Machine Automation Controller

NX-series

EtherNet/IP™ Coupler Unit

User's Manual

NX-EIC202

EtherNet/IP Coupler Unit

W536-E1-02

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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

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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.

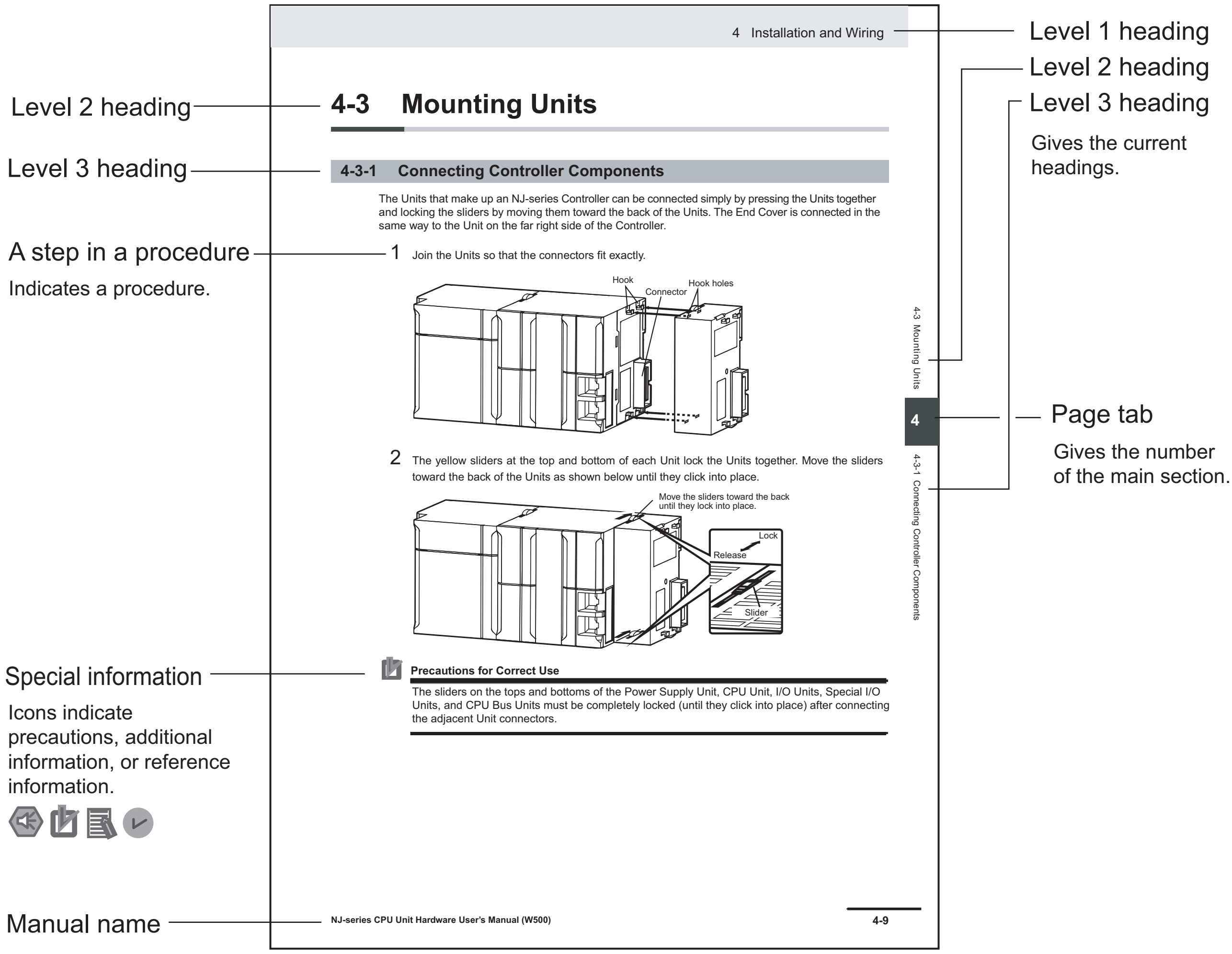
Other manuals, such as related product manuals, are necessary for specific system configurations and applications. Refer to *Related Manuals* on page 27 for the related manuals.

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 and Icons

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



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

Special Information

Special information in this manual is classified as follows:

Precautions for Safe Use

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

Precautions for Correct Use

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

Additional Information

Additional information to read as required.

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

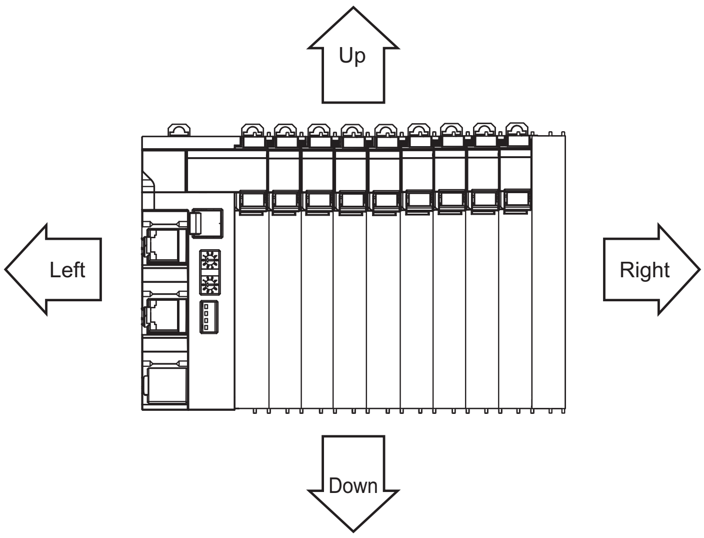
Version Information

Information on differences in specifications and functionality for CPU Units and EtherNet/IP Coupler Units with different unit versions and for different versions of the Sysmac Studio is given.

Note References are provided to more detailed or related information.

Precaution on Terminology

- In this manual, “download” refers to transferring data from the Sysmac Studio to the physical EtherNet/IP Coupler Unit and “upload” refers to transferring data from the physical EtherNet/IP Coupler Unit to the Sysmac Studio.
- In this manual, the directions in relation to the Units are given in the following figure, which shows upright installation.



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Safety Precautions

Definition of Precautionary Information

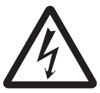
The following notation is used in this manual to provide precautions required to ensure safe usage of an NX-series EtherNet/IP Coupler Unit.

The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.

The following notation is used.

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

Symbols

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

Warnings

⚠ WARNING

During Power Supply

Do not touch the terminal section while power is ON.

Electric shock may occur.

Do not attempt to take any Unit apart.

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

Fail-safe Measures

Provide safety measures in external circuits to ensure safety in the system if an abnormality occurs due to malfunction of the CPU Unit, 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 will turn OFF all outputs from Basic Output Units in the following cases. The remote I/O slaves will operate according to the settings in the slaves.

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

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

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

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

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

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

Voltage and Current Inputs

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

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

Transferring

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

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

Cautions

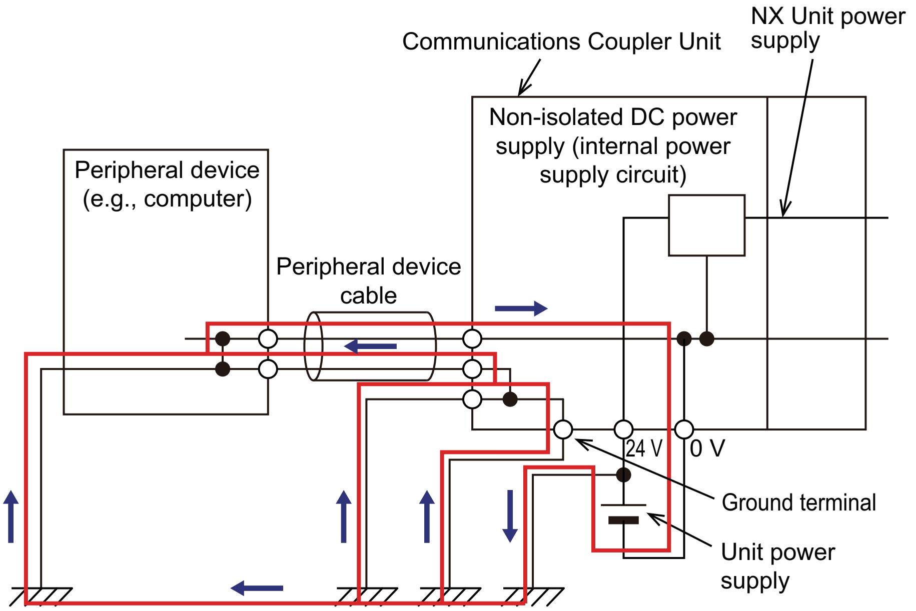
Caution

Wiring

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

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

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



Precautions for Safe Use

Transporting

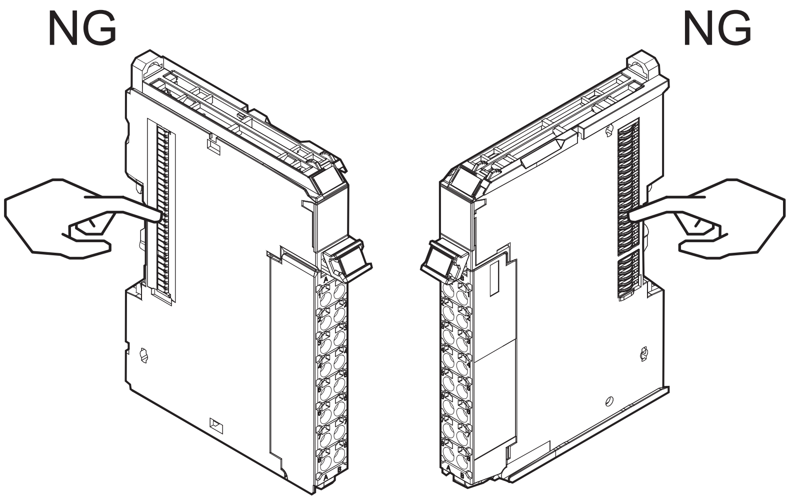
- When transporting any Unit, use the special packing box for it.
  Also, do not subject the Unit to excessive vibration or shock during transportation.
- Do not drop any Unit or subject it to abnormal vibration or shock.
  Doing so may result in Unit malfunction or burning.

Mounting

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

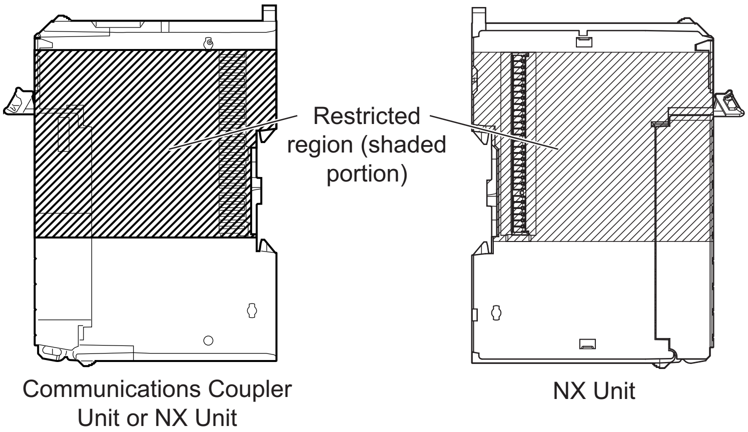
Installation

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

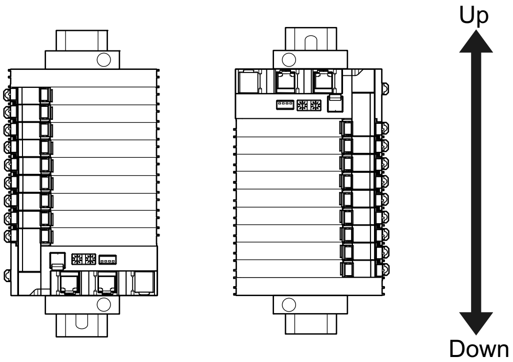


Example: NX Unit (12 mm width)

- Do not write on 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.

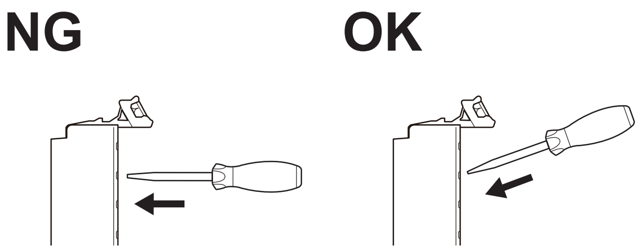


- For the installation orientations in the following figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables. The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured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



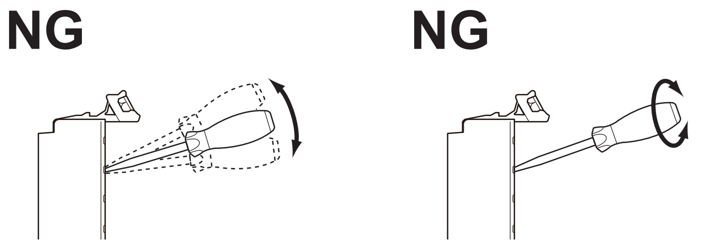
Wiring

- 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.



- 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.



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 Sysmac Studio.
- Always turn OFF the external power supply to the Units before attempting any of the following.

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

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

Operation

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

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

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 EtherCAT.
- Do not exceed the ranges that are given in the specifications for the communications distance and number of connected Units.
- 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 Sysmac Studio and you can check the actual slave revisions from the Sysmac Studio 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

Conformance to EC 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 EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

*1. Applicable EMC (Electromagnetic Compatibility) standards are as follows:
EMS (Electromagnetic Susceptibility): EN 61131-2
EMI (Electromagnetic Interference): EN 61131-2 (Radiated emission: 10-m regulations).

Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 VAC and 75 to 1,500 VDC meet the required safety standards. The applicable directive is EN 61131-2.

Conformance to EC Directives

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

- The NX-series Units must be installed within a control panel.
- You must use reinforced insulation or double insulation 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 EC 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 EC 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 Standards

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

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

Class A Device (Broadcasting Communications Device for Office Use)

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

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

Software Licenses and Copyrights

This product incorporates certain third party software. The license and copyright information associated with this software is available at the following web sites.

- http://www.fa.omron.co.jp/nj_info_e/
- http://www.fa.omron.co.jp/nx_info_j/

Unit Versions

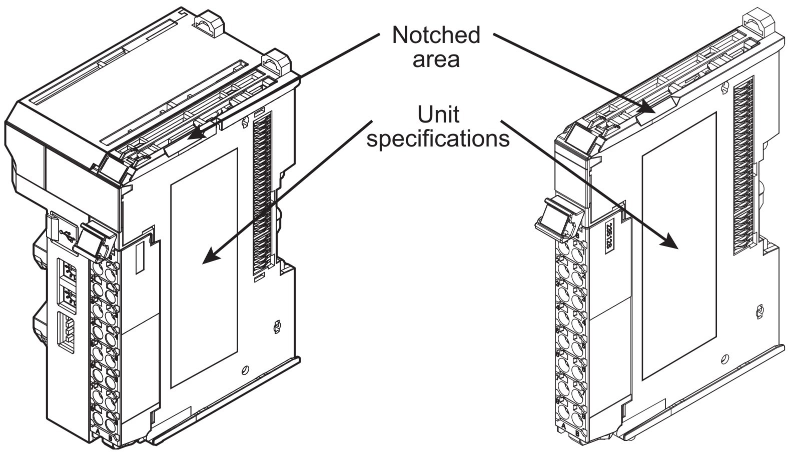
This section describes the notation that is used for unit versions, the confirmation method for unit versions, and the relationship between unit versions and Sysmac Studio versions.

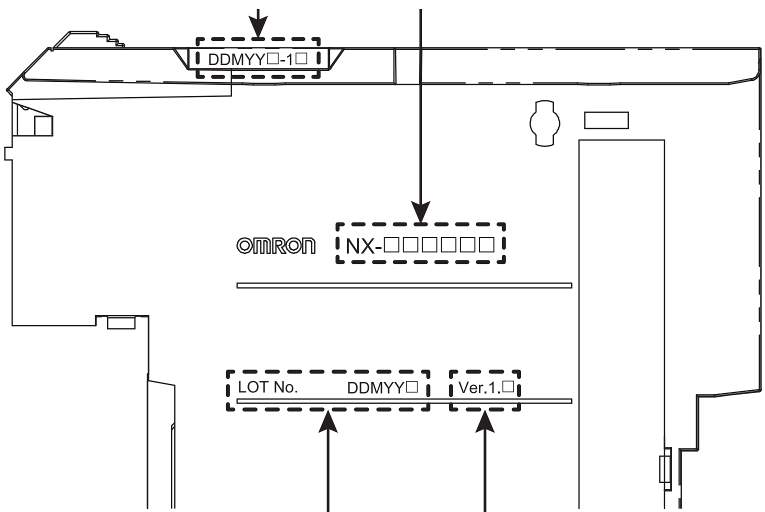
Unit Versions

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. DDMYY□: Lot number, □: Used by OMRON. "M" gives the month (1 to 9: January to September, X: October, Y: November, Z: December)

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

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

Confirming Unit Versions with the Sysmac Studio

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

1 Double-click **NX-EIC202** under **Configurations and Setup** in the Multiview Explorer, and then double-click the EtherNet/IP Coupler Unit. Or, right-click the EtherNet/IP Coupler Unit and select ***Edit*** from the menu. The Edit Slave Terminal Configuration Tab Page is displayed.

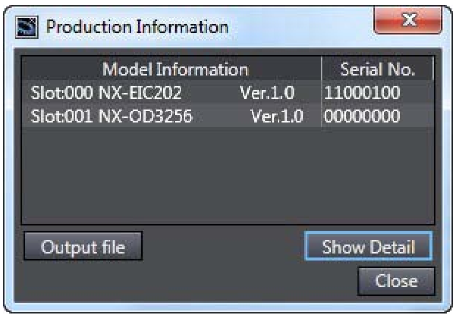
You can also display the Edit Slave Terminal Configuration Tab Page with any of the following operations.

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***.

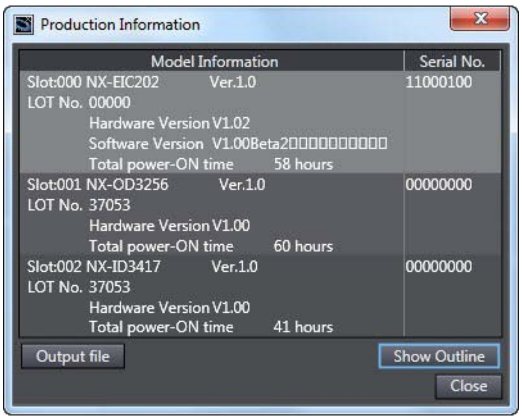
Or, select the EtherNet/IP Coupler Unit on the EtherNet/IP Configuration Edit Tab Page click the **Edit Slave Terminal Configuration** button.

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

In this example, “Ver.1.0” is displayed next to the Unit model.

The following items are displayed.

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

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

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-EIC□□□	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 CJ1W-EIP21 CJ2H-CPU6□-EIP 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. Refer to the *Communications Commands Reference Manual* (Cat. No. W342) for details on FINS commands that can be sent to CS/CJ-series CPU Units when using the FINS communications service. Refer to the *Ethernet Units Operation Manual Construction of Applications* (Cat. No. W421) for details on constructing host applications that use FINS communications.
Sysmac Studio Version 1 Operation Manual	W504	SYSMAC-SE2□□□	Learning about the operating procedures and functions of the Sysmac Studio.	Describes the operating procedures of the Sysmac Studio.
NX-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□□□□ NX-IA□□□□ NX-OC□□□□ NX-OD□□□□	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	W522	NX-AD□□□□ NX-DA□□□□ NX-TS□□□□	Learning how to use NX-series Analog I/O Units and Temperature Input Units	The hardware, setup methods, and functions of the NX-series Analog I/O Units and Temperature Input Units are described.
NX-series System Units User's Manual	W523	NX-PD1□□□ NX-PF0□□□ NX-PC0□□□ NX-TBX01	Learning how to use NX-series System Units	The hardware and functions of the NX-series System Units are described.

Manual name	Cat. No.	Model numbers	Application	Description
NX-series Position Interface Units User’s Manual	W524	NX-EC0□□□ NX-ECS□□□ NX-PG0□□□	Learning how to use NX-series Position Interface Units	The hardware, setup methods, and functions of the NX-series Incremental Encoder Input Units, SSI Input Units, and Pulse Output Unit are described.
NX-series Safety Control Unit User’s Manual	Z930	NX-SL□□□□ NX-SI□□□□ NX-SO□□□□	Learning how to use NX-series Safety Control Units	The hardware, setup methods, and functions of the NX-series Safety Control Units are described.
NX-series Safety Control Unit Instructions Reference Manual	Z931	NX-SL□□□□	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 Safety Control Unit User’s Manual* (Cat. No. Z930).
NJ/NX-series CPU Unit Built-in EtherNet/IP™ Port User's Manual	W506	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ 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. This manual provides an introduction and provides information on the configuration, features, and setup. Use this manual together with the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500) or *NX-series CPU Unit Hardware User’s Manual* (Cat. No. W535) and with the *NJ/NX-series CPU Unit Software User's Manual* (Cat. No. W501).

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.
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. In this manual, also referred to as “EtherNet/IP Coupler Unit”.
Electronic Data Sheet	EDS	A text file that contains setting information for an EtherNet/IP slave.
I/O port	---	A logical interface that is used by the CPU Unit to exchange data with an external device (slave or Unit).
I/O refreshing	---	Cyclic data exchange with external devices that is performed with predetermined memory addresses.
Index	---	Address of an object within an application process.
Master	---	In this manual, referring to EtherNet/IP Units such as CJ1W-EIP21, CS1W-EIP21 or built-in EtherNet/IP port of a CJ2M-CPU6☐ or CJ2M-CPU3☐. The master may also referred to as the originator or controller.
Network Configuration Information	---	The EtherNet/IP network configuration information held by the EtherNet/IP master.
NX Bus	---	The NX-series internal bus.
NX Unit	---	An I/O or System Unit connected to the bus of an NX Communication Coupler Unit.
Object	---	An abstract representation of a particular component within a device, which consists of data, parameters, and methods.
Object Dictionary	OD	Data structure that contains description of data type objects, communication objects and application objects.
Operational	---	A state in NX bus communications where SDO communications and I/O are possible.
PDO Communications	---	An acronym for process data communications.
Pre-Operational	---	A state in NX bus communications where only SDO communications are possible with the slaves, i.e., no I/O can be performed.
Process Data	---	Collection of application objects designated to be downloaded cyclically or acyclically for the purpose of measurement and control.
Process Data Communications	---	One type of EtherNet/IP communications in which process data objects (PDOs) are used to exchange information cyclically and in realtime. This is also called PDO communications.
Process Data Object	PDO	A structure that describes the mappings of parameters that have one or more process data entities.
Safe-Operational	---	A state in NX bus communications where only SDO communications and reading input data from slaves are possible. Outputs from slaves are not performed.
SDO Communications	---	One type of NX bus communications in which service data objects (SDOs) are used to transmit information whenever required.
Service Data Object	SDO	CoE asynchronous mailbox communications where all objects in the object dictionary can be read and written.
Slave Terminal	---	A building-block remote I/O terminal to which a Communications Coupler Unit and NX Units are mounted.
Subindex	---	Sub-address of an object within the object dictionary.

Revision History

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

Cat. No. W536-E1-02

Revision code

Revision code	Date	Revised content
01	December 2014	Original production
02	April 2015	Corrected mistakes.

Sections in this Manual

1	EtherNet/IP Networks	9	Setting Up Slave Terminals
2	Features and System Configuration	10	I/O Refreshing
3	Specifications and Application Procedures	11	EtherNet/IP Coupler Unit Functions
4	Part Names and Functions	12	Troubleshooting
5	Designing the Power Supply System	13	Maintenance and Inspection
6	Installation	A	Appendices
7	Wiring	I	Index
8	EtherNet/IP Communications		

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1

EtherNet/IP Networks

This section provides an introduction to EtherNet/IP networks.

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1-1-1 EtherNet/IP Features 1-2
1-2 EtherNet/IP Network Configuration Elements 1-5
1-2-1 System Configuration Example of an EtherNet/IP Network 1-5
1-2-2 Introduction to Configuration Devices 1-6
1-2-3 Support Software Used to Construct a Network 1-7

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, which allows cyclic communications (called tag data links in this manual) with EtherNet/IP devices. Data can be exchanged at high speed between Controllers and devices.

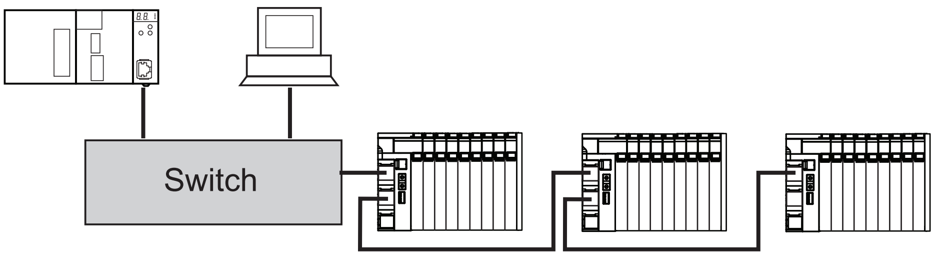
● Tag Data Link (Cyclic Communications) Cycle Time

Tag data links (cyclic communications) operate at the cyclic period specified for each 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 concurrency of the connection's data is maintained. Because 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.

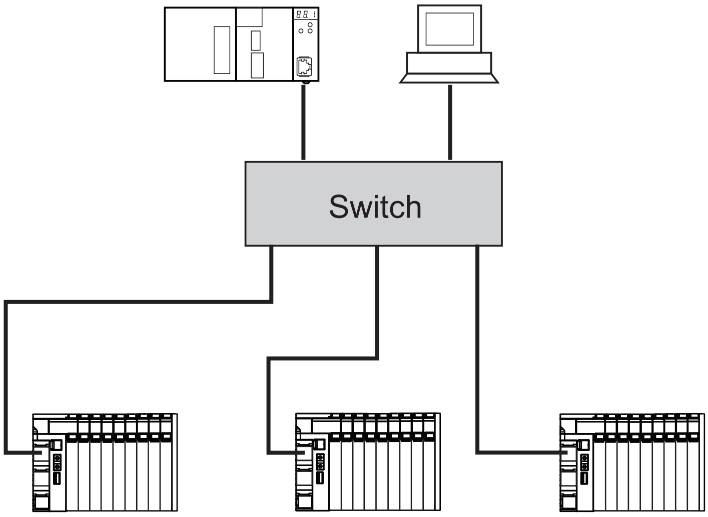
● Flexible Network Topology

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

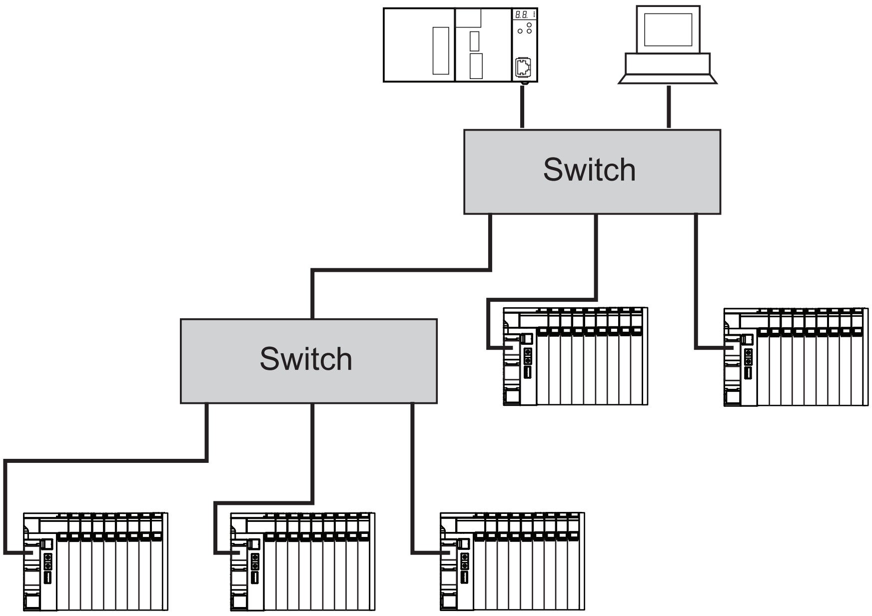
- **Line**



- **Star**

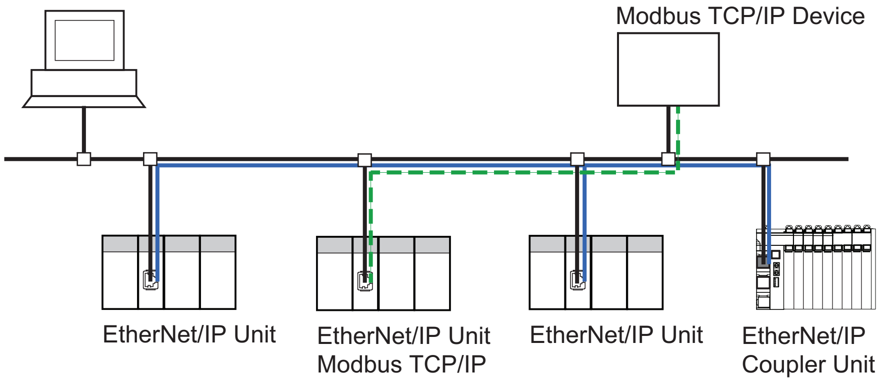


- **Tree**



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.

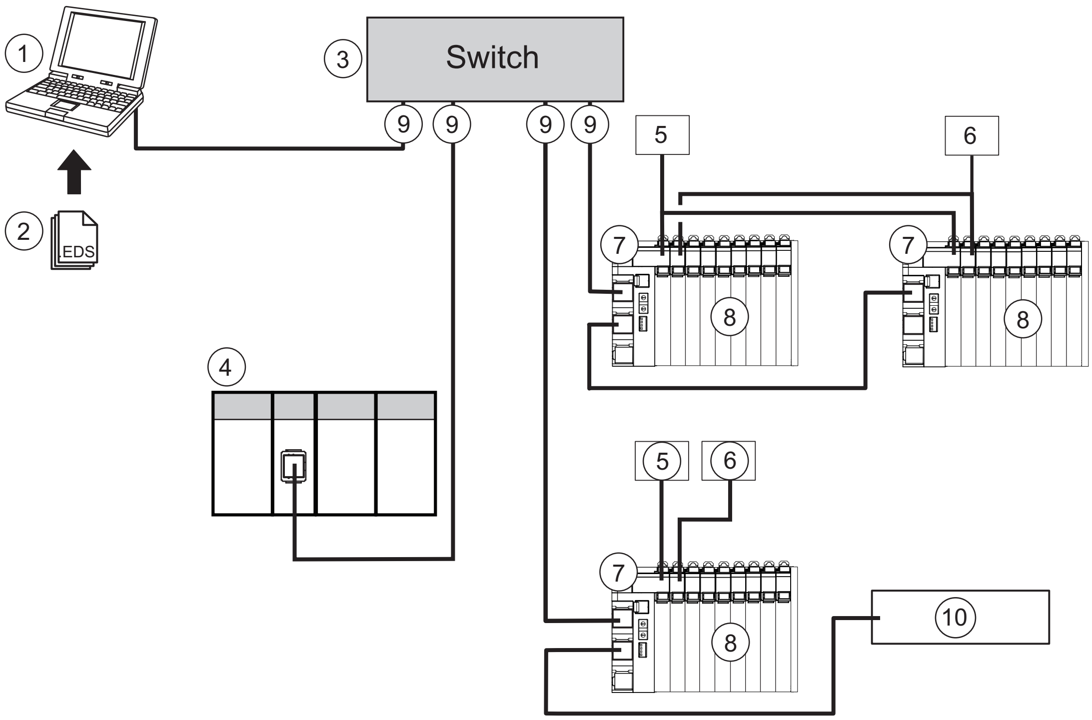


1-2 EtherNet/IP Network Configuration Elements

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 Unit
5	NX Unit Power Supply
6	NX I/O Power Supply
7	EtherNet/IP Coupler Unit
8	NX I/O Units
9	Communication Cables
10	EtherNet/IP Slave Unit

1-2-2 Introduction to Configuration Devices

This section introduces the configuration devices.

EtherNet/IP Network Devices

- **EtherNet/IP Unit**

  There are several unit types for EtherNet/IP Units, such as CJ1W-EIP21, CS1W-EIP21 or built-in EtherNet/IP port on supported PLC CPU Units.

- **NX EtherNet/IP Coupler Units**

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

- **NX I/O Units**

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

- **EtherNet/IP Slave Unit**

  Any EtherNet/IP Unit that has an EDS file available.

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.

Ethernet Switch

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

EDS (Electronic Data Sheet) Files

EDS files are descriptions of devices used to construct, set, and manage networks that contain EtherNet/IP slaves from other companies.

Unit Power Supplies

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

I/O Power Supplies

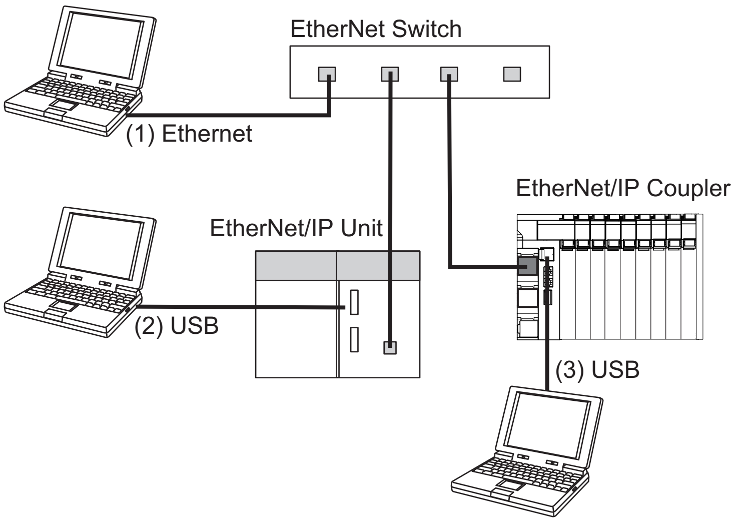
I/O power supplies provide power for the I/O operation of the external devices that are connected to EtherNet/IP Slave Terminals.

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

This section describes the Support Software that is used to construct an EtherNet/IP network.

The EtherNet/IP Unit has Ethernet settings and tag data link settings, which are stored in the non-volatile memory in the EtherNet/IP Unit. Support Software is provided for each, as described below.

Sysmac Studio is used for NX I/O mapping and EtherNet/IP Coupler Unit configuration.



Connection Number	Support Software	Function
(1) Ethernet	Network Configurator	• Upload • Download • Reset • Change IP Address • Automatic Clock Time Setting • EtherNet/IP Network Configuration
	Third-party Software	Configure third-party EtherNet/IP Devices and install EDS files
(2) USB	CX-Programmer	Configure EtherNet/IP Unit settings
(3) USB	Sysmac Studio	• Upload • Download • Configure NX-I/O Parameters • Configure NX Unit I/O Allocation • Troubleshooting

EtherNet/IP Unit Settings: EtherNet/IP Unit Configuration Software

Use EtherNet/IP Unit configuration software (such as CX-Programmer) to set the basic settings such as the IP address and subnet mask of the EtherNet/IP Unit and the NTP server settings.

Additional Information

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 CX-One version 3.0 or higher. The main functions of the Network Configurator are given below.

● Setting and Monitoring Tag Data Links (Connections)

The network device configuration and tag data links (connections) can be created and edited. After connecting to the network, the device configuration and tag data link settings can be uploaded and monitored.

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

An EtherNet/IP Coupler Unit address can be set using rotary switches or Network Configurator software (refer to *4-3 Hardware Switch Settings* on page 4-8 for rotary switch settings).

● Setting the Clock Time

The EtherNet/IP Coupler Unit includes an internal clock to provide clock information for events that may occur. This clock is set with an NTP server. (refer to *11-3-3 Automatic Clock Adjustment* on page 11-11).

● 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.

EtherNet/IP Coupler Unit Configuration and I/O Mapping: Sysmac Studio

Sysmac Studio is used to configure an EtherNet/IP Coupler Unit when connected directly with USB. The main functions are given below.

● Upload and Download

Transfer configurations to and from the EtherNet/IP Coupler Unit.

● Setting NX Unit Parameters

Configure operation setting parameters for specific Units.

● Setting NX Unit I/O Allocation

Create I/O mapping of connected NX Units.

● Troubleshooting

Diagnostic, memory clear, restart and other functions.

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 2-2

2-2 System Configurations of EtherNet/IP Slave Terminals 2-5

2-2-1 System Configuration 2-5

2-2-2 Types of NX Units 2-7

2-2-3 Safety Control System 2-7

2-3 Support Software 2-8

2-3-1 Applicable Support Software 2-8

2-3-2 Connection Method and Procedures 2-8

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 protocol supports implicit communications, which allows cyclic communications (called tag data links in this manual) with EtherNet/IP devices. Data can be exchanged at high speed between Controllers and devices, using high-volume tag sets between PLCs.

● Tag Data Link (Cyclic Communications) Cycle Time

Tag data links (cyclic communications) can operate at the cyclic period 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 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. 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.

Safety Control Features

● 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.

No special safety control communications cables or interface devices are required.

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, and Position Interface 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.

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 Sysmac Studio 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/IP and UDP/IP Interface

The EtherNet/IP Coupler Unit supports TCP/IP interface and UDP/IP interface alternatives to the standard EtherNet/IP Tag Data Link interface. 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.

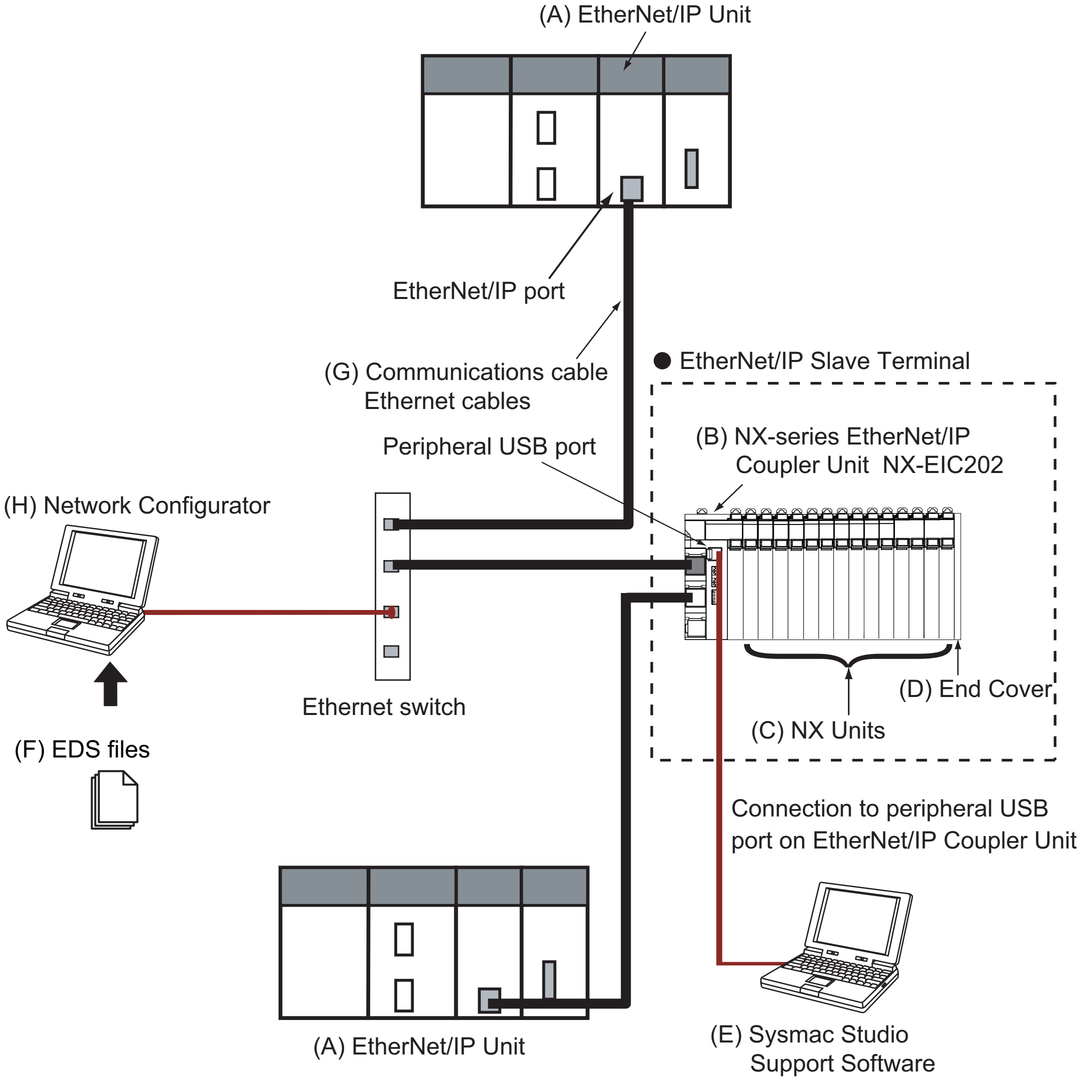
Refer to *A-2 UDP/IP and TCP/IP Message Service Interface* on page A-9 for more information.

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

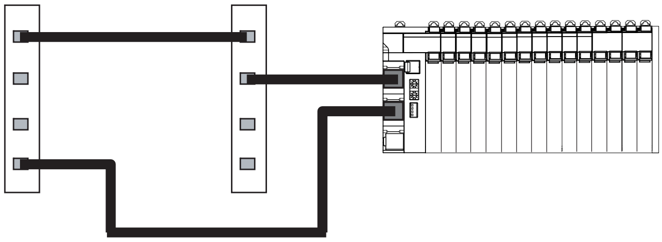
An example of a system configuration for an EtherNet/IP Slave Terminal is shown below.



Precautions for Correct Use

Do not make a loop connection in the communications path between Ethernet switches.

An example of a loop connection in the communications path is shown below.



Additional Information

An alternative configuration utilizing TCP/IP and UDP/IP communications is available. Refer to *A-2 UDP/IP and TCP/IP Message Service Interface* on page A-9 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. The types of EtherNet/IP Units are listed below. • A Unit such as CJ1W-EIP21 or CS1W-EIP21 • Built-in EtherNet/IP port on supported PLC CPU Units • SYSMAC Gateway
(B)	EtherNet/IP Coupler Unit	The EtherNet/IP Coupler Unit is an interface that performs process data communications between a group of NX Units and the EtherNet/IP Unit over an EtherNet/IP network. 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. You can connect up to 63 NX Units.
(C)	NX Units	The NX Units perform I/O processing with connected external devices. The NX Units perform process data communications with the EtherNet/IP master through the EtherNet/IP Coupler Unit. 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)	Sysmac Studio Support Software	The Sysmac Studio runs on a personal computer and it is used to configure EtherNet/IP Slave Terminals and to perform programming, monitoring, and troubleshooting. You can connect the computer in which the Sysmac Studio is installed to the peripheral USB port on the EtherNet/IP Coupler Unit to set up the EtherNet/IP Slave Terminal and/or Safety units. Refer to *2-3 Support Software* on page 2-8 for the connection procedure.
(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 to easily allocate data and view or change settings. 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.
(H)	Network Configurator	The software tool to configure the EtherNet/IP network.

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.
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.
Position Interface Units		These Units perform I/O processing of position data for positioning.
	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

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

Support Software	Version
Sysmac Studio	1.10 or higher

2-3-2 Connection Method and Procedures

This section describes the method and procedures that are used to connect the Sysmac Studio to an EtherNet/IP Slave Terminal.

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

● Connection Methods

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

● Connection Procedure

Use the following procedure to place the Sysmac Studio online.

1 Connect the EtherNet/IP Coupler Unit to a computer in which the Sysmac Studio 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 9-7 for the procedures to create the Unit configuration information.

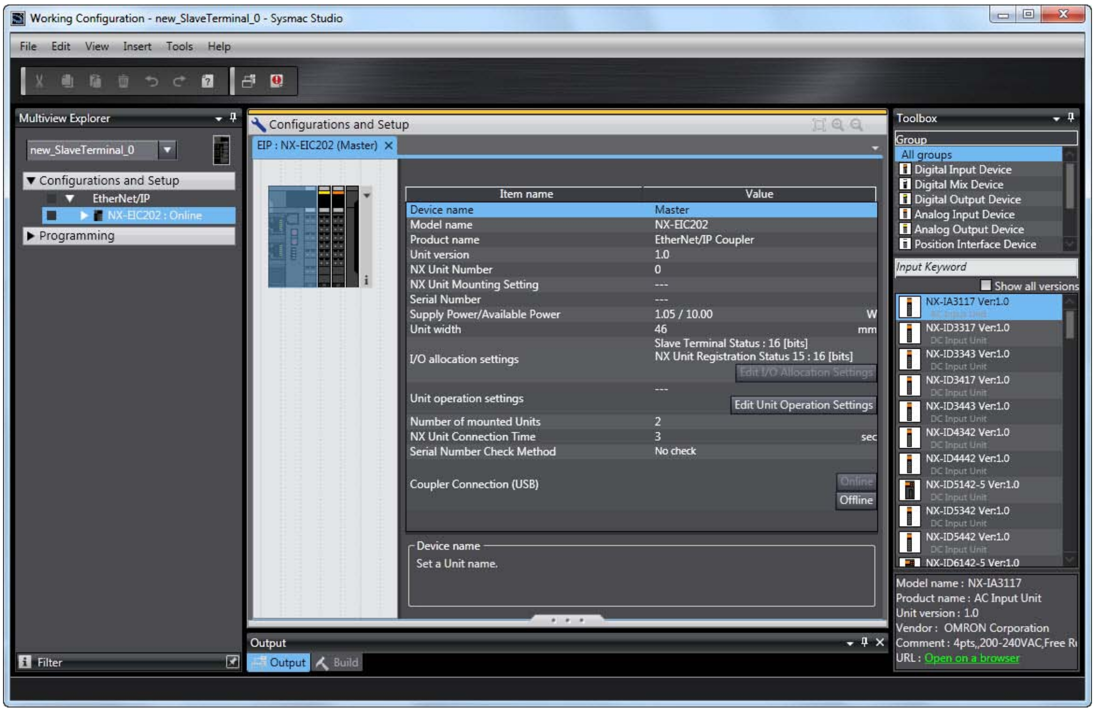
3 Right-click the EtherNet/IP Coupler Unit in the Edit EtherNet/IP Slave Terminal Configuration Tab Page, and select ***Coupler Connection (USB)*** – ***Online***. Or, right-click the EtherNet/IP Coupler Unit in the Multiview Explorer and select ***Coupler Connection (USB)*** – ***Online***.

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 Sysmac Studio 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. Sysmac Studio 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 **3-2**
3-1-1 General Specifications of EtherNet/IP Slave Terminals 3-2
3-1-2 EtherNet/IP Coupler Unit Specifications 3-3
3-1-3 End Cover Specifications 3-6
3-2 Procedures **3-7**
3-2-1 EtherNet/IP Slave Terminal Application Procedures 3-7
3-2-2 Details 3-9

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

<table>
<tr><th colspan="2">Item</th><th>Specification</th></tr>
<tr><td colspan="2">Enclosure</td><td>Mounted in a panel</td></tr>
<tr><td colspan="2">Grounding method</td><td>Ground to 100 Ω or less.</td></tr>
<tr><td rowspan="12">Operating environment</td><td>Ambient operating temperature</td><td>0 to 55°C</td></tr>
<tr><td>Ambient operating humidity</td><td>10% to 95% (with no condensation or icing)</td></tr>
<tr><td>Atmosphere</td><td>Must be free from corrosive gases.</td></tr>
<tr><td>Ambient storage temperature</td><td>–25 to 70°C (with no condensation or icing)</td></tr>
<tr><td>Altitude</td><td>2,000 m max.</td></tr>
<tr><td>Pollution degree</td><td>2 or less: Conforms to JIS B3502 and IEC 61131-2.</td></tr>
<tr><td>Noise immunity</td><td>2 kV on power supply line (Conforms to IEC61000-4-4.)</td></tr>
<tr><td>Overvoltage category</td><td>Category II: Conforms to JIS B3502 and IEC 61131-2.</td></tr>
<tr><td>EMC immunity level</td><td>Zone B</td></tr>
<tr><td>Vibration resistance</td><td>Conforms to IEC 60068-2-6.
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]</td></tr>
<tr><td>Shock resistance</td><td>Conforms to IEC 60068-2-27. 147 m/s^2, 3 times each in X, Y, and Z directions[*1]</td></tr>
<tr><td colspan="2">Applicable standards[*2]</td><td>cULus: Listed UL508 and ANSI/ISA 12.12.01
EC: EN 61131-2
C-Tick</td></tr>
</table>

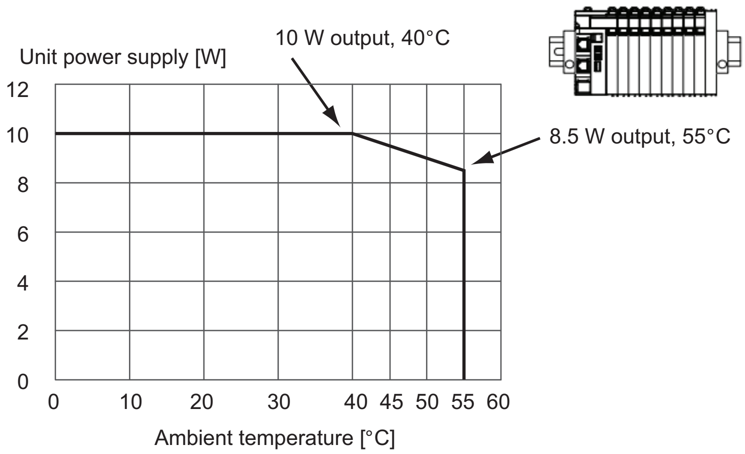
*1. Refer to the *NX-series Digital I/O Units User's Manual* (Cat. No. W521) for the vibration and shock resistance specifications of the Relay Output Unit.

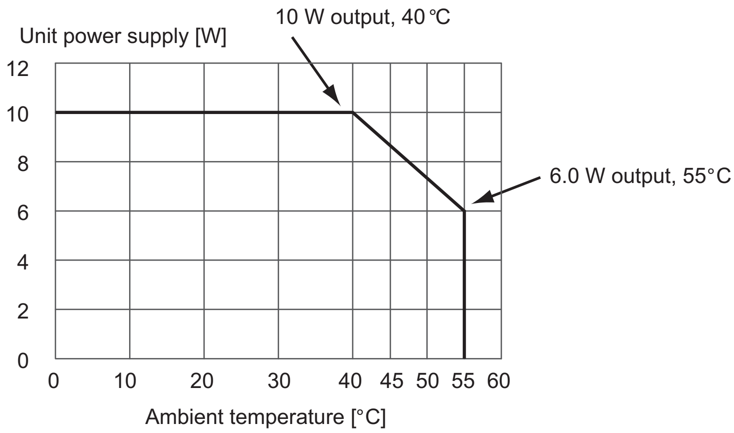
*2. Refer to the OMRON website (http://www.ia.omron.com/) or consult your OMRON representative for the most recent applicable standards for each model.

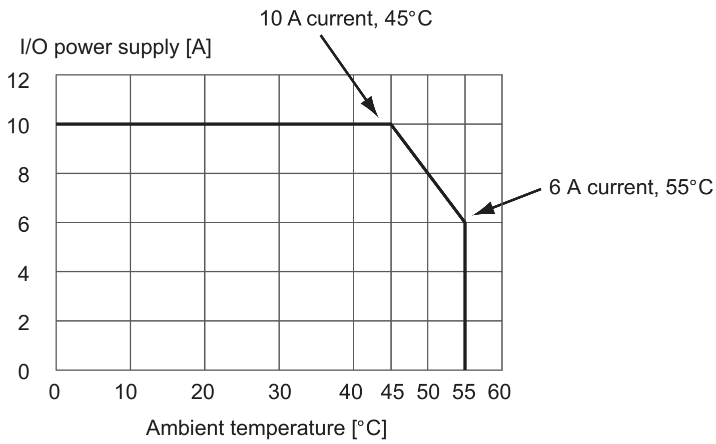
3-1-2 EtherNet/IP Coupler Unit Specifications

<table>
<tr><th colspan="2">Item</th><th colspan="2">Specification</th></tr>
<tr><td colspan="2">Model</td><td colspan="2">NX-EIC202</td></tr>
<tr><td colspan="2">Number of connectable NX Units</td><td colspan="2">63 Units max.*1</td></tr>
<tr><td colspan="2" rowspan="2">Communications protocols</td><td colspan="2">EtherNet/IP</td></tr>
<tr><td>UDP/IP and TCP/IP (Message Services)</td><td>Number of buffers (sockets):
• 8 message buffers for server
• No message buffers for client
• Shared buffers for UDP/IP messages and TCP/IP messages
Maximum message size:
• Request: 492 bytes
• Response: 496 bytes
Maximum NX output data size:
• 490 bytes
Maximum NX input data size:
• 496 bytes</td></tr>
<tr><td colspan="2">Modulation</td><td colspan="2">Baseband</td></tr>
<tr><td colspan="2">Link speed</td><td colspan="2">100 Mbps</td></tr>
<tr><td colspan="2">Physical layer</td><td colspan="2">100BASE-TX (IEEE 802.3)</td></tr>
<tr><td colspan="2">Number of connections</td><td colspan="2">8</td></tr>
<tr><td colspan="2">Received Packet Interval (RPI, refresh cycle)</td><td colspan="2">4 to 1,000 ms</td></tr>
<tr><td colspan="2">Allowed communications bandwidth for Unit</td><td colspan="2">1,000 pps</td></tr>
<tr><td colspan="2">Topology</td><td colspan="2">Line, Tree, Star</td></tr>
<tr><td colspan="2">Ethernet switch</td><td colspan="2">Layer 2 Ethernet switch</td></tr>
<tr><td colspan="2">Transmission media</td><td colspan="2">Category 5 or higher twisted-pair cable (Recommended cable: double-shielded cable with aluminum tape and braiding)</td></tr>
<tr><td colspan="2">Transmission distance</td><td colspan="2">Distance between nodes: 100 m or less</td></tr>
<tr><td colspan="2">NX bus I/O data size</td><td colspan="2">Input: 512 bytes max. (including input data, status, and unused areas)
Output: 512 bytes max. (including output data and unused areas)</td></tr>
<tr><td colspan="2">EtherNet/IP I/O connection size</td><td colspan="2">Input: 504 bytes max. (including input data, status, and unused areas)
Output: 504 bytes max. (including output data and unused areas)</td></tr>
<tr><td colspan="2">Refreshing methods</td><td colspan="2">Free-Run refreshing</td></tr>
<tr><td rowspan="5">Unit power supply</td><td>Power supply voltage</td><td colspan="2">24 VDC (20.4 to 28.8 VDC)</td></tr>
<tr><td>NX Unit power supply capacity</td><td colspan="2">10 W max.
Refer to Installation orientation and restrictions for details.</td></tr>
<tr><td>NX Unit power supply efficiency</td><td colspan="2">70%</td></tr>
<tr><td>Isolation method</td><td colspan="2">No isolation between NX Unit power supply and Unit power supply terminals</td></tr>
<tr><td>Current capacity of power supply terminals</td><td colspan="2">4 A max.</td></tr>
</table>

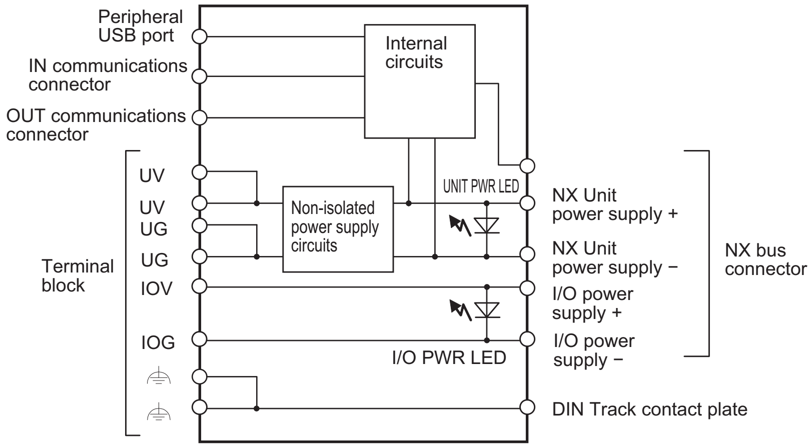
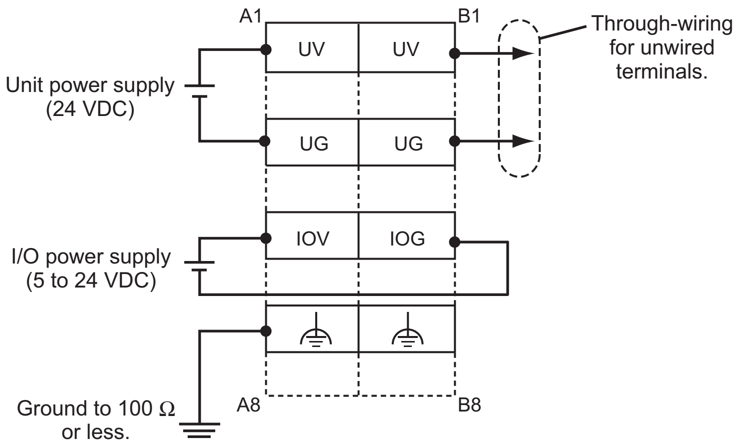
Item		Specification
I/O power supply	Power supply voltage	5 to 24 VDC (4.5 to 28.8 VDC) *2
	Maximum I/O power supply current	10 A Refer to *Installation orientation and restrictions* for details.
	Current capacity of power supply terminals	10 A max.
NX Unit power consumption		1.60 W max.
Current consumption 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 For EtherNet/IP communications. • RJ45 × 2 (shielded)
		Screwless Clamping Terminal Block For Unit power supply, I/O power supply, and grounding. Removable.
		Peripheral USB Port For Sysmac Studio connection. • Physical layer: USB 2.0-compliant, B-type connector • Transmission distance: 5 m max.
Dimensions		46 × 100 × 71 mm (W×H×D)
Weight		150 g max.

