WIN-62-0069-01

W I N − 6 2 − 0 0 6 9

HITACHI

HITACHI INDUSTRIAL COMPUTER

HF-W100E

INSTRUCTION MANUAL

USER'S MANUAL

WIN-62-0069-01

HITACHI

HITACHI INDUSTRIAL COMPUTER

HF-W100E

INSTRUCTION MANUAL

Read and keep this manual.

- **Read safety instructions carefully and understand them before starting your operation.**
- **Keep this manual at hand for reference.**

USER'S MANUAL

First Edition, October 2017, WIN-62-0069 (out of print)
Second Edition, November 2017, WIN-62-0069-01

All Rights Reserved, Copyright © 2017, Hitachi, Ltd.

The contents of this publication may be revised without prior notice.

No part of this publication may be reproduced in any form or by any means without permission in writing from the publisher.

Printed in Japan.

This Page Intentionally Left Blank

PREFACE

This manual is intended for operators of the HITACHI INDUSTRIAL COMPUTER HF-W100E (hereafter called as this equipment) contains information about the operation and maintenance of various equipment necessary for their routine work. And also this manual describes the setup procedure of the OS installed in this equipment, namely the following pre-installed OS.

- Windows® Embedded Standard 7
- Windows® 10 IoT Enterprise

SEPARATE VOLUME CONSTITUTION

The manual of the HITACHI INDUSTRIAL COMPUTER HF-W100E consists of the following:

- SAFETY INSTRUMENTS
- INSTRUCTION MANUAL (This manual)
- RAS FEATURES MANUAL

MANUAL CONSTITUTION

This manual consists of the following:

PREFACE
IMPORTANT NOTIFICATION
SAFETY INSTRUCTIONS
PRECAUTIONS
CHAPTER 1 GETTING STARTED
CHAPTER 2 OPERATION
CHAPTER 3 SETUP
CHAPTER 4 PRECAUTIONS REGARDING THE OS
CHAPTER 5 SPECIFICATIONS
CHAPTER 6 CHECKUP AND MAINTENANCE
CHAPTER 7 RESTORING THE FACTORY-SHIPPED CONDITION USING A RECOVERY DVD
CHAPTER 8 MAINTENANCE OPERATIONS
CHAPTER 9 TROUBLESHOOTING
APPENDIX HANDLING REPLACEABLE COMPONENTS

[Trademarks]

- Microsoft®, Windows®, Internet Explorer® are registered trademarks of U.S. Microsoft Corporation in the United States and other countries.
- Intel®, Intel® Atom™ are trademarks of Intel Corporation in the United States and other countries.
- CFast™ is a registered trademark of Compact Flash Association.
- 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.
- Ethernet is a registered trademark of Fuji Xerox Co., Ltd.
- EtherCAT is a patented technology licensed by Beckhoff Automation GmbH, Germany and is a registered trademark.
- CODESYS® is a registered trademark of 3S-Smart Software Solutions GmbH.
- All other product names (software and hardware) not from Hitachi described in this manual are the registered trademarks, the trademarks, or the products of their respective owners.
- Zlib is used as a compression and decompression engine built in a part of the software of this product. Its copyright notice is as follows:
  Zlib ver 1.2.3 Copyright © 1995-2005 Jean-loup Gailly and Mark Adler

IMPORTANT NOTIFICATIONS

- The contents of this manual cannot be copy without permission.
- The contents of this manual are subject to change without notice.

NOTICE

Depending on the type of failure, important files may be lost when you use this equipment. Files can be lost by power failure and human mistakes during operation in addition to the failure of the equipment. If such a situation occurs, the files cannot be recovered. In order to prevent 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 IEC/EN 61000-3-2 Power supply Harmonic 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). Using this equipment in a residential environment may cause radio disturbance. In this case, the user may be required to take appropriate measures.

[Note for storage capacity calculations]

- Memory capacities and requirements, file sizes and storage requirements, etc. must be calculated according to the formula 2^n. The following examples show the results of such calculations by 2^n (to the right of the equals signs).

  1 KB (kilobyte) = 1,024 bytes

  1 MB (megabyte) = 1,048,576 bytes

  1 GB (gigabyte) = 1,073,741,824 bytes

  1 TB (terabyte) = 1,099,511,627,776 bytes

- As for disk capacities, they must be calculated using the formula 10^n. Listed below are the results of calculating the above example capacities using 10^n in place of 2^n.

  1 KB (kilobyte) = 1,000 bytes

  1 MB (megabyte) = $1{,}000^2$ bytes

  1 GB (gigabyte) = $1{,}000^3$ bytes

  1 TB (terabyte) = $1{,}000^4$ bytes

- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
  This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

- 이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라 며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
  This equipment conforms to the electromagnetic wave for Industrial use (Class A).Vender or user should take notice and use the purpose except for household use.

- 警告使用者：此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求採取某些適當的對策。

[Terms used in this manual]

Terms used in this manual are defined as follows.

・Install: An operation of installing software programs in the computer’s mSATA SSD

・Setup: An operation of setting an environment so that the software can use in the computer

[Rereading terms]

This manual describes the Windows® operating procedure. Names of operations “sign in” and “sign out” are replaced with “log on” and “log off” respectively depending on Windows® types. Reread them as required.

SAFETY INSTRUCTIONS

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

- Operate the equipment by following the instructions and procedures described in this manual.

- Pay attention especially to safety precautions displayed on the equipment or in this manual. Make sure you follow them. Otherwise, personal injury and property damage including damage to the equipment may result.

- A safety precaution is indicated by a heading as shown below. A heading is either a safety alert symbol; a word such as “DANGER”, “WARNING”, “CAUTION”, or “NOTICE”; or a combination of both.

This is a safety alert symbol. This symbol is used to signify potential hazards that may result in personal injury or death. Make sure you follow the safety message that follows this symbol in order to avoid possible injury or death.

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

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

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

NOTICE: This symbol is used to indicate hazards that may result in equipment or property damage but not personal injury.

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

- Do not attempt to perform any operation that is not described in this manual. If there is any problem with the equipment, call your maintenance personnel.

- Read this manual carefully and fully understand the directions and precautions written in this manual before operating the equipment.

- Keep this manual nearby so that you can reference the manual anytime you need it.

- Every effort has been made to specify the best precautions on the equipment and in the manual. Nevertheless, unexpected incidents may occur. When you use the equipment, you are asked not only to follow the instructions but also to use your own judgment on safety.

⚠ SAFETY INSTRUCTIONS (Continued)

1. COMMON SAFETY PRECAUTIONS
   Carefully read and fully understand the following safety precautions.

1.1 ⚠ WARNING

- This equipment is not designed and manufactured to be used for a life-critical system that requires extreme safety. If there is a possibility that the equipment may be used for this purpose, contact relevant sales representatives.

- In case of smoke, a burning smell, or the like, unplug the power cable from the outlet, disconnect the power cable from the outlet, and contact your supplier or maintenance personnel. Using the faulty equipment without repair may result in a fire or an electric shock.

- Do not modify this equipment because that may result in a fire or an electric shock. If you do not, serious injury or death may result due to the equipment failure. The Manufacturer's responsibility is exempted from any result arising out of the user's modification of the Equipment.

- Fire and electric shock or burn by heat may occur. When using the optional AC adapter, please be used with caution in the following.
  - Never disassemble.
  - Do not use in high humidity place. Also, do not wet with water or touch with wet hands.
  - Do not use in dusty place.
  - Do not use or leave this equipment in an environment where heat is stucked.
  - Do not put anything on top.
  - Make sure to connect the ground wire to the ground terminal of the equipment when the user independently prepares a power supply unit and a DC power cable without using the optional AC adapter and the attached AC power cable. Also, use this equipment after fully performing the operation verification by the user-self.
    In addition, install an earth leakage circuit breaker together. If you do not, fire or electric shock may result.

1.2 CAUTION

- If the equipment drops or is tipped over, personal injury may result. Pay full attention when transporting the equipment.

- Make sure you do not catch or hit your fingers to cause personal injury when unpacking or carrying the equipment.

- Do not use this equipment for purposes other than its original purpose.
  If you do, personal injury or this equipment failure may result.

- Do not touch this equipment directly during operation and immediately after shutting down, since the equipment may become hot during operation. If you do not, injury of burn may result. In addition, install this equipment in a place where the user does not touch during operation.

1.3 NOTICE

- This equipment alone cannot guarantee the system safety. In order to ensure sufficient safety of your system even when this equipment should fail, malfunction, or have program bugs, you must add systemic protections such as building external protective/safety circuits to facilitate safety measures to prevent personal injury and serious accidents.

- When you work on installation or replacement of hardware, wear an antistatic wrist strap to prevent the buildup of static electricity.

- When you tighten or remove a screw, use a screwdriver that fits the size and type of the head of the screw to avoid stripping the head.
  When you tighten a screw, drive a screw along the axis of a tapped hole without adding too much torque in order to avoid damaging the thread.

- Do not use the equipment in the environment full of dust or with corrosive gas because that may cause the equipment to fail.

- Do not give a shock to the equipment when unpacking or carrying the equipment. If you do, that may cause the equipment to fail.

- Make sure sufficient clearance is provided for air intake and exhaust in front of and behind the equipment. Otherwise, the temperature inside the equipment may rise and that may cause a failure or short life span of the equipment. In addition, you need to ensure sufficient clearance for maintenance work.

SAFETY INSTRUCTIONS (Continued)

- Use the basic software that we specify. Operation is not guaranteed if any other basic software is used.

- Performing emergency shutdown (that is, unplugging the power cable from the outlet or shutting off the circuit breaker without proper shutdown of the OS) may cause the OS or applications not to work properly or may cause the saved data to be corrupted. Never perform emergency shutdown unless you must stop the system immediately due to some kind of error.

- Keep in mind that if the power supply is cut, the system may not be able to recover automatically.

⚠ SAFETY INSTRUCTIONS (Continued)

2. SAFETY WARNINGS IN THIS MANUAL

2.1 Safety Warning Indicated as "⚠ WARNING"

- Warning about the equipment (hazardous voltage)
  Do not disassemble, or modify the equipment and the optional AC adapter.
  If you do, serious injury or death may result due to the equipment failure.
  (Page 1-3)

- It may cause electric shock or equipment failure. When using this equipment without optional AC adapter and attached power cable, prepare the AC adapter and power cable which fit input voltage and inspect the safeness of this equipment enough.
- It may cause electric shock or equipment failure. The power cable attached to AC adapter is rated at the input voltage of 125VAC. When using this optional AC adapter at over 125 VAC, prepare the power cable which fit input voltage and inspect the safeness of this equipment enough.
- It may result in a fire or electric shock. When you connect a plug of the power cable to an outlet, make sure you use an outlet with a ground terminal (ground pole) that is properly grounded. In addition, you must install and use an earth leakage circuit breaker.
- It may cause electric shock or equipment failure. Do not use a two-prong plug without a ground pole.
- It may cause electric shock or equipment failure. Make sure to connect the ground wire to the ground terminal of the equipment when the user independently prepares a DC power supply unit and a DC power cable.
  (Page 1-9)

- Do not exceed the specification range when the user prepare a DC power supply unit, a power cable, etc. connected to this equipment. If you do, fire may result.
  (Page 1-15)

- Fire or equipment failure may result since the equipment inside temperature increase unless the installation clearance of this equipment is secure.
  (See "1.5.2 Installation".)
  (Page 2-1)

- In case of smoke, a burning smell, or the like, unplug the power cable from the outlet, and contact your dealer or maintenance personnel. Using faulty equipment without repair may result in a fire or an electric shock.
  (Page 2-4) (Page 9-1)

⚠ SAFETY INSTRUCTIONS (Continued)

2.2 Safety Warning Indicated as "⚠ CAUTION"

- If you keep at high temperature this equipment, do not touch bare hands. Otherwise you may result burns.

  (Page 1-8)

- Make sure to install this equipment on the vertical mounting bracket with fasten screw, when you use this equipment in a vertical orientation. If you not, injury may result due to fall or fall down the equipment
- Make sure to confirm the installation work has been done securely. Injury may result due to drop the equipment since installing failure or loosing screw.

  (Page 1-11)

- When procuring a AC power cable, make sure that the cable has proper rating and meets local safety requirements whatever applicable. Otherwise, an electric shock or machine failure may result.

  (Page 1-16)

- Before you start the work, make sure you shut down the OS, unplug the power cable from the outlet, and wait for at least one minute. Otherwise, an electric shock or failure of the equipment may result.
- Do not touch the equipment directly with bare hands during work. Injury of burn may result due to getting hot of the equipment.

  (Page 6-3)

- When you install or remove a CFast card, make sure you do not cut your fingers on the protrusions.

  (Page 6-4)

- When you install or remove a USB cable, make sure you do not cut your fingers on the protrusions.

  (Page 6-6)

- When you install or remove a DisplayPort cable, make sure you do not cut your fingers on the protrusions.

  (Page 6-9)

2.3 Safety Warning Indicated as “NOTICE”

- Depending on the type of failure, important files may be lost when you use this equipment. Files can be lost by power failure and human mistakes during operation in addition to the failure of the equipment. If such a situation occurs, the files cannot be recovered. In order to prevent data loss, make it a routine to save your files and establish a systematic schedule for backing up files.

(Page iii) (Page C-7)

- When you transport or carry the equipment, pack it in a dedicated container (the container and packing materials used when the equipment was delivered). If you use other container or packing materials, that may damage the equipment.
- Do not use damaged or broken dedicated container when you transport or carry the equipment. If you do, that may damage the equipment.

(Page C-1) (Page 1-9)

- Never hot-swap a CFast card because that may result failure of the equipment and CFast card.
- When using a USB port, check the orientation of the USB connector, and then insert the connector slowly. Otherwise, the USB port may be damaged.
- Do not remove or insert a USB device during online operation (system operation) because that may affect currently running applications.
- Insertion or access to a CD or DVD from an external DVD drive or the like may increase the system load and affect the running application. Do not insert or access an optical disc during online operation (system operation).

(Page 1-3)

SAFETY INSTRUCTIONS (Continued)

- Do not route the interface cables, etc. (including cables for other devices such as a PC) near the power cable. If you do, a failure or malfunction of the equipment may result.
- Do not connect / disconnect the interface cable while this equipment and connected equipment are turned on. Failure of the equipment may result due to short circuit of power supply voltage. If the interface cable is disconnected while this equipment is on, shut down the OS and unplug the power cable from the DC power connector. If you unplug the power cable suddenly from the DC power connector without shutting down the OS, the contents of the file may be crashed.
- When you connect a cable for external contacts, make sure you connect the cable to a connector for the external contacts. If you connect the cable to the wrong connector, it may cause failure of the equipment.

(Page 1-12)

- Performing emergency shutdown (e.g. unplug the power cable from the DC power connector without shutting down the OS, unplug the power cable of optional AC adapter from the outlet, or turn off the circuit breaker.) may cause the OS or applications not to work properly or may cause saved data to be corrupted. Do not perform emergency shutdown unless you must stop the system immediately due to some kind of error.
- If you turn off power at the source of power supply, the system may not be able to recover automatically.

(Page 2-4)

SAFETY INSTRUCTIONS (Continued)

- Never remove a CFast card while the power to the equipment is on. Never hot-swap a CFast card. If you do, the equipment failure or the CFast card failure may result.
- Make sure to certainly insert a CFast card to the equipment. If you do not insert it completely, the equipment failure or the CFast card failure may result.

(Page 6-4)

- Never connect/disconnect a USB cable while the equipment is turned on. If you do, the equipment failure may result.
- Make sure to certainly connect a USB cable to the equipment. If you do not connect it completely, the equipment failure may result.

(Page 6-6)

- Never connect/disconnect a DisplayPort cable while the equipment is turned on. If you do, the equipment failure may result.
- Make sure to certainly connect a DisplayPort cable to the equipment. If you do not connect it completely, the equipment failure may result.

(Page 6-9)

- The recovery DVD contains an image file created for the hardware configuration at the factory shipment. If the hardware configuration has changed from the one at the factory, the OS may not start after restoration work. Remove all external storage devices to resume the hardware configuration at the factory shipment before you perform restoration work using the recovery DVD.(Excludes the DVD drive connected to read the recovery DVD)
  When the recovery DVD is used, <u>all data in the system drive is deleted</u>. Back up the data beforehand as required.

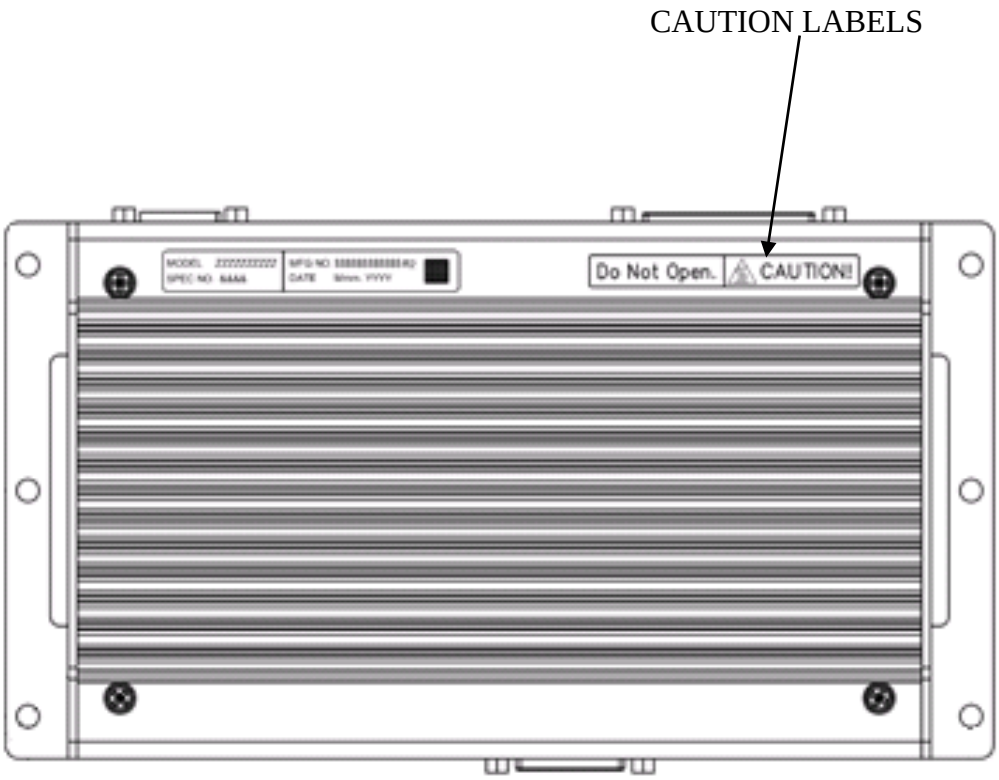
(Page 7-1)

- Do not use a replaceable component for longer than the recommended replacement cycle. If you do, a deteriorating or worn-out component may cause the equipment to fail.

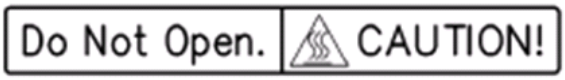
(Page A-1)

3. CAUTION LABELS

The warning labels are attached to the following position on the equipment.



CAUTION LABELS

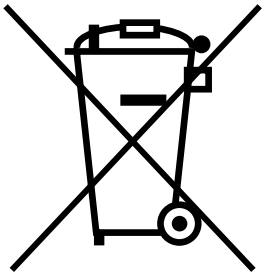


SAFETY INSTRUCTIONS (Continued)

4. DISPOSING THE EQUIPMENT
   This Equipment contains materials potentially harmful to environment if improperly abandoned. When you dispose of this Equipment, observe local laws and regulations whatever applicable.

5. EU BATTERY DIRECTIVE (2006/66/EC)

EU



This symbol mark is valid in countries inside the European Union. This symbol mark is specified in Article 20 “Information for end-users” and Annex II of the EU directive 2006/66/EC.
This equipment is equipped with a lithium battery.
In the European Union, a separate collection system for used battery and accumulator has been in place. Process batteries and accumulators appropriately at a local collection/recycle center.

PRECAUTIONS

1. PRECAUTIONS ABOUT THE EQUIPMENT

NOTICE
● When you transport or carry the equipment, pack it in a dedicated container (the container and packing materials used when the equipment was delivered). If you use other container or packing materials, that may damage the equipment. ● Do not use damaged or broken dedicated container when you transport or carry the equipment. If you do, that may damage the equipment.

(1) TRANSPORTING THE EQUIPMENT

<Required actions>

- When you transport or carry the equipment, pack it in a dedicated container (the container or packing materials used when the equipment was delivered). When you transport or carry the equipment in a chassis, protect the equipment so that any vibration and shock the equipment is subjected to is within the specifications provided.
- Keep a dedicated container (the container or packing materials used when the equipment was delivered). You can then use them later when the equipment is transported or carried.

(2) INTERFACE CABLES

<Precautions>

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

<Required actions>

- Route the cables in a neat and orderly manner alongside the device so that those cables do not catch on hands or feet. If the power cord is disconnected during operation of the equipment and the power is lost, crucial data stored on this equipment may be break.

(3) CONNECTOR

<Precautions>

- In order to connect a connector properly, you need to insert it with the proper orientation and at the proper angle. If a connector is not inserted properly, the connection may fail or malfunction.
- Make sure there are no loose I/O cable connectors on the equipment.

(4) POWER SUPPLY

1. Power Voltage

<Required actions>

- Confirm that the voltage of the power input to the equipment is within the specified range (12Vto24VDC). If the voltage of the power input is close to the upper or lower limit of the specified range, you should treat it as you would a setting error of the input voltage and ask the manager of the power facility to inspect the voltage output by the facility.
  (The rated output of AC adapter is 12 VDC)

2. Power Cord＜When using option AC adapter＞

<Precautions>

- The power cable attached to AC adapter is rated at the input voltage of 125VAC.
  When using this optional AC adapter at over 125 VAC, prepare the power cable which fit input voltage and inspect the safeness of this equipment enough.
- Install D class grounding (previously known as third class grounding) defined in the Technical Standard for Electrical Facilities of Japan in order to maintain normal operation of electronic circuits containing highly integrated LSIs and protect equipment from abnormal voltage caused by lightning or the like.
- Use a power cord with a 2-prong plug and a grounding pole. (See“1.6 Hardware connection”.)
- When you connect the plug of the power cord to an outlet, make sure you use an outlet with a neutral pole that is properly grounded. In addition, you must install and use an earth leakage circuit breaker.
- Do not put any object on the power cord. In addition, do not install signal lines near the power cord.

3. Turning the Power On and Off

<Precautions>

- Wait for at least one minute before turning the power on again after turning it off. If you wait for less than one minute, the equipment may not operate as specified by the BIOS power setting. (See “5.3 BIOS Setup”.)
- Do not turn off the equipment during communication or reading/writing mSATA SSD and CFast card.

<Required actions>

- When you connect or disconnect a peripheral, make sure both the equipment and the peripheral have been turned off. Otherwise, a malfunction or failure may result.
- When you turn on the power, turn on the peripherals first and then turn on the equipment. When you turn off the power, turn off the equipment first and then turn off the peripherals.
- When you are not using the equipment, turn off the power. Also, if you do not use this equipment for a long time, either unplug the optional AC adapter's power cable from the outlet or unplug the power cable directly from the equipment's DC power connector.
- Depending on the material, a rug, a lap blanket, or the like may cause static buildup and consequently cause a malfunction of the equipment. Use a conductive rug or lap blanket resistant to static buildup.
- Instantaneous power failure or brownout may occur during operation and the screen may black out when lightning strikes nearby or the AC power supply is not stable. When this situation happens, turn off the power to the equipment and then turn it back on.

(5) INSTALLATION ENVIRONMENT

<Precautions>

- Be careful not to exceed the maximum rated value for the current when using a USB device. (See “5.1 Equipment Specifications (6) Maximum current specifications (USB port, DisplayPort)”.)
- In order to use this equipment without failure for a long period of time, you must use it with proper care and in the proper environment. Do not use the equipment in the locations described below. If you do, the life span of the equipment may be reduced and failure of the equipment may result.

- In a place subject to exposure to direct sunlight……Too close to a window
- In a place subject to rapid temperature or humidity change……Too close to an air conditioner
- In a place close to device that generates electrical noise……Too close to electric motors and generators
- In a place close to device that generates a strong magnetic field……Too close to magnets or the like
- In an environment full of dust
- In a place subject to vibration
- In an environment with corrosive gasses present
- In a place with vibration caused by loud sounds……Too close to device that generates a loud buzzer or alarm

- The following are precautions for the left, right, top, and bottom sides of the equipment:
  - Do not attach heating devices.
  - For ease of maintenance work, make sure that the Equipment can be moved easily; if fixed, 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 near or at the place where the equipment is installed.

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

  Location of whiskers: Whiskers are created by electrogalvanized equipment such as floor panels, stringers, posts, aseismic flat steel, and the like.

  Phenomenon: Hair-like zinc crystals (conductive whiskers) float into the air from the floor for some reason, go inside the device, and short-circuit a PCB or its pins. The root cause is difficult and time-consuming to find because the symptom differs depending on the location of the short circuit, and often, it is mistaken for a temporary issue.

  (*) JEITA : Japan Electronics and Information Technology Industries Association

<Required action>

- If you mount the equipment in a chassis or on a desk, the temperature increase around the equipment needs to be taken into consideration.
- The system clock and the like inside the equipment always operates using a backup battery even when the power is off. Therefore, if you store the equipment at a temperature outside the operating temperature range, you may 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 “5.3 BIOS Setup”.

(6) OPERATING CONDITION

<Precautions>

- In order to prevent moisture condensation, when you move the equipment from outside the building to inside, wait for at least four hours before using the equipment.
- The equipment is made of precision electronics components. Do not subject the equipment to any vibration or shock.
- Do not sit on the equipment nor place anything on the equipment.
- 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 action>

- We recommend that you remove the dust built up in the neighborhood of the device (in particular, below the device), in the vents on the device , and on the front of the device itself.

(7) WARRANTY

<Specifications>

- The Manufacturer cannot guarantee for damage to data or application software caused by hardware damage to the equipment.
- Use an operating system specified by the Manufacturer. The Manufacturer cannot guarantee proper operation of the equipment if you use an operating system not specified by the Manufacturer.

2. NETWORK

<Precautions>

- When you send a Magic Packet™ frame, make sure the standby lamp of the equipment is on. If you send a Magic Packet™ frame when the power is about to be turned off after an OS shutdown, the equipment may restart without being turned off or wake on LAN (WOL) may not function at all. (See “2.6.2 Turning on the power using the LAN”.)

<Specifications>

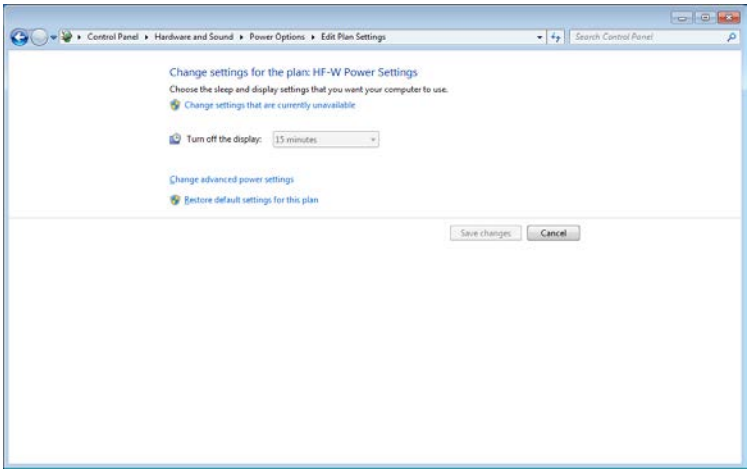
- Depending on the status of the network, Magic Packet™ frames can be lost. In order to avoid this, set up the system so that Magic Packet™ frames can be propagated without loss. (See “2.6.2 Turning on the power using the LAN”.)
- Even though a network drive may be configured to be reconnected at logon, sometimes the reconnection may fail. If this happens, log on again or use the “net use” command to establish the 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 may be compromised or the network adapter may not work properly. (See “2.7 Setting Up the LAN Interface”.)
- The electric 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 the ones specified in “5.5.1 Connector specifications”.

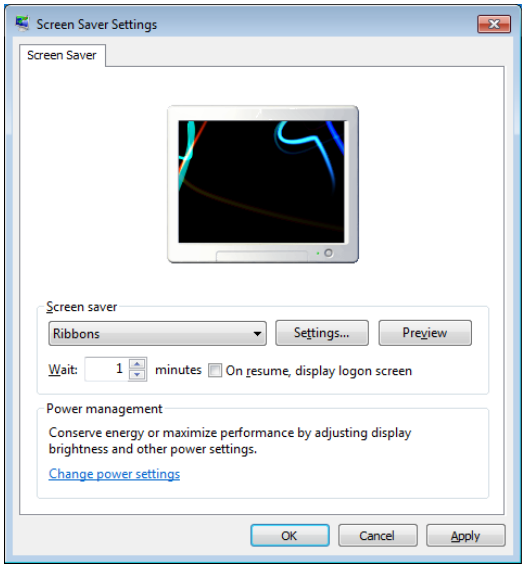
3. DISPLAY SCREEN

<Specifications>

- Before you set up the screen, terminate all running application software.
- When you change connections to switch between single- and multi- display configurations, turn off the power to the equipment, change the connection of display cables, turn the power back on, and then set up the screen configuration.
- When you change the connection configuration for the displays, reconfigure the screen settings accordingly.
- Depending on application software, the screen may flicker and video playback may not be smooth.
- The multi-stream function (daisy chain) of DisplayPort is not supported.
- If a display unit connected with DisplayPort is turned off, the display cannot be detected.

(The display image assumes Windows® Embedded Standard 7 but it is similar under other OS.)





4. MINI SERIAL ATA SOLID STATE DRIVES (mSATA SSDs)

NOTICE
Depending on the type of failure, important files may be lost when you use this equipment. Files can be lost by power failure and human mistakes during operation in addition to the failure of the equipment. If such a situation occurs, the files cannot be recovered. In order to prevent data loss, make it a routine to save your files and establish a systematic schedule for backing up files.

(1) mSATA SSDs

<Specifications>

- When you modify existing partitions, delete the partitions first and then re-create them.
- The capacity and performance of mSATA SSD may change depending on parts.

(2) Backing Up Files

<Required actions>

- Make sure the contents of all mSATA SSDs are backed up periodically.
- When you delete a partition, all files in the partition will be deleted. Before you delete a partition, back up important files you need.

(3) About the failure analysis information partition (H: drive)

<Required actions>

- It is arranged as an area for storing information necessary for failure analysis such as Windows event log, so please do not write to this area.
- Since information necessary for failure analysis can not be written, please do not filter this drive when using the filter function of built-in device specific function (EEF).

5. USB DEVICE

<Precautions>

- When you start using a USB device, test the device before using it. Never use a USB device for mission critical use.
- Do not connect a USB device during the OS startup because the OS may not start normally.
- If you switch screens during OS startup when you use a CPU/USB KVM switch, the OS may not start normally depending on the type of the CPU/USB KVM switch. When you use a CPU/USB KVM switch, make sure you test its operation thoroughly.
- For USB2.0 and USB3.0, the length of the cable used must be less than or equal to the length specified in the specifications. Otherwise, the transfer speed may be compromised. Use a USB2.0 or USB3.0 cable that matches the device you use. Otherwise, the actual transfer speed of the device may not be as high as it should be, or communication errors may result. For information about the cable specifications, ask the manufacturer of the cable. (For information about the cable length, see “5.5.3 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 in order not to damage the USB port.
- When a USB device is inserted, removed, or accessed, the system load may be increased. If you need to use a USB device during online operation (system operation), you must confirm that using the device does not affect the currently running application software before using the device.
- After you clean a USB keyboard, check the connection between the equipment and the connector of the keyboard. A loose connection may cause the keyboard to be recognized incorrectly or prevent the system from starting normally.

<Specifications>

- It is not guaranteed that all USB devices can be connected.
- 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 may not start properly and the clock setting may be corrupted. When you select a USB device, make sure you test its operation thoroughly.

6. LITHIUM BATTERIES

<Required actions>

- This equipment uses a lithium battery. When you dispose of the battery, observe local laws and regulations whatever applicable.
- When disposing of this equipment, remove the lithium battery. To remove the lithium battery, remove all the screws on the top and side of this equipment, remove the top cover, and then remove the lithium battery inside the equipment.

7. BIOS SETTINGS

<Specifications>

- The purpose of the clock displayed on the BIOS setup menu screen is not to show the correct time and date but to configure the time and date. Because of this, the date displayed on the screen does not change when the actual date changes. If the actual date changes during setup, you must update the date setting. (See “5.3 BIOS Setup”.)
- When the setup menu is used, the clock display may sometimes show a delay. After you finish the setup menu, make sure you confirm the clock is correct. (See “5.3 BIOS Setup”.)

8. MAINTENANCE SERVICES

<Specifications>

- Microsoft® Windows®, device drivers, and commercially available application software may not be able to be modified directly as a counter measure for a particular failure. Instead, the Manufacturer may offer a work-around as a counter measure.
- If you add new commercially available hardware to the equipment without notice to the Manufacturer, the equipment as a whole will lose eligibility for warranty.
- Some components used in the equipment (such as LSIs from Intel corporation) can not be disassembled for failure analysis because the Manufacturer does not have the right to do so.
- The price of this equipment does not cover maintenance and support. When you order the equipment, you must clarify the desired maintenance support level in the maintenance contract and make the required payment for the maintenance fee defined by the maintenance support level.

9. WINDOWS® SETTINGS

(1) Applying a Hotfix and Other Updates

<Specification>

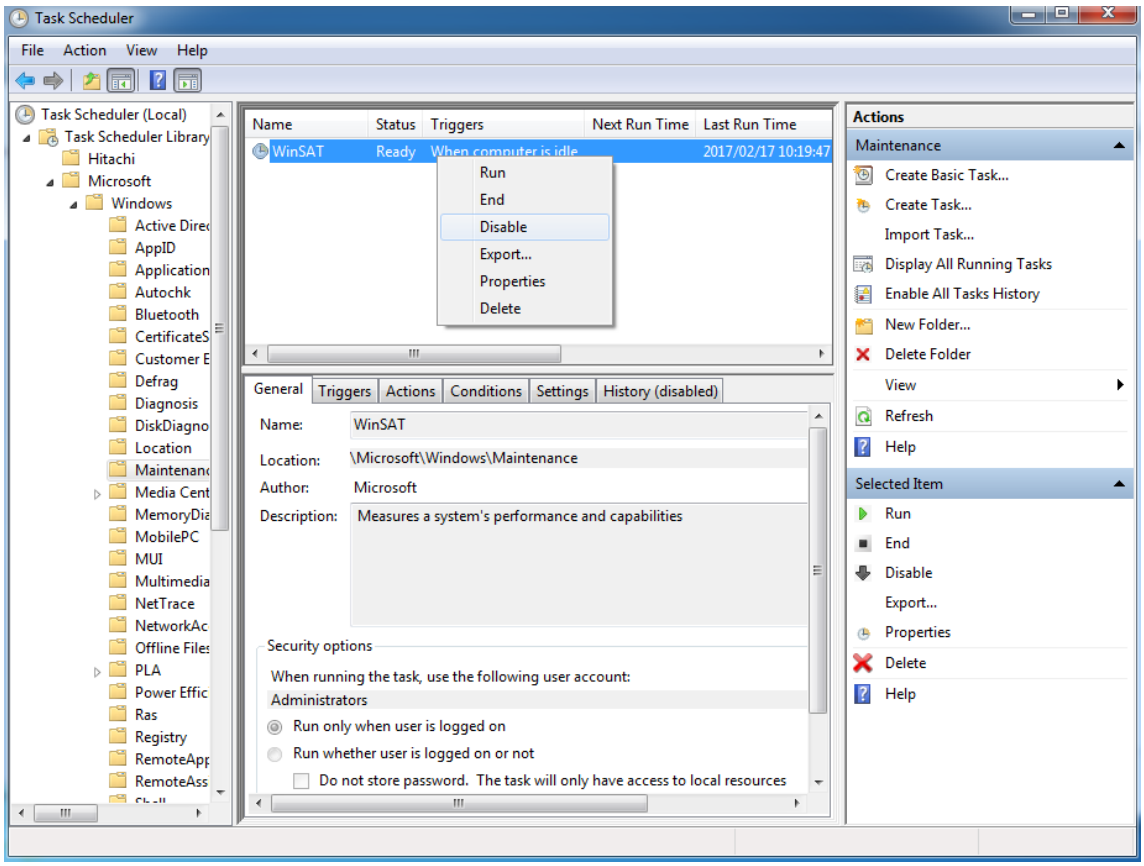
- If you need to apply a hotfix, Windows Update, or the latest service pack, do it on your own responsibility. You must thoroughly check the system operation and evaluate how the system is affected by applying the hotfix, Windows Update, or service pack.

(2) Power Options

<Specification>

- In case of Windows® Embedded Standard 7, even if you configured the system such that power for the display is not be turned off in the Power Options (Never is specified for "Turn off the display"), the power plan can be temporarily switched to **High performance** when the Windows Experience Index is triggered automatically and the power for the display can be turned off.
  To prevent the power for the display from being turned off, go through the following step 1 to 6 to disable automatic execution of the Windows Experience Index.

- Procedure to change the settings of the Windows Experience Index
  1. Click **Start** and click **Control Panel**.
  2. Since the **Control Panel** is displayed**,** and click **System and Security** > **Administrative Tools**.
  3. Double-click **Task Scheduler**.
  4. From the tree in the left pane of the Task Scheduler window, select **Task Scheduler Library** > **Microsoft** > **Windows** > **Maintenance**.
  5. Right-click **WinSAT** displayed in the center of the window and select **Disable**.



- If you follow the procedure described above to disable automatic execution of the Windows Experience Index, the Windows Experience Index may not be triggered at all or may not be triggered even after a device driver is updated or a hardware configuration is changed. If the Windows Experience Index is not triggered, Windows® may not operate in the optimum manner and the performance can be compromised. Because of this, you may need to trigger the Windows Experience Index manually.

Follow the procedure below to trigger the Windows Experience Index manually:

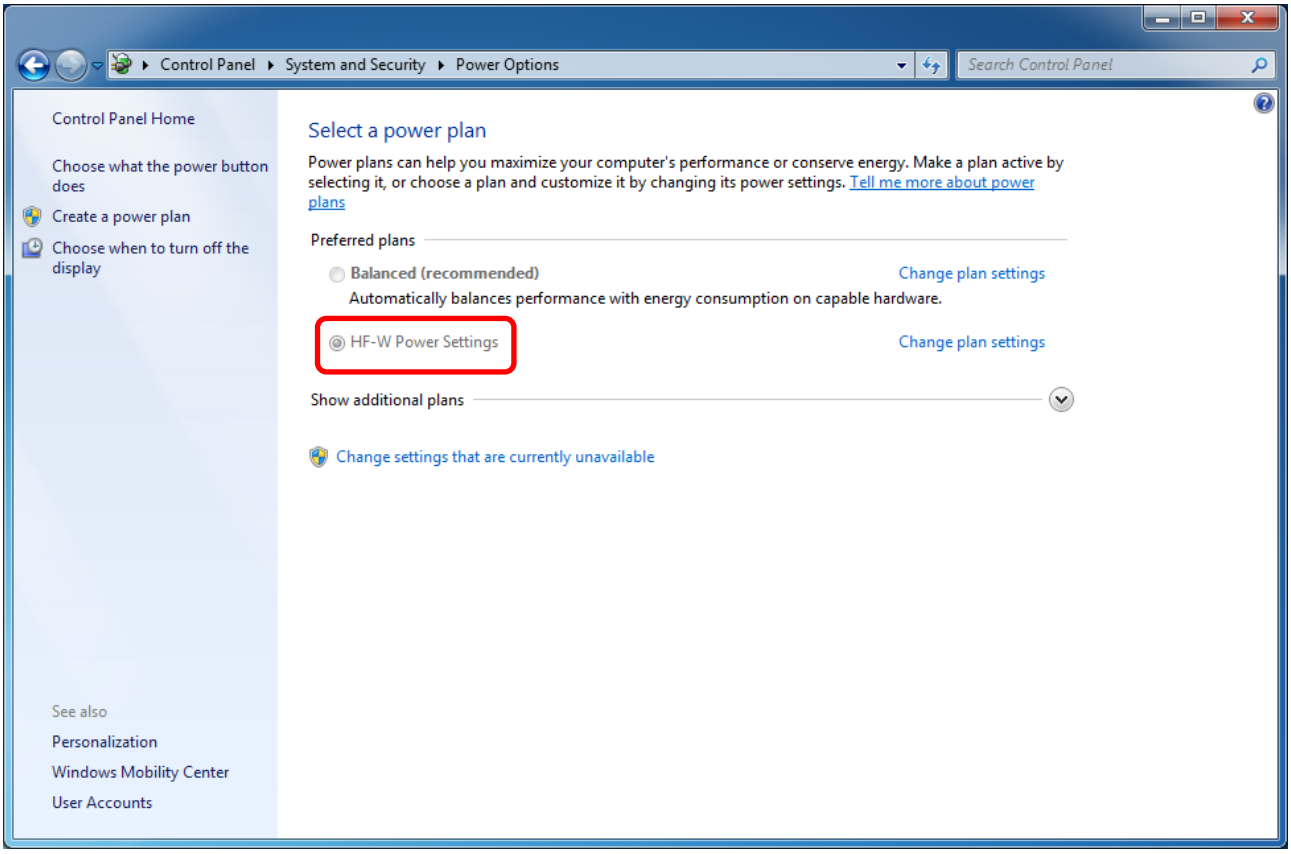
● Procedure required to trigger the Windows Experience Index manually

1. Click **Start** and click **Control Panel**.
2. Since the **Control Panel** is displayed**,** and click **System and Security**.
3. Click **Check the Windows Experience Index**.
4. Click **Rate this computer**. (For the second time and later, click **Re-run the assessment**.) When you see the **User Account Control** window, click **Yes**.

<Required actions>

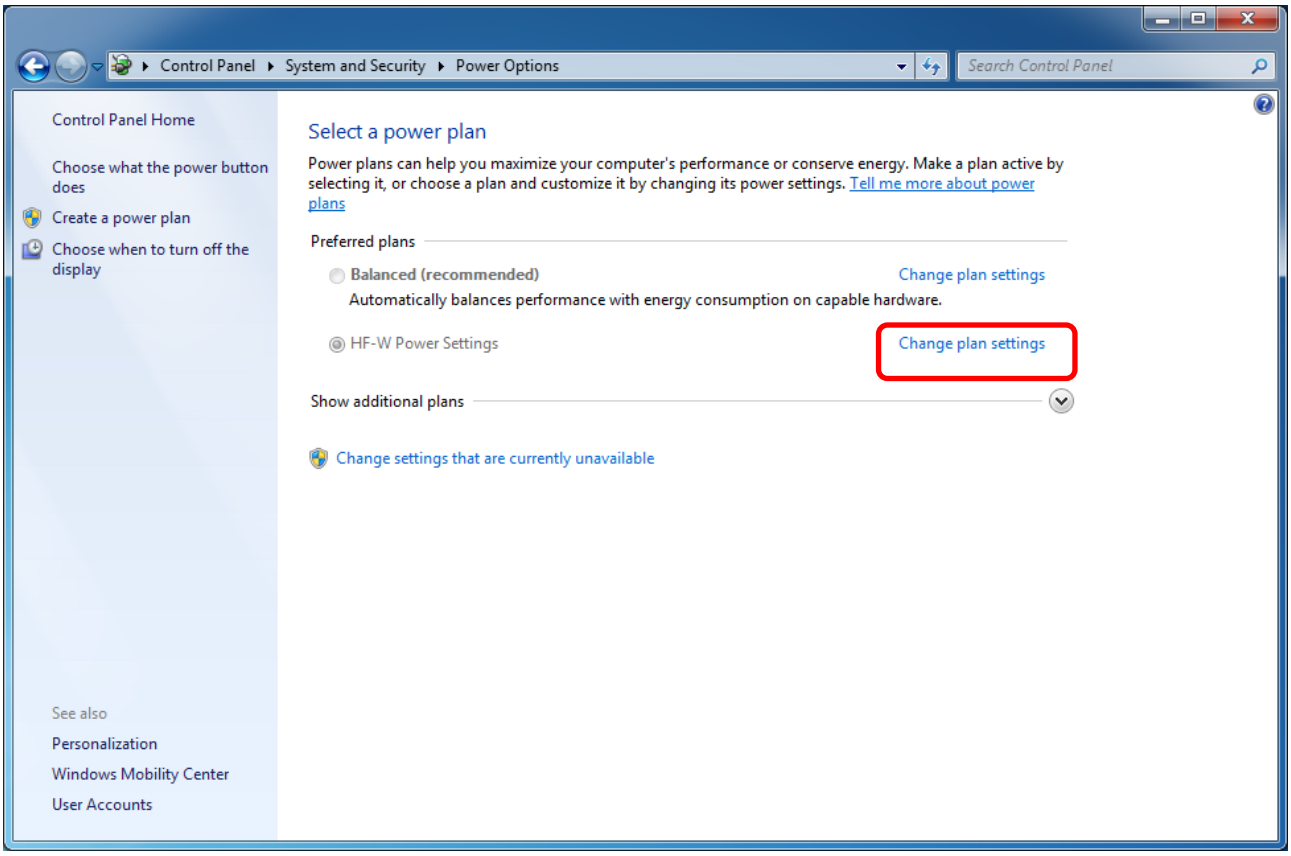
- Do not change the factory default setting, "**HF-W Power Settings**", for the power plan. Furthermore, do not change "**Turn off hard disk after**" setting from "**0**". If you want to confirm the current setting for power plan and "**Turn off hard disk after**" setting, follow the procedure below.
  (The display image assumes Windows® Embedded Standard 7 but it is similar under other OS.)

- Confirmation procedure of the current power plan settings
  1. Click **Start** and click **Control Panel**.
  2. Since the **Control Panel** is displayed**,** and click **System and Security**.
  3. Click **Power Options** and display **Power Options** window.
     - Confirm that **HF-W Power Settings** radio button is selected under **Preferred plans**.



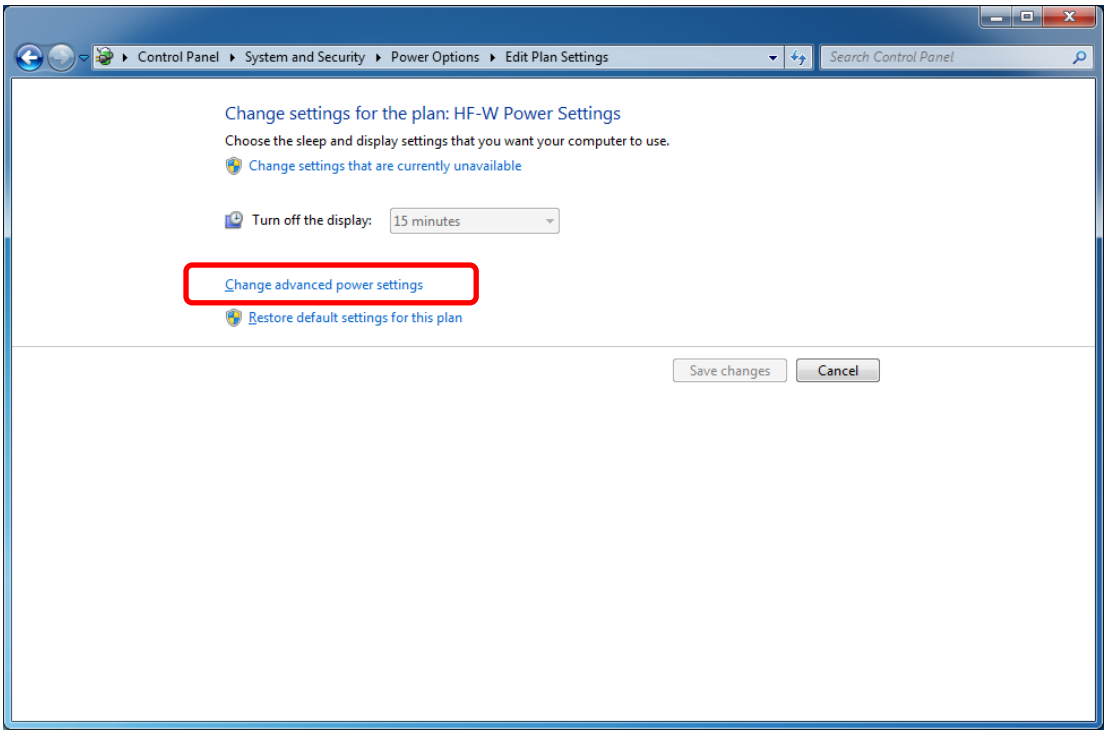
- Confirmation procedure of "**Turn off hard disk after**" setting

  1. Following the confirmation procedure of the current power plan settings, click **Change plan settings** at **HF-W Power Settings**.



