

Industrial PC Platform

NY-series

IPC Machine Controller

Industrial Box PC

Hardware User's Manual

NY512-1500-1XX□13□□X

NY512-1400-1XX□13□□X

NY512-1300-1XX□13□□X

Industrial Box PC




W556-E2-06

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Introduction

Thank you for purchasing the IPC Machine Controller.

This manual contains information that is necessary to use the IPC Machine Controller. Please read this manual and make sure you understand the functionality and performance of the Box PC before attempting to use it in a control system.

Keep this manual in a safe place where it will be available for reference during operation.

Part of the specifications and restrictions for the IPC Machine Controller are available in other manuals.

Refer to *Relevant Manuals* on page 2 and *Related Manuals* on page 33.

Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of introducing Factory Automation systems.
- Personnel in charge of designing Factory Automation systems.
- Personnel in charge of installing and maintaining Factory Automation systems.
- Personnel in charge of managing Factory Automation systems and facilities.

For programming, this manual is intended for personnel who understand the programming language specifications in international standard IEC 61131-3.

Applicable Products

This manual covers following Industrial Box PC with Machine Automation Control Software configurations:

NY512-1500-1XX□13□□X

NY512-1400-1XX□13□□X

NY512-1300-1XX□13□□X



Additional Information

Refer to *1-4 Product Configuration* on page 1-6 for configuration details.

Relevant Manuals

The following sections provide the relevant manuals for the IPC Machine Controller.

Read all of the manuals that are relevant to your system configuration and application before you use the IPC Machine Controller.

Overview Relevant Manuals

| Purpose of use | Manual | | | | | | | | | |
|------------------------------------|----------------------------------|--|--|--|--|----------------------------------|---|---|--|---|
| | Basic Information | | | | | | | | | |
| | NY-series Troubleshooting Manual | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherNet/IP Port User's Manual | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC | NY-series Software User's Manual | NY-series Instructions Reference Manual | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Motion Control User's Manual | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC | NY-series Instructions Reference Manual |
| Introduction to NY-series Panel PC | | ● | | | | | | | | |
| Introduction to NY-series Box PC | | | ● | | | | | | | |
| Setting devices and hardware | | | | | | | | | | |
| Using motion control | | ● | ● | | | | | ● | | |
| Using EtherCAT | | | | | | | | | ● | |
| Using EtherNet/IP | | | | | | | | | | ● |
| Making setup | | | | | | | | | | |
| Making initial settings | | | | ● | | | | | | |
| Preparing to use Controllers | | | | | | | | | | |
| Software settings | | | | | | | | | | |
| Using motion control | | | | | | ● | | ● | | |
| Using EtherCAT | | | | | | | | | ● | |
| Using EtherNet/IP | | | | | | | | | | ● |

| | Manual | | | | | | | | | |
|--|--|--|---|--|--|-------------------------------------|---|--|--|--|
| | Basic Information | | | | | NY-series Troubleshooting Manual | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherNet/IP Port User's Manual | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT Port User's Manual | NY-series Motion Control Instructions Reference Manual | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Motion Control User's Manual |
| Purpose of use | NY-series IPC Machine Controller Industrial Box PC Hardware User's Manual | NY-series IPC Machine Controller Industrial Box PC | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual | NY-series Instructions Reference Manual | | | | | |
| Writing the user program | | | | | | | | | | |
| | Using motion control | | | | | | ● | ● | | |
| | Using EtherCAT | | | | ● | ● | | | ● | |
| | Using EtherNet/IP | | | | | | | | | ● |
| Testing operation and debugging | | | | ● | | | | | | |
| | Using motion control | | | | ● | | ● | | | |
| | Using EtherCAT | | | | | | | ● | | |
| Learning about error management and corrections *1 | ▲ | ▲ | | ▲ | | ▲ | | ▲ | ▲ | ● |
| Maintenance | | | | | | | | | | |
| | Using motion control | ● | ● | | | | ● | | | |
| | Using EtherCAT | | | | | | | ● | | |
| Using EtherNet/IP | | | | | | | | | ● | |

*1. Refer to the NY-series *Troubleshooting Manual (Cat. No. W564)* for the error management concepts and an overview of the error items. Refer to the manuals that are indicated with triangles for details on errors for the corresponding Units.

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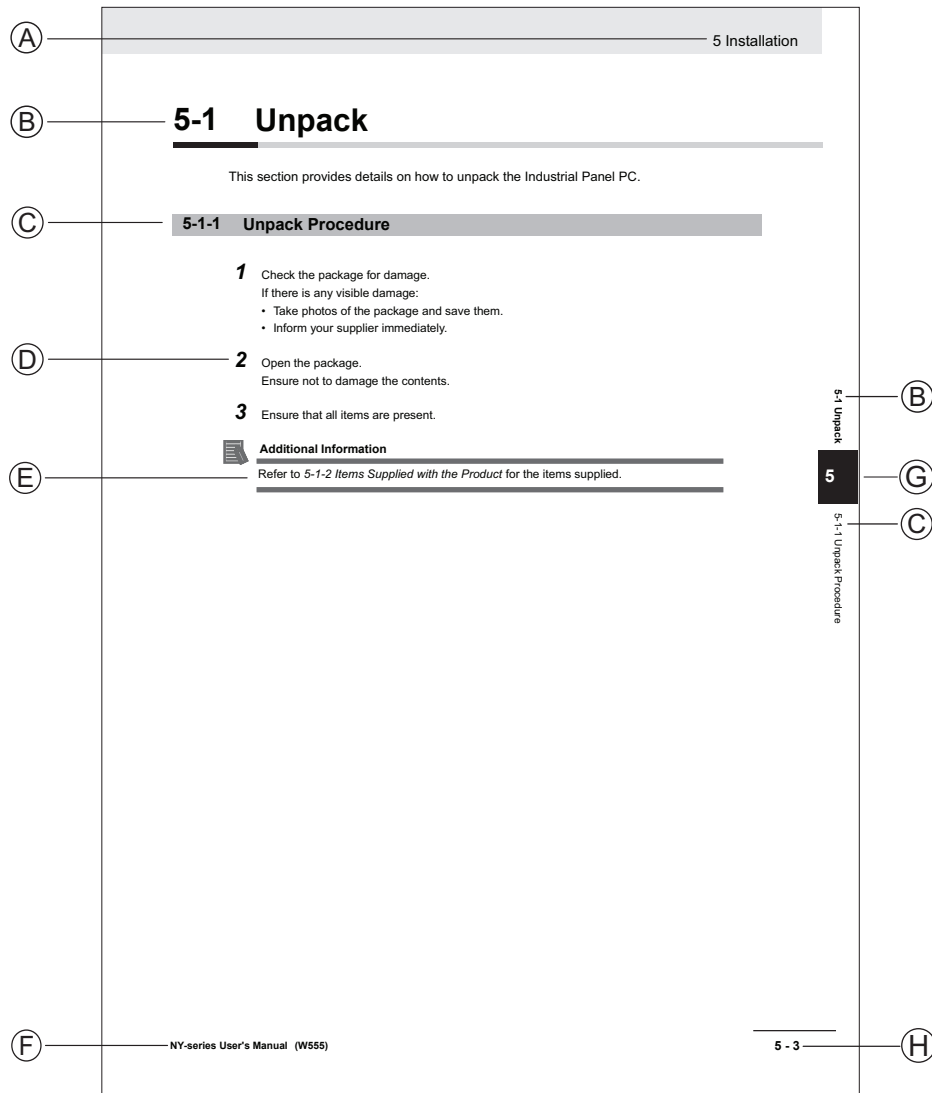
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Manual Information

This section provides information about this manual.

Page Structure

The following page structure is used in this manual.



Note: This illustration is provided as a sample. It will not literally appear in this manual.

| Item | Explanation | Item | Explanation |
|------|---------------------|------|--|
| A | Level 1 heading | E | Special Information |
| B | Level 2 heading | F | Manual name |
| C | Level 3 heading | G | Page tab with the number of the main section |
| D | Step in a procedure | H | Page number |

Special Information

Special information in this manual is classified as follows:



Precautions for Safe Use

Precautions on what to do and what not to do to ensure safe usage of the product.



Precautions for Correct Use

Precautions on what to do and what not to do to ensure proper operation and performance.



Additional Information

Additional information to read as required.

This information is provided to increase understanding or make operation easier.



Version Information

Information on differences in specifications and functionality between different versions.

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Safety Precautions

Definition of Precautionary Information





The following notation is used in this manual to provide precautions required to ensure safe usage of the IPC Machine Controller. The safety precautions that are provided are extremely important to safety.

Always read and heed the information provided in all safety precautions.

The following notation is used.

| | |
|--|--|
|  WARNING | Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage. |
|  Caution | Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage. |

Symbols

| | |
|---|--|
|  | The circle and slash symbol indicates operations that you must not do. The specific operation is shown in the circle and explained in text. This example indicates prohibiting disassembly. |
|  | The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for electric shock. |
|  | The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a general precaution. |
|  | The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do. |

Warnings

WARNING

Disassembly and Dropping

Do not attempt to disassemble, repair, or modify the product in any way. Doing so may result in malfunction or fire.



Installation

Always connect to a ground of 100 Ω or less when installing the product.



Ensure that installation and post-installation checks of the product are performed by personnel in charge who possess a thorough understanding of the machinery to be installed.



Fail-safe Measures

Provide safety measures in external circuits to ensure safety in the system if an abnormality occurs due to malfunction of the product or due to other external factors affecting operation. Not doing so may result in serious accidents due to incorrect operation.



Emergency stop circuits, interlock circuit, limit circuits, and similar safety measures must be provided in external control circuits.



The product will turn OFF all outputs from Output Units in the following cases. The slaves will operate according to the settings in the slaves.

- If an error occurs in the power supply
- If a CPU watchdog timer error or CPU reset occurs
- If a major fault level Controller error occurs
- While the product is on standby until RUN mode is entered after the power is turned ON
- If a system initialization error occurs



External safety measures must be provided to ensure safe operation of the system in such cases.

If external power supplies for slaves or other devices are overloaded or short-circuited, the voltage will drop, outputs will turn OFF, and the system may be unable to read inputs. Provide external safety measures in controls with monitoring of external power supply voltage as required so that the system operates safely in such a case.



Unintended behavior may occur when an error occurs in internal memory of the product. As a countermeasure for such problems, external safety measures must be provided to ensure safe operation of the system.



Provide measures in the communications system and user program to ensure safety in the overall system even if errors or malfunctions occur in data link communications or remote I/O communications.



If there is interference in remote I/O communications or if a major fault level error occurs, output status will depend on the products that are used. Confirm the operation that will occur when there is interference in communications or a major fault level error, and implement safety measures. Adjust all of the settings in the slaves and Units.



The use of an uninterruptible power supply (UPS) allows normal operation to continue even if a momentary power failure occurs, possibly resulting in the reception of an erroneous signal from an external device affected by the momentary power failure. Take external fail-safe measures. Where necessary, monitor the power supply voltage on the system for external devices and use it as an interlock condition.



Downloading

Always confirm safety at the destination before you transfer a user program, configuration data, setup data, or device variables from the Sysmac Studio. The devices or machines may perform unexpected operation regardless of the operating mode of the product.



Actual Operation

Check the user program, data, and parameter settings for proper execution before you use them for actual operation.



Security setting adjustments should only be performed by the engineer in charge that possesses a thorough understanding of the security settings. Selecting non-recommended security settings can put your system at risk.



Changing BIOS information is only allowed for the engineer in charge that possesses a thorough understanding of the BIOS settings because it can change the behavior of the product.



Cautions

⚠ Caution

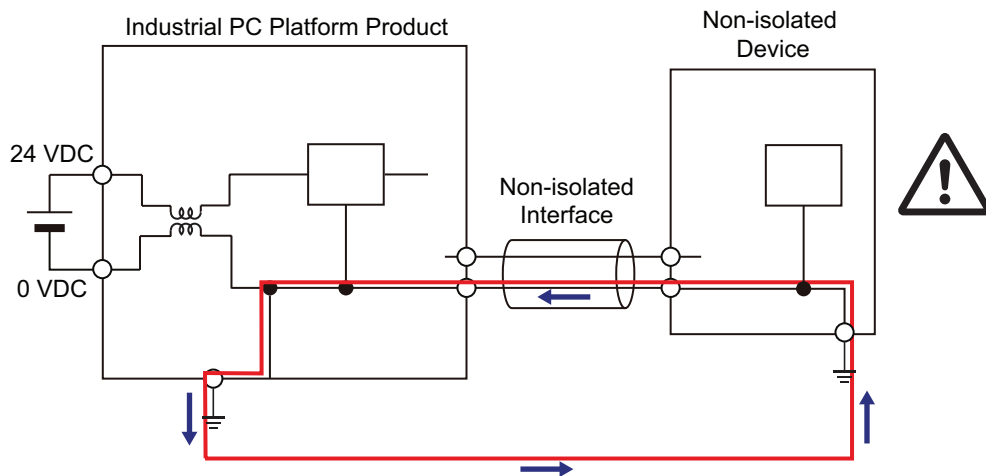
Installation

When installing or removing a PCIe card, ensure to grip the Card Clip on the sides to prevent contact with the sharp edges of the sheet metal frame tab. Injury may result.



Wiring

The product has an internal non-isolated DC power supply. Circuit ground (0 VDC) and frame ground are connected together. When connecting a non-isolated device or a non-isolated interface to the product, take appropriate actions to avoid communication failures or damage to the mentioned ports.



Never ground the 24 VDC side of the power supply. This may cause a short circuit.



Online Editing

Execute online editing only after confirming that no adverse effects will be caused by deviations in the timing of I/O. If you perform online editing, the task execution time may exceed the task period, I/O may not be refreshed with external devices, input signals may not be read, and output timing may change.



Precautions for Safe Use

Disassembly, Dropping, Mounting, Installation and Storage

- Do not drop the product or subject it to abnormal vibration or shock. Doing so may result in product malfunction or burning.
- When unpacking, check carefully for any external scratches or other damages. Also, shake the product gently and check for any abnormal sound.
- Always use the devices specified in the relevant manual.
- The product must be installed in a control panel.
- Always install equipment that is included in the product specifications. Not doing so may result in failure or malfunction.
- If the storage period exceeds 6 months, check the performance of the Fan Unit before production starts.
- Install the product in the correct orientation and temperature according to the specifications in the manual to prevent overheating. Not doing so may result in malfunction.
- When connecting peripheral devices to the product, ensure sufficient countermeasures against noise and static electricity during installation of the peripheral devices.

Wiring

- Follow the instructions in the manual to correctly perform connector wiring and insertion. Double-check all wiring and connector insertion before turning ON the power supply.
- Always ensure connectors, cables, PCIe Cards and Storage devices are completely locked in place to prevent accidental disconnection.
- Before you connect a computer to the product, disconnect the power supply plug of the computer from the AC outlet. Also, if the computer has an FG terminal, make the connections so that the FG terminal has the same electrical potential as the product. A difference in electrical potential between the computer and the product may cause failure or malfunction.
- Do not bend or pull the cables beyond normal limit. Do not place heavy objects on top of the cables or other wiring lines. Doing so may break the cables.
- Always use power supply wires with sufficient wire diameters to prevent voltage drop and burning. Make sure that the current capacity of the wire is sufficient. Otherwise, excessive heat may be generated. When cross-wiring terminals, the total current for all the terminals will flow in the wire. When wiring cross-overs, make sure that the current capacity of each of the wires is not exceeded.
- Be sure that all mounting bracket screws and cable connector screws are tightened to the torque specified in the relevant manuals. The loose screws may result in fire or malfunction.
- Use crimp terminals for wiring.
- For an NY Monitor Link connection, always follow the cable type and connection method specifications in the manual. Otherwise, communications may be faulty.

Task Design

- If the following variables are specified for a condition expression when the execution condition is a condition expression for a variable, event tasks may not be executed when conditions are met or event tasks may be executed when conditions are not met:

- Structure members whose data size is 16 bits or more, except for system-defined variables for motion control.
- Array elements whose data size is 16 bits or more.

For information on event task execution conditions, refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)*.

Power Supply Design and Turning ON/OFF the Power Supply

- Always use a power supply that provides power within the rated range in the manual.
- Do not perform a dielectric strength test.
- Always use the recommended uninterruptible power supply (UPS) to prevent data loss and other system file integrity issues caused by unexpected power interruption. Back up the system files in the planned way to prevent data loss and other system file integrity issues caused by incorrect operation.
- Use an Omron S8BA UPS with the correct revision number to prevent improper system shutdown.
- It takes up to approximately 10 to 20 s to enter RUN mode after the power is turned ON. The outputs during this time behave according to the slave or Output Unit specifications. Implement fail-safe circuits so that external devices do not operate incorrectly.
- Power ON after the DVI or NY Monitor Link cable is connected between the product and an external monitor.
- Always check the power supply and power connections before applying power. Incorrect power connections can damage the product or cause burning.
- Always turn OFF the power supply to system before you attempt any of the following.
 - Inserting or removing PCIe Cards
 - Connecting cables
 - Connecting or disconnecting the connectors
 - Wiring the system
 - Replacing or removing the HDD/SSD
 - Replacing the Battery
 - Replacing the Fan Unit

Actual Operation

- Choose a OS password that is not obvious to prevent unauthorized access.
- Remember the OS user name and password. The product is inaccessible without it.
- Before operating the system, please make sure the appropriate software is installed and configured. Doing so may prevent unexpected operation.
- Install all updates and ensure the browser stays up-to-date.
- Install all updates and ensure the firewall stays up-to-date.
- Make sure that your OS environment is protected against malicious software and viruses.
- Install all updates and ensure virus definitions stay up-to-date.
- Do not remove the fan cover while the power is ON. Contact with a rotating fan may result in injury.
- Virtual memory settings can affect the performance of the system. Disable the paging file after installation of applications or updates.
- Correctly perform wiring and setting, and ensure that the shutdown by the UPS can be executed.

Operation

- Confirm that no adverse effect will occur in the system before you attempt any of following.
 - Changing the operating mode of the product (including changing the setting of the Startup Mode)
 - Changing the user program or settings
 - Changing set values or present values
 - Forced refreshing
- Do not carry out the following operations when accessing a USB device or an SD Memory Card.
 - Turn OFF the power supply of the product.
 - Press the Power Button of the product.
 - Remove a USB device or SD memory card.
- If two different function modules are used together, such as when you see PCIe connected board and EtherCAT slaves, take suitable measures in the user program and external controls to ensure that safety is maintained in the controlled system if one of the function modules stops. The relevant outputs will behave according to the slave or Output Unit specifications if a partial fault level error occurs in one of the function modules.
- Do not attempt to remove or touch the fan unit while the product is powered ON or immediately after the power supply is turned OFF. If you attempt to replace the fan unit then, there is a risk of personal injury due to hot or rotating parts.
- Press the power button for several seconds to force the product shutdown. Always back up files in the planned way to prevent data loss or system file corruption.
- Do not touch any product housing when power is being supplied or immediately after the power supply is turned OFF. Doing so may result in burn injury.
- Always confirm safety at the connected equipment before you perform the following operations when the device output hold configuration is set to enable. The equipment may operate unexpectedly because the last status for outputs is retained.
 - Changing the operating mode of the product
 - When downloaded

General Communications

- Unexpected operation may result if inappropriate data link tables are set. Even if appropriate data link tables have been set, confirm that the controlled system will not be adversely affected before you transfer the data link tables. The data links start automatically after the data link tables are transferred.
- Separate the machine network segment from the office network to avoid communication failures.

EtherNet/IP Communications

- Make sure that the communications distance, number of nodes connected, and method of connection for EtherNet/IP are within specifications. Do not connect EtherNet/IP communications to EtherCAT or other networks. An overload may cause the network to fail or malfunction.
- All related EtherNet/IP nodes are reset when you transfer settings for the built-in EtherNet/IP port (including IP addresses and tag data links settings). The settings can only be enabled after the reset. Confirm that the system will not be adversely affected by resetting nodes before you transfer the settings.
- If EtherNet/IP tag data links (cyclic communications) are used with a repeating hub, the communications load on the network will increase. This will increase collisions and may prevent stable

communications. Do not use repeating hubs on networks where tag data links are used. Use an Ethernet switch instead.

EtherCAT Communications

- Malfunctions or unexpected operation may occur for some combinations of EtherCAT revisions of the master and slaves. If you disable the revision check in the network settings, use the Sysmac Studio to check the slave revision settings in the master and the actual slave revisions, and then make sure that functionality is compatible in the slave manuals or other references. You can check the actual slave revisions from the Sysmac Studio or on slave nameplates.
- If the Fail-soft Operation parameter is set to stop operation, process data communications will stop for all slaves when an EtherCAT communications error is detected in a slave. At that time, the Servo Drive will operate according to the Servo Drive specifications. Make sure that the Fail-soft Operation parameter setting results in safe operation when a device error occurs.
- If noise occurs or an EtherCAT slave is disconnected from the network, any current communications frames may be lost. If frames are lost, slave I/O data is not communicated, and unintended operation may occur. The slave outputs will behave according to the slave specifications. Refer to the manual for the slave. If a noise countermeasure or slave replacement is required, perform the following processing.
 - Program the Input Data Invalid system-defined variable as an interlock condition in the user program.
 - Set the PDO communications timeout detection count setting in the EtherCAT master to at least 2. Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT Port User's Manual (Cat. No. W562)* for details.
- EtherCAT communications are not always established immediately after the power supply is turned ON. Use the system-defined variables in the user program to confirm that communications are established before attempting control operations.
- When an EtherCAT slave is disconnected or disabled, communications will stop and control of the outputs will be lost not only for the disconnected slave, but for all slaves connected after it. Confirm that the system will not be adversely affected before you disconnect or disable a slave.
- You cannot use standard Ethernet hubs or repeater hubs with EtherCAT communications. If you use one of these, a major fault level error or other error may occur.
- Always use the specified EtherCAT slave cables. If you use any other cable, the EtherCAT master or the EtherCAT slaves may detect an error and one of the following may occur.
 - Continuous refreshing of process data communications will not be possible.
 - Continuous refreshing of process data communications will not end during the set cycle.

Motion Control

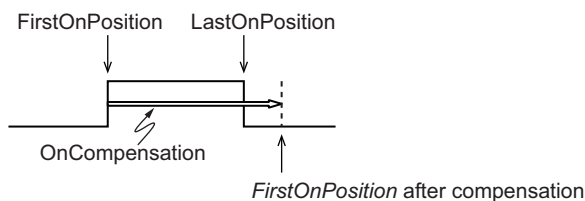
- The motor is stopped if communications are interrupted between the Sysmac Studio and the product during an MC Test Run. Connect the communications cable between the computer and product securely and confirm that the system will not be adversely affected before you perform an MC Test Run.
- The positive drive prohibit input (POT), negative drive prohibit input (NOT), and home proximity input (DEC) of the Servo Drive are used by the MC Function Module as the positive limit input, negative limit input, and home proximity input. Make sure that the signal widths for all of these input signals are longer than the control period of the MC Function Module. If the input signal widths are

shorter than the control period, the MC Function Module may not be able to detect the input signals, resulting in incorrect operation.

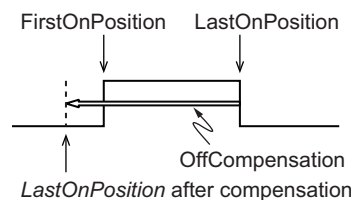
- Always execute the Save Cam Table instruction if you change any of the cam data from the user program in the CPU Unit or from the Sysmac Studio. If the cam data is not saved, the previous condition will be restored when the power is turned ON again, possibly causing unexpected machine operation.
- Confirm the axis number carefully before you perform an MC Test Run.
- Use the NX_AryDOutTimeStamp (Write Digital Output Array with Specified Time Stamp) instruction only after you confirm that InOperation from the MC_DigitalCamSwitch (Enable Digital Cam Switch) instruction is TRUE.
- Always use the axis at a constant velocity for the MC_DigitalCamSwitch (Enable Digital Cam Switch) instruction.

If you set the Count Mode to Rotary Mode, the following operation will occur if you use *OnCompensation* or *OffCompensation* and the axis velocity changes abruptly.

- If the value of *OnCompensation* or *OffCompensation* is equivalent to the time for half a rotation or more, *InOperation* will be FALSE.
- If the value of *OnCompensation* results in exceeding *LastOnPosition*, the output timing will be unstable.



- If the value of *OffCompensation* results in exceeding *FirstOnPosition*, the output timing will be unstable.



Backup

- We recommend that you back up the present values of variables while the retained variables are not refreshed. If you back up while the values of retained variables are refreshed, the data may not be saved correctly.

For information on Backup Functions and a backup for present values of variables, refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)*.

Restoring Data

- The absolute encoder home offsets are backed up with a non-volatile memory in the product as absolute encoder information. If any of the following conditions is met, clear the absolute encoder home offsets from the list of data items to restore, and then restore the data. Then, define the absolute encoder home again. If you do not define home, unintended operation of the controlled system may occur.

- The Servomotor or Servo Drive was changed since the data was backed up.
- The absolute encoder was set up after the data was backed up.
- The absolute data for the absolute encoder was lost.
- You can partially or cannot at all back up, restore, or compare data of the settings depending on slaves and Units. Also, you cannot back up, restore, or compare data for disabled slaves or Units. After you restore data, sufficiently confirm that operation is correct before you start actual operation.

Battery Replacement

- Dispose of any Battery that has been dropped on the floor or otherwise subjected to excessive shock. Batteries that have been subjected to shock may leak if they are used.
- UL standards require that only an experienced engineer replace the Battery. Make sure that an experienced engineer is in charge of Battery replacement.
- The Battery may leak, rupture, heat, or ignite. Never short-circuit, charge, disassemble, heat, or incinerate the Battery or subject it to strong shock.

Product Replacement

- Make sure that the required data, including the user program, configurations, settings and variables is transferred to a product that was replaced and to externally connected devices before restarting operation.
Be sure to include the tag data link settings and routing tables, which are stored in the product.

Cleaning, Maintenance and Disposal

- Do not use corrosive substances to clean the product. Doing so may result in the failure or malfunction.
- Dispose of the product and batteries according to local ordinances as they apply.



廢電池請回收

- The following information must be displayed for all products that contain primary lithium batteries with a perchlorate content of 6 ppb or higher when shipped to or transported through the State of California, USA.
Perchlorate Material - special handling may apply.
See <http://www.dtsc.ca.gov/hazardouswaste/perchlorate>.
- The product contains a lithium battery with a perchlorate content of 6ppb or higher. When exporting an end product containing the product to or shipping through California, USA, label all packing and shipping containers appropriately.

Precautions for Correct Use

Storage, Installation and Mounting

- Do not operate or store the product in the following locations. Operation may stop or malfunctions may occur.
 - Locations subject to direct sunlight
 - Locations subject to temperatures or humidity outside the range specified in the specifications
 - Locations subject to condensation as the result of severe changes in temperature
 - Locations subject to corrosive or flammable gases
 - Locations subject to dust (especially iron dust) or salts
 - Locations subject to exposure to water, oil or chemicals
 - Locations subject to shock or vibration
 - Locations outdoors subject to direct wind and rain
 - Locations subject to strong ultraviolet light
- Always install the product with sufficient surrounding space to allow for adequate heat dissipation and cooling effect.
- Take appropriate and sufficient countermeasures when installing the product in the following locations
 - Locations subject to strong, high-frequency noise
 - Locations subject to static electricity or other forms of noise
 - Locations subject to strong electromagnetic fields
 - Locations subject to possible exposure to radioactivity
 - Locations close to power lines
- Always touch a grounded piece of metal to discharge static electricity from your body before starting an installation or maintenance procedure.
- Insert USB devices and PCIe devices correctly to avoid the burning, failure or malfunction.
- Execute a backup of the product before PCIe addition or replacement. Be sure that the PCIe device works correctly before you use them for actual operation. PCIe devices and their related software may cause an OS boot failure or crash.
- Ensure the selected operating system supports ACPI to enable operating system shutdown using the power button.
- Download the enhanced Video Driver from the OMRON Download Center and install it on the Industrial PC.

Wiring

- Always ensure the rated supply voltage is connected to the product.
- Do not allow wire clippings, shavings, or other foreign material to enter the product. Otherwise, burning, failure, or malfunction may occur. Cover the product or take other suitable countermeasures, especially during wiring work.
- Do not use cables exceeding the maximum specified length. Doing so may cause malfunction.
- Do not connect an AC power supply to the DC power connector.
- Observe the following precautions to prevent broken wires.
 - When you remove the sheath, be careful not to damage the conductor.
 - Connect the conductor without twisting the wires.

- Do not weld the conductors. Doing so may cause the wires to break with vibration.

Actual Operation and Operation

- After an OS update or a peripheral device driver update for the product is executed, the product behavior might be different. Confirm that operation is correct before you start actual operation.
- Ensure the fan is operational to provide adequate cooling while the power is turned ON.
- HDD and SSD storage devices, SD Memory Cards, power buttons, fan units and batteries have finite lives and if those are exceeded, the product may fail or malfunction.
- Always monitor the fan status. If a fan is used beyond its service life, the *Low Revolution Speed* warning message is displayed and the product overheating may occur.
- Always monitor the battery warning message. When a battery has low voltage, the system time will be lost.
- Do not reset or power OFF the product while the password is being changed. If you fail to save the password there is a possibility that the project will not work.
- Always confirm safety at the connected equipment before you reset Controller errors with an event level of partial fault or higher from the EtherCAT master Function Module. When the Error is reset, all slaves that were in any state other than Operational state due to a Controller error with an event level of partial fault or higher (in which output are disabled) will go to Operational state and the outputs will be enabled. Before you reset all errors or restart a slave, confirm that no Controller errors with an event level of partial fault have occurred for the EtherCAT Master Function Module.
- The functions that are supported depend on the unit version of the product. The version of Sysmac Studio that supports the functions that were added for an upgrade is also required to use those functions. Refer to Version Information for NY-series Controllers for the relationship between the unit versions of the controller and the Sysmac Studio versions, and for the functions that are supported by each unit version.
- If the product experiences a sudden loss of power or disconnecting the cable while saving a setting or transfer of data is underway, the changes may not be stored and unexpected behavior may occur.
- Ensure that available software checks are performed by personnel in charge who possess a thorough understanding of the software.
- Always create a Rescue Disk using the Rescue Disk Utility and restore to recover the HDD/SSD configuration if necessary.
- Confirm the device output hold configuration before you change the operating mode of the product or execute the download.

Error Processing

- In applications that use the results of instructions that read the error status, consider the effect on the system when errors are detected and program error processing accordingly. For example, even the detection of a minor error, such as Battery replacement during operation, can affect the system depending on how the user program is written.
- If you change the event level of a Controller error, the output status when the error occurs may also change. Confirm safety before you change an event level.

Restoring Data

- When you edit the restore command file, do not change anything in the file except for the “yes” and “no” specifications for the selectable data groups. If you change anything else in the file, the Controller may perform unexpected operation when you restore the data.

Task Settings

- If a Task Period Exceeded error occurs, shorten the programs to fit in the task period or increase the setting of the task period.

Motion Control

- Before you start an MC Test Run, make sure that the operation parameters are set correctly.
- Do not download motion control settings during an MC Test Run.

EtherCAT Communications

- Set the Servo Drives to stop operation if an error occurs in EtherCAT communications between the Controller and a Servo Drive.
- If you need to disconnect the cable from an EtherCAT slave during operation, first disconnect the software connection to the EtherCAT slave or disable the EtherCAT slave and all of the EtherCAT slaves that are connected after it.
- Make sure that all of the slaves to be restored are participating in the network before you reset a Network Configuration Verification Error, Process Data Communications Error, or Link OFF Error in the EtherCAT Master Function Module. If any slave is not participating when any of these errors is reset, the EtherCAT Master Function Module may access slave with a different node address than the specified node address or the error may not be reset correctly.
- Make sure that the communications distance, number of devices connected, and method of connection for EtherCAT are within specifications. Do not connect EtherCAT communications to EtherNet/IP, a standard in-house LAN, or other networks. An overload may cause the network to fail or malfunction.
- After you transfer the user program, the product is restarted and communications with the EtherCAT slaves are cut off. During that period, the slave outputs behave according to the slave specifications. The time that communications are cut off depends on the EtherCAT network configuration. Before you transfer the user program, confirm that the system will not be adversely affected.

Battery Replacement

- Turn ON the power after replacing the battery for a product that has been unused for an extended period of time. Leaving the product unused without turning ON the power even once after the battery is replaced may result in a shorter battery life.
- Make sure to use a battery of the correct type, install the battery properly.
- Apply power for at least five minutes before changing the battery. Mount a new battery within five minutes after turning OFF the power supply. If power is not supplied for at least five minutes, the clock data may be lost. Check the clock data after changing the battery.

SD Memory Cards

- Insert an SD Memory Card completely and ensure it is in place.

Debugging

- If you use data tracing to sample following variables, correct data may not be sampled:
 - Structure members whose data size is 16 bits or more, except for system-defined variables for motion control.
 - Array elements whose data size is 16 bits or more.

For information on data tracing, refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)*.

Regulations and Standards

Conformance to EU Directives

The IPC Machine Controller complies with EU Directives. To ensure that the machine or device in which the IPC Machine Controller is used complies with EU Directives, the following precautions must be observed:

- The IPC Machine Controller must be installed within a control panel.
- The IPC Machine Controller that complies with EU Directives also conforms to the Common Emission Standard. Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment in which the IPC Machine Controller is used complies with EU Directives.
- This is a Class A product (for industrial environments). In a residential environment, it may cause radio interference. If radio interference occurs, the user may be required to take appropriate measures.

Applicable Directive

EMC Directive

EMC Directive

OMRON devices that comply with EU Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards.

Applicable EMC (Electromagnetic Compatibility) standards are as follows:

- EMS (Electromagnetic Susceptibility): EN 61131-2
- EMI (Electromagnetic Interference): EN 61131-2 (Radiated emission: 10-m regulations)

Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer. EMC-related performance of the OMRON devices that comply with EU Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

Conformance to KC Standards

When you use this product in South Korea, observe the following precautions.

사 용 자 안 내 문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

This product meets the electromagnetic compatibility requirements for business use. There is a risk of radio interference when this product is used in home.

Conformance to UL and CSA Standards

Some Industrial PC Platform products comply with UL and CSA standards. If you use a product that complies with UL or CSA standards and must apply those standards to your machinery or devices, refer to this manual. This manual provides the application conditions for complying with the standards. If the product is used in a manner not specified in the Instruction Sheet or in the product manuals then the protection provided by the equipment may be impaired.

Software Licenses and Copyrights

This product incorporates certain third party software. The license and copyright information associated with this software is available at http://www.fa.omron.co.jp/nj_info_e/.

Versions

Hardware revisions and unit versions are used to manage the hardware and software in NY-series products. The hardware revision or unit version is updated each time there is a change in hardware or software specifications. Even when two products have the same model number, they will have functional or performance differences if they have different hardware revisions or unit versions.

Check Unit Versions

You can check unit versions on the ID Information Label or with the Sysmac Studio.

Check Unit Versions on ID Information Label

The unit version is given on the ID information label on the product.



Additional Information

- Refer to *3-1-2 Back of the Industrial Box PC* on page 3-6 for the label location.
- Refer to *1-3 ID Information Label* on page 1-5 for label details.

Check Unit Versions with the Sysmac Studio

You can use the Sysmac Studio to check unit versions.



Additional Information

Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)* for the Sysmac Studio procedures to determine versions.

Check Hardware Revision

You can check the hardware revision with the Industrial PC Support Utility or with the Sysmac Studio. The hardware revision is not displayed on the ID Information Label.

Check Hardware Revision with the Industrial PC Support Utility

You can check the hardware revision version with the Industrial PC Support Utility.



Additional Information

Refer to *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)* for Industrial PC Support Utility details.

Check Hardware Revision with the Sysmac Studio

You can use the Sysmac Studio to check hardware revisions.



Additional Information

Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)* for the Sysmac Studio procedures to determine hardware revisions.

Related Manuals

The following manuals are related. Use these manuals for reference.

Related IPC Machine Controller Manuals

This table contains all related manuals, including this manual.

| Manual name | Cat. No. | Model numbers | Application | Description |
|---|----------|---------------------------|---|--|
| NY-series IPC Machine Controller Industrial Panel PC Hardware User's Manual | W557 | NY532-□□□□ | Learning all basic information about the Industrial Panel PC with Machine Automation Control Software. This includes introductory information, installation, operating procedures and maintenance. Mainly hardware information is provided. | An introduction to the Industrial Panel PC with Machine Automation Control Software is provided along with the following information: <ul style="list-style-type: none"> • Overview • System Configurations • Specifications • Installation • Operating Procedures • Maintenance |
| NY-series IPC Machine Controller Industrial Box PC Hardware User's Manual | W556 | NY512-1□□□□ | Learning all basic information about the Industrial Box PC with Machine Automation Control Software. This includes introductory information, installation, operating procedures and maintenance. Mainly hardware information is provided. | An introduction to the Industrial Box PC with Machine Automation Control Software is provided along with the following information: <ul style="list-style-type: none"> • Overview • System Configurations • Specifications • Installation • Operating Procedures • Maintenance |
| NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual | W568 | NY532-□□□□ NY512-1□□□□ | Learning the initial settings of the NY-series Industrial PC with Machine Automation Control Software and preparations to use Controllers. | The following information is provided on an introduction to the entire NY-series system: <ul style="list-style-type: none"> • Two OS systems • Initial settings • Industrial PC Support Utility • IPC Compolet • IPC .NET API • Backup and recovery |

| Manual name | Cat. No. | Model numbers | Application | Description |
|--|----------|---------------------------|--|--|
| NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual | W558 | NY532-□□□□ NY512-1□□□□ | Learning how to program and set up the Machine Automation Controller functions in an NY-series Industrial PC with Machine Automation Control Software. | The following information is provided on Machine Automation Controller functions: <ul style="list-style-type: none"> • Controller operation • Controller features • Controller settings • Programming based on IEC 61131-3 language specifications |
| NY-series Instruction Reference Manual | W560 | NY532-□□□□ NY512-1□□□□ | Learning detailed specifications on the basic instructions of an NY-series Industrial PC with Machine Automation Control Software. | The instructions in the instruction set (IEC 61131-3 specifications) are described. |
| NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Motion Control User's Manual | W559 | NY532-□□□□ NY512-1□□□□ | Learning about motion control settings and programming concepts of an NY-series Industrial PC with Machine Automation Control Software. | The settings and operation of the Controller and programming concepts for motion control are described. |
| NY-series Motion Control Instructions Reference Manual | W561 | NY532-□□□□ NY512-1□□□□ | Learning the specifications of the motion control instructions of an NY-series Industrial PC with Machine Automation Control Software. | The motion control instructions are described. |
| NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT® Port User's Manual | W562 | NY532-□□□□ NY512-1□□□□ | Using the built-in EtherCAT port in an NY-series Industrial PC with Machine Automation Control Software. | Information on the built-in EtherCAT port is provided. This manual provides an introduction and provides information on the configuration, features, and setup. |
| NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherNet/IP™ Port User's Manual | W563 | NY532-□□□□ NY512-1□□□□ | Using the built-in EtherNet/IP port in an NY-series Industrial PC with Machine Automation Control Software. | Information on the built-in EtherNet/IP port is provided. Information is provided on the basic setup, tag data links, and other features. |
| NY-series Troubleshooting Manual | W564 | NY532-□□□□ NY512-1□□□□ | Learning about the errors that may be detected in an NY-series Industrial PC with Machine Automation Control Software. | Concepts on managing errors that may be detected in an NY-series Controller and information on individual errors are described.. |

| Manual name | Cat. No. | Model numbers | Application | Description |
|---------------------------------------|----------|----------------|---|--|
| Sysmac Studio Version 1 User's Manual | W504 | SYSMAC-SE2□□□□ | Learning about the operating procedures and functions of the Sysmac Studio. | Describes the operating procedures of the Sysmac Studio. |

Related Products Manuals

This section provides an overview of the manuals of related products.