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Installation orientation and restrictions</td><td>
Installation orientation: 6 possible orientations
Restrictions:
• Used in the upright installation orientation.


• Used in any other orientation than the upright installation orientation.




</td></tr>
</table>

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.

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 • *3-1 Specifications* on page 3-2 • *Section 5 Designing the Power Supply System* • *6-1-3 Installation Orientation* on page 6-8 • Manuals for the specific NX Units
↓	
2. Making Hardware Settings and Wiring the Slave Terminal	• *4-3 Hardware Switch Settings* on page 4-8 • *6-1 Installing Units* on page 6-2 • *Section 7 Wiring*
↓	
3. Configuring the Slave Terminal and Making the Operation Settings	*9-2 Setting Slave Terminal Parameters* on page 9-7
↓	
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 and Automatic Clock.	• *9-4 Setting IP Address* on page 9-31 • *11-3-3 Automatic Clock Adjustment* on page 11-11
↓	
6. Setting Tag Data Links	*9-5 Setting Tag Data Links* on page 9-34
↓	
7. Assigning Network Variables	*9-6 Assigning Network Variables* on page 9-69
↓	

8. Checking Indicators	• *CS and CJ Series EtherNet/IP Units Operation Manual* (W465) • *4-2 Indicators* on page 4-5 • *12-2 Checking for Errors and Trouble-shooting with the Indicators* on page 12-3

↓

9. Confirming Operation by Checking the Wiring	• *CX-Programmer Operation Manual* (W446) • Manuals for the specific NX Units

↓

10. Programming	• *CJ-series CJ2 CPU Unit Software User's Manual* (W473) • *CS and CJ Series EtherNet/IP Units Operation Manual* (W465) • *CX-Programmer Operation Manual* (W446)

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 • Manuals for the specific NX Units
		Confirming Suitability of Slave Terminal Specifications	Confirm that the following specific restrictions for the Slave Terminal are met. • Number of NX Units • Send/receive PDO data sizes • Design conditions for the NX Unit power supply and I/O power supply • Installation orientation	• *3-1 Specifications* on page 3-2 • *Section 5 Designing the Power Supply System* • *6-1-3 Installation Orientation on page 6-8*
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. 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 4-8 • *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 Tag Data Links.	*4-3-2 DIP Switch* on page 4-8
		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. • Connect the communications cables. • Connect the Unit power supply. • Connect the I/O power supply. • Connect the ground wire. • Connect the external I/O devices.	*Section 7 Wiring*
3	Configuring the Slave Terminal and Making the Operation Settings		Set up the Slave Terminal (create the configuration and set the parameters) with the Sysmac Studio.	*9-2 Setting Slave Terminal Parameters* on page 9-7
		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 9-7
		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 Sysmac Studio.	*9-3 Transferring and Comparing Settings* on page 9-28
5	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. You can also use the switch settings to set the IP address. Refer to *9-4 Setting IP Address* on page 9-31. Set the Automatic Clock with the Network Configurator.	• *9-4 Setting IP Address* on page 9-31 • *11-3-3 Automatic Clock Adjustment* on page 11-11

Procedure		Item	Description	Reference
6	Setting Tag Data Links		Use the Network Configurator to set the tag data links.	*9-5 Setting Tag Data Links* on page 9-34
7	Assigning Network Variables		Network variables are assigned in the PLC according to the I/O allocations created in Sysmac Studio.	*9-6 Assigning Network Variables* on page 9-69
8	Checking Indicators	EtherNet/IP Unit	Check the following indicators on the EtherNet/IP Unit. • MS • NS • COMM • 100M • 10M	*CS and CJ Series EtherNet/IP Units Operation Manual* (W465)
		EtherNet/IP Coupler Unit	Check the following indicators on the EtherNet/IP Coupler Unit. • MS • NS • TS • L/A P1 • L/A P2 • UNIT PWR • I/O PWR	• *4-2 Indicators* on page 4-5 • *12-2 Checking for Errors and Troubleshooting with the Indicators* on page 12-3
9	Confirming Operation by Checking the Wiring		Check the wiring by monitoring inputs or using forced outputs with CX-Programmer.	• *CX-Programmer Operation Manual* (W446) • Manuals for the specific NX Units
10	Programming		Write the user program with network variables.	• *CS and CJ Series EtherNet/IP Units Operation Manual* (W465) • *CJ-series CJ2 CPU Unit Software User's Manual* (W473) • *CX-Programmer Operation Manual* (W446)

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 4-2

4-1-1 EtherNet/IP Coupler Units 4-2

4-1-2 NX Units 4-3

4-1-3 End Cover 4-4

4-2 Indicators 4-5

4-3 Hardware Switch Settings 4-8

4-3-1 Rotary Switches 4-8

4-3-2 DIP Switch 4-8

4-3-3 Setting the IP Address 4-9

4-4 Communications Connector and Peripheral USB Port 4-11

4-5 Terminal Blocks 4-12

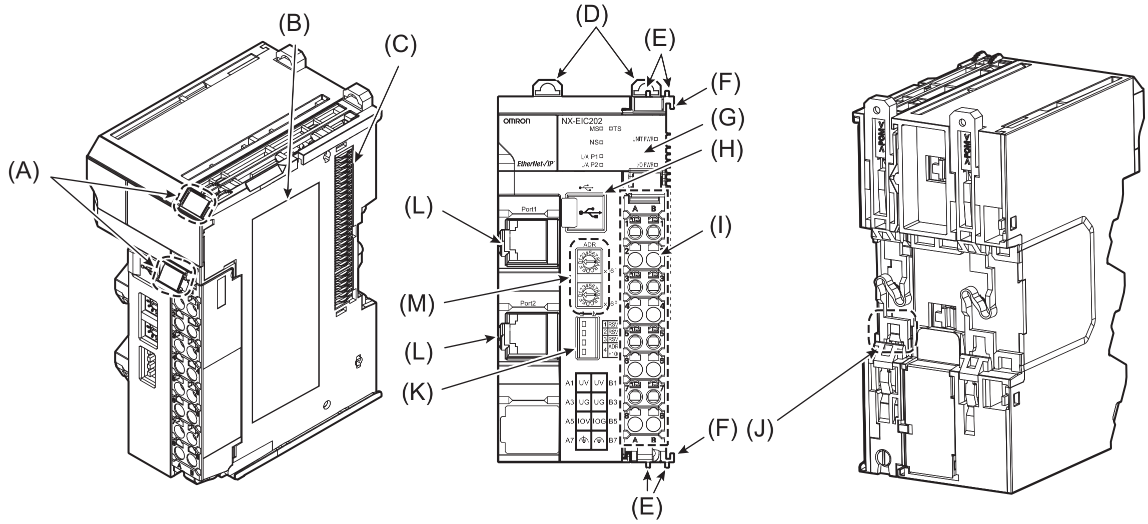
4-6 DIN Track Contact Plate 4-14

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.

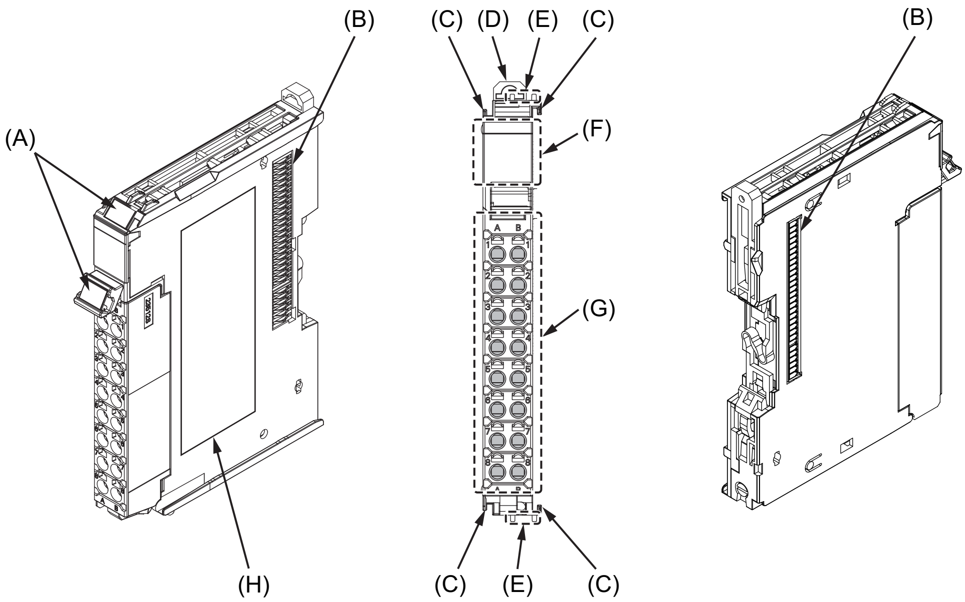


Letter	Name	Function
(A)	Marker attachment locations	The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed. For details, refer to *6-1-8 Attaching Markers* on page 6-18.
(B)	Unit specifications	The 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 Sysmac Studio.
(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 Ether-Net/IP Coupler Unit as an EtherNet/IP slave.
(L)	Communications connectors	These connectors are connected to the communications cables of the EtherNet/IP network.
(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 Units

This section provides an example of an NX Unit.

Refer to the user's manual for each NX Unit for specific information.

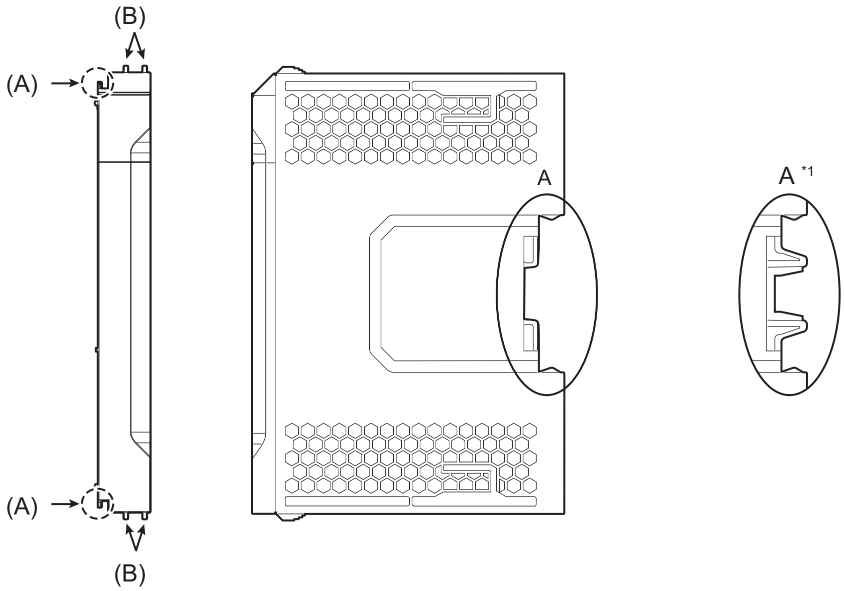


Letter	Name	Function
(A)	Marker attachment locations	The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed.
(B)	NX bus connector	This connector is used to connect each Unit.
(C)	Unit hookup guides	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. 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.

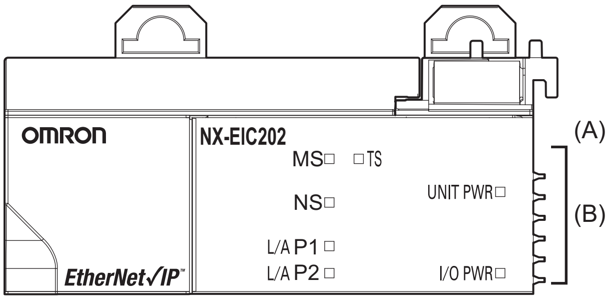
Letter	Name	Function
(A)	Unit hookup guides	These guides are used to connect the End Cover to the NX Unit on the left of the End Cover.
(B)	Protrusions for removing the Unit	The protrusions to hold when removing the End Cover.

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.



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	Normal operational state. • The unit is operating normally.
	Flashing	The unit is restarting or initializing.
Red	Lit	• Fatal error A hardware error has occurred in the unit.
	Flashing	• Recoverable error There is a recoverable Minor Fault.
---	Not lit	The power supply is OFF, the unit is being reset or the unit is being initialized.

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	• EtherNet/IP I/O connection timeout The Ethernet communications have stopped.
	Lit	• Fatal communications error. The address is set out of range or the same address has been set for more than one node.
---	Not lit	• Offline • Insufficient or 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. • Communication with all connected NX Units. • A correct NX Unit configuration is downloaded in the unit from Sysmac Studio.
		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).
Red		Lit	• Hardware failure • Non-volatile Memory Checksum Error • Unit Configuration Error • Unit Configuration Information Error • Unit Configuration Verification Error • Slave Unit Verification Error • Memory Corruption Detected • NX Unit Startup Error • Watch Dog Timer Error
		Flashing at 1.0 sec intervals	• NX Unit Communications Timeout • NX Unit Initialization Error • Errors related to EtherNet/IP communications settings • Illegal State Transition Request Received • Error State Transition Received
---		Not lit	• Insufficient or no Unit power supply. • Restarting is in progress for the Slave Terminal • 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	Power supplied
---		Not lit	Insufficient or 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	Power supplied
---		Not lit	Insufficient or no Unit 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 • Communications are active
---		Not lit	• No link • No activity

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 • Communications are active
---		Not lit.	• No link • No activity

4-3 Hardware Switch Settings

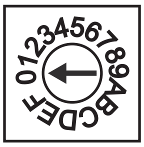
This section describes the functions of the hardware switches (i.e., the rotary switches and the DIP switch) on the front panel of the EtherNet/IP Coupler Unit.

4-3-1 Rotary Switches

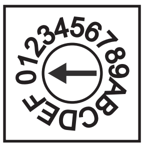
The rotary switches are used to set the last octet of the IP address for the EtherNet/IP network. Combine the rotary switches to set the desired value.

The setting range is 00 to FE with the default setting 00.

- Setting 00 = Set the IP address by software using Network Configurator*1.
- Setting 01 to FE = Set the last octet of the IP address.
- Setting FF = Out of range (an error will occur).



$x16^1$



$x16^0$

Refer to *4-3-3 Setting the IP Address* on page 4-9 for information on setting the node address by combining the rotary switches and pin 4 of the DIP switch that is described below.

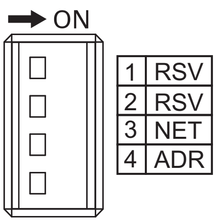
Note 1. If no IP address is set by software, the default IP address is used.

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	Meaning
Pin 1	Reserved by the system	Keep turned OFF
Pin 2		(The factory setting is OFF)
Pin 3	Network interface setting	ON: Enable UDP/IP communications and TCP/IP communications (disable Tag Data Links)*1*2 OFF: Enable Tag Data Links (disable UDP/IP communications and TCP/IP communications)
Pin 4	IP address base setting*3	ON: 192.168.1.□ (with □ set by rotary switches) OFF: 192.168.250.□ (with □ set by rotary switches)

*1. The following CIP services are unavailable when UDP/IP communications and TCP/IP communications are enabled:
- Tag data link (Class 1 connection)
- Explicit message (Class 3 connection)

The EtherNet/IP Coupler Unit will reply with a CIP General Error “Device State Conflict (0x10)” to a Forward_Open request while UDP/IP communications and TCP/IP communications are enabled.

*2. Network Configurator uses the UCMM type of explicit messages.

*3. Refer to *4-3-3 Setting the IP Address* on page 4-9 for information on setting the node address by combining the rotary switches that are described above and pin 4 of the DIP switch.

4-3-3 Setting the IP Address

You must set the node address to enable the EtherNet/IP master to connect with the EtherNet/IP Slave Terminal.

There are two ways to set the node address:
- Switch settings
- Settings from the Network Configurator

The switch settings below are used to select the method to use.

Setting the IP Address with Switch Settings

The following switches are used to set the node address. The setting range is from 001 to 254.

If these switches are used, the node address that is set on the switches will be valid. (The factory setting is 000.)

Switch	Node address range	Node address setting
DIP switch pin 4 ON DIP switch pin 4 OFF	192.168.1.□ or 192.168.250.□	Preset
Top rotary switch Bottom rotary switch	0-F 0-F	1 to 254 (setting 01 to FE)

You can set any IP address that is within the setting range as long as the same node address is not set for another EtherNet/IP slave on the EtherNet/IP network.

Setting the IP Address from the Network Configurator

To set the IP address from the Network Configurator, set both rotary switches to 0.
This will enable setting the node address from the Network Configurator.

The EtherNet/IP Unit has the default IP address 192.168.250.1 (DIP switch 4 is OFF) or 192.168.1.1 (DIP switch 4 is ON).

Switch	Range	Node address setting
Top rotary switch	0-F	0
Bottom rotary switch	0-F	0

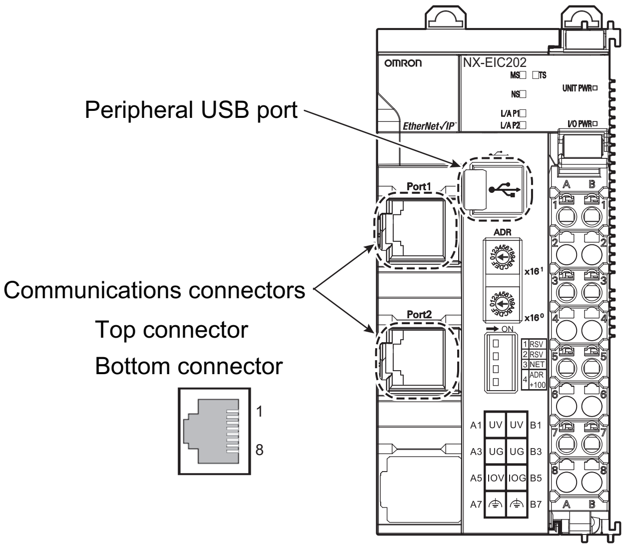
Refer to *9-4-2 Setting the IP Address with the Network Configurator* on page 9-31 for the procedure to set the node address from the Network Configurator.

Precautions for Correct Use

- The IP address that is set on the switches is read only once when the Unit power supply is turned ON or the EtherNet/IP Coupler Unit is restarted. Even if the node address is changed after the Unit power supply is turned ON or after the EtherNet/IP Coupler Unit is restarted, the new node address will not be used until the next time that power is turned ON or the EtherNet/IP Coupler Unit is restarted.
- An error will occur if the same node address is set for more than one Unit.
- An error will occur if the same IP address is set for more than one Unit.
- An error will occur if the node address is not within the setting range.

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* (W506).

Peripheral USB Port

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

4-5 Terminal Blocks

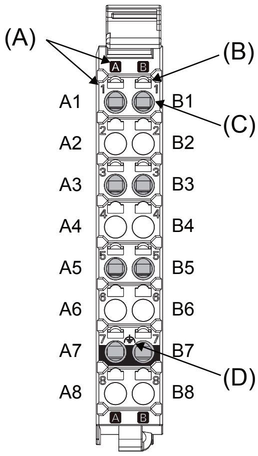
The terminal block on the EtherNet/IP Coupler Unit is a removable screwless clamping terminal block that allows you to easily connect and remove the wiring.

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

NX-TBC082



8-terminal type

Letter	Name	Function
(A)	Terminal number indications	The terminal numbers (A1 to A8 and B1 to B8) are displayed. 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 model Terminal Block. The terminal current capacity of 4A 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

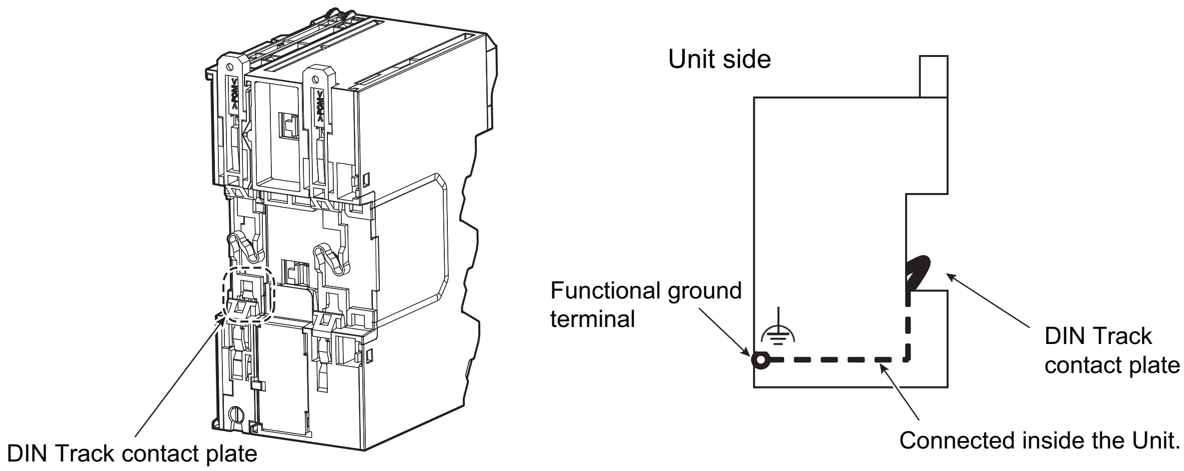
Refer to *A-6 Terminal Block Model Numbers* on page A-23 for the Screwless Clamping Terminal Blocks for EtherNet/IP Slave Terminals.

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 7-7.



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 5-2

5-1-1 Power Supply System and Types of Power Supplies 5-2

5-1-2 NX-series Power Supply-related Units 5-3

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

5-2 Designing the NX Unit Power Supply System 5-6

5-2-1 Procedure for Designing the NX Unit Power Supply System 5-6

5-2-2 Calculation Example for the NX Unit Power Supply 5-7

5-3 Designing the I/O Power Supply System 5-9

5-3-1 I/O Power Supply Method 5-9

5-3-2 Designing the I/O Power Supply from the NX Bus 5-10

5-3-3 Designing the I/O Power Supply from External Sources 5-14

5-3-4 Restrictions on Inrush Current for ON/OFF Operation 5-14

5-4 Selecting External Power Supplies and Protective Devices 5-16

5-4-1 Selecting the Unit Power Supply 5-16

5-4-2 Selecting the I/O Power Supplies 5-18

5-4-3 Selecting Protective Devices 5-18

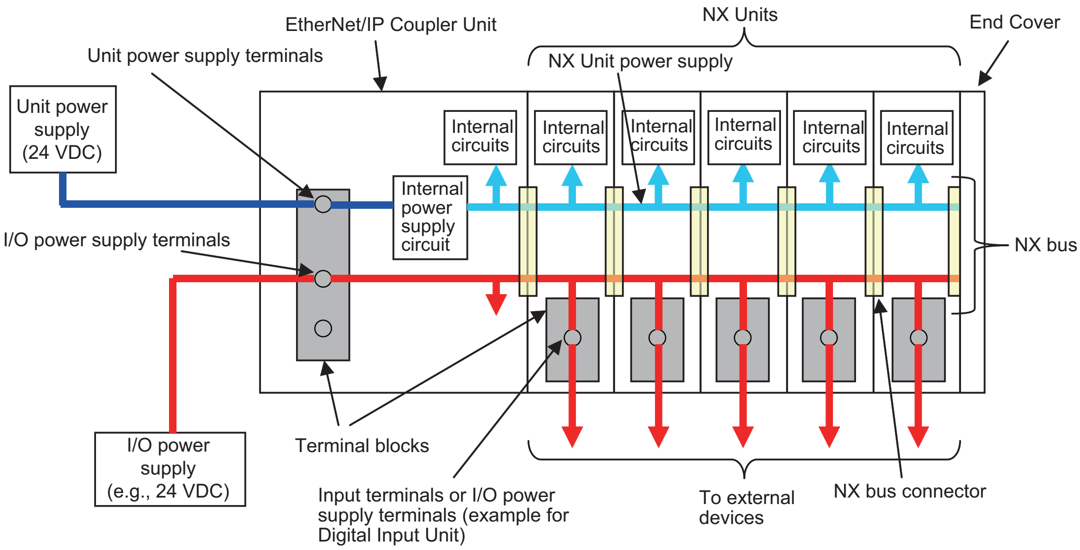
5-1 Power Supply System and Design Concepts

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. 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. The NX Unit power is supplied to the NX Units in the Slave Terminal through the NX bus connectors.
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.

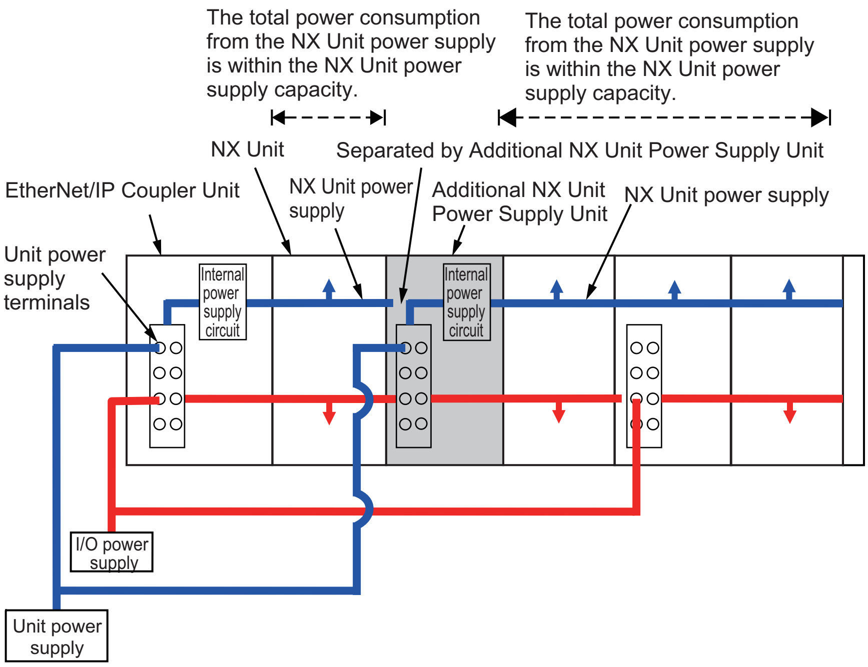
Precautions for Correct Use

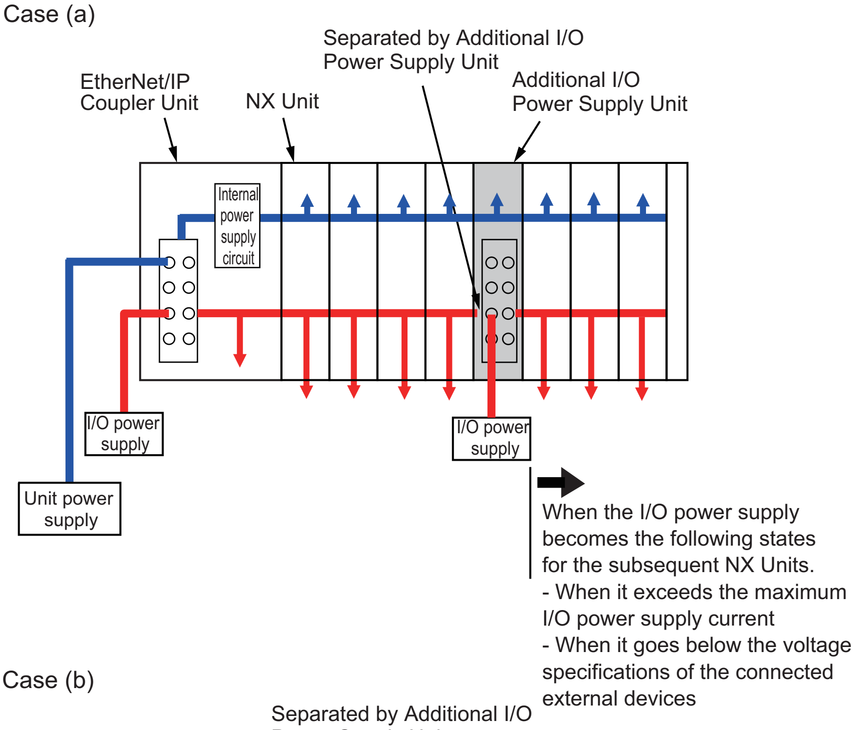
Always use separate power supplies for the Unit power supply and the I/O power supply. If you supply power from the same power supply, noise may cause malfunctions.

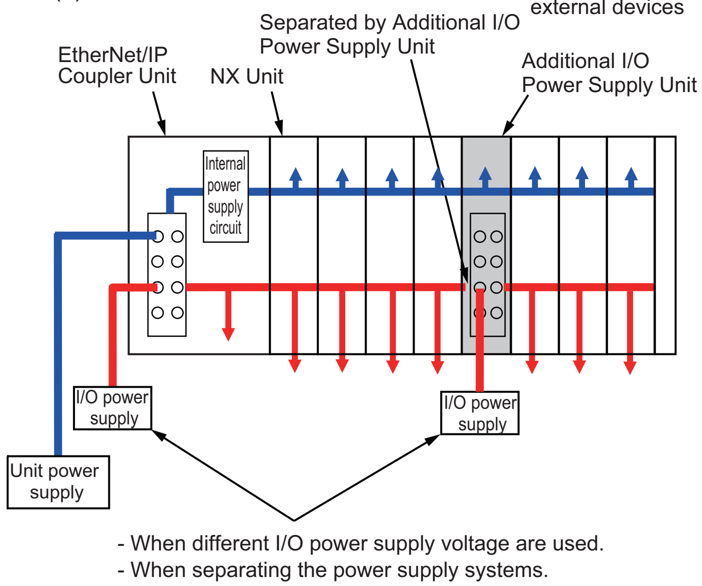
5-1-2 NX-series Power Supply-related Units

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.

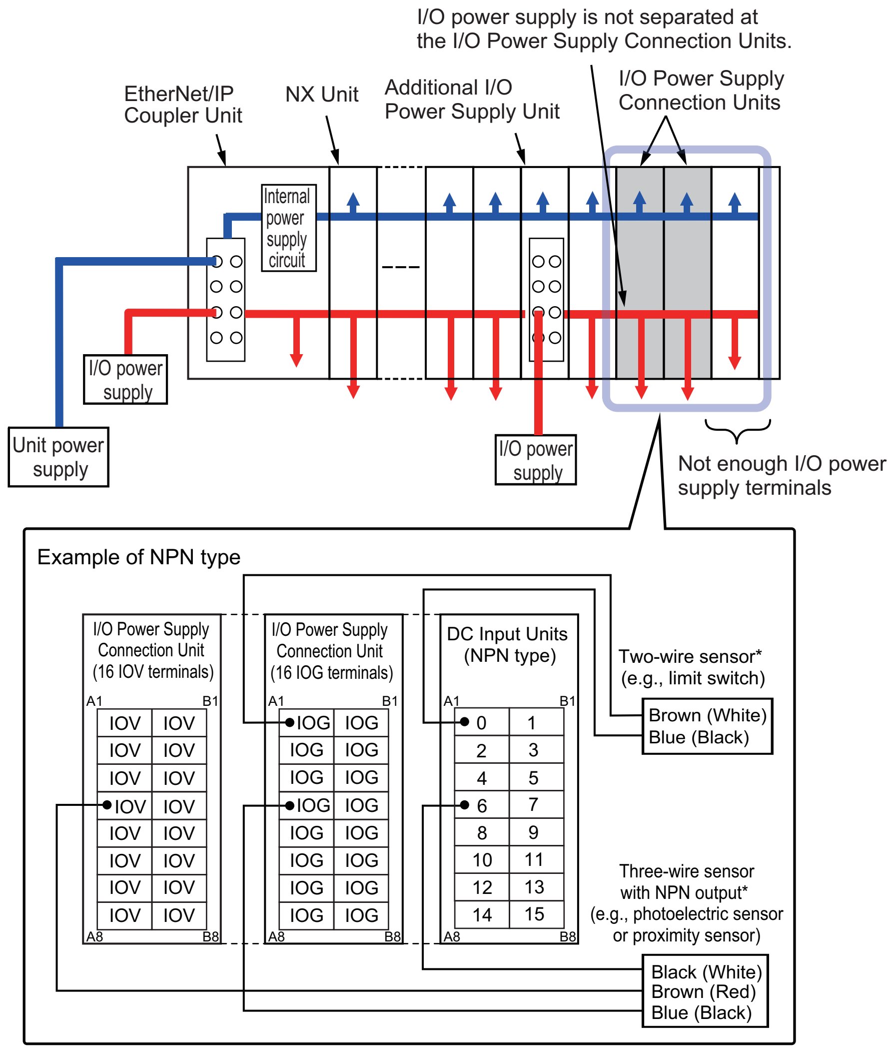
Unit name	Function
Additional NX Unit Power Supply Unit	This NX Unit provides NX Unit power supply. This NX Unit is used when the total power consumption of the NX Units in the Slave Terminal exceeds the NX Unit power supply capacity of the EtherNet/IP Coupler Unit.  The I/O power supply for the Additional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

<table>
<tr><th>Unit name</th><th>Function</th></tr>
<tr><td>Additional I/O Power Supply Unit</td><td>
This NX Unit provides additional I/O power supply.
Use this NX Unit in the following cases.
(a) When the I/O power supply capacity is insufficient
• When the total current consumption for the I/O power supply exceeds the maximum I/O power supply current of the EtherNet/IP Coupler Unit
• When a voltage drop in the I/O power supply causes the voltage of the I/O power supply to go below the voltage specifications of the I/O circuits or connected external devices
(b) Separating the I/O power supply
• When connected external devices have different I/O power supply voltages
• When separating the power supply systems
Case (a)


Case (b)


The NX Unit power supply of the Additional I/O Power Supply Unit is connected to the NX Unit on the left through the NX bus connector.
</td></tr>
</table>

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



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

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

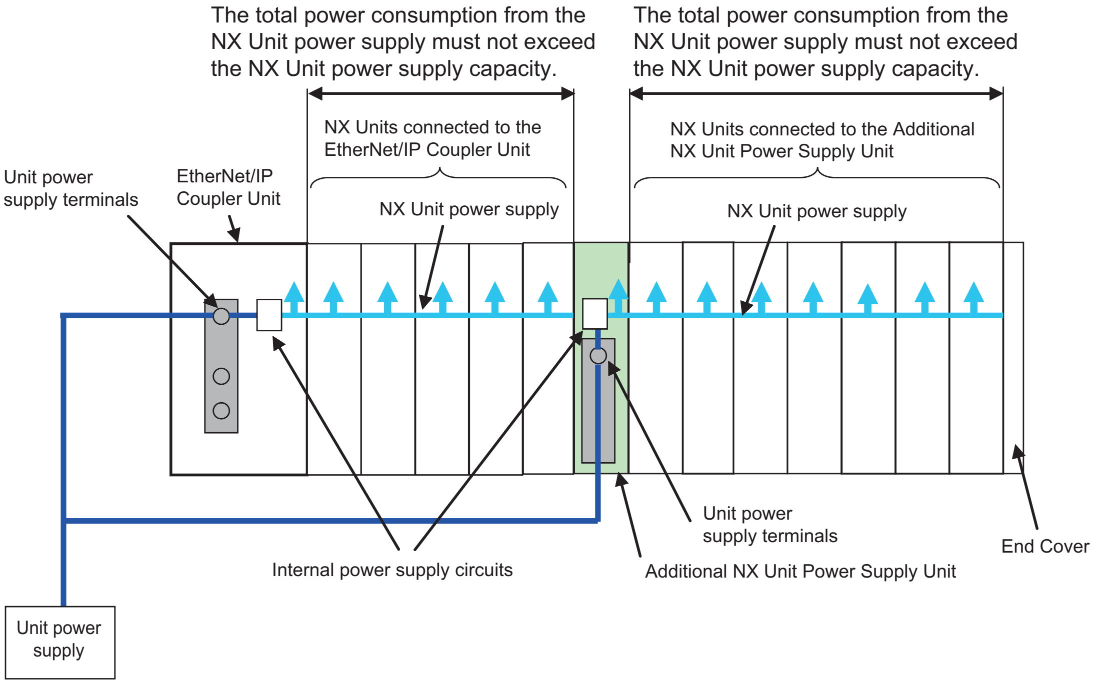
This section describes how to design the NX Unit power supply to the EtherNet/IP Slave Terminal.

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

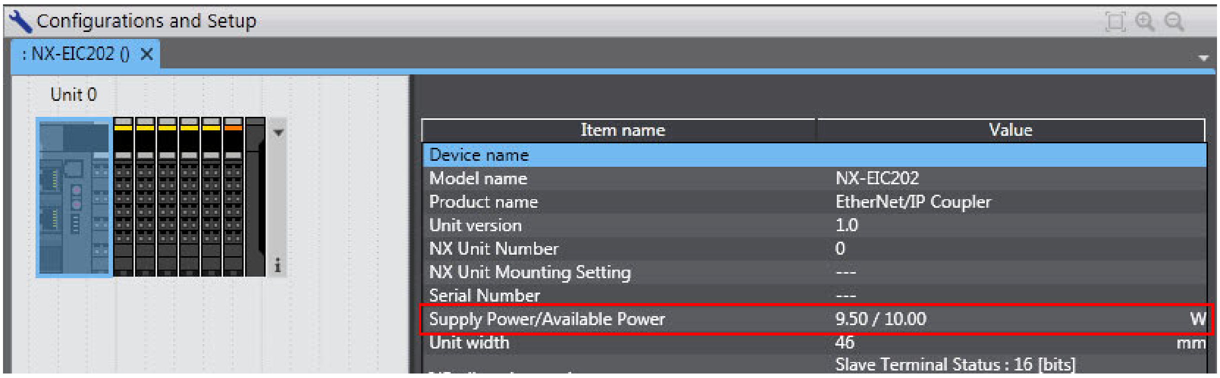
Confirming the NX Unit Power Supply Capacity of the EtherNet/IP Coupler Unit

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.

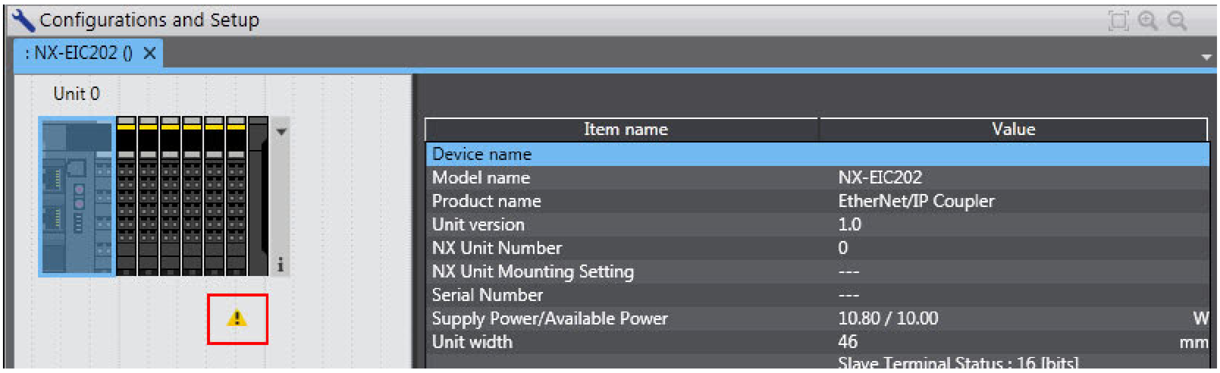
Additional Information

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 Sysmac Studio. Use the following procedure to check the power supply capacity.

On the Edit Slave Terminal Configuration Tab Page on the Sysmac Studio, 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 Sysmac Studio 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.

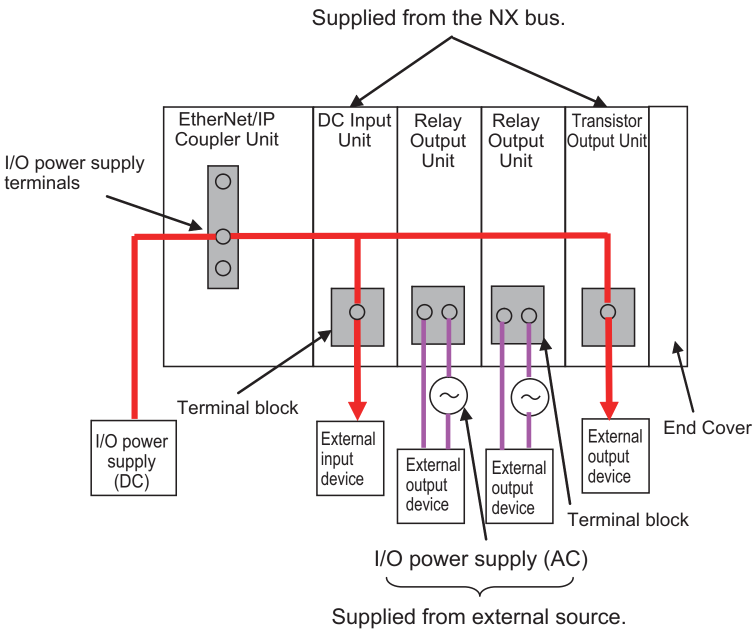
5-3-1 I/O Power Supply Method

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. 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.

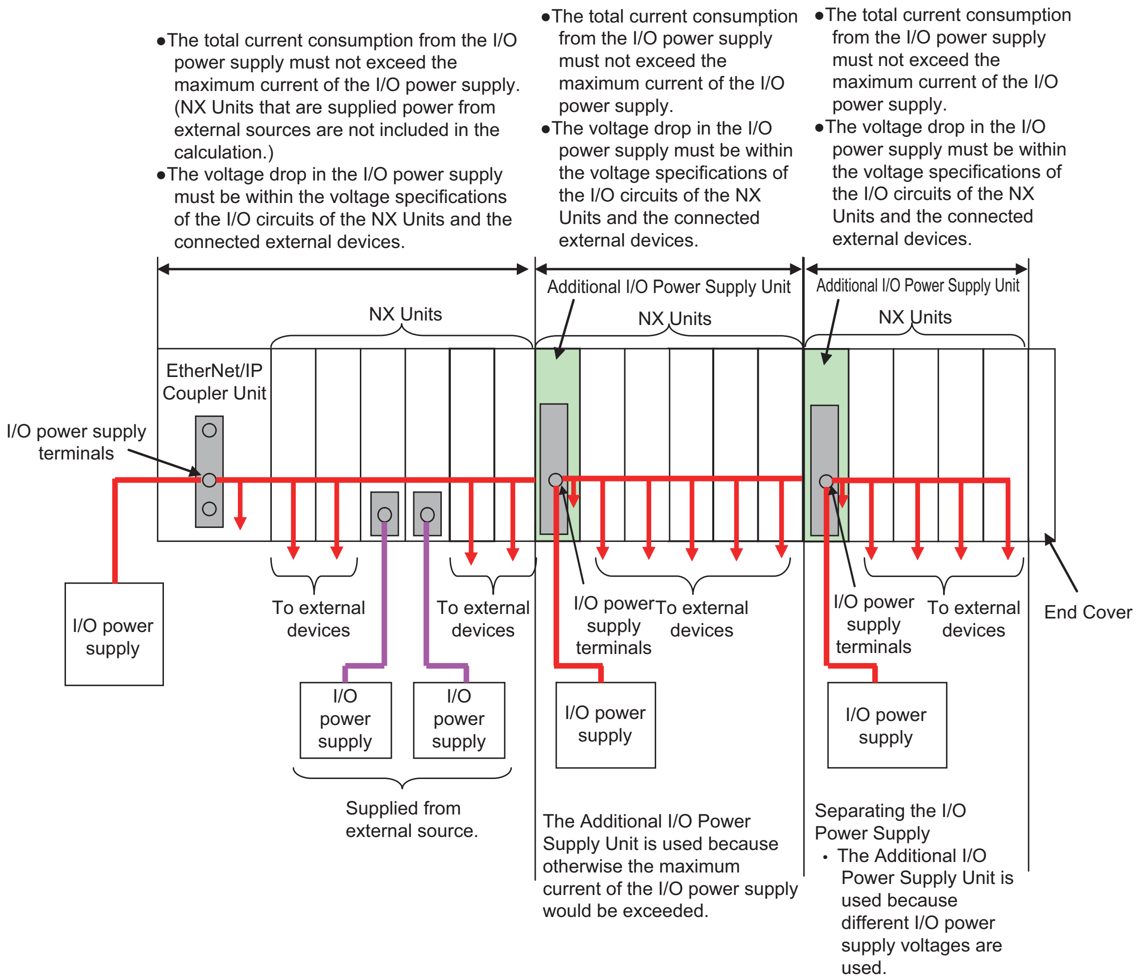
(b) Voltage drop in the I/O power supply causes the voltage of the I/O power supply to go below the voltage specifications of the I/O circuits of the NX Units or the connected external devices.

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. Specific values are given in the user's manuals for individual Units.

Current consumption item	Description
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. 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. 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

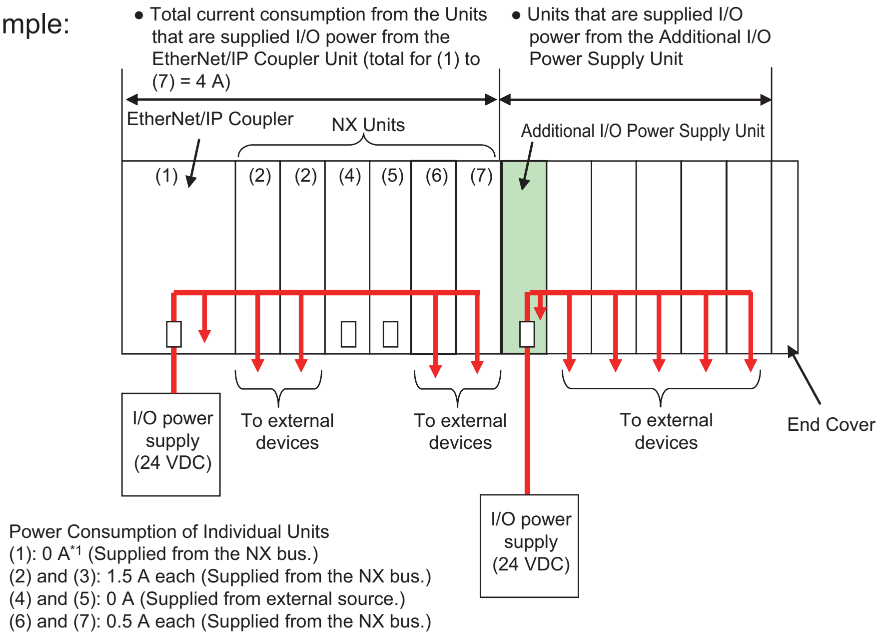
Voltage drop occurs in the EtherNet/IP Slave Terminal due to the contact resistance at the points where Units are connected to each other. Design the I/O power supply system to maintain the voltage specifications of the NX Unit I/O circuits and connected external devices even if the voltage of the I/O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



*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.

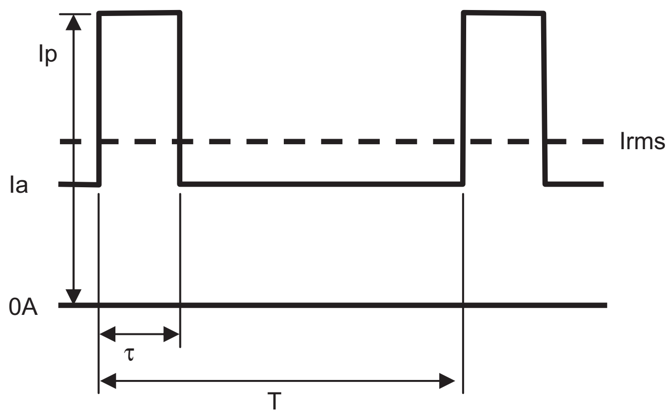
Unit	Model	Peak value	Pulse width
EtherNet/IP Coupler Unit	NX-EIC202	50 A	1 s

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)


Ip
Irms
Ia
0A
τ
T

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

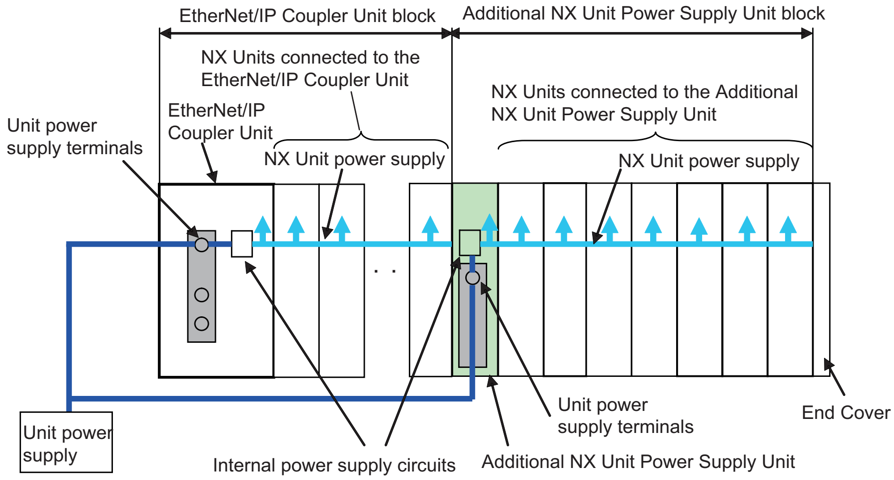
Use the following formula to calculate the required Unit power supply capacity for each block in the EtherNet/IP Slave Terminal.

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. 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.

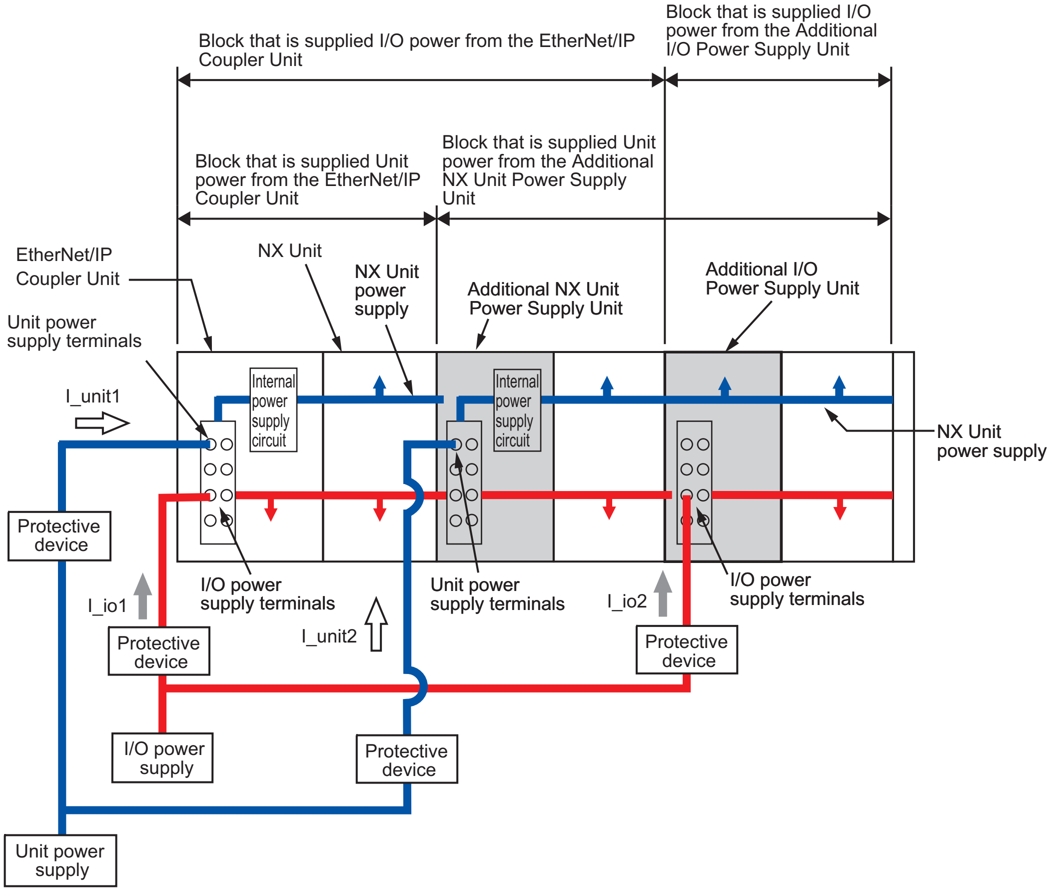
Current	Breaking/fusing time
14 A	1 min max.
28 A	9 s max.
56A	1.5 s max.
70 A	0.8 s max.

