OMRON

Machine Automation Controller

NX-series

# EtherNet/IP™ Coupler Unit

## User's Manual

NX-EIC202

EtherNet/IP Coupler Unit


W536-E1-11

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# Introduction

Thank you for purchasing an NX-series EtherNet/IP Coupler Unit.
This manual contains information that is necessary to use the NX-series EtherNet/IP Coupler Unit.
Please read this manual and make sure you understand the functionality and performance of the NX-series EtherNet/IP Coupler 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 EtherNet/IP Coupler Unit
  NX-EIC202

# Relevant Manuals

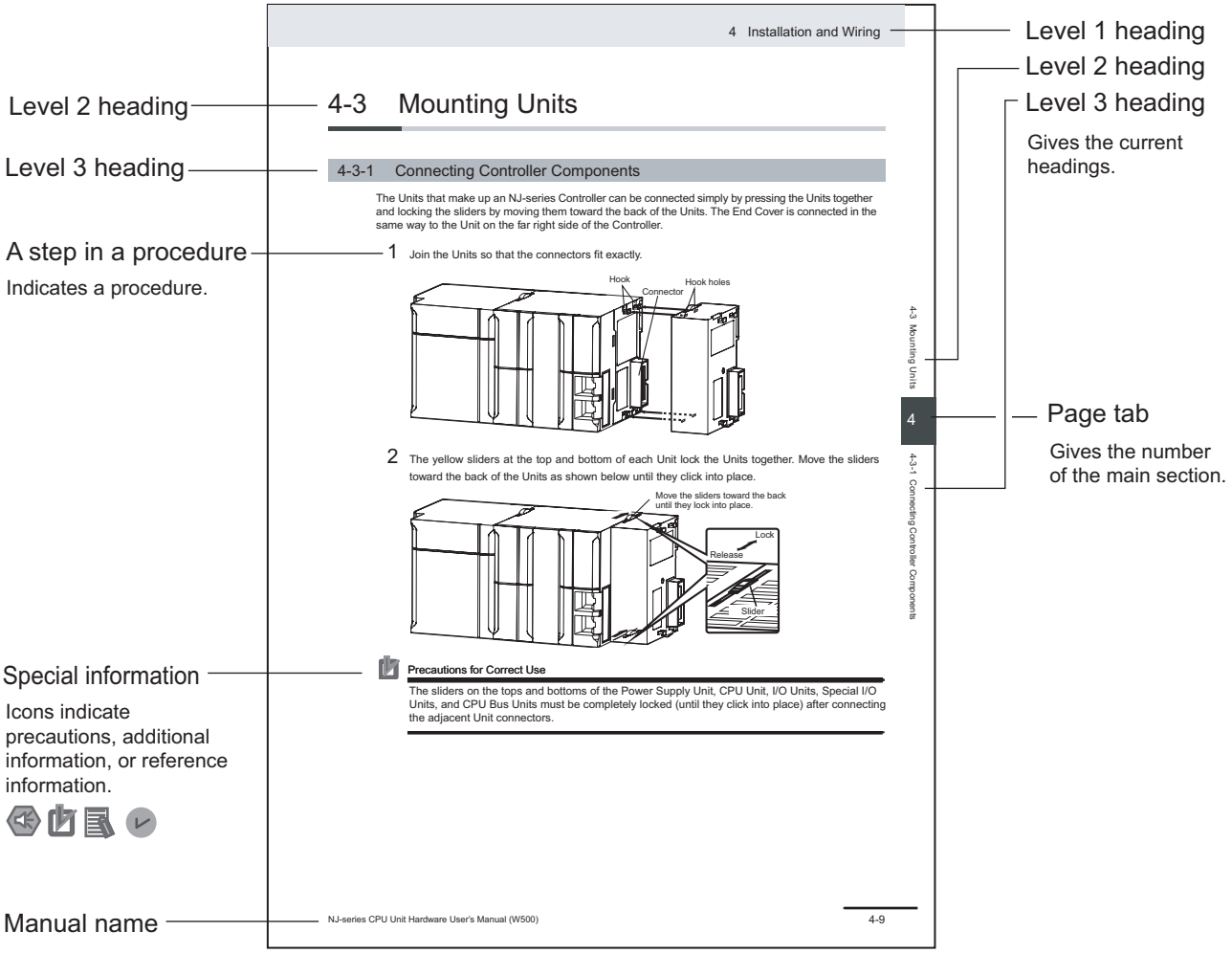
The table below provides the relevant manuals for the NX-series EtherNet/IP Coupler Units.
Read all of the manuals that are relevant to your system configuration and application to make the most of the NX-series EtherNet/IP Coupler Units.
Other manuals, such as related product manuals, are necessary for specific system configurations and applications. Refer to *Related Manuals* on page 35 for the related manuals.

| Manual name | Application |
|---|---|
| NX-series EtherNet/IP™ Coupler Unit User's Manual | Leaning how to use an NX-series EtherNet/IP Coupler Unit and EtherNet/IP Slave Terminals |
| NX-series Data Reference Manual | Referencing lists of the data that is required to configure systems with NX-series Units |

# Manual Structure

## Page Structure

The following page structure is used in this manual.




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**

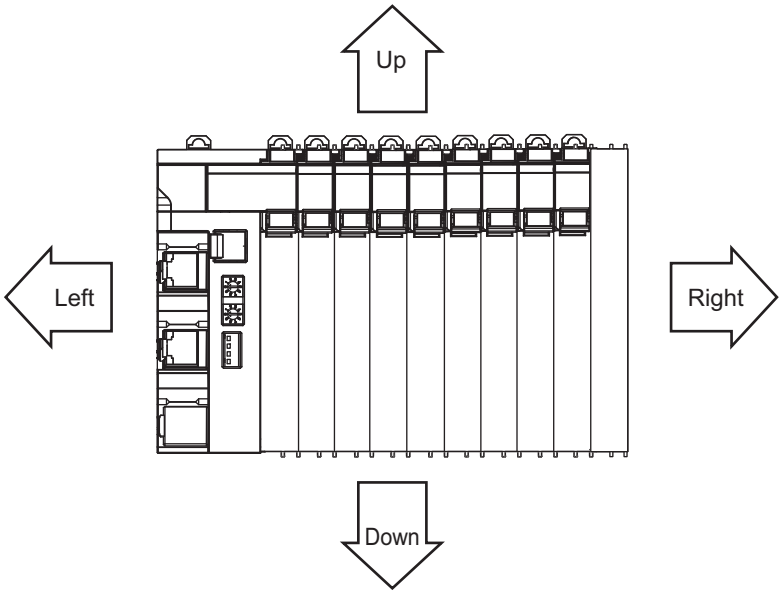
Additional information to read as required.
This information is provided to increase understanding or make operation easier.

**Version Information**

Information on differences in specifications and functionality for Controller with different unit versions and for different versions of the Sysmac Studio is given.

## 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 EtherNet/IP port on an *NJ/NX-series CPU Unit* or *NY-series Industrial PC* as simply a *built-in EtherNet/IP 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 35 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 EtherNet/IP™ Port User's Manual | User's manual for built-in EtherNet/IP port on the connected CPU Unit or Industrial PC | Built-in EtherNet/IP port |
| NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherNet/IP™ Port User's Manual | | |

# Sections in this Manual

# CONTENTS



## Section 1 EtherNet/IP Networks

## Section 6 Installation



## Section 7 Wiring



## Section 8 EtherNet/IP Communications

## Section 9 Setting Up Slave Terminals



## Section 10 I/O Refreshing



## Section 11 EtherNet/IP Coupler Unit Functions

## Section 12 Troubleshooting



## Section 13 Maintenance and Inspection

# Appendices



# Index

# Terms and Conditions Agreement

## Warranty, Limitations of Liability

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# Safety Precautions

## Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of the .
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.<br>The specific operation is shown in the circle and explained in text.<br>This example indicates prohibiting disassembly. |
|  | The triangle symbol indicates precautions (including warnings).<br>The specific operation is shown in the triangle and explained in text.<br>This example indicates a precaution for electric shock. |
|  | The triangle symbol indicates precautions (including warnings).<br>The specific operation is shown in the triangle and explained in text.<br>This example indicates a general precaution. |
|  | The filled circle symbol indicates operations that you must do.<br>The specific operation is shown in the circle and explained in text.<br>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.

## Security Measures

**Anti-virus protection**
Install the latest commercial-quality antivirus software on the computer connected to the control system and maintain to keep the software up-to-date.

**Security measures to prevent unauthorized access**
Take the following measures to prevent unauthorized access to our products.

- Install physical controls so that only authorized personnel can access control systems and equipment.
- Reduce connections to control systems and equipment via networks to prevent access from untrusted devices.
- Install firewalls to shut down unused communications ports and limit communications hosts and isolate control systems and equipment from the IT network.
- Use a virtual private network (VPN) for remote access to control systems and equipment.
- Adopt multifactor authentication to devices with remote access to control systems and equipment.
- Set strong passwords and change them frequently.
- Scan virus to ensure safety of USB drives or other external storages before connecting them to control systems and equipment.

**Data input and output protection**
Validate backups and ranges to cope with unintentional modification of input/output data to control systems and equipment.

- Checking the scope of data
- Checking validity of backups and preparing data for restore in case of falsification and abnormalities
- Safety design, such as emergency shutdown and fail-soft operation in case of data tampering and abnormalities

**Data recovery**
Backup data and keep the data up-to-date periodically to prepare for data loss.

When using an intranet environment through a global address, connecting to a SCADA or an unauthorized terminal such as an HMI or to an unauthorized server may result in network security issues such as spoofing and tampering. You must take sufficient measures such as restricting access to the terminal, using a terminal equipped with a secure function, and locking the installation area by yourself.

When constructing an intranet, communication failure may occur due to cable disconnection or the influence of unauthorized network equipment. Take adequate measures, such as restricting physical access to network devices, by means such as locking the installation area.

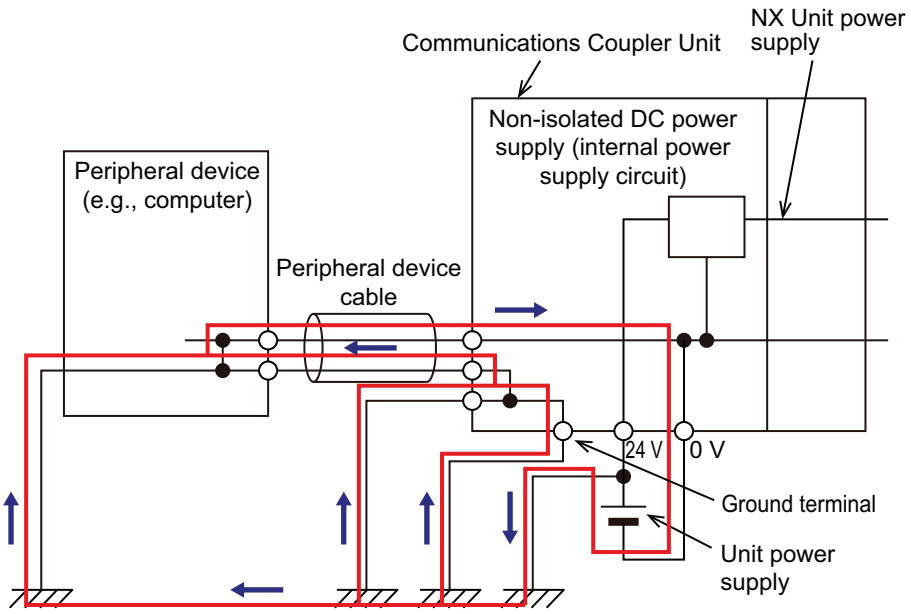
When using a device equipped with the SD Memory Card function, there is a security risk that a third party may acquire, alter, or replace the files and data in the removable media by removing the removable media or unmounting the removable media. Please take sufficient measures, such as restricting physical access to the Controller or taking appropriate management measures for removable media, by means of locking the installation area, entrance management, etc., by yourself.

## 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

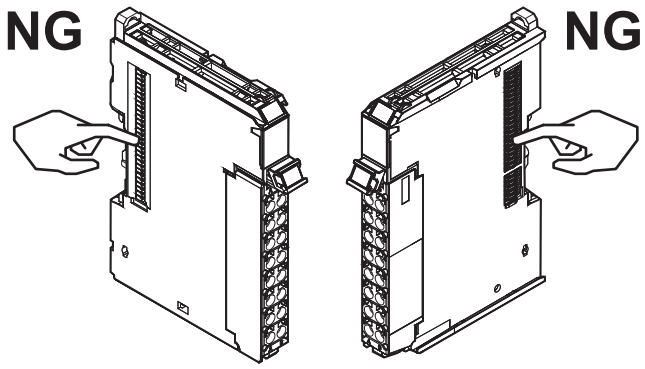
- When transporting any Unit, use the special packing box for it.
  Also, do not subject the Unit to excessive vibration or shock during transportation.
- Do not drop any Unit or subject it to abnormal vibration or shock.
  Doing so may result in Unit malfunction or burning.

## 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.

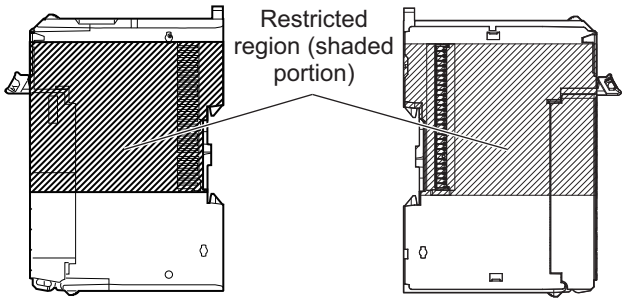
## Installation

- Always turn OFF the power supply before installing the Unit. If the power supply is not OFF, the Unit may malfunction or may be damaged.
- Always turn OFF the Unit power supply and I/O power supply before you remove the NX Unit.
- 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.

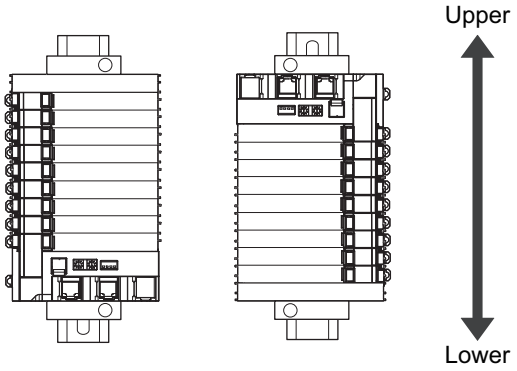



Example: NX Unit (12 mm width)

- Do not write on the Communications Coupler Unit or 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 Slave Terminal.



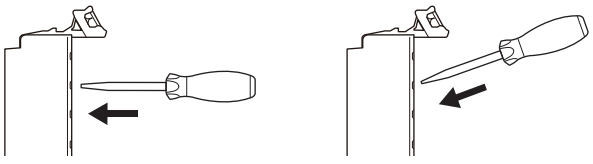

- For the installation orientations in the following figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables. The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured 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.
- 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.
  a) Mounting or removing an NX Unit, Communications Coupler Unit, CPU Unit, Industrial PC, or Communication Control Unit
  b) Assembling Units
  c) Setting DIP switches or rotary switches
  d) Connecting or wiring cables
  e) 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.
  a) Changing the operating mode of the CPU Unit or Industrial PC (including changing the setting of the Operating Mode at Startup)
  b) Changing the user program or settings
  c) Changing set values or present values
  d) Forced refreshing
- Always sufficiently check the safety at the connected devices before you change the settings of a slave or Unit.

## EtherNet/IP Communications

- Make sure that the communications distance, number of nodes connected, and method of connection for EtherNet/IP are within specifications.
  Do not connect EtherNet/IP Coupler Units to an EtherCAT network.
- Malfunctions or unexpected operation may occur for some combinations of EtherNet/IP revisions of the master and slaves. If you disable the revision check in the network settings, check the slave revision settings in the master and the actual slave revisions, and then make sure that functionality is compatible in the manuals or other references. You can check the slave versions in the settings from the Support Software and you can check the actual slave revisions from the Support Software or on slave nameplates.
- After you transfer the user program, the CPU Unit is restarted and communications with the EtherNet/IP slaves are cut off. During that period, the slave outputs behave according to the *slave settings*.
  The time that communications are cut off depends on the EtherNet/IP network configuration. Before you transfer the user program, confirm that the system will not be adversely affected.
- EtherNet/IP communications are not always established immediately after the power supply is turned ON. Use the slave terminal status bits in the user program to confirm that communications are established before attempting control operations.
- If frames sent to EtherNet/IP slaves are lost due to noise or other causes, slave I/O data is not communicated, and the intended operation is sometimes not achieved. Perform the following processing if noise countermeasures are necessary.

Program the Slave Terminal Status (refer to *9-2-3 I/O Allocation Information* on page 9-12 ) and/or Unit status CIO bits as an interlock condition in the user program.
Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for details.

- When an EtherNet/IP slave is *disconnected*, communications will stop and control of the outputs will be lost not only for the disconnected slave, but for all slaves connected after it. Confirm that the system will not be adversely affected before you *disconnect* a slave.
- If you disconnect the cable from an EtherNet/IP slave to disconnect it from the network, any current communications frames will be lost. If frames are lost, slave I/O data is not communicated, and the intended operation is sometimes not achieved. Perform the following processing for a slave that needs to be replaced.
  Program the Slave Terminal Status (refer to *9-2-3 I/O Allocation Information* on page 9-12 ) and/or Unit status CIO bits as an interlock condition in the user program.
  Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for details.
- Separate the EtherNet/IP communications from the office network to avoid EtherNet/IP communication failures.

## 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.
- Use the EtherNet/IP connection methods and applicable cables that are specified in this manual and in the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)*. Otherwise, communications may be faulty.

## 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 Communications Coupler Unit or NX Units.

## EtherNet/IP Communications

Do not disconnect the EtherNet/IP communications cables during operation. The outputs will become unstable.

# Regulations and Standards

## Using this products in other countries

In this products, when you export the goods (or technologies) that need an export permission or approval regulated by the Foreign Exchange and Foreign Trade Control Act, you must obtain the export permission or approval (or permission for service transactions) based on this Act.

## Conformance to EU Directives

### Applicable Directives

- EMC Directives
- Low Voltage Directive

### Concepts

#### ● EMC Directives

OMRON devices that comply with EC 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 EN61010-2-201.

#### ● 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 S8JX-series Power Supplies. EMC standard compliance was confirmed for the 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.

### Usage Conditions for NK and LR Shipbuilding Standards

- The EtherNet/IP Coupler Unit must be installed within a control panel.
- Gaps in the door to the control panel must be completely filled or covered with gaskets or other material.
- The following noise filter must be connected to the power supply line.

| Name | Manufacturer | Model |
|---|---|---|
| Noise filter | Cosel Co., Ltd. | TAH-06-683 |

## Conformance to KC Certification

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

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

Class A Device (Broadcasting Communications Device for Office Use)

This device obtained EMC registration for office use (Class A), and it is intended to be used in places other than homes.
Sellers and/or users need to take note of this.

## 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/ and http://www.fa.omron.co.jp/nx_info_e/.

# Unit Versions

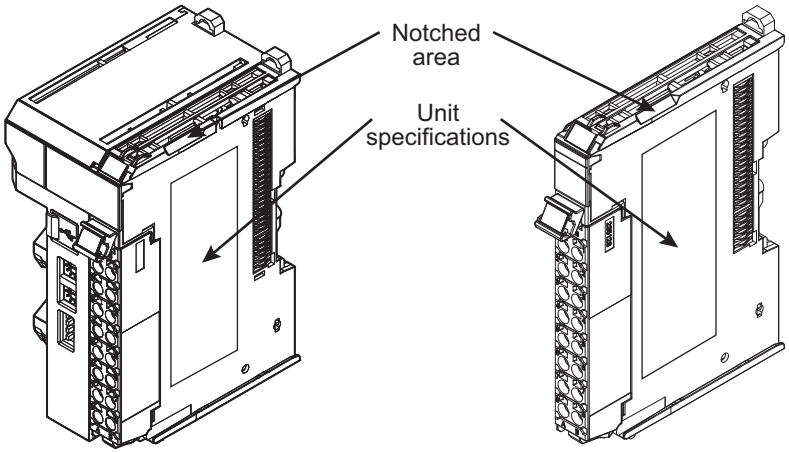
This section describes the notation that is used for unit versions, the confirmation method for unit versions, and the relationship between unit versions and Support Software versions.

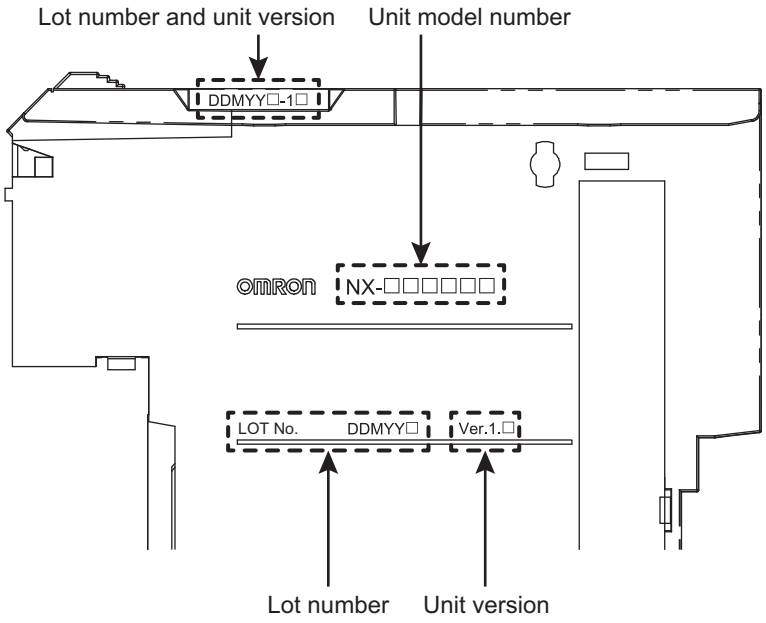
## Unit Versions

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

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

## Confirming Unit Versions with the Support Software

You can use Support Software to check unit versions. The confirmation method depends on the Support Software.

### ● Checking Unit Versions with the Sysmac Studio

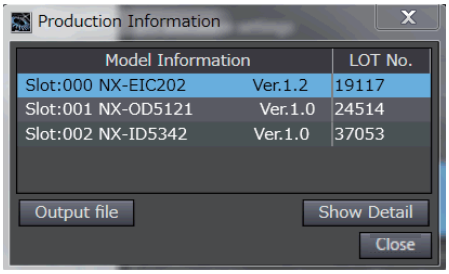
You can use the **Production Information** on the Sysmac Studio to check the unit versions of EtherNet/IP Coupler Unit and NX Units.

***1*** Select **Configurations and Setup** in the Multiview Explorer and then select **EtherNet/IP**. Double-click the EtherNet/IP Coupler Unit under EtherNet/IP. Or, right-click the EtherNet/IP Coupler Unit and select **Edit** from the menu.
The Edit Slave Terminal Configuration Tab Page is displayed.

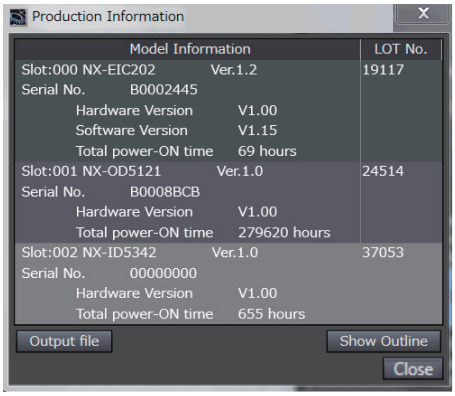
You can also display the Edit Slave Terminal Configuration Tab Page with any of the following operations.
Double-click **EtherNet/IP** under **Configurations and Setup** in the Multiview Explorer, right-click the EtherNet/IP Coupler Unit in the EtherNet/IP Configuration Edit Tab Page, and select **Edit Slave Terminal Configuration**.
Or, select the EtherNet/IP Coupler Unit on the EtherNet/IP Configuration Edit Tab Page, and then click the **Edit Slave Terminal Configuration** button.

***2*** Go online.

***3*** Right-click the EtherNet/IP Coupler Unit and select **Display Production Information** from the menu.
The **Production Information** Dialog Box is displayed.




Simple Display




Detailed Display

The unit version is displayed on the right of the Unit model. The unit version is 1.2 in the example above.

The following items are displayed except the unit version.

- Slot number
- Unit model number
- Serial number
- Lot number
- Hardware version
- Software version
- Total power-ON time

The software version is displayed only for Units that contain software.

### ● Checking Unit Versions with Support Software Other Than the Sysmac Studio

You can use Support Software other than the Sysmac Studio to check the unit versions of the Communications Coupler Unit and NX Units.

Refer to the operation manual for each type of Support Software for the methods to check unit versions.

## 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 required to use those functions.

Refer to *A-10 Version Information* on page A-74 for the functions that are supported by each unit version.

# Related Manuals

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

| 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. |
| EtherNet/IP™ Units Operation Manual | W465 | CS1W-EIP21<br>CJ1W-EIP21<br>CJ2H-CPU6□-EIP<br>CJ2M-CPU3□ | Learning how to use an EtherNet/IP Unit | Information on using an EtherNet/IP Unit that is connected to a CS/CJ-series CPU Unit is provided. Information is provided on the basic setup, tag data links, and FINS communications. |
| Sysmac Studio Version 1 Operation Manual | W504 | SYSMAC<br>-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-<br>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-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | 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-□□□□<br>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 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. |
| NX-series Digital I/O Units User's Manual | W521 | NX-ID□□□□<br>NX-IA□□□□<br>NX-OC□□□□<br>NX-OD□□□□<br>NX-MD□□□□ | Learning how to use NX-series Digital I/O Units. | The hardware, setup methods, and functions of the NX-series Digital I/O Units are described. |
| NX-series Analog I/O Units User's Manual for Analog Input Units and Analog Output Units*1 | W522 | NX-AD□□□□<br>NX-DA□□□□ | Learning how to use NX-series Analog Input Units and Analog Output Units | The hardware, setup methods, and functions of the NX-series Analog Input Units and Analog Output Units are described. |
| NX-series System Units User's Manual | W523 | NX-PD1□□□<br>NX-PF0□□□<br>NX-PC0□□□<br>NX-TBX01 | Learning how to use NX-series System Units. | The hardware and functions of the NX-series System Units are described. |

| Manual name | Cat.No. | Model numbers | Application | Description |
|---|---|---|---|---|
| NX-series<br>Position Interface Units<br>User's Manual | W524 | NX-EC0□□□<br>NX-ECS□□□<br>NX-PG0□□□ | Learning how to use NX-series Position Interface Units. | The hardware, setup, and functions for the NX-series Incremental Encoder Input Units, SSI Input Units, and Pulse Output Unit are described. |
| NX-series<br>Load Cell Input Unit<br>User's Manual | W565 | NX-RS□□□□ | Learning how to use an NX-series Load Cell Input Unit. | The hardware, setup methods, and functions of the NX-series Load Cell Input Unit are described. |
| NX-series Analog I/O Units<br>User's Manual for Temperature Input Units and Heater Burnout Detection Units*2 | W566 | NX-TS□□□□<br>NX-HB□□□□ | Learning how to use NX-series Temperature Input Units and Heater Burnout Detection Units | The hardware, setup methods, and functions of the NX-series Temperature Input Units and Heater Burnout Detection Units are described. |
| NX/GX-series<br>IO-Link System User's Manual | W570 | NX-ILM400<br>GX-ILM08C | Learning everything from an introduction to details about IO-Link Systems that use NX/GX-series IO-Link Master Units, including mainly software information common to all IO-Link masters, Support Software operating methods, and troubleshooting. | Provides an overview of IO-Link Systems that use NX/GX-series IO-Link Master Units and explains the system configuration, communications specifications, communications methods, I/O data, parameters, functions, Support Software, and troubleshooting. |
| NX-series<br>IO-Link Master Unit<br>User's Manual | W567 | NX-ILM400 | Learning hardware information, wiring, and specifications for the NX-series IO-Link Master Unit and checking a list of NX objects. | Describes part names, functions, installation, and wiring and also provides tables of specifications and NX objects for the NX-series IO-Link Master Unit. |
| NX-series<br>Communications Interface Units<br>User's Manual | W540 | NX-CIF□□□ | Learning how to use NX-series Communications Interface Units. | The hardware, setup methods, and functions of the NX-series Communications Interface Unit are described. |
| NX-series Temperature Control Units<br>User's Manual | H228 | NX-TC□□□□ | Learning how to use NX-series Temperature Control Units. | The hardware, setup methods, and functions of the NX-series Temperature Control Units are described. |
| NX-series<br>Safety Control Unit<br>User's Manual | Z930 | NX-SL□□□□<br>NX-SI□□□□<br>NX-SO□□□□ | Learning how to use NX-series Safety Control Units. | Describes the hardware, setup methods, and functions of the NX-series Safety Control Units. |
| NX-series<br>Safety Control Unit<br>Instructions Reference Manual | Z931 | NX-SI□□□□ | Learning about the specifications of instructions for the Safety CPU Unit. | The instructions for the Safety CPU Unit are described. When programming, use this manual together with the . |
| NX-series CPU Unit<br>Hardware User's Manual | W535 | NX701-□□□□ | Learning the basic specifications of the NX701 CPU Units, including introductory information, designing, installation, and maintenance.<br>Mainly hardware information is provided. | An introduction to the entire NX701 system is provided along with the following information on the CPU Unit.<br>• Features and system configuration<br>• Introduction<br>• Part names and functions<br>• General specifications<br>• Installation and wiring<br>• Maintenance and inspection |

| Manual name | Cat.No. | Model numbers | Application | Description |
|---|---|---|---|---|
| NX-series<br>NX502 CPU Unit<br>Hardware<br>User's Manual | W629 | NX502-□□□□ | Learning the basic specifications of the NX502 CPU Units, including introductory information, designing, installation, and maintenance.<br>Mainly hardware information is provided. | An introduction to the entire NX502 system is provided along with the following information on the CPU Unit.<br>• Features and system configuration<br>• Introduction<br>• Part names and functions<br>• General specifications<br>• Installation and wiring<br>• Maintenance and inspection |
| NX-series<br>NX102 CPU Unit<br>Hardware<br>User's Manual | W593 | NX102-□□□□ | Learning the basic specifications of the NX102 CPU Units, including introductory information, designing, installation, and maintenance.<br>Mainly hardware information is provided. | An introduction to the entire NX102 system is provided along with the following information on the CPU Unit.<br>• Features and system configuration<br>• Introduction<br>• Part names and functions<br>• General specifications<br>• Installation and wiring<br>• Maintenance and inspection |
| NX-series<br>NX1P2 CPU Unit<br>Hardware<br>User's Manual | W578 | NX1P2-□□□□ | Learning the basic specifications of the NX1P2 CPU Units, including introductory information, designing, installation, and maintenance.<br>Mainly hardware information is provided. | An introduction to the entire NX1P2 system is provided along with the following information on the CPU Unit.<br>• Features and system configuration<br>• Introduction<br>• Part names and functions<br>• General specifications<br>• Installation and wiring<br>• Maintenance and inspection |
| NJ-series CPU Unit<br>Hardware User's Manual | W500 | NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | Learning the basic specifications of the NJ-series CPU Units, including introductory information, designing, installation, and maintenance.<br>Mainly hardware information is provided. | An introduction to the entire NJ-series system is provided along with the following information on the CPU Unit.<br>• Features and system configuration<br>• Introduction<br>• Part names and functions<br>• General specifications<br>• Installation and wiring<br>• Maintenance and inspection |
| NJ/NX-series CPU Unit<br>Software User's Manual | W501 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | Learning how to program and set up an NJ/NX-series CPU Unit.<br>Mainly software information is provided. | The following information is provided on a Controller built with an NJ/NX-series CPU Unit.<br>• CPU Unit operation<br>• CPU Unit features<br>• Initial settings<br>• Programming based on IEC 61131-3 language specifications |
| NJ/NX-series<br>CPU Unit<br>Built-in EtherNet/IP™ Port<br>User's Manual | W506 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | Using the built-in EtherNet/IP port on an NJ/NX-series CPU Unit. | Information on the built-in EtherNet/IP port is provided.<br>Information is provided on the basic setup, tag data links, and other features. |
| NJ/NX-series Instructions Reference Manual | W502 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | Learning detailed specifications on the basic instructions of an NJ/NX-series CPU Unit. | The instructions in the instruction set (IEC 61131-3 specifications) are described. |

| Manual name | Cat.No. | Model numbers | Application | Description |
|---|---|---|---|---|
| NJ/NX-series CPU Unit Motion Control User's Manual | W507 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | Learning about motion control settings and programming concepts. | The settings and operation of the CPU Unit and programming concepts for motion control are described. |
| NY-series IPC Machine Controller Industrial Panel PC Hardware User's Manual | W557 | NY532-□□□□ | Learning the basic specifications of the NY-series Industrial Panel PCs, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | An introduction to the entire NY-series system is provided along with the following information on the Industrial Panel PC.<br>• Features and system configuration<br>• Introduction<br>• Part names and functions<br>• General specifications<br>• Installation and wiring<br>• Maintenance and inspection |
| NY-series IPC Machine Controller Industrial Box PC Hardware User's Manual | W556 | NY512-□□□□ | Learning the basic specifications of the NY-series Industrial Box PCs, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | An introduction to the entire NY-series system is provided along with the following information on the Industrial Box PC.<br>• Features and system configuration<br>• Introduction<br>• Part names and functions<br>• General specifications<br>• Installation and wiring<br>• Maintenance and inspection |
| NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual | W558 | NY532-□□□□<br>NY512-□□□□ | Learning how to program and set up the Controller functions of an NY-series Industrial PC. | The following information is provided on the NY-series Controller functions.<br>• Controller operation<br>• Controller features<br>• Controller settings<br>• Programming based on IEC 61131-3 language specifications |
| NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherNet/IP™ Port User's Manual | W563 | NY532-□□□□<br>NY512-□□□□ | Using the built-in EtherNet/IP port in an NY-series Industrial PC. | Information on the built-in EtherNet/IP port is provided.<br>Information is provided on the basic setup, tag data links, and other features. |
| NY-series Instructions Reference Manual | W560 | NY532-□□□□<br>NY512-□□□□ | Learning detailed specifications on the basic instructions of an NY-series Industrial PC. | The instructions in the instruction set (IEC 61131-3 specifications) are described. |
| NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Motion Control User's Manual | W559 | NY532-□□□□<br>NY512-□□□□ | Learning about motion control settings and programming concepts of an NY-series Industrial PC. | The settings and operation of the Controller and programming concepts for motion control are described. |

*1. From revision 05 of this manual, information on the NX-series Temperature Input Units (NX-TS□□□□) that were included in previous revisions was moved to the following manual: *NX-series Analog I/O Units User's Manual for Temperature Input Units and Heater Burnout Detection Units (Cat. No. W566)*. Accompanying that change, the name of this manual was changed from the *NX-series Analog I/O Units User's Manual (Cat. No. W522)* to the *NX-series Analog I/O Units User's Manual for Analog Input Units and Analog Output Units (Cat. No. W522)*.

*2. The NX-series Temperature Input Units (NX-TS□□□□ ) that were included in the *NX-series Analog I/O Units User's Manual (Cat No. W522)* in revision 04 and earlier revisions were moved to this manual. For revision 05 of the *NX-series Analog I/O Units User's Manual (Cat No. W522)*, the manual name was changed to *NX-series Analog I/O Units User's Manual for Analog Input Units and Analog Output Units (Cat No. W522-E1-05)*.

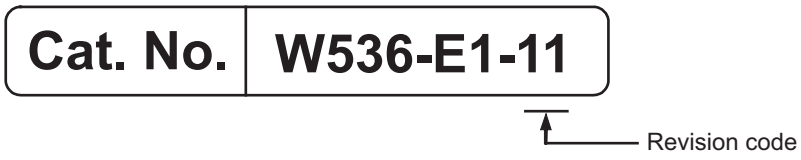
# Terminology

| Term | Abbre-viation | Description |
|---|---|---|
| Common Industrial Protocol | CIP | The CIP (Common Industrial Protocol) is a shared industrial protocol used in networks such as EtherNet/IP and DeviceNet. |
| Electronic Data Sheet | EDS | A text file that contains setting information for an EtherNet/IP slave. |
| EtherNet/IP slave | --- | A device that outputs the data that is received from the EtherNet/IP master through the EtherNet/IP network to a connected external device, and sends the data that is input from a connected external device to the EtherNet/ IP master through the EtherNet/IP network. An EtherNet/IP slave is also called an *adapter* . Furthermore, it refers to the *target* when opening a connection. |
| EtherNet/IP master | --- | A device that monitors the status of the connections with EtherNet/IP slaves and exchanges I/O data with EtherNet/IP slaves through the EtherNet/ IP network. OMRON EtherNet/IP masters include EtherNet/IP Units such as CJ1W-EIP21 and CS1W-EIP21 as well as the built-in EtherNet/ IP ports of CPU Units. An EtherNet/IP master is also called a *scanner* or *controller*. Furthermore, it refers to the *originator* when opening a connection. |
| 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. |
| NX bus | --- | The NX-series internal bus. |
| NX Unit 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. |
| NX Unit | --- | An I/O or System Unit connected to the bus of an NX Communication Coupler Unit. |
| PDO communications | --- | An acronym for process data communications. |
| index | --- | Address of an object within an application process. |
| object | --- | An abstract representation of a particular component within a device, which consists of data, parameters, and methods. |
| Operational | Op | A state in which NX message communications and I/O refresh communications are possible between the communications master and the Communications Coupler Unit or NX Units. |
| Originator | --- | The node that sends a request to open a connection at the time of opening a tag data link connection. |
| subindex | --- | Sub-address of an object within the object dictionary. |
| Slave Terminal | --- | A building-block remote I/O terminal, which consists of a Communication Coupler Unit connected with NX Units. |
| 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. |
| Target | --- | The node that receives a request to open a connection at the time of opening a tag data link connection. |
| Master from another manufacturer | --- | An EtherNet/IP master from another manufacturer. |

| Term | Abbre-viation | Description |
|---|---|---|
| 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. |
| Network Configuration Information | --- | The EtherNet/IP network configuration information held by the Ether-Net/IP master. |
| 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. |
| process data | --- | Collection of application objects designated to be transferred cyclically or acyclically for the purpose of measurement and control. |
| process data object | PDO | A structure that describes the mappings of parameters that have one or more process data entities. |
| Process Data Communications | --- | One type of NX bus communications in which process data objects (PDOs) are used to exchange information cyclically and in realtime. |

# 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 | December 2014 | Original production |
| 02 | April 2015 | Corrected mistakes. |
| 03 | June 2016 | • Updated the EtherNet/IP logo.<br>• Corrected mistakes. |
| 04 | June 2017 | • Made changes accompanying the upgrade of the NX-EIC202 unit version to version 1.2.<br>• Corrected mistakes. |
| 05 | October 2017 | Corrected mistakes. |
| 06 | April 2018 | • Made changes accompanying the addition of the NX-series NX102 CPU Unit.<br>• Corrected mistakes. |
| 07 | October 2018 | • Made revisions accompanying the appearance change of the indicators.<br>• Corrected mistakes. |
| 08 | December 2018 | Corrected mistakes. |
| 09 | November 2020 | Corrected mistakes. |
| 10 | July 2022 | Revisions for adding safety precautions regarding security. |
| 11 | October 2025 | Corrected mistakes, and revisions for adding descriptions. |

# 1



# EtherNet/IP Networks

This section provides an introduction to EtherNet/IP networks.

# 1-1 Introduction to EtherNet/IP

## 1-1-1 EtherNet/IP Features

EtherNet/IP is an industrial multi-vendor network that uses Ethernet. The EtherNet/IP specifications are open standards managed by the ODVA (Open DeviceNet Vendor Association), just like DeviceNet. EtherNet/IP is not just a network between Controllers. It is also used as a field network. Because EtherNet/IP uses standard Ethernet technology, various general-purpose Ethernet devices can be used in the network.

### ● High-speed, High-capacity Data Exchange through Tag Data Links

The EtherNet/IP protocol supports implicit communications (class 1 connections), which enable cyclic communications with EtherNet/IP devices. In this manual, these cyclic communications are called tag data links. Data can be exchanged at high speed between Controllers and devices.

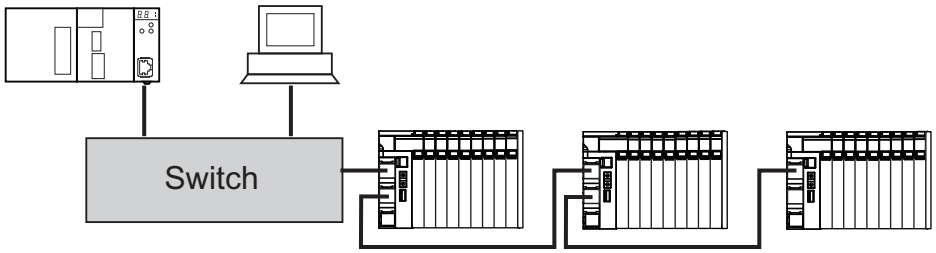
### ● Tag Data Link (Cyclic Communications) Cycle Time

Tag data links (cyclic communications) operate at the cyclic period specified for each connection, regardless of the number of nodes. Data is exchanged over the network at the refresh cycle set for each connection, so the communications refresh cycle does not increase even if the number of nodes is increased. Also, the concurrency of the connection's data is maintained. Since the refresh cycle can be set for each connection, each application can communicate at its ideal refresh cycle. For example, inter-process interlocks can be transferred at high speed, while the production commands and the status monitor information are transferred at low speed.

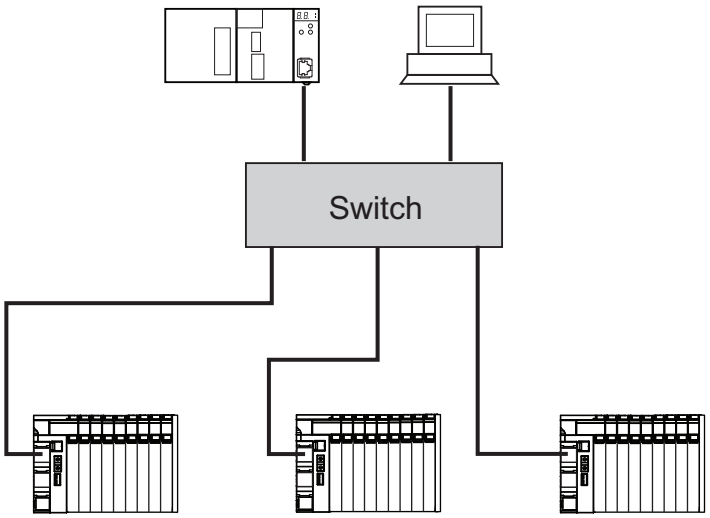
### ● Flexible Network Topology

Line, star and tree topologies are possible with the dual communication port configuration of the EtherNet/IP Coupler Unit.

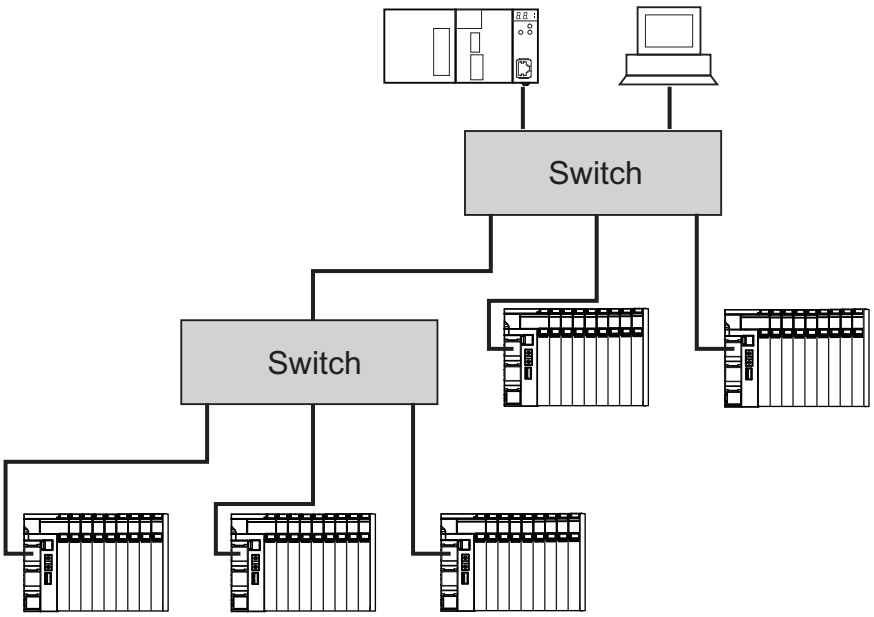
- Line




- Star

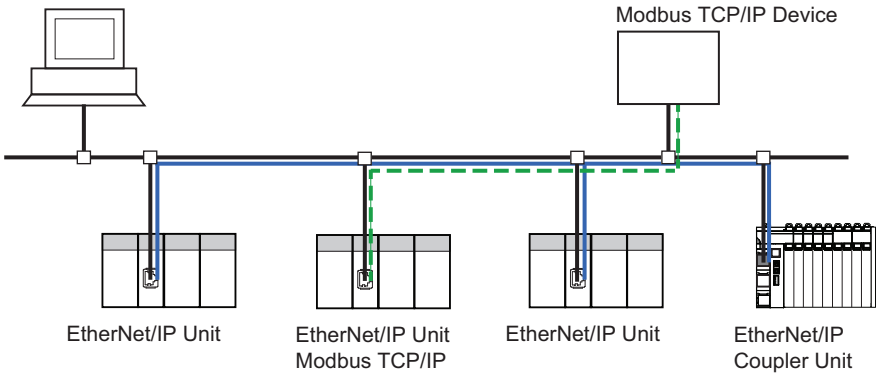



- Tree



## Parallel Protocols

Various, general-purpose Ethernet devices can be used within the same EtherNet/IP network because EtherNet/IP uses standard Ethernet technology. Additional protocols such as Modbus/TCP can be used in parallel to EtherNet/IP when communicating with other devices.

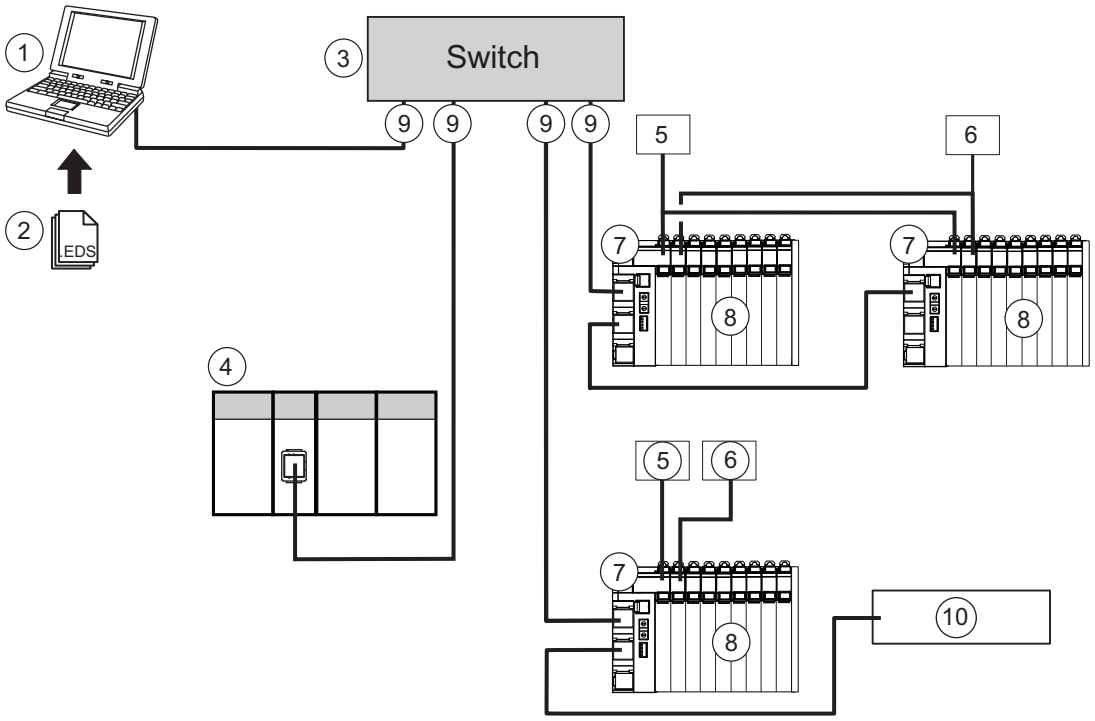


# 1-2 EtherNet/IP Network Configuration Elements

This section describes the devices that configure EtherNet/IP networks and the usage of those devices.

## 1-2-1 System Configuration Example of an EtherNet/IP Network

This section provides a system configuration example of an EtherNet/IP network.




| Item Number | Item |
|---|---|
| 1 | Support Software |
| 2 | EDS File |
| 3 | Ethernet Switch |
| 4 | EtherNet/IP master |
| 5 | NX Unit Power Supply |
| 6 | NX I/O Power Supply |
| 7 | EtherNet/IP Coupler Unit |
| 8 | NX Units |
| 9 | Communication Cables |
| 10 | EtherNet/IP slaves |

## 1-2-2 Introduction to Configuration Devices

This section introduces the configuration devices.

### EtherNet/IP Master

The EtherNet/IP master monitors the status of the connections with EtherNet/IP slaves and exchanges I/O data with EtherNet/IP slaves through the EtherNet/IP network. The OMRON EtherNet/IP masters include EtherNet/IP Units, such as the CJ1W-EIP21 and CS1W-EIP21, as well as EtherNet/IP ports built into CPU Units. Furthermore, you can use an EtherNet/IP master from another manufacturer. An EtherNet/IP master from another manufacturer is referred to as a master from another manufacturer.

### EtherNet/IP Slaves

The EtherNet/IP slaves output the data that is received from the EtherNet/IP master through the EtherNet/IP network to connected external devices. They also send data that is input from connected external devices to the EtherNet/IP master through the EtherNet/IP network.

### EtherNet/IP Slave Terminals

An EtherNet/IP Slave Terminal is a building-block EtherNet/IP slave that is created by mounting a group of NX Units to an EtherNet/IP Coupler Unit.

Refer to *Section 2 Features and System Configuration* on page 2-1 for details on the features and system configuration of an EtherNet/IP Slave Terminal.

- **EtherNet/IP Coupler Unit**

  An EtherNet/IP Coupler Unit is a Communications Coupler Unit that connects NX Units to an EtherNet/IP network.

- **NX Units**

  The NX I/O Units perform I/O refresh communications with the EtherNet/IP master through the EtherNet/IP Coupler Unit.

### Ethernet Switch

A relay device that connects multiple nodes in a star-shaped LAN.

### Communications Cables

This cable is used to connect the built-in EtherNet/IP port or EtherNet/IP Unit to an Ethernet switch. Use an STP (shielded twisted-pair) cable of category 5 (100BASE-TX) or higher.

## EDS (Electronic Data Sheet) Files

The files contain information that is unique to the EtherNet/IP slaves.
You can load the EDS files into the Support Software to set up connections with the slaves, edit parameters in the slaves, and easily make other settings.
The EDS files for OMRON EtherNet/IP slaves are already installed in the Sysmac Studio and Network Configurator.
You can update the Sysmac Studio, CX-One, or from OMRON websites to get the ESI files for the most recent models.

## NX Unit Power Supplies

Unit power supplies provide power for communications and the internal operation of EtherNet/IP Slave Terminals.

## NX I/O Power Supplies

I/O power supplies provide power for the I/O operation of the external devices that are connected to EtherNet/IP Slave Terminals.

# 1-2-3 Support Software Used to Construct a Network

There are several types of Support Software for network configuration. They are used as follows depending on the purpose.

| Purpose | Description | Applicable Support Software |
|---|---|---|
| EtherNet/IP Unit settings | Basic settings of an EtherNet/IP Unit when using an EtherNet/IP Unit as the EtherNet/IP master | • Sysmac Studio<br>• CX-Programmer |
| EtherNet/IP network configurations | Tag data link settings of an EtherNet/IP master | Network Configurator |
| EtherNet/IP Coupler Unit configurations | Settings of an EtherNet/IP Coupler Unit | Sysmac Studio |
| I/O mapping | I/O allocations of NX Units that are connected to the EtherNet/IP Coupler Unit | |

## EtherNet/IP Unit Settings: Sysmac Studio or CX-Programmer

When using an EtherNet/IP Unit as the EtherNet/IP master, use the CPU Unit configuration software (such as the Sysmac Studio or CX-Programmer) to set the basic settings, such as the IP address and subnet mask of the EtherNet/IP Unit.
You can also use the CPU Unit configuration software to check data I/O for tag data links to see if they are performed normally.

**Additional Information**

- Refer to the *Sysmac Studio Version 1 Operation Manual (Cat. No. W504)* for detailed information on the Sysmac Studio.
- Refer to the *CX-Programmer Operation Manual (Cat. No. W446)* for information on the CX-Programmer.

## EtherNet/IP Network Configuration: Network Configurator

The Network Configurator is used to set the tag data links for the EtherNet/IP Unit or built-in EtherNet/IP port. The Network Configurator is included in Sysmac Studio or CX-One version 3.0 or higher. The main functions are described below.

### ● Setting and Monitoring Tag Data Links (Connections)

The network device configuration and tag data links (connections) can be created and edited. You can connect to the network to read the device configuration and tag data links settings and perform monitoring.

### ● Setting the IP Address of an EtherNet/IP Coupler Unit

You can set the IP address of an EtherNet/IP Coupler Unit with rotary switches, with software settings from the Network Configurator, or with getting the IP address from the BOOTP server. Refer to *9-4 Setting IP Address* on page 9-31 for the IP address setting procedure for EtherNet/IP Coupler Units.

### ● Automatic Clock Adjustment Setting

The EtherNet/IP Coupler Unit includes an internal clock to provide time information to register with events that may occur. The time information can be adjusted based on the NTP server or it can be set from the EtherNet/IP master. Refer to *11-3-3 Automatic Clock Adjustment* on page 11-10 for details on setting automatic adjustment of the time information.

### ● Multivendor Device Connections

EDS files can be installed and deleted to enable constructing, setting, and managing networks that contain EtherNet/IP devices from other companies. You can also change the IP addresses of EtherNet/IP devices.

**Additional Information**

With NJ/NX-series CPU Units and NY-series Industrial PCs, you can use the Sysmac Studio to set up tag data links. For details on how to set up tag data links with the Sysmac Studio, refer to the user's manual for the built-in EtherNet/IP port on the connected CPU Unit or Industrial PC.

## EtherNet/IP Slave Terminal Configuration and I/O Mapping: Sysmac Studio or NX-IO Configurator

The Sysmac Studio or NX-IO Configurator is connected to the EtherNet/IP Coupler Unit to configure an EtherNet/IP Slave Terminal. The Sysmac Studio and NX-IO Configurator are used according to the system configuration, as described below.

| System configuration | Support Software |
|---|---|
| • NJ/NX-series CPU Unit connection<br>• NY-series Industrial PC connection | Sysmac Studio |
| • CS/CJ/CP-series CPU Unit connection<br>• Sysmac Gateway connection<br>• Connection to PLC from another company | NX-IO Configurator |

However, if you use an NX-series Safety Control Unit, the Sysmac Studio is required even if the EtherNet/IP master is a CS/CJ/CP-series CPU Unit, Sysmac Gateway, or PLC from another company.

The main functions of the Sysmac Studio and NX-IO Configurator are described below.

### ● Upload and Download

NX Unit configuration information, I/O allocation information, Unit operation settings, and Unit application data are transferred to and from the EtherNet/IP Coupler Unit.

### ● Unit Operation Settings

Make the Unit operation settings for the EtherNet/IP Coupler Unit and NX Units.

### ● Creating the I/O Mapping

You must create the I/O mappings of the EtherNet/IP Coupler Unit and NX Units.

### ● Troubleshooting

You can read current error information, clear current errors, read event logs, clear all memory, restart Units, and use other functions to troubleshoot EtherNet/IP Coupler Units and NX Units.

**Precautions for Correct Use**

- In addition to the Standard Edition, the Sysmac Studio is also available in an NX-IO Edition. The Standard Edition provides all of the functionality of the Sysmac Studio. The NX-IO Edition provides only the functionality required to set up EtherNet/IP Slave Terminals.
- The NX-IO Configurator does not support setting up the NX-series safety control system. To set up the NX-series safety control system, the Sysmac Studio Standard Edition or NX-IO Edition is required even if the configuration connects to a CS/CJ/CP-series CPU Unit, Sysmac Gateway, or PLC from another company.

**Additional Information**

When you use an NX-series IO-Link Master Unit to connect IO-Link devices, use CX-ConfiguratorFDT to set the IO-Link devices. For details on CX-ConfiguratorFDT, refer to the *IO-Link System User's Manual (Cat. No. W570)* or *NX-series IO-Link Master Unit User's Manul (Cat. No. W567)*.

# 2

# Features and System Configuration



This section describes the features and system configurations of EtherNet/IP Slave Terminals.

# 2-1 Features of EtherNet/IP Slave Terminals

An EtherNet/IP Slave Terminal is a building-block EtherNet/IP slave that is created by mounting a group of NX Units to an EtherNet/IP Coupler Unit.
The NX Units can be flexibly combined with an EtherNet/IP Coupler Unit to achieve the optimum EtherNet/IP slave for the application with less wiring, less work, and less space.
The features of the EtherNet/IP Slave Terminals are described below.

## Connection to Omron PLC

### ● High-speed, High-capacity Data Exchange through Tag Data Links

The EtherNet/IP Coupler Unit supports implicit communications and can perform cyclic communications with the EtherNet/IP master. In this manual, these cyclic communications are called tag data links. Large volumes of data can be sent to and from the EtherNet/IP master at high speed.

### ● Tag Data Link (Cyclic Communications) Cycle Time

Tag data links (cyclic communications) can operate at the cyclic period specified on connections for each application, regardless of the number of nodes. Data is exchanged over the network at the refresh cycle set for each connection, so the communications refresh cycle will not increase even if the number of nodes is increased, i.e., the synchronicity of the connection's data is preserved. Also, the concurrency of the connection's data is maintained. Since the refresh cycle can be set for each connection, each application can communicate at its ideal refresh cycle. For example, processes interlocks can be transferred at high speed while the production commands and the status monitor information are transferred at low speed.

**Note** The communications load to the nodes must be within the Units' allowed communications bandwidth.

## Parallel EtherNet/IP Based Networking

Various, general-purpose Ethernet devices can be used within the same EtherNet/IP network because EtherNet/IP uses standard Ethernet technology.
Refer to *1-1-1 EtherNet/IP Features* on page 1-2 for more details.

## Flexible Network Structures

The EtherNet/IP Coupler Unit is equipped with two Ethernet ports that support the layer 2 Ethernet switch functions.
This enables you to configure, in addition to star and tree topologies, a line topology without using Ethernet switches.
Refer to *1-1-1 EtherNet/IP Features* on page 1-2 for more details.

## Features That Reduce Equipment Design Work and Commissioning Work, and Encourage Modular Equipment Design

### ● Registering NX Units in the Unit Configuration Information as Unmounted Units for Future Expansion (Designing, Commissioning, and Modularity)

You can register any NX Units as unmounted Units in the Unit configuration information. This allows the following possibilities.

- NX Units for future expansion can be registered in advance. This eliminates the need to change the user program when the NX Units are actually added. (Designing)
- If certain NX Units are temporarily unavailable, you can still debug the system in advance with the NX Units that are available. (Commissioning)
- Even if the number of NX Units changes depending on the type of equipment, the user program does not have to be changed. (Designing and Modularity)

### ● Exporting/importing NX Unit Settings (Designing)

You can use the Support Software to export and import the NX Unit settings as files. This allows you to reuse settings from NX Units for other EtherNet/IP Slave Terminals or NX Units.

### ● Simplified I/O Wiring with Screwless Clamping Terminal Blocks (Commissioning)

The EtherNet/IP Coupler Unit and the NX Units use screwless clamping terminal blocks. The use of ferrules makes wiring an easy matter of inserting them. The screwless design greatly reduces wiring work.

## Fail-soft Operation

Fail-soft operation is provided so that the EtherNet/IP Coupler Unit can start or continue I/O refreshing only with the NX Units that can operate normally when an error occurs for the EtherNet/IP Slave Terminal.

You can use fail-soft operation in the following cases.

- When it is dangerous to stop the entire EtherNet/IP Slave Terminal all at once
- To continue the operation of the EtherNet/IP Slave Terminal until the system can be stopped safely through the user program or user operation
- To not stop all devices, i.e., to continue operation for only some devices

## TCP/UDP Message Service

The EtherNet/IP Coupler Unit supports a TCP/UDP message service. Message services can be used to send/receive data between general-purpose applications and Slave Terminals with this interface. You can use these communications services to send and receive any data to and from remote nodes, i.e., between host computers and Slave Terminals.

Refer to *A-2 TCP/UDP Message Service* on page A-39 for more information.

## Connection with NX-series Safety Control Units

### ● Easy Setup of a Stand-alone Safety Control System

The EtherNet/IP Coupler Unit enables you to build a modular stand-alone safety control system that uses the NX-series Safety Control Units.
Moreover, setup of the safety control system is integrated into the Sysmac Studio software. Using Sysmac Studio brings consistent operating procedures together with various types of debugging, including monitoring, changing present values, and forced refreshing.

### ● Easy Creation of an Interface with the Standard Controls

You can exchange data between the safety controls that are based on the Safety CPU Unit and the standard controls that are based on the EtherNet/IP Unit.
This allows you to maintain the independent nature of the previously separate safety controls and standard controls while easily interfacing monitoring and commands between them.

### ● Excellent Connectability with OMRON Safety I/O and Standard I/O Devices

You can directly connect OMRON's wide lineup of Safety I/O Devices to Safety I/O Units without using any special Units. Additionally, you can connect an extensive range of NX I/O Units such as Digital I/O, Analog I/O, Temperature Input, Position Interface, and IO-Link Master Units.

### ● Integrating Setting and Debugging Operations for Safety Controls into the Sysmac Studio

Setting and debugging operations for safety controls are integrated into the Sysmac Studio software. The shared concepts, such as IEC 61131-3, consistent operating procedures, one-project management, integrated debugging, and integrated troubleshooting, reduce the software workload. You can connect the Sysmac Studio to perform various types of debugging, including monitoring, changing present values, and forced refreshing.

**Additional Information**

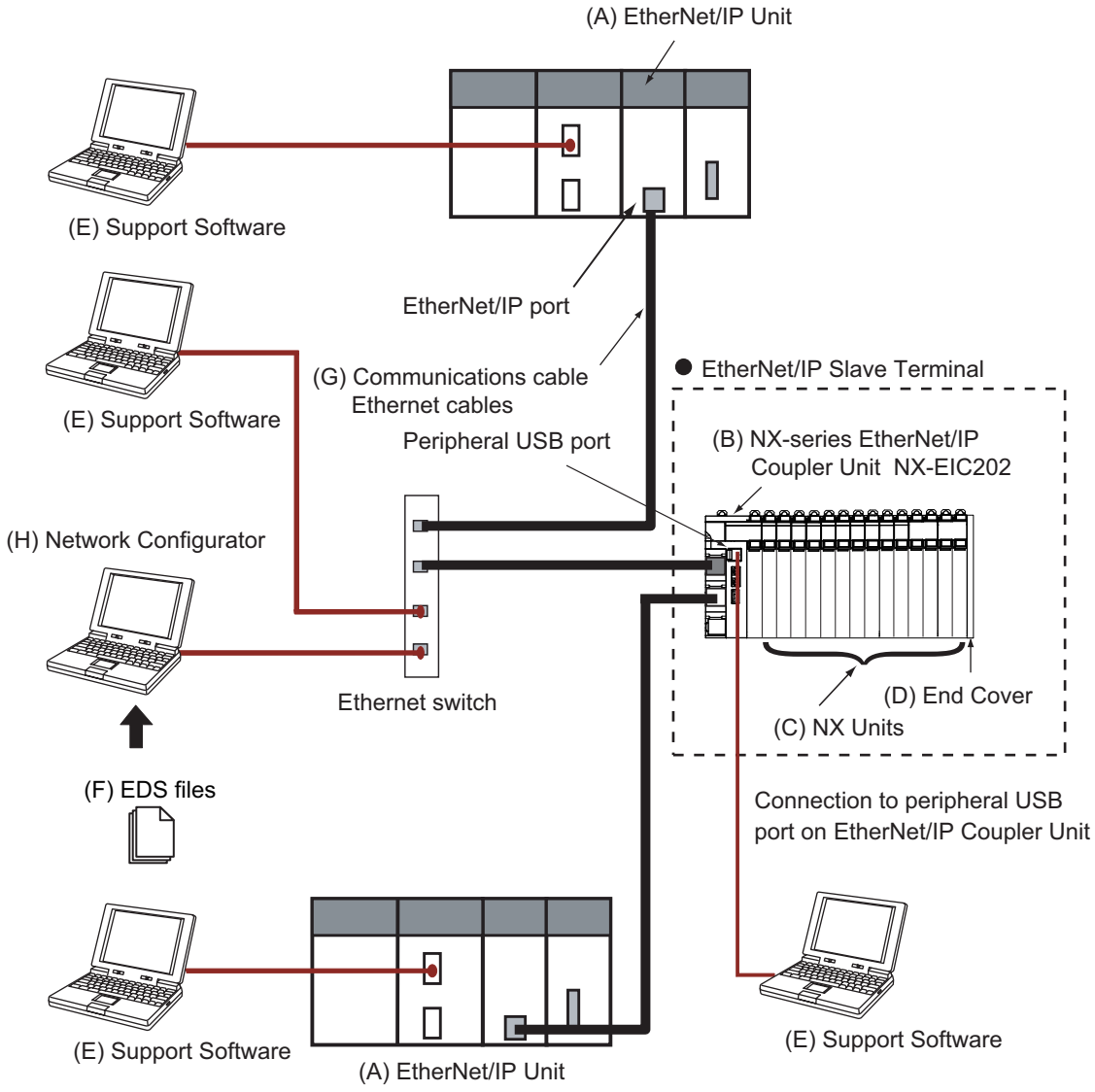
Refer to the *NX-series Safety Control Unit User's Manual (Cat. No. Z930)* for details on safety control systems built with Safety Control Units.

# 2-2 System Configurations of EtherNet/IP Slave Terminals

This section describes the system configuration of an EtherNet/IP Slave Terminal.

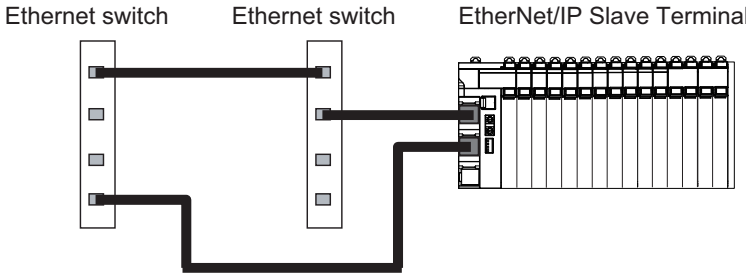
## 2-2-1 System Configuration

An example of a system configuration for an EtherNet/IP Slave Terminal is shown below.



### Precautions for Correct Use

Do not make a loop connection in the communications path between Ethernet switches. If a loop connection is made, the broadcast frame will continue to loop around the path, creating a broadcast stream. This will place a high load on the network and may cause unstable communications.
An example of a loop connection in the communications path is shown below.




### Additional Information

You can use an alternative configuration that uses the TCP/UDP message service. Refer to *A-2 TCP/UDP Message Service* on page A-39 for more information.

| Letter | Item | Description |
|---|---|---|
| (A) | EtherNet/IP Unit | The EtherNet/IP master manages the EtherNet/IP network, monitors the status of the slaves, and exchanges I/O data with the slaves.<br>The types of EtherNet/IP Units are listed below.<br>• A Unit such as CJ1W-EIP21 or CS1W-EIP21<br>• Built-in EtherNet/IP port on a CPU Unit<br>• SYSMAC Gateway |
| (B) | EtherNet/IP Coupler Unit | The EtherNet/IP Coupler Unit is an interface that performs I/O refresh communications between a group of NX Units and the EtherNet/IP Unit over an EtherNet/IP network.<br>The I/O data for the NX Units is first accumulated in the EtherNet/IP Coupler Unit and then all of the data is exchanged with the EtherNet/IP Unit at the same time.<br>You can connect up to 63 NX Units. |
| (C) | NX Units*1 | The NX Units perform I/O processing with connected external devices. The NX I/O Units perform I/O refresh communications with the EtherNet/IP master through the EtherNet/IP Coupler Unit.<br>Refer to *2-2-2 Types of NX Units* on page 2-7 for the types of NX Units. |
| (D) | End Cover | The End Cover is attached to the end of the Slave Terminal. |
| (E) | Support Software*2 | The Support Software runs on a personal computer and it is used to configure EtherNet/IP Slave Terminals and to perform programming, monitoring, and troubleshooting. |
| (F) | EDS (Electronic Data Sheet) file | The EDS file contains all information that is unique to the EtherNet/IP Slave Terminal. You can load the EDS files into the Network Configurator or other EtherNet/IP network setup software to easily allocate data and view or change settings.<br><br>The EtherNet/IP Slave Terminal supports EDS files with a CIP revision number of 1.2 or later. |
| (G) | Communications cable | Use a double-shielded cable with aluminum tape and braiding of category 5 (100BASE-TX) or higher, and use straight wiring. |

| Letter | Item | Description |
|---|---|---|
| (H) | Network Configurator | The software tool to configure the EtherNet/IP network. |

*1. For whether an NX Unit can be connected to the EtherNet/IP Coupler Unit, refer to the version information in the user's manual for the NX Unit.

*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.

## 2-2-2 Types of NX Units

The following table lists some examples of the types of NX Units that are available.

| Unit type | | Overview |
|---|---|---|
| Digital I/O Units | | These Units process I/O with digital signals. |
| | Digital Input Units | These Units process inputs with digital signals. |
| | Digital Output Units | These Units process outputs with digital signals. |
| Analog I/O Units | | These Units process I/O with analog signals. |
| | Analog Input Units | These Units process inputs with analog signals. |
| | Analog Output Units | These Units process outputs with analog signals. |
| | Temperature Input Units | These Units process inputs from temperature sensors. |
| | Heater Burnout Detection Units | Heater Burnout Detection Units have the following functions.<br>• Monitoring of CT currents to provide alarms for heater burnouts and SSR failures<br>• Time-proportional control output processing to operate heaters with SSRs |
| System Units | | System Units are used as required to build a Slave Terminal. |
| | Additional NX Unit Power Supply Unit | This Unit is used when the NX Unit power supply is not sufficient. |
| | Additional I/O Power Supply Unit | This Unit is used when the I/O power supply is not sufficient or to separate the power supply in the Slave Terminal. |
| | I/O Power Supply Connection Unit | This Unit is used when the I/O power supply terminals for connections to external I/O devices are not sufficient. |
| | Shield Connection Unit | This Unit is used to ground more than one shield wire from external I/O connections to the same ground. |
| Load Cell Input Units | | These Units perform input processing of the output signal from a load cell to measure the weight or force. |
| IO-Link Master Units | | These Units use IO-Link communications to perform I/O processing for IO-Link devices. They also support I/O processing of digital signals from non-IO-Link-devices. |
| Communications Interface Units | | These Units support serial communications. Both RS-232C and RS-422A/485 are supported as the serial interface. |
| Temperature Control Unit | | This Unit receives signals from the temperature sensor and controls the heater temperature to match the set temperature. |
| Position Interface Units | | These Units perform I/O processing of position data for positioning. |

| Unit type | | Overview |
|---|---|---|
| | Incremental Encoder Input Units | These Units count pulses from incremental encoders. |
| | SSI Input Units | These Units process serial signal inputs from absolute encoders or linear scales that have an SSI interface. |
| Safety Control Units | | The NX-series Safety Control Units constitute a programmable safety controller that complies with IEC 61131-3 and PLCopen® Safety. They include Safety CPU Units and Safety I/O Units. |
| | Safety CPU Unit | This Unit controls the Safety I/O Units through the NX bus and EtherNet/IP. |
| | Safety Input Units | These Units process safety inputs with digital signals. |
| | Safety Output Units | These Units process safety outputs with digital signals. |

Refer to the user's manual for the specific Units for details.
For information on the most recent lineup of NX Units, refer to NX-series catalogs or OMRON websites, or ask your OMRON representative.

## 2-2-3 Safety Control System

Refer to the *NX-series Safety Control Unit User's Manual (Cat. No. Z930)* for details on safety control systems built with Safety Control Units.

# 2-3 Support Software

This section describes the Support Software that is used to set up the EtherNet/IP Slave Terminal.

## 2-3-1 Applicable Support Software

The following Support Software can be used to set up the EtherNet/IP Slave Terminal.

| System configuration | Support Software name | Version |
|---|---|---|
| • NJ/NX-series CPU Unit connection<br>• NY-series Industrial PC connection | Sysmac Studio | Version 1.10 or higher |
| • CS/CJ/CP-series CPU Unit connection<br>• Sysmac Gateway connection<br>• Connection to PLC from another company | NX-IO Configurator | Version 1.0 or higher |

However, if you use an NX-series Safety Control Unit, the Sysmac Studio is required even if the EtherNet/IP master is a CS/CJ/CP-series CPU Unit, Sysmac Gateway, or PLC from another company.

## 2-3-2 Connection Method and Procedures

This section describes the method and procedures that are used to connect the Support Software to an EtherNet/IP Slave Terminal. The Sysmac Studio is connected to a USB port of an EtherNet/IP Coupler Unit as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

### Going Online through the USB Port on the EtherNet/IP Coupler Unit

#### ● Connection Methods

You can place the Support Software online with the EtherNet/IP Slave Terminal. Connect the Support Software to the USB port on the EtherNet/IP Coupler Unit.

#### ● Connection Procedure

Use the following procedure to place the Support Software online.

***1*** Connect the EtherNet/IP Coupler Unit to a computer in which the Support Software is installed through a USB cable.

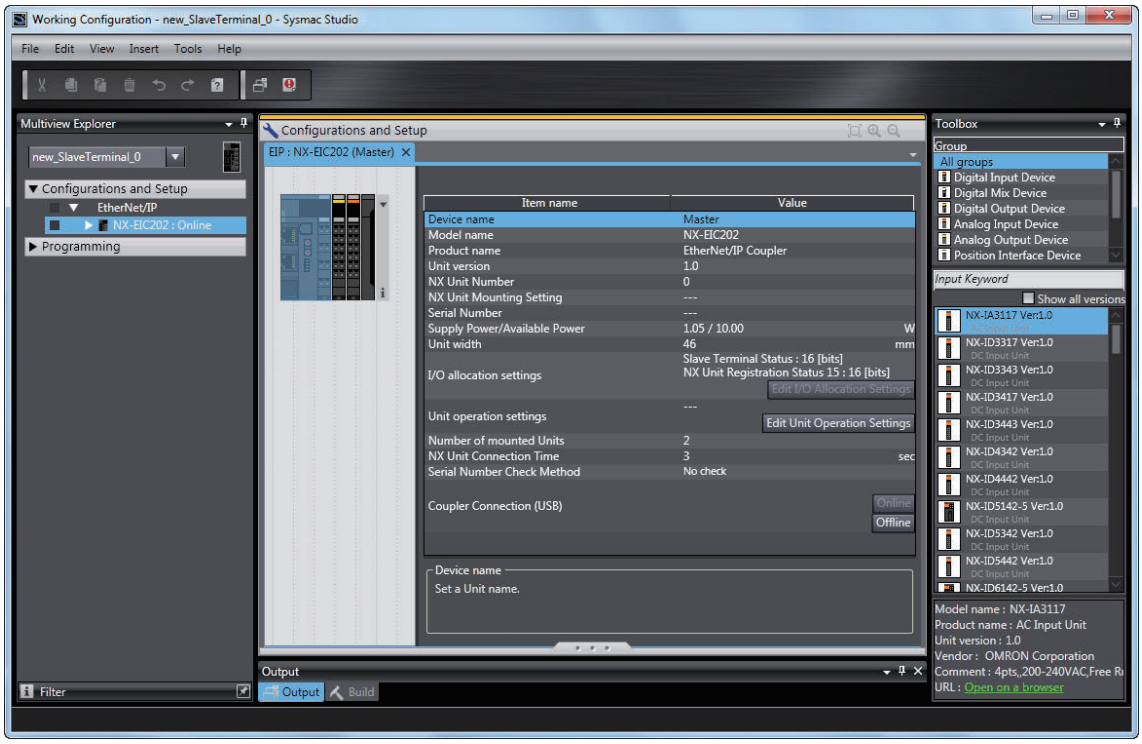
***2*** Create a new project with the following settings.
- Category: Slave terminal
- Device: EtherNet/IP coupler

Refer to *9-2-2 Setting the NX Unit Configuration Information* on page 9-6 for the procedures to create the Unit configuration information.

***3*** Right-click the EtherNet/IP Coupler Unit in the Edit EtherNet/IP Slave Terminal Configuration Tab Page, and select **Coupler Connection (USB)** − **Online**. Or, right-click the EtherNet/IP Coupler Unit in the Multiview Explorer and select **Coupler Connection (USB)** − **Online**.

A confirmation dialog box is displayed.

**4** Click the **OK** button.
The Sysmac Studio goes online with the EtherNet/IP Slave Terminal.




The scope of access from the Support Software when it is connected to the USB port on the EtherNet/IP Coupler Unit is limited to the EtherNet/IP Slave Terminal at the connection. Support Software cannot access any Units that are not at the connection (such as other EtherNet/IP slaves, or other EtherNet/IP Slave Terminals).

# 3

# Specifications and Application Procedures



This section provides the general specifications of the EtherNet/IP Slave Terminal, the specifications of the EtherNet/IP Coupler Unit and End Cover, and the applications procedures for the EtherNet/IP Slave Terminal.

# 3-1 Specifications

This section provides the general specifications of an EtherNet/IP Slave Terminal and the specifications of the EtherNet/IP Coupler Unit and End Cover.

## 3-1-1 General Specifications of EtherNet/IP Slave Terminals

| Item | | Specification |
|---|---|---|
| **Enclosure** | | Mounted in a panel |
| **Grounding method** | | Ground to 100 Ω or less. |
| **Operating environment** | **Ambient operating temperature** | 0 to 55°C |
| | **Ambient operating humidity** | 10% to 95% (with no condensation or icing) |
| | **Atmosphere** | Must be free from corrosive gases. |
| | **Ambient storage temperature** | −25 to 70°C (with no condensation or icing) |
| | **Altitude** | 2,000 m max. |
| | **Pollution degree** | 2 or less: Conforms to JIS B3502 and IEC 61131-2. |
| | **Noise immunity** | 2 kV on power supply line (Conforms to IEC61000-4-4.) |
| | **Overvoltage category** | Category II: Conforms to JIS B3502 and IEC 61131-2. |
| | **EMC immunity level** | Zone B |
| | **Vibration resistance** | Conforms to IEC 60068-2-6.<br>5 to 8.4 Hz with 3.5-mm amplitude, 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)*1 |
| | **Shock resistance** | Conforms to IEC 60068-2-27. 147 $m/s^2$, 3 times each in X, Y, and Z directions*1 |
| **Applicable standards*2** | | cULus: Listed UL508 and ANSI/ISA 12.12.01<br>EC: EN 61131-2<br>C-Tick or RCM, KC: KC Registration, and NK |

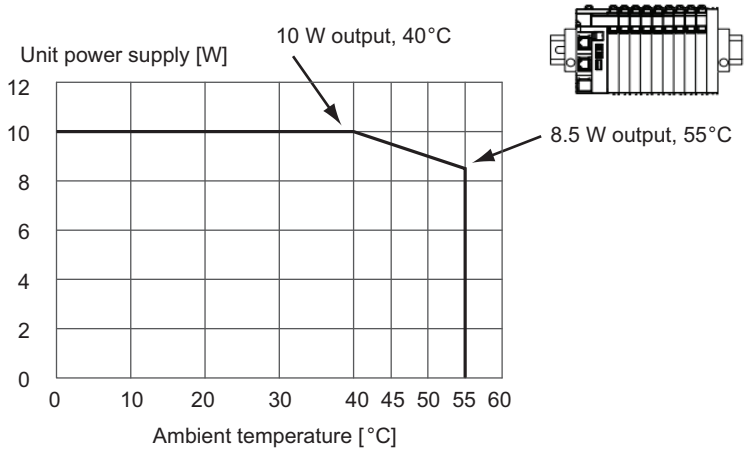
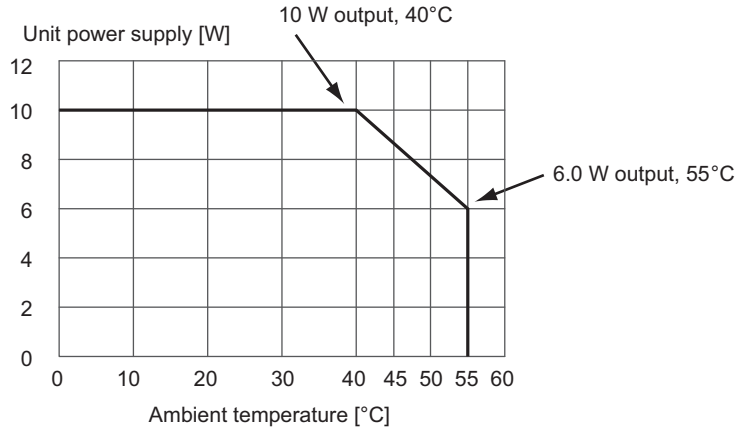
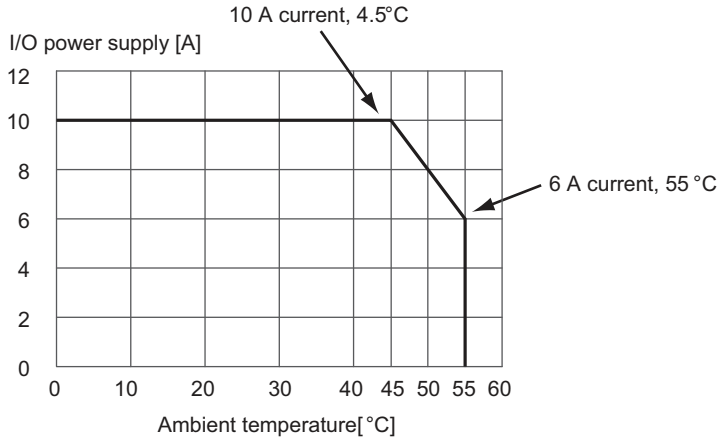
*1. Refer to the *NX-series Digital I/O Units User's Manual (Cat. No. W521)* for the vibration and shock resistance specifications of the Relay Output Unit.

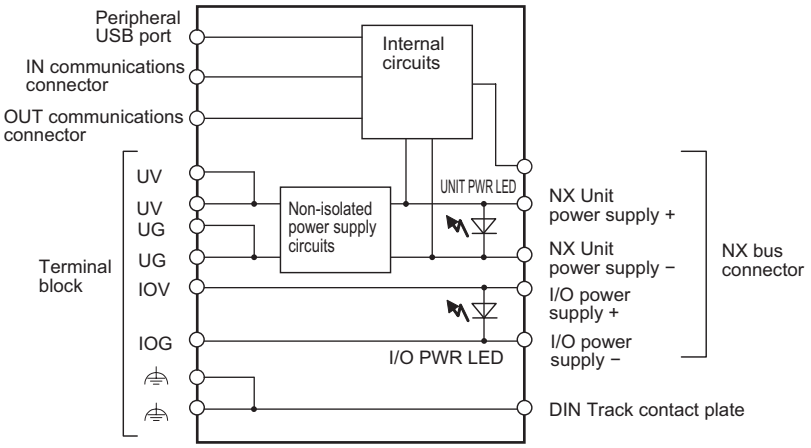
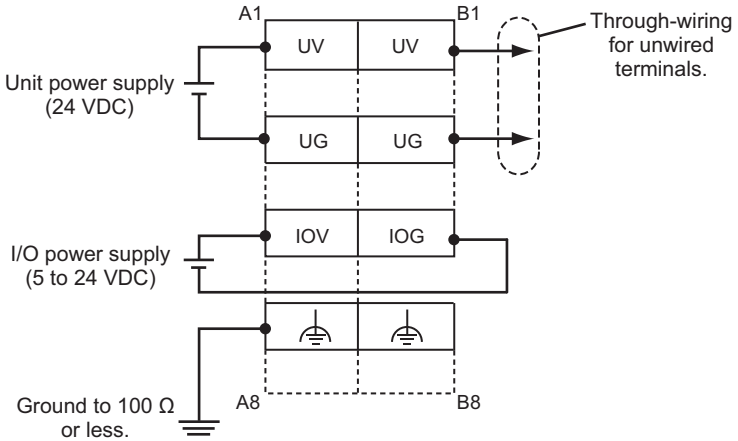
*2. Refer to the OMRON website (http://www.ia.omron.com/) or consult your OMRON representative for the most recent applicable standards for each model.

## 3-1-2 EtherNet/IP Coupler Unit Specifications

| Item | | Specification |
|---|---|---|
| **Model** | | NX-EIC202 |
| **Number of connectable NX Units** | | 63 Units max.*1 |
| **Communications protocols** | | EtherNet/IP protocol<br>• Implicit messages (class 1)<br>• Explicit messages (class 3, UCMM) |
| | | TCP/UDP message services |
| **Modulation** | | Baseband |
| **Link speed** | | 100 Mbps |
| **Ethernet physical layer** | | 100BASE-TX (IEEE 802.3) |
| **Ethernet switch** | | Layer 2 Ethernet switch |
| **Transmission media** | | Category 5 or higher twisted-pair cable (Recommended cable: double-shielded cable with aluminum tape and braiding) |
| **Transmission distance** | | Distance between nodes: 100 m or less |
| **Topology** | | Line, Tree, Star |
| **EtherNet/IP tag data links** | **Number of connections** | 8 |
| | **Packet interval (RPI)** | 4 to 1,000 ms |
| | **Unit allowable communications band width** | 1,000 pps |
| **TCP/UDP message service** | **Maximum number of simultaneously connectable clients** | 8 |
| | **Maximum message size** | Request: 492 bytes<br>Response: 496 bytes |
| | **Maximum controllable NX bus I/O data size** | Output data: 490 bytes<br>Input data: 496 bytes |
| **NX bus** | **I/O data size** | Input: 512 bytes max. (including input data, status, and unused areas)<br>Output: 512 bytes max. (including output data and unused areas) |
| | **Refreshing method** | Free-Run refreshing |
| **Number of connections** | | 8 |
| **Received Packet Interval (RPI, refresh cycle)** | | 4 to 1,000 ms |
| **Allowed communications bandwidth for Unit** | | 1,000 pps |
| **EtherNet/IP I/O connection size** | | Input: 504 bytes max. (including input data, status, and unused areas)<br>Output: 504 bytes max. (including output data and unused areas) |

| Item | | Specification |
|---|---|---|
| **Unit power supply** | **Power supply voltage** | 24 VDC (20.4 to 28.8 VDC) |
| | **NX Unit power supply capacity** | 10 W max.<br>Refer to *Installation orientation and restrictions page 3-5* for details. |
| | **NX Unit power supply efficiency** | 70% |
| | **Isolation method** | No isolation between NX Unit power supply and Unit power supply terminals |
| | **Current capacity of power supply terminal** | 4 A max. |
| **I/O power supply** | **Power supply voltage** | 5 to 24 VDC (4.5 to 28.8 VDC)*2 |
| | **Maximum I/O power supply current** | 10 A<br>Refer to *Installation orientation and restrictions page 3-5* for details. |
| | **Current capacity of power supply terminals** | 10 A max. |
| **NX Unit power consumption** | | 1.60 W max. |
| **Current consumption from I/O power supply** | | 10 mA max. (for 24 VDC) |
| **Dielectric strength** | | 510 VAC for 1 min, leakage current: 5 mA max. (between isolated circuits) |
| **Insulation resistance** | | 100 VDC, 20 MΩ min. (between isolated circuits) |
| **External connection terminals** | | Communications Connector<br>For EtherNet/IP communications.<br>• RJ45 × 2 (shielded) |
| | | Screwless Clamping Terminal Block<br>For Unit power supply, I/O power supply, and grounding. Removable. |
| | | Peripheral USB Port<br>To connect Support Software<br>• Physical layer: USB 2.0-compliant, B-type connector<br>• Transmission distance: 5 m max. |
| **Dimensions** | | 46 × 100 × 71 mm (W×H×D) |
| **Weight** | | 150 g max. |

| Item | Specification |
|---|---|
| **Installation orientation and restrictions** | Installation orientation: 6 possible orientations<br>Restrictions:<br>• Used in the upright installation orientation.<br>  <br><br>• Used in any other orientation than the upright installation orientation.<br>  <br><br>  <br> |

| Item | Specification |
|---|---|
| **Circuit layout** |  |
| **Terminal arrangement** |  |
| **Accessory** | End Cover (NX-END01): 1 |

*1. Refer to the *NX-series Safety Control Unit User's Manual (Cat. No. Z930)* for the number of Safety Control Units that can be connected.

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

## 3-1-3 End Cover Specifications

| Item | Specification |
|---|---|
| **Model** | NX-END01 |
| **Dimensions** | 12 × 100 × 71 (W×H×D) |
| **Weight** | 35 g max. |

# 3-2 Procedures

This section describes how to use EtherNet/IP Slave Terminals on an EtherNet/IP network.
Refer to the *NX-series Safety Control Unit User's Manual (Cat. No. Z930)* for the procedures to use Safety Control Units.
Refer to *A-6 Connecting to Masters from Other Manufacturers* on page A-60 for application procedures for a connection to a PLC from another company.

## 3-2-1 EtherNet/IP Slave Terminal Application Procedures

| Procedure | Sections |
|---|---|
| 1. Preparing for Work | • *2-2-2 Types of NX Units* on page 2-7<br>• *3-1 Specifications* on page 3-2<br>• *Section 5 Designing the Power Supply System* on page 5-1<br>• *6-1-3 Installation Orientation* on page 6-8<br>• Manuals for the specific NX Units |
| ↓ | |
| 2. Making Hardware Settings and Wiring the Slave Terminal | • *4-3 Hardware Switch Settings* on page 4-10<br>• *6-1 Installing Units* on page 6-2<br>• *Section 7 Wiring* on page 7-1 |
| ↓ | |
| 3. Setting the EtherNet/IP Coupler Unit's IP Address and Automatic Clock. | • *9-4 Setting IP Address* on page 9-31<br>• *11-3-3 Automatic Clock Adjustment* on page 11-10 |
| ↓ | |
| 4. Configuring the Slave Terminal and Making the Operation Settings | *9-2 Setting Slave Terminal Parameters* on page 9-6 |
| ↓ | |
| 5. Transferring and Comparing EtherNet/IP Coupler Unit Parameter Settings | *9-3 Transferring and Comparing Settings* on page 9-28 |
| ↓ | |

| | |
|---|---|
| 6. IO-Link Device Settings (when using an IO-Link device) | *IO-Link System User's Manual (Cat. No. W570)*<br>*NX-series IO-Link Master Unit User's Manul (Cat. No. W567)* |

| | |
|---|---|
| 7. Setting Tag Data Links | *9-5 Setting Tag Data Links* on page 9-36 |

| | |
|---|---|
| 8. Assigning Network Variables | *9-6 Assigning Network Variables* on page 9-70 |

| | |
|---|---|
| 9. Checking Indicators | • Software user's manual for the CPU Unit<br>• User's manual for the EtherNet/IP Coupler Unit<br>• *4-2 Indicators* on page 4-6<br>• *12-2 Checking for Errors and Troubleshooting with the Indicators* on page 12-3 |

| | |
|---|---|
| 10. Confirming Operation by Checking the Wiring | • Operation manual for the Support Software<br>• Manuals for the specific NX Units |

| | |
|---|---|
| 11. Creating the User Program | • Software user's manual for the CPU Unit<br>• User's manual for the EtherNet/IP Coupler Unit<br>• Instructions reference manual<br>• Operation manual for the Support Software |

## 3-2-2 Details

| Procedure | Item | | Description | Reference |
|---|---|---|---|---|
| 1 | Preparing for Work | Selecting NX Units | Select the NX Units and the quantity and types of I/O that are required. | • *2-2-2 Types of NX Units* on page 2-7<br>• Manuals for the specific NX Units |
| | | Confirming Suitability of Slave Terminal Specifications | Confirm that the following specific restrictions for the Slave Terminal are met.<br>• Number of NX Units<br>• EtherNet/IP maximum I/O connection size<br>• Design conditions for the NX Unit power supply and I/O power supply<br>• Installation orientation | • *3-1 Specifications* on page 3-2<br>• *Section 5 Designing the Power Supply System* on page 5-1<br>• *6-1-3 Installation Orientation* on page 6-8 |
| 2 | Making Hardware Settings and Wiring the Slave Terminal | Switch Settings | Set the network interface type and enable tag data links with the hardware switches on the EtherNet/IP Coupler Unit. | *4-3-2 DIP Switch* on page 4-11 |
| | | Installation | Connect the NX Units and End Cover to the EtherNet/IP Coupler Unit and secure the Slave Terminal to a DIN Track to install it. | *6-1 Installing Units* on page 6-2 |
| | | Wiring | Wire the Slave Terminal.<br>• Connect the communications cables.<br>• Connect the Unit power supply.<br>• Connect the I/O power supply.<br>• Connect the ground wire.<br>• Connect the external I/O devices. | *Section 7 Wiring* on page 7-1 |
| 3 | Setting the EtherNet/IP Coupler's IP Address and Automatic Clock | | Set the IP address of the EtherNet/IP Coupler Unit with the Network Configurator.<br>You can also use the switch settings to set the IP address. Refer to *9-4 Setting IP Address* on page 9-31.<br>Set the automatic clock with the Network Configurator. | • *9-4 Setting IP Address* on page 9-31<br>• *11-3-3 Automatic Clock Adjustment* on page 11-10 |

| Procedure | Item | | Description | Reference |
|---|---|---|---|---|
| 4 | Configuring the Slave Terminal and Making the Operation Settings | | Set up the Slave Terminal (create the configuration and set the parameters) with the Support Software. | *9-2 Setting Slave Terminal Parameters* on page 9-6 |
| | | Creating the Unit Configuration Information | Create the Slave Terminal configuration information such as number and order of NX Units, individual NX Unit information and information about the EtherNet/IP Coupler Unit. | *9-2-2 Setting the NX Unit Configuration Information* on page 9-6 |
| | | Setting the I/O Allocation Information | Make the I/O allocations for the EtherNet/IP Coupler Unit and NX Units as required. | *9-2-3 I/O Allocation Information* on page 9-12 |
| | | Unit Operation Settings | Make the Unit operation settings for the EtherNet/IP Coupler Unit and NX Units as required. | *9-2-4 Unit Operation Settings* on page 9-22 |
| | | Setting Unit Application Data | Create the Unit application data. This step applies only to Units that have Unit application data. | *9-2-5 Unit Application Data* on page 9-23 |
| 5 | Transferring and Comparing EtherNet/IP Coupler Unit Parameter Settings | | Transfer and compare Slave Terminal settings with the Support Software. | *9-3 Transferring and Comparing Settings* on page 9-28 |
| 6 | IO-Link Device Settings (when using an IO-Link device) | | Use the CX-ConfiguratorFDT to set up IO-Link devices. | • *IO-Link System User's Manual (Cat. No. W570)*<br>• *NX-series IO-Link Master Unit User's Manul (Cat. No. W567)* |
| 7 | Setting Tag Data Links | | Use the Network Configurator to set the tag data links. | *9-5 Setting Tag Data Links* on page 9-36 |
| 8 | Assigning Network Variables | | Network variables are assigned in the PLC according to the I/O allocations created in the Support Software. | *9-6 Assigning Network Variables* on page 9-70 |
| 9 | Checking Indicators | | Check operation with the indicators on the CPU Unit, Industrial PC, EtherNet/IP Units, and EtherNet/IP Coupler Units. | • Software user's manual for the CPU Unit<br>• User's manual for the EtherNet/IP Coupler Unit<br>• *4-2 Indicators* on page 4-6<br>• *12-2 Checking for Errors and Troubleshooting with the Indicators* on page 12-3 |
| 10 | Confirming Operation by Checking the Wiring | | Check the wiring by monitoring inputs or using forced refreshing of outputs from Watch Window of the Support Software. | • Operation manual for the Support Software<br>• Manuals for the specific NX Units |

| Procedure | Item | Description | Reference |
|---|---|---|---|
| 11 | Creating the User Program | Write the user program with network variables. | • Software user's manual for the CPU Unit<br>• User's manual for the EtherNet/IP Coupler Unit<br>• Instructions reference manual<br>• Operation manual for the Support Software |

# 4

# Part Names and Functions

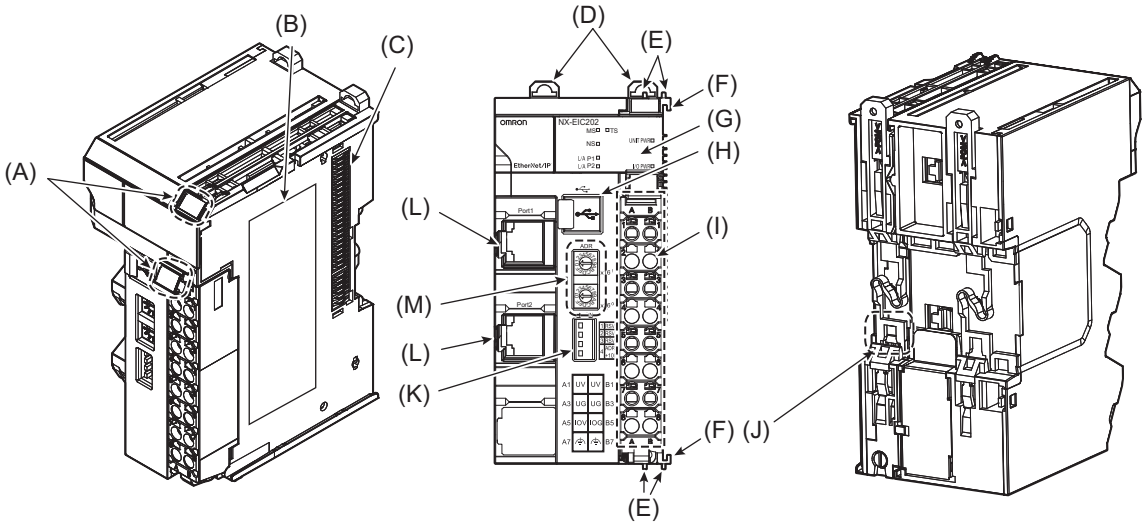
This section gives the names of the parts of the EtherNet/IP Coupler Unit, NX Units, and End Cover and describes the functions of the parts.

# 4-1 Parts and Names

This section gives the names of the parts of the EtherNet/IP Coupler Unit, NX Units, and End Plates and describes the functions of the parts.

## 4-1-1 EtherNet/IP Coupler Units

This section gives the names of the parts of the EtherNet/IP Coupler Unit.

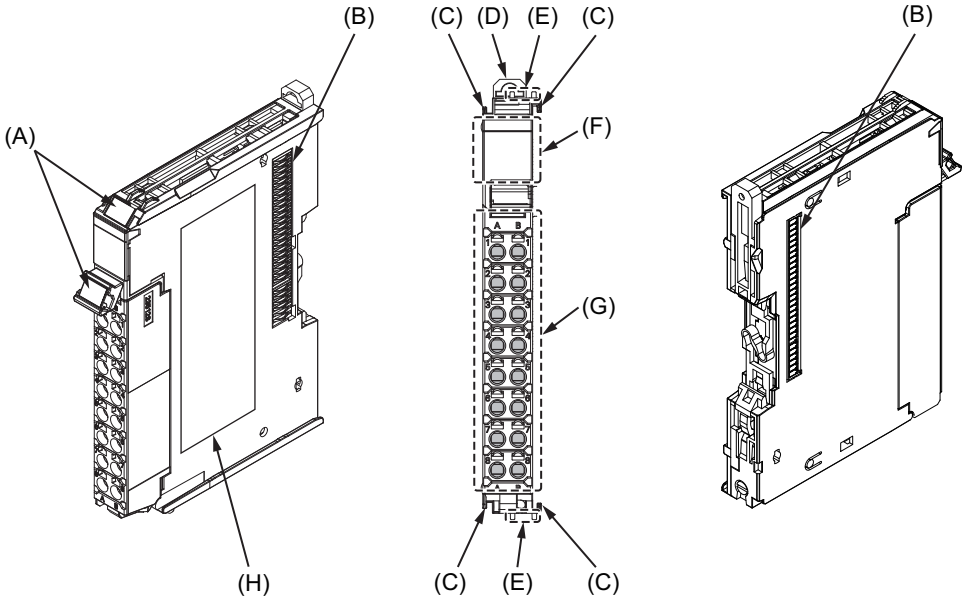



| Letter | Name | Function |
|---|---|---|
| (A) | Marker attachment locations | The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed.<br>For details, refer to *6-1-8 Attaching Markers* on page 6-18. |
| (B) | Unit specifications | The specifications of the Unit are engraved in the side of the casing. |
| (C) | NX bus connector | This connector is used to connect the EtherNet/IP Coupler Unit to the NX Unit on the right of the Coupler Unit. |
| (D) | DIN Track mounting hooks | These hooks are used to mount the EtherNet/IP Coupler Unit to a DIN Track. |
| (E) | Protrusions for removing the Unit | The protrusions to hold when removing the Unit. |
| (F) | Unit hookup guides | These guides are used to connect two Units. |
| (G) | Indicators | The indicators show the current operating status of the Unit and the status of the power supply. |
| (H) | Peripheral USB port | This port is used to connect to the Support Software. |
| (I) | Terminal block | The terminal block is used to connect to the power supply cables and ground wire. |
| (J) | DIN Track contact plate | This plate is connected internally to the functional ground terminal on the terminal block. |
| (K) | DIP switch | The DIP switch is used to set the default node address of the EtherNet/IP Coupler Unit as an EtherNet/IP slave. |
| (L) | Communications connectors | These connectors are connected to the communications cables of the EtherNet/IP network. |

| Letter | Name | Function |
|---|---|---|
| (M) | Rotary switches | The rotary switches are used to set the last octet of the IP address of the EtherNet/IP Coupler Unit as an EtherNet/IP Slave. The address is set in hexadecimal. |

## 4-1-2 NX Unit

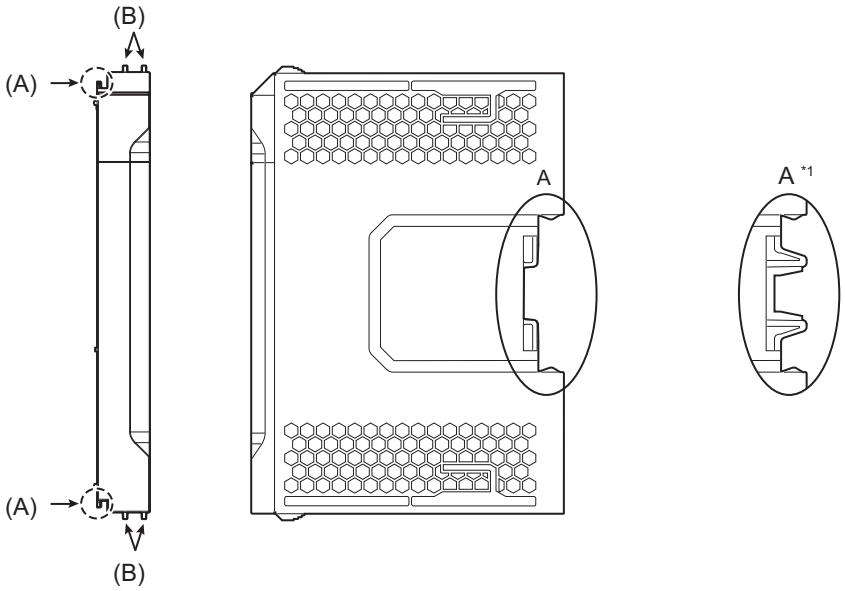
This section provides an example of an NX Unit.
Refer to the user's manual for each NX Unit for specific information.




| 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. |
| (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. |
| (G) | Terminal block | The terminal block is used to connect external devices.<br>The number of terminals depends on the type of Unit. |
| (H) | Unit specifications | The specifications of the Unit are given. |

## 4-1-3 End Cover

An NX-END01 End Cover is connected to the end of the EtherNet/IP Slave Terminal.
One End Cover is provided together with the EtherNet/IP Coupler Unit.