UPS S8BA

| Manual name | Cat. No. | Model numbers | Application | Description |
|------------------------|----------|---------------|--|--|
| UPS S8BA User's Manual | U702 | S8BA | Learning the information that is necessary to use the Uninterruptible Power Supply (UPS) Unit. | An introduction to the UPS is provided along with the following information: <ul style="list-style-type: none"> • Overview • Preparation • Installation and Connection • Check and Start Operation • Maintenance and Inspection • Shutdown Processing • I/O Signal Functions • Troubleshooting |

Industrial Monitor Manual

This table contains the related manual of the Industrial Monitor.

| Manual name | Cat. No. | Model numbers | Application | Description |
|----------------------------------|----------|--|---|---|
| Industrial Monitor User's Manual | W554 | NYM15W-C100□ NYM15W-C106□ NYM12W-C100□ NYM12W-C106□ | Learning all basic information about the Industrial Monitor. This includes introductory information with features, hardware overview, specifications, mounting, wiring, connecting, operating and maintaining the Industrial Monitor. | An introduction to the Industrial Monitor is provided along with the following information: <ul style="list-style-type: none"> • Overview • Hardware • Software • Specifications • Installation • Operating Procedures • Maintenance |

Terminology and Abbreviations

Industrial PC Platform

| Term / Abbreviation | Description |
|------------------------|--|
| Industrial PC Platform | An integrated range of OMRON products designed for use in any industrial application that will benefit from advanced PC technology |
| Industrial Monitor | An industrial monitor with a touchscreen as the user interface designed to work in industrial environments |
| Industrial Panel PC | An industrial PC with an integrated touchscreen monitor designed to work in industrial environments |
| Industrial Box PC | A box-shaped industrial PC including an OS designed to work in industrial environments |
| IPC | Industrial PC |
| Sysmac | OMRON's brand name of the product family for the industrial automation equipment |

Hardware

| Term / Abbreviation | Description |
|---------------------|--|
| BMC | Board Management Controller |
| CPU | A Central Processing Unit is the hardware within a computer that executes the instructions of a computer program |
| DVI | Digital Visual Interface |
| DVI-D | A Digital Visual Interface with only Digital signals |
| DVI-I | A Digital Visual Interface with Analog and Digital signals |
| Ethernet | A network communication protocol used in TCP/IP network |
| HDD | A Hard Disk Drive storage device |
| HMI | A Human Machine Interface that facilitates machine operation and control |
| iMLC | Industrial Multi-Level Cell type of SSD storage device |
| NYML | NY Monitor Link interface with video signals and USB signals |
| PCIe | The PCI Express is a high-speed computer bus standard called Peripheral Component Interconnect Express |
| SATA | The Serial AT Attachment is a serial bus interface primarily used with mass storage devices such as hard disk drives |
| SLC | Single-Level Cell type of SSD storage device |
| SO-DIMM | Small Outline Dual Inline Memory Module |
| SSD | A Solid State Drive storage device |
| USB | Universal Serial Bus |

Software

| Term / Abbreviation | Description |
|-----------------------------|---|
| API | Application Programming Interface |
| BIOS | Basic Input Output System. The first software run by a PC when powered on. |
| Developer | Any person involved with the development of software |
| DST | Daylight Saving Time |
| EtherCAT | A real time Ethernet protocol standard |
| EtherNet/IP | An industrial Ethernet protocol standard |
| EWf | Enhanced Write Filter |
| FBWF | File-Based Write Filter |
| IEC 61131-3 | Industrial standard for programming languages for PLCs and the Machine controller |
| IIoT | Industrial Internet of Things |
| Machine Controller Software | Software acting as a machine controller providing an IEC 61131-3 runtime, a motion control engine and potentially a robotics engine |
| MSDN | Microsoft Developer Network |
| Merge module | A module providing a standard method by which developers deliver shared Windows installer components and setup logic to their applications |
| NUI | Natural User Interface |
| OS | Operating System |
| PLC | Programmable Logic Controller |
| SDK | Software Development Kit |
| Sysmac Studio | An OMRON computer software application for setting, programming, debugging and troubleshooting NY series controllers. It also provides operations for motion control and a simulator. |
| TCP/IP | Transmission Control Protocol / Internet Protocol, a core member of the Internet protocol suite |
| TPM | Trusted Platform Module |
| Windows | An Operating System designed by Microsoft |

Revision History

On the front and back covers of the manual a manual revision code appears as a suffix to the catalog number.

| | |
|-----------------|-------------------|
| Cat. No. | W556-E2-06 |
|-----------------|-------------------|

↑
Revision code

| Revision code | Date | Revised content |
|---------------|----------------|--|
| 06 | May 2019 | <ul style="list-style-type: none"> • Added several storage devices • Updated Conformance to KC certification • Minor modifications |
| 05 | April 2018 | <ul style="list-style-type: none"> • Updated to Controller version 1.18 • Updated BIOS settings to version AQ27R111 |
| 04 | June 2017 | <ul style="list-style-type: none"> • Added Storage Device Considerations • Added 2 preventive maintenance actions • Added NY Monitor Link option • Modified UPS configuration procedure • Minor modifications |
| 03 | April 2017 | <ul style="list-style-type: none"> • Made changes accompanying release of unit version 1.14 of the Controllers • Improved UPS Connect procedure • Minor modifications |
| 02 | December 2016 | <ul style="list-style-type: none"> • UL implementation • KC Standard implementation • Minor modifications |
| 01 | September 2016 | First release |

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| 2 | System Configurations | 2 |
| 3 | Hardware Overview | 3 |
| 4 | Specifications | 4 |
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| 7 | Maintenance | 7 |
| A | Appendices | A |



1

Introduction to the Industrial Box PC

This section provides an introduction to the NY-series IPC Machine Controller.

| | | |
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| 1-1 | Intended Use | 1-2 |
| 1-2 | Features | 1-3 |
| 1-2-1 | Hardware Features | 1-3 |
| 1-2-2 | Machine Controller Software Features | 1-4 |
| 1-3 | ID Information Label | 1-5 |
| 1-3-1 | Label with Controller License (Optional)..... | 1-5 |
| 1-4 | Product Configuration | 1-6 |
| 1-5 | Overall Operating Procedure | 1-7 |

1-1 Intended Use

The IPC Machine Controller is an industrial-grade PC intended for use within factory automation environments. This Box PC simultaneously uses the standard Windows operating system and programs alongside OMRON's Sysmac Machine Controller Software to serve as a powerful PC based machine control platform.

The Box PC can be easily integrated in manufacturing innovations like big data, NUI and IIoT without compromising on the proven reliability and robustness of a PLC.

The IPC Machine Controller has a compact design that offers flexibility, expandability and easy maintenance for applications in factory automation environments.

1-2 Features

This section provides an overview of the features of the IPC Machine Controller.

- **Concurrent Operation of Windows and Real-time OS**
The Box PC is provided with two operating systems: Windows and a real-time OS. It can concurrently perform both machine control functions by using the Controller Function on the real-time OS and application processing on Windows.
With one IPC Machine Controller, you can control the equipment with the Controller, get the equipment data from the Windows application, and communicate with other factory automation systems.
- **Ensuring Operating System Independency**
Windows and the real-time Operating System run independently. The Controller continues controlling even if Windows makes an unexpected stop.
- **Machine Controller Software**
The Sysmac NY-series IPC Machine Controller are next-generation machine automation controllers that provide the functionality and high-speed performance that are required for machine control. They provide the safety, reliability, and maintainability that are required of industrial controllers. The IPC Machine Controller provide the functionality of previous OMRON machine controllers, and they also provide the functionality that is required for motion control. Synchronized control of I/O devices on high-speed EtherCAT can be applied to safety devices, vision systems, motion equipment, discrete I/O, and more. OMRON offers the new Sysmac Series of control devices designed with unified communications specifications and user interface specifications. The IPC Machine Controller are part of the Sysmac Series. You can use them together with EtherCAT slaves, other Sysmac products, and the Sysmac Studio Automation Software to achieve optimum functionality and ease of operation. With a system that is created from Sysmac products, you can connect components and commission the system through unified concepts and usability.

1-2-1 Hardware Features

Depending on the product configuration the Industrial Box PC with Machine Automation Control Software provides the following hardware features:

- **Compact design with two mounting orientation options**
The Box PC has a compact design to minimize panel space while allowing for two mounting orientations.
- **Powerful CPU**
A powerful CPU provides high performance for various applications.
- **Parallel Execution of Tasks with a Multi-core Processor**
With a multi-core processor, the IPC Machine Controller can execute the task, the tag data link service, and system services in parallel. This enables high-speed control of even large-scale devices.
- **Easy access to storage devices and the PCI Express Card**
Adding or changing storage devices (HDD, SSD) and the PCI Express Card is fast and simple.
- **LED indicators**
The LED indicators provide clear indication of the operational status of the Box PC.
- **DVI visual interface**
The video interface for the Box PC is provided with a DVI connector for connection to a monitor. An extra (optional) DVI interface is available for connection to a second monitor.

- **NY Monitor Link interface**
The interface combines video signals and USB signals for a connection to an OMRON Industrial Monitor using a single NY Monitor Link cable up to 100 meter.
- **3 Ethernet ports 1Gb/s**
Three ports support EtherCAT, EtherNet/IP, and Ethernet (for Windows) for interfacing with multiple network types.
- **EtherCAT Control Network Support**
The IPC Machine Controller provides an EtherCAT master port for EtherCAT communications. EtherCAT is an advanced industrial network system that achieves faster, more-efficient communications. It is based on Ethernet. Each node achieves a short fixed communications cycle time by transmitting Ethernet frames at high speed.
The standard-feature EtherCAT control network allows you to connect all of the devices required for machine control (e.g., I/O systems, Servo Drives, Inverters, and machine vision) to the same network.
- **Support for EtherCAT Slave Terminals**
You can use EtherCAT Slave Terminals to save space. You can also flexibly build systems with the wide variety of NX Units.
- **Achieving a Safety Subsystem on EtherCAT**
You can use NX-series Safety Control Units to integrate safety controls in a sequence and motion control system as a subsystem on EtherCAT.
- **Built-in I/O**
Built-in I/O for UPS status and Box PC shutdown control are provided.
- **4 USB ports**
2 USB2.0 ports and 2 USB3.0 ports are provided for connection to external USB devices such as keyboards, memory sticks, or other peripheral hardware.
- **Built-in SD Memory Card slot**
An SD Memory Card slot is provided for removable memory.

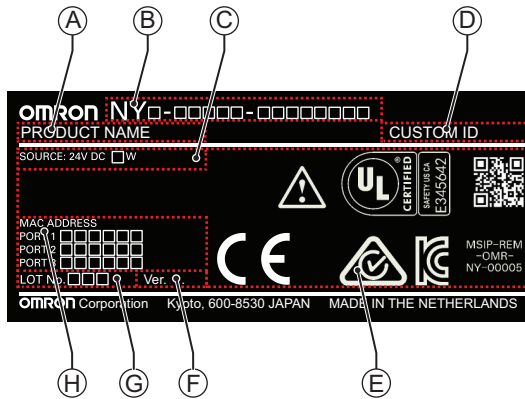
1-2-2 Machine Controller Software Features

The Machine Controller Software of the Box PC provides the following features:

- **Data Exchange between Windows and Controller**
The Windows and the Controller on the real-time OS can exchange data while each makes an independent operation. Through the shared folder on the Windows, you can get data from and write data into the Controller. Also, you can shut down or restart the Windows from the Controller.

1-3 ID Information Label

The ID information label contains relevant information about the IPC Machine Controller. The following example will be different from your product label.



| Item | Name | Description |
|------|------------------------------|--|
| A | Product name | IPC Machine Controller |
| B | Model *1 | Model and configuration details |
| C | Power rating | Power rating details |
| D | Custom ID (Optional) | A custom ID [NYC□□□-□□□□□□□□] Only for Industrial Monitors and Industrial Panel PCs with a custom logo *1. |
| E | Standards and QR code | The applicable standards and a QR code for OMRON internal use |
| F | Unit Ver. | Unit version of the Machine Controller Software |
| G | LOT number and serial number | Production details, consisting of: <ul style="list-style-type: none"> The lot number of the IPC Machine Controller in the format DDMYY□. DDMYY with Month number 1 to 9 for January to September, X for October, Y for November, and Z for December. □: For use by OMRON Serial number (4 digits) |
| H | MAC ADDRESS *2 | <ul style="list-style-type: none"> PORT 1: the MAC address of Ethernet port 1 PORT 2: the MAC address of Ethernet port 2 PORT 3: the MAC address of Ethernet port 3 |

*1. Refer to 1-4 Product Configuration on page 1-6 for model details.

*2. Refer to 4-2-4 Ethernet Connector Specifications on page 4-14 for Ethernet specifications.



Additional Information

Refer to 3-1-2 Back of the Industrial Box PC on page 3-6 for the ID Information label location.

1-3-1 Label with Controller License (Optional)

This license label contains the license key for the Industrial PC with Programmable Multi Axis Controller.

IPC Programmable Multi Axis Controller license number
□□□□ □□□□ □□□□ □□□□ □□□□ □□□□

1-4 Product Configuration

This section provides an overview of the product configurations available for the IPC Machine Controller.

The product configuration is visible in the model-type that is mentioned on the ID information label of the product.

The structure of the model-type is: NY□□□-□□□□-□□□□□□□□□□.

Each item in the model-type has a specific meaning.

N Y □ □ □ - □ □ □ □ - □ □ □ □ □ □ □ □ □ □
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

| Item | Description | Option / Description |
|------|-------------------------------------|--|
| 1 | Series name | NY: NY-series Industrial PC Platform |
| 2 | Controller specifications | 5: "5" series: Large scale, high speed and high precision control application for up to 64 axes. |
| 3 | Model type | 1: Industrial Box PC 3: Industrial Panel PC |
| 4 | Sequential number | 2 or more |
| 5 | Function module | 1: Standard |
| 6 | Number of axes for motion control | 3: 16 axes 4: 32 axes 5: 64 axes |
| 7 | Additional Function Software Module | 0: --- |
| 8 | Reserved | 0: --- |
| 9 | Expansion slots | 1: 1 PCIe slot |
| 10 | Frame type | 1: Aluminum frame, black, Projected Capacitive Touch type X: No display (Industrial Box PC) |
| 11 | Display size | 1: 12.1 inch model 2: 15.4 inch model X: No display (Industrial Box PC) |
| 12 | Operating system | 1: Windows Embedded Standard 7 - 32 bit 2: Windows Embedded Standard 7 - 64 bit |
| 13 | Processor | 1: Intel® Core™ i7-4700EQ Processor 4th generation CPU with Fan Unit for active cooling |
| 14 | Main memory | 3: 8 GB Non-ECC |
| 15 | Storage | 8: 32 GB, SSD SLC 9: 64 GB, SSD SLC C: 320 GB, HDD K: 128 GB, SSD iMLC |
| 16 | Optional interface | 1: RS-232C 2: DVI-D 6: NY Monitor Link |
| 17 | Logo | 0: OMRON 2: Customization X: No display (Industrial Box PC) |

1-5 Overall Operating Procedure

This section gives the overall operating procedure of the IPC Machine Controller.

| Step 1. Design the Factory Automation Software | |
|--|---|
| Design the overall system configuration, machine control programs and Windows applications interacting with the Machine Controller Software. | |
| Description | Reference |
| Step 1-1 Design the machine control programs | <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)</i> |
| Step 1-2 Specify variables and data to be exchanged between the Machine Controller Software and Windows applications | <ul style="list-style-type: none"> • <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)</i> • <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)</i> |
| Step 1-3 Design the Windows applications interacting with the Machine Controller Software | <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)</i> |



| Step 2. Setup the Machine Controller Software | |
|---|--|
| Create the system configurations that you designed in step 1-1 and 1-2 and assign the variables. Create the tasks and programs, and debug them, e.g., with simulations. | |
| Description | Reference |
| Step 2-1 Slave and Unit Configurations | • <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)</i> |
| Step 2-2 Controller Setup | |
| Step 2-3 Programming | • <i>Sysmac Studio Version 1 Operation Manual (Cat. No. W504)</i> |
| Step 2-4 Offline Debugging | |



| Step 3. Setup the Windows Applications | |
|---|---|
| Create the Windows applications that you designed in step 1-2 and 1-3 using the NY-Compolet API and the Industrial PC System API. | <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)</i> |



| Step 4. Install the Box PC | | |
|--|--|--|
| Mount the Box PC and implement it in the automation environment. | | |
| Description | Reference | |
| Step 4-1 Install options | 5-2 <i>Install Options</i> on page 5-5 | |
| Step 4-2 Mount | 5-3 <i>Mount</i> on page 5-14 | |
| Step 4-3 Wire | 5-4 <i>Wire</i> on page 5-26 | |
| Step 4-4 Connect | 5-5 <i>Connect</i> on page 5-40 | |



| Step 5. Configure the Software | | |
|---|---|--|
| Configure Windows, install applications and download the machine control project. | | |
| Description | Reference | |
| Step 5-1 First time startup and configure Windows | <ul style="list-style-type: none"> 5-6 <i>Initial Power ON</i> on page 5-48 <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)</i> | |
| Step 5-2 Configure shared folders | <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)</i> | |
| Step 5-3 Install Windows applications | | |
| Step 5-4 Download the machine control project | <ul style="list-style-type: none"> <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)</i> <i>Sysmac Studio Version 1 Operation Manual (Cat. No. W504)</i> | |



| Step 6. Check and then Start Actual Operation | | |
|---|--|--|
| Configure Windows, install applications and download the machine control project. | | |
| Description | Reference | |
| Step 6-1 Check the machine control operation | <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)</i> | |
| Step 6-2 Check the operation of the Windows applications | <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)</i> | |
| Step 6-3 Create a system backup | | |
| Step 6-4 Start actual operation | <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual (Cat. No. W558)</i> | |

2

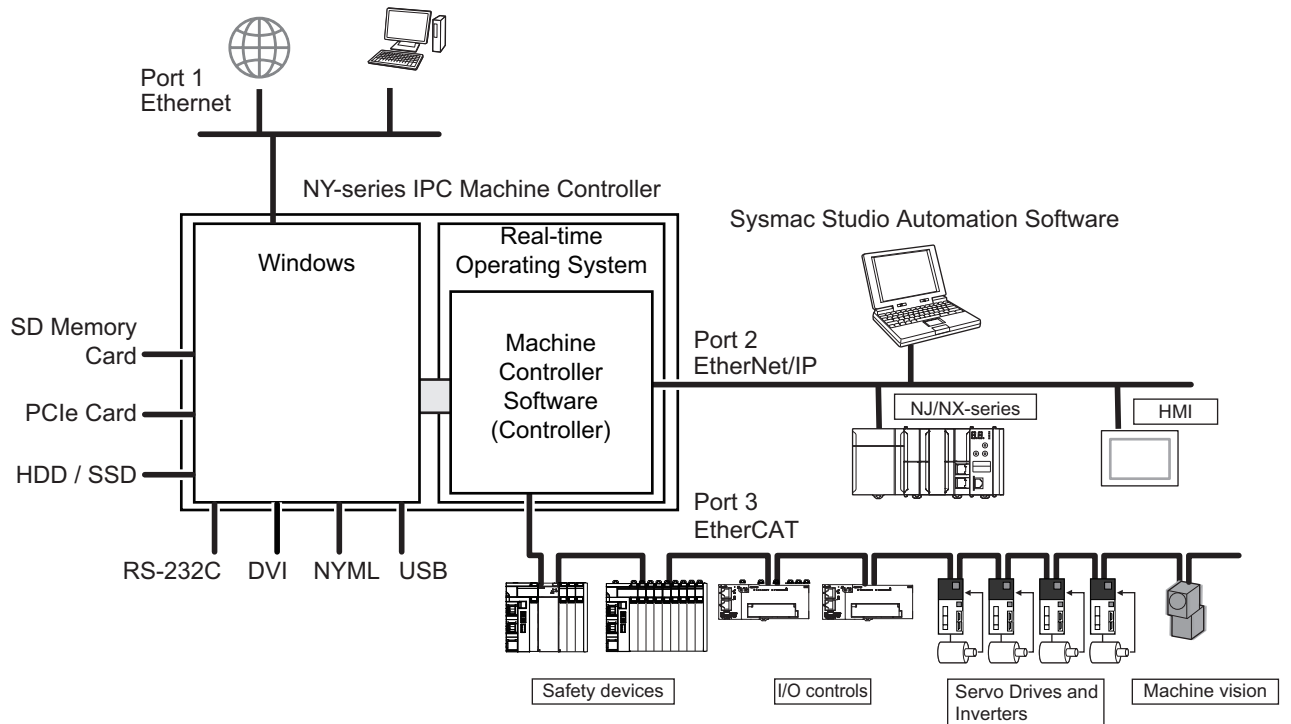
System Configurations

This section provides an overview of the system configurations for the IPC Machine Controller.

| | | |
|------------|---|------------|
| 2-1 | Basic Configurations | 2-2 |
| 2-2 | EtherCAT Network Configuration | 2-3 |
| 2-2-1 | Related EtherCAT Hardware | 2-4 |
| 2-3 | EtherNet/IP Network Configuration | 2-5 |
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| 2-4 | Connection with the Sysmac Studio | 2-7 |
| 2-4-1 | Configurations That Allow Online Connections | 2-7 |
| 2-4-2 | Configurations That Do Not Allow Online Connections | 2-8 |

2-1 Basic Configurations

The IPC Machine Controller supports the following system configurations.



The Windows operating system has all interfaces an Industrial PC requires:

- 1 Ethernet port to connect with regular Ethernet networks and to be able to connect with databases, MES- and ERP systems and other IIoT applications
- 4 USB ports to connect peripheral device
- 1 or 2 DVI ports to connect one or two monitors
- 1 optional RS-232 port to connect (legacy) peripheral devices and factory automation devices
- 1 optional NYML port to connect an Omron Industrial Monitor using a single cable
- 2 bays for HDD and/or SSD storage devices
- 1 SD Memory Card slot for removable storage
- 1 PCIe Card Slot to add support for other (industrial) networks or peripheral ports

The Machine Controller Software has 2 Ethernet ports assigned.

- 1 EtherCAT port for (real-time) communication with EtherCAT Slaves, like I/O controls, servo drives and safety devices.
- 1 EtherNet/IP port for machine-to-machine (M2M) communication, communication to other Controllers and HMI's. The EtherNet/IP port is also used to connect with the Box PC with the Sysmac Studio to configure, program and monitor the Machine Controller Software and connected EtherCAT Slaves.

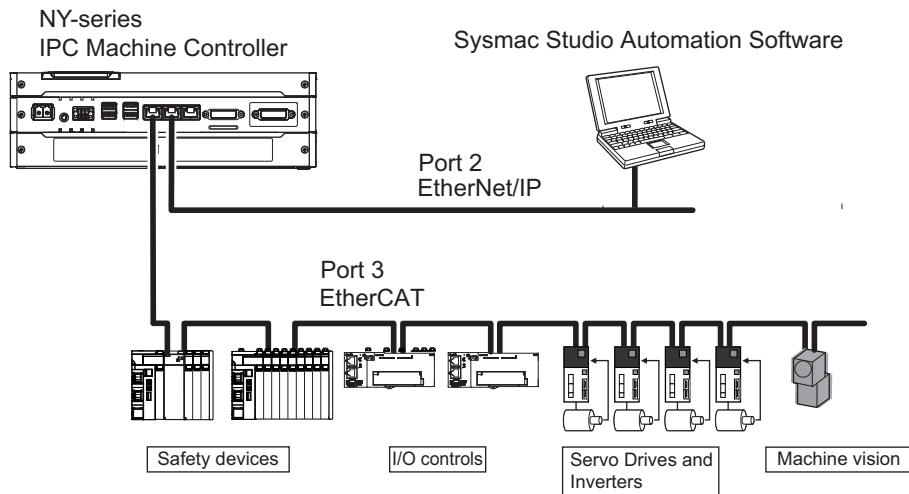


Additional Information

- The SD Memory Card slot and the USB ports are not available for the Machine Controller Software.
- Refer to *2-2 EtherCAT Network Configuration* on page 2-3 for EtherCAT details.
- Refer to *2-3 EtherNet/IP Network Configuration* on page 2-5 for EtherNet/IP details.

2-2 EtherCAT Network Configuration

The EtherCAT network configuration consists of an IPC Machine Controller and the EtherCAT Slaves. You use the built-in EtherCAT master port on the Box PC to connect EtherCAT Slaves.



Additional Information

Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT Port User's Manual (Cat. No. W562)* for EtherCAT network configuration details.

2-2-1 Related EtherCAT Hardware

IPC Machine Controller

The Machine Controller Software located on the Box PC is the central controller for machine automation. It executes tasks, refreshes I/O for other Units and is the EtherCAT master for all connected EtherCAT slaves.

Ethernet port 3 on the Box PC is the built-in EtherCAT port.



Additional Information

- Refer to *Relevant Manuals* on page 2 for EtherCAT related manuals.
- Refer to *EtherCAT Connector Specifications* on page 4-17 for port specifications.

EtherCAT Slaves

A device that exchanges data with the EtherCAT master built into Machine Controller Software through the EtherCAT network. The device provides non-synced EtherCAT Slaves and synced EtherCAT Slaves.



Additional Information

Refer to the specific EtherCAT Slave manuals for details.

EtherCAT Cables

Use the recommended EtherCAT cables to connect the Box PC to the EtherCAT system.

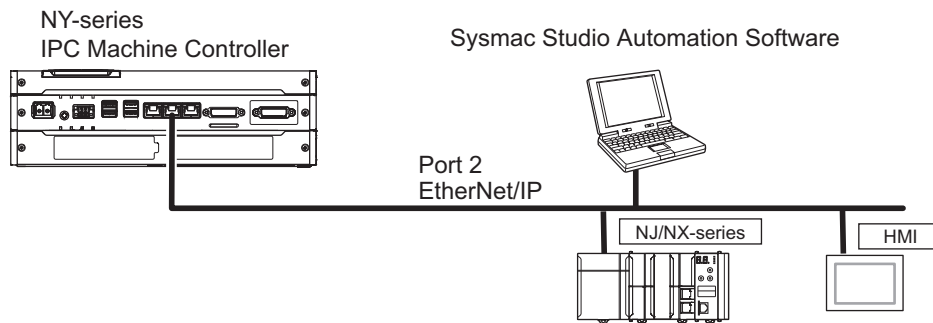


Additional Information

Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT Port User's Manual (Cat. No. W562)* for details.

2-3 EtherNet/IP Network Configuration

The EtherNet/IP network configuration consists of an IPC Machine Controller and the EtherNet/IP Devices. You use the built-in EtherNet/IP port on the Box PC to connect EtherNet/IP Devices.



Additional Information

Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherNet/IP Port User's Manual (Cat. No. W563)* for EtherNet/IP network configuration details.

2-3-1 Related EtherNet/IP Hardware

IPC Machine Controller

The Machine Controller Software located on the Box PC is the central controller for machine automation.

Ethernet port 2 on the Box PC is the built-in EtherNet/IP port.



Additional Information

- Refer to *Relevant Manuals* on page 2 for EtherNet/IP related manuals.
- Refer to *EtherNet/IP Connector Specifications* on page 4-16 for port specifications.

EtherNet/IP Devices

A device that exchanges data with the Machine Controller Software through the EtherNet/IP network.



Additional Information

Refer to the specific EtherNet/IP Device manuals for details.

EtherNet/IP Cables

Use the recommended EtherNet/IP cables to connect the Box PC to the EtherNet/IP system.



Additional Information

Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherNet/IP Port User's Manual (Cat. No. W563)* for details.

2-4 Connection with the Sysmac Studio

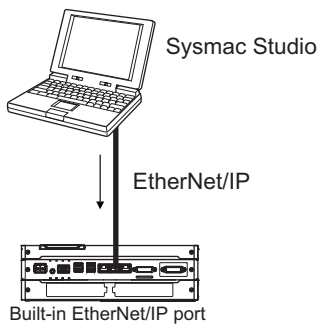
This section describes the configurations to connect the Sysmac Studio to an IPC Machine Controller.

2-4-1 Configurations That Allow Online Connections

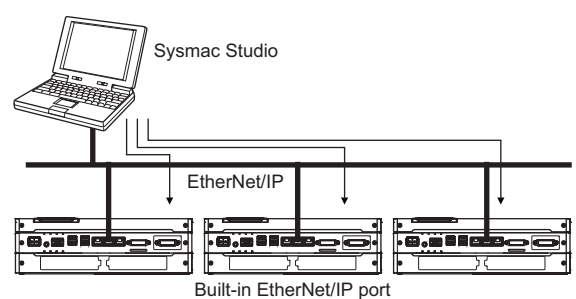
You can connect online from the Sysmac Studio to the built-in EtherNet/IP port of the NY-series Box PC.

Connect with EtherNet/IP

1:1 Connection



1:N Connections

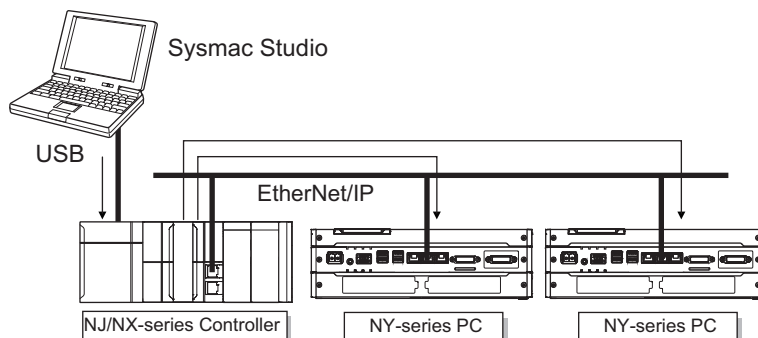


- A direct connection is made from the computer that runs Sysmac Studio. You do not need to specify the IP address or connection device.
- You can make the connection either with or without an Ethernet switch.
- You can use either a cross cable or a straight cable.
- Specify the IP address of the remote node from the Sysmac Studio.
- You can use either a cross cable or a straight cable.

Connect to EtherNet/IP through USB

You can connect to the NY-series built-in EtherNet/IP port through a USB port of an NJ/NX-series Controller.

Connect a computer and the NJ/NX-series CPU Unit with a USB 2.0 certified cable. Do not use a USB hub to connect them.





Additional Information

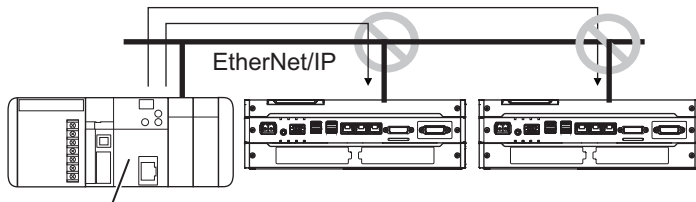
It is not possible to use a USB port of the Box PC to connect the Sysmac Studio with the Machine Controller Software.

2-4-2 Configurations That Do Not Allow Online Connections

This section gives information on configurations that do not provide a connection to the Sysmac Studio.

Routing through CS/CJ-series EtherNet/IP Units/Ports

You cannot connect to an NY-series Box PC by routing through a CS/CJ-series Ethernet/IP Unit or port (CS1W-EIP2, CJ1W-EIP21, CJ2 CPU Unit built-in EtherNet/IP port, or CJ2M CPU Unit built-in EtherNet/IP port).



CJ2 CPU Unit built-in EtherNet/IP port or EtherNet/IP Units

3

Hardware Overview

This section provides an overview of the hardware of the IPC Machine Controller.

| | | |
|------------|--|-------------|
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| 3-9-8 | Industrial Monitor | 3-25 |
| 3-9-9 | Power Supply..... | 3-25 |
| 3-9-10 | UPS | 3-26 |

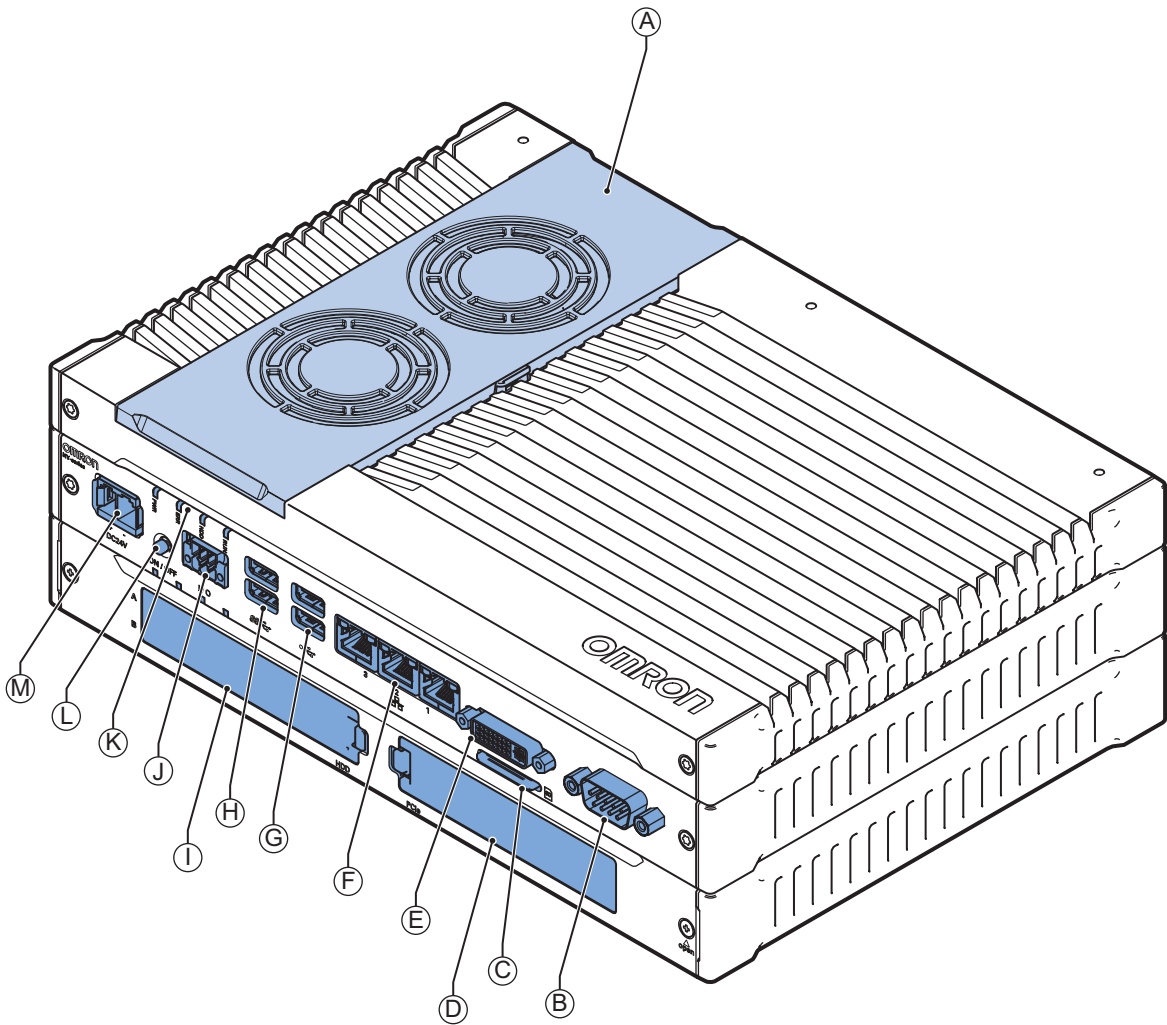
3-9-11 UPS Communication Cable 3-26

3-1 Component Names and Functions

This section shows views of the IPC Machine Controller with information about all items.

3-1-1 Front and Top of the Industrial Box PC

This section shows the component names and functions for the front and top of the Box PC.



| Item | Name | Description |
|------|-------|--|
| A | Cover | Provides access to: <ul style="list-style-type: none"> The battery The fans (only for Box PCs that have active cooling) The battery replacement date The license key for the operating system (optional) |

| Item | Name | Description |
|------|--|---|
| B | Option port | Interface connection options for peripheral devices or an additional monitor: <ul style="list-style-type: none"> • RS-232C connector or <ul style="list-style-type: none"> • DVI-D connector or <ul style="list-style-type: none"> • NYML connector |
| C | SD Memory Card slot | SD Memory Card slot |
| D | PCIe bay | PCI Express mounting slot |
| E | DVI connector | Digital Visual Interface connector |
| F | 10BASE-T/100BASE-TX/1000BASE-T Ethernet connectors | 3 RJ45 Gb Ethernet interface connectors |
| G | USB 2.0 connectors | 2 USB 2.0 interface connectors |
| H | USB 3.0 connectors | 2 USB 3.0 interface connectors |
| I | Drive bays ^{*1} | Two 2.5 inch drive bays for HDD/SSD storage devices: <ul style="list-style-type: none"> • Drive bay A = Bay for an optional drive ^{*2} for the operating system and main storage Drive bay A is the bay at the side of the connectors • Drive bay B = Bay for an optional drive ^{*2} for additional storage Drive bay B is the bay at the outside of the Box PC |
| J | I/O connector | 2 inputs (Power ON/OFF Input and UPS Mode Input) and 1 output (Power Status Output) |
| K | LED indicators | Visual indicators for the operating state of the IPC Machine Controller |
| L | Power button | Pushbutton to manually power ON/OFF the Box PC |
| M | Power connector | Lockable power connector |

*1. Depending on the model one or two drives are supported.
Refer to *4-1-4 CPU Specifications* on page 4-4 for the number of supported drives.

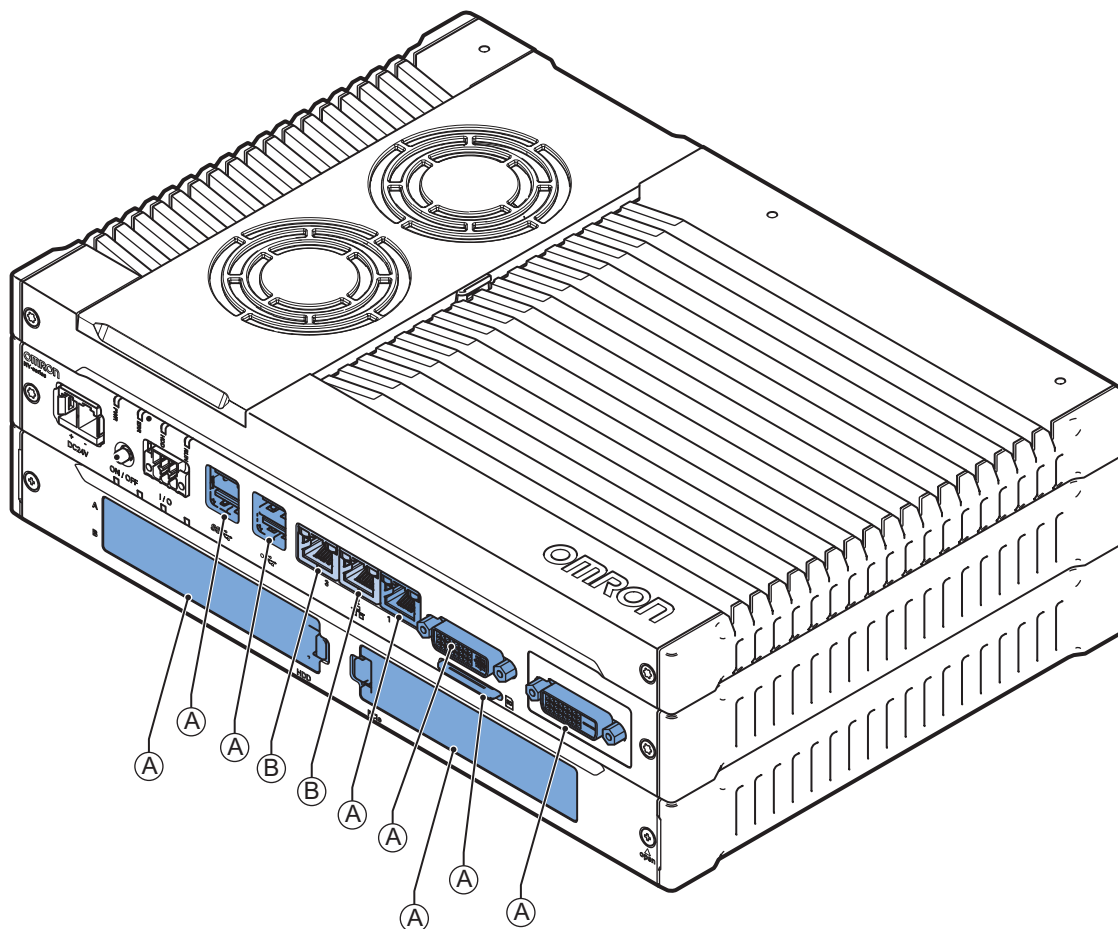
*2. Installed storage and the operating system are depending on the configuration.

Refer to *1-4 Product Configuration* on page 1-6 for:

- installed drive (storage) details
- operating system details

Ports for Windows and Ports for the Controller

The ports for Windows and the ports for the Machine Controller Software.



| Item | Name | Description |
|------|-----------------------------|---|
| A | Windows Operating System | Ports for the Windows Operating System. These ports do not give access to the Machine Controller Software. |
| B | Machine Controller Software | Ethernet ports ^{*1} for the Machine Controller Software. These connectors do not give access to the Windows Operating System. |

*1. Refer to 4-2-4 *Ethernet Connector Specifications* on page 4-14 for Ethernet specifications.