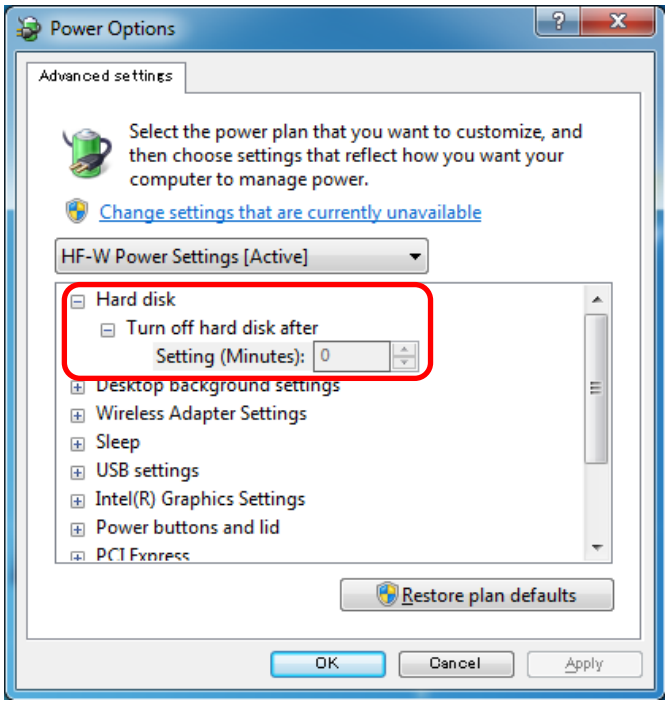
  2. **Edit Plan Settings** window appears.

  ・Click **Change advanced power settings**.



3. **Advanced setting** tab of **Power Options** appears.

・Confirm that **Turn off hard disk after setting** is "**0**".

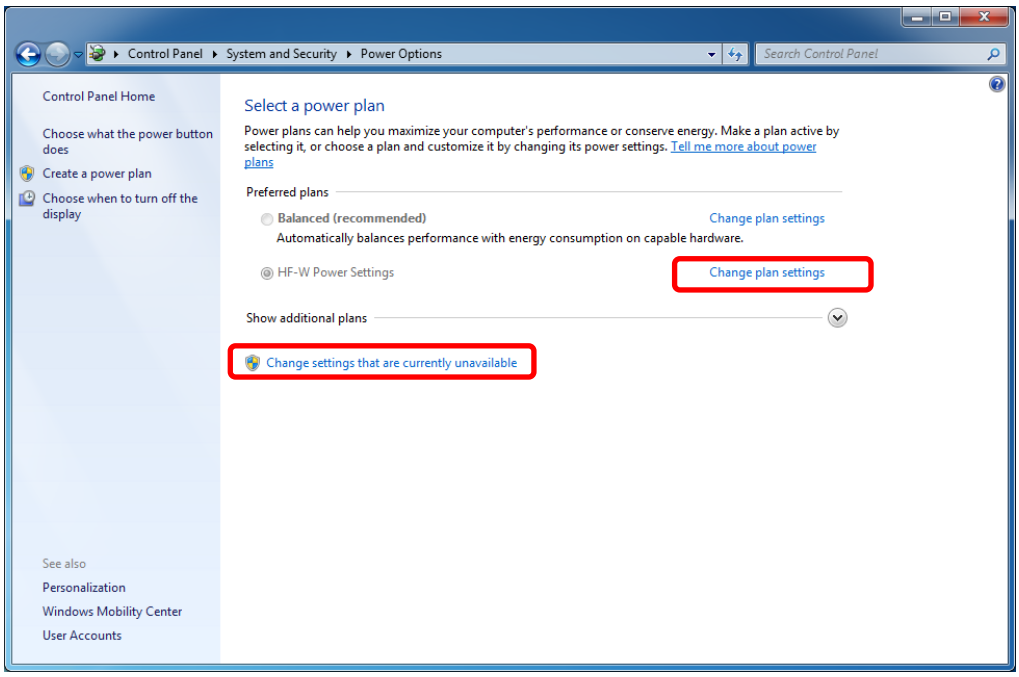


- When you change the settings from factory default setting, restore the factory default setting following the procedure below.

1. Click **Start** and click **Control Panel**.
2. Since the **Control Panel** is displayed**,** and click **System and Security**.
3. Click **Power Options** and display **Power Options** window.

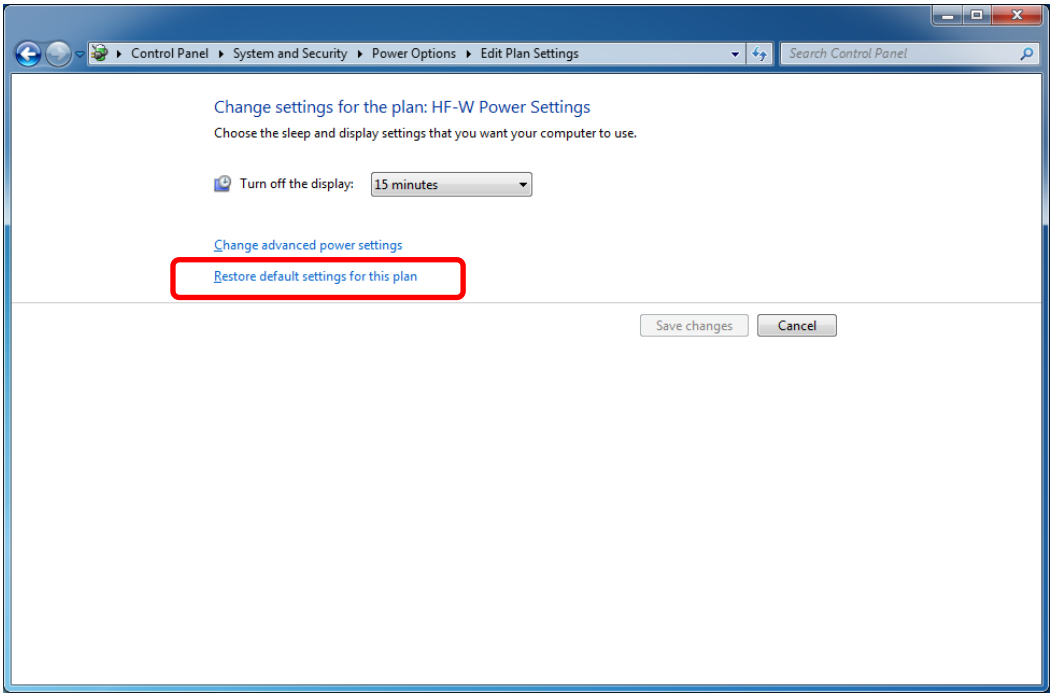
・Click **Change settings that are currently unavailable**.

・Confirm that **HF-W Power Settings** radio button is selected under **Preferred plans**.



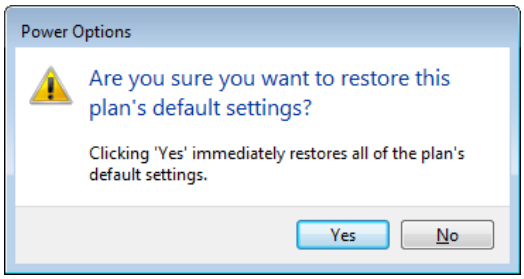
4. **Edit Plan Settings** window appears.

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



5. **Power Options** window appears.

・Click **Yes**.



This Page Intentionally Left Blank

CONTENTS

PREFACE i
IMPORTANT NOTIFICATIONS iii

SAFETY INSTRUCTIONS S-1

PRECAUTIONS C-1

CHAPTER 1 GETTING STARTED 1-1
1.1 Scope 1-1
1.2 Role of an Operator 1-1
1.3 Work Flow 1-2
1.4 Name and Function of Each Part 1-3
1.5 Installation Environment 1-8
1.5.1 Environment 1-8
1.5.2 Installation 1-9
1.6 Hardware Connection 1-12
1.7 Power Cable 1-16

CHAPTER 2 OPERATION 2-1
2.1 Before Turning on the Power 2-1
2.2 Starting the Equipment 2-2
2.3 Shutting Down the Equipment 2-3
2.4 Power Shutdown 2-4
2.5 Emergency Shutdown 2-4
2.6 Controlling the Power Using the LAN 2-5
2.6.1 Enabling the WOL (Wake ON LAN) Function 2-5
2.6.2 Turning on the Power Using the LAN 2-6
2.7 Setting Up the LAN Interface 2-8
2.8 Setting Up the Screen 2-16

CHAPTER 3 SETUP 3-1
3.1 Setup Procedure when You Turn on the Power for the First Time..... 3-1
3.1.1 Setting up Windows® Embedded Standard 7 3-1
3.1.2 Setting up Windows® 10 3-4
3.2 Configuring Basic Settings after OS Setup 3-7
3.2.1 Basic settings for Windows® Embedded Standard 7 3-7
3.2.2 Basic settings for Windows® 10 3-16

CHAPTER 4 PRECAUTIONS REGARDING THE OS 4-1
4.1 Embedded Enabling Features of Windows® Embedded Standard 7 4-1
4.1.1 What is Windows® Embedded Standard 7 4-2
4.1.2 Embedded Enabling Features overview and examples 4-3
4.2 Precautions While the OS is Running 4-16
4.2.1 Event log entries during setup 4-16
4.2.2 Event log entries while the OS is running 4-17
4.2.3 Scheduled functions by default 4-19
4.2.4 Security enhancement function..... 4-29
4.2.5 Factory-shipped network settings 4-29
4.2.6 Product Activation in Windows® 10 4-30

CHAPTER 5 SPECIFICATIONS 5-1
5.1 Equipment Specifications 5-1
5.2 Serial Port Settings 5-5
5.3 BIOS Setup 5-6
5.4 Hardware System Clock 5-11
5.5 Interface Specifications 5-12
5.5.1 Connector specifications 5-12
5.5.2 External general purpose I/O specifications 5-16
5.5.3 External interface cable length specifications 5-20

CHAPTER 6 CHECKUP AND MAINTENANCE 6-1
6.1 Periodic Checkup 6-1
6.2 Installing and Removing Components 6-2
6.2.1 Types and locations of installed components 6-2
6.2.2 Before installing or removing components..... 6-3
6.2.3 Installing and removing a CFast card 6-4
6.2.4 How to secure a USB cable 6-6
6.2.5 How to secure a DisplayPort cable 6-9

CHAPTER 7 RESTORING THE FACTORY-SHIPPED CONDITION USING A RECOVERY DVD 7-1
7.1 Overview of Restoration Procedure..... 7-2
7.2 Preparation 7-3
7.3 Restoring the System Drive Back to the Factory-Shipped Condition 7-4
7.3.1 Procedure for restoring the system drive back to the factory-shipped condition 7-4
7.3.2 Errors generated during a restoration process and their corrective actions 7-10

CHAPTER 8 MAINTENANCE OPERATIONS 8-1
8.1 Overview 8-1
8.2 Collecting a Memory Dump 8-6
8.2.1 Configuring the settings related to a memory dump 8-9
8.3 Maintenance Operation Commands 8-11
8.3.1 Log information collection command (logsave) 8-12
8.3.2 Memory dump file copy command (mdump) 8-14
8.3.3 RAS information display command (getrasinfo) 8-16

CHAPTER 9 TROUBLESHOOTING 9-1
9.1 List of Problems 9-1
9.1.1 Problems that occur before the OS startup 9-1
9.1.2 Problems that occur after the OS startup 9-2
9.2 Countermeasures 9-3
9.2.1 Problems that occur before the OS startup 9-3
9.2.2 Problems that occur after the OS startup 9-6
9.3 STOP Error Codes 9-14
9.4 Event Log 9-15
9.5 Checking the System Load by Using Performance Monitor 9-17
9.6 Failure Analysis Information Partition Mount Setting 9-21
9.6.1 “Mount setting confirmation” message 9-21
9.6.2 Failure analysis information Partition check and mount setting procedure 9-22

APPENDIX HANDLING REPLACEABLE COMPONENTS A-1

FIGURES

Figure 1-1 Name of Each Part (Front View) 1-4
Figure 1-2 Name of Each Part (Rear View) 1-5
Figure 1-3 Service Clearance (Top View) 1-10
Figure 1-4 Operation and Installation Clearance 1-10
Figure 1-5 Exterior View (Horizontal Installation) 1-11
Figure 1-6 Exterior View (Vertical Installation) 1-11
Figure 1-7 Hardware Connection 1-13
Figure 5-1 Definition of Output Pin of External Contact Part (When There is No Output Just Before S5) 5-17
Figure 5-2 Definition of Output Pin of External Contact Part (When There is Output Just Before S5) 5-17
Figure 5-3 Definition of Output Pin of External Contact Part (When There is No Output Just Before S5) 5-18
Figure 5-4 Definition of Output Pin of External Contact Part (When There is Output Just Before S5) 5-18
Figure 6-1 Types and Locations of Installed Components 6-2
Figure 6-2 Removing a CFast Card 6-5
Figure 6-3 Securing a USB Cable to the Front of the Equipment 6-7
Figure 6-4 Securing a USB Cable to the Back of the Equipment 6-8
Figure 6-5 Fixing a DisplayPort Cable 6-10

TABLES

Table 1-1 Function of Each Part 1-6
Table 1-2 Dimension, Service Clearance, and Installation Clearance 1-10
Table 1-3 Power Cord and Plug Identification 1-17
Table 4-1 Features Comparison of Windows® Embedded Standard 7 and Windows® 7 4-2
Table 4-2 Filter Features Installed in This Equipment 4-2
Table 4-3 Ewfmgr Command Specification 4-5
Table 4-4 Fbwfmgr Command Specification 4-9
Table 4-5 Features Comparison of EWF and FBWF 4-10
Table 4-6 Registry Filter Setting Specification 4-12
Table 4-7 Defined Registry Filter Setting List 4-13
Table 5-1 Hardware System Clock Specification 5-11
Table 8-1 Errors That Trigger a Memory Dump 8-6
Table 8-2 Maintenance Operation Commands 8-11
Table 8-3 Information Saved by logsave 8-12
Table 8-4 Error Messages of the logsave Command 8-13
Table 8-5 Error Messages of the mdump Command 8-15
Table 8-6 Information Displayed by the getrasinfo Command 8-16
Table 8-7 Error Messages of the getrasinfo Command 8-21
Table 9-1 STOP Error Codes 9-14
Table 9-2 Event Log Entries Unique to the Equipment 9-16
Table 9-3 Performance Counters Related to the Performance of the Equipment 9-19
Table 9-4 Failure Analysis Information and Storage Folder 9-21

CHAPTER 1 GETTING STARTED

1.1 Scope

This manual is intended for operators of the HITACHI INDUSTRIAL COMPUTER HF-W100E and contains information about the operation and maintenance of various devices necessary for their routine use.

After you unpack, go through the “delivered items list” to confirm all the items have been delivered and no items are missing or damaged. If there are missing or damaged items, contact our sales representative.

For information about RAS features, refer to the following manuals.

・HITACHI INDUSTRIAL COMPUTER HF-W100E RAS FEATURES MANUAL (manual number WIN-63-0095)

1.2 Role of an Operator

In order to use this equipment in good working order for a long period of time, an operator must take care of the following items.

(1) Consideration for the characteristics of the equipment

(a) See “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT” and take necessary actions considering the characteristics of the equipment.

(b) The instructions described in this manual are the basics of the procedures you need to follow when you use the equipment. Make sure you follow these instructions.

(c) For information about how to use the equipment, how to clean the equipment, and so on, see the respective chapters.

(2) Keep this equipment in good condition

When you use this equipment, an operator must take care of the following items.

(a) Backing up files

See “PRECAUTIONS 4. MINI SERIAL ATA SOLID STATE DRIVES (mSATA SSDs) (2) Backing Up Files”.

(b) Power cable and shutting down the power

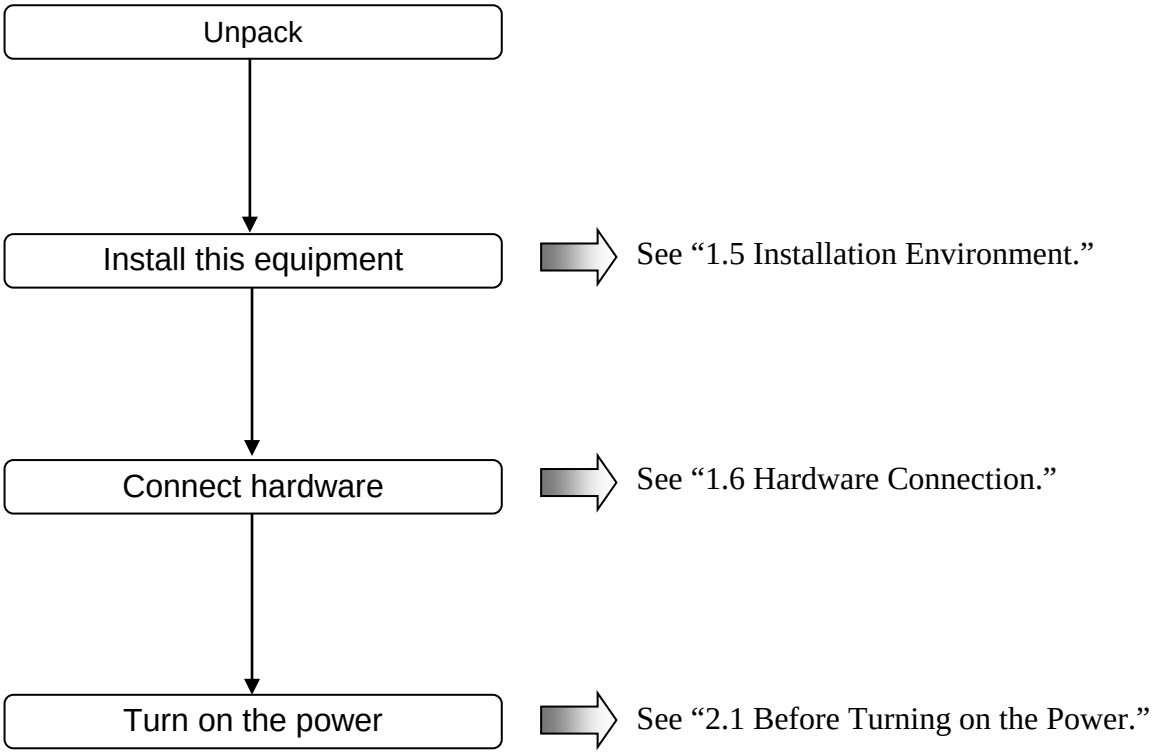
See “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT (4) POWER SUPPLY”.

(3) Maintenance of this equipment

(a) For information about maintenance, see “6.1 Periodic Checkup”.

1.3 Work Flow

The work flow until turning on the equipment is following:



1.4 Name and Function of Each Part

WARNING

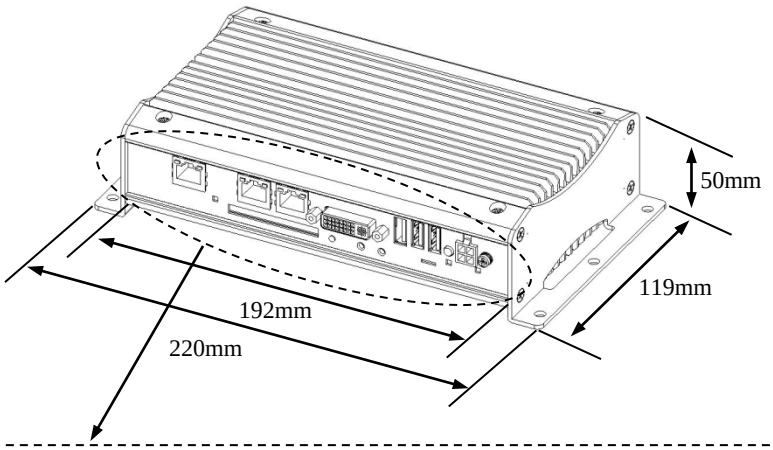
Warning about the equipment (hazardous voltage)
Do not disassemble, or modify the equipment and optional AC adapter.
If you do, serious injury or death may result due to the equipment failure.

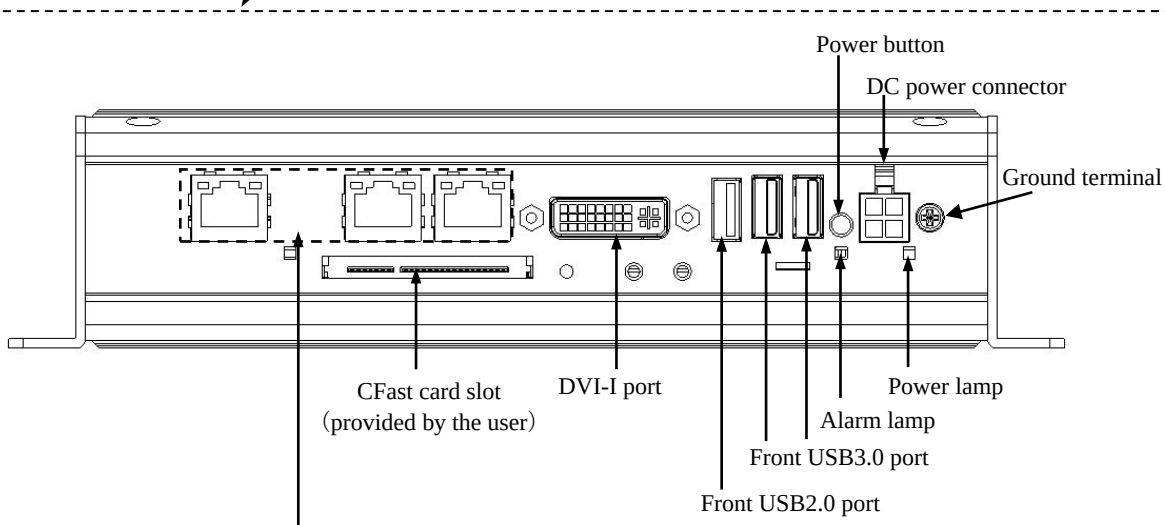
NOTICE

- Never hot-swap CFast card because that may result failure of the equipment and CFast card.
- When using a USB port, check the orientation of the USB connector, and then insert the connector slowly. Otherwise, the USB port may be damaged.
- Do not remove or insert a USB device during online operation (system operation) because that may affect currently running applications.
- Insertion or access to a CD or DVD from an external DVD drive or the like may increase the system load and affect the running application. Do not insert or access an optical disc during online operation (system operation).

● Display and User Input Sections

(1) Front view





Communication speed lamp

ACT/LINK lamp

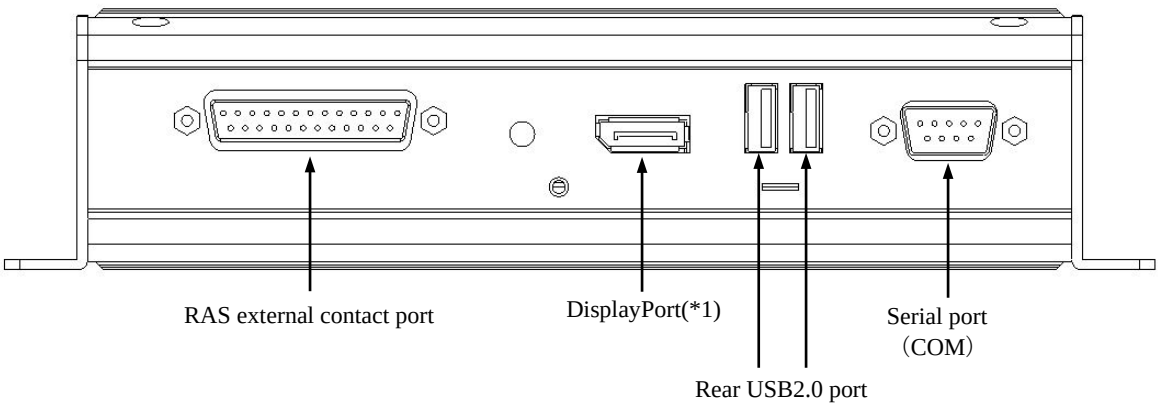
LAN port:
1000BASE-T/100BASE-TX/10BASE-T

- Left side : LAN A(Ethernet) (*1)
- Center : LAN B(EtherCAT) (*1)
- Right side : LAN C(EtherCAT) (*1)

(*1) The above is initially set at software PLC installation model, Ethernet of each LAN port, will be EtherCAT configuration specification. (See “5.1 Equipment Specifications (2) Pre-installed OS model”.)
Ethernet, EtherCAT configuration allows users to freely change.
In addition, if it is not software PLC installation, the initial value will be Ethernet in all of LAN port.

Figure 1-1 Name of Each Part (Front View)

(2) Rear view



(*1) If a display unit connected with DisplayPort is turned off, the display cannot be detected.

Figure 1-2　Name of Each Part (Rear View)

Table 1-1 Function of Each Part (1/2)

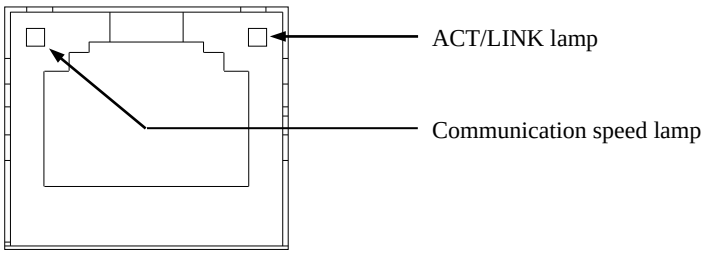
<table>
<tr><th>Name</th><th>Function</th></tr>
<tr><td>Power button</td><td>When you press this button, the power is turned on. When you press the button for four seconds or more during operation, the power is turned off and the system goes into standby mode (for emergencies only).</td></tr>
<tr><td>Power lamp (☼)</td><td><table><tr><th>Lamp</th><th>Status</th></tr><tr><td>Lit in green</td><td>The equipment is running.</td></tr><tr><td>Lit in orange</td><td>The system is in standby mode.</td></tr><tr><td>Off</td><td>The power is off.</td></tr></table></td></tr>
<tr><td>Alarm lamp (ALARM)</td><td><table><tr><th>Lamp</th><th>Status</th></tr><tr><td>Lit in red</td><td>This lamp is lit in red if one of the following abnormalities is detected.
• RAS software abnormality</td></tr><tr><td>Off</td><td>No abnormality</td></tr></table></td></tr>
<tr><td>DC power connector</td><td>・Input voltage 12 to 24VDC +30%/-20%
・Connect the DC power supply of the user preparation (See “1.6 Hardware Connection”.)
・Support input 100 to 240VAC±10% with Optional AC adapter (A wide-range input voltage corresponds).</td></tr>
<tr><td>Serial port (COM)
(9 pins: RS-232C/485/422)</td><td>You can use this connector to connect a device such as a modem that uses a serial interface.
(See “5.5.1 Connector specifications”.)
How to change the setting of RS-232/485/422 See “5.2 Serial Port Settings”.</td></tr>
<tr><td>RAS external contact port
(25 pins: GPIO)</td><td>A connector for connecting external contacts. (See “5.5.1 Connector specifications”.)</td></tr>
<tr><td>DVI-I port (*1)</td><td>Connects the cable from the digital interface of a display. (See “5.5.1 Connector specifications”.)</td></tr>
<tr><td>DisplayPort</td><td>Connects the cable from the digital interface of a display. (See “5.5.1 Connector specifications”.)</td></tr>
<tr><td>USB port (USB2.0/USB3.0)</td><td>Used to connect a device that uses a USB interface.</td></tr>
</table>

(*1) By using a conversion connector or DVI-A cable, you can output an analog VGA signal. The conversion connector or DVI-A cable must be provided by the user.

Table 1-1 Function of Each Part (2/2)

<table>
<tr><th>Name</th><th>Function</th></tr>
<tr><td>LAN port
(1000BASE-T/100BASE-TX/
10BASE-T)</td><td>You can connect a LAN cable to a LAN port. (See “5.5.1 Connector specification”.)

● Onboard LAN

<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.
• 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 have some errors.</td></tr>
<tr><td>Blinking in green</td><td>Network data is being transmitted or received.
The blink interval changes depending on the traffic on the network.</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></td></tr>
</table>

< NOTE >

- For information about the precautions for USB devices, see “PRECAUTIONS 5. USB DEVICES”.

1.5 Installation Environment

1.5.1 Environment

CAUTION

If you keep at high temperature this equipment, do not touch bare hands. Otherwise you may result burns.

When this equipment is used, it must be used in the following environment.

Item	Requirement
Ambient temperature (Operation)	0 to 55°C for altitudes up to 1000 m (1000BASE-T Link:0 to 50℃) 0 to 45°C for altitudes more than 1000 m up to 2000 m ※When using optional AC adapter:0 to 40℃
Ambient temperature (Storage)	-10 to 70℃
Temperature gradient	±15 K/h or less
Humidity	10 to 90%RH (non-condensing) ※When using optional AC adapter:20 to 80%RH
Dust (*1)	No heavy dust (0.3 mg/m^3 or less (JEITA IT-1004A classB))(*2)
Corrosive gas	Corrosive gas is less environment (JEITA IT-1004A class B) (*2) ※When using optional AC adapter: none (JEITA IT-1004A class A) (*2)
Vibration resistance	10-57Hz/ Half amplitude0.375mm, 57-500Hz/49m/s^2
Shock resistance	980m/s^2
Power voltage	12 to 24VDC +30%/-20% (Support input 100 to 240VAC with optional AC adapter. (A wide-range input voltage corresponds))
Power frequency(*3)	50/60 Hz ± 3 Hz
Power supply noise(*3)	2.0 kV (fast transient / burst wave)
Electrostatic noise contact discharge	4 kV (Air: 8 kV)
Insulation resistance(*3)	500 VDC, 5 MΩ
Dielectric strength(*3)	1.5 kVAC, one minute
Transient power fault(*3)	20 ms or less
Altitude	Less than 2000 m

(*1) This equipment cannot be used in the environment where conductive dust or the like is floating.
(*2) JEITA：Japan Electronics and Information Technology Industries Association.
(*3) When using optional AC adapter.

< NOTE >

- For information about the precautions for the environment, see "PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT (5) INSTALLATION ENVIRONMENT".

1.5.2 Installation

WARNING

- It may cause electric shock or equipment failure. When using this equipment without optional AC adapter and attached power cable, prepare the AC adapter and power cable which fit input voltage and inspect the safeness of this equipment enough.
- It may cause electric shock or equipment failure. The power cable attached to AC adapter is rated at the input voltage of 125VAC. When using this optional AC adapter at over 125 VAC, prepare the power cable which fit input voltage and inspect the safeness of this equipment enough.
- It may result in a fire or electric shock. When you connect the plug of the power cable to an outlet, make sure you use an outlet with a ground terminal (ground pole) that is properly grounded. In addition, you must install and use an earth leakage circuit breaker..
- It may cause electric shock or equipment failure. Do not use a two-prong plug without a ground pole.
- It may cause electric shock or equipment failure. Make sure to connect the ground wire to the ground terminal of the equipment when the user independently prepares a DC power supply unit and a DC power cable.

NOTICE

- When you transport or carry the equipment, pack it in the dedicated container (the container and packing materials used when the equipment was delivered). If you use other container or packing materials, that may damage the equipment.
- Do not use damaged or broken dedicated container when you transport or carry the equipment. If you do, that may damage the equipment.

< NOTE >

・For information about the precautions for concerning installation requirements, see “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT (5) INSTALLATION ENVIRONMENT”.

Table 1-2 Dimension, Service Clearance, and Installation Clearance

Dimension (mm)			Operation and service clearance (mm)				Installation clearance (mm)			
Height	Width	Depth	Front	Rear	Left	Right	Front	Rear	Left	Right
50	192	119	200	200	200	200	100	100	50	50

- During operation and installation, secure the space shown in Figure 1-4.
- Make sure not to prevents the air flow since this equipment adopt natural cooling. Especially, leave sufficient clearance in the front (100 mm) and in the rear (100 mm). (This includes clearance required for routing cable connectors for the rear side.)

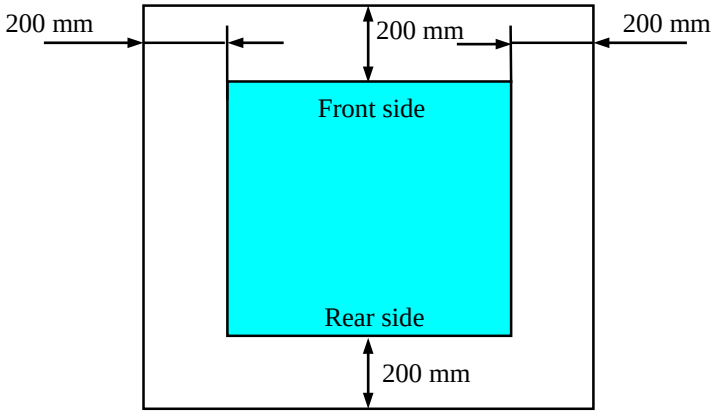


Figure 1-3 Service Clearance (Top View)

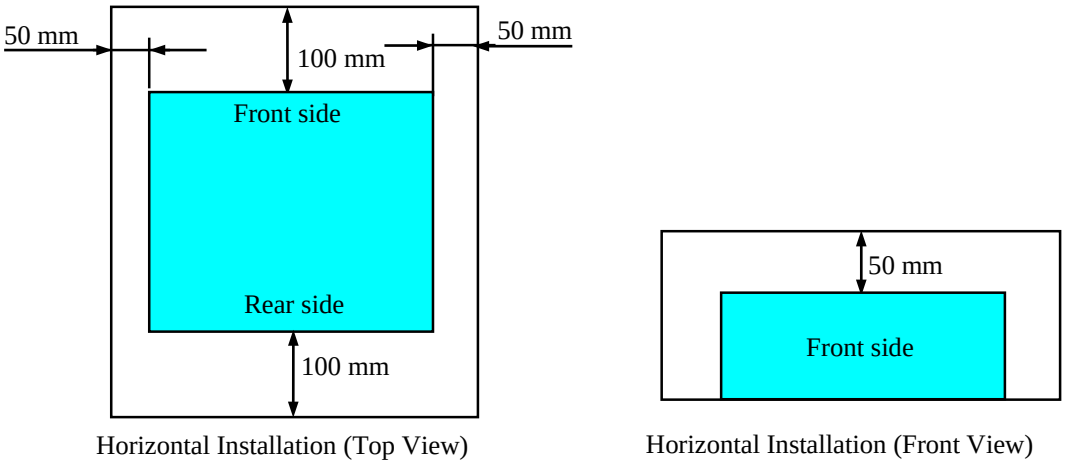


Figure 1-4 Operation and Installation Clearance

(a) Horizontal Installation

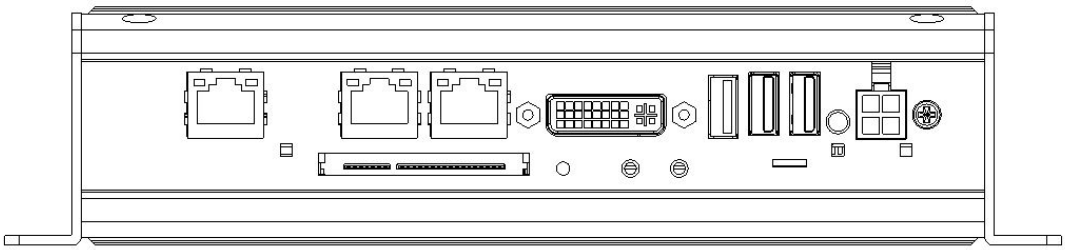


Figure 1-5 Exterior View (Horizontal Installation)

(b) Vertical Installation

⚠ CAUTION

- Make sure to install this equipment on the vertical mounting bracket with fasten screw, when you use this equipment in a vertical orientation. If you not, injury may result due to fall or fall down the equipment
- Make sure to confirm the installation work has been done securely. Injury may result due to drop the equipment since installing failure or loosing screw.

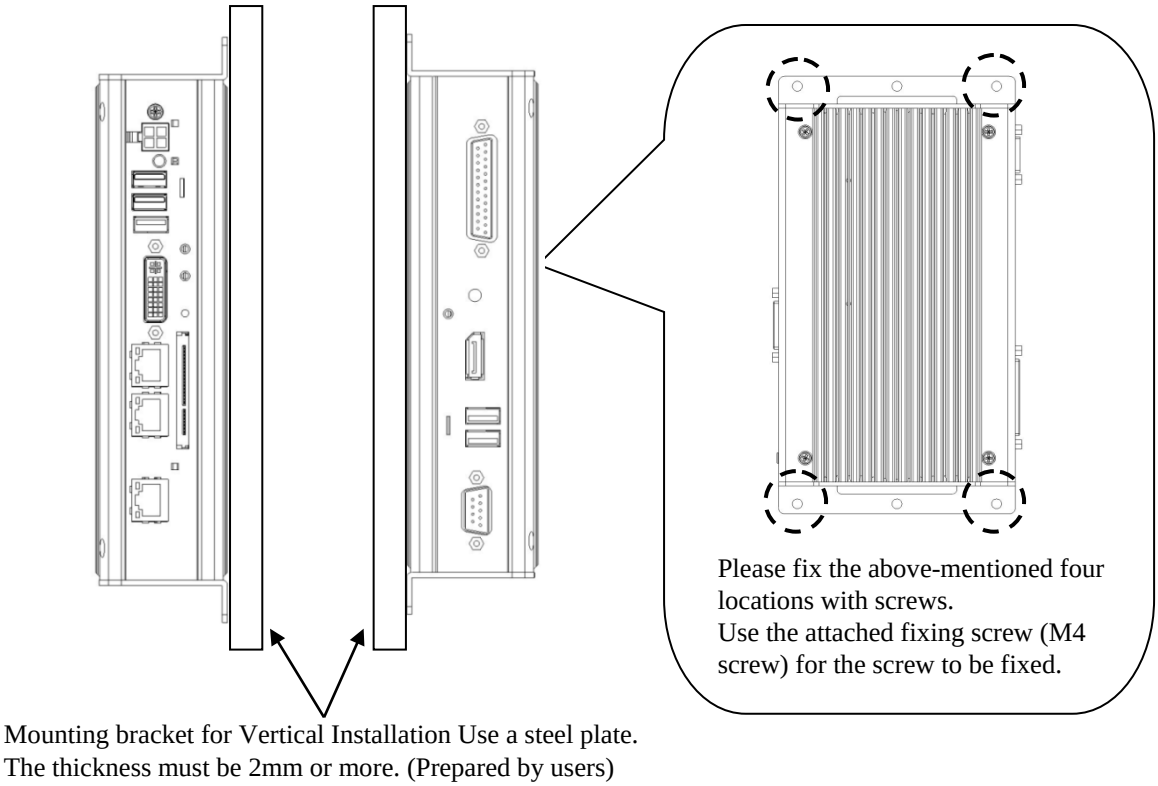


Figure 1-6 Exterior View (Vertical Installation)

< NOTE >

・When installing the equipment, please install so that vibration and impact applied to the equipment fall within the specification values of the equipment, see “1.5.1 Environment”.

1.6 Hardware Connection

NOTICE
● Do not route the interface cables, etc. (including cables for other devices such as a PC) near the power cable. If you do, a failure or malfunction of the equipment may result. ● Do not connect / disconnect the interface cable while this equipment and connected equipment are turned on. Failure of the equipment may result due to short circuit of power supply voltage. If the interface cable is disconnected while this equipment is on, shut down the OS and unplug the power cable from the DC power connector. If you unplug the power cable suddenly from the DC power connector without shutting down the OS, the contents of the file may be crashed. ● When you connect a cable for external contacts, make sure you connect the cable to a connector for the external contacts. If you connect the cable to the wrong connector, it may cause failure of the equipment.

Before you connect hardware, carefully read SAFETY INSTRUCTIONS in this document and fully understand the contents.

Connect hardware based on the connection example shown in the figure below.
When you use the optional AC adapter and attached power cable, plug the power cable to an outlet after connecting display, keyboard and mouse to the equipment.
Make sure to connect the ground wire to the ground terminal of the equipment after connecting display, keyboard and mouse to the equipment when the user independently prepares a DC power supply unit and a DC power cable without using the optional AC adapter and attached power cable.

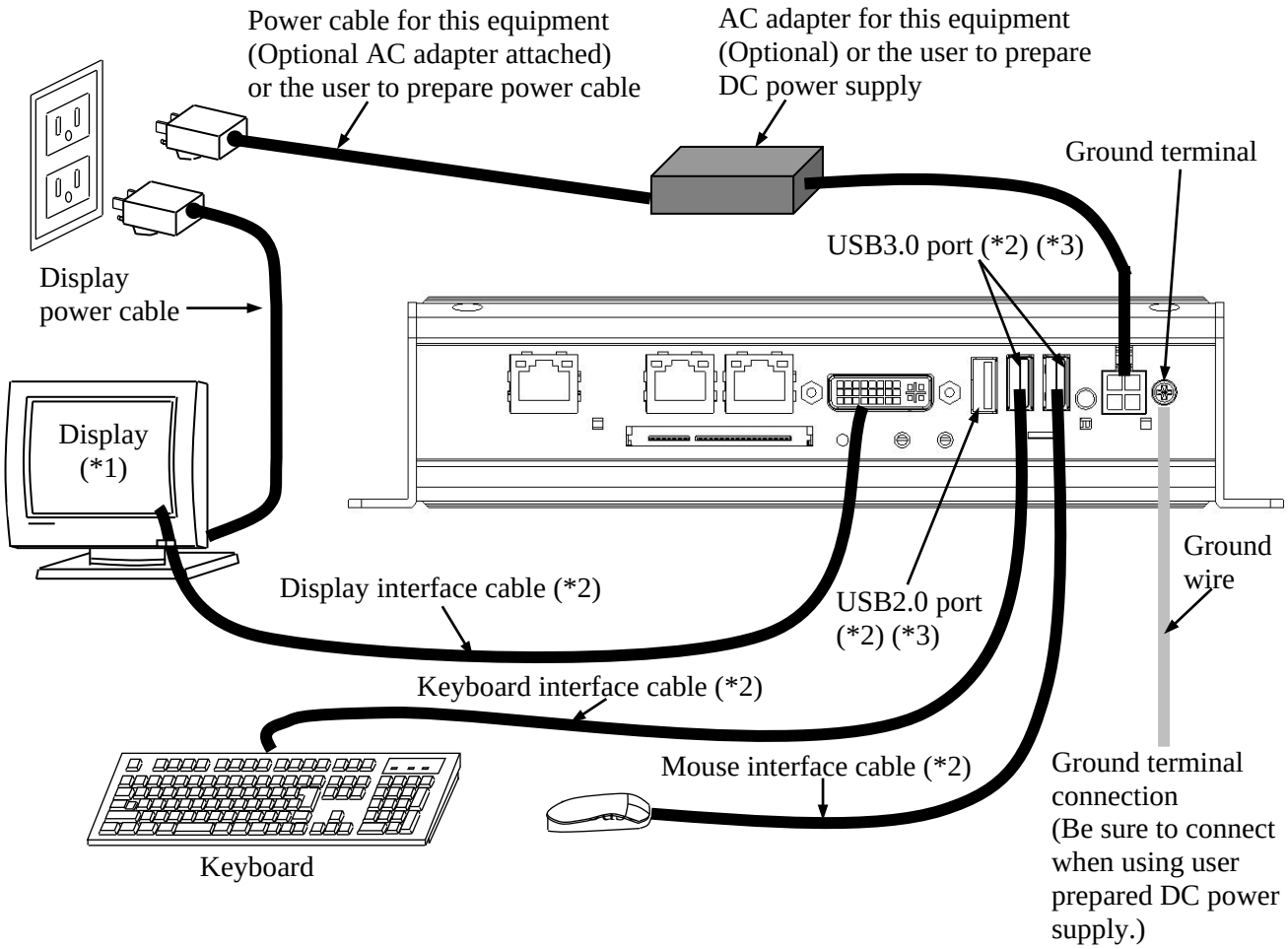


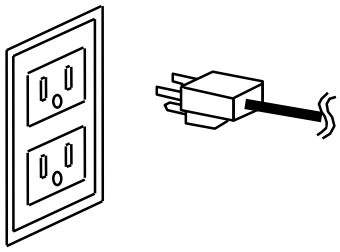
Figure 1-7 Hardware Connection

(*1) For information about the naming of the user input module and how to operate and adjust the device, refer to the user's manual that comes with the device.
(*2) For information about the length of each connection cable, see "5.5.3 External interface cable length specifications". The mouse and keyboard connection cables must be directly connected to this equipment. Do not use extension cables for them. If you use extension cables, the mouse or keyboard may not work properly.
(*3) When you connect USB devices to the USB connectors, pay attention to the orientation of the connector. In addition, in the USB port, a USB cable may fall out from the connector by the unexpected contact because there is not the locking mechanism of the connector in a standard. When you install this equipment, fix USB cables if it is necessary.

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

- Connecting to an outlet (When using optional AC adapter)

Plug the power cable that attached the optional AC adapter into a grounded outlet completely. (*1)



Make sure you use a power cable with a 2-pole plug with a grounding pole.

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

< NOTE >
- The power cable attached to AC adapter is rated at the input voltage of 125VAC. When using this optional AC adapter at over 125 VAC, prepare the power cable which fit input voltage and inspect the safeness of this equipment enough.

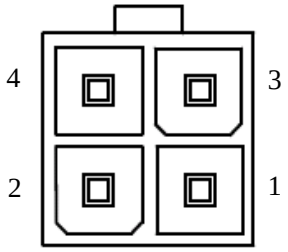
● DC power connector specification

WARNING

Do not exceed the specification range when the user prepare a DC power supply unit, a power cable, etc. connected to this equipment. If you do, fire may result.

When the user prepares a DC power supply unit and a DC power cable, use after conducting sufficient operation verification based on the following specifications by the user-self.

・DC power connector specification



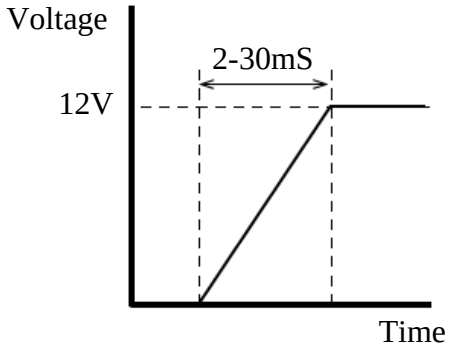
Pin No.	Signal name
1	GND
2	GND
3	12 to 24V DC
4	12 to 24V DC

Rated input voltage：12 to 24V DC
Input voltage range：10.8 to 33.6V DC (Rated input voltage -20% / + 30%)
power supply capacity：12V5A or less, 24V5A or less

・Connection cable specification (recommended)

Part name	Model	Manufacturer	Remarks
Housing	9357-04	ALEX	Match the housing maker and contact maker.
	5557-04R	MOLEX	
Contact	4256T2-LF（AWG18-24）	ALEX	
	5556（AWG18-24）	MOLEX	
Cable	-	-	Cable thickness: AWG 18 to 24, UL standard: UL1571, Flame retardant: VW -1 please use cables.

・Power rise time



1.7 Power cable

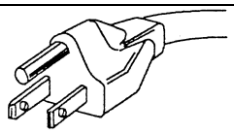
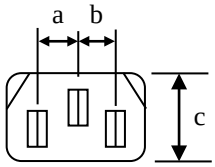
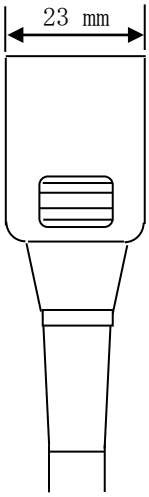
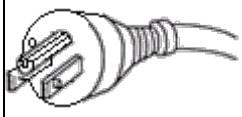
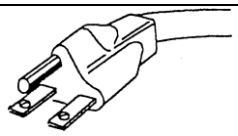
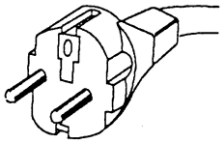
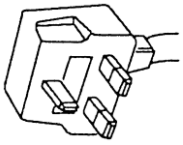
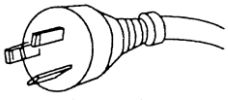
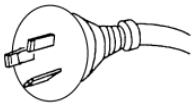
CAUTION

When procuring an AC power cable, make sure that the cable has proper rating and meets local safety requirements whatever applicable. Otherwise, an electric shock or machine failure may result.

The optional power cable that comes with the equipment is rated at the input voltage of 125 VAC.
When using this equipment at over 125VAC, prepare the power cable fitting input voltage and inspect the safeness of this equipment enough. Common power cables are shown in Table 1-3.

1 ANSI: American National Standards Institute
2 NEMA: National Electrical Manufacture’s Association
3 IEC: International Electrotechnical Commission
4 CEE: International Commission on Rules for the Approval of Electrical Equipment
5 BS: British Standard Institution
6 AS: Standards Association of Australia
7 GB:国家标准(Guójiā Biāozhǔn)

Table 1-3 Power Cord and Plug Identification

Input rating	*Plug configuration*	*Reference standards*	*Cord and connector*
100V - 120V	 North America	1 ANSI C73.11 2 NEMA 5-15P 3 IEC 83	 a=7±0.05 mm b=7±0.05 mm c=15.8 mm  Three-wire power cable with a two-pole three-terminal grounding-type connector. 电源线请务必使用带接地相的3相插头。
125V	 North America	1 ANSI C73.11 2 NEMA 5-15P 3 IEC C13	
200V - 240V	 North America	1 ANSI C73.11 2 NEMA 6-15P 3 IEC 83	
	 Universal Euro	4 CEE (7) II, IV, VII 3 IEC 83	
	 UK	5 BS 1365 3 IEC 83	
	 Australia	6 AS C112	
220V – 250V	 中华人民共和国	7 GB/T 5023.5 GB 1002, GB 2099.1 GB 17465.1 GB 15934	

This Page Intentionally Left Blank

CHAPTER 2 OPERATION

2.1 Before Turning on the Power

WARNING

Fire or equipment failure may result since the equipment inside temperature increase unless the installation clearance of this equipment is secure.
(See “1.5.2 Installation”.)