*1. This is the shape for Units with lot numbers through December 2014.

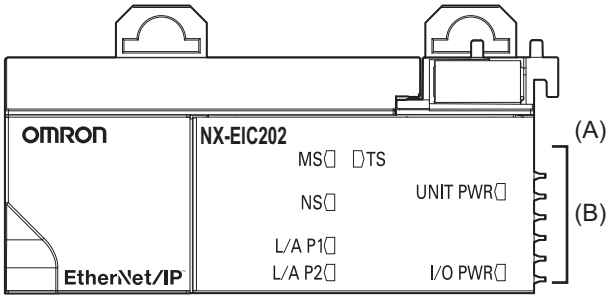
| Letter | Name | Function |
|---|---|---|
| (A) | Unit hookup guides | These guides are used to connect the End Cover to the NX Unit on the left of the End Cover. |
| (B) | Protrusions for removing the Unit | The protrusions to hold when removing the End Cover. |

**Precautions for Correct Use**

Always mount an End Cover to the end of the EtherNet/IP Slave Terminal to protect the last NX Unit in the EtherNet/IP Slave Terminal. Not attaching the End Cover may result in malfunction or failure of the EtherNet/IP Slave Terminal.

# 4-2 Indicators

There are indicators to show the current operating status of the EtherNet/IP Coupler Unit.
The appearance of the indicators has been changed for models released in or before September 2018 with lot numbers that represent the date of or after September 20, 2018. In this manual, those models are shown with the indicators after the change. For details on the applicable models and the changes, refer to *Appearance Change of the Indicators* on page 4-9.




| Letter | Name | Function |
|---|---|---|
| (A) | Model number | The model number of the EtherNet/IP Coupler Unit is shown. |
| (B) | Indicators | The current operating status of the EtherNet/IP Coupler Unit is shown. |

## MS Indicator

The Module Status (MS) indicator indicates the status of the Unit.

| Color | Status | | Meaning |
|---|---|---|---|
| Green |  | Lit | The Unit is operating normally. |
| |  | Flashing | The Unit is starting or restarting. |
| Red |  | Lit | One of the following unrecoverable errors was detected.<br>• Bus Controller Error<br>• Non-volatile Memory Hardware Error<br>• Memory Corruption Detected |
| |  | Flashing | One of the following nonfatal errors was detected.<br>• Unit Configuration Verification Error<br>• Non-volatile Memory Control Parameter Error<br>• Unit Configuration Error<br>• Unit Configuration Error, Too Many Units<br>• Unit Configuration Error, Unsupported Configuration<br>• TCP/IP Setting Error (Local IP Address)<br>• NTP Client Setting Error<br>• NX Unit Communications Timeout<br>• NX Unit Initialization Error<br>• NX Unit Startup Error |

| Color | Status | | Meaning |
|---|---|---|---|
| --- |  | Not lit | No Unit power supply |

## NS Indicator

The Network Status (NS) indicator indicates the status of the network.

| Color | Status | | Meaning |
|---|---|---|---|
| Green |  | Lit | Tag data link communications have been established and normal communications are in progress. |
| |  | Flashing | Normal communications are in progress, but tag data link communications have not been established. |
| Red |  | Flashing | • Tag Data Link Timeout detected<br>• BOOTP Server Connection Error |
| |  | Lit | IP Address Duplication Error detected |
| --- |  | Not lit | No Unit power supply |

## TS Indicator

The TS indicator shows the status of the EtherNet/IP Coupler Unit and the communications status between the EtherNet/IP Coupler Unit and the NX Units.

| Color | Status | | Meaning |
|---|---|---|---|
| Green |  | Lit | • Unit operates normally.<br>• Communication with all connected NX Units.<br>• A correct NX Unit configuration is downloaded in the Unit from the Support Software. |
| |  | Flashing at 1.0 sec intervals | EtherNet/IP communication not available for the NX Units based on the stored configuration. |
| | | Flashing at 0.5 sec intervals | Unit is operating in automatic configuration mode (the unit configuration was automatically created). |

| Color | Status | | Meaning |
|---|---|---|---|
| Red |  | Lit | • Non-volatile Memory Hardware Error<br>• Bus Controller Error<br>• Non-volatile Memory Control Parameter Error<br>• Unit Configuration Error<br>• Unit Configuration Information Error<br>• Unit Configuration Verification Error<br>• Memory Corruption Detected<br>• NX Unit Startup Error<br>• Any other error that requires replacement of the EtherNet/IP Coupler Unit |
| |  | Flashing at 1.0 sec intervals | • NX Unit Communications Timeout<br>• NX Unit Initialization Error<br>• BOOTP Server Connection Error<br>• TCP/IP Setting Error (Local IP Address)<br>• IP Address Duplication Error |
| --- |  | Not lit | • No Unit power supply<br>• Restarting is in progress for the Slave Terminal<br>• Waiting for initialization to start. |

## UNIT PWR Indicator

The UNIT PWR indicator shows the status of the Unit power supply.

| Color | Status | | Meaning |
|---|---|---|---|
| Green |  | Lit | Unit power supplied |
| --- |  | Not lit | No Unit power supply |

## I/O PWR Indicator

The I/O PWR indicator shows the status of the I/O power supply.

| Color | Status | | Meaning |
|---|---|---|---|
| Green |  | Lit | I/O power supplied |
| --- |  | Not lit | No I/O power supply |

## L/A P1 Indicator

The Port 1 Link/Activity (L/A) indicator shows the linked status and the EtherNet/IP communication status for Port 1.

| Color | Status | | Meaning |
|---|---|---|---|
| Green |  | Lit | Link established |
| |  | Flickering | • Link established<br>• Communications are active |
| --- |  | Not lit | No link established |

## L/A P2 Indicator

The Port 2 Link/Activity (L/A) indicator shows the linked status and the EtherNet/IP communication status for Port 2.

| Color | Status | | Meaning |
|---|---|---|---|
| Green |  | Lit | Link established |
| |  | Flickering | • Link established<br>• Communications are active |
| --- |  | Not lit | No link established |

## Appearance Change of the Indicators

The appearance of the indicators has been changed for models released in or before September 2018 with lot numbers that represent the date of or after September 20, 2018. See below for details on the applicable models and the changes. Models that are not listed here have the appearance after the change.

### ● Applicable Models

NX-EIC202

### ● Change Details

The shape of the light emitting part of each indicator has been changed from a square to a pentagon.

Below is an example of the TS indicator.


Before change　　After change

# 4-3 Hardware Switch Settings

This section describes the functions of the hardware switches (i.e., the rotary switches and the DIP switch) on the front panel of the EtherNet/IP Coupler Unit.

## 4-3-1 Rotary Switches

The two rotary switches show a two-digit hexadecimal number. The setting range is 0x00 to 0xFF with the default setting 0x00.

$x16^1$

$x16^0$

Use the rotary switches to specify how to set the IP address of the EtherNet/IP Coupler Unit.
The meanings of the set values are as follows:

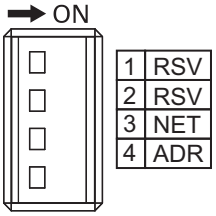
| Set value (hex) | IP address setting method |
|---|---|
| 00 | Set the IP address with the Network Configurator. |
| 01 to FE | Set the IP address with the DIP switch (pin 4) and rotary switches. |
| FF | Get the IP address from the BOOTP server.*1 |

*1. This function is supported for NX-EIC202 version 1.2 or later. An error will occur for earlier versions.

Refer to *9-4 Setting IP Address* on page 9-31 for the IP address setting procedure.

## 4-3-2 DIP Switch

Use DIP switch pin 3 to set the network interface type.
Use DIP switch pin 4 to set the base of the IP address for the EtherNet/IP network.
The other pins are reserved by the system.

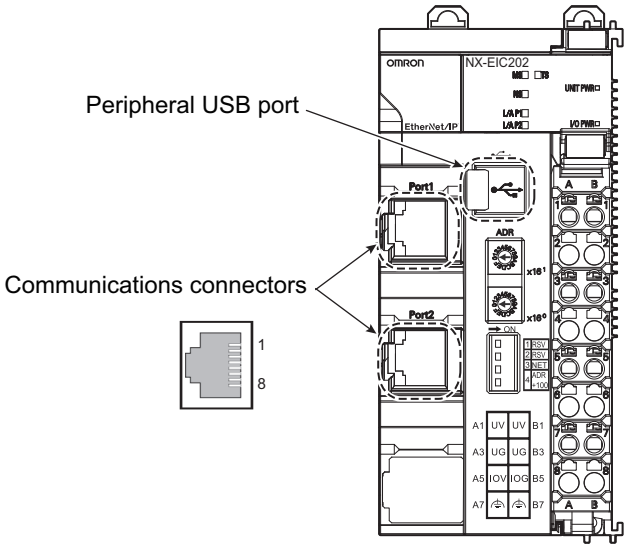



| Pin | Name | Setting | Description |
|---|---|---|---|
| Pin 1 | Reserved by the system | Keep turned OFF. | --- |
| Pin 2 | | | |
| Pin 3 | Network interface setting | ON | Enable TCP/UDP message service (disable tag data links).*1*2 |
| | | OFF (factory setting) | Enable tag data links (disable TCP/UDP message service). |
| Pin 4 | IP address base setting*3 | ON | 192.168.1.☐ (with ☐ set by rotary switches) |
| | | OFF (factory setting) | 192.168.250.☐ (with ☐ set by rotary switches) |

*1. The following CIP service is unavailable when the TCP/UDP message service is enabled:
Tag data link (Class 1 connection)
While the TCP/UDP message service is enabled, the EtherNet/IP Coupler Unit will return a "Device State Conflict (0x10)" CIP general error for a Forward_Open request.
*2. Network Configurator uses the UCMM type of explicit messages.
*3. Refer to *9-4 Setting IP Address* on page 9-31 for information on setting the node address by combining the rotary switches that are described above and pin 4 of the DIP switch.

# 4-4 Communications Connector and Peripheral USB Port

This section provides the specifications of the communications connectors and peripheral USB port on the front panel of the EtherNet/IP Coupler Unit.




## Communications Connectors

Connect Ethernet cables to the communications connectors. The specifications of the Ethernet communications connectors are given below.

- Electrical specifications: Conform to IEEE 802.3 standards.
- Connector structure: RJ45 8-pin Modular Connector (Conforms to ISO 8877).

**Additional Information**

Refer to the *NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual (Cat. No. W506)*.

## Peripheral USB Port

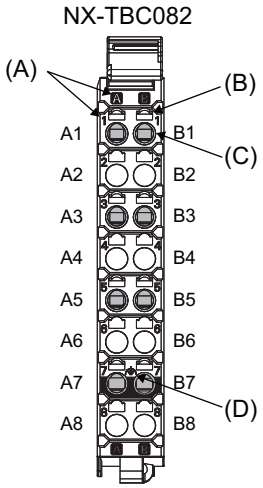
This port is used to connect to the Support Software. You can use a USB cable (connector type: B) to directly connect the EtherNet/IP Coupler Unit to the Support Software to enable setting up the EtherNet/IP Slave Terminal.

# 4-5 Terminal Blocks

The terminal block on the EtherNet/IP Coupler Unit is a removable screwless clamping terminal block that allows you to easily connect and remove the wiring.
The Unit power supply, I/O power supply, and ground wire are connected to this screwless clamping terminal block.
For details, refer to *7-2 Connecting the Power Supply and Ground Wires* on page 7-6.



## Terminal Block Part Names and Functions




8-terminal type

| Letter | Name | Function |
|---|---|---|
| (A) | Terminal number indications | The terminal numbers (A1 to A8 and B1 to B8) are displayed.<br>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 the ground terminals. |

Terminal blocks come in three types depending on the number of terminals that can be used. There are 8-terminal type, 12-terminal type, and 16-terminal type. Only an 8-terminal type can be mounted to the EtherNet/IP Coupler Unit. To prevent incorrect wire insertion, other terminal blocks cannot be mounted.

**Additional Information**

On 8-terminal type of terminal blocks, the following terminals do not have terminal holes and release holes: A2, A4, A6, A8, B2, B4, B6, and B8.

## Applicable Terminal Blocks for Each Model

The terminal blocks that you can use with each model of the EtherNet/IP Coupler Unit are given in the following table.

| Unit model number | Terminal block | | | |
|---|---|---|---|---|
| | Terminal block model number | Number of terminals | Ground terminal mark | Terminal current capacity |
| NX-EIC202 | NX-TBC082 | 8 | Present | 10 A |

**Precautions for Correct Use**

Do not use the NX-TBA081 Terminal Block. The terminal current capacity of 4 A for that type is not sufficient for the NX-EIC202.

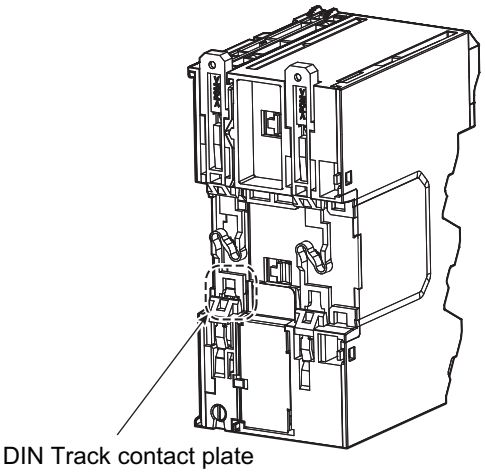
To differentiate between the two models of terminal blocks, use the terminal number column indications. The terminal block with white letters on a dark background is the NX-TBC082.

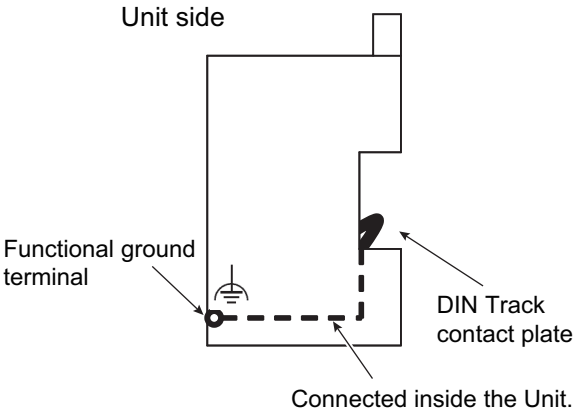
**Additional Information**

Refer to *A-8 NX Objects* on page A-65 for the screwless clamping terminal blocks for EtherNet/IP Slave Terminals.

# 4-6 DIN Track Contact Plate

There is a DIN Track contact plate in the section on the back of the EtherNet/IP Coupler Unit that comes into contact with the DIN Track.
This plate is connected internally to the functional ground terminal on EtherNet/IP Coupler Unit. This means that the functional ground terminal will be electrically connected to the DIN Track.
For details, refer to *7-2-3 Grounding the EtherNet/IP Slave Terminal* on page 7-8.



# 5

# Designing the Power Supply System

This section describes how to design the power supply system for the EtherNet/IP Slave Terminal.

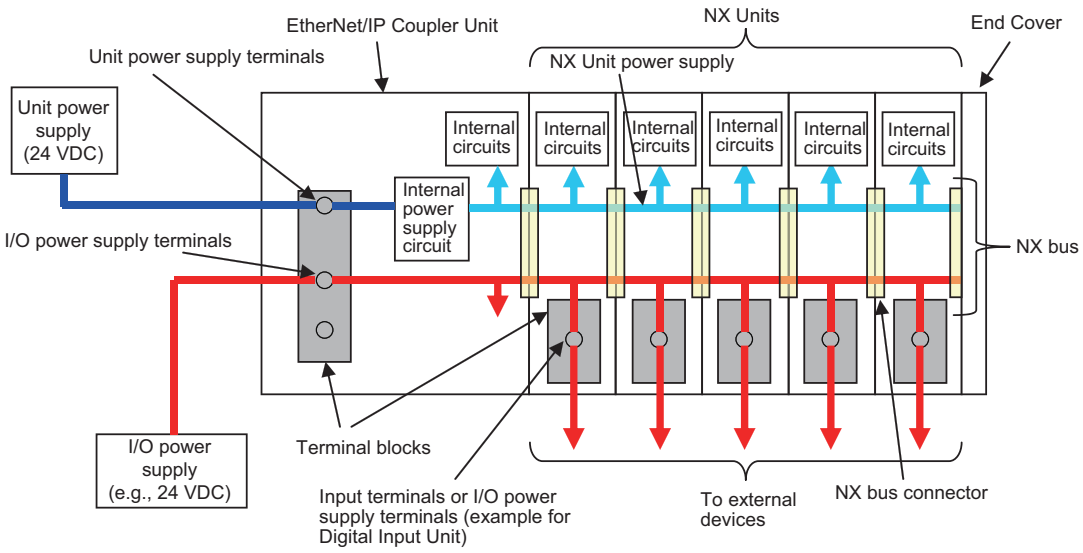
# 5-1 Power Supply System and Design Concepts

This section describes the power supply system for an EtherNet/IP Slave Terminal and the design concepts.

## 5-1-1 Power Supply System and Types of Power Supplies

### Power Supply System Configuration Diagram

An example of a power supply system configuration diagram for an EtherNet/IP Slave Terminal is shown below.




### Power Supply Types

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

| Power supply type | Description |
|---|---|
| Unit power supply | This power supply is required to generate the NX Unit power, which is necessary for the EtherNet/IP Slave Terminal to operate. This power supply is connected to the Unit power supply terminals on the EtherNet/IP Coupler Unit.<br>The internal power supply circuit in the EtherNet/IP Coupler Unit generates the NX Unit power supply from the Unit power supply. The internal circuits of the EtherNet/IP Coupler Unit and of the NX Units operate on the NX Unit power supply.<br>The NX Unit power is supplied to the NX Units in the Slave Terminal through the NX bus connectors. |

| Power supply type | Description |
|---|---|
| I/O power supply | This power supply drives the internal I/O circuits of the NX Units and it is used for the connected external devices. This power supply is connected to the I/O power supply terminals on the EtherNet/IP Coupler Unit. The I/O power is supplied to the NX Units from the I/O power supply terminals and through the NX bus connectors. |

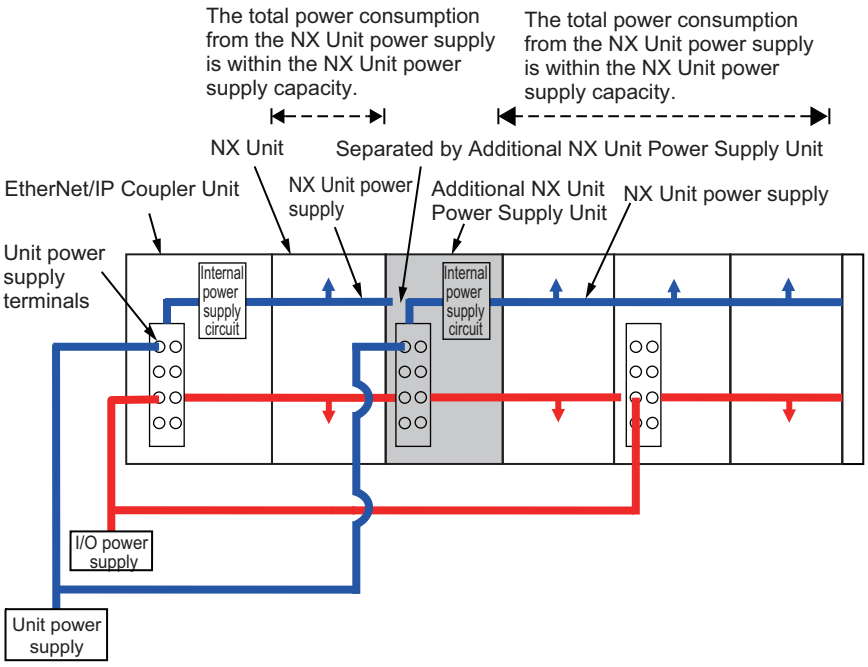
**Precautions for Correct Use**

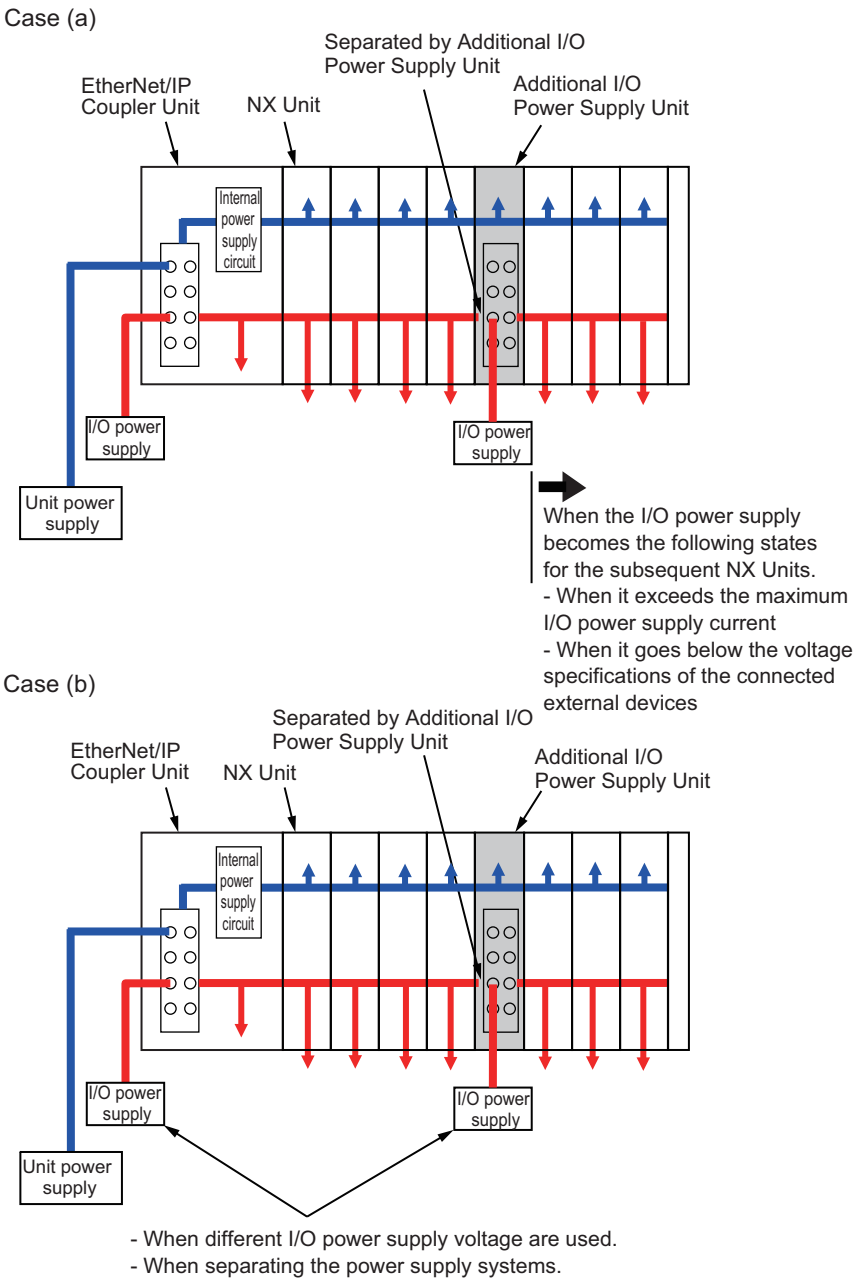
Always use separate power supplies for the Unit power supply and the I/O power supply. If you supply power from the same power supply, noise may cause malfunctions.

## 5-1-2 NX-series Power Supply-related Units

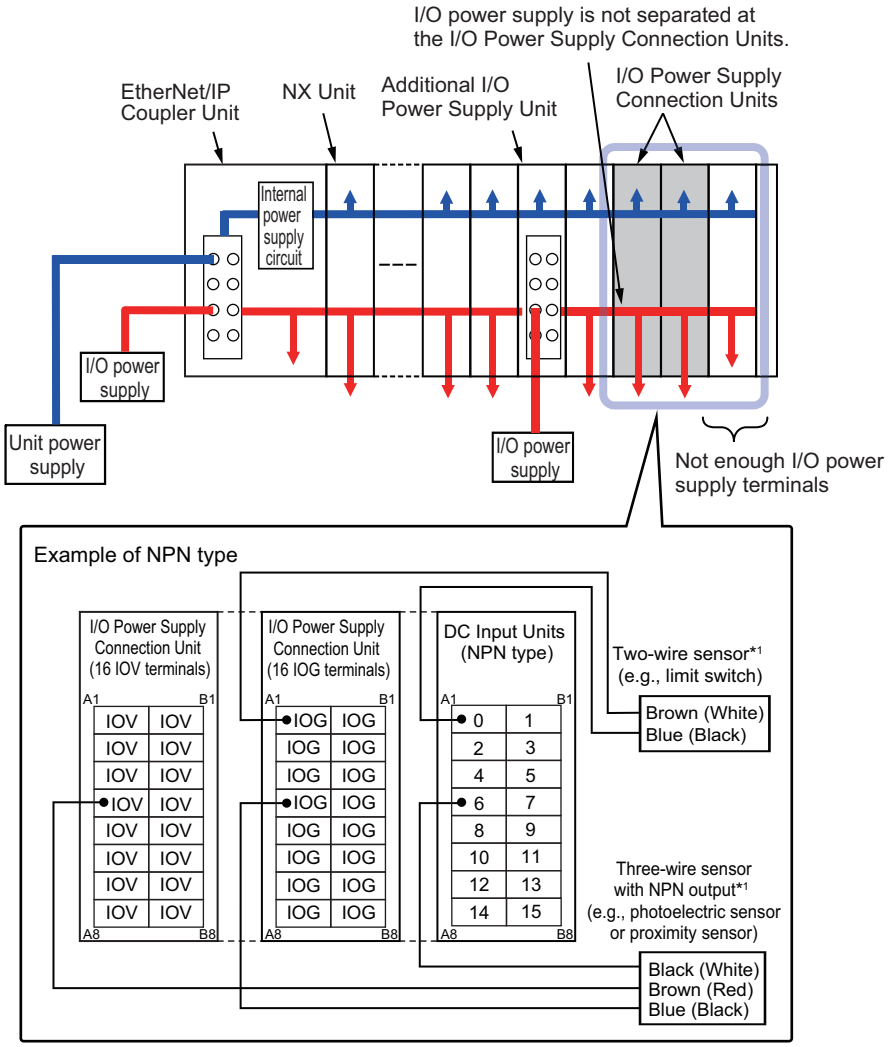
The EtherNet/IP Coupler Unit supplies the NX Unit power and I/O power to the NX Units in the Slave Terminal. The Units that are related to power supply for the NX Series other than the EtherNet/IP Coupler Unit are listed in the following table.

For the specifications of NX-series power supply-related Units, refer to the *NX-series System Units User's Manual (Cat. No. W523)*. For information on the most recent lineup of NX Series power supply-related Units, refer to NX-series catalogs or OMRON websites, or ask your OMRON representative.

| Unit name | Function |
|---|---|
| Additional NX Unit Power Supply Unit | This NX Unit provides NX Unit power supply.<br>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 EtherNet/IP Coupler Unit.<br>  <br><br>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.<br>Use this NX Unit in the following cases.<br>(a) When the I/O power supply capacity is insufficient<br>• When the total current consumption for the I/O power supply exceeds the maximum I/O power supply current of the EtherNet/IP Coupler Unit<br>• 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<br>(b) Separating the I/O power supply<br>• When connected external devices have different I/O power supply voltages<br>• When separating the power supply systems<br>  <br>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. |




*1. 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.

## 5-1-3 Design Concepts for Power Supply to the EtherNet/IP Slave Terminal

The following must be studied when designing the power supply system to the EtherNet/IP Slave Terminal.

- The NX Unit power supply and I/O power supply systems must be designed and then the design conditions for both must be confirmed.
- The external power supplies (i.e., Unit power supply and I/O power supplies) must be selected.

# 5-2 Designing the NX Unit Power Supply System

This section describes how to design the NX Unit power supply to the EtherNet/IP Slave Terminal.

## 5-2-1 Procedure for Designing the NX Unit Power Supply System

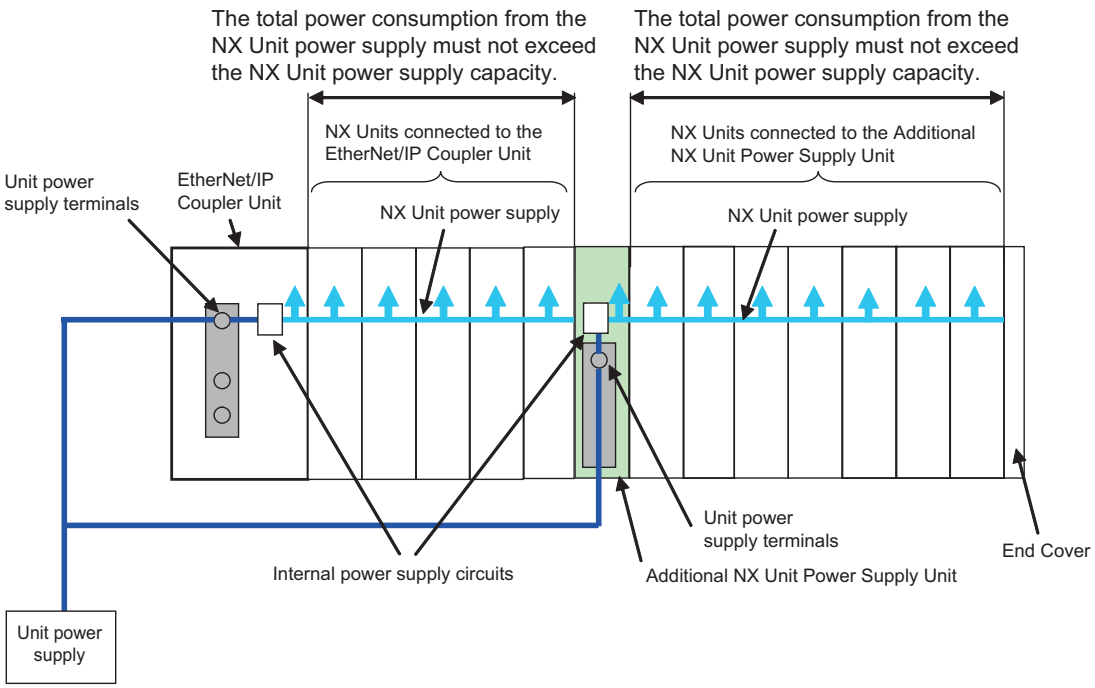
The total power consumption from the NX Unit power supply must not exceed the NX Unit power supply capacity of the Unit that supplies the NX Unit power.
Use the following procedure to design the NX Unit power supply.

1. Calculate the total power consumption from the NX Unit power supply that is required by the NX Units that are connected to the EtherNet/IP Coupler Unit.

2. If the total power consumption from the NX Unit power supply exceeds the NX Unit power supply capacity of the EtherNet/IP Coupler Unit, add an Additional NX Unit Power Supply Unit to the right of an NX Unit before the capacity is exceeded.

3. Calculate the total power consumption from the NX Unit power supply that is required by the NX Units that are connected after the Additional NX Unit Power Supply Unit. If the total power consumption of those NX Units exceeds the NX Unit power supply capacity of the Additional NX Unit Power Supply Unit, add another Additional NX Unit Power Supply Unit to the right of an NX Unit before the capacity is exceeded.

4. Repeat step 3 until the design conditions for the NX Unit power supply are met.



### ● NX Unit Power Supply Capacity and Restrictions

The internal power supply circuits of the EtherNet/IP Coupler Unit or Additional NX Unit Power Supply Unit supply the NX Unit power to the NX Units.

The NX Unit power supply capacity does not include the NX Unit power consumption of the EtherNet/IP Coupler Unit or Additional NX Unit Power Supply Units.

The NX Unit power supply capacity of the EtherNet/IP Coupler Unit is restricted by the following application conditions.

- Ambient operating temperature
- Installation orientation

Consider these conditions and determine the required NX Unit power supply capacity, and then design the NX Unit power supply system.

Refer to *3-1-2 EtherNet/IP Coupler Unit Specifications* on page 3-3 for restrictions on the EtherNet/IP Coupler Unit.

For restrictions on the Additional NX Unit Power Supply Unit, refer to the *NX-series System Units User's Manual (Cat. No. W523)*.

**Precautions for Correct Use**

- Do not exceed the NX Unit power supply capacity. If you exceed the NX Unit power supply capacity, malfunction may occur.
- Use the same Unit power supply to supply the Unit power to the entire Slave Terminal. If you supply power from different Unit power supplies, differences in electrical potential may cause unexpected currents in the NX Unit power supply, which may result in failure or malfunction.

## 5-2-2 Calculation Example for the NX Unit Power Supply

This section provides a calculation example for the NX Unit power supply.

### ● Unit Configuration Example

| Name | Model | Quantity | Power consumption/Unit |
|---|---|---|---|
| EtherNet/IP Coupler Unit | NX-EIC202 | 1 | 1.60 W |
| Digital Input Unit | NX-ID3317 | 5 | 0.5 W |
| Relay Output Unit | NX-OC2633 | 5 | 0.8 W |

### ● Application Conditions

The ambient operating temperature is 55°C and an upright installation orientation is used.

### ● Calculating the Total Power Consumption from the NX Unit Power Supply

Calculate the total power consumption from the NX Unit power supply that is required by the NX Units that are connected to the EtherNet/IP Coupler Unit. The NX Unit power consumption of the EtherNet/IP Coupler Unit is not included in this calculation.

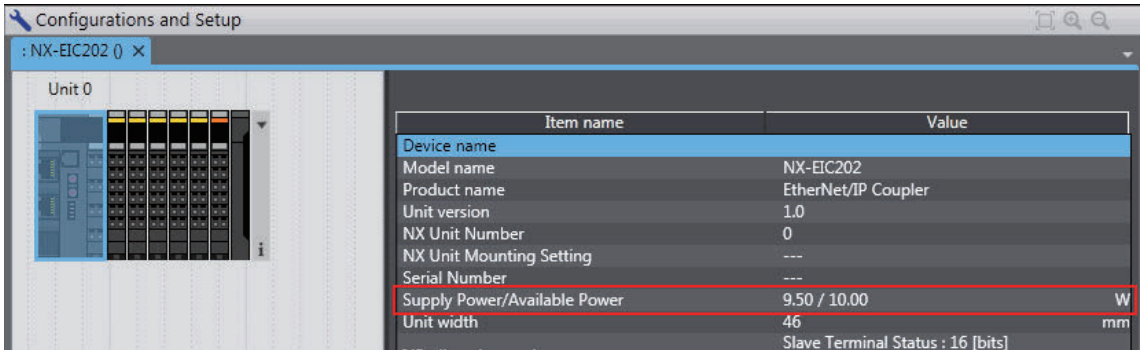
Total power consumption from NX Unit power supply [W] = (0.5 W × 5) + (0.8 W × 5) = 6.5 W

## Confirming the NX Unit Power Supply Capacity of the EtherNet/IP Coupler Unit

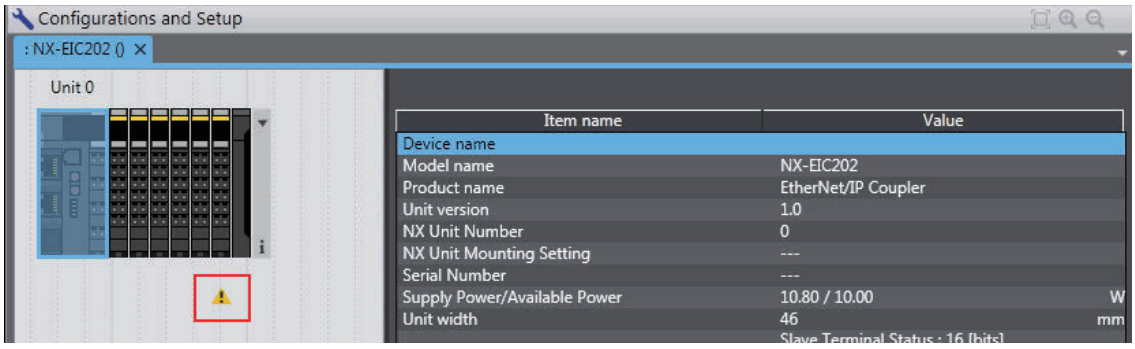
According to the graph in *Installation orientation and restrictions on page 3-5* in *3-1-2 EtherNet/IP Coupler Unit Specifications* on page 3-3, the NX Unit power supply capacity is 8.5 W max. Therefore, in this example, the total power consumption from the NX Unit power supply is 6.5 W, and the NX Unit power supply capacity is 8.5 W max., so the design conditions are met.

### Additional Information

Excess or insufficiency in the NX Unit power supply capacity can be easily checked when the Unit configuration is created on the Edit Slave Terminal Configuration Tab Page on the Support Software. Use the following procedure to check the power supply capacity.
On the Edit Slave Terminal Configuration Tab Page on the Support Software, select the Unit to supply NX Unit power. The power that is supplied by the NX Unit power supply (i.e., the total power consumption) and the power supply capacity are displayed for the **Supply Power/ Available Power** parameter. The following example is for when the EtherNet/IP Coupler Unit is selected.




If the power to supply exceeds the NX Unit power supply capacity of the Unit that is selected to supply the NX Unit power, a yellow warning icon is displayed by the first NX Unit for which there is not sufficient capacity and also by all the remaining NX Units.




However, the Support Software determines excess and insufficiency in the supplied power for an NX Unit power supply capacity of 10 W max. It does not consider the power supply restrictions of the NX Unit power supply in actual application conditions and I/O power supply design conditions. When actually designing the power supply, refer to *5-2-1 Procedure for Designing the NX Unit Power Supply System* on page 5-6 and *5-3-2 Designing the I/O Power Supply from the NX Bus* on page 5-10.

# 5-3 Designing the I/O Power Supply System

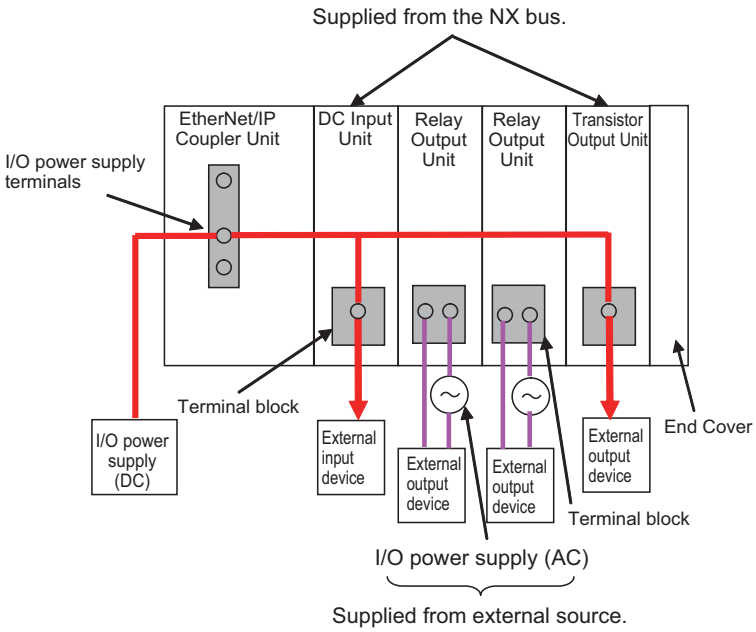
This section describes how to design the I/O power supply to the EtherNet/IP Slave Terminal.

## 5-3-1 I/O Power Supply Method

There are the following two methods to supply the I/O power supply to the EtherNet/IP Slave Terminal depending on the type and model of the NX Units.

| Supply method | Description |
|---|---|
| Supply from the NX bus | Power is supplied through the NX bus connectors by connecting an I/O power supply to the I/O power supply terminals on the EtherNet/IP Coupler Unit or Additional I/O Power Supply Units. |
| Supply from external source | Power is supplied to the Units from an external source.<br>I/O power is supplied by connecting an I/O power supply to the terminal blocks on the Units. |

Refer to the user's manuals for individual NX Units or to the *NX-series Data Reference Manual (Cat. No. W525)* for the power supply method for specific NX Units.
An example is shown below.



## 5-3-2 Designing the I/O Power Supply from the NX Bus

### Procedure for Designing the I/O Power Supply

Make sure that the following design conditions are met when you design the I/O power supply from the NX bus.

- The total current consumption from the I/O power supply must not exceed the maximum I/O power supply current of the Unit that supplies the I/O power.
- The voltage drop in the I/O power supply must be within the voltage specifications of the I/O circuits of the NX Units and the connected external devices.

Use the following procedure to design the I/O power supply.

***1*** Calculate the total current consumption from the I/O power supply of the EtherNet/IP Coupler Unit and the NX Units that are connected to the EtherNet/IP Coupler Unit, and calculate the voltage drop in the I/O power supply.

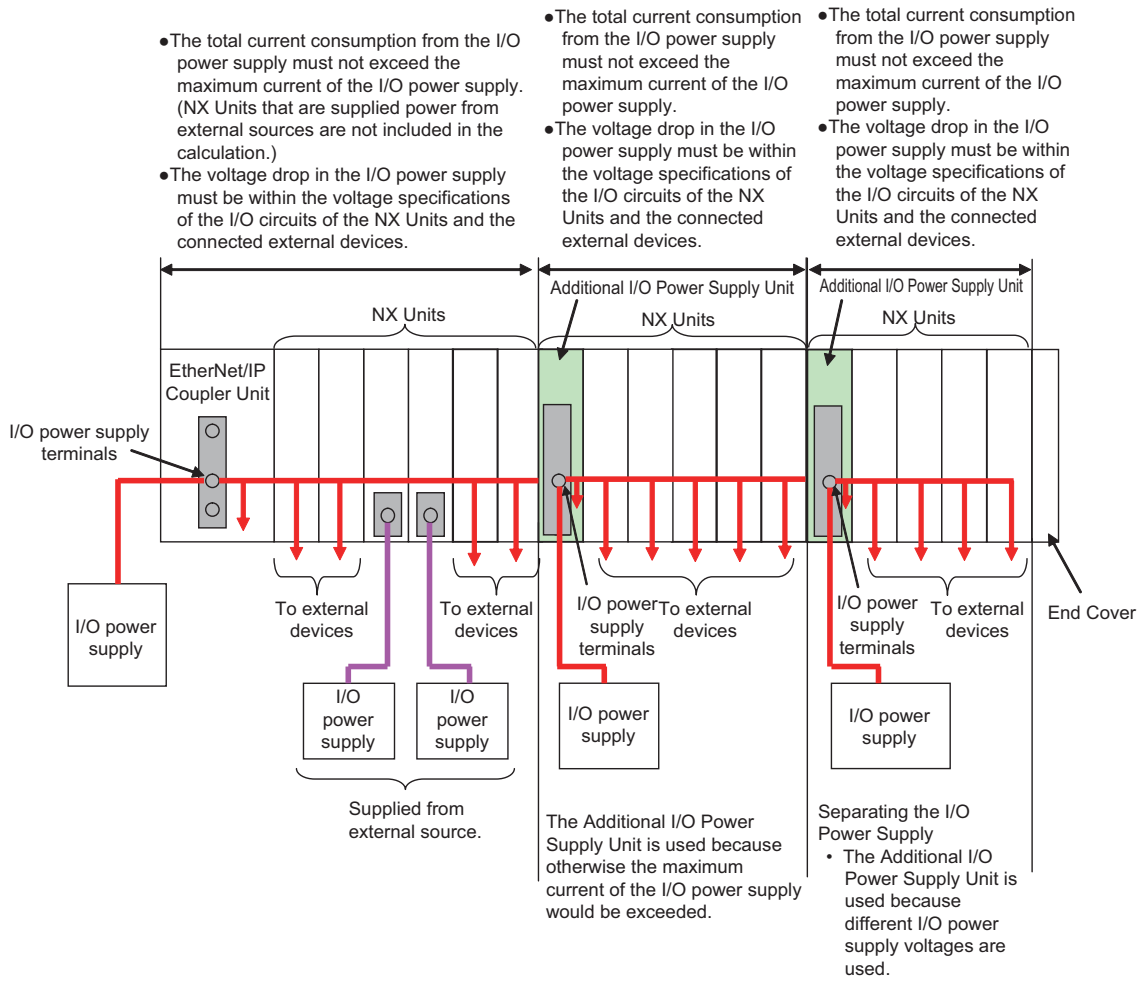
***2*** If either of the following items (a) and (b) is true, add an Additional I/O Power Supply Unit to the right of an NX Unit for which (a) and (b) are not true.

a) The total current consumption for the I/O power supply exceeds the I/O power supply capacity of the EtherNet/IP Coupler Unit.
b) 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 of the NX Units or the connected external devices.

***3*** Calculate the voltage drop in the I/O power supply after the Additional I/O Power Supply Unit and the total current consumption from the I/O power supply that is required by the Additional I/O Power Supply Unit and by the NX Units that are connected after the Additional I/O Power Supply Unit. If either of the following items (a) and (b) is true, add another Additional I/O Power Supply Unit to the right of an NX Unit for which (a) and (b) are not true.

a) The total current consumption for the I/O power supply exceeds the I/O power supply capacity of the Additional I/O Power Supply Unit.
b) 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 of the NX Units or the connected external devices.

***4*** Repeat step 3 until the design conditions for the I/O power supply are met.




### ● Maximum I/O Power Supply Current

The maximum I/O power supply current is the maximum current that the I/O power supply that is connected to the EtherNet/IP Coupler Unit or Additional I/O Power Supply Unit can supply through the NX bus connectors to the NX Units. For the maximum I/O power supply current of the EtherNet/IP Coupler Unit, refer to *3-1-2 EtherNet/IP Coupler Unit Specifications* on page 3-3. For the maximum I/O power supply current of the Additional I/O Power Supply Unit, refer to the *NX-series System Units User's Manual (Cat. No. W523)*.

## Calculating the Total Current Consumption from the I/O Power Supply

The total current consumption from the I/O power supply from the NX bus is the total of the following current consumptions.

- The current consumption from the I/O power supply that is required for the EtherNet/IP Coupler Unit or the Additional I/O Power Supply Unit, and for the NX Units that are connected to the EtherNet/IP Coupler Unit or Additional I/O Power Supply Unit
- The current consumption between the NX Units and the connected external devices

| Current consumption item | Description |
|---|---|
| Current consumption from I/O power supply | This is the current that is consumed by the internal circuits that operate on the I/O power supply.<br>Specific values are given in the user's manuals for individual Units. |
| Current consumption between the NX Units and the connected external devices | This is the current that is consumed between the NX Units and the connected external devices.<br>For example, this is the current consumed by a Digital Input Unit to supply power to photoelectric sensors or to turn ON the input circuits in the Digital Input Unit.<br>The current consumption depends on the type of I/O circuit in the NX Unit, the number of I/O points that are used, and the current consumption of the connected external device. It must be calculated for each NX Unit. |

## ● Calculation Examples

Examples of calculating the current consumption from the I/O power supply are given below for a Digital Input Unit and Digital Output Unit.

| | | |
|---|---|---|
| Current consumption of Digital Input Unit | = | Current consumption from I/O power supply + (Input current × Number of inputs used) + Total current consumption of connected input devices |

| | | |
|---|---|---|
| Current consumption of Digital Output Unit | = | Current consumption from I/O power supply + Total load current of connected loads + Total current consumption of connected output devices |

## Calculating the Voltage Drop in the I/O Power Supply

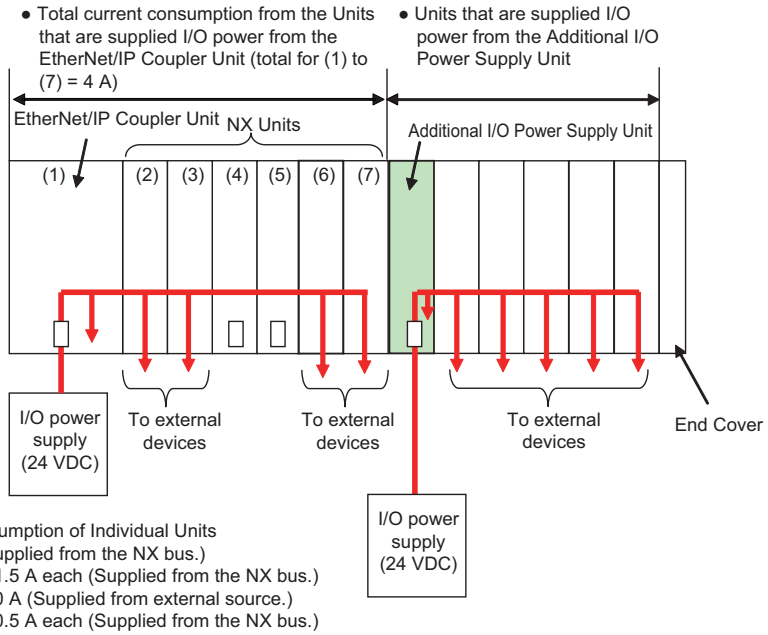
Voltage drop occurs in the EtherNet/IP Slave Terminal due to the contact resistance at the points where Units are connected to each other. Design the I/O power supply system to maintain the voltage specifications of the NX Unit I/O circuits and connected external devices even if the voltage of the I/O power supply drops.

As shown in the following table, the voltage drop per Unit depends on the total current consumption from the I/O power supply. However, the total current consumption from the I/O power supply must not exceed the maximum I/O power supply current of the Unit that supplies the I/O power.

| Total current consumption from the I/O power supply | Voltage drop per Unit |
|---|---|
| 10 A | 0.20 V |
| 8 A | 0.16 V |
| 6 A | 0.12 V |
| 4 A | 0.08 V |
| 3 A | 0.06 V |
| 2 A | 0.04 V |
| 1 A | 0.02 V |

Here, the following Unit configuration example is used to show how to calculate the I/O power that is supplied by the EtherNet/IP Coupler Unit. The same method can be used to calculate the I/O power supply from an Additional I/O Power Supply Unit.

Example:




Power Consumption of Individual Units
(1): 0 A*1 (Supplied from the NX bus.)
(2) and (3): 1.5 A each (Supplied from the NX bus.)
(4) and (5): 0 A (Supplied from external source.)
(6) and (7): 0.5 A each (Supplied from the NX bus.)

*1. The current consumption of the EtherNet/IP Coupler Unit is not actually 0 A. However, a value of 0 A is used in this calculation example.
In actual calculations, use the current consumption from the I/O power supply that is given elsewhere in this manual.

### ● Outline

Find the I/O power supply voltage of the NX Unit that is the farthest from the EtherNet/IP Coupler Unit. In this example, the I/O power supply voltage of Unit (7) is found.

### ● Conditions

Assume that an I/O power supply voltage of 24.00 VDC is supplied to the I/O power supply terminals on the EtherNet/IP Coupler Unit.

### ● Procedure

***1*** Use the following formula to calculate the total current consumption from the I/O power supply.

| | | |
|---|---|---|
| Total current consumption from the I/O power supply | = | (1) + (2) + (3) + (4) + (5) + (6) + (7) |
| | = | 0 A + 1.5 A + 1.5 A + 0 A + 0 A + 0.5 A + 0.5 A |
| | = | 4 A |

***2*** Find the I/O power supply voltage and make sure that it is within the voltage specifications of the I/O circuits of the NX Units and the connected external devices.

| | | |
|---|---|---|
| I/O power supply voltage at (7) | = | I/O power supply voltage on I/O power supply terminals − (Voltage drop per Unit × Number of Units passed through) |
| | = | 24.00 V − 0.08 V × (7 − 1 Units) |
| | = | 23.52 V |

## Design to Separate the I/O Power Supply

If the I/O power supply voltages of the connected external devices are different, connect an Additional I/O Power Supply Unit at the point where the I/O power supply voltage changes and then perform similar calculations to design a system that meets the power supply conditions. The same method is used to separate the power supply systems. Connect an Additional I/O Power Supply Unit at the point where the power supply systems are to be separated and then perform similar calculations to design the overall system to meet the power supply conditions.

## 5-3-3 Designing the I/O Power Supply from External Sources

Unlike supplying power from the NX bus, there is no specific design method for supplying I/O power from external sources.
Calculate the total current consumption from the I/O power supply for the NX Units to be supplied power from an external source.
Refer to the user's manuals of the NX Units for the total current consumption from the I/O power supply.

## 5-3-4 Restrictions on Inrush Current for ON/OFF Operation

This section describes the restrictions on inrush current from the I/O power supply that occurs when connected external devices turn ON and OFF.

## Inrush Current Restrictions

If inrush current to the I/O power supply occurs when a connected external device turns ON or OFF, do not allow the effective value of the I/O power supply current to exceed the following rated values when the inrush current is added to the current consumption from the I/O power supply.

- Maximum I/O power supply current
- Current capacity of power supply terminals for the I/O power supply

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

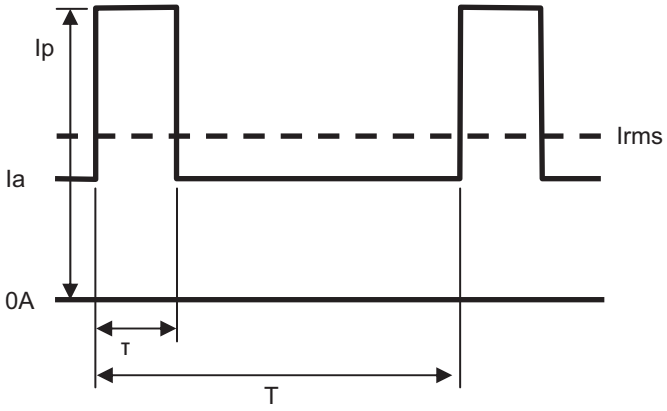
| Unit | Model | Peak value | Pulse width |
|---|---|---|---|
| EtherNet/IP Coupler Unit | NX-EIC202 | 50 A | 1 s |

## Calculating the Effective Value of the I/O Power Supply Current

The formula to calculate the effective value of the I/O power supply current, Irms, is given below.

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

- Ip: Peak inrush current (A)
- Irms: Effective value of I/O power supply current (A)
- Ia: Total current consumption from the I/O power supply (A)
- D: Inrush current duty
- τ: Inrush current pulse width (s)
- T: Inrush current period (s)



# 5-4 Selecting External Power Supplies and Protective Devices

This section describes how to select the external power supplies and protective devices for the EtherNet/IP Slave Terminal, i.e., the Unit power supply and the I/O power supplies.

## 5-4-1 Selecting the Unit Power Supply

This section describes how to select the Unit power supply for the EtherNet/IP Slave Terminal.

### Recommended Power Supplies

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 of 24 VDC (20.4 to 28.8 VDC).

Recommended Power Supplies: S8JX Series (manufactured by OMRON)

### Calculating the Required Power Supply Capacity of the Unit Power Supply

#### ● Formula

This section describes how to calculate the required capacity of the Unit power supply for the EtherNet/IP Slave Terminal.

| | | |
|---|---|---|
| Required capacity of the Unit power supply for the EtherNet/IP Slave Terminal | = | Total of required Unit power supply capacity for each block |

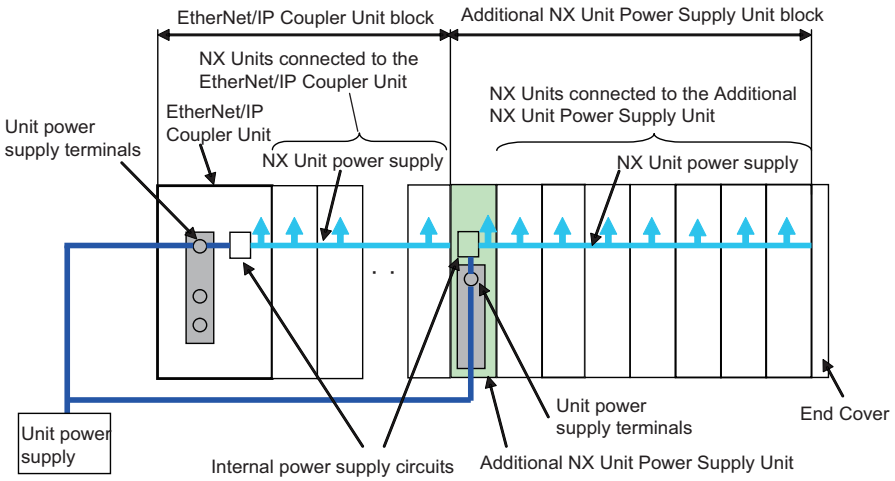
Use the following formula to calculate the required Unit power supply capacity for each block in the EtherNet/IP Slave Terminal.

Required Unit power supply capacity of each block = (A + B)/C

| | |
|---|---|
| (A) | NX Unit power consumption of the Unit that supplies the NX Unit power |
| (B) | 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) | NX Unit power supply efficiency of the Unit that supplies the NX Unit power |

## Blocks

A block consists of the Unit that supplies the NX Unit power and the range of Units to which that Unit supplies the NX Unit power. For example, in the configuration in the following figure there are two blocks in the EtherNet/IP Slave Terminal: the block with the EtherNet/IP Coupler Unit and the block with the Additional NX Unit Power Supply Unit.




The total of the required Unit power supply capacity for these two blocks is the required power supply capacity of the Unit power supply for the EtherNet/IP Slave Terminal.

**Precautions for Correct Use**

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

## Calculation Example

This section provides a calculation example for the configuration example that is given in *5-2-2 Calculation Example for the NX Unit Power Supply* on page 5-7.

| Name | Model | Quantity | Power consumption/Unit |
|---|---|---|---|
| EtherNet/IP Coupler Unit | NX-EIC202 | 1 | 1.6 W |
| Digital Input Unit | NX-ID3317 | 5 | 0.5 W |
| Relay Output Unit | NX-OC2633 | 5 | 0.8 W |

- The NX Unit power supply efficiency of the EtherNet/IP Coupler Unit is 70%.

In this configuration example, there is only one block, the EtherNet/IP Coupler Unit block.

Required power supply capacity of Unit power supply to EtherNet/IP Slave Terminal

= Required Unit power supply capacity of EtherNet/IP Coupler Unit block

= (Power consumption from NX Unit power supply of EtherNet/IP Coupler Unit + Total power consumption from NX Unit power supply of NX Units connected to EtherNet/IP Coupler Unit)/NX Unit power supply efficiency of EtherNet/IP Coupler Unit

= (1.6 W + (0.5 W × 5) + (0.8 W × 5))/0.7
= Approximately. 11.6 W

**Precautions for Correct Use**

Consider the inrush current when the power supply is turned ON and select a Unit power supply with sufficient extra capacity. The inrush current when power is turned ON may prevent the Unit power supply from operating correctly.

## 5-4-2 Selecting the I/O Power Supplies

This section describes how to select the I/O power supplies for the EtherNet/IP Slave Terminal.

### Recommended Power Supplies

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.

Recommended Power Supplies: S8JX Series (manufactured by OMRON)

### Calculating the Required Power Supply Capacity of the I/O Power Supply

Use the calculation method that is described in *5-3 Designing the I/O Power Supply System* on page 5-9 and calculate the total current consumption from the I/O power supply and the required power supply capacity of the I/O power supply.

Unlike the Unit power supply, it is not necessary to use only one I/O power supply to supply power to the entire Slave Terminal.

**Precautions for Correct Use**

Consider the inrush current when the power supply is turned ON and select an I/O power supply with sufficient extra capacity. The inrush current when power is turned ON may prevent the I/O power supply from operating correctly.

## 5-4-3 Selecting Protective Devices

This section describes how to select protective devices (e.g., breakers and fuses) to protect against short circuits and overcurrents in external circuits.

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

- For the Unit power supply, the rating of the NX Unit power supply capacity or of the current capacity of the power supply terminals
- For the I/O power supply, the rating of the maximum I/O power supply current or of the current capacity of the power supply terminals

For the above ratings for the EtherNet/IP Coupler Unit, refer to *3-1-2 EtherNet/IP Coupler Unit Specifications* on page 3-3. For the ratings of NX-series power supply-related Units, refer to the *NX-series System Units User's Manual (Cat. No. W523)*.

## Selecting Protective Devices

Consider the following items when you select protective devices.

- Protective device specifications (breaking/fusing, detection characteristics, steady current value, etc.)
- Inrush current when power is turned ON
- Inrush current when connected external devices turn ON and OFF*1

*1. Refer to *5-3-4 Restrictions on Inrush Current for ON/OFF Operation* on page 5-14 for information on the inrush current when connected external devices are turned ON and OFF.

For the breaking/fusing time, use protective devices that meet the conditions in the following table.

### ● For Unit Power Supply

| Current | Breaking/fusing time |
|---|---|
| 6 A | 1 min max. |
| 12 A | 15 s max. |
| 21 A | 5 s max. |
| 30 A | 2.5 s max. |

### ● For I/O Power Supply

The following values apply for a Unit which has 10 A of current capacity of the power supply terminals.

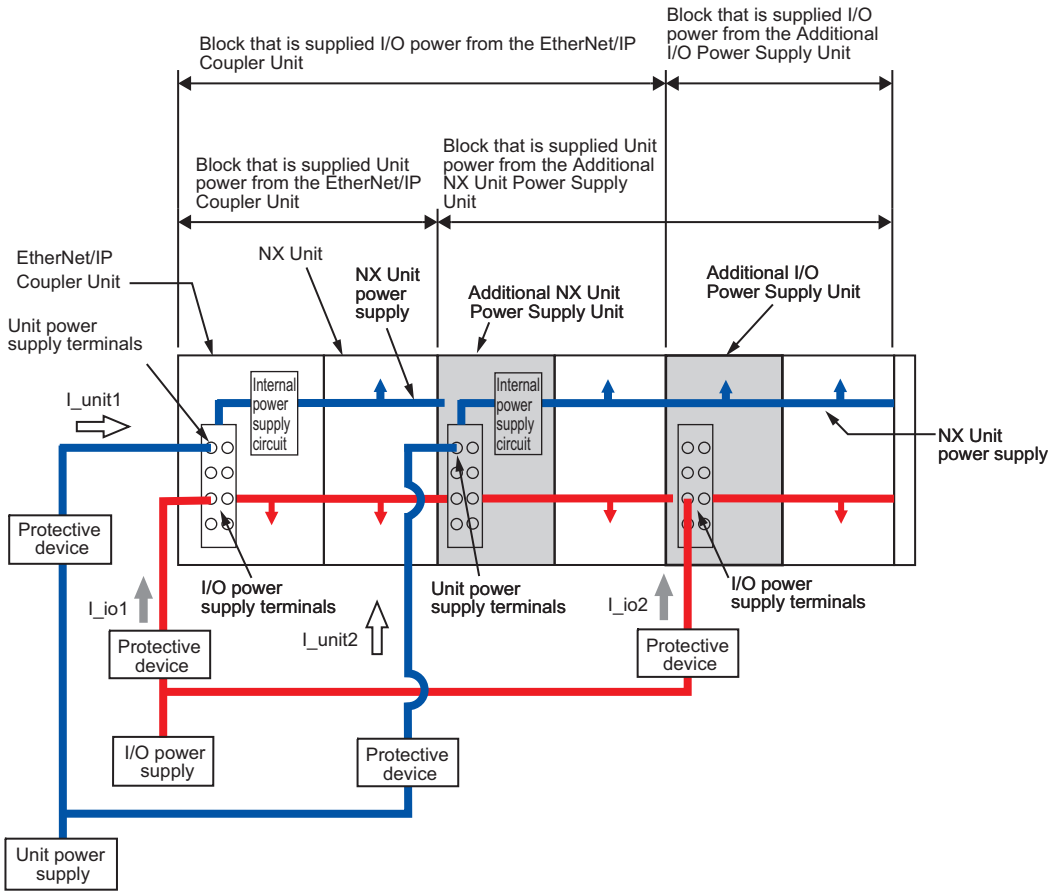
| Current | Breaking/fusing time |
|---|---|
| 14 A | 1 min max. |
| 28 A | 9 s max. |
| 56 A | 1.5 s max. |
| 70 A | 0.8 s max. |

The following values apply for a Unit which has 4 A of current capacity of the power supply terminals.

| Current | Breaking/fusing time |
|---|---|
| 6 A | 1 min max. |
| 12 A | 15 s max. |
| 21 A | 5 s max. |
| 30 A | 2.5 s max. |

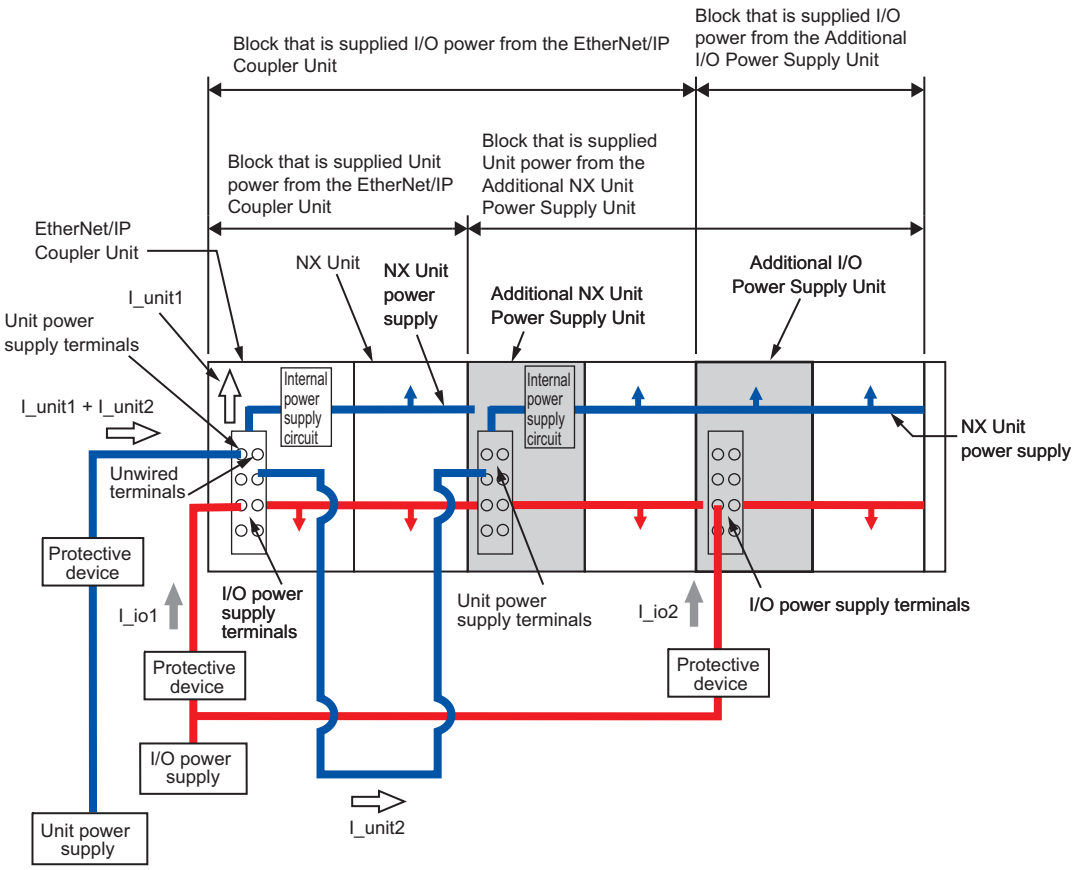
## Installation Locations for Protective Devices

Install protective devices for the Unit power supply and I/O power supply in the locations that are shown in the following figure.




However, fewer protective devices may be required when the current consumption of each block does not exceed the rated current. An example of this is provided below.

- Using Unwired Unit Power Supply Terminals
  In this example, the current consumption from each power supply is as follows:
  Current consumption from Unit power supply: I_unit1 + I_unit2 ≤ Lowest rated current
  Current consumption from I/O power supply: I_io1 + I_io2 ≥ Lowest rated current*1



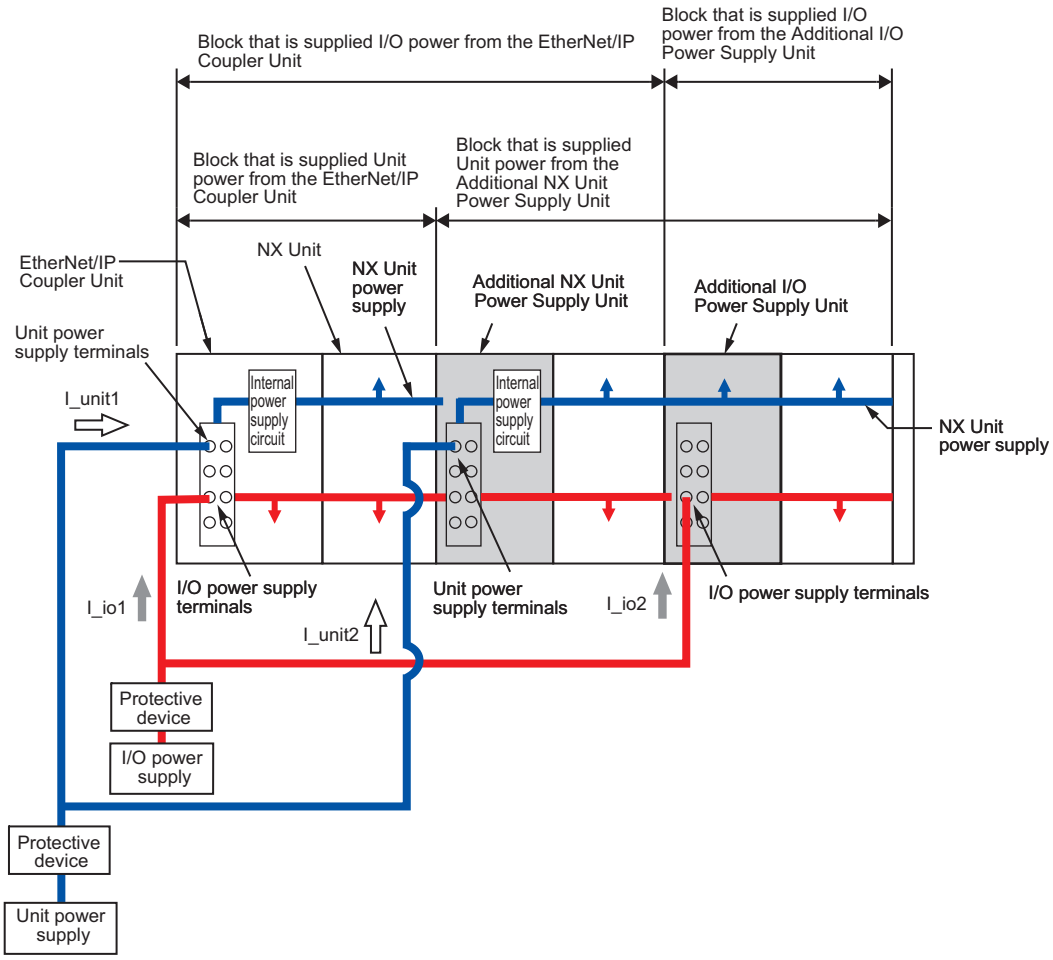

*1. This is the lowest rated current of all of the Units that supply I/O power and are connected to protective devices. For example, if terminals with both a 10-A and 4-A capacities are connected, the value is 4 A.

- When Total Current Consumption for All Blocks Does Not Exceed the Rated Current

  In this example, the current consumption from each power supply is as follows:

  Current consumption from Unit power supply: I_unit1 + I_unit2 ≤ Lowest rated current

  Current consumption from I/O power supply: I_io1 + I_io2 ≤ Lowest rated current*1




*1. This is the lowest rated current of all of the Units that supply I/O power and are connected to protective devices. For example, if terminals with both a 10-A and 4-A capacities are connected, the value is 4 A.

# 6

# Installation

This section describes how to install the EtherNet/IP Slave Terminal.

# 6-1 Installing Units

This section describes how to mount Units to an EtherNet/IP Slave Terminal.

## 6-1-1 Installation Precautions

To increase the reliability of the EtherNet/IP Slave Terminal and take complete advantage of its functionality, observe the following precautions.

### Installation Location

Do not install the EtherNet/IP Slave Terminal in the following locations.

- Locations subject to ambient temperatures outside the range of 0 to 55°C
- Locations subject to condensation as the result of severe changes in temperature
- Locations subject to a relative humidity outside the range of 10% to 95%
- Locations subject to corrosive or flammable gases
- Locations subject to excessive dust, salt, and metal powder
- Locations subject to shock or vibration
- Locations subject to direct sunlight
- Locations subject to splashing of water, oils, or chemicals

Take appropriate and sufficient countermeasures when installing the EtherNet/IP Slave Terminal in the following locations.

- 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

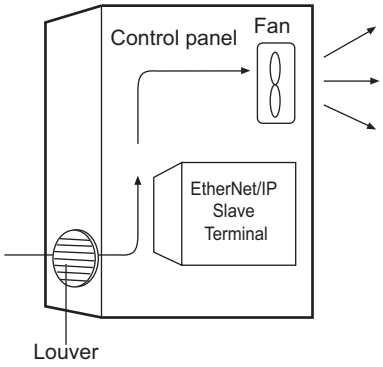
## Installation in Cabinets or Control Panels

Consider the ambient temperature, accessibility for operation, accessibility for maintenance, noise immunity, and installation orientation when you install the EtherNet/IP Slave Terminal in a cabinet or control panel.

### ● Temperature Control

The ambient operating temperature of the EtherNet/IP Slave Terminal must be between 0 and 55°C. When necessary, take the following steps to maintain the proper temperature.

- Provide enough space for good air flow.
- Do not install the EtherNet/IP Slave Terminal directly above equipment that generates a large amount of heat such as heaters, transformers, or high-capacity resistors.
- If the ambient temperature exceeds 55°C, install a cooling fan or air conditioner.

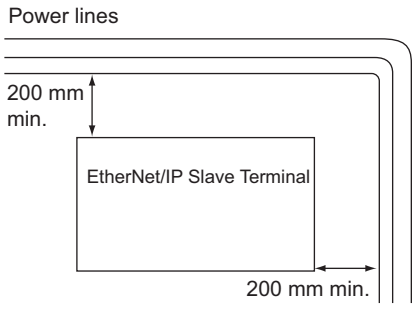



### ● Accessibility for Operation and Maintenance

- To ensure safe access for operation and maintenance, separate the EtherNet/IP Slave Terminal as much as possible from high-voltage equipment and power machinery.
- If will be easy to operate the EtherNet/IP Slave Terminal if it is mounted at a height of 1.0 to 1.6 m above the floor.

### ● Improving Noise Immunity

- Do not mount the EtherNet/IP Slave Terminal in a cabinet or control panel containing high-voltage equipment.
- Install the EtherNet/IP Slave Terminal at least 200 mm away from power lines.




- Ground the mounting plate between the EtherNet/IP Slave Terminal and the mounting surface.

### ● Installation Orientation

Refer to *6-1-3 Installation Orientation* on page 6-8.

## Installation Method in Control Panels

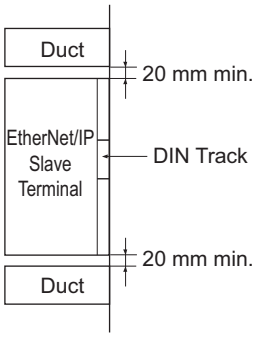
Mount the EtherNet/IP Slave Terminal on DIN Track if you install it in a cabinet or control panel. Consider the width of wiring ducts, wiring, ventilation, and Unit replacement when determining the space between EtherNet/IP Slave Terminals.

**Additional Information**

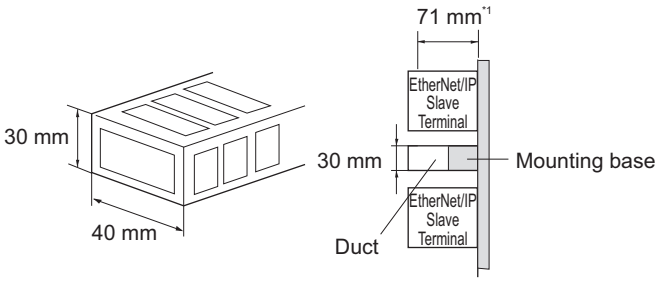
The EtherNet/IP Slave Terminal must be mounted on DIN Track.
It cannot be mounted with screws.

### ● Wiring Ducts

Whenever possible, route I/O wiring through wiring ducts.
Install mounting bases so that it is easy to wire the I/O Units through ducts. It is handy to have the ducts at the same height as the EtherNet/IP Slave Terminal.



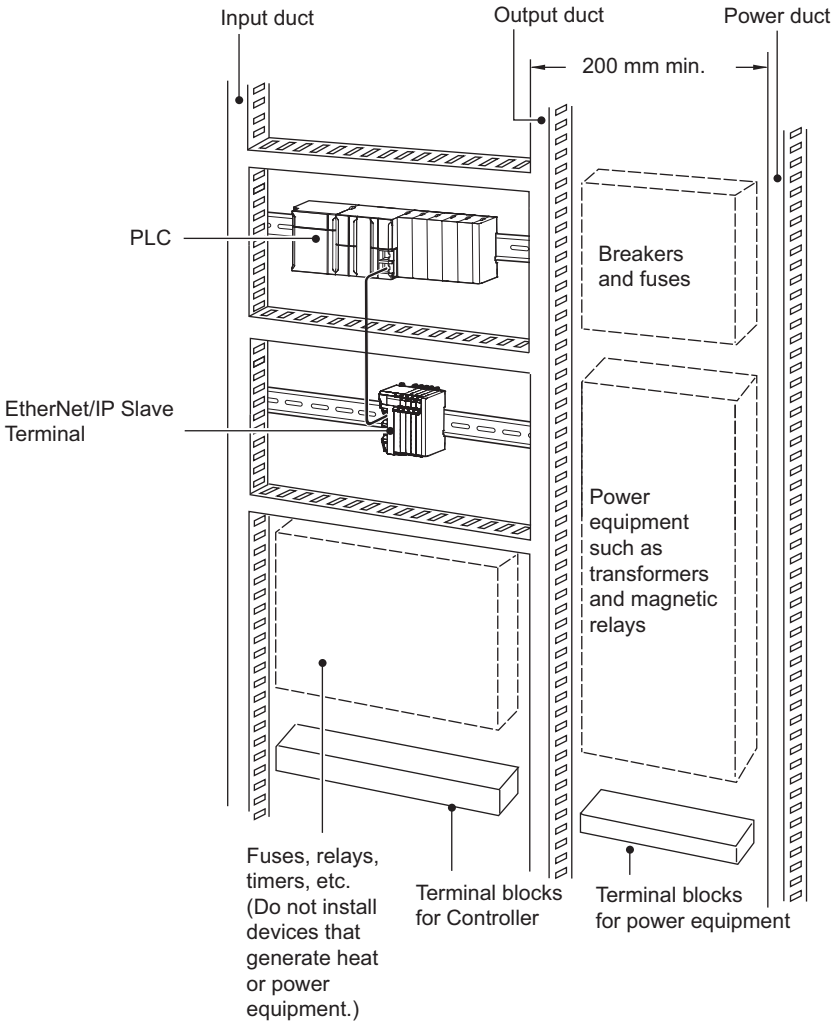

### ● Wiring Duct Example




*1. The height of the DIN Track is not considered in this figure.

## ● Routing Wiring Ducts

Install the wiring ducts at least 20 mm away from the tops of the devices and any other objects (e.g., top of the panel, other wiring ducts, structural supports, and components) to provide enough space for air circulation and replacement of Units.



## 6-1-2 Preparations for Installation

You must install the EtherNet/IP Coupler Unit and NX Units on a DIN Track.
The following products are recommended.

| Name | Model | Manufacturer | Remarks |
|---|---|---|---|
| 35-mm DIN Track | PFP-50N | OMRON Corporation | • Length: 50 cm<br>• Material: Aluminum<br>• Surface treatment: Insulated |
| | PFP-100N | OMRON Corporation | • Length: 100 cm<br>• Material: Aluminum<br>• Surface treatment: Insulated |
| | NS 35/7,5 PERF | Phoenix Contact | • Length: 75.5, 95.5, 115.5, or 200 cm<br>• Material: Steel<br>• Surface treatment: Conductive |
| | NS 35/15 PERF | Phoenix Contact | • Length: 75.5, 95.5, 115.5, or 200 cm<br>• Material: Steel<br>• Surface treatment: Conductive |
| End Plate | PFP-M | OMRON Corporation | Two End Plates are required for each EtherNet/IP Slave Terminal. |
| | CLIPFIX 35 | Phoenix Contact | Two End Plates are required for each EtherNet/IP Slave Terminal. |

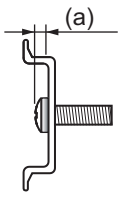
Not all of the combinations of the DIN Tracks and End Plates listed above are possible.
Confirm applicability of the combinations in the following table.

| DIN Track model | PFP-M (OMRON) | CLIPFIX 35 (Phoenix Contact) |
|---|---|---|
| PFP-50N | Possible. | Possible. |
| PFP-100N | Possible. | Possible. |
| NS 35/7,5 PERF | Possible. | Possible. |
| NS 35/15 PERF | Not possible. | Possible. |

Also, use screws and washers of the following sizes to fix the DIN Tracks.

(a): Dimensions from the screw head to the fastening surface

| DIN Track model | Applicable screw size | (a)*1 |
|---|---|---|
| PFP-50N | M4 | 4.9 mm max. (4.1 mm max.) |
| NS35/7,5PERF | M6 | 5.4 mm max. (4.6 mm max.) |
| NS35/15PERF | M6 | 10 mm max. |

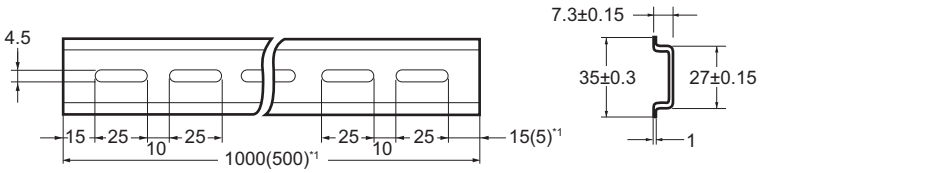



*1. Dimensions in parentheses are for Communications Coupler Units with lot numbers through December 2014 or for NX Units with 12-mm widths with lot numbers through December 2014.

If you use any DIN Track other than those listed in the table above, refer to the dimensions shown in *6-1-10 Assembled Appearance and Dimensions* on page 6-21 and use proper screws and washers.

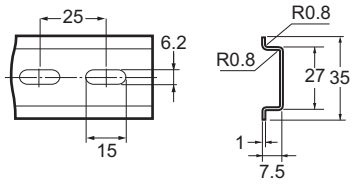
## ● DIN Tracks

PFP-100N/50N DIN Track

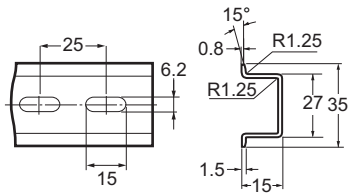



*1 PFP-50N dimensions are given in parentheses.

NS 35/7,5 PERF

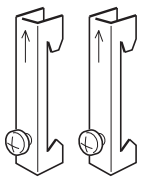



NS 35/15 PERF

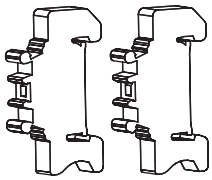



## ● End Plate

PFP-M (Two)

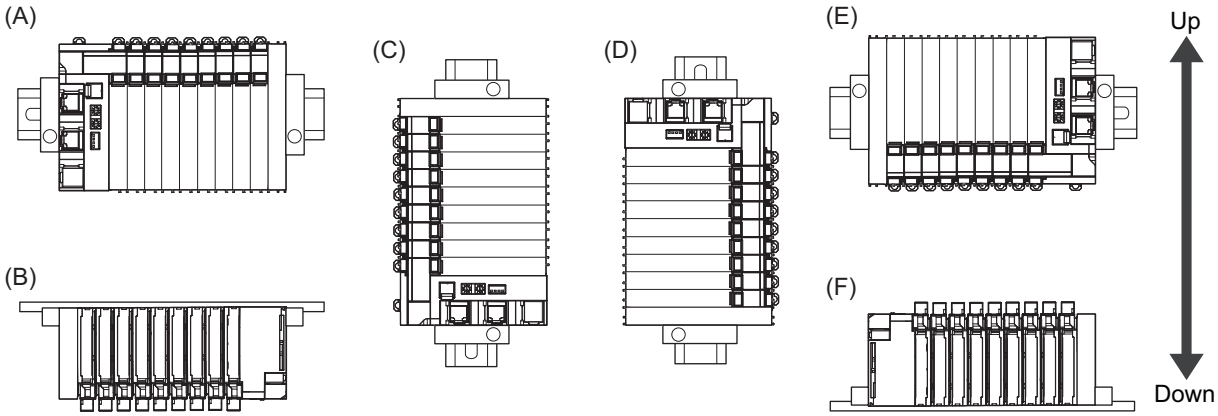


CLIPFIX 35 (Two)



## 6-1-3 Installation Orientation

An EtherNet/IP Slave Terminal can be installed in any of the following six orientations.
(A) is the upright installation direction and (B) to (F) are installation directions other than upright.




However, there are restrictions on the installation orientation of the EtherNet/IP Coupler Unit due to the ambient operating temperature and the NX Unit power supply capacity.
There are also installation orientation restrictions on the DIN Track of the EtherNet/IP Coupler Unit and restrictions to specifications that can result from the NX Units that are used.
For restrictions on the EtherNet/IP Coupler Unit, refer to *3-1-2 EtherNet/IP Coupler Unit Specifications* on page 3-3.
Refer to the user's manual for the NX Units that you will use for specific NX Unit restrictions.

**Precautions for Safe Use**

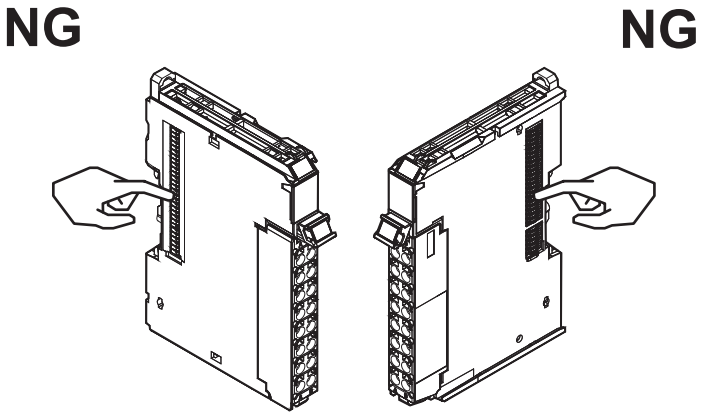
For installation orientations (C) and (D) in the above figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables. The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured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

## 6-1-4 Installing the EtherNet/IP Coupler Unit

This section describes how to install the EtherNet/IP Coupler Unit.

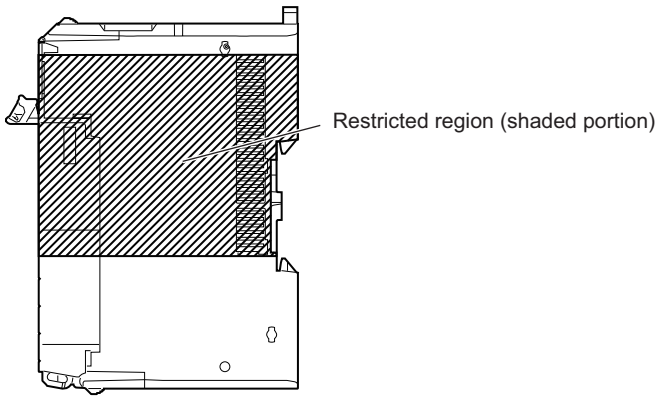
### Precautions for Safe Use

- Always turn OFF the power supply before installing the Unit.
  If the power supply is not OFF, the Unit may malfunction or may be damaged.
- 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 the EtherNet/IP Coupler 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 EtherNet/IP Slave Terminal.



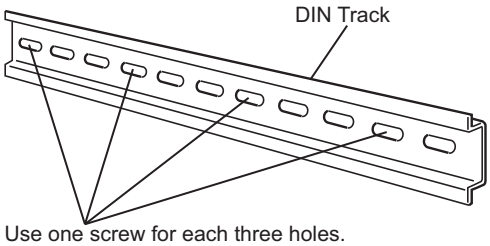

### Precautions for Correct Use

- When you handle the Unit, be careful not to touch or bump the pins in the NX bus connector.
- When you handle the Unit, be careful not to apply stress to the pins in the NX bus connector. If the Unit is installed and the power supply is turned ON when the pins in the NX bus connector are deformed, contact failure may cause malfunctions.

***1*** Install the DIN Track.

- Using a PFP-50N/100N DIN Track

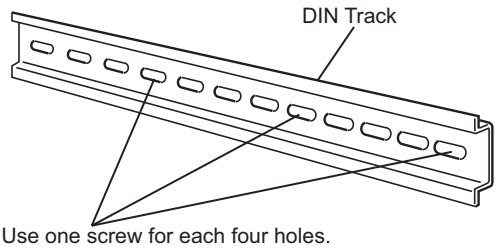
Use one M4 screw for each three holes in the DIN Track. Ensure the head of each screw is at least 2 mm below the top of the DIN Track to prevent damage to units. There must be a screw for each interval of 105 mm or less. The screw tightening torque is 1.2 N·m.




Use one screw for each three holes.

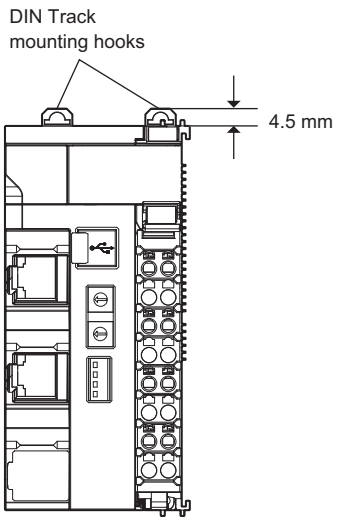
• Using an NS 35/7,5 PERF or NS 35/15 PERF DIN Track

Use one M6 screw for each four holes in the DIN Track. There must be a screw for each interval of 100 mm or less. The screw tightening torque is 5.2 N·m.

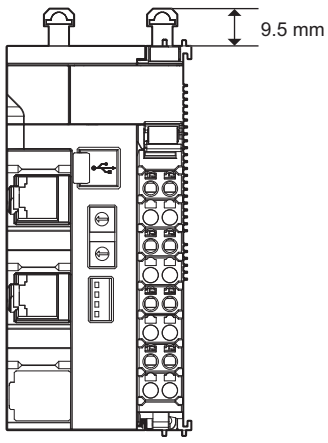



Use one screw for each four holes.

***2*** Make sure that the two DIN Track mounting hooks on the EtherNet/IP Coupler Unit are in the locked position.




DIN Track Mounting
Hooks in Locked Position

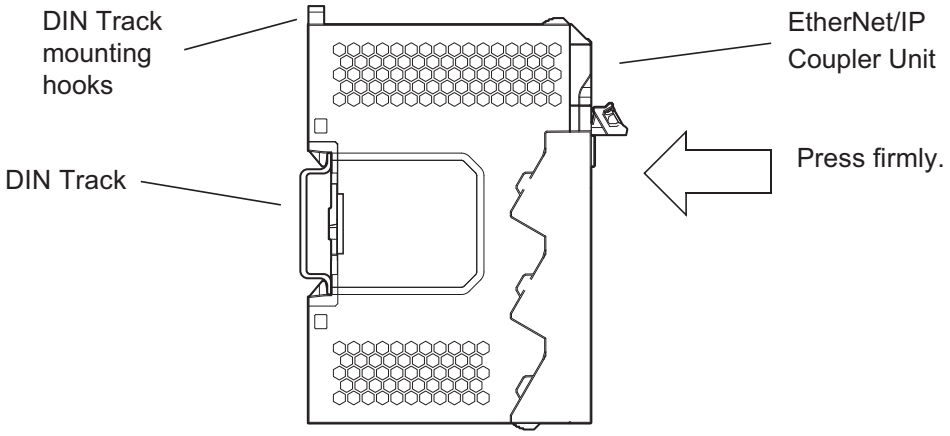



DIN Track Mounting
Hooks in Unlocked Position

If the DIN Track mounting hooks are pressed down, they are in the locked position.
If the DIN Track mounting hooks are up, they are in the unlocked position.
If the DIN Track mounting hooks are unlocked, press them down into the locked position.

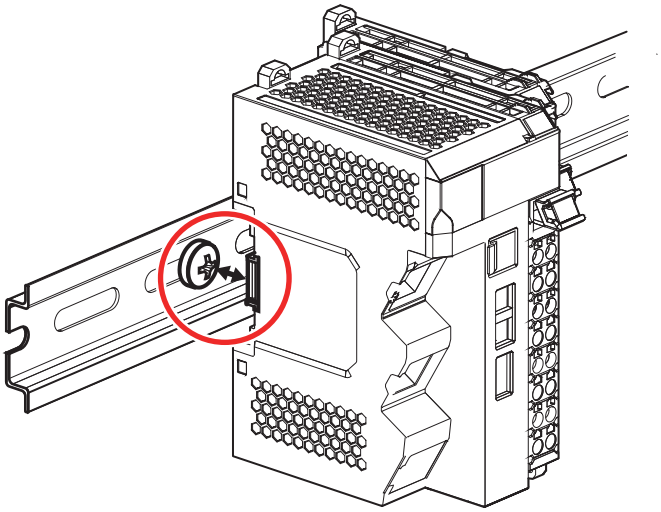
***3*** Press the EtherNet/IP Coupler Unit firmly against the DIN Track until you hear the DIN Track mounting hook lock into place.

After you mount the EtherNet/IP Coupler Unit, check to be sure that it is securely mounted on the DIN Track.




### Precautions for Correct Use

The EtherNet/IP Coupler Unit may not be mounted properly to the DIN Track if the protrusions on the left back of the EtherNet/IP Coupler Unit interfere with the screw that fixes the DIN Track as shown in the following figure.
When you mount the EtherNet/IP Coupler Unit to the DIN Track, avoid interference of the protrusions on the left back of the EtherNet/IP Coupler Unit with the screw on the DIN Track. (This applies to Ethernet/IP Coupler Units with lot numbers through December 2014.)



### Additional Information

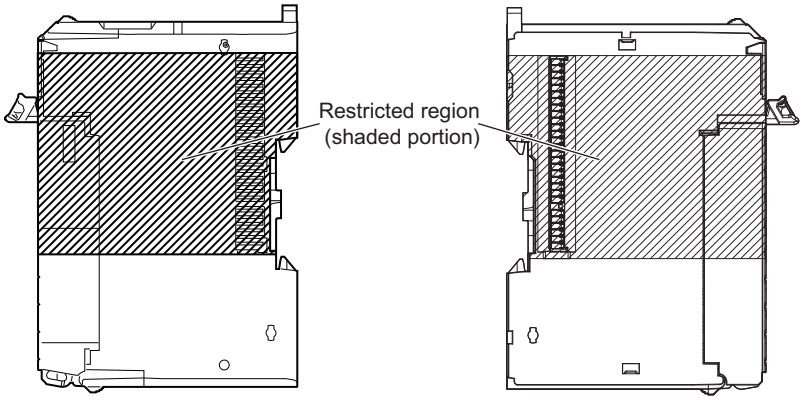
It is not normally necessary to unlock the DIN Track mounting hooks when you mount the EtherNet/IP Coupler Unit. However, if you mount the EtherNet/IP Coupler Unit on a DIN Track that is not one of the recommended DIN Tracks, the DIN Track mounting hooks may not lock properly. If that happens, unlock the DIN Track mounting hooks at the start of the procedure, mount the Unit to the DIN Track, and then lock the DIN Track mounting hooks.

## 6-1-5 Installing and Connecting NX Units

This section describes how to mount NX Units to the EtherNet/IP Coupler Unit and how to connect NX Units to each other.

### Precautions for Safe Use

- Always turn OFF the power supply before mounting the NX Units. If the power supply is not OFF, the Unit may malfunction or may be damaged.
- Do not apply labels or tape to the Units. When the Units are installed or removed, adhesive or scraps may adhere to the pins in the NX bus connector, which may result in malfunctions.
- 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 EtherNet/IP Slave Terminal.

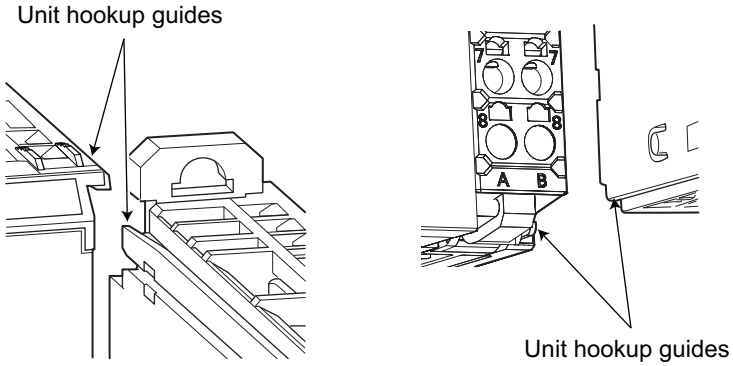



### Precautions for Correct Use

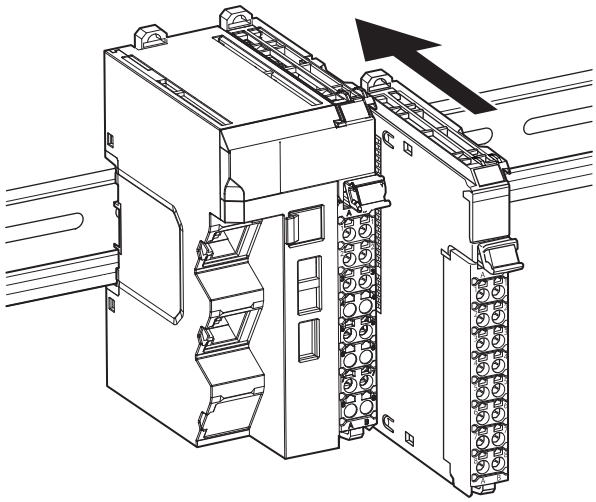
- When you mount an NX Unit to the EtherNet/IP Coupler Unit or when you connect NX Units to each other, always mount the Units one at a time on the DIN Track. If you connect NX Units to each other and attempt to mount them together to the DIN Track at the same time, the Units may separate from each other and fall.
- When you handle a Unit, be careful not to apply stress to the pins in the NX bus connector. If the Unit is installed and the power supply is turned ON when the pins in the NX bus connector are deformed, contact failure may cause malfunctions.
- When you handle a Unit, be careful not to touch or bump the pins in the NX bus connector.

## ● Mounting an NX Unit to the EtherNet/IP Coupler Unit

**1** From the front of the EtherNet/IP Coupler Unit, engage the Unit hookup guides on the NX Unit with the Unit hookup guides on the EtherNet/IP Coupler 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.

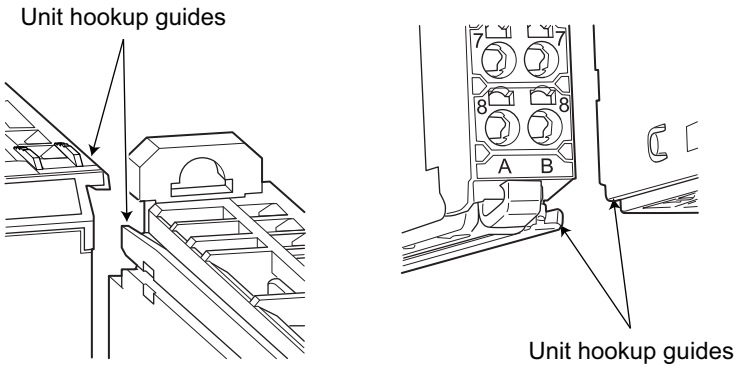
**Additional Information**

It is not normally necessary to unlock 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 one of the recommended DIN Tracks, the DIN Track mounting hook may not lock properly. If that happens, unlock the DIN Track mounting hook at the start of the procedure, mount the NX Unit to the DIN Track, and then lock the DIN Track mounting hook.

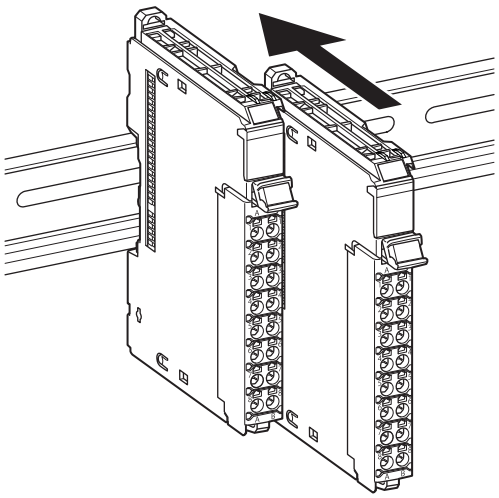
## ● Mounting NX Units to Each Other

Use the following procedure to mount NX Units to each other.

***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**

It is not normally necessary to unlock 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 one of the recommended DIN Tracks, the DIN Track mounting hook may not lock properly. If that happens, unlock the DIN Track mounting hook at the start of the procedure, mount the NX Unit to the DIN Track, and then lock the DIN Track mounting hook.

## 6-1-6 Mounting the End Cover

Always mount an End Cover to the end of the Slave Terminal.

