

Industrial PC Platform

NY-series

IPC Without Operating System Industrial Panel PC

User's Manual

NYP17-□100□-15WC100□

NYP17-□100□-12WC100□

NYP25-□100□-15WC100□

NYP25-□100□-12WC100□

NYP1C-□100□-15WC100□

NYP1C-□100□-12WC100□

Industrial Panel PC




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Introduction

Thank you for purchasing the Panel PC Without Operating System.

This manual contains information that is necessary to use the Panel PC Without Operating System (hereafter also named as Panel PC). Please read this manual and make sure you understand the functionality and performance of the Panel PC before attempting to use it.

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

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.

Applicable Products

This manual covers following Industrial Panel PC without Operating System products:

Product	Model
Industrial Panel PC, 15.4 inch	<ul style="list-style-type: none"> • NYP17-□100□-15WC100□ • NYP25-□100□-15WC100□ • NYP1C-□100□-15WC100□
Industrial Panel PC, 12.1 Inch	<ul style="list-style-type: none"> • NYP17-□100□-12WC100□ • NYP25-□100□-12WC100□ • NYP1C-□100□-12WC100□



Additional Information

Refer to *1-4 Product Configuration* on page 1 - 5 for configuration details.

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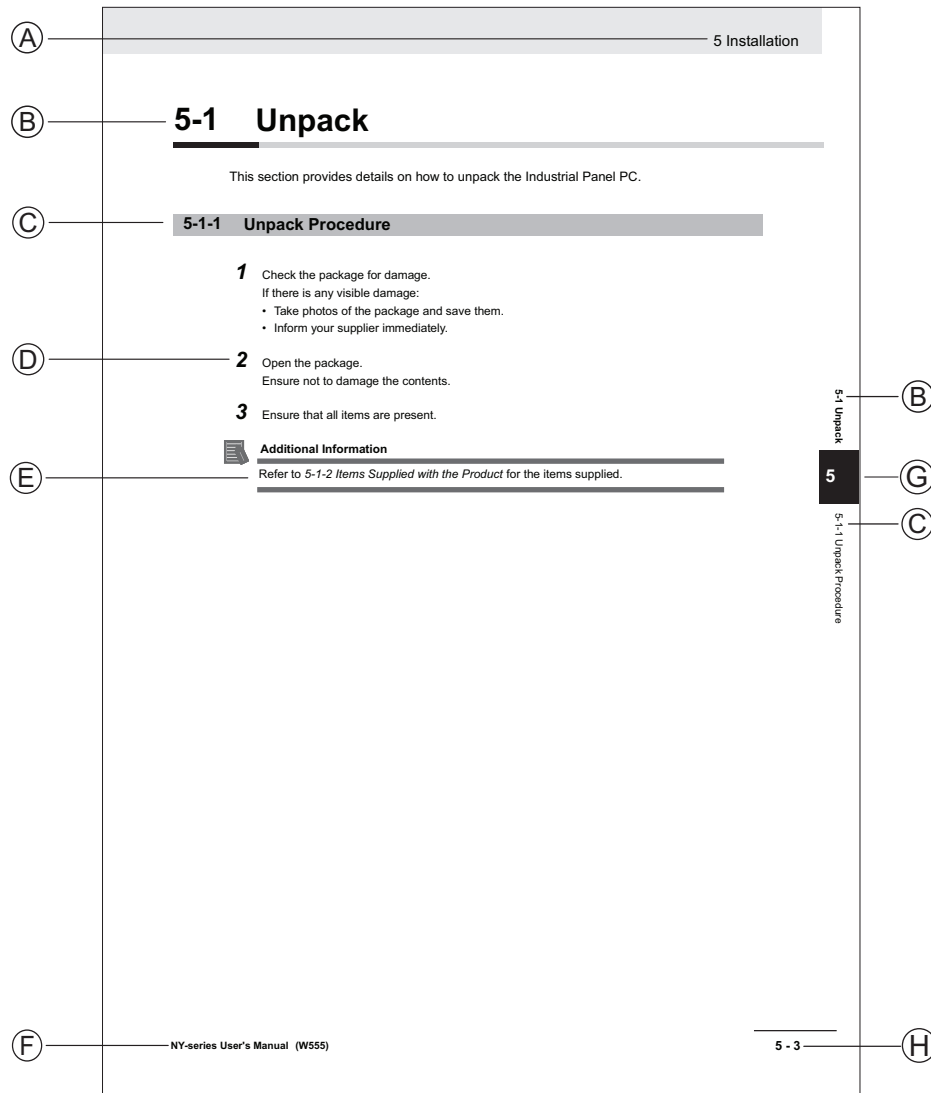
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Manual Information

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.

Terms and Conditions Agreement

Warranty and Limitations of Liability

Warranty

- **Exclusive Warranty**

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- Omron Companies shall not be responsible for the operation of the user accessible operating system (e.g. Windows, Linux), or any consequence thereof.

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Change in Specifications

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

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Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.



Safety Precautions

Definition of Precautionary Information





The following notation is used in this manual to provide precautions required to ensure safe usage of the Panel PC Without Operating System. 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.



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.



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.



Do not use the input functions of the touchscreen in applications that involve human life, in applications that may result in serious injury, or for emergency stop switches.



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.



Water or other liquid present on the touchscreen surface may create false touch behavior and unexpected operation. Wipe away the liquid on the touchscreen before operation.

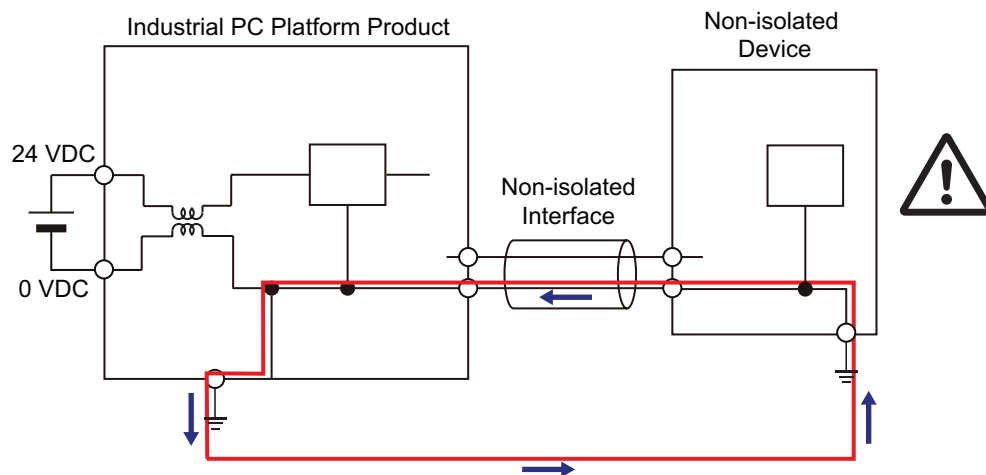


Cautions

⚠ Caution

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.



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.
- The mounting panel must be between 1.6 and 6.0 mm thick. Tighten the Mounting Brackets evenly to a torque of 0.6 Nm to maintain water and dust resistance. If the tightening torque exceeds the specified value, or the tightening is not even, deformation of the front panel may occur. Additionally, make sure the panel is not dirty or warped and that it is strong enough to hold the product.
- Do not let metal particles enter the product when preparing the panel. Do not allow wire clippings, shavings, or other foreign material to enter any product. Otherwise, the product burning, failure, or malfunction may occur. Cover the product or take other suitable countermeasures, especially during wiring work.

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.

- 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.
- For an NY Monitor Link connection, always follow the cable type and connection method specifications in the manual. Otherwise, communications may be faulty.

Power Supply Design and Turning ON/OFF the Power Supply

- Always use a power supply that provides power within the rated range.
- 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.
- 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 an operating system 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.
- Always use the SMART monitoring feature for storage devices that do not comply to the Omron Storage Device Specifications. Monitor the operating temperature and vibrations to ensure they stay within the environmental specifications of the storage device.

Operation

- 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.
- 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.
- Confirm the safety of the system before using the touch panel.
- Signals from the touchscreen may not be entered if the touchscreen is pressed consecutively at high speed. Only move on to the next operation after confirming that the product has detected the previous input of the touchscreen.
- Do not accidentally press the touchscreen when the backlight is not lit or when the display does not appear. Confirm the safety of the system before pressing the touchscreen.
- Do not use hard or pointed objects to operate or scrub the touchscreen, otherwise the surface of the touchscreen may be damaged.
- In systems with multiple screens in extended view, an interruption in the video signal of one screen will cause all windows on that screen to be moved to the primary screen. Make sure that this situation is properly handled.

General Communications

- Separate the machine network segment from the office network to avoid communication failures.

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.

Cleaning, Maintenance and Disposal

- Do not use corrosive substances to clean the product. Doing so may result in the failure or malfunction.
- Periodically check the installation conditions in applications where the product is subject to contact with oil or water.
- As the rubber gasket will deteriorate, shrink, or harden depending on the operating environment, periodical inspection is necessary.
- 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.
- The backlight has a finite life and if that is exceeded, the product may fail or malfunction. Check the brightness periodically and if necessary, replace the product.
- 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.

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.
- Always create a Windows System Repair Disk using Windows Backup and Restore to recover the HDD/SSD configuration if necessary.
- 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.
- The touchscreen supports 5 simultaneous touches. When the number of touches is exceeded, not all touch points will be detected.
- The capacitive touchscreen reacts to contact on its surface. Accidental touching the surface of the touchscreen may cause unintended behavior.
- You can operate the touchscreen even when you wear some gloves. Confirm that you can correctly operate the touchscreen while wearing gloves prior to actual operation.
- Do not turn ON the power supply to the product when a part of a human body or a conductive object is touching the surface of the touchscreen. Doing so will cause the touchscreen functionality to be disabled. Remove the conductive object and cycle the power supply to restore the touchscreen functionality.
- 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.
- Diagnostic information is not available when the Industrial PC Support Utility is not installed.

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.

Cleaning and Maintenance

- Do not use corrosive substances to clean the product.
- Turn OFF the product or disable the touchscreen for cleaning with water.

Regulations and Standards

Conformance to EU Directives

The Panel PC Without Operating System complies with EU Directives. To ensure that the machine or device in which the Panel PC Without Operating System is used complies with EU Directives, the following precautions must be observed:

- The Panel PC Without Operating System must be installed within a control panel.
- The Panel PC Without Operating System 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 Panel PC Without Operating System 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

Observe the following precaution if you use Industrial PC Platform products in Korea.

A 급 기기 (업무용 방송통신기자재)

이 기기는 업무용(A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Class A Device (Broadcasting Communications Device for Office Use).

This device obtained EMC registration for office use (Class A), and it is intended to be used in places other than homes.

Sellers and/or users need to take note of this.

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/.

Related Manuals

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

Related Products Manuals

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
UPS Setting Utility Instruction Manual	---	<ul style="list-style-type: none"> • SB8A • BU-2RWL 	Learning the information that is necessary to connect the UPS and to configure all settings.	An introduction to the UPS Setting Utility is provided along with the following information: <ul style="list-style-type: none"> • Overview • Operating Environment • Software License Agreement • Connect • Use the UPS Setting Utility • Setting Details
UPS Power Attendant Lite for Windows User's Manual	---	S8BA	Learning the information that is necessary to use the software to monitor, test and control the UPS and to configure all settings.	An introduction to the software is provided along with the following information: <ul style="list-style-type: none"> • Overviews • Connection and Installation • The Simple Usage and Operation Test • Settings

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
ACPI	Advanced Configuration and Power Interface protocol for operating systems
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
EFW	Enhanced Write Filter
FBWF	File-Based Write Filter
IIoT	Industrial Internet of Things
Linux	An open source Operating System
MBR	Master Boot Record
Merge module	A module providing a standard method by which developers deliver shared Windows installer components and setup logic to their applications
MSDN	Microsoft Developer Network
NUI	Natural User Interface
OS	Operating System
PLC	Programmable Logic Controller
RTOS	Realtime Operating System
SDK	Software Development Kit
TCP/IP	Transmission Control Protocol / Internet Protocol, a core member of the Internet protocol suite
TPM	Trusted Platform Module
VxWorks	A Realtime Operating System designed by Wind River
Windows	An Operating System designed by Microsoft

Revision History

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

Cat. No. W587-E2-02

↑ Revision code

Revision code	Date	Revised content
02	June 2017	Added NY Monitor Link option
01	April 2017	First release

Sections in this Manual

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1

Overview

This section provides general information about the Panel PC Without Operating System.

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1-4	Product Configuration	1 - 5
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1-1 Intended Use

The Industrial Panel PC is intended to be used as a panel mounted industrial PC in factory automation environments. This Panel PC can be configured with Windows, Linux or a realtime operating system (RTOS). It can be used with third party software to serve as a powerful PC platform.

A user can access the Panel PC for control, configuration and supervisory operations using the integrated touchscreen display.

The Panel PC can easily be integrated in manufacturing innovations like big data, NUI and IIoT.

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

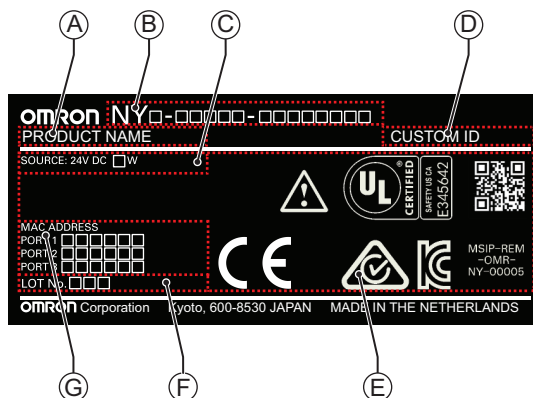
1-2 Hardware Features

The Industrial Panel PC provides the following hardware features.

- Flexible mounting orientation
The Panel PC is designed to support landscape and portrait mounting orientations.
- Powerful CPU options
Powerful CPU options provide high performance for various applications.
- Fanless cooling for multiple CPU types
The Panel PC has passive cooling for multiple CPU types which means no moving parts and less maintenance effort.
- 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
LED indicators provide a clear indication of the operational status of the Panel PC.
- DVI visual interface
The video interface for the Panel PC is provided with a DVI connector for connection to an additional monitor.
An extra (optional) DVI interface is available for connection to a second additional 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
Interface with multiple networks.
- Built-in I/O
Built-in I/O for UPS status and Panel 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.
- LCD touchscreen
The LCD touchscreen provides high functionality for your PC interface.
The high resolution and a high brightness provide clarity and high visibility.
- Multi-touch functionality
Up to 5 simultaneous touches are supported for complex functions.
- Backlit Logo
The standard product logo is OMRON. Check your sales representative for the possibilities to customize the product logo. The product logo is provided with a controllable backlight to increase visibility.
- Brightness control
Use the Monitor Utilities to control the Panel PC's LCD brightness.

1-3 ID Information Label

The ID information label contains relevant information about the Panel PC Without Operating System. The following example will be different from your product label.



Item	Name	Description
A	Product name	The name of your product
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	LOT number and serial number	Production details, consisting of: <ul style="list-style-type: none"> The lot number of the Panel PC Without Operating System in the format DDMYY□. DDMY□ 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)
G	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 - 5 for model details.

*2. Refer to 4-2-4 Ethernet Connector Specifications on page 4 - 18 for Ethernet specifications.



Additional Information

Refer to 2-1-1 Front and Top of the Industrial Panel PC on page 2 - 2 for the ID label location.

1-4 Product Configuration

This section provides an overview of the product configurations available for the Panel PC Without Operating System.

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

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

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

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

Item	Description	Option / Description
1	Series name	NYP: NY- series Industrial Panel PC
2	Processor	17: Intel® Core™ i7-4700EQ 4th generation CPU with Fan Unit for active cooling 25: Intel® Core™ i5-4300U 4th generation CPU with fanless cooling 1C: Intel® Celeron® 2980U 4th generation CPU with fanless cooling
3	Main memory	1: 2 GB, non-ECC 2: 4 GB, non-ECC 3: 8 GB, non-ECC
4	Expansion slots	1: 1 PCIe slot
5	Operating system	0: No Operating System
6	Storage	0: No Drive
7	Optional interface	1: RS-232C 2: DVI-D 6: NY Monitor Link
8	Display size (diagonal)	12: 12.1 inch model, 1280 x 800 pixels, 24 bit full color 15: 15.4 inch model, 1280 x 800 pixels, 24 bit full color
9	Display ratio	W: Wide
10	Touchscreen	C: Projected Capacitive Touch type
11	Frame type	1: Aluminum frame, black
12	Design	0: Standard
13	Built-in options	0: None
14	Logo	0: OMRON 2: Customization

1-5 Industrial PC Platform Overview

The Industrial PC Platform is an integrated range of products designed for use in a variety of industrial applications that will benefit from advanced PC technology. The range is scalable, robust and reliable, and is suitable for use with both standard operating system software and proprietary programs for machine control and automation.

In line with OMRON's established quality standards, each element in the Industrial PC Platform, ranging from the standalone Industrial Box PC to the touchscreen Industrial Monitor, is engineered with long-life components and built to the most advanced design standards.

The following sections introduce Industrial PC Platform products.

1-5-1 Industrial Monitor

The Industrial Monitor is of key importance at the interface between operator and system. The Industrial Monitor is efficient, effective and highly visible with an attractive design.

Using smart algorithms, the touch controller determines the exact location of each touch for precise control as well as detecting abnormal or illegal actions to protect misuse or false touches.



1-5-2 Industrial Box PC

The Industrial Box PC is designed to meet the specific needs of the industrial environment. Design simplification and future-proof architecture minimize the risk of failure. In addition, new PC features can be seamlessly incorporated, without the need for wholesale redesign.



1-5-3 Industrial Panel PC

The Industrial Panel PC intelligently combines the functionality of the Industrial Box PC and Industrial Monitor. No cables are used between the two components, which ensures optimal signal distribution and reliable operation in industrial environments.



2

Hardware

This section provides an overview of the hardware of the Panel PC Without Operating System.

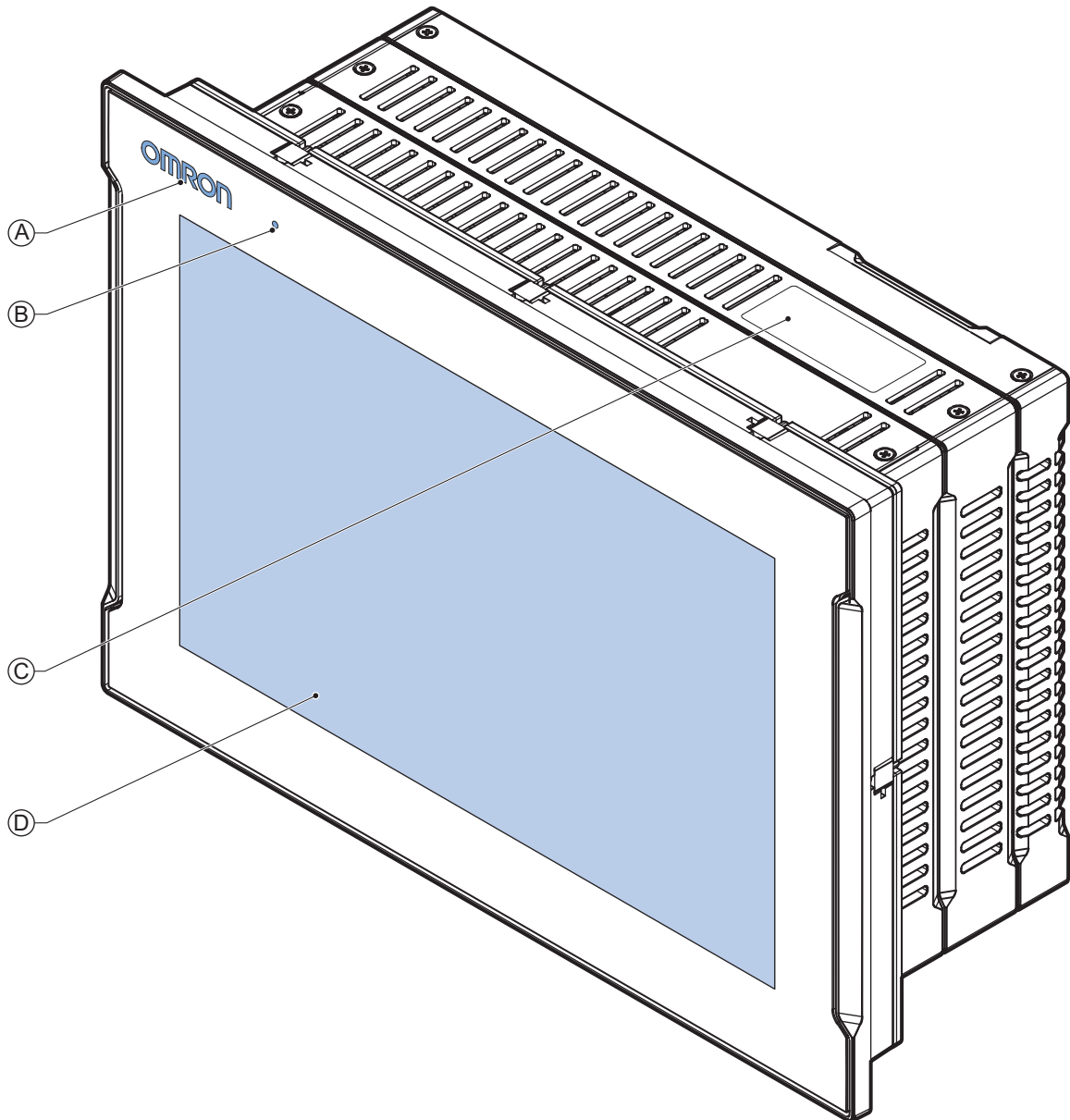
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2-1 Component Names and Functions

This section shows views of the Panel PC Without Operating System with information about all items.

2-1-1 Front and Top of the Industrial Panel PC

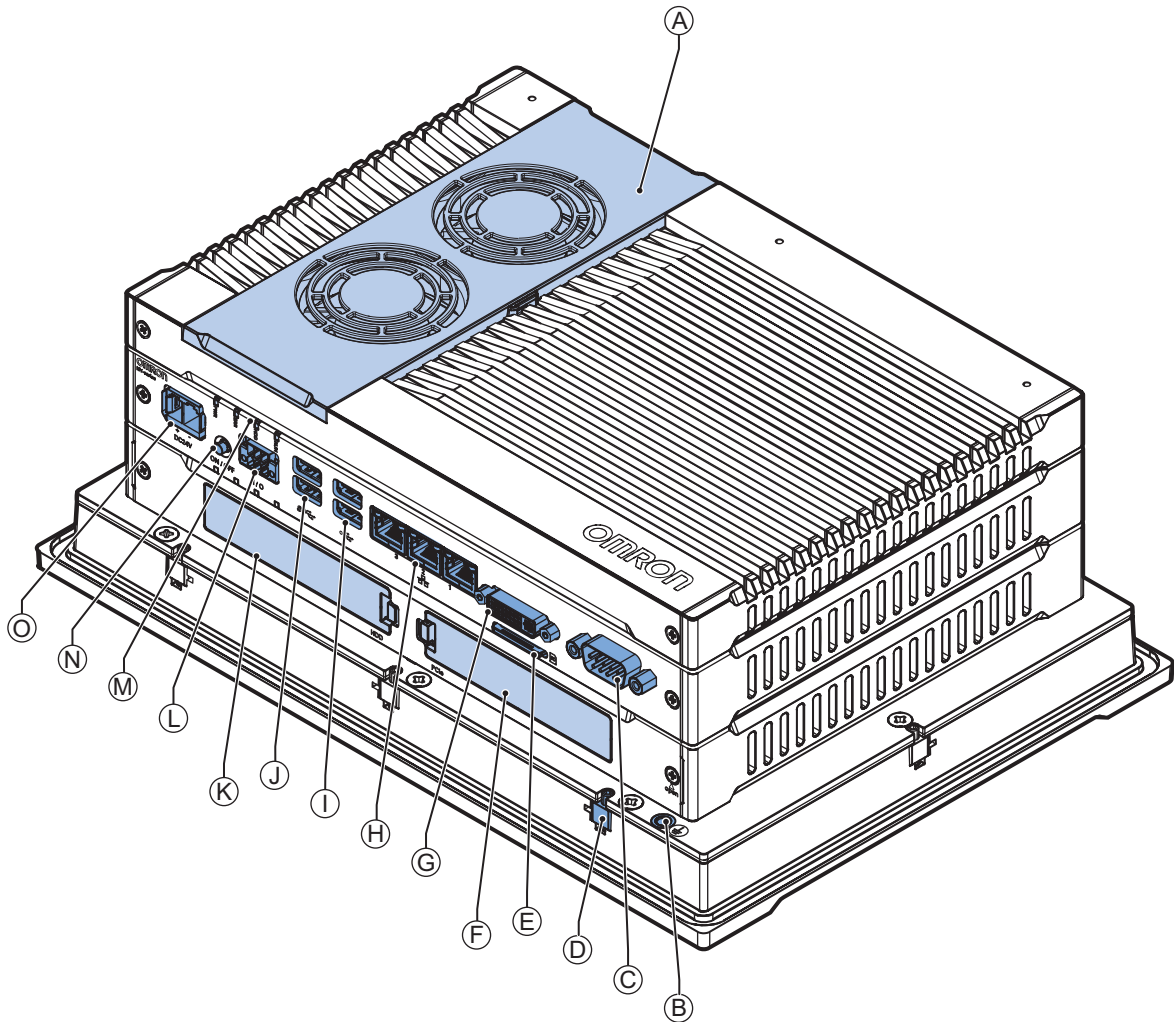
This section shows the component names and functions for the front and top of the Panel PC.



Item	Name	Description
A	Logo LED	Backlit logo with adjustable brightness
B	Status LED indicator	LED to indicate power and connection status with adjustable brightness
C	ID information label	Label containing Model ID., LOT No. and other product specific information. Refer to <i>1-3 ID Information Label</i> on page 1 - 4 for label details.
D	Touchscreen LCD	Multi-touch LCD display

2-1-2 Back and Bottom of the Industrial Panel PC

This section shows the component names and functions for the back and bottom of the Panel PC.



Item	Name	Description
A	Cover	Provides access to: <ul style="list-style-type: none"> The battery The fans (only for Panel PCs that have active cooling) The battery replacement date The license key for the operating system (optional)
B	Ground terminal	Provides a ground terminal for the Panel PC
C	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

Item	Name	Description
D	Mounting brackets	8 retractable mounting brackets to secure the Panel PC on a mounting surface
E	SD Memory Card slot	SD Memory Card slot
F	PCIe bay	PCI Express mounting slot
G	DVI connector	Digital Visual Interface connector
H	10BASE-T / 100BASE-TX / 1000BASE-T Ethernet connectors	3 RJ45 Gb Ethernet interface connectors
I	USB 2.0 connectors	2 USB 2.0 interface connectors
J	USB 3.0 connectors	2 USB 3.0 interface connectors
K	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 side of the display
L	I/O connector	2 inputs (Power ON/OFF Input and UPS Mode Input) and 1 output (Power Status Output)
M	LED indicators	Visual indicators for the operating state of the Panel PC Without Operating System
N	Power button	Pushbutton to manually power ON/OFF the Panel PC
O	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 - 6 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 - 5 for:

- installed drive (storage) details
- operating system details

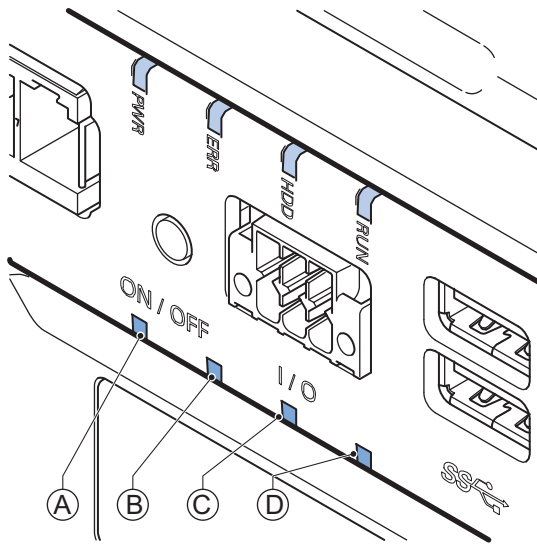
2-2 LED Indicators

The Industrial Panel PC has two rows of four LED indicators on the bottom of the Panel PC and two LED indicators on the front of the Panel PC. These LED indicators provide the current operating status of the Panel PC Without Operating System.

2-2-1 Bottom LED Indicators

The Industrial Panel PC has two rows of four LED indicators on the bottom that show the operating status of the Panel PC Without Operating System. 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 Panel PC Without Operating System.
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 status of a user-defined function.




PWR LED Indicator

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

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

ERR LED Indicator

The Error LED (ERR) indicates the presence and type of an error within the Panel PC.

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




Additional Information

- Refer to *7-2 Corrective Maintenance* on page 7 - 6 for actions to solve errors.
- For a Panel PC with a Windows operating system the status of this LED can be defined by users using the Industrial PC System API.
Refer to NY-series Industrial Box PC User's Manual (Cat. No. W553) for Industrial PC System API details.

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.

RUN LED Indicator

The RUN LED has no functionality and will not be lit.