< NOTE >

When you turn on the power, see the following:

- “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT (2) INTERFACE CABLES
- “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT (4) POWER SUPPLY”
- “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT (5) INSTALLATION ENVIRONMENT”

2.2 Starting the Equipment

Follow the procedure below to start the equipment:

【When you turn on the power for the first time】

1. Turn on the power to the display.
2. When using the optional AC adapter and the attached power cable, connect it to this equipment and then plug the power cable attached the AC adapter into an outlet.
   When not using the optional AC adapter and the attached power cable, the user independently prepares a DC power supply unit and a DC power cable.
   And then plug the power cable after connecting to this equipment.
   When plugging the power cable, the equipment turns on and the power lamp (☼) lights up in "green".
3. After the OS starts, set up the equipment according to “3.1 Setup Procedure when You Turn on the Power for the First Time”. (You need to follow this procedure only once for the first time when you start the equipment after you purchase the equipment.)

【From the second time on, when starting the equipment】

Since the startup operation differs depending on the procedure after shutdown, start up the equipment with either Step 1 or Step 2 below.

1. When the main power OFF state (power lamp is off), start up the equipment by performing the operation “See 【When you turn on the power for the first time】 Step 2”.
2. When the standby state (power lamp is lit orange), press the power button (See “1.4 Name and Function of Each Part”) of this equipment to start up.
3. If you do either Step 1 or Step 2, the power turns on and the power lamp (☼) lights up in "green".

After the above steps are complete, the equipment automatically goes through the startup process until the sign in screen appears.

For information about how to control the power using the LAN, see “2.6 Controlling the Power Using the LAN”.

2.3 Shutting Down the Equipment

When you shut down the equipment, first confirm that no other users are using the equipment and no background programs are running. Then follow the procedure below:

・Stop application programs.

・Shut down the OS.

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

<If the OS is Windows® Embedded Standard 7>

To shut down the OS, click the **Start** button at the left bottom corner of the screen and click **Shut down**. After the OS is shut down, the power is automatically turned off and only the auxiliary power supply is on (standby mode). (At this time, the power lamp is lit orange.)

<If the OS is Windows® 10 IoT Enterprise>

To shut down the OS, click the Start button at the left bottom corner of the screen and open the start menu. Then click Power on the start menu and click Shut down. After the OS is shut down, the power is automatically turned off and only the auxiliary power supply is on (standby mode). (At this time, the power lamp is lit orange.)

If the normal shutdown process cannot be executed (for example, a shutdown request cannot be accepted due to system deadlock), open the protective cover on the right upper part of the front panel and press the power button for at least four seconds. The power is turned off and the equipment goes into the standby mode. If you turn off the power by pressing the power button for at least four seconds, you cannot turn on the power by way of the LAN next time. Do not turn off the power this way except for emergencies. (See “2.6 Controlling the Power Using the LAN”.) For information about how to collect a memory dump, see “8.2 Collecting a Memory Dump”.

2.4 Power Shutdown

1. Confirm that the equipment is shut down. (See “2.3 Shutting Down the Equipment”.)
2. Unplug the optional AC adapter power cable plug from the outlet. Or unplug the power cable directly from the DC power connector on the equipment.

2.5 Emergency Shutdown

WARNING

In case of smoke, a burning smell, or the like, unplug the power cable from the outlet, and contact your dealer or maintenance personnel. Using faulty equipment without repair may result in a fire or an electric shock.

NOTICE

- Performing emergency shutdown (e.g. unplug the power cable from the DC power connector without shutting down the OS, unplug the power cable of optional AC adapter from the outlet, or turn off the circuit breaker.) may cause the OS or applications not to work properly or may cause saved data to be corrupted. Do not perform emergency shutdown unless you must stop the system immediately due to some kind of error.
- If you turn off power at the source of power supply, the system may not be able to recover automatically.

In the following cases, turn off the power at the source of the power.

- When the equipment shows an error condition and you have to shut down the power immediately (for example, when a burning smell is detected).
- When you cannot shut down the equipment due to some error.
- When the power is turned off repeatedly or only the auxiliary power supply is on due to excess current or overheating.

Also, in the following cases, either disconnect the power cable from the DC power connector of the equipment or unplug the power cable of the optional AC adapter from the outlet, or shut off the power at the power supply source.

- If the fan is stopped and the temperature gets too high or too low and consequently the power is automatically turned off to protect the equipment and only the auxiliary power supply is on, after the OS starts, when a stopped fan is detected, the OS is automatically shut down and then the power is turned off (When already RAS was installed).

2.6 Controlling the Power Using the LAN

The power for this equipment can be turned on from a remote device by way of the LAN.

This section explains WOL (Wake ON LAN), which is used for turning on the power for the equipment through the LAN. When the power is turned on by using WOL, the equipment is started by sending a Magic Packet™ frame to the LAN interface when the standby lamp (☼) is lit orange.

In the initial factory default setting, this function is disabled. If you want to use this function, follow steps 1 through 3 described in "2.6.1 Enabling the WOL (Wake ON LAN) function" to enable the WOL function and then follow the steps below.

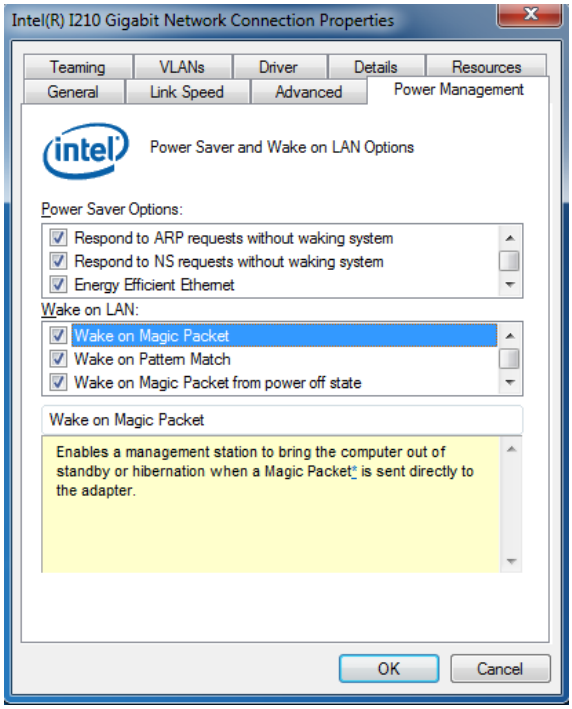
< NOTE >

- For information about the precautions for the network, see "PRECAUTIONS 2. NETWORK".

2.6.1 Enabling the WOL (Wake ON LAN) function

By following the procedure below, you can set up whether to start WOL when a Magic Packet™ frame is received. In the factory default setting, the WOL function is disabled. (The display image assumes Windows® Embedded Standard 7 but it is similar under other OS.)

1. Execute steps 1 though 5 in "● Setting up the network transfer speed" in "2.7 Setting Up the LAN Interface".
2. Click the **Power Management** tab. If you want to enable WOL, select the **Wake on Magic Packet from power off state** check box under **Wake on LAN :**.
3. Click **OK** and restart the system.



2.6.2 Turning on the power using the LAN

1. Turn on this equipment and start up. After the equipment started up, make sure to turn off the equipment by shutting down the OS. After turning off the power, Do not disconnect the power cable from the DC power connector of the equipment.
2. Send a Magic Packet™ frame to the built-in LAN adapter in the equipment. When the built-in LAN adapter receives a Magic Packet™ frame, the power turns on and the power lamp (☼) lights up in "green".

If you start the equipment and you want to continue to use WOL at the next startup, go through the shutdown process when you turn off the power.

The built-in LAN adapter in the equipment is compliant with WfM 2.0 (*1) to support the Magic Packet™ technology. Because of this, the power for the equipment can be turned on when a special data packet called a “Magic Packet™ frame” (*2) is received at the built-in LAN adapter.

A program for transmitting a Magic Packet™ frame does not come with the equipment. Use a commercially available program for to transmit the Magic Packet™ frame.

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

(*2) The Magic Packet™ technology has been proposed by AMD Japan, Ltd. and can be starting a PC on a network from a remote device.

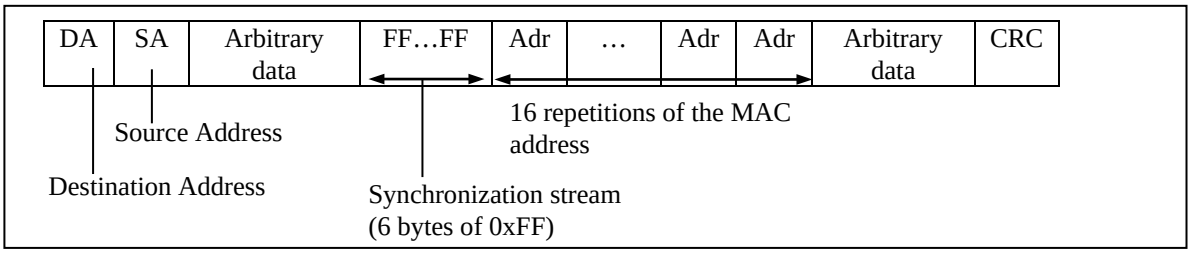
< NOTE >

- When you send a Magic Packet™ frame to the equipment, make sure you send it to the built-in LAN adapter in the equipment. (For information about the location of the connector, see “1.4 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 the power button for at least four seconds, you cannot use WOL the next time. When you turn off the power by pressing the power button for at least four seconds, turn on the equipment by pressing the power button and go through the shutdown process to turn off the power.

< About the Magic Packet™ frame >

In a Magic Packet™ frame, the SOURCE ADDRESS, DESTINATION ADDRESS (the MAC address of the receiver or the 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.

A Magic Packet™ frame is shown in the following figure.



2.7 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 connector (1000BASE-T/100BASE-TX/10BASE-T), see “1.4 Name and Function of Each Part”.

< NOTE >

・ For information about the precautions for the network, see “PRECAUTIONS 2. NETWORK”.

● Automatic recognition of the network transfer speed or transfer mode

The LAN port has an auto-negotiation function to automatically recognize the network transfer speed or transfer mode. For normal use, enable the auto-negotiation function. (Especially when you use the WOL function. If the speed is fixed to 1000Mbps (auto-negotiation), the WOL function cannot be used.)

If there is a compatibility issue with the connected hub, the auto-negotiation function may not work properly and that may affect the communication with other terminals.

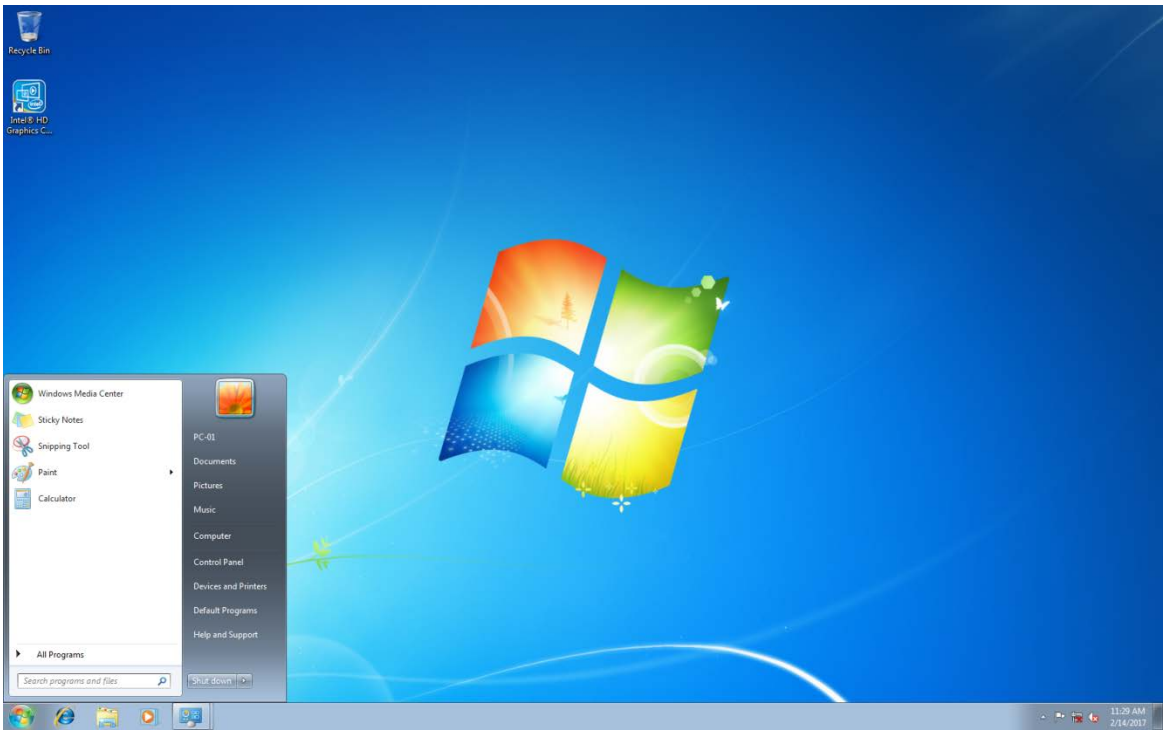
If the auto-negotiation function does not work properly, configure the LAN interface as follows.

Specification of the hub	Specification of the LAN setting (*)	
	Speed	Duplex
10 Mbps / Half-duplex	10 Mbps	Half Duplex
10 Mbps / Full-duplex	10 Mbps	Full Duplex
100 Mbps / Half-duplex	100 Mbps	Half Duplex
100 Mbps / Full-duplex	100 Mbps	Full Duplex
1000 Mbps	1000 Mbps (1.0 Gbps)	Auto Negotiation or Full Duplex

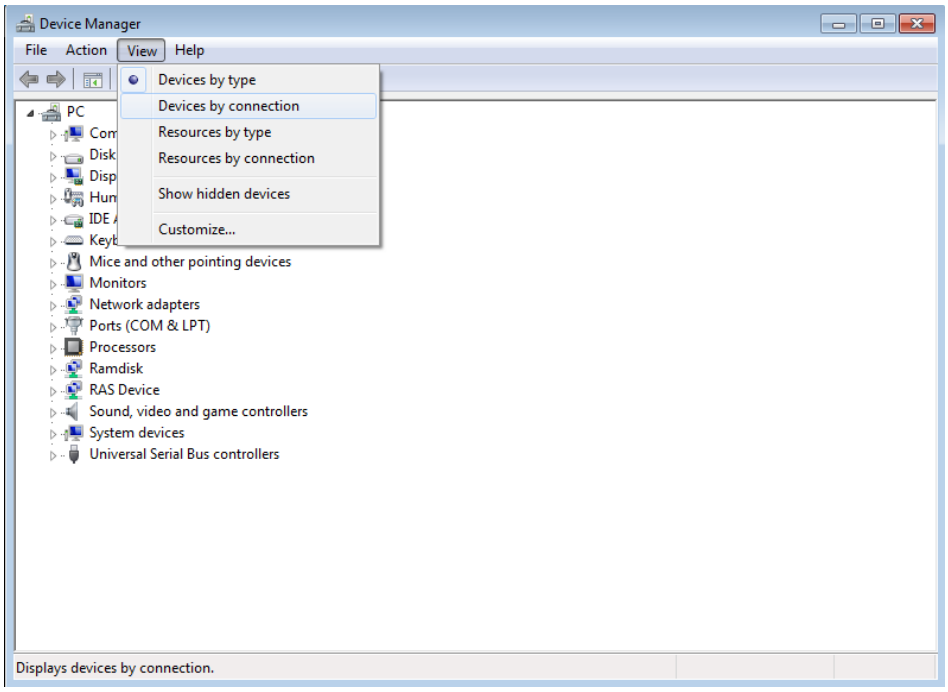
(*) How the setting is displayed is different depending on the OS and the LAN port in use.

● Setting the network transfer speed
(The display image assumes Windows® Embedded Standard 7 but it is similar under other OS.)

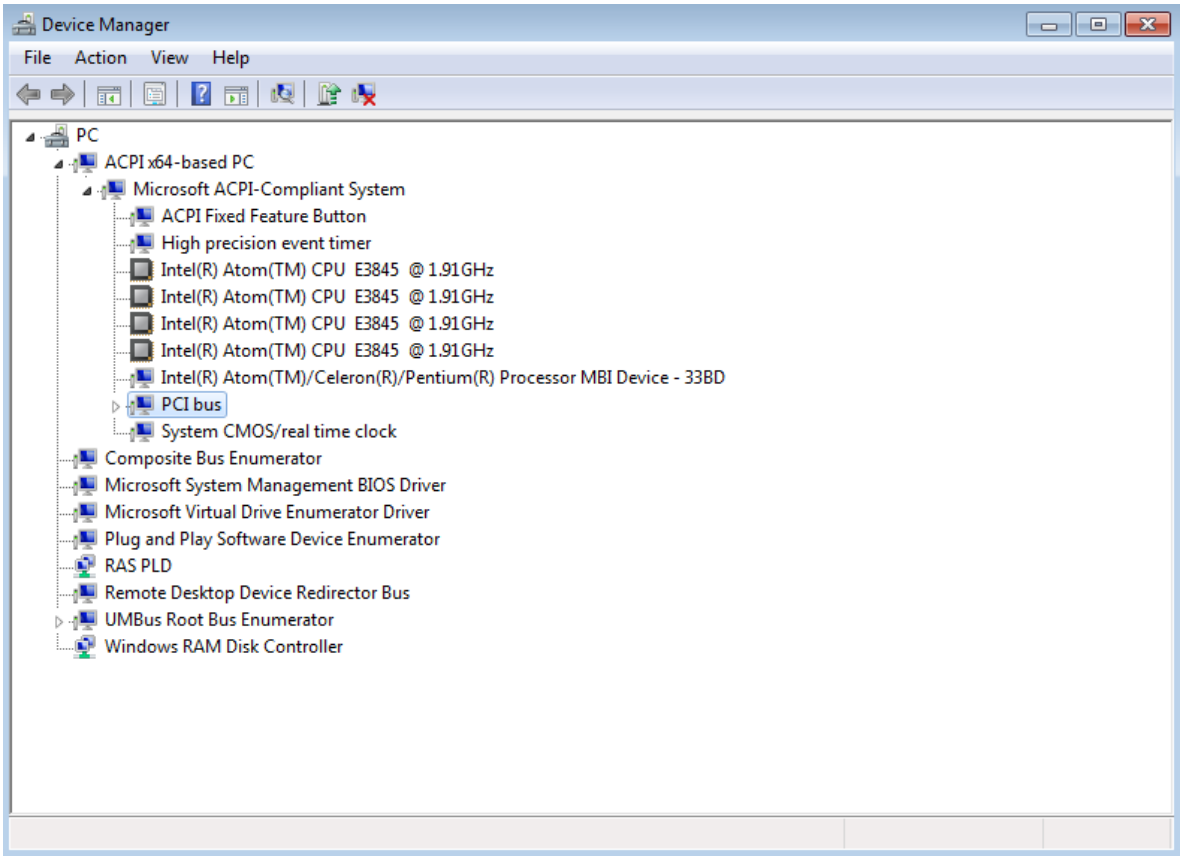
1. Log on to the computer using an administrator's account.
2. Click **Start** and click **Control Panel**.
   (If the OS is Windows® 10, right-click **Start** and click **Control Panel** from the menu.)
3. Since the **Control Panel is displayed,** and click **System and Security**.
4. Click **System** > **Device Manager**.



5. Click the **View** menu and select **Devices by connection**.



6. Click **ACPI x64-based PC** > **Microsoft ACPI-Compliant System** > **PCI bus**.
(If the OS is Windows® 10, click **ACPI x64-based PC** > **Microsoft ACPI-Compliant System** > **PCI Root Complex**.)

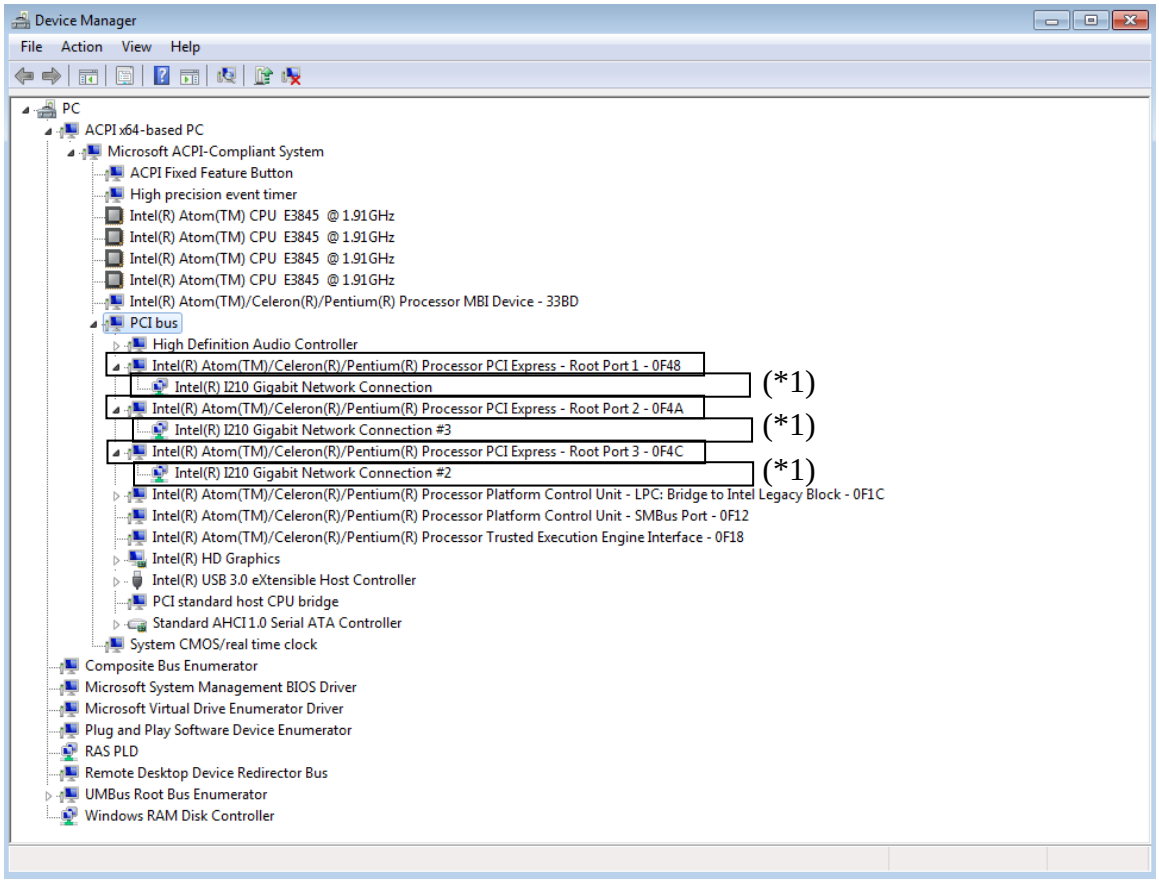


7. See the following and double-click the network adapter you want to configure and open **Network Connection Properties** window.
   The figure below is an example. Please note that the display name of the network adapter varies depending on the equipment.

   [When you configure the built-in LAN (LAN A)]
   Click **Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express – Root Port1 – 0F48**.
   Then double-click the network adapter under it (in the example in the figure below, **Intel(R) I210 Gigabit Network Connection#3** (*1)).

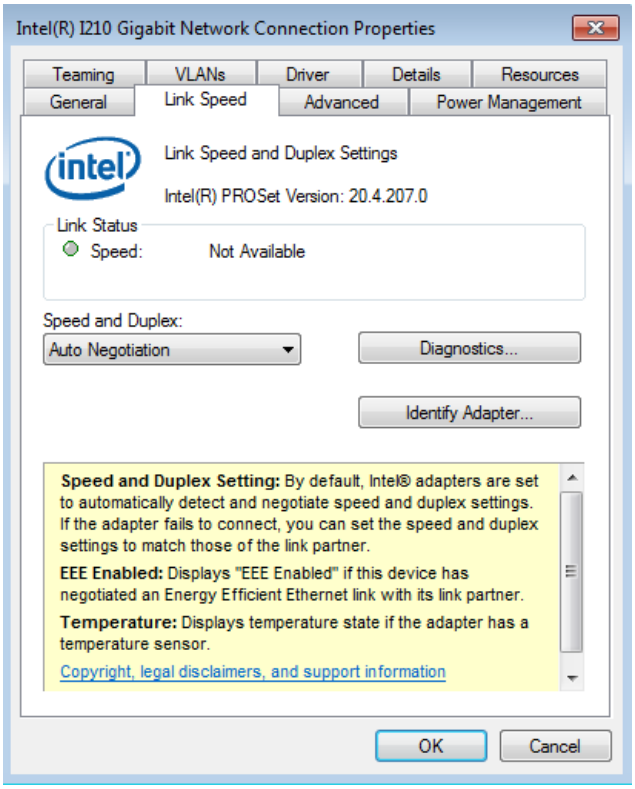
   [When you configure the built-in LAN (LAN B)]
   Click **Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express – Root Port2 – 0F4A**.
   Then double-click the network adapter under it (in the example in the figure below, **Intel(R) I210 Gigabit Network Connection#2** (*1)).

   [When you configure the built-in LAN (LAN C)]
   Click **Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express – Root Port3 – 0F4C**.
   Then double-click the network adapter under it (in the example in the figure below, **Intel(R) I210 Gigabit Network Connection** (*1)).



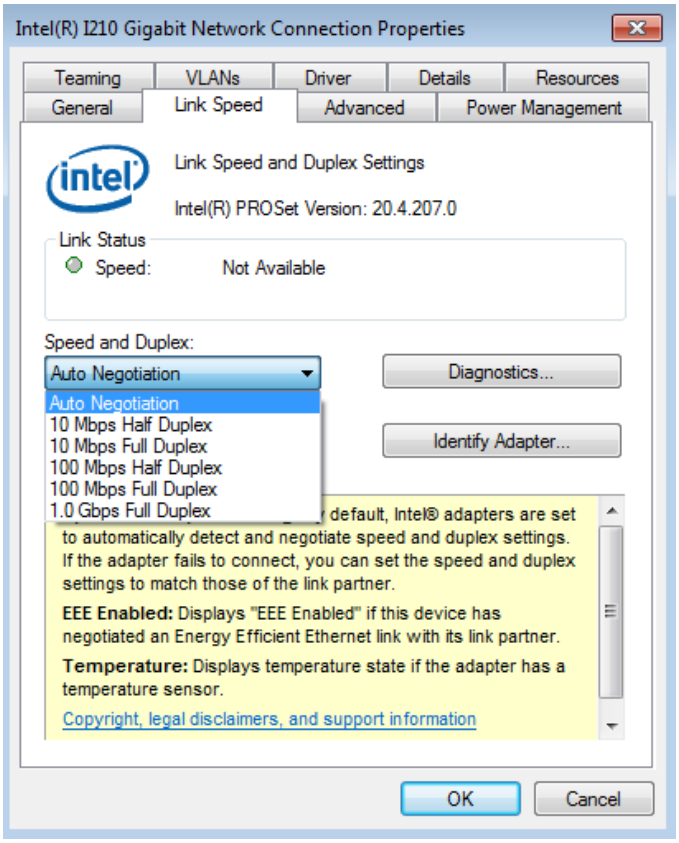
（*1） The display name of the network adapter depends on the equipment.

8. Click the **Link Speed** tab.



9. Select the transfer speed and the transfer mode you want to choose from the **Speed and Duplex** list.
   - 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
   - 1.0 Gbps Full Duplex: 1.0 Gbps/Full-duplex setting

If you do not have to configure the transfer speed and the transfer mode, select **Auto Negotiation** at the top of the list to choose the auto-negotiation setting.



10. Click **OK**.
11. Close the **Device Manager** window.

< NOTE >

- For information about the precautions for the network, see “PRECAUTIONS 2. NETWORK”.

● Action to take if the link is unstable at 1000 Mbps

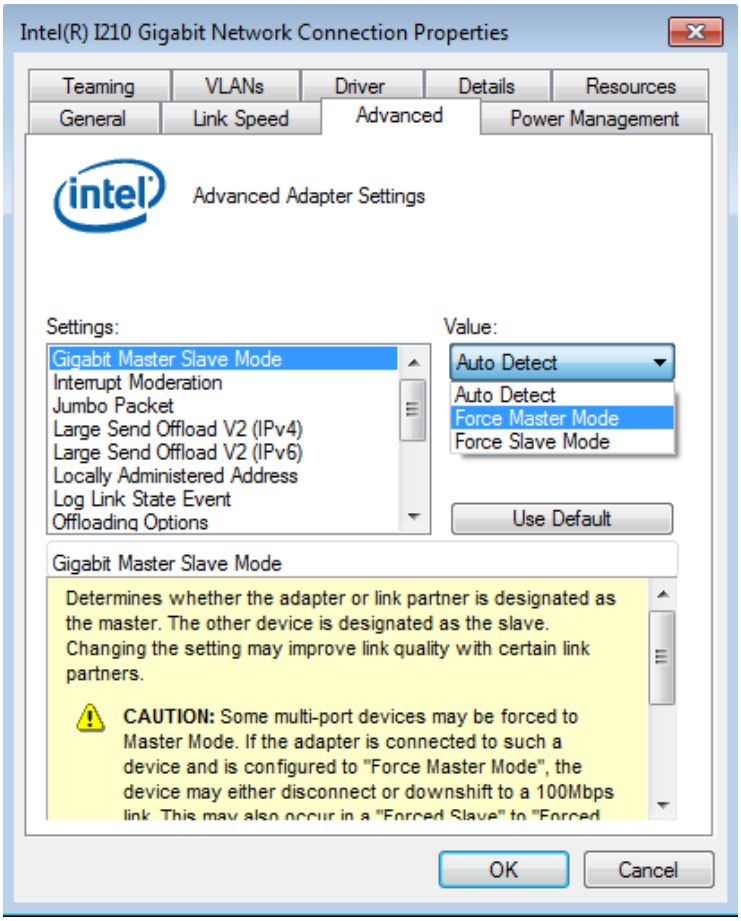
Depending on the type of the connected hub, the link may not be stable at 1000 Mbps. If you want to use the network at 1000 Mbps, verify the connection with the hub in advance. If the link is unstable at 1000 Mbps, it is made stable by taking the following action.

• Use a cable which is 20 to 100 meters long (UTP Category 5e or better).

• Fix the master/slave mode setting to Master (valid only in the 1000Mbps setting).

Follow the procedure below to fix the mater/slave mode to Master. The link may not function depending on the type of the hub. In this case, re-set the setting to **Auto Detect**.

1. Execute steps 1 though 5 in "● Setting the network transfer speed" in "2.7 Setting Up the LAN Interface".
2. Click the **Advanced** tab. Select **Gigabit Master/Slave Mode** from the **Settings** list.
3. From the **Value** pull-down menu, select **Force Master Mode**.
4. Click **OK** and restart the equipment.



● Notes about the case when link down is recorded in the log during OS startup.

While Windows® is starting, the following warnings may be displayed in the event log. These warnings are recorded by the initialization process of the LAN driver at the startup of Windows® and will not cause any problems in the system operation.

Event ID	Source	Type	Category	Description(*1)
27	e1rexpress	Warning	None	Intel(R) I210 Gigabit Network Connection(*1) Network link is disconnected.(*2)

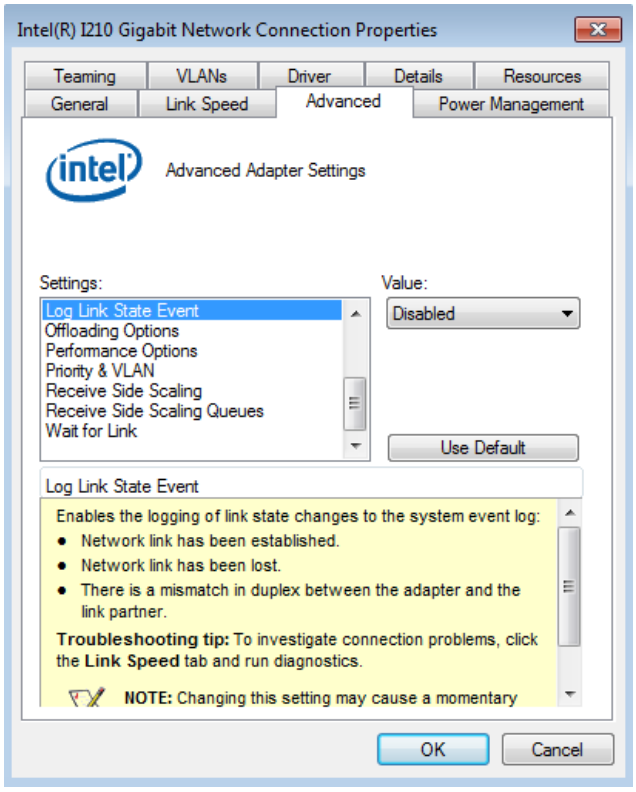
(*1) How the name is displayed differs depending on the LAN adapter
(*2) How the contents are displayed differs depending on the OS.

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

Note that if you change the settings shown below, log entries such as LAN connection and disconnection during system operation are also not recorded and that may make failure analysis difficult when a problem occurs.

(The display image assumes Windows® Embedded Standard 7 but it is similar under other OS.)

1. Execute steps 1 though 5 in "● Setting the network transfer speed" in "2.7 Setting Up the LAN Interface".
2. Click the **Advanced** tab. Select **Log Link State Event**. Select **Disabled** from the **Value** list.



2.8 Setting Up the Screen

For screen settings, you can configure resolution (the number of dots that constitutes the screen), refresh rate (the number of screen refreshes per second), and the single- display and multiple-display settings.
(The display image assumes Windows® Embedded Standard 7 but it is similar under other OS.)

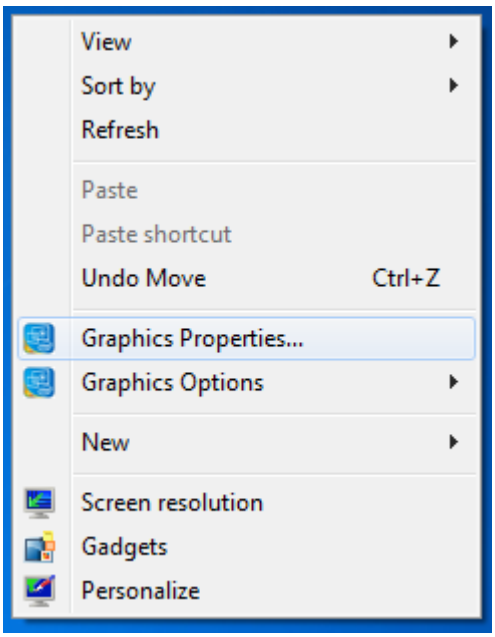
< NOTE >

- For information about the precautions for the screen, see “PRECAUTIONS 3. DISPLAY SCREEN”.
- When you want to change screen settings, use "Intel® HD Graphics Control Panel" and change the screen settings.

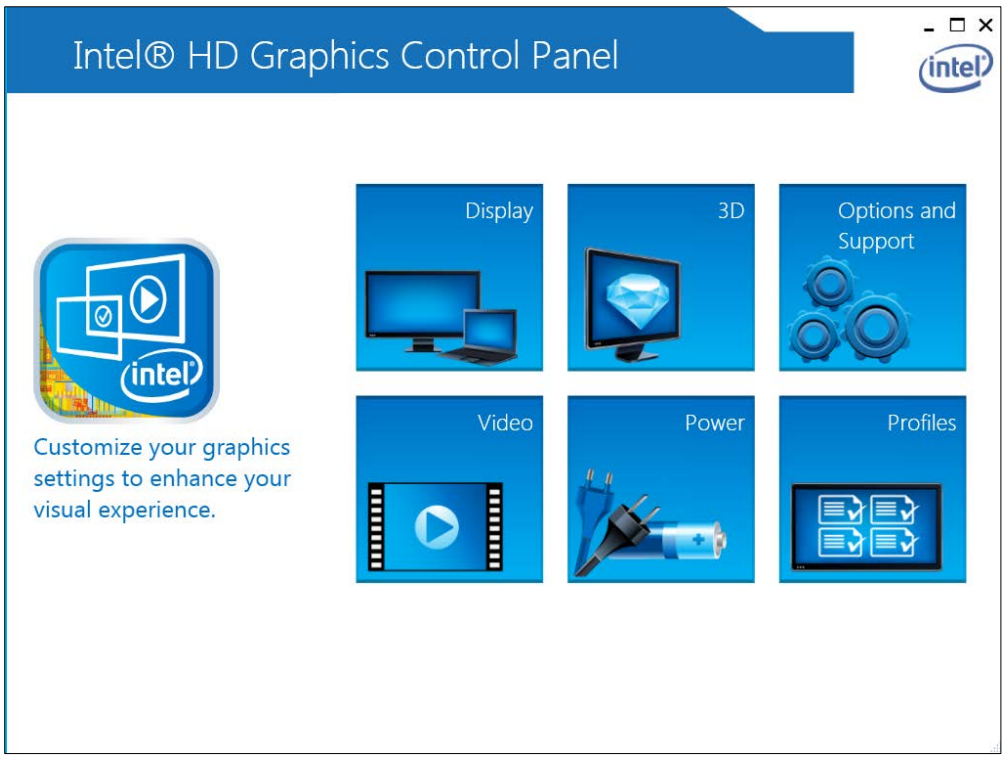
(1) Configuring screen settings for a single display

When one display is connected, follow the procedure below to configure the screen settings.

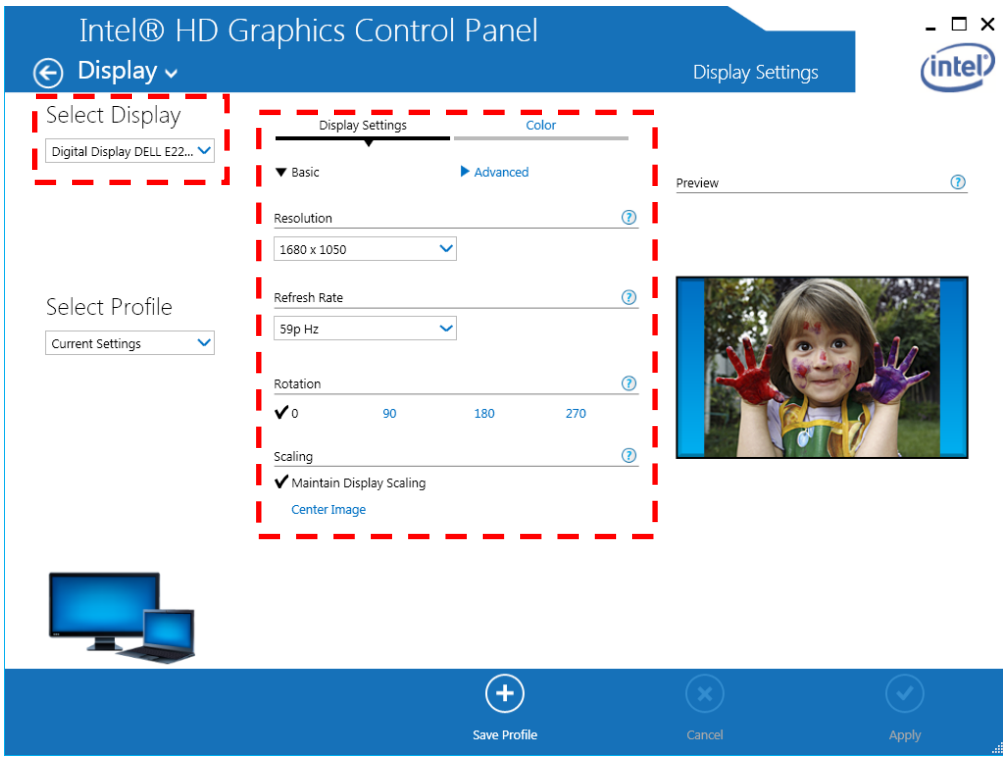
1. Right-click on the desktop to display a menu. From the menu, click **Graphics Properties** to start **HD Graphics Control Panel**.



2. In the **HD Graphics Control Panel** window, click **Display**.



3. Please set the screen with the item in the dotted line below.

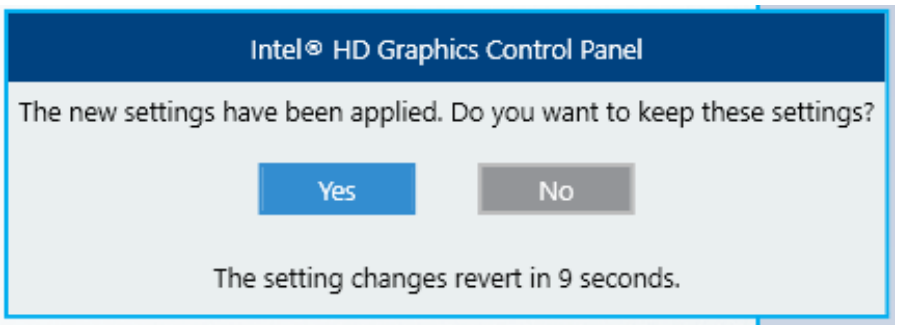


Setting Item	Description
Resolution	This allows you to select the resolution.
Refresh Rate	This allows you to select the refresh rate.

< NOTE >

- Do not change the Rotation and Scaling settings.
- When you configure the resolution, color depth, and refresh rate, you must choose from the options described in “5.1 Equipment Specification (5) Supported resolutions”.

4. When you finish configuring the setting items, click **Apply**. If you change the resolution or refresh rate, the following confirmation screen for the configuration change will be displayed. Click **Yes**.



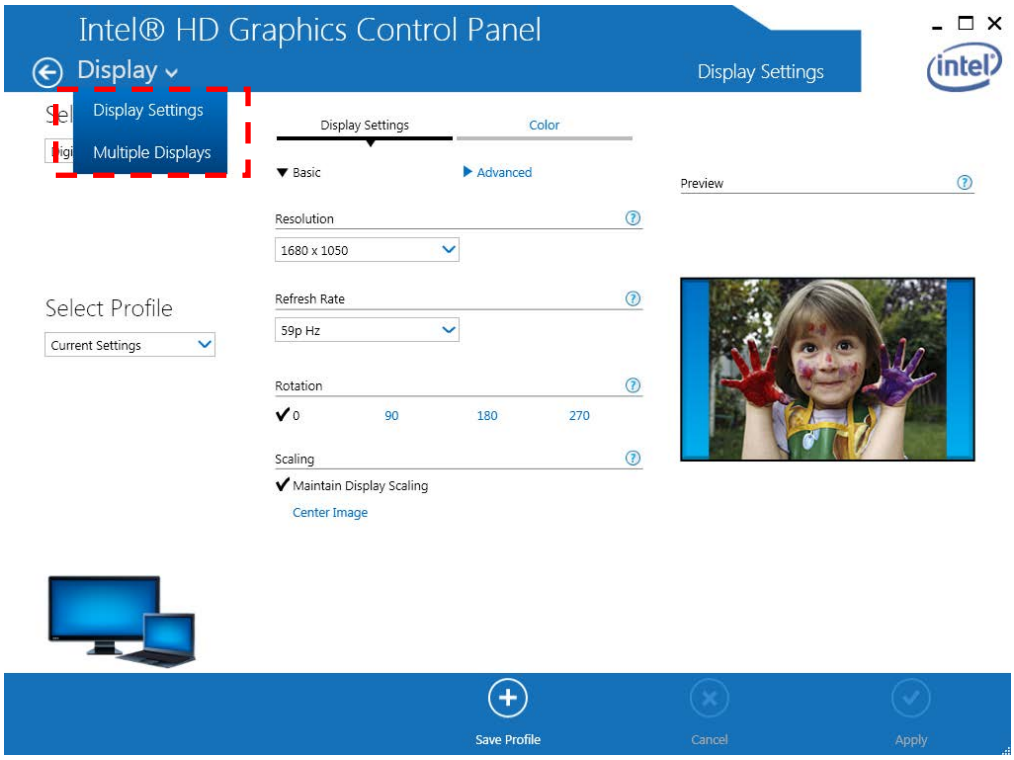
< NOTE >

- The resolution options may include resolutions larger than the resolutions supported by the connected display.
- If you select a resolution larger than the maximum resolution supported by the display, the display will black out.
- After the driver is installed, the resolution is automatically set to the maximum resolution supported by the connected display. When you change the resolution, select a resolution smaller than that.

(2) Configuring screen settings for multiple displays

This equipment supports multiple display output. If you connect multiple displays, the multiple displays can be used simultaneously. The following shows how to set up the multiple display output.

1. Execute steps 1 though 2 in (1) Configuring screen settings for a single display".
2. Click **Display** at the upper left corner in the window, and then click **Multiple Displays**. Then configure the settings for multiple displays.
   See "(a) Clone display", "(b) Extended desktop" setting method.



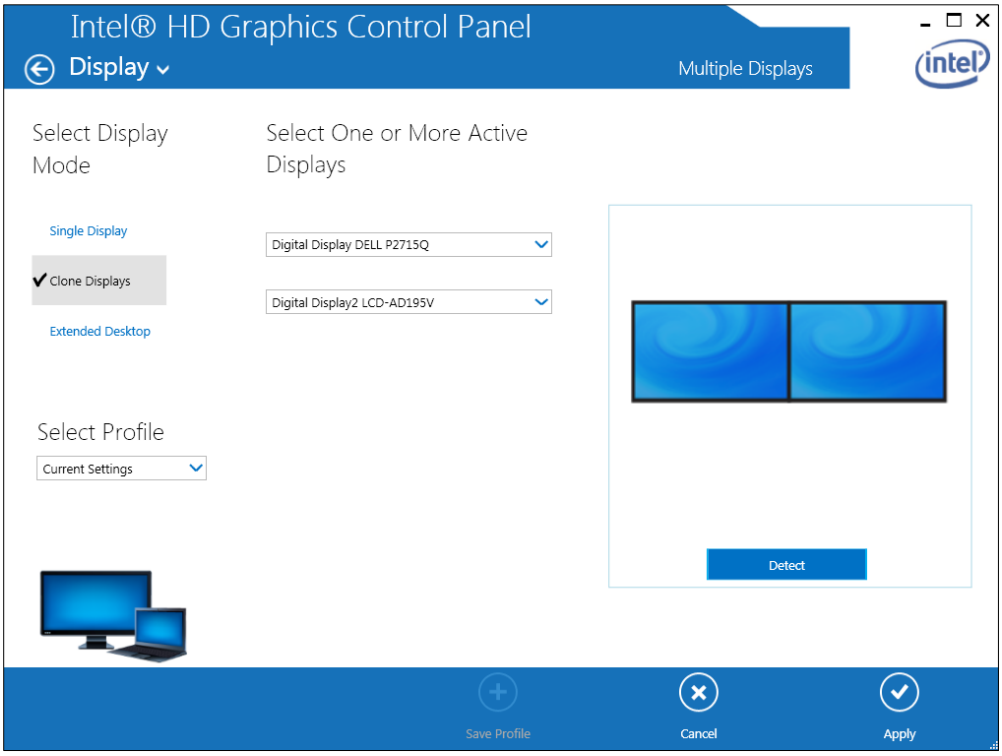
< NOTE >

- The multi-stream function (daisy chain) of DisplayPort is not supported.

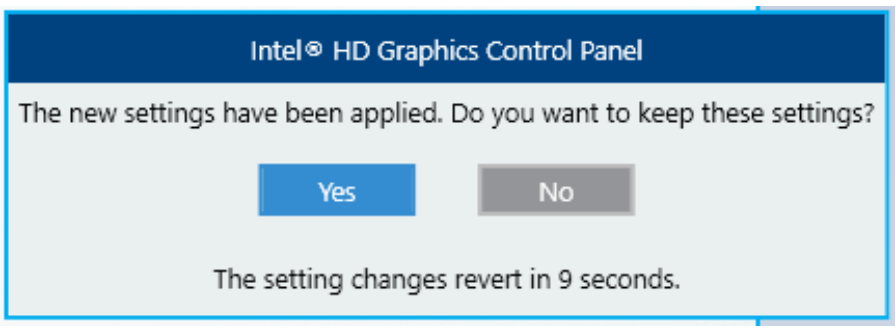
(a) Clone display

If you select this mode, multiple displays show the same screen and have the same resolution, color depth, and refresh rate. Before connecting displays, check the capabilities of the displays (maximum resolution, highest refresh rate, and so on).

