Connector specifications.)
Expansion slot (SLOT3)	This is a slot for inserting a PCI board.
Expansion slot (SLOT2)	This is a slot for inserting a PCI Express x4 board, but the connector is PCI Express x16.
Expansion slot (SLOT1)	This is a slot for inserting a PCI Express x16 board, which can be x1, x2, x4, x8, or x16.
USB ports (USB2.0/USB3.2 (Gen1))	These ports are used to connect USB devices.

#1: These are not explicitly marked as EXT or COM2 on the main unit

Table 1-1 Function of each part (3/5)

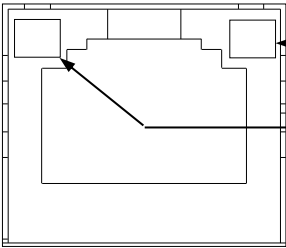
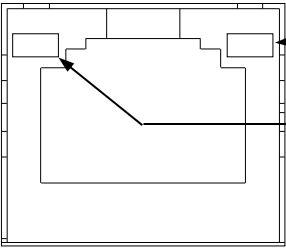
Name	Function																				
LAN port (1000Base-T/100Base-TX/ 10Base-T)	<p>This port is used to connect a LAN cable. (See 5.8.1 <i>Connector specifications</i>.)</p> <ul style="list-style-type: none"> On-board LAN  <p>The diagram shows a rectangular area representing the LAN port. It contains two small squares. One square is labeled 'Communication speed lamp' with an arrow pointing to it. The other square is labeled 'ACT/LINK lamp' with an arrow pointing to it.</p> <table border="1"> <thead> <tr> <th colspan="2">ACT/LINK lamp</th></tr> <tr> <th>Lamp</th><th>Status</th></tr> </thead> <tbody> <tr> <td>Lit in green</td><td>A link is established. Both the equipment and the remote device are powered up, and the connection over the twisted-pair Ethernet cable is stable.</td></tr> <tr> <td>Off</td><td>No link is established. <ul style="list-style-type: none"> The equipment is not physically connected to the network. The switching hub is not powered up. The connection over the twisted-pair Ethernet cable is not stable. The driver settings contain one or more errors. </td></tr> <tr> <td>Blinking green</td><td>Network data is being transmitted or received. The blink interval changes depending on network traffic.</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Communication speed lamp</th></tr> <tr> <th>Lamp</th><th>Status</th></tr> </thead> <tbody> <tr> <td>Lit in orange</td><td>The link is established at 1000 Mbps.</td></tr> <tr> <td>Lit in green</td><td>The link is established at 100 Mbps.</td></tr> <tr> <td>Off</td><td>The link is established at 10 Mbps, or no link is established.</td></tr> </tbody> </table>	ACT/LINK lamp		Lamp	Status	Lit in green	A link is established. Both the equipment and the remote device are powered up, and the connection over the twisted-pair Ethernet cable is stable.	Off	No link is established. <ul style="list-style-type: none"> The equipment is not physically connected to the network. The switching hub is not powered up. The connection over the twisted-pair Ethernet cable is not stable. The driver settings contain one or more errors. 	Blinking green	Network data is being transmitted or received. The blink interval changes depending on network traffic.	Communication speed lamp		Lamp	Status	Lit in orange	The link is established at 1000 Mbps.	Lit in green	The link is established at 100 Mbps.	Off	The link is established at 10 Mbps, or no link is established.
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Lit in green	The link is established at 100 Mbps.																				
Off	The link is established at 10 Mbps, or no link is established.																				

Table 1-1 Function of each part (4/5)

Name	Function																				
LAN port (1000Base-T/100Base-TX/ 10Base-T)	<div><ul style="list-style-type: none">Optional LAN adapter (HJ-F2060-20)<div><div><div>ACT/LINK lamp</div><div>Communication speed lamp</div></div></div><table><tr><th colspan="2">ACT/LINK lamp</th></tr><tr><th>Lamp</th><th>Status</th></tr><tr><td>Lit in green</td><td>A link is established. Both the equipment and the remote device are powered up, and the connection over the twisted-pair Ethernet cable is stable.</td></tr><tr><td>Off</td><td>No link is established.<ul style="list-style-type: none">The equipment is not physically connected to the network.The switching hub is not powered up.The connection over the twisted-pair Ethernet cable is not stable.The driver settings contain one or more errors.</td></tr><tr><td>Blinking green</td><td>Network data is being transmitted or received. The blink interval changes depending on network traffic.</td></tr></table><table><tr><th colspan="2">Communication speed lamp</th></tr><tr><th>Lamp</th><th>Status</th></tr><tr><td>Lit in orange</td><td>The link is established at 1000 Mbps.</td></tr><tr><td>Lit in green</td><td>The link is established at 100 Mbps.</td></tr><tr><td>Off</td><td>The link is established at 10 Mbps, or no link is established.</td></tr></table></div>	ACT/LINK lamp		Lamp	Status	Lit in green	A link is established. Both the equipment and the remote device are powered up, and the connection over the twisted-pair Ethernet cable is stable.	Off	No link is established. <ul style="list-style-type: none">The equipment is not physically connected to the network.The switching hub is not powered up.The connection over the twisted-pair Ethernet cable is not stable.The driver settings contain one or more errors.	Blinking green	Network data is being transmitted or received. The blink interval changes depending on network traffic.	Communication speed lamp		Lamp	Status	Lit in orange	The link is established at 1000 Mbps.	Lit in green	The link is established at 100 Mbps.	Off	The link is established at 10 Mbps, or no link is established.
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Note 1: The locations of the ACT/LINK lamp and the communication speed lamp differ between the optional LAN adapter and the onboard LAN.

Note 2: Looking from the rear of this equipment in a horizontal installation: port A is on the right, and port B is on the left.

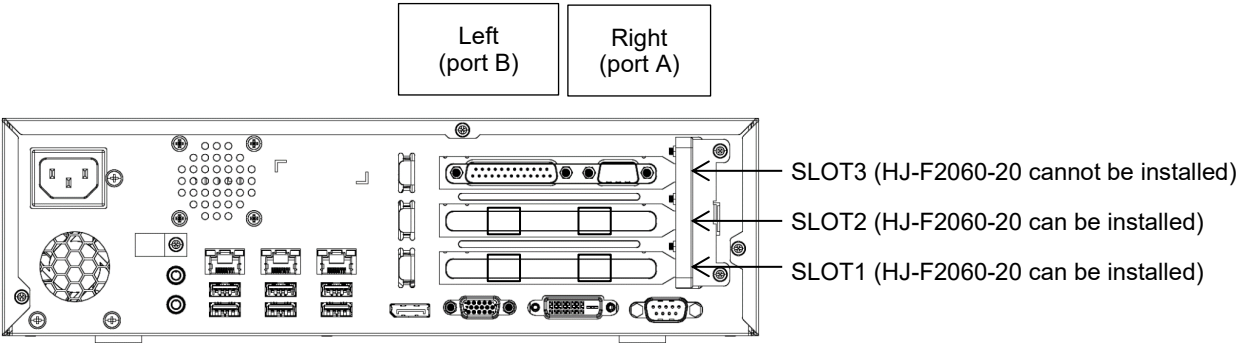
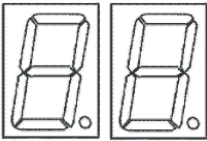
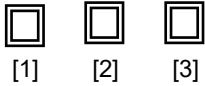


Table 1-1 Function of each part (5/5)

Name	Function
<p>Digital LED status indicator</p>   <p>[1] [2] [3]</p> <p>Status indication LEDs</p>	<p>Various states of this equipment are indicated as a two-digit code in hexadecimal, and by the status indication LEDs.</p> <p>The digital LED status indicator and the status identification LEDs might remain lit even after the equipment shuts down or enters standby mode. This condition remains until the power is turned on again.</p> <p>Status identification LEDs:</p> <p>[1] RAS status (red)</p> <p>[2] Application status (green)</p> <p>[3] BIOS status (orange)</p> <p>(For information about how to display arbitrary status data on the digital LED status indicator from a user application, see the <i>HF-W2000 Model 68/65 RAS FEATURES MANUAL</i> (WIN-63-0102).)</p>

NOTE

- For information about the precautions for USB devices, see 6. *USB devices in Precautions*.

1.6 Installation environment

1.6.1 Environment



CAUTION

If this equipment is stored at high temperature, be careful not to touch it with your bare hands. Touching the equipment in this state might result in burns.

This equipment must be used in the following environment.

Item	Requirement
Ambient temperature (operation)	Model 68: 5°C to 35°C Model 65: 5°C to 40°C (at altitudes of 1000 m or higher)
Ambient temperature (storage)	-10 to 60 °C
Temperature gradient	±10 K/h or less
Humidity	20% to 80% RH (non-condensing)
Humidity gradient	10% RH/h or less
Dust [#]	No excessive dust (0.3 mg/m ³ or less (JEITA IT-1004B Class B))
Corrosive gas	None (JEITA IT-1004B Class B (temperature: 25°C, humidity 50% RH))
Vibration resistance	5.9 m/s ² (10 Hz, 5 s; excluding the DVD drive)
Shock resistance	Operation: 19.6 m/s ² (while not powered on: 98 m/s ²)
Power voltage	100 to 240 V AC ±10%
Power frequency	50/60 Hz ± 3 Hz
Power supply noise	2.0 kV (fast transient/burst wave)
Electrostatic noise contact discharge	4 kV (air: 8 kV)
Insulation resistance	500 V DC, 20 MΩ
Dielectric strength	1.5 kV AC, one minute
Transient power fault	20 ms or less
Altitude	2,000 m or less

[#]: This equipment cannot be used in an environment where conductive dust or similar substances are airborne.

NOTE

- For information about the precautions for the environment, see (5) *Installation environment* under 1. *Precautions about the environment* in *Precautions*.

1.6.2 Installation



WARNING

- Use only the power cord provided with this equipment. Using any other cable might cause equipment failure, fire, or electric shock.
Before using this equipment at a voltage exceeding 125 V AC, ensure that the power cord is appropriate for the input voltage, and perform sufficient operational verification in advance.
- Make sure that the power outlet used to connect this equipment is properly earthed via a suitable ground pole. Furthermore, ensure that an earth leakage circuit breaker is installed.
Failure to take these measures might result in fire or electric shock.
- Do not use a two-prong plug without a ground pole, as doing so might result in electric shock or failure of the equipment.



CAUTION

- When installing the device on a desk, ensure that it is placed on a level surface. Failure to do so may result in the device tipping over or falling, which could cause injury. Additionally, when placing the device in a vertical position, always attach the included vertical stand to the device.

NOTICE

- Before you move this equipment, make sure you shut down the OS, unplug the power cord, and wait for at least one minute. Failure to do so might cause HDDs, SSDs, or other devices to fail.
- When transporting or carrying the equipment, use the dedicated container and packing materials used for initial delivery of the equipment. Use of a different container or packing materials might result in damage to the equipment.
- If the dedicated container is damaged or broken, do not use it to transport or carry the equipment. Doing so might result in damage to the equipment.

NOTE

- For information about precautions concerning the installation requirements, see (5) *Installation environment* under 1. *Precautions about the environment* in *Precautions*.

1. Getting started

Table 1-2 Dimensions, operation and service clearance, and installation clearance

Dimensions (mm)			Operation and service clearance (mm)				Installation clearance (mm)			
Height	Width	Depth	Front	Rear	Left	Right	Front	Rear	Left	Right
93	325	356	500	600	200	200	50	100	10	10

- When operating the equipment or doing maintenance work, provide sufficient clearance, as shown in Figure 1-4.
- The equipment is cooled by fans (with intake vents at the front and exhaust vents at the rear and sides). Ensure that air flow is not blocked.

In particular, leave sufficient clearance at the front (50 mm) and rear (100 mm). (This includes the clearance required for routing cable connectors at the rear.)

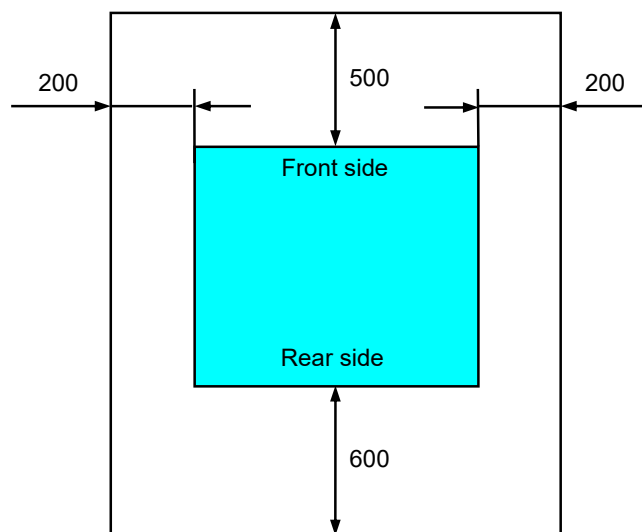


Figure 1-4 Operation and service clearance (top view)

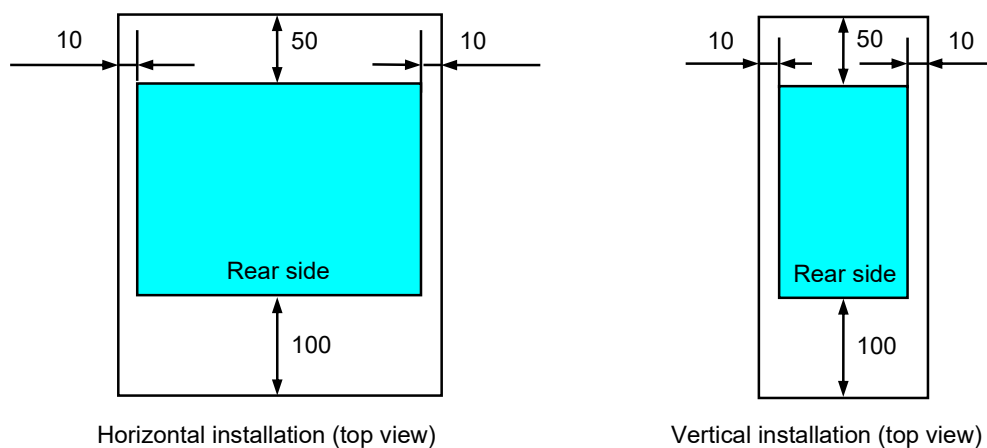


Figure 1-5 Installation clearance

(a) Horizontal installation on a desktop

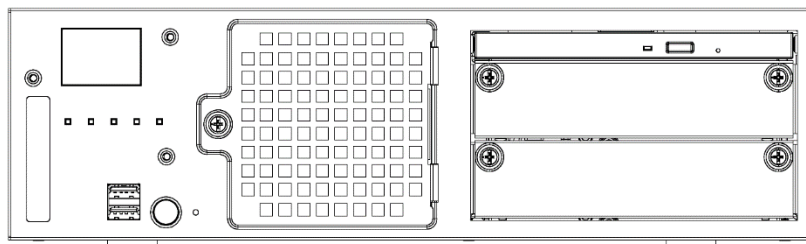


Figure 1-6 Exterior view (horizontal installation on a desktop)

(b) Vertical installation on a desktop

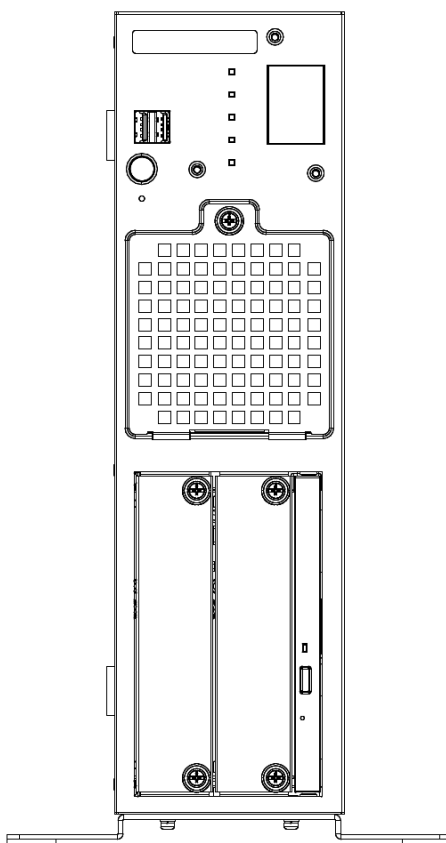


Figure 1-7 Exterior view (vertical installation on a desktop)

1.7 Hardware connections



WARNING

- Ensure that no excessive load is applied to the cables connected to the device during operation. Using the device while stress is placed on the cables may result in smoke generation or fire.

NOTICE

- Do not route interface cables (such as those for a PC and other devices) near the power cord. Doing so might cause failure or malfunction of the equipment.
- Do not connect or disconnect an interface cable while the power for this equipment or a remote device is on. Doing so might cause failure of the equipment from a short-circuit between power supply and ground.
If an interface cable becomes disconnected while the power for the equipment is on, shut down the OS, and then unplug the power cord from the outlet. Unplugging the power cord from the outlet without shutting down the OS might result in loss of important data.
- When connecting a cable for external contacts, make sure you connect it to the RAS external contact port (EXT). Relay load voltages as high as 40 V DC might be applied to such cables. Connecting such a cable to the wrong connector might cause failure of the equipment.

Before connecting any hardware, carefully read and ensure that you understand the content of the *Safety instructions* section of this document.

Connect hardware based on the connection example shown in the following figure.

Connect the display, keyboard, and mouse to this equipment, and then plug the power cord into an outlet.

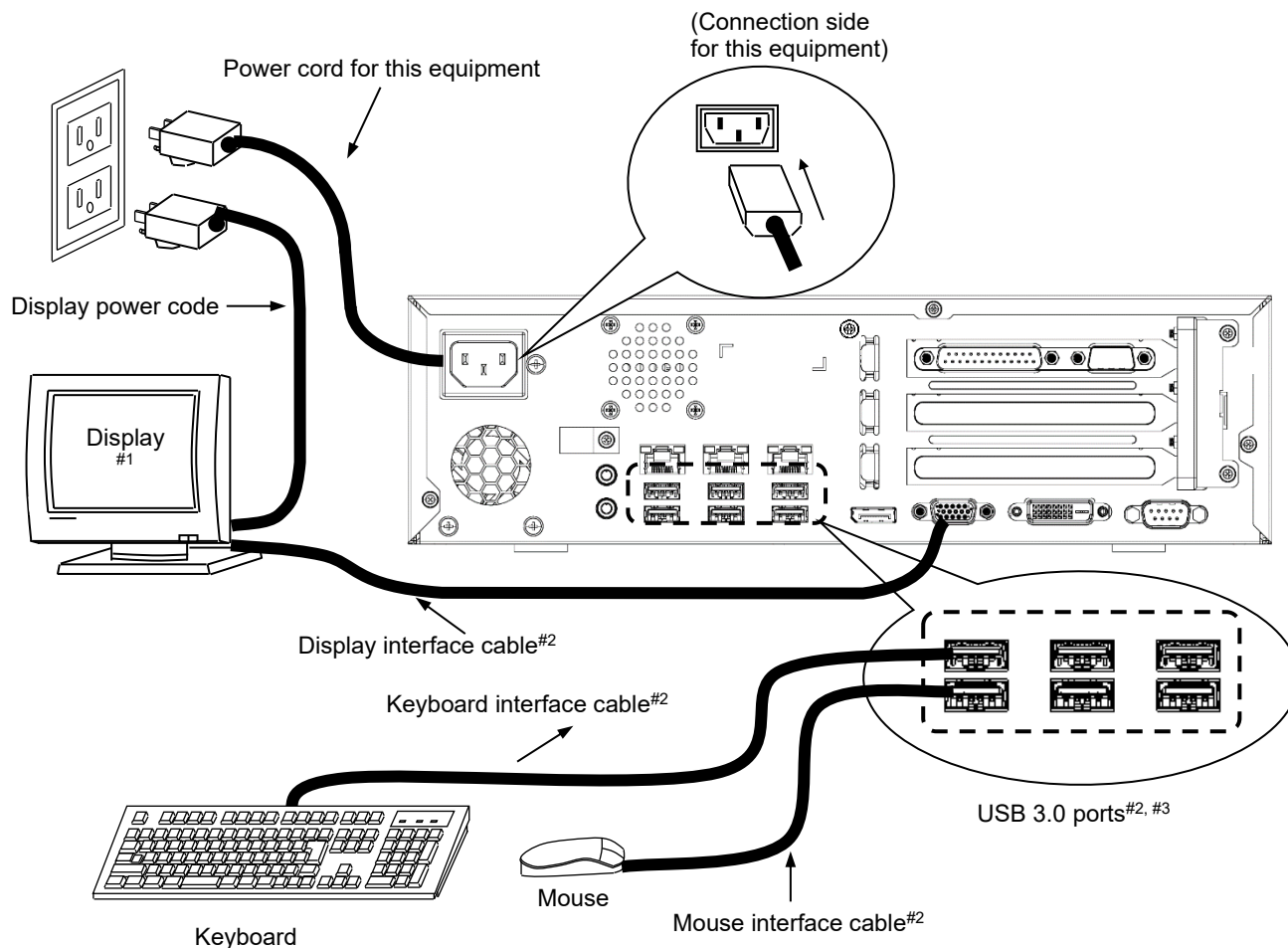


Figure 1-8 Hardware connections

#1: For information about the naming of the user input module and how to operate and adjust the device, see the user's manual that comes with the device.

#2: For information about the length of each connection cable, see *5.8.3 External interface cable length specifications*. The mouse and keyboard interface cables must be directly connected to this equipment. Do not use extension cables for these cables.

If you use extension cables, the mouse or keyboard might not work properly.

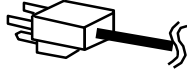
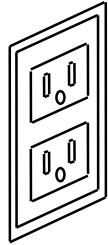
#3: When connecting USB devices to the USB connectors, note the orientation of the connectors. Furthermore, note that a USB cable might become disconnected if it is knocked. (USB ports do not typically have a mechanism to secure the cable in the port.) Secure USB cables as necessary when installing this equipment.

Note: To ensure conformity with EMC standards (VCCI, FCC, and CE), use shielded cables for the interface cables connected to the equipment (display interface cable, keyboard interface cable, and mouse interface cable).

1. Getting started

- Connecting to an outlet

Fully and securely insert the plug of the power cord of this equipment into an outlet with a grounding pole that is properly grounded.^{#1}



Use a power cord with a 2-pole plug and grounding pole.

#1: If you have no choice other than to use an outlet without a grounding pole that is properly grounded, use a 3-pole to 2-pole conversion adapter and connect the green ground line from the adapter to the ground of the outlet. Verify proper functionality of the 3-pole to 2-pole conversion adapter before using it.

NOTE

- The power cord that comes with the equipment is rated at an input voltage of 125 V AC.
When using this equipment at voltages over 125 V AC, prepare a power cord that is compatible with the input voltage to be used.
- If you use a power cord clamp to prevent accidental disconnection, leave sufficient slack in the power cord to facilitate disconnection in an emergency. Alternatively, install an emergency circuit breaker at the outlet side.

Chapter 2 Operation

2.1 Before turning on the power

WARNING

- If an air intake or exhaust vent of the equipment is blocked, increased chassis interior temperature could lead to fire or equipment failure. Make sure you install the equipment with sufficient clearance around it. (See 1.6.2 *Installation*.)

NOTE

When turning on the power, see the following:

- (2) *Interface cables* under 1. *Precautions about the equipment* in *Precautions*
- (4) *Power supply* under 1. *Precautions about the equipment* in *Precautions*
- (5) *Installation environment* under 1. *Precautions about the equipment* in *Precautions*

2.2 Starting the equipment

To start the equipment:

1. Plug the power cord into an outlet.

When the power cord is plugged into an outlet, the standby lamp (DRIVE/STBY) lights up orange.

2. Turn on the display.
3. Press the power switch. (See *1.5 Name and function of each part*.)

When the power is turned on, the standby lamp (DRIVE/STBY) turns off and the status lamp (STATUS) lights. The status lamp turns red when the power is turned on, and green when the OS has started up and the equipment is operating.

4. Set up the equipment as described in *3.1 Setup procedure when turning on the power for the first time*. (This procedure is required only once, after purchasing the equipment and turning it on for the first time.)

NOTE

- When RAS software is not installed or during the recovery process, the status lamp (STATUS) remains red (does not turn green).

After these steps are complete, the equipment automatically performs startup until the sign-in screen appears.

For information about controlling the power by using a LAN, see *2.7 Controlling the power by using a LAN*.

2.3 Shutting down the equipment

When shutting down the equipment, first verify that no other users are using the equipment and that no background programs are running, and then perform the following actions:

- Stop application programs.
- Shut down the OS.

The specific procedure for stopping an application program differs depending on the application. For more information, see the manual of the relevant application.

To shut down the OS, click the **Start** button at the bottom-left corner of the screen to open the Start menu. Then, click **Power** and **Shutdown**. After the OS shuts down, the power automatically turns off, and only the auxiliary power supply remains on (standby mode). (In this mode, the status lamp (STATUS) turns off and the standby lamp (DRIVE/STBY) lights up orange.)

If the normal shutdown process cannot be performed (for example, a shutdown request cannot be accepted because of a system deadlock), press and hold the power switch for at least four seconds. The power turns off and the equipment goes into standby mode. If you turn off the power by pressing and holding the power switch for at least four seconds, you cannot turn on the power via a LAN the next time that you turn the power on. Do not turn off the power this way except in emergencies. (See *2.7 Controlling the power by using a LAN*.) For information about how to collect a memory dump, see *8.2 Memory dump collection feature*.

2.4 Shutting down the power

1. Verify that the equipment is shut down. (See 2.3 *Shutting down the equipment*.)
2. Unplug the power cord of the equipment from the outlet.
3. When the AC power is off as a result of step 2, the standby lamp (DRIVE/STBY) turns off.

2.5 Emergency shutdown



WARNING

In the case of smoke, a burning smell, or a similar problem, unplug the power cord and contact your dealer or maintenance personnel. Using faulty equipment might result in fire or electric shock.

NOTICE

- Performing emergency shutdown (unplugging the power cord or shutting off the circuit breaker without proper shutdown of the OS) might cause malfunction of the OS or applications, or corruption of saved data. Never perform emergency shutdown unless you must stop the system immediately because of an error.
- Keep in mind that if the power supply is cut, the system might not be able to recover automatically.

In the following cases, turn off power at the AC power source:

- When the equipment exhibits an abnormal condition, and you must shut down the power immediately (for example, when you detect a burning smell)
- When you cannot shut down the equipment because of an error
- When the power is turned off repeatedly or only the auxiliary power supply is on because of excess current or overheating

In the following cases, unplug the power cord of this equipment or turn off power at the AC power source:

- If the fan is stopped and temperature becomes too high or low, causing the power to turn off automatically to protect the equipment (leaving only the auxiliary power supply on).

Before the OS is started, the BIOS might detect a stopped fan during BIOS startup. In this case, the power turns off automatically.

After the OS is started, when the RAS software detects that a fan is stopped, the OS automatically shuts down and power turns off (only if RAS software is already installed).

2.6 DVD drive

NOTICE

- If you insert or access a disc (CD or DVD), system load might increase and subsequently affect running applications. Do not insert or access a disc during online operation (system operation).
- When disc (CD or DVD) access is complete, eject the disc from the DVD drive. Leaving a disc in the DVD drive might result in failure.
- Leaving the disc tray open might result in failure.
Keep the disc tray closed when not in use.
- Do not use an optical disc that is unbalanced (such as one with labels attached), cracked, scratched, warped, or of a nonstandard shape. Use of such discs might cause abnormal sound, vibration might be generated and failure of the equipment might result.

2.6.1 Inserting an optical disc (CD or DVD)

1. Gently press the eject button to open the disc tray.
2. While supporting the disc tray with one hand, place the CD or DVD on the disc tray with the top (the side with the printed text) facing up.
3. Push the disc tray gently to load the disc into the DVD drive.

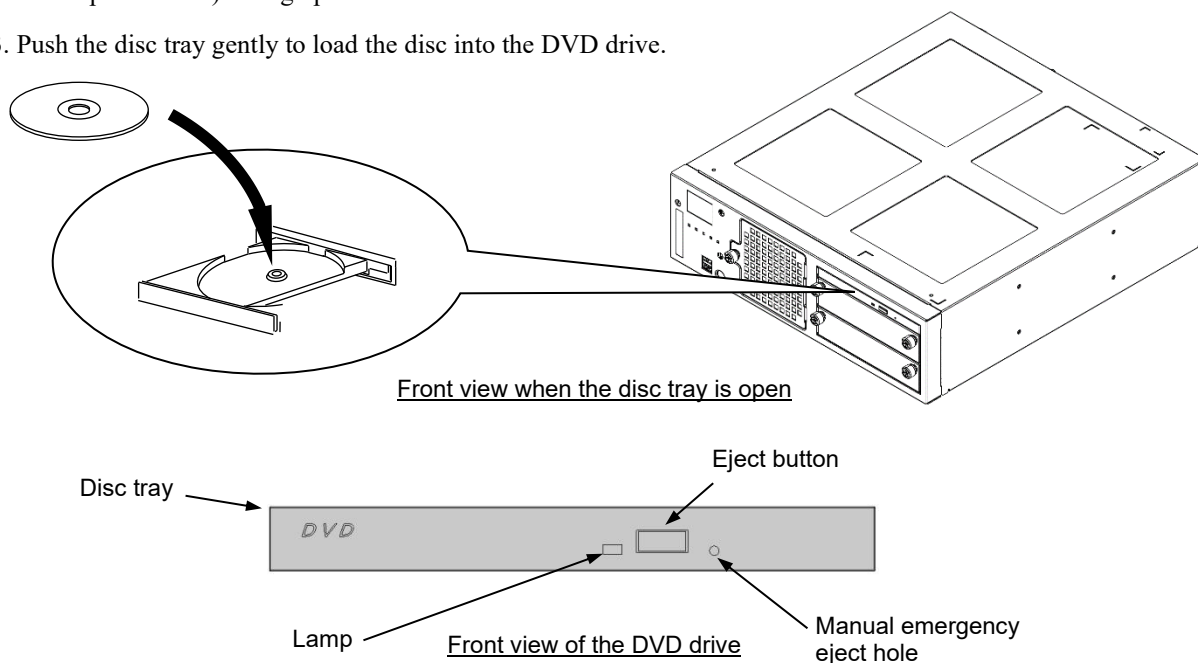


Figure 2-1 DVD drive (front view)

NOTE

- For information about precautions that apply to the DVD drive, see 5. *DVDs* in *Precautions*.

2.6.2 Ejecting an optical disc (CD or DVD)

1. Confirm that the drive is not operating (that is, the lamp is neither on nor flashing).
2. Press the eject button gently to open the disc tray.
3. Pick up the CD or DVD.

NOTE

- When writing to a CD or DVD, use the OS to eject the disc. If you press the eject button, writing to the disc might fail.

2.6.3 Using the DVD drive when the equipment is installed vertically

1. Press the eject button to eject the disc tray from the DVD drive.
2. While holding the disc tray with your left hand, set a CD or DVD on the disc tray with your right hand.
3. Remove your left hand from the disc tray.
4. Push the disc tray gently to load the disc into the DVD drive.
5. When removing a CD or DVD, avoid using excessive force.

2.7 Controlling the power by using a LAN

The power for this equipment can be turned on via a remote device by using a LAN.

This section explains Wake-on-Lan (WOL), which is used to turn on power to the equipment via a LAN. When you use WOL to turn on the power, the equipment is started through the transmission of a Magic Packet™ frame to the LAN interface when the standby lamp (DRIVE/STBY) is lit orange.

This feature is enabled by default. If you do not use WOL, we recommend that you change the setting to disable it for security reasons.

If you do not use this feature, follow steps 1 through 3 in *2.7.1 Enabling or disabling the Wake-on-LAN (WOL) feature* to disable the WOL feature, and then perform the following procedure.

NOTE

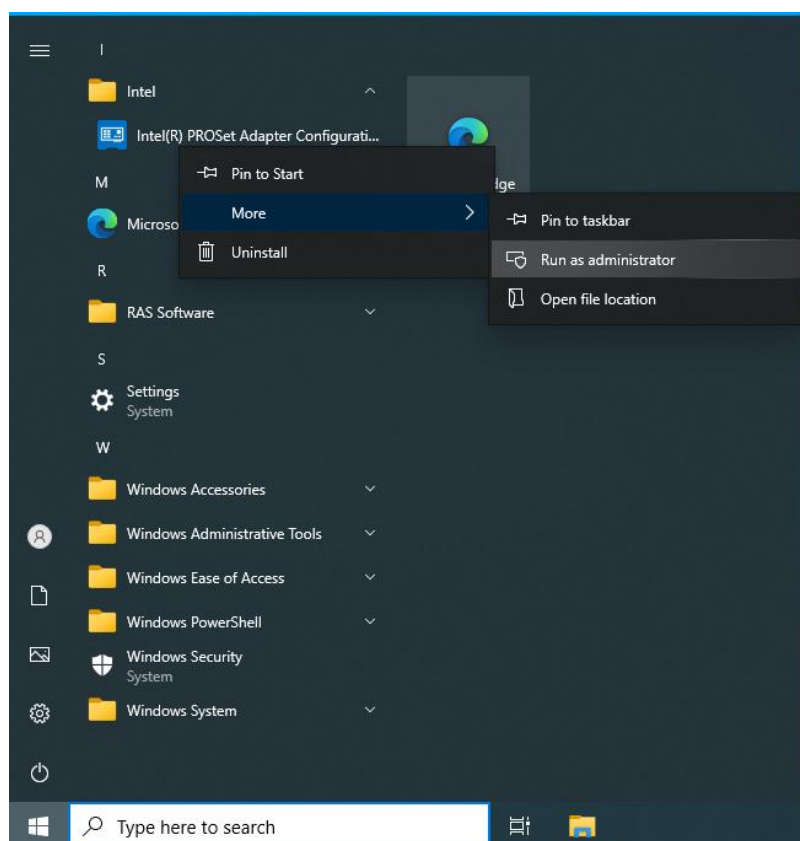
- For information about the precautions that apply to a network, see *2. Networks in Precautions*.

2.7.1 Enabling or disabling the Wake-on-LAN (WOL) feature

Perform the following procedure to specify whether to start WOL when a Magic Packet™ frame is received. The WOL feature is enabled by default.

< Windows® 10 and Windows Server® 2022 >

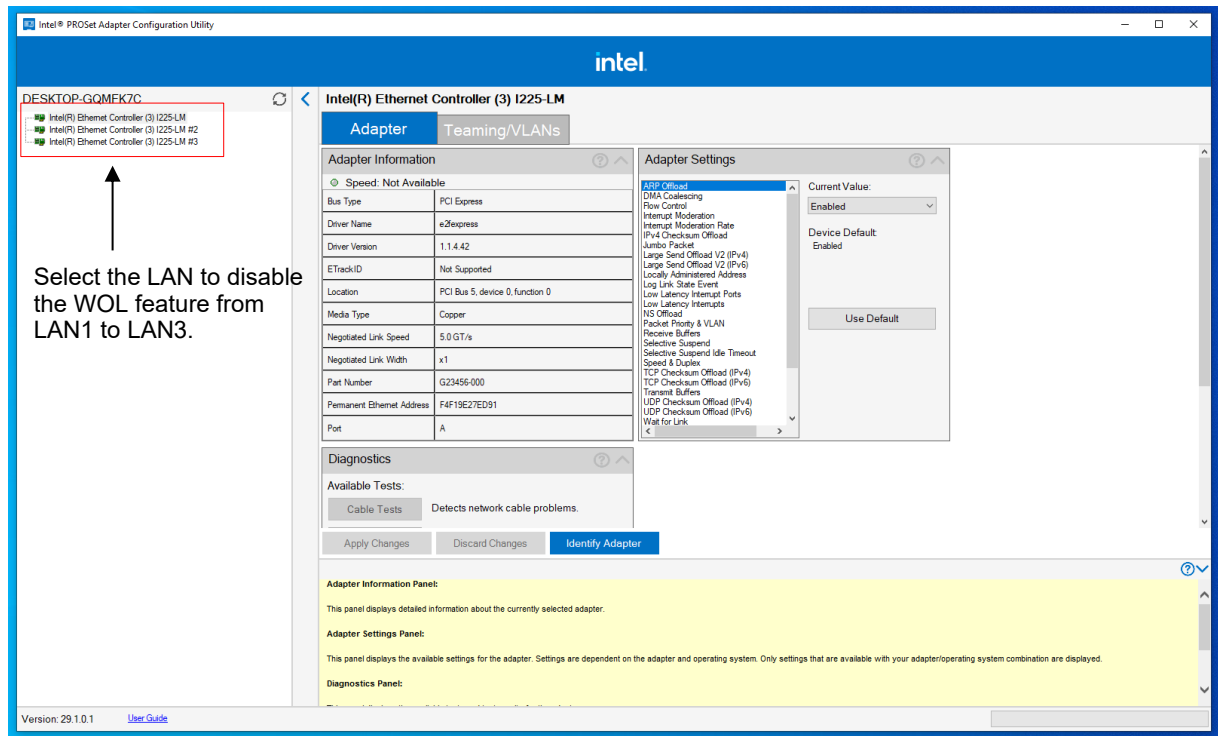
- Click the **Start** button, and then click **Intel**. Right-click *Intel(R) PROSet Adapter Configuration Utility*. Select **More**, and then click **Run as administrator**.



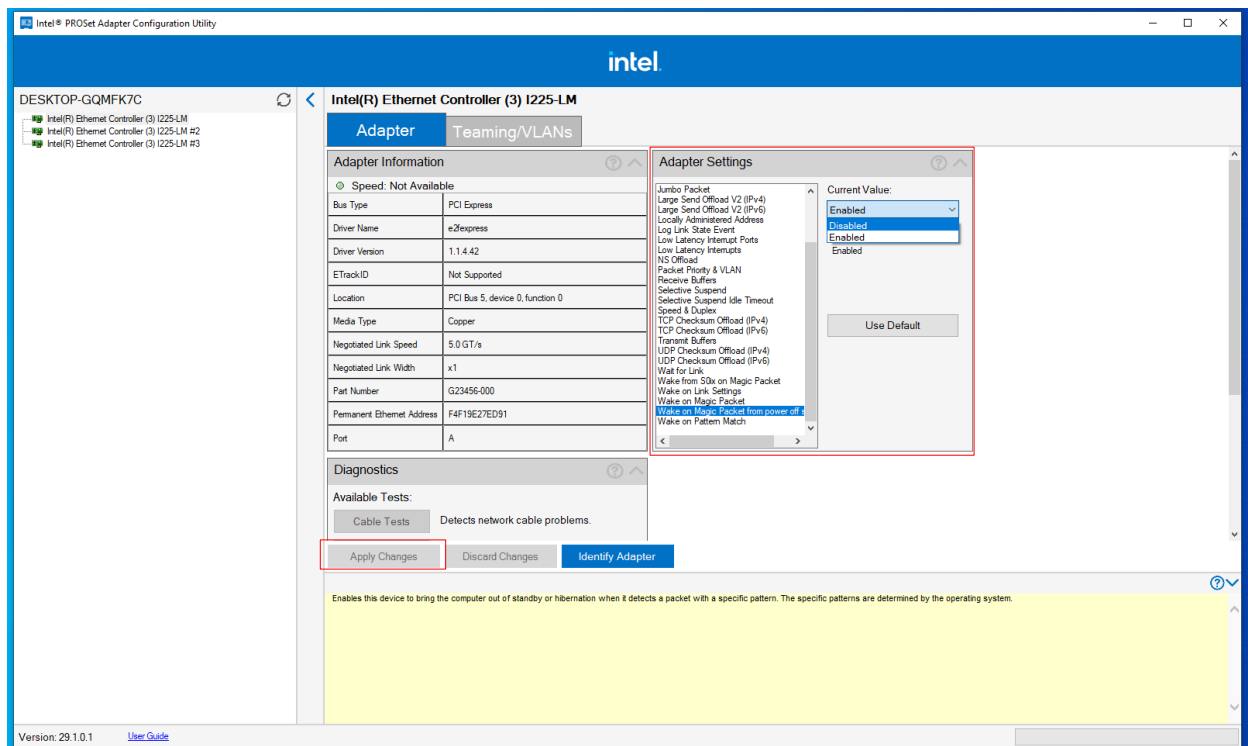
2. Operation

2. Select the LAN to disable the WOL feature from LAN1 to LAN3 of DESKTOP-xxxxxxx.

The above `xxxxxxx` might display a different character string for each device.

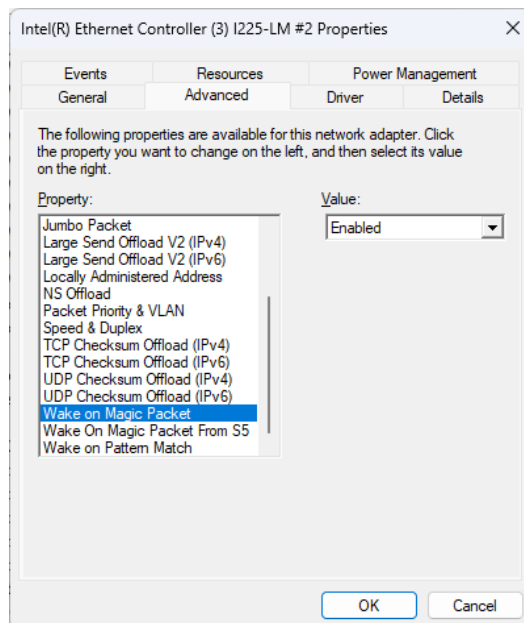


3. In the **Adapter Settings**, select **Wake on Magic Packet from power-off state**. From the **Current Value** pull-down menu, select **Enabled** or **Disabled** for the WOL feature, and then click the **Apply Changes** button.

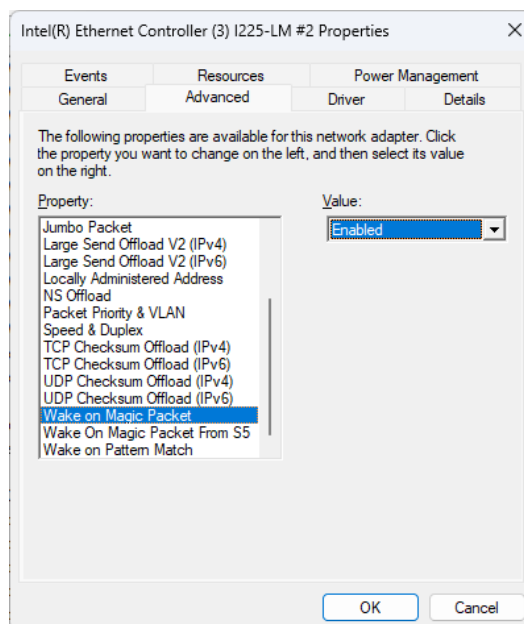


< Windows® 11 and Windows Server® 2025 >

1. Perform steps 1 through 5 in *Setting the network transfer speed* under 2.8 *Setting up the LAN interface*.
2. Click the **Advanced** tab, and then select the **Wake on Magic Packet** from the **Property** pull-down menu.



3. From the **Value** dropdown menu, select **Enabled** to enable the WOL function, or **Disabled** to disable it, then click the **OK** button.



2.7.2 Turning on the power by using a LAN

1. Plug the power cord into an outlet. The standby lamp (DRIVE/STBY) lights up orange.
2. Press the power switch to start the OS. When the OS starts up, the status lamp (STATUS) lights up green.
3. Follow steps 1 through 3 in *2.7.1 Enabling or disabling the Wake-on-LAN (WOL) feature* to enable the WOL feature.
4. Perform the shutdown process to turn the power off. The standby lamp (DRIVE/STBY) lights up orange. Retain this state.
5. Send a Magic Packet™ frame to the LAN port of this equipment. When the built-in LAN receives the Magic Packet™ frame, the equipment starts.

The standby lamp (DRIVE/STBY) must be lit in orange to start the equipment via the LAN (that is, by using WOL). If you start the equipment and you want to use WOL again at the next startup, perform the shutdown process to turn the power off.

The built-in LAN adapter of the equipment is compliant with WfM 2.0^{#1} to support Magic Packet™ technology^{#2}. This means that the equipment power can be turned on when a special data packet called a Magic Packet™ frame^{#2} is received by the built-in LAN adapter.

The equipment does not come with a program for transmitting Magic Packet™ frames. Use a commercially available program to transmit Magic Packet™ frames.

#1: Wired for Management (WfM) is a guideline regarding the hardware specifications proposed by Intel Corporation for managing PCs on a network.

#2: Magic Packet™ technology has been developed by Advanced Micro Devices, Inc., and can be used to start a PC over a network from a remote device.

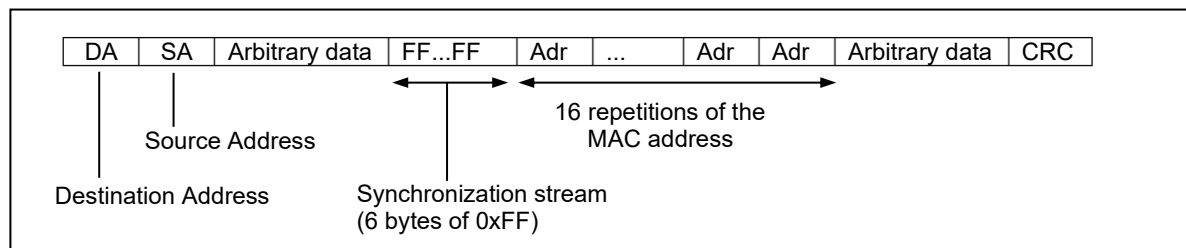
NOTE

- When you transmit a Magic Packet™ frame to the equipment, transmit the frame to the built-in LAN adapter of the equipment. (For information about the location of the connector, see *1.5 Name and function of each part*) You cannot use WOL if you send a Magic Packet™ frame to an optional LAN adapter.
- If you turn off the power by pressing and holding the power switch for at least four seconds, the subsequent power-on is not possible by using WOL. When you turn off the power by pressing and holding the power switch for at least four seconds, turn on the equipment by pressing the power switch, and then perform the shutdown process to turn off the power again.
- Even if you unplug the power cord from the socket after performing steps 1 through 3 in *2.7.2 Turning on the power by using a LAN*, you can still use WOL the next time you turn the power on.

About Magic Packet™ frames

In a Magic Packet™ frame, the SOURCE ADDRESS, DESTINATION ADDRESS (MAC address of the receiver or MULTICAST ADDRESS including the BROADCAST ADDRESS), CRC, and the like must meet the basic requirements of the LAN in use. The data in a Magic Packet™ frame consists of a sequence of 16 repetitions of the MAC address of the node. This sequence can be anywhere in the packet but it must follow a synchronization stream. The synchronization stream is defined as 6 bytes of 0xFF. As long as the MAC address that repeats itself 16 times targets the address of the equipment to be started, the device can receive a BROADCAST frame.

The following figure is an illustration of a Magic Packet™ frame:



2.8 Setting up the LAN interface

This equipment has three built-in 1000BASE-T/100BASE-TX/10BASE-T LAN ports. For information about the location of the LAN port connectors (1000BASE-T/100BASE-TX/10BASE-T), see *1.5 Name and function of each part*.

NOTE

- For information about the precautions that apply to a network, see *2. Networks in Precautions*.
- Automatic recognition of the network transfer speed and transfer mode
 The LAN ports have an auto-negotiation feature that automatically recognizes the network transfer speed and transfer mode. During normal use, enable the auto-negotiation feature. (Use the auto-negotiation feature when using the WOL feature. Note that if the speed is fixed to 1000 Mbps, the WOL feature cannot be used.) If there is a compatibility issue with a connected hub, the auto-negotiation feature might not work properly, which might affect communications with other terminals.
 If the auto-negotiation feature does not work properly, configure the LAN interface as follows:

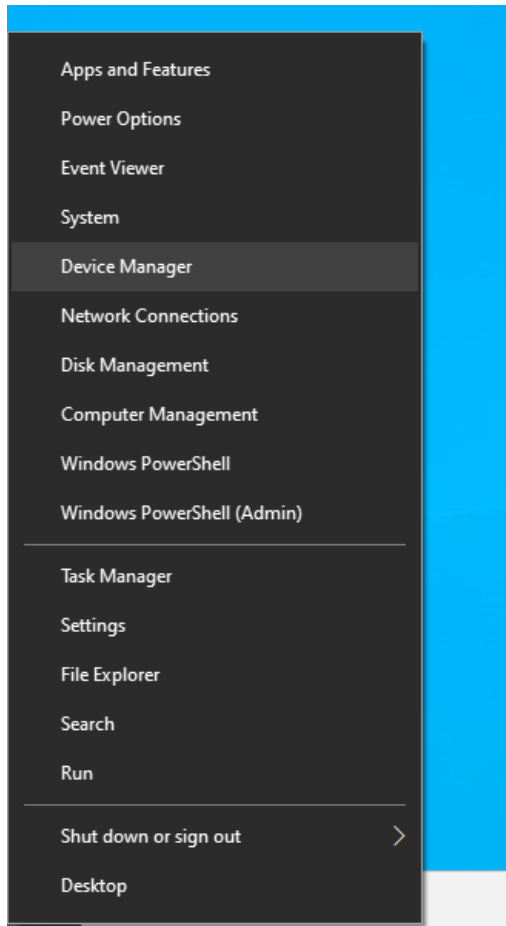
Specification of the hub	LAN setting specifications [#]	
	Speed	Duplex
10 Mbps, half-duplex	10Mbps	Half duplex
10 Mbps, full-duplex	10Mbps	Full duplex
100 Mbps, half-duplex	100Mbps	Half duplex
100 Mbps, full-duplex	100Mbps	Full duplex
1000Mbps	1000 Mbps (1.0 Gbps)	Full duplex

[#]: Settings are displayed differently depending on the OS and LAN port (including the optional LAN adapter) being used.

- Setting the network transfer speed

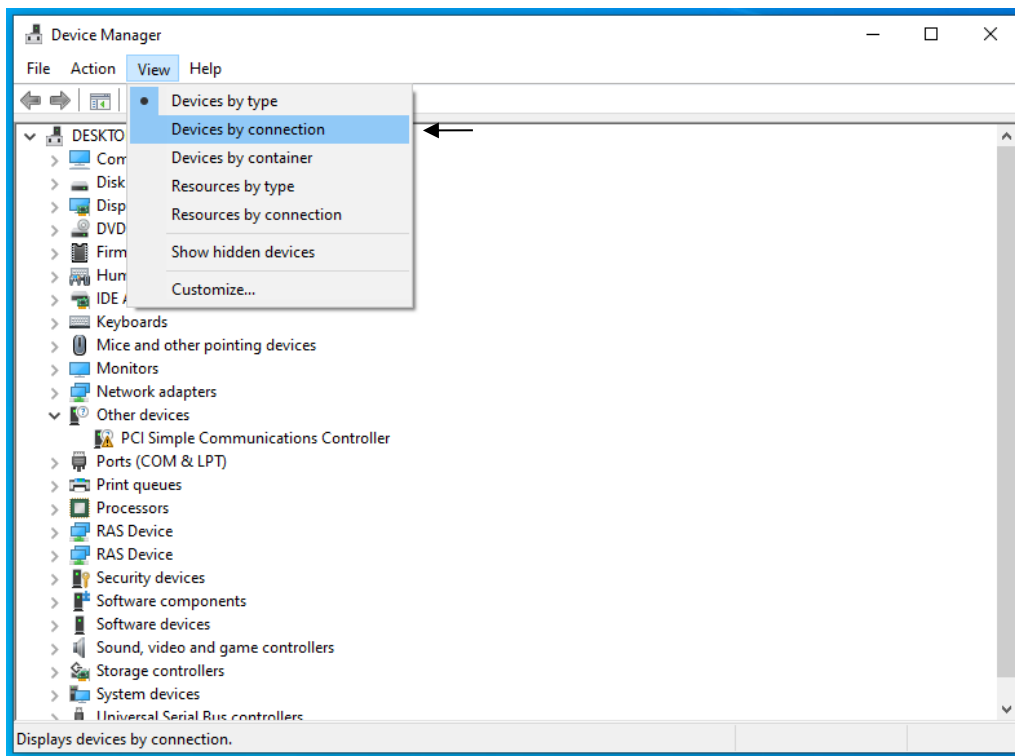
(The image shown is an example using Windows® 10, but the same applies to other operating systems.)

1. Log on to the computer by using an administrator account.
2. Right-click the Start menu, and then click **Device Manager**. The Device Manager window appears.

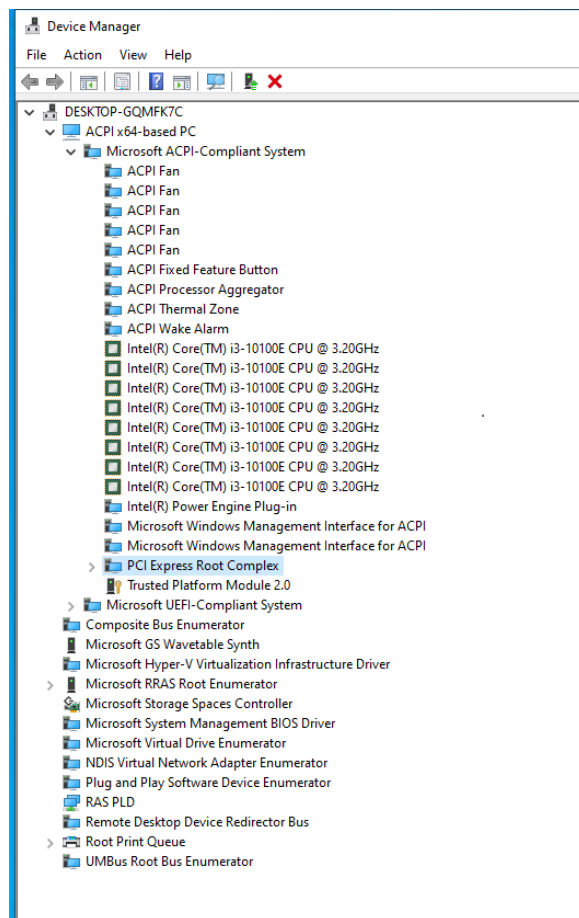


2. Operation

3. Click the **View** menu, and then select **Devices by connection**.



4. Click **ACPI x64-based PC**, **Microsoft ACPI-Compliant System**, and then **PCI Express Root Complex**.



2. Operation

5. Refer to the following, and double-click the network adapter that you want to configure to open the Network Connection Properties window.

To configure the built-in LAN (LAN1):

Click **Intel(R) PCI Express Root Port #6 – 06BD**. Then, double-click the network adapter under it (in the example in the following figure, the network adapter is **Intel(R) Ethernet Controller(3)I225-LM**).

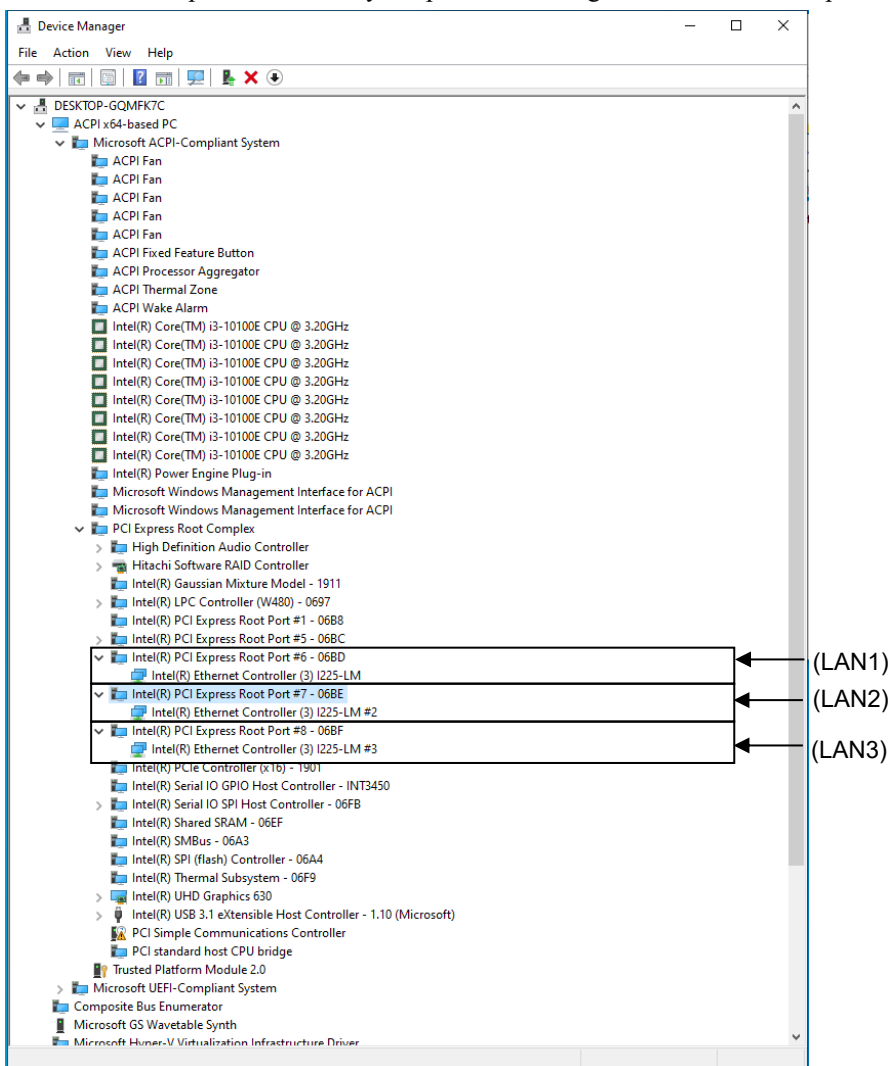
To configure the built-in LAN (LAN2):

Click **Intel(R) PCI Express Root Port #7 – 06BE**. Then, double-click the network adapter under it (in the example in the following figure, the network adapter is **Intel(R) Ethernet Controller(3)I225-LM #2**).

To configure the built-in LAN (LAN3):

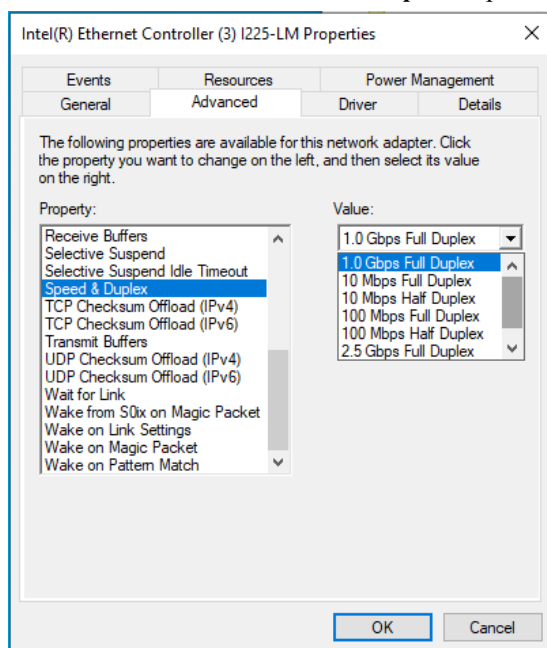
Click **Intel(R) PCI Express Root Port #8 – 06BF**. Then, double-click the network adapter under it (in the example in the following figure, the network adapter is **Intel(R) Ethernet Controller(3)I225-LM #3**).

Follow a similar procedure when you update the settings for the network adapter mounted in an extension slot.



#1: The display names above might differ depending on your OS and LAN driver version.

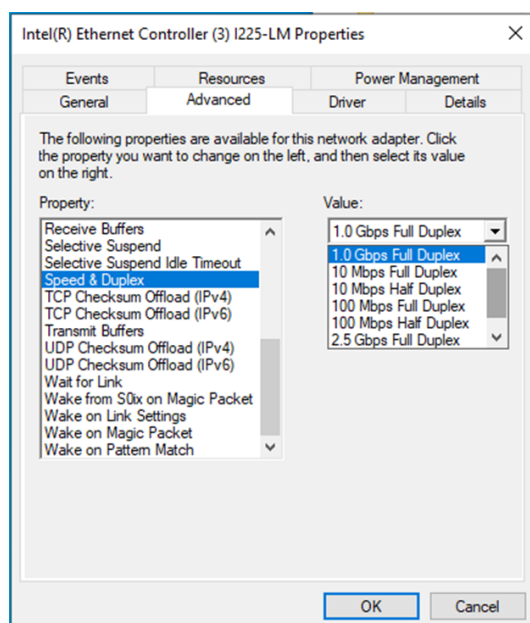
6. Click the **Advanced** tab. From the **Properties** pull-down menu, select **Speed & Duplex**.



7. From the **Value** pull-down menu, select the transfer speed and transfer mode.

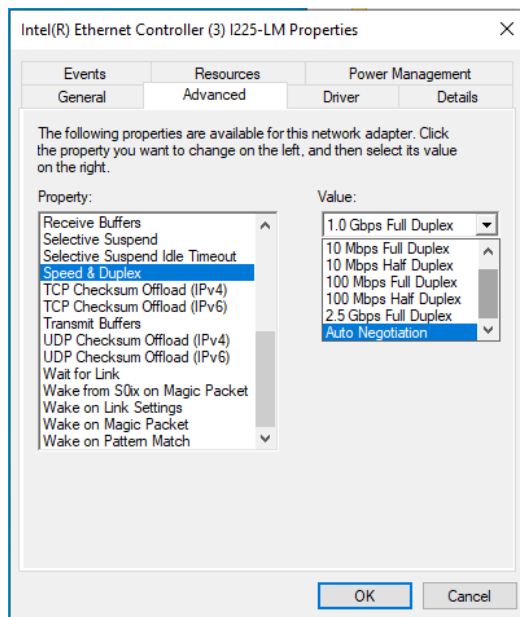
Although **2.5 Gbps Full Duplex** may appear as an option in the pull-down menu, selecting it will still result in 1.0 Gbps full duplex communication.