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

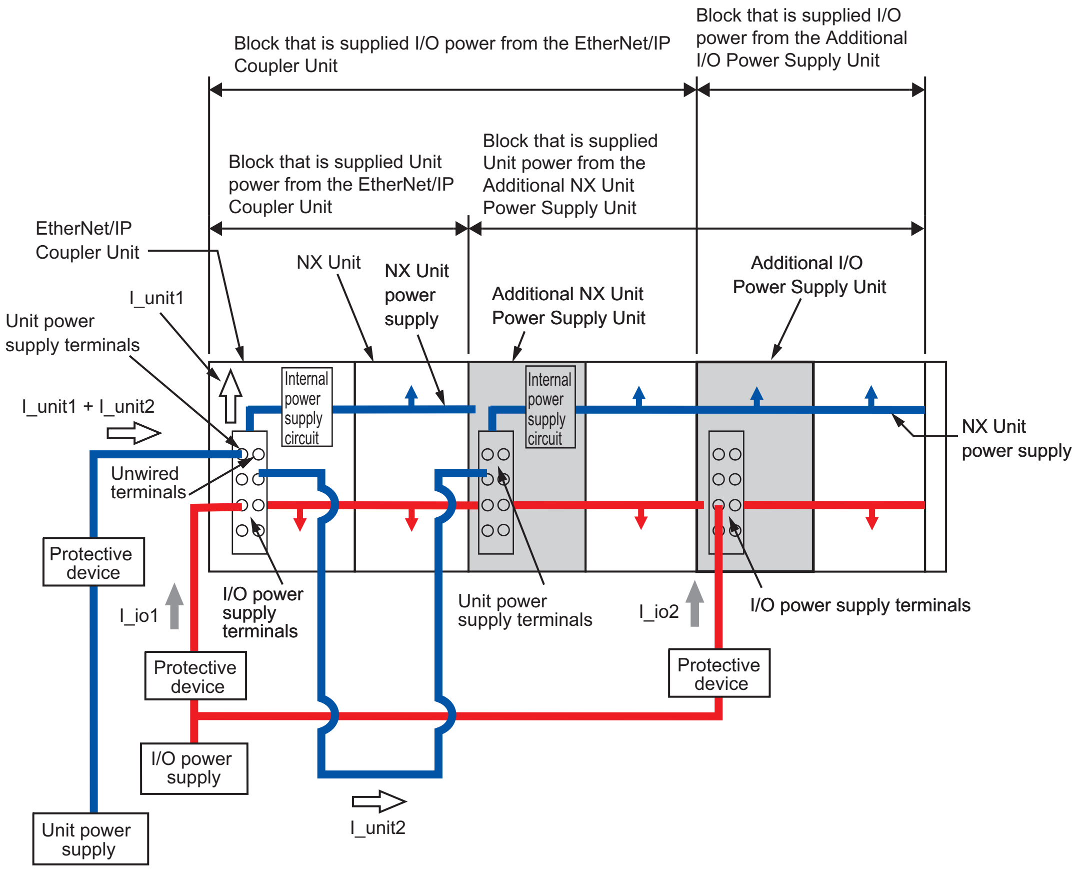
Install protective devices for the Unit power supply and I/O power supply in the locations that are shown in the following figure.



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

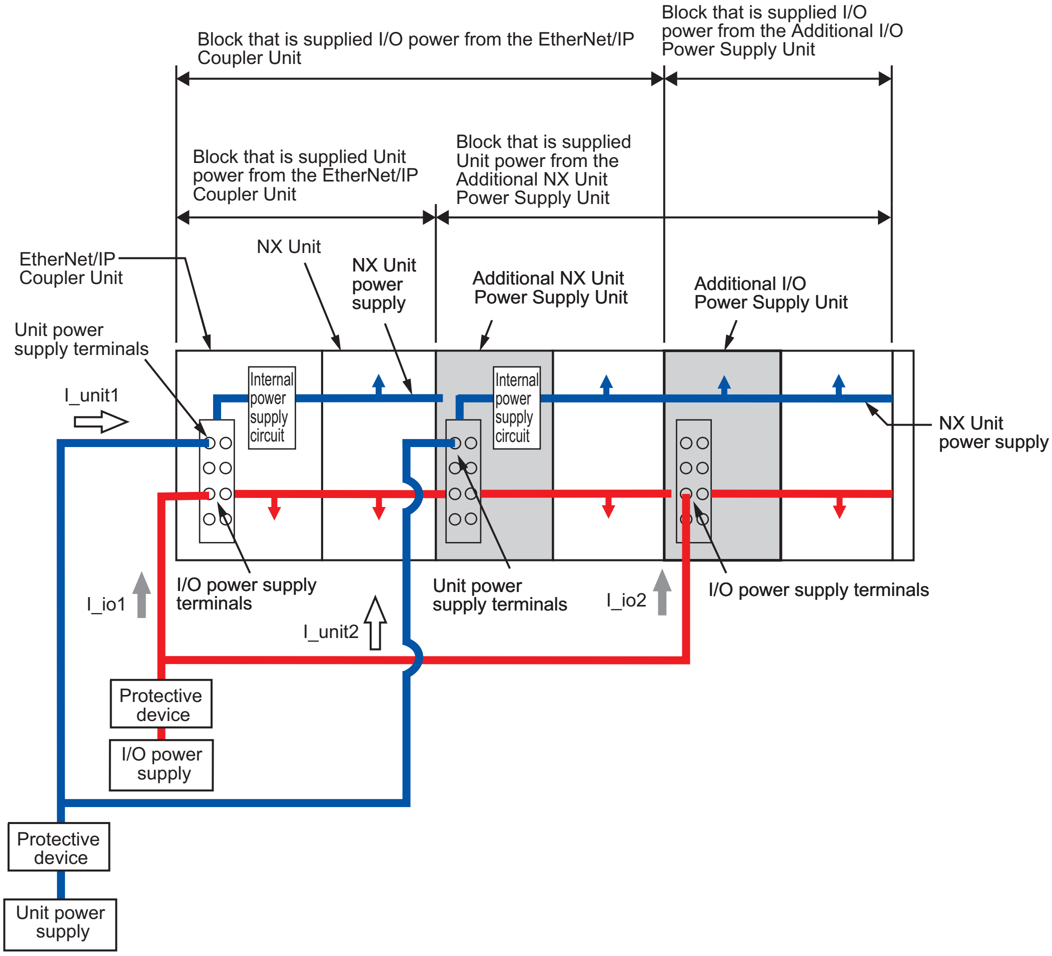


*1. This is the lowest rated current of all of the Units that supply I/O power and are connected to protective devices. For example, if terminals with both a 10-A and 4-A capacities are connected, the value is 4 A.

- 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.

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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

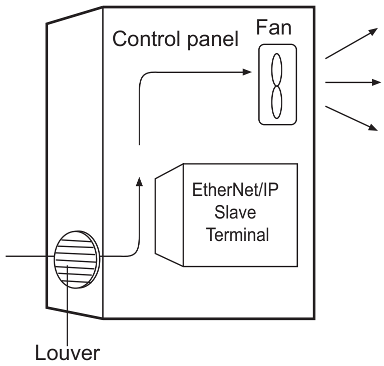
Installation in Cabinets or Control Panels

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.

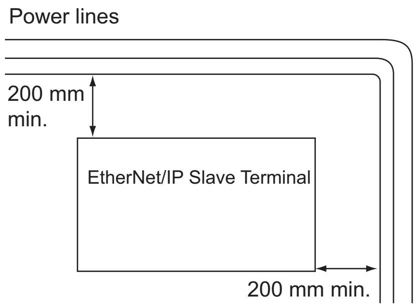


● Accessibility for Operation and Maintenance

- 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.

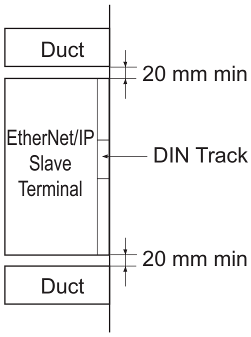
Additional Information

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

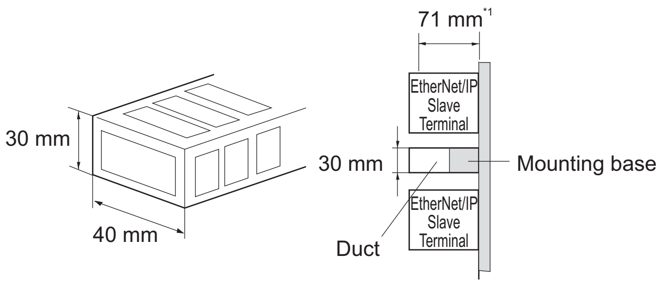
Wiring Ducts

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.



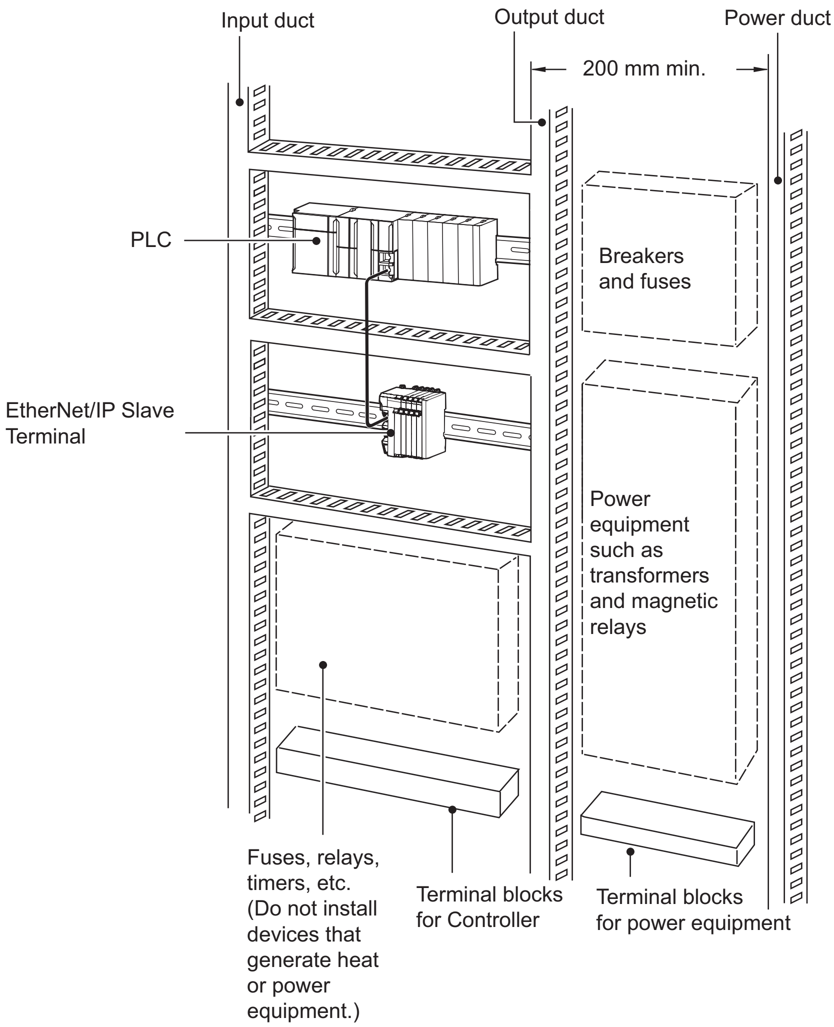
Wiring Duct Example



*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 • Material: Aluminum • Surface treatment: Insulated
	PFP-100N	OMRON Corporation	• Length: 100 cm • Material: Aluminum • Surface treatment: Insulated
	NS 35/7,5 PERF	Phoenix Contact	• Length: 75.5, 95.5, 115.5, or 200 cm • Material: Steel • Surface treatment: Conductive
	NS 35/15 PERF	Phoenix Contact	• Length: 75.5, 95.5, 115.5, or 200 cm • Material: Steel • 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.

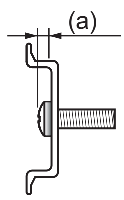
DIN Track model	PFP-M (OMRON)	CLIPFIX 35 (Phoenix Contact)
PFP-50N	Possible.	Possible.
PFP-100N	Possible.	Possible.
NS 35/7,5 PERF	Possible.	Possible.
NS 35/15 PERF	Not possible.	Possible.

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.

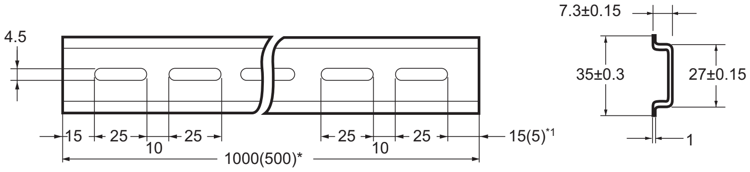
*1. Dimensions in parentheses are for Communications Coupler Units with lot numbers through December 2014 or for NX Units with 12-mm widths with lot numbers through December 2014.



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.

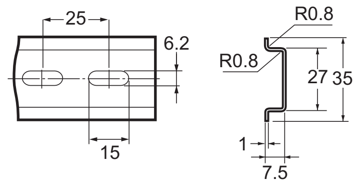
● DIN Tracks

PFP-100N/50N DIN Track

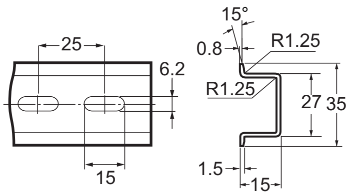


*1 PFP-50N dimensions are given in parentheses.

NS 35/7,5 PERF

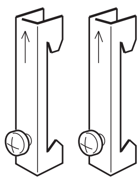


NS 35/15 PERF

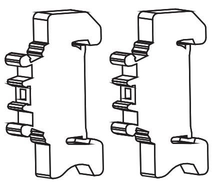


● End Plate

PFP-M (Two)



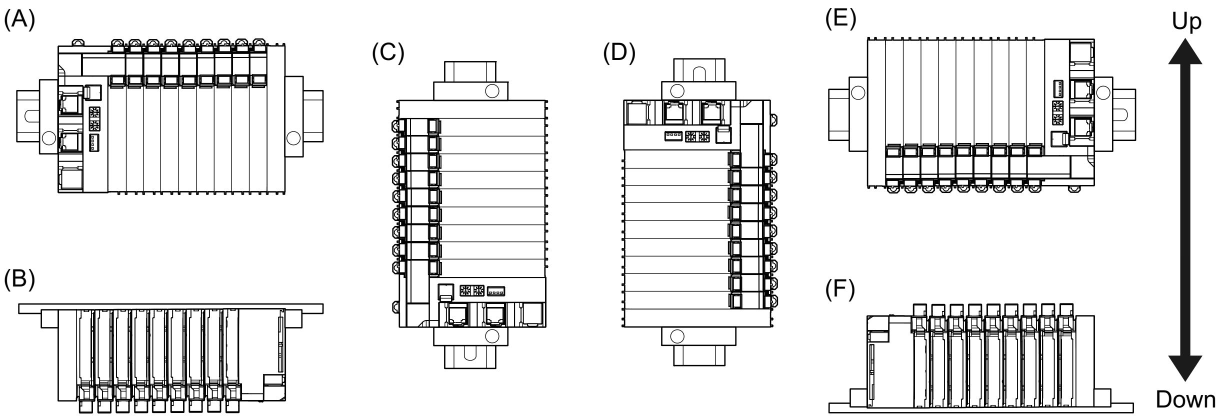
CLIPFIX 35 (Two)



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

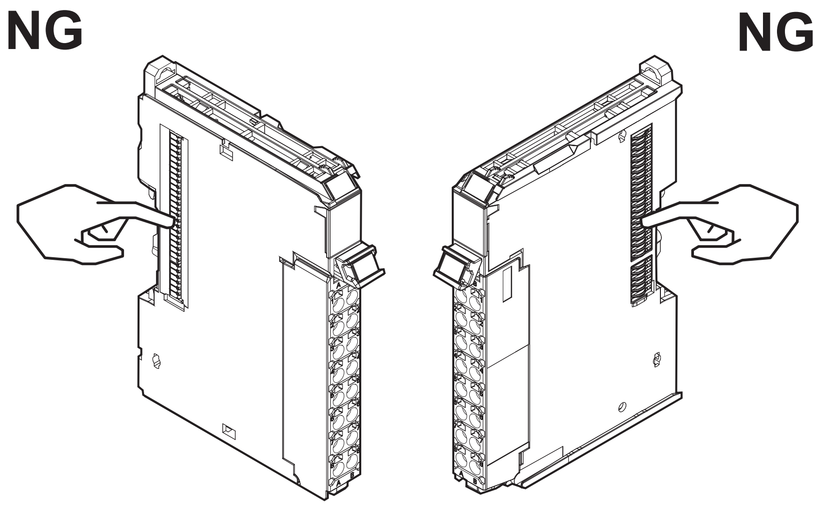
For installation orientations (C) and (D) in the above figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables. The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured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

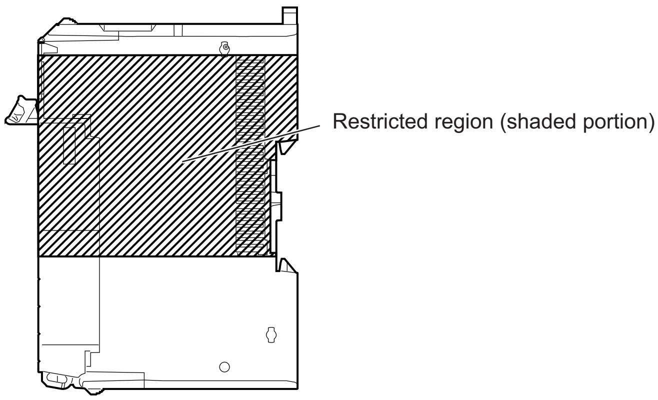
Precautions for Safe Use

- 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.



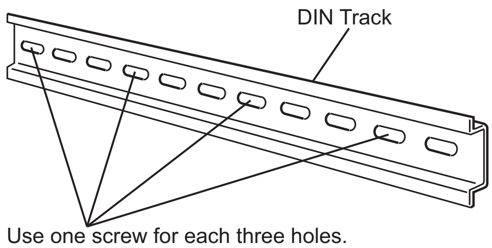
Precautions for Correct Use

- 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.

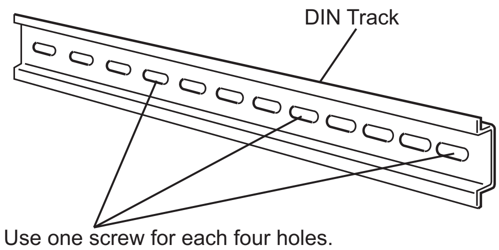
- Using a PFP-50N/100N DIN Track

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.

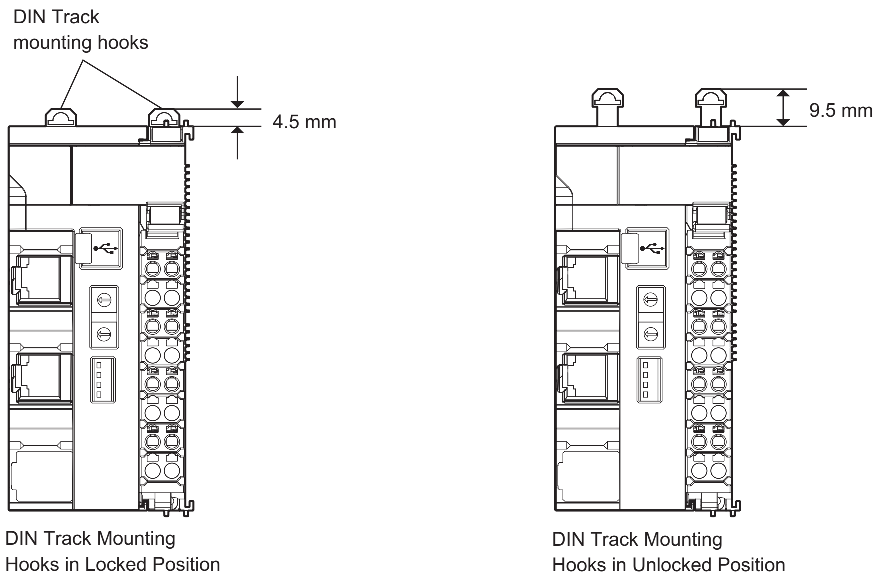


- Using an NS 35/7,5 PERF or NS 35/15 PERF DIN Track

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.



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



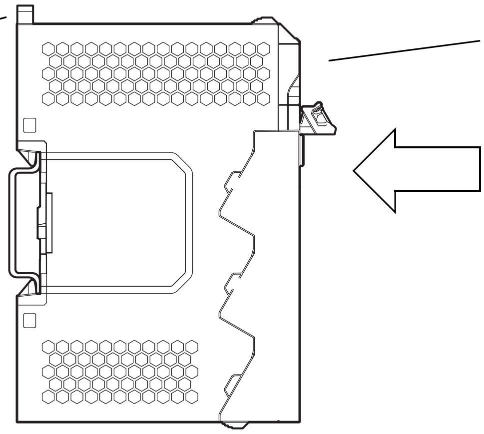
If the DIN Track mounting hooks are pressed down, they are in the locked position.

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.

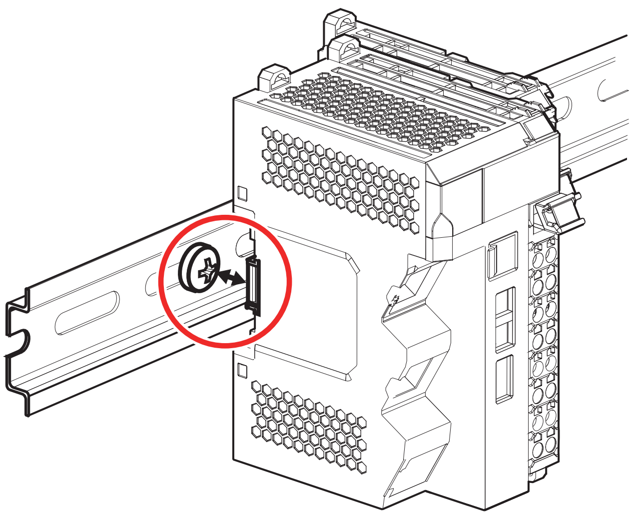
3 Press the EtherNet/IP Coupler Unit firmly against the DIN Track until you hear the DIN Track mounting hook lock into place.

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

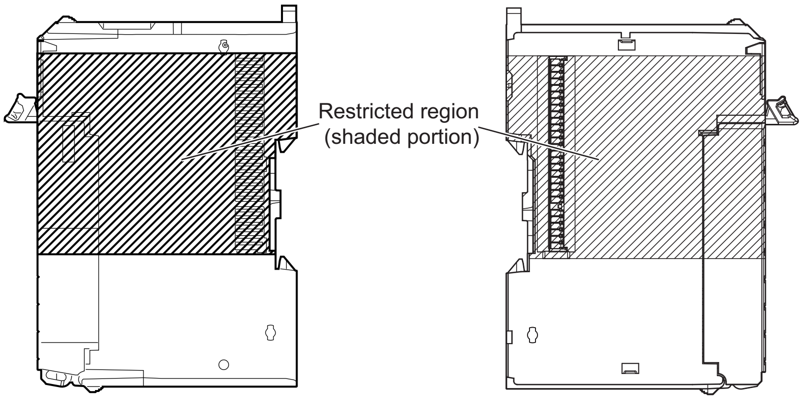
It is not normally necessary to unlock the DIN Track mounting hooks when you mount the EtherNet/IP Coupler Unit. However, if you mount the EtherNet/IP Coupler Unit on a DIN Track that is not one of the recommended DIN Tracks, the DIN Track mounting hooks may not lock properly. If that happens, unlock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

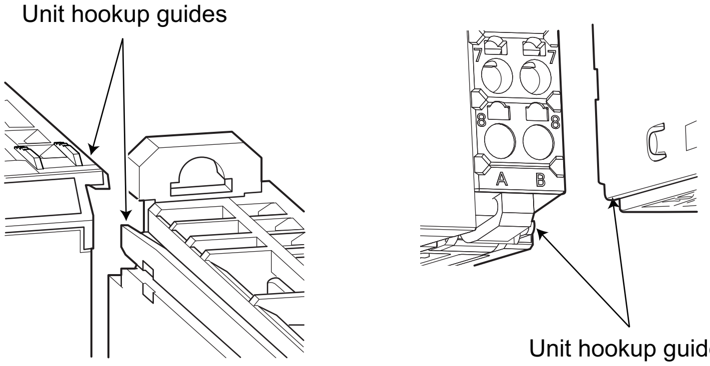


Precautions for Correct Use

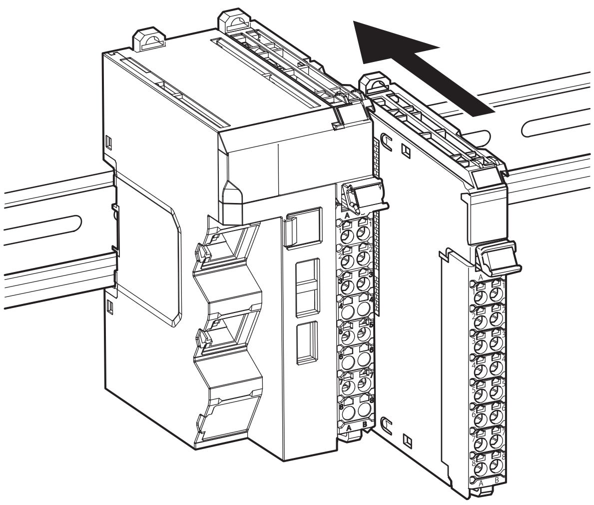
- When you mount an NX Unit to the EtherNet/IP Coupler Unit or when you connect NX Units to each other, always mount the Units one at a time on the DIN Track. If you connect NX Units to each other and attempt to mount them together to the DIN Track at the same time, the Units may separate from each other 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.

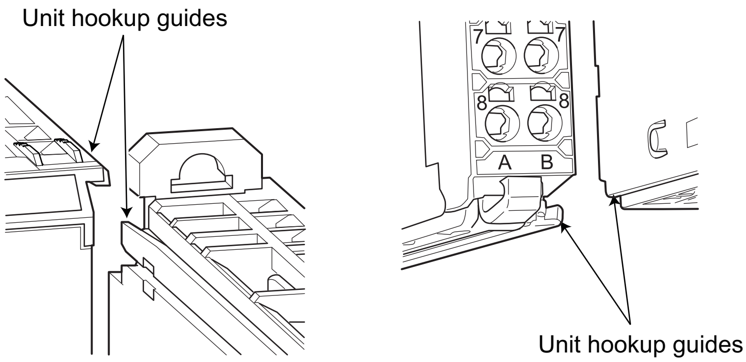
Additional Information

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.

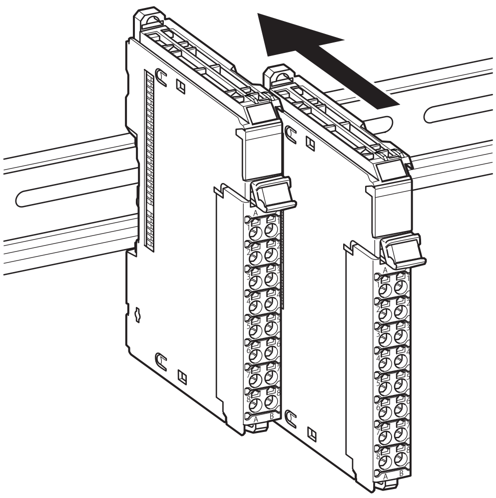
● Mounting NX Units to Each Other

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.

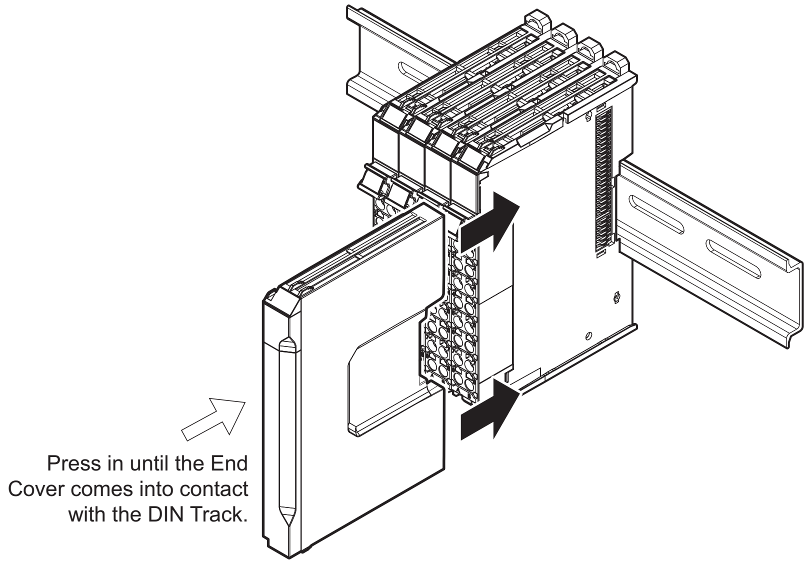
Precautions for Correct Use

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.

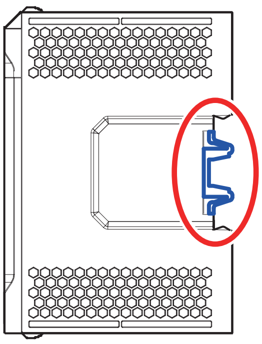
After you mount the End Cover, check to be sure that it is securely mounted on the DIN Track.



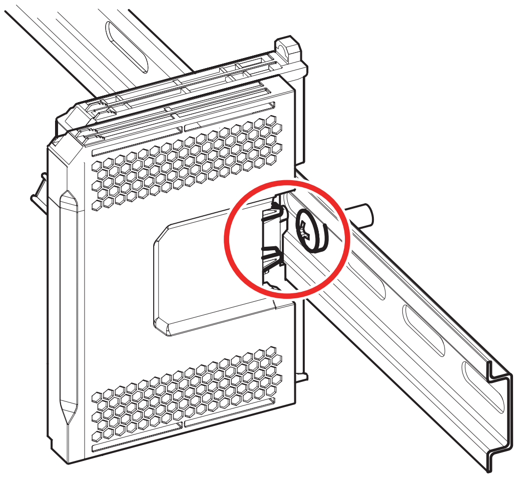
Precautions for Correct Use

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

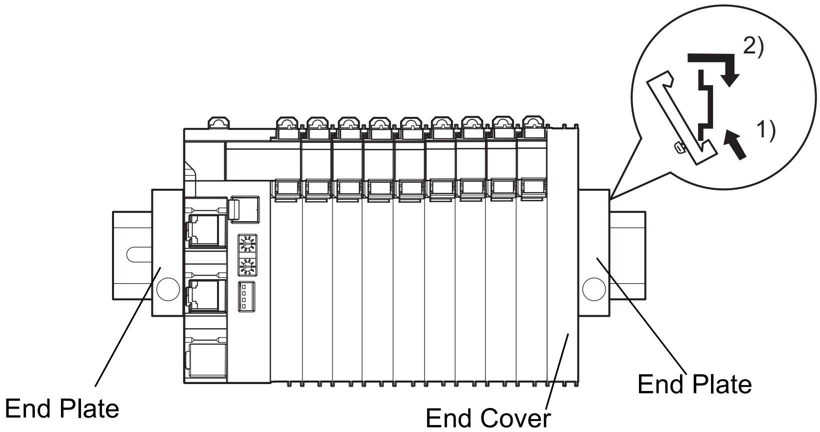
After you mount the End Cover, always secure the EtherNet/IP Slave Terminal with End Plates.

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.

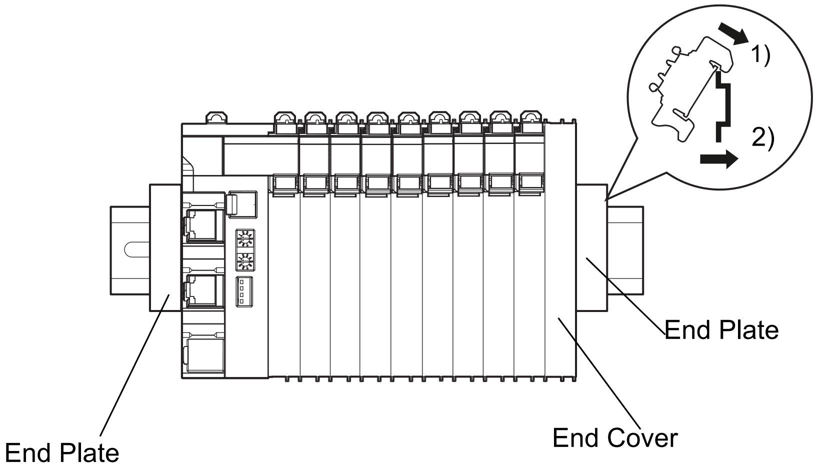
● Using PFP-M (OMRON)

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.

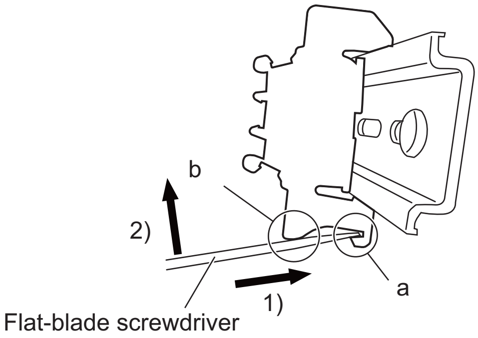


● Using CLIPFIX 35 (Phoenix Contact)

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.



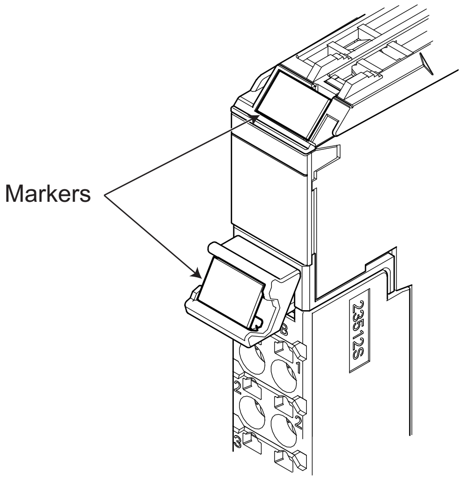
6-1-8 Attaching Markers

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.

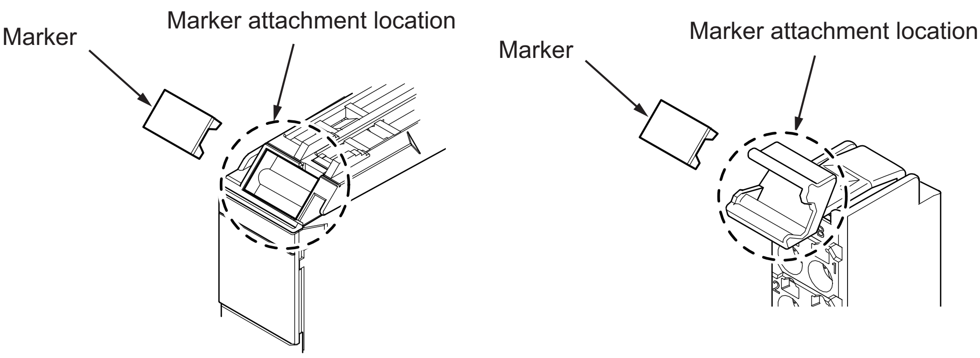
Commercially available markers can also be installed.

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

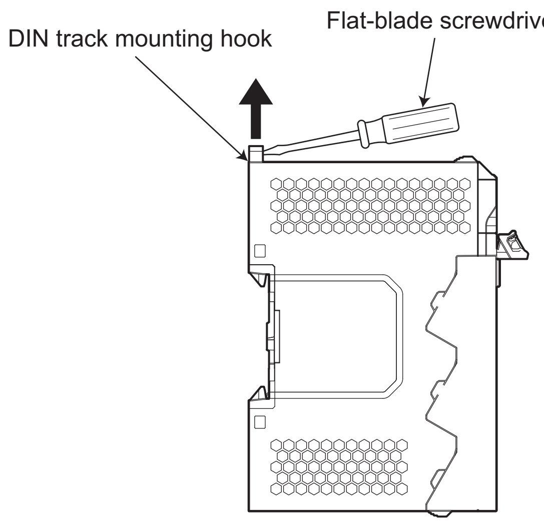
Precautions for Safe Use

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.

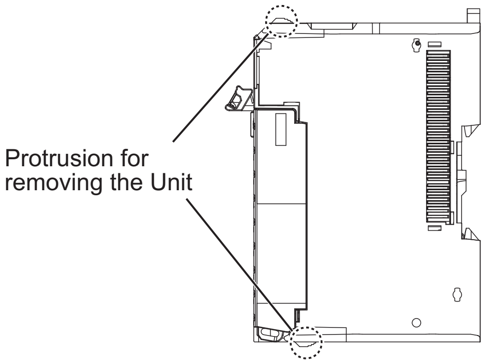
1 Use a flat-blade screwdriver to pull up the DIN Track mounting hook on the Unit to remove.

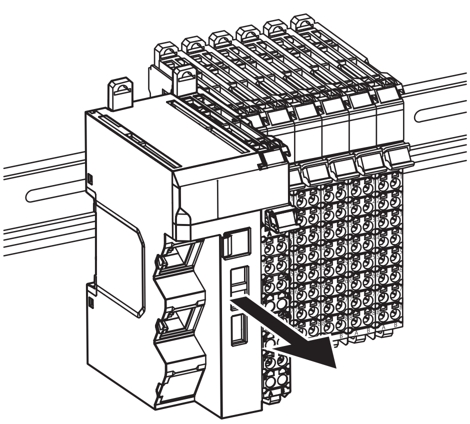


2 Remove the Unit with either (a) or (b) below.

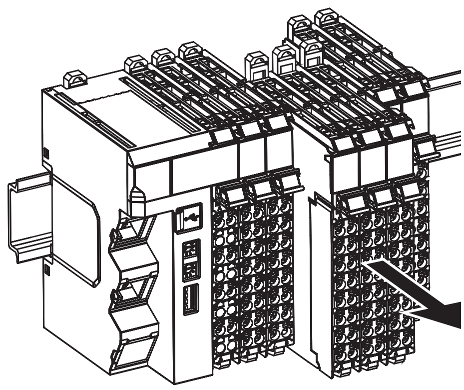
(a) For an EtherNet/IP Coupler Unit, place your fingers on the protrusions on the EtherNet/IP Coupler Unit and pull it straight forward.

(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.





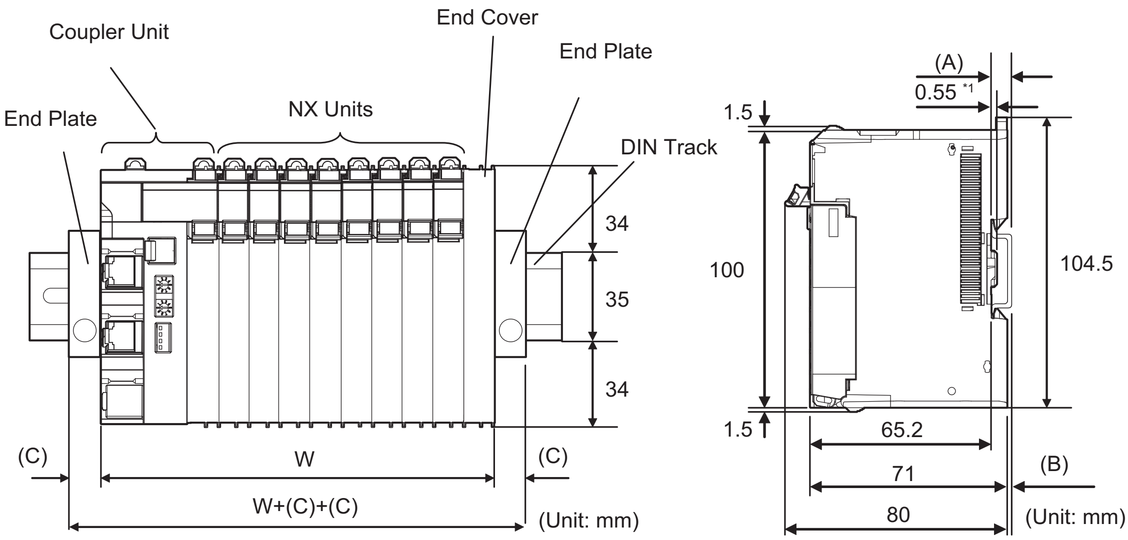
<EtherNet/IP Coupler Unit>



<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.

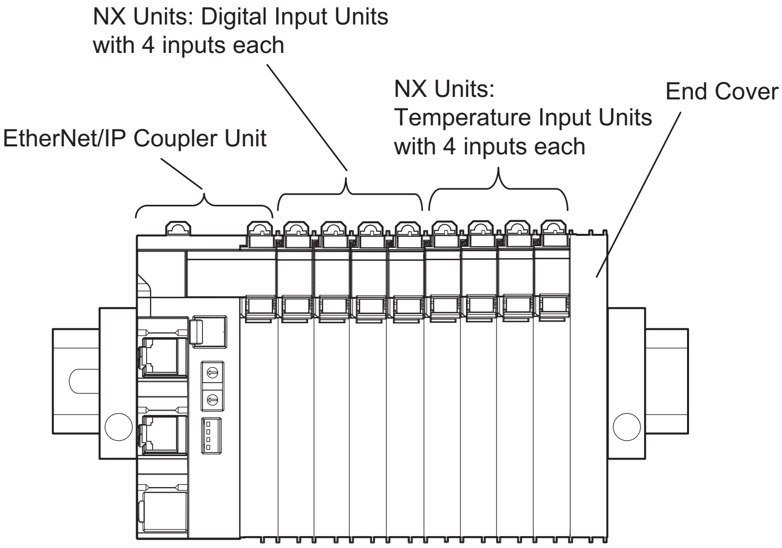
W: Width of the EtherNet/IP Slave Terminal

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

DIN Track model	(A) DIN Track dimension	(B) 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) End Plate dimension
PFP-M	10 mm
CLIPFIX 35	9.5 mm

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



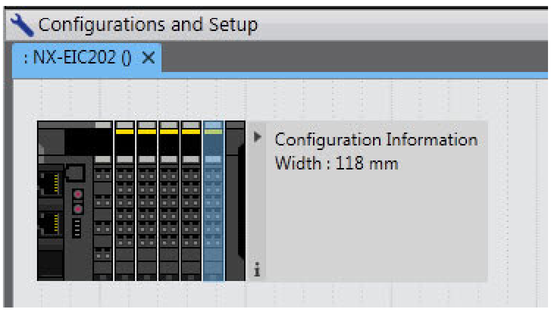
The widths of the Units in the example EtherNet/IP Slave Terminal configuration and the total configuration width are given below.

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 Sysmac Studio. You can display the width on the right of the Slave Terminal on the Edit Slave Terminal Configuration Tab Page on the Sysmac Studio. Click ▼ to display the width.



Installation Height

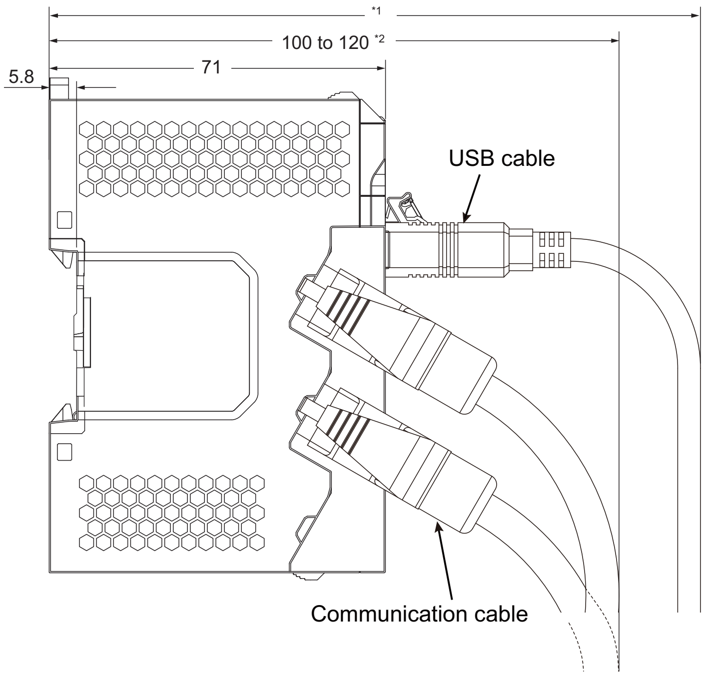
The installation height of the EtherNet/IP Slave Terminal depends on the model of DIN Track and on the models of NX Units that are mounted.

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 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 Sysmac Studio 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

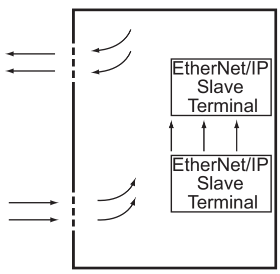
Use the following cooling methods as required, taking into account the ambient temperature and the amount of heating inside the panel.

● Natural Cooling

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

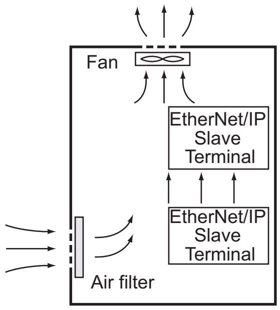
When using this method, observe the following points.

- 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.



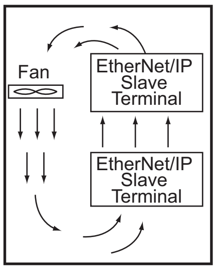
Natural Cooling

- **Forced Ventilation by Fan at Top of Panel**



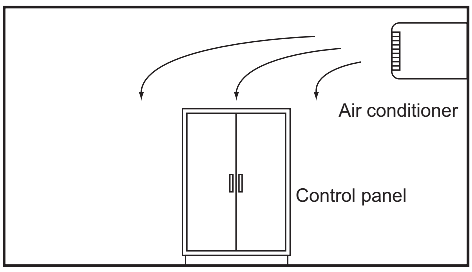
Forced Ventilation Method

- **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.

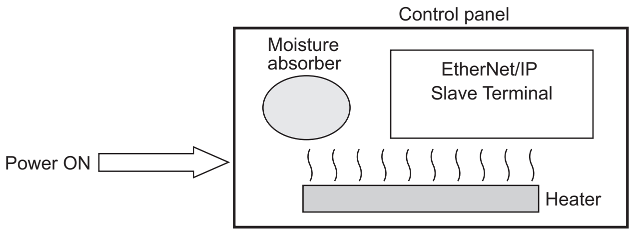
Maintain an air temperature of at least approximately 5°C inside the panel, by implementing measures such as installing a low-capacity space heater in the panel.

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.

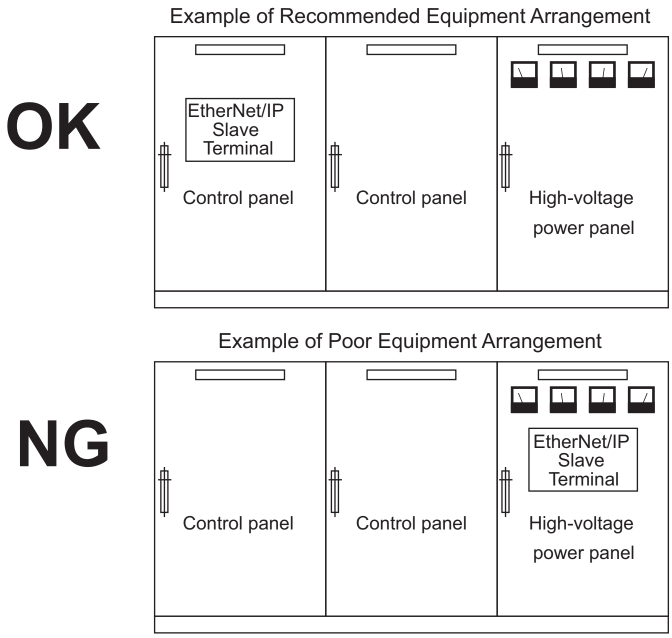
- In locations exposed to dust, dirt, salt, metal powder, soot, or organic solvents, use a panel with an airtight structure. Be careful of temperature increases inside the panel.
- In locations exposed to corrosive gas, purge the air inside the panel to clear the gas and then pressurize the inside of 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.

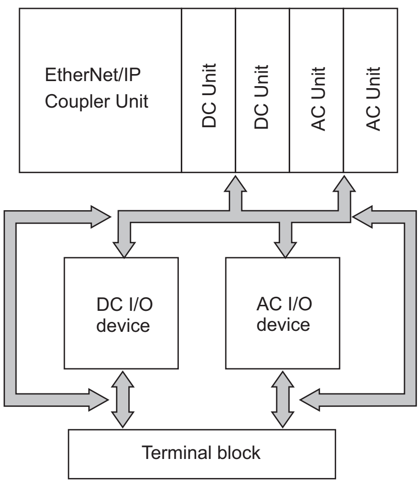


Examples of Equipment Arrangement in Panel with High-voltage Devices

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

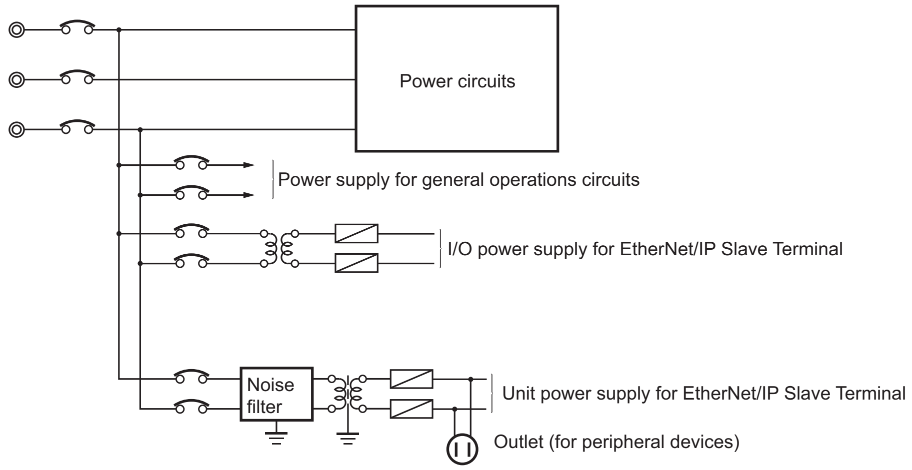
Wire Layout for the Power Supply System

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.

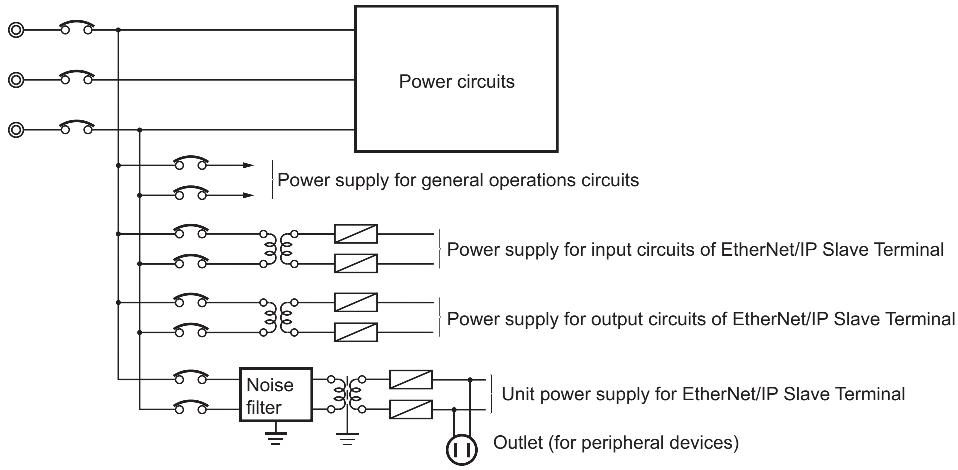
- Keep the wiring between the transformer and the EtherNet/IP Slave Terminal as short as possible, twist the wires well, and keep the wiring separate from high-voltage and power lines.

● Supplying I/O Power from the NX Bus



Power Supply System Diagram

● Supplying I/O Power from External Sources

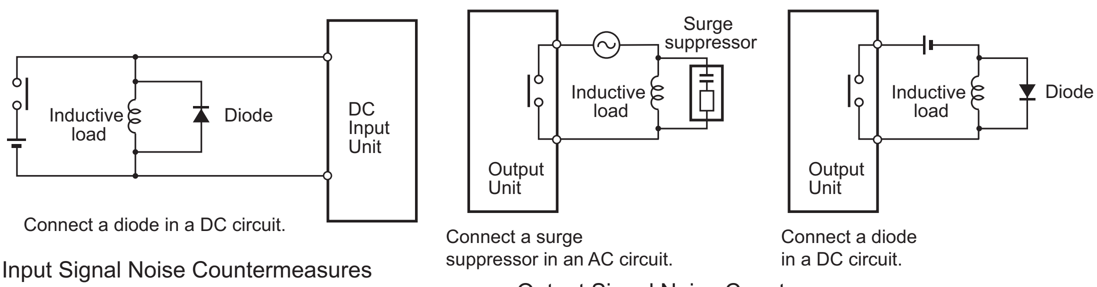


Power Supply System Diagram

Wiring External I/O Signal Lines

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

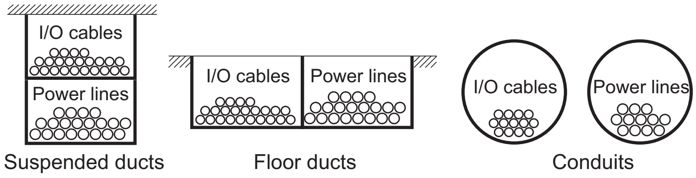
- To absorb reverse electromotive force when an inductive load is connected to an output signal, connect a surge suppressor near the inductive load in an AC circuit, or connect a diode near the inductive load in a DC circuit.



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

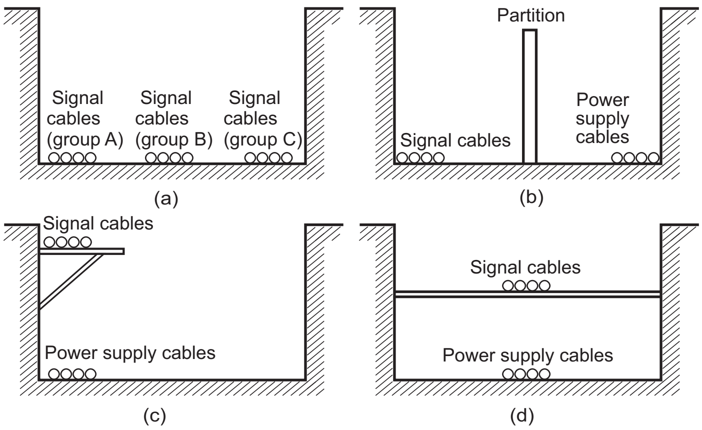
Each of the following combinations includes different signal types, properties, or levels. They will cause the signal-to-noise ratio to drop due to factors such as electrical induction. As a general rule when wiring, either use separate cables or separate wiring routes for these items. Future maintenance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

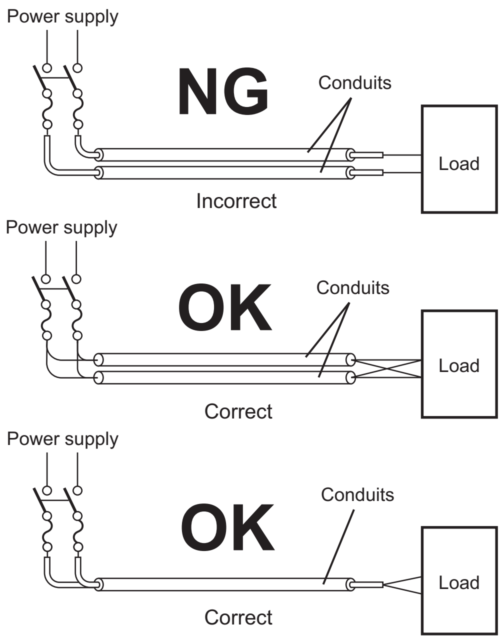
Observe the following points when wiring power supply and signal cables.

- 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.