1. Open **Multiple Displays** and Select **Select Display Mode** > **Clone Displays**.



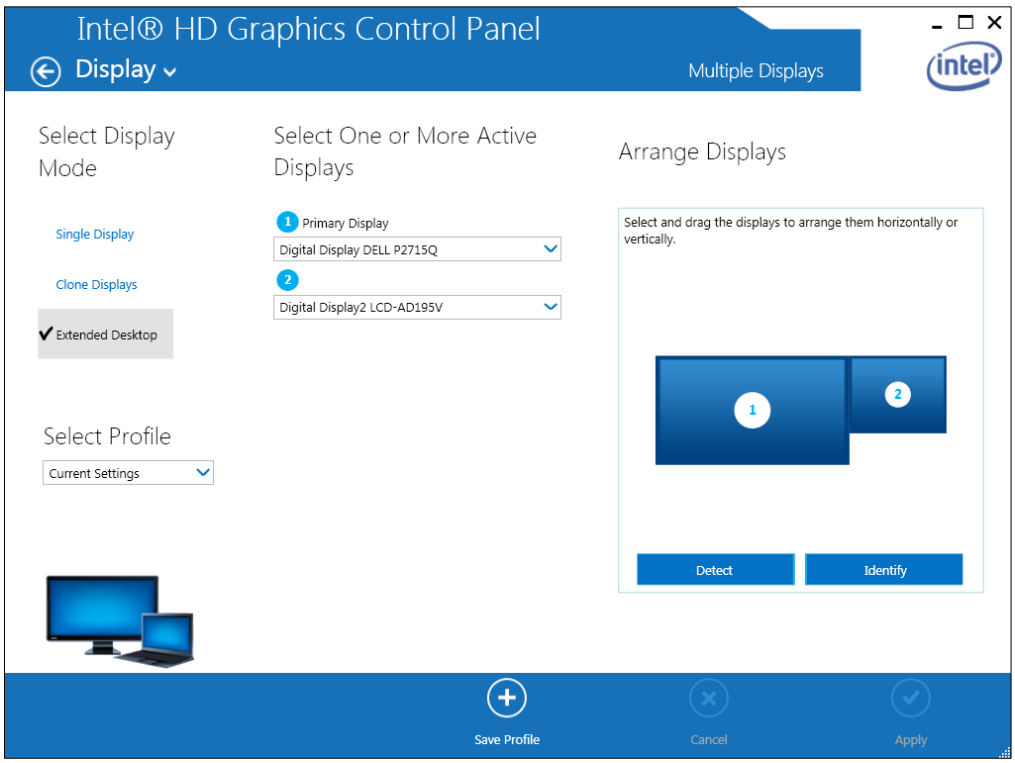
2. When you finish configuring the settings, click **Apply**. If you change the resolution or refresh rate, the following confirmation screen for the setting change will be displayed. Click **Yes**.



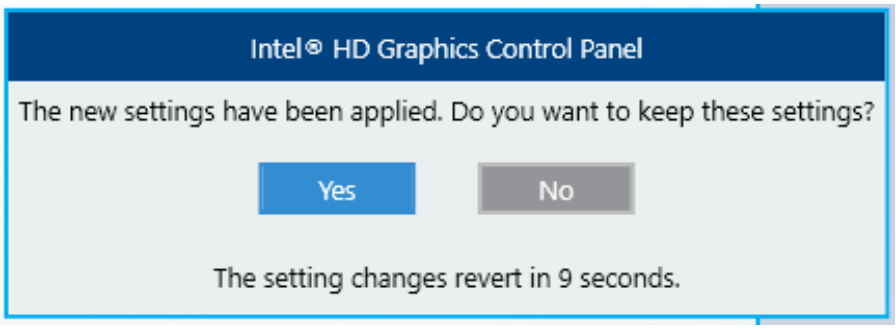
(b) Extended desktop

If you select this mode, one screen is divided into multiple and displayed on multiple displays. The resolution, color depth, and refresh rate can be configured independently. The task bar is displayed in primary display only. Which resolution, color depth, and refresh rate can be selected depends on the capabilities of the display connected.

1. Open **Multiple Displays** and Select **Select Display Mode** > **Extended Desktop**.



2. When you finish configuring the settings, click **Apply**. If you change the resolution or refresh rate, the following confirmation screen for the setting change will be displayed. Click **Yes**.



This Page Intentionally Left Blank

CHAPTER 3 SETUP

3.1 Setup Procedure when You Turn on the Power for the First Time

3.1.1 Setting up Windows® Embedded Standard 7

This section describes the procedure for setting up the preinstalled Windows® Embedded Standard 7.

- Set basic items of Windows® Embedded Standard 7.
- The RAS function is automatically set up.
- This setup procedure takes about 20 minutes.

● Preparation for setup

The following items are required during the setup procedure. Prepare (check) them in advance before starting the setup procedure.

Item	Description
License certificate	Confirm that the license certificate is attached to the body of this computer.
User name	User name of the computer administrator account You can later change it in Control Panel.
Password	The password for the user name. You can later change it in Control Panel.
Computer name	The name used for identifying the computer on the network. ・This name is used for identify the computer on the network. Select a unique name on the network. You can later change it in Control Panel.

● Windows® Embedded Standard 7 setup procedure

Perform the following procedure to set up Windows® Embedded Standard 7.

1. Remove the external storage device from the equipment if it is connected to this equipment.
2. Turn on this equipment.

   Windows starts running and setup is prepared.

   Then, the message “Setup is installing devices. Please wait...” appears, indicating that installation of the device driver is in progress.

   • This processing may take several minutes. Please wait until it is completed.

   After a while, the Windows® Embedded Standard 7 setup window opens.
3. A window is displayed to select a display language.

   Select a display language and then click **Next**. For example, if you want to select the English language, select **My language is English** from the list.

   (It should be noted that the language used in the window is changed to the specified display language immediately after you select the language.)

   The correspondence between the display language and the notation in the list is as in the table below. (In the same order as in the list)

Display language	Notation in the list
English	My language is English
Japanese	私の言語: 日本語

< NOTE >

・ If you select Japanese, RAS software for Japanese environment will be installed, so if you have the possibility of switching to a language other than Japanese for overseas later, select English and select the English version of RAS software Please be sure to install it.

4. The country or region, time and currency format, keyboard layout setting screen is displayed.

   ・If you selected English with step 3, click **Next** with the settings as it is.

   ・If you selected Japanese with step 3, set the country / region, time and currency format, keyboard layout, if necessary, and click **Next**. At this time, please select "日本語 (日本)" for the time and currency format.

5. The user name input window is displayed.

   ・Enter the user name and the computer name and click **Next**.

6. The password input window is displayed.
   · Enter a password in the **Type a password** box and in the **Retype your password** box.
   · Enter a password hint in the **Type a password hint** box.
   · Click **Next**.
7. The **Help protect your computer and improve Windows automatically** window is displayed.
   · Click **Ask me later**.
8. The **Review your time and date settings** window is displayed.
   · Configure the time zone, the date and the time.
   · Click **Next**.

< NOTE >

- Regardless of the display language selected at step 3, “(UTC)Coordinated Universal Time” is selected as the time zone by default. Set the time zone according to the actual location where this equipment is used.

9. The **Windows Security** window is displayed.
   · Click **Install**.
10. The **Windows Security** window will be displayed again, so click **Install** in the same way.
11. After the setup is completed, this equipment is automatically logged on to the Windows and then this equipment automatically restart..
12. After the log-on window is displayed, enter the password and log on to the Windows.

This completes Windows® Embedded Standard 7 Professional setup. From this point on, follow the instruction in “3.2 Configuring Basic Settings after OS Setup” to configure the basic settings of the OS.

3.1.2 Setting up Windows® 10

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

- Set basic items of Windows® 10.
- The RAS function is automatically set up.
- This setup procedure takes about 20 minutes.

● Preparation for setup

The following items are required during the setup procedure. Prepare (check) them in advance before starting the setup procedure.

Item	Description
License certificate	Confirm that the license certificate is attached to the body of this computer.
User name	The user name of an administrator account of the computer. You can later change it in Control Panel.
Administrator’s password	Password of the administrator This password can be changed later on the control panel.

● Windows® 10 setup procedure

Perform the following procedure to set up Windows® 10.

1. Remove the external storage device from the equipment if it is connected to this equipment.
2. Turn on this equipment.
   Windows starts running and setup is prepared.
   Then, the message “Setup is installing devices. Please wait...” appears, indicating that installation of the device driver is in progress.
   • This processing may take several minutes. Please wait until it is completed.
   • After the OS reboots, Setup goes on.
3. The **Hi there** window opens.
   Select the language and setting item to use, and click **Next**.
   (It should be noted that the language used in the window is changed to the specified display language immediately after you select the language.)

< NOTE >

・ The default setting of the time zone is "(UTC + 09: 00) Osaka, Sapporo, Tokyo". When you change the time zone, the system time is changed from the time zone of "(UTC + 09: 00) Osaka, Sapporo, Tokyo" by the time difference.

・ If you select Japanese, RAS software for Japanese environment will be installed, so if you have the possibility of switching to a language other than Japanese for overseas later, select English and select the English version of RAS software Please be sure to install it.

4. The **Here's the legal stuff** window opens.
   • Check the contents, and then click **Accept**.
5. The **Get going fast** window opens.
   • Click **Customize**.
   • Select On or Off for settings as needed, and then click **Next**.
6. The **Create an account for this PC** window opens.
   • Type a user name in **Who's going to use this PC?**.
   • Type a password in **Enter password** in **Make it secure**.
   • Retype the password in **Re-enter password**.
   • Type a hint of password in **Password hint**.
   • Click **Next**.

< NOTE >

Rarely you can not type Japanese when typing a password hint.
In this case, type Japanese by the following method.

- Move the input point to **Who's going to use this PC** and check whether you can type Japanese. If you can type Japanese, move the input point to **Password hint** and check if you can type Japanese.
- If you can not enter Japanese even if the above correspondence is done, reset password after setup and enter hint of password.

7. Setup will continue.
8. After automatically signing in, please wait as it will display "Setup is starting. Please wait. The system will restart automatically."
   - This processing may take several minutes. Please wait until it is completed.
   - Restart after processing is completed.
9. After rebooting, setup is complete. Please sign in to this device.

The Windows® 10 setup procedure has been completed. From this point on, follow the instruction in "3.2 Configuring Basic Settings after OS Setup" to configure the basic settings of the OS.

3.2 Configuring Basic Settings after OS Setup

3.2.1 Basic settings for Windows® Embedded Standard 7

This section describes the basic settings procedure of the preinstalled Windows® Embedded Standard 7.
Perform this procedure as needed after the setup of OS according to “3.1 Setup Procedure when You Turn on the Power for the First Time”.

3.2.1.1 Outline of basic settings procedure

Setting up the network environment → See “2.7 Setting Up the LAN Interface”.

Setting up the screen → See “2.8 Setting Up the Screen”.

Setting up auto-update → See “3.2.1.2 Setting up Auto-update”.
・The procedure takes about 5 minutes.

Only when changing display language

Change display language → See “3.2.1.3 Setting display language”.

Only when using the Internet Exp1orer 11

Internet Explorer 11 setup procedure → See “3.2.1.4 Internet Explorer 11 setup procedure” .

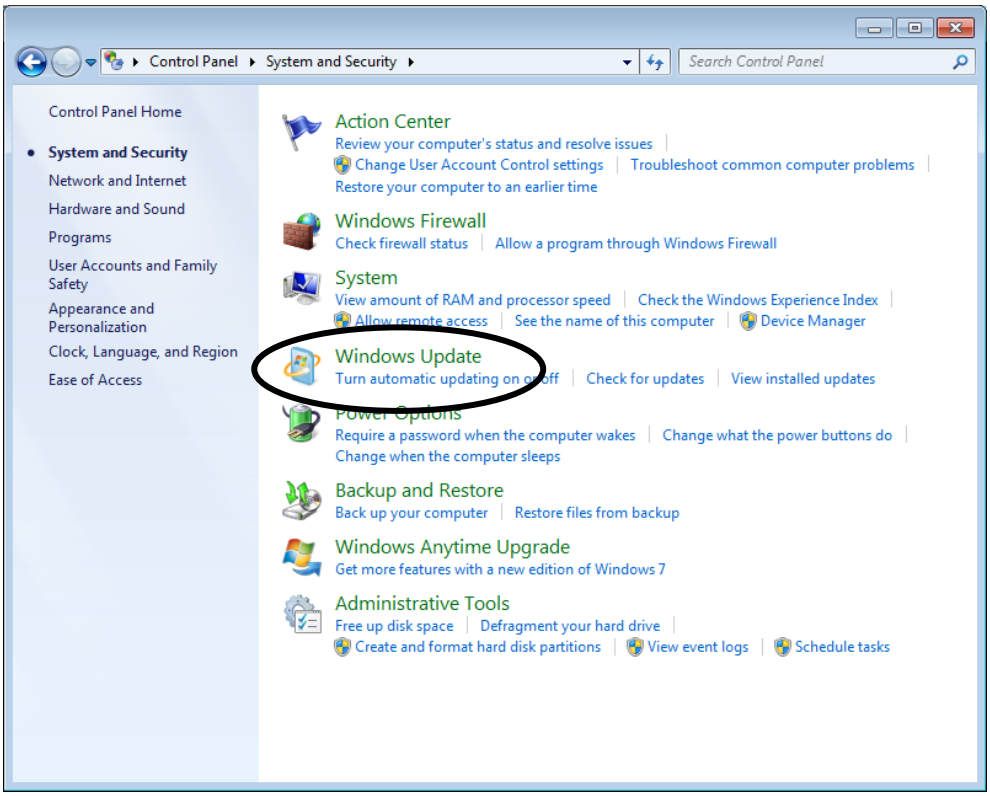
3.2.1.2 Setting up Auto-update

Windows® 7 has an automatic updating function for bug fixes. This function automatically downloads and installs bug fix updates released on the Microsoft Web site.

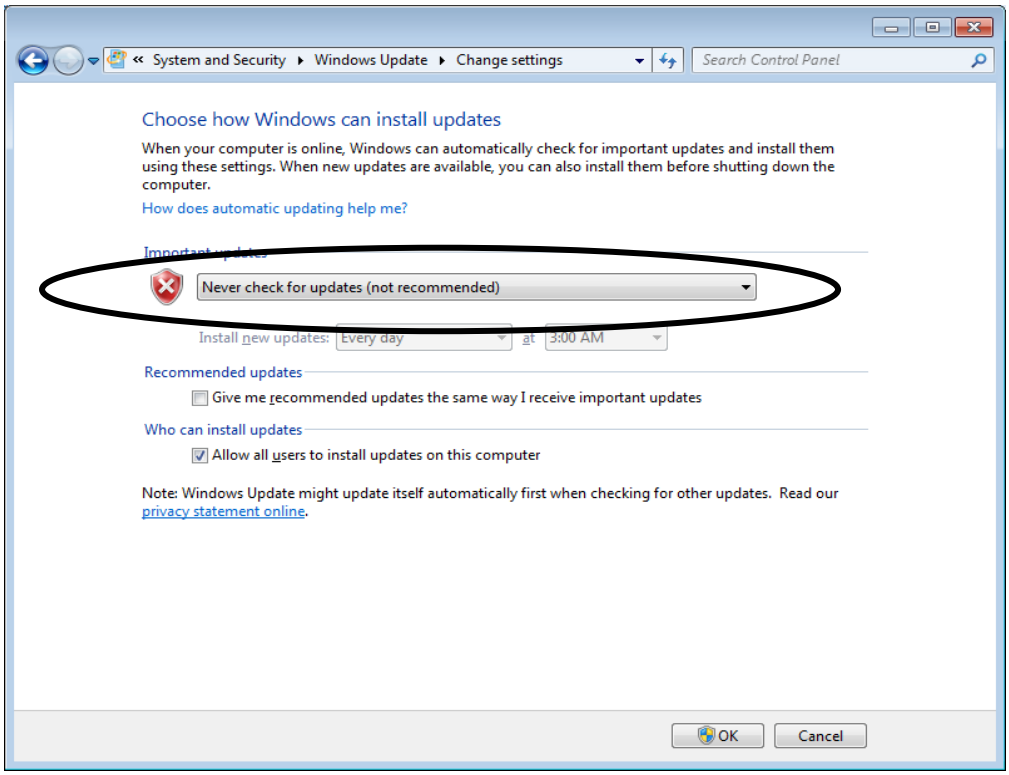
It should be noted that currently running programs can be affected when this function is executed. The modules updated by this function can also affect currently running programs. Because of all this, this function must be turned “off”.

The following procedure shows how to turn off automatic updating.

1. If you are not logged on to the computer as an administrator account, log on to the computer as an administrator account.
2. Click **Start** and click **Control Panel**.
3. Since the **Control Panel** is displayed, and click **System and Security**.
4. Click **Turn automatic updating on or off** under **Windows Update**.



5. The **Choose how Windows can install updates** is displayed. Select **Never check for updates (not recommended)** and click **OK**.



6. Click the **Close** button [×] at the upper right corner of the **System and Security** window.

3.2.1.3 Setting display language

Windows® Embedded Standard 7 preinstalled on this equipment adopts Windows® multilingual user interface (MUI), and displays the display language of Windows® itself as English, Japanese, Chinese(simplified), Korean, Portuguese, and Thai.

●To change the display language to “English” or “Japanese”:
Since the language packs are pre-installed, switch the display language according to “(1) Switching display language”.

●To change the display language to a language other than “English” or “Japanese”:
The language packs are stored on the last disc of the recovery DVD. Install language packs and switch display languages according to “(2) Installing language pack”.

(1) Switching display language
Follow the steps below to change the display language.

1. Click **Start** and then click **Control Panel**.
2. When you select **Change Display Language** from **Clock, Language, and Region**, the “**Region and Language**” window opens.
3. Select the **Formats** tab and click the language you want to display from **Format**.
4. Select the **Location** tab and click the place you want to display from **Current location**.
5. Select the **Keyboards and Languages** tab and click the language you want to display from **Choose a display language**.
6. When you click **Change keyboards** on the **Keyboards and Languages** tab, the “**Text Service and Input Language**” window will be displayed, so if necessary, select the environment you want to use from “**Default input language**”, “**Installed service**” click **OK**.
7. When you finish setting the “**Region and language**” window, click **OK**.
8. When you change the display language, the “**Change Display Language**” dialog box is displayed. If you log off, click the “**Log off Now**”. If you log off later, click the “**Cancel**”. Please respond as necessary.

(2) Installing the language pack

< NOTE >

- To install the language pack, you need a recovery DVD and a DVD drive with USB connection. Prepare before starting work.

Follow the steps below to install the language pack.

1. Connect the DVD drive to the equipment.
2. After starting the OS, set the last disc of the recovery DVD "HITACHI HJ - 100E - **** Product Recovery DVD" in the DVD drive (second disc in the case of two-disc sets, the third disc in a case of three-disc sets).
   (The underlined part is an example, since the model of the equipment you purchased is listed, so the content of * differs for each model. For parts that are similarly described in subsequent procedures, change to the type of equipment you purchased.)
3. If you have not logged on with the computer's administrator account, log on to the computer with the computer's administrator account.
4. Click **Start** and then click **Control Panel**.
5. Click **Clock, Language, and Region**.
6. Under **Regional and Language**, click **Install or uninstall display languages**.
7. The "**Install or uninstall display languages**" window opens. Click **Install display languages**.
8. Under **Choose your method of install**, click **Browse computer or network**.
9. Click **Browse** in **Select the display language to install**.
10. The "**Browse for Files or Folders**" window opens. Select the language pack you want to install from the DVD drive and click **OK**.
    Folder path of language pack is as follows.

Language	Culture name	Language pack folder path
English	en-US	(Installation is unnecessary)
Japanese	ja-JP	(Installation is unnecessary)
Chinese (China)	zh-CN	D:\langpacks\zh-cn\lp.cab
Korean	ko-Kr	D:\langpacks\ko-kr\lp.cab
Portuguese	Pt-PT	D:\langpacks\pt-pt\lp.cab
Thai	th-th	D:\langpacks\th-th\lp.cab

※Replace D: with the drive letter of the DVD drive (assuming [D] in the above example).

11. The display language to be added is displayed in the list, so check the check box of the corresponding language and click **Next**.

12. Select “**I accept the license terms.**” under “**Review and accept Microsoft Software License Terms**” and click **Next**.
13. Installation of the display language will start (about 10 minutes per language).
14. When “**completed**” is displayed in the progress of the installation language installation, click **Next**.
15. Select the language to be displayed in **Select Display Language**, check the check box of **Apply display language to welcome screen and system account**, if necessary, and click **Change display language**.
16. If necessary, you will be asked to log off or restart Windows, so please respond in a timely manner.
17. Remove the Product Recovery DVD from the DVD drive and remove the DVD drive from the equipment.

3.2.1.4 Internet Explorer 11 setup procedure

The shipment state of the Windows® Embedded Standard 7 preinstalled model is in the state that Internet Explorer 8 is installed to ensure compatibility with our conventional model. Microsoft support for Internet Explorer 8 in Windows® Embedded Standard 7 has been discontinued on January 12, 2016. Therefore, perform the following procedure to upgrade Internet Explorer 8 to Internet Explorer 11.

< NOTE >

・To install the Internet Explorer 11 in a language other than English and Japanese, you need a recovery DVD and a DVD drive with USB connection. Prepare before starting work.

1. If you are using Internet Explorer 11 in a language other than English and Japanese, connect the DVD drive to the equipment.
2. If you have not logged on with the computer's administrator account, log on to the computer with the computer's administrator account.
3. Close all running applications.
4. Activate the command prompt of administrator authority.
   - Click **Start** and point to **All Programs**.
   - Click **Accessories**.
   - Right-click **Command Prompt** to show a menu. On the menu, click **Run as administrator**.
     (If the administrator account you used for log on is a built-in administrator account, simply click **Command Prompt**.)
   - If you see the **User Account Control** window, click **Yes**.
5. Type the following character string in the command prompt, and then press the **Enter** key.
   C:\HITACHI\IE11\Preparation.bat
6. The following message appears and installation of the update program necessary for installing Internet Explorer 11 starts.
   Please wait.
   Installing Windows Update for IE11: 1 of 9. (This message is displayed until "9 of 9" is shown.)
7. When the update program has been installed, the following message appears to prompt restart. Enter **y** to restart the system.
   Please restart system.
   Are you sure you want to restart now?*[y/n]*

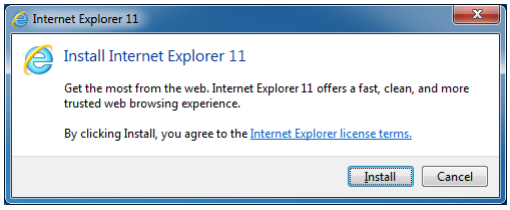
8. To use Internet Explorer 11 in a language other than English and Japanese, connect the DVD drive with the last set of recovery DVD (second disc in the case of two-disc sets, the third disc in a case of three-disc sets) set to the equipment after rebooting.
9. Activate the command prompt of administrator authority again, and then type the following character string.

   C:\HITACHI\IE11\IE11INSTALL.BAT JA-JP D:

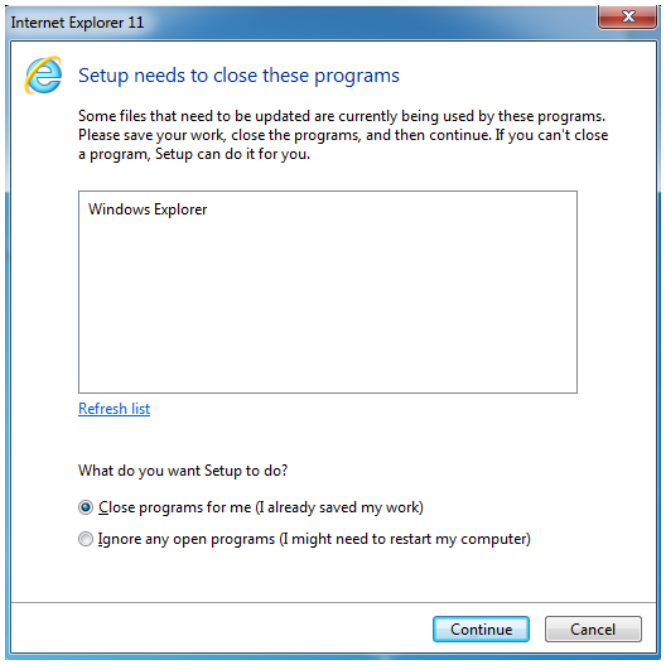
Notes : Please specify the culture name corresponding to the language you are using as part of JA - JP. The correspondence between language and culture name is as follows. Also, if it is not English or Japanese, specify the DVD drive (In the example above, it is the case of the D drive).

Language	Culture name	Specify drive
Japanese	JA-JP	Not required
English	EN-US	Not required
Chinese (China)	ZH-CN	Required
Korean	KO-KR	Required
Portuguese	PT-PT	Required
Thai	TH-TH	Required

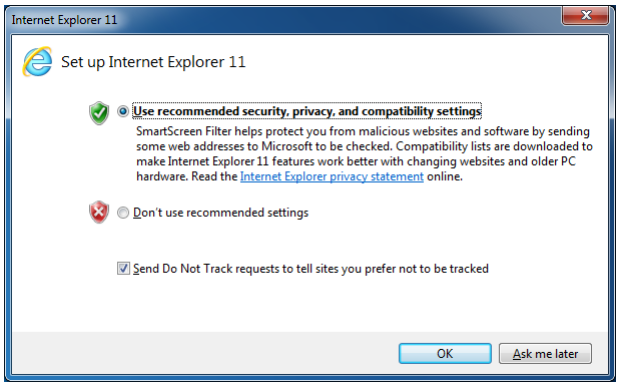
10. The following window opens. On this window, click **Install**.



11. The following screen will be displayed, please click **Continue**. Installation will start.



12. When the installation has been completed, the following window opens. Click **OK**.



13. Perform the Internet Explorer 11 setting following the instruction in the window.
14. Remove the last disc of the recovery DVD (In the case of two sets, the second one. In the case of three sets the third one) , and then remove the DVD drive.

< NOTE >

- If the installation failed, visit the following site to solve the problem.

  Microsoft technical information Document number : 2872074
  Troubleshooting a failed installation of Internet Explorer 11
  https://support.microsoft.com/en-us/kb/2872074

3.2.2 Basic settings for Windows® 10

This section describes the basic settings procedure of the preinstalled Windows® 10. Perform this procedure as needed after the setup of OS according to “3.1 Setup Procedure when You Turn on the Power for the First Time”.

3.2.2.1 Outline of basic settings procedure

Setting up the network environment → See “2.7 Setting Up the LAN Interface”.

Setting up the screen → See “2.8 Setting Up the Screen”.

Setting up auto-update → See “3.2.2.2 Setting Up Auto-update”.
・The procedure takes about 5 minutes.

Only when changing display language

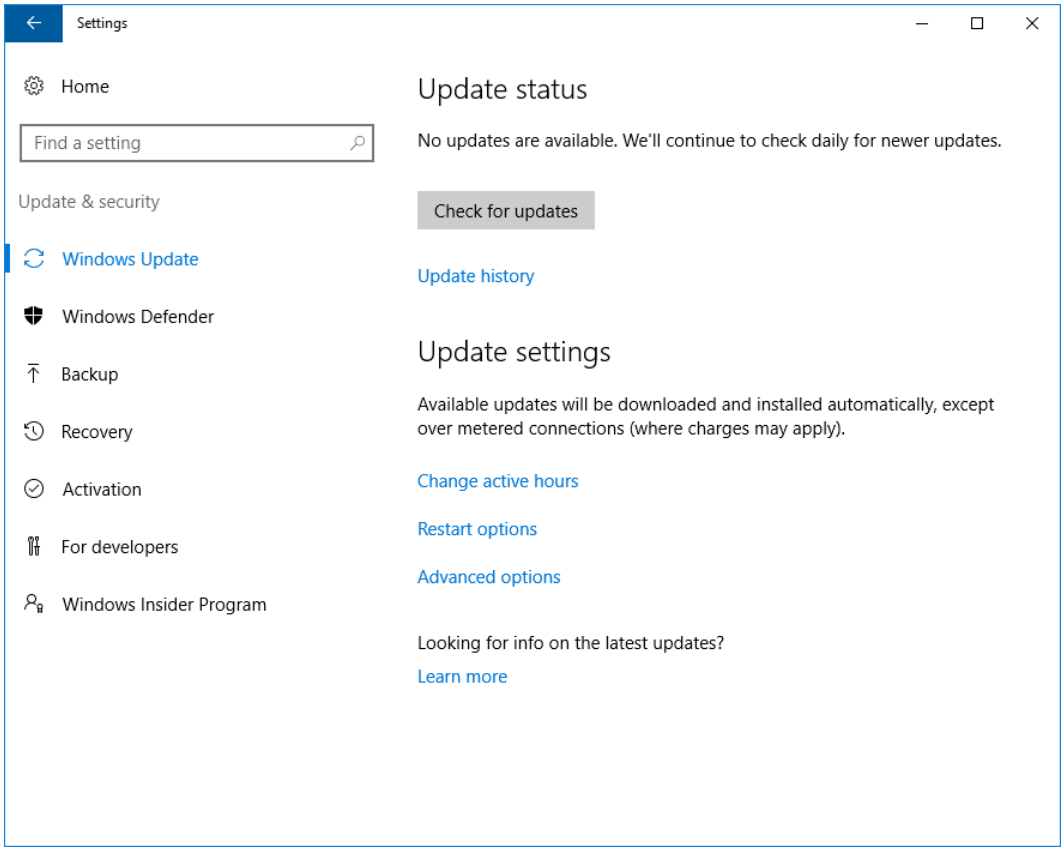
Setting up display language → See “3.2.2.3 Setting Up display language”.

3.2.2.2 Setting Up Auto-update

Windows® 10 settings allow update programs delivered from Windows Update to be applied automatically. The system and application update programs are regularly checked and are automatically downloaded and installed.

Perform the following procedure to set auto-update.

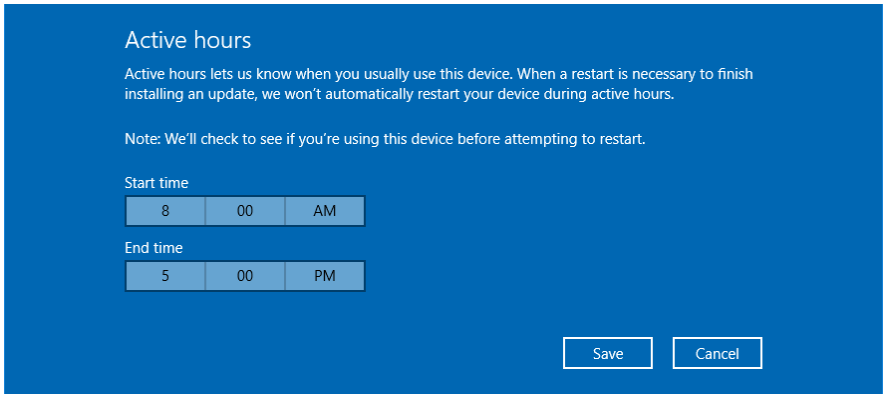
1. Click the **Start**, and then click **Settings** from the displayed menu.
2. Click **Update & security**. The **Windows Update** window opens.



There are the following items in the automatic update setting of Windows® 10.

(1) Change active hours

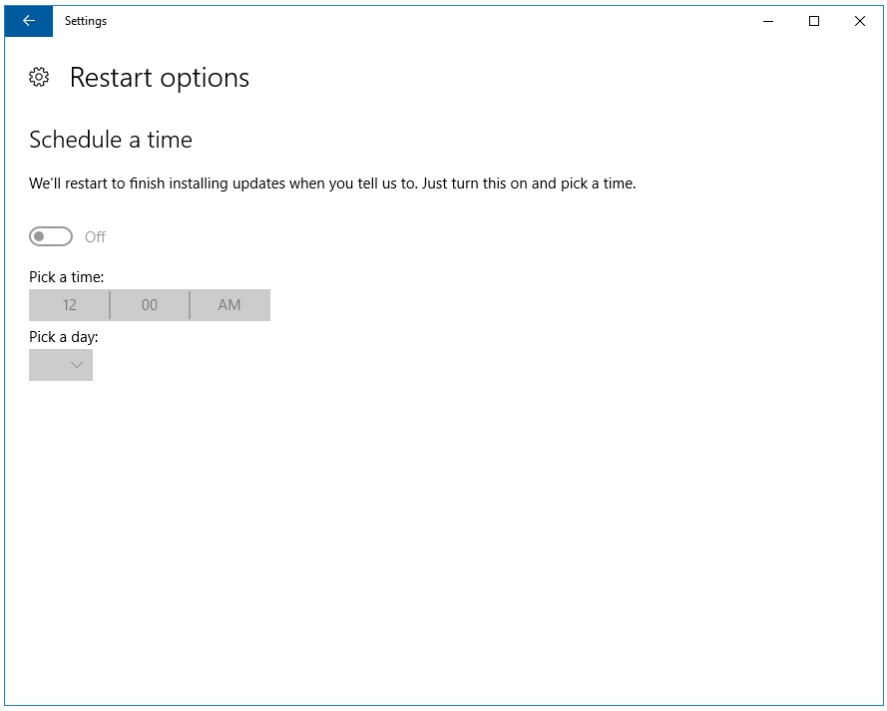
Downloading and installation is done automatically, but restarting is not done during active hours, restarting is scheduled outside active hours. Please set according to your usage environment.



（It is set from AM 8:00 to PM 5:00 by default.）

(2) Restart options

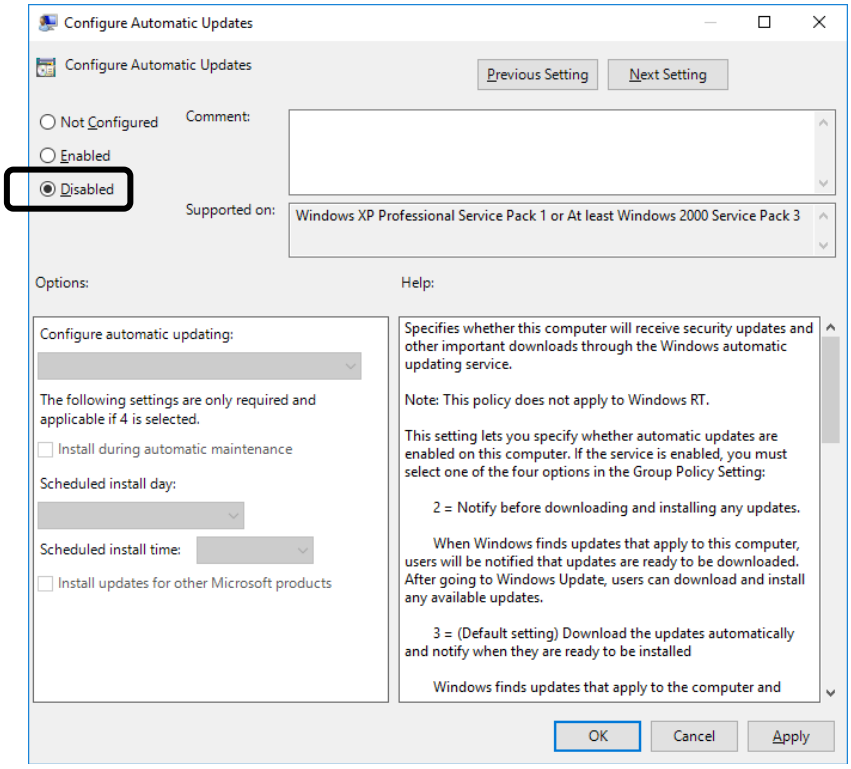
It can temporarily set the reboot date and time if automatic update is performed and reboot is scheduled. This setting overrides the active hours.



[Enabling manual update of Windows Update]

If you do not want auto download and installation of update programs, you can set Windows Update to manual update by using the local group policy editor (gpedit.msc). The following describes the procedure to set Windows Update to manual update.

1. Sign in the computer with a computer's administrator account.
2. Right-click the **Start**, and then click **Run** from the displayed menu..
3. On the **Run** window, type "gpedit.msc" and then click **OK**. Local Group Policy Editor starts.
4. On the **Local Group Policy Editor** window, open **Computer Configuration – Administrative Templates - Windows components - Windows Update**, and then double-click **Configure Automatic Updates**.
5. On the **Configure Automatic Updates** window, select **Disabled,** and then click **OK**.



3.2.2.3 Setting Up display language

Windows® 10 preinstalled on this equipment can display the language specified from Control Panel by installing an additional language.

< NOTE >

- To install additional languages, you need a recovery DVD and a DVD drive with USB connection. Prepare before starting work.
- If you want to change the display language to "English" or "Japanese", installation of additional languages is unnecessary. Please switch the display language according to "(2) Switching display language".

(1) Installing additional language

Perform the following procedure to install an additional language.

1. Connect the DVD drive to the equipment.
2. After starting the OS, set the last disc of the recovery DVD "HITACHI HJ-100E-**** Product Recovery DVD" in the DVD drive (second disc in the case of two-disc sets, the third disc in a case of three-disc sets). (The underlined part is an example, since the model of the equipment you purchased is listed, so the content of * differs for each model. For parts that are similarly described in subsequent procedures, change to the type of equipment you purchased.)
3. Execute the following command from the Command Prompt as administrator.

   dism /online /Add-package /Packagepath:d:\langpacks\Microsoft-Windows-Client-Language-Pack_x64_zh-CN.cab

Notes 1: Specify the DVD drive letter for d: (assuming [d] in the command example).

2: Specify the culture name corresponding to the language you want to add for zh-cn. Correspondence between language and culture name is shown below.

Language	Culture name	Remarks
English	en-US	(Installation is unnecessary)
Japanese	ja-JP	(Installation is unnecessary)
Chinese (China)	zh-CN	
Korean	ko-Kr	
Portuguese	Pt-PT	
Thai	th-th	

4. After the installation has been completed, restart the system.

(2) Switching display language

Perform the following procedure to switch the display language .

1. Open Control Panel, and then click **Add a language**.
2. The **Language** window opens. click **Add a language**.
3. Select the language you want to display, and then click **Add**.
4. Click **Options** of the language you want to display.
5. Click **Make this the primary language** in **Windows display language**.
6. The **Change display language** dialog box appears. In this dialog box, click **Log off now**.
7. After sign in has been completed, reopen Control Panel, and then click **Change date, time, or number formats**.
8. The **Region** window opens. On this window, click **Administrative** tab.
9. Click **Copy settings...** in **Welcome screen and new user accounts settings**.
10. The **Welcome screen and new user accounts settings** window opens. On this window, select the **Welcome screen and system accounts** checkbox and **New user accounts** checkbox, and then click **OK**.
11. The **Change Display Language** dialog box appears. In this dialog box, click the **Restart Now**.
12. After sign in has been completed, reopen Control Panel, and then click **Change date, time, or number formats**.
13. The **Region** window opens. On this window, click **Administrative** tab.
14. Click **Change system locale...** in **Language for non-Unicode programs**.
15. The **Region Settings** window opens. On this window, set the region, and then click **OK**.
16. The **Change System Locale** dialog box appears. In this dialog box, click **Restart Now**.

(3) Reinstall of updates

Perform the following procedure to reinstall updates

1. Open Control Panel, and then click **Uninstall a program**.
2. The **Programs and Features** window opens. Click**View installed updates.**
3. The **Installed Updates** window opens. On this window, select **Update for Microsoft Windows (KB4039396)**, and then click **Uninstall**.
4. **Uninstall an update** dialog box appears. In this dialog box, click **Yes**.
5. A dialog box "Please wait while the updates…" is displayed to indicate that updates are being uninstalled.
6. After uninstall has been completed, a window is displayed to indicate restart. On this window, click **Restart Now**.
7. After the OS has started, set the last disc of the recovery DVD (second disc in the case of two-disc sets, the third disc in a case of three-disc sets).
8. Execute the following command from the Command Prompt as administrator.

   d:\WindowsUpdates\AMD64-all-windows10.0-kb4039396-x64_bd1f9e1c7add02b8f3334f1aeaa07cae6632c3cf.msu

Notes: Specify the DVD drive letter for d: (assuming [d] in the command example).

9. A dialog box "Preparing the installation…" is displayed.
10. **Windows Update Standalone Installer** window opens. In this window click **Yes**.
11. A dialog box "Copying packages to the Windows Update cache …" is displayed.
12. **Download and Install Updates** window opens.
13. After install has been completed, a window is displayed to indicate restart. Remove the recovery DVD from the DVD drive, and click **Restart Now**.

CHAPTER 4 PRECAUTIONS REGARDING THE OS

4.1 Embedded Enabling Features of Windows® Embedded Standard 7

This section explains the following.

- What is Windows® Embedded Standard 7
  (about feature comparison with Windows® 7)
- Outline and example of Embedded Enabling Features (EEF)

< NOTE >

- Windows® Embedded Standard 7 has features (EEF) unique to embedded equipment not found in ordinary Windows® 7, and this equipment is installed a filter feature.
  For the filter feature, refer to Microsoft's "Embedded Enabling Features Technical Reference (Standard 7 SP1)" and fully evaluate it before use.

<Embedded Enabling Features Technical Reference (Standard 7 SP1)>
https://msdn.microsoft.com/en-US/library/ff794908(v=winembedded.60).aspx

Since each function of EEF at the factory default setting is disabled, the operation described in this section is unnecessary when EEF is not used.

4.1.1 What is Windows® Embedded Standard 7

Windows® Embedded Standard 7 is an embedded-use OS based on Windows® 7. The feature comparison table with Windows® 7 is shown below.

Table 4-1 Features Comparison of Windows® Embedded Standard 7 and Windows® 7

No.	feature	Windows® Embedded Standard 7	Windows® 7
1	API support	○	○
2	Device driver	○	○
3	Multimedia	○	○
4	Security	○	○
5	Language Pack	○	○
6	Multi touch support	○	○
7	Windows Update	○	○
8	Dolby Digital Plus Codec	×	○
9	Backup and restore	×	○
10	Windows XP mode	×	○
11	Game	×	○
12	Remote boot	×	○
13	Virtual desktop infrastructure (VDI) extension	×	○
14	Embedded Enabling Features (EEF)	○	×

○:Supported ×:Not supported

As mentioned above, in Windows® Embedded Standard 7, some features that were available in Windows® 7 are unsupported. On the other hand, the embedded enabling feature (EEF) that is not found in regular Windows® 7 is prepared, and the following filter features can be used with this equipment.

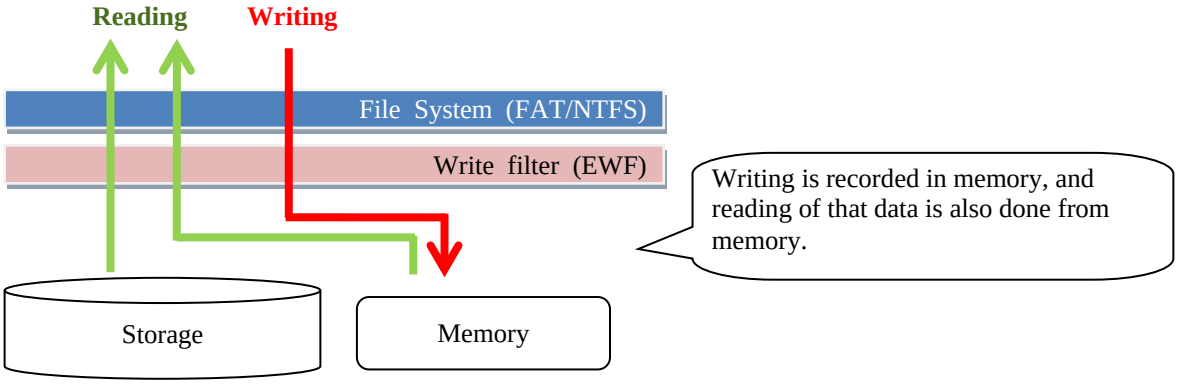
Table 4-2 Filter Features Installed in This Equipment

No.	EEF installed in this equipment	Description
1	Enhanced Write Filter with HORM(EWF)	It is a feature to redirect writing to storage to RAM and protect the storage contents on a sector unit. It can also be used to reduce the number of write times of mSATA SSD. This equipment can not be used in hibernation mode because the hibernation status is not supported.
2	File-Based Write Filter (FBWF)	It is a feature to redirect writing to storage to RAM and protect the storage contents on a sector unit. It can also be used to reduce the number of write times of mSATA SSD.
3	Registry Filter	It is a feature that makes it possible to write to specific registry even when using No.1 and No.2 filter features.
4	Keyboard Filter	It blocks the specific key input of the keyboard.

4.1.2 Embedded Enabling Features overview and examples

(1) Enhanced Write Filter with HORM (EWF)

EWF suppresses writing to storage and redirects writes to RAM's overlay cache. As a result, the ability to manage and protect the storage of the corresponding partition on a sector units.



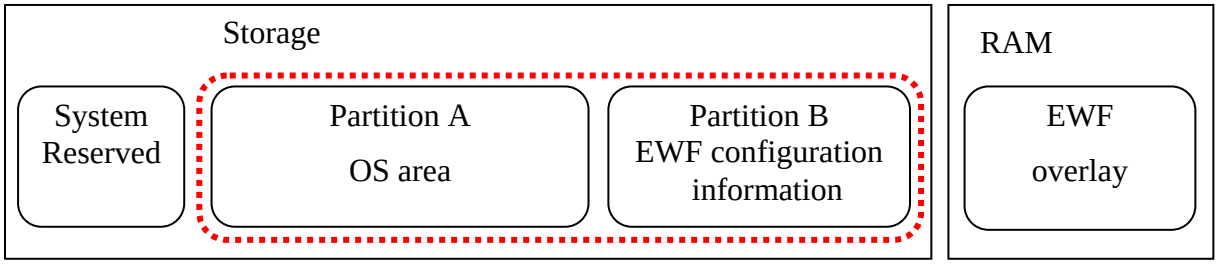
With the above, Writing is discarded by shutting down or restarting the OS, so it is possible to restore to the state before EWF was enabled.

There are two types of operation modes (RAM mode / RAM registry mode) in EWF, and the management method of EWF configuration information is different as shown below.

The EWF of this equipment operates in RAM registry mode.

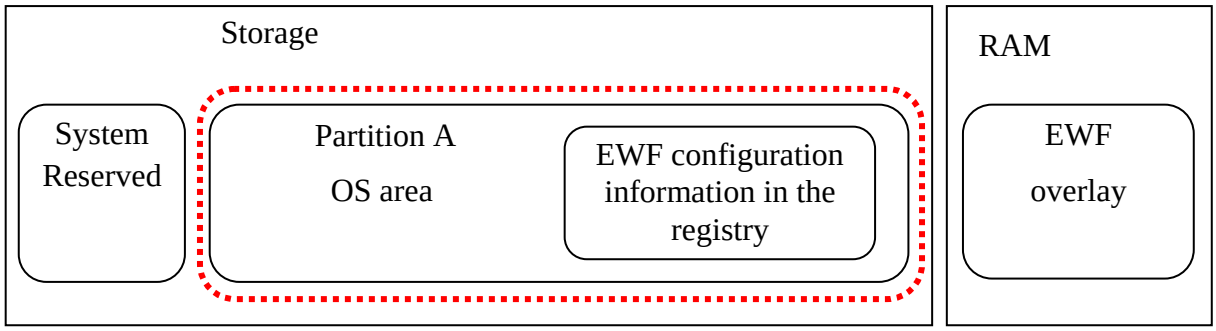
- RAM mode

  Manage the EWF configuration information with a partition dedicated to EWF.



- RAM registry mode (Operation mode in this equipment. It can not switch to RAM mode.)

  Manage the EWF configuration information in the registry.



※The disable option of the “ewfmgr” command can not be used (since the contents of the setting change written in the registry are discarded by EWF). For details of the command, see <Setting Command>.

<Recommended OS settings>

When enabling EWF, the items of OS setting change recommended by Microsoft to improve its performance are shown below. For details on setting change, refer to "EWF Performance Considerations (Standard 7 SP1)" by Microsoft Corporation.

<EWF Performance Considerations (Standard 7 SP1)>
https://msdn.microsoft.com/en-us/library/ff794096(v=winembedded.60).aspx

1. Change the location of the event log to an unprotected volume.
   → In this equipment, it is already set to record in “H:\SystemLog\Winodws\winevt” in advance.
2. Change the location of a system pagefile to an unprotected volume.
3. Change the location of temporary file / folder to an unprotected volume.
4. Disable the NTFS last access time stamps.
   → In this equipment, it is set disabled in advance.
5. Disable the Prefetch.
   → In this equipment, Prefetch and SuperFetch are set disabled in advance.
6. Disable system protection and restore settings.
   → In this equipment, it is set disabled in advance.

< NOTE >

- If you enable the EWF, the used memory will continue to be accumulated without released. For this reason, periodic restart of the equipment is necessary.
- If you enable the EWF, information that is changed by RAS software installed in HF-W series and commercially available software is also discarded. Enable EWF after the environment necessary for system operation is ready.
- Since this equipment does not support hibernation, does not use the HORM function of EWF. Also, features that operate only in RAM mode can not be used. For unsupported features, see <Setting command>.
- When the Windows error recovery processing screen is displayed during EWF use and OS startup, you can suppress it by executing the following command from the command prompt of administrator privilege.
  “bcdedit.exe /set {current} bootstatuspolicy ignoreallfailures”
- If volumes do not overlap, it is possible to use EWF and FBWF in coexistence.
- In addition to the setting commands prepared by the standard, it is also possible to implement an application for control using the EWF API (sample code is also published). For details of API, refer to "EWF API (Standard 7 SP1)" by Microsoft Corporation.
  <EWF API (Standard 7 SP1)>
  https://msdn.microsoft.com/en-us/library/ff793904(v=winembedded.60).aspx

<Setting command>

The EWF setting is performed using the “ewfmgr” command. The specification of the “ewfmgr “command is shown below, but since the result of the command is applied the next OS started up time, restarting the equipment is necessary to validate the change contents.

ewfmgr [<volume-name>*] [options]

Table 4-3 Ewfmgr Command Specification

Command options	Description
-all	Performs a specified command on all protected volumes.
-enable	Enables the overlay on the specified protected volume. (Enable EWF)
-disable (*1) : Not supported	Disables the overlay on the specified protected volume. (Disable EWF)
-commit	Commits (write) all data in the overlay to the protected volume. The overlay is written to protected volume when the system is shut down or restarted. (*2)
-commitanddisable [-live] (*3)	Commit all data in the overlay to the protected volume and invalidate the overlay. Overlays are written to protected volumes when the equipment is shut down or restarted. You can use the **-live** option to immediately commit the overlay to the protected volume and disable the overlay without having to restart the system. Example: ewfmgr c: -commitanddisable -live
-nocmd	Clears the current pending command.
-persist="<persistent data>" (*4) : Not supported	Specify a 64-byte field that persists throughout all overlays for a specific protected volume.
-activatehorm (*5) : Not supported	Enable HORM.
-deactivatehorm (*5) : Not supported	Disable HORM.