- Auto Negotiation: Auto-negotiation setting
- 10 Mbps Half Duplex: 10 Mbps, half-duplex setting
- 10 Mbps Full Duplex: 10 Mbps, full-duplex setting
- 100 Mbps Half Duplex: 100 Mbps, half-duplex setting
- 100 Mbps Full Duplex: 100 Mbps, full-duplex setting
- 1 Gbps Full Duplex: 1 Gbps, full-duplex setting



2. Operation

If you do not need to configure the transfer speed or transfer mode, select **Auto Negotiation** to enable the auto-negotiation setting.



8. Click OK.

9. Close the Device Manager window.

NOTE:

- For information about the precautions that apply to a network, see 2. *Networks* in *Precautions*.

Actions to take if the link is unstable at 1000 Mbps

Depending on the type of connected hub, the link might not be stable at 1000 Mbps.

If you want to use the network at 1000 Mbps, verify the connection with the hub in advance.

If the link is unstable at 1000 Mbps, you can stabilize it as follows:

- Use a 20- to 100-meter-length cable (UTP Category 5e or better).

- Precautions related to mounting and using multiple LAN adapters

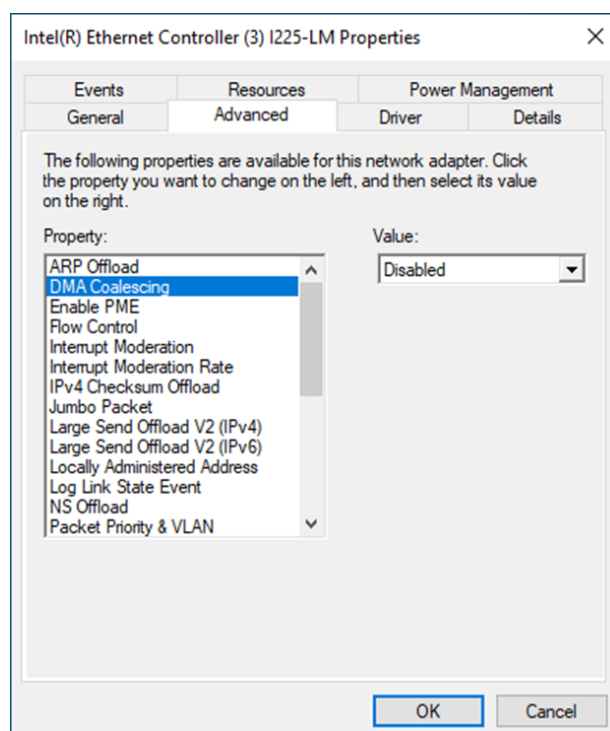
If multiple LAN adapters are implemented, performance of each adapter may not meet expectations when interrupt requests occur frequently or when processing large amounts of data. (This is because interrupt requests from LAN adapters impose a higher CPU load relative to the amount of data being processed, and when multiple LAN adapters are implemented, the CPU requires significantly more time to process all interrupt requests from these adapters.)

If you use multiple mounted LAN adapters, confirm that each built-in LAN port and optional LAN adapter is capable of achieving the expected level of performance. If any are not, adjust the network load or change the LAN adapter settings by performing the following procedure. For details about each configuration item, see the description at the bottom of the corresponding setup window.

1. Perform steps 1 through 5 in *Setting the network transfer speed* under 2.8 *Setting up the LAN interface*.
2. Click the **Advanced** tab, and then select the following items from the **Properties** pull-down menu.

- DMA coalescing

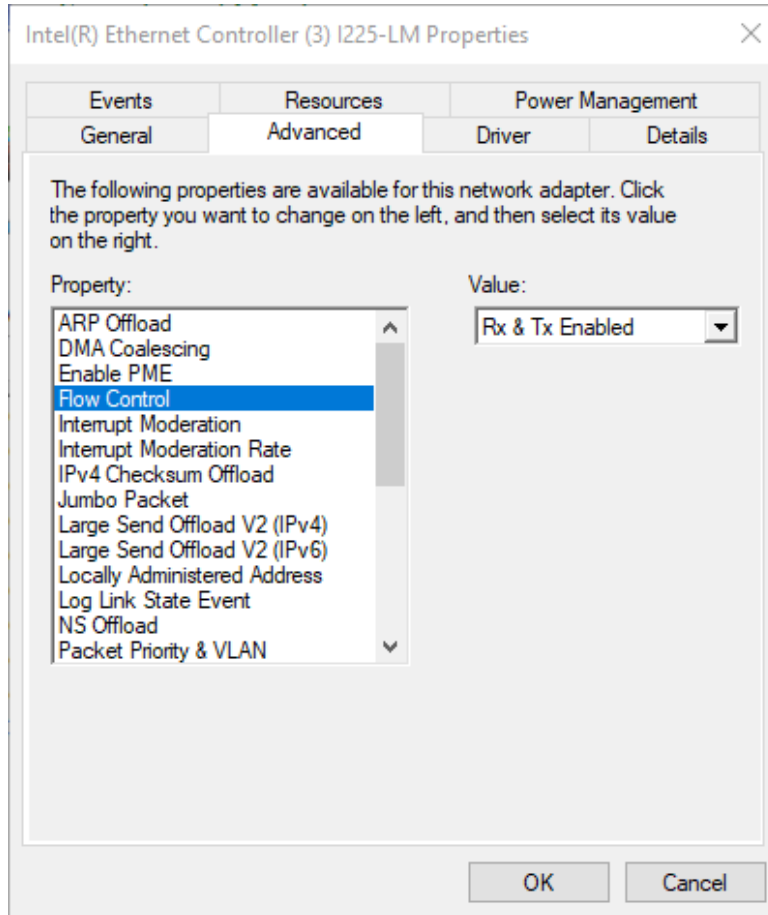
Sets the maximum latency limit that applies to all network packets.



2. Operation

- Flow control

Enables adapters to generate or respond to flow control frames, which help regulate network traffic. The default setting for flow control differs depending on the OS and the type of LAN adapter being used. You must configure the flow control setting according to the network you are using.]



NOTES:

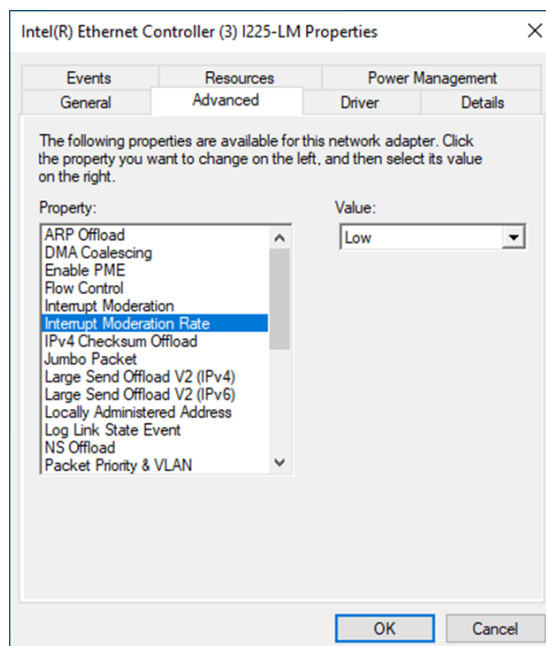
- If the LAN driver stops because of a system failure such as an OS deadlock, broadcast frames from other devices might not be processed, and the receive queue might become full.

If **Rx Enabled** or **Rx & Tx Enabled** is specified for **Flow Control**, flow control frames are continuously sent from this equipment under such conditions. If this happens, the entire network connected to the equipment might be affected. Specify **Disabled** for **Flow Control** for this equipment or at the connected hub as required.

- If **Disabled** is specified for **Flow Control** and the device receives frames faster than it can process them, the device becomes overloaded, and the received frames are discarded until the device recovers from the overload condition. Design the network appropriately to avoid such overload conditions.

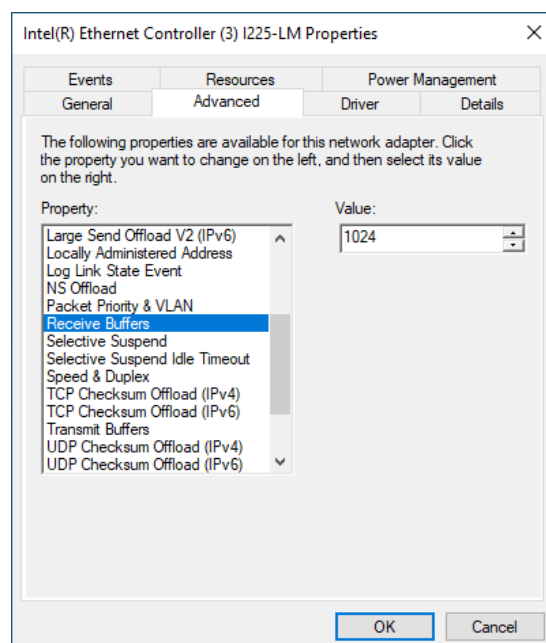
- Interrupt Moderation Rate

This sets the rate at which the controller moderates or delays the generation of interrupts.



- Receive Buffers

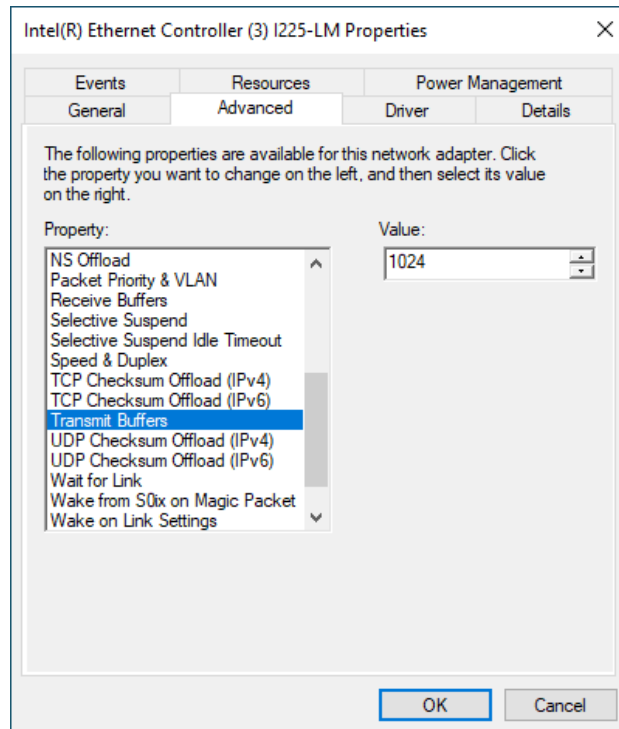
Sets the number of receive buffers used by the adapter when copying data to memory.



2. Operation

- Transmit Buffers

Sets the number of transmit buffers used by the adapter when copying data to memory.



- Notes about cases where a link-down is recorded in the log during OS startup

While Windows® is starting, the following warnings might be displayed in the event log. These warnings are recorded by the initialization process of the LAN driver at Windows® startup, and do not affect system operation.

Event ID	Source	Type	Category	Description
27	e1rexpess	Warning	None	Intel(R) I225 Ethernet Controller (3) I225-LM ^{#1)} Network link is disconnected. ^{#2}

#1: The displayed name differs depending on the LAN adapter.

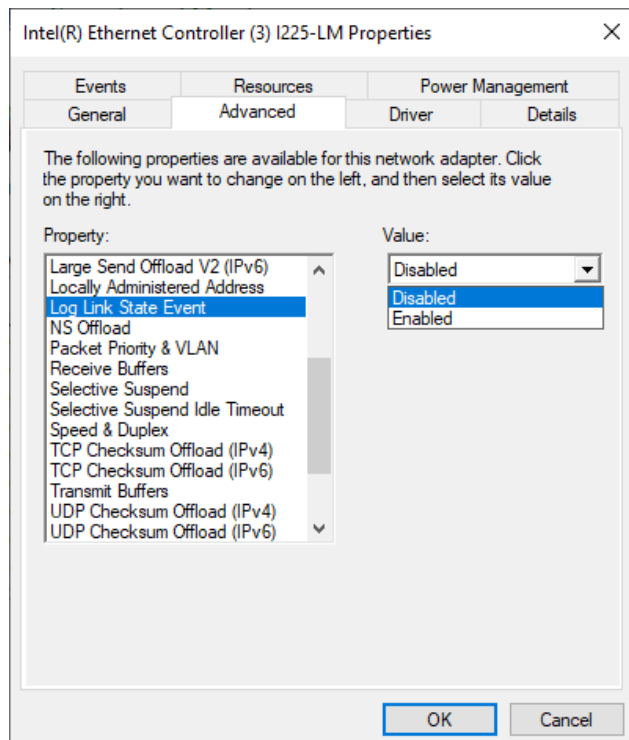
#2: The displayed content differs depending on the OS.

You can prevent these warnings from being displayed in the event log by changing the LAN adapter settings as follows.

Note that if you change the following settings, log entries such as those for LAN connections and disconnections during system operation are also not recorded, which might complicate failure analysis when a problem occurs.

(The image shown is an example using Windows® 10, but the same applies to other operating systems.)

- Perform steps 1 through 5 in *Setting the network transfer speed* under 2.8 *Setting up the LAN interface*.
- Click the **Advanced** tab, and then select **Log Link State Event** from the **Properties** pull-down menu.
- From the **Value** drop-down list, select **Disabled**.



2.9 Setting up the screen

For screen settings, you can configure resolution (number of screen pixels), refresh rate (number of screen refreshes per second), and single-display and multiple-display settings.

NOTE:

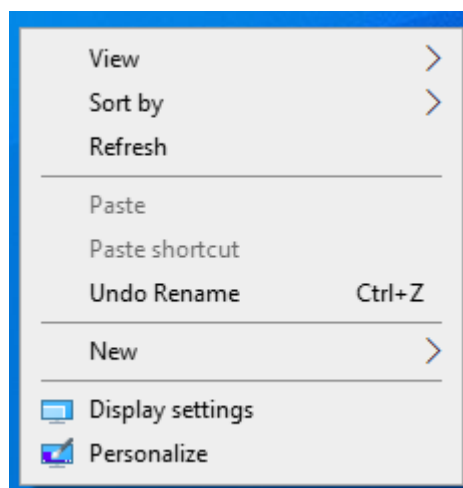
- For information about precautions that apply to the DVD drive, see *3. Display screens in Precautions*.

< Windows® 10 and Windows Server® 2022 >

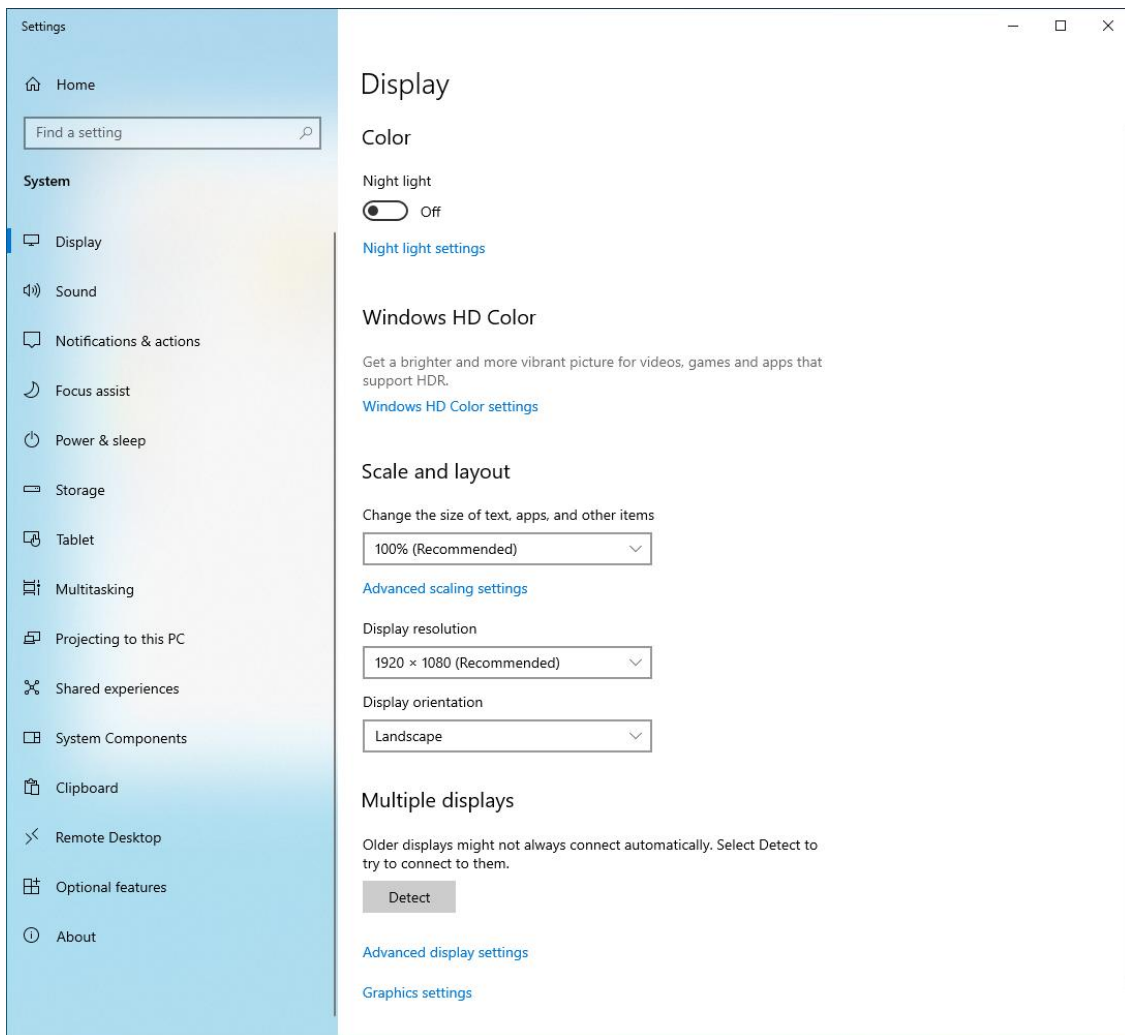
(1) Configuring screen settings for a single display

When a single display is connected, perform the following procedure to configure the screen settings:

1. Right-click on the desktop. From the displayed menu, click **Display settings**.

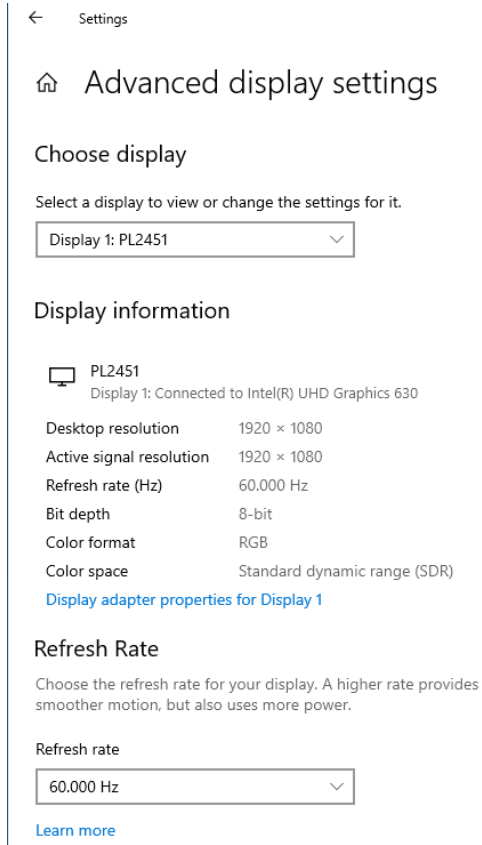


2. You can change the **Display resolution** (number of pixels) displayed in the screen.

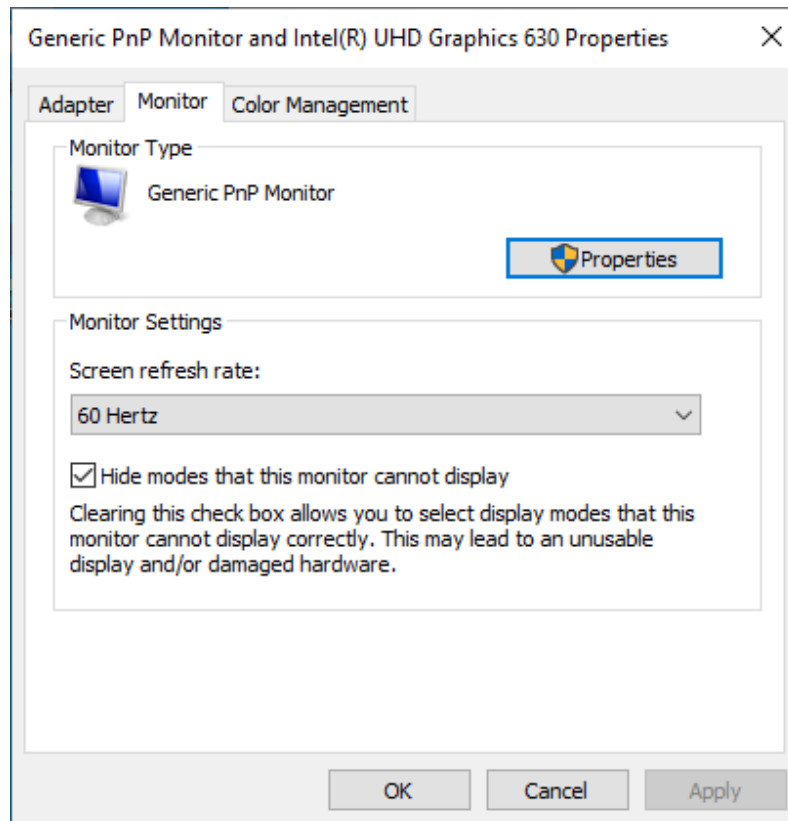


2. Operation

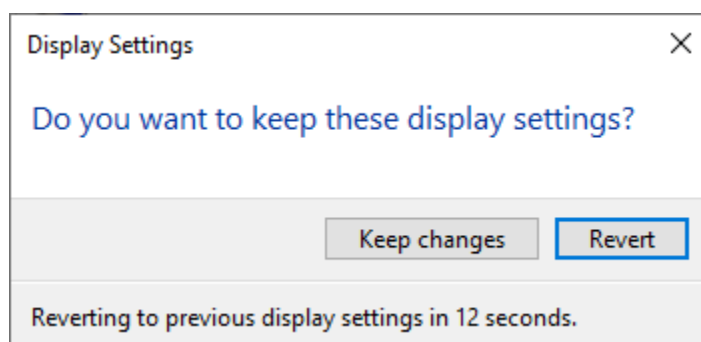
3. To change the refresh rate (number of screen refreshes per second), click **Advanced display settings** on the screen of the previous page, and then click **Display adapter properties for Display 1.** on the following screen.



- Click the **Monitor** tab. In the **Monitor Settings**, select an appropriate value from the **Screen refresh rate** pull-down menu.



- Click **OK**.
- If the following dialog appears, click **Keep changes**.



NOTE

- When configuring the resolution and refresh rate, you must choose from the options described in *(6) Supported resolutions* under *5.1 Equipment specifications*.
- Selecting a resolution higher than that supported by the display will render a blank screen.
- After the display driver is installed, the resolution is automatically set to the maximum resolution supported by the connected display. When changing the resolution, select a resolution lower than the maximum resolution.

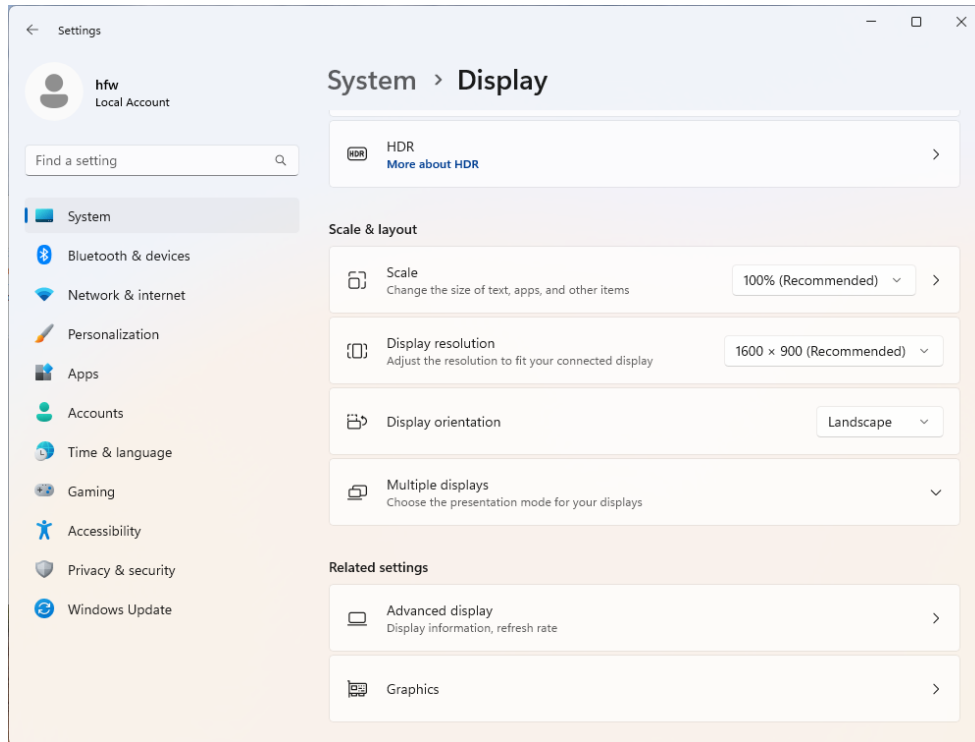
2. Operation

< Windows® 11 and Windows Server® 2025 >

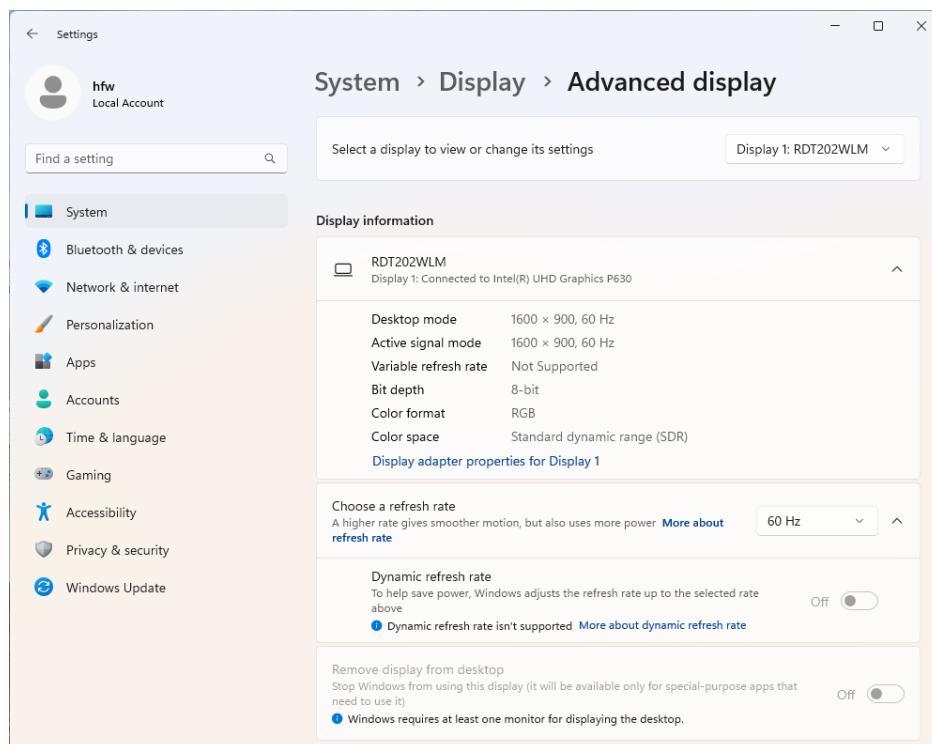
(1) Configuring screen settings for a single display

When a single display is connected, perform the following procedure to configure the screen settings:

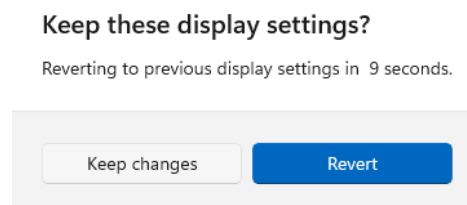
1. Right-click on the desktop. From the displayed menu, click **Display settings**.
2. You can change the Display resolution (number of pixels) displayed in the screen.



- To change the refresh rate (number of screen refreshes per second), click **Advanced display** on the screen of the previous page, and then select an appropriate value from the **Choose a refresh rate** dropdown menu.



- If the following dialog appears, click **Keep changes**.



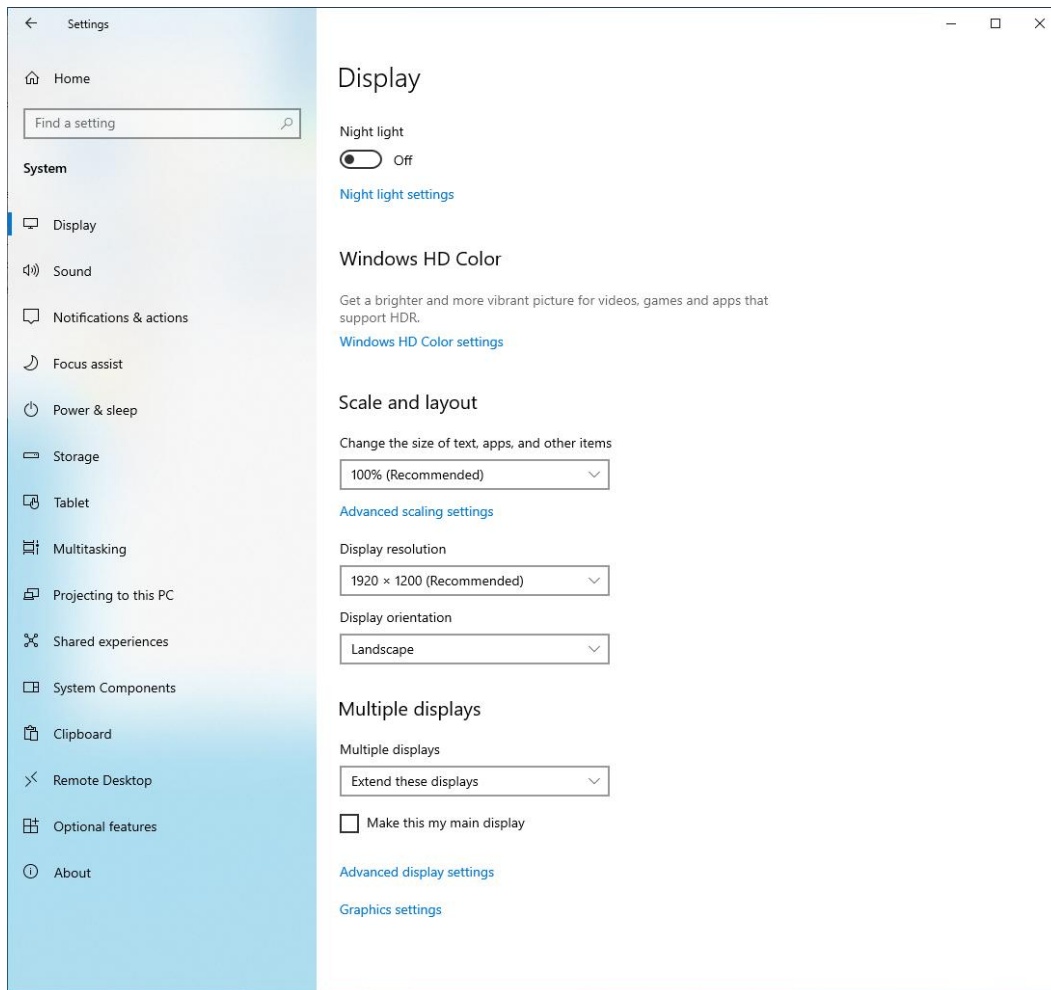
2. Operation

(2) Configuring screen settings for multiple displays

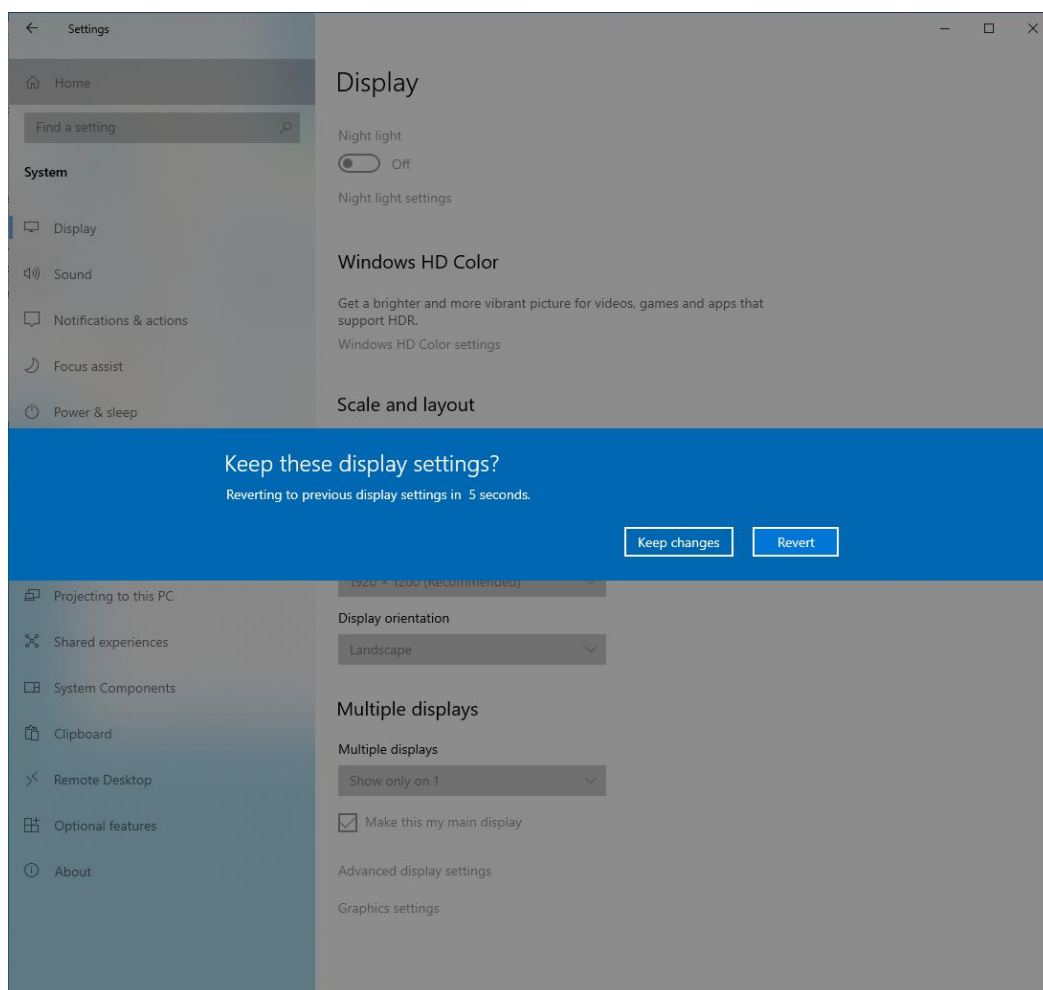
< Windows® 10 and Windows Server® 2022 >

This equipment supports output to multiple displays. If you connect two displays, the two displays can be used simultaneously. To configure multiple displays:

1. Right-click on the desktop. From the displayed menu, click **Display settings**.
2. In the **Multiple Displays** section of the displayed screen, configure the settings for multiple displays.



3. The confirmation screen for the settings appears. Click **Keep changes**. These settings allow you to configure multiple displays.

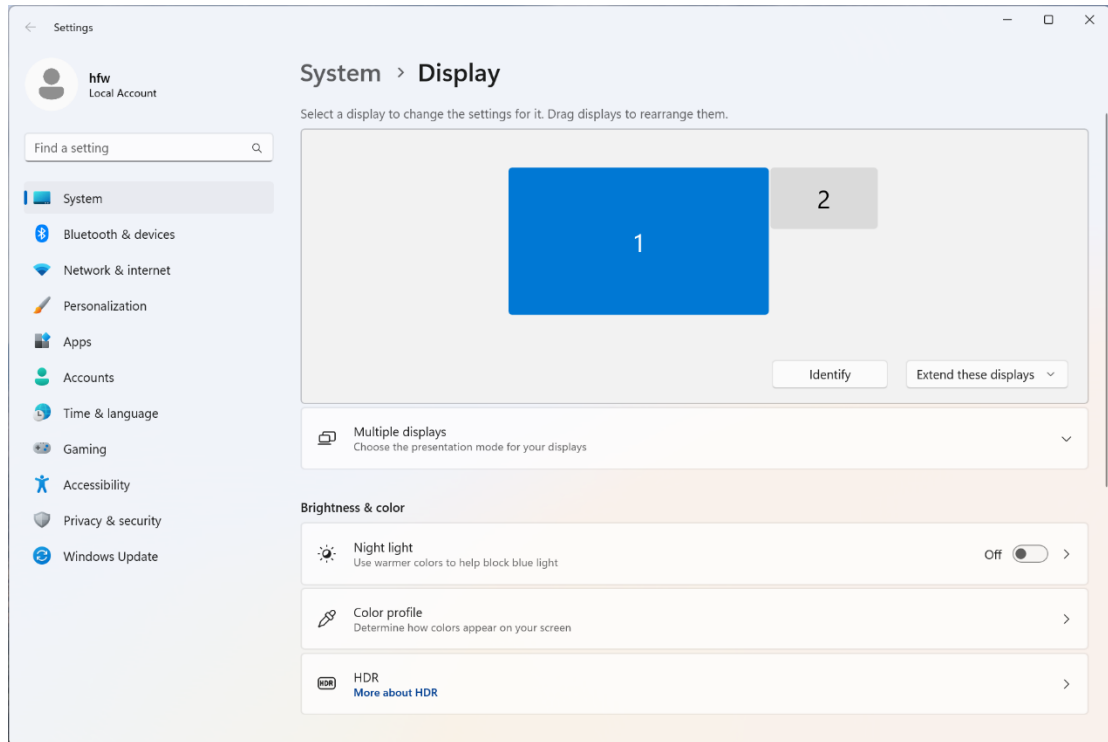


2. Operation

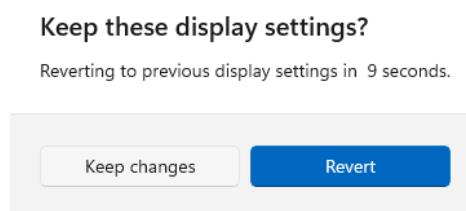
< Windows® 11 and Windows Server® 2025 >

This equipment supports output to multiple displays. If you connect two displays, the two displays can be used simultaneously. To configure multiple displays:

1. Right-click on the desktop. From the displayed menu, click **Display settings**.
2. In the **Multiple Displays** section of the displayed screen, configure the settings for multiple displays.



3. The confirmation screen for the settings appears. Click **Keep changes**. These settings allow you to configure multiple displays.



NOTE

- The multi-streaming feature DisplayPort (daisy-chain) is not supported.
- Types of **Multiple Display** setting. (Some settings might not be displayed depending on the number of displays connected.)

Setting item	Description
<ul style="list-style-type: none"> • Extend desktop to this display • Extend these displays 	The main and additional monitor(s) behave as a single display.
<ul style="list-style-type: none"> • Duplicate these displays • Duplicate desktop on 1 and 2 • Duplicate desktop on 1 and 3 • Duplicate desktop on 2 and 3 	The main and additional monitor(s) display the same image.
<ul style="list-style-type: none"> • Show only on 1 	Monitor 2 displays nothing.
<ul style="list-style-type: none"> • Show only on 2 	Monitor 2 becomes the main monitor, and Monitor 1 stops displaying.
<ul style="list-style-type: none"> • Disconnect this display 	The monitor selected in Select and rearrange displays is disconnected and becomes inactive. To make it active again, you must restart the equipment and have it detected.

Chapter 3 Set up

3.1 Setup procedure when turning on the power for the first time

3.1.1 Setting up Windows® 10

This section describes the procedure for setting up the preinstalled Windows® 10 operating system.

- This procedure covers setup for the basic items of Windows® 10.
- RAS features are automatically set up.
- The setup procedure takes about 20 minutes.

- Preparing for setup

The following items are required during the setup procedure. Prepare them before starting the setup procedure. Furthermore, perform the setup procedure indicated in this section by using the factory-shipped hardware configuration.

License certificate	Verify that the license certificate is attached to the body of the computer.
User name	The user name for the administrator account of the computer. This can be changed later from the Control Panel.
Administrator's password	This can be changed later from the Control Panel.

3. Set up

- Windows® 10 setup procedure

To set up Windows® 10:

1. Turn on this equipment.

Windows® starts and prepares setup.

- This processing might take several minutes. Wait until it is complete.
- Setup continues after the system restarts.

NOTE

Restarting is done automatically, so do not turn off the power to the equipment during setup.

2. A screen to select your language appears.
 - Select the language to use, and then click **Yes**.
3. A screen to select your region appears.
 - Select your region, and then click **Yes**.

NOTE

The default time zone setting for this equipment is **Osaka, Tokyo, and Sapporo**.

If you change the time zone, the system time of this equipment changes by the number of hours difference from the **Osaka, Tokyo, and Sapporo** time zone.

4. A screen to confirm the keyboard layout appears.
 - Verify the displayed keyboard layout, and then click **Yes**.
5. A screen to add a second keyboard layout appears.
 - To add a second layout, click **Add layout**, select the additional keyboard layout to use, and then click **Next**.
 - To not add a second layout, click **Skip**.
6. A screen to connect to a network appears.
 - Click **Skip for now**.
 - When the screen changes, click the **No**.
 - If Japanese is selected, setup continues after the system restart.
After the restart, a screen to connect to a network appears again, and click **Skip for now**.
7. The Windows 10 License Agreement window appears.
 - Verify the displayed information, and then click **Accept**.

8. The **Who's going to use this PC?** screen appears.
 - Enter your name in **Name**, and then click **Next**.
9. The **Create a really memorable password** screen appears.
 - Enter your password in **Password**, and then click **Next**.
 - The **Confirm your password** screen appears. Enter your password in **Confirm password**, and then click **Next**.

NOTE

In the **Create an account for this PC** screen, even if you select Japanese as the language to use, the Windows keyboard layout is set to the English keyboard by default.

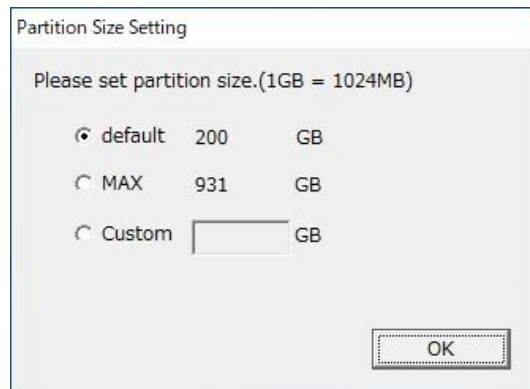
For this reason, Japanese text cannot be entered even when using a Japanese keyboard, and symbols and characters will not correspond to keys as marked on a Japanese keyboard.

If you want to use Japanese symbols or characters in your user name, password, or password hint, you should temporarily create your account using only alphanumeric characters. Once the setup is complete, you can then change these fields to include the Japanese symbols or characters you prefer.

10. The **Create security questions for this account** screen appears.
 - Select a question from **Security questions**, and then enter an answer in **Your answer**.
Create three security questions.
 - Click **Next**.
11. The **Choose privacy settings for your device** screen appears.
 - Select **Yes** or **No** as necessary for each setting item, and then click **Accept**.
12. After setup is complete, the sign-in operation is performed automatically.

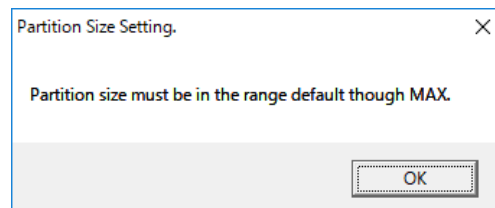
3. Set up

13. The Partition Size Setting window appears.



- The minimum possible size that can be created (**default**) and the maximum possible size that can be created (**MAX**) are displayed. Select the size that you want to create, and then click **OK**. The minimum possible size that can be created (**default**) is the size that is displayed when the product is shipped.
- To enter a size value directly, select **Custom**, enter a value for the partition size in GB (where 1 GB = 1,073,741,824 bytes), and then click **OK**.

If you select **Custom** and click **OK** and the entered value is outside the accepted range, the following message appears. Click **OK**, and then re-enter the partition size.



NOTE

If you are using a recovery DVD to return the system to its factory-shipped condition and you select **Only the system and boot partition**, the Partition Size Setting window does not appear, and setup proceeds to the point at which the dialog box in step 16 closes.

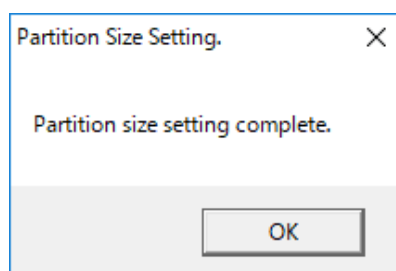
14. The Partition Size Setting confirmation window appears.

If the displayed partition size is acceptable, click **OK**.



15. If partition size setting is successful, the following message appears.

Click **OK** to close the dialog box.



Setup continues with a message about Windows System Assessment Tool, followed by the message Please wait. The system will restart automatically. Wait until the system restarts. This processing takes several minutes.

NOTE

Restarting is done automatically, so do not turn off the power to the equipment during setup.

The Windows® 10 setup procedure is now complete. Now, configure the basic OS settings according to the procedure described in 3.2 *Configuring basic settings after OS setup*.

3.1.2 Setting up Windows® 11

This section describes the procedure for setting up the preinstalled Windows® 11 operating system.

- This procedure covers setup for the basic items of Windows® 11.
- RAS features are automatically set up.
- The setup procedure takes about 20 minutes.

- Preparing for setup

The following items are required during the setup procedure. Prepare them before starting the setup procedure. Furthermore, perform the setup procedure indicated in this section by using the factory-shipped hardware configuration.

License certificate	Verify that the license certificate is attached to the body of the computer.
User name	The user name for the administrator account of the computer. This can be changed later from the Control Panel.
Administrator's password	This can be changed later from the Control Panel.

- Windows® 11 setup procedure

To set up Windows® 11:

1. Turn on this equipment.

Windows® starts and prepares setup.

- This processing might take several minutes. Wait until it is complete.
- Setup continues after the system restarts.

NOTE

Restarting is done automatically, so do not turn off the power to the equipment during setup.

2. A screen to select your language appears.
 - Select the language to use, and then click **Continue**.
3. A screen to select your region appears.
 - Select your region, and then click **Yes**.

NOTE

The default time zone setting for this equipment is **Osaka, Tokyo, and Sapporo**.

If you change the time zone, the system time of this equipment changes by the number of hours difference from the **Osaka, Tokyo, and Sapporo** time zone.

4. A screen to confirm the keyboard layout appears.
 - Verify the displayed keyboard layout, and then click **Yes**.
5. A screen to add a second keyboard layout appears.
 - To add a second layout, click **Add layout**, select the additional keyboard layout to use, and then click **Next**.
 - To not add a second layout, click **Skip**.
6. A screen to connect to a network appears.
 - Click **I don't have internet**.
 - If Japanese is selected, setup continues after the system restart.

After the restart, a screen to connect to a network appears again, and click **I don't have internet**.
7. The Windows® 11 License Agreement window appears.
 - Verify the displayed information, and then click **Accept**.

3. Set up

8. The **Who's going to use this device?** screen appears.
 - Enter your name in **Name**, and then click **Next**.
9. The **Create a super memorable password** screen appears.
 - Enter your password in **Password**, and then click **Next**.
 - The **Confirm your password** screen appears. Enter your password in **Confirm password**, and then click **Next**.

NOTE

In the **Create an account for this PC** screen, even if you select Japanese as the language to use, the Windows keyboard layout is set to the English keyboard by default.

For this reason, Japanese text cannot be entered even when using a Japanese keyboard, and symbols and characters will not correspond to keys as marked on a Japanese keyboard.

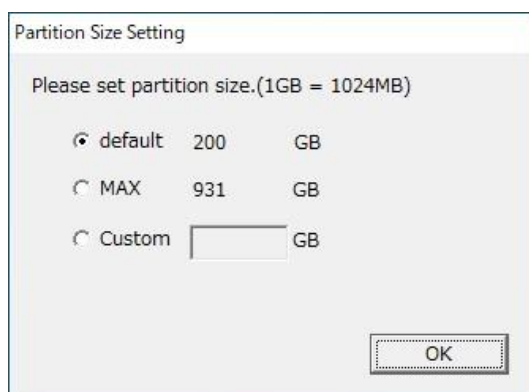
If you want to use Japanese symbols or characters in your user name, password, or password hint, you should temporarily create your account using only alphanumeric characters. Once the setup is complete, you can then change these fields to include the Japanese symbols or characters you prefer.

10. The **Now add security questions** screen appears.
 - Select a question from **Security questions**, and then enter an answer in **Your answer**.
Create three security questions.
 - Click **Next**.
11. The **Choose privacy settings for your device** screen appears.
 - Select **Yes** or **No** as necessary for each setting item, and then click **Accept**.
12. After setup is complete, the sign-in operation is performed automatically.

NOTE

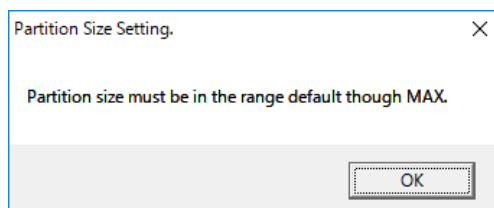
The desktop background is set randomly from a selection of predefined images.

13. The Partition Size Setting window appears.



- The minimum possible size that can be created (**default**) and the maximum possible size that can be created (**MAX**) are displayed. Select the size that you want to create, and then click **OK**. The minimum possible size that can be created (**default**) is the size that is displayed when the product is shipped.
- To enter a size value directly, select **Custom**, enter a value for the partition size in GB (where 1 GB = 1,073,741,824 bytes), and then click **OK**.

If you select **Custom** and click **OK** and the entered value is outside the accepted range, the following message appears. Click **OK**, and then re-enter the partition size.



NOTE

If you are using a recovery DVD to return the system to its factory-shipped condition and you select **Only the system and boot partition**, the Partition Size Setting window does not appear, and setup proceeds to the point at which the dialog box in step 16 closes.

3. Set up

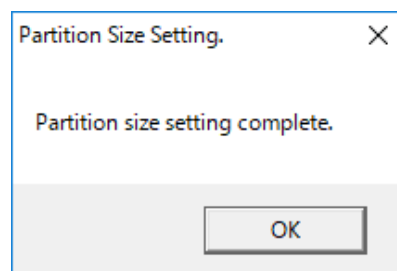
14. The Partition Size Setting confirmation window appears.

If the displayed partition size is acceptable, click **OK**.



15. If partition size setting is successful, the following message appears.

Click **OK** to close the dialog box.



Setup continues with a message about Windows System Assessment Tool, followed by the message `Please wait. The system will restart automatically.` Wait until the system restarts. This processing takes several minutes.

NOTE

Restarting is done automatically, so do not turn off the power to the equipment during setup.

The Windows® 11 setup procedure is now complete. Now, configure the basic OS settings according to the procedure described in 3.2 *Configuring basic settings after OS setup*.

3.1.3 Setting up Windows Server® 2022

This section describes the procedure for setting up the preinstalled Windows Server® 2022 operating system.

- This procedure covers setup for the basic items of Windows Server® 2022.
- RAS features are automatically set up.
- The setup procedure takes about 20 minutes.

- Preparing for setup

The following items are required during the setup procedure. Prepare them before starting the setup procedure. Furthermore, perform the setup procedure indicated in this section by using the factory-shipped hardware configuration.

License certificate	Verify that the license certificate is attached to the body of the computer.
User name	The user name for the administrator account of the computer. This can be changed later from the Control Panel.
Administrator's password	This can be changed later from the Control Panel.

3. Set up

- Windows Server® 2022 setup procedure

To set up Windows Server® 2022:

1. Turn on this equipment.

Windows® starts and prepares setup.

- This processing might take several minutes. Wait until it is complete.
- Setup continues after the system restarts.

2. The **Hi there** screen appears.

- Select the language and settings to use, and then click **Next**.

NOTE

The default time zone setting for this equipment is **Osaka, Tokyo, and Sapporo**.

If you change the time zone, the system time of this equipment changes by the number of hours difference from the **Osaka, Tokyo, and Sapporo** time zone.

3. The **License terms** screen appears.

- Verify the displayed information, and click **I agree**.

4. The **Customize settings** screen appears.

- Enter your password in **Password**.
- Enter your password again in **Confirm password**.
- Click **Finish**.
- The system restarts.

NOTE

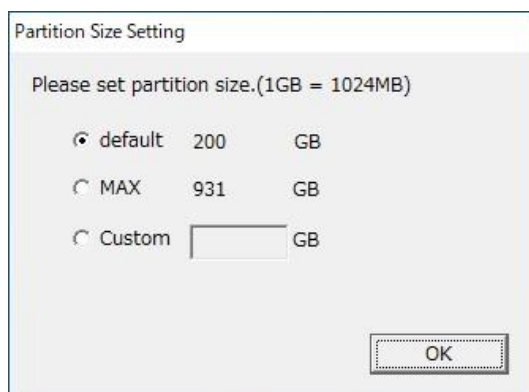
In the **Customize settings** window, even if you select Japanese as the language to use, the Windows keyboard layout is set to the English keyboard by default.

For this reason, Japanese text cannot be entered even when using a Japanese keyboard, and symbols and characters will not correspond to keys as marked on a Japanese keyboard.

If you want to use Japanese symbols or characters in your password, you should temporarily create your account using only alphanumeric characters. Once the setup is complete, you can then change these fields to include the Japanese symbols or characters you prefer.

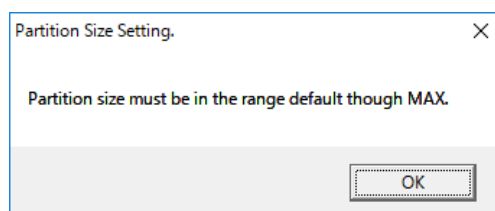
5. Sign in.

6. The Partition Size Setting window appears.



- The minimum possible size that can be created (**default**) and the maximum possible size that can be created (**MAX**) are displayed. Select the size that you want to create, and then click **OK**. The minimum possible size that can be created (**default**) is the size that is displayed when the product is shipped.
- To enter a size value directly, select (**Custom**), enter a value for the partition size in GB (where 1 GB = 1,073,741,824 bytes), and then click **OK**.

If you select (**Custom**) and click **OK** and the entered value is outside the accepted range, the following message appears. Click **OK**, and then re-enter the partition size.



NOTE

If you are using a recovery DVD to return the system to its factory-shipped condition and you select **Only the system and boot partition**, the **Partition Size Setting** window does not appear, and setup proceeds to the point at which the dialog box in step 8 closes.

3. Set up

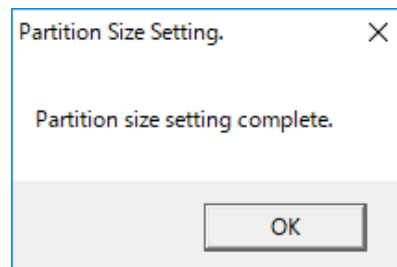
7. The **Partition Size Setting** confirmation window appears.

If the displayed partition size is acceptable, click **OK**.



8. If the partition size settings succeed, the following message appears.

Click **OK** to close the dialog box.



Setup continues with a message about Windows System Assessment Tool, followed by the message Please wait. The system will restart automatically.. Wait until the system restarts. This processing takes several minutes.

The Windows Server® 2022 setup procedure is now complete. Now, configure the basic OS settings according to the procedure described in *3.2 Configuring basic settings after OS setup*.

3.1.4 Setting up Windows Server® 2025

This section describes the procedure for setting up the preinstalled Windows Server® 2025 operating system.

- This procedure covers setup for the basic items of Windows Server® 2025.
- RAS features are automatically set up.
- The setup procedure takes about 20 minutes.

- Preparing for setup

The following items are required during the setup procedure. Prepare them before starting the setup procedure. Furthermore, perform the setup procedure indicated in this section by using the factory-shipped hardware configuration.

License certificate	Verify that the license certificate is attached to the body of the computer.
User name	The user name for the administrator account of the computer. This can be changed later from the Control Panel.
Administrator's password	This can be changed later from the Control Panel.

3. Set up

- Windows Server® 2025 setup procedure

To set up Windows Server® 2025:

1. Turn on this equipment.

Windows® starts and prepares setup.

- This processing might take several minutes. Wait until it is complete.
- Setup continues after the system restarts.

2. The **Hi there** screen appears.

- Select the language and settings to use, and then click **Next**.

NOTE

The default time zone setting for this equipment is **Osaka, Tokyo, and Sapporo**.

If you change the time zone, the system time of this equipment changes by the number of hours difference from the **Osaka, Tokyo, and Sapporo** time zone.

3. The **License terms** screen appears.

- Verify the displayed information, and click **Accept**.

4. The **Customize settings** screen appears.

- Enter your password in **Password**.
- Enter your password again in **Confirm password**.
- Click **Finish**.
- The system restarts.

NOTE

In the **Customize settings** window, even if you select Japanese as the language to use, the Windows keyboard layout is set to the English keyboard by default.

For this reason, Japanese text cannot be entered even when using a Japanese keyboard, and symbols and characters will not correspond to keys as marked on a Japanese keyboard.

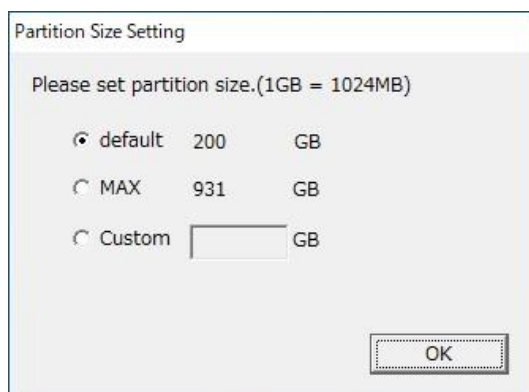
If you want to use Japanese symbols or characters in your password, you should temporarily create your account using only alphanumeric characters. Once the setup is complete, you can then change these fields to include the Japanese symbols or characters you prefer.

5. Sign in.

When you sign in, the **Send diagnostic data to Microsoft** window will appear.

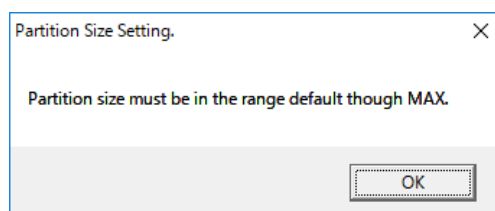
Click the **Accept**.

6. The Partition Size Setting window appears.



- The minimum possible size that can be created (**default**) and the maximum possible size that can be created (**MAX**) are displayed. Select the size that you want to create, and then click **OK**. The minimum possible size that can be created (**default**) is the size that is displayed when the product is shipped.
- To enter a size value directly, select (**Custom**), enter a value for the partition size in GB (where 1 GB = 1,073,741,824 bytes), and then click **OK**.

If you select (**Custom**) and click **OK** and the entered value is outside the accepted range, the following message appears. Click **OK**, and then re-enter the partition size.



NOTE

If you are using a recovery DVD to return the system to its factory-shipped condition and you select **Only the system and boot partition**, the **Partition Size Setting** window does not appear, and setup proceeds to the point at which the dialog box in step 8 closes.

3. Set up

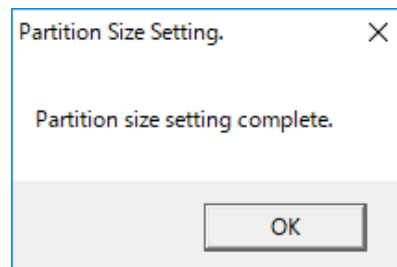
7. The **Partition Size Setting** confirmation window appears.

If the displayed partition size is acceptable, click **OK**.



8. If the partition size settings succeed, the following message appears.

Click **OK** to close the dialog box.



Setup continues with a message about Windows System Assessment Tool, followed by the message Please wait. The system will restart automatically.. Wait until the system restarts. This processing takes several minutes.

The Windows Server® 2025 setup procedure is now complete. Now, configure the basic OS settings according to the procedure described in *3.2 Configuring basic settings after OS setup*.