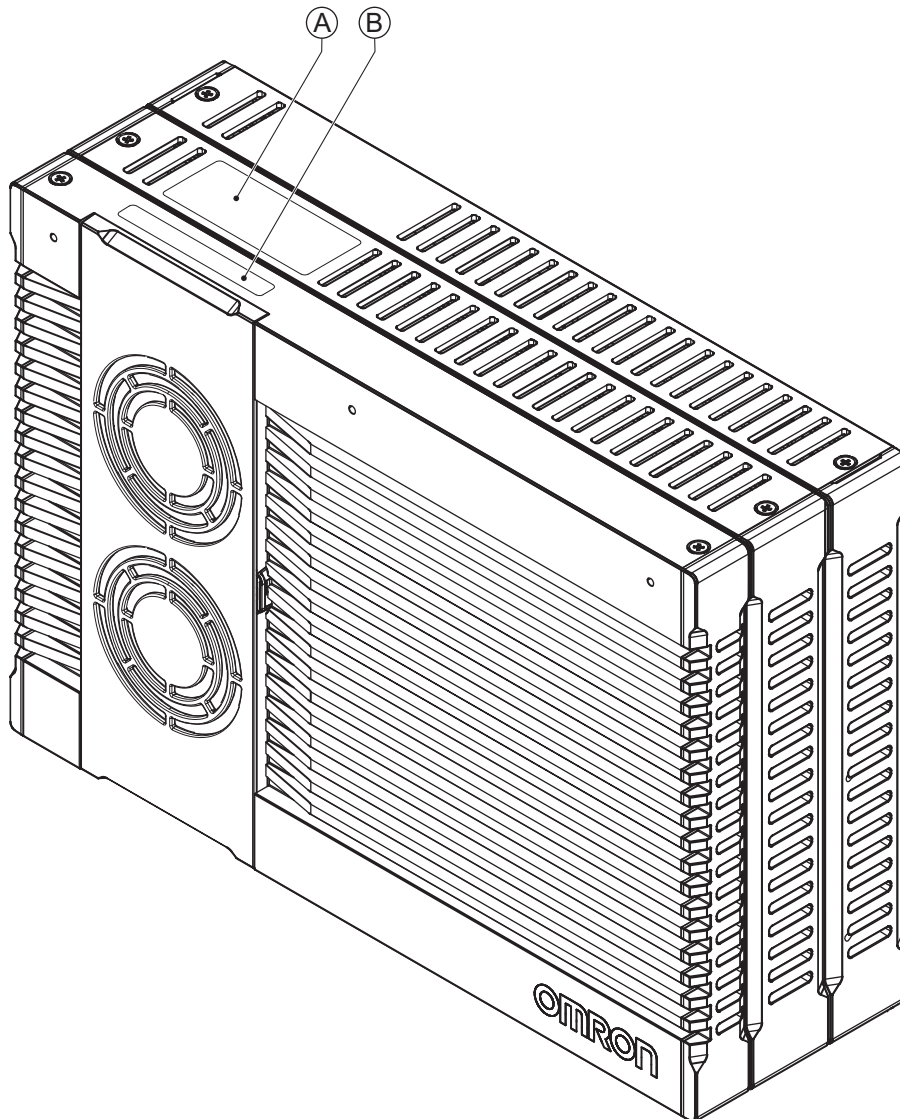


Additional Information

The ports for Windows include the SD Memory Card slot and the USB connectors. These are not accessible for the Machine Controller Software.

3-1-2 Back of the Industrial Box PC

This section shows the component names and functions for the back of the Industrial Box PC.



| Item | Name | Description |
|------|----------------------|---|
| A | ID information label | Label containing Model ID., LOT No. and other product specific information. *1 |
| B | License label | Optional label containing the license number. Only available on Industrial PC with Programmable Multi Axis Controller models. *1 *2 |

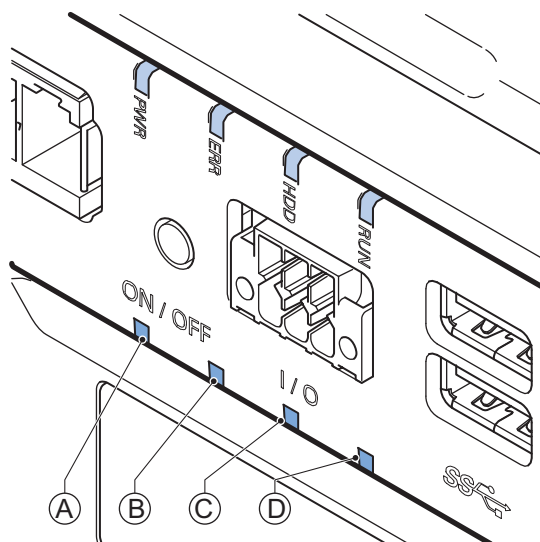
*1. Refer to 1-3 *ID Information Label* on page 1-5 for label details.

*2. Refer to 1-4 *Product Configuration* on page 1-6 for configuration details.

3-2 LED Indicators

The Industrial Box PC has two rows of four LED indicators that show the operating status of the Box PC. Both rows have the same function.

The following LED indicators are available:



| Item | LED Indicator | Name | Description |
|------|---------------|-----------------|---|
| A | PWR | Power | Indicates the operating mode of the Box PC. |
| B | ERR | Error | Indicates the presence and type of an error. |
| C | HDD | Hard Disk Drive | Indicates HDD/SSD activity. |
| D | RUN | Run | Indicates the Machine Controller Software status. |




3-2-1 PWR LED Indicator

The Power LED (PWR) indicates the operating mode of the Box PC.

| Color | Status | | Meaning |
|-------|--------|----------|---|
| Green | | Not lit | There is no power supplied or the Box PC is OFF. |
| | | Blinking | Power is currently supplied and the Box PC is in stand-by mode. |
| | | Lit | Power is currently supplied and the Box PC is turned ON. |

3-2-2 ERR LED Indicator

The Error LED (ERR) indicates the presence and type of an error within your IPC Machine Controller.

| Color | Status | | Meaning |
|-------|---|----------|---|
| Red |  | Not lit | <ul style="list-style-type: none"> The 24 VDC power is not supplied No error is present |
| |  | Blinking | <ul style="list-style-type: none"> Fan Error Battery low |
| |  | Lit | <ul style="list-style-type: none"> Thermal shutdown Watchdog Error Power Supply Undervoltage Error Power Supply Overvoltage Error Power supply defective Machine Controller Error |




Additional Information

Refer to the *NY-series Troubleshooting Manual (Cat. No. W564)* for error details.




3-2-3 HDD LED Indicator

The Hard Disk Drive LED (HDD) indicates activity of the HDD or SSD.

| Color | Status | | Meaning |
|--------|---|------------|---------------------------|
| Yellow |  | Flickering | The HDD or SSD is active. |

3-2-4 RUN LED Indicator

The RUN LED indicates the status of the Machine Controller Software.

| Color | Status | | Meaning |
|-------|---|----------|---|
| Green |  | Not lit | Machine Controller Software is not active. Operation is stopped in PROGRAM mode when a Machine Controller Software reset is in progress, or when any of the following errors occurs. <ul style="list-style-type: none"> Controller error in the major fault level CPU error (WDT error) |
| |  | Blinking | Machine Controller Software is initializing. |
| |  | Lit | Machine Controller Software active and in RUN mode. |

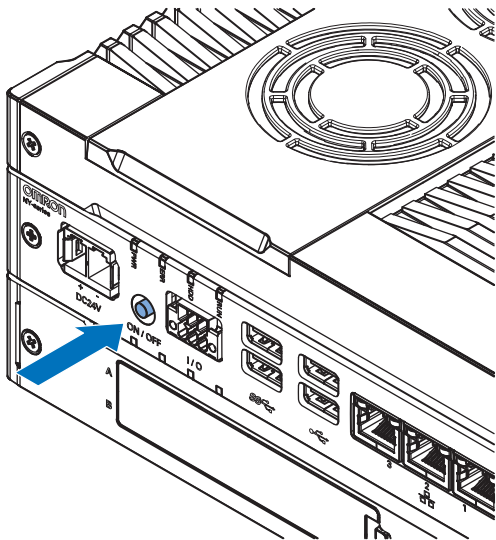


Additional Information

Refer to the *NY-series Troubleshooting Manual (Cat. No. W564)* for error details.

3-3 Power Button

The power button is used to manually switch the Box PC ON and OFF.

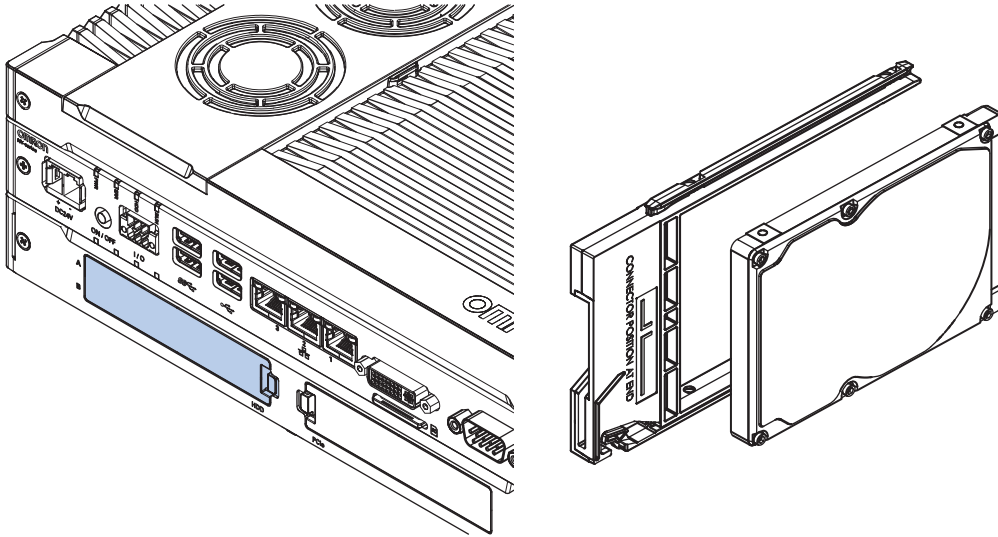


Additional Information

- Refer to 6-1 *Power ON* on page 6-2 for ON details.
- Refer to 6-2 *Power OFF* on page 6-4 for OFF details.

3-4 Drive Bays

The drive bays in the IPC Machine Controller accept 2.5 inch Hard Disk Drives (HDD) or Solid State Drives (SSD). Depending on the model one or two drives are supported.



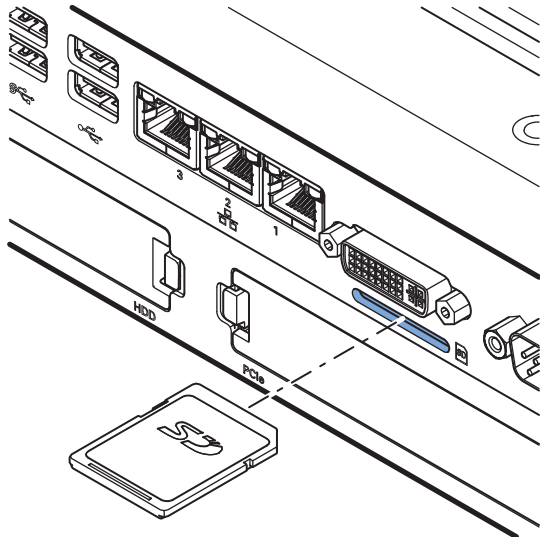
Additional Information

- Refer to 4-1-4 *CPU Specifications* on page 4-4 for the number of supported drives.
 - Refer to 4-1-6 *Storage Device Specifications* on page 4-5 for storage device specifications.
 - Refer to 5-2-1 *Install a Drive* on page 5-5 for install information.
 - Refer to 7-2-4 *Replace a Drive* on page 7-9 for maintenance information.
-

3-5 SD Memory Card Slot

The SD Memory Card slot on the IPC Machine Controller accepts SD Memory Cards with the following specifications.

- SDHC type (SD 2.0 specification)
- Up to 32 GB capacity



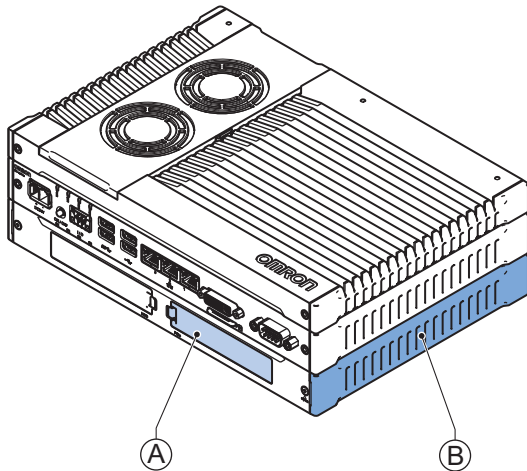
Additional Information

Refer to 3-9-2 *SD Memory Cards* on page 3-20 for SD Memory Card details.

3-6 PCIe Card Slot

The PCI Express (PCIe) Card slot of the IPC Machine Controller accepts various PCIe Cards for specific hardware needs.

The PCIe Card connectors are available behind the cover (A) and the PCIe Card is mounted in the PCIe drawer (B).



Additional Information

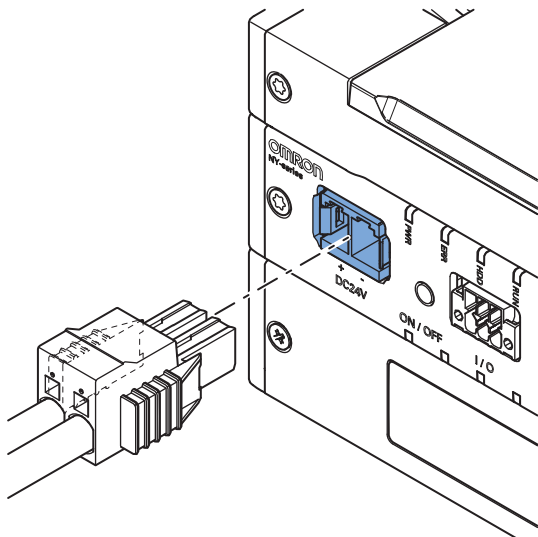
- Refer to *4-1-7 PCIe Card Specifications* on page 4-6 for specifications.
- Refer to *5-2-2 Install the PCIe Card* on page 5-9 for install information.
- Refer to *7-2-5 Replace the PCIe Card* on page 7-14 for maintenance information.

3-7 Connectors

This section gives an overview of the available connectors for the IPC Machine Controller.

3-7-1 Power Connector

The power connector on the Box PC is used to supply 24 VDC power to the Box PC. The power connector is supplied with the Box PC.



Additional Information

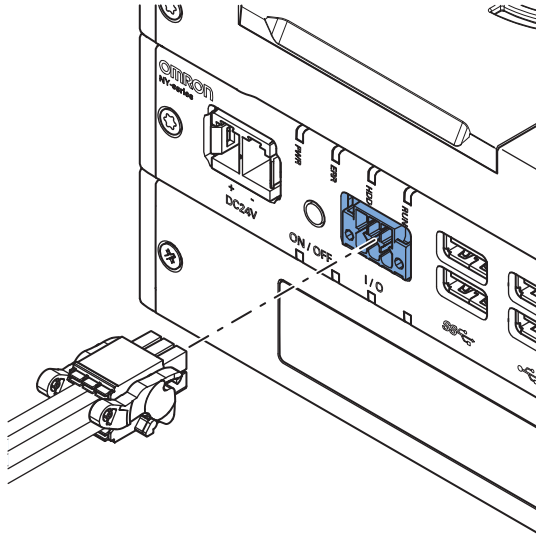
- Refer to *4-2-1 Power Connector Specifications* on page 4-8 for specifications.
- Refer to *5-4-3 Wire the Power Connector* on page 5-34 for wiring details.
- Refer to *5-5 Connect* on page 5-40 for connection details.

3-7-2 I/O Connector

The I/O connector on the IPC Machine Controller provides discrete signals with the following functions.

- Input signal to the Box PC when a connected UPS switches to battery power.
- Input signal to the Box PC to perform a shutdown or power ON when the signal turns ON.
- Output signal from the Box PC to indicate the power status of the Box PC.

The I/O connector is supplied with the Box PC.



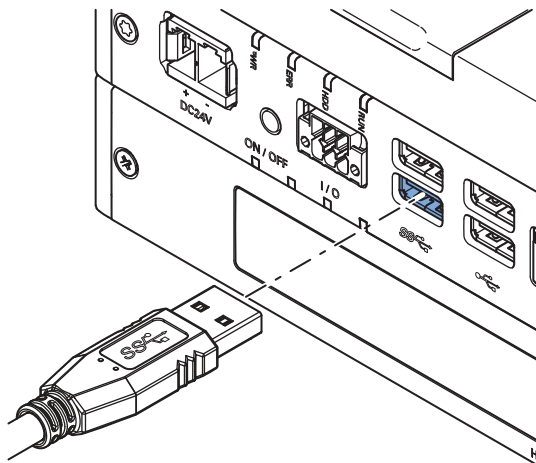
Additional Information

- Refer to 4-2-2 *I/O Connector Specifications* on page 4-9 for specifications.
- Refer to 5-4-4 *Wire the I/O Connector* on page 5-37 for wiring details.
- Refer to 5-5 *Connect* on page 5-40 for connection details.

3-7-3 USB Connectors

The USB connectors support USB 2.0 and USB 3.0 specifications.

All USB interfaces are protected against overcurrent and all ports support Wake-on-USB.

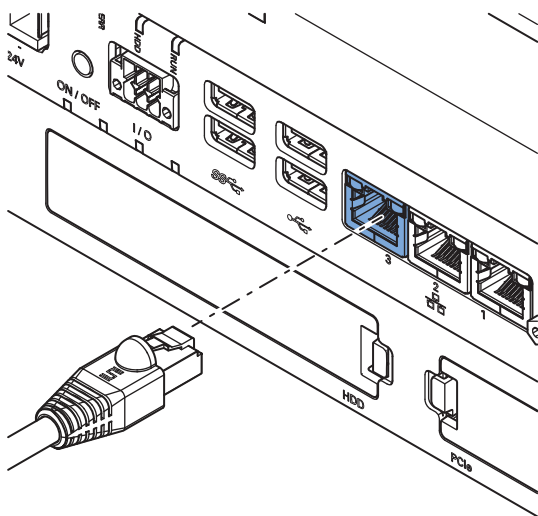


Additional Information

- Refer to 4-2-3 *USB Connector Specifications* on page 4-13 for specifications.
- Refer to 5-5 *Connect* on page 5-40 for connection details.

3-7-4 Ethernet Connectors

The Ethernet connectors provide 3 individual Ethernet ports on the IPC Machine Controller. Each port offers 10BASE-T/100BASE-TX/1000BASE-T Ethernet speeds.

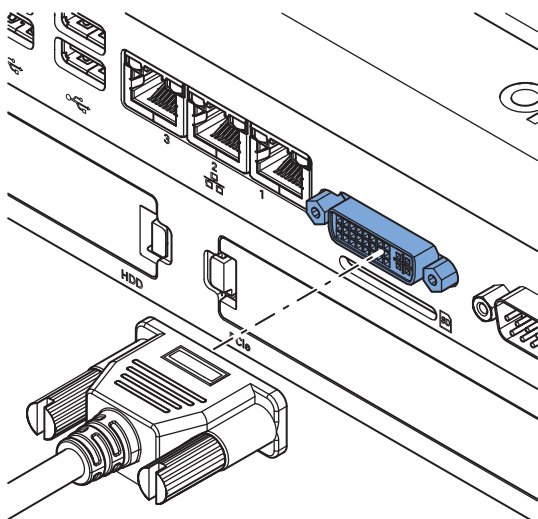


Additional Information

- Refer to 4-2-4 *Ethernet Connector Specifications* on page 4-14 for specifications.
- Refer to 5-5 *Connect* on page 5-40 for connection details.

3-7-5 DVI Connector

The DVI interfaces supported on this connector are dependent on the configuration of the IPC Machine Controller.

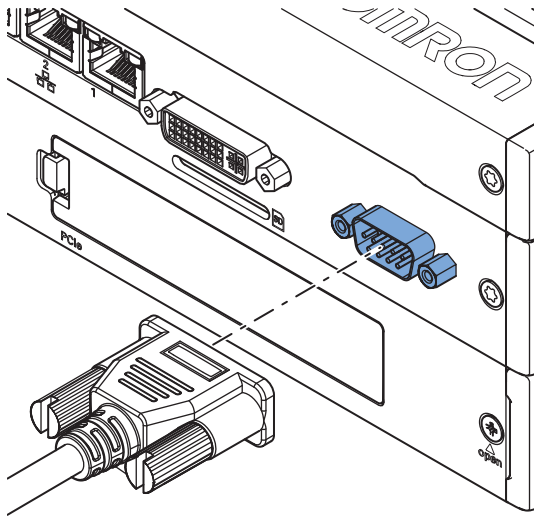


Additional Information

- Refer to 1-4 *Product Configuration* on page 1-6 for configuration details.
- Refer to 4-2-5 *DVI Connector Specifications* on page 4-18 for specifications.
- Refer to 5-5 *Connect* on page 5-40 for connection details.

3-7-6 RS-232C Connector (Optional)

Depending on the product configuration an optional RS-232C connector is available.

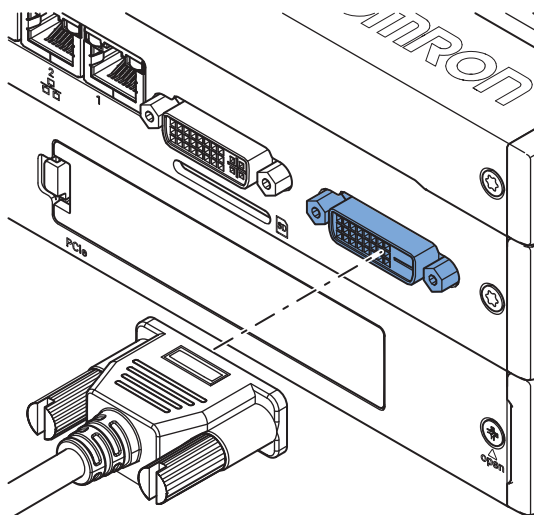


Additional Information

- Refer to *1-4 Product Configuration* on page 1-6 for configuration details.
- Refer to *4-2-7 RS-232C Connector Specifications* on page 4-20 for specifications.
- Refer to *5-5 Connect* on page 5-40 for connection details.

3-7-7 DVI-D Connector (Optional)

Depending on the product configuration an optional DVI-D connector is available. This interface only supports digital video signals.



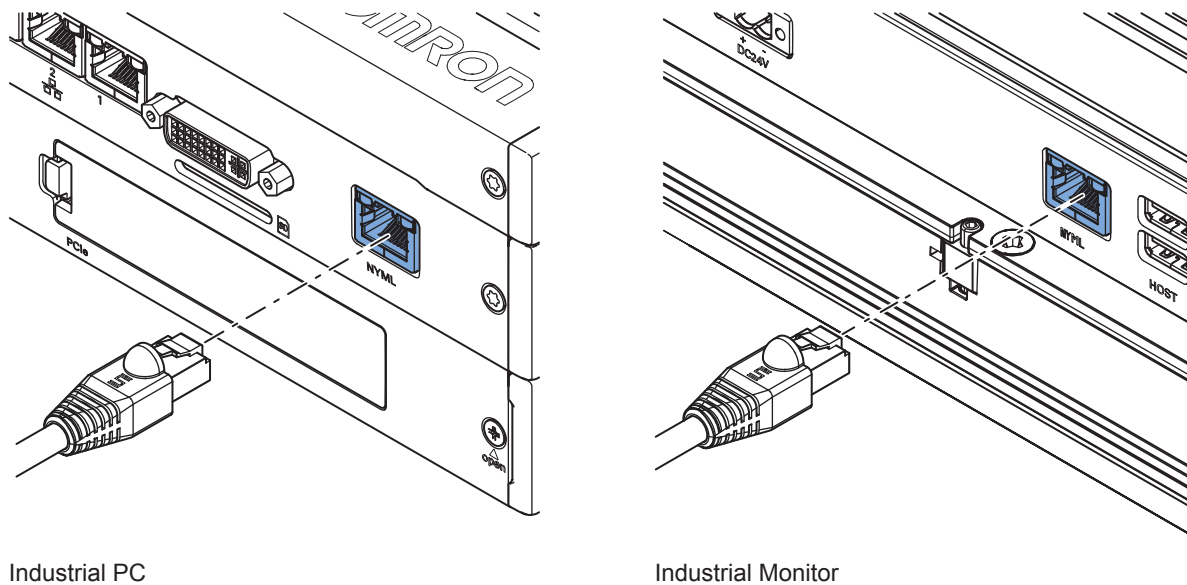
Additional Information

- Refer to *1-4 Product Configuration* on page 1-6 for configuration details.
- Refer to *4-2-6 DVI-D Connector Specifications* on page 4-19 for specifications.
- Refer to *5-5 Connect* on page 5-40 for connection details.

3-7-8 NY Monitor Link Connector (Optional)

Depending on the product configuration this NY Monitor Link connector is available.

The NY Monitor Link interface connector connects an OMRON Industrial PC to the OMRON Industrial Monitor.



Industrial PC

Industrial Monitor



Additional Information

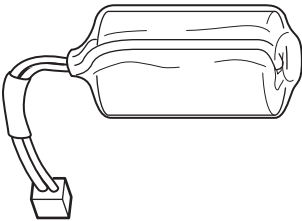
- Refer to *1-4 Product Configuration* on page 1-6 for configuration details.
- Refer to *4-2-8 NY Monitor Link Connector Specifications* on page 4-20 for specifications.
- Refer to *5-5 Connect* on page 5-40 for connection details.

3-8 Spare Parts

The following spare parts for the IPC Machine Controller are available.

3-8-1 Battery

One battery is supplied with the Box PC. The battery supplies power to the real-time clock. The battery is located inside the Box PC.

| Model | Appearance | Specifications |
|------------|---|-------------------------------|
| CJ1W-BAT01 |  | Service life: 5 years at 25°C |

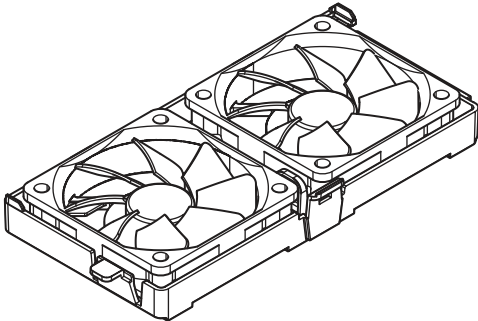


Additional Information

Refer to 7-2-3 *Replace the Battery* on page 7-7 for the replacement procedure.

3-8-2 Fan Unit

The Fan Unit is available for the Box PC that has active cooling.

| Model | Appearance | Specifications |
|------------|---|--|
| NY000-AF00 |  | <ul style="list-style-type: none"> • Service life: 70,000 hours of continuous operation at 40°C with 15% to 65% relative humidity • Shelf life: 6 months This is the storage limitation with no power supplied. We highly recommend performance testing if the Fan Unit has been stored over 6 months. |

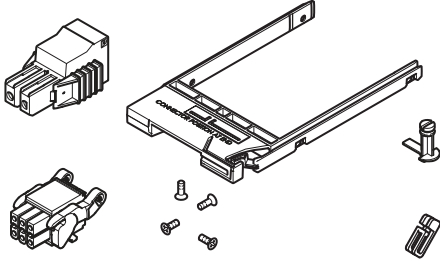


Additional Information

Refer to 7-2-2 *Replace the Fan Unit* on page 7-5 for the replacement procedure.

3-8-3 Accessory Kit

The accessory kit for the Box PC.


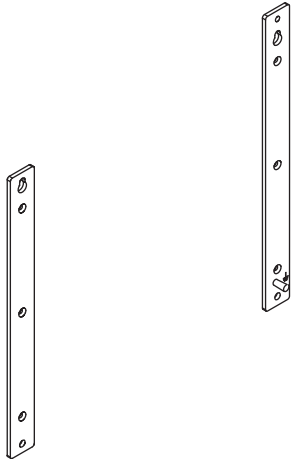
| Model | Appearance | Specifications |
|------------|---|---|
| NY000-AK00 |  | <p>Accessory Kit containing all accessories supplied with the Box PC.</p> <ul style="list-style-type: none"> • Power connector • I/O connector • Drive bracket for drive installation • 4 mounting screws for drive installation • PCIe Card support for PCIe Card installation • PCIe Card clip for PCIe Card installation |

3-9 Optional Hardware

The following optional hardware is available for the IPC Machine Controller.

3-9-1 Mounting Brackets


Mounting brackets details are provided below.

| Model | Appearance | Bracket type |
|------------|---|--------------|
| NY000-AB00 |  | Book mount |
| NY000-AB01 |  | Wall mount |

3-9-2 SD Memory Cards

SD Memory Card details are provided below.

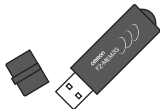
OMRON is not responsible for the operation, performance or write life of any other brand of SD Memory Card.

| Model | Appearance | Card type | Capacity | Format |
|-----------|---|-----------|----------|--------|
| HMC-SD291 |  | SD Card | 2 GB | FAT16 |
| HMC-SD491 | | SDHC Card | 4 GB | FAT32 |
| HMC-SD1A1 | | SDHC Card | 16 GB | FAT32 |

3-9-3 USB Flash Drives

USB Flash Drive details are provided below.

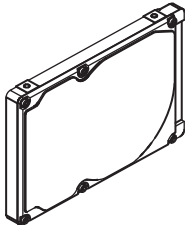
OMRON is not responsible for the operation, performance, or write life of any other brand of USB Flash Drives.

| Model | Appearance | Capacity |
|----------|---|----------|
| FZ-MEM2G |  | 2 GB |
| FZ-MEM8G | | 8 GB |

3-9-4 Storage Devices

Storage device details are provided below.

OMRON is not responsible for the operation, performance, or write life of any other storage device.

| Model | Appearance | Storage type | Capacity | Details |
|------------|--|--------------|----------|----------------------------|
| NY000-AH00 |  | HDD | 320 GB | Toshiba MQ01ABF032 |
| NY000-AH01 | | | 500 GB | Toshiba MQ01ABF050 |
| NY000-AS00 | | SSD | 32 GB | Apacer APS25AB7032G-AT |
| NY000-AS01 | | SLC | 64 GB | Apacer APS25AB7064G-AT |
| NY000-AS02 | | SSD iMLC | 128 GB | Apacer APS25H12128G-GTM1 |
| NY000-AS04 | | | | Innodisk DES25-A28M41BC1DC |



Additional Information

Refer to 4-1-6 *Storage Device Specifications* on page 4-5 for storage device specifications.

Storage Device Considerations

For a storage device that is not an OMRON NY000-A□□□ consider the following:

- OMRON is not responsible for the operation, performance or write life of any storage device other than those supplied by OMRON.
- Test and measure the environmental performance of the intended storage device before actual operation, using the SMART monitoring feature of the selected storage device.
- Ensure the temperature and vibrations of the storage device are within the operating temperature specifications and vibration specifications during actual operation.
- Using a storage device with maximum power consumption exceeding 2W is not advised. Ensure that the SMART monitor features of the storage device are used to detect overheating.




Additional Information

- Refer to 4-1-6 *Storage Device Specifications* on page 4-5 for storage device specifications.
- Refer to 4-3-1 *Operation Environment Specifications* on page 4-22 for environment specifications, specifically temperature and vibration specifications.

3-9-5 DVI Cables

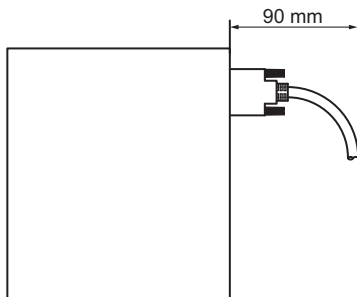
DVI cable details are provided below.

OMRON is not responsible for the operation or performance of any other brand of DVI cable.

| Model | Appearance | Cable length | Specifications |
|---------------|---|--------------|--|
| NY000-AC00 2M |  | 2 m | <ul style="list-style-type: none"> • Supports DVI-D • Minimum bend radius: 36 mm |
| NY000-AC00 5M | | 5 m | |

DVI Cable Clearance

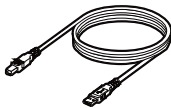
The DVI cable requires a minimum clearance of 90 mm from the connector entry to prevent excessive strain on the connector and cable assembly.



3-9-6 USB Type-A to USB Type-B Cables

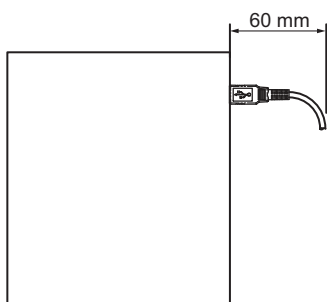
USB Type-A to USB Type-B cable details are provided below.

OMRON is not responsible for the operation or performance of any other brand of USB Type-A to USB Type-B cable.

| Model | Appearance | Cable length | Specifications |
|------------|---|--------------|---|
| FH-VUAB 2M |  | 2 m | <ul style="list-style-type: none"> • USB 2.0 • Minimum bend radius: 25 mm |
| FH-VUAB 5M | | 5 m | |

USB Type-A to USB Type-B Cable Clearance

The USB Type-A to USB Type-B cable requires a minimum clearance of 60 mm from the connector entry to prevent excessive strain on the connector and cable assembly.



3-9-7 NY Monitor Link Cables

The following table lists the recommended cables and connectors for the NY Monitor Link cable.

| Application | | Intra cabinet or light industrial environment | Inter cabinet | Inter cabinet and harsh industrial environment |
|---|------------------|---|----------------------------|--|
| Maximum length | | 25 m | 100 m | 100 m |
| Manufacturer | | Lapp | Lapp | Lapp |
| Cable type | | 2170196 | 2170614 | 2170466 |
| Category type | | Cat 6A | Cat 7 | Cat 6A |
| Cable sheath | | Halogen free | Halogen free | Halogen free |
| Conductor pairs/size/type | | 4 x 2 x AWG23/1 | 4 x 2 x AWG23/1 | 4 x 2 x AWG22/1 |
| Overall shielding | | Aluminum foil | Copper braid | Copper braid |
| Pair shielding | | Aluminum foil | Aluminum foil | Aluminum foil |
| Maximum outer diameter | | 7.6 mm | 7.7 mm | 9.0 mm |
| Maximum bending radius of cable in a fixed position | | 31 mm | 31 mm | 90 mm |
| Maximum temperature for a cable in a fixed position | | 60°C | 60°C | 80°C |
| RJ45 connectors | Manufacturer | Stewart Connector | Stewart Connector | Lapp |
| | Partnumber | SS39200-027 or SS39200-030 | SS39200-027 or SS39200-030 | 21700600 (T568A) or 21700601 (T568B) |
| | Connector length | 30 mm | 30 mm | 50 mm |



Additional Information

When making cables, connect the shield to the connectors at both ends.

NY Monitor Link Cable Clearance

The NY Monitor Link cable requires a minimum clearance from the connector entry to prevent excessive strain on the connector and cable assembly.

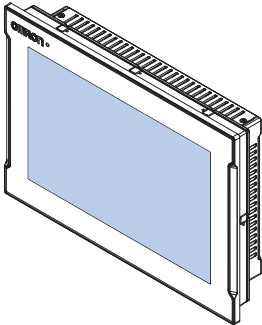
The minimum clearance consists of the sum of:

- Connector length
- Maximum bending radius of cable in a fixed position

3-9-8 Industrial Monitor

Details for the recommended monitor are provided below.

OMRON is not responsible for the operation or performance of any other monitor.

| Model | Appearance | Specifications |
|--|---|---|
| NYM15W-C100□ NYM15W-C106□ NYM12W-C100□ NYM12W-C106□ |  | <ul style="list-style-type: none"> • LCD touchscreen • Multi-touch functionality • Supply voltage: 24 VDC • Up to 1,280 x 800 pixels at 60 Hz • 2 USB Type-A Connectors • Programmable brightness control |



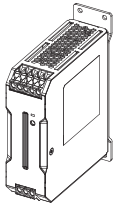
Additional Information

Refer to the OMRON website for specifications and manuals.

3-9-9 Power Supply

Details for the recommended power supply are provided below.

OMRON is not responsible for the operation or performance of any other power supply.

| Model | Appearance | Specifications |
|-------------|---|------------------------|
| S8VK-G□□□24 |  | Output voltage: 24 VDC |



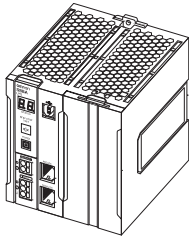
Additional Information

- Refer to *4-1-3 Power Consumption Specifications* on page 4-3 for power consumption details.
- Refer to [the OMRON website](#) for specifications and manuals of the S8VK-G. Note that the power consumption details of the Box PC determine the minimum power rating of your power supply.

3-9-10 UPS

Details for the recommended UPS are provided below.

OMRON is not responsible for the operation or performance of any other UPS.

| Model | Appearance | Specifications |
|--|---|---|
| S8BA with revision number 04 or higher. *1 |  | Output voltage during backup operation: 24 VDC±5% |

*1. The revision number of the UPS can be retrieved from the serial number label on the product and the product packaging.

A3□□□□□□□□□□□□
 1 2 3 4
 ↑

| Item | Description |
|------|--------------------------------------|
| 1 | Product code |
| 2 | Product period and sequential number |
| 3 | Revision number |
| 4 | RoHS status |



Precautions for Safe Use

Use an Omron S8BA UPS with the correct revision number to prevent improper system shutdown.



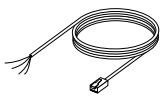
Additional Information

- Refer to 3-9-9 *Power Supply* on page 3-25 for power supply details.
- Refer to 4-1-3 *Power Consumption Specifications* on page 4-3 for power consumption details.
- Refer to [the OMRON website](#) for S8BA specifications or to the *UPS S8BA User's Manual (Cat. No. U702)* for the UPS manual.
Note that the power consumption details determine the output current/capacity of your UPS.

3-9-11 UPS Communication Cable

Communication cable details are provided below.

OMRON is not responsible for the operation or performance of any other brand of communication cable.

| Model | Appearance | Cable length | Specifications |
|----------|---|--------------|---|
| S8BW-C02 |  | 2 m | Signals for <ul style="list-style-type: none"> • Signal output (BL, TR, BU, WB) • Remote ON/OFF input • UPS Stop Signal input (BS) |

4

Specifications

This section provides specifications of the IPC Machine Controller.

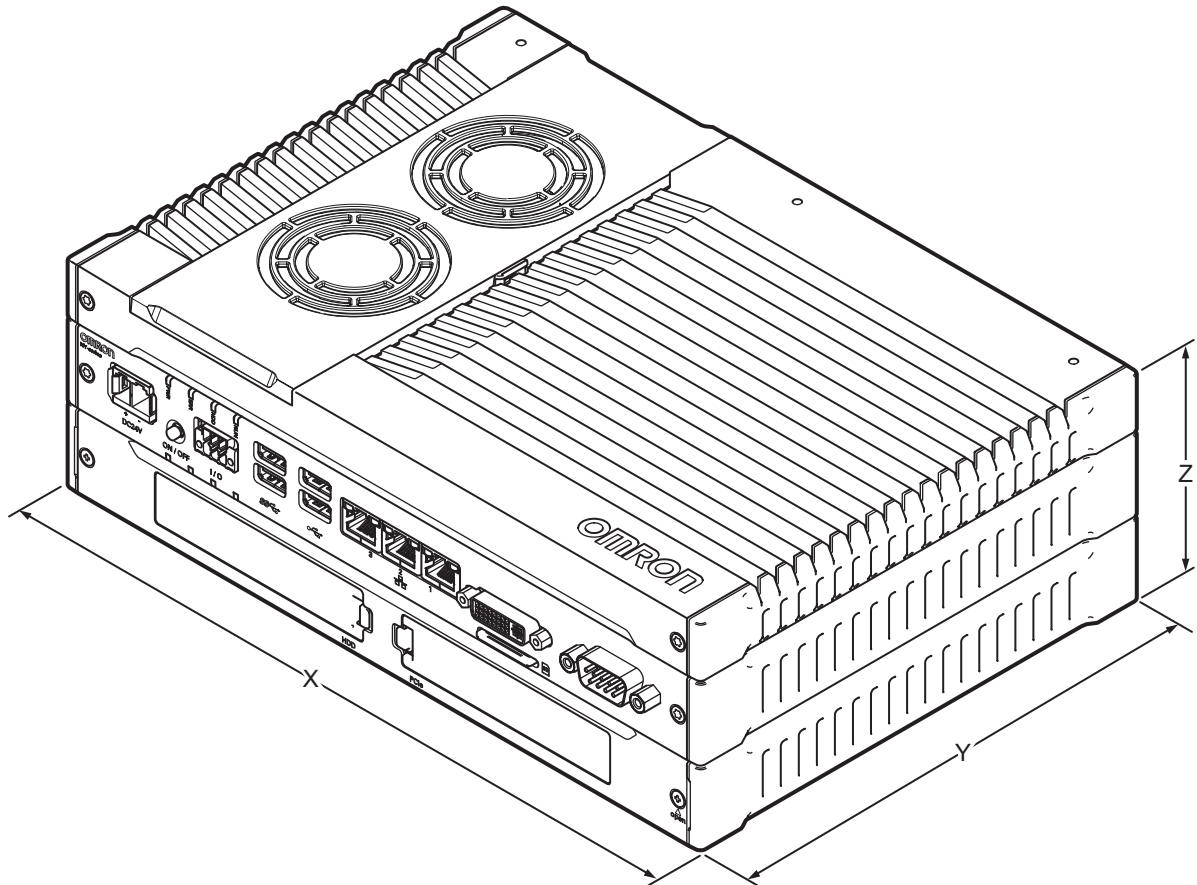
| | | |
|------------|--|-------------|
| 4-1 | General Specifications | 4-2 |
| 4-1-1 | Dimensions and Weight | 4-2 |
| 4-1-2 | General Electrical Specifications | 4-3 |
| 4-1-3 | Power Consumption Specifications | 4-3 |
| 4-1-4 | CPU Specifications | 4-4 |
| 4-1-5 | Memory Specifications | 4-4 |
| 4-1-6 | Storage Device Specifications | 4-5 |
| 4-1-7 | PCIe Card Specifications | 4-6 |
| 4-1-8 | Bracket Specifications | 4-7 |
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| 4-2-1 | Power Connector Specifications | 4-8 |
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| 4-2-7 | RS-232C Connector Specifications | 4-20 |
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| 4-3 | Environmental Specifications | 4-22 |
| 4-3-1 | Operation Environment Specifications | 4-22 |
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| 4-3-3 | Recycling Specifications | 4-25 |

4-1 General Specifications

This section provides general specifications of the IPC Machine Controller.