(*1) Since the EWF of this equipment operates in the RAM registry mode, the disable option can not be used (the contents of the setting change written in the registry are discarded by EWF). You must use the “commitanddisable option”.

(*2) Due to the EWF specification, it is not possible to commit without restarting the system or shutting down. However, in the case of commit (-commitanddisable-live) with EWF disabled, immediate execution is possible.

(*3) Since you can not execute the commit option and the disable option alone at the same time, in that case use the “commitanddisable option”.

(*4) It is not supported on this equipment because it can be used only when EWF is in RAM mode.

(*5) By enabling HORM, it is possible to shorten the time it takes to return from hibernation mode, but do not use this system because it is not supported.

<Example of use>

An example of using the “ewfmgr” command is shown below. Execute the command from a command prompt started with administrator privileges. In the example below, drive C is protected.

● Enables EWF

Executes the "ewfmgr c: -enable" command and restart this equipment.

● When this equipment restart or shutdown, commit the data written in overlay to storage

Executes the "ewfmgr c: - commit" command.

● Disables EWF (alternative method of disable option)

Immediately after restarting this equipment, executes “ewfmgr c: - commitanddisable” command and restart the system again.

(When the command is executed with the -live option, the second restart is unnecessary)

※ During system operation, restart this equipment before commitment so as not to reflect the data written to the overlay as much as possible to the storage.

● When this equipment restart or shutdown, commit the data written in the overlay to the storage and then Disable EWF

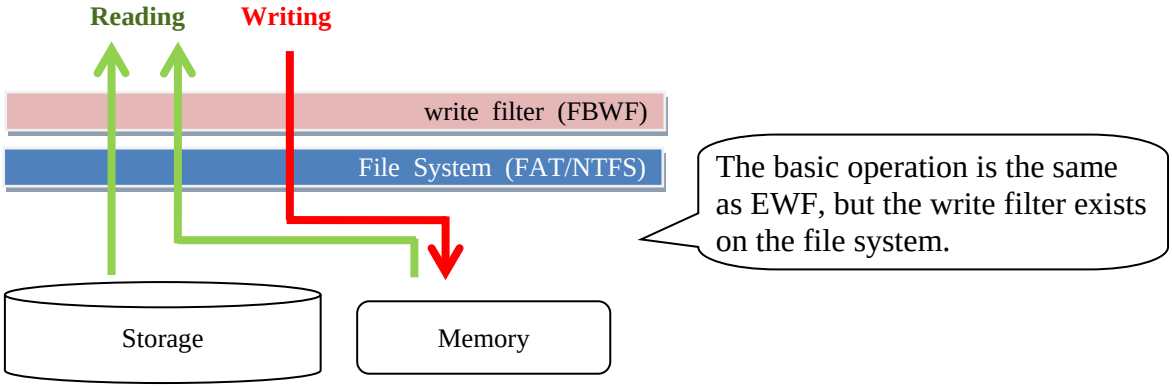
Executes the “ewfmgr c: - commitanddisable” command.

● While the system is running, EWF is invalidated (commit and immediate execution of EWF invalidation) after committing the data written in the overlay to the storage

Executes the “ewfmgr c: - commitand disable – live” command.

(2) File-Based Write Filter (FBWF)

FBWF suppresses writing to the storage and redirects the write to the RAM overlay cache. This is the feature of managing and protecting the corresponding partition of storage in file units.

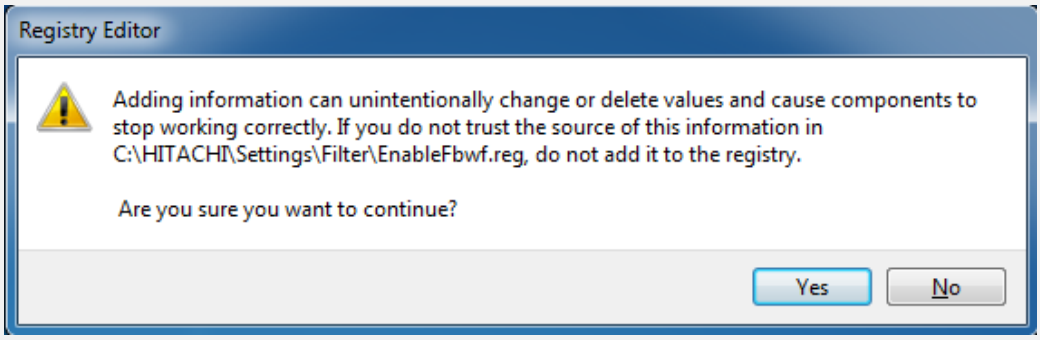


By the above, writing is discarded by shutting down or restarting the equipment, so it is possible to restore to the state before FBWF is enabled. The performance of memory usage is improved compared with EWF, and it is possible to set "exclusion list" to reflect change of specified file even when FBWF is valid.

< NOTE >

- When using FBWF with this equipment, it is necessary to start the target service. Please do the following.

  1. Double-click the EnableFbwf.reg file (DisableFbwf.reg to stop the service) under “C:\HITACHI\Settings\Filter”.
  2. The following message will be displayed. Click **Yes**.



  3. A message indicating that it was successfully added is displayed, so click **OK** and restart the equipment.

- When the Windows error recovery processing screen is displayed while FBWF is in use and OS is started, it can be suppressed by executing the following command from an administrator privileged command prompt.
  “bcdedit.exe /set {current} bootstatuspolicy ignoreallfailures”
- You can not move files between folders set in the exclusion list and folders that are not set.
- Because of file-based filtering, it is not possible to completely disable all writes even if the exclusion list is not set yet. Also, it is not possible to use all NTFS functions in the same way. For details, refer to <Features comparison of EWF and FBWF>.
- Enable FBWF may extend OS startup time due to its overhead.
- If volumes do not overlap, it is possible to use EWF and FBWF in coexistence.
- In addition to the setting commands prepared by the standard, it is also possible to implement an application for control using the FBWF API. For details of API, refer to “FBWF API (Standard 7 SP1)” by Microsoft Corporation.
  <FBWF API (Standard 7 SP1)>
  https://msdn.microsoft.com/en-us/library/ff794531(v=winembedded.60).aspx

<Setting command>

The FBWF setting is performed using the “fbwfmgr” command. The specification of the “fbwfmgr “command is shown below, but since the result of the command is applied the next OS started up time, restarting the equipment is necessary to validate the change contents.

fbwfmgr [options]

Table 4-4 Fbwfmgr Command Specification

Command options	Description
/? [command]	Displays help for FBWF.
/help [command]	
/displayconfig	Displays all configuration information for the write filter including protected volumes list, overlay configuration and write through paths.
/overlaydetail	Displays detail on the current overlay contents for all protected volumes.
/enable	Enables FBWF.
/disable	Disables FBWF.
/addvolume volumename	Adds a volume to the protected volume list.
/removevolume volumename 1|0	Removes a volume from the protected volume list. 1 : Removes exclusion list 0 : Preserves exclusion list (When reusing an exclusion list when adding a volume again)
/addexclusion volumename file_or_dir_path	Adds a folder (file) path to the exclusion list.
/removeexclusion volumename file_or_dir_path	Removes the folder (file) path from the exclusion list.
/commit volumename file_path (*1)	Commits the changes made to the specified file to the protected volume.
/restore volumename file_path (*1)	Discards the changes made to specified file (restore from protected volume).
/setthreshold threshold	Sets the memory overlay size (value [MB]).
/setcompression 1|0	Sets memory overlay compression. 1 : Compression enable 0 : Compression disable
/setpreallocation 1|0	Sets cache pre-allocation. 1 : Enable (Can be used up to cache size) 0 : Disable (Can not guarantee use up to cache size)
/setsizedisplay 1|0	Sets the display mode of the protected volume. 1 : Virtual capacity mode 0 : Actual capacity mode
/getvirtualsize volumename	Displays the disk size information of the virtual volume.
/getactualsize volumename	Displays the disk size information of the actual volume.

(*1) It will be executed immediately. It can not be specified by folder or wild card.

<Example of use>

An example of using the “fbwfmgr” command is shown below. Execute the command from a command prompt started with administrator privileges. In the example below, drive C is protected.

● Enables FBWF and add protected volume
Executes “fbwfmgr /enable” command, “fbwfmgr /addvolume c:” command in that order, and restart the equipment.

● Adds folder (file) to exclusion list
Executes the “fbwfmgr /addexclusion c:\test” command and restart the equipment.
(For files, specify “\test” as “\test\log.txt”)

● Commits file to the protected volume (immediate execution)
Executes “fbwfmgr /commit c:\test\log.txt” command.

● Restores files from the protected volume (immediate execution)
Executes “fbwfmgr /restore c:\test\log.txt” command.

● Removes the protected volume (keep exclusion list) and disable FBWF
Executes the “fbwfmgr /removevolume c: 0” command and then the “fbwfmgr /disable” command in this order, and restart the equipment.

＜Features comparison of EWF and FBWF＞

A comparison table of EWF and FBWF filter features is shown below.

Table 4-5 Features Comparison of EWF and FBWF

No.	Feature		EWF	FBWF
1	Operation level		Sector base	File base
2	Memory usage efficiency		Memory is not released once secured	Memory is released such as file deletion
3	Filter exclusion settings		-	Files / Folders
4	Commit unit		Overall overlay	File only
5	Live Commit & Filter Invalidate		○	-
6	NTFS	File lock / unlock	○	-
		File ID	○	-
		Reparse point	○	-
		Quota	○	-
		Hard link	○	-
		Opportunistic lock	○	-
		File compression, encryption	○	-
7	HORM		○	-
8	Used with registry filter		○	○
9	Coexistence of EWF and FBWF		Can coexist if volumes do not overlap	

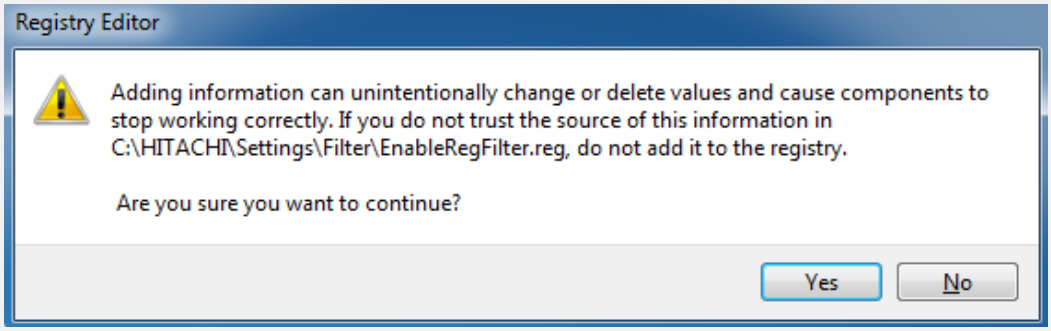
○:Supported -:Not supported

(3) Registry Filter

Registry Filter is a feature to reflect the writing to the specified registry for the EWF or FBWF protected storage mentioned above. Registry filters allow you to preserve certain registry keys and values when you restart the equipment without committing the overlay when EWF or FBWF is enabled.

< NOTE >

- When using registry filter with this equipment, you need to start the target service. Please do the following.
  1. Double-click the EnableRegFilter.reg file (DisableRegFilter.reg to stop the service) under “C:\HITACHI\Settings\Filter”.
  2. The following message will be displayed. Click **Yes**.



  3. A message indicating that it was successfully added is displayed, so click **OK** and restart the equipment.

- HKLM Set an arbitrary key below (set the key, not the value).
- A predefined key exists, assuming participation in the domain and use of Terminal Services Client Access License (TSCAL). For details, see <Example of use>.
- Do not turn off the power without shutting down the system by using EWF when the registry filter is enabled. Writing to the registry may not be reflected.

<Example of use>

An example of using a registry filter is shown below.

In this example, writing to "HKLM \ Software \ TestKey" key is enabled when EWF is enabled.

1. With EWF invalid, sets the following registry key and value.

Table 4-6 Registry Filter Setting Specification

Registry filter setting		Description
Key	HKLM\SYSTEM\CurrentControlSet\services \RegFilter\Parameters\MonitoredKeys\TestKey	—
Value	ClassKey(REG_SZ) : HKLM	Defines the class of the registry. Set HKLM (unique).
	FileNameForSaving(REG_SZ) : TestKey.rgf	Sets the file name to save registry changes.
	RelativeKeyName(REG_SZ) : Software\TestKey	Sets the registry key position.

2. Enables EWF and restart the equipment.
3. Adds / changes new key and value below “HKLM\Software\TestKey” key.
4. Restarts the equipment again, and confirm that the added / changed key is retained in step 3 in the state where EWF is valid.

In the registry filter, the following two items are defined in advance.

Table 4-7 Defined Registry Filter Setting List

No.	Registry filter setting	
1	Key	HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\RegFilter \Parameters\MonitoredKeys_MachineAccount
	Value	ClassKey(REG_SZ) : HKLM
		FileNameForSaving(REG_SZ) : _MachineAccount.RGF
		RelativeKeyName(REG_SZ) : SECURITY\Policy\Secrets\$MACHINE.ACC
2	Key	HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\RegFilter \Parameters\MonitoredKeys_MSLicensing
	Value	ClassKey(REG_SZ) : HKLM
		FileNameForSaving(REG_SZ) : _MSLicensing.RGF
		RelativeKeyName(REG_SZ) : Software\Microsoft\MSLicensing

No.1: It is prepared for devices participating in the domain. To participate in a domain, you need to update the system's secret information every 30 days, and that data is written to the registry. If the system volume is protected by EWF or FBWF, this change is not discarded.

No. 2: It is prepared for devices that use TSCAL. When connecting to the application server using Remote Desktop Client, TSCAL will be issued the first time you connect. If the system volume is protected by EWF or FBWF, this license information stored in the registry is not lost.

(4) Keyboard Filter

The Keyboard Filter is a feature to block specific key input from the keyboard. In addition to providing predefined lists of keys and key combinations (e.g. Ctrl + Alt + Del, Windows + L etc.), you can also define your own custom keys.

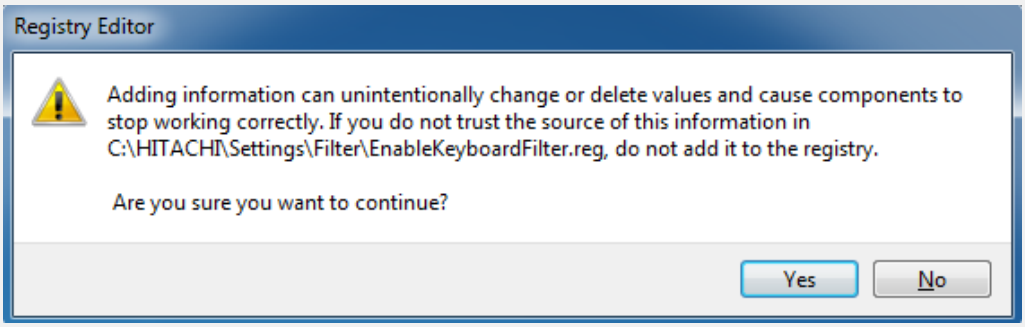
After logging in with an account with administrator privileges, configure the keyboard filter using the Local Group Policy Editor (“gpedit.msc” command).

For details on keyboard filter, refer to “Keyboard Filter Technical Reference (Standard 7 SP1)” by Microsoft Corporation.

<Keyboard Filter Technical Reference (Standard 7 SP1)>
https://msdn.microsoft.com/en-US/library/hh505874(v=winembedded.60).aspx

< NOTE >

- When using keyboard filter with this equipment, you need to start the target service. Please do the following.
  1. Double-click the EnableKeyboardFilter.reg file (DisableKeyboardFilter.reg to stop the service) under "C:\HITACHI\Settings\Filter".
  2. The following message will be displayed. Click **Yes**.



  3. A message indicating that it was successfully added is displayed, so click **OK** and restart the equipment.

- A list of predefined key and key combinations is grouped by category.
- Input from the screen keyboard can not be filtered. To restrict the use of screen keyboard, please use AppLocker etc. function.
- Since filtering is disabled on the secure desktop screen, you can log on to Windows® without problems.
- A custom key filter is defined by specifying the key or key combination to be blocked, using the English virtual key name. Therefore, if you want to use keyboard filters with keyboards and languages other than English, please define a custom key filter using the
  English key name defined in Microsoft's “Virtual Key Reference”.
  <Virtual Key Reference (Standard 7 SP1)>
  https://msdn.microsoft.com/en-us/library/hh505878(v=winembedded.60).aspx

<Example of use>

An example of using a keyboard filter is shown below.

(1) Block [Ctrl] + [Alt] + [Del] / [Windows] +[R] / [Shift] key with predefined key

1. Type “gpedit.msc” in the search field on the [Start] menu to start the Local Group Policy Editor.
2. From the left side of the display screen, click to **Local Computer Policy** > **Computer Configuration** > **Administrative Templates** > **System**> **Keyboard Filter** > **Security Keys**.
3. Double click on **Block Secure Desktop (Ctrl + Alt + Del)**, select **Enable** and click **OK** (Filtering will be effective at this point, it takes several seconds to reflect) .
4. Click to **Keyboard Filter** > **Desktop and Shell Keys**.
5. Double-click **Block Run Dialog (Windows + R)**, select **Enable**, and click **OK**.
6. Click to **Keyboard Filter** > **Modifier Keys**.
7. Double-click **Block Shift Keys**, select **Enable**, and click **OK**.
8. Close the Local Group Policy Editor and check that the key entry you set is blocked.

(2) Block [Windows] + [Home] key with custom key

Many predefined key combinations are provided, but if there are other combinations that you want to block, you can define custom key combinations.
The following procedure blocks the combination of [Windows] + [Home] key (minimize inactive windows) combination.

1. Launch Local Group Policy Editor and click to **Local Computer Policy** > **Computer Configuration** > **Administrative Templates** > **System**> **Keyboard Filter**.
2. Double-click **Custom Key Filters** and select **Enable**.
3. Click **Display** in the "Options" window to display a list of custom key combinations to be blocked (only blank lines are displayed for the first time use).
4. Enter “Windows + Home” in the blank line and add it to the list. If there are other combinations you want to block, fill in the added blank line and then click **OK**.
5. Click **OK** in the “Custom Key Filters” window (filtering will take effect at this point, it will take several seconds to reflect).
6. Close the Local Group Policy Editor and check that the key entry you set is blocked.

Please refer to Microsoft Software's “Custom Key Filter Configuration (Standard 7 SP1)” for details on the keys that can be blocked, the keys that can not be blocked, the syntax and notes in the creation of custom keys.

<Custom Key Filter Configuration (Standard 7 SP1)>

https://msdn.microsoft.com/en-us/library/hh505883(v=winembedded.60).aspx

4.2 Precautions While the OS is Running

4.2.1 Event log entries during setup

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

Source	Event ID	Type
volmgr	49	Error
e1rexpress	27	Warning

4.2.2 Event log entries while the OS is running

● In the case of Windows® Embedded Standard 7

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

Source	Event ID	Type
BROWSER	8032	Error
	8021	Warning
Time-Service	134, 36	Warning
User Profile Service	1530	Warning
elrexpress	27	Warning

In addition, the following event may be recorded in the event log when a USB device is connected or disconnected or when the system starts for the first time after a storage device is added, even though the USB device or the storage device works without any problems. Those events are recorded due to the specifications of the OS and do not affect the operation of the system.

Source	Event ID	Type
Disk	11	Error

For detail, see the following web site.

Microsoft technical information　　Document number：2537729

Disk event ID11 may be recorded when you connect USB flash memories or USB disks to the computer which installed Windows 7 or Windows Server 2008 R2.

https://support. microsoft. com/ja-jp/kb/2537729

● In the case of Windows® 10

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

Source	Event ID	Type
DistributedCOM	10010, 10016	Error
Search	3104	Error
Time-Service	134	Warning
Search	1008	Warning
TXEIx64	1	Warning
elrexpress	27	Warning

In the case of Windows®10, the Product Activation is automatically carried out at the time of Internet connection. If you don't carry out the Product Activation in the environment unconnected to the Internet, the following event log is recorded regularly, but the operation of this equipment does not have any problems.

Source	Event ID	Type
Security-SPP	1014, 8198, 8200	Error

The following event log is recorded, when you log off or shut down.

Source	Event ID	Type
Service Control Manager	7023, 7031	Error

Finish all application before you log off, shut down, or restart.
For detail, see following web site.

Microsoft technical information Document number：3116667
Event ID 7031 or 7034 when you log off a device that’s running Windows 10
https：//support. microsoft. com/en−us/kb/3118867

4.2.3 Scheduled functions by default

In Windows®, various functions are scheduled by default and executed periodically in the background. Among those functions, the disk defragmenter (or optimize drives) may increase the system load significantly when they run and may affect the operation of the applications for business use.

(1) Disk Defragmenter (For Windows® Embedded Standard 7)

On this equipment, scheduled defragmentation by Disk Defragmenter is turned off. If you want to defragment disks using Disk Defragmenter, you can do that by using either one of the methods below.

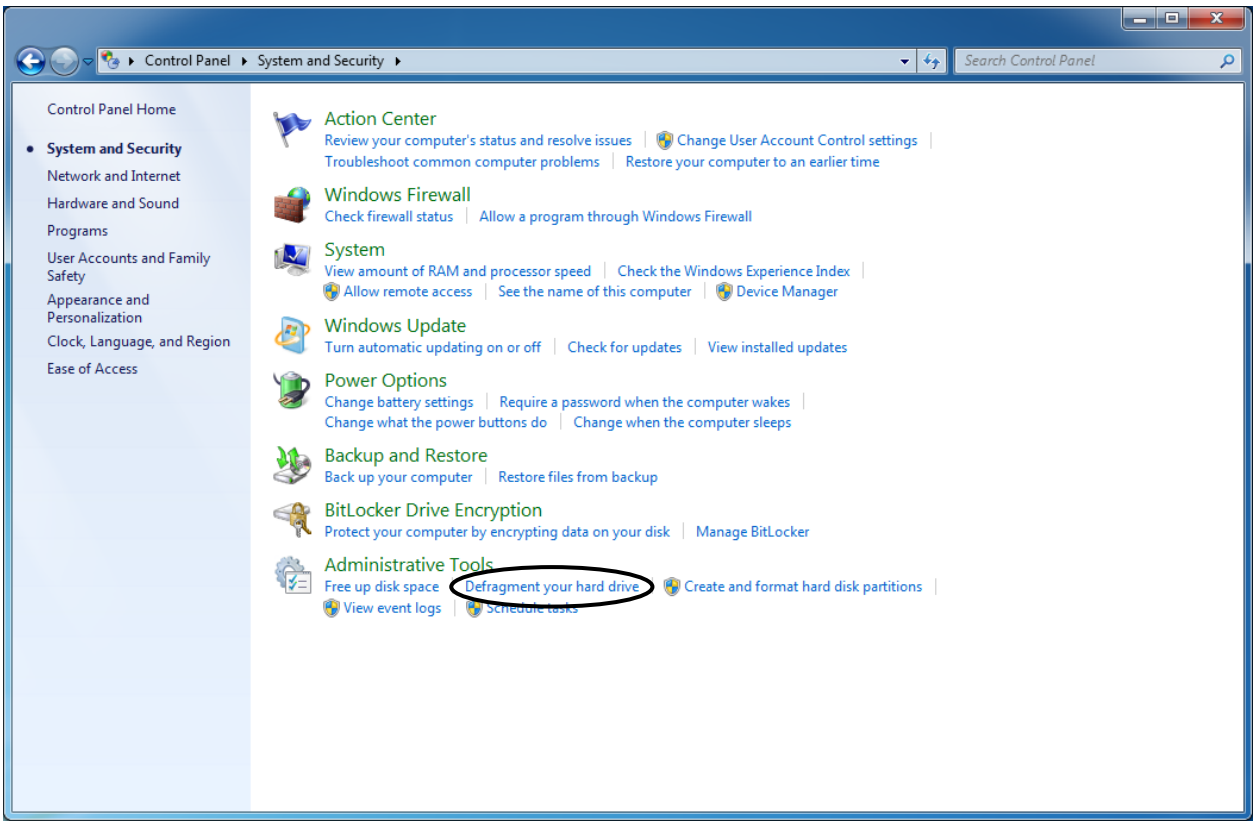
(a) Turn on scheduled defragmentation by Disk Defragmenter.

(b) Run Disk Defragmenter manually.

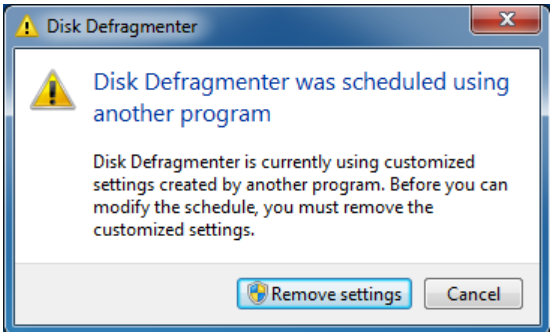
The procedure of each method is described below.

(a) Turn on scheduled defragmentation by Disk Defragmenter.

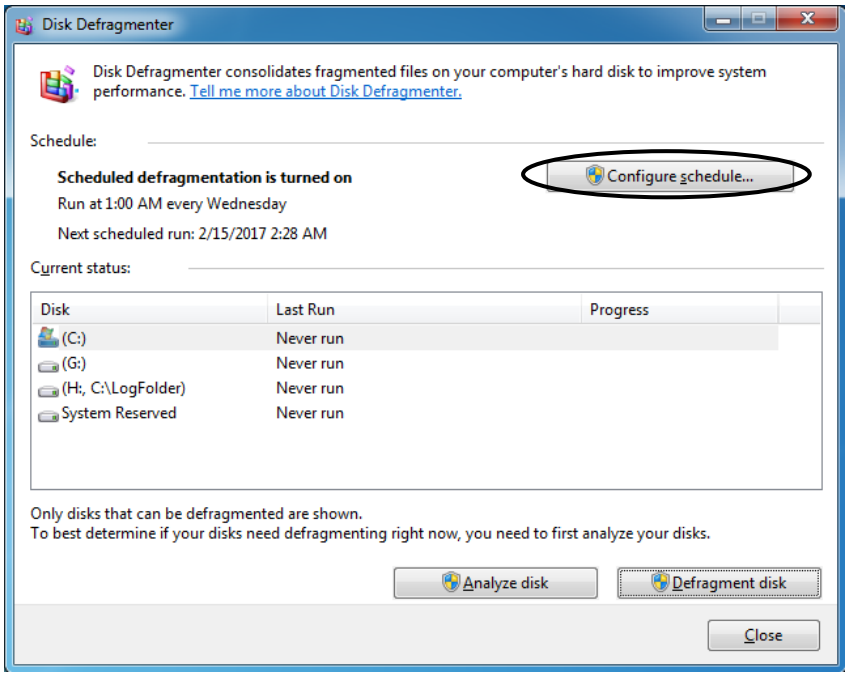
1. If you are not logged on to the computer as an administrator, log on to the computer as an administrator.
2. Click **Start** > **Control Panel**.
3. The **Control Panel** window appears. Click **System and Security**
4. Click **Defragment your hard drive** under **Administrative Tools**.



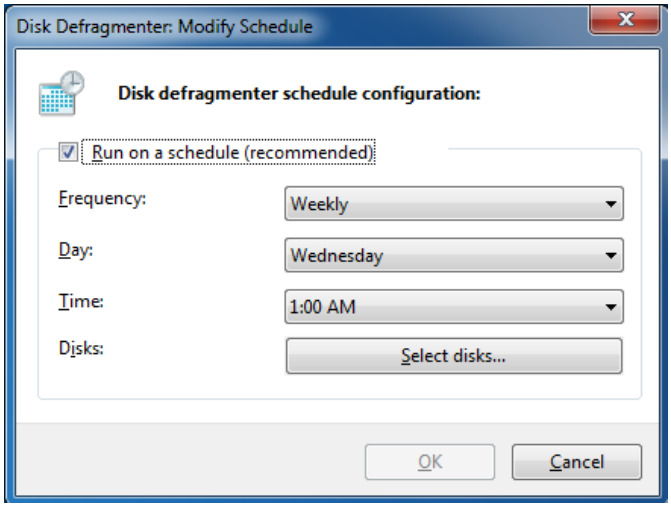
・The following screen will be displayed only when you select it for the first time, so click **Remove settings**.



5. The **Disk Defragmenter** window appears.
   - Under **Schedule**, click **Turn on schedule**.



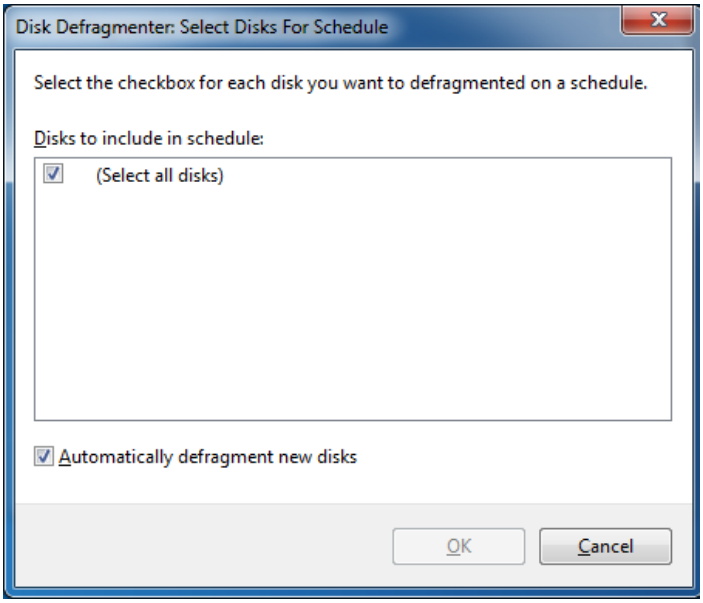
6. The **Disk Defragmenter: Modify Schedule** window appears.



As required, configure the frequency, day of the week, and start time of defragmentation. We recommend the scheduled times of defragmentation you configure do not conflict with the schedule of the applications for business use. The initial schedule of defragmentation is as follows.

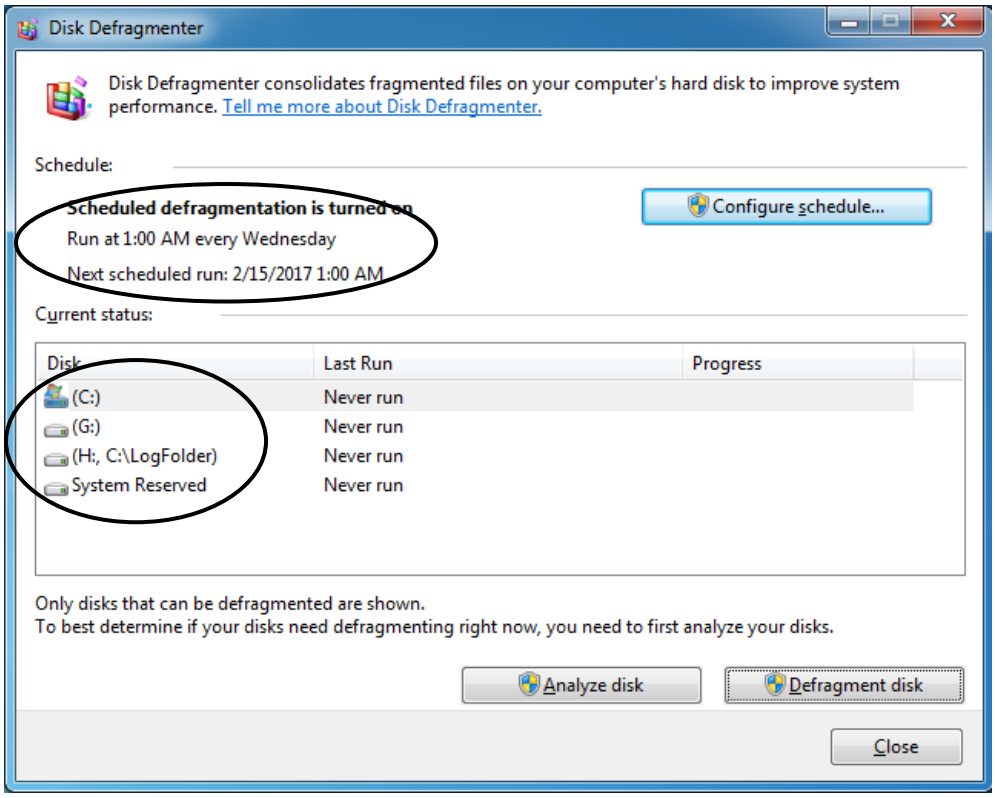
- Frequency: Weekly
- Day of the week: Wednesday
- Start time: 1:00

7. Click **Select disks**.
8. The **Disk Defragmenter: Select Disks For Schedule** window appears. As required, select the drives you want to defragment.
   - Click **OK**.



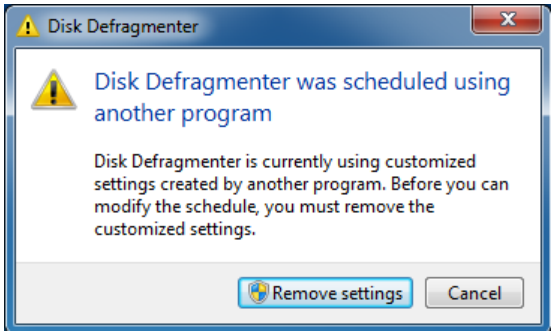
Notes 1: SSD is not appeared on **Select Disks For Schedule** window.

9. The configured schedules are displayed under **Schedule**. Check the contents, and click **Close** to close the window.



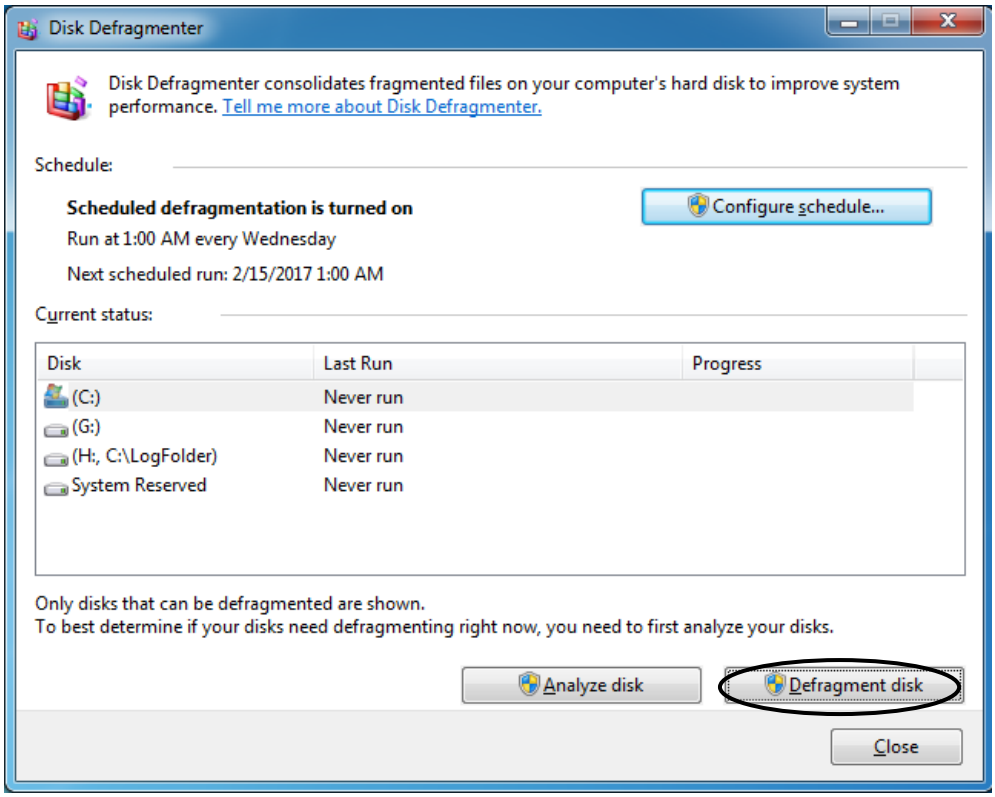
(b) Run Disk Defragmenter manually.

1. If you are not logged on to the computer as an administrator, log on to the computer as an administrator.
2. Click **Start** > **Control Panel**.
3. The **Control Panel** window appears. Click **System and Security**.
4. Click **Defragment your hard drive** under **Administrative Tools**.
   - The following screen will be displayed only when you select it for the first time, so click **Remove settings**. (As the schedule for optimizing the drive becomes effective, if you want to invalidate the schedule after executing Disk Defragmentation, please do Step 7 or later)



5. The **Disk Defragmenter** window appears.

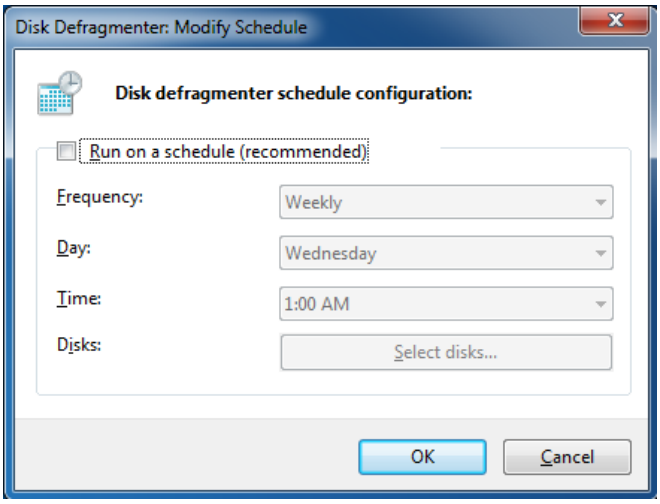
- Under **Current status**, select the drive you want to defragment, and click **Defragment disk**.



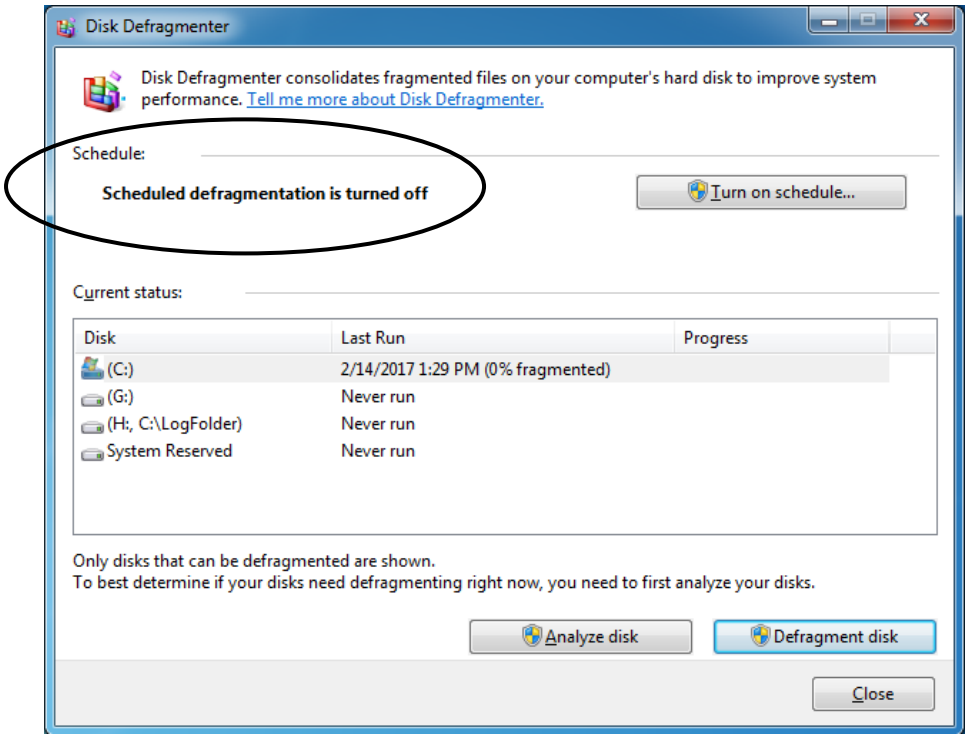
- When the defragmentation process is complete, the date and time of the defragmentation is displayed in the **Last Run** column.

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

7. If you want to disable the optimization schedule for the drive, do the following:
   - Click **Defragment your hard drive** under **Administrative Tools**.
   - Click **Configure Schedule** in **Schedule** on the **Disk Defragmenter** screen.
   - The **Disk Defragmenter: Modify Schedule** screen will be displayed, so uncheck the "**Run on a schedule (recommended)**" check box and click **OK**.



8. Optimization schedule will be invalid.



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

(2) Drive Optimize (For Windows® 10)

On this equipment, the drive optimization schedule is turned off by default. If you want to optimize drives, you can do that by using either one of the methods below.

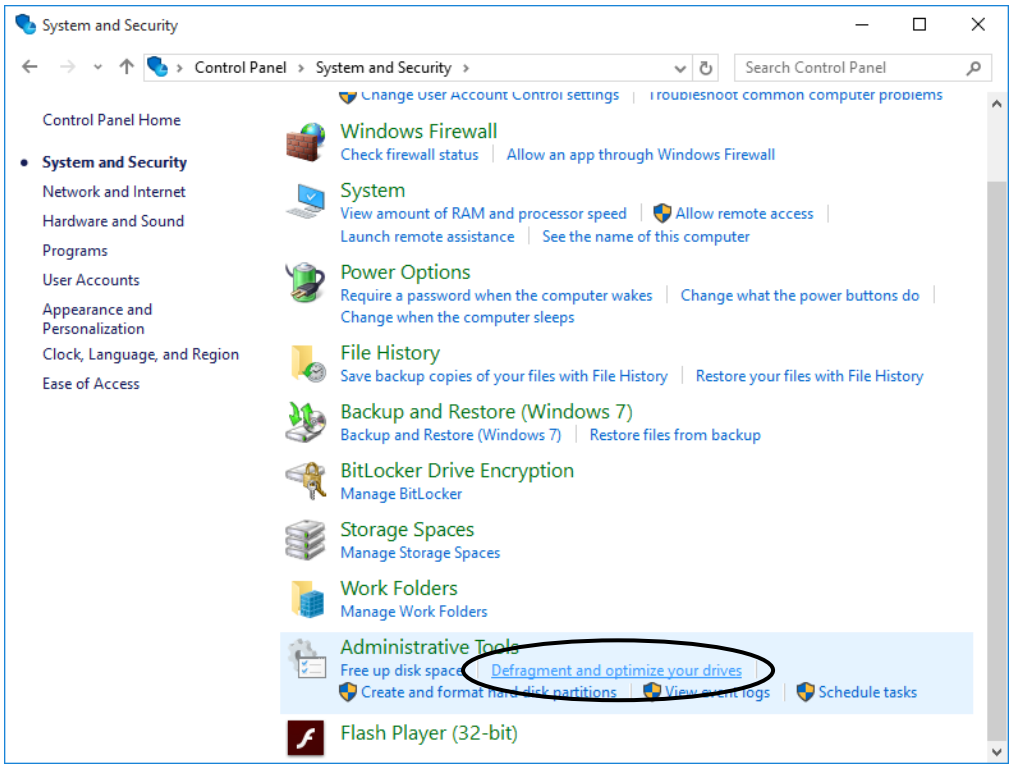
(a) Turn on the drive optimization schedule.

(b) Run the drive optimization manually.

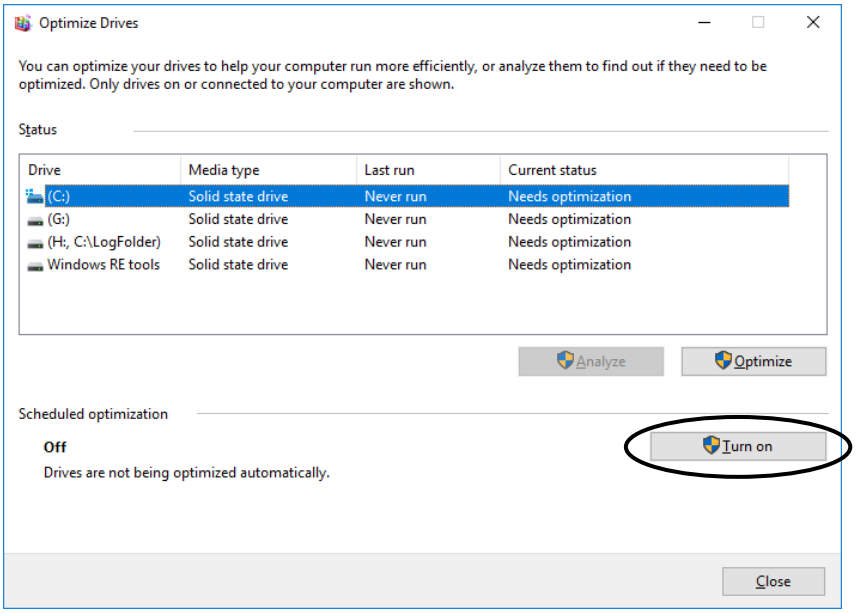
The procedure of each method is described below.

(a) Turn on the drive optimization schedule.

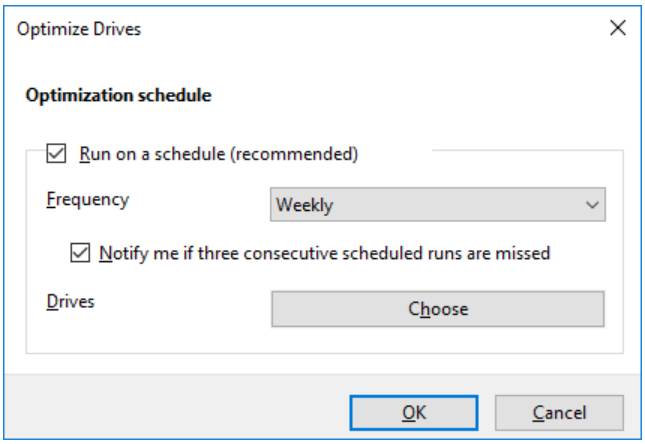
1. Sign in to the computer as an administrator.
2. Right-click **Start** and then click **Control Panel** from displayed menu.
3. The **Control Panel** opens. click **System and Security**.
4. Under **Administrative Tools**, click **Defragment and optimize your drives**.



5. The **Optimize Drives** window opens.
   - Under **Scheduled optimization**, click **Turn on**.

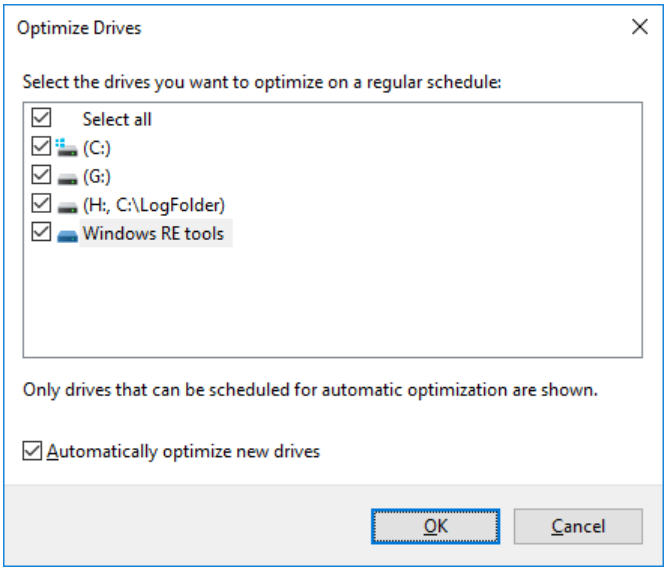


6. The **Optimization schedule** window opens. Select the **Run on a schedule (recommended)** check box.

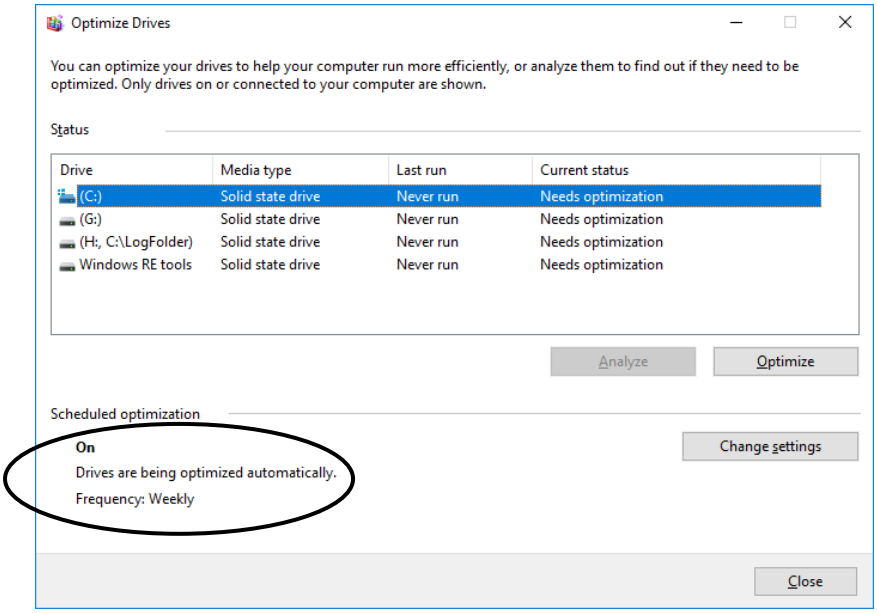


7. As required, configure the frequency of defragmentation. The initial schedule of defragmentation is as follows.
   - Frequency: Weekly
8. Click **Choose**.