**Precautions for Safe Use**

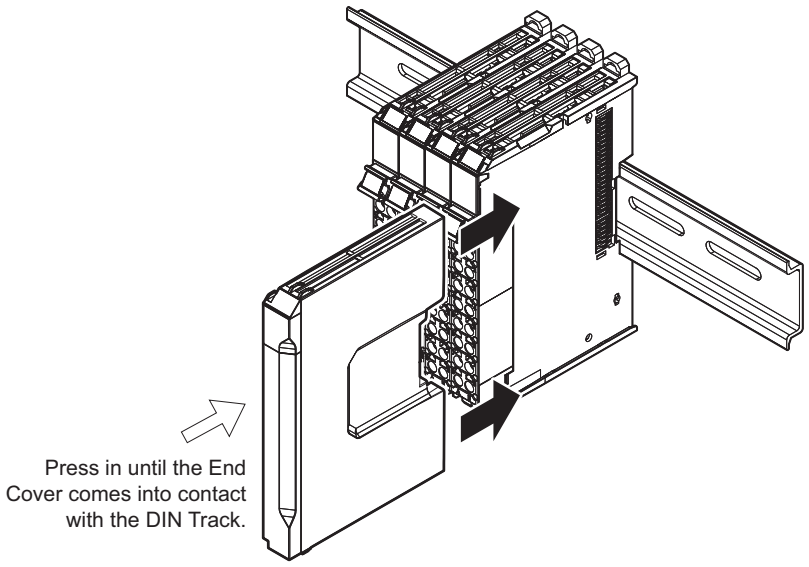
- Always turn OFF the power supply before mounting the End Cover. If the power supply is not OFF, the Unit may malfunction or may be damaged.
- Do not apply labels or tape to the Units. When the Units are installed or removed, adhesive or scraps may adhere to the pins in the NX bus connector, which may result in malfunctions.

**Precautions for Correct Use**

Always mount an End Cover to the end of the EtherNet/IP Slave Terminal to protect the last NX Unit in the EtherNet/IP Slave Terminal. Not mounting the End Cover may result in malfunction or failure of the EtherNet/IP Slave Terminal.

***1*** From the front of the EtherNet/IP Slave Terminal, slide the End Cover in on the Unit hookup guides on the NX Unit on the right end of the EtherNet/IP Slave Terminal.

***2*** Press the End Cover firmly against the DIN Track until you hear it lock into place on the DIN Track.
After you mount the End Cover, check to be sure that it is securely mounted on the DIN Track.

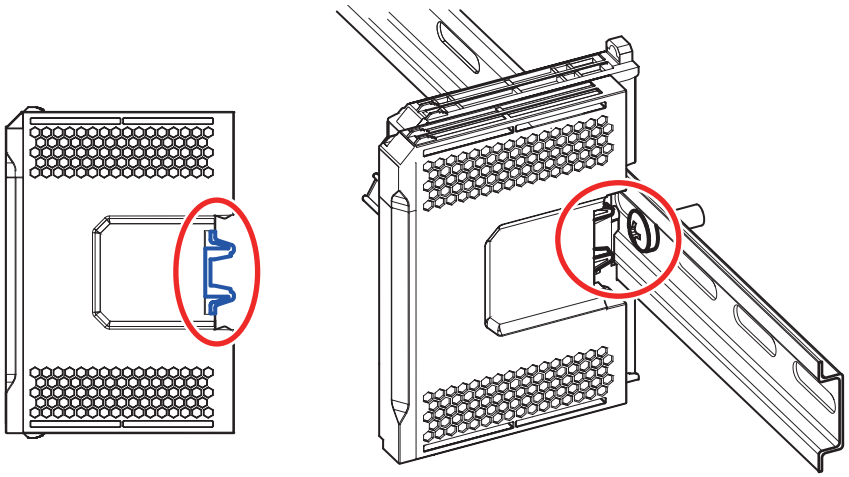


**Precautions for Correct Use**

The End Cover may not be mounted properly to the DIN Track if the protrusions on the back of the End Cover that are marked in the left below figure interfere with the screw that fixes the DIN Track as shown in the right below figure.
When you mount the End Cover to the DIN Track, avoid interference of the protrusions on the back of the End Cover with the screw on the DIN Track. (This applies to End Covers provided with EtherNet/IP Coupler Units with lot numbers through December 2014.)

Protrusions on the back of End Cover

Interference of the protrusions with the screw



## 6-1-7 Mounting the End Plates

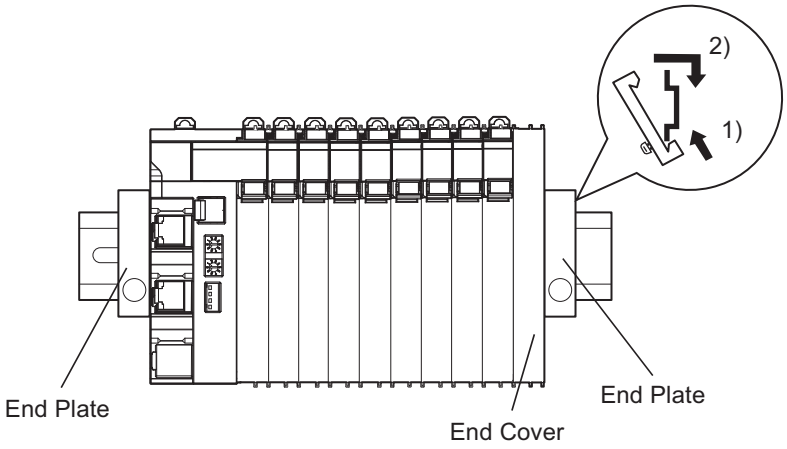
After you mount the End Cover, always secure the EtherNet/IP Slave Terminal with End Plates.

**Precautions for Correct Use**

After you mount the EtherNet/IP Slave Terminal, always install an End Plate on each side of the Slave Terminal to secure the Slave Terminal. If you do not secure it, the EtherNet/IP Slave Terminal may be damaged or malfunction.

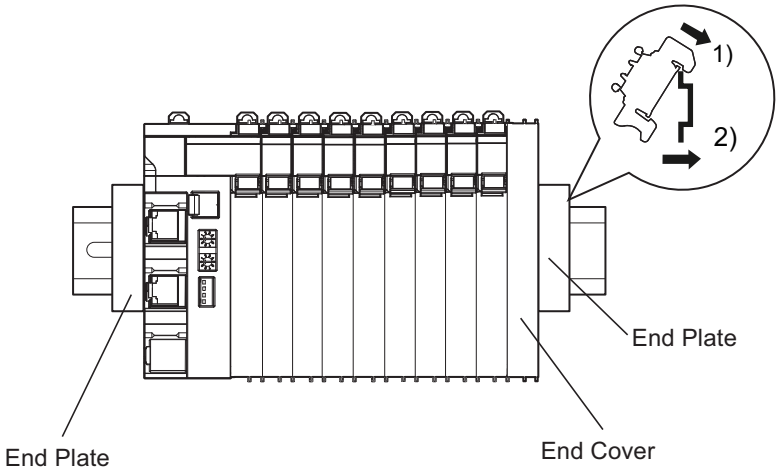
### ● Using PFP-M (OMRON)

To mount an End Plate, 1) hook the bottom of it on the bottom of the DIN Track and 2) rotate the End Plate to hook the top of it on the top of the DIN Track.
Then tighten the screw to lock the End Plate in place.

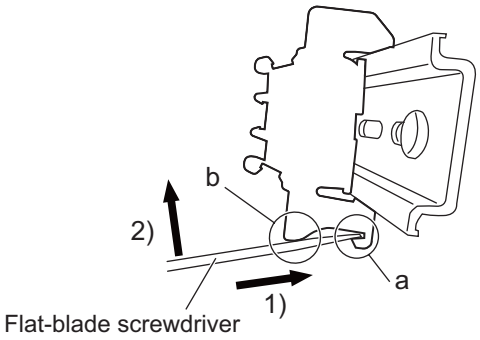



### ● Using CLIPFIX 35 (Phoenix Contact)

To mount an End Plate, 1) hook the top of it on the top of the DIN Track and 2) rotate the End Plate to hook the bottom of it on the bottom of the DIN Track. Press in until you hear the End Plate lock into place.




To remove an End Plate 1) insert the tip of a flat-blade screwdriver into groove “a” and 2) use “b” as a fulcrum and lift the end of the screwdriver, as shown in the following diagram.



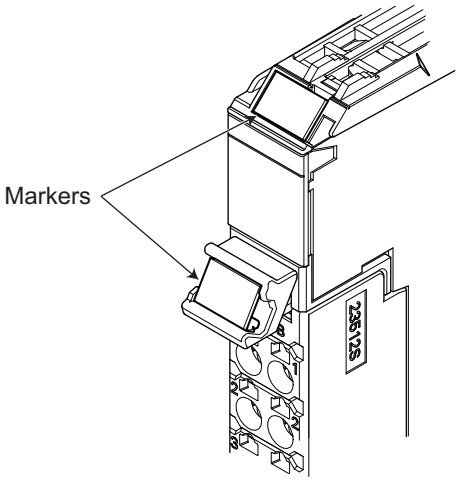

## 6-1-8 Attaching Markers

Markers can be attached to EtherNet/IP Coupler Units, 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.

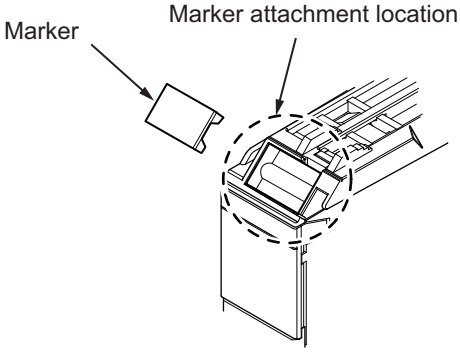
Commercially available markers can also be installed.

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

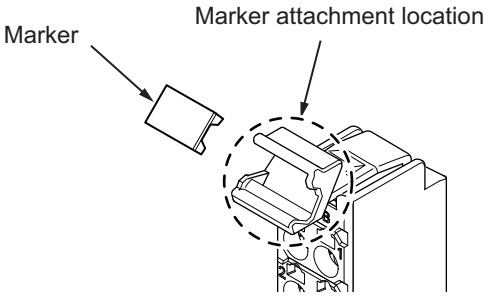



### ● Installation Method

Insert the protrusions on the markers into the marker attachment locations on the EtherNet/IP Coupler Units, NX Units, and terminal blocks on NX Units.




<Units>




<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.

## 6-1-9 Removing Units

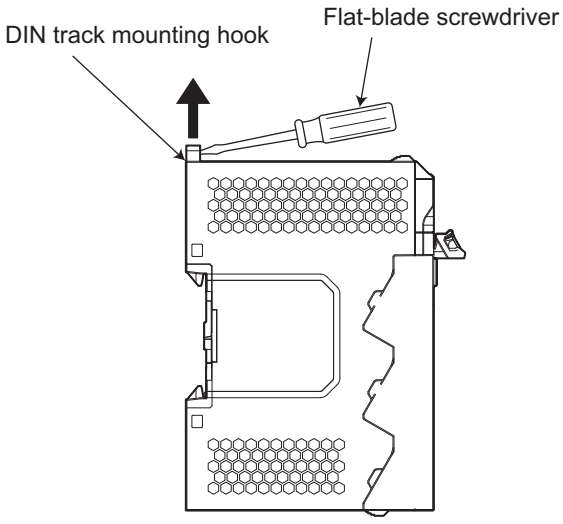
**Precautions for Safe Use**

Always turn OFF the power supply before removing any Unit.
If the power supply is not OFF, the Unit may malfunction or may be damaged.

**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.
- When you remove a Unit, be careful not to touch or bump the pins in the NX bus connector.

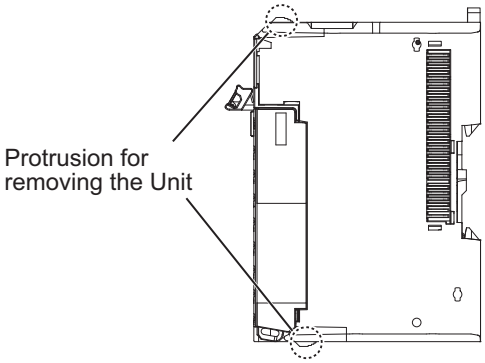
***1*** Use a flat-blade screwdriver to pull up the DIN Track mounting hook on the Unit to remove.

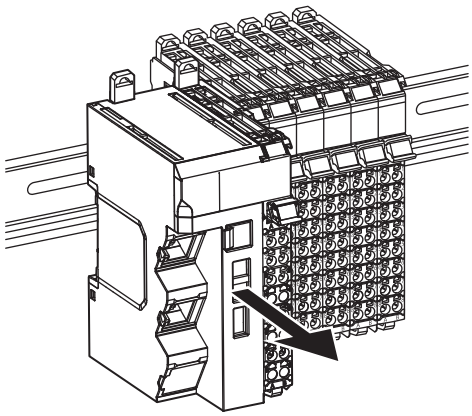



***2*** Remove the Unit with either (a) or (b) below.

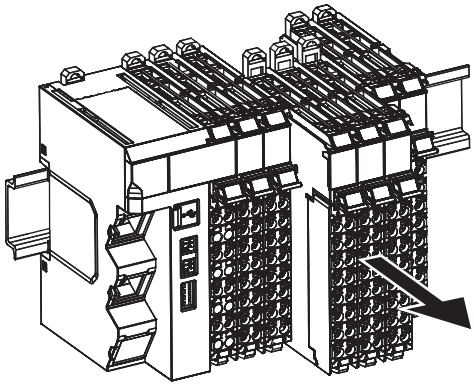
a) For an EtherNet/IP Coupler Unit, place your fingers on the protrusions on the EtherNet/IP Coupler Unit and pull it straight forward.

b) For an NX Unit, place your fingers on the protrusions on more than one NX Unit, including the NX Unit to remove, and pull the NX Units straight forward.



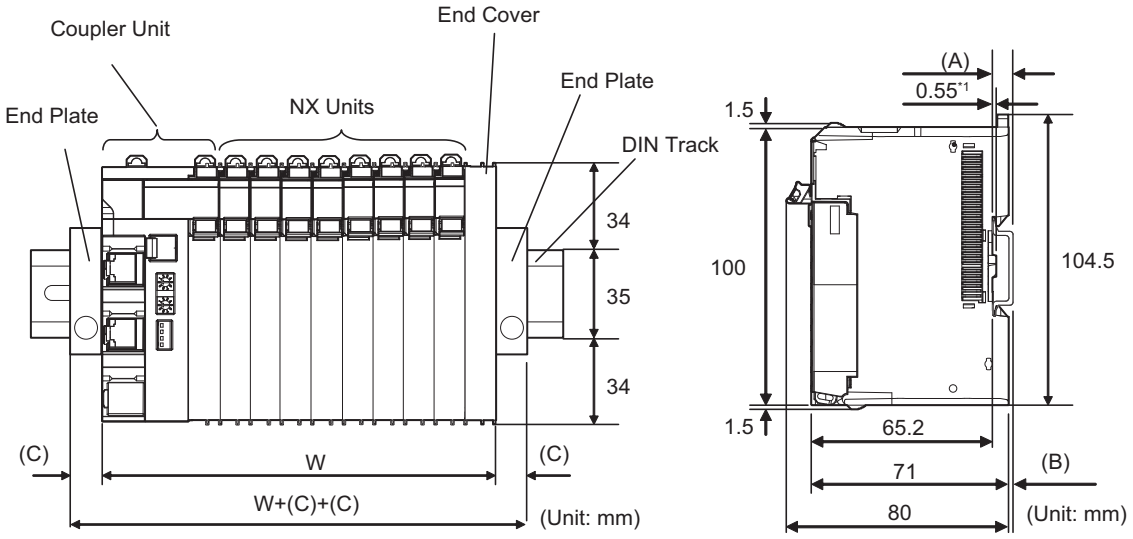
<EtherNet/IP Coupler Unit>



<NX Unit>

## 6-1-10 Assembled Appearance and Dimensions

### Installation Dimensions




*1. The dimension is 1.35 mm for Communications Coupler Units with lot numbers through December 2014 or for NX Units with 12-mm widths with lot numbers through December 2014.

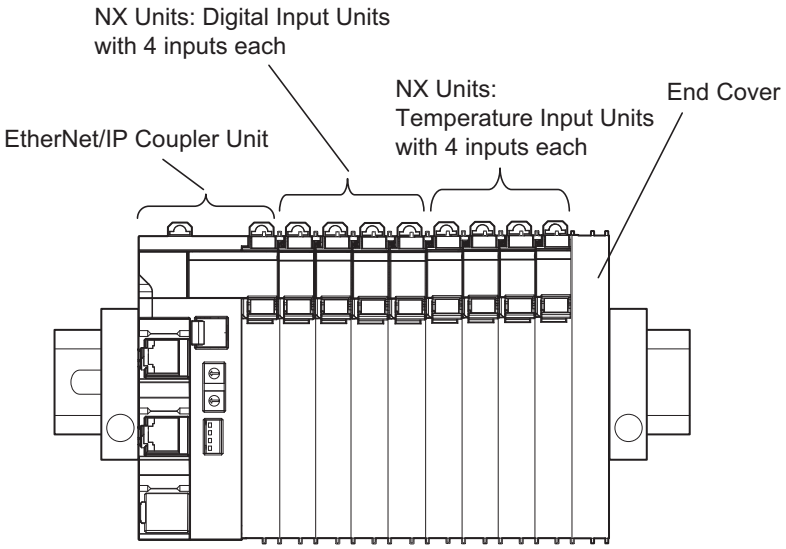
W: Width of the EtherNet/IP Slave Terminal

W + (C) + (C): Width of the EtherNet/IP Slave Terminal including the End Plates

| DIN Track model | (A)<br>DIN Track dimension | (B)<br>Dimension from the back of the Unit to the back of the DIN Track |
|---|---|---|
| PFP-100N | 7.3 mm | 1.5 mm |
| PFP-50N | 7.3 mm | 1.5 mm |
| NS 35/7,5 PERF | 7.5 mm | 1.7 mm |
| NS 35/15 PERF | 15 mm | 9.2 mm |

| End Plate model | (C)<br>End Plate dimension |
|---|---|
| PFP-M | 10 mm |
| CLIPFIX 35 | 9.5 mm |

## ● Calculation Example for the Configuration Width of an EtherNet/IP Slave Terminal



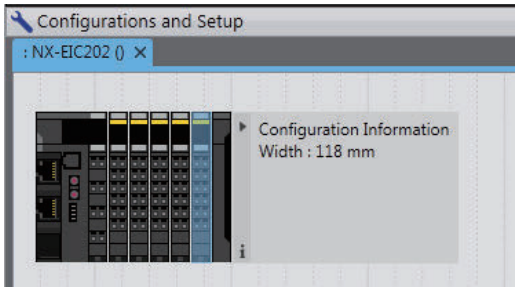

The widths of the Units in the example EtherNet/IP Slave Terminal configuration and the total configuration width are given below.

| Name | Model | Unit width |
|---|---|---|
| EtherNet/IP Coupler Unit | NX-EIC202 | 46 mm |
| NX Units: Digital Input Units | NX-ID3317 | 12 mm × 4 Units |
| NX Units: Temperature Input Units | NX-TS3101 | 24 mm × 2 Units |
| End Cover | NX-END01 | 12 mm |

Total: W = 46 + (12 × 4) + (24 × 2) + 12 = 154 mm

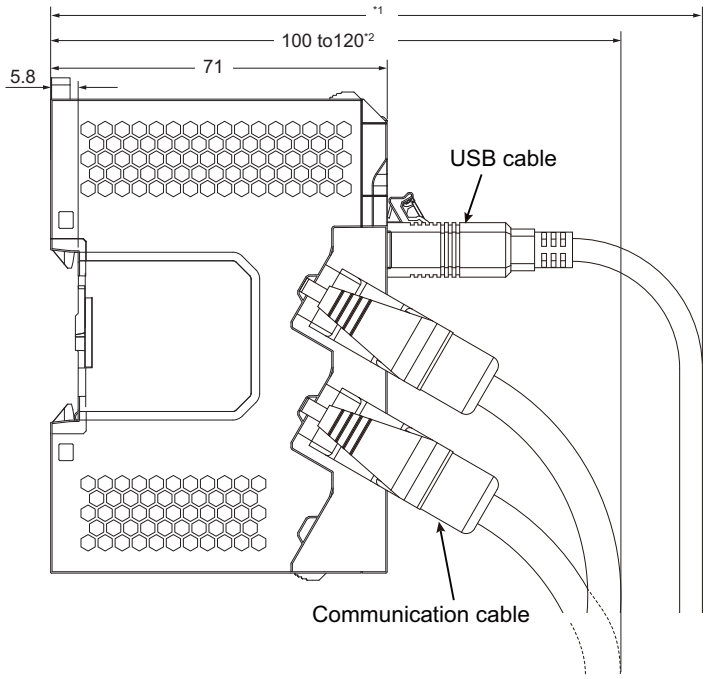
### Additional Information

You can check the width of a Slave Terminal when you create the Unit configuration on the Edit Slave Terminal Configuration Tab Page on the Support Software. You can display the width on the right of the Slave Terminal on Edit Slave Terminal Configuration Tab Page on the Support Software. Click to display the width.



## Installation Height

The installation height of the EtherNet/IP Slave Terminal depends on the model of DIN Track and on the models of NX Units that are mounted.
Also, additional space is required for the cables that are connected to the Unit. Allow sufficient depth in the control panel and allow extra space when you mount the EtherNet/IP Slave Terminal.
The following figure shows the dimensions from the cables connected to the EtherNet/IP Coupler Unit to the back of the Unit.
This is the installation height without the DIN Track of the EtherNet/IP Coupler Unit.
Refer to *Installation Dimensions* on page 6-21 for the influence on the installation height on the DIN Track.




*1. This dimension depends on the specifications of the commercially available USB certified cable. Check the specifications of the USB cable that is used.
*2. Dimension from Back of Unit to Communications Cables
- 100 mm: When an MPS588-C Connector is used.
- 120 mm: When an XS6G-T421-1 Connector is used.

As shown above, the installation height depends on the USB cable specifications when a USB cable is used to connect the Support Software to the EtherNet/IP Coupler Unit. Check the specifications of the USB cable that is used.
Refer to the manuals for the specific NX Units for the dimensions of NX Units.

# 6-2 Control Panel Installation

To ensure system reliability and safety, the system must be designed and configured according to the installation environment (temperature, humidity, vibration, shock, corrosive gases, overcurrent, noise, etc.).

## 6-2-1 Temperature

Panels have been reduced in size due to space-saving and miniaturization in devices and systems, and the temperature inside the panel may be at least 10 to 15°C higher than outside the panel. Implement the following measures against overheating at the installation site and in the panel, and allow a sufficient margin for the temperature.

### High Temperatures

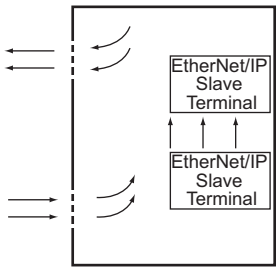
Use the following cooling methods as required, taking into account the ambient temperature and the amount of heating inside the panel.

#### ● Natural Cooling

Natural cooling relies on natural ventilation through slits in the panel, rather than using cooling devices such as fans or coolers.

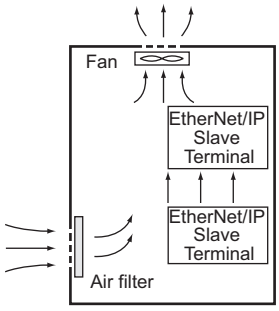
When using this method, observe the following points.

- Do not install the EtherNet/IP Slave Terminal at the top of the panel, where hot air tends to stagnate.
- To provide ventilation space above and below the EtherNet/IP Slave Terminal, leave sufficient distance from other devices, wiring ducts, etc.
- Do not install the EtherNet/IP Slave Terminal directly above heat-generating equipment, such as heaters, transformers, and devices with high resistance.
- Do not install the EtherNet/IP Slave Terminal in a location exposed to direct sunlight.



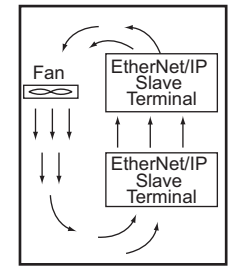

Natural Cooling

### ● Forced Ventilation by Fan at Top of Panel



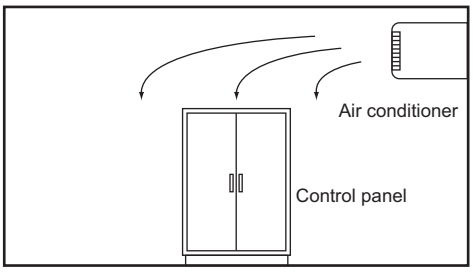

Forced Ventilation Method

### ● Forced Air Circulation by Fan in Closed Panel




Forced Circulation Method

### ● Room Cooling (Cooling the Entire Room Where the Control Panel Is Located)




Room Cooling

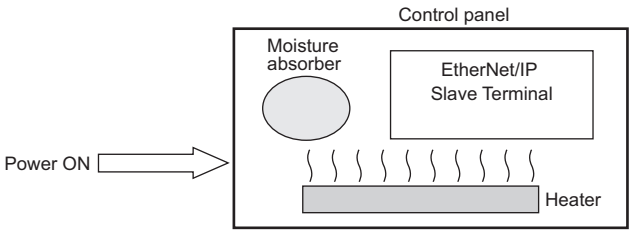
## Low Temperatures

The EtherNet/IP Slave Terminal may not start normally if the temperature is below 0°C when the power is turned ON.
Maintain an air temperature of at least approximately 5°C inside the panel, by implementing measures such as installing a low-capacity space heater in the panel.
Alternatively, leave the EtherNet/IP Slave Terminal power ON to keep the EtherNet/IP Slave Terminal warm.

## 6-2-2 Humidity

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

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




Examples of Measures against Condensation

## 6-2-3 Vibration and Shock

The EtherNet/IP Slave Terminal is tested for conformity with the sine wave vibration test method (IEC 60068-2-6) and the shock test method (IEC 60068-2-27) of the Environmental Testing for Electrotechnical Products. It is designed so that malfunctioning will not occur within the specifications for vibration and shock. If, however, the EtherNet/IP Slave Terminal is to be used in a location in which it will be directly subjected to regular vibration or shock, then implement the following countermeasures:

- Separate the control panel from the source of the vibration or shock. Or secure the EtherNet/IP Slave Terminal and the panel with rubber padding to prevent vibration.
- Make the building or the floor vibration-resistant.
- To prevent shock when other devices in the panel such as electromagnetic contactors operate, secure either the source of the shock or the EtherNet/IP Slave Terminal with rubber padding.

## 6-2-4 Atmosphere

Using the EtherNet/IP Slave Terminal in any of the following locations can cause defective contact with connectors and corrosion of components. Implement countermeasures such as purging the air as required.

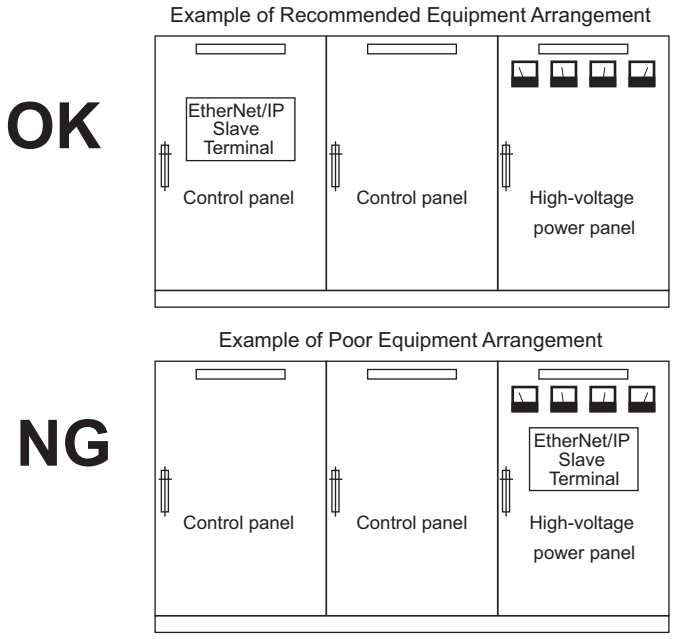
- In locations exposed to dust, dirt, salt, metal powder, soot, or organic solvents, use a panel with an airtight structure. Be careful of temperature increases inside the panel.
- In locations exposed to corrosive gas, purge the air inside the panel to clear the gas and then pressurize the inside of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

## 6-2-5 Electrical Environment

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

### Installation Location of EtherNet/IP Slave Terminals

Install the EtherNet/IP Slave Terminal as far away as possible from high-voltage (600 V or higher) and power devices to ensure safe operation and maintenance.

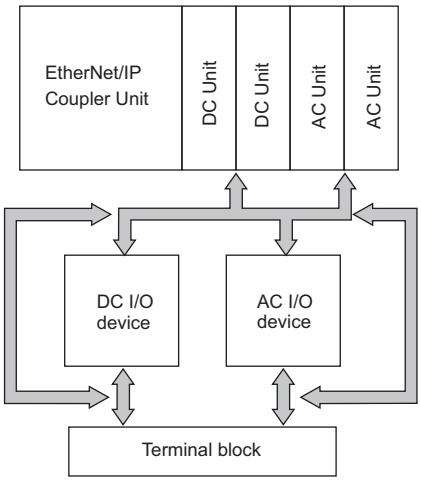



Examples of Equipment Arrangement in Panel with High-voltage Devices

### Arrangement of EtherNet/IP Slave Terminal and Cables

Observe the following points.

- The coils and contacts in electromagnetic contactors and relays in an external circuit are sources of noise. Do not install them close to the EtherNet/IP Slave Terminal. Locate them at least 100 mm away from the EtherNet/IP Slave Terminal.



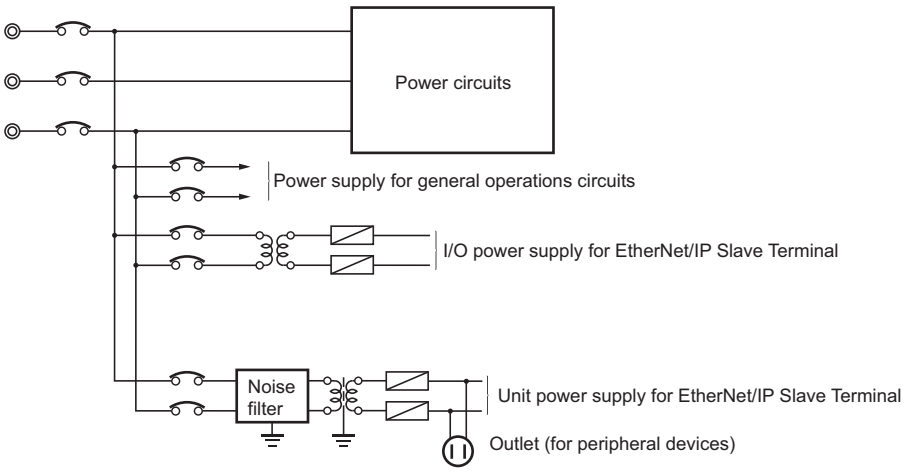

Example of Arrangement in Panel

## Wire Layout for the Power Supply System

Observe the following points when wiring the power supply system.

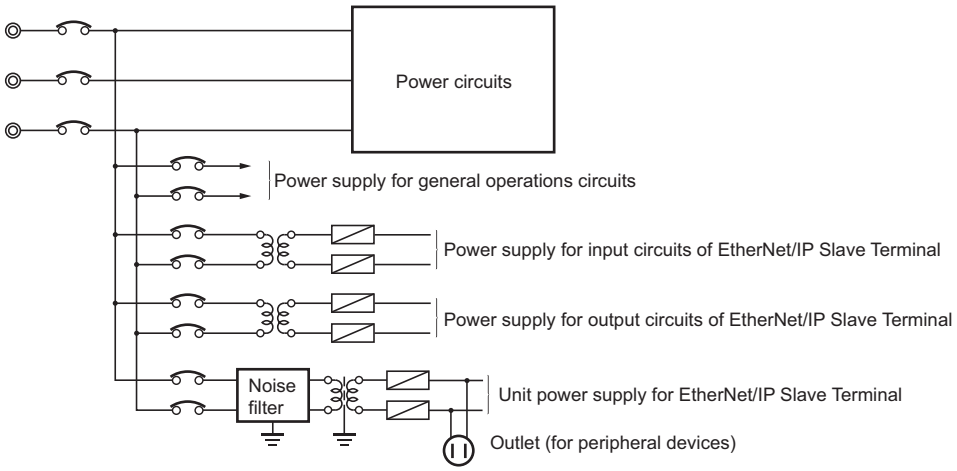
- Separate the EtherNet/IP Slave Terminal power supply from the I/O device power supply and install a noise filter near the power supply feed section.
- Use an isolating transformer to significantly reduce noise between the EtherNet/IP Slave Terminal and the ground. Install the isolating transformer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

### ● Supplying I/O Power from the NX Bus




Power Supply System Diagram

## ● Supplying I/O Power from External Sources

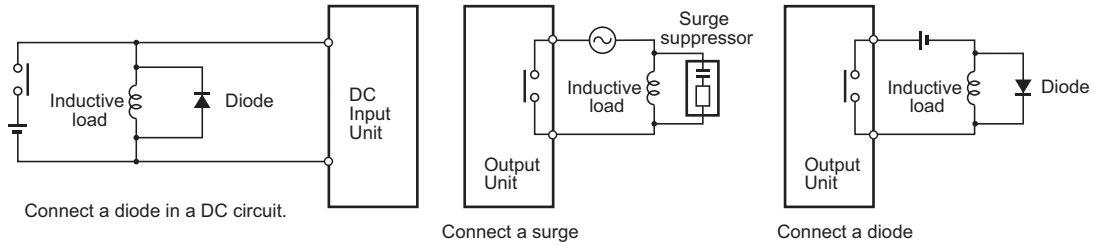



Power Supply System Diagram

## Wiring External I/O Signal Lines

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

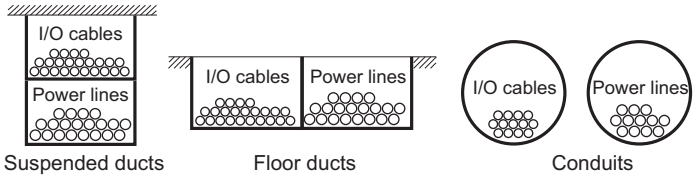
- To absorb reverse electromotive force when an inductive load is connected to an output signal, connect a surge suppressor near the inductive load in an AC circuit, or connect a diode near the inductive load in a DC circuit.




Input Signal Noise Countermeasures

Output Signal Noise Countermeasures

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




I/O Cable Arrangement

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

## External Wiring

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

### ● Wiring Routes

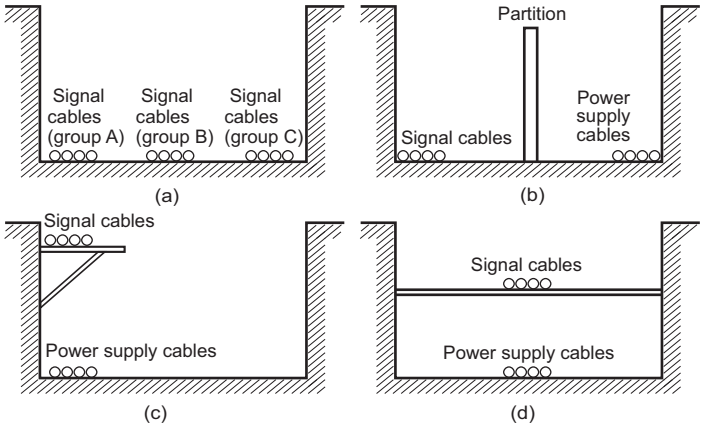
Each of the following combinations includes different signal types, properties, or levels. They will cause the signal-to-noise ratio to drop due to factors such as electrical induction. As a general rule when wiring, either use separate cables or separate wiring routes for these items. Future maintenance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

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

### ● Wiring

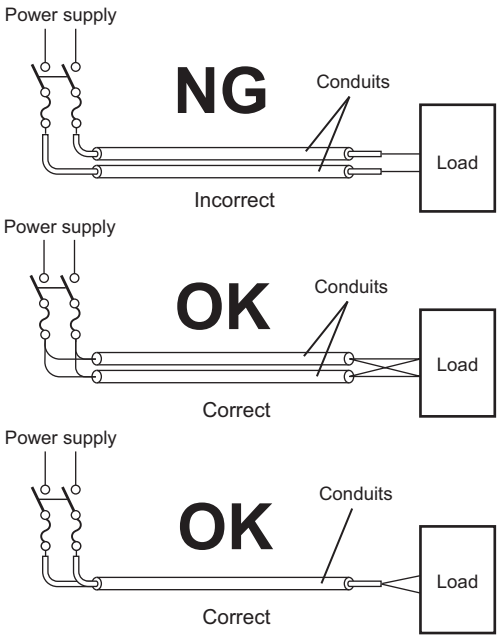
Observe the following points when wiring power supply and signal cables.

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



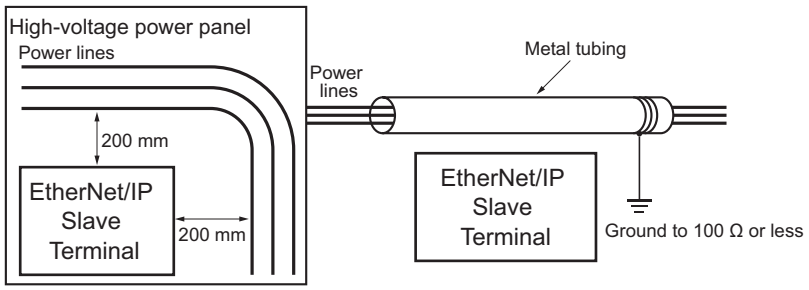

Partitioning Methods for Signal and Power Supply Cables

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




Parallel Wiring (Single Phase)

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




Example: Separating EtherNet/IP Slave Terminal from Power Lines

### ● Other Precautions

Some models of Digital Input Units and Digital Output Units have polarity. Make sure that you wire the polarity correctly.

## 6-2-6 Grounding

Grounding has the following two purposes.

- Protective Grounding
  Protective grounding is done to ensure safety. It is intended to prevent electrical shock by grounding the electrical potential that is generated by factors such as leakage, induction, or failure.
- Functional Grounding

Functional grounding is done to protect device and system functions, including prevention of noise from external sources, or prevention of noise from devices or equipment that could have harmful effects on other devices or equipment.

Grounding requirements sometimes depend on the situation, and they may be found based on experimentation. It is important to sufficiently check the particular circumstances before grounding.

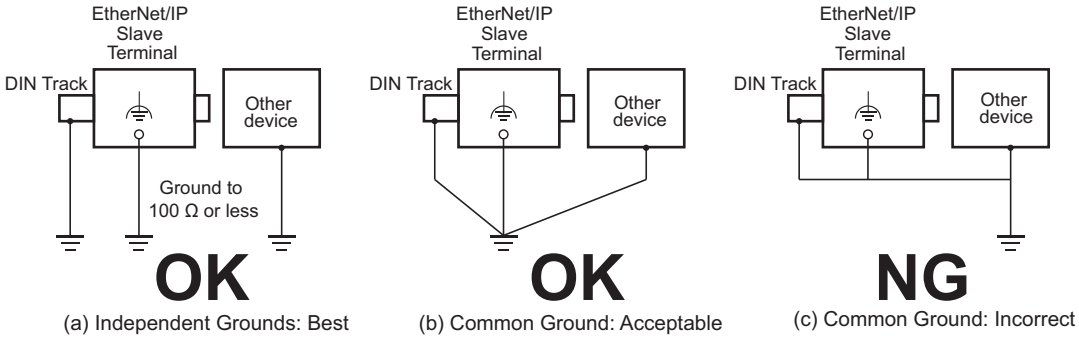
## Wire Layout for the Power Supply System

### ● Principles of One-point Grounding

For devices to operate properly, the reference potential between the devices must be stabilized. Use one-point grounding so that noise current does not flow to ground lines between the devices. Whenever possible, use an independent ground (with the ground pole separated by a minimum of 10 m from any other ground pole).

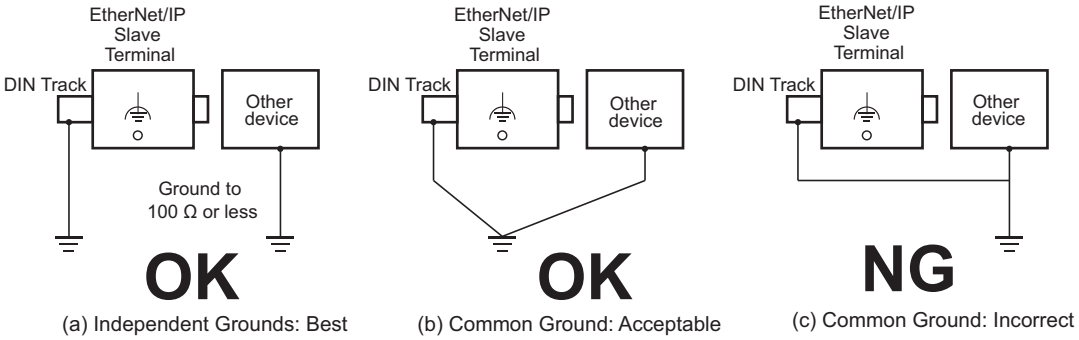
- Ground to 100 Ω or less, and if possible use a separate ground from those of other devices. (See following figure (a).)
- If using an independent ground is not possible, then use a common ground as shown in figure (b). Connect to the ground pole of the other device.
- Never connect to the same ground as a device that draws a large amount of power, such as a motor or inverter. Ground the devices separately to avoid mutually adverse influences.
- To prevent electrical shock, do not connect to ground poles to which multiple devices are connected.
- Use a ground pole as close to the EtherNet/IP Slave Terminal as possible and keep the ground line as short as possible.

### ● Grounding Methods




If the DIN Track is made of steel and the surface is not treated to produce an insulating material, you can omit grounding the functional ground terminal on any Unit that has one, as shown in the following figures.

- DIN Track Made of Steel and Surface Not Insulated




## ● Precautions when Grounding

- To prevent influence from leakage current from other electrical devices, electrically isolate the panel in which the EtherNet/IP Slave Terminal is housed from other devices.
- If high-frequency equipment is present, then ground not only the high-frequency equipment but also the panel itself in which the EtherNet/IP Slave Terminal is housed.
- To ground the shield wire when using shielded cables for I/O wiring, wire the ground according the shield treatment specifications for the NX Unit that is used.
  Wire communications cables according to the shield treatment specifications for the Unit.

# 7

# Wiring

This section describes how to wire the EtherNet/IP Slave Terminal.

# 7-1 EtherNet/IP Network Wiring

This section describes how to install the EtherNet/IP network.

## 7-1-1 Installation Precautions

Basic precautions for the installation of EtherNet/IP networks are provided below.

### Precautions when Installing a Network

- When you install an EtherNet/IP network, take sufficient safety precautions and perform the installation according to all applicable standards and specifications. An expert well versed in safety measures and the standards and specifications should be asked to perform the installation.
- Do not install EtherNet/IP network equipment near sources of noise.
  If the network must be installed in an area with noise, take steps to address the noise, such as placing equipment in metal cases.

### Precautions when Installing Communications Cables

- Check the following items on the communications cables that are used in the network.
  Are there any breaks?
  Are there any shorts?
  Are there any connector problems?
- When you connect the cable to the communications connectors on devices, firmly insert the communications cable connector until it locks in place.
- Do not lay the communications cables together with high-voltage lines.
- Do not lay the communications cable near devices that generate noise.
- Do not lay the communications cables in locations subject to high temperatures or high humidity.
- Do not lay the communications cables in locations subject to excessive dust, oil mist, or other contaminants.
- There are limitations on the bending radius of communications cables. Check the specifications of the communications cable for the bending radius.

## 7-1-2 Preparations for Installation

Prepare the following devices.

| Product | Remarks |
|---|---|
| Twisted-pair cable | The twisted-pair cable connects EtherNet/IP Units or built-in EtherNet/IP ports to the Ethernet switch, with an RJ45 Modular Connector at each end.<br>Use an STP (shielded twisted-pair) cable of category 5 or higher. |

**Precautions for Safe Use**

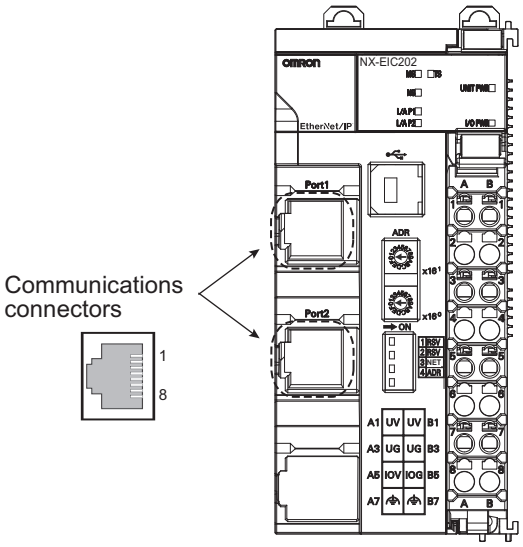
- Double-check all switches and other settings and double-check all wiring to make sure that they are correct before turning ON the power supply. Use the correct wiring parts and tools when you wire the system.
- Do not exceed the ranges that are given in the specifications for the communications distance and number of connected Units.

**Precautions for Correct Use**

The maximum length between nodes is 100 m. However, some cables are specified for less than 100 m. Generally speaking, if the conductors are twisted wire rather than solid wire, transmission performance will be lower, and reliable communications may not be possible at 100 m. Confirm details with the cable manufacturer.

## 7-1-3 Pin Arrangement of Communications Connectors on the EtherNet/IP Coupler Unit

The pin arrangement of the Ethernet communications connectors is given below.



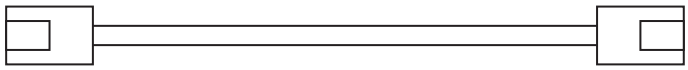

| Pin No. | Signal name | Abbreviation |
|---|---|---|
| 1 | Send data + | TD+ |
| 2 | Send data − | TD− |
| 3 | Receive data + | RD+ |
| 4 | Not used − | --- |
| 5 | Not used − | --- |
| 6 | Receive data − | RD− |
| 7 | Not used − | --- |
| 8 | Not used − | --- |

**Additional Information**

Refer to the *NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual (Cat. No. W506)*.

## 7-1-4 Connecting Communications Cables and Connectors

Use straight connections for the communications cables and connectors, as shown below.



| Pin No. | Wire color |
|---|---|
| 1 | White-Green |
| 2 | Green |
| 3 | White-Orange |
| 4 | Blue |
| 5 | White-Blue |
| 6 | Orange |
| 7 | White-Brown |
| 8 | Brown |
| Hood | Shield*1 |

| Wire color | Pin No. |
|---|---|
| White-Green | 1 |
| Green | 2 |
| White-Orange | 3 |
| Blue | 4 |
| White-Blue | 5 |
| Orange | 6 |
| White-Brown | 7 |
| Brown | 8 |
| Shield*1 | Hood |

*1. Connect the cable shield wire to the connector hood at both ends of the cable.

**Precautions for Correct Use**

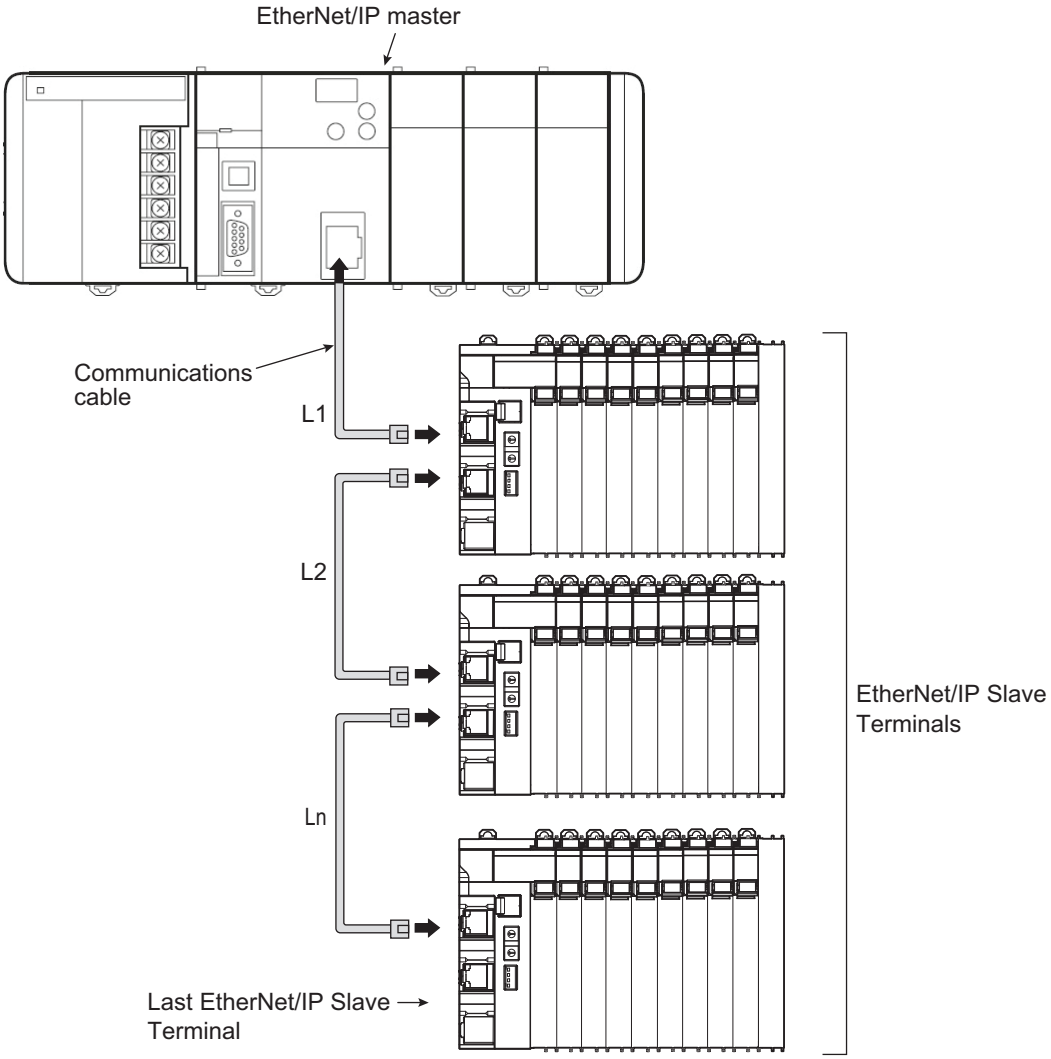
Do not exceed the ranges that are given in the specifications for the communications distance and number of connected Units.

**Additional Information**

There are two connection methods for Ethernet cables: *T568A* and *T568B*.
The *T568A* connection method is shown in the above figure, but the *T568B* connection method can also be used.

## 7-1-5 Connecting Communications Cables

Cable connections can be made freely in EtherNet/IP networks.
The following example shows line topology.
Connect the communications cable from the EtherNet/IP master to one of the ports on the first EtherNet/IP Slave Terminal, and then connect another communications cable from the second port on the first EtherNet/IP Slave Terminal to one of the port on the next EtherNet/IP Slave Terminal.




**Precautions for Correct Use**

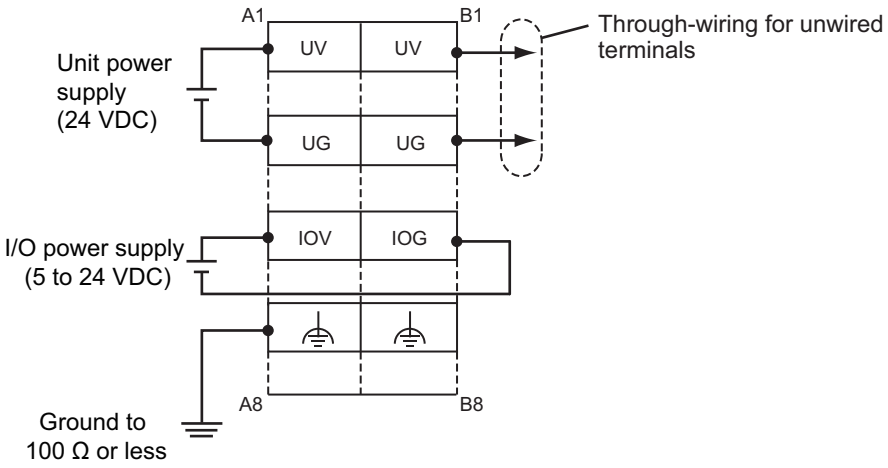
- The cable between any two nodes (L1, L2 ... Ln) must be 100 m or less.
- Do not exceed the ranges that are given in the specifications for the communications distance and number of connected Units.
- Firmly connect the communications cable connector until it clicks into place.
- When you install the communications cables, observe the cable specifications (e.g., bending radius) of the cable manufacturer.
- Do not disconnect the communications cables from the EtherNet/IP Slave Terminals during operation. The outputs from the EtherNet/IP master may become unstable. However, for the EtherNet/IP master, it is OK to disconnect the communications cable from an EtherNet/IP Slave Terminal that has been *disconnected* from communications in the software.

# 7-2 Connecting the Power Supply and Ground Wires

This section describes how to wire the power supplies and ground the EtherNet/IP Slave Terminal.

## 7-2-1 Wiring the EtherNet/IP Coupler Unit

The wiring of the power supply and ground to the EtherNet/IP Coupler Unit is shown in the following figure.




### ● Unit Power Supply Terminals

These terminals are connected to the Unit power supply. The details are given in the following table.

| Terminal number indication | Terminal name | Description |
|---|---|---|
| A1 or B1 | UV | Connect the 24-VDC wire (positive side) from the Unit power supply to either the A1 or B1 terminal. |
| A3 or B3 | UG | Connect the 0-VDC wire (negative side) from the Unit power supply to either the A3 or B3 terminal. |

You can use the unwired terminals for through-wiring to an Additional NX Unit Power Supply Unit or to the Unit power supply terminals on another EtherNet/IP Coupler Unit. Make the current supplied from the unwired terminals meet the following conditions.

Current supplied from unwired terminals ≤ Current capacity of power supply terminals − Current consumption of the EtherNet/IP Coupler Unit block

Refer to *5-4-1 Selecting the Unit Power Supply* on page 5-16 for details on blocks.

### ● I/O Power Supply Terminals

These terminals are connected to the I/O power supply. The details are given in the following table.

| Terminal number indication | Terminal name | Description |
|---|---|---|
| A5 | IOV | Connect the 5 to 24-VDC wire (positive side) from the I/O power supply. |
| B5 | IOG | Connect the 0-VDC wire (negative side) from the I/O power supply. |

Provide a power supply voltage that is within the power supply voltage specifications of the NX Unit I/O circuits and connected external devices.

### ● Functional Ground Terminals

These are the functional ground terminals. Connect the ground wire to one of these terminals. The details are given in the following table.

| Terminal number indication | Terminal symbol | Description |
|---|---|---|
| A7 or B7 |  | Connect the ground wire to either the A7 or B7 terminal. |

**Precautions for Correct Use**

Do not connect the through-wiring terminals on the Unit power supply terminals to the I/O power supply terminals. Always use separate power supplies for the Unit power supply and the I/O power supply. Otherwise, noise may cause malfunctions.

Refer to *7-2-5 Wiring to the Screwless Clamping Terminal Block* on page 7-13 for the procedure to connect wires to the terminals on the screwless clamping terminal block.

## 7-2-2 Wiring the Power Supply to the EtherNet/IP Slave Terminal

Refer to *Section 5 Designing the Power Supply System* on page 5-1 for information on wiring the power supplies to the EtherNet/IP Slave Terminal.

## 7-2-3 Grounding the EtherNet/IP Slave Terminal

This section describes how to ground the EtherNet/IP Slave Terminal.

### Units with Ground Terminals and Type of Ground Terminals

Some of the Units in an EtherNet/IP Slave Terminal have ground terminals.

### ● Units with Ground Terminals

- EtherNet/IP Coupler Units
- Additional NX Unit Power Supply Unit
- Shield Connection Unit

  When connecting NX Units to external devices, the Shield Connection Unit is used to connect the shield wire when the shield is used. You can ground more than one shield wire to the same ground pole to reduce the amount of wiring work for grounding. For the specifications of the Shield Connection Unit, refer to the *NX-series System Units User's Manual (Cat. No. W523)*.

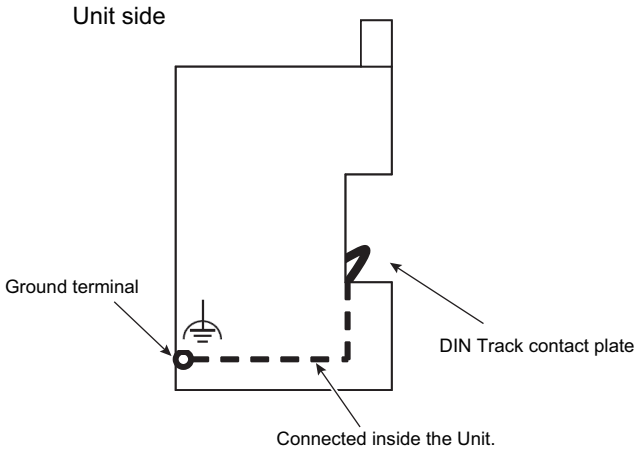
### ● Type of Ground Terminals

The ground terminals are functional ground terminals.

Functional grounding is done to protect device and system functions, including prevention of noise from external sources, or prevention of noise from devices or equipment that could have harmful effects on other devices or equipment.

## DIN Track Contact Plates

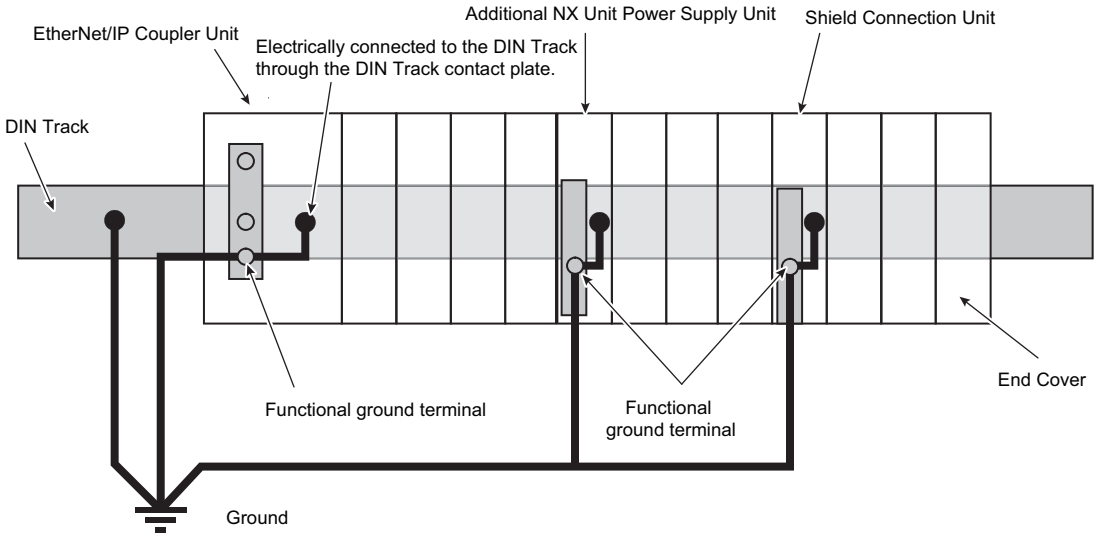
A Unit that has a ground terminal also has a DIN Track contact plate on the back of the Unit.




The DIN Track contact plate is connected internally to the ground terminal on the Unit.
This means that the ground terminal will be electrically connected to the DIN Track.
For information on the DIN Track contact plate on the EtherNet/IP Coupler Unit, refer to *4-6 DIN Track Contact Plate* on page 4-15. For information on the NX Units that have a ground terminal, refer to the *NX-series System Units User's Manual (Cat. No. W523)*.

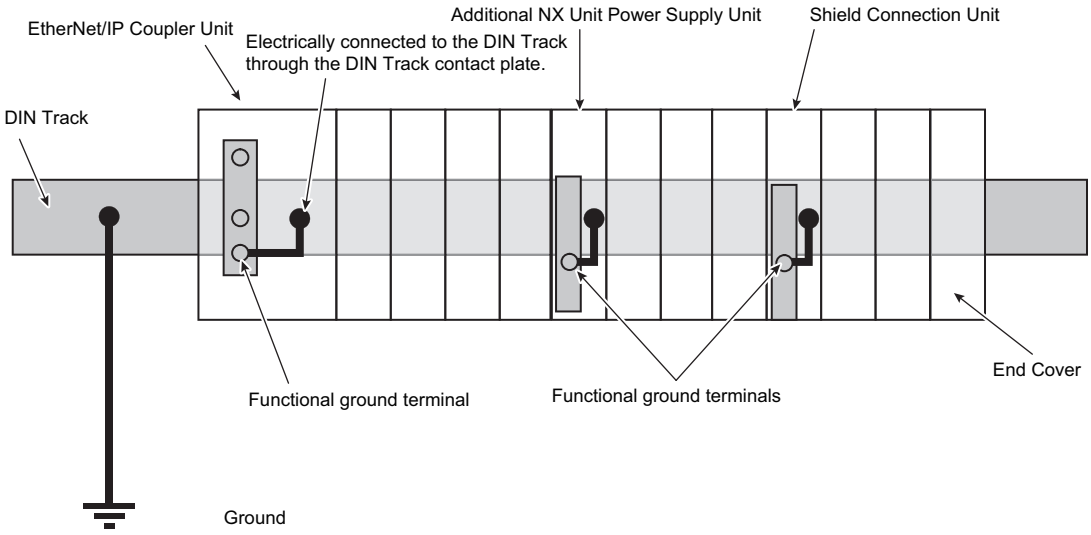
## Grounding the EtherNet/IP Slave Terminal

This section describes how to ground the ground terminals on the EtherNet/IP Slave Terminal.
The functional ground terminals that are provided on some Units and the DIN Track are grounded.



If the DIN Track is made of steel and the surface is not treated to produce an insulating material, you can omit grounding the functional ground terminal on any Unit that has one, as shown in the following figures.

■ DIN Track Made of Steel and Surface Not Insulated




**Precautions for Correct Use**

- Ground the ground terminals and DIN Track through dedicated ground wires to a ground resistance of 100 Ω or less. The ground wire should not be more than 20 m long. Use a ground wire that is 2.0 $mm^2$ or larger. Refer to *Applicable Wires* on page 7-13 for the applicable ground wires for screwless clamping terminal blocks.
- If the DIN Track is not made of steel or if the surface is treated to produce an insulating material*1, always connect ground wires to the ground terminals. Otherwise, noise may cause malfunctions.

*1. If the surface of the DIN Track is treated to produce an insulating material (e.g., anodized aluminum), the DIN Track contact plate will not be electrically connected to the DIN Track even if they are in physical contact.

## Grounding the DIN Track

Attach a crimped terminal to the ground wire and then connect it to mounting hole on the DIN Track with a screw to ground the DIN Track.

## Grounding the EtherNet/IP Slave Terminal with Peripheral Devices and in Control Panels

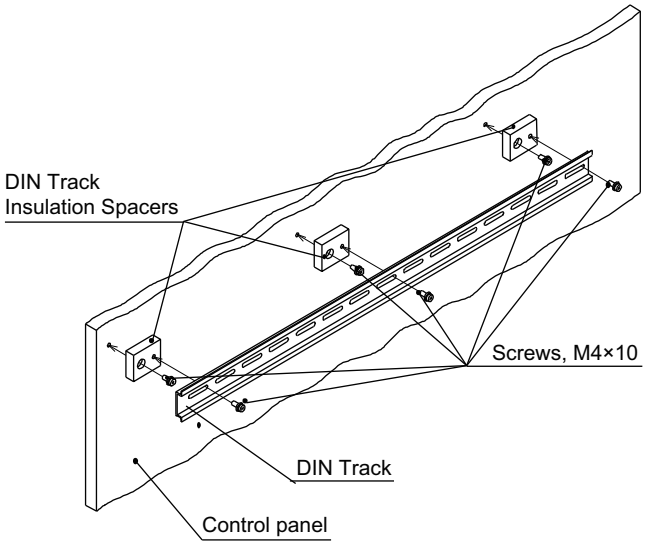
Refer to *6-2-6 Grounding* on page 6-32 for the grounding procedures for the EtherNet/IP Slave Terminal with peripheral devices and in control panels.

## Isolating the EtherNet/IP Slave Terminal from the Control Panel

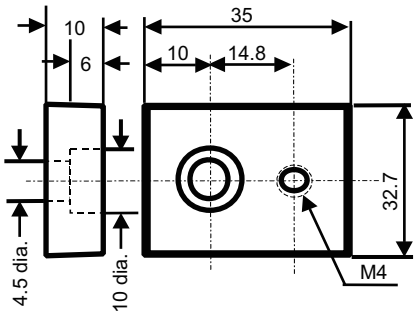
If the ground wire for the EtherNet/IP Coupler Unit or an NX Unit with a ground terminal is shared with power equipment, noise will adversely affect the Units.
You can use OMRON NX-AUX01 DIN Track Insulation Spacers with PFP-50N or PFP-100N DIN Tracks to isolate an EtherNet/IP Slave Terminal from the control panel.

### ● Installing DIN Track Insulation Spacers and DIN Track

Secure the DIN Track Insulation Spacers to the control panel with screws, and then secure the DIN Track to the DIN Track Insulation Spacers. The recommended tightening torque for M4 screws is 1.2 N·m.




- DIN Track Insulation Spacers
  NX-AUX01 (OMRON Corporation)




**Precautions for Correct Use**

If you use DIN Track Insulation Spacers to install an EtherNet/IP Slave Terminal, the height will be increased by approximately 10 mm. Make sure that the EtherNet/IP Slave Terminal and connecting cables do not come into contact with other devices.

## 7-2-4 Precautions for Wiring the EtherNet/IP Slave Terminal Together with Computers and other Peripheral Devices

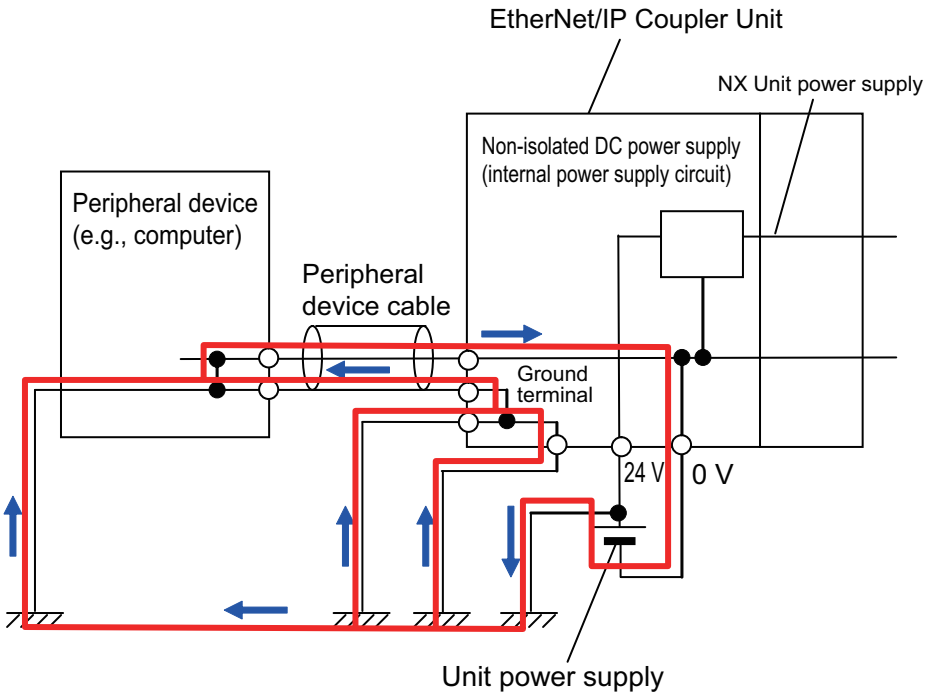
**⚠ CAUTION**

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

- EtherNet/IP Coupler Unit with a non-isolated DC power supply (internal power supply circuits)

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

Grounding That Causes a 24-V Power Supply to Short



## 7-2-5 Wiring to the Screwless Clamping Terminal Block

This section describes how to connect wires to the screwless clamping terminal block on the EtherNet/IP Coupler Unit, 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.

**⚠ 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 failure or fire.

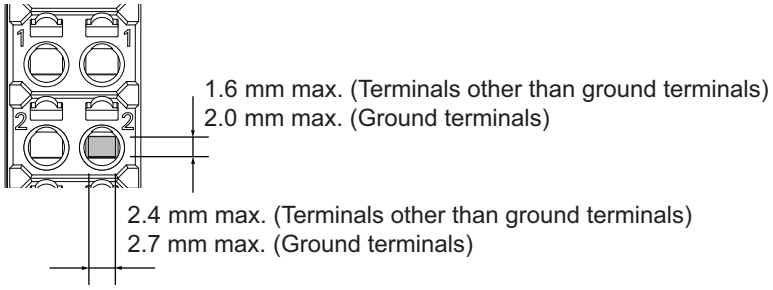
### Applicable Wires

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.

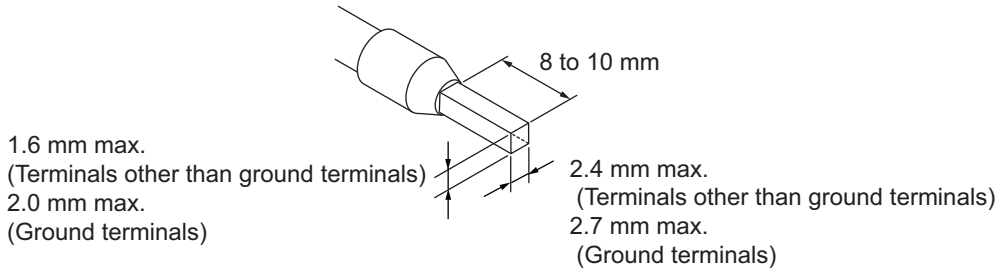
Always use plated one-pin ferrules. Do not use unplated ferrules or two-pin ferrules.

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.)<br>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.)<br>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. For the ferrule type AI2,5-10, use wires with a diameter of 2.0 to 2.1 $mm^2$. Wires with a diameter exceeding 2.1 $mm^2$ cannot be used with 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.



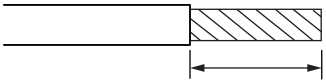

## ● Using Twisted or Solid Wires

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) |
|---|---|---|---|---|---|---|---|
| | | Twisted wires | | Solid wire | | | |
| Classification | Current capacity | 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 | | Not possible | Possible*1 | Not possible | | |
| | Greater than 4 A | Possible*1 | | 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 7-18 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.

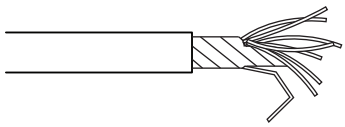


Conductor length (stripping length)

### Precautions for Correct Use

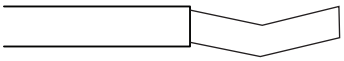
- Use cables with suitable wire sizes for the carrying current. There are also restrictions on the current due to the ambient temperature. Refer to the manuals for the cables and use the cables correctly for the operating environment.
- Double-check all switches and other settings and double-check all 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.
- 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.

**NG**



Unravel wires

**NG**



Bend wires

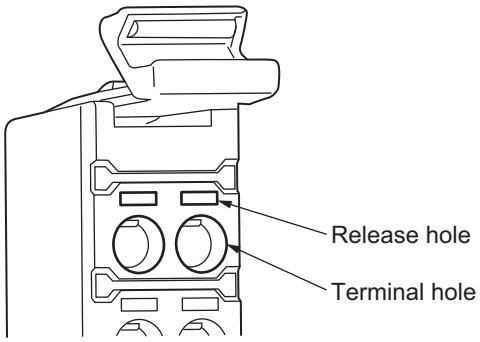
### Additional Information

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

## Connecting/Removing Wires

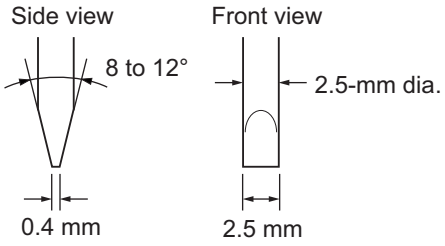
This section describes how to connect and remove wires.

## ● Terminal Block Parts and Names




## ● Required Tools

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

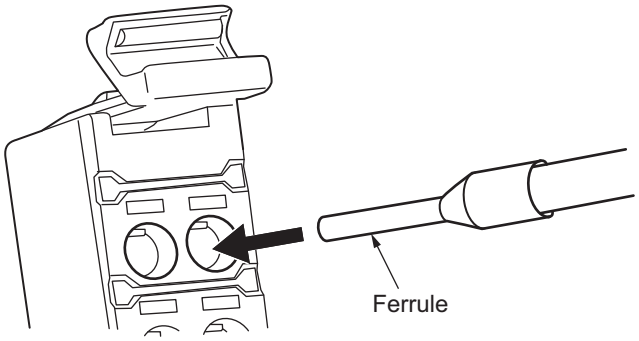



Recommended screwdriver

| Model | Manufacturer |
|---|---|
| SZF 0-0,4X2,5 | 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.



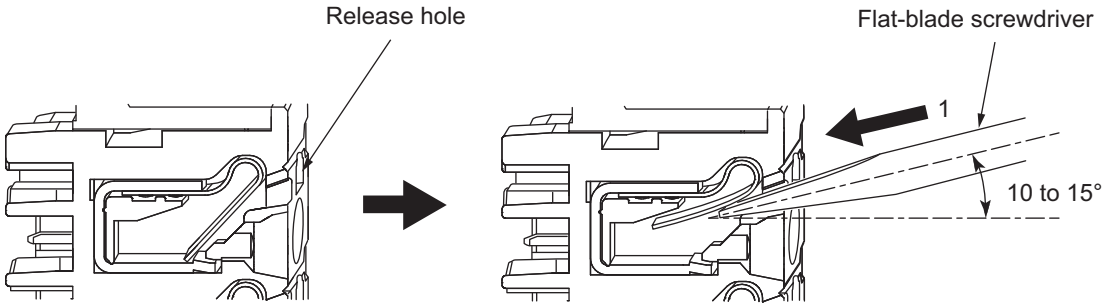

After you make a connection, make sure that the ferrule is securely connected to the terminal block.

## ● Connecting Twisted Wires/Solid Wires

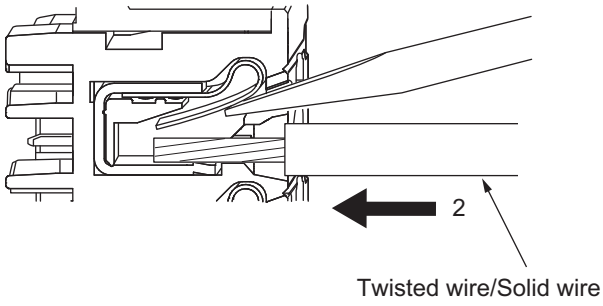
Use the following procedure to connect the twisted wires or solid wires to the terminal block.

***1*** Press the a flat-blade screwdriver diagonally into the release hole.
Press at an angle of 10° to 15°.

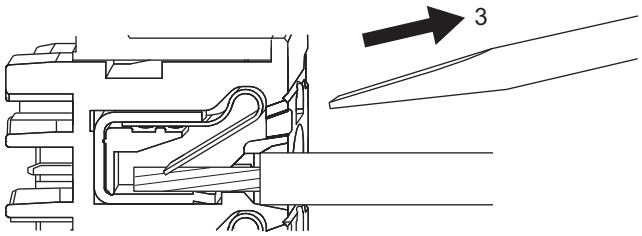
If you press in the screwdriver correctly, you will feel the spring in the release hole.




**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.

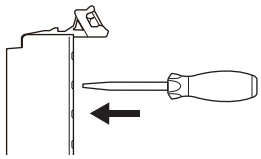



After you make a connection, make sure that the twisted wire or the solid wire is securely connected to the terminal block.

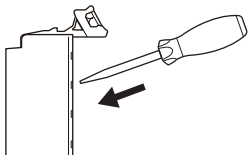
**Precautions for Safe Use**

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

NG

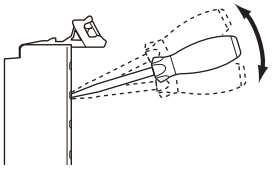


OK

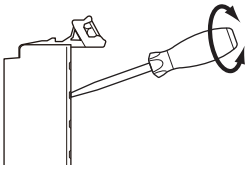


- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N max. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may break the terminal block.

NG



NG



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

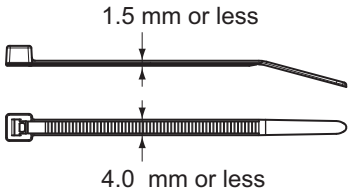
## ● Securing Wires

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.

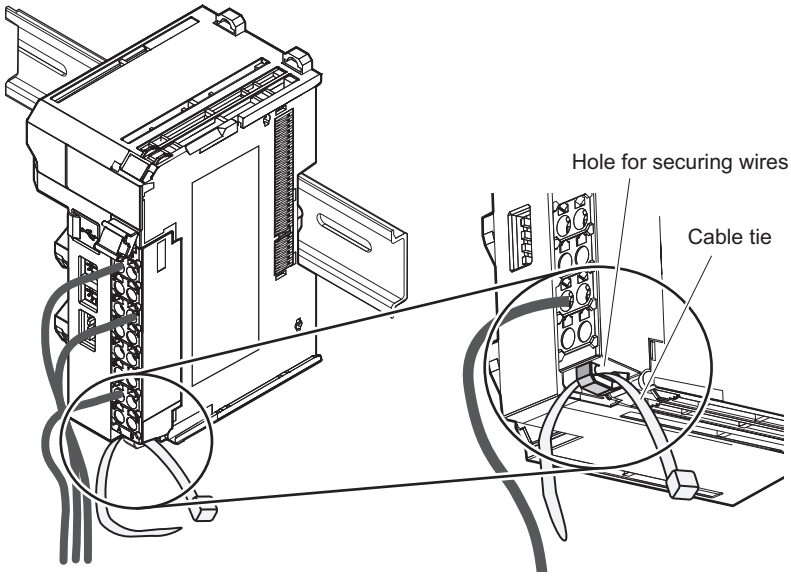
| Terminals | | Wire type | | | | |
|---|---|---|---|---|---|---|
| | | Ferrule | Twisted wires | | Solid wire | |
| Classification | Current capacity | | Plated | Unplated | Plated | Unplated |
| All terminals except ground terminals | 2 A max. | No | No | No | No | No |
| | Greater than 2 A and 4 A 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.

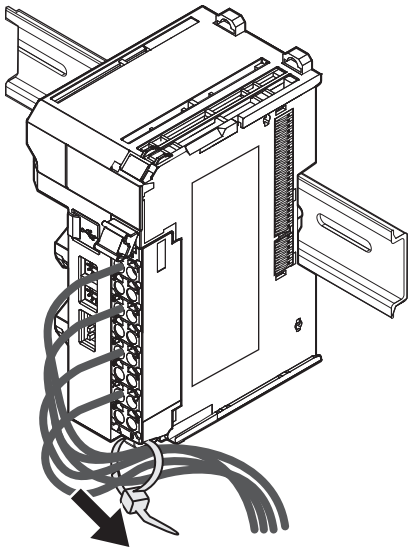
***1*** Prepare a cable tie.
A cable tie can be used with a width of 4 mm or less and a thickness of 1.5 mm or less.
Select a cable tie correctly for the operating environment.



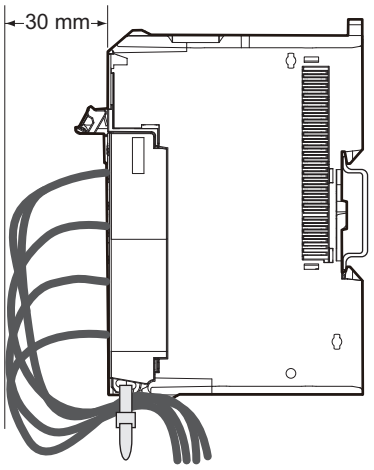

**2** Pass a cable tie through the hole for securing wires on the bottom of the screwless clamping terminal block




**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.

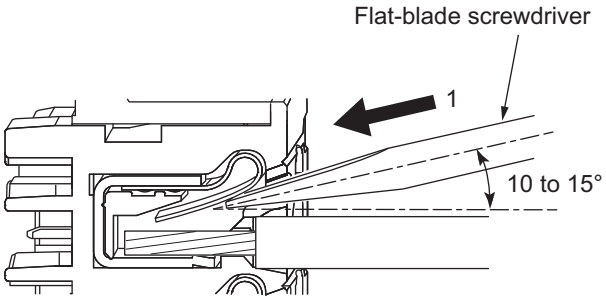



## ● Removing Wires

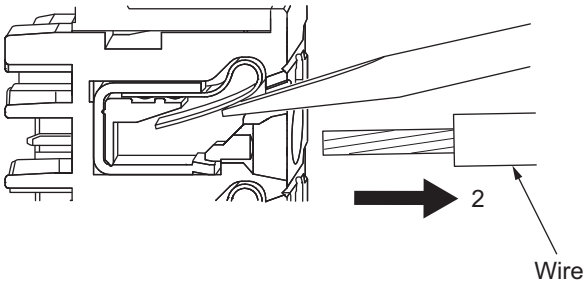
Use the following procedure to remove the wires from the terminal block.
The removal method is the same for ferrules, twisted wires, and solid wires.

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

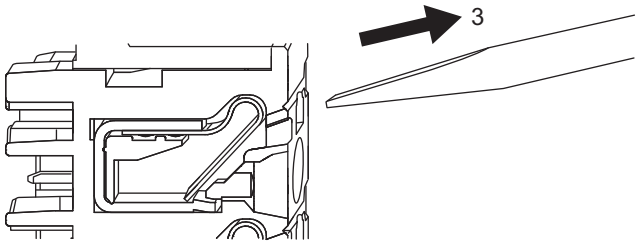
***1*** Press the flat-blade screwdriver diagonally into the release hole.
Press at an angle of 10° to 15°.
If you press in the screwdriver correctly, you will feel the spring in the release hole.




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

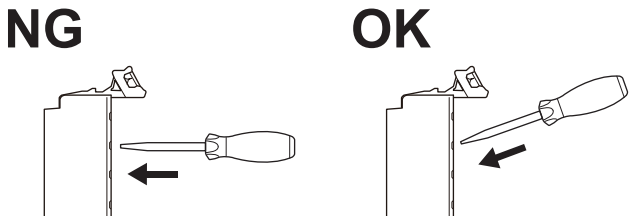



***3*** Remove the flat-blade screwdriver from the release hole.

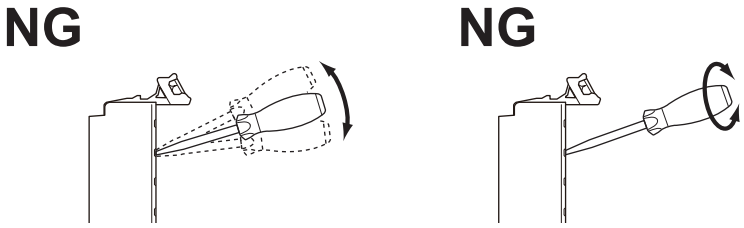



**Precautions for Safe Use**

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



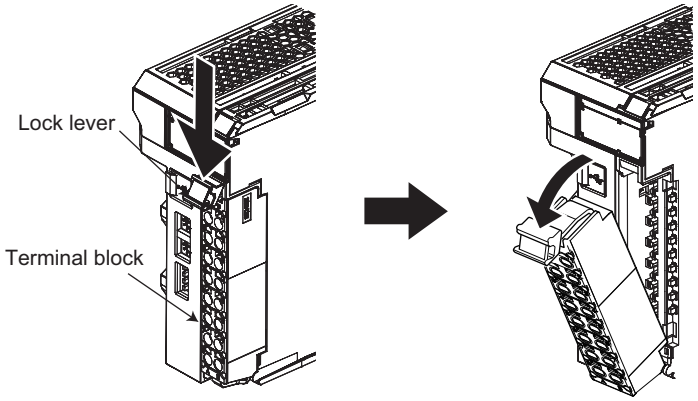

- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N max. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may break the terminal block.




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

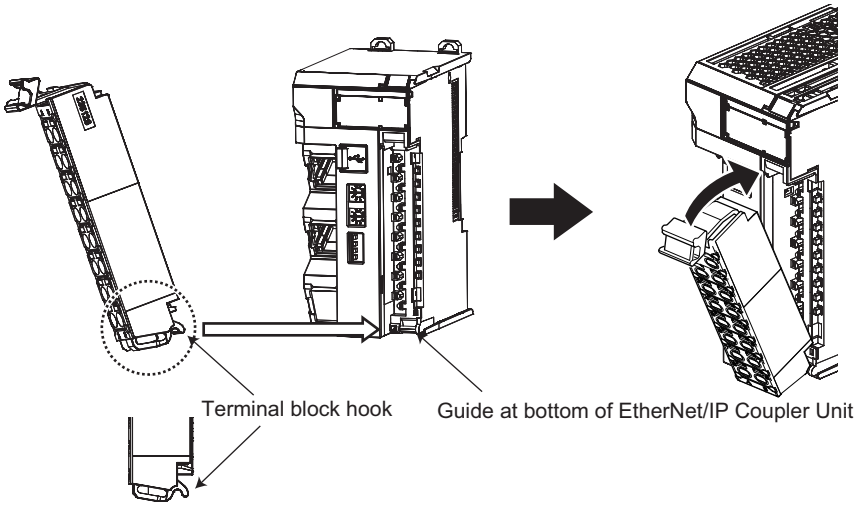
## Removing a Terminal Block

***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

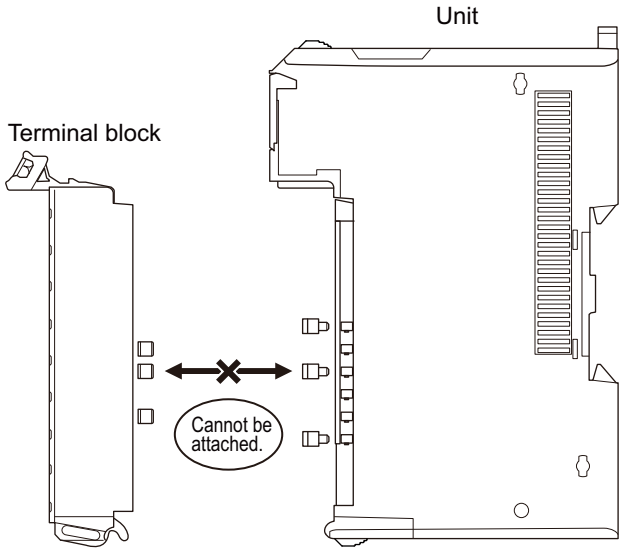
**1** Mount the terminal block hook on the guide at the bottom of the EtherNet/IP Coupler Unit, lift up the terminal block, and press in on the top of the terminal block until you hear it engage. The terminal block will click into place on the Unit.
After you mount the terminal block, make sure that it is locked to the Unit.




Mount a Terminal Block that is applicable to the model of the EtherNet/IP Coupler Unit.
Refer to *4-5 Terminal Blocks* on page 4-13 for the applicable Terminal Blocks.

## Preventing Incorrect Attachment of Terminal Blocks

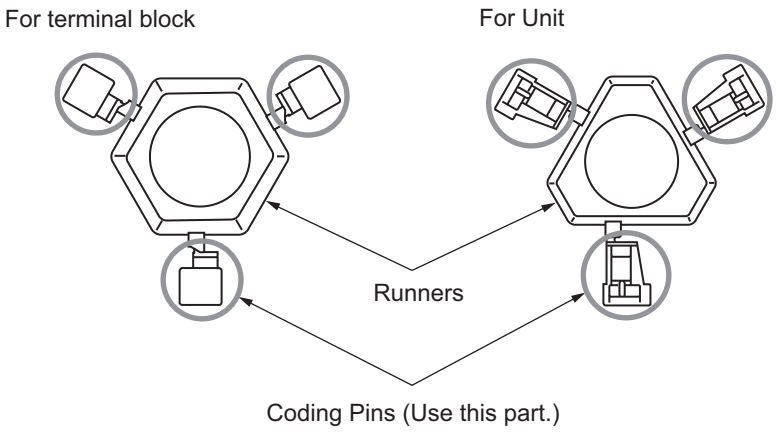
In order to prevent unintentionally installing the wrong terminal block, you can limit the combination of a Unit and a terminal block.
Insert three Coding Pins (NX-AUX02) into three of the six incorrect attachment prevention holes on the Unit and on the terminal block. Insert these pins into positions 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.



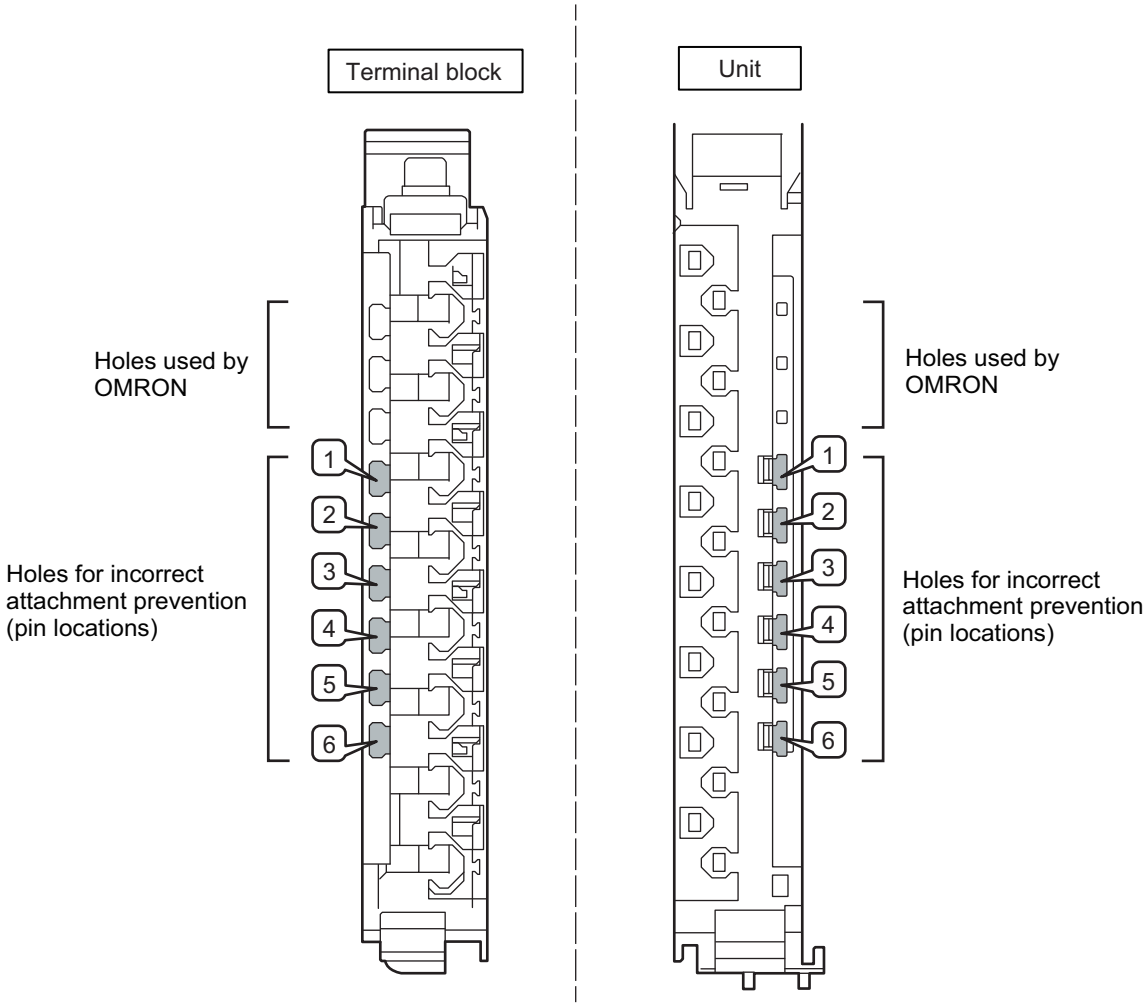

Use the following Coding Pins.

| Name | Model | Specification |
|---|---|---|
| Coding Pin | NX-AUX02 | For 10 Units<br>(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.)

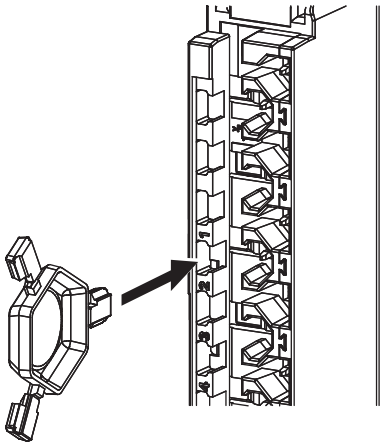
**Precautions for Correct Use**

- 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, it would be impossible to mount the terminal block on a Unit.
- Do not use Coding Pins that have been attached and then removed. If you use them again, they may fall off.

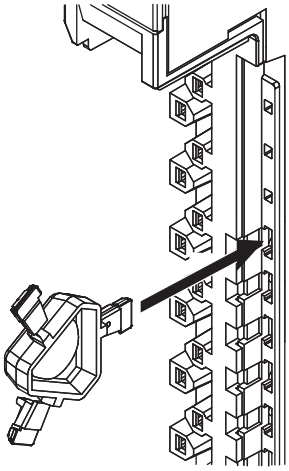
## ● Inserting the Coding Pins

***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

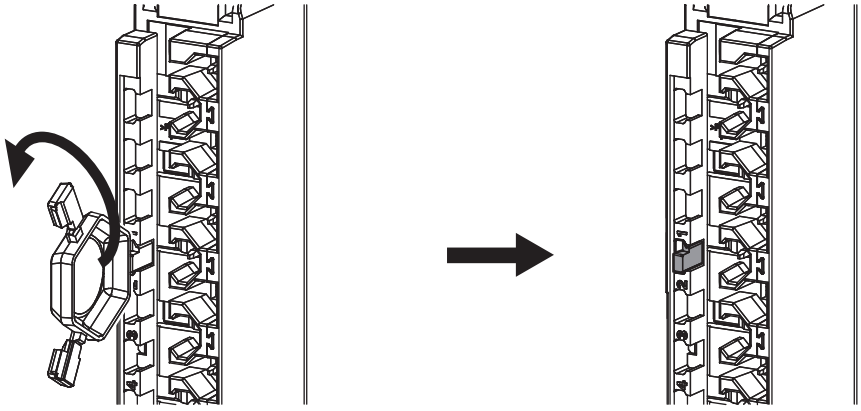


Unit

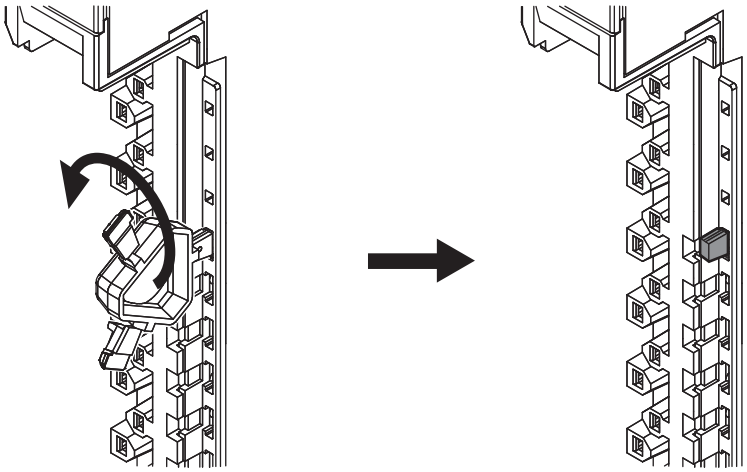


***2*** Rotate the runner to break off the Coding Pin.

Terminal block



Unit

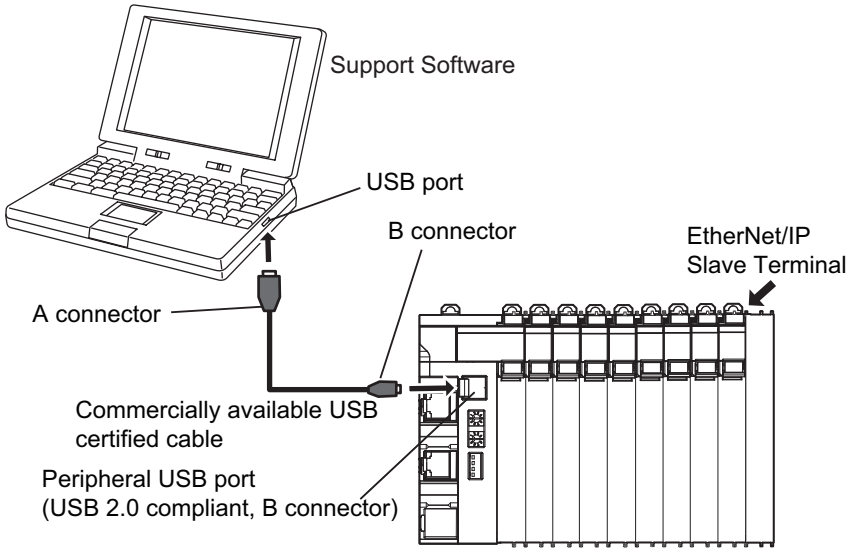


# 7-3 Connecting USB Cable

The EtherNet/IP Coupler Unit can be connected directly to a computer in which the Support Software is installed through a USB cable.

## Connection Method

Use a commercially available USB certified cable to connect the computer in which the Support Software is installed to the peripheral USB port on the EtherNet/IP Coupler Unit.




## Connecting Cable

Use the following cable to connect the EtherNet/IP Coupler Unit and the computer in which the Support Software is installed.

| Unit port | Computer port | Network type (communications mode) | Model | Length |
|---|---|---|---|---|
| Peripheral USB port (USB 2.0 compliant, B connector) | USB port | USB 2.0 | Commercially available USB certified cable (A connector and B connector) | 5 m max. |

## Preparations

To connect the EtherNet/IP Coupler Unit to a computer with USB, you must first install a USB driver in the computer.
When you install the Support Software, a USB driver for a USB connection will be automatically installed in the computer.
When you turn ON the Unit power supply to the EtherNet/IP Slave Terminal and connect the EtherNet/IP Coupler Unit and computer with a USB cable, the computer will automatically recognize the device and start installing the USB driver.

## Making Settings with the Support Software

The connection between the EtherNet/IP Coupler Unit and computer is set up with the Support Software.

Refer to *2-3-2 Connection Method and Procedures* on page 2-9 for the procedure to connect to the Support Software.

## Restrictions for USB Connections

When you connect the computer to the EtherNet/IP Coupler Unit, the USB specifications impose the following restrictions.

- You can connect only one computer to only one EtherNet/IP Coupler Unit with a USB connection. You cannot connect more than one of each at the same time.
- You cannot use more than one software tool simultaneously with the USB connection.
- Do not disconnect the USB cable while the Support Software is online with the EtherNet/IP Coupler Unit. Always place the Support Software offline before you disconnect the USB cable.

# 7-4 Wiring External Signal Lines

Refer to the sections on wiring in the user's manuals for individual NX Units for information on wiring the external I/O signal lines between the external devices and the NX Units.
For precautions on wiring in control panels, refer to *6-2 Control Panel Installation* on page 6-24.

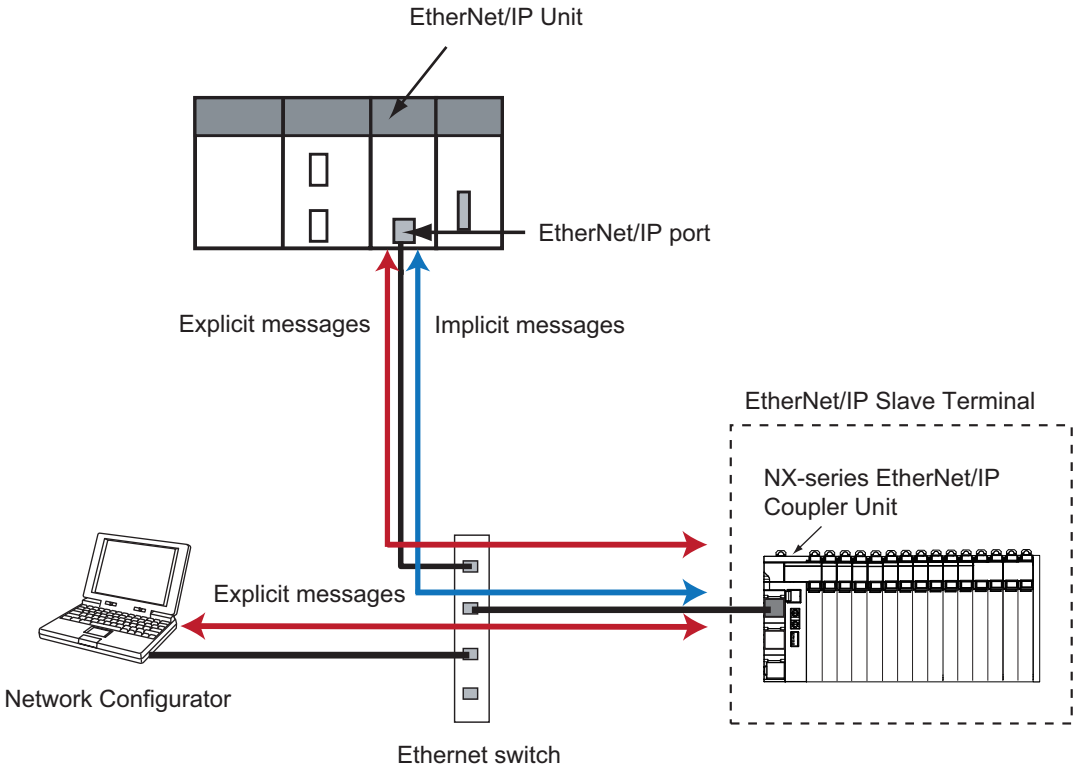
# 8

# EtherNet/IP Communications

This section provides an introduction to EtherNet/IP communications.

# 8-1 EtherNet/IP Functions

The EtherNet/IP Coupler Unit uses implicit and explicit message functions to exchange I/O data and perform configuration settings. Connection-based cyclic, class 1, implicit messages are used to exchange I/O information. Connection-based, class 3 explicit messages and connectionless UCMM explicit messages are used for configuration and other non-cyclic communications.




## 8-1-1 Implicit Message Communications

Implicit communications allow cyclic communications (called tag data links in this manual) with EtherNet/IP devices. Data can be exchanged at high speed between EtherNet/IP Coupler Units and controllers using high-volume tag sets. Tag data links can operate at the cyclic period (cyclic communications) specified for each application, regardless of the number of nodes. Data is exchanged over the network at the refresh cycle set for each connection, so the communication's refresh cycle will not increase even if the number of nodes is increased, i.e., the synchronicity of the connection's data is preserved.

Since the refresh cycle can be set for each connection, each application can communicate at its ideal refresh cycle. For example, an application's critical interlock information can be transferred at higher speed while the less critical production commands and the status monitor information are transferred at lower speed.

The communications load to the nodes must be within the Units' allowed communication bandwidth.

There are 3 common types of implicit message connections classified as exclusive owner, input only connection and listen only.

### ● Exclusive Owner Connection

An exclusive owner connection uses a bidirectional connection with an EtherNet/IP slave that has I/O data, to control output data to the EtherNet/IP slave where the data is controlled by only one EtherNet/IP master, such as an EtherNet/IP Unit. You cannot make exclusive owner connections from more than one EtherNet/IP master. For an EtherNet/IP Coupler Unit, a connection I/O type of *Input/Output* is equivalent to an exclusive owner connection.