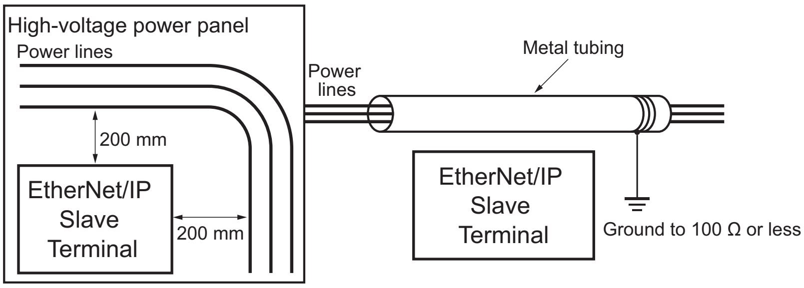
Partitioning Methods for Signal and Power Supply Cables

- 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

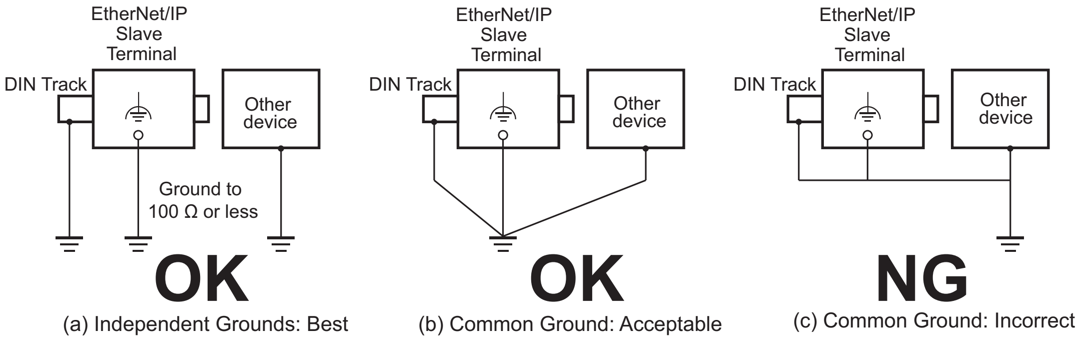
● Principles of One-point Grounding

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).

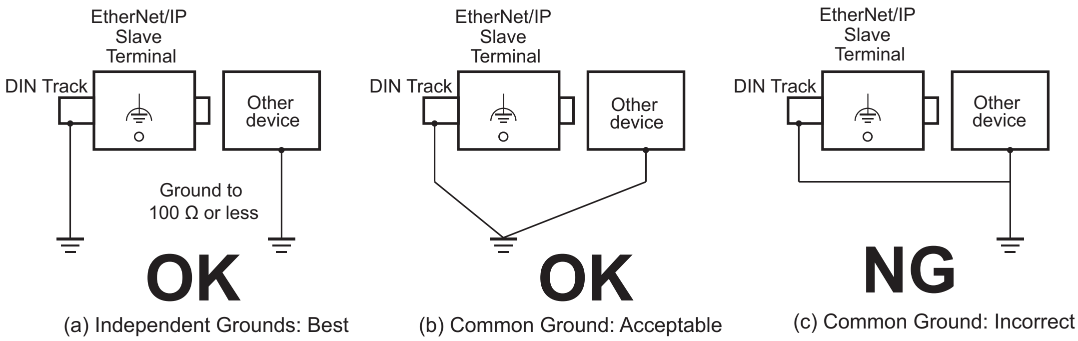
- Ground to 100 Ω or less, and if possible use a separate ground from those of other devices. (See following figure (a).)
- If using an independent ground is not possible, then use a common ground as shown in figure (b). Connect to the ground pole of the other device.
- Never connect to the same ground 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 7-2

7-1-1 Installation Precautions 7-2

7-1-2 Preparations for Installation 7-2

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

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

7-1-5 Connecting Communications Cables 7-4

7-2 Connecting the Power Supply and Ground Wires 7-6

7-2-1 Wiring the EtherNet/IP Coupler Unit 7-6

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

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

7-2-4 Precautions for Wiring the EtherNet/IP Slave Terminal Together with Computers and other Peripheral Devices 7-11

7-2-5 Wiring to the Screwless Clamping Terminal Block 7-11

7-3 Connecting USB Cable 7-24

7-4 Wiring External Signal Lines 7-26

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. Use an STP (shielded twisted-pair) cable of category 5 or higher.

Precautions for Safe Use

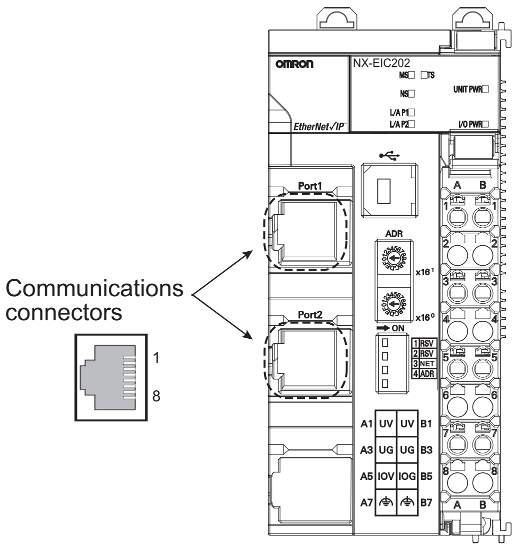
- Double-check all switches and other settings and double-check all wiring to make sure that they are correct before turning ON the power supply. Use the correct wiring parts and tools when you wire the system.
- Do not exceed the ranges that are given in the specifications for the communications distance 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* (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	Wire color	Pin No.
1	White-Green	White-Green	1
2	Green	Green	2
3	White-Orange	White-Orange	3
4	Blue	Blue	4
5	White-Blue	White-Blue	5
6	Orange	Orange	6
7	White-Brown	White-Brown	7
8	Brown	Brown	8
Hood	Shield*1	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.

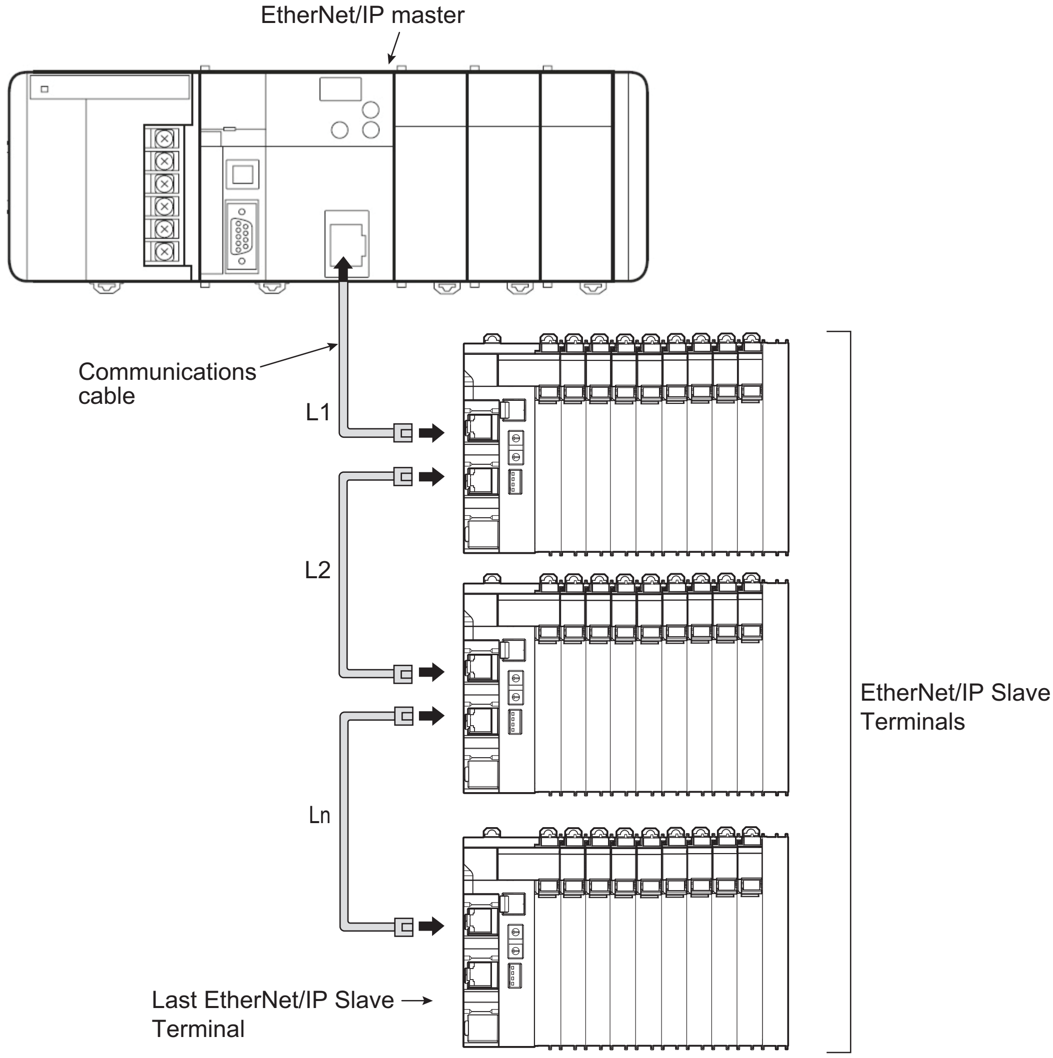
The T568A connection method is shown in the above figure, but the T568B connection method can also be used.

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

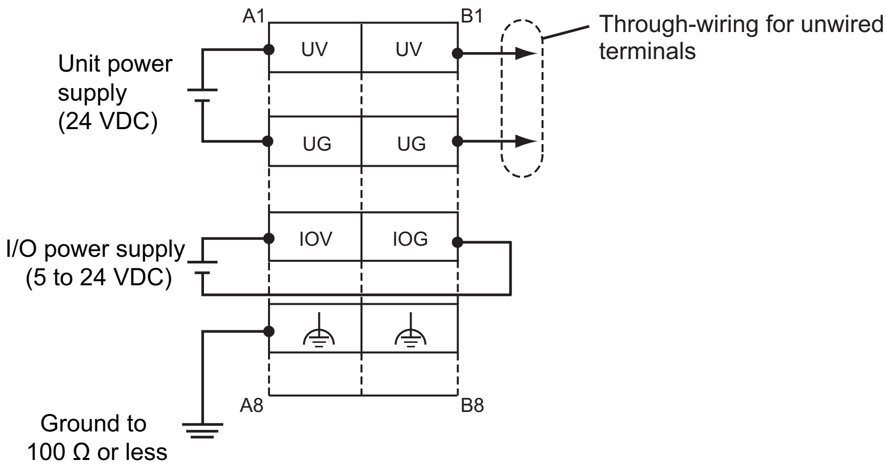
- The cable between any two nodes (L1, L2 ... Ln) must be 100 m or less.
- Do not exceed the ranges that are given in the specifications for the communications distance and number of connected Units.
- Firmly connect the communications cable connector until it clicks into place.
- When you install the 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

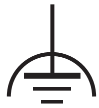
These terminals are connected to the I/O power supply. The details are given in the following table.

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 7-11 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* 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.

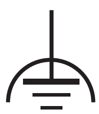
● Units with Ground Terminals

- 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

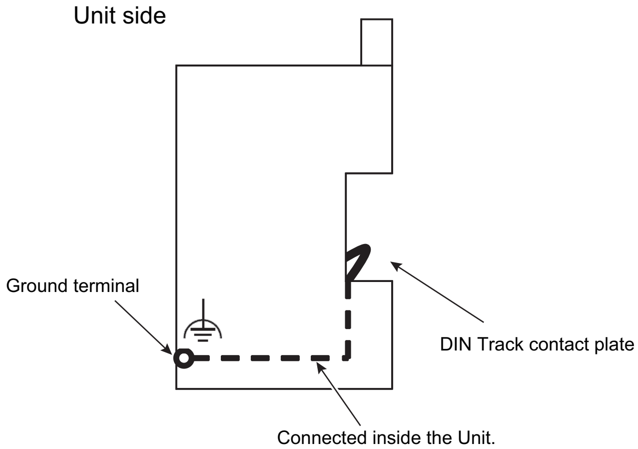
The ground terminals are functional ground terminals.



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.

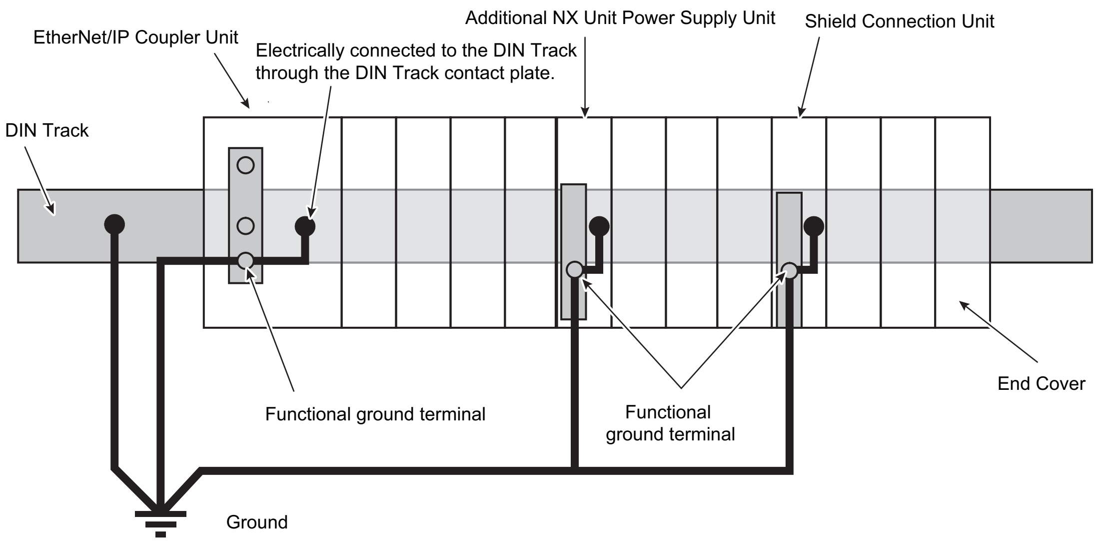
This means that the ground terminal will be electrically connected to the DIN Track.

For information on the DIN Track contact plate on the EtherNet/IP Coupler Unit, refer to *4-6 DIN Track Contact Plate* on page 4-14. 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

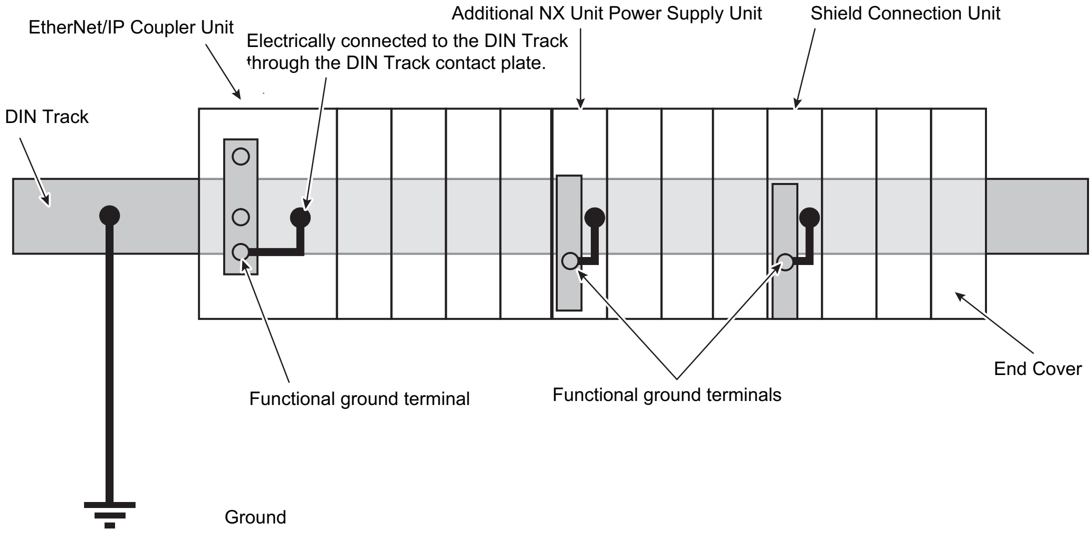
This section describes how to ground the ground terminals on the EtherNet/IP Slave Terminal.

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 7-12 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 6-31 for the grounding procedures for the EtherNet/IP Slave Terminal with peripheral devices and in control panels.

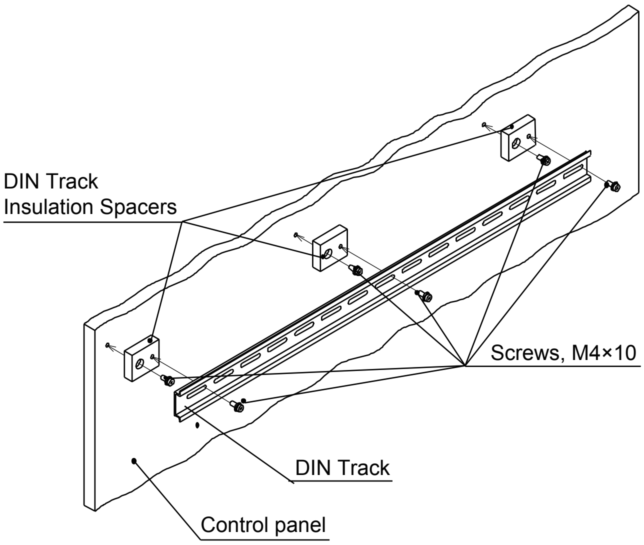
Isolating the EtherNet/IP Slave Terminal from the Control Panel

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.

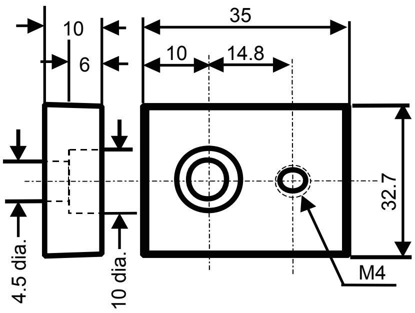
Installing DIN Track Insulation Spacers and DIN Track

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

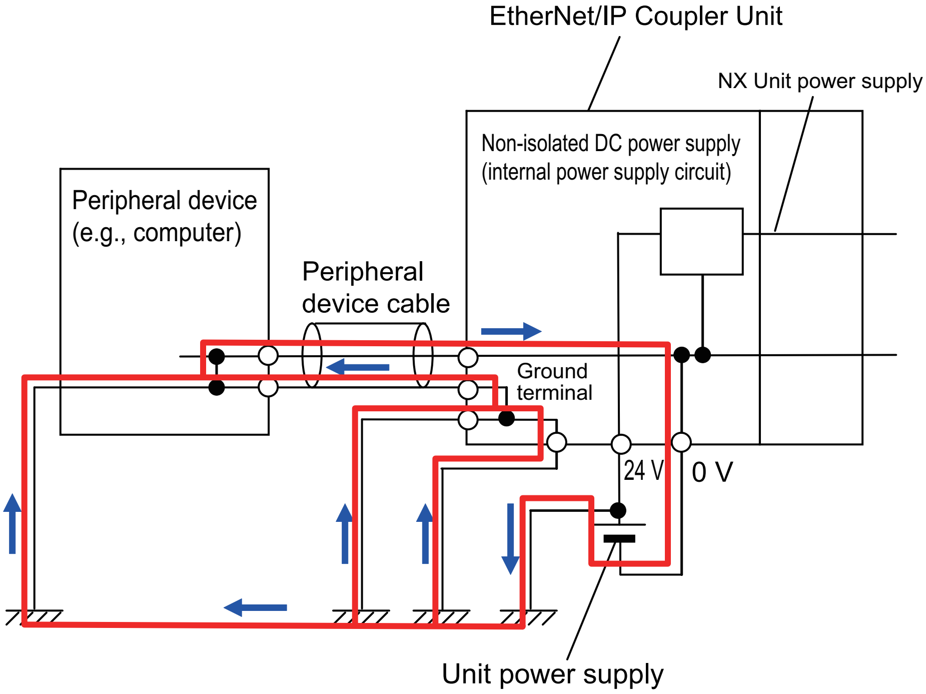
⚠ Caution

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.

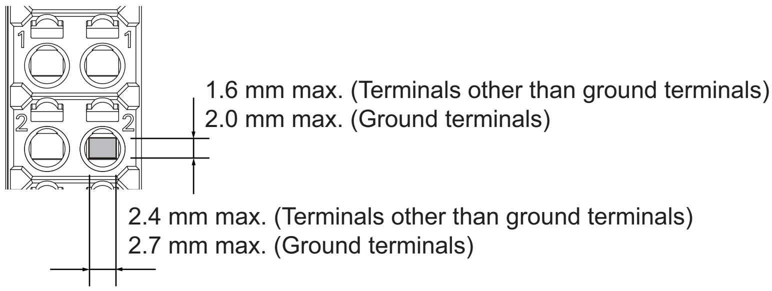
Applicable Wires

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.

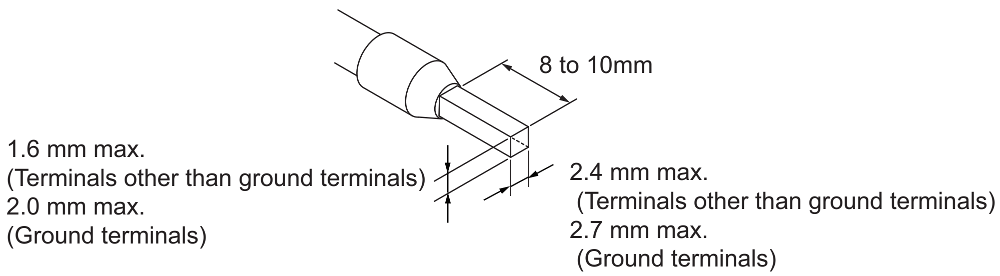
The applicable ferrules, wires, and crimping tools are listed in the following table.

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.) 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	

Terminal types	Manufac-turer	Ferrule model	Applica-ble wire (mm^2 (AWG))	Crimping tool
Terminals other than ground ter-minals	Weidmuller	H0.14/12	0.14 (#26)	Weidmuller (The figure in parentheses is the appli-cable wire size.) PZ6 Roto (0.14 to 6 mm^2, AWG26 to 10)
		H0.25/12	0.25 (#24)	
		H0.34/12	0.34 (#22)	
		H0.5/14	0.5 (#20)	
		H0.5/16		
		H0.75/14	0.75 (#18)	
		H0.75/16		
		H1.0/14	1.0 (#18)	
		H1.0/16		
		H1.5/14	1.5 (#16)	
		H1.5/16		

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

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

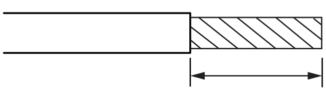


● Using Twisted or Solid Wires

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

Terminals		Wire type		Wire plating		Wire size	Conductor length (stripping length)
Classifica-tion	Current capacity	Twisted wires	Solid wire	Plated	Unplated		
All termi-nals except ground ter-minals	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 pos-sible		
	Greater than 4 A		Not pos-sible				
Ground ter-minals*1	---		Possible		Possible	2.0 mm^2	9 to 10 mm

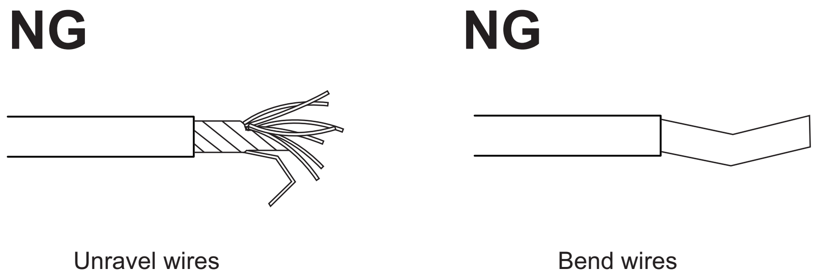
*1. With the NX-TB☐☐☐1 Terminal Block, use twisted wires to connect the ground terminal. Do not use a solid wire.



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.



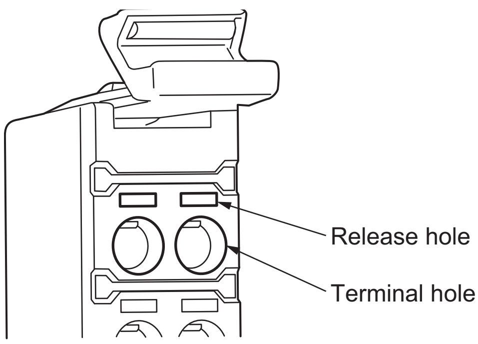
Additional Information

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.

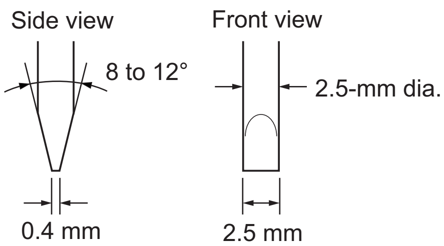
● Terminal Block Parts and Names



● Required Tools

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

Use the following flat-blade screwdriver.



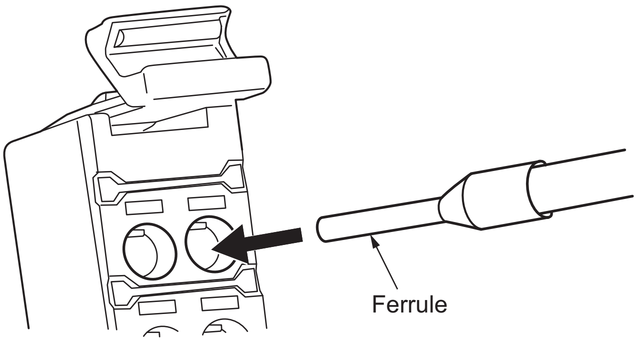
Recommended screwdriver

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.

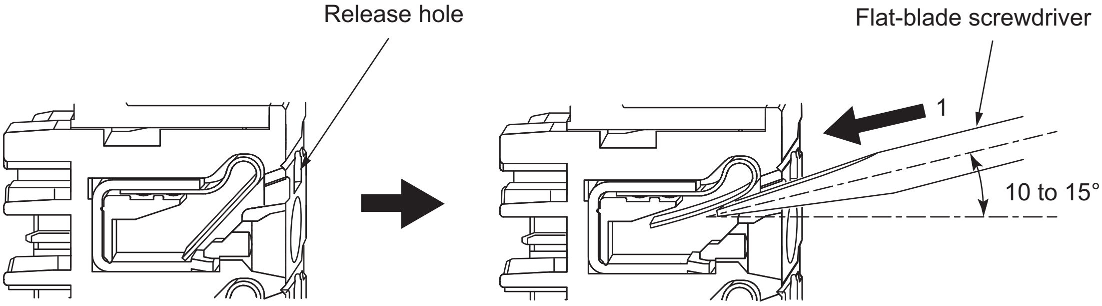
● Connecting Twisted Wires/Solid Wires

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.

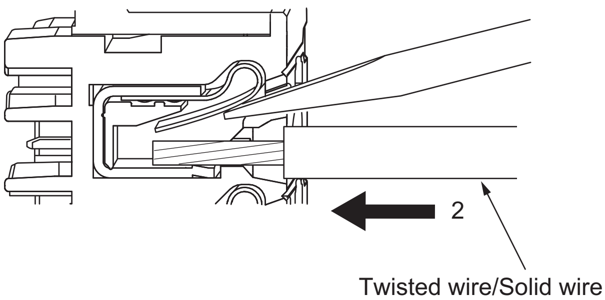
Press at an angle of 10° to 15°.

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

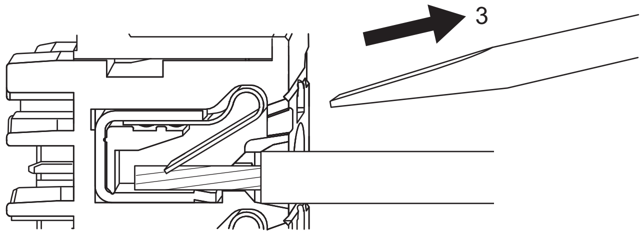


2 Leave the flat-blade screwdriver pressed into the release hole and insert the twisted wire or the solid wire into the terminal hole.

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.

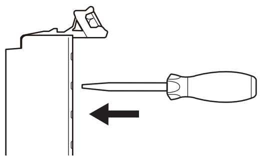


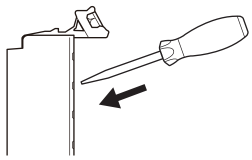
After you make a connection, make sure that the twisted wire or the solid wire is securely connected to the terminal block.

Precautions for Safe Use

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

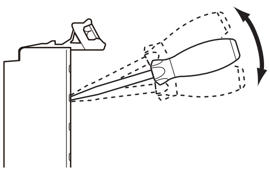
NG **OK**

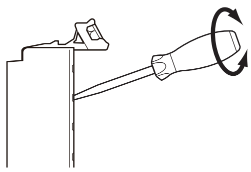




- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N max. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may break the terminal block.

NG **NG**





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

● Removing Wires

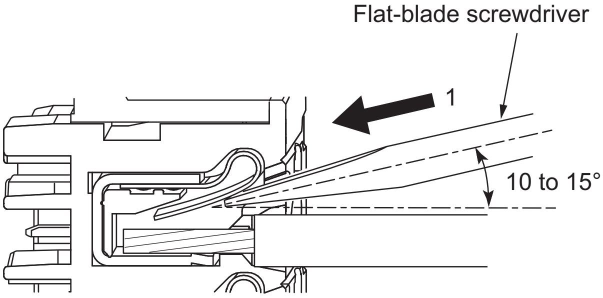
Use the following procedure to remove the wires from the terminal block.

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

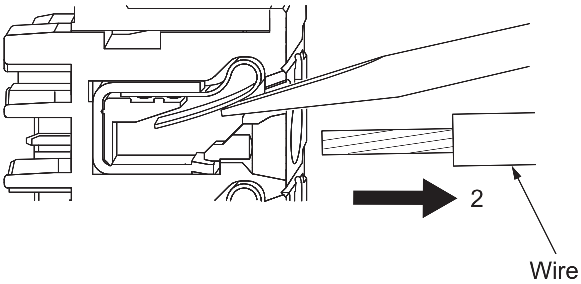
1 Press the flat-blade screwdriver diagonally into the release hole.

Press at an angle of 10° to 15°.

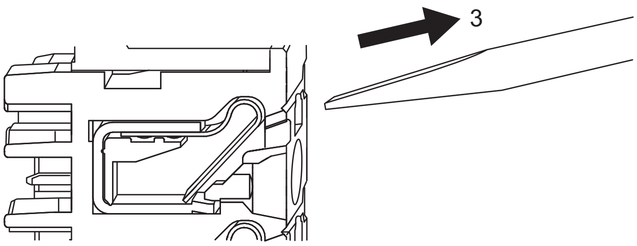
If you press in the screwdriver correctly, you will feel the spring in the release hole.



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

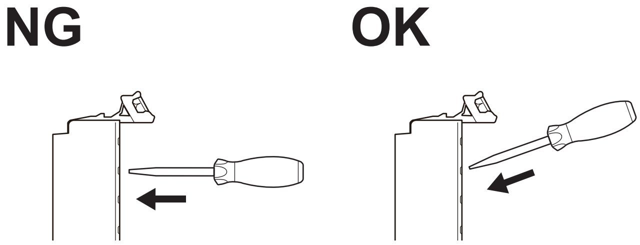


3 Remove the flat-blade screwdriver from the release hole.

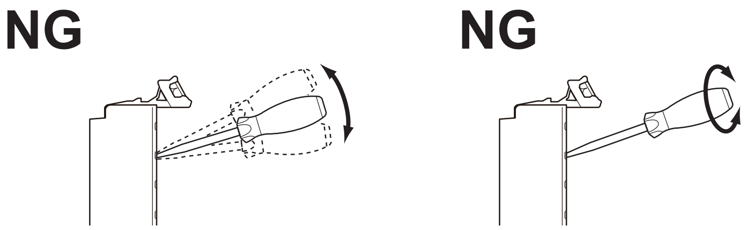


Precautions for Safe Use

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



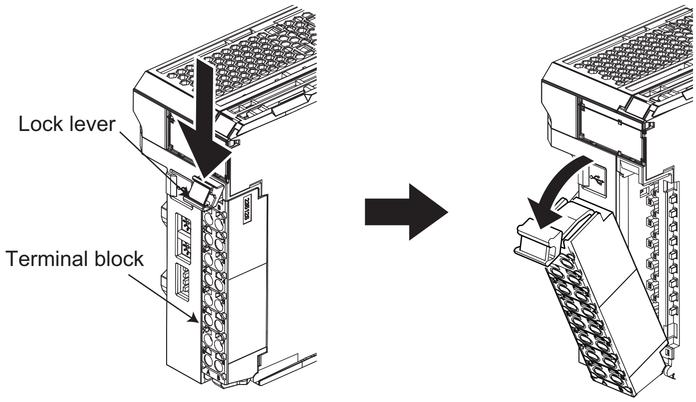
- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N max. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may break the terminal block.



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

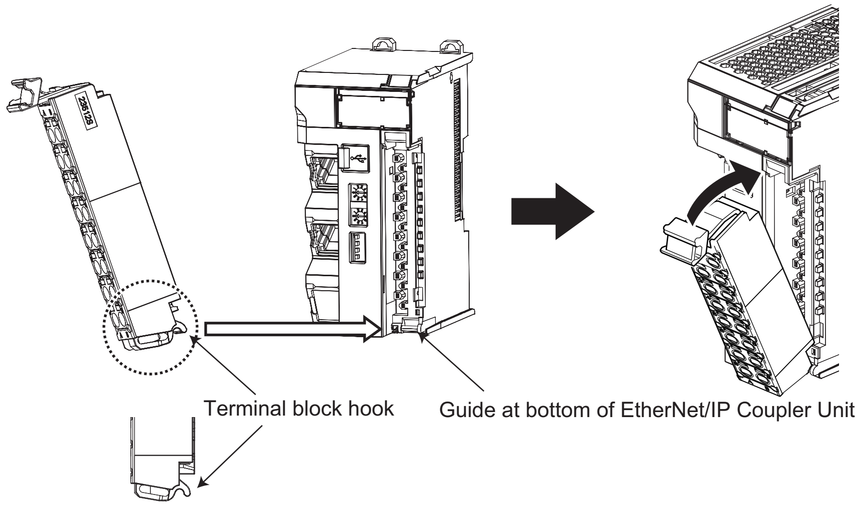
Removing a Terminal Block

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



Attaching a Terminal Block

1 Mount the terminal block hook on the guide at the bottom of the 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.



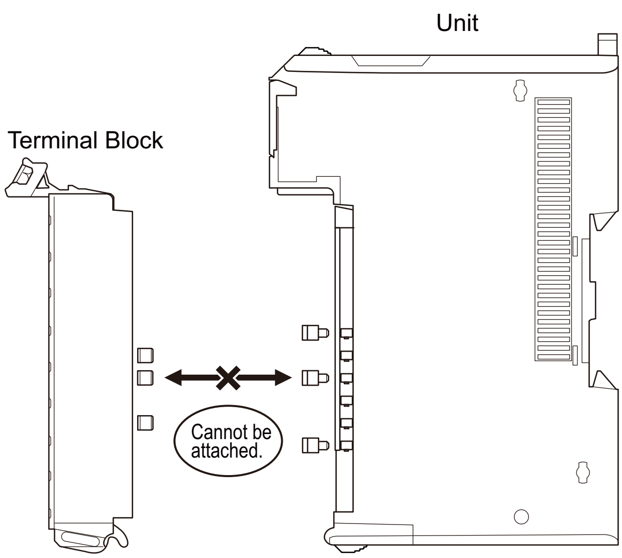
Mount a Terminal Block that is applicable to the model of the EtherNet/IP Coupler Unit.
Refer to *4-5 Terminal Blocks* on page 4-12 for the applicable Terminal Blocks.

Preventing Incorrect Attachment of Terminal Blocks

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

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

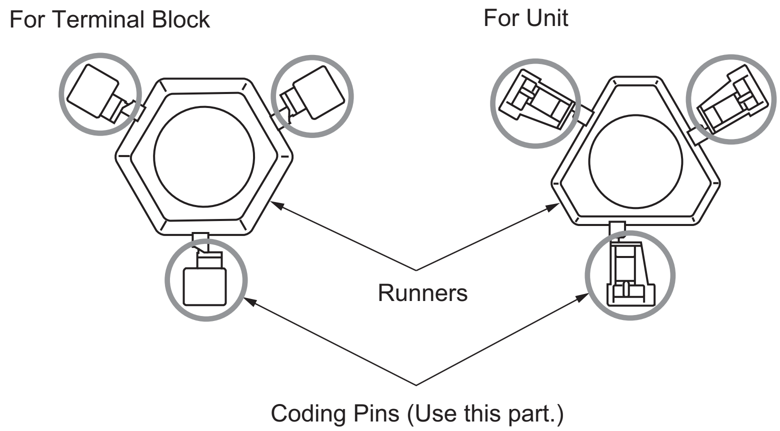
You can use these pins to create a combination in which the wrong terminal block cannot be attached because the pin patterns do not match.



● Types of Coding Pins

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

Three pins come with each runner.



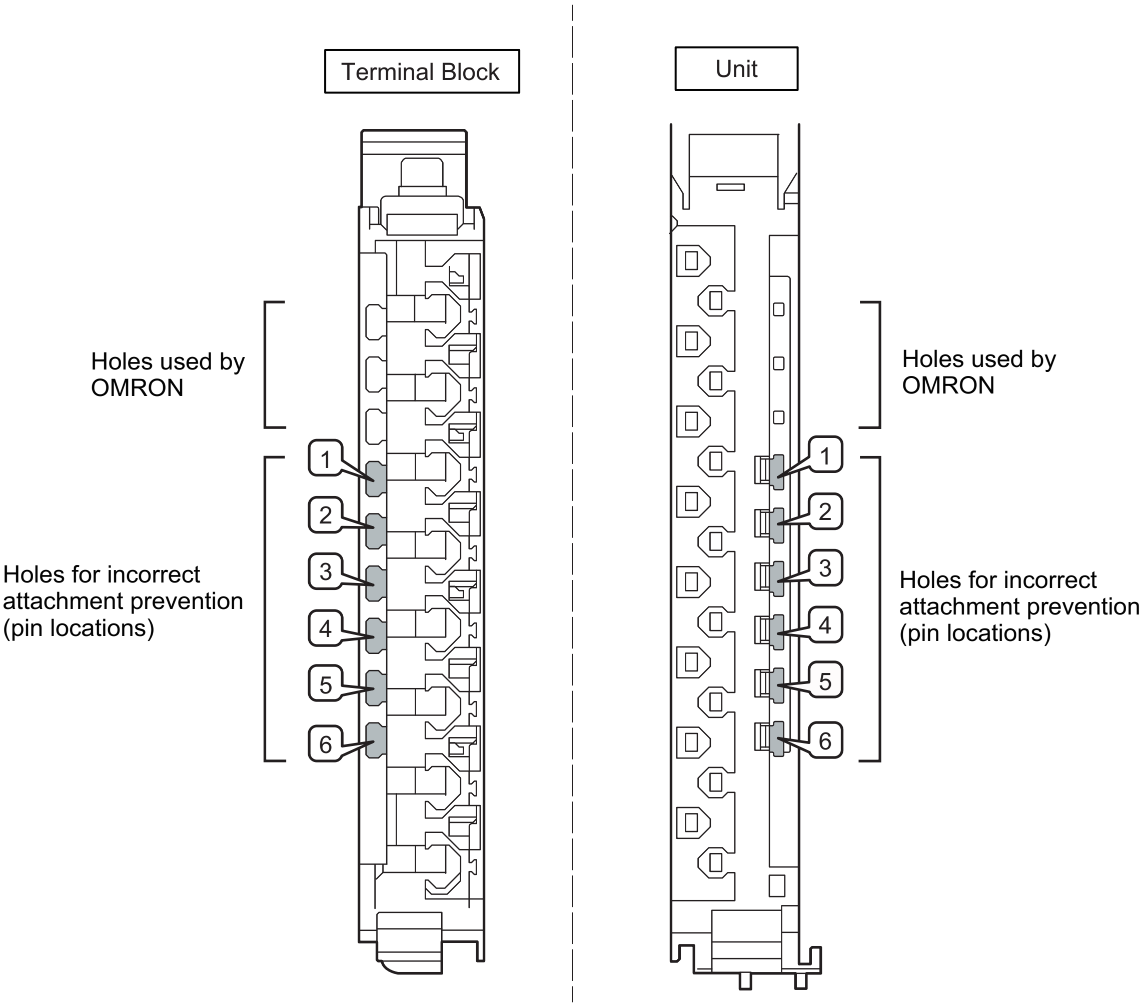
Use the following Coding Pins.

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

● Insertion Locations and Patterns of Coding Pins

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

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



○: Pin inserted

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

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

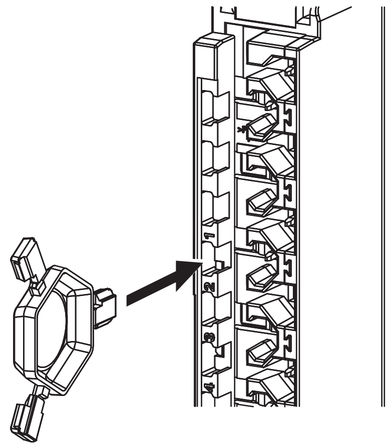
Precautions for Correct Use

- OMRON uses the holes other than No. 1 to 6 in the figure on the previous page. If you insert a Coding Pin into one of the holes used by OMRON on the terminal block side, 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.

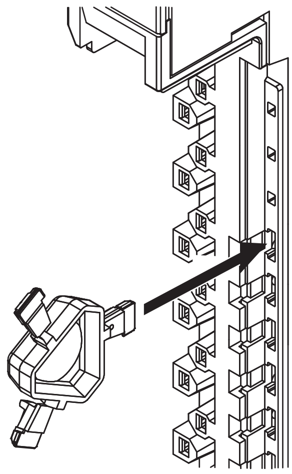
● Inserting the Coding Pins

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

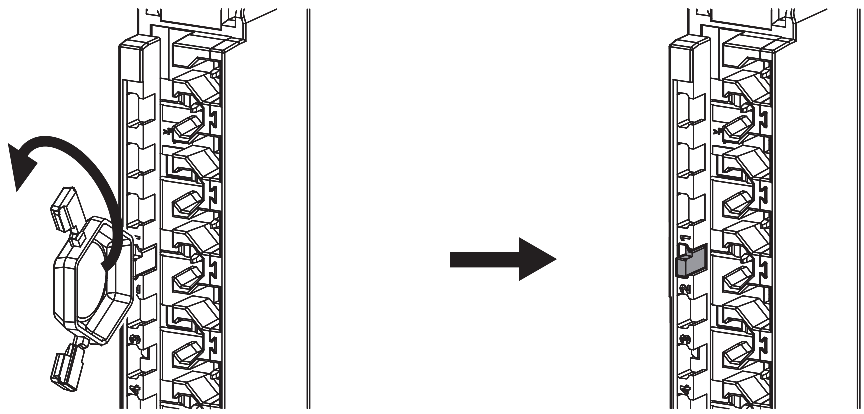


Unit

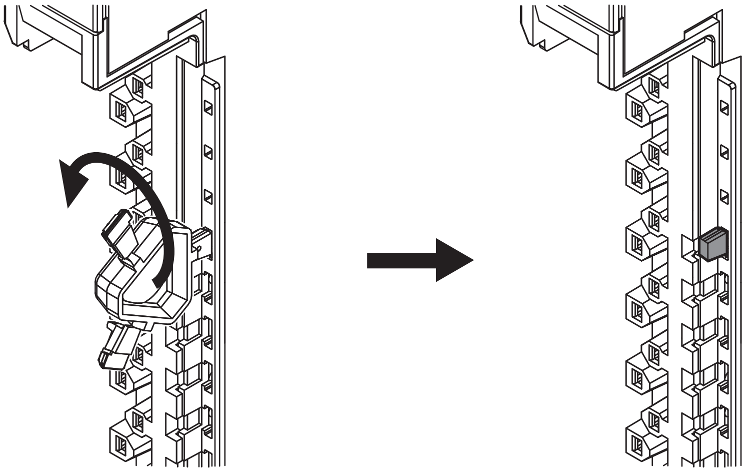


2 Rotate the runner to break off the Coding Pin.

Terminal Block



Unit

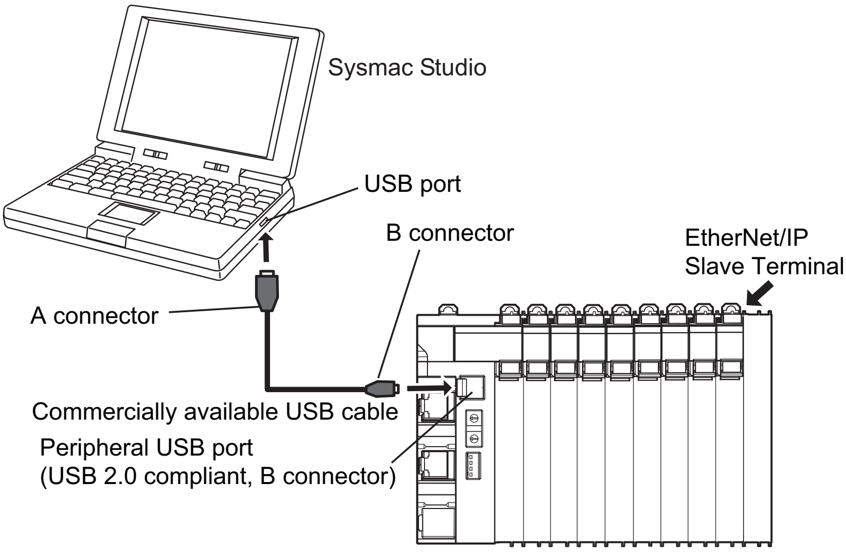


7-3 Connecting USB Cable

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

Connection Method

Use a commercially available USB cable to connect the computer in which the Sysmac Studio 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 Sysmac Studio 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 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 Sysmac Studio, 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.

Setting Up With the Sysmac Studio

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

Refer to *2-3-2 Connection Method and Procedures* on page 2-8 for the procedure to connect to the Sysmac Studio.

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 Sysmac Studio is online with the EtherNet/IP Coupler Unit. Always place the Sysmac Studio 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.

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8-1-2 Explicit Message Communications . . . 8-3

8-2 Tag Data Links . . . 8-4

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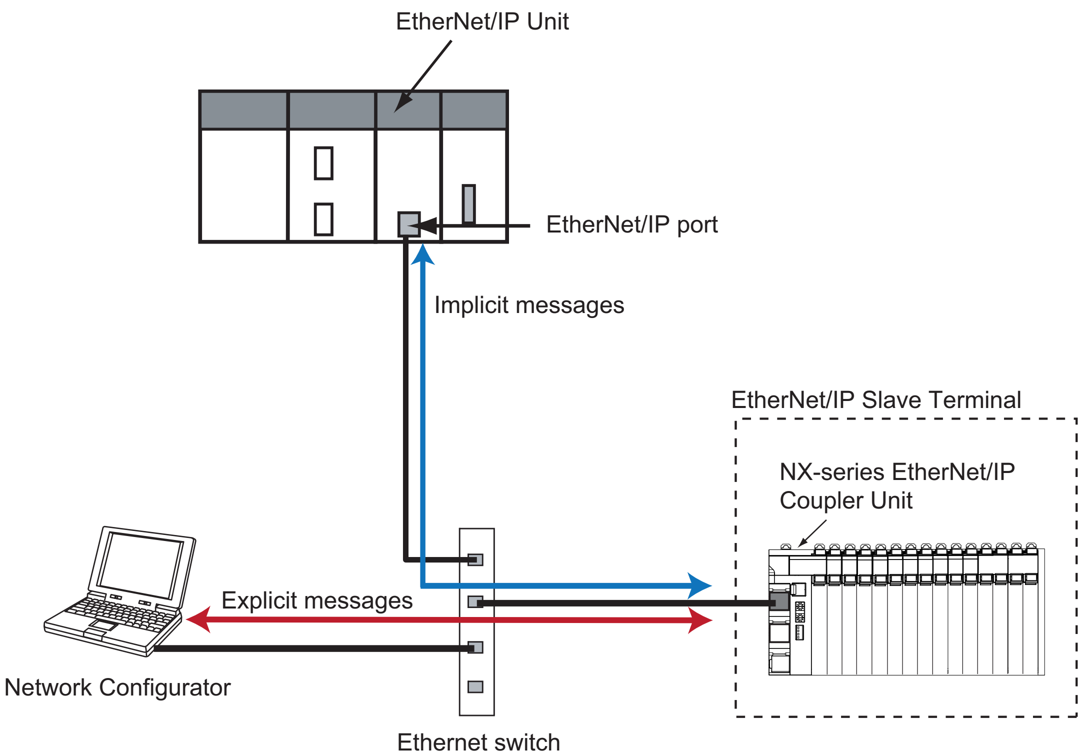
8-1 EtherNet/IP Functions

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



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

A bidirectional connection to an output device where the data is controlled by only one master device, such as an EtherNet/IP Unit.

- **Input Only Connection**

A connection to an input device where the data is received by the master device. With this type of connection, the master device produces only a heartbeat signal to the input device and no output data is present.

- **Listen Only Connection**

A connection that operates like an input only connection and can be attached to an existing exclusive owner or input only connection. 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 in an acyclic manner to access CIP objects from a device such as configuration tool.

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. Refer to *9-5 Setting Tag Data Links* on page 9-34 for information on how to make the settings.

Tag Sets

The output words and input words for each node for which data is exchanged are set in the connection information. These words 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.

PLC Symbols

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

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 9-67 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. Data exchange for the tags are exchanged in the order that the tags are registered in the tag sets. Register the tags in the same order in the input and output tag sets.

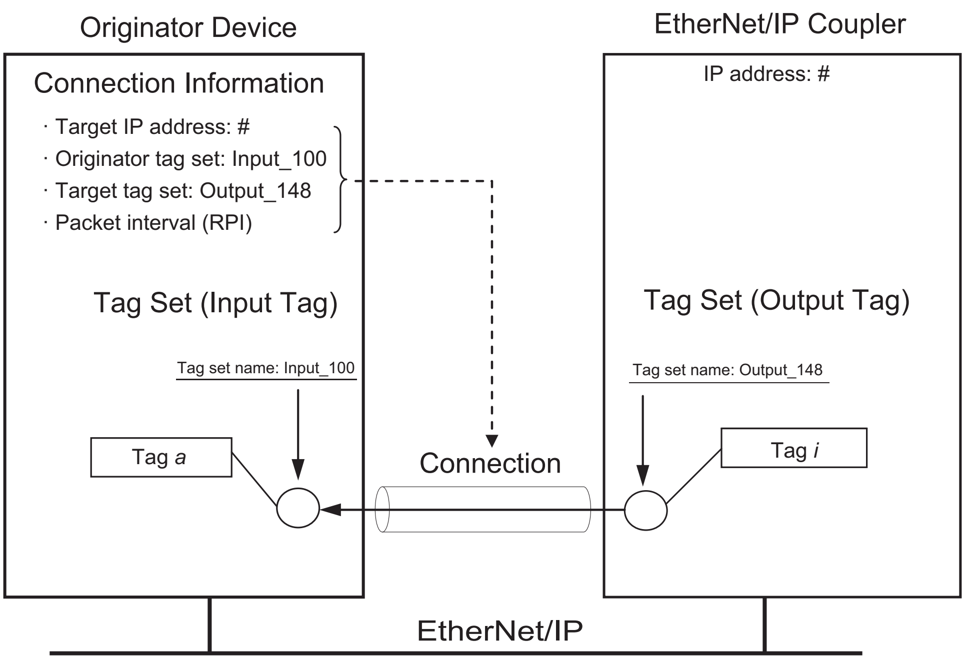
Note A connection is used to exchange data as a unit within which data concurrency is maintained. Thus, data concurrency is maintained for all the data exchanged for the tags in one data set.

Precautions for Correct Use

Data for the tags is exchanged in the order that the tags are registered in the tag sets. Register the tags in the same order in the input and output tag sets.

● **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 9-34 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 9-54 for packet interval setting specifications.

9

Setting Up Slave Terminals

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

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9-1 Settings and Setting Procedures

This section describes the settings that are required to access I/O data in EtherNet/IP Slave Terminals from a CJ EtherNet/IP Unit. This section also describes the setting procedures.

Additional Information

Refer to *A-2 UDP/IP and TCP/IP Message Service Interface* on page A-9 for information about TCP/IP communications and UDP/IP communications.

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

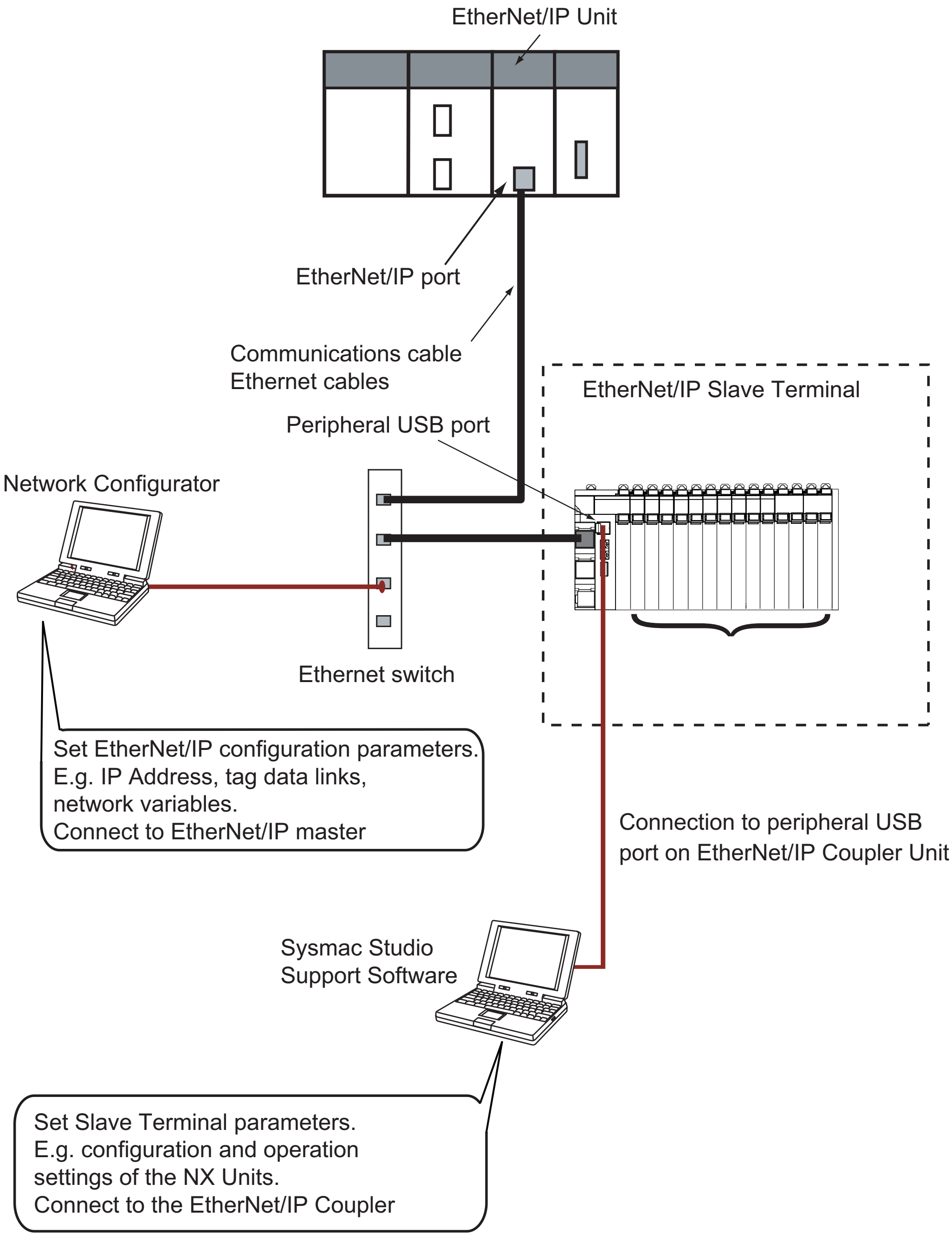
This data is set using Sysmac Studio software.

