OMRON

Machine Automation Controller

NX-series

System Units

User's Manual

NX-PD1□□□
NX-PF0□□□
NX-PC0□□□
NX-TBX01

Additional NX Unit Power Supply Units
Additional I/O Power Supply Units
I/O Power Supply Connection Units
Shield Connection Units

SYSMAC
always in control

W523-E1-06

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Introduction

Thank you for purchasing an NX-series System Unit.

This manual contains information that is necessary to use the NX-series System Unit. Please read this manual and make sure you understand the functionality and performance of the NX-series System Unit before you attempt to use it in a control system.

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 FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and maintaining FA systems.
- Personnel in charge of managing FA systems and facilities.

For programming, this manual is intended for personnel who understand the programming language specifications in international standard IEC 61131-3 or Japanese standard JIS B 3503.

Applicable Products

This manual covers the following product.

- NX-series System Unit

  NX-PD□□□□ /PF□□□□ /PC□□□□
  NX-TBX□□□

CONTENTS

Relevant Manuals

The table below provides the relevant manuals for the NX-series System Units.

Read all of the manuals that are relevant to your system configuration and application to make the most of the NX-series System Units.

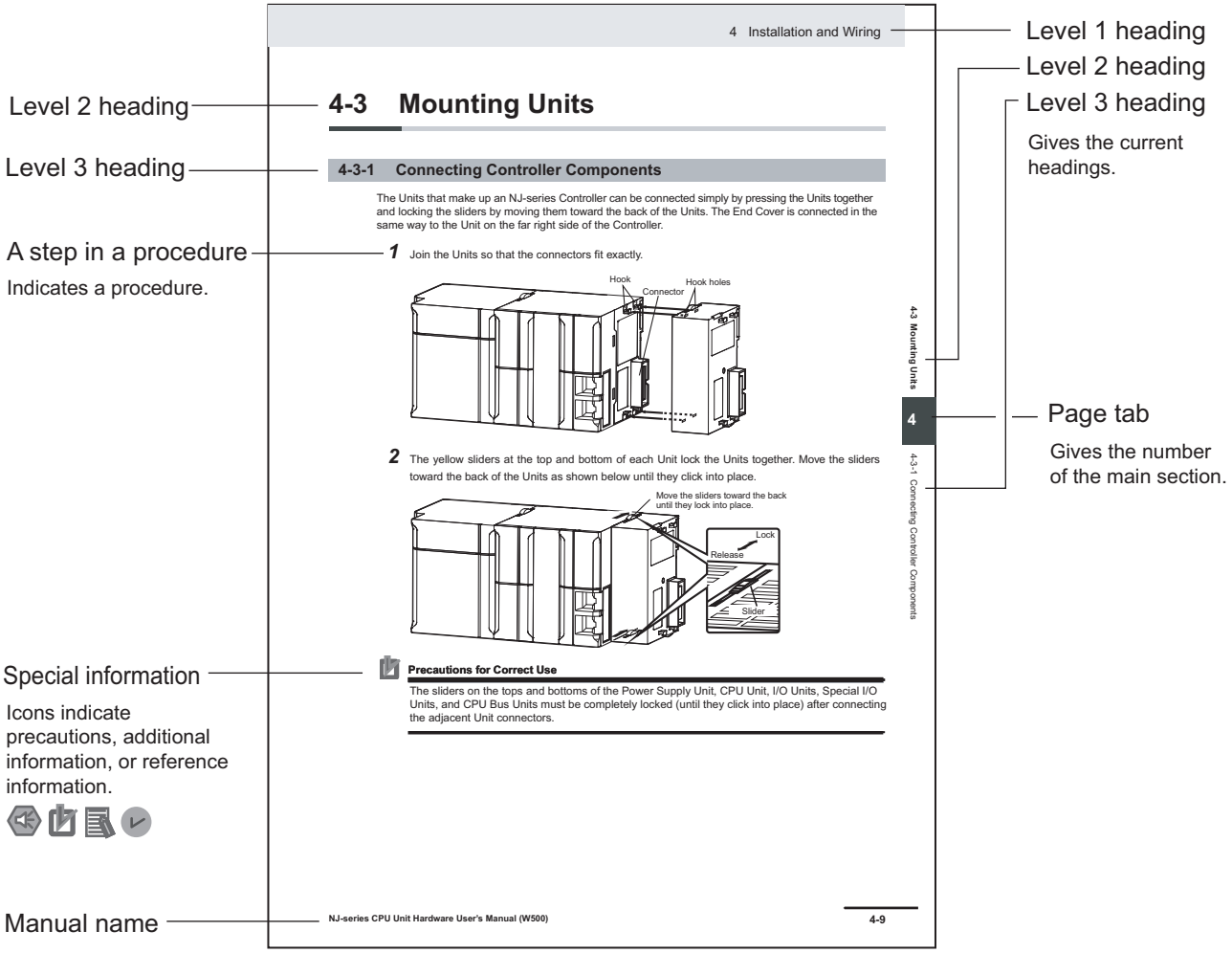
Other manuals, such as related product manuals, are necessary for specific system configurations and applications. Refer to *Related Manuals* on page 26 for the related manuals.

Manual name	Application
NX-series System Units User's Manual	Learning how to use NX-series System Units
NX-series Data Reference Manual	Referencing lists of the data that is required to configure systems with NX-series Units

Manual Structure

Page Structure and Icons

The following page structure and icons are used in this manual.



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

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.

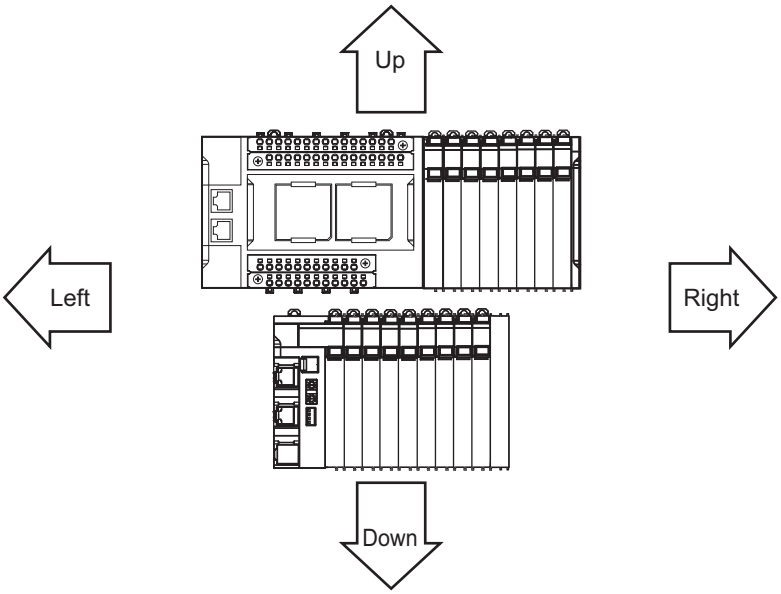
Version Information

Information on differences in specifications and functionality for CPU Units, Industrial PCs, and Communications Coupler Units with different unit versions and for different versions of the Support Software is given.

Note References are provided to more detailed or related information.

Precaution on Terminology

- In this manual, “download” refers to transferring data from the Support Software to a physical device and “upload” refers to transferring data from a physical device to the Support Software.
- In this manual, the directions in relation to the Units are given in the following figure, which shows upright installation.



- This user's manual refers to the NY-series IPC Machine Controller Industrial Panel PCs and Industrial Box PCs as simply *Industrial PCs* or as *NY-series Industrial PCs*.
- This user's manual refers to the built-in EtherCAT port on an NJ/NX-series Controller or NY-series Industrial PC as simple a built-in EtherCAT port.
- This user's manual may omit manual names and manual numbers in places that refer to the user's manuals for CPU Units and Industrial PCs. The following table gives some examples. When necessary, refer to *Related Manuals* on page 26 to determine the appropriate manual based on the common text for the omitted contents.

Examples:

Manual name	Omitted contents	Common text
NJ/NX-series CPU Unit Software User's Manual	Software user's manual for the connected CPU Unit or Industrial PC	Software User's Manual
NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User’s Manual		
NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual	User's manual for built-in EtherCAT port on the connected CPU Unit or Industrial PC	Built-in EtherCAT port
NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT® Port User’s Manual		

- This user's manual may omit manual names and manual numbers in places that refer to the user's manuals for Communications Coupler Units. If you will use a Communications Coupler Unit, refer to *Related Manuals* on page 26 to identify the manual for your Unit.

Terms and Conditions Agreement

Warranty, Limitations of Liability

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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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Safety Precautions

Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of an NX-series System Unit.

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

During Power Supply

Do not touch the terminal section while power is ON.

Electric shock may occur.

Do not attempt to take any Unit apart.

In particular, high-voltage parts are present in Units that supply power while power is supplied or immediately after power is turned OFF. Touching any of these parts may result in electric shock. There are sharp parts inside the Unit that may cause injury.

Fail-safe Measures

Provide safety measures in external circuits to ensure safety in the system if an abnormality occurs due to malfunction of the CPU Unit, Industrial PC, other Units, or slaves or due to other external factors affecting operation.

Not doing so may result in serious accidents due to incorrect operation.

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

The CPU Unit or Industrial PC will turn OFF all outputs from Output Units in the following cases. The remote I/O slaves will operate according to the settings in the slaves.

- If a power supply error occurs.
- If the power supply connection becomes faulty.
- If a CPU watchdog timer error or CPU reset occurs.
- If a Controller error in the major fault level occurs.
- While the CPU Unit is on standby until RUN mode is entered after the power is turned ON

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

The outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safe operation of the system.

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

You must take fail-safe measures to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.

Not doing so may result in serious accidents due to incorrect operation.

Voltage and Current Inputs

Make sure that the voltages and currents that are input to the Units and slaves are within the specified ranges.

Inputting voltages or currents that are outside of the specified ranges may cause accidents or fire.

Transferring

Always confirm safety at the destination node before you transfer Unit configuration information, parameters, settings, or other data from tools such as the Sysmac Studio.

The devices or machines may operate unexpectedly, regardless of the operating mode of the Controller.

Cautions

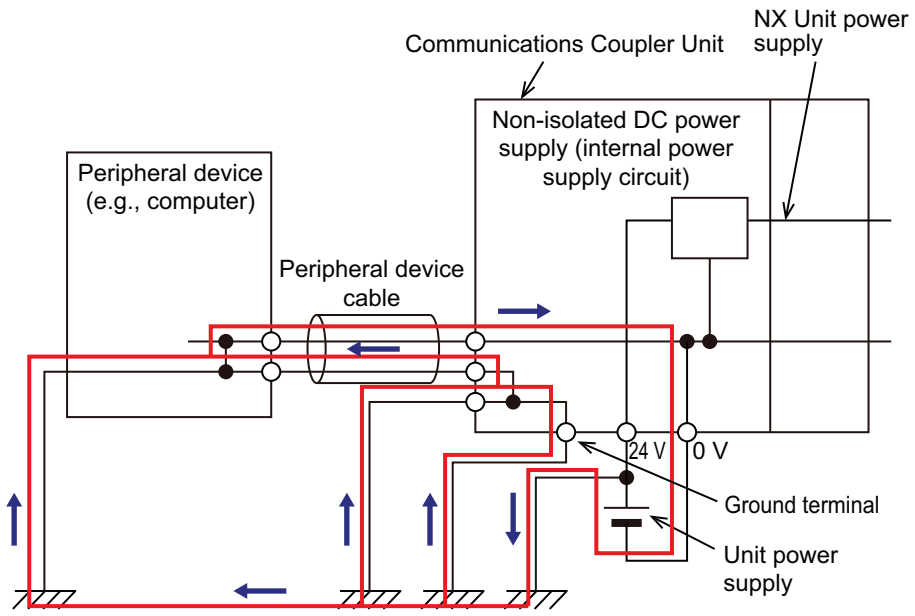
⚠ Caution

Wiring

When you connect a computer or other peripheral device to a Communications Coupler Unit that has a non-isolated DC power supply, either ground the 0-V side of the external power supply (i.e. Unit power supply) or do not ground it at all.

If the peripheral devices are grounded incorrectly, the external power supply (i.e. Unit power supply) may be short-circuited.

Never ground the 24-V side of the power supply, as shown in the following figure.



Be sure that all terminal screws and cable connector screws are tightened to the torque specified in the relevant manuals. The loose screws may result in fire or malfunction.

Online Editing

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

Precautions for Safe Use

Transporting

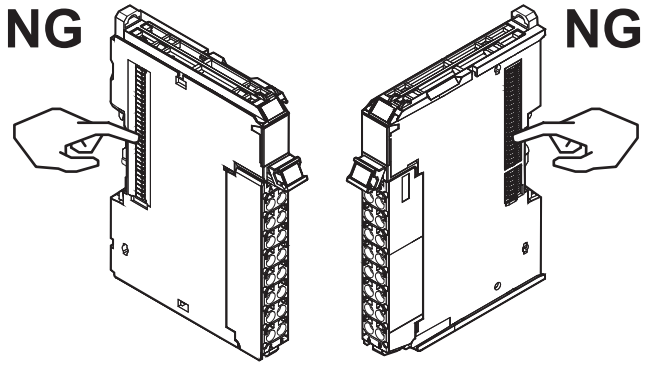
- When transporting any Unit, use the special packing box for it.
  Also, do not subject the Unit to excessive vibration or shock during transportation.
- Do not drop any Unit or subject it to abnormal vibration or shock.
  Doing so may result in Unit malfunction or burning.

Mounting

- Mount terminal blocks and connectors only after checking the mounting location carefully.
- Be sure that the terminal blocks, expansion cables, and other items with locking devices are properly locked into place.

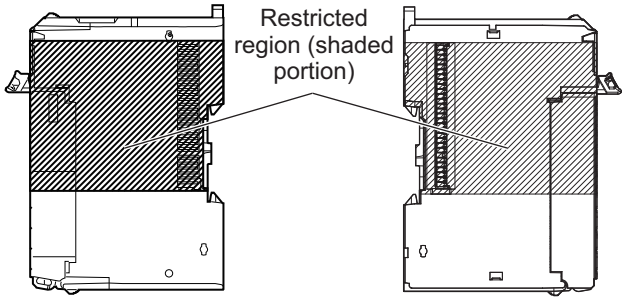
Installation

- Do not apply labels or tape to the Unit. When the Unit is installed or removed, adhesive or scraps may adhere to the pins in the NX bus connector, which may result in malfunctions.
- Do not touch the pins in the NX bus connector on the Unit. Dirt may adhere to the pins in the NX bus connector, which may result in malfunctions.

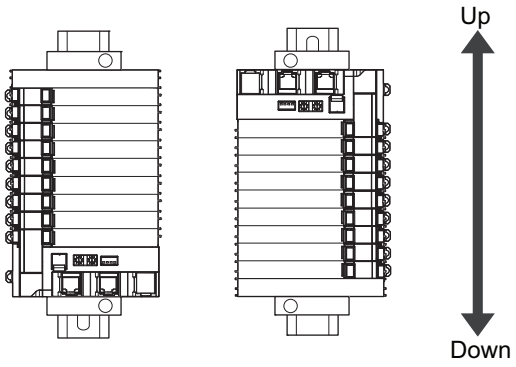


Example: NX Unit (12 mm width)

- Do not write on an NX Unit with ink within the restricted region that is shown in the following figure. Also do not get this area dirty. When the Unit is installed or removed, ink or dirt may adhere to the pins in the NX bus connector, which may result in malfunctions in the CPU Rack or the Slave Terminal.
  Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for the restricted region of CPU Unit and Communications Coupler Unit.



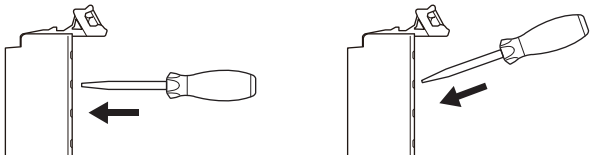
- For the installation orientations in the following figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables. The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured to the DIN Track, which may result in malfunctions.



Wiring

- Double-check all switches and other settings and double-check all wiring to make sure that they are correct before turning ON the power supply.
  Use the correct wiring parts and tools when you wire the system.
- Do not pull on the cables or bend the cables beyond their natural limit. Also, do not place heavy objects on top of the cables or other wiring lines. Doing so may break the cable.
- When wiring or installing the Units, do not allow metal fragments to enter the Units.
- Do not press the flat-blade screwdriver straight into the release holes on a screwless clamping terminal block. Doing so may damage the terminal block.

NG **OK**



- When you insert a flat-blade screwdriver into a release hole on a screwless clamping terminal block, press it down with a force of 30N or less. Applying excessive force may damage the terminal block.
- Do not incline or twist the flat-blade screwdriver while it is in a release hole on a screwless clamping terminal block. Doing so may damage the terminal block.

NG **NG**

- Use crimp terminals for wiring the M3 screw terminal blocks. Do not connect bare stranded wires directly to the M3 screw terminal blocks.

Power Supply Design

- Use all Units within the I/O power supply ranges that are given in the specifications.
- Use the I/I/O power supply current for the CPU Rack of the NX-series NX1P2 CPU Unit at 4 A or less. Using the currents that are outside of the specifications may cause failure or damage.
- Supply sufficient power according to the contents of this manual.
- Use the power supply voltage that is specified in this manual.
- Do not apply voltages that exceed the rated value to any Input Unit.
- Do not apply voltages or connect loads to the Output Units or slaves in excess of the maximum ratings.
- Inrush current occurs when the power supply is turned ON. When selecting fuses or breakers for external circuits, consider their fusing and detection characteristics as well as the above precautions and allow sufficient margin in shut-off performance.
- Install external breakers and take other safety measures against short-circuiting and overcurrents in external wiring.

Turning ON the Power Supply

- When you set the Operating Mode at Startup, confirm that no adverse effect will occur in the system.

Actual Operation

- Before you start operation, always register the NX Units that are connected to the Communications Coupler Unit in the host communications master as the Unit Configuration Information.
- Check the user program, data, and parameter settings for proper execution before you use them for actual operation.
- If you change the fail-soft operation setting, the output status when the error occurs may also change. Confirm safety before you change the fail-soft operation setting.
- If you use fail-soft operation, write programming to determine whether Unit I/O data is valid. Without such programming, the user program cannot distinguish between Units for which I/O refreshing is continued and Units for which I/O refreshing is stopped.

Turning OFF the Power Supply

- Do not disconnect the cable or turn OFF the power supply to the Controller or a Slave Terminal when downloading data or the user program from the Support Software.
- Always turn OFF the external power supply to the Units before attempting any of the following.

  Mounting or removing an NX Unit, Communications Coupler Unit, CPU Unit, or Industrial PC
  Assembling Units
  Setting DIP switches or rotary switches
  Connecting or wiring cables
  Attaching or removing terminal blocks or connectors

  Units that supply power continue to supply power to the Units for up to several seconds after the power supply is turned OFF. The PWR indicator remains lit as long as power is supplied. Confirm that the PWR indicator is not lit before you perform any of the above.

Operation

- Confirm that the controlled system will not be adversely affected before you perform any of the following operations.

  Changing the operating mode of the CPU Unit or the Industrial PC (including changing the setting of the Operating Mode at Startup)
  Changing the user program or settings
  Changing set values or present values
  Forced refreshing
- Always sufficiently check the safety at the connected devices before you change the settings of a slave or Unit.

General Communications

- Do not exceed the ranges that are given in the specifications for the communications distance and number of connected Units.
- Refer to the user's manual for the Communications Coupler Unit for precautions for the safe use of communications with the connected Communications Coupler Unit.

Unit Replacement

- When you replace a Unit, start operation only after you transfer the settings and variables that are required for operation to the new Unit.

Disposal

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

Precautions for Correct Use

Storage, Mounting, and Wiring

- Follow the instructions in this manual to correctly perform installation and wiring.
- Do not operate or store the Units in the following locations. Doing so may result in malfunction, in operation stopping, or in burning.

  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
- Take appropriate and sufficient countermeasures during installation 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
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up.
- Use the rated power supply voltage for the Units that supply power. Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied in places where the power supply is unstable.
- Install the Units away from sources of heat and ensure proper ventilation. Not doing so may result in malfunction, in operation stopping, or in burning.
- Do not allow foreign matter to enter the openings in the Unit. Doing so may result in Unit burning, electric shock, or failure.

Actual Operation

- If you change the event level of an error, the output status when the error occurs may also change. Confirm safety before you change an event level.

Turning OFF the Power Supply

- Do not turn OFF the power supply while data is being transferred.
- Do not turn OFF the power supply while parameters are being written to the CPU Unit, the Communications Coupler Unit or NX Units.

General Communications

- Refer to the user's manual for the Communications Coupler Unit for precautions for the correct use of communications with the connected Communications Coupler Unit.

Regulations and Standards

Conformance to EU Directives

Applicable Directives

- EMC Directives
- Low Voltage Directive

Concepts

EMC Directives

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.*1

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.

*1. 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).

Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 VAC and 75 to 1,500 VDC meet the required safety standards. The applicable directive is EN 61010-2-201.

Conformance to EU Directives

The NX-series Units comply with EU Directives. To ensure that the machine or device in which the NX-series Units are used complies with EU Directives, the following precautions must be observed.

- The NX-series Units must be installed within a control panel.
- You must use SELV power supply for the DC power supplies that are connected as the Unit power supplies and I/O power supplies for the NX-series Units.

  We recommend that you use the OMRON S8VK-S series Power Supplies for the CPU Racks with NX-series NX1P2 CPU Units. We recommend that you use the OMRON S8JX-series Power Supplies for Slave Terminals. EMC standard compliance was confirmed for these recommended Power Supplies.
- NX-series Units that comply with EU Directives also conform to the Common Emission Standard (EN 61131-2). 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 NX-series Units are used complies with EU Directives.
- You must use power supplies with an output hold time of 10 ms or longer for the DC power supplies that are connected as the Unit power supplies and I/O power supplies for the NX-series Units.

- 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.

Conformance to UL and CSA Standards

Some NX-series products comply with UL and CSA standards. If you use an NX-series product that complies with UL or CSA standards and the machinery or system in which you use the NX-series product must also comply with the standards, refer to the *Instruction Sheet* that is provided with the product. The *Instruction Sheet* provides the application conditions for complying with the standards.

Conformance to Shipbuilding Standards

Some NX-series products comply with shipbuilding standards. If you use an NX-series product that complies with shipbuilding standards and the machinery or system in which you use the NX-series product must also comply with the standards, consult with your OMRON representative. Application conditions are defined according to the installation location. Application may not be possible for some installation locations.

For usage conditions for shipbuilding standards, refer to *Conformance to Shipping Standards* in the user's manual for the CPU Unit or Communications Coupler Unit to which NX Units are connected.

Conformance to KC Standards

Observe the following precaution if you use NX-series Units in Korea.

A 급 기기 (업무용방송통신기자재)
이 기기는 업무용(A 급) 전저파작합기기로서 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.

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/.

Unit Versions

This section describes the notation that is used for unit versions, the confirmation method for unit versions, and the relationship between unit versions and Support Software versions.

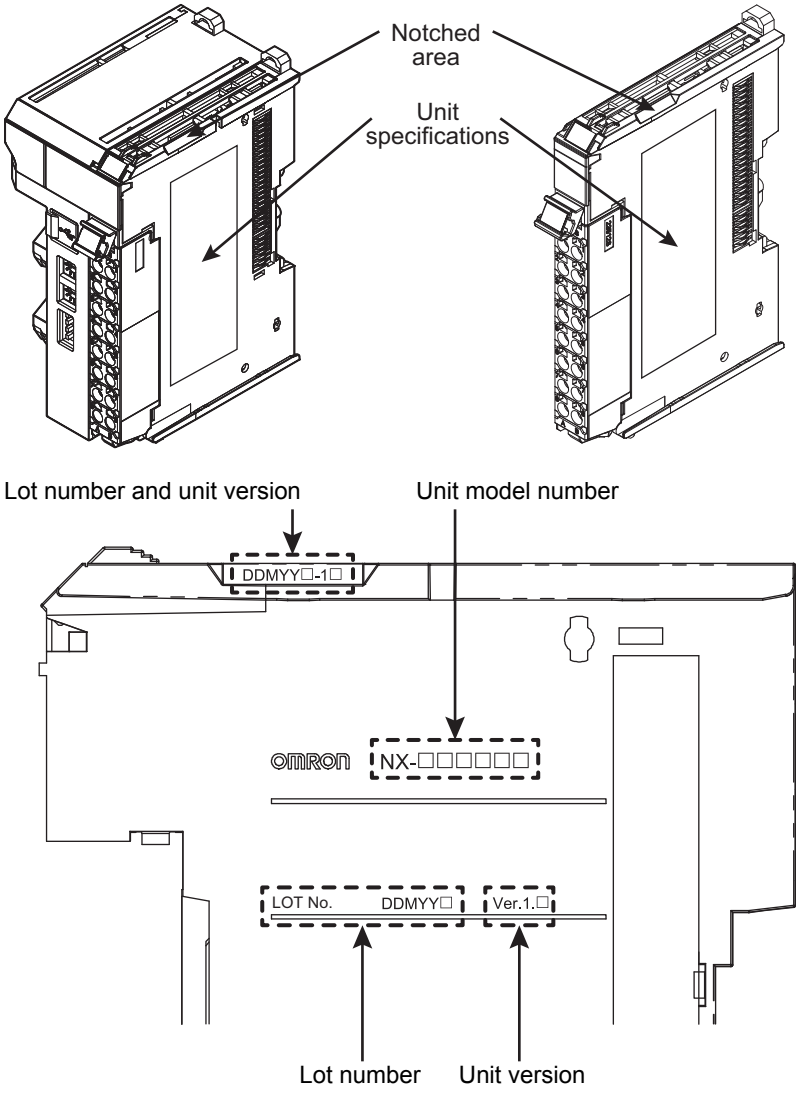
Unit Versions

A “unit version” has been introduced to manage the Units in the NX Series according to differences in functionality accompanying Unit upgrades.

An example is provided below for Communications Coupler Units and NX Units. For the notation that is used for the unit versions of CPU Units or Industrial PCs and the confirmation method for unit versions, refer to the user's manual for each Unit.

Notation of Unit Versions on Products

The unit version is given with the Unit specifications on the side of the Unit or in the notched area.



The following information is provided in the Unit specifications on the Unit.

Name	Function
Unit model number	Gives the model of the Unit.
Unit version	Gives the unit version of the Unit.
Lot number	Gives the lot number of the Unit. DDMYY□: Lot number, □: Used by OMRON. “M” gives the month (1 to 9: January to September, X: October, Y: November, Z: December)

The following information is provided in the notched area on the Unit.

Name	Function
Lot number and unit version	Gives the lot number and unit version of the Unit. • DDMYY□: Lot number, □: Used by OMRON. “M” gives the month (1 to 9: January to September, X: October, Y: November, Z: December) • 1□: Unit version The decimal portion of the unit version is omitted. (It is provided in the Unit specifications.)

Confirming Unit Versions with the Support Software

If your NX Unit is connected to a CPU Unit, refer to the user’s manual of the connected CPU Unit for the confirmation method for the unit version of the NX Unit.

If your NX Unit is connected to a Communications Coupler Unit, refer to the user’s manual of the connected Communications Coupler Unit for the confirmation method for the unit version of the Communications Coupler Unit and NX Unit.

Unit Versions and Support Software Versions

The functions that are supported depend on the unit version of the Unit. The version of Support Software that supports the functions that were added for an upgrade is also required to use those functions.

Refer to *A-5 Version Information with CPU Units* on page A-26 or *A-6 Version Information with Communications Coupler Units* on page A-27 for the functions that are supported by each Unit version.

Related Manuals

The following table shows related manuals. Use these manuals for reference.

Manual name	Cat. No.	Model numbers	Application	Description
NX-series System Units User's Manual	W523	NX-PD1□□□ NX-PF0□□□ NX-PC0□□□ NX-TBX01	Learning how to use NX-series System Units	The hardware and functions of the NX-series System Units are described.
NX-series Data Reference Manual	W525	NX-□□□□□□	Referencing lists of the data that is required to configure systems with NX-series Units	Lists of the power consumptions, weights, and other NX Unit data that is required to configure systems with NX-series Units are provided.
Sysmac Studio Version 1 Operation Manual	W504	SYSMAC-SE2□□□	Learning about the operating procedures and functions of the Sysmac Studio	Describes the operating procedures of the Sysmac Studio.
NX-IO Configurator Operation Manual	W585	CXONE-AL□□D-V4	Learning about the operating procedures and functions of the NX-IO Configurator.	Describes the operating procedures of the NX-IO Configurator.
NJ/NX-series Troubleshooting Manual	W503	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ NX1P2-□□□□	Learning about the errors that may be detected in an NJ/NX-series Controller	Concepts on managing errors that may be detected in an NJ/NX-series Controller and information on individual errors are described.
NY-series Troubleshooting Manual	W564	NY532-□□□□ NY512-□□□□	Learning about the errors that may be detected in an NY-series Industrial PC	Concepts on managing errors that may be detected in an NY-series Controller and information on individual errors are described.
NX-series NX1P2 CPU Unit Hardware User's Manual	W578	NX1P2-□□□□	Learning the basic specifications of the NX-series NX1P2 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided.	An introduction to the entire NX1P2 CPU Unit system is provided along with the following information on the CPU Unit. • Features and system configuration • Overview • Part names and functions • General specifications • Installation and wiring • Maintenance and Inspection
NX-series EtherCAT® Coupler Unit User's Manual	W519	NX-ECC20□	Learning how to use an NX-series EtherCAT Coupler Unit and EtherCAT Slave Terminals	The following items are described: the overall system and configuration methods of an EtherCAT Slave Terminal (which consists of an NX-series EtherCAT Coupler Unit and NX Units), and information on hardware, setup, and functions to set up, control, and monitor NX Units through EtherCAT.

Manual name	Cat. No.	Model numbers	Application	Description
NX-series EtherNet/IP™ Coupler Unit User's Manual	W536	NX-EIC202	Learning how to use an NX-series EtherNet/IP Coupler Unit and EtherNet/IP Slave Terminals	The following items are described: the overall system and configuration methods of an EtherNet/IP Slave Terminal (which consists of an NX-series EtherNet/IP Coupler Unit and NX Units), and information on hardware, setup, and functions to set up, control, and monitor NX Units.
NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual	W505	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ NX1P2-□□□□	Using the built-in EtherCAT port on an NJ/NX-series CPU Unit	Information on the built-in EtherCAT port is provided. This manual provides an introduction and provides information on the configuration, features, and setup.
NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT® Port User's Manual	W562	NY532-□□□□ NY512-□□□□	Using the built-in EtherCAT port on an NY-series Industrial PC	Information on the built-in EtherCAT port is provided. This manual provides an introduction and provides information on the configuration, features, and setup.

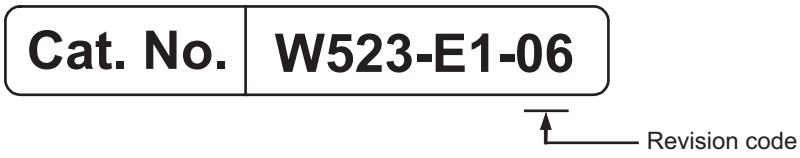
Terminology

Term	Abbre-viation	Description
application layer status, AL status	---	Status for indicating information on errors that occur in an application on a slave.
CAN application protocol over EtherCAT	CoE	A CAN application protocol service implemented on EtherCAT.
CAN in Automation	CiA	CiA is the international users' and manufacturers' group that develops and supports higher-layer protocols.
Communications Coupler Units	---	The generic name of an interface unit for remote I/O communications on a network between NX Units and a host network master.
CPU Rack	---	A rack to which a CPU Unit is mounted. For an NX-series NX1P2 CPU Unit, a CPU Rack has a CPU Unit with NX Units and an End Cover mounted to it.
DC time	---	Time indicated by the clock shared between the CPU Unit and the NX Units in a CPU Rack for an NX-series NX1P2 CPU Unit. EtherCAT slaves that support distributed clock synchronization have a clock that is shared by all slaves in the network. The time that is based on this distributed clock is called the DC time. The same clock is shared by an NX-series NX1P2 CPU Unit, NX Units connected to the CPU Unit, and applicable EtherCAT slaves.
device profile	---	A collection of device dependent information and functionality providing consistency between similar devices of the same device type.
device variable	---	A variable that is used to access a specific device through an I/O port by an NJ/NX-series CPU Unit or NY series Industrial PC. Process data on an EtherCAT slave is allocated to this variable. For an NX-series NX1P2 CPU Unit, I/O data for the NX Units on a CPU Unit is allocated. A user application on a CPU Unit or Industrial PC accesses a device that can be connected, by directly reading and writing this device variable.
distributed clock	DC	Clock distribution mechanism used to synchronize EtherCAT slaves and the EtherCAT master.
EtherCAT slave controller	ESC	A controller for EtherCAT slave communications.
EtherCAT slave information	ESI	An XML file that contains setting information for an EtherCAT slave.
EtherCAT state machine	ESM	An EtherCAT communications state machine.
EtherCAT Technology Group	ETG	The ETG is a global organization in which OEM, end users, and technology providers join forces to support and promote the further technology development.
I/O map settings	---	Settings that assign variables to I/O ports. Assignment information between I/O ports and variables.
I/O port	---	A logical interface that is used by the NJ/NX-series CPU Unit or NY-series Industrial PC to exchange data with an external device (slave or Unit).
I/O refreshing	---	Cyclic data exchange with external devices that is performed with predetermined memory addresses.
index	---	Address of an NX object within an application process.
network configuration information	---	The EtherCAT network configuration information held by the EtherCAT master.
NX bus	---	The NX-series internal bus.
NX message communications	---	One form of NX bus communications that uses message communications to execute the functions of NX Units and access NX objects whenever required.
object	---	An abstract representation of a particular component within a device, which consists of data, parameters, and methods.