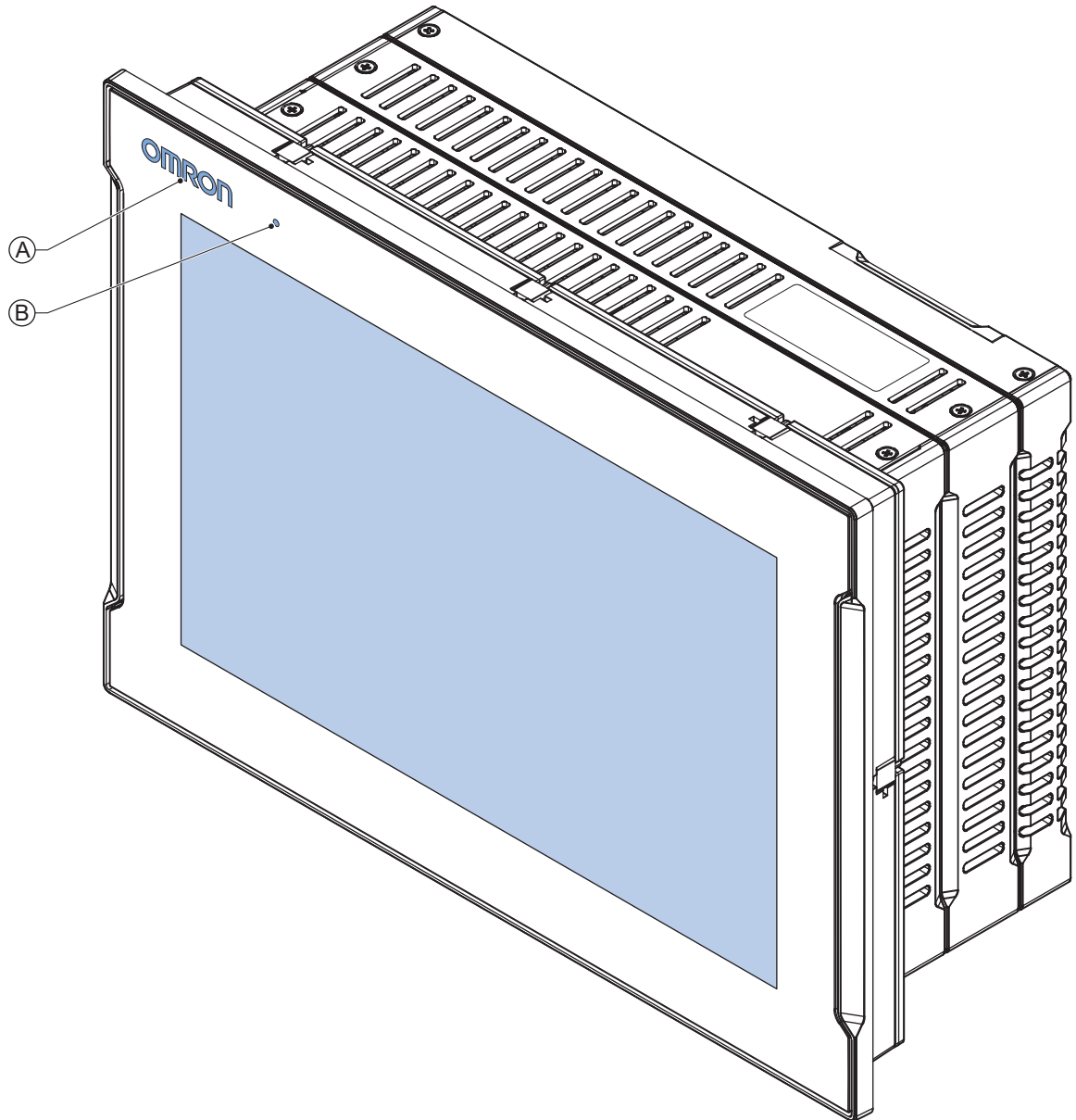
Additional Information

- For a Panel PC with a Windows operating system the status of this LED can be defined using the Industrial PC System API.
Refer to NY-series Industrial Box PC User's Manual (Cat. No. W553) for Industrial PC System API details.

2-2-2 Front LED and LED Indicator

The front of the Panel PC Without Operating System has a logo LED and a Status LED indicator. The Status LED indicator provides the same information as the Power and Error LEDs on the bottom of the Panel PC Without Operating System.

The following LEDs are available on the front of the Panel PC Without Operating System.



Item	LED	Description
A	Logo LED	LED to backlight the logo
B	Status Indicator LED	Indicates the operating condition of the Panel PC Without Operating System

Logo LED

The Logo LED brightness can be changed with the Industrial Monitor Utility.



Additional Information

The Logo LED brightness is adjustable.

Refer to Industrial Monitor Utility for brightness details.

The Industrial Monitor Utility information is available:

- For products *NYM* in the section *Software* in this manual.
- For products *NYP* in the section *Support Software* in this manual.
- For products *NY5* in the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)*

Status LED Indicator

The Status LED indicator provides information about the operating condition of the Panel PC Without Operating System.

Color	Status	Meaning
None		Not lit One of the following situations: <ul style="list-style-type: none"> • The 24 VDC power is not supplied. • Normal operation • Turned OFF by the Industrial Monitor Utility.
Green		Blinking Power is currently supplied and the Panel PC Without Operating System is in stand-by mode.
Red		Blinking One of the following situations: <ul style="list-style-type: none"> • Fan Error • Battery low
Red		Lit At maximum brightness in following situations: <ul style="list-style-type: none"> • Power supply undervoltage error • Power supply overvoltage error • Power supply defective • Monitor internal hardware error At controllable brightness in following situations: <ul style="list-style-type: none"> • Thermal shutdown • Watchdog Error

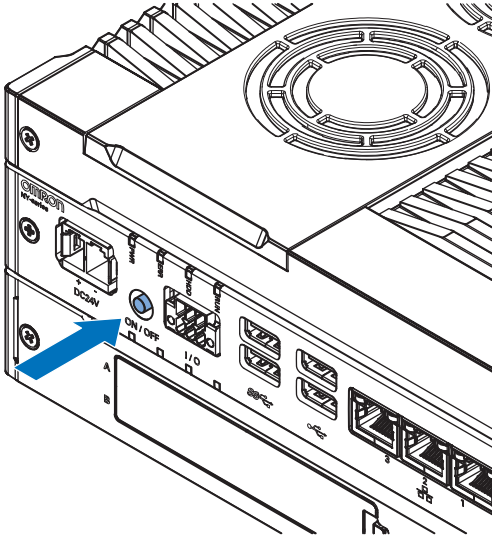


Additional Information

- Refer to Industrial Monitor Utility information for brightness adjustment details.
- For Panel PCs without Machine Controller Software the status of this LED can also be defined by the Industrial Monitor API.
- The Industrial Monitor Utility information and the Monitor API information are available:
 - For products *NYP* in the section *Support Software*.
 - For products *NY5* in the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)*
 - *NY-series Software Development Kit User's Manual*

2-3 Power Button

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

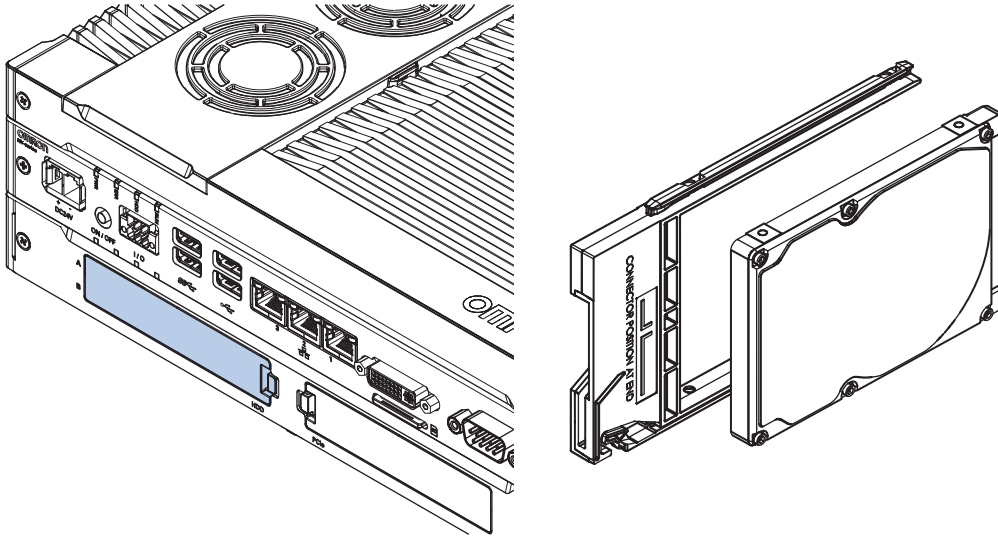


Additional Information

- Refer to 6-2 *Power ON* on page 6 - 3 for ON details.
- Refer to 6-3 *Power OFF* on page 6 - 4 for OFF details.

2-4 Drive Bays

The drive bays in the Panel PC Without Operating System accept 2.5 inch Hard Disk Drives (HDD) or Solid State Drives (SSD). Depending on the model one or two drives are supported.



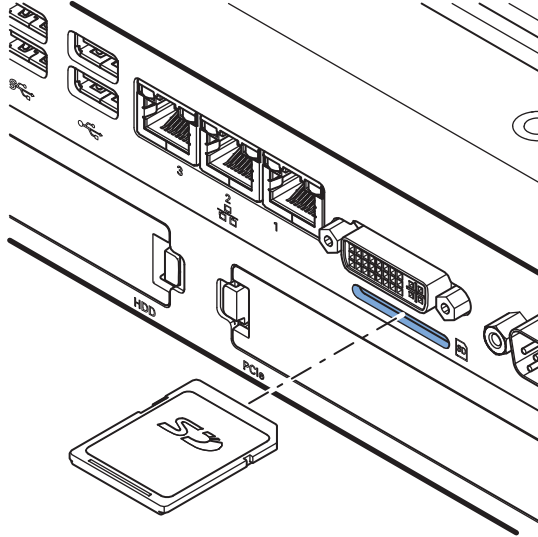
Additional Information

- Refer to 4-1-4 *CPU Specifications* on page 4 - 6 for the number of supported drives.
 - Refer to 4-1-6 *Storage Device Specifications* on page 4 - 8 for storage device specifications.
 - Refer to 5-2-1 *Install a Drive* on page 5 - 4 for install information.
 - Refer to 7-2-5 *Replace a Drive* on page 7 - 12 for maintenance information.
-

2-5 SD Memory Card Slot

The SD Memory Card slot on the Panel PC Without Operating System accepts SD Memory Cards with the following specifications.

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



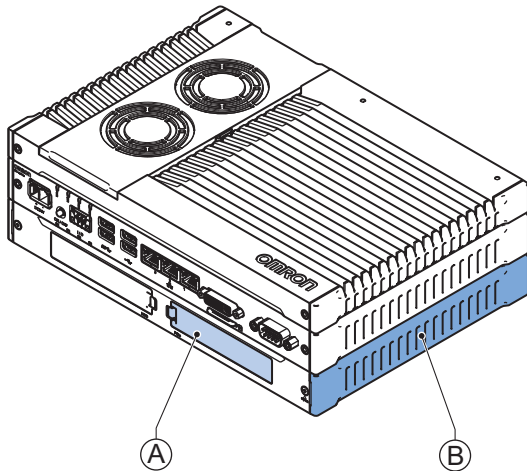
Additional Information

Refer to 2-9-1 *SD Memory Cards* on page 2 - 20 for SD Memory Card details.

2-6 PCIe Card Slot

The PCI Express (PCIe) Card slot of the Panel PC Without Operating System 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

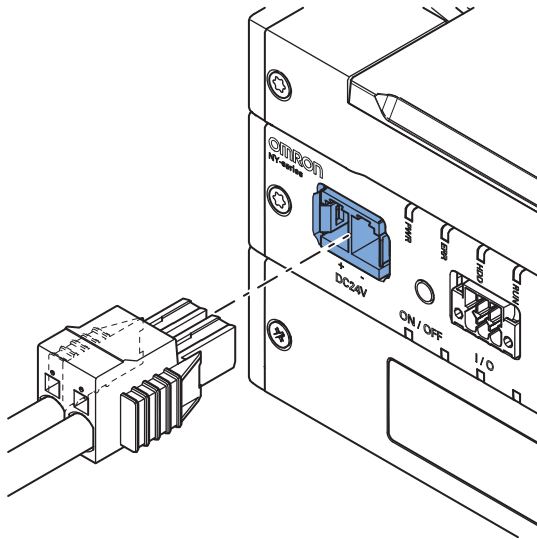
- Refer to 4-1-7 *PCIe Card Specifications* on page 4 - 10 for specifications.
 - Refer to 5-2-2 *Install the PCIe Card* on page 5 - 8 for install information.
 - Refer to 7-2-6 *Replace the PCIe Card* on page 7 - 17 for maintenance information.
-

2-7 Connectors

This section gives an overview of the available connectors for the Panel PC Without Operating System.

2-7-1 Power Connector

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



Additional Information

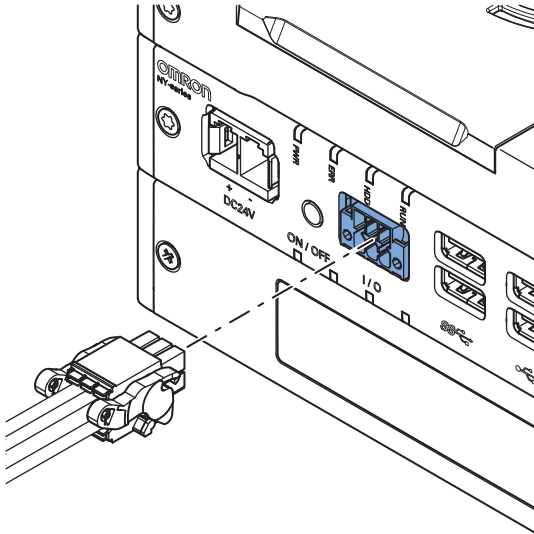
- Refer to *4-2-1 Power Connector Specifications* on page 4 - 12 for specifications.
- Refer to *5-4-3 Wire the Power Connector* on page 5 - 33 for wiring details.
- Refer to *5-5 Connect* on page 5 - 39 for connection details.

2-7-2 I/O Connector

The I/O connector on the Panel PC Without Operating System provides discrete signals with the following functions.

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

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



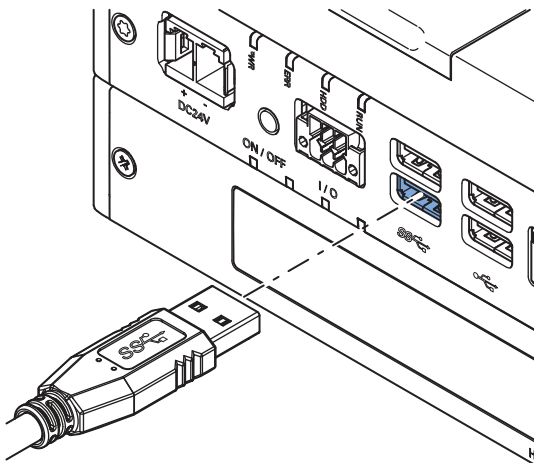
Additional Information

- Refer to 4-2-2 *I/O Connector Specifications* on page 4 - 13 for specifications.
- Refer to 5-4-4 *Wire the I/O Connector* on page 5 - 36 for wiring details.
- Refer to 5-5 *Connect* on page 5 - 39 for connection details.

2-7-3 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.



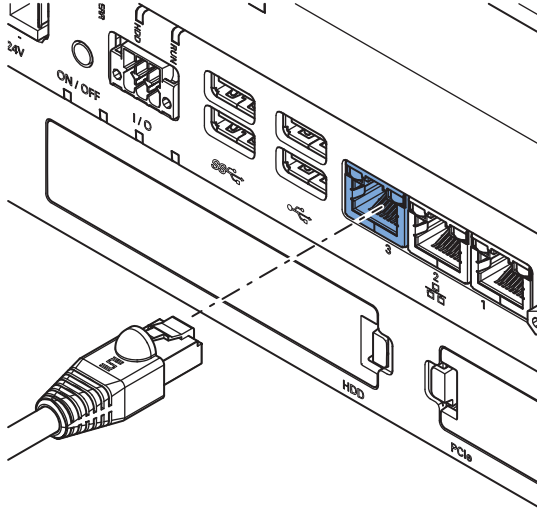
Additional Information

- Refer to 4-2-3 *USB Connector Specifications* on page 4 - 17 for specifications.
- Refer to 5-5 *Connect* on page 5 - 39 for connection details.

2-7-4 Ethernet Connectors

The Ethernet connectors provide 3 individual Ethernet ports on the Panel PC Without Operating System.

Each port offers 10BASE-T/100BASE-TX/1000BASE-T Ethernet speeds.

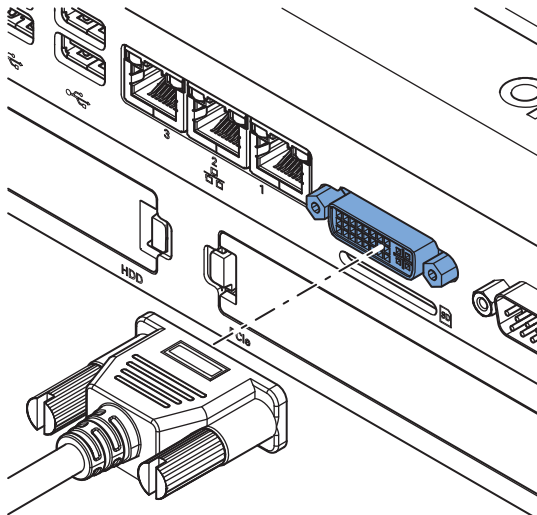


Additional Information

- Refer to 4-2-4 *Ethernet Connector Specifications* on page 4 - 18 for specifications.
- Refer to 5-5 *Connect* on page 5 - 39 for connection details.

2-7-5 DVI Connector

The DVI interfaces supported on this connector are dependent on the configuration of the Panel PC Without Operating System.

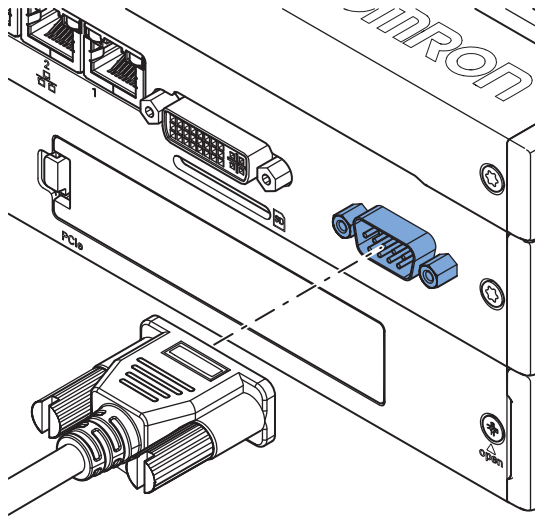


Additional Information

- Refer to 1-4 *Product Configuration* on page 1 - 5 for configuration details.
- Refer to 4-2-5 *DVI Connector Specifications* on page 4 - 19 for specifications.
- Refer to 5-5 *Connect* on page 5 - 39 for connection details.

2-7-6 RS-232C Connector (Optional)

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

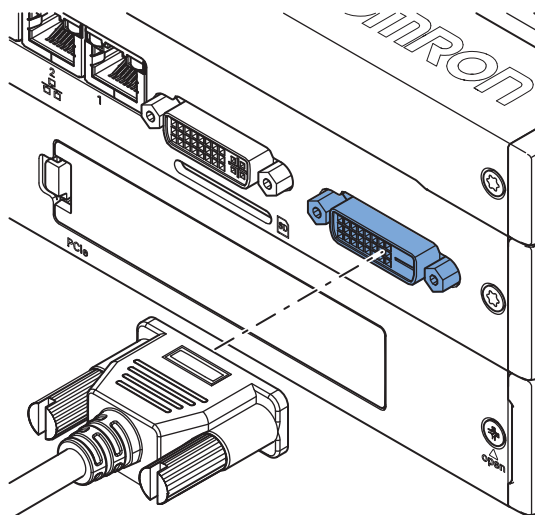


Additional Information

- Refer to *1-4 Product Configuration* on page 1 - 5 for configuration details.
- Refer to *4-2-7 RS-232C Connector Specifications* on page 4 - 22 for specifications.
- Refer to *5-5 Connect* on page 5 - 39 for connection details.

2-7-7 DVI-D Connector (Optional)

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



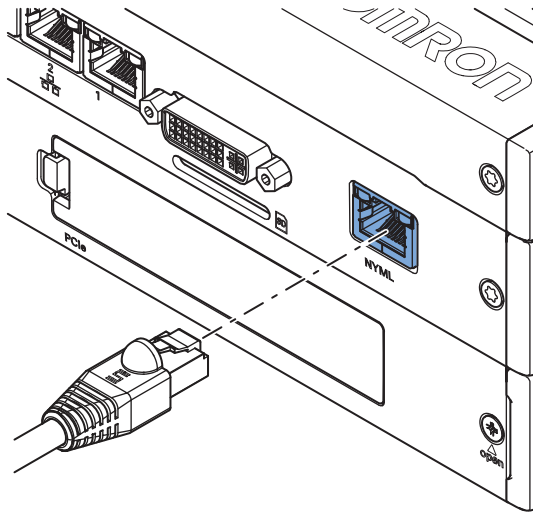
Additional Information

- Refer to *1-4 Product Configuration* on page 1 - 5 for configuration details.
- Refer to *4-2-6 DVI-D Connector Specifications* on page 4 - 21 for specifications.
- Refer to *5-5 Connect* on page 5 - 39 for connection details.

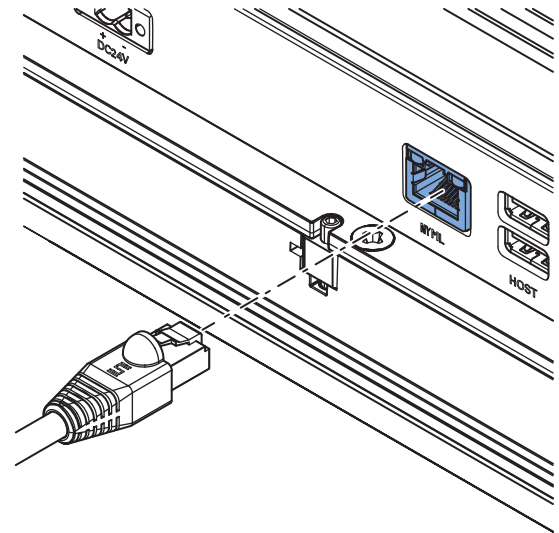
2-7-8 NY Monitor Link Connector (Optional)

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

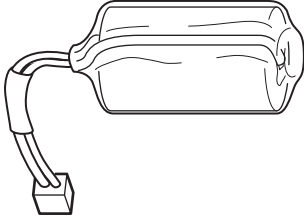
- Refer to *1-4 Product Configuration* on page 1 - 5 for configuration details.
- Refer to *4-2-8 NY Monitor Link Connector Specifications* on page 4 - 22 for specifications.
- Refer to *5-5 Connect* on page 5 - 39 for connection details.

2-8 Spare Parts

The following spare parts for the Panel PC Without Operating System are available.

2-8-1 Battery

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

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

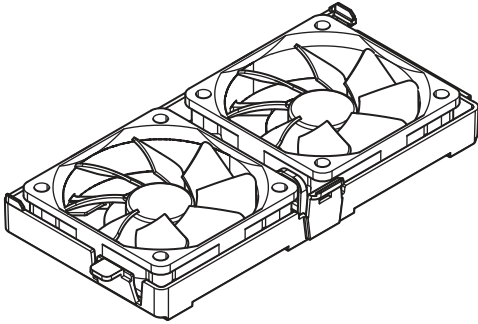


Additional Information

Refer to 7-2-4 *Replace the Battery* on page 7 - 10 for the replacement procedure.

2-8-2 Fan Unit

The Fan Unit is available for the Panel 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.

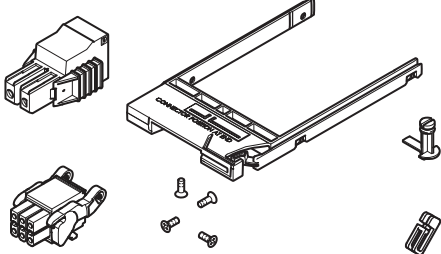


Additional Information

Refer to 7-2-3 *Replace the Fan Unit* on page 7 - 8 for the replacement procedure.

2-8-3 Accessory Kit

The accessory kit for the Panel PC.

Model	Appearance	Specifications
NY000-AK00		<p>Accessory Kit containing all accessories supplied with the Panel 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


2-9 Optional Hardware

The following optional hardware is available for the Panel PC Without Operating System.

2-9-1 SD Memory Cards

SD Memory Card details are provided below.

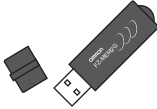
OMRON is not responsible for the operation, performance or write life of any other brand of SD Memory Card.

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

2-9-2 USB Flash Drives

USB Flash Drive details are provided below.

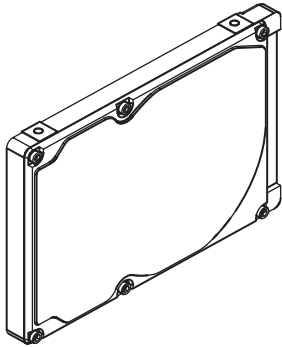
OMRON is not responsible for the operation, performance, or write life of any other brand of USB Flash Drives.

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

2-9-3 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
NY000-AH00		HDD	320 GB
NY000-AS00		SSD SLC	32 GB
NY000-AS01			64 GB
NY000-AS02		SSD iMLC	128 GB



Additional Information

Refer to *4-1-6 Storage Device Specifications* on page 4 - 8 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.



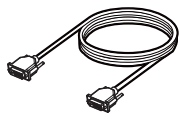
Additional Information

- Refer to *4-1-6 Storage Device Specifications* on page 4 - 8 for storage device specifications.
- Refer to *4-4-1 Operation Environment Specifications* on page 4 - 25 for environment specifications, specifically temperature and vibration specifications.

2-9-4 DVI Cables

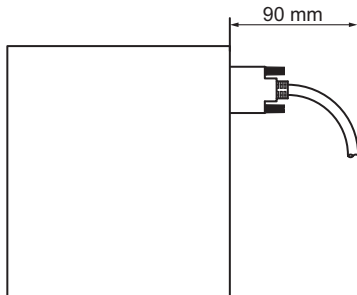
DVI cable details are provided below.

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.



2-9-5 USB Type-A to USB Type-B Cables

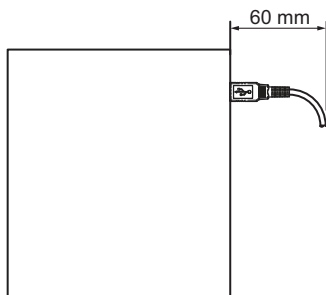
USB Type-A to USB Type-B cable details are provided below.

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.



2-9-6 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.

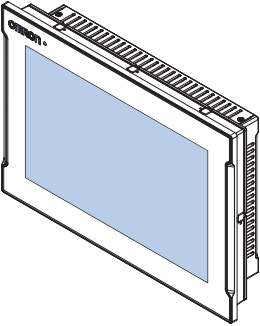
The minimum clearance consists of the sum of:

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

2-9-7 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



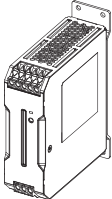
Additional Information

Refer to the OMRON website for specifications and manuals.

2-9-8 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



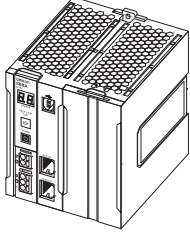
Additional Information

- 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 Panel PC determine the minimum power rating of your power supply.

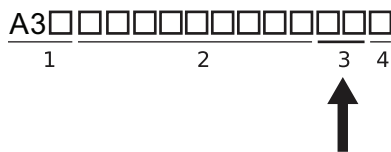
2-9-9 UPS

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.



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.

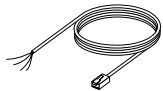
Additional Information

- Refer to 2-9-8 *Power Supply* on page 2 - 24 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.

2-9-10 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)

3

Software

This section provides software information for the Panel PC Without Operating System.

3-1	Compatible Operating Systems	3 - 2
3-2	Support Software	3 - 3
3-2-1	Overview IPC Support Software for Windows	3 - 3
3-2-2	Overview IPC Developer Software for Windows	3 - 3

3-1 Compatible Operating Systems

The operating system installed on the Panel PC must be:

- compatible with the Advanced Configuration and Power Interface (ACPI) protocol
- installed on the storage device in drive bay A

Compatible operating systems for the Panel PC are:

- Windows 7
- Windows 10
- Wind River Linux 7 (64bit)
- Wind River VxWorks 7 (64bit)
- Linux Ubuntu LTS 14.04 (64Bit)



Additional Information

Install applicable hardware drivers and support software to access all features of the Panel PC.

- Refer to *5-7-1 Drivers and Custom Software* on page 5 - 45 for driver details.
 - Refer to *3-2 Support Software* on page 3 - 3 for software details.
-

3-2 Support Software

This section provides an overview of the support software available for your Panel PC Without Operating System.

3-2-1 Overview IPC Support Software for Windows

This section gives an overview of the software utilities available for all Industrial PC Platform products with a Windows operating system.

Product	Software utility
Industrial Monitor	Industrial Monitor Utility Industrial Monitor Brightness Utility Industrial PC Tray Utility
Industrial Box PC	Industrial PC Support Utility Industrial PC Tray Utility
Industrial Panel PC	Industrial Monitor Utility Industrial Monitor Brightness Utility Industrial PC Support Utility Industrial PC Tray Utility

Select and download the utilities required from the OMRON download website.



Additional Information

- An internet connection is required to install support software.
- Refer to NY-series Industrial Panel PC User's Manual (Cat. No. W555) for support software details.