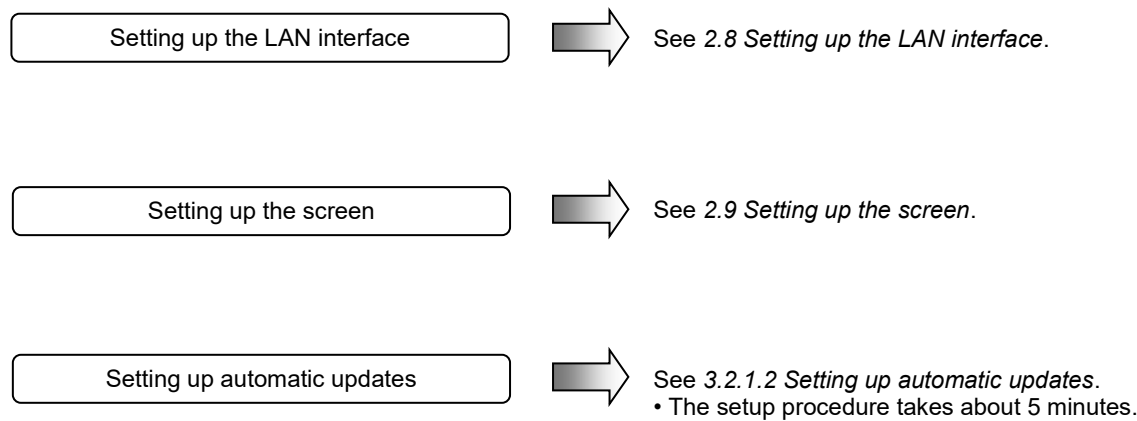
3.2 Configuring basic settings after OS setup

3.2.1 Basic settings for Windows® 10 and Windows Server® 2022

This section describes the procedure for setting up the preinstalled Windows® 10 and Windows Server® 2022 operating systems.

Perform this procedure as required after setting up the OS as described in *3.1 Setup procedure when turning on the power for the first time*.

3.2.1.1 Overview of the basic settings procedure



3. Set up

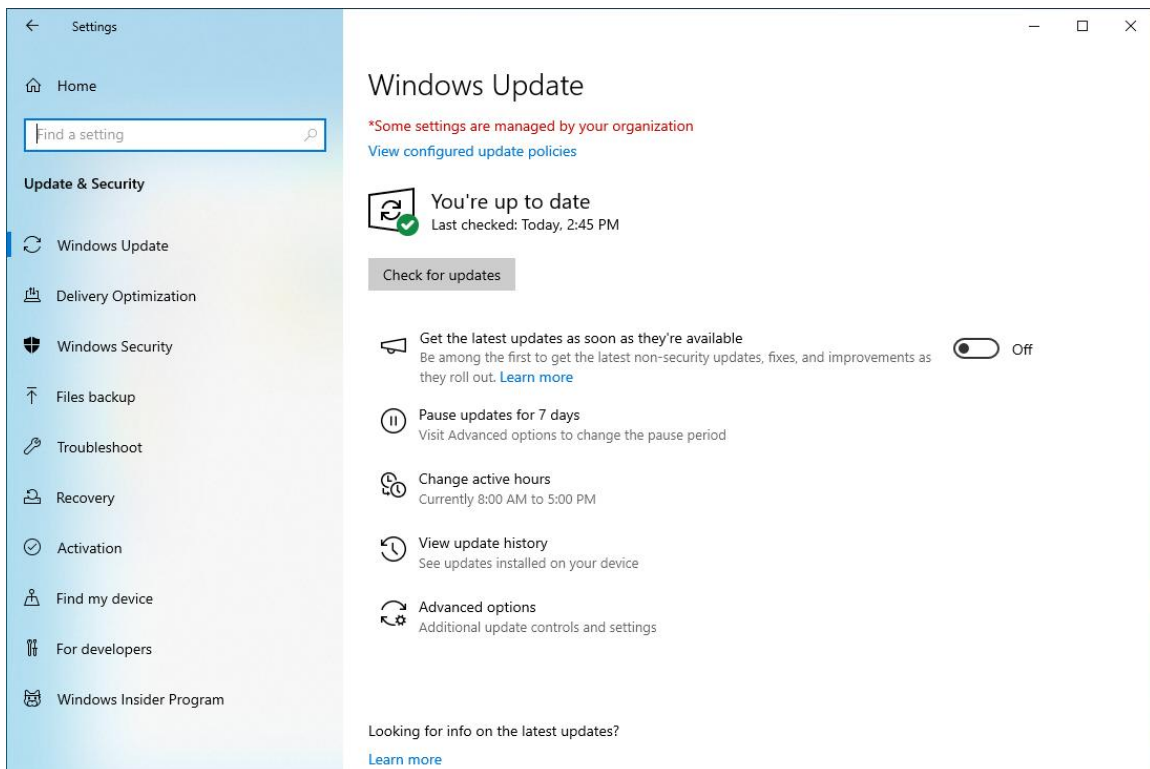
3.2.1.2 Setting up automatic updates

Windows® 10 and Windows Server® 2022 settings allow update programs delivered from Windows Update to be applied automatically. Update programs for the system and applications are regularly checked, and are automatically downloaded and installed.

To set up automatic updates:

1. Click **Start**, and then from the displayed menu, click **Settings**.
2. Click **Update & Security**. The Windows Update window appears.

(The following figure is an example from Windows® 10.)



The automatic update settings in Windows® 10 and Windows Server® 2022 include the following items.

(1) Changing the active hours

Downloads and installation will be performed automatically, but the system will not restart during active hours.

Rather, restarts will be scheduled outside of active hours. Configure this setting according the needs of the customer environment. (The following figure is an example from Windows® 10.)

Active hours

Set active hours to let us know when you typically use this device. We won't automatically restart it during active hours, and we won't restart without checking if you're using it.

Start time

8	00	AM
---	----	----

End time (max 18 hours)

5	00	PM
---	----	----

Save Cancel

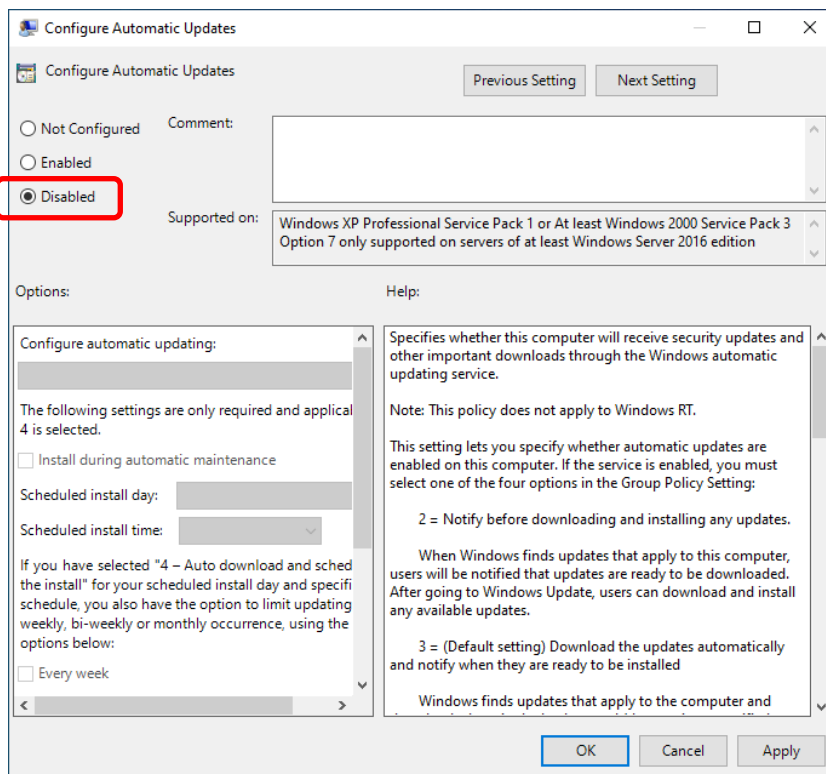
(Active hours are set for 8:00 a.m. to 5:00 p.m. by default.)

3. Set up

Enabling manual updates via Windows Update

If you do not want to automatically download and install update programs, you can set Windows Update to manual updates by using the Local Group Policy Editor (`gpedit.msc`). To set Windows Update to manual updates:

1. Sign in to the computer as an administrator.
2. Right-click **Start**, and then click **Run**.
3. In the Run window, enter `gpedit.msc` to open the Local Group Policy Editor.
4. In the Local Group Policy Editor window, click **Computer Configuration**, **Administrative Templates**, **Windows components**, **Windows Update**, and **Configure Automatic Updates**.
5. In the Configure Automatic Updates window, select **Disabled**, and then click **OK**.



3.2.2 Basic settings for Windows® 11 and Windows Server® 2025

This section describes the procedure for setting up the preinstalled Windows® 11 and Windows Server® 2025 operating systems.

Perform this procedure as required after setting up the OS as described in *3.1 Setup procedure when turning on the power for the first time*.

3.2.2.1 Overview of the basic settings procedure

Setting up the LAN interface



See 2.8 *Setting up the LAN interface*.

Setting up the screen



See 2.9 *Setting up the screen*.

Setting up automatic updates



See 3.2.2.2 *Setting up automatic updates*.
• The setup procedure takes about 5 minutes.

3. Set up

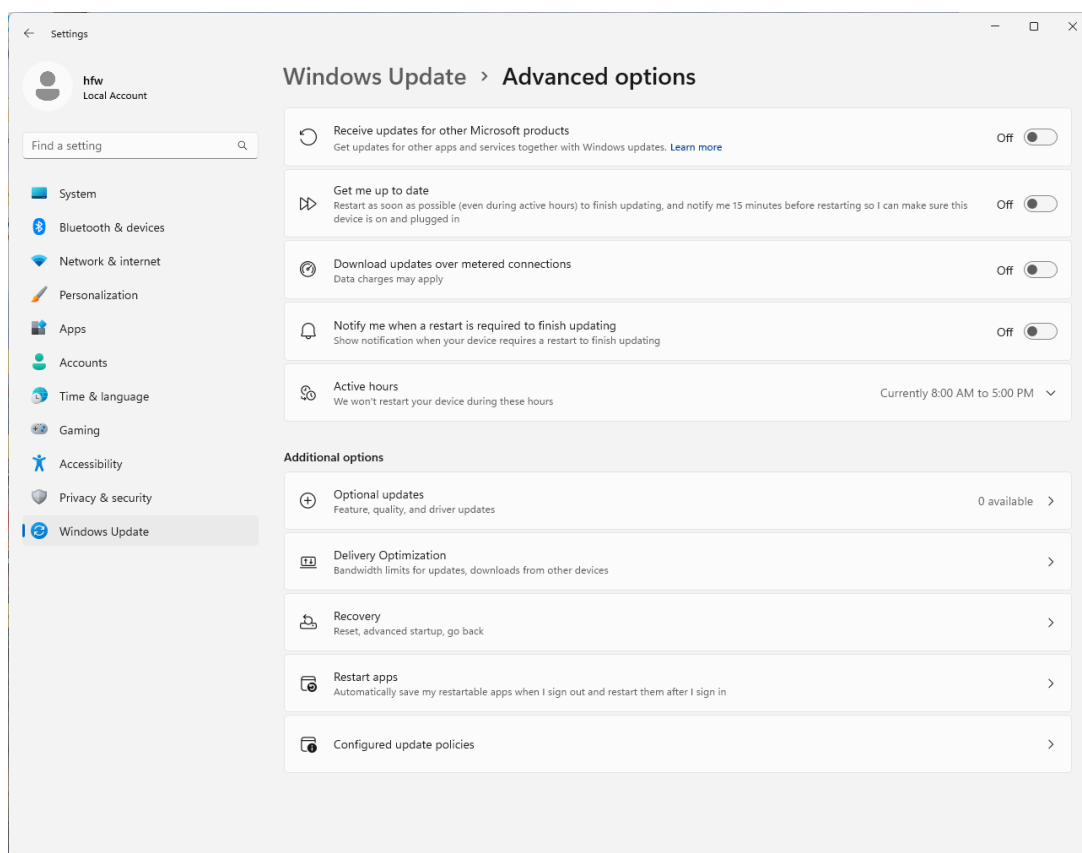
3.2.2.2 Setting up automatic updates

Windows® 11 and Windows Server® 2025 settings allow update programs delivered from Windows Update to be applied automatically. Update programs for the system and applications are regularly checked, and are automatically downloaded and installed.

To set up automatic updates:

1. Click **Start**, and then from the displayed menu, click **Settings**.
2. Click **Windows Update**.
3. Click **Advanced options**. The **Advanced options** window appears.

(The following figure is an example from Windows® 11.)



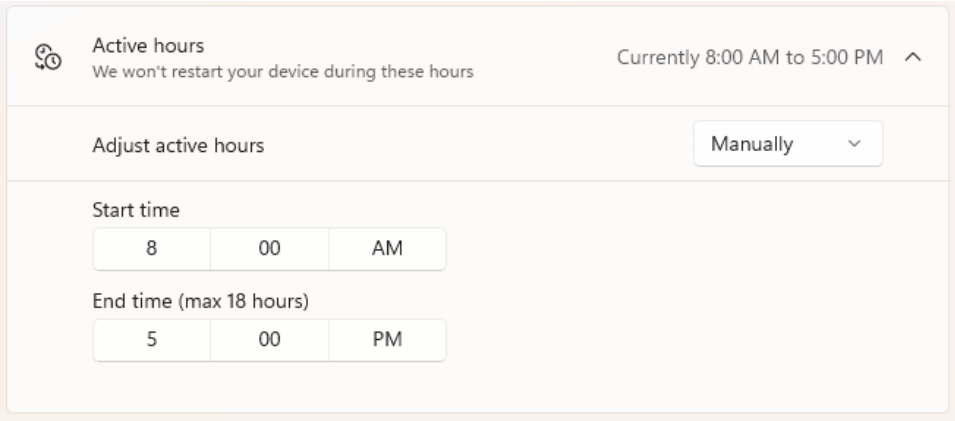
The automatic update settings in Windows® 11 and Windows Server® 2025 include the following items.

(1) Changing the active hours

Downloads and installation will be performed automatically, but the system will not restart during active hours.

Rather, restarts will be scheduled outside of active hours. Configure this setting according the needs of the customer environment. (The following figure is an example from Windows® 11.)

The active hours can be changed from the **Active hours** section in the **Advanced options** window.



Active hours

We won't restart your device during these hours

Currently 8:00 AM to 5:00 PM ^

Adjust active hours

Manually v

Start time

8 00 AM

End time (max 18 hours)

5 00 PM

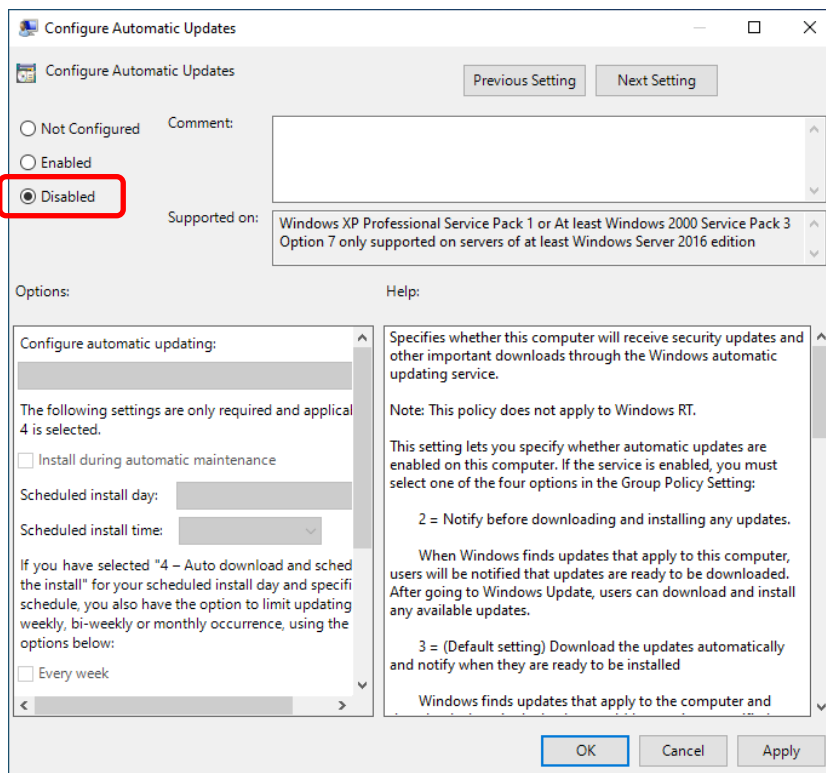
(Active hours are set for 8:00 a.m. to 5:00 p.m. by default.)

3. Set up

Enabling manual updates via Windows Update

If you do not want to automatically download and install update programs, you can set Windows Update to manual updates by using the Local Group Policy Editor (`gpedit.msc`). To set Windows Update to manual updates:

1. Sign in to the computer as an administrator.
2. Right-click **Start**, and then click **Run**.
3. In the Run window, enter `gpedit.msc` to open the Local Group Policy Editor.
4. In the Local Group Policy Editor window, click **Computer Configuration**, **Administrative Templates**, **Windows components**, **Windows Update**, **Manage end user experience**, and **Configure Automatic Updates**.
5. In the Configure Automatic Updates window, select **Disabled**, and then click **OK**. (The following figure is an example from Windows® 11.)



Chapter 4 Precautions while the OS is running

4.1 Event log entries during setup

This equipment might record the following events in the event log during OS setup, but these events do not affect system operation.

Table 4-1 Error and warning event logs (during setup)

Source	Event ID	Type
Search-ProfileNotify	2	Error
SecurityCenter	16	Error
volmgr	46,49	Error
Service Control Manager	7000,7009,7022 7023,7024,7038,7043	Error
Bits-Client	16392	Error
SideBySide	33	Error
e2f68	24	Error
DistributedCOM	10005	Error
Search	1008	Warning
e1rexpess	27	Warning
e2fexpess	27	Warning
e2rexpess	27	Warning
eli68x64	27	Warning
Kernel-PnP	219	Warning
User Profiles Service	1534	Warning
Winlogon	6005,6006	Warning
AppModel-State	23,24	Warning ^{#1}

#1: This is a warning in Windows® 11 and Windows Server® 2025.

Event IDs 7009 and 7023 might be recorded in the event log even during situations other than OS setup, but this does not indicate a problem provided that the event logs are not recorded intermittently.

Event ID 33 might be recorded because of installation processing for the RAS software during setup, but this does not indicate an operational problem. This event log might also be recorded when the RAS software is re-installed.

4.2 Event log entries while the OS is running

This equipment might record the following events in the event log while the OS is running, but these events do not affect system operation.

Table 4-2 Error and warning event logs (OS is running)

Source	Event ID	Type
DistributedCOM	10010	Error
Search	3086 ^{#2} , 3104	Error
iANSMiniport	11,16	Error
CertificateServicesClient-CertEnroll	86	Error ^{#2}
Security-SPP	16398	Error ^{#2}
Security-SPP	1014,8198,8200	Warning ^{#1}
DistributedCOM	10016	Warning
Wininit	15	Warning
e1rexpess	27	Warning
e2fexpess	27	Warning
e2rexpess	27	Warning
e1i68x64	27	Warning
Time-Service	134	Warning
Search	3036	Warning
Windows Remote Management	10149	Warning
Service Control Manager	7023	Warning
AppModel-State	23,24	Warning ^{#2}

#1: This is a error in Windows Server®.

#2: Only Windows® 11 and Windows Server® 2025 are recorded.

4.3 Operations scheduled by default

In Windows®, various operations are scheduled by default and performed periodically in the background. Among these operations, the disk defragmenter (or drive optimization) might significantly increase system load when they run, and might adversely impact operation of business applications.

(1) Drive optimization

On this equipment, the drive optimization schedule is turned off by default. To optimize drives, use either of the following methods.

In Windows Server® 2025, when the Optimize Drives windows shown in the procedure below is displayed for the first time, the drive optimization schedule may become enabled automatically.

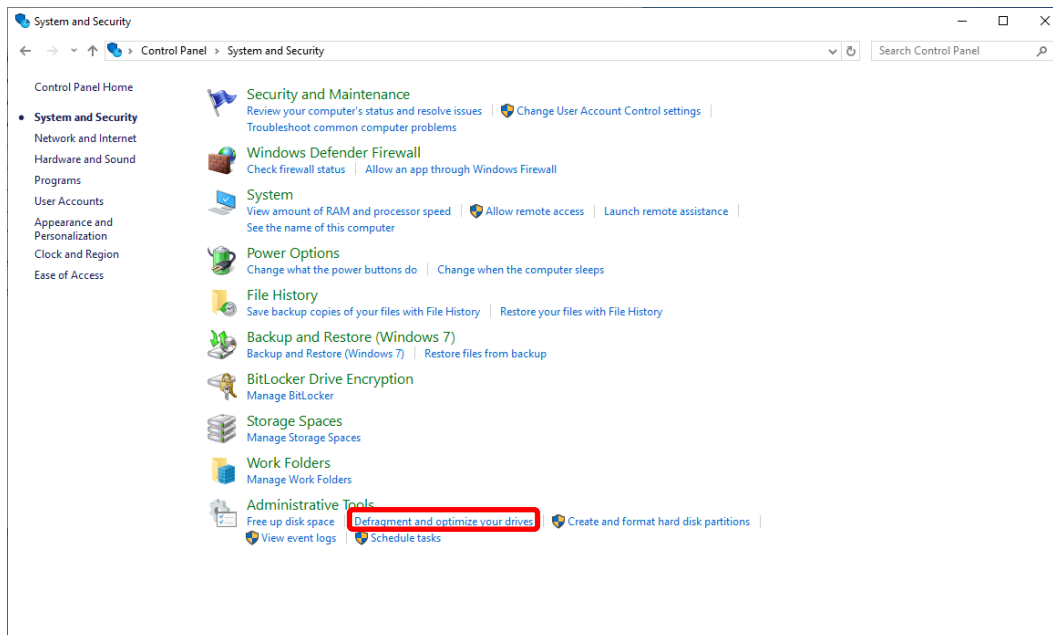
If it is unintentionally enabled, please follow step (c) in the procedure below.

- (a) Turning on the drive optimization schedule
- (b) Optimizing drives manually
- (c) Turning off the drive optimization schedule

The following describes the procedure for each method.

(a) Turning on the drive optimization schedule

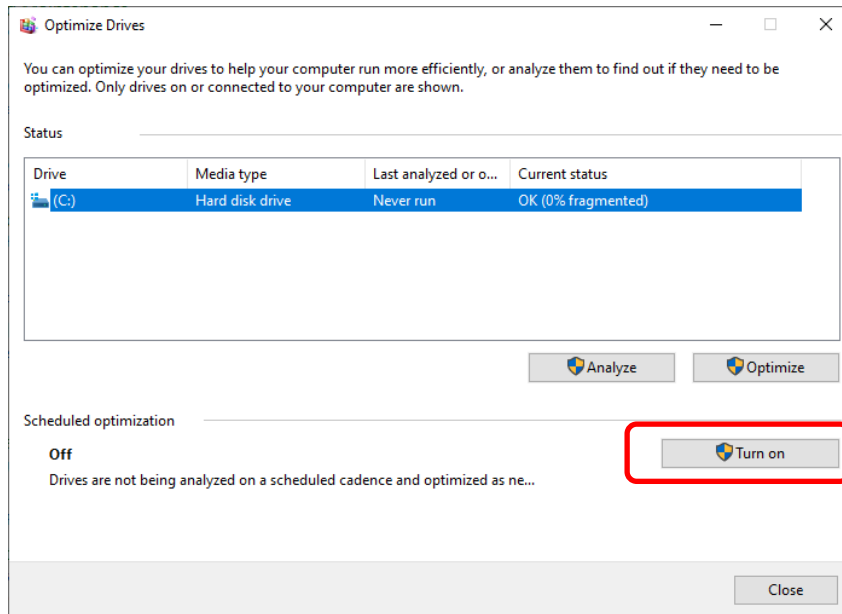
1. Sign in to the computer as an administrator, and then open the **Control Panel**.
2. Click **System and Security**.
3. Under **Administrative Tools**, click **Defragment and optimize your drives**.



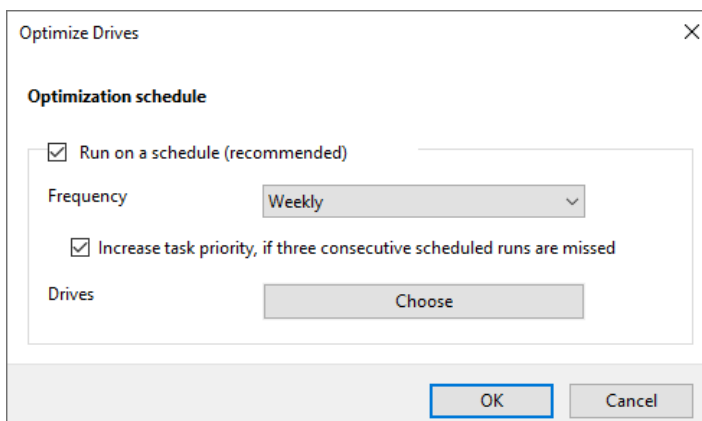
4. Precautions while the OS is running

4. The Optimize Drives window appears.

- Under **Scheduled optimization**, click **Turn on**.



5. The Optimization schedule window appears. Select the **Run on a schedule (recommended)** check box.



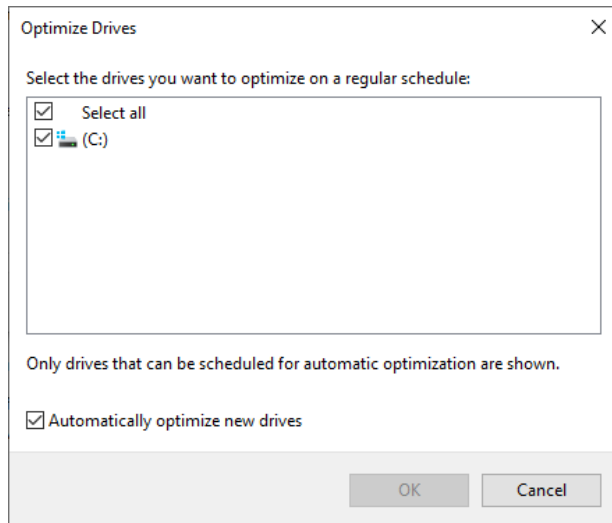
6. Configure the frequency of defragmentation as required. The initial schedule of defragmentation is as follows.

- **Frequency: Weekly**

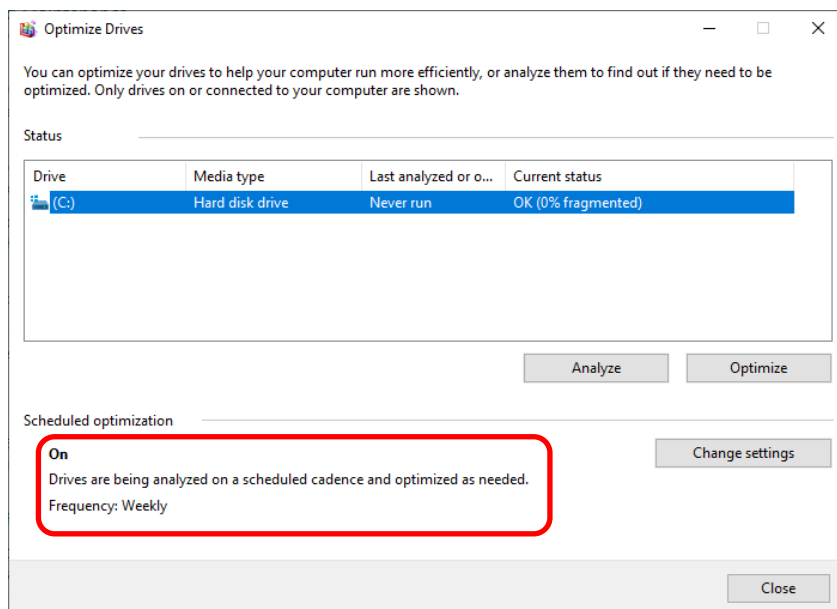
7. Click **Choose**.

8. The **Select the drives you want to optimize on a regular schedule** window appears. Select the drives that you want to defragment.

• Click **OK**.



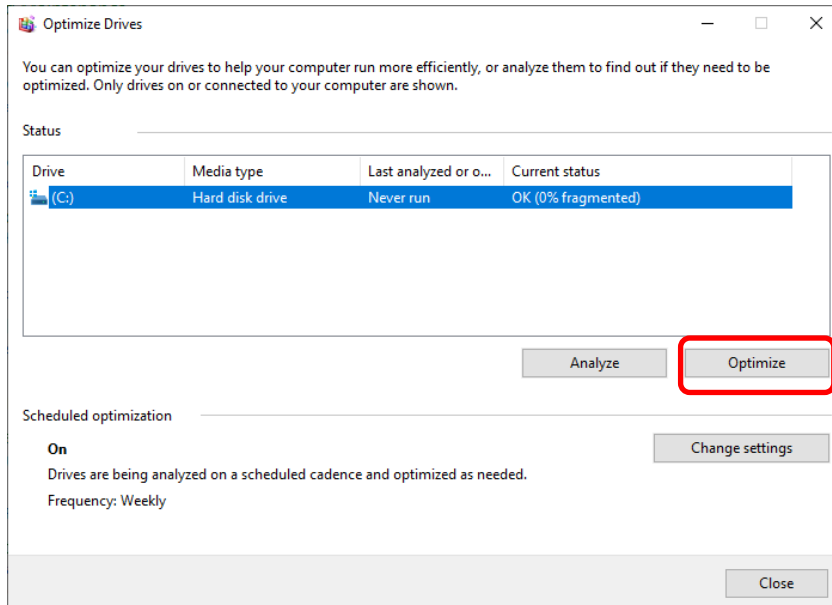
9. The Optimization schedule window appears. Click **OK**.
10. The configured schedules are displayed under **Scheduled optimization**. Check the contents, and then click **Close** to close the window.



4. Precautions while the OS is running

(b) Optimizing drives manually

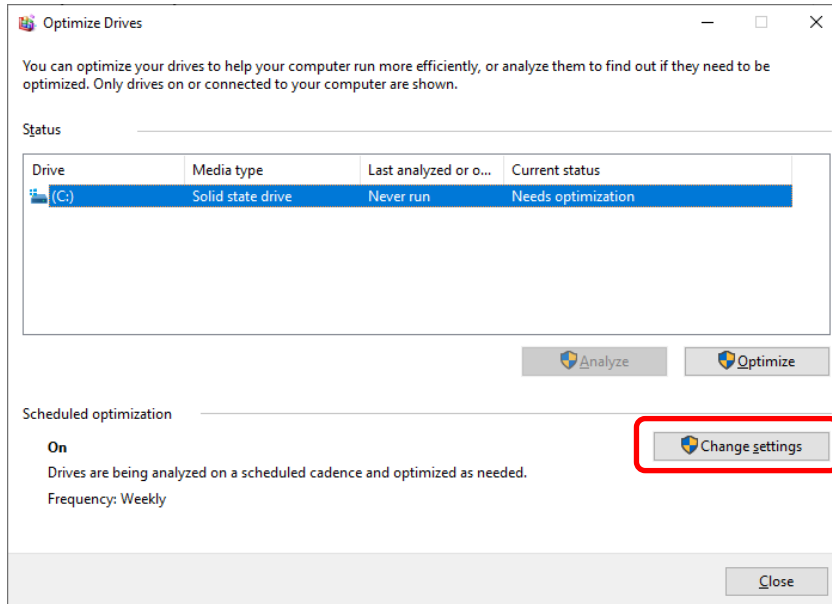
1. Perform steps 1 through 3 under (a) *Turning on the drive optimization schedule*.
2. The Optimize Drives window appears.
 - Under **Status**, select the drive that you want to defragment, and then click **Optimize**.



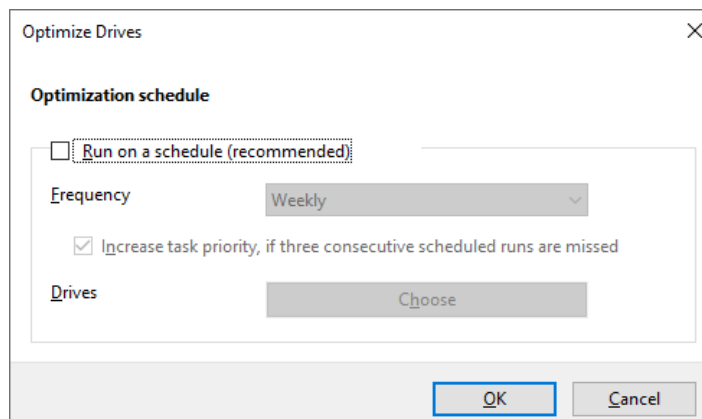
- When the disk optimization process is complete, the date and time of the optimization is displayed in the **[Last Analysis or Optimization]** column.
3. Click **Close** to close the window.

(c) Turning off the drive optimization schedule

1. Perform steps 1 through 3 under (a) *Turning on the drive optimization schedule*.
2. The Optimize Drives window appears.
 - Under **Scheduled optimization**, click **Change settings**.



3. The Optimization schedule window appears. Uncheck the **Run on a schedule (recommended)** check box.
 - Click **OK**.



3. Click **Close** to close the window.

4.4 Security enhancement functionality

In Windows® 10, Windows® 11, Windows Server® 2022 and Windows Server®2025, Windows Defender (anti-spyware) is enabled by default. Windows Defender also includes antivirus functionality. In some cases, this antivirus functionality might adversely impact application performance.

4.5 Factory default network settings

- Turning off SNP (Scalable Networking Pack)

SNP is intended to reduce processor load by delegating TCP-related processing to the network adapter. SNP consists of the following three features:

- TCP Chimney Offload
- Receive Side Scaling (RSS)
- Network Direct Memory Access (NetDMA)

Unfortunately, if the system is used in Windows® with SNP turned on, network processing might become unstable, or network performance might be reduced when you use the network in specific ways. For these reasons, SNP is disabled in this equipment.

In Windows® 10 and Windows Server®, TCP Chimney Offload and Network Direct Memory Access (NetDMA) are disabled by default, so only Receive Side Scaling (RSS) needs to be disabled.

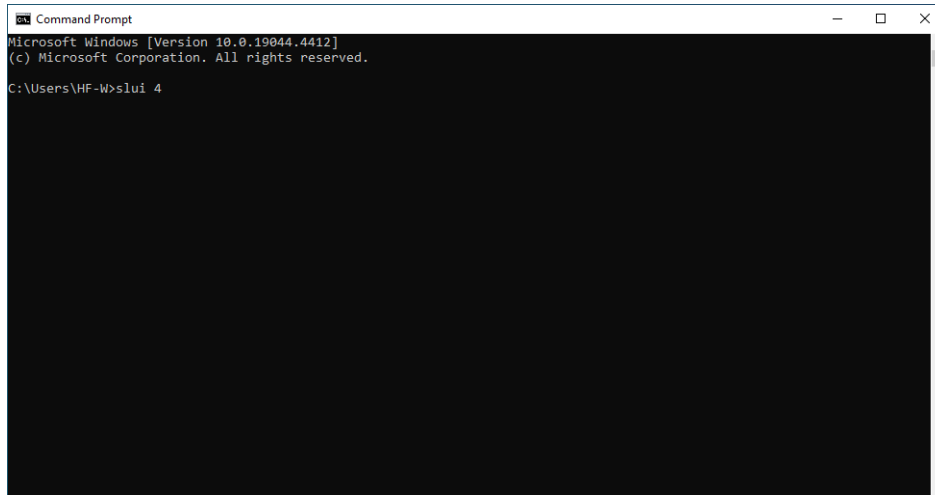
4.6 License activation

Windows® 10 and Windows® 11 are activated automatically when the equipment is connected to the internet. Even if Windows has not been activated in an environment that is not connected to the internet, you can continue to use the equipment.

To activate Windows offline over the phone, perform the following procedure:

1. Open a command prompt as an administrator, and then run the following command:

```
C:\windows\system32>slui 4
```



If the **Activation** window appears, click **Activate by phone**.

2. When the **Select your country or region** window appears, select your country, and then click **Next**.
3. The **Call and provide your installation ID** window appears. Call the displayed phone number, and then verify the confirmation ID.

After verifying the confirmation ID, click **Enter confirmation ID**.

4. The **Enter your confirmation ID** window appears. Enter your confirmation ID, and then click **Activate Windows**.
 5. The **Windows is activated** window appears. Click the **Close** button.
- Windows is now activated.

Windows Server® 2022 and Windows Server® 2025 are already activated.

4.7 Unresponsive mouse in the sign-in window

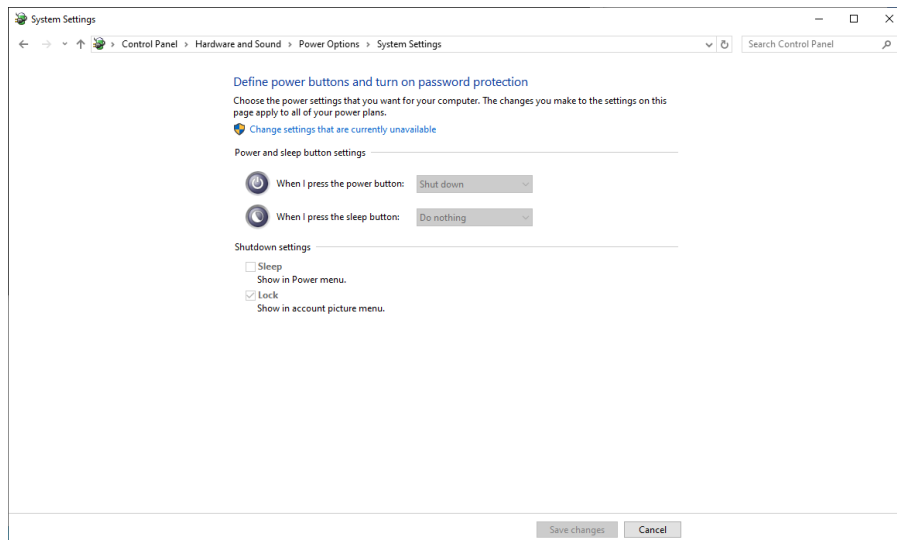
In Windows® 10 and Windows® 11, if a message for verifying the settings for the collection of memory dumps appears when a user with a set password is signing in, the sign-in window might be displayed in the background and the mouse might become unresponsive.

In such cases, the sign-in window can be displayed by pressing **Enter** on the keyboard.

4.8 Power options

This equipment does not support the hibernation and sleep power options (disabled by default). Therefore, do not change the settings to enable hibernation and sleep.

The Sleep setting is displayed on the power settings dialog box, but it cannot be changed. Note that we cannot guarantee operation of the equipment if the hibernation or sleep settings are enabled.



4.9 BitLocker

This equipment includes TPM (Trusted Platform Module) and supports BitLocker, a security feature of Windows®. BitLocker is disabled by default.

You can enable BitLocker in Windows® and Windows Server® as follows:

NOTE

If the equipment is locked by BitLocker, enter the recovery key to unlock it.

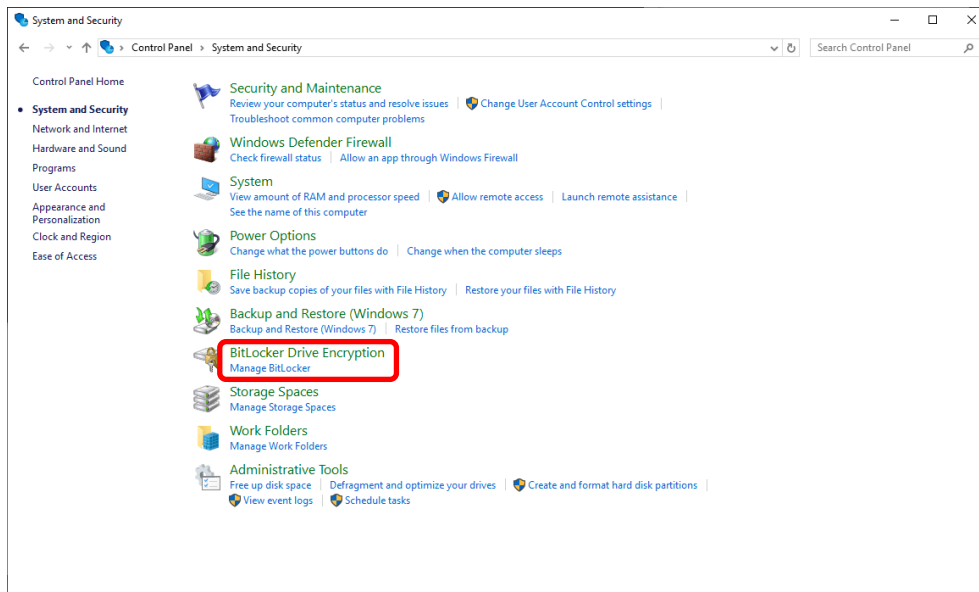
This recovery key is required for maintenance and repair, so make sure to store it on a medium separate from the equipment.

Accordingly, please enable BitLocker after preparing a medium to store the recovery key.

4.9.1 Procedure for enabling BitLocker in Windows® 10 and Windows® 11

This section explains how to enable BitLocker in Windows® 10 and Windows® 11.

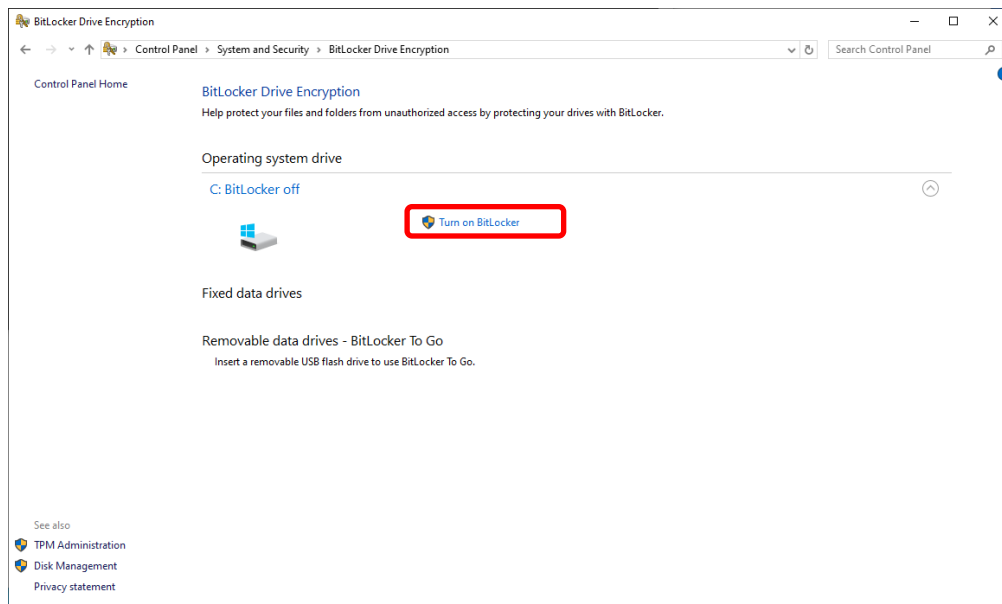
1. Sign in to the computer as an administrator, and then open the **Control Panel**.
2. Click **System and Security**.
3. Click **BitLocker Drive Encryption**.



4. Precautions while the OS is running

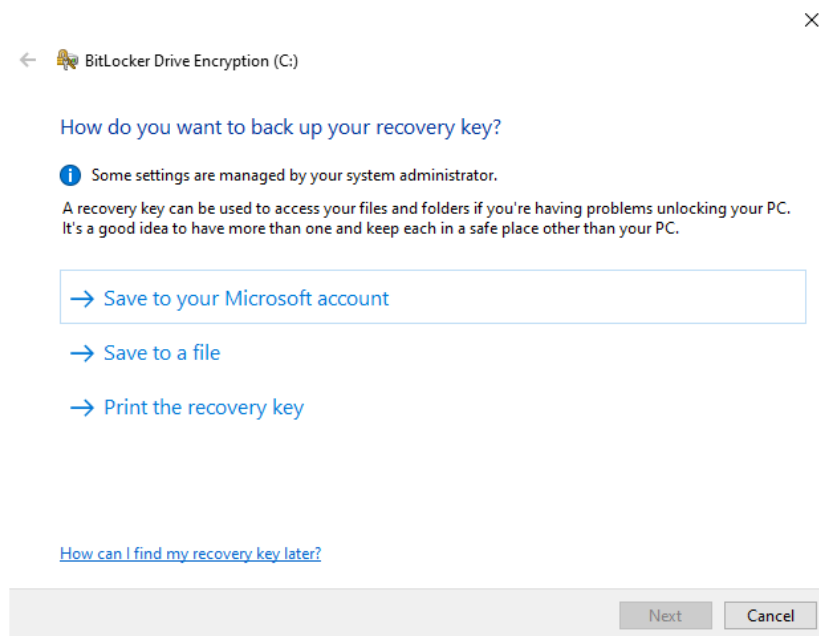
4. Click **Turn on BitLocker** for the target drive.

In this procedure, the C drive is the target drive.

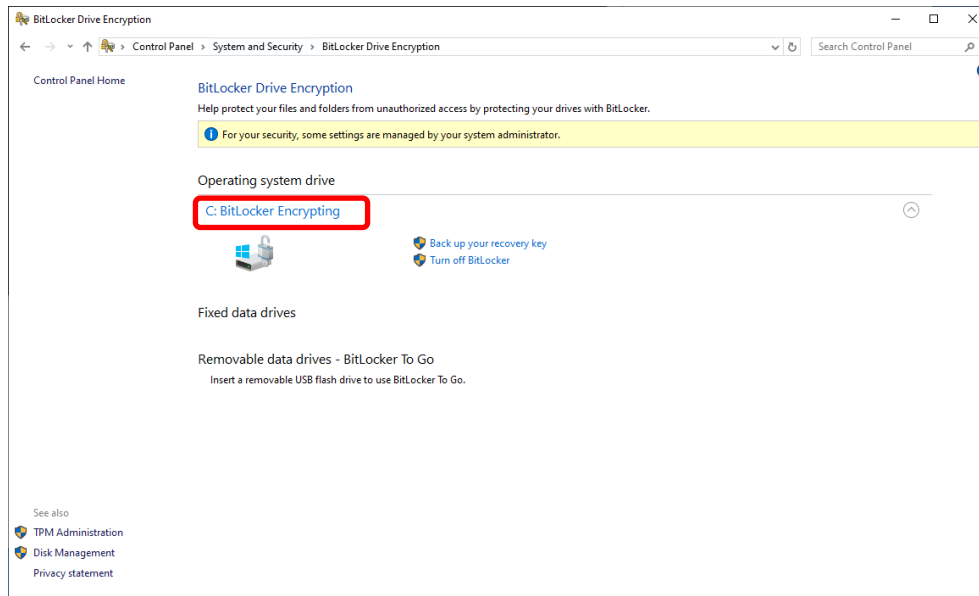


5. The BitLocker Drive Encryption window opens. Specify how to back up your recovery key, and save the key.

6. Click **Next**.



7. Choose how much of your drive you want to encrypt, and then click **Next**.
8. Choose the encryption mode to be used, and then click **Next**.
9. Select the check box if you want to perform BitLocker system check, and then click **Start encrypting** or **Continue**.
10. Restart the equipment.
11. Perform steps 1 to 3.
12. Verify that **BitLocker Encrypting** is displayed for the drive specified in step 4.



4.9.2 Procedure for enabling BitLocker in Windows Server®

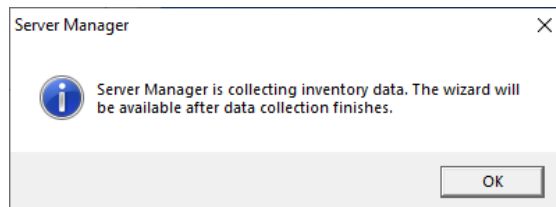
This section explains how to enable BitLocker in Windows Server®.

Since BitLocker is not installed by default on Windows Server®, BitLocker must be enabled after the BitLocker feature is installed.

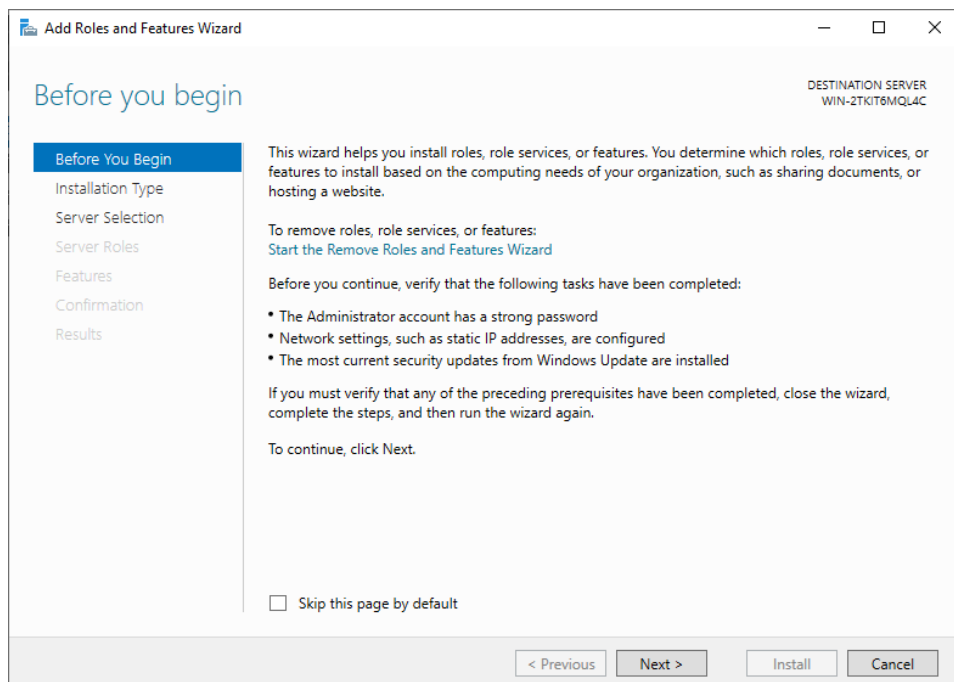
1. Sign in as the computer administrator and open the **Server Manager** window.
2. Select **Manage**, and then click **Add Roles and Features**.

[Note]

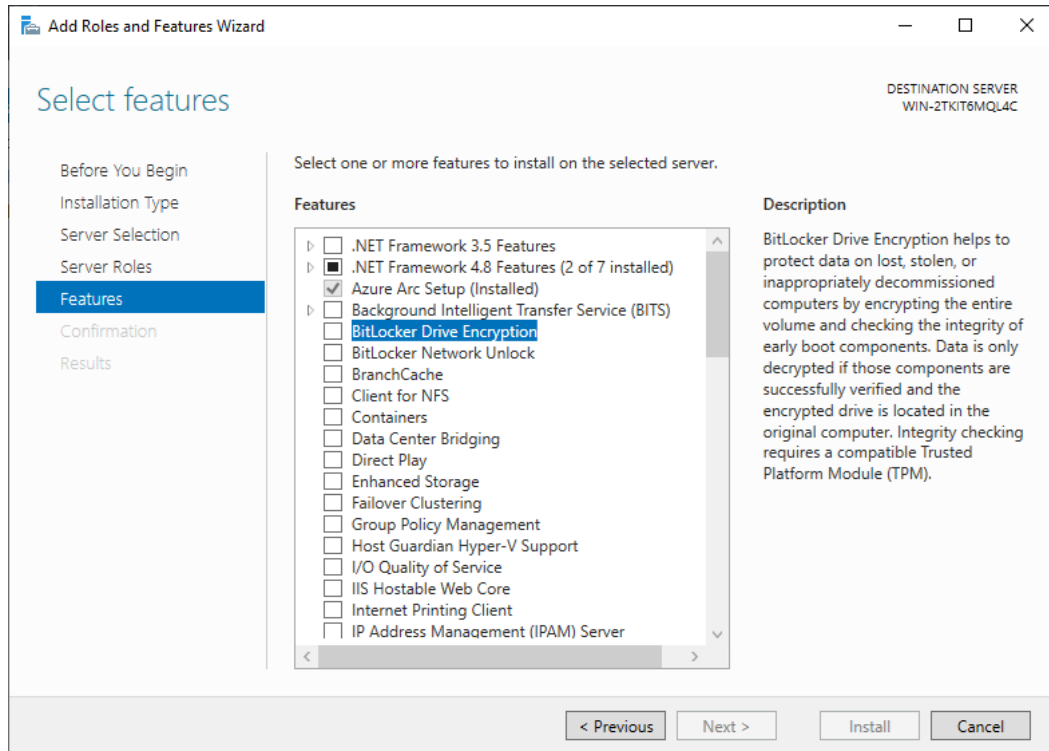
If you perform any operations while Server Manager is still starting up, a window like the one shown below may appear. In such cases, please wait until Server Manager has fully launched before trying again.



3. The **Add Roles and Features Wizard** appears. If the **Before you begin** window appears, click **Next**.

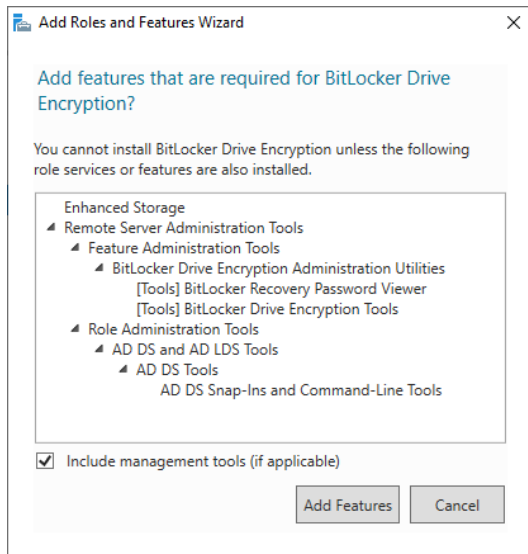


4. In the **Installation type** window, select **Role-based or feature-based installation**, and then click **Next**.
5. In the **Server Selection** window, select **Select a server from the server pool**, and then select the server for which you want to install BitLocker.
6. Click **Next**.
7. In the **Server Roles** window, click **Next**.
8. In the **Select features** window, select the **BitLocker Drive Encryption** check box



4. Precautions while the OS is running

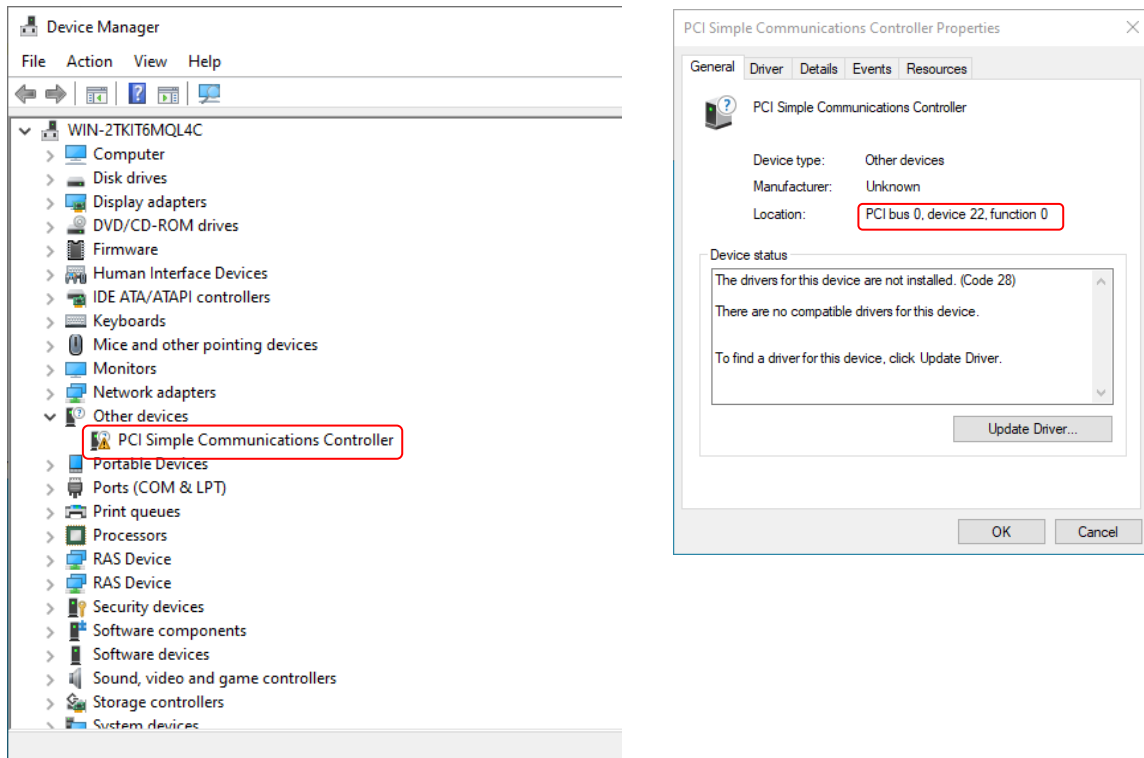
9. When the **Add Roles and Features Wizard** opens, add any necessary features as needed, then click **Add Features**.



10. In the **Features** window, click **Next**.
11. In the **Confirmation** window, click **Install** to start installing the features, and then wait until it is complete.
12. After the installation is complete, click **Close** to restart the equipment.
13. Enable BitLocker using the same procedure as in *4.9.1 Procedure for enabling BitLocker in Windows® 10*.

4.10 Device Manager display

The PCI communication simple controller (PCI bus 0, device 22, function 0) of this equipment is Intel® Management Engine (Intel® ME). As this equipment does not use the Intel® ME function, no driver is installed. For this reason, it might be marked as a driver not installed (with an exclamation (!) mark). As this function is not used, it will not affect system operation.



If there are multiple **PCI Simple Communication Controller**, the device driver might not be installed on the installed expansion board. Install the appropriate device driver for devices whose Properties dialog is other than the one shown above.

4.11 Notes on Applying Update Packages

In Windows® 11, double-clicking an update package to apply it may result in an error.

If an error occurs, apply the update using the DISM command from an administrator Command Prompt.

`DISM /online /Add-Package /PackagePath:"Path to the update package"`

Chapter 5 Specifications

5.1 Equipment specifications

(1) Common specifications

Item		Specifications
Model		See (2) <i>Individual specifications</i> .
Processor		See (2) <i>Individual specifications</i> .
Main memory		8GB/16GB/32GB
Display resolution and color depth		See (6) <i>Supported resolutions</i> .
Built-in file device	DVD	DVD-RW drive ^{#1}
	HDD/SSD	See (2) <i>Individual specifications</i> .
Expansion slots	PCI	See (2) <i>Individual specifications</i> .
	PCI Express	See (2) <i>Individual specifications</i> .
Standard I/O interface	Display	Analog (RGB Mini-D Sub 15 pins)
		Digital (DVI-D 24 pins)
		Digital (DisplayPort 20 pins) ^{#2, #3}
	USB ports	USB 2.0 × 2 (front)
		USB 3.2 (Gen1) × 6 (rear)
	Serial port	RS-232C (D-sub 9 pins) × 1
	LAN ports	1000Base-T/100Base-TX/10Base-T by auto-negotiation × 3 (RJ45, Wake on LAN TM supported)
	Audio	LINE IN × 1, LINE OUT × 1
External dimensions (Width × Depth × Height)		93 × 356 × 325 mm (excluding rubber feet and vertical stand)
RAS features ^{#4}		Hardware status monitoring (fan failure, temperature failure, SMART, and more), OS deadlock monitoring, watchdog monitoring, alarm notification when failures are detected (pop-up notifications, digital LED status indicator, remote notifications, and more), memory dump collection, maintenance operation support commands, simulation functions
Weight		Approx. 8.7kg (including two HDDs)
Inrush current		50 A or less (115 V AC), 100A or less (230 V AC)
Leakage current		3.5 mA or less
Consumption current (max.) AC100V/AC240V		2.4A/1.0A
Power	Voltage	100 - 240 V AC ± 10% (wide range input)
	Frequency	50/60 Hz ± 3 Hz
Keyboard and mouse		Optional

5. Specifications

(2) Individual specifications

Item		Specifications	
		HF-W2000 Model 68	HF-W2000 Model 65
Model ^{#5}		A model: HJ-2068-xxxA B model: HJ-2068-xxxB S model: HJ-2068-xxxS T model: HJ-2068-xxxT	A model: HJ-2065-xxxA B model: HJ-2065-xxxB S model: HJ-2065-xxxS T model: HJ-2065-xxxT
Processor		Intel® Xeon® W-1250E (3.5GHz)	Intel® Core™ i3-10100E (3.2 GHz)
Built-in file device ^{#6, #7}	DRIVE1 ^{#8}	SATA HDD 1TB or SATA SSD 480 GB	
	DRIVE2 ^{#9}	SATA HDD 1 TB (optional) SATA SSD 480 GB (optional)	
Expansion slots	PCI	Full height short size × 1	
	PCI-Express	Full height short size PCI Express x16 × 1 Full height short size PCI Express x4 × 1 ^{#10}	

#1: The DVD drive in this equipment supports the following types of media:

Read supported: CD-ROM, DVD-ROM

Read/write supported: DVD-R

Depending on the type of CD or DVD used, reading or writing to the disc might not be possible. In such cases, use another CD or DVD.

#2: When using three-screen output, you must use an active-type DisplayPort-DVI conversion adapter, and perform a preliminary evaluation to verify proper functionality before use.

#3: For details about the output resolution when using a DisplayPort-DVI conversion adapter, see the adapter's specifications.

#4: Data can be obtained from the RAS external contact; Type C does not support some functions.

#5: The xx parts of the name indicate the OS type. For details about OS types, see (3) *Pre-installed OS model specifications* in 5.1 *Equipment specifications*.

If xx is NO, no OS is installed.

y denotes the supported language of the OS.

M denotes support for both Japanese and English; J denotes support for Japanese only.

(For HF-W2000 models 68/65, only M — Japanese/English support — is available.)

If no OS is installed, J is used.

The letter at the end of the name denotes the model:

A: A model (single SATA HDD model), B: B model (SATA HDD software RAID1 hot-swap model),

S: S model (single SATA SSD), T: T model (SATA SSD software RAID1 hot-swap model).

#6: For details about precautions for hard disks, see 4. *Hard Disk Drives (HDDs) and Solid State Drives (SSDs)* in *Precautions*.