4-1-1 Dimensions and Weight

The following table provides specification details on dimensions and weights.



| Item | Specifications | Specifications with book mount bracket | Specifications with wall mount brackets |
|------------|--|---|--|
| Dimensions | Width X = 282 mm Depth Y = 195 mm Y = 200 mm including the DVI connectors Height Z = 88.75 mm | Width X = 319 mm, this is the bracket height Depth Y = 207 mm Height Z = 96 mm, this is the bracket width | Width X = 282 mm Depth Y = 245 mm, this is the bracket length Height Z = 92.2 mm |
| Weight | 3.8 kg | 4.9 kg | 4.1 kg |

4-1-2 General Electrical Specifications

The following table provides the general electrical specifications.

| Item | Specifications |
|--------------------------------------|---|
| Rated power supply voltage | 24 VDC |
| Allowable power supply voltage range | 20.4 to 28.8 VDC |
| Power supply standard | SELV |
| Grounding method | Ground to less than 100 Ω |
| Inrush current | At 24 VDC: 12 A / 6 ms max. for cold start at room temperature |
| Overvoltage category | JIS B3502 and IEC 61131-2: Category II |
| EMC immunity level | IEC 61132-2: Zone B |
| RTC accuracy | At ambient temperature of 55°C: -3.5 to +0.5 min error per month At ambient temperature of 25°C: -1.5 to +1.5 min error per month At ambient temperature of 0°C: -3 to +1 min error per month |
| Power button life | 100,000 operations |
| Fan life | 8 years of continuous operation at 40°C |
| Battery life | 5 years at 25°C (for battery CJ1W-BAT01) |

4-1-3 Power Consumption Specifications

The following tables provide details on the power consumption of the IPC Machine Controller. The total power consumption is the sum of the power consumption of all items that are installed in your Box PC.



Additional Information

Refer to *1-4 Product Configuration* on page 1-6 for details.

Power Consumption with an Intel® Core™ i7-4700EQ CPU

Power consumption specifications for IPC Machine Controllers with an Intel® Core™ i7-4700EQ CPU.

| Item | Power consumption | |
|---|-------------------|---|
| Industrial Box PC with Intel® Core™ i7-4700EQ excluding Drives and Expansions | 81 W | |
| Drives *1 | HDD 320 GB | 2 W |
| | SSD SLC 32 GB | |
| | SSD SLC 64 GB | |
| | SSD iMLC 128 GB | |
| Expansions *2 | USB | 14 W max. ((2 x 500 mA at 5 V) + (2 x 900 mA at 5 V)) |
| | PCIe | 15 W max. |

*1. Refer to *1-4 Product Configuration* on page 1-6 for product configuration details.

*2. Refer to the documentation of your expansions for their power consumption details.

The total power consumption is the sum of the power consumption of all items that are installed in your IPC Machine Controller.

The required supply specifications for a Box PC with an Intel® Core™ i7-4700EQ CPU.

| Item | Minimum power requirements |
|--|----------------------------|
| Power supply Refer to 3-9-9 <i>Power Supply</i> on page 3-25 for power supply products. | 240 W |
| UPS Refer to 3-9-10 <i>UPS</i> on page 3-26 for UPS products. | 120 W |

4-1-4 CPU Specifications

This section gives the specifications of the CPUs that are available for the IPC Machine Controller. Refer to 1-4 *Product Configuration* on page 1-6 for product configuration details.

Intel® Core™ i7-4700EQ CPU Specifications

CPU specifications for IPC Machine Controllers with an Intel® Core™ i7-4700EQ CPU.

| Item | Specifications |
|----------------------|---|
| Cores / Threads | 4 *1 / 8 |
| CPU base frequency | 2.4 GHz |
| Cache | 6 MB |
| Cooling details | Requires active cooling (fan) |
| Drive bays (HDD/SSD) | 2 |
| Graphics controller | Intel® HD Graphics 4600. Up to two independent screens. |

*1. Only two cores are available for Windows.

4-1-5 Memory Specifications

The following table provides specification details of the memory.

| Item | Specifications | |
|---|--|-----------|
| Total Memory size / Memory size available for Windows | 8 GB / 6.5 GB for Windows 64 bit 8 GB / 3.3 GB for Windows 32 bit | |
| Memory type | DDR3L | |
| Package memory format | SO-DIMM | |
| Serial Presence Detect (SPD) | Speed grade | 1600 Mbps |
| | CAS Latency | CL11 |



Additional Information

The small outline dual in-line memory modules (SO-DIMM) cannot be added or replaced by users.

4-1-6 Storage Device Specifications

This section provides the specifications of the storage devices.

Hard Disk Drive Specifications

Specifications for the Hard Disk Drive (HDD) are provided in the table below.

| Item | Model Specifications | |
|-----------------------|---|----------------------|
| | 320 GB ^{*1} | 500 GB ^{*1} |
| Model | NY000-AH00 | NY000-AH01 |
| S.M.A.R.T. support | Yes | |
| Rotation speed | 5,400 r/min | |
| Interface | Serial ATA 3.0 | |
| Operating temperature | 5 to 55°C ^{*2} | |
| Operating humidity | <ul style="list-style-type: none"> • 10% to 95% (with no condensation) • 29°C wet-bulb temperature max. | |
| Storage temperature | -40 to 65°C | |
| Storage humidity | <ul style="list-style-type: none"> • 8% to 90% (with no condensation) • 40°C wet-bulb temperature max. | |
| Life | Approximately 5 years or 20,000 powered-ON hours (whichever comes first) under the following conditions: <ul style="list-style-type: none"> • 25°C at 101.3 kPa • Less than 333 powered-ON hours/month^{*3} • Less than 20% operation while powered-ON^{*4} • Less than 1.30 x 10⁶ seeks/month | |

*1. Refer to *1-4 Product Configuration* on page 1-6 for product configuration details.

*2. Refer to *4-3-1 Operation Environment Specifications* on page 4-22 for the temperature specifications of the complete Box PC

*3. Powered-ON hours include sleep and standby modes.

*4. Operation includes seeking, writing, and reading functions.

Solid State Drive Specifications

Specifications for the Solid State Drive (SSD) are provided in the table below.

| Item | Model Specifications | | | |
|-----------------------------|-------------------------|---------------------|----------------------|------------|
| | 32 GB ^{*1} | 64 GB ^{*1} | 128 GB ^{*1} | |
| Model ^{*2} | NY000-AS00 | NY000-AS01 | NY000-AS02 | NY000-AS04 |
| Type | SLC | | iMLC | |
| Max. power consumption | 1.4 W | 1.4 W | 1.6 W | 0.8 W |
| S.M.A.R.T. support | Yes | | | |
| Interface | Serial ATA 3.1 | | | |
| Max. sequential read speed | 160 MB/s | 160 MB/s | 430 MB/s | 530 MB/s |
| Max. sequential write speed | 145 MB/s | 150 MB/s | 170 MB/s | 190 MB/s |
| Operating temperature | 0 to 70°C ^{*3} | | | |

| Item | Model Specifications | | | |
|--|----------------------|--------------|--------------|--------------|
| | 32 GB *1 | 64 GB *1 | 128 GB *1 | |
| Max. operating humidity (with no condensation) | 10 to 95% RH | 10 to 95% RH | 10 to 95% RH | 10 to 95% RH |
| Storage temperature | -40 to 100°C | -40 to 100°C | -40 to 85°C | -55 to 95°C |
| Max. storage humidity (with no condensation) | 10 to 95% RH | | | |
| Endurance | 749 TBW | 1497 TBW | 114 TBW | 208 TBW |

*1. Refer to 1-4 Product Configuration on page 1-6 for product configuration details.

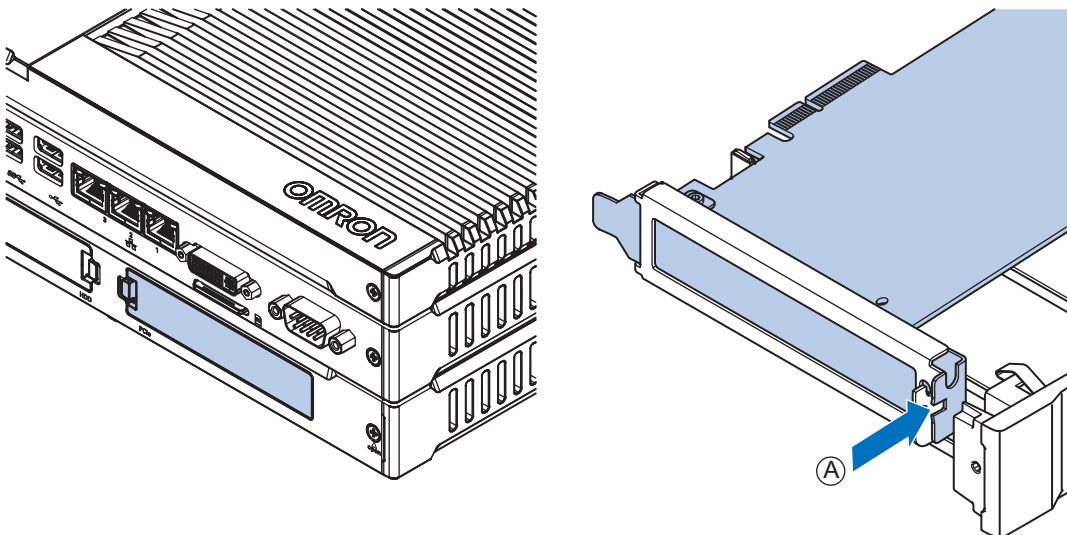
*2. Refer to 3-9-4 Storage Devices on page 3-21 for brand details.

*3. Refer to 4-3-1 Operation Environment Specifications on page 4-22 for the temperature specifications of the complete Box PC.

4-1-7 PCIe Card Specifications

The PCI Express (PCIe) Card slot of the IPC Machine Controller accepts various cards for specific hardware needs.

Ensure that, according to the PCIe hardware specifications, the indent (A) is present in the PCIe Card.



The following tables provide PCIe Card details per CPU type.

PCIe Card Slot Specifications with an Intel® Core™ i7-4700EQ CPU

The table below provides PCIe Card slot details for IPC Machine Controllers with an Intel® Core™ i7-4700EQ CPU.

| Item | Specifications |
|-------------------|---|
| Configuration | X4 (4 lanes) up to Gen 3 |
| Card height | Standard height cards, 4.20 inches (106.7 mm)*1 |
| Card length | Half-length cards, 6.6 inches (167.65 mm) |
| Power consumption | Refer to Power Consumption with an Intel® Core™ i7-4700EQ CPU on page 4-3 for the maximum power consumption |

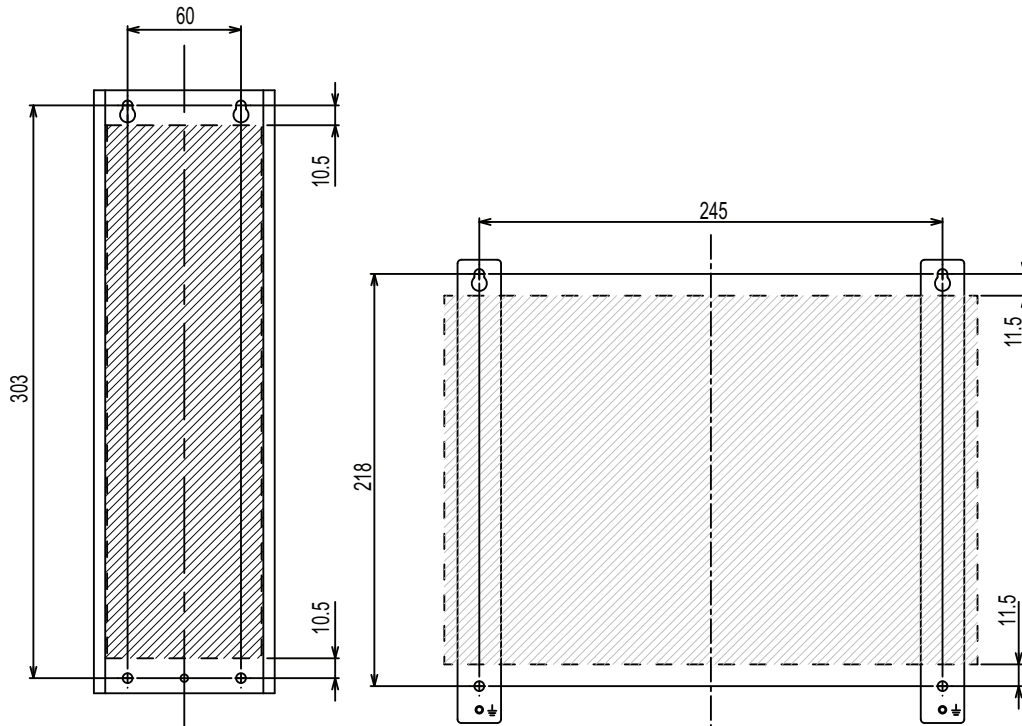
*1. Low profile cards, 2.536 inches (64.4 mm) are not supported.

4-1-8 Bracket Specifications

The metal mounting brackets mount your Box PC and they are the connection for the functional ground.

Use metal screws with a diameter of 4 mm or 5 mm to mount the brackets.

Mounting screw locations for book mount and wall mount orientation:



Additional Information

- Refer to 5-3-8 *Book Mount Procedure* on page 5-24 for book mount details.
- Refer to 5-3-9 *Wall Mount Procedure* on page 5-25 for wall mount details.

4-2 Connector Specifications

This section provides the Connector Specifications of the IPC Machine Controller.

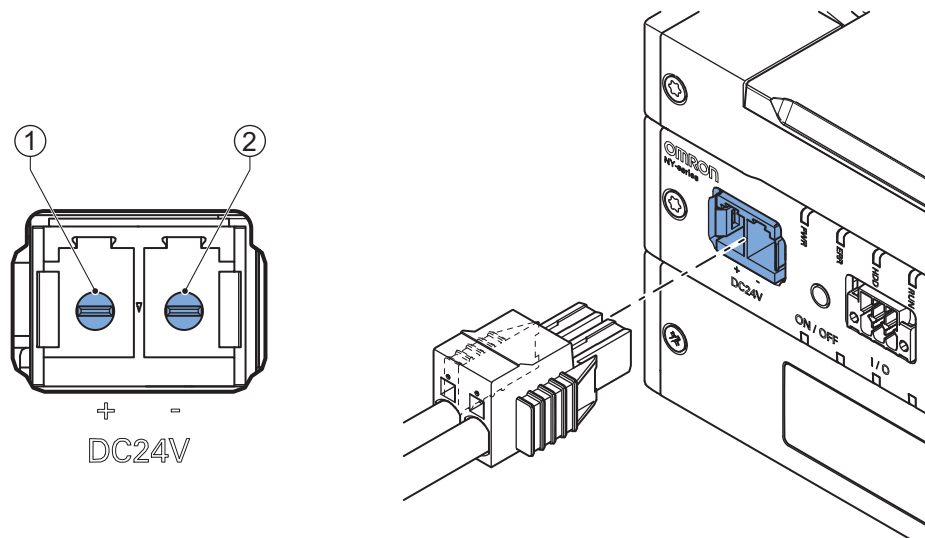
4-2-1 Power Connector Specifications

The power supply connector can be locked to prevent unintentional disconnection.

The connector can only be inserted the correct way.

The connector is a Phoenix Contact type SPC5/2-STCL-7.62 BK (1711708).

The Box PC provides protection against reverse polarity.



The pin layout represents the power connector on the Box PC.

| Pin | Description |
|-----|-------------|
| 1 | 24 VDC |
| 2 | 0 VDC |

| Item | Specifications |
|----------------------------|----------------|
| Conductor isolation rating | 90°C |
| Termination rating | 90°C |

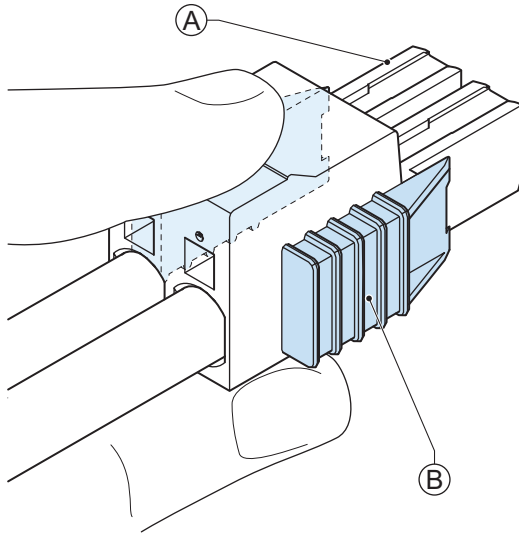


Additional Information

- Refer to 5-4-3 *Wire the Power Connector* on page 5-34 for wiring details.
- Refer to 5-4-2 *Ground* on page 5-27 for grounding details.

Locking and Removing the Power Connector

The power connector automatically locks into place when the black part of the connector is held and pushed in.



Pushing both orange sliders (B) towards the end of the connector (A) will release the lock when removing the connector.

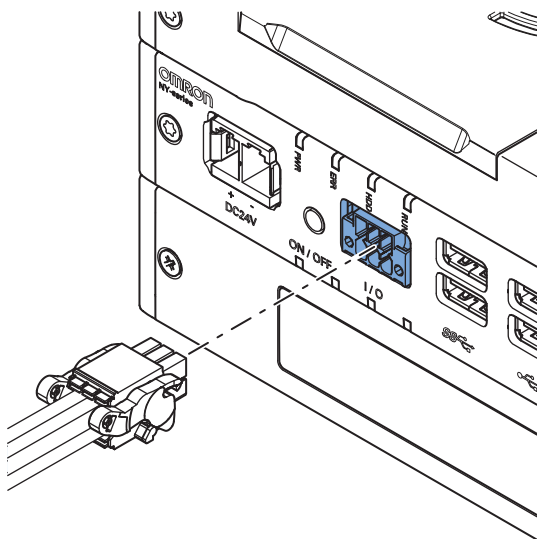
4-2-2 I/O Connector Specifications

Details of the I/O connector are provided below.

The I/O connector can be locked to prevent unintentional disconnection.

The connector can only be inserted in the correct way.

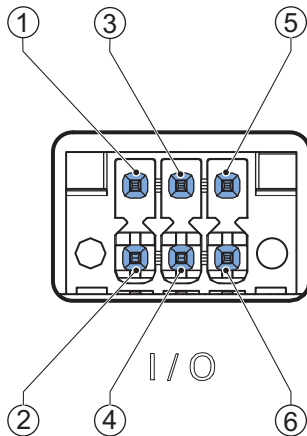
The Lock-and-Release Latch connector is a Phoenix Contact type DFMC 1,5/ 3-ST-3,5-LR BK (1711658).



| Item | Specifications |
|----------------------------|----------------|
| Conductor isolation rating | 90°C |
| Termination rating | 90°C |

I/O Connector Pin Details

The pin details of the I/O connector.



The pin layout represents the I/O connector on the Box PC.

The I/O signals connected must be powered from a power supply which conforms to the SELV standards.

Pin details of the I/O Connector:

| Pin | Description | Type | Electrical Specifications | Details |
|--------|---------------------------|---|--|--|
| 1 2 | Power Status Output *1 | Contact output | <ul style="list-style-type: none"> • SPST-NO contact configuration • 24 VDC at 2A switching capacity (resistive load) • Operation lifetime 150,000 cycles at 2A max. • Connect to SELV | <ul style="list-style-type: none"> • Open: The Power Status Output is OFF when the Box PC is OFF or has been disconnected from the power supply. • Closed: The Power Status Output is ON when the Box PC has shutdown successfully and is connected to the power supply and has not been disconnected from that power supply since power OFF. <p>Refer to <i>I/O Connector Power Status Output Details</i> on page 4-11 for details.</p> |
| 3 4 | Power ON/OFF Input *2 | Isolated transistor input (sinking or sourcing) | <ul style="list-style-type: none"> • ON: 8.8 VDC min./5 mA min. • OFF: 1.1 VDC max./0.5 mA max. • Connect to SELV | <p>If the signal changes from inactive to active, the Box PC will perform one of the following operations.</p> <ul style="list-style-type: none"> • When powered ON, the Box PC will shut down and power OFF. • When powered OFF, the Box PC will power ON. |
| 5 6 | UPS Mode Input | | | <p>This input is provided to allow monitoring the state of an external UPS unit that provides a compatible power state output signal.</p> |

*1. Refer to *I/O Connector Power Status Output Details* on page 4-11 for Power Status Output details.

*2. Refer to *6-1 Power ON* on page 6-2 and *6-2 Power OFF* on page 6-4 for Power ON/OFF Input details.



Additional Information

Refer to *5-4-4 Wire the I/O Connector* on page 5-37 for I/O connector wiring details.

I/O Connector Power Status Output Details

This section provides details of the Power Status Output relay.

The Power Status Output is a relay between pin 1 and 2 of the I/O Connector.

● Power ON Power Status Output Operation

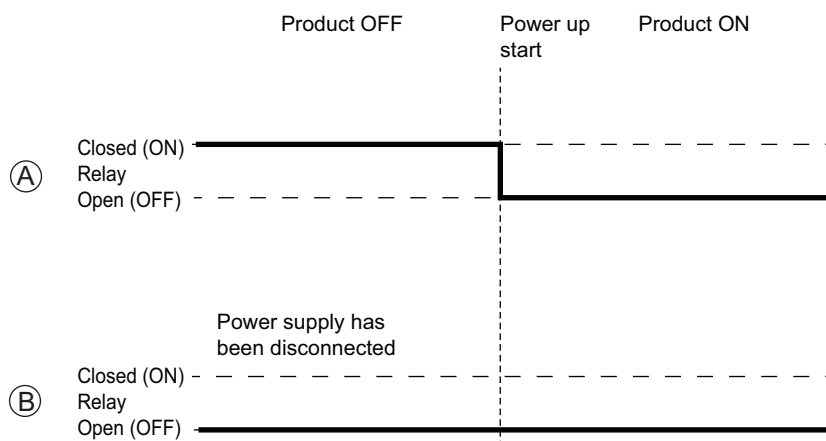
This section provides power ON details of the Power Status Output operation.

The Power Status Output turns ON to indicate that the system has been shut down and the power supply to the Box PC can be turned OFF.

If power is not turned OFF, the Power Status output will turn OFF when the Box PC is turned ON.

The Power Status Output is ON (A) when the Box PC has been used and has not been disconnected from the power supply.

The Power Status Output is OFF (B) when the Box PC has been disconnected from the power supply.



Additional Information

Refer to 5-4-4 *Wire the I/O Connector* on page 5-37 for I/O connector wiring details.

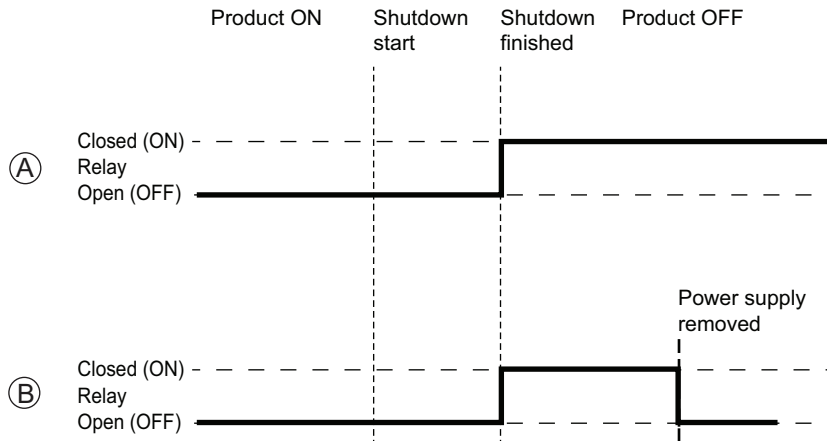
● Power OFF Power Status Output Operation

This section provides power OFF details of the Power Status Output operation.

The Power Status Output turns ON to indicate that the system has been shut down and the power supply to the Box PC can be turned OFF.

If power is not turned OFF, the Power Status output will stay ON (A). It will turn OFF when the Box PC is turned ON.

If power is turned OFF, the Power Status Output will turn OFF (B).

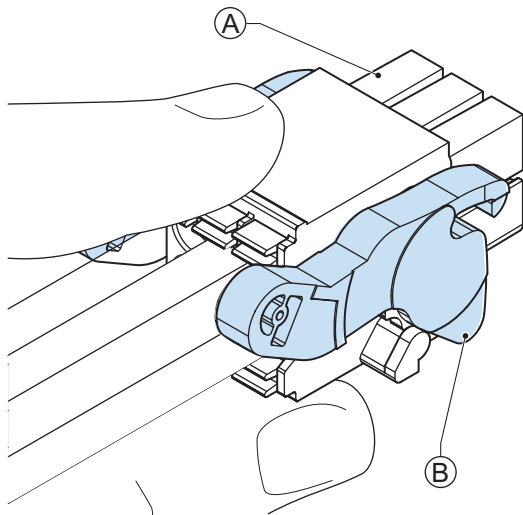


Additional Information

Refer to 5-4-4 *Wire the I/O Connector* on page 5-37 for I/O connector wiring details.

Lock and Remove the I/O Connector

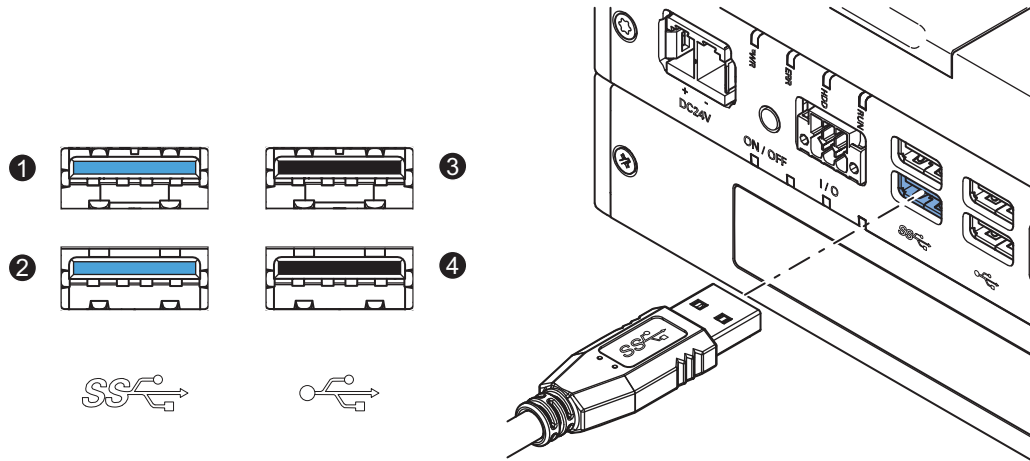
The I/O connector locks into place when the black part of the connector is held and pushed in.



Tilting both levers B will release the I/O connector A from the Box PC.

4-2-3 USB Connector Specifications

The IPC Machine Controller includes four USB connectors. Two connectors provide version 2.0 performance and two connectors provide version 3.0 performance. Details of the USB interface connectors are provided below.



The connector layout represents the USB connectors on the Box PC.

| Interface Connector | Details |
|---------------------|--|
| 1 | <ul style="list-style-type: none"> • USB 3.0 • 900 mA maximum current • 3 m maximum cable length • Blue color |
| 2 | |
| 3 | <ul style="list-style-type: none"> • USB 2.0 • 500 mA maximum current • 5 m maximum cable length • Black color |
| 4 | |



Additional Information

Refer to 5-4-2 *Ground* on page 5-27 for grounding details.

4-2-4 Ethernet Connector Specifications

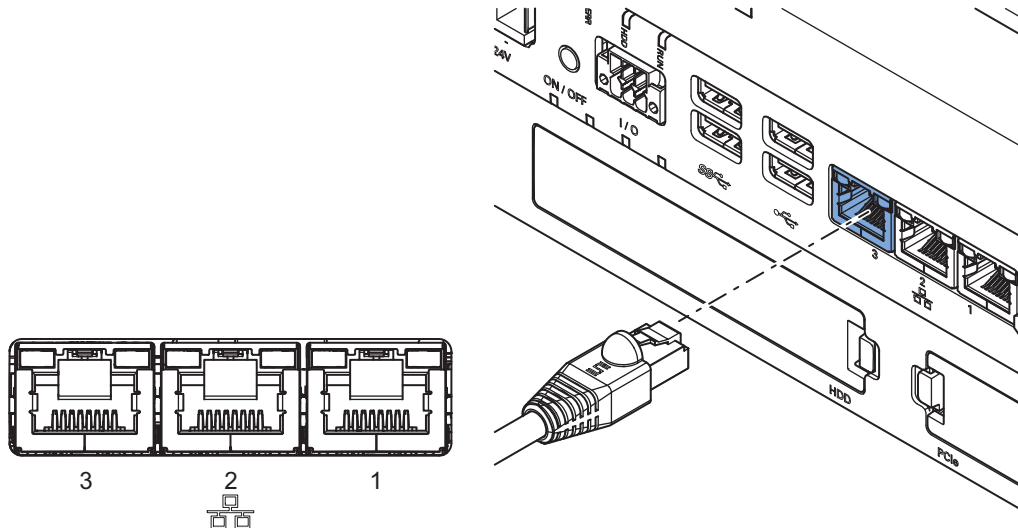
Details of the RJ45 Ethernet connectors are provided below.

There are three Ethernet ports, each with a specific function.

Following ports are available:

- Ethernet (general)
This port is available for the Windows Operating System.
- EtherNet/IP
This port is available for the Machine Controller Software.
Refer to *EtherNet/IP Connector Specifications* on page 4-16 for more details.
- EtherCAT
This port is available for the Machine Controller Software.
Refer to *EtherCAT Connector Specifications* on page 4-17 for more details.

The Ethernet connector locks automatically to prevent unintentional disconnection.



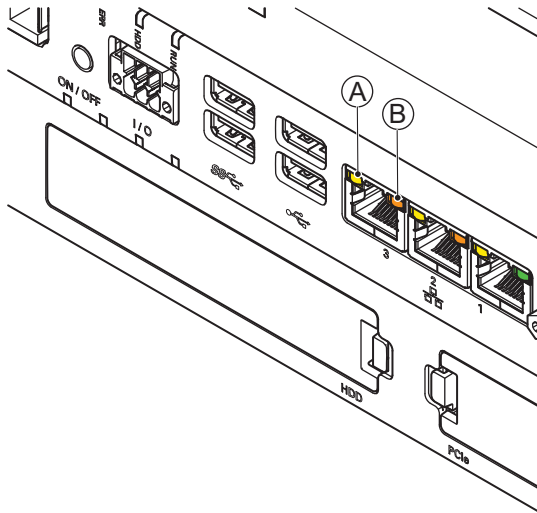
The view represents the Ethernet connector on the Box PC.







The Ethernet connectors are designated in the following manner.

- Connector number 1: Ethernet
- Connector number 2: EtherNet/IP
- Connector number 3: EtherCAT

Ethernet Connector LED Indicators

Each connector has LED indicators for speed, link and activity.



| Item | Indicator | Color | Status | | Description |
|------|-----------|---------|---|----------|--------------------|
| A | Link/Act | Yellow |  | Not lit | No link |
| | | |  | Lit | Link |
| | | |  | Flashing | Link and activity |
| B | Speed | Not lit |  | Not lit | 10 Mbps or no link |
| | | Green |  | Lit | 100 Mbps link |
| | | Orange |  | Lit | 1 Gbps link |

Ethernet Connector Specifications

This Ethernet connector is available in Windows and acts as regular Ethernet port.

| Item | Specifications |
|---------------------------|--|
| Ethernet connector number | 1 |
| Physical layer | 10BASE-T, 100BASE-TX or 1000BASE-T |
| Frame length | 1,514 bytes max. |
| Media access method | CSMA/CD |
| Modulation | Baseband |
| Topology | Star |
| Transmission media | STP (shielded, twisted pair) cable of Ethernet category 5,5e or higher |

| Item | Specifications |
|--|---|
| Maximum transmission distance between Ethernet switch and node | 100 m |
| Maximum number of cascade connections | There are no restrictions if an Ethernet switch is used |

EtherNet/IP Connector Specifications

The EtherNet/IP connector is assigned to the Machine Controller Software.

This port can be used for communication between the IPC Machine Controller and Ethernet/IP units.

| Item | Specifications | | |
|--|--|--|----|
| Ethernet connector number | 2 | | |
| Physical layer | 10BASE-T, 100BASE-TX or 1000BASE-T | | |
| Frame length | 1,514 bytes max. | | |
| Media access method | CSMA/CD | | |
| Modulation | Baseband | | |
| Topology | Star | | |
| Baud rate | 1 Gbps (1000BASE-T) | | |
| Transmission media | STP (shielded, twisted pair) cable of Ethernet category 5,5e or higher | | |
| Maximum transmission distance between Ethernet switch and node | 100m | | |
| Maximum number of cascade connections | There are no restrictions if an Ethernet switch is used. | | |
| CIP Service: Tag data links (cyclic communications) | Maximum number of connections | 128 | |
| | Packet interval | 1 to 10,000 ms in 1.0-ms increments Can be set for each connection. | |
| | Permissible communications band | 20,000 pps (including heartbeat) | |
| | Maximum number of tag sets | 128 | |
| | Tag types | Network variables | |
| | Number of tags per connections (i.e., per tag set) | 8 (7 tags if Controller status is included in the tag set) | |
| | Maximum number of tags | 256 | |
| | Maximum link data size per node (total size for all tags) | 184,832 bytes | |
| | Maximum data size per connection | 1,444 bytes | |
| | Maximum number of registrable tag sets | 128 (1 connection = 1 tag set) | |
| | Maximum tag set size | 1,444 bytes (Two bytes are used if Controller status is included in the tag set) | |
| Multi-cast packet filter | Supported | | |
| CIP message service: Explicit messages | Class 3 (number of connections) | 64 total (clients plus server) | |
| | UCMM (non-connection type) | Maximum number of clients that can communicate at one time | 32 |
| | | Maximum number of servers that can communicate at one time | 32 |
| Number of TCP sockets | 30 | | |

EtherCAT Connector Specifications

The EtherCAT connector is assigned to the Machine Controller Software.

This port can be used for communication between the Machine Controller Software and EtherCAT Slaves. This port acts as an EtherCAT master.

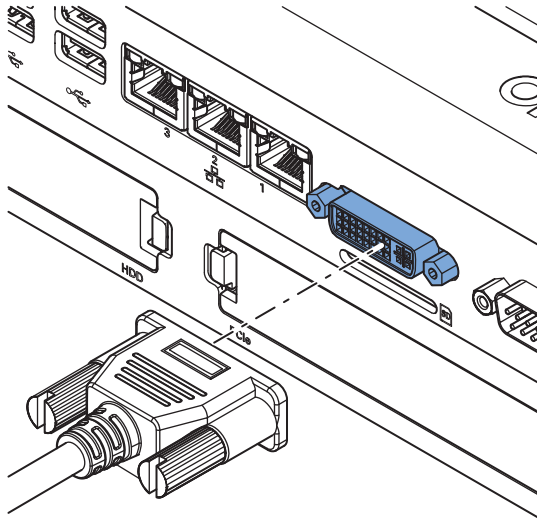
Specifications for Units with Machine Controller Software.

| Item | Specifications |
|---|---|
| Ethernet connector number | 3 |
| Communications standard | IEC 61158 Type 12 |
| EtherCAT master specifications | Class B (Feature Pack Motion Control compliant) |
| Physical layer | 100BASE-TX |
| Modulation | Baseband |
| Baud rate | 100 Mbps (100BASE-TX) |
| Duplex mode | Auto |
| Topology | Line, daisy, chain and branching |
| Transmission media | Twisted pair cable of category 5 or higher (double-shielded straight cable with aluminum tape and braiding) |
| Maximum transmission distance between nodes | 100 m |
| Maximum number of slaves | 192 |
| Range of node addresses that can be set | 1 to 512 |
| Maximum process data size | Input: 5,736 bytes, Output 5,736 bytes, the maximum number of process data frames is 4 |
| Maximum process data size per slave | Input 1,434 bytes, Output 1,434 bytes |
| Communications cycle | 500 μ s to 8 ms in 250 μ s-increments |
| Sync jitter | 1 μ s max. |

4-2-5 DVI Connector Specifications

DVI is the standard video interface for the Box PC.

The video interface depends on the model of the Box PC as specified below:



Additional Information

- Refer to 4-1-4 *CPU Specifications* on page 4-4 for graphics controller details.
- Refer to 5-4-2 *Ground* on page 5-27 for grounding details.
- Refer to A-3 *DVI Connector Pin Details* on page A-12 for pin details.

The following tables provide DVI details per CPU type.

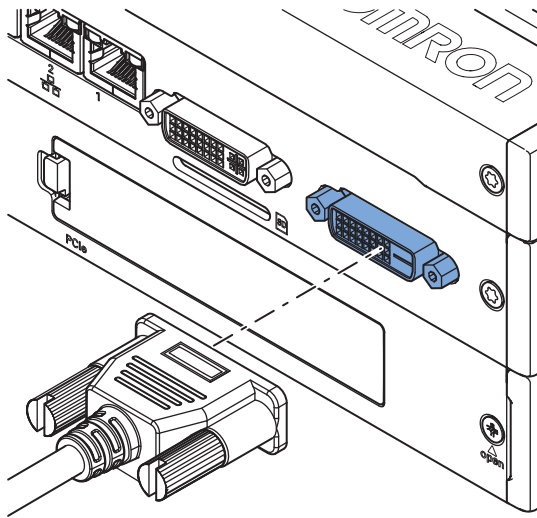
DVI-I Connector Specifications with an Intel® Core™ i7-4700EQ CPU

DVI-I connector specifications for IPC Machine Controllers with an Intel® Core™ i7-4700EQ CPU.

| Item | Specifications |
|--------------------------|--|
| Video interface | Digital or Analog |
| Resolution | Up to 1920 x 1200 pixels at 60 Hz |
| Type | Dual link |
| Maximum DVI cable length | Dependent upon connected monitor type and resolution |

4-2-6 DVI-D Connector Specifications

The optional video interface on the Box PC uses a DVI dual link connector.



| Item | Specification |
|--------------------------|--|
| Video interface | Digital only |
| Resolution | Up to 1920 x 1200 pixels at 60 Hz |
| Type | Dual link |
| Maximum DVI cable length | Dependent upon connected monitor type and resolution |

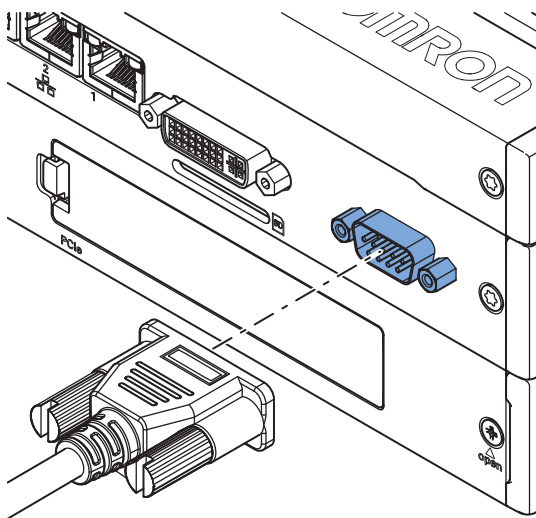


Additional Information

- Refer to *4-1-4 CPU Specifications* on page 4-4 for graphics controller details.
- Refer to *5-4-2 Ground* on page 5-27 for grounding details.
- Refer to *A-3-2 DVI-D Connector Pin Details* on page A-13 for pin details.

4-2-7 RS-232C Connector Specifications

The optional RS-232C interface on the Box PC uses a standard SUBD9 connector. The RS-232C interface is not isolated from the internal Box PC's components.



Additional Information

- Refer to 5-4-2 *Ground* on page 5-27 for grounding details.
- Refer to A-4 *RS-232C Connector Pin Details* on page A-15 for pin details.

4-2-8 NY Monitor Link Connector Specifications

The NY Monitor Link connector connects an OMRON Industrial Monitor with an OMRON Industrial PC that has an NY monitor link connector.