3-2-2 Overview IPC Developer Software for Windows

This section gives an overview of the software available for developers for all Industrial PC Platform products with a Windows operating system.

Product	Developer software
Industrial Monitor	Industrial Monitor SDK Industrial Monitor API
Industrial Box PC	Industrial PC System SDK Industrial PC System API
Industrial Panel PC	Industrial Monitor SDK Industrial Monitor API Industrial PC System SDK Industrial PC System API

Select and download the software required from the OMRON download website.

4

Specifications

This section provides specifications of the Panel PC Without Operating System.

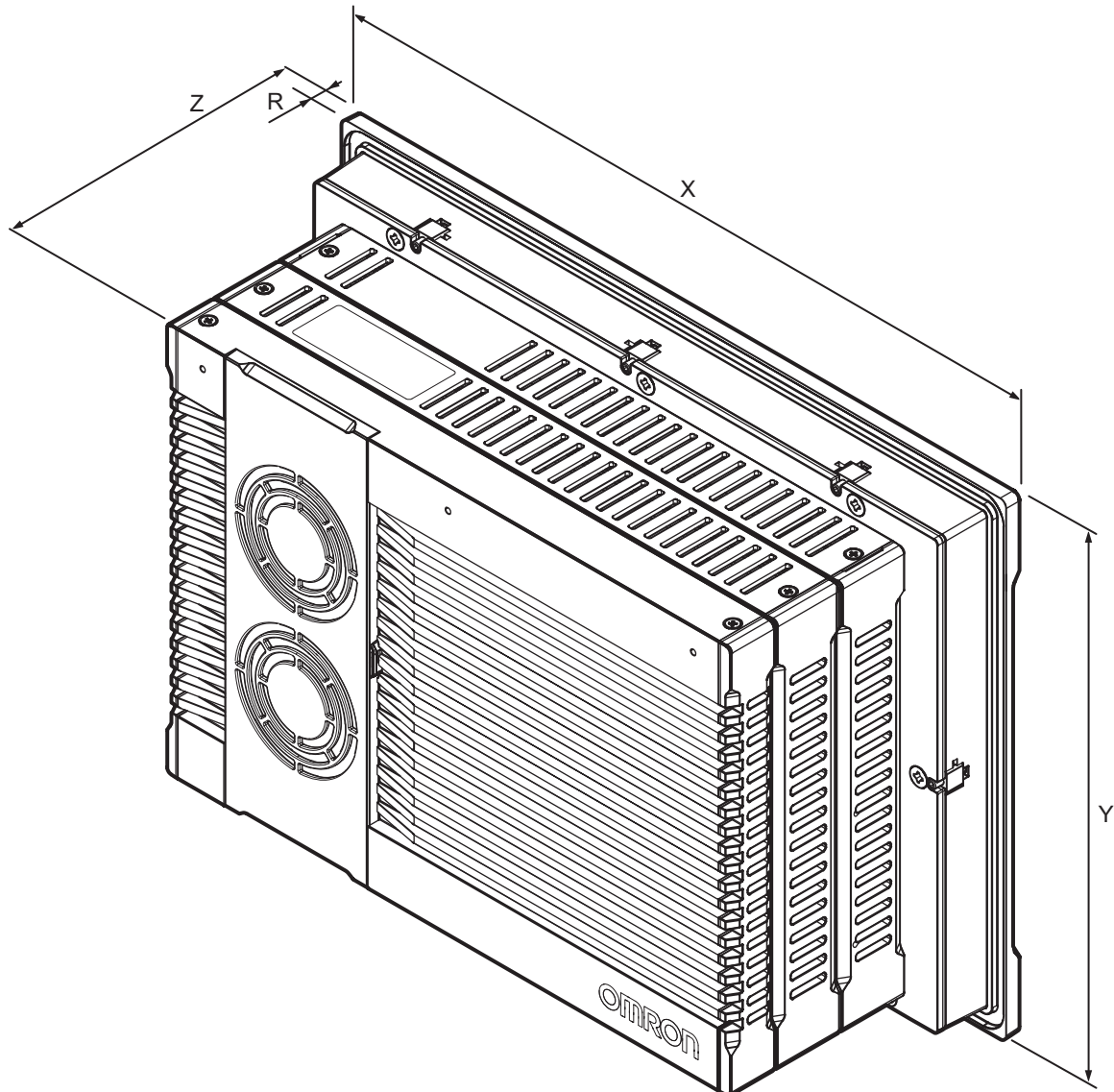
4-1	General Specifications	4 - 2
4-1-1	Dimensions and Weight	4 - 2
4-1-2	General Electrical Specifications	4 - 3
4-1-3	Power Consumption Specifications	4 - 3
4-1-4	CPU Specifications	4 - 6
4-1-5	Memory Specifications	4 - 7
4-1-6	Storage Device Specifications	4 - 8
4-1-7	PCIe Card Specifications	4 - 10
4-2	Connector Specifications	4 - 12
4-2-1	Power Connector Specifications	4 - 12
4-2-2	I/O Connector Specifications	4 - 13
4-2-3	USB Connector Specifications	4 - 17
4-2-4	Ethernet Connector Specifications	4 - 18
4-2-5	DVI Connector Specifications	4 - 19
4-2-6	DVI-D Connector Specifications	4 - 21
4-2-7	RS-232C Connector Specifications	4 - 22
4-2-8	NY Monitor Link Connector Specifications	4 - 22
4-3	Display Specifications	4 - 24
4-4	Environmental Specifications	4 - 25
4-4-1	Operation Environment Specifications	4 - 25
4-4-2	Temperature and Humidity Specifications	4 - 26
4-4-3	Recycling Specifications	4 - 30

4-1 General Specifications

This section provides general specifications of the Panel PC Without Operating System.

4-1-1 Dimensions and Weight

The following table provides specification details on dimensions and weights.



Item	Model Specifications	
	12.1 Inch *1	15.4 Inch *1
Dimensions	Width X = 332 mm Height Y = 234 mm Depth Z = 121 mm	Width X = 401 mm Height Y = 277 mm Depth Z = 121 mm
Monitor thickness in front of panel	Rim thickness R = 8.0 mm	
Weight	6.1 kg	7.2 kg

*1. Refer to 1-4 Product Configuration on page 1 - 5 for product configuration details.

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 Panel PC Without Operating System.

The total power consumption is the sum of the power consumption of all items that are installed in your Panel PC.



Additional Information

Refer to *1-4 Product Configuration* on page 1 - 5 for details.

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

Power consumption specifications for an Panel PC Without Operating System with an Intel® Core™ i7-4700EQ CPU.

Item	Power consumption	
	12.1 Inch models *1	15.4 Inch models *1
Panel PC Without Operating System with an Intel® Core™ i7-4700EQ excluding Drives and Expansions.	99 W	99 W
Drives *1	HDD 320 GB	2 W
	SSD SLC 32 GB	
	SSD SLC 64 GB	
	SSD iMLC 128 GB	

Item		Power consumption	
		12.1 Inch models ^{*1}	15.4 Inch models ^{*1}
Expansions ^{*2}	USB	14 W max. ((2 x 500 mA at 5 VDC) + (2 x 900 mA at 5 VDC))	
	PCIe	15 W max.	

*1. Refer to *1-4 Product Configuration* on page 1 - 5 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 Panel PC Without Operating System.

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

Item	Minimum power requirements
Power supply Refer to <i>2-9-8 Power Supply</i> on page 2 - 24 for power supply products.	240 W
UPS Refer to <i>2-9-9 UPS</i> on page 2 - 25 for UPS products.	240 W

Power Consumption with an Intel® Core™ i5-4300U CPU

Power consumption specifications for an Panel PC Without Operating System with an Intel® Core™ i5-4300U CPU.

Item		Power consumption	
		12.1 Inch models ^{*1}	15.4 Inch models ^{*1}
Panel PC Without Operating System with an Intel® Core™ i5-4300U excluding Drives and Expansions.		70 W	70 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 VDC) + (2 x 900 mA at 5 VDC))	
	PCIe	5 W max.	

*1. Refer to *1-4 Product Configuration* on page 1 - 5 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 Panel PC Without Operating System.

The required supply specifications for a Panel PC with an Intel® Core™ i5-4300U CPU.

Item	Minimum power requirements
Power supply Refer to <i>2-9-8 Power Supply</i> on page 2 - 24 for power supply products.	120 W
UPS Refer to <i>2-9-9 UPS</i> on page 2 - 25 for UPS products.	120 W

Power Consumption with an Intel® Celeron® 2980U CPU

Power consumption specifications for an Panel PC Without Operating System with an Intel® Celeron® 2980U CPU.

Item	Power consumption	
	12.1 Inch models *1	15.4 Inch models *1
Panel PC Without Operating System with an Intel® Celeron® 2980U excluding Drives and Expansions.	63 W	63 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 VDC) + (2 x 900 mA at 5 VDC))
	PCIe	5 W max.

*1. Refer to *1-4 Product Configuration* on page 1 - 5 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 Panel PC Without Operating System.

The required supply specifications for a Panel PC with an Intel® Celeron® 2980U CPU.

Item	Minimum power requirements
Power supply Refer to <i>2-9-8 Power Supply</i> on page 2 - 24 for power supply products.	120 W
UPS Refer to <i>2-9-9 UPS</i> on page 2 - 25 for UPS products.	120 W

4-1-4 CPU Specifications

This section gives the specifications of the CPUs that are available for the Panel PC Without Operating System.

Refer to *1-4 Product Configuration* on page 1 - 5 for product configuration details.

Intel® Core™ i7-4700EQ CPU Specifications

CPU specifications for Panel PC Without Operating Systems with an Intel® Core™ i7-4700EQ CPU.

Item	Specifications
Cores / Threads	4 / 8
CPU base frequency	2.4 GHz
Maximum turbo frequency	3.4 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.



Additional Information

Refer to *A-1-3 BIOS - Advanced* on page A - 5 for turbo frequency details.

Intel® Core™ i5-4300U CPU Specifications

CPU specifications for Panel PC Without Operating Systems with an Intel® Core™ i5-4300U CPU.

Item	Specifications
Cores / Threads	2 / 4
CPU base frequency	1.9 GHz
Maximum turbo frequency	2.9 GHz
Cache	3 MB
Cooling details	Passive cooling (fanless)
Drive bays (HDD/SSD)	2
Graphics controller	Intel® HD Graphics 4400. Up to two independent screens.



Additional Information

Refer to *A-1-3 BIOS - Advanced* on page A - 5 for turbo frequency details.

Intel® Celeron® 2980U CPU Specifications

CPU specifications for Panel PC Without Operating Systems with an Intel® Celeron® 2980U CPU.

Item	Specifications
Cores / Threads	2 / 2
CPU base frequency	1.6 GHz
Maximum turbo frequency	---
Cache	2 MB
Cooling details	Passive cooling (fanless)
Drive bays (HDD/SSD)	1. Drive bay A.
Graphics controller	Intel® HD Graphics. Up to two independent screens.

4-1-5 Memory Specifications

The following table provides specification details of the memory.

Item	Model Specifications		
	2 GB *1	4 GB *1	8 GB *1
Memory type	DDR3L		
Package memory format	SO-DIMM		
Serial Presence Detect (SPD)	Speed grade	1600 Mbps	
	CAS Latency	CL11	

*1. Refer to *1-4 Product Configuration* on page 1 - 5 for product configuration details.



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}	
Model	NY000-AH00	
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 - 5 for product configuration details.

*2. Refer to 4-4-1 Operation Environment Specifications on page 4 - 25 for the temperature specifications of the complete Panel 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	NY000-AS00	NY000-AS01	NY000-AS02
Type	SLC	SLC	iMLC
S.M.A.R.T. support	Yes		
Interface	Serial ATA 3.1		
Sustained read speed	Up to 160 MB/s		Up to 430 MB/s
Sustained write speed	Up to 150 MB/s		Up to 190 MB/s
Operating temperature	0 to 70°C ^{*2}		
Operating humidity	10% to 95% (with no condensation)		
Storage temperature	-40 to 100°C		
Storage humidity	10% to 95% (with no condensation)		

Item	Model Specifications		
	32 GB *1	64 GB *1	128 GB *1
Life	1500 TB/11 years at a daily workload of 350 GB	3000 TB/23 years at a daily workload of 350 GB	114 TB/3 years at a daily workload of 100 GB

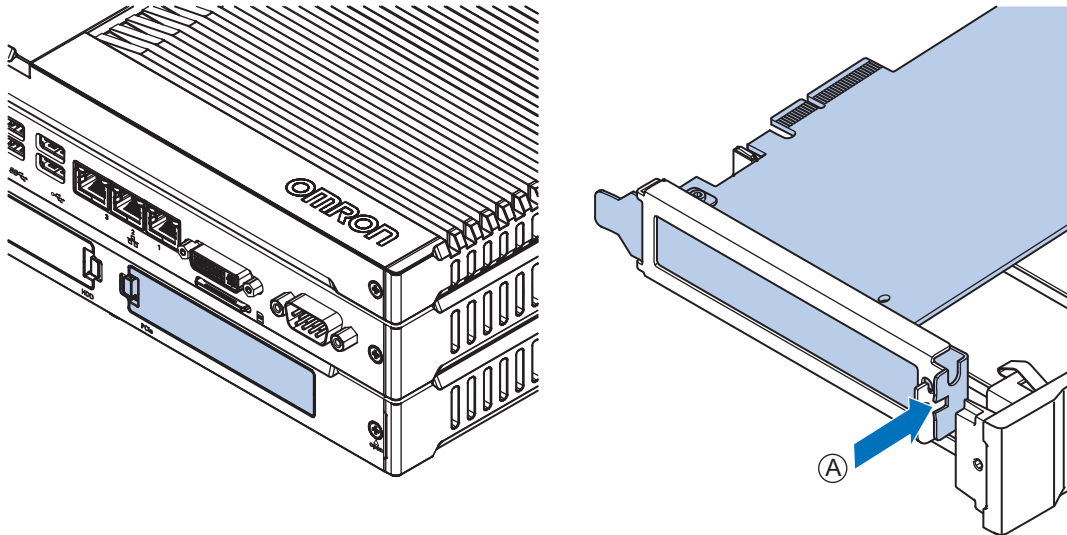
*1. Refer to *1-4 Product Configuration* on page 1 - 5 for product configuration details.

*2. Refer to *4-4-1 Operation Environment Specifications* on page 4 - 25 for the temperature specifications of the complete Panel PC

4-1-7 PCIe Card Specifications

The PCI Express (PCIe) Card slot of the Panel PC Without Operating System 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 Panel PC Without Operating Systems 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 <i>Power Consumption with an Intel® Core™ i7-4700EQ CPU</i> on page 4 - 3 for the maximum power consumption

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

PCIe Card Slot Specifications with an Intel® Core™ i5-4300U CPU

The table below provides PCIe Card slot details for Panel PC Without Operating Systems with an Intel® Core™ i5-4300U CPU.

Item	Specifications
Configuration	X1 (1 lane) up to Gen 2
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 <i>Power Consumption with an Intel® Core™ i5-4300U CPU</i> on page 4 - 4 for the maximum power consumption

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

PCIe Card Slot Specifications with an Intel® Celeron® 2980U CPU

The table below provides PCIe Card slot details for Panel PC Without Operating Systems with an Intel® Celeron® 2980U CPU.

Item	Specifications
Configuration	X1 (1 lane) up to Gen 2
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 <i>Power Consumption with an Intel® Celeron® 2980U CPU</i> on page 4 - 5 for the maximum power consumption

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

4-2 Connector Specifications

This section provides the Connector Specifications of the Panel PC Without Operating System.

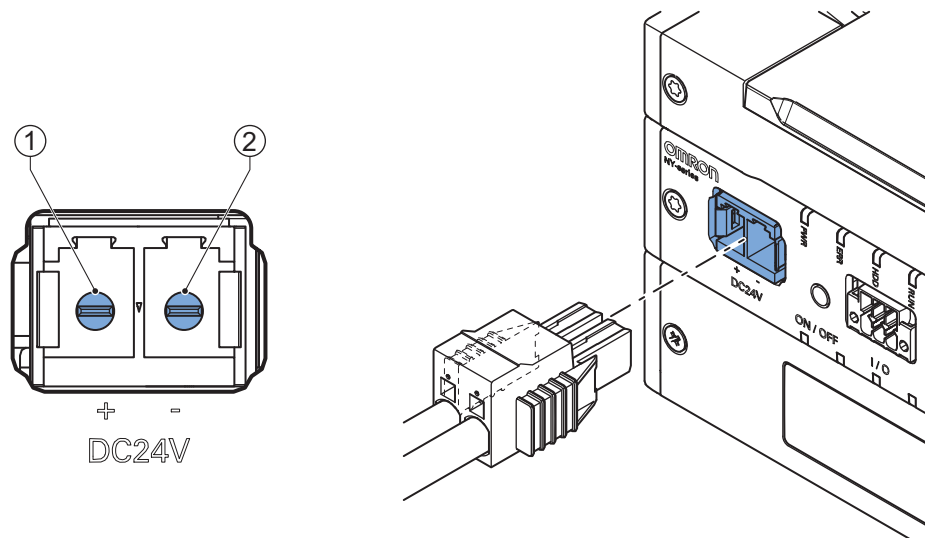
4-2-1 Power Connector Specifications

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 Panel PC provides protection against reverse polarity.



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

Pin	Description
1	24 VDC
2	0 VDC

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

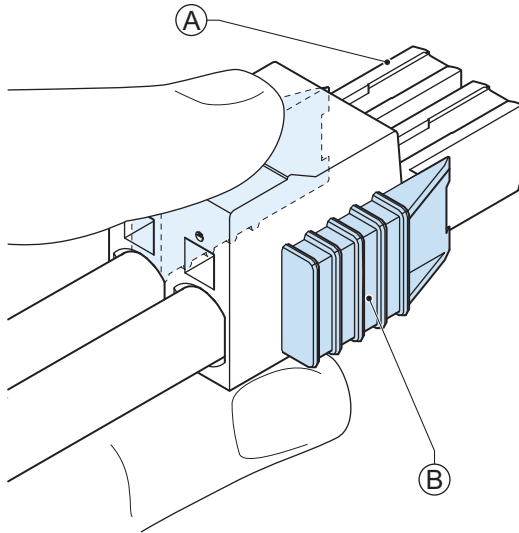


Additional Information

- Refer to 5-4-3 *Wire the Power Connector* on page 5 - 33 for wiring details.
- Refer to 5-4-2 *Ground* on page 5 - 26 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.

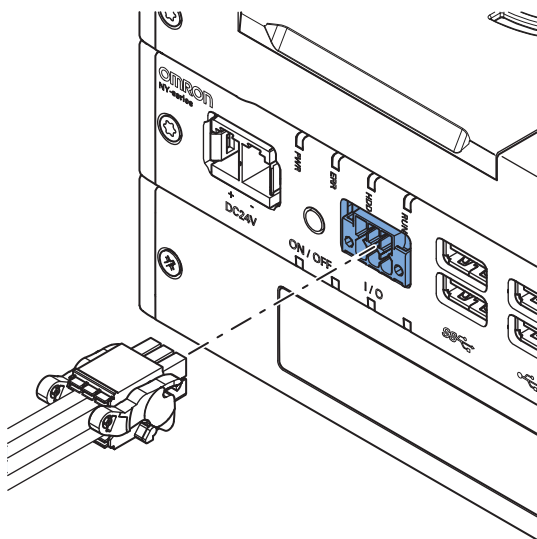
4-2-2 I/O Connector Specifications

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.

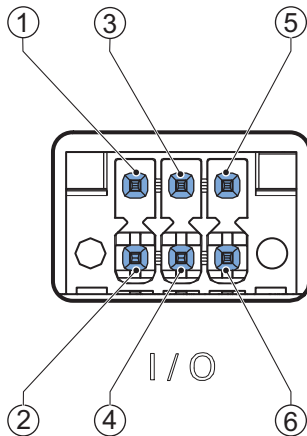
The Lock-and-Release Latch connector is a Phoenix Contact type DFMC 1,5/ 3-ST-3,5-LR BK (1711658).



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 Panel 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 Panel PC is OFF or has been disconnected from the power supply. • Closed: The Power Status Output is ON when the Panel 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 - 15 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 Panel PC will perform one of the following operations.</p> <ul style="list-style-type: none"> • When powered ON, the Panel PC will shut down and power OFF. • When powered OFF, the Panel 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 - 15 for Power Status Output details.

*2. Refer to 6-2 *Power ON* on page 6 - 3 and 6-3 *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 - 36 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

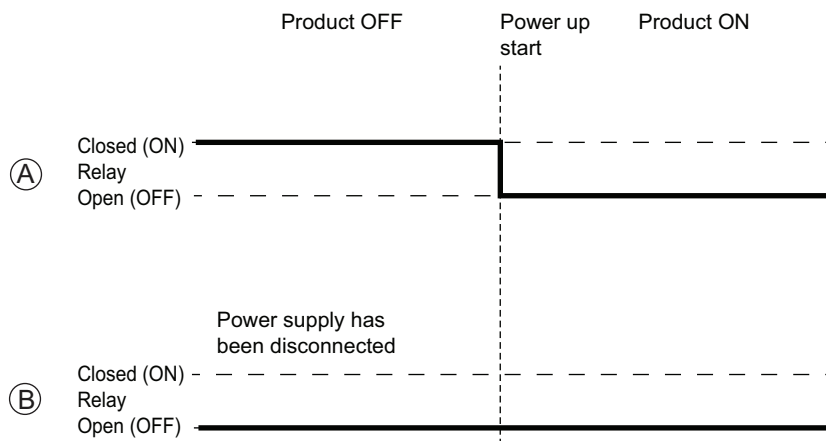
This section provides power ON details of the Power Status Output operation.

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

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

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

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



Additional Information

Refer to 5-4-4 *Wire the I/O Connector* on page 5 - 36 for I/O connector wiring details.

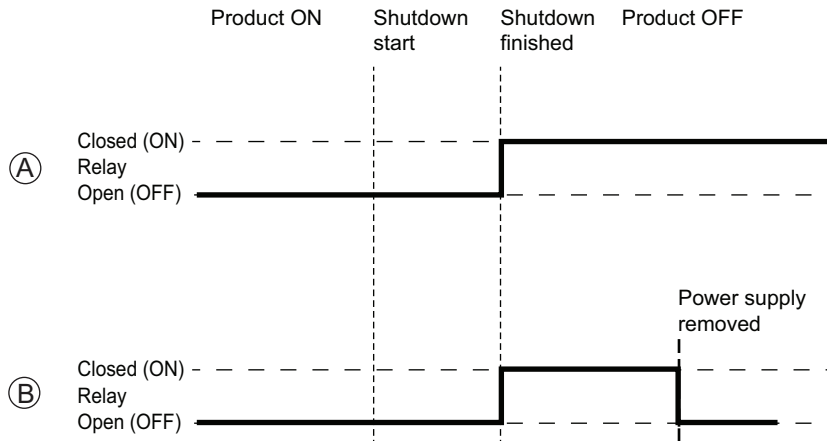
● Power OFF Power Status Output Operation

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 Panel 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 Panel PC is turned ON.

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

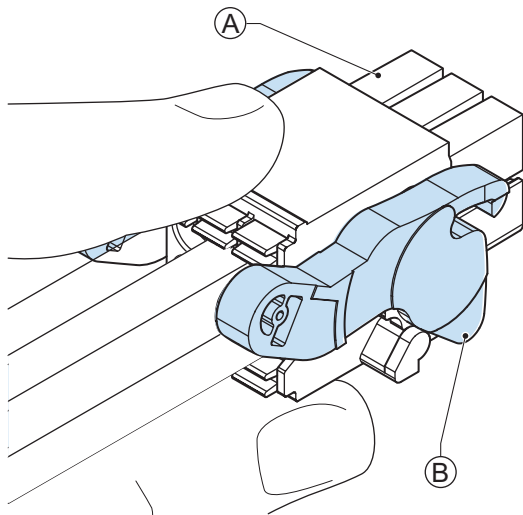


Additional Information

Refer to 5-4-4 *Wire the I/O Connector* on page 5 - 36 for I/O connector wiring details.

Lock and Remove the I/O Connector

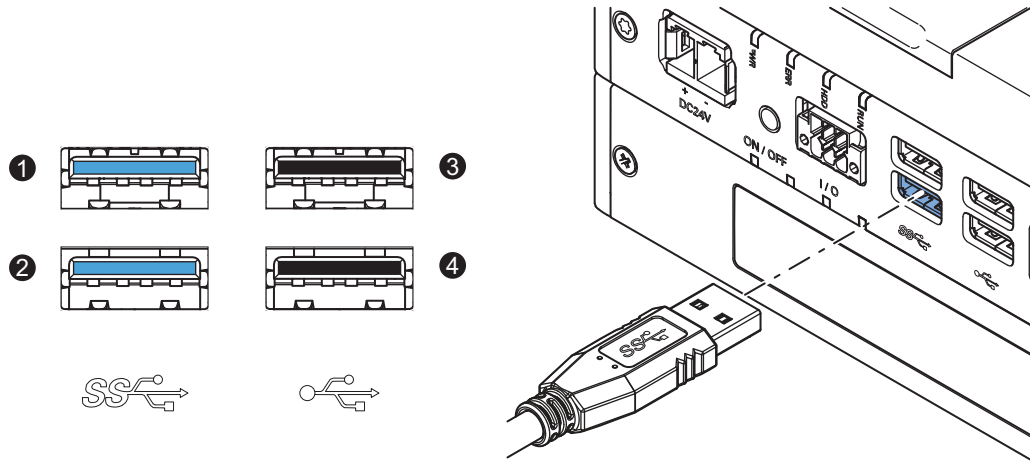
The I/O connector locks into place when the black part of the connector is held and pushed in.



Tilting both levers (B) will release the I/O connector (A) from the Panel PC.

4-2-3 USB Connector Specifications

The Panel PC Without Operating System 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 Panel 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	



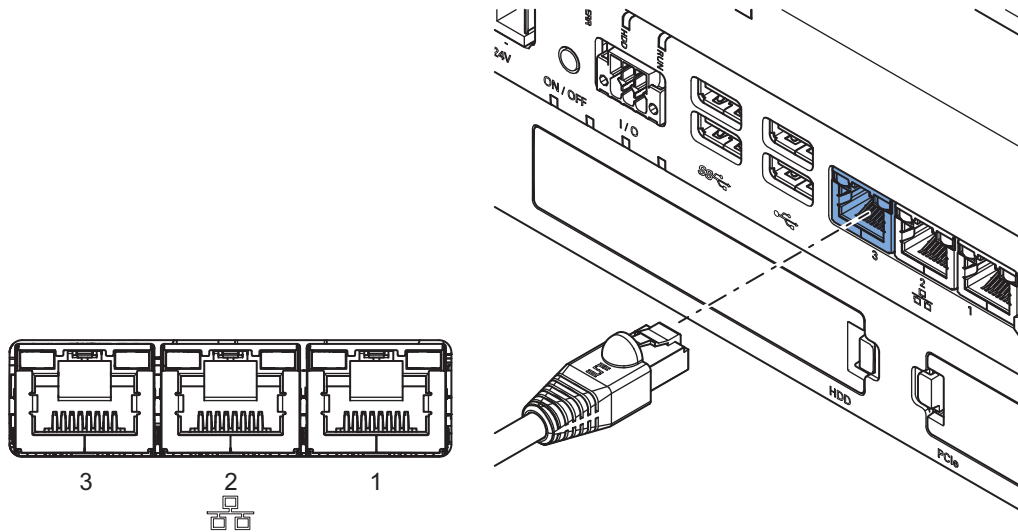
Additional Information

Refer to 5-4-2 *Ground* on page 5 - 26 for grounding details.

4-2-4 Ethernet Connector Specifications

Details of the RJ45 Ethernet connectors are provided below.

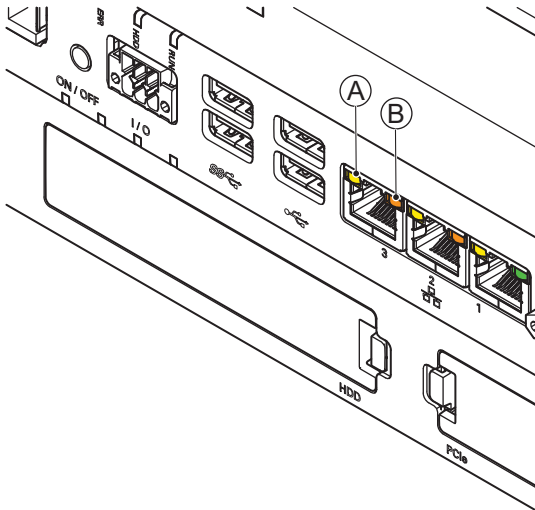
The Ethernet connector locks automatically to prevent unintentional disconnection.






The view represents the Ethernet connector on the Panel PC Without Operating System.

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

Item	Indicator	Color	Status	Description	
B	Speed	Not lit		Not lit	10 Mbps or no link
		Green		Lit	100 Mbps link
		Orange		Lit	1 Gbps link

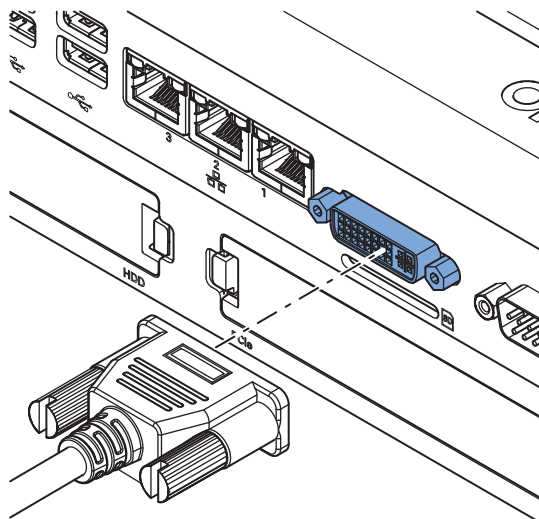
Ethernet Connector Specifications

Item	Specifications
Number of available ports	3
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
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

4-2-5 DVI Connector Specifications

DVI is the standard video interface for the Panel PC.