#7: For the B model and T model, the capacity of DRIVE1 and DRIVE2 must be the same. Do not install HDDs or SSDs with different capacities.

For the A model and S model, a combination of HDD and SSD is not supported.

#8: The factory default C drive partition size is 200 GB, with the remaining space left unallocated.

- #9: DRIVE2 is an option for the A model and S model, but is part of the standard configuration for the B model and T model.
- #10: Although a PCI Express x16 connectors is used, the internal connection is equivalent to PCI Express x4.

5. Specifications

(3) Pre-installed OS model specifications

OS type	Pre-installed OS
NO	No OS
WG	Microsoft® Windows® 10 IoT Enterprise 2021 LTSC (64-bit) (Embedded licensing version)
SF	Microsoft® Windows Server® IoT 2022 Standard (64-bit) (Embedded licensing version) ^{#1, #2}
WH	Microsoft® Windows® 11 IoT Enterprise LTSC 2024 (64-bit) (Embedded licensing version)
SG	Microsoft® Windows Server® IoT 2025 Standard (64-bit) (Embedded licensing version) ^{#1, #2}

#1: The client access license (CAL) is available for purchase. For details, contact your sales account representative.

#2: Only B/T models of the HF-W2000 model 68 are supported.

(4) Accessories

Item	Specifications
Power cord	7 A 125 V two-prong plug with ground pole
Vertical Stand	Used when installing the device in a vertical orientation. (For installation instructions, refer to “6.4.9 Installing and removing the vertical stand”)
Manual	Safety instructions (manual number: WIN-B-5002)

(5) Optional specifications

Item	Specifications
LAN adapter	1000Base-T/100Base-TX/10Base-T by auto-negotiation × 1 (For details, see (8) <i>Optional LAN adapter specifications (HJ-F2060-20).</i>)
RAS external contact port	Type A (For details, see 5.8.2 <i>External contact specifications.</i>)
	Type B (For details, see 5.8.2 <i>External contact specifications.</i>)
	Type C (For details, see 5.8.2 <i>External contact specifications.</i>)
Service menu	Failure Analysis Support Service (as-needed contract)
	Failure Analysis Support Plus (purchasable with the main unit)
Optional Tool	Auto-Restart Tool “RunWatcher® R2.1”

(6) Supported resolutions

Screen settings			
Resolution	Refresh rate ^{#1}		
	Analog RGB	DVI-D	DisplayPort
	Analog	Digital	Digital
800 × 600	60Hz	60Hz	60Hz
1,024 × 768	60Hz	60Hz	60Hz
1,280 × 1,024	60Hz	60Hz	60Hz
1,600 × 1,200	60Hz	60Hz	60Hz
1,920 × 1,080	60Hz	60Hz	60Hz
1,920 × 1,200	60Hz	60Hz	60Hz
2,560 × 1,440	—	—	60Hz
2,560 × 1,600	—	—	60Hz
3,840 × 2,160	—	—	60Hz

#1: All refresh rate settings indicated in the table have been confirmed to work in the test environment provided by Hitachi. Supported resolutions and refresh rates differ by display. Consequently, some settings might not be usable with some displays.

#2: ‘—’ indicates that this product does not support this screen setting.

5. Specifications

(7) Main memory specifications

Only the following combinations can be used for the configuration of the main memory of this equipment.

DIMM1	DIMM2	Total capacity
8GB	—	8GB
8GB	8GB	16GB
16GB	16GB	32GB

(8) Optional LAN adapter specifications (HJ-F2060-20)

Item	Specifications
Interface	1000Base-T/100Base-TX/10Base-T by auto-negotiation × 2 (RJ-45, Wake on LAN™ not supported)
Installed slot	PCI Express x1
Dimensions	120.7 mm × 67 mm (including full height bracket)
Weight	About 40 g

(9) Maximum current specifications (USB ports, extension boards, DisplayPort)

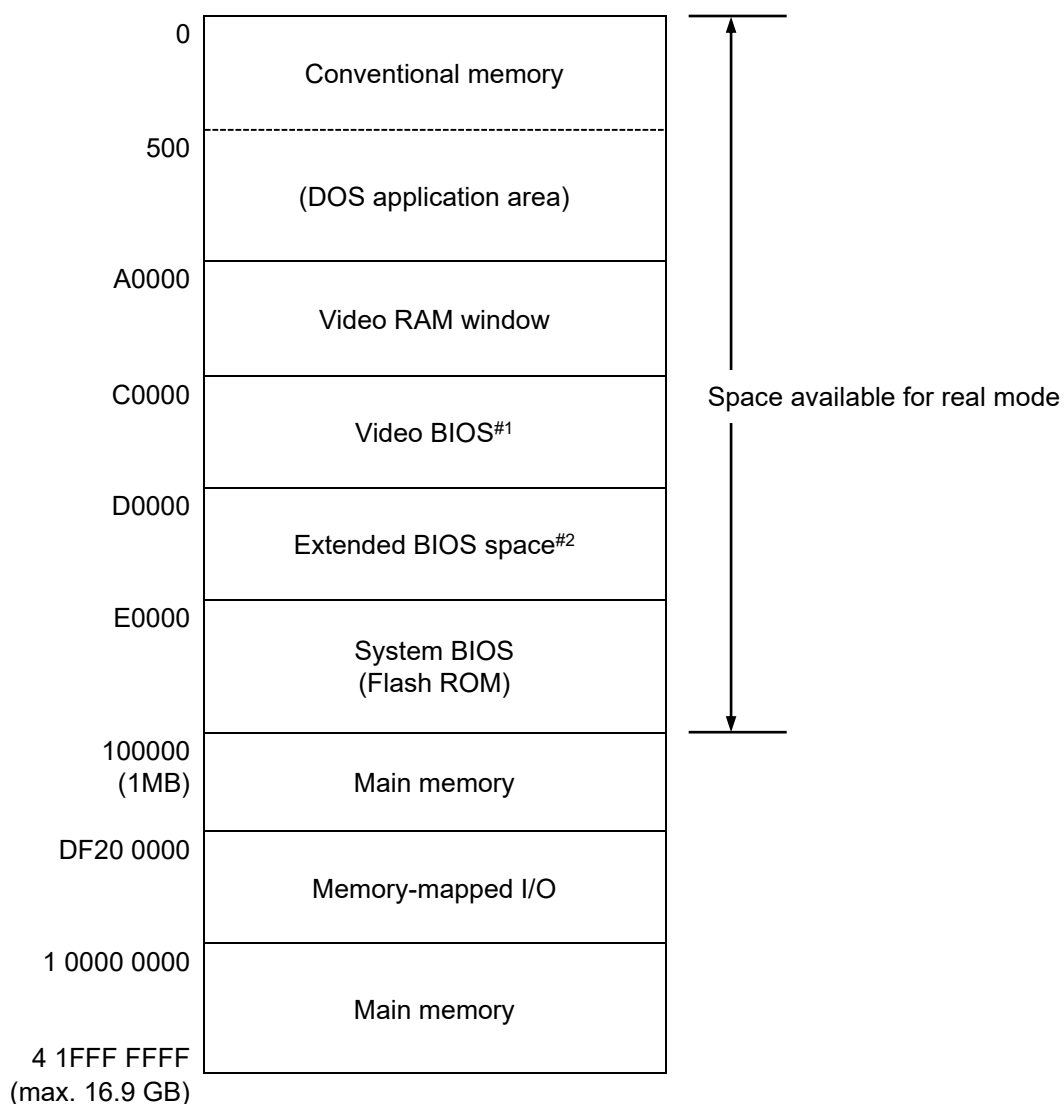
The following table shows the maximum total current consumption for the USB ports, expansion slots (PCI Express/PCI), and DisplayPort.

DC output	Maximum total current consumption for USB port × 8 ports/ Extension board × 3 slots/ DisplayPort × 1 port
3.3 V	3.5 A
5 V	7.5 A
12 V	2.1 A
-12 V	0.1 A

The following table shows the maximum current consumption for each of the USB ports, expansion slots (PCI Express/PCI), and DisplayPort. Make sure that the inrush current when a device is connected does not exceed the specified maximum current. If the inrush current exceeds the specified maximum current, the surge protection circuit might activate, and the connected device might not be recognized.

Item	Voltage	Maximum current
USB 2.0/port	5 V	0.5 A/port
USB 3.2 (Gen1)/port	5 V	0.9 A/port
PCI Express x 16 slots	3.3 V	3.0 A/slot
	12 V	2.1 A/slot
PCI Express x 4 slots	3.3 V	3.0 A/slot
	12 V	2.1 A/slot
PCI slot	3.3 V	6.0 A/slot
	5 V	5.0 A/slot
	12 V	0.5 A/slot
	-12 V	0.1 A/slot
Analog RGB	5 V	1.0 A/port
DVI-D	5 V	0.5 A/port
DisplayPort	3.3V	0.5 A/port

5.2 Memory space



#1: The size of the video BIOS might change in future versions.

#2: The extended BIOS space is a narrow space between D0000 and DFFFF, and might already be in use by other devices. In addition, the size of the BIOS of the standard built-in adapters might change in future versions. If possible, we recommend not using the extended BIOS space when designing a new device. If you do, a conflict might occur between devices, resulting in device malfunctions.

5.3 I/O spaces

List of I/O spaces

I/O address	Device name
0000 - 001F	DMA controller
0020 - 002D	Interrupt controller
002E - 002F	Super I/O configuration
0030 - 003D	Interrupt controller
0040-0043	System timer
004E - 004F	Super I/O configuration
0050-0053	System timer
0060, 0062, 0064, 0066	Keyboard controller
0061	NMI controller
0070-0077	RTC controller
0080	DMA and POST code
0081-0091	DMA controller
0092	Reset controller
0093 - 009F	DMA controller
00A0 - 00B1	Interrupt controller
00B2 - 00B3	Power management controller
00B4 - 00BD	Interrupt controller
00C0 - 00DF	DMA controller
0000 - 00FF	Reserved (domain other than the preceding)
0240 - 025F	RAS LSI register
02E8 - 02EF	Serial port
02F8 - 02FF	Serial port
03B0 - 03DF	VGA controller
02E8 - 02EF	Serial port
03F8 - 03FF	Serial port 1 (COM1): A
04D0 - 04D1	Interrupt controller
0CF8 - 0CFB	PCI configuration (address)
0CF9	Reset controller
0CFC - 0CFF	PCI configuration (data)
1800 - 189F	Power management controller
F000 - F03F	VGA controller
F040 - F05F	SMBus controller
F060 - F07F	AHCI controller
F080 - F083	AHCI controller
F090 - F097	AHCI controller

5.4 List of interrupts

Interrupt pin	Description
IRQ0	System timer
IRQ1	Not used
IRQ2	Not used
IRQ3	Serial port 2 (COM2)
IRQ4	Serial port 1 (COM1)
IRQ5	Not used
IRQ6	Not used
IRQ7	Not used
IRQ8	Not used
IRQ9	Not used
IRQ10	Not used
IRQ11	SMBus
IRQ12	Not used
IRQ13	Coprocessor
IRQ14	Not used
IRQ15	Not used
IRQ16	Not used
IRQ17	Not used
IRQ18	Not used
IRQ19	Not used
IRQ20	Not used
IRQ21	Not used
IRQ22	Not used
IRQ23	Not used
MSI	xHCI, onboard video, LAN1, LAN2, LAN3, SATA controller, PCI Express slot 1,2, PCI slot 3

NOTE

- This list is valid when the APIC is enabled (default settings).
- The IRQ numbers are fixed, and you cannot change the settings shown here.
- Even in an APIC-capable OS, APIC-enabled IRQ numbers are assigned only while the corresponding devices are active. In other cases, APIC-disabled IRQ numbers are assigned (see the next page).

IRQ assignment when the APIC is disabled

Interrupt pin	Description
IRQ0	System timer
IRQ1	Not used
IRQ2	Not used
IRQ3	Serial port 2 (COM2)
IRQ4	Serial port 1 (COM1)
IRQ5	Not used
IRQ6	Not used
IRQ7	Not used
IRQ8	Real-time clock
IRQ9	Not used
IRQ10	LAN1
IRQ11	SMBus controller, onboard video, xHCI, SATA controller, LAN2, LAN3, PCI Express slot 1,2, PCI slot 3
IRQ12	Not used
IRQ13	Coprocessor
IRQ14	Not used
IRQ15	Not used

5.5 Serial port settings

The factory default settings for the serial ports are as follows. Do not change these settings. If you do, the equipment might not work properly.

Name recognized by the BIOS	I/O address#	IRQ assignment#	Name recognized by the OS	Note
Serial port A	3F8h	IRQ 4	COM1	Standard feature
Serial port B	2F8h	IRQ 3	COM2	Optional

#: Automatically assigned by the BIOS.

5.6 BIOS setup

The BIOS stores the system configuration information in an SPI-ROM. If you modify the system configuration, you might also need to change the BIOS settings.

For cautions on usage when changing the BIOS settings, see *Precautions 10. BIOS settings*.

NOTE

The BIOS is configured to match the system configuration when the equipment was shipped.

If the BIOS settings are changed, the system might not start properly or operation might be unstable. Use sufficient care when changing the BIOS settings.

(1) Starting the setup menu

When you set up the BIOS, start the setup menu.

Turn on the power switch (see *1.5 Name and function of each part*). Messages related to system initialization will be displayed. Press the **F2** key to launch the setup menu.

(2) Navigating the setup menu

Use the following keys to navigate the menu.

Key name	Description
Esc	Used to exit setup or return from a lower menu to a higher menu.
← or →	Used to select a menu or a menu group displayed at the top of the screen.
↑ or ↓	Used to select an item or a sub-item under a menu group.
+ or -	Used to select a value for the setting. By pressing these keys, settings cycle through the available options.
Space	Used to select a value for the setting. If there are only two available options, this key toggles the setting.
Tab	When configuring the date and time, this key toggles between setting items (for example, from month to day and from hour to minute).
Enter	Used to move from a higher menu to a lower menu, to exit setup (saving data to the SPI-ROM), and for various other purposes.

(3) Overview of the setup menu

The setup menu consists of the following items:

Main: This is the screen displayed when the menu starts. You can configure basic system settings such as the date and time.

Advanced: You can configure detailed system settings such as interrupt ports and I/O address settings.

Chipset: You can configure ECC support settings and whether to enable or disable a LAN.

Boot: You can configure the priority order of devices from which an OS is booted.

Save&Exit: You can save modified configuration information to the SPI-ROM, reset configuration information to the default settings, and make other changes.

(4) Details of the setup menu

The following tables show the details of the items you can set in each menu.

(1/7)

Top menu	Setting item		Default value	Description
Main	System Date		—	When you set the system up for the first time, make sure to configure these items.
	System Time		—	
Advanced	Beep on Boot		Disabled	Specifies whether to turn the beep sound on or off at startup. Option: Disabled, Enabled
	Correctable ECC Error		Pause	Specifies whether to display a message and pause startup, or to ignore errors and proceed with startup when a Correctable ECC Error is detected. Option: Pause, Pass
	Hardware Monitor		Ambient Monitor : CPU External Temperature : CPU Internal Temperature : CPU Fan Speed : System Fan Speed : PSU Fan Speeds : 1V_CPU_CORE : 1D2V_S3 : 12V_S0 : 5V_S0 : 3D3V_S0 : 5V_S5 : -12V : V_BAT :	Displays the temperature, fan speed, and power supply voltage.
	Memory testing	Memory testing	Enabled	Specifies whether to test the memory during startup. Option: Enabled, Disabled
		Mode of testing	Normal test	Specifies the test mode for the memory test during startup. Option: Normal test, Fast test
	CPU Configuration	Core Multi Processing	Enabled	Specifies whether to use a single core or multiple cores. Option: Enabled, Disabled
		Hyper-Threading	Enabled	Specifies whether to enable or disable Hyper-Threading Technology. Option: Enabled, Disabled This item does not appear for processors that do not support Hyper-Threading. Is this sentence necessary?
		EIST	Enabled	Specifies whether to enable or disable EIST. Option: Enabled, Disabled

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		MMIO Range	Dynamic	Specifies whether MMIO is dynamic or fixed (2 GB). Option: Dynamic, 2GB
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(2/7)

Top menu	Setting item		Default value	Description
Advanced	SATA Configuration	SATA Mode Selection	AHCI	Do not change the setting to the left.
		Drive 1 Slot	Enabled	Specifies whether to enable or disable the applicable slot. Option: Enabled, Disabled
		Drive 2 Slot	Enabled	Specifies whether to enable or disable the applicable slot. Option: Enabled, Disabled
		Drive 3 Slot	Enabled	Specifies whether to enable or disable the applicable slot. Option: Enabled, Disabled
	USB Configuration	Front USB Port	Enabled	Specifies whether to enable or disable the front USB ports. Option: Enabled, Disabled

Top menu	Setting item		Default value	Description
Advanced	Power Configuration	After AC Power On	Auto	<p>Specifies settings that govern the behavior when power is restored after power is lost.</p> <p>Stay Off: When the power is turned on, the system goes into the soft power off mode.</p> <p>Power On: When the power is turned on, the OS starts automatically.</p> <p>Auto: If the OS was running the last time the power was turned off, the OS starts as in the case of Power On. If the OS was not running the last time the power was turned off, the system goes into the soft power off mode as in the case of Stay Off. If the backup battery runs out of power or if the battery is not connected, the settings operate the same way as Stay Off when the power is turned off. If the backup battery runs out of power or is replaced, the applicable setting value reverts to the default (Auto).</p>
		Fan Failure Detection	Enabled	<p>Specifies whether to detect fan failures when the power is turned on.</p> <p>Option: Enabled, Disabled</p>
		Fan Speed Control	Auto	<p>Specifies the rotational speed of the fan.</p> <p>Auto: The fan speed changes automatically according to the CPU temperature.</p> <p>Full: Fan speed is always at maximum.</p>
		Cx State Enable	Disabled	<p>Changes the behavior of the processor power state (Cx).</p> <p>Option: Disabled, Enabled</p>

(4/7)

Top menu	Setting item			Default value	Description
Advanced	PCI Configuration	PCI-Express Device Slot #1	Enable Master	Enabled	Specifies whether to enable or disable mastering for the device connected in Slot #1. Option: Enabled, Disabled
			Link Speed	Auto	Specifies the link speed of the device installed in the applicable slot. Option: Auto, Gen1, Gen2, Gen3
		PCI-Express Device Slot #2	Enable Master	Enabled	Specifies whether to enable or disable mastering for the device connected in Slot #2. Option: Enabled, Disabled
			Link Speed	Auto	Specifies the link speed of the device installed in the applicable slot. Option: Auto, Gen1, Gen2, Gen3
		PCI-Express Device Slot #3	Enable Master	Enabled	Specifies whether to enable or disable mastering for the device connected in Slot #3. Option: Enabled, Disabled
			Link Speed	Auto	Specifies the link speed of the device installed in the applicable slot. Option: Auto, Gen1, Gen2, Gen3
		PCI Parity Error Detection		Enabled	Specifies whether to enable or disable PCI Bus Parity Error. Option: Enabled, Disabled

Top menu	Setting item		Default value	Description
Advanced	I/O Device Configuration	Serial Port A	Enabled	Do not change the setting to the left.
		Base I/O Address	3F8h	
		Interrupt	IRQ4	
		Serial Port B	Enabled	
		Base I/O Address	2F8h	
		Interrupt	IRQ3	
	Trusted Computing	TPM Support	Enabled	

(6/7)

Top menu	Setting item	Default value	Description
Chipset	ECC Support	Enabled	Specifies whether to enable or disable the ECC function of the memory. Option: Enabled, Disabled
	LAN 1	Enabled	Specifies whether to enable or disable the applicable LAN port. Option: Enabled, Disabled
	LAN 2	Enabled	Specifies whether to enable or disable the applicable LAN port. Option: Enabled, Disabled
	LAN 3	Enabled	Specifies whether to enable or disable the applicable LAN port. Option: Enabled, Disabled
Boot	Bootup Num Lock State	On	Specifies whether to turn Num Lock on for the keyboard upon startup. Option: On, Off
	Boot Option Priorities	1. UEFI USB FDD 2. UEFI SATA CD/DVD 3. UEFI USB CD 4. UEFI DRIVE1 5. UEFI DRIVE2 6. UEFI USB KEY 7. UEFI USB HDD 8. UEFI AP:UEFI:Built-in EFI Shell	Specifies the priority for devices that start the OS, and whether to start the OS from a particular device.
	UEFI Drive 1 BBS Priorities	Windows Boot Manager (P1: SSSTC ER3-CD480A)	Boot devices are listed in the setup menu only if they are implemented. The available items may vary depending on the installed devices.
	UEFI Application Boot Priorities	UEFI: Built in EFI Shell	

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Save&Exit	Save Changes and Reset	—	Saves the changes you made in setup to the SPI-ROM, and then reboots the system.
	Discard Changes and Reset		Discards the changes you made in setup, and reboots the system by using the configuration that was saved to the SPI-ROM last time.
	Restore Defaults		Loads the BIOS default settings. Default values are loaded but not saved in the SPI-ROM. If you want to save the default settings in the SPI-ROM, use Save Changes and Reset .

(5) Restoring the default settings

To restore all items in the setup menu to the default settings:

1. Start the setup menu. (See *(1) Starting the setup menu.*)
2. Open **Save&Exit** in the top menu. Move the cursor to **Restore Defaults** and press **Enter**.

The message Load Optimized Defaults? is displayed.

Select **Yes**, and then press **Enter**.

Open **Save&Exit** in the top menu again. Move the cursor to **Save Changes and Reset**, and then press **Enter**.

The message Save configuration and reset? is displayed.

Select **Yes**, and then press **Enter**.

This completes the procedure.

5.7 Hardware system clock

This equipment has a hardware system clock that uses an RTC (real-time clock) IC.

The clock, with its built-in calendar, remains operational via backup battery even when system power is off.

Table 5-1 Hardware system clock specifications

Item	Specifications
Time function	Hour/minute/second (24-hour clock)
Date function	Year/month/day
Precision	± 4 seconds per day [#]
Battery backup	Lithium battery

[#]: Approximation based on ambient temperature of 25°C.

The system regularly updates the internal clock by using a periodic timer. The internal clock is adjusted by reading the time and date from the hardware clock when, for example, the system starts.

5.8 Interface specifications

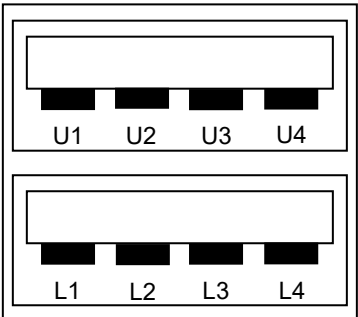
5.8.1 Connector specifications

The following shows the specifications of the interfaces from this equipment to external devices.

For information about the location of the ports, see sections pertaining to the display and user operation in *1.5 Name and function of each part*.

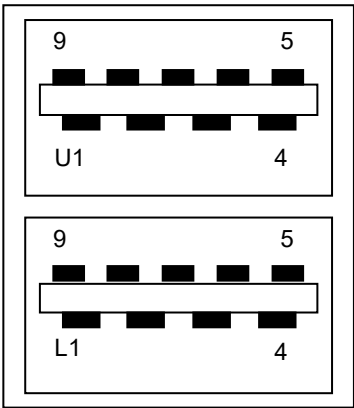
(1) Motherboard (standard)

- USB 2.0 port (front)



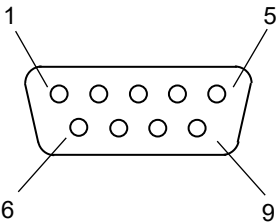
Pin no.	Signal name
U1	+5 V
U2	USBD1-
U3	USBD1+
U4	GND
L1	+5 V
L2	USBD0-
L3	USBD0+
L4	GND

- USB 3.2 (Gen1) port (rear)



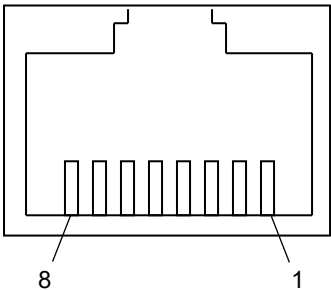
Pin no.	Signal name	Pin no.	Signal name
L1 (1)	+5 V	U1 (10)	+5 V
L2 (2)	USBD0-	U2 (11)	USBD1-
L3 (3)	USBD0+	U3 (12)	USBD1+
L4 (4)	GND	U4 (13)	GND
L5 (5)	SSRX1-	U5 (14)	SSRX2-
L6 (6)	SSRX1+	U6 (15)	SSRX2+
L7 (7)	GND	U7 (16)	GND
L8 (8)	SSTX1-	U8 (17)	SSTX2-
L9 (9)	SSTX1+	U9 (18)	SSTX2+

- Serial port (male connector, inch screws) (COM1、 COM2 (Optional))



Pin no.	Signal name	Pin no.	Signal name
1	CD	6	DSR
2	RD	7	RTS
3	TD	8	CTS
4	DTR	9	RI
5	GND		

- Built-in LAN port (RJ45 modular port 8 pins)



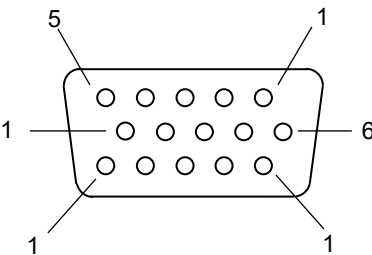
Pin no.	Signal name
1	TRD0+
2	TRD0-
3	TRD1+
4	TRD2+
5	TRD2-
6	TRD1-
7	TRD3+
8	TRD3-

For network connections, use the following specified cable.

Cable specification: UTP cable (twisted-pair cable without shielding), Category 5e or 6

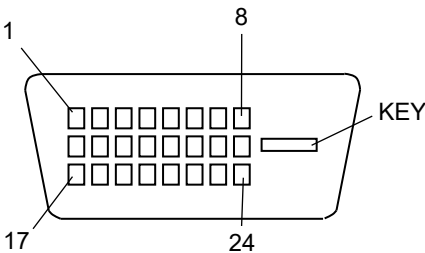
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- Video port (VGA terminal Mini D-sub 15 pins, inch screws)



Pin no.	Signal name	Pin no.	Signal name
1	RED	9	+5 V
2	GREEN	10	GND
3	BLUE	11	NC
4	NC	12	SDA
5	GND	13	HSYNC
6	RED-RTN	14	VSYNC
7	GREEN-RTN	15	SCL
8	BLUE-RTN		

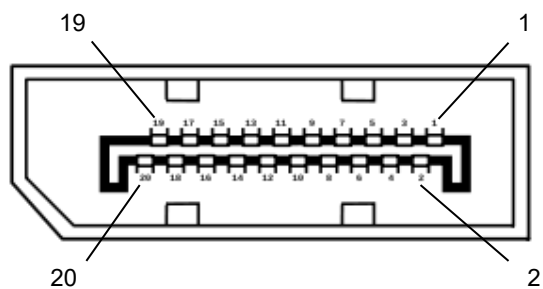
- Video port (DVI-D 24 pins, inch screws)



Pin no.	Signal name	Pin no.	Signal name	Pin no.	Signal name
1	TX2M	9	TX1M	17	TX0M
2	TX2P	10	TX1P	18	TX0P
3	SGND	11	SGND	19	SGND
4	NC(TX4M)	12	NC	20	NC
5	NC(TX4P)	13	NC	21	NC
6	DDCCLK2	14	P5DFP	22	SGND
7	DDCDAT2	15	PGND	23	TXCP
8	NC	16	NC	24	TXCM

Note: This video port supports single-link connections only.

- Video port (DisplayPort 20 pins)

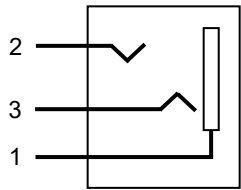


Pin no.	Signal name	Pin no.	Signal name
1	MainLane0+	11	GND
2	GND	12	MainLane3-
3	MainLane0-	13	GND
4	MainLane1+	14	GND
5	GND	15	Aux+
6	MainLane1-	16	GND
7	MainLane2+	17	Aux-
8	GND	18	HotplugDetect
9	MainLane2-	19	GND
10	MainLane3+	20	+3.3 V

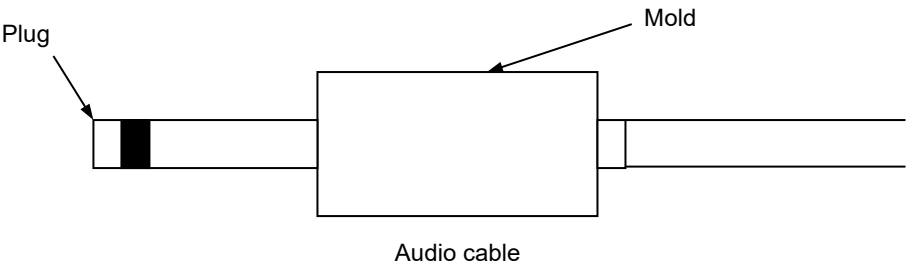
- #1: When using three-screen output, you must use an active-type DisplayPort-DVI conversion adapter, and perform a preliminary evaluation to verify proper functionality before use.
- #2: For details about the output resolution when using a DisplayPort-DVI conversion adapter, see the adapter's specifications.

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- Audio port: LIN and LOUT (3.5φ stereo audio port)



LIN		LOUT	
Pin no.	Signal name	Pin no.	Signal name
1	AGND	1	AGND
2	LIN L	2	LOUT L
3	LIN R	3	LOUT R

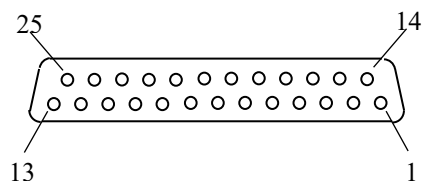


NOTE

The diameter of the mold of the cable must be no more than 10 mm. If the mold diameter exceeds 10 mm, you won't be able to connect cables to both LINE IN and LINE OUT ports simultaneously, as the molds will physically interfere with each other.

(2) RAS external contact interface (optional)

- External contact I/O port (male connector, inch screws)



Type A/B

Pin no.	Signal name	Pin no.	Signal name
1	MCALL_1	14	MCALL_2
2	GENDO0_1	15	GENDO0_2
3	GENDO1_1	16	GENDO1_2
4	WDTTO_1	17	WDTTO_2
5	PSDOWN_1	18	PSDOWN_2
6	GENDI0_1	19	GND(RMTPWRON_2/GENDI2_2)
7	RMTSTDN_1/GENDI_1	20	GND(RMTSTDN_2/GENDI_2)
8	GND(RMTRESET_2)	21	GND(GENDI1_2)
9	CPUSTOP_2	22	GND(GENDI0_2)
10	RMTPWRON_1/GENDO2_2	23	CPUSTOP_1
11	RMTRESET_1	24	GENDO2_1
12	GENDI1_1	25	GND
13	GENDI2_1		

Type C

Pin no.	Signal name	Pin no.	Signal name
1	NC	14	NC
2	GENDO0_1	15	GENDO0_2
3	NC	16	NC
4	GENDO1_1	17	GENDO1_2
5	PSDOWN_1	18	PSDOWN_2
6	NI_RMTPWRON_1/NI_GENDI2_1	19	GND(NI_RMTPWRON_1/NI_GENDI2_2)
7	NI_GENDI1_1	20	GENDI1_2
8	NC	21	RMTPWRON_2/GENDI2_2
9	NC	22	GND(NI_GENDI1_2)
10	NC	23	NC
11	NC	24	NC
12	GENDI1_1	25	NC
13	RMTPWRON_1/GENDI2_1		

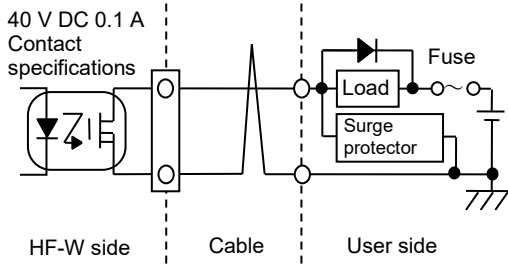
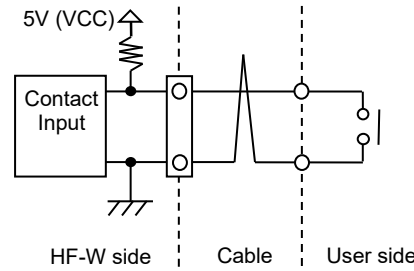
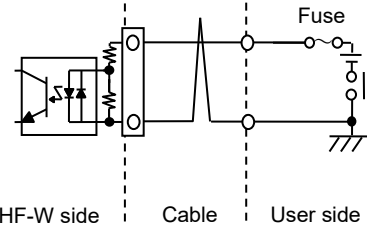
5.8.2 External contact specifications

Users can choose from Type A, B, and C for the external contact I/O at the time of purchase. (This cannot be changed after purchasing the equipment.)

(1) List of external contact I/O signals

Signal line		Meaning
Output	PSDOWN	Activated when the OS is shut down (standby or the main power is off) or when power is not supplied to the equipment.
	CPUSTOP	Activated when the OS, application, device driver, or similar cannot run properly because of an abnormally high system load or crash.
	WDTTO	Activated when a timeout is detected by the watchdog timer. A timeout is also detected when the OS is shut down (standby or the main power is off) or when power is not supplied to the equipment.
	MCALL	This is a maintenance request signal. This contact is activated when temperature, fan status, or one side of mirrored disks (B/T model only) is abnormal.
	GENDO0 GENDO1 GENDO2	These are general-purpose contact output signals. A user can assign a task to each of the contacts GENDO0 through GENDO2.
Input	RMTSHTDN (GENDI)	This is a shutdown request signal or a general-purpose input signal. When this contact is closed, the OS will be shut down. The user can select which signal to use.
	RMTREST	This is a reset request signal. When this contact is closed, the equipment is hard reset.
	GENDI0 GENDI1	These are general-purpose input signals. A user can assign a task to each of contacts GENDI0 and GENDI1.
	GENDI2 (RMTPWON)	These are general-purpose input signals. A user can assign a task to contact GENDI2. This input can also be used for the remote power-on function.

(2) External contact I/O port specifications

Item	Output ^{#1}							Input				
	PS DOWN	CPU STOP	WDT TO	MCALL	GEN DO0	GEN DO1	GEN DO2	RMTSHTDN/ GENDI ^{#2}	RMT RESET	GEN DI0	GEN DI1	GENDI2/ RMTPWRON ^{#3}
Type A	A contact							Yes	Yes	Yes	Yes	Yes
Type B	B contact			A contact				Yes	Yes	Yes	Yes	Yes
Type C	A contact	—	—	—	A contact		—	—	—	Yes	Yes	
Specifications	Contact specifications: PhotoMOS relay contact Load voltage: Max. 40 V DC Load current: Max. 0.1 A/point (steady state) Max. 0.6 A/point (inrush) Dielectric strength: 250 V AC, 1 minute							Contact specifications: Non-voltage transistor contact Contact current: 1 mA/point				
Contact diagram	 <p>40 V DC 0.1 A Contact specifications</p> <p>HF-W side Cable User side</p>							<p>Type A/B: Non-isolated Type C: Support for two types of input, non-isolated and isolated (not usable simultaneously)</p> <p>Non-isolated:</p>  <p>5V (VCC)</p> <p>Contact Input</p> <p>HF-W side Cable User side</p> <p>Isolated: 24 V DC 5 mA</p>  <p>HF-W side Cable User side</p>				

PS DOWN: Power supply down
 CPU STOP: CPU stopped (OS freeze monitoring)
 WDTTO: Watchdog time out
 MCALL: Maintenance technician call

RMTPWRON: Remote power on
 RMTSHTDN: Remote shutdown
 RMTRESET: Remote reset

GENDI*: General input
 GENDO*: General output

5. Specifications

#1: Operation of the A contact and B contact are as follows:

A contact (MCALL):

Open when normal, closed when abnormal, open when power is cut.

A contact (PSDOWN, CPUSTOP, WDTTO):

Closed when normal, open when abnormal, open when power is cut.

A contact (GENDO*):

The contact state depends on the user program instruction. Open when power is cut or without program instruction.

B contact (PSDOWN, CPUSTOP, WDTTO):

Open when normal, closed when abnormal, closed when power is cut.

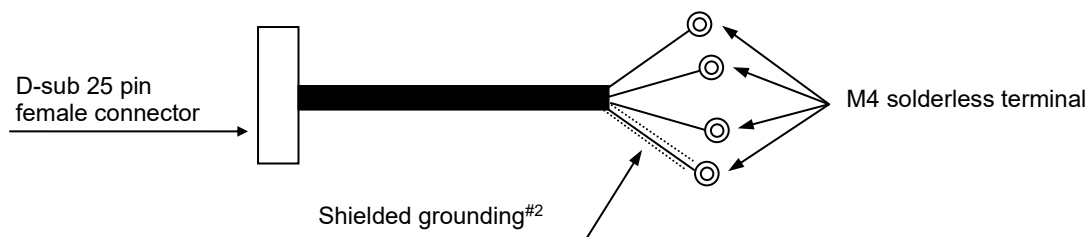
#2: RMTSHTDN and GENDI use the same contact (switched by the RAS software setting). RMTPWRON and GENDI2 use the same contact (switched by the jumper pin setting). For details, see *6.6 Enabling the remote power-on function*.

#3: When you use the RMTPWRON function, ensure that no noise is added to the external contact.

If the contact closes for 15 ms or more during the soft power-off mode (because of noise or other reason), power might turn on unexpectedly. Note that when the OS or BIOS is running after the power turns on, the RMTPWRON function is disabled, and the contact can be used as a GENDI2 input.

(3) Recommended EXT cable specifications

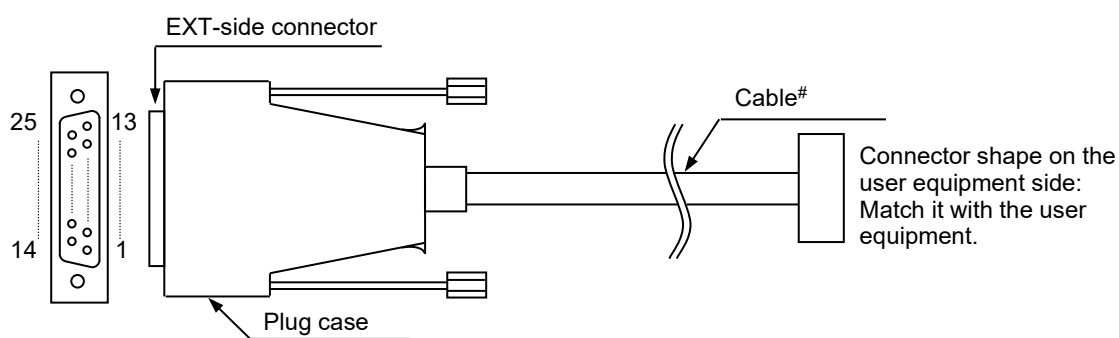
1. The following cable is required for connections.^{#1}



#1: The maximum cable length is 30 m.

#2: To connect a cable shield, in addition to the cable, you must provide a shielded grounding bar for dedicated use with shielded wire connections.

2. User-made cables must meet the following specifications:



Exterior view of the external contact cable and connector

- #: The ground shield of the cable must firmly contact the conductor of the plug case (frame ground).
(All GND pins of the EXT port are signal ground and must not be connected to this ground shield.
If you do so, the equipment might malfunction.)

- EXT side connector specifications (recommended connector)

Connector shape: D-sub 25 pin female connector (two lines)

Part name	Model	Manufacturer
Plug case	HDB-CTH1(4-40)(10)	Hirose Electric Co., Ltd.
Female connector	HDBB-25S	Hirose Electric Co., Ltd.

- Cable specifications (recommended cable)

Item	Specifications	Note
Maximum cable length	30m	
Electric shield of the cable	Required	Connected to the frame ground
Recommended cable	UL2464SB 13P × 24AWG	Proterial, Ltd.

5.8.3 External interface cable length specifications

(1) External interface cable length specifications

The recommended maximum cable length for each interface of this equipment is as follows:

No.	Connector name	Maximum cable length	Note
1	Analog RGB port	3m	
2	DVI-D port	3m	
3	DisplayPort	3m	
4	LAN port	100m	UTP Category 5e or better
5	RAS external contact port (optional)	30m	For details, see section 5.8.2 (3).
6	Serial port (COM1)	15m	Use a shielded cable.
7	Serial port (COM)		
8	Front USB 2.0 (2 ports)	3m	Use a USB 2.0 compliant shielded cable. If you use an extension cable, connected USB devices might not work properly. If you use an extension cable, connected USB devices
9	Rear USB 3.2 (Gen1) (6 ports)	2m	Depending on the connected device, use a USB 3.2 (Gen1) compliant or USB 2.0 compliant shielded cable. If you use an extension cable, connected USB devices might not work properly.
10	Audio (LINE IN/LINE OUT)	2m	

Note that some devices might not work properly with the interface. Please verify proper operation before actual use.

Equipment operation cannot be guaranteed when used in combination with extension or switching devices.

Verify correct operation of the equipment in advance.

Chapter 6 Inspection and maintenance

6.1 Daily Inspections



WARNING

Make sure that you install a dust filter in the equipment. Failure to do so could lead to dust ingress and subsequent fire from a short-circuit.



CAUTION

Before cleaning or replacing the dust filter, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute. Failure to do so might result in injury to the hands or fingers.

NOTICE

- Before moving this equipment, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute. If you do not, the HDDs and other devices might fail.
- When transporting or carrying the equipment, use the dedicated container and packing materials as used when the equipment was delivered. Use of a different container or packing materials might result in damage to the equipment.
- If the dedicated container is damaged or broken, do not use it to transport or carry the equipment. Doing so might result in damage to the equipment.

6. Inspection and maintenance

(1) Cleaning the dust filter

NOTICE

If you wash a dust filter, dry it completely before re-attaching it to the equipment. Using the equipment with a dust filter that is not completely dry might result in failure of the equipment. Use only a neutral detergent to clean the dust filter. Use of other types of detergent might adversely affect dust filter function.

(a) Frequency

Clean the dust filter once every one to three months, depending on the amount of dust in the environment.

(b) Procedure

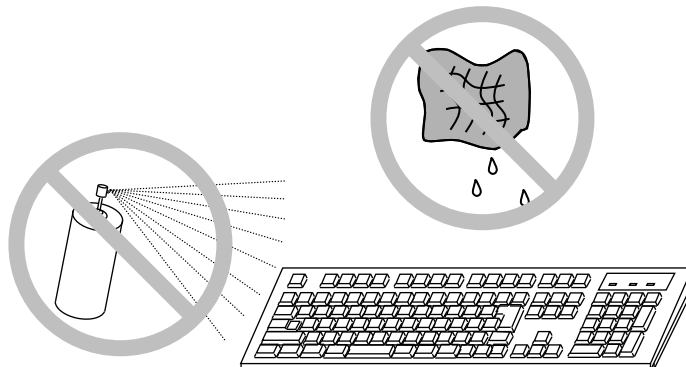
1. Shut down the OS.
2. Unplug the power cord and wait for at least one minute before you start cleaning.
3. Remove the dust filter on the front panel, and clean or wash it as necessary. After washing the filter, dry it completely before re-installing it.

For details about how to install or remove the dust filter, see *6.4.8 Installing and removing a dust filter*.

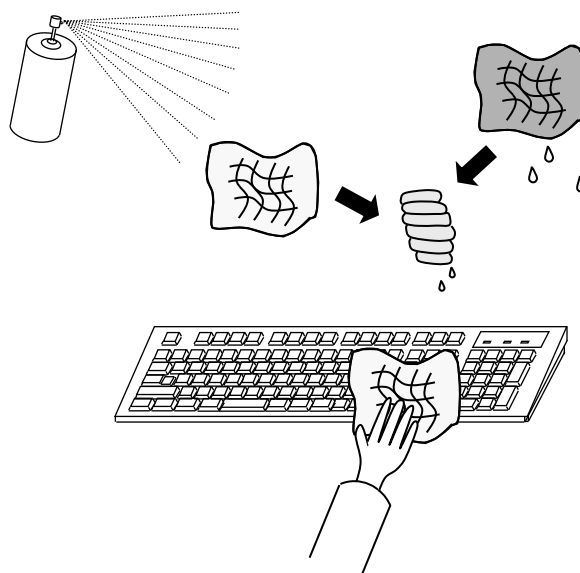
(2) Cleaning the optional keyboard

When cleaning the keyboard, note the following:

- Do not spray detergent directly onto the keyboard or spill liquid detergent on it.
- Do not use a soaking wet cloth on the keyboard. If you do so, the equipment might fail.



- Use only small amounts of detergent on the cleaning cloth.
- When using a wet cloth for cleaning, wring it out thoroughly before use.
- Use a soft cloth, such as gauze.
- Before using detergent, carefully read the instructions on its use.
- Cover the entire keyboard with gauze, spray detergent over it, allow it to stand for several minutes, and then wipe off the keyboard.



NOTE

- For information about precautions for USB devices, see 6. *USB devices* in *Precautions*.

6.2 Periodic inspections

The following table shows how to perform periodic inspections of the equipment. Periodic inspections are available through a maintenance contract with Hitachi, and are performed by Hitachi maintenance personnel (with the exception of daily inspections). Periodic inspections must be performed only by qualified maintenance personnel. Include the inspection plan in the system operation schedule.

Inspection item	Frequency	Note
Collection of logging information	Annually	
Inspection and cleaning of components <ul style="list-style-type: none"> • Inspection and cleaning of the inside and outside of the equipment • Inspection of fan rotation and removal of dust • Removal of foreign objects from the equipment • Other general inspection items 	Annually	
Replacing dust filters	Annually	
Measuring the power voltage	Annually	
Operational checks <ul style="list-style-type: none"> • Operational checks of switches and lamps • Operational checks by using test programs 	Annually	
Periodic replacement of replaceable components [#]	As required	
Daily inspections <ul style="list-style-type: none"> • Cleaning the keyboard • Cleaning dust filters 	From once a month to once every three months	For details, see <i>6.1 Daily inspections</i> .

[#]: For details about how to handle replaceable components, see *Appendix Handling of replaceable components*.

6.3 Maintenance service contract

This equipment has a maintenance service contract that includes 24-hour maintenance support, on-site measures, preventive maintenance, and other services required by information control systems. If you do not have a maintenance service contract, repairs will be carried out during the maintenance period by sending the equipment back to the manufacturer (send-back repair). For details about the maintenance service contract, contact your sales account representative.

We also respond to inquiries about the distribution software delivered with the equipment.

Table 6-1 Scope of maintenance service and maintenance period

Target		Scope of maintenance service	Maintenance period	Note
Hardware	Equipment	Yes	Up to 10 years ^{#1}	
	Optional peripheral equipment	Yes	In accordance with the manufacturer's maintenance period ^{#2}	
	Recommended peripheral equipment	No	In accordance with the manufacturer's maintenance period	Multi-vendor hardware maintenance service applies.
	Hardware other than the above	No	In accordance with the manufacturer's maintenance period	Multi-vendor hardware maintenance service applies.
Software	Microsoft® Windows® (Embedded licensing version)	Yes	In accordance with the support period of the manufacturer	
	Hitachi RAS software	Yes	Up to 10 years ^{#1}	
	Auto-Restart Tool "RunWatcher® R2.1"	Yes	Up to 10 years ^{#1}	
	Distribution application	No	—	Maintenance contract with the product provider.

Yes: Applicable

No: Not applicable

#1: The maintenance period for products covered by a maintenance service contract is up to 10 years from the date of delivery to the user. If no maintenance service contract is in place, the maintenance service will be provided by sending the equipment back to the manufacturer (send-back repair). Repairs by sending the equipment back to the manufacturer (send-back repairs) is available for up to 7 years from the date of delivery to the user (except for models that accept send-back repairs for up to 10 years).

#2: In principle, this depends on the manufacturer's maintenance parts supply period and maintenance period. By signing a maintenance service contract, you will receive timely information about discontinued products, maintenance deadlines, and recommended replacements. This allows you to use your system with confidence over the long term through partial replacements or overhauls as needed.

For details about paid replaceable components, see *Appendix Handling of replaceable components*.

6. Inspection and maintenance

- Periods

The free repair period is one year from the date of delivery (arrival date).

Repairs for a recurring fault are covered by warranty for six months (after repair).

- Repairs

The user is responsible for the transportation costs of sending the product to be repaired to Hitachi. We will bear the transportation costs of returning the repaired product to the user.

For repairs within the free repair period, send the faulty equipment to our designated repair contact for repair (send-back repair).

When requesting a send-back repair, fill in the necessary information in the *Hitachi Industrial Computer HF-W Series - Repair Request Form and Statement of Received Goods* at the end of this instruction manual, and send it with the equipment to be repaired.^{#3}

- Acceptance of returned goods

We accept returns from 9:00 to 17:00 on weekdays (excluding Saturdays, Sundays, public holidays, year-end and New Year holidays, and company holidays).

#3: If you wish to receive a maintenance service other than the send-back repair during the free repair period, consider purchasing a paid maintenance service contract starting from the beginning of ownership (first year).

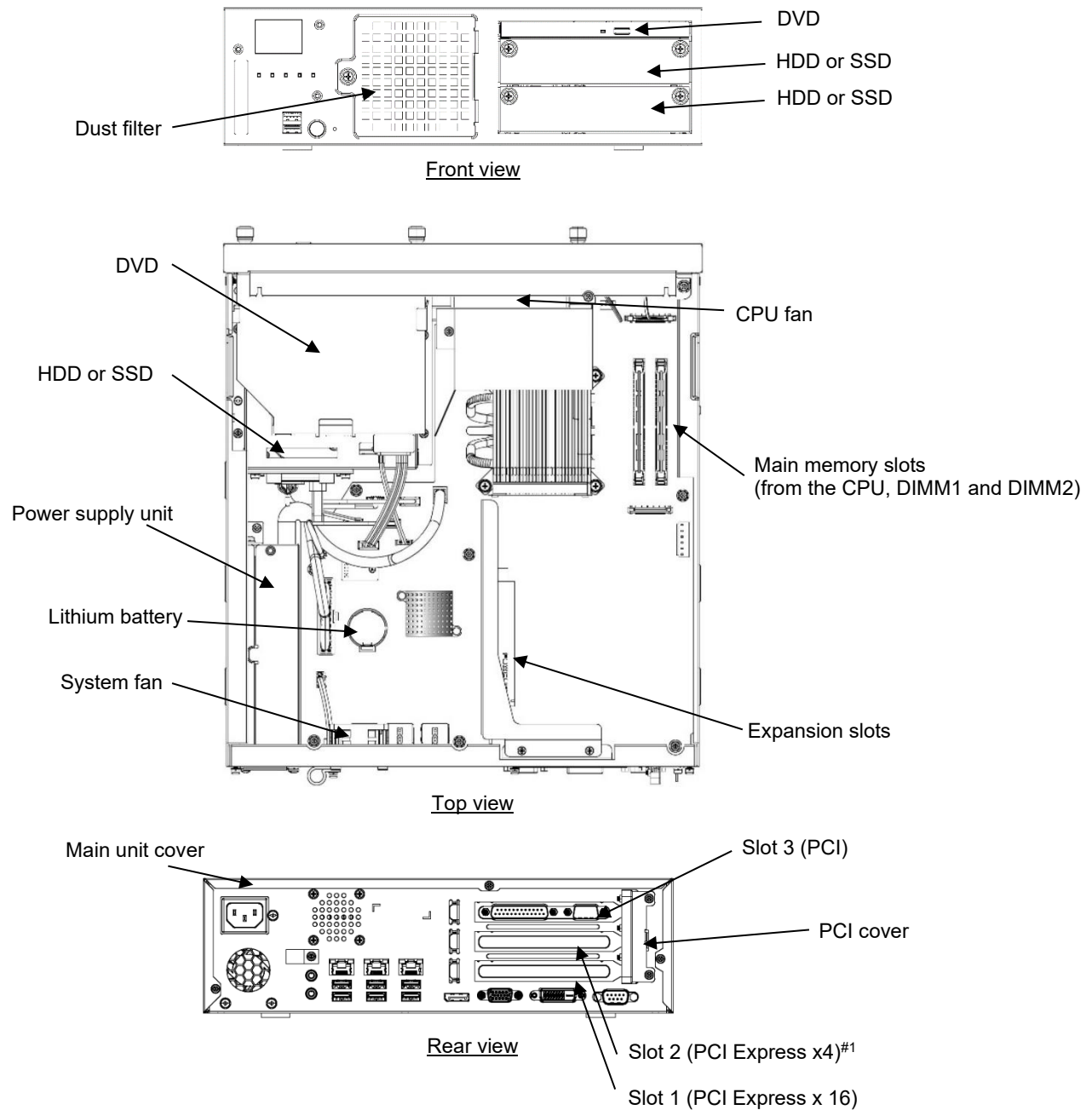
For details, please contact your sales representative.

Replaceable components and similar items will be charged for even during the free repair period.

6.4 Installing and removing components

6.4.1 Types and locations of installed components

The following figure shows the types and locations of the components installed in this equipment.



#1: Although a PCI Express x16 connector is used, the internal connection is equivalent to PCI Express x4.

Figure 6-1 Types and locations of installed components

6.4.2 Before installing or removing components

When installing or removing components, comply with the following instructions.



WARNING

Before commencing work, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute. Failure to do so could result in electric shock or equipment failure.



CAUTION

When installing or removing an extension board, avoid direct contact with parts inside the equipment. Some parts inside the equipment are hot and might cause burns if they are touched. Furthermore, touching such parts might result in failure of the equipment.

- Ensure sufficient clearance for maintenance work. Work on a flat surface. (See *1.6.2 Installation*.)
- Wear cotton gloves when installing or removing components.
- When tightening or removing screws, use a Phillips screwdriver (JIS #1 or JIS #2) to avoid stripping the heads.
- When tightening a screw, apply only moderate force along the axis of the screw to avoid stripping the thread.

Furthermore, comply with any instructions specific to work items.

6.4.3 Installing and removing the cover of the main unit



CAUTION

When you install the cover of the equipment, do not put your fingers inside the cover. If you do, your fingers may get caught and injured.

Before starting work, see 6.4.2 *Before installing or removing components*.

(1) Removing the cover of the main unit

- [1] Remove the three screws on the rear of the equipment.
- [2] Slide the cover towards the rear of the equipment.
- [3] Lift the cover up and away.

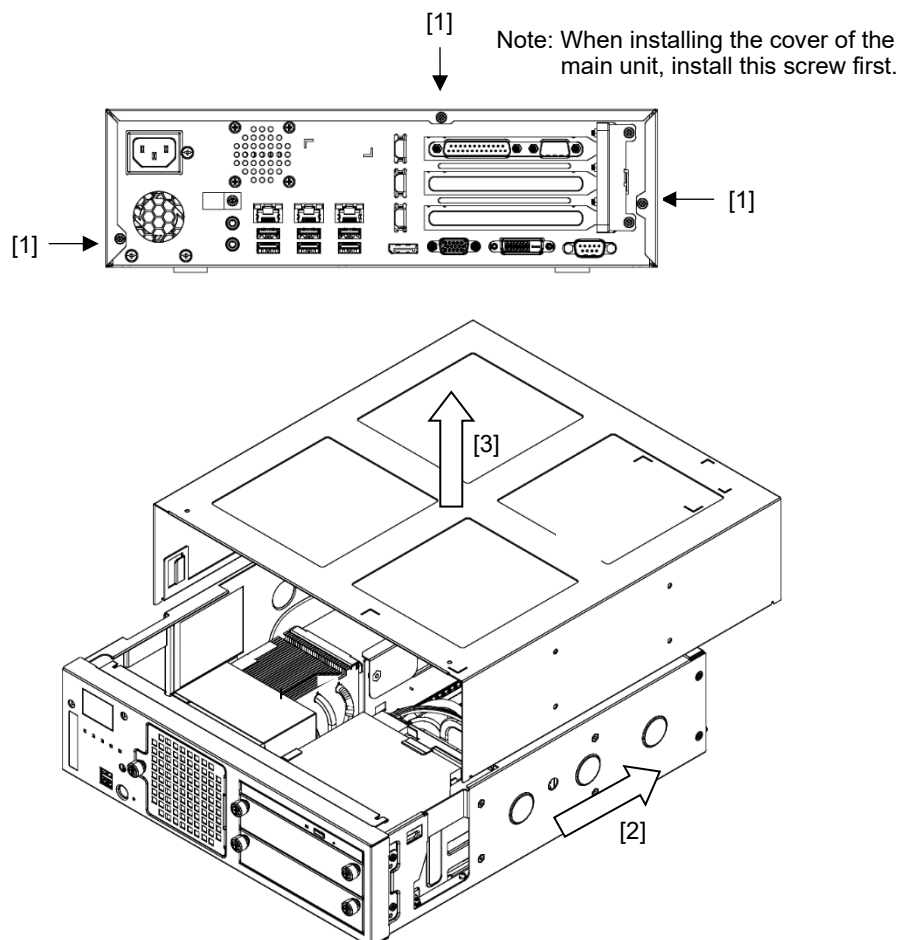


Figure 6-2 Removing the cover of the main unit

(2) Installing the cover of the main unit

When installing the cover of the main unit, reverse the procedure described in (1) *Removing the cover of the main unit*.

Then, install the center screw first, as shown in Figure 6-2.

6.4.4 Installing and removing an extension board



WARNING

Before installing or removing an extension board, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute. Installing or removing an extension board without shutting down the power might result in electric shock or fire.

NOTICE

Before installing or removing an extension board, make sure that you disconnect all external cables, as failing to do so might result in equipment failure.

- (1) Before installing or removing an extension board
 - Before starting work, see *6.4.2 Before installing or removing components*.
 - If extension boards are already installed, remove boards from higher-number slots before installing or removing boards from lower-number slots.
 - When installing multiple extension boards at the same time, install them beginning from the lower-number slots.
 - For details about the locations of extension boards, see *Figure 6-1 Types and locations of installed components*.

NOTE

- For information about the precautions for extension boards, see *7. Extension boards in Precautions*.

(2) Information about extension boards

(a) Types of extension boards

This equipment has a total of three expansion slots (two PCI Express slots and a PCI slot).

- The PCI Express slots are compliant with PCI Express Base Specification Revision 3.0.
- The PCI slot is compliant with PCI Local Bus Specification Revision 2.1.

Expansion slots	Supported extension boards
SLOT3	PCI short size
SLOT2	PCI Express x4, full height, short size ^{#1}
SLOT1	PCI Express x16, full height, short size

#1: Although a PCI Express x16 connector is used, the internal connection is equivalent to PCI Express x4.

(b) Size of extension boards

The board sizes (length × height) in the PCI Express and PCI specifications are as follows (heights include the connectors):

- PCI Express specifications
 - Short type: 167.65 × 111.15 (mm)
- PCI specifications
 - Short type: 174.63 × 106.68 (mm)

(3) Installing an extension board

- [1] Follow the instructions in 6.4.3 *Installing and removing the cover of the main unit* to remove the cover of the main unit.
- [2] Remove the two screws on the rear of the equipment, and then remove the PCI cover.

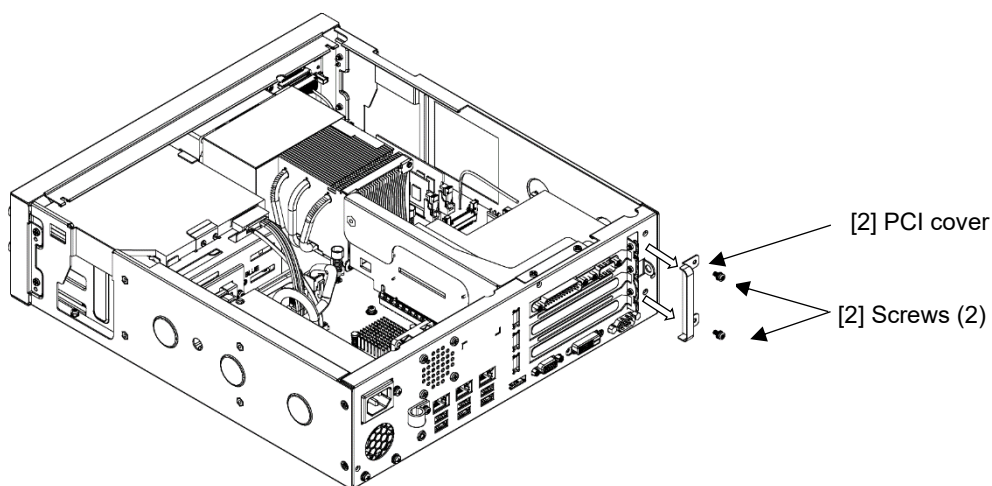


Figure 6-3 Removing the PCI cover

6. Inspection and maintenance

- [3] Remove the screw securing the extension board, and then remove the slot cover. (Store the slot cover in a safe place.)
- [4] While pressing on both ends of the extension board, insert the extension board horizontally into the expansion slot connector.
- [5] Press directly above the extension board connector to fully insert the extension board into the expansion slot connector.
- [6] Follow the removal steps in reverse order to secure the extension board and install the PCI cover.
- [7] Install the cover of the main unit for the equipment.