Term	Abbre-viation	Description
Operational	---	A state in which I/O refresh communications and NX message communications are possible between the communications master and the Communications Coupler Unit or NX Units.
PDO communications	---	An acronym for process data communications.
Pre-Operational	---	A state in which NX message communications are possible between the communications master and the Communications Coupler Unit or NX Units, but I/O refresh communications are not possible.
primary periodic task	---	The task with the highest priority.
process data	---	Collection of application objects designated to be downloaded cyclically or acyclically for the purpose of measurement and control.
process data communications	---	One type of NX bus communications in which process data objects (PDOs) are used to exchange information cyclically and in realtime. This is also called PDO communications.
process data object	PDO	A structure that describes the mappings of parameters that have one or more process data entities.
receive PDO	RxPDO	A process data object received by an EtherCAT slave.
Safe-Operational	---	A state in which input refresh communications and NX message communications are possible between the communications master and the Communications Coupler Unit or NX Units, but output refresh communications are not possible.
Slave Information Interface	SII	Slave information that is stored in non-volatile memory in the slave.
Slave Terminal	---	A building-block remote I/O terminal to which a Communications Coupler Unit and NX Units are mounted
subindex	---	Sub-address of an NX object within the object dictionary.
Sync0	---	A signal that gives the interrupt timing based on the distributed clock (DC) in EtherCAT communications. The slaves execute controls according to this interrupt timing.
Sync Manager	SM	Collection of control elements to coordinate access to concurrently used objects.
task period	---	The interval at which the primary periodic task or a periodic task is executed.
transmit PDO	TxPDO	A process data object sent from an EtherCAT slave.

Revision History

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



Revision code	Date	Revised content
01	April 2013	Original production
02	June 2013	Corrected mistakes
03	September 2013	Added information on the NX-PF0730 and corrected mistakes.
04	April 2015	Made changes accompanying the addition of the NX-series CPU Unit and corrected mistakes.
05	October 2016	• Made changes accompanying the addition of NY-series IPC Machine Controller Industrial Panel PCs and Industrial Box PCs. • Made changes accompanying the addition of the NX-series NX1P2 CPU Unit. • Corrected mistakes.
06	June 2017	• Made changes accompanying the upgrade of the NX-ECC203 unit version to version 1.5. • Made changes accompanying the upgrade of the NX-EIC202 unit version to version 1.2. • Corrected mistakes.

Sections in this Manual

1

Features and System Configuration

This section describes NX system configuration and System Unit types.

1-1 Features and Types of System Units

This section describes features and types of System Units.

1-1-1 System Unit Features

System Units are Units used to build the system for separating power supply systems or supplying power in the midstream in a CPU Rack or a Slave Terminal.

The NX-series System Units provide the following features.

Additional Information

CPU Rack

A CPU Rack is a rack to which a CPU Unit is mounted. For an NX1P2 CPU Unit, a CPU Rack is configured to have a CPU Unit with NX Units and an End Cover mounted to it.

Slave Terminal

Slave Terminal is a generic name for a building block-type remote I/O terminal that contains a group of NX Units connected to a Communications Coupler Unit.

Can be Connected to a CPU Unit or Communications Coupler Unit

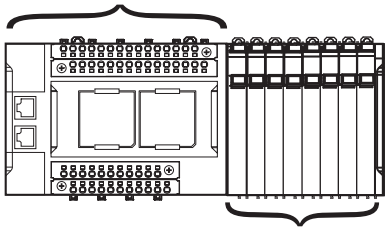
NX Unit NX-series System Units can be connected to the following Units.*1

- NX-series CPU Unit
- NX-series Communications Coupler Unit

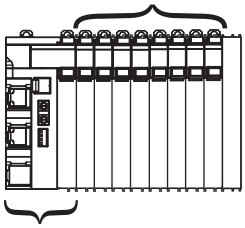
When a CPU Unit and a Communications Coupler Unit are used together, you can unify the methods for installing, wiring, and setting up NX Units, and eventually reduce design costs.

Example:

NX-series NX1P2 CPU Unit



NX Units: NX-series System Units



NX-series EtherCAT Coupler Unit

*1. For whether NX Units can be connected to the CPU Unit or Communications Coupler Unit to be used, refer to the user's manual for the CPU Unit or Communications Coupler Unit to be used.

Simple I/O Wiring with a Screwless Clamping Terminal Block

The terminal block is a screwless clamping terminal block.

You can connect the wires simply by pushing the ferrules into the terminals. The amount of wiring work is reduced without requiring the use of screws.

1-1-2 System Unit Types

The types of System Units are as follows.

Type		Purpose
System Units		These Units are used as required to build a CPU Rack or a Slave Terminal.
	Additional NX Unit Power Supply Unit	This Unit is used when the NX Unit power supply is insufficient.
	Additional I/O Power Supply Unit	This Unit is used when the I/O power supply is insufficient or to separate the I/O power supply in the CPU Rack or Slave Terminal. This Unit must be used when the type of the I/O power supply for the NX Unit that is used in a CPU Rack is the supply from NX bus.
	I/O Power Supply Connection Unit	This Unit is used when the I/O power supply terminals are insufficient for connections to external I/O devices.
	Shield Connection Unit	This Unit is used to ground more than one shield from external I/O connections to the same ground.

Refer to *1-3 Model List* on page 1-7 for details on System Unit models.

1-2 System Configuration

NX Unit NX-series System Units can be connected to the following Units.

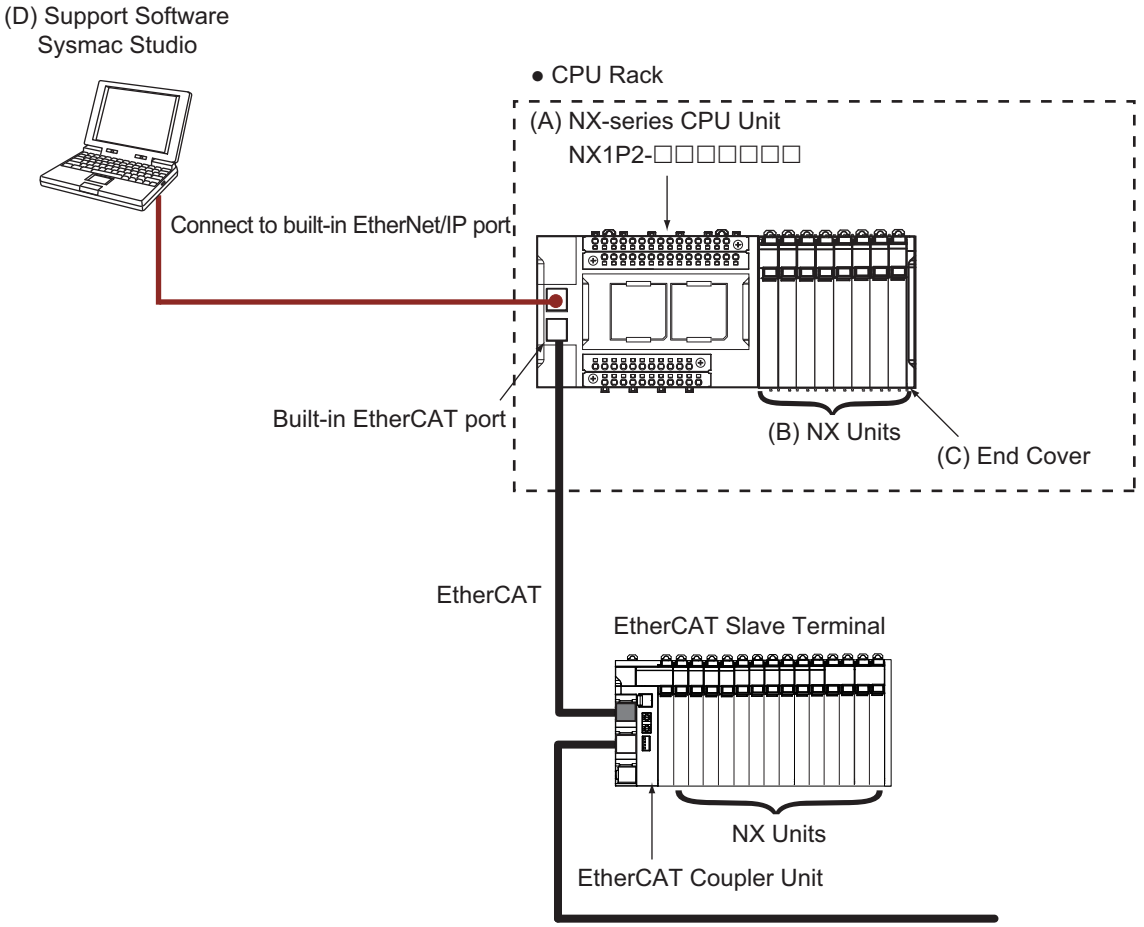
- NX-series CPU Unit
- NX-series Communications Coupler Unit

The following explains the system configuration for each NX Unit connection destination.

1-2-1 System Configuration in the Case of a CPU Unit

The following figure shows a system configuration when a group of NX Units is connected to an NX-series CPU Unit.

You can connect the EtherCAT Slave Terminal to the built-in EtherCAT port on the CPU Unit. Refer to *1-2-2 System Configuration of Slave Terminals* on page 1-5 for details on the system configuration of a Slave Terminal.



Symbol	Item	Description
(A)	NX-series CPU Unit	The Unit that serves as the center of control for a Machine Automation Controller. It executes tasks, refreshes I/O for other Units and slaves, etc. NX Units can be connected to an NX1P2 CPU Unit.
(B)	NX Units	The NX Units perform I/O processing with connected external devices. The NX Units exchange data with the CPU Unit through I/O refreshing. A maximum of eight NX Units can be connected to an NX1P2 CPU Unit.
(C)	End Cover	The End Cover is attached to the end of a CPU Rack.

Symbol	Item	Description
(D)	Support Software (Sysmac Studio)	A computer software application for setting, programming, debugging, and troubleshooting NJ/NX/NY-series Controllers. For an NX1P2 CPU Unit, this application performs setting operation by making a connection to a built-in EtherNet/IP port.

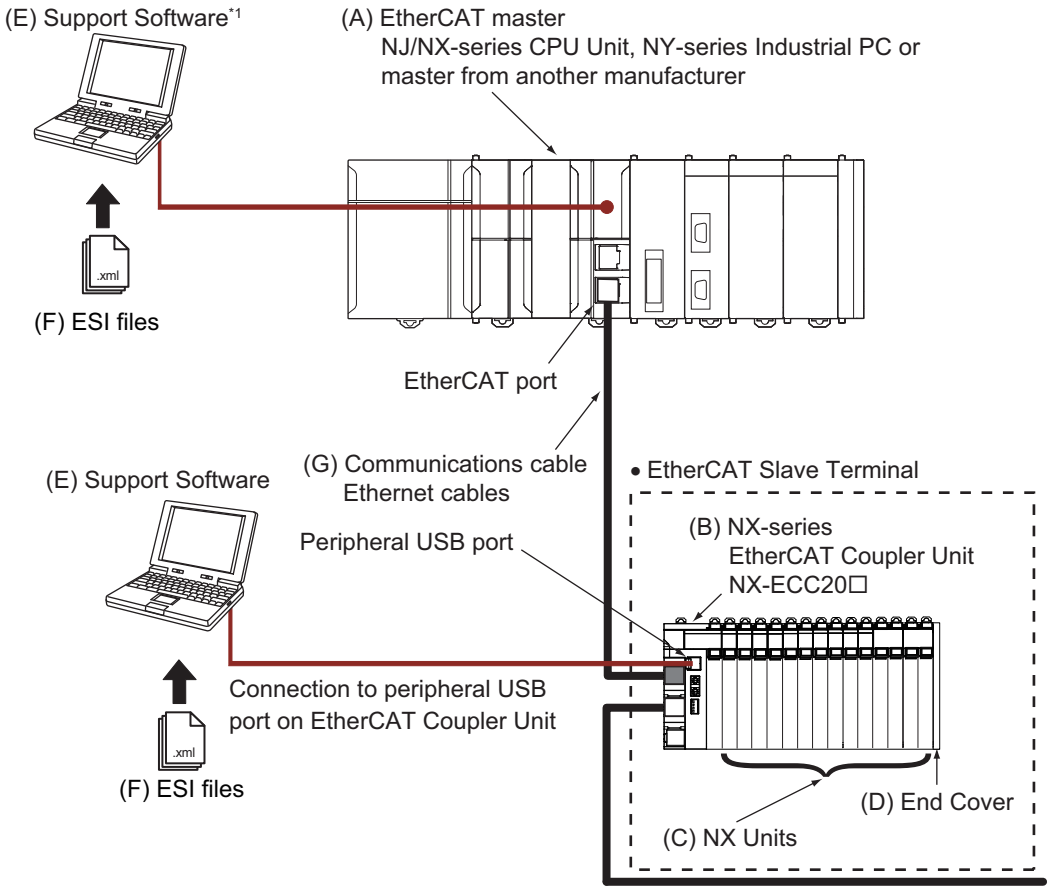
1-2-2 System Configuration of Slave Terminals

A building-block remote I/O slave provided with a group of NX Units connected to a Communications Coupler Unit is generically called a Slave Terminal.

The NX Units can be flexibly combined with a Communications Coupler Unit to achieve the optimum remote I/O slave for the application with less wiring, less work, and less space.

The following figure shows an example of the system configuration when an EtherCAT Coupler Unit is used as a Communications Coupler Unit.

Refer to the user's manual for the connected Communications Coupler Unit for details on how to configure the system when any other type of Communications Coupler Unit is used.



*1. The connection method for the Support Software depends on the model of the CPU Unit or Industrial PC.

Letter	Item	Description
(A)	EtherCAT master *1	The EtherCAT master manages the network, monitors the status of slaves, and exchanges I/O data with slaves.
(B)	EtherCAT Coupler Unit	The EtherCAT Coupler Unit serves as an interface for process data communications on the EtherCAT network between the NX Units and the EtherCAT master. The I/O data for the NX Units is accumulated in the EtherCAT Coupler Unit and then all of the data is exchanged with the EtherCAT master at the same time. The EtherCAT Coupler Unit can also perform message communications (SDO communications) with the EtherCAT master.
(C)	NX Units	The NX Units perform I/O processing with connected external devices. The NX Units perform process data communications with the EtherCAT master through the EtherCAT Coupler Unit.
(D)	End Cover	The End Cover is attached to the end of the Slave Terminal.
(E)	Support Software *2*3	The Sysmac Studio runs on a personal computer and it is used to configure the EtherCAT network and EtherCAT Slave Terminal, and to program, monitor, and troubleshoot the Controllers.
(F)	ESI (EtherCAT Slave Information) file	The ESI file contains information that is unique to the EtherCAT Slave Terminal in XML format. You can load the ESI file into the Support Software to easily allocate Slave Terminal process data and configure other settings. The ESI files for OMRON EtherCAT slaves are already installed in the Support Software. You can update the Support Software to get the ESI files for the most recent models.
(G)	Communications cable	Use a double-shielded cable with aluminum tape and braiding of Ethernet category 5 (100Base-TX) or higher, and use straight wiring.

*1. An EtherCAT Slave Terminal cannot be connected to any of the OMRON CJ1W-NC□81 or CJ1W-NC□82 Position Control Units even though they can operate as EtherCAT masters.

*2. The term Support Software indicates software that is provided by OMRON. If you connect to a master from another company, use the software tool corresponding to that master.

*3. Refer to *1-4 Support Software* on page 1-10 for information on Support Software.

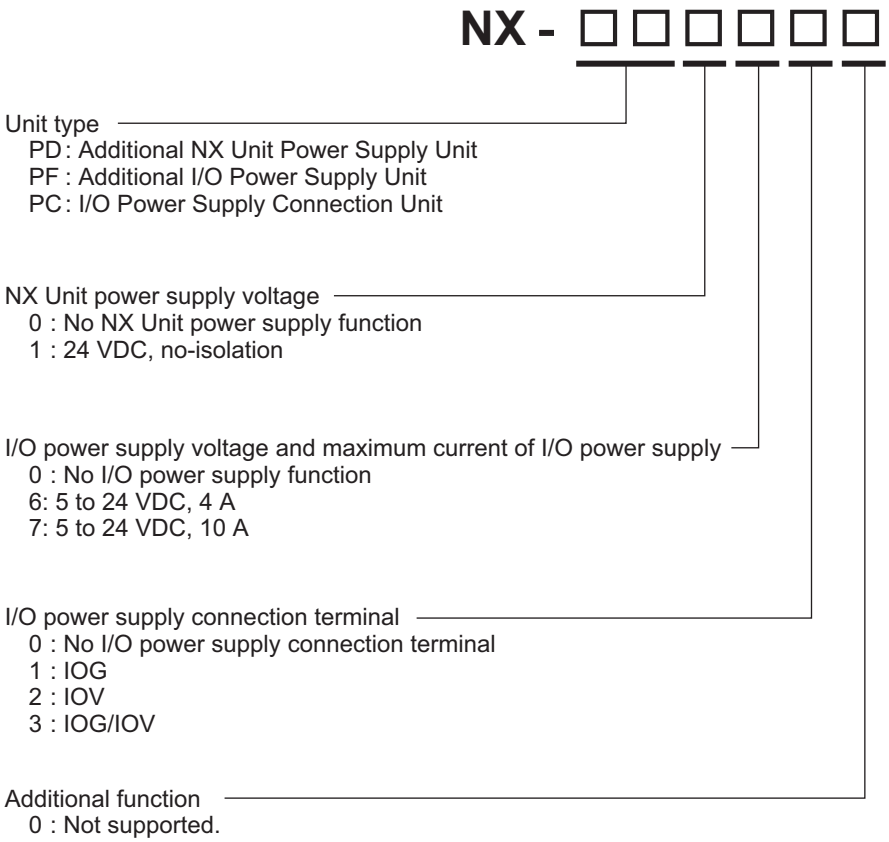
1-3 Model List

1-3-1 Model Notation

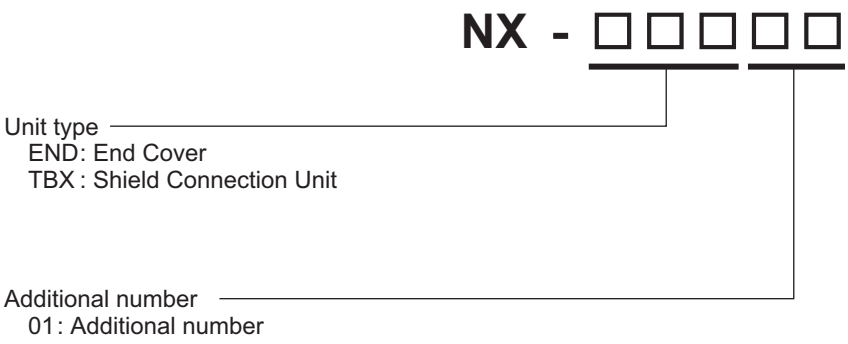
The System Unit models are assigned based on the following rules.

Model notation for the power supply-related Units (Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit and I/O Power Supply Connection Unit) differs from that of System Units other than power supply-related Units.

Power Supply-related Units



System Units Other Than Power Supply-related Units



1-3-2 Additional NX Unit Power Supply Unit

This section shows a list of Additional NX Unit Power Supply Units.

Refer to *A-1-2 Additional NX Unit Power Supply Unit* on page A-3 for details.

Screwless Clamping Terminal Block, 12 mm Width

Model	Rated power supply voltage	NX Unit power supply capacity	Reference
NX-PD1000	24 VDC	10 W max.	P. A-4

1-3-3 Additional I/O Power Supply Unit

This section shows a list of Additional I/O Power Supply Units.

Refer to *A-1-3 Additional I/O Power Supply Unit* on page A-6 for details.

Screwless Clamping Terminal Block, 12 mm Width

Model	Rated power supply voltage	Maximum current of I/O power supply	Reference
NX-PF0630	5 to 24 VDC	4 A	P. A-7
NX-PF0730	5 to 24 VDC	10 A*1	P. A-9

*1. When the Additional I/O Power Supply Unit is connected to an NX-series NX1P2 CPU Unit, the value will be 4 A max. because of the restriction on the CPU Rack system configuration.

1-3-4 I/O Power Supply Connection Unit

This section shows a list of I/O Power Supply Connection Units.

Refer to *A-1-4 I/O Power Supply Connection Unit* on page A-11 for details.

Screwless Clamping Terminal Block, 12 mm Width

Model	Number of I/O power supply terminals	Current capacity of I/O power supply terminal	Reference
NX-PC0020	IOV: 16 terminals	4 A/terminal max.	P. A-12
NX-PC0010	IOG: 16 terminals		P. A-14
NX-PC0030	IOV: 8 terminals IOG: 8 terminals		P. A-16

1-3-5 Shield Connection Unit

This section shows a list of Shield Connection Units.

Refer to *A-1-5 Shield Connection Unit* on page A-18 for details.

Screwless Clamping Terminal Block, 12 mm Width

Model	Number of shield terminals	Reference
NX-TBX01	14 terminals (The following two terminals are functional ground terminals.)	P. A-19

1-4 Support Software

The Support Software that is used depends on the system configuration.

- **Support Software for a System Configured with a CPU Unit**

  If your system is configured by connecting an NX Unit to a CPU Unit, the Sysmac Studio is used as the Support Software.

- **Support Software for a System Configured with a Slave Terminal**

  If your system is configured by connecting an NX Unit to a Communications Coupler Unit, refer to the user's manual for the Communications Coupler Unit for information on the Support Software.

Refer to *A-5 Version Information with CPU Units* on page A-26 or *A-6 Version Information with Communications Coupler Units* on page A-27 for information on the Support Software versions.

2

Specifications

This section describes the general specifications and individual specifications of System Units.

2-1 General Specifications

This table shows the general specifications of all System Units.

Item		Specification
Enclosure		Mounted in a panel
Grounding methods		Ground of 100 Ω or less
Operating environment	Ambient operating temperature	0 to 55°C
	Ambient operating humidity	10 to 95% RH (with no icing or condensation)
	Atmosphere	Must be free from corrosive gases.
	Ambient storage temperature	–25 to 70°C (with no icing or condensation)
	Altitude	2,000 m max.
	Pollution degree	Pollution degree 2 or less: Conforms to JIS B 3502 and IEC 61131-2.
	Noise immunity	Conforms to IEC 61000-4-4, 2 kV (power supply line)
	Overvoltage category	Category II: Conforms to JIS B 3502 and IEC 61131-2.
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC 60068-2-6. 5 to 8.4 Hz with amplitude of 3.5 mm, 8.4 to 150 Hz, acceleration of 9.8 m/s^2 100 min each in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance	Conforms to IEC 60068-2-27, 147 m/s^2, 3 times each in X, Y, and Z directions
	Insulation resistance	*1
	Dielectric strength	*1
Applicable standards*2		cULus: Listed (UL508), ANSI/ISA 12.12.01, EU: EN 61131-2, C-Tick, KC: KC Registration, NK, LR

*1. Varies with NX Unit Models. Refer to *A-1 Data Sheet* on page A-2 for the specifications of NX Units.

*2. Refer to the OMRON website (www.ia.omron.com) or ask your OMRON representative for the most recent applicable standards for each model.

2-2 Individual Specifications

Refer to *A-1 Data Sheet* on page A-2 for the specifications of individual System Units.

3

Part Names and Functions

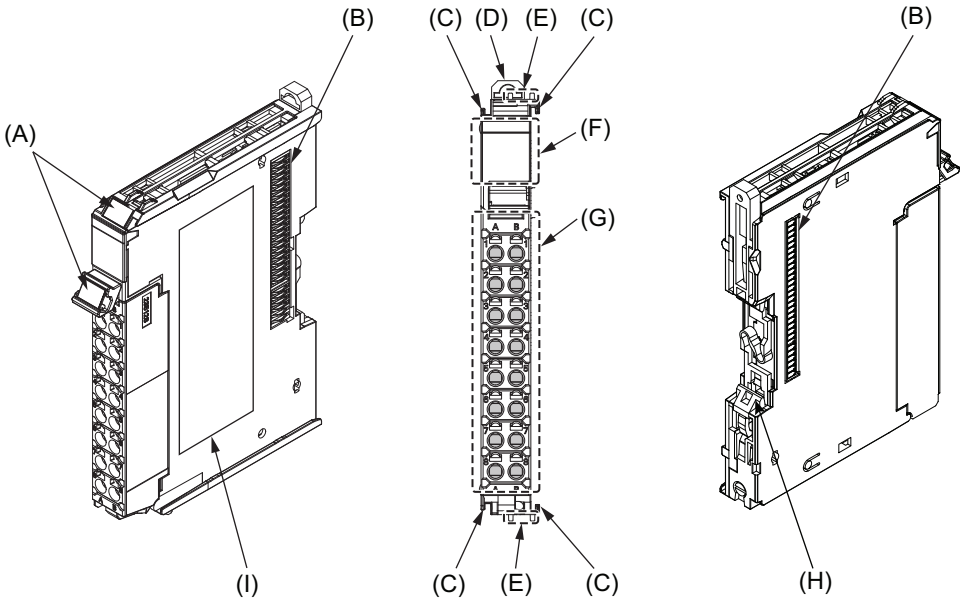
This section describes the names and functions of the System Unit parts.

3-1 Names of Power Supply-related Unit Parts

This section describes the names and functions of power supply-related Unit parts (Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit, and I/O Power Supply Connection Unit).

3-1-1 Screwless Clamping Terminal Block Type

NX Units (12 mm Width)

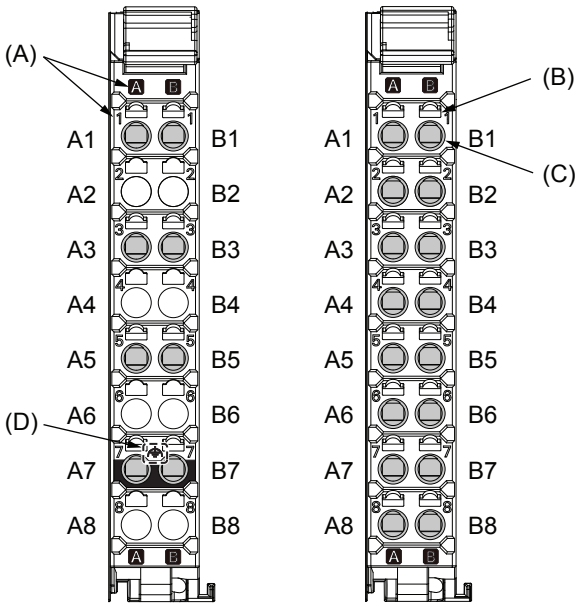


Letter	Name	Function
(A)	Marker attachment locations	The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed. Refer to *4-1-2 Attaching Markers* on page 4-4
(B)	NX bus connector	This connector is used to connect each Unit.
(C)	Unit hookup guides	These guides are used to connect two Units.
(D)	DIN Track mounting hooks	These hooks are used to mount the NX Unit to a DIN Track.
(E)	Protrusions for removing the Unit	The protrusions to hold when removing the Unit.
(F)	Indicators	The indicators show the current operating status of the Unit. Refer to *3-1-2 Indicators* on page 3-6
(G)	Terminal block	The terminal block is used to connect external devices. The number of terminals depends on the type of Unit.
(H)	DIN Track contact plate	This plate is used to contact the ground terminal with a DIN Track. It is only on the Units that have ground terminals.
(I)	Unit specifications	The specifications of the Unit are given.

Terminal Blocks

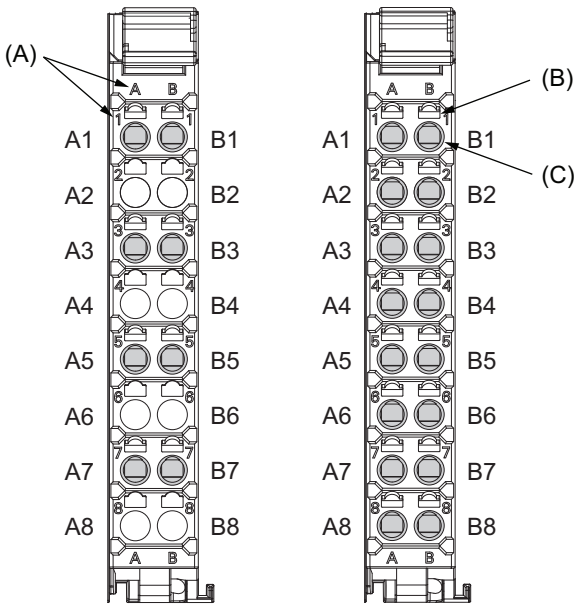
There are two models of screwless clamping terminal blocks: NX-TB□□□2 and NX-TB□□□1. Each model has three types of terminal blocks: 8-terminal type, 12-terminal type, and 16-terminal type. Use the 8-terminal type and the 16-terminal type for the power supply-related Units.

● NX-TB□□□2



8-terminal type　　16-terminal type

● NX-TB□□□1



8-terminal type　　16-terminal type

Letter	Name	Function
(A)	Terminal number indications	Terminal numbers for which A and B indicate the column, and 1 to 8 indicate the line are displayed. The terminal number is a combination of column and line, i.e. A1 to A8 and B1 to B8. The terminal number indications are the same regardless of the number of terminals on the terminal block.
(B)	Release holes	Insert a flat-blade screwdriver into these holes to connect and remove the wires.
(C)	Terminal holes	The wires are inserted into these holes.
(D)	Ground terminal mark	This mark indicates ground terminals. It is only on the NX-TBC□□2.

The NX-TB□□□2 and NX-TB□□□1 Terminal Blocks have different terminal current capacities. The NX-TB□□□2 has 10 A and NX-TB□□□1 has 4 A.

To differentiate between the two models of terminal blocks, use the terminal number column indications. The terminal block with white letters on a dark background is the NX-TB□□□2.

You can mount either NX-TB□□□1 or NX-TB□□□2 Terminal Blocks to the Units that the current capacity specification of the terminals is 4 A or less.

You can only mount the NX-TB□□□2 Terminal Block to the Units that the current capacity specification of the terminals is greater than 4 A.

Additional Information

- Each power supply-related Unit is compatible with only one of three types of terminal blocks. You cannot use a terminal block with a number of terminals that differs from the specifications for a particular Unit.
- The 8-terminal type does not have terminal holes and release holes for following terminal numbers.

  A2, A4, A6, A8, B2, B4, B6, and B8

Applicable Terminal Blocks for Each Unit Model

The following indicates the terminal blocks that are applicable to each Unit.

Unit model number	Terminal block			
	Model	Number of terminals	Ground terminal mark	Current capacity
NX-PD1000	NX-TBA081	8	Not provided	4 A
	NX-TBC082		Provided	10 A
NX-PF0630	NX-TBA081		Not provided	4 A
	NX-TBA082			10 A
NX-PF0730	NX-TBA082			
NX-PC□□□	NX-TBA161	16		4 A
	NX-TBA162			10 A

Precautions for Correct Use

You can mount either NX-TB□□□1 or NX-TB□□□2 Terminal Blocks to the Units that the current capacity specification of the terminals is 4 A or less.

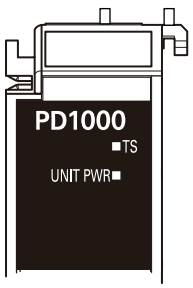
However, even if you mount the NX-TB□□□2 Terminal Block, the current specification does not change because the current capacity specification of the terminals on the Units is 4 A or less.

Refer to *A-4 List of Screwless Clamping Terminal Block Models* on page A-25 for information on the models of terminal blocks.

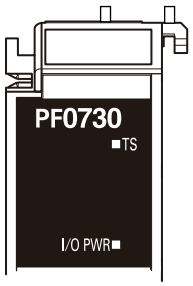
3-1-2 Indicators

There are the indicators to show the current operating status of the NX Unit on the Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit, and I/O Power Supply Connection Unit.

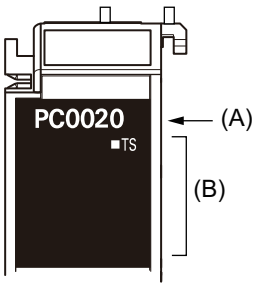
The following indicator patterns are available depending on the Unit types.



Additional NX Unit Power Supply Unit



Additional I/O Power Supply Unit

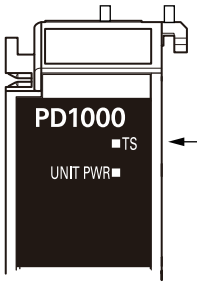


I/O Power Supply Connection Unit

Letter	Name	Function
(A)	Model number indications	The model numbers of the NX Unit are displayed. Example: "PD1000" in the case of NX-PD1000
(B)	Indicators	The indicator shows the current operating status of the NX Unit.

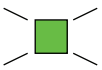
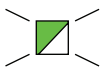
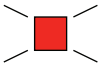
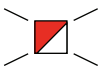
The following section describes the specifications of each indicator.

TS Indicator



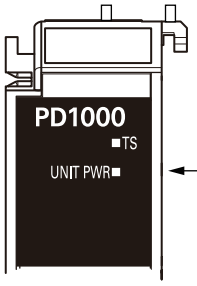
This indicator shows the current status of the Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit, or I/O Power Supply Connection Unit and its communications status with the CPU Unit or Communications Coupler Unit.

The meanings of light statuses are described as follows:

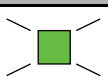
Color	Status		Description
Green		Lit	The Unit is operating normally. The Unit is ready for I/O refreshing.
		Flashing at 2-s intervals.	• Initializing • Restarting is in progress for the Unit. • Downloading
Red		Lit	A hardware failure, WDT error, or other fatal error that is common to all I/O Units occurred.
		Flashing at 1-s intervals.	A communications error or other NX bus-related error that is common to all I/O Units occurred.
---		Not lit	• No Unit power supply • Restarting is in progress for the Unit. • Waiting for initialization to start

UNIT PWR Indicator

This is mounted only on an Additional NX Unit Power Supply Unit.

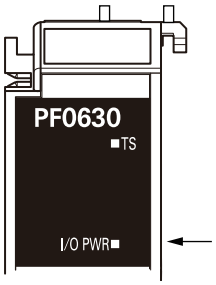


This indicator shows the NX Unit power status of an Additional NX Unit Power Supply Unit.