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 Sysmac Studio.

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.


EtherNet/IP Unit
EtherNet/IP port
Communications cable
Ethernet cables
Peripheral USB port
EtherNet/IP Slave Terminal
Network Configurator
Ethernet switch
Set EtherNet/IP configuration parameters.
E.g. IP Address, tag data links,
network variables.
Connect to EtherNet/IP master
Connection to peripheral USB
port on EtherNet/IP Coupler Unit
Sysmac Studio
Support Software
Set Slave Terminal parameters.
E.g. configuration and operation
settings of the NX Units.
Connect to the EtherNet/IP Coupler

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 9-7 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 Sysmac Studio Refer to *9-2 Setting Slave Terminal Parameters* on page 9-7.	(1) *Setting the NX Unit Configuration Information* on page 9-7 ↓ (2) *I/O Allocation Information* on page 9-12 ↓ (3) *Unit Operation Settings* on page 9-22 ↓ (4) *Unit Application Data* on page 9-23 ↓ (5) *Sysmac Studio Functions Used as Required* on page 9-24

↓

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 9-34	(1) *9-5-1 Starting the Network Configurator* on page 9-34 ↓ (2) *9-5-3 Registering Devices* on page 9-37 ↓ (3) *9-5-5 Creating Tags and Tag Sets* on page 9-41 ↓ (4) *9-5-6 Connection Settings* on page 9-54 ↓ (5) *9-5-8 Downloading Tag Data Link Parameters* on page 9-61

5 *9-6 Assigning Network Variables* on page 9-69

9-2 Setting Slave Terminal Parameters

This section describes how to set the Slave Terminal parameters with Sysmac Studio.

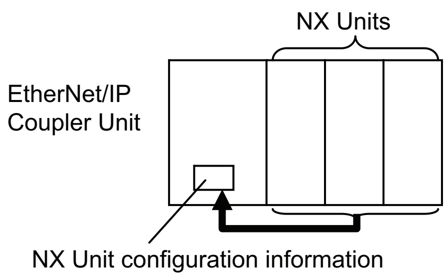
9-2-1 Items to Set

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. Use the EtherNet/IP Configuration Edit Tab Page to change this setting.	---	E *** (* is a serial number from 001). The default value is automatically generated based on the node address.

Setting	Settable	Description	Data range	Default
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
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] 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 left-most 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 11-4 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.
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.

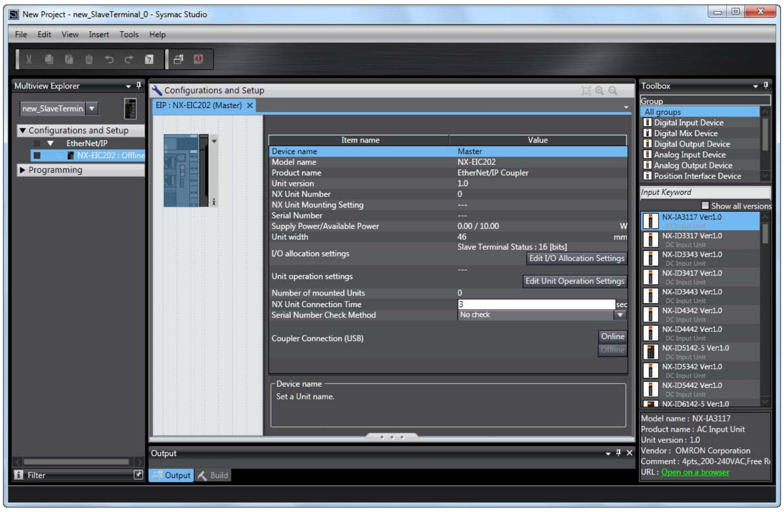
Setting the NX Unit Configuration Information

- **Creating the Unit Configuration Information with the Edit Slave Terminal Configuration Tab Page**

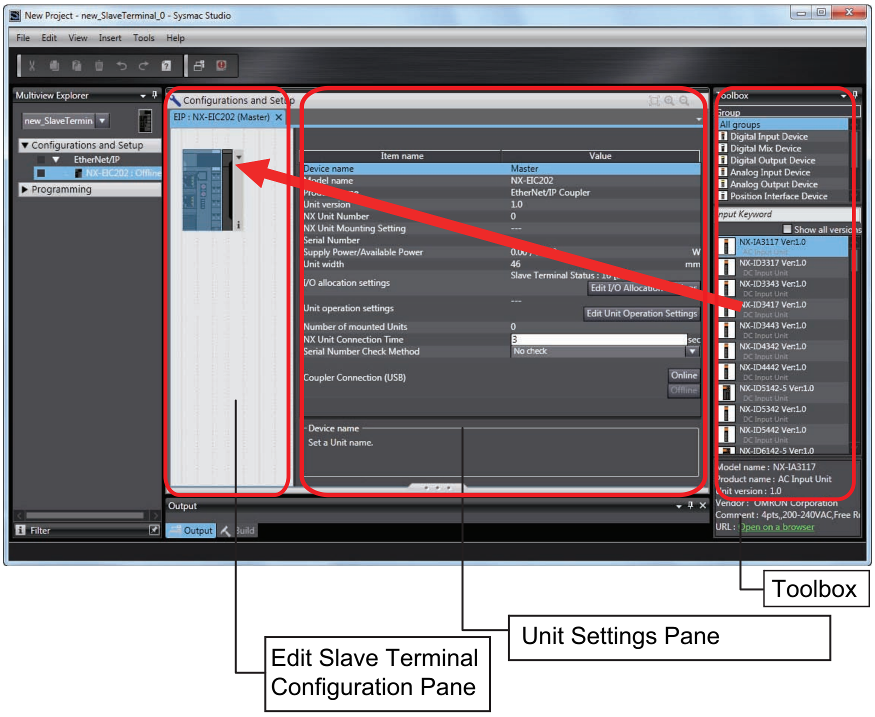
1 Create a new Sysmac Studio project.

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. • **Edit I/O Allocation Settings** button: Click this button to change the I/O allocation information. • **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.

When using the EtherNet/IP Slave Terminal without any stored Unit configuration information in combination with one or more NX Safety Units:

- NX Safety Units will go into operating mode, but the safety and standard I/O data of these Units will not be accessible via EtherNet/IP.
- 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 9-69 for more information.
- It is strongly recommended to add any NX Safety Units to the end of a configuration when using the EtherNet/IP Slave Terminal without any stored Unit configuration information. If this recommendation is not followed, the layout of EtherNet/IP Slave Terminal'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 Slave Terminal's I/O data blocks according to their physical location in the configuration.

● Creating Unit Configuration Information Based on the Actual Configuration

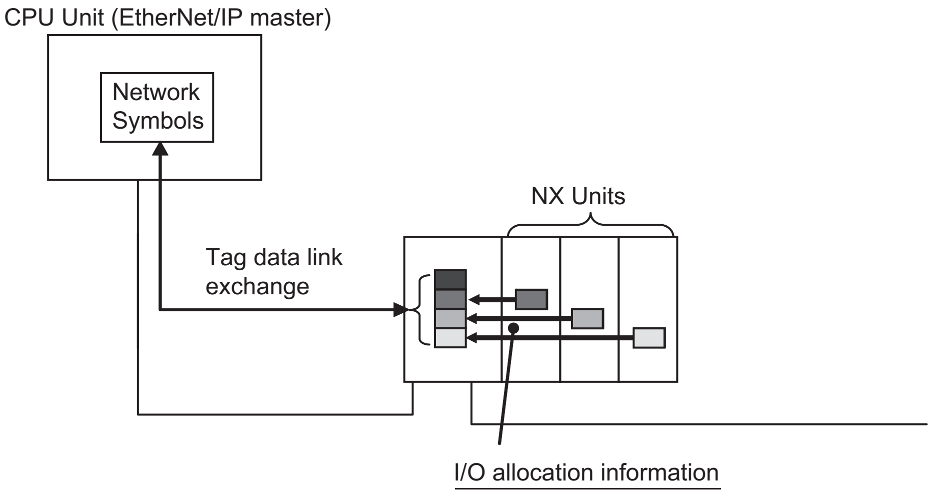
This method uses the physical Unit configuration for the Unit configuration information.

Connect the Sysmac Studio to the EtherNet/IP Coupler Unit through the USB port. 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 Sysmac Studio Functions Used as Required* on page 9-24 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

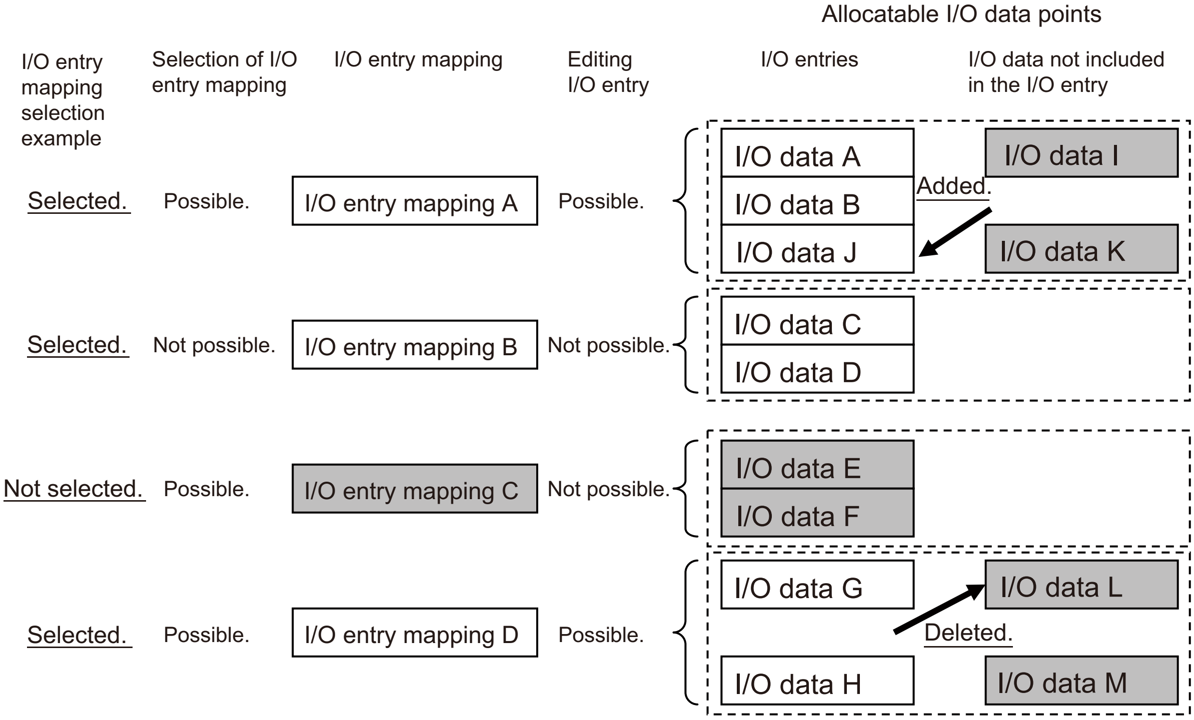
An I/O entry mapping defines a set of I/O data. Each Unit has its own I/O entry mapping.

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 per-

formance. 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	Regis-tered by default	NX object	
						Index number	Subin-dex 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 NX Unit Registration Status 31 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. 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. Each bit has the following meaning. TRUE: Registered FALSE: Not registered If the Unit configuration information is registered, the status is TRUE for each Unit that is registered. 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. The status is TRUE for NX Units that are set as unmounted Units. Each bit is updated at the following times. • If the Unit Configuration Information Is Registered: The status changes to TRUE when the system is started. The status changes to FALSE when the configuration information is cleared. • If the Unit Configuration Information Is Automatically Created: The status changes to TRUE when the configuration information is confirmed. 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 NX Unit Message Enabled Status 31 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. 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. Each bit has the following meaning. TRUE: Message communications possible. FALSE: Message communications not possible. The status says that message communications are enabled for NX Units that meet the following conditions. • The comparison shows no differences (only if the Unit configuration information is registered). • The NX Unit does not have a WDT error. The status is FALSE for NX Units that are set as unmounted Units. 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 NX Unit I/O Data Active Status 31 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. 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. Each bit has the following meaning. TRUE: The I/O data in the NX Unit can be used for control. FALSE: The I/O data in the NX Unit cannot be used for control. The status is FALSE for NX Units that are set as unmounted Units. 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 NX Unit Error Status 31 NX Unit Error Status 63	This status tells whether an error exists on the NX Units. 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. 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. Each bit has the following meaning. TRUE: Error FALSE: No error 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. Each bit is set to TRUE when the level of the error is as follows: • Minor fault • Observation The status is FALSE for NX Units that are set as unmounted Units. Each bit is updated at the following times. The status changes to TRUE when an error occurs. 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 • ON: Observation status for one or more of the NX Units • OFF: No observation status
5	Minor Fault • ON: Minor fault status for one or more of the NX Units • OFF: No minor fault
6	Partial Fault • ON: Partial fault status for one or more of the NX Units • OFF: No partial fault
7	Major Fault • ON: Major fault status for one or more of the NX Units • OFF: No major fault
8	Reserved
9	
10	
11	
12	
13	
14	Error Detection Flag • ON: Any of the bits 0 to 13 ON • OFF: None of the bits 0 to 13 ON
15	I/O Refresh Flag • ON: Normal I/O communications for all NX Units • OFF: I/O communications stopped in one or more NX Units

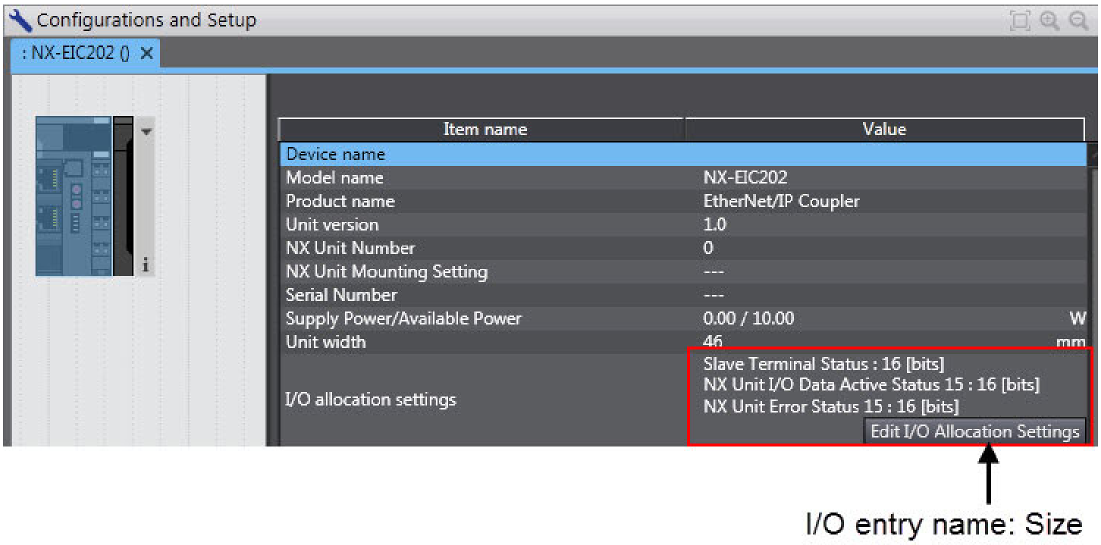
Additional Information

Refer to *12-3-4 Event Codes for Errors and Troubleshooting Procedures* on page 12-20 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

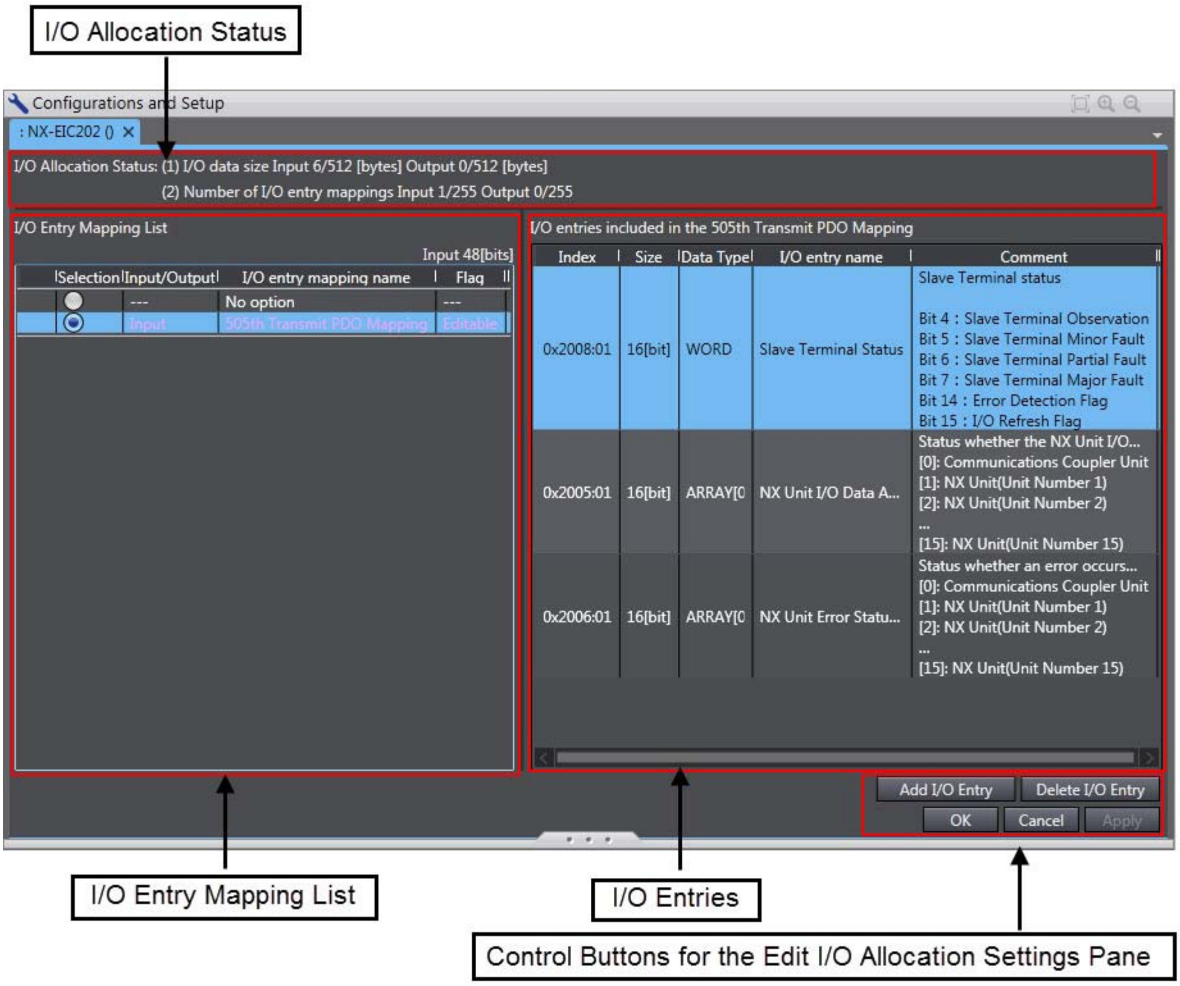
A detailed display of I/O Allocation can be found by right-clicking the EtherNet/IP Coupler Unit and selecting ***Display I/O Allocation*** from the menu. Refer to *9-6-2 I/O Allocation Features of Sysmac Studio* on page 9-71 for more details.

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. (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. 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. (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.

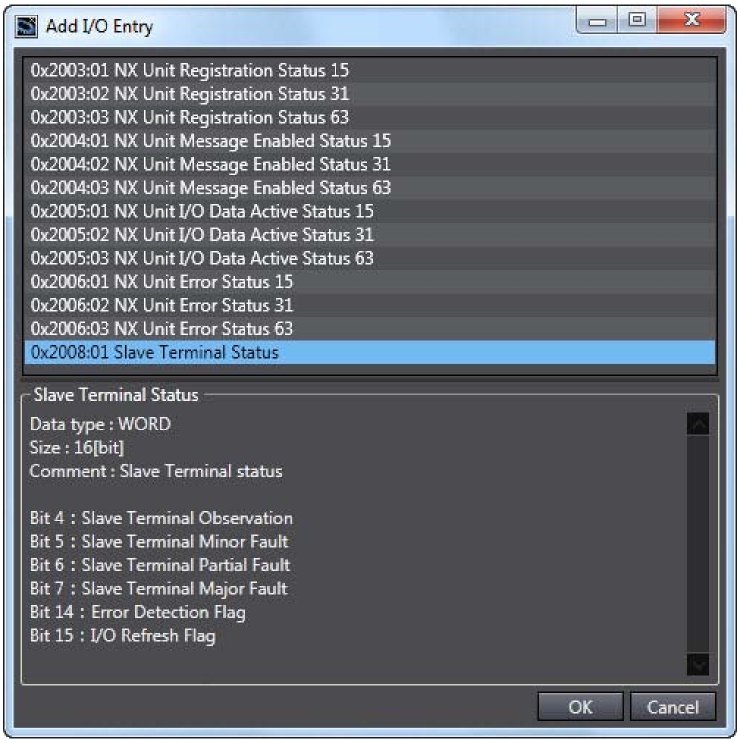
<table>
<tr><th>Name/Label</th><th colspan="2">Description</th></tr>
<tr><td>I/O Entry Mapping List</td><td colspan="2">This is a mapping list of the I/O entries in the corresponding Unit.
The I/O entry mapping list shows up to four inputs and outputs respectively.
The I/O entry mapping list shows the following items.
• Selection: This column is used to select the I/O entry mappings that you wish to allocate.
Select the I/O entry mapping that you wish to allocate.
If you do not want to allocate the I/O entry mapping as part of the I/O allocation information, select No option.
• Input/Output: This column shows whether the data is an input or an output in terms of the CPU Unit.
• I/O entry mapping name: This column gives the name of the I/O entry mapping.
• Flag: If the I/O entry is editable, this column indicates “Editable.”
If the I/O entry is not editable, this column indicates “---.”</td></tr>
<tr><td>I/O entries</td><td colspan="2">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.
Each I/O entry contains the following information.
• Index: This is the index number for the NX object.
The index is displayed after “0x” as index_number:subindex_number.
• Size: This column gives the size of the I/O entry data.
• Data Type: This column gives the data type of the I/O entry.
• I/O entry name: This column gives the name of the I/O entry.
• Comment: This column gives a description of the I/O entry.</td></tr>
<tr><td rowspan="5">Control buttons for the Edit I/O Allocation Settings Pane</td><td>Add I/O Entry button:</td><td>This button adds an I/O entry to the selected I/O entry mapping.</td></tr>
<tr><td>Delete I/O Entry button:</td><td>This button deletes the selected I/O entry from the selected I/O entry mapping.</td></tr>
<tr><td>OK button:</td><td>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.</td></tr>
<tr><td>Cancel button:</td><td>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.</td></tr>
<tr><td>Apply button:</td><td>This button confirms the settings in the Edit I/O Allocation Settings Pane, and allows you to edit other I/O entries.</td></tr>
</table>

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.

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. Select *Fail-soft operation* to perform fail-soft operation. Refer to *11-7 Fail-soft Operation* on page 11-26 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.

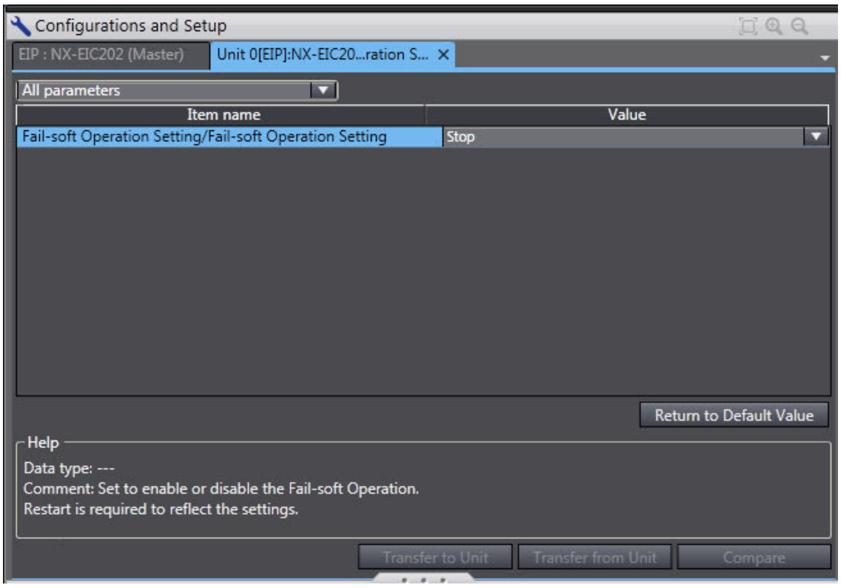
Refer to the manual for the specific NX Unit for the settings and their meanings.

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 Sysmac Studio Functions Used as Required

You can use the following functions on the Sysmac Studio.

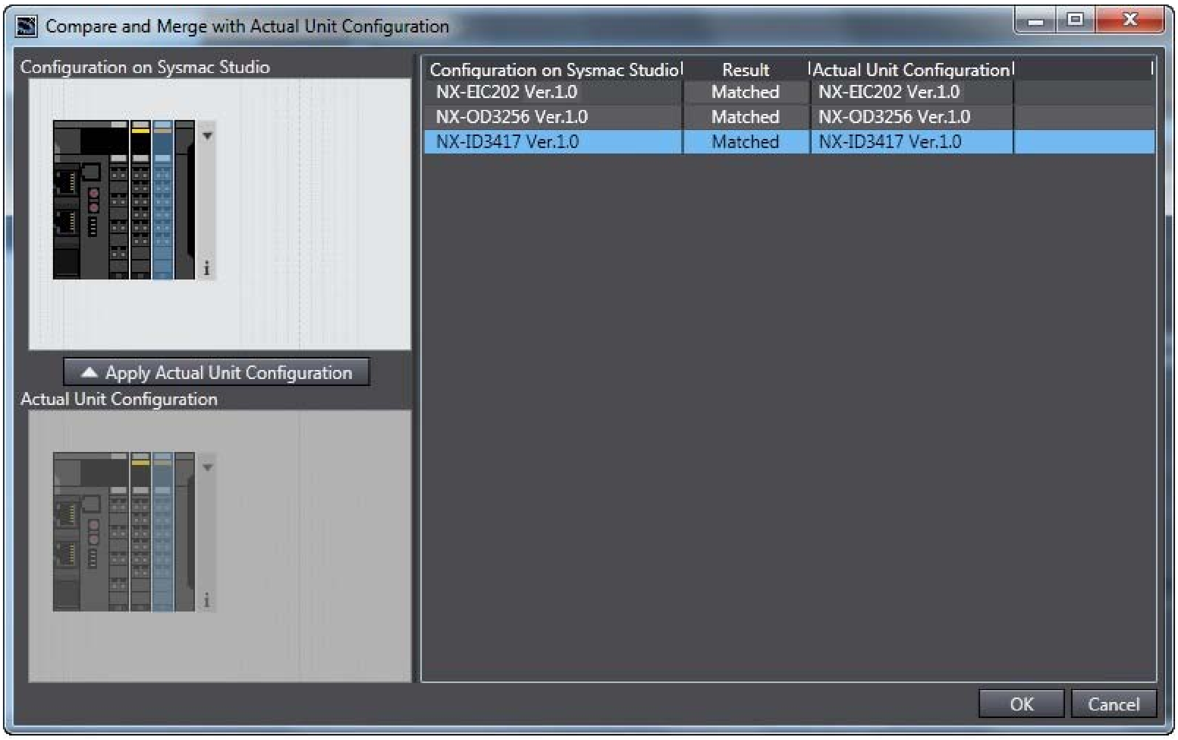
- Getting NX Unit serial numbers
- Comparing and merging with actual Unit configuration of the Slave Terminal
- Exporting/importing NX Unit settings
- Uploading Slave Terminal settings through the USB port on the EtherNet/IP Coupler Unit
- Adding additional Slave Terminals

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 Sysmac Studio. 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 Sysmac Studio 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

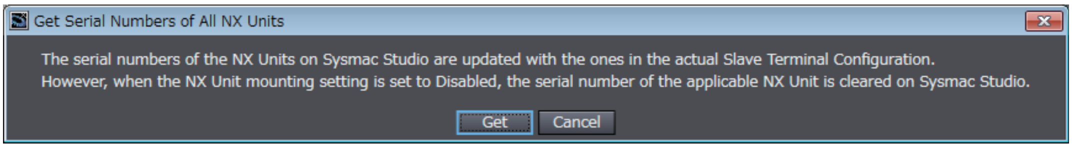
You can read only the Unit configuration in the Slave Terminal by comparing and merging with the actual Unit configuration. You cannot read the I/O allocation information, Unit operation settings, and Unit application data.

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 Sysmac Studio. Refer to *9-2-2 Setting the NX Unit Configuration Information* on page 9-7 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 Sysmac Studio.

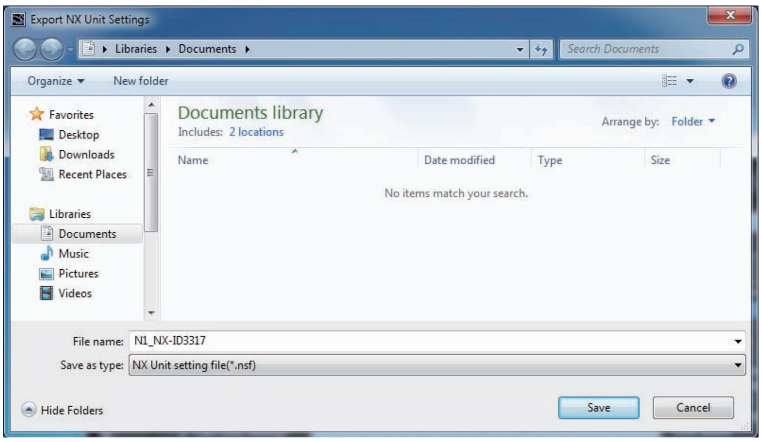
Exporting/Importing NX Unit Settings

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 Sysmac Studio.

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

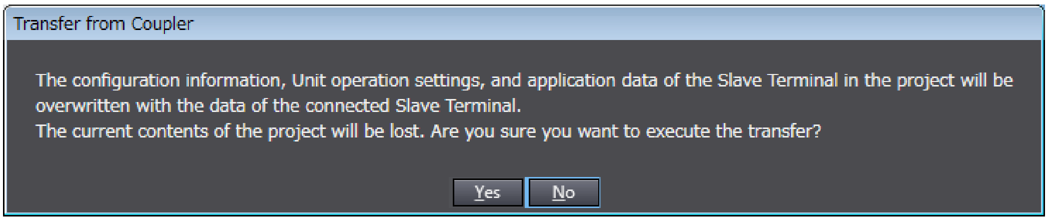
You can connect the Sysmac Studio to the USB port on the EtherNet/IP Coupler Unit and transfer the settings information to the Sysmac Studio from the Slave Terminal.

Use the following procedure to upload the settings.

1 Connect the Sysmac Studio 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.

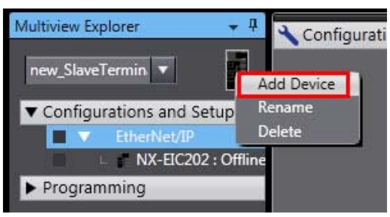
The configuration information, Unit operation settings, and Unit application data of the Slave Terminal setting information are transferred.

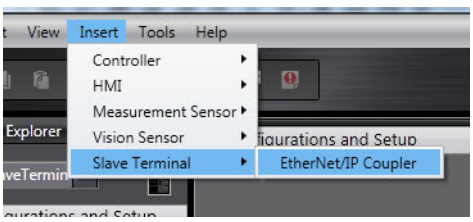
Adding Additional Slave Terminals

A Sysmac Studio project can include multiple Slave Terminal device configurations.

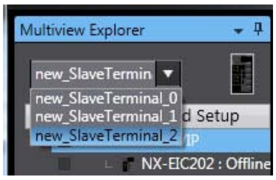
Use the following procedure to add additional Slave Terminal configurations to a project when necessary.

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.



9-3 Transferring and Comparing Settings

This section describes how to transfer and compare Slave Terminal settings that you set on the Sysmac Studio.

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 Sysmac Studio or other Support Software.
The devices or machines may operate unexpectedly, regardless of the operating mode of the Controller.

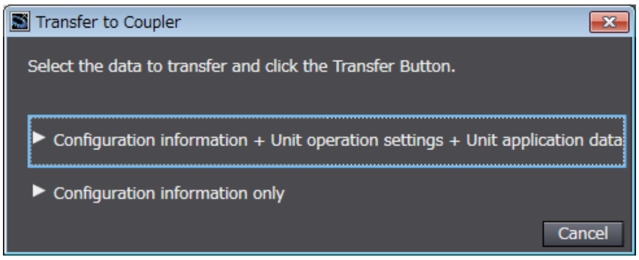
You can connect the Sysmac Studio to the USB port on the EtherNet/IP Coupler Unit to transfer the Slave Terminal settings information to the Slave Terminal.

Use the following procedure to transfer the settings.

1 Connect the Sysmac Studio 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***.

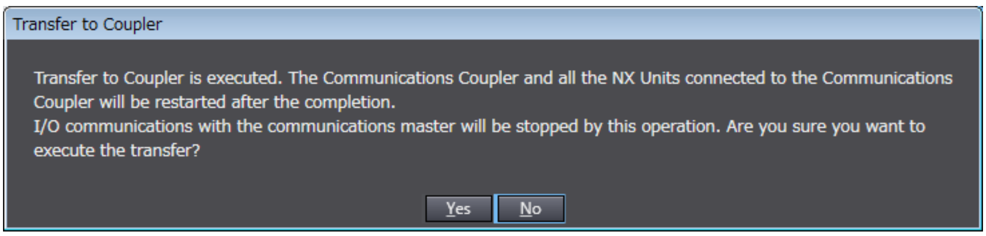
The Transfer to Coupler Dialog Box is displayed.



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 Sysmac Studio 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.
- The Slave Terminal setting information must be the same between the EtherNet/IP master and the EtherNet/IP Slave Terminal. When you transfer the Slave Terminal setting information, always use the synchronization function from the Sysmac Studio that is connected to the CPU Unit.

9-3-2 Comparing Settings

To compare the Slave Terminal settings, connect the Sysmac Studio to the USB port of the EtherNet/IP Coupler Unit to compare. Use the following procedure.

Refer to *9-2-6 Sysmac Studio Functions Used as Required* on page 9-24 to compare the Unit configuration.

1 Connect the Sysmac Studio 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.

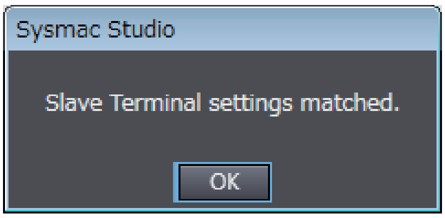
3 Click the **OK** button.

The Sysmac Studio goes online with the Slave Terminal.

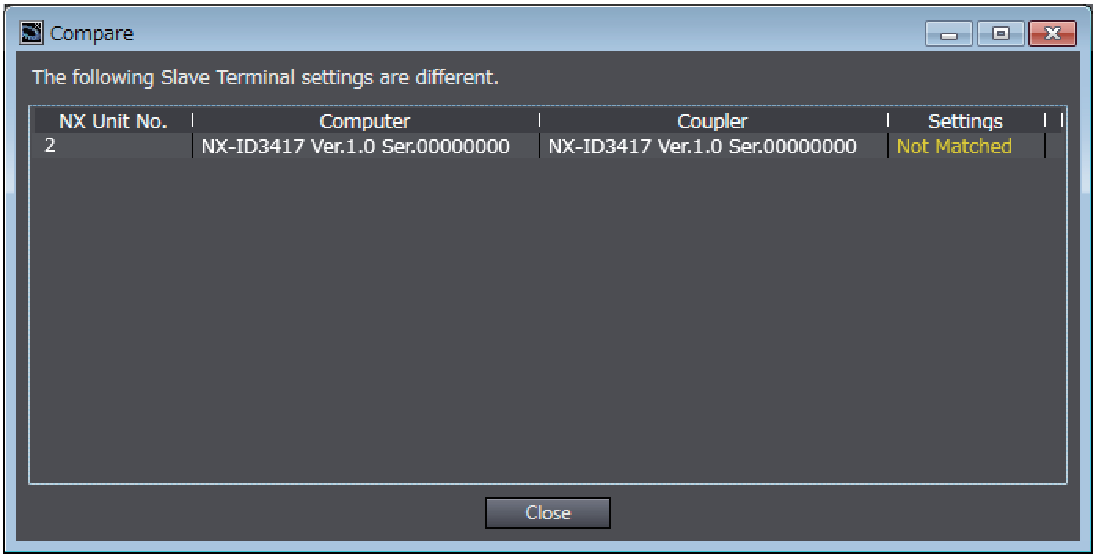
4 Right-click the target EtherNet/IP Coupler Unit and select ***Coupler Connection (USB) − Compare*** from the pop-up menu.

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 two methods to set the IP address of the Slave Terminal.

(1) Hardware Switch Settings
Refer to *9-4-1 Setting the IP Address using Hardware Switch Settings* on page 9-31 for more information.

(2) Settings from Network Configurator
Refer to *9-4-2 Setting the IP Address with the Network Configurator* on page 9-31 for more information.

9-4-1 Setting the IP Address using Hardware Switch Settings

If both rotary switches are not set to 0x0 then the IP Address is set by the combination of the two Rotary switches and DIP switch pin 4.

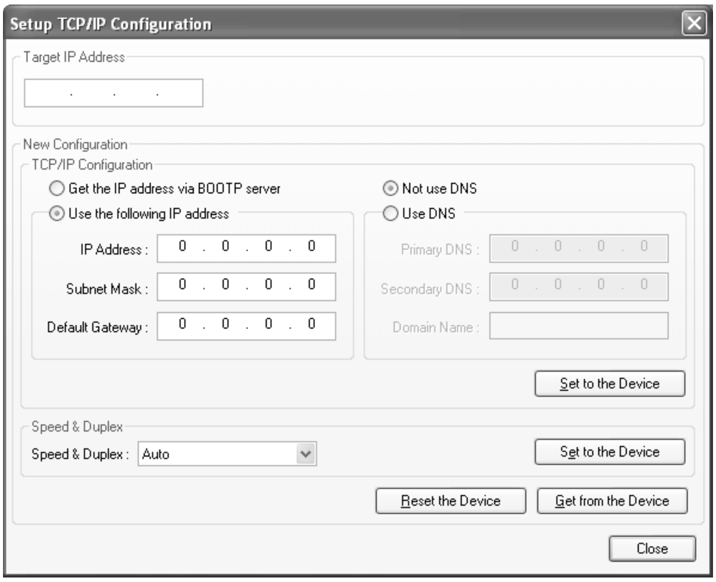
1. Set DIP switch pin 4 to select range 192.168.1.□ (ON) or range 192.168.250.□ (OFF).
2. Set the last part of the IP Address with the combination of both rotary switches to a number in the range from 1 to 254.
3. Power the EtherNet/IP Coupler Unit OFF and back ON.

Refer to section *4-3 Hardware Switch Settings* on page 4-8 for more information.

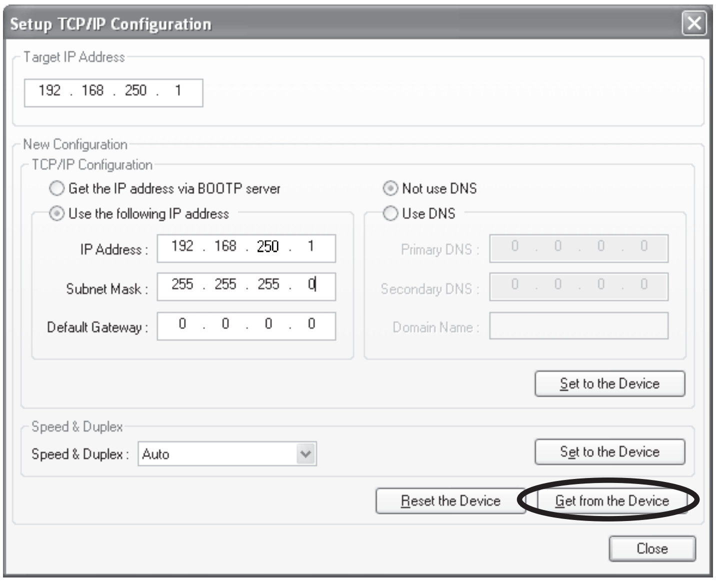
9-4-2 Setting the IP Address with the Network Configurator

Use the Network Configurator to change IP address settings for the EtherNet/IP Coupler Unit.

1. Set both rotary switches to 0x0 and power on the EtherNet/IP Coupler Unit. The EtherNet/IP Unit will have the default IP address 192.168.250.1 (DIP switch 4 is OFF) or 192.168.1.1 (DIP switch 4 is ON).
   Refer to *4-3 Hardware Switch Settings* on page 4-8 for more information.
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 IP address to set 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.

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.

● 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

9-5 Setting Tag Data Links

9-5-1 Starting the Network Configurator

Procedure

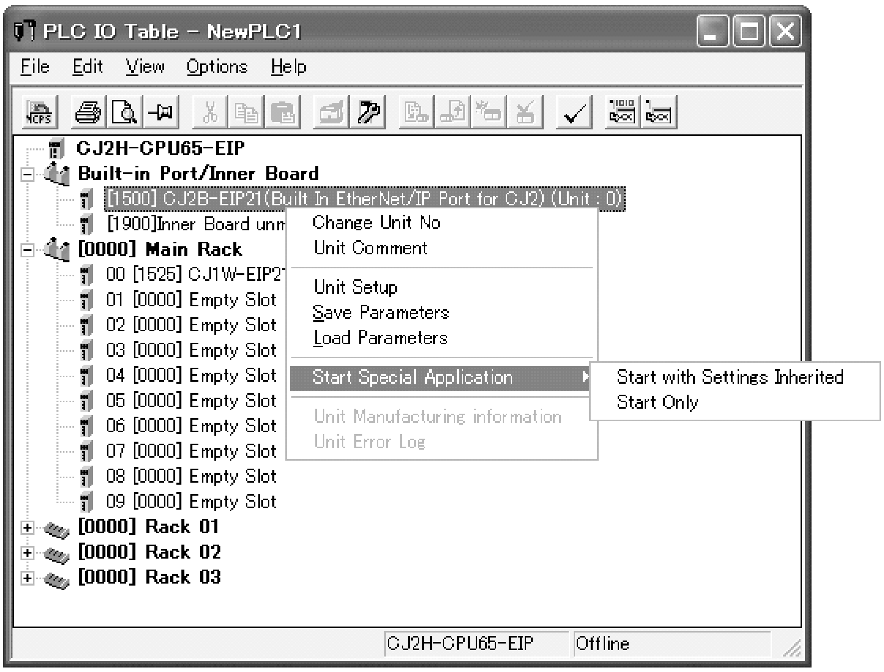
Tag data links are set by using the Network Configurator. Use the following procedure to start the Network Configurator.

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.

● Starting from the I/O Table Dialog Box in CX-Programmer

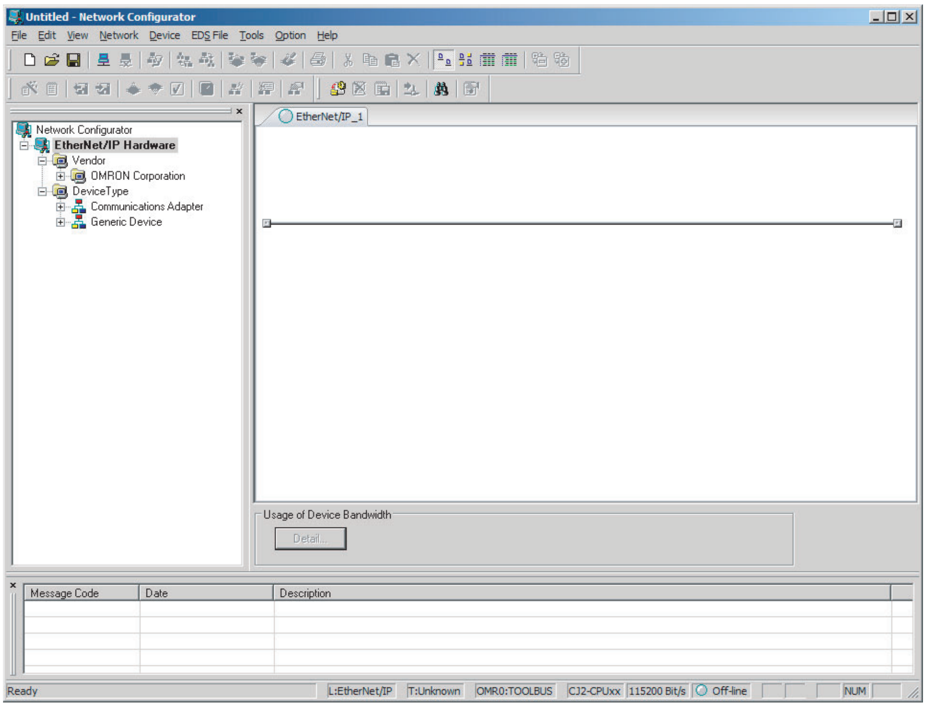
To start the Network Configurator, select the Unit in the PLC I/O Table Dialog Box and select either of the options for ***Start Special Application*** from the pop-up menu. Only operation will be started even if *Start with Settings Inherited* is selected.



- **Starting from the Windows Start Menu**

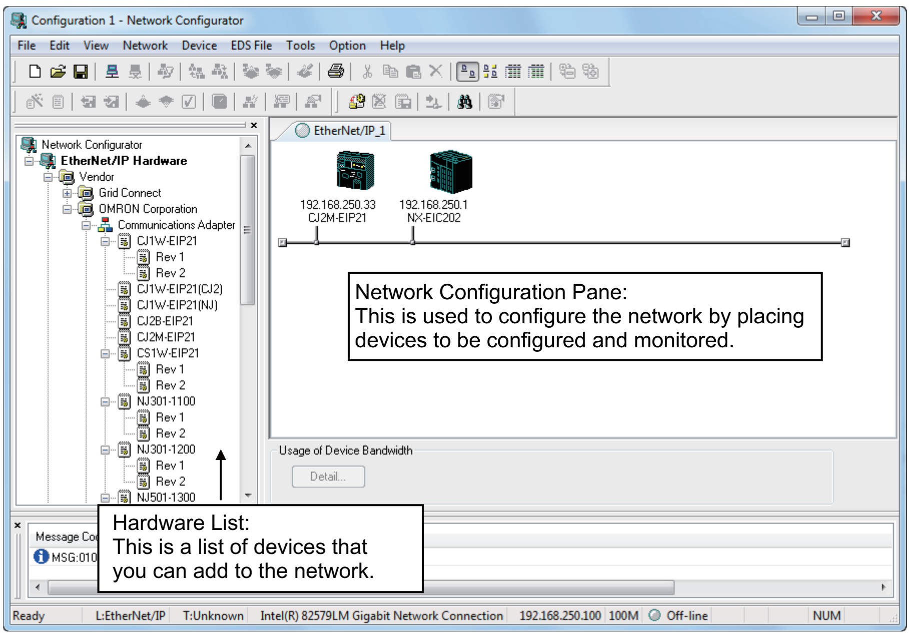
To start the Network Configurator, select ***OMRON - CX-One - Network Configurator for EtherNetIP - Network Configurator*** from the Windows Start Menu.

When the Network Configurator starts, the following window is displayed.

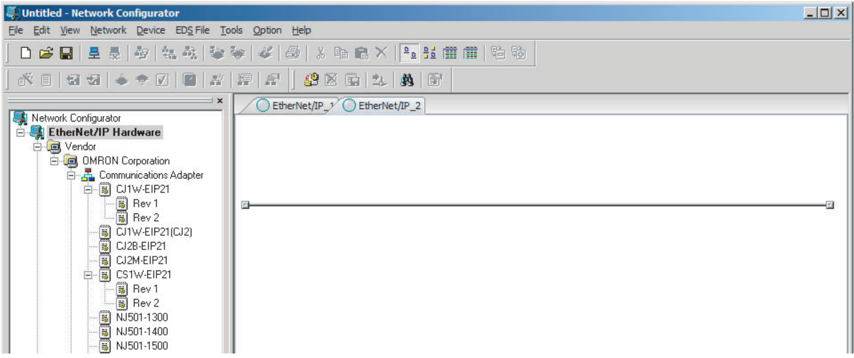


Main Window

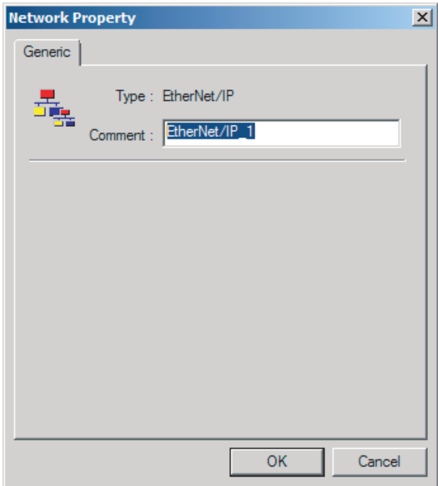
The Main Window consists of a Hardware List and a Network Configuration Pane, as shown in the following diagram.



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 9-37 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:

1) Create tags and tag sets for all registered devices. Refer to *9-5-5 Creating Tags and Tag Sets* on page 9-41 for more information.

2) 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 9-54.

(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 12-8).

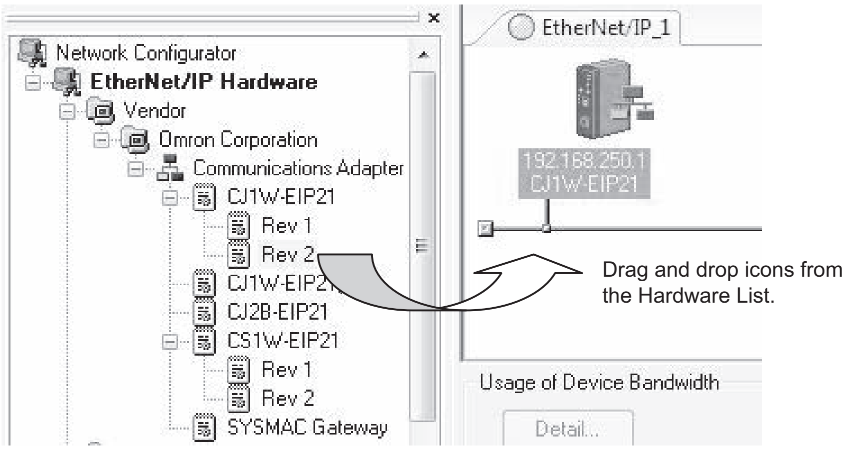
5 Make sure that the output tag data is updated in the input tag by using the CX-Programmer's Watch Window or PLC memory function.

9-5-3 Registering Devices

Register all of the devices required in the equipment (such as EtherNet/IP Units performing 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.



Hardware List

The device names and major CIP revisions (Rev ☐) are displayed in the hardware list. This is shown in the following table.

Name in hardware list	CIP version	EtherNet/IP Unit
CJ2B-EIP21	Rev. 2	Built-in EtherNet/IP port on CJ2H CPU Unit (CJ2H-CPU☐☐-EIP)
CJ2M-EIP21	Rev. 2	Built-in EtherNet/IP port on CJ2M CPU Unit (CJ2M-CPU3☐)
CJ1W-EIP21	Rev. 1 or 2	CJ1W-EIP21 EtherNet/IP Unit connected to CJ1 CPU Unit

Name in hardware list	CIP version	EtherNet/IP Unit
CJ1W-EIP21 (CJ2)	Rev. 2	CJ1W-EIP21 EtherNet/IP Unit connected to CJ2 CPU Unit

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.

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.

3. If the revision is unknown, select the newest revision (i.e., the revision with the highest number). The following table shows the relation between the CIP revision and the unit version.

CJ1W-EIP21, and CJ2H-CPU☐☐-EIP

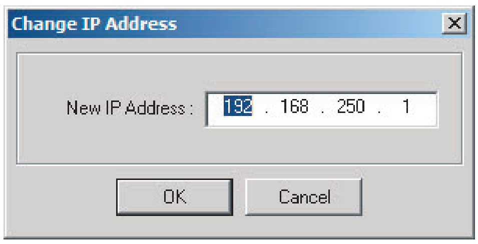
Unit version	CIP revision
Ver. 1.0	Revision 1.01
Ver. 2.0	Revision 2.01 or 2.02

CJ2M-CPU3☐

Unit version	CIP revision
Ver. 2.0	Revision 2.01
Ver. 2.1	Revision 2.02

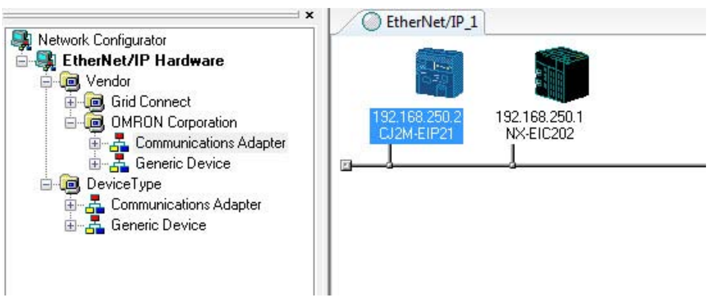
4. When mounting the CJ1W-EIP21 to a CJ2 CPU Unit, select CJ1W-EIP21 (CJ2) from the Hardware List.

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.

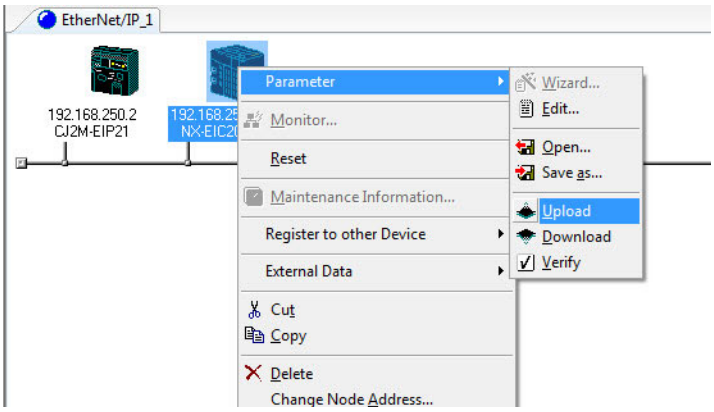
(2) Use the Sysmac Studio to examine the I/O allocation.