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



Additional Information

- Refer to 4-1-4 *CPU Specifications* on page 4 - 6 for graphics controller details.
- Refer to 5-4-2 *Ground* on page 5 - 26 for grounding details.
- Refer to A-2-2 *DVI-D Connector Pin Details* on page A - 13 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 Panel PC Without Operating Systems 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

DVI-D Connector Specifications with an Intel® Core™ i5-4300U CPU

DVI-D connector specifications for Panel PC Without Operating Systems with an Intel® Core™ i5-4300U CPU.

Item	Specifications
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

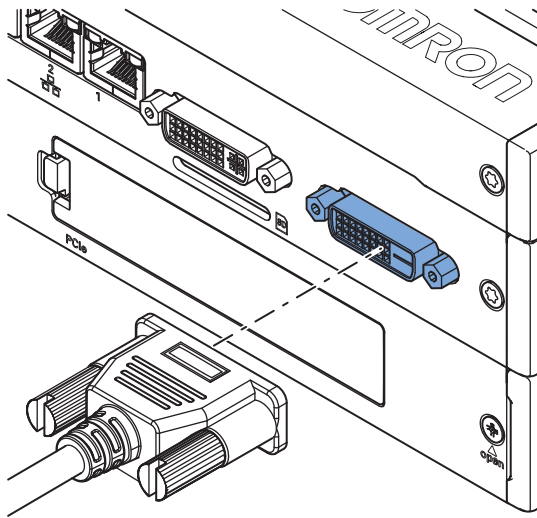
DVI-D Connector Specifications with an Intel® Celeron® 2980U CPU

DVI-D connector specifications for Panel PC Without Operating System with an Intel® Celeron® 2980U CPU.

Item	Specifications
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

4-2-6 DVI-D Connector Specifications

The optional video interface on the Panel 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

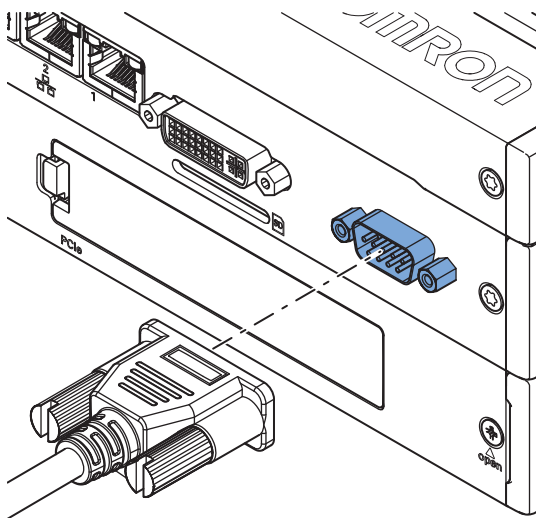


Additional Information

- Refer to *4-1-4 CPU Specifications* on page 4 - 6 for graphics controller details.
- Refer to *5-4-2 Ground* on page 5 - 26 for grounding details.
- Refer to *A-2-2 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 Panel PC uses a standard SUBD9 connector. The RS-232C interface is not isolated from the internal Panel PC's components.



Additional Information

- Refer to 5-4-2 *Ground* on page 5 - 26 for grounding details.
- Refer to A-3 *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.

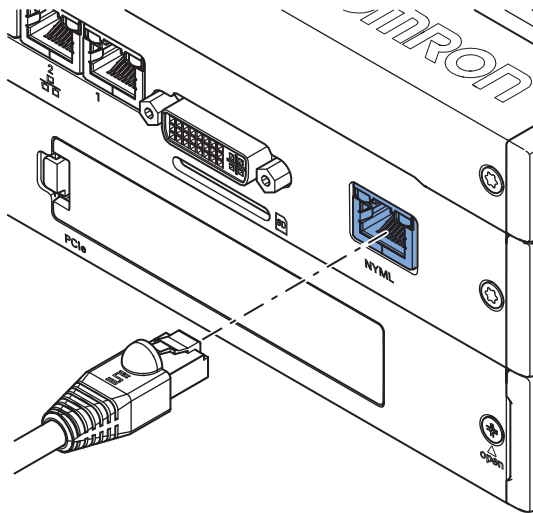
Item	Specifications
Connector type	RJ45
Transmission media	Twisted pair cable of category 6A or higher (double-shielded straight cable with copper braiding and aluminum foil)
Maximum cable length between Industrial PC and Industrial Monitor	100 m
Topology	Line (direct) connection only ^{*1}
Video resolution	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.

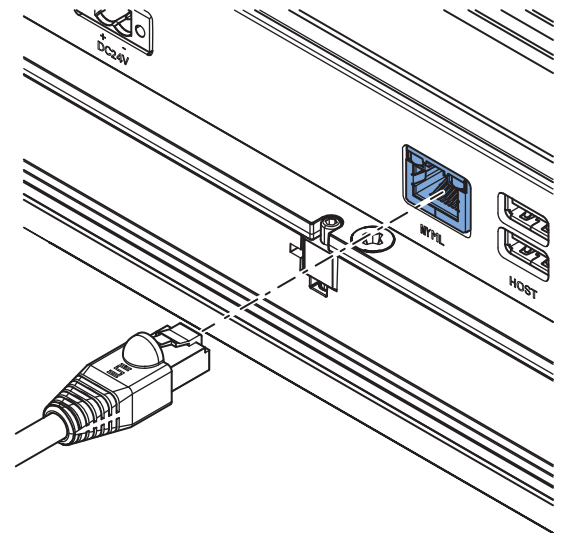
Do not use:

- Ethernet switches
- Ethernet hubs
- Daisy chain connections

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



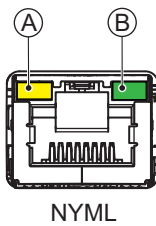
Industrial PC



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 Display Specifications

This section provides the display specifications of the Industrial Panel PC.

 **WARNING**

Do not use the input functions of the touchscreen in applications that involve human life, in applications that may result in serious injury, or for emergency stop switches.





Precautions for Correct Use

The touchscreen supports 5 simultaneous touches. When the number of touches is exceeded, not all touch points will be detected.

Item		Model Specifications	
		12.1 Inch ^{*1}	15.4 Inch ^{*1}
Display panel ^{*2}	Display device	TFT LCD	
	Screen size	12.1 inches	15.4 inches
	Surface treatment	Anti glare treatment	
	Surface hardness	Mohs scale 5-6	
	Resolution	1,280 × 800 pixels at 60 Hz (horizontal × vertical)	
	Colors	16,770,000 colors	
	Effective display area	261 × 163 mm (horizontal × vertical)	331 × 207 mm (horizontal × vertical)
	View angles	Left: 60°, Right: 60°, Top: 60°, Bottom: 60°	
	Life	50,000,000 operations minimum	
	EMC	Correct touchscreen operation is possible within allowable EMC immunity conditions ^{*3}	
Touch	Technology	Projected capacitive	
	Touch resolution	Touch accuracy 1.5% (4-5mm)	
	Multitouch	Up to 5 simultaneous touches	
	Features	Water detection ^{*4} , hand palm rejection ^{*5} , gloves ^{*6}	
Backlight	Life	50,000 hours minimum. ^{*7}	
	Brightness adjustment ^{*8}	200 levels	

*1. Refer to 1-4 *Product Configuration* on page 1 - 5 for details.

*2. There may be some defective pixels in the display. This is not a fault as long as the number of defective light and dark pixels fall within the following standard range: light and dark pixels 10 or less. There must not be 3 adjacent light/dark pixels.

*3. Refer to 4-1-2 *General Electrical Specifications* on page 4 - 3 for EMC immunity level specifications.

*4. If water is detected the touch functionality will not be available.

*5. If a palm is detected that specific area is neglected.

*6. The touchscreen can be operated when wearing gloves. Confirm you can operate the touchscreen with gloves before actual operation.

*7. This is the estimated time before brightness is reduced by half at room temperature. The life expectancy is drastically shortened if used at high temperatures.

*8. If the brightness is set to very dark, it causes flickering or the screen will be too dark to use.

4-4 Environmental Specifications

This section provides environmental specifications of the Panel PC Without Operating System.

4-4-1 Operation Environment Specifications

The following table provides general environmental specifications for the Industrial Panel 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) *1
Ambient storage humidity	10% to 90% (with no condensation) *1
Operating atmosphere	No corrosive gases
Altitude	2,000 m max.
Noise resistance (during operation)	Conforms to IEC 61000-4-4, 2kV (power lines)
Vibration resistance (during operation)	The vibration resistance depends on the storage device(s): <ul style="list-style-type: none"> For a Panel PC with only SSD storage devices: 5 to 8.4Hz with 3.5 mm single amplitude and 8.4 to 150 Hz with 9.8 m/s² for 10 times each in X, Y and Z directions. Conforms to IEC 60068-2-6. For a Panel PC with one or more HDD storage devices the Panel PC must be installed in a vibration free environment. *2
Shock resistance (during operation)	Conforms to IEC 60068-2-27. 147 m/s ² , 3 times each in X, Y and Z directions
Degree of protection	Front of Monitor: IP65 or the equivalent *3
Pollution degree	JIS B3502 and IEC 61131-2: 2 or less

*1. Refer to 4-4-2 *Temperature and Humidity Specifications* on page 4 - 26 for ambient operating temperature and humidity details per CPU type.

*2. A Panel PC with one or more HDD storage devices should not be used in applications subject to vibration. Examples of applications subject to vibration:

- AGV (Automated Guided Vehicles)
- Rail vehicle
- Stacker crane
- Elevator
- Tableting machine
- Connector pin assembling machine
- Bending machine

Ensure your Panel PC with HDD does not vibrate. When in doubt use a Panel PC with SSD storage devices.

*3. The Panel PC may not operate properly in locations subjected to oil splashes for extended periods of time.

4-4-2 Temperature and Humidity Specifications

The maximum ambient operating temperature depends on CPU type, mounting orientation, and storage device type.

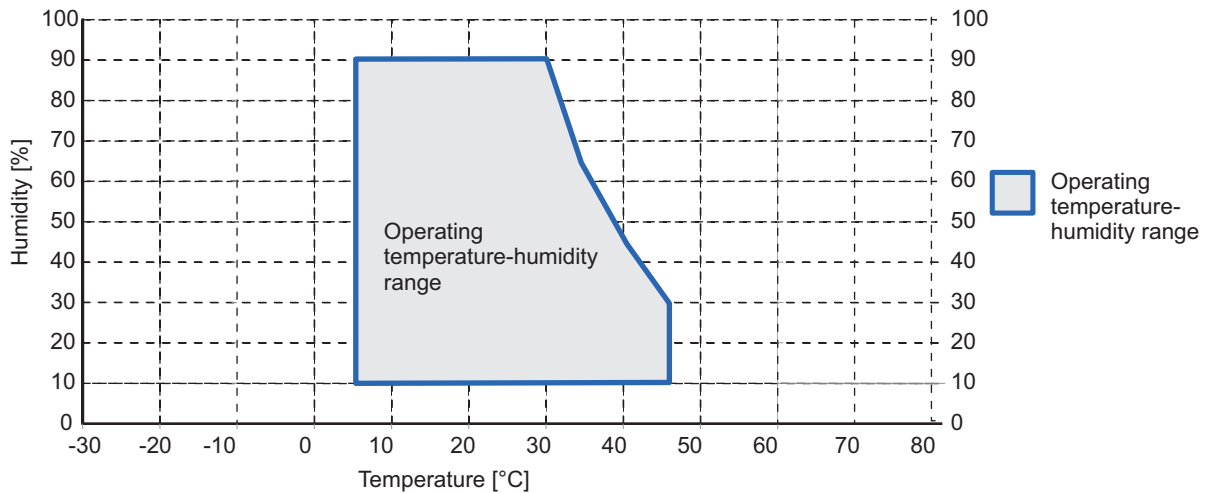
The following tables provide ambient temperature and humidity details per CPU type.

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.

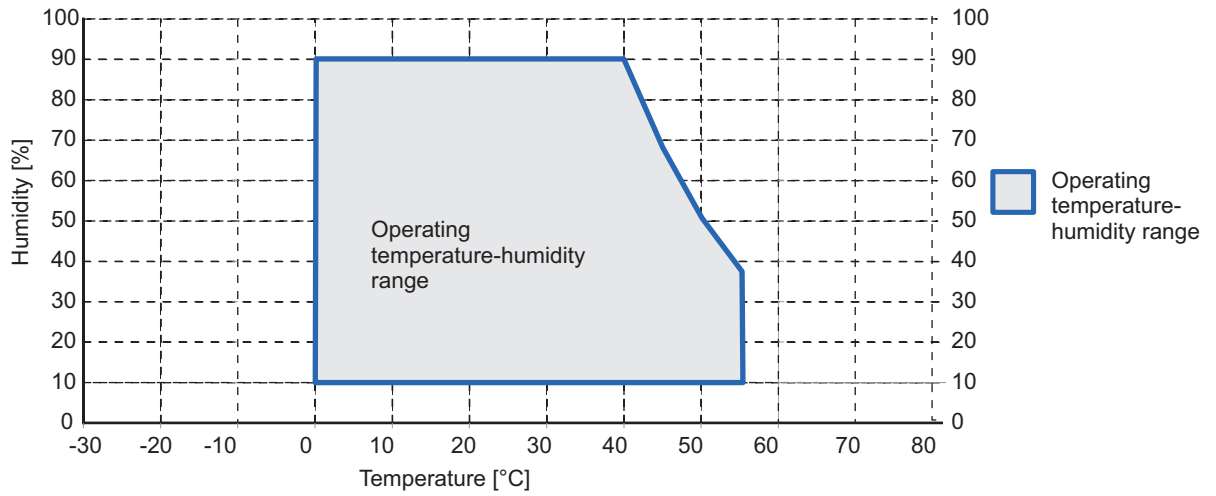
- Operate the Panel PC with a HDD within the ambient temperature and humidity ranges as shown in the following graph.



Additional Information

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

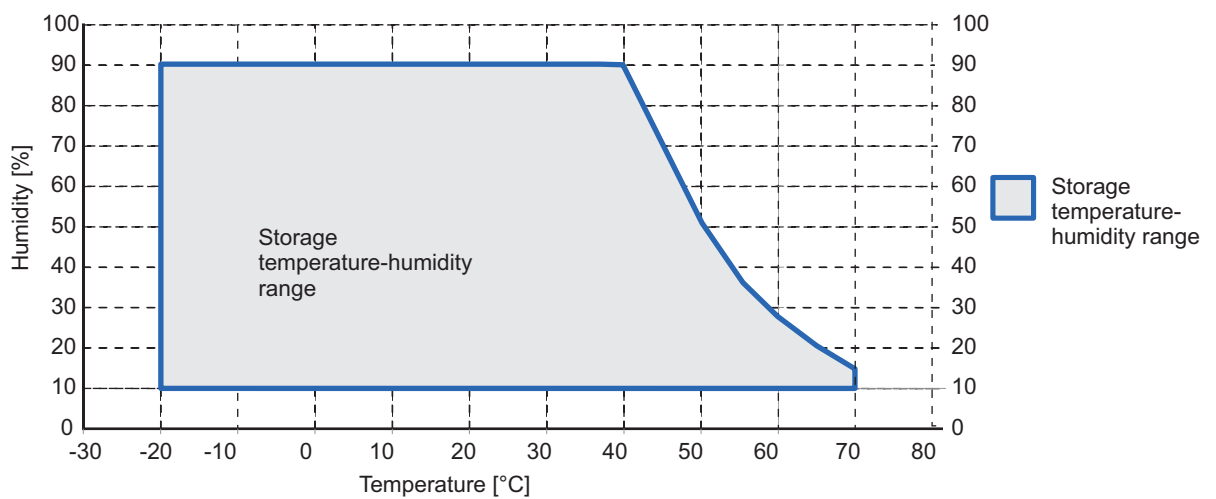
- Operate the Panel PC with a SSD within the ambient temperature and humidity ranges as shown in the following graph.



Additional Information

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

- Store the Panel PC within the ambient temperature and humidity ranges as shown in the following graph.

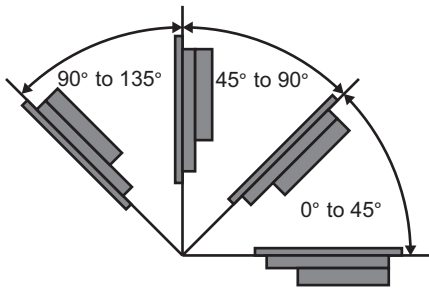


Temperature Specifications with an Intel® Core™ i7-4700EQ CPU

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

Product Orientation	Mounting Angle	Configuration *1	
		With 1 or 2 SSD's	With 1 HDD
Landscape and Portrait	0° to 45°	0 to 50°C	5 to 35°C
Landscape	45° to 90°	0 to 55°C	5 to 35°C
	90° to 135°	0 to 55°C	5 to 40°C
Portrait	45° to 90°	0 to 55°C	5 to 40°C
	90° to 135°	0 to 55°C	5 to 40°C

*1. Refer to 1-4 Product Configuration on page 1 - 5 for model details.



Additional Information

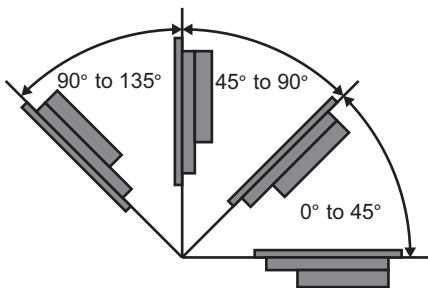
Refer to *Temperature and Humidity Graphs* on page 4 - 26 for graph details.

Temperature Specifications with an Intel® Core™ i5-4300U CPU

Ambient operating temperature specifications for a Panel PC with an Intel® Core™ i5-4300U CPU.

Product Orientation	Mounting Angle	Configuration ^{*1}	
		With 1 or 2 SSD's	With 1 HDD
Landscape and Portrait	0° to 45°	0 to 50°C	5 to 35°C
Landscape	45° to 90°	0 to 55°C	5 to 35°C
	90° to 135°	0 to 55°C	5 to 40°C
Portrait	45° to 90°	0 to 55°C	5 to 40°C
	90° to 135°	0 to 55°C	5 to 40°C

*1. Refer to 1-4 Product Configuration on page 1 - 5 for model details.



Additional Information

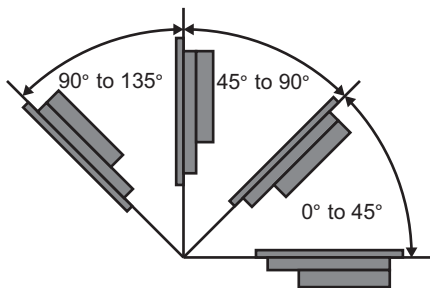
Refer to *Temperature and Humidity Graphs* on page 4 - 26 for graph details.

Temperature Specifications with an Intel® Celeron® 2980U CPU

Ambient operating temperature specifications for a Panel PC with an Intel® Celeron® 2980U CPU.

Product Orientation	Mounting Angle	Configuration *1	
		With 1 or 2 SSD's	With 1 HDD
Landscape and Portrait	0° to 45°	0 to 50°C	5 to 35°C
Landscape	45° to 90°	0 to 55°C	5 to 35°C
	90° to 135°	0 to 55°C	5 to 40°C
Portrait	45° to 90°	0 to 55°C	5 to 40°C
	90° to 135°	0 to 55°C	5 to 40°C

*1. Refer to 1-4 Product Configuration on page 1 - 5 for model details.



Additional Information

Refer to *Temperature and Humidity Graphs* on page 4 - 26 for graph details.

4-4-3 Recycling Specifications

The following table provides recycling information for the Panel PC Without Operating System.

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.



廢電池請回收

5

Installation

This section provides all installation details for the Panel PC Without Operating System.

5-1	Unpack	5 - 2
5-1-1	Unpack Procedure	5 - 2
5-1-2	Items Supplied	5 - 3
5-2	Install Options	5 - 4
5-2-1	Install a Drive	5 - 4
5-2-2	Install the PCIe Card	5 - 8
5-3	Mount	5 - 13
5-3-1	Installation Method in Control Panels	5 - 13
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5-3-8	Prepare the Mounting Surface	5 - 23
5-3-9	Mount the Panel PC	5 - 25
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5-8	Connect UPS	5 - 46
5-8-1	Connect UPS Using the USB Connector	5 - 47
5-8-2	Connect UPS Using the I/O Connector	5 - 49

5-1 Unpack

This section provides details on how to unpack the Panel PC Without Operating System.

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.



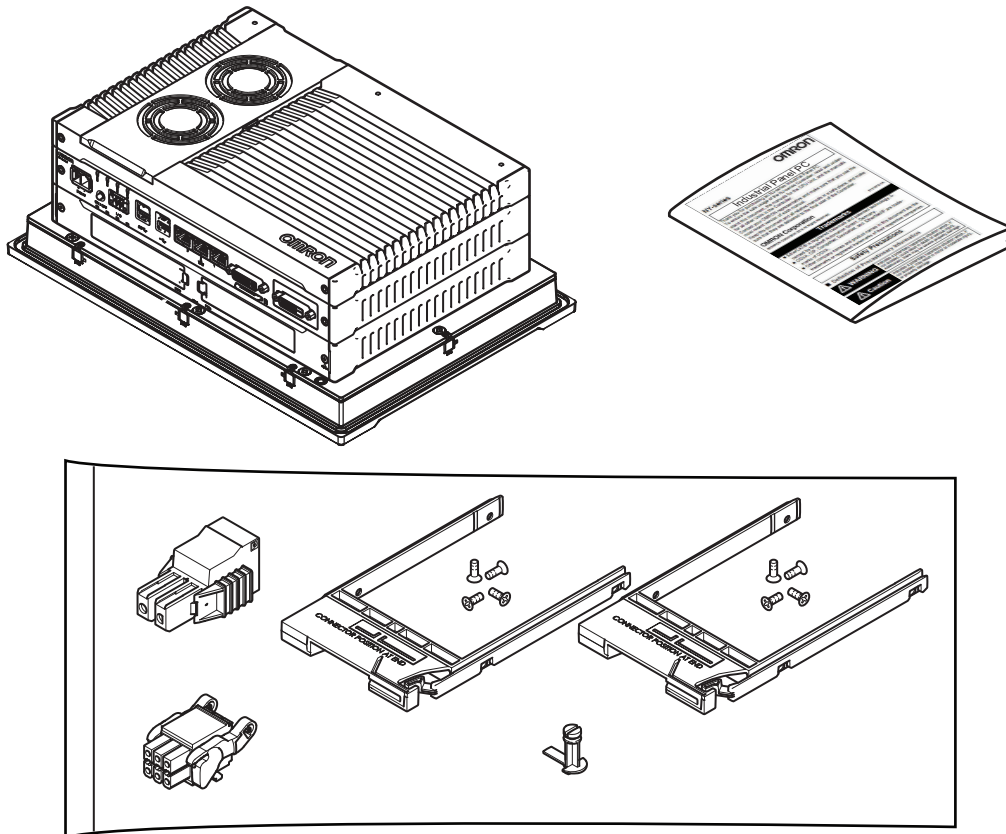
Additional Information

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

5-1-2 Items Supplied

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

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



5-2 Install Options

This section describes the installable options for the Panel PC Without Operating System.

5-2-1 Install a Drive

A drive is a storage device for the Panel PC Without Operating System.



Additional Information

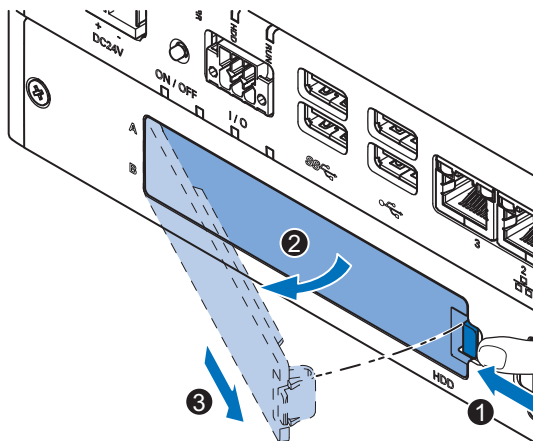
- Depending on the product configuration a drive is already installed. Refer to *1-4 Product Configuration* on page 1 - 5 for storage details.
- Depending on the CPU type one or two drives are supported. Refer to *4-1-4 CPU Specifications* on page 4 - 6 for the number of supported drives.
- Refer to *2-9-3 Storage Devices* on page 2 - 21 for the recommended drive models.
- Refer to *4-1-6 Storage Device Specifications* on page 4 - 8 for drive specifications.

Prepare the following items:

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

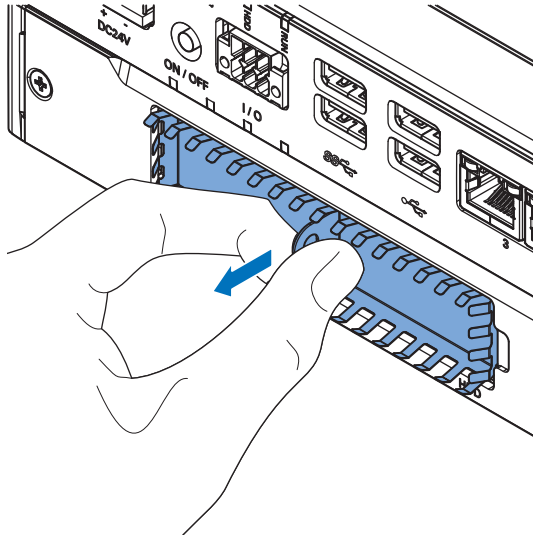
To install a drive:

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

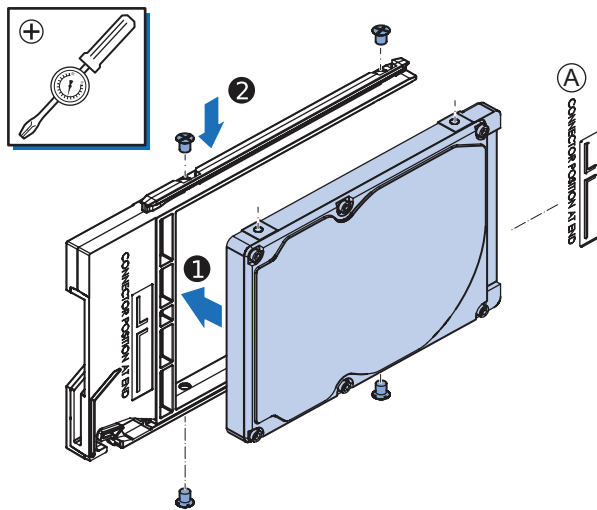


- (1) Push the lock lever **1**.
- (2) Tilt the drive cover **2**.
- (3) Remove the drive cover **3**.

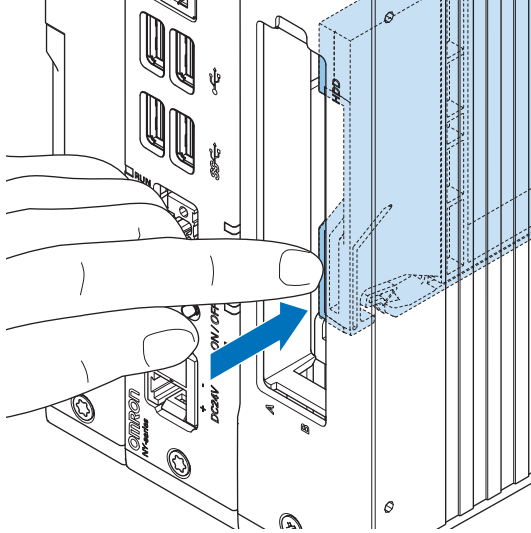
- 3** Pull the metal shielding cover out of the Panel PC.



- 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.

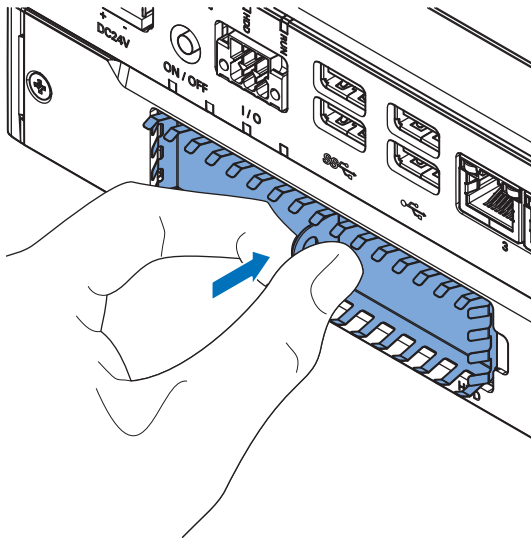


- 5** Insert the bracket with the drive in the correct bay.
- A drive for the operating system has to be inserted in bay A
 - The drive for additional storage can be inserted in bay B
- Ensure the bracket is completely in the Panel PC with an extra push.