The NY Monitor Link communication is a combination of video and USB information.

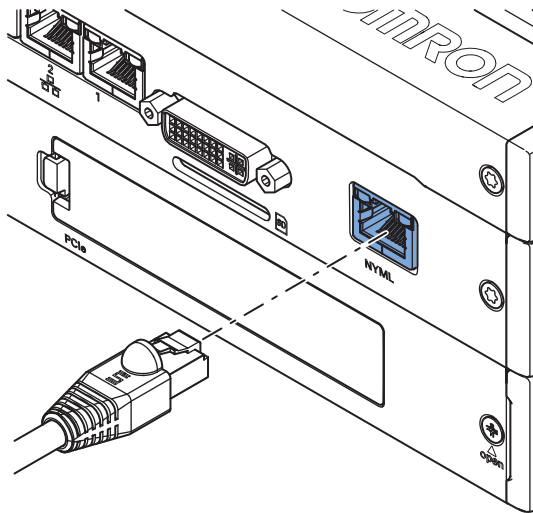
| Item | Specifications |
|---|---|
| Connector type | RJ45 |
| Transmission media | Twisted pair cable of category 6A or higher (double-shielded straight cable with copper braiding and aluminum foil) |
| Maximum cable length between Industrial PC and Industrial Monitor | 100 m |
| Topology | Line (direct) connection only ^{*1} |
| Video resolution | 1.280 x 800 pixels at 60 Hz |
| Data throughput rate | 280 Mbps max. |

*1. Use a direct connection between the OMRON Industrial PC and the OMRON Industrial Monitor.

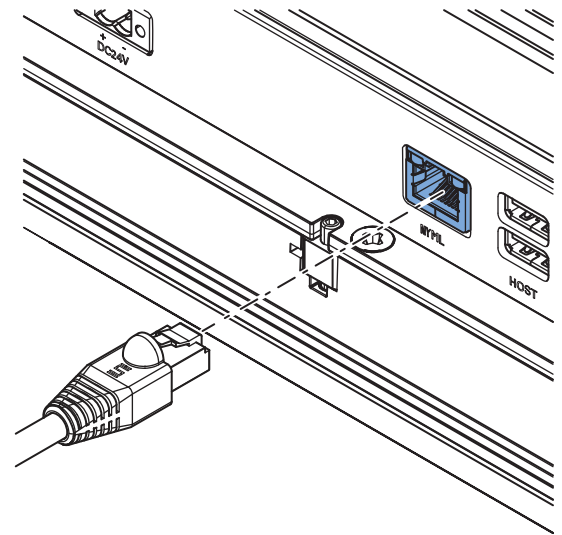
Do not use:

- Ethernet switches
- Ethernet hubs
- Daisy chain connections

The NY Monitor Link connector locks automatically to prevent unintentional disconnection.



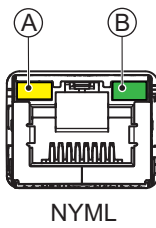
Industrial PC



Industrial Monitor

NY Monitor Link Connector LED Indicators

The connector has LED indicators Connected (A) and Video (B).



NYML

| Item | Indicator | Color | Status | | Description |
|------|-----------|--------|--------|----------|--|
| A | Connected | Yellow | | Not lit | Not connected |
| | | | | Lit | Connected USB communication active |
| B | Video | Green | | Not lit | No video signal |
| | | | | Blinking | Video signal present |
| | | | | Lit | Encrypted video signal present Video output is not supported for encrypted video. |

4-3 Environmental Specifications

This section provides environmental specifications of the IPC Machine Controller.

4-3-1 Operation Environment Specifications

The following table provides the general environmental specifications for the Industrial Box PC.

| Item | Specifications |
|---|---|
| Ambient operating temperature | 0 to 55°C *1 |
| Ambient storage temperature | -20 to 70°C *1 |
| Ambient operating humidity | 10% to 90% with no condensation |
| Ambient storage humidity | 10% to 90% with no condensation |
| Operating atmosphere | No corrosive gases |
| Altitude | 2,000 m max. |
| Noise resistance (during operation) | Conforms to IEC61000-4-4, 2kV (power lines) |
| Vibration resistance (during operation) | Conforms to IEC 60068-2-6. For a Box PC with an SSD: 5 to 8.4 Hz with 3.5 mm single amplitude and 8.4 to 150 Hz with 9.8 m/s ² for 10 times each in X, Y and Z directions. For a Box PC with a HDD the vibration resistance depends on the mounting orientation*2. |
| Shock resistance (during operation) | Conforms to IEC 60068-2-27. 147 m/s ² , 3 times in each X, Y and Z directions |
| Pollution degree | JIS B3502 and IEC 61131-2: 2 or less |
| RTC accuracy | At ambient temperature of 55°C: -3.5 to +0.5 min error per month At ambient temperature of 25°C: -1.5 to +1.5 min error per month At ambient temperature of 0°C: -3 to +1 min error per month |

*1. Refer to 4-3-2 *Temperature and Humidity Specifications* on page 4-23 for ambient operating temperature details per CPU type.

*2. Vibration resistance depends on the Box PC's mounting orientation and storage device type:

| Mounting Orientation | SSD | HDD |
|----------------------|----------------------|----------------------|
| Book | 9.8 m/s ² | 2.5 m/s ² |
| Wall | | 4.9 m/s ² |

4-3-2 Temperature and Humidity Specifications

The allowed ambient operating temperature and ambient humidity depend on product type, CPU type, mounting orientation, and storage device type.

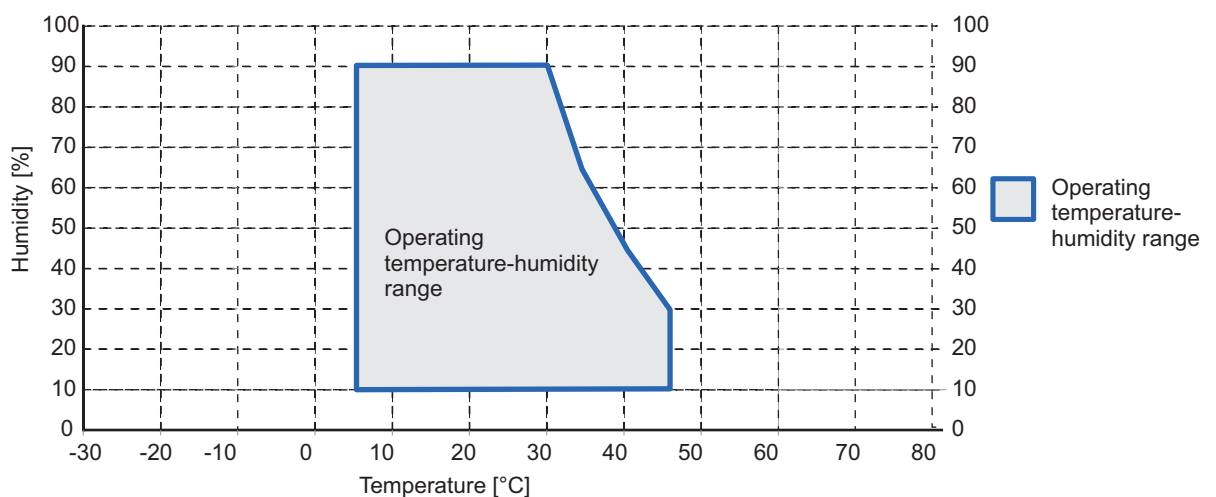
The following sections provide temperature and humidity details per CPU type.

Temperature and Humidity Graphs

The maximum ambient operating temperature and ambient humidity are specified per CPU type, mounting orientation and storage device type.

The following graphs provide ambient temperature and humidity details per storage device type and the conditions for storage.

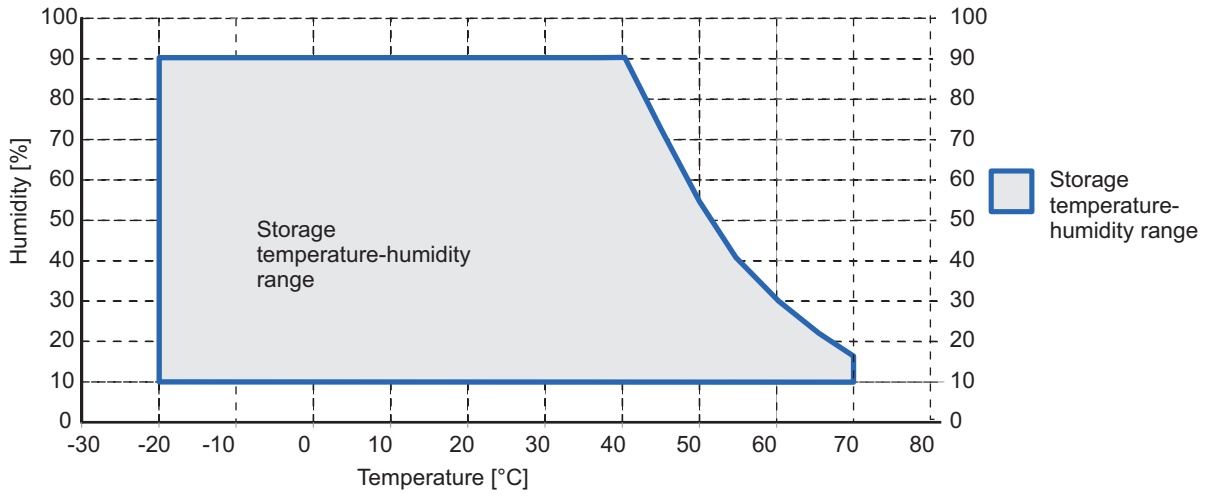
- Operate the Box PC with a SSD within the general environmental specifications.
- Operate the Box PC with a HDD within the ambient temperature and humidity ranges as shown in following graph.



Additional Information

Refer to the ambient temperature and humidity specifications per CPU type for specific limitations.

- Store the Box PC with a SSD within the general environmental specifications.
- Store the Box PC with a HDD within the ambient temperature and humidity ranges as shown in following graph.



Temperature Specifications with an Intel® Core™ i7-4700EQ CPU

Ambient operating temperature specifications for a Box PC with an Intel® Core™ i7-4700EQ CPU.

| Mounting Orientation | Storage device type ^{*1} | | | | |
|----------------------|-----------------------------------|---------|-----------|-----------|-----------------|
| | 1 x SSD | 2 x SSD | 1 x HDD | 2 x HDD | 1 x SSD 1 x HDD |
| Book | 0 to 55°C | | 5 to 45°C | 5 to 35°C | 5 to 45°C |
| Wall | 0 to 55°C | | 5 to 45°C | 5 to 35°C | 5 to 45°C |

*1. Refer to 1-4 Product Configuration on page 1-6 for model details.



Additional Information

Refer to *Temperature and Humidity Graphs* on page 4-23 for graph details.

4-3-3 Recycling Specifications

The following table provides recycling information for the IPC Machine Controller.

| Part | Recycle specifications |
|---|------------------------|
| Battery | Chemical waste |
| PCIe Card and other electrical components | Electrical waste |



Precautions for Safe Use

Dispose of the product and batteries according to local ordinances as they apply.



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5

Installation

This section provides all installation details for the IPC Machine Controller.

| | | |
|------------|---|-------------|
| 5-1 | Unpack | 5-2 |
| 5-1-1 | Unpack Procedure | 5-2 |
| 5-1-2 | Items Supplied | 5-3 |
| 5-2 | Install Options | 5-5 |
| 5-2-1 | Install a Drive | 5-5 |
| 5-2-2 | Install the PCIe Card | 5-9 |
| 5-3 | Mount | 5-14 |
| 5-3-1 | Installation Method in Control Panels | 5-14 |
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| 5-3-4 | Humidity | 5-18 |
| 5-3-5 | Vibration and Shock | 5-18 |
| 5-3-6 | Atmosphere | 5-19 |
| 5-3-7 | Electrical Environment | 5-19 |
| 5-3-8 | Book Mount Procedure | 5-24 |
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| 5-4 | Wire | 5-26 |
| 5-4-1 | Wiring Warnings and Cautions | 5-26 |
| 5-4-2 | Ground | 5-27 |
| 5-4-3 | Wire the Power Connector | 5-34 |
| 5-4-4 | Wire the I/O Connector | 5-37 |
| 5-5 | Connect | 5-40 |
| 5-5-1 | Connector Identification | 5-40 |
| 5-5-2 | Connection Procedure | 5-42 |
| 5-5-3 | Ethernet Connection Procedure | 5-44 |
| 5-5-4 | Connect UPS | 5-45 |
| 5-6 | Initial Power ON | 5-48 |
| 5-6-1 | Initial Power ON Procedure | 5-48 |

5-1 Unpack

This section provides details on how to unpack the IPC Machine Controller.

5-1-1 Unpack Procedure

- 1** Check the package for damage.
If there is any visible damage:
 - Take photos of the package and save them.
 - Inform your supplier immediately.
- 2** Open the package.
Ensure not to damage the contents.
- 3** Ensure that all items are present.



Additional Information

Refer to *5-1-2 Items Supplied* on page 5-3 for the items supplied.

5-1-2 Items Supplied

The Industrial Box PC is supplied with several items.



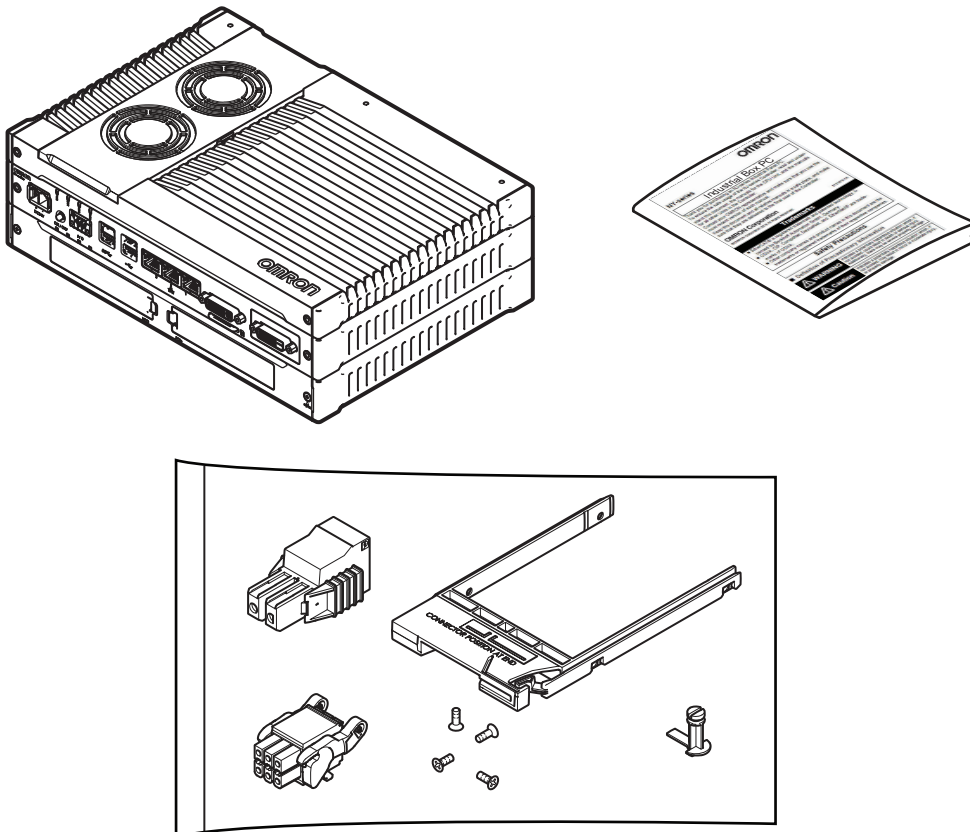
Additional Information

- Refer to *Items Supplied with the Industrial Box PC* on page 5-3 for more details.
- Refer to *Items Supplied with the Brackets* on page 5-4 for more details.

Items Supplied with the Industrial Box PC

This section describes the items supplied with your Industrial Box PC.

- Industrial Box PC
- Documentation:
 - Safety Precautions sheets (English and Japanese)
 - EU Compliance sheet
 - Standards and Certifications sheet
- Bag with:
 - Power connector
 - I/O connector
 - Drive bracket for drive installation
 - 4 Mounting screws for drive installation
 - PCIe Card support for PCIe Card installation



Items Supplied with the Brackets

This section describes the items supplied with the brackets for your Industrial Box PC.



Additional Information

- Refer to *3-9-1 Mounting Brackets* on page 3-20 for bracket details.
 - Refer to *5-3-8 Book Mount Procedure* on page 5-24 for book mount installation.
 - Refer to *5-3-9 Wall Mount Procedure* on page 5-25 for wall mount installation.
-

● Book Mount

Check if the content is complete.

Supplied items:

- 1 Book mount bracket
- 6 Mounting screws
- 1 Nut for the functional ground terminal connection
- 2 Washers for the functional ground terminal connection

● Wall Mount

Check if the content is complete.

Supplied items:

- 2 Wall mount brackets
- 6 Mounting screws
- 1 Nut for the functional ground terminal connection
- 2 Washers for the functional ground terminal connection

5-2 Install Options

This section describes the installable options for the IPC Machine Controller.

5-2-1 Install a Drive

A drive is a storage device for the IPC Machine Controller.



Additional Information

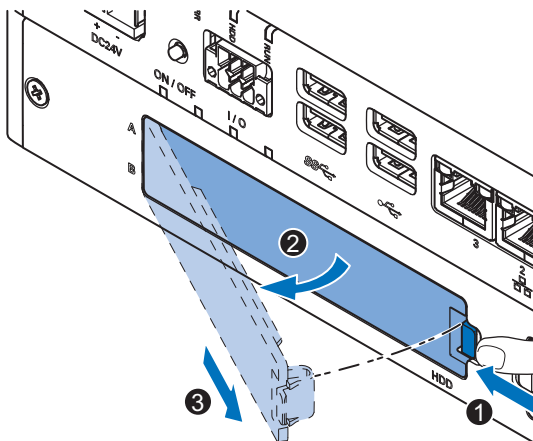
- Depending on the product configuration a drive is already installed. Refer to *1-4 Product Configuration* on page 1-6 for storage details.
- Depending on the CPU type one or two drives are supported. Refer to *4-1-4 CPU Specifications* on page 4-4 for the number of supported drives.
- Refer to *3-9-4 Storage Devices* on page 3-21 for the recommended drive models.
- Refer to *4-1-6 Storage Device Specifications* on page 4-5 for drive specifications.

Prepare the following items:

- The drive
A drive is not supplied with the Box PC.
- The drive bracket with mounting screws
These are supplied with the Box PC.

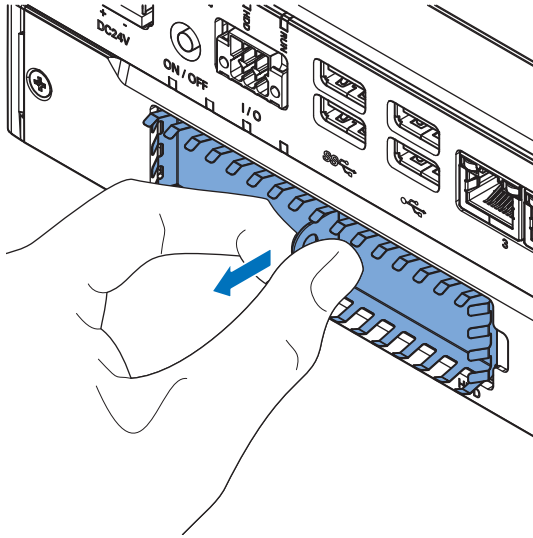
To install a drive:

- 1** Ensure the Box PC is OFF.
- 2** Remove the drive cover.

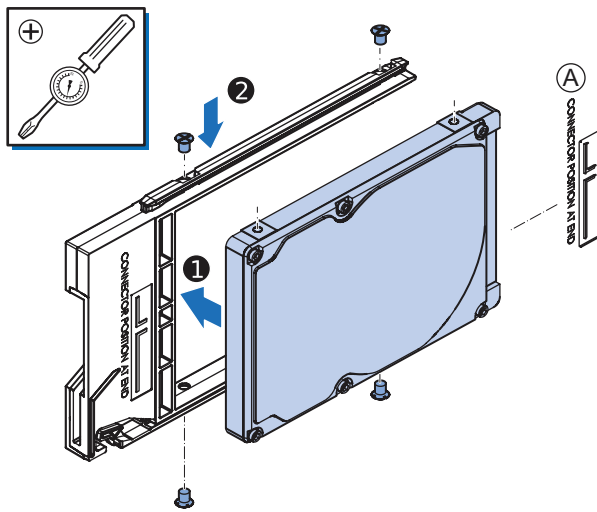


- 1) Push the lock lever **1**.
- 2) Tilt the drive cover **2**.
- 3) Remove the drive cover **3**.

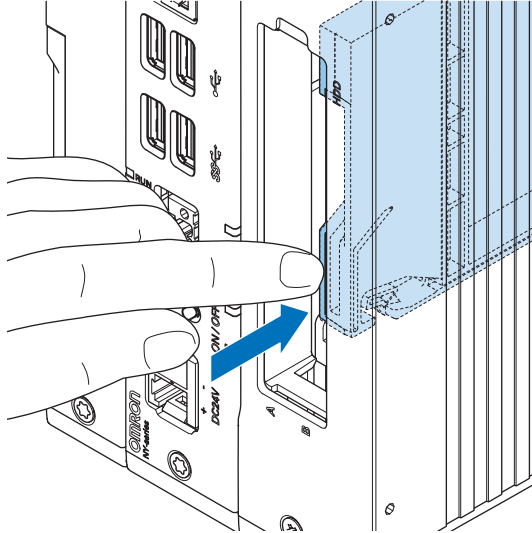
- 3** Pull the metal shielding cover out of the Box PC.



- 4** Align the connectors of the drive as shown (A) on the bracket. Then insert the replacement drive (1) in the bracket and insert the 4 mounting screws (2). Tighten these screws with a torque of 0.35 N·m.

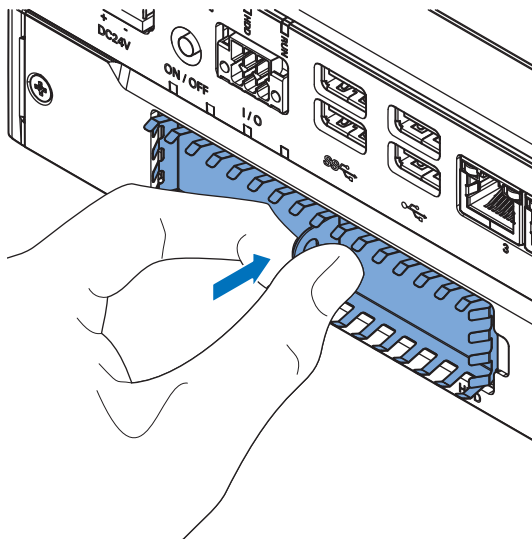


- 5** Insert the bracket with the drive in the correct bay.
- A drive for the operating system has to be inserted in bay A
 - The drive for additional storage can be inserted in bay B
- Ensure the bracket is completely in the Box PC with an extra push.

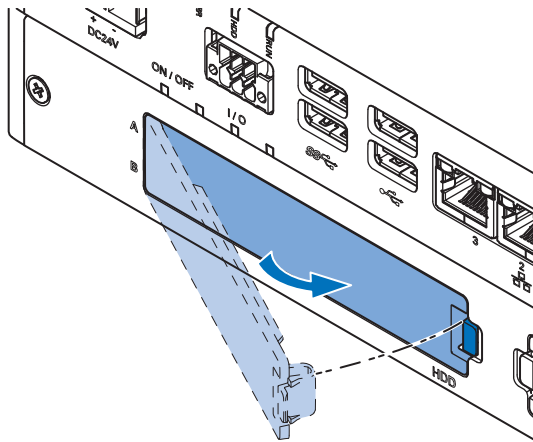


The drive bracket will lock into place when it is fully inserted.

- 6** Insert the metal shielding cover.



- 7** Mount the drive cover.
The lock lever will click when closed correctly.



- 8** Finalize the drive installation when the Box PC installation is completed.
- If the drive is inserted in bay A:
 - 1) Install an operating system
 - 2) Power OFF and then Power ON
 - 3) Ensure the drive is functional and confirm normal operation.
If required set the drive as boot disk in the BIOS settings.
Refer to *A-1-5 BIOS - Boot* on page A-9 for boot priority settings.
 - If the drive is inserted in bay B:
 - 1) Ensure the drive is functional and confirm normal operation.
If the Box PC has a Windows operating system and the storage drive is not visible in Windows then the drive needs to be allocated.

The drive is installed and functional.

5-2-2 Install the PCIe Card

Prepare the following items:

- The PCIe Card.

A PCIe Card is not supplied with the Box PC.



Additional Information

Refer to 4-1-7 *PCIe Card Specifications* on page 4-6 for PCIe specifications.

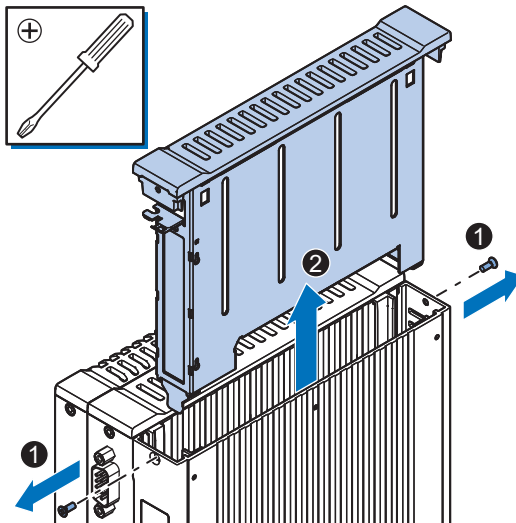
- The PCIe Card mounting material: Card Support.

This item is supplied with the Box PC.

To install the PCIe Card:

- 1** Ensure the Box PC is OFF.
- 2** Remove the two crosshead screws **1** indicated with "open" and then pull up **2** the PCIe Drawer.

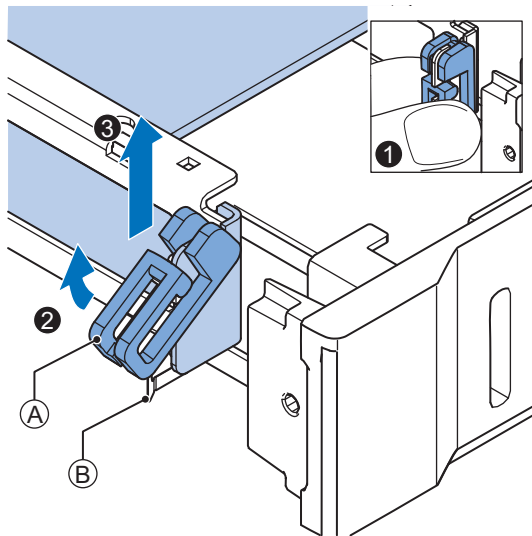
The indent at the side of the drawer will help you to pull the drawer from the Box PC.



- 3** Grip the Card Clip on the sides **1**. Pull the middle of the Card Clip to unlock it **2** and remove it **3** from the PCIe Drawer.

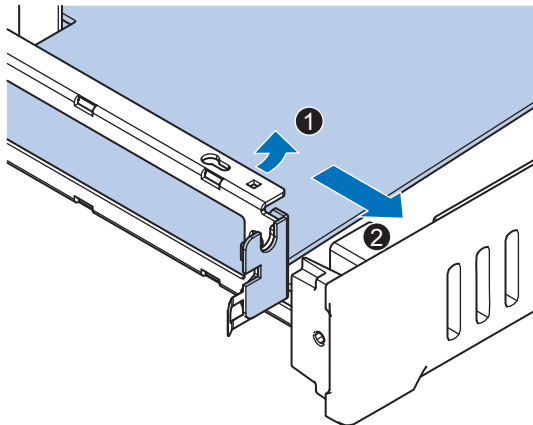
Caution

When installing or removing a PCIe card, ensure to grip the Card Clip on the sides to prevent contact with the sharp edges of the sheet metal frame tab. Injury may result.



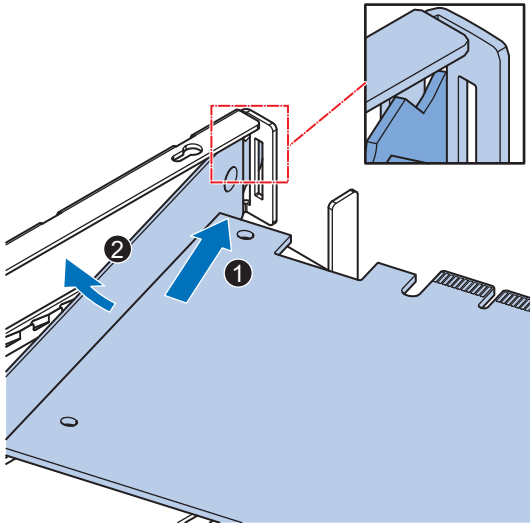
- (A) Card Clip
- (B) Sheet metal frame tab

- 4** Remove the slot cover from the PCIe Drawer. The thin sheet metal frame should stay in the PCIe Drawer.



The slot cover is now removed.

- 5** Place the PCIe Card in the PCIe Drawer.



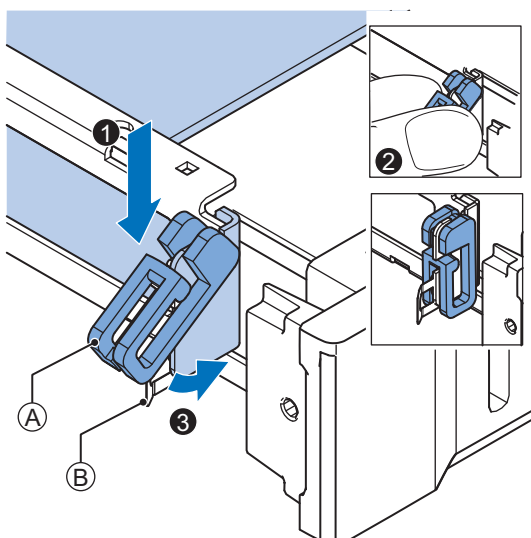
Ensure to insert the PCIe Card in the correct opening.

Ensure the thin sheet metal frame is positioned between the PCIe Card and the PCIe Drawer to ensure a good conductive contact.

- 6** Place the Card Clip in the PCIe Card and PCIe Drawer **1**, grip the Card Clip on the sides **2** and then rotate the Clip **3** to lock it in place.

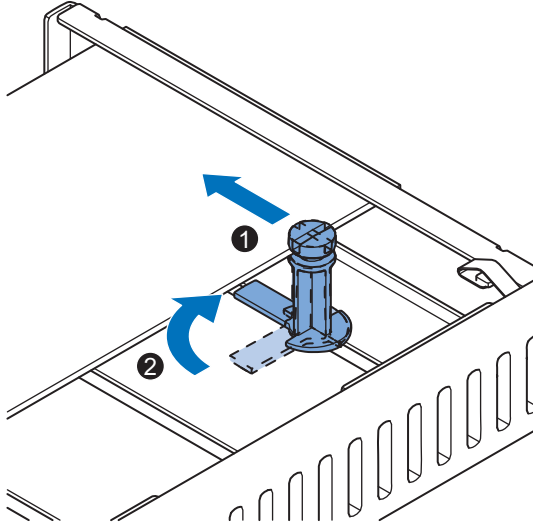
Caution

When installing or removing a PCIe card, ensure to grip the Card Clip on the sides to prevent contact with the sharp edges of the sheet metal frame tab. Injury may result.

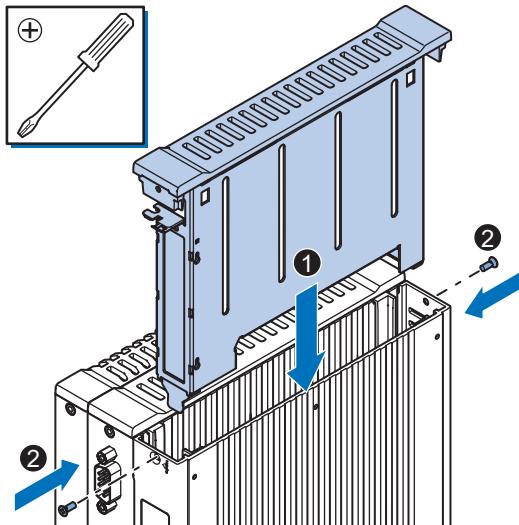


- (A) Card Clip
- (B) Sheet metal frame tab

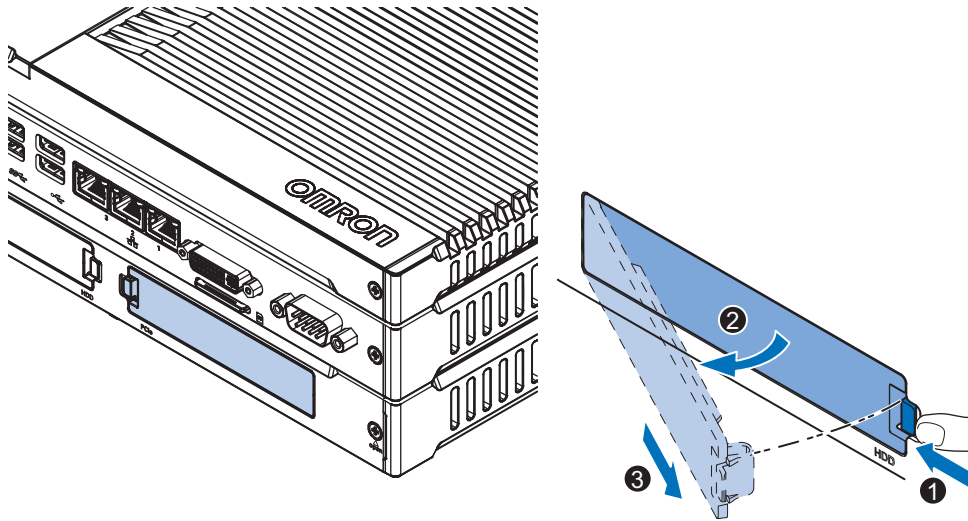
- 7** Slide the Card Support **1** so that it supports the side of the PCIe Card.
The card should be in small groove so there is support below and above the card.
Rotate the Card Support **2** to lock it in place.



- 8** Insert the PCIe Drawer in the Box PC and then insert the two crosshead screws that hold the PCIe Drawer in place.



- 9** Remove the PCIe cover if the PCIe Card has external connectors.



- 1) Push the lock lever **1**.
- 2) Tilt the PCIe cover **2**.
- 3) Remove the PCIe cover **3**.

The PCIe Card is installed.

5-3 Mount

This section describes how to mount the Box PC in either a book or wall orientation inside a control panel.

WARNING

Ensure that installation and post-installation checks of the product are performed by personnel in charge who possess a thorough understanding of the machinery to be installed.



5-3-1 Installation Method in Control Panels

The IPC Machine Controller must be mounted in a cabinet or a control panel. Consider the orientation, cooling distance, noise resistance, ducts and Box PC replacement when determining the space between the Box PC and other devices.



Precautions for Safe Use

Install the product in the correct orientation and temperature according to the specifications in the manual to prevent overheating. Not doing so may result in malfunction.



Precautions for Correct Use

Do not operate or store the product in the following locations. Operation may stop or malfunctions may occur.

- Locations subject to direct sunlight
- Locations subject to temperatures or humidity outside the range specified in the specifications
- Locations subject to condensation as the result of severe changes in temperature
- Locations subject to corrosive or flammable gases
- Locations subject to dust (especially iron dust) or salts
- Locations subject to exposure to water, oil or chemicals
- Locations subject to shock or vibration



Additional Information

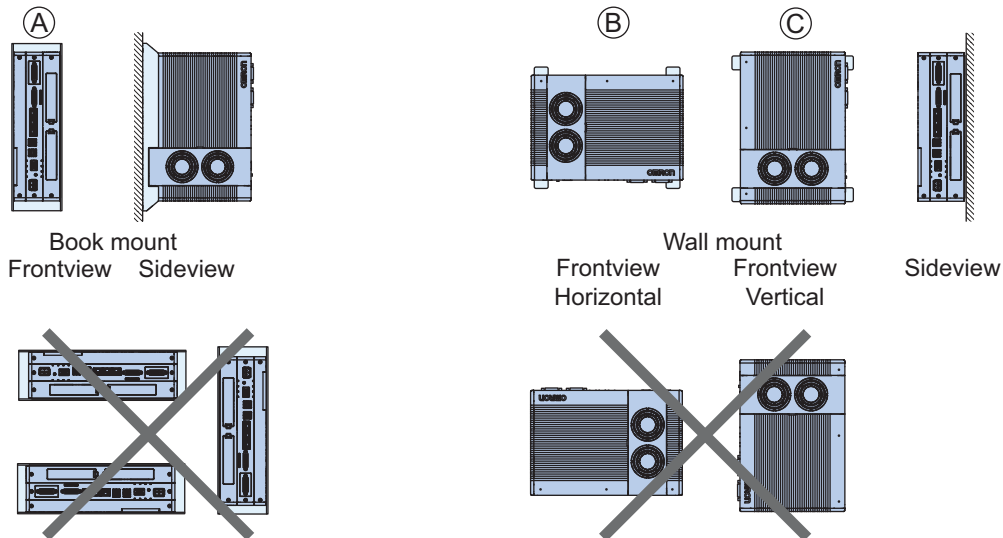
- Ensure you have installed the options before you mount the product. Refer to *5-2 Install Options* on page 5-5 for option details.
- Refer to *5-3-8 Book Mount Procedure* on page 5-24 or *5-3-9 Wall Mount Procedure* on page 5-25 for orientation details.
- Refer to *5-3-3 Temperature* on page 5-15 for temperature details.
- Refer to *5-3-4 Humidity* on page 5-18 for humidity details.
- Refer to *5-4 Wire* on page 5-26 for wiring details.

5-3-2 Product Orientation

The Box PC can be mounted in a book (A) or wall (B) (C) orientation.

- For book mount there is one allowed orientation (A).
- For wall mount there are two allowed orientations, horizontally mounted (B) and vertically mounted (C).

Do not install the Box PC in other orientations.



5-3-3 Temperature

The temperature inside a control panel may be at least 10 to 15°C higher than outside the panel. Implement the following measures against overheating at the installation site and in the control panel, and allow a sufficient margin for the temperature.

Distance for Cooling

Adequate airflow around the Industrial Box PC is required.

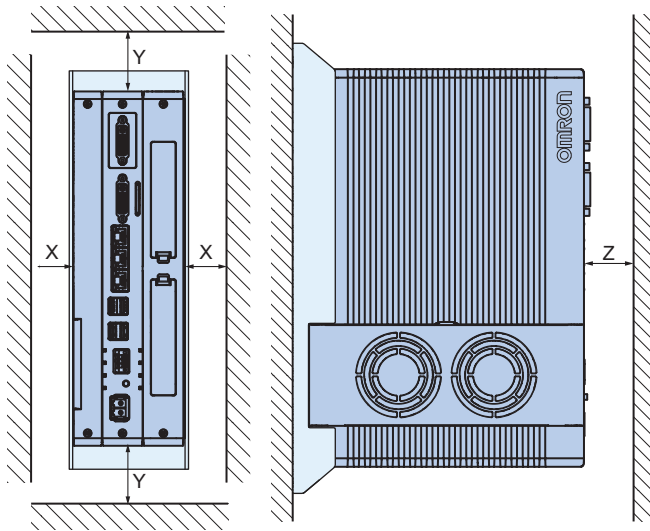


Additional Information

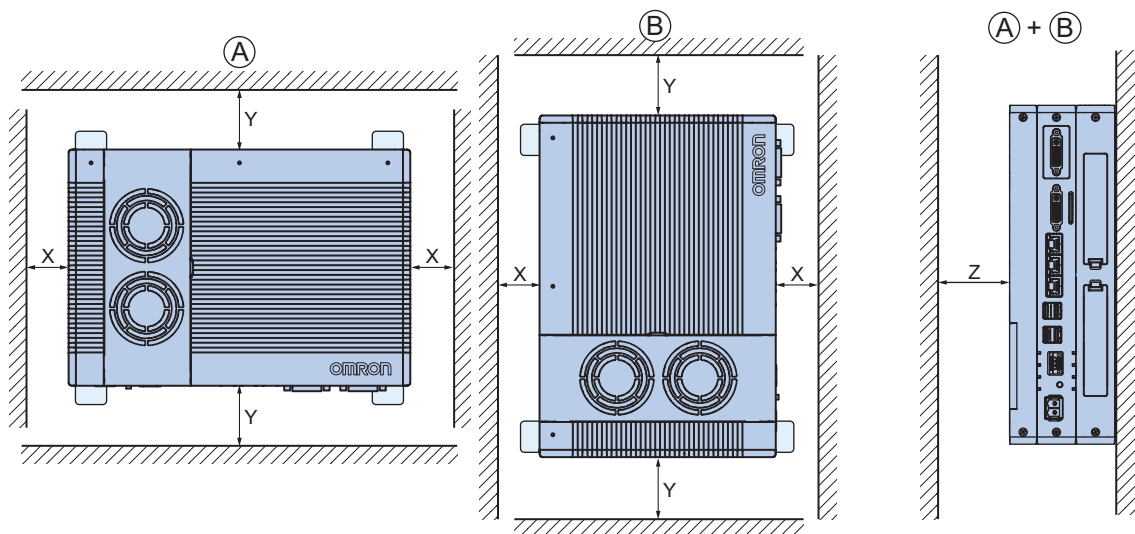
- The ambient temperature must be within the operating range. Refer to *4-3-1 Operation Environment Specifications* on page 4-22 for temperature specifications.
- Allow space to accommodate for the bending radius of the cables. Refer to:
 - *3-9-5 DVI Cables* on page 3-22
 - *3-9-6 USB Type-A to USB Type-B Cables* on page 3-23
 - *3-9-7 NY Monitor Link Cables* on page 3-23 for cable bending requirements.