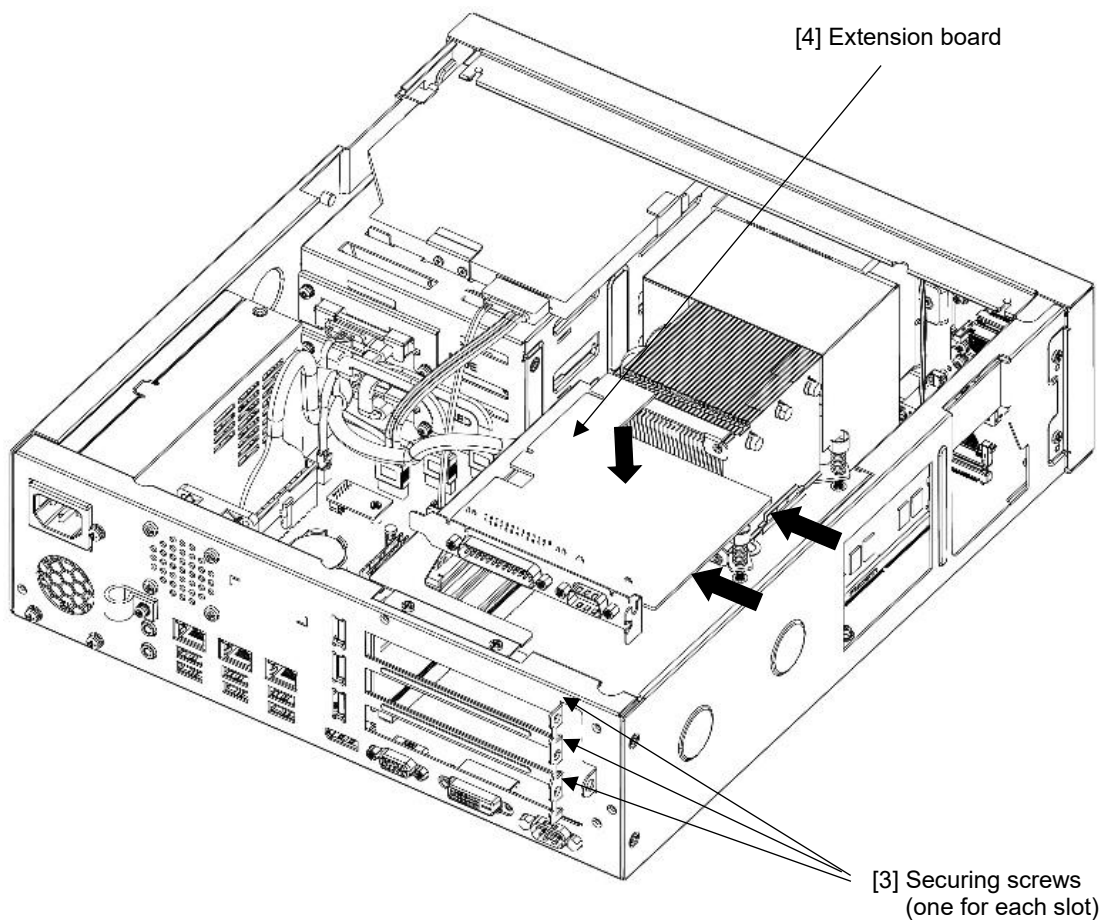


Figure 6-4 Installing an extension board

NOTE

- When you install an extension board, adjacent boards might become loose. Verify that all adjacent boards are fully inserted.
- The RAS board can be installed in any of the expansion slots (from SLOT1 to SLOT3).
- When installing the RAS board, attach the cable connector to the motherboard and RAS board. When attaching the cable connector, pay attention to the orientation of the tab.
- If you are preparing your own expansion board, perform a preliminary evaluation before using it.

(4) Removing an extension board

- [1] Follow the instructions in 6.4.3 *Installing and removing the cover of the main unit* to remove the cover of the main unit.
- [2] Remove the two screws securing the extension slot and remove the PCI cover.
- [3] Remove the screw securing the extension board.
- [4] While holding both ends of the extension board connector, pull out the extension board horizontally from the expansion slot connector^{#1}.
- [5] Use a screw to secure the stored slot cover over the empty expansion slot.
- [6] Follow the removal steps in reverse order.
- [7] Install the cover of the main unit for the equipment.

#1: When removing the RAS board, remove the cable connector on the motherboard side.

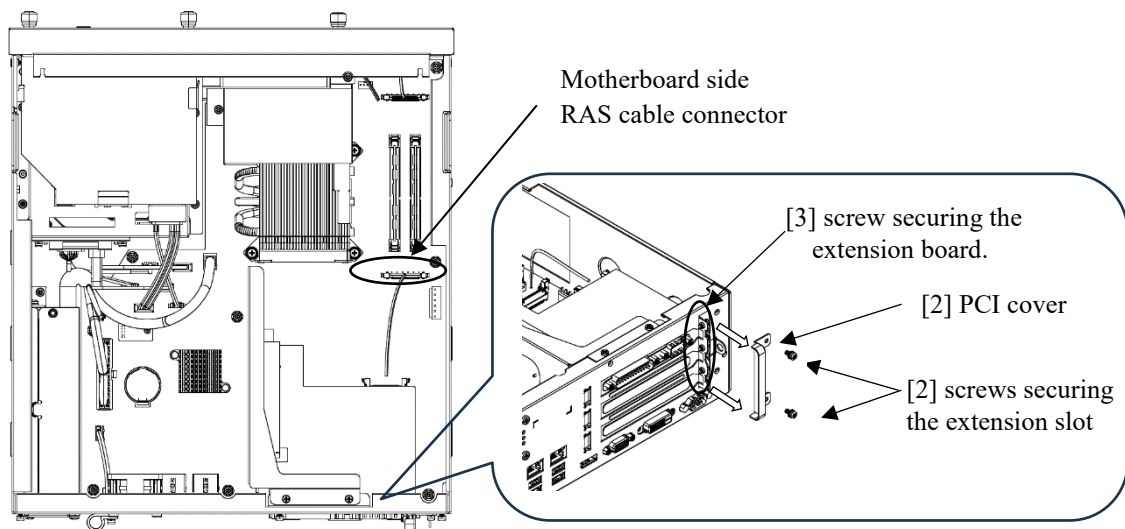


Figure 6-5 removing an extension board

NOTE

- When handling the RAS external contact board, discharge any static electricity beforehand, or wear cotton gloves. Touching an electronic component such as an IC without first discharging static electricity might damage or destroy it.
- When attaching or removing the cable connector, handle it carefully so as not to break the tab.

NOTICE

Always attach a slot cover to each unused slot and attach a connector cover to each unused connector. Otherwise, failure of the equipment might result.

6.4.5 Installing and removing the main memory



WARNING

Before installing or removing main memory, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute. Installing or removing main memory without shutting down the power might result in electric shock or fire.

NOTICE

Make sure that you disconnect all external cables connected to the equipment before you install or remove main memory. Failure to do so might cause malfunction.

(1) Before installing or removing the main memory

- Before starting work, see *6.4.2 Before installing or removing components*.
- For information about the location of the main memory slots, see *Figure 6-6 Installing the main memory*.

(2) Installing the main memory

NOTICE

- The orientation of a main memory module on a connector is fixed. When you install a main memory module, make sure that the orientation is correct. If the orientation is incorrect, failure of the equipment might result.
- Do not install main memory modules of different capacities in slots DIMM1 and DIMM2. Doing so might result in the modules not being recognized.

- [1] Follow the instructions in 6.4.3 *Installing and removing the cover of the main unit* to remove the cover of the main unit.
- [2] Open the retention clips on both sides of the connector
- [3] Insert the main memory module straight down into the slot. You will hear a “click” sound when it is properly seated.

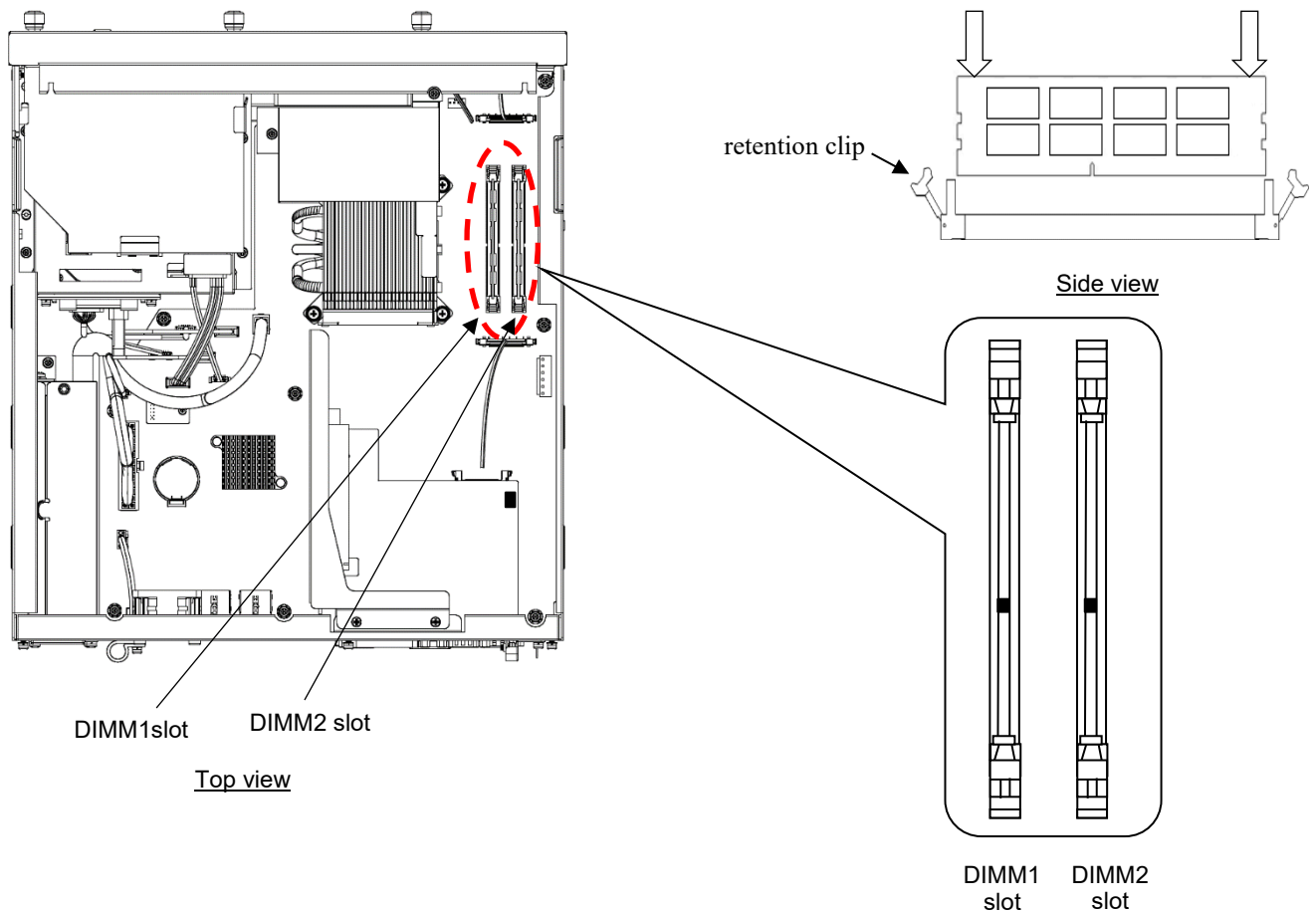


Figure 6-6 Installing the main memory

6. Inspection and maintenance

Only the following combinations of main memory modules are allowed with this equipment.

Main memory modules	DIMM1 slot	DIMM2 slot	Total capacity
1	8 GB	—	8 GB
2	8 GB	8 GB	16 GB
2	16 GB	16 GB	32 GB

(3) Removing the main memory

Remove the main memory by following the procedure described in (2) *Installing the main memory* in reverse order.

- [1] Follow the instructions in 6.4.3 *Installing and removing the cover of the main unit* to remove the cover of the main unit.
- [2] Open the retention clips on both ends of the connector and remove the main memory from the connector.
After removing the memory module, close the retention clips.

(4) Reconfiguring the memory dump file settings

When you change the capacity of the main memory, you must reconfigure the memory dump collection settings.

For details about reconfiguring the memory dump collection settings, see 8.2.1 *Memory dump confirmation messages*.

6.4.6 Installing and removing an HDD or SSD



CAUTION

When installing or removing an HDD or SSD, be careful of protruding parts.

NOTICE

- Put the HDD or SSD on a shock-absorbing material (such as an antistatic cushion) even for a temporary task. Placing an HDD or SSD directly on a hard surface (such as a desktop) might lead to data loss, shorter life, or failure of the drive as a result of shock.
- Never remove the screws on an HDD or SSD while the power to the unit is on. Never hot-swap HDDs or SSDs. If you do either of these, failure of the equipment or the drive might result.
- Before you replace an HDD or SSD, make sure that you shut down the OS, unplug the power cord, and wait for at least one minute.
- Install or remove an HDD only if necessary (for example, in the case of HDD failure). Frequent installation or removal of HDDs or SSDs might cause equipment failure.
- Fully insert an HDD or SSD. Loose contacts or missing screws might result in failure.
- When installing an HDD or SSD, do not subject it and mounted HDDs or SSDs to impact. Subjecting an HDD or SSD to impact might damage it.

(1) Before installing or removing an HDD or SSD

Before starting work, see *6.4.2 Before installing or removing components*.

NOTE

- Information about precautions for HDDs or SSDs, see *4. Hard Disk Drives (HDDs) and Solid State Drives (SSDs) in Precautions*.

6. Inspection and maintenance

(2) Removing an HDD or SSD

NOTICE

For the B/T model, before you install or remove an HDD or SSD, check the drive bay number carefully. If you install an HDD or SSD in a drive bay that has a different number to the drive bay you removed it from, the configuration information will be inconsistent, and the equipment might not be able to start or the data in the HDD or SSD might be lost.

- [1] Loosen the two set screws for the HDD or SSD case.
- [2] Grasp both set screws of the HDD or SSD case with your hands and gently pull to slide out the HDD or SSD.

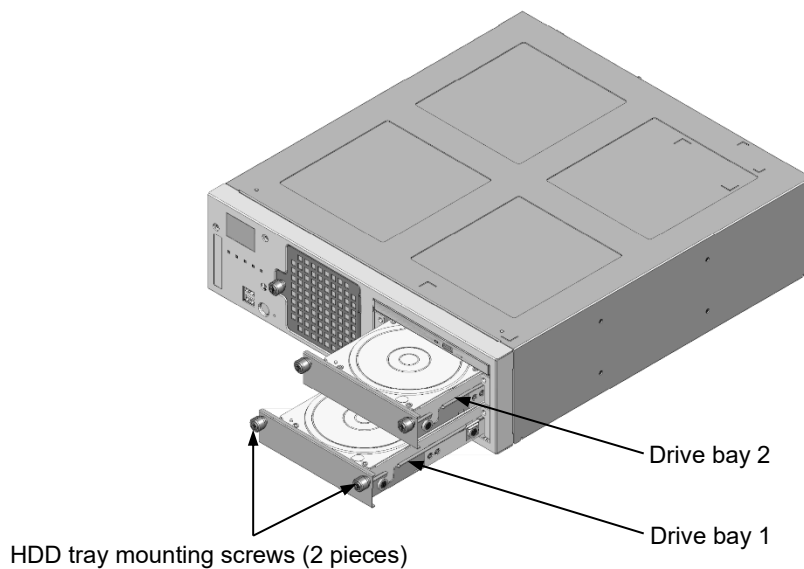


Figure 6-7 Removing an HDD or SSD

NOTE

- When pulling out an HDD or SSD, be careful not to apply excessive force to the connector, and pull it out slowly to avoid subjecting the drive to physical shock.
- When connecting an HDD or SSD to a connector, do not subject it to impact.
- For the B/T model (software RAID1 models), do not use a combination of HDD and SSD in Drive Bay 1 and Drive Bay 2. Make sure that you install HDDs and SSDs of the same capacity.

(3) Installing an HDD or SSD

Follow the procedure described in (2) *Removing an HDD or SSD* in reverse to install an HDD or SSD.

(4) Installing the HDD into the HDD Tray

[1] Insert the blue rubber-mounted screw into the end of the L-shaped groove on the HDD tray. Make sure the orientation of the HDD is correct.

[2] While opening the metal bracket on the side of the HDD tray, insert the other rubber-mounted screw into the tray.



①Insert the blue rubber-mounted screw into the end

②Open the side bracket and insert the rubber-mounted screw into the HDD tray.

(5) Removing the HDD from the HDD Tray

Follow the procedure described in (4) *Installing the HDD into the HDD Tray* in reverse to install an HDD.

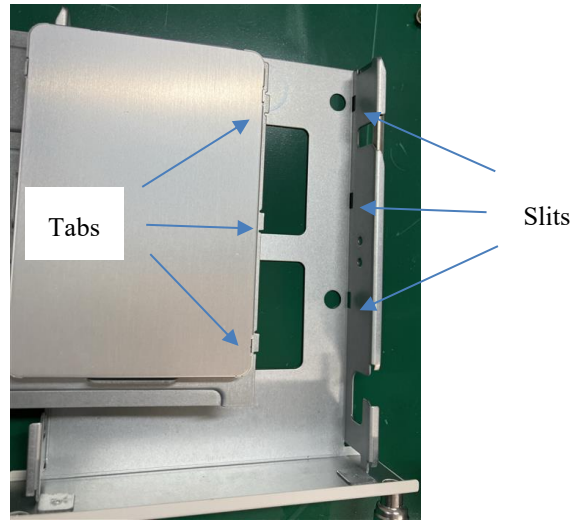
NOTE

Do not remove the blue rubber-mounted screws attached to the sides of the HDD.

6. Inspection and maintenance

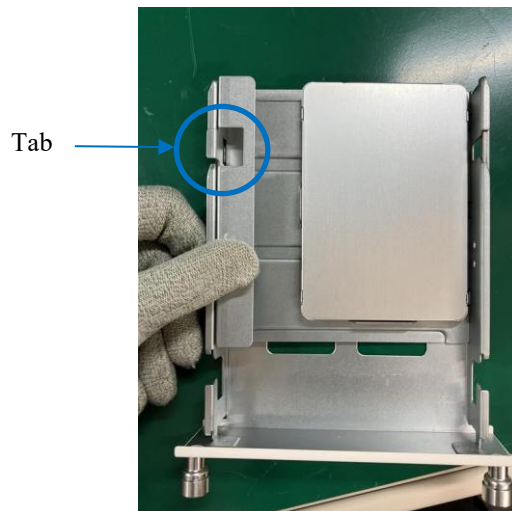
(6) Installing the SSD into the HDD Tray

- [1] Insert the tabs of the SSD bracket into the slits of the HDD tray.
- [2] Push the SSD bracket in and secure it in the drive bay.



(7) Removing the SSD from the HDD Tray

Grasp the tab and remove the dedicated bracket from the HDD tray.



NOTE

Do not remove the screws securing the SSD to the SSD bracket.

6.4.7 Installing or removing a DVD drive



CAUTION

When installing or removing a DVD drive, be careful of protruding parts.

NOTICE

Make sure that you do not apply too much force to the connector and top of the DVD drive. Doing so might result in failure of the DVD drive.

- (1) Before installing or removing a DVD drive
 - Before starting work, see 6.4.2 *Before installing or removing components*.
- (2) Removing a DVD drive
 - [1] Follow the instructions in 6.4.3 *Installing and removing the cover of the main unit* to remove the cover of the main unit.
 - [2] Remove the two screws securing the DVD drive to the equipment.
When removing the screws, be careful not to drop them.
 - [3] Push the DVD drive gently towards the front of the equipment, and remove the DVD drive connector from the DVD drive.
 - [4] Remove the DVD drive from the equipment.

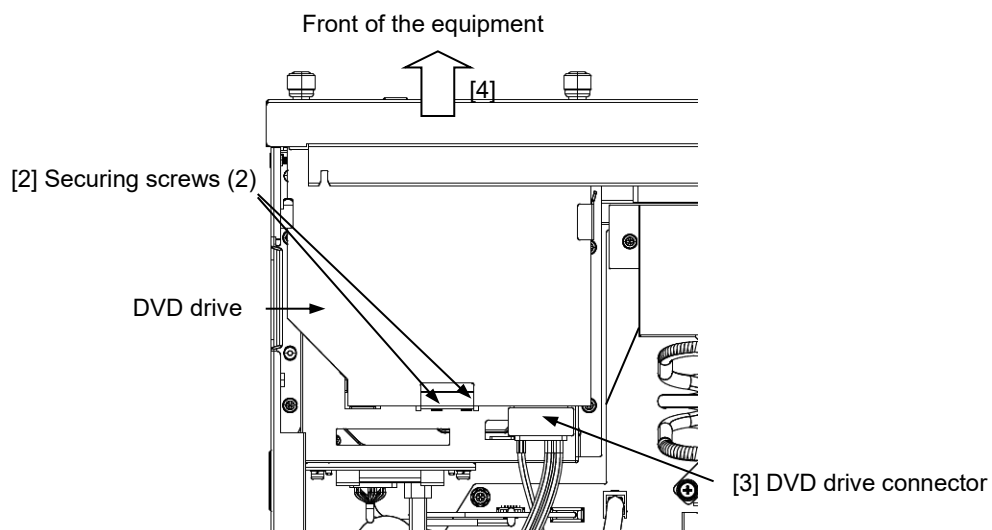


Figure 6-8 Removing the DVD drive

- (3) Installing a DVD drive
Follow the procedure described in (2) *Removing a DVD drive* in reverse to install a DVD drive.

6.4.8 Installing and removing a dust filter



WARNING

Make sure that you install a dust filter in the equipment. Failure to do so could lead to dust ingress and subsequent fire from a short-circuit.

- (1) Before installing or removing a dust filter
 - Before starting work, see 6.4.2 *Before installing or removing components*.
- (2) Removing a dust filter
 - [1] Loosen the screw for the dust filter cover.
 - [2] Remove the dust filter cover from the equipment.
 - [3] Remove the dust filter from the dust filter cover.

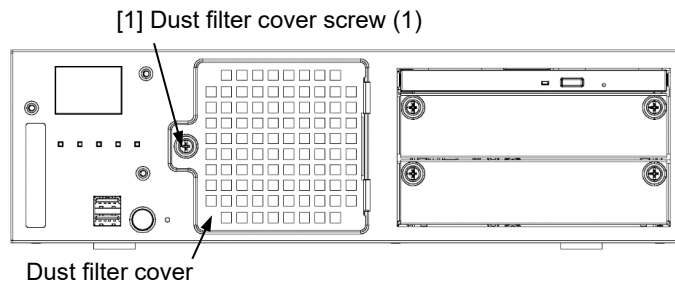


Figure 6-9 Removing the dust filter

- (3) Installing a dust filter

Follow the procedure described in (2) *Removing a dust filter* in reverse to install a dust filter. Insert the tabs of the dust filter cover into the slits as shown in the following figure.

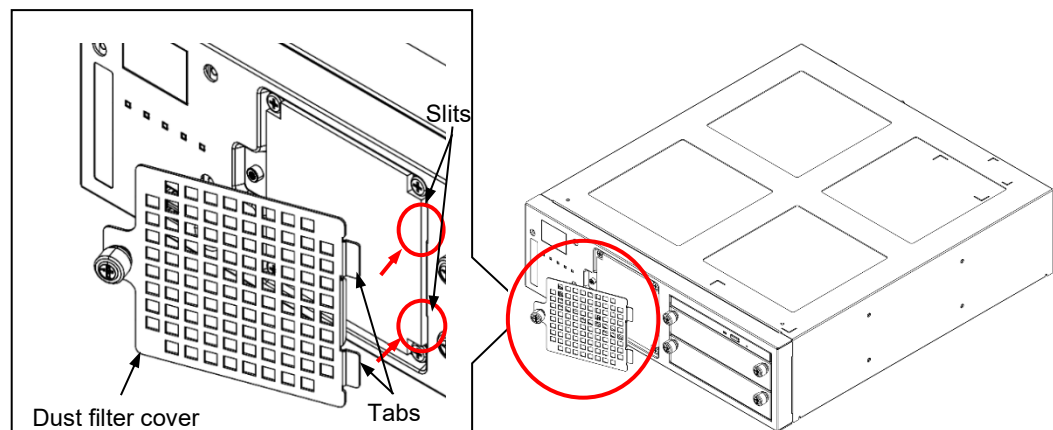


Figure 6-10 Installing a dust filter

6.4.9 Installing and removing the vertical stand



CAUTION

When installing the equipment vertically, make sure that you place it on a level surface and secure it with the provided vertical stand. Failure to secure the equipment with the vertical stand might result in it toppling and causing personal injury.

(1) Before installing and removing the vertical stand

- Before starting work, see 6.4.2 *Before installing or removing components*.
- Disconnect all cables connected to the equipment.
- Do not subject the equipment to impact.

(2) Installing the vertical stand

Install the vertical stand on the equipment securely by using the dedicated screws provided.

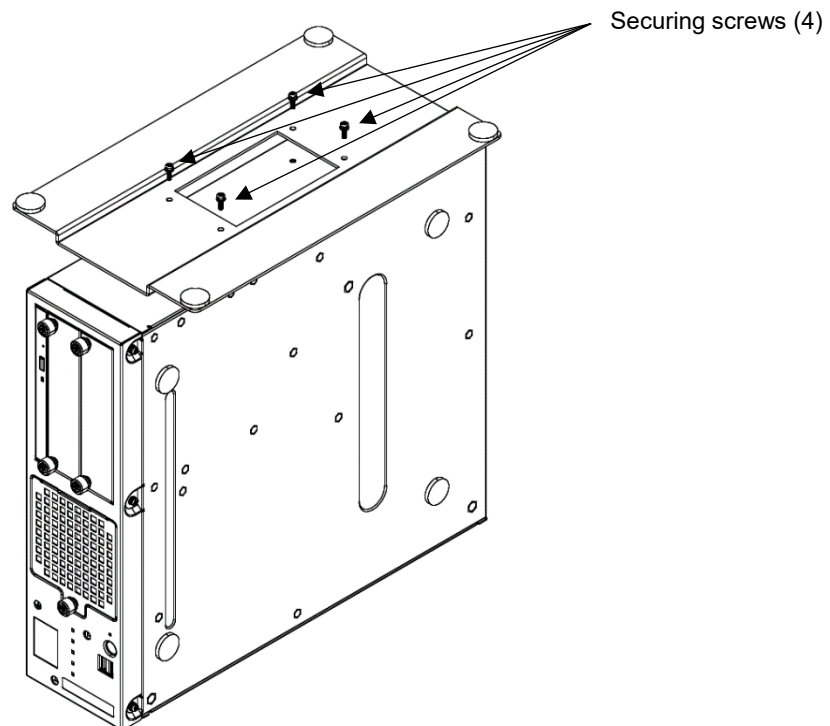


Figure 6-11 Installing the vertical stand

(3) Removing the vertical stand

Follow the procedure described in (2) *Installing the vertical stand* in reverse to remove the vertical stand. Store the removed vertical stand and screws in a safe place.

6.5 Removing and installing the lithium battery



- This equipment uses a lithium battery. When replacing the lithium battery, make sure that you replace it with one specified by the manufacturer. Replacing it with an unspecified battery might result in battery leakage, bursting, explosion, fire, overheating, or gas generation.
- Do not use the battery with its (+) and (-) poles reversed. Charging or short-circuiting the battery might cause battery leakage, overheating, or explosion.

(1) Before removing the lithium battery

- Before starting work, see 6.4.2 *Before installing or removing components*.

(2) Removing and installing the lithium battery

- [1] Follow the instructions in 6.4.3 *Installing and removing the cover of the main unit* to remove the cover of the main unit.
- [2] With your finger, push the hook on the protruding part of the battery holder in the direction of the white arrow.

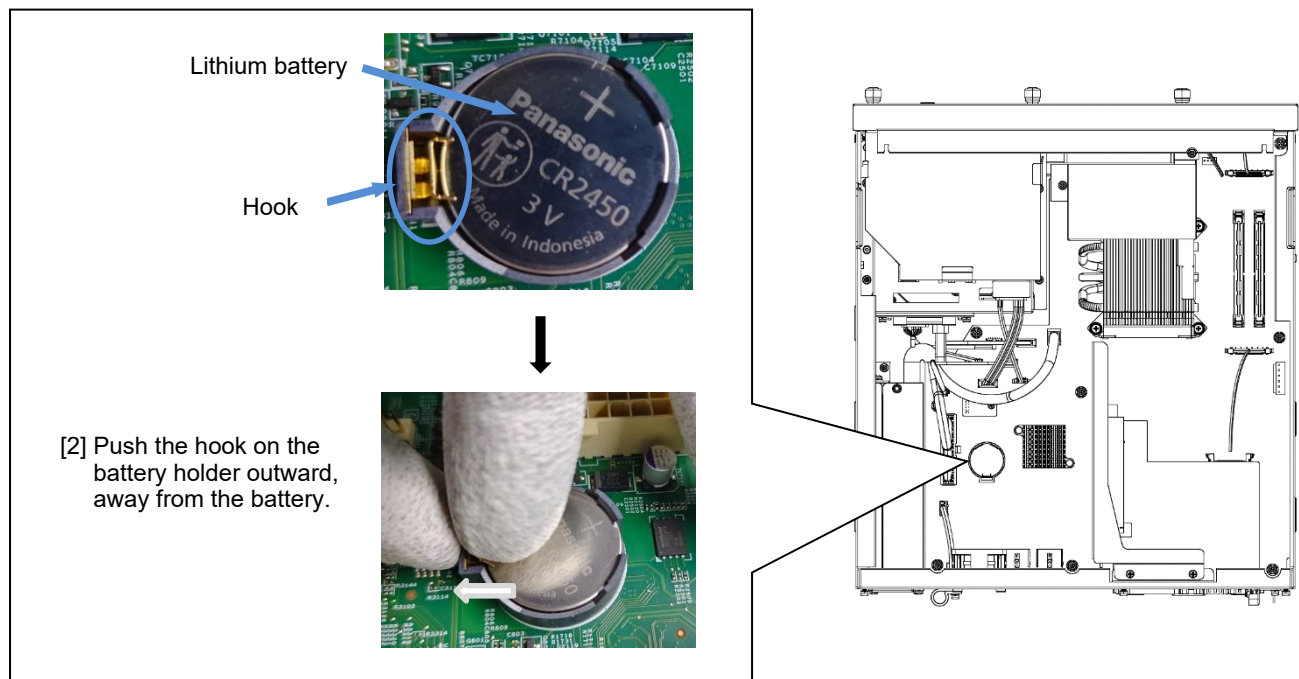


Figure 6-12 (1) Removing the lithium battery

- [3] While gently pressing down on the button battery with your finger, use a flat-bladed screwdriver to scoop up the lithium battery from the protruding part of the battery holder, and lift the lithium battery out.
- [4] When the protruding side of the lithium battery is clear of the battery holder, lift out the lithium battery.

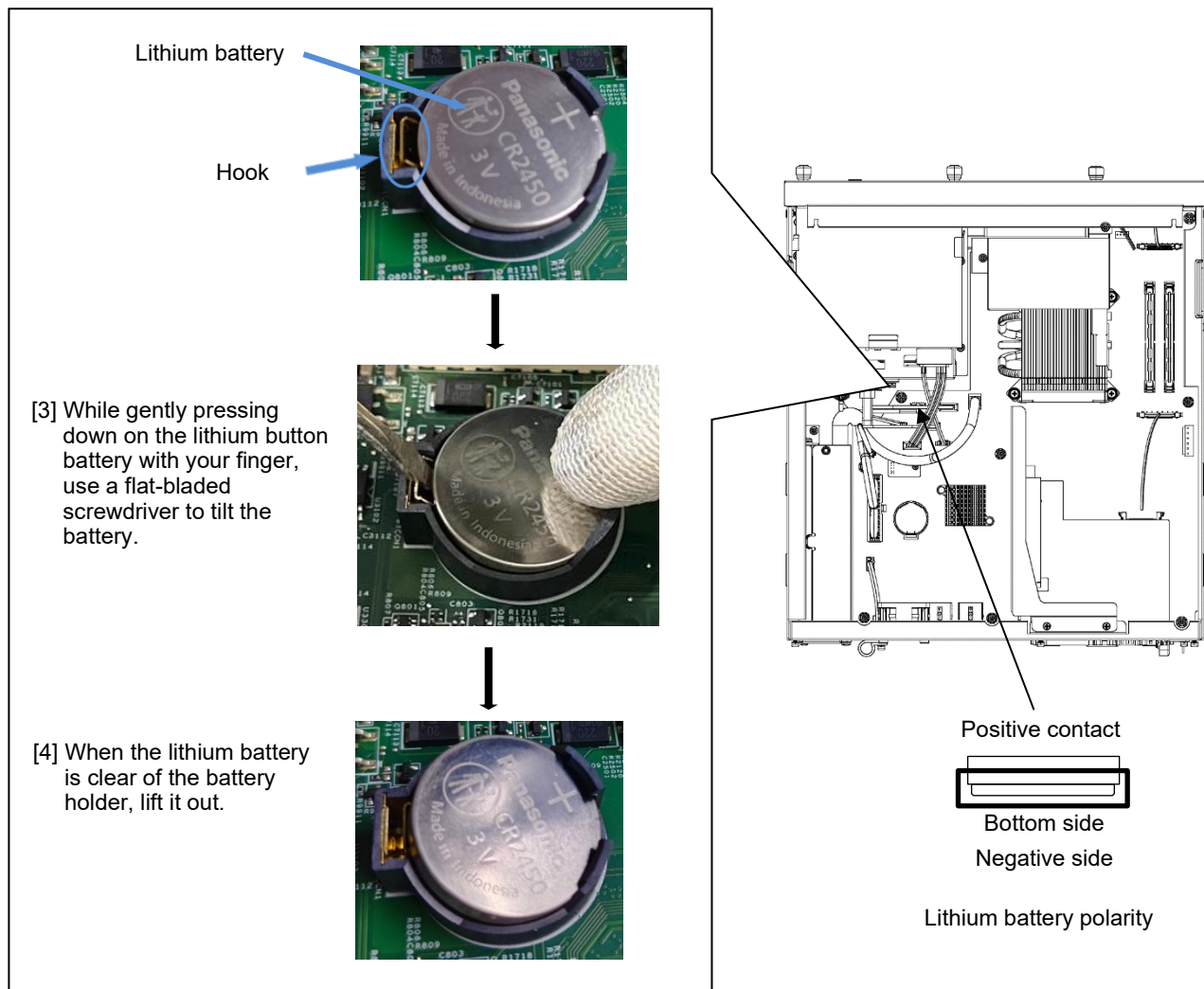


Figure 6-12 (2) Removing the lithium battery

NOTE

- When disposing of a battery, observe local laws and regulations whenever applicable. For disposal overseas, follow the laws of the relevant country.

6.6 Enabling the remote power-on function



CAUTION

When installing or removing a jumper, avoid direct contact with parts inside the equipment. Some parts inside the equipment are hot and might cause burns if they are touched. Furthermore, touching such parts might result in failure of the equipment.

When you use the remote power-on function of the RAS external contact port, perform the following procedure to remove the jumper from JP6501 on the motherboard. Jumper installation determines whether the feature of the RAS external contact GENDI2 is a general-purpose digital input signal or the remote power-on signal. (See 5.8.2 *External contact specifications*.)

Jumper status	GENDI2 setting
Installed	General-purpose digital input signal
Not installed	Remote power-on signal

(1) Before installing or removing the jumper

- Before starting work, see 6.4.2 *Before installing or removing components*.

(2) Removing the jumper

- [1] Follow the instructions in 6.4.3 *Installing and removing the cover of the main unit* to remove the cover of the main unit.
- [2] If an extension board is interfering with the removal of the jumper, follow the instructions in 6.4.4 *Installing and removing an extension board*.
- [3] Remove the jumper from JP6501.

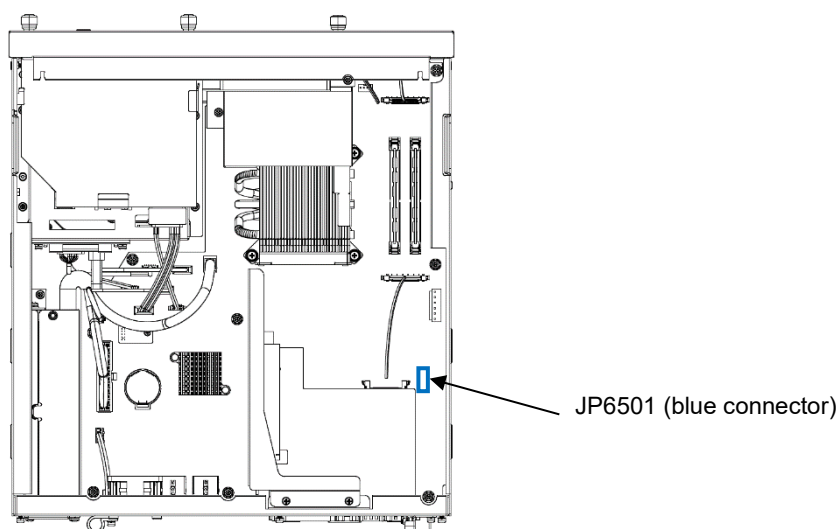


Figure 6-13 Removing the jumper

(3) Installing the jumper

Follow the procedure described in (2) *Removing the jumper* in reverse to install the jumper.

NOTE

- Store the removed jumper in a safe place for when you want to restore the original settings later.

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Chapter 7 Restoring the factory-shipped condition by using a recovery DVD

NOTICE

A recovery DVD contains an image file of the factory-shipped hardware configuration. If the factory-shipped hardware configuration has been changed, the OS might not start after restoration work. Remove all external storage devices before you perform restoration work using a recovery DVD, and use the factory-shipped hardware configuration.

When a recovery DVD is used, all data in the system drive is deleted. Back up any important data beforehand.

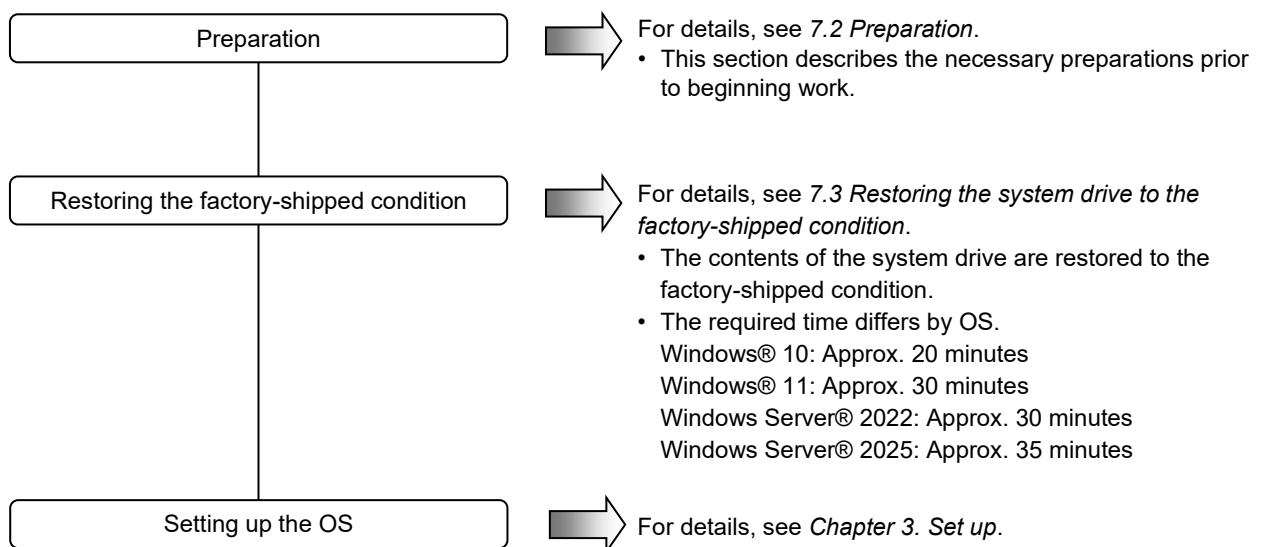
This chapter describes the following procedure:

- Restoring the system drive to the factory-shipped condition (when discontinuing use of your current system configuration).

7.1 Overview of the restoration procedure

This section gives an overview of the procedure to restore the system drive to its factory-shipped condition (when discontinuing use of your current system configuration). After you restore the contents of the system drive to its factory-shipped condition by using a recovery DVD, follow the procedure described in *Chapter 3. Set up* to set up the OS.

The following is a simplified flowchart of the procedure.



7.2 Preparation

Before starting work to restore the system to the factory-shipped condition by using a recovery DVD, have the following recovery DVD ready.

Recovery DVD for HF-W DVD	HITACHI <u>HJ-206x-****</u> Product Recovery DVD (The underlined part is the model number of the equipment you purchased.)
------------------------------	---

7.3 Restoring the system drive to the factory-shipped condition

7.3.1 Procedure for restoring the system drive to the factory-shipped condition

Perform the following procedure to restore the system drive of an HF-W2000 Model 68/65 to its factory-shipped condition by using a recovery DVD.

1. Turn on the power to the equipment, and then insert the recovery DVD *HITACHI HJ-206x-**** Product Recovery DVD* into the DVD drive. If you have multiple recovery DVDs, insert the first disc (for example, if you have two recovery DVDs, insert the disc numbered 1/2).

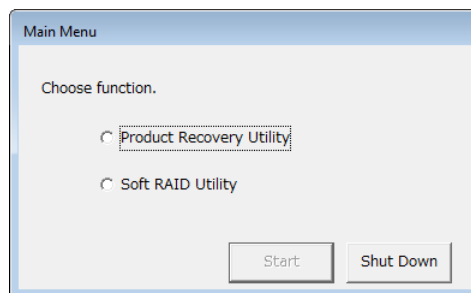
Note: The underlined part is the model number of the equipment you purchased. Hence, the part indicated by * differs according to model. In the following procedure, substitute the model number of your actual equipment in place of HJ-206x-****.

2. When you boot from the recovery DVD, a confirmation message appears.

Note 1: If you cannot boot from the recovery DVD, turn the equipment off and then on again.

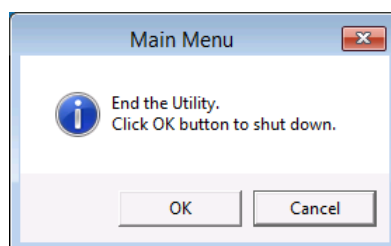
Note 2: For the B/T model, the following screen appears. Select **Product Recovery Utility**, and then click the **Start** button.

Note 3: For the B/T model, install drives in both drive bays.



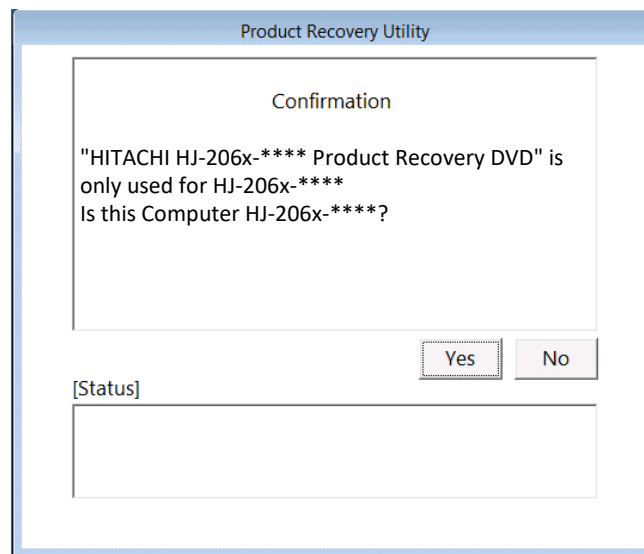
If you click **Shut Down**, the following message dialog box appears. Click **OK**. The recovery DVD is automatically ejected, and then the equipment automatically shuts down.

To return to the confirmation message window, click **Cancel**.



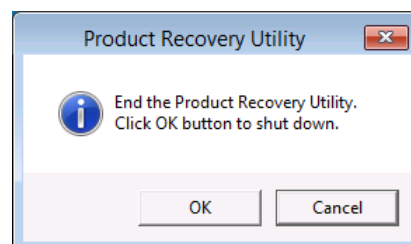
7. Restoring the factory-shipped condition by using a recovery DVD

- If the model name in the confirmation message matches that of your equipment, click **Yes**.
- If the model name in the confirmation message does not match that of your equipment, click **No**.



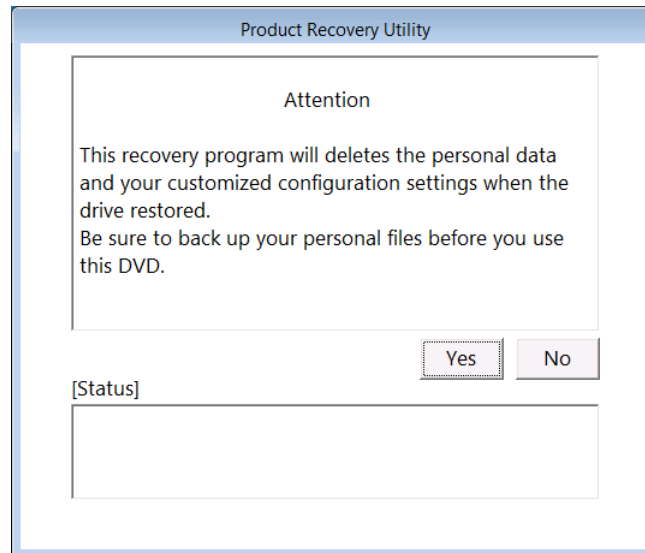
If you click **No**, the following message dialog box appears. Click **OK**. The recovery DVD is automatically ejected, and then the equipment automatically shuts down.

To return to the confirmation message window, click **Cancel**.



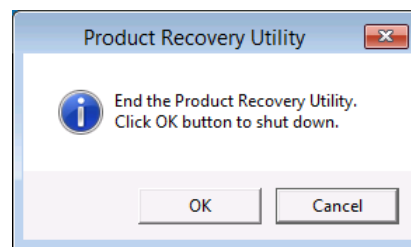
3. If you click **Yes** in the confirmation message window, the following confirmation window appears.
 - If the situation described in the message is acceptable, click **Yes**.
 - If it is not, click **No**.

7. Restoring the factory-shipped condition by using a recovery DVD



If you click **No**, the following message dialog box appears. Click **OK**. The recovery DVD is automatically ejected, and then the equipment automatically shuts down.

To return to the confirmation message window, click **Cancel**.



4. If you click **Yes** in the confirmation window, the selection window for the drive restoration options appears.
 - To restore the system drive to the factory-shipped condition, select a restoration option, and then click **Next**.
 - To cancel restoration of the system drive to the factory-shipped condition, click **Cancel**.

Entire drive:

Select this option if you want to restore the entire system drive to factory-shipped state, or if you want to configure a new drive for factory-shipped state to replace the system drive.

After selecting this option, click **Next**, and then proceed to step 5.

Only the system and boot partition:

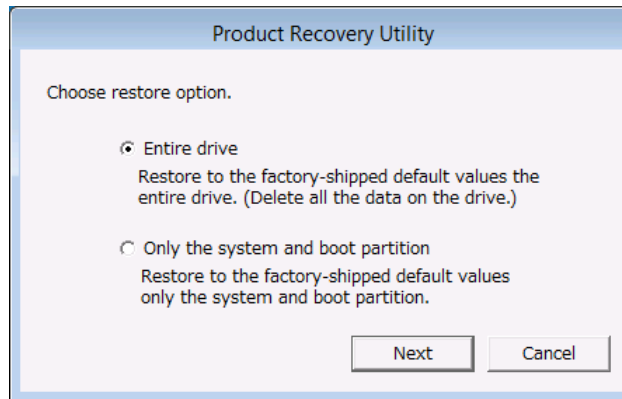
Select this option when restoring the system drive to factory-shipped condition while preserving partitions other than for Windows boot (for example, for data storage). This option restores only the boot partition to the factory-shipped condition.

7. Restoring the factory-shipped condition by using a recovery DVD

After selecting this option, click **Next**, and then proceed to step 6.

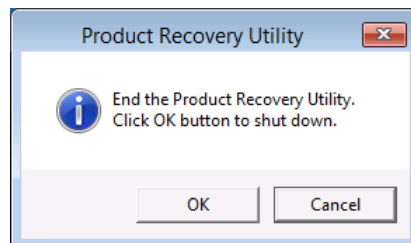
You cannot select this option in the following cases:

- The system drive has no boot partitions.
- The system drive has more than one boot partition.
- The size of the boot partition is less than the minimum boot partition size defined for the equipment.
(For the HF-W2000 Model 68/65, the minimum size is 200 GB.)
- No array is built (for the B/T model only).



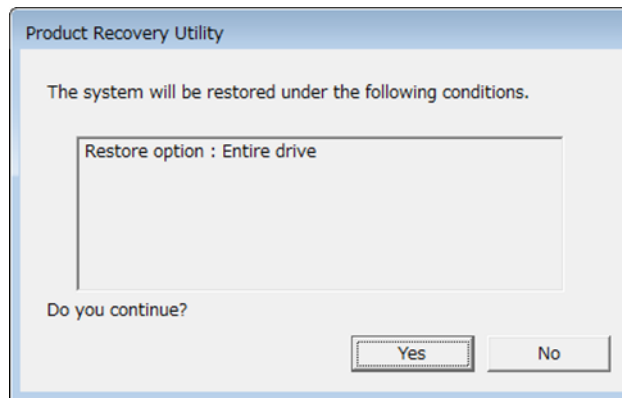
If you click **Cancel**, the following message dialog box appears. Click **OK**. The recovery DVD is automatically ejected, and then the equipment automatically shuts down.

To return to the selection window for drive restoration options, click **Cancel**.



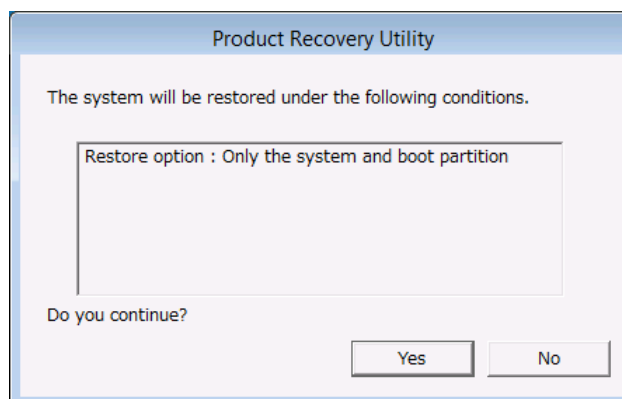
If you select **Entire drive** in the selection window for the drive restoration option:

5. If you select **Entire drive** in the selection window for the drive restoration option, the confirmation window for the settings of the drive restoration appears.
 - If the displayed partition size to be restored is acceptable, click **Yes**. Proceed to step 7.
 - If the displayed partition size to be restored is not acceptable, click **No**. You are returned to the selection window for the drive restoration option.



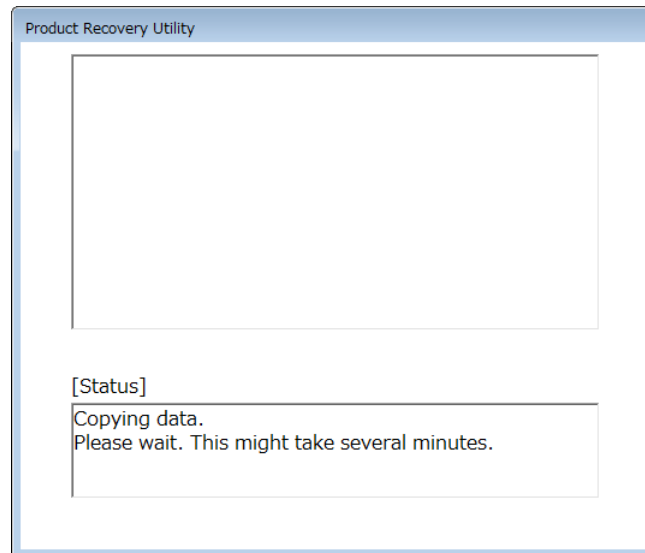
If you select **Only the system and boot partition** in the selection window for the drive restoration option:

6. If you select **Only the system and boot partition** in the selection window for the drive restoration option, the confirmation window for the settings of the drive restoration appears.
 - If you agree with restoring only the boot partition, click **Yes**. Proceed to step 7.
 - If you disagree with restoring only the boot partition, click **No**. You are returned to the selection window for the drive restoration option.

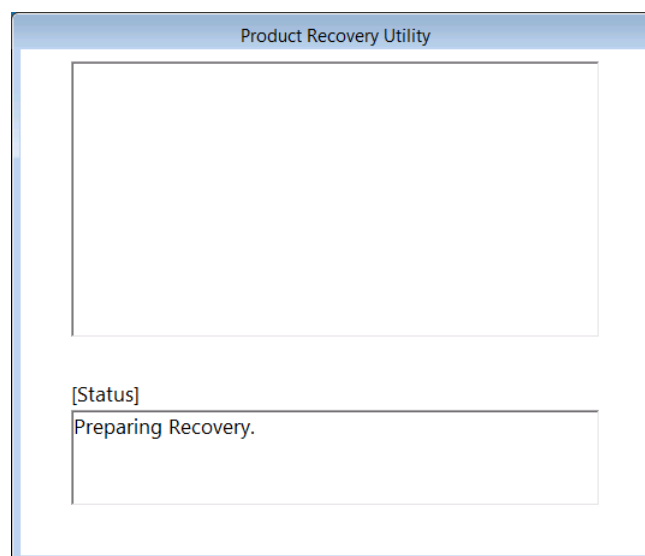


7. Restoring the factory-shipped condition by using a recovery DVD

7. If you click **Yes** in the confirmation window for the settings of the drive restoration, the drive restoration process starts, and the message `Copying data. Please wait. This might take several minutes.` is displayed in the **Status** box.

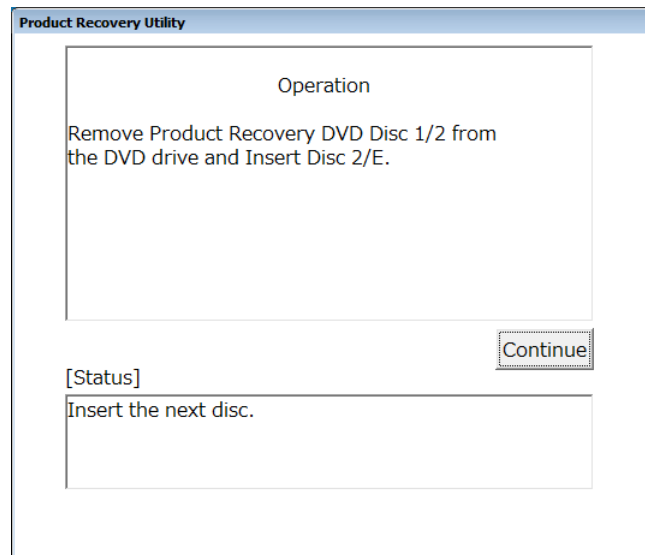


Note: If you select **Only the system and boot partition** in the selection window for the drive restoration option, the boot partition is formatted before the restoration process begins. Formatting the partition might take several minutes. (The time required for formatting depends on the size of the boot partition.) During the formatting process, `Preparing Recovery.` appears in the **Status** box.

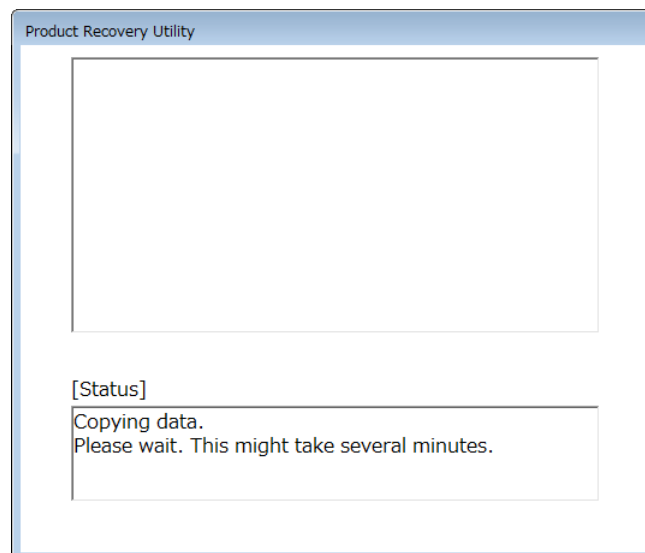


7. Restoring the factory-shipped condition by using a recovery DVD

8. If you are using multiple recovery DVDs, when processing by the current recovery DVD is complete, the following message appears, and the recovery DVD is automatically ejected. Remove the recovery DVD from the DVD drive, and then insert the next recovery DVD. (The example in the following figure shows a 2-disc recovery DVD set.)



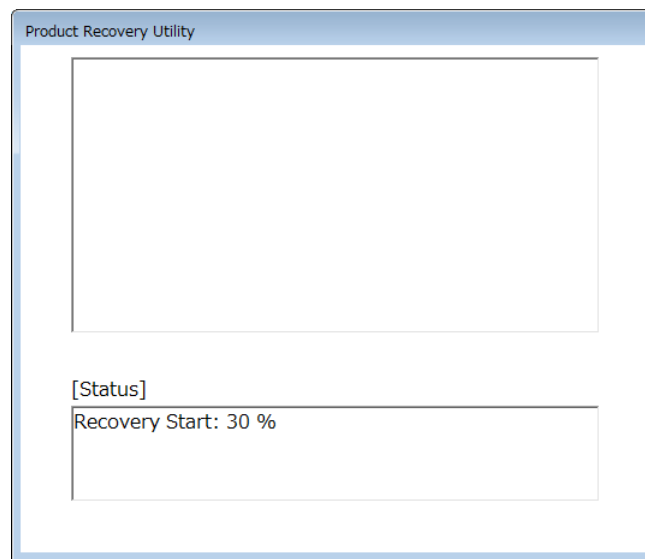
9. If you click **Continue**, the message "Copying data. Please wait. This might take several minutes." appears in the **Status** box, and then the processing to restore the factory-shipped condition resumes.



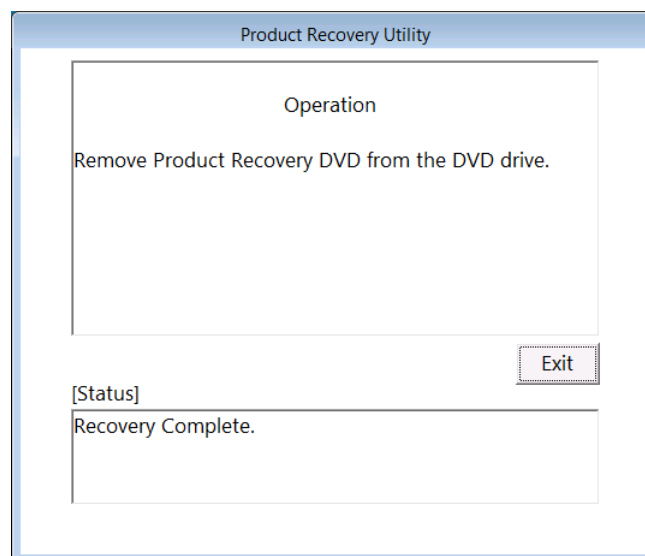
10. For multiple recovery DVDs, repeat steps 8 and 9 for each DVD.

7. Restoring the factory-shipped condition by using a recovery DVD

11. When all the preparations for drive restoration process are complete, drive restoration starts, and the progress is displayed in the **Status** box. When the recovery DVD is automatically ejected, remove it from the DVD drive.



12. When processing to restore the factory-shipped condition by the recovery DVD is completed, the message **Recovery Complete.** appears in the **Status** box. Click the **Exit** button to shut down the equipment.



The system drive of the HF-W2000 Model 68/65 is now restored to its factory settings (as performed by the recovery DVD).

Now, set up the OS according to the procedure described in *Chapter 3. Set up.*

7.3.2 Errors generated during the recovery process and corrective actions

When an error occurs during the recovery process, record the error message and the error code displayed in the window, and take action as shown in the following table. If you take action accordingly but are still unable to proceed with the recovery process, or if the No. 8 error message appears, contact our sales representative.

Table 7-1 Error messages generated during the recovery process

No.	Error message	Action
1	Retry time out. Please refer to the INSTRUCTION MANUAL.	<ul style="list-style-type: none"> Verify the integrity of the system drive, such as by performing read and write tests.
2	Image file is not found. Please refer to the INSTRUCTION MANUAL.	<ul style="list-style-type: none"> Retry the recovery process. Verify the integrity of the recovery DVD, such as by performing read tests. Verify the integrity of the DVD drive, such as by performing read tests.
3	Drive failed or not connected. Please refer to the INSTRUCTION MANUAL.	<ul style="list-style-type: none"> Verify that the system drive is connected correctly. Verify the integrity of the system drive, such as by performing read and write tests.
4	Failed to access the drive. Please refer to the INSTRUCTION MANUAL.	
5	Failed to assign drive letter. Please refer to the INSTRUCTION MANUAL.	<ul style="list-style-type: none"> Check whether any devices unnecessary for the recovery process are connected. If any such devices are connected, disconnect them.
6	Failed to read from Product Recovery DVD. Please refer to the INSTRUCTION MANUAL.	<ul style="list-style-type: none"> Verify that the DVD drive is connected correctly. Verify the integrity of the recovery DVD, such as by performing read tests. Verify the integrity of the DVD drive, such as by performing read tests.
7	Recovery failed. Please refer to the INSTRUCTION MANUAL.	<ul style="list-style-type: none"> Retry the recovery process.
8	Recovery invalid. Please refer to the INSTRUCTION MANUAL.	<ul style="list-style-type: none"> Contact one of our sales representatives.
9	Drive capacity is not enough. Please refer to the INSTRUCTION MANUAL.	<ul style="list-style-type: none"> Verify the size of the system drive.
10	The capacity of drive is not equal.	<ul style="list-style-type: none"> Install drives with equivalent capacities.

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Chapter 8 Maintenance operations

This chapter describes maintenance operations that use the Reliability, Availability, and Serviceability (RAS) features of this equipment.