### ● Input Only Connection

An input only connection is used to connect to an EtherNet/IP slave that has input data so that the input data can be received from the EtherNet/IP slave. You can create input only connections from more than one EtherNet/IP master. With an input only connection, the master device produces only a heartbeat signal to the EtherNet/IP slave and no output data is present.

### ● Listen Only Connection

A listen only connection is like an input only connection in that it is used to receive input data from an EtherNet/IP slave. A listen only connection can be attached to an existing exclusive owner or input only connection opened by another EtherNet/IP master, but only when multicasting is specified for sending the input data to EtherNet/IP masters. A listen only connection cannot be created if there is no existing connection or if the input data send specification to the EtherNet/IP master is not for multicasting. If the existing connection closes, then the listen only connection will also be closed or timed out.

## 8-1-2 Explicit Message Communications

The EtherNet/IP Coupler Unit supports explicit message server functions to access CIP objects from a device such as an EtherNet/IP master or configuration tool. You can use explicit messages to access CIP objects to read current error information, clear current errors, read event logs, and use other troubleshooting functions and to set the Unit operation settings, the IP address setting, or other communications parameters. Also, if the EtherNet/IP master does not support tag data links (i.e., implicit messages), you can use explicit messages as an alternative message means to control I/O for EtherNet/IP Slave Terminals.

Refer to *A-1 Supported CIP Objects* on page A-3 for details on CIP objects that are supported by the EtherNet/IP Coupler Unit. Refer to *A-3 Examples of EtherNet/IP Slave Terminal Settings and I/O Data Control Procedure Using Messages* on page A-51 for specific procedures.

# 8-2 Tag Data Links

Tag data links enable cyclic data exchanges on an EtherNet/IP network between PLCs and EtherNet/IP Coupler Units.
The settings for tag data links are made using the Network Configurator or other Support Software that can edit settings for EtherNet/IP. Refer to *9-5 Setting Tag Data Links* on page 9-36 for information on how to make the settings.

**Additional Information**

For details on the tag data link setting procedure when connecting a master from another manufacturer, refer to the manual for the master from the another manufacturer.

## Tag Sets

The output data and input data for each node for which data is exchanged are set in the connection information. These data are called the output tag set and input tag set. A tag set must specify at least one tag. The size of the data for data exchange is the total size of the tags included in the tag set. The size of the output tag set and the size of the input tag set must match.

**Additional Information**

If an I/O device is used, the Network Configurator must have an EDS file installed that includes connection information for the I/O device.

**Precautions for Correct Use**

The EtherNet/IP Coupler supports one tag for the tag set. Multiple tags within a tag set are not supported.

## Originator and Target Devices

With a tag data link, one node requests the *connection* of a communications line to exchange data with another node. The node that requests the connection is called the *originator*, and the node that receives the request is called the *target*.

## Variables in the EtherNet/IP Master

I/O memory addresses (e.g., in the CIO or DM Area) and symbols can be assigned to tags in the EtherNet/IP master.

## Starting and Stopping Tag Data Links

Tag data links are automatically started when the data link parameters are downloaded from the Network Configurator. Thereafter, tag data links can be stopped and started for the entire network or individual devices from the Network Configurator. Starting and stopping tag data links for individual

devices must be performed for the originator. Refer to *9-5-10 Starting and Stopping Tag Data Links* on page 9-68 for details.

## 8-2-1 Tag Data Link Data Areas

### Tags

A *tag* is a data link between the local I/O memory and a remote I/O memory. A *tag* can be set using a network variable or an I/O memory address.

### Tag Sets

Each *tag set* represents the data that is linked for a tag data link connection. Tag data links are therefore created through a connection between one tag set and another tag set. A tag set name must be set for each tag set.

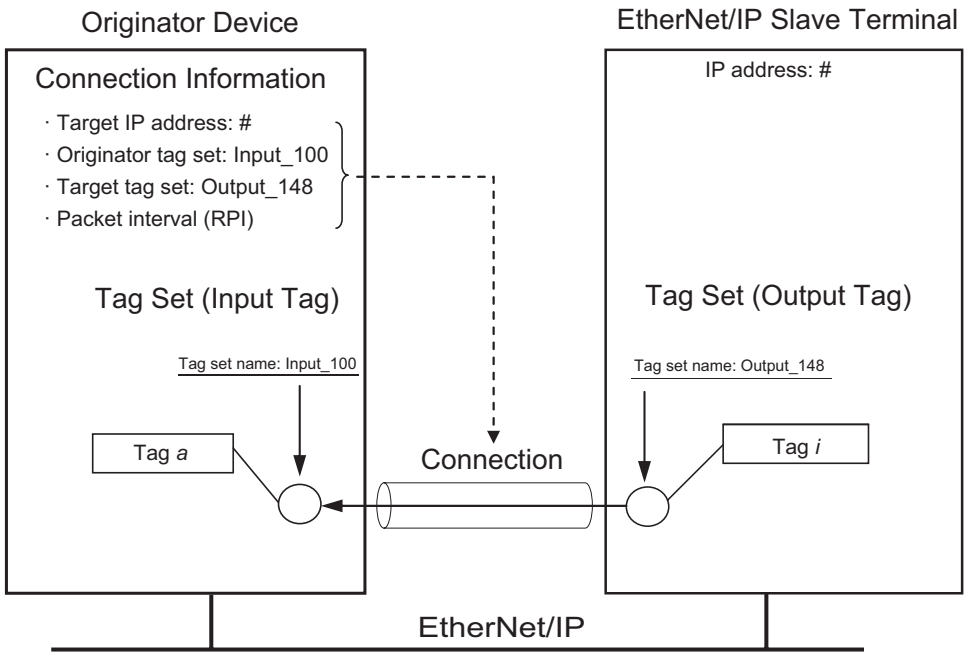
**Note** A connection is used to exchange data as a unit within which data concurrency is maintained. Thus, data concurrency is maintained for all the data exchanged for the tags in one data set.

**Precautions for Correct Use**

Data exchange for the tags are exchanged with the EtherNet/IP Slave Terminal in the order that the tags are registered in the tag sets in the EtherNet/IP master. Therefore, register the input tag sets in the EtherNet/IP master and the output tag sets in the EtherNet/IP Slave Terminal with the same sizes and in the same order, and register the output tag sets in the EtherNet/IP master and the input tag sets in the EtherNet/IP Slave Terminal with the same sizes and in the same order.

#### ● Example

In the following example, input tag a at the originator is a tag set named *Input_100* and output tag i is a tag set named *Output_148*. A connection is set between these two tag sets.



There are both input (consume) and output (produce) tag sets. Each tag set can contain only input tags or only output tags. The same input tag cannot be included in more than one input tag set.

## 8-2-2 Creating Tag Data Links

Use the following procedure with the Network Configurator if tag data link functionality is used with an EtherNet/IP Unit. Refer to *9-5 Setting Tag Data Links* on page 9-36 for detailed steps on creating tag data links.

***1*** Create input (reception) tags for addresses in the CPU Unit's I/O memory area or for network variables.

***2*** Create output (send) tags for addresses in the CPU Unit's I/O memory area or for network variables.

***3*** Create input and output tag sets that include previously created tags.

***4*** Set and create a connection by associating the target device output tag set and the originator device input tag set.

**Using Multicast and Unicast Communications**

A multicast connection or unicast (point-to-point) connection can be selected as the connection type in the tag data link connection settings. With a multicast connection, you can send an output tag set in one package to multiple nodes and make allocations to the input tag sets. If multicast connections are used, however, use an Ethernet switch that has multicast filtering, otherwise the tag set is received by all nodes in the network.

A unicast connection separately sends one output tag set to each node, and so it sends the same number of packets as the number of input tag sets. Therefore, using multicast connections can decrease the communications load if one output tag set is sent to multiple nodes.

If an Ethernet switch that does not have multicast filtering is used, the multicast packets will be broadcast to the entire network and packets will be sent to nodes that do not require them, which will cause the communications load on those nodes to increase. This applies only if one output tag set is sent to multiple nodes using a multicast connection with one packet, the connection type of the connections that receive the output tag set is multicast, and the connection I/O types, packet intervals (RPI), and timeout values are all the same.

***5*** Set RPI (Packet Interval).

The packet interval is the data I/O refresh cycle in the Ethernet circuit when performing tag data links, and can be set separately for each connection.

With EtherNet/IP, data is exchanged on the communications line at the packet interval that is set for each connection, regardless of the number of nodes.

The timeout value is set as a multiple of the packet interval (RPI) and can be set to 4, 8, 16, 32, 64, 128, 256, or 512 times the packet interval. The default setting is 4 times the packet interval (RPI).

The performance of communications devices is limited to some extent by the limitations of each product's specifications. Consequently, there are limits to the packet interval (RPI) settings.

Refer to *9-5-6 Connection Settings* on page 9-55 for packet interval setting specifications.

**Precautions for Correct Use**

If you set a tag data link with a short packet interval (RPI) when many NX Units are mounted to the EtherNet/IP Slave Terminal, a Tag Data Link Timeout may occur depending on the load conditions on the EtherNet/IP Slave Terminal. If that occurs, increase the length of the packet interval (RPI) or reduce the number of NX Units that are mounted.

# 9

# Setting Up Slave Terminals

This section describes the procedures used to set up Slave Terminals.

# 9-1 Settings and Setting Procedures

As examples, this section describes EtherNet/IP Slave Terminal setting items and procedure and the settings that are required to access I/O data in EtherNet/IP Slave Terminals from a CJ-series EtherNet/IP Unit. For other settings and setting procedures, refer to the operation manual for the Support Software that you will use.

**Additional Information**

- Refer to *A-2 TCP/UDP Message Service* on page A-39 for details on the TCP/UDP message service.
- If you do not use a Safety Control Unit, you do not need any Support Software to use the EtherNet/IP Slave Terminal with the default settings. Refer to *A-5 Application Procedure for the Default Settings* on page A-58 for information on using an EtherNet/IP Slave Terminal with the default settings.

## 9-1-1 Items to Set

The settings that are used to access I/O data in the Slave Terminals from a CJ EtherNet/IP Unit can be divided into two areas:

- NX-I/O Units data
- EtherNet/IP data

### NX-I/O Units Data

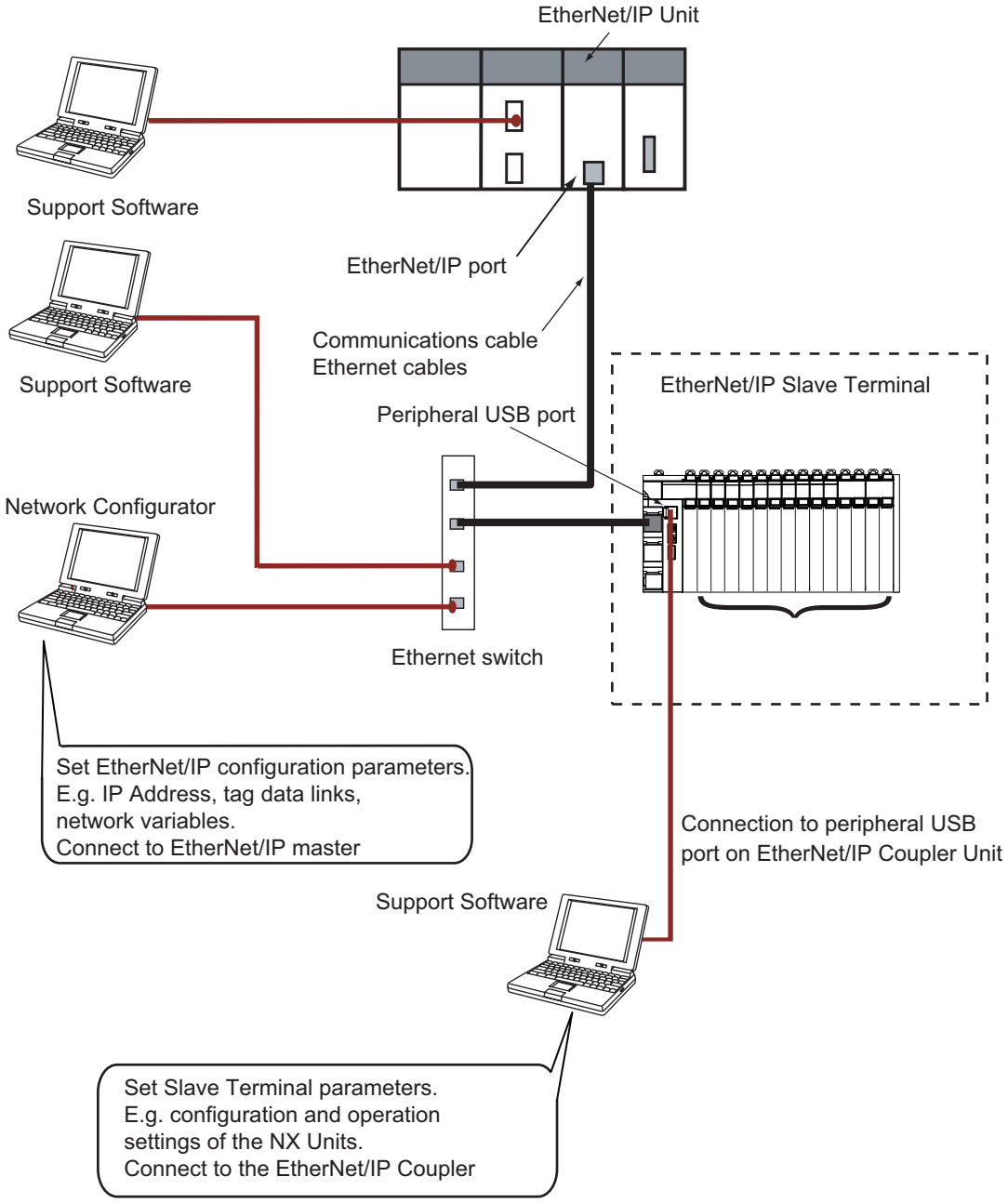
This data is set using Support Software.

| Setting | Description |
|---|---|
| Setting Slave Terminal Configuration and Operation Settings | Adjust the settings of the Slave Terminal with the configuration and operation settings of the NX Units and EtherNet/IP Coupler Unit using Support Software. |

### EtherNet/IP Data

This data is set using a configuration tool such as the OMRON Network Configurator.

| Setting | Description |
|---|---|
| Setting IP Address | Set the IP address of the EtherNet/IP Coupler Unit. |
| Setting the Clock Time | Set the clock of the EtherNet/IP Coupler Unit. |
| Setting Tag Data Links | Set the tag data links for the EtherNet/IP Unit. |
| Assigning Network Variables | Assign and register the network variables that are required to access the I/O data from the user program. |




## 9-1-2 Slave Terminal Parameters

Parameters must be set to ensure that the Slave Terminal operates as intended and performs data exchange with other EtherNet/IP devices. The settings are listed in the following table.

| Setting | | | Description |
|---|---|---|---|
| Slave Terminal configuration and operation settings | Configuration information | NX Unit configuration information | This information describes the configuration of the Slave Terminal. |
| | | I/O allocation information | This information specifies what I/O data in the NX Units of the Slave Terminal to exchange with process data communications. |
| | NX Unit operation settings | | These are the operation settings for each NX Unit in the Slave Terminal. |
| | NX Unit application data settings | | These data settings enable the functionality that is specific to each NX Unit. |

Refer to *9-2 Setting Slave Terminal Parameters* on page 9-6 for details on the settings.

## 9-1-3 Setting Procedures

Use the following procedures to set up a Slave Terminal for connection to a CJ EtherNet/IP Unit.

**1** **Setting EtherNet/IP Coupler Unit parameters with Support Software**
Refer to *9-2 Setting Slave Terminal Parameters* on page 9-6.

**(1) *9-2-2 Setting the NX Unit Configuration Information* on page 9-6**

↓

**(2) *9-2-3 I/O Allocation Information* on page 9-12**

↓

**(3) *9-2-4 Unit Operation Settings* on page 9-22**

↓

**(4) *9-2-5 Unit Application Data* on page 9-23**

↓

**(5) *9-2-6 Support Software Functions Used as Required* on page 9-23**

↓

**2** ***9-3 Transferring and Comparing Settings* on page 9-28**

↓

**3** ***9-4 Setting IP Address* on page 9-31**

| | |
|---|---|
| **4** ***9-5 Setting Tag Data Links*** **on page 9-36** | **(1)** ***9-5-1 Starting the Network Configurator*** **on page 9-36** |
| | ↓ |
| | **(2)** ***9-5-3 Registering Devices*** **on page 9-39** |
| | ↓ |
| | **(3)** ***9-5-5 Creating Tags and Tag Sets*** **on page 9-42** |
| | ↓ |
| | **(4)** ***9-5-6 Connection Settings*** **on page 9-55** |
| | ↓ |
| | **(5)** ***9-5-8 Downloading Tag Data Link Parameters*** **on page 9-61** |

↓

| |
|---|
| **5** ***9-6 Assigning Network Variables*** **on page 9-70** |

**Additional Information**

You can use the NX Units for EtherNet/IP Coupler Units and EtherNet/IP Slave Terminals with the default settings. Refer to *A-5 Application Procedure for the Default Settings* on page A-58 for the application procedures for the default settings.

# 9-2 Setting Slave Terminal Parameters

This section describes how to set the Slave Terminal parameters with Support Software. The Sysmac Studio is used as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

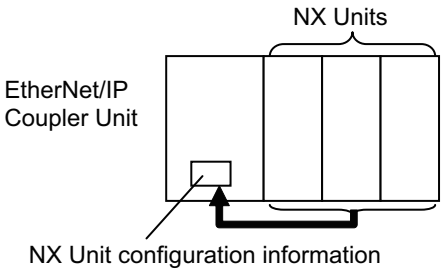
## 9-2-1 Items to Set

The following settings must be adjusted in the Slave Terminal.

| Name | | Description |
|---|---|---|
| Configuration information | Slave Terminal configuration information | This information describes the configuration of the Slave Terminal: the number and order of NX Units mounted after the EtherNet/IP Coupler Unit, individual NX Unit information, and information about the EtherNet/IP Coupler Unit. |
| | I/O allocation information | This information defines the I/O data in the EtherNet/IP Coupler Unit and the NX Units. |
| Slave Terminal operation settings | | The Slave Terminal operation settings are for the EtherNet/IP Coupler Unit and the NX Units. |
| NX Unit application data | | This data controls the functionality that is specific to each NX Unit. Not all NX Units have Unit application data. |

## 9-2-2 Setting the NX Unit Configuration Information

Specify the NX Unit configuration information for the Slave Terminal, which consists of an EtherNet/IP Coupler Unit and NX Units.




### Settings in the NX Unit Configuration Information

#### ● EtherNet/IP Coupler Unit

The EtherNet/IP Coupler Unit settings are listed below.
You can set only the items that have “Yes” in the *Settable* column.

| Setting | Settable | Description | Data range | Default |
|---|---|---|---|---|
| Device name | | This is the name of the EtherNet/IP Coupler Unit.<br>Use the EtherNet/IP Configuration Edit Tab Page to change this setting. | --- | E *** (* is a serial number from 001).<br>The default value is automatically generated based on the node address. |
| Model name | | This is the model of the EtherNet/IP Coupler Unit. | --- | The model number of the EtherNet/IP Coupler Unit is shown. |
| Product name | | This is the product name. | --- | EtherNet/IP Coupler |
| Unit version | | This is the Unit version of the EtherNet/IP Coupler Unit. | --- | --- |
| NX Unit Number | | This number represents the logical position of the EtherNet/IP Coupler Unit. | --- | 0 |
| NX Unit Mounting Setting | | This setting enables or disables the mounting of an NX Unit. You cannot directly edit these settings in the EtherNet/IP Coupler Unit. | --- | --- |
| Serial Number | | This is the serial number of the EtherNet/IP Coupler Unit. You can get the serial number to set the serial number of the actual EtherNet/IP Coupler Unit. | --- | --- |
| Supply Power/ Available Power [W] | | The power that is currently drawn by the NX Units and the maximum available power supply capacity are given. | --- | -/10.00 |
| Unit width [mm] | | This is the width of the EtherNet/IP Coupler Unit. | --- | 46 |
| I/O allocation settings | Yes | These are the I/O allocation settings for the EtherNet/IP Coupler Unit. Click the **Edit I/O Allocation Settings** button to edit these settings. | --- | Refer to *9-2-3 I/O Allocation Information* on page 9-12. |
| Unit operation settings | Yes | These are the Unit operation settings for the EtherNet/IP Coupler Unit. Click the **Edit Unit Operation Settings** button to edit these settings. | --- | Refer to *9-2-4 Unit Operation Settings* on page 9-22. |
| Number of mounted Units | | This is the number of mounted NX Units. | --- | --- |
| NX Unit Connection Time (s) | Yes | This is the wait time for the NX Units to connect to the Slave Terminal. | 3 to 200 s | 3 s |

| Setting | Settable | Description | Data range | Default |
|---|---|---|---|---|
| Serial Number Check Method | Yes | Set this setting to **Setting = Actual device** to compare the serial numbers of the NX Units at these times: when the power is turned ON and after the EtherNet/IP Coupler Unit is restarted. The serial numbers of the NX Units saved in the Unit configuration information are compared with the actual serial numbers of the NX Units.*1<br>If differences are found, a *Unit Configuration Verification Error* will occur. | No check. Setting = Actual device | No check. |

*1. If this setting is set to **Setting = Actual device** and you replace an NX Unit in the Slave Terminal, a *Unit Configuration Verification Error* will occur. A *Unit Configuration Verification Error* will also occur if you swap the mounting position of two Units of the same model. If it becomes necessary to replace an NX Unit, or swap the mounting positions of two Units of the same model while this setting is set to **Setting = Actual device**, you must correct the Unit configuration information and download it to the EtherNet/IP Coupler Unit. Set this parameter to **Setting = Actual device** if strict management of the equipment configuration is required.

## ● NX Units

| Name | Settable | Description | Data range | Default |
|---|---|---|---|---|
| Device name | Yes | The name of the NX Unit. | --- | N* (Where * is a serial number from 1) |
| Model name | | This is the model number of the NX Unit. | --- | --- |
| Product name | | This is the product name. | --- | --- |
| Unit version | | This is the Unit version of the NX Unit. | --- | --- |
| NX Unit Number | | This number represents the logical position of the NX Unit. Numbers are automatically assigned from the leftmost mounting position. | --- | --- |
| NX Unit Mounting Setting | Yes | This setting enables or disables the mounting of an NX Unit. Refer to *11-2 NX Unit Mounting Settings* on page 11-3 for details on this setting. | Enabled or Disabled | Enabled |
| Serial Number | | This is the serial number of the NX Unit. You can get the serial number to set the serial number of the actual EtherNet/IP Coupler Unit. | --- | 0 |
| Supply Power/ Available Power [W] | | The power that is currently drawn by the NX Units and the maximum available power supply capacity are given. This item is for an Additional NX Unit Power Supply Unit. | --- | -/10.00 |
| Power consumption [W] | | This is the power consumption of the NX Units from the NX bus. This setting applies to Units other than an Additional NX Unit Power Supply Unit. | --- | Refer to the manual for the specific NX Unit. |
| Unit width [mm] | | This is the width of the NX Unit. | --- | Refer to the manual for the specific NX Unit. |

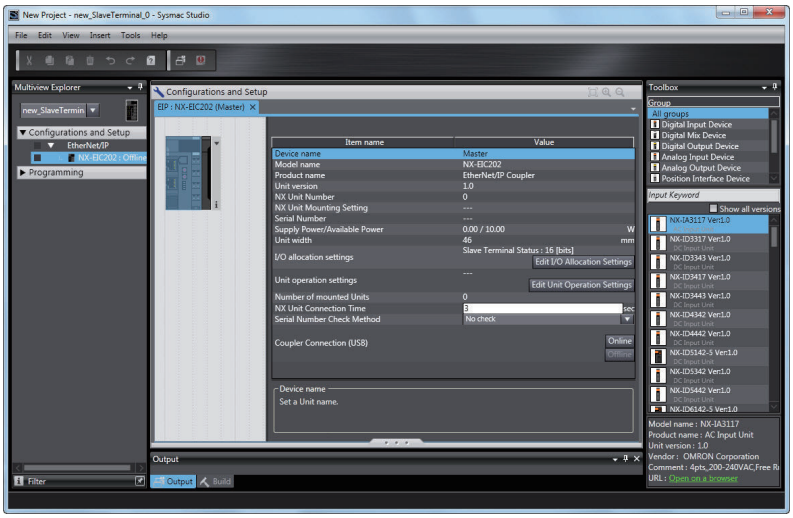
| Name | Settable | Description | Data range | Default |
|---|---|---|---|---|
| I/O allocation settings | Yes | These are the I/O allocation settings for the NX Unit. Click the **Edit I/O Allocation Settings** button to edit these settings. You cannot change this setting for System Units. | --- | Refer to the manual for the specific NX Unit. |
| Unit operation settings | Yes | These are the Unit operation settings for the NX Unit. Click the **Edit Unit Operation Settings** button to edit these settings. You cannot change this setting for System Units. | --- | Refer to the manual for the specific NX Unit. |

## Setting the NX Unit Configuration Information

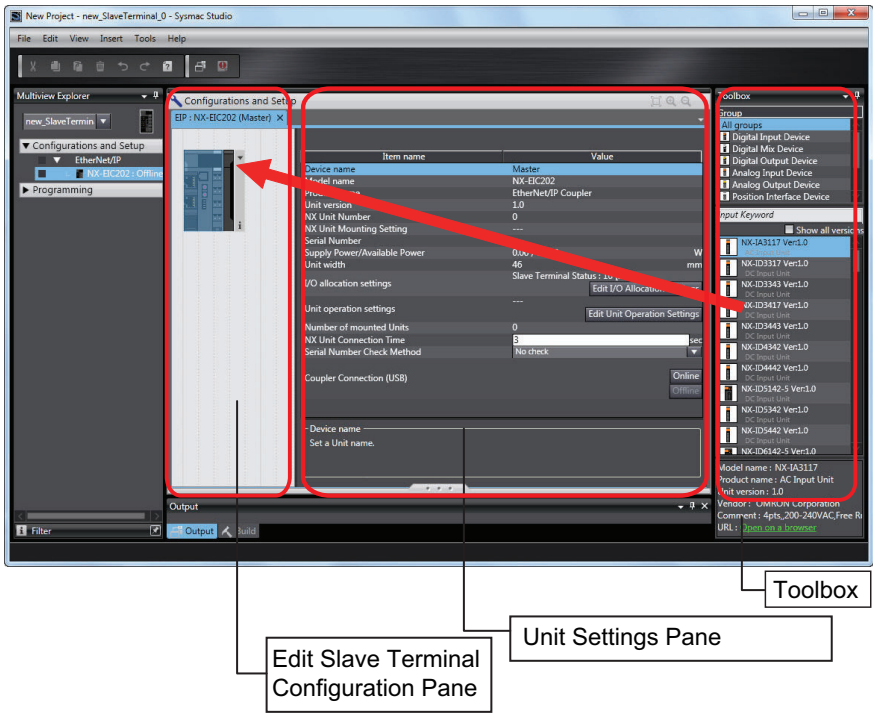
### ● Creating the Unit Configuration Information with the Edit Slave Terminal Configuration Tab Page

***1*** Create a new Support Software project.

***2*** Double-click **NX-EIC202** under **Configurations and Setup** in the Multiview Explorer or right-click **NX-EIC202** under **Configurations and Setup** and select **Edit**.
The Edit Slave Terminal Configuration Tab Page is displayed.




***3*** Drag the NX Unit from the Toolbox to the Edit Configuration Pane and drop it on the Slave Terminal.




| Item | Description |
|---|---|
| Edit Slave Terminal Configuration Pane | You can edit the Unit configuration information for the Slave Terminal here. |
| Unit Settings Pane | This list displays the setting information for the currently selected Unit.<br>• **Edit I/O Allocation Settings** button: Click this button to change the I/O allocation information.<br>• **Edit Unit Operation Settings** button: Click this button to edit the Unit operation settings. |
| Toolbox | This area shows the NX Units by groups and individual Units. |

***4*** Set the Unit configuration information in the Unit Settings Pane.

### Precautions for Correct Use

If you turn ON the power to an EtherNet/IP Slave Terminal before you create or transfer the *Unit configuration information* to the EtherNet/IP Slave Terminal, the TS indicator on the front panel of the EtherNet/IP Coupler Unit will flash green at 0.5-second intervals. This means that the EtherNet/IP Slave Terminal is operating without any Unit configuration information.
In this state, the EtherNet/IP Slave Terminal will start and operate based on the physical Unit configuration when the power is turned ON. The Unit configuration is not checked.

- I/O data of Standard NX Units will be mapped to the EtherNet/IP Slave Terminal's I/O data blocks by their physical order. Refer to *9-6-1 Basic I/O Mapping* on page 9-70 for more information.
- You cannot use a Safety Control Unit without NX Unit configuration information. To use a Safety Control Unit, set the NX Unit configuration information in the EtherNet/IP Coupler Unit. For the Unit configuration information setting procedure, refer to *9-2-2 Setting the NX Unit Configuration Information* on page 9-6.

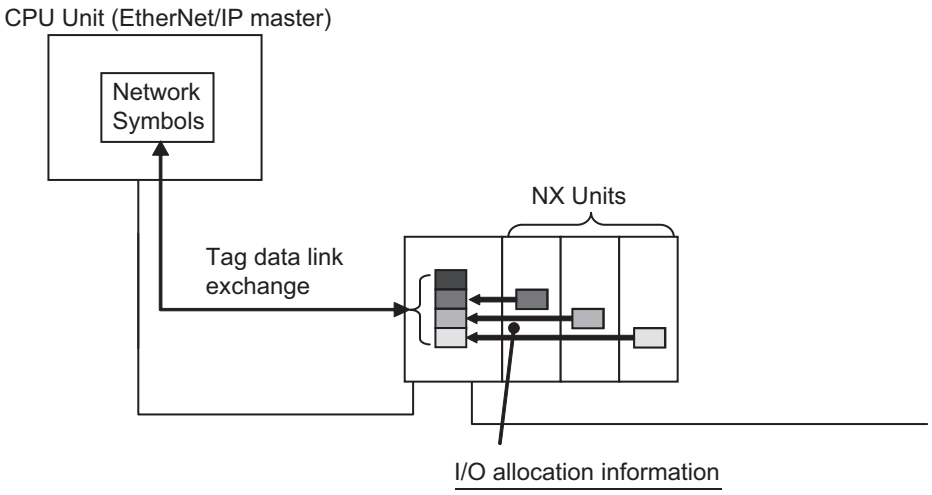
## ● Creating Unit Configuration Information Based on the Actual Configuration

This method uses the physical Unit configuration for the Unit configuration information.

Connect the Support Software to the EtherNet/IP Coupler Unit. Compare and merge with the actual Unit configuration to read the Unit configuration of the Slave Terminal. Set the settings as an EtherNet/IP device on the EtherNet/IP Configuration Edit Tab Page. Finally, create the Slave Terminal configuration and operation settings on the Edit Slave Terminal Configuration Tab Page.
Refer to *9-2-6 Support Software Functions Used as Required* on page 9-23 for details on the comparing and merging with the actual Unit configuration of the Slave Terminal.

## 9-2-3 I/O Allocation Information

The I/O allocation information maps the I/O data in the EtherNet/IP Coupler Unit to exchange with the tag data link. The Slave Terminal performs tag data link exchange with the CJ EtherNet/IP Units based on the I/O allocation information.




The EtherNet/IP Coupler Unit and the NX Units contain default values for the I/O allocation information. These default values are sufficient for a standard exchange of I/O data. Change the settings as necessary.

### Specifications for I/O Data Allocations in Slave Terminals

The following limitations apply to I/O data allocations for the entire Slave Terminal.

| Item | Input data | Output data |
|---|---|---|
| Number of I/O entry mappings | 255 | 255 |
| EtherNet/IP maximum I/O connection size | 504 bytes | 504 bytes |
| Allocatable I/O data points | Maximum of 4,000 points total for both inputs and outputs | |

**Note** The NX bus I/O data size is for Input 512 bytes max. and for Output 512 bytes max.

### I/O Allocation Settings

To allocate I/O, select an I/O entry mapping and register an I/O entry to the I/O entry mapping.

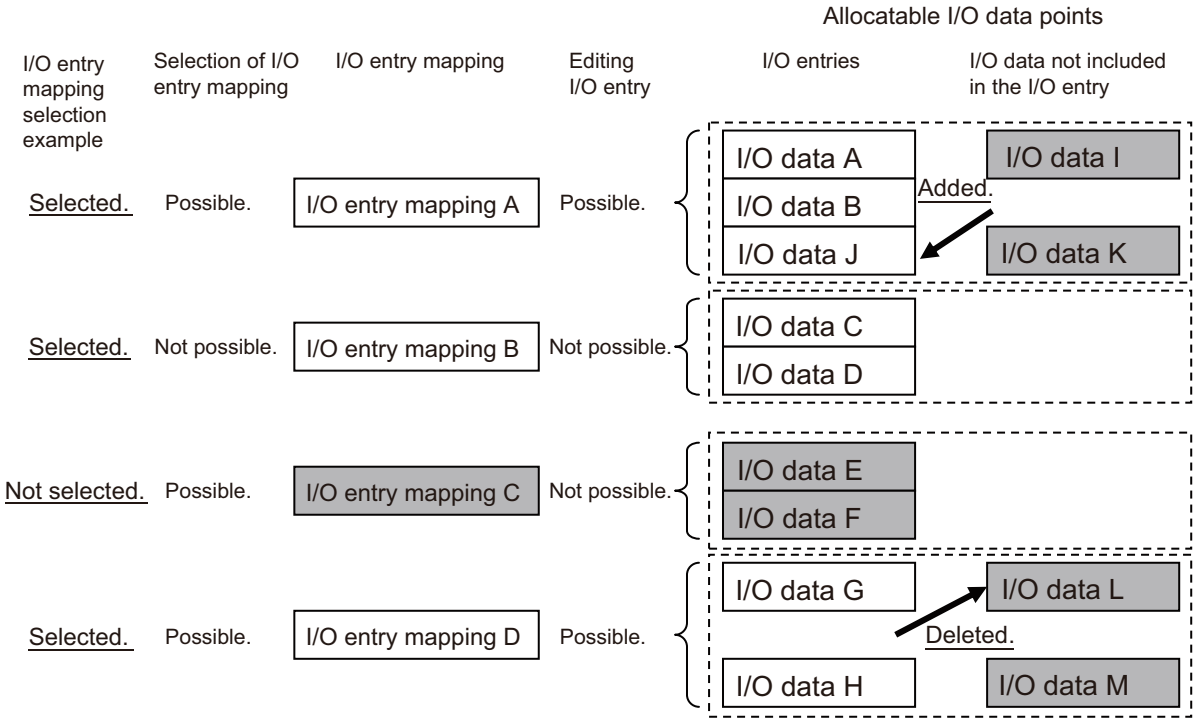
#### ● Selecting I/O Entry Mappings

An I/O entry mapping defines a set of I/O data. Each Unit has its own I/O entry mapping.
The data for each I/O entry included in the selected I/O entry mappings are exchanged using process data communications. Default values are assigned to the I/O entry mapping selections.
Change the I/O entry mapping selections as necessary. If an I/O entry mapping must be selected, the option to deselect it will not be available.

#### ● Registering I/O Entries

The I/O data assigned to an I/O entry mapping is called an I/O entry.

Default values are assigned to the I/O entries in each I/O entry mapping. Some I/O entry mappings allow you to add or delete I/O entries. Also, the I/O data that you can assign to an I/O entry mapping is predetermined. Change the I/O entries as necessary.




*The shaded I/O data is not exchanged with process data communications.

## Allocatable I/O Data in an EtherNet/IP Coupler Unit

This section gives the I/O data in the EtherNet/IP Coupler Unit that you can assign as I/O for network variables.

To access I/O data as NX objects, use the index numbers.

### ● I/O Entry Mappings for EtherNet/IP Coupler Units

The following I/O entry mappings are available.

| I/O | I/O entry mapping name | I/O entry mapping | | I/O entry | |
|---|---|---|---|---|---|
| | | Selecting | Default | Editing | Maximum entries |
| Inputs | 505th Transmit PDO Mapping | Possible | Selected | Possible | 5 |

## ● I/O Data Allocatable to I/O Entry Mappings

The following I/O data can be registered as I/O entries for the I/O entry mappings.
If you use a status that has a number as the suffix to the data name, select a status according to the number of used NX Units. Doing so will reduce the I/O data size and improve communications performance. For example, if you use 10 NX Units, we recommend that you use the status that has *Status 15* in the data name.

| I/O entry mapping name | Data name | Function | Data type | Default | Registered by default | NX object | |
|---|---|---|---|---|---|---|---|
| | | | | | | Index number | Subindex number |
| 505th Transmit PDO Mapping | NX Unit Registration Status 15 | This is the registration status for 15 NX Units. | ARRAY[0..15] OF BOOL | FALSE | No | 2003 hex | 01 hex |
| | NX Unit Registration Status 31 | This is the registration status for 31 NX Units. | ARRAY[0..31] OF BOOL | FALSE | | 2003 hex | 02 hex |
| | NX Unit Registration Status 63 | This is the registration status for 63 NX Units. | ARRAY[0..63] OF BOOL | FALSE | | 2003 hex | 03 hex |
| | NX Unit Message Enabled Status 15 | This tells whether message communications are enabled for 15 NX Units. | ARRAY[0..15] OF BOOL | FALSE | | 2004 hex | 01 hex |
| | NX Unit Message Enabled Status 31 | This tells whether message communications are enabled for 31 NX Units. | ARRAY[0..31] OF BOOL | FALSE | | 2004 hex | 02 hex |
| | NX Unit Message Enabled Status 63 | This tells whether message communications are enabled for 63 NX Units. | ARRAY[0..63] OF BOOL | FALSE | | 2004 hex | 03 hex |
| | NX Unit I/O Data Active Status 15 | This tells whether I/O data is usable for 15 NX Units. | ARRAY[0..15] OF BOOL | FALSE | | 2005 hex | 01 hex |
| | NX Unit I/O Data Active Status 31 | This tells whether I/O data is usable for 31 NX Units. | ARRAY[0..31] OF BOOL | FALSE | | 2005 hex | 02 hex |
| | NX Unit I/O Data Active Status 63 | This tells whether I/O data is usable for 63 NX Units. | ARRAY[0..63] OF BOOL | FALSE | | 2005 hex | 03 hex |
| | NX Unit Error Status 15 | This gives the error status for 15 NX Units. | ARRAY[0..15] OF BOOL | FALSE | | 2006 hex | 01 hex |
| | NX Unit Error Status 31 | This gives the error status for 31 NX Units. | ARRAY[0..31] OF BOOL | FALSE | | 2006 hex | 02 hex |
| | NX Unit Error Status 63 | This gives the error status for 63 NX Units. | ARRAY[0..63] OF BOOL | FALSE | | 2006 hex | 03 hex |
| | Slave Terminal Status | This gives the Slave Terminal's Status. | ARRAY[0..15] OF BOOL | FALSE | Yes | 2008 hex | 02 hex |

The next section describes each data item in detail.

## Details of I/O Data in the EtherNet/IP Coupler Unit

This section describes the I/O data in detail.

### ● NX Unit Registration Status

| Data name | Description |
|---|---|
| NX Unit Registration Status 15<br>NX Unit Registration Status 31<br>NX Unit Registration Status 63 | This status tells whether the NX Units are registered in the Unit Configuration. The status is acquired for as many NX Units as the numeric suffix at the end of the data name. Select the I/O data with the appropriate numeric value based on the number of NX Units that are mounted.<br>This status is given as an array of BOOL data. The subscript of the array corresponds to the NX Unit number. A subscript of 0 indicates the EtherNet/IP Coupler Unit.<br>Each bit has the following meaning.<br>TRUE: Registered<br>FALSE: Not registered<br><br>If the Unit configuration information is registered, the status is TRUE for each Unit that is registered.<br>If the Unit configuration information was automatically created (with only the actual Unit configuration information and no registered information), the status is FALSE for all Units.<br><br>The status is *TRUE* for NX Units that are set as unmounted Units.<br><br>Each bit is updated at the following times.<br>• If the Unit Configuration Information Is Registered:<br>The status changes to TRUE when the system is started.<br>The status changes to FALSE when the configuration information is cleared.<br>• If the Unit Configuration Information Is Automatically Created:<br>The status changes to TRUE when the configuration information is confirmed.<br>The status is always FALSE if the Unit configuration information is automatically created. |

## ● NX Unit Message Enabled Status

| Data name | Description |
|---|---|
| NX Unit Message Enabled Status 15<br>NX Unit Message Enabled Status 31<br>NX Unit Message Enabled Status 63 | This status tells whether the NX Units can process message communications. The status is acquired for as many NX Units as the numeric suffix at the end of the data name. Select the I/O data with the appropriate numeric value based on the number of NX Units that are mounted.<br>This status is given as an array of BOOL data. The subscript of the array corresponds to the NX Unit number. A subscript of 0 indicates the EtherNet/IP Coupler Unit.<br>Each bit has the following meaning.<br>TRUE: Message communications possible.<br>FALSE: Message communications not possible.<br><br>The status says that *message communications are enabled* for NX Units that meet the following conditions.<br>• The comparison shows no differences (only if the Unit configuration information is registered).<br>• The NX Unit does not have a WDT error.<br><br>The status is *FALSE* for NX Units that are set as unmounted Units.<br><br>Each bit is updated when the message communications status changes on the corresponding NX Unit. |

## ● NX Unit I/O Data Active Status

| Data name | Description |
|---|---|
| NX Unit I/O Data Active Status 15<br>NX Unit I/O Data Active Status 31<br>NX Unit I/O Data Active Status 63 | This status tells whether the NX Units can process I/O data communications. The status is acquired for as many NX Units as the numeric suffix at the end of the data name. Select the I/O data with the appropriate numeric value based on the number of NX Units that are mounted.<br>This status is given as an array of BOOL data. The subscript of the array corresponds to the NX Unit number. A subscript of 0 indicates the EtherNet/IP Coupler Unit.<br>Each bit has the following meaning.<br>TRUE: The I/O data in the NX Unit can be used for control.<br>FALSE: The I/O data in the NX Unit cannot be used for control.<br><br>The status is *FALSE* for NX Units that are set as unmounted Units.<br><br>Each bit is updated when the operating status changes on the corresponding NX Unit. |

## ● NX Unit Error Status

| Data name | Description |
|---|---|
| NX Unit Error Status 15<br>NX Unit Error Status 31<br>NX Unit Error Status 63 | This status tells whether an error exists on the NX Units.<br>The status is acquired for as many NX Units as the numeric suffix at the end of the data name. Select the I/O data with the appropriate numeric value based on the number of NX Units that are mounted.<br>This status is given as an array of BOOL data. The subscript of the array corresponds to the NX Unit number. A subscript of 0 indicates the EtherNet/IP Coupler Unit.<br>Each bit has the following meaning.<br>TRUE: Error<br>FALSE: No error<br><br>If the Unit configuration information is registered, the status is reported for only the NX Units for which the *NX Unit Registration Status* is *TRUE (registered)*. This status is FALSE for all NX Units for which the NX Unit Registration Status is *FALSE (not registered)*. If automatic generation*1 is used for the Unit configuration information, the status is given for all NX Units.<br><br>Each bit is set to TRUE when the level of the error is as follows:<br>• Minor fault<br>• Observation<br><br>The status is *FALSE* for NX Units that are set as unmounted Units.<br><br>Each bit is updated at the following times.<br>The status changes to TRUE when an error occurs.<br>The status changes to FALSE when the error is reset. Even if the cause of the error has been removed, you must reset the error for the status to change to FALSE. |

*1. This applies when only the physical Unit configuration information is used and the Unit configuration information is not registered.

## Slave Terminal Status

| Data name | Description |
|---|---|
| Slave Terminal Status | This indicates the status conditions of the Slave Terminal. |

The following table shows the structure of the bits in the Slave Terminal status.

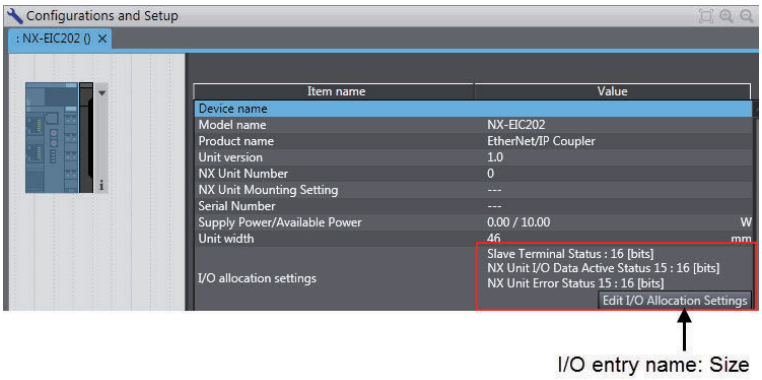
| Bit | Description |
|---|---|
| 0 | Reserved |
| 1 | |
| 2 | |
| 3 | |
| 4 | Observation<br>• ON: Observation status for one or more of the NX Units<br>• OFF: No observation status |
| 5 | Minor Fault<br>• ON: Minor fault status for one or more of the NX Units<br>• OFF: No minor fault |
| 6 | Partial Fault<br>• ON: Partial fault status for one or more of the NX Units<br>• OFF: No partial fault |
| 7 | Major Fault<br>• ON: Major fault status for one or more of the NX Units<br>• OFF: No major fault |
| 8 | Reserved |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | Error Detection Flag<br>• ON: Any of the bits 0 to 13 ON<br>• OFF: None of the bits 0 to 13 ON |
| 15 | I/O Refresh Flag<br>• ON: Normal I/O communications for all NX Units<br>• OFF: I/O communications stopped in one or more NX Units |

**Additional Information**

Refer to *12-3-5 Event Codes for Errors and Troubleshooting Procedures* on page 12-25 for more information on observation status and faults.

## Viewing I/O Allocation Information

Select the Unit in the Edit Slave Terminal Configuration Tab Page.
The Unit Settings Pane is displayed for the selected Unit. The I/O entry name and data size are displayed in the **I/O allocation settings**.



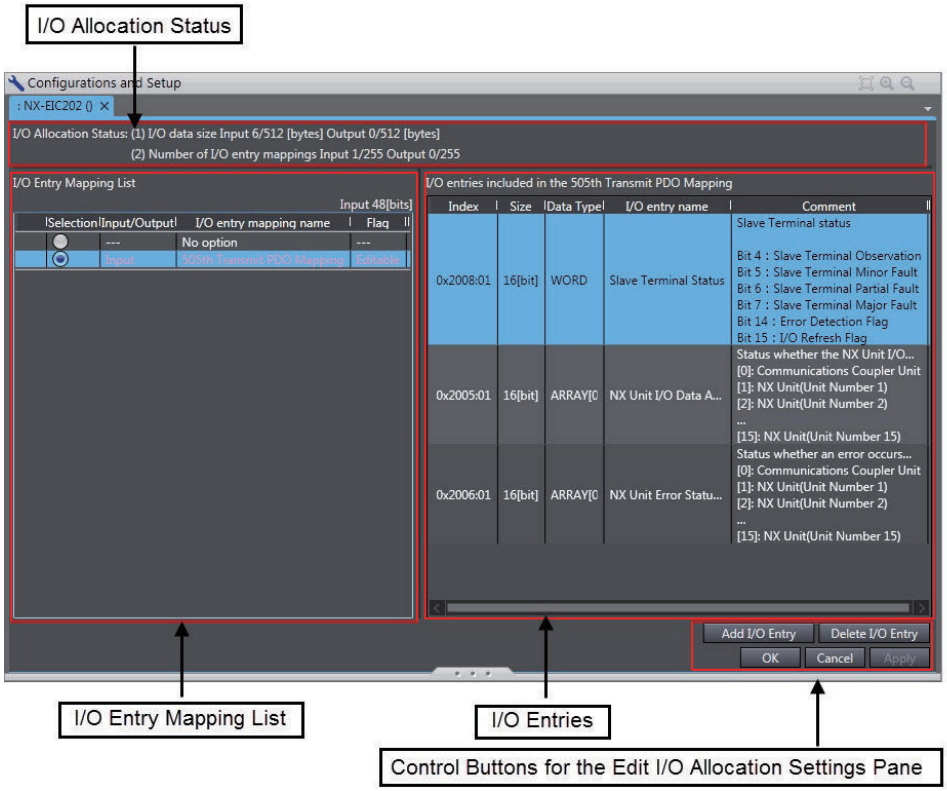

### Additional Information

A detailed display of I/O Allocation can be found by right-clicking the EtherNet/IP Coupler Unit and selecting **Display I/O Allocation** from the menu. Refer to *9-6-2 Support Software I/O Allocation Functions* on page 9-72 for more details.

## Editing the I/O Allocation Settings

You can edit the I/O allocations for the EtherNet/IP Coupler Unit and NX Units as necessary.

**1** In the Unit Settings Pane, click the **Edit I/O Allocation Settings** button.
The **Edit I/O Allocation Settings** Pane is displayed over the Edit Slave Terminal Configuration Tab Page.



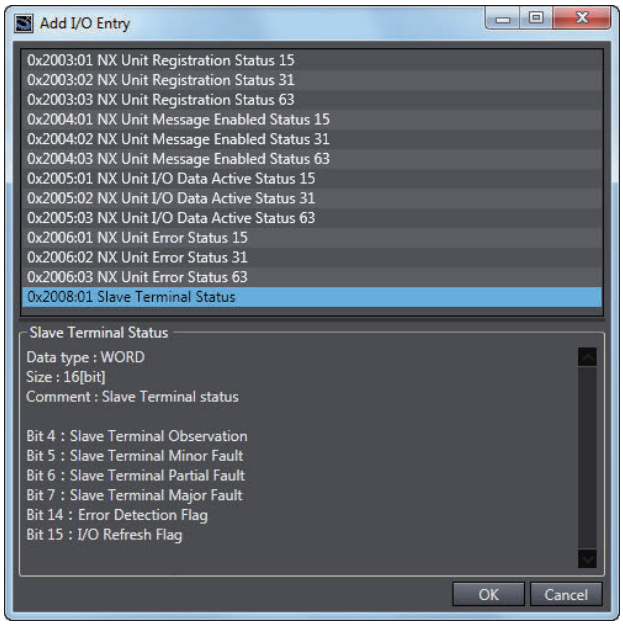

**Edit I/O Allocation Settings** Pane

| Name/Label | Description |
|---|---|
| I/O Allocation Status | The usage of I/O allocation for the entire Slave Terminal is displayed here.<br>1. I/O data size: The size of the I/O data that is allocated for the entire Slave Terminal is given. The denominator is the maximum allocatable size.<br>The I/O data size gives the amount of memory that is used by the I/O data. This value will not necessarily be the same as the total sum of all I/O entry sizes.<br>2. Number of I/O entry mappings: The number of I/O entry mappings that are allocated to the entire Slave Terminal is given. The denominator is the maximum number of allocatable I/O data. |

| Name/Label | Description |
|---|---|
| I/O Entry Mapping List | This is a mapping list of the I/O entries in the corresponding Unit.<br>The I/O entry mapping list shows up to four inputs and outputs respectively.<br>The I/O entry mapping list shows the following items.<br>• Selection: This column is used to select the I/O entry mappings that you wish to allocate.<br>Select the I/O entry mapping that you wish to allocate.<br>If you do not want to allocate the I/O entry mapping as part of the I/O allocation information, select **No option**.<br>• Input/Output: This column shows whether the data is an *input* or an *output* in terms of the CPU Unit.<br>• I/O entry mapping name: This column gives the name of the I/O entry mapping.<br>• Flag: If the I/O entry is editable, this column indicates **Editable**.<br>If the I/O entry is not editable, this column indicates **---**. |
| I/O entries | This pane allows you to view and edit the I/O entries for the I/O entry mappings that are selected in the I/O Entry Mapping List.<br>Each I/O entry contains the following information.<br>• Index: This is the index number for the NX object. The index is displayed after "0x" as *index_number:subindex_number*.<br>• Size: This column gives the size of the I/O entry data.<br>• Data Type: This column gives the data type of the I/O entry.<br>• I/O entry name: This column gives the name of the I/O entry.<br>• Comment: This column gives a description of the I/O entry. |
| Control buttons for the **Edit I/O Allocation Settings** Pane | **Add I/O Entry** button: This button adds an I/O entry to the selected I/O entry mapping.<br>**Delete I/O Entry** button: This button deletes the selected I/O entry from the selected I/O entry mapping.<br>**OK** button: This button confirms the settings in the Edit I/O Allocation Settings Pane, and returns the display to the Edit Slave Terminal Configuration Tab Page.<br>**Cancel** button: This button cancels the settings in the Edit I/O Allocation Settings Pane, and returns the display to the Edit Slave Terminal Configuration Tab Page.<br>**Apply** button: This button confirms the settings in the Edit I/O Allocation Settings Pane, and allows you to edit other I/O entries. |

***2*** Select the option button next to the I/O entry mapping that you wish to edit. You can select only I/O entry mappings that have the **Editable** in the **Flag** column from the **I/O Entry Mapping List**.

***3*** Click the **Add I/O Entry** button.
The **Add I/O Entry** Dialog Box is displayed.
A list similar to the one that is shown below is displayed. This list shows the I/O data that you can add to the selected I/O entry mapping list.




***4*** Select the I/O data to add.

**Note** The sequence of your selection determines the order in the I/O allocation table.

***5*** Click the **OK** button.

The selected I/O entry is added to the I/O allocation table.

***6*** Click the **Apply** button or **OK** button to confirm the current settings.

You can also delete I/O entries. In step 3, select the I/O entry to delete, and then click the **Delete I/O Entry** button.

## 9-2-4 Unit Operation Settings

### Unit Operation Settings for the EtherNet/IP Coupler Unit

The operation settings of the EtherNet/IP Coupler Unit are listed below.

| Setting | Setting range | Default | Description |
|---|---|---|---|
| Fail-soft Operation Setting/Fail-soft Operation Setting | *Stop* or *Fail-soft* operation | *Stop* | Set whether to use fail-soft operation for the Slave Terminal.<br>Select *Fail-soft operation* to perform fail-soft operation.<br>Refer to *11-7 Fail-soft Operation* on page 11-27 for details on fail-soft operation. |

### Unit Operation Settings for the NX Unit

The settings that are available depend on the type of the NX Unit.

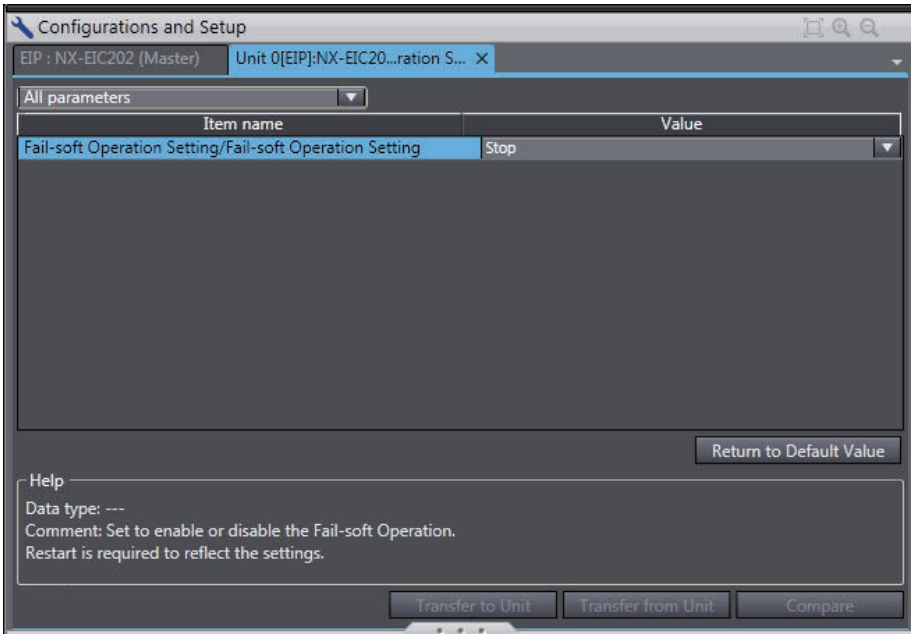
For example, Digital Input Units have a setting for the input filter value, and Digital Output Units have a setting for the output value at load rejection.

Refer to the manual for the specific NX Unit for the settings and their meanings.

## Editing the Unit Operation Settings

You can edit the Unit operation settings for the EtherNet/IP Coupler Unit and NX Units as necessary.

***1*** In the Unit Settings Pane, click the **Edit Unit Operation Settings** button.
The Edit Unit Operation Settings Tab Page is displayed.




***2*** Change the set value of each setting.

## 9-2-5 Unit Application Data

The Unit application data is the data that enables the functionality that is specific to each NX Unit. Not all NX Units have Unit application data.
Refer to the manual for NX Units that have Unit application data for the method to set and transfer Unit application data.

## 9-2-6 Support Software Functions Used as Required

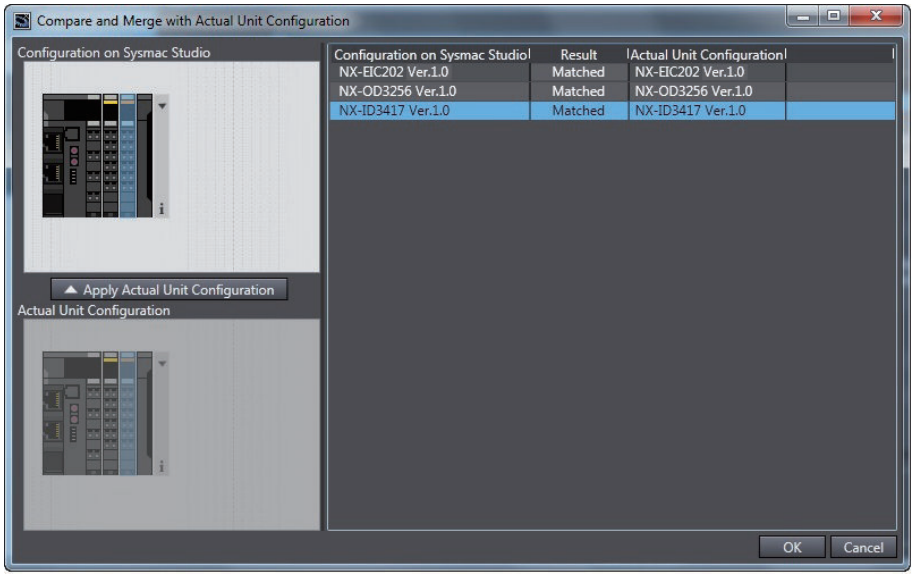
You can use the following functions on the Support Software.

- Getting NX Unit serial numbers
- Comparing and merging with actual Unit configuration of the Slave Terminal
- Exporting/importing NX Unit settings
- Uploading Slave Terminal settings through the USB port on the EtherNet/IP Coupler Unit
- Adding additional Slave Terminals

## Comparing and Merging with Actual Unit Configuration of the Slave Terminal

You can compare the Unit configuration information in an Slave Terminal that was created offline with the actual Unit configuration. You can also use this command to merge a configuration that was created offline with the actual configuration.

**1** Go online, right-click anywhere in the Edit Slave Terminal Configuration Tab Page, and select **Compare and Merge with Actual Unit Configuration**.
The actual Unit configuration is read and compared with the Unit configuration on the Support Software. The results are displayed in the **Compare and Merge with Actual Unit Configuration** Dialog Box.




**2** To merge with actual Unit configuration, click the **Apply Actual Unit Configuration** button.
The configuration information on the Support Software will now match the actual Unit configuration.

**3** Click the **OK** button.
The display returns to the Edit Slave Terminal Configuration Tab Page.

**Precautions for Correct Use**

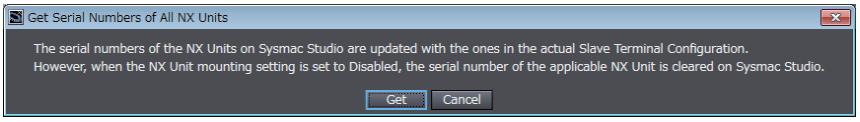
You can read only the Unit configuration in the Slave Terminal by comparing and merging with the actual Unit configuration. You cannot read the I/O allocation information, Unit operation settings, and Unit application data.

## Getting NX Unit Serial Numbers

If the **serial number check method** that is set in the EtherNet/IP Coupler Unit is set to **Setting = Actual device**, you must download the Unit configuration information in which the serial numbers for the NX Units are set to the EtherNet/IP Coupler Unit. Use the following procedure to apply the serial numbers of the actual devices to the serial numbers of the NX Units in the Unit configuration

information on the Support Software. Refer to *9-2-2 Setting the NX Unit Configuration Information* on page 9-6 for information on checking serial numbers.

**1** Go online, right-click anywhere in the Edit Slave Terminal Configuration Tab Page, and select **Get Serial Numbers of All NX Units**.
An execution confirmation dialog box is displayed.

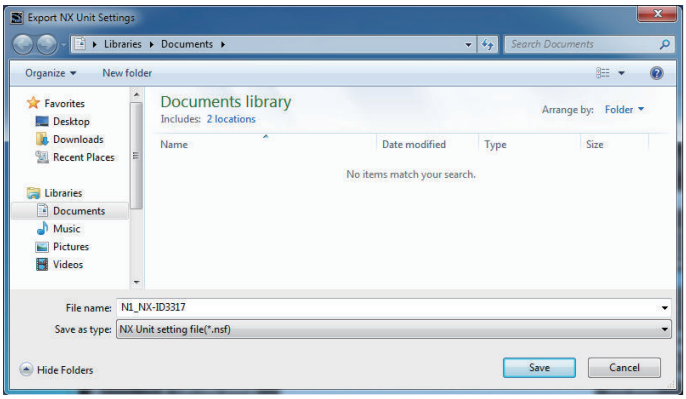



**2** Click the **Get** button.
The serial numbers are read from the actual Unit configuration, and applied to the Units in the configuration information for the Slave Terminal on the Support Software.

## Exporting/Importing NX Unit Settings

On the Edit Slave Terminal Configuration Tab Page, you can export the NX Unit operating settings and NX Unit application data for each NX Unit into a single file (extension .nsf).
The exported NX Unit setting file can be imported to add other NX Units with the same settings. To do this, go into the Edit Slave Terminal Configuration Tab Page in a new project or the same project on the Support Software.

**1** On the Edit Slave Terminal Configuration Tab Page, right-click the NX Unit to export and select **Export NX Unit Settings**.
The **Export NX Unit Settings** Dialog Box is displayed.




**2** Enter a file name, and then click the **Save** button.
An NX Unit setting file with an .nsf extension is saved.

To import a file, select **Import NX Unit Settings and Insert New Unit** in step 1, and specify the file to import.

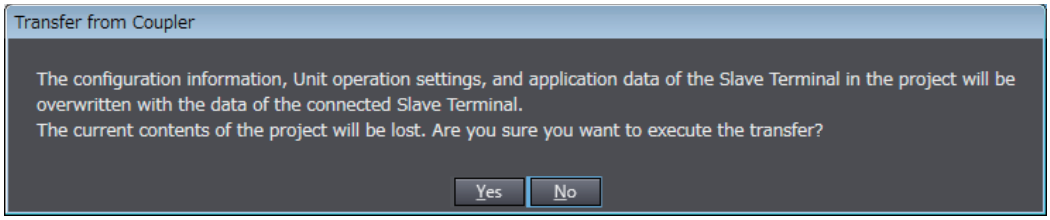
## Uploading Slave Terminal Settings through the USB Port on the EtherNet/IP Coupler Unit

You can connect the Support Software to the USB port on the EtherNet/IP Coupler Unit and transfer the settings information to the Support Software from the Slave Terminal. With some Support Software, you can connect through Ethernet or with any other method except for a USB port. Refer to the operation manual for the Support Software for details.

Use the following procedure to upload the settings.

1. Connect the Support Software to the peripheral USB port on the EtherNet/IP Coupler Unit and place it online.

2. Right-click the EtherNet/IP Coupler Unit in the Edit Slave Terminal Configuration Tab Page, and select **Coupler Connection (USB)** − **Transfer from Coupler**.
   An execution confirmation dialog box is displayed.

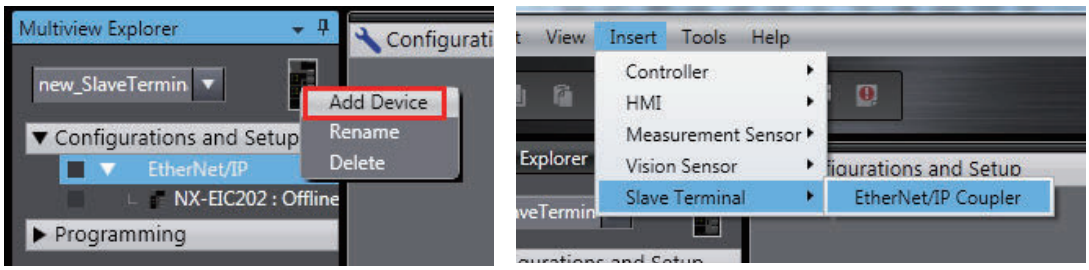



3. Click the **Yes** button.
   The *configuration information*, *Unit operation settings*, and *Unit application data* of the Slave Terminal setting information are transferred.

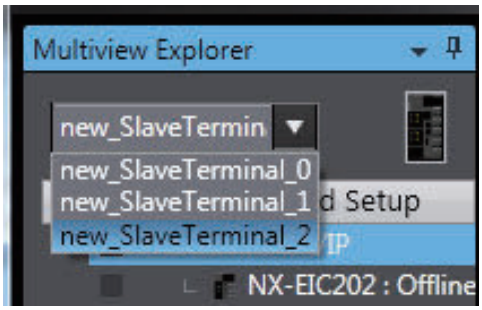
## Adding Additional Slave Terminals

A Support Software project can include multiple Slave Terminal device configurations.
Use the following procedure to add additional Slave Terminal configurations to a project when necessary.

1. Right-click the Slave Terminal icon and select **Add Device** or select **Insert** - **Slave Terminal** - **EtherNet/IP Coupler**.




2. Additional Slave Terminal configurations can be accessed with the drop down selection menu.


Multiview Explorer
new_SlaveTermin
new_SlaveTerminal_0
new_SlaveTerminal_1
new_SlaveTerminal_2
d Setup
IP
NX-EIC202 : Offline

# 9-3 Transferring and Comparing Settings

This section describes how to transfer and compare Slave Terminal settings that you set on the Support Software. The Sysmac Studio is used as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

## 9-3-1 Transferring Slave Terminal Setting Information through the USB Port on the EtherNet/IP Coupler Unit

**⚠ WARNING**

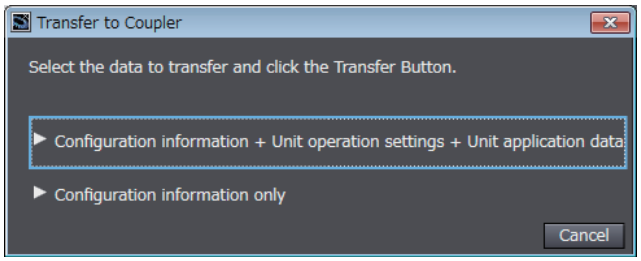
Always confirm safety at the destination before you transfer the Unit configuration information, parameters, set values, or other data from the Support Software.
The devices or machines may operate unexpectedly, regardless of the operating mode of the Controller.

You can connect the Support Software to the USB port on the EtherNet/IP Coupler Unit to transfer the Slave Terminal settings information to the Slave Terminal. With some Support Software, you can connect through Ethernet any other method except for a USB port. Refer to the operation manual for the Support Software for details.

Use the following procedure to transfer the settings.

***1*** Connect the Support Software to the peripheral USB port on the EtherNet/IP Coupler Unit and place it online.

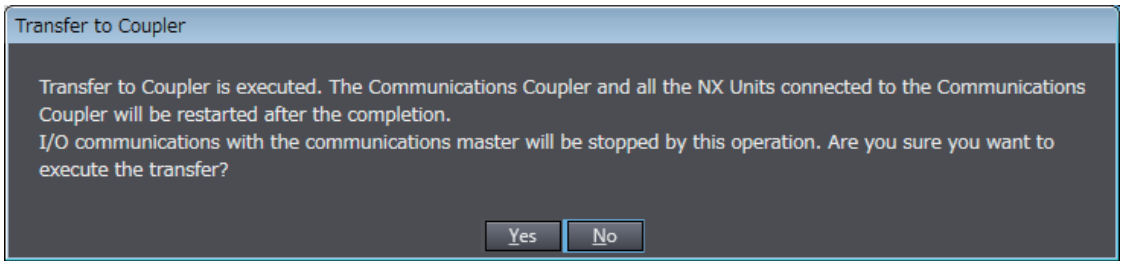
***2*** Right-click the EtherNet/IP Coupler Unit in the Edit Slave Terminal Configuration Tab Page, and select **Coupler Connection (USB)** − **Transfer to Coupler**.
The **Transfer to Coupler** Dialog Box is displayed.




***3*** Select the data to transfer.

- To transfer the *configuration information*, *Unit operation settings*, and *Unit application data*, select **Configuration Information + Unit Operation Settings + Unit Application Data**.
- To transfer only the *configuration information*, select **Configuration information only**.

An execution confirmation dialog box is displayed.




**4** Click the **Yes** button.
The specified data is transferred.

**Precautions for Correct Use**

- The EtherNet/IP master may detect an error when the Slave Terminal is restarted after the Slave Terminal setting information is transferred with a direct USB connection between the Support Software and EtherNet/IP Coupler Unit. If an error is detected, you need to reset the error in the EtherNet/IP master.
  Refer to *9-3 Transferring and Comparing Settings* on page 9-28 for a transfer method that does not produce an error on the EtherNet/IP master.
- When the Slave Terminal is restarted, all of the Units on the Slave Terminal perform the same operation as when the power supply is cycled. Refer to the manuals for the specific Units for the operation that is performed when the power supply is turned ON.

## 9-3-2 Comparing Settings

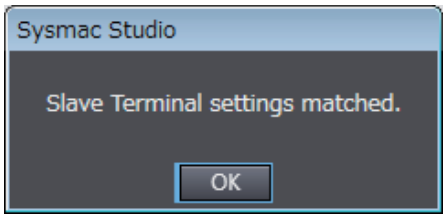
To compare the Slave Terminal settings, connect the Support Software to the USB port of the EtherNet/IP Coupler Unit to compare. Use the following procedure.
Refer to *9-2-6 Support Software Functions Used as Required* on page 9-23 to compare the Unit configuration.

**1** Connect the Support Software to the USB port on the EtherNet/IP Coupler Unit.

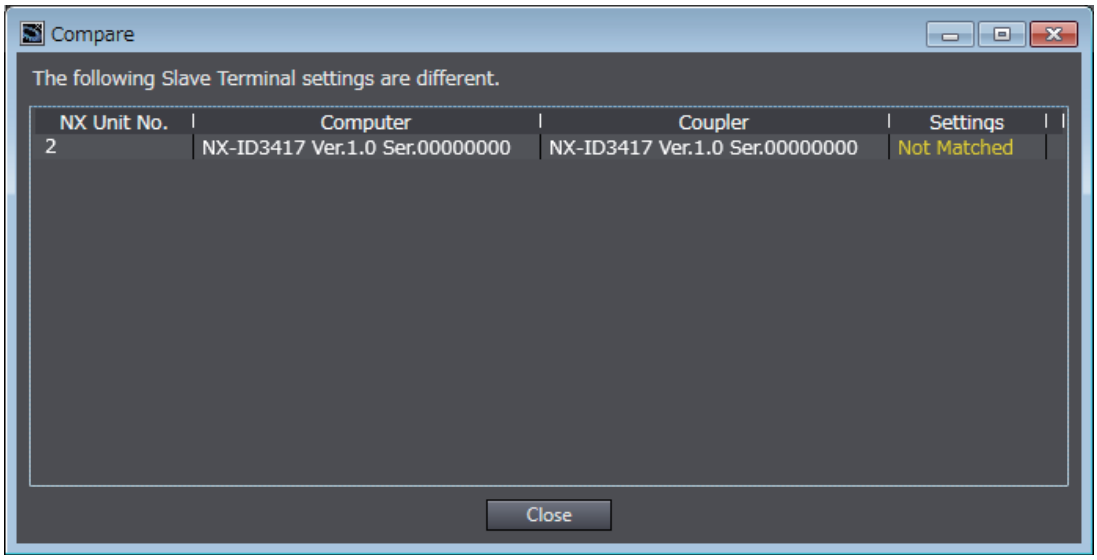
**2** In the *Unit Settings Pane* on the Edit Slave Terminal Configuration Tab Page, click the **Online** button next to **Coupler Connection (USB)** for the target EtherNet/IP Coupler Unit.
An execution confirmation dialog box is displayed.

**3** Click the **OK** button.
The Support Software will go online.

**4** Right-click the target EtherNet/IP Coupler Unit and select **Coupler Connection (USB)** − **Compare** from the pop-up menu.
The results of the comparison are displayed as shown below.
When the Settings Are the Same:




When the Settings Are Different:



# 9-4 Setting IP Address

There are several ways to set the IP address of the Slave Terminal. Specify the IP address setting method as follows with the rotary switches.

| Set value (hex) | IP address setting method |
|---|---|
| 00 | • Directly set the IP address with the Network Configurator.<br>• Specify getting the IP address from the BOOTP server with the Network Configurator. |
| 01 to FE | Directly set the IP address using hardware switches. |
| FF | Specify getting the IP address from the BOOTP server. |

**Precautions for Correct Use**

Use the following methods to check the IP address of the Slave Terminal.
- Check with a combination of the DIP switch (pin 4) and rotary switches.
- Use attached information 1 for *IP Address Fixed* in the event log.

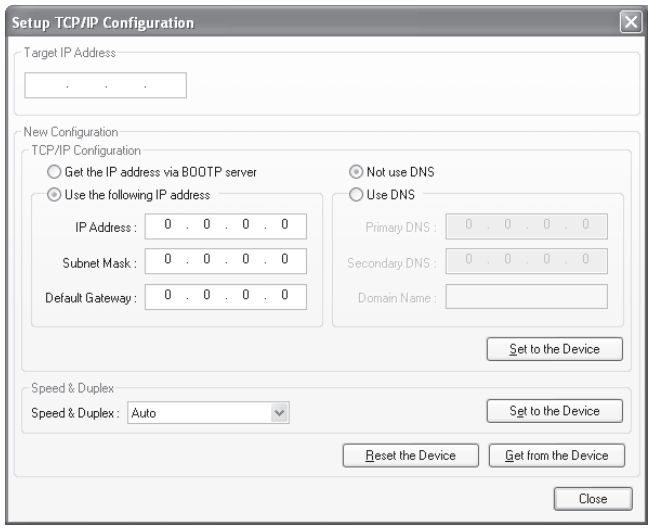
**Version Information**

Getting an IP address from the BOOTP server is supported from NX-EIC202 version 1.2 or later.

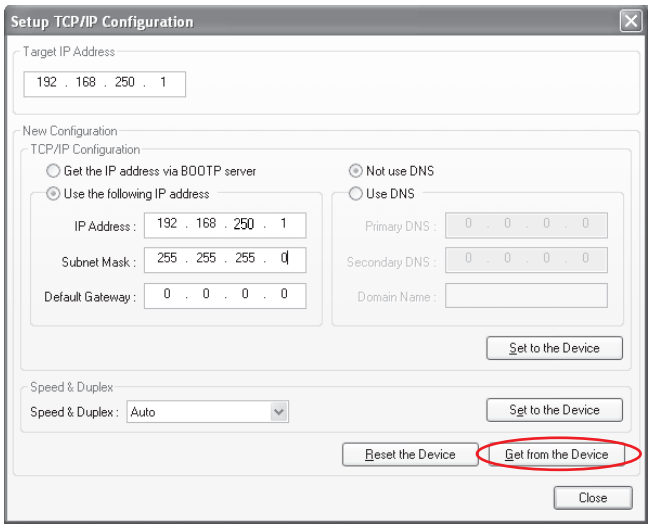
## 9-4-1 Directly Setting the IP Address with the Network Configurator

Use the Network Configurator to directly set the IP address. The setting procedure is as follows.

1. Set the rotary switches to 00 hex and turn ON the power supply to the EtherNet/IP Coupler Unit.
2. Connect the Network Configurator online.
3. Select Tools - **Setup TCP/IP Configuration** to display the following **Setup TCP/IP Configuration** Dialog Box, and set the TCP/IP Configuration for the target device. In the following example, the settings are all at their default values.



**4** Enter the **Target IP address** and press the **Get from the Device** button. The present setting will be obtained. Change the **IP address** in the **New Configuration** Box if required.




**5** Press the **Set to the Device** button. The IP address will be transferred to the device. The applicable device is the device specified in the **Target IP Address** Box.

**6** The device must be reset to enable the transferred setting. Power the EtherNet/IP Coupler Unit OFF and back ON or click **Reset the Device** button.

## ● TCP/IP Parameters

The following TCP/IP parameters can be set from the Network Configurator:

- IP address
- Subnet mask
- Default gateway

The following TCP/IP parameters are not used:

- Preferred DNS server
- Alternate DNS server
- Domain name

The following TCP/IP parameters are preset:

- Link parameter - Link speed preset to 100 Mbps
- Link parameter - Duplex preset to Full duplex

**Precautions for Correct Use**

- The transfer function for IP address settings is defined by ODVA specifications. When setting the IP address of the target device with the Network Configurator, connect the devices one at a time, and download the TCP/IP Configuration's IP address parameters. If TCP/IP parameters are set for the EtherNet/IP Unit or built-in EtherNet/IP port from the Network Configurator, the EtherNet/IP Unit may automatically be reset and restarted. Before setting the TCP/IP parameters, make sure that no system problems will occur when the Unit is restarted. If the Unit does not restart automatically, click the **Reset the Device** button.
- If the target node address (IP address) is not set correctly, invalid device parameters may be set in the wrong device, so check the connected device before downloading parameters.
- An error will occur if the same IP address is set for another device.
- An error will occur if the IP address is not within the setting range.

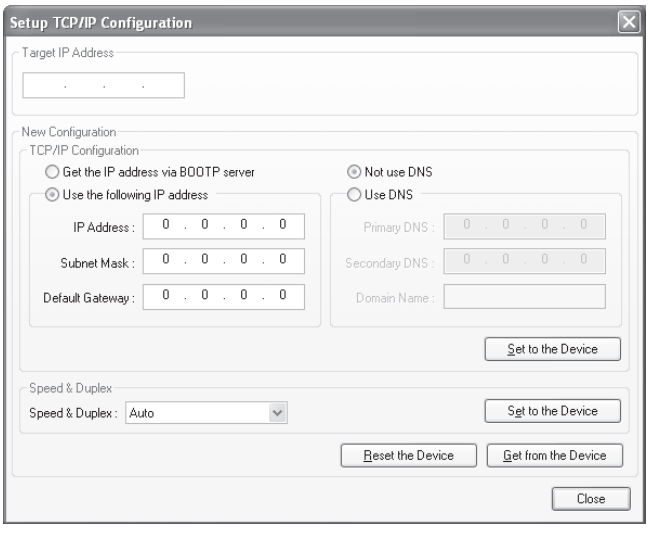
## 9-4-2 Getting the IP Address from the BOOTP Server with the Network Configurator

Use the Network Configurator to specify getting the IP address from the BOOTP server. The specifying procedure is as follows.

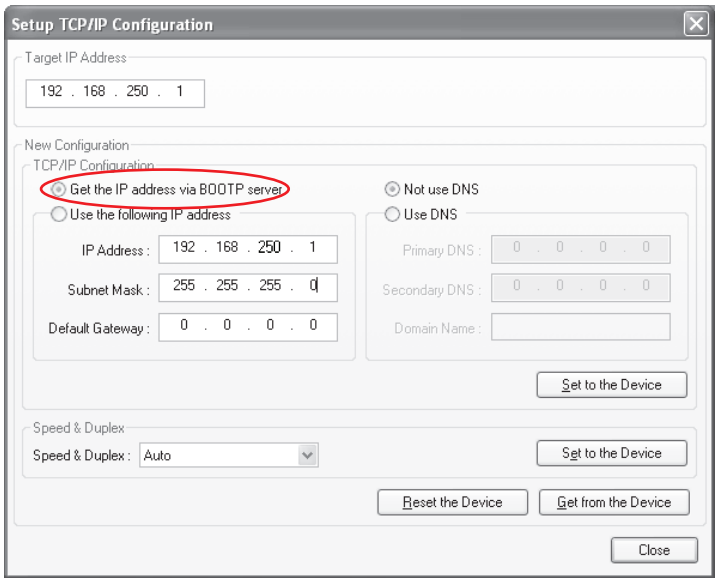
***1*** Set the rotary switches to 00 hex and turn ON the power supply to the EtherNet/IP Coupler Unit.

***2*** Place the Network Configurator online.

***3*** Select Tools - **Setup TCP/IP Configuration** to display the following **Setup TCP/IP Configuration** Dialog Box, and set the TCP/IP configuration for the target device. In the following example, the settings are all at their default values.




***4*** Select the **Get the IP address via BOOTP server** option.




**5** In the **New Configuration** area, click the **Set to the Device** button to send the new setting to the applicable device. The applicable device is the device specified in the **Target IP Address** Box.

**6** The device must be reset to enable the transferred setting. Cycle the power supply to the EtherNet/IP Coupler Unit or click **Reset the Device** button.

**Precautions for Correct Use**

The IP address will be gotten from the BOOTP server only once the first time the device is re-started after the setting to get the IP address from the BOOTP server is enabled. An IP address is not gotten from the BOOTP server after than even if the device is restarted. To get an IP address from the BOOTP server every time the device is reset, set the rotary switches to FF hex.

## 9-4-3 Directly Setting the IP Address Using Hardware Switches

Use the DIP switch pin 4 and rotary switches to directly set the IP address.
The following table shows the relationship between the switch settings and the set IP address.

| DIP switch pin 4 setting | Rotary switch setting (hex) | Set IP address |
|---|---|---|
| ON | 01 to FE | 192.168.1.☐<br>☐ is the setting on the rotary switches converted to decimal.*1 |
| OFF | 01 to FE | 192.168.250.☐<br>☐ is the setting on the rotary switches converted to decimal.*2 |

*1. For example, if the rotary switches are set to 11 hex, IP address 192.168.1.17 is set.
*2. For example, if the rotary switches are set to 11 hex, IP address 192.168.250.17 is set.

**Precautions for Correct Use**

- The IP address that is set is read only once when the Unit power supply is turned ON or the Unit is restarted. Even if the IP address setting is changed after the Unit power supply is turned ON or after the Unit is restarted, the new IP address will not be used until the next time that power is turned ON or the Unit is restarted.
- An error will occur if the same IP address is set for another device.
- An error will occur if the IP address is not within the setting range.

## 9-4-4 Getting an IP Address from the BOOTP Server

If the rotary switches are set to FF hex, the IP address gotten from the BOOTP server is enabled. Every time the Unit power supply is turned ON or the Unit is restarted, an IP address for the Unit is gotten from the BOOTP server and it is automatically saved and applied as the IP address of the Unit.

**Precautions for Correct Use**

- To get an IP address from the BOOTP server, you must register the IP address and MAC address of the EtherNet/IP Coupler Unit in the BOOTP server in advance.
- An error occurs if an IP address is not gotten from the BOOTP server within 60 seconds of restarting the Unit. The Unit will continue to try to get an IP address from the BOOTP server even after this error occurs. To cancel getting an IP address from the BOOTP server, change the rotary switches to any setting except for FF hex and cycle the Unit power supply or restart the Unit.
- If an illegal address is gotten from the BOOTP server, an TCP/IP Setting Error (Local IP Address) is detected. The Unit will continue to try to get an IP address from the BOOTP server even after this error occurs.
- You can specify getting an IP address from the BOOTP server with the Network Configurator as well. However, the timing of getting the IP address from the BOOTP server depends on whether you set the rotary switches to FF hex or specify using the BOOTP server from the Network Configurator.

| Setting method | Timing of getting the IP address from the BOOTP server |
|---|---|
| Setting the rotary switches to FF hex | An IP address is gotten every time the Unit power supply is turned ON or the Unit is restarted. |
| Setting with the Network Configurator | An IP address is gotten from the BOOTP server only once after the setting is made, either when the Unit power supply is turned ON or the Unit is restarted. |

# 9-5 Setting Tag Data Links

## 9-5-1 Starting the Network Configurator

### Procedure

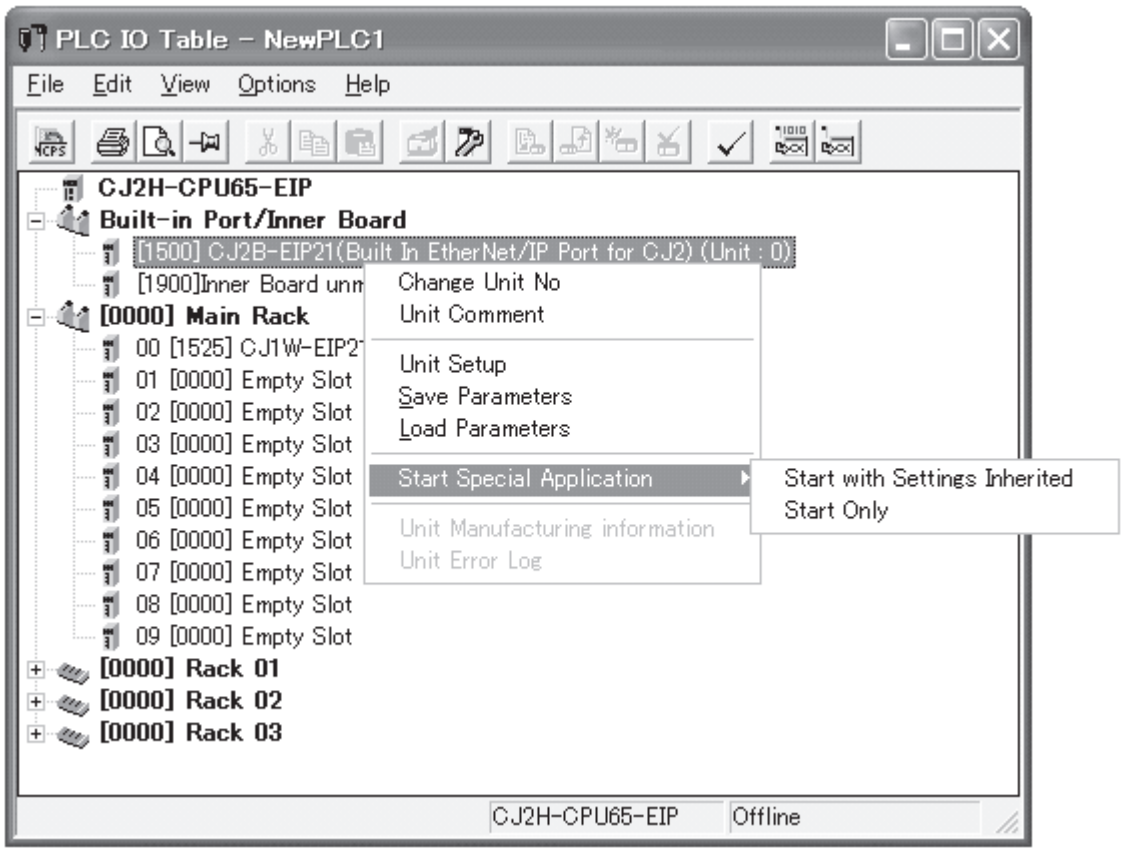
Tag data links are set by using the Network Configurator. Use the following procedure to start the Network Configurator.

**Additional Information**

- Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for more details on the use of Network Configurator.
- With NJ/NX-series CPU Units and NY-series Industrial PCs, you can use the Sysmac Studio to set up tag data links. For details on how to set up tag data links with the Sysmac Studio, refer to the user's manual for the built-in EtherNet/IP port on the connected CPU Unit or Industrial PC.

#### ● Starting from the I/O Table Dialog Box in CX-Programmer

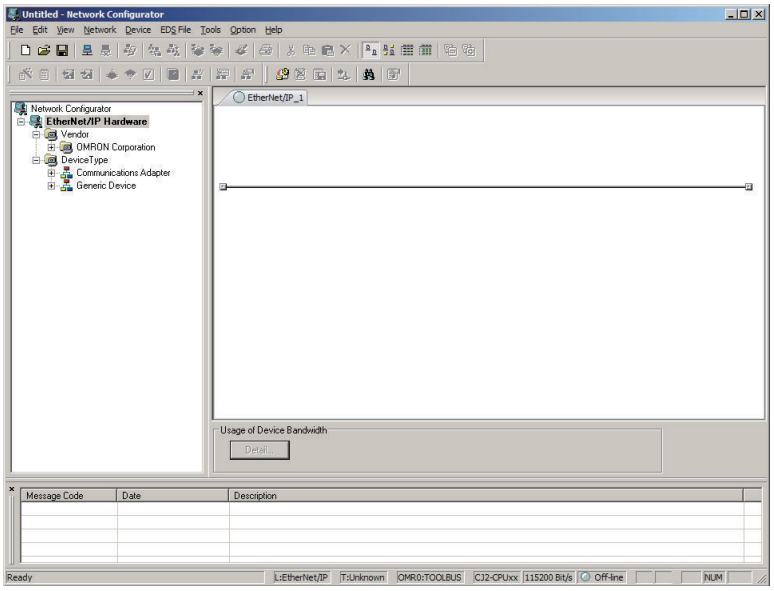
To start the Network Configurator, select the Unit in the PLC I/O Table Dialog Box and select either of the options for **Start Special Application** from the pop-up menu. Only operation will be started even if **Start with Settings Inherited** is selected.



### ● Starting from the Windows Start Menu

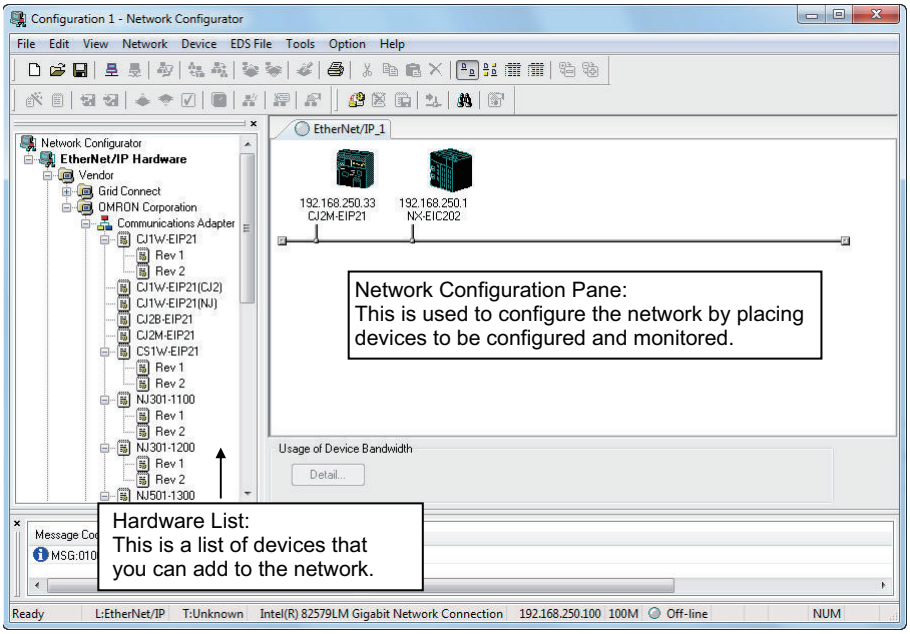
To start the Network Configurator, select **OMRON** - **CX-One** - **Network Configurator for EtherNetIP** - **Network Configurator** from the Windows Start Menu.

When the Network Configurator starts, the following window is displayed.

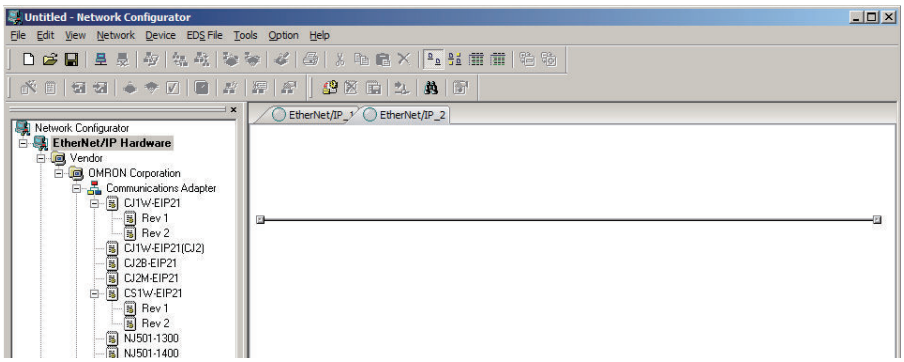



## Main Window

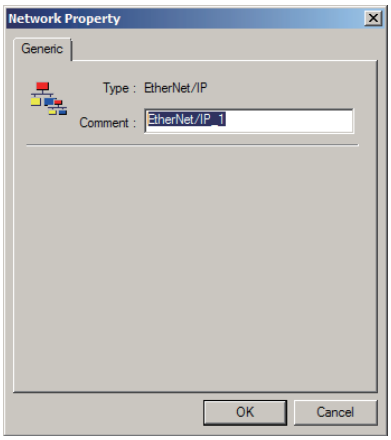
The Main Window consists of a Hardware List and a Network Configuration Pane, as shown in the following diagram.




To manage two or more networks, you can select **Network** - **Add** to add a new Network Configuration Pane.




To change the name displayed in the **Network** Tab Page, select **Network** - **Property**. You can change the name set in the Comment Field of the Network Property Dialog Box.




## 9-5-2 Tag Data Link Setting Procedure

This section describes the procedure to set tag data links (i.e., connection information). The connection information is set only in the originator for data links, i.e., the node that receives data.

***1*** Create the network configuration.

1) Register all EtherNet/IP Units for which to create connections in the EtherNet/IP Network Configuration Pane. Refer to *9-5-3 Registering Devices* on page 9-39 for more information.
   If a system has already been installed, connect online to the EtherNet/IP network and upload the network configuration. Refer to *9-5-9 Uploading Tag Data Link Parameters* on page 9-64 for more information.

***2*** Create the tag and tag set connections.
Set the connections with one of the following methods.

1) Basic Operation:
   a) Create tags and tag sets for all registered devices. Refer to *9-5-5 Creating Tags and Tag Sets* on page 9-42 for more information.
   b) Create a connection for the originator device (i.e., the registered device that receives data as input data). Refer to *9-5-6 Connection Settings* on page 9-55.

2) Create the connections by dragging registered devices. Refer to *9-5-9 Uploading Tag Data Link Parameters* on page 9-64.

***3*** Download the tag data link parameters. Refer to *9-5-8 Downloading Tag Data Link Parameters* on page 9-61.

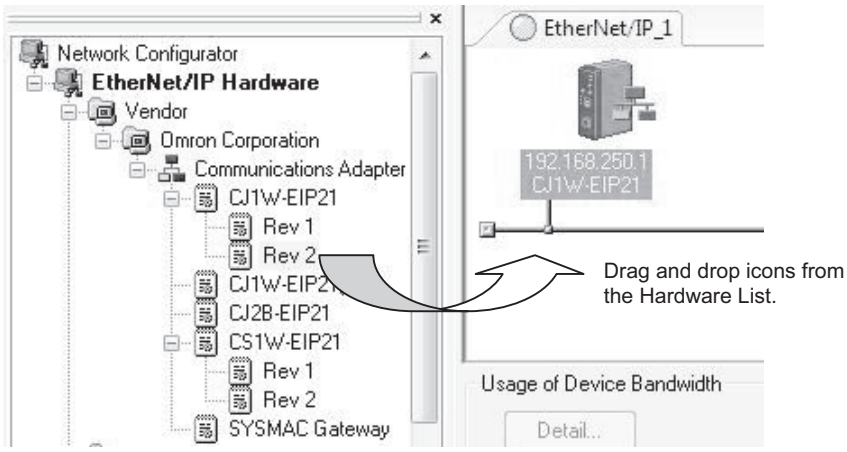
***4*** Make sure that the tag data links are operating normally by using the indicators for the EtherNet/IP Unit (refer to *12-2-1 Checking for Errors and Troubleshooting with the Indicators on the EtherNet/IP Coupler Unit* on page 12-3) and the Network Configurator monitor functions (refer to *12-3-1 Checking Status with the Network Configurator* on page 12-10).

***5*** Make sure that the output tag data is updated in the input tag by using the CX-Programmer's Watch Window or PLC memory function.

## 9-5-3 Registering Devices

Register all of the devices required in the equipment (such as EtherNet/IP Units and EtherNet/IP Coupler Units that perform tag data links) in the network configuration.

***1*** Register the devices that will participate in the tag data links by dragging the devices from the Hardware List and dropping them in the Network Configuration Pane on the right. (To drag and drop an icon, click and hold the left mouse button over the icon, move the icon to the destination, and release the mouse button.)
You can also select a device in the Hardware List and press the Enter Key to register it. The icon of the device is displayed in the Network Configuration Pane, as shown in the following diagram.




The device names and major CIP revisions (*Rev □*) are displayed in the hardware list. This is shown in the following table.

**Note 1.** Select the correct device name. If you select the wrong device name, an *Invalid Device Type* error will be displayed when you attempt to download the data and the download will fail.

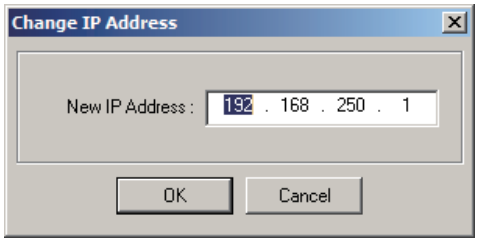
**Note 2.** Select devices with the correct major and minor CIP revisions for the unit version. If you select the wrong revision, a *Wrong Unit Revision error* will be displayed when you attempt to download the data and the download will fail. If either of these errors occurs, refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for more information.

**Note 3.** If the revision is unknown, select the newest revision (i.e., the revision with the highest number). Refer to the user's manuals for the specific Units for the relation between CIP versions and unit versions.

**Note 4.** When mounting the CJ1W-EIP21 to a CJ2 CPU Unit, select CJ1W-EIP21 (CJ2) from the Hardware List.

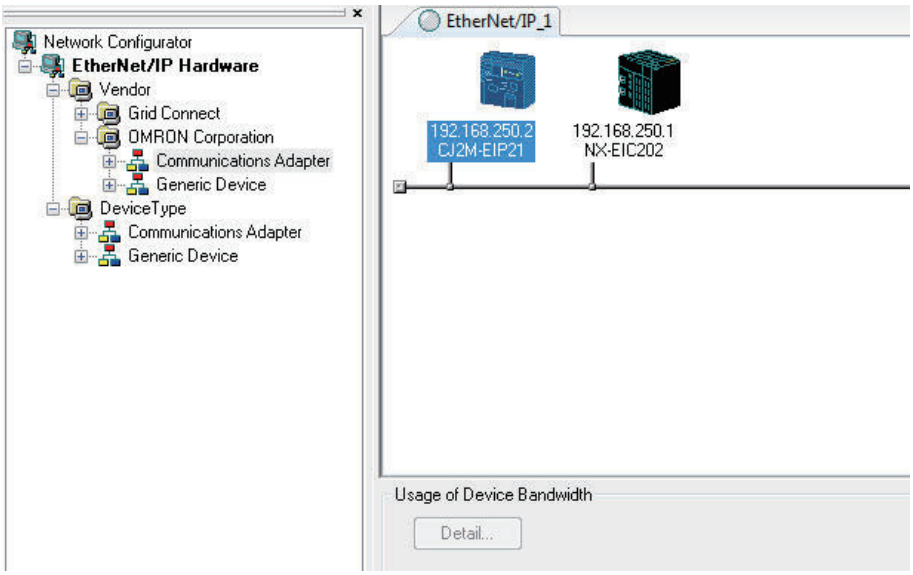
**Note 5.** When mounting the CJ1W-EIP21 to an NJ-series CPU Unit, select CJ1W-EIP21 (NJ) from the Hardware List.

***2*** Right-click the registered device's icon to display the pop-up menu, and select **Change Node Address**.




***3*** Set the IP address to match the node address (IP address) actually used in the device and click the **OK** button.

***4*** Repeat steps 1 to 3, and register all of the devices that participate in the tag data links. If the device is not listed in the hardware list, an EDS file may need to be installed.




## 9-5-4 Determine Tag Sizes

Before tags can be created, the size of data to exchange must be determined. This tag size is directly related to the Slave Terminal hardware configuration.

The EtherNet/IP Coupler Unit will automatically generate I/O allocations based on the connected NX Units when power is turned ON. This I/O allocation is translated to appropriate input and output tag sizes that can be viewed with the following methods.

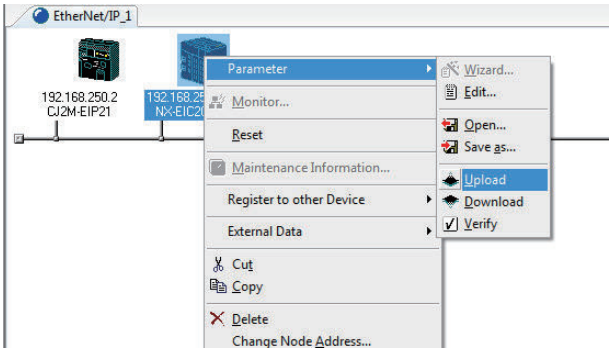
1. Use the Network Configurator to upload the Slave Terminal parameter.
2. Use the Support Software to examine the I/O allocation.

## Use the Network Configurator to Upload the Slave Terminal Parameter

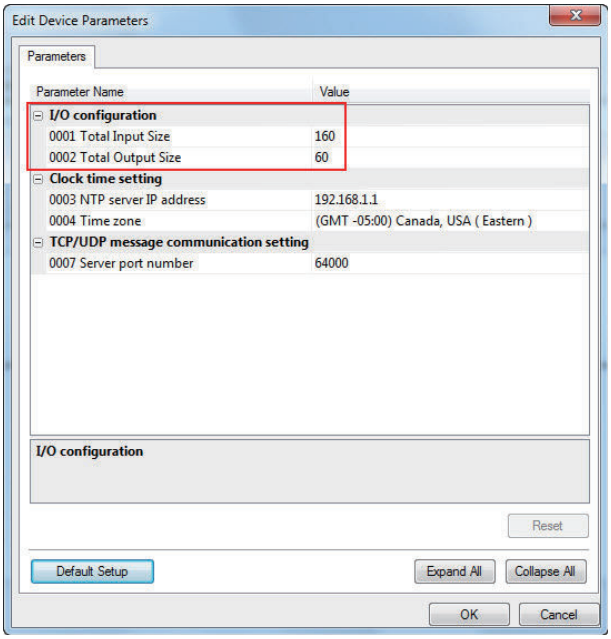
Use the following steps to view the input and output tag sizes that are configured in the EtherNet/IP Coupler Unit.