Provide enough space for good air flow and ensure the following minimum distances are observed around the sides of the Box PC.

• **Book Mount**



• **Wall Mount in landscape (A) or portrait (B) orientation**



| Item | Minimum distance *1 |
|------|---------------------|
| X | 50 mm |
| Y | 100 mm |
| Z | 50 mm |

*1. Measure the minimum distances X and Y at the air openings in the sides of the Box PC.

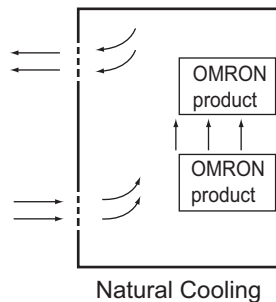
High Temperatures

Use the following cooling methods as required, taking into account the ambient temperature and the amount of heating inside the panel.

● Natural Cooling

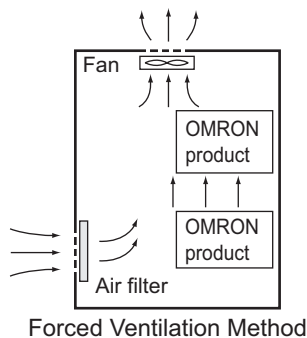
Natural cooling relies on natural ventilation through slits in the panel, rather than using cooling devices such as fans or coolers. When using this method, observe the following points.

- Do not install the Box PC at the top of the panel, where hot air tends to stagnate.
- To provide ventilation space above and below the Box PC, leave sufficient distance from other devices, wiring ducts, etc.
- Do not mount the Box PC in the wrong direction (e.g., vertically or upside down). Doing so may cause abnormal heating in the Box PC.
- Do not install the Box PC directly above any heat-generating equipment, such as heaters or transformers.
- Do not install the Box PC in a location exposed to direct sunlight.



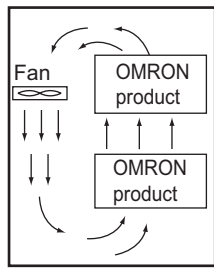
● Forced Ventilation

Forced ventilation with a fan in the top of the control cabinet.



● Forced Air Circulation

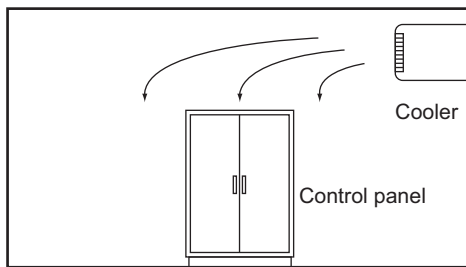
Forced circulation with a fan inside the closed control cabinet.



Forced Air Circulation

● Room Cooling

Cool the entire room where the control panel is located.



Room Cooling

Low Temperatures

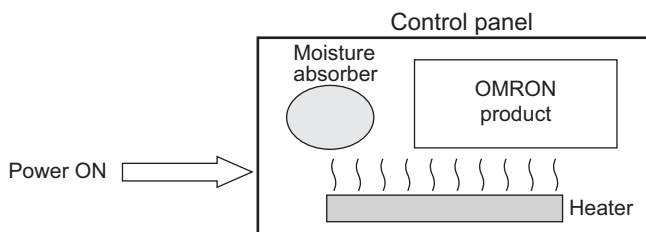
The Box PC may not start normally if the temperature is below 0°C when the power is turned ON. Maintain an air temperature of at least 5°C inside the panel, by implementing measures such as installing a low-capacity space heater in the panel.

Alternatively, leave the Box PC power ON to keep the Box PC warm.

5-3-4 Humidity

Rapid temperature changes can cause condensation to occur, resulting in malfunctioning due to short-circuiting.

When there is a possibility of this occurring, take measures against condensation, such as leaving the Box PC power ON at night or installing a heater in the control panel to keep it warmer.



Examples of Measures against Condensation

5-3-5 Vibration and Shock

The Box PC is tested for conformity with the sine wave vibration test method (IEC 60068-2-6) and the shock test method (IEC 60068-2-27) of the Environmental Testing for Electrotechnical Products. It is

designed so that malfunctioning will not occur within the specifications for vibration and shock. If, however, the Box PC is to be used in a location in which it will be directly subjected to regular vibration or shock, then implement the following countermeasures:

- Separate the Box PC control panel from the source of the vibration or shock. Or secure the Box PC and the control panel with rubber padding to prevent vibration.
- Make the building or the floor vibration-resistant.
- Prevent shocks when other devices in the panel, such as electromagnetic contactors, operate. Secure either the source of the shock or the Box PC with rubber padding.

5-3-6 Atmosphere

Using the Box PC in any of the following locations can cause defective contact with connectors and corrosion of components. Implement countermeasures such as purging the air as required.

- In locations exposed to dust, dirt, salt, metal powder, soot, or organic solvents, use a panel with an airtight structure. Be careful of temperature increases inside the panel.
- In locations exposed to corrosive gas, purge the air inside the panel to clear the gas and then pressurize the inside of the panel to prevent gas from entering from outside.
- In locations where flammable gas is present, either use an explosion-protected construction or do not use the Box PC.

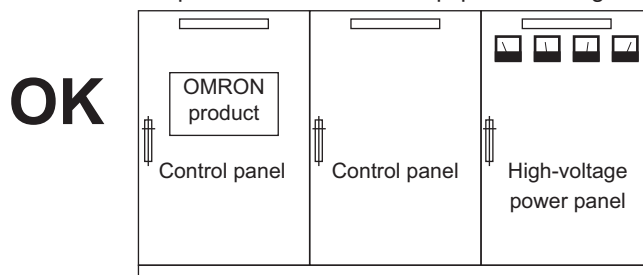
5-3-7 Electrical Environment

When installing or wiring devices, make sure that there will be no danger to people and that noise will not interfere with electrical signals.

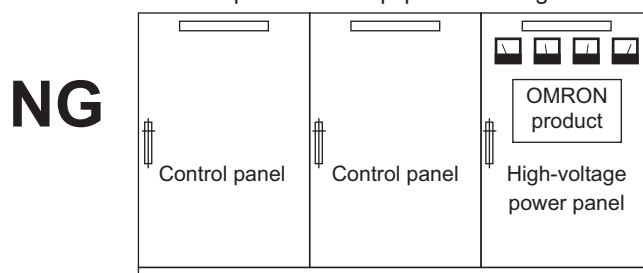
Installation Location

Install the Box PC as far away as possible from high-voltage (600 V or higher) and power devices to ensure safe operation and maintenance.

Example of Recommended Equipment Arrangement



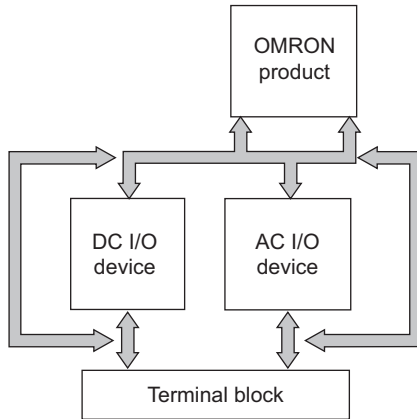
Example of Poor Equipment Arrangement



Examples of Equipment Arrangement in Panel with High-voltage Devices

Hardware Arrangement

The coils and contacts in electromagnetic contacts and relays in an external circuit are sources of noise. Do not install them close to the Box PC. Locate them at least 100 mm away from the Box PC.

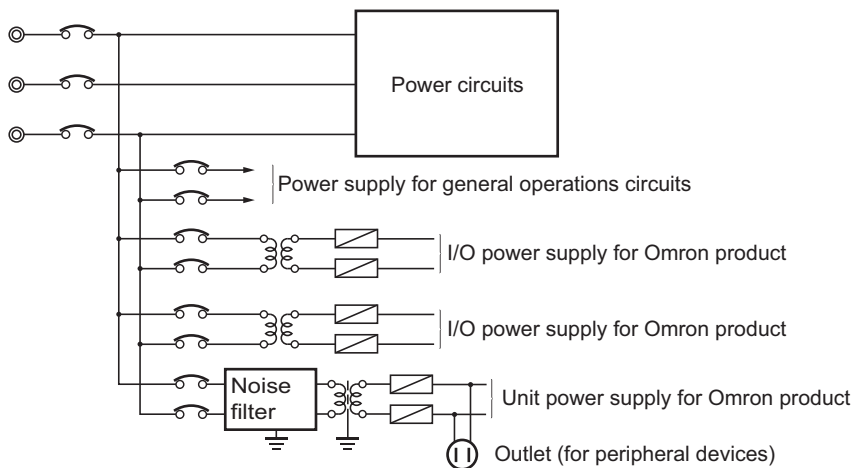


Example of Arrangement in Panel

Wire Layout for the Power Supply

Observe the following points when wiring the power supply system.

- Separate the Box PC power supply from the I/O device power supply and install a noise filter near the Box PC power supply feed section.
- Use an isolating transformer to significantly reduce noise between the Box PC and the ground. Install the isolating transformer between the Box PC power supply and the noise filter, and do not ground the secondary coil of the transformer.
- Keep the wiring between the transformer and the Box PC as short as possible, twist the wires well, and keep the wiring separate from high-voltage and power lines.

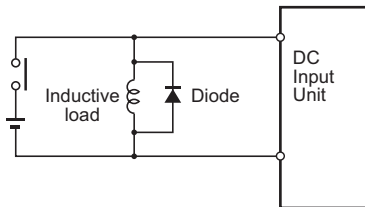


Power Supply System Diagram

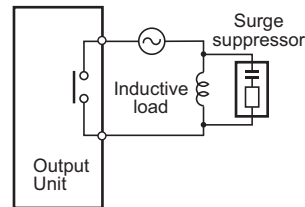
Wire External I/O Signal Lines

Observe the following points when wiring the external I/O signal lines.

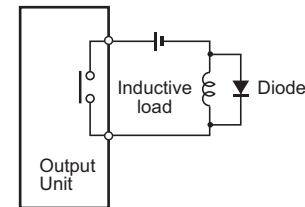
- To absorb reverse electromotive force when an inductive load is connected to an output signal, connect a surge suppressor near the inductive load in an AC circuit, or connect a diode near the inductive load in a DC circuit.



Connect a diode in a DC circuit.



Connect a surge suppressor in an AC circuit.

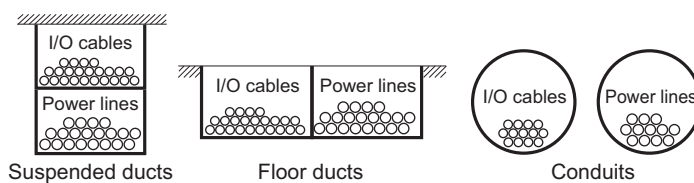


Connect a diode in a DC circuit.

Input Signal Noise Countermeasures

Output Signal Noise Countermeasures

- Never bundle output signal lines with high-voltage or power lines, and do not route them in close proximity or parallel to such lines. If output signal lines must be routed in close proximity to such lines, place them in separate ducts or conduits. Be sure to ground the ducts or conduits.



I/O Cable Arrangement

- If the signal lines and power lines cannot be routed in separate ducts, use shielded cable. Connect the shield to the ground terminal at the Box PC, and leave it unconnected at the input device.
- Wire the lines so that common impedance does not occur. Such wiring will increase the number of wires, so use common return circuits. Use thick wires with sufficient allowance for the return circuits, and bundle them with lines of the same signal level.
- For long I/O lines, wire the input and output signal lines separately.
- Use twisted-pair wires for pilot lamps (and particularly lamps with filaments).
- Use countermeasures, such as CR surge absorbers and diodes, for input device and output load device noise sources, as required.

External Wiring

Wiring, and noise countermeasures in particular, are based on experience, and it is necessary to closely manage wiring based on experience and information in the manuals.

● Wiring Routes

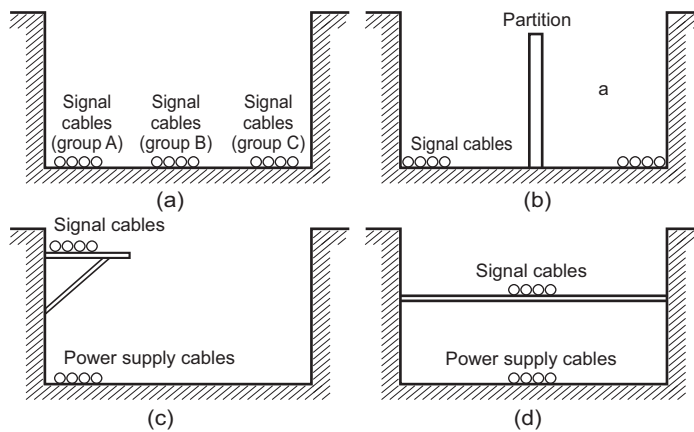
Each of the following combinations includes different signal types, properties, or levels. They will cause the signal-to-noise ratio to drop due to factors such as electrical induction. As a general rule when wiring, either use separate cables or separate wiring routes for these items. Future maintenance operations and changes to the system will also be made easier by carefully organizing the wiring from the start.

- Power lines and signal lines
- Input signals and output signals
- Analog signals and digital signals
- High-level signals and low-level signals
- Communications lines and power lines
- DC signals and AC signals
- High-frequency devices (such as Inverters) and signal lines (communications)

● (Routing of) Wiring

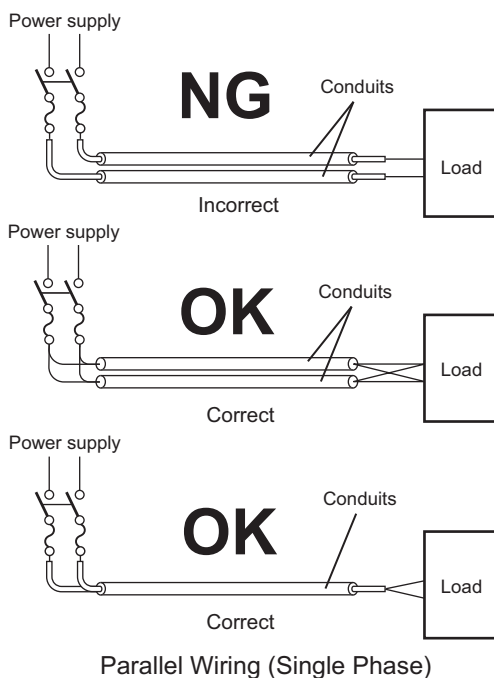
Observe the following points when wiring power supply and signal cables.

- When routing signal cables with differing characteristics through the same duct, always keep them separated.
- As much as possible, avoid routing multiple power supply lines through the same duct. If it cannot be avoided, then construct a partition between them in the duct and ground the partition.

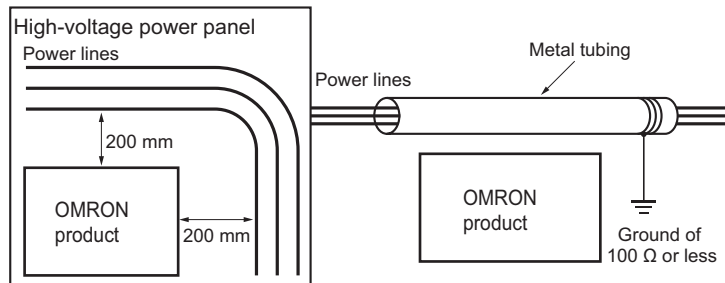


Partitioning Methods for Signal and Power Supply Cables

- To avoid overheating the conduits when using conduits for wiring, do not place wires for a single circuit in separate conduits.



- Power cables and signal cables adversely affect each other. Do not wire them in parallel.
- Noise induction may occur if the Box PC is installed in a panel that includes high-voltage devices. Wire and install them as far apart as possible.
- Either install the Box PC a minimum of 200 mm away from high-voltage lines or power lines, or place the high-voltage lines or power lines in metal tubing and completely ground the metal tubing to 100 Ω or less.



Example: Separating an OMRON product from Power Lines

● Wiring Ducts

Whenever possible, route the cables and wires through wiring ducts.

Install the wiring ducts so that it is easy to route the wires from the IPC Machine Controller directly into the duct.



Additional Information

Refer to *Distance for Cooling* on page 5-15 for the minimum required distances.

It is convenient to use wiring ducts that have the same depth as the IPC Machine Controller.



5-3-8 Book Mount Procedure

Use the following procedure to mount the IPC Machine Controller in the book orientation.

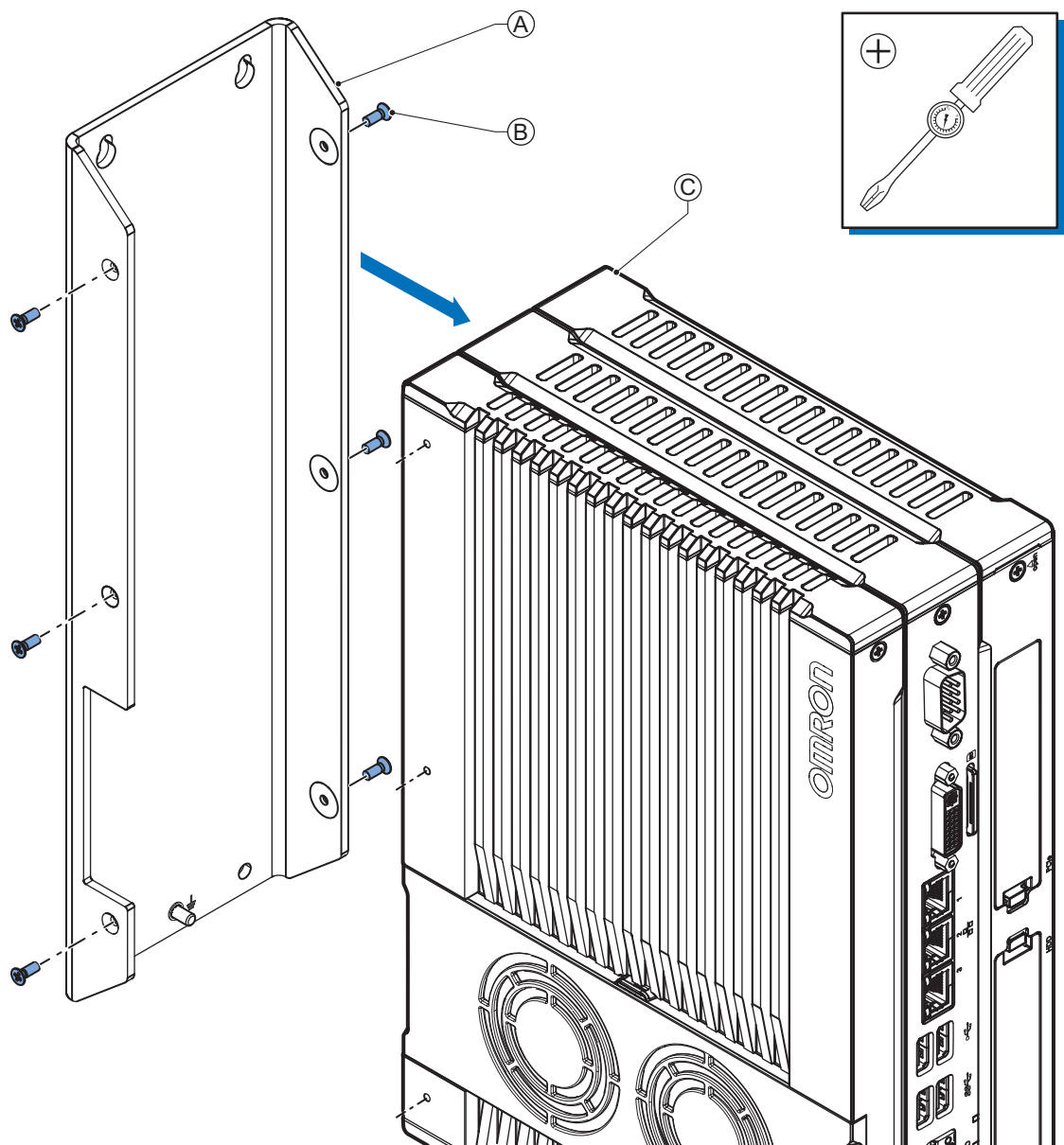


Additional Information

- Refer to 5-4-2 *Ground* on page 5-27 for grounding details.
- Refer to 3-9-1 *Mounting Brackets* on page 3-20 for the bracket model.

To mount the Box PC:

- 1 Mount the Bracket (A) to the Industrial Box PC (C) with the 6 Phillips screws (B) supplied with the brackets. Tighten these screws with a torque of 0.5 N·m.



- 2 Mount the Box PC with the bracket in position.
 - Drill the four holes at the location where the Box PC with bracket will be mounted. Refer to 4-1-8 *Bracket Specifications* on page 4-7 for details.
 - Position the Industrial Box PC with bracket in the mounting location.

- Insert screws through the bracket into the mounting surface.
Note that these screws are not in the scope of delivery.
- Tighten all four screws with a torque of 0.5 N·m.

The Box PC is mounted.

5-3-9 Wall Mount Procedure

Use the following procedure to mount the Box PC in the wall orientation.

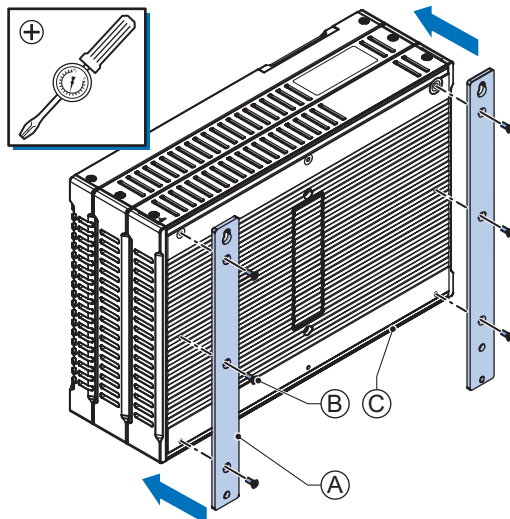


Additional Information

- Refer to 5-4-2 *Ground* on page 5-27 for grounding details.
- Refer to 3-9-1 *Mounting Brackets* on page 3-20 for the bracket model.

To mount the Box PC:

- 1 Mount the Brackets (A) to the Industrial Box PC (C) with the 6 Phillips screws (B) supplied with the brackets.
Tighten these screws with a torque of 0.5 N·m.



- 2 Mount the Industrial Box PC with the brackets in position.
 - Drill the four holes at the location where the Box PC with brackets will be mounted.
Refer to 4-1-8 *Bracket Specifications* on page 4-7 for details.
 - Position the Industrial Box PC with bracket in the mounting location.
 - Insert screws through the bracket into the mounting surface.
Note that these screws are not in the scope of delivery.
 - Tighten all four screws with a torque of 0.5 N·m.

The Box PC is mounted.

5-4 Wire

This section describes how to wire the IPC Machine Controller.

5-4-1 Wiring Warnings and Cautions

This section describes the Warnings and Cautions when wiring the IPC Machine Controller.

WARNING

If external power supplies for slaves or other devices are overloaded or short-circuited, the voltage will drop, outputs will turn OFF, and the system may be unable to read inputs. Provide external safety measures in controls with monitoring of external power supply voltage as required so that the system operates safely in such a case.



WARNING

Provide safety measures in external circuits to ensure safety in the system if an abnormality occurs due to malfunction of the product or due to other external factors affecting operation. Not doing so may result in serious accidents due to incorrect operation.



WARNING

Emergency stop circuits, interlock circuit, limit circuits, and similar safety measures must be provided in external control circuits.



WARNING

Provide measures in the communications system and user program to ensure safety in the overall system even if errors or malfunctions occur in data link communications or remote I/O communications.



WARNING

Unintended behavior may occur when an error occurs in internal memory of the product. As a countermeasure for such problems, external safety measures must be provided to ensure safe operation of the system.



Precautions for Safe Use

Do not allow wire clippings, shavings, or other foreign material to enter the Box PC. Otherwise, Box PC burning, failure, or malfunction may occur. Cover the Box PC or take other suitable countermeasures, especially during wiring work.

5-4-2 Ground

This section describes how to ground the IPC Machine Controller.

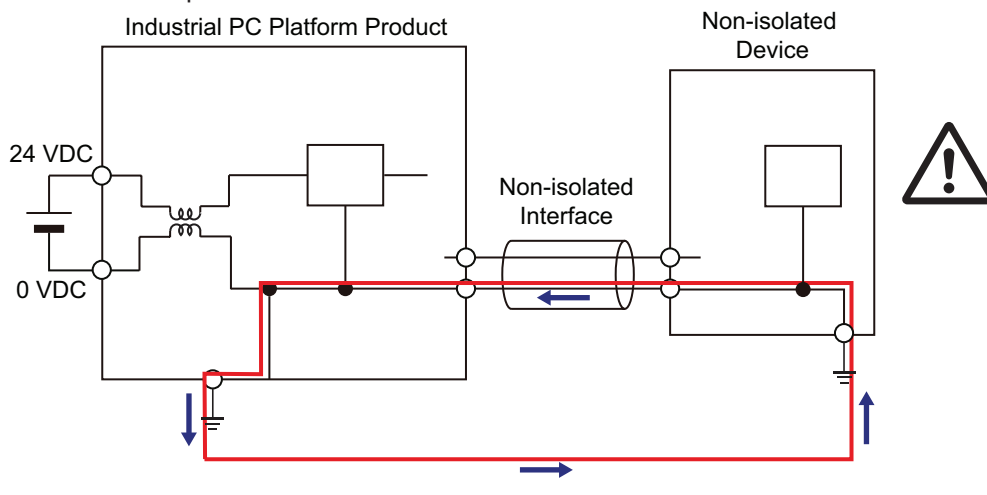
WARNING

Always connect to a ground of $100\ \Omega$ or less when installing the product.



Caution

The product has an internal non-isolated DC power supply. Circuit ground (0 VDC) and frame ground are connected together. When connecting a non-isolated device or a non-isolated interface to the product, take appropriate actions to avoid communication failures or damage to the mentioned ports.



Caution

Never ground the 24 VDC side of the power supply. This may cause a short circuit.



The shielding of the communication connectors are directly bonded to the case and to the functional ground of the Box PC.

The shield of a communication cable should be terminated to ground at both ends of the cable with a low impedance connection. A large surface area surrounding the entire cable shield ensures a low impedance connection, avoid the use of pigtailed.

Potential differences between the two connected communicating devices might cause an equipotential current to flow through the shielding connected at both ends.

To avoid equipotential currents on the cable shields, an additional equipotential bonding conductor must be installed.

Refer to IEC 61918 for guidelines regarding conductor sizing and length to prevent a voltage offset between two communicating devices exceeding 1 V.

Make sure to run the bonding conductor in close proximity to the communication cable.

Considerations for Earthing Methods

Local potential fluctuations due to lightning or noise occurred by power devices will cause potential fluctuations between ground terminals of devices. This potential fluctuation may result in device malfunction or damage. To prevent this, it is necessary to suppress the occurrence of a difference in electrical potential between ground terminals of devices. You need to consider the earthing methods to achieve this objective.

The recommended earthing methods for each usage condition are given in the following table.

| Specification of communications cables | Earthing methods | | |
|---|------------------------------|-----------------|-----------------|
| | Equipotential bonding system | Star earthing | Daisy chain |
| The cable shield connected to the connector hood at both ends of the communications cable | Recommended | Not recommended | Not recommended |



Additional Information

- In a country or region where the earthing method is regulated, you must comply with the regulations. Refer to the applicable local and national ordinances of the place where you install the system, or other international laws and regulations.
- Ethernet switches are used with the EtherNet/IP. For information on the environmental resistance of the Ethernet switch to use, the grounding between Ethernet switches, or the specifications of cables, ask the Ethernet switch manufacturer.

Each of these earthing methods is given below.

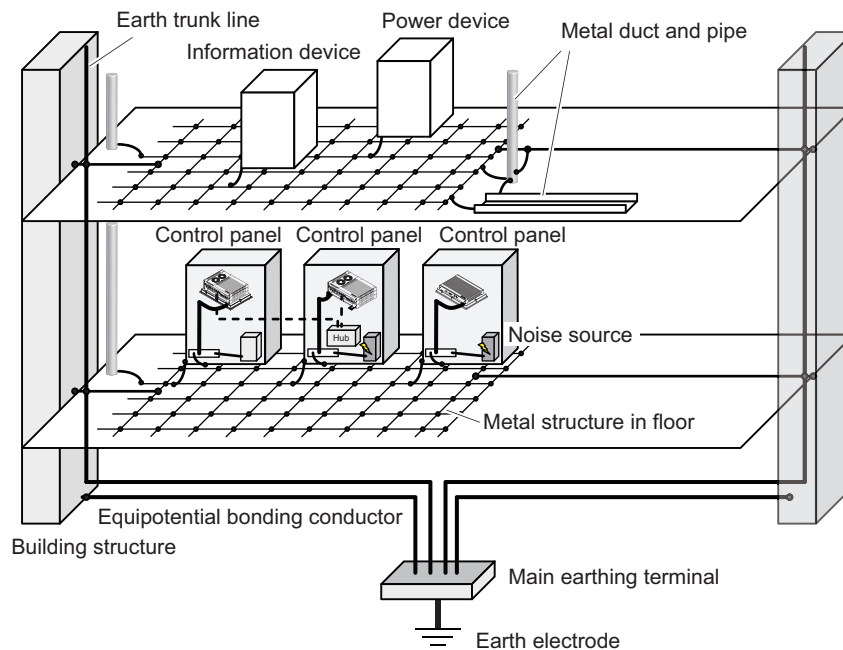
Equipotential Bonding System

Equipotential bonding is an earthing method in which steel frames and building structures, metal ducts and pipes, and metal structures in floors are connected together and make connections to the earth trunk line to achieve a uniform potential everywhere across the entire building. We recommend this earthing method.

The following figure shows an example of an equipotential bonding system.

Connect the main earthing terminal and building structures together with equipotential bonding conductors and embed the mesh ground line in each floor.

Connect the ground line of each control panel to the equipotential bonding system.



Star Earthing

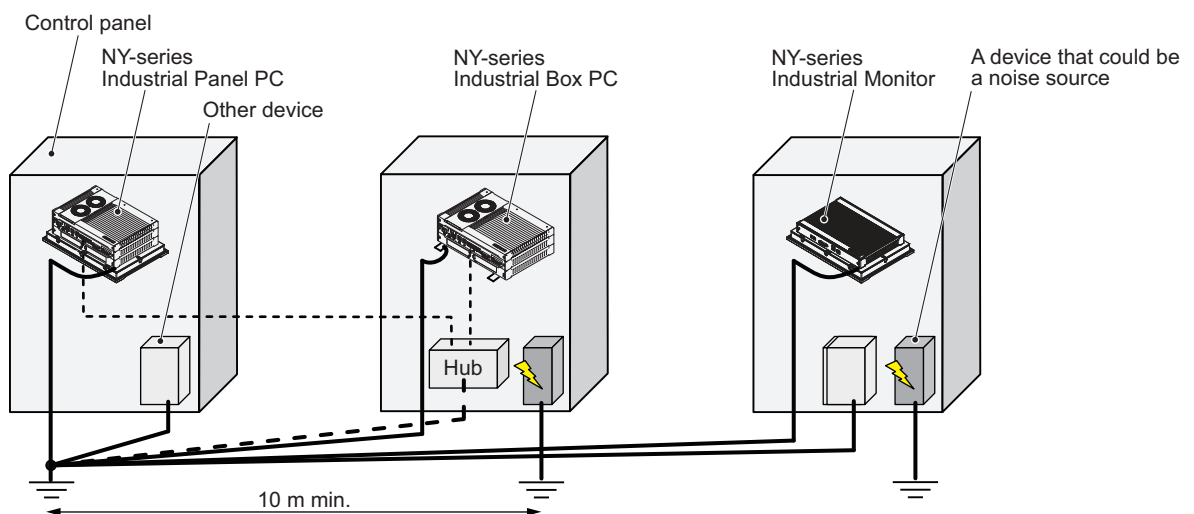
If the earthing method used for the building is not equipotential bonding or the earthing system is unknown, choose (a) from among the earthing methods given below.

a. Connecting devices and noise sources to separate earth electrodes

This is an earthing method to separately ground an earth electrode of the device that is connected with a communications cable or other devices and an earth electrode of a high-power device that could be a noise source, such as a motor or inverter.

Each earth electrode must be ground to 100 Ω or less.

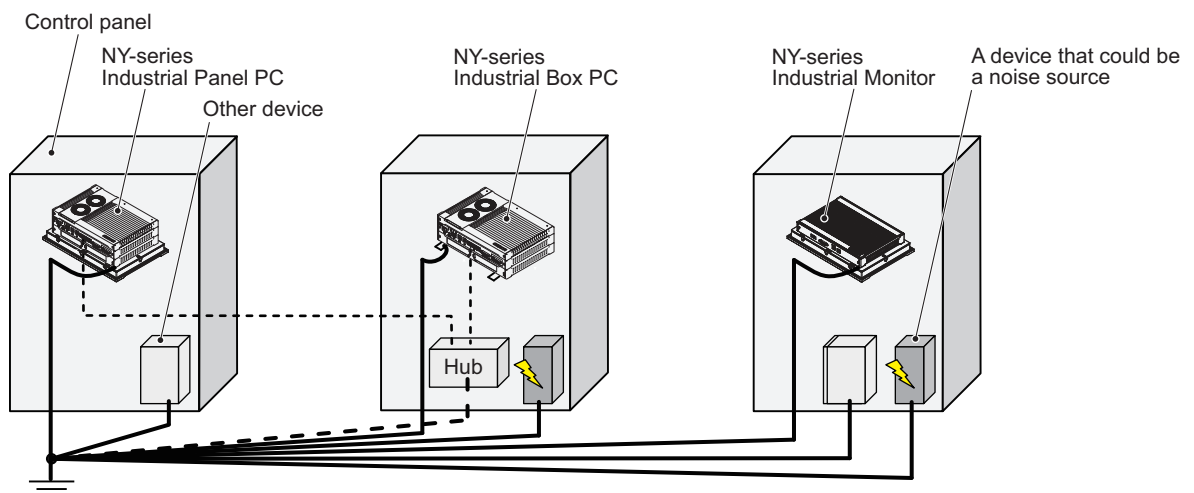
Connect the ground lines of the device that is connected with a communications cable and other devices as a bundle to a single earth electrode. Be sure that the earth electrode is separated by a minimum of 10 m from any other earth electrode of a device that could be a noise source.



b. Connecting devices and noise sources to a common earth electrode

This is an earthing method to connect the device that is connected with a communications cable, other devices, and a device that could be a noise source, to a common earth electrode.

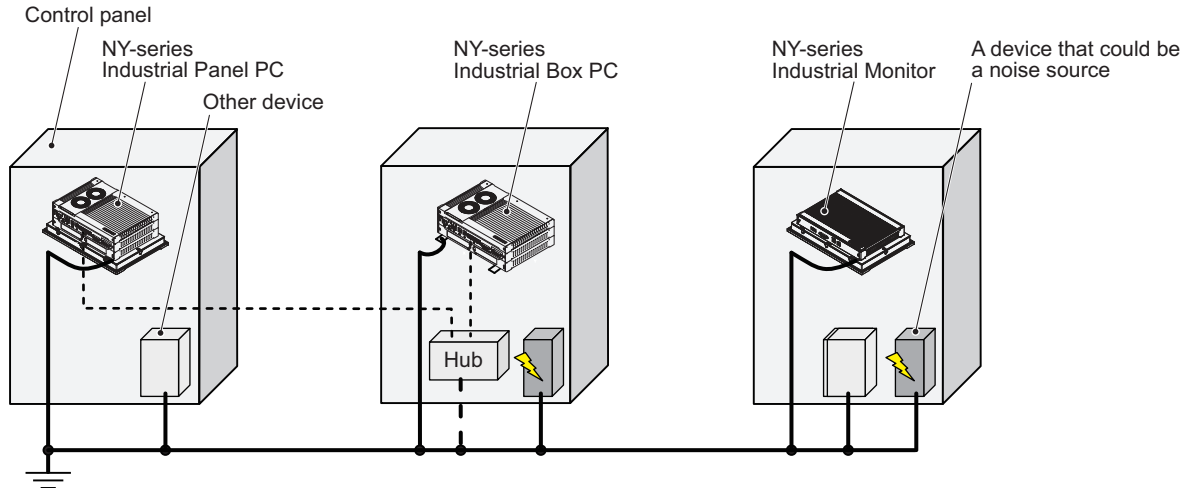
This earthing method is not recommended because the device that could be a noise source may interfere electromagnetically with other devices.



Daisy Chain

This is an earthing method to connect the device that is connected with a communications cable, other devices, and a device that could be a noise source using a daisy-chain topology to a common earth electrode.

This earthing method is not recommended because the device that could be a noise source may interfere electromagnetically with other devices.



Ground Connection Details

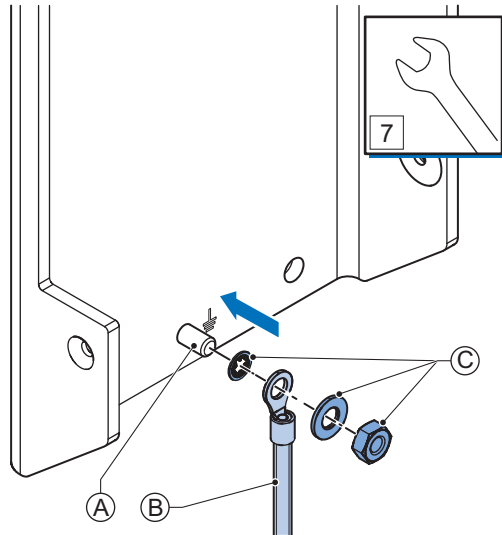
This section provides details about the ground connection.

Use the functional ground terminal on the mounting bracket(s) to ground your Industrial Box PC.

The washers and nut (C) are supplied with the bracket(s).

Refer to *Items Supplied with the Brackets* on page 5-4 for details.

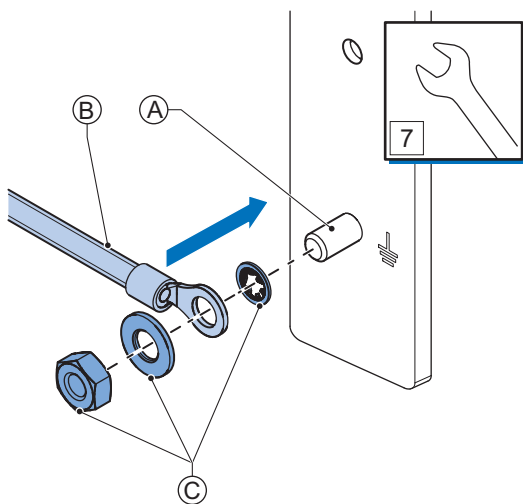
Book Mount



Mount the ground connection wire (B) to the functional ground terminal (A) using the washers and nut (C). Tighten the nut with a torque of 1.2 N·m max.

Refer to *5-3-8 Book Mount Procedure* on page 5-24 for book mounting details.

Wall Mount

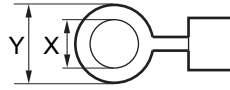


Mount the ground connection wire (B) to the functional ground terminal (A) using the washers and nut (C). Tighten the nut with a torque of 1.2 N·m max.

Refer to *5-3-9 Wall Mount Procedure* on page 5-25 for wall mounting details.

- **Crimp terminals**

Use crimp terminals with dimensions X = M4 and Y = 8 mm max.



5-4-3 Wire the Power Connector

This section describes how to wire the power connector.



Precautions for Safe Use

- Do not perform a dielectric strength test.
 - Always use the recommended uninterruptible power supply (UPS) to prevent data loss and other system file integrity issues caused by unexpected power interruption. Back up the system files in the planned way to prevent data loss and other system file integrity issues caused by incorrect operation.
-



Additional Information

- The selected conductor size must match with the used maximum power supply capacity or an overcurrent protection device must be used.
 - The used wires and the overcurrent protection device must meet the applicable national standards.
Standards are:
 - NEC (National Electric Code)
 - CEC (Canadian Electrical Code)
 - international applicable standards
 - Refer to 4-1-2 *General Electrical Specifications* on page 4-3 for electrical specifications.
 - Refer to 4-1-3 *Power Consumption Specifications* on page 4-3 for power consumption specifications.
 - Refer to 3-9-10 *UPS* on page 3-26 for UPS information.
-

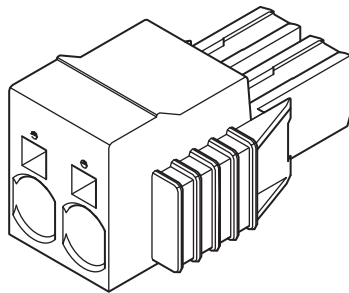
Power Connector Wiring Materials

Use the power supply connector that was supplied to connect the power supply to the IPC Machine Controller.