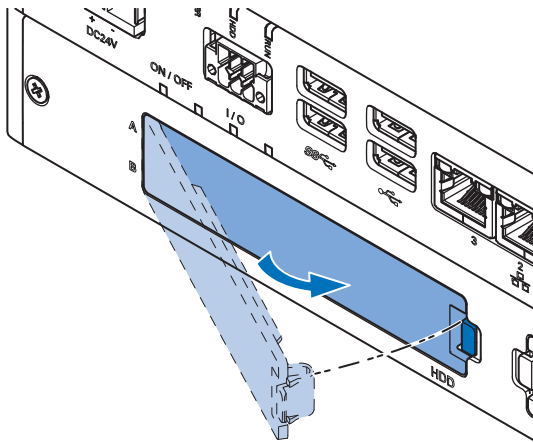


The drive bracket will lock into place when it is fully inserted.

- 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 Panel 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 - 10 for boot priority settings.
 - If the drive is inserted in bay B:
 - (1) Ensure the drive is functional and confirm normal operation.
If the Panel 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 Panel PC.



Additional Information

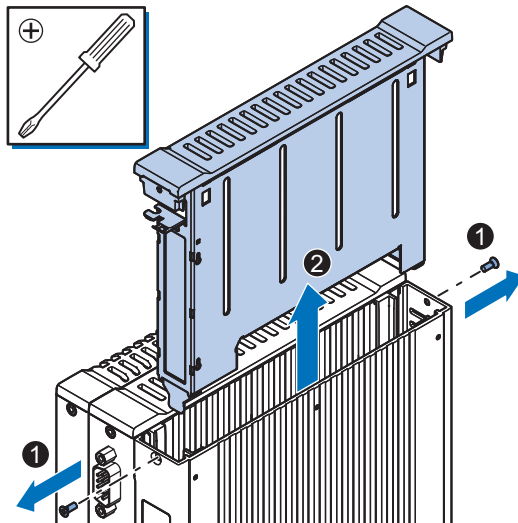
Refer to *4-1-7 PCIe Card Specifications* on page 4 - 10 for PCIe specifications.

- The PCIe Card mounting material: Card Support.
This item is supplied with the Panel PC.

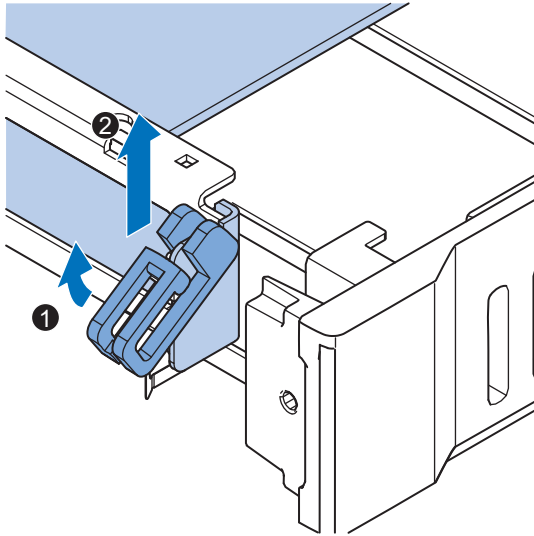
To install the PCIe Card:

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

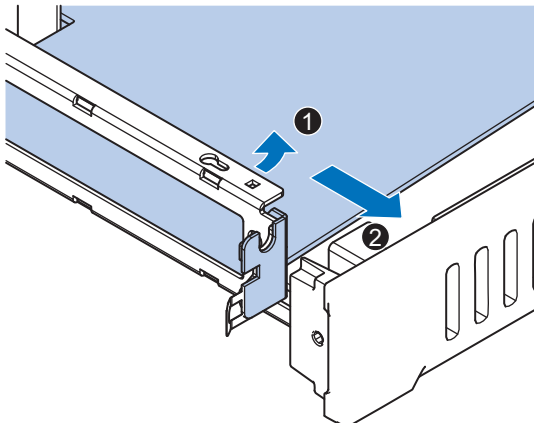
The indent at the side of the drawer will help you to pull the drawer from the Panel PC.



- 3** Pull the middle of the Card Clip to unlock it and remove it from the PCIe Drawer.

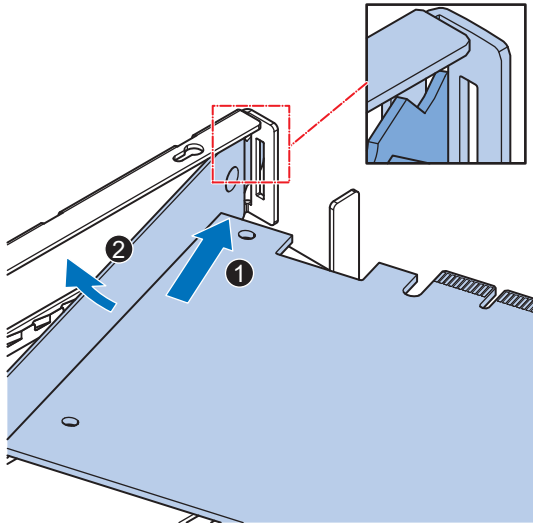


- 4** Remove the slot cover from the PCIe Drawer.
The thin sheet metal frame should stay in the PCIe Drawer.



The slot cover is now removed.

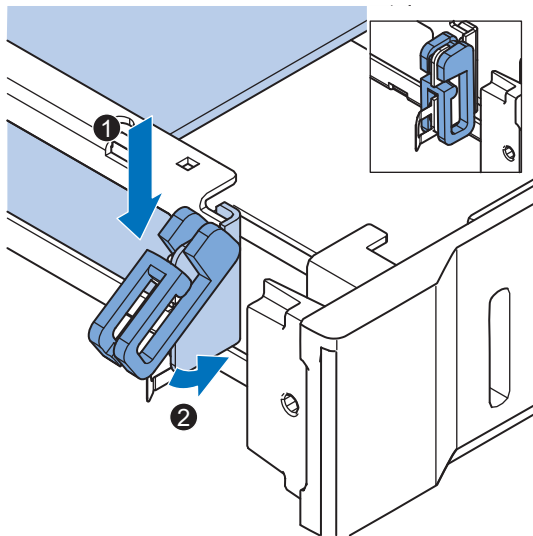
- 5** Place the PCIe Card in the PCIe Drawer.



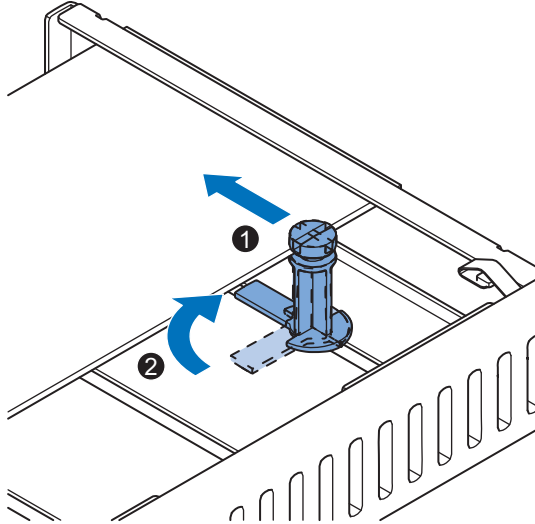
Ensure to insert the PCIe Card in the correct opening.

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

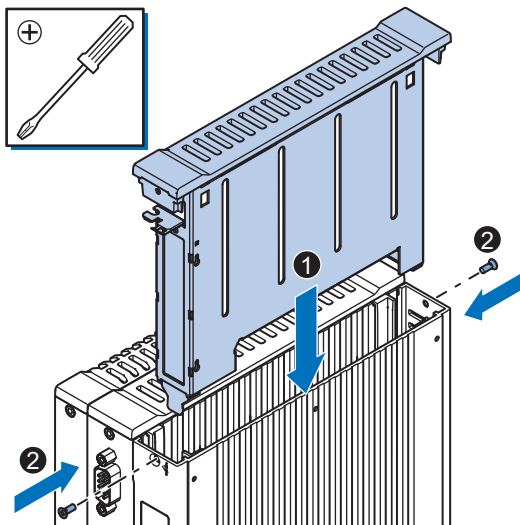
- 6** Place the Card Clip in the PCIe Card and PCIe Drawer **1** and then rotate the Clip **2** to lock it in place.



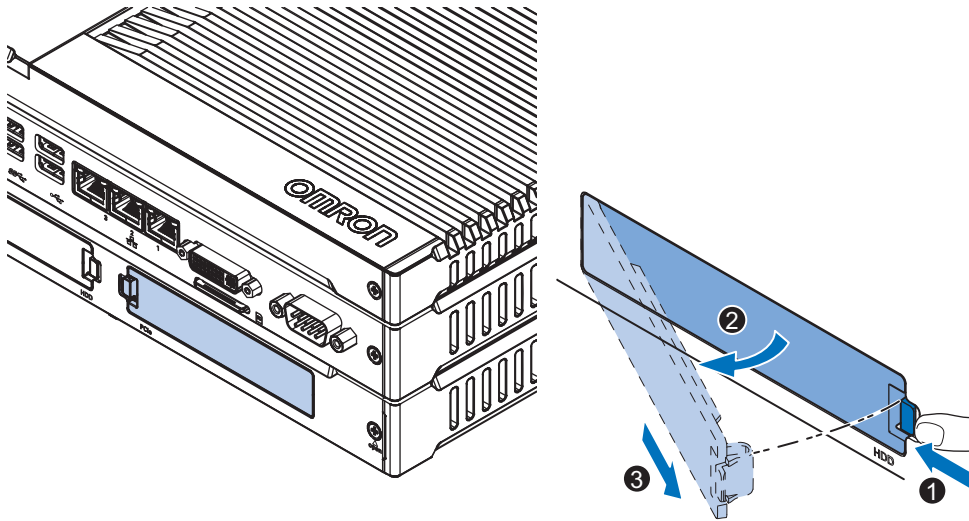
- 7** Slide the Card Support **1** so that it supports the side of the PCIe Card.
The card should be in small groove so there is support below and above the card.
Rotate the Card Support **2** to lock it in place.



- 8** Insert the PCIe Drawer in the Panel 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 ❶.
- (2) Tilt the PCIe cover ❷.
- (3) Remove the PCIe cover ❸.

The PCIe Card is installed.

5-3 Mount

This section describes how to mount the Panel PC Without Operating System in either a landscape or portrait orientation in 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 Panel PC must be mounted to the outside surface of a control panel. Consider product orientation, cooling distance, noise resistance, ducts and product replacement when determining the space between the Panel 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
- Locations outdoors subject to direct wind and rain
- Locations subject to strong ultraviolet light

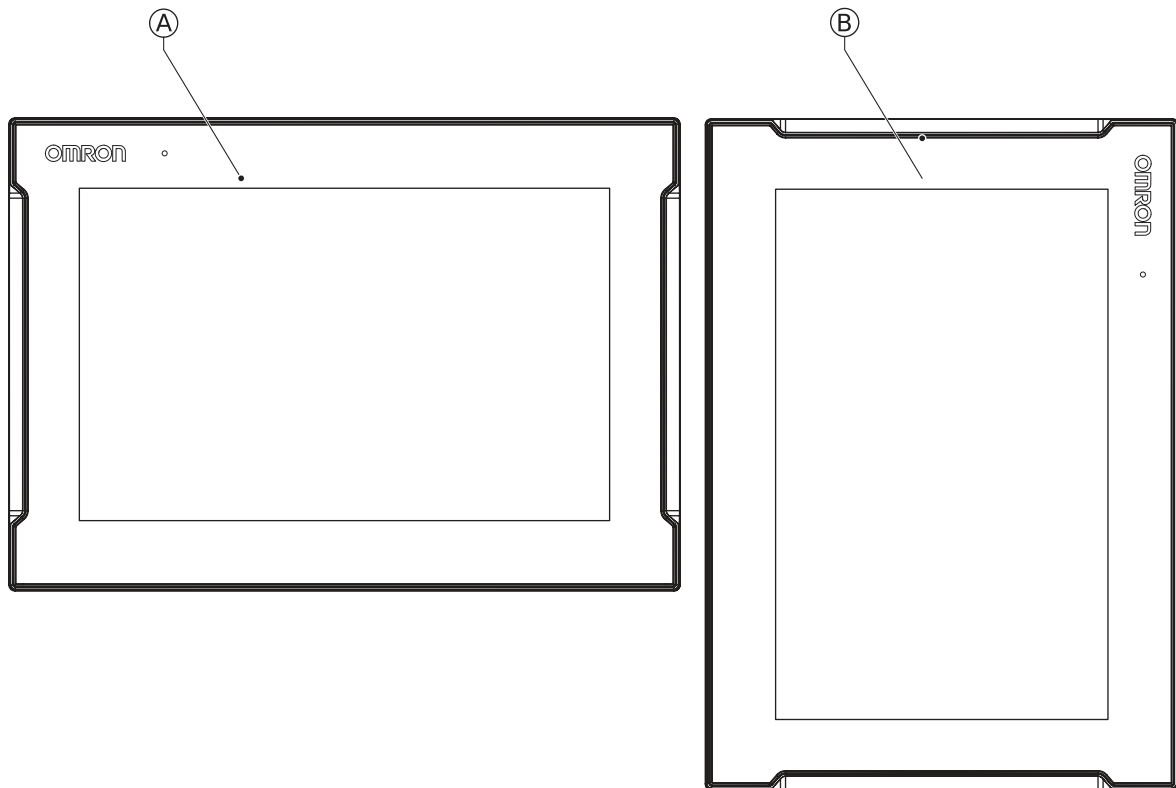


Additional Information

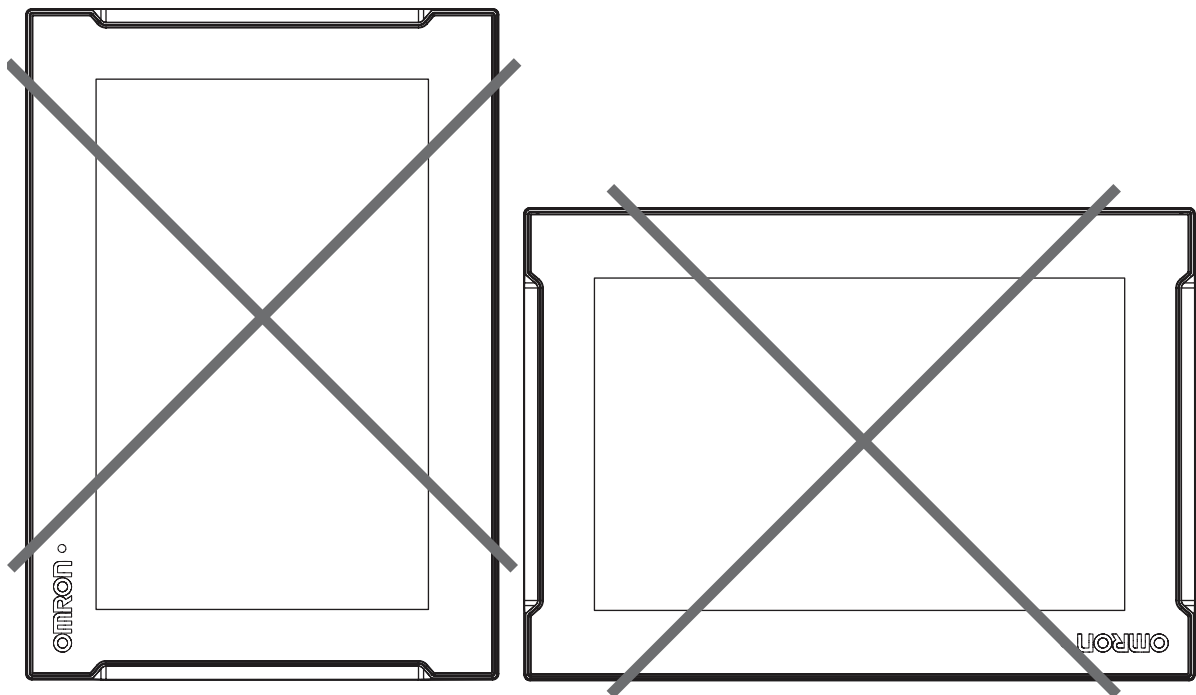
- Ensure you have installed the options before you mount the product. Refer to *5-2 Install Options* on page 5 - 4 for option details.
- Refer to *5-3-2 Product Orientation* on page 5 - 14 for orientation details.
- Refer to *5-3-3 Temperature* on page 5 - 15 for temperature details.
- Refer to *5-3-4 Humidity* on page 5 - 17 for humidity details.
- Refer to *5-4 Wire* on page 5 - 26 for wiring details.

5-3-2 Product Orientation

The Panel PC Without Operating System can be mounted in a landscape **(A)** or portrait **(B)** orientation.



Do not install the Panel PC Without Operating System in any of the following 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

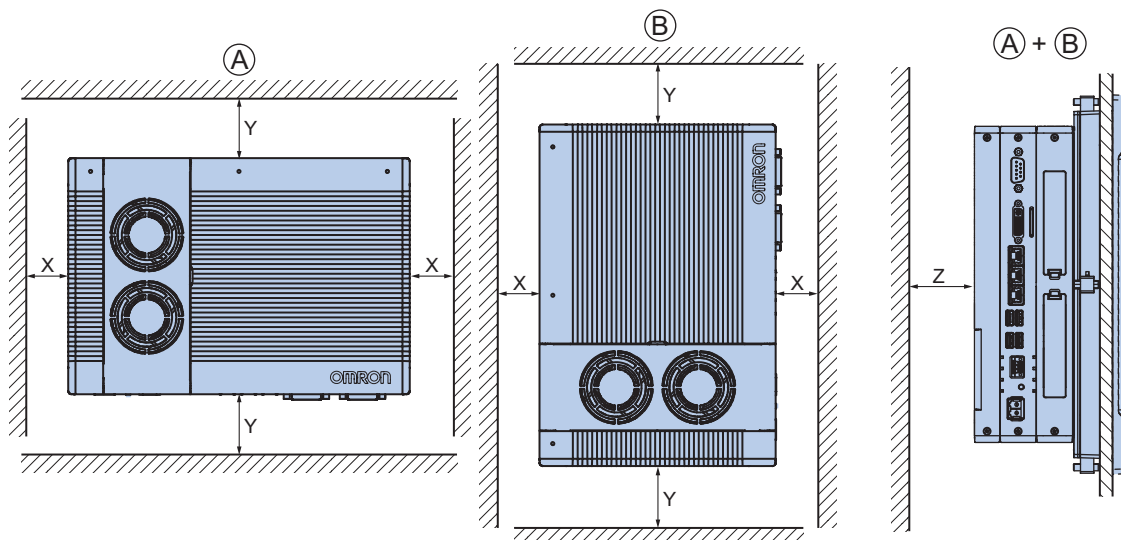
Adequate airflow around the Industrial Panel PC is required.



Additional Information

- The ambient temperature must be within the operating range. Refer to *4-4-1 Operation Environment Specifications* on page 4 - 25 for temperature specifications.
- Allow space to accommodate for the bending radius of the cables. Refer to:
 - *2-9-4 DVI Cables* on page 2 - 22
 - *2-9-5 USB Type-A to USB Type-B Cables* on page 2 - 22
 - *2-9-6 NY Monitor Link Cables* on page 2 - 23
 - individual cable specifications
 for cable bending requirements and connector clearance, and to *2-9-5 USB Type-A to USB Type-B Cables* on page 2 - 22 for USB cable bending requirements.

Provide enough space for good air flow and ensure the following minimum distances are observed around the sides of the Panel PC Without Operating System for landscape (A) and portrait (B) orientations.



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

*1. Measure the minimum distances X and Y at the air openings in the sides of the Panel PC Without Operating System.

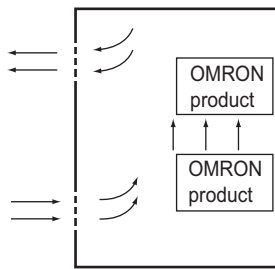
High Temperatures

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.

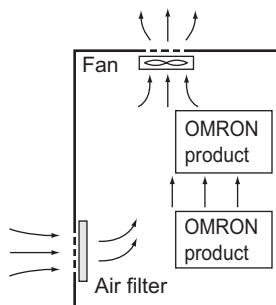
- Do not install the Panel PC at the top of the panel, where hot air tends to stagnate.
- To provide ventilation space above and below the Panel PC, leave sufficient distance from other devices, wiring ducts, etc.
- Do not mount the Panel PC in the wrong direction (e.g., vertically or upside down). Doing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



Natural Cooling

● Forced Ventilation

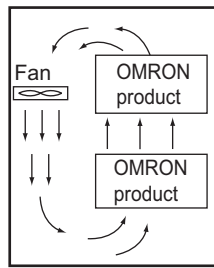
Forced ventilation with a fan in the top of the control cabinet.



Forced Ventilation Method

● Forced Air Circulation

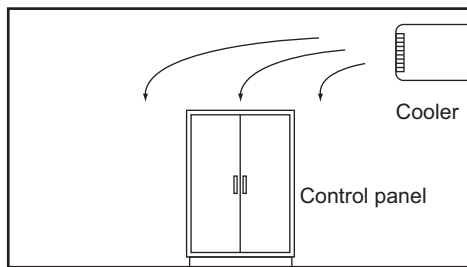
Forced circulation with a fan inside the closed control cabinet.



Forced Air Circulation

● Room Cooling

Cool the entire room where the control panel is located.



Room Cooling

Low Temperatures

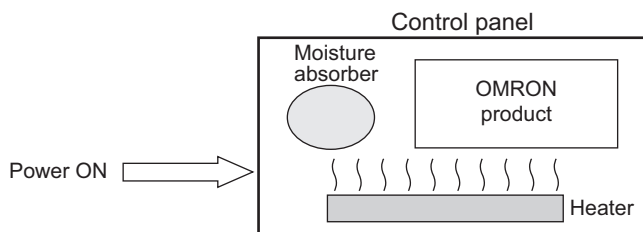
The Panel PC may not start normally if the temperature is below 0°C when the power is turned ON. Maintain an air temperature of at least 5°C inside the panel, by implementing measures such as installing a low-capacity space heater in the panel.

Alternatively, leave the Panel PC power ON to keep the Panel 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 Panel 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 Panel 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 Panel 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 Panel PC control panel from the source of the vibration or shock. Or secure the Panel 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 Panel PC with rubber padding.

5-3-6 Atmosphere

Using the Panel 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 Panel PC.

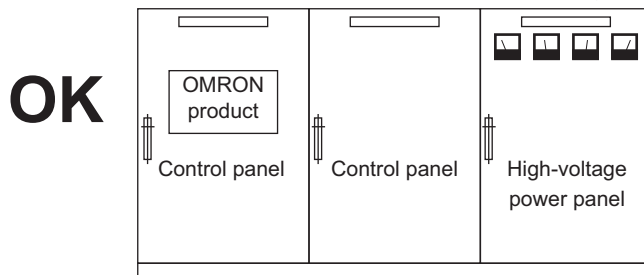
5-3-7 Electrical Environment

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

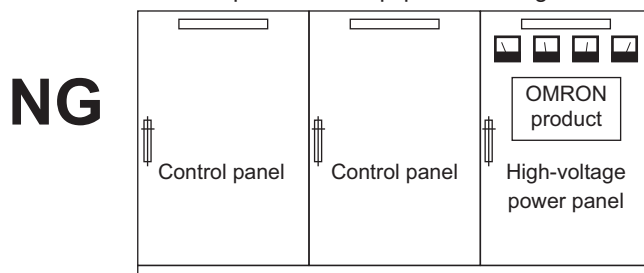
Installation Location

Install the Panel 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



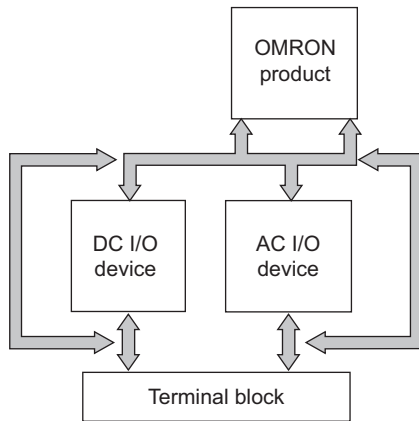
Example of Poor Equipment Arrangement



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 Panel PC. Locate them at least 100 mm away from the Panel PC.

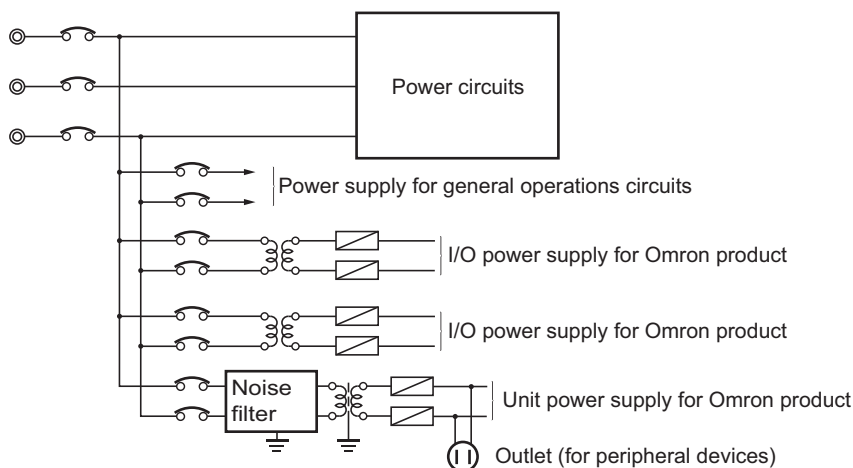


Example of Arrangement in Panel

Wire Layout for the Power Supply

Observe the following points when wiring the power supply system.

- Separate the Panel PC power supply from the I/O device power supply and install a noise filter near the Panel PC power supply feed section.
- Use an isolating transformer to significantly reduce noise between the Panel PC and the ground. Install the isolating transformer between the Panel 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 Panel PC as short as possible, twist the wires well, and keep the wiring separate from high-voltage and power lines.

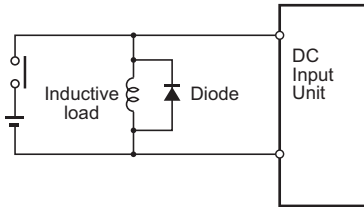


Power Supply System Diagram

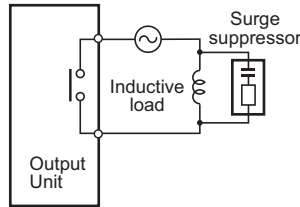
Wire External I/O Signal Lines

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

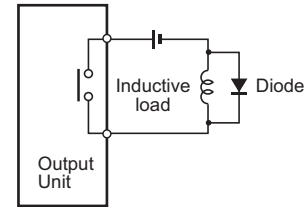
- To absorb reverse electromotive force when an inductive load is connected to an output signal, connect a surge suppressor near the inductive load in an AC circuit, or connect a diode near the inductive load in a DC circuit.



Connect a diode in a DC circuit.



Connect a surge suppressor in an AC circuit.

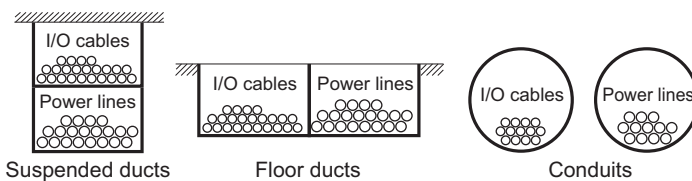


Connect a diode in a DC circuit.

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 Panel 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

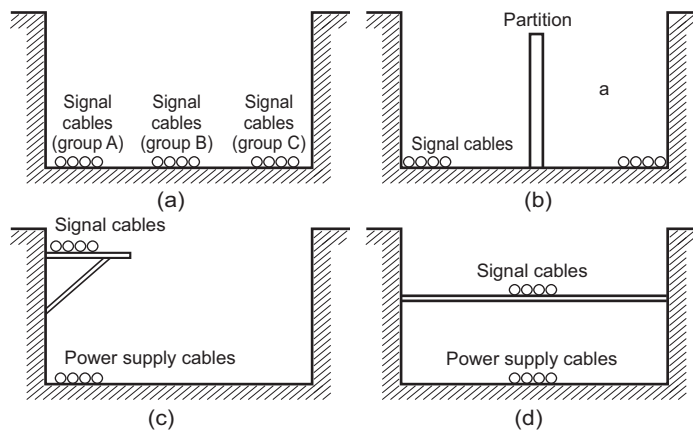
Each of the following combinations includes different signal types, properties, or levels. They will cause the signal-to-noise ratio to drop due to factors such as electrical induction. As a general rule when wiring, either use separate cables or separate wiring routes for these items. Future maintenance 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

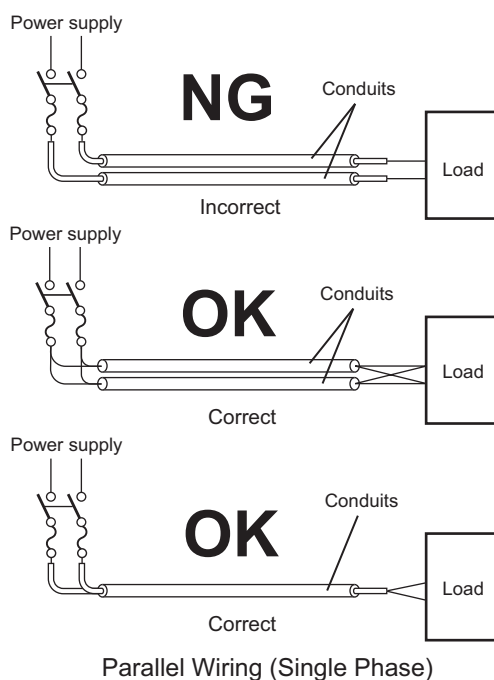
Observe the following points when wiring power supply and signal cables.

- 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.