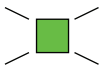
Color	Status		Description
Green		Lit	The Unit power is supplied.
		Not lit	The Unit power is not supplied.

● I/O PWR Indicator

This is mounted only on the Additional I/O Power Supply Unit.



This indicator shows the I/O power supply status of an Additional I/O Power Supply Unit.

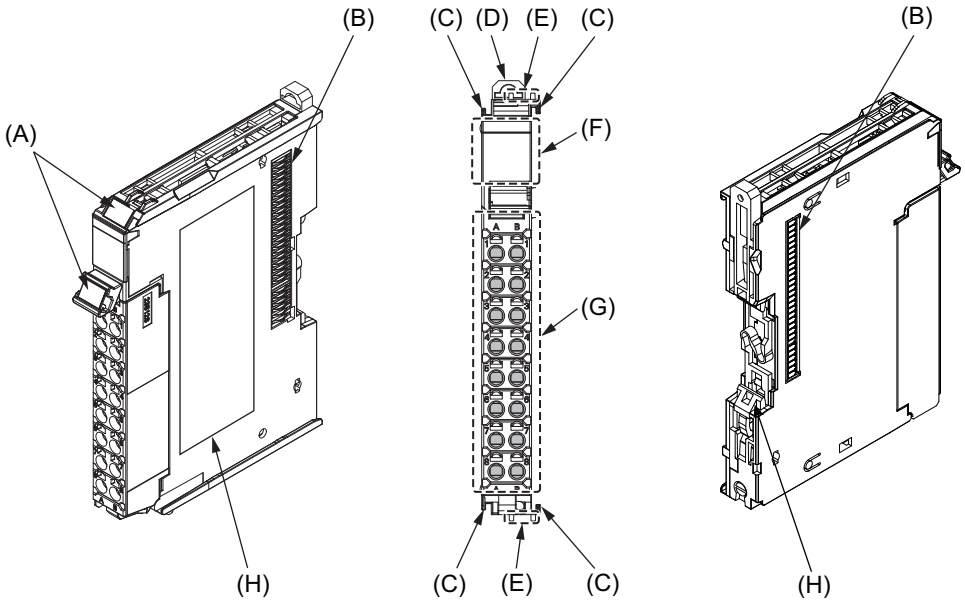
Color	Status		Description
Green		Lit	The I/O power is supplied.
		Not lit	The I/O power is not supplied.

3-2 Names of Shield Connection Unit Parts

This section describes the names and functions of the Shield Connection Unit parts.

3-2-1 Screwless Clamping Terminal Block Type

NX Units (12 mm Width)

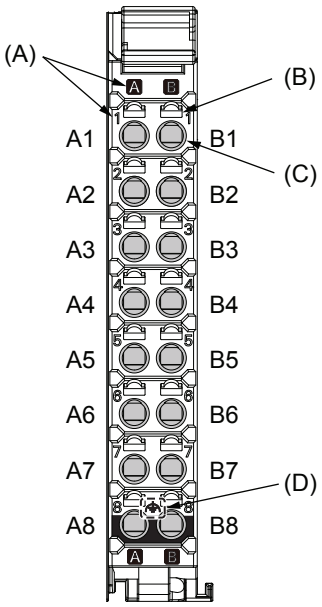


Letter	Name	Function
(A)	Marker attachment locations	The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed. Refer to *4-1-2 Attaching Markers* on page 4-4
(B)	NX bus connector	This connector is used to connect each Unit.
(C)	Unit hookup guides	These guides are used to connect two Units.
(D)	DIN Track mounting hooks	These hooks are used to mount the NX Unit to a DIN Track.
(E)	Protrusions for removing the Unit	The protrusions to hold when removing the Unit.
(F)	Indicators	The indicators show the current operating status of the Unit. Refer to *3-2-2 Indicators* on page 3-12
(G)	Terminal block	The terminal block is used to connect external devices. The number of terminals depends on the type of Unit.
(H)	DIN Track contact plate	This plate is used to contact the ground terminal with a DIN Track. It is only on the Units that have ground terminals.
(I)	Unit specifications	The specifications of the Unit are given.

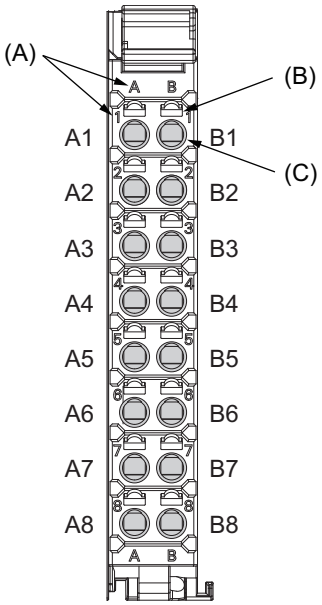
Terminal Blocks

There are two models of screwless clamping terminal blocks: NX-TB□□□2 and NX-TB□□□1. Each model has three types of terminal blocks: 8-terminal type, 12-terminal type, and 16-terminal type. Use the 16-terminal type for the Shield Connection Unit.

● NX-TBC162



● NX-TBA161



Letter	Name	Description
(A)	Terminal number indications	Terminal numbers for which A and B indicate the column, and 1 to 8 indicate the line are displayed. The terminal number is a combination of column and line, i.e. A1 to A8 and B1 to B8.
(B)	Release holes	Insert a flat-blade screwdriver into these holes to connect and remove the wires.
(C)	Terminal holes	The wires are inserted into these holes.
(D)	Ground terminal mark	This mark indicates ground terminals. It is only on the NX-TBC□□2.

The NX-TB□□□2 and NX-TB□□□1 Terminal Blocks have different terminal current capacities. The NX-TB□□□2 has 10 A and NX-TB□□□1 has 4 A.

To differentiate between the two models of terminal blocks, use the terminal number column indications. The terminal block with white letters on a dark background is the NX-TB□□□2.

You can mount either NX-TB□□□1 or NX-TB□□□2 Terminal Blocks to the Shield Connection Unit.

Additional Information

The Shield Connection Unit is only compatible with the 16-terminal type. You cannot use a terminal block with a different number of terminals.

Applicable Terminal Blocks for Each Unit Model

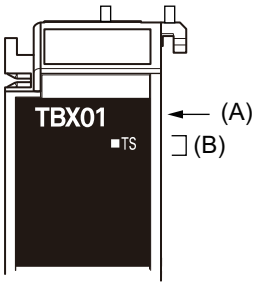
The following indicates the terminal blocks that are applicable to each Unit.

Unit model number	Terminal block			
	Model	Number of terminals	Ground terminal mark	Current capacity
NX-TBX01	NX-TBA161	16	Not provided	4 A
	NX-TBC162		Provided	10 A

Refer to *A-4 List of Screwless Clamping Terminal Block Models* on page A-25 for information on the models of terminal blocks.

3-2-2 Indicators

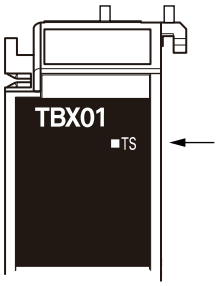
There are the indicators to show the current operating status of the NX Unit on the Shield Connection Unit.



Letter	Name	Description
(A)	Model number indications	The model numbers of the NX Unit are displayed. Example: "TBX01" in the case of NX-TBX01
(B)	TS indicator	The indicator shows the current operating status of the NX Unit.

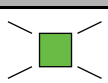
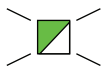
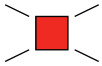
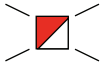
The following section describes the specifications of the TS indicator.

● TS Indicator



This indicator shows the current status of the Shield Connection Unit and its communications status with the CPU Unit or Communications Coupler Unit.

The meanings of light statuses are described as follows:

Color	Status		Description
Green		Lit	The Unit is operating normally. The Unit is ready for I/O refreshing.
		Flashing at 2-s intervals.	• Initializing • Restarting is in progress for the Unit. • Downloading
Red		Lit	A hardware failure, WDT error, or other fatal error that is common to all I/O Units occurred.
		Flashing at 1-s intervals.	A communications error or other NX bus-related error that is common to all I/O Units occurred.
---		Not lit	• No Unit power supply • Restarting is in progress for the Unit. • Waiting for initialization to start

4

Installation and Wiring

This section describes how to install the NX Units, the types of power supplies used in the CPU Rack or Slave Terminal, their wiring methods, and how to wire the NX Units.

4-1 Installing NX Units

This section describes how to install NX Units.

Refer to the user's manual for the CPU Unit or Communications Coupler Unit to which NX Units are connected for information on preparations of installation and installation in a control panel.

4-1-1 Installing NX Units

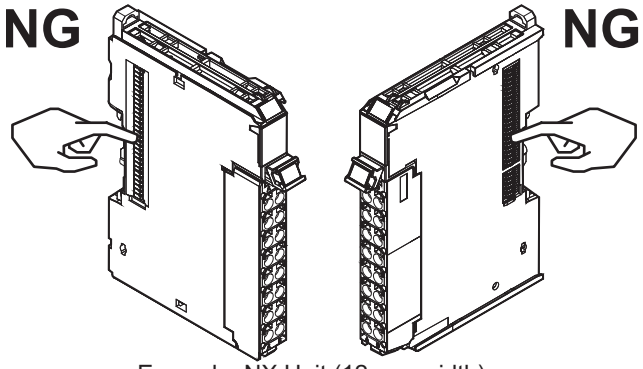
This section describes how to mount two NX Units to each other.

Always turn OFF the power supply before you mount NX Units.

Always mount NX Units one at a time. If you attempt to mount multiple NX Units that are already connected together, the connections between the NX Units may separate from each other and fall.

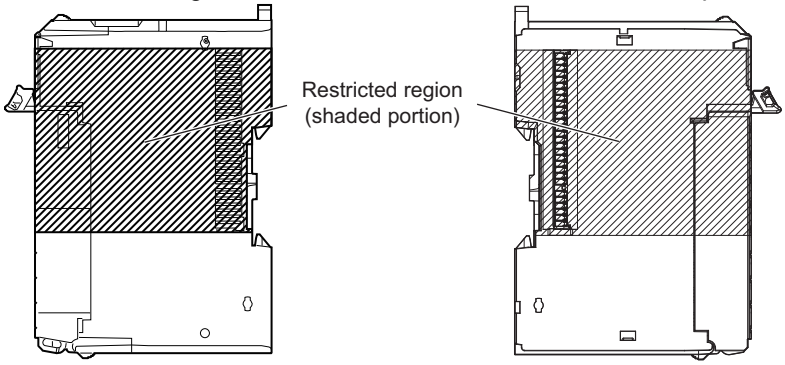
Precautions for Safe Use

- Do not apply labels or tape on the NX Units. When the Unit is installed or removed, adhesive or scrap may adhere to the pins of the NX bus connector, which may cause malfunctions.
- Do not touch the pins in the NX bus connector on the Unit. Dirt may adhere to the pins in the NX bus connector, which may result in malfunctions.



Example: NX Unit (12 mm width)

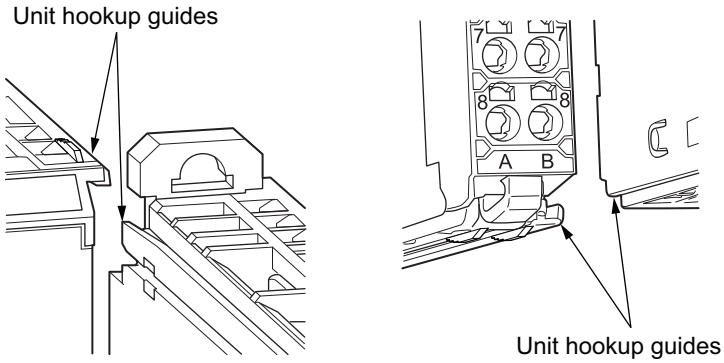
- Do not write on an NX Unit with ink within the restricted region that is shown in the following figure. When the Unit is installed or removed, ink or dirt may adhere to the pins of the NX bus connector, which may cause malfunctions in the CPU Rack or Slave Terminal.
  Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for the restricted region of CPU Unit and Communications Coupler Unit.



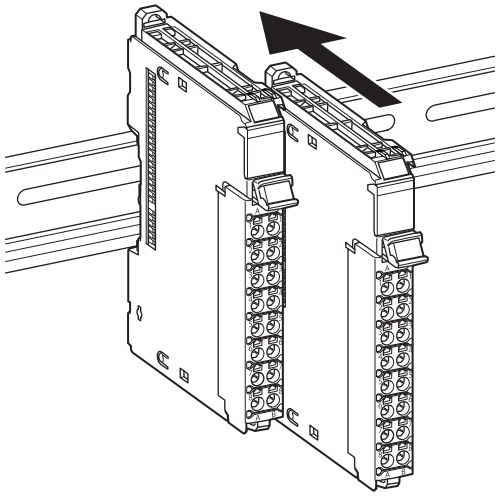
Precautions for Correct Use

- When you install an NX Unit, do not touch or bump the pins in the NX bus connector.
- When you handle an NX Unit, be careful not to apply any stress to the pins in the NX bus connector. If you install an NX Unit and turns ON the power supply when the pins in the NX bus connector are deformed, a contact defect may cause malfunctions.

1 From the front of the previously mounted NX Unit, engage the Unit hookup guides on a new Unit with the Unit hookup guides on the previously mounted NX Unit.



2 Slide the NX Unit in on the hookup guides.



3 Press the NX Unit with a certain amount of force against the DIN Track until you hear the DIN Track mounting hook lock into place.

When you mount the NX Unit, it is not necessary to release the DIN track mounting hook on the NX Unit.

After you mount the NX Unit, make sure that it is locked to the DIN Track.

Additional Information

- Normally, it is not necessary to release the DIN track mounting hook when you mount the NX Unit. However, if you mount the NX Unit on a DIN Track that is not a recommended DIN Track, the DIN track mounting hook may not lock correctly. If that happens, first unlock the DIN track mounting hook, mount the NX Unit to the DIN Track, then lock the DIN track mounting hook.
- Refer to the user's manual for the CPU Unit to which NX Units can be connected for information on how to mount the CPU Unit, and how to mount NX Units to the CPU Unit.
- Refer to the user's manual for the Communications Coupler Unit for information on how to mount the Communications Coupler Unit, and how to mount the NX Unit to the Communications Coupler Unit.

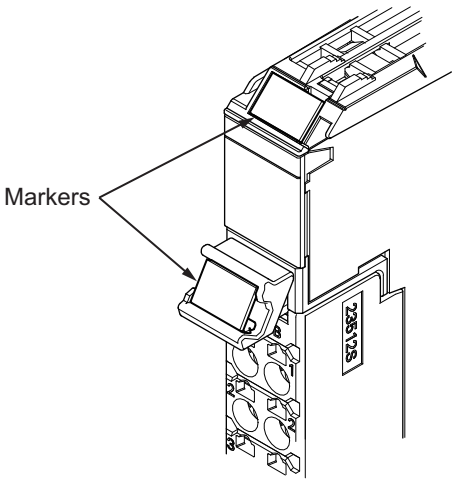
4-1-2 Attaching Markers

Markers can be attached to the NX Units and terminal blocks on NX Units to identify them.

The plastic markers made by OMRON are installed for the factory setting. The ID information can be written on them.

Commercially available markers can also be installed.

Replace the markers made by OMRON if you use commercially available markers now.

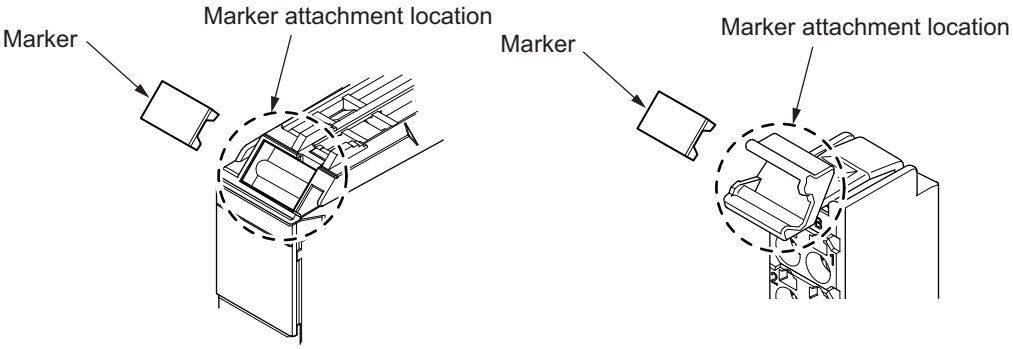


The marker attachment locations on the NX Units depend on the type of external connection terminals.

Refer to the user’s manual for the NX Units that you will use for the marker attachment locations.

Installation Method

Insert the protrusions on the markers into the marker attachment locations on the NX Units and terminal blocks on NX Units.



<NX Unit> <Terminal block>

Commercially Available Markers

Commercially available markers are made of plastic and can be printed on with a special printer.

To use commercially available markers, purchase the following products.

Product name	Model number	
	Manufactured by Phoenix Contact	Manufactured by Weidmuller
Markers	UC1-TMF8	DEK 5/8
Special marker printer	UM EN BLUEMARK X1	PrintJet PRO

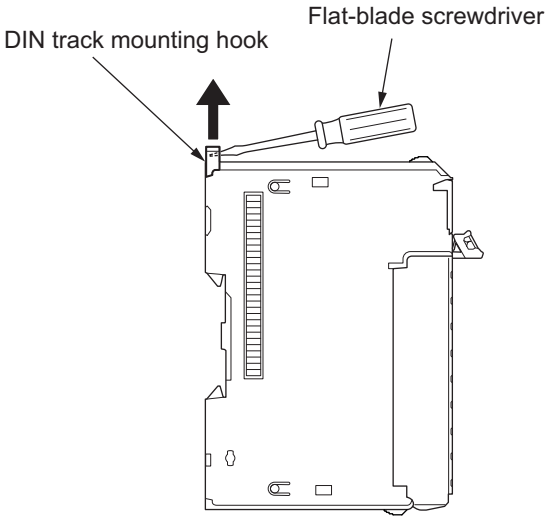
The markers made by OMRON cannot be printed on with commercially available special printers.

4-1-3 Removing NX Units

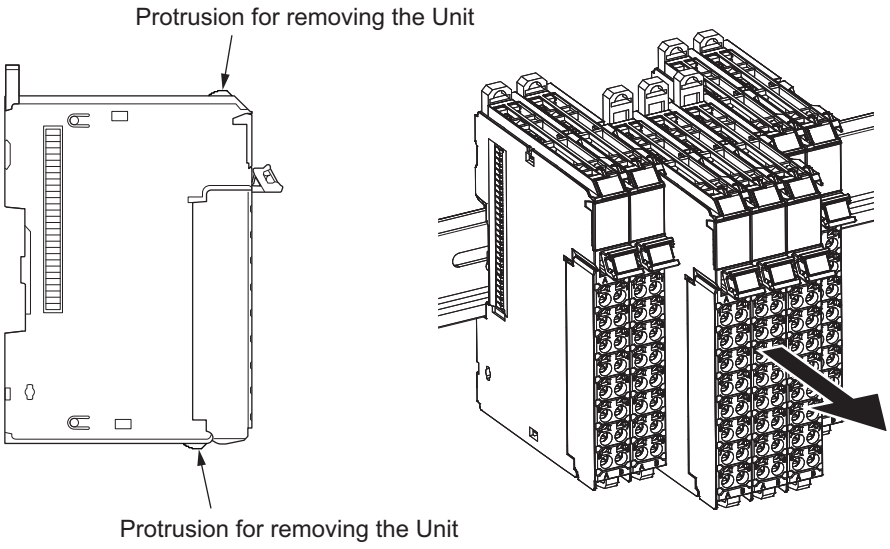
Precautions for Safe Use

Always turn OFF the Unit power supply and I/O power supply before you remove the NX Unit.

1 Use a flat-blade screwdriver to pull up the DIN Track mounting hook on the Unit to remove.



2 Put your fingers on the protrusions for removing multiple NX Units including the Unit to be removed, then pull out straight forward to remove.



Precautions for Correct Use

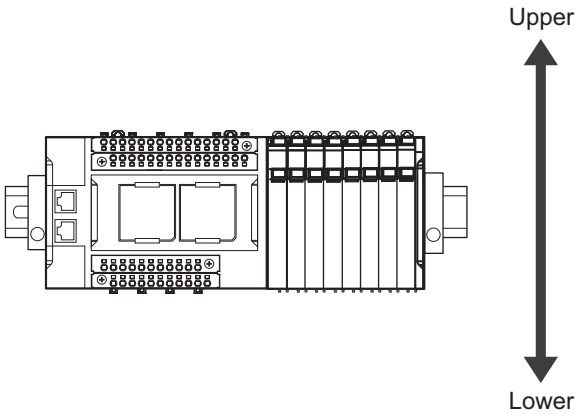
- When removing an NX Unit, remove multiple Units together which include the one you want to remove. If you attempt to remove only one Unit, it is stuck and hard to pull out.
- Do not unlock the DIN track mounting hooks on all of the NX Units at the same time. If you unlock the DIN Track mounting hooks on all of the NX Units at the same time, all of the Units may come off.

4-1-4 Installation Orientation

The following explains the installation orientation for each NX Unit connection destination.

Installation Orientation in the Case of a CPU Unit

Orientation is possible only in the upright installation orientation.



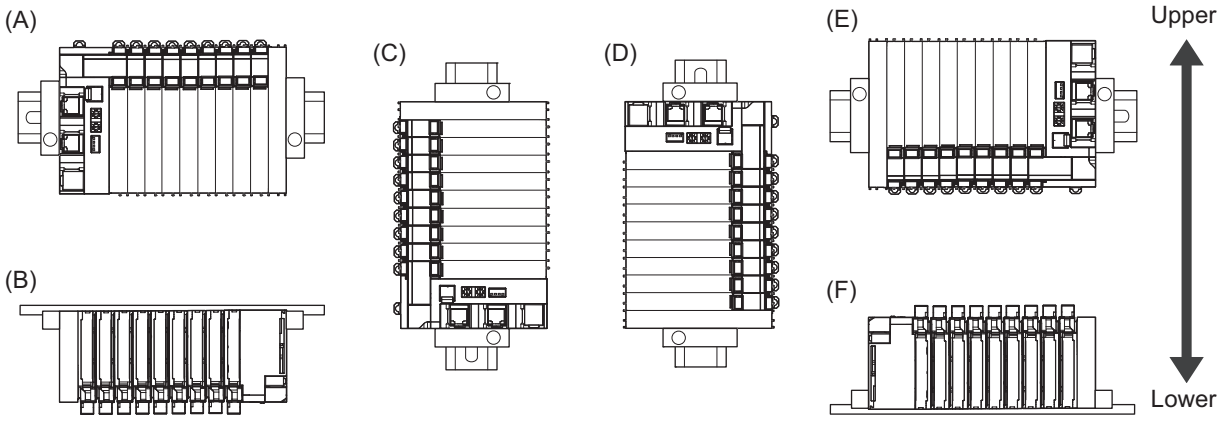
However, there are restrictions on the specifications depending on the NX Units to be used.

Refer to the user's manuals for the NX Units and System Units that you will use for details on restrictions.

Installation Orientation in the Case of a Slave Terminal

Orientation is possible in the following six directions.

(A) is the upright orientation and (B) to (F) are other orientations.



However, there are restrictions on the installation orientation and restrictions to specifications that can result from the Communications Coupler Units and NX Units that are used.

Refer to the user's manuals for the Communications Coupler Units, NX Units and System Units that you will use for details on restrictions.

Precautions for Safe Use

For installation orientations (C) and (D) in the above figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables.The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured to the DIN Track, which may cause malfunctions.

4-2 Wiring the Power Supply to the CPU Unit

This section describes the methods of power supplying and wiring with NX Unit in a CPU Rack when connecting NX Unit with NX-series NX1P2 CPU Unit.

4-2-1 Power Supply Types

There are the following two types of power supplies that supply power to the CPU Rack of the NX1P2 CPU Units.

I/O power supply is also required to drive the built-in I/O output circuit. However, only the supply to the NX Unit is described in this section.

For the I/O power supply to the built-in I/O, refer to the hardware user's manual for the CPU Unit to which NX Units are connected.

Power supply name	Description
Unit power supply	This is the power supply for generating the internal power supply required for the CPU Rack to operate. This power supply is connected to the Unit power supply terminals on the CPU Unit. From the Unit power supply, the internal power supply circuit in the CPU Unit generates the internal circuit power supply, Option Board power supply and NX Unit power supply. The internal circuits of the NX Unit operates on the NX Unit power supply. The NX Unit power supply is supplied to the NX Units in the CPU Rack through the NX bus connectors.
I/O power supply	This power supply is used for driving the I/O circuits of the NX Units and for the connected external devices. There are the following two I/O power supply methods. Either supply method used depends on each model of NX Unit. • Supply from the NX bus • Supply from external source Refer to *4-2-2 Supplying Each Power Supply and Wiring* on page 4-9 for the details on the power supply methods.

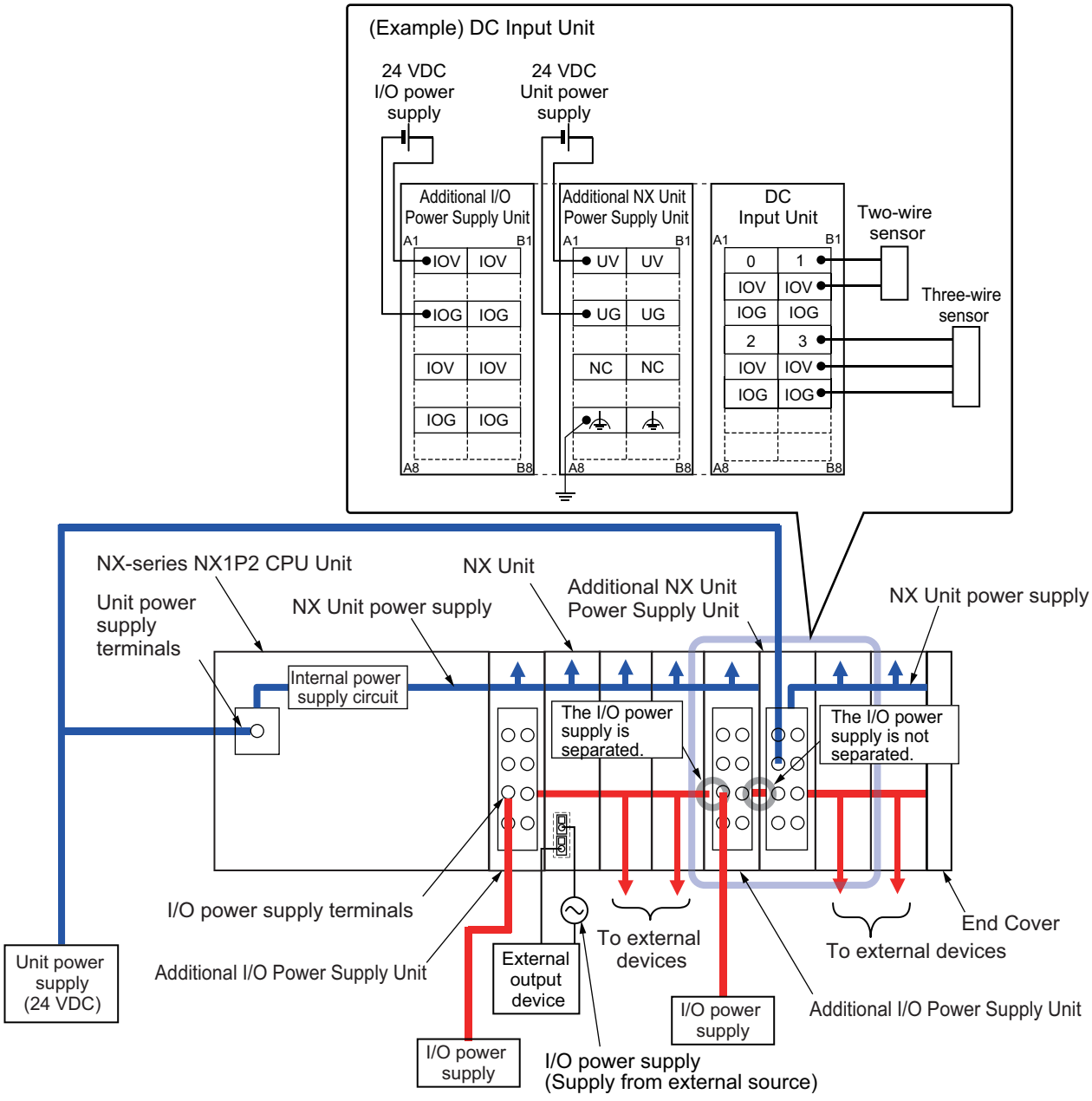
4-2-2 Supplying Each Power Supply and Wiring

The supply method for each power supply to the NX Units is as follows.

Power supply name	Description
NX Unit power supply	This power is supplied to the NX Units through the NX bus connectors by connecting a Unit power supply to the Unit power supply terminals on the CPU Unit or Additional NX Unit Power Supply Units.

Power supply name	Description
I/O power supply	This power is supplied by one of the following two methods. • Supply from the NX bus This power is supplied through the NX bus connectors by connecting an I/O power supply to the I/O power supply terminals on the Additional I/O Power Supply Units. • Supply from external source This power is supplied to the Units from an external source. I/O power is supplied by connecting an I/O power supply to the I/O power supply terminals on the Units. Refer to data sheet of the user's manual for the supply methods that you will use for each NX Unit models. Refer to *A-1 Data Sheet* on page A-2 for the supply method for each System Unit model.

The following are wiring diagrams (examples) for each power supply.



Precautions for Correct Use

Always use separate power supplies for the Unit power supply and the I/O power supply. If you supply power from the same power supply, noise may cause malfunctions.

Additional Information

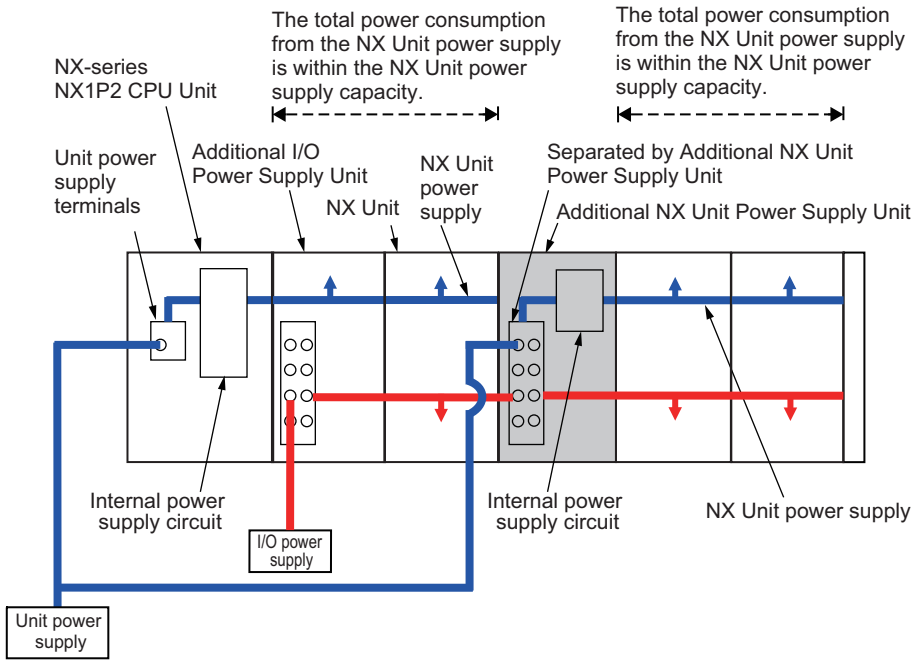
Refer to the hardware user's manual for the CPU Unit to which Units are connected for information on the designing of the power supply for the CPU Rack.

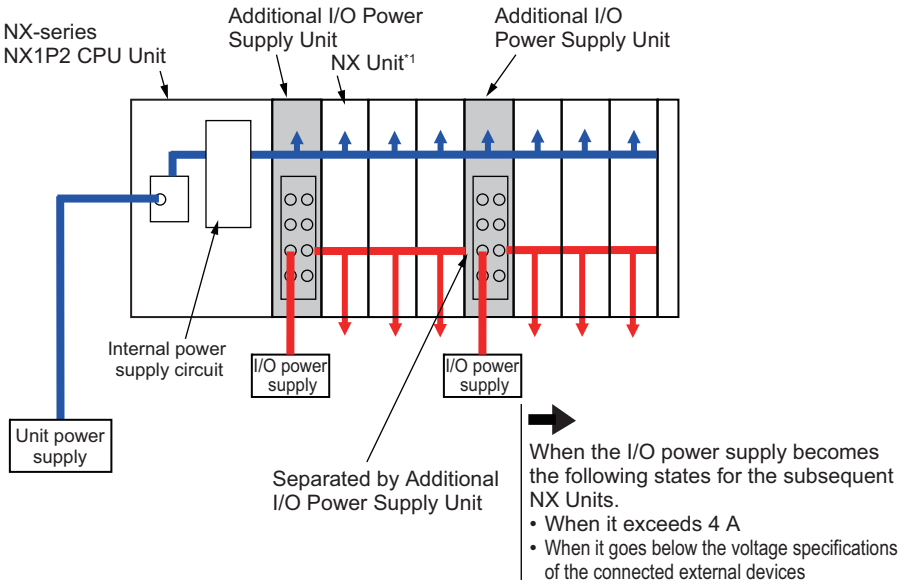
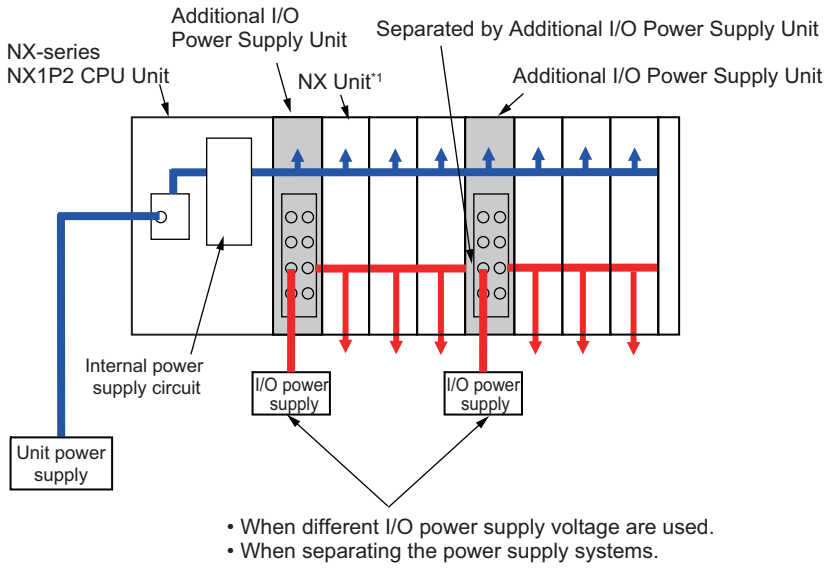
4-2-3 Power Supply-related Units and Wiring Methods

The CPU Unit supplies the NX Unit power to the NX Units in the CPU Rack.