- Select power supply conductors with consideration to the voltage drop and heat generation for the cable length at the installation environment.
- Always use twisted wires to minimize the occurrence of electrical disturbance.
- Recommended power supply conductor sizes are provided in the table.

| Wire type | Conductor cross-section |
|--|---------------------------|
| Solid conductor | 0.5 to 10 mm ² |
| Flexible conductor | 0.5 to 6 mm ² |
| Flexible conductor, with ferrule and no plastic sleeve | 0.5 to 6 mm ² |
| Flexible conductor, with ferrule and plastic sleeve | 0.5 to 4 mm ² |
| Minimum AWG according to UL/cUL | 20 |
| Maximum AWG according to UL/cUL | 8 |

- Power Supply Connector



DC Power Supply

The OMRON S8VK-series power supply is recommended for use with the IPC Machine Controller.



Additional Information

- Refer to *3-9-9 Power Supply* on page 3-25 for more information.
- Refer to *4-1-3 Power Consumption Specifications* on page 4-3 for power consumption details.

Power Connector Wiring Procedure

Use the following procedure to wire the power connector.

- 1 Remove the sheath from the power supply wires.

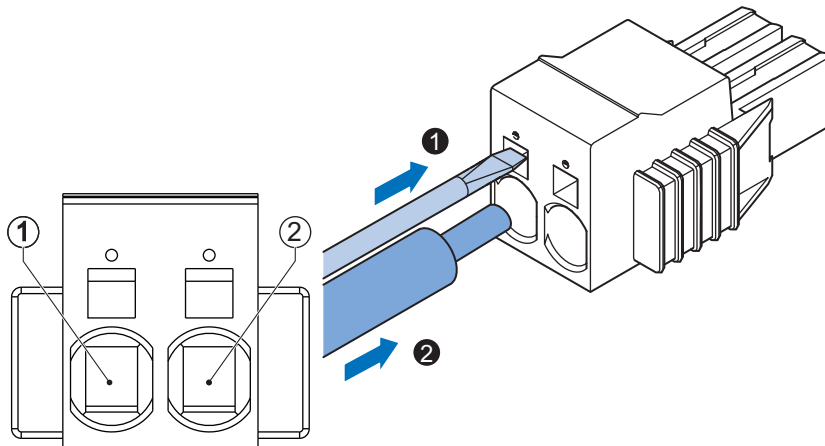


Precautions for Safe Use

Observe the following precautions to prevent broken wires.

- When you remove the sheath, be careful not to damage the conductor.
- Connect the conductor without twisting the wires.
- Do not weld the conductors. Doing so may cause the wires to break with vibration.

- 2 Insert a screwdriver in the small opening above the cable opening ① to unlock the cable entry and then push the wire all the way to the back of the cable opening ②.



| Pin | Description |
|-----|-------------|
| 1 | 24 VDC |
| 2 | 0 VDC |

- 3 Remove the screwdriver.

Do not apply stress to the cable after you have connected the wires.

5-4-4 Wire the I/O Connector

This section describes how to wire the I/O connector.

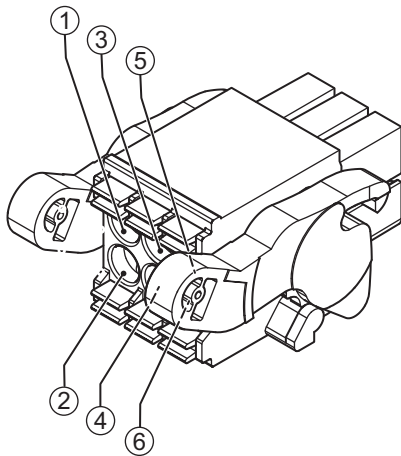
I/O Connector Wiring Materials

Use the supplied I/O connector to connect the inputs and outputs to the IPC Machine Controller. Recommended I/O conductor sizes for the connector are provided in the table.

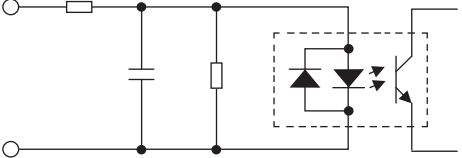
| Wire type | Conductor cross-section |
|--|------------------------------|
| Solid conductor | 0.2 to 1.5 mm ² |
| Flexible conductor | |
| Flexible conductor, with ferrule and no plastic sleeve | 0.25 to 1.5 mm ² |
| Flexible conductor, with ferrule and plastic sleeve | 0.25 to 0.75 mm ² |
| Minimum AWG according to UL/cUL | 24 |
| Maximum AWG according to UL/cUL | 16 |

I/O Connections

This section describes I/O connection details.



| Pin | Description | Internal Circuit Details |
|--------|---------------------|---|
| 1 2 | Power Status Output | <p>The Power Status Output has an internal relay. Wire this according to the input device connected to the Power Status Output.</p> |

| Pin | Description | Internal Circuit Details |
|-----|----------------|---|
| 3 | Power ON Input | <p>The Power ON Input and the UPS Mode Input are bi-directional and isolated. Each input can be wired as sinking (NPN) or sourcing (PNP). Wire these according to the output device connected to the inputs.</p>  |
| 4 | | |
| 5 | UPS Mode Input | |
| 6 | | |



Additional Information

- Refer to *4-2-2 I/O Connector Specifications* on page 4-9 for I/O connector specifications.
- Refer to *I/O Connector Power Status Output Details* on page 4-11 for power status output details.
- Refer to *5-5-4 Connect UPS* on page 5-45 for UPS connection details.

I/O Connector Wiring Procedure

Use the following procedure to wire the I/O connector.

- 1** Remove the sheath from the wires. 

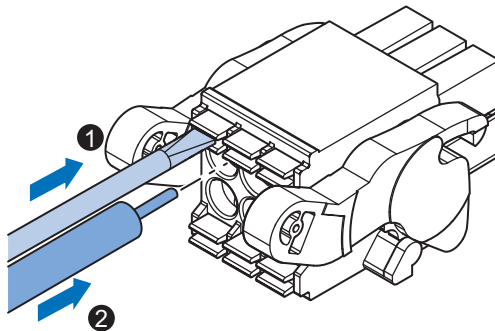


Precautions for Safe Use

Observe the following precautions to prevent broken wires.

- When you remove the sheath, be careful not to damage the conductor.
- Connect the conductor without twisting the wires.
- Do not weld the conductors. Doing so may cause the wires to break with vibration.

- 2** Remove the I/O connector from the Box PC.
- 3** Insert a screwdriver in the small groove above the cable entry **1** to unlock the cable entry and then push the wire all the way to the back of the cable opening **2**.



- 4** Remove the screwdriver.

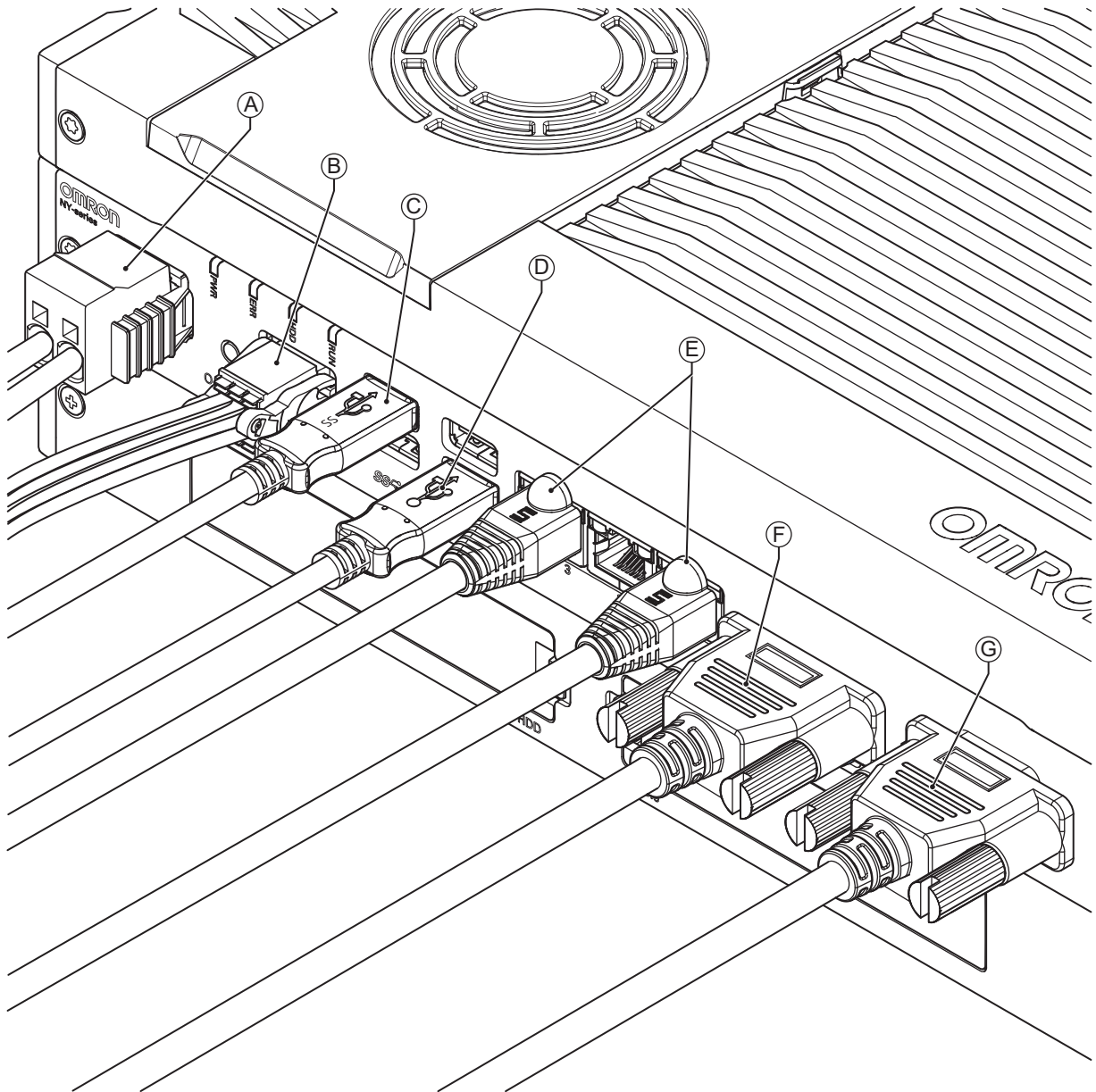
Do not apply stress to the cable after you have connected the wires.

5-5 Connect

This section describes how to connect the IPC Machine Controller.

5-5-1 Connector Identification

The Industrial Box PC connectors are shown below.



| Item | Name | Description |
|------|-------------------|--|
| A | Power connector | Lockable power connector |
| B | I/O connector | 2 inputs (UPS signal and power OFF control) and 1 output (Industrial Box PC power state) |
| C | USB 3.0 connector | 2 USB 3.0 connectors |
| D | USB 2.0 connector | 2 USB 2.0 connectors |

| Item | Name | Description |
|------|--|---|
| E | 10BASE-T/100BASE-TX/ 1000BASE-T Ethernet connectors | 3 RJ45 Gb Ethernet connectors |
| F | DVI connector | Digital Visual Interface connector |
| G | Option port | Interface connection options for peripheral devices or an additional monitor: <ul style="list-style-type: none">• RS-232C connector (default)• DVI-D connector• NY Monitor Link connector |

5-5-2 Connection Procedure

Use the following procedure to connect the IPC Machine Controller.

Ensure the Box PC is securely fastened to the mounting surface.

Ensure the mounted Box PC can be connected to power and peripheral devices. Remove dust covers where applicable and store them in a safe place.

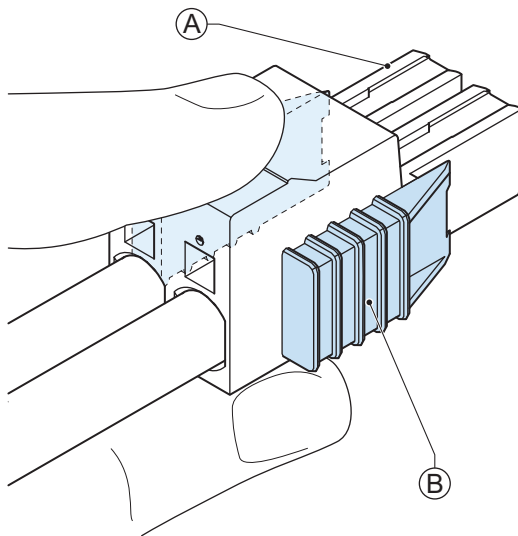


Additional Information

- Refer to *5-3 Mount* on page 5-14 for mounting details.
- Refer to:
 - *3-9-5 DVI Cables* on page 3-22
 - *3-9-6 USB Type-A to USB Type-B Cables* on page 3-23
 - *3-9-7 NY Monitor Link Cables* on page 3-23
 - individual cable specifications for cable bending requirements and connector clearance.

Use the following procedure to connect the Box PC:

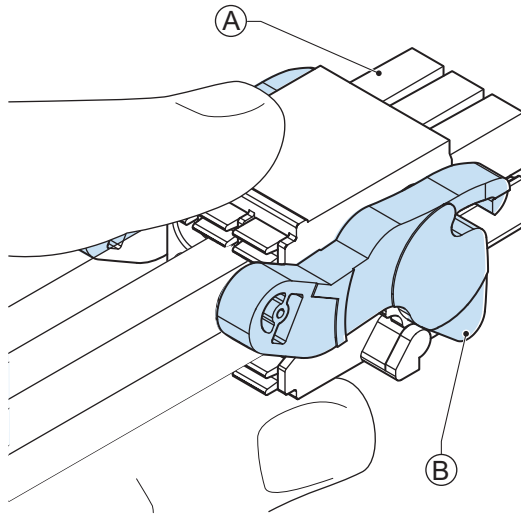
- 1** Ensure the ground terminal is connected.
Refer to *5-4-2 Ground* on page 5-27 for grounding details.
- 2** Connect the power connector **(A)**.
Hold the black part to enable the auto-locking mechanism.



Do not push the orange sliders **(B)** in the direction of the Box PC because this will unlock the connector.

3 Connect the I/O connector.

Hold the black part **(A)** when inserting the connector, this enables the auto-locking mechanism.



Do not tilt the orange levers **(B)** because this will unlock the connector.

4 Connect an external monitor such as the Industrial Monitor.

Connect the monitor to the DVI interface and tighten the fastening screws or use the optional NYML connector.

For an Industrial Panel PC this is optional because a monitor is integrated.

5 Connect a device to the optional interface (DVI, RS-232C or NYML) if applicable and tighten the fastening screws when applicable.**6** Connect the USB ports to peripheral devices .**7** Connect the Box PC to the required Ethernet interface connector(s).

Refer to *5-5-3 Ethernet Connection Procedure* on page 5-44 for Ethernet port details.

The Box PC is connected.

5-5-3 Ethernet Connection Procedure

Use the following procedure to connect the Ethernet connectors of the IPC Machine Controller.

- 1** Remove the dust caps from the Ethernet ports to be connected.
- 2** Connect Ethernet Port 1 of the Box PC to a normal Ethernet network.
- 3** Connect Ethernet port 2 of the Box PC to the Ethernet/IP network.
- 4** Connect Ethernet port 3 of the Box PC to the EtherCAT network.



Additional Information

- Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherNet/IP Port User's Manual (Cat. No. W563)* for Ethernet/IP port details.
 - Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT Port User's Manual (Cat. No. W562)* for EtherCAT port details.
-

The Ethernet connectors are connected.

5-5-4 Connect UPS

The OMRON S8BA UPS protects the Box PC from power failures, voltage variations and instantaneous voltage drops. Short power interruptions will be backed up by the UPS and the Box PC will continue normal operation. The UPS signals the Box PC when a power failure occurs and then the Box PC will shutdown normally without data loss. The Box PC can automatically start up again when the power is restored.

WARNING

The use of an uninterruptible power supply (UPS) allows normal operation to continue even if a momentary power failure occurs, possibly resulting in the reception of an erroneous power signal from an external device affected by the momentary power failure. Take external fail-safe measures. Where necessary, monitor the power supply voltage on the system for external devices and use it as an interlock condition.



Precautions for Safe Use

- Always use an uninterruptible power supply (UPS) to prevent data loss and other system file integrity issues caused by unexpected power interruption.
- Use an Omron S8BA UPS with the correct revision number to prevent improper system shutdown.
- Correctly perform wiring and setting, and ensure that the shutdown by the UPS can be executed.



Additional Information

- The minimum power requirements of the UPS are dependent on the power consumption. Refer to *4-1-3 Power Consumption Specifications* on page 4-3 for power consumption details.
- Refer to [the OMRON website](#) for S8BA specifications and for the *UPS S8BA User's Manual (Cat. No. U702)*.
Note that the power consumption details determine the output current/capacity of your UPS.

Connect UPS Using the I/O Connector

The I/O connector of the IPC Machine Controller

- receives the power status of the UPS with the UPS Mode Input.
- indicates the power status of the Box PC to the UPS with the Power Status Output when the Box PC has a Windows operating system. For other operating systems this output is not functional.

The Box PC will shut down properly in case of a power supply interruption.



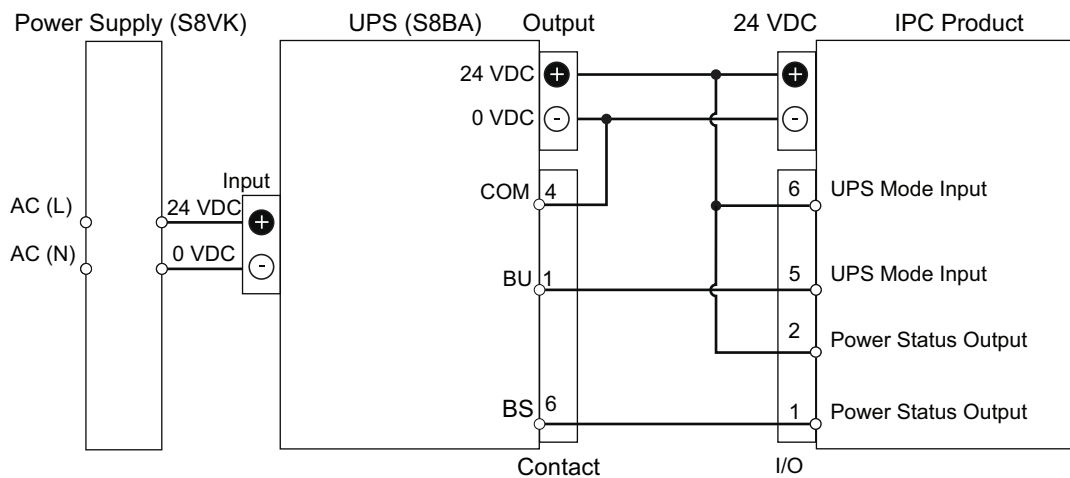
Precautions for Safe Use

- Always use the recommended uninterruptible power supply (UPS) to prevent data loss and other system file integrity issues caused by unexpected power interruption.
- Use an Omron S8BA UPS with the correct revision number to prevent improper system shutdown.
- Correctly perform wiring and setting, and ensure that the shutdown by the UPS can be executed.

Follow the steps below to connect the S8BA UPS to the I/O connector of the Box PC and to configure it correctly.

Refer to 5-4-4 *Wire the I/O Connector* on page 5-37 for I/O Connector details.

- 1** Ensure the revision number of the UPS is correct.
Refer to 3-9-10 *UPS* on page 3-26 for more information.
- 2** Connect and install the S8BA UPS.
Refer to the *UPS S8BA User's Manual (Cat. No. U702)* for details.
Connect the Contact port of the S8BA UPS to the I/O port of the Box PC with the connection cable S8BW-02.



- 3** Power ON the Box PC.



Additional Information

First execute the Initial Power ON Procedure and Initial Settings procedure before continuing with the next step when the Box PC is powered ON for the first time.

- Refer to 5-6 *Initial Power ON* on page 5-48 for Initial Power ON details.
- Refer to NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568) for Initial Settings details.

- 4** Configure the UPS.
 - 1) Connect the USB cable supplied with the UPS to the USB connector of the UPS and to the USB connector of the Box PC.
 - 2) Configure the UPS using the UPS Settings Utility.
Refer to UPS Setting Utility Instruction Manual for S8BA/BU-2RWL for details.
 - 3) Remove the USB cable between the UPS and the Box PC.
- 5** Configure the Box PC to auto-start after power loss within the BIOS settings.
 - Refer to A-1-1 *BIOS Overview* on page A-2 for details on BIOS changes.
 - Refer to A-1-5 *BIOS - Boot* on page A-9 for power loss BIOS details.
- 6** Simulate a power interruption and confirm a correct shutdown of the Box PC.
 - Start the Box PC
 - Start applications

- Create a power interruption
- Monitor the shutdown sequence and confirm a correct shutdown sequence

The UPS is connected and configured.

The Box PC will shut down properly in case of a power supply interruption and restart automatically when the power is restored.



Additional Information

- The default **Input sensitivity setting** is **Standard voltage sensitivity** and this is correct. Do not set this parameter to **Low voltage sensitivity**. Doing so can cause a system malfunction when switching to battery mode.
 - Do not use the Simple Shutdown Software because it can not Power OFF the IPC Machine Controller.
-

5-6 Initial Power ON

This section describes how to Power ON the IPC Machine Controller for the first time.

WARNING

Ensure that installation and post-installation checks of the product are performed by personnel in charge who possess a thorough understanding of the machinery to be installed.



5-6-1 Initial Power ON Procedure

Use the following procedure to power ON the IPC Machine Controller for the first time.

- 1** Ensure the following conditions are present before applying power for the first time:
 - The Box PC is securely fastened to the mounting surface.
 - The Box PC is connected to ground.
 - All connectors are securely fastened.
- 2** Ensure that the connected monitor(s) is powered ON.
- 3** Connect a keyboard and/or mouse.
 - If using an OMRON Industrial Monitor, this may not be required because it has touch functionality.
 - Do not connect additional storage devices before the installation of the operating system completed. Adding storage devices like a USB flash drive, an SD memory card or a PCIe card might influence the default drive letter sequence.
- 4** Ensure the power supply is ON.



Precautions for Safe Use

Always check the power supply and power connections before applying power. Incorrect power connections can damage the product or cause burning.

- 5** Press the power button and release within 1 second.
Refer to 3-3 *Power Button* on page 3-9 for the power button location.
The Box PC starts and the PWR LED will go ON.

- 6** Verify the ERR LED is OFF.

The Industrial Box PC is ON and the Operating System starts.



Additional Information

Refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)* for details on how to continue the setup.

6

Operating Procedures

This section provides the operating procedures for the IPC Machine Controller.

| | | |
|------------|---|------------|
| 6-1 | Power ON | 6-2 |
| 6-1-1 | Power ON Using the Power Button | 6-2 |
| 6-1-2 | Power ON Using the Power ON/OFF Input | 6-2 |
| 6-1-3 | Power ON Using Safe Mode..... | 6-3 |
| 6-1-4 | Auto Power ON | 6-3 |
| 6-2 | Power OFF | 6-4 |
| 6-2-1 | Power OFF Using the Power Button..... | 6-4 |
| 6-2-2 | Power OFF Using the Power ON/OFF Input | 6-4 |
| 6-2-3 | Forced Power OFF Using the Power Button | 6-5 |

6-1 Power ON

This section provides Power ON details.

6-1-1 Power ON Using the Power Button

Start condition: Power is supplied to the Box PC and the Box PC is OFF.

- 1** Press the power button and release within 1 second.
Refer to *3-3 Power Button* on page 3-9 for the power button location.
The Box PC starts and the PWR LED will turn ON.
- 2** Wait until the PWR LED is ON and verify that the ERR LED is OFF.
The Box PC is ON and the Operating System, if installed, starts.

6-1-2 Power ON Using the Power ON/OFF Input

Start condition: Power is supplied to the Box PC and the Box PC is OFF.

- 1** Supply an input signal to pins 3 and 4 of the I/O connector.
The input signal must remain ON for a minimum of 60 ms and a maximum of 750 ms to be correctly detected by the Box PC.
The Box PC starts and the PWR LED will turn ON.
- 2** Wait until the PWR LED is ON and verify that the ERR LED is OFF.
The Box PC is ON and the Operating System, if installed, starts.



Additional Information

- Refer to *4-2-2 I/O Connector Specifications* on page 4-9 for connector specifications.
 - Refer to *5-4-4 Wire the I/O Connector* on page 5-37 for wiring details.
-

6-1-3 Power ON Using Safe Mode

Start condition: The IPC Machine Controller is OFF.



Additional Information

Use this procedure to start the Box PC without starting the Machine Controller Software.

- 1** Remove the power supply connector.
- 2** Press and hold the power button on the Box PC.
- 3** Connect the power supply connector while pressing the power button.
After 10 seconds the Box PC starts in Safe Mode and the PWR LED will turn ON.
- 4** Wait until the PWR LED is ON and verify that the ERR LED is OFF.

The IPC Machine Controller is ON with the Windows Operating System in normal mode and the Machine Controller Software not active.

6-1-4 Auto Power ON

The Box PC can be configured to start up when power is supplied to the power connector.

The **Power Loss Control** BIOS setting controls this behavior.

Set the Power Loss Control setting to **Turn ON** to activate the Auto Power ON function.



Additional Information

Refer to *A-1-5 BIOS - Boot* on page A-9 for BIOS details.

6-2 Power OFF

This section provides Power OFF details.

Before following power OFF procedures below, check that the IPC Machine Controller is ON by examining the LED indicators on the Box PC.

6-2-1 Power OFF Using the Power Button

- 1** Ensure all programs are closed.
If required close all active programs.
- 2** Press and release the power button on the Box PC within 1 second.
Refer to 3-3 *Power Button* on page 3-9 for the power button location information.
The IPC Machine Controller will power OFF.
- 3** Wait until the PWR LED is OFF.
The IPC Machine Controller is powered OFF.



Additional Information

The IPC Machine Controller will be restarted by the UPS when powered off using the power button, when the UPS is connected using the I/O Connector. Use the power button of the UPS or remove the input power from the UPS for a normal shutdown of the system.

6-2-2 Power OFF Using the Power ON/OFF Input

- 1** Ensure all programs are closed.
If required, close all active programs.
- 2** Supply a 24 VDC signal to the Power ON/OFF Input (pins 3 and 4) of the I/O connector.
The input signal must remain ON for a minimum of 60 ms and a maximum of 750 ms to be correctly detected by the Box PC.
The IPC Machine Controller will power OFF.
- 3** Wait until the PWR LED is OFF.
The IPC Machine Controller is powered OFF.



Additional Information

- Refer to 4-2-2 *I/O Connector Specifications* on page 4-9 for connector specifications.
 - Refer to 5-4-4 *Wire the I/O Connector* on page 5-37 for wiring details.
-

6-2-3 Forced Power OFF Using the Power Button



Precautions for Safe Use

Press the power button for several seconds to force the product shutdown. Always back up files in the planned way to prevent data loss or system file corruption.

- 1** Ensure all programs are closed.
If required, close all active programs to prevent losing unsaved data.
- 2** Press and hold the power button on the Box PC for 5 to 10 seconds.
Refer to *3-3 Power Button* on page 3-9 for power button location information.
The IPC Machine Controller will power OFF.
Any optional operating system settings related to power OFF will be disregarded.

- 3** Wait until the PWR LED is OFF.

The Box PC is powered OFF.

Confirm normal operation and check all product settings because unsaved data was lost.



Maintenance

This section provides an overview of all maintenance tasks for the IPC Machine Controller.

| | | |
|------------|---------------------------------------|------------|
| 7-1 | Preventive Maintenance | 7-2 |
| 7-1-1 | Preventive Maintenance Schedule | 7-2 |
| 7-1-2 | Clean the Box PC | 7-3 |
| 7-2 | Corrective Maintenance..... | 7-4 |
| 7-2-1 | Remove the Cover..... | 7-4 |
| 7-2-2 | Replace the Fan Unit..... | 7-5 |
| 7-2-3 | Replace the Battery | 7-7 |
| 7-2-4 | Replace a Drive | 7-9 |
| 7-2-5 | Replace the PCIe Card..... | 7-14 |

7-1 Preventive Maintenance

Preventive Maintenance covers all actions that prevent downtime.

7-1-1 Preventive Maintenance Schedule

Prevent unscheduled downtime with the following preventive maintenance schedule.

| Daily | Reference |
|--|---|
| Check Box PC status | Refer to <i>3-2 LED Indicators</i> on page 3-7 for LED details. |
| Monitor storage devices that do not comply to the Omron specifications | Refer to <i>Storage Device Considerations</i> on page 3-21 for details. |
| Weekly | Reference |
| Clean the Box PC | Refer to <i>7-1-2 Clean the Box PC</i> on page 7-3 for cleaning details. |
| Ensure you have the latest software updates | Refer to the <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)</i> for update details. |
| When changing applications or configurations | Reference |
| Create a backup of the IPC Machine Controller | Refer to the <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)</i> for backup details. |
| Periodically but at least every 6 months | Reference |
| Check the ambient environment: <ul style="list-style-type: none"> • Temperature and humidity within specifications • Noise sources not close to the Box PC | Refer to <i>4-3 Environmental Specifications</i> on page 4-22 for environmental specifications. |
| Check installation: Box PC mounted secure | Refer to <i>5-3 Mount</i> on page 5-14 for mounting details. |
| Check wiring and connections: <ul style="list-style-type: none"> • Cable connectors fully inserted and locked • No damaged wiring or connectors | <ul style="list-style-type: none"> • Refer to <i>5-4 Wire</i> on page 5-26 for wiring details. • Refer to <i>5-5 Connect</i> on page 5-40 for connection details. |
| Check the battery replacement date on the label at the inside of the cover. Replace the battery before the replacement date. | <ul style="list-style-type: none"> • Refer to <i>7-2-1 Remove the Cover</i> on page 7-4 to check the label. • Refer to <i>7-2-3 Replace the Battery</i> on page 7-7 to replace the battery. |
| Check the backup and repair media. | Refer to the <i>NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)</i> for Rescue Disk details. |

| When the IPC Machine Controller is not powered for 6 months | Reference |
|--|---|
| Confirm both fans rotate immediately after Power ON. Replace the Fan Unit when the fans do not rotate smoothly. | Refer to 7-2-2 <i>Replace the Fan Unit</i> on page 7-5 to replace the Fan Unit. |

7-1-2 Clean the Box PC

Clean the Box PC periodically in order to keep it in the best operating condition.

Wipe the Box PC with a dry, soft cloth.



Precautions for Safe Use

Do not use corrosive substances to clean the product.
 Doing so may result in the failure or malfunction.

7-2 Corrective Maintenance

Corrective maintenance covers all actions to correct problems that cause downtime.

WARNING

Do not attempt to disassemble, repair, or modify the product in any way. Doing so may result in malfunction or fire.



Additional Information

Refer to the *NY-series Troubleshooting Manual (Cat. No. W564)* for troubleshooting details.

7-2-1 Remove the Cover

The Cover of the IPC Machine Controller provides access to the following items.

- Battery
- Fan Unit (applies to products with active cooling)

The inside of the Cover contains the following information.

- Battery replacement date
- License key for the operating system (optional)

No tools are required to open the Cover.

Use the following procedure to remove the Cover of the Box PC.

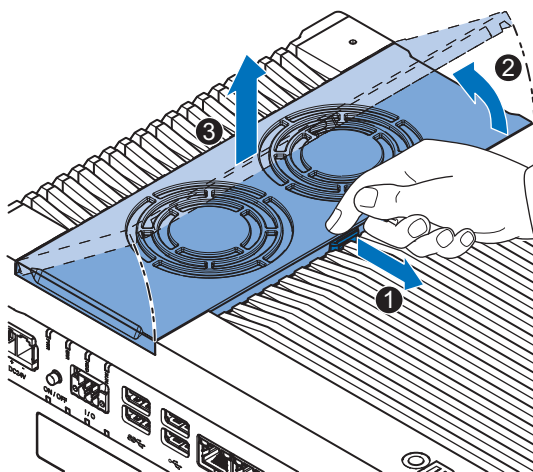
- 1** Power OFF your Box PC if it has active cooling.



Precautions for Safe Use

Do not remove the fan cover while the power is ON. Contact with the rotating fan may result in injury.

- 2** Remove the Cover.



- 1) Pull the lever **1** to unlock the Cover.

- 2) Lift the side ② to tilt the Cover.
- 3) Remove ③ the complete Cover.

The Cover is removed.

To mount the Cover, position the side of the Cover in the Box PC and push the cover in place.

The lever will lock in place.

7-2-2 Replace the Fan Unit

The fans are mounted in the Fan Unit.

Use the following procedure to replace the Fan Unit.



Precautions for Safe Use

If the replacement Fan Unit has been stored over 6 months then check the performance of the Fan Unit after replacement.



Additional Information

Refer to 3-8-2 *Fan Unit* on page 3-18 for the model.

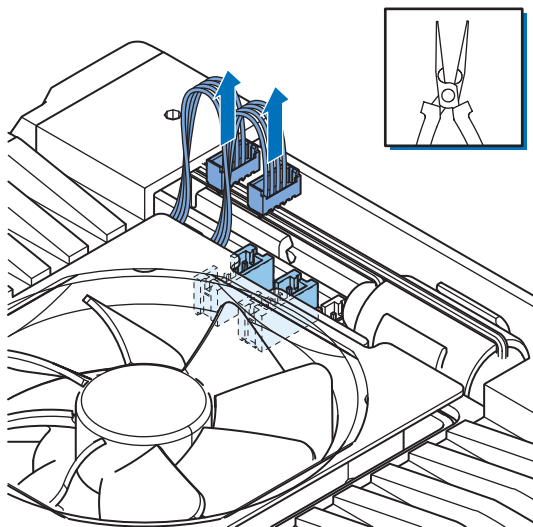
- 1 Power OFF the Box PC.
- 2 Remove the Cover of the Box PC.



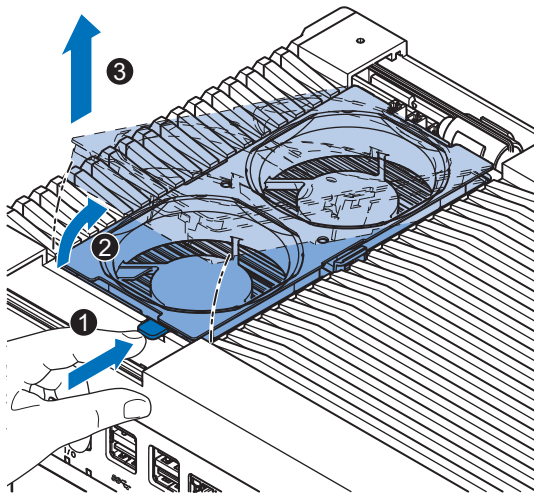
Additional Information

Refer to 7-2-1 *Remove the Cover* on page 7-4 for the cover removal procedure.

- 3 Disconnect the Fan Connectors from the board.



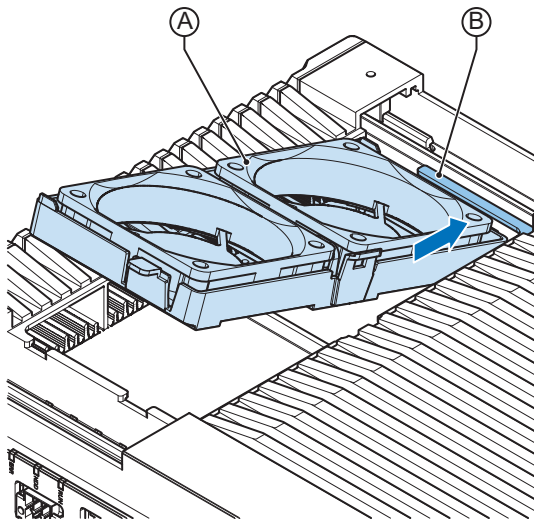
4 Replace the complete Fan Unit.



- 1) Push the lever **1** to unlock the Fan Unit.
- 2) Lift the lever to tilt **2** the Fan Unit.
- 3) Remove **3** the complete Fan Unit.

5 Insert the new Fan Unit in the Box PC.

Ensure the end of the Fan Unit **(A)** is positioned under the fan guide **(B)**.



6 Connect the Fan Connectors to the board.

7 Mount the Cover.

8 Power ON the system.

Confirm both fans rotate immediately after Power ON.

The fans are replaced and the alarm is automatically reset.

7-2-3 Replace the Battery



Precautions for Safe Use

- The Battery may leak, rupture, heat, or ignite. Never short-circuit, charge, disassemble, heat, or incinerate the Battery or subject it to strong shock.
- Dispose of any Battery that has been dropped on the floor or otherwise subjected to excessive shock. Batteries that have been subjected to shock may leak if they are used.
- UL standards require that only an experienced engineer replace the Battery. Make sure that an experienced engineer is in charge of Battery replacement.



Precautions for Correct Use

- Always touch a grounded piece of metal to discharge static electricity from your body before starting an installation or maintenance procedure.
- Make sure to use a battery of the correct type and install the battery properly.
- Apply power for at least five minutes before changing the battery. Mount a new battery within five minutes after turning OFF the power supply. If power is not supplied for at least five minutes, the clock data may be lost. Check the clock data after changing the battery.
- Turn ON the power after replacing the battery for a product that has been unused for an extended period of time. Leaving the product unused without turning ON the power even once after the battery is replaced may result in a shorter battery life.



Additional Information

- Refer to *3-8-1 Battery* on page 3-18 for the battery model.
- UL standards require that batteries be replaced by experienced technicians. Always place an experienced technician in charge of battery replacement.

Use the following procedure to replace the battery:

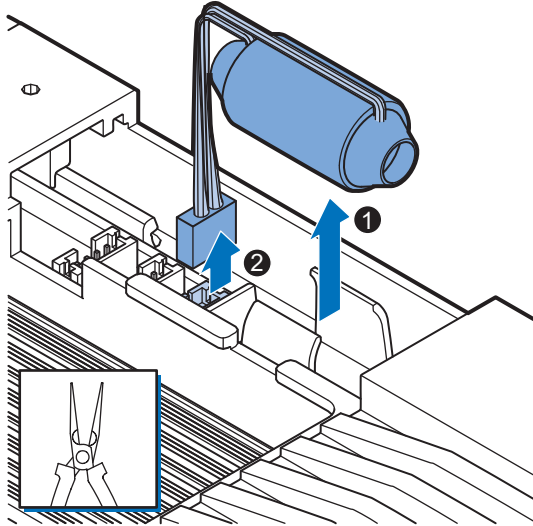
- 1** Power OFF the Box PC.
- 2** Remove the cover.



Additional Information

Refer to *7-2-1 Remove the Cover* on page 7-4 for the cover removal procedure.

- 3** Lift the battery ❶ from the compartment.
- 4** Disconnect the battery from the battery connector ❷.



- 5** Connect the new battery to the battery connector.
- 6** Place the new battery in the Box PC.
Ensure the wires are at the side of the battery and not on top of the battery. If the wires are on top of the battery this might make closing and opening the cover more difficult.
- 7** Write the next date of replacement on the label at the inside of the cover.



Additional Information

Refer to *3-8-1 Battery* on page 3-18 for lifetime of the battery.

- 8** Mount the cover.
 - 9** Remove the power connector for at least 3 seconds to reset the battery warning.
 - 10** Power ON the Box PC.
 - 11** Check the Date and Time in the operating system.
Correct the Date and Time if this is required.
- The battery is replaced and the alarm is reset.

7-2-4 Replace a Drive

Use the following procedure to replace a drive.

Prepare the new drive.

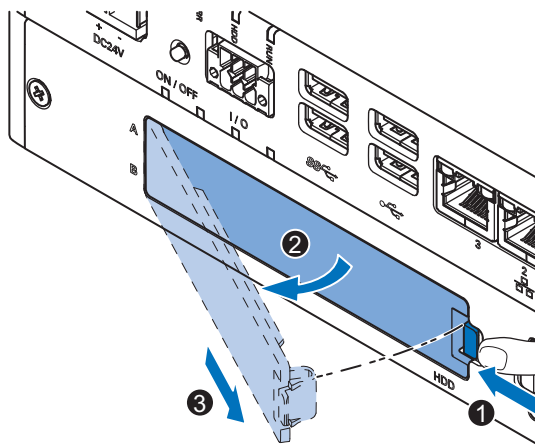


Additional Information

- Refer to *1-4 Product Configuration* on page 1-6 for the installed drive model.
- Refer to *3-9-4 Storage Devices* on page 3-21 for the available drive models.
- Refer to *4-1-6 Storage Device Specifications* on page 4-5 for drive specifications.