9. The **Select the drives you want to optimize on a regular schedule** window opens. As required, select the drives you want to optimize.
   - Click **OK**.

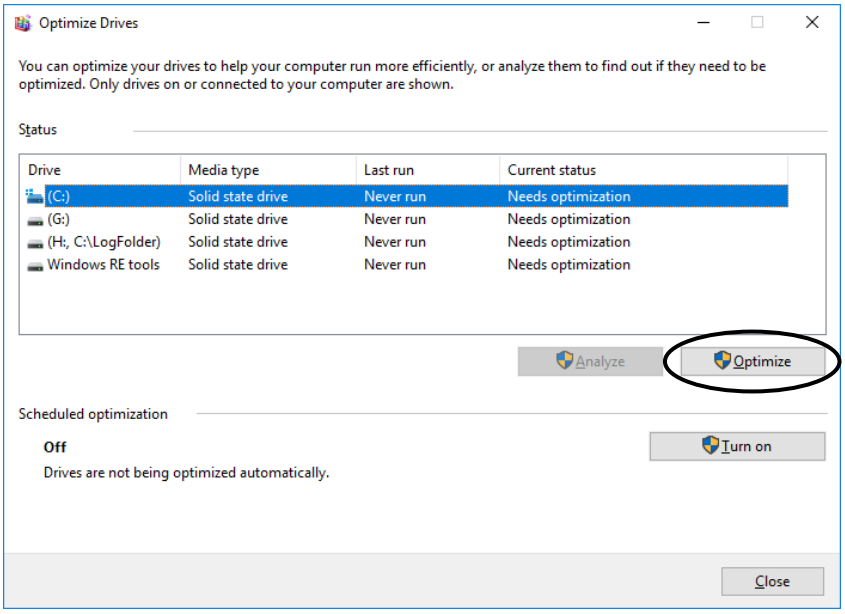


10. The **Optimization schedule** window opens. Click **OK**.
11. The configured schedules are displayed under **Scheduled optimization**. Check the contents, and click **Close** to close the window.



(b) Run the drive optimization manually.

1. Execute steps 1 though 4 in ” (a) Turn on the drive optimization schedule.”
2. The **Optimize Drives** window opens.
   - Under **Status**, select the drive you want to optimize, and click **Optimize**.



   - When the disk optimization process is complete, the date and time of the optimization is displayed in the **Last Run** column.

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

4.2.4 Security enhancement function

- Windows® Embedded Standard 7

In Windows® Embedded Standard 7, a spyware preventive function Windows Defender has been scheduled and is executed regularly on the background. We recommend that you change the scheduled time as needed so as not to overlap with the operation schedule of job applications.

The initial schedule settings are shown below.

• Frequency: Every day

• Approximate time: 2:00

- Windows® 10

In Windows® 10, a spyware preventive function Windows Defender has been enabled. The Windows Defender also includes a virus preventive function. This virus preventive function may adversely impact application performance compared with when using Windows® 7 in some cases.

4.2.5 Factory-shipped network settings

- Turning off SNP (Scalable Networking Pack)

The purpose of SNP is to reduce the processor load by delegating TCP-related processing to the network adapter. SNP is made of the following three features.

・ TCP Chimney Offload

・ Receive Side Scaling (RSS)

・ Network Direct Memory Access (NetDMA)

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

In Windows® 10, TCP Chimney Offload and Network Direct Memory Access are not supported by OS, so that we set only Receive Side Scaling (RSS) for invalidity.

4.2.6 Product Activation in Windows® 10

In Windows® 10, product activation is carried out automatically when you connect the Internet connection. If you don't carry out the Product Activation in the environment unconnected to the Internet, "Connect to the Internet to activate Windows" will be displayed on the Control panel － System and Security - System, but you can use it as it is.

CHAPTER 5 SPECIFICATION

5.1 Equipment Specifications

(1) Common specifications

Item		Specifications
Model		HJ-100E-xxMM（*1）
Processor		Intel® Atom™ Processor E3845（1.91GHz）
Main memory		4GB
Display resolution and color depth		See “(5) Supported resolutions”.
Built-in file device	mSATA SSD	32GB(MLC NAND)（*2）
	CFast	CFast card（Prepared by users）
Interface	Display	Digital (DVI-I 29 pins) (*3)
		Digital (DisplayPort 20 pins)
	USB	USB2.0/1.1 × 2 (front × 1, rear× 2)
		USB3.0/2.0/1.1 × 2 (front × 2)
	Serial	RS-232C/422/485 (D-sub 9 pins) × 1
	LAN	1000BASE-T/100BASE-TX/10BASE-T by auto-negotiation × 3 (RJ45, Wake ON LAN supported) (*4)
	Audio	None(DisplayPort Audio is available)
	External general I/O	GPIO×1(DI port×7, DO port×8, PWR_BTN, PW_STATUS signal)
External Dimensions (Width × Depth × Height)		192 × 119 × 50 mm (protrusions not included)
RAS features		Hardware status monitoring (temperature failure, SMART, and others), OS deadlock monitoring, watchdog monitoring, alarm notification when failure is detected (pop up notification, remote notification, and others), memory dump collection, maintenance operation support commands, and simulation function
Weight		About 1.4 kg
Inrush current		5A or less(DC 12-24V)
Leakage current(*5)		0.75 mA or less
Consumption current (max) DC12V/DC24V		DC12V：3.0A, DC24V：1.6A
Power	Voltage	DC 12-24V +30% -20% (Optional AC adapter attached:100-240VAC±10%)
	Frequency (Optional AC adapter attached)	50/60 Hz ± 3 Hz

(*1) The “xx” denotes the OS type. For details about OS types, see “ (2) Pre-installed OS model specifications”. If “xx” is “NO”, an OS is not installed.
Depending on the language of the OS, MUI (Multilingual User Interface). A language supporting in MUI is English, Korean, Portuguese, Thai, Chinese (China).
(*2) For information about the precautions for mSATA SSD, see “PRECAUTIONS 4. MINI SERIAL ATA SOLID STATE DRIVES (mSATA SSDs)”.
For details of partition configuration, see "5.1 Equipment Specification (3) Partition configuration”.
(*3) By using a conversion connector or DVI-A cable, you can output an analog VGA signal. The conversion connector or DVI-A cable must be provided by the users.
(*4) At the LAN port, only two ports may be set to EtherCAT by default. See “1.4 Name and Function of Each Part (1) Front view”)
(*5) It is the specification of the AC adapter.

(2) Pre-installed OS model

OS type	Pre-installed OS + Software
PA	Microsoft® Windows® 10 IoT Enterprise 2016 LTSB (64bit) (Embedded) + Softmotion
PB	Microsoft® Windows® 10 IoT Enterprise 2016 LTSB (64bit) (Embedded) + Softmotion + CNC
PF	Microsoft® Windows® 10 IoT Enterprise 2016 LTSB (64bit) (Embedded)
PG	Microsoft® Windows® Embedded Standard 7 SP1 (64bit) + Softmotion
PH	Microsoft® Windows® Embedded Standard 7 SP1 (64bit)+ Softmotion + CNC
PL	Microsoft® Windows® Embedded Standard 7 SP1 (64bit)

(3) Partition configuration

The partition configuration in the OS preinstalled model of this equipment is as follows. In addition to the boot partition (C :) where Windows® is installed, two partitions are arranged.

Drive	Use		Capacity
C:	Boot partition	Windows® Embedded Standard 7	28GB
		Windows® 10	27.5GB
G:	Application data storage partition		1GB
H:	Fault analysis information partition		About 700MB

・Application data storage partition
Please use as a storage area of the application data (logs etc.). In particular, you can use it as a writing area when using the filter feature of Embedded Enabling Features(EEF). For details on the Embedded Enabling Features, see "4.1 Embedded Enabling Features of Windows® Embedded Standard 7".

・Fault analysis information partition
It is arranged as an area for storing information necessary for failure analysis such as Windows® event logs and minimum memory dump file, and it is set mount settings. Therefore, do not change the drive letter or write to this area. For the mount setting, see "9.6 Failure Analysis Information Partition Mount Setting".

(4) Accessories

Item	Specifications
CFast card suppressed bracket, and each fixing screw	CFast card suppressed bracket:1 piece Each fall-off prevention metal fitting fixing screw (M3 screw):3 piece Equipment fixing screw (M4 screw):4 piece
USB removal prevention fitting	USB removal prevention fitting:1 piece
DisplayPort / USB removal prevention fitting	DisplayPort / USB removal prevention fitting:1 piece
Cable band	USB fixing band:2 piece
Manual	SAFETY INSTRUMENTS (Manual number WIN-B-0003)

(5) Supported resolutions

Screen settings			
Resolution	Refresh rate（*1）		
	DVI-I（*2）		DisplayPort
	Analog	Digital	Digital
800×600	60,75Hz	60,75Hz	60,75Hz
1024×768	60,75Hz	60,75Hz	60,75Hz
1280×1024	60,75Hz	60,75Hz	60Hz
1600×1200	60Hz	60Hz	60Hz
1920×1080	60Hz	60Hz	60Hz
1920×1200	60Hz	-	60Hz

(*1) It has been confirmed that all refresh rate settings indicated in the table actually work in the test environment provided by Hitachi. It should be noted that supported resolutions and refresh rates are different depending on the display. Consequently, some settings may not be used for a specific display.

(*2) By using a conversion connector or DVI-A cable, you can output an analog VGA signal. The conversion connector or DVI-A cable must be provided by users.

(6) Maximum current specifications (USB port, DisplayPort)

The following table shows the maximum total current consumption for the USB ports and DisplayPort.

DC Output	Maximum total current consumption for USB port 5 port/ DisplayPort 1 port
3.3V	0.5A
5V	3.3A

The following table shows the maximum current consumption for each of the USB ports 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 may be activated and the connected device may not be recognized.

Item	Voltage	Maximum current
USB2.0/1.1 port	5V	0.5A/port
USB3.0/2.0/1.1 port	5V	0.9A/port
DisplayPort	3.3V	0.5A/port

5.2 Serial Port Settings

The equipment shipped, the default for the serial ports is RS-232 specification.

In the case of RS-232(Default)

Name recognized by the BIOS	I/O address (*1)(*2)	IRQ assignment (*1)(*2)	Name recognized by the OS(*2)	Note
Serial port	3F8h	IRQ 4	COM1	Standard feature

You can change the setting of the serial ports to RS-485 Half Duplex, RS-422 Full Duplex by the following operation.

(1) Setup the serial ports

1. Start the setup menu. (See “5.3 BIOS Setup (1) Starting the setup menu”)
2. Open **Advanced** in top menu. Select **Super IO Configuration** and press **Enter**.
3. Select **Serial Port A Configuration**, next select **Mode select**.
4. **RS-232**, **RS-485 Half Duplex**, **RS-422 Full Duplex** a three modes are displayed. Please select the mode to use.
5. Open **Exit** in the top menu again. Move the cursor to **Exit Saving Changes**. Press **Enter**. The message “Save configuration and reset?” is displayed.
6. Select “Yes” and press **Enter**.

This completes the procedure. Then turn off the equipment and restart it.

In the case of RS-485 Half Duplex

Name recognized by the BIOS	I/O address (*1)(*2)	IRQ assignment (*1)(*2)	Name recognized by the OS(*2)	Note
Serial port	3F8h	IRQ 4	COM1	Available only when set by user

In the case of RS-422 Full Duplex

Name recognized by the BIOS	I/O address (*1)(*2)	IRQ assignment (*1)(*2)	Name recognized by the OS(*2)	Note
Serial port	3F8h	IRQ 4	COM1	Available only when set by user

(*1) Automatically assigned by the BIOS.

(*2) Do not change the “I/O address”, “IRQ assignment”, or “Name recognized by the OS” even if you change the serial port setting.

5.3 BIOS Setup

The BIOS stores the system configuration information in the SPI-ROM. When the system configuration is modified, it may be necessary to change the BIOS settings.

< NOTE >
When the equipment is shipped, the BIOS is configured in accordance with the system configuration.
If the BIOS settings are changed, the system may not operate stably or may not start properly. Pay sufficient attention when you change the BIOS settings.

(1) Starting the setup menu

When you set up the BIOS, start the setup menu.
Turn on the power (see “2.2 Starting the Equipment”). Messages related system initialization will be displayed. Press the Delete key or ESC key to launch the setup menu.

(2) Maneuvering through the setup menu

Use the following keys to maneuver through the menu.

Key name	Description
Esc	Used for exiting the setup or returning from a lower menu to a higher menu.
← or →	Used for selecting a menu or selecting a menu group displayed at the top of the screen.
↑ or ↓	Used for selecting an item or selecting a sub-item under a menu group.
＋or －	Used for selecting a value for the setting. By pressing those keys, the setting switches among the available options.
Space	Used for selecting a value for the setting. If there are only two available options, the setting toggles when you press the key.
Tab	When you configure the date and time, by pressing this key, the focus moves between setting items, for example, from month to day and from hour to minute.
Enter	Used for moving from a higher menu to a lower menu, exiting the setup (saving data to the SPI-ROM), or 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 date and time.
Advanced: You can configure detailed system settings such as interrupt ports and I/O address settings.
Chipset: Sets the operation mode at power-on, USB port power supply setting at standby state, etc.
Security: Make security settings such as HDD password.
Boot: You can configure the priority order of the devices from which an OS is booted.
Exit: You can save modified configuration information to the SPI-ROM, reset configuration information back 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 up in each menu.

(1/3)

Top menu	Setting item			Default value	Note
Main	System Date				When you set the system up for the first time, be sure to configure these two items.
	System Time				
Advanced	ACPI Settings	Enable Hibernation		Disabled	Do not change this setting.
		Wake On LAN Control on S5		Enabled	
		Wake On RI Control on S5		Disabled	
		Resume On RTC Alarm		Disabled	
	Super IO Configuration	Serial Port A Configuration	Serial Port	Enabled	
			Change Settings	IO=3F8h;IRQ=4;	
		RS422/485 Terminator Control		Disabled	
		Mode Select		RS-232	You can change the serial port setting. See”5.2 Serial Port Settings”
		Digital I/O Configuration	Digital Output 0	Output High	Change initial value of output of GPIO.
			Digital Output 1	Output High	
			Digital Output 2	Output High	
			Digital Output 3	Output High	
			Digital Output 4	Output High	
			Digital Output 5	Output High	
			Digital Output 6	Output High	
			Digital Output 7	Output High	
	CPU Configuration	Execute Disabled Bit		Enabled	Do not change this setting.
		Intel Virtualization Technology		Enabled	
	PPM Configuration	EIST		Disabled	
		CPU C state Report		Disabled	
		S0ix		Disabled	
	SATA Configuration	Serial-ATA(SATA)		Enabled	
		SATA Test Mode		Disabled	
		SATA Speed Support		Gen2	
		Serial-ATA Port 0		Enabled	
		Serial-ATA Port 1		Enabled	
	CSM Configuration	CSM Support		Enabled (In the case of Windows® Embedded Standard 7)	
				Disabled (In the case of Windows® 10)	
		Network		Do not launch	Do not change this setting. (Note) It is not displayed in Windows® 10.
		Storage		Legacy	
		Other PCI devices		Legacy	

(2/3)

Top menu	Setting item			Default value	Note
Chipset	North Bridge	Max TOLUD		3GB	Do not change this setting.
		Bypass SPD Detect		Disabled	
		Intel IGD Configuration	PAVC	LITE Mode	
			DVMT Pre-Allocated	64M	
			DVMT Total Gfx Mem	Max	
			Aperture Size	256MB	
			GTT Size	2MB	
		LCD Control	Primary IGFX Boot Display	CRT	
			Secondary IGFX Boot Display	DVI	
	South Bridge	Restore AC Power Loss		Power On	You can specify the startup state that the equipment is in when the PC is turned on.
		USB Configuration	Legacy USB Support	Enabled	You can specify the functions that support USB ports.
			XHCI Hand-off	Enabled	Do not change this setting.
			EHCI Hand-off	Disabled	
			USB Mass Storage Driver Support	Enabled	
			USB Overcurrent	Disabled	
			USB Powerdown on S5	Disabled	You can specify whether power is supplied from the USB port in the standby state. The default value is the power supply status.
			USB 3.0(XHCI) Support	Smart Auto (In the case of Windows® Embedded Standard 7)	Do not change this setting.
				Enabled (In the case of Windows® 10)	
			USB2 Link Power Management	Disabled	
Security	Administrator Password				You can set the password on the left. However, if you forget your password, you will not be able to use the equipment, so please carefully consider whether or not you need a password.
	User Password				
	HDD Security Configuration				
	P0:***** (*)				
	Secure Boot menu	Secure Boot		Enabled	Do not use this setting. (Note) It is not displayed in Windows® Embedded Standard 7.
		Secure Boot Mode		Standard	
		Key Management	Provision Factory Default keys	Disabled	
			Enroll all Factory Default keys		
			Platform Key(PK)		
			Key Exchange Keys		
			Authorized Signatures		
			Forbidden Signatures		
			Authorized TimeStamps		

(*)The model of mSATA SSD is displayed in the part *****.

(3/3)

BOOT	Setup Prompt Timeout		1	Do not change this setting.
	Bootup NumLock State		On	
	Quiet Boot		Disabled	
	Fast Boot		Disabled	
	Boot Option #1		(*3)	Configures the priority order of the devices from which an OS is booted. Do not change this setting. (Note) UEFI Boot is not supported in Windows® Embedded Standard 7.
	Boot Option #2			
	Boot Option #3			
	Boot Option #4			
	Boot Option #5			
	Boot Option #6			
	Boot Option #7			
	Boot Option #8			
	Boot Option #9			
	Boot Option #10			
	Hard Drive BBS Priorities (*1)		P0:InnoDisk Corp. mSATA 3ME	Not displayed when the device is not connected. Do not change this setting.
	***** BBS Priorities			It is displayed when multiple devices of the same type are connected. (***** is the name of the connected device.) If more than one bootable device is connected, set the device to be booted from this menu to Boot Option # 1 and start up the equipment. (*2)
Save & Exit	Save Changes and Exit			You can exit after saving the settings.
	Discard Changes and Exit			You can exit without saving the settings.
	Save Options	Save Changes		You can save the settings.
		Discard Changes		The settings are not saved.
	Restore Defaults for Windows 7			Set the setting back to the default of Windows® Embedded Standard 7. See ”5.3 BIOS Setup (5) Restoring the default settings”.
	Restore Defaults for Windows 10			Set the setting back to the default of Windows® 10. See ”5.3 BIOS Setup (5) Restoring the default settings”.
	Save as User Defaults			You can save the changes as user defaults.
	Restore User Defaults			You can restore the user defaults.
	Boot Override	Built-in EFI Shell		Do not change this setting.
	Launch EFI Shell from filesystem device			

(*1) Booting from CFast is unsupported. Please do not install OS on CFast. Also, “Hard Disk Drive BBS Priorities” and “UEFI Hard Disk Drive BBS Priorities” should not be changed.

(*2) “CDROM / DVD Drive BBS Priorities” is displayed only when connecting multiple USB CD / DVD drives.

(*3) The default values are as follows. It depends on OS.

Setting items	Windows® Embedded Standard 7	Windows® 10
Boot Option #1	USB Floppy	UEFI USB Floppy
Boot Option #2	UEFI USB Floppy	UEFI USB CD/DVD
Boot Option #3	USB CD/DVD	UEFI USB Key
Boot Option #4	UEFI USB CD/DVD	UEFI Hard Disk
Boot Option #5	USB Key	UEFI USB Hard Disk
Boot Option #6	UEFI USB Key	—
Boot Option #7	Hard Disk	—
Boot Option #8	UEFI Hard Disk	—
Boot Option #9	USB Hard Disk	—
Boot Option #10	UEFI USB Hard Disk	—

(5) Restoring the default settings

When you want to restore all items in the setup menu back to the default settings, follow the procedure below:

1. Start the setup menu. (See “5.3 BIOS Setup (1) Starting the setup menu”.)
2. Open **Save & Exit** in the top menu.
   【 In the case of Windows® Embedded Standard 7】
   Move the cursor to **Restore Defaults Windows 7** and press **Enter**.
   【 In the case of Windows® 10】
   Move the cursor to **Restore Defaults Windows 10** and press **Enter**.
   The message “Load Optimized Defaults?” is displayed.
3. Select “Yes” and press **Enter**.
4. Open **Save & Exit** in the top menu again. Move the cursor to **Saving Changes and Exit**. Press **Enter**. The message “Save configuration and reset?” is displayed.
5. Select “Yes” and press **Enter**.

This completes the procedure.

5.4 Hardware System Clock

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

The clock has a built-in calendar and continues to work using a backup battery even when the system power is off.

Table 5-1 Hardware System Clock Specification

Item	Specifications
Time function	Hour/Minute/Second (24-hours clock)
Date function	Year/Month/Date
Precision	± 3 minutes per month (*)
Battery backup	Lithium battery

(*) Rough estimates when the ambient temperature is 25°C.

For your information, the system program normally 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.

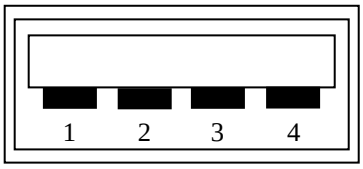
5.5 Interface Specifications

5.5.1 Connector specifications

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

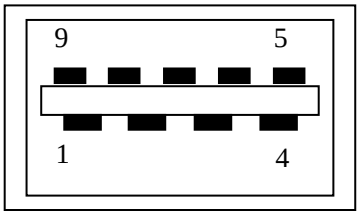
For information about the location of the ports, see “1.4 Name and Function of Each Part”.

● USB2.0/1.1 port (front and rear)



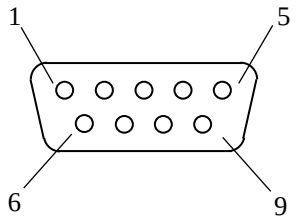
Pin No.	Signal name
1	USB_VCC
2	DATA-
3	DATA+
4	USB_GND

● USB3.0/2.0/1.1 port (front)



Pin No.	Signal name
1	USB_VCC
2	DATA-
3	DATA+
4	USB_GND
5	SSRX-
6	SSRX+
7	USB_GND
8	SSTX-
9	SSTX+

● Serial port (male connector, inch screws)



In the case of RS-232C

Pin No.	Signal name	Pin No.	Signal name
1	DCD	6	DSR
2	RxD	7	RTS
3	TxD	8	CTS
4	DTR	9	RI
5	GND		

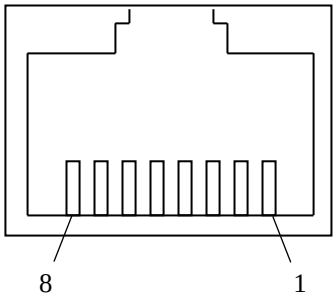
In the case of RS-422 Full Duplex

Pin No.	Signal name	Pin No.	Signal name
1	Tx-	6	RTS-
2	Tx+	7	RTS+
3	Rx+	8	CTS+
4	Rx-	9	CTS-
5	GND		

In the case of RS-485 Half Duplex

Pin No.	Signal name	Pin No.	Signal name
1	Tx-	6	NC
2	Tx+	7	NC
3	Rx+	8	NC
4	Rx-	9	NC
5	GND		

● Built-in LAN port (RJ-45 modular port 8 pins)

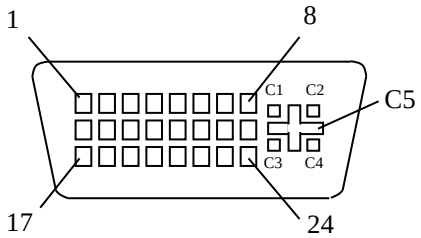


Pin No.	Signal name
1	TRD+(0)
2	TRD-(0)
3	TRD+(1)
4	TRD+(2)
5	TRD-(2)
6	TRD-(1)
7	TRD+(3)
8	TRD-(3)

For network connection, use a cable specified as follows.

Cable specification: UTP cable (twisted-pair cable without shield) category 5e or 6

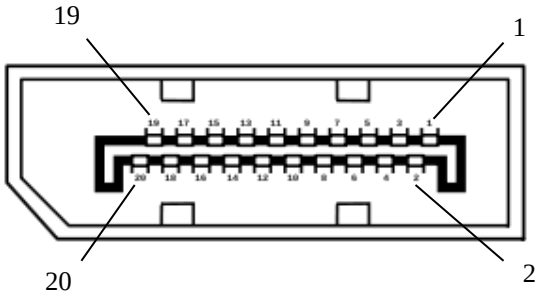
● Video port (DVI-I 29 pins, inch screws)



Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name
1	DATA2-	9	DATA1-	17	DATA0-
2	DATA2+	10	DATA1+	18	DATA0+
3	DATA2 SHIELD	11	DATA1 SHIELD	19	DATA0 SHIELD
4	N.C.	12	N.C.	20	N.C.
5	N.C.	13	N.C.	21	N.C.
6	DDC CLK	14	+5V	22	DATA0 SHIELD
7	DDC DATA	15	GND	23	CLK+
8	VSYNC	16	HPD	24	CLK-

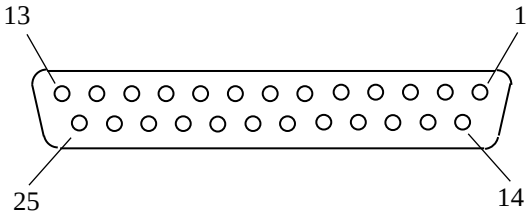
Pin No.	Signal name
C1	RED
C2	GREEN
C3	BLUE
C4	HSYNC
C5	GND

● Video port (DisplayPort 20 pins)



Pin No.	Signal name	Pin No.	Signal name
1	Lane0+	11	GND
2	GND	12	Lane3-
3	Lane0-	13	GND
4	Lane1+	14	GND
5	GND	15	Aux+
6	Lane1-	16	GND
7	Lane2+	17	Aux-
8	GND	18	HotPlug
9	Lane2-	19	GND
10	Lane3+	20	3.3V

● External general purpose I/O port (Female connector, inch screws)



Pin No.	Signal name	Pin No.	Signal name
1	PWR_BTN	14	GENDO0
2	GENDI0	15	GENDO1
3	GENDI1	16	GND
4	GENDI2	17	GENDO2
5	GND	18	GENDO3
6	GENDI3	19	GND
7	GENDI4	20	GENDO4
8	GENDI5	21	GENDO5
9	GENDI6	22	GND
10	GND	23	GENDO6
11	NC	24	GENDO7
12	NC	25	PS_STATUS(+5V)
13	NC		

5.5.2 External general purpose I/O specifications

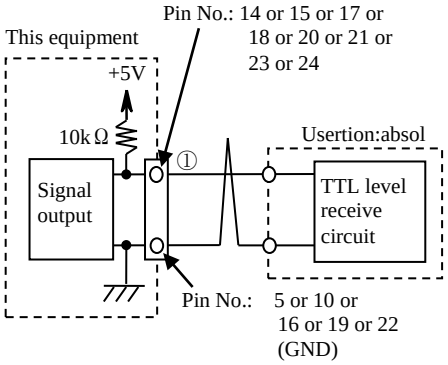
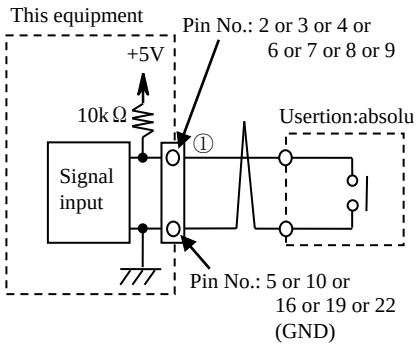
(1) External general purpose I/O port(EXT) specifications

Item		Specification
Input (*1)(*2)		
	Input points	7 points
	Input type	Non-isolated 5 VTTL level input (Input resistance: include pull-up resister 10kΩ)
Output (*2)		
	Output points	8 points
	Output type	Non-isolated 5 VTTL level output (Output resistance: include pull-up resister 10kΩ)

(*1) The external general purpose I/O port is non-insulation. Be attention not to apply noises to external general purpose I/O connector when you use external general purpose input / output port. Otherwise, this equipment may malfunction under the influence of a noise etc.

(*2) External general purpose I/O signal is effective only in the period which this equipment has been running.

(2) Table of External general purpose I/O port (EXT) signals

Pin No	Signal name	Meaning	Diagram of connection
14	GENDO0	General-purpose output signals. User can define the meaning of a signal for every GENDO0~7 output. In addition, a default output signal is high-level.	 ※For ①, see Figure 5-1 to 5-4.
15	GENDO1		
17	GENDO2		
18	GENDO3		
20	GENDO4		
21	GENDO5		
23	GENDO6		
24	GENDO7		
25	PWR_STATUS	Power ON state signal. This signal outputs 5 V when the equipment is turned on, and outputs 0 V when the equipment is turned off.	
2	GENDI0	General-purpose input signals User can define the meaning of a signal for every GENDI0~6 input. Signal width must be tailored to the width (time) of user program.	 ※For ①, see Figure 5-1 to 5-4.
3	GENDI1		
4	GENDI2		
6	GENDI3		
7	GENDI4		
8	GENDI5		
9	GENDI6		
1	PWR_BTN	Power switch input signal. This signal operates in the same way as the power button, and starts up the equipment with input at standby state. Also, it will be shut down at input during operation. The input signal length should be 200 ms or more and 1 s or less. If you input a signal longer than 4s, the equipment is forcibly shut down.	
5、10、16、19、22	GND	Use this signal as reference voltage of TTL.	–
11、12、13	-	Do not connect.	–

External general purpose I/O signal is effective only in the period which this equipment has been running. (Period A in the figure below).

When power goes off (G3 state) to standby state (S5 state), general output (GENDO0 to 7) is output at high level until BIOS initialization is completed. By using it together with the PWR_STATUS signal, it is possible to detect the general-purpose output in the state where the equipment is running.
Also, when the equipment enters the standby state (S5 state) from the equipment start state (S0 state), the values of the general-purpose output (GENDO0 to 7) are retained in the previous state.

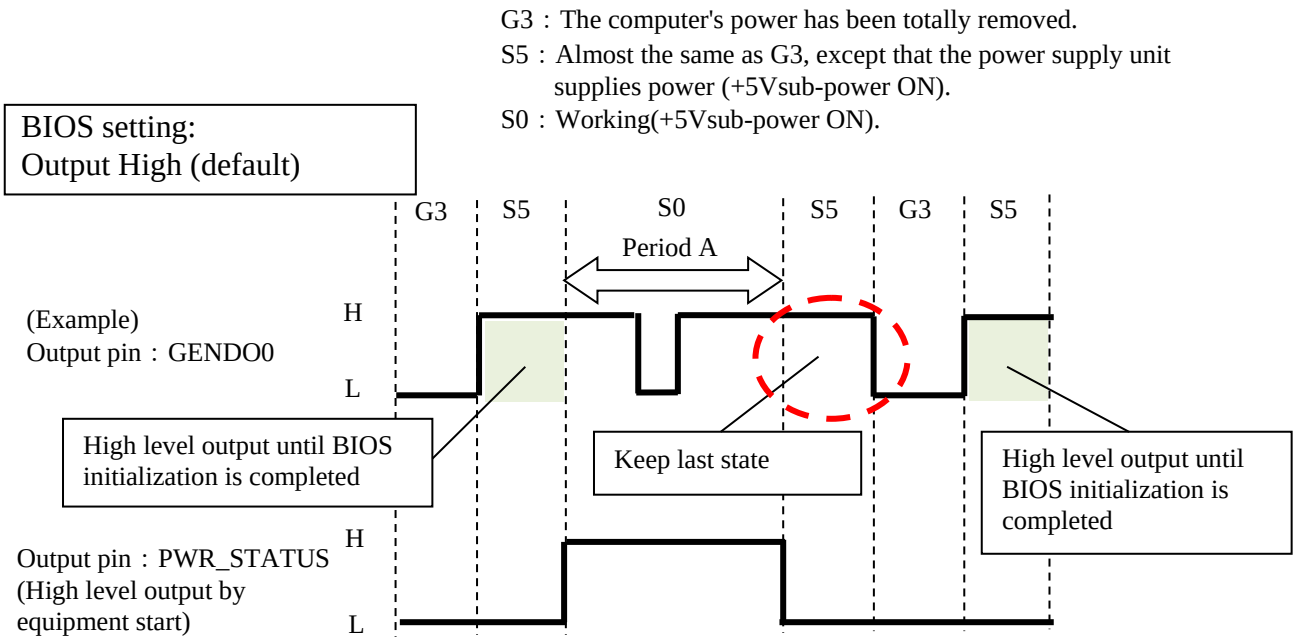


Figure 5-1 Definition of Output Pin of External Contact Part (When There is No Output Just Before S5)

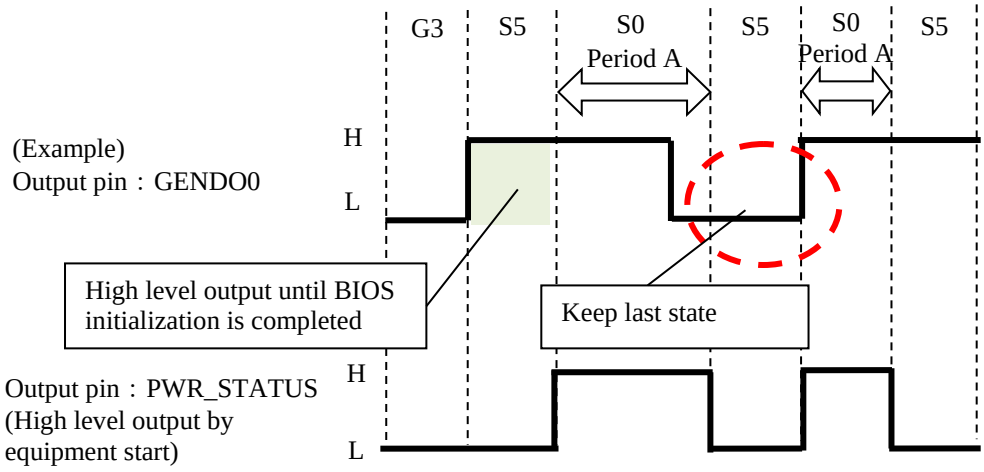


Figure 5-2 Definition of Output Pin of External Contact Part (When There is Output Just Before S5)

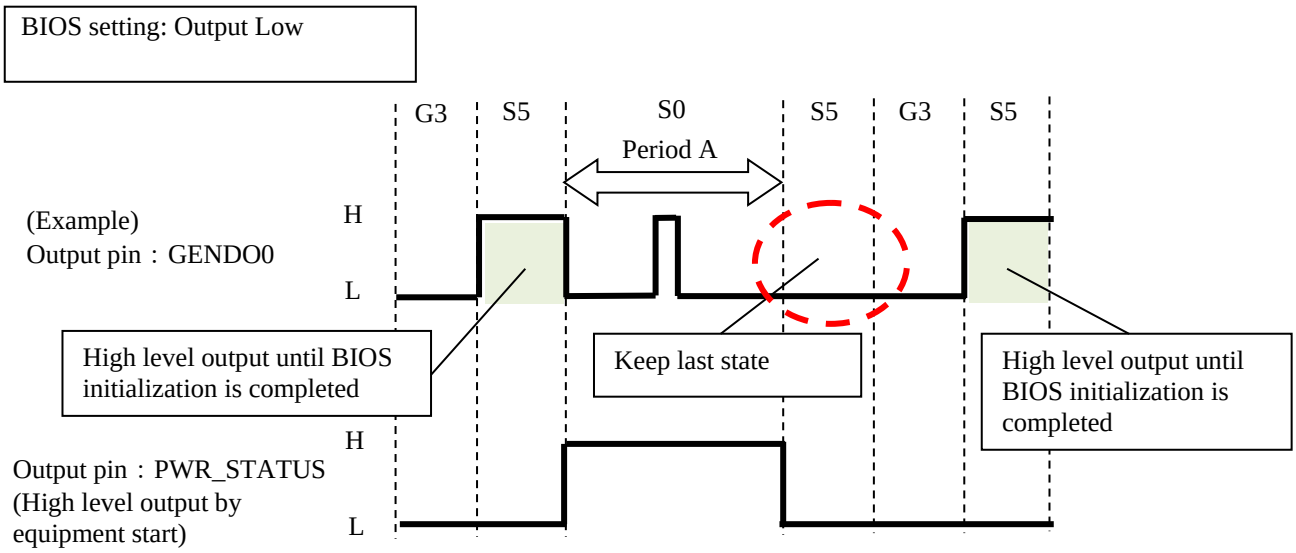


Figure 5-3 Definition of Output Pin of External Contact Part (When There is No Output Just Before S5)

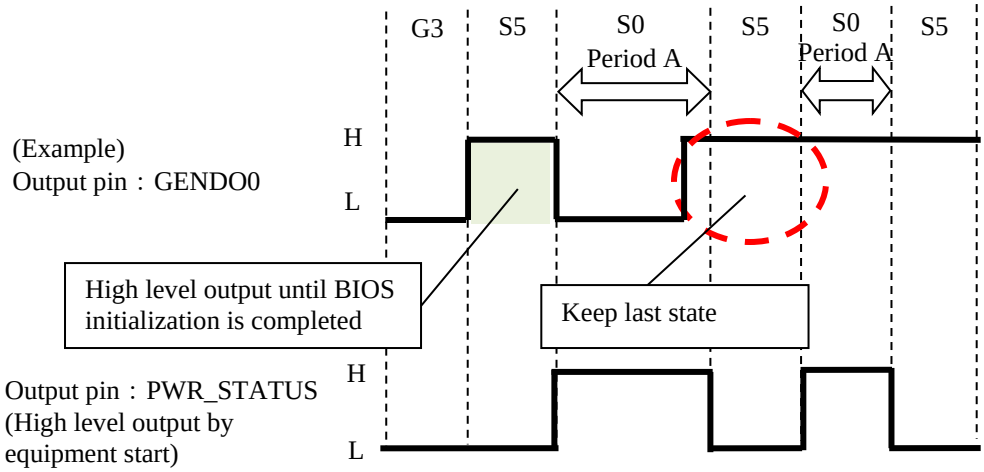
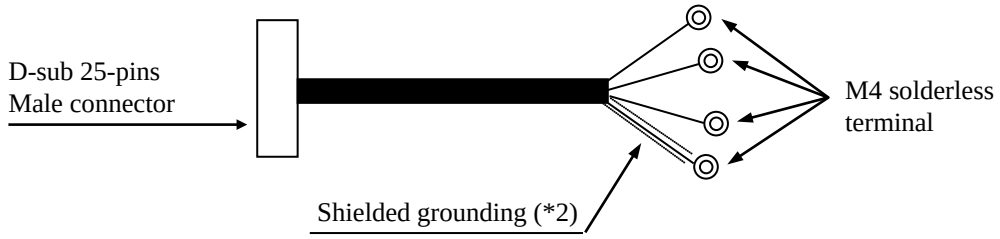


Figure 5-4 Definition of Output Pin of External Contact Part (When There is Output Just Before S5)

(3) Recommended EXT cable specifications

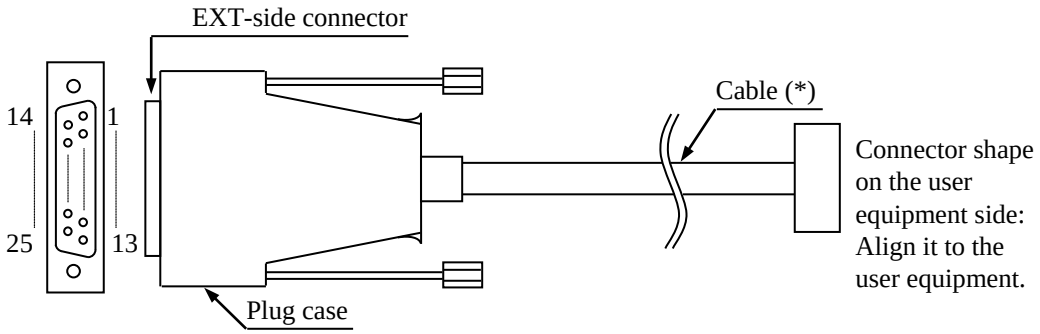
1. For connection, the following cable is required.



(*1) The maximum cable length is 5 m.

(*2) To connect a cable shield, beside the cable, you must provide a shielded grounding bar dedicated for a shielded wire connection.

2. When a user makes a cable, the user must follow the specifications below.



Exterior view of EXT cable and connector

(*) The shielded grounding of the cable must firmly contact the conductor of the plug case (frame ground). (Do not connect a GND pin of the EXT port to the shielded grounding because all GND pins are signal ground. If you do so, the equipment may malfunction.

● Cable specification (recommended cable)

Item	Specifications	Note
Maximum cable length	5 m	
Electric shield of the cable	Required	Connected to the frame ground

5.5.3 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	Cable length (m)	Remarks
1	DVI-I port	3	
2	DisplayPort	3	
3	LAN port	100	UTP Category 5e or better
4	External general purpose I/O port	5	For information about the cable specifications, see “5.5.2 External general purpose I/O specifications (3) Recommended EXT cable specifications”.
5	Serial port(RS232)	15	Use a shielded cable.
6	Serial port(RS422/RS485)	1200	Please use shielded cable. Connector pin number etc. See "5.5.1 Connector specifications".
7	Front USB2.0/1.1 (1 ports)	3	Use a USB 2.0 compliant shielded cable. If you use an extension cable, connected USB devices may not work properly.
	Rear USB2.0/1.1 (2 ports)		
8	Front USB3.0/2.0/1.1 (2 ports)	2	Depending on a device to connect, use a USB 3.0 compliant shielded cable or a USB 2.0 compliant shielded cable. If you use an extension cable, connected USB devices may not work properly.

A connected device may not work properly depending on the device. Check proper operation of the device before you use it.

CHAPTER 6 CHECKUP AND MAINTENANCE

6.1 Periodic Checkup

The table below shows how to check up the Equipment periodically. A qualified maintenance personnel must conduct this periodical checkout. Include the checkout time in the system operation schedule.

Checkup item	Frequency
Collection of logging information	Once per year
Inspection and cleaning for the components • Inspection and cleaning for outside of the equipment • Other general inspection items	Once per year
Measuring the power voltage	Once per year
Operation check • Operation check of switches and indicators • Operation check by using test programs	Once per year
Periodic replacement of replacement components (*)	As required

(*) For details about how to handle replaceable components, see “APPENDIX HANDLING REPLACEABLE COMPONENTS”.

6.2 Installing and Removing Components

6.2.1 Types and locations of installed components

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

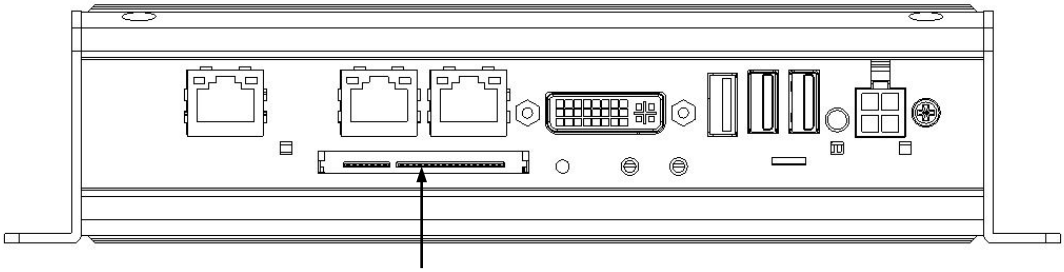


Figure 6-1 Types and Locations of Installed Components

6.2.2 Before installing or removing components

When you install or removing components, confirm and keep strictly the following instructions.

CAUTION

- Before you start the work, make sure you shut down the OS, unplug the power cable from the outlet, and wait for at least one minute. Otherwise, an electric shock or failure of the equipment may result.
- Do not touch the equipment directly with bare hands during work. Injury of burn may result due to getting hot of the equipment.

・Allocate sufficient clearance for maintenance work. Carry out the work on a flat surface. (See “1.5.2 Installation”.)
・Wear cotton gloves when you install or remove components.
・When you tighten or remove a screw, use a Phillips screwdriver (JIS #1 or JIS#2) to avoid stripping the head.
・When you tighten a screw, drive the screw along the axis of the tapped hole without adding too much torque in order to avoid damaging the thread.

As well as the above, there are instructions every work item. Confirm and keep strictly these instructions.

6.2.3 Installing and removing a CFast card

CAUTION

When you install or remove a CFast card, make sure you do not cut your fingers on the protrusions.

NOTICE

- Never remove a CFast card while the power to the equipment is on. Never hot-swap a CFast card. If you do, the equipment failure or the CFast card failure may result.
- Make sure to certainly insert a CFast card to the equipment. If you do not insert it completely, the equipment failure and the CFast card failure may result.

(1) Before Installing or removing a CFast card

・Before starting to work, see “6.2.2 Before installing or removing components”.

< NOTE >

・Please do not touch the terminal part of the CFast card. This may cause a malfunction.

・Please do not mistake CFast card insertion direction. Also, please do not apply too much force when inserting CFast card. It may damage the connector.

(2) Installing a CFast card

1. Place a CFast card in the mounting position with the top side facing up and press lightly.
2. After installing the CFast card, attach the attached CFast card suppressed bracket.

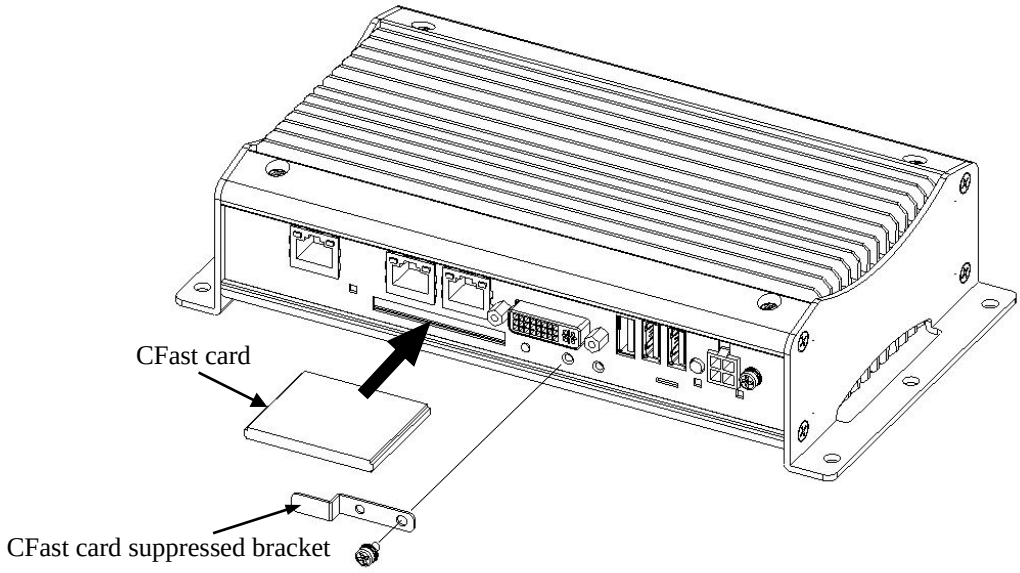


Figure 6-2 Removing a CFast Card

(3) Removing a CFast card

Follow the procedure described in “(2) Installting a CFast card” in reverse to remove a CFast card.

< NOTE >

When you pull out a CFast card, make sure you do not apply too much force to the connector. Slowly pull out the CFast card in order not to subject the CFast card.

6.2.4 How to secure a USB cable

This section explains how to fix the USB cable to the equipment to prevent the USB cable connector from falling out of the USB port.

CAUTION

When you install or remove a USB cable, make sure you do not cut your fingers on the protrusions.

NOTICE

- Never connect/disconnect a USB cable while the equipment is turned on. If you do, the equipment failure may result.
- Make sure to certainly connect a USB cable to the equipment. If you do not connect it completely, the equipment failure may result.

(1) Before securing a USB cable

・Before starting to work, see “6.2.2 Before installing or removing components”.

・Securing a USB cable to the front of the equipment

(2) Securing a USB cable to the front of the equipment

1. See Figure 6-3 and secure the USB removal prevention fittings to the equipment with screws (M3 screw).
2. Attach the USB cable to the equipment and attach the Cable band.