8.1 Overview

RAS features are designed to provide highly reliable functionality for the equipment. The following table shows an overview of the RAS features of this equipment.

Table 8-1 Overview of RAS features

Category		Item
Monitoring features		Hardware status monitoring
		OS deadlock monitoring
		Watchdog timer monitoring
GUI feature settings		RAS Setup window
Status checks	GUI display	Hardware status window
	Notifications	Event notifications
		Pop-up notifications
		Digital LED status indicator
		Remote notifications
		Status acquisition by using library functions
Control features	Shutdown/startup suppression	Automatic shutdown feature
		Shutdown by using library functions
		Startup suppression in the event of severe failure
		Control of the general-purpose external contacts (HJ-F2060-11, HJ-F2060-12, HJ-F2060-13)
		Control of the digital LED status indicator
Library functions		RAS library
Maintenance and failure analysis	Memory dump related	Memory dump collection feature
		STOP error code cause notification
		Log information collection window
		Maintenance operation support commands
		Logging of trends of the chassis interior temperature
Simulation feature		Hardware status simulation feature

Monitoring features

(1) Hardware status monitoring

This feature monitors the status of equipment hardware such as fans, drives, and chassis interior temperature.

(2) OS deadlock monitoring

8. Maintenance operations

This feature uses the dedicated timer in this equipment to monitor the operational state of the OS. The status lamp on the front of this equipment is lit green while any high-priority (real-time priority class) process is running properly.

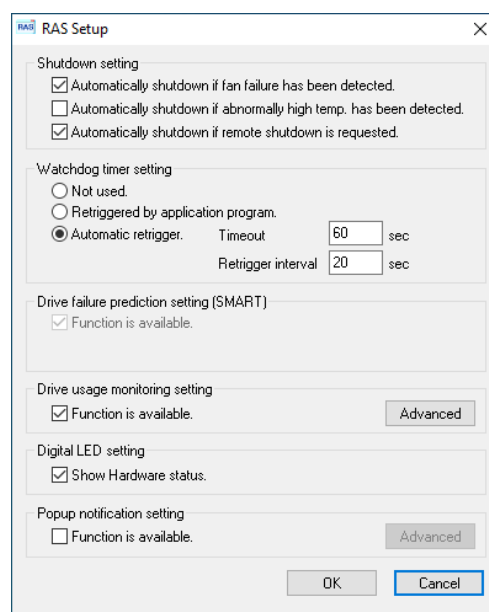
(3) Watchdog timer monitoring

This feature uses the watchdog timer in this equipment to monitor whether processes are scheduled properly. A library function for using the watchdog timer is also provided.

GUI feature settings

(4) RAS Setup window

This window provides a graphical user interface for configuring RAS feature settings such as automatic shutdown conditions and watchdog timer settings.



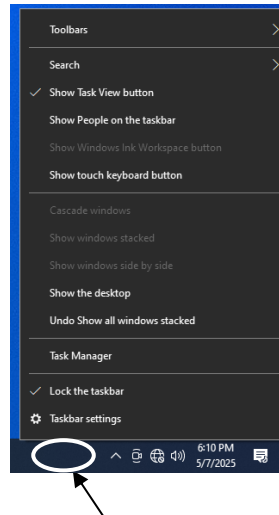
Status checks

(5) Hardware status window

This window displays the equipment hardware status through a graphical user interface. The taskbar notification area includes a hardware status icon.



This icon is not shown when using the default settings at the time that the equipment is shipped. However, if you click the arrow to the side of the notification area, the icon will appear. If you want this icon to be displayed in the notification area of the taskbar, right-click the taskbar, and then click **Taskbar settings** in the displayed menu. In the displayed window, click **Select which icons appear on the taskbar**, and then set the icon for **envdisp MFC Application** to on.



Right-clicking the taskbar displays a menu.

(6) Event notifications

This feature allows the user to monitor the status of event objects with user applications to check the equipment hardware status.

(7) Pop-up notifications

A pop-up message appears to notify a user that a hardware error occurred in this equipment.

(8) Digital LED status indicator

The digital LED status indicator on the front of this equipment notifies a user that an error occurred in the hardware. This indicator is also available to user applications (to notify of application failures, for example).

(9) Remote notifications

This feature allows a user to check the hardware status of this equipment from a remote device. A remote device can also be notified whenever the hardware status changes.

(10) Status acquisition by using library functions

This feature allows user applications to obtain equipment hardware status by using the RAS library.

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Control features

(11) Automatic shutdown feature

This feature automatically shuts down the equipment when detecting a fan failure, an abnormal chassis interior temperature, or a remote shutdown signal input. Configure the settings shown in (4) *RAS Setup window* under *GUI feature settings* to enable or disable the automatic shutdown feature.

(12) Shutdown by using library functions

User applications can shut down this equipment by using the RAS library.

(13) Startup suppression in the event of severe failure

This feature suppresses startup of this equipment when a failure (for example, fan failure) is detected during OS startup.

(14) Control of the general-purpose external contacts (HJ-F2060-11 and HJ-F2060-12, HJ-F2060-13) and digital LED status indicator

A user can use the RAS library to control the general-purpose external contacts and the digital LED status indicator.

[1] HJ-F2060-11 and HJ-F2060-12 each offer four digital inputs and three digital outputs.

[2] HJ-F2060-13 offers two digital inputs and two digital outputs.

The user can use these contacts to input signals from an external device to this equipment and output signals from this equipment to an external device.

Library functions

(15) RAS library interface

This interface offers library functions for recording log information, in addition to the library functions offered by (10) under *Status checks* and (12) and (14) under *Control features*.

Maintenance and failure analysis

(16) Memory dump collection feature

If a failure (such as unexpected device stoppage) occurs, pressing the NMI switch records the contents of the system memory to a file (memory dump file). Analyzing the memory dump file allows a user to investigate the cause of the failure.

(17) STOP error code cause notification

This feature detects a blue screen with STOP error code 0x80, and then records the cause of this error code in the event log.

(18) Log information collection window

This window allows users to collect log data and memory dump files for this equipment by using the graphical user interface.

(19) Maintenance operation support commands

These commands include a command for saving failure information from memory dump files and event log files to external media.

(20) Logging of trends of the chassis interior temperature

This feature periodically measures equipment chassis interior temperature and records the data in a file.

Simulation feature

(21) Hardware status simulation feature

This feature simulates the hardware status of this equipment. This allows users to test user applications and check the notification interface of the RAS software even if there is no actual hardware error.

This manual explains the feature in (13) under *Control features* and the features in (16) and (19) under *Maintenance and failure analysis*.

For details about other features, see the *HF-W2000 Model 68/65 RAS FEATURES MANUAL* (WIN-63-0102).

For more information about the POST message functionality of the digital LED status indicator described in (8) under *Status checks*, see 9.6.1 *POST messages*.

8.2 Memory dump collection feature

If one of the errors in Table 8-2 occurs, this equipment records the contents of the system memory in a file (a memory dump file). A blue screen then appears. By analyzing the data in the memory dump file, you can investigate the cause of the failure.

Table 8-2 Errors that trigger memory dump collection

Cause	Description
Forced recovery from hanging OS	When the OS hangs, press the NMI switch or input a remote reset signal to the external contact RMTRESET ^{#1} . This causes the collection of the memory dump.
Hardware NMI	If a serious failure (such as an uncorrectable memory error or a PIC bus parity check error) occurs in the equipment hardware, a non-maskable interrupt (NMI) is generated, and a memory dump is collected.
Windows® STOP error	When a fatal error occurs in the Windows® kernel, a memory dump is collected.

#1: Do not input a remote reset signal continuously to the external contact RMTRESET.

Doing so prevents this equipment from collecting a memory dump.

To select the memory dump file type, from the **Control Panel**, open **System**. You can select from the following five types of memory dump file defined below. The memory dump file type determines the extent to which you can analyze failures. We recommend selecting **Complete memory dump** whenever possible. The factory default setting is **Complete memory dump**.

- **Complete memory dump:** The entire contents of the system memory are recorded. The boot volume^{#2} must have enough free space to hold a paging file equal to the size of the physical memory plus 1 MB.
- **Kernel memory dump:** The kernel memory is recorded. The boot volume^{#2} must have a paging file that is at least the size of the kernel memory.
- **Minimum memory dump:** The minimum information necessary to identify what caused the equipment to stop is recorded. The boot volume^{#2} must have enough free space to hold a paging file greater than 2 MB in size.
- **Automatic memory dump:** Similarly to the kernel memory dump, the kernel memory is recorded. The difference from the kernel memory dump is that the automatic memory dump can create an initial paging file that is smaller than the physical memory size.
- **Active memory dump:** The contents of the memory assigned to virtual machines are filtered, and only the contents of the memory used in Hyper-V hosts are recorded. Active memory dumps can record a memory dump file that is smaller than with a complete memory dump.

#2: The boot volume is a volume that contains the Windows® files and Windows® support files.

To collect a complete memory dump file, you need a memory dump file of a size comparable to the capacity of the physical memory. In addition, the virtual memory (page file) and memory dump settings must be the ones that are recommended for this equipment^{#3}.

#3: The recommended settings are the settings in **Advanced system settings** in the **Control Panel** configured as follows. These are the default settings when this equipment is shipped from the factory.

- In **Startup and Recovery**, **Complete memory dump** is selected as the memory dump type.
- In **Startup and Recovery**, **Overwrite any existing file** is selected.
- In **Performance**, the **Initial size** and **Maximum size** settings for the virtual memory are the physical memory size plus 300 MB.

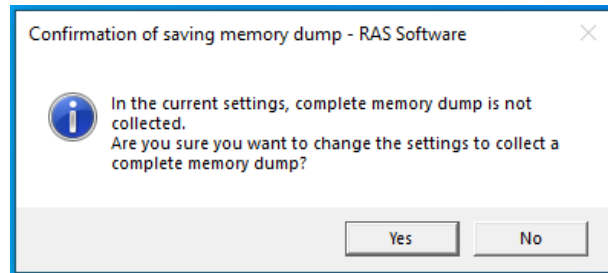
When an incident occurs that triggers a memory dump or when the NMI switch is pressed, the window called the *blue screen* appears, and the processing that triggers a memory dump is then started.

NOTE

- The time required to collect a memory dump depends on the type of dump file collected, the configuration of the installed drives, and the capacity of physical memory. Note that using the recommended setting (**Complete memory dump**) for this equipment might require a considerably long time.
- After a blue screen appears, update of the count on the screen that shows the progress of the memory dump sometimes stops. This occurs when the collection of the memory dump fails due to an error in the file system or on a hard disk. If this occurs, record the first five lines of the STOP message screen. Then, press the NMI switch or turn the power off and then back on to restart the equipment.

8.2.1 Memory dump confirmation messages

This equipment might become unable to collect a complete memory dump if, for example, the memory dump settings are changed. This equipment might also become unable to collect a complete memory dump if the total size of physical memory exceeds the capacity of a memory dump file or virtual memory as a result of adding physical memory. In such cases, this equipment displays the following message and records an event in the event log:

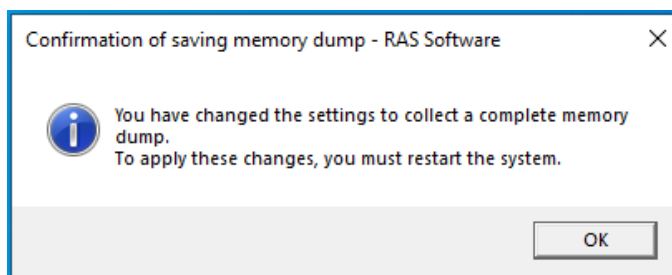


If you want to use the system with the memory dump setting recommended for this equipment, click **Yes** to close the message box. The memory dump and virtual memory settings are updated and an area for saving the memory dump is allocated automatically as required.

NOTE

- When the preceding message box is displayed, an information log entry with Event ID 26 is recorded in the event log.
- If you do not want to use the system with the memory dump setting recommended for this equipment, click **No** to close the message box. This message box will then no longer be displayed.

If the following message is displayed thereafter to prompt you to restart the system, click **OK** to close the message box, and then restart the system.



8.2.2 Specifying the settings related to memory dumps

This section describes how to specify the settings related to a memory dump.

Use the following procedure when you want to change the memory dump settings to the settings recommended for this equipment. If you are already using the memory dump settings recommended for this equipment (for example, you are using the equipment immediately after it has been shipped from the factory), or you click **Yes** in the dialog box described in 8.2.1 *Memory dump confirmation messages*, you do not have to perform this procedure.

NOTE

- Before starting a procedure in this section, you must sign in to the local computer as an administrator registered on that computer (as a member of the Administrators group).

(1) Configuring virtual memory

1. Open the **Control Panel**, and then click **System and Security**. Then, click **System**.
2. Click **Advanced system settings**.
3. In the **Advanced** tab, under **Performance**, click **Settings**.
4. In the Performance Options window, click the **Advanced** tab.
5. In the **Virtual memory** group, click **Change**.
6. Clear the **Automatically manage paging file size for all drives** check box.
7. In the **Drive** list, select the drive that stores the paging file that you want to change. In this example, select **C:** (the system drive).
8. Select **Custom size**. In the **Initial size (MB)** or **Maximum size (MB)** box, enter the new size of the paging file in megabytes, and then click **Set**.

Specify the following value for both the initial size and the maximum size based on the physical memory size:

- If the physical memory size is 8 GB: 8373
- If the physical memory size is 16 GB: 16565
- If the physical memory size is 32 GB: 32912

You can check the physical memory size as follows:

- a. Open the **Control Panel**, and then click **System and Security**.
 - b. Click **System**, and then check the value of **Memory (RAM)**.
9. Click **OK**.

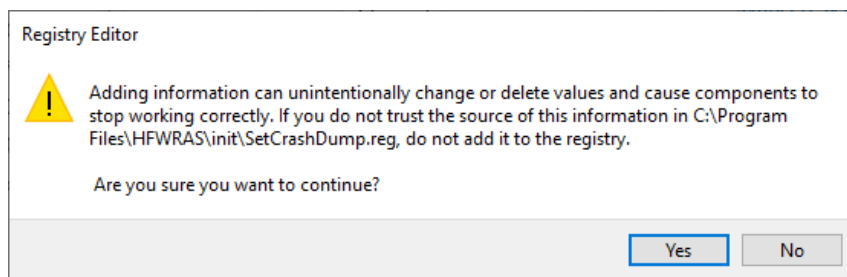
8. Maintenance operations

(2) Specifying a memory dump file

1. Open the **Control Panel**, and then click **System and Security**. Then, click **System**.
2. Click **Advanced system settings**.
3. In the **Advanced** tab, in the **Startup and Recovery** group, click **Settings**.
4. In the **Dump file** box, enter a memory dump file name.
By default, %SystemRoot%\MEMORY.DMP is specified.
If no changes are required, you do not need to enter another name in this box.
5. Select the **Overwrite any existing file** check box.
6. Click **OK**.

To enable collection of a complete memory dump as recommended for this equipment, perform the following procedure:

1. In the C:\Program Files\HFWRAS\init folder, double-click the SetCrashDump.reg file.
2. The following message box appears. Click **Yes**.



3. A message box appears, indicating that information has been added successfully. Click **OK**.
4. The setting is applied after the system restarts.

(3) Reserving the area for saving a memory dump

Reserve the area to be used for saving a memory dump by using the `createdmp` command.

For details, see *8.4 Maintenance operation support commands*.

8.3 Startup suppression in the event of severe failure

If one of the following incidents is detected while Windows® is being started, startup of this equipment is suppressed to protect the equipment hardware:

1. Fan failure
2. Remote shutdown signal input

NOTE

- In the case of a remote shutdown signal input, startup is suppressed only when **Enable automatic shutdown at remote shutdown input** is selected in the RAS Setup window. If the automatic shutdown setting is not selected, startup is not suppressed. For details about how to use the RAS Setup window, see the *HF-W2000 Model 68/65 RAS FEATURES MANUAL* (WIN-63-0102).

When a remote shutdown signal input is detected, the equipment displays a blue screen and then stops. For information about the STOP error code displayed on the LED indicator in this case, see *9.3 STOP error codes*.

8.4 Maintenance operation support commands

This section explains how to use the maintenance operation support commands. These commands are used when problems occur in the equipment and during preventive maintenance. When using these commands, run them in the Command Prompt window.

Table 8-3 shows a list of maintenance operation support commands.

Table 8-3 Maintenance operation support commands

Command name	Feature
logsave	Used to collect data for preventive maintenance or data for post-failure analysis during preventive maintenance, or when problems occur.
mdump	Used to copy a memory dump file to portable media when a memory dump is collected due to, for example, a STOP error.
createdmp	Used to reserve disk space for a memory dump file when a message is displayed indicating that the space available for the memory dump file is insufficient.
getrasinfo	Used for checking the status of the equipment, such as the status of the fan and the chassis interior temperature.

The manufacturer provides services to analyze the data collected by these maintenance operation support commands, such as a memory dump file and data for failure analysis, for a fee.

8.4.1 Log information collection command (logsave)

Name

logsave - Collects log information

Syntax

logsave [-e *file-name*] [*directory*]

Functionality

The `logsave` command saves data used for preventive maintenance and post-failure analysis of problems. The data is compressed and recorded as a single file with the file name `logsave.zip`.

The following options are available for this command. If no option is specified, the `logsave` directory is created directly under the system drive (usually `C:\`), and data is saved in that directory.

-e *file-name*: Data previously saved by the `logsave` command will be decompressed. For *file-name*, specify the absolute path of the file that you want to decompress. If this option is not used, the `logsave` command will save the data.

directory: When you are not using the -e option, specify the directory in which you want to store the saved data. If this option is not used, the `logsave` directory is created directly under the system drive (usually `C:\`), and data is saved in that directory.

When you are using the -e option, specify the directory where you want to store the decompressed data. If this option is not used, the data is decompressed in the current directory.

Table 8-4 shows the information collected by the `logsave` command.

Table 8-4 Information saved by the logsave command

Item	Description
Windows® event log file	Backup of the event log file
RAS software log data	RAS software operation log
RAS software user settings information	User settings definition file for pop-up notifications
Windows® version information	Version information for Windows® system files and driver files
Minimum memory dump	Files in the directory used for storing a minimum memory dump
System information	System information that includes hardware resources and the software environment
Output of the RAS information display command	Status of the equipment (such as the fan and chassis interior temperature) and configuration information about the RAS software
Output of the <code>ipconfig</code> command	Network settings
RAID log data	RAID operational logs (for the B/T model only)
Windows® setup log	Log files from Windows® setup

8. Maintenance operations

Diagnosis

When this command terminates with an error, the following error message appears.

If a directory for saving data does not exist, an error message from the Windows® `xcopy` command is displayed.

Table 8-5 Error messages of the `logsave` command

Error message	Description
You do not have the privilege to run this command. Please run this command again on "Administrator: Command Prompt".	You do not have administrator privileges. Sign in to the computer as an administrator, and then run the command again. If User Account Control (UAC) is enabled, open the Command Prompt window as an administrator, and then run the command.

NOTE

- When you run the `logsave` command, sign in to the computer as an administrator registered on the computer (as a member of the Administrators group). You cannot run multiple instances of the `logsave` command simultaneously.
- Open the Command Prompt window as an administrator to run the command.
- Log information can also be collected by using a program in the **Start** menu. For details, see the *HF-W2000 Model 68/65 RAS FEATURES MANUAL* (WIN-63-0102) .
- Double-click the saved `logsave.zip` file, and then verify that you can view the contents of the ZIP file. If you are unable to view the contents of the ZIP file, it might be corrupted. In this case, try running the command again.

8.4.2 Memory dump file copy command (mdump)

Name

mdump - Copies a memory dump file

Syntax

mdump [-n | -e *file-name*] *copy/extraction-destination-path-name*

Functionality

If this equipment stops unexpectedly, Microsoft® Windows® collects a memory dump file. The mdump command copies the file to portable media in a compressed format. The files copied by the command are all files in the minimum dump directory and the dump file specified in the Startup and Recovery window. To open this window, select **Control Panel > System and Security > System > Advanced system settings > Startup and Recovery > Settings**. The memory dump file is compressed and stored as a file with the file name `MEMORY.zip`.

If the -e option is specified, the command extracts files from a compressed file.

The following options are available for this command.

-n: Copies files without compression.

-e *file-name*: Extracts a file compressed by the mdump command. You must specify the file name.

copy/extraction-destination-path-name: When you are not using the -e option, specify the drive of the copy destination. If you want to copy files to a subdirectory, specify the full path name, including the directory name.
When you are using the -e option, specify the directory in which to store the extracted files.

- The memory dump file is copied to the copy/extraction destination specified in this command.
- If the copy/extraction destination directory already contains a file with the same name as the file being copied or extracted, the existing file is overwritten.
- When you run the mdump command by typing mdump / ? or mdump - ? at the command prompt or when there is an error in the specified parameters, a help message appears, indicating how to use the command.

8. Maintenance operations

Diagnosis

When this command terminates with an error, the following error message appears.

Table 8-6 Error messages of the mdump command

Message	Description
You do not have the privilege to run this command. Please run this command again on "Administrator: Command Prompt".	You do not have administrator privileges. Sign in to the computer as an administrator, and then run the command again. If User Account Control (UAC) is enabled, open the Command Prompt window as an administrator, and then run the command.

NOTE

- When you run the mdump command, sign in to the computer as an administrator registered on the computer (as a member of the Administrators group). You cannot run multiple instances of the mdump command simultaneously.
- Open the Command Prompt window as an administrator to run the command.
- If you run the mdump command and there is not enough free space at the copy destination, the Compressed Folders Error occurs. Ensure that there is sufficient free space equivalent to the capacity of the physical memory before running the mdump command.
- Do not run the mdump command immediately after the OS starts after the blue screen appears. If you do so, the Compressed Folders Error occurs. For details, see the *HF-W2000 Model 68/65 RAS FEATURES MANUAL* (WIN-63-0102).
- Double-click the saved MEMORY.zip file, and then verify that you can view the contents of the ZIP file. If you are unable to view the contents of the ZIP file, it might be corrupted. In this case, try running the command again.

8.4.3 Disk space allocation command for saving a memory dump (createdmp)

Name

`createdmp` - Reserves disk space for a memory dump file

Syntax

`createdmp`

Functionality

The `createdmp` command creates an empty memory dump file beforehand, and reserves disk space for a memory dump to prevent situations where collecting a memory dump fails because of insufficient disk space. By using this command, you can avoid failures when collecting memory dumps that are caused by insufficient disk space.

The `createdmp` command reserves disk space if the following conditions are met. If these conditions are not met, the command terminates with an error. Ensure that the memory dump settings are appropriate, and then retry this command. For information about how to set up the memory dump settings, see *8.2.2 Specifying the settings related to memory dumps*.

- The **Complete memory dump** setting is specified.
- The file name of the memory dump is entered correctly.
- The memory dump file can be overwritten.
- After the space for the memory dump file is allocated, the partition used for allocation still has free space totaling at least 10% of the disk capacity.

The size of the allocated disk space is as follows:

- The size of the physical memory size plus 10 MB

NOTE

- When you run the `createdmp` command, sign in to the computer as an administrator registered on the computer (as a member of the Administrators group). You cannot run multiple instances of the `createdmp` command simultaneously.
- If User Account Control (UAC) is enabled, open the Command Prompt window as an administrator, and then run the command.

8. Maintenance operations

Diagnosis

When this command ends normally, it does not output anything in the Command Prompt window. When the command terminates with an error, one of the following error messages appears.

Table 8-7 Error messages of the createdmp command

Error message	Description
Error: In the current settings, memory dump file won't be saved.	A memory dump cannot be collected by using the current settings. In the memory dump settings, select the Complete memory dump option.
Error: Free disk space is too low.	The free space on the disk is insufficient. Increase the free space on the disk, and then try again.
Error: Systemcall failed. (%s, %x) %s: Name of the Windows API function where the error occurred %x: Error code from the Windows API	An internal error occurred.
You do not have the privilege to run this command. Please run this command again on "Administrator: Command Prompt".	You do not have administrator privileges. Sign in to the computer as an administrator, and then run the command again. If User Account Control (UAC) is enabled, open the Command Prompt window as an administrator, and then run the command.

8.4.4 RAS information display command (getrasinfo)

Name

`getrasinfo` - Displays the status of the equipment (such as the fan and chassis interior temperature) and the configuration information of the RAS software

Syntax

```
getrasinfo [/status | /setting] [/e file-name]
```

Functionality

The `getrasinfo` command displays the current status of the equipment (such as the fan status and chassis interior temperature) and the configuration information of the RAS software in the Command Prompt window. This command can also store the output to a specified file in text format.

The following options are available for this command. If neither the `/status` nor `/setting` option is used, the command displays both information about the equipment and the settings of the RAS software.

`/status`: Displays the current status of the equipment (such as the fan and chassis interior temperature).

`/setting`: Displays the configuration information of the RAS software.

`/e file-name`: The output is not displayed in the Command Prompt window, but is instead stored in the file specified by the file name, in text format.

Table 8-8 shows the information displayed by the `getrasinfo` command.

Table 8-8 Information displayed by the `getrasinfo` command

Item	Description
Status of the equipment	<ul style="list-style-type: none"> • Fan status • Temperature status • RAID status (B/T model only) • Drive status • Memory status
RAS software settings	<ul style="list-style-type: none"> • Automatic shutdown settings • Watchdog timer settings • Drive failure prediction (SMART) settings • Drive usage monitoring settings • Settings for the digital LED status indicator • Pop-up notification settings

8. Maintenance operations

Displayed output

The following is an example of the displayed output when the `getrasinfo` command is executed without options.

```
<<getrasinfo result>>
Date: 2024/01/30 17:28:30
Model Name: HJ-206x

[Hardware Status]
[Fan condition]
  PS fan status:      Normal
  System fan status:  Normal
  CPU fan status:     Normal

[Temperature condition]
  Internal temperature status: Normal
  Internal temperature value:  28 deg C

[RAID condition]#1
  Array1
    Status:      Optimal
    RAID level:  1

[Drive condition]
  Drive bay1
    Type:      HDD
    Status:    Healthy
    Used hours: 2000 hours
    Used Endurance -- %
  Drive bay2
    Type:      HDD
    Status:    Healthy
    Used hours: 2000 hours
    Used Endurance -- %

[Memory condition]
  DIMM1 status: Normal
  DIMM2 status: Normal
```

} Header

} [Hardware Status] section
(Status of the equipment)

(Continued on the next page)

[RAS Setting]

[Automatic shutdown setting]

Fan:	ON
Temperature:	OFF
Remote shutdown:	ON

[Watchdog timer setting]

Retrigger type:	Automatic
Timeout:	60 sec
Interval:	20 sec

[Drive failure prediction setting]

Function is available:	Enable
------------------------	--------

[Drive used hours monitoring setting]

Function is available:	Enable
Drive bay1:	Enable
Drive bay2:	Enable

[Advanced]

Time limit of drive bay1:	20000 hours
Time limit of drive bay2:	20000 hours

[Digital LED setting]

Show Hardware status:	ON
-----------------------	----

[Popup setting]

Function is available:	Disable
------------------------	---------

[Advanced]

Fan:	Enable
Temperature:	Disable
SMART:	Disable
Used hours:	Enable
RAID:	Enable ^{#1}
Memory:	Disable
Memory Failure:	Disable

[RAS Setting] section
(RAS software settings)

#1: This appears only when using the B/T model.

8. Maintenance operations

Explanation of the displayed output

■ Header

This section shows the date and time when the `getrasinfo` command was executed and the model name.

The following is the format of the header.

```
<<getrasinfo result>>  
Date: YYYY/MM/DD hh:mm:ss  
Model Name: HJ-206x
```

YYYY: year, MM: month, DD: day, hh: hour (24-hour clock), mm: minute, ss: second

■ [Hardware Status] section

This section shows the status of the equipment. The [Hardware Status] section has the following subordinate sections:

• [Fan condition] section

This section shows the status of fans. The following table describes the items in this section.

Output item	Description	
<u>xx</u> fan status: <u>yy</u>	<u>xx</u>	Indicates the name of a fan. PS: Power supply fan System: System fan CPU: CPU fan
	<u>yy</u>	Indicates the status. Normal: The fan is operating normally. Error: The fan is not operating normally.

• [Temperature condition] section

This section shows the various statuses related to temperature. The following table describes the items in this section.

Output item	Description	
<u>xx</u> Temperature status: <u>yy</u>	<u>xx</u>	Indicates the type of temperature. Internal: Inside the chassis
	<u>yy</u>	Indicates the status. Normal: The temperature is normal. Error: The temperature is not normal.
<u>xx</u> Temperature value: <u>zz</u>	<u>xx</u>	Indicates the type of temperature. Internal: Inside the chassis
	<u>zz</u>	Indicates the temperature value.

- [RAID condition] section

This section shows the RAID status. The following table describes the items in this section. This section is available only when using the B/T model.

Output item	Description	
Array <u>xx</u>	<u>xx</u>	Indicates the number of the RAID array.
Status: <u>yy</u> (<u>zz</u> <u>ww</u> , <u>Media Error</u>)	<u>yy</u>	Indicates the RAID status: Optimal: Normal status Degrade: Degraded (abnormal) status Unknown: Unknown status
	<u>zz</u>	This item is output only when there is a task being executed. Rebuild: Rebuilding is in progress.
	<u>ww</u>	Indicates the progress of the task. This item is output only when there is a task being executed.
	<u>Media Error</u>	This item is output only when a media error was detected during a task.
RAID level: <u>vv</u>	<u>vv</u>	Indicates the RAID level as follows: 1: RAID1

- [Drive condition] section

This section shows the status of a drive. The following table describes the items in this section.

Output item	Description	
Drive bay <u>xx</u>	<u>xx</u>	Indicates the drive bay number.
Type: <u>ww</u>	<u>ww</u>	Indicates the drive type.
Status: <u>yy</u>	<u>yy</u>	Indicates the status of the drive: Healthy: Normal Not Connected: No disks are installed. Smart Detected: Drive failure prediction by SMART was detected. Offline: Offline (B/T model only) Rebuild: Rebuilding is in progress. (B/T model only) Overrun: The total number of power-on (used) hours exceeded the threshold. Unknown: Unknown status Smart Detected, Overrun: Drive failure prediction by SMART was detected and the total number of power-on hours exceeded the threshold.
Used hours: <u>zz</u>	<u>zz</u>	Indicates the total number of drive power-on (used) hours.
Used Endurance: <u>vv</u> %	<u>vv</u>	Indicates the percentage of the number of write operations performed on the drive to the upper limit. (This item is output only if the drive type is SSD.)

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- [Memory condition] section

This section shows the status of the main memory. The following table describes the items in this section.

Output item	Description	
<u>xx</u> status: <u>yy</u>	<u>xx</u>	Indicates the memory slot name. DIMM1: DIMM1 DIMM2: DIMM2
	<u>yy</u>	Indicates the status of the memory. Normal: Normal Error: Error correction occurs frequently. Not Mounted: No memory modules are installed.

- [RAS Setting] section

This section shows the settings of the RAS software. The [RAS Setting] section has the following subordinate sections:

- [Automatic shutdown setting] section

This section shows the automatic shutdown settings. The following table describes the items in this section.

Output item	Description	
Fan: <u>xx</u>	<u>xx</u>	Indicates whether the feature that automatically shuts down the system when a fan failure occurs is enabled or disabled. ON: Enabled OFF: Disabled
Temperature: <u>yy</u>	<u>yy</u>	Indicates whether the feature that automatically shuts down the system when the temperature is abnormally high is enabled or disabled. ON: Enabled OFF: Disabled
Remote shutdown: <u>zz</u>	<u>zz</u>	Indicates whether the feature that automatically shuts down the system when a remote shutdown signal is input to the contact is enabled or disabled. ON: Enabled OFF: Disabled

- [Watchdog timer setting] section

This section shows the watchdog timer settings. The following table describes the items in this section.

Output item	Description	
Retrigger type: <u>xx</u>	<u>xx</u>	Indicates the retrigger type. Automatic: The watchdog timer is retriggered automatically. Application: The watchdog timer is retriggered by an application. Not used: The watchdog timer is not used.
Timeout: <u>yy</u>	<u>yy</u>	Indicates the timeout time to be applied when the watchdog timer is retriggered automatically.
Interval: <u>zz</u>	<u>zz</u>	Indicates the interval of retriggering to be applied when the watchdog timer is retriggered automatically.

- [Drive failure prediction setting] section

This section shows the drive failure prediction (SMART) settings. The following table describes the items in this section.

Output item	Description	
Function is available: <u>xx</u>	<u>xx</u>	Indicates whether drive failure prediction (SMART) is enabled or disabled. Enable: Enabled For the HJ-206x, this feature is always enabled.

- [Drive used hours monitoring setting] section

This section shows the drive usage monitoring settings. The following table describes the items in this section.

Output item	Description	
Function is available: <u>xx</u>	<u>xx</u>	Indicates whether the drive usage monitoring feature is enabled or disabled. Enable: Enabled Disable: Disabled
Drive bay1: <u>vv</u>	<u>vv</u>	Indicates whether the monitoring feature for the usage time of drive bay 1 is enabled or disabled. Enable: Enabled Disable: Disabled
Drive bay2: <u>ww</u>	<u>ww</u>	Indicates whether the monitoring feature for the usage time of drive bay 2 is enabled or disabled. Enable: Enabled Disable: Disabled
[Advanced]	—	Indicates the advanced settings.
Time limit of drive bay <u>yy</u> : <u>zz</u>	<u>yy</u>	Indicates the drive bay number.
	<u>zz</u>	Indicates the threshold used for the drive usage monitoring feature.

- [Digital LED setting] section

This section shows the settings for the digital LED status indicator. The following table describes the items in this section.

Output item	Description	
Show Hardware status: <u>xx</u>	<u>xx</u>	Indicates whether the hardware status display is enabled or disabled. ON: Enabled OFF: Disabled

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- [Popup setting] section

This section shows the pop-up notification settings. The following table describes the items in this section.

Output item	Description	
Function is available: <u>xx</u>	<u>xx</u>	Indicates whether the pop-up notifications feature is enabled or disabled. Enable: Enabled Disable: Disabled
[Advanced]	—	Indicates the advanced settings.
Fan: <u>yy</u>	<u>yy</u>	Indicates whether pop-up notifications are displayed for fan failures. Enable: Displayed Disable: Not displayed
Temperature: <u>zz</u>	<u>zz</u>	Indicates whether pop-up notifications are displayed when the temperature is abnormal. Enable: Displayed Disable: Not displayed
SMART: <u>aa</u>	<u>aa</u>	Indicates whether pop-up notifications are displayed when drive failure prediction by SMART is detected. Enable: Displayed Disable: Not displayed
Used hours: <u>bb</u>	<u>bb</u>	Indicates whether pop-up notifications are displayed when the total number of drive power-on (usage) hours exceeds the threshold. Enable: Displayed Disable: Not displayed
RAID: <u>cc</u> (B/T model only)	<u>cc</u>	Indicates whether pop-up notifications are displayed when an abnormal RAID status is detected. Enable: Displayed Disable: Not displayed
Memory: <u>dd</u>	<u>dd</u>	Indicates whether pop-up notifications are displayed when frequent memory error corrections are detected. Enable: Displayed Disable: Not displayed
Memory Failure: <u>ee</u>	<u>ee</u>	Indicates whether pop-up notifications are displayed when a potential memory failure is detected. Enable: Displayed Disable: Not displayed

Diagnosis

When the `getrasinfo` command ends normally, it returns exit code 0. When the command terminates with an error, one of the following error messages appears, and the command returns exit code 1.

Table 8-9 Error messages of the `getrasinfo` command

Error message	Description
Usage: <code>getrasinfo [/status /setting] [/e File]</code>	There is an error in the specified options. Specify the options correctly.
An error occurred in %s. errorcode=%ax %s: Name of the Windows API function or inner function where the error occurred %ax: Error code from the Windows API function or inner function	An internal error occurred. Re-execute the command.
You do not have the privilege to run this command. Please run this command again on "Administrator: Command Prompt".	You do not have administrator privileges. Sign in to the computer as an administrator, and then run the command again. If User Account Control (UAC) is enabled, open the Command Prompt window as an administrator, and then run the command.

NOTE

- When you run the `getrasinfo` command, sign in to the computer as an administrator registered on the computer (as a member of the Administrators group). You cannot run multiple instances of the `getrasinfo` command simultaneously.
- Open the Command Prompt window as an administrator to run the command.
- When the `/e` option is specified, if the file output destination directory already contains a file of the same name as the file being output, the existing file is overwritten.
- If the command fails to acquire some of the information required for the output, only a section name might appear, or some of the displayed content might show as ---. In this case, re-execute the command.
- When a drive is newly connected or replaced during maintenance, Not Connected might appear for Status in the [Drive condition] section. This is because recognition of the drive takes some time upon first startup after it is connected. In this case, restart the OS.

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Chapter 9 Troubleshooting

This chapter describes the possible causes of common problems and the actions to take to address them. First, select the relevant symptom from the list in *9.1 List of problems*. Then, see the references to other sections *9.2 Causes and countermeasures* to *9.6 Digital LED status indicator*) and take action according to the instructions. If following the instructions in *9.2 Causes and countermeasures* does not resolve the problem, contact the system administrator or maintenance personnel.

WARNING

In the case of smoke, a burning smell, or a similar problem, unplug the power cord and contact your dealer or maintenance personnel. Using faulty equipment might result in a fire or an electric shock.

9.1 List of problems

The following is a list of problems that can occur in the equipment. Search for the relevant item in the following list, perform a root cause analysis, and then take appropriate action.

9.1.1 Troubleshooting When the System Fails to Start Normally

After inserting the power cable plug into the outlet, check the system behavior in steps (1) through (9) until the operating system starts.

If any of the listed conditions apply, refer to the corresponding page for the “Possible Cause” and “Countermeasure” sections.

After the system has started, check the event log to determine whether any abnormal logs were generated during startup.

- | | |
|--|------------------|
| (1) The standby lamp (DRIVE/STBY) does not light up. | (→ See page 9-4) |
| (2) The fan does not rotate. | (→ See page 9-4) |
| (3) The status lamp does not light up. | (→ See page 9-4) |
| (4) The status lamp lights up in red. | (→ See page 9-5) |
| (5) The digital LED status indicator displays alphanumeric characters and stops. | (→ See page 9-5) |
| (6) Nothing is displayed on the screen. | (→ See page 9-6) |
| (7) A message is displayed on the screen and the system stops. | (→ See page 9-6) |
| (8) The system stops at the Windows® logo screen. | (→ See page 9-6) |
| (9) A blue screen is displayed and the system stops. | (→ See page 9-6) |

9.1.2 Problems that might occur before OS startup

The following is a list of problems that might occur before the desktop appears (before the OS starts up). For information about the names of the lamps on the front panel, see *1.5 Name and function of each part*.

- | | |
|---|----------------|
| (1) Beeping sounds are generated. | (See page 9-7) |
| (2) The BIOS setup menu cannot be opened. | (See page 9-7) |
| (3) The remote power-on feature cannot be activated through the RAS external contact. | (See page 9-7) |
| (4) Wake-on-Lan (WOL) cannot be used. | (See page 9-7) |
| (5) When an extension board is installed, the equipment does not start. | (See page 9-8) |
| (6) The system does not recognize a disc (CD or DVD). | (See page 9-8) |

9.1.3 Problems that might occur after OS startup

The following is a list of problems that might occur after the Windows® logo appears and the desktop is shown (after OS starts up completely). For the names of the front panel indicator lamps, refer to *1.5 Names and Functions of Each Part*.

- | | |
|---|-----------------|
| (1) The digital LED status indicator displays alphanumeric characters. | (See page 9-9) |
| (2) The system operates slowly. | (See page 9-11) |
| (3) The system is unresponsive or has frozen. | (See page 9-11) |
| (4) The system automatically enters standby mode or restarts. | (See page 9-12) |
| (5) The screen flickers, remains blank, or is not displayed correctly. | (See page 9-13) |
| (6) The screen sometimes blinks or blacks out, then recovers. | (See page 9-14) |
| (7) A blue screen appears or has appeared. | (See page 9-14) |
| (8) Cannot connect to the network. | (See page 9-15) |
| (9) The network connection is frequently lost or the communication speed is slow. | (See page 9-15) |
| (10) The system does not recognize a disc (CD or DVD), or cannot read/write the disc. | (See page 9-16) |
| (11) Failed to write data to a disc (CD or DVD). | (See page 9-16) |
| (12) Cannot eject a disc (CD or DVD). | (See page 9-17) |
| (13) Keyboard input is not accepted. | (See page 9-17) |
| (14) Mouse input is not accepted, or the cursor/buttons do not function properly. | (See page 9-18) |
| (15) USB devices are not recognized or do not function. | (See page 9-19) |
| (16) No sound is output, or the volume is extremely low. | (See page 9-20) |
| (17) The serial port does not function properly. | (See page 9-20) |
| (18) The RAS external contact port does not function properly. | (See page 9-21) |
| (19) Cannot shut down the system. | (See page 9-21) |
| (20) The system clock is incorrect. | (See page 9-22) |
| (21) The fan does not rotate or makes unusual noises. | (See page 9-22) |
| (22) An error message is displayed. | (See page 9-23) |
| (23) Unusual noises are heard from the system. | (See page 9-23) |

9.2 Causes and countermeasures

9.2.1 Countermeasures When the System Fails to Start Normally

After inserting the power cable plug into the outlet, check the system behavior in steps (1) through (9) until the operating system starts.

If any of the listed conditions apply, refer to the corresponding page for the “Possible Cause” and “Countermeasure” sections.

After the system has started, check the event log to determine whether any abnormal logs were generated during startup.

(1) The standby lamp (DRIVE/STBY) does not light up.

<Possible Cause>

The system may not be receiving power, or the power supply unit may be malfunctioning.

<Countermeasure>

[1] Make sure the power cable plug is securely connected to the power outlet.

[2] Check that the circuit breaker on the distribution panel is set to ON.

[3] If the standby lamp (DRIVE/STBY) lights up in orange after completing steps 1 and 2, press the power switch.

→ If the system starts, the fan will begin to rotate and the status lamp will light up.

[4] If the standby lamp (DRIVE/STBY) still does not light up, the cause may be a poor contact or a loose connection at the power connector or a faulty power supply unit. Contact your system administrator or maintenance personnel.

(2) The fan does not rotate.

<Possible Cause>

A poor contact or a loose connection at a FAN connector, foreign objects attached to the fan, or fan failure may be the cause.

<Countermeasure>

[1] Check the digital LED status indicator and refer to “9.6.1 POST Display” to determine whether there is an abnormality in the power fan, system fan, or CPU fan. If any issues are found, contact your system administrator or maintenance personnel.

(3) The status lamp does not light up.

<Possible Cause>

A poor contact or a loose connection at related connectors, a failure of the LED board may be the cause.

<Countermeasure>

Contact your system administrator or maintenance personnel.

(4) The status lamp lights up in red.

<Possible Cause>

A malfunction of the connected device or a failure of the motherboard may be the cause.

<Countermeasure>

[1] Disconnect all extension boards and devices connected to each port, then restart the system with the minimum configuration to check if the issue is resolved. If the issue is resolved, contact your system administrator or maintenance personnel.

[2] If the issue persists even with the minimum configuration in [1], a failure of the motherboard may be the cause. In this case, contact your system administrator or maintenance personnel.

(5) The digital LED status indicator displays alphanumeric characters and stops.

<Possible Cause>

An error may have been detected during POST

<Countermeasure>

1. See 9.6.1 POST messages and take appropriate action. →When the equipment recovers, the alphanumeric code displayed on the digital LED status indicator disappears, and the OS starts.

(6) The screen is blank.

<Possible Cause>

A malfunction of the display or a failure of the motherboard may be the cause.

<Countermeasure>

1. Make sure that the display's power cable is properly plugged into an electrical outlet.

2. Ensure that the power switch on the display is turned ON.

3. Confirm that the display interface cable is properly connected between the system and the display (also check for any loose or faulty connections).

4. Review the display settings. Refer to the user manual provided with the display for instructions.

5. Try using a different display or cable to check if the screen can be displayed properly, and verify whether the issue lies with the display or cable.

6. If the screen is still not displayed even after changing the display and cable, a motherboard failure may be the cause. Please contact your system administrator or maintenance personnel.

9. Troubleshooting

(7) A message is displayed on the screen and the system stops.

<Possible Cause>

The battery is dead, no drive (HDD/SSD) is installed, or the OS is corrupted.

<Countermeasure>

1. If any of the following messages appear, take the appropriate action:

● “RTC Error, Load default values”

⇒ If this message appears every time the system starts, the internal coin battery may be depleted. Contact your system administrator or maintenance personnel.

● “UEFI Interactive Shell”

⇒ This may indicate a problem with the HDD/SSD or the operating system. Please check the following:

i) Make sure that no USB CD, USB FD, or USB boot device is connected to the system.

⇒ If any of these devices are connected, disconnect them.

ii) Ensure that the HDD/SSD is properly inserted into the drive bay and securely fastened with screws.

⇒ If properly installed, the HDD/SSD should be recognized in the BIOS screen.

(See to 5.6 BIOS Setup)

iii) If you have a recovery DVD, use it to restore the system to its factory default state.

(8) The system stops at the Windows® logo screen.

<Possible Cause>

A hardware failure or operating system corruption may be the cause.

<Countermeasure>

1. Unplug the power cable from the electrical outlet, and remove all USB devices except for the keyboard and mouse, as well as any extension boards. Then, reconnect the power cable and start the system. (For instructions on removing extension boards, refer to “6.4.4 Installing/Removing Extension Boards.”)

2. If the issue persists after performing step 1, the operating system may be corrupted. If you have a recovery DVD, use it to restore the system to its factory default state and recover the system using your backup data.

[NOTE]

- Do not connect USB devices during the OS startup process, as doing so may prevent the OS from starting properly.

- Depending on the KVM (CPU) switch used, switching the display during OS startup may also cause the OS to fail to start correctly. If using a KVM switch, be sure to conduct sufficient operational testing in advance.

(9) A blue screen is displayed and the system stops.

<Possible Cause>

The cause may be an input of a remote shutdown signal or an error in the RAID configuration.

<Countermeasure>

See to 9.3 STOP Error Codes and take the appropriate action.

9.2.2 Problems that might occur before OS startup

(1) Beeping sounds are generated.

<Possible Cause>

A hardware error may have been detected.

<Countermeasure>

1. Check the code displayed on the digital LED status indicator, and then take appropriate action by referring to *9.6.1 POST messages*.

(2) The BIOS setup menu cannot be opened.

<Possible Cause>

Keyboard input is not accepted.

<Countermeasure>

1. Disconnect the keyboard and securely reconnect it to ensure a stable connection.
2. Connect the keyboard to another port.

(3) Remote power-on through the RAS external contact is not functioning.

<Possible Cause>

The cause may be that the remote power-on function is disabled, there is a faulty cable connection, or the RAS board is malfunctioning.

<Countermeasure>

1. Refer to “6.6 Enabling the Remote Power-On Function” and enable the remote power-on function.
2. If remote power-on is still not possible after enabling the function, the RAS board may be malfunctioning. Contact your system administrator or maintenance personnel.

(4) Wake-on-Lan (WOL) cannot be used.

<Possible Cause>

The Wake-on-LAN (WOL) function may be disabled, or the LAN port may be malfunctioning.

<Countermeasure>

1. Refer to “2.7.1 Enabling/Disabling the WOL (Wake-on-LAN) Function” and enable the WOL function.
2. Insert a LAN cable and check whether the LED on the LAN port lights up. For information on the function of the LAN port LED, refer to “1.5 Names and Functions of Each Part.”
3. If the connection of the LAN port cannot be confirmed in step 2, replace the LAN cable.
4. If the issue persists after performing step 3, the motherboard may be malfunctioning. Contact your system administrator or maintenance personnel.

9. Troubleshooting

(5) If an extension board is installed, the equipment does not start.

<Possible Cause>

. Possible causes include a poor connection of the expansion board or a conflict in address space with an onboard device.

<Countermeasure>

1. While the system is powered off, remove the expansion board and reinstall it.
2. If the issue persists after performing step 1, the expansion board may be faulty. Refer to the manual provided with the expansion board and take the appropriate action.

(6) If an extension board is installed, the equipment does not start.

<Possible Cause>

Possible causes include the use of an unsupported disc (CD or DVD), a defective disc, a loose connector, or a malfunction of the DVD drive.

<Countermeasure>

1. Refer to “5.1 System Specifications” and check whether the disc (CD or DVD) you are using is supported.
2. Check that the disc (CD or DVD) is free from scratches or dirt. If dirty, clean the disc.
3. Replace the disc (CD or DVD) with another one.
4. If the issue persists after steps 1–3, the DVD drive may be malfunctioning. Contact your system administrator or maintenance personnel.

[NOTE]

When using a USB DVD drive, it may take approximately 10 minutes for some DVD drives to read a disc (CD or DVD) during system startup.

9.2.3 Problems that might occur after OS startup

(1) The digital LED status indicator displays alphanumeric characters.

<Possible cause>

This notification pertains either to a hardware error detected by the RAS software or to a user application.

<Countermeasure>

1. If a status identification LED is lit in red, the RAS software has detected a hardware error. Check the code displayed on the digital LED status indicator.

- If the code displayed on the digital LED status indicator is 11, 12, or 13

→ The rotation of a fan is abnormal. (The displayed code indicates the relevant fan: 11 = power supply fan, 12 = system fan, 13 = CPU fan)

Take the following actions:

- i) Make sure that no foreign objects are attached to the fan.
→ If any foreign objects are attached, the cooling efficiency inside the equipment is reduced. Remove any foreign objects.
- ii) If the issue is not resolved by step i), the cause may be a poor connection at the fan power connector or a failure of the corresponding fan. Contact your system administrator or maintenance personnel.

- If the code displayed on the digital LED status indicator is 21

→ The temperature is abnormal. Take the following actions:

- i) Check for clogging of the dust filter at the front of the equipment and the rear exhaust vent.
→ If clogging is found, refer to “6.1 Daily Inspection” and clean the dust filter and air intake/exhaust vents. If necessary, refer to “6.4.8 Attaching/Detaching the Dust Filter” to replace the dust filter.
- ii) Make sure that sufficient clearance is provided around the equipment.
→ If clearance is insufficient, provide sufficient clearance around the equipment. Refer to “1.6.2 Installation.”
- iii) Make sure that the temperature of the installation environment (the ambient temperature) is less than 40°C[#].
→ Remove obstacles to airflow or use air-conditioning to keep the ambient temperature lower than 40°C[#].

(#: For the HF-W2000 model 68, the maximum temperature is 35°C)

- If the code displayed on the digital LED status indicator is 31 or 32

→ Failure of the drive in a drive bay is suspected. (The displayed code indicates the relevant drive bay: 31 = drive bay 1, 32 = drive bay 2)

We recommend that you back up the data and replace the drive.

<Countermeasure>

- **If the code displayed on the digital LED status indicator is 41 or 42**

→ The drive in a drive bay is abnormal. (The displayed code indicates the relevant drive bay:
41 = drive bay 1, 42 = drive bay 2)

Replace the drive by referring to *10.4.2 Recovery in the case where either drive failed.*

- If the code displayed on the digital LED status indicator is 4C

→ The RAID status is unknown. (The RAS software cannot acquire the RAID status.)

Contact the system administrator or maintenance personnel.

- If the code displayed on the digital LED status indicator is 4D[#]

→ A media error occurred on the RAID array. See *2.8.2 Note about media errors* in the *HF-W2000 Model 68/65 RAS FEATURES MANUAL* (WIN-63-0102) , and take action accordingly.

[#]: This code is not displayed when you are using the default settings. For details about displaying this code, see *2.8.2 Note about media errors* in the *HF-W2000 Model 68/65 RAS FEATURES MANUAL*.

NOTE

If the green status identification LED is lit, the notification pertains to the user application. Contact the system administrator or maintenance personnel.

(2) The system operates slowly.

<Possible cause>

The capacity of the memory or the HDD or SSD is insufficient.

<Countermeasure>

1. Close any unnecessary applications to increase the available memory.
→ To check the CPU and memory usage, follow the instructions in *9.5 Checking the system load by using Performance Monitor*.
2. Delete any unnecessary files to increase free space on the HDD or SSD.

(3) The system is unresponsive or has frozen.

<Possible cause>

There is an error in the hardware or software.

<Countermeasure>

1. The screen can appear to be frozen when an application freezes. If the equipment responds when you press **Alt+Tab** or **Ctrl+Alt+Delete**, try performing the following procedure:
 - i) Switch applications by pressing **Alt+Tab**, and identify which application is frozen.
 - ii) After you identify the frozen application, use Task Manager to terminate the application. To open Task Manager, press **Ctrl+Alt+Delete**. The Windows Security window opens. Click **Task Manager**.
 - iii) Restart the equipment.
2. Press the NMI switch to collect a memory dump. If you want to have an analysis performed on the memory dump (a service provided for a fee), restart the equipment and save the log (see *8.4 Maintenance operation commands*), and then contact one of our sales representatives. If the restart is not performed automatically, turn off the power of the equipment by referring to *Forcibly terminating the equipment* shown later.
3. If you are unable to collect a memory dump after following the instructions in step 2, turn off the power of the equipment by referring to *Forcibly terminating the equipment* shown later.
4. If performing the actions described in steps 1 and 2 does not resolve the symptom, turn off the power, remove all USB devices and extension boards except for the keyboard and mouse, and then start the equipment.
5. See *9.2.1 When the System Fails to Start Normally* and check the system startup status.

Forcibly terminating the equipment

If a shutdown fails, press the power switch for at least four seconds. The power turns off and the equipment goes into standby mode.

9. Troubleshooting

(4) The system automatically enters standby mode or restarts.

a) An alphanumeric code is displayed on the digital LED status indicator and the system enters standby mode.

<Possible cause>

This notification pertains either to an error detected by the RAS software or to a user application.

<Countermeasure>

1. Check the code displayed on the digital LED status indicator.

- If a status identification LED is lit in red, the RAS software has detected an error.

See *9.6.1 POST messages* and take appropriate action.

(*) If the equipment is started without sufficient time delay after being moved from an environment below the ambient operating temperature specified in “1.6.1 Environmental Conditions,” the equipment may display “13” and shut down. In such cases, leave the equipment in the appropriate temperature environment for at least four hours before turning the power on again.

- If the green status identification LED is lit, the notification pertains to the user application. Contact the system administrator or maintenance personnel.

b) A warning or error message is recorded in the event log.

<Possible cause>

There is an error in the hardware or software.

<Countermeasure>

1. Check the description of the messages in the *System* or *Application* category in the event log and take action accordingly. (See *9.4 Event log*.)

2. If the source of the message is a component purchased by the user, contact the supplier.

c) If neither a) nor b) applies

<Possible cause>

There is a problem with a cable connection, or the AC power supply is unstable.

<Countermeasure>

1. Make sure that the power cord is securely plugged in.

2. If the symptom persists after step 1, the AC power supply might be unstable. Make sure that the AC power voltage is appropriate.

(5) The screen flickers, remains blank, or is not displayed correctly.

<Possible cause>

There is an error in the display or in the video card.

<Countermeasure>

1. Make sure that the power cord for the display is plugged in.
2. Make sure that the equipment and the display are securely connected through a display interface cable. (Make sure that the cable connection is not loose.)
3. Replace the display interface cable with a new one. (Check whether the cable is broken.)
4. Review the display settings. For information about how to adjust the display, see the display manual.
5. If you are using a video card, check the following items:
 - i) Make sure that the settings of the video card are correct. (For information about how to set up the video card, see the manual for the video card.)
 - ii) Turn off the main power switch. Replace the video card with another and check whether the new video card works.
6. If you are using a display that supports the MST (Multi Stream Transport) technology of DisplayPort, check the following items. (See the display manual for these settings.)
 - i) If the display can switch between DisplayPort 1.1 and DisplayPort 1.2, select DisplayPort 1.2.
 - ii) If the display can change the MST setting, set it to **Primary**.

NOTE

If MST is enabled, the **DisplayPort topology** item appears when you right-click on the desktop.

(6) The screen sometimes blinks or blacks out, then recovers.

<Possible cause>

Windows® is performing a process to correctly recover the graphics feature if the graphics driver is taking time in response to a high load on the system.

<Countermeasure>

1. If this phenomenon occurs, the message *Response stop and recovery of display driver* might be displayed or a warning message with the event ID 4101 might be recorded in the event log. If such a message is displayed or recorded, reduce the system load, and use the system under a load that does not cause this kind of indication or recording.

(7) A blue screen appears or has appeared.

<Possible cause>

There is an error in the OS or in the equipment.

<Countermeasure>

1. If a blue screen is currently shown, record the STOP error code (for example, 0x00000080) or distinguished name (for example, NMI_HARDWARE_FAILURE).
2. Press the NMI button to obtain a memory dump, then restart the equipment.
If memory dump analysis (paid service) is required, save the log after restarting the system (refer to *8.4 Maintenance Support Commands*) and contact our sales representative.
3. If the equipment does not restart following step 2, refer to *9.2.1 When the System Fails to Start Normally* and check the system startup status.
4. If the STOP error code or identifier (e.g., NMI_HARDWARE_FAILURE) could not be confirmed in step 1, check the “System” category in the Event Log and identify the cause code.
5. Check the description in *9.3 STOP error codes* to determine what caused the memory dump to be collected.

(8) Cannot connect to the network.

<Possible cause>

There is an error in the settings of the LAN or the network device (the hub or another device), or there is a problem with the cable connection.

<Countermeasure>

1. Review the network settings by referring to the instructions in *2.8 Setting up the LAN interface*.
2. Disconnect the LAN cable and securely reconnect it to ensure a stable connection.
3. Make sure that the LAN cable is connected to the correct port.
4. Replace the LAN cable with another LAN cable.
5. When you use the network device, check the following items:
 - i) Make sure that the power of the network device is on.
 - ii) Turn on the power of the network device before turning on the power of this equipment.
 - iii) Replace the network device with another and check whether the latter works.
6. If the issue is not resolved after performing steps 1 through 5, contact your system administrator or maintenance personnel.

(9) The network connection is frequently lost or the communication speed is slow..

<Possible cause>

There is an error in the settings of the LAN or the network device, or there is a problem with the cable connection.

<Countermeasure>

1. Review the network settings by referring to the instructions in *2.8 Setting up the LAN interface*.
2. Disconnect the LAN cable and securely reconnect it to ensure a stable connection.
3. Make sure that the LAN cable is connected to the correct port.
4. Replace the LAN cable with another LAN cable.
5. When you use the network device, check the following items:
 - i) Turn on the power of the network device before turning on the power of this equipment.
 - ii) Replace the network device with another and check whether the latter works.
6. If the issue is not resolved after performing steps 1 through 5, contact your system administrator or maintenance personnel.

9. Troubleshooting

(10) The system does not recognize a disc (CD or DVD), or cannot read/write the disc.

<Possible cause>

The use of unsupported discs (CD or DVD), defective discs, or a DVD drive failure may be the cause.

<Countermeasure>

1. See *5.1 Equipment specifications* and confirm that the CD or DVD you want to use is supported.
2. Check that there are no scratches or dirt on the CD or DVD. Clean the disc if it is dirty.
3. Use another CD or DVD.
4. From [PC] – [Explorer], check whether the DVD drive is recognized.
⇒ If it is not recognized, restart the equipment.

(11) Failed to write data to a disc (CD or DVD)

<Possible cause>

The capacity of the drive (HDD/SSD) is insufficient, or the CD or DVD is faulty.

<Countermeasure>

1. Confirm that the CD or DVD is writable.
2. If not enough free space is available for the work area on the drive (HDD/SDD), clean up files and increase the free space on the drive.
3. Check that there are no scratches or dirt on the CD or DVD. Clean the disc if it is dirty.
4. Use another CD or DVD.

(12) Cannot eject a disc (CD or DVD).

<Possible cause>

Writing to a disc (CD or DVD) is in progress, or there is an error in the DVD drive.

<Countermeasure>

1. Check whether writing to a disc (CD or DVD) is in progress (the drive access lamp is on or flashing). You cannot eject a disc when writing to it.
2. Press the eject button at least five times.
3. Insert an eject pin into the manual emergency ejection hole. (See 2.6.1 *Inserting an optical disc (CD or DVD).*)
When the disc tray opens slightly, pull it out by hand.

NOTE

- Turn off the main power of the equipment before attempting to eject a disc by using the manual emergency ejection hole. Do not insert an eject pin at an angle or apply too much force.
- An eject pin is not provided with the equipment. If an eject pin is not available, use a suitably sized pin that fits the ejection hole.

(13) Keyboard input is not accepted.

<Possible cause>

An application has frozen, there is a problem with the cable connection, or the keyboard is faulty.

<Countermeasure>

1. Keyboard input might not be accepted temporarily due to a frozen application.
If the equipment responds when you press **Alt+Tab** or **Alt+Ctrl+Delete**, try performing the following procedure:
 - i) Switch applications by pressing **Alt+Tab**, and identify which application is frozen.
 - ii) After you identify the frozen application, use Task Manager to terminate the application. To open Task Manager, press **Alt+Ctrl+Delete**. The Windows Security window opens. Click **Task Manager**.
 - iii) Restart the equipment.
2. Disconnect the keyboard interface cable and securely reconnect it to ensure a stable connection.
3. Connect the keyboard interface cable to another port.
4. Replace the keyboard with another keyboard and check whether the latter works.
5. Restart the equipment.

9. Troubleshooting

(14) Mouse input is not accepted, or the cursor/buttons do not function properly.

<Possible cause>

The mouse does not work properly due to dust or dirt on the mouse, there is a problem with the cable connection, or the mouse is faulty.