**1** Connect the Network Configurator to the network.

**2** Right-click the EtherNet/IP network and click **Upload**.



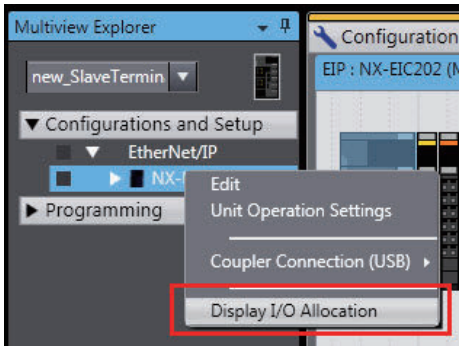

**3** Confirm the upload success and check the updated sizes. Right-click the EtherNet/IP Coupler Unit, select **Parameter** - **Edit**. The **Edit Device Parameters** Dialog Box should appear and indicate the Input and Output sizes.



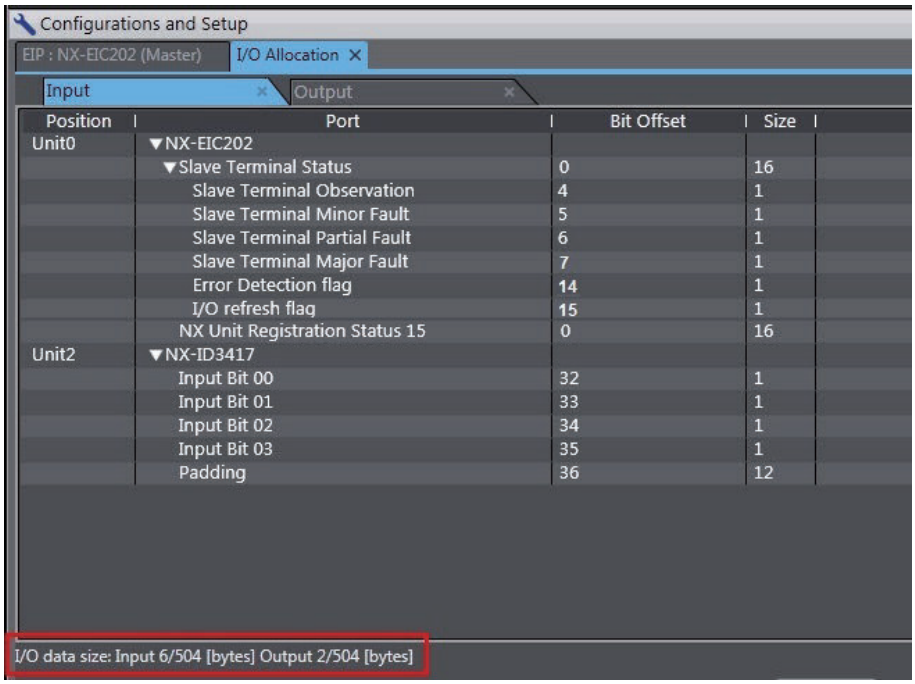

## Using the Support Software to Examine I/O Allocations

Use the following steps to view the input and output tag sizes that are configured in the EtherNet/IP Coupler Unit.

**1** In the Multiview Explorer, right-click the EtherNet/IP Coupler and select **Display I/O Allocation** from the menu.




**2** The I/O allocation indicates the input and output tag sizes (bytes) for the present configuration.




| Position | Port | Bit Offset | Size |
|---|---|---|---|
| Unit0 | ▼NX-EIC202 | | |
| | ▼Slave Terminal Status | 0 | 16 |
| | Slave Terminal Observation | 4 | 1 |
| | Slave Terminal Minor Fault | 5 | 1 |
| | Slave Terminal Partial Fault | 6 | 1 |
| | Slave Terminal Major Fault | 7 | 1 |
| | Error Detection flag | 14 | 1 |
| | I/O refresh flag | 15 | 1 |
| | NX Unit Registration Status 15 | 0 | 16 |
| Unit2 | ▼NX-ID3417 | | |
| | Input Bit 00 | 32 | 1 |
| | Input Bit 01 | 33 | 1 |
| | Input Bit 02 | 34 | 1 |
| | Input Bit 03 | 35 | 1 |
| | Padding | 36 | 12 |

**Additional Information**

Refer to *9-6-2 Support Software I/O Allocation Functions* on page 9-72 for more details.

## 9-5-5 Creating Tags and Tag Sets

The tag sets and set member tags required to create connections for a registered EtherNet/IP Unit must be created. The I/O memory addresses or network symbols that are used in the control programs can be set for the tags (using network symbols is supported only by the CJ2H-CPU6□-EIP21 and CJ2M-CPU3□). This section first describes the basic procedure for creating tags and tag sets for using the Network Configurator's device parameter editing function.

(1) Creating tags and tag sets with the Network Configurator's *Device Parameter Editing* Function

Next, the following two procedures, which can be used to effectively use network symbols in tags, are described.

(2) Importing Network Symbols Created with the CX-Programmer to the Network Configurator

(3) Importing Network Symbols That Were Registered to tags with the Network Configurator to the CX-Programmer

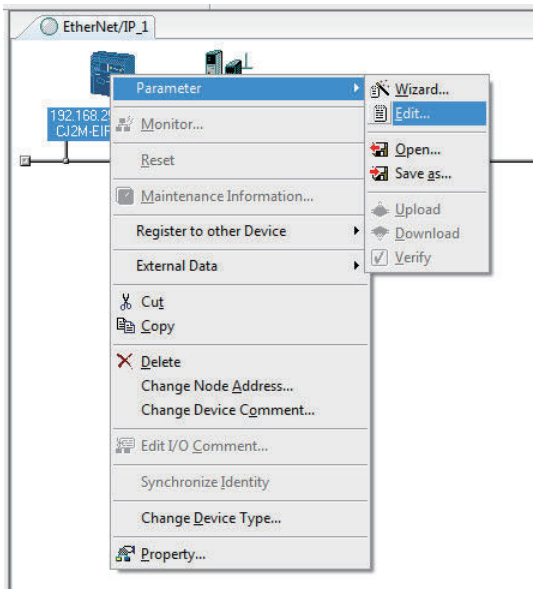
## 1) Creating Tags and Tag Sets with the *Network Configurator's Device Parameter Editing Function*

**Precautions for Correct Use**

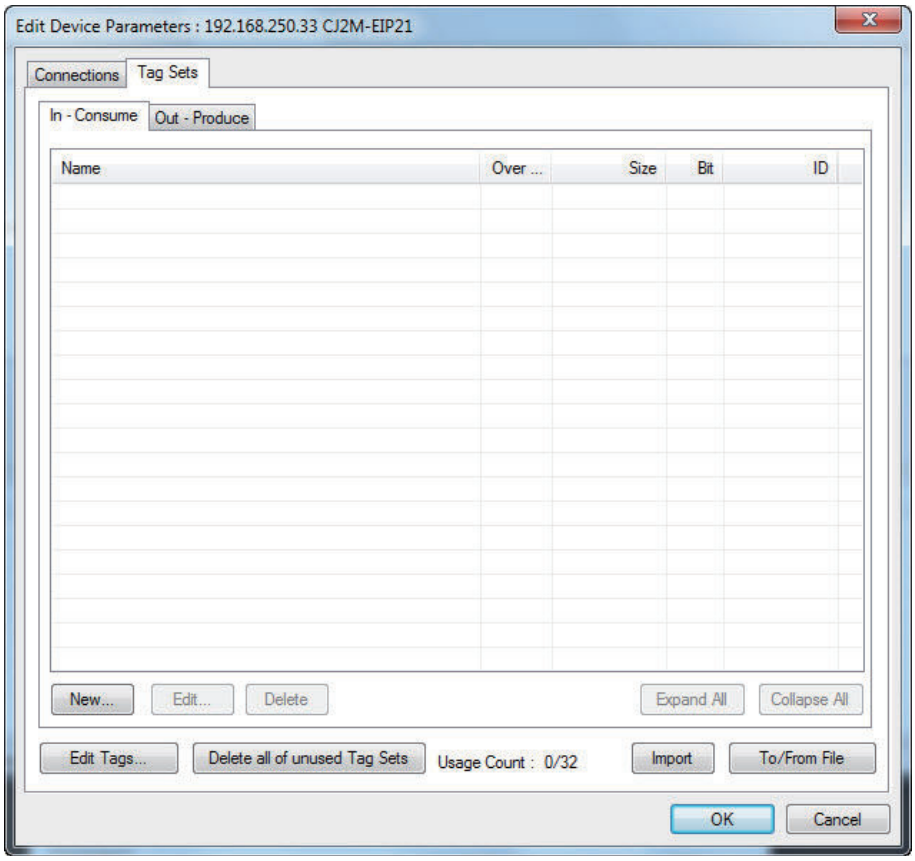
The network variables described in this section can be used only if you are using a CJ2H-CPU6□-EIP21 or CJ2M-CPU3□ CPU Unit.

### ● Creating a Tag Set

**1** Double-click the icon of the device for which to create a tag set to display the **Edit Device Parameters** Dialog Box. Right-click the icon to display the pop-up menu, and select **Parameter** - **Edit**.



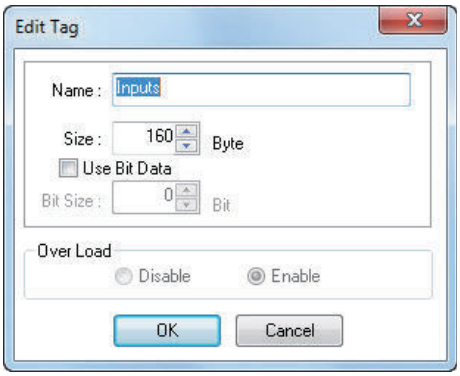

**2** Click the **Tag Sets** Tab at the top of the **Edit Device Parameters** Dialog Box. There are two kinds of tag sets: input (consume) and output (produce).




## ● Creating and Adding Tags

**1** Click the **Edit Tags** button.
The **Edit Tags** Dialog Box is displayed.
Register the input (consume) tags and output (produce) tags separately.


**2** Click the **In - Consume** Tab, and then click the **New** button.
The **Edit Tag** Dialog Box is displayed.




**3** In the **Name** Field, enter the character string for the CPU Unit's I/O memory address or a network variable (e.g., 100, W100, D0, Inputs).

### Precautions for Correct Use

When using PLCs that support network variables, avoid using a name that is similar to an address in CX-Programmer, such as W100. If a name is chosen that is similar to an address, importing network variables into CX-Programmer will result in error.

| CPU Unit's data area | | Address (Text to input in Name Field.) |
|---|---|---|
| CIO Area | | 0000 to 6143 |
| Holding Area | | H000 to H511 |
| Work Area | | W000 to W511 |
| DM Area | | D00000 to D32767 |
| EM Area | Bank 0 hex | E0_00000 to E0_32767 |
| | ... | ... |
| | Bank 18 hex | E18_00000 to E18_32767 |

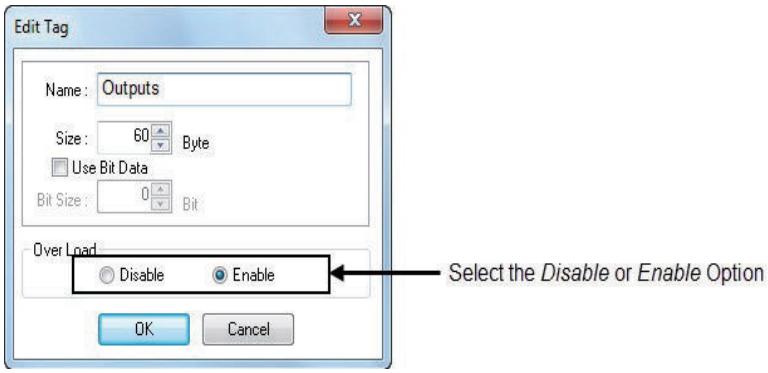
**Note 1.** The H, W, D, and E characters can also be input in lower case as h, w, d, and e.
**Note 2.** Be sure to directly enter the CPU Unit's I/O memory address (e.g., 100, W100, D0) or a network variable as a character string.

**4** Input the size of the tag in the **Size** Field, in bytes.
The input size should match the actual size (refer to section *9-5-4 Determine Tag Sizes* on page 9-40 for more information).

**5** Click the **Regist** button to register the tag.
If an I/O memory address is specified for a tag name, the **Edit Tags** Dialog Box will be displayed with the next consecutive address as the tag name for editing the next tag. Once you have registered the tags, click the **Cancel** button.

**6** Click the **Out - Produce** Tab, and then click the **New** button.
The **Edit Tag** Dialog Box is displayed. Input the output tag in the same way. Use the *Fault Action* setting of the output (produce) tag to specify whether to clear the output data or continue to send it when a major fault occurs in the CPU Unit. The *Fault Action* setting is not required for input (consume) tag sets.

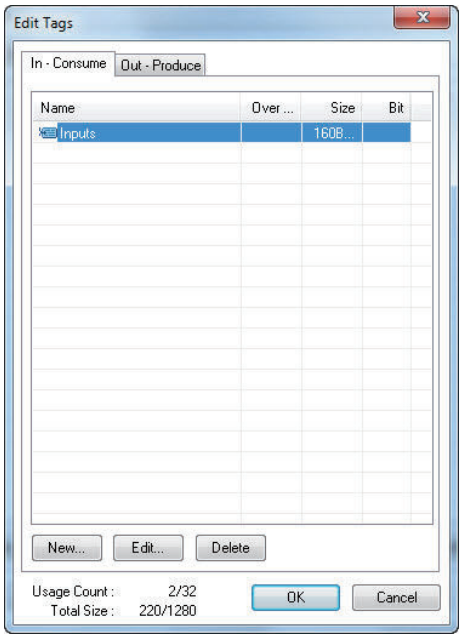
- Retain output for major fault: **Hold** (default) - Output data maintains its previous status even after a major fault occurs.
- Clear output at major fault: **Clear** - Output data is cleared to 0 when a major fault occurs.



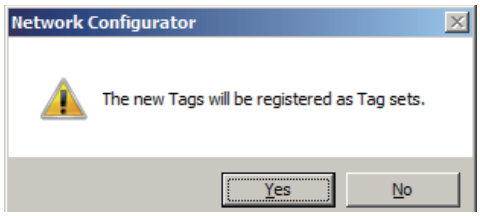

**Note** When any of the following errors occurs in the originator PLC while tag data links are in progress, the connection will be forcibly disconnected.

- Fatal CPU Unit error
- I/O refreshing error
- CPU Unit WDT error
- I/O bus error

**7** When you are finished registering the required tags, click the **OK** button at the bottom of the **Edit Tags** Dialog Box.



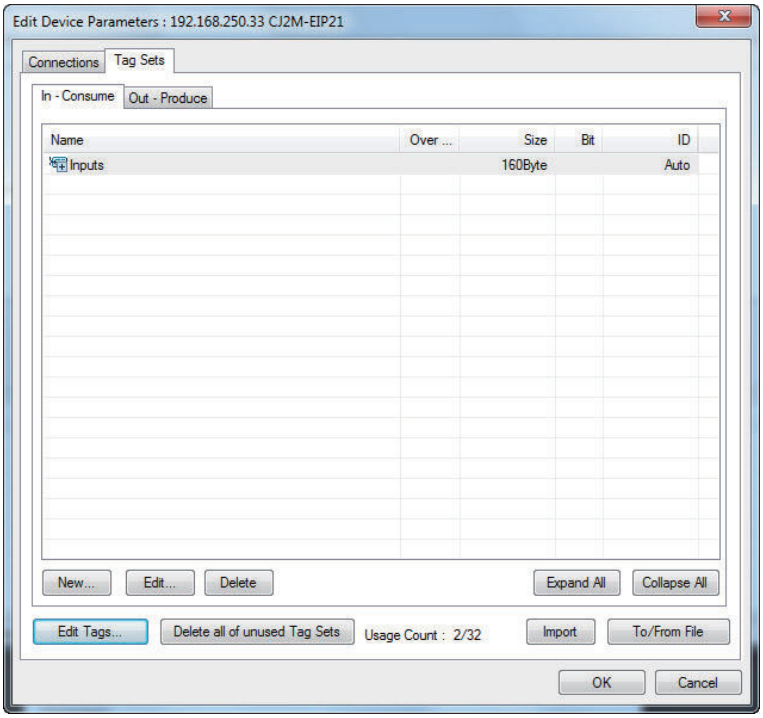

**8** At this point, a confirmation dialog box is displayed to check whether the registered tag names are used as the tag set names. A tag set can contain up to eight tags, but tag sets are registered with one tag per tag set if the tag names are registered as tag set names. In this case, click the **Yes** button.



If the **No** button is clicked, more tags can be registered at the end of the tag set. Refer to step 10 in *Changing and Registering Tag Sets* on page 9-47 for details on adding tags to the end of the tag set.

## ● Changing and Registering Tag Sets

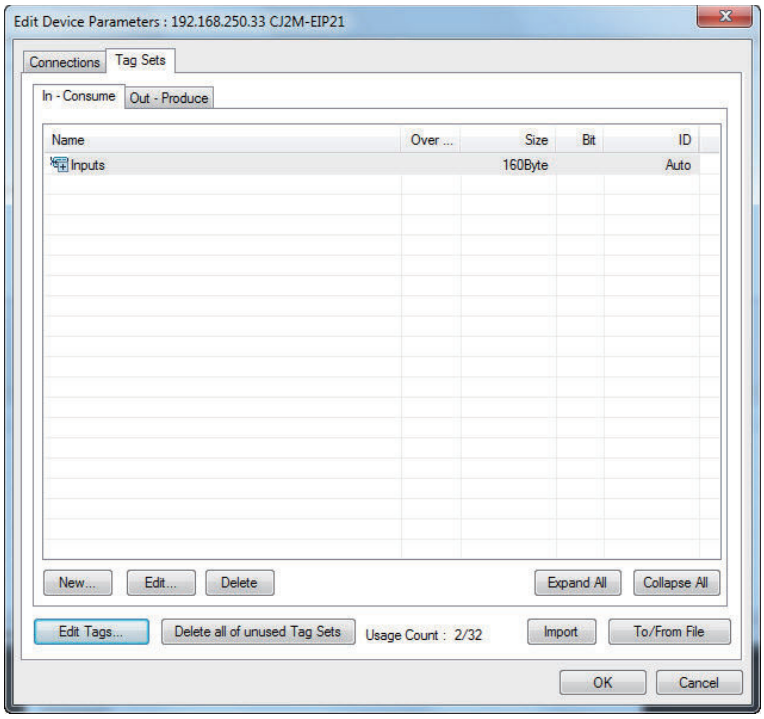
***1*** The following dialog box will be displayed when the tags in the **Edit Tags** Dialog Box are registered directly as tag sets.



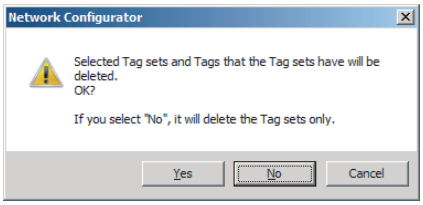

***2*** If an input tag has already been registered in an input tag set, and you want to change its registration to a different input tag set, it is necessary to delete the tag from the tag set in which it was originally registered.

Open the **Edit Device Parameters** Dialog Box, select the tag set containing the tag that you want to delete in the **Tag Sets** Tag Page, and click the **Delete** button. (If there are other tags registered in that tag set, it is possible to delete just one tag by selecting the tag that you want

to delete in the **Edit Tag Set** Dialog Box and clicking the button.)

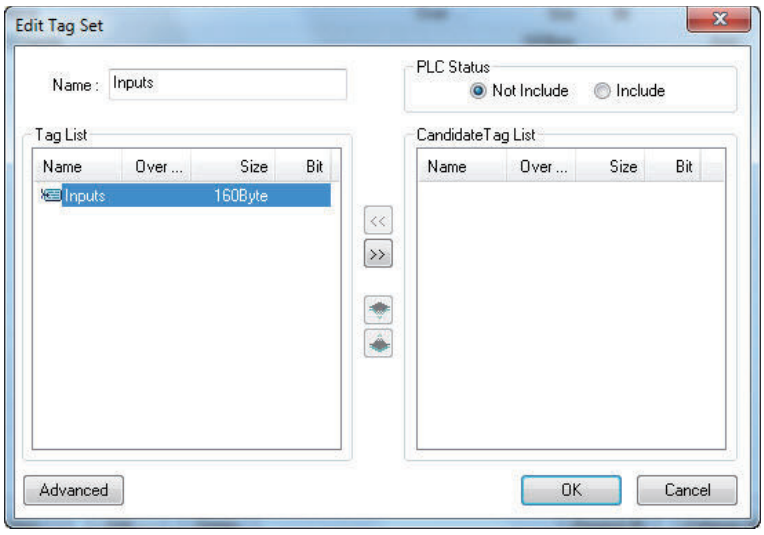



At this point, a confirmation dialog box will be displayed to confirm that you want to delete the selected tag set and the tags contained in that tag set.



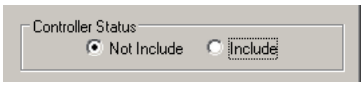

If the **No** button is clicked, only the tag set will be deleted. Click the **No** button.

**3** To edit a registered tag set and add tags, either double-click the tag set, or select the tag set and click the **Edit** button. The **Edit Tag Set** Dialog Box is displayed.



The Tag List on the left side of the dialog box shows the tags that are already registered, and the Candidate Tag List on the right side of the dialog box shows the other tags that are not registered yet. To add a tag, select it in the Candidate **Tag List** and click the << button.

**4** For the tag sets used for tag data communications with the EtherNet/IP Coupler Unit, select the **Not Include** option in the **Controller Status** area at the upper-right corner of the **Edit Tag Set** Dialog Box.

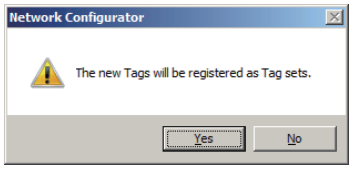



**5** To confirm a change, click the **OK** button in the **Edit Tag Set** Dialog Box.

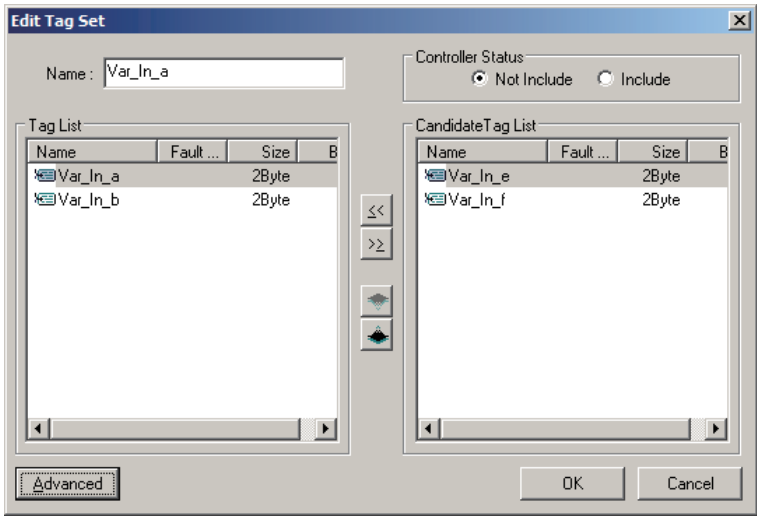
**6** Click the **OK** button in the **Edit Device Parameters** Dialog Box.

**7** After you register all of the required tags, click the **OK** button at the bottom of the **Edit Tags** Dialog Box.

**8** At this point, a confirmation dialog box is displayed to check whether the registered tag names are used as the tag set names. Tags are just added in this case, so click the **No** button. Just the tags are registered. The tags are not registered as tag sets.

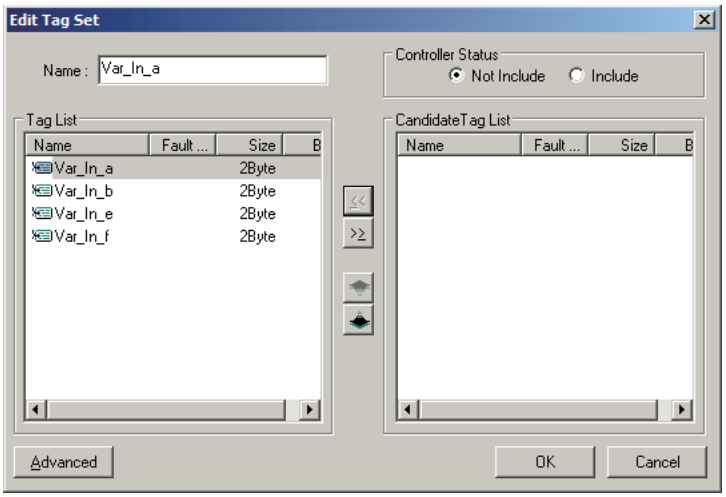



**9** To register the newly added tags in a tag set, either double-click the desired tag set, or select the tag set and click the **Edit** button.



The Tag List on the left side of the dialog box shows the tags that are already registered, and the Candidate Tag List on the right side of the dialog box shows the other tags that are not registered yet.

***10*** Select the tags that you want to add from the Candidate Tag List and click the button.




If you include the Controller status in the tag set, you can register up to only seven tags, and two bytes are added to the size. Data is sent and received in the order it is displayed in the tag list. To change the order of a tag, select the tag and click the Up and Down buttons ( , ).

***11*** To confirm the changes, click the **OK** button at the bottom of the **Edit Tag Set** Dialog Box.

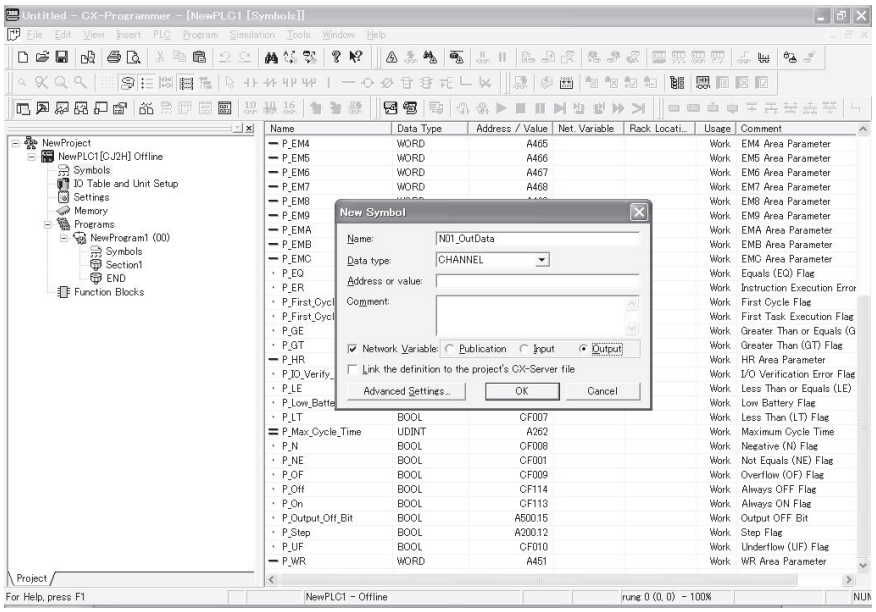
***12*** Click the **OK** button in the **Edit Device Parameters** Dialog Box.

## 2) Importing Network Symbols/Variables Created with the CX-Programmer to the Network Configurator

If the CJ2H-CPU6□-EIP or CJ2M-CPU3□ is used, you can create network symbols/variables using the CX-Programmer, import them into the Network Configurator, and then create tags and tag sets. Use the following procedure.

### ● Creating Global Symbols

Create global symbol with the Global Symbol Editor of the CX-Programmer and select *Input* or *Output* for the *network variable* properties. Save the project when you are finished.
Any global symbols with *Input* or *Output* set for the *network variable* property will be imported when the import procedure is performed from the **Edit Device Parameters** Dialog Box.



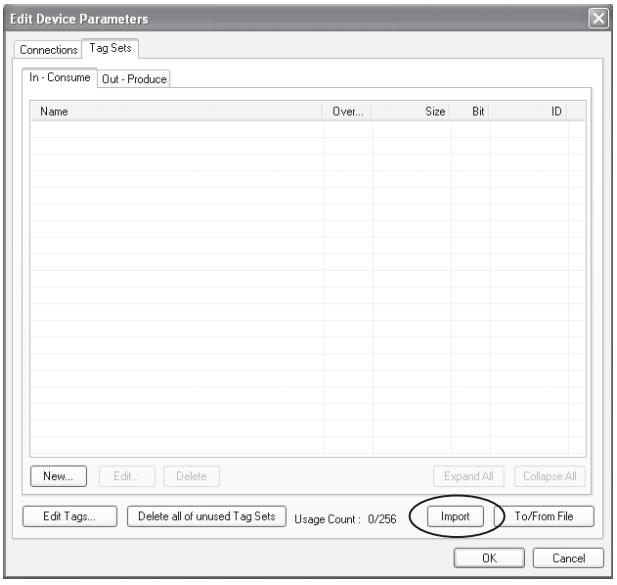

## ● Importing Symbols to the Network Configurator

**1** Start the CX-Programmer and open the project that was saved.

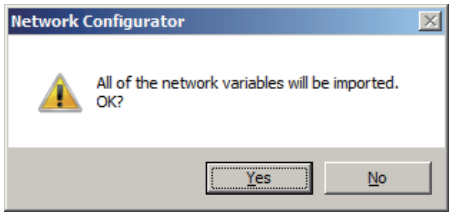
**Note** When multiple copies of the CX-Programmer are running at the same time, it is possible to import only from the CX-Programmer project that was started first. If the global symbols that are to be imported are stored in multiple CX-Programmer project files, the projects must be started one by one to import the symbols.

**2** From the devices registered in the Network Configurator, double-click the icon of the device for which to import the network symbols. The **Edit Device Parameter** Dialog Box will be displayed. You can also right-click the icon and select **Device** - **Parameters** - **Edit** from the pop-up menu.

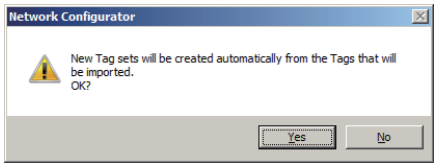
**3** Click the **Import** button on the **Tag Sets** Tab Page of the **Edit Device Parameter** Dialog Box.



A confirmation dialog box is displayed that asks you how you want to import the variables as shown below.
To import all symbols with a Network Publish attribute, click the **Yes** button. To import only some of these variables, click the **No** button.

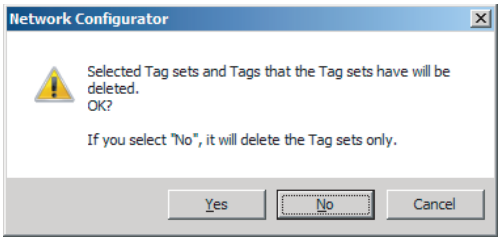



After you import the variables to the tags, click the **Yes** button to automatically create tag sets, or click the **No** button to set up tag sets manually.

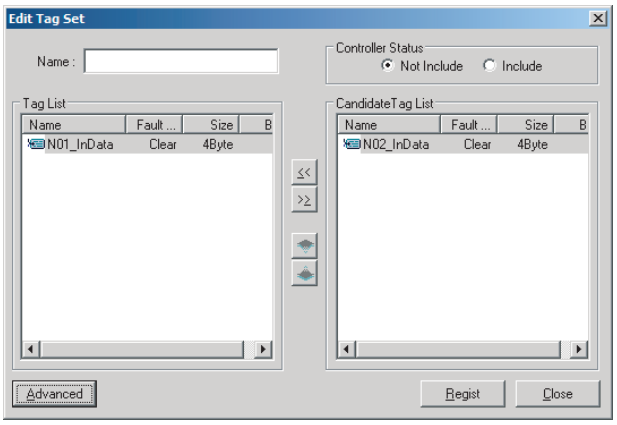



The symbols will be imported as shown below on the **Tag Sets** Tab Page. Each symbol will be imported into a different tag set and the device parameters will be automatically edited. (The symbol name will be used for the tag set name.)

To place more than one input symbol (input tag) imported from the CX-Programmer into one tag set, you must delete the input tags that were registered to separate input tag sets.
Select the tag sets for the symbols that are included in the one tag set and click the **Delete** button. A confirmation message will be displayed. Click the **No** button to delete only the tag sets.




To create a new tag set for more than one tag, click the **New** button. To place more than one tag in an existing tag set, double-click the tab set, or select it and click the **Edit** button.
The **Edit Tag Set** Dialog Box will be displayed. Imported tags that are not registered in another tag set will be displayed in the **Candidate Tag List** area on the right. Click the Right Arrow button to add tags individually.




***4*** You can change tag set names in this dialog box. To confirm a change, click the **Regist** button in the **Edit Tag Set** Dialog Box.

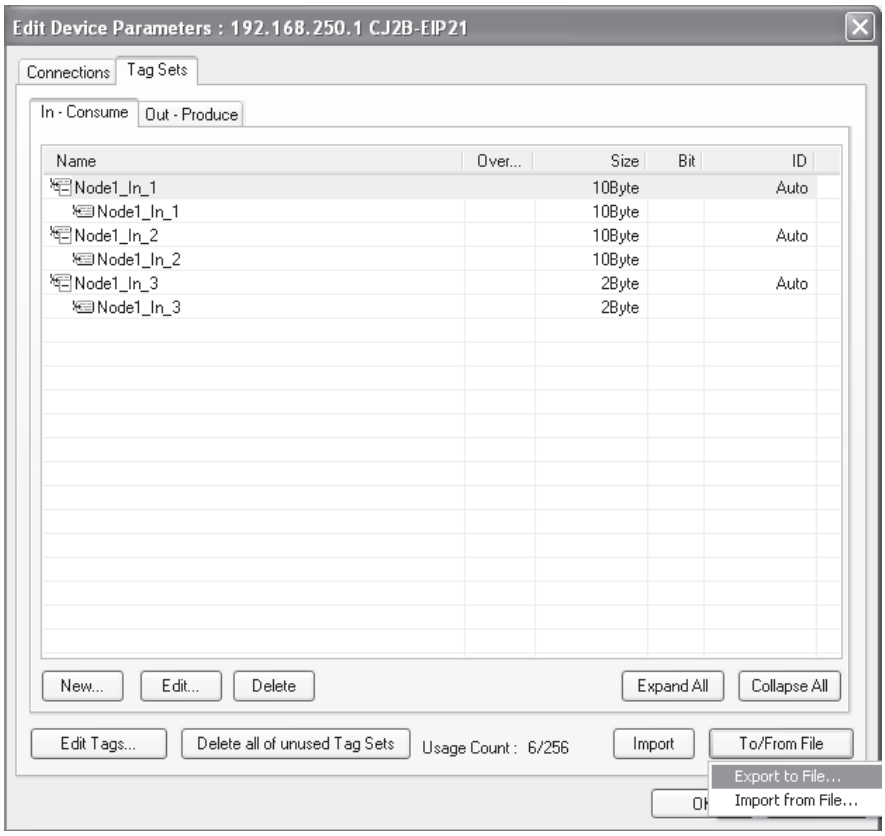
***5*** Perform steps 1 to 3 for all the devices that will perform tag data links.

## 3) Importing Network Symbols That Were Registered to Tags with the Network Configurator to the CX-Programmer

If the CJ2H-CPU6□-EIP or CJ2M-CPU3□ is used, you can specify network symbols for tags using the Network Configurator. The procedure to import network symbols that were created using the Network Configurator into the CX-Programmer is described below.

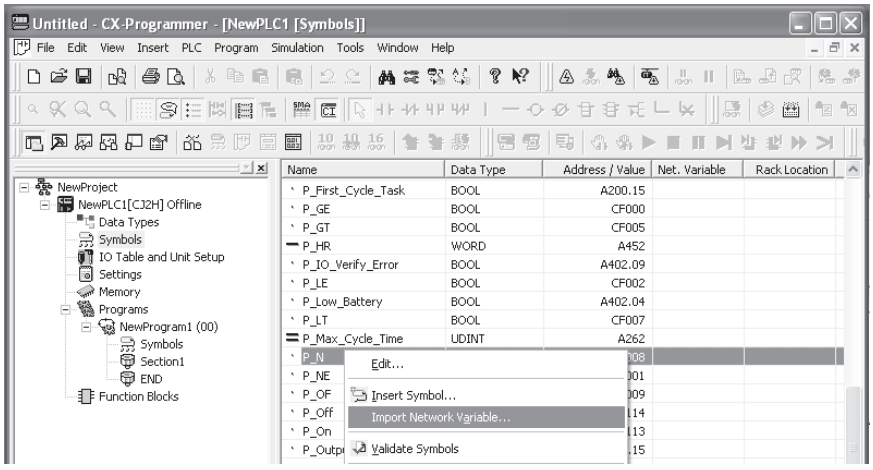
### ● Exporting Tags and Tag Sets with the Network Configurator

Select **To/From File** - **Export to file** on the **Tag Sets** Tab Page in the **Edit Device Parameters** Dialog Box to export the tag and tag set information to a CSV file.

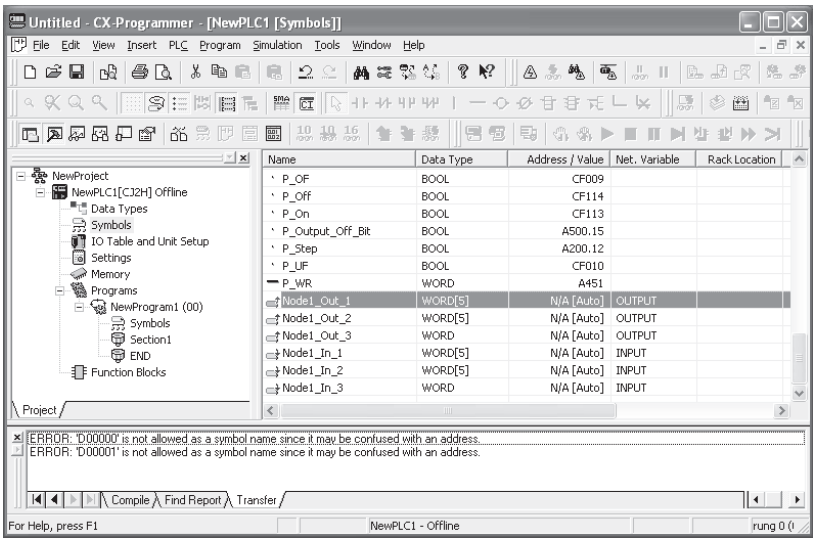



## ● Importing the Tag and Tag Set CSV File with the CX-Programmer

***1*** In the project global symbol table for the CJ2H-CPU6□-EIP or CJ2M-CPU3□, right-click and select **Import Network Variable** from the pop-up menu.




***2*** You can add a tag as a network symbol by selecting and executing the CSV file exported using the Network Configurator.




**Precautions for Correct Use**

The following precautions apply when importing.

- Tags that have a specified I/O memory address cannot be imported.
- Tags are imported as network symbols in a one-dimensional WORD array. To change the data type, use the Symbol Editor of the CX-Programmer.

## 9-5-6 Connection Settings

After you create the tag sets, click the **Connections** Tab at the top of the **Edit Device Parameters** Dialog Box, and set the following connection information.

- The target devices or tag sets with which connections are opened
- The connection type (multi-cast or unicast)
- Packet interval (RPI)
- Connection name (optional)

Make the connections settings in the originator only. The connections settings are not necessary in the target device.

**Precautions for Correct Use**

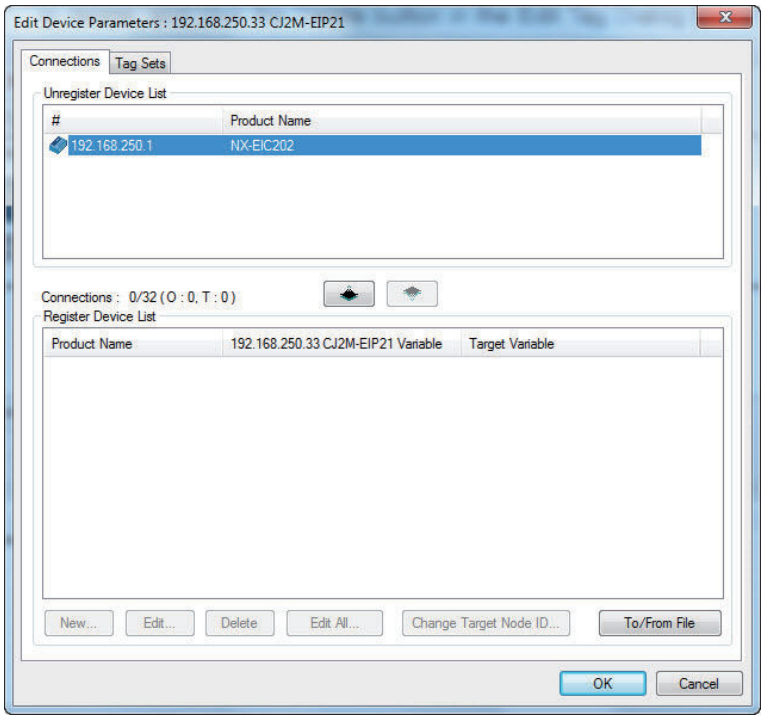
Make the connections settings after you create tag sets for all of the devices involved in tag data links.

### Connection Settings (Connections Tab Page)

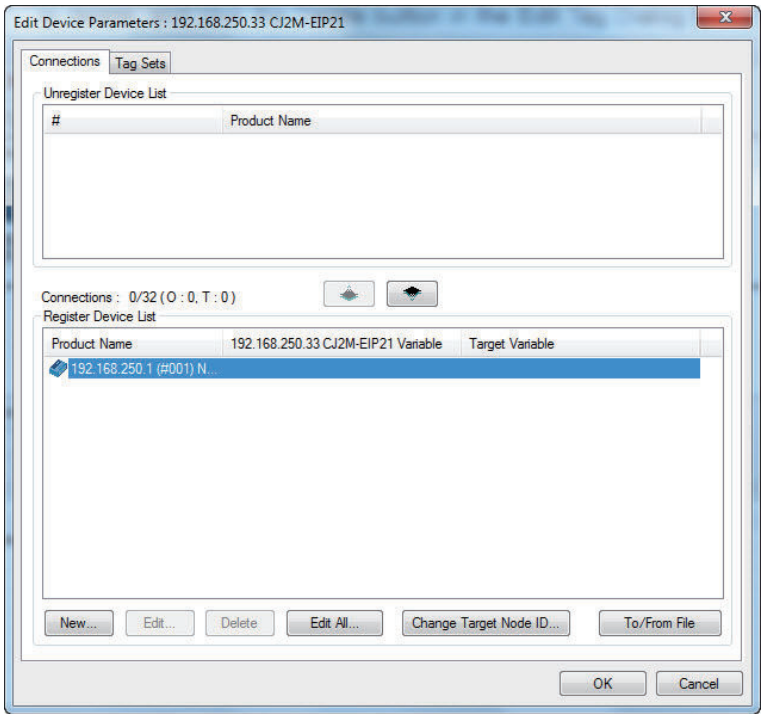
#### ● Registering Devices in the Register Device List

***1*** Double-click the icon of the device for which to make originator settings in the Network Configuration Pane of the Network Configurator. The **Edit Device Parameters** Dialog Box is displayed. Right-click the icon to display the pop-up menu, and select **Parameter** - **Edit**.

***2*** Click the **Connections** Tab in the **Edit Device Parameters** Dialog Box.
All of the devices registered in the network (except the local node) are displayed.

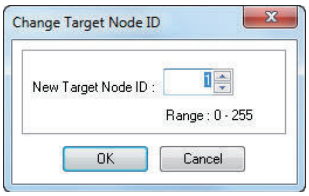



In the **Unregister Device List**, select the target device that requires connection settings by clicking the device so its color changes to gray, and click the  button. The selected target device will be displayed in the **Register Device List**, as shown in the following diagram.




***3*** Target node IDs are assigned to devices registered in the **Register Device List**.
This target node ID determines the location in the originator node PLC of the Target Node PLC Operating Flag, Target Node PLC Error Flag, Registered Target Node Flag, and Normal Target Node Flag. By default, the target ID is automatically set to the rightmost 8 bits of the IP address. In the example above, the target device's IP address is 192.168.250.1, so the device

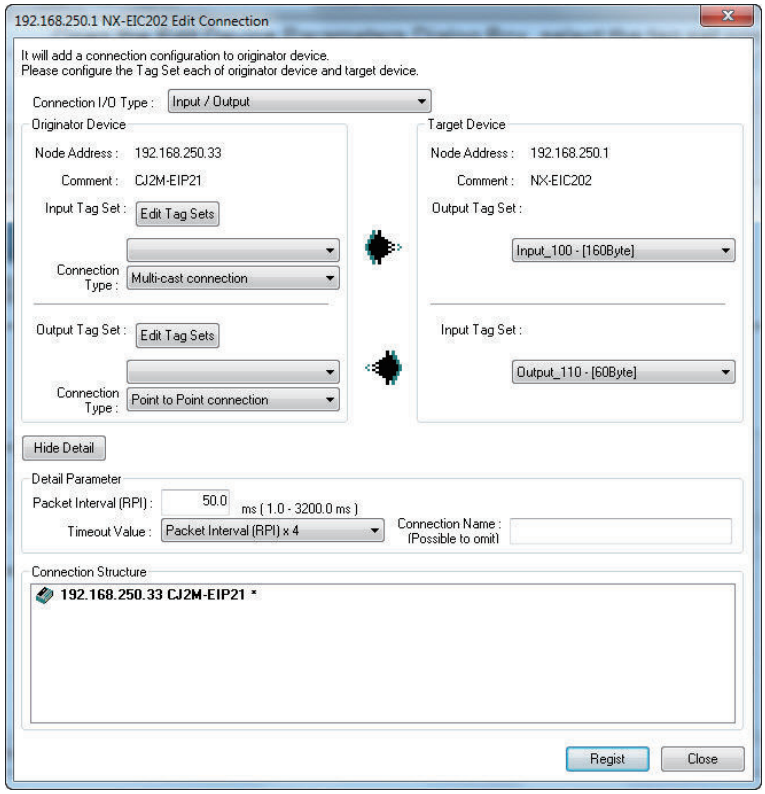
number is #1. If a target node ID is duplicated and you want to change the device number, click the **Change Target Node ID** button and change the target ID.




## ● Editing Settings for Individual Connections

You can edit each connection separately.

***1*** Click the **Connections** Tab and then click the **New** button. The following **Edit Connection** Dialog Box is displayed according to the type of device that is selected.
Using Other EtherNet/IP Devices as Targets (for Settings Other Than Input Only)




| Setting | Description |
|---|---|
| Connection I/O Type | Selects one of the following: Input/Output, Input Only, or Listen Only. |

| Setting | Description |
|---|---|
| Connection Type | Selects whether the data is sent in multicast or unicast (point-to-point). The default setting is multicast.<br>• Multicast connection:<br>Select when the same data is shared by multiple nodes. This setting is usually used.<br>• Point-to-Point connection:<br>Select this type when the same data is not shared by multiple nodes. In a unicast connection, other nodes are not burdened with an unnecessary load.<br>**Note** Refer to *8-2-2 Creating Tag Data Links* on page 8-6 for details on using multicast and unicast connections. |
| The **Connection Structure** Field and the following items will not be displayed if the **Hide Detail** button is pressed. | |
| Packet Interval (RPI) | Sets the data update cycle (i.e., the *packet interval*) of each connection between the originator and target.<br>• Minimum RPI for the EtherNet/IP Coupler Unit is 4 ms.<br>• Default setting is 50 ms (i.e., data updated once every 50 ms).<br>• The interval can be set to an even number of ms (4, 6, 8,...)<br>The interval can be set to between 4 and 1000 ms for the CJ2M-EIP21 and 0.5 and 10,000 ms for other CPU Units in 0.5-ms increments. |
| Timeout Value | Sets the time until a connection times out. The timeout value is set as a multiple of the packet interval (RPI) and can be set to 4, 8, 16, 32, 64, 128, 256, or 512 times the packet interval.<br>The default setting is 4 times the packet interval (RPI). |
| Connection Name | Sets a name for the connection. (32 characters max.) |

***2*** After you make all of the settings, click the **OK** button.

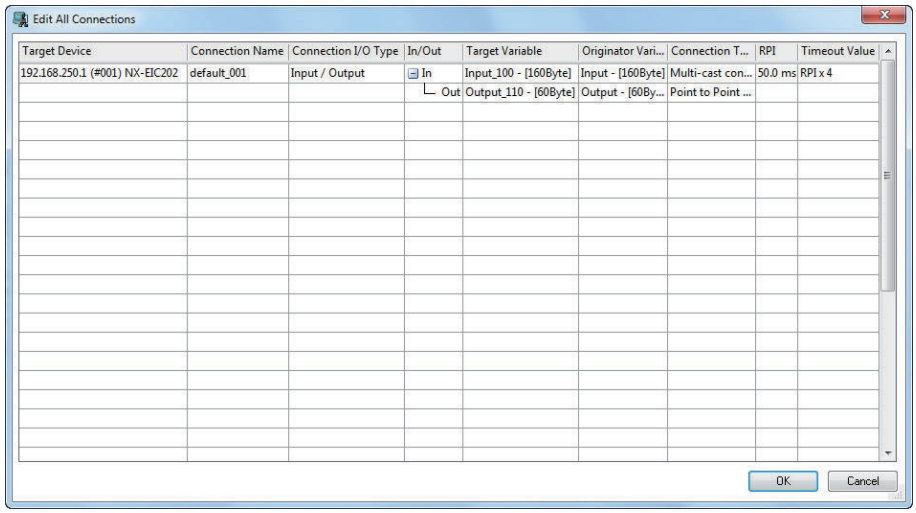
**Precautions for Correct Use**

If you set a tag data link with a short packet interval (RPI) when many NX Units are connected to the EtherNet/IP Slave Terminal, a Tag Data Link Timeout may occur depending on the load conditions on the EtherNet/IP Slave Terminal. If that occurs, increase the length of the packet interval (RPI) or reduce the number of NX Units that are mounted.

## ● Editing Settings for All Connections

You can edit the connection settings between the originator and all of the target devices selected in the Register Device List together in a table.

***1*** Click the **Connections** Tab, and then click the **Edit All** button.
The following **Edit All Connections** Dialog Box is displayed.




| Setting | Description |
|---|---|
| Target Device | Select the target device. |
| Connection Name | Any name can be given to the connection (32 single-byte characters max.). If this field is left blank, a default name is assigned. The connection name is used as a comment. |
| Connection I/O Type | Select one of the following: Input/Output, Input Only, or Listen Only. |
| In/Out | The connections I/O is automatically displayed based on the selected connection.<br>• Input/Output: In and Out levels are displayed.<br>• Input Only or Listen Only: Just In is displayed. |
| Target Variable | Select and allocate the target node's tag set.<br>• In: Select the target's output (produce) tag set.<br>• Out: Select the target's input (consume) tag set. |
| Originator Variable | Select and allocate the originator node's tag set.<br>• In: Select the originator's input (consume) tag set.<br>• Out: Select the originator's output (produce) tag set. |
| Connection Type | Select whether the data is sent in multi-cast or unicast (point-to-point) form. The default setting is multi-cast.<br>• Multi-cast connection:<br>Select when the same data is shared by multiple nodes. This setting is usually used.<br>• Point-to-Point connection:<br>Select when the same data is not shared by multiple nodes. In a unicast connection, other nodes are not burdened with an unnecessary load.<br>**Note** Refer to *8-2-2 Creating Tag Data Links* on page 8-6 for details on using multi-cast and unicast connections. |
| RPI | Set the data update cycle (i.e., the *packet interval*) of each connection between the originator and target.<br>• Minimum RPI for the EtherNet/IP Coupler Unit is 4 ms.<br>• The default setting is 50 ms (i.e., data is updated once every 50 ms).<br>• The interval can be set to an even number of ms (4, 6, 8,...)<br>• The interval can be set to between 4 and 1000 ms for the CJ2M-EIP21 and 0.5 and 10,000 ms for other CPU Units in 0.5-ms increments. |
| Timeout Value | Set the time until a connection timeout is detected. The timeout value is set as a multiple of the packet interval (RPI) and can be set to 4, 8, 16, 32, 64, 128, 256, or 512 times the packet interval. The default setting is 4 times the packet interval (RPI). |

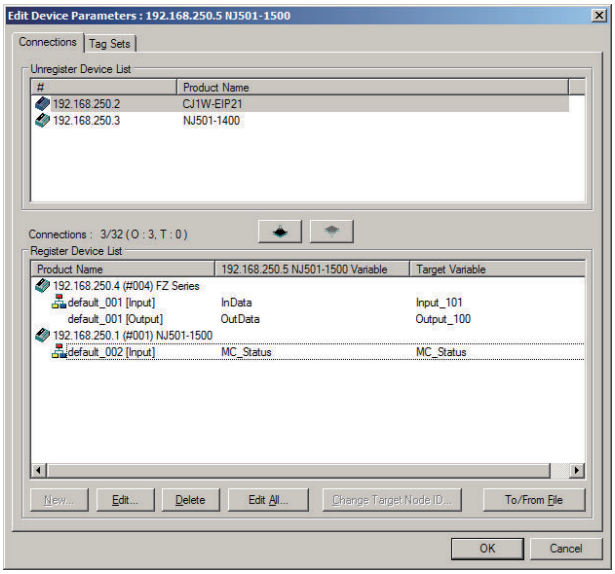
**2** After you make all of the settings, click the **OK** button.

**Precautions for Correct Use**

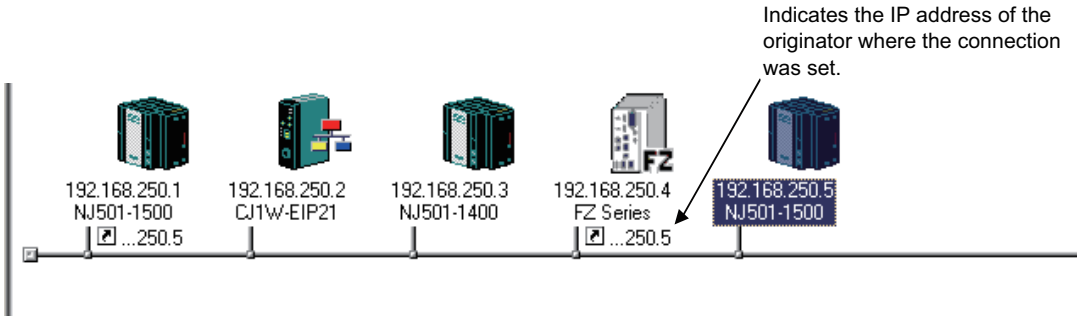
If you set a tag data link with a short packet interval (RPI) when many NX Units are connected to the EtherNet/IP Slave Terminal, a Tag Data Link Timeout may occur depending on the load conditions on the EtherNet/IP Slave Terminal. If that occurs, increase the length of the packet interval (RPI) or reduce the number of NX Units that are mounted.

## ● Confirming the Connections Settings

**1** An overview of the connections that were set in the Register Device List is displayed in the **Connections** Tab Page.




**2** Click the **OK** button. The following diagram is displayed.




**3** Repeat the Connections setting procedure until all of the connections have been set.

**Precautions for Correct Use**

After completing the settings, always click the **OK** button before closing the **Edit Device Parameters** Dialog Box and performing another operation. If the **Cancel** button is clicked and the dialog box is closed, the new settings will be discarded.

**4** If the tag set's size is changed in either the originator or target after the connection was set, the size will not match the other node and a parameter data mismatch will occur.
In this case, if the connection settings have been changed, be sure to *check the connections.*

## 9-5-7 Tag Data Parameters and Specifications

| Item | Specification |
|---|---|
| Communications type | Standard EtherNet/IP implicit communications (connection-type cyclic communications) |
| Setting method | After you have set the tags, tag sets, and connections with the Network Configurator, you must download the tag data link parameters to all devices on the EtherNet/IP network.<br>After the parameters are downloaded, the EtherNet/IP Units are restarted to start the tag data links. |
| EtherNet/IP Coupler tag size | Input tag size: 1 to 504 Bytes<br>Output tag size: 0 to 504 Bytes |
| Tag sets | Number of tags per tag set: 1 maximum |
| Connection type | Each connection can be set for 1-to-1 (unicast) or 1-to-N (multicast) communications.<br>Default setting: Multicast |
| Packet interval (RPI) | The packet interval can be set separately for each connection. |
| Timeout Value | Sets the time until a connection times out. The timeout value is set as a multiple of the packet interval (RPI) and can be set to 4, 8, 16, 32, 64, 128, 256, or 512 times the packet interval. The default setting is 4 times the packet interval (RPI). |

## 9-5-8 Downloading Tag Data Link Parameters

To make tag data links, you must download tag data link parameters, such as tag set settings and connection settings, to all devices in the EtherNet/IP network. When the download operation is executed, the tag data link parameters are transferred to the EtherNet/IP Units that require the settings.
The following procedure shows how to download the tag data link parameters.

**Additional Information**

Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for more for information on how to connect the Network Configurator online.

**Precautions for Correct Use**

- If the node addresses (IP addresses) are not set correctly, you may connect to the wrong Controller and set incorrect device parameters. Download data only after you confirm that you are connected to the correct Controller.
- If incorrect tag data link parameters are set, it may cause equipment to operate unpredictably. Even when the correct tag data link parameters are set, make sure that there will be no effect on equipment before you transfer the data.
- When network variables are used in tag settings, a connection error will result if the variables are not also set in the CPU Unit. Before downloading the tag data link parameters, check to confirm that the network variables are set in the CPU Unit. Check whether the network variable, tag, and connection settings are correct.
- If a communications error occurs, the output status depends on the specifications of the device being used. When a communications error occurs for a device that is used along with output devices, check the operating specifications and implement safety countermeasures.
- The EtherNet/IP Unit is automatically restarted after the parameters are downloaded. This restart is required to enable the tag set and connection information. Before you download the parameters, check to confirm that problems will not occur with the equipment when the Unit is restarted.
- Do not disconnect the Ethernet cable or reset or turn OFF the power to the EtherNet/IP Unit during the parameter download.
- Tag data links (data exchange) between relevant nodes is stopped during a download. Before you download data in RUN mode, make sure that it will not affect the controlled system. Also implement interlocks on data processing in ladder diagram programming that uses tag data links when the tag data links are stopped or a tag data link error occurs.
- For EtherNet/IP Units with revision 1, you can download tag data link parameters only when the CPU Unit is in PROGRAM mode.
- Even for Units with revision 2 or later, all CPU Units must be in PROGRAM mode to download the parameters if any Units with revision 1 are included in the network.

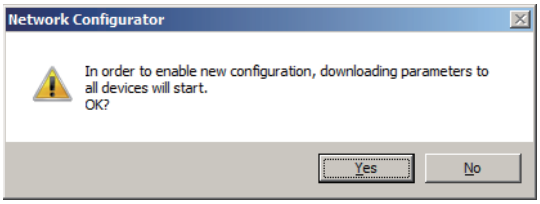
***1*** Connect the Network Configurator online.

***2*** There are two ways to download the parameters.

- Downloading to All Devices in the Network

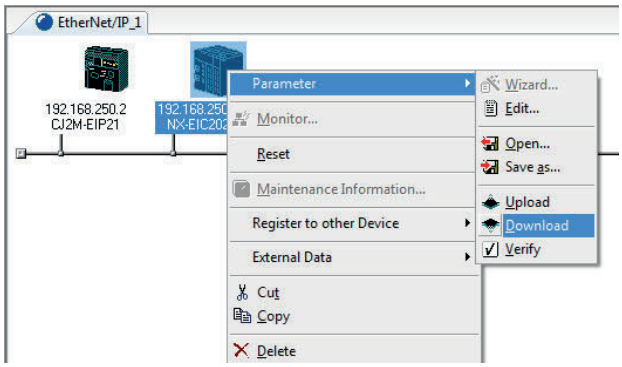
  Select **Network** - **Download**.

  The following dialog box is displayed:

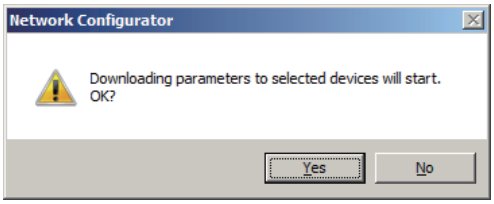



- Downloading Individually to Particular Devices

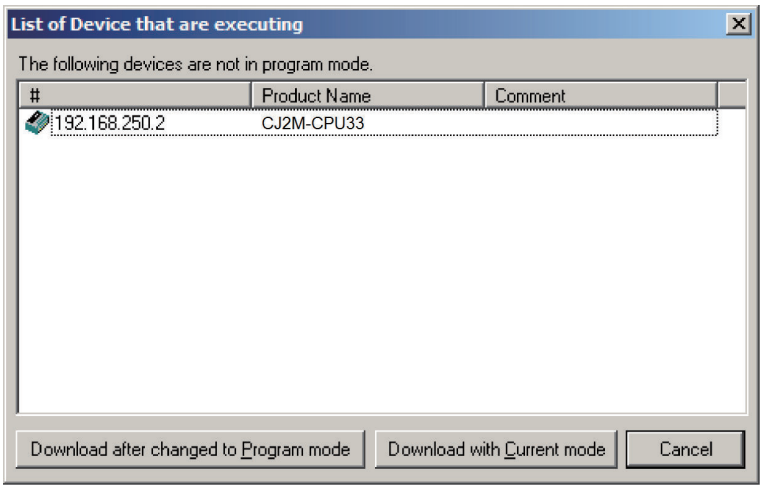
  Select the icon of the EtherNet/IP Unit to which you want to download. To select multiple nodes, hold down the **Shift** Key while you click the icons. (In the following example, 2 nodes are selected: 192.168.250.2 and 192.168.250.1.) Right-click the icon to display the pop-up menu, and select **Parameter** - **Download**.



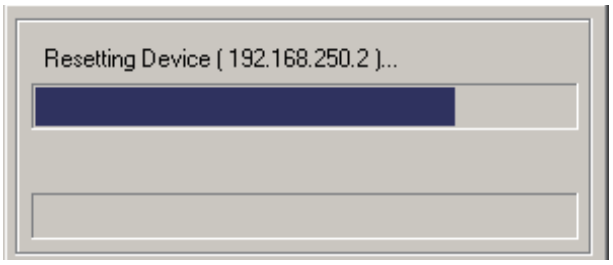

The following dialog box is displayed.



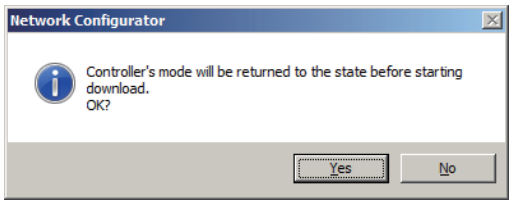

**3** Click the **Yes** button to download the tag data link parameters to the EtherNet/IP Unit.
The following dialog box is displayed if any of the CPU Units is not in PROGRAM mode.




If the **Download after changed to Program mode** button is clicked, all CPU Units are changed to PROGRAM mode and the parameters are downloaded. Confirm safety for all controlled equipment before you change the CPU Units to PROGRAM mode. You can restore the operating modes after the parameters are downloaded.
You can click the **Download with Current mode** button to download the parameters even when one or more CPU Units is in RUN mode. The **Download with Current mode** button is disabled if the EtherNet/IP Unit does not support this function (e.g., revision 1 of CJ1W-EIP21).
During the download, the following progress monitor is displayed to show the progress of the download.




If the operating mode of one or more CPU Units was changed to download the parameters, you can return the CPU Units to the previous operating modes. If the **No** button is clicked, the CPU Units remain in PROGRAM mode.




***4*** The following dialog box is displayed to show that the download was completed.


## 9-5-9 Uploading Tag Data Link Parameters

Tag data link parameters (such as the tag set settings and connection settings) can be uploaded from devices in the EtherNet/IP network. The following procedure shows how to upload the parameters.

**Additional Information**

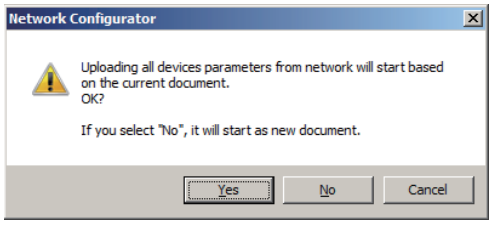
Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for more for information on how to connect the Network Configurator online.

There are two ways to upload the parameters.

### ● Uploading from All Devices in the Network

***1*** Connect the Network Configurator online, and then select **Upload** from the **Network** Menu.

***2*** The following dialog box will be displayed.

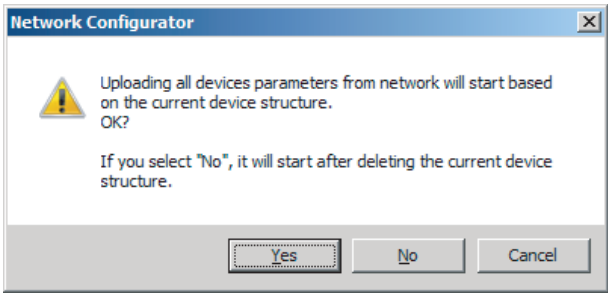



Clicking the **Yes** button:
Parameters will be uploaded only from the devices registered in the Network Configuration Pane. Parameters will not be uploaded from devices that are not registered in the Network Configuration Pane.
Clicking the **No** button:

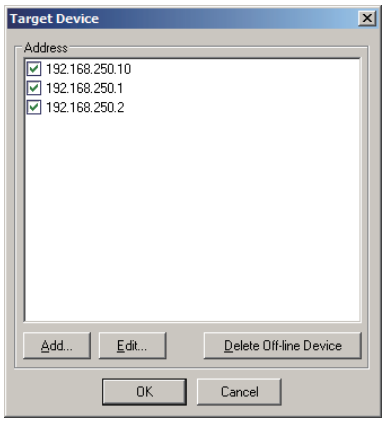
- If parameters are being uploaded from all devices in the network, the parameters will be newly uploaded from all devices. The current network configuration information will be lost.
- If parameters are being uploaded from specified devices only, the upload operation will be cancelled and the upload will not be performed.

Clicking the **Cancel** button:
The upload operation will be cancelled and the upload will not be performed.

***3*** If you click the **Yes** button in step 2, the following dialog box is displayed.

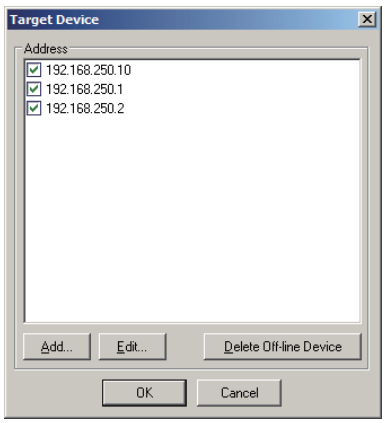



Clicking the **Yes** button:
Parameters are uploaded only from the devices registered in the Network Configuration Pane. Parameters are not uploaded from devices that are not registered in the Network Configuration Pane.
Clicking the **No** button:
Performing a Batch Upload over the Network Parameters are uploaded from all devices on the network. The current Network Configuration Information will be lost.
The following dialog box will be displayed. Select the devices for which to upload parameters and click the **OK** button.



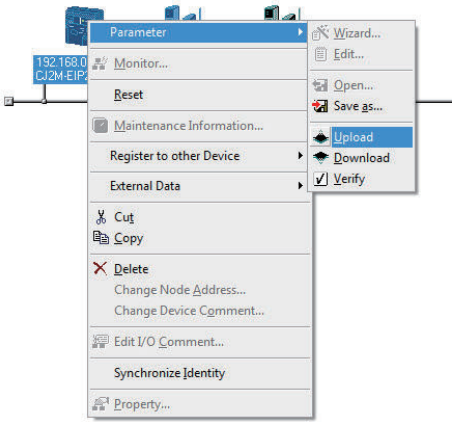

Clicking the **Cancel** button:
The upload operation is cancelled. The upload is not performed.

***4*** If you click the **No** button in step 2, the following dialog box is displayed.
Select the devices for which to upload parameters and click the **OK** button.

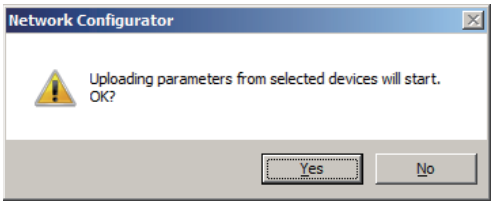



## ● Uploading Individually from Particular Devices

***1*** Connect the Network Configurator online and select the icon of the EtherNet/IP Unit from which you want to upload the parameters. To select multiple nodes, press and hold the **Shift** Key while you select additional icons. (In the following example, 2 nodes are selected.)
Right-click the icon to display the pop-up menu, and select **Parameter** - **Upload**.

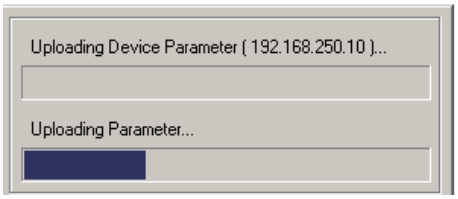



**2** The following dialog box is displayed.

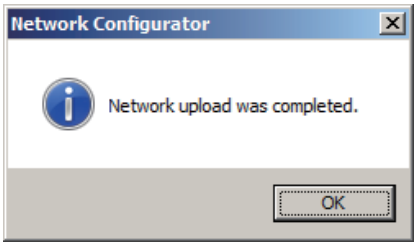



Click the **Yes** button or the **No** button.

**3** During the upload, the following progress monitor is displayed to show the progress of the upload.




**4** The following dialog box is displayed to show that the upload was completed.




### Additional Information

Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for more for information on how to verify tag data links.

## 9-5-10 Starting and Stopping Tag Data Links

### Automatically Starting Tag Data Links

Tag data links are automatically started immediately after the data link parameters are downloaded from the Network Configurator (they are automatically started after the CPU Unit's power is turned ON or the Unit is restarted).

**Additional Information**

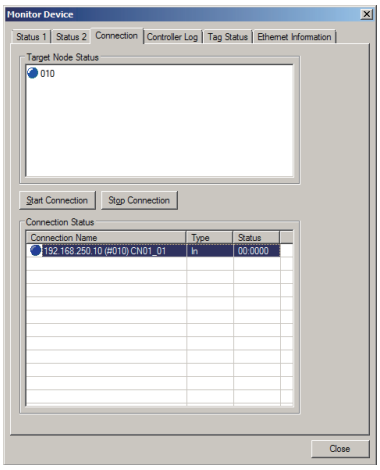
With CPU Units with unit version 1.04 or later, a *Tag Data Link Connection Timeout* error will occur if a connection is not established with the target device within 1 minute after the tag data links are started in operation as the originator device. Reconnection processing is continued periodically even after this error occurs to automatically recover. If the application environment allows this error to be ignored, such as when a target device is started later than the originator device, you can change the event level to the observation level.

### Starting and Stopping Tag Data Links for the Entire Network

All tag data links on the network can be started and stopped by selecting **I/O Connection** - **Start**/**Stop** from the **Network** Menu.

### Starting and Stopping Tag Data Links for the Individual Devices

You can start and stop tag data links for individual devices using the **Connection** Tab Page in the **Monitor Device** Dialog Box. This applies only to tag data links for which the device is the originator. Select **Monitor** from the **Device** Menu to access the Monitor Device Dialog Box.




**Start Connection** button:
Starts all connections for which the device is the originator.
**Stop Connection** button:
Stops all connections for which the device is the originator.

**Precautions for Correct Use**

Connections will be cut off if any of the following errors occurs in the CPU Unit that is the originator while tag data links are active.

- Fatal CPU Unit error
- I/O refresh error
- CPU Unit WDT error
- I/O bus error

## 9-5-11 Additional Tag Data Link Functions

The following additional functions are available with the Network Configurator. Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for more information.

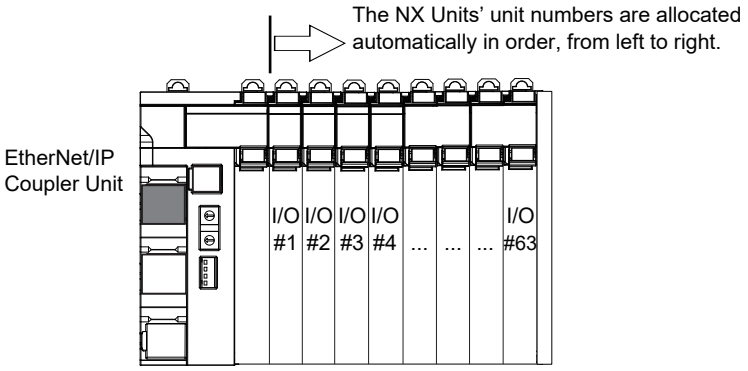
- Clearing the Device Parameters
- Saving the Network Configuration File
- Reading a Network Configuration File
- Checking Connections
- Changing Devices
- Displaying Device Status

# 9-6 Assigning Network Variables

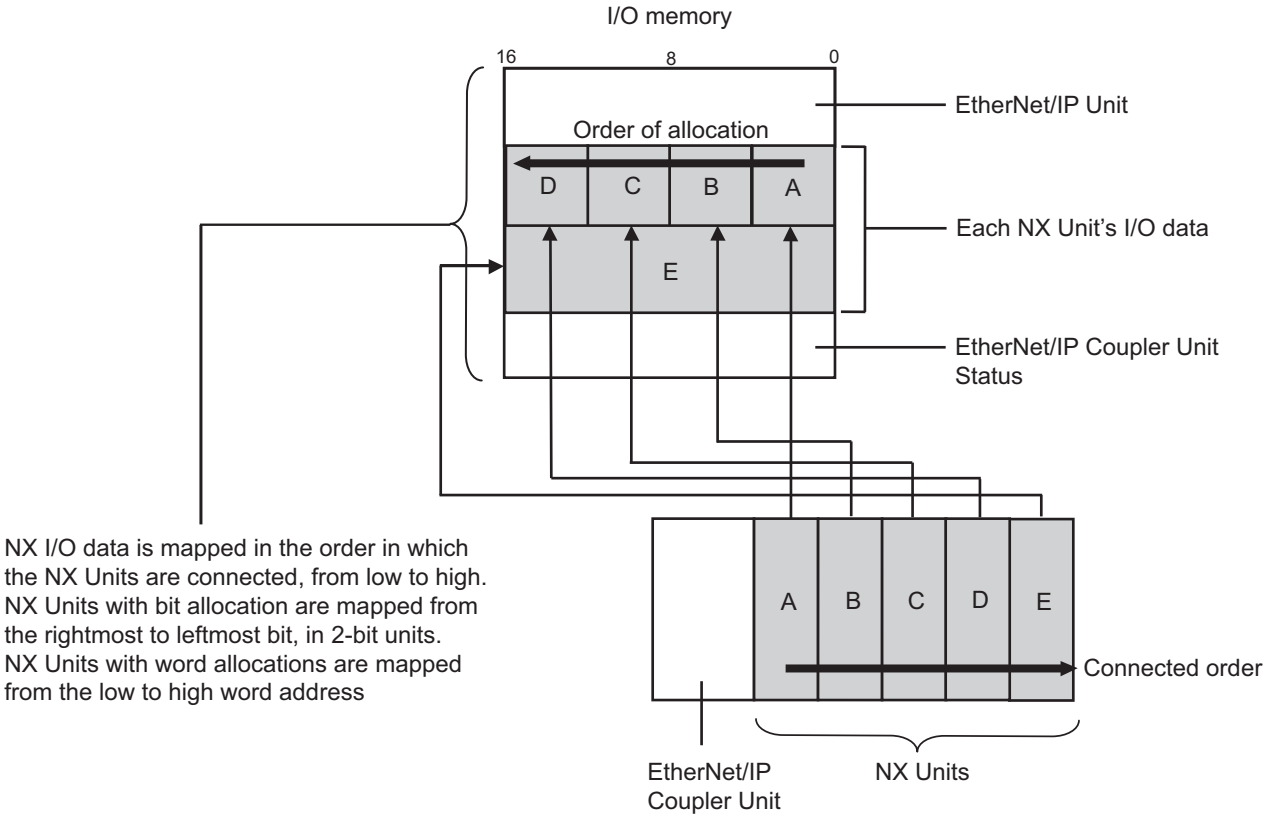
Network variables are assigned in the PLC according to the I/O mapping created in the Support Software. Use the following information to assign Network Variables in the PLC.

## 9-6-1 Basic I/O Mapping

The numbers used to identify NX Units in a Slave Terminal are called Unit Numbers. These numbers are allocated automatically from left to right starting with 1 when the power is turned ON. It is not necessary for the user to set these numbers. The EtherNet/IP Coupler Unit will have a unit number of 0.




The type and order in which NX Units are mounted will determine the I/O allocation and will also affect the Network Variable address assignments in the PLC. Refer to *9-5-5 Creating Tags and Tag Sets* on page 9-42 for more information about importing/exporting Network variables. The figure below shows this mapping.



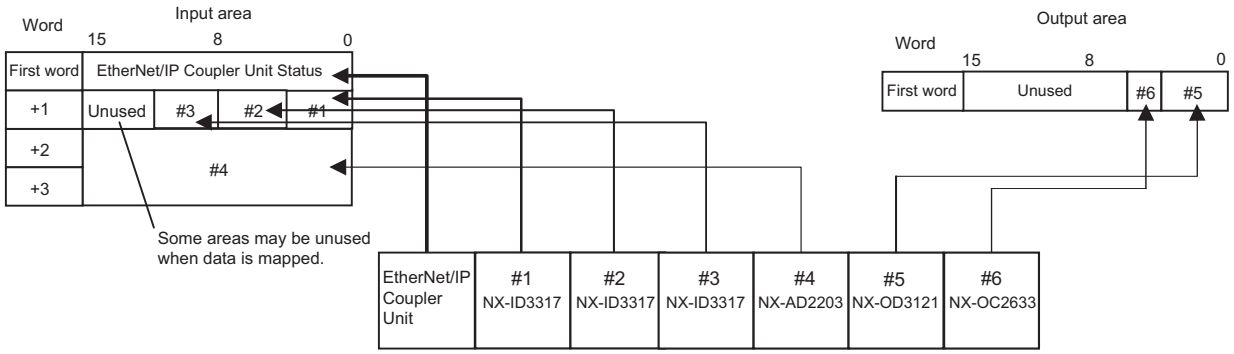
**Additional Information**

- One block of mapped output data and one block of mapped input data are maintained in the EtherNet/IP Unit.
- Refer to *9-2-3 I/O Allocation Information* on page 9-12 for details about I/O allocation and EtherNet/IP Coupler Unit Status.
- Bit-sized NX Units (digital I/O types, up to 8 points), e.g. NX-ID3317, NX-OC2633 are grouped together in words. They are mapped from the right-most bit to the left-most bit.
- Word-sized NX Units (analog I/O types) and 8 points or higher Bit-sized NX Units, e.g. NX-AD2203, NX-DA203, NX-ID4342 (8 points Input), NX-OD5121 (16 points output) are mapped in word units, from the low to the high word address.
  - It is strongly recommended to add any NX Safety Units to the end of a configuration when using the EtherNet/IP Coupler Unit without any stored Unit configuration information. If this recommendation is not followed, the layout of EtherNet/IP Coupler Unit's I/O data blocks will change when the configuration is downloaded. It that case, standard I/O data of the NX Safety Units will be inserted in the EtherNet/IP Coupler Unit's I/O data blocks according to their physical location in the configuration.
- The combined total size of mapped input data can be up to 512 bytes.
- The combined total size of mapped output data can be up to 512 bytes.

## ● I/O Mapping Example

I/O data is mapped to the EtherNet/IP Coupler Unit's I/O data blocks in the same order the NX Units are connected to the EtherNet/IP Coupler Unit, regardless of the NX Units' models.

The example below shows the I/O data mapping to the Input / Output blocks.




The following example shows the mapping of NX Output Units.

Slave Terminal Configuration

| EtherNet/IP Coupler Unit | #1 | #2 | #3 | #4 | #5 | #6 |
|---|---|---|---|---|---|---|
| | NX-OD3121 | NX-OD3121 | NX-OD3121 | NX-OC2633 | NX-OD3121 | NX-DA2203 |

Data is allocated in 2-bit units to NX Units which require 4 bits. There may be unused areas as shown in the following table.

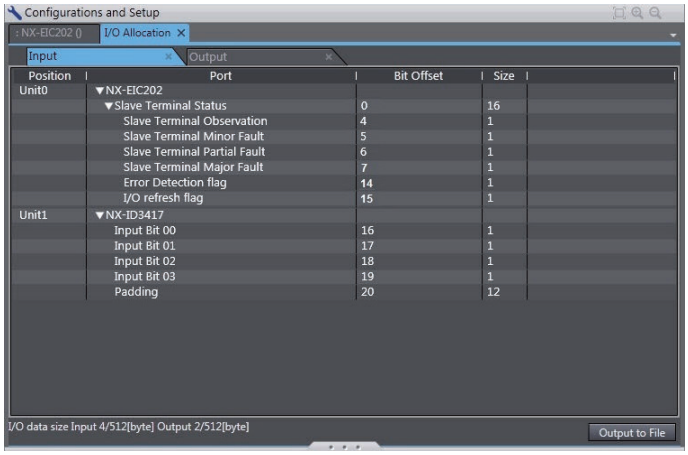
| Word | 15 | | | 8 | | 0 |
|---|---|---|---|---|---|---|
| +0 | #5 | #4 | #3 | #2 | #1 | |
| +1 | Unused | | | | | #5 |
| +2 | #6 | | | | | |
| +3 | | | | | | |

**Additional Information**

- Refer to the appropriate NX-series User's Manual for more information on NX Unit data allocation sizes.
- Refer to *9-2 Setting Slave Terminal Parameters* on page 9-6 for more information about status data configuration.

## 9-6-2 Support Software I/O Allocation Functions

The Support Software provides a display of the I/O allocation for the Slave Terminal configuration. This display shows the bit offset and size of the data allocated for a specific configuration as well as other important information. Use this display to understand the mapping of I/O data within the Slave Terminal for accurate network variable assignment in the PLC.
In the Multiview Explorer, right-click the EtherNet/IP Coupler and select **Display I/O Allocation** from the menu.




## I/O Allocation Display

The I/O allocation display area includes the following information.

| Item | Description |
|---|---|
| **Input** Tab | The overview of the input I/O allocation. |
| **Output** Tab | The overview of the output I/O allocation. |
| **Position** | The Slave Terminal Unit mounting location with corresponding Unit number. Refer to *9-6-1 Basic I/O Mapping* on page 9-70 for more information. |
| **Port** | I/O entries previously defined with the **Edit I/O Allocation Settings** button. Refer to *9-2-3 I/O Allocation Information* on page 9-12 for more information. |
| **Bit Offset** | The consecutive order of bits assigned based on the size of each port accounting for any necessary padding (see below for padding details). |
| **Size** | Each item in the **Port** area has a specific data size and this determines the bit offset and the data input/output total size. |
| **I/O Data Size** | The summary of the input/output bytes required to accommodate all port items previously configured. |
| **Output to File** | Clicking Output to File will generate a zip file that includes an .xsl and .xml file. Opening the .xml file in a browser will display a table overview of the I/O allocation. |

## Padding

Padding is sometimes required in the I/O allocation to fill remaining bits within an incomplete byte of data. This is done automatically to ensure whole bytes are used for data exchange.

# 10

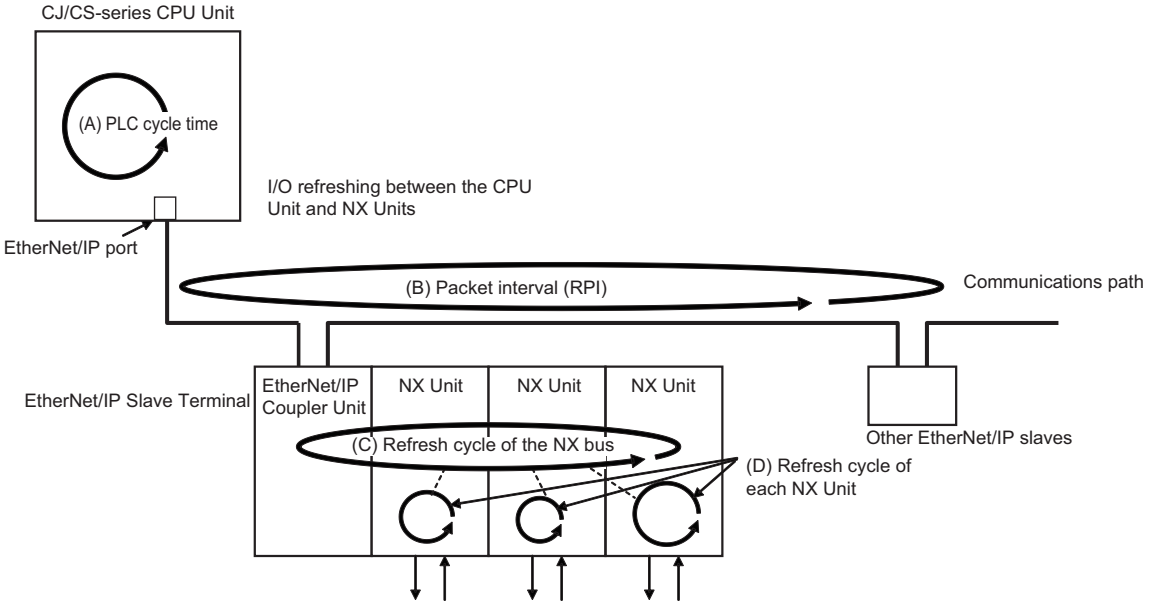


# I/O Refreshing

This section describes I/O refreshing for EtherNet/IP Slave Terminals.

# 10-1 Introduction to I/O Refreshing for EtherNet/IP Slave Terminals

This section introduces I/O refreshing for NX-series EtherNet/IP Slave Terminals.
The CJ/CS-series CPU Unit performs I/O refreshing cyclically with the NX Units in an EtherNet/IP Slave Terminal through EtherNet/IP communications and the NX bus. The following four cycles affect the operation of I/O refreshing between the CJ/CS-series CPU Unit and the NX Units in an EtherNet/IP Slave Terminal.
(A) Cycle Time in the CPU Unit
(B) Packet Interval (RPI)
(C) Refresh Cycle of the NX bus = 1.5 ms
(D) Refresh Cycle of each NX Unit
I/O refreshing operates asynchronously between the CJ/CS-series CPU Unit and Slave Terminals. This is an important function when calculating the I/O response time (refer to *10-2-1 I/O Response Time* on page 10-5 for more information).
The following figure shows the operation of I/O refreshing with an EtherNet/IP Slave Terminal.




**Additional Information**

Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for more information about CJ-series built-in EtherNet/IP port and EtherNet/IP Unit communication performance.

## Requested Packet Interval (RPI) Settings

In tag data links for the EtherNet/IP port, the data transmission period is set for each connection as the requested packet interval (RPI).

The target device will send data (i.e., output tags) once each RPI, regardless of the number of nodes. Also, the heartbeat frame is sent from the originator to the target for each connection. The target uses the heartbeat to check to see if errors have occurred in the connection with the originator. The data transmission period of the heartbeat frame depends on the RPI settings.

**Heartbeat Frame Transmission Period**

- If packet interval < 100 ms, the heartbeat frame transmission period is 100 ms.
- If packet interval ≥ 100 ms, the heartbeat frame transmission period is the same as the RPI.

Example:

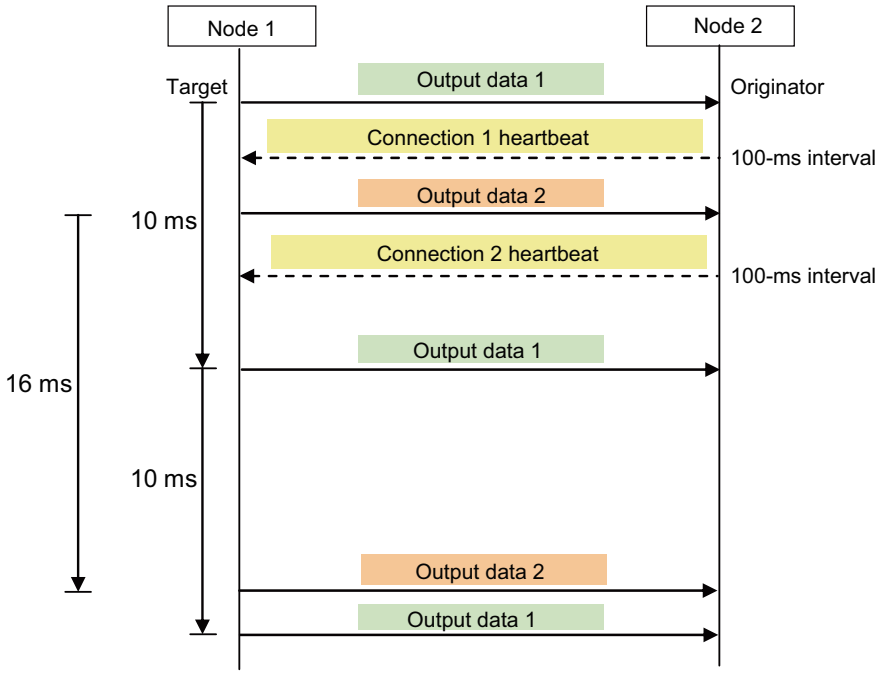
In this example, 2 tag data link connections are set for node 2 (the originator) and node 1 (the target).

The RPI for output data 1 is set to 10 ms.

The RPI for output data 2 is set to 16 ms.

In this case, output data 1 is sent from node 1 to node 2 every 10 ms, and output data 2 is sent from node 1 to node 2 every 16 ms, as shown in the following diagram.

Also, data is sent from node 2 (the originator) to node 1 (the target) with a heartbeat of 100 ms for connection 1 and a heartbeat of 100 ms for connection 2.

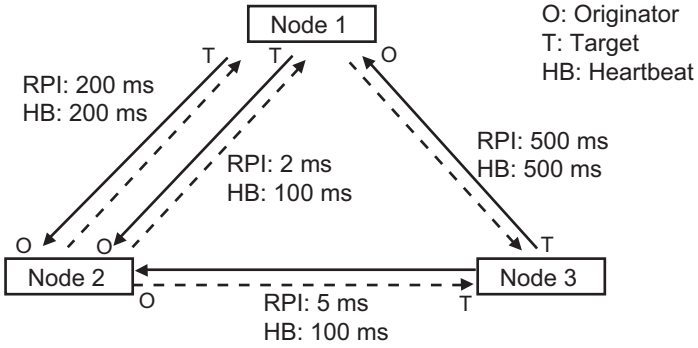


## Requested Packet Interval (RPI) and Bandwidth Usage (PPS)

The number of packets transferred each second is called the *used bandwidth* or PPS (packets per second).
The PPS is calculated from the RPI and heartbeat as follows for each connection:
PPS used in a connection (pps) = (1,000 ÷ RPI (ms)) + (1,000 ÷ Heartbeat transmission period (ms))
Use the following equation to calculate the total number of packets transferred by each Ether- Net/IP port (Unit) in 1 second.

EtherNet/IP port's total PPS = Total PPS of target connections

The maximum number of packets that the EtherNet/IP Coupler Unit can transfer in 1 second (called the *allowed Unit bandwidth*) is 1,000 pps, so set the connection below this maximum value.
Example:
Node 1 has both originator and target connections, with send RPI of 200 ms and 2 ms, and receive RPI of 500 ms.
Node 2 has originator connections only, with receive RPIs of 200 ms, 2 ms, and 5 ms.
Node 3 has target connections only, with send RPIs of 5 ms and 1 ms.




Each node's total PPS is calculated as follows:

- Total PPS of node 1's Unit
  = 1000 / 200 ms + 1000 / 2 ms + 1000 / 500 ms (for data)
  + 1000 / 200 ms + 1000 / 100 ms + 1000 / 500 ms (for heartbeat)
  = 524 pps
- Total PPS of node 2's Unit
  = 1000 / 200 ms + 1000 / 2 ms + 1000 / 5 ms (for data)
  + 1000 / 200 ms + 1000 / 100 ms + 1000 / 100 ms (for heartbeat)
  = 730 pps
- Total PPS of node 3's Unit
  = 1000 / 5 ms + 1000 / 500 ms (for data)
  + 1000 / 100 ms + 1000 / 500 ms (for heartbeat)
  = 214 pps

All of the Units are within the allowed Unit bandwidth (refer to appropriate EtherNet/IP Unit specification), so they can transfer data.

# 10-2 Communications Performance

This section describes the characteristics of EtherNet/IP communications with a Slave Terminal connected to a CJ/CS-series EtherNet/IP Unit. Use this section for reference when planning operations that require precise I/O timing.

The equations provided here are valid under the following conditions:

- All of the required Slave Terminals are participating in communications.
- No errors are being indicated at the EtherNet/IP Unit.
- Messages are not being produced in the network (from another company's configurator, for example).

## 10-2-1 I/O Response Time

The I/O response time is the time it takes from the reception of an input signal at an NX Unit to the output of the corresponding output signal at an NX Unit after being processed by the PLC's user program.

This section describes the characteristics of EtherNet/IP communications with a Slave Terminal connected to a CJ/CS-series EtherNet/IP Unit. Use this section for reference when planning operations that require precise I/O timing.

The equations provided here are valid under the following conditions:

- All of the required Slave Terminals are participating in communications.
- No errors are being indicated at the EtherNet/IP Unit.
- Messages are not being produced in the network (from another company's configurator, for example).

**Precautions for Correct Use**

The values provided by these equations may not be accurate if another company's EtherNet/IP Unit or Slave device is being used in the network.

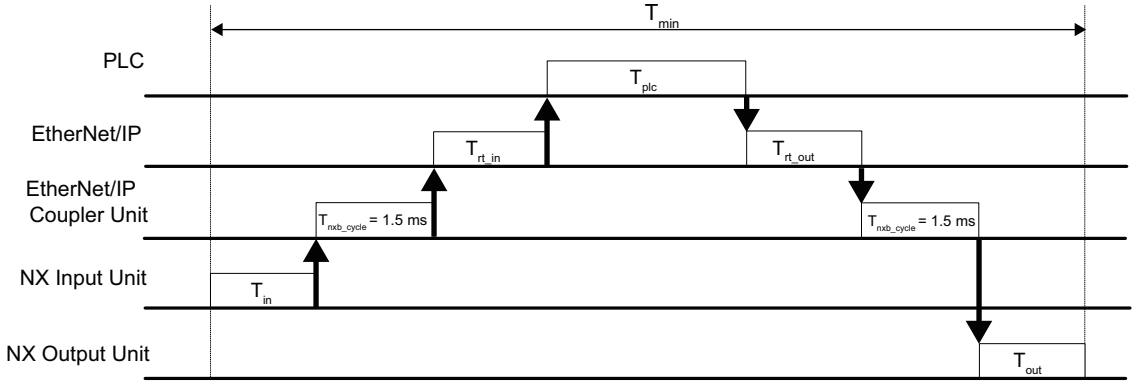
**Additional Information**

This manual describes the communications with the Slave Terminal only. For details on the CJ/CS-series EtherNet/IP Unit or overall EtherNet/IP network, refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* for more information about CJ-series built-in EtherNet/IP port and EtherNet/IP Unit communication performance.

## ● Minimum I/O Response Time

The minimum I/O response time ($T_{min}$) can be calculated with the following formula.

$T_{min} = T_{in} + T_{nxb\_cycle} + T_{rt\_in} + T_{plc} + T_{rt\_out} + T_{nxb\_cycle} + T_{out}$




$T_{in}$: NX Input Unit switching response time

$T_{nxb\_cycle}$: NX bus communication time = 1.5 ms

$T_{rt\_in}$: EtherNet/IP Coupler's communication time (input)

$T_{plc}$: PLC cycle time

$T_{rt\_out}$: EtherNet/IP Coupler's communication time (output)

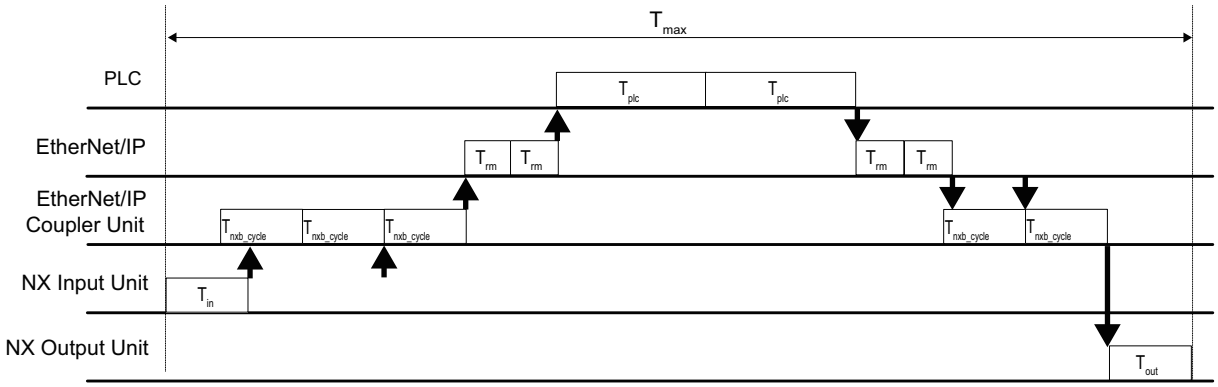
$T_{nxb\_cycle}$: NX bus communication time = 1.5 ms

$T_{out}$: NX Output Unit switching response time

## ● Maximum I/O Response Time

The maximum I/O response time ($T_{max}$) can be calculated with the following formula.

$T_{max} = T_{in} + (T_{nxb\_cycle} \times 5) + (T_{rm} \times 4) + (T_{plc} \times 2) + T_{out}$




$T_{in}$: NX Input Unit switching response time

3 x $T_{nxb\_cycle}$: NX bus communication time

2 x $T_{rm}$: EtherNet/IP communication period (RPI)

2 x $T_{plc}$: PLC cycle time

2 x $T_{rm}$: EtherNet/IP communication period (RPI)

2 x $T_{nxb\_cycle}$: NX bus communication time

$T_{out}$: NX Output Unit switching response time

# 11

# EtherNet/IP Coupler Unit Functions



This section describes the functions of the EtherNet/IP Coupler Unit when it is used in an EtherNet/IP Slave Terminal.

# 11-1 Functions

The functions of the EtherNet/IP Coupler Unit when it is used in an EtherNet/IP Slave Terminal are listed below.

| Function | Overview | Reference |
|---|---|---|
| Setting the Slave Terminal | This function is used to read and set the Slave Terminal parameters from the Support Software. You can make settings offline, or go online and read and set the Unit configuration of the actual Slave Terminal. | *Section 9 Setting Up Slave Terminals* on page 9-1 |
| Cyclic I/O Refreshing | The EtherNet/IP Coupler Unit exchanges I/O data with the mounted NX Units. | *Section 10 I/O Refreshing* on page 10-1 |
| Free-Run Refreshing | With this I/O refreshing method, the refresh cycle of the NX bus and the I/O refresh cycles of the NX Units are asynchronous. | |
| NX Unit Mounting Settings | This function is used to register NX Units that are not connected to the actual configuration but will be added at a later time in the Unit configuration information as unmounted Units. If you use this function, you do not have to modify the user program after the NX Units are added. | *11-2 NX Unit Mounting Settings* on page 11-3 |
| Event Logs | This function records events, such as errors and status changes, that occur in the EtherNet/IP Slave Terminal. | *11-3 Event Logs* on page 11-7 |
| Clear All Memory | This function initializes the entire EtherNet/IP Slave Terminal or specified Units from the Support Software. | *11-4 Clearing All Memory* on page 11-17 |
| Restarting | This function allows you to apply changes to settings with the Support Software or through special instructions, without cycling the Unit power supply. | *11-5 Restarting* on page 11-23 |
| Changing Event Levels | This function allows you to change the level of errors that occur in the EtherNet/IP Slave Terminal. | *11-6 Changing Event Levels* on page 11-25 |
| Resetting Errors | This function allows you to use the Support Software to reset errors that occur in the EtherNet/IP Slave Terminal. | *12-4 Resetting Errors* on page 12-57 |
| Fail-soft Operation | This function allows the EtherNet/IP Coupler Unit to start or continue I/O refreshing only with the NX Units that can operate normally when an error occurs for the EtherNet/IP Slave Terminal. | *11-7 Fail-soft Operation* on page 11-27 |
| Monitoring Total Power-ON Time | Each of the EtherNet/IP Coupler Units and NX Units records the total time that the Unit power supply is ON to it and the total times can be displayed on the Support Software. | *11-8 Monitoring Total Power-ON Time* on page 11-31 |

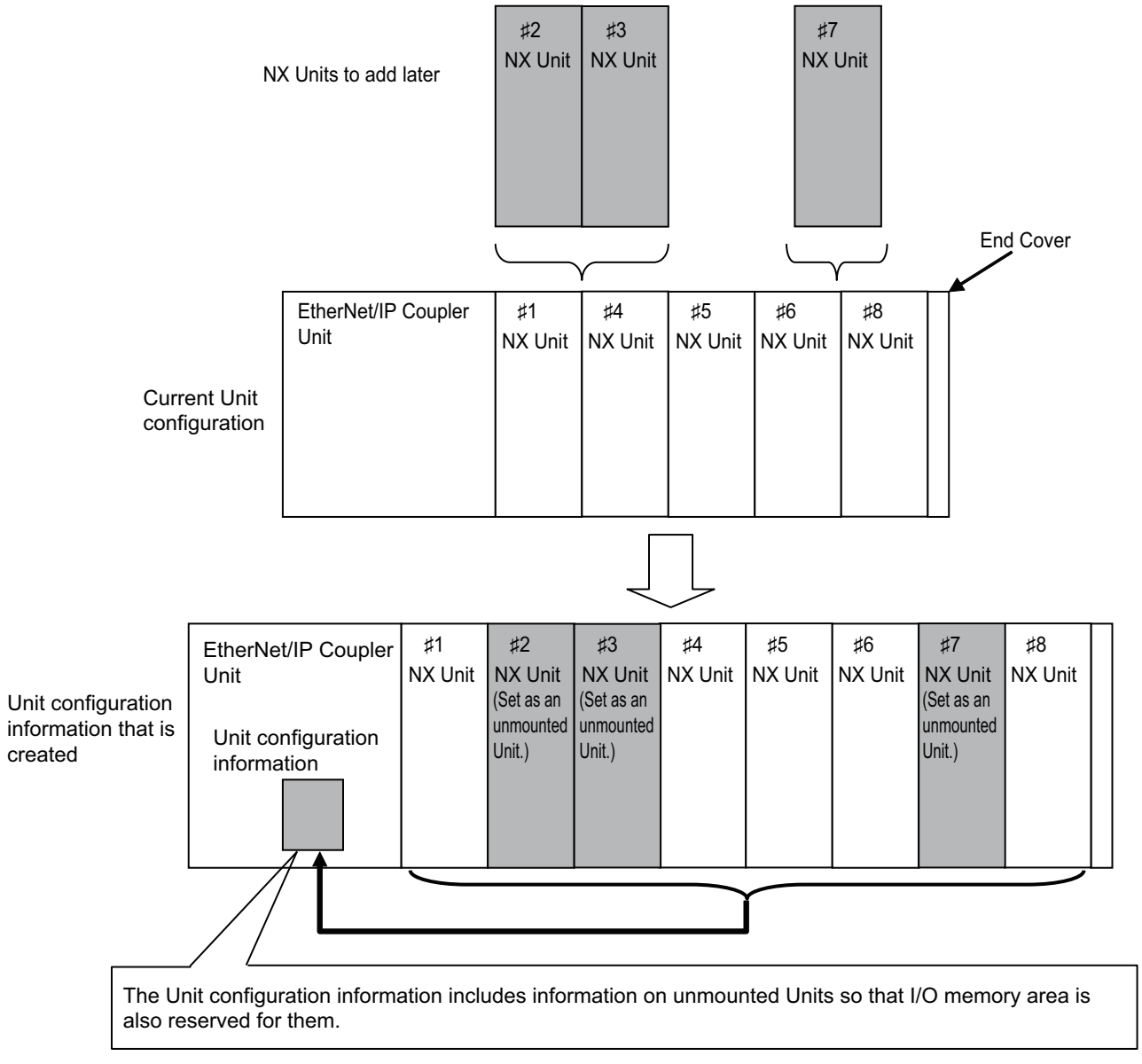
# 11-2 NX Unit Mounting Settings

This section describes the NX Unit mounting function when the disabled setting is used.