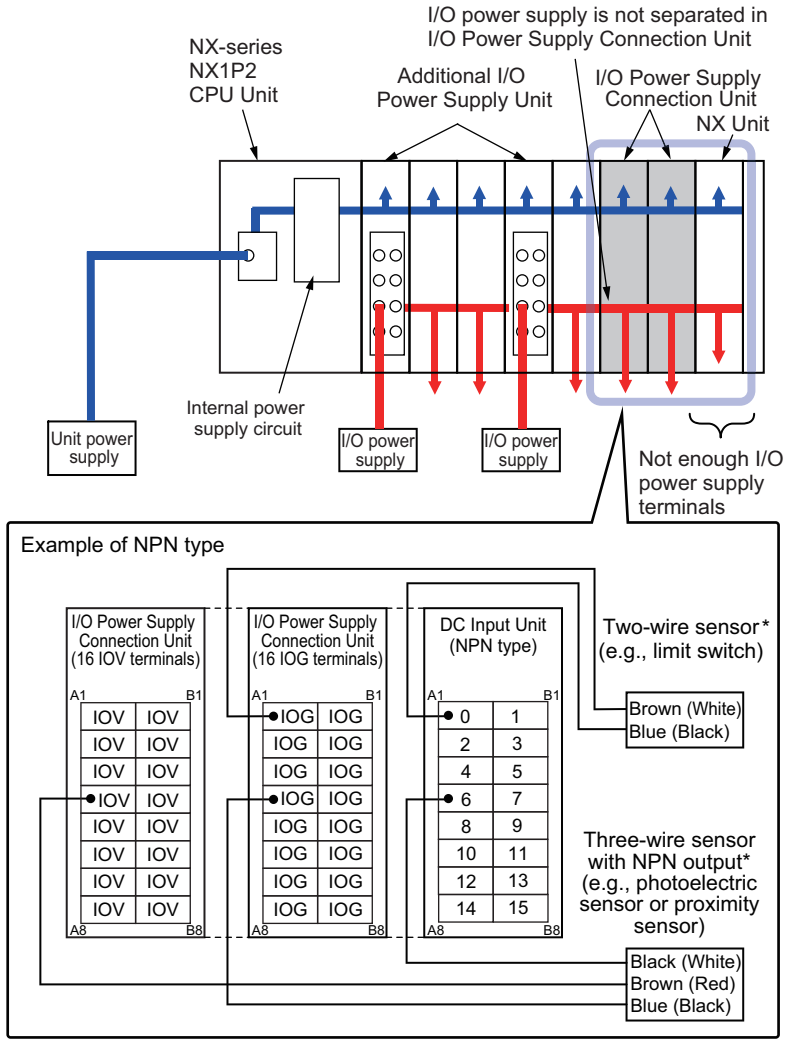
There are the following types of NX-series power supply-related Units other than CPU Unit.

Refer to NX-series catalogs or OMRON websites, or ask your OMRON representative for information on the most recent lineup of NX Units.

Unit name	Function
Additional NX Unit Power Supply Unit	This NX Unit provides NX Unit power supply. This NX Unit is used when the total power consumption of the NX Units in the CPU Rack exceeds the NX Unit power supply capacity of the CPU Unit.  The I/O power supply for the Additional NX Unit Power Supply Unit is connected to the NX Unit on the left through the NX bus connector.

Unit name	Function
Additional I/O Power Supply Unit	This NX Unit provides additional I/O power supply. This Unit is used when the I/O power supply for the NX Unit connected to the CPU Unit is supplied through the NX bus. Additionally use this NX Unit in the following cases. (a) When the I/O power supply capacity is insufficient • When the total current consumption for the I/O power supply exceeds 4 A • When a voltage drop in the I/O power supply causes the voltage of the I/O power supply to go below the voltage specifications of the I/O circuits or connected external devices (b) Separating the I/O power supply • When connected external devices have different I/O power supply voltages Case (a)  *1. The NX Unit to which I/O power is supplied from the NX bus Case (b)  *1. The NX Unit to which I/O power is supplied from the NX bus The NX Unit power supply of the Additional I/O Power Supply Unit is connected to the NX Unit on the left through the NX bus connector.

Unit name	Function
I/O Power Supply Connection Unit	This NX Unit is used when there are not enough I/O power supply terminals for the connected external devices that are connected to NX Units such as Digital I/O Units and Analog I/O Units.



* Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

4-3 Wiring the Power Supply to the Slave Terminal

This section describes how to supply power to the Slave Terminal and wiring.

4-3-1 Power Supply Types

There are the following two types of power supplies that supply power to the Slave Terminal.

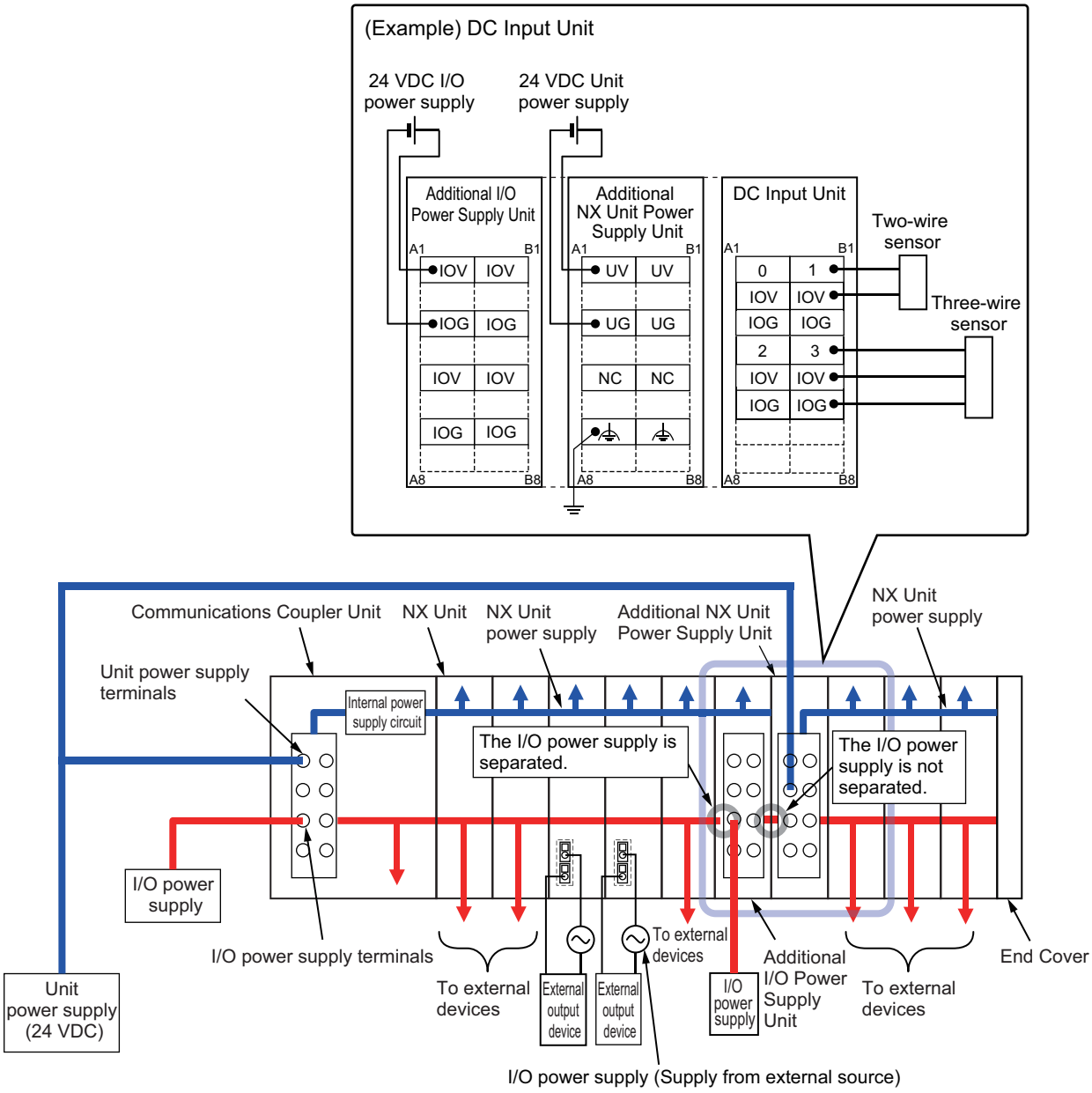
Power supply name	Description
Unit power supply	This is the power supply for generating the NX Unit power supply required for the Slave Terminal to operate. This is connected to the Unit power supply terminal on the Communications Coupler Unit or on the Additional NX Unit Power Supply Unit. The internal power supply circuit in the Communications Coupler Unit or the Additional NX Unit Power Supply Unit generates the NX Unit power supply from the Unit power supply. The internal circuits of the Communications Coupler Unit and NX Units operate by the NX Unit power supply. The NX Unit power supply is supplied to the NX Units in the Slave Terminal through the NX bus connectors.
I/O power supply	This power supply provides power to drive the I/O circuits of the Position Interface Units and it provides power to external devices such as external encoders and sensors. There are the following two I/O power supply methods. Either supply method used depends on each model of NX Unit. • Supply from the NX bus • Supply from external source Refer to *4-3-2 Supplying Each Power Supply and Wiring* on page 4-15 for the details on the power supply methods.

4-3-2 Supplying Each Power Supply and Wiring

The supply method for each power supply to the NX Units is as follows.

Power supply name	Description
NX Unit power supply	This power is supplied to the NX Units through the NX bus connectors by connecting a Unit power supply to the Unit power supply terminals on the Communications Coupler Unit or Additional NX Unit Power Supply Units.
I/O power supply	This power is supplied by one of the following two methods. • Supply from the NX bus This power is supplied through the NX bus connectors by connecting an I/O power supply to the I/O power supply terminals on the Communications Coupler Unit or Additional I/O Power Supply Units. • Supply from external source This power is supplied to the Units from an external source. I/O power is supplied by connecting an I/O power supply to the I/O power supply terminals on the Units. Refer to data sheet of the user's manual for the supply methods that you will use for each NX Unit models. Refer to *A-1 Data Sheet* on page A-2 for the supply method for each System Unit model.

The following are wiring diagrams (examples) for each power supply.



Precautions for Correct Use

Always use separate power supplies for the Unit power supply and the I/O power supply. If you supply power from the same power supply, noise may cause malfunctions.

Additional Information

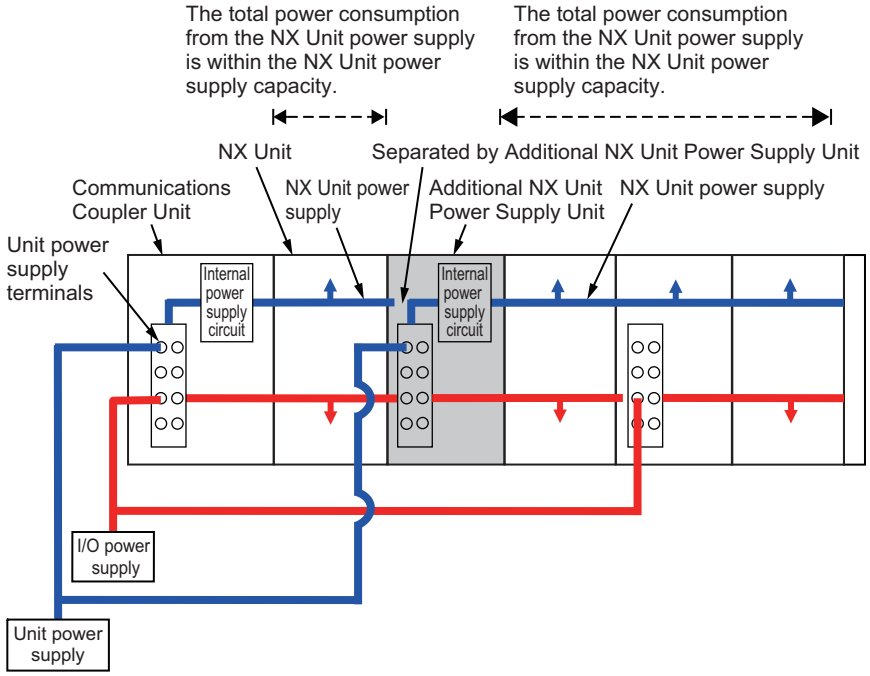
Refer to the user's manual for the Communications Coupler Unit on design for power supply to the Slave Terminal.

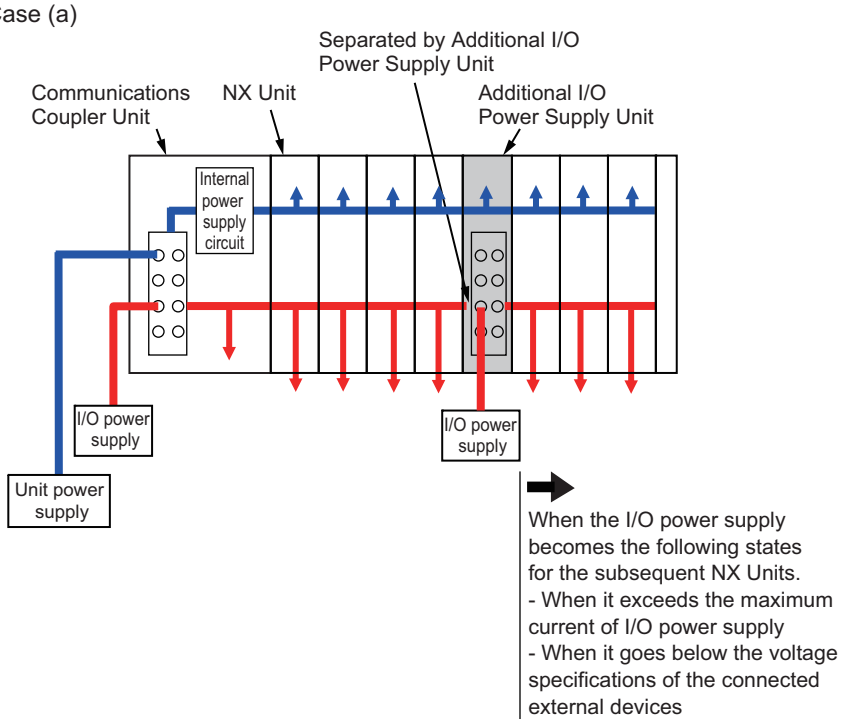
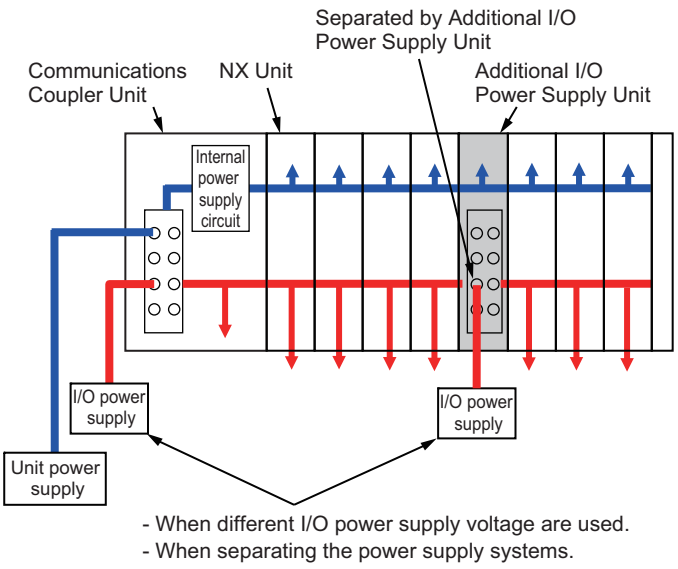
4-3-3 Power Supply-related Units and Wiring Methods

A Communications Coupler Unit supplies the NX Unit power supply and I/O power supply to the NX Units in the Slave Terminal.

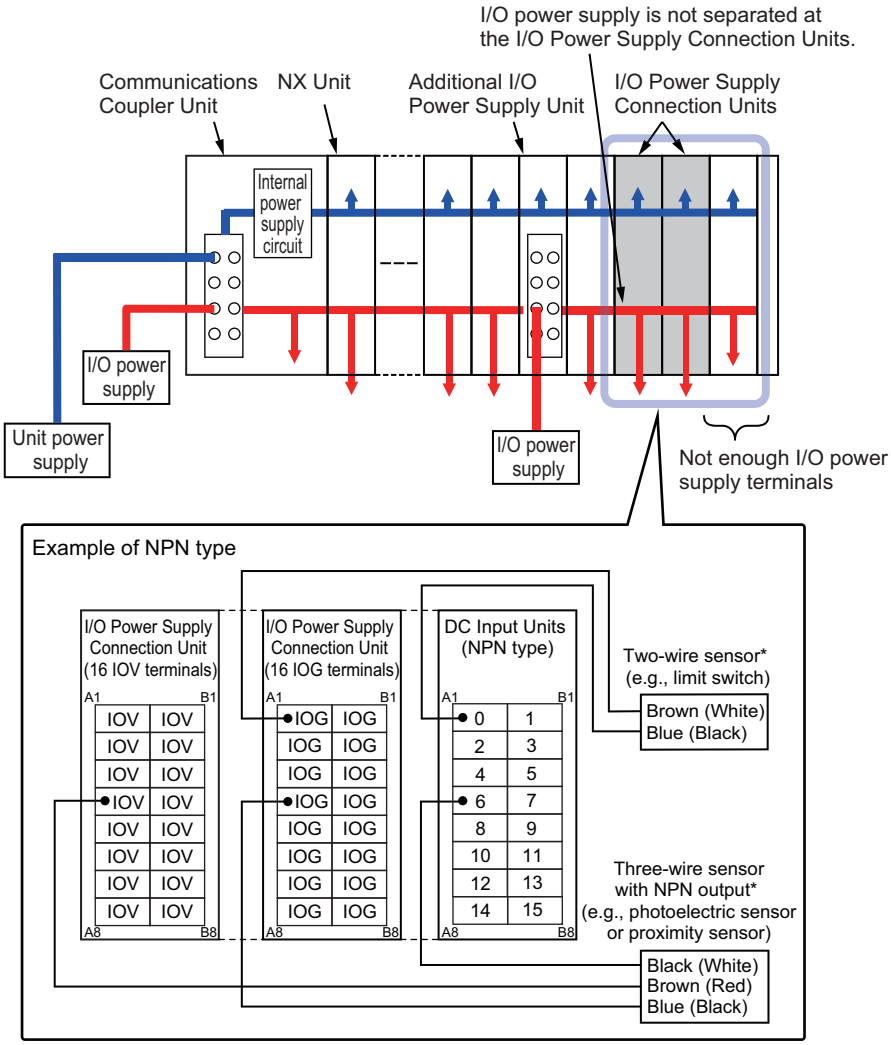
There are the following types of NX-series power supply-related Units other than Communications Coupler Unit.

Refer to NX-series catalogs or OMRON websites, or ask your OMRON representative for information on the most recent lineup of NX Units.

Unit name	Function
Additional NX Unit Power Supply Unit	This NX Unit provides NX Unit power supply. This NX Unit is used when the total power consumption of the NX Units in the Slave Terminal exceeds the NX Unit power supply capacity of the Communications Coupler Unit.  The I/O power supply for the Additional NX Unit Power Supply Unit is connected to the NX Unit on the left through the NX bus connector.

Unit name	Function
Additional I/O Power Supply Unit	This NX Unit provides additional I/O power supply. Use this NX Unit in the following cases. (a) When the I/O power supply capacity is insufficient • When the total current consumption for the I/O power supply exceeds the maximum current of I/O power supply of the Communications Coupler Unit • When a voltage drop in the I/O power supply causes the voltage of the I/O power supply to go below the voltage specifications of the I/O circuits or connected external devices (b) Separating the I/O power supply • When connected external devices have different I/O power supply voltages • When separating the power supply systems Case (a)  Case (b)  The NX Unit power supply of the Additional I/O Power Supply Unit is connected to the NX Unit on the left through the NX bus connector.

Unit name	Function
I/O Power Supply Connection Unit	This NX Unit is used when there are not enough I/O power supply terminals for the connected external devices that are connected to NX Units such as Digital I/O Units and Analog I/O Units.



* Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

4-4 Wiring of Grounding

This section describes how to ground the CPU Rack and the Slave Terminal.

Units with Functional Ground Terminals in CPU Rack

Some of the Units in a CPU Rack of the NX-series NX1P2 CPU Unit have the following functional ground terminals.

- CPU Unit
- Additional NX Unit Power Supply Unit
- Shield Connection Unit

Additional Information

A Shield Connection Unit is used to connect the shield when connecting to external input devices. You can ground more than one shield to the same ground pole to reduce the amount of wiring work for grounding.

Refer to the hardware user's manual for the connected CPU Unit for the details on the ground terminals for the CPU Rack.

Units with Functional Ground Terminals in Slave Terminal

Some of the NX Units in a Slave Terminal have the following functional ground terminals.

- Communications Coupler Unit
- Additional NX Unit Power Supply Unit
- Shield Connection Unit

Additional Information

A Shield Connection Unit is used to connect the shield when connecting to external input devices. You can ground more than one shield to the same ground pole to reduce the amount of wiring work for grounding.

Refer to the user's manual for the connected Communications Coupler Unit for details on grounding the Slave Terminal.

4-5 Wiring the Additional Power Supply Units

This section describes how to wire the terminals on the Additional Power Supply Units.

⚠ WARNING

Make sure that the voltages and currents that are input to the Units and slaves are within the specified ranges.

Inputting voltages or currents that are outside of the specified ranges may cause accidents or fire.

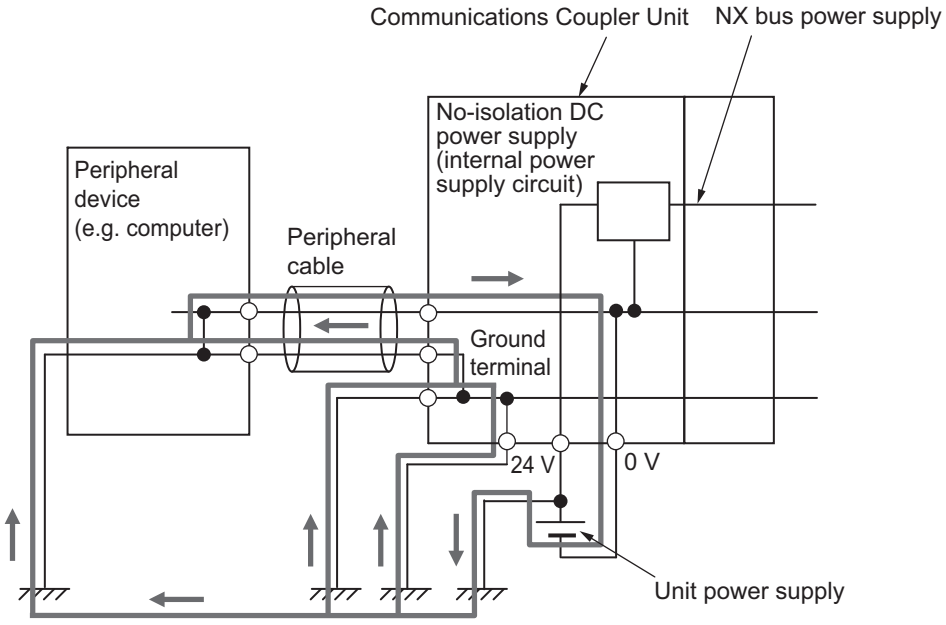
⚠ Caution

When you connect a computer or other peripheral device to any of the following NX Units, ground the 0 V side of an external power supply (Unit power supply) or do not ground it at all.

- Communications Coupler Unit with non-isolated type internal power supply circuits
- Communications Coupler Unit that is connected to a non-isolated type Additional NX Unit Power Supply Unit

Depending on how the peripheral device is grounded, the external power supply (Unit power supply) may be shorted. Never ground the 24 V side of the power supply as shown in the figure below.

<Grounding that causes a 24-V power supply to short>



4-5-1 Wiring the Additional NX Unit Power Supply Unit

This section describes how to wire Additional NX Unit Power Supply Unit.

Wiring Terminals

- Unit power supply terminals
- Functional ground terminals

Wiring Examples

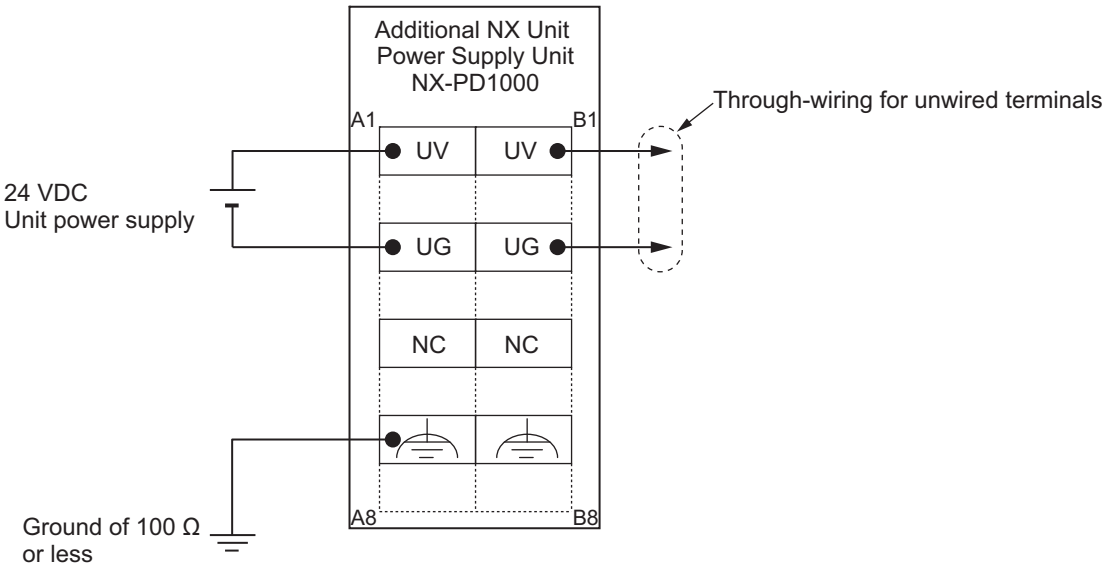
The Unit power supply is connected to the Unit power supply terminal (UV/UG).

You can use the unwired terminals of the Unit power supply terminals for through-wiring to an Additional NX Unit Power Supply Unit, to other CPU Units to which NX Unit can be connected or to the Unit power supply terminals on another Communications Coupler Unit.

Make the current supplied from the unwired terminals meet the following conditions.

Current supplied from unwired terminals ≤ Current capacity of power supply terminal - Current consumption of Additional NX Unit Power Supply Unit block

Refer to *Required Power Supply Capacity* on page 4-23 for information on the block.



Ground the functional ground terminal to 100 Ω or less.

Power Supply Used

24 VDC power is supplied to the Unit power supply terminals. The power supply voltage range for the Unit power supplies is as follows.

Model	Power supply voltage range
NX-PD1000	20.4 to 28.8 VDC

Use an SELV power supply that meets the following conditions for the Unit power supply.

- Has overcurrent protection.
- Has double or reinforced insulation between the input and output.
- Has an output voltage that falls within the power supply voltage range for the Unit power supply.

We recommend the following power supply.

Recommended power supply in a CPU Rack: Model S8VK series (Omron)

Recommended power supply in a Slave Terminal: Model S8VK series or Model S8JX series (Omron)

Precautions for Correct Use

- Use the same Unit power supply to supply power to the entire CPU Rack. If you supply power from different power supplies, differences in electrical potential may cause unexpected currents in the NX Unit power supply, which may result in failure or malfunction.
- Use the same Unit power supply to supply power to the entire Slave Terminal. If you supply power from different power supplies, differences in electrical potential may cause unexpected currents in the NX Unit power supply, which may result in failure or malfunction.

Required Power Supply Capacity

The equation for the Unit power supply capacity in the CPU Rack and in the Slave Terminal is as follows.

● Equation in a CPU Rack

<Equation>

The equation for the Unit power supply capacity in the CPU Rack of NX1P2 CPU Unit is as follows.

Unit power supply capacity in the CPU Rack = The total power capacity from Unit power supply on each block

The equation for the Unit power supply capacity on each block in the CPU Rack is as follows.

- Required Unit power supply capacity of each block in the CPU Unit = (A + B)/C
- Unit power supply capacity of Additional NX Unit Power Supply Unit block = (D + E)/F

(A): Unit power consumption of a CPU Unit

(B): The total power consumption from the NX Unit power supply that is required by the NX Units that are connected to the CPU Unit

(C): The NX Unit power supply efficiency of the CPU Unit

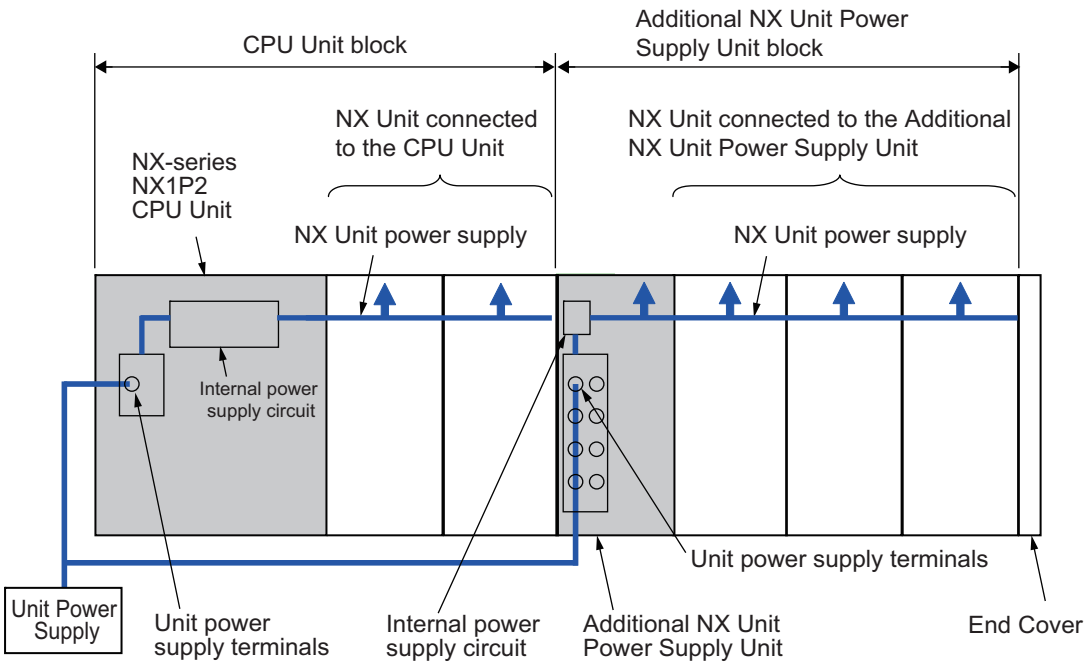
(D): NX Unit power consumption of the additional NX Unit Power Supply Unit

(E): Total power consumption from the NX Unit power supply that is required by the NX Units that are connected to the Additional NX Unit Power Supply Unit

(F): NX Unit power supply efficiency of the Additional NX Unit Power Supply Unit

<Block>

The following shows the Unit that supplies NX Unit power and its supplying range. For example, the CPU Rack in the following diagram is configured with two blocks: the CPU Unit block and the Additional NX Unit Power Supply Unit block.



The total Unit power supply capacity for these two blocks is the power supply capacity that the CPU Rack requires.

Precautions for Correct Use

Select a Unit power supply with sufficient capacity by considering the inrush current when the power is turned ON. Sometimes, the Unit power supply may not be turned ON caused by inrush current when the power is turned ON.

Equation in the Slave Terminal

<Equation>

The equation for the Unit power supply capacity in the Slave Terminal is as follows.