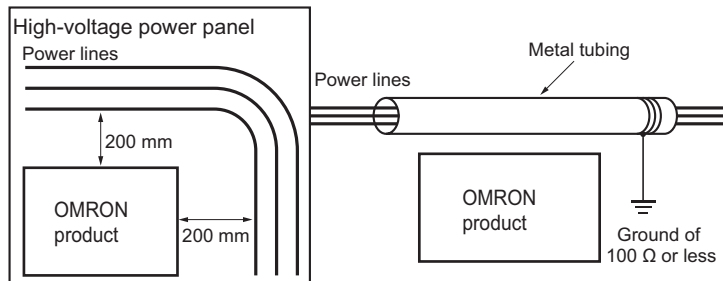


Partitioning Methods for Signal and Power Supply Cables

- 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 Panel PC is installed in a panel that includes high-voltage devices. Wire and install them as far apart as possible.
- Either install the Panel 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 Panel PC Without Operating System 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 Panel PC Without Operating System.

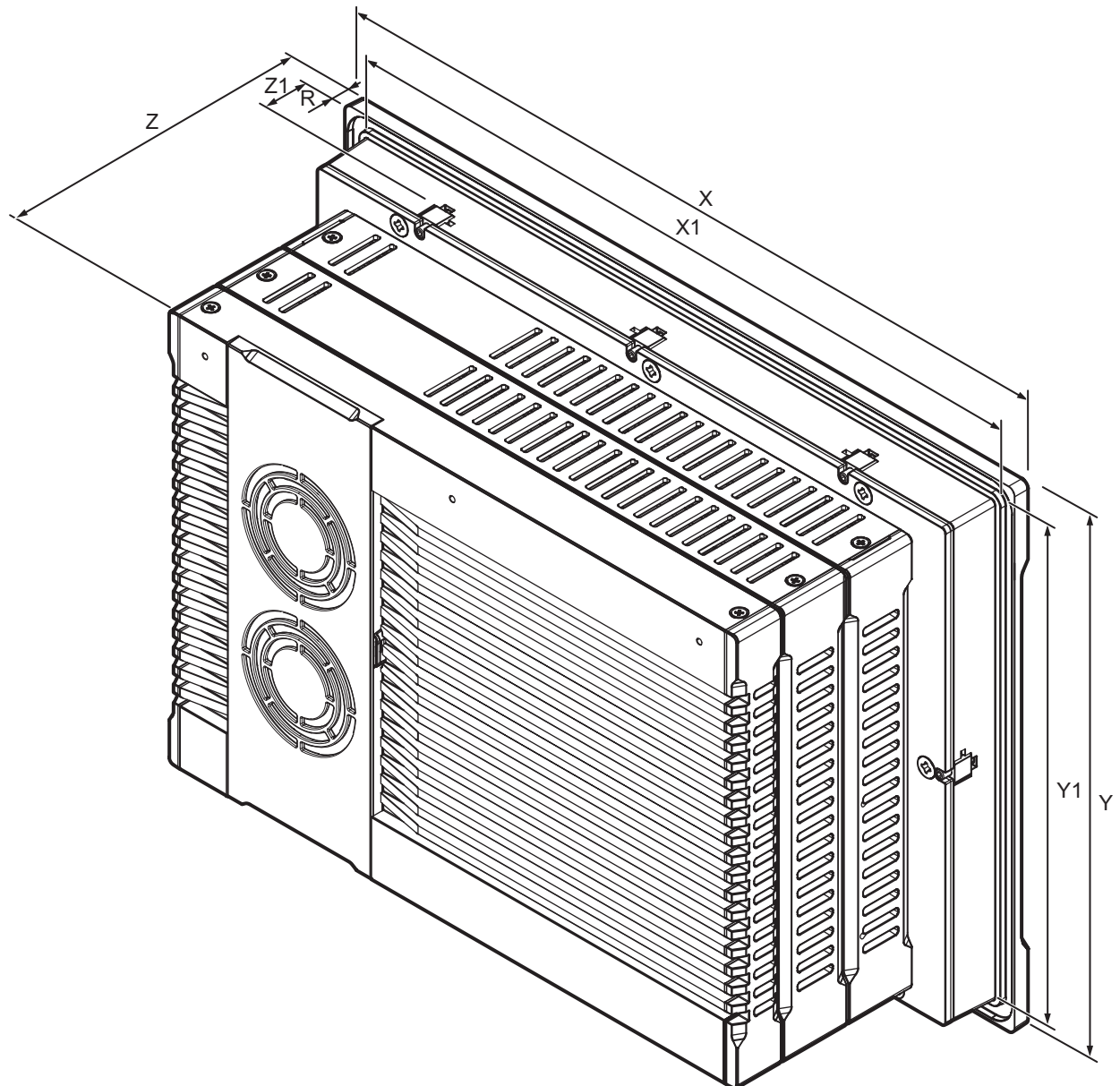


● Other Precautions

Basic I/O Units have both plus and minus commons, so pay attention to the polarity when wiring.

5-3-8 Prepare the Mounting Surface

The Panel PC Without Operating System can be mounted in a landscape or portrait orientation. The mounting hardware is integrated into the back of the Panel PC.



5-3 Mount

5

5-3-8 Prepare the Mounting Surface

Item	Model Specifications	
	12.1 Inch models ^{*1}	15.4 Inch models ^{*1}
Panel cutout dimensions	Cutout Width X1 = 314 ^{-0 +1} mm Cutout Height Y1 = 216 ^{-0 +1} mm	Cutout Width X1 = 383 ^{-0 +1} mm Cutout Height Y1 = 259 ^{-0 +1} mm
Panel thickness range ^{*2}	Panel thickness range Z1 = 1.6 to 6.0 mm	Panel thickness range Z1 = 1.6 to 6.0 mm
Dimensions	Refer to 4-1-1 <i>Dimensions and Weight</i> on page 4 - 2 for X, Y, Z and R dimensions.	

*1. Refer to 1-4 *Product Configuration* on page 1 - 5 for model details.

*2. The minimum panel thickness depends on the panel material.

For the most common materials the minimum panel thickness is mentioned in the following steps.

- 1** Ensure the mounting surface conforms to following requirements.

Standards conformance	Material	Mounting panel requirements
IP65	Steel	Thickness 1.6 to 6.0 mm
	Aluminum	Thickness 2.5 to 6.0 mm

- 2** Create an opening in the mounting surface.

The table before step 1 gives an overview of the cut out dimensions for the Panel PC. Prepare a rectangular cut out with the dimensions X1 and Y1.

- 3** Ensure the mounting surface is clean and not warped.

5-3-9 Mount the Panel PC

Ensure the panel cut out is ready before beginning the mounting procedure.

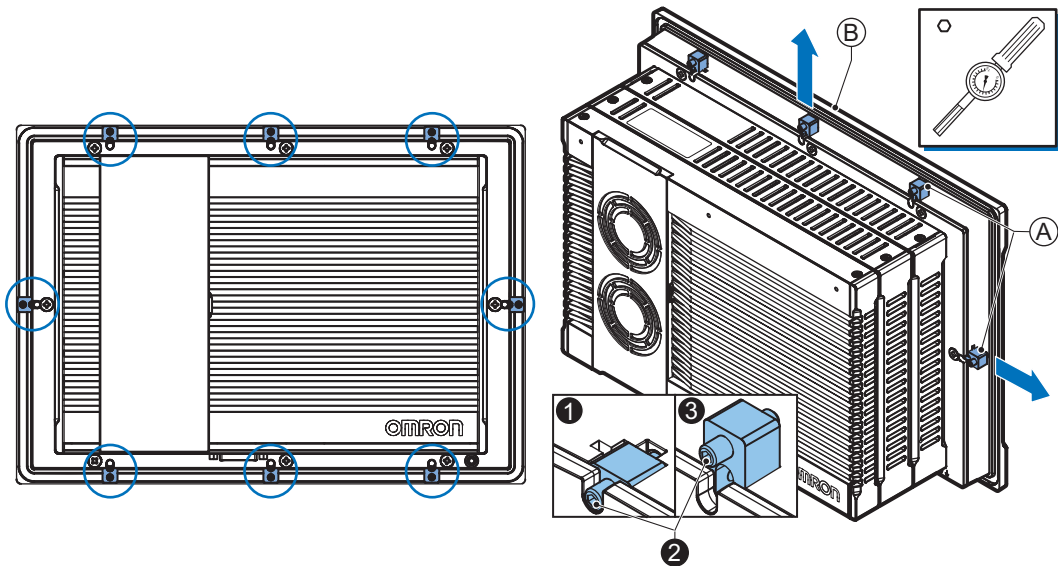
Tools required: Torque screw driver with hexagon 2 mm bit.

The Panel PC is equipped with 8 retractable mounting brackets (A) on the back of the Panel PC.

These brackets are used to fasten and secure the Panel PC to the mounting surface.

Use the following procedure to mount the Panel PC to the mounting surface:

- 1 Ensure all 8 retractable mounting brackets (A) are in the retracted position ①. If required press the mounting brackets in the retracted position and hand tighten the allen bolt ②.



The left image shows a Panel PC with passive cooling. The right image shows a Panel PC with active cooling.

- 2 Insert the Panel PC into the mounting surface cut out so the bezel (B) touches the mounting surface.
- 3 Loosen the allen bolts ② of the mounting brackets.
The mounting brackets are spring loaded and will extend ③ when loose.
- 4 Ensure all mounting brackets extend to overlap the mounting surface.
- 5 Tighten all mounting brackets to a torque of 0.6 N·m to maintain water and dust resistance.



Precautions for Safe Use

The mounting panel must be between 1.6 and 6.0 mm thick. Tighten the mounting brackets evenly to a torque of 0.6 N·m to maintain water and dust resistance. If the tightening torque exceeds the specified value, or the tightening is not even, deformation of the front panel may occur. Additionally, make sure the panel is not dirty or warped and that it is strong enough to hold the product.

5-4 Wire

This section describes how to wire the Panel PC Without Operating System.

5-4-1 Wiring Warnings and Cautions

This section describes the Warnings and Cautions when wiring the Panel PC Without Operating System.

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

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 let metal particles enter the product when preparing the panel. Do not allow wire clippings, shavings, or other foreign material to enter any product. Otherwise, the product burning, failure, or malfunction may occur. Cover the product or take other suitable countermeasures, especially during wiring work.


5-4-2 Ground

This section describes how to ground the Panel PC Without Operating System.

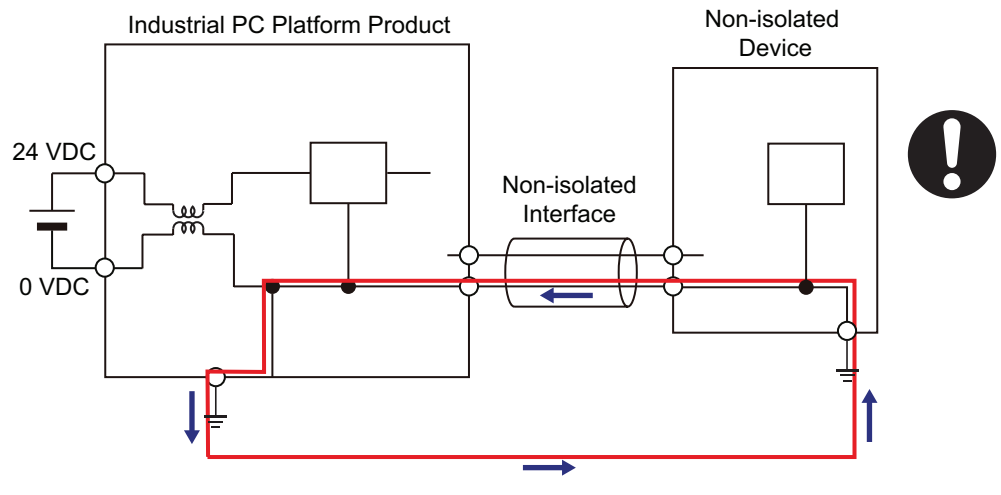
WARNING


Always connect to a ground of 100 Ω 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 ground of the Panel 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 pigtails.

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.

The Panel PC has a protection ground connection because the metal part of the Panel PC outside of the enclosure must be part of the protection grounding of that enclosure (for example a cabinet).

There are no power supply voltages used in the Panel PC which require protection grounding.

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.

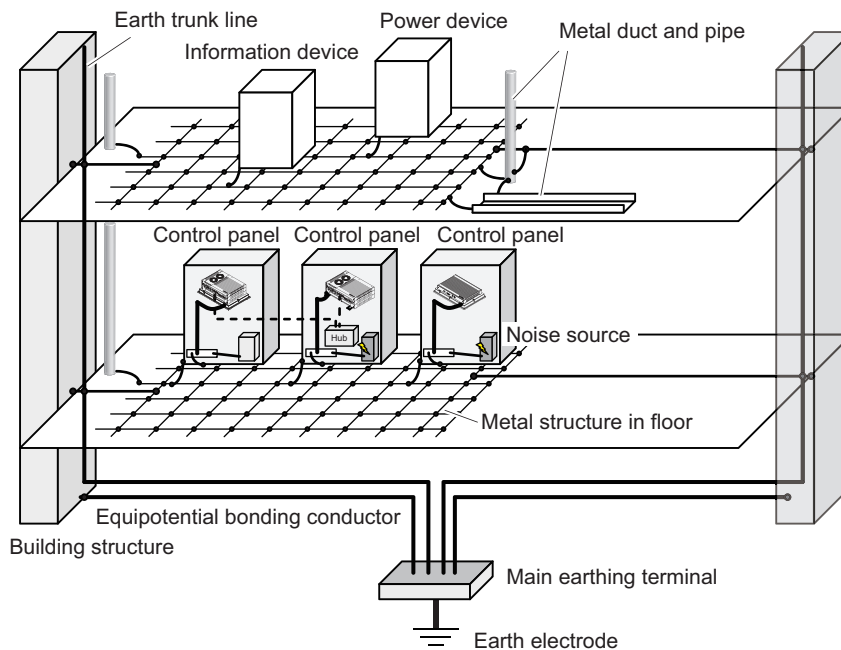
Equipotential Bonding System

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

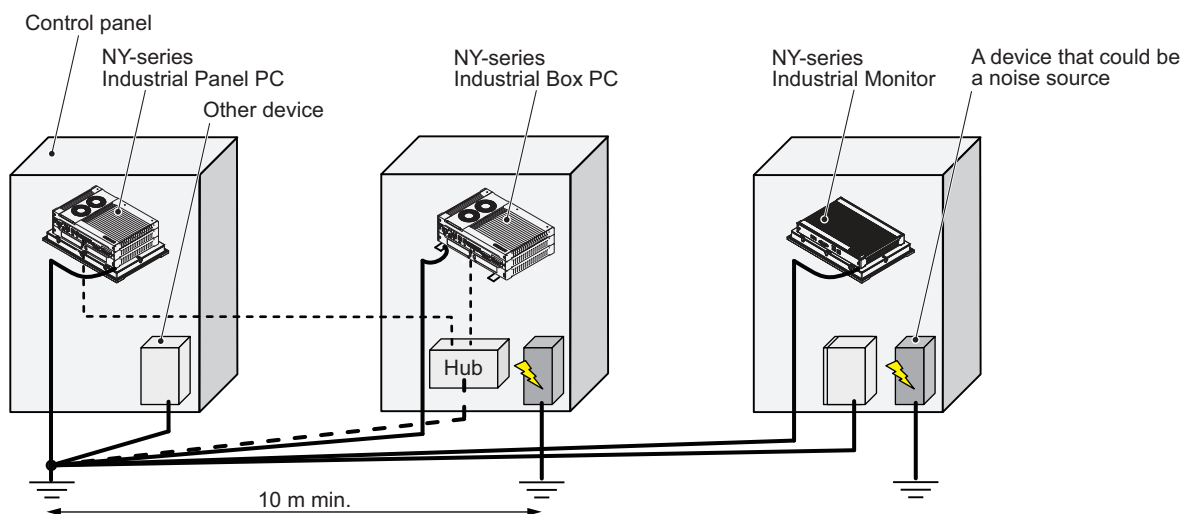
If the earthing method used for the building is not equipotential bonding or the earthing system is unknown, choose (a) from among the earthing methods given below.

(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.

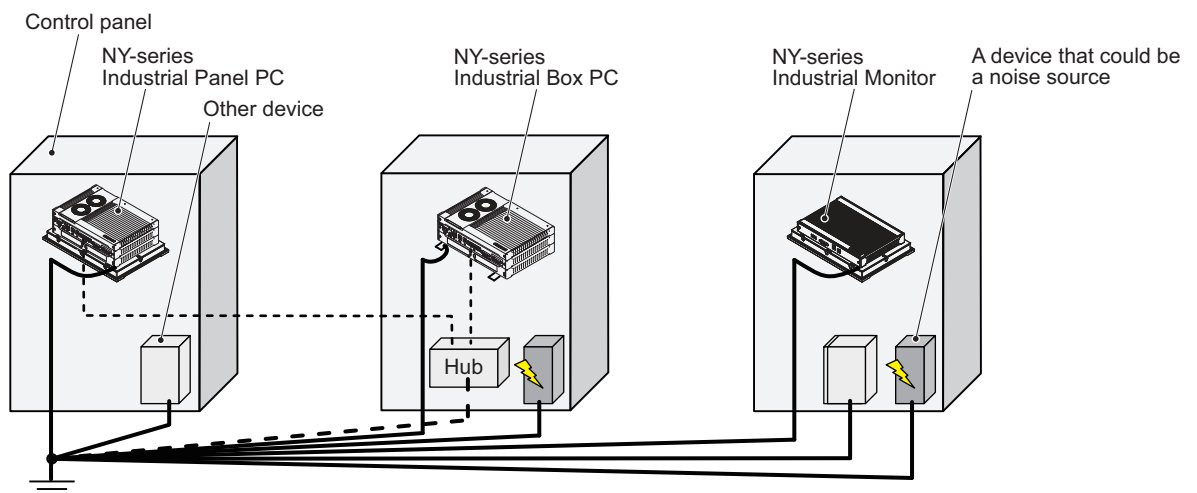
Connect the ground lines of the device that is connected with a communications cable and other devices as a bundle to a single earth electrode. Be sure that the earth electrode is separated by a minimum of 10 m from any other earth electrode of a device that could be a noise source.



(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.

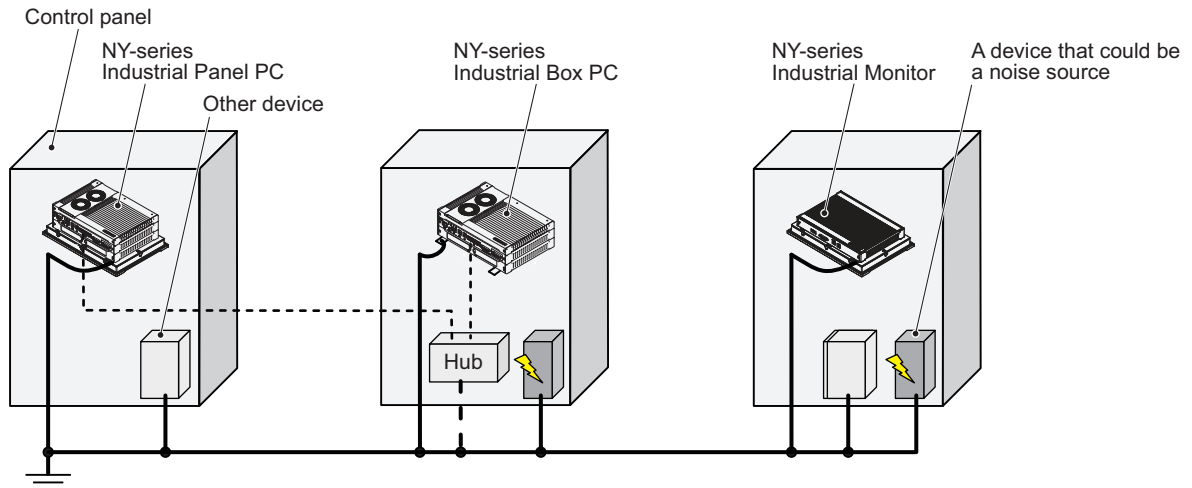
This earthing method is not recommended because the device that could be a noise source may interfere electromagnetically with other devices.



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.

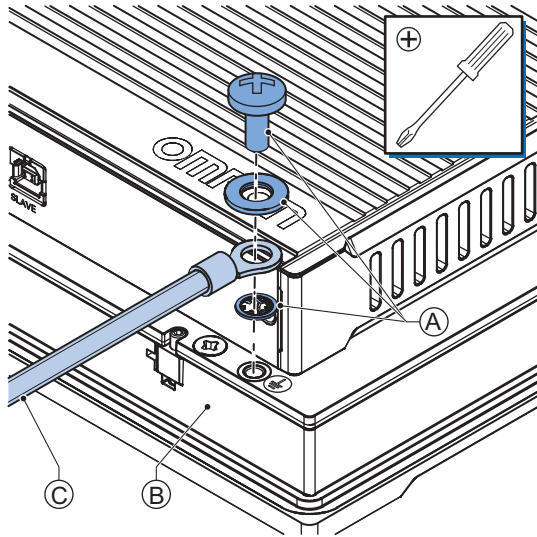


Ground Connection Details

This section provides details about the ground connection.

Use the ground terminal on the backside of the monitor to ground your Panel PC Without Operating System.

The washers and screw (A) are pre-mounted at the Panel PC Without Operating System.



Remove the pre-mounted washers and screw (A) and then mount the ground connection wire (C) to the Panel PC (B) using the washers and screw (A).

Tighten the screw with a torque of 1.2 N·m max.

● 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 2-9-9 *UPS* on page 2 - 25 for UPS information.
-

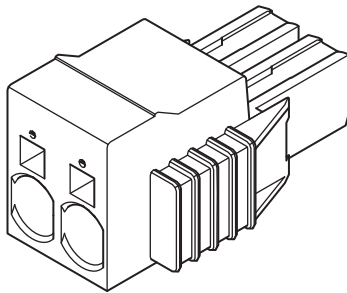
Power Connector Wiring Materials

Use the power supply connector that was supplied to connect the power supply to the Panel PC Without Operating System.

- 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 Panel PC Without Operating System.



Additional Information

- Refer to *2-9-8 Power Supply* on page 2 - 24 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.

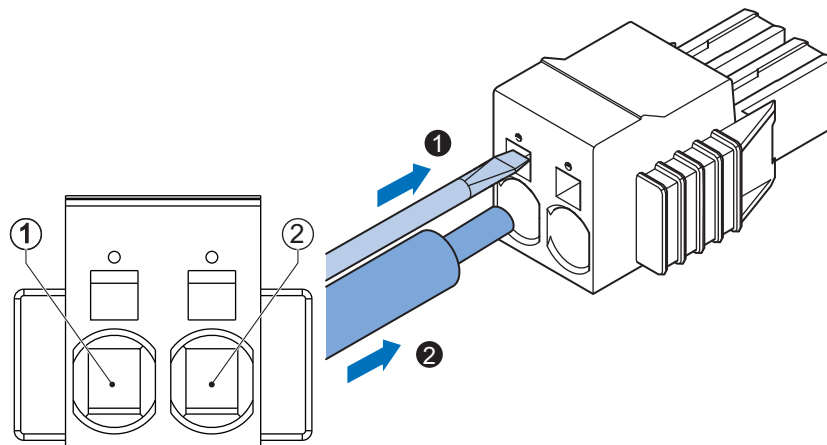


Precautions for Safe Use

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

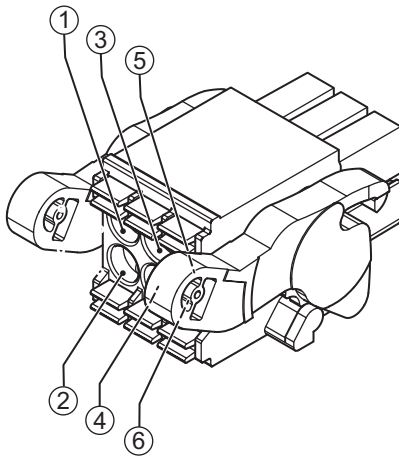
Use the supplied I/O connector to connect the inputs and outputs to the Panel PC Without Operating System.

Recommended I/O conductor sizes for the connector are provided in the table.

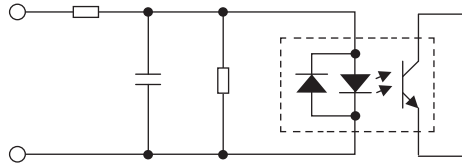
Wire type	Conductor cross-section
Solid conductor	0.2 to 1.5 mm ²
Flexible conductor	
Flexible conductor, with ferrule and no plastic sleeve	0.25 to 1.5 mm ²
Flexible conductor, with ferrule and plastic sleeve	0.25 to 0.75 mm ²
Minimum AWG according to UL/cUL	24
Maximum AWG according to UL/cUL	16

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 - 13 for I/O connector specifications.
- Refer to *I/O Connector Power Status Output Details* on page 4 - 15 for power status output details.
- Refer to *5-8 Connect UPS* on page 5 - 46 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.

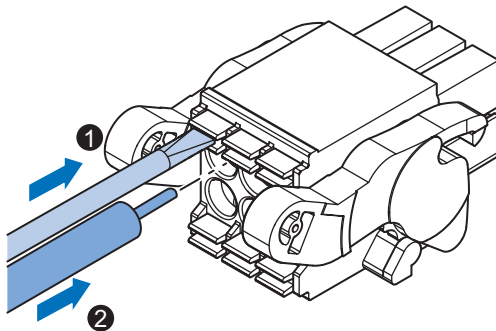


Precautions for Safe Use

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 Panel 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.

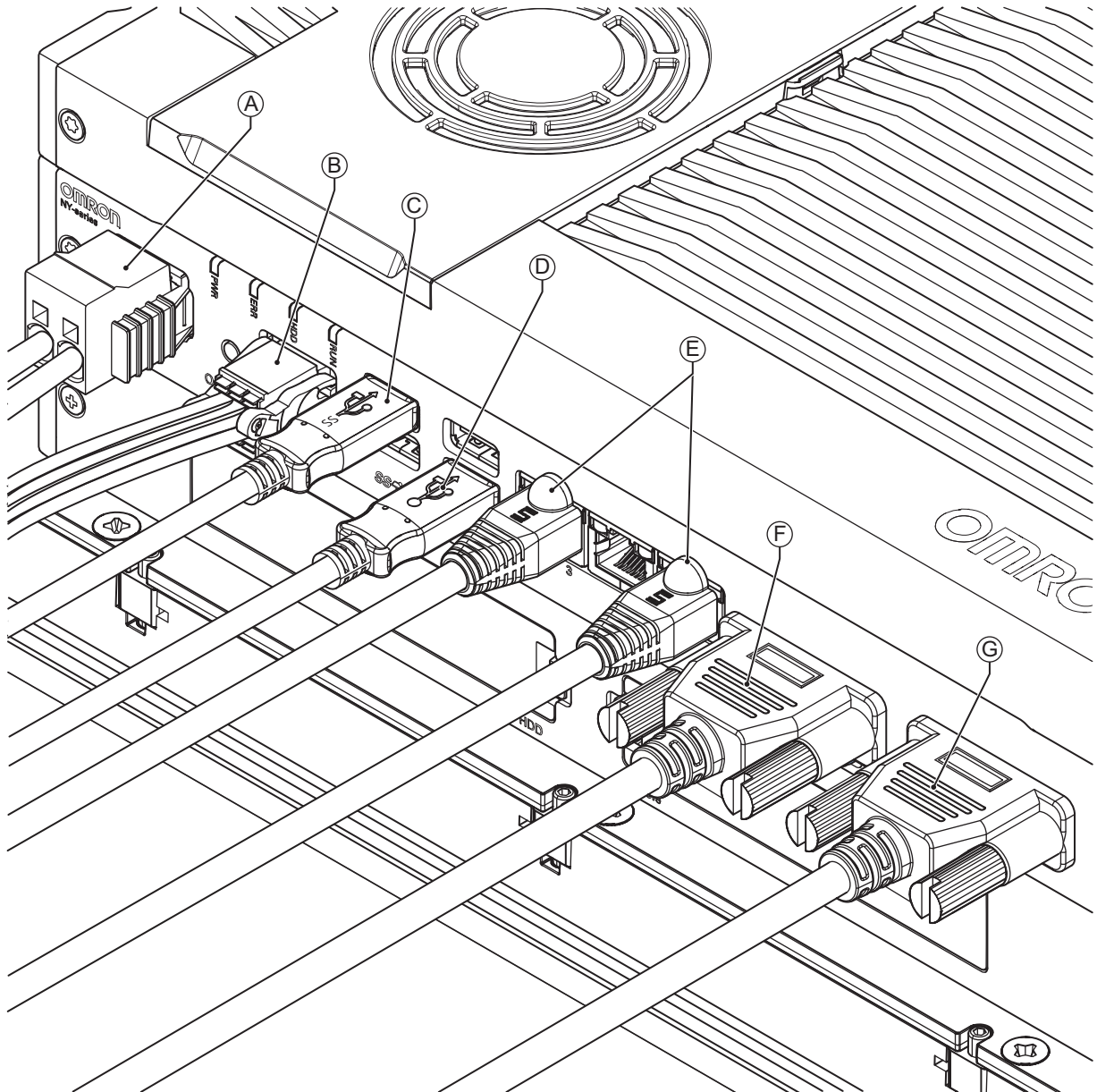
Do not apply stress to the cable after you have connected the wires.

5-5 Connect

This section describes how to connect the Panel PC Without Operating System.

5-5-1 Connector Identification

The Industrial Panel PC connections 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 (power state)
C	USB 3.0 connector	2 USB 3.0 connectors
D	USB 2.0 connector	2 USB 2.0 connectors
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 Panel PC Without Operating System.