## 11-2-1 Introduction

The disabled setting is used to register NX Units that are not connected to the actual configuration but will be added at a later time in the Unit configuration information as unmounted Units.
If you use this function, you do not have to modify the user program after the NX Units are added because of the following reasons.

- I/O memory area is reserved for these unmounted NX Units in the same way that it is reserved for mounted NX Units.
- Unmounted NX Units are also assigned NX Unit numbers. This prevents the NX Unit numbers of other NX Units in the same Slave Terminal from changing when you change the setting of an NX Unit from unmounted to mounted.



## 11-2-2 Applications

For example, if you use this function in the following cases, you do not have to modify the user program.

- When you plan to add Units in the future
- When a specific Unit is temporarily unavailable, such as when commissioning the system
- When the number of NX Units depends on the type of equipment

## 11-2-3 Operating Specifications for NX Units That Are Set as Unmounted Units

The operating specifications for NX Units that are set as unmounted Units are given in the following table.

| Item | Operation |
|---|---|
| Bandwidth reservation for I/O refresh data with the EtherNet/IP master | Bandwidth is reserved. |
| I/O refreshing with the EtherNet/IP master | The I/O is not refreshed. |
| Detection of events | Events are not detected. |
| Assignment of NX Unit numbers to NX Units | Unit numbers are not assigned because the Units do not exist. |
| Message communications | Not possible because the Units do not exist. |
| Transfers for the synchronization function of the Sysmac Studio | Not applicable. |
| Transfer of the Unit operation settings | Not applicable. |
| Sysmac Studio Controller backup function | Not applicable. |
| SD Memory Card backup function | Not applicable. |
| Instructions | Parameters cannot be read or written. An instruction error will occur. |
| Clearing all memory | Not applicable. |
| Reading/writing Slave Terminal setting information through backup/restore operations | Not applicable. |
| Reading event logs | Not applicable. |
| Notification of status information | Not applicable. |

NX Units that are set as unmounted Units are included in the calculations for total power consumption and total Unit width when the Unit configuration is created on the Support Software.

**Precautions for Safe Use**

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

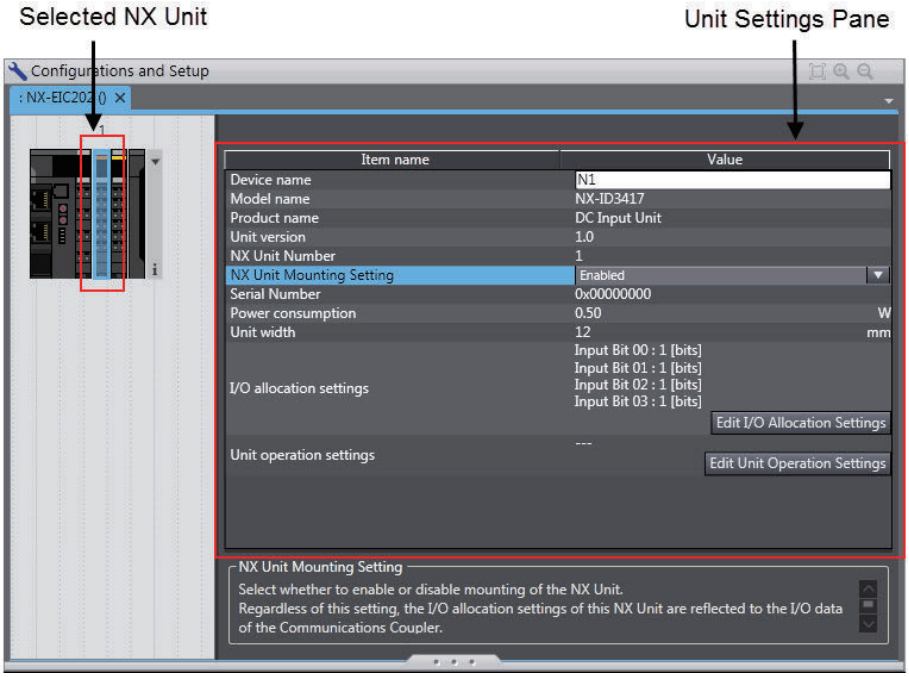
**Precautions for Correct Use**

When you mount an NX Unit that was set as an unmounted Unit, a Unit Configuration Verification Error will occur.

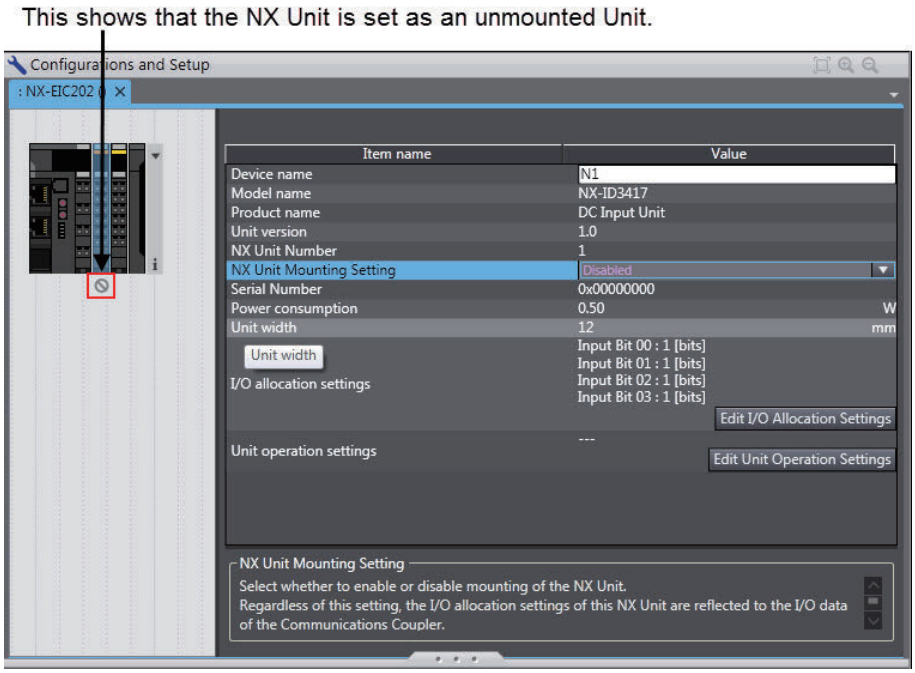
## 11-2-4 Setting NX Units as Unmounted Units

You use the Support Software to set NX Units as unmounted Units. The operations are described by using the Sysmac Studio as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.
After you change the settings for any NX Units, always transfer the Unit configuration information to the EtherNet/IP Slave Terminal.

***1*** Select the NX Units to set as unmounted Units from those that are registered to the EtherNet/IP Coupler Unit on the Edit Slave Terminal Configuration Tab Page.
The **Unit Settings** Pane is displayed.




***2*** In the **Unit Setting** Pane, set the **NX Unit Mounting Setting** to **Disabled**.
The selected NX Unit is set as an unmounted Unit.




To change an NX Unit that is set as an unmounted Unit to a mounted NX Unit, set the **NX Unit Mounting Setting** to **Enabled** in step 2.

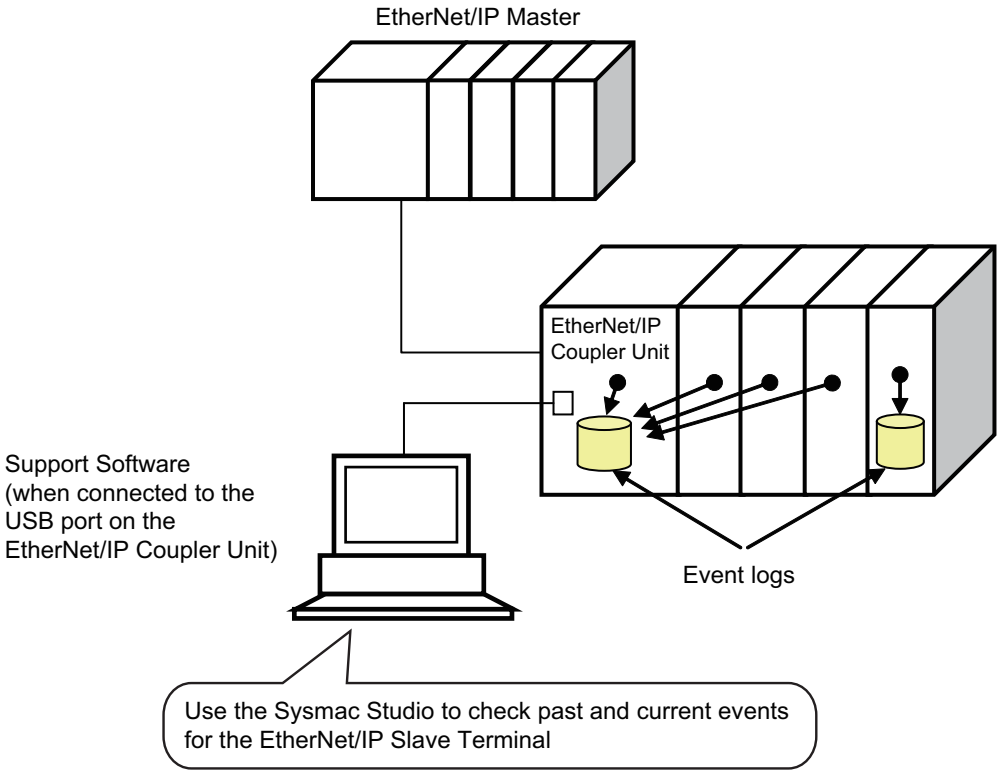
# 11-3 Event Logs

The EtherNet/IP Slave Terminal supports the event logs to perform troubleshooting.
This section describes event logging for EtherNet/IP Slave Terminals.



## 11-3-1 Introduction

The EtherNet/IP Slave Terminal records events, such as errors and status changes, that occur in the EtherNet/IP Slave Terminal. You can use the Support Software to check the meaning of the events in the EtherNet/IP Slave Terminals.




*Event* for an EtherNet/IP Slave Terminal is a generic term for an unexpected error or for information that does not indicate an error but for which the user must be notified.

### Features

Event logging in the EtherNet/IP Slave Terminal offer following benefits:

- In addition to error logs, various logs are recorded, such as execution of restarting.
- This allows you to check events based on time, which can help you isolate the causes of errors when problems occur.

## Displaying Event Logs

You can use the troubleshooting functions on the Support Software to check current and past events in an EtherNet/IP Slave Terminal.

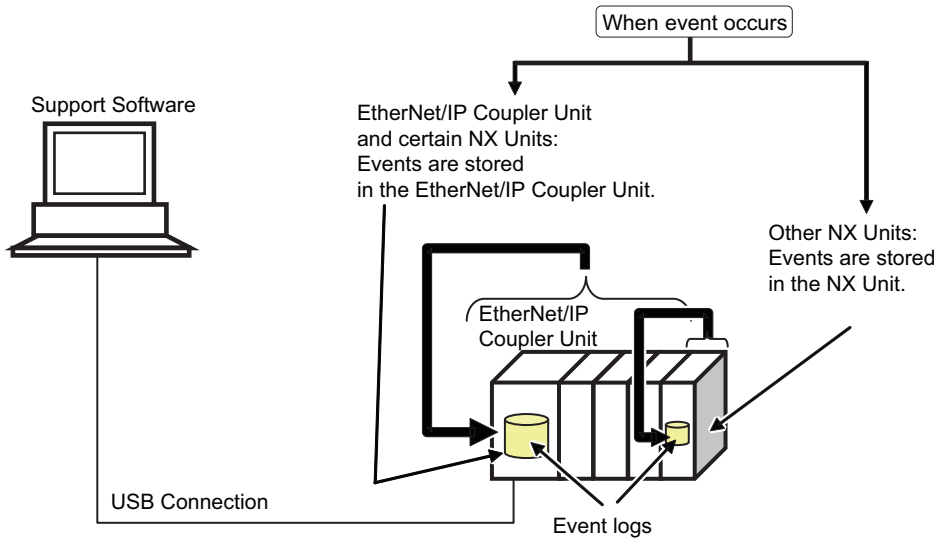
# 11-3-2 Detailed Information on Event Logs

This section describes the event logs in detail.

## Where Events Are Stored

Events that occur in the EtherNet/IP Slave Terminal are stored as described below.

| Unit where event occurred | Where events are stored |
|---|---|
| EtherNet/IP Coupler Unit | In the EtherNet/IP Coupler Unit |
| NX Units | In the EtherNet/IP Coupler Unit or in the NX Unit<br>Refer to the manual for the specific Unit for the location where events are stored. |




## Event Sources

The sources of events that occur in the EtherNet/IP Slave Terminal are listed below.

| Item | Description |
|---|---|
| Event source | EtherNet/IP Master Function Module |
| Source details | EtherNet/IP node address, slot position, NX Unit number, and model number |

## Event Log Categories

This information gives the category of the event log.
You view each of these logs separately on the Support Software.

| Event type | Event log category | Description |
|---|---|---|
| Controller event | System log | This is a log of the events that are detected by each Unit. |
| | Access log | This is a log of the events that affect the Slave Terminal operation due to user actions. |



## Number of Records

Each event log can contain the following number of records. If the number of events exceeds this number, the oldest events are overwritten.

| Event log category | Unit type | | |
|---|---|---|---|
| | EtherNet/IP Coupler Unit | NX Unit | |
| | | Units that store events in the EtherNet/IP Coupler Unit | Units that store their own events |
| System event log | Total: 128 events | | Check the specifications in the manual for each Unit. |
| Access event log | Total: 32 events | | |

## Retaining Event Logs during Power Interruptions

The EtherNet/IP Slave Terminal retains event logs even if the Unit power supply is interrupted.

## Event Codes

Event codes are pre-assigned to the events based on the type of event. Event codes are displayed as 8-digit hexadecimal numbers.
Refer to *12-3-5 Event Codes for Errors and Troubleshooting Procedures* on page 12-25 for details on event codes and error meanings.

**Additional Information**

When the power supply is turned ON, the EtherNet/IP Coupler Unit resets any current errors and detects errors again. Therefore, the same error may be recorded more than once in the event log of the EtherNet/IP Slave Terminal. This applies to the following errors.

- Errors that occurred before the power supply to the EtherNet/IP Slave Terminal was cycled for which the causes of the errors remain.
- Errors that occur after the power supply to the EtherNet/IP Slave Terminal is turned ON but before it moves to the Pre-Operational state.

## Event Levels

Each event has an *event level*.
Events are classified into the following five levels according to the level of impact the events have on control.

| No. | Event level | Classification |
|---|---|---|
| 1 | High | Major fault |

| No. | Event level | Classification |
|---|---|---|
| 2 | ↕ | Partial fault level |
| 3 | | Minor fault level |
| 4 | | Observation level |
| 5 | Low | Information level |

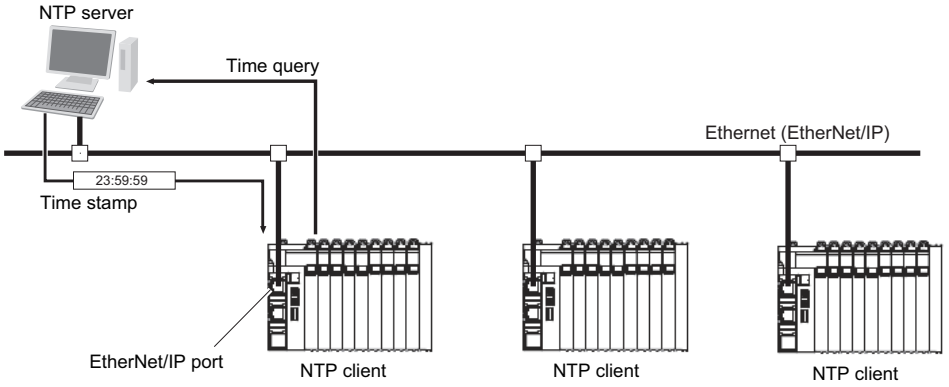
Errors with a higher level have a greater affect on the functions that the complete system provides, and it is more urgent to recover from them. These classifications are displayed on the Support Software when an error occurs.

You can change the level assigned to some events. Refer to *11-6 Changing Event Levels* on page 11-25.

## 11-3-3 Automatic Clock Adjustment

With the EtherNet/IP Coupler Unit, clock information can be read from the NTP*1 server after the power supply to the EtherNet/IP Coupler Unit is turned ON. The internal clock time in the EtherNet/IP Unit is updated with the read time.

*1. The NTP (Network Time Protocol) server is used to control the time on the LAN.




The time at which an event occurs in the EtherNet/IP Slave Terminal is recorded based on the time information from the clock built in the EtherNet/IP Coupler Unit, which is obtained from the NTP server. If the clock information cannot be obtained from the NTP server, the time on the Support Software is displayed as ----/--/-- --:--:--. The time of events that occur before the time is obtained from the NTP server are also displayed as ----/--/-- --:--:--.

**Version Information**

If the clock information cannot be obtained from the NTP server or if an event occurs before the time is obtained from the NTP server, the time of event occurrence is displayed as *1970/1/1 0:00:00* for Sysmac Studio version 1.14 or lower.

**Precautions for Correct Use**

If the EtherNet/IP Coupler Unit cannot obtain clock information even though it is connected to an NTP server, one possible cause is that it fails to synchronize the time due to large time fluctuations of the NTP server. Use an NTP server with minimal time fluctuations. For example, when using the Windows Time service as an NTP server, set the LocalClockDispersion value to the minimum value (0) in the NTP server settings.

## Specifications

| Item | Specification |
|---|---|
| Protocol | NTP |
| Port No. | 123 (UDP) |
| Access to NTP server | Obtains clock information from the NTP server and applies the time stamp to the EtherNet/IP Coupler Unit. |
| NTP Operation Timing | Clock information is automatically updated when the power supply to the EtherNet/IP Coupler Unit is turned ON. The interval to check the NTP server will vary between 1 and 128 s. |

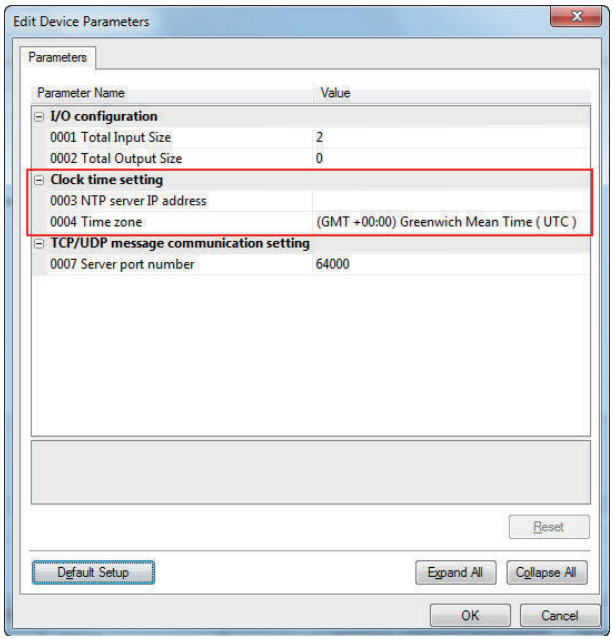
## Procedure

1. Open the Network Configurator file that contains the EtherNet/IP Coupler Unit.
2. Display the **Edit Device Parameters** area with either of the following methods.
   - Double-click the EtherNet/IP Coupler Unit in the network.
   - Right-click the EtherNet/IP Coupler Unit in the network and select **Parameter** - **Edit**.
3. Enter the values for NTP server IP address and Time Zone and click **OK**.
4. Go online and download the parameters to the EtherNet/IP Coupler Unit.

## Settings Required for Automatic Clock Adjustment

The following EtherNet/IP Coupler Unit settings are made from Network Configurator to use automatic clock adjustment.

| Setting | Setting conditions |
|---|---|
| NTP server IP address | Enter the NTP server IP address in the format of □□□.□□□.□□□.□□□. |
| Time Zone | Select a local time zone from the list.<br>Default: (GMT +00:00) Greenwich Mean Time (UTC) |



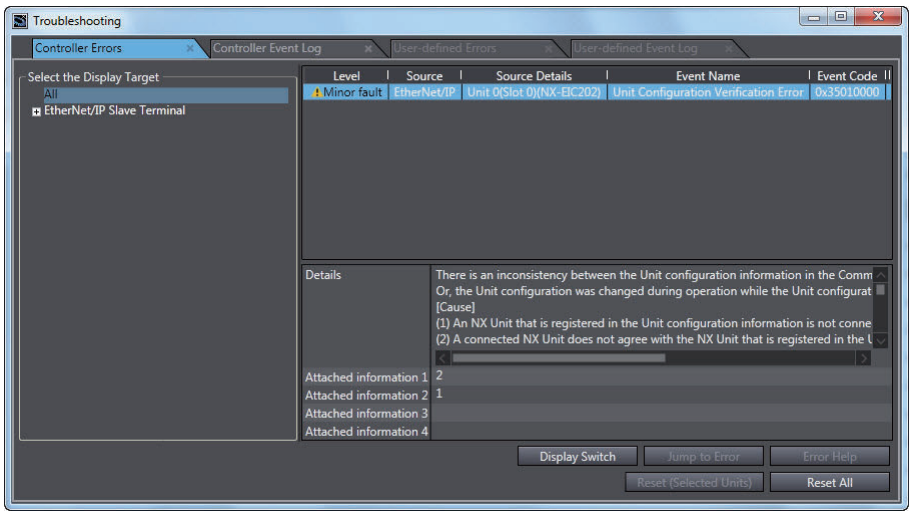

**Additional Information**

Daylight Savings Time is not supported.

## 11-3-4 Reading Event Logs

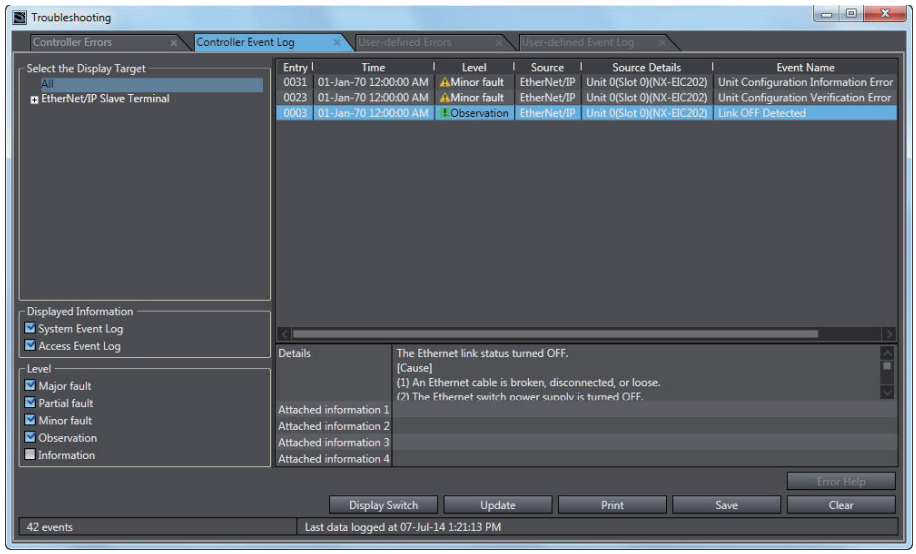
Use the following procedure to read the event log. The operations are described by using the Sysmac Studio as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

***1*** Select **Troubleshooting** from the **Tools** Menu while online. You can also click the **Troubleshooting** button in the toolbar.
The following **Troubleshooting** Dialog Box is displayed.




***2*** Click the **Controller Event Log** Tab.
The event log for the EtherNet/IP Coupler Unit is displayed.

Click the **Update** button to display the latest event log.
If an event is for a Slave Terminal, the node number of the Slave Terminal and the NX Unit number are displayed as the source details.




**Additional Information**

- The NX Unit numbers that are displayed as the source in the event log are the NX Unit numbers in the current Unit configuration. They are not necessarily the NX Unit numbers at the time that the event occurred.
- You can check the NX Unit event log that is stored in the EtherNet/IP Coupler Unit for NX Units that are no longer mounted under the EtherNet/IP Coupler Unit. To check them, select everything or select the EtherNet/IP Slave Terminal in the **Select the Display Target** from the **Controller Event Log** Tab Page. The event log display will also include NX Units that were previously mounted to the EtherNet/IP Coupler Unit. For these NX Units, the NX Unit number is the number when the error occurred.
  To display the event log for only the currently mounted NX Units, select the NX Units in the **Select the Display Target**.
- If the most recent version of the Support Software is not used, the Support Software may not support some events. The event code and attached information are displayed correctly.
  Use the most recent version of the Support Software to check events.

## 11-3-5 Clearing Event Logs

You can clear the event logs in the EtherNet/IP Slave Terminal. This section describes how to clear the event logs.

### Specifying the Scope of Event Logs to Clear

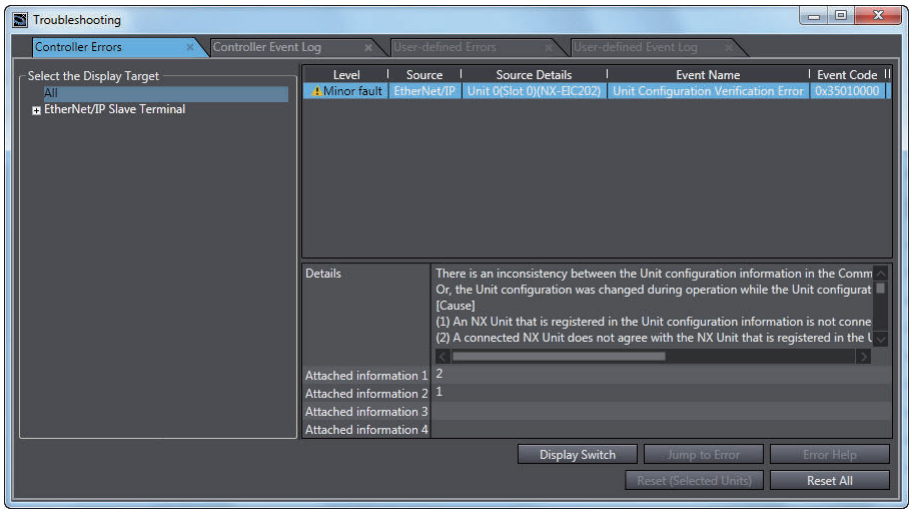
You can specify whether to clear events from the entire EtherNet/IP Slave Terminal, the EtherNet/IP Coupler Unit, or the NX Units.

| Support Software connection | Unit to clear log from | |
|---|---|---|
| | Clearing event logs in the entire EtherNet/IP Slave Terminal at once | Clearing events for specific Units |
| Peripheral USB port on EtherNet/IP Coupler Unit | • EtherNet/IP Slave Terminal | • EtherNet/IP Coupler Unit<br>• NX Units |

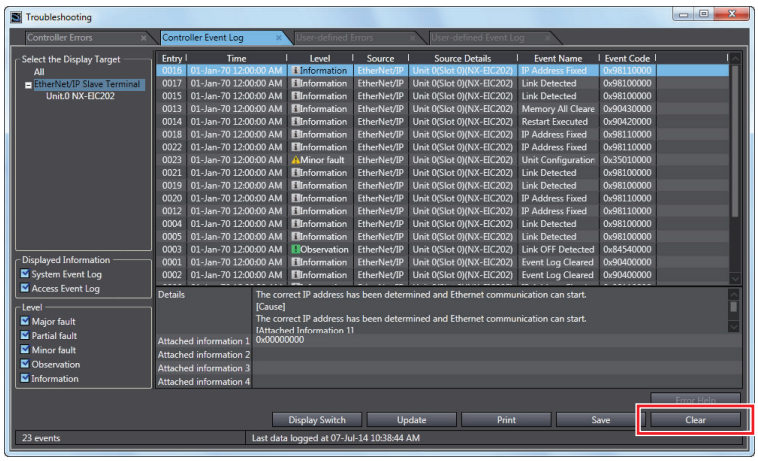
## Procedure for Clearing Event Logs

From the Controller Event Log Tab Page, you can clear the events for an entire Slave Terminal or the events for a specified EtherNet/IP Coupler Unit or NX Unit. The operations are described by using the Sysmac Studio as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

**1** Select **Troubleshooting** from the **Tools** Menu while online. You can also click the **Troubleshooting** button in the toolbar.
The following **Troubleshooting** Dialog Box is displayed.




**2** In the **Select the Display Target** Area of the **Controller Event Log** Tab Page, select the Units to clear and click the **Clear** button.



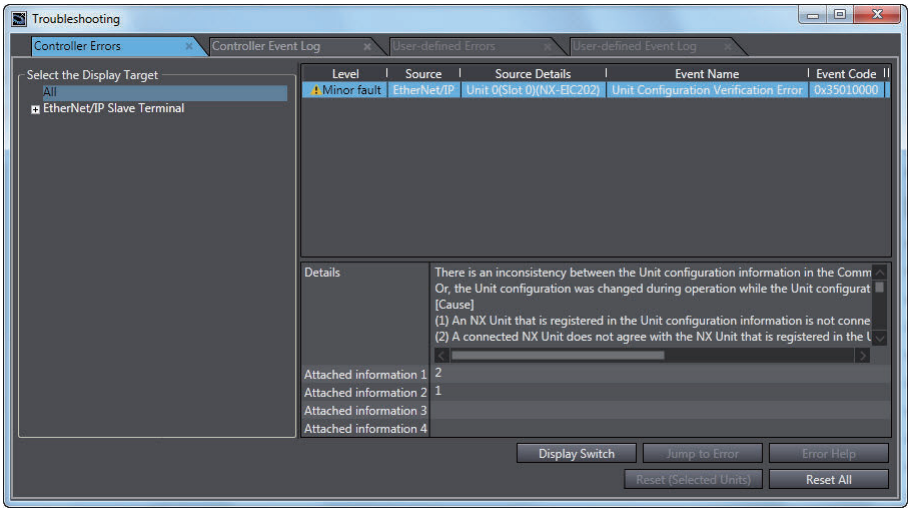

A confirmation dialog box is displayed.

**3** Click the **Yes** button.
The selected events are cleared.

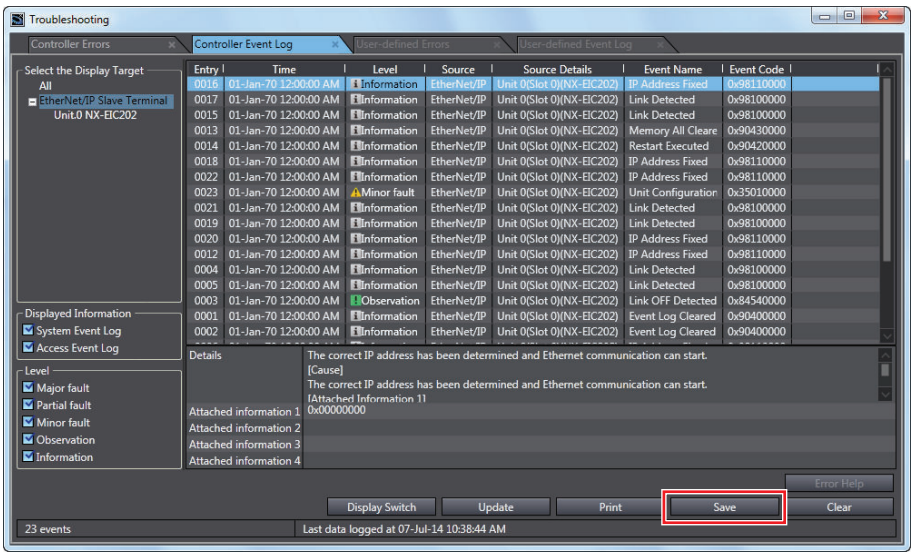
## 11-3-6 Exporting the Event Log

You can export the contents of the event log to a CSV file.
The event log for the EtherNet/IP Coupler Unit and NX Units is displayed as part of the Controller event log. Use the Support Software. The operations are described by using the Sysmac Studio as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

**1** Select **Troubleshooting** from the **Tools** Menu while online. You can also click the **Troubleshooting** button in the toolbar.
The following **Troubleshooting** Dialog Box is displayed.




**2** In the **Select the Display Target** Area of the **Controller Event Log** Tab Page, select the Unit for which to export the events and click the **Save** button.




The Save Dialog Box is displayed.

***3*** Input the file name, and then click the **Save** button.
The Controller event logs are saved in CSV format.

# 11-4 Clearing All Memory



This section describes how to clear all memory in the EtherNet/IP Slave Terminals.
This procedure is not used to clear all memory in the Safety Control Units. Refer to the *NX-series Safety Control Unit User's Manual (Cat. No. Z930)* for the procedure for the Clear All Memory operation for the Safety Control Units.

## 11-4-1 Introduction

The clear all memory function of the Support Software initializes various setting information in the EtherNet/IP Slave Terminal to the default settings, such as the Unit configuration information and the I/O allocation information.
You can use this function on the Sysmac Studio to initialize various setting information.

## 11-4-2 Details on Clearing All Memory

### Specifying the Scope of Memory to Clear

You can specify the scope of the memory to clear from the following.

- EtherNet/IP Coupler and NX Units
- EtherNet/IP Coupler Unit only
- NX Units only
- Event Logs

**Additional Information**

- Use the Support Software to clear the parameters of the connected NX Units.
- The Support Software can not clear all EtherNet/IP parameters. Use the Network Configurator to clear all EtherNet/IP related parameters.

## Scope of Data to Clear and State of Memory After it is Cleared

The function clears the following data in the EtherNet/IP Slave Terminal.

| Data | Status after Clear All Memory operation for each specification | | |
|---|---|---|---|
| | Entire EtherNet/IP Slave Terminal | EtherNet/IP Coupler Unit | NX Unit |
| Unit configuration information | This data is set to the default settings.<br>If you turn ON the Unit power supply immediately after the Clear All Memory operation is completed, the Slave Terminal starts based on the actual Unit configuration information. | The data is not cleared. | The data is not cleared. |
| I/O allocation information | This data is set to the default settings. | The data is not cleared. | The data is not cleared. |
| Unit operation settings | This data is set to the default settings. | This data is set to the default settings.<br>EtherNet/IP settings stay in memory, only TCP/IP settings and SNTP settings are cleared. | This data is set to the default settings. |
| Unit application data | Refer to the manual for each NX Unit for the operating specifications when the Clear All Memory operation is used on NX Units that have Unit application data. | --- | Refer to the manual for each NX Unit for the operating specifications when the Clear All Memory operation is used on NX Units that have Unit application data. |
| Event logs | Event logs are cleared if you select the Clear event log Option when you execute the Clear All Memory operation. | Event logs are cleared if you select the Clear event log Option when you execute the Clear All Memory operation. | Event logs are cleared if you select the Clear event log Option when you execute the Clear All Memory operation. |

**Additional Information**

- IP address information is not altered when memory is cleared. Use the Network Configurator to clear all EtherNet/IP related parameters.
- NTP server setting information is not altered when memory is cleared. Use the Network Configurator to clear all NTP server related parameters.

## Restarting After Clear All Memory Operation

Restarting is automatically performed after the Clear All Memory operation.
The following table gives the target of the Clear All Memory operation and the type of restart that is performed after the Clear All Memory operation.

| Target of Clear All Memory operation | Type of restart |
|---|---|
| Entire EtherNet/IP Slave Terminal | Restarting the Slave Terminal. |
| EtherNet/IP Coupler Unit | Restarting the Slave Terminal. |

| Target of Clear All Memory operation | Type of restart |
|---|---|
| NX Unit | Restarting the Slave Terminal or the NX Unit.*1 |

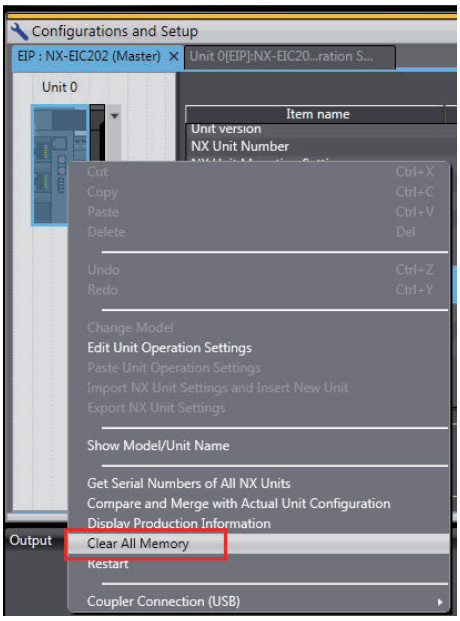
*1. The function to restart individual NX Units was added for a version upgrade. The NX Unit is restarted if the unit versions of the NX Unit support restarting individual NX Units.
The Slave Terminal is restarted if the unit version of the NX Unit does not support restarting individual NX Units.

## 11-4-3 Procedure for Clearing All Memory

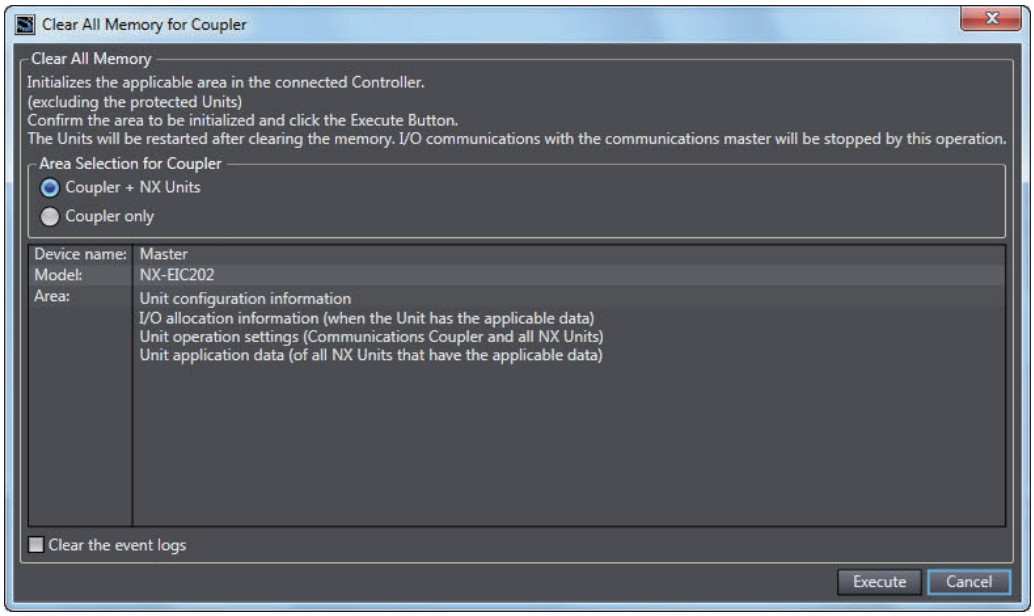
This section provides the procedure for the Clear All Memory operation. The operations are described by using the Sysmac Studio as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

### Clearing All Memory for EtherNet/IP Coupler Unit

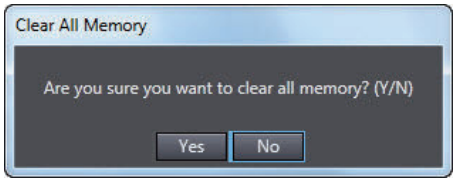
***1*** Go online, right-click the EtherNet/IP Coupler Unit in the Edit Slave Terminal Configuration Tab Page, and select **Clear All Memory**.



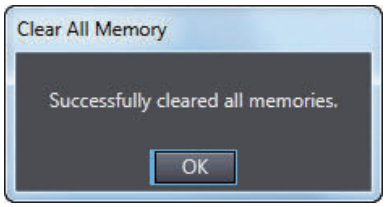

A **Clear All Memory** Dialog Box is displayed.




**2** Make an area selection for coupler and click **Execute**.
An execution confirmation dialog box is displayed.

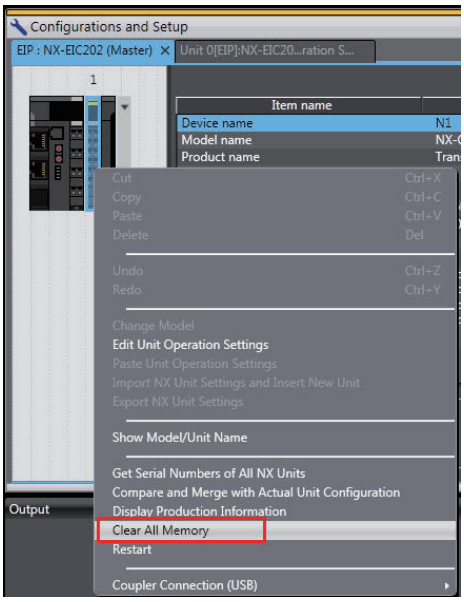



**3** Click the **Yes** button.
After the memory is cleared, an automatic restart occurs and the memory all cleared dialog box is displayed.

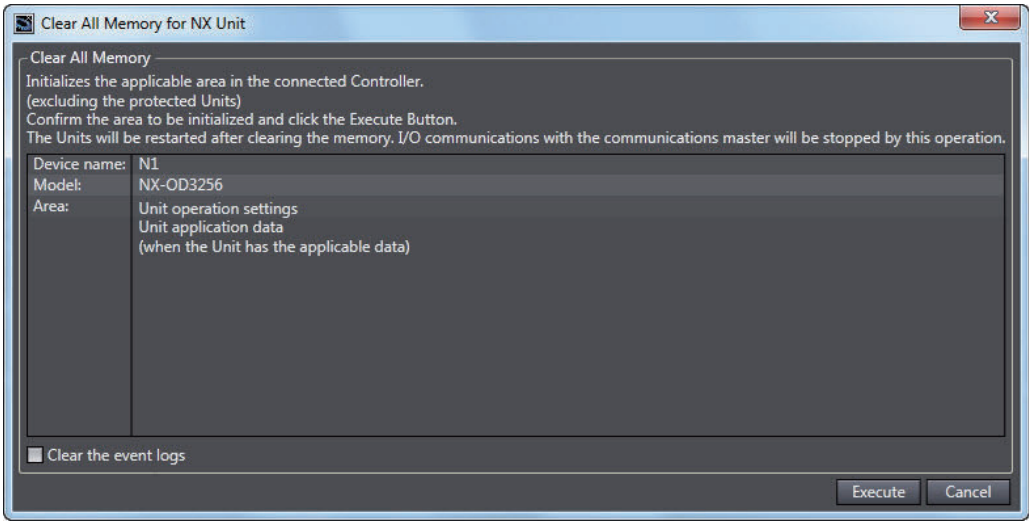



## Clearing All Memory for NX Unit

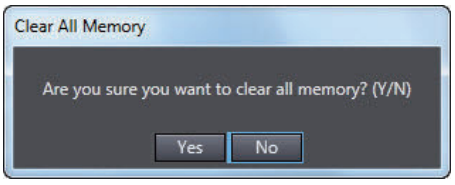
**1** Go online, right-click the NX Unit in the Edit Slave Terminal Configuration Tab Page, and select **Clear All Memory**.



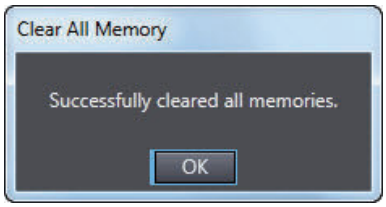

A **Clear All Memory** Dialog Box is displayed.




***2*** Make an area selection for coupler and click **Execute**.
An execution confirmation dialog box is displayed.




***3*** Click the **Yes** button.
After the memory is cleared, an automatic restart occurs and the memory all cleared dialog box is displayed.


Clear All Memory
Successfully cleared all memories.
OK

# 11-5 Restarting

This section describes restarting an EtherNet/IP Slave Terminal.



## 11-5-1 Introduction

The restart function is used to apply changes to settings with the Support Software or by executing instructions without cycling the Unit power supply to the EtherNet/IP Slave Terminal.

## 11-5-2 Details on Restarting

This section describes the types of restarts: Restarting the Slave Terminal and restarting individual NX Units.

### Types of Restarts

The following table provides functions for the types of restarts.

| Type | Function |
|---|---|
| Restarting Slave Terminal | The EtherNet/IP Coupler Unit and all NX Units mounted to the Slave Terminal are restarted. |
| Restarting individual NX Units | The specified NX Unit is restarted. |

### Restarting Slave Terminals

The EtherNet/IP Coupler Unit and all NX Units mounted to the Slave Terminal are restarted.
Use the Support Software to restart the Slave Terminal. Select the EtherNet/IP Coupler Unit of the Slave Terminal to restart and then execute the restart.

**Precautions for Correct Use**

- The EtherNet/IP master may detect an error when the Slave Terminal is restarted after a restart operation is performed with a direct USB connection between the Support Software and EtherNet/IP Coupler Unit. If an error is detected, you need to reset the error in the EtherNet/IP master.
- When the Slave Terminal is restarted, all of the Units on the Slave Terminal perform the same operation as when the power supply is cycled. Refer to the manuals for the specific Units for the operation that is performed when the power supply is turned ON.

### Restarting Individual NX Units

One specified NX Unit is restarted. The EtherNet/IP Coupler Unit and all NX Units that were not specified for restarting continue to operate.
Use the Support Software to restart the NX Unit. Select the NX Unit of the Slave Terminal to restart and then execute the restart.

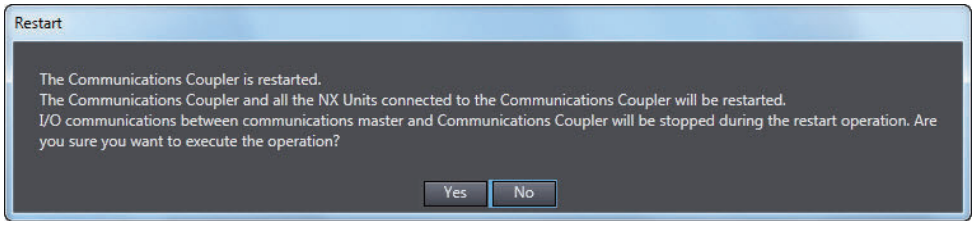
## 11-5-3 Procedure for Restarting

The Sysmac Studio is used as an example to describe the operation to restart a Unit with Support Software. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

### Restarting the Slave Terminal

Use the following procedure to restart all of the Units in the Slave Terminal.

**1** Go online, right-click the EtherNet/IP Coupler Unit in the Edit Slave Terminal Configuration Tab Page, and select **Restart**.
A Restart Confirmation Dialog Box is displayed.

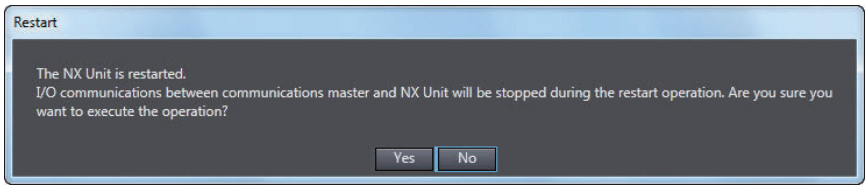



**2** Click the **Yes** button.
After the Units are restarted, a Restart Completion Dialog Box is displayed.

### Restarting an NX Unit

Use the following procedure to restart an NX Unit.

**1** Go online, right-click the NX Unit to restart in the Edit Slave Terminal Configuration Tab Page, and select **Restart**.
A Restart Confirmation Dialog Box is displayed.




**2** Click the **Yes** button.
After the Unit is restarted, a Restart Completion Dialog Box is displayed.

# 11-6 Changing Event Levels



This section describes changing event levels for the EtherNet/IP Slave Terminals.

## 11-6-1 Introduction

You can change the event levels that are assigned to each Controller event.

## 11-6-2 Details on Changing Event Levels

### Unit of Event Level Settings

Levels are set for each event in each Unit. If the same event code occurs in more than one Unit, you can set a different event level for each Unit.

### Events with Changeable Levels

- **EtherNet/IP Coupler Unit**

  The EtherNet/IP Coupler Unit does not have events for which you can change the event level.

- **NX Units**

  Refer to *Error Event Codes and Troubleshooting* in the *Troubleshooting* section of the manual for the NX Unit for the events for which you can change the event level in each NX Unit.

### When Changes Take Effect

Changes to the event levels take effect only after they are downloaded and the Unit power supply is cycled or the Units are restarted.

**Additional Information**

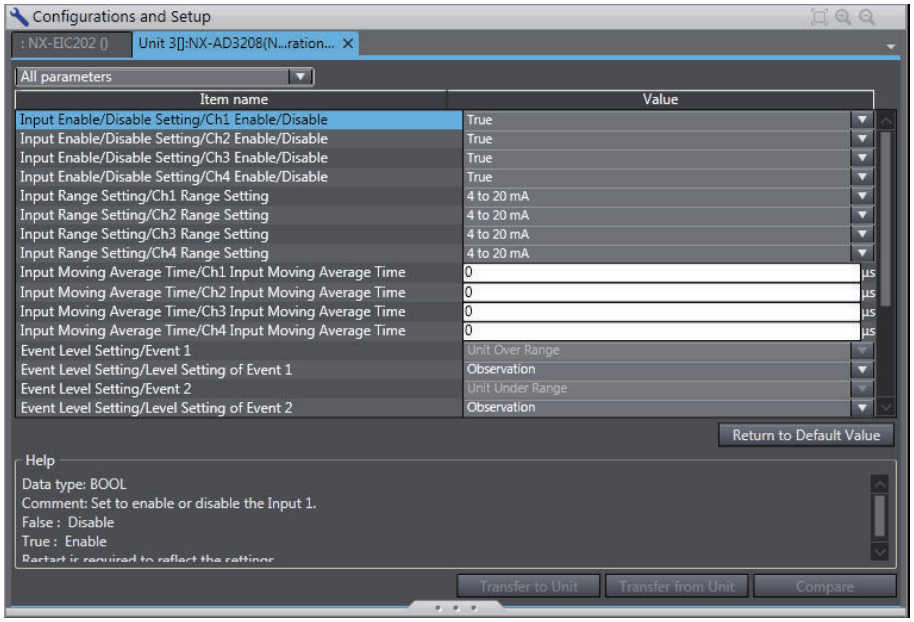
**Changing the Event Levels for Current Errors**
The event levels of current errors do not change when the event level settings are changed and downloaded. You must restart the EtherNet/IP Coupler Unit or cycle the Unit power supply to enable the changes.

## 11-6-3 Procedure to Change an Event Level

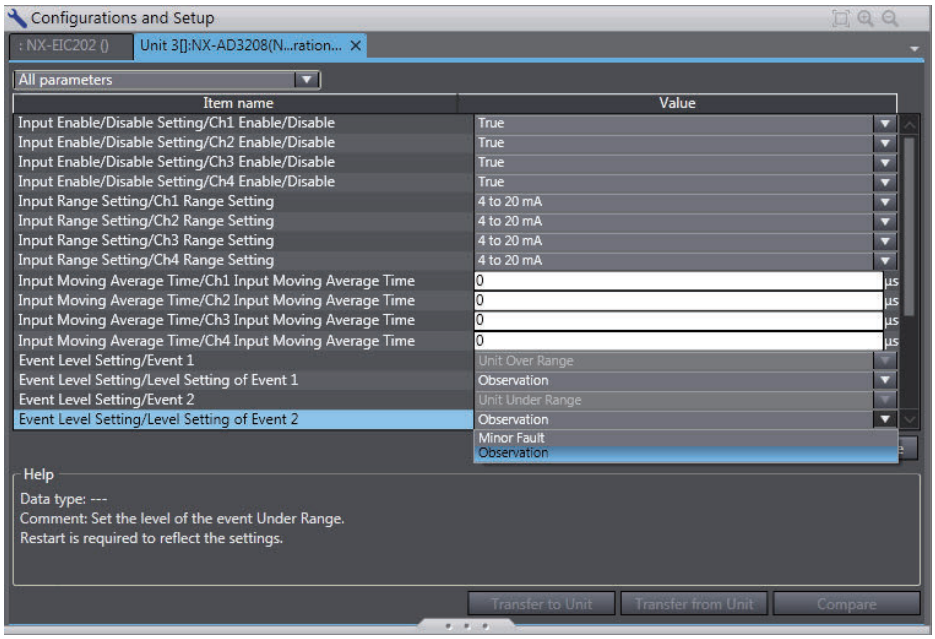
Use the Support Software to change an event level. The operations are described by using the Sysmac Studio as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.
After you change an event level, always transfer the operation settings to the Controller.

***1*** On the Edit Slave Terminal Configuration Tab Page, select the Unit for which to change the event level and click the **Unit Operation Settings** button.

The *Edit Unit Operation Settings* Tab Page is displayed.




**2** From the events for which *Level setting* is displayed, select the event for which you want to change the level, and then select a level from the list in the Value Field.



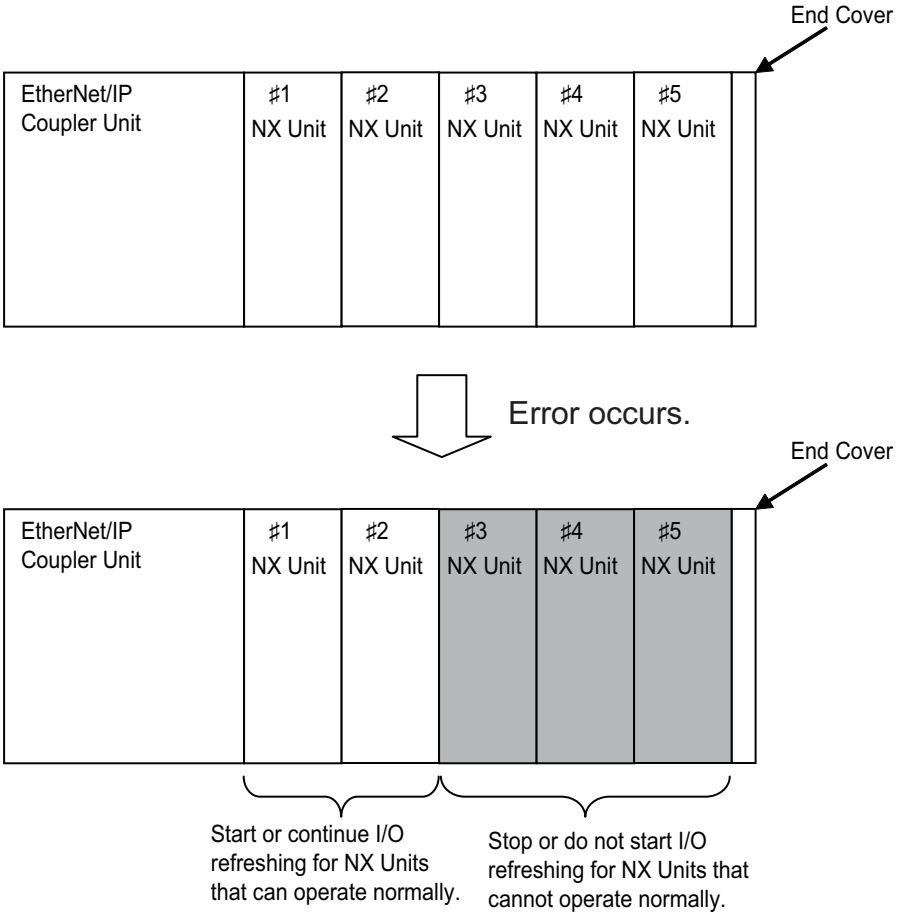

**3** After you make the change, go online and click the **Transfer to Unit** button to transfer the change to the Controller.
The specified event level is changed.
There are no events for the EtherNet/IP Coupler Unit for which you can change the event level.

# 11-7 Fail-soft Operation

This section describes the fail-soft operation for EtherNet/IP Slave Terminals.

## 11-7-1 Overview

This function allows the EtherNet/IP Coupler Unit to start or continue I/O refreshing only with the NX Units that can operate normally when an error occurs for the EtherNet/IP Slave Terminal.




**Precautions for Safe Use**

- If you change the fail-soft operation setting, the output status when the error occurs may also change. Confirm safety before you change the 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.
  To determine whether Unit I/O data is valid, you must assign the *NX Unit I/O Data Active Status* and the *NX Unit Error Status* from the I/O data that is assignable to the EtherNet/IP Coupler Unit.
  The *NX Unit Error Status* is not assigned by default. Add it to the I/O entry mapping.

## 11-7-2 Application

You can use this function in the following cases.

- When it is dangerous to stop the entire EtherNet/IP Slave Terminal all at once
- To continue the operation of the EtherNet/IP Slave Terminal until the system can be stopped safely through the user program or user operation
- To not stop all devices, i.e., to continue operation for only some devices

## 11-7-3 Details on Fail-soft Operation

This section describes fail-soft operation in detail.

### Operation for Errors with and without Fail-soft Operation

The following table describes the operation of an EtherNet/IP Slave Terminal when the EtherNet/IP Slave Terminal is used with and without fail-soft operation.

| Operating status | Operation when an error occurs while starting the EtherNet/IP Slave Terminal | Operation when an error occurs during normal operation of the EtherNet/IP Slave Terminal |
|---|---|---|
| With fail-soft operation | The EtherNet/IP Coupler Unit starts I/O refreshing for the NX Units that can operate normally.<br>It does not start I/O refreshing for NX Units that cannot operate normally. | The EtherNet/IP Coupler Unit continues I/O refreshing for the NX Units that can operate normally.<br>It stops I/O refreshing for NX Units that cannot operate normally. |
| Without fail-soft operation*1 | The EtherNet/IP Coupler Unit does not start I/O refreshing for any of the NX Units. | The EtherNet/IP Coupler Unit stops I/O refreshing for all of the NX Units. |

*1. When fail-soft operation is not used, all I/O refreshing is stopped.

Except for the I/O refreshing, the operation when an error occurs for the EtherNet/IP Slave Terminal is the same regardless of whether fail-soft operation is used. Specifically, error notification is provided and errors are recorded in the event log. Also, the indicators will show the error.

### Setting Fail-soft Operation

#### ● Using Fail-soft Operation

To enable fail-soft operation, use the Support Software to set the **Fail-soft Operation Setting** in the Unit operation settings for the EtherNet/IP Coupler Unit to **Fail-soft operation**. After you change the setting, always transfer the Unit operation settings to the EtherNet/IP Coupler Unit. For the Unit operation settings of the EtherNet/IP Coupler Unit and editing procedures, refer to *9-2-4 Unit Operation Settings* on page 9-22. Refer to *9-3 Transferring and Comparing Settings* on page 9-28 for the procedure to transfer the settings.

#### ● Not Using Fail-soft Operation

To disable fail-soft operation, use the Support Software to set the **Fail-soft Operation Setting** in the Unit operation settings for the EtherNet/IP Coupler Unit to **Stop**. The default setting is **Stop**. After you change the setting, always transfer the Unit operation settings to the EtherNet/IP Coupler Unit. For the Unit operation settings of the EtherNet/IP Coupler Unit and editing procedures, refer to *9-2-4 Unit Operation Settings* on page 9-22. Refer to *9-3 Transferring and Comparing Settings* on page 9-28 for the procedure to transfer the settings.

## Errors to Which Fail-soft Operation Applies

The following errors are examples of the errors to which fail-soft operation applies.

- Unit Configuration Verification Error*1
- NX Unit Communications Timeout
- NX Unit Initialization Error
- NX Unit Startup Error

*1. Even if you enable **fail-soft** operation, the EtherNet/IP Coupler Unit may not start refreshing I/O for any of the NX Units when the EtherNet/IP Slave Terminal is started, depending on the cause of the error. Refer to *Causes of Unit Configuration Verification Errors and Error Operation* on page 11-29 for details on the operation for different error causes.

Refer to *Error Descriptions* on page 12-30 for the errors to which fail-soft operation applies. If an error occurs to which **fail-soft operation** does not apply, the EtherNet/IP Coupler Unit will stop I/O refreshing for all of the NX Units even if you enable fail-soft operation.

## Causes of Unit Configuration Verification Errors and Error Operation

Depending on the cause of a Unit Configuration Verification Error, I/O refreshing may not start when the EtherNet/IP Slave Terminal starts even if **fail-soft** operation is enabled.
Examples are provided below.

| Example of Unit configuration information and actual configuration | | | | | | Description of configuration | Operation when EtherNet/IP Slave Terminal starts |
|---|---|---|---|---|---|---|---|
| | NX Unit numbers | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | | |
| Unit configuration information | A | B | C | D | E (unmounted) | The following models of Units are mounted after the EtherNet/IP Coupler Unit in the order given on the left: A, B, C, D, and E. Unit E, however, has the NX Unit Mounting Setting set to **Disable**. | --- |

| Example of Unit configuration information and actual configuration | | NX Unit numbers | | | | | Description of configuration | Operation when EtherNet/IP Slave Terminal starts |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | | |
| Actual configuration | Case 1 | A | B | C | --- | --- | Unit D is not mounted. | I/O refreshing is started for NX Unit numbers 1, 2, and 3 because fail-soft operation is enabled. |
| | Case 2 | A | C | D | --- | --- | Unit B is not mounted. | I/O refreshing does not start for any of the NX Units. |
| | Case 3 | A | B | D | C | --- | Units C and D are mounted in reverse order. | I/O refreshing does not start for any of the NX Units. |
| | Case 4 | A | B | C | D | D | An extra Unit D is mounted for NX Unit number 5. | I/O refreshing does not start for any of the NX Units. |
| | Case 5 | A | B | C | F | --- | Unit F is mounted for NX Unit number 4, but it does not exist in the Unit configuration information. | I/O refreshing does not start for any of the NX Units. |
| | Case 6 | A | B | C | D | E | Unit E is mounted for NX Unit number 5 even though its NX Unit Mounting Setting is set to **Disable**. | I/O refreshing does not start for any of the NX Units. |

# 11-8 Monitoring Total Power-ON Time

This section describes how to monitor the total power-ON time for EtherNet/IP Coupler Units and NX Units.

## 11-8-1 Overview

Each of the EtherNet/IP Coupler Units and NX Units records the total time that the Unit power supply is ON to it and the total times can be displayed on the Support Software.

## 11-8-2 Details on Monitoring Total Power-ON Times

The specifications of monitoring the total power-ON times are given in the following table.

| Item | Specification |
|---|---|
| Display unit | • When total power-ON time is less than 1 hour: Minutes<br>• When total power-ON time is 1 hour or longer: Hours |
| Update interval | • When total power-ON time is less than 1 hour: 10 minutes<br>• When total power-ON time is 1 hour or longer: 1 hour |
| Measurement error | 1 hour/month max. |
| Default setting | 0 minutes |

## 11-8-3 Checking Total Power-ON Times

You can use the **Production Information** on the Support Software to check the total power-ON times of the EtherNet/IP Coupler Unit and NX Units.
For the procedure to check the **Production Information** on the Support Software, refer to *Confirming Unit Versions with the Support Software* on page 33.

### ● Display When Times Cannot Be Recorded

If the total power-ON time cannot be recorded because of a non-volatile memory hardware error, the total power-ON time is displayed as **Invalid record** on the Support Software.

### ● Display for Units That Do Not Support Monitoring the Total Power-ON Time

If a Unit does not support monitoring the total power-ON time, the total power-ON time for the Unit is displayed as "**---**" on the Support Software.

### ● Display When Reading the Time Failed

If reading the time failed, the total power-ON time is displayed as "**---**" on the Support Software.

# 11-9 Ethernet Switch Functions

This section describes the Ethernet switch functions of the EtherNet/IP Coupler Unit.
The Ethernet ports of an EtherNet/IP Coupler Unit support the layer 2 Ethernet switch functions.

The supported functions are given below.

| Item | |
|---|---|
| Packet buffer size | 64 KB |
| Number of MAC address tables | 1,000 |
| Broadcast storm detection | Supported |
| QoS for EtherNet/IP | Not supported |
| SNMP | Not supported |
| VLAN | Not supported |
| STP | Not supported |
| IGMP snooping | Not supported |
| Port mirroring | Not supported |

**Precautions for Correct Use**

The communications path will be cut off when the Ethernet/IP Coupler Unit is restarted.

# 12

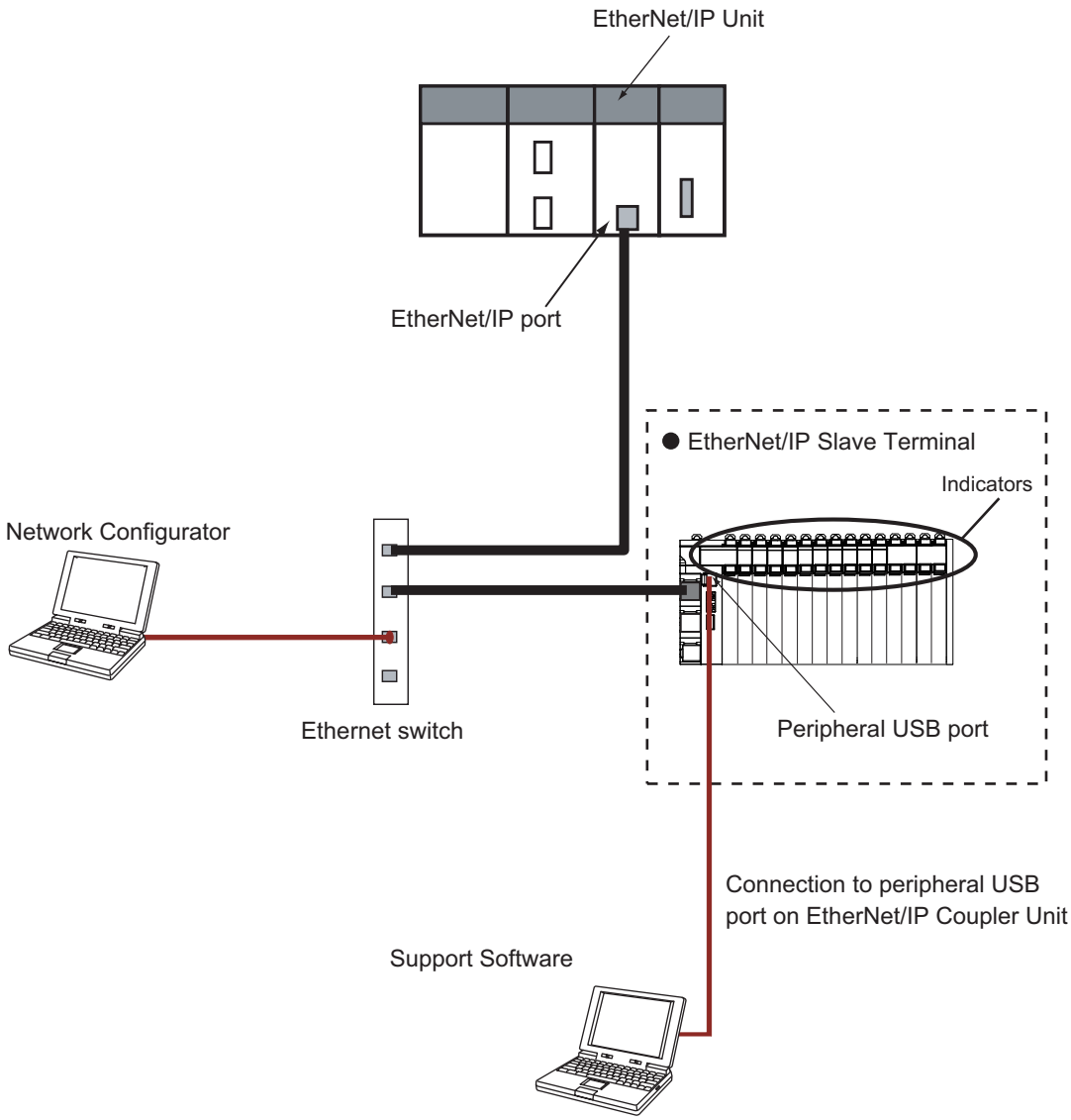
# Troubleshooting



There are several ways to check errors on an EtherNet/IP Slave Terminal. If an error occurs, refer to this section to troubleshoot the error.

# 12-1 How to Check for Errors

Use the following methods to check the status of errors on the EtherNet/IP Slave Terminal.




| Checking method | What you can check |
|---|---|
| Checking the indicators | The indicators tell you the status of each Unit, and the level of the error. |
| Troubleshooting with the Support Software | You can check for current errors, a log of past errors, error sources, error causes, and corrections. |

**Precautions for Correct Use**

You cannot use the HMI Troubleshooter for an EtherNet/IP Slave Terminal.

# 12-2 Checking for Errors and Troubleshooting with the Indicators

You can check for errors in the EtherNet/IP Slave Terminal with the indicators on the EtherNet/IP Coupler Unit and the NX Units. This section tells you about the errors that the indicators show and the troubleshooting procedures for them.

## 12-2-1 Checking for Errors and Troubleshooting with the Indicators on the EtherNet/IP Coupler Unit

### Indicators

| Name | Function |
|---|---|
| L/A P1 | The L/A P1 indicator shows the status of the port 1 EtherNet/IP communications. |
| L/A P2 | The L/A P2 indicator shows the status of the port 2 EtherNet/IP communications. |
| MS | The MS indicator shows the EtherNet/IP Coupler Unit operating status. |
| NS | The NS indicator shows the operating status of the EtherNet/IP communications. |
| TS | The TS indicator gives the status of the EtherNet/IP Coupler Unit and the communications status between the EtherNet/IP Coupler Unit and the NX Units. |
| UNIT PWR | The UNIT PWR indicator shows the status of the Unit power supply. |
| I/O PWR | The I/O PWR indicator shows the status of the I/O power supply. |

### Primary Errors That the Indicators Show and Troubleshooting Procedures

- **Troubleshooting the Primary Errors That are Displayed with the MS and NS Indicators**

  The MS indicator represents the EtherNet/IP Coupler Unit module status.

  The NS indicator represents the EtherNet/IP Coupler Unit Error status.

| MS | | NS | | Cause | Corrective action |
|---|---|---|---|---|---|
| Green | Red | Green | Red | | |
| Not Lit | Not Lit | Not Lit | Not Lit | • No power is supplied by the Unit power supply.<br>• Restarting is in progress for the Unit.<br>• Waiting for initialization to start. | Check the following items and make sure that power is correctly supplied from the Unit power supply.<br>Checks Related to the Power Supply<br>• Make sure that the power supply cable is wired properly.<br>• Make sure that there are no breaks in the power supply cable.<br>• Make sure that the power supply voltage is within the specified range.<br>• Make sure that the power supply has enough capacity.<br>• Make sure that the power supply has not failed.<br>• Wait for the Unit to finish initializing.<br>Check the UNIT PWR indicator for additional information. |
| Flashes at 0.5-s intervals. | --- | --- | --- | Restarting or initialization is in progress for the Slave Terminal. | --- (This is the normal status. Wait until processing is completed.) |
| Lit | --- | Flashes at 0.5-s intervals. | --- | No tag data links or connection-based message (class 3) connection with an EtherNet/IP master has been established. | If there is no connection even though connections, e.g., for tag data links, are set in the EtherNet/IP master, there may be mistakes in the connection settings in the EtherNet/IP master. Check for errors related to connections that were detected by the EtherNet/IP master and review the connection settings in the EtherNet/IP master. |
| Lit | --- | Lit | --- | Normal operation and online communication connection is established. | --- (This is the normal status.) |
| --- | Lit | --- | --- | • Bus Controller Error<br>• Non-volatile Memory Hardware Error<br>• Memory Corruption Detected | Cycle power to the Slave Unit.<br>If cycling the power does not clear the error, replace the Slave Unit. |

| MS | | NS | | Cause | Corrective action |
|---|---|---|---|---|---|
| Green | Red | Green | Red | | |
| --- | Flashes at 0.5-s intervals. | --- | --- | • Unit Configuration Verification Error<br>• Non-volatile Memory Control Parameter Error<br>• Unit Configuration Error<br>• Unit Configuration Error, Too Many Units<br>• Unit Configuration Error, Unsupported Configuration<br>• TCP/IP Setting Error (Local IP Address)<br>• NTP Client Setting Error<br>• NX Unit Communications Timeout<br>• NX Unit Initialization Error<br>• NX Unit Startup Error | Refer to *12-3-5 Event Codes for Errors and Troubleshooting Procedures* on page 12-25 for troubleshooting information. |
| Lit | --- | --- | Lit | Fatal communication error. The Unit detects that it cannot communicate on the network. | Check the following items.<br>• IP address duplication |
| Lit | --- | --- | Flashes at 0.5-s intervals. | A timeout occurred in tag data link communications. | Check the following items.<br>• Communication cable connections |
| | | | | BOOTP Server Connection Error | Refer to *12-3-5 Event Codes for Errors and Troubleshooting Procedures* on page 12-25 for troubleshooting information. |

## ● Troubleshooting the Primary Errors That Are Displayed with the TS Indicators

The TS indicator shows the status of the EtherNet/IP Coupler Unit and the communications status between the EtherNet/IP Coupler Unit and the NX Units.

| TS | | Cause | Corrective action |
|---|---|---|---|
| Green | Red | | |
| Lit | --- | Communication established with all connected NX Units | --- (This is the normal status.) |
| Flashes at 2.0-s intervals. | --- | Initializing | --- (This status is normal. Wait until processing is completed) |
| Flashes at 0.5-s intervals. | --- | Unit configuration information is not set. The EtherNet/IP Coupler Unit is operating according to the actual Unit configuration. | Promptly check whether the configuration is the intended configuration and then register the Unit configuration information on the Support Software. |

| TS | | Cause | Corrective action |
|---|---|---|---|
| Green | Red | | |
| --- | Lit | Non-volatile Memory Control Parameter Error | If you turn OFF the power supply to the NX Unit or disconnect the Support Software communications while writing the control parameters is in progress, write the control parameters again. |
| | | Memory Corruption Detected | Cycle the power supply to the Slave Terminal. If this error occurs again even after you cycle the power supply, replace the EtherNet/IP Coupler Unit. |
| | | Unit Configuration Error, Too Many Units | Make sure that the number of NX Units that are connected does not exceed the upper limit of the specifications. |
| | | Unit Configuration Error, Unsupported Configuration | Make sure that the total byte size of all I/O data in the EtherNet/IP Slave Terminal does not exceed the upper size limit of 512 bytes for input data or 512 bytes for output data. |
| | | Unit Configuration Information Error | If you turn OFF the power supply to the EtherNet/IP Coupler Unit or disconnect communications with the Support Software while a download of Unit configuration information is in progress, clear all memory on the EtherNet/IP Coupler Unit, and then download the Unit configuration information again. |
| | | Unit Configuration Verification Error | There is an inconsistency between the Unit configuration information in the EtherNet/IP Coupler Unit and the Units that are actually connected.<br>• Make sure that the Unit that is connected is registered.<br>• Make sure that the Unit that is registered is connected. |
| | | NX Unit Startup Error | Cycle the power supply to the Slave Terminal. If this error occurs again even after you cycle the power supply, replace the NX Unit. |
| | | Non-volatile Memory Hardware Error | Replace the Communications Coupler Unit. |
| | | Bus Controller Error | • Mount the NX Units and End Cover securely and secure them with End Plates.<br>• Cycle the power supply to the Communications Coupler Unit.<br>• If the error occurs again even after you make the above correction, replace the Communications Coupler Unit. |
| | | Check the items described above. If this error occurs again even after you cycle the power supply, replace the EtherNet/IP Coupler Unit. | |

| TS | | Cause | Corrective action |
|---|---|---|---|
| Green | Red | | |
| --- | Flashes at 1.0-s intervals. | NX Unit Communications Timeout | Check the following items.<br>• Make sure that the NX Unit is mounted correctly.<br>If the error occurs again even after you make the above correction, replace the NX Unit. |
| | | NX Unit Initialization Error | Connect the Support Software, and then set and save the Unit configuration information in the EtherNet/IP Coupler Unit again. If this error occurs again, check that there are no errors in the NX Unit settings and I/O data mapping information, and correct any errors that are found.<br>For an Analog I/O Unit, set the Channel Enable/Disable Setting to *Enable* for at least one channel.<br>If the error occurs again even after you check the items above, cycle the power supply to the NX Unit in question. If this error persists, replace the NX Unit. |
| | | • BOOTP Server Connection Error<br>• TCP/IP Setting Error (Local IP Address)<br>• IP Address Duplication Error | Refer to *12-3-5 Event Codes for Errors and Troubleshooting Procedures* on page 12-25 for troubleshooting information. |
| Not Lit | Not Lit | No power is supplied by the Unit power supply. | Check the following items and make sure that power is correctly supplied from the Unit power supply.<br>Checks Related to the Power Supply<br>• Make sure that the power supply cable is wired properly.<br>• Make sure that there are no breaks in the power supply cable.<br>• Make sure that the power supply voltage is within the specified range.<br>• Make sure that the power supply has enough capacity.<br>• Make sure that the power supply has not failed.<br>• Wait for the Unit to finish initializing.<br>Check the MS and NS indicators for additional information.<br>Check the UNIT PWR indicator for additional information. |

## ● Troubleshooting the Primary Errors That Are Displayed with the UNIT PWR Indicators

The UNIT PWR indicator shows the status of the Unit power supply.

| UNIT PWR | Cause | Corrective action |
|---|---|---|
| Green | | |
| Lit | --- | --- (This is the normal status.) |

| UNIT PWR<br>Green | Cause | Corrective action |
|---|---|---|
| Not Lit | No power is supplied by the Unit power supply. | Check the following items and make sure that power is correctly supplied from the Unit power supply.<br>Checks related to the Power Supply<br>• Make sure that the power supply cable is wired properly.<br>• Make sure that there are no breaks in the power supply cable.<br>• Make sure that the power supply voltage is within the specified range.<br>• Make sure that the power supply has enough capacity.<br>• Make sure that the power supply has not failed. |

## ● Troubleshooting the Primary Errors That Are Displayed with the I/O PWR Indicators

The I/O PWR indicator shows the status of the I/O power supply.

| I/O PWR<br>Green | Cause | Corrective action |
|---|---|---|
| Lit | --- | --- (This is the normal status.) |
| Not Lit | No power is supplied by the I/O power supply. | Check the following items and make sure that power is correctly supplied from the I/O power supply.<br>Checks related to the I/O Supply<br>• Make sure that the power supply cable is wired properly.<br>• Make sure that there are no breaks in the power supply cable.<br>• Make sure that the power supply voltage is within the specified range.<br>• Make sure that the power supply has enough capacity.<br>• Make sure that the power supply has not failed. |

## ● Troubleshooting the Primary Errors That Are Displayed with the L/A P1 and L/A P2 Indicators

The L/A P1 and L/A P2 indicators show the status of the port activity.

| L/A P1<br>L/A P2<br>Green | Cause | Corrective action |
|---|---|---|
| Lit | A link was established in the physical layer. | --- (The Coupler Unit is in standby status after the link was established in the physical layer. Wait until processing is completed.) |
| Blinking | Link present and communicating. | --- (This is the normal status.) |

| L/A P1<br>L/A P2<br>Green | Cause | Corrective action |
|---|---|---|
| Not Lit | A link was not established in the physical layer. | Check the following items, and then restart the Slave Terminal based on the specifications of the connected EtherNet/IP master.<br>Items Related to the Communications Cable<br>• Make sure that the communications cable is wired properly.<br>• Make sure that there are no breaks in the communications cable or loosening in the mating parts.<br>• Make sure that the cable is of the appropriate length.<br>• Make sure that the communications cable meets the recommended specifications. |
| | If you cannot resolve the problem after you check the above items and cycle the Unit power supply, there may be a hardware failure. In that case, replace the EtherNet/IP Coupler Unit. | |

## 12-2-2 Checking for Errors and Troubleshooting with the Indicators on the NX Units

The **TS** indicator on an NX Unit tells you the status and level of any errors in the NX Unit.
Refer to the manuals for the individual NX Units for details on the other indicators on the NX Units.

# 12-3 Checking for Errors and Troubleshooting with Support Software

Support Software can be used to check the status and errors for troubleshooting hardware and network issues.
The following table provides a general description of the troubleshooting functions of each Support Software.

| Applicable Support Software | Troubleshooting Function |
|---|---|
| Network Configurator | The following troubleshooting functions are available with Network Configurator Software. These are functions of the EtherNet/IP Unit.<br>• Ethernet Status<br>• Data Link Status<br>• Configuration Error Status<br>• Target Node Status<br>• Target Controller Status<br>• Connection Status<br>• Controller Log<br>• Tag Status<br>• Ethernet Information |
| Sysmac Studio and NX-IO Configurator | The following troubleshooting functions are available with the Sysmac Studio and NX-IO Configurator.<br>• Check errors managed by the EtherNet/IP Coupler Unit*1<br>• Check errors in the NX Units that are connected to the EtherNet/IP Coupler Unit*2 |

*1. You cannot check errors if there is a *fatal error in the EtherNet/IP Coupler Unit*.
*2. On NX Units that manage their own errors, current errors cannot be checked after a *fatal error occurs in that NX Unit*. On NX Units that record their own event logs, the error log cannot be checked after a *fatal error occurs in that NX Unit*.

## 12-3-1 Checking Status with the Network Configurator

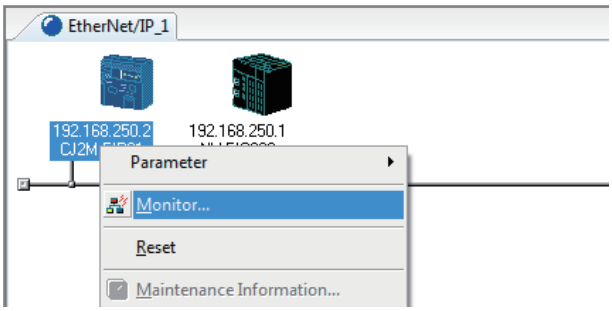
The EtherNet/IP Unit provides status information with the Network Configurator.

**Precautions for Correct Use**

To check the status of communications with the EtherNet/IP Coupler Unit, check the status information provided by the EtherNet/IP Unit. You cannot check the status information provided by the EtherNet/IP Coupler Unit with the Network Configurator. To check the status information provided by the EtherNet/IP Coupler Unit, you must allocate the status information to tag data links. Refer to *9-2-3 I/O Allocation Information* on page 9-12 for details on allocating the status information to tag data links.

### The Network Configurator's Device Monitor Function

Connect the Network Configurator online, select the device to be checked, right-click to display the pop-up menu, and select **Monitor**.




The **Monitor Device** Dialog Box will be displayed.

**Additional Information**

If a communications error occurs during monitoring, the dialog box will continue to show the last information that was collected. To start monitoring again, close the **Monitor Device** Dialog Box, and then open the dialog box again.

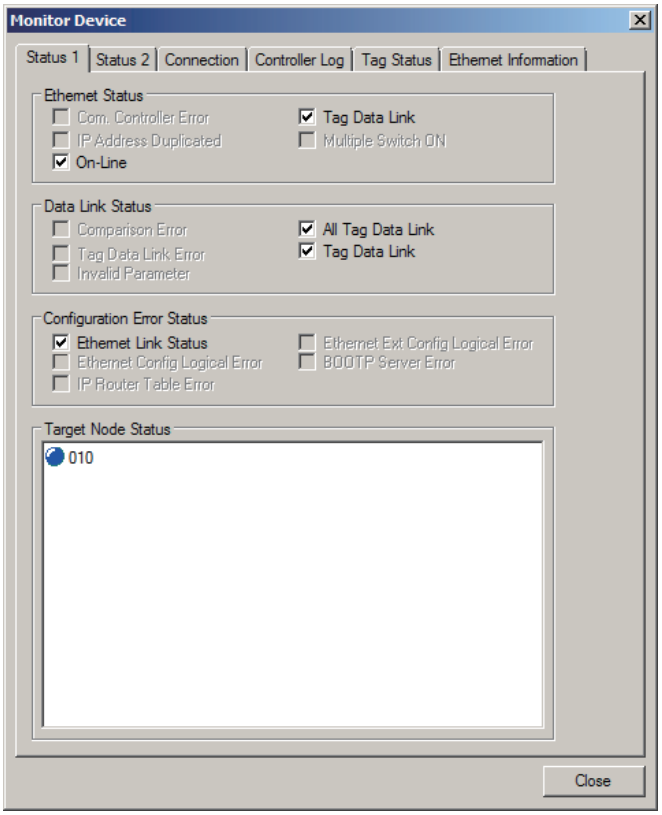
## ● Status 1 Tab Page

The following check boxes are displayed for the status. If a check box is selected, the status is TRUE.

| Classification | Item | Description |
|---|---|---|
| Ethernet Status | Com. Controller Error | An error occurred in the communications controller. |
| | IP Address Duplicated | The same IP address is assigned to more than one node. |
| | On-Line | Indicates that the Unit is online. (The EtherNet/IP Unit can perform communications processing.) |
| | Tag Data Link | Indicates that the tag data link is in operation. This is TRUE in the following cases:<br>• The originator is set up and the power supply is turned ON.<br>• The originator is set up and the start data link switch is changed to TRUE. |
| | Multiple Switch ON | Indicates that more than one data link start/stop switch changed to TRUE at the same time. |
| Data Link Status | Comparison Error | The remote node information in the tag data link parameters was different from the actual node information.<br>Main causes:<br>• The specified target does not exist.<br>• The variable name does not match.<br>• The connection size is different.<br>• Connection resources are not sufficient. |
| | Tag Data Link Error | There were two or more errors in a connection as an originator. |
| | Invalid Parameter | An error was found in the validation check of the parameters for tag data links that are saved in non-volatile memory. |
| | All Tag Data Links | Tag data links are communicating in all connections as the originator. |
| | Tag Data Link | Tag data links are communicating in one or more connections as the originator. |

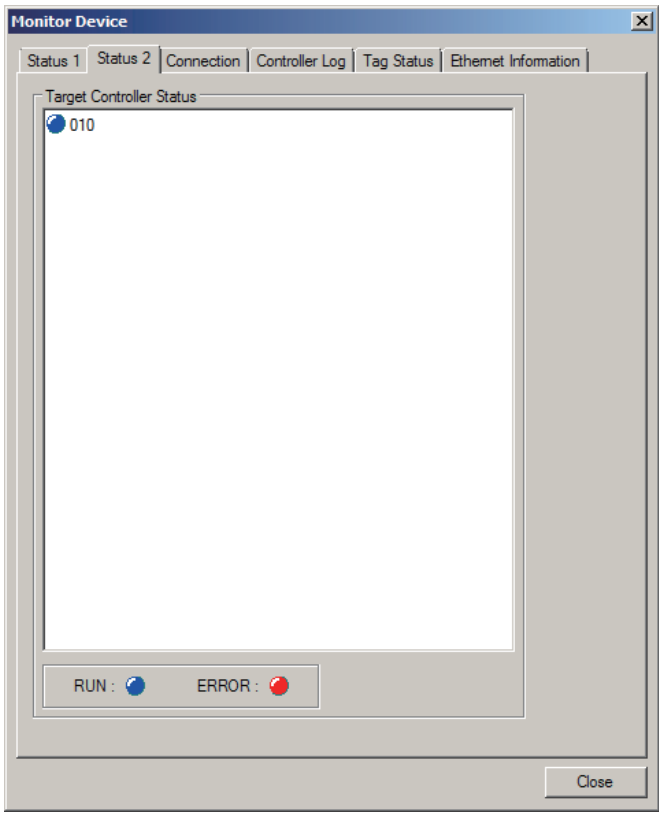
| Classification | Item | Description |
|---|---|---|
| Configuration Error Status | Ethernet Link Status | TRUE when a link is established with the Ethernet switch. |
| | Ethernet Basic Settings Logic Error | TRUE when the following settings are incorrect:<br>• TCP/IP settings (IP address, subnet mask, or link settings) |
| | IP Router Table Error | TRUE when there is a mistake in the IP router table information. |
| | Ethernet Ext Config Logical Error | Always FALSE. |
| | BOOTP Server Error | TRUE when one of the following errors occurs when using the BOOTP server.<br>• The IP address received from the BOOTP server is incorrect.<br>• A communications timeout occurred with the server. |

Information about the target node that acts as the originator is displayed.
If all tag data link connections to the node are established and normal, this information is displayed in blue. However, if any connection is broken it is displayed in red.



## Status 2 Tab Page

The Status 2 Tab Page's Target PLC Status Field shows the status of the target node PLCs that are connected with the EtherNet/IP Unit as the tag data link originator. The icon will be blue if the CPU Unit is in RUN mode or MONITOR mode, gray if it is in PROGRAM mode, or red if an error occurred.

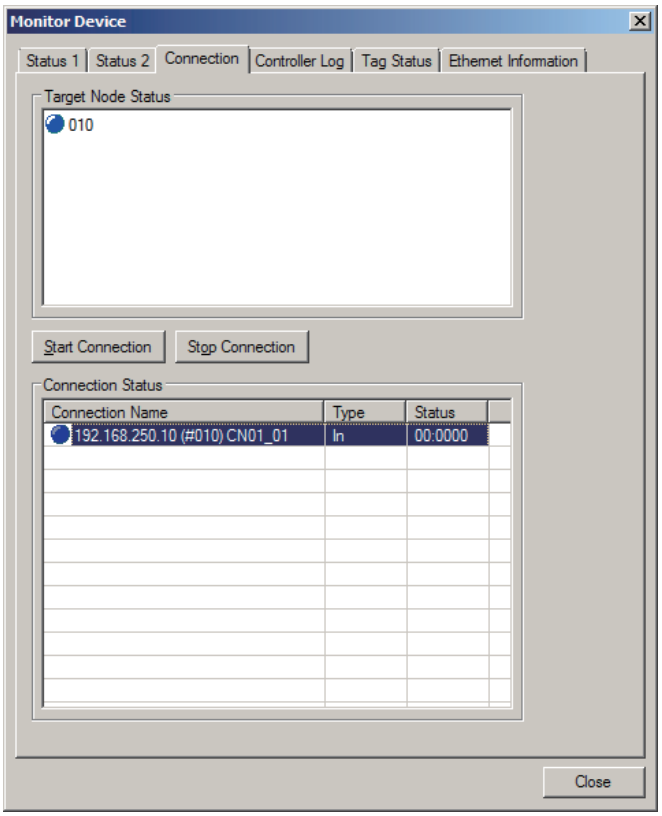



### Additional Information

The target Controller status can be used when the Controller status is selected for all the target sets for both originator and target connections. If it is not selected, it is grayed out on the display.

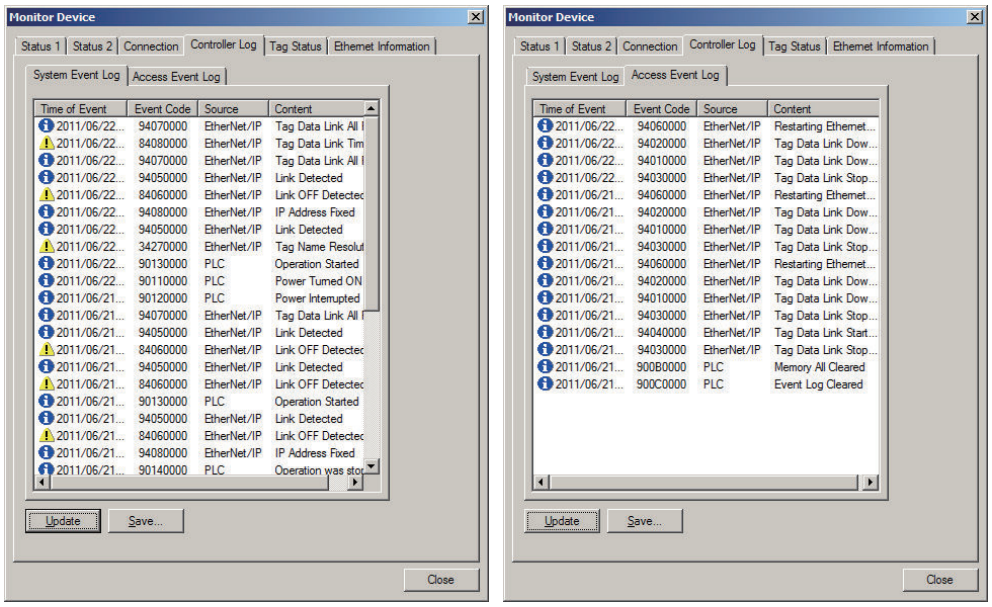
## Connection Tab Page

Information about the target node that acts as the originator is displayed. If all tag data link connections to the node are established and normal, this information is displayed in blue. However, if any connection is broken it is displayed in red. However, this information is displayed in gray if the connection to the node is stopped. In addition, the **Connection Status** Area shows the current status of each connection that is set as the originator. This information can be used to identify the cause of tag data link errors. Refer to *12-3-2 Connection Status Codes and Troubleshooting* on page 12-17 for details on the connection status.



## Controller Event Log Tab Page

This tab page displays the Controller event log that is stored in the CPU Unit. The error history shows errors that have occurred. It can be saved in a file in the computer. Refer to the operation manual of the CPU Unit for details on error information.

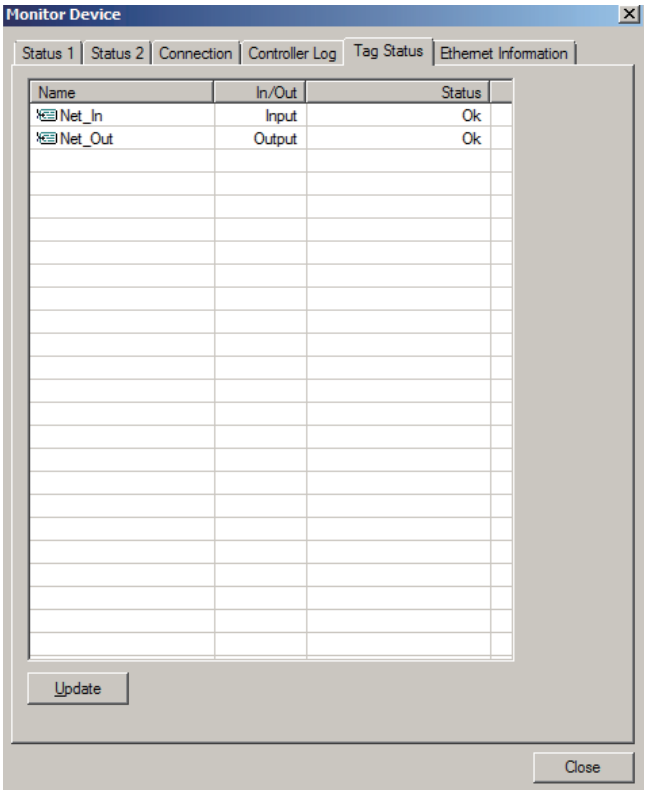



## Tag Status Tab Page

This tab page displays if the tag settings for each tag for tag data links are set so that data can be exchanged with the CPU Unit. The following status is displayed depending on the status that is set.

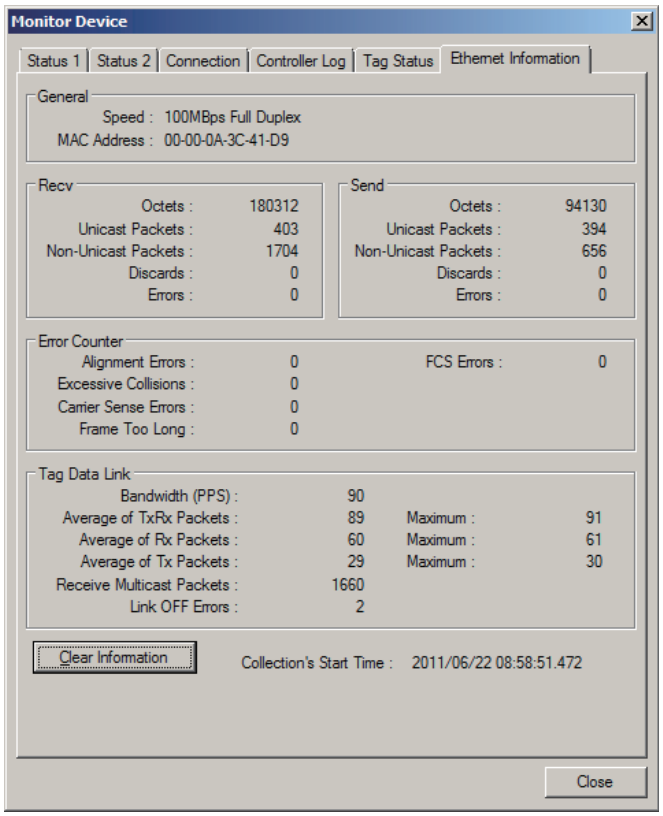
- Normal resolution completed: Normal data exchange is possible.
- Resolving: The variables with tags are being resolved. When the resolution is completed normally, a connection will be established and the data exchange will start.
- Size does not match error: Different sizes are set for the network variables and the tag settings. A connection will not be established for a tag for which this error occurs.
- No tag: A network variable is not set in the variable table in the CPU Unit for the specified tag setting. A connection will not be established for a tag for which this error occurs.
- Attribute error: Writing is not possible for Read Only and Constant attributes.

If the status is not “Normal resolution completed,” check the tag data link settings or the network variable settings in the symbol table in the CJ2-series CPU Unit.




## ● EtherNet/IP Information Tab Page

This tab page displays the communications status at the communications driver level of the EtherNet/IP port. The error counter information can be used to confirm whether communications problems have occurred. The tag data link information can be used to confirm characteristics such as the bandwidth usage (pps).




## 12-3-2 Connection Status Codes and Troubleshooting

This section explains how to identify and correct errors based on the tag data link's connection status. The connection status can be read using the **Connection** Tab Page of the Network Configurator's Monitor Device Window. Refer to *12-3-1 Checking Status with the Network Configurator* on page 12-10 for details.

### Additional Information

The connection status has the same meaning as the Connection Manager's General and Additional error response codes, as defined in the CIP specifications.