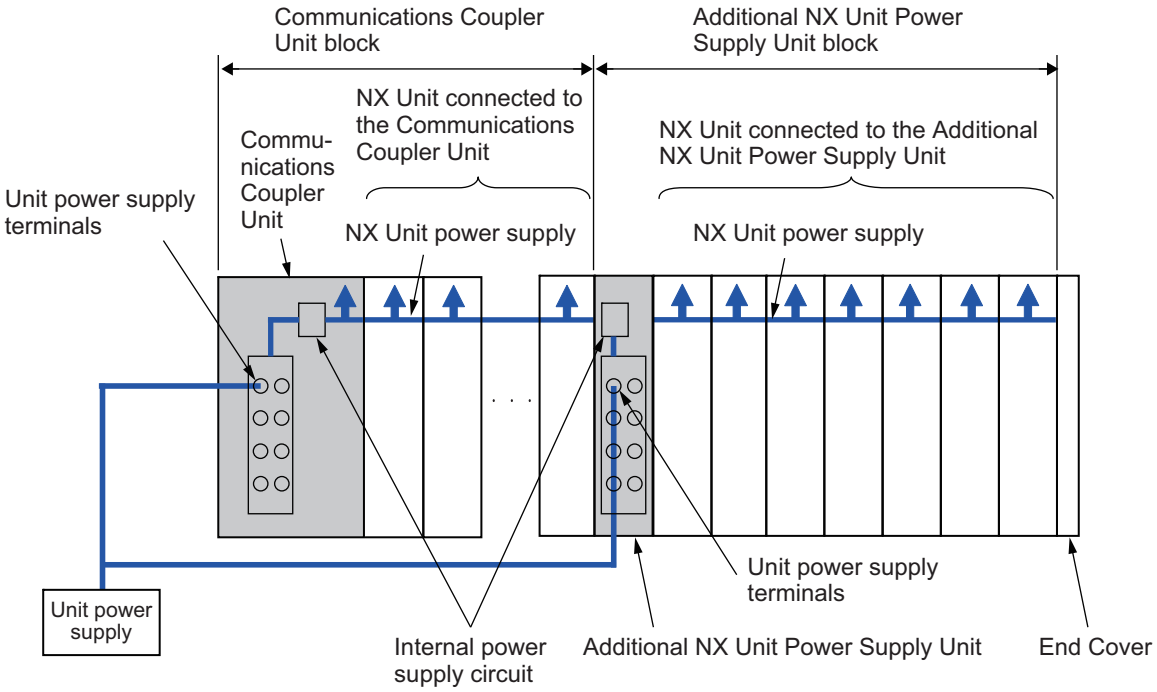
Unit power supply capacity in the Slave Terminal = The total power capacity from Unit power supply on each block

The equation for the Unit power supply capacity on each block in the Slave Terminal is as follows.

Unit power supply capacity requirement for each block = ((A) + (B))/(C) (A): The NX Unit power consumption of the Unit that supplies NX Unit power (B): The total power consumption from the NX Unit power supply that is required by the NX Units that are connected to the Unit that supplies NX Unit power (C): The NX Unit power supply efficiency of the Unit that supplies NX Unit power

<Block>

The following shows the Unit that supplies NX Unit power and its supplying range. For example, the Slave Terminal in the following diagram is configured with two blocks: the Communications Coupler Unit block and the Additional NX Unit Power Supply Unit block.



The total Unit power supply capacity for these two blocks is the power supply capacity that the Slave Terminal requires.

Precautions for Correct Use

Select a Unit power supply with sufficient capacity by considering the inrush current when the power is turned ON. Sometimes, the Unit power supply may not be turned ON caused by inrush current when the power is turned ON.

4-5-2 Wiring the Additional I/O Power Supply Unit

This section describes how to wire Additional I/O Power Supply Unit.

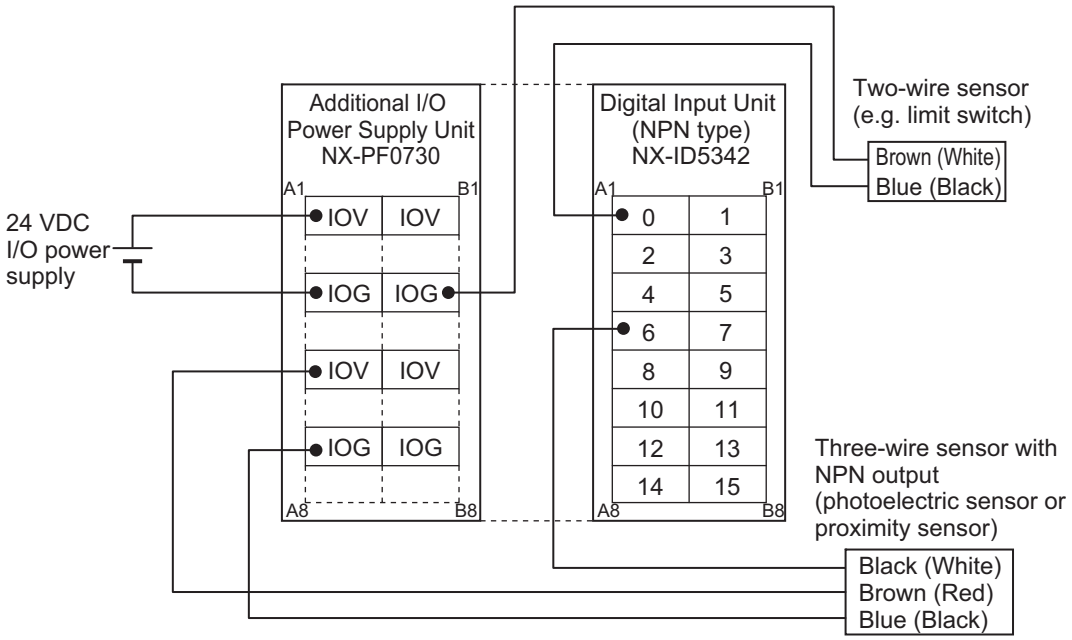
Wiring Terminals

I/O power supply terminals

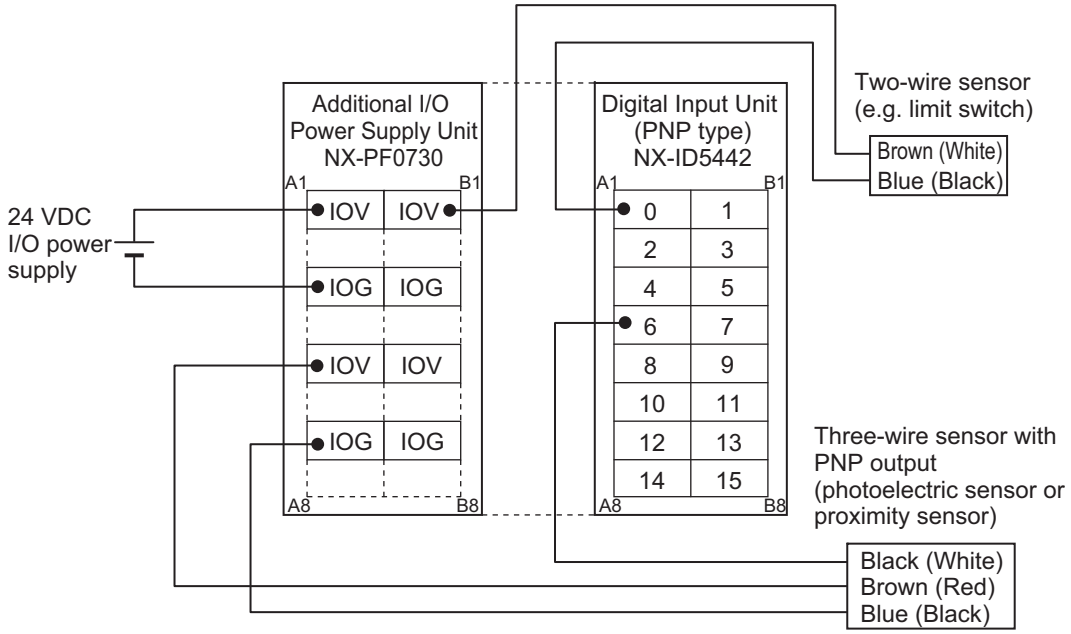
Wiring Examples

The external power supply is connected to the A1 and A3 terminals of the I/O power supply terminals. The other I/O power supply terminals can be used for power supply for connected external devices.

- **NPN Type (NX-ID5342)**



● PNP Type (NX-ID5442)



Additional Information

Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

Power Supply Used and Required Power Supply Capacity

Power Supply Used

5 to 24 VDC power is supplied to A1 and A3 terminals of the I/O power supply terminals.

Use an SELV power supply that meets the following conditions for the I/O power supply.

- Has overcurrent protection.
- Has double or reinforced insulation between the input and output.
- Has an output voltage of 5 to 24 VDC (4.5 to 28.8 VDC).*1

*1. Use an output voltage that is appropriate for the I/O circuits of the NX Units and the connected external devices.

We recommend the following power supply.

Recommended power supply in a CPU Rack: Model S8VK series (Omron)

Recommended power supply in a Slave Terminal: Model S8VK series or Model S8JX series (Omron)

Required Power Supply Capacity

The power supply capacity required by the I/O power supply to be connected is equal to the NX Unit power supply total power consumption that uses the same I/O power supply. Refer to *Calculation Example for Power Supply Capacity of I/O Power Supply* on page 4-30 for details on calculating the required power supply capacity.

However, if the inrush current occurs when a connected external device turns ON or OFF, do not allow the effective value of the I/O power supply current including the inrush current to exceed the following rated values.

Connecting destination of Additional I/O Power Supply Unit	Rated item	Rating
NX1P2 CPU Unit	Maximum current of I/O power supply	4 A max.*1
	Current capacity of I/O power supply terminals	
Communications Coupler Units	Maximum current of I/O power supply	Less than the rating of Additional I/O Power Supply Unit
	Current capacity of I/O power supply terminals	

*1. When the Additional I/O Power Supply Unit is connected to the CPU Unit, use the I/O power supply current at 4 A or less, regardless of the Additional I/O Power Supply Unit specifications.

Refer to *A-1 Data Sheet* on page A-2 for details on the ratings for Additional I/O Power Supply Unit.

Precautions for Safe Use

Use the I/O power supply current for the CPU Rack of NX1P2 CPU Unit at 4 A or less. Using the currents that are outside of the specifications may cause failure or damage.

Do not allow the inrush current to exceed the values in the table below.

Connecting destination of Additional I/O Power Supply Unit	Model of Additional I/O Power Supply Unit	Peak value	Pulse width
NX1P2 CPU Unit	NX-PF0730	20 A*1	1 s*1
	NX-PF0630		
Communications Coupler Units	NX-PF0730	50 A	1 s
	NX-PF0630	20 A	1 s

*1. When the Additional I/O Power Supply Unit is connected to the CPU Unit, the value will be as described on this table, regardless of the specification of the Additional I/O Power Supply Unit.

Refer to the user's manual for the Communications Coupler Unit on the ratings for Communications Coupler Unit that can supply I/O power.

Calculating the effective value of the I/O power supply current

The following gives the equation to calculate the effective value of the I/O power supply current, Irms.

$$Irms = \sqrt{Ip^2 \times D + Ia^2 \times (1-D)}$$
$$(D = \tau / T)$$

Ip: Peak inrush current (A)

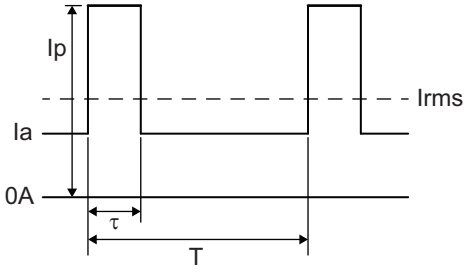
Irms: Effective value of the I/O power supply current (A)

Ia: Total current consumption from I/O power supply (A)

D: Inrush current duty

τ: Inrush current pulse width (s)

T: Inrush current period (s)



For details on the current consumption from I/O power supply of the NX Units to be used, refer to the user's manual for individual NX Units.

Refer to the user's manual for the connected CPU Unit or the Communications Coupler Unit for details on calculating current consumption from I/O power supply.

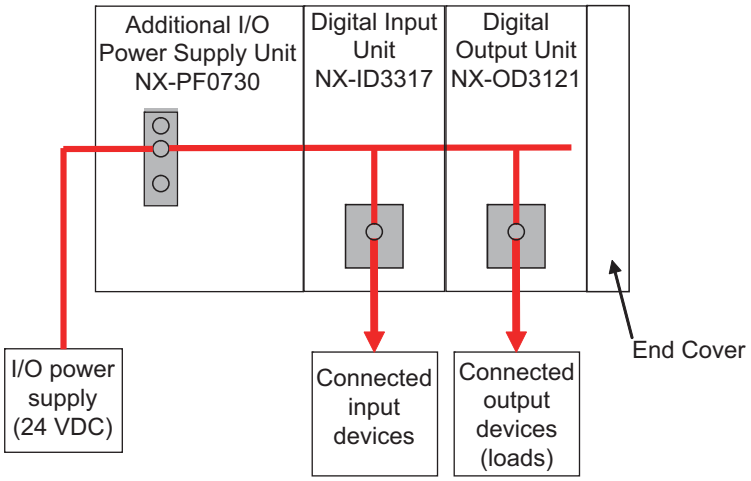
Precautions for Correct Use

Select an I/O power supply with sufficient capacity by considering the inrush current when the power is turned ON. Sometimes, the I/O power supply may not be turned ON caused by inrush current when the power is turned ON.

● Calculation Example for Power Supply Capacity of I/O Power Supply

An example of calculating the required power supply capacity of the I/O power supply is given below.

(a) Configuration and Conditions



Item		Condition
I/O power supply voltage		24 VDC
Inputs	Number of inputs used (that turn ON simultaneously)	4 points
	Current consumption of connected input devices	50 mA/point
Outputs	Number of outputs (that turn ON simultaneously)	4 points
	Load current of connected loads	125 mA/point
	Current consumption of connected output devices	50 mA/point

I/O power is supplied to the NX-ID3317 and NX-OD3121 from the NX bus.

(b) Unit Specifications

Model	Current consumption from I/O power supply	Input current
NX-PF0730	10 mA	---
NX-ID3317	0 mA	6 mA/point
NX-OD3121	10 mA	---

(c) Calculations

The current consumption from the I/O power supply for each Unit is calculated as follows.

NX-PF0730 Current Consumption	= (Current consumption from I/O power supply) = 10 mA

NX-ID3317 Current Consumption	= (Current consumption from I/O power supply) + (Input current x Number of inputs used) + (Total current consumption of connected input devices) = 0 mA + (6 mA x 4 points) + (50 mA x 4 points) = 224 mA

NX-OD3121 Current Consumption	= (Current consumption from I/O power supply) + (Total load current of connected loads) + (Total current consumption of connected output devices) = 10 mA + (125 mA x 4 points) + (50 mA x 4 points) = 710 mA

The required power supply capacity for the I/O power supply is calculated as follows.

Power supply capacity of I/O power supply	= (Current consumed by NX-PF0730) + (Current consumed by NX-ID3317) + (Current consumed by NX-OD3121) = 10 mA + 224 mA + 710 mA = 944 mA

4-5-3 Protective Devices

This section describes the protective devices to protect against short circuits and overcurrents of external circuits.

Overcurrent means the current that flows when an excessive load is connected and one of the following ratings is exceeded.

Unit name of supplying Unit	Connecting destination of supplying Unit	Rated item	Rating
Additional NX Unit Power Supply Unit	NX1P2 CPU Unit or Communications Coupler Unit	NX Unit power supply capacity	Less than the rating of Additional NX Unit Power Supply Unit
		Current capacity of power supply terminal	
Additional I/O Power Supply Unit	NX1P2 CPU Unit	Maximum current of I/O power supply	4 A max.*1
		Current capacity of I/O power supply terminals	
	Communications Coupler Unit	Maximum current of I/O power supply	Less than the rating of Additional I/O Power Supply Unit
		Current capacity of I/O power supply terminals	

*1. When the Additional I/O Power Supply Unit is connected to the CPU Unit, use the I/O power supply current at 4 A or less, regardless of the Additional I/O Power Supply Unit specifications.

Refer to the *A-1 Data Sheet* on page A-2 for details on the ratings for NX-series power supply-related Units.

Refer to the hardware user's manual for the connected CPU Unit or the user's manual for the connected Communications Coupler Unit for the ratings of the CPU Unit or the Communications Coupler Unit that can supply NX Unit power.

Refer to the user's manual for the connected Communications Coupler Unit for the ratings of the Communications Coupler Unit that can supply I/O power.

Precautions for Safe Use

Use the I/O power supply current for the CPU Rack of NX1P2 CPU Unit at 4 A or less. Using the currents that are outside of the specifications may cause failure or damage.

● Selecting Protective Devices

Refer to the hardware user's manual for the connected CPU Unit or the user's manual for the connected Communications Coupler Unit for selecting the protective devices.

Refer to *Required Power Supply Capacity* on page 4-28 for information on the inrush current that occurs when external devices connected to an Additional I/O Power Supply Unit are turned ON or OFF, which is one of the items to consider when you select protective devices.

Installation Locations for Protective Devices

Refer to the hardware user’s manual for the connected CPU Unit or the user's manual for the connected Communications Coupler Unit for installation locations for protective devices.

4-6 Wiring the I/O Power Supply Connection Unit

The I/O Power Supply Connection Unit is used as additional I/O power supply terminals when there are not enough I/O power supply terminals in which it is connected to the connected external devices.

This section describes how to wire the I/O Power Supply Connection Unit.

Wiring Terminals

IOV or IOG terminal

Wiring Examples

A wiring example is shown below.

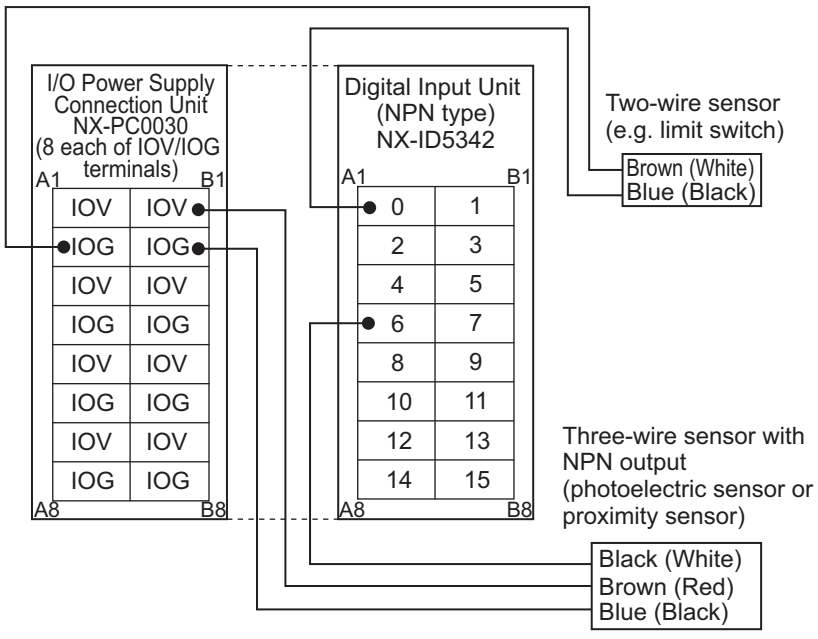
I/O power supply terminals can be used for power supply for connected external devices.

It is not possible to supply I/O power from the external power supply to this Unit.

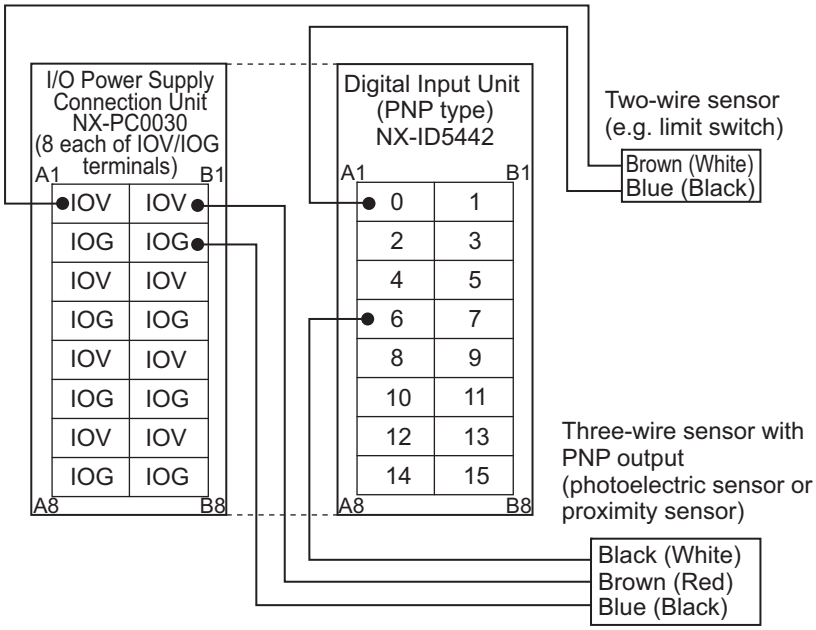
● Wiring Example 1

When the I/O Power Supply Connection Unit (NX-PC0030) is connected to a Digital Input Unit (16 inputs)

NPN type (NX-ID5342)



PNP type (NX-ID5442)



Note Connecting three-wire sensors to all 16 inputs requires two NX-PC0030 Units.

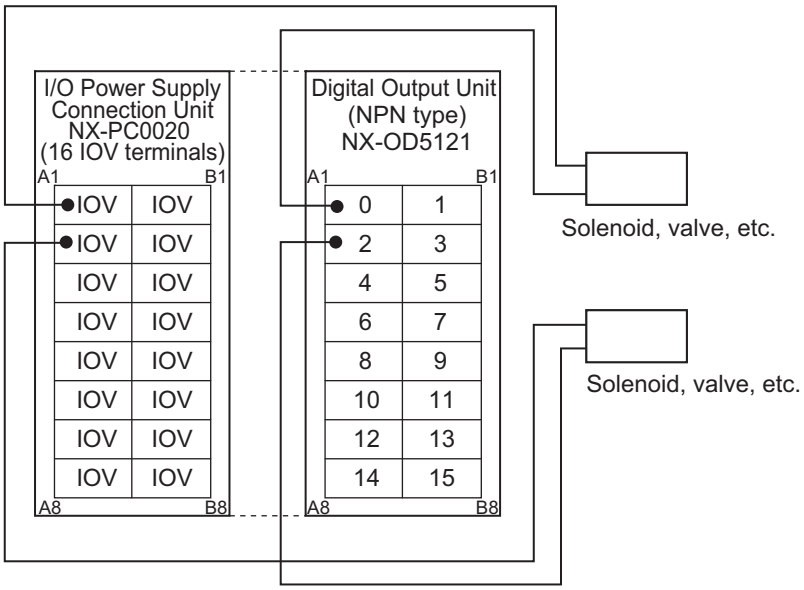
Additional Information

Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

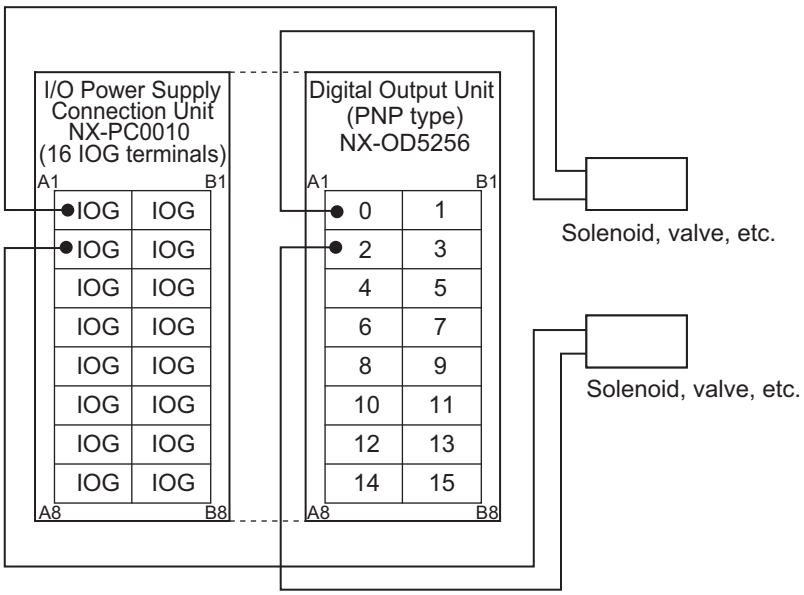
Wiring Example 2

When the I/O Power Supply Connection Unit (NX-PC0020 or NX-PC0010) is connected to a Digital Output Unit (16 outputs)

NPN type (NX-OD5121)



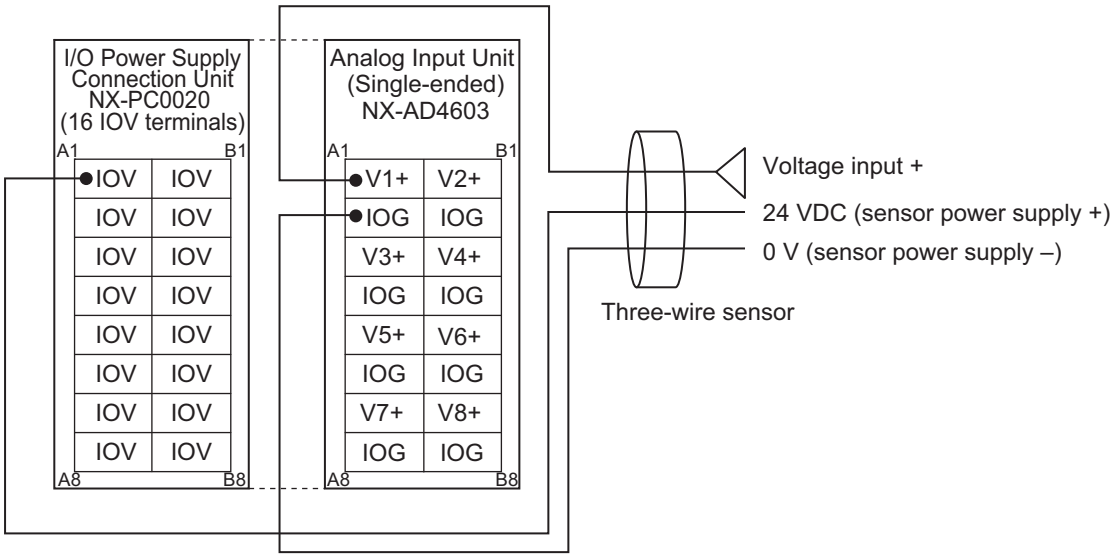
PNP type (NX-OD5256)



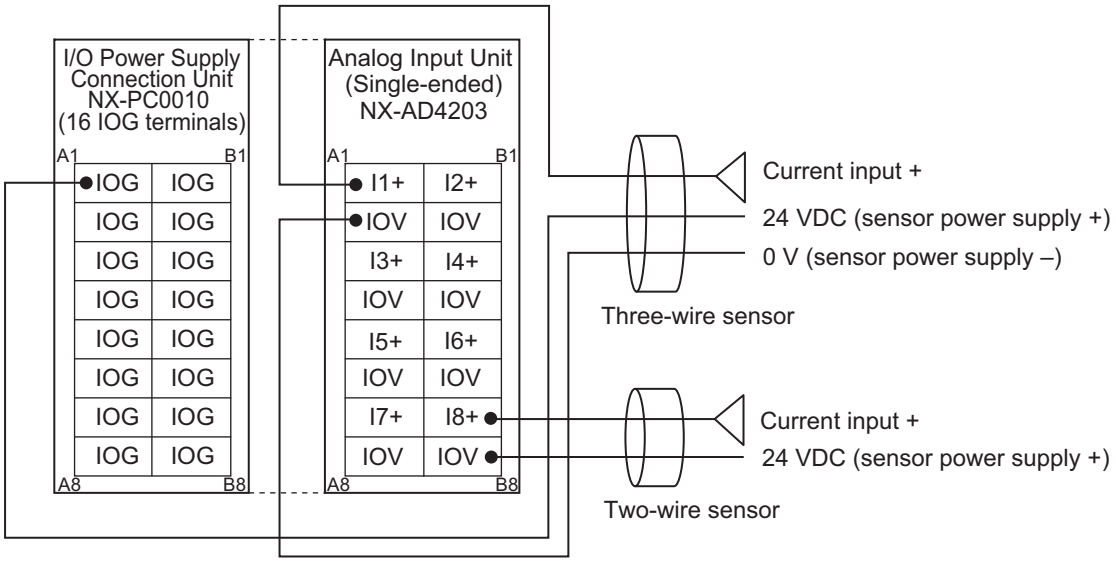
Wiring Example 3

When the I/O Power Supply Connection Unit (NX-PC0020 or NX-PC0010) is connected to an Analog Input Unit (8 inputs, single-ended inputs)

For voltage 8 inputs (NX-AD4603)



For current 8 inputs (NX-AD4203)



4-7 Wiring the Shield Connection Unit

The Shield Connection Unit is used when there are not enough terminals to connect the shield for the connection of external devices.

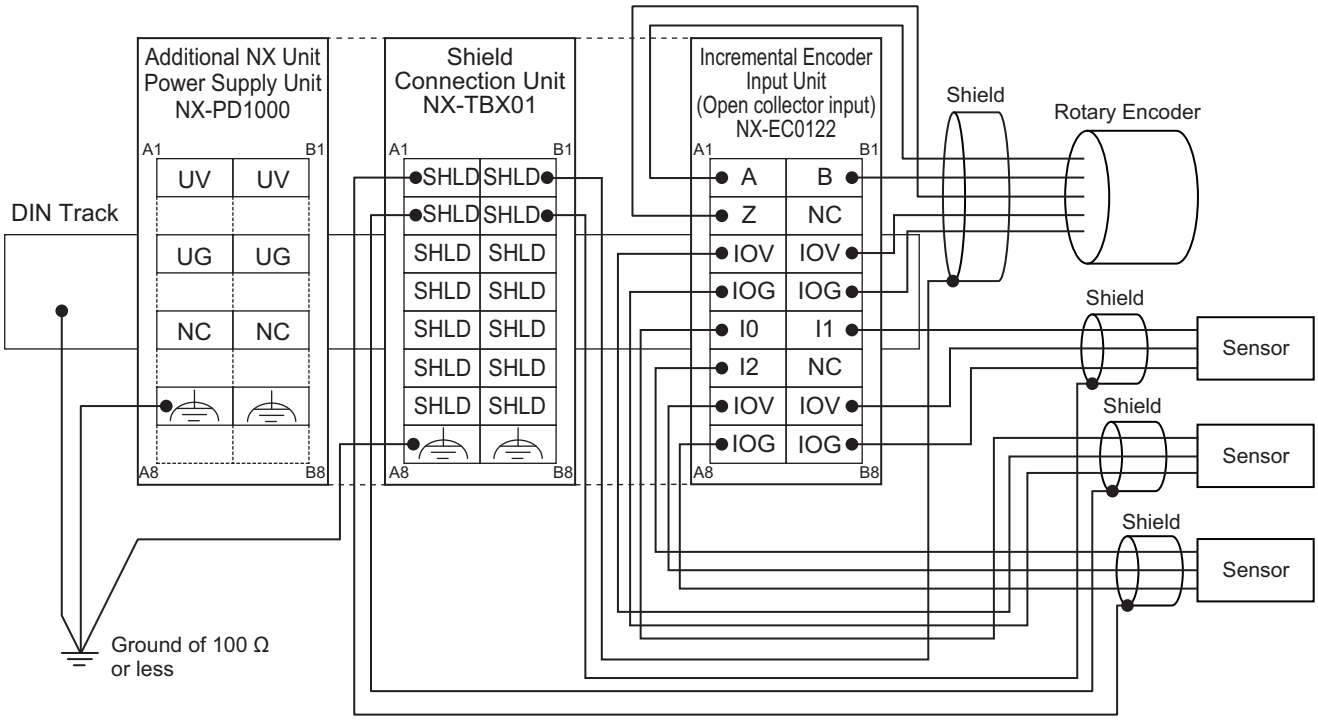
This section describes how to wire the Shield Connection Unit.

Wiring Terminals

- SHLD terminal
- Functional ground terminals

Wiring Examples

The following shows a wiring example in which the shield wire is used to connect an Incremental Encoder Input Unit (NX-EC0122) and a rotary encoder to the Shield Connection Unit.



Connect the shield of cable to the SHLD terminal.

And ground the functional ground terminal to 100 Ω or less.

Refer to the hardware user's manual for the connected CPU Unit for details on grounding the CPU Rack.

Refer to the user's manual for the connected Communications Coupler Unit for details on grounding the Slave Terminal.

4-8 Wiring the Terminals

This section describes how to wire the terminals on the System Units.

⚠ WARNING

Make sure that the voltages and currents that are input to the Units and slaves are within the specified ranges.

Inputting voltages or currents that are outside of the specified ranges may cause accidents or fire.

4-8-1 Wiring to the Screwless Clamping Terminal Block

This section describes how to connect wires to the screwless clamping terminal block, the installation and removing methods, and functions for preventing incorrect attachment.

You can connect ferrules that are attached to the twisted wires to the screwless clamping terminal block. You can also connect the twisted wires or the solid wires to the screwless clamping terminal block. If you connect the ferrules, all you need to do to connect the wires is to insert the ferrules into the terminal holes.

Wiring Terminals

The terminals to be wired are as follows.

- Unit power supply terminals
- I/O power supply terminals
- SHLD terminal
- Functional ground terminals

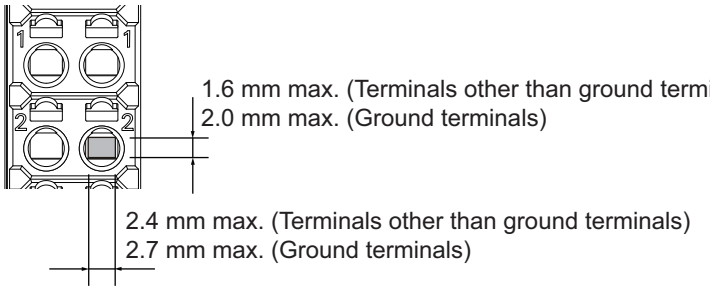
Applicable Wires

The wires that you can connect to the screwless clamping terminal block are twisted wires, solid wires, and ferrules that are attached to the twisted wires. The following section describes the dimensions and processed methods for applicable wires.

● Dimensions of Wires Connected to the Terminal Block

The dimensions of wires that you can connect into the terminal holes of the screwless clamping terminal block are as in the figure below.

Process the applicable wires that are specified in the following description to apply the dimensions.



Using Ferrules

If you use ferrules, attach the twisted wires to them.

Observe the application instructions for your ferrules for the wire stripping length when attaching ferrules.