Use the Network Configurator to Upload the Slave Terminal Parameter

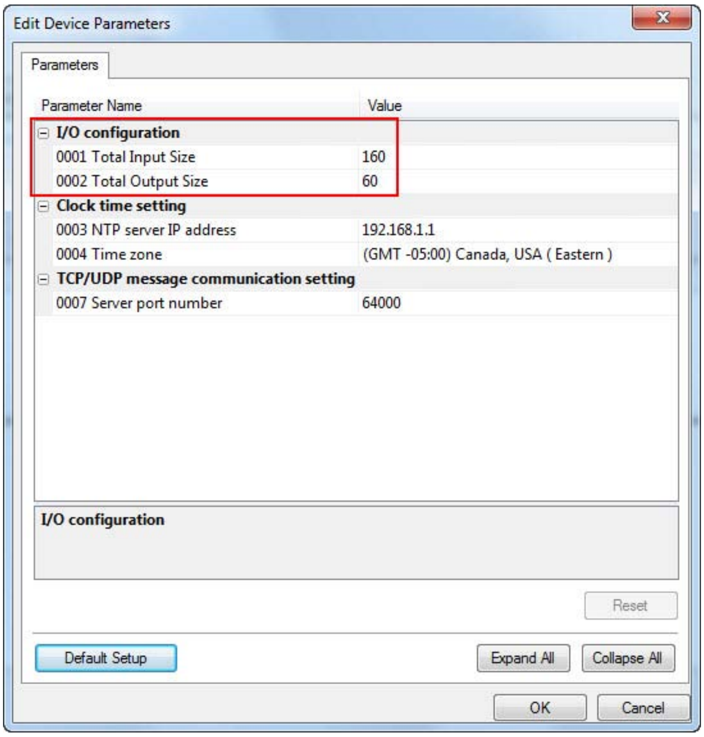
Use the following steps to view the input and output tag sizes that are configured in the EtherNet/IP Coupler Unit.

1 Connect the Network Configurator to the network.

2 Right-click the EtherNet/IP network and click **Upload**.



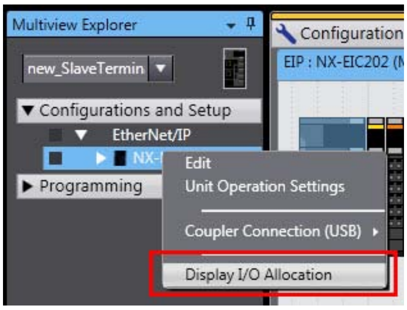
3 Confirm the upload success and check the updated sizes. Right-click the EtherNet/IP Coupler Unit, select ***Parameter*** - ***Edit***. The Edit Device Parameters Dialog Box should appear and indicate the Input and Output sizes.



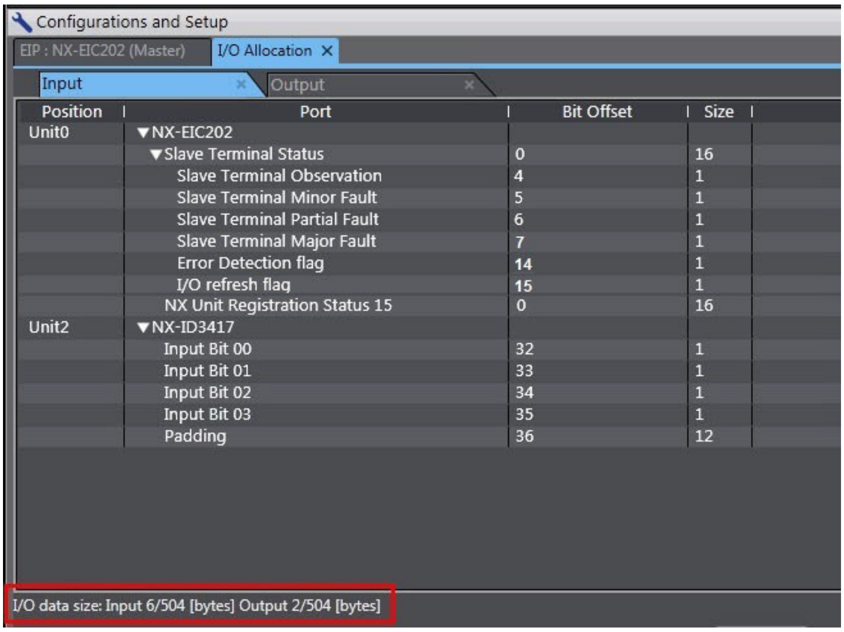
Use the Sysmac Studio to Examine the I/O Allocation Status

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.



Additional Information

Refer to *9-6-2 I/O Allocation Features of Sysmac Studio* on page 9-71 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

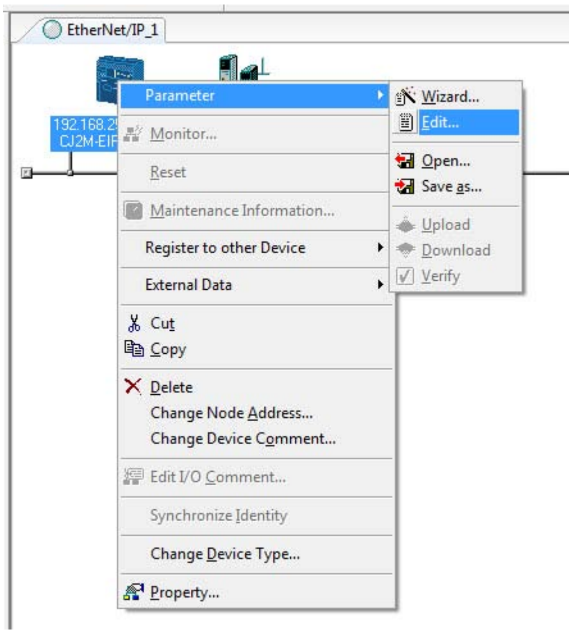
1) Creating Tags and Tag Sets with the Network Configurator’s Device Parameter Editing Function

Precautions for Correct Use

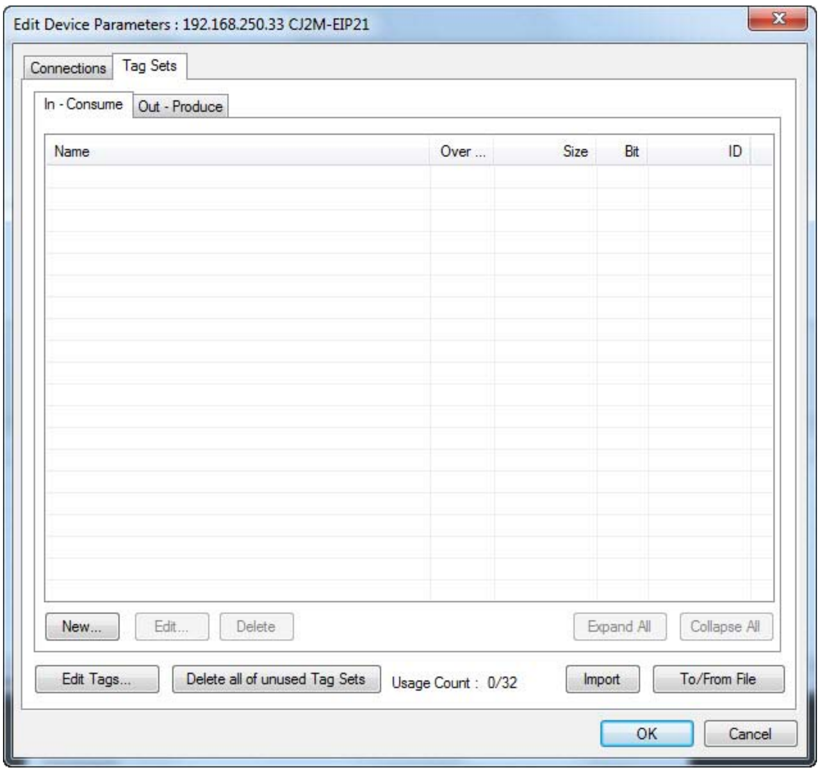
The network variables described in this section can be used only if you are using a CJ2H-CPU6☐-EIP21 or CJ2M-CPU3☐ CPU Unit.

● 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).



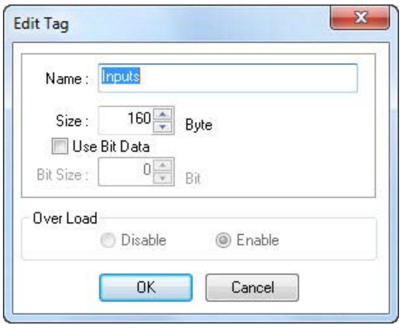
● Creating and Adding Tags

3 Click the **Edit Tags** button.

The Edit Tags Dialog Box is displayed.

Register the input (consume) tags and output (produce) tags separately.

4 Click the **In - Consume** Tab, and then click the **New** button. The Edit Tag Dialog Box is displayed.



5 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.

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.

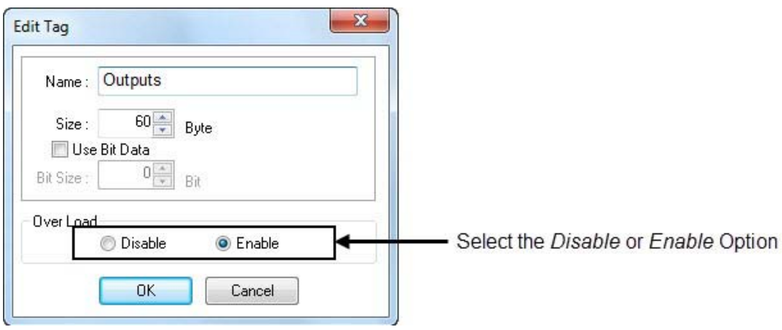
6 Input the size of the tag in the *Size* Field, in bytes. The input size should match the actual size (refer to section *9-5-4 Determine Tag Sizes* on page 9-39 for more information).

7 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.

8 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.

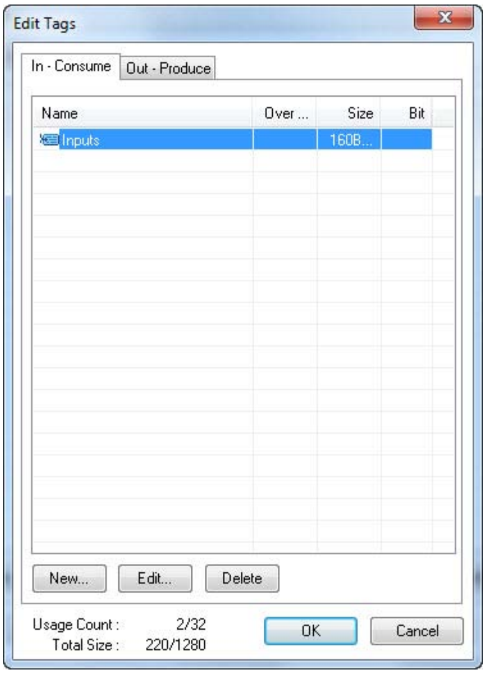
- Retain output for major fault: *Hold* (default) - Output data maintains its previous status even after a major fault occurs.
- Clear output at major fault: *Clear* - Output data is cleared to 0 when a major fault occurs.



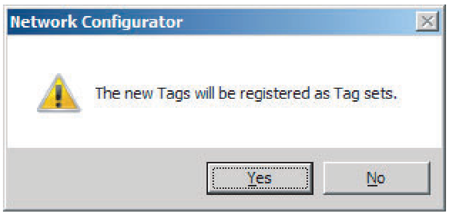
Note When any of the following errors occurs in the originator PLC while tag data links are in progress, the connection will be forcibly disconnected.

- Fatal CPU Unit error
- I/O refreshing error
- CPU Unit WDT error
- I/O bus error

9 When you are finished registering the required tags, click the **OK** button at the bottom of the Edit Tags Dialog Box.



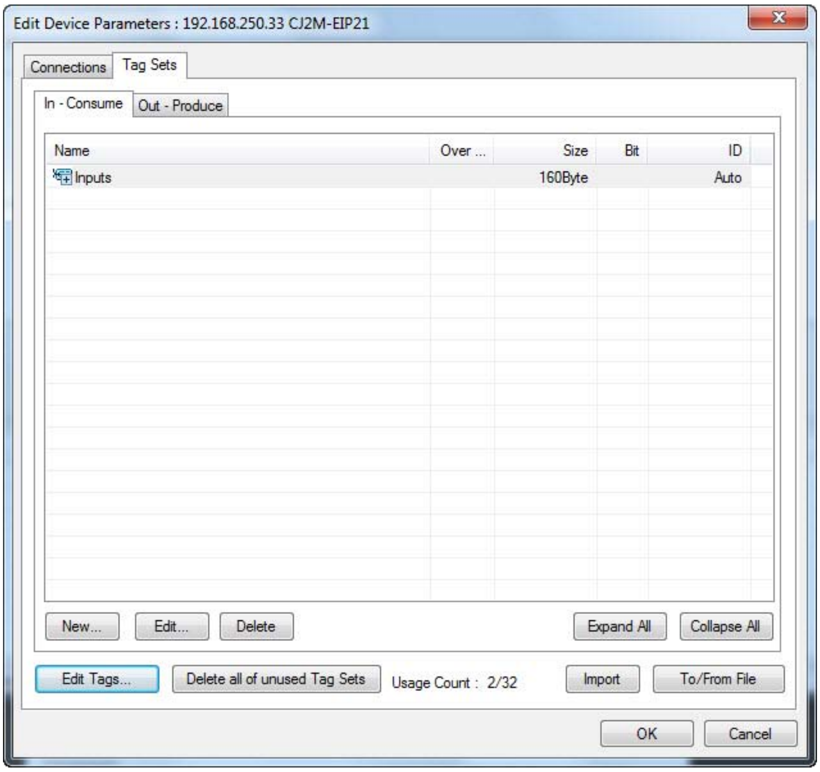
10 At this point, a confirmation dialog box is displayed to check whether the registered tag names are used as the tag set names. A tag set can contain up to eight tags, but tag sets are registered with one tag per tag set if the tag names are registered as tag set names. In this case, click the **Yes** button.



If the **No** button is clicked, more tags can be registered at the end of the tag set. Refer to step 20 for details on adding tags to the end of the tag set.

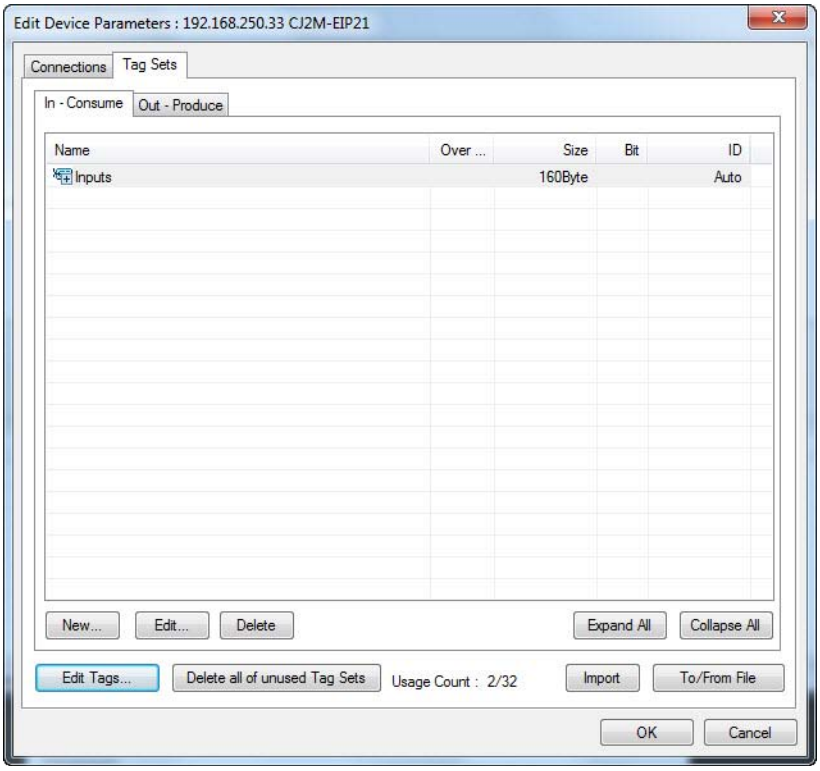
Changing and Registering Tag Sets

11 The following dialog box will be displayed when the tags in the Edit Tags Dialog Box are registered directly as tag sets.

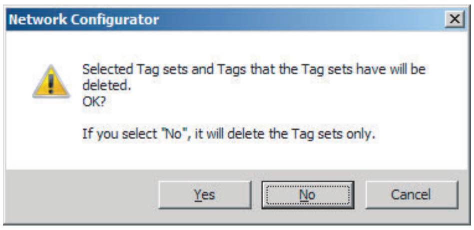


12 If an input tag has already been registered in an input tag set, and you want to change its registration to a different input tag set, it is necessary to delete the tag from the tag set in which it was originally registered.

Open the Edit Device Parameters Dialog Box, select the tag set containing the tag that you want to delete, and click the **Delete** button in the Edit Tag Dialog Box. (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.)

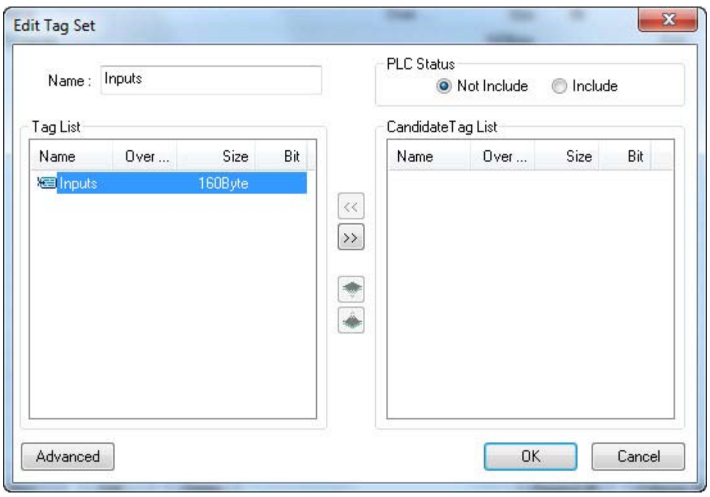


At this point, a confirmation dialog box will be displayed to confirm that you want to delete the selected tag set and the tags contained in that tag set.



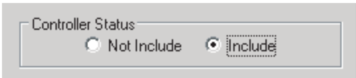
If the **No** button is clicked, only the tag set will be deleted. Click the **No** button.

13 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.

14 To include the Controller status in the tag set, select the *Include* Option at the upper-right corner of the dialog box.

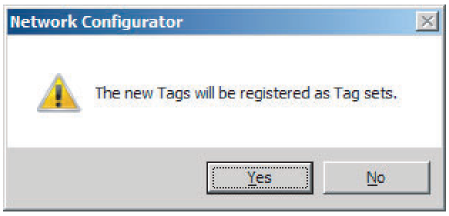


15 To confirm a change, click the **OK** button in the Edit Tag Set Dialog Box.

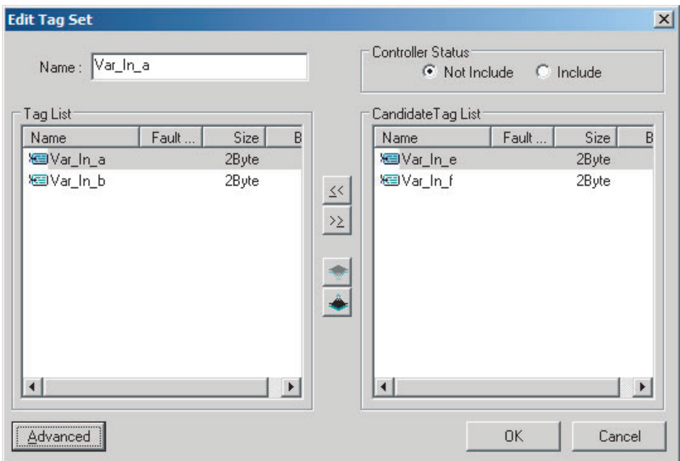
16 Click the **OK** button in the Edit Device Parameters Dialog Box.

17 After you register all of the required tags, click the **OK** button at the bottom of the Edit Tags Dialog Box.

18 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.

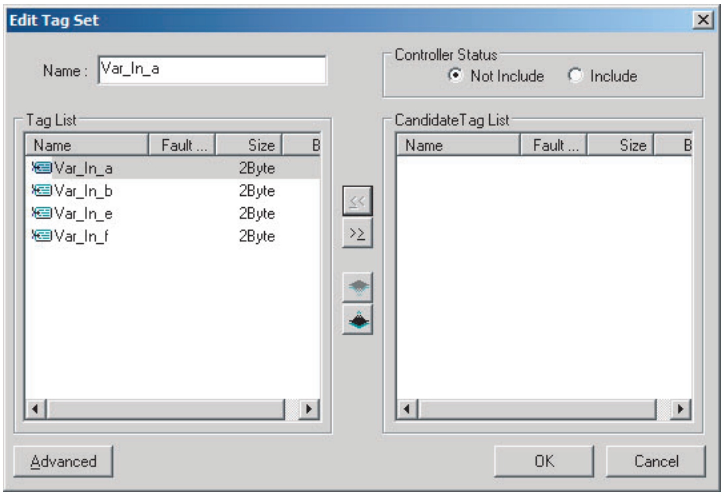


19 To register the newly added tags in a tag set, either double-click the desired tag set, or select the tag set and click the **Edit** button.



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.

20 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 ( ).

21 To confirm the changes, click the **OK** button at the bottom of the Edit Tag Set Dialog Box.

22 Click the **OK** button in the Edit Device Parameters Dialog Box.

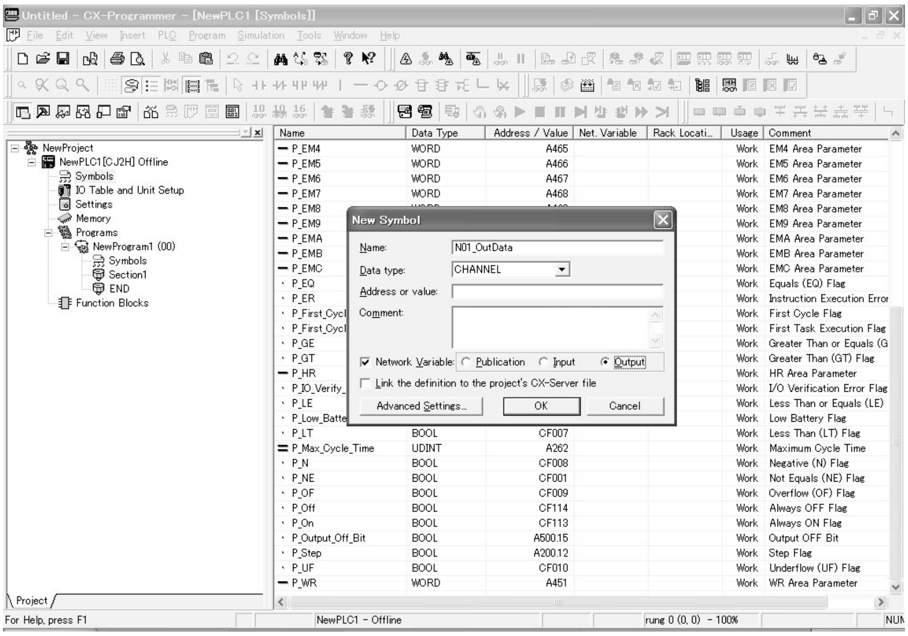
2) Importing Network Symbols/Variables Created with the CX-Programmer to the Network Configurator

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.



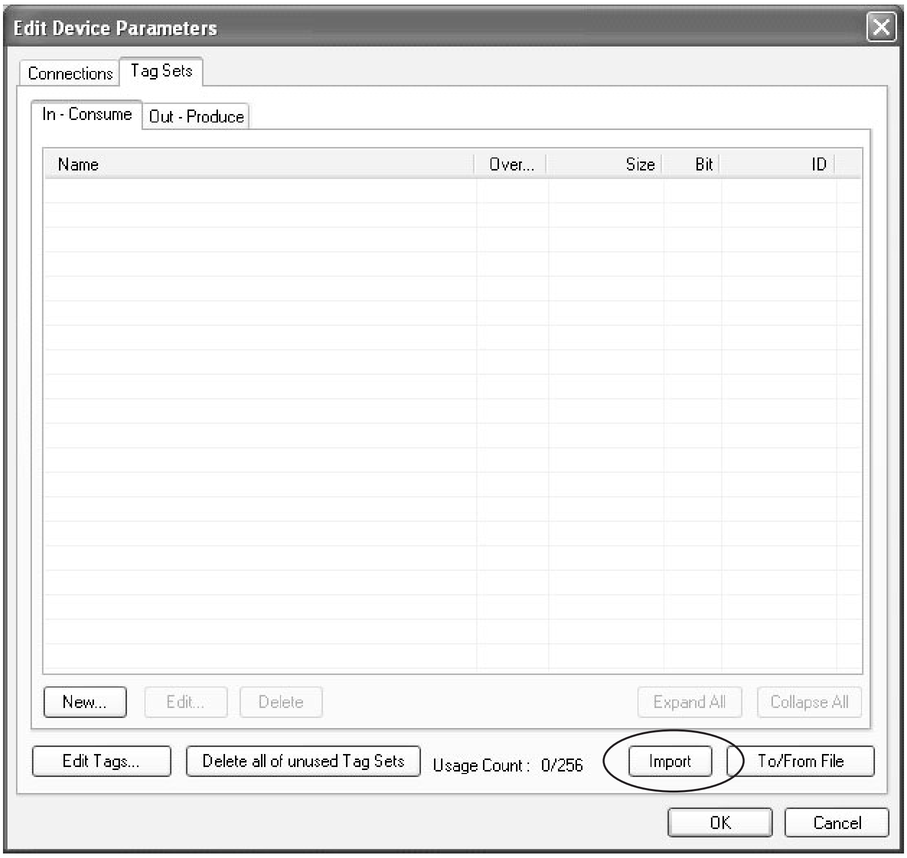
Importing Symbols to the Network Configurator

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.

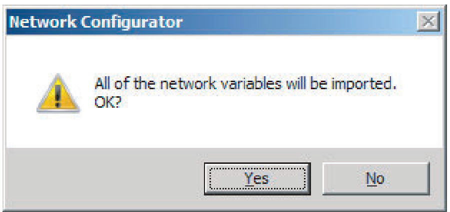
2 From the devices registered in the Network Configurator, double-click the icon of the device for which to import the network symbols. The Edit Device Parameter Dialog Box will be displayed. You can also right-click the icon and select ***Device - Parameters - Edit*** from the pop-up menu.

3 Click the **Import** button on the Tag Sets Tab Page of the Edit Device Parameter Dialog Box.

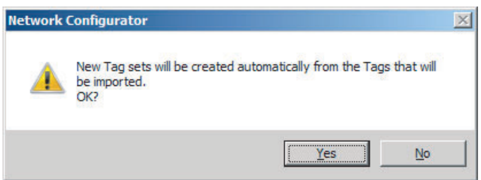


A confirmation dialog box is displayed that asks you how you want to import the variables as shown below.

To import all symbols with a Network Publish attribute, click the **Yes** button. To import only some of these variables, click the **No** button.



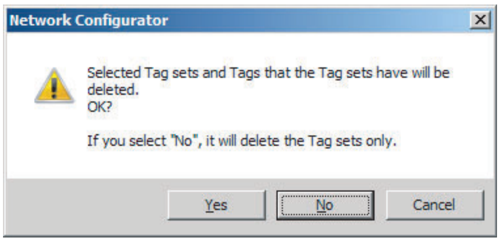
After you import the variables to the tags, click the **Yes** button to automatically create tag sets, or click the **No** button to set up tag sets manually.



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.)

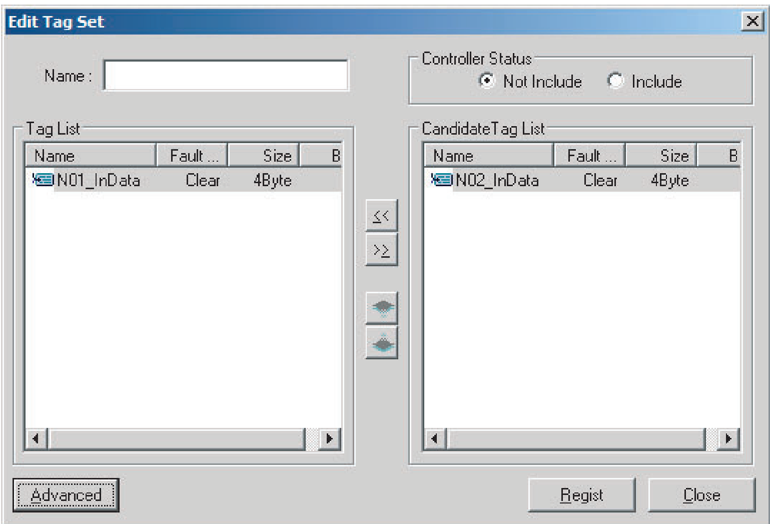
To place more than one input symbol (input tag) imported from the CX-Programmer into one tag set, you must delete the input tags that were registered to separate input tag sets.

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.

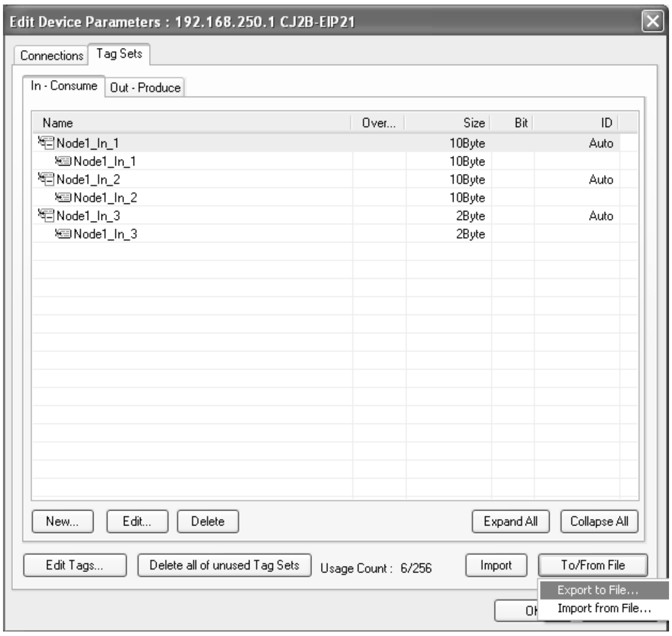
5 Perform steps 1 to 3 for all the devices that will perform tag data links.

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.

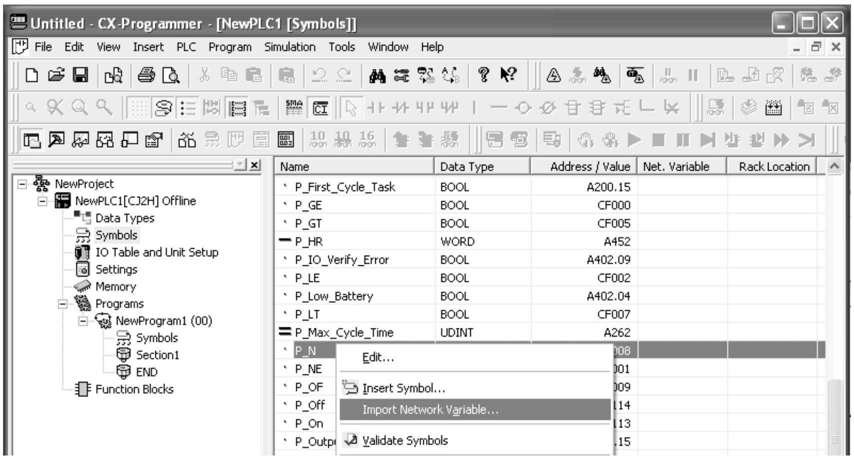
● Exporting Tags and Tag Sets with the Network Configurator

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.

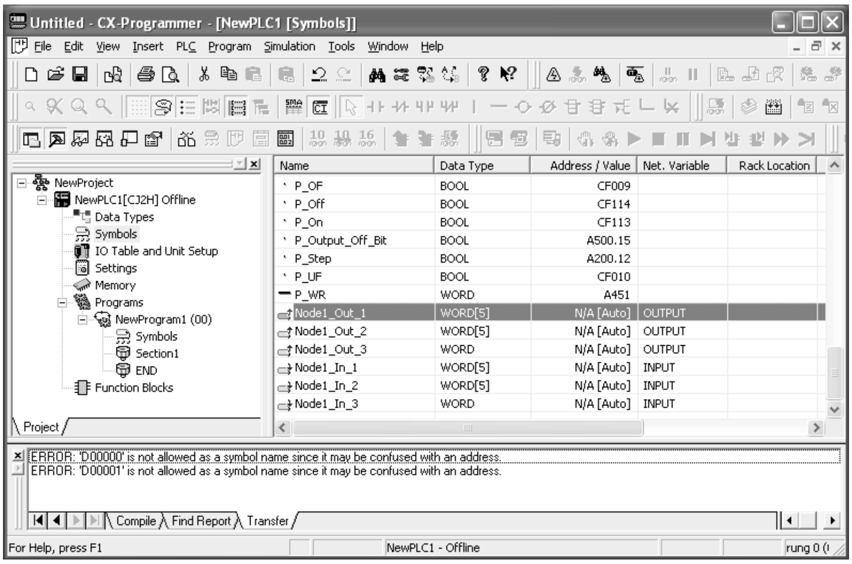


● **Importing the Tag and Tag Set CSV File with the CX-Programmer**

1 In the project global symbol table for the CJ2H-CPU6☐-EIP or CJ2MCPU3☐, 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 with which connections are opened
- The connection type (multi-cast or unicast)
- The length of the packet intervals (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

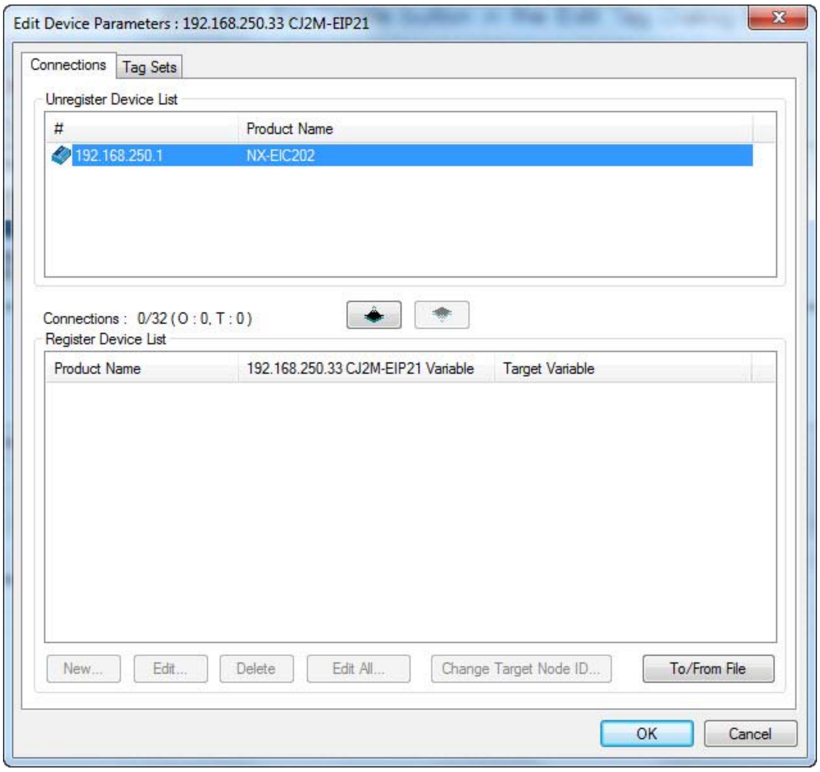
Make the connections settings after you create tag sets for all of the devices involved in tag data links.

Connection Settings (Connections Tab Page)

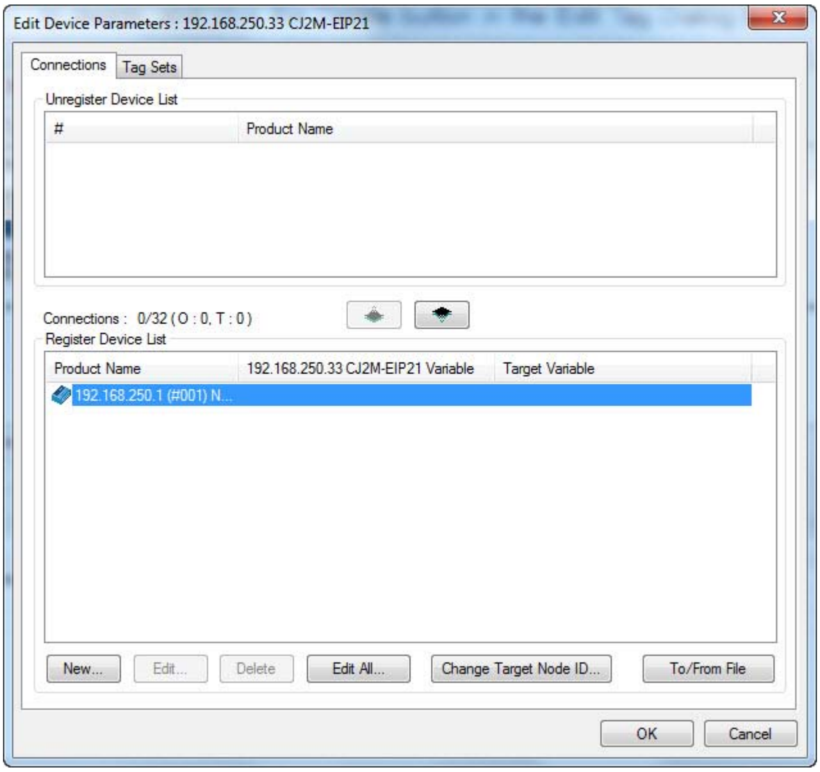
● Registering Devices in the Register Device List

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.

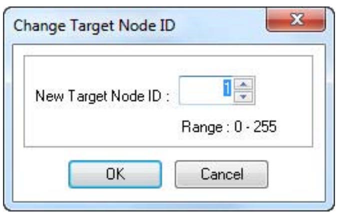


In the Unregister Device List, select the target device that requires connection settings by clicking the device so its color changes to gray, and click the  button. The selected target device will be displayed in the Register Device List, as shown in the following diagram.



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.

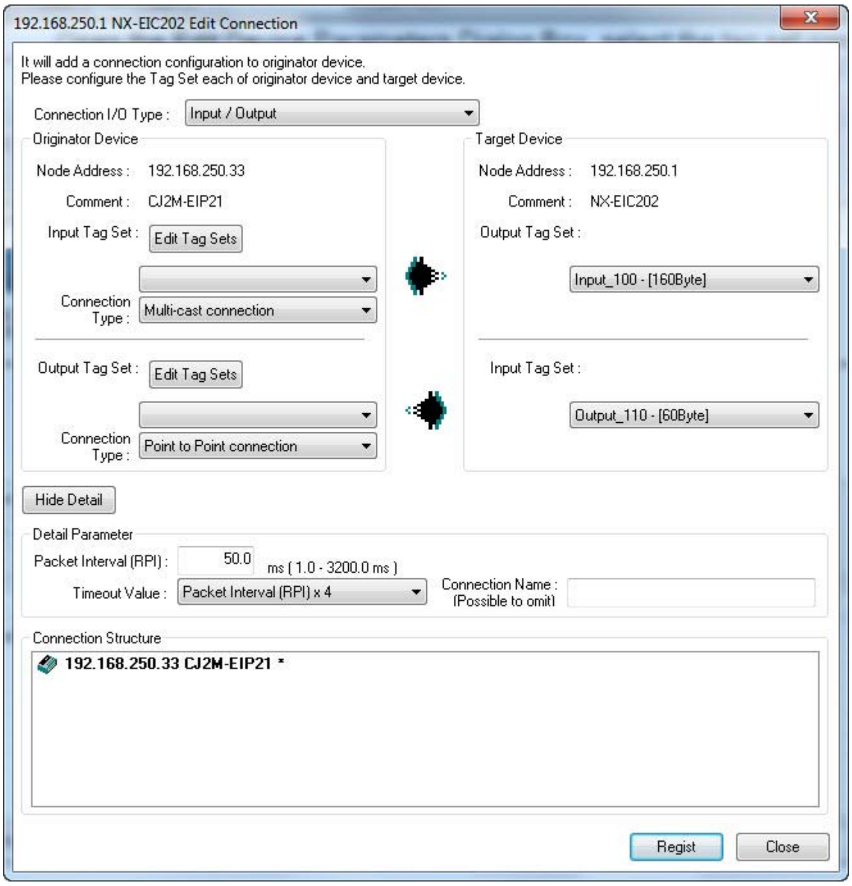


● Editing Settings for Individual Connections

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	When creating tag data links for a CJ1W-EIP21, CJ2B-EIP21, or CJ2M-EIP21, select Input Only (tag type). When creating tag data links for other target devices, select the connection I/O type specified in that device’s EDS file. Use the ***Input Only (ID type)*** setting when another company's node is the originator and does not support connection settings with a tag type setting.
Connection Type	Selects whether the data is sent in multicast or unicast (point-to- point). The default setting is multicast. • Multicast connection Select this type when the same data is shared by multiple nodes. This setting is usually used. • Point-to-Point connection 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. **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.	

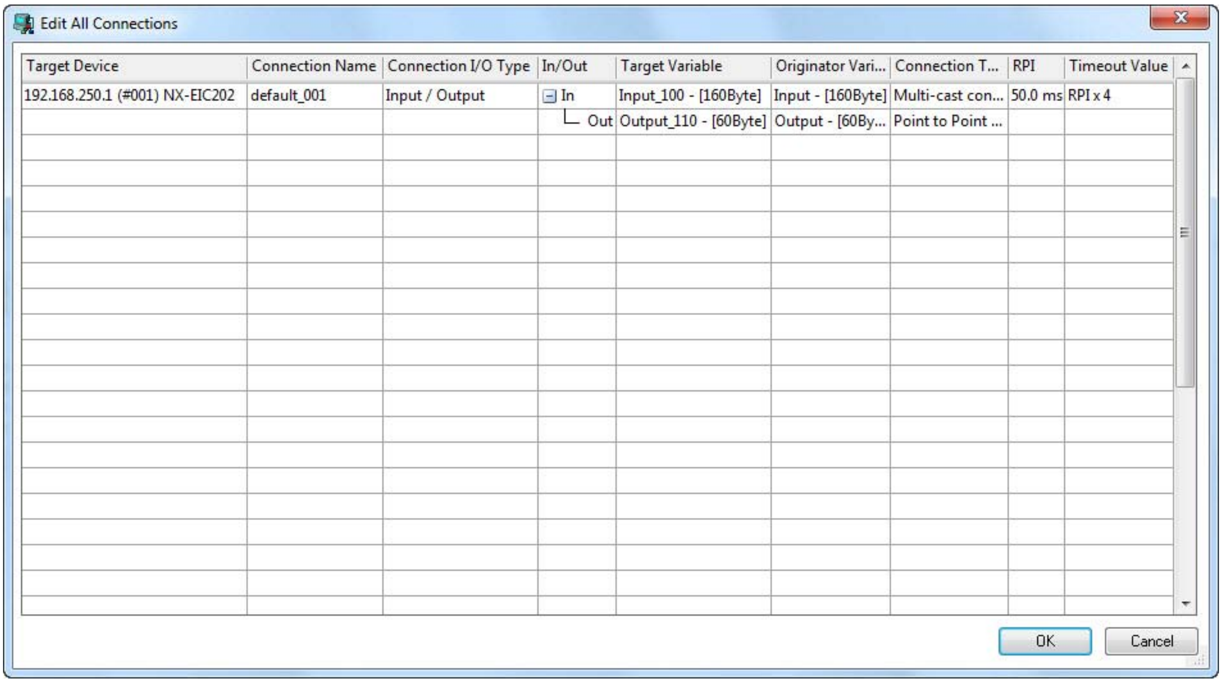
Setting	Description
Packet Interval (RPI)	Sets the data update cycle (i.e., the packet interval) of each connection between the originator and target. • Minimum RPI for the EtherNet/IP Coupler Unit is 4 ms. • Default setting is 50 ms (i.e., data updated once every 50 ms). • The interval can be set to an even number of ms (4, 6, 8,...) The interval can be set to between 1 and 3200 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. 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.

● 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.



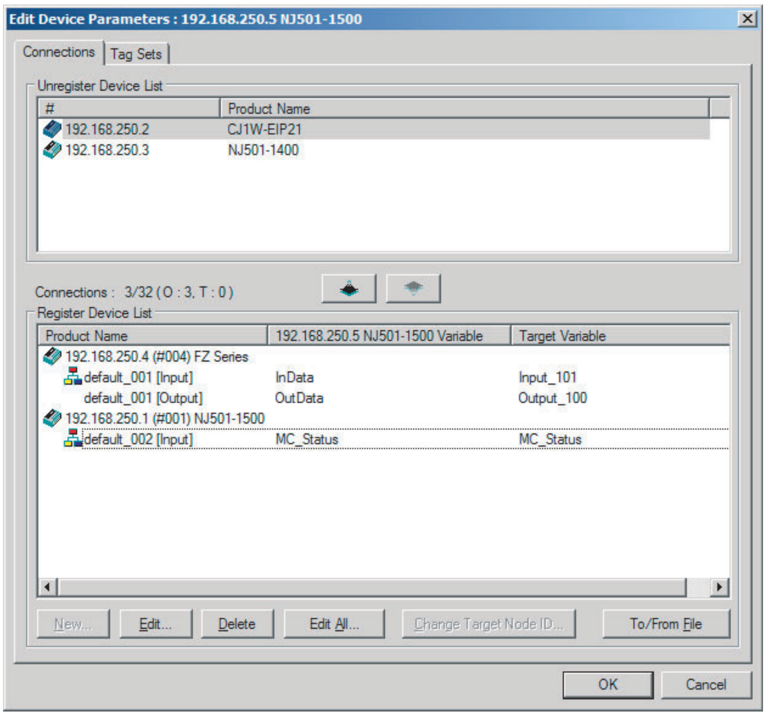
Setting	Description
Target Device	Select the target device.
Connection Name	Any name can be given to the connection (32 single-byte characters max.). If this field is left blank, a default name is assigned. The connection name is used as a comment.

Setting	Description
Connection I/O Type	Select Input Only (tag type) to use tag data links with a CJ1W-EIP21, CJ2B-EIP21, CJ2M-EIP21 or CJ1W-EIP21(CJ2). When you create tag data links for other devices, select the connection I/O type specified in that device's EDS file. Use the ***Input Only (ID type)*** setting when another company's node is the originator and does not support connection settings with a tag type setting.
In/Out	The connections I/O is automatically displayed based on the selected connection. • Input Only: Just *In* is displayed.
Target Variable	Select and allocate the target node's tag set. • In: Select the target's output (produce) tag set. • Out: Select the target's input (consume) tag set.
Originator Variable	Select and allocate the originator node's tag set. • In: Select the originator's input (consume) tag set. • 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. • Multi-cast connection: Select when the same data is shared by multiple nodes. This setting is usually used. • Point-to-point connection: Select when the same data is not shared by multiple nodes. In a unicast connection, other nodes are not burdened with an unnecessary load. **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. For unit version 1.03 or later, you can set the RPI to between 1 and 10,000 ms in 1-ms increments. For unit version 1.02 or earlier, you can set the RPI to between 10 and 10,000 ms in 1-ms increments. The default setting is 50 ms (i.e., data is updated once every 50 ms).
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).

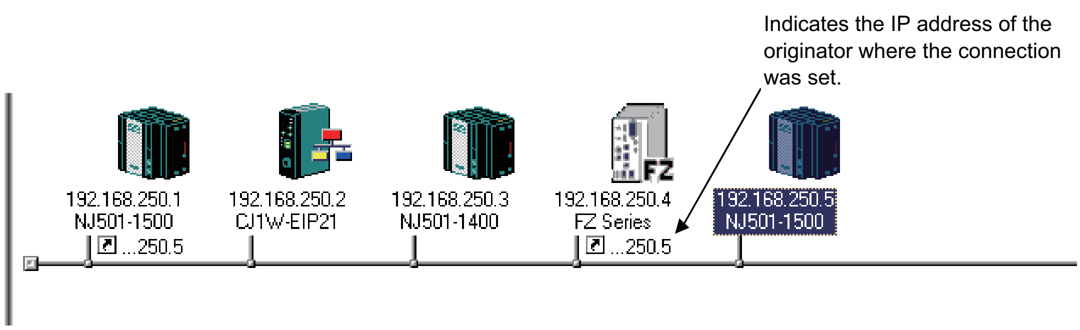
2 After you make all of the settings, click the **OK** button.

● 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. 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 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. 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 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.

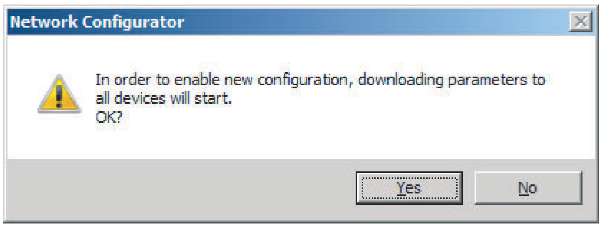
1 Connect the Network Configurator online.

2 There are two ways to download the parameters.

Downloading to All Devices in the Network

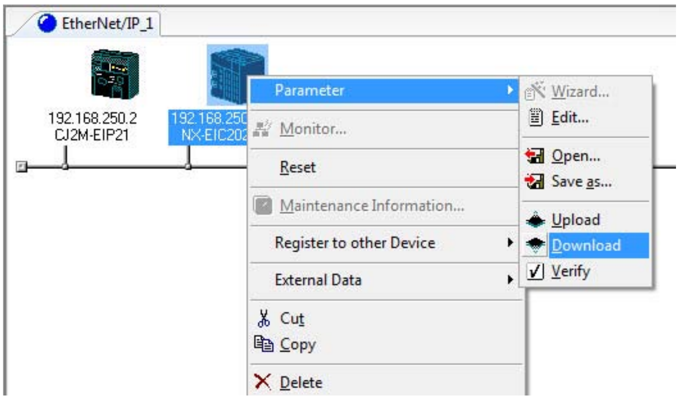
Select ***Network - Download.***

The following dialog box is displayed:

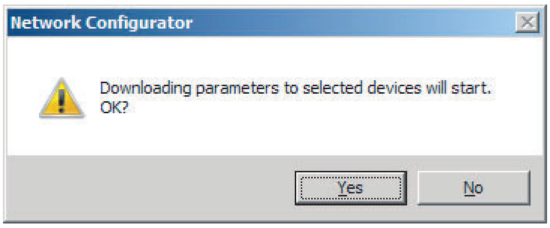


Downloading Individually to Particular Devices

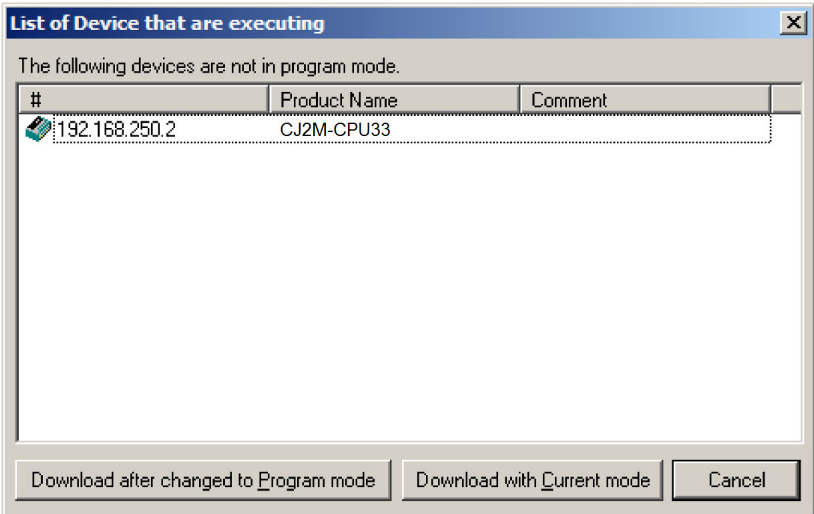
Select the icon of the EtherNet/IP Unit to which you want to download. To select multiple nodes, hold down the **Shift** Key while you click the icons. (In the following example, 2 nodes are selected: 192.168.250.2 and 192.168.250.1.) Right-click the icon to display the pop-up menu, and select ***Parameter - Download.***



The following dialog box is displayed.



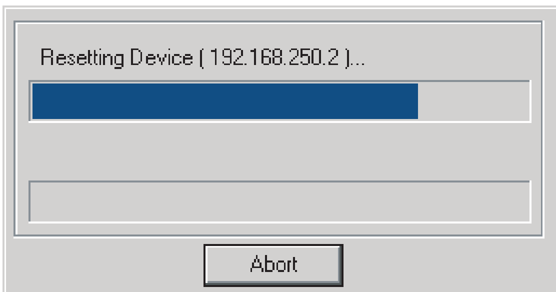
3 Click the **Yes** button to download the tag data link parameters to the EtherNet/IP Unit. The following dialog box is displayed if any of the CPU Units is not in PROGRAM mode.



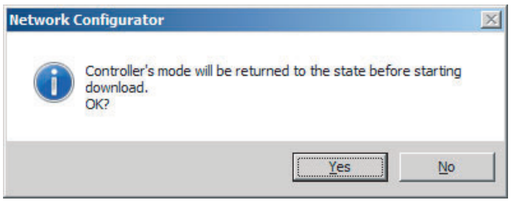
If the **Download after changed to Program mode** button is clicked, all CPU Units are changed to PROGRAM mode and the parameters are downloaded. Confirm safety for all controlled equipment before you change the CPU Units to PROGRAM mode. You can restore the operating modes after the parameters are downloaded.

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).

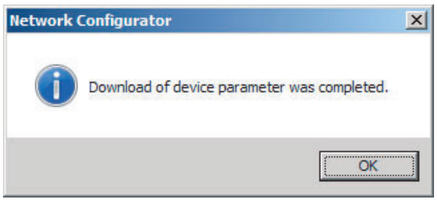
During the download, the following progress monitor is displayed to show the progress of the download.



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

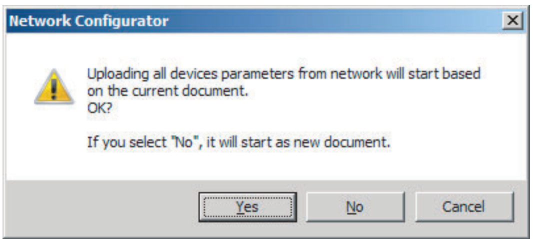
Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual* (Cat. No. W465) for more for information on how to connect the Network Configurator online.

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.

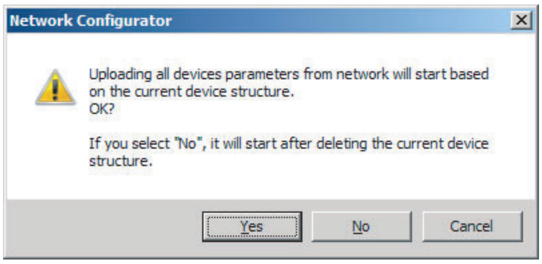
Clicking the No button:

- 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.



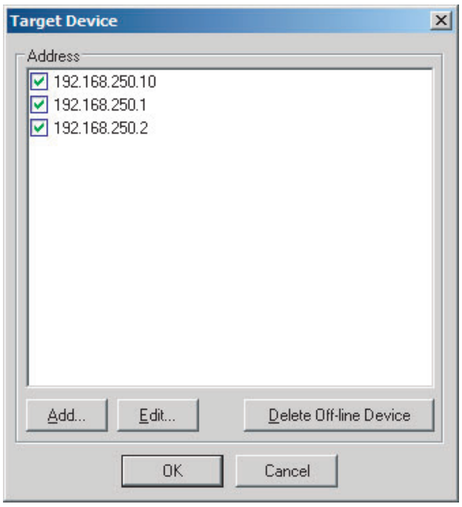
Clicking the Yes button:

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.