The following table shows the likely causes of the errors for each configuration and connection status (code).

| | Originator | Target |
|---|---|---|
| Configuration 1 | CJ1W-EIP21, CJ2H-CPU□□-EIP, CJ2M-CPU3□, or other OMRON EtherNet/IP master devices | EtherNet/IP Coupler Unit |
| Configuration 2 | EtherNet/IP master device from another manufacturer | EtherNet/IP Coupler Unit |

| Connection status | | Source of error | Handling | |
|---|---|---|---|---|
| General Status (hex) | Additional Status (hex) | | Configuration 1 | Configuration 2 |
| 00 | 0000 | Normal status code:<br>The connection has been opened and the tag data link is communicating normally. | --- | --- |
| 01 | 0100 | Error code returned from target:<br>Attempted to open multiple connections for the same connection. | This error does not occur. | Depends on the originator's specifications. (This error should not occur. If is does, contact the originator device's manufacturer.) |
| 01 | 0103 | Error code returned from target:<br>Attempted to open a connection with an unsupported transport class. | This error does not occur. | Confirm that the originator supports Class 1. |
| 01 | 0106 | Duplicate consumers:<br>Attempted to open multiple connections for single-consumer data. | If the tag data link is stopped or started, this error may occur according to the timing, but the system will recover automatically. | If the tag data link is stopped or started, this error may occur according to the timing, but the system will recover automatically. |
| 01 | 0107 | Error code returned from target:<br>Attempted to close a connection, but that connection was already closed. | This error does not occur. | This is not an error because the connection is already closed. |
| 01 | 0108 | Error code returned from target:<br>Attempted to open a connection with an unsupported connection type. | This error does not occur. | Check which connection types can be used by the originator. (An error will occur if a connection other than a multicast or point-to-point connection is set.) |
| 01 | 0109 | Error code returned from target:<br>The connection size settings are different in the originator and target. | Check the connection sizes set in the originator and target. Please update tag size as described in *9-5-4 Determine Tag Sizes* on page 9-40. | |
| 01 | 0110 | Error code returned from target:<br>The target was unable to open the connection, because of its operating status, such as downloading settings. | Check whether the tag data link is stopped at the target. (Restart the tag data link communications with the software switch.) | Check whether the tag data link is stopped at the target. (Restart the tag data link communications with the software switch.) |
| 01 | 0111 | Error code returned from target:<br>The RPI was set to a value that exceeds the specifications. | This error does not occur. | Set the originator's RPI setting to 10 seconds or less. |
| 01 | 0113 | Error code generated by originator or returned from target:<br>Attempted to open more connections than allowed by the specifications (32). | Check the connection settings (number of connections) at the originator and target. | Check the connection settings (number of connections) at the originator and target. Check the connection specifications for devices from other manufacturers. |

| Connection status | | Source of error | Handling | |
|---|---|---|---|---|
| General Status (hex) | Additional Status (hex) | | Configuration 1 | Configuration 2 |
| 01 | 0114 | Error code returned from target:<br>The Vendor ID and Product Code did not match when opening connection. | This error does not occur. | Check the originator's connection settings. |
| 01 | 0115 | Error code returned from target:<br>The Product Type did not match when opening connection. | This error does not occur. | Check the originator's connection settings. |
| 01 | 0116 | Error code returned from target:<br>The Major/Minor Revisions did not match when opening connection. | Check the major and minor revisions set for the target device and connection. If necessary, obtain the most recent EDS file and set it again. | Implement one of the following measures.<br>• Enable the Compatibility bit by the Support Software of the originator.<br>The Compatibility bit is used as an ODVA term. However, the term used may vary depending on the Support Software used.<br>• Match the major and minor revisions set for the target device in the originator to the major and minor revisions of the actual target device. |
| 01 | 0117 | Error code returned from target:<br>The tag set specified in the connection's target variables does not exist. | Check whether the originator and target tag sets and tags are set correctly. | Check the originator's connection settings.<br>Check whether the target tag sets and tags are set correctly. |
| 01 | 0118 | Error code returned from the target:<br>There is a mistake in the size specified with the data segment included in the connection path. | This error does not occur. | Check the originator's connection settings. |
| 01 | 0119 | Error code returned from the target:<br>An attempt was made to open a listen only connection when there was no connection other than a listen only connection open. | Check the connection settings of all originator devices and see if an Input/Output or Input Only connection is set. | |

| Connection status | | Source of error | Handling | |
|---|---|---|---|---|
| General Status (hex) | Additional Status (hex) | | Configuration 1 | Configuration 2 |
| 01 | 011A | Error code generated by originator:<br>Connection could not be established because the buffer was full due to high traffic. | Unexpected network traffic may have been received. Use the Network Configurator Device Monitor or the **Ethernet** Tab Page to check the bandwidth usage, and correct the load. If there are places where broadcast storms occur, such as loop connections in the network connection format, then correct them. | Depends on the target's specifications. (Contact the target device's manufacturer.) |
| 01 | 011B | Error code returned from target:<br>The RPI was set to a value that is below the specifications. | This error does not occur. | Set the originator's RPI setting to 1 ms or greater. |
| 01 | 0123 | Error code returned from the target:<br>A request was received to open a type of connection that is not supported<br>(a connection type going from the originator to the target). | This error does not occur. | Check the originator's connection type. An error will occur if any type other than multicast or point-to-point is specified. |
| 01 | 0124 | Error code returned from the target:<br>A request was received to open a type of connection that is not supported<br>(a connection type going from the target to the originator). | This error does not occur. | Check the originator's connection type. An error will occur if any type other than multicast or point-to-point is specified. |

| Connection status | | Source of error | Handling | |
|---|---|---|---|---|
| General Status (hex) | Additional Status (hex) | | Configuration 1 | Configuration 2 |
| 01 | 0127 | Error code returned from the target:<br>A different data size is set for the connection in the originator and target<br>(data from the originator to the target). | Check the connection sizes set in the originator and target<br>(data from the originator to the target). | Implement one of the following measures.<br>• Enable the Compatibility bit by the Support Software of the originator.<br>The Compatibility bit is used as an ODVA term. However, the term used may vary depending on the Support Software used.<br>• Match the connection size by the Support Software of the originator.<br>For example, when this Unit is replaced from the Unit version 1.0 to the Unit version 1.2 without changing the Unit configuration information and this error occurs, there is a four bytes difference of connection size due to the originator setting, and a connection may fail be opened.<br>• Match the major and minor revisions set for the target device in the originator to the major and minor revisions of the actual target device. |
| 01 | 0128 | Error code returned from the target:<br>A different data size is set for the connection in the originator and target<br>(data from the target to the originator). | Check the connection sizes set in the originator and target<br>(data from the target to the originator). | |
| 01 | 0203 | Error code generated by originator:<br>The connection timed out. | Tag data link communications from the target timed out. Check the power supply and cable wiring of the devices in the communications path, including the target and switches. If performance has dropped due to heavy traffic, change the performance settings. For example, increase the timeout time or RPI setting. | |

| Connection status | | Source of error | Handling | |
|---|---|---|---|---|
| General Status (hex) | Additional Status (hex) | | Configuration 1 | Configuration 2 |
| 01 | 0204 | Error code generated by originator:<br>The connection open process timed out. | There was no response from the target. Check the power supply and cable wiring of the devices in the communications path, including the target and switches. | |
| 01 | 0205 | Error code returned from target:<br>There was a parameter error in the frame used to open the connection. | This error does not occur. | Depends on the originator's specifications. (Contact the originator device's manufacturer.) |
| 01 | 0302 | Error code generated by originator or returned from target:<br>The tag data link's allowable bandwidth (pps) was exceeded. | Check the connection settings (number of connections and RPI) at the originator and target. | Check the connection settings (number of connections and RPI) at the originator and target. |
| 01 | 0311 | Error code returned from target:<br>There was a parameter error in the frame used to open the connection. | This error does not occur. | Depends on the originator's specifications. (Contact the originator device's manufacturer.) |
| 01 | 0312 | Error code returned from target:<br>There was a parameter error in the frame used to open the connection. | This error does not occur. | Depends on the originator's specifications. (Contact the originator device's manufacturer.) |
| 01 | 0315 | Error code returned from target:<br>There was a parameter error in the frame used to open the connection. | This error does not occur. | Depends on the originator's specifications. (Contact the originator device's manufacturer.) |
| 01 | 0316 | Error code returned from target:<br>There was a parameter error in the frame used to close the connection. | This error does not occur. | Depends on the originator's specifications. (Contact the originator device's manufacturer.) |
| 01 | 031C | Error code generated by originator:<br>Some other error occurred. | This error does not occur. | Depends on the originator's specifications. (Contact the originator device's manufacturer.) |
| 08 | --- | Error code returned from target:<br>There is no Forward Open or Large Forward Open service in the target device. | This error does not occur. | Depends on the originator's specifications. (Contact the originator device's manufacturer.) |

| Connection status | | Source of error | Handling | |
|---|---|---|---|---|
| General Status (hex) | Additional Status (hex) | | Configuration 1 | Configuration 2 |
| D0 | 0001 | Error code generated by originator:<br>The connection operation is stopped. | The connection was stopped because the Tag Data Link Stop Bit was turned ON, or the settings data is being downloaded. Either turn ON the Tag Data Link Start Switch, or wait until the settings data has been downloaded. This code includes fatal Controller errors and Unit failure. To handle these errors, refer to *12-1 How to Check for Errors* on page 12-2. | Depends on the originator's specifications. (Contact the originator device's manufacturer.) |
| D0 | 0002 | Error code generated by originator:<br>The connection is being opened (opening processing in progress). | Wait until the opening processing is completed. | Depends on the originator's specifications. (Contact the originator device's manufacturer.) |
| **OMRON error code** | | | | |
| 01 | 0810 | Error code returned from target:<br>New data could not be obtained from the CPU Unit when opening connection. (The Unit will automatically recover, and attempt to open the connection again.) | This error may occur if the CPU Unit's task period was long when opening the connection or some problem in the Controller caused the Controller to stop. If the task period was too long, operation recovers automatically. If the Controller has stopped, identify the error from the error information in the CPU Unit. | The meaning of this error code is defined by each vendor, so it depends on the originator's specifications. (Contact the originator device's manufacturer.) |
| 01 | 0811 | Error code generated by originator:<br>New data could not be obtained from the CPU Unit when opening connection. (The Unit will automatically recover, and attempt to open the connection again.) | This error may occur if the CPU Unit's task period was long when opening the connection. If the task period was too long, operation recovers automatically. | The meaning of this error code is defined by each vendor, so it depends on the originator's specifications. (Contact the originator device's manufacturer.) |

**Additional Information**

For details, refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)*, the user's manual for the built-in EtherNet/IP port of the connected CPU Unit or Industrial PC, or the manual for the connected EtherNet/IP master from another company.

## 12-3-3 Checking for Errors from the Sysmac Studio

When an error occurs, you can place the Sysmac Studio online to the EtherNet/IP Coupler Unit to check current errors and the log of past errors.
If you cannot check the error on the Sysmac Studio, check the errors using the indicators as outlined in *12-2 Checking for Errors and Troubleshooting with the Indicators* on page 12-3.

### Current Errors

Open the Sysmac Studio's **Controller Errors** Tab Page to check the current error's *level*, *source*, *source details*, *event name*, *event codes*, *details*, *attached information 1 to 4* and *correction*. Refer to *11-3-4 Reading Event Logs* on page 11-12 for more information on checking controller errors.
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 |
|---|---|
| EtherNet/IP Coupler Unit | 128 errors |
| NX Units | For NX Units that manage their own current errors, the number of current errors depends on the specifications of the individual Units.<br>For NX Units that do not manage their own current errors, current errors are managed in the EtherNet/IP Coupler Unit, so the number of current errors is limited by the number of errors for the EtherNet/IP Coupler Unit.<br>Refer to the manual for each NX Unit to find out if the NX Unit manages its own current errors. |

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 **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.
Refer to *12-3-5 Event Codes for Errors and Troubleshooting Procedures* on page 12-25 for details on event codes.

## 12-3-4 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. Refer to the operation manual for the Support Software for the methods to check for errors.
Refer to *12-3-5 Event Codes for Errors and Troubleshooting Procedures* on page 12-25 for information on event codes.

## 12-3-5 Event Codes for Errors and Troubleshooting Procedures

This section describes the errors (events) that can occur and how to troubleshoot them.

### Error Table

The errors (i.e., events) that can occur in the EtherNet/IP Coupler Unit are given on the following pages. The following abbreviations are used in the Level column.

| Abbreviation | Meaning |
|---|---|
| Maj | Major fault level |
| Prt | Partial fault level |
| Min | Minor fault level |
| Obs | Observation level |
| Info | Information level |

| Event code | Event name | Meaning | Assumed cause | Level | | | | | Reference |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Maj | Prt | Min | Obs | Info | |
| 00210000 hex | Bus Controller Error | An internal bus error occurred. | • A Unit failed or an I/O communications error occurred between the Communications Coupler Unit and the NX Unit. | | | ○ | | | page 12-32 |
| 00220000 hex | Non-volatile Memory Hardware Error | An error occurred in non-volatile memory. | • Non-volatile memory failure | | | ○ | | | page 12-33 |
| 10420000 hex | Non-volatile Memory Control Parameter Error | An error occurred in the control parameters. | • The power supply to the Communications Coupler Unit was turned OFF or Support Software communications were disconnected while writing the Unit operation settings was in progress. | | | ○ | | | page 12-34 |
| 10430000 hex | Memory Corruption Detected | Memory corruption was detected. | • Memory corruption was detected. | | | ○ | | | page 12-35 |
| 24A00000 hex | Unit Configuration Error, Too Many Units | The number of connected NX Units exceeds the maximum value for the EtherNet/IP Coupler Unit. | • More than the maximum number of NX Units is connected to the Communications Coupler Unit. | | | ○ | | | page 12-36 |

| Event code | Event name | Meaning | Assumed cause | Level | | | | | Reference |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Maj | Prt | Min | Obs | Info | |
| 24A10000 hex | Unit Configuration Error, Unsupported Configuration | An unsupported NX Unit is mounted. Or, the total byte size of all I/O data for the connected NX Units exceeds the predetermined maximum value for the EtherNet/IP Coupler Unit. | • An unsupported NX Unit was detected.<br>• The total byte size of all I/O data for the connected NX Units exceeds the predetermined maximum value for the Communications Coupler Unit. | | | ○ | | | page 12-37 |
| 35000000 hex | Unit Configuration Information Error | An error occurred in the Unit configuration information in the Communications Coupler Unit. | • The power supply to the Communications Coupler Unit was turned OFF or Support Software communications were disconnected while downloading the Unit configuration information. | | | ○ | | | page 12-38 |

| Event code | Event name | Meaning | Assumed cause | Level | | | | | Reference |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Maj | Prt | Min | Obs | Info | |
| 35010000 hex | Unit Configuration Verification Error | There is an inconsistency between the Unit configuration information in the EtherNet/IP Coupler Unit and the Units that are actually connected. Or, the Unit configuration was changed during operation while the Unit configuration information was not set in the EtherNet/IP Coupler Unit. | • An NX Unit that is registered in the Unit configuration information is not connected.<br>• A connected NX Unit does not agree with the NX Unit that is registered in the Unit configuration information.<br>• An NX Unit that is not registered in the Unit configuration information is connected.<br>• A mounted Unit is disabled in the NX Unit Mounting Setting for the Unit configuration information.<br>• An NX Unit became disconnected during operation.<br>• An NX Unit was connected during operation.<br>• The serial number of a Unit that is registered in the Unit configuration information does not agree with the serial number of the Unit that is connected. (The Serial Number Check Method is *set to Setting = Actual device*.)<br>• The version of a Unit that is registered in the Unit configuration information is newer than the version of the Unit that is connected.<br>• The power supply to an Additional NX Unit Power Supply Unit is not turned ON. | | | ○ | | | page 12-39 |
| 35500000 hex | TCP/IP Setting Error (Local IP Address) | An error was detected in the IP address settings. | • TCP/IP setting error<br>• Power was interrupted when a download was in progress for TCP/IP settings.<br>• The IP address delivered from the BOOTP server is incorrect. | | | ○ | | | page 12-42 |

| Event code | Event name | Meaning | Assumed cause | Level | | | | | Reference |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Maj | Prt | Min | Obs | Info | |
| 40200000 hex | NX Unit Processing Error | A fatal error occurred in an NX Unit. | • An error occurred in the software. | | | ○ | | | page 12-43 |
| 84500000 hex | IP Address Duplication Error | The same IP address is used more than once. | • The IP address of the EtherNet/IP port is also used as the IP address of another node. | | | ○ | | | page 12-44 |
| 84510000 hex (Ver. 1.2 or later) | BOOTP Server Connection Error | The connection with the BOOTP server failed. | • BOOTP server is stopped.<br>• An error occurred in communications with the BOOTP server. | | | ○ | | | page 12-45 |
| 84C00000 hex | NX Unit Communications Timeout | An error occurred in I/O data communications with the NX Units. | • An NX Unit is not mounted properly.<br>• An NX Unit has failed. | | | ○ | | | page 12-46 |
| 84C10000 hex | NX Unit Initialization Error | Initializing an NX Unit failed. | • An error occurred in processing the Communications Coupler Unit.<br>• An initialization error occurred in an NX Unit.<br>• The Channel Enable/Disable Setting for all channels of the Analog Input Unit are set to *Disable*.<br>The Enabled Channel Settings for all channels of the Analog Output Unit are set to *Disable*. | | | ○ | | | page 12-47 |
| 84C50000 hex | NX Unit Startup Error | Starting an NX Unit failed. | • A startup error occurred in an NX Unit. | | | ○ | | | page 12-48 |
| 350E0000 hex | NX Bus Cycle Delay Detected | Exceeding the NX bus cycle was detected. | • The NX bus cycle was exceeded. | | | | ○ | | page 12-49 |
| 35510000 hex | NTP Client Setting Error | An error was detected in the NTP client settings. | • The IP address set in the NTP client settings is invalid.<br>• Power was interrupted when a download was in progress for the NTP client settings. | | | | ○ | | page 12-50 |

| Event code | Event name | Meaning | Assumed cause | Level | | | | | Reference |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Maj | Prt | Min | Obs | Info | |
| 80220000 hex | NX Message Communications Error | An error was detected in message communications and the message frame was discarded. | For the NX bus of CPU Units<br>• The message communications load is high.<br>For Communications Coupler Units<br>• The message communications load is high.<br>• The communications cable is disconnected or broken.<br>• Message communications were cutoff in communications. | | | | ○ | | page 12-51 |
| 84530000 hex | NTP Server Connection Error | Connection with NTP server failed. | • The IP address setting error of the NTP server<br>• NTP server is stopped.<br>• An error occurred in communications with the NTP server. | | | | ○ | | page 12-52 |
| 84540000 hex | Link OFF Detected | Disconnection of an Ethernet link was detected. | • An Ethernet cable is broken, disconnected, or loose.<br>• The Ethernet switch power supply is turned OFF.<br>• Link speed mismatch.<br>• Noise | | | | ○ | | page 12-53 |
| 90400000 hex | Event Log Cleared | The event log was cleared. | • The event log was cleared by the user. | | | | | ○ | page 12-53 |
| 90420000 hex | Restart Executed | A restart was executed. | • A restart command was received. | | | | | ○ | page 12-54 |
| 90430000 hex | Memory All Cleared | The Unit settings were cleared. | • The Clear All Memory operation was executed. | | | | | ○ | page 12-54 |
| 98100000 hex | Link Detected | Establishment of an Ethernet link was detected. | • Establishment of an Ethernet link was detected. | | | | | ○ | page 12-55 |
| 98110000 hex | IP Address Fixed | The correct IP address has been determined and Ethernet communication can start. | • The correct IP address has been determined and Ethernet communication can start. | | | | | ○ | page 12-55 |
| 98120000 hex (Ver. 1.2 or later) | BOOTP Client Started | The BOOTP client was started. | • The BOOTP client was started. | | | | | ○ | page 12-56 |

## Error Descriptions

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

### ● Slave Terminal 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 EtherNet/IP Coupler Unit indicators.</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.</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 Slave Terminal is turned OFF and then back ON after the cause of the error is removed.
Slave Terminal reset: Normal status is restored when the Slave Terminal 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.

## ● Error Descriptions

| | | | | | | |
|---|---|---|---|---|---|---|
| **Event name** | Bus Controller Error | | | **Event code** | 00210000 hex | |
| **Meaning** | An internal bus error occurred. | | | | | |
| **Source** | EtherNet/IP | | **Source details** | EtherNet/IP Coupler Unit | **Detection timing** | When power is turned ON to the EtherNet/IP Coupler Unit or during NX bus communications |
| **Error attributes** | **Level** | Minor fault | **Recovery** | Cycle the power supply to the EtherNet/IP Coupler Unit | **Log category** | System |
| **Effects** | **User program** | Continues. | **Operation** | I/O refreshing for the NX Units in the Slave Terminal stops. | | |
| **System-defined variables** | **Variable** | | **Data type** | | **Name** | |
| | None | | --- | | --- | |
| **Cause and correction** | **Assumed cause** | | **Correction** | | **Prevention** | |
| | A Unit failed or an I/O communications error occurred between the Communications Coupler Unit and the NX Unit. | | Mount the NX Units and End Cover securely and secure them with End Plates.<br>Cycle the power supply to the Communications Coupler Unit.<br>If the error occurs again even after you make the above correction, replace the Communications Coupler Unit. | | None | |
| **Attached information** | None | | | | | |
| **Precautions/ Remarks** | None | | | | | |

| Event name | Non-volatile Memory Hardware Error | | | Event code | 00220000 hex | |
|---|---|---|---|---|---|---|
| Meaning | An error occurred in non-volatile memory. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | When power is turned ON to the EtherNet/IP Coupler Unit |
| Error attributes | Level | Minor fault | Recovery | Cycle the power supply to the EtherNet/IP Coupler Unit | Log category | System |
| Effects | User program | Continues. | Operation | Writing to non-volatile memory will not be possible.<br>I/O refreshing for the NX Units in the Slave Terminal stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | Non-volatile memory failure | | Replace the Communications Coupler Unit. | | None | |
| Attached information | None | | | | | |
| Precautions/ Remarks | None | | | | | |

<table>
<tr><td>Event name</td><td colspan="3">Non-volatile Memory Control Parameter Error</td><td>Event code</td><td colspan="2">10420000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">An error occurred in the control parameters.</td></tr>
<tr><td>Source</td><td colspan="2">EtherNet/IP</td><td>Source details</td><td>EtherNet/IP Coupler Unit</td><td>Detection timing</td><td>When power is turned ON to the EtherNet/IP Coupler Unit</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Minor fault</td><td>Recovery</td><td>Cycle the power supply to the EtherNet/IP Coupler Unit</td><td>Log category</td><td>System</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">I/O refreshing for the NX Units in the Slave Terminal stops. Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td rowspan="2">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td colspan="2">The power supply to the Communications Coupler Unit was turned OFF or Support Software communications were disconnected while writing the Unit operation settings was in progress.</td><td colspan="2">Download the Unit operation settings of the Communications Coupler Unit again.</td><td colspan="2">Do not turn OFF the power supply to the Communications Coupler Unit or disconnect Support Software communications while transfer of the Unit operation settings for the Communications Coupler Unit by the Support Software or save of NX Unit parameters by a message is in progress.</td></tr>
<tr><td>Attached information</td><td colspan="6">None</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">None</td></tr>
</table>

| Event name | Memory Corruption Detected | | | Event code | 10430000 hex | |
|---|---|---|---|---|---|---|
| Meaning | Memory corruption was detected. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | Continuously |
| Error attributes | Level | Minor fault | Recovery | Cycle the power supply to the EtherNet/IP Coupler Unit | Log category | System |
| Effects | User program | Continues. | Operation | I/O refreshing for the NX Units in the Slave Terminal stops. Messages cannot be sent to the NX Units in the Slave Terminal. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | Memory corruption was detected. | | Cycle the power supply to the Communications Coupler Unit. If this error occurs again even after you cycle the power supply, replace the Communications Coupler Unit. | | None | |
| Attached information | None | | | | | |
| Precautions/ Remarks | None | | | | | |

| Event name | Unit Configuration Error, Too Many Units | | | Event code | | 24A00000 hex |
|---|---|---|---|---|---|---|
| Meaning | The number of connected NX Units exceeds the maximum value for the Communications Coupler Unit. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | When power is turned ON to the EtherNet/IP Coupler Unit or the Slave Terminal is restarted |
| Error attributes | Level | Minor fault | Recovery | Cycle power to the EtherNet/IP Coupler Unit or restart the Slave Terminal. | Log category | System |
| Effects | User program | Continues. | Operation | • EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for the NX Units in the Slave Terminal stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | More than the maximum number of NX Units is connected to the Communications Coupler Unit. | | Reduce the number of NX Units that are connected to the maximum number or fewer. | | Configure the Unit within the maximum number of NX Units. | |
| Attached information | None | | | | | |
| Precautions/ Remarks | None | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Event name** | Unit Configuration Error, Unsupported Configuration | | | **Event code** | 24A10000 hex | |
| **Meaning** | An unsupported NX Unit is mounted. Or, the total byte size of all I/O data for the connected NX Units exceeds the predetermined maximum value for the Communications Coupler Unit. | | | | | |
| **Source** | EtherNet/IP | | **Source details** | EtherNet/IP Coupler Unit | **Detection timing** | When power is turned ON to the EtherNet/IP Coupler Unit or the Slave Terminal is restarted |
| **Error attributes** | **Level** | Minor fault | **Recovery** | Cycle power to the EtherNet/IP Coupler Unit or restart the Slave Terminal. | **Log category** | System |
| **Effects** | **User program** | Continues. | **Operation** | • EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for the NX Units in the Slave Terminal stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal. | | |
| **System-defined variables** | **Variable** | | **Data type** | | **Name** | |
| | None | | --- | | --- | |
| **Cause and correction** | **Assumed cause** | | **Correction** | | **Prevention** | |
| | An unsupported NX Unit was detected. | | Remove the unsupported NX Unit or replace it with a supported NX Unit. | | Connect only supported NX Units to the Communications Coupler Unit. | |
| | The total byte size of all I/O data for the connected NX Units exceeds the predetermined maximum value for the Communications Coupler Unit. | | Configure the NX Units so that the total byte size of all I/O for the connected NX Units does not exceed the predetermined maximum value for the Communications Coupler Unit. | | Configure the NX Units so that the total byte size of all I/O for the connected NX Units does not exceed the predetermined maximum value for the Communications Coupler Unit. | |
| **Attached information** | Attached information 1: Unit number of the NX Unit where the error was detected | | | | | |
| **Precautions/ Remarks** | None | | | | | |

<table>
<tr><td>Event name</td><td colspan="3">Unit Configuration Information Error</td><td>Event code</td><td colspan="2">35000000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">An error occurred in the Unit configuration information in the Communications Coupler Unit.</td></tr>
<tr><td>Source</td><td colspan="2">EtherNet/IP</td><td>Source details</td><td>EtherNet/IP Coupler Unit</td><td>Detection timing</td><td>When power is turned ON to the EtherNet/IP Coupler Unit or the Slave Terminal is restarted</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Minor fault</td><td>Recovery</td><td>Cycle power to the EtherNet/IP Coupler Unit or restart the Slave Terminal.</td><td>Log category</td><td>System</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for the NX Units in the Slave Terminal stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td rowspan="2">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td colspan="2">The power supply to the Communications Coupler Unit was turned OFF or Support Software communications were disconnected while downloading the Unit configuration information.</td><td colspan="2">Clear all of memory in the Communications Coupler Unit, and then download the Unit configuration information again.</td><td colspan="2">Do not turn OFF the power supply to the Communications Coupler Unit or disconnect Support Software communications while downloading the Unit configuration information.</td></tr>
<tr><td>Attached information</td><td colspan="6">None</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">None</td></tr>
</table>

<table>
<tr><td>Event name</td><td colspan="3">Unit Configuration Verification Error</td><td>Event code</td><td colspan="2">35010000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">There is an inconsistency between the Unit configuration information in the Communications Coupler Unit and the Units that are actually connected. Or, the Unit configuration was changed during operation while the Unit configuration information was not set in the Communications Coupler Unit.</td></tr>
<tr><td>Source</td><td colspan="2">EtherNet/IP</td><td>Source details</td><td>EtherNet/IP Coupler Unit</td><td>Detection timing</td><td>When power is turned ON to the EtherNet/IP Coupler Unit, when the Slave Terminal is restarted, or during NX bus communications</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Minor fault</td><td>Recovery</td><td>Cycle power to the EtherNet/IP Coupler Unit or restart the Slave Terminal.</td><td>Log category</td><td>System</td></tr>
<tr><td rowspan="4">Effects</td><td rowspan="4">User program</td><td rowspan="4">Continues.</td><td rowspan="4">Operation</td><td colspan="3">When Fail-soft Operation Is Set to Fail-soft and Fail-soft Operation Is Possible<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for the NX Units that have a verification error in the Slave Terminal stops.<br>Messages cannot be sent to the NX Units that have a verification error in the Slave Terminal.</td></tr>
<tr><td colspan="3">When Fail-soft Operation Is Set to Fail-soft and Fail-soft Operation Is Not Possible<br>• The operation is the same as when fail-soft operation is set to Stop.</td></tr>
<tr><td colspan="3">When Fail-soft Operation Is Set to Stop<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for the NX Units in the Slave Terminal stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
</table>

| Cause and correction | Assumed cause | Correction | Prevention |
|---|---|---|---|
| | An NX Unit that is registered in the Unit configuration information is not connected. | Connect the NX Units that are registered in the Unit configuration information.<br>Or, connect the Support Software, unregister the unconnected NX Unit from the Unit configuration information, and download the Unit configuration information to the Communications Coupler Unit. | Download the Unit configuration information that contains the actually connected configuration to the Communications Coupler Unit. |
| | A connected NX Unit does not agree with the NX Unit that is registered in the Unit configuration information. | Connect the NX Units that are registered in the Unit configuration information.<br>Or, connect the Support Software, change the Unit configuration information to reflect the actually connected NX Units, and download the Unit configuration information to the Communications Coupler Unit. | |
| | An NX Unit that is not registered in the Unit configuration information is connected. | Remove the NX Unit that is not registered in the Unit configuration information.<br>Or, connect the Support Software, add the unregistered NX Unit to the Unit configuration information, and download the Unit configuration information to the Communications Coupler Unit. | |

| | | | |
|---|---|---|---|
| **Cause and correction** | A mounted Unit is disabled in the NX Unit Mounting Setting for the Unit configuration information. | Remove the Unit that is disabled in the NX Unit Mounting Setting for the Unit configuration information.<br>Or, connect the Support Software, enable the disabled Unit in the NX Unit Mounting Setting, download the Unit configuration information to the Communications Coupler Unit, and mount the enabled Unit. | Remove the Unit that is disabled in the NX Unit Mounting Setting for the Unit configuration information.<br>Or, connect the Support Software, enable the disabled Unit in the NX Unit Mounting Setting, download the Unit configuration information to the Communications Coupler Unit, and mount the enabled Unit. |
| | An NX Unit became disconnected during operation. | Turn OFF the power supply to the Slave Terminal, mount the NX Units securely, and turn the power supply to the Slave Terminal back ON. | Do not connect or disconnect NX Units during operation. |
| | An NX Unit was connected during operation. | Cycle the power supply to the Slave Terminal. | |
| | The serial number of a Unit that is registered in the Unit configuration information does not agree with the serial number of the Unit that is connected. (The Serial Number Check Method is set to *Setting = Actual device*.) | Download the Unit configuration information in which the serial number of the connected Unit is set to the Communications Coupler Unit. | If the Serial Number Check Method is set to *Setting = Actual device*, read the serial numbers of the actually connected Units to the Support Software and use them. |
| | The version of a Unit that is registered in the Unit configuration information is newer than the version of the Unit that is connected. | Create a Unit configuration information with the version of the actually connected Unit, and download it to the Communications Coupler Unit. | Make sure that the results of the compare and merge operation for the Unit configuration of the Slave Terminal do not indicate any incompatibilities before you download the Unit configuration information to the Communications Coupler Unit. |
| | The power supply to an Additional NX Unit Power Supply Unit is not turned ON. | Turn ON the power supply to the Additional NX Unit Power Supply Units before the NX Unit wait time expires. | Increase the length of the NX Unit wait time. Turn ON the power supply to the Additional NX Unit Power Supply Unit before you turn ON the power supply to the Communications Coupler Unit. |
| **Attached information** | Attached information 1: Unit number of the NX Unit where the error was detected<br>Attached Information 2: Error details<br>0: A connected Unit has the same model number as the Unit that is registered in the Unit configuration information, but the Unit is not compatible.<br>1: A Unit that is registered in the Unit configuration information is not connected.<br>2: A Unit that is not registered in the Unit configuration information is connected. | | |
| **Precautions/ Remarks** | None | | |

<table>
<tr><td>Event name</td><td colspan="3">TCP/IP Setting Error (Local IP Address)</td><td>Event code</td><td colspan="2">35500000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">An error was detected in the IP address settings</td></tr>
<tr><td>Source</td><td colspan="2">EtherNet/IP</td><td>Source details</td><td>EtherNet/IP Coupler Unit</td><td>Detection timing</td><td>When power is turned ON to the EtherNet/IP Coupler Unit or the Slave Terminal is restarted</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Minor fault</td><td>Recovery</td><td>Cycle power to the EtherNet/IP Coupler Unit or restart the Slave Terminal.</td><td>Log category</td><td>System</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">When Fail-soft Operation Is Set to Fail-soft<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• NX Bus<br>(1) NX Safety Standalone mode<br>I/O refreshing to the NX Units continues.<br>(2) Remote I/O mode<br>I/O refreshing to the NX Units stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="3">When Fail-soft Operation Is Set to Stop<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• NX Bus<br>(1) NX Safety Standalone mode<br>I/O refreshing to the NX Units stops.<br>(2) Remote I/O mode<br>I/O refreshing to the NX Units stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td>System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td></td><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
</table>

| Cause and correction | Assumed cause | Correction | Prevention |
|---|---|---|---|
| | TCP/IP setting error | Identify the error from the attached information, correct the setting, and then download the settings again. Then, cycle the power supply to the EtherNet/IP Coupler Unit or restart the EtherNet/IP Coupler Unit. | Set the TCP/IP settings correctly. |
| | Power was interrupted when a download was in progress for TCP/IP settings. | Download the TCP/IP settings again. Then, cycle the power supply to the EtherNet/IP Coupler Unit or restart the EtherNet/IP Coupler Unit. | Do not turn OFF the power supply while a download is in progress for the TCP/IP settings. |
| | The IP address delivered from the BOOTP server is incorrect. | Set the IP address correctly in the settings of the BOOTP server. | Set the IP address correctly in the settings of the BOOTP server. |
| **Attached information** | Attached information 1: When settings are inconsistent (11 hex: Illegal IP address, 12 hex: Illegal subnet mask, 13 hex: Illegal default gateway, 14 hex: invalid primary name server, 15 hex: invalid secondary name server, 16 hex: invalid domain name, 17 hex: invalid host name) | | |
| **Precautions/ Remarks** | If the IP address that was set in the TCP/IP settings is not correct, the EtherNet/IP Coupler Unit is started by the following IP addresses.<br>• Setting with switches: IP address according to the switch settings<br>• Setting from the Network Configurator: Default IP address of the settings with the Network Configurator<br>If the power supply of the EtherNet/IP Slave Terminal is cycled in the status that the IP address delivered from the BOOTP server is not correct, the EtherNet/IP Coupler Unit is started by the following IP addresses.<br>• The TCP/IP settings are made: IP address that is set in the TCP/IP settings<br>• The TCP/IP settings are not made: Default IP address of the settings with the Network Configurator | | |

| Event name | NX Unit Processing Error | | | Event code | 40200000 hex | |
|---|---|---|---|---|---|---|
| Meaning | A fatal error occurred in an NX Unit. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | Continuously |
| Error attributes | Level | Minor fault | Recovery | Cycle the power supply to the EtherNet/IP Coupler Unit | Log category | System |
| Effects | User program | Continues. | Operation | I/O refreshing for the NX Units in the Slave Terminal stops. Messages cannot be sent to the NX Units in the Slave Terminal. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | An error occurred in the software. | | Contact your OMRON representative. | | None | |
| Attached information | Attached information 1: System information<br>Attached information 2: System information<br>Attached information 3: System information<br>Attached information 4: System information | | | | | |
| Precautions/ Remarks | None | | | | | |

<table>
<tr><td>Event name</td><td colspan="3">IP Address Duplication Error</td><td>Event code</td><td colspan="2">84500000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">The same IP address is used more than once</td></tr>
<tr><td>Source</td><td colspan="2">EtherNet/IP</td><td>Source details</td><td>EtherNet/IP Coupler Unit</td><td>Detection timing</td><td>After link is established</td></tr>
<tr><td rowspan="2">Error attributes</td><td>Level</td><td>Minor fault</td><td>Recovery</td><td>Cycle power to the EtherNet/IP Coupler Unit or restart the Slave Terminal.</td><td>Log category</td><td>System</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">When Fail-soft Operation Is Set to Fail-soft<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• NX Bus<br>(1) NX Safety Standalone mode<br>I/O refreshing to the NX Units continues.<br>(2) Remote I/O mode<br>I/O refreshing to the NX Units stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td colspan="4"></td><td colspan="3">When Fail-soft Operation Is Set to Stop<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• NX Bus<br>(1) NX Safety Standalone mode<br>I/O refreshing to the NX Units stops.<br>(2) Remote I/O mode<br>I/O refreshing to the NX Units stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td rowspan="2">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td colspan="2">The IP address of the EtherNet/IP port is also used as the IP address of another node</td><td colspan="2">Perform either of the following and then cycle the power supply to the EtherNet/IP Coupler Unit or restart the EtherNet/IP Coupler Unit.<br>• Check the IP addresses of other nodes and correct the IP address settings so that the same address is not used by more than one node.<br>• Remove the node that has the duplicate IP address from the network.</td><td colspan="2">Set the IP address of the EtherNet/IP Coupler Unit so that the same address is not used by another node.</td></tr>
<tr><td>Attached information</td><td colspan="6">Attached information 1: Duplicated IP address (example: C0A8FA01 hex = address 192.168.250.1)</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">When the EtherNet/IP Coupler Unit is started or the link of the EtherNet/IP port is established, an ARP request is broadcasted with the set IP address. A duplicated address error occurs if there is an ARP response from another node for this request.</td></tr>
</table>

<table>
<tr><td>Event name</td><td colspan="3">BOOTP Server Connection Error</td><td>Event code</td><td colspan="2">84510000 hex*1</td></tr>
<tr><td>Meaning</td><td colspan="6">The connection with the BOOTP server failed.</td></tr>
<tr><td>Source</td><td colspan="2">EtherNet/IP</td><td>Source details</td><td>EtherNet/IP Coupler Unit</td><td>Detection timing</td><td>During BOOTP operation</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Minor fault</td><td>Recovery</td><td>Reset error in EtherNet/IP Coupler Unit.</td><td>Log category</td><td>System</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">When Fail-soft Operation Is Set to Fail-soft<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• NX Bus<br>(1) NX Safety Standalone mode<br>I/O refreshing to the NX Units continues.<br>(2) Remote I/O mode<br>I/O refreshing to the NX Units stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="3">When Fail-soft Operation Is Set to Stop<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• NX Bus<br>(1) NX Safety Standalone mode<br>I/O refreshing to the NX Units stops.<br>(2) Remote I/O mode<br>I/O refreshing to the NX Units stops.<br>Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td>System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td></td><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td>Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td></td><td colspan="2">BOOTP server is stopped.</td><td colspan="2">Check if the BOOTP server is operating normally and set it to operate normally if it is not.</td><td colspan="2">Set the BOOTP server to operate normally.</td></tr>
<tr><td></td><td colspan="2">An error occurred in communications with the BOOTP server.</td><td colspan="2">Check the communications path with the BOOTP server and take corrective measures if there are any problems.</td><td colspan="2">Keep the communications status with the BOOTP server correctly.</td></tr>
<tr><td>Attached information</td><td colspan="6">None</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">None</td></tr>
</table>

*1. This event code occurs for unit version 1.2 or later of the EtherNet/IP Coupler Unit.

| Event name | NX Unit Communications Timeout | | | Event code | 84C00000 hex | |
|---|---|---|---|---|---|---|
| Meaning | An error occurred in I/O data communications with the NX Units. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | Continuously |
| Error attributes | Level | Minor fault | Recovery | Reset error in EtherNet/IP Coupler Unit. | Log category | System log |
| Effects | User program | Continues. | Operation | When Fail-soft Operation Is Set to *Fail-soft*<br>Not affected. | | |
| | | | | When Fail-soft Operation Is Set to *Stop*<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for the NX Units in the Slave Terminal stops. | | |

| System-defined variables | Variable | Data type | Name |
|---|---|---|---|
| | None | --- | --- |

| Cause and correction | Assumed cause | Correction | Prevention |
|---|---|---|---|
| | An NX Unit is not mounted properly. | Mount the NX Units and End Cover securely and secure them with End Plates. | Mount the NX Units and End Cover securely and secure them with End Plates. |
| | An NX Unit has failed. | If the error occurs again even after you make the above correction, replace the NX Unit. | None |

| Attached information | Attached information 1: Unit number of the NX Unit where the error was detected |
|---|---|
| Precautions/ Remarks | None |

<table>
<tr><td>Event name</td><td colspan="3">NX Unit Initialization Error</td><td>Event code</td><td colspan="2">84C10000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">Initializing an NX Unit failed.</td></tr>
<tr><td>Source</td><td colspan="2">EtherNet/IP</td><td>Source details</td><td>EtherNet/IP Coupler Unit</td><td>Detection timing</td><td>When power is turned ON to the EtherNet/IP Coupler Unit, the Slave Terminal is restarted, an NX Unit is restarted, or an error is reset in the EtherNet/IP Coupler Unit</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Minor fault</td><td>Recovery</td><td>Reset error in EtherNet/IP Coupler Unit.</td><td>Log category</td><td>System</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">When Fail-soft Operation Is Set to Fail-soft<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for all of the NX Units that have an initialization error in the Slave Terminal stops.<br><br>When Fail-soft Operation Is Set to Stop<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for the NX Units in the Slave Terminal stops.</td></tr>
<tr><td>System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td></td><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td>Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td></td><td colspan="2">An error occurred in processing the Communications Coupler Unit.</td><td colspan="2">Set and save the Unit configuration information in the Communications Coupler Unit again.<br>If this error occurs again, check that there are no errors in the NX Unit settings and I/O data mapping information, and correct any errors that are found.</td><td colspan="2">Correctly set NX Units and I/O data mapping information, and set and save the Unit configuration information in the Communications Coupler Unit.</td></tr>
<tr><td></td><td colspan="2">An initialization error occurred in an NX Unit.</td><td colspan="2">Cycle the power supply to the relevant NX Unit.<br>If the error occurs again, replace the NX Unit.</td><td colspan="2">None</td></tr>
<tr><td></td><td colspan="2">The Channel Enable/Disable Setting for all channels of the Analog Input Unit are set to Disable.<br>The Enabled Channel Settings for all channels of the Analog Output Unit are set to Disable.</td><td colspan="2">Set the Enabled Channel Setting to Enable for at least one channel.</td><td colspan="2">Set the Enabled Channel Setting to Disabled for only the unused channels.</td></tr>
<tr><td>Attached information</td><td colspan="6">Attached information 1: Unit number of the NX Unit where the error was detected</td></tr>
</table>

| | |
|---|---|
| **Precautions/ Remarks** | None |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Event name** | NX Unit Startup Error | | | **Event code** | 84C50000 hex | |
| **Meaning** | Starting an NX Unit failed. | | | | | |
| **Source** | EtherNet/IP | | **Source details** | EtherNet/IP Coupler Unit | **Detection timing** | When power is turned ON to the EtherNet/IP Coupler Unit, the Slave Terminal is restarted, or an error is reset in the EtherNet/IP Coupler Unit |
| **Error attributes** | **Level** | Minor fault | **Recovery** | Cycle power to the EtherNet/IP Coupler Unit or restart the Slave Terminal. | **Log category** | System |
| **Effects** | **User program** | Continues. | **Operation** | When Fail-soft Operation Is Set to *Fail-soft*<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for all of the NX Units that have a startup error in the Slave Terminal stops.<br>Messages cannot be sent to the NX Units that have an initialization error in the Slave Terminal. | | |
| | | | | When Fail-soft Operation Is Set to *Stop*<br>• EtherNet/IP Coupler Unit, EtherNet/IP Communications<br>Ethernet communication stops.<br>• EtherNet/IP Coupler Unit, NX Bus<br>I/O refreshing for the NX Units in the Slave Terminal stops.<br>Messages cannot be sent to the NX Units that have a startup error in the Slave Terminal. | | |

| | | | |
|---|---|---|---|
| **System-defined variables** | **Variable** | **Data type** | **Name** |
| | None | --- | --- |
| **Cause and correction** | **Assumed cause** | **Correction** | **Prevention** |
| | A startup error occurred in an NX Unit. | Cycle the power supply to the Communications Coupler Unit. If this error occurs again even after you cycle the power supply, replace the NX Unit. | None |
| **Attached information** | Attached information 1: Slot number of the NX Unit where the error occurred | | |
| **Precautions/ Remarks** | None | | |

| Event name | NX Bus Cycle Delay Detected | | | Event code | 350E0000 hex | |
|---|---|---|---|---|---|---|
| Meaning | Exceeding the NX bus cycle was detected. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | Safe-Operational or Operational state |
| Error attributes | Level | Observation | Recovery | --- | Log category | System |
| Effects | User program | Continues. | Operation | Not affected. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | The NX bus cycle was exceeded. | | Use the Support Software and download the configuration information. | | None | |
| Attached information | None | | | | | |
| Precautions/ Remarks | None | | | | | |

<table>
<tr><td>Event name</td><td colspan="3">NTP Client Setting Error</td><td>Event code</td><td colspan="2">35510000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">An error was detected in the NTP client settings</td></tr>
<tr><td>Source</td><td colspan="2">EtherNet/IP</td><td>Source details</td><td>EtherNet/IP Coupler Unit</td><td>Detection timing</td><td>When power is turned ON to the EtherNet/IP Coupler Unit or the Slave Terminal is restarted</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Observation</td><td>Recovery</td><td>Cycle power to the EtherNet/IP Coupler Unit or restart the Slave Terminal.</td><td>Log category</td><td>System</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">Time cannot be acquired from NTP.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td colspan="2">Data type</td><td colspan="2">Name</td></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td rowspan="3">Cause and correction</td><td colspan="2">Assumed cause</td><td colspan="2">Correction</td><td colspan="2">Prevention</td></tr>
<tr><td colspan="2">The IP address set in the NTP client settings is invalid.</td><td colspan="2">Correct the IP address of the NTP server in the NTP client settings and then download it again. Then, cycle the power supply to the EtherNet/IP Coupler Unit or restart the EtherNet/IP Coupler Unit.</td><td colspan="2">Set the IP address of the BOOTP server correctly in the NTP client settings.</td></tr>
<tr><td colspan="2">Power was interrupted when a download was in progress for the NTP client settings.</td><td colspan="2">Download the NTP client settings again. Then, cycle the power supply to the EtherNet/IP Coupler Unit or restart the EtherNet/IP Coupler Unit.</td><td colspan="2">Do not turn OFF the power supply while a download is in progress for the NTP client settings.</td></tr>
<tr><td>Attached information</td><td colspan="6">None</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">None</td></tr>
</table>

| | | | | | | |
|---|---|---|---|---|---|---|
| **Event name** | NX Message Communications Error | | **Event code** | 80220000 hex | | |
| **Meaning** | An error was detected in message communications and the message frame was discarded. | | | | | |
| **Source** | EtherNet/IP | | **Source details** | EtherNet/IP Coupler Unit | **Detection timing** | During message communications |
| **Error attributes** | **Level** | Observation | **Recovery** | --- | **Log category** | System |
| **Effects** | **User program** | Continues. | **Operation** | Not affected. | | |
| **System-defined variables** | **Variable** | | **Data type** | | **Name** | |
| | None | | --- | | --- | |
| **Cause and correction** | **Assumed cause** | | **Correction** | | **Prevention** | |
| | For the NX bus of CPU Units | | | | | |
| | The message communications load is high. | | Reduce the number of times instructions are used to send NX messages. | | Reduce the number of times instructions are used to send NX messages. | |
| | For Communications Coupler Units | | | | | |
| | The message communications load is high. | | Reduce the number of times instructions are used to send NX messages. | | Reduce the number of times instructions are used to send NX messages. | |
| | The communications cable is disconnected or broken.<br>This cause does not apply if attached information 2 is *0 (NX bus)*. | | Connect the communications cable securely. | | Connect the communications cable securely. | |
| | Message communications were cutoff by executing the followings in message communications.<br>• Transfer of parameters by the Support Software<br>• Restoration of the backup data (if this error occurred in the EtherCAT Slave Terminal)<br>• Disconnection of an EtherCAT slave (if this error occurred in the EtherCAT Slave Terminal) | | --- | | --- | |
| **Attached information** | Attached information 1: System information<br>Attached Information 2: Type of communications where error occurred | | | | | |
| | 0: NX bus<br>1: EtherCAT<br>2: Serial communications (USB)<br>3: EtherNet/IP<br>65535: Internal Unit communications (routing) | | | | | |
| **Precautions/ Remarks** | None | | | | | |

| Event name | NTP Server Connection Error | | | Event code | 84530000 hex | |
|---|---|---|---|---|---|---|
| Meaning | The connection with the NTP server failed. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | At NTP operation |
| Error attributes | Level | Observation | Recovery | Reset error in EtherNet/IP Coupler Unit.*1 | Log category | System |
| Effects | User program | Continues. | Operation | Time cannot be acquired from NTP. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | The IP address setting error of the NTP server | | Correct the IP address of the NTP server at the remote connection in the NTP client settings and then download it again. Then, cycle the power supply to the EtherNet/IP Coupler Unit or restart the EtherNet/IP Coupler Unit. | | Set the IP address of the NTP server at the remote connection correctly. | |
| | NTP server is stopped. | | Check if the NTP server at the remote connection is operating normally and set it to operate normally if it is not. | | Set the NTP server at the remote connection to operate normally. | |
| | An error occurred in communications with the NTP server. | | Check the communications path with the NTP server at the remote connection and take corrective measures if there are any problems. | | Keep the communications status with the NTP server at the remote connection correctly. | |
| Attached information | None | | | | | |
| Precautions/ Remarks | None | | | | | |

*1. If you correct the NTP server settings, cycle the power to the EtherNet/IP Coupler Unit or restart the Slave Terminal.

| Event name | Link OFF Detected | | | Event code | 84540000 hex | |
|---|---|---|---|---|---|---|
| Meaning | Disconnection of an Ethernet link was detected. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | After link is established |
| Error attributes | Level | Observation | Recovery | Reset error in EtherNet/IP Coupler Unit. | Log category | System |
| Effects | User program | Continues. | Operation | Not affected. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | An Ethernet cable is broken, disconnected, or loose. | | Connect the Ethernet cable securely. If the cable is broken, replace it. | | Connect the Ethernet cable securely. Check the cable to make sure that it is not disconnected. | |
| | The Ethernet switch power supply is turned OFF. | | Turn ON the power supply to the Ethernet switch. Replace the Ethernet switch if it fails. | | Do not turn OFF the power supply to the Ethernet switch. | |
| | Link speed mismatch. | | Make the port settings at the remote node to the auto negotiation setting. | | Make the port settings at the remote node to the auto negotiation setting. | |
| | Noise | | Implement noise countermeasures if there is excessive noise. | | Implement noise countermeasures. | |
| Attached information | None | | | | | |
| Precautions/ Remarks | None | | | | | |

| Event name | Event Log Cleared | | | Event code | 90400000 hex | |
|---|---|---|---|---|---|---|
| Meaning | The event log was cleared. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler 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 1: Events that were cleared<br>1: The system event log was cleared.<br>2: The access event log was cleared. | | | | | |
| Precautions/ Remarks | None | | | | | |

| Event name | Restart Executed | | Event code | 90420000 hex | | |
|---|---|---|---|---|---|---|
| Meaning | A restart was executed. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | When the Slave Terminal or an NX Unit is restarted |
| Error attributes | Level | Information | Recovery | --- | Log category | Access |
| Effects | User program | Continues. | Operation | Operation starts after the restart is executed. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | A restart command was received. | | --- | | --- | |
| Attached information | Attached information 1: Type of restart<br>0: The Slave Terminal was restarted.<br>1: An NX Unit was restarted.<br>Attached information 2: Unit number of the NX Unit where the restart was executed | | | | | |
| Precautions/ Remarks | None | | | | | |

| Event name | Memory All Cleared | | Event code | 90430000 hex | | |
|---|---|---|---|---|---|---|
| Meaning | The Unit settings were cleared. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | When commanded from user |
| Error attributes | Level | Information | Recovery | --- | Log category | Access |
| Effects | User program | Continues. | Operation | The Unit settings were cleared. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | The Clear All Memory operation was executed. | | --- | | --- | |
| Attached information | Attached information 1 and 3: Unit number of the NX Unit where the Clear All Memory operation was performed. If the Clear All Memory operation was performed for the entire Slave Terminal, the information given will be 255.<br>Attached information 2 and 4: Execution results<br>0: Successful<br>1: Hardware error<br>2: Initialization failed<br>3: Initialization not possible | | | | | |
| Precautions/ Remarks | Refer to the attached information for the results of the Clear All Memory operation. | | | | | |

| Event name | Link Detected | | | Event code | 98100000 hex | |
|---|---|---|---|---|---|---|
| Meaning | Establishment of an Ethernet link was detected. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | When establishing link |
| Error attributes | Level | Information | Recovery | --- | Log category | System |
| Effects | User program | Continues. | Operation | Not affected. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | Establishment of an Ethernet link was detected. | | --- | | --- | |
| Attached information | None | | | | | |
| Precautions/ Remarks | None | | | | | |

| Event name | IP Address Fixed | | | Event code | 98110000 hex | |
|---|---|---|---|---|---|---|
| Meaning | The correct IP address has been determined and Ethernet communication can start. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | When power is turned ON to the EtherNet/IP Coupler Unit or the Slave Terminal is restarted |
| Error attributes | Level | Information | Recovery | --- | Log category | System |
| Effects | User program | Continues. | Operation | Not affected. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | The correct IP address has been determined and Ethernet communication can start. | | --- | | --- | |
| Attached information | Attached information 1: IP address (example: C0A8FA01 hex = address 192.168.250.1) | | | | | |
| Precautions/ Remarks | None | | | | | |

| Event name | BOOTP Client Started | | | Event code | 98120000 hex*1 | |
|---|---|---|---|---|---|---|
| Meaning | The BOOTP client was started. | | | | | |
| Source | EtherNet/IP | | Source details | EtherNet/IP Coupler Unit | Detection timing | When power is turned ON to the EtherNet/IP Coupler Unit or the Slave Terminal is restarted |
| Error attributes | Level | Information | Recovery | --- | Log category | System |
| Effects | User program | Continues. | Operation | Not affected. | | |
| System-defined variables | Variable | | Data type | | Name | |
| | None | | --- | | --- | |
| Cause and correction | Assumed cause | | Correction | | Prevention | |
| | The BOOTP client was started. | | --- | | --- | |
| Attached information | None | | | | | |
| Precautions/ Remarks | None | | | | | |

*1. This event code occurs for unit version 1.2 or later of the EtherNet/IP Coupler Unit.

# 12-4 Resetting Errors

Current errors in a Slave Terminal are retained, unless you reset them, until you cycle the power supply or restart the Slave Terminal.
To reset errors, you must remove the cause of the current error. If you reset an error without removing the cause, the same error will occur again.

**Precautions for Correct Use**

- Resetting the errors does not remove the cause of the error.
- Always remove the cause of the error and then reset the error.

You can use the following methods to reset errors in a Slave Terminal.

| Method | Operation | Scope of error reset | Description |
|---|---|---|---|
| Commands from Support Software | Resetting errors | All errors in the Slave Terminal | Reset the error from the Troubleshooting Dialog Box on the Support Software. |
| | | Errors for individually specified NX Units | |
| | Clearing all memory for the Slave Terminal | All errors in the Slave Terminal | If the causes for the Slave Terminal errors are removed, all errors in the Slave Terminal are reset. |
| | Restarting Slave Terminals | | |
| CIP Command | Clear Error | All errors in the Slave Terminal | Use a CIP command to send an explicit message to the Slave Terminal.<br>Refer to *A-1 Supported CIP Objects* on page A-3 for more information. |
| Cycling the Unit power supply to the Slave Terminal | --- | All errors in the Slave Terminal | If the causes for the Slave Terminal errors are removed, all errors in the Slave Terminal are reset when the Slave Terminal is restarted. |

**Additional Information**

With Safety Control Units, it is sometimes necessary to reset errors from a safety program. Refer to the *NX-series Safety Control Unit User's Manual (Cat. No. Z930)* for information on resetting errors for Safety Control Units.

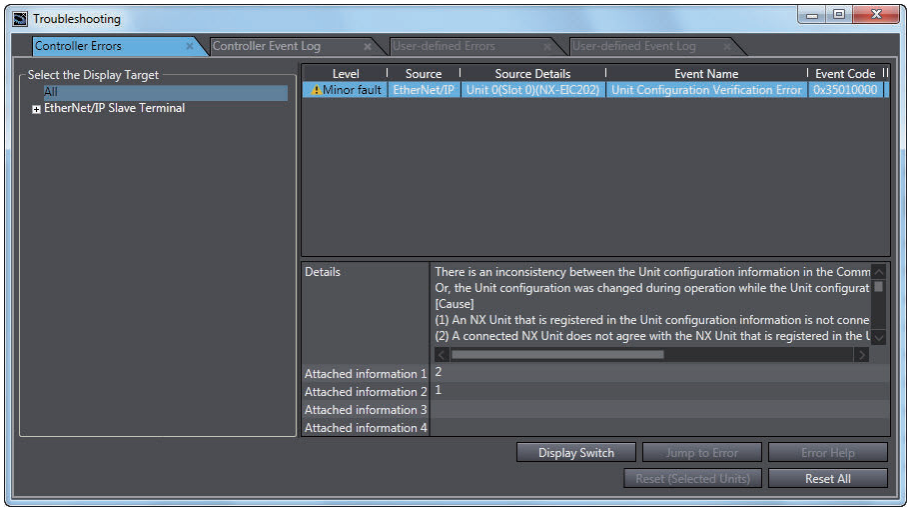
## 12-4-1 Procedure to Reset Errors

The current errors and the contents of the event logs in the online Controller are read and reset in the **Troubleshooting** Dialog Box. Use the Support Software. The operations are described by using the Sysmac Studio as an example. For Support Software other than the Sysmac Studio, refer to the operation manual for the Support Software that you are using.

### Resetting Errors Individually in Units in the EtherNet/IP Slave Terminal

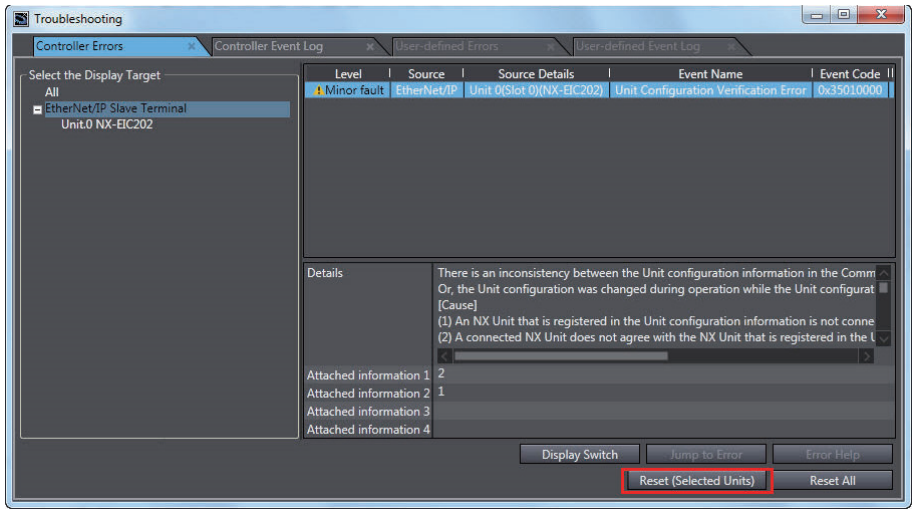
*1* Connect the computer on which the Support Software is installed to the peripheral USB port on the EtherNet/IP Coupler Unit and go online.

*2* Select **Troubleshooting** from the Tools Menu while online. You can also click the **Troubleshooting** button in the toolbar.
The following **Troubleshooting** Dialog Box is displayed.




The current Controller errors are displayed on the **Controller Errors** Tab Page (observations and information are not displayed).

*3* In the **Select the Display Target** of the **Controller Errors** Tab Page, select the Unit for which to reset the errors and click the **Reset (Selected Units)** button.




The errors in the selected NX Unit are reset.

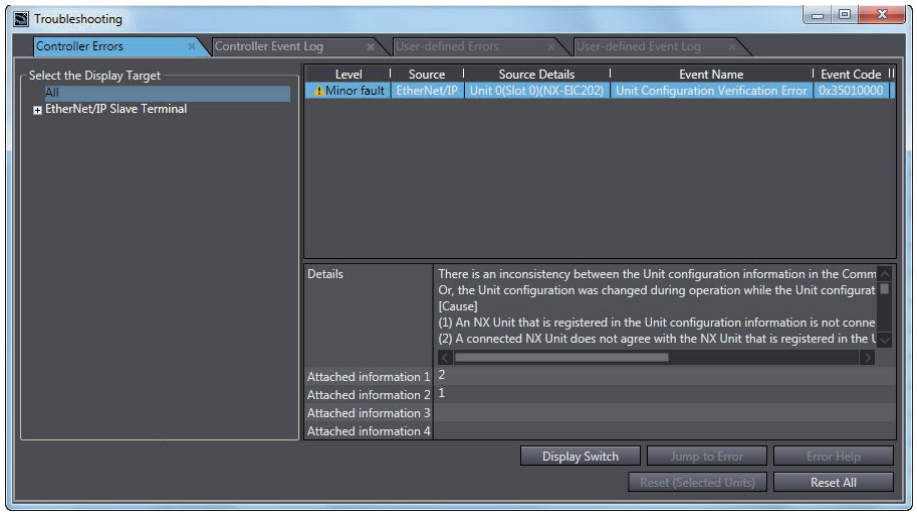
**Additional Information**

If you select the EtherNet/IP Slave Terminal or EtherNet/IP Coupler Unit, errors are reset for the entire EtherNet/IP Slave Terminal.

## Resetting the Errors in All Units in the EtherNet/IP Slave Terminal at the Same Time

***1*** Connect the computer on which the Support Software is installed to the peripheral USB port on the EtherNet/IP Coupler Unit and go online.

***2*** Select **Troubleshooting** from the Tools Menu while online. You can also click the **Troubleshooting** button in the toolbar.
The following **Troubleshooting** Dialog Box is displayed.



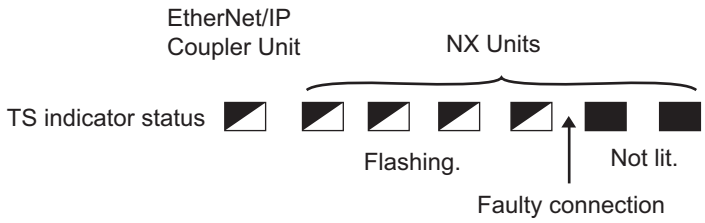

The current Controller errors are displayed on the **Controller Errors** Tab Page (observations and information are not displayed).

***3*** Click the **Reset All** button.
The errors are reset. Any errors for which the causes remain are displayed again.

# 12-5 Troubleshooting Other Errors



This section describes error symptoms that cannot be resolved with the methods for checking for errors and troubleshooting that were described earlier.

| Status | Possible cause and correction |
|---|---|
| When the Unit configuration was registered, the TS indicator on the EtherNet/IP Coupler Unit flashed green, and the TS indicators on the first few NX Units near the EtherNet/IP Coupler Unit flash green and the TS indicators on the other NX Units are not lit. | The NX bus connector on the left side of the Units where the TS indicators are not lit is not connected properly.<br>Connect it properly and cycle the power supply.<br>  |
| • All TS indicators on the EtherNet/IP Slave Terminal (EtherNet/IP Coupler Unit and NX Units) are lit green.<br>• When the output of the EtherNet/IP Coupler is active, the OUT indicator on the Digital I/O Unit is lit yellow but the actual output is OFF.<br>• A device (e.g., sensor) that is connected to the Digital I/O Unit is ON, but a signal is not input, and the IN and OUT indicators are both not lit. | • The power supply to the Additional NX Unit Power Supply Unit is not turned ON. Check the wiring and turn ON the power supply.<br>• The NX bus connectors between the Units are not connected properly. Make sure that the Unit hookup guides are properly engaged.<br>• The wiring for the I/O power supply is disconnected. Check the wiring. |

# 13

# Maintenance and Inspection

This section describes the procedures for cleaning, inspecting, and replacing EtherNet/IP Coupler Units.

# 13-1 Cleaning and Maintenance

This section describes daily maintenance and the cleaning and inspection methods.
Inspect the EtherNet/IP Coupler Unit daily or periodically in order to keep it in optimal operating condition.

## 13-1-1 Cleaning

Clean the EtherNet/IP Coupler Unit regularly as described below in order to keep it in optimal operating condition.

- Wipe the network over with a soft, dry cloth when doing daily cleaning.
- If dirt remains even after wiping with a soft, dry cloth, wipe over with a cloth that has been wet with a sufficiently diluted detergent (2%) and wrung dry.
- A smudge may remain on the Unit from gum, vinyl, or tape that was left on for a long time. Remove the smudge when cleaning.

**Precautions for Correct Use**

- Never use volatile solvents, such as paint thinner, benzene, or chemical wipes.
- Do not touch the NX bus connector.

## 13-1-2 Periodic Inspections

Although the major components in EtherNet/IP Coupler Unit have an extremely long life time, they can deteriorate under improper environmental conditions. Periodic inspections are thus required.
Inspection is recommended at least once every six months to a year, but more frequent inspections will be necessary in adverse 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 | Correction |
|---|---|---|---|---|
| 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. |

| No. | Inspection item | Inspection details | Criteria | Correction |
|---|---|---|---|---|
| 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 gases | 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 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 insert them 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

# 13-2 Maintenance Procedures

This section describes the procedures to replace the Slave Terminal components.
The EtherNet/IP Coupler Unit stores NX Unit setting data. If you replace the EtherNet/IP Coupler Unit, you must restore the settings for the EtherNet/IP Coupler and the NX Units using the Support Software.
Replacing an NX Unit on a previously configured EtherNet/IP Coupler Unit will cause that NX Unit to inherit settings from the EtherNet/IP Coupler Unit.

## 13-2-1 Importing and Exporting Data

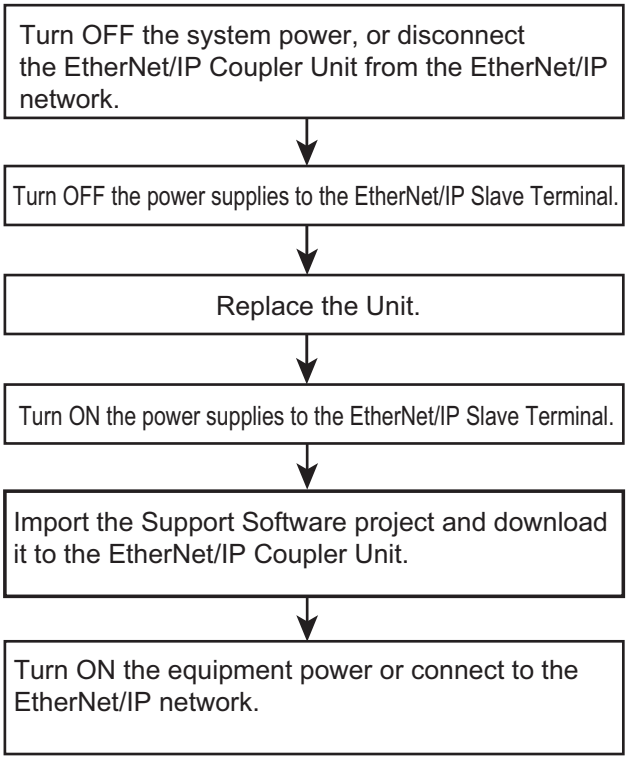
You can use the Support Software to export and import the Slave Terminal settings and NX Unit settings as files. This allows you to reuse settings from an Slave Terminal or NX Units for other Slave Terminals or NX Units such as:

- Unit configuration information
- I/O allocation information
- Unit operation settings
- Hardware switch information

Refer to *9-2-6 Support Software Functions Used as Required* on page 9-23 for more information about importing and exporting Slave Terminal settings.

## 13-2-2 Replacement Procedure for the EtherNet/IP Coupler Unit

This section describes how to replace the EtherNet/IP Coupler Unit.



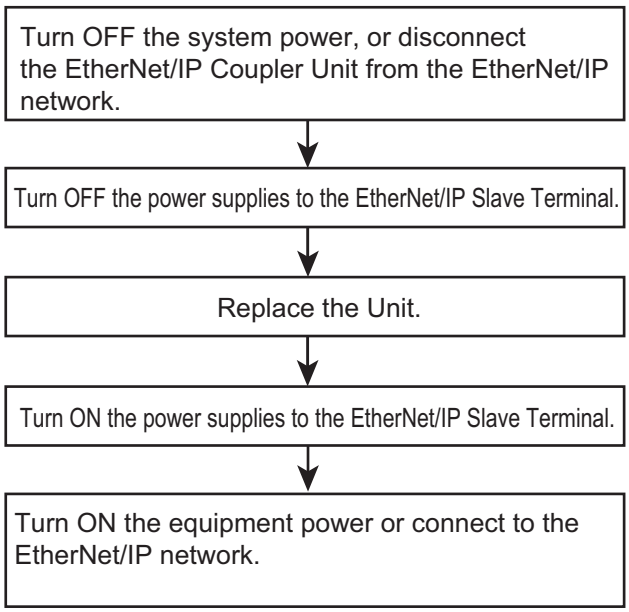
1. Turn OFF the power supply to all of the equipment or disconnect the EtherNet/IP Slave Terminal that includes the EtherNet/IP Coupler Unit from the EtherNet/IP network.
2. Turn OFF the Unit power supplies and I/O power supplies for the EtherNet/IP Slave Terminal.
3. Replace the EtherNet/IP Coupler Unit. Make sure that the hardware switches are set to the same settings as the original Unit.
4. Turn ON the Unit power supplies and I/O power supplies to the EtherNet/IP Slave Terminal.
5. Import a Support Software project, download and verify data for the EtherNet/IP Coupler Unit using the Support Software.
6. Turn ON the power supply to all of the equipment, or connect the EtherNet/IP Slave Terminal to the EtherNet/IP network.

**Additional Information**

- Refer to *6-1 Installing Units* on page 6-2 for the procedures to mount and remove the EtherNet/IP Coupler Unit.
- Refer to *Precautions for Safe Use* on page 22 for the procedures to disconnect and connect the EtherNet/IP Coupler Unit from and to the EtherNet/IP network.

## 13-2-3 Basic Replacement Procedure for NX Units

This section describes the basic replacement procedures for the NX Units that are mounted after the EtherNet/IP Coupler Unit.
The procedure may differ from the one that is described below depending on the model number of the NX Unit. Refer to the manual for the specific NX Unit to replace, in addition to this manual.




1. Turn OFF the power supply to all of the equipment or disconnect the EtherNet/IP Slave Terminal that includes the NX Unit to replace from the EtherNet/IP network.

**2** Turn OFF the Unit power supplies and I/O power supplies for the EtherNet/IP Slave Terminal.

**3** Replace the NX Unit. If the NX Unit has hardware switches, set the hardware switches to the same settings as on the original NX Unit.

**4** Turn ON the Unit power supplies and I/O power supplies to the EtherNet/IP Slave Terminal.

**5** Turn ON the power supply to all of the equipment, or connect the EtherNet/IP Slave Terminal to the EtherNet/IP network.

**Precautions for Correct Use**

**Checking the Serial Numbers of NX Units**
If the *Serial Number Check Method* setting on the EtherNet/IP Coupler Unit is set to *Setting = Actual device*, temporarily change this setting to *None,* and then replace the NX Unit. Get the serial number of the new NX Unit, and then set *the Serial Number Check Method* setting on the EtherNet/IP Coupler Unit to *Setting = Actual device* again.
If you replace the NX Unit with the *Serial Number Check Method* setting set to *Setting = Actual device*, a *Unit Configuration Verification Error* will occur.
Refer to *9-2-2 Setting the NX Unit Configuration Information* on page 9-6 for details on the Serial Number Check Method setting for the EtherNet/IP Coupler Unit, and to *9-2-6 Support Software Functions Used as Required* on page 9-23 for details on getting the serial numbers of NX Units.

**Additional Information**

- Refer to the manual for the specific NX Unit for the procedures to mount and remove the NX Unit.
- Refer to *Precautions for Safe Use* on page 22 for the procedures to disconnect and connect the EtherNet/IP Coupler Unit from and to the EtherNet/IP network.

## 13-2-4 Using Settings from NX Units on Other Slave Terminals

To mount and use NX Units that were set for one Slave Terminal under a different EtherNet/IP Coupler Unit, you must export and import NX Unit settings.
To use the NX Unit settings on a different Slave Terminal, you must export the NX Unit settings from the Unit configuration of the set Slave Terminal and then import the settings to the Unit configuration of the newly mounted Slave Terminal.

**Additional Information**

- Refer to *9-2-6 Support Software Functions Used as Required* on page 9-23 for information on exporting and importing NX Unit settings.
- Some of the NX Unit settings are saved in the EtherNet/IP Coupler Unit.
  Therefore, even if you upload the NX Unit settings to an NX Unit that was set on a different Slave Terminal, the original NX Unit settings are not correctly applied to the newly mounted Slave Terminal. If you want to use the set NX Unit by mounting it to another Slave Terminal, transfer the Unit operation settings to the relevant NX Unit.

# A

# Appendices

The appendices provide information on CIP objects, TCP/UDP message service functions, and other supplemental information.

# A-1 Supported CIP Objects

This appendix lists the supported CIP objects and describes CIP message examples*1 and response codes.

*1. Refer to *UDP/IP and TCP/IP Message Formats* on page A-44 for information on how to use the TCP/UDP message service.

The following CIP objects are supported.

| Object name | Function | Reference |
|---|---|---|
| Identity object | Read product information from an EtherNet/IP Coupler Unit. | *A-1-1 Identity Object (Class ID: 01 Hex)* on page A-3 |
| Assembly object | Concatenates the I/O data for an EtherNet/IP Coupler Unit and the NX Units. | *A-1-2 Assembly Object (Class ID: 04 Hex)* on page A-5 |
| NX Configuration object | Controls NX Units. | *A-1-3 NX Configuration Object (Class ID: 74 Hex)* on page A-7 |
| TCP/IP Interface object | Sets the TCP/IP interface. | *A-1-4 TCP/IP Interface Object (Class ID: F5 Hex)* on page A-27 |
| Ethernet Link object | Gets Ethernet Link information. | *A-1-5 Ethernet Link Object (Class ID: F6 Hex)* on page A-30 |

**Precautions for Correct Use**

The parameter data type for CIP objects is one of INT, UINT, UDINT, ULINT, WORD, and DWORD. Write data is stored little endian. Read data is also stored little endian.
Attributes values in this manual are written big endian.

## A-1-1 Identity Object (Class ID: 01 Hex)

The Identity object is used to get product information from an EtherNet/IP Coupler Unit.

### Service Codes

The following service codes are supported.

| Service code (hex) | Parameter name | Description |
|---|---|---|
| 01 | Get_Attribute_All | Reads the values of all attributes. |
| 05 | Reset | 0: Restart<br>1: Restart with default settings |
| 0E | Get_Attribute_Single | Reads the value of a specified attribute. |

### Class IDs and Instance IDs

The class ID and instance ID are given in the following table.

| ID type | Value (hex) |
|---|---|
| Class ID | 01 |
| Instance ID | 01 |

## Attribute IDs

The instance attribute IDs are given in the following table.

| Attribute ID (hex) | Parameter name | Description | Attrib-ute | Data type | Value (hex) |
|---|---|---|---|---|---|
| 01 | Vender ID | Vendor ID | Read | UINT | 002F (fixed) |
| 02 | Device Type | Device type | Read | UINT | 000C (fixed) |
| 03 | Product Code | Product code | Read | UINT | See below. |
| 04 | Revision | Device CIP revision | Read | STRUCT | See below. |
| | Major Revision | Major revision | Read | USINT | |
| | Minor Revision | Minor revision | Read | USINT | |
| 05 | Status | EtherNet/IP Coupler Unit status | Read | WORD | See below. |
| 06 | Serial Number | Serial number | Read | UDINT | 9D461D01*1 |
| 07 | Product Name | Product name | Read | SHORT STRING | 094E582D45 4943323032 (fixed)*2 |

*1. The value of Serial Number is different for each Unit.
*2. This indicates "NX-EIC202".

### ● Value of Product Code

| Model | Value of Product Code (hex) |
|---|---|
| NX-EIC202 | 067C (fixed) |

### ● Values of Revision

| Unit version of NX-EIC202 | Value of Major Revision (hex) | Value of Minor Revision (hex) |
|---|---|---|
| Ver.1.0 | 01 | 02 |
| Ver.1.2 | 01 | 03 |

### ● Values of Status

| Bit | Name | Description |
|---|---|---|
| 0 | Owned | Indicates that the EtherNet/IP Coupler Unit opened a connection as the target of a tag data link.<br>TRUE: Open.<br>FALSE: Not open. |
| 1 | Reserved | Always FALSE. |
| 2 | Configured | Indicates that the NX Unit configuration information has been confirmed.<br>TRUE: Confirmed.<br>FALSE: Not confirmed. |
| 3 | Reserved | Always FALSE. |
| 4-7 | Extended Device Status | Gives the status of the EtherNet/IP Coupler Unit.<br>02 hex: A timeout occurred in one or more target connections.<br>03 hex: A tag data link is not set.<br>05 hex: There is a Major Fault.<br>06 hex: One or more connections are communicating normally. |
| 8 | Minor Recoverable Fault | Indicates that the following error has occurred. The value changes to TRUE when the error occurs.<br>• Tag Data Link Timeout |

| Bit | Name | Description |
|---|---|---|
| 9 | Minor Unrecoverable Fault | Indicates that the following error has occurred. The value changes to TRUE when the error occurs.<br>• IP Address Duplication Error |
| 10 | Major Recoverable Fault | Indicates that one of the following errors has occurred. The value changes to TRUE when one of these errors occurs.<br>• Unit Configuration Verification Error<br>• Non-volatile Memory Control Parameter Error<br>• Unit Configuration Information Error<br>• Unit Configuration Error, Too Many Units<br>• Unit Configuration Error, Unsupported Configuration<br>• TCP/IP Setting Error (Local IP Address)<br>• NTP Client Setting Error<br>• NX Unit Communications Timeout<br>• NX Unit Initialization Error<br>• NX Unit Startup Error |
| 11 | Major Unrecoverable Fault | Indicates that one of the following errors has occurred. The value changes to TRUE when one of these errors occurs.<br>• Bus Controller Error<br>• Non-volatile Memory Hardware Error<br>• Memory Corruption Detected |
| 12 | Reserved | Always FALSE. |

## A-1-2 Assembly Object (Class ID: 04 Hex)

The Assembly object is used to concatenate I/O data from the EtherNet/IP Coupler Unit and NX Units.

### Service Codes

The following service codes are supported.

| Service code (hex) | Parameter name | Description |
|---|---|---|
| 0E | Get_Attribute_Single | Reads the value of a specified attribute. |
| 10 | Set_Attribute_Single | Writes the value of a specified attribute. |

### Class IDs and Instance IDs

The class ID and instance ID are given in the following table.

| ID type | Value (hex) | Description |
|---|---|---|
| Class ID | 04 | |
| Instance ID | 64 | Input data instance<br>(Data direction: Originator to Target) |
| | 94 | Output data instance<br>(Data direction: Target to Originator) |
| | C5 | Heart beat instance for input only connection |
| | C6 | Heart beat instance for listen only connection |
| | C7 | Configuration instance |

If you use a master from another company, set the following instance IDs according to the connection form of the tag data link communications (implicit message). These settings are not required if you import the EDS file into the support software of the other company.

| Connection form | Input data instance (hex) | Output data instance (hex) | Configuration instance (hex) |
|---|---|---|---|
| Input or Output | 64 | 94 | C7 |
| InputOnly | 64 | C5 | C7 |
| ListenOnly | 64 | C6 | C7 |

## Attribute IDs

The instance attribute IDs are given in the following tables.

### ● Attribute ID for Instance ID 64 Hex (Input Data Instance)

| Attribute ID (hex) | Parameter name | Description | Attribute | Data type | Value (hex) |
|---|---|---|---|---|---|
| 03 | Data | Input data | Read or Write | ARRAY OF BYTE | 0 to 504 bytes of data |

### ● Attribute ID for Instance ID 94 Hex (Output Data Instance)

| Attribute ID (hex) | Parameter name | Description | Attribute | Data type | Value (hex) |
|---|---|---|---|---|---|
| 03 | Data | Output data | Read or Write | ARRAY OF BYTE | 0 to 504 bytes of data |

## A-1-3 NX Configuration Object (Class ID: 74 Hex)

The NX Configuration object is used to control NX Units.

### Service Codes

The following service codes are supported. Refer to *Service Code Details* on page A-9 for details on each service code.

| Service code (hex) | Parameter name | Description |
|---|---|---|
| 0E*1 | Get_Attribute_Single | Reads the value of a specified attribute. |
| 10*1 | Set_Attribute_Single | Writes the value of a specified attribute. |
| 32 | Clear error | Clears NX Unit errors. |
| 33*1 | Read NX object | Reads the value of an NX object. |
| 34*1 | Write NX object | Writes the value of an NX object. |
| 35*1 | Restart NX unit | Restarts an NX Unit. |
| 36*1 | Save parameter | Saves the settings of an NX Unit. |
| 37*1 | Switch parameter write mode | Changes an NX Unit to NX Unit Write Mode. |
| 38*1 | Read total power on time | Reads the total power-ON time of an NX Unit. |
| 39*1 | Change NX state | Changes the status of an NX Unit. |
| 3A*1 | Get current error | Reads current errors from an NX Unit. |
| 3B*1 | Get event log | Reads the event log from an NX Unit. |
| 3C*1 | Clear event log | Clears the event log from an NX Unit. |
| 3D*1 | Initialize unit operation parameter | Initializes the setting parameters in an NX Unit. |

*1. These service codes can be used with NX-EIC202 version 1.2 or later.

### Class IDs and Instance IDs

The class ID and instance ID are given in the following table.

| ID type | Value (hex) |
|---|---|
| Class ID | 74 |
| Instance ID | 01 |

### Attribute IDs

The instance attribute IDs are given in the following table.

| Attribute ID (hex) | Parameter name | Description | Attribute | Data type | Value (hex) |
|---|---|---|---|---|---|
| 01 | NX PDO total output size | EtherNet/IP maximum I/O connection output size*1 | Read | UINT | 0000 to 01F8*2 |
| 02 | NX PDO total input size | EtherNet/IP maximum I/O connection input size*3 | Read | UINT | 0000 to 01F8*1 |

| Attribute ID (hex) | Parameter name | Description | Attribute | Data type | Value (hex) |
|---|---|---|---|---|---|
| 03 | NX unit configuration mode | NX Unit configuration information mode | Read or Write | UINT | 0000: Clear NX Unit configuration information and change to NX Unit self-configuration mode.<br><br>0001: Set the NX Unit configuration information with the current Unit configuration.<br><br>Default: 0000 |
| 04 | Clock time for event log | Time setting for event logs | Read or Write | ARRAY OF UINT | UINT[0]: Year<br>UINT[1]: Month<br>UINT[2]: Day of month<br>UINT[3]: Hour<br>UINT[4]: Minutes<br>UINT[5]: Seconds |

*1. The size is unified to the output data size in the Assembly object.
*2. Specify the value in bytes.
*3. The size is unified to the input data size in the Assembly object.

## Service Code Details

The request format, format for normal responses, format for error responses, and CIP error codes for each service code are given below.

### ● Clear Error (Service Code: 32 Hex)

The request format and format for normal responses for Clear error are given below. A normal reply is always returned for this service.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code | USINT | 32 |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Clear error service | USINT | B2 |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |

### ● Read NX Object (Service Code: 33 Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Read NX object are given below.

Request Format

| Parameter name | | Description | Data type | Value (hex) |
|---|---|---|---|---|
| Service | | Service code | USINT | 33 |
| Request Path Size | | Request path size | USINT | 02 |
| Request Path | | Request path | Padded EPATH | 20742401 |
| Data | | | | |
| | Unit No | Unit number | UINT | 0000: Communications Coupler Unit<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |
| | Index | Object dictionary index | UINT | Refer to *A-8 NX Objects* on page A-65. |
| | Subindex | Object dictionary subindex | USINT | Refer to *A-8 NX Objects* on page A-65. |
| | Control Field | Reserved | USINT | 00 |

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Read NX object service | USINT | B3 |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |
| Data | | | |
| Length | Read data size | UINT | Read data size in bytes |
| Read data | Read data | Depends on the type of data. | Read data |

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Read NX object service | USINT | B3 |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.
*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 10 | Device state conflict |
| 11 | Reply data too large |
| 13 | Not enough data |
| 15 | Too much data |
| 1F | Vendor specific error |
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.

## ● Write NX Object (Service Code: 34 Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Write NX object are given below.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code | USINT | 34 |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |
| Data | | | |
| Unit No | Unit number | UINT | 0000: Communications Coupler Unit<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |
| Index | Object dictionary index | UINT | Refer to *A-8 NX Objects* on page A-65. |
| Subindex | Object dictionary subindex | USINT | Refer to *A-8 NX Objects* on page A-65. |
| Control Field | Reserved | USINT | 00 |
| Length | Write data size | UINT | Data size in bytes |
| Write data | Write data | Depends on the type of data. | Write data |

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Write NX object service | USINT | B4 |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Write NX object service | USINT | B4 |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.

*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 0E | Attribute not settable |
| 10 | Device state conflict |
| 13 | Not enough data |
| 15 | Too much data |
| 1F | Vendor specific error |
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.

## ● Restart NX Unit (Service Code: 35 Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Restart NX unit object are given below.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code | USINT | 35 |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |
| Data | | | |
| Unit No | Unit number | UINT | 0000: Communications Coupler Unit<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Restart NX unit service | USINT | B5 |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Restart NX unit service | USINT | B5 |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.
*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 10 | Device state conflict |
| 13 | Not enough data |
| 15 | Too much data |
| 1F | Vendor specific error*2 |
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.
*2. A vendor specific error will occur if you execute this service for an NX Unit that does not support restarting.

## ● Save Parameter (Service Code: 36 Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Save parameter object are given below.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code | USINT | 36 |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |
| Data | | | |
| Unit No | Unit number | UINT | 0000: Communications Coupler Unit<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Save parameter service | USINT | B6 |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Save parameter service | USINT | B6 |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.

*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 13 | Not enough data |
| 15 | Too much data |
| 19 | Store operation failure |
| 1F | Vendor specific error |
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.

## ● Switch Parameter Write Mode (Service Code: 37 Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Switch parameter write mode object are given below.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code | USINT | 37 |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |
| Data | | | |
| Unit No | Unit number | UINT | 0000: All Units in the Slave Terminal<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Switch parameter write mode service | USINT | B7 |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Switch parameter write mode service | USINT | B7 |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.
*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 10 | Device state conflict |
| 13 | Not enough data |
| 15 | Too much data |
| 1F | Vendor specific error |
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.

## ● Read Total Power ON Time (Service Code: 38 Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Read total power on time object are given below.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code | USINT | 38 |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |
| Data | | | |
| Unit No | Unit number | UINT | 0000: Communications Coupler Unit<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Read total power on time service | USINT | B8 |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |
| Data | | | |
| Total power on time | Total power-ON time | ULINT | Total power-ON time (Unit: Minutes) |

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Switch parameter write mode service | USINT | B8 |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.
*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

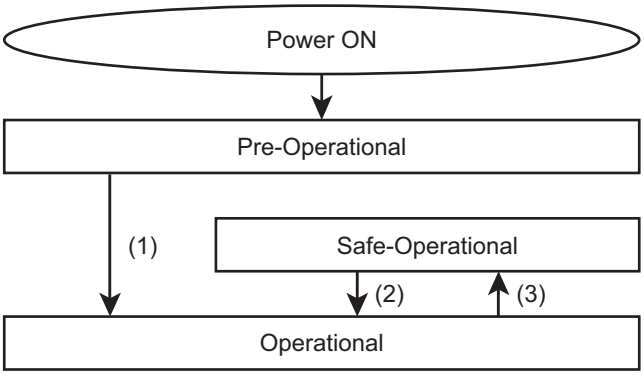
| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 13 | Not enough data |
| 15 | Too much data |
| 1F | Vendor specific error |

| General status code (hex) | Error code*1 |
|---|---|
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.

## ● Change NX State (Service Code: 39 Hex)

The following shows the transition of the communications state from power ON.
Turning ON the power supply puts the NX Unit in a Pre-Operational state. After that, you can execute the Change NX state service to change the state of the NX Unit.
Since it is not possible to directly change the state from Pre-Operational to Safe-Operational, when you execute Change NX state for the first time after turning ON the power supply, set the State parameter to 08 hex.




| Status | Description |
|---|---|
| Pre-Operational | A state in which NX message communications are possible but I/O refresh communications are not possible between the communications master and the Communications Coupler Unit or NX Units. |
| Safe-Operational | A state in which NX message communications and input refresh communications are possible but output refresh communications are not possible between the communications master and the Communications Coupler Unit or NX Units. |
| Operational | A state in which NX message communications and I/O refresh communications are possible between the communications master and the Communications Coupler Unit or NX Units. |

| Transition condition | From | To | Description |
|---|---|---|---|
| (1) | Pre-Operational | Operational | When Change NX state is executed with the State parameter set to 08 hex (Operational) |
| (2) | Safe-Operational | Operational | When Change NX state is executed with the State parameter set to 08 hex (Operational) |
| (3) | Operational | Safe-Operational | When Change NX state is executed with the State parameter set to 04 hex (Safe-Operational)<br>Or, when output data is not written for more than the monitoring timeout time for output data access |

The request format, format for normal responses, format for error responses, and CIP error codes for the Change NX state object are given below.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code | USINT | 39 |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |
| Data | | | |
| Unit No | Unit number | UINT | 0000: Communications Coupler Unit<br>0001 or higher: Not supported. |
| State | State of NX Unit | BYTE | 04: Safe-Operational<br>08: Operational |
| Reserved | Reserved | USINT | 00 |
| Output data access watch dog timeout time (ms) | Monitoring timeout time for output data access*1 | UDINT | 0000000A to 0036EE80: Time-out time*2 |

*1. If the communications master does not write output data for more than the monitoring timeout time for output data access, data will be output according to the load rejection output setting for each NX Unit. To request output data by command, continue to send the same command periodically so that it does not time out. Since the monitoring timeout time for output data access has no default value, the NX Unit will operate according to the value specified by Change NX state.

*2. The address is set in increments of 10 ms. If you set 0000000A hex (10 decimal), the time will be 10 ms. If you set 0036EE80 hex (3,600,000 decimal), the time will be 1 hour.

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Change NX state service | USINT | B9 |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Change NX state service | USINT | B9 |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.

*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 10 | Device state conflict*2*3 |
| 13 | Not enough data |

| General status code (hex) | Error code*1 |
|---|---|
| 15 | Too much data |
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.
*2. A drive state conflict error will occur if you execute this service when tag data link communications are established.
*3. A device state conflict error will occur if you execute this service for an NX Unit for which writing is enabled by an execution of the Switch parameter write mode object.

**Precautions for Correct Use**

- If you do not use tag data link communications but want to input and output data with an NX Unit, use this service and set the NX Unit to Operational state in advance.
- NX-series Safety Units do not support Change NX state.
- If you execute Change NX Unit state when tag data link communications are established, a Device state conflict error occurs and the state of the NX Unit does not change. Restart the EtherNet/IP Unit to enable any changes made with Change NX state.
- You cannot establish tag data link communications during execution of Change NX state.
- To confirm from the user program that I/O data communications for an NX Unit are possible, use *NX Unit Message Enabled Status* in the I/O data. To check the Slave Terminal status, use *Slave Terminal Status* in the I/O data. For details, refer to *Details of I/O Data in the EtherNet/IP Coupler Unit* on page 9-15.

## ● Get Current Error (Service Code: 3A Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Get current error object are given below.

Request Format

| Parameter name | | Description | Data type | Value (hex) |
|---|---|---|---|---|
| Service | | Service code | USINT | 3A |
| Request Path Size | | Request path size | USINT | 02 |
| Request Path | | Request path | Padded EPATH | 20742401 |
| Data | | | | |
| | Unit No | Unit number | UINT | 0000: Communications Coupler Unit<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |
| | Start number of read record | Number of first record to read | UINT | Number of first record to read |
| | Number of request read record | Requested number of records to read | UINT | Requested number of records to read*1 |

*1. The range of values is 0 to 9.

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Get current error service | USINT | BA |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |
| Data | | | |
| Error update count | Total number of errors*1 | UINT | Total number of errors |
| Record size | Size of one record (bytes) | UINT | 0032 (fixed) |
| Number of registered record | Number of registered records*2 | UINT | Number of registered records |
| Number of readout record | Number of records that were read*3 | UINT | Number of records that were read |
| Current error record[0] | Current error 0*4 | ARRAY OF STRUCT*5 | Current error 0 |
| : | : | : | : |
| Current error record[8] | Current error 8*4 | ARRAY OF STRUCT*5 | Current error 8 |

*1. The total number of errors is incremented when an error occurs and held when the error is reset. The value is cleared to 0 when the power supply is turned OFF. If an error occurs when this is the maximum value, the maximum value is held. The maximum value differs for each NX Unit. For the EtherNet/IP Coupler Unit, the maximum value is 128.

*2. The number of registered records is incremented when an error occurs and decremented when the error is reset. The maximum value differs for each NX Unit. For the EtherNet/IP Coupler Unit, the maximum value is 128.

*3. The number of current records specified by Number of readout record are stored in the Current error record array. The remaining elements in the Current error record array are not included in the response data.

*4. The current error records are stored in the order of occurrence. The most recent error record is stored in Current error record[0] and any error record that is reset is deleted from the current error records.

*5. The structure specifications are given below.

Structure Specifications for Current Error Record

| Member name | Description | Data type |
|---|---|---|
| Index | Index of current error*1 | UDINT |
| Unit number | Unit number<br>0: Communications Coupler Unit<br>1 to 63: NX Unit | USINT |
| Event priority | Event level | USINT |
| Event occurred time | Time of error occurrence | UDINT |
| Product code | Product code of Unit where error occurred | UDINT |
| Event code | Event code*2 | UDINT |
| Additional information[0] | Event additional information [0]*1 | ARRAY OF BYTE |
| : | : | : |
| Additional information[31] | Event additional information [8]*1 | ARRAY OF BYTE |

*1. These numbers are attached in the order that the errors occurred.

*2. Refer to *12-3-5 Event Codes for Errors and Troubleshooting Procedures* on page 12-25 for details.

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Get current error service | USINT | BA |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.
*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 13 | Not enough data |
| 15 | Too much data |
| 1F | Vendor specific error |
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.

## ● Get Event Log (Service Code: 3B Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Get event log object are given below.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code | USINT | 3B |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |
| Data | | | |
| Unit No | Unit number | UINT | 0000: Communications Coupler Unit<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |
| Event log type | Type of event log | UINT | 0000: System event log<br>0001: Access event log |
| Start index of read record | Index number of first record to read | UDINT | Index number of first record to read |
| Number of read record | Number of records to read | UINT | Number of records to read*1 |

*1. The range of values is 0 to 9.

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Get event log service | USINT | BB |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |
| Data | | | |
| Record size | Size of one record (bytes) | UINT | 0032 (fixed) |
| Number of registerd record | Number of registered records | UINT | Number of registered records |
| Latest index of registered record | Index number of most recently registered record | UDINT | Index number of most recently registered record |
| Last index of readout record | Index number of record that was read last | UDINT | Index number of record that was read last |
| Number of readout record | Number of records that were read*1 | UINT | Number of records that were read |
| Reserved | Reserved | USINT | 00 |
| Event log record[0] | Event log record 0 | ARRAY OF STRUCT*2 | Event log record 0 |
| : | : | : | : |
| Event log record[8] | Event log record 8 | ARRAY OF STRUCT*1 | Event log record 8 |

*1. The number of event log records specified by Number of readout record are stored in the Event log record array. The remaining elements in the Event log record array are not included in the response data.

*2. The structure specifications are given below.

Structure Specifications for Event Log Record

| Member name | Description | Data type |
|---|---|---|
| Index | Index of the event log record*1 | UDINT |
| Unit number | Unit number<br>0: Communications Coupler Unit<br>1 to 63: NX Unit | USINT |
| Event priority | Event level | USINT |
| Event occurred time | Event time of occurrence | UDINT |
| Product code | Product code of Unit where event occurred | UDINT |
| Event code | Event code*2 | UDINT |
| Additional information[0] | Event additional information [0]*1 | ARRAY OF BYTE |
| : | : | : |
| Additional information[31] | Event additional information [8]*1 | ARRAY OF BYTE |

*1. These numbers are attached in the order that the events occurred.

*2. Refer to *12-3-5 Event Codes for Errors and Troubleshooting Procedures* on page 12-25 for details.

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Get event log service | USINT | BB |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.
*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 13 | Not enough data |
| 15 | Too much data |
| 1F | Vendor specific error |
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.

## ● Clear Event Log (Service Code: 3C Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Clear event log object are given below.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code | USINT | 3C |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |
| Data | | | |
| Unit No | Unit number | UINT | 0000: Communications Coupler Unit<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |
| Event log type | Type of event log | UINT | 0000: System event log<br>0001: Access event log<br>0002: Both system event log and access event log |

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Clear event log service | USINT | BC |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Clear event log service | USINT | BC |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.

*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 13 | Not enough data |
| 15 | Too much data |
| 1F | Vendor specific error |
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.

## ● Initialize Unit Operation Parameter (Service Code: 3D Hex)

The request format, format for normal responses, format for error responses, and CIP error codes for the Initialize unit operation parameter object are given below.

Request Format

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Service | Service code*1*2*3 | USINT | 3D |
| Request Path Size | Request path size | USINT | 02 |
| Request Path | Request path | Padded EPATH | 20742401 |
| Data | | | |
| Unit No | Unit number | UINT | 0000: Communications Coupler Unit*4<br>0001 to 003F: NX Unit<br>0040 or higher: Not supported. |

*1. The initialized parameters are enabled after the Unit is restarted.
*2. A Memory All Cleared event (event code 90430000 hex) will be registered after this service is executed.
*3. The NX-series Safety CPU Units do not support this service. An error will occur if you execute this service for an NX-series Safety Control Unit.
*4. Settings related to TCP/IP, NTP, and other parts of the Ethernet configuration are not initialized.

Format for Normal Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Initialize unit operation parameter service | USINT | BD |
| Reserved | Reserved | USINT | 00 |
| General Status | Code that indicates normal | USINT | 00 |
| Size of Additional Status | Size of Additional status | USINT | 00 |

Format for Error Response

| Parameter name | Description | Data type | Value (hex) |
|---|---|---|---|
| Reply Service | Reply to Initialize unit operation parameter service | USINT | BD |
| Reserved | Reserved | USINT | 00 |
| General Status | Current error code defined by CIP | USINT | Current error code |
| Size of Additional Status | Size of Additional status | USINT | 00*1 |
| Data | | | |
| Additional status | Additional status | UINT | Additional status*2 |

*1. If the general status code in the response code is 0x1F (Vendor specific error), the value is 0x01.
*2. This is stored only when the value of Size of Additional Status is 0x01.

CIP error code

| General status code (hex) | Error code*1 |
|---|---|
| 02 | Resource unavailable |
| 10 | Device state conflict |
| 13 | Not enough data |
| 15 | Too much data |
| 1F | Vendor specific error |

| General status code (hex) | Error code*1 |
|---|---|
| 20 | Invalid parameter |

*1. Refer to *General Status Code* on page A-34 for error descriptions.

## A-1-4 TCP/IP Interface Object (Class ID: F5 Hex)

The TCP/IP Interface object is used to set up the TCP/IP interface.

### Service Codes

Specify the service to execute with the service code.

| Service code (hex) | Parameter name | Description |
|---|---|---|
| 0E | Get_Attribute_Single | Reads the value of a specified attribute. |
| 10 | Set_Attribute_Single | Writes the value of a specified attribute. |

### Class IDs and Instance IDs

The class ID and instance ID are given in the following table.

| ID type | Value (hex) |
|---|---|
| Class ID | F5 |
| Instance ID | 01 |

### Attribute IDs

The instance attribute IDs are given in the following table.

| Attribute ID (hex) | Parameter name | Description | Attribute | Data type | Value (hex) |
|---|---|---|---|---|---|
| 01 | Interface Configuration Status | Interface IP address setting condition | Read | DWORD | See below. |
| 02 | Configuration Capability | Controller configuration and settings that are possible for the interface | Read | DWORD | See below. |
| 03*1 | Configuration Control | IP address setting method when interface started | Read or Write | DWORD | See below. |
| 04 | Physical Link Object | Path to physical link object | Read | STRUCT | |
| | Path size | Path size in words | Read | UINT | 0002 (fixed) |
| | Path | Fixed path to physical link object | Read | Padded EPATH | 20F62401 (fixed) |

| Attribute ID (hex) | Parameter name | Description | Attribute | Data type | Value (hex) |
|---|---|---|---|---|---|
| 05*1 | Interface Configuration | Interface settings | Read or Write | STRUCT | *2 |
| | IP Address | IP address | | UDINT | C0A8FA01 (fixed) |
| | Network Mask | Subnet mask | | UDINT | FFFFFF00 (fixed) |
| | Gateway Address | Default gateway | | UDINT | 00000000 (fixed) |
| | Name Server | Primary name server | | UDINT | 00000000 (fixed) |
| | Name Server 2 | Secondary name server | | UDINT | 00000000 (fixed) |
| | Domain Name | Domain name | | STRING | 0000 (fixed) |
| 06 | Host Name | Host name | Read or Write | STRING | 0000 (fixed) |
| 0D | Encapsulation Inactivity Timeout | Encapsulation inactivity timeout time | Read or Write | UINT | 0000: Disabled<br>0000 to 0E10: Timeout time (s)<br>Default: 0078 |
| 64 | NTP server IP address | NTP server IP address | Read or Write | SHORT_STRING*3 | “00”: NTP client function disabled<br>Not “00”: NTP server IP address<br>Default: “00” |
| 66 | Time zone | Time zone | Read or Write | UINT | See below.<br>Default: 000F |
| 69 | TCP/UDP Message Service Server Port No. | TCP/UDP message service server port number | Read or Write | UINT | 0400 to FFFF*4<br>Default: FA00 |

*1. The new settings are enabled after the power supply is cycled.
*2. This indicates the following: 192.168.250.1, 255.255.255.0, 0.0.0.0, 0.0.0.0, 0.0.0.0, “”.
*3. The maximum number of characters is 64.
*4. This is 1,024 to 65,535 decimal. You cannot set 8AE or AF12.

## ● Values of Interface Configuration Status

| Bit | Name | Value |
|---|---|---|
| 0 to 3 | Interface Configuration Status | 0: IP address not set. Includes when the IP address is not yet set during BOOTP startup.<br>1: IP address set.*1 |
| 4 and 5 | Reserved | Always FALSE. |
| 6 | AcdStatus | Always FALSE. |
| 7 to 31 | Reserved | Always FALSE. |

*1. Interface Configuration Status can be read only when the IP address is set. Therefore, the value of Interface Configuration Status is always 1 when read.

## Values of Configuration Capability

| Bit | Name | Value |
|---|---|---|
| 0 | BOOTP Client | Always TRUE.*1 |
| 1 | DNS Client | Always FALSE. |
| 2 | DHCP Client | Always FALSE. |
| 3 | DHCP-DNS Update | Always FALSE. |
| 4 | Configuration Settable | Always TRUE. |
| 5 | Hardware Configurable | Always TRUE. |
| 6 | Interface Configuration Change Requires Reset | Always TRUE. |
| 7 | ACD Capable | Always FALSE. |
| 8 to 31 | Reserved | Always FALSE. |

*1. The value is always FALSE for NX-EIC202 version 1.0.

## Values of Configuration Control

| Bit | Name | Value |
|---|---|---|
| 0 to 3 | IP address setting method | 0: Fixed IP address<br>1: Set from BOOTP.<br>2 to 15: Reserved |
| 4 | DNS Enable | Always FALSE. |
| 5 to 31 | Reserved | Always FALSE. |

## Values of Time Zone

| Time zone | Value |
|---|---|
| (GMT -12:00) Kwajalein | 0 |
| (GMT -11:00) Midway Island | 1 |
| (GMT -10:00) USA ( Hawaii ) | 2 |
| (GMT -09:00) USA ( Alaska ) | 3 |
| (GMT -08:00) Canada, USA ( Pacific ) | 4 |
| (GMT -07:00) Canada, USA ( Mountain ) | 5 |
| (GMT -06:00) Canada, USA ( Central ) | 6 |
| (GMT -05:00) Canada, USA ( Eastern ) | 7 |
| (GMT -04:00) Canada ( Atlantic ) | 8 |
| (GMT -03:30) Canada ( Newfoundland ) | 9 |
| (GMT -03:00) Argentina | 10 |
| (GMT -02:00) Antarctica | 11 |
| (GMT -01:00) Azores | 12 |
| (GMT +00:00) England | 13 |
| (GMT +00:00) United Kingdom, Portugal | 14 |
| (GMT +00:00) Greenwich Mean Time ( UTC ) | 15 |
| (GMT +01:00) France, Germany, Italy, Spain, Switzerland | 16 |
| (GMT +01:00) Sweden | 17 |
| (GMT +02:00) Bulgaria, Finland, Greece | 18 |
| (GMT +03:00) Russia ( Moscow, St.Petersburg ) | 19 |
| (GMT +03:30) Iran | 20 |
| (GMT +04:00) Russia ( Samara, Izhevsk ) | 21 |
| (GMT +04:30) Afghanistan | 22 |
| (GMT +05:00) Russia ( Yekaterinburg, Perm ) | 23 |

| Time zone | Value |
|---|---|
| (GMT +05:30) India | 24 |
| (GMT +05:45) Nepal | 25 |
| (GMT +06:00) Russia ( Novosibirsk, Omsk ) | 26 |
| (GMT +06:30) Myanmar | 27 |
| (GMT +07:00) Thailand | 28 |
| (GMT +07:00) Vietnam | 29 |
| (GMT +08:00) Australia ( Western ) | 30 |
| (GMT +08:00) China | 31 |
| (GMT +08:00) Taiwan | 32 |
| (GMT +09:00) Japan | 33 |
| (GMT +09:00) Republic of Korea | 34 |
| (GMT +09:30) Australia ( Northern Territory ), Australia ( South ) | 35 |
| (GMT +10:00) Australia ( New South Wales/Queensland/Victoria ) | 36 |
| (GMT +10:30) Australia ( Lord Howe Island ) | 37 |
| (GMT +11:00) New Caledonia | 38 |
| (GMT +11:30) Norfolk Island | 39 |
| (GMT +12:00) New Zealand | 40 |
| (GMT +12:45) Chatham Island | 41 |
| (GMT +13:00) Tonga | 42 |

## A-1-5 Ethernet Link Object (Class ID: F6 Hex)

The Ethernet Link object is used to get Ethernet Link information.