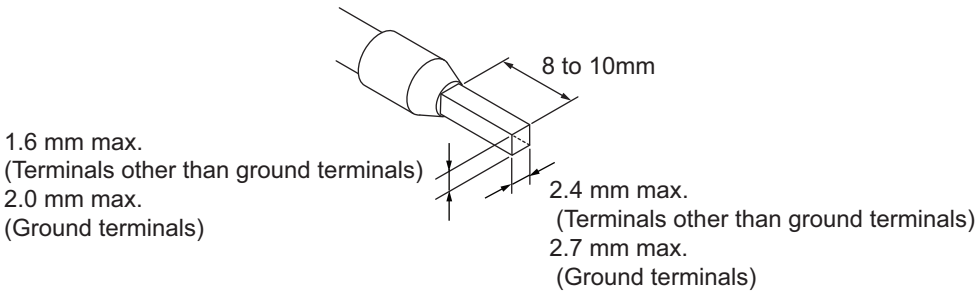
Always use plated one-pin ferrules. Do not use unplated ferrules or two-pin ferrules.

The applicable ferrules, wires, and crimping tools are listed in the following table.

Terminal types	Manufacturer	Ferrule model	Applicable wire (mm^2 (AWG))	Crimping tool
Terminals other than ground terminals	Phoenix Contact	AI0,34-8	0.34 (#22)	Phoenix Contact (The figure in parentheses is the applicable wire size.) CRIMPFOX 6 (0.25 to 6 mm^2, AWG24 to 10)
		AI0,5-8	0.5 (#20)	
		AI0,5-10		
		AI0,75-8	0.75 (#18)	
		AI0,75-10		
		AI1,0-8	1.0 (#18)	
		AI1,0-10		
		AI1,5-8	1.5 (#16)	
		AI1,5-10		
Ground terminals		AI2,5-10	2.0 *1	
Terminals other than ground terminals	Weidmuller	H0.14/12	0.14 (#26)	Weidmuller (The figure in parentheses is the applicable wire size.) PZ6 Roto (0.14 to 6 mm^2, AWG26 to 10)
		H0.25/12	0.25 (#24)	
		H0.34/12	0.34 (#22)	
		H0.5/14	0.5 (#20)	
		H0.5/16		
		H0.75/14	0.75 (#18)	
		H0.75/16		
		H1.0/14	1.0 (#18)	
		H1.0/16		
		H1.5/14	1.5 (#16)	
		H1.5/16		

*1. Some AWG14 wires exceed 2.0 mm^2 and cannot be used in the screwless clamping terminal block.

When you use any ferrules other than those in the above table, crimp them to the twisted wires so that the following processed dimensions are achieved.



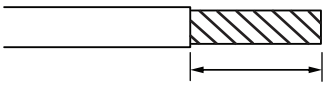
Using Twisted Wires/Solid Wires

If you use twisted wires or solid wires, use the following table to determine the correct wire specifications.

Terminals		Wire type				Wire size	Conductor length (stripping length)
Classification	Current capacity	Twisted wires		Solid wire			
		Plated	Unplated	Plated	Unplated		
All terminals except ground terminals	2 A max.	Possible	Possible	Possible	Possible	0.08 to 1.5 mm^2 (AWG 28 to 16)	8 to 10 mm
	Greater than 2 A and 4 A or less			Possible *1	Not possible		
	Greater than 4 A	Possible *1	Not possible	Not possible			
Ground terminals	---	Possible	Possible	Possible *2	Possible*2	2.0 mm^2	9 to 10 mm

*1. Secure wires to the screwless clamping terminal block. Refer to *Securing Wires* on page 4-46 for how to secure wires.

*2. With the NX-TB□□□□1 Terminal Block, use twisted wires to connect the ground terminal. Do not use a solid wire.



Conductor length (stripping length)

Precautions for Correct Use

- Use cables with suitable wire sizes for the carrying current. There are also restrictions on the current due to the ambient temperature. Refer to the manuals for the cables and use the cables correctly for the operating environment.
- For twisted wires, strip the sheath and twist the conductor portion. Do not unravel or bend the conductor portion of twisted wires or solid wires.

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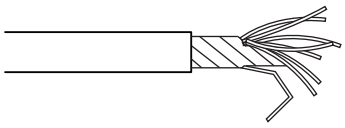

Unravel wires

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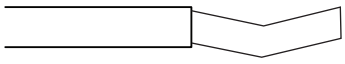


Bend wires

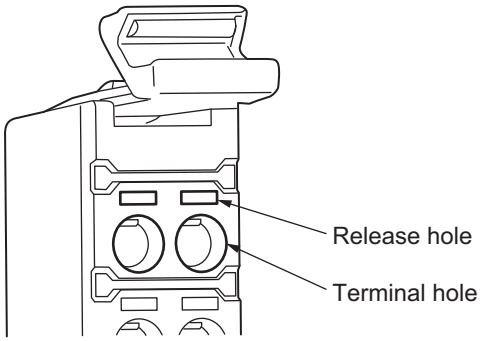
Additional Information

If more than 2 A will flow on the wires, use plated wires or use ferrules.

Connecting/Removing Wires

This section describes how to connect and remove wires.

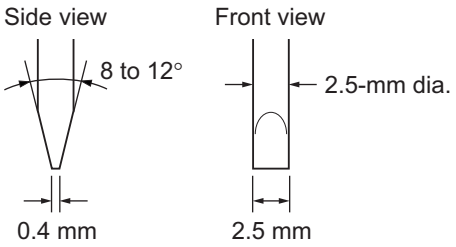
● Terminal Block Parts and Names



● Required Tools

Use a flat-blade screwdriver to connect and remove wires.

Use the following flat-blade screwdriver.



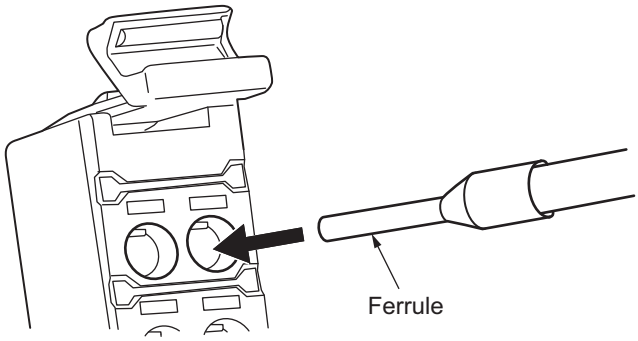
Recommended screwdriver

Model	Manufacturer
SZF 0-0,4×2,5	Phoenix Contact

Connecting Ferrules

Insert the ferrule straight into the terminal hole.

It is not necessary to press a flat-blade screwdriver into the release hole.



After you make a connection, make sure that the ferrule is securely connected to the terminal block.

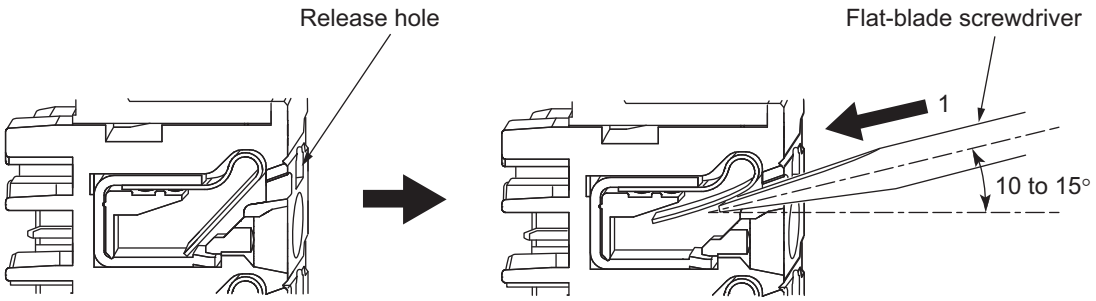
Connecting Twisted Wires/Solid Wires

Use the following procedure to connect the twisted wires or solid wires to the terminal block.

1 Press the a flat-blade screwdriver diagonally into the release hole.

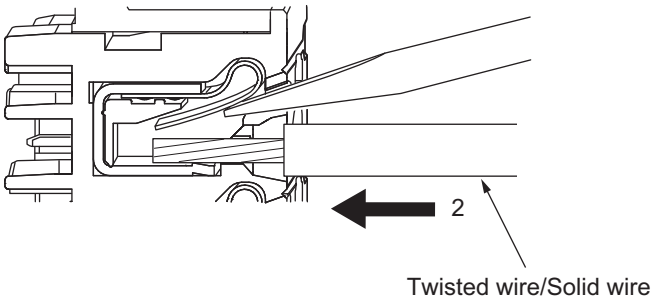
Press at an angle of 10° to 15°.

If you press in the screwdriver correctly, you will feel the spring in the release hole.

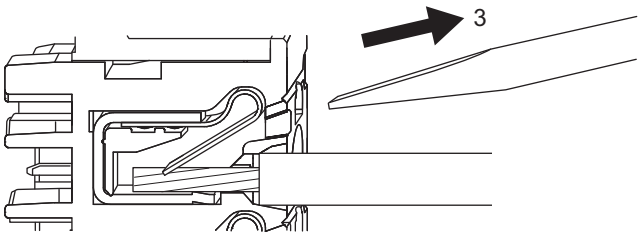


2 Leave the flat-blade screwdriver pressed into the release hole and insert the twisted wire or the solid wire into the terminal hole.

Insert the twisted wire or the solid wire until the stripped portion is no longer visible to prevent shorting.



3 Remove the flat-blade screwdriver from the release hole.



After you make a connection, make sure that the twisted wire or the solid wire is securely connected to the terminal block.

Precautions for Safe Use

- Do not press the flat-blade screwdriver straight into the release hole. Doing so may break the terminal block.

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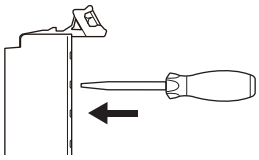

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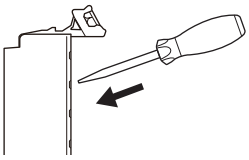
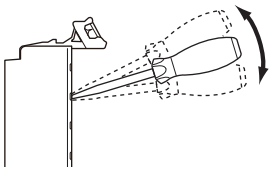


- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N max. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may break the terminal block.

NG



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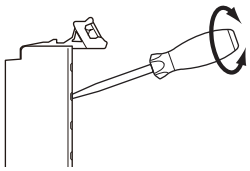


- Make sure that all wiring is correct.
- Do not bend the cable forcibly. Doing so may sever the cable.

Securing Wires

It is necessary to secure wires to the screwless clamping terminal block depending on the wire types that are used or the current flows on the wires.

The following table gives the necessity for securing wires.

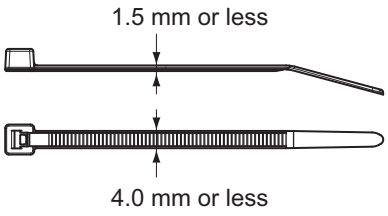
Terminals		Wire type				
		Ferrule	Twisted wires		Solid wire	
Classification	Current capacity		Plated	Unplated	Plated	Unplated
All terminals except ground terminals	2 A max.	No	No	No	No	No
	Greater than 2 A and 4 A or less			Not Possible	Yes	Not Possible
	Greater than 4 A		Yes		Not Possible	
Ground terminals	---		No	No	No	No

Use the following procedure to secure the wires.

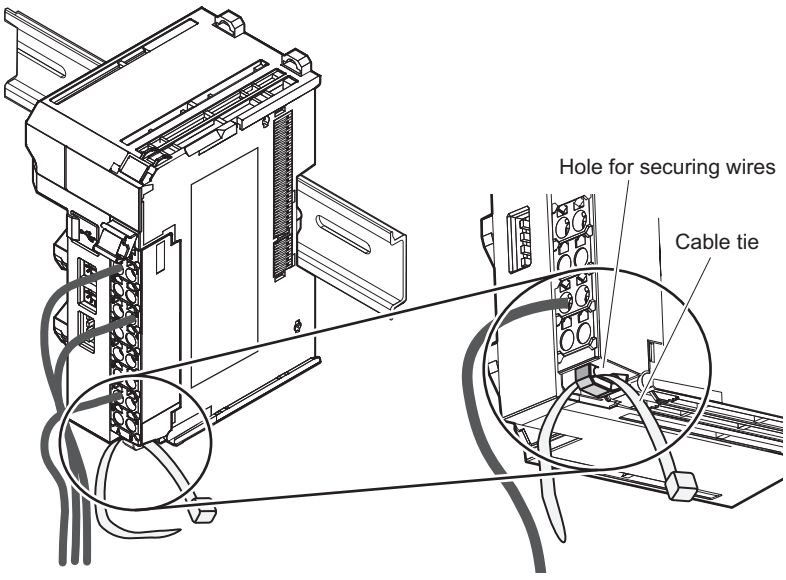
1 Prepare a cable tie.

A cable tie can be used with a width of 4 mm or less and a thickness of 1.5 mm or less.

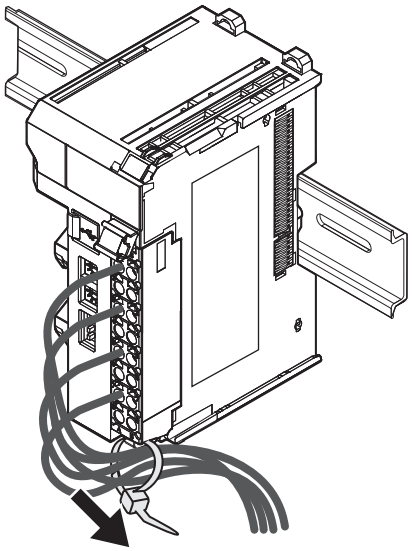
Select a cable tie correctly for the operating environment.



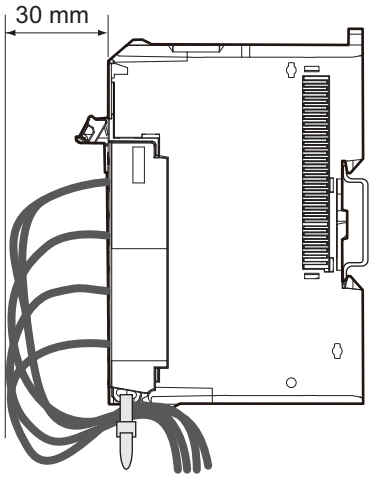
2 Pass a cable tie through the hole for securing wires on the bottom of the screwless clamping terminal block.



3 Bundle the wires with a cable tie and secure them to the screwless clamping terminal block.



Secure wires within the range of 30 mm from the screwless clamping terminal block.



Removing Wires

Use the following procedure to remove the wires from the terminal block.

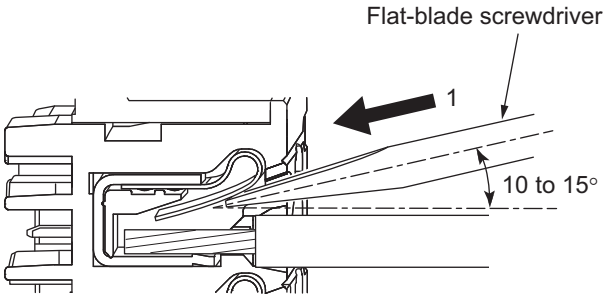
The removal method is the same for ferrules, twisted wires, and solid wires.

If wires are secured firmly to the terminal block, release them first.

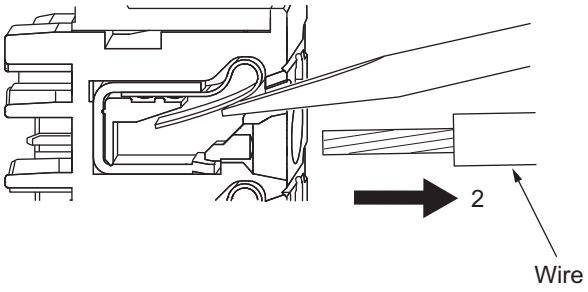
1 Press the flat-blade screwdriver diagonally into the release hole.

Press at an angle of 10° to 15°.

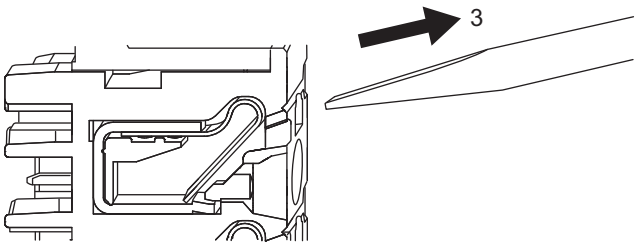
If you press in the screwdriver correctly, you will feel the spring in the release hole.



2 Leave the flat-blade screwdriver pressed into the release hole and pull out the wire.



3 Remove the flat-blade screwdriver from the release hole.



Precautions for Safe Use

- Do not press the flat-blade screwdriver straight into the release hole. Doing so may break the terminal block.

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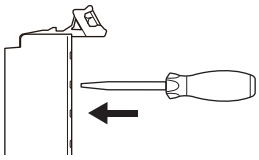

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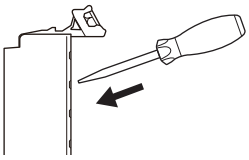
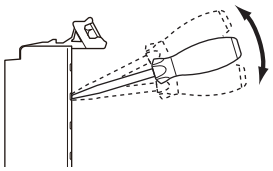


- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N max. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may break the terminal block.

NG



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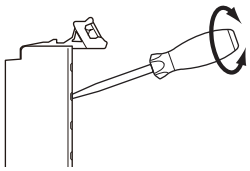
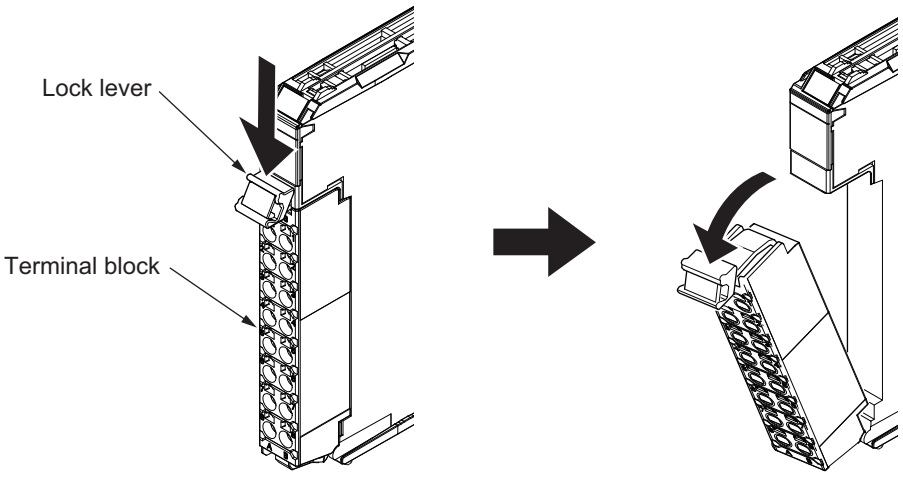


- Make sure that all wiring is correct.
- Do not bend the cable forcibly. Doing so may sever the cable.

Removing a Terminal Block

1 Press the lock lever on the terminal block and pull out the top of the terminal block to remove it.

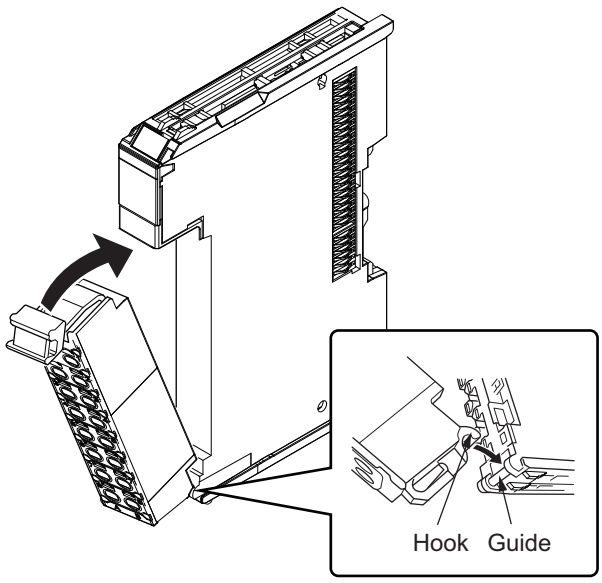


Attaching a Terminal Block

1 Mount the terminal block hook on the guide at the bottom of the NX Unit, lift up the terminal block, and press in on the top of the terminal block until you hear it engage.

The terminal block will click into place on the Unit.

After you mount the terminal block, make sure that it is locked to the Unit.



Mount a terminal block that is applicable to each Unit model.

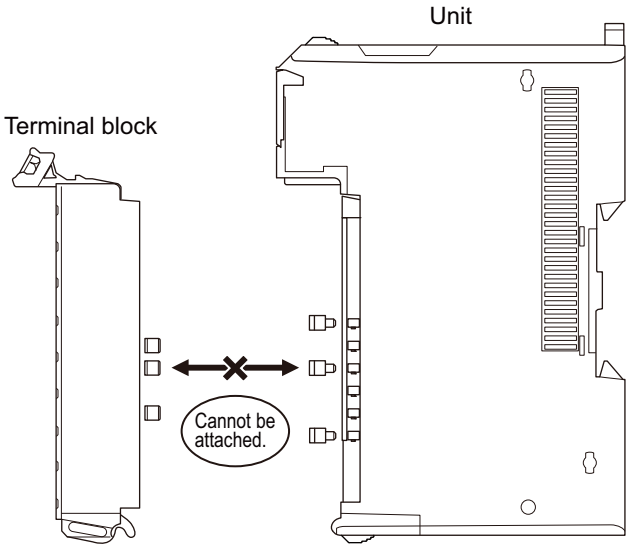
Refer to *Applicable Terminal Blocks for Each Unit Model* on page 3-5 for the applicable terminal blocks.

Preventing Incorrect Attachment of Terminal Blocks

In order to prevent unintentionally installing the wrong terminal block, you can limit the combination of a Unit and a terminal block.

Insert three Coding Pins (NX-AUX02) into three of the six incorrect attachment prevention holes on the Unit and on the terminal block. Insert these pins into positions so that they do not interfere with each other when the Unit and terminal block are connected to each other.

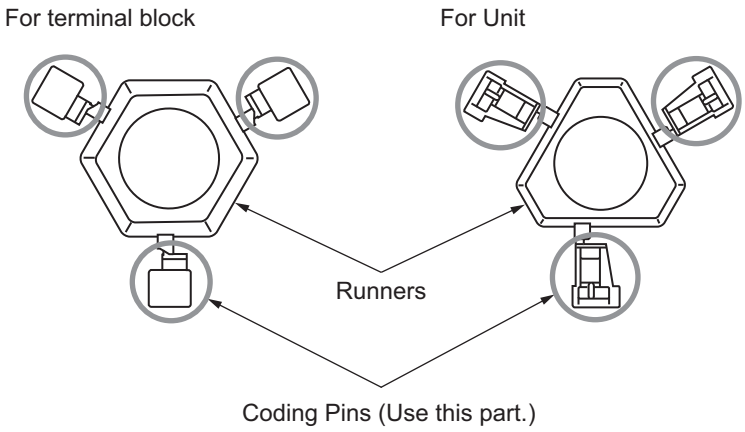
You can use these pins to create a combination in which the wrong terminal block cannot be attached because the pin patterns do not match.



Types of Coding Pins

There are two types of Coding Pins, both with their own unique shape: one for terminal blocks and one for Units.

Three pins come with each runner.



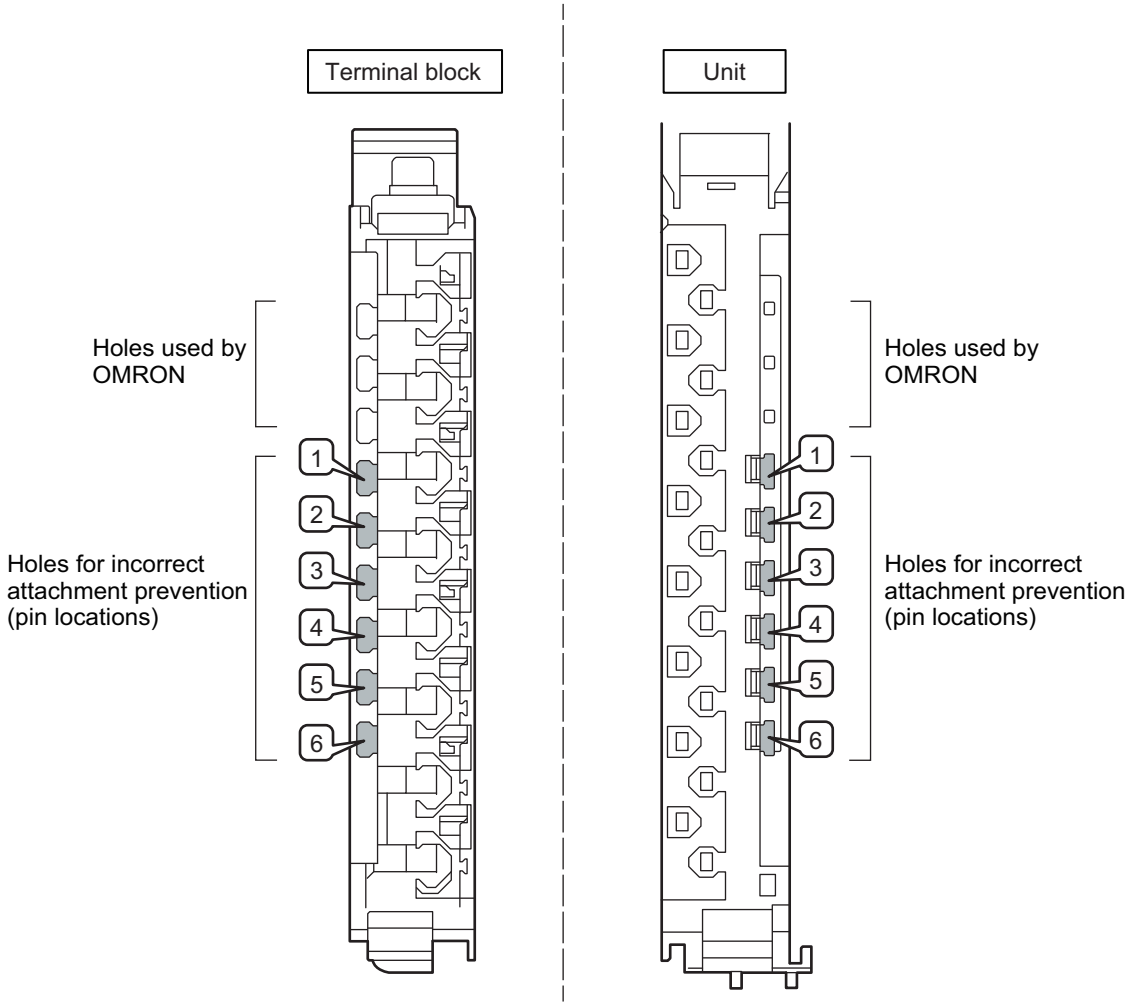
Use the following Coding Pins.

Name	Model	Specification
Coding Pin	NX-AUX02	For 10 Units (Terminal block: 30 pins, Unit: 30 pins)

Insertion Locations and Patterns of Coding Pins

Insert three Coding Pins of each on the terminal block and on the Unit at the positions designated by the numbers 1 through 6 in the figure below.

As shown in the following table, there are 20 unique pin patterns that can be used.



○: Pin inserted

Pattern	Pin locations for terminal block						Pin locations for Unit					
	1	2	3	4	5	6	1	2	3	4	5	6
No.1	○	○	○							○	○	○
No.2	○	○		○					○		○	○
No.3	○	○			○				○	○		○
No.4	○	○				○			○	○	○	
No.5	○		○	○				○			○	○
No.6	○		○		○			○		○		○
No.7	○		○			○		○		○	○	
No.8	○			○	○			○	○			○
No.9	○			○		○		○	○		○	
No.10	○				○	○		○	○	○		
No.11		○	○	○			○				○	○
No.12		○	○		○		○			○		○
No.13		○	○			○	○			○	○	
No.14		○		○	○		○		○			○
No.15		○		○		○	○		○		○	
No.16		○			○	○	○		○	○		
No.17			○	○	○		○	○				○
No.18			○	○		○	○	○			○	
No.19			○		○	○	○	○		○		
No.20				○	○	○	○	○	○			

To make the maximum of 20 patterns, purchase two sets of NX-AUX02 Pins. (One set for 10 Units.)

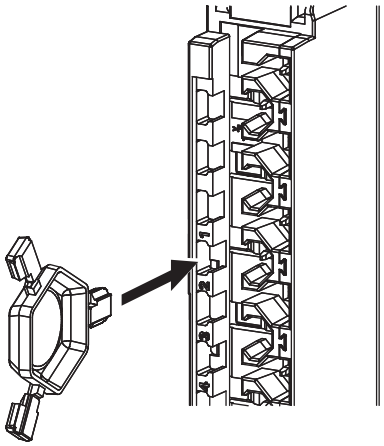
Precautions for Correct Use

- OMRON uses the holes other than No. 1 to 6 in the figure on the previous page. If you insert a Coding Pin into one of the holes used by OMRON on the terminal block side, this makes it impossible to mount the terminal block on a Unit.
- Do not use Coding Pins that have been attached and removed.

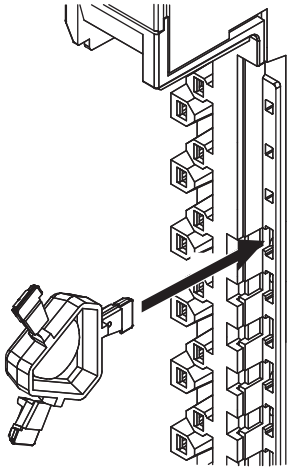
● Inserting the Coding Pins

1 Hold the pins by the runner and insert a pin into one of the incorrect attachment prevention holes on the terminal block or on the Unit.

Terminal block

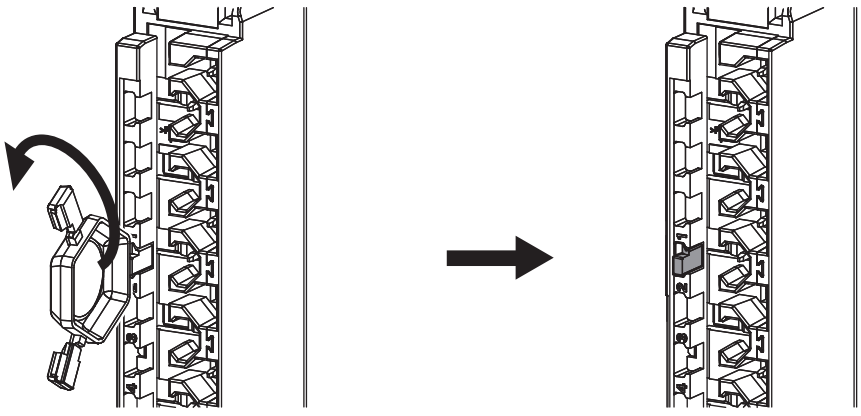


Unit

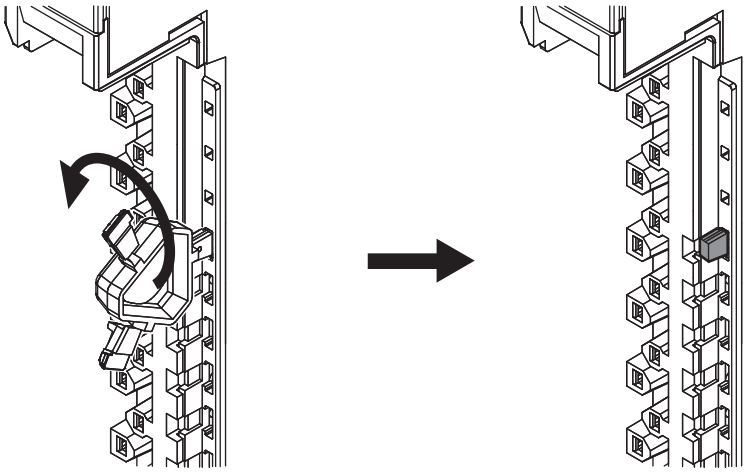


2 Rotate the runner to break off the Coding Pin.

Terminal block



Unit



5

Troubleshooting

This section describes the error information and corrections for errors that can occur when the System Units are used.

5-1 How to Check for Errors

Use one of the following error checking methods.

- Checking the indicators
- Troubleshooting with the Support Software

Refer to the user's manual for the CPU Unit or Communications Coupler Unit that the NX Units are connected to for information on checking errors with the troubleshooting functions of the Support Software.

5-2 Checking for Errors with the Indicators

You can use the indicators on the NX Units to check the NX Unit status and level of errors.

This section describes the meanings of errors that the indicator shows and the troubleshooting procedures for them.

In this section, the status of the indicator is indicated with the following abbreviations.

Abbreviation	Indicator status
Lit	Lit
Not Lit	Not lit
FS ( )	Flashing. The numeric value in parentheses is the flashing interval.
---	Undefined

Troubleshooting the Primary Errors

● All Units

TS indicator		Cause	Correction
Green	Red		
Lit	Not Lit	---	--- (This is the normal status.)
FS (2 s)	Not Lit	• Initializing • Downloading	--- (Normal. Wait until the processing is completed.)
Lit	Lit	This status is not present.	
Not Lit	Not Lit	The Unit power supply is not supplied.	Check the following items and supply the Unit power supply correctly. [Check items for power supply] • Make sure that the power supply cable is wired correctly. • Make sure that the power supply cable is not disconnected. • Make sure that power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • Make sure that power supply has not failed.
		• Waiting for initialization to start • Restarting	--- (Normal. Wait until the processing is completed.)
		If you cannot resolve the problem after you check the above items and cycle the Unit power supply, the Unit may have a hardware failure. If this happens, replace the Unit.	
Not Lit	Lit	Hardware failure	If this error occurs after you cycle the Unit power supply, replace the Unit.
Not Lit	Lit	Non-volatile Memory Hardware Error	Refer to Event *Non-volatile Memory Hardware Error* on page 5-9.
Not Lit	FS (1 s)	This status is not present	

● Additional NX Unit Power Supply Unit

UNIT PWR indicator Green	Cause	Correction
Lit	The Unit power supply is supplied.	--- (This is the normal status.)
Not Lit	The Unit power supply is not supplied.	Check the following items and supply the Unit power supply correctly. [Check items for power supply] • Make sure that the power supply cable is wired correctly. • Make sure that the power supply cable is not disconnected. • Make sure that power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • Make sure that power supply has not failed.