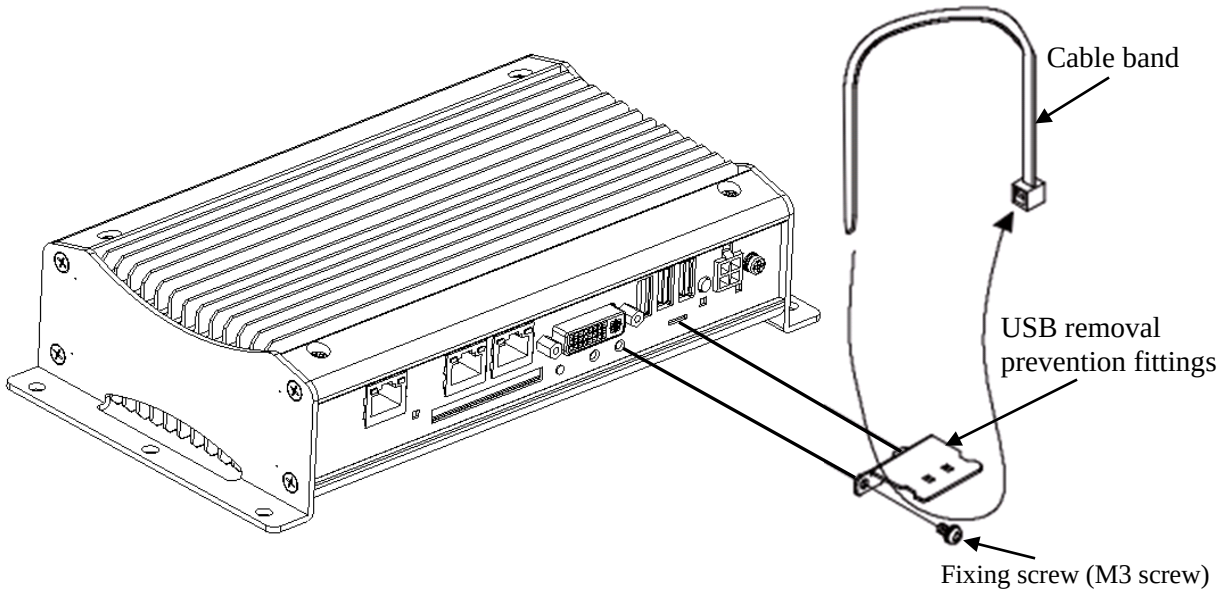


Figure 6-3 Securing a USB Cable to the Front of the Equipment

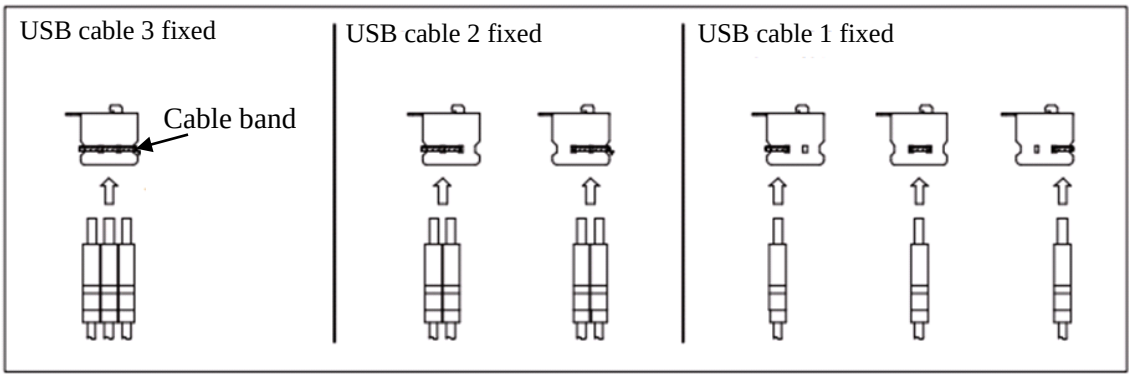
(3) Removing the USB cable on the front of the equipment

Follow the procedure described in “(2) Securing a USB cable to the front of the equipment” in reverse to remove the USB cable.

Also, since you can not reuse the cable band used once, prepare a new cable band for use when the cable band is used again.

< NOTE >

When attaching the securing cable band, see the figure below and install it by the installation method matching the number of USB cables to be attached to the equipment.



・Securing a USB cable to the back of the equipment

(2) Securing a USB cable to the back of the equipment

1. See Figure 6-4 and secure the DisplayPort / USB removal prevention fittings to the equipment with screws (M3 screw).
2. Attach the USB cable to the equipment and attach the Cable band.

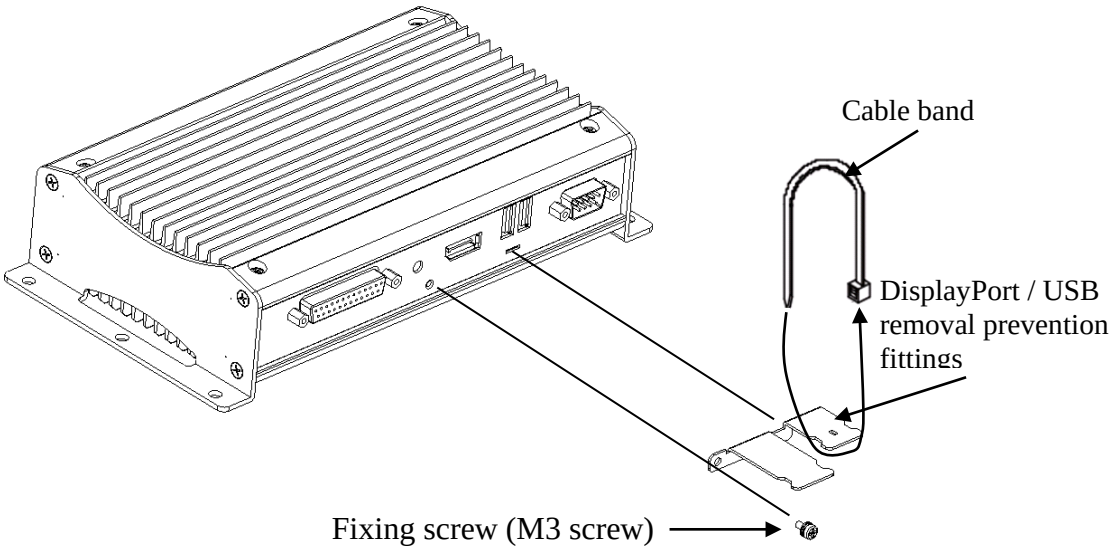


Figure 6-4 Securing a USB Cable to the Back of the Equipment

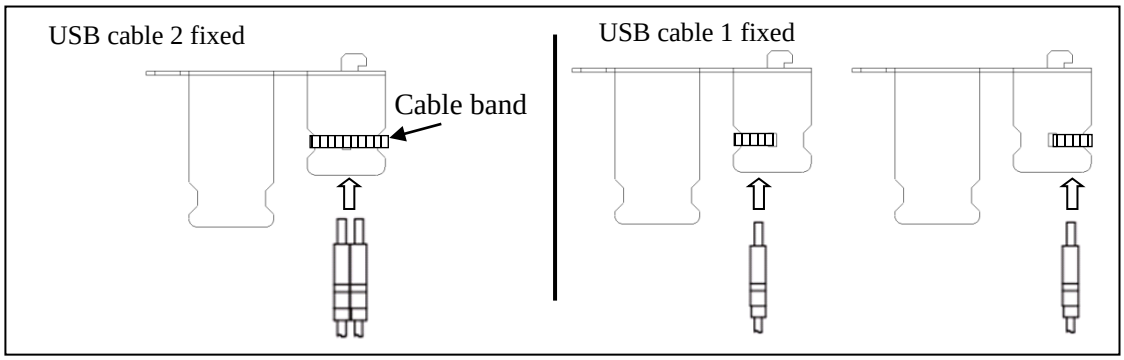
(3) Removing the USB cable on the back of the equipment

Follow the procedure described in “(2) Securing a USB cable to the back of the equipment” in reverse to remove the USB cable.

Also, since you can not reuse the cable band used once, prepare a new cable band for use when the cable band is used again.

< NOTE >

When attaching the securing cable band, see the figure below and install it by the installation method matching the number of USB cables to be attached to the equipment.



6.2.5 How to secure a DisplayPort cable

CAUTION

When you install or remove a DisplayPort cable, make sure you do not cut your fingers on the protrusions.

NOTICE

- Never connect/disconnect a DisplayPort cable while the equipment is turned on. If you do, the equipment failure may result.
- Make sure to certainly connect a DisplayPort cable to the equipment. If you do not connect it completely, the equipment failure may result.

Since a DisplayPort cable has a locking mechanism, it does not attach a cable band for fixing, but the user can attach a cable band for fixing. When fixing is necessary, prepare the cable band by the user and fix it with the following procedure.

(1) Before securing a DisplayPort cable

・Before starting to work, see “6.2.2 Before installing or removing components”.

(2) Securing a DisplayPort cable

1. See Figure 6-5 and secure the DisplayPort / USB removal prevention fittings to the equipment with screws (M3 screw).
2. Attach the DisplayPort cable to the equipment and attach the Cable band (Prepared by users).

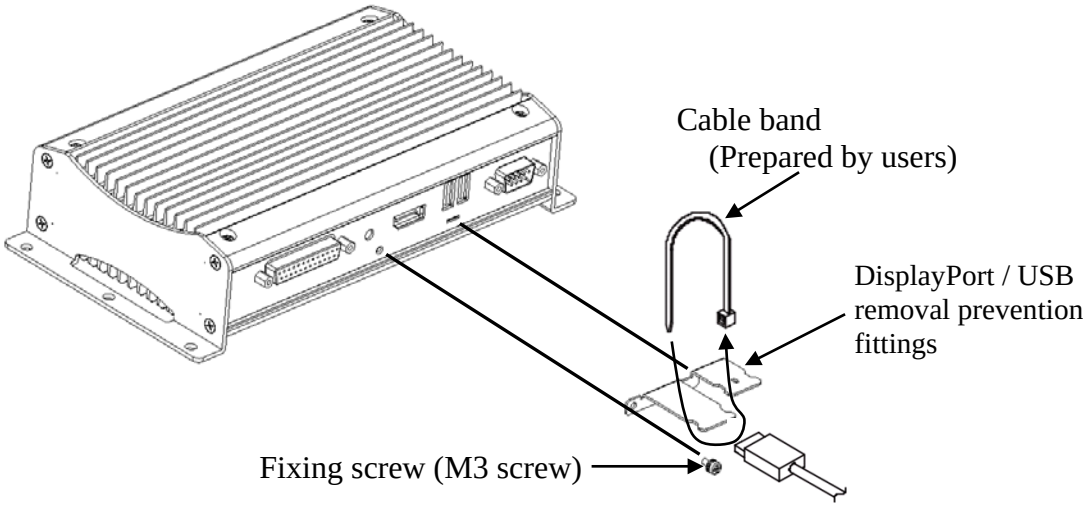


Figure 6-5 Fixing a DisplayPort Cable

(3) Removing the DisplayPort cable

Follow the procedure described in “(2) Secureing a DisplayPort cable” in reverse to remove the DisplayPort cable.

Also, since you can not reuse the cable band used once, prepare a new cable band for use when the cable band is used again.

CHAPTER 7 RESTORING THE FACTORY-SHIPPED CONDITION USING A RECOVERY DVD

NOTICE
The recovery DVD contains an image file created for the hardware configuration at the factory shipment. If the hardware configuration has changed from the one at the factory, the OS may not start after restoration work. Remove all external storage devices to resume the hardware configuration at the factory shipment before you perform restoration work using the recovery DVD. (Excludes the DVD drive connected to read the recovery DVD) When the recovery DVD is used, all data in the system drive is deleted. Back up the data beforehand as required.

This chapter describes the following procedure:

・The procedure to restore the system drive back to the factory-shipped conditions when you discontinue the system you have built.

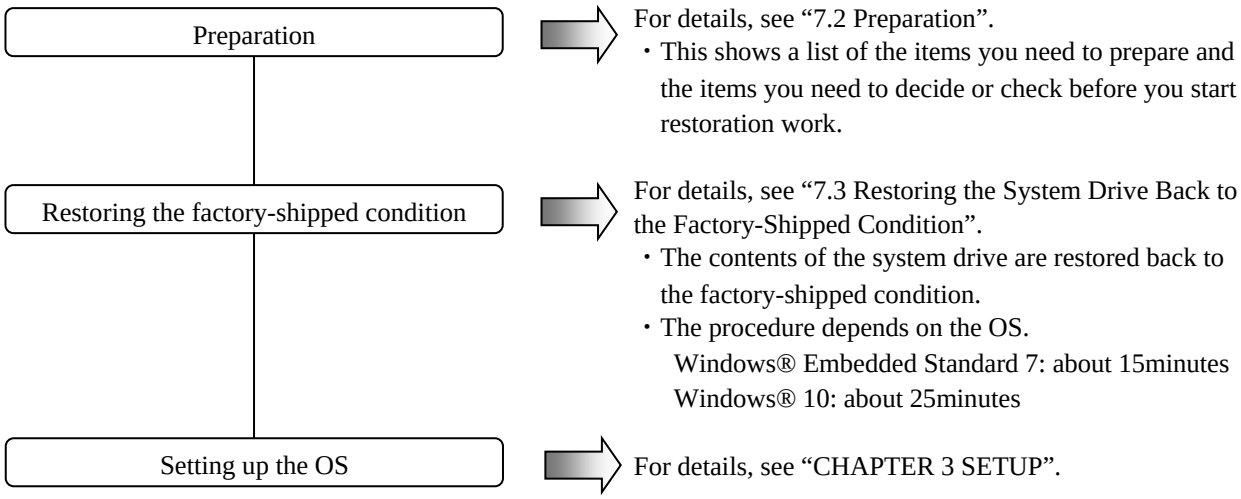
< NOTE >

It is necessary to prepare an external optical disk drive with USB connection (a drive capable of reading DVD media (hereinafter referred to as DVD drive)).

7.1 Overview of Restoration Procedure

This section describes the overview of the procedure to restore the system drive back to the factory-shipped condition when you discontinue the system you have built. After you restore the contents of the system drive back to the factory-shipped condition, follow the procedure described in “CHAPTER 3 SETUP” to set up the OS.

The following is a rough flow chart of the procedure.



7.2 Preparation

1. Before you start restoration work using recovery DVDs, have the following recovery DVDs ready.

Recovery DVD for HF-W	HITACHI HJ-100E-**** Product Recovery DVD (The underlined part is the model number of the equipment you purchased.)

2. Please connect USB drive DVD drive to this equipment.

7.3 Restoring the System Drive Back to the Factory-Shipped Condition

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

Follow the steps below to restore the system drive of the HF-W100E to the factory-shipped condition using the recovery DVD.
(Note) Depending on the model of the device you purchased, the design and font of the displayed screen may differ.

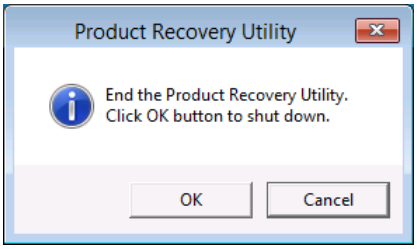
1. Turn on the power to the computer, and insert a recovery DVD “HITACHI HJ-100E-**** Product Recovery DVD” to the DVD drive. If the number of recovery DVDs is multiple, insert a first disc (For example, in the case of two-disc sets, insert the disc number : 1/2).

   (Note) In the underlined part, the model of the equipment you purchased is listed. For parts that are similarly described in the subsequent procedures, please change to the type of equipment you purchased.

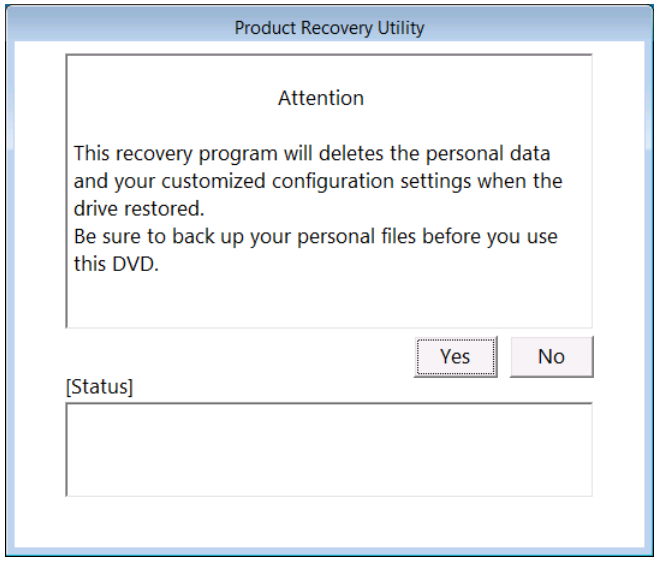
2. When you boot from the recovery DVD, the confirmation message is displayed.
   (Note) If you cannot boot from the recovery DVD, turn off the computer, and then turn it back on.

   - When the model name displayed in the confirmation message is the same as the model name of the equipment you use, click **Yes**.
   - When the model name displayed in the confirmation message is different from the model name of the equipment you use, click **No**.

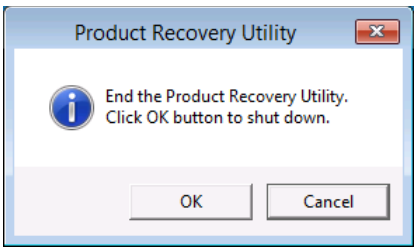
When you click **No**, the following message box is displayed. Click **OK**.
The recovery DVD is automatically ejected, and then the computer is automatically shut down.
If you want to go back to the confirmation window for the attention message, click **Cancel**.



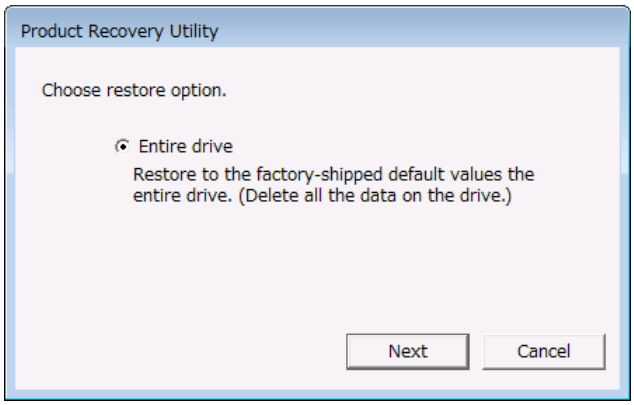
3. When you click **Yes** on the confirmation message window, the confirmation window for the following attention message is displayed.
   - If you are OK with the attention message, click **Yes**.
   - If you are not OK with the message, click **No**.



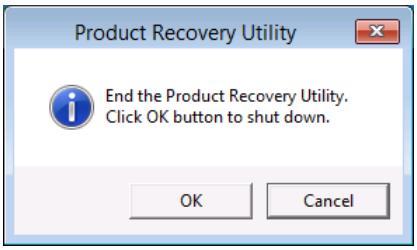
When you click **No**, the following message box is displayed. Click **OK**. The recovery DVD is automatically ejected, and then the computer is automatically shut down.
If you want to go back to the confirmation window for the attention message, click **Cancel**.



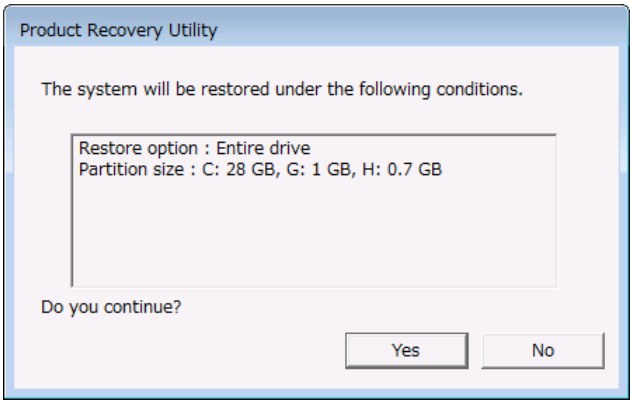
4. When you click **Yes** on the confirmation window for the attention message, the selection window for the drive restore option is displayed. In the case of this equipment, it is only **Entire drive**.
   - If you want to restore the system drive back to the factory-shipped condition, select the restore option, and then click **Next**.
   - If you want to cancel restoring the system drive back to the factory-shipped condition, click **Cancel**.



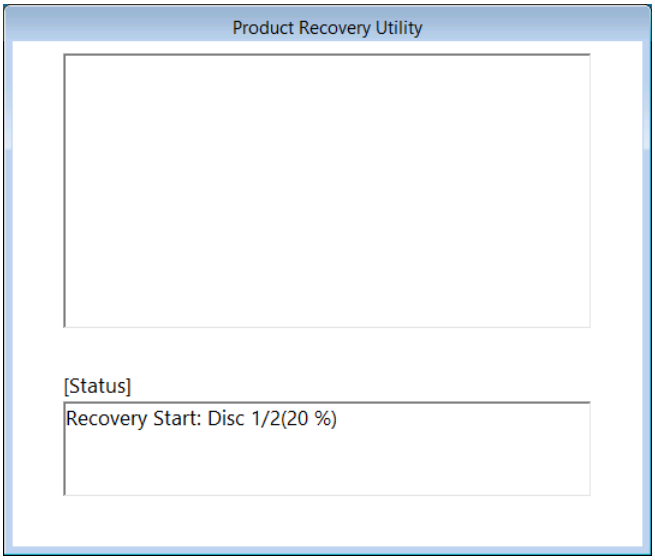
When you click **Cancel**, the following message is displayed. Click **OK**. The recovery DVD is automatically ejected, and then the computer is automatically shut down.
If you want to go back to the selection window for the drive restore option, click **Cancel**.



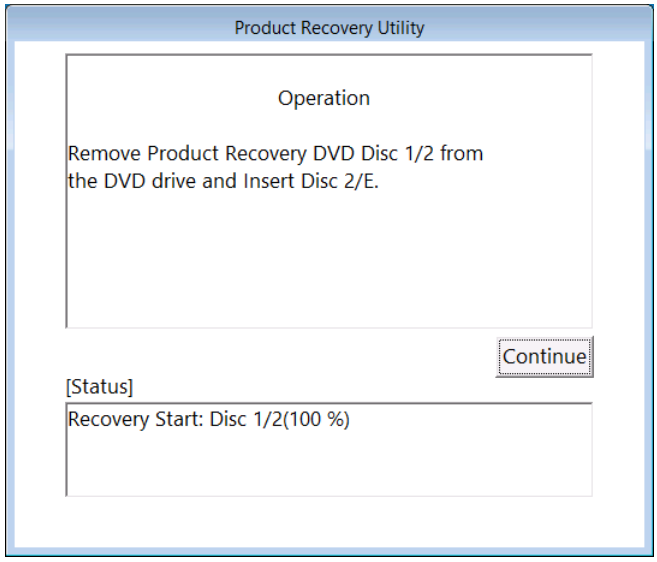
5. When you select **Entire drive** on the selection window for the drive restore option, the confirmation window for the settings of the drive restoration is displayed.
   - If you are OK with the displayed partition size to be restored, click **Yes**.
   - If you are not OK with the displayed partition size to be restored, click No.
     The selection window for the drive restore option returns.



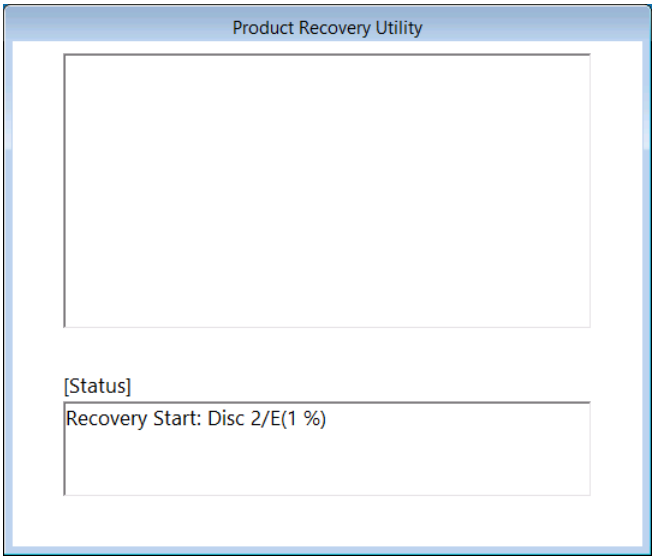
6. When you click **Yes** in the confirmation window for the settings of the drive restoration, a restoration process for the drive starts. The progress is displayed in the **[Status]** box. The following picture is a example that the number of recovery DVDs is two.



7. In the case of the number of recovery DVDs is multiple, when the restoration process back to the factory-shipped condition performed by the current recovery DVD, the following message is displayed, and the recovery DVD is automatically ejected. Remove the recovery DVD from the DVD drive, and insert the next recovery DVD.
   The following picture is a example that the number of recovery DVDs is two.

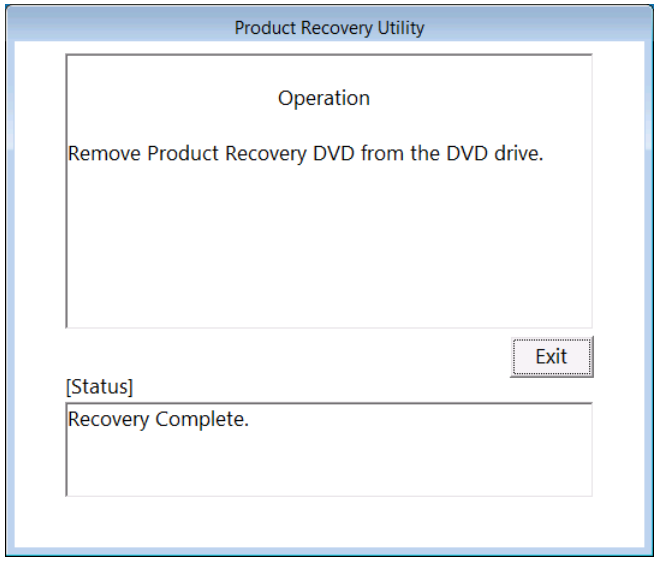


8. When you click **Continue**, it is displayed "Preparing Recovery. Please wait a few minutes." in the **[Status]** box. Then, the restoration process back to the factory-shipped condition resumes and the progress is displayed in the **[Status]** box.



9. If the number of recovery DVDs is multiple, repeat steps 7 and 8.

10. When the restoration process back to the factory-shipped condition performed by the recovery DVD is fully completed, “Recovery Complete.” is displayed in the **[Status]** box, and the recovery DVD is automatically ejected. Remove the recovery DVD from the DVD drive, and then click **Exit**. The computer will be shut down.



The system drive of the HF-W100E is now successfully restored to the factory-shipped condition by using the recovery DVD. After you finish the procedure above, follow the instruction in “CHAPTER 3 SETUP” to set up the OS.

7.3.2 Errors generated during a restoration process and their corrective actions

When an error occurs during a restoration process, record the error message and the error code displayed on the window, and take actions as shown in the following table. If you take the actions accordingly but cannot let the recovery process go through or if the No. 8 error message is displayed, contact our sales representative.

No.	Error message	Action
1	Retry time out. Please refer to the INSTRUCTION MANUAL.	• Check the integrity of the system drive. (Read/write tests and so on)
2	Image file is not found. Please refer to the INSTRUCTION MANUAL.	• Retry a recovery process. • Check the integrity of the recovery DVD. (Read tests and so on) • Check if the DVD drive works properly. (Read tests and so on)
3	Drive failed or not connected. Please refer to the INSTRUCTION MANUAL.	• Check if the system drive is connected correctly. • Check the integrity of the system drive. (Read/write tests and so on)
4	Failed to access the drive. Please refer to the INSTRUCTION MANUAL.	
5	Failed to assign drive letter. Please refer to the INSTRUCTION MANUAL.	• Check that any devices unnecessary for a recovery process are connected. If connected, remove them.
6	Failed to read from Product Recovery DVD. Please refer to the INSTRUCTION MANUAL.	• Check if the DVD drive is connected correctly. • Check the integrity of the recovery DVD. (Read tests and so on) • Check if the DVD drive works properly. (Read tests and so on)
7	Recovery failed. Please refer to the INSTRUCTION MANUAL.	• Retry a recovery process.
8	Recovery invalid. Please refer to the INSTRUCTION MANUAL.	• Contact our sales representative.
9	Drive capacity is not enough. Please refer to the INSTRUCTION MANUAL.	• Check the size of the system drive.

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 achieve highly reliable features of the equipment. The following table shows an overview of the RAS features of this equipment.

Category		Item
Monitoring		Hardware status monitoring
		Watchdog timer monitoring
GUI features setting		RAS features setting window
Status check	GUI display	Hardware status window
	Notification	Event notification
		Pop-up notification
		Remote notification
		Status acquisition by using library functions
Control	Shutdown /Startup suppression	Automatic shutdown
		Shutdown by Library functions
		Controlling general purpose external contacts
Library functions		RAS library
Maintenance/ Failure analysis	Memory dump related	Memory dump collection
		Log information collection window
		Maintenance operation support commands
		Logging the trend of the temperature inside the chassis
Simulation		Hardware status simulation

<Monitoring>

(1) Hardware status monitoring

It monitors the temperature inside the enclosure of this equipment, the state of storage, and so on.

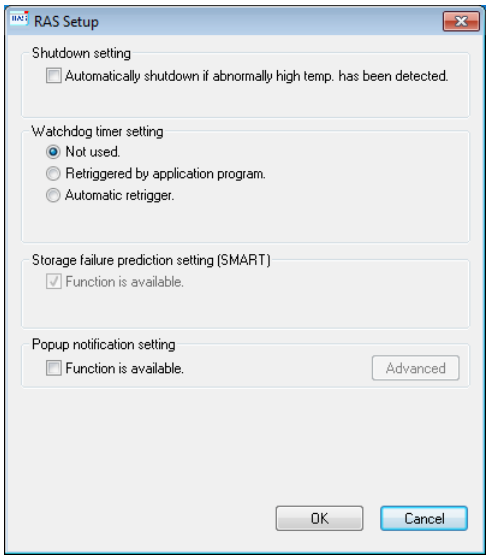
(2) Watchdog timer monitoring

This feature monitors that the OS is running and that the user program is running, using the watchdog timer implemented on this equipment. This feature also offers a library to use the watchdog timer.

<GUI feature settings>

(3) RAS setting window

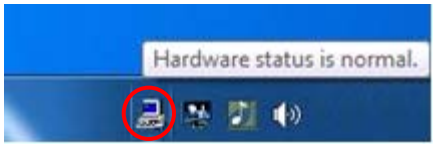
This window provides a graphical user interface for configuring RAS feature settings including the condition of automatic shutdown and the setting of the watchdog timer.



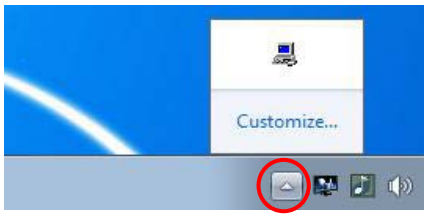
<Status check>

(4) Hardware status window

This window displays the hardware status of this equipment by using a graphical interface. There is always an icon in the notification area of the taskbar to display the hardware status.



This icon is not shown in the notification area of the taskbar by default, but if you click the arrow at the side of the notification area, the icon will appear. Furthermore, if you click **Customize**, you can set this icon to be displayed in the notification area of the taskbar.
(If you use the Windows® 10, right-click the arrow at the side of the notification area and click **Properties** on the menu displayed above the arrow. The **Taskbar and Start Menu Properties** window is displayed. Click **Customize** and open the **Settings** window. Then, click **Select which icons appear on the taskbar** and set **envdisp MFC Application** icon to be displayed in the notification area of the taskbar.)



(5) Event notification

This feature enables a user application to check the hardware status of this equipment by monitoring the status of event objects.

(6) Pop-up notification

This feature notifies a user that an error has occurred in the hardware of this equipment by displaying pop-up messages.

(7) Remote notification

This feature enables a remote device to check the hardware status of the equipment. It also notifies the remote device whenever the hardware status changes.

(8) Status acquisition by using library functions

This function enables a user application to get the hardware status of this equipment by using the RAS library.

<Control>

(9) Automatic shutdown

This feature automatically shuts down the equipment when abnormal temperature inside the chassis is detected. Use “(3) RAS setting window” to enable or disable the automatic shutdown feature.

(10) Shutdown using library functions

You can shut down the equipment from a user application using the RAS library.

(11) Control of external general purpose input/output

By using RAS library, external general purpose input/output can be controlled.

7 points for input and 8 points for output are available for general purpose input/output that can be used by the user. Using these general purpose inputs and outputs, you can input signals from external equipment to this equipment, or you can output signals from this equipment to the outside.

<Library functions>

(12) RAS library interface

This interface offers library functions for recording log information in addition to the library functions offered by items (2), (8), (10) and (11).

<Maintenance / Failure analysis>

(13) Memory dump collection

When a failure occurs, for example, this equipment stops unexpectedly, you can save the contents of the system memory to a file (memory dump file) by keyboard operation (pressing Scroll Lock twice while holding the right Ctrl key). By analyzing the data in this memory dump, you can investigate the cause of the failure.

(14) Log information collection window

In this window you can collect log data and memory dump files for this equipment using a graphical user interface.

(15) Maintenance operation support commands

These commands include a command used for saving failure information such as memory dump files and event log files to an external medium.

(16) Trend logging of the temperature inside the chassis

This feature periodically measures the temperature inside the chassis of this equipment and records the data in a file.

<Simulation>

(17) Hardware status simulation

This feature simulates the hardware status of this equipment including the status of the fans and drives as well as the temperature inside the chassis. By using this feature, even if hardware abnormality actually does not occur, you can perform the test of the user application and check the notification interface of the RAS software.

This manual explains the features about “(13) Memory dump collection” and “(15) Maintenance operation support commands” in <Maintenance / Failure analysis>. For details about other features, refer to “HF-W100E RAS FEATURES MANUAL(WIN-63-0095)”.

8.2 Collecting a Memory Dump

When one of the errors in Table 8-1 occurs, this equipment records the contents of the system memory in a file (memory dump file). Then a blue screen appears and a STOP error code is displayed. By analyzing the data in this memory dump file, you can investigate the cause of the failure.

Table 8-1 Error That Trigger a Memory Dump

Cause	Description
Memory dump collection by keyboard operation	Memory dumps are collected by keyboard operation (pressing Scroll Lock twice while holding the right Ctrl key) (*).
Watchdog timer timeout	Memory dumps are collected when the watchdog timer timeout occurs.
Microsoft® Windows® STOP error	When a fatal error occurs in the Microsoft® Windows® kernel, a memory dump is collected.

(*) Depending on the conditions, such as when Windows® stops responding with a high interrupt request level (IRQL), memory dumps may not be collected.

< NOTE >

In this equipment, the Windows® function that collects memory dumps by keyboard operation (pressing Scroll Lock twice while holding the right Ctrl key) is enabled. Therefore, do not perform this operation except for collecting memory dumps.

For details about the displayed STOP error code, see “9.3 STOP Error Codes”.
To select the memory dump file type, open System in Control Panel. You can select from the following five types defined below. (In the case of Windows® Embedded Standard 7, three types except "automatic memory dump" and "active memory dump")

- Complete memory dump(*1) : The entire contents of system memory is 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 than the kernel memory size.
- Minimum memory dump : The minimum information necessary for identifying what caused the equipment to stop is recorded. The boot volume (*2) must have enough free space to hold a paging file of more than 2 MB.
- Automatic memory dump : Similarly to the kernel memory dump, the kernel memory is recorded. The difference from the kernel memory dump is that the Auto memory dump can make the initial paging file small from the physical memory size.
- Active memory dump : The contents of the memory assigned to a virtual machine are filtered, and the contents of the memory used in the Hyper-V hosts are recorded only. The active memory dump can make the recorded memory dump file smaller than the complete memory dump.

(*1) To collect a complete memory dump file, see Section 8.2.1 "(3) Setting method when collecting complete memory dump" and set it.
(*2) The boot volume is a volume that contains Windows® files and Windows® support files.

Although the scope of failure analysis can vary depending on the type of memory dump file, for this device, we recommend setting "kernel memory dump" for Windows® Embedded Standard 7 and "Automatic memory dump" for Windows® 10 from the viewpoint of securing disk space. The recommended settings for memory dump and virtual memory (page file) in this equipment are as follows. These settings are preset when the equipment is shipped from the factory.

＜For Windows® Embedded Standard 7＞

System and Security > **System** > **Advanced System Settings** in the Control panel

- In the **Startup and Recovery**, **Kernel memory dump** is selected as memory dump type.
- In the **Startup and Recovery**, **Overwrite any existing file** is selected.
- In the **Performance**, the **Initial size** and **Maximum size** of the virtual memory is the physical memory size plus 300MB.

＜For Windows® 10＞

System and Security > **System** > **Advanced System Settings** in the Control panel

- In the **Startup and Recovery**, **Automatic memory dump** is selected as memory dump type.
- In the **Startup and Recovery**, **Overwrite any existing file** is selected.
- In the **Startup and Recovery**, **Disable automatic deletion of memory dumps when disk space is low** is selected.
- In the **Performance**, **Automatically manage paging file size for all drives** is selected.
- In the **Performance**, **System managed size** is selected.

When an incident occurs that triggers a memory dump, the process that collecting a memory dump is started after the window called “blue screen” is displayed.

< NOTE >

- If a failure due to a STOP error occurs in the "Automatic Memory Dump" setting, the size of the page file will be expanded to the same extent as physical memory so that normal kernel memory dumps can be collected when the next STOP error occurs. Note that the size of the page file is expanded.
  After that, if the STOP error does not occur for 4 weeks, the page file size is automatically reduced to the original size.
- The time required for collecting a memory dump depends on the type of dump file collected, the configuration of the mounted drives, and the memory capacity. It should be noted that when you set “Complete memory dump”, the time required may be extremely long.
- After “Beginning dump of physical memory” is displayed on the blue screen, the count on the screen that shows the progress of the memory dump sometimes stops being updated. This is because collection of the memory dump failed due to an error of the file system or a hard disk.
  If this happens, record the contents displayed on the screen. Then turn off the power of this unit once and put it on again and restart it.

8.2.1 Configuring the settings related to a memory dump

This subsection describes how to configure the settings related to a memory dump.

Use the following procedure when you want change the memory dump setting to the one recommended for this equipment. If you are already operating the system with this equipment recommended memory dump setting, you do not need to do it.

< NOTE >
Before starting a procedure in this subsection, you must log on to the local computer by using an administrator account registered on the computer (as a member of the Administrators group).

(1) Configuring virtual memory

1. Click **Start** > **Control Panel**.
   (If the OS is Windows® 10, right-click **Start** and click **Control Panel** from menu.)
2. Click **System and Security**. Then click **System**.
3. Under **Task** on the left side of the window, click **Advanced system settings**.
4. On the **Advanced** tab page, click **Settings** under **Performance**.
5. In the **Performance Options** window, click the **Advanced** tab.
6. Click **Change** which is under **Virtual memory**.
7. If the OS is Windows® Embedded Standard 7, clear the **Automatically manage paging file size for all drives** check box.
   If the OS is Windows® 10, select the **Automatically manage paging file size for all drives** check box and click **OK**. In the OS is Windows® 10, the setting of the virtual memory has been completed.
8. In the **Drive** list, select the drive that stores the paging file you want to change. For the sake of explanation, assume C: (system drive) is clicked here.
9. Select **Custom size**. In the **Initial size (MB)** or **Maximum size (MB)** box, type the new size of the paging file in megabytes. 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 4GB: “4286”

   You can check the physical memory size using the following procedure.
   a. Click **Start** > **Control Panel** > **System and Security**.
   b. Click **System**. Then check the value of “Memory(RAM)：”
10. Click **OK**.

(2) Specifying a memory dump file

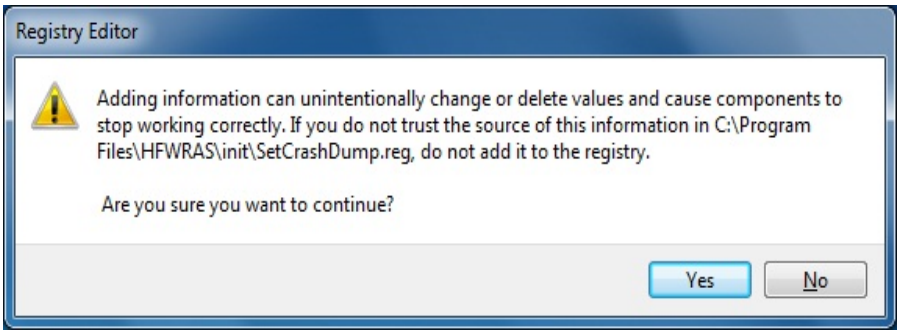
1. Click **Start** > **Control Panel**.
   (If the OS is Windows® 10, right-click **Start** and click **Control Panel** from menu.)
2. Click **System and Security**. Then click **System**.
3. Under **Task** on the left side of the window, click **Advanced system settings**.
4. In the **Advanced** tab page, click **Settings** under **Startup and Recovery**.
5. In the **Dump file** box, type a memory dump file name.
   By default, "%SystemRoot%\MEMORY.DMP" is specified for this box.
   Unless it is necessary, you do not have to enter a name.
6. If the OS is Windows® Embedded Standard 7, select the **Kernel memory dump** under **Write debugging information**.
   If the OS is Windows® 10, select the **Automatic memory dump** under **Write debugging Information**.
7. Select the **Overwrite any existing file** check box.
8. If the OS is Windows® 10, select the **Disable automatic deletion od memory dumps when disk space is low** check box.
9. Click **OK**.

This is the end of memory dump setting recommended by this equipment.

(3) Setting method when collecting Complete memory dump

In order to enable a Complete memory dump as recommended for this equipment, follow the procedure below.

1. Double-click the SetCrashDump.reg file under C:\Program Files\HFWRAS\init.
2. The following message box will open. Click **Yes**.



3. A message box will appear indicating that information has been added successfully. Click **OK**.
4. Restart the system.

8.3 Maintenance Operation Commands

This section explains how to use maintenance operation commands. These commands are used when problems occur in the equipment and during preventive maintenance. All these commands are started at the command prompt when they are used.

Table 8-2 shows a list of maintenance operation commands.

Table 8-2 Maintenance Operation Commands

Command name	Feature
logsave	Used for collecting data for preventive maintenance or data for post-failure analysis during preventive maintenance or when problems occur.
mdump	Used for copying a memory dump file to a portable medium when a memory dump is collected due to a STOP error.
getrasinfo	Used for checking the status of the equipment such as the status of the temperature inside the chassis.

The Manufacturer provides charged services to analyze the data collected by these maintenance operation commands, such as memory dump files and data for failure analysis.

8.3.1 Log information collection command (logsave)

<Name>
logsave - Collecting log information

<Syntax>
logsave [-e file name][Directory]

<Feature>
The logsave command saves the data used for preventive maintenance and post-failure analysis of problems. The data is compressed and recorded as one file (File name: logsave.zip).
The following options are available for this command. If no options are specified, the logsave directory, is created under the system drive (usually C:\) and the data is saved under that directory.
-e File name: The data previously saved by the logsave command will be decompressed. For the file name, specify the absolute path of the file you want to decompress. If this option is not used, the logsave command will save the data.
Directory: When the -e option is not used, specify the directory where you want to store the saved data. If this option is not used, a directory, the logsave directory, is created under the system drive (usually C:\) and the data is saved under that directory.
When the -e option is used, specify the directory where you want to store the decompressed data. If this option is not used, the data is decompressed under the current directory.

Table 8-3 shows the information collected by the logsave command.

Table 8-3 Information Saved by logsave

Item	Description
Windows® event log file	Backup of the event log file
RAS software log data	RAS software operation log
RAS software user setting information	User setting definition file for pop-up notification
Windows® version information	Version information of the Windows® system files and driver files
Minimum memory dump	Files under the directory used for storing a minimum memory dump
System information	System information including hardware resources and software environment.
Output of the RAS information display command	Status of the equipment such as the status of the temperature inside the chassis and configuration information of the RAS software
Output of the ipconfig command	Network that sets information

<Diagnosis>

When this command is terminated with an error, the following error message is displayed. If a directory for saving data does not exist, an error message from the Windows® xcopy command is displayed.

Table 8-4 Error Messages of the logsave Command

Error message	Meaning
usage: logsave [-e File] [Directory]	There is an error in option specification. Please specify the correct option.
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. Log on to the computer by using an administrator account and run the command again. If User Account Control (UAC) is enabled, start the command prompt with administrator privileges and run the command.

< NOTE >

- When you run the logsave command, log on to the computer by using an administrator account registered on computer (as a member of the Administrators group). You cannot run multiple instances of the logsave command simultaneously.
- Start the command prompt with administrator privileges and run the command.
- The log information can also be collected by using a program in the start menu For details, refer to “HF-W100E RAS FEATURES MANUAL(WIN-63-0095)”.

8.3.2 Memory dump file copy command (mdump)

<Name>
mdump - Copying a memory dump file

<Syntax>
mdump [-n | -e file name] <Copy (Decompress) destination path name>

<Feature>
The mdump command compresses a memory dump file collected by Microsoft® Windows® when the equipment stops unexpectedly. Then the command copies the compressed memory dump file to a portable medium. The dump file, which is specified in the **Startup and Recovery** window displayed by selecting **Control Panel** > **System and Security** > **System** > **Advanced system settings** and clicking **Settings** under **Startup and Recovery**, and all the files under the minimum dump directory will be saved. The memory dump file is compressed and stored as a file (File name: MEMORY.zip).
As an option, if you use the -e option, the compressed file will be decompressed.

The following options are available for this command:
-n: Files will be copied without compression.
-e file name: A file compressed by the mdump command will be decompressed. You must specify the file name.
Copy destination path name: When the -e option is not specified, specify the drive name of the copy destination. If you want to copy files to a directory, specify a full path including the directory name.
When the -e option is used, specify the directory where you want to store the decompressed files.

- A memory dump file is copied to the copy (decompress) destination specified by this command.
- If a file with the same name as the copy (decompress) destination already exists at the same location, the 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 will be displayed to show how to use the command.

<Diagnosis>

When this command is terminated with an error, the following error messages is displayed.

Table 8-5 Error Messages of the mdump Command

Message	Description
Usage: mdump [-n | -e compressionFilePath] DestinationPath	There is an error in option specification. Please specify the correct option.
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. Log on to the computer by using an administrator account and run the command again. If User Account Control (UAC) is enabled, start the command prompt with administrator privileges and run the command.

< NOTE >

- When you run the mdump command, log on to the computer by using an administrator account registered on the computer (as a member of the Administrators group). You cannot run multiple instances of the mdump command simultaneously.
- Start the command prompt with administrator privileges and run the command.
- If there is not enough free space on the copy destination, the Compressed Folders Error occurs when you run the mdump command. Make sure that there is a free space that is comparable to the capacity of the physical memory before running the mdump command.
- Do not run the mdump command immediately after the OS start after the blue screen is displayed. If you do, the Compressed Folders Error occurs. For details, refer to “HF-W100E RAS FEATURES MANUAL(WIN-63-0095)”.

8.3.3 RAS information display command (getrasinfo)

<Name>

getrasinfo - Display of equipment status and RAS software setting information

<Syntax>

getrasinfo [/status | /setting] [/e file name]

<Feature>

The getrasinfo command displays the status of the equipment such as the status of the temperature inside the chassis as well as the configuration information of the RAS software at the command prompt. This command can also store the output in the specified file in the text format.

The following options are available for this command. If neither the /status nor the /setting option is used, the command displays both the information about the equipment and the settings of the RAS software.

/status: Displays the status of the current equipment including the status of the fan and the temperature inside the chassis.

/setting: The command displays the configuration information of the RAS software.

/e File name: The output is not displayed at the command prompt but instead stored in the file specified by the file name in the text format.

Table 8-6 shows the information displayed by the getrasinfo command.

Table 8-6 Information Displayed by the getrasinfo Command

Item	Description
Status of the equipment	• Temperature status • Storage status • Memory status
RAS software settings	• Automatic shutdown setting • Watchdog timer setting • Self-Monitoring, Analysis and Reporting Technology (SMART) setting • Pop-up display setting

<Display output>

The following is an example of display output when the getrasinfo command is executed without options.

```
<<getrasinfo result>>
Date: 2017/01/30 17:28:30
Model Name: HF-W100E

[Hardware Status]
  [Temperature condition]
    Internal temperature status:      Normal
    Internal temperature value:       28 deg C

  [Drive condition]
    mSATA SSD1
      Status:                         Healthy

  [Memory condition]
    DIMM 1 status:                    Normal

[RAS Setting]
  [Automatic shutdown setting]
    Temperature:                      OFF

  [Watchdog timer setting]
    Retrigger type:                   Not used

  [Drive failure prediction setting]
    Function is available:            Enable

  [Popup setting]
    Function is available:            Disable
    [Advanced]
      Temperature:                    Disable
      SMART:                          Disable
      Memory:                         Disable
```

Header

Hardware Status section
(Status of the equipment)

RAS Setting section
(RAS software setting)

Continues on the next page.

<Explanation of the display output>

■ Header:

This section shows the date and time when the getrasinfo command is executed and the model name.

The following is the format of the header.

```
<<getrasinfo result>>
Date: YYYY/MM/DD hh:mm:ss
Model Name: HF-W100E
```

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 subsections.