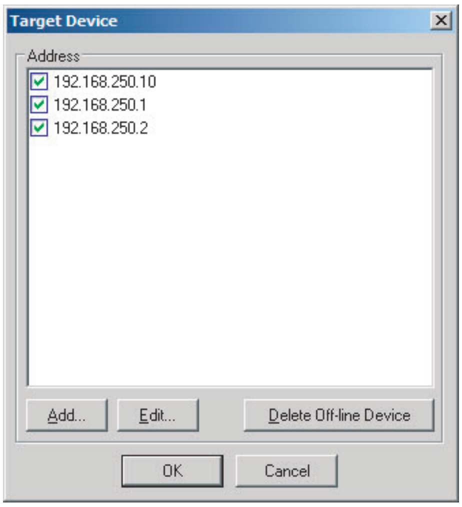


Clicking the Cancel button:

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.

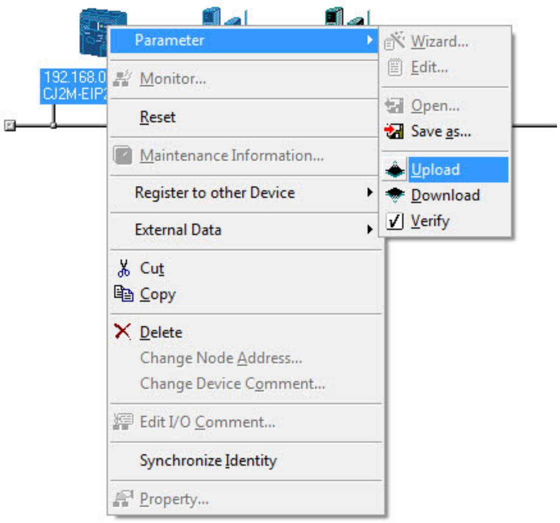
Select the devices for which to upload parameters and click the **OK** button.



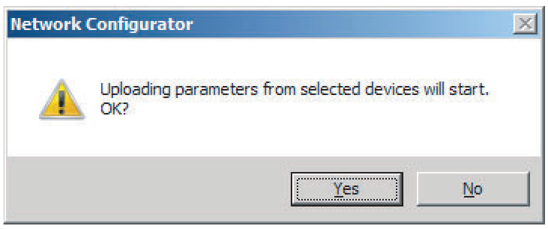
Uploading Individually from Particular Devices

5 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.***

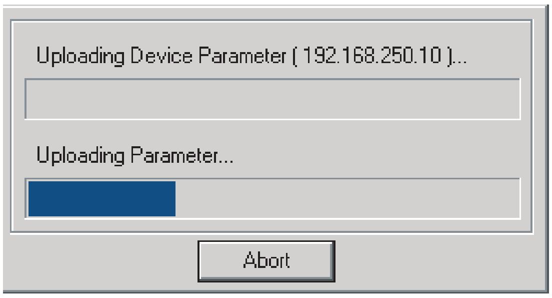


6 The following dialog box is displayed.

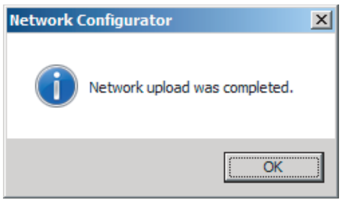


Click the **Yes** button or the **No** button.

7 During the upload, the following progress monitor is displayed to show the progress of the upload.



8 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

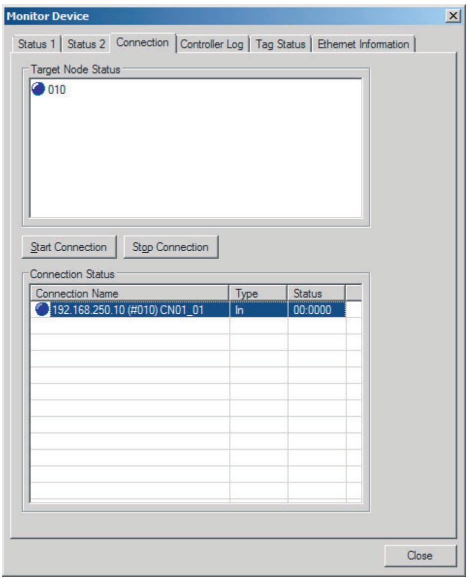
With CPU Units with unit version 1.04 or later, a Tag Data Link Connection Timeout error will occur if a connection is not established with the target device within 1 minute after the tag data links are started in operation as the originator device. Reconnection processing is continued periodically even 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 for information.

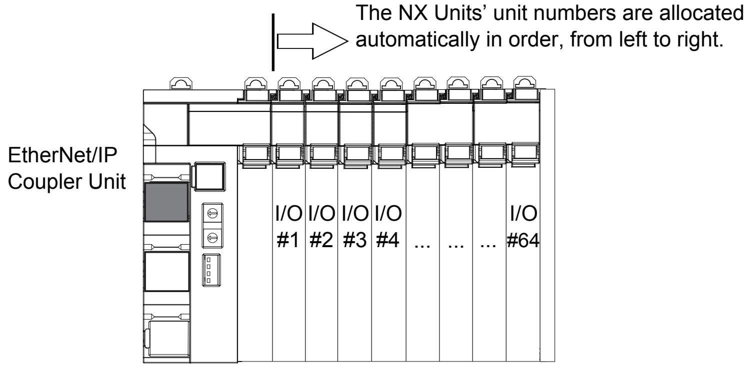
- Clearing the Device Parameters
- Saving the Network Configuration File
- Reading a Network Configuration File
- Checking Connections
- Changing Devices
- Displaying Device Status

9-6 Assigning Network Variables

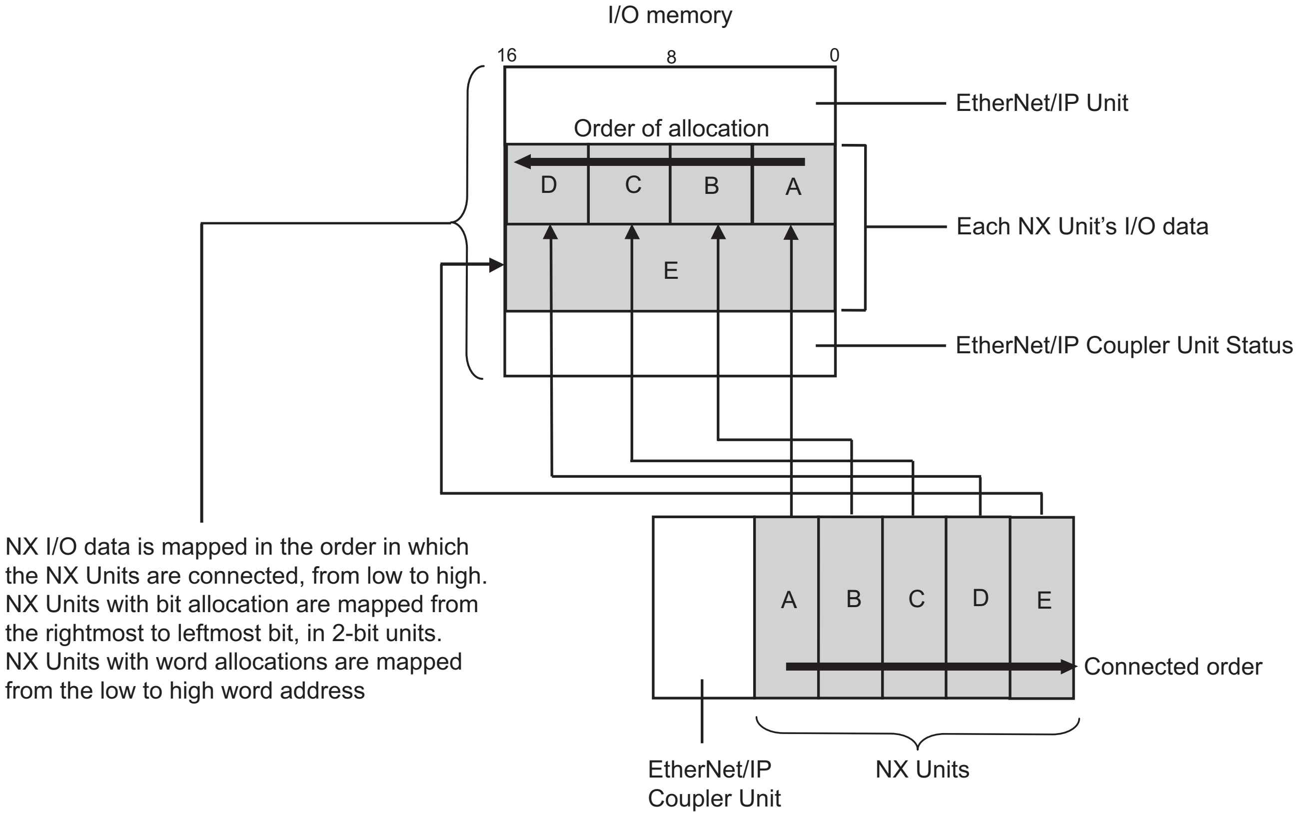
Network Variables are assigned in the PLC according to the I/O mapping created in Sysmac Studio. Use the following information to assign Network Variables in the PLC.

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 9-41 for more information about importing/exporting Network variables. The figure below shows this mapping.



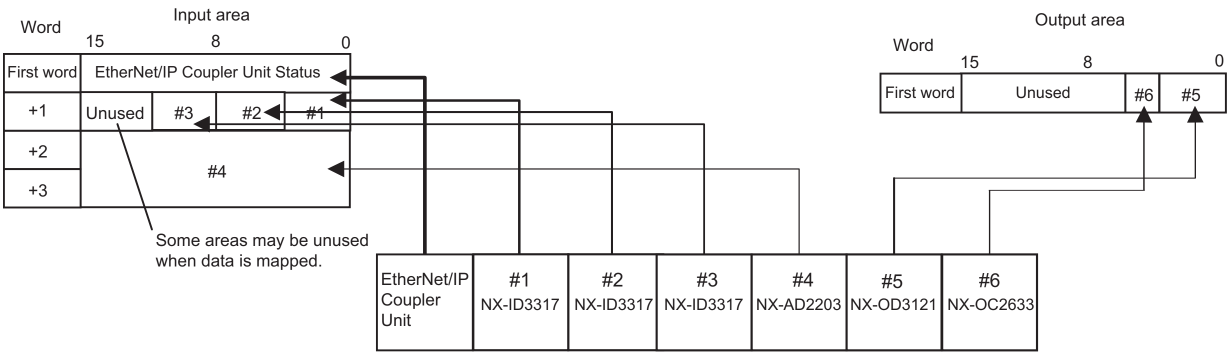
Additional Information

- 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 to one or more words, 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.

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 9-7 for more information about status data configuration.

Slave Terminal Configuration

EtherNet/IP Coupler Unit	#1 NX-OD3121	#2 NX-OD3121	#3 NX-OD3121	#4 NX-OC2633	#5 NX-OD3121	#6 NX-DA2203

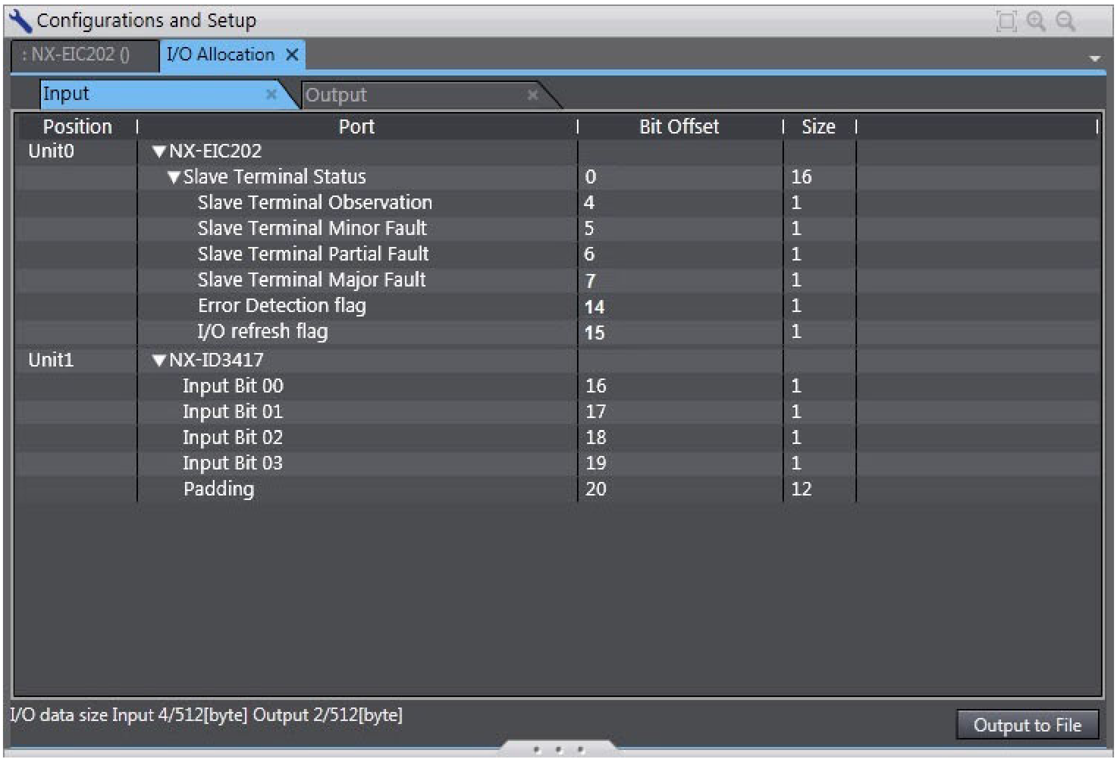
Data is allocated in 2-bit units to NX Units which require 4 bits. There may be unused areas as shown in the following table.

Word (bits 15 … 8 … 0)					
+0	#5	#4	#3	#2	#1
+1	Unused				#5
+2	#6				
+3	#6				

9-6-2 I/O Allocation Features of Sysmac Studio

Sysmac Studio 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 9-69 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.

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10-2 Communications Performance 10-5

10-2-1 I/O Response Time 10-5

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

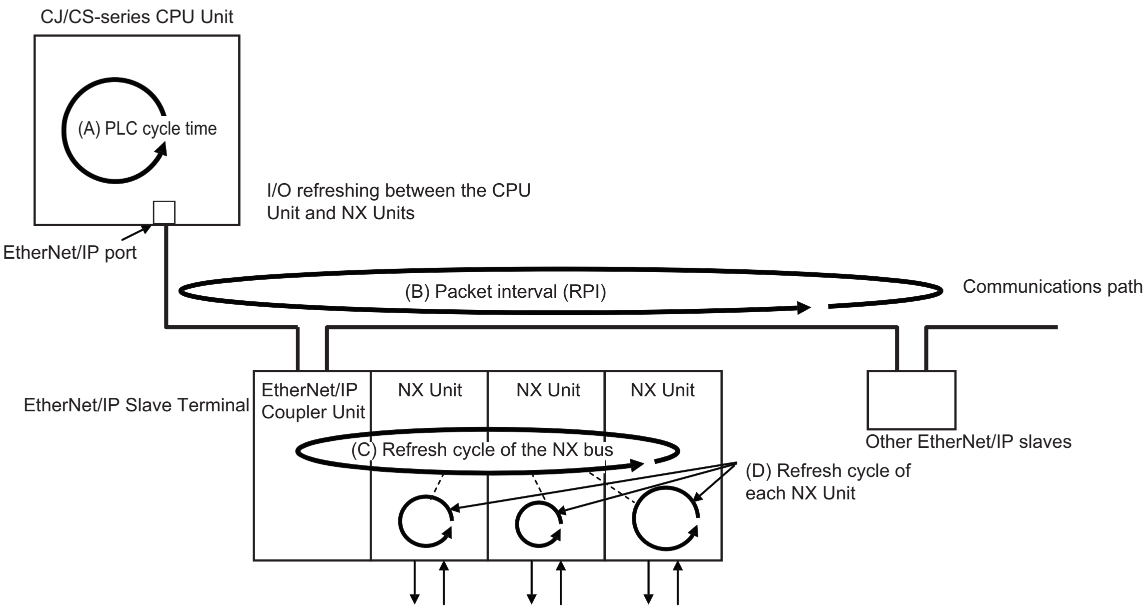
(B) Packet Interval (RPI)

(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:

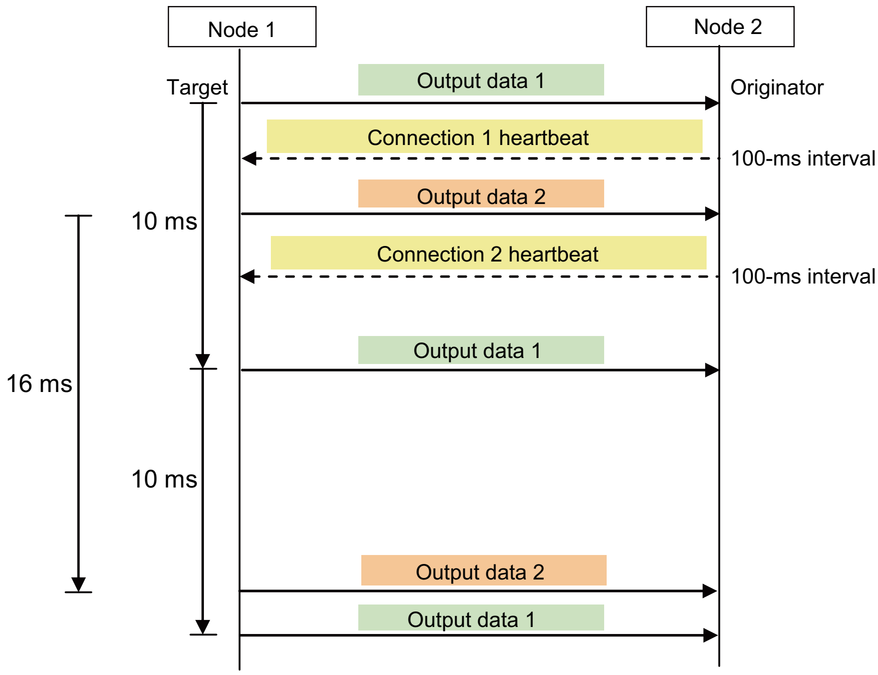
In this example, 2 tag data link connections are set for node 2 (the originator) and node 1 (the target).

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

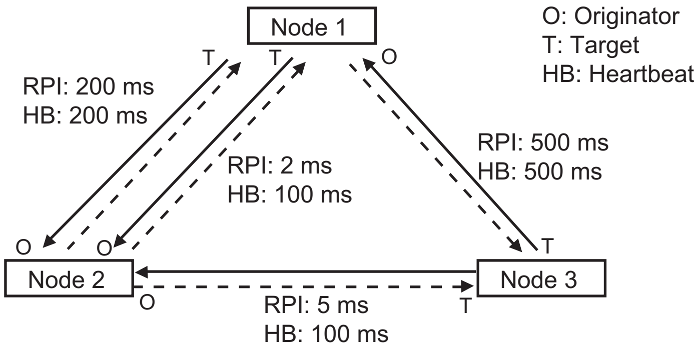
The maximum number of packets that the EtherNet/IP Coupler Unit can transfer in 1 second (called the allowed Unit bandwidth) is 1,000 pps, so set the connection below this maximum value.

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 / 200ms + 1000 / 2 ms + 1000 / 5 ms (for data)

+ 1000 / 200ms + 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)

= 214pps

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.

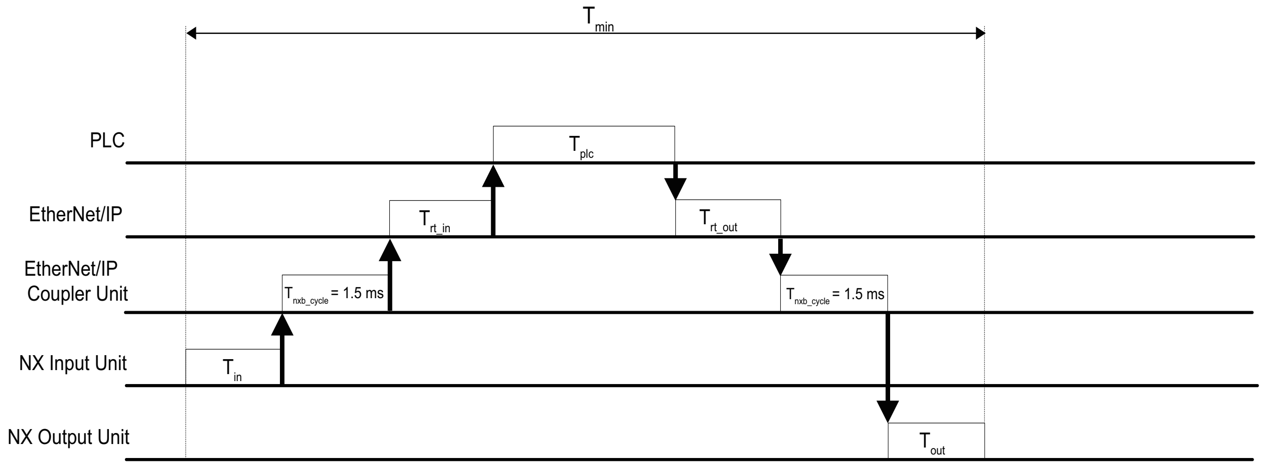
Additional Information

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)

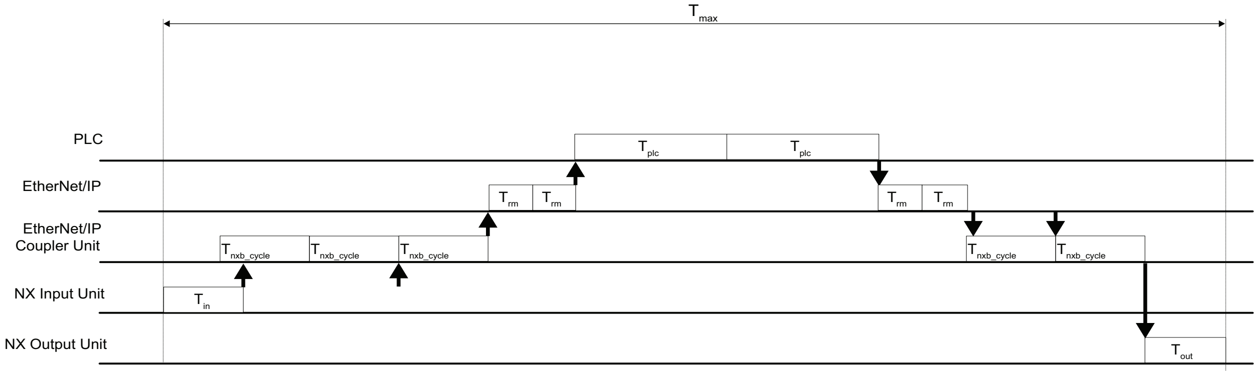
T_{nxb_cycle}: NX bus communication time = 1.5 ms

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.

$$T_{max} = T_{in} + (T_{nxb\_cycle} \text{ x } 5) + (T_{rm} \text{ x } 4) + (T_{plc} \text{ x } 2) + T_{out}$$



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.

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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 Sysmac Studio. 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*
Cyclic I/O Refreshing		The EtherNet/IP Coupler Unit exchanges I/O data with the mounted NX Units.	*Section 10 I/O Refreshing*
	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 11-4
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 11-8
Clear All Memory		This function initializes the entire EtherNet/IP Slave Terminal or specified Units from the Sysmac Studio.	*11-4 Clearing All Memory* on page 11-17
Restarting		This function allows you to apply changes to settings with the Sysmac Studio or through special instructions, without cycling the Unit power supply.	*11-5 Restarting* on page 11-22
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 11-24
Resetting Errors		This function allows you to use the Sysmac Studio to reset errors that occur in the EtherNet/IP Slave Terminal.	*12-4 Resetting Errors* on page 12-45
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 11-26
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. You can display these times on the Sysmac Studio.	*11-8 Monitoring Total Power-ON Time* on page 11-29

11-2 NX Unit Mounting Settings

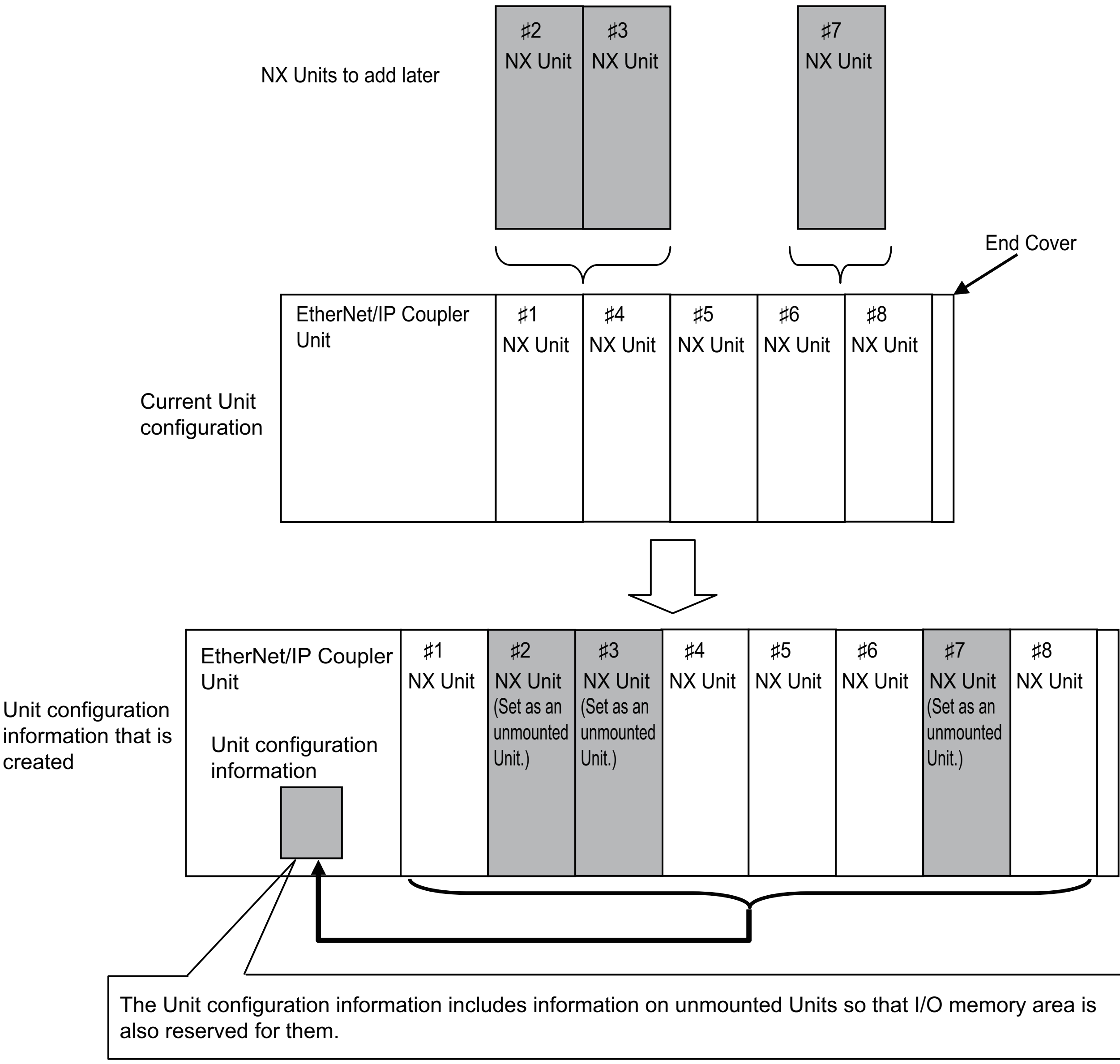
This section describes the NX Unit mounting function when the disabled setting is used.

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 Sysmac Studio.

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

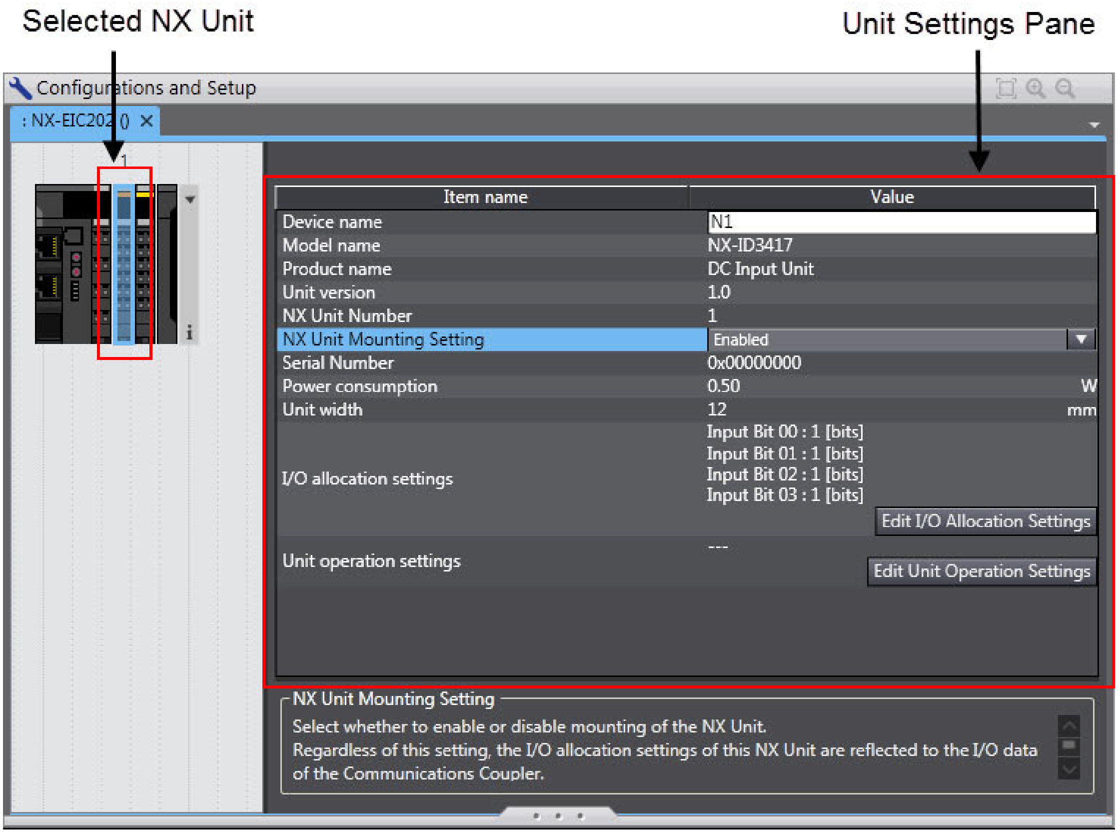
When you mount an NX Unit that was set as an unmounted Unit, a Unit Configuration Verification Error will occur.

11-2-4 Setting NX Units as Unmounted Units

You use the Sysmac Studio to set NX Units as unmounted Units. 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.

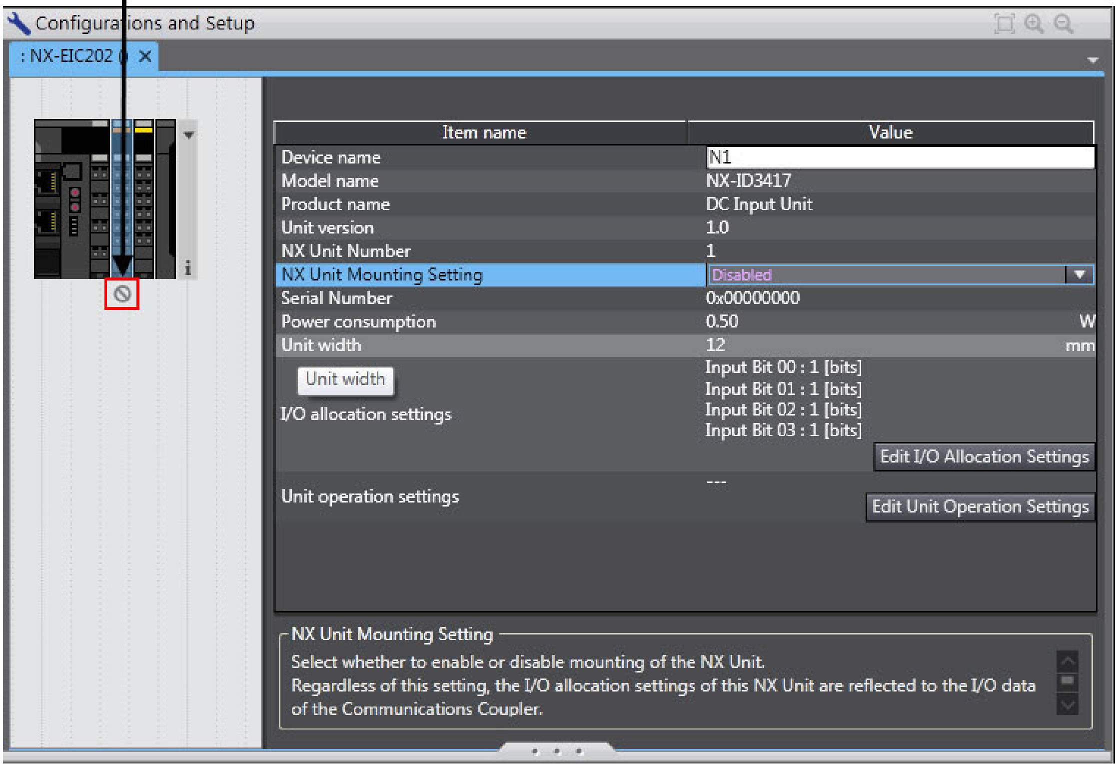
The Unit Settings Pane is displayed.



2 In the *Unit Setting* pane, set the *NX Unit Mounting Setting to Disabled*.

The selected NX Unit is set as an unmounted Unit.

This shows that the 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.

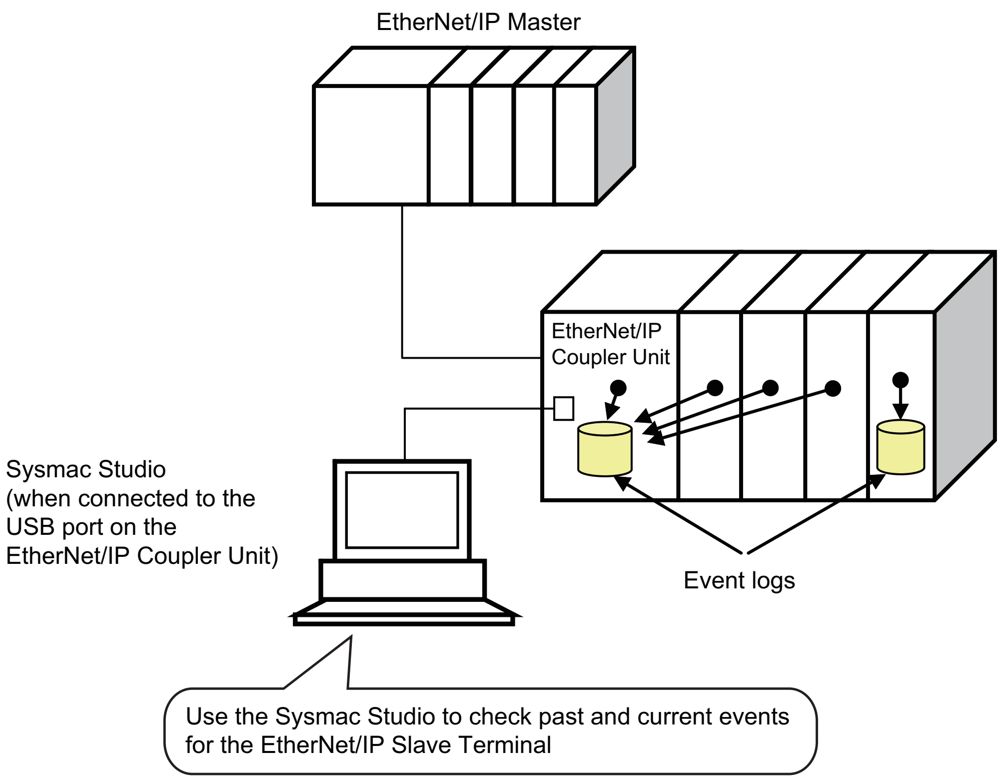
11-3 Event Logs

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 Sysmac Studio 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 Sysmac Studio to check current and past events in an EtherNet/IP Slave Terminal.

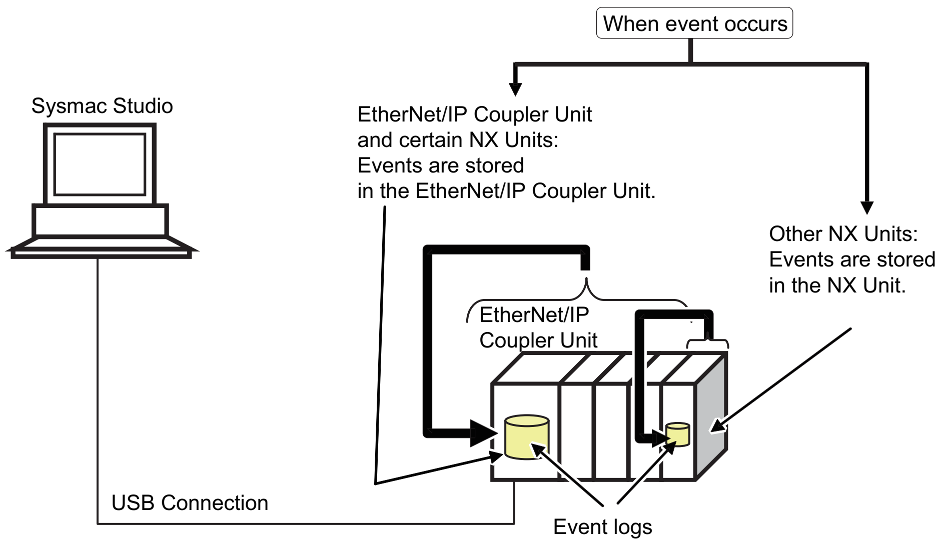
11-3-2 Detailed Information on Event Logs

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 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 Sysmac Studio.

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 *12-3-4 Event Codes for Errors and Troubleshooting Procedures* on page 12-20 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
2		Partial fault level
3		Minor fault level
4		Observation level
5	Low	Information level

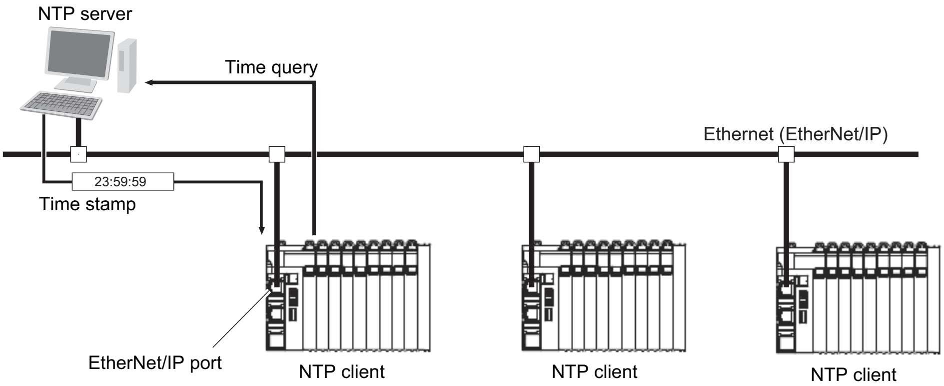
Errors with a higher level have a greater affect on the functions that the complete system provides, and it is more urgent to recover from them. These classifications are displayed on the Sysmac Studio when an error occurs.

You can change the level assigned to some events. Refer to *11-6 Changing Event Levels* on page 11-24.

11-3-3 Automatic Clock Adjustment

With the EtherNet/IP Coupler Unit, clock information can be read from the NTP* 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.

* 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 retrieved from the NTP server.

If the clock information cannot be retrieved from the NTP server, the time on the Sysmac Studio is displayed as *1970/1/1 0:00:00*. The time of events that occur before the time is retrieved from the NTP server are also displayed as *1970/1/1 0:00:00*.

Specifications

Item	Specification
Protocol	NTP
Port No.	123 (UDP)
Access to NTP server	Retrieves 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***.

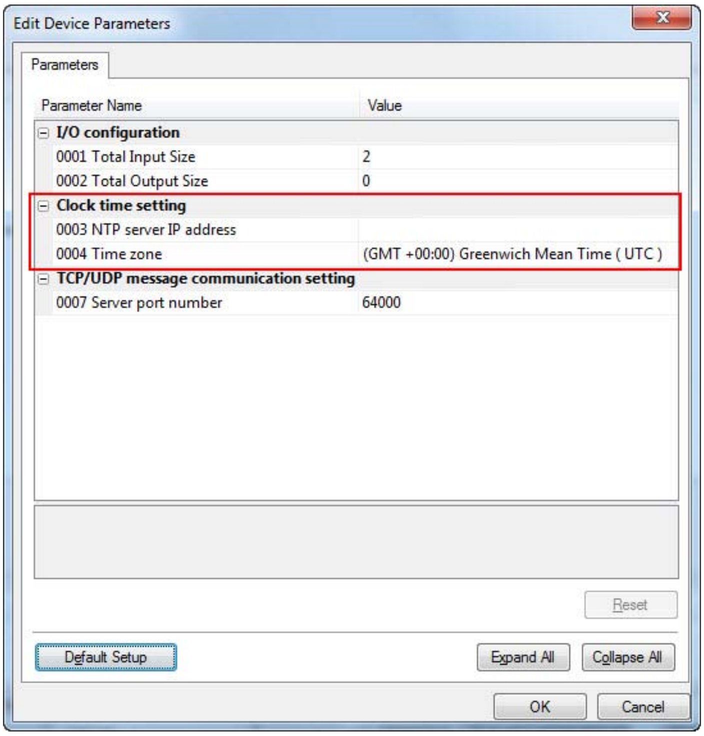
3 Enter the values for NTP server IP address and Time Zone and click ***OK***.

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. Default: (GMT +00:00) Greenwich Mean Time (UTC)



Additional Information

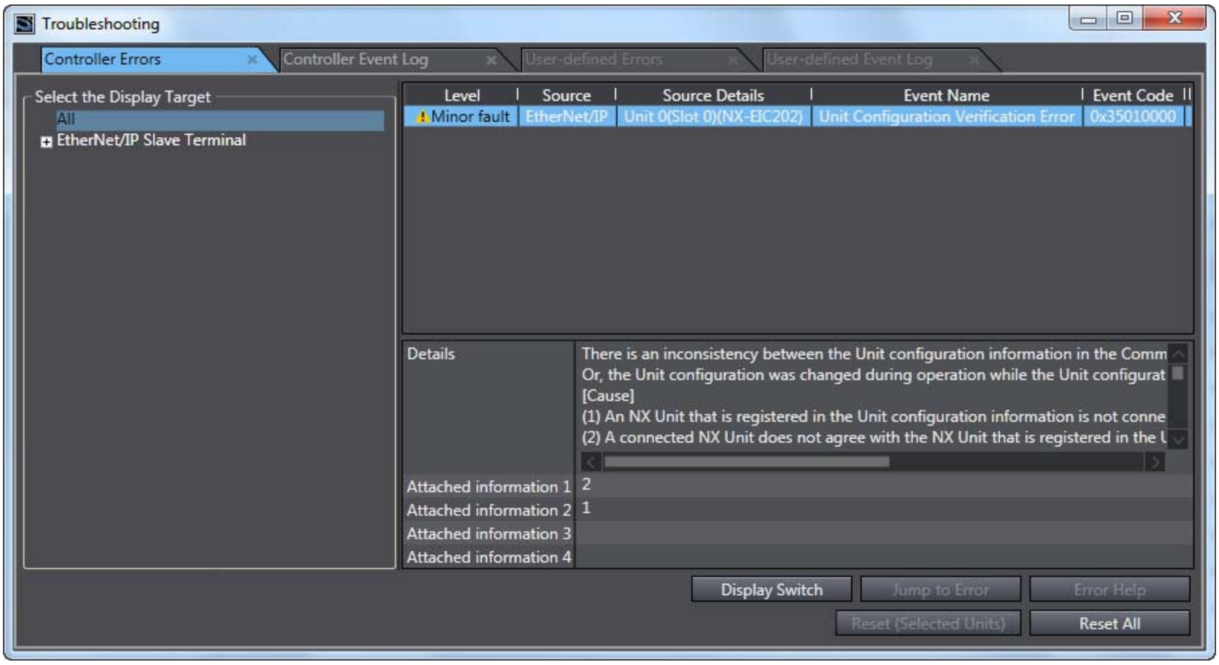
Daylight Savings Time is not supported.

11-3-4 Reading Event Logs

Use the following procedure to read the event log.

1 Select ***Troubleshooting*** from the Tools Menu while online. You can also click the **Trouble-shooting** button in the toolbar.

The following Troubleshooting Dialog Box is displayed.

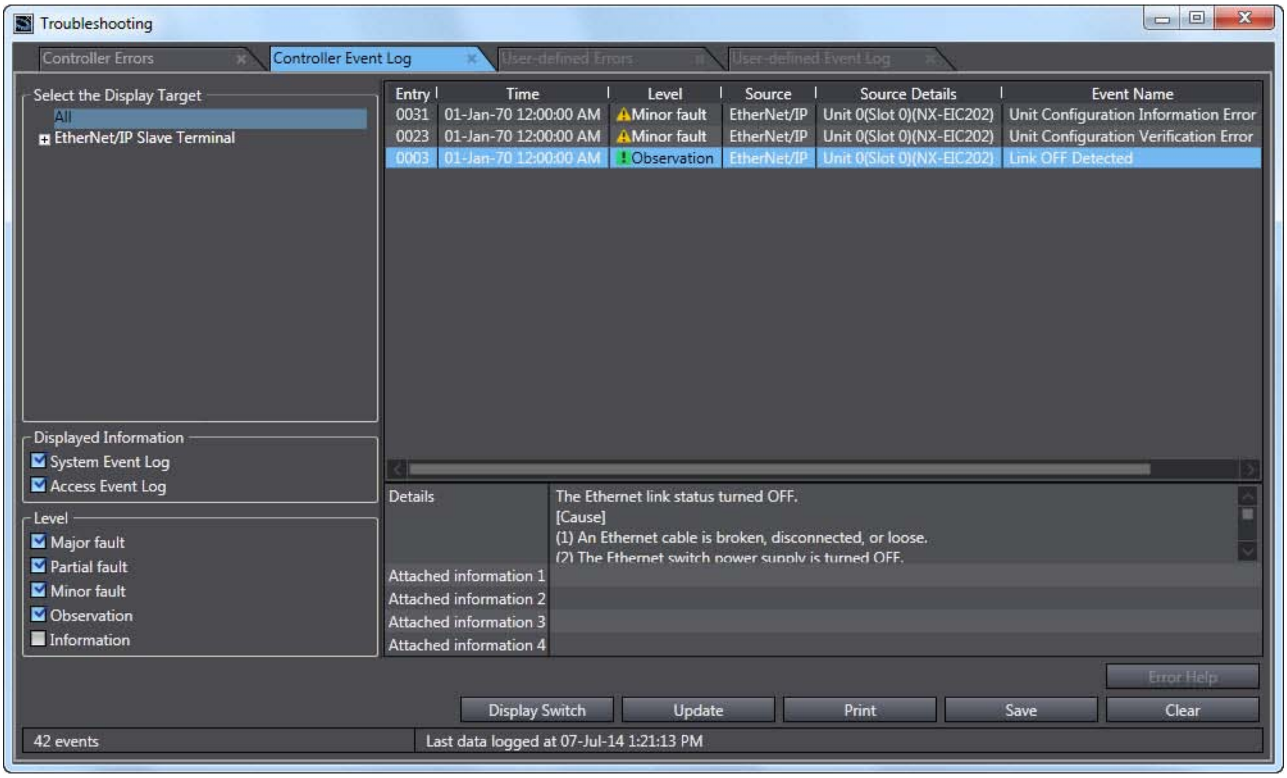


2 Click the **Controller Event Log** Tab.

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 Sysmac Studio is not used, the Sysmac Studio may not support some events. If unsupported events occur, *Unknown* is given for the source and *Unknown Event* is given for the event name. The event code and attached information are displayed correctly.
  Use the most recent version of the Sysmac Studio 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.

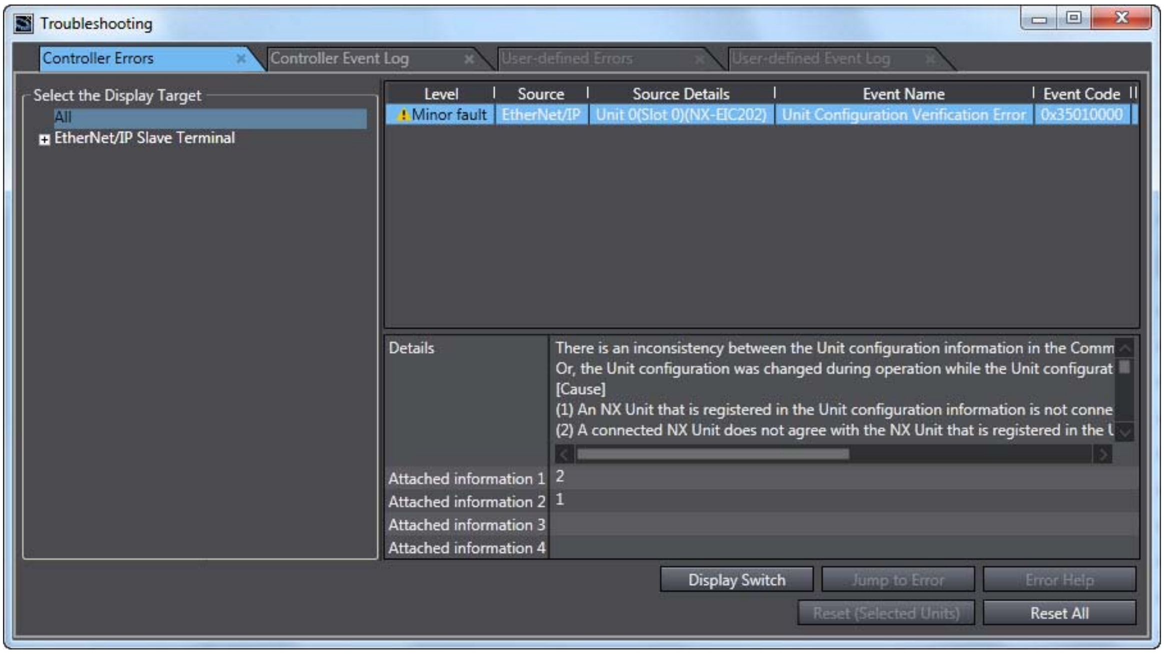
Sysmac Studio connection	Unit to clear log from	
	Clearing event logs in the entire EtherNet/IP Slave Terminal at once	Clearing events for specific Units
Peripheral USB port on EtherNet/IP Coupler Unit	• EtherNet/IP Slave Terminal	• EtherNet/IP Coupler Unit • NX Units

Procedure for Clearing Event Logs

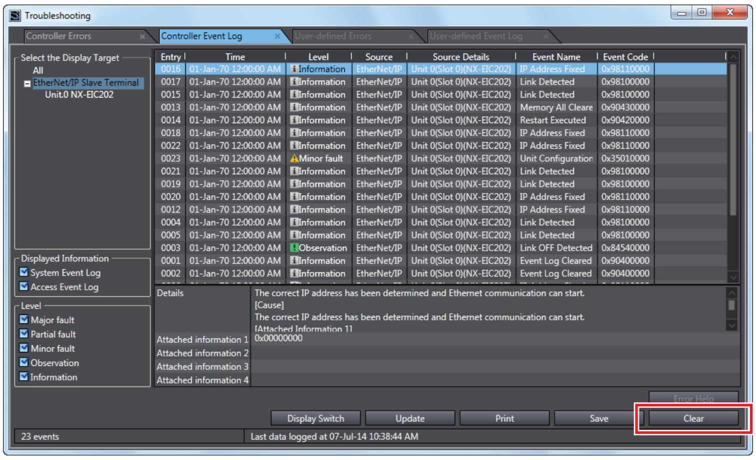
From the Controller Event Log Tab Page, you can clear the events for an entire Slave Terminal or the events for a specified EtherNet/IP Coupler Unit or NX Unit.

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.

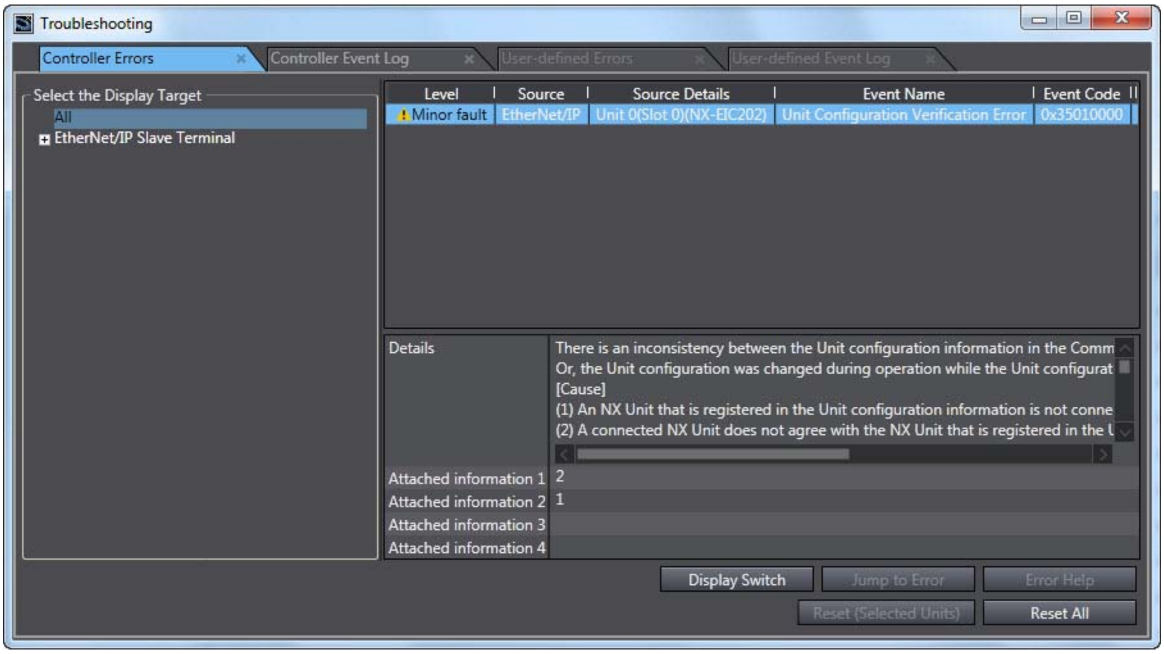
11-3-6 Exporting the Event Log

You can export the contents of the event log to a CSV file.

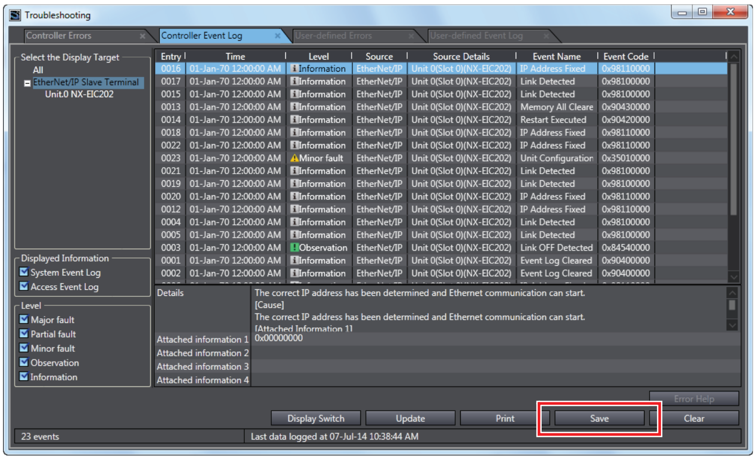
The event log for the EtherNet/IP Coupler Unit and NX Units is displayed as part of the Controller event log. Use the Sysmac Studio.