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

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

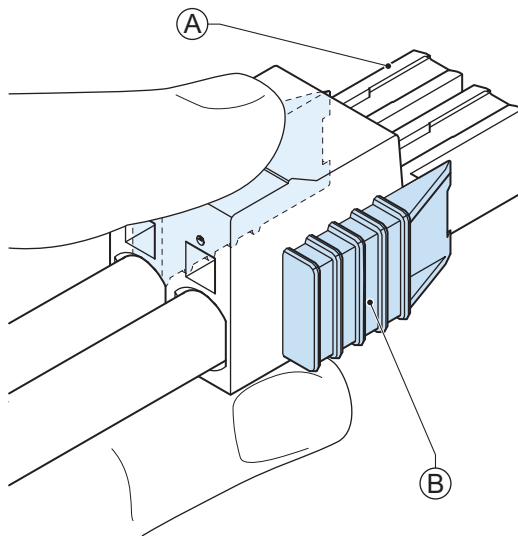


Additional Information

- Refer to *5-3 Mount* on page 5 - 13 for mounting details.
- Refer to:
 - *2-9-4 DVI Cables* on page 2 - 22
 - *2-9-5 USB Type-A to USB Type-B Cables* on page 2 - 22
 - *2-9-6 NY Monitor Link Cables* on page 2 - 23
 - individual cable specifications
- for cable bending requirements and connector clearance.

Use the following procedure to connect the Panel PC:

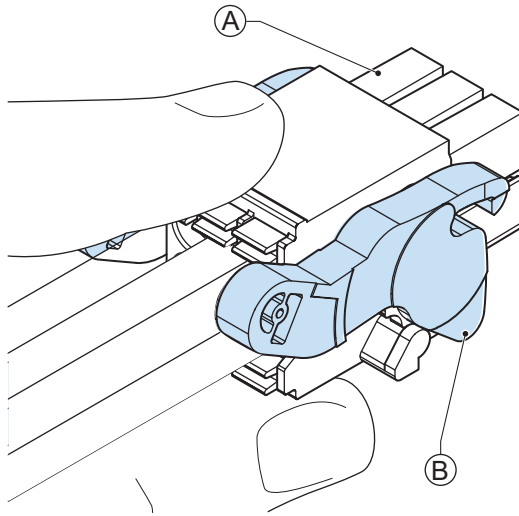
- 1** Ensure the ground terminal is connected.
Refer to *5-4-2 Ground* on page 5 - 26 for grounding details.
- 2** Connect the power connector **(A)**.
Hold the black part to enable the auto-locking mechanism.



Do not push the orange sliders **(B)** in the direction of the Panel 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 Panel PC to the required Ethernet interface connector(s).

Refer to *4-2-4 Ethernet Connector Specifications* on page 4 - 18 for Ethernet port details.

The Panel PC is connected.

5-6 Initial Power ON

This section describes how to Power ON the Panel PC Without Operating System 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 Panel PC Without Operating System for the first time.

- 1** Ensure the following conditions are present before applying power for the first time:
 - The Panel PC is securely fastened to the mounting surface.
 - The Panel PC is connected to ground.
 - All connectors are securely fastened.
- 2** Ensure that an optional connected monitor(s) is powered ON.
- 3** Connect an optional keyboard and/or mouse.
 - If using an OMRON Industrial Panel PC this is not 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 *2-3 Power Button* on page 2 - 9 for the power button location.
The Panel PC starts and the PWR LED will go ON.



Additional Information

- Do not connect or disconnect the DVI-D cable while power is supplied to the Panel PC.
- If a Windows operating system is preinstalled:
 - the Windows configuration will automatically start
 - refer to *Windows Startup First Time* for details

- 6** Verify the ERR LED is OFF.

The Panel PC is ON and if an operating system is installed it will start.



Precautions for Safe Use

Always use the SMART monitoring feature for storage devices that do not comply to the Omron Storage Device Specifications. Monitor the operating temperature and vibrations to ensure they stay within the environmental specifications of the storage device.



Additional Information

- The first time initialization will prepare the system and automatically reboot the Panel PC when required.
 - Install support software to fully utilize your Panel PC and optional connected hardware like the Industrial Monitor.
-

5-7 Install Software

This section describes how to install the software for the Panel PC Without Operating System.

5-7-1 Drivers and Custom Software

Use the following procedure to install drivers and custom software on your Panel PC Without Operating System.

- For an Industrial PC without Operating System download the drivers from the OMRON download website.
- For an Industrial PC with a Windows operating system the drivers for most OMRON devices and common third party devices are already available on the product. They will be installed automatically after the initial Windows configuration or upon connection of a device to the Panel PC.

- 1** Install drivers that are required for the application.
- 2** Install third-party software that is required for application.
Follow the installation instructions as supplied with the driver or software.



Precautions for Safe Use

Before operating the system, please make sure the appropriate software is installed and configured. Doing so may prevent unexpected operation.

5-8 Connect UPS

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

5-8-1 Connect UPS Using the USB Connector

The Simple Shutdown Software monitors the UPS status via the USB interface and shuts down the Panel PC Without Operating System when needed.

UPS Drivers and the required software can be downloaded from the OMRON download site:

- Drivers for the S8BA UPS
- Installation files for the Simple Shutdown Software
- Installation files for the UPS Setting Utility (Windows only)

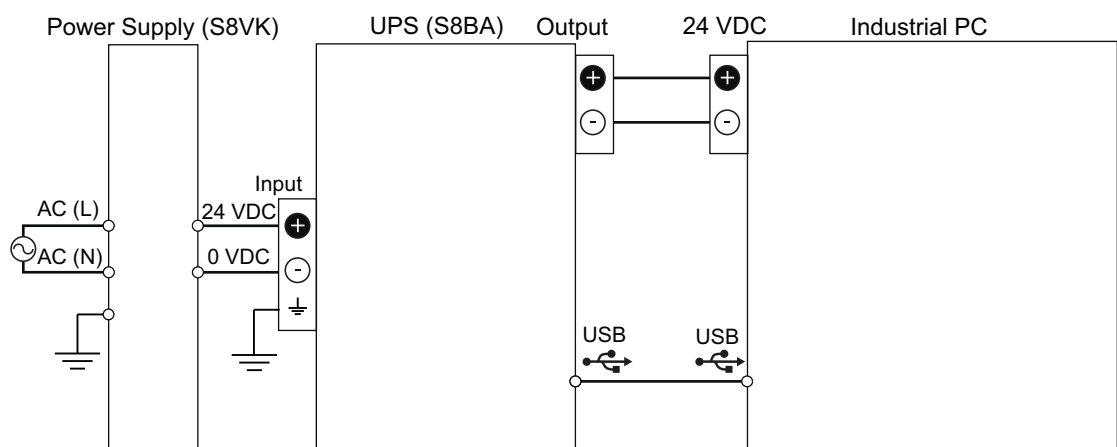


Precautions for Safe Use

- 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.

Follow the steps below to connect the S8BA UPS with a USB cable and to configure it correctly.

- 1** Ensure the revision number of the UPS is correct.
Refer to 2-9-9 *UPS* on page 2 - 25 for more information.
- 2** Download the above mentioned software.
- 3** Wire the S8BA UPS.
 - (1) Wire the input of the UPS to the output of the Power Supply.
 - (2) Wire the output of the UPS to the power connector of the Panel PC.
 - (3) Ground the UPS.
 - (4) Connect the USB port of the S8BA UPS to the USB port of the Panel PC using the USB cable provided with the S8BA UPS.



Refer to the *UPS S8BA User's Manual (Cat. No. U702)* for details.

Refer to 5-4-3 *Wire the Power Connector* on page 5 - 33 for Power Connector details.

- 4** Supply power to the Power Supply.

- 5** Press and hold the UPS power button until **On** appears on the UPS display.
- 6** Power ON the Panel PC and then wait until the device drivers are successfully installed.
- 7** Configure the UPS using the UPS Settings Utility.
- 8** Install the Simple Shutdown Utility.
- 9** Configure the Simple Shutdown Utility.
- 10** Configure the Panel 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 - 10 for power loss BIOS details.
- 11** Simulate a power interruption and confirm a correct shutdown of the Panel PC.
 - Start the Panel PC
 - Start applications
 - Create a power interruption
 - Monitor the shutdown sequence and confirm a correct shutdown sequence

The UPS is connected and configured.

The Panel 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.
 - The UPS Setting Utility can not be used when the Simple Shutdown Software is active. To use the UPS Setting Utility:
 - (1) Right-click the Simple Shutdown icon and select Agent Stop.
 - (2) Use the UPS Setting Utility.
 - (3) Right-click the Simple Shutdown icon and select Agent Start.
-

5-8-2 Connect UPS Using the I/O Connector

The I/O connector of the Panel PC Without Operating System:

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



Additional Information

- A UPS connection using the I/O connector is only possible for a Panel PC with a Windows operating system. For all other operating systems use the USB connector to connect the UPS.
Refer to *5-8-1 Connect UPS Using the USB Connector* on page 5 - 47 for details.
- The Panel PC does not react automatically to the UPS Mode Input. A custom software program is required to shut down the Panel PC when needed.

UPS Drivers and the required software can be downloaded from the OMRON download site:

- Drivers for the S8BA UPS
- Installation files for the UPS Setting Utility (Windows only)

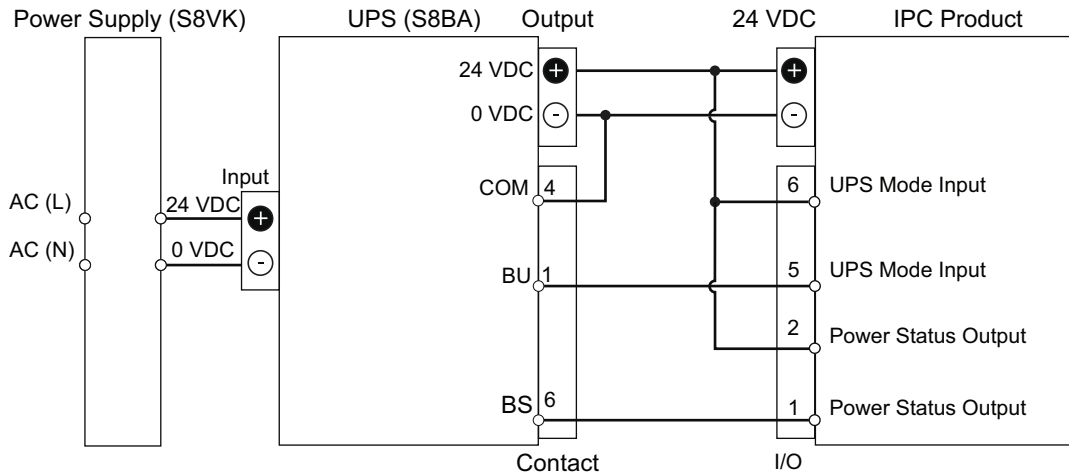


Precautions for Safe Use

- 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 Panel PC and to configure it correctly.

- 1** Ensure the revision number of the UPS is correct.
Refer to *2-9-9 UPS* on page 2 - 25 for more information.
- 2** Download the above mentioned software.
- 3** Wire the S8BA UPS.
 - (1) Wire the input of the UPS to the output of the Power Supply.
 - (2) Wire the output of the UPS to the power connector of the Panel PC.
 - (3) Ground the UPS.
 - (4) Connect the Contact port of the S8BA UPS to the I/O port of the Panel PC with the connection cable S8BW-02.



Refer to the *UPS S8BA User's Manual (Cat. No. U702)* for details.

Refer to *5-4-3 Wire the Power Connector* on page 5 - 33 for Power Connector details.

Refer to *5-4-4 Wire the I/O Connector* on page 5 - 36 for I/O Connector details.

- 4** Power ON the Panel PC.
- 5** 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 Panel PC.
 - (2) Configure the UPS using the UPS Settings Utility.
 - (3) Remove the USB cable between the UPS and the Panel PC.
- 6** Configure the Panel 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 - 10 for power loss BIOS details.
- 7** Create a software program that monitors the UPS Mode Input and initiates Power OFF of the Panel PC when the UPS Mode Input becomes active.

Use the Industrial PC System API to obtain the UPS Mode Input status.

Refer to *NY-series Software Development Kit User's Manual* for Industrial PC System API details.
- 8** Install the created software program.
- 9** Test the created software program and ensure it functions correctly.
- 10** Simulate a power interruption and confirm a correct shutdown of the Panel PC.
 - Start the Panel PC
 - Start applications
 - Create a power interruption
 - Monitor the shutdown sequence and confirm a correct shutdown sequence

The UPS is connected and configured.

The Panel 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.

6

Operating Procedures

This section provides the operating procedures for the Panel PC Without Operating System.

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6-2	Power ON	6 - 3
6-2-1	Power ON Using the Power Button	6 - 3
6-2-2	Power ON Using the Power ON/OFF Input	6 - 3
6-2-3	Auto Power ON	6 - 3
6-3	Power OFF	6 - 4
6-3-1	Power OFF Using the Operating System Shut Down	6 - 4
6-3-2	Power OFF Using the Power Button	6 - 4
6-3-3	Power OFF Using the Power ON/OFF Input	6 - 5
6-3-4	Forced Power OFF Using the Power Button	6 - 5

6-1 Touchscreen Operation

WARNING

Water or other liquid present on the touchscreen surface may create false touch behavior and unexpected operation. Wipe away liquid on the touchscreen before operation.



Caution

When using a system with multiple touchscreens, multiple users can perform simultaneous operations. Make sure that this can not result in unintended actions.



Precautions for Correct Use

The touchscreen supports 5 simultaneous touches. When the number of touches is exceeded, not all touch points will be detected.

The touchscreen supports following operations.

- The touchscreen supports projected capacitive technology for the touch operation. Only light pressure is required to activate the touch function.
- Up to 5 simultaneous touches can be detected.
- Multiple simultaneous touch points can be supported in software for advanced touch functions such as zoom, rotation and multiple user interaction.
- The touchscreen can ignore hand-palm touches while still accepting additional correct touches.
- The touchscreen can be operated when wearing gloves. Check correct usage of the gloves before using them.
- When water is detected on the touchscreen, the touch functions will be blocked to prevent erroneous touches.



Additional Information

Refer to *7-1-2 Clean the Touchscreen Surface* on page 7 - 4 for cleaning details.

6-2 Power ON

This section provides Power ON details.

6-2-1 Power ON Using the Power Button

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

- 1** Press the power button and release within 1 second.
Refer to *2-3 Power Button* on page 2 - 9 for the power button location.
The Panel 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 Panel PC is ON and the Operating System, if installed, starts.

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

Start condition: Power is supplied to the Panel PC and the Panel 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 Panel PC.
The Panel 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 Panel PC is ON and the Operating System, if installed, starts.



Additional Information

- Refer to *4-2-2 I/O Connector Specifications* on page 4 - 13 for connector specifications.
- Refer to *5-4-4 Wire the I/O Connector* on page 5 - 36 for wiring details.

6-2-3 Auto Power ON

The Panel 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 - 10 for BIOS details.

6-3 Power OFF

This section provides Power OFF details.

Before following power OFF procedures below, check that the Panel PC Without Operating System is ON by examining the LED indicators on the Panel PC.

6-3-1 Power OFF Using the Operating System Shut Down

- 1** Ensure all programs are closed.
If required close all active programs.
- 2** Select **Shut down** of the Operating System.
The Panel PC will shut down.
- 3** Wait until the PWR LED is OFF.
The Panel PC is powered OFF.

6-3-2 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 Panel PC Without Operating System within 1 second.
The Panel PC Without Operating System will shutdown.
Note that this behaviour of can be reconfigured with the Power Options settings.
Refer to *2-3 Power Button* on page 2 - 9 for power button location information.
- 3** Wait until the PWR LED is OFF.
The Panel PC is powered OFF.



Additional Information

The Panel PC will restart automatically if a UPS is connected to the I/O connector of the Panel PC. Use the Power button of the UPS or remove the input power from the UPS for a normal shutdown of the Panel PC.

6-3-3 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 Panel PC Without Operating System.
The Panel PC Without Operating System will shutdown.
Note that this behaviour can be reconfigured with the Power Options settings.
- 3** Wait until the PWR LED is OFF.
The Panel PC is powered OFF.



Additional Information

- Refer to 4-2-2 *I/O Connector Specifications* on page 4 - 13 for connector specifications.
- Refer to 5-4-4 *Wire the I/O Connector* on page 5 - 36 for wiring details.

6-3-4 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 Panel PC for 5 to 10 seconds.
Refer to 2-3 *Power Button* on page 2 - 9 for power button location information.
The Panel PC Without Operating System will power OFF.
Any optional operating system settings related to power OFF will be disregarded.
- 3** Wait until the PWR LED is OFF.
The Panel 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 Panel PC Without Operating System.

7-1	Preventive Maintenance	7 - 2
7-1-1	Preventive Maintenance Schedule	7 - 2
7-1-2	Clean the Touchscreen Surface.....	7 - 4
7-1-3	Clean the Panel PC	7 - 4
7-1-4	Check the Gasket Seal	7 - 5
7-1-5	Keep Software Updated.....	7 - 5
7-2	Corrective Maintenance.....	7 - 6
7-2-1	Warning and Error Messages	7 - 6
7-2-2	Remove the Cover.....	7 - 7
7-2-3	Replace the Fan Unit	7 - 8
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7-2-5	Replace a Drive	7 - 12
7-2-6	Replace the PCIe Card.....	7 - 17
7-2-7	Correct Display Functionality when Nothing is Displayed.....	7 - 22

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 Panel PC Without Operating System status	<ul style="list-style-type: none"> Refer to <i>7-2-1 Warning and Error Messages</i> on page 7 - 6 for all available messages. Refer to <i>2-2 LED Indicators</i> on page 2 - 5 for LED details.
Monitor storage devices that do not comply to the Omron specifications	Refer to <i>Storage Device Considerations</i> on page 2 - 21 for details.
Clean the display	Refer to <i>7-1-2 Clean the Touchscreen Surface</i> on page 7 - 4 for display cleaning details.
Weekly	Reference
Clean the Panel PC	Refer to <i>7-1-3 Clean the Panel PC</i> on page 7 - 4 for cleaning details.
Ensure you have the latest software updates	Refer to <i>7-1-5 Keep Software Updated</i> on page 7 - 5 for update details.
When changing applications or configurations	Reference
Create a backup of the Panel PC Without Operating System	---
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 Panel PC 	Refer to <i>4-4 Environmental Specifications</i> on page 4 - 25 for environmental specifications.
Check installation: Panel PC mounted securely	Refer to <i>5-3 Mount</i> on page 5 - 13 for installation details.
Check wiring and connections: <ul style="list-style-type: none"> Cable connectors fully inserted and locked No damaged wiring or connectors 	Refer to <i>5-4 Wire</i> on page 5 - 26 for wiring details. Refer to <i>5-5 Connect</i> on page 5 - 39 for connection details.
Check the gasket behind the monitor rim	Refer to <i>7-1-4 Check the Gasket Seal</i> on page 7 - 5 for gasket details.
Check the display: <ul style="list-style-type: none"> Brightness is sufficient No touch offset (optional) 	Refer to <i>4-3 Display Specifications</i> on page 4 - 24 for display specifications. Refer to <i>3-2 Support Software</i> on page 3 - 3 for the Industrial Monitor Brightness Utility that can set brightness.
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>7-2-2 Remove the Cover</i> on page 7 - 7 to check the label. Refer to <i>7-2-4 Replace the Battery</i> on page 7 - 10 to replace the battery.

Periodically but at least every 6 months	Reference
Check that the backup of the Panel PC Without Operating System is available and operational.	---
When the Panel PC 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 7-2-3 <i>Replace the Fan Unit</i> on page 7 - 8 to replace the Fan Unit.

7-1-2 Clean the Touchscreen Surface

Clean the touchscreen surface of the Panel PC Without Operating System when necessary to keep it in the best operating condition.

- Ensure the Panel PC Without Operating System is OFF before cleaning.
- Wipe the Panel PC Without Operating System daily with a dry, soft cloth. If the touchscreen is very dirty and you try to clean it with a dry cloth, you may scratch the surface. Use a damp cloth first to remove the dirt.
- When a spot cannot be removed with a dry cloth, dampen the cloth with a neutral cleanser (an approximately 2% solution), wring out the cloth, and wipe the Panel PC Without Operating System.
- Remove all residue from gum, vinyl or tape when cleaning.



Precautions for Correct Use

Turn OFF the product or disable the touchscreen for cleaning.

7-1-3 Clean the Panel PC

Clean the Panel PC periodically in order to keep it in the best operating condition.
Wipe the Panel PC with a dry, soft cloth.



Precautions for Safe Use

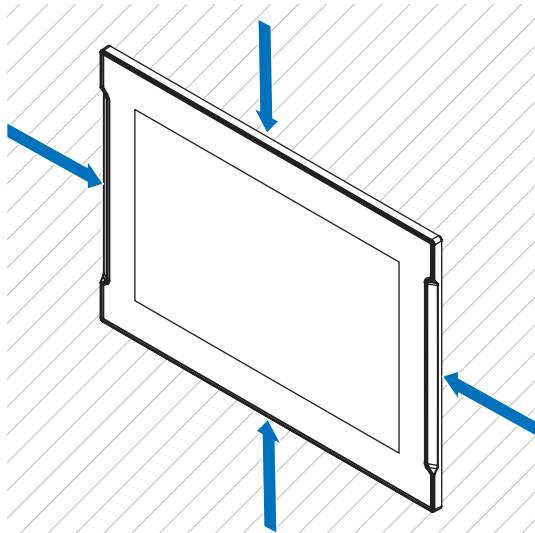
Do not use corrosive substances to clean the product.
Doing so may result in the failure or malfunction.

7-1-4 Check the Gasket Seal

The gasket prevents liquid from penetrating the mounting surface.
A damaged gasket can lead to Panel PC or other hardware failure.

Check the gasket on all 4 sides of the Panel PC.

The gasket should be visible as a thin black line that has no dents or damage.



Precautions for Safe Use

As the rubber gasket will deteriorate, shrink, or harden depending on the operating environment, periodical inspection is necessary.

7-1-5 Keep Software Updated

Always keep software at the latest released version to ensure stable operation.

This is specifically important for:

- Internet browser
- Operating system security patches
- OMRON software



Precautions for Correct Use

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.

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.	

Contact your local OMRON representative if the corrective maintenance actions did not solve the problem.

7-2-1 Warning and Error Messages

Warning and Error messages are provided by the Panel PC Without Operating System when there is a potential problem that may cause downtime. This section provides details about these messages. Warning messages inform you about a situation that will lead to downtime of the Panel PC Without Operating System.

Error messages inform you about what caused the downtime of the Panel PC Without Operating System.

The following message channels are available.

LED Indicators

The ERR LED indicator provides information on warnings and errors.



Additional Information

Refer to *ERR LED Indicator* on page 2 - 6 for ERR details.

7-2-2 Remove the Cover

The Cover of the Panel PC Without Operating System 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 Panel PC.

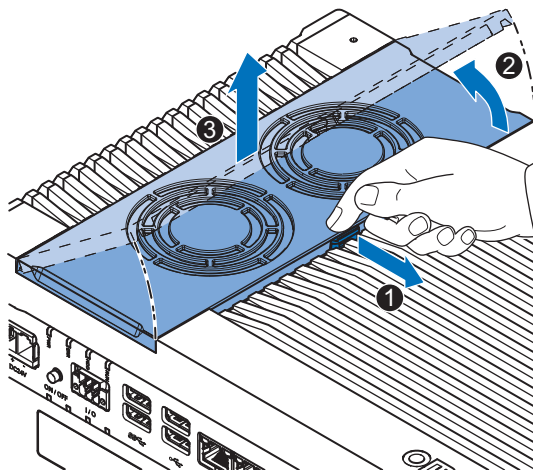
- 1** Power OFF your Panel PC if it has active cooling.



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 Panel PC and push the cover in place.

The lever will lock in place.

7-2-3 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 2-8-2 *Fan Unit* on page 2 - 18 for the model.

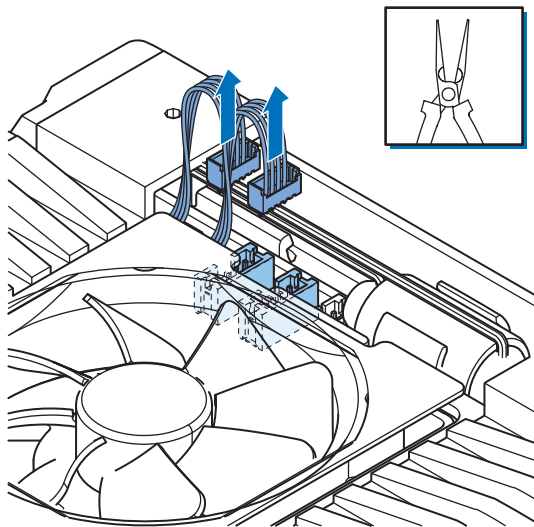
- 1** Power OFF the Panel PC.
- 2** Remove the Cover of the Panel PC.



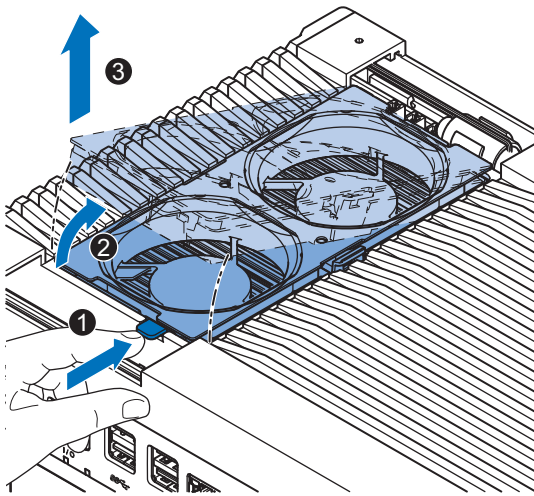
Additional Information

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

- 3** Disconnect the Fan Connectors from the board.



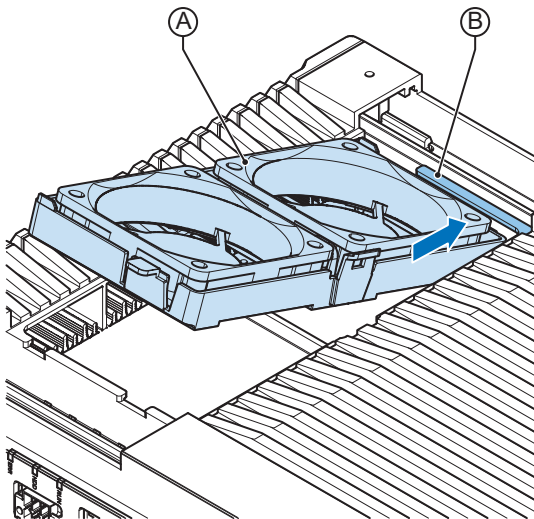
4 Replace the complete Fan Unit.



- (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 Panel 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.

7-2-4 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 *2-8-1 Battery* on page 2 - 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:

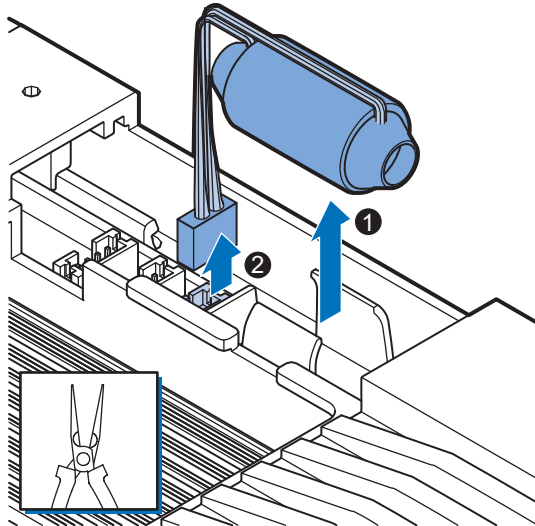
- 1** Power OFF the Panel PC.
- 2** Remove the cover.



Additional Information

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

- 3** Lift the battery ① from the compartment.
- 4** Disconnect the battery from the battery connector ②.



- 5** Connect the new battery to the battery connector.
- 6** Place the new battery in the Panel 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 2-8-1 *Battery* on page 2 - 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 Panel 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.

7-2-5 Replace a Drive

Use the following procedure to replace a drive.

Prepare the new drive.

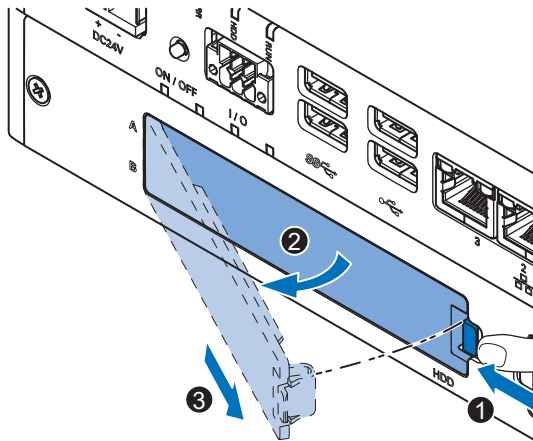


Additional Information

- Refer to *1-4 Product Configuration* on page 1 - 5 for the installed drive model.
- Refer to *2-9-3 Storage Devices* on page 2 - 21 for the available drive models.
- Refer to *4-1-6 Storage Device Specifications* on page 4 - 8 for drive specifications.