To replace a drive:

- 1** Power OFF the Box PC.
- 2** Remove the drive cover.



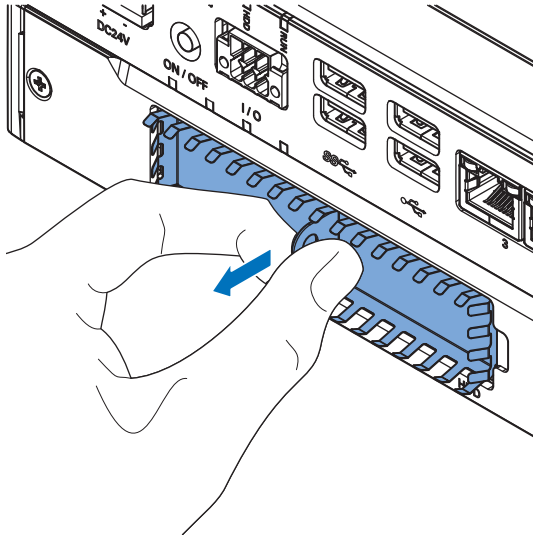
- 1) Push the lock lever **1**.
- 2) Tilt the cover **2**.
- 3) Remove the drive cover **3**.



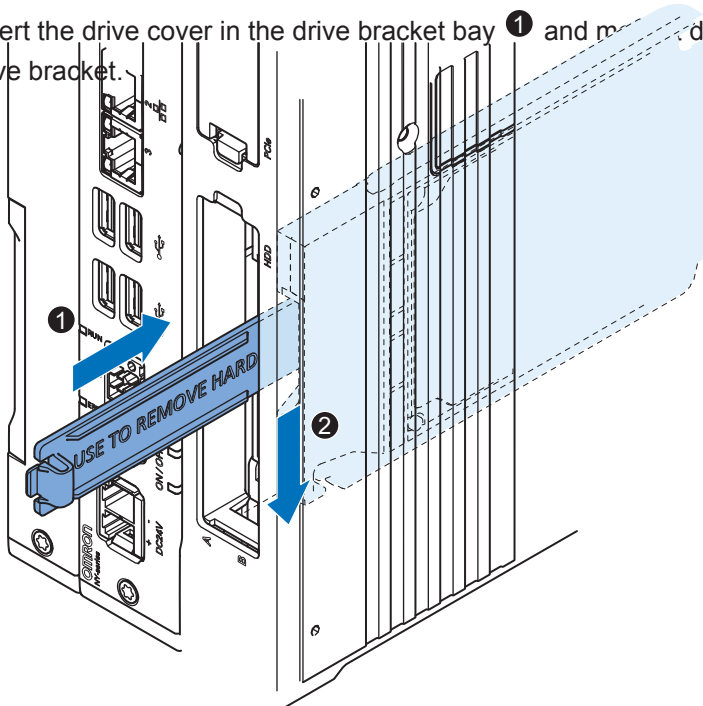
Additional Information

- Refer to *3-4 Drive Bays* on page 3-10 for the location of the drive cover.
- The Box PC has 2 drive bays, marked with "A" and "B" at the left side of the drive cover. Take note of the bay position for the drive that is being removed and do not place a drive in the incorrect bay.

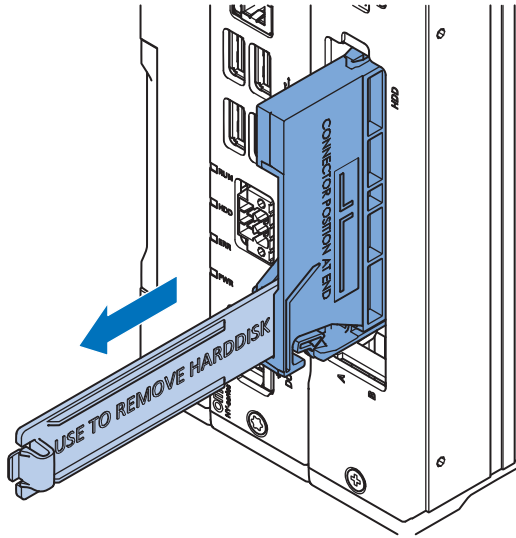
- 3** Pull the metal shielding cover out of the Box PC.



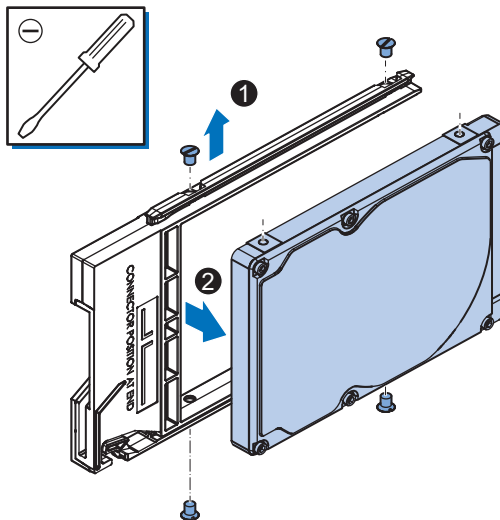
- 4** Insert the drive cover in the drive bracket bay **1** and push down **2** so that it locks in the drive bracket.



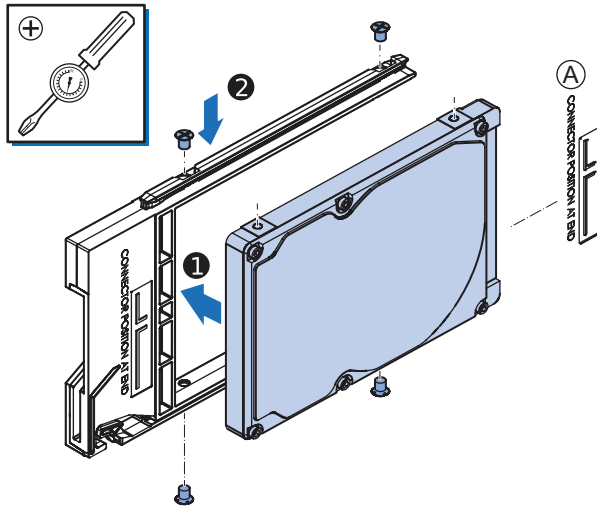
- 5 Remove the drive bracket from the Box PC using the drive cover.



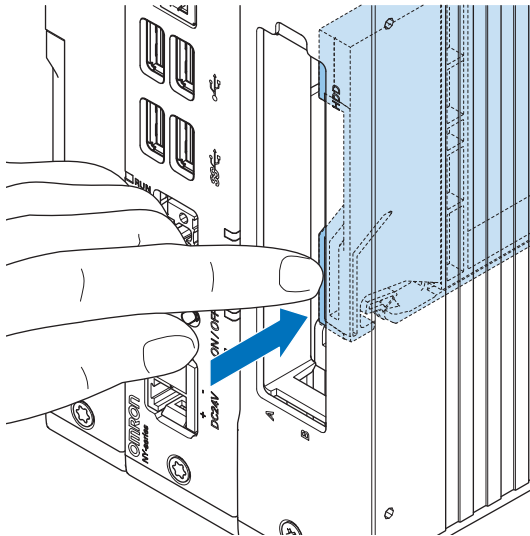
- 6 Remove the 4 mounting screws ① and then remove the drive ② from the drive bracket.



- 7** Align the connectors of the replacement drive as shown **(A)** on the bracket. Then insert the replacement drive **(1)** in the bracket and insert the 4 mounting screws **(2)**. Tighten these screws with a torque of 0.35 N·m.

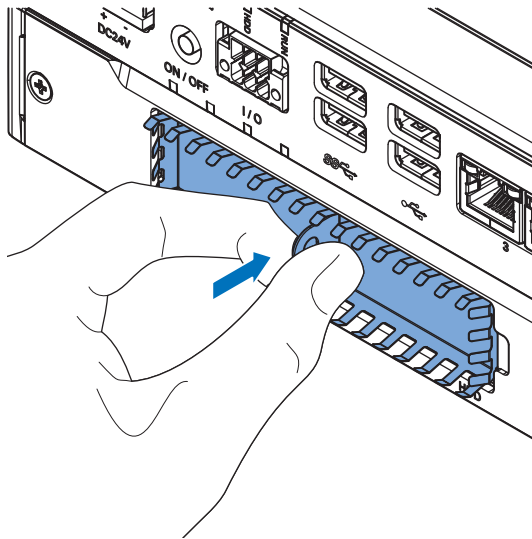


- 8** Insert the bracket with the replacement drive into the correct bay of the Box PC. Ensure the bracket is completely in the Box PC with an extra push.

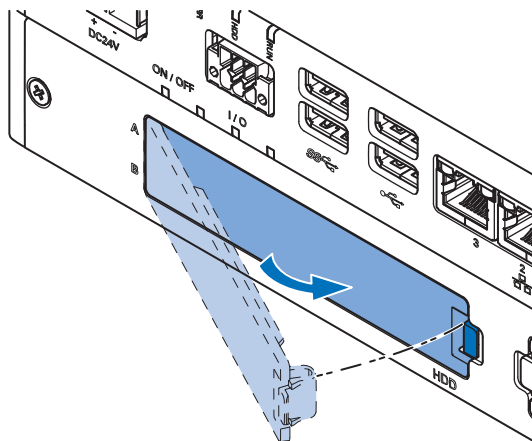


The drive bracket will lock into place when it is fully inserted.

9 Insert the metal shielding cover.



10 Mount the drive cover.
The lock lever will click when closed correctly.



11 Restore the drive data.

- For products *NYB* and *NYP*:
 - For an Industrial PC with RTOS Controller restore the drive data from a backup.
 - For an Industrial PC without Operating System restore the drive data from a backup.
 - For an Industrial PC with a Windows operating system refer to the restore procedure in the section *Corrective Maintenance* to restore data.
- For products *NY512-A* refer to the restore procedure in the section *Corrective Maintenance* to restore data.
- For products *NY512-1* refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)* to restore data from a backup.

12 Finalize the drive replacement.

If the Box PC has a Windows operating system and the storage drive is not visible in Windows then the drive needs to be allocated.

The drive is replaced.

7-2-5 Replace the PCIe Card

Use the following procedure to replace the PCIe Card.

Prepare:

- The PCIe Card



Additional Information

Refer to 4-1-7 *PCIe Card Specifications* on page 4-6 for PCIe specifications.

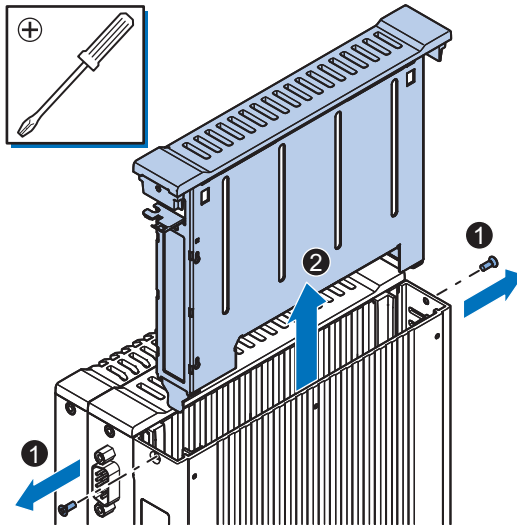
- The PCIe Card mounting materials: Card Clip and Card Support

These are supplied with the IPC Machine Controller.

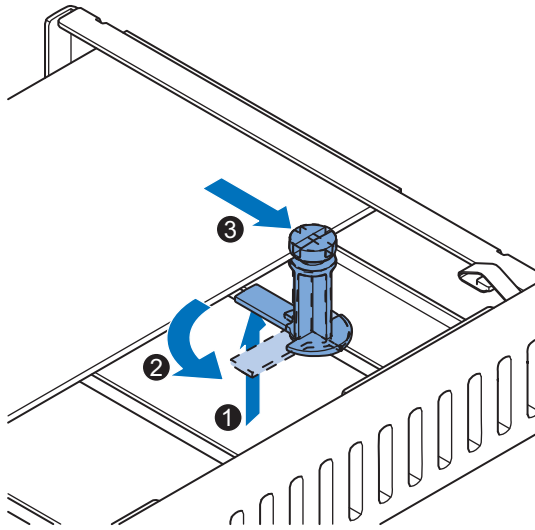
To replace the PCIe Card:

- 1** Power OFF the system.
- 2** Unmount the Box PC.
- 3** Remove the two crosshead screws **1** indicated with "open" and then pull up **2** the PCIe Drawer.

The indent at the side of the drawer will help you to pull the drawer from the Box PC.



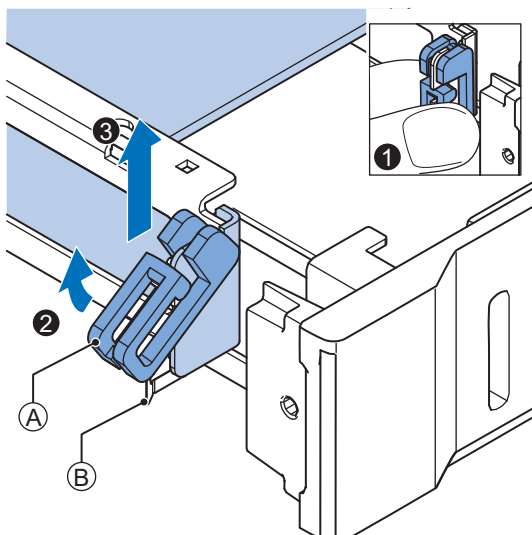
- 4** Push the notch **1** at the bottom of the Card Support up and rotate **2** the Card Support. Slide the Card Support **3** away from the card to create space and to remove it.



- 5** Grip the Card Clip on the sides **1**. Pull the middle of the Card Clip to unlock it **2** and remove it **3** from the PCIe Drawer.

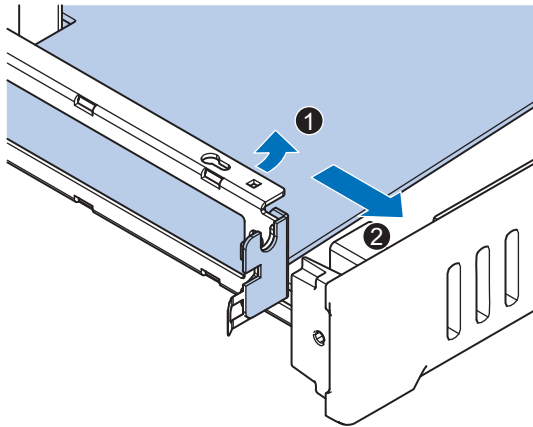
Caution

When installing or removing a PCIe card, ensure to grip the Card Clip on the sides to prevent contact with the sharp edges of the sheet metal frame tab. Injury may result.



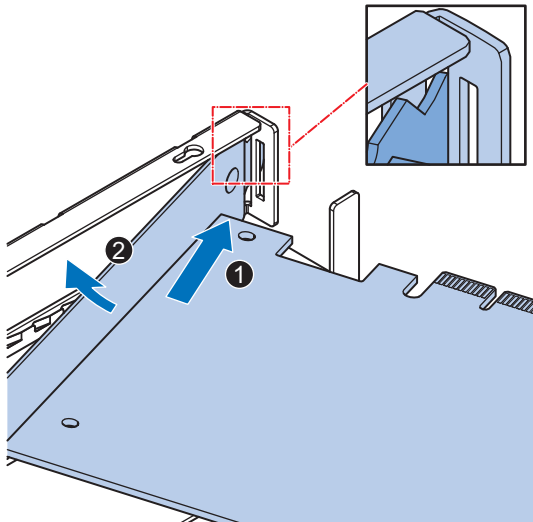
- A** Card Clip
- B** Sheet metal frame tab

- 6** Remove the PCIe Card from the PCIe Drawer.



The PCIe Card is now removed.

- 7** Place the replacement PCIe Card in the PCIe Drawer.

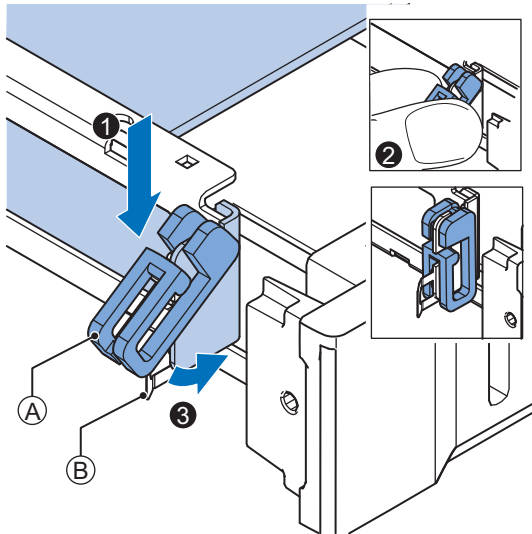


Ensure the PCIe Card is inserted into the correct opening.

- 8 Place the Card Clip in the PCIe Card and PCIe Drawer ①, grip the Card Clip on the sides ② and then rotate the Clip ③ to lock it in place.

⚠ Caution

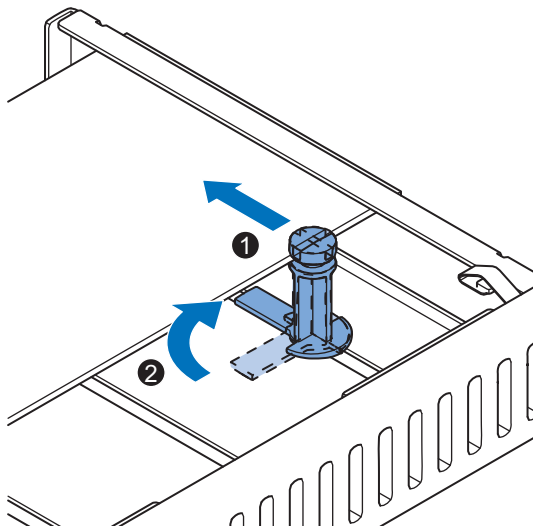
When installing or removing a PCIe card, ensure to grip the Card Clip on the sides to prevent contact with the sharp edges of the sheet metal frame tab. Injury may result.



Ⓐ Card Clip

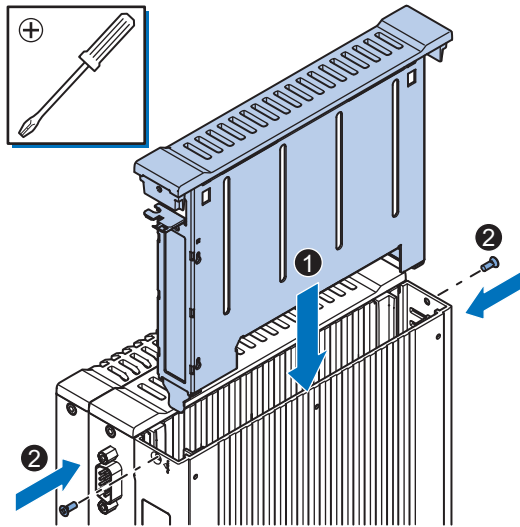
Ⓑ Sheet metal frame tab

- 9 Slide the Card Support ① so that it supports the side of the PCIe Card. Rotate the Card Support ② to lock it in place.



Ensure the Card Support contacts the PCIe Card with the small groove so that there is support below and above the PCIe Card.

- 10** Insert the PCIe Drawer in the Box PC and then insert the two crosshead screws that hold the PCIe Drawer in place.



- 11** Remount the Box PC.

- 12** Confirm normal operation.
The PCIe Card is replaced.



Appendices

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A-1 BIOS

This section provides the BIOS information of the IPC Machine Controller.

WARNING

Changing BIOS information is only allowed for the engineer in charge that possesses a thorough understanding of the BIOS settings because it can change the behavior of the product.



A-1-1 BIOS Overview

The BIOS contains settings that influence the behavior of the IPC Machine Controller. The touchscreen functionality is not functional when working in BIOS. Ensure a USB keyboard is connected.

BIOS Setup Program

Press the **DEL** or **F2** key repeatedly directly after Power ON to access the BIOS Setup Program.

Boot Selection Popup Menu

Press the **F11** key repeatedly directly after Power ON to display the Boot Selection Popup menu. The popup menu allows selection of the boot device and the option to enter the BIOS setup program.

BIOS Structure

The BIOS contains a menu bar, a left frame and a right frame.

The left frame displays all the options that can be configured in the selected menu.

The left frame uses following colors:

- Blue = Configurable options
- Greyed-out = Not configurable
- Inverse white = Selected

The right frame displays the key legend. Above the key legend is an area reserved for text messages. These text messages explain the options and the possible impacts when you change the selected option in the left frame.

Use the **→←** keys to navigate between pages.

The menu bar gives access to following pages with settings:

- **Main**
Refer to *A-1-2 BIOS - Main* on page A-4 for Main details.
- **Advanced**
Refer to *A-1-3 BIOS - Advanced* on page A-5 for Advanced details.
- **Chipset**
Refer to *A-1-4 BIOS - Chipset* on page A-8 for Chipset details.
- **Boot**

Refer to *A-1-5 BIOS - Boot* on page A-9 for Boot details.

- **Security**

Refer to *A-1-6 BIOS - Security* on page A-10 for Security details.

- **Save & Exit**

Refer to *A-1-7 BIOS - Save & Exit* on page A-10 for Save and Exit details.

BIOS - Navigation and Function Keys

The right part of the BIOS screens is divided in two parts.

Top part.

Provides additional information on selected screens or parameters.

Bottom part.

Provides information on Keys.

- **→←** : Select Screen

Changed between different BIOS pages.

- **↑↓** : Select Item

Changed between different parameters.

- **Enter: Select**

Selects the parameter that has the focus and displays a submenu or the possibility to change the parameter.

- **+ / - : Change Option**

Change settings. A numerical value will be increased or decreased. A boolean value will toggle.

- **F1: General Help**

Displays help information.

- **F2: Previous Values**

Changes all parameters to the values they had when entering the BIOS.

- **F9: Optimized Defaults**

Changes all settings to the default values.

- **F10: Save & Exit**

Saves all changes and exits the BIOS.

- **ESC: Exit**

Go one level up. For parameters this is the previous level. For the main pages this exits the BIOS.

BIOS Password & Write Protection

A BIOS password protects the BIOS setup program from unauthorized access. This ensures that users cannot change the system configuration without authorization. With an assigned BIOS password, the BIOS prompts the user for a password on a setup entry. If the password entered is wrong, the BIOS setup program will not launch.

The BIOS uses encryption for the password.

The BIOS password is case sensitive with a minimum of 3 characters and a maximum of 20 characters. Once a BIOS password has been assigned, the BIOS activates the grayed out **BIOS Update and Write Protection** option. If this option is set to **enabled**, only authorized users (users with the correct password) can update the BIOS. With the BIOS password protection and the BIOS update and write protection, the system configuration is completely secured. If the BIOS is password protected, you cannot change the configuration of an end application without the correct password.

A-1-2 BIOS - Main

The main setup screen gives platform information about the BIOS, Board Information, Firmware Revision, MAC Addresses and information about the number of Boots and the Running Time.

Changeable BIOS Main parameters and their factory default values:

- **System Date**

Use the **Enter** key to the next Date field.

- **System Time**

Use the **Enter** key to the next Time field.

A-1-3 BIOS - Advanced

This section provides advanced BIOS information.

Changeable BIOS Advanced parameters and their factory default values:

| Item | | Default / Remark | |
|-----------------------------------|-----------------------------------|--|----------|
| Machine Control | | Enabled | |
| Graphics | Primary Graphics Device | Auto | |
| | Internal Graphics Device | Auto | |
| | IGD Pre-Allocated Graphics Memory | 32M | |
| | IGD Total Graphics Memory | 256M | |
| | Max. GPU Frequency *2 | Default | |
| | Primary IGD Boot Display Device | Auto | |
| | Active LFP Configuration | <ul style="list-style-type: none"> eDP / for Industrial Panel PC No Local Flat Panel / for Industrial Box PC | |
| | Digital Display Interface 1 | HDMI/DVI | |
| | Digital Display Interface 2 | HDMI/DVI | |
| Hardware Health Monitoring | Start Temperature | 50 C | |
| | Temperature Range | 30 C | |
| | Minimum Fan Speed | 30% / Fixed | |
| | Maximum Fan Speed | 100% | |
| | Fan Always On At Minimum Speed | Disabled | |
| PCI & PCI Express | PIRQ Routing & IRQ Reservation | PIRQA,B,C,D,E,F,G,H Auto | |
| | PCI Express Settings | Relaxed Ordering | Disabled |
| | | Extended Tag | Disabled |
| | | No Snoop | Enabled |
| | | Maximum Payload | Auto |
| | | Maximum Read Request | Auto |
| | | ASPM | Disabled |
| | | Extended Synch | Disabled |
| | | Link Training Retry | 5 |
| Link Training Timeout (us) | 100 | | |
| Restore PCIe Registers | Disabled | | |

| Item | | Default / Remark | |
|-------------------|--|--|---------------------|
| PCI & PCI Express | PCI Express Gen 2 Settings | Completion Timeout | Default |
| | | ARI Forwarding | Disabled |
| | | AtomicOp Requester Enable | Disabled |
| | | AtomicOp Egress Blocking | Disabled |
| | | IDO Request Enable | Disabled |
| | | IDO Completion Enable | Disabled |
| | | LTR Mechanism Enable | Disabled |
| | | End-End TLP Prefix Blocking | Disabled |
| | | Target Link Speed | Auto |
| | | Clock Power Management | Disabled |
| | | Compliance SOS | Disabled |
| | | Hardware Autonomous Width | Enabled |
| | | Hardware Autonomous Speed | Enabled |
| | | PCI Express Gen3 Settings (for Port 0 and 1) | Run-time C7 Allowed |
| | Detect Non-compliant Device | | Disabled |
| | Program PCIe ASPM after OpROM | | Disabled |
| | PEG Sampler Calibrate | | Disabled |
| | Swing Control | | Full |
| | Peg Gen3 Equalization | | Enabled |
| | - Gen3 EQ Phase 2 | | Enabled |
| | - PEG Gen3 Root Port Preset Value for each Lane. Lane 0...15 | | 8 |
| | - PEG Gen3 Endpoint Preset Value for each Lane. Lane 0...15 | | 7 |
| | - PEG Gen3 Endpoint Hint Value for each Lane. Lane 0...15 | | 2 |
| | - Gen3 Eq Preset Search | | Enabled |
| | - Always Re-search Gen3 Eq Preset | | Disabled |
| | - Preset Search Dwell Time | | 1000 |
| | - Error Target | | 1 |
| | PEG RxCEM Loopback Mode | | Disabled |
| | PCIe Gen3 RxCTLEp Setting. PCIe Gen3 RxCTLEp 0...7 | | 8 |

| Item | | Default / Remark | |
|---|---------------------------------------|---|--|
| PCI & PCI Express | GbE Channel 0 | PCI Express Port 0 | Enabled |
| | | ASPM | Disabled |
| | GbE Channel 1 | PCI Express Port 1 | Enabled |
| | | ASPM | Disabled |
| | PCI Express Port 0, 1 (x4 Gen3) | PEG1 Speed | Auto |
| | | PEG1 ASPM | Disabled |
| | | PEG1 De-emphasis Control | -3.5 dB |
| | PCI Express Port 2, 3, 4, 5 (x1 Gen2) | PCI Express Port x | Enabled |
| | | ASPM | Disabled |
| | | Hot Plug | Disabled |
| PCIe Speed | | Auto | |
| Detect Non-compliant Device | | Disabled | |
| ACPI | ACPI Sleep State | | S3 (Suspend to RAM) Suspend Disabled *2 |
| | Lock Legacy Resources | | Disabled |
| | S3 Video Repost | | Disabled |
| | Native PCI Express Support | | Enabled |
| | - Native ASPM | | Disabled |
| | ACPI Debug | | Disabled |
| | ACPI 5.0 CPPC Support | | Disabled |
| RTC Wake | Make System At Fixed Time | Disabled | |
| Trusted Computing | Trusted Computing information | Display of Trusted Computing parameters | |
| CPU | CPU information | Display of CPU parameters | |
| SATA | SATA information | Display of SATA parameters | |
| Memory Configuration | Memory Configuration information | | Display of Memory Configuration parameters |
| | Memory Remap *2 | | Enabled |
| Intel (R) Rapid Start Technology | Intel Rapid Start information | Display of Intel Rapid Start parameters | |

| Item | | Default / Remark | |
|--|------------------------------------|--|-----------------|
| USB | XHCI Mode | Enabled | |
| | Overcurrent Protection | Disabled | |
| | USB Ports Per-Port Disable Control | USB Ports Per-Port Disable Control | Enabled |
| | | - USB Port 0...6 | Enabled |
| | | - USB 3.0 Port 0...1 | Enabled |
| | Legacy USB Support | Enabled | |
| | External USB Controllers Support | Enabled | |
| | XHCI Hand-off | Enabled | |
| | EHCI Hand-off | Disabled | |
| | USB Mass Storage Driver Support | Enabled | |
| | USB Transfer Timeout | 20 sec | |
| | Device Reset Timeout | 20 sec | |
| | Device Power-up Delay Selection | Auto | |
| | Generic Ultra HS-COMBO | Auto | |
| SMART Settings | Smart Self Test *1 | Disabled | |
| UEFI Network Stack | UEFI Network Stack | Disabled | |
| NVMe Configuration | NVMe Configuration information | Display of NVMe Configuration parameters | |
| Intel® Ethernet Connection I218-LM - Unique MAC Address | NIC Configuration | Link Speed | Auto Negotiated |
| | | Wake On LAN | Enabled |
| | Blink LEDs | | 0 |
| | Link Status *2 | | Disconnected |

*1. Smart Self Test monitors the status of the HDD/SSD. Enable only when Smart Monitoring software is used.

*2. In BIOS version AQ27R111 and later.

A-1-4 BIOS - Chipset

Provides Chipset settings.

Changeable BIOS Chipset parameters and their factory default values:

| Item | | Default / Remark |
|--|-------------------------|------------------|
| Platform Controller Hub (PCH) | Isolate SMBus Segments | During POST |
| | PCH Thermal Device *1 | Disabled |
| Processor (Integrated Components) | Audio Device (B0:D3:F0) | Enabled |

*1. In BIOS version AQ27R111 and later.

A-1-5 BIOS - Boot

Provides Boot information and configuration settings.

Changeable BIOS Boot parameters and their factory default values:

| Item | | Default / Remark |
|--------------------------------------|----------------------------------|-----------------------------|
| Quiet Boot | | Disabled |
| Setup Prompt Timeout | | 1 |
| Bootup NumLock State | | On |
| Battery Support | | Auto (Battery Manager) |
| Power Loss Control *1 | | Remain Off |
| CSM & Option ROM Control | Launch CSM | Enabled |
| | Boot Option Filter | UEFI and Legacy |
| | PXE Option ROM Launch Policy | UEFI ROM Only |
| | Storage Option ROM Launch Policy | Legacy ROM Only |
| | Video Option ROM Launch Policy | Legacy ROM Only |
| | Other Option ROM Launch Policy | UEFI ROM Only |
| | Gate A20 Active | Upon Request |
| | Option ROM Messages | Force BIOS |
| Enter Setup If No Boot Device | | No |
| Enable Popup Boot Menu | | Yes |
| Type Based Boot Priority | 1st Boot Device | SATA 2 Drive |
| | 2nd Boot Device | Disabled SATA 3 Drive *2 |
| | 3rd Boot Device | Disabled |
| | 4th Boot Device | Disabled |
| | 5th Boot Device | Disabled |
| | 6th Boot Device | Disabled |
| | 7th Boot Device | Disabled |
| | 8th Boot Device | Disabled |
| UEFI Fast Boot | | Disabled |

*1. Power Loss Control settings are :

Remain OFF: The Box PC will stay OFF when power is supplied to the power connector

Turn ON: The Box PC will automatically start up when power is supplied to the power connector.

Last State: The Box PC will start up or remain OFF when power is supplied based on the Box PC state at the moment power was removed from the power connector.

*2. In BIOS version AQ27R111 and later.

A-1-6 BIOS - Security

Provides security information like BIOS Password and HDD information.

WARNING

Security setting adjustments should only be performed by the engineer in charge that possesses a thorough understanding of the security settings. Selecting non-recommended security settings can put your system at risk.

Changeable BIOS Security parameters and their factory default values:

| Item | | Default / Remark | |
|-----------------------------------|------------------|-------------------------|---------------|
| BIOS Password | | Empty | |
| BIOS Lock | | Enabled | |
| HDD Security Configuration | Diskname | Display disk parameters | |
| Secure Boot Menu | Secure Boot | Disabled | |
| | Secure Boot Mode | Custom | |
| | Key Management | Default Key Provision | Disabled |
| | | Platform Key (PK) | NOT INSTALLED |
| | | Key Exchange Key (KEK) | NOT INSTALLED |
| | | Authorized Signatures | NOT INSTALLED |
| | | Forbidden Signatures | NOT INSTALLED |
| Authorized TimeStamps | NOT INSTALLED | | |

A-1-7 BIOS - Save & Exit

Provides the possibility to leave the BIOS with or without saving changes.

Save & Exit Parameters: **Disabled**.

- **Save Changes and Exit**
Changed settings are saved and the Operating System starts with the changed settings.
- **Discard Changes and Exit**
Changed settings are not saved and the Operating System starts with the unchanged settings.
- **Save Changes and Reset**
Changed settings are saved and the Box PC restarts using the changed settings.
- **Discard Changes and Reset**
Changed settings are not saved and the Box PC restarts with the unchanged settings.
- **Save Changes**
Changed settings are saved and the BIOS setup stays open.
- **Discard Changes**
Changed settings are reverted to their last saved values and the BIOS setup stays open.
- **Restore Defaults**
Revert all BIOS settings to factory default.

A-2 Allocate a Drive in Windows

An added drive must be allocated before it becomes visible in Windows.

To allocate a drive in Windows:

- 1** Ensure the Box PC is ON.
- 2** Select the Windows **Start** Button.
- 3** In the search field, input *partition*.
- 4** Select **Create and format hard disk partitions**.
The Disk Management window opens. The new disk is displayed with a storage space **Unallocated**.
- 5** Right click on the unallocated space and select **New Simple Volume**.
The New Simple Volume Wizard opens.
- 6** Follow the steps in the New Simple Volume Wizard.

The drive is installed and ready for use in Windows under the configured drive letter.



Additional Information

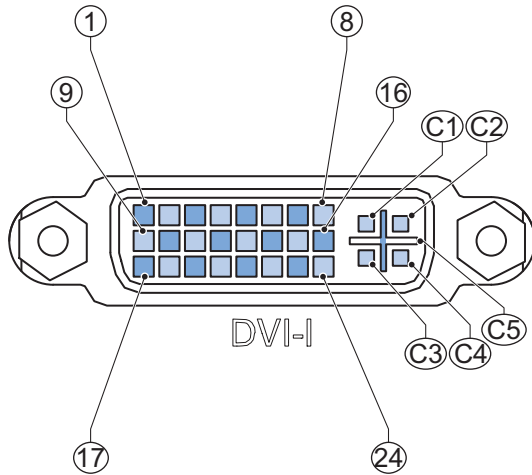
Do not format, resize or change settings for partition C:. Windows is installed on drive partition C: and any change to this partition can cause Windows to stop working.

A-3 DVI Connector Pin Details

This section provides the pin details for the DVI-I and the DVI-D connectors.

A-3-1 DVI-I Connector Pin Details

Pin details of the DVI-I connector.



The pin layout represents the DVI-I connector on the IPC Machine Controller.

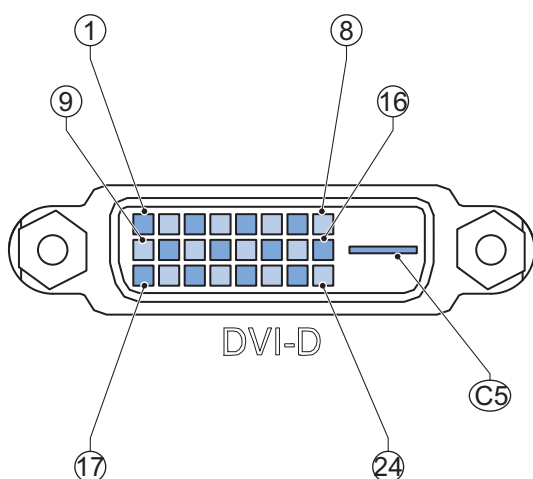
Pin numbers increase from left to right for every row.

| Pin | Signal Name | Function |
|-----|----------------------|---|
| 1 | TMDS data 2- | Digital red- (link 1) |
| 2 | TMDS data 2+ | Digital red+ (link 1) |
| 3 | 0 VDC | TMDS data 2/4 shield |
| 4 | Not connected | --- |
| 5 | Not connected | --- |
| 6 | DDC clock | DDC clock |
| 7 | DDC data | DDC data |
| 8 | Analog vertical sync | For Intel® Core™ i7-4700EQ CPU type |
| 9 | TMDS data 1- | Digital green- (link 1) |
| 10 | TMDS data 1+ | Digital green+ (link 1) |
| 11 | 0 VDC | TMDS data 1/3 shield |
| 12 | Not connected | --- |
| 13 | Not connected | --- |
| 14 | +5 V | Power for monitor DDC interface |
| 15 | 0 V | Return for pin 14 and analog sync |
| 16 | HPD | Hot Plug Detect |
| 17 | TMDS data 0- | Digital blue- (link 1) and digital sync |
| 18 | TMDS data 0+ | Digital blue+ (link 1) and digital sync |
| 19 | 0 VDC | TMDS data 0/5 shield |
| 20 | Not connected | --- |
| 21 | Not connected | --- |
| 22 | 0 VDC | TMDS clock shield |

| Pin | Signal Name | Function |
|-----|------------------------|--|
| 23 | TMDS clock+ | Digital clock+ |
| 24 | TMDS clock- | Digital clock- |
| C1 | Analog red | For Intel® Core™ i7-4700EQ CPU type |
| C2 | Analog green | For Intel® Core™ i7-4700EQ CPU type |
| C3 | Analog blue | For Intel® Core™ i7-4700EQ CPU type |
| C4 | Analog horizontal sync | For Intel® Core™ i7-4700EQ CPU type |
| C5 | 0 VDC | Analog ground return for red, green and blue for Intel® Core™ i7-4700EQ CPU type |

A-3-2 DVI-D Connector Pin Details

Pin details of the DVI-D connector.

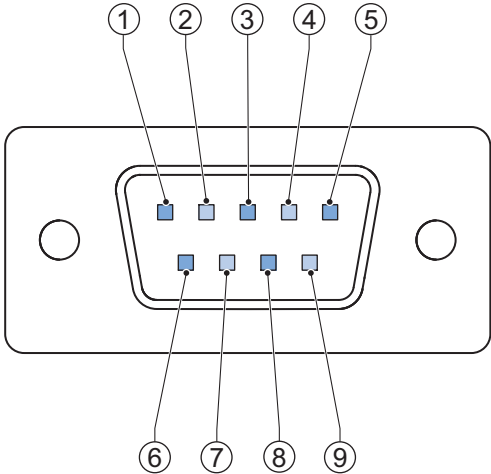


The pin layout represents the DVI connector on the IPC Machine Controller. Pin numbers increase from left to right for every row.

| Pin | Signal Name | Function |
|-----|---------------|---------------------------------|
| 1 | TMDS data 2- | Digital red- (link 1) |
| 2 | TMDS data 2+ | Digital red+ (link 1) |
| 3 | 0 VDC | TMDS data 2/4 shield |
| 4 | Not connected | --- |
| 5 | Not connected | --- |
| 6 | DDC clock | DDC clock |
| 7 | DDC data | DDC data |
| 8 | Not connected | --- |
| 9 | TMDS data 1- | Digital green- (link 1) |
| 10 | TMDS data 1+ | Digital green+ (link 1) |
| 11 | 0 VDC | TMDS data 1/3 shield |
| 12 | Not connected | --- |
| 13 | Not connected | --- |
| 14 | +5 V | Power for monitor DDC interface |
| 15 | 0 V | Return for pin 14 |

| Pin | Signal Name | Function |
|-----|---------------|---|
| 16 | HPD | Hot plug detect |
| 17 | TMDS data 0- | Digital blue- (link 1) and digital sync |
| 18 | TMDS data 0+ | Digital blue+ (link 1) and digital sync |
| 19 | 0 VDC | TMDS data 0/5 shield |
| 20 | Not connected | --- |
| 21 | Not connected | --- |
| 22 | 0 VDC | TMDS clock shield |
| 23 | TMDS clock+ | Digital clock+ |
| 24 | TMDS clock- | Digital clock- |
| C5 | Not connected | --- |

A-4 RS-232C Connector Pin Details



The pin layout represents the RS-232C connector on the Box PC.

| Pin | Signal Name |
|-----|-------------|
| 1 | CD |
| 2 | RXD |
| 3 | TXD |
| 4 | DTR |
| 5 | 0 VDC *1 |
| 6 | DSR |
| 7 | RTS |
| 8 | CTS |
| 9 | RI |

*1. The 0 VDC pin is internally connected to the ground connection.



Additional Information

Refer to 5-4-2 *Ground* on page 5-27 for grounding details.





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