● Additional I/O Power Supply Unit

I/O PWR indicator Green	Cause	Correction
Lit	The I/O power supply is supplied.	--- (This is the normal status.)
Not Lit	The I/O power supply is not supplied.	Check the following items and supply the Unit power supply correctly. [Check items for power supply] • Make sure that the power supply cable is wired correctly. • Make sure that the power supply cable is not disconnected. • Make sure that power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • Make sure that power supply has not failed.

5-3 Checking for Errors and Troubleshooting on the Support Software

Error management on the NX Series is based on the methods used for the NJ/NX/NY-series Controllers.

This allows you to use the Support Software to check the meanings of errors and troubleshooting procedures. The confirmation method depends on the Support Software.

5-3-1 Checking for Errors from the Sysmac Studio

When an error occurs, you can place the Sysmac Studio online to the Controller or the Communications Coupler Unit to check current Controller errors and the log of past Controller errors.

Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for details on how to check errors.

Current Errors

Open the Sysmac Studio's Controller Error Tab Page to check the current error's level, source, source details, event name, event codes, details, attached information 1 to 4, and correction.

Errors in the observation level are not displayed.

Additional Information

Number of Current Errors

The following table gives the number of errors that are reported simultaneously as current errors in each Unit.

Unit	Number of simultaneous error notifications
System Units	When these Units are connected to the CPU Unit, since current errors are managed in the CPU Unit, the number of current errors is limited by the number of errors for the CPU Units. For Slave Terminals, since current errors are managed in the Communications Coupler Unit, the number of current errors is limited by the number of errors for the Communications Coupler Unit.

If the number of errors exceeds the maximum number of reportable current errors, errors are reported with a priority given to the oldest and highest-level errors. Errors that exceed the limit on simultaneous error notifications are not reported.

Errors that are not reported are still reflected in the error status.

Log of Past Errors

Open the Sysmac Studio's Controller Event Log Tab Page to check the times, levels, sources, source details, event names, event codes, details, attached information 1 to 4, and corrections for previous errors.

Additional Information

Number of Logs of Past Errors

Event logs in the System Units are stored in the connected CPU Unit or Communications Coupler Unit.

Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for details on the amount of event logs that are stored in the Unit.

Refer to the troubleshooting manual for the connected CPU Unit or Industrial PC and the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504-E1-19 or later) for the items that you can check and the procedures to check for errors.
Refer to *5-3-3 Event Codes and Corrections for Errors* on page 5-7 for details on event codes.

5-3-2 Checking for Errors from Support Software Other Than the Sysmac Studio

You can check the error descriptions and logs with Support Software other than the Sysmac Studio. For the error checking methods, refer to the user's manual for the connected Communications Coupler Unit and the operation manual for the Support Software.

Refer to *5-3-3 Event Codes and Corrections for Errors* on page 5-7 for details on event codes.

The number of current errors and the number of error log errors that occurred in the past are the same as for the Sysmac Studio.

5-3-3 Event Codes and Corrections for Errors

The errors (i.e.,events) that occur in the System Units are shown below.

The following abbreviations are used in the event level column.

Abbreviation	Name
Maj	Major fault level
Prt	Partial fault level
Min	Minor fault level
Obs	Observation
Info	Information

Refer to the troubleshooting manual for the connected CPU Unit or Industrial PC for information on NJ/NX/NY-series event codes.

Event code	Event name	Meaning	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
00200000 hex	Non-volatile Memory Hardware Error	An error occurred in non-volatile memory.	• Non-volatile memory failure			Yes			P. 5-9
90400000 hex	Event Log Cleared	The event log was cleared.	• The event log was cleared by the user.					Yes	P. 5-10

5-3-4 Meaning of Error

This section describes the information that is given for individual errors.

Error Descriptions

The items that are used to describe individual errors (events) are described in the following copy of an error table.

<table>
<tr><td>Event name</td><td colspan="3">Gives the name of the error.</td><td>Event code</td><td colspan="2">Gives the code of the error.</td></tr>
<tr><td>Meaning</td><td colspan="6">Gives a short description of the error.</td></tr>
<tr><td>Source</td><td colspan="2">Gives the source of the error.</td><td>Source details</td><td>Gives details on the source of the error.</td><td>Detection timing</td><td>Tells when the error is detected.</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Tells the level of influence on control.*1</td><td>Recovery</td><td>Gives the recovery method.*2</td><td>Log category</td><td>Tells which log the error is saved in.*3</td></tr>
<tr><td>Effects</td><td>User program</td><td>Tells what will happen to execution of the user program.*4</td><td>Operation</td><td colspan="3">Provides special information on the operation that results from the error.</td></tr>
<tr><td>Indicators</td><td colspan="6">Gives the status of the built-in EtherNet/IP port and built-in EtherCAT port indicators. Indicator status is given only for errors in the EtherCAT Master Function Module and the EtherNet/IP Function Module.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td>Data type</td><td colspan="3">Name</td></tr>
<tr><td colspan="6">Lists the variable names, data types, and meanings for system-defined variables that provide direct error notification, that are directly affected by the error, or that contain settings that cause the error.</td></tr>
<tr><td rowspan="2">Cause and correction</td><td colspan="2">Assumed cause</td><td>Correction</td><td colspan="3">Prevention</td></tr>
<tr><td colspan="6">Lists the possible causes, corrections, and preventive measures for the error.</td></tr>
<tr><td>Attached information</td><td colspan="6">This is the attached information that is displayed by the Support Software or an HMI.*5,*6</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">Provides precautions, restrictions, and supplemental information. If the user can set the event level, the event levels that can be set, the recovery method, operational information, and other information are also provided.</td></tr>
</table>

*1. One of the following:
Major fault: Major fault level
Partial fault: Partial fault level
Minor fault: Minor fault level
Observation
Information

*2. One of the following:
Automatic recovery: Normal status is restored automatically when the cause of the error is removed.
Error reset: Normal status is restored when the error is reset after the cause of the error is removed.
Cycle the power supply: Normal status is restored when the power supply to the Controller is turned OFF and then back ON after the cause of the error is removed.
Controller reset: Normal status is restored when the Controller is reset after the cause of the error is removed.
Depends on cause: The recovery method depends on the cause of the error.

*3. One of the following:
System: System event log
Access: Access event log

*4. One of the following:
Continues: Execution of the user program will continue.
Stops: Execution of the user program stops.
Starts: Execution of the user program starts.

*5. “System information” indicates internal system information that is used by OMRON.

*6. Refer to the appendices of the troubleshooting manual for the connected CPU Unit or Industrial PC for the applicable range of the HMI Troubleshooter.

Event name	Non-volatile Memory Hardware Error			**Event code**	00200000 hex	
Meaning	An error occurred in non-volatile memory.					
Source	Depends on where the Support Software is connected and the system configuration.		**Source details**	NX Unit	**Detection timing**	When power is turned ON to the NX Unit
Error attributes	**Level**	Minor fault		**Log category**	System	
	Recovery	For the NX bus of CPU Units Cycle the power supply to the Unit or restart the NX bus. For Communications Coupler Units Cycle the power supply to the Unit or restart the Slave Terminal. If the errors are detected in the Controller, reset all of the errors in the Controller.				
Effects	**User program**	Continues.	**Operation**	I/O refreshing for the NX Unit stops. Messages cannot be sent to the NX Unit.		
System-defined variables	**Variable**		**Data type**		**Name**	
	None		---		---	
Cause and correction	**Assumed cause**		**Correction**		**Prevention**	
	Non-volatile memory failure.		For the NX bus of CPU Units Cycle the power supply to the Unit or restart the NX bus. If the error persists even after you make the above correction, replace the relevant NX Unit. For Communications Coupler Units Cycle the power supply to the Unit or restart the Slave Terminal. If the error persists even after you make the above correction, replace the relevant NX Unit.		None	
Attached information	None					
Precautions/ Remarks	None					

Event name	Event Log Cleared			**Event code**	90400000 hex	
Meaning	The event log was cleared.					
Source	Depends on where the Support Software is connected and the system configuration.		**Source details**	NX Unit	**Detection timing**	When commanded from user
Error attributes	**Level**	Information	**Recovery**	---	**Log category**	Access
Effects	**User program**	Continues.	**Operation**	Not affected.		
System-defined variables	**Variable**		**Data type**		**Name**	
	None		---		---	
Cause and correction	**Assumed cause**		**Correction**		**Prevention**	
	The event log was cleared by the user.		---		---	
Attached information	Attached information: Events that were cleared 1: The system event log was cleared. 2: The access event log was cleared.					
Precautions/ Remarks	None					

5-4 Resetting Errors

Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for details on how to reset errors.

5-5 Troubles Specific to Each Type of NX Units

5-5-1 Additional NX Unit Power Supply Unit

Problem	Assumed cause	Correction
The UNIT PWR indicator is not lit.	The Unit power is not supplied.	Check that the Unit power is supplied.
	The Unit power supply voltage is outside the specified range.	Set the Unit power supply voltage within the specified range.
	Wiring with the Unit power supply is incorrect.	Check the wiring with the Unit power supply.
	Wiring with the Unit power supply is disconnected.	Check the wiring with the Unit power supply.
	The terminal block is loose.	Check the installation of the terminal block.
	The Unit power supply is defective.	Replace the Unit power supply.
	The NX Unit power consumption exceeds the power supply capacity of the Additional NX Unit Power Supply Unit.	Add an Additional NX Unit Power Supply Unit.
Even though the UNIT PWR indicator is lit, the indicators of NX Units on the right are not lit.	Either this NX Unit or the NX Unit on the right is not installed correctly.	Check the NX Units are installed correctly.

5-5-2 Additional I/O Power Supply Unit

Problem	Assumed cause	Correction
The I/O PWR indicator is not lit.	The I/O power is not supplied.	Check that the I/O power is supplied.
	The I/O power supply voltage is outside the specified range.	Set the I/O power supply voltage within the specified range.
	Wiring with the connected device is incorrect.	Check the wiring with the connected device.
	A connected device is disconnected.	Check the wiring with the connected device.
	The terminal block is loose.	Check the installation of the terminal block.
	A connected device is defective.	Replace the connected device.
Even though the external power supply is turned ON, the I/O PWR indicator is not lit.	The I/O power supply voltage is outside the specified range.	Set the I/O power supply voltage within the specified range.
	Wiring with the connected device is incorrect.	Check the wiring with the connected device.
	Wiring to the terminal block is loose.	Check the wiring to the terminal block.
	A connected device is disconnected.	Check the wiring with the connected device.
	The terminal block is loose.	Check the installation of the terminal block.
	A connected device is defective.	Replace the connected device.
Even though the I/O PWR indicator is lit, the indicators of NX Units on the right are not lit.	Either this NX Unit or the NX Unit on the right is not installed correctly.	Check the NX Units are installed correctly.

5-6 Troubleshooting Flowchart

Refer to the user's manual for the connected CPU Unit or Communications Coupler Unit for details on the standard troubleshooting process when an error occurs.

6

Inspection and Maintenance

This section describes how to clean, inspect, and maintain the system.

6-1 Cleaning and Inspection

This section describes daily device maintenance such as cleaning and inspection.

Make sure to perform daily or periodic inspections in order to maintain the System Unit's functions in the best operating condition.

6-1-1 Cleaning

Perform the following cleaning procedures periodically to ensure the System Units are maintained in the best operating condition.

- Wipe the equipment over with a soft, dry cloth when performing daily cleaning.
- If dirt remains even after wiping with a soft, dry cloth, wipe with a cloth that has been wet with a sufficiently diluted detergent (2%) and wrung dry.
- Units will become stained if items such as rubber, vinyl products, or adhesive tape are left on the NX Unit for a long period. Remove such items during regular cleaning.

Precautions for Correct Use

- Never use benzene, thinners, other volatile solvents, or chemical cloths.
- Do not touch the NX bus connectors.

6-1-2 Periodic Inspection

NX Units do not have parts with a specific life. However, its elements can deteriorate under improper environmental conditions. Periodic inspections are thus required to ensure that the required conditions are being maintained.

Inspection is recommended at least once every six months to a year, but more frequent inspections may be necessary depending on the severe environments.

Take immediate steps to correct the situation if any of the conditions in the following table are not met.

Periodic Inspection Items

No.	Inspection item	Inspection details	Criteria	Corrective action
1	External power supply	Is the power supply voltage measured at the terminal block within standards?	Within the power supply voltage range	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring the power supply within the power supply voltage range.
2	I/O power supply	Is the power supply voltage measured at the I/O terminal block within standards?	Voltages must be within I/O specifications of each NX Unit.	Use a voltage tester to check the power voltage at the terminals. Take necessary steps to bring the I/O power supply within NX Unit standards.
3	Ambient environment	Is the ambient operating temperature within standards?	0 to 55°C	Use a thermometer to check the temperature and ensure that the ambient operating temperature remains within the allowed range of 0 to 55°C.
		Is the ambient operating humidity within standards?	Relative humidity must be 10% to 95% with no condensation.	Use a hygrometer to check the humidity and ensure that the ambient operating humidity remains between 10% and 95%. Make sure that condensation does not occur due to rapid changes in temperature.
		Is it subject to direct sunlight?	Not in direct sunlight	Protect the Controller if necessary.
		Is there an accumulation of dirt, dust, salt, metal powder, etc.?	No accumulation	Clean and protect the Controller if necessary.
		Is there water, oil, or chemical sprays hitting the Controller?	No spray	Clean and protect the Controller if necessary.
		Are there corrosive or flammable gases in the area of the Controller?	No spray	Check by smell or use a sensor.
		Is the Unit subject to shock or vibration?	Vibration resistance and shock resistance must be within specifications.	Install cushioning or other vibration and shock absorbing equipment if necessary.
		Are there noise sources near the Controller?	No significant noise sources	Either separate the Controller and noise source, or protect the Controller.
4	Installation and wiring	Are the DIN track mounting hooks for each NX Unit securely locked?	No looseness	Securely lock the DIN track mounting hooks.
		Are the cable connectors fully inserted and locked?	No looseness	Correct any improperly installed connectors.
		Are there any loose screws on the track End Plates (PFP-M)?	No looseness	Tighten loose screws with a Phillips-head screwdriver.
		Are the NX Units connected to each other along the hookup guides and until they touch the DIN track?	You must connect and fix the NX Units to the DIN track.	Connect the NX Units to each other along the hookup guides and until they touch the DIN track.
		Are there any damaged external wiring cables?	No visible damage	Check visually and replace cables if necessary.

Tools Required for Inspections

Required Tools

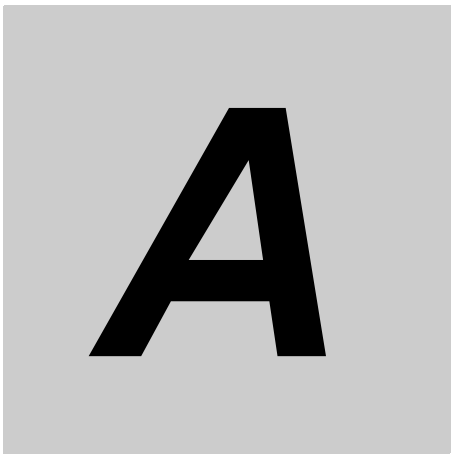
- Phillips screwdriver
- Flat-blade screwdriver
- Voltage tester or digital voltmeter
- Industrial alcohol and pure cotton cloth

Tools Required Occasionally

- Oscilloscope
- Thermometer and hygrometer

6-2 Maintenance Procedures

When you replace a System Unit, follow the procedure in the user's manual for the connected CPU Unit or Communications Coupler Unit.



Appendices

This section describes the data sheets of the System Units and their dimensions.

A-1 Data Sheet

The specifications of individual System Units are shown below.

A-1-1 Model List

Additional NX Unit Power Supply Unit

Model	Rated power supply voltage	NX Unit power supply capacity	Reference
NX-PD1000	24 VDC	10 W max.	P. A-4

Additional I/O Power Supply Unit

Model	Rated power supply voltage	Maximum current of I/O power supply	Reference
NX-PF0630	5 to 24 VDC	4 A	P. A-7
NX-PF0730	5 to 24 VDC	10 A*1	P. A-9

*1. When the Additional I/O Power Supply Unit is connected to an NX-series NX1P2 CPU Unit, the value will be 4 A max. because of the restriction on the CPU Rack system configuration.

I/O Power Supply Connection Unit

Model	Number of I/O power supply terminals	Current capacity of I/O power supply terminal	Reference
NX-PC0020	IOV: 16 terminals	4 A/terminal max.	P. A-12
NX-PC0010	IOG: 16 terminals		P. A-14
NX-PC0030	IOV: 8 terminals IOG: 8 terminals		P. A-16

Shield Connection Unit

Model	Number of shield terminals	Reference
NX-TBX01	14 terminals	P. A-19

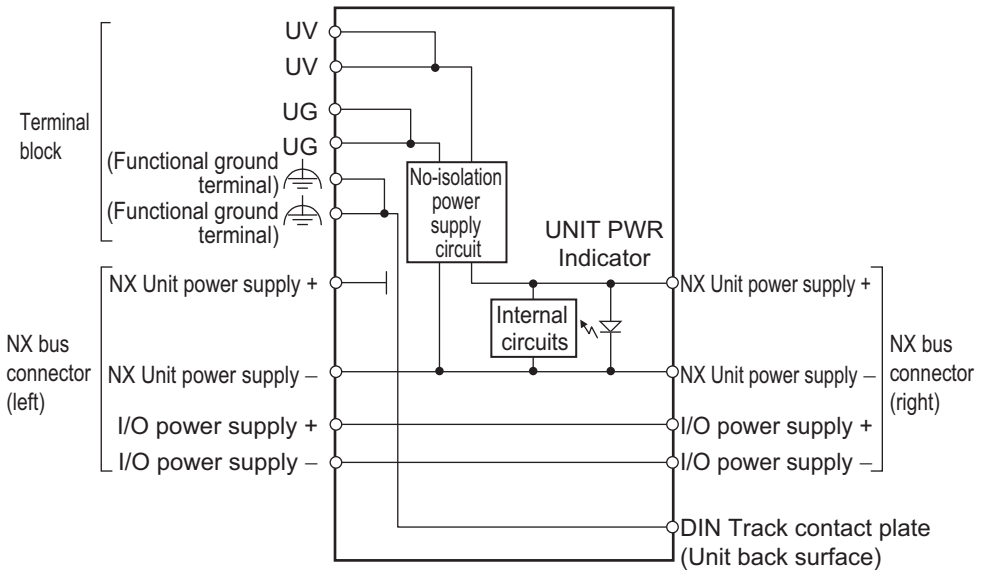
A-1-2 Additional NX Unit Power Supply Unit

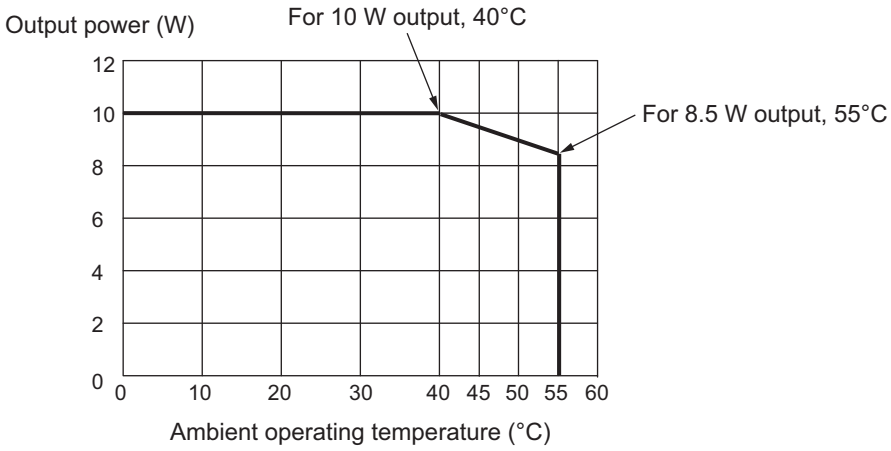
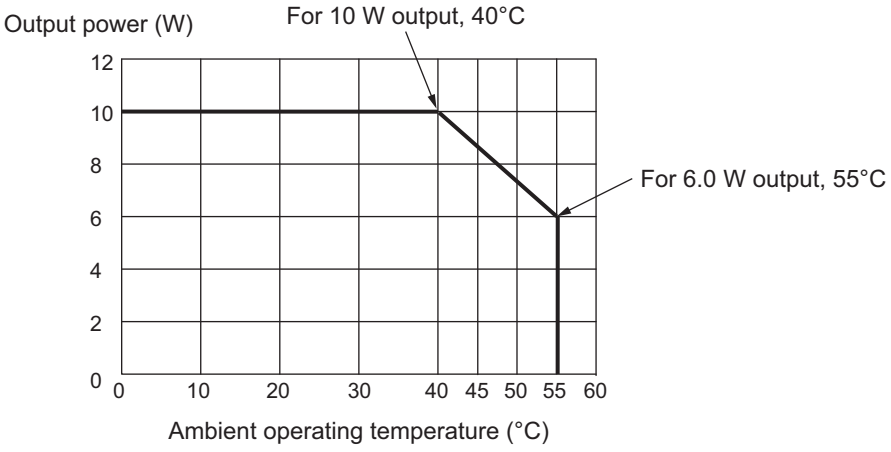
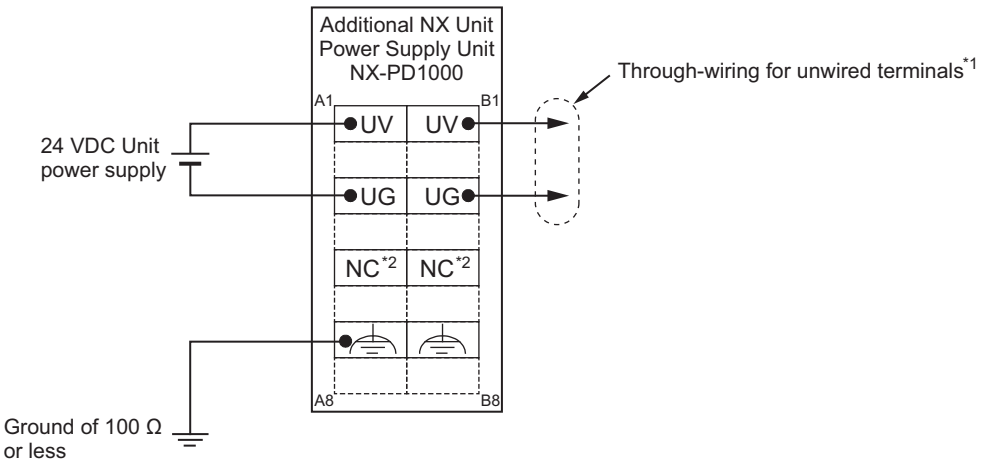
Description of Items on the Data Sheet of the Additional NX Unit Power Supply Unit

The meanings of the items on the data sheet of the Additional NX Unit Power Supply Unit are explained in the table below.

Item	Description
Unit name	The name of the Unit.
Model	The model of the Unit.
External connection terminals	The type of terminal block and connector that is used for connecting the Unit. The number of terminals on the terminal block is also described when a screwless clamping terminal block is used.
Power supply voltage	The rated voltage and voltage range that are supplied to the Unit.
NX Unit power supply capacity	The amount of power that the Unit can supply to the NX Units. The NX Unit power consumption of the Unit is not included.
NX Unit power supply efficiency	The efficiency of the power supply circuit.
Current capacity of power supply terminal	The current capacity of the Unit power supply terminal (UV/UG). When you supply the Unit power to the connected external devices, do not allow the total of the current consumed by its own block and the current supplied to external to exceed this value.
Dimensions	The dimensions of the Unit. They are described as W × H × D. The unit is "mm".
Isolation method	The isolation method between the NX Unit power supply and Unit power supply terminals of the Unit.
Insulation resistance	The insulation resistance between the external connection terminals and internal circuit of the Unit.
Dielectric strength	The dielectric strength between the external connection terminals and internal circuit of the Unit.
NX Unit power consumption	The power consumption of the NX Unit power supply of the Unit. The power consumption when NX Units are connected to a CPU Unit and the power consumption when NX Units are connected to a Communications Coupler Unit.
Current consumption from I/O power supply	The current consumption from I/O power supply of the Unit.
Weight	The weight of the Unit.
Circuit layout	The circuit layout of the Unit.
Installation orientation and restrictions	The installation orientation of a CPU Unit containing the Unit and the installation orientation of a Slave Terminal containing the Unit. Any restrictions to specifications that result from the installation orientation are also given.
Terminal connection diagram	A diagram of the connection between the Unit and connected external devices. When an I/O Power Supply Connection Unit or a Shield Connection Unit is required to be connected to the connected external devices, the description for such is included.

Additional NX Unit Power Supply Unit (Screwless Clamping Terminal Block, 12 mm Width)

Unit name	Additional NX Unit Power Supply Unit
Model	NX-PD1000
External connection terminals	Screwless clamping terminal block (8 terminals)
Power supply voltage	24 VDC (20.4 to 28.8 VDC)
NX Unit power supply capacity	10 W max. (Refer to *Installation orientation and restrictions* for details.)
NX Unit power supply efficiency	70%
Current capacity of power supply terminal	4 A max. (including the current of through-wiring)
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	• Connected to a CPU Unit 0.85 W max. • Connected to a Communications Coupler Unit 0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	

Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit Possible in upright installation. • Connected to a Communications Coupler Unit Possible in 6 orientations. Restrictions: As shown in the following. • For upright installation  • For any installation other than upright 
Terminal connection diagram	

*1. You can use the unwired terminals of the Unit power supply terminals (UV/UG) for through-wiring of the Additional NX Unit Power Supply Unit, to other CPU Units to which NX Unit can be connected or to the Unit power supply terminals on another Communications Coupler Unit.

*2. The NC terminals are not connected to the internal circuits.

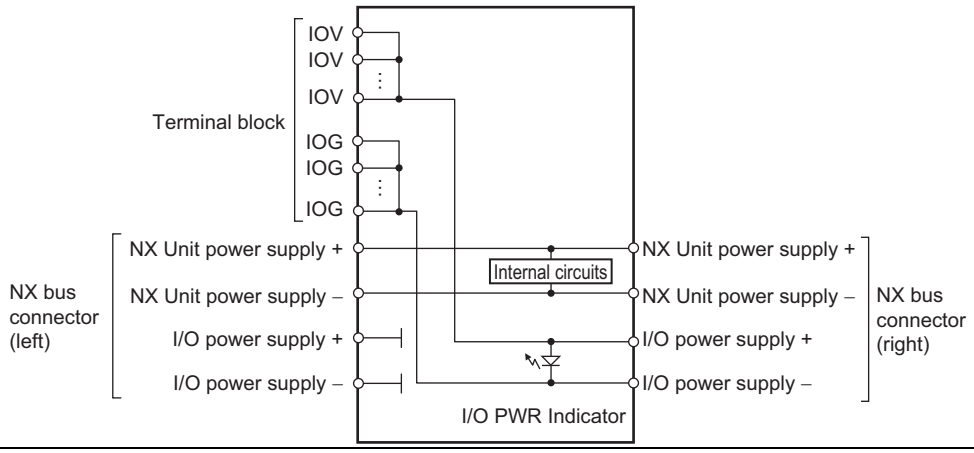
A-1-3 Additional I/O Power Supply Unit

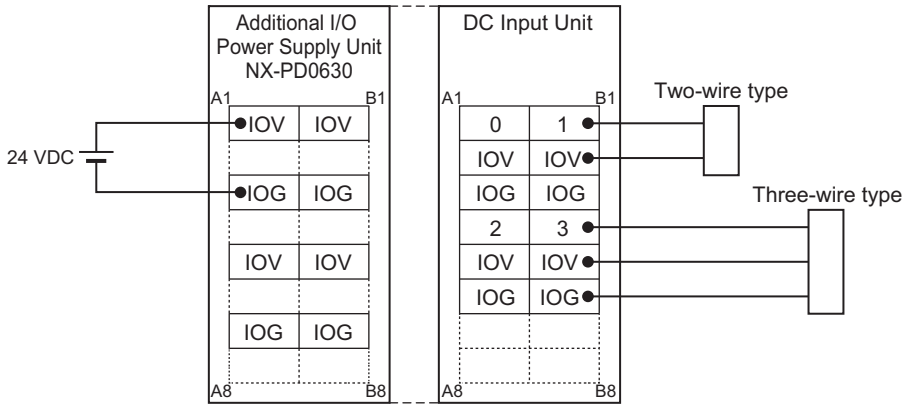
Description of Items on the Data Sheet of the Additional I/O Power Supply Unit

The meanings of the items on the data sheet of the Additional I/O Power Supply Unit are explained in the table below.

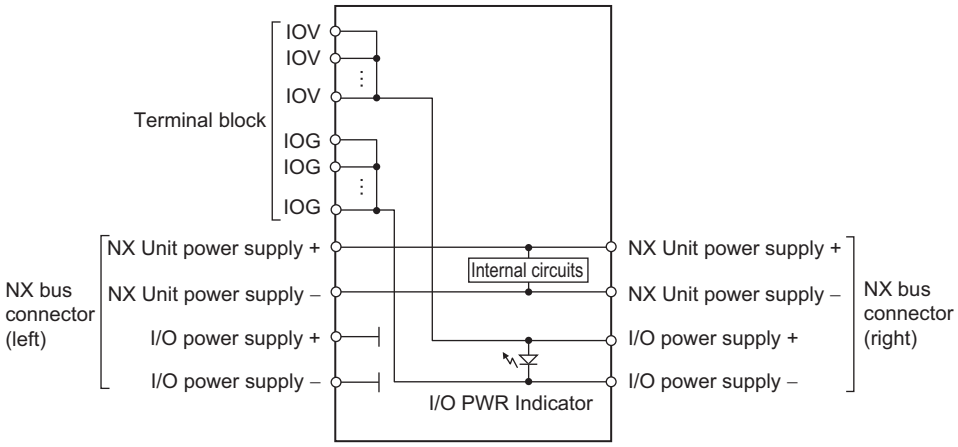
Item	Description
Unit name	The name of the Unit.
Model	The model of the Unit.
External connection terminals	The type of terminal block and connector that is used for connecting the Unit. The number of terminals on the terminal block is also described when a screwless clamping terminal block is used.
Power supply voltage	The rated voltage and voltage range of the I/O power supply that is supplied to the Unit.
Maximum current of I/O power supply	The maximum value of the current that can be supplied to the Units from the I/O power supply to be connected to the Unit through the NX bus connectors.
Current capacity of I/O power supply terminal	The current capacity of I/O power supply terminals of the Unit.
Dimensions	The dimensions of the Unit. They are described as W × H × D. The unit is "mm".
Isolation method	The isolation method between the I/O power supply terminal and internal I/O power supply of the Unit.
Insulation resistance	The insulation resistance between the external connection terminals and internal circuit of the Unit.
Dielectric strength	The dielectric strength between the external connection terminals and internal circuit of the Unit.
NX Unit power consumption	The power consumption of the NX Unit power supply of the Unit. The power consumption when NX Units are connected to a CPU Unit and the power consumption when NX Units are connected to a Communications Coupler Unit.
Current consumption from I/O power supply	The current consumption from I/O power supply of the Unit.
Weight	The weight of the Unit.
Circuit layout	The circuit layout of the Unit.
Installation orientation and restrictions	The installation orientation of a CPU Unit containing the Unit and the installation orientation of a Slave Terminal containing the Unit. Any restrictions to specifications that result from the installation orientation are also given.
Terminal connection diagram	A diagram of the connection between the Unit and connected external devices. When an I/O Power Supply Connection Unit or a Shield Connection Unit is required to be connected to the connected external devices, the description for such is included.
Overload/low voltage detection	The function of the Unit to detect an overload and low voltage in the I/O power supply.
Protective function	The protective function that the Unit has.

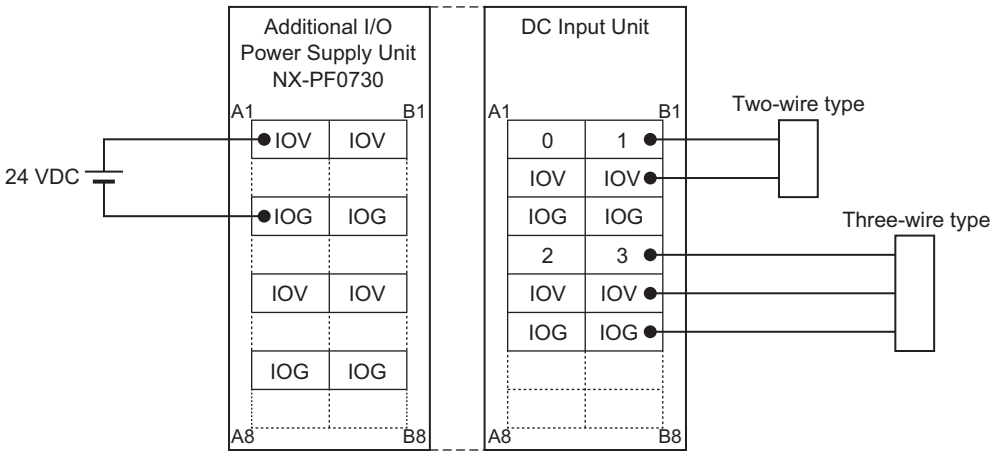
Additional I/O Power Supply Units (Screwless Clamping Terminal Block, 12 mm Width)

Unit name	Additional I/O Power Supply Unit
Model	NX-PF0630
External connection terminals	Screwless clamping terminal block (8 terminals)
Power supply voltage	5 to 24 VDC (4.5 to 28.8 VDC)*1
Maximum current of I/O power supply	4 A
Current capacity of I/O power supply terminal	4 A max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	• Connected to a CPU Unit 0.85 W max. • Connected to a Communications Coupler Unit 0.45 W max.
Current consumption from I/O power supply	10 mA max.
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit Possible in upright installation. • Connected to a Communications Coupler Unit Possible in 6 orientations. Restrictions: No restrictions

Terminal connection diagram	
Overload/low voltage detection	Not supported.
Protective function	Not supported.