### Service Codes

Specify the service to execute with the service code.

| Service code (hex) | Parameter name | Description |
|---|---|---|
| 0E | Get_Attribute_Single | Reads the value of a specified attribute. |

### Class IDs and Instance IDs

The class ID and instance ID are given in the following table.

| ID type | Value (hex) |
|---|---|
| Class ID | F6 |
| Instance ID | 01 |

### Attribute IDs

The instance attribute IDs are given in the following table.

| Attribute ID (hex) | Parameter name | Description | Attribute | Data type | Value (hex) |
|---|---|---|---|---|---|
| 01 | Interface Speed | Interface communications speed | Read | UDINT | 00000064 (fixed) |
| 02 | Interface Flags | Interface status | Read | DWORD | 0000000F (fixed) |
| 03 | Physical Address | Interface MAC address | Read | ARRAY OF USINT*1 | MAC address |
| 0B | Interface Capability | Interface communications performance | Read | STRUCT | --- |
| | Capability Bits | Communications performance setting | | DWORD | See below. |
| | Speed/Duplex Options | Communications speed/bidirectional options | | STRUCT | --- |
| | Speed/Duplex Array Count | Communications speed/bidirectional array size | | USINT | 01 |
| | Speed/Duplex Array | Communications speed/bidirectional array | | ARRAY OF STRUCT | --- |
| | Interface Speed | Interface communications speed | | UINT | 0064 (fixed) |
| | Interface Duplex Mode | Interface bidirectional mode | | USINT | 01: Full duplex (fixed) |

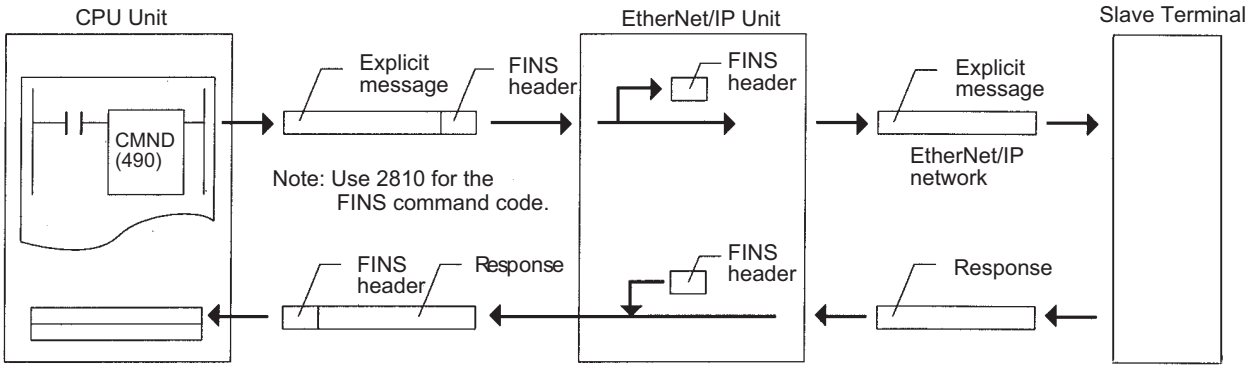
*1. The array size is 6.

### ● Values of Capability Bits

| Bit | Name | Value |
|---|---|---|
| 0 | Manual Setting Requirement Reset | Always FALSE. |
| 1 | Auto-negotiate | Always TRUE. |
| 2 | Auto-MDIX | Always TRUE. |
| 3 | Manual Speed/Duplex | Always FALSE. |
| 4 to 31 | Reserved | Always FALSE. |

## A-1-6 Clear Error Explicit Message Example Using CMND(490)

With an EtherNet/IP Unit, a CMND(490) instruction in the PLC CPU Unit's ladder diagram program can send explicit messages to a Slave Terminal.



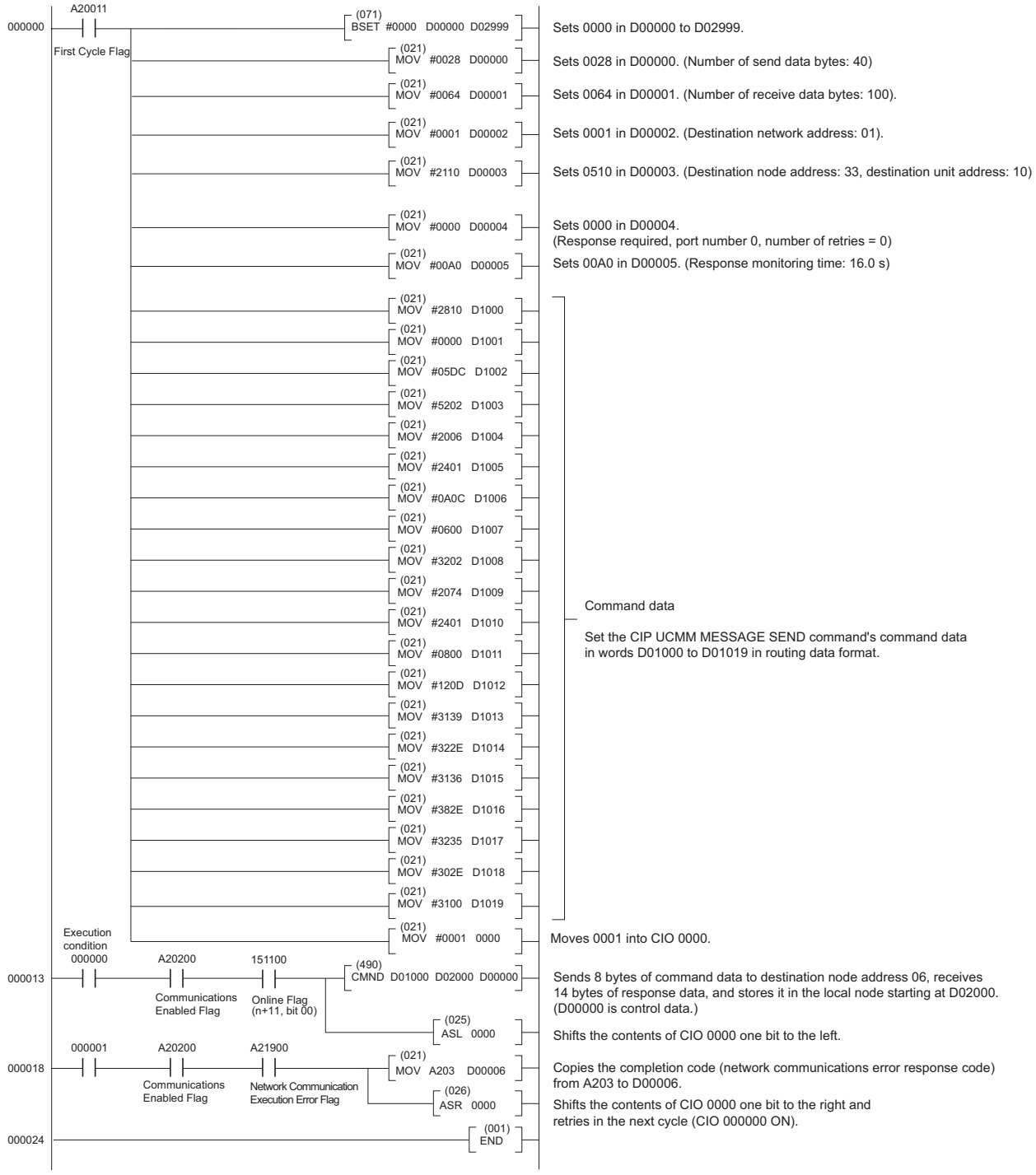

The clear error service code (0x32 hex) is sent to the Slave Terminal at IP address 192.168.250.1, using the *CIP UCMM MESSAGE SEND* command, 2810. The network number assigned to the EtherNet/IP network is 1. The IP address and node number of the EtherNet/IP Unit is 33.
The command data is stored in the DM Area starting at DM01000, and the response data is stored in the DM Area starting at D02000. If the command ends with an error, the end code is stored in D00006 and command transmission is retried.

## Command Details

| CMND Word | Address | Value (hex) | Description |
|---|---|---|---|
| S | D01000 (first command word) | 2810 | Command Code |
| | D01001 | 0000 | Transport ID: 0000 hex |
| | D01002 | 05DC | Message monitoring time: 15.00 s |
| | D01003 | 5202 | • Slave code: 52 hex (Unconnected Send)<br>• Request path size: 2 words |
| | D01004 | 2006 | • Request path: 20 06 24 01 hex (Connection Manager)<br>• Class ID: 06 hex<br>• Instance ID: 01 hex |
| | D01005 | 2401 | |
| | D01006 | 0A0C | • Priority/Time_Tick: 0A hex<br>• Timeout Ticks: 0C hex |
| | D01007 | 0600 | Message request size: 6 bytes |
| | D01008 | 3202 | • Service: 32 hex (Clear Error)<br>• Request path size: 2 words |
| | D01009 | 2074 | • 8-bit class ID: 20 hex<br>• Class ID: 74 hex |
| | D01010 | 2401 | • 8-bit instance ID: 24 hex<br>• Instance ID: 01 hex (Identity Object) |
| | D01011 | 0800 | Route path size: 8 words |
| | D01012 | 120D | • Extended link address size: 1 hex<br>• Route path size: 13 bytes (characters) = 0D hex |
| | D01013 | 3139 | IP address: “19” |
| | D01014 | 322E | IP address: “2.” |
| | D01015 | 3136 | IP address: “16” |
| | D01016 | 382E | IP address: “8.” |
| | D01017 | 3235 | IP address: “25” |
| | D01018 | 302E | IP address: “0.” |
| | D01019 | 3100 | • IP address: “1”<br>• Padding data: 00 hex |
| D | D2000 (first response word at local node) | | |
| C | D0000 (first control word) | 0028 | Number of command bytes: 40 bytes |
| | D0001 | 0064 | Number of response bytes: 100 bytes |
| | D0002 | 0001 | Destination network address: 1 |
| | D0003 | 2110 | • Destination node address: 33<br>• Destination unit address: FE hex (or 10 hex) |
| | D0004 | 0000 | Response, communications port 0, no retries |
| | D0005 | 00A0 | Response monitoring time: 16.0 s |

Words C+6 to C+18 contain the service response data. The service code 32 returns 0000s as response data for normal execution. Other service codes return response data such as assembly object input/output data and size.

## Program Example




# A-1-7 Response Codes

## General Status Code

The General Status Code is stored in the response data after execution of the CMND instruction has been completed.

| General status code (hex) | Status name | Description |
|---|---|---|
| 00 | Success | Service was successfully performed by the object specified. |
| 01 | Connection failure | A connection related service failed along the connection path. |
| 02 | Resource unavailable | Resources needed for the object to perform the requested service were unavailable. |
| 03 | Invalid parameter value | See Status Code 20 hex, which is the preferred value to use for this condition. |
| 04 | Path segment error | The path segment identifier or the segment syntax was not understood by the processing node. Path processing shall stop when a path segment error is encountered. |
| 05 | Path destination unknown | The path is referencing an object class, instance or structure element that is not known or is not contained in the processing node. Path processing shall stop when a path destination unknown error is encountered. |
| 06 | Partial transfer | Only part of the expected data was transferred. |
| 07 | Connection lost | The messaging connection was lost. |
| 08 | Service not supported | The requested service was not implemented or was not defined for this Object Class/Instance. |
| 09 | Invalid attribute value | Invalid attribute data detected. |
| 0A | Attribute list error | An attribute in the Get_Attribute_List or Set_Attribute_List response has a non-zero status. |
| 0B | Already in requested mode/state | The object is already in the mode/state being requested by the service. |
| 0C | Object state conflict | The object cannot perform the requested service in its current mode/state. |
| 0D | Object already exists | The requested instance of object to be created already exists. |
| 0E | Attribute not settable | A request to modify a non-modifiable attribute was received. |
| 0F | Privilege violation | A permission/privilege check failed. |
| 10 | Device state conflict | The device's current mode/state prohibits the execution of the requested service. |
| 11 | Reply data too large | The data to be transmitted in the response buffer is larger than the allocated response buffer |
| 12 | Fragmentation of a primitive value | The service specified an operation that is going to fragment a primitive data value, i.e. half a REAL data type. |
| 13 | Not enough data | The service did not supply enough data to perform the specified operation. |
| 14 | Attribute not supported | The attribute specified in the request is not supported. |
| 15 | Too much data | The service supplied more data than was expected. |
| 16 | Object does not exist | The object specified does not exist in the device. |
| 17 | Service fragmentation sequence not in progress | The fragmentation sequence for this service is not currently active for this data. |
| 18 | No stored attribute data | The attribute data of this object was not saved prior to the requested service. |

| General status code (hex) | Status name | Description |
|---|---|---|
| 19 | Store operation failure | The attribute data of this object was not saved due to a failure during the attempt. |
| 1A | Routing failure (request packet too large) | The service request packet was too large for transmission on a network in the path to the destination. The routing device was forced to abort the service. |
| 1B | Routing failure (response packet too large) | The service response packet was too large for transmission on a network in the path from the destination. The routing device was forced to abort the service. |
| 1C | Missing attribute list entry data | The service did not supply an attribute in a list of attributes that was needed by the service to perform the requested behavior. |
| 1D | Invalid attribute value list | The service is returning the list of attributes supplied with status information for those attributes that were invalid. |
| 1E | Embedded service error | An embedded service resulted in an error. |
| 1F | Vendor specific error | A vendor specific error has been encountered. The Additional Code Field of the Error Response defines the particular error encountered. Use of this General Error Code should only be performed when none of the Error Codes presented in this table or within an Object Class definition accurately reflect the error. |
| 20 | Invalid parameter | A parameter associated with the request was invalid. This code is used when a parameter does not meet the requirements of this specification and/or the requirements defined in an Application Object Specification. |
| 21 | Write-once value or medium already written | An attempt was made to write to a write-once medium (e.g. WORM drive, PROM) that has already been written, or to modify a value that cannot be changed once established. |
| 22 | Invalid Reply Received | An invalid reply is received (e.g. reply service code does not match the request service code, or reply message is shorter than the minimum expected reply size). This status code can serve for other causes of invalid replies. |
| 23-24 | --- | Reserved by CIP for future extensions |
| 25 | Key Failure in path | The Key Segment that was included as the first segment in the path does not match the destination module. The object specific status shall indicate which part of the key check failed. |
| 26 | Path Size Invalid | The size of the path which was sent with the Service Request is either not large enough to allow the Request to be routed to an object or too much routing data was included. |
| 27 | Unexpected attribute in list | An attempt was made to set an attribute that is not able to be set at this time. |
| 28 | Invalid Member ID | The Member ID specified in the request does not exist in the specified Class/Instance/Attribute. |

| General status code (hex) | Status name | Description |
|---|---|---|
| 29 | Member not settable | A request to modify a non-modifiable member was received. |
| 2A | Group 2 only server general failure | This error code may only be reported by DeviceNet group 2 only servers with 4K or less code space and only in place of Service not supported, Attribute not supported and Attribute not settable. |
| 2B-CF | --- | Reserved by CIP for future extensions |
| D0-FF | Reserved for Object Class and service errors | This range of error codes is to be used to indicate Object Class specific errors. Use of this range should only be performed when none of the Error Codes presented in this table accurately reflect the error that was encountered. |

## Example of Additional Status in Case That General Status is 01 Hex (Status of Connection Manager Object)

| General status code (hex) | Additional status code (hex) | Description |
|---|---|---|
| 01 | 0100 | Connection in Use or Duplicate Forward Open. |
| 01 | 0103 | Transport Class and Trigger combination not supported |
| 01 | 0106 | Ownership Conflict |
| 01 | 0107 | Connection not found at target application. |
| 01 | 0108 | Invalid Connection Type. Indicates a problem with either the Connection Type or Priority of the Connection. |
| 01 | 0109 | Invalid Connection Size |
| 01 | 0110 | Device not configured |
| 01 | 0111 | RPI not supported. May also indicate problem with connection time-out multiplier, or production inhibit time. |
| 01 | 0113 | Connection Manager cannot support any more connections |
| 01 | 0114 | Either the Vendor Id or the Product Code in the key segment did not match the device |
| 01 | 0115 | Product Type in the key segment did not match the device |
| 01 | 0116 | Major or Minor Revision information in the key segment did not match the device |
| 01 | 0117 | Invalid Connection Point |
| 01 | 0118 | Invalid Configuration Format |
| 01 | 0119 | Connection request fails since there is no controlling connection currently open. |
| 01 | 011A | Target Application cannot support any more connections |
| 01 | 011B | RPI is smaller than the Production Inhibit Time. |
| 01 | 0203 | Connection cannot be closed since the connection has timed out |

| General status code (hex) | Additional status code (hex) | Description |
|---|---|---|
| 01 | 0204 | Unconnected Send timed out waiting for a response. |
| 01 | 0205 | Parameter Error in Unconnected Send Service |
| 01 | 0206 | Message too large for Unconnected message service |
| 01 | 0207 | Unconnected acknowledge without reply |
| 01 | 0301 | No buffer memory available |
| 01 | 0302 | Network Bandwidth not available for data |
| 01 | 0303 | No Tag filters available |
| 01 | 0304 | Not Configured to send real-time data |
| 01 | 0311 | Port specified in Port Segment Not Available |
| 01 | 0312 | Link Address specified in Port Segment Not Available |
| 01 | 0315 | Invalid Segment Type or Segment Value in Path |
| 01 | 0316 | Path and Connection not equal in close |
| 01 | 0317 | Either Segment not present or Encoded Value in Network Segment is invalid. |
| 01 | 0318 | Link Address to Self Invalid |
| 01 | 0319 | Resources on Secondary Unavailable |
| 01 | 031A | Connection already established |
| 01 | 031B | Direct connection already established |
| 01 | 031C | Miscellaneous |
| 01 | 031D | Redundant connection mismatch |
| 01 | 031F | No connection resources exist for target path |
| 01 | 0320-07FF | Vendor specific |

# A-2 TCP/UDP Message Service

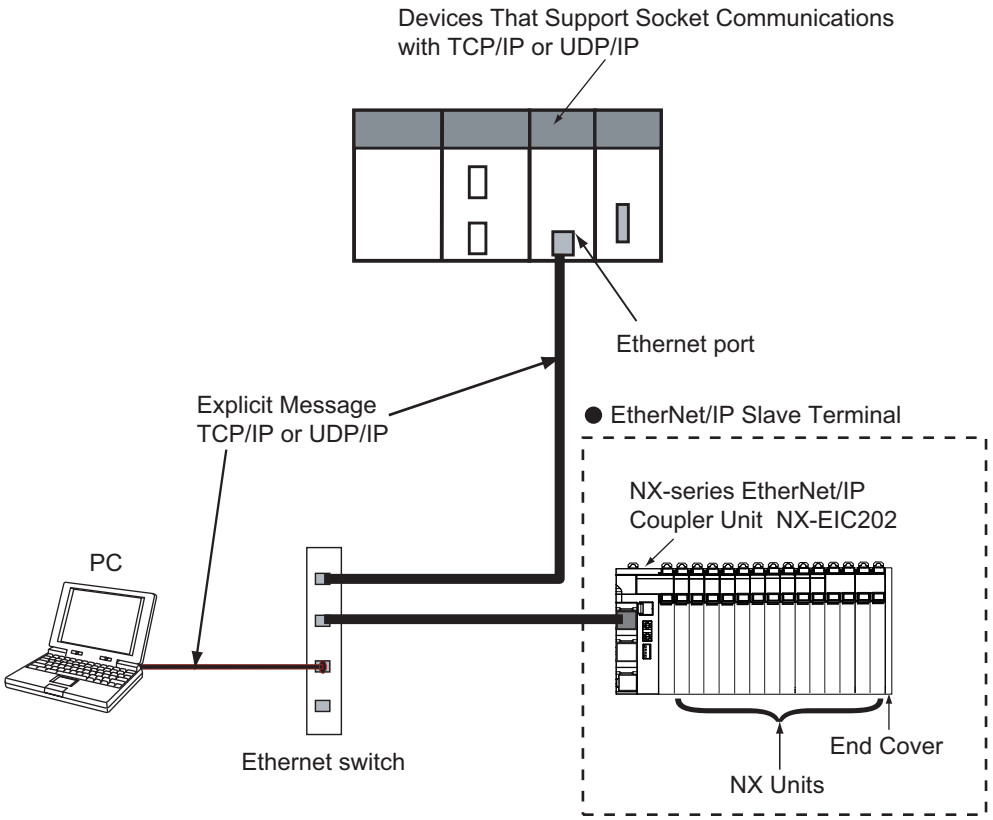
The EtherNet/IP Coupler Unit supports a TCP/UDP message service. You can use the TCP/UDP message service from a PLC or general-purpose PC that does not support the EtherNet/IP protocol to make settings in EtherNet/IP Slave Terminals, control I/O, and perform troubleshooting.
You can send TCP/UDP commands from a device that supports the TCP/IP protocol or UDP/IP protocol (socket communications) to access CIP objects in the EtherNet/IP Coupler Unit and thereby control the EtherNet/IP Slave Terminal. For details on request commands, refer to *A-1 Supported CIP Objects* on page A-3.
You can use DIP switch pin 3 to enable and disable the TCP/UDP message service. For details, refer to *4-3-2 DIP Switch* on page 4-11.

**Version Information**

- With NX-EIC202 version 1.1 or earlier, reading input data and writing output data are only possible when a Safety Control Unit is included in the Slave Terminal. Refer to the *NX-series Safety Control Unit User's Manual (Cat. No. Z930)* for more information.
- With NX-EIC202 version 1.2 or later, using the Change NX state service enables access to I/O data of the EtherNet/IP Coupler Unit and NX Units. Refer to *A-3-6 Reading and Writing I/O Data for EtherNet/IP Slave Terminals* on page A-55 for details on how to read and write I/O data.

## A-2-1 System Configuration for Using the TCP/UDP Message Service

For a device that does not support EtherNet/IP, you can use the TCP/UDP message service as an alternative to EtherNet/IP communications. Devices such as PCs or other controllers can send and receive Omron specific TCP/IP commands and UDP/IP commands to access CIP objects (refer to *A-1 Supported CIP Objects* on page A-3 for details on CIP objects) as shown in the image below.




## A-2-2 Setup Procedure for TCP/UDP Message Service

This section describes how to use EtherNet/IP Slave Terminals with the TCP/UDP message service. Refer to the *NX-series Safety Control Unit User's Manual (Cat. No. Z930)* for the procedures to use Safety Control Units.

| Procedure | Sections |
|---|---|
| 1. Preparing for Work | • *2-2-2 Types of NX Units* on page 2-7<br>• *3-1 Specifications* on page 3-2<br>• *Section 5 Designing the Power Supply System* on page 5-1<br>• *6-1-3 Installation Orientation* on page 6-8<br>• Manuals for the specific NX Units |
| 2. Making Hardware Settings and Wiring the Slave Terminal | • *4-3 Hardware Switch Settings* on page 4-10<br>• *6-1 Installing Units* on page 6-2<br>• *Section 7 Wiring* on page 7-1 |

| | |
|---|---|
| 3. Configuring the Slave Terminal and Making the Operation Settings | *9-2 Setting Slave Terminal Parameters* on page 9-6 |

| | |
|---|---|
| 4. Transferring and Comparing EtherNet/IP Coupler Unit Parameter Settings | *9-3 Transferring and Comparing Settings* on page 9-28 |

| | |
|---|---|
| 5. Setting the EtherNet/IP Coupler Unit's IP Address, Automatic Clock and Port Number. | • *9-4 Setting IP Address* on page 9-31<br>• *11-3-3 Automatic Clock Adjustment* on page 11-10<br>• *A-2-5 TCP/IP and UDP/IP Port Number Setting* on page A-47 |

| | |
|---|---|
| 6. Checking Indicators | *4-2 Indicators* on page 4-6 |

| | |
|---|---|
| 7. Confirming Operation by Checking the Wiring | Manual for the specific NX Units |

| | |
|---|---|
| 8. Creating and Confirming Operation of TCP/UDP Socket Communications Program with the TCP/UDP Message Service | Manual for the Controller |

## A-2-3 Detailed Setup Procedure for TCP/UDP Message Service

| Procedure | | Item | Description | Reference |
|---|---|---|---|---|
| 1 | Preparing for Work | Selecting NX Units | Select the NX Units and the quantity and types of I/O that are required. | • *2-2-2 Types of NX Units* on page 2-7<br>• Manuals for the specific NX Units |
| | | Confirming Suitability of Slave Terminal Specifications | Confirm that the following specific restrictions for the Slave Terminal are met.<br>• Number of NX Units<br>• Message service maximum message size<br>• Design conditions for the NX Unit power supply and I/O power supply<br>• Installation orientation | • *3-1 Specifications* on page 3-2<br>• *Section 5 Designing the Power Supply System* on page 5-1<br>• *6-1-3 Installation Orientation* on page 6-8<br>• *A-2-4 TCP/UDP Message Service Specifications* on page A-44 |
| 2 | Making Hardware Settings and Wiring the Slave Terminal | Switch Settings | Set the IP address of the EtherNet/IP Coupler Unit with the hardware switches.<br>You can also use the Network Configurator to set the IP address. Refer to *9-4 Setting IP Address* on page 9-31. | • *4-3 Hardware Switch Settings* on page 4-10<br>• *9-4 Setting IP Address* on page 9-31 |
| | | | Set the network interface type of the EtherNet/IP Coupler with the hardware switches to enable UDP/IP communications and TCP/IP communications. | • *4-3-2 DIP Switch* on page 4-11 |
| | | Installation | Connect the NX Units and End Cover to the EtherNet/IP Coupler Unit and secure the Slave Terminal to a DIN Track to install it. | *6-1 Installing Units* on page 6-2 |
| | | Wiring | Wire the Slave Terminal.<br>• Connect the communications cables.<br>• Connect the Unit power supply.<br>• Connect the I/O power supply.<br>• Connect the ground wire.<br>• Connect the external I/O devices. | *Section 7 Wiring* on page 7-1 |
| 3 | Configuring the Slave Terminal and Making the Operation Settings | | Set up the Slave Terminal (create the configuration and set the parameters) with the Support Software. | *9-2 Setting Slave Terminal Parameters* on page 9-6 |
| | | Creating the Unit Configuration Information | Create the Slave Terminal configuration information such as number and order of NX Units, individual NX Unit information and information about the EtherNet/IP Coupler Unit. | *9-2-2 Setting the NX Unit Configuration Information* on page 9-6 |
| | | Setting the I/O Allocation Information | Make the I/O allocations for the EtherNet/IP Coupler Unit and NX Units as required. | *9-2-3 I/O Allocation Information* on page 9-12 |
| | | Unit Operation Settings | Make the Unit operation settings for the EtherNet/IP Coupler Unit and NX Units as required. | *9-2-4 Unit Operation Settings* on page 9-22 |
| | | Setting Unit Application Data | Create the Unit application data. This step applies only to Units that have Unit application data. | *9-2-5 Unit Application Data* on page 9-23 |
| 4 | Transferring and Comparing EtherNet/IP Coupler Unit Parameter Settings | | Transfer and compare Slave Terminal settings with the Support Software. | *9-3 Transferring and Comparing Settings* on page 9-28 |

| Procedure | | Item | Description | Reference |
|---|---|---|---|---|
| **5** | Setting the EtherNet/IP Coupler's IP Address, Automatic Clock and Port Number. | | Set the IP address of the EtherNet/IP Coupler Unit with the Network Configurator.<br>You can also use the switch settings to set the IP address. Refer to *9-4 Setting IP Address* on page 9-31.<br>Set the Automatic Clock with the Network Configurator.<br>Set the Port Number with the Network Configurator. | • *9-4 Setting IP Address* on page 9-31<br>• *11-3-3 Automatic Clock Adjustment* on page 11-10<br>• *A-2-5 TCP/IP and UDP/IP Port Number Setting* on page A-47 |
| **6** | Checking Indicators | Ethernet Unit | Check the following indicators on the Ethernet Unit. The following example is for a CJ-series Ethernet Unit.<br>• RUN<br>• 100M<br>• ERC<br>• ERH<br>• SD<br>• RD<br>• LNK<br>• TCP<br>• FTP<br>• HOST | *Ethernet Units Operation Manual Construction of Networks (Cat. No. W420)* |
| | | EtherNet/IP Coupler Unit | Check the following indicators on the EtherNet/IP Coupler Unit.<br>• MS<br>• NS<br>• TS<br>• L/A P1<br>• L/A P2<br>• UNIT PWR<br>• I/O PWR | • *4-2 Indicators* on page 4-6<br>• *12-2 Checking for Errors and Troubleshooting with the Indicators* on page 12-3 |
| **7** | Confirming Operation by Checking the Wiring | | Check the wiring by monitoring inputs or using forced outputs. | • Manual for the Controller<br>• Manual for the specific NX Units |
| **8** | Creating and Confirming Operation of TCP/UDP Socket Communications Program with the TCP/UDP Message Service | | Write the user program for TCP/IP or UDP/IP communications with message services. | Manual for the Controller |

## A-2-4 TCP/UDP Message Service Specifications

The EtherNet/IP Couple Unit supports a TCP/UDP message service based on the following specifications.

| Item | Specification |
|---|---|
| **Maximum number of simultaneously connectable clients** | 8 |
| **Maximum message size** | Request: 492 bytes<br>Response: 496 bytes |
| **Maximum NX output data size** | 490 bytes<br>Note: 2 bytes are used for the attribute field in the explicit message UDP/IP command and TCP/IP command. |
| **Maximum NX input data size** | 496 bytes<br>Note: 2 bytes are used for the attribute field in the explicit message UDP/IP command and TCP/IP command. |
| **Port number** | Default: 64000 decimal<br>The port number can be changed by Network Configurator (restart required). Acceptable port number ranges are shown below in decimal format.<br>• 1024 to 2221<br>• 2223 to 44817<br>• 44819 to 65535 |
| **Keep-alive** | Keep Alive can be used for TCP/IP and UDP/IP communications with an EtherNet/IP Coupler Unit. The keep alive function checks whether a connection is normally established when no data is sent or received for a certain period on the communications line where the connection was established.<br>The keep-alive timeout is 5.5 minutes. |

## UDP/IP and TCP/IP Message Formats

### ● Command Format

The following format is used to send commands (TCP/IP messages or UDP/IP messages) from a device on Ethernet. The command parameters are specified in little endian order.

• When the attribute ID is specified

| | | |
|---|---|---|
| +0 | Message sequence number | 2 bytes |
| +2 | Reserved 1 | 2 bytes |
| +4 | Data size | 2 bytes |
| +6 | Reserved 2 | 1 byte |
| +7 | Service code | 1 byte |
| +8 | Class ID | 2 bytes |
| +10 | Instance ID | 2 bytes |
| +12 | Attribute ID | 2 bytes |
| +14 | Data | 490 bytes max. |

• When the attribute ID is not specified

| | | |
|---|---|---|
| +0 | Message sequence number | 2 bytes |
| +2 | Reserved 1 | 2 bytes |
| +4 | Data size | 2 bytes |
| +6 | Reserved 2 | 1 byte |
| +7 | Service code | 1 byte |
| +8 | Class ID | 2 bytes |
| +10 | Instance ID | 2 bytes |
| +12 | Data | 492 bytes max. |

| Parameter[*1] | Address offset | Size (bytes) | Description |
|---|---|---|---|
| Message sequence number | 0 | 2 | Numbers are set to differentiate frames when there is more than one send frame.<br>An arbitrary value is assigned by the device that sends the message. The same value is stored in the corresponding response.<br>Setting range: 0 to 65535 |
| Reserved 1 | 2 | 2 | Always set to 0. |
| Data size | 4 | 2 | The data size from *Reserved 2* to the end of the data is set. The unit is bytes.<br>Setting range: 6 to 498 |
| Reserved 2 | 6 | 1 | Always set to 0. |
| Service code | 7 | 1 | The service code for the destination object is set. The service code that is set here is sent to the destination node as is. |
| Class ID | 8 | 2 | The class ID of the destination object is set. The class ID that is set here is sent to the destination node as is. |
| Instance ID | 10 | 2 | The instance ID of the destination object is set. The instance ID that is set here is sent to the destination node as is. |
| Attribute ID[*2] | 12 | 2 | Set the attribute ID of the destination object. |
| Data | 14[*3] | 490 max.[*4] | Set data in the request format. The content of the data differs depending on the service code. |

*1. Parameters in the command are in little endian order.
*2. The attribute ID is set only when you execute a service code that requires the specification of the attribute ID (Set_Attribute_Single or Get_Attribute_Single).
*3. When the attribute ID is not set, the address offset is 12.
*4. When the attribute ID is not set, the maximum data size is 492 bytes.

## ● Response Format

When a response is returned from the destination device on the network, the EtherNet/IP Coupler Unit sends a response (TCP/IP message or UDP/IP message) to the device on Ethernet that sent the command. The response parameters are stored in little endian order.
The response format is shown below.

| | | |
|---|---|---|
| +0 | Message sequence number | 2 bytes |
| +2 | Data size | 2 bytes |
| +4 | Reserved | 1 byte |
| +5 | Service code | 1 byte |
| +6 | General status | 1 byte |
| +7 | Size of additional status | 1 byte |
| +8 | Data | 496 bytes max. |

| Parameter*1 | Address offset | Size (bytes) | Description |
|---|---|---|---|
| Message sequence number | 0 | 2 | The sequence number that was set when the command was sent is returned. |
| Data size | 2 | 2 | The data size for *Reserved* and subsequent parameters is stored. The unit is bytes.<br>Size range: 4 to 500 |
| Reserved | 4 | 1 | Always set to 0. |
| Service code | 5 | 1 | The service code for the destination object that was set when the command was sent is stored.<br>For a normal response, the most-significant bit in the requested service code is turned ON. |
| General status | 6 | 1 | General status code. |
| Size of additional status | 7 | 1 | The number of 16 bit words in additional status array. |
| Data | 8 | 496 max. | Data in response format is stored. The data stored differs depending on the service code executed and whether or not it was executed successfully. |

*1. The response parameters are stored in little endian order.

## TCP/IP and UDP/IP Message Examples

Examples of a command and normal response when the attribute ID is specified and when the attribute ID is not specified are shown below.

### ● When the Attribute ID Is Specified

An example of a command and normal response when executing Get_Attribute_Single (service code: 0E hex) with the Identity object (class ID: 01 hex) to read the Vendor ID (instance attribute: 01 hex) is shown below.

• Command

| | | Value (hex) |
|---|---|---|
| +0 | Message sequence number | 00<br>00 |
| +2 | Reserved 1 | 00<br>00 |
| +4 | Data size | 08<br>00 |
| +6 | Reserved 2 | 00 |
| +7 | Service code | 0E |
| +8 | Class ID | 01<br>00 |
| +10 | Instance ID | 01<br>00 |
| +12 | Attribute ID | 01<br>00 |

• Normal response

| | | Value (hex) |
|---|---|---|
| +0 | Message sequence number | 00<br>00 |
| +2 | Data size | 06<br>00 |
| +4 | Reserved | 00 |
| +5 | Service code | 8E |
| +6 | General status | 00 |
| +7 | Additional status size | 00 |
| +8 | Data | 2F<br>00 |

### ● When the Attribute ID Is Not Specified

An example of a command and normal response when executing Read NX object (service code: 33 hex) with the NX Configuration object (class ID: 74 hex) to read the Product Code (Index: 1000 hex, Subindex: 04 hex) of the EtherNet/IP Coupler Unit (Unit No. 0) is shown below.

• Command

| | | | Value (hex) |
|---|---|---|---|
| +0 | Message sequence number | | 00<br>00 |
| +2 | Reserved 1 | | 00<br>00 |
| +4 | Data size | | 0C<br>00 |
| +6 | Reserved 2 | | 00 |
| +7 | Service code | | 33 |
| +8 | Class ID | | 74<br>00 |
| +10 | Instance ID | | 01<br>00 |
| +12 | Data | UnitNo | 00<br>00 |
| +14 | | Index | 00<br>10 |
| +16 | | Subindex | 04 |
| +17 | | Control Field | 00 |

• Normal response

| | | | Value (hex) |
|---|---|---|---|
| +0 | Message sequence number | | 00<br>00 |
| +2 | Data size | | 0A<br>00 |
| +4 | Reserved | | 00 |
| +5 | Service code | | B3 |
| +6 | General status | | 00 |
| +7 | Additional status size | | 00 |
| +8 | Data | Length | 04<br>00 |
| +10 | | Read data | 02<br>02<br>64<br>00 |

## A-2-5 TCP/IP and UDP/IP Port Number Setting

The TCP/IP port number or UDP/IP port number can be set with Network Configurator.

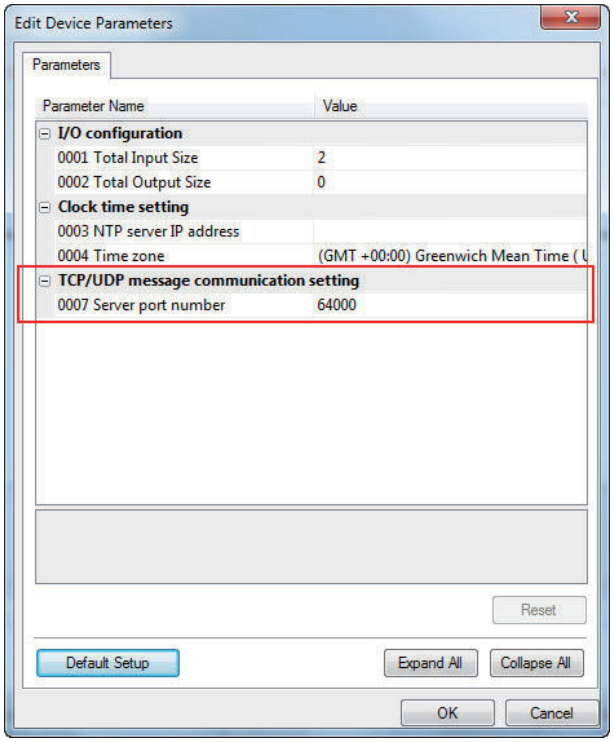
### Procedure

***1*** Open the Network Configurator file that contains the EtherNet/IP Coupler Unit.

**2** Display the **Edit Device Parameters** area with either of the following methods.

- Double-click the EtherNet/IP Coupler Unit in the network.
- Right-click the EtherNet/IP Coupler Unit in the network and select **Parameter** - **Edit**.

**3** Enter the value for **Server port number** and click **OK** (refer to *A-2-4 TCP/UDP Message Service Specifications* on page A-44 for port number ranges).




**4** Go online and download the parameters to the EtherNet/IP Coupler Unit.

**5** Restart the EtherNet/IP Coupler Unit to enable the setting.

**Additional Information**

Refer to *A-2-4 TCP/UDP Message Service Specifications* on page A-44 for information on TCP/IP port number and UDP/IP port number setting ranges.

## A-2-6 Troubleshooting Errors Related to the TCP/UDP Message Service

Use the following information to determine the cause and corrective actions of problems in the TCP/UDP message service.

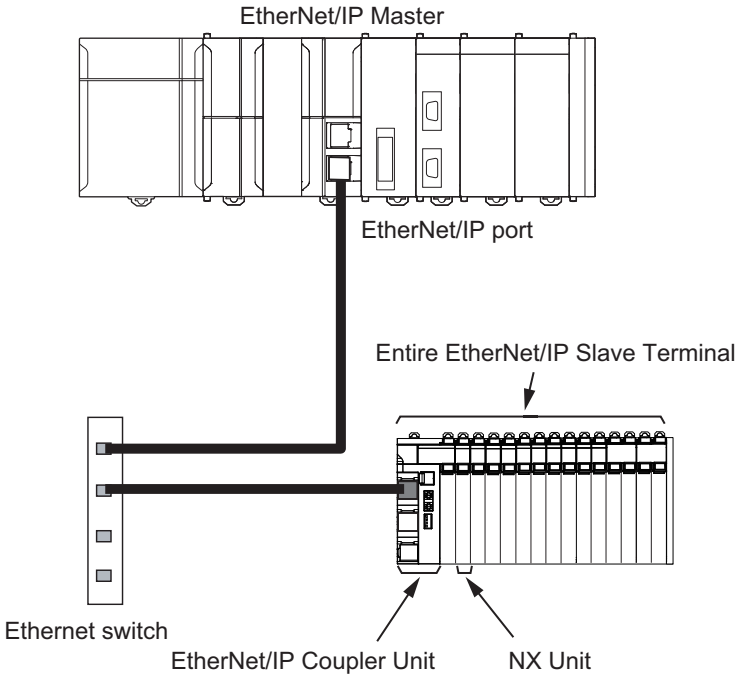
| Observation | General status | Cause | Corrective action |
|---|---|---|---|
| Reading or writing data is not possible.<br>An error response is returned by the EtherNet/IP Coupler Unit. | NOT_ENOUGH_DATA (0x13) | The frame size has exceeded 504 bytes.<br>The data size parameter value does not match the data size of the frame actually received. | Set the frame size to less than 504 bytes.<br>Refer to *A-2-4 TCP/UDP Message Service Specifications* on page A-44 for more information. |
| | TOO_MUCH_DATA (0x15) | The data size parameter value does not match the data size of the frame actually received. | Confirm that the data size parameter value is calculated correctly.<br>Refer to *A-2-4 TCP/UDP Message Service Specifications* on page A-44 for more information. |
| | Other error codes | --- | Refer to *A-1 Supported CIP Objects* on page A-3 and *General Status Code* on page A-34. |
| Reading or writing data is not possible.<br>No error response is returned by the EtherNet/IP Coupler Unit. | --- | The frame size is less than the minimum value (12 bytes). | Confirm that the frame size is within the specification range. |
| | --- | The data size parameter value does not match the data size of the frame actually sent. | Confirm that the data size of the frame is the same as the number of bytes specified in the data size parameter. |
| | --- | Unstable network communications. | Check network connections and other sources of interference.<br>Refer to *7-1 EtherNet/IP Network Wiring* on page 7-2 for more information. |
| | --- | The TCP/UDP message service has not been enabled in the EtherNet/IP Coupler Unit. (Tag data links are enabled.) | Check the position of DIP switch pin 3. Refer to *4-3-2 DIP Switch* on page 4-11 for more information. |
| | --- | The frame is sent to an EtherNet/IP Coupler Unit with an incorrect port number setting. | Check the port number setting. Refer to *A-2-5 TCP/IP and UDP/IP Port Number Setting* on page A-47. |
| An unexpected frame size restriction violation occurred during usage of the TCP/UDP message service. | --- | The requested frame length exceeds the MTU (maximum datagram size). | Ensure the maximum frame size is the same or less than the maximum allowed datagram size on the client. |

| Observation | General status | Cause | Corrective action |
|---|---|---|---|
| Cannot establish a TCP/IP connection. | Standard TCP error | A total of 8 active TCP clients are already connected with the EtherNet/IP Coupler Unit. | Ensure there are less than 8 active connections when trying to establish a new TCP/IP connection. |
| | | The TCP/UDP message service has not been enabled in the EtherNet/IP Coupler Unit. (Tag data links are enabled.) | Check the position of DIP switch pin 3. Refer to *4-3-2 DIP Switch* on page 4-11. |
| A TCP/IP connection is lost and the client must reconnect. | | The TCP/IP connection was idle for more than 30 seconds and a 9th client attempted a connection. In this condition, an idle active client will be automatically closed. | Ensure the client connection remains active by setting the idle time to less than 30 seconds. |

# A-3 Examples of EtherNet/IP Slave Terminal Settings and I/O Data Control Procedure Using Messages

You can use messages to access CIP objects to set up EtherNet/IP Slave Terminals and control I/O data even if you do not use tag data links (implicit messages).
This section shows examples of setting up EtherNet/IP Slave Terminal and controlling I/O data with messages.
Refer to *A-1 Supported CIP Objects* on page A-3 for details on CIP objects.
When you use devices that do not support explicit messages, access CIP objects by using the TCP/UDP message service. For details on accessing CIP objects by using the TCP/UDP message service, refer to *A-2 TCP/UDP Message Service* on page A-39 .
The following six types are shown as procedure examples.

- Changing the Unit operation settings of an EtherNet/IP Coupler Unit
- Changing the Unit operation settings of one NX Unit
- Changing the Unit operation settings of multiple NX Units
- Changing the Unit operation settings of the entire EtherNet/IP Slave Terminal
- Initializing the Unit operation settings of one NX Unit
- Reading and writing I/O data of an EtherNet/IP Slave Terminal




**Precautions for Correct Use**

For details on checking for errors and troubleshooting during various settings with messages, refer to *12-3 Checking for Errors and Troubleshooting with Support Software* on page 12-10.

**Version Information**

Using messages to set up EtherNet/IP Slave Terminal and control I/O data is supported for NX-EIC202 version 1.2 or later.

## A-3-1 Changing the Unit Operation Settings for the EtherNet/IP Coupler Unit

This procedure changes the Unit operation settings of the EtherNet/IP Coupler Unit. The unit number of the EtherNet/IP Coupler Unit is 0.
The setting procedure is given in the following table.

| Step | Description | CIP objects to use | | | |
|---|---|---|---|---|---|
| | | Class ID | Instance ID | Service code | Unit number |
| 1 | Change the write mode of the EtherNet/IP Coupler Unit to enable writing. | 0x74<br>NX Configuration object | 0x01 | 0x37<br>Switch parameter write mode | 0x00 |
| 2 | Write the values to the NX object in the EtherNet/IP Coupler Unit. | 0x74<br>NX Configuration object | 0x01 | 0x34<br>Write NX object | 0x00 |
| 3 | Save the set values in the EtherNet/IP Coupler Unit. | 0x74<br>NX Configuration object | 0x01 | 0x36<br>Save parameter | 0x00 |
| 4 | Restart the Slave Terminal. | 0x01<br>Identity object | 0x01 | 0x05<br>Reset | Setting not required. |
| 5*1 | Write the initial values of the output data to the EtherNet/IP Coupler Unit.*2 | 0x04<br>Assembly object | 0x94 | 0x10<br>Set_Attribute_Single | Setting not required. |
| 6*1 | Change the EtherNet/IP Coupler Unit to the Operational state. | 0x74<br>NX Configuration object | 0x01 | 0x39<br>Change NX state | 0x00 |

*1. This process is not necessary when you use an EtherNet/IP master that supports explicit messages.
*2. This is necessary to prevent invalid data from being output as soon as the EtherNet/IP Coupler Unit enters the Operational state.

## A-3-2 Changing the Unit Operation Settings of One NX Unit

This procedure changes the Unit operation settings of one NX Unit in the EtherNet/IP Slave Terminal.
The unit number of the relevant NX Unit is 1.
The setting procedure is given in the following table.

| Step | Description | CIP objects to use | | | |
|---|---|---|---|---|---|
| | | Class ID | Instance ID | Service code | Unit number |
| 1 | Change the write mode of the NX Unit to enable writing. | 0x74<br>NX Configuration object | 0x01 | 0x37<br>Switch parameter write mode | 0x01 |
| 2 | Write the values to the NX object in the NX Unit. | 0x74<br>NX Configuration object | 0x01 | 0x34<br>Write NX object | 0x01 |

| Step | Description | CIP objects to use | | | |
|---|---|---|---|---|---|
| | | Class ID | Instance ID | Service code | Unit number |
| 3 | Save the set values in the NX Unit. | 0x74<br>NX Configuration object | 0x01 | 0x36<br>Save parameter | 0x01 |
| 4 | Restart the NX Unit. | 0x74<br>NX Configuration object | 0x01 | 0x35<br>Restart NX unit | 0x01 |

## A-3-3 Changing the Unit Operation Settings of Multiple NX Units

This procedure changes the Unit operation settings of multiple NX Units in the EtherNet/IP Slave Terminal. The unit numbers of the relevant NX Units are 1 and 2.
The setting procedure is given in the following table.

| Step | Description | CIP objects to use | | | |
|---|---|---|---|---|---|
| | | Class ID | Instance ID | Service code | Unit number |
| 1 | Change the write mode of the NX Unit with unit number 1 to enable writing. | 0x74<br>NX Configuration object | 0x01 | 0x37<br>Switch parameter write mode | 0x01 |
| 2 | Change the write mode of the NX Unit with unit number 2 to enable writing. | 0x74<br>NX Configuration object | 0x01 | 0x37<br>Switch parameter write mode | 0x02 |
| 3 | Write the values to the NX object in the NX Unit with unit number 1. | 0x74<br>NX Configuration object | 0x01 | 0x34<br>Write NX object | 0x01 |
| 4 | Write the values to the NX object in the NX Unit with unit number 2. | 0x74<br>NX Configuration object | 0x01 | 0x34<br>Write NX object | 0x02 |
| 5 | Save the set values in the NX Unit with unit number 1. | 0x74<br>NX Configuration object | 0x01 | 0x36<br>Save parameter | 0x01 |
| 6 | Save the set values in the NX Unit with unit number 2. | 0x74<br>NX Configuration object | 0x01 | 0x36<br>Save parameter | 0x02 |
| 7 | Restart the NX Unit with unit number 1. | 0x74<br>NX Configuration object | 0x01 | 0x35<br>Restart NX unit | 0x01 |
| 8 | Restart the NX Unit with unit number 2. | 0x74<br>NX Configuration object | 0x01 | 0x35<br>Restart NX unit | 0x02 |

## A-3-4 Changing the Unit Operation Settings of the Entire EtherNet/IP Slave Terminal

This procedure changes the Unit operation settings of all of the NX Units in the EtherNet/IP Slave Terminal. The unit numbers of the relevant NX Units are 0 to 63.
The setting procedure is given in the following table.

| Step | Description | CIP objects to use | | | |
|---|---|---|---|---|---|
| | | Class ID | Instance ID | Service code | Unit number |
| 1 | Change the write mode of all NX Units in the EtherNet/IP Slave Terminal to enable writing. | 0x74<br>NX Configuration object | 0x01 | 0x37<br>Switch parameter write mode | 0x00 |
| 2 | Write the values to the NX object in the EtherNet/IP Coupler Unit. | 0x74<br>NX Configuration object | 0x01 | 0x34<br>Write NX object | 0x00 |
| 3 | Write the values to the NX object in the NX Unit with unit number 1. | 0x74<br>NX Configuration object | 0x01 | 0x34<br>Write NX object | 0x01 |
| 4 | Write the values to the NX object in the NX Unit with unit number 2. | 0x74<br>NX Configuration object | 0x01 | 0x34<br>Write NX object | 0x02 |
| : | : | : | : | : | : |
| 5 | Write the values to the NX object in the NX Unit with unit number 63. | 0x74<br>NX Configuration object | 0x01 | 0x34<br>Write NX object | 0x3F |
| 6 | Save the set values in the EtherNet/IP Coupler Unit. | 0x74<br>NX Configuration object | 0x01 | 0x36<br>Save parameter | 0x00 |
| 7 | Save the set values in the NX Unit with unit number 1. | 0x74<br>NX Configuration object | 0x01 | 0x36<br>Save parameter | 0x01 |
| 8 | Save the set values in the NX Unit with unit number 2. | 0x74<br>NX Configuration object | 0x01 | 0x36<br>Save parameter | 0x02 |
| : | : | : | : | : | : |
| 9 | Save the set values in the NX Unit with unit number 63. | 0x74<br>NX Configuration object | 0x01 | 0x36<br>Save parameter | 0x3F |
| 10 | Restart the Slave Terminal. | 0x01<br>Identity object | 0x01 | 0x05<br>Reset | Setting not required. |
| 11*1 | If tag data link communications are set in the EtherNet/IP master, the tag data links will recover automatically.*2 | --- | --- | --- | --- |
| 11*3 | Write the initial values of the output data to the Units in the EtherNet/IP Slave Terminal.*4 | 0x04<br>Assembly object | 0x94 | 0x10<br>Set_Attribute_Single | Setting not required. |
| 12*3 | Change the Units in the EtherNet/IP Slave Terminal to the Operational state. | 0x74<br>NX Configuration object | 0x01 | 0x39<br>Change NX state | 0x00 |

*1. This process occurs when you use an EtherNet/IP master that supports explicit messages.

*2. If tag data link communications are not set in the EtherNet/IP master, refer to *A-3-6 Reading and Writing I/O Data for EtherNet/IP Slave Terminals* on page A-55 for the method to restart I/O communications.

*3. This process is not necessary when you use an EtherNet/IP master that supports explicit messages.

*4. This is necessary to prevent invalid data from being output as soon as the Units in the EtherNet/IP Slave Terminal enter the Operational state.

## A-3-5 Initializing the Unit Operation Settings of One NX Unit

This procedure initializes the Unit operation settings of one NX Unit in the EtherNet/IP Slave Terminal.
The unit number of the relevant NX Unit is 1.
The setting procedure is given in the following table.

| Step | Description | CIP objects to use | | | |
|---|---|---|---|---|---|
| | | Class ID | Instance ID | Service code | Unit number |
| 1 | Change the write mode of the NX Unit to enable writing. | 0x74<br>NX Configuration object | 0x01 | 0x37<br>Switch parameter write mode | 0x01 |
| 2 | Initialize the Unit operation settings of the NX Unit with unit number 1.*1 | 0x74<br>NX Configuration object | 0x01 | 0x3D<br>Initialize unit operation parameter | 0x01 |
| 3 | Restart the NX Unit with unit number 1.*2 | 0x74<br>NX Configuration object | 0x01 | 0x35<br>Restart NX unit | 0x01 |

*1. The NX-series Safety CPU Units do not support the Initialize unit operation parameter object (service code 3D hex). An error will occur if you execute the Initialize unit operation parameter object (service code 3D hex) for an NX-series Safety Control Unit.

*2. An error will occur if you execute the Restart NX unit object (service code 35 hex) for an NX Unit that does not support restarting. If this error occurs, restart the entire EtherNet/IP Slave Terminal (Identity object: 01 hex, Reset: 05 hex).

## A-3-6 Reading and Writing I/O Data for EtherNet/IP Slave Terminals

You can read and write the I/O data of an EtherNet/IP Slave Terminal using explicit messages from a device that does not support tag data link (implicit message) communications.
When you use an EtherNet/IP master that does not support explicit messages, you can use the TCP/UDP message service to read and write the I/O data of an EtherNet/IP Slave Terminal.
The procedure is given in the following table.

| Step | Description | CIP objects to use | | | |
|---|---|---|---|---|---|
| | | Class ID | Instance ID | Service code | Unit number |
| 1 | Write the initial values of the output data to the Units in the EtherNet/IP Slave Terminal.*1 | 0x04<br>Assembly object | 0x94 | 0x10<br>Set_Attribute_Single | Setting not required. |
| 2 | Change the Units in the EtherNet/IP Slave Terminal to the Operational state. | 0x74<br>NX Configuration object | 0x01 | 0x39<br>Change NX state | 0x00 |
| 3 | Read the input data. | 0x04<br>Assembly object | 0x64 | 0x0E<br>Get_Attribute_Single | Setting not required. |
| | Write the output data.*2 | 0x04<br>Assembly object | 0x94 | 0x10<br>Set_Attribute_Single | Setting not required. |

| Step | Description | CIP objects to use | | | |
|---|---|---|---|---|---|
| | | Class ID | Instance ID | Service code | Unit number |
| --- | If a Output Data Write Timeout Occurs (Error)<br>• If the output data from the EtherNet/IP master is not written within the output data access monitor timeout time, an output data write timeout occurs and the outputs from the EtherNet/IP Slave Terminal stop. The NX Units will enter the Safe-Operational state. | --- | --- | --- | --- |
| --- | Recovery Method<br>Change the state of each NX Unit in the EtherNet/IP Slave Terminal to Operational again. At this time, review the monitoring timeout time for output data access. | 0x74<br>NX Configuration object | 0x01 | 0x39<br>Change NX state | 0x00 |

*1. This is necessary to prevent invalid data from being output as soon as the Units in the EtherNet/IP Slave Terminal enter the Operational state.

*2. It is not necessary to write data if there is no data to output. In this case, the output data access monitor timer does not operate.

# A-4 Programming Example To Detect Valid I/O Data

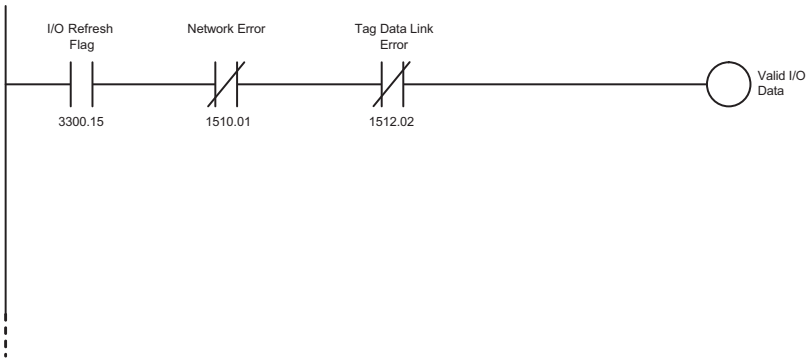


The following programming example can be used to confirm that normal communications are being performed for a Slave Terminal.
This example requires that the Slave Terminal Status is included in the I/O allocation for the Slave Terminal configuration. For details on the I/O allocation information of the Slave Terminal configuration, refer to *9-2-3 I/O Allocation Information* on page 9-12.

## Program Example Using Network Variables for Status

The following example uses Slave Terminal Status bits and PLC CIO areas to confirm that normal communications are being performed for a Slave Terminal.
The example below monitors the following bits to determine the validity of the I/O data.

- I/O Refresh Flag from the Slave Terminal I/O Allocation (bit 15 of the Slave Terminal Status)
- Network Error (bit 1 of the Unit Status 1 allocated CIO area for the EtherNet/IP Unit)
- Tag Data Link Error (bit 2 of the Communications Status 1 allocated CIO area for the EtherNet/IP Unit)




**Additional Information**

For details on the memory allocation of the EtherNet/IP master, refer to the *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)* or the user's manual for the built-in EtherNet/IP port on the connected CPU Unit or Industrial PC.

# A-5 Application Procedure for the Default Settings

The NX Units for EtherNet/IP Coupler Units and EtherNet/IP Slave Terminals can be used without configuring the Unit operation settings or NX Unit configuration information with the Support Software. In that case, the NX Units will operate with their default settings.
This section describes the procedure to configure the Slave Terminal with the default settings. If other non-default settings are required, Support Software may be required.

**Precautions for Correct Use**

- NX Unit operation settings are stored in the EtherNet/IP Coupler Unit. If the Unit operation settings of each Unit and NX Unit configuration information have not been cleared, the memory of the EtherNet/IP Coupler Unit must be set to the factory state using the clear all memory function of the Support Software before performing the procedure described in this section. If all memory is not cleared, stored settings for NX Units that were previously mounted may be automatically transferred to mounted NX Units. For details on the clear all memory function of the Sysmac Studio, refer to *11-4 Clearing All Memory* on page 11-17.
- The Sysmac Studio is required if you use a Safety Control Unit.

## A-5-1 Basic Procedure

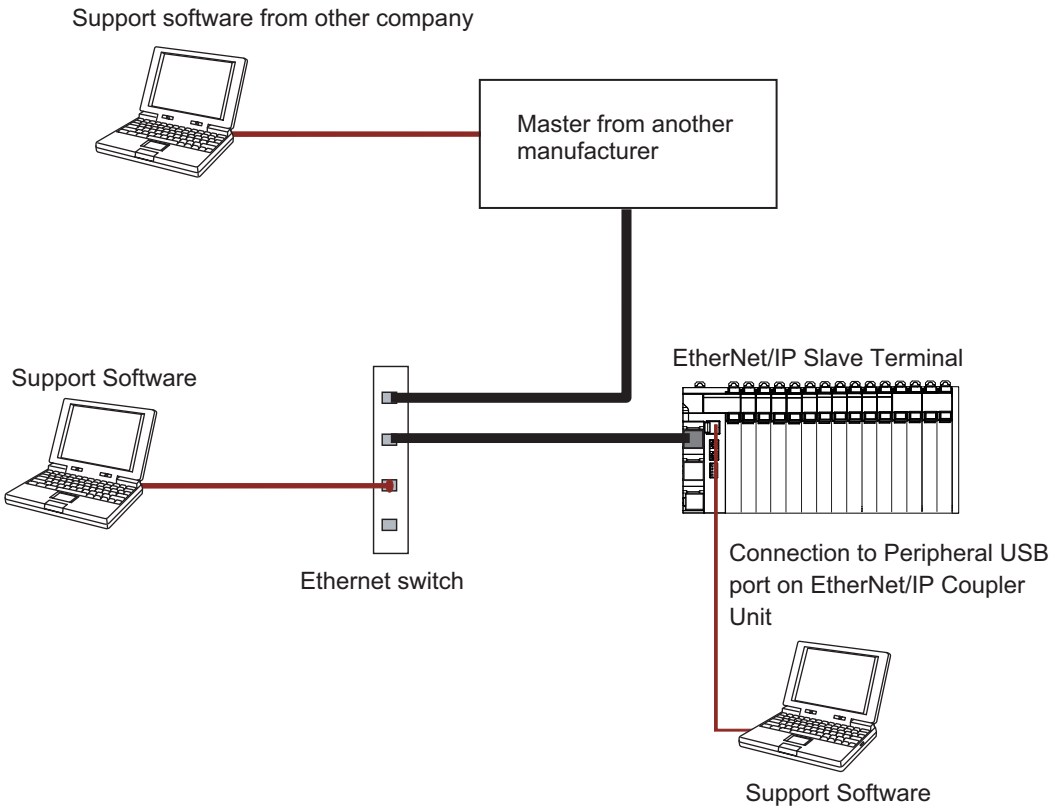
| Procedure | | Item | Description |
|---|---|---|---|
| **1** | Making Hardware Settings and Wiring the Slave Terminal | Switch Settings | Set the IP address of the EtherNet/IP Coupler Unit with the hardware switches. Refer to *4-3 Hardware Switch Settings* on page 4-10.<br>You can also use the Network Configurator to set the IP address. Refer to *9-4 Setting IP Address* on page 9-31. |
| | | Installation | Connect the NX Units and End Cover to the EtherNet/IP Coupler Unit and secure the Slave Terminal to a DIN Track to install it. Refer to *6-1 Installing Units* on page 6-2. |
| | | Wiring | Wire the Slave Terminal. Refer to *Section 7 Wiring* on page 7-1.<br>• Connect the communications cables.<br>• Connect the Unit power supply.<br>• Connect the I/O power supply.<br>• Connect the ground wire.<br>• Connect the external I/O devices. |
| **2** | Apply power to the Slave Terminal | Apply Power | During power up and initialization, the EtherNet/IP coupler automatically detects connected NX Units and applies a default configuration. |
| **3** | Upload EtherNet/IP Unit Parameters with Network Configurator | Upload | Examine the LED indicators to determine when initialization is complete. Refer to *12-2 Checking for Errors and Troubleshooting with the Indicators* on page 12-3.<br>Connect to the EtherNet/IP Coupler Unit with Network Configurator and upload the parameters.<br>Examine the I/O configuration that was automatically established during initialization. Refer to *9-5-4 Determine Tag Sizes* on page 9-40. |
| **4** | Configure the EtherNet/IP Unit | EtherNet/IP Unit Configuration | Configure the EtherNet/IP Unit using the I/O configuration parameters determined in step 3. Refer to *9-5 Setting Tag Data Links* on page 9-36. |

# A-6 Connecting to Masters from Other Manufacturers

This appendix provides the procedure to connect an EtherNet/IP Slave Terminal to a master from another manufacturer through EtherNet/IP.

## A-6-1 System Configuration

A system configuration for a connection to a master from another manufacturer is shown in the following figure.



## A-6-2 Application Procedure

The following table gives the application procedure and support software.

| Step | Item | Description | Support Software |
|---|---|---|---|
| 1 | Preparing for Work | • Selecting NX Units<br>• Checking the Specifications of the EtherNet/IP Coupler Unit and NX Units<br>• Checking the Mounting Direction<br>• Designing the Power Supplies for the EtherNet/IP Slave Terminal | --- |
| 2 | Making Hardware Settings and Wiring the Slave Terminal | • Switch Settings<br>• Installing NX Units<br>• Wiring | --- |
| 3 | Setting the IP Address and Clock of the EtherNet/IP Coupler Unit | • Setting IP Address<br>• Setting NTP Server | Support software from other company |
| 4 | Setting Slave Terminal Configuration and Operation Settings*1 | • Creating the Unit Configuration Information<br>• Setting the I/O Allocation Information<br>• Unit Operation Settings<br>• Setting Unit Application Data | NX-IO Configurator*2*3 |
| 5 | Transferring and Comparing EtherNet/IP Coupler Unit Parameter Settings*4 | • Transferring the Unit Configuration Information<br>• Transferring the I/O Allocation Information<br>• Transferring the Unit Operation Settings<br>• Transferring Unit Application Data<br>• Verifying Settings | NX-IO Configurator*2*3 |
| 6 | IO-Link Settings*5 | • IO-Link Device Settings | CX-ConfiguratorFDT*6 |
| 7 | Setting Tag Data Links | • Creating Tag Data Links<br>• Determining RPIs and Timout Values<br>• Adjusting Network Load | Support software from other company |
| 8 | Assigning Network Variables*7 | • Creating the I/O Mapping | NX-IO Configurator*2*3 |
| 9 | Checking Indicators*8 | • Checking EtherNet/IP Coupler Unit Indicators<br>• Checking NX Units Indicators<br>• Troubleshooting | • NX-IO Configurator*2*3<br>• Support software from other company |
| 10 | Confirming Operation by Checking the Wiring | • Checking Wiring with Input Monitoring and Forced Outputs | Support software from other company |
| 11 | Programming | • Creating the User Program | Support software from other company |

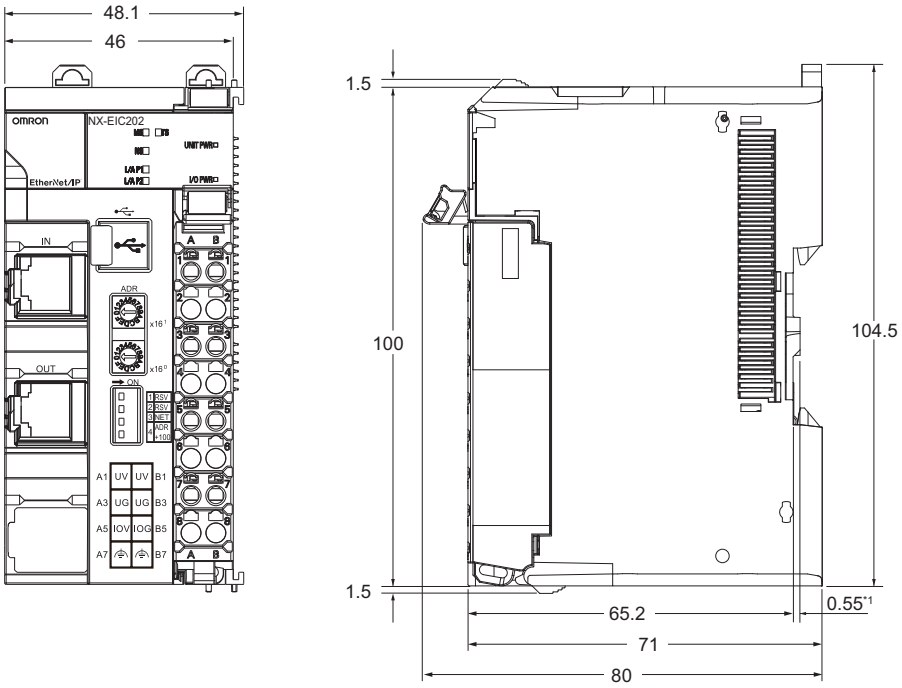
*1. For details on the settings, refer to *9-2 Setting Slave Terminal Parameters* on page 9-6.
*2. The NX-IO Configurator can be used with NX-EIC202 version 1.2 or later. Otherwise, the Sysmac Studio must be connected to the peripheral USB port on the EtherNet/IP Coupler Unit.
*3. If a Safety Control Unit is connected, the Sysmac Studio Standard Edition must be connected to the peripheral USB port on the EtherNet/IP Coupler Unit.
*4. For details on the settings, refer to *9-3 Transferring and Comparing Settings* on page 9-28.
*5. This setting is required only when an IO-Link Master Unit is connected.
*6. The CX-ConfiguratorFDT can be connected via Ethernet if NX-EIC202 version 1.2 or later is connected. Otherwise, it must be connected to the peripheral USB port on the EtherNet/IP Coupler Unit.
*7. For details on the settings, refer to *9-6 Assigning Network Variables* on page 9-70.
*8. For details on the specifications, refer to *4-2 Indicators* on page 4-6.

# A-7 Dimensions

## A-7-1 EtherNet/IP Coupler Unit

### ● EtherNet/IP Coupler Unit Only

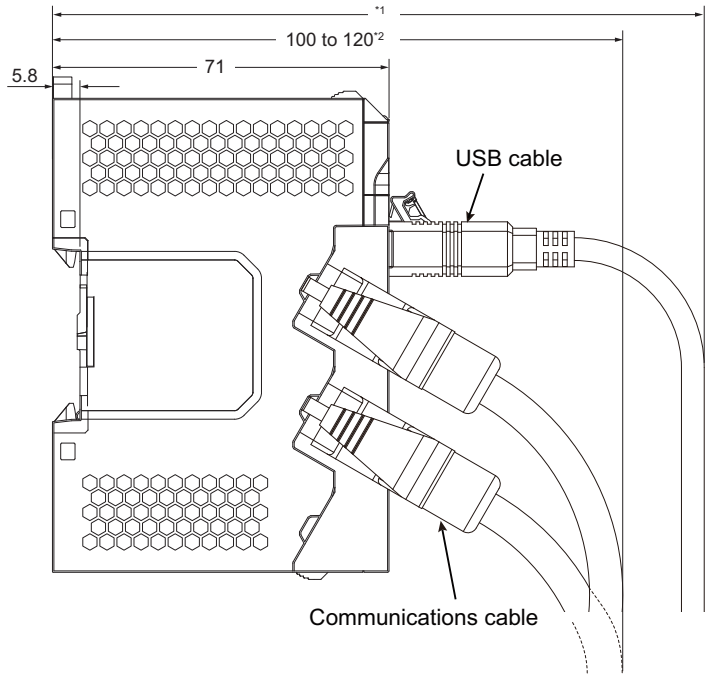
Unit: mm




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

## ● With Cables Connected

Unit: mm

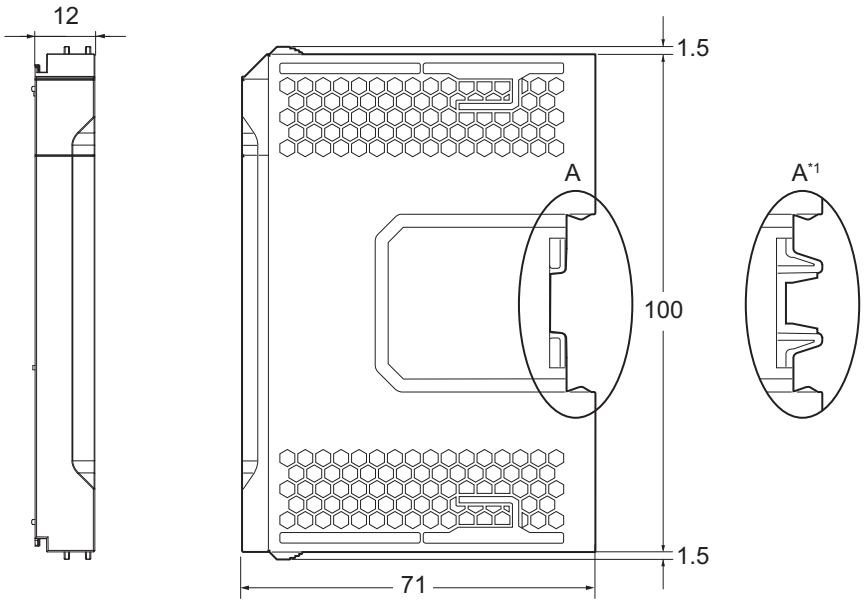



*1. This dimension depends on the specifications of the commercially available USB certified cable. Check the specifications of the USB cable that is used.

*2. This is the dimension from the back of the Unit to the communications cables.
- 100 mm: When an MPS588-C Connector is used.
- 120 mm: When an XS6G-T421-1 Connector is used.

## A-7-2 End Cover

Unit: mm




*1. This is the shape for Units with lot numbers through December 2014.

# A-8 NX Objects

This section describes the NX objects that are implemented in the EtherNet/IP Coupler Unit.

## A-8-1 NX Objects

These NX objects are exclusively for EtherNet/IP Slave Terminals.
You can read or write these objects with special instructions that are supported by the NJ/NX-series CPU Units and NY-series Industrial PCs. The *Read NX Unit Object* (NX_ReadObj) instruction reads NX objects, and the *Write NX Unit Object* (NX_WriteObj) writes NX objects. Refer to the instructions reference manual for the connected CPU Unit or Industrial PC for information on the instructions.
Refer to the manuals for the individual NX Units for details on the NX objects that are implemented by each NX Unit.

## A-8-2 Format of Object Descriptions

This manual describes NX objects with the following format.

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| <Index> | <Subindex> | <Object name> | <Default> | <Data range> | <Unit> | <Data type> | <Access> | <I/O allocation> | <Data attribute> |

Items within the <> brackets are replaced with data. Each item has the following meaning.

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

## A-8-3 Unit Information Objects

These objects are related to product information.

| Index (hex) | Subindex (hex) | Object name | Default | 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 | --- | --- | --- | ARRAY [0..11] OF BYTE | RO | Not possible. | --- |
| | 04 | Product Code | --- | --- | --- | UDINT | RO | Not possible. | --- |
| | 05 | Vendor Code | 00000001 hex | --- | --- | UDINT | RO | Not possible. | --- |
| | 06 | Unit version | --- | --- | --- | UDINT | RO | Not possible. | --- |
| | 07 | Serial Number | --- | 00000000 to FFFFFFFF hex | --- | UDINT | RO | Not possible. | --- |

- Subindex 02 hex returns the Unit model number in ASCII. If all 12 bytes are not required, the remaining bytes are filled with spaces ($20).
- For subindex 04 hex, 00640202 hex is returned.
- Subindex 06 hex gives the Unit version of the product.
  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
- Subindex 07 hex gives the serial number of the product.

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| 1001 | --- | Production Info | --- | --- | --- | --- | --- | --- | --- |
| | 00 | Number of Entries | 5 | 5 | --- | USINT | RO | Not possible. | --- |
| | 01 | Lot Number | --- | 00000000 to FFFFFFFF hex | --- | UDINT | RO | Not possible. | --- |
| | 02 | Hardware Version | “V1.0 " (padded with 16 spaces (character 20 hex)) | --- | --- | ARRAY [0..19] OF BYTE | RO | Not possible. | --- |
| | 03 | Software Version | --- | --- | --- | ARRAY [0..19] OF BYTE | RO | Not possible. | --- |

- Subindex 01 hex gives the lot number of the product.
- Subindex 02 hex gives the hardware version as a text string.
- Subindex 03 hex gives the software version as a text string.

## A-8-4 Objects That Accept I/O Allocations

These objects accept I/O allocations.
Refer to *Allocatable I/O Data in an EtherNet/IP Coupler Unit* on page 9-13 and *Details of I/O Data in the EtherNet/IP Coupler Unit* on page 9-15 under *9-2-3 I/O Allocation Information* on page 9-12 for details on the data for objects that allow I/O allocations.

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| 2003 | --- | NX Unit Registration Status | --- | --- | --- | --- | --- | --- | --- |
| | 00 | Number of Entries | 3 | 3 | --- | USINT | RO | Not possible. | --- |
| | 01 | NX Unit Registration Status 15 | FALSE | FALSE or TRUE | --- | ARRAY[0..15] OF BOOL | RO | Possible. | --- |
| | 02 | NX Unit Registration Status 31 | FALSE | FALSE or TRUE | --- | ARRAY[0..31] OF BOOL | RO | Possible. | --- |
| | 03 | NX Unit Registration Status 63 | FALSE | FALSE or TRUE | --- | ARRAY[0..63] OF BOOL | RO | Possible. | --- |

- Subindexes 01 to 03 hex tell whether the NX Unit is registered in the Unit configuration information.

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| 2004 | --- | NX Unit Message Enabled Status | --- | --- | --- | --- | --- | --- | --- |
| | 00 | Number of Entries | 3 | 3 | --- | USINT | RO | Not possible. | --- |
| | 01 | NX Unit Message Enabled Status 15 | FALSE | FALSE or TRUE | --- | ARRAY[0..15] OF BOOL | RO | Possible. | --- |
| | 02 | NX Unit Message Enabled Status 31 | FALSE | FALSE or TRUE | --- | ARRAY[0..31] OF BOOL | RO | Possible. | --- |
| | 03 | NX Unit Message Enabled Status 63 | FALSE | FALSE or TRUE | --- | ARRAY[0..63] OF BOOL | RO | Possible. | --- |

- Subindexes 01 to 03 tell whether the message communications are enabled in the NX Units.

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| 2005 | --- | NX Unit I/O Data Active Status | --- | --- | --- | --- | --- | --- | --- |
| | 00 | Number of Entries | 3 | 3 | --- | USINT | RO | Not possible. | --- |
| | 01 | NX Unit I/O Data Active Status 15 | FALSE | FALSE or TRUE | --- | ARRAY[0..15] OF BOOL | RO | Possible. | --- |
| | 02 | NX Unit I/O Data Active Status 31 | FALSE | FALSE or TRUE | --- | ARRAY[0..31] OF BOOL | RO | Possible. | --- |
| | 03 | NX Unit I/O Data Active Status 63 | FALSE | FALSE or TRUE | --- | ARRAY[0..63] OF BOOL | RO | Possible. | --- |

- Subindexes 01 to 03 tell whether the NX Units can perform I/O data communications.

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| 2006 | --- | NX Unit Error Status | --- | --- | --- | --- | --- | --- | --- |
| | 00 | Number of Entries | 3 | 3 | --- | USINT | RO | Not possible. | --- |
| | 01 | NX Unit Error Status 15 | FALSE | FALSE or TRUE | --- | ARRAY[0..15] OF BOOL | RO | Possible. | --- |
| | 02 | NX Unit Error Status 31 | FALSE | FALSE or TRUE | --- | ARRAY[0..31] OF BOOL | RO | Possible. | --- |
| | 03 | NX Unit Error Status 63 | FALSE | FALSE or TRUE | --- | ARRAY[0..63] OF BOOL | RO | Possible. | --- |

- Subindexes 01 to 03 tell whether errors exist in the NX Units.

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| 2008 | --- | Slave Terminal Status | --- | --- | --- | --- | --- | --- | --- |
| | 00 | Number of Entries | 1 | 1 | --- | USINT | RO | Not possible. | --- |
| | 01 | Slave Terminal Status | 0000 hex | --- | --- | WORD | RO | Possible. | --- |
| | | Reserved | --- | --- | --- | BIT4 | RO | Not possible. | --- |
| | | Slave Terminal Observation | FALSE | FALSE or TRUE | --- | BOOL | RO | Possible. | --- |
| | | Slave Terminal Minor Fault | FALSE | FALSE or TRUE | --- | BOOL | RO | Possible. | --- |
| | | Slave Terminal Partial Fault | FALSE | FALSE or TRUE | --- | BOOL | RO | Possible. | --- |
| | | Slave Terminal Major Fault | FALSE | FALSE or TRUE | --- | BOOL | RO | Possible. | --- |
| | | Reserved | --- | --- | --- | BIT6 | RO | Not possible. | --- |
| | | Error Detection Flag | FALSE | FALSE or TRUE | --- | BOOL | RO | Possible. | --- |
| | | I/O Refresh Flag | FALSE | FALSE or TRUE | --- | BOOL | RO | Possible. | --- |

- Subindex 01 hex gives the Slave Terminal error status, Error Detection Flag, and I/O Refresh Flag.
- The assignments of bits for subindex 01 hex are listed below.

Bit 15: I/O Refresh Flag
Bit 14: Error Detection Flag
Bits 8 to 13: Reserved
Bit 7: Slave Terminal Major Fault
Bit 6: Slave Terminal Partial Fault
Bit 5: Slave Terminal Minor Fault
Bit 4: Slave Terminal Observation
Bits 0 to 3: Reserved

- Bits 4 to 7 are 0 (FALSE) if no error exists or 1 (TRUE) if an error exists.
- The Error Detection Flag in bit 14 is 1 (TRUE) if any of bits 4 to 7 are 1 (TRUE). Otherwise, it is 0 (FALSE).
- The I/O Refresh Flag in bit 15 is 1 (TRUE) if I/O communications are active for all of the NX Units in the Slave Terminal. Otherwise, it is 0 (FALSE).

## A-8-5 Other Objects

This section lists other objects.

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| 4000 | --- | NX Unit Configuration | --- | --- | --- | --- | --- | --- | --- |
| | 00 | Number of Entries | 4 | 4 | --- | USINT | RO | Not possible. | --- |
| | 04 | NX Unit Serial Number Verification Setting | 0 | 0 or 1 | --- | USINT | RW | Not possible. | Y |

- Subindex 04 tells whether the serial number verification is enabled.
  0: Not checked.
  1: Checked.
  Serial numbers are verified only for NX Units (not for EtherNet/IP Coupler Units).

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| 4007 | --- | Error Detection Setting of NX Unit | --- | --- | --- | --- | --- | --- | --- |
| | 00 | Number of Entries | 2 | 2 | --- | USINT | RO | Not possible. | --- |
| | 02 | NX Unit Connection Wait Time | 3 | 3 to 200 | s | UINT | RW | Not possible. | Y |

- Subindex 02 hex gives the wait time to monitor for connection of the NX Units.

| Index (hex) | Subindex (hex) | Object name | Default | Data range | Unit | Data type | Access | I/O allocation | Data attribute |
|---|---|---|---|---|---|---|---|---|---|
| 400D | --- | Fail-soft Operation Setting | --- | --- | --- | --- | --- | --- | --- |
| | 00 | Number of Entries | 1 | 1 | --- | USINT | RO | Not possible. | --- |
| | 01 | Fail-soft Operation Setting | 1 | 0 or 1 | --- | USINT | RW | Not possible. | Y |

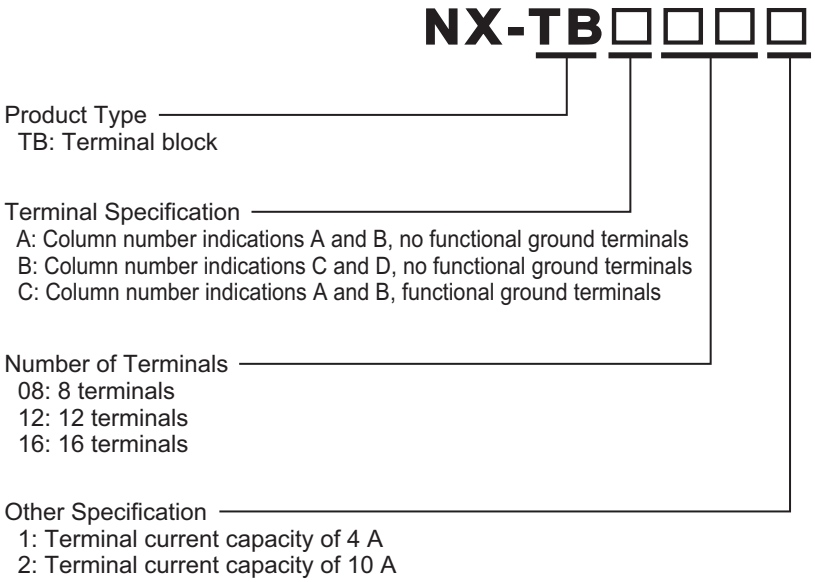
- Subindex 01 hex specifies whether to use fail-soft operation for the EtherNet/IP Slave Terminal. Set subindex 01 to *Fail-soft operation* to use fail-soft operation.
  0: Fail-soft operation
  1: Stop
  Refer to *11-7 Fail-soft Operation* on page 11-27 for details on fail-soft operation.

# A-9 Terminal Block Model Numbers

This section describes the models of screwless clamping terminal blocks for the EtherNet/IP Coupler Units and NX Units.

## A-9-1 Model Number Notation

The terminal block model numbers are assigned based on the following rules.




## A-9-2 Models

The following table lists the terminal blocks.

**Precautions for Correct Use**

Do not use terminal blocks with a terminal current capacity of 4 A because this is not sufficient for the NX-EIC202.

Refer to *4-5 Terminal Blocks* on page 4-13 for the terminal blocks that are applicable to the EtherNet/IP Coupler Unit.

| Terminal block model number | Number of terminals | Ground terminal mark | Terminal current capacity |
|---|---|---|---|
| NX-TBA081 | 8 | None | 4 A |
| NX-TBA121 | 12 | None | 4 A |
| NX-TBA161 | 16 | None | 4 A |
| NX-TBB121 | 12 | None | 4 A |
| NX-TBB161 | 16 | None | 4 A |
| NX-TBA082 | 8 | None | 10 A |
| NX-TBA122 | 12 | None | 10 A |
| NX-TBA162 | 16 | None | 10 A |
| NX-TBB122 | 12 | None | 10 A |

| Terminal block model number | Number of terminals | Ground terminal mark | Terminal current capacity |
|---|---|---|---|
| NX-TBB162 | 16 | None | 10 A |
| NX-TBC082 | 8 | Provided | 10 A |
| NX-TBC162 | 16 | Provided | 10 A |

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

# A-10 Version Information

This section describes the relationship between the unit versions of the EtherNet/IP Coupler Units, CPU Units, and Industrial PCs and the versions of the Support Software.

## A-10-1 Relationship between Unit Versions

This section describes the relationship between the unit versions of the EtherNet/IP Coupler Units, CPU Units, and Industrial PCs and the versions of the Support Software for different system configurations.

If you use any of the combinations of versions/unit versions that are the same or that are later or higher than the corresponding versions given in the following table, you can use all of the functions that are supported by that unit version of the EtherNet/IP Coupler Unit. Refer to *A-10-2 Functions That Were Added or Changed for Each Unit Version* on page A-77 for the functions that are supported for each unit version of the EtherNet/IP Coupler Unit.
Refer to version-related information given in the user's manuals of the CPU Unit or Industrial PC for corresponding versions when using CPU Unit versions, Industrial PC unit versions, and Support Software versions that are the same or that are later or higher than the corresponding versions.

Depending on the type and model of the Unit, some Units do not have all of the versions given in the corresponding versions. 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.

### Connection to the NJ/NX-series CPU Unit or NY-series Industrial PC

The following describes the relationship between the unit versions of the EtherNet/IP Coupler Units, the unit versions of the NJ/NX-series CPU Units, the unit versions of the NY-series Industrial PCs, and the versions of the Support Software.

#### ● NX-series CPU Unit or NY-series Industrial PC

| EtherNet/IP Coupler Unit | | Corresponding unit version/version | | | |
|---|---|---|---|---|---|
| Model | Unit version | Unit version of CPU Unit or Industrial PC | Sysmac Studio version | Network Configurator for EtherNet/IP version | CX-ConfiguratorFDT version |
| NX-EIC202 | Ver.1.2 | Ver.1.14 | Ver.1.19 | Ver.3.21 | Ver.2.4*1 |
| | Ver.1.0 | Not possible. | Not possible. | Not possible. | Not possible. |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

### ● NJ-series CPU Unit

| EtherNet/IP Coupler Unit | | Corresponding unit version/version | | | | |
|---|---|---|---|---|---|---|
| Model | Unit version | Unit version of CPU Unit | Unit version of CJ1W-EIP21 | Sysmac Studio version | Network Configurator for EtherNet/IP version | CX-ConfiguratorFDT version |
| NX-EIC202 | Ver.1.2 | Ver.1.14 | Ver.2.1 | Ver.1.19 | Ver.3.21 | Ver.2.4*1 |
| | Ver.1.0 | Not possible. | Not possible. | Not possible. | Not possible. | Not possible. |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

## Connection to CS/CJ/CP-series CPU Unit

The following describes the relationship between the unit versions of the EtherNet/IP Coupler Units, the unit versions of the CS/CJ/CP-series CPU Units, and the versions of the Support Software.

### ● CS1G/CS1H/CJ1H/CJ1M CPU Units

| EtherNet/IP Coupler Unit | | Corresponding unit version/version | | | | |
|---|---|---|---|---|---|---|
| Model | Unit version | Unit version of CPU Unit | Unit version of CS1W-EIP21/ CJ1W-EIP21 | Network Configurator for EtherNet/IP version | NX-IO Configurator version | CX-ConfiguratorFDT version |
| NX-EIC202 | Ver.1.2 | Ver.3.0 | Ver.2.1 | Ver.3.00 | Ver.1.00 | Ver.2.4*1 |
| | Ver.1.0 | | | | Ver.1.00*2 | Ver.2.2 |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

*2. You can connect only to the peripheral USB port on the EtherNet/IP Coupler Unit. You cannot connect with any other path.

### ● CJ2H-CPU6□/CJ2M-CPU1□/CP1H CPU Unit

| EtherNet/IP Coupler Unit | | Corresponding unit version/version | | | | |
|---|---|---|---|---|---|---|
| Model | Unit version | Unit version of CPU Unit | Unit version of CJ1W-EIP21 | Network Configurator for EtherNet/IP version | NX-IO Configurator version | CX-ConfiguratorFDT version |
| NX-EIC202 | Ver.1.2 | Ver.1.0 | Ver.2.1 | Ver.3.00 | Ver.1.00 | Ver.2.4*1 |
| | Ver.1.0 | | | | Ver.1.00*2 | Ver.2.2 |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

*2. You can connect only to the peripheral USB port on the EtherNet/IP Coupler Unit. You cannot connect with any other path.

### ● CJ2H-CPU6□-EIP CPU Unit

| EtherNet/IP Coupler Unit | | Corresponding unit version/version | | | | |
|---|---|---|---|---|---|---|
| Model | Unit version | Unit version of CPU Unit | Unit version of CJ1W-EIP21 | Network Configurator for EtherNet/IP version | NX-IO Configurator version | CX-ConfiguratorFDT version |
| NX-EIC202 | Ver.1.2 | Ver.1.5 | Ver.2.1 | Ver.3.00 | Ver.1.00 | Ver.2.4*1 |
| | Ver.1.0 | | | | Ver.1.00*2 | Ver.2.2 |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

*2. You can connect only to the peripheral USB port on the EtherNet/IP Coupler Unit. You cannot connect with any other path.

### ● CJ2M-CPU3□ CPU Unit

| EtherNet/IP Coupler Unit | | Corresponding unit version/version | | | | |
|---|---|---|---|---|---|---|
| Model | Unit version | Unit version of CPU Unit | Unit version of CJ1W-EIP21 | Network Configurator for EtherNet/IP version | NX-IO Configurator version | CX-ConfiguratorFDT version |
| NX-EIC202 | Ver.1.2 | Ver.1.0 | Ver.2.1 | Ver.3.21 | Ver.1.00 | Ver.2.4*1 |
| | Ver.1.0 | | | | Ver.1.00*2 | Ver.2.2 |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

*2. You can connect only to the peripheral USB port on the EtherNet/IP Coupler Unit. You cannot connect with any other path.

## Connection to the Sysmac Gateway

The following describes the relationship between the unit versions of the EtherNet/IP Coupler Units, the unit versions of the Sysmac Gateway, and the versions of the Support Software.

### ● Sysmac Gateway

| EtherNet/IP Coupler Unit | | Corresponding unit version/version | | | |
|---|---|---|---|---|---|
| Model | Unit version | Sysmac Gateway version | Network Configurator for EtherNet/IP version | NX-IO Configurator version | CX-ConfiguratorFDT version |
| NX-EIC202 | Ver.1.2 | Ver.1.31 | Ver.3.50 | Ver.1.00 | Ver.2.4*1 |
| | Ver.1.0 | | | Ver.1.00*2 | Ver.2.2 |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

*2. You can connect only to the peripheral USB port on the EtherNet/IP Coupler Unit. You cannot connect with any other path.

## A-10-2 Functions That Were Added or Changed for Each Unit Version

This section gives the functions that were added or changed for each unit version of the EtherNet/IP Coupler Unit.

### Changes in and Additions to Functions

The following table shows the unit version of the EtherNet/IP Coupler Unit, the unit version of the CPU Unit, the unit version of the Industrial PC, and the version of the Support Software for changes in or additions to the functions.
You can use the added or changed functions with the versions/unit versions given in the table or with later/higher versions.
Refer to version-related information given in the user's manuals of the CPU Unit or Industrial PC for corresponding versions when using CPU Unit versions, Industrial PC unit versions, and Support Software versions that are the same or that are later or higher than the corresponding versions.
Depending on the type and model of the Unit, some Units do not have all of the versions given in the corresponding versions. 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.

#### ● NX-EIC202

The following table shows the relationship when the NJ/NX-series CPU Unit is connected.

| Function | Change or addition | EtherNet/IP Coupler Unit | Corresponding unit version/version | | | | NX Unit restrictions |
|---|---|---|---|---|---|---|---|
| | | | Using an NX-series CPU Unit | | Using an NJ-series CPU Unit | | |
| | | | CPU Unit | Sysmac Studio | CPU Unit | Sysmac Studio | |
| NX Unit control with CIP objects | Addition | Ver.1.2 | Ver.1.14 | Ver.1.19 | Ver.1.14 | Ver.1.19 | None |
| Setting IO-Link devices from Support Software other than the Sysmac Studio connected to peripheral USB port on the EtherNet/IP Coupler Unit | Addition | | Not possible. | Not possible. | Not possible. | Not possible. | Yes |
| Communications Interface Unit control | Addition | | Ver.1.14 | Ver.1.19 | Ver.1.14 | Ver.1.19 | Yes |
| BOOTP client | Addition | | | | | | None |

The following table shows the relationship when the NY-series Industrial PC is connected.

| Function | Change or addition | EtherNet/IP Coupler Unit | Corresponding unit version/version | | NX Unit restrictions |
|---|---|---|---|---|---|
| | | | Using an NY-series Industrial PC | | |
| | | | Industrial PC | Sysmac Studio | |
| NX Unit control with CIP objects | Addition | Ver.1.2 | Ver.1.14 | Ver.1.19 | None |
| Setting IO-Link devices from Support Software other than the Sysmac Studio connected to peripheral USB port on the EtherNet/IP Coupler Unit | Addition | | Not possible. | Not possible. | Yes |
| Communications Interface Unit control | Addition | | Ver.1.14 | Ver.1.19 | Yes |
| BOOTP client | Addition | | | | None |

The following table shows the relationship when the CS1G/CS1H/CJ1H/CJ1M CPU Unit is connected.

| Function | Change or addition | EtherNet/IP Coupler Unit | Corresponding unit version/version | | | | | NX Unit restrictions |
|---|---|---|---|---|---|---|---|---|
| | | | CPU Unit | CS1W-EIP21/ CJ1W-EIP21 | Network Configurator for EtherNet/IP | NX-IO Configurator | CX-ConfiguratorFDT | |
| NX Unit control with CIP objects | Addition | Ver.1.2 | Ver.3.0 | Ver.2.1 | Ver.3.00 | Ver.1.00 | Ver.2.4*1 | None |
| Setting IO-Link devices from Support Software other than the Sysmac Studio connected to peripheral USB port on the EtherNet/IP Coupler Unit | Addition | | | | | | | Yes |
| Communications Interface Unit control | Addition | | | | | | | Yes |
| BOOTP client | Addition | | | | | | | None |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

The following table shows the relationship when the CJ2H-CPU6□/CJ2M-CPU1□/CP1H CPU Unit is connected.

| Function | Change or addition | EtherNet/IP Coupler Unit | Corresponding unit version/version | | | | | NX Unit restrictions |
|---|---|---|---|---|---|---|---|---|
| | | | CPU Unit | CJ1W-EIP21 | Network Configurator for EtherNet/IP | NX-IO Configurator | CX-ConfiguratorFDT | |
| NX Unit control with CIP objects | Addition | Ver.1.2 | Ver.1.0 | Ver.2.1 | Ver.3.00 | Ver.1.00 | Ver.2.4*1 | None |
| Setting IO-Link devices from Support Software other than the Sysmac Studio connected to peripheral USB port on the EtherNet/IP Coupler Unit | Addition | | | | | | | Yes |
| Communications Interface Unit control | Addition | | | | | | | Yes |
| BOOTP client | Addition | | | | | | | None |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

The following table shows the relationship when the CJ2H-CPU6□-EIP CPU Unit is connected.

| Function | Change or addition | EtherNet/IP Coupler Unit | Corresponding unit version/version | | | | | NX Unit restrictions |
|---|---|---|---|---|---|---|---|---|
| | | | CPU Unit | CJ1W-EIP21 | Network Configurator for EtherNet/IP | NX-IO Configurator | CX-ConfiguratorFDT | |
| NX Unit control with CIP objects | Addition | Ver.1.2 | Ver.1.5 | Ver.2.1 | Ver.3.00 | Ver.1.00 | Ver.2.4*1 | None |
| Setting IO-Link devices from Support Software other than the Sysmac Studio connected to peripheral USB port on the EtherNet/IP Coupler Unit | Addition | | | | | | | Yes |
| Communications Interface Unit control | Addition | | | | | | | Yes |
| BOOTP client | Addition | | | | | | | None |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

The following table shows the relationship when the CJ2M-CPU3□ CPU Unit is connected.

| Function | Change or addition | EtherNet/IP Coupler Unit | Corresponding unit version/version | | | | | NX Unit restrictions |
|---|---|---|---|---|---|---|---|---|
| | | | CPU Unit | CJ1W-EIP21 | Network Configurator for EtherNet/IP | NX-IO Configurator | CX-ConfiguratorFDT | |
| NX Unit control with CIP objects | Addition | Ver.1.2 | Ver.1.0 | Ver.2.1 | Ver.3.00 | Ver.1.00 | Ver.2.4*1 | None |
| Setting IO-Link devices from Support Software other than the Sysmac Studio connected to peripheral USB port on the EtherNet/IP Coupler Unit | Addition | | | | | | | Yes |
| Communications Interface Unit control | Addition | | | | | | | Yes |
| BOOTP client | Addition | | | | | | | None |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

The following table shows the relationship when the Sysmac Gateway is connected.

| Function | Change or addition | EtherNet/IP Coupler Unit | Corresponding unit version/version | | | | NX Unit restrictions |
|---|---|---|---|---|---|---|---|
| | | | Sysmac Gateway | Network Configurator for EtherNet/IP | NX-IO Configurator | CX-ConfiguratorFDT | |
| NX Unit control with CIP objects | Addition | Ver.1.2 | Ver.1.31 | Ver.3.00 | Ver.1.00 | Ver.2.4*1 | None |
| Setting IO-Link devices from Support Software other than the Sysmac Studio connected to peripheral USB port on the EtherNet/IP Coupler Unit | Addition | | Not possible. | Not possible. | Not possible. | Not possible. | Yes |
| Communications Interface Unit control | Addition | | Ver.1.31 | Ver.3.00 | Ver.1.00 | Ver.2.4*1 | Yes |
| BOOTP client | Addition | | | | | | None |

*1. The CX-ConfiguratorFDT with version 2.2 or later can be used if it is connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

Refer to the *NX-series Data Reference Manual (Cat. No. W525)* for the restrictions on NX Units.

## Addition of Connectable NX Units

Additions are sometimes made to the NX Units that you can connect when the unit version of the EtherNet/IP Coupler Unit is upgraded.
Refer to the *NX-series Data Reference Manual (Cat. No. W525)* for the addition of connectable NX Units.

# A-10-3 Unit Versions and Support Software

The following tables give the relationship between the unit version of the EtherNet/IP Coupler Unit, the Support Software that you can use, and the Support Software connection methods.

### ● NX-EIC202 Ver.1.2

| Purpose | NJ/NX/NY-series Controller | | CS/CJ/CP-series Controller | | PLC from another manufacturer | |
|---|---|---|---|---|---|---|
| | Support Software | Connection Method | Support Software | Connection Method | Support Software | Connection Method |
| Programming | Sysmac Studio Standard Edition | • Connection to CPU Unit<br>• Industrial PC<br>• Ethernet connection | CX-Programmer | • Connection to CPU Unit<br>• Ethernet connection | Support software from other company | Depends on support software from other company. |
| EtherNet/IP Network Configuration | Sysmac Studio Standard Edition and Network Configurator | • Connection to CPU Unit<br>• Industrial PC<br>• Ethernet connection | Network Configurator | • Connection to CPU Unit<br>• Ethernet connection | Support software from other company | Depends on support software from other company. |
| EtherNet/IP Coupler Unit Configuration and I/O Mapping | NX-IO Configurator*1 | • Connection to CPU Unit<br>• Industrial PC<br>• Ethernet connection<br>• Connection to peripheral USB port on EtherNet/IP Coupler Unit | NX-IO Configurator*2 | • Connection to CPU Unit<br>• Ethernet connection<br>• Connection to peripheral USB port on EtherNet/IP Coupler Unit | NX-IO Configurator*2 | • Ethernet connection<br>• Connection to peripheral USB port on EtherNet/IP Coupler Unit |

| Purpose | NJ/NX/NY-series Controller | | CS/CJ/CP-series Controller | | PLC from another manufacturer | |
|---|---|---|---|---|---|---|
| | Support Software | Connection Method | Support Software | Connection Method | Support Software | Connection Method |
| IO-Link Settings | CX-ConfiguratorFDT | • Connection to CPU Unit<br>• Industrial PC<br>• Ethernet connection<br>• Connection to peripheral USB port on EtherNet/IP Coupler Unit | CX-ConfiguratorFDT | • Connection to CPU Unit<br>• Ethernet connection<br>• Connection to peripheral USB port on EtherNet/IP Coupler Unit | CX-ConfiguratorFDT | • Ethernet connection<br>• Connection to peripheral USB port on EtherNet/IP Coupler Unit |
| Safety Control Unit Settings | Sysmac Studio Standard Edition | Connection to peripheral USB port on EtherNet/IP Coupler Unit | Sysmac Studio | Connection to peripheral USB port on EtherNet/IP Coupler Unit | Sysmac Studio | Connection to peripheral USB port on EtherNet/IP Coupler Unit |

*1. If a Safety Control Unit is connected, the Sysmac Studio Standard Edition must be connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

*2. If a Safety Control Unit is connected, the Sysmac Studio Standard Edition or NX-IO Edition must be connected to the peripheral USB port on the EtherNet/IP Coupler Unit.

## ● NX-EIC202 Ver.1.0

| Purpose | NJ/NX/NY-series Controller | | CS/CJ/CP-series Controller | | PLC from another manufacturer | |
|---|---|---|---|---|---|---|
| Support Software | Connection Method | Support Software | Connection Method | Support Software | Connection Method | |
| Programming | Cannot be connected. | | CX-Programmer | • Connection to CPU Unit<br>• Ethernet connection | Support software from other company | Depends on support software from other company. |
| EtherNet/IP Network Configuration | | | Network Configurator | • Connection to CPU Unit<br>• Ethernet connection | Support software from other company | Depends on support software from other company. |
| EtherNet/IP Coupler Unit Configuration and I/O Mapping | | | Sysmac Studio | Connection to peripheral USB port on EtherNet/IP Coupler Unit | Sysmac Studio | Connection to peripheral USB port on EtherNet/IP Coupler Unit |
| IO-Link Settings | | | CX-ConfiguratorFDT | Connection to peripheral USB port on EtherNet/IP Coupler Unit | CX-ConfiguratorFDT | Connection to peripheral USB port on EtherNet/IP Coupler Unit |
| Safety Control Unit Settings | | | Sysmac Studio | Connection to peripheral USB port on EtherNet/IP Coupler Unit | Sysmac Studio | Connection to peripheral USB port on EtherNet/IP Coupler Unit |

# I

# Index

# Index

## Numerics



## A



## B



## C



## D



## E

## F



## G



## H



## I



## K



## L



## M

## N



## O



## P



## R



## S

## T



## U



## V



## W

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