<Countermeasure>

1. If you are using an optical mouse, check the following items:
 - i) Check whether dust or dirt is on the optical sensor. Clean the sensor if it is dirty.
 - ii) Do not use an optical mouse on glass, a mirror, or a shiny material. (We recommend using a mouse pad designed for use with an optical mouse.)
2. If you are using a mouse that is not an optional component provided by the manufacturer, see the manual for the mouse for usage instructions.
3. Disconnect the mouse interface cable and securely reconnect it to ensure a stable connection.
4. Replace the mouse with another mouse and check whether the latter works.
5. If you are using a USB KVM switch, read its user's manual.

The problem might be alleviated if you change settings such as emulation settings.
6. If the OS is being started while a serial port is receiving data, start using the serial port after the OS has started, and then check whether the condition has been improved.

(15) USB devices are not recognized or do not function.

<Possible cause>

A loose cable connection, missing USB device driver, or a motherboard malfunction may be the cause.

<Countermeasure>

1. Disconnect the cable for the USB device and securely reconnect it to ensure a stable connection.
2. Replace the cable for the USB device with another cable.
3. If the USB device requires installation of a device driver, install it by referring to the manual of the USB device, and then restart the equipment.
4. If the USB device requires an external power supply, make sure that the power cord of the USB device is plugged in.
5. If the USB device uses USB bus power, make sure that the current consumption of the USB device does not exceed the specified maximum current for the USB port of the equipment. (See 5.1(9) *Maximum current specifications*.) If the USB device can accept an external power supply, connect the device to an external power supply.
6. If steps 1 through 5 do not resolve the symptom, a failure of the USB device might be the cause. See the manual of the USB device and take appropriate action.
7. If the USB device is not faulty and has previously been successfully connected, a failure of the USB port (motherboard) may be suspected. Please contact your system administrator or maintenance personnel.

9. Troubleshooting

(16) No sound is output, or the volume is extremely low.

Possible cause

There is an error in the settings of the equipment and the speakers, there is a problem with the cable connection, or the speakers have failed.

<Countermeasure>

1. Adjust the volume of the equipment to an appropriate level. (See *Setting the volume* shown later.)
2. When you use speakers, check the following items:
 - i) Make sure that the speakers have built-in amplifiers.
(If the speakers do not have amplifiers, you cannot hear sound.)
 - ii) Make sure that the power cord of the speakers is plugged in.
 - iii) Turn on the power of the speakers.
 - iv) Make sure that the volume level of the speakers is adequately adjusted.
 - v) Make sure that the cable from the speakers is connected to LINE OUT.
 - vi) When you record an audio signal from an audio device, connect a cable from LINE OUT of the audio device to LINE IN of the equipment. (LINE IN cannot be used as a MIC input.)
 - vii) Disconnect the cable from the speakers and securely reconnect it to ensure a stable connection.
 - viii) Replace the speakers with other ones.

Setting the volume:

1. Open the Control Panel, and then click **Hardware and Sound**.
2. Click **Adjust system volume** to adjust the volume.

(17) The serial port does not function properly.

<Possible cause>

There is a problem with the cable connection, or the applicable device has failed.

<Countermeasure>

1. Disconnect the cable and securely reconnect it to ensure a stable connection.
2. Check to see if the target device has failed.
3. If the OS is being started while a serial port is receiving data, start using the serial port after the OS has started, and then check whether the condition has been improved.

(18) The RAS external contact port does not function properly.

<Possible cause>

A loose cable connection, interface failure with the connected device, or a malfunction of the RAS board may be the cause.

<Countermeasure>

1. Disconnect the cable and securely reconnect it to ensure a stable connection.
2. See 5.8.2 *External contact specifications* and confirm that the external contact specifications are met.
3. A malfunction of the RAS board may be the cause. Please contact your system administrator or maintenance personnel.

(19) Cannot shut down the system.

a) The drive access (DRIVE/STANBY) lamp lights up or flashes in green.

<Possible cause>

The shutdown process is simply taking a long time.

<Countermeasure>

1. Wait until the shutdown process finishes.

b) In cases other than a)

<Possible cause>

The OS has frozen.

<Countermeasure>

1. Press the NMI switch to collect a memory dump. If you want to have an analysis performed on the memory dump (a service provided for a fee), restart the equipment and save the log (see 8.4 *Maintenance operation commands*), and then contact one of our sales representatives. If the restart is not performed automatically, turn off the power of the equipment by referring to *Forcibly terminating the equipment* shown later.
2. If you are unable to collect a memory dump after following the instructions in step 1, turn off the power of the equipment by referring to *Forcibly terminating the equipment* shown later.
3. If performing the action described in step 1 does not resolve the symptom, turn off the power, remove all USB devices and extension boards except for the keyboard and mouse, and then start the equipment.

Forcibly terminating the equipment:

If a shutdown fails, press the power switch for at least four seconds. The power turns off and the equipment goes into standby mode.

(20) The system clock is incorrect.

Possible cause <Possible cause>

The Secure Time feature cannot receive the correct time because the equipment is not connected to the internet.

<Countermeasure>

1. Use the following procedure to disable the Secure Time feature:
 - i) Right-click the **Start** button, and then click **Run**.
 - ii) In the Run dialog box that appears, enter `regedit`, and then click **OK**.
 - iii) In the window that appears, open nodes in the following order: **HKEY_LOCAL_MACHINE > SYSTEM > CurrentControlSet > Services > W32Time > Config**.
 - iv) Under the **Config** node, right-click **UtilizeSslTimeData**, and then click **Modify**.
 - v) Change the value in **Value data** to 0, and then click **OK**.
 - vi) Manually set the clock correctly, and then restart the equipment.

NOTE

If the OS time is faster than real time, the time corrected in BIOS might not have reflected in the OS. In such a case, correct the OS time.

(21) The fan does not rotate or makes unusual noises.

<Possible cause>

The fan may be malfunctioning due to dust accumulation or a loose connection of the fan's power cable.

<Countermeasure>

1. Clean the dust filter and the affected fan.
2. Reconnect the fan's power cable and ensure it is properly connected.
3. If the issue persists after performing steps 1 and 2, the fan may be faulty. Please contact your system administrator or maintenance personnel.

(22) An error message is displayed.

<Possible cause>

This may indicate that a system abnormality has been detected.

a) If an alphanumeric string is displayed on a blue screen:

<Countermeasure>

1. See *9.3 STOP Error Codes* for troubleshooting instructions.

b) If an error or warning is shown in the event log:

<Countermeasure>

1. See *9.4 Event Log* and take appropriate action.

(23) Unusual noises are heard from the system.

<Possible cause>

A malfunction of the fan or DVD drive may be suspected.

<Countermeasure>

1. See *9.4 Event Log* and check the event log for any related entries.
2. If no error is found in the event log and the noise persists, clean the fan if it is identified as the source of the noise.
3. If the issue is not resolved after performing steps 1 and 2, the affected component may be faulty. Please contact your system administrator or maintenance personnel.

9.3 STOP error codes

A STOP error code is information that has summarized the cause of an error.

Each time a blue screen appears, a STOP error code is logged in a memory dump file.

Table 9-1 lists STOP error codes displayed on blue screens and the corresponding causes. Any distinguished names that correspond to STOP error codes are also displayed.

There are multiple causes for the STOP error code 0x00000080. You can check the detailed information about the cause for this STOP error code in the event log (event ID: 800, source: HFWRAS_SYS).

Table 9-1 STOP error codes

No.	Code	Cause	Action
1	0x00000080 (NMI_HARDWARE_FAILURE)	--	The cause is recorded in the event log. See <i>Table 9-2 List of actions for the STOP error code 0x80</i> and take appropriate action. If nothing is recorded in the event log, contact the system administrator or maintenance personnel.
2	0x00009221	When Windows® started, a remote shutdown input was detected.	For causes related to remote shutdowns, contact the system administrator or maintenance personnel.
3	0x00009501 ^{#1}	There are inconsistencies in the RAID1 configuration information.	See <i>10.4.4 Recovery in the case where both drives failed</i>
4	0x00009502 ^{#1}	The RAID1 configuration is incorrect.	See <i>10.4.3 When a problem occurs during recovery</i> .
5	0x00009503 ^{#1}	An error occurred during access to the RAID1 configuration information.	See <i>10.4.4 Recovery in the case where both drives failed</i>
6	Another problem occurred.	A Windows® STOP error occurred.	For details about a Windows® STOP error, search the Microsoft Knowledge Base for the relevant article. To request an analysis of the memory dump (a service provided for a fee), contact one of our sales representatives.

#1: These statuses are applicable to the B/T model only.

Table 9-2 List of actions for the STOP error code 0x80

Message recorded in the event log (event ID: 800, source: HFWRAS_SYS)	Cause	Action
A reset signal was input. Detailed code = 0x9201	Forced recovery from the OS hanging	Check whether a remote reset signal was input before the message appeared. It is expected behavior for this event log to appear when the NMI switch is pressed. If this event occurs without pressing the NMI switch, please contact your system administrator or maintenance personnel.
A PCI bus parity error occurred. Detailed code = 0x9202	Hardware NMI	Remove the extension board, replace it with another board, and then recheck operation. For the replacement work, see <i>6.4 Installing and removing components</i> . If the issue persists or if no expansion board is installed, please contact your system administrator or maintenance personnel.
An uncorrectable error occurred in DIMM2. Detailed code = 0x9217	An uncorrectable memory error occurred.	Check whether the main memory is correctly installed. If this error still occurs with the main memory correctly installed, the main memory itself might have failed. Contact the system administrator or maintenance personnel.
An uncorrectable error occurred in DIMM1. Detailed code = 0x9218		

9.4 Event log

When a critical event occurs (for example, when the environment information changes or when a remote shutdown request is generated), this equipment collects logs by using the Windows® event log service.

The following procedure shows how to check the event log.

(The screenshot shown later is based on Windows® 10, but is similar in other OSs.)

1. Open the Control Panel, click **System and Security** and then **View event logs**.
2. When the Event Viewer window opens, select **Windows Logs**. Then, select **System** to view the system log, or select **Application** to view the application log.

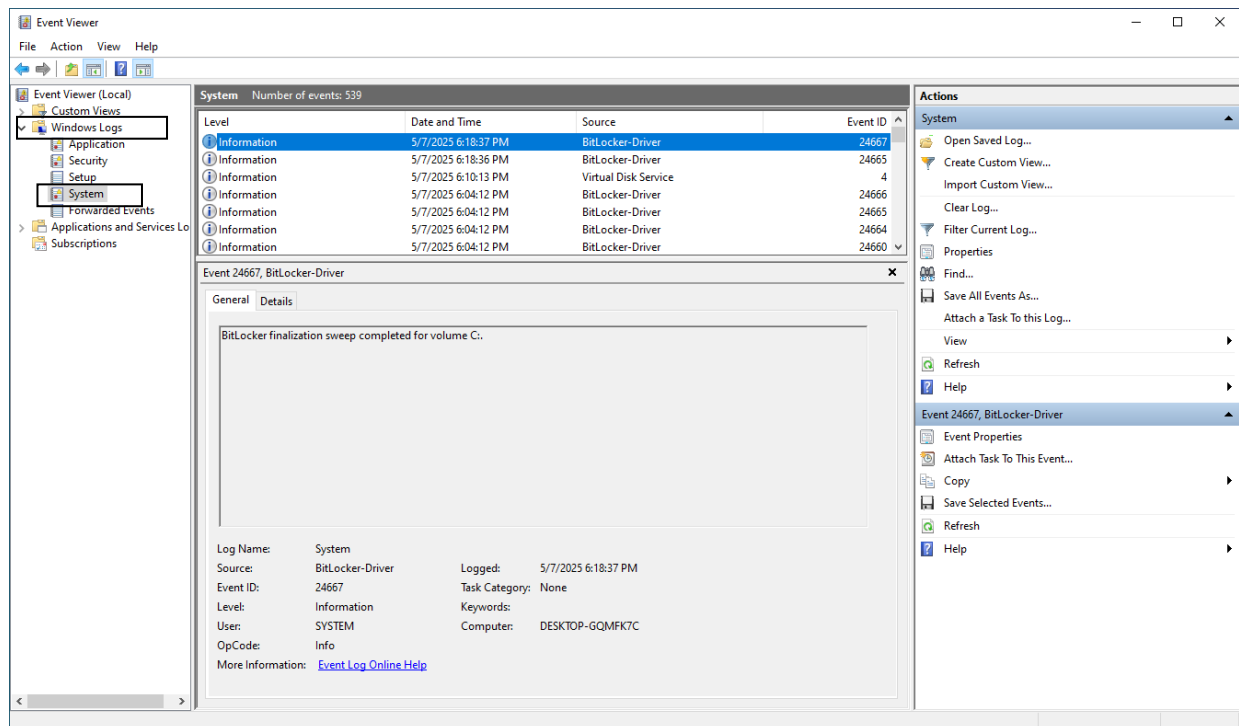


Table 9-3 lists the event log entries that are specific to this equipment. Items 1 to 18 and 21 to 32 are collected in the system log. Items 19 and 20 are collected in the application log.

Table 9-3 Event log entries specific to this equipment (1/3)

No.	Event ID	Source	Type	Description	Action
1	257	HFWRAS_SYS	Error	Power supply fan speed (number of revolutions value) has decreased significantly.	Read the description of fan failure in section 9.2.3 (1) and take action accordingly.
2	259	HFWRAS_SYS	Warning	The temperature exceeded the specified value.	Read the description of abnormal temperature in section 9.2.3 (1) and take action accordingly.
3	260	HFWRAS_SYS	Information	A remote shutdown request occurred.	No action required.
4	261	HFWRAS_SYS	Information	Power supply fan speed (number of revolutions value) has returned to normal.	No action required.
5	263	HFWRAS_SYS	Information	The temperature returned to the specified value.	No action required.
6	265	HFWRAS_SYS	Warning	A failure of the drive in drive bay %1 (%2) might be imminent.	We recommend that you back up the data and replace the drive.
7	266	HFWRAS_SYS	Error	CPU fan speed (number of revolutions value) has decreased significantly.	Read the description of fan failure in section 9.2.3 (1) and take action accordingly.
8	267	HFWRAS_SYS	Information	CPU fan speed (number of revolutions value) has returned to normal.	No action required.
9	268	HFWRAS_SYS	Error	The computer was shut down because the temperature became dangerous.	Read the description of abnormal temperature in section 9.2.3 (1) and take action accordingly.
10	270	HFWRAS_SYS	Information	Usage hours of the drive in drive bay %1 has exceeded the specified value.	We recommend that you back up the data and replace the drive.
11	277	HFWRAS_SYS	Error	System fan speed (number of revolutions value) has decreased significantly.	Read the description of fan failure in section 9.2.3 (1) and take action accordingly.
12	278	HFWRAS_SYS	Information	System fan speed (number of revolutions value) has returned to normal.	No action required.
13	519	HFWRAS_SYS	Error	The RAS MCU has failed.	The RAS MCU (microcontroller) might have failed. Contact the system administrator or maintenance personnel.

Table 9-3 Event log entries specific to this equipment (2/3)

No.	Event ID	Source	Type	Description	Action
14	524	HFWRAS_SYS	Information	Under the current settings, the memory dump file is not saved. %1	See section 8.2.1 Memory dump confirmation messages and take action. Alternatively, see section 8.2.2 Specifying the settings related to memory dumps and change the settings manually.
15	525	HFWRAS_SYS	Information	In DIMM%1, error corrections have been occurring at a high frequency.	The main memory might have failed. Contact the system administrator or maintenance personnel.
16	539	HFWRAS_SYS	Error	The %1 monitor finished.	Hardware monitoring of the RAS software has been terminated. If restarting the equipment does not resolve the error, contact the system administrator or maintenance personnel.
17	540	HFWRAS_SYS	Information	In DIMM%1, the number of single-bit errors that have been corrected since the OS started is %2 (comparison with last time: %3).	No action required.
18	541	HFWRAS_SYS	Warning	DIMM%1 might have failed.	The main memory might have failed. Contact the system administrator or maintenance personnel.
19	769	HFWRAS_APP	Error	An error occurred in %1. Error code = %2	An error was generated by the RAS software while the software was running. If restarting the equipment does not resolve the error, contact the system administrator or maintenance personnel.
20	771	HFWRAS_APP	Error	Because an incorrect value is specified in the registry value %1, the default value %2 is set.	If restarting the equipment does not resolve the error, contact the system administrator or maintenance personnel.
21	800	HFWRAS_SYS	Information	%1 Detailed code = %2	A STOP error occurred. Check the error and see 9.3 STOP error codes and take appropriate action.
22	2001	HFWRAS_SYS	Error	The drive in drive bay %1 was unmounted because of a failure.	See 10.4.2 Recovery in the case where either drive failed and take action.
23	2002	HFWRAS_SYS	Information	The RAID status is optimal.	No action required.

Table 9-3 Event log entries specific to this equipment (3/3)

No.	Event ID	Source	Type	Description	Action
24	2003	HFWRAS_SYS	Error	RAS could not acquire the RAID status. The RAID status is unknown.	Please restart the system. If the error persists after restarting, contact the system administrator or maintenance personnel.
25	2004	HFWRAS_SYS	Information	The RAID status was revealed.	No action required.
26	2009	HFWRAS_SYS	Information	The drive in drive bay %I was unmounted manually.	No action required.
27	2011	HFWRAS_SYS	Information	Rebuilding of the RAID is complete, but unreadable sectors were detected on the source drive (drive bay %I). (Media error)	See section 10.4.2 Recovery in the case where either drive failed and take action.
28	2012	HFWRAS_SYS	Error	Rebuilding of the RAID failed due to an error on the destination drive (drive bay %I).	See section 10.4.2 Recovery in the case where either drive failed and build a RAID array again.
29	2019	HFWRAS_SYS	Information	A media error occurred in the RAID.	See section 2.8.2 Note about media errors in the <i>HF-W2000 Model 68/65 RAS FEATURES MANUAL</i> (WIN-63-0102) and take action accordingly.
30	3000	HTsfRAID_SYS	Information	RAID status changed. (ARRAY = %I, DRIVE1 = %2, DRIVE2 = %3)	No action required.
31	3001	HTsfRAID_SYS	Information	Rebuild process was stopped. Reason: %I	See section 10.4.3 When a problem occurs during recovery and take action. If the detailed code is not written in section 10.4.3, contact the system administrator or maintenance personnel.
32	3010	HTsfRAID_SYS	Error	Service internal error. Reason: %I	Contact the system administrator or maintenance personnel.

9. Troubleshooting

No. 6: %1 denotes the drive bay number. %2 denotes the manufacturer and the model name of the drive.

No. 10: %1 denotes the drive bay number.

No. 14: %1 indicates the cause of the record in message format. One of the following is recorded.

%1
The writing of debug information is not a complete memory dump.
Overwriting to an existing file is disabled.
The size of the paging file is insufficient.
No memory dump file exists or the size of the memory dump file is insufficient.

No. 15: %1 denotes the slot number of the DIMM.

No. 16: For %1, one of the following strings is output:

FAN, TEMP, RMTSTDN, MEM, CPU, TEMPLOG, WDT, RAID1, RAID SMART, SMART, USETIME, RASLOG,
INTERNAL - LOGD

No. 17: %1 indicates the DIMM slot number. %2 indicates the total number of times that a single-bit error has been detected.

%3 indicates the difference compared to the last time that the total number of detected single-bit error was recorded.

No. 18: %1 indicates the DIMM slot number.

No. 19: %1 indicates the name of a function that terminated with an error. %2 denotes the error code.

No. 20: %1 indicates that a registry key has an illegal value. %2 denotes the default value of the registry key.

No. 21: For %1 and %2, specific strings are output in specific combinations. The following shows the combinations of strings that are output.

%1	%2
A reset signal was input.	0x9201
A PCI bus parity error occurred.	0x9202
An uncorrectable error occurred in DIMM2.	0x9217
An uncorrectable error occurred in DIMM1.	0x9218

Nos. 22, 26, 27, and 28: %1 denotes the drive bay number.

No. 30: For %1, one of the following strings is output:

OPTIMAL, OPTIMAL (MEDIA ERROR) , DEGRADE, DEGRADE (MEDIA ERROR) , DEGRADE (REBUILD) ,
DEGRADE (REBUILD MEDIA ERROR)

For %2 and %3, one of the following strings is output:

ONLINE, OFFLINE, REBUILD, NOT CONNECTED

No. 31: %1 denotes the rebuilding interruption factor code.

No. 32: %1 denotes the error code.


9.5 Checking the system load by using Performance Monitor

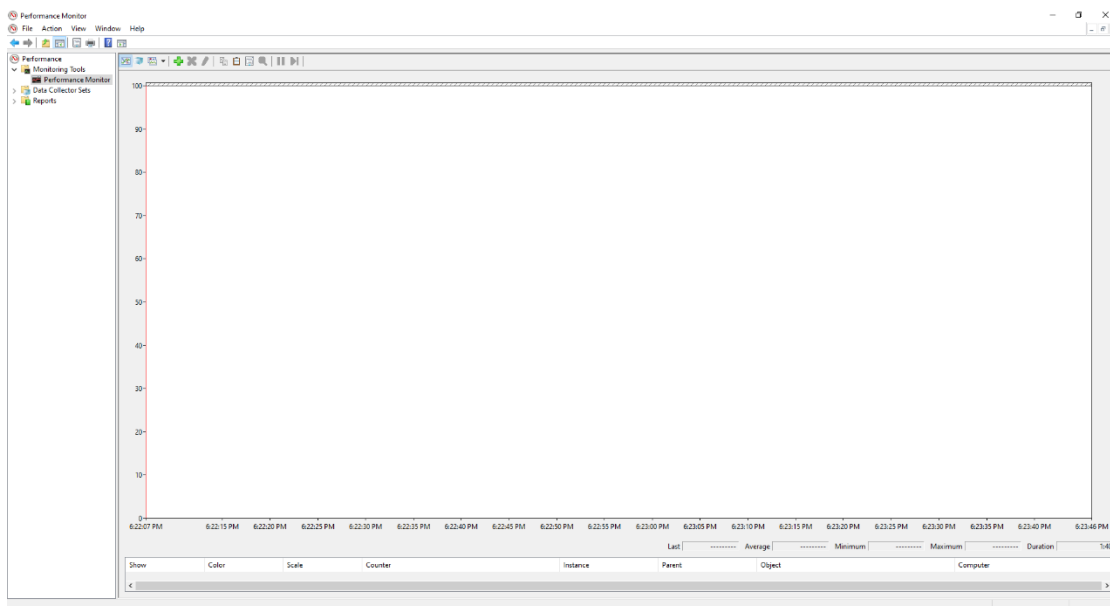
Windows® provides the Performance Monitor tool that can be used to monitor the usage of the CPU and memory.

Use this tool when, for example, you want to analyze the system load.

The following shows how to start Performance Monitor.

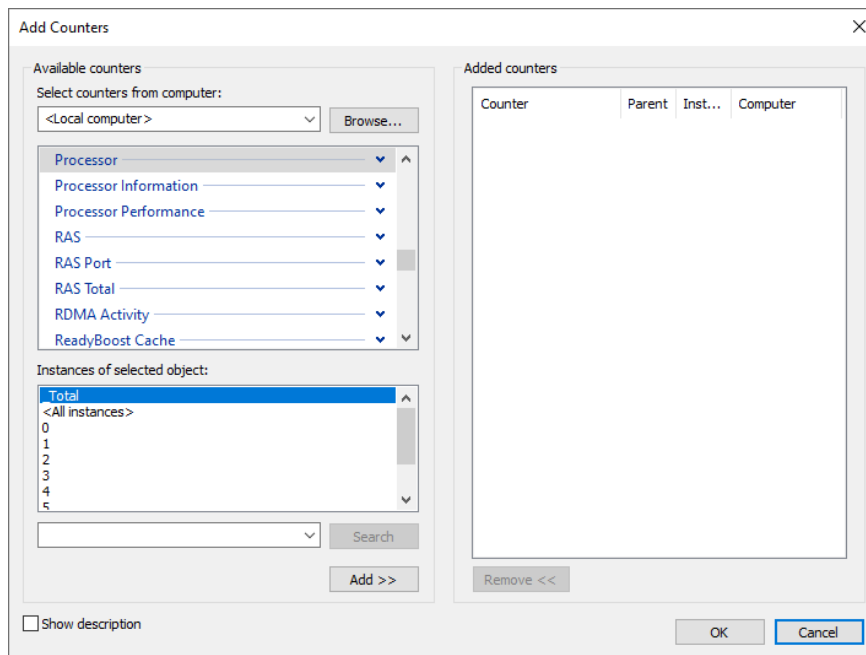
(The screenshot shown later is based on Windows® 10, but is similar in other OSs.)

1. From the **Start** menu, select **Control Panel, System and Security**, and then **Administrative Tools**.
For Windows® 11 and Windows Server® 2025, open **Control Panel, System and Security**, and then **Windows Tools**.
2. Double-click **Performance Monitor**.
3. When the Performance Monitor window opens, select the **Performance Monitor** node, and then click the green plus-sign button ().

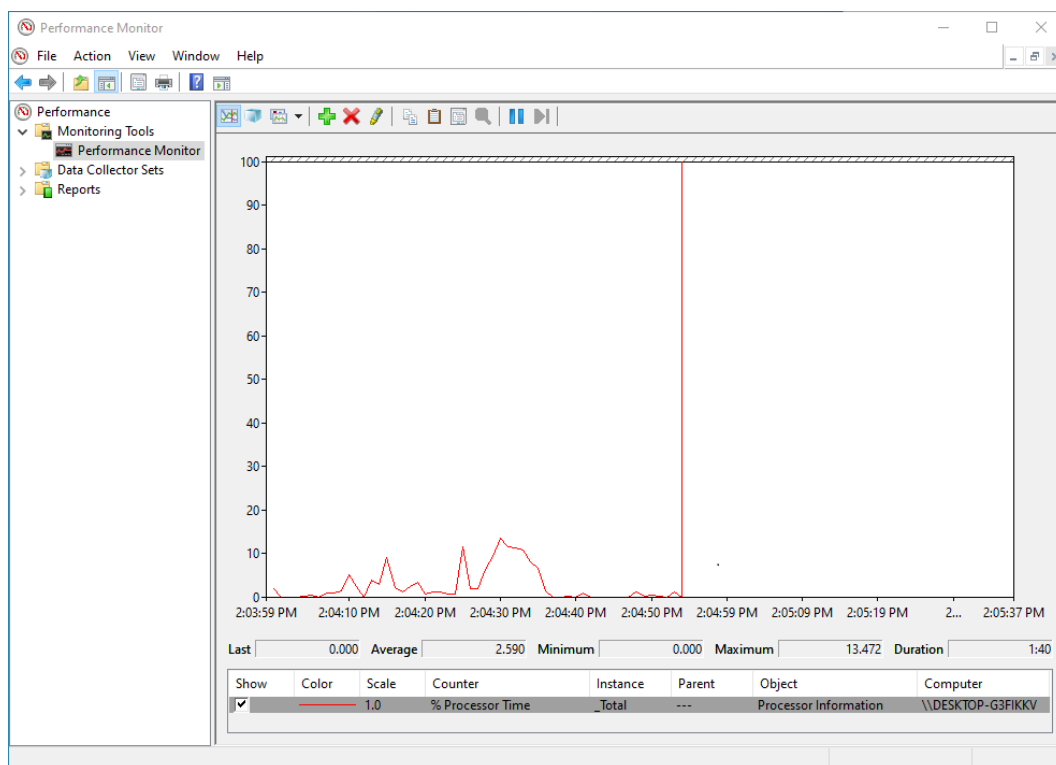


9. Troubleshooting

- The Add Counters window opens. In this window, you can select and add items (counters) with which you can check the performance. The selectable items include **Processor**, **Memory**, **PhysicalDisk**, and **Network Interface**. You can add an item by selecting it and clicking **Add >>**. Add all desired items, and then click **OK**.



- In the Performance Monitor window, you can check the performance of the items you select.



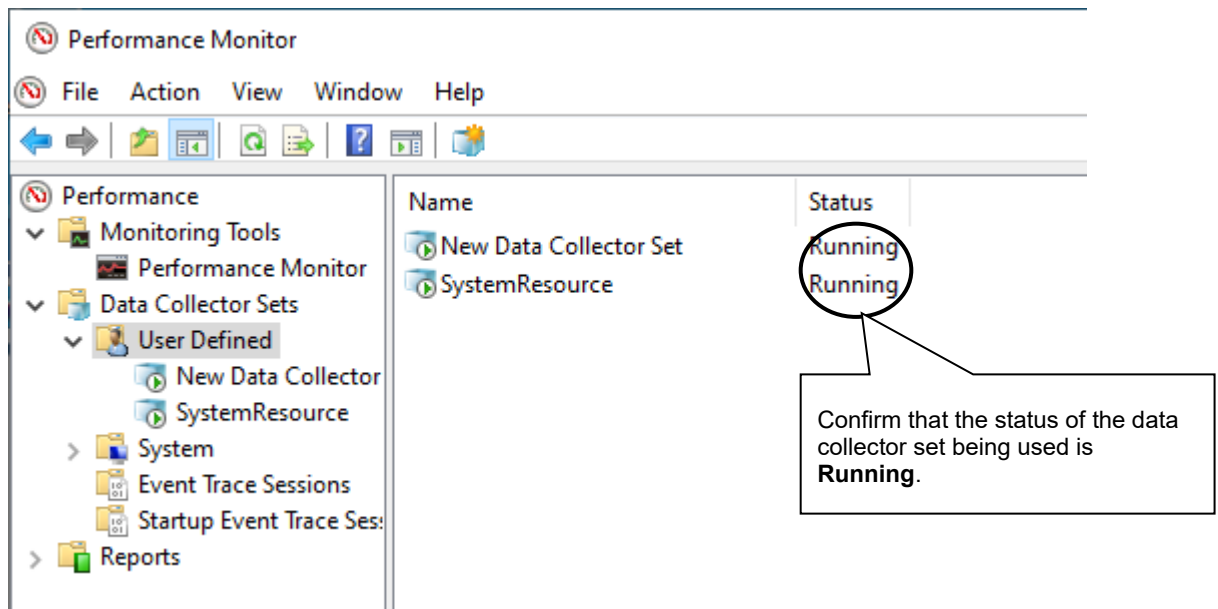
The following table shows a list of performance counters most closely related to the performance of the equipment.

Table 9-4 Performance counters related to the performance of the equipment

No.	Performance object	Counter	Description
1	Processor	%Processor Time	Shows the CPU usage. If this value is continuously high, the CPU processing power is likely to be a bottleneck.
2	Memory	Pages/sec	Indicates the number of pages per second that are read from or written to the disk to resolve page faults. If this value is high, it is likely that the amount of memory is insufficient. The closer this value is to 0, the better.
3		Available Bytes	Indicates the size of the physical memory available for processes. If this value indicates a decreasing trend, it is likely that there is a memory leak.
4		Pool Nonpaged Bytes	Indicates the size of the memory area that will never be paged out to the disk and that stays in the physical memory as long as it is allocated. An increasing trend in this value is likely indicative of a memory leak.
5	PhysicalDisk	%Disk Time	Indicates the percentage of time that the disk is busy reading and writing. A continuously high value is likely indicative of disk performance bottleneck.
6	Network Interface	Bytes Total/sec	Indicates the number of bytes per second that are sent and received by the network adapter. A continuously high value (compared to that of the counter in item 7) is likely indicative of network bottleneck.
7		CurrentBandwidth	Shows the network bandwidth.

NOTE

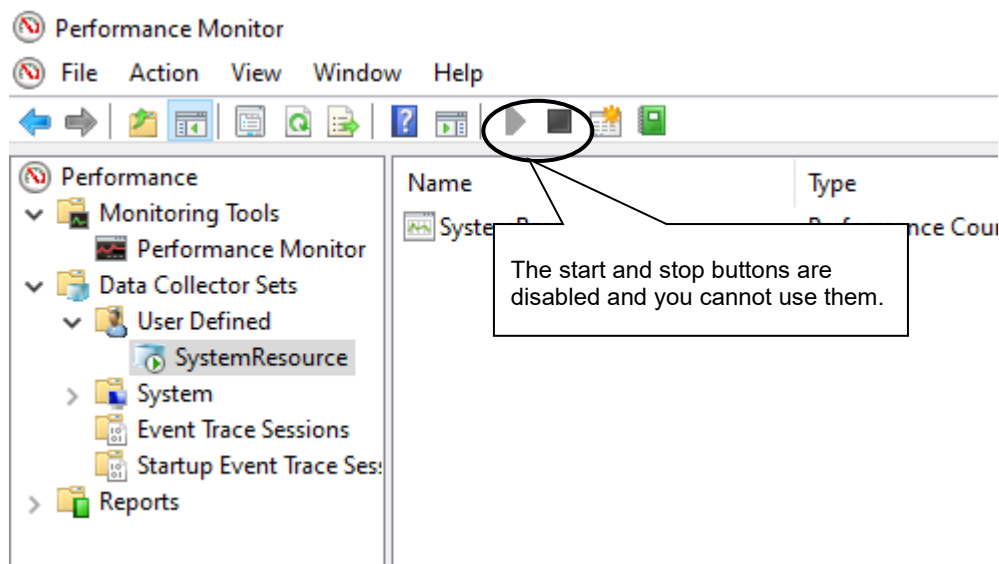
You might not be able to start data collection from performance counters when the system load is high. After you start data collection from performance counters, confirm that the status of the data collector set being used is

Running.

Confirm that data collection from performance counters has started properly.

Also note that if the system load is high or if you repeatedly start and stop data collection from performance counters, sometimes you become unable to start or stop data collection.

If this case, terminate Performance Monitor, wait for a while, restart Performance Monitor, and then start data collection again.



Operations for collecting data from performance counters cannot be performed.

If you still cannot start data collection from performance counters even after you have restarted Performance Monitor, restart the OS.

9.6 Digital LED status indicator

The digital LED status indicator displays POST codes during system startup (during the period from BIOS start to OS start). This indicator also displays a hardware status code when an error occurs on the hardware during system operation.

The digital LED status indicator and a status identification LED might remain lit even after the equipment is shut down and placed in standby mode. This state remains until the main power is shut down or the power is turned on again.

Note that the digital LED status indicator might display a code even when there is no error.

For example, 1F is displayed while the BIOS setup menu is started, and POST codes are displayed since power is supplied until OS is started.

The digital indicator displays hexadecimal numbers (0 to F) using seven-segment representation as follows:



9.6.1 POST messages

Power On Self Test (POST) is a feature whereby the system BIOS makes routine checks for hardware failures when the power of the computer system is turned on. If any failure is found, the POST code (corresponding to failure location) is displayed on the digital LED status indicator on the front of the equipment. The user is then notified via a message on the display or a beep sounding several times.

The digital LED status indicator displays a POST code when the orange status identification LED (BIOS status lamp) turns on.

The following table shows the POST codes that are displayed when the system stops during startup and the respective actions for resolving them.

Table 9-5 POST codes, reasons for stopping, and actions (1/3)

POST code	Reasons for stopping and actions	Suspected Component	Actions
98	There might be a problem with the keyboard or mouse	Keyboard Mouse Motherboard	1. See section 9.2.3 (15) USB devices are not recognized or not working.
1D~31 3F~4E 50~55	There might be a problem with the main memory.	Main Memory Motherboard	1. Reseat the memory and ensure it is properly installed. 2. If the issue persists, contact your system administrator or maintenance personnel.

Table 9-5 POST codes, reasons for stopping, and actions (2/3)

POST code	Reasons for stopping and actions	Suspected Component	Actions
97	The video feature is not working properly.	Motherboard	1. If a video board is installed in an expansion slot, check that it is properly seated. 2. If the issue persists, replacing the video board is recommended.
91~96	There might be a problem with an extension board.	Expansion Board Riser Board Motherboard	1. Remove and reinstall the expansion board, then check its operation.
99	There might be a problem with a serial device.	Expansion Board Riser Board Motherboard	Remove and reinstall the expansion board, then check its operation.
9A~9D	There might be a problem with a USB device.	Motherboard	1. Reseat the USB device and ensure it is properly connected. 2. Try connecting the USB device to another port. If the issue is resolved, contact your system administrator or maintenance personnel. 3. If the issue persists after steps 1. and 2, the USB device may be faulty.
56~5A	The CPU may be faulty.	Motherboard	Replace the motherboard.
90	There may be a problem with the boot device.	HDD/SSD Motherboard	1. Reseat the boot device and ensure it is properly installed. 2. Try connecting the boot device to a different port. If the issue is resolved, contact your system administrator or maintenance personnel. 3. If the issue persists after step 1. and 2., the boot device may be faulty.
			If the boot device is an internal HDD/SSD: 1. Reseat the HDD/SSD and ensure it is properly installed.

Table 9-5 POST codes, reasons for stopping, and actions (3/3)

POST code	Reasons for stopping and actions	Suspected Component	Actions
E1	The rotation of system fan is abnormal	Keyboard Mouse Motherboard	Read the description of fan failure in section 9.2.3 (1) and take action accordingly.
E2	The rotation of CPU fan is abnormal	Main Memory Motherboard	Read the description of fan failure in section 9.2.3 (1) and take action accordingly.
E3	The rotation of Power supply fan is abnormal	Power supply	Read the description of fan failure in section 9.2.3(1) and take action accordingly.

9.6.2 Display of hardware status codes

A hardware status code is displayed when a hardware status becomes abnormal during system operation.

The digital LED status indicator displays a hardware status code when the red status identification LED (RAS status lamp) turns on.

Table 9-6 Hardware status codes, related causes, and actions

Status code	Cause	Action
11	The rotation of the power supply fan is abnormal.	Read the description of fan failure in section 9.2.3 (1) and take action accordingly.
12	System fan rotation is abnormal.	
13	CPU fan rotation is abnormal.	
21	Temperature is abnormal.	Read the description of abnormal temperature in section 9.2.3 (1) and take action accordingly.
31	SMART predicted failure of the drive in drive bay 1.	We recommend that you back up the data and replace the drive.
32	SMART predicted failure of the drive in drive bay 2.	
41 ^{#1}	The drive in drive bay 1 is offline.	See section 10.4.2 Recovery in the case where either drive failed and replace the drive.
42 ^{#1}	The drive in drive bay 2 is offline.	
4C	The RAID status is unknown. (The RAS software cannot acquire the RAID status.)	Contact the system administrator or maintenance personnel.
4D ^{#2}	A media error occurred on the RAID array.	See section 2.8.2 Note about media errors in the <i>HF-W2000 Model 68/65 RAS FEATURES MANUAL</i> (WIN-63-0102) and take action accordingly.

#1: This code remains displayed during rebuilding.

#2: This code is not displayed when you are using the default settings. For details about displaying this code, see section 5.3 (3) Switching whether to send notifications in the event of media errors (by specifying the /NOTIFY option) in the *HF-W2000 Model 68/65 RAS FEATURES MANUAL* (WIN-63-0102).

NOTE

If a code that is not listed in the preceding table is displayed, contact the system administrator or maintenance personnel.

Chapter 10 Software RAID1

10.1 Overview of software RAID1

10.1.1 What is software RAID1?

This chapter describes how to manage the software RAID1 feature of the B and T models.

In this chapter, *this equipment* denotes either the B model or the T model. Note that the drives used for this equipment are either hard disk drives (HDDs) or solid-state drives (SSDs). The term *drive* in this chapter refers to an HDD or SSD. Also note that *software RAID1* is hereinafter abbreviated to *RAID1* in this chapter.

The screenshots shown in this chapter are based on Windows® 10, but the displayed content is essentially the same in other OSs. The models and the capacities of drives might be different from those in actual implementations.

NOTICE

- Although this equipment features RAID1 and is thus more reliable than general systems, it is still vulnerable to some kinds of failure that causes the loss of data stored on the drives. Data loss is caused not only by mechanical failures, but also by unexpected power failures or operational errors. Data lost due to such causes cannot be restored. To prevent such data loss, schedule data backup operations as routine tasks. In addition, protect the power source from undesirable interruptions by using a UPS or other means.
- This equipment is evaluated assuming the use of the specific drive models authorized by the manufacturer. Replace drives by using only the specific items specified by the manufacturer. Failure to do so might result in existing data on the drive being lost. In addition, always observe the recommended replacement interval for drives (see *Appendix Handling of replaceable components*).
- Each unit of equipment has its own RAID1 configuration information (such as a serial number). Therefore, you cannot use drives by swapping them even between two different units of this equipment. If you attempt to do so, unexpected operation might result from inconsistencies in the configuration information or other reasons.
- Do not use a drive previously used in any model as a replacement drive. If you do, this equipment might not operate properly, or the data on the drives might be lost because of configuration information discrepancies or other reasons.
- For a replacement drive, use a brand-new (unused) drive or an initialized drive (see *10.6.7 Drive initialization feature*).
- Maintaining a RAID1 system requires a high level of expertise. User error might cause loss of data on drives.
- Make sure that drives installed in drive bays 1 and 2 have the same capacity. Do not install drives that have different capacities.

10. Software RAID1

RAID1 (Redundant Array of Inexpensive Disks Level 1) is a technology generally referred to as *disk mirroring*. RAID1 does not use a RAID controller (hardware) to implement disk mirroring, and instead uses software to construct a system where a pair of drives are managed as a single system (array). Should one drive fail, the correct data can be read from the other drive. Although RAID1 uses two drives, available capacity is only that of one drive.

10.1.2 Features of RAID1

The RAID1 adopted by this equipment provides the following features:

Hot swap

This equipment supports hot swap (replacement of a drive with the power turned on), which makes it possible to replace drives without stopping the system.

Rebuilding feature

After the drives are replaced, the RAID1 array needs to be rebuilt. A user can perform manual rebuilding (via command) or configure this equipment to initiate rebuilding automatically after drives are replaced. The user can also change the load level of writing data to the drives during the rebuilding. These settings can be changed by using the RAS software. For details about how to change these settings, see *5.3 RAID configuration control command (raidctrl) (B/T model only)* in the *HF-W2000 Model 68/65 RAS FEATURES MANUAL (WIN-63-0102)*.

GUI features

This equipment can graphically display the drive status of the RAID1 array by using the RAS software. For details about how to use the RAS software, see *4.1 Hardware status window* in the *HF-W2000 Model 68/65 RAS FEATURES MANUAL (WIN-63-0102)*.

Offline rebuilding feature

This equipment provides a special tool that can be used to rebuild the RAID1 array while the OS is not running. This tool can restore the system faster because the rebuilding while the OS is not running requires a shorter time than the rebuilding while the OS is running.

10.2 Setup

10.2.1 Overview of setup

The RAID1 device driver that achieves RAID1 redundancy of this equipment implements drive mirroring by making the OS recognize the connected two drives as a single drive. The RAID1 device driver is factory-installed before shipment. Therefore, you do not need to install it when you set up a RAID1 array.

10.2.2 Newly setting up a RAID1 array

Before newly setting up a RAID1 array, you need to restore the system to factory settings by using the recovery DVD. For details about how to restore the factory settings, see *Chapter 7 Restoring the factory-default settings by using a recovery DVD*.

10.3 Checking the status of the RAID1 array

10.3.1 Checking by using status indication lamps

As shown in the following figure, this equipment has drive status lamps (DRIVE1 and DRIVE2 lamps), which indicate the statuses of the drives (HDDs or SSDs) that make up the RAID1 array.

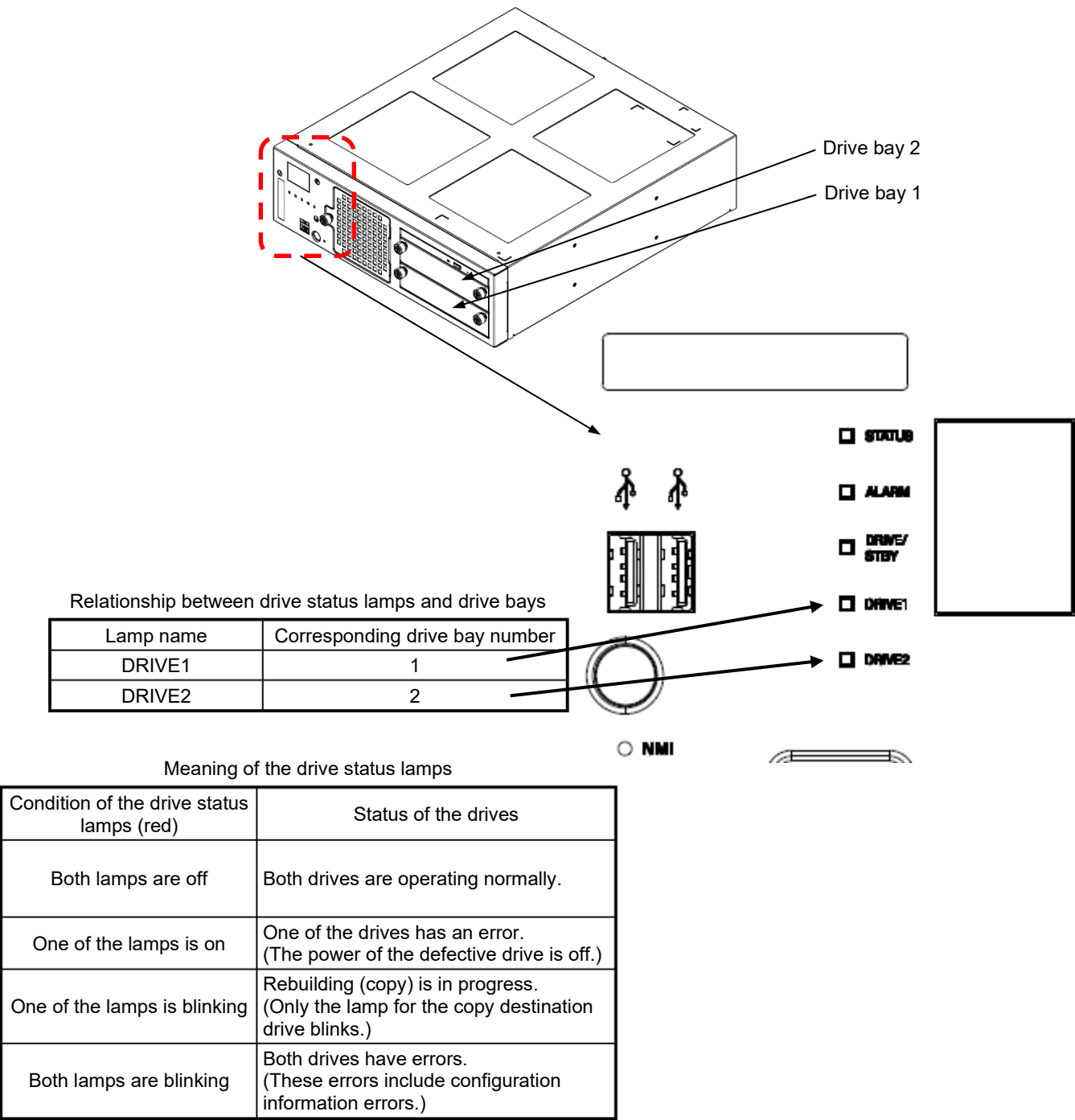


Figure 10-1 Drive status lamps

10.3.2 Checking by using the Hardware status window

In this equipment, you can use the Hardware status window to check the statuses of the drives that make up the RAID1 array. To open the Hardware status window, double-click the hardware status icon in the notification area on the taskbar.



Note: This icon is not shown in the notification area on the taskbar by default. The icon appears when you click the up arrow (^) icon beside the notification area.

You can also specify settings to show the icon in the notification area of the taskbar by using the following procedure:

1. Right-click on the taskbar.
2. In the menu that appears, click **Taskbar settings**.
3. Click **Select which icons appears on the taskbar**.

< Windows® 11 and Windows Server® 2025 >

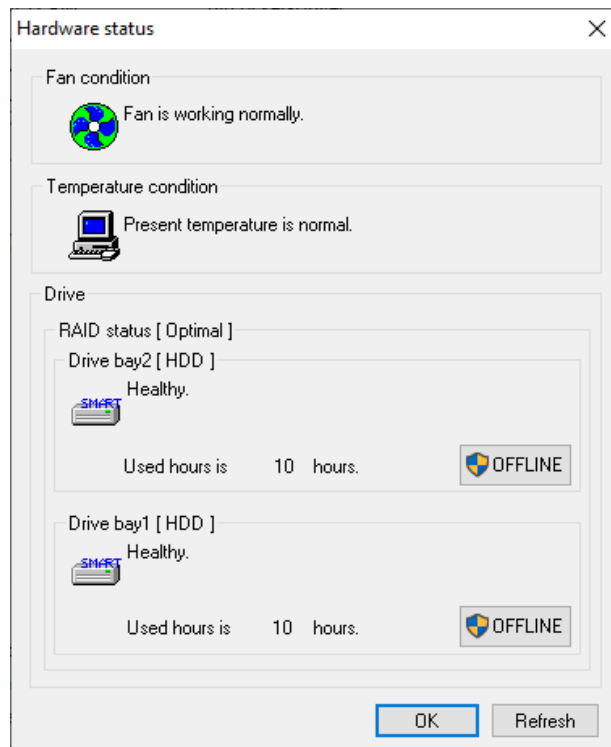
Click **Other system tray icons**.

4. Set the icon for **envdisp MFC Application** to on.



The following figure is an example of the window displayed when both drives are operating normally.

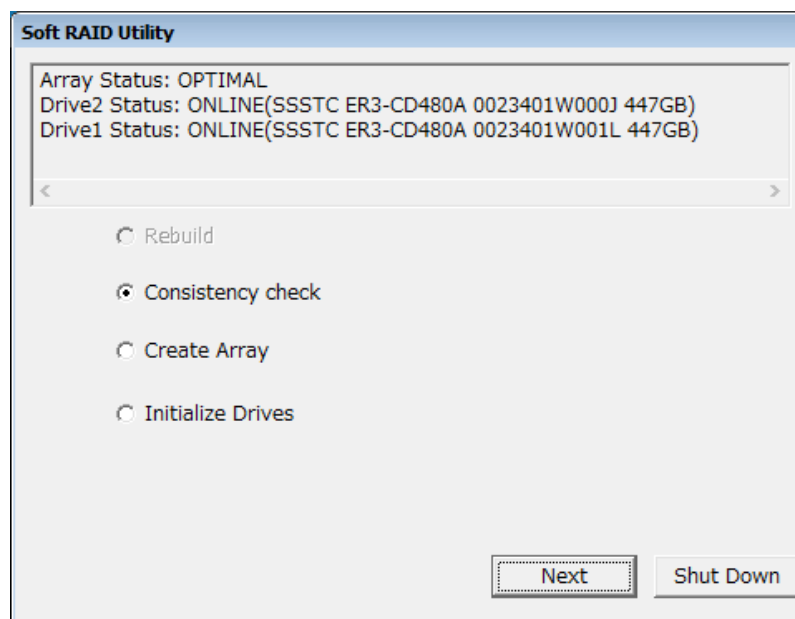
Hardware status window



Note: In the RAS software, HDDs, SSDs, and other auxiliary storage devices are generally called *drives*.

10.3.3 Checking by using the software RAID utility

This equipment provides a software RAID utility, which you can use to check the status of the RAID array. For details about how to use the software RAID utility, see *10.6 Software RAID utility*.



10.4 Recovering from a failure

10.4.1 Detecting a failure

Upon detection of a RAID1-related failure, this equipment executes the actions listed in the following table.

Table 10-1 List of actions executed upon detection of a RAID1-related failure

No.	Action	Cause
1	Turns on either or both of the drive status lamps (red).	Drive failure (on either or both of the drives)
2	Displays a code on the digital LED status indicator. (See 9.6.1 <i>POST messages</i> and the <i>HF-W2000 Model 68/65 RAS FEATURES MANUAL</i> .)	
3	Turns on the ALARM lamp (red).	Drive failure on either drive
4	Closes the external contact for MCALL (maintenance personnel call signal). (See 5.8.2 <i>External contact specifications</i> .)	
5	Uses the event log to record data. (See 9.4 <i>Event log</i> .)	
6	Displays the drive status of the RAID1 array in the Hardware status window. (See 4.1.3 <i>Hardware status window</i> in the <i>HF-W2000 Model 68/65 RAS FEATURES MANUAL</i> (WIN-63-0102).)	

NOTE

- Upon detecting a RAID1-related failure, this equipment enters degraded mode, in which system operation will use only one drive. When you start up this equipment for the first time in degraded mode, the OS might be restarted to ensure that the OS is not booted from the defective drive.

The following describes how to recover from each type of failure and how to handle problems that occur during recovery work.

10.4.2 Recovery in the case where either drive failed

NOTICE

- Never remove a drive when the drive status lamp for the drive is off. Doing so might corrupt the data stored on the drive.
- When replacing a drive, wear cotton gloves to prevent problems caused by static electricity. Failure to do so might result in corruption of the data stored on the drive.
- Verify correct procedures before starting work. Failure to follow the correct procedures might result in loss of data stored on a drive.
- Do not use a drive previously used in any model as a replacement drive. If you do, this equipment might not operate properly, or the data on the drives might be lost because of configuration information discrepancies or other reasons.
- Install drives securely. Loose contacts or missing screws might result in failure.
- During replacement, do not subject a drive that you are replacing or a drive that is already installed to excessive shock. Subjecting a drive to excessive shock might result in drive failure.
- Until rebuilding is complete, avoid shutting off the power to this equipment or installing and removing drives. Performing these actions might result in data on the drives being lost or a failure.

To recover from a failure on either drive, perform the procedure described later.

To perform recovery by using a backup drive, see *10.5.2 Recovery by using a backup drive*.

(1) Case in which you perform rebuilding while the OS is running**NOTE**

- This equipment allows for change of data-write load level on drives during rebuilding. Before changing the load level, consider the effect on system operations during the rebuilding. The factory setting is HIGH, which enables rebuild processing with a high load. Specifying a lower writing load level results in longer rebuilding time. The following are guidelines for the time required for rebuilding.

Level setting	B model	T model
HIGH	2 hours	45 minutes
MIDDLE	5 hours and 45 minutes	2 hours and 30 minutes
LOW	9 hours and 10 minutes	4 hours and 30 minutes

For details about changing the factory settings, see *5.3 RAID configuration control command (raidctrl) (B/T model only)* in the *HF-W2000 Model 68/65 RAS FEATURES MANUAL (WIN-63-0102)*.

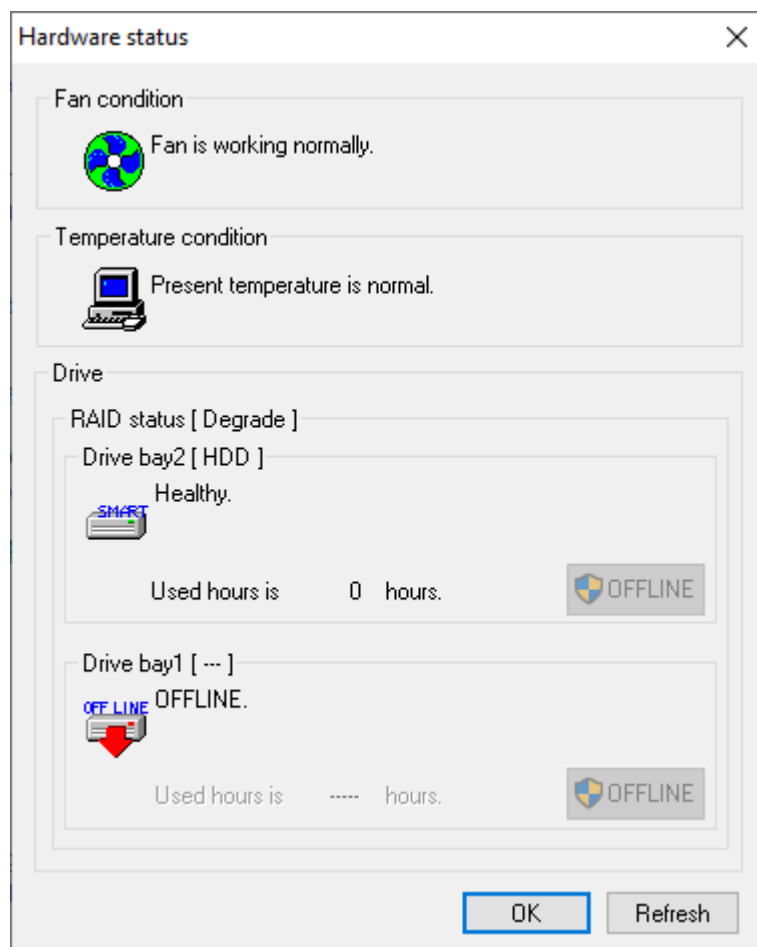
10. Software RAID1

(a) If you replace a drive while the power to this equipment is on

1. Back up the data.
(See (2) *Backing up files in 4. Hard disk drives (HDDs) and solid state drives (SSDs) in Precautions.*)
2. Close all running applications.
3. In the notification area on the taskbar, double-click the hardware status icon to open the Hardware status window. In the Hardware status window, check for defective drives.



Hardware status window



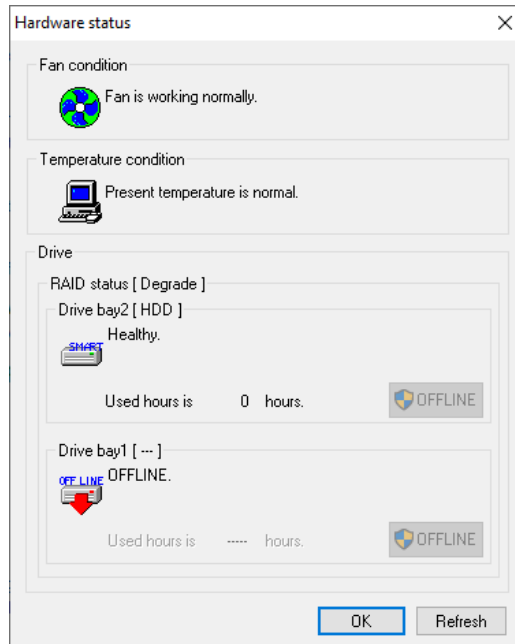
Confirm that the DRIVE1 lamp is on.

Note that it might take tens of seconds before the DRIVE1 lamp turns on.

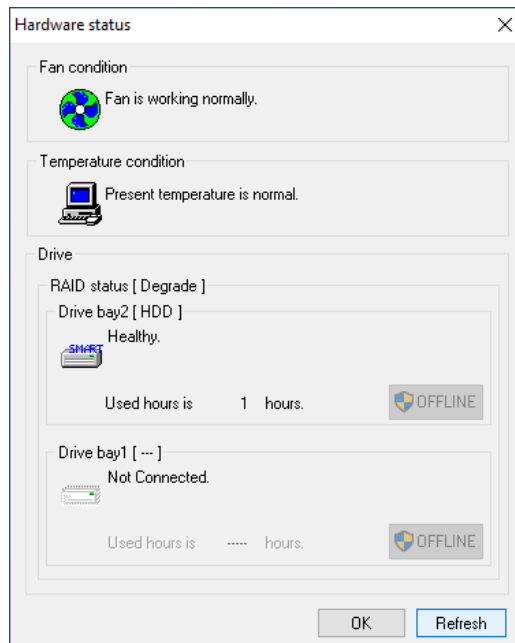
4. Remove the defective drive from this equipment.
(See 6.4.6 *Installing and removing an HDD or SSD.*)

5. In the Hardware status window, click **Refresh**, and then check whether *Not Connected* is displayed as the drive status of the drive bay from which you removed the defective drive. If *Not Connected* is not displayed, wait a while, and then click **Refresh** again. Repeat this operation until *Not Connected* appears.

Hardware status window



Click **Refresh**.



NOTE

- If you install a replacement drive on this equipment before *Not Connected* appears, the drive might not be recognized. Always wait until *Not Connected* appears.

6. Install the replacement drive on this equipment.

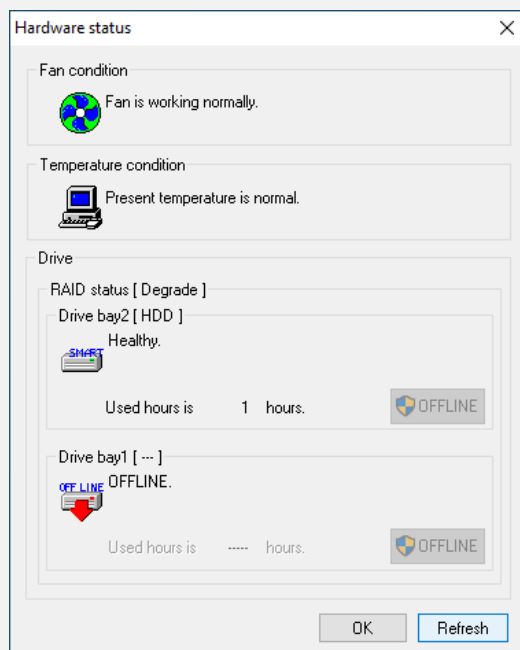
(See 6.4.6 *Installing and removing an HDD or SSD*.)

After a while, the drive status lamp for the drive bay containing the replacement drive begins to blink and rebuilding of the RAID1 array starts.