・[Temperature condition] section:

Shows the various statuses related to temperature. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
xx Temperature status: yy	xx	Shows the type of temperature Internal: Inside the chassis
	yy	Shows the status. Normal: The temperature is normal. Error: The temperature is not normal.
xx Temperature value: zz	xx	Shows the type of temperature Internal: Inside the chassis
	zz	Shows the temperature value.

・[Storage condition] section:

Display the storage status. The display items and their meanings are shown below.

Output item		Description	
mSATA SSD xx		xx	Indicates the number of internal storage.
	Status: yy	yy	Shows the status of the drive. Healthy: Normal Smart Detected: SMART is detected. Unknown: Unknown status

・[Memory condition] section:

Shows the status of the main memory. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
DIMM xx status:yy	xx	Shows the memory slot name. 1 : DIMM1
	yy	Shows the status of the memory. Normal: Normal Error: Error correction occurs frequently.

■ [RAS Setting] section:

This section shows the settings of the RAS software. The RAS Setting section has the following subsections.

・ [Automatic shutdown setting] section:

Shows the automatic shutdown setting. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Temperature:xx	xx	Shows whether the system is automatically shut down when the temperature is abnormal. ON: Enabled OFF: Disable

・ [Watchdog timer setting] section:

Shows the watchdog timer setting. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Retrigger type:xx	xx	Shows the retrigger type. Automatic: Automatically retriggered. Application: Retriggered by an application. Not used: Not used.

・ [Drive failure prediction setting] section:

Shows the Self-Monitoring, Analysis and Reporting Technology (SMART) setting. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Function is available:xx	xx	Shows whether the Self-Monitoring, Analysis and Reporting Technology (SMART) is enabled or disabled. Enable: Enabled In the case of the HF-W100E, this setting is fixed to “Enable”.

・ [Popup setting] section:

Shows the pop-up notification setting. The following table shows the list of items in this subsection and their respective descriptions.

Output item		Description	
Function is available:xx		xx	Shows whether the pop-up notification function is enabled or disabled. Enable: Enabled Disable: Disabled
[Advanced]		-	Shows the advanced settings.
	Temperature:yy	yy	Shows whether a pop-up is displayed when the temperature is abnormal. Enable: Displayed Disable: Not displayed
	SMART:zz	zz	Shows whether a pop-up is displayed when SMART is detected. Enable: Displayed Disable: Not displayed
	Memory: aa	aa	Shows whether a pop-up is displayed when frequent memory error correction is detected. Enable: Displayed Disable: Not displayed

<Diagnosis>

When this command finishes normally, the getrasinfo command returns exit code 0. When this command is terminated with an error, one of the following error messages is displayed and exit code 1 is returned.

Table 8-7 Error Messages of the getrasinfo Command

Error message	Meaning
Usage: getrasinfo [/status | /setting] [/e File]	There is an error in the specified options. Specify correct options.
An error occurred in %s. errorcode=%x %s: Function name or internal function name of error Windows API %x: Error code of Windows API or internal function	An internal error has 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. Log on to the computer by using an administrator account and run the command again. If User Account Control (UAC) is enabled, start the command prompt with administrator privileges and run the command.

< NOTE >

- When you run the getrasinfo command, log on to the computer by using an administrator account registered on the computer (as a member of the Administrators group). You cannot run multiple instances of the getrasinfo command simultaneously.
- Start the command prompt with administrator privileges and run the command.
- When the /e option is used, if a file with the same name as the output file already exists at the same output location, the file is overwritten.
- If the command fails to acquire some of the information required for the output, it is possible that only the section name is displayed in a section or a part of the information is replaced with “---”. If this situation happens, re-execute the command.

This Page Intentionally Left Blank

CHAPTER 9 TROUBLESHOOTING

This chapter explains the possible causes of common problems and the actions to be taken to address those problems. Select an applicable symptom from the list in “9.1 List of Problems”. Follow the link (“9.2 Countermeasures” through “9.6 Failure Analysis Information Partition Mount Setting”) and take actions according to the instruction. If following the instruction in “9.2 Countermeasures” does not resolve the symptom, contact the system administrator or maintenance personnel.

WARNING
In case of smoke, a burning smell, or the like, unplug the power cable from the outlet, and contact your dealer or maintenance personnel. Using faulty equipment without repair may 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 an applicable item in the list below, perform root cause analysis, and take an appropriate action.

9.1.1 Problems that occur before the OS startup

The following is a list of problems that occur before the desktop is displayed (before the OS startup). For information about the names of the lamps, see “1.4 Name and Function of Each Part”.

(1) The equipment does not start.

Check the operation of the equipment after the plug of the power cord is connected to the outlet in the order of the following steps 1 through 5. If there is an applicable item, follow the link. (If there are multiple applicable items, the first one has precedence.)

1. Even if you press the power button, the equipment does not start. (See page 9-3.)
2. The screen is blank. (See page 9-3.)
3. The screen shows an error message and the system stops. (See page 9-3.)
4. The system stops when the Windows® logo is displayed. (See page 9-4.)
5. The system stops when a blue screen is displayed. (See page 9-4.)

(2) Beep sounds are generated. (See page 9-4.)

(3) The BIOS setup menu cannot be opened. (See page 9-5.)

(4) The remote power on function cannot be activated through the PWR_BTN. (See page 9-5.)

(5) WOL cannot be used. (See page 9-5.)

9.1.2 Problems that occur after the OS startup

The following is a list of problems that occur after the desktop is displayed (after the OS startup).

(1) The alarm lamp is lit. (See page 9-6.)
(2) The processing speed of the equipment is slow. (See page 9-6.)
(3) The equipment does not respond. (See page 9-7.)
(4) The equipment automatically goes into the standby mode, or restarts. (See page 9-7.)
(5) The screen flickers or blacks out. (See page 9-8.)
(6) In the screen resolution setting, an unconnected display is shown. (See page 9-8.)
(7) Screen display blinks or screen contents are displayed again after blackout in some cases. (See page 9-9.)
(8) A blue screen is/was displayed. (See page 9-9.)
(9) The equipment cannot connect to the network. (See page 9-9.)
(10) The network connection is unstable, or the connection speed is slow. (See page 9-10.)
(11) Keyboard input is not accepted. (See page 9-10.)
(12) Mouse input is not accepted, or a cursor /button does not work normally. (See page 9-11.)
(13) A USB device (other than a keyboard and a mouse) cannot be recognized or does not work. (See page 9-11.)
(14) A serial port or a parallel port does not work properly. (See page 9-12.)
(15) The RAS external contact port does not work properly. (See page 9-12.)
(16) The equipment cannot be shut down. (See page 9-12.)
(17) “Mount setting confirmation” message is displayed (See page 9-13.)

9.2 Countermeasures

9.2.1 Problems that occur before the OS startup

(1) The equipment does not start.

1. Even if you press the power button, the equipment does not start.

<Possible cause>

Power is not supplied to the equipment or failure of equipment will be considered.

<Action>

1. See "2.2 Starting the Equipment" and check whether the equipment starts up.
2. Make sure that the circuit breaker on the power distribution panel is on.
3. If the standby lamp is turned on after steps 1 and 2, turn on the power button.
   -> Contact the system administrator or maintenance personnel.

2. The screen is blank.

<Possible cause>

The display has a problem.

<Action>

1. Make sure that the power switch of the display is on.
2. Make sure that the plug of the power cord for the display is connected to the outlet.
3. Make sure that the equipment and the display are connected through a display interface cable.
4. Re-examine the display settings. For information about the display settings, refer to the manual of the display.

3. The screen shows an error message and the system stops.

<Possible cause>

The battery is dead, the OS is corrupted.

<Action>

1. If one of the following error messages is displayed, take a corresponding action.
   - “Error：Remove Battery or Clear CMOS, Load default value”
     -> If this message is displayed each time the equipment starts, the battery is dead. Contact your system administrator or maintenance personnel.
   - “Operating System not found”
     -> There is an error in a mSATA SSD or the OS. Check the following items:
     i) Check if a USB CD, USB FD, or USB boot device is connected to the equipment.
     -> If a USB CD, USB FD, or USB boot device is connected, disconnect it.
     ii) If you have a recovery DVD, restore the system drive back to the factory-shipped condition by using the recovery DVD.

4. The system stops when the Windows® logo is displayed.

<Possible cause>

There is an error in hardware, or the OS is corrupted.

<Action>

1. Unplug the power cable from the outlet, or if the equipment is connected to user prepared DC power supply, remove the USB devices except a keyboard and a mouse after disconnect the DC power supply. Then start the equipment again.
2. If the symptom persists after step 1, the OS may be corrupted. If you have a recovery DVD, restore the system drive back to the factory-shipped condition using the recovery DVD.

< NOTE >

- Do not connect a USB device during the OS startup because the OS may not start normally.
- When you change screens during the OS startup, the OS does not start normally in some CPU switching devices. If you use a CPU switching device, perform sufficient operation verification.

5. The system stops when a blue screen is displayed.

<Possible cause>

The equipment has received an active remote shutdown signal.

<Action>

1. Take appropriate action according to “9.3 STOP Error Codes”.

(2) Beep sounds are generated.

a) The beep sounds “Pipipi-pipi-pi”.

<Possible cause>

This is just a sound for power-on. This is not an error.

b) Other sounds sound.

<Possible cause>

A hardware error was detected.

<Action>

1. Contact the system administrator or maintenance personnel.

(3) The BIOS setup menu cannot be opened.

<Possible cause>

Keyboard input is not accepted.

<Action>

1. Disconnect the keyboard cable and securely reconnect it to ensure stable connection.
2. Connect the keyboard cable to another port.

(4) The remote power on feature cannot be activated through the PWR_BTN.

<Possible cause>

There is a problem with a cable connection, or the equipment is failure.

<Action>

1. Make sure that the equipment and cable are connected through a EXT cable. (Check if the connection of the cable is not loose.)
2. Replace the EXT cable with a new one. (Check that the cable is broken.)
3. If the standby lamp is turned on after steps 1 and 2, turn on the power button.
   -> Contact the system administrator or maintenance personnel.

(5) WOL cannot be used.

<Possible cause>

The WOL function is not enabled.

<Action>

1. Check which OS is used. If the OS's specification is not support the WOL function, the WOL function is not available.
2. Enable the WOL function according to "2.6.1 Enabling the WOL (Wake ON LAN) function".

9.2.2 Problems that occur after the OS startup

(1) The alarm lamp is lit.

<Possible cause>

This is a hardware error notification from the RAS software or is displayed by a user application.

<Action>

1. If the alarm lamp is lit in red, this is a hardware error notification from the RAS software.
   -> The temperature is abnormal. Check the following items.
   i) Make sure that sufficient clearance is provided around the equipment. (See “1.5.2 Installation”.)
   -> If not, provide sufficient clearance around the equipment.
   ii) Make sure that the installation environment (ambient temperature) meets see “1.5.1 Environment”.
   -> Please make sure that the ambient temperature satisfies see “1.5.1 Environmental condition” by removal of obstacles or temperature adjustment by air conditioning.

(2) The processing speed of the equipment is slow.

<Possible cause>

The capacity of the memory or the mSATA SSDs is not sufficient.

<Action>

1. Terminate unnecessary applications to increase available memory.
   -> When you want to check the usage of the CPU and memory, follow the instructions in “9.5 Checking the System Load by Using Performance Monitor”.
2. Delete unnecessary files to increase free clearance on the mSATA SSDs.

(3) The equipment does not respond.

<Possible cause>

There is an error in hardware or software.

<Action>

1. The screen can seem to be frozen when an application freezes. If the equipment responds by pressing **Alt**+**Tab** or **Ctrl**+**Alt**+**Delete**, try the following procedure.
   i) Switch applications by pressing **Alt**+**Tab** and identify which application has frozen.
   ii) After you identify the frozen application, use Task Manager to terminate the application. To start Task Manager, press **Ctrl**+**Alt**+**Delete**. The **Windows Security** window will open. Click **Task Manager**.
   iii) Restart the equipment.
2. If executing steps 1 does not resolve the symptom, remove all USB devices except a keyboard and mouse when the power is off and then start the equipment.

<Forcibly terminating the equipment>

If the shutdown fails, press the power button for at least four seconds. The power is turned off and the equipment goes into the standby mode.

(4) The equipment automatically goes into the standby mode, or restarts.

a) A warning or error message is recorded in the event log.

<Possible cause>

There is an error in hardware or software.

<Action>

1. Check the description of the messages in the “System” or “Application” category in the event log and take actions accordingly. (See “9.4 Event Log.”)
2. If the source of the message is a component purchased by the user, contact the supplier.

b) Neither a)

<Possible cause>

There is a problem with a cable connection, or the power supply is unstable.

<Action>

1. Make sure that the power cable is firmly connected to the DC power connector and the AC adapter power connector.
2. If the symptom persists after step 1, the power supply may be unstable. Check that the power voltage is appropriate.

(5) The screen flickers or blacks out.

<Possible cause>

There is an error in the display.

<Action>

1. Make sure that the power cable for the display is plugged into the outlet.
2. Make sure that the equipment and the display are connected through a display interface cable. (Check if the connection of the cable is not loose.)
3. Replace the display interface cable with a new one. (Check that the cable is broken.)
4. Re-examine the display settings. For information about how to adjust the display, refer to the manual of the display.
5. When you use the display which supports MST (Multi Stream Transport) of the DisplayPort, make sure the following items. (Refer to the manual attached to the display for the setting.)
   i) If the Display can change the DisplayPort1.1 and the DisplayPort1.2, select the the DisplayPort1.2.
   ii) If the display can change the setting of MST, set it to “Primary”.

< NOTE >

If MST is enabled, the item of "Display Port topology" is displayed when you right-click on the desktop window.

(6) In the screen resolution setting, an unconnected display is shown.

<Possible cause>

It is possible that an unconnected display is shown due to the specifications of the OS.

<Action>

1. Right-click on the desktop to display a pop-up menu. Click **Screen resolution**.
2. In the screen resolution setting window, select an unconnected display.
3. Under **Multiple Displays**, select **Delete this display**. If this setting change is not applied automatically, click **Apply** to delete the unconnected display.
4. If multiple unconnected displays are shown, repeat steps 2 and 3.

(7) Screen display blinks or screen contents are displayed again after blackout in some cases.

<Possible cause>

Windows® is performing a process to correctly recover the graphics function if the graphics driver takes time in response due to a high load on the system.

<Action>

1. In the case of this phenomenon, when a balloon message “Response stop and recovery of display driver” appears or when a warning log of event ID4101 is recorded in the event log, reduce the system load and use the system with a load that does not cause this kind of indication or recording.

(8) A blue screen is/was displayed.

<Possible cause>

There is an error in the OS or in the equipment.

<Action>

1. If the blue screen is still displayed, record the STOP error code (0x00000080 and so on) or distinguished name (NMI_HARDWARE_FAILURE and so on).
2. If you cannot record the STOP error code, search the “System” category in the event log for the STOP error code.
3. Check the description in “9.3 STOP Error Codes” to determine what caused the memory dump to be collected.
4. When you request an analysis of the memory dump (a service provided for a fee), save the log after you restart the equipment (see “8.3 Maintenance Operation Commands”) and contact our sales representatives.

(9) The equipment cannot connect to the network.

<Possible cause>

LAN, network equipment (hub etc.) setting, cable connection defect is considered.

<Action>

1. Re-examine the network settings according to the instructions in “2.7 Setting Up the LAN Interface”.
2. Disconnect the LAN cable and securely reconnect it to ensure a stable connection.
3. See ” 1.4 Name and Function of Each Part” and check whether the LAN cable connection port is correct.
4. Replace the LAN cable with another LAN cable.
5. When you use 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 first and then turn on the power of this equipment.
   iii) Replace the network device with other one to check whether the latter works.

(10) The network connection is unstable, or the connection speed is slow.

<Possible cause>

LAN, network equipment (hub etc.) setting, cable connection defect is considered.

<Action>

1. Re-examine the network settings according to the instructions in “2.7 Setting Up the LAN Interface”.
2. Disconnect the LAN cable and securely reconnect it to ensure a stable connection.
3. See ” 1.4 Name and Function of Each Part” and check whether the LAN cable connection port is correct.
4. Replace the LAN cable with another LAN cable.
5. When you use network equipment, check the following items.
   i) Turn on the power of the network device first and then turn on the power of this equipment.
   ii) Replace the network device with other one to check whether the latter works.

(11) Keyboard input is not accepted.

<Possible cause>

An application has frozen, there is a problem with the cable connection, or the keyboard has failed.

<Action>

1. Keyboard input may not be accepted temporarily due to a frozen application.
   If the equipment responds to **Alt**+**Tab** or **Ctrl**+**Alt**+**Delete**, try the following procedure:
   i) Switch applications by pressing **Alt**+**Tab** and identify which application has frozen.
   ii) After you identify the frozen application, use Task Manager to terminate the application. To start Task Manager, press **Alt**+**Ctrl**+**Delete**. The **Windows Security** window will open. 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 to check whether the latter works.
5. Reboot the equipment.

(12) Mouse input is not accepted, or a cursor /button does not work normally.

<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 has failed.

<Action>

1. When you use an optical mouse, check the following items.
   i) Check if dust or dirt is clinging to the optical sensor. If dust or dirt is present, clean it off.
   ii) Do not use an optical mouse on a glass, mirror, or shiny material. (We recommend using a mouse pad designed for use with an optical mouse.)
2. If you use a mouse that is not an optional component provided by the Manufacturer, refer to the manual of the mouse for information about how to use it.
3. Disconnect the mouse interface cable and securely reconnect it to ensure a stable connection.
4. Replace the mouse with another mouse to check whether the latter works.
5. When you use a USB KVM switch, read the user's manual that comes with the USB KVM switch. The problem may be alleviated if you change settings such as emulation settings.
6. If the OS starts while a serial port is receiving data, use the serial port after the OS starts instead and see whether the problem goes away.

(13) A USB device (other than a keyboard and a mouse) cannot be recognized or does not work.

<Possible cause>

There is a problem with the cable connection, or the device driver for the USB device has not been installed.

<Action>

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 installing a device driver, install the device driver according to the manual of the USB device and restart the equipment.
4. If the USB device requires an external power supply, make sure that the plug of the power cord of the USB device is connected to the outlet.
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 Equipment Specifications (6) Maximum current specifications”.) If the USB device can accept an external power supply, connect the device to an external power supply.
6. If the above steps 1 through 5 do not resolve the symptom, a failure of the USB device may be the cause. Take action according to the manual of the USB device.

(14) A Serial port or a parallel port does not work properly.

<Possible cause>

There is a problem with the cable connection, or the target device has failed.

<Action>

1. Disconnect the cable and securely reconnect it to ensure a stable connection.
2. See “5.2 Serial Port Setting” and check whether the BIOS serial port setting is correct.
3. Check to see if the target device has failed.
4. If the OS starts while a serial port is receiving data, use the serial port after the OS starts instead and see whether the problem goes away.

(15) The RAS external contact port does not work properly.

<Possible cause>

There is a problem with the cable connection or the interface with the target device.

<Action>

1. Disconnect the cable and securely reconnect it to ensure a stable connection.
2. See “5.5.2 External general purpose I/O specifications” and confirm that the external control specifications are met.

(16) The equipment cannot be shut down.

<Possible cause>

The OS has frozen.

<Action>

1. Press the **Scroll Lock** key twice while holding down the right **Ctrl** key to collect a memory dump. The equipment restarts automatically after a memory dump is collected. When you request an analysis of the memory dump (a service provided for a fee), save the log after you restart the equipment (see “8.3 Maintenance Operation Commands”) and contact our sales representatives.
2. If you cannot restart the equipment at step 1, turn off the power of the equipment according to the instructions in <Forcibly terminating the equipment> below.
3. If executing step 1 does not resolve the problem, remove all USB devices except a keyboard and mouse when the power is off and then start the equipment.

<Forcibly terminating the equipment>

If the shutdown fails, press the power button for at least four seconds. The power is turned off and the equipment goes into the standby mode.

(17) “Mount setting confirmation” message is displayed.

<Possible cause>

The mount setting on the failure analysis information partition may have been canceled.

<Action>

1. See “9.6 Failure Analysis Information Partition Mount Setting” and take appropriate action.

9.3 STOP Error Codes

A STOP error code provides a summary of an error cause. STOP error codes are displayed on a blue screen as well as embedded in a memory dump file.

Table 9-1 shows the error cause corresponding to the message which is displayed in the blue screen.

If the OS is Windows® 10, if there is a Distinguished Name corresponding to a STOP error code, the Distinguished Name is displayed.

Table 9-1 STOP Error Codes

No.	STOP error code (or Distinguished Name)	Error Cause	Action
1	0x00009222	Watchdog timer timeout occurrence	Contact the system administrator or maintenance personnel.
2	Other than the above	STOP error code for Windows®	For information about a Windows® STOP error, refer to the Microsoft Knowledge Base. When you request an analysis of the memory dump (a service provided for a fee), after restarting the equipment, save the log (see "8.3 Maintenance Operation Commands"), contact our sales representatives.

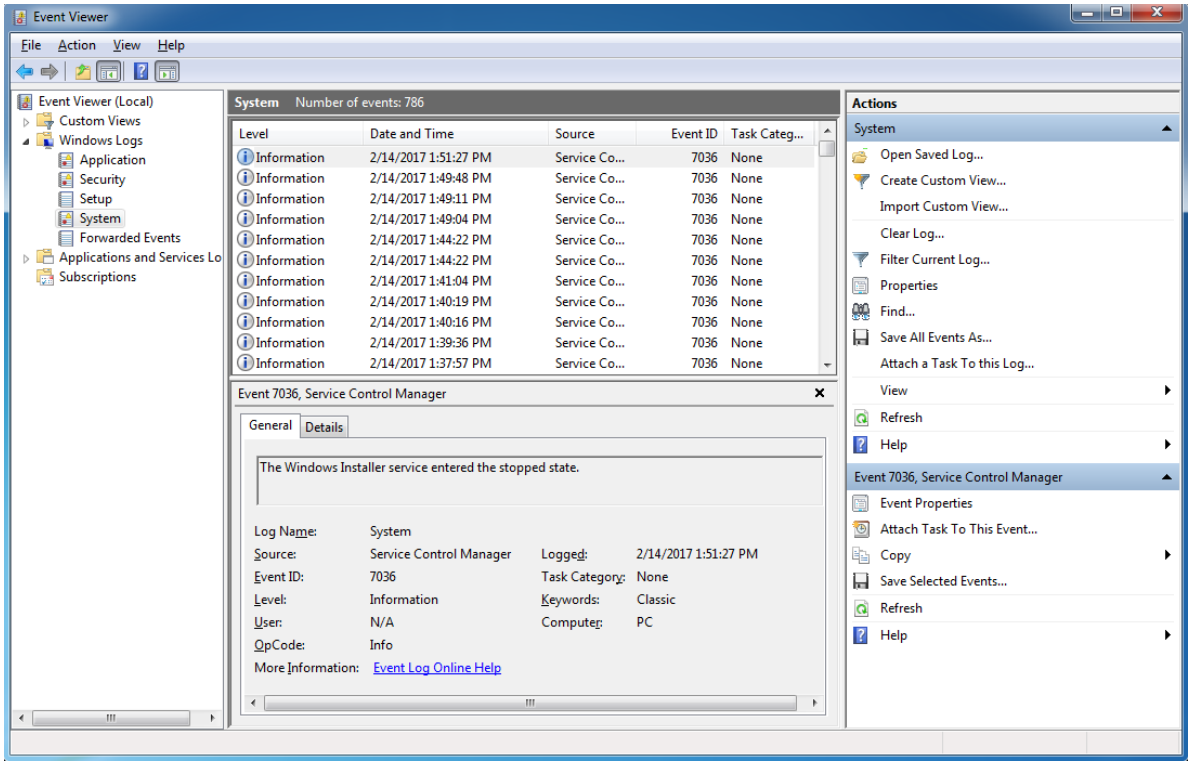
9.4 Event Log

When a critical event occurs, for example, when the environment information is changed 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 display image assumes Windows® Embedded Standard 7 but it is similar other OS.)

1. Click **Start** and click **Control Panel**.
   (If the OS is Windows® 10, right-click **Start** and click **Control Panel** from menu.)
2. Since the **Control Panel is displayed,** and click **System and Security** > **View event logs**.
3. The **Event Viewer** window opens. Select **Windows Logs** and then select **System** or **Application** to check the system log or application log.



< NOTE >

- The system log may contain an error log entry of the event “ID51”.
  The entry may show a message “An error was detected on the CD-ROM during the paging operation.”, but as long as you can access the external DVD drive, there is no problem.
- The system log may contain a warning log entry of the event “ID19”.
  The entry may show a message “A corrected hardware error has occurred.”, but as long as the value of the Details tab is “0x9xxxxxxx000f 0005” (e.g.:0x90000040000f0005), there is no problem with the running this equipment.

Table 9-2 lists event log entries unique to the equipment. No.1 through 6 are collected in the system log, and Nos.7 and 8 are collected in the application log.

Table 9-2 Event Log Entries Unique to the Equipment (1/1)

No.	Event ID	Source	Type	Description	Action
1	259	HFWRAS_SYS	Warning	The temperature exceeded prescribed value.	Read the description of abnormal temperature in “9.2.2 Problems that occur after the OS startup (1) The alarm lamp is lit” and take action accordingly.
2	263	HFWRAS_SYS	Information	Temperature returned to prescribed value.	No handling
3	265	HFWRAS_SYS	Warning	A failure may be imminent on the drive of the mSATA SSD%1 (%2).	We recommend you back up the data and replace the drive.
4	268	HFWRAS_SYS	Error	The computer was shut down because temperature became dangerous.	Read the description of abnormal temperature in “9.2.2 Problems that occur after the OS startup (1) The alarm lamp is lit” and take action accordingly.
5	525	HFWRAS_SYS	Information	In the DIMM %1, error correcting have occurred with high frequency.	The DIMM may be out of order. Contact your system administrator or maintenance personnel.
6	539	HFWRAS_SYS	Error	The "%1" was 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.
7	769	HFWRAS_APP	Error	An error occurred in %1. errorcode = %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.
8	771	HFWRAS_APP	Error	Because a wrong value is set up in registry value "%1", default value %2 is set up.	If restarting the equipment does not resolve the error, contact the system administrator or maintenance personnel.

No.3 : %1 denotes the drive bay number. %2 denotes the manufacturer and the model name of the drive.

No.5 : %1 denotes the slot number of the DIMM.

No.6 : %1 records one of the following :

TEMP, MEM, CPU, TEMPLOG, WDT, SMART, RASLOG, INTERNAL - LOGD

No.7 : %1 denotes the function terminated with an error. %2 denotes the error code.

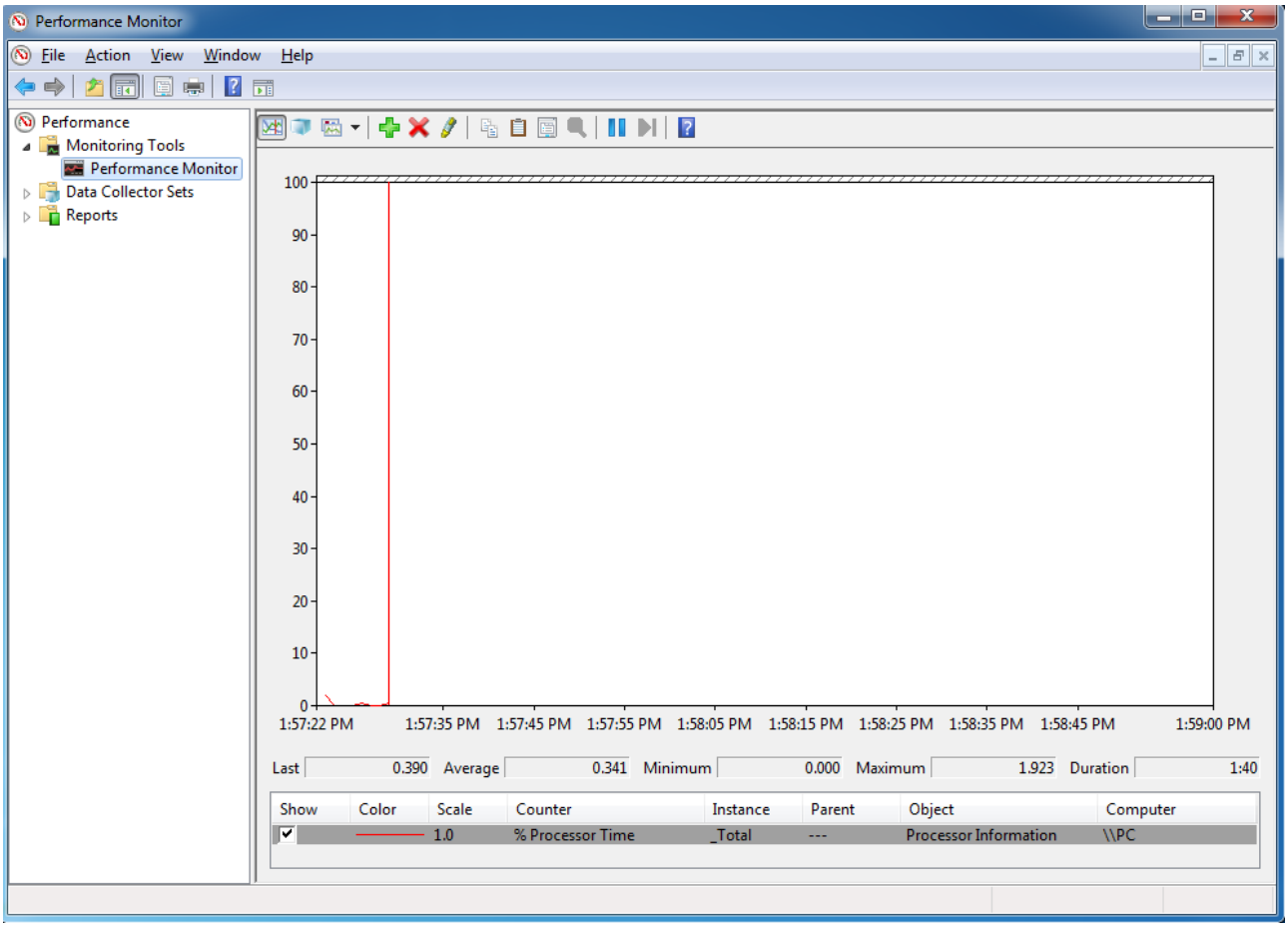
No.8 : %1 denotes the registry key that has an illegal value. %2 denotes the default value of the registry key.

9.5 Checking the System Load by Using Performance Monitor

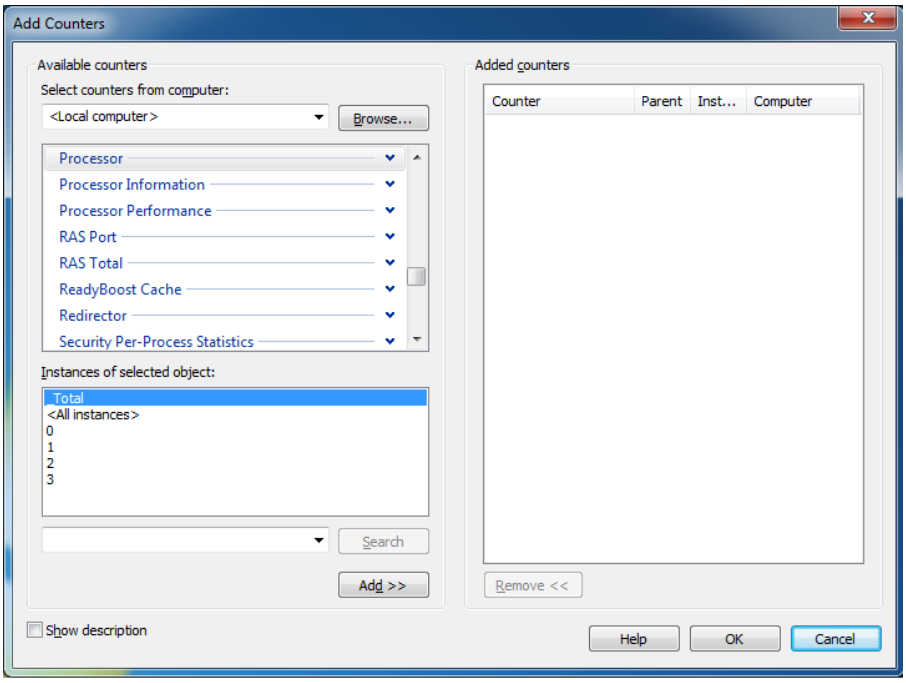
Performance Monitor that comes with Windows® is used for monitoring the usage of the CPU and memory. Use this tool, for example, when you analyze the system load.
(The display image assumes Windows® Embedded Standard 7 but it is similar other OS.)

The following shows how to start the performance monitor:

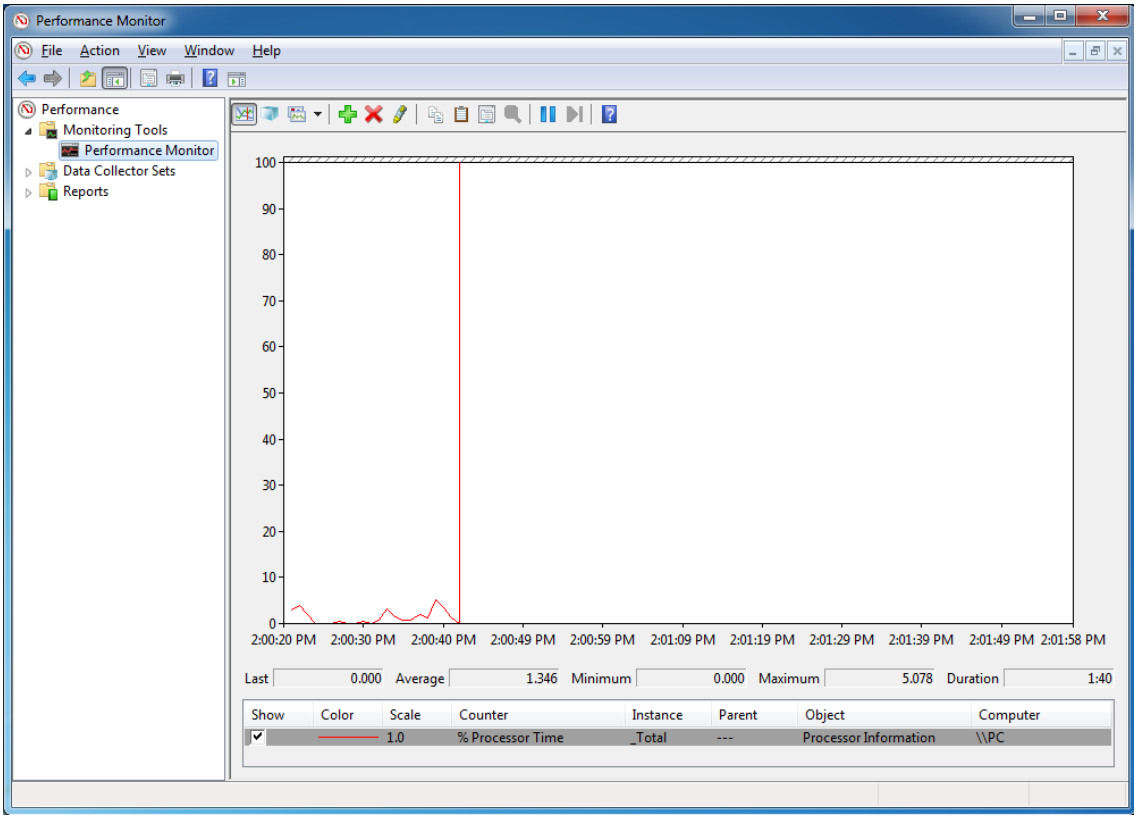
1. Click **Start** and click **Control Panel**.
   (If the OS is Windows® 10, right-click **Start** and click **Control Panel** from menu.)
2. Since the **Control Panel is displayed,** and click **System and Security** > **Administrative Tools**.
3. Double-click **Performance Monitor**.
4. The **Performance Monitor** window opens. Click **Performance Monitor** and then click .



5. The **Add Counters** window opens. If you select items such as Processor, Memory, Physical Disk, or Network Interface and click **Add**>>, the performance of those items will be monitored. Click **OK**.



6. In the **Performance Monitor** window, you can check the performance of the items you selected.



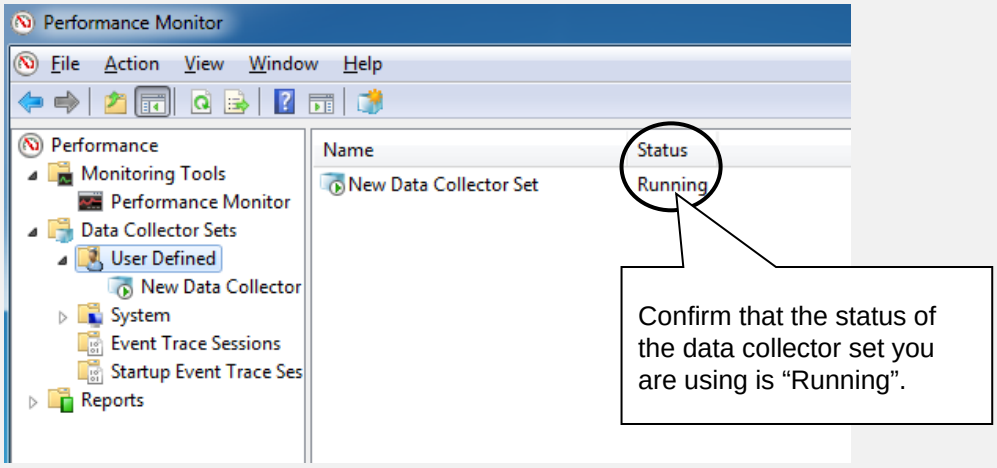
The following table shows a list of performance counters most closely related to the performance of the equipment.

Table 9-3 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 write to the disk in order to resolve page faults. If this value is high, it is likely that the amount of memory is not sufficient. The closer this value is to 0, the better.
3		Available Bytes	Indicates the size of 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 stays in the physical memory as long as it is allocated. If this value indicates an increasing trend, it is likely that there is a memory leak.
5	Physical Disk	%Disk Time	Indicates the percentage of time that the disk is busy reading and writing. If this value is continuously high, the disk performance is likely to be a bottleneck.
6	Network Interface	Bytes Total/sec	Indicates the number of bytes per second that are sent and received by the network adapter. If this value is continuously high compared to the value of No.7, the network is likely to be a bottleneck.
7		CurrentBandwidth	Shows the network bandwidth.

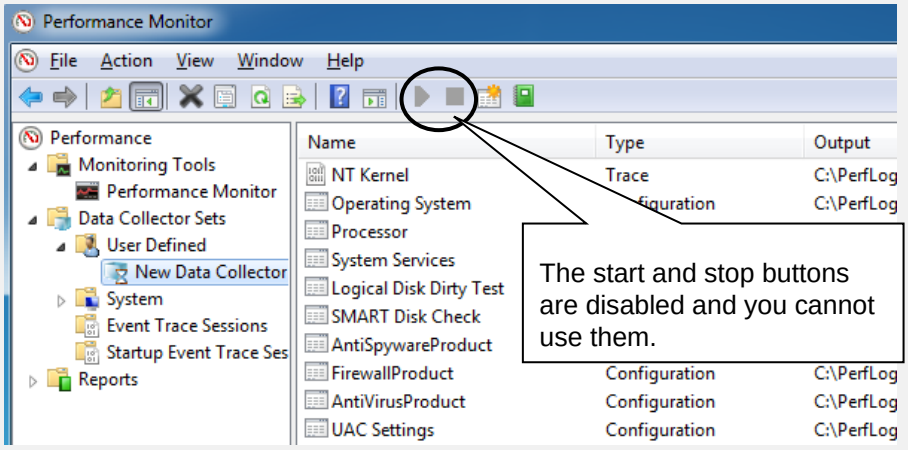
< NOTE >

You may not be able to start collecting performance counter data when the system load is high. After you start collecting performance counter data, confirm that the status of the data collector set you are using is “Running”.



Confirm that the Performance Counter data collection has started properly.

In addition, if the system load is high or if you repeatedly start and stop collecting performance counter data, sometimes you cannot start or stop collecting performance counter data.
If this situation happens, terminate Performance Monitor, wait for a while, restart Performance Monitor, and then start collecting the data.



Performance Counter data cannot be collected.

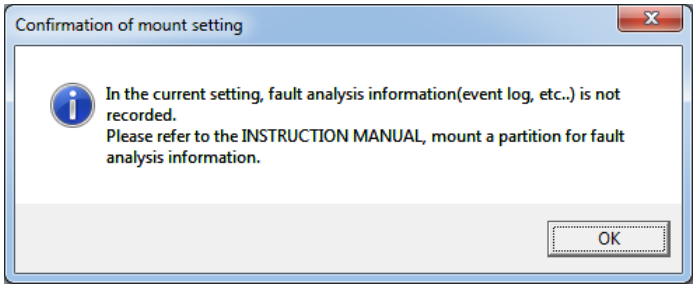
If you cannot start collecting performance counter data even after you have restarted Performance Monitor, restart the system.

9.6 Failure Analysis Information Partition Mount Setting

9.6.1 "Confirmation of mount setting" message

In this equipment, a fault analysis information partition (H: drive) is placed and mounted as a recording destination of fault analysis information such as Windows® event log.

The mount setting is checked at the time of Windows® startup, and when the mount setting is not done correctly, a message box will be displayed to prompt the user.



If a message box is displayed, the mount setting of the fault analysis information partition will be canceled and information for fault analysis, such as the Windows® event log, may not be recorded, so see "9.6.2 Failure analysis information Partition check and mount setting procedure " to check the fault analysis information partition and mount setting.

Fault analysis information and storage destination folder to be stored in the fault analysis information partition are as follows.

Table 9-4 Failure Analysis Information and Storage Folder

No.	Item	Folder structure
1	Windows® event log	H:\SystemLog\Windows\winevt
2	Windows® minidump file	H:\SystemLog\Windows\Minidump
3	RAS software log information	H:\SystemLog\RAS_Software
4	User mode process dump file (* 1)	H:\SystemLog\Windows\Appdump

(*1) The storage folder of the dump file of the user mode process is set in the following registry.

Subkey: HKLM\SOFTWARE\Microsoft\Windows\Windows Error Reporting \LocalDumps

Value name: DumpFolder

Value: C:\LogFolder\SystemLog\Windows\Appdump\%USERNAME%

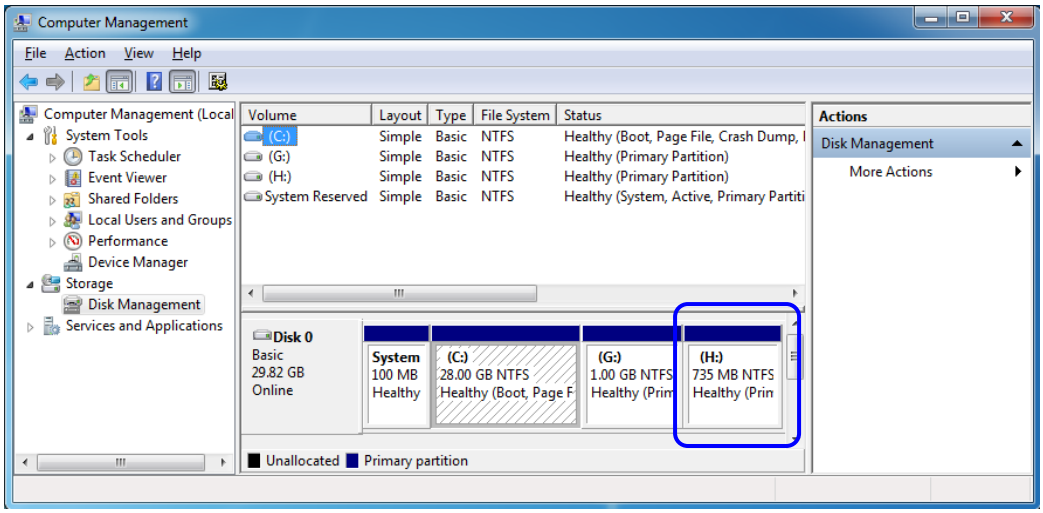
9.6.2 Failure analysis information Partition check and mount setting procedure

(1) Confirmation of failure analysis information partition

Confirm the fault analysis information partition (about 700 MB) located at the end of the system drive (the side with the larger sector number) when shipping this equipment.
(The display image assumes Windows® Embedded Standard 7 but it is similar other OS.)

<Procedure>

1. If you are not logged on as a computer administrator, log on as a computer administrator.
2. Click **Start** and click **Control Panel**.
   (If the OS is Windows® 10, right-click **Start** and click **Control Panel** from menu.)
3. Open **Control Panel** and click **System and Security**, **Administrative Tools**, and double-click **Computer Management** in the right window of the administration tool.
4. As the computer management screen is displayed, double-click **Storage Area**, then **Disk Management**.
5. Since the layout of the disk is displayed in the center of the screen, check the drive letter and file system of the partition on the right side of disk 0.



The above is the factory default setting display. The failure analysis information partition is allocated H: to the drive letter and formatted with NTFS.

- (H :) is displayed, and it is formatted with NTFS
  Follow "(2) Mount setting of failure analysis information partition" and perform mount setting.
- When the drive letter is other than (H :)
  Change the drive letter to (H :) and then perform the mount setting according to see "(2) Mount setting of the failure analysis information partition" .
- Partition is not displayed or is not formatted with NTFS
  Please use the recovery DVD to restore the factory-shipped condition.

(2) Mount setting of failure analysis information partition

Follow the steps below to set the mounting of the failure analysis information partition.

<Procedure>

1. If you are not logged on as a computer administrator account, log on with the computer's administrator account.
2. Start the command prompt with administrator privileges.
3. On the **Command Prompt** screen, enter the following to create a folder in the failure analysis information partition. (It may be output if a folder has already been created, but please continue)

   mkdir H:\SystemLog\Windows\winevt [Enter]
   mkdir H:\SystemLog\Windows\Minidump [Enter]
   mkdir H:\SystemLog\Windows\Appdump [Enter]
   mkdir H:\SystemLog\RAS_Software [Enter]
   icacls H:\SystemLog\Windows\Appdump /grant:r Everyone:(OI)(CI)(F) [Enter]

4. Next, enter the following to delete the mount point and recreate the mount target folder.

   mountvol C:\LogFolder /d [Enter]
   rmdir C:\LogFolder [Enter]
   mkdir C:\LogFolder [Enter]

5. Then enter the following to check the volume information of the failure analysis information partition.

   mountvol [Enter]

<Example of command execution result>

(Abbreviation)

```
    \\?\Volume{d0f4d25d-df3c-11e6-a968-806e6f6e6963}\      ··(A)
            H:\                                            ··(B)
```

(Abbreviation)

※Check the volume information of the volume indicated as "H: \" in the command execution result.
The above (A) and (B) show the volume information and drive letter of the failure analysis information partition (H :), respectively.

6. Then enter the following and reset the mount point.

   mountvol C:\LogFolder XXXXX [Enter]

※ For XXXXX, enter the volume information (A) of the failure analysis information partition confirmed by the command execution result of step 5.
("\\?\Volume{d0f4d25d-df3c-11e6-a968-806e6f6e6963}\" in the example of step 5)

This completes the mount setting operation. Please exit the command prompt and restart the equipment.

If "Message confirming mount setting" message box appears again after rebooting, use recovery DVD to restore the factory-shipped condition.

APPENDIX　HANDLING REPLACEABLE COMPONENTS

NOTICE
Do not use a replaceable component for longer than the recommended replacement cycle. If you do, a deteriorating or worn-out component may cause the equipment to fail.

・As you use a component, it gradually deteriorates and becomes subject to wear and tear. The following components must be replaced at fixed intervals.
・Replacement of these components is not free of charge.
・The recommended replacement cycle in the following table assumes that the average ambient temperature of the system unit is 25°C or less.
Note that when the average ambient temperature exceeds 25°C, the replacement cycle may be shortened in some cases.

Replaceable component	Recommended replacement cycle	Note
AC adapter（Optional）	5 years	If this AC adapter is used in high temperature, its life time may be shorten.

< NOTE >

- When you replace a component in order to, for example, repair equipment, you may need to replace the component with a functionally compatible one.
- If you repair a component in a manner not recommended by the Manufacturer, proper operation of the component is not guaranteed.
- For the following parts, the following restrictions will occur for long-term use.

Part name	Limitations	Available years
mSATA SSD	TBW(*1)：9.6TB	10 years (*2)

(*1) Total Byte Written: Total written amount

(*2) It is the usable year when the amount of data written by the application per day for the internal file device (mSATA SSD) is about 2 GB / day or less.

TBW: 9.6 TB ÷ ((application written amount: 2.0 GB + OS written amount: 0.58 GB) × 365 days) = about 10 years

【OS writing amount assuming general usage of Windows environment: about 0.58 GB / day】

- Also, even if trouble should arise in the content of the file, please carry out periodic backup work of the file in daily work so that it can recover promptly.

■How to use when the amount of writing exceeds 2 GB / day

(1) It is recommended that program parts with fewer write times be stored in the internal file device (C drive) and log data and so on that have been written many times are stored in external file devices (CFast card).

(2) By utilizing Windows Enhanced Write Filter (EWF), by placing internal files in main memory, you can extend the usable life of mSATA SSD. For details on how to use EWF see “4.1.2” separately.