To replace a drive:

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



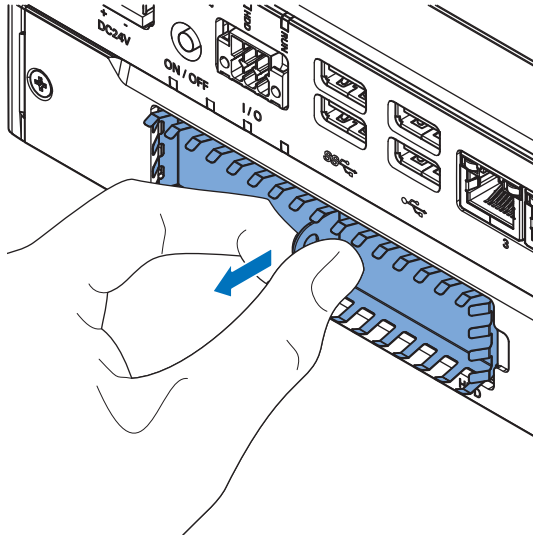
- (1) Push the lock lever **1**.
- (2) Tilt the cover **2**.
- (3) Remove the drive cover **3**.



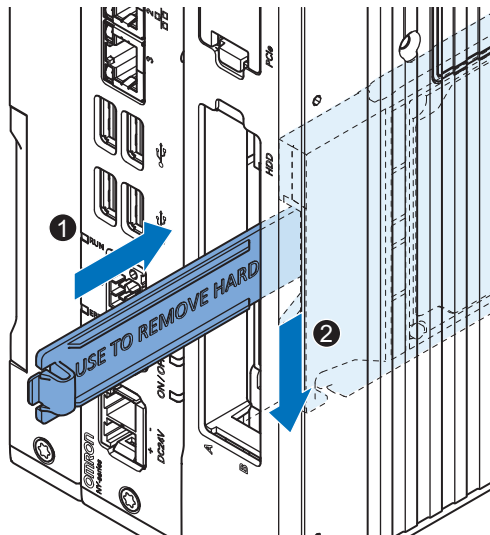
Additional Information

- Refer to *2-4 Drive Bays* on page 2 - 10 for the location of the drive cover.
- The Panel 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.

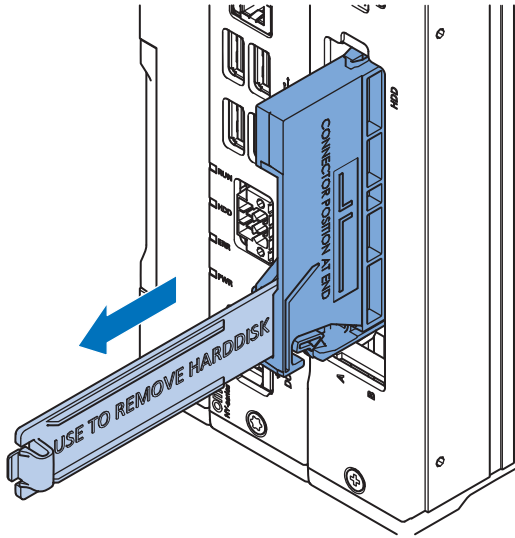
- 3** Pull the metal shielding cover out of the Panel PC.



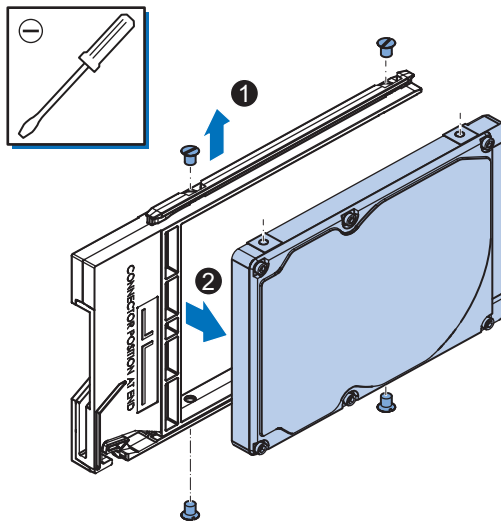
- 4** Insert the drive cover in the drive bracket bay **1** and move it down **2** so that it locks in the drive bracket.



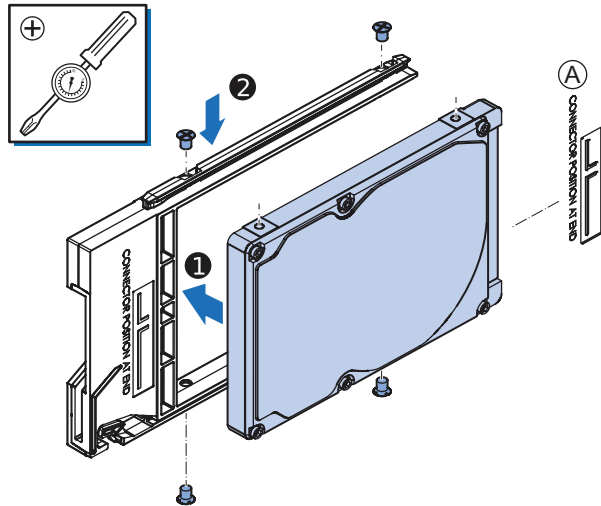
- 5** Remove the drive bracket from the Panel PC using the drive cover.



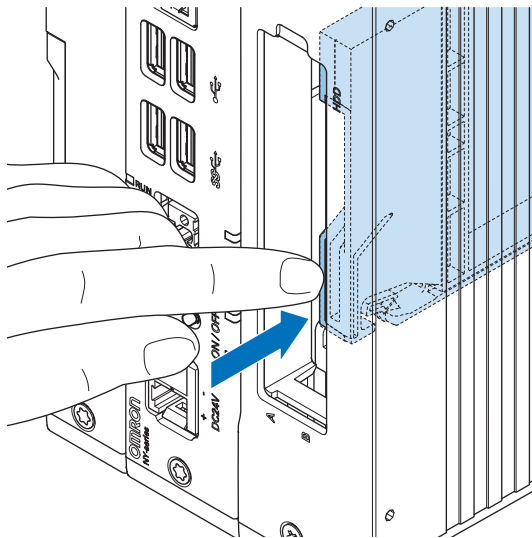
- 6** Remove the 4 mounting screws **1** and then remove the drive **2** from the drive bracket.



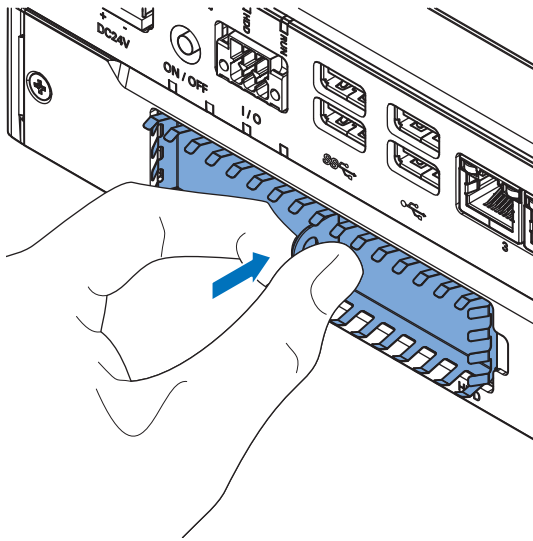
- 7** Align the connectors of the replacement drive as shown **(A)** on the bracket. Then insert the replacement drive **(1)** in the bracket and insert the 4 mounting screws **(2)**. Tighten these screws with a torque of 0.35 N·m.



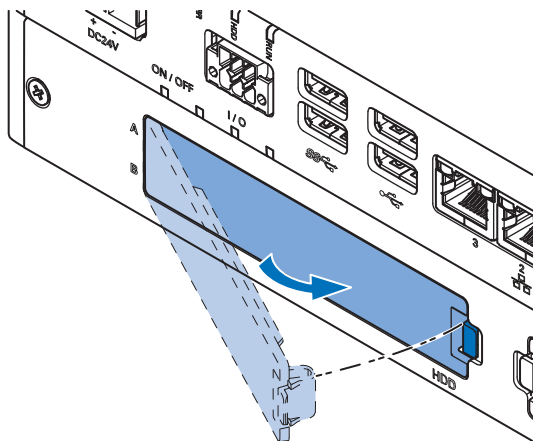
- 8** Insert the bracket with the replacement drive into the correct bay of the Panel PC. Ensure the bracket is completely in the Panel PC with an extra push.



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 Panel 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.

7-2-6 Replace the PCIe Card

Use the following procedure to replace the PCIe Card.

Prepare:

- The PCIe Card



Additional Information

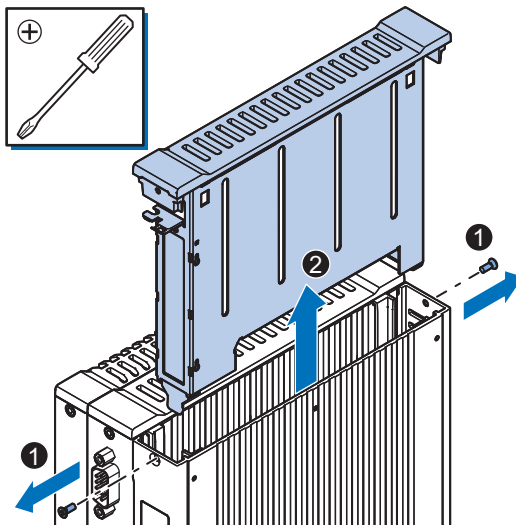
Refer to 4-1-7 *PCIe Card Specifications* on page 4 - 10 for PCIe specifications.

- The PCIe Card mounting materials: Card Clip and Card Support
These are supplied with the Panel PC Without Operating System.

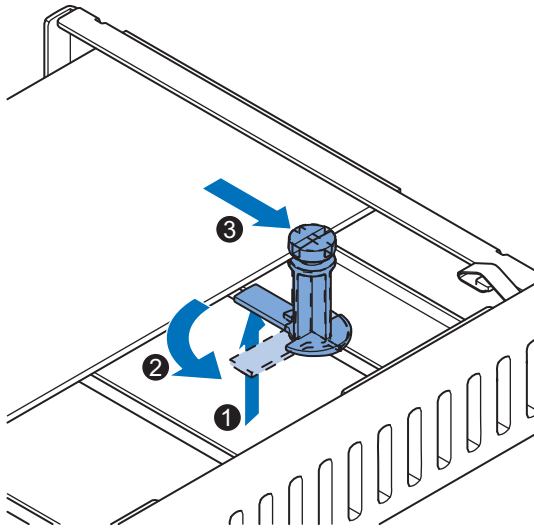
To replace the PCIe Card:

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

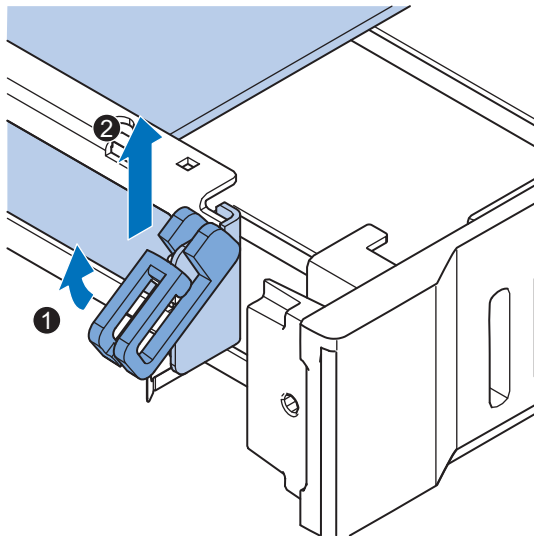
The indent at the side of the drawer will help you to pull the drawer from the Panel PC.



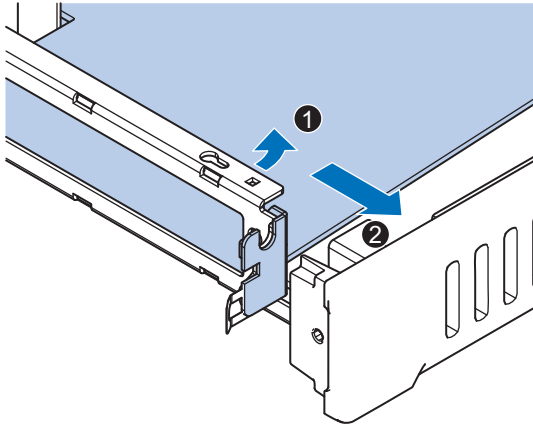
- 4** Push the notch **1** at the bottom of the Card Support up and rotate **2** the Card Support. Slide the Card Support **3** away from the card to create space and to remove it.



- 5** Pull the middle of the Card Clip to unlock it and remove it from the PCIe Drawer.

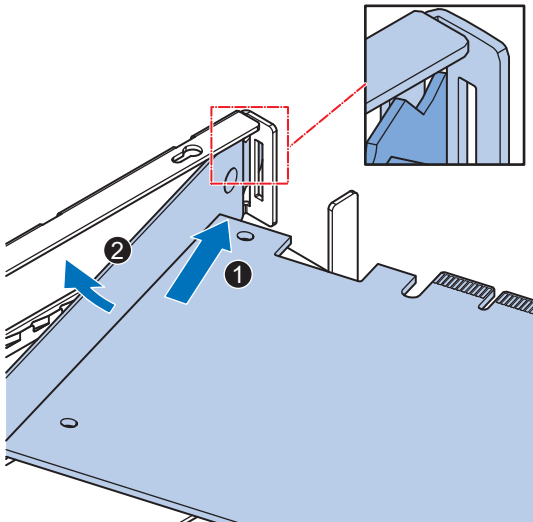


- 6** Remove the PCIe Card from the PCIe Drawer.



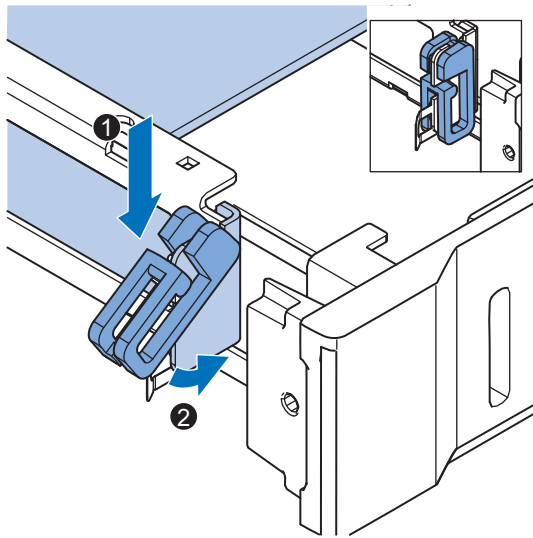
The PCIe Card is now removed.

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

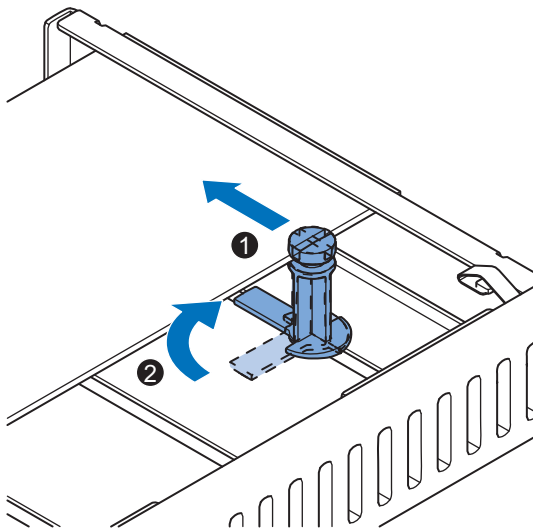


Ensure the PCIe Card is inserted into the correct opening.

- 8** Place the Card Clip in the PCIe Card and PCIe Drawer **1** and then rotate the Clip **2** to lock it in place.

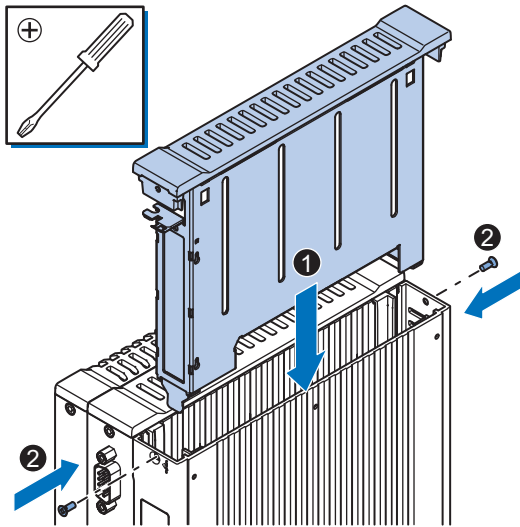


- 9** Slide the Card Support **1** so that it supports the side of the PCIe Card. Rotate the Card Support **2** to lock it in place.



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 Panel PC and then insert the two crosshead screws that hold the PCIe Drawer in place.



- 11** Remount the Panel PC.

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

7-2-7 Correct Display Functionality when Nothing is Displayed

When it seems the display is not functional, check the ERR LED.

- If the ERR LED is OFF
 - Check if the power supply is present.
Refer to *4-1-2 General Electrical Specifications* on page 4 - 3 for power supply specifications.
 - Check if the brightness setting is not too low.
Refer to *Industrial Monitor Utility* for brightness details.
The *Industrial Monitor Utility* information is available:
 - For products *NYP*□ in the section *Software* in this manual.
 - For products *NY5*□ in the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)*
- If the ERR LED is blinking check if the Panel PC is not in standby mode.
- If the ERR LED is ON
 - Check if the power supply voltage is inside specifications.
Refer to *4-1-2 General Electrical Specifications* on page 4 - 3 for power supply specifications.
 - Check if the ambient temperature is inside specifications.
Refer to *4-4-1 Operation Environment Specifications* on page 4 - 25 for temperature specifications.
 - Check if the Fan Unit has no warning messages.
Refer to *ERR LED Indicator* on page 2 - 6 for message details.
 - Check if a watchdog error occurred.
The watchdog is disabled by default and can only be enabled by software using the *Industrial PC System API*.
The API information is available:
 - For products *NYP*□ in the section *Software*.
 - For products *NY5*□ refer to the *NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual (Cat. No. W568)*

A

Appendices

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A-1-2	BIOS - Main	A - 4
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A-1 BIOS

This section provides the BIOS information of the Panel PC Without Operating System.

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 Panel PC Without Operating System. 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 - 9 for Chipset details.
- **Boot**

Refer to *A-1-5 BIOS - Boot* on page A - 10 for Boot details.

- **Security**

Refer to *A-1-6 BIOS - Security* on page A - 11 for Security details.

- **Save & Exit**

Refer to *A-1-7 BIOS - Save & Exit* on page A - 11 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 *1		Disabled	
Graphics	Primary Graphics Device	Auto	
	Internal Graphics Device	Auto	
	IGD Pre-Allocated Graphics Memory	32M	
	IGD Total Graphics Memory	256M	
	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 *1	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	PCI Latency Timer	32 PCI Bus Clocks	
	PERR # Generation	Disabled	
	SERR # Generation	Disabled	
	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	
Unpopulated Links	Disabled		
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) *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) *4	PEG1 Speed	Auto
		PEG1 ASPM	Disabled
		PEG1 De-emphasis Control	-3.5 dB
	PCI Express Port 2, 3, 4, 5 (x1 Gen2) *4	PCI Express Port x	Enabled
		ASPM	Disabled
		Hot Plug	Disabled
		PCIe Speed	Auto
		Detect Non-compliant Device	Disabled
ACPI	Hibernation Support		Disabled
	ACPI Sleep State		Suspend Disabled
	Lock Legacy Resources		Disabled
	S3 Video Repost		Disabled
	ACPI Low Power S0 Idle *3 *2		Disabled
	Native PCI Express Support		Enabled
	- Native ASPM		Disabled
	ACPI Debug		Disabled
	ACPI 5.0 CPPC Support		Disabled
	Active Trip Point *3 *2		71 C
	Automatic Critical Trip Point		Enabled
RTC Wake	Make System At Fixed Time	Disabled	
Trusted Computing	Security Device Support	Enable	
	TPM State	Enabled	
	Pending operation	None	

Item		Default / Remark	
CPU	CPU Information	Display of CPU parameters	
	Set Boot Freq Ratio	255	
	Hyper-Threading *2 *1	Enabled	
	Active Processor Cores	All	
	Limit CPUID Maximum	Disabled	
	Execute Disable Bit	Enabled	
	Intel Vitalization Technology	Enabled	
	Hardware Prefetcher	Enabled	
	Adjacent Cache Line Prefetch	Enabled	
	CPU AES *2 *1	Enabled	
	EIST	Enabled	
	- Turbo Mode *2 *1	Enabled	
	- Energy Performance *2 *1	Performance	
	P-State Reduction *3	Disabled	
	CPU C States	Disabled	
	TCC Activation Offset	0	
	Intel TXT(LT) Support *2 *1	Disabled	
SATA	SATA Controller(s)	Enabled	
	SATA Mode Selection	AHCI	
	SATA Test Mode	Disabled	
	Aggressive LPM Support	Disabled	
	SATA Controller Speed	Default	
	Serial ATA Port 0, 1, 2, 3 *5	SATA Port	Enabled *5
		Hot Plug	Disabled
		External SATA	Disabled
		SATA Device Type	Hard Disk Drive
		Spin Up Device	Disabled
Memory Configuration		Display of memory parameters	
Intel (R) Rapid Start Technology		Disabled	
USB	XHCI Mode	Smart Auto	
	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		

Item		Default / Remark
SMART Settings	Smart Self Test *6	Disabled
UEFI Network Stack	UEFI Network Stack	Disabled
NVMe Configuration		No NVME device found
Intel® Ethernet Connection I218-LM - Unique MAC Address	NIC Configuration	Link Speed
		Wake On LAN
	Blink LEDs	0

- *1. Only for Panel PCs with a CPU type Intel® Core™ i7-4700EQ.
- *2. Only for Panel PCs with a CPU type Intel® Core™ i5-4300U.
- *3. Only for Panel PCs with a CPU type Intel® Celeron® 2980U.
- *4. The active PCI Express Port number is related to the CPU type
 - Panel PCs with an Intel® Core™ i7-4700EQ CPU type use Port 0..5
 - Panel PCs with an Intel® Core™ i5-4300U CPU type use Port 2 and 3
 - Panel PCs with an Intel® Celeron® 2980U CPU type use Port 2 and 3
- *5.
 - Panel PCs with an Intel® Celeron® 2980U CPU type only Port 0 and 1 are available
 - Panel PCs with an Intel® Core™ i5-4300U CPU type Port 1 is Disabled
 - Panel PCs with an Intel® Core™ i7-4700EQ CPU type Port 1 is Disabled. For Port 2: SATA Port = Enabled.
- *6. Smart Self Test monitors the status of the HDD/SSD.
Enable only when Smart Monitoring software is used.

A-1-4 BIOS - Chipset

Provides Chipset settings.

Changeable BIOS Chipset parameters and their factory default values:

Item		Default / Remark
Platform Controller Hub (PCH)	PCI Express Clock Gating	Disabled
	DMI Link ASPM PCH Side	Disabled
	DMI Link Extended Synch Control	Disabled
	Isolate SMBus Segments	During POST
	PCIe-USB Glitch W/A	Disabled
	USB Precondition	Disabled
	BTCG	Enabled
	HDA Controller	Auto
	HDA PME	Disabled
	PCH LAN Controller	Enabled
	Wake on LAN	Enabled
	Serial IRQ Mode	Continuous
	SB CRID	Disabled
	Port 80h Redirection	LPC Bus
	Subtractive Decode	Disabled
Processor (Integrated Components)	VT-d *1 *2	Enabled
	Audio Device (B0:D3:F0)	Enabled
	NB CRID	Disabled
	BDAT ACPI Table Support	Disabled

- *1. Only for Panel PCs with a CPU type Intel® Core™ i5-4300U.
- *2. Only for Panel PCs with a CPU type Intel® Core™ i7-4700EQ.

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
Boot Priority Selection		Type Based
Boot Option Sorting Method		Legacy First
Type Based Boot Priority	1st Boot Device	SATA 2 Drive *2
	2nd Boot Device	Disabled
	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 Panel PC Without Operating System will stay OFF when power is supplied to the power connector

Turn ON: The Panel PC Without Operating System will automatically start up when power is supplied to the power connector.

Last State: The Panel PC Without Operating System will start up or remain OFF when power is supplied based on the Panel PC Without Operating System state at the moment power was removed from the power connector.

*2. For Panel PCs with a CPU type Intel® Celeron® 2980U: SATA 1 Drive

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**.

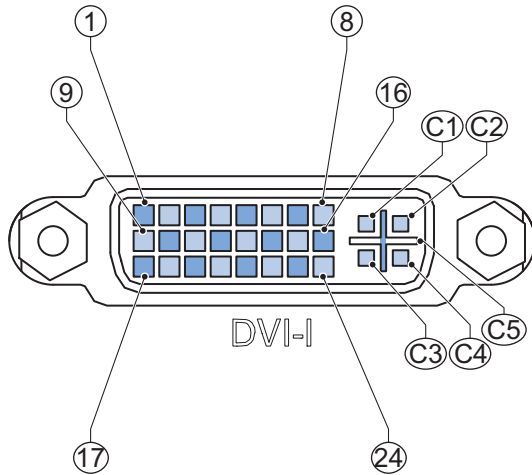
- **Save Changes and Exit**
Changed settings are saved and the Operating System starts with the changed settings.
- **Discard Changes and Exit**
Changed settings are not saved and the Operating System starts with the unchanged settings.
- **Save Changes and Reset**
Changed settings are saved and the Panel PC restarts using the changed settings.
- **Discard Changes and Reset**
Changed settings are not saved and the Panel 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 DVI Connector Pin Details

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

A-2-1 DVI-I Connector Pin Details

Pin details of the DVI-I connector.



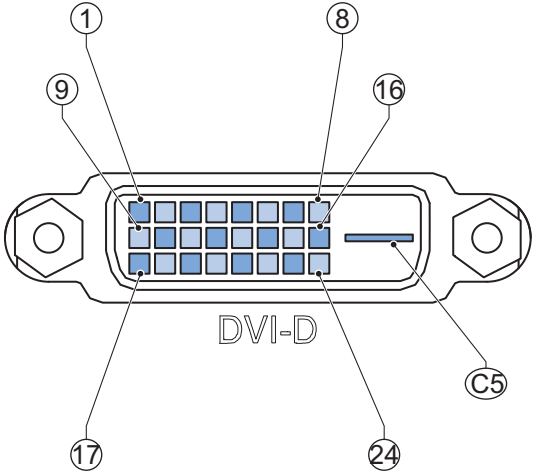
The pin layout represents the DVI-I connector on the Panel PC Without Operating System. Pin numbers increase from left to right for every row.

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-2-2 DVI-D Connector Pin Details

Pin details of the DVI-D connector.



The pin layout represents the DVI connector on the Panel PC Without Operating System. 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
16	HPD	Hot plug detect

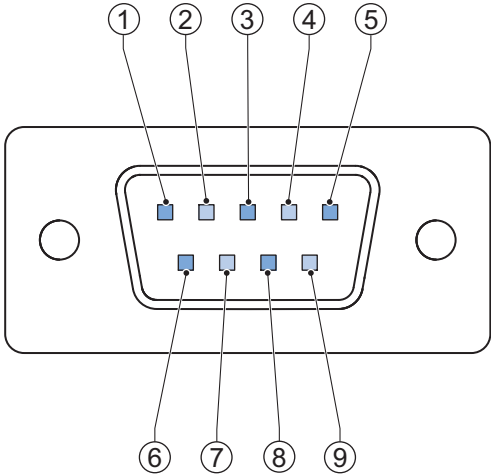
A-2 DVI Connector Pin Details

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A-2-2 DVI-D Connector Pin Details

Pin	Signal Name	Function
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-3 RS-232C Connector Pin Details



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

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

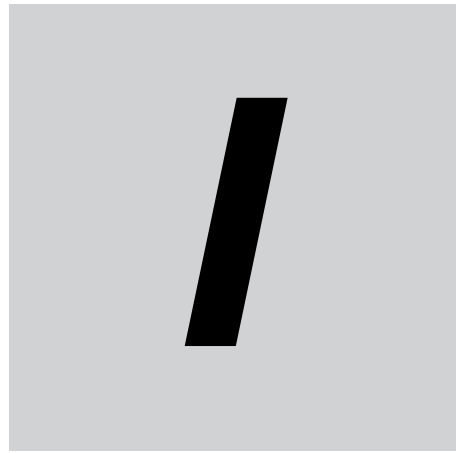
*1. The 0 VDC pin is internally connected to the ground connection.



Additional Information

Refer to 5-4-2 *Ground* on page 5 - 26 for grounding details.





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OMRON Corporation Industrial Automation Company
Kyoto, JAPAN

Contact: www.ia.omron.com

Regional Headquarters

OMRON EUROPE B.V.

Wegalaan 67-69, 2132 JD Hoofddorp
The Netherlands
Tel: (31)2356-81-300/Fax: (31)2356-81-388

OMRON ELECTRONICS LLC

2895 Greenspoint Parkway, Suite 200
Hoffman Estates, IL 60169 U.S.A.
Tel: (1) 847-843-7900/Fax: (1) 847-843-7787

OMRON ASIA PACIFIC PTE. LTD.

No. 438A Alexandra Road # 05-05/08 (Lobby 2),
Alexandra Technopark,
Singapore 119967
Tel: (65) 6835-3011/Fax: (65) 6835-2711

OMRON (CHINA) CO., LTD.

Room 2211, Bank of China Tower,
200 Yin Cheng Zhong Road,
PuDong New Area, Shanghai, 200120, China
Tel: (86) 21-5037-2222/Fax: (86) 21-5037-2200

Authorized Distributor:

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