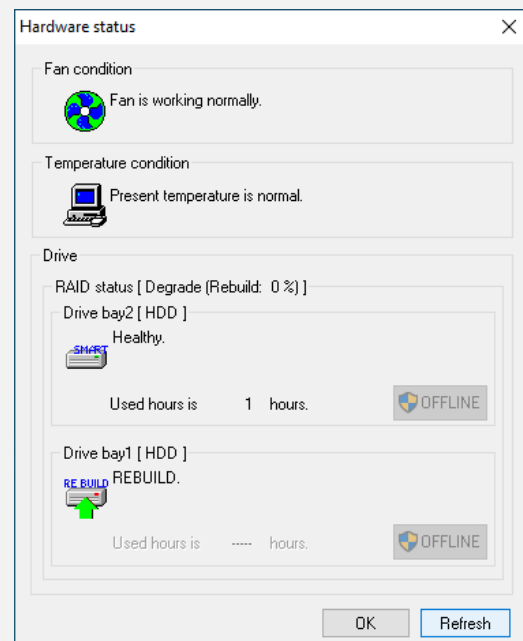
NOTE

- If rebuilding does not start after about three minutes, a drive or this equipment might be defective, or the replacement drive you installed was used in the RAID1 array of other equipment. See 10.4.3 *When a problem occurs during recovery*.
- After the drive has been installed on this equipment, the drive bay status in the Hardware status window is as follows until rebuilding is complete.

Note that the status *OFFLINE* sometimes does not appear even immediately after the drive is installed.



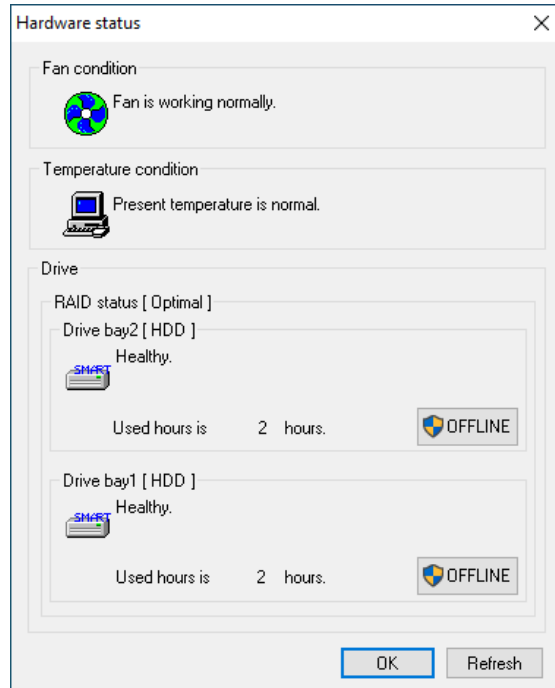
Immediately after the drive is installed



Rebuilding in progress

7. When rebuilding is complete, the drive status lamp turns off and the RAID1 array is restored. In the Hardware status window, click **Refresh**. Then, confirm that *Optimal* is displayed as the RAID status and *Healthy* is displayed as the drive status of the drive bay where the drive was replaced.

Hardware status window (normal condition)



NOTE

- After rebuilding is complete, if *Optimal (Media Error)* is displayed as the RAID status, we recommend that you back up the data and then replace the copy-source drive with a new one. (For the replacement procedure, see 6.4.6 *Installing and removing an HDD or SSD*.)

After replacing both drives, set up this equipment again, and then restore data from a backup file. (For details about how to set up this equipment again, see 10.2.2 *Newly setting up a RAID1 array*.)

Alternatively, recover this equipment by using a backup drive. (See 10.5.2 *Recovery by using a backup drive*.)

Hardware status window (when there is a media error)



(b) If you replace a drive while the power to this equipment is off

1. Back up the data.
(See (2) *Backing up files* in 4. *Hard disk drives (HDDs) and solid state drives (SSDs)* in *Precautions*.)
2. Shut down the OS and unplug the power cord. Wait for at least one minute, and then replace the defective drive with a new one.
(See 6.4.6 *Installing and removing an HDD or SSD*.)
3. Turn on the power to this equipment. When the OS is started, the system automatically detects that the replacement drive has been installed and starts rebuilding. Confirm that the drive status lamp for the replaced drive is blinking.
4. When the drive status lamp turns off, rebuilding is complete. In the Hardware status window, confirm that both drives are *Healthy*.

NOTE

- After rebuilding is complete, if *Optimal (Media Error)* is displayed as the RAID status, we recommend that you back up the data and then replace the copy-source drive with a new one. (For the replacement procedure, see 6.4.6 *Installing and removing an HDD or SSD*.)

After replacing both drives, set up this equipment again, and then restore data from a backup file. (For details about how to set up this equipment again, see 10.2.2 *Newly setting up a RAID1 array*.)

Alternatively, recover this equipment by using a backup drive. (See 10.5.2 *Recovery by using a backup drive*.)

(2) Case in which you perform rebuilding while the OS is not running

NOTE

- If you perform rebuilding while the OS is not running, use the following recovery DVD set:
*HITACHI HJ-206x-***B/T Product Recovery DVD* Prepare this DVD before starting your work.
(The text indicated by the underlined asterisks (***) in the name of the DVD varies depending on the equipment you are using.)

1. Back up the data.
(See (2) *Backing up files* in 4. *Hard disk drives (HDDs) and solid state drives (SSDs)* in *Precautions*.)
2. Shut down the OS and unplug the power cord. Wait for at least one minute, and then replace the defective drive with a new one.
(See 6.4.6 *Installing and removing an HDD or SSD*.)
3. Use the software RAID utility to perform rebuilding. For details, see 10.6.2 *Starting and exiting the software RAID utility* and 10.6.4 *Rebuilding feature*.
4. After rebuilding is complete, start the OS, and then confirm that both drives appear as *Healthy* in the Hardware status window.

10.4.3 When a problem occurs during recovery

(1) Rebuilding does not start

RAID1 does not detect that a drive has been connected or settings are specified so that rebuilding is started manually.

Alternatively, a drive that was used in another system has been installed as the replacement drive.

1. In the Hardware status window, check whether *OFFLINE* is displayed as the status of the installed drive. If you have installed a replacement drive before *Not Connected* is displayed as the drive status, remove the drive, and then wait until *Not Connected* is displayed. Then, install the replacement drive again.
2. Check whether a RAID1-related event (event ID: 3001, source: HTsfRaid_SYS) has been recorded in the **System** category of the event log. If this event has been recorded in the event log, take action as follows according to the cause code given in the event log:

- If the cause code is 0x0504310n (n: numeric value)

A drive that was used for a RAID1 array might be installed. Check whether a defective drive is installed. If a drive that was used as a backup drive has been installed, initialize the drive as described in *10.4.5 Recovering a normal drive that was set to offline by mistake*, and then restart recovery.

- If the cause code is not 0x0504310n (n: numeric value)

Access to the installed drive might have failed. Check whether the drive is healthy.

(2) A blue screen (0x9502) is shown during OS startup after drive replacement

The new drive that you installed might be a drive that was used in the RAID1 array of other equipment. Use a brand-new or initialized drive.

10.4.4 Recovery in the case where both drives failed

Replace both drives, set up this equipment again (see *10.2.2 Newly setting up a RAID1 array*), and then restore the data from a backup file.

Alternatively, recover this equipment by using a backup drive. (See *10.5.2 Recovery by using a backup drive.*)

10.4.5 Recovering a normal drive that was set to offline by mistake

In this equipment, drives that are set to offline (hereinafter referred to as *offline drives*) are kept track of by RAID1 and can no longer be reused in normal cases.

The exceptional case is when a normal drive is set to offline by a user inadvertently or by the RAS software for equipment evaluation purposes. In such a case, the offline drive can be used as a new drive again by applying the offline drive recovery method described later.

NOTICE

- If you apply the offline drive recovery method to a drive that was set to offline by a means other than the RAS software, the drive might not be recovered, or might not work properly after recovery.
- Use the offline drive recovery method only for evaluation of this equipment. If you apply the offline drive recovery method to equipment actually used in the field (for example, a system in normal operation), malfunction such as data loss might result.
- A drive automatically set to offline by this equipment might have failed. Do not apply the offline drive recovery method to such a drive.
- A drive recovered by using the offline drive recovery method must not be used for equipment actually used in the field. If such a drive is used for equipment actually used in the field, problems such as data loss might result.

1. Shut down the OS and unplug the power cord of this equipment. Wait for at least one minute, and then remove the normal drive. Note down the number of the drive bay from which the drive was removed.
2. Make sure that only the offline drive is installed on this equipment.
3. Use the software RAID utility to initialize the offline drive. For details, see *10.6.2 Starting and exiting the software RAID utility* and *10.6.7 Drive initialization feature*.
4. Wait for about one minute, and then install the offline drive and the normal drive (the drive you removed in step 1) in the original drive bay. (Check the recorded drive bay number to ensure that the installation location is correct.)

The offline drive can now be used as a new drive again.

10.5 Preventive maintenance

10.5.1 Creating a backup drive

NOTICE
<ul style="list-style-type: none">• When replacing a drive, wear cotton gloves to prevent damage from static electricity. Failure to do so might result in corruption of the data stored on the drive.• Verify correct procedures before starting work. Failure to follow the correct procedures might result in loss of data stored on a drive.

RAID1 is more reliable compared to a system with a conventional configuration. Even so, the data stored on the drives might be lost due to human error or other reasons. If you create a backup drive, you can recover from such data losses. (Note that you can only restore to the point of the backup.) We recommend that you prepare a brand new or initialized drive for backup purposes, and use it to back up data periodically.

This section shows the procedure for creating a backup drive.

NOTE

- If you want to reuse a previously used backup drive as a replacement drive, you must initialize the drive. (See *10.6.7 Drive initialization feature*.)
- When replacing a drive (drive bay 1 in the following procedure), make sure the replacement drive is the same capacity.
- The following procedure assumes that drive bay 1 is used to create a backup drive. You can also use drive bay 2 to create a backup drive. In this case, consider *drive bay 1* as *drive bay 2*.

1. Shut down the OS and unplug the power cord of this equipment. Wait for at least one minute, and then replace the drive in drive bay 1 with a brand-new drive. (See *6.4.6 Installing and removing an HDD or SSD*.)
2. The drive you removed in the previous step becomes a backup drive. Keep it at hand.
3. Turn on power to this equipment. RAID1 then automatically detects that a brand-new drive has been installed and starts rebuilding the RAID1 array. Confirm that the DRIVE1 lamp is blinking.
4. The OS starts while the rebuilding continues. The time required for the rebuilding processing depends on what applications are running during this period.
If you use the software RAID utility, you can perform the rebuilding while the OS is not running.
5. When the DRIVE1 lamp turns off, the rebuilding is complete. In the Hardware status window, confirm that both drives are *Healthy*.

10.5.2 Recovery by using a backup drive

NOTICE

- When replacing a drive, wear cotton gloves to prevent problems caused by static electricity. Failure to do so might result in corruption of the data stored on the drive.
- Verify correct procedures before starting work. Failure to follow the correct procedures might result in loss of data stored on a drive.

Prepare a backup drive and a brand new or initialized drive.

Then, recover the array by performing the procedure shown later. For details about installing or removing a drive, see 6.4.6 *Installing and removing an HDD or SSD*.

NOTE

- The following procedure assumes that you install a backup drive in drive bay 1. You can also install a backup drive in drive bay 2. In this case, consider *drive bay 1* as *drive bay 2*.
- When preparing a brand new or initialized drive, make sure that its capacity is the same as the capacity of the backup drive. Do not install drives that have different capacities.

1. Shut down the OS and unplug the power cord of this equipment. Remove any installed drives.
2. Install a backup drive in drive bay 1 and install a brand new or initialized drive in drive bay 2.
3. Turn on power to the equipment. RAID1 then automatically detects a brand new or initialized drive, and starts rebuilding the RAID1 array. When rebuilding starts, the DRIVE2 lamp blinks.
4. The OS starts while the rebuilding processing continues. The time required for the rebuilding processing depends on what applications are running during this period.

If you use the software RAID utility, you can perform the rebuilding while the OS is not running.

5. When the DRIVE2 lamp turns off, the rebuilding is complete. In the Hardware status window, confirm that both drives are *Healthy*.

10.5.3 Periodically replacing drives

NOTICE

- When replacing a drive, wear cotton gloves to prevent damage from static electricity. Failure to do so might result in corruption of the data stored on the drive.
- Verify correct procedures before starting work. Failure to follow the correct procedures might result in loss of data stored on a drive.
- Do not use a drive previously used in any model as a replacement drive. If you do, this equipment might not operate properly, or the data on the drives might be lost because of configuration information discrepancies or other reasons.
- Do not replace both drives at the same time. Doing so might result in data corruption.
- Before you remove a drive for replacement, always make sure that the drive is set to offline in the Hardware status window. You might not be able to check the hardware status in some situations, such as when the OS has just started up. Do not replace a drive in such a situation. Doing so might result in a failure.

Replace the drives periodically before their life cycle expires. (For information about the recommended replacement cycle, see *Appendix Handling of replaceable components*.)

This section shows procedures for periodic replacement.

Note: The procedures in this section assume that you replace a drive installed in drive bay 1. If you replace a drive installed in drive bay 2, consider *drive bay 1* as *drive bay 2* and the *DRIVE1 lamp* as the *DRIVE2 lamp*.

(1) If you replace a drive while the power to this equipment is off

1. Back up the data.
2. Shut down the OS and unplug the power cord. Wait for at least one minute, and then replace the drive installed in drive bay 1 with the replacement drive.
(See 6.4.6 *Installing and removing an HDD or SSD*.)
3. Turn on power to this equipment. RAID1 then automatically detects that a replacement drive has been installed and starts rebuilding the RAID1 array. Confirm that the DRIVE1 lamp is blinking.
4. The OS starts while the rebuilding continues. The time required for the rebuilding processing depends on what applications are running during this period.
If you use the software RAID utility, you can perform the rebuilding while the OS is not running.
5. When the DRIVE1 lamp turns off, the rebuilding is complete. In the Hardware status window, confirm that both drives are *Healthy*.

(2) If you replace a drive while the power to this equipment is on

NOTE

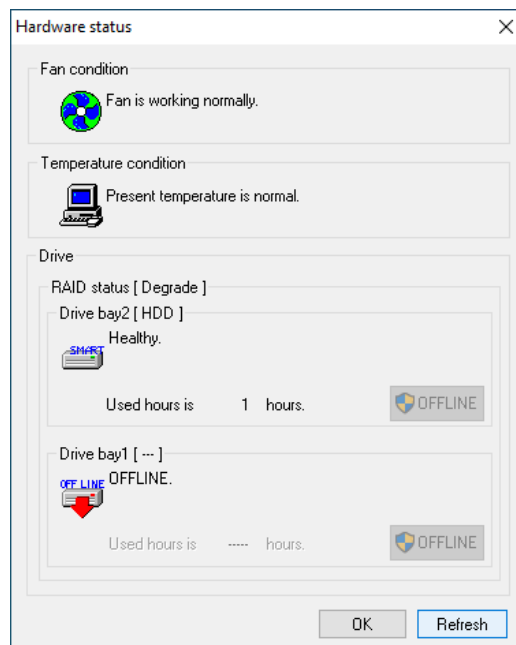
You need to have administrator privileges to execute step 3. Log on with an administrator account, and then click **OFFLINE**. If User Account Control (UAC) is enabled, click **Yes** in the confirmation message. When the User Account Control window appears, click **Continue**.

Note that if User Account Control (UAC) is disabled and a user without administrator privileges clicks **OFFLINE**, the drive is not disconnected.

1. Back up the data.
2. Close all running applications.
3. Double-click the hardware status icon in the notification area on the taskbar to open the Hardware status window. In the Hardware status window, under **Drive bay1**, click **OFFLINE** to place the drive in the offline state.



Hardware status window



Confirm that the DRIVE1 lamp is on.

Note that it might take tens of seconds before the DRIVE1 lamp turns on.

4. Rebuild the array by executing steps 4 to 7 in 10.4.2(1)(a) *If you replace a drive while the power to this equipment is on.*

10.5.4 Data matching

As a result of drive deterioration over time or another reason, defective blocks are generated that might cause some data on the drive to become unreadable. Potential failures in the rebuilding when recovering the system from degradation can be reduced by regularly performing drive matching (drive data consistency checks). Use the software RAID utility to perform drive matching. Perform drive matching by referring to *10.6.5 Consistency check feature*.

10.6 Software RAID utility

10.6.1 Overview

The software RAID utility can be used to check the status of the RAID1 array or rebuild the RAID1 array while the OS is not running. The software RAID utility is included as one of the recovery DVD features.

The software RAID utility provides the following features:

(1) RAID1 array status display feature

The RAID1 array status display feature displays the current status of the RAID1 array. The status of the RAID1 array is shown in the menu window displayed during startup of the software RAID utility.

(2) RAID1 array rebuilding feature

The RAID1 array rebuilding feature rebuilds the RAID1 array. Rebuilding is performed with the OS not running, and can be completed faster than rebuilding performed with the OS running. Use this feature when you do not want to run the OS or to reduce the maintenance time.

(3) Consistency check feature

The consistency check feature checks the consistency of the data in all areas of the drives in drive bay 1 and drive bay 2. Use this feature for periodic inspection to enhance the availability of the equipment.

(4) Array creation feature

The array creation feature allows the user to edit the RAID1 management information of drives, and create an array with two drives. You can use this feature when you restore data from a backup by using commercially available backup software.

(5) Drive initialization feature

The drive initialization feature initializes the configuration information of the drive that was used in a RAID1 array, effectively creating a new drive. You can use this feature in cases such as when you are reusing a drive that was used as a backup drive, and when you are reusing a normal drive that was manually set to offline by mistake.

10.6.2 Starting and exiting the software RAID utility

This section shows the procedures for starting and exiting the software RAID utility.

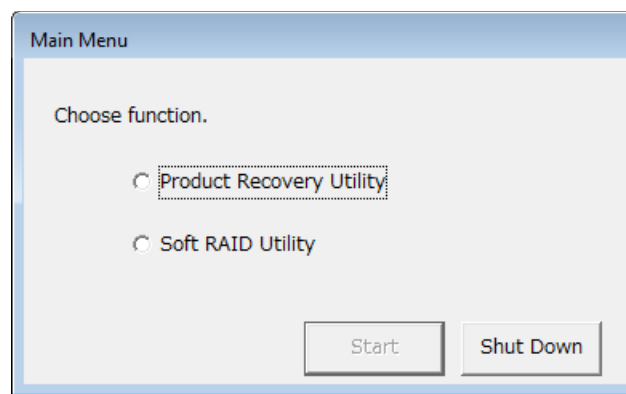
(1) Procedure for starting the utility

1. Prepare the following recovery DVD set that came with this equipment, turn on this equipment, and then set disc 1 (disc number: 1/2) in the DVD drive before the OS starts:

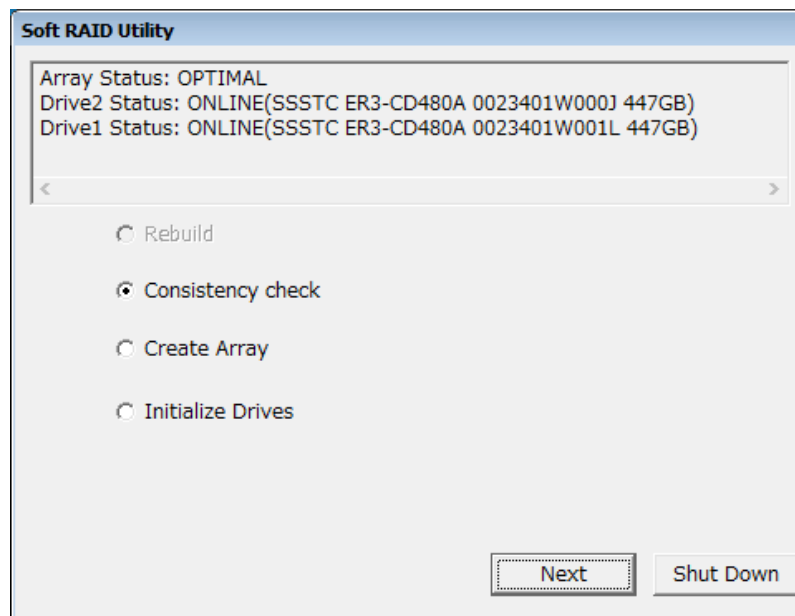
*HITACHI HJ-206x-***B/T Product Recovery DVD* (The text indicated by the underlined asterisks (***) in the DVD name varies depending on the equipment you are using.)

2. After the software RAID utility runs from the recovery DVD, the following window opens.

Note: If this utility fails to run from the recovery DVD, turn off this equipment, and then turn it on again.



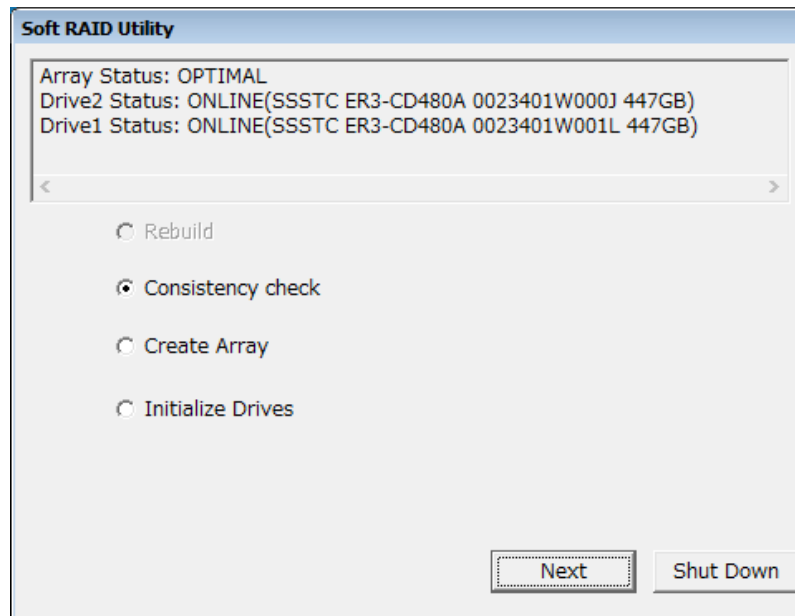
3. Select the **Soft RAID Utility** radio button, and then click **Start**. The Soft RAID Utility menu window opens.



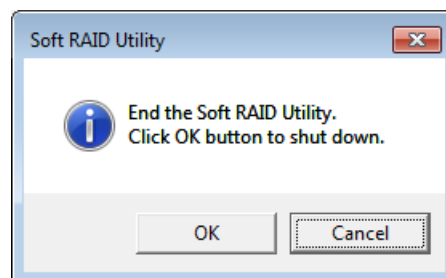
10. Software RAID1

(2) Procedure for exiting the utility

1. Display the Soft RAID Utility menu window.



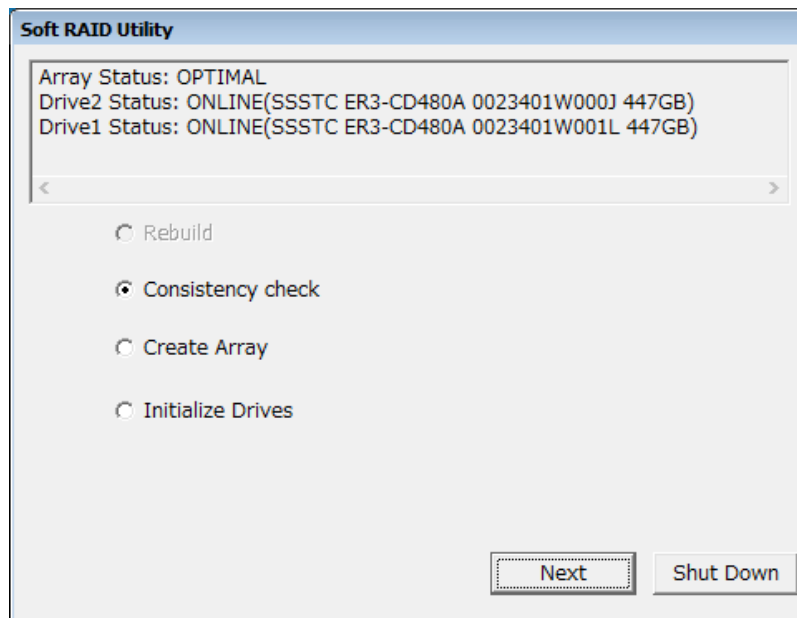
2. Click **Shut Down**. The following confirmation dialog box appears:



3. Click **OK**. The disc is ejected from the DVD drive, and then this equipment shuts down.

10.6.3 Status display feature

The status display feature displays the current status of the RAID1 array. The status of the RAID1 array is shown in the menu window displayed during startup of the software RAID utility.



This feature displays the information shown in the following table.

Table 10-2 Information displayed as the statuses of the array and drives

Item	Value	Meaning
Array Status	OPTIMAL	The array has redundancy and both drives are operating in <i>ONLINE</i> status.
	OPTIMAL (MEDIA ERROR)	The array status is <i>OPTIMAL</i> and a media error is present.
	DEGRADE	The array does not have redundancy and is operating in degraded mode. Only one of the drives is working in <i>ONLINE</i> status.
	DEGRADE (MEDIA ERROR)	The array status is <i>DEGRADE</i> and a media error is present.
	UNKNOWN	The array status is unknown. The statuses of the drives are unknown or no array has been built.
Drive1 Status Drive2 Status	ONLINE	The drive is operating normally.
	OFFLINE	The drive is unmounted because it is defective.
	NOT CONNECTED	No drive is installed in the drive bay.
	NEW	The drive is new and has never been used with the B/T model.
	REBUILD	Rebuilding of the array is in progress.
	ERROR	This is a drive that could not be accessed.

10.6.4 Rebuilding feature

The rebuilding feature rebuilds the RAID1 array. The rebuilding is performed with the OS not running and can therefore be completed faster than the rebuilding performed with the OS running. Use this feature when you do not want to run the OS or to reduce the maintenance time.

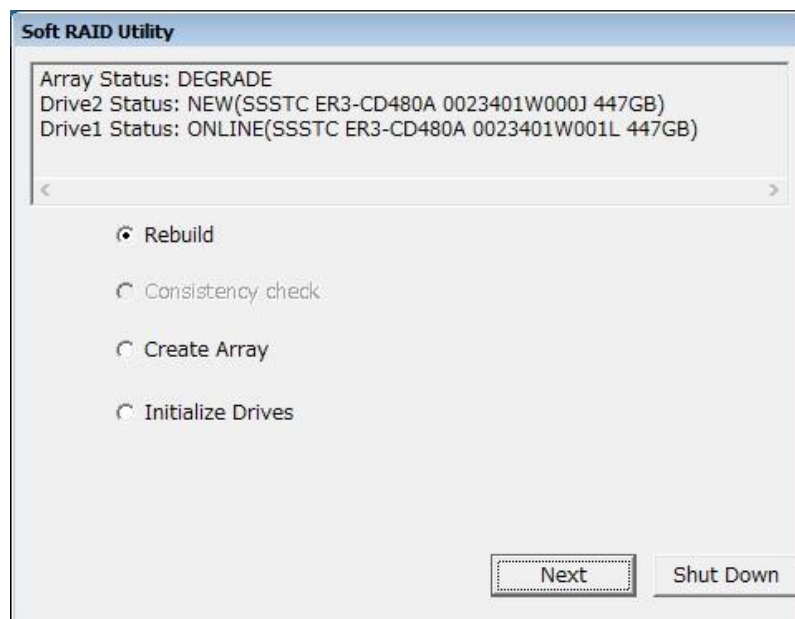
NOTE

- Before using this feature, complete other necessary work, such as replacing defective drives.
- Rebuilding can be performed only when one drive is in *ONLINE* status and the other drive is in *NEW* or *REBUILD* status. In other cases, you cannot perform the rebuilding. (You cannot even select this feature in the menu window.)
- If the rebuilding is aborted for any reason after it has started, any drives that were subject to the array rebuilding become no longer usable for rebuilding until you initialize them. When you initialize the drives, use the drive initialization feature. (See *10.6.7 Drive initialization feature*.) Attempting to restart this equipment with rebuilding aborted might result in the equipment failing to start or drive data being lost.
- The time required for the rebuilding processing to finish differs depending on the model. The following table shows the approximate required time for each model.

B model	T model
2 hours	45 minutes

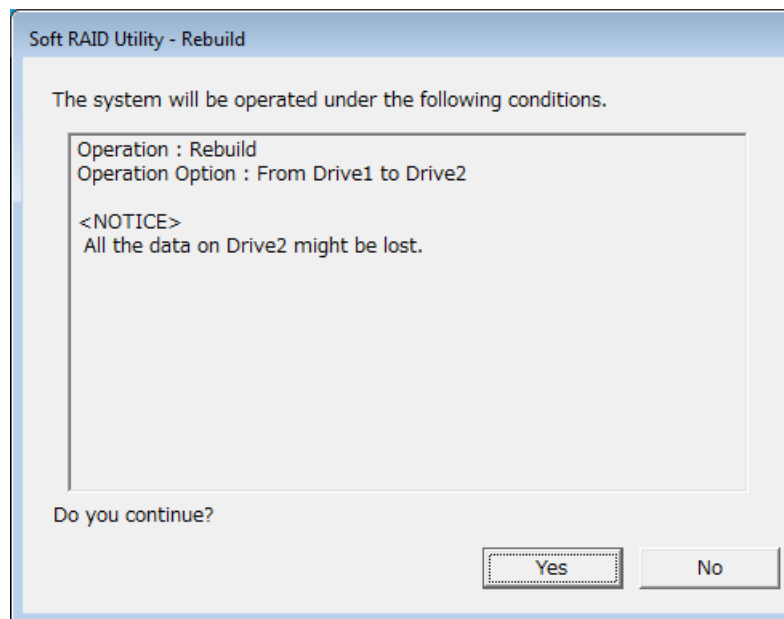
The following shows the procedure for using the rebuilding feature:

1. Use the procedure described in section 10.6.2(1) to display the Soft RAID Utility menu window.



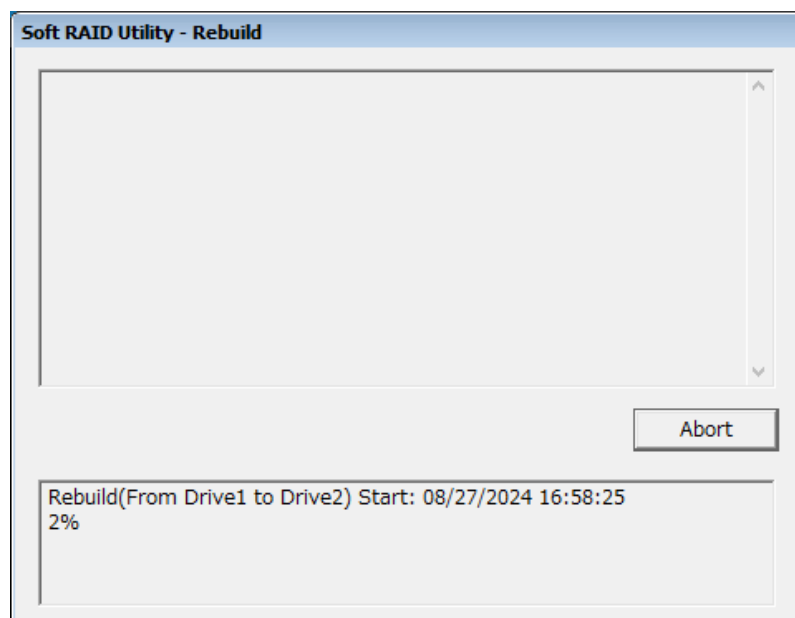
2. Select the **Rebuild** radio button, and then click **Next**. The execution confirmation window opens.

- Click **Yes** to start execution of the rebuilding feature.
- Click **No** to cancel execution of the rebuilding feature.



Clicking **No** redisplay the menu window.

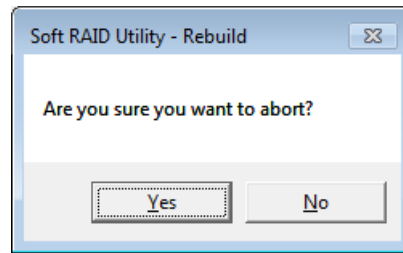
3. In the execution confirmation window, click **Yes**. Rebuilding starts and the progress is displayed.



10. Software RAID1

To abort rebuilding, click **Abort**. The following confirmation message box appears.

- To abort the processing, click **Yes**.
- To continue the processing, click **No**.



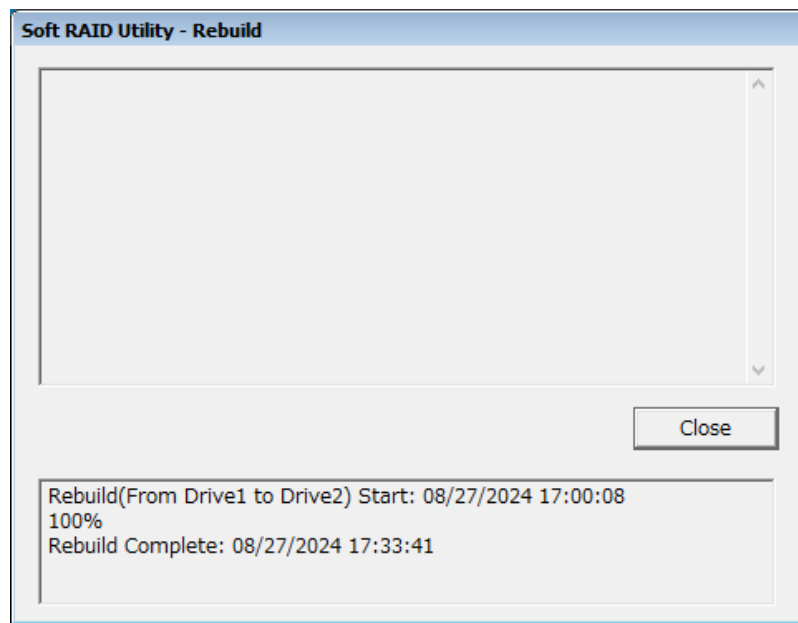
- If you click **Yes**, rebuilding is aborted and the following message appears:



Click **Close** to return to the menu window.

- If you click **No**, the rebuilding feature redisplay the window that shows the progress of processing.

4. When the rebuilding processing is complete, a rebuilding completion message appears.



Click **Close** to return to the menu window.

If an error message appears during the rebuilding, take action to correct the relevant error as described in *10.6.8 List of error messages*.

10.6.5 Consistency check feature

The consistency check feature checks the consistency of the data in all areas of the drives in drive bay 1 and drive bay 2. Use this feature for periodic inspection to enhance the availability of the equipment.

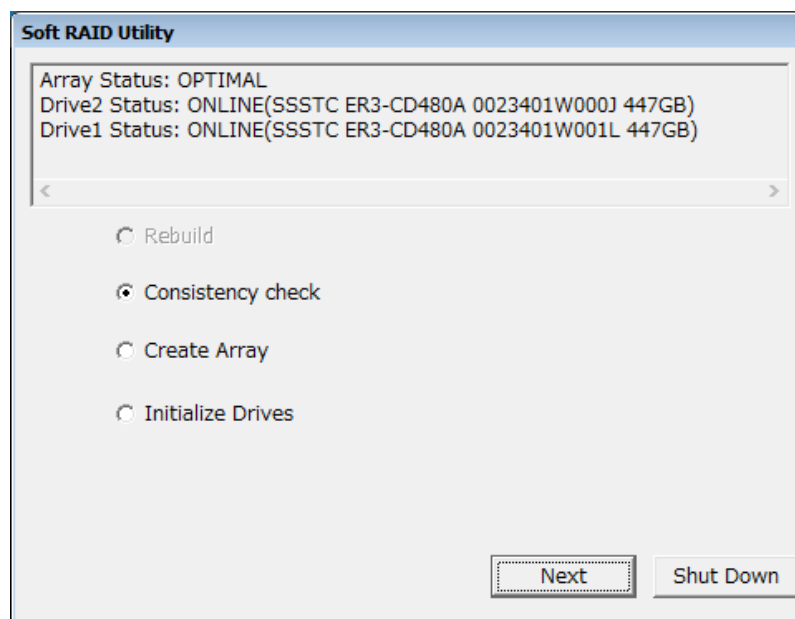
NOTE

- The consistency check feature can be performed only when both drives are in *ONLINE* status. In other cases, you cannot perform the consistency check. (The feature is not available in the menu window.)
- The time required for the consistency check to finish differs depending on the model. The following table shows the approximate required time for each model. Note that the consistency check takes more time if there are many data discrepancies and many sectors to be repaired.

B model	T model
2 hours	45 minutes

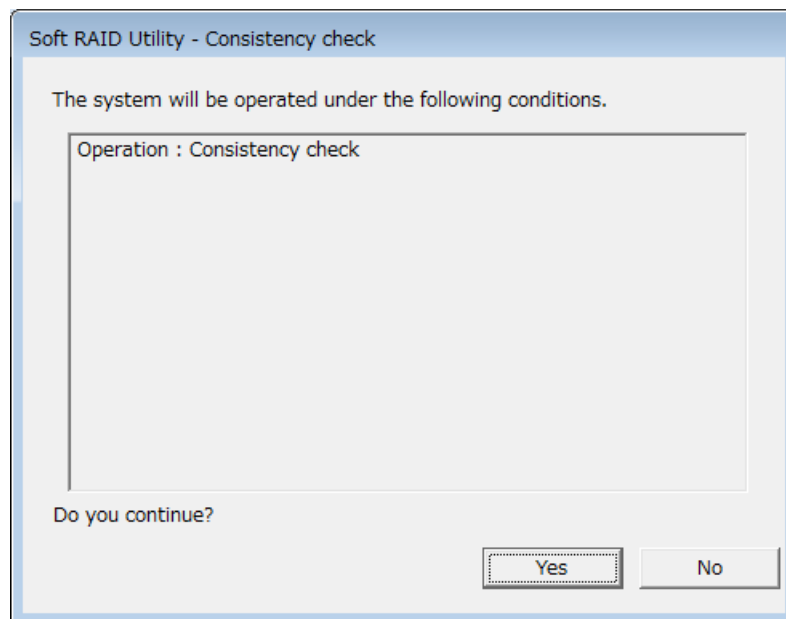
The following shows the procedure for using the consistency check feature:

1. Use the procedure described in section 10.6.2(1) to display the Soft RAID Utility menu window.



2. Select the **Consistency check** radio button, and then click **Next**. The execution confirmation window opens.

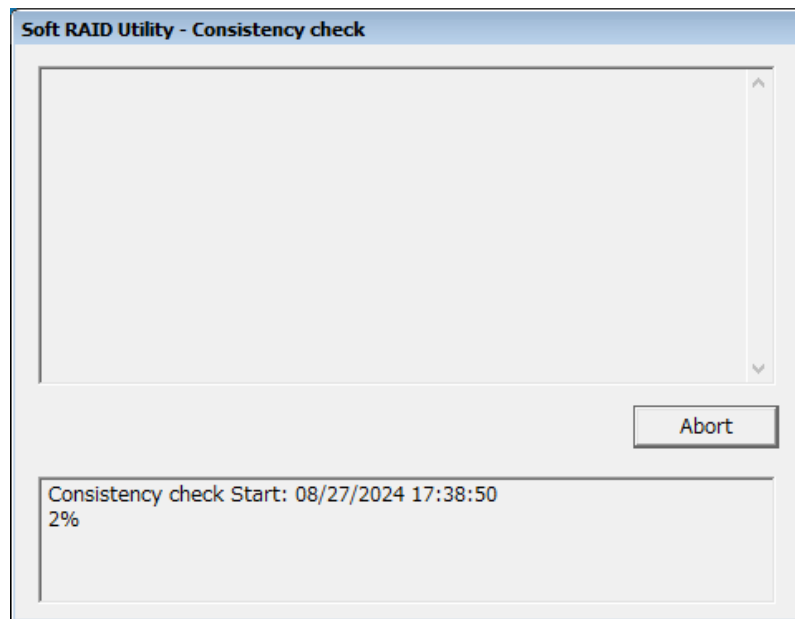
- Click **Yes** to start execution of the consistency check.
- Click **No** to cancel execution of the consistency check.



Clicking **No** redisplay the menu window.

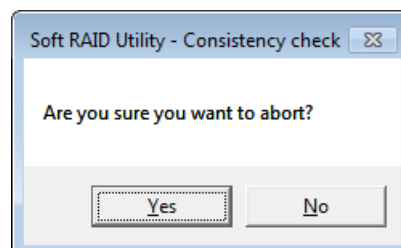
10. Software RAID1

3. In the execution confirmation window, click **Yes**. The consistency check feature is started and the progress of processing is displayed.

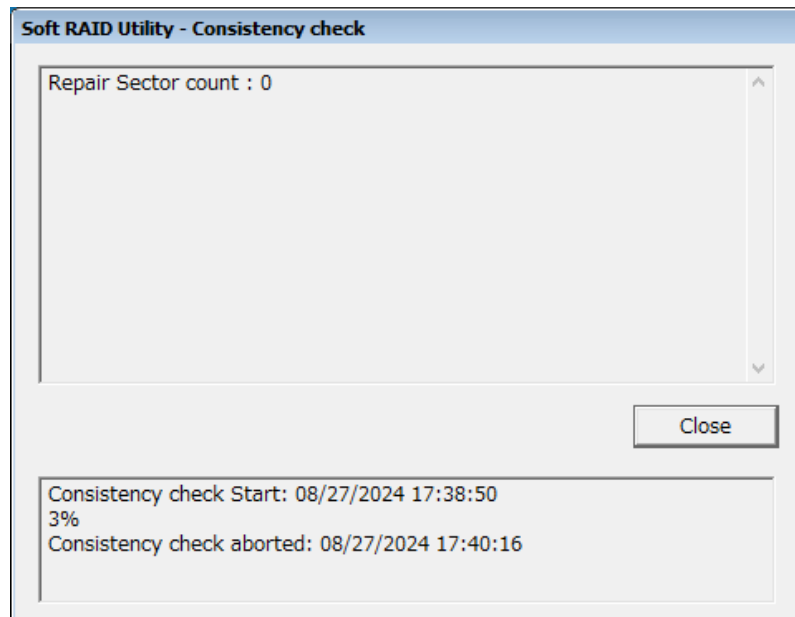


To abort consistency check processing, click **Abort**. The following confirmation message box appears.

- To abort the processing, click **Yes**.
- To continue the processing, click **No**.

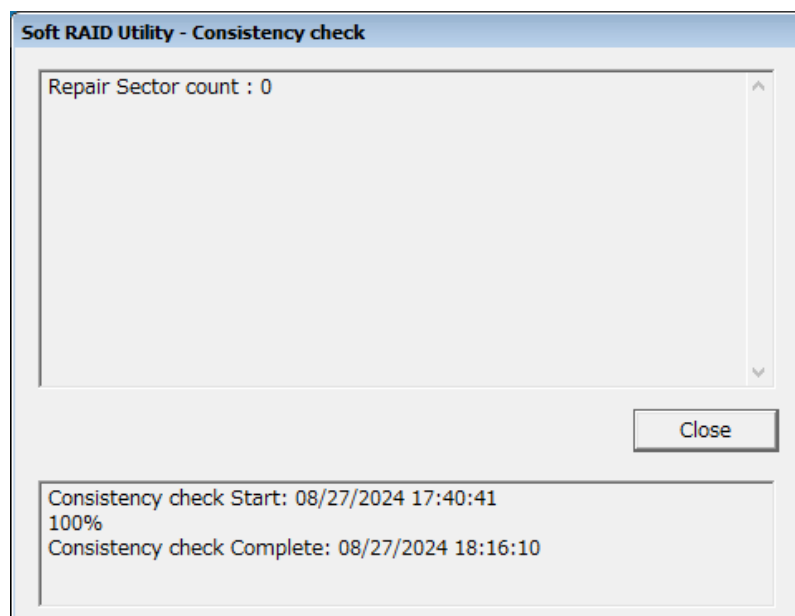


- If you click **Yes**, the consistency check processing is aborted and the following message appears:



Click **Close** to return to the menu window.

- If you click **No**, the rebuilding feature redisplay the window that shows the progress of processing.
4. When the consistency check is complete, the number of corrected sectors is shown as reference information, and a consistency check completion message appears.



Click **Close** to return to the menu window.

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If an error message appears during the consistency check processing, take action to correct the relevant error as described in *10.6.8 List of error messages*.

10.6.6 Array creation feature

The array creation feature allows the user to edit the RAID1 management information of drives, and create an array with two drives. You can use this feature when you restore data from a backup by using commercially available backup software. Note that *offline environment* as described here means an environment that is activated by Windows PE. In this equipment, because the RAID1 device driver running on the OS performs mirroring processing, the drives that make up a RAID1 array are individually recognized in an offline environment. Therefore, the data of an RAID1 array can be restored from a backup by using the array creation feature in an offline environment in which the RAID1 device driver is running.

This equipment supports the 64-bit edition of Windows PE for Windows 10 and Windows PE for Windows 11 as a RAID1 device driver for an offline environment. The location of this RAID1 device driver is as follows. Apply this driver as instructed in the documentation for the backup software you use.

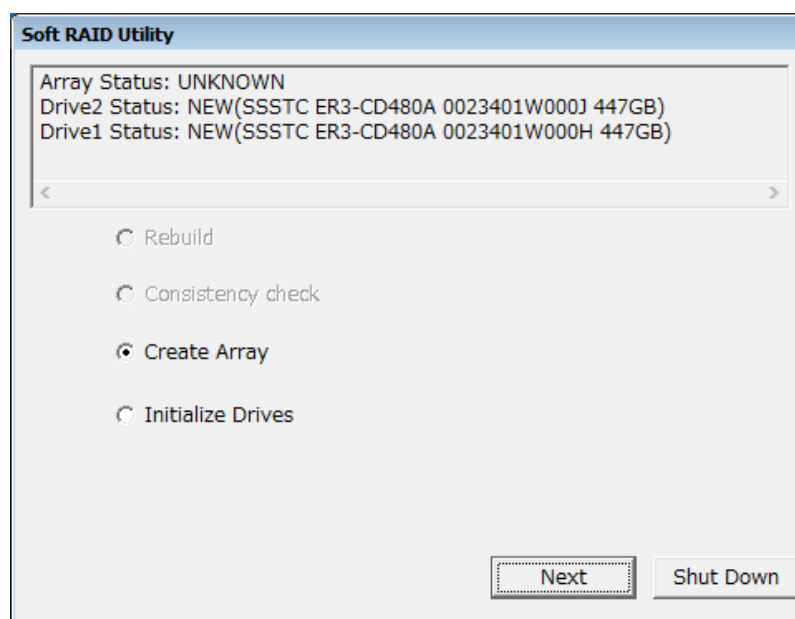
64-bit edition: C:\Drivers\SoftwareRAID1\x64\PE

NOTE

- This feature is used in a situation where the user must create a new array by using the drives that are already installed on the equipment. In this situation, the user creates an array by writing RAID1 management information to the existing drives. Note that if this feature is used for drives that are functioning normally as a RAID1 array, those drives can no longer be used in the current RAID1 array.
- Use the array creation feature when both drives are installed.
- After you have created an array, use commercially available backup software to restore data from a backup.

The following shows the procedure for using the array creation feature:

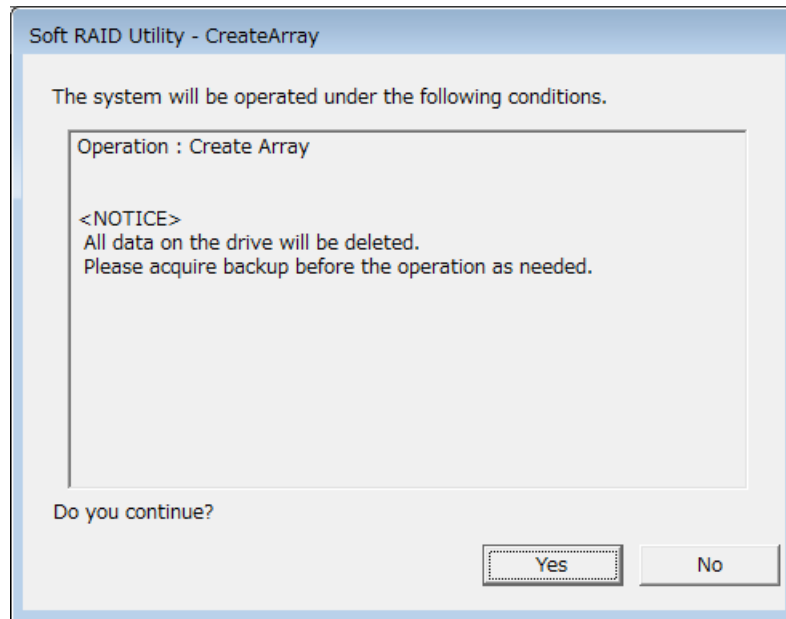
1. Use the procedure described in section 10.6.2(1) to display the Soft RAID Utility menu window.



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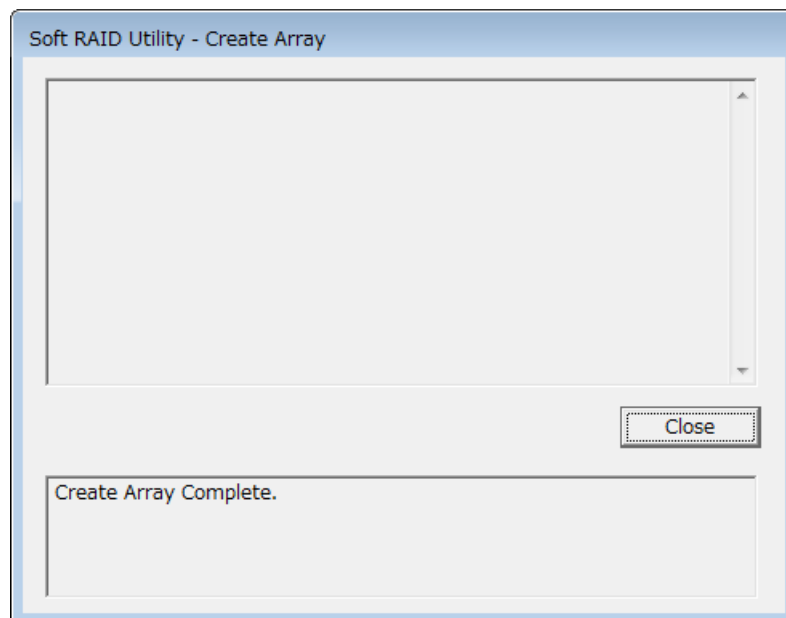
2. Select the **Create Array** radio button, and then click **Next**. The execution confirmation window opens.

- Click **Yes** to start execution of the array creation feature.
- Click **No** to cancel execution of the array creation feature.



Clicking **No** redisplay the menu window.

3. In the execution confirmation window, click **Yes**. The array creation feature is started and an array creation completion message is displayed.



Click **Close** to return to the menu window.

10.6.7 Drive initialization feature

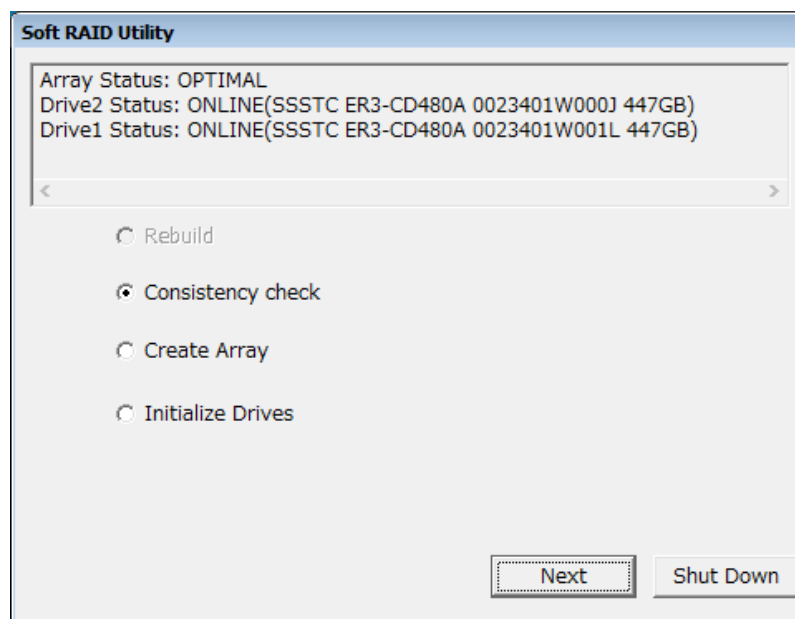
The drive initialization feature initializes the configuration information of the drive that was used in a RAID1 array, effectively creating a new drive. You can use this feature in the following cases:

- When reusing a drive that was used as a backup drive
- When reusing a normal drive that was set to offline by a user inadvertently
- When reusing a drive that was set to offline by the RAS software for equipment evaluation purposes

NOTE

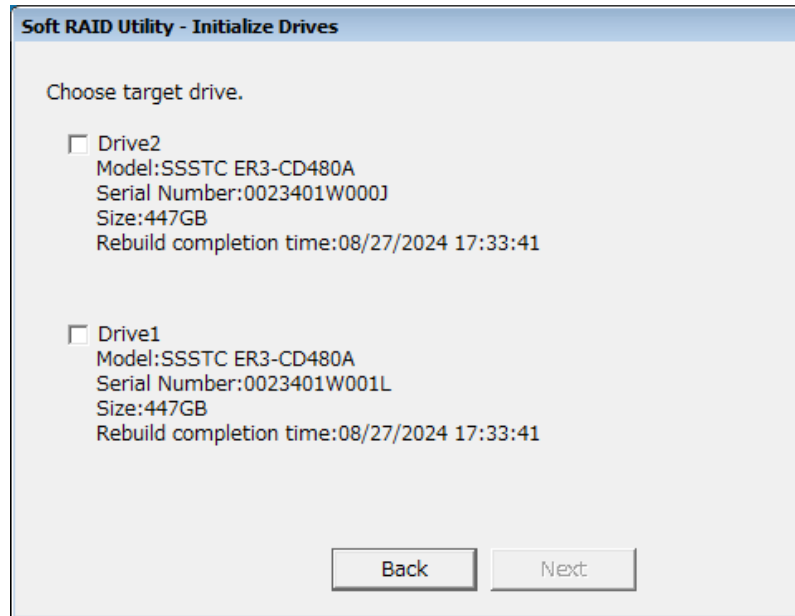
- Use the drive initialization feature in only the cases shown in this manual. Reuse of drives initialized by this feature in other cases might adversely affect the system. For example, the system might not be recoverable or might not operate correctly even after recovery.
- A drive automatically set to offline by this equipment might have failed. Do not use the drive initialization feature for such a drive.

1. Use the procedure described in section 10.6.2(1) to display the Soft RAID Utility menu window.



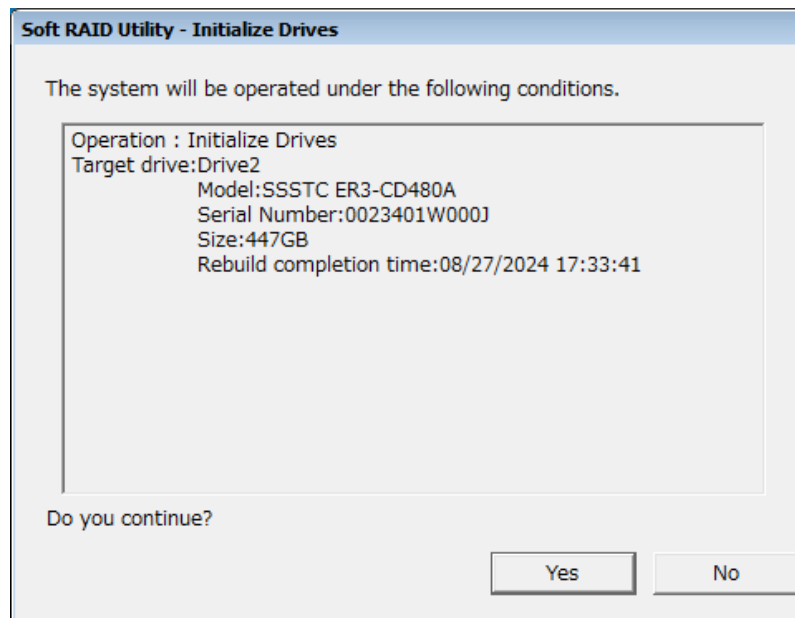
10. Software RAID1

2. Select the **Initialize Drives** radio button, and then click **Next**. The window for selecting a drive to be initialized opens.



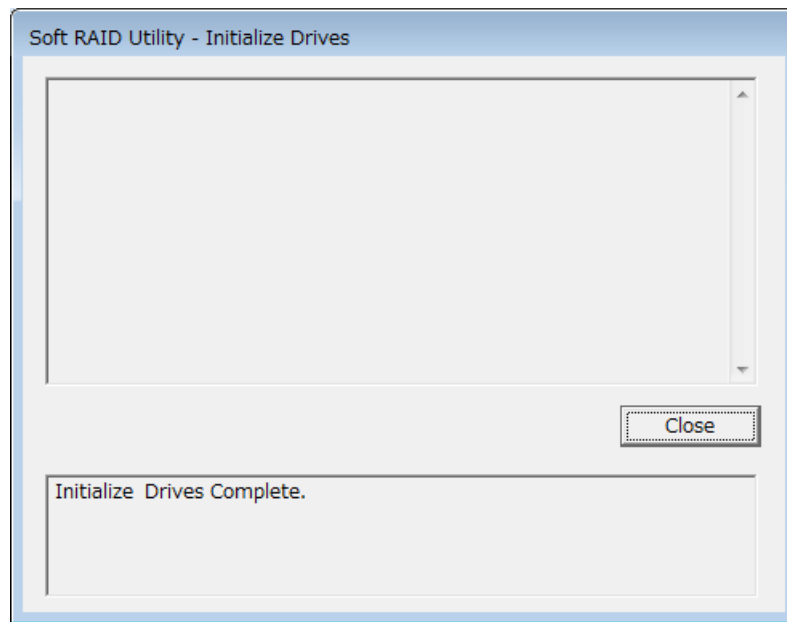
To cancel the initialization of the drive, click **Back**. The menu window reopens.

3. Select a drive to be initialized, and then click **Next**. The initialization confirmation window opens.
 - Click **Yes** to start execution of the drive initialization feature.
 - Click **No** to cancel execution of the drive initialization feature.



Clicking **No** redispays the menu window.

4. In the initialization confirmation window, click **Yes**. The drive initialization feature is started and a drive initialization completion message is displayed.



Click **Close** to return to the menu window.

10.6.8 List of error messages

This section lists the error messages displayed by the software RAID utility and the actions to be taken.

Table 10-3 List of error messages

No.	Error message	Meaning	Action
1	Unreadable sector was detected on the Master . (Media error) (Mirrored)	An unreadable sector was detected on the master (or mirrored) drive. This is a media error.	Because the information about an unreadable sector is not rebuilt, the system might not operate correctly when the system reads the sector. Back up your data, replace the affected drive, and then rebuild the RAID array. After the RAID array is rebuilt, restore the data from a backup.
2	Media error was occurred on RAID.	An unreadable sector was detected on both drives during the consistency check. This is a media error.	Back up your data, replace either of the drives, and then rebuild the RAID array. Then, replace the other drive, rebuild the RAID array again, and then restore the data from a backup.
3	Unwritable sector was detected on the Master . Operation aborted. (Mirrored)	An unwritable sector was detected on the master (or mirrored) drive. Operation was aborted.	Replace the affected drive, and then rebuild the RAID array.
4	The capacity of drive is not equal.	The capacities of the installed drives are different.	Install drives that have the same capacity.
5	Operation failed. (EC=0xXXXXXXXXXXXXZZ)	An internal error occurred. XXXX: Affected module YYYY: Affected process ZZZZZZZZ: Detailed error code	Contact one of our sales representatives.
6	Operation failed. (EC=0xXXXXXXXXXXXXZZ) Click OK button to shut down.	An internal error occurred. (This is the case where an error occurred before the Main Menu window appears.) XXXX: Affected module YYYY: Affected process ZZZZZZZZ: Detailed error code	

Appendix Handling of replaceable components

NOTICE

Do not use a replaceable component for longer than the recommended replacement cycle. If you do, the component might cause the equipment to fail.

- Components are subject to wear and tear, and gradually deteriorate during use over time. The components listed in the table shown later must be replaced at fixed intervals.
- Replacement of these components is available at a fee.
- The recommended replacement cycle in the table shown later assumes that the average ambient temperature of the system unit is maintained at 25°C or less.

Note that when the average ambient temperature exceeds 25°C, the replacement cycle might be shortened in some cases.

Furthermore, note that the recommended replacement period is a simple guideline under assumed specific use of the equipment. The replacement cycle might be shorter than indicated depending on equipment usage and environment (for example, in the case where magnetic disk devices are used, disk access frequency). Conduct regular inspections and replace parts accordingly in consideration of your particular usage environment.

Replaceable component	Recommended replacement cycle	Note
HDD	2 years	A replacement cycle of 2 years applies if this equipment is running on a 24/7 basis. Even if this equipment is not running on a 24/7 basis, the HDD must be replaced every four years or when the total number of power-on hours exceeds 20,000 hours, whichever comes first. Routinely back up your important files to ensure that they can be quickly restored in the event of data loss.
SSD	7 years or the expected lifetime [#] , whichever comes first	[#] : The expected lifetime (in years) is calculated by using the following formula The SSD must be replaced before its expected lifetime (in years) is reached. $\text{Expected lifetime (days)} = \frac{788,480 \text{ GB (Total Volume written, or TBW)}}{\text{Volume (in GB) written to drive daily}}$ Routinely back up your important files to ensure that they can be quickly restored in the event of data loss.
DVD drive	4 years	
Dust filter	1 year	If you do not replace the filter regularly, failure or shorter life span of the equipment might result.
Keyboard (optional)	4 years	
Mouse (optional)	4 years	

NOTE:

- When replacement of a component is requested (for example, for repair), a functionally compatible substitute component might have to be used.
- If you repair a component in a manner not recommended by the manufacturer, proper operation of the component is not guaranteed.

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