*1. Use a voltage that is appropriate for the I/O circuits of the NX Units and the connected external devices.

Unit name	Additional I/O Power Supply Unit
Model	NX-PF0730
External connection terminals	Screwless clamping terminal block (8 terminals)
Power supply voltage	5 to 24 VDC (4.5 to 28.8 VDC)*1
Maximum current of I/O power supply	10 A*2
Current capacity of I/O power supply terminal	• A1 and A3: 10 A max.*2 • A5, A7, B1, B3, B5 and B7: 4 A max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	• Connected to a CPU Unit 0.85 W max. • Connected to a Communications Coupler Unit 0.45 W max.
Current consumption from I/O power supply	10 mA max.
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit Possible in upright installation. • Connected to a Communications Coupler Unit Possible in 6 orientations. Restrictions: No restrictions

Terminal connection diagram	
Overload/low voltage detection	Not supported.
Protective function	Not supported.

*1. Use a voltage that is appropriate for the I/O circuits of the NX Units and the connected external devices.

*2. When you connect to NX-series NX1P2 CPU Unit, use it at 4 A max due to the restriction of system configuraion in a CPU Rack.

A-1-4 I/O Power Supply Connection Unit

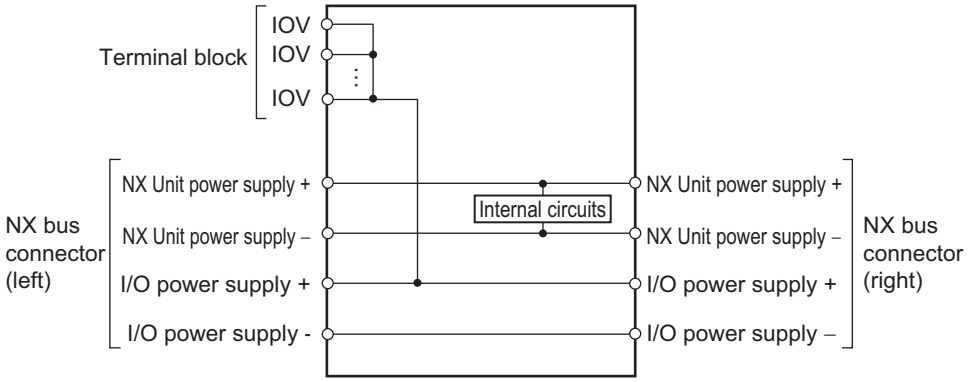
Description of Items on the Data Sheet of the I/O Power Supply Connection Unit

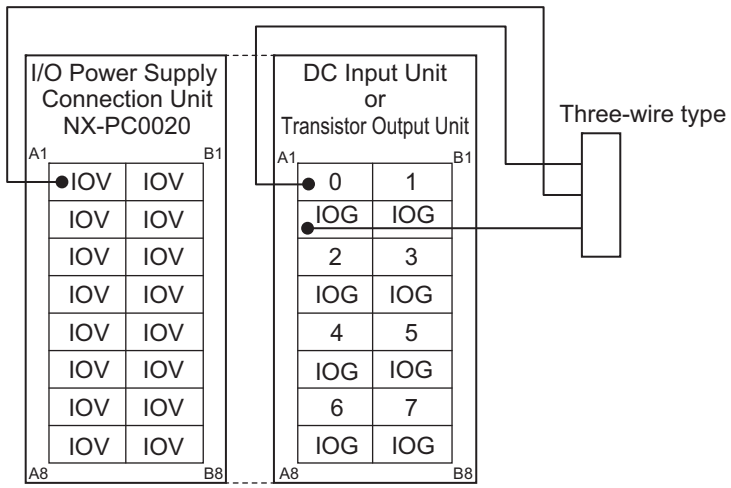
The meanings of the items on the data sheet of the I/O Power Supply Connection Unit are explained in the table below.

Item	Description
Unit name	The name of the Unit.
Model	The model of the Unit.
External connection terminals	The type of terminal block and connector that is used for connecting the Unit. The number of terminals on the terminal block is also described when a screwless clamping terminal block is used.
Number of I/O power supply terminals	The type (IOV/IOG) and number of I/O power supply terminals of the Unit.
Current capacity of I/O power supply terminal	The current capacity of I/O power supply terminals of the Unit.
Dimensions	The dimensions of the Unit. They are described as W × H × D. The unit is "mm".
Isolation method	The isolation method between the I/O power supply terminal and internal I/O power supply of the Unit.
Insulation resistance	The insulation resistance between the external connection terminals and internal circuit of the Unit.
Dielectric strength	The dielectric strength between the external connection terminals and internal circuit of the Unit.
NX Unit power consumption	The power consumption of the NX Unit power supply of the Unit. The power consumption when NX Units are connected to a CPU Unit and the power consumption when NX Units are connected to a Communications Coupler Unit.
Current consumption from I/O power supply	The current consumption from I/O power supply of the Unit.
Weight	The weight of the Unit.
Circuit layout	The circuit layout of the Unit.
Installation orientation and restrictions	The installation orientation of a CPU Unit containing the Unit and the installation orientation of a Slave Terminal containing the Unit. Any restrictions to specifications that result from the installation orientation are also given.
Terminal connection diagram	A diagram of the connection between the Unit and connected external devices. When an I/O Power Supply Connection Unit or a Shield Connection Unit is required to be connected to the connected external devices, the description for such is included.

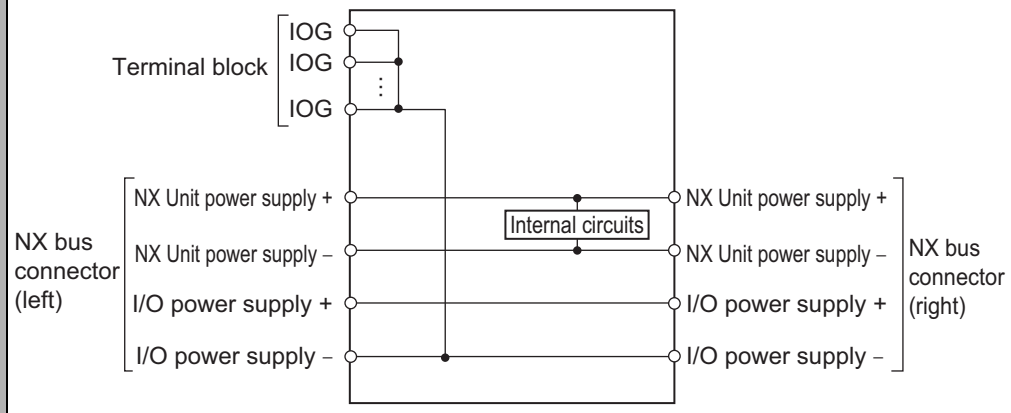
I/O Power Supply Connection Unit (Screwless Clamping Terminal Block, 12 mm Width)

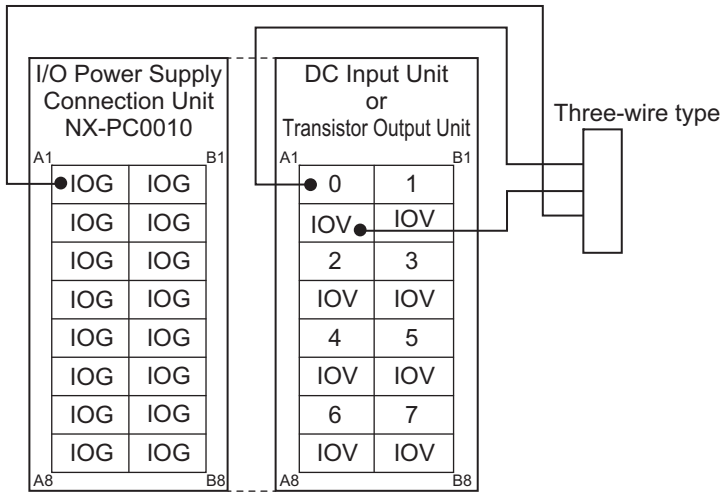
● IOV Terminal Type

Unit name	I/O Power Supply Connection Unit
Model	NX-PC0020
External connection terminals	Screwless clamping terminal block (16 terminals)
Number of I/O power supply terminals	IOV: 16 terminals
Current capacity of I/O power supply terminal	4 A/terminal max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	• Connected to a CPU Unit 0.85 W max. • Connected to a Communications Coupler Unit 0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit Possible in upright installation. • Connected to a Communications Coupler Unit Possible in 6 orientations. Restrictions: No restrictions

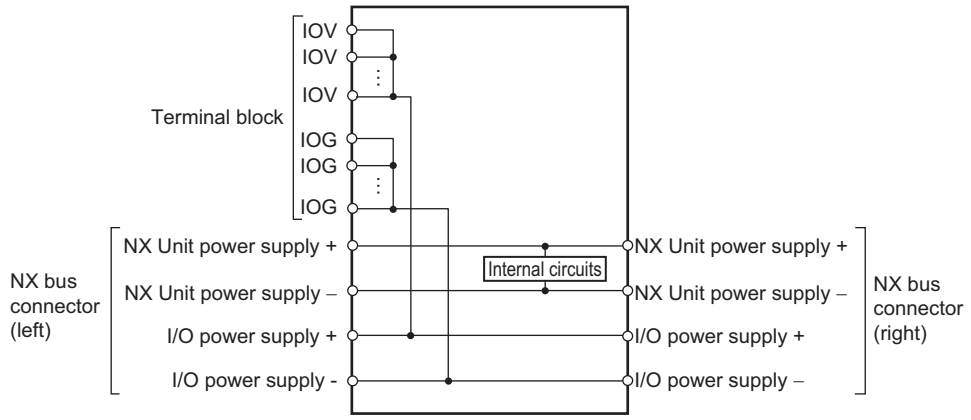
Terminal connection diagram	

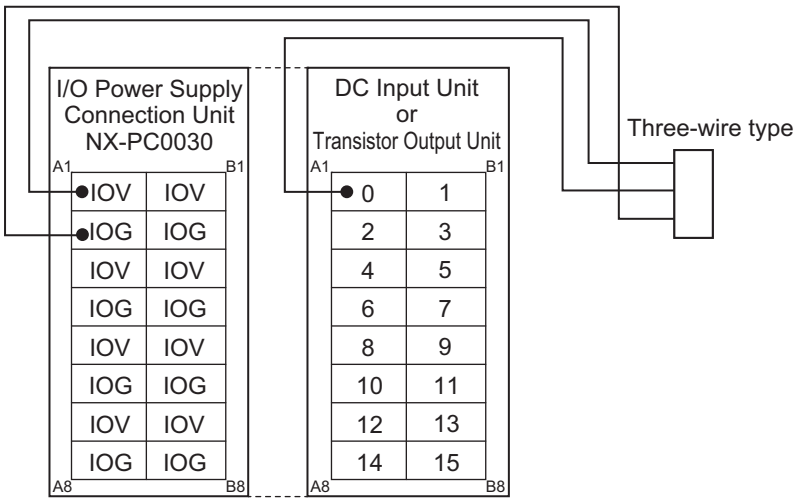
● IOG Terminal Type

Unit name	I/O Power Supply Connection Unit
Model	NX-PC0010
External connection terminals	Screwless clamping terminal block (16 terminals)
Number of I/O power supply terminals	IOG: 16 terminals
Current capacity of I/O power supply terminal	4 A/terminal max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	• Connected to a CPU Unit 0.85 W max. • Connected to a Communications Coupler Unit 0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit Possible in upright installation. • Connected to a Communications Coupler Unit Possible in 6 orientations. Restrictions: No restrictions

Terminal connection diagram	

● IOV/IOG Terminal Type

Unit name	I/O Power Supply Connection Unit
Model	NX-PC0030
External connection terminals	Screwless clamping terminal block (16 terminals)
Number of I/O power supply terminals	IOV: 8 terminals IOG: 8 terminals
Current capacity of I/O power supply terminal	4 A/terminal max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	• Connected to a CPU Unit 0.85 W max. • Connected to a Communications Coupler Unit 0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit Possible in upright installation. • Connected to a Communications Coupler Unit Possible in 6 orientations. Restrictions: No restrictions

Terminal connection diagram	

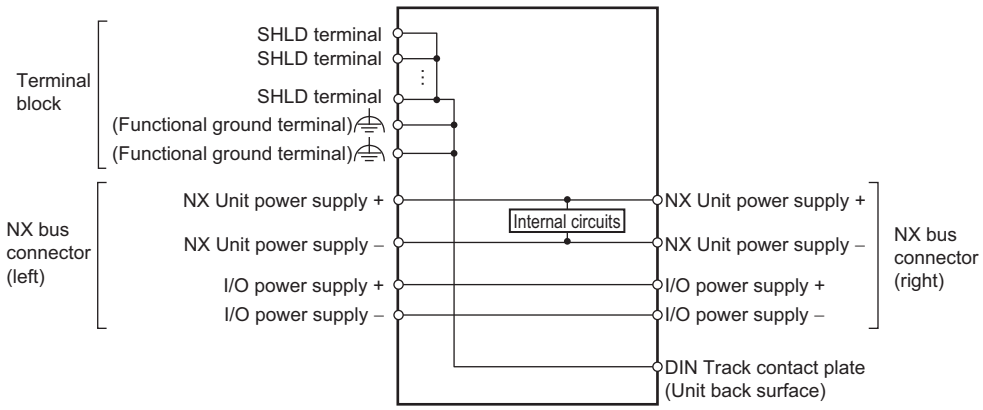
A-1-5 Shield Connection Unit

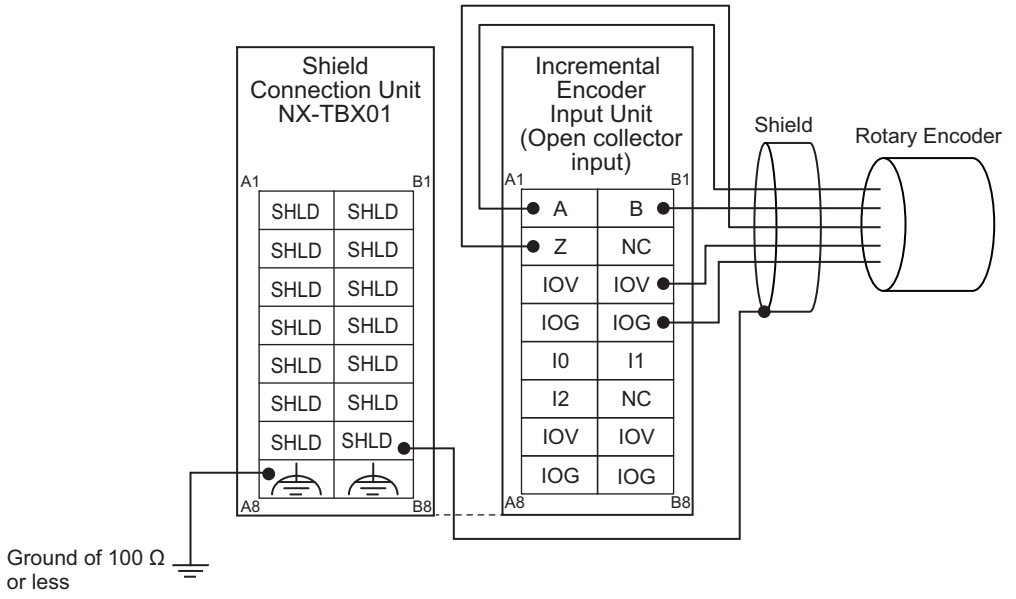
Description of Items on the Data Sheet of the Shield Connection Unit

The meanings of the items on the data sheet of the Shield Connection Unit are explained in the table below.

Item	Description
Unit name	The name of the Unit.
Model	The model of the Unit.
External connection terminals	The type of terminal block and connector that is used for connecting the Unit. The number of terminals on the terminal block is also described when a screwless clamping terminal block is used.
Number of shield terminals	The number of terminals of the SHLD terminal of the Unit.
Dimensions	The dimensions of the Unit. They are described as W × H × D. The unit is "mm".
Isolation method	The isolation method between the SHLD terminal, functional ground terminal, and internal circuit of the Unit.
Insulation resistance	The insulation resistance between the external connection terminals and internal circuit of the Unit.
Dielectric strength	The dielectric strength between the external connection terminals and internal circuit of the Unit.
NX Unit power consumption	The power consumption of the NX Unit power supply of the Unit. The power consumption when NX Units are connected to a CPU Unit and the power consumption when NX Units are connected to a Communications Coupler Unit.
Current consumption from I/O power supply	The current consumption from I/O power supply of the Unit.
Weight	The weight of the Unit.
Circuit layout	The circuit layout of the Unit.
Installation orientation and restrictions	The installation orientation of a CPU Unit containing the Unit and the installation orientation of a Slave Terminal containing the Unit. Any restrictions to specifications that result from the installation orientation are also given.
Terminal connection diagram	A diagram of the connection between the Unit and connected external devices. When an I/O Power Supply Connection Unit or a Shield Connection Unit is required to be connected to the connected external devices, the description for such is included.

Shield Connection Unit (Screwless Clamping Terminal Block, 12 mm Width)

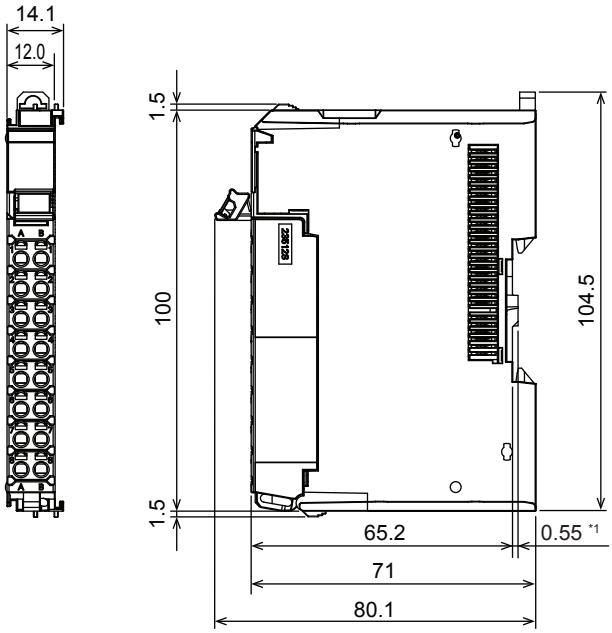
Unit name	Shield Connection Unit
Model	NX-TBX01
External connection terminals	Screwless clamping terminal block (16 terminals)
Number of shield terminals	14 terminals (The following two terminals are functional ground terminals.)
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	Isolation between the SHLD functional ground terminal, and internal circuit: No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	• Connected to a CPU Unit 0.85 W max. • Connected to a Communications Coupler Unit 0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit Possible in upright installation. • Connected to a Communications Coupler Unit Possible in 6 orientations. Restrictions: No restrictions

Terminal connection diagram	

A-2 Dimensions

A-2-1 Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit, I/O Power Supply Connection Unit, and Shield Connection Unit

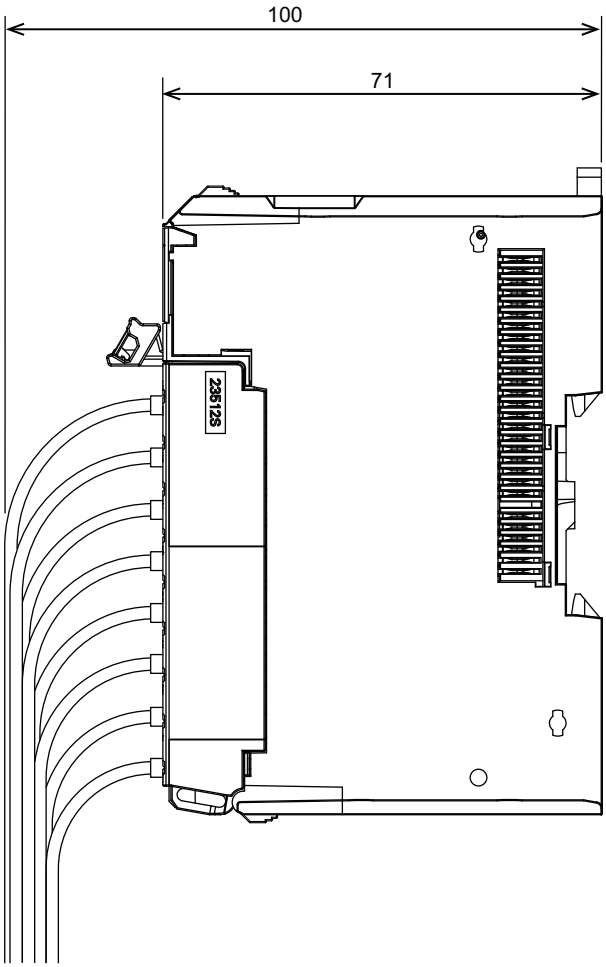
12 mm Width



(Unit: mm)

*1. The dimension is 1.35 mm for Units with lot numbers through December 2014.

Installation Height



(Unit: mm)

A-3 List of NX Objects

This section describes the NX objects of the System Units.

The method to access NX objects through instructions or other messages depends on where the NX Unit is connected.

If the NX Unit is connected to a CPU Unit, access is possible with the Read NX Unit Object instruction and the Write NX Unit Object instruction.

When the NX Unit is connected to a Communications Coupler Unit, the method depends on the connected communications master and Communications Coupler Unit.

Refer to the user's manual for the connected Communications Coupler Unit for method to use messages to access NX objects on Slave Terminals.

A-3-1 Format of Object Descriptions

In this manual, NX objects are described with the following format.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute

Index (Hex)	:	This is the index of the NX object that is expressed as a four-digit hexadecimal number.
Subindex (Hex)	:	This is the subindex of the NX object that is expressed as a two-digit hexadecimal number.
Object name	:	This is the name of the object. For a subindex, this is the name of the subindex.
Default value	:	This is the value that is set by default.
Data range	:	For a read-only (RO) NX object, this is the range of the data you can read. For a read-write (RW) NX object, this is the setting range of the data.
Unit	:	The unit is the physical units.
Data type	:	This is the data type of the object.
Access	:	This data tells if the object is read-only or read/write. RO: Read only RW: Read/write
I/O allocation	:	This tells whether I/O allocation is allowed.
Data attribute	:	This is the timing when changes to writable NX objects are enabled. Y: Enabled by restarting N: Enabled at all times ---: Write-prohibited

A-3-2 System Units

Unit Information Objects

This object gives the product information.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
1000	---	NX Bus Identity	---	---	---	---	---	---	---
	00	Number of Entries	7	7	---	USINT	RO	Not possible	---
	02	Model	*1	---	---	ARRAY [0..11] OF BYTE	RO	Not possible	---
	03	Device Type	*2	---	---	UDINT	RO	Not possible	---
	04	Product Code	*3	---	---	UDINT	RO	Not possible	---
	05	Vendor Code	00000001 hex *4	---	---	UDINT	RO	Not possible	---
	06	Unit Version	*5	---	---	UDINT	RO	Not possible	---
	07	Serial Number	*6	00000000 to FFFFFFFF hex	---	UDINT	RO	Not possible	---
1001	---	Production Info	---	---	---	---	---	---	---
	00	Number of Entries	2	2	---	USINT	RO	Not possible	---
	01	Lot Number	*7	00000000 to FFFFFFFF hex	---	UDINT	RO	Not possible	---
	02	Hardware Version	*8	---	---	ARRAY [0..19] OF BYTE	RO	Not possible	---

*1. The product models are assigned in ascending order from the lowest number of array elements. Any remainder elements are filled with spaces.

*2. The device types are assigned for each product Unit type.
Bits 0 to 31: Device type

*3. The product codes are assigned for each product model.
Bits 0 to 31: Product code

*4. OMRON vendor code

*5. Bits 24 to 31: Integer part of the Unit version.
Bits 16 to 23: Fractional part of the Unit version.
Bits 0 to 15: Reserved
(Example) For Ver.1.0, 0100□□□□ hex

*6. A unique serial number is assigned for each product unit.
Bits 0 to 31: Serial number

*7. The year, month, and day of production are assigned to the "lot number".
Bits 24 to 31: Date of production
Bits 16 to 23: Month of production
Bits 8 to 15: Year of production
Bits 0 to 7: Reserved

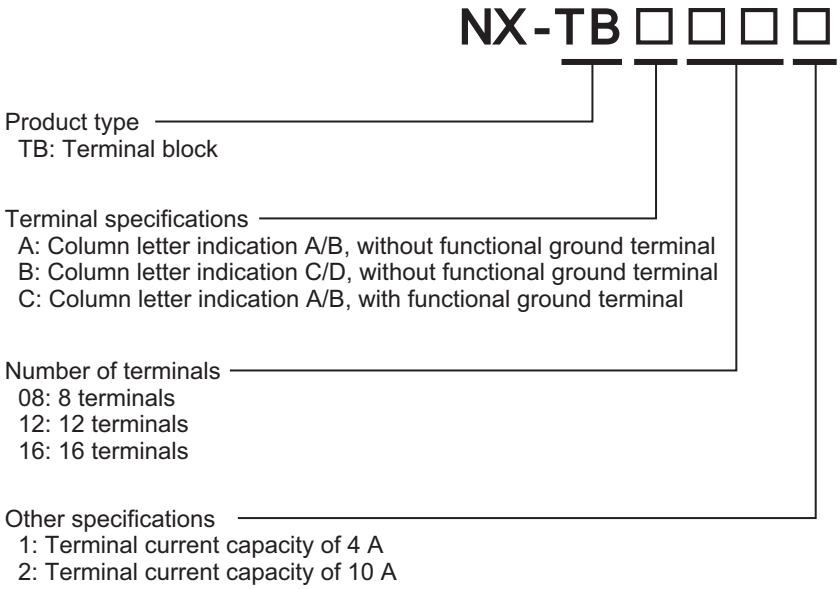
*8. The hardware version is assigned in ascending order from the earliest number of array elements. Any remainder elements are filled with spaces.

A-4 List of Screwless Clamping Terminal Block Models

This section explains how to read the screwless clamping terminal block models and shows the model table.

A-4-1 Model Notation

The screwless clamping terminal block models are assigned based on the following rules.



A-4-2 List of Terminal Block Models

The following table shows a list of screwless clamping terminal blocks.

Terminal block model	Number of terminals	Ground terminal mark	Terminal current capacity
NX-TBA081	8	Not provided	4 A
NX-TBA121	12		
NX-TBA161	16		
NX-TBB121	12		
NX-TBB161	16		
NX-TBA082	8		10 A
NX-TBA122	12		
NX-TBA162	16		
NX-TBB082	8		
NX-TBB122	12		
NX-TBB162	16		
NX-TBC082	8	Provided	
NX-TBC162	16		

Note When you purchase a terminal block, purchase an NX-TB□□□2.

A-5 Version Information with CPU Units

This section provides version-related information when connecting Units to a CPU Unit. This section describes the relationship between the unit versions of each Unit and the CPU Unit, and Sysmac Studio version.

A-5-1 Relationship between Unit Versions of Units

The relationship between the unit versions of each Unit and the CPU Unit, and Sysmac Studio version are indicated.

Interpreting the Version Combination Tables

The items that are used in the version combination tables are given below.

Refer to the user's manual for the CPU Unit for the models of CPU Unit to which NX Units can be connected.

NX Unit		Corresponding unit versions/versions	
Model	Unit version	CPU Unit	Sysmac Studio
Model number of NX Units.	Unit versions of NX Units.	Unit versions of the CPU that are compatible with the NX Units.	Sysmac Studio versions that are compatible with the NX Units and CPU Units.

Version Combination Tables

- With the combinations of the unit versions/versions shown below, you can use the functions that are supported by the unit version of the Unit model. Use the unit versions/versions (or the later/higher unit versions/versions) that correspond to the NX Unit models and the unit versions. You cannot use the specifications that were added or changed for the relevant NX Unit models and the unit versions unless you use the corresponding unit versions/versions.
- Depending on the type and model of the Unit to which the NX Unit is connected, some Units do not have the corresponding versions given in the table. If a Unit does not have the specified version, support is provided by the oldest available version after the specified version. Refer to the user's manuals for the specific Units for the relation between models and versions.
- If you use the corresponding unit versions/versions given in the following table or later/higher versions, refer to the version information on the CPU Unit.

NX Unit		Corresponding unit versions/versions	
Model	Unit version	CPU Unit	Sysmac Studio
NX-PD1000	Ver. 1.0	Ver.1.13	Ver. 1.17
NX-PF0630			
NX-PF0730			
NX-PC0020			
NX-PC0010			
NX-PC0030			
NX-TBX01			

A-6 Version Information with Communications Coupler Units

This section provides version-related information when connecting Units to a Communications Coupler Unit. Version information is provided for each Communications Coupler Unit that an NX Unit is connected to.

A-6-1 Connection to an EtherCAT Coupler Unit

The relationship between the unit versions of each Unit, EtherCAT Coupler Unit, CPU Unit and Industrial PC, and versions of the Sysmac Studio are shown below.

Relationship between Unit Versions of Units

The items that are used in the version combination tables are given below.

NX Unit		Corresponding unit versions/versions		
Model	Unit version	EtherCAT Coupler Units	CPU Units or Industrial PCs	Sysmac Studio
Model numbers of NX Units.	Unit versions of NX Units.	Unit versions of EtherCAT Coupler Units that are compatible with the NX Units.	Unit versions of NJ/NX-series CPU Units or NY-series Industrial PCs that are compatible with the EtherCAT Coupler Units.	Sysmac Studio versions that are compatible with the NX Units, EtherCAT Coupler Units, CPU Units and Industrial PCs.

The version combination table is given below.

- With the combinations of the unit versions/versions shown below, you can use the functions that are supported by the unit version of the Unit model. Use the unit versions/versions that correspond to the NX Unit models and the unit versions or the later/higher versions. You cannot use the specifications that were added or changed for the relevant NX Unit models and the unit versions unless you use the corresponding unit versions/versions.
- Depending on the type and model of the Unit to which the NX Unit is connected, some Units do not have the corresponding versions given in the table. If a Unit does not have the specified version, support is provided by the oldest available version after the specified version. Refer to the user's manuals for the specific Units for the relation between models and versions.
- If you use the corresponding unit versions/versions given in the following table or later/higher versions, refer to the version information in the user's manual for Communications Coupler Unit, CPU Unit, and Industrial PC.

NX Unit		Corresponding unit versions/versions		
Model	Unit version	EtherCAT Coupler Unit	CPU Unit or Industrial PC	Sysmac Studio
NX-PD1000	Ver. 1.0	Ver. 1.0	Ver. 1.05	Ver. 1.06
NX-PF0630				
NX-PF0730				Ver. 1.08
NX-PC0020				Ver. 1.06
NX-PC0010				
NX-PC0030				
NX-TBX01				

A-6-2 Connection to an EtherNet/IP Coupler Unit

The relationship between the unit versions of each Unit, EtherNet/IP Coupler Unit, CPU Unit and Industrial PC, and versions of the Sysmac Studio and NX-IO Configurator are shown below.

Relationship between Unit Versions of Units

The items that are used in the version combination tables are given below.

NX Unit		Corresponding unit versions/versions					
Model	Unit version	Application with an NJ/NX/NY-series Controller			Application with a CS/CJ/CP-series PLC		
		EtherNet/IP Coupler Unit	CPU Unit or Industrial PC	Sysmac Studio	EtherNet/IP Coupler Unit	Sysmac Studio	NX-IO Configurator
Model number of NX Unit	Unit version of the NX Unit	Unit version of EtherNet/IP Coupler Unit that is compatible with the NX Unit	Unit version of NJ/NX-series CPU Unit or NY-series Industrial PC that is compatible with the EtherNet/IP Coupler Unit	Sysmac Studio version that is compatible with the NX Unit, EtherNet/IP Coupler Unit, CPU Unit, and Industrial PC	Unit version of EtherNet/IP Coupler Unit that is compatible with the NX Unit	Sysmac Studio version that is compatible with the NX Unit, EtherNet/IP Coupler Unit, and CPU Unit	NX-IO Configurator version that is compatible with the NX Unit, EtherNet/IP Coupler Unit, and CPU Unit

The version combination table is given below.

- With the combinations of the unit versions/versions shown below, you can use the functions that are supported by the unit version of the Unit model. Use the unit versions/versions (or the later/higher unit version/versions) that correspond to the NX Unit models and the unit versions. You cannot use the specifications that were added or changed for the relevant NX Unit models and the unit versions unless you use the corresponding unit versions/versions.
- Depending on the type and model of the Unit to which the NX Unit is connected, some Units do not have the corresponding versions given in the table. If a Unit does not have the specified version, support is provided by the oldest available version after the specified version. Refer to the user's manuals for the specific Units for the relation between models and versions.
- If you use the corresponding unit versions/versions given in the following table or later/higher versions, refer to the version information in the user's manual for the Communications Coupler Unit, CPU Unit, and Industrial PC.

NX Unit		Corresponding unit versions/versions					
Model	Unit version	Application with an NJ/NX/NY-series Controller*1			Application with a CS/CJ/CP-series PLC*2		
		EtherNet/IP Coupler Unit	CPU Unit or Industrial PC	Sysmac Studio	EtherNet/IP Coupler Unit	Sysmac Studio	NX-IO Configurator*3
NX-PD1000	Ver. 1.0	Ver. 1.2	Ver. 1.14	Ver. 1.19	Ver. 1.0	Ver. 1.10	Ver. 1.00
NX-PF0630							
NX-PF0730							
NX-PC0020							
NX-PC0010							
NX-PC0030							
NX-TBX01							

*1. Refer to the user's manual for the EtherNet/IP Coupler Units for information on the unit versions of EtherNet/IP Units that are compatible with EtherNet/IP Coupler Units.

*2. Refer to the user's manual for the EtherNet/IP Coupler Units for information on the unit versions of CPU Units and EtherNet/IP Units that are compatible with EtherNet/IP Coupler Units.

*3. For connection to an EtherNet/IP Coupler Unit with unit version 1.0, You can connect only to the peripheral USB port on the EtherNet/IP Coupler Unit. You cannot connect with any other path. If you need to connect by another path, use an EtherNet/IP Coupler Unit with unit version 1.2 or later.

I

Index

Index

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