1 Select ***Troubleshooting*** from the Tools Menu while online. You can also click the **Trouble-shooting** 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 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 Sysmac Studio to clear the parameters of the connected NX-I/O Units.
- Sysmac Studio 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. 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.

Data	Status after Clear All Memory operation for each specification		
	Entire EtherNet/IP Slave Terminal	EtherNet/IP Coupler Unit	NX Unit
Unit operation settings	This data is set to the default settings.	This data is set to the default settings. 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.
NX Unit	Restarting the Slave Terminal or the NX Unit.*1

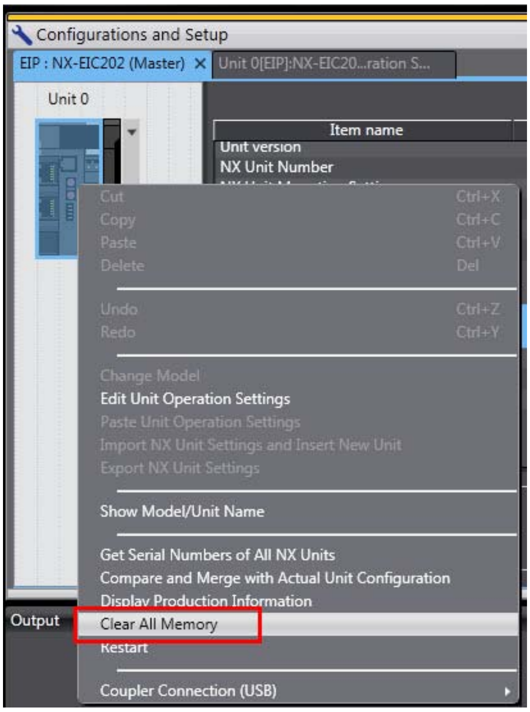
*1. The function to restart individual NX Units was added for a version upgrade.
The NX Unit is restarted if the unit versions of the NX Unit support restarting individual NX Units.
The Slave Terminal is restarted if the unit version of the NX Unit does not support restarting individual NX Units.

11-4-3 Procedure for Clearing All Memory

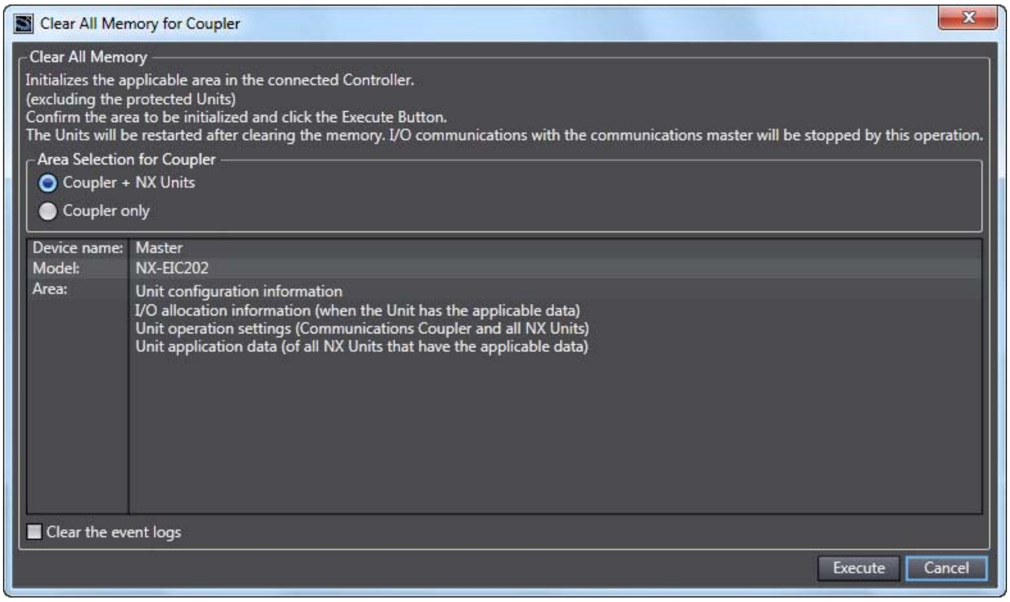
This section provides the procedure for the Clear All Memory operation.

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***.

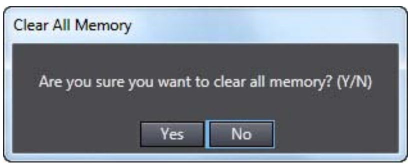


A Clear All Memory Dialog Box is displayed.



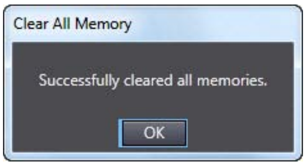
2 Make an area selection for coupler and click ***Execute***.

An execution confirmation dialog box is displayed.



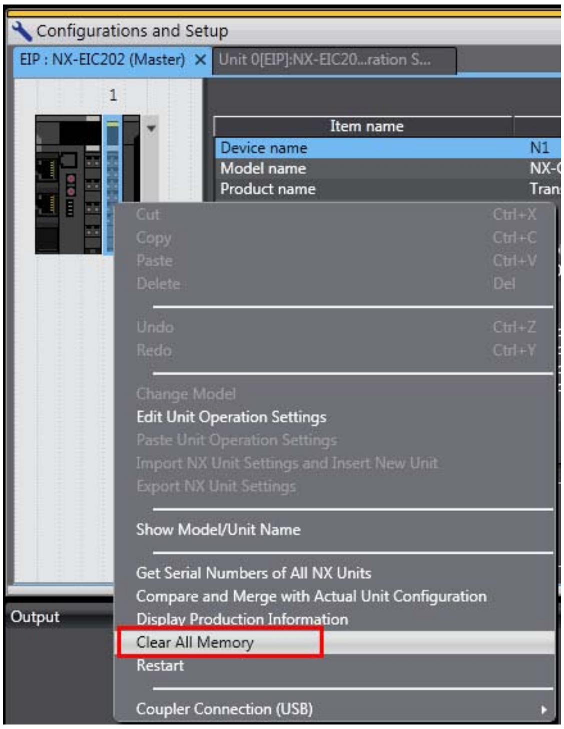
3 Click the **Yes** button.

After the memory is cleared, an automatic restart occurs and the memory all cleared dialog box is displayed.

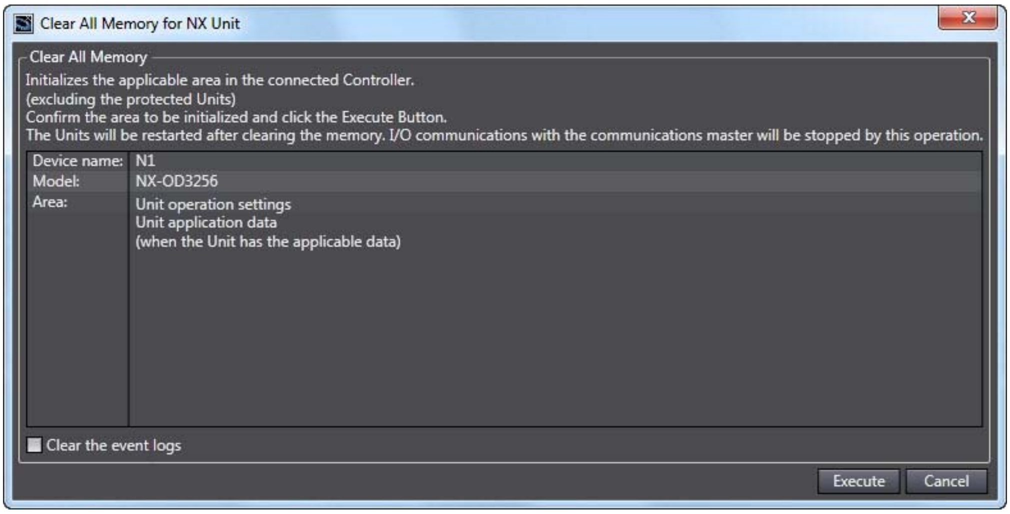


Clearing All Memory for NX Unit

1 Go online, right-click the NX Unit in the Edit Slave Terminal Configuration Tab Page, and select ***Clear All Memory***.

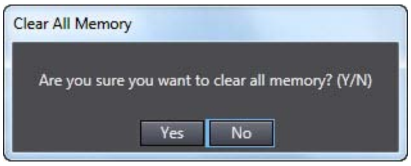


A Clear All Memory Dialog Box is displayed.



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.

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 Sysmac Studio 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 Sysmac Studio 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 Sysmac Studio 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 Sysmac Studio 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

This section provides the restart procedures for the Sysmac Studio.

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.

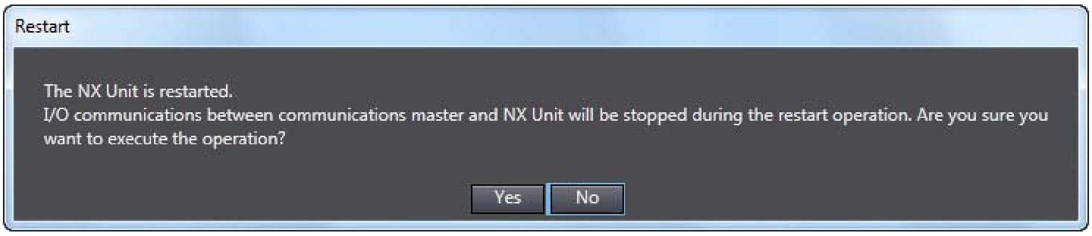
After the Units are restarted, a Restart Completion Dialog Box is displayed.

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.

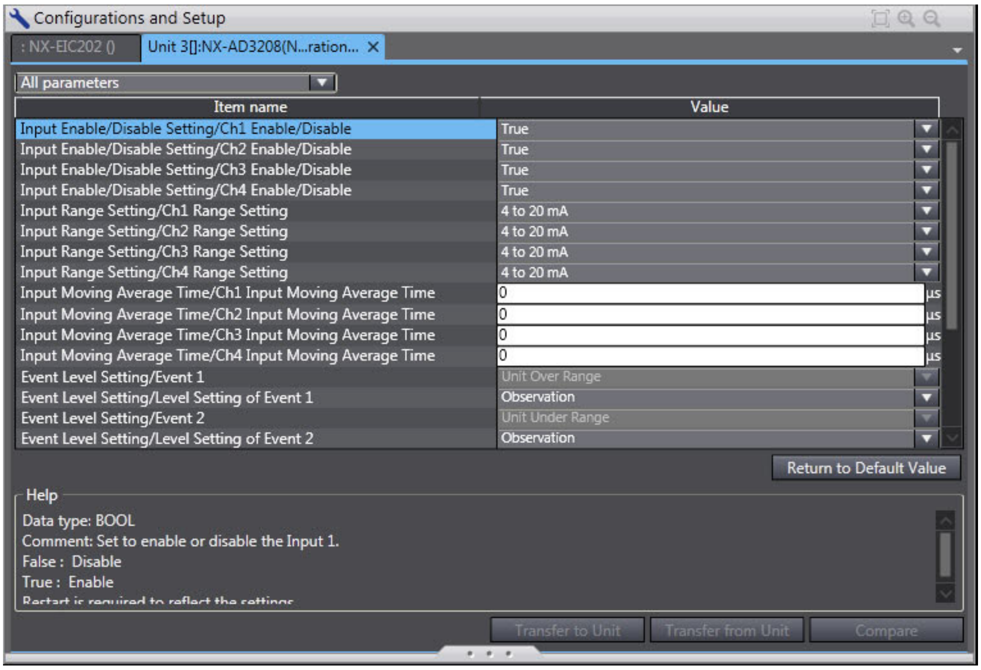
11-6-3 Procedure to Change an Event Level

Use the Sysmac Studio to change an event level.

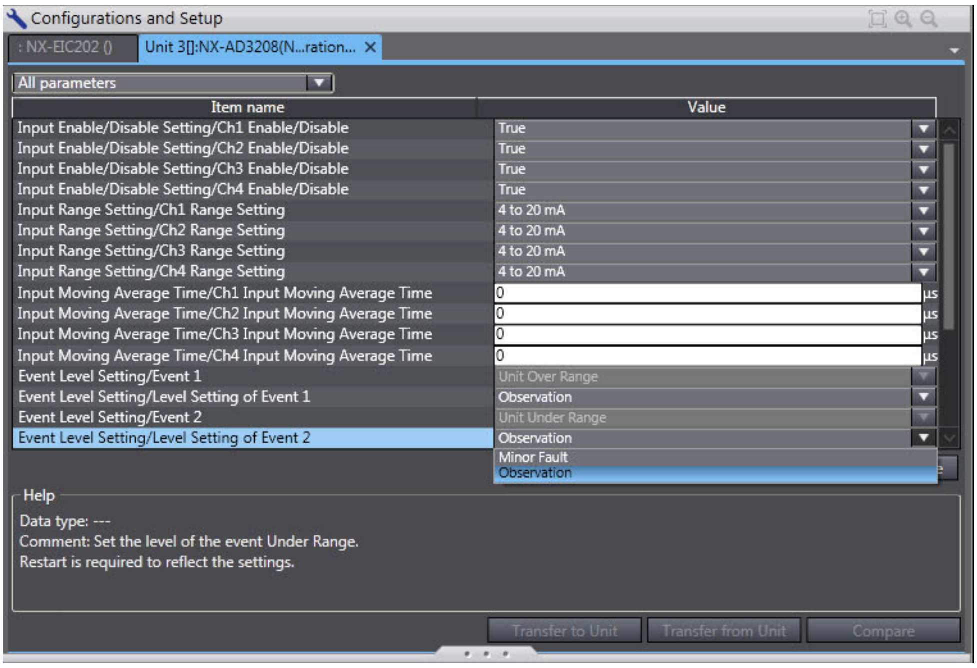
After you change an event level, always transfer the operation settings to the Controller.

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.

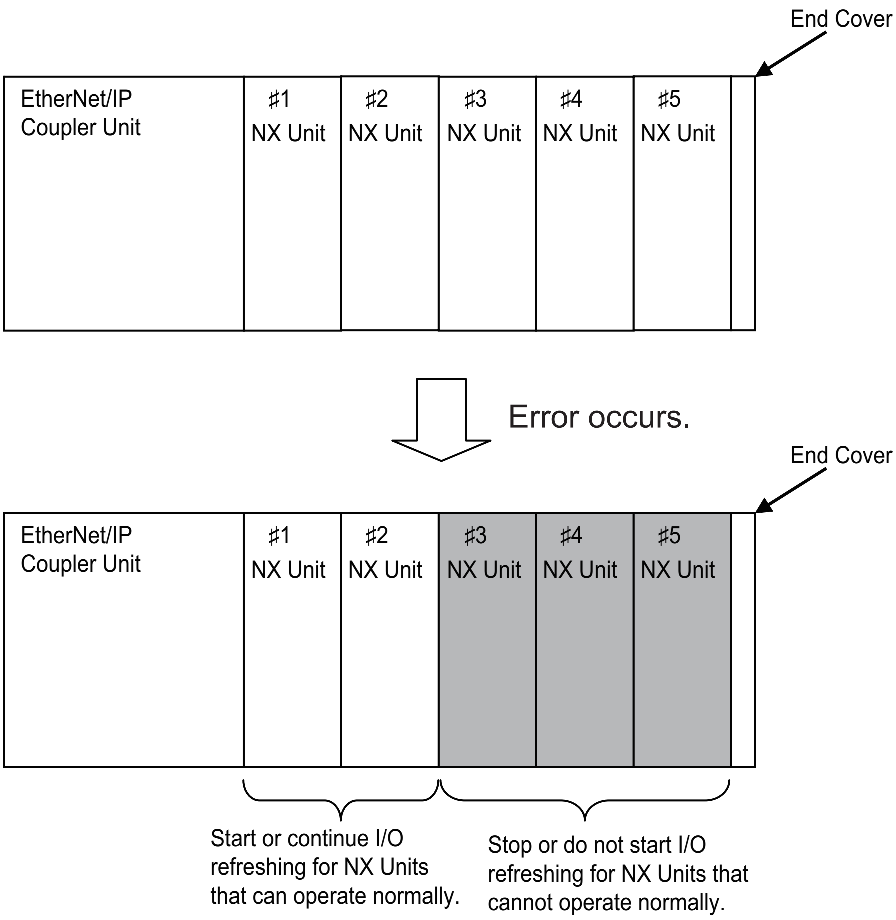
There are no events for the EtherNet/IP Coupler Unit for which you can change the event level.

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. 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. 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 Sysmac Studio 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 Sysmac Studio 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 11-28 for details on the operation for different error causes.

Refer to *Error Descriptions* on page 12-23 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*.	---
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. You can display these times on the Sysmac Studio.

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
	• 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
	• 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 Unit Production Information on the Sysmac Studio to check the total power-ON times of the EtherNet/IP Coupler Unit and NX Units.

For the procedure to check the Unit Production Information on the Sysmac Studio, refer to *Confirming Unit Versions with the Sysmac Studio* on page 25.

● 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 Sysmac Studio.

● 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 Sysmac Studio.

● Display When Reading the Time Failed

If reading the time failed, the total power-ON time is displayed as “---” on the Sysmac Studio.

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 12-2

12-2 Checking for Errors and Troubleshooting with the Indicators 12-3

12-2-1 Checking for Errors and Troubleshooting with the Indicators on the EtherNet/IP Coupler Unit 12-3

12-2-2 Checking for Errors and Troubleshooting with the Indicators on the NX Units 12-7

12-3 Checking for Errors and Troubleshooting with Software 12-8

12-3-1 Checking Status with the Network Configurator 12-8

12-3-2 Connection Status Codes and Troubleshooting 12-15

12-3-3 Checking for Errors from the Sysmac Studio 12-19

12-3-4 Event Codes for Errors and Troubleshooting Procedures 12-20

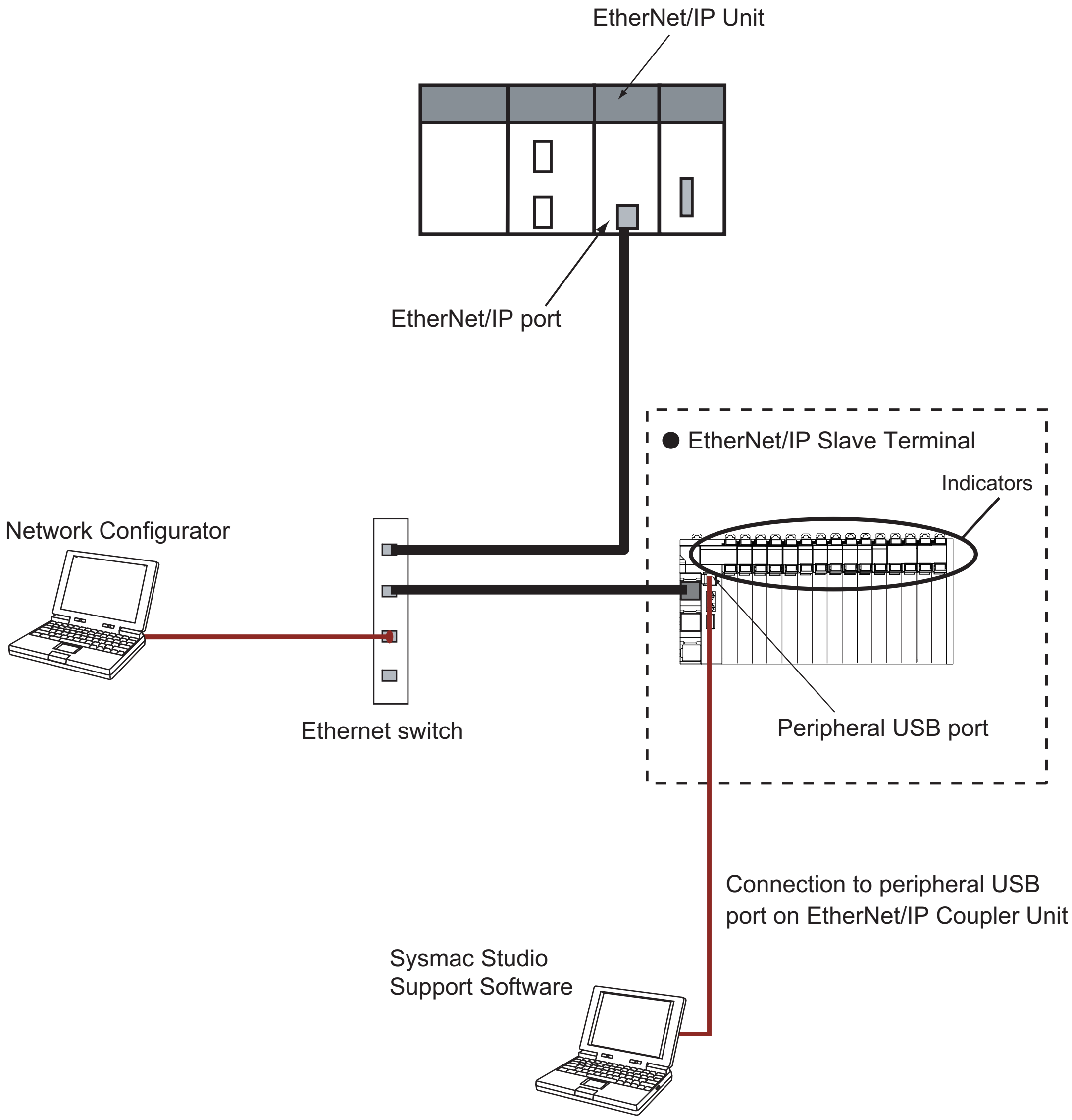
12-4 Resetting Errors 12-45

12-4-1 Procedure to Reset Errors 12-45

12-5 Troubleshooting Other Errors 12-48

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 Sysmac Studio and Network Configurator	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 Trouble-shooting 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 and NS indicators show the operating status of EtherNet/IP communications for the EtherNet/IP Coupler Unit.
NS	
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

Here, the following abbreviations are used to describe the status of the indicators.

Abbreviation	Indicator status
Lit	Lit.
Not Lit	Not lit.
FS ()	A flashing pattern other than flickering, blinking, single flash, and double flash. The numeric value in parenthesis is the interval.

● 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. • Restarting is in progress for the Unit. • Waiting for initialization to start.	Check the following items and make sure that power is correctly supplied from the Unit power supply. Checks Related to the Power Supply • Make sure that the power supply cable is wired properly. • Make sure that there are no breaks in the power supply cable. • Make sure that the power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • Make sure that the power supply has not failed. • Wait for the Unit to finish initializing. Check the UNIT PWR indicator for additional information.
FS (0.5 sec)	---	---	---	Restarting or initialization is in progress for the Slave Terminal.	--- (This is the normal status.)
Lit	---	Lit	---	Normal operation and online communication connection is established.	--- (This is the normal status.)
Lit	---	---	Lit	Fatal communication error. The unit detects that it cannot communicate on the network.	Check the following items. • IP address duplication
Lit	---	FS (0.5 sec)	---	No connection with an EtherNet/IP master has been established.	Wait for the EtherNet/IP master to initialize.
Lit	---	---	FS (0.5 sec)	EtherNet/IP I/O connection has timed out.	Check the following items. • Communication cable connections
---	Lit	Not Lit	Not Lit	Hardware failure	Cycle power to the Slave Unit. If cycling the power does not clear the error, replace the Slave Unit.
---	FS (0.5 sec)	---	---	Recoverable NX bus error.	Correct NX bus configuration and restart the unit.

● 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.)
FS (2.0 sec)	---	Initializing	--- (This status is normal. Wait until processing is completed)

TS		Cause	Corrective action
Green	Red		
FS (1.0 sec)	---	Communication not available for all NX Units	Check NX Unit mounting and make sure the NX Units mounted match the Slave Terminal configuration.
FS (0.5 s)	---	Unit configuration information is not set.	Promptly check whether the configuration is the intended configuration and then register the Unit configuration information on the Sysmac Studio.
---	Lit	Non-volatile Memory Checksum Error	If you turn OFF the power supply to the NX Unit or disconnect the Sysmac Studio 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 Unit	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 Sysmac Studio 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. • Make sure that the Unit that is connected is registered. • Make sure that the Unit that is registered is connected.
		Slave Unit Verification Error	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.
		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.
		Check the items described above. If this error occurs again even after you cycle the power supply, replace the EtherNet/IP Coupler Unit.	
---	FS (1.0 sec)	NX Unit Communications Timeout	Check the following items. • Make sure that the NX Unit is mounted correctly. If the error occurs again even after you make the above correction, replace the NX Unit.
		NX Unit Initialization Error	Connect the Sysmac Studio, 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. For an Analog I/O Unit, set the Channel Enable/Disable Setting to Enable for at least one channel. 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.

TS		Cause	Corrective action
Green	Red		
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. Checks Related to the Power Supply • Make sure that the power supply cable is wired properly. • Make sure that there are no breaks in the power supply cable. • Make sure that the power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • Make sure that the power supply has not failed. • Wait for the Unit to finish initializing. Check the MS and NS indicators for additional information. 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.)
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. Checks related to the Power Supply • Make sure that the power supply cable is wired properly. • Make sure that there are no breaks in the power supply cable. • Make sure that the power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • 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	Cause	Corrective action
Green		
Lit	---	--- (This is the normal status.)

I/O PWR Green	Cause	Corrective action
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. Checks related to the I/O Supply • Make sure that the power supply cable is wired properly. • Make sure that there are no breaks in the power supply cable. • Make sure that the power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • 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 L/A P2 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.)
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. Items Related to the Communications Cable • Make sure that the communications cable is wired properly. • Make sure that there are no breaks in the communications cable or loosening in the mating parts. • Make sure that the cable is of the appropriate length. • Make sure that the communications cable meets the recommended specifications.
	The host master is not operating.	Make sure that the operation of the EtherNet/IP master is correct.
	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 Software

Sysmac Studio and Network Configurator 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 software.

Software Used	Troubleshooting Function
Network Configurator	The following troubleshooting functions are available with Network Configurator Software. These are functions of the EtherNet/IP Unit. • Ethernet Status • Data Link Status • Configuration Error Status • Target Node Status • Target Controller Status • Connection Status • Controller Log • Tag Status • Ethernet Information
Sysmac Studio	The following troubleshooting functions are available with Sysmac Studio • Check errors managed by the EtherNet/IP Coupler Unit*1 • 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.

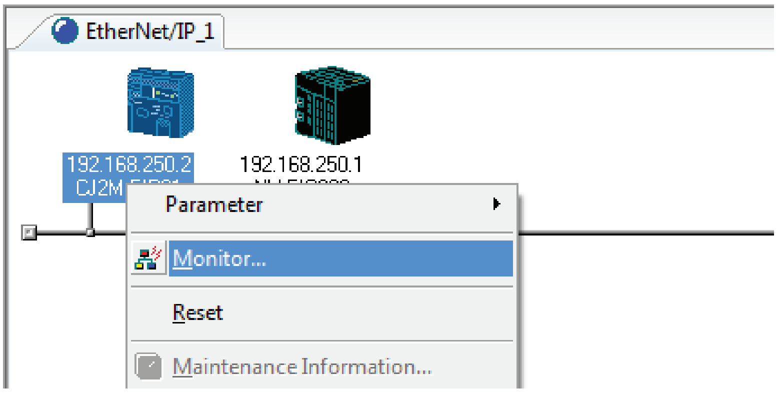
*2. On NX Units that manage their own errors, current errors cannot be checked after a fatal error occurs in that NX Unit. On NX Units that record their own event logs, the error log cannot be checked after a fatal error occurs in that NX Unit.

12-3-1 Checking Status with the Network Configurator

The EtherNet/IP Unit provides status information with the Network Configurator.

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.

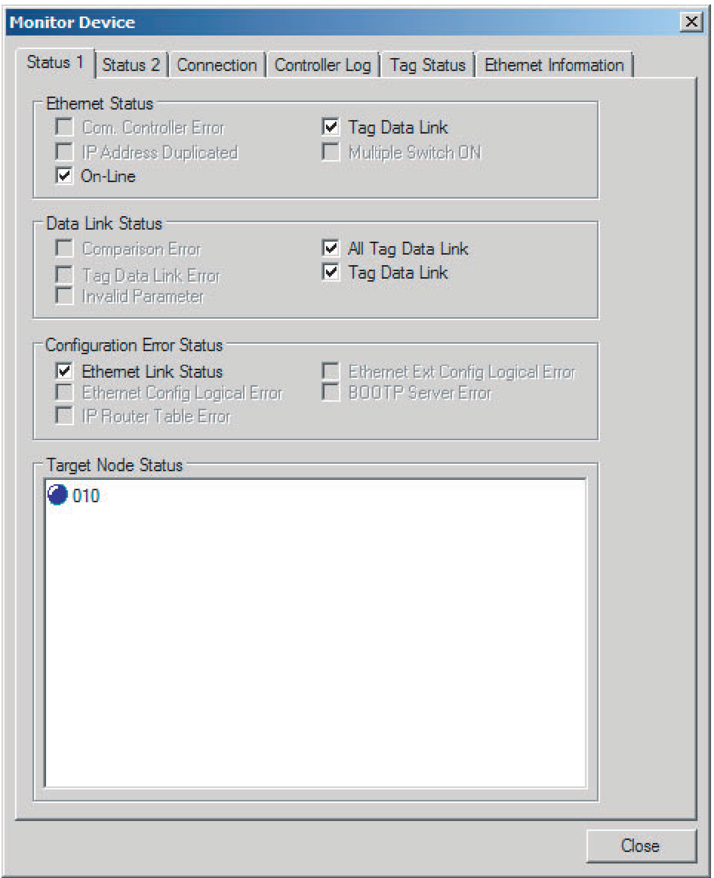
● Status 1 Tab Page

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: • The originator is set up and the power supply is turned ON. • 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. Main causes: •The specified target does not exist. •The variable name does not match. •The connection size is different. •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.

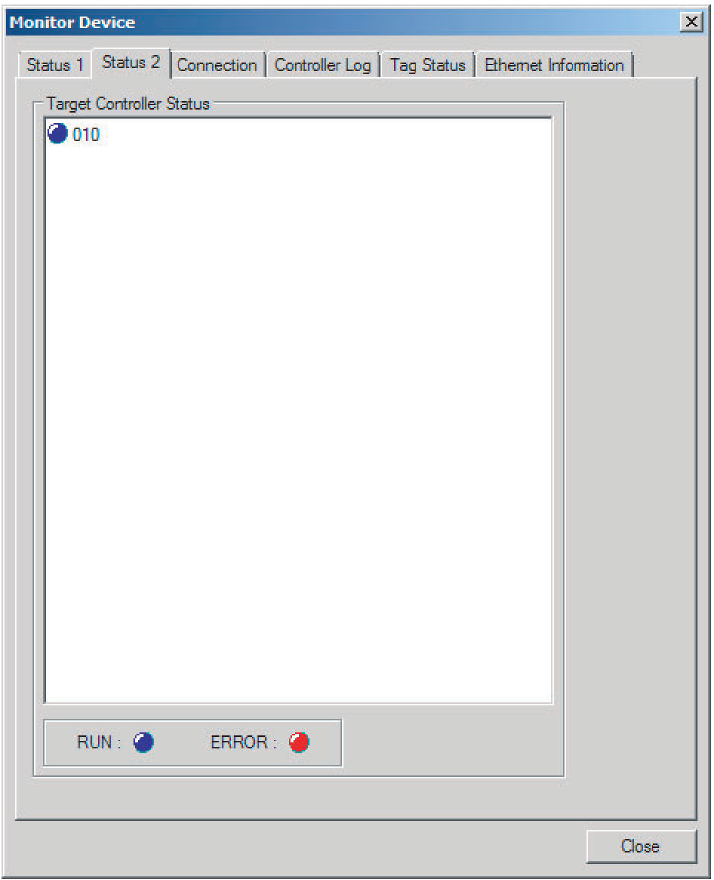
Classification	Item	Description
Configuration Error Status	Ethernet Link Status	TRUE when a link is established with the Ethernet switch.
	Ethernet Basic Settings Logic Error	TRUE when the following settings are incorrect: • TCP/IP settings (IP address, subnet mask, or link settings)
	IP Router Table 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. • The IP address received from the BOOTP server is incorrect. • 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.

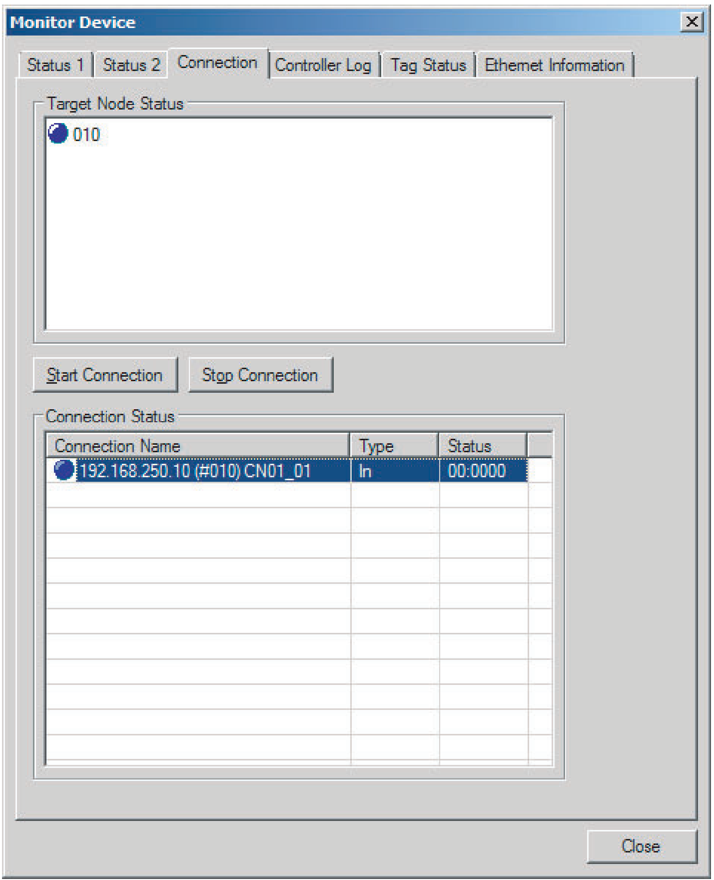


Additional Information

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.

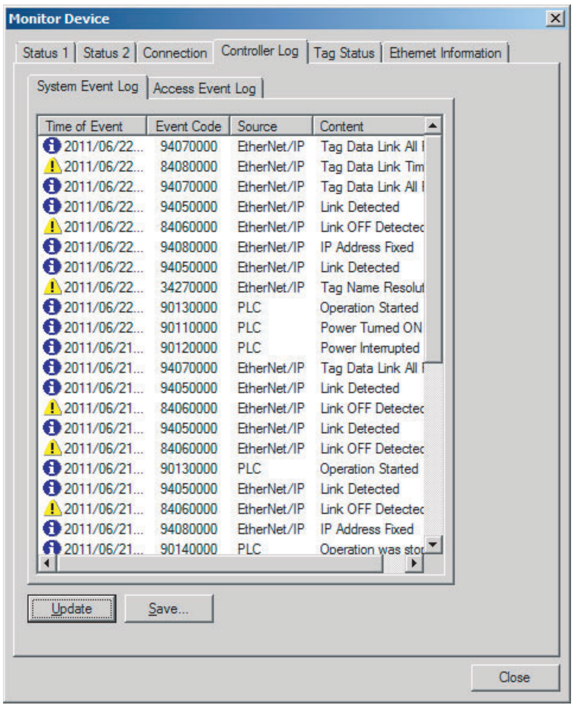
● Connection Tab Page

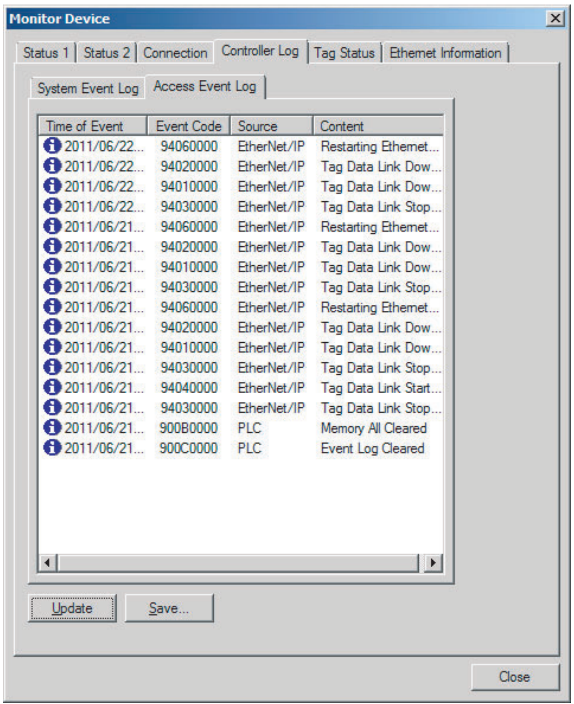
Information about the target node that acts as the originator is displayed. If all tag data link connections to the node are established and normal, this information is displayed in blue. However, if any connection is broken it is displayed in red. However, this information is displayed in gray if the 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 12-15 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.



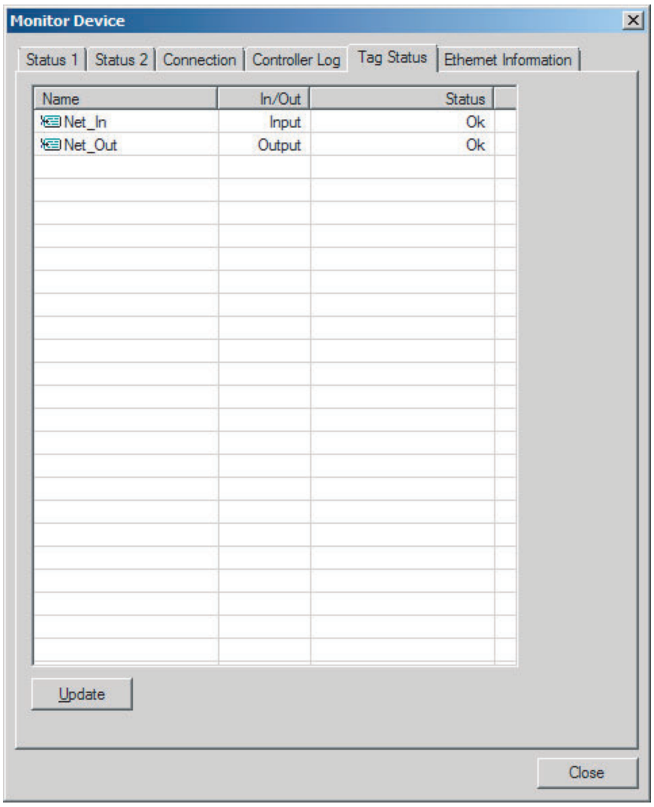


● Tag Status Tab Page

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.

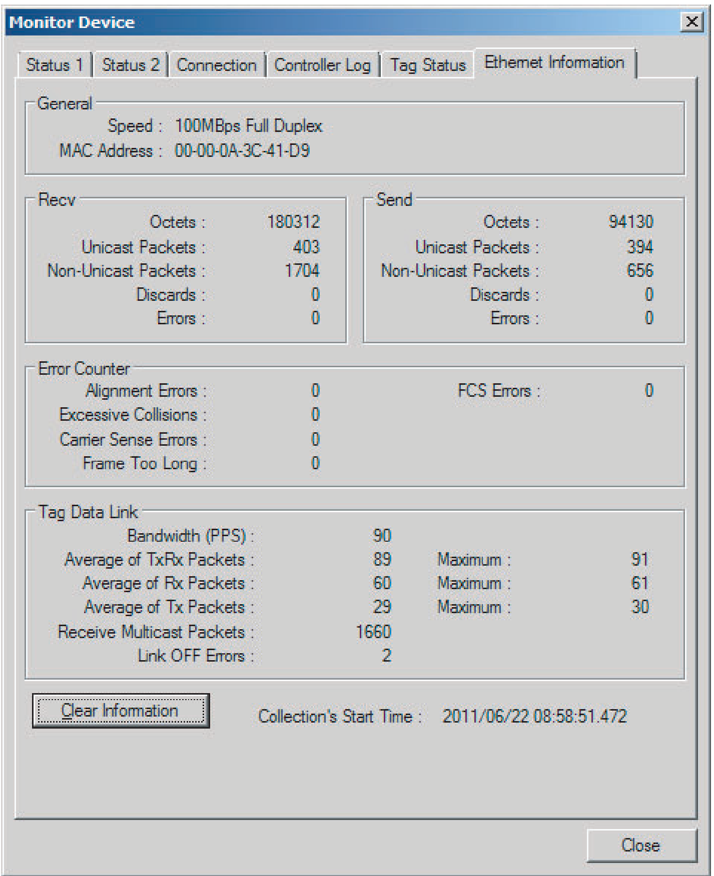
- Normal resolution completed: Normal data exchange is possible.
- Resolving: The variables with tags are being resolved. When the resolution is completed normally, a connection will be established and the data exchange will start.
- Size does not match error: Different sizes are set for the network 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 12-8 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, and CJ2M-CPU3☐	CJ1W-EIP21, CJ2H-CPU☐☐-EIP, and CJ2M-CPU3☐
Configuration 2	CJ1W-EIP21, CJ2H-CPU☐☐-EIP, and CJ2M-CPU3☐	Products from other manufacturers
Configuration 3	Products from other manufacturers	CJ1W-EIP21, CJ2H-CPU☐☐-EIP, and CJ2M-CPU3☐

Connection status		Source of error	Handling		
General Status (hex)	Additional Status (hex)		Configuration 1	Configuration 2	Configuration 3
00	0000	Normal status code: The connection has been opened and the tag data link is communicating normally.	---	---	---
01	0100	Error code returned from target: Attempted to open multiple connections for the same connection.	This error does not occur.	Depends on the target's specifications. (This error should not occur. If is does, contact the target device's manufacturer.)	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: Attempted to open a connection with an unsupported transport class.	This error does not occur.	Confirm that the target supports Class 1.	Confirm that the originator supports Class 1.
01	0106	Duplicate consumers: 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.	Depends on the target's specifications. (Contact the target device's manufacturer.)	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: Attempted to close a connection, but that connection was already closed.	This error does not occur.	This error does not occur.	This is not an error because the connection is already closed.
01	0108	Error code returned from target: Attempted to open a connection with an unsupported connection type.	This error does not occur.	Check which connection types can be used by the target. (Contact the manufacturer.) Only multicast and point-to-point connections can be set.	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.)

Connection status		Source of error	Handling		
General Status (hex)	Additional Status (hex)		Configuration 1	Configuration 2	Configuration 3
01	0109	Error code returned from target: 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 9-39.		
01	0110	Error code returned from target: 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.)	Depends on the target's specifications. (Contact the target device's manufacturer.)	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: The RPI was set to a value that exceeds the specifications.	This error does not occur.	Check the target's RPI setting specifications.	Set the originator's RPI setting to 10 seconds or less.
01	0113	Error code generated by originator or returned from target: 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.	Check the connection settings (number of connections) at the originator and target. Check the connection specifications for devices from other manufacturers.
01	0114	Error code returned from target: The Vendor ID and Product Code did not match when opening connection.	This error does not occur.	Depends on the target's specifications. (Contact the target device's manufacturer.) Check that the target device's EDS file is correct.	Check the originator's connection settings.
01	0115	Error code returned from target: The Product Type did not match when opening connection.	This error does not occur.	Depends on the target's specifications. (Contact the target device's manufacturer.) Check that the target device's EDS file is correct.	Check the originator's connection settings.
01	0116	Error code returned from target: 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.	Depends on the target's specifications. (Contact the target device's manufacturer.) Check that the target device's EDS file is correct.	Check the originator's connection settings.
01	0117	Error code returned from target: 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.	Depends on the target's specifications. (Contact the target device's manufacturer.)	Check the originator's connection settings. Check whether the target tag sets and tags are set correctly.
01	011A	Error code generated by originator: 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.	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.)

Connection status		Source of error	Handling		
General Status (hex)	Additional Status (hex)		Configuration 1	Configuration 2	Configuration 3
01	011B	Error code returned from target: The RPI was set to a value that is below the specifications.	This error does not occur.	Depends on the target's specifications. (Contact the target device's manufacturer.)	Set the originator's RPI setting to 1 ms or greater.
01	0203	Error code generated by originator: 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.		
01	0204	Error code generated by originator: 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: There was a parameter error in the frame used to open the connection.	This error does not occur.	Depends on the target's specifications. (Contact the target device's manufacturer.)	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	0302	Error code generated by originator or returned from target: 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 target's connection settings (number of connections and RPI). 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: There was a parameter error in the frame used to open the connection.	This error does not occur.	Depends on the target's specifications. (Contact the target device's manufacturer.)	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	0312	Error code returned from target: There was a parameter error in the frame used to open the connection.	This error does not occur.	Depends on the target's specifications. (Contact the target device's manufacturer.)	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	0315	Error code returned from target: There was a parameter error in the frame used to open the connection.	This error does not occur.	Depends on the target's specifications. (Contact the target device's manufacturer.)	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	0316	Error code returned from target: There was a parameter error in the frame used to close the connection.	This error does not occur.	Depends on the target's specifications. (Contact the target device's manufacturer.)	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	031C	Error code generated by originator: Some other error occurred.	This error does not occur.	The originator generates this code when an unsupported response code is returned from the target in reply to an open request.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
08	---	Error code returned from target: There is no Forward Open or Large Forward Open service in the target device.	This error does not occur.	Depends on the target's specifications. (Contact the target device's manufacturer.)	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**	**Configuration 3**
D0	0001	Error code generated by originator: 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*.	The meaning of this error code is defined by each vendor, so it depends on the target's specifications. (Contact the target device's manufacturer.)	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
D0	0002	Error code generated by originator: The connection is being opened (opening processing in progress).	Wait until the opening processing is completed.	The meaning of this error code is defined by each vendor, so it depends on the target's specifications. (Contact the target device's manufacturer.)	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
OMRON error code					
01	0810	Error code returned from target: 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 target's specifications. (Contact the target device's manufacturer.)	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: 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 target's specifications. (Contact the target device's manufacturer.)	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

Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual* (Cat. No. W465) for more information on Error Log Functions.

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. 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. 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 *12-3-4 Event Codes for Errors and Troubleshooting Procedures* on page 12-20 for details on event codes.

12-3-4 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 Communication Coupler Unit and the NX Unit.			√			P. 12-24
00220000 hex	Non-volatile Memory Hardware Error	An error occurred in non-volatile memory.	• Non-volatile memory failure			√			P. 12-25
10420000 hex	Non-volatile Memory Control Parameter Error	An error occurred in the control parameters.	• The power supply to an NX Unit was turned OFF or Sysmac Studio communications were disconnected during a writing of the control parameters.			√			P. 12-25
10430000 hex	Memory Corruption Detected	Memory corruption was detected.	• Memory corruption was detected.			√			P. 12-26
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 Communication Coupler Unit.			√			P. 12-26
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. • The total byte size of all I/O data for the connected NX Units exceeds 512 bytes for input data or 512 bytes for output data.			√			P. 12-27
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.			√			P. 12-28
84530000 hex	NTP Server Connection Error	Connection with NTP server failed.	• Parameter error. • Server is down. • An error occurred in the communications path.				√		P. 12-29

Event code	Event name	Meaning	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
35500000 hex	TCP/IP Basic Setting Error (Local IP Address)	An error was detected in the IP address settings.	• Ip address setting error or power was interrupted when a download was in progress for TCP/IP basic settings.			√			P. 12-30
35510000 hex	NTP Client Setting Error	An error was detected in the NTP client settings.	• Power was interrupted when a download was in progress for the NTP client settings				√		P. 12-31
84540000 hex	Link OFF Detected	The Ethernet link status turned OFF.	• An Ethernet cable is broken, disconnected, or loose. • The Ethernet switch power supply is turned OFF. • Link speed mismatch. • Noise.				√		P. 12-32
98100000 hex	Link Detected	The establishment of an Ethernet link was detected.	• The establishment of an Ethernet link was detected.					√	P. 12-33
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					√	P. 12-33
35000000 hex	Unit Configuration Information Error	An error occurred in the Unit configuration information in the Communication Coupler Unit.	• The power supply to the Communication Coupler Unit was turned OFF or Sysmac Studio communications were disconnected during a downloading of the Unit configuration information.			√			P. 12-34
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. • A connected NX Unit does not agree with the NX Unit that is registered in the Unit configuration information. • An NX Unit that is not registered in the Unit configuration information is connected. • A Unit that is disabled in the Unit configuration information is mounted. • An NX Unit became disconnected during operation. • An NX Unit was connected during operation. • 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*.) • The version of a Unit that is registered in the Unit configuration information is newer than the version of the Unit that is connected. • The power supply to an Additional NX Unit Power Supply Unit is not turned ON.			√			P. 12-35

Event code	Event name	Meaning	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
84C0 0000 hex	NX Unit Communications Timeout	An error occurred in I/O data communications with the NX Units.	• An NX Unit is not mounted properly. • An NX Unit has failed.			√			P. 12-38
84C1 0000 hex	NX Unit Initialization Error	Initializing an NX Unit failed.	• An error occurred in processing the Communication Coupler Unit. • An initialization error occurred in an NX Unit. • The Channel Enable/Disable Setting for all channels of the Analog Input Unit are set to *Disable*. The Enabled Channel Settings for all channels of the Analog Output Unit are set to *Disable*.			√			P. 12-39
84C5 0000 hex	NX Unit Startup Error	Starting an NX Unit failed.	• A startup error occurred in an NX Unit.			√			P. 12-40
350E 0000 hex	NX Bus Cycle Delay Detected	Exceeding the NX bus cycle was detected.	• The NX bus cycle was exceeded.				√		P. 12-41
8022 0000 hex	NX Message Communications Error	An error was detected in message communications and the message frame was discarded.	• The message communications load is high. • The communications cable is disconnected or broken. • Message communications were cut off as the result of executing a synchronization or restoration operation on the Sysmac Studio or as the result of disconnecting an EtherNet/IP slave.				√		P. 12-42
9040 0000 hex	Event Log Cleared	The event log was cleared.	• The event log was cleared by the user.					√	P. 12-43
9042 0000 hex	Restart Executed	A restart was executed.	• A restart command was received.					√	P. 12-43
9043 0000 hex	Memory All Cleared	The Unit settings were cleared.	• The Clear All Memory operation was executed.					√	P. 12-44

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="4">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="7">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 colspan="2">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 colspan="2">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="4">Provides special information on the operation that results from the error.</td></tr>
<tr><td>Indicators</td><td colspan="7">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 colspan="2">Data type</td><td colspan="3">Name</td></tr>
<tr><td colspan="7">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 colspan="2">Correction</td><td colspan="3">Prevention</td></tr>
<tr><td colspan="7">Lists the possible causes, corrections, and preventive measures for the error.</td></tr>
<tr><td>Attached information</td><td colspan="7">This is the attached information that is displayed by the Sysmac Studio.</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="7">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

<table>
<tr><td>Event name</td><td colspan="3">Bus Controller Error</td><td>Event code</td><td colspan="2">00210000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">An internal bus error occurred.</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 during NX bus communications</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.</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">A Unit failed or an I/O communications error occurred between the Communication Coupler Unit and the NX Unit.</td><td colspan="2">Mount the NX Units and End Cover securely and secure them with End Plates.
Cycle the power supply to the Communication Coupler Unit.
If the error occurs again even after you make the above correction, replace the Communication Coupler Unit.</td><td colspan="2">None</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	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. I/O refreshing for the NX Units in the Slave Terminal stops. Messages cannot be sent to the NX Units in the Slave Terminal.		
Sys-tem-defined variables	**Variable**		**Data type**		**Name**	
	None		---		---	
Cause and correction	**Assumed cause**		**Correction**		**Prevention**	
	Non-volatile memory failure		Replace the Communication Coupler Unit.		None	
Attached information	None					
Precautions/ Remarks	None					

Event name	Non-volatile Memory Control Parameter Error			**Event code**	10420000 hex	
Meaning	An error occurred in the control parameters.					
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**	I/O refreshing for the NX Units in the Slave Terminal stops. Messages cannot be sent to the NX Units in the Slave Terminal.		
Sys-tem-defined variables	**Variable**		**Data type**		**Name**	
	None		---		---	
Cause and correction	**Assumed cause**		**Correction**		**Prevention**	
	The power supply to an NX Unit was turned OFF or Sysmac Studio communications were disconnected during a writing of the control parameters.		Write the control parameters again.		Do not turn OFF the power supply to an NX Unit or disconnect Sysmac Studio communications during a writing of the control parameters.	
Attached information	None					
Precautions/ Remarks	None					

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 Communication Coupler Unit. If this error occurs again even after you cycle the power supply, replace the Communication 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 Communication 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	The Slave Terminal stops in Pre-Operational state. 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	
	More than the maximum number of NX Units is connected to the Communication Coupler Unit.		Reduce the number of NX Units that are connected to the maximum number or fewer.		Configure the Slave Terminal 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 Communication 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**	The Slave Terminal stops in Pre-Operational state. 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 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 Communication Coupler Unit.	
	The total byte size of all I/O data for the connected NX Units exceeds 1,024 bytes for input data or 1,024 bytes for output data.		Configure the NX Units so that the total byte size of all I/O data for the connected NX Units does not exceed 512 bytes for input data or 512 bytes for output data.		Configure the NX Units so that the total byte size of all I/O data for the connected NX Units does not exceed 512 bytes for input data or 512 bytes for output data.	
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">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>Communication Coupler Unit</td><td>Detection timing</td><td>After link is established</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="2">Effects</td><td rowspan="2">User program</td><td rowspan="2">Continues.</td><td rowspan="2">Operation</td><td colspan="3">When Fail-soft Operation Is Set to Fail-soft
• EtherNet/IP Coupler Unit, EtherNet/IP Communications
Ethernet communication stops.
• NX Bus
(1) NX Safety Standalone mode
I/O refreshing to the NX Units continues.
(2) Remote I/O mode.
I/O refreshing to the NX Units stops.
Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td colspan="3">When Fail-soft Operation Is Set to Stop
• EtherNet/IP Coupler Unit, EtherNet/IP Communications
Ethernet communication stops.
• NX Bus
(1) NX Safety Standalone mode
I/O refreshing to the NX Units stops.
(2) Remote I/O mode.
I/O refreshing to the NX Units 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 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 reset the EtherNet/IP Coupler Unit.
• 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.
• Remove the node that has the duplicate IP address from the network.</td><td colspan="2">Perform allocations so that IP addresses of nodes on the network are used for only one node.</td></tr>
<tr><td>Attached information</td><td colspan="6">None</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">A duplicated address error occurs if an ARP is sent with the set IP address and there is an ARP response.</td></tr>
</table>

<table>
<tr><th>Event name</th><td colspan="3">NTP Server Connection Error</td><th>Event code</th><td colspan="2">84530000 hex</td></tr>
<tr><th>Meaning</th><td colspan="6">The connection with the NTP server failed.</td></tr>
<tr><th>Source</th><td colspan="2">EtherNet/IP</td><th>Source details</th><td>Communication Coupler Unit</td><th>Detection timing</th><td>At NTP operation</td></tr>
<tr><th>Error attributes</th><th>Level</th><td>Observation</td><th>Recovery</th><td>Automatic recovery (after downloading the NTP settings)</td><th>Log category</th><td>System</td></tr>
<tr><th>Effects</th><th>User program</th><td>Continues.</td><th>Operation</th><td colspan="3">Time cannot be acquired from NTP.</td></tr>
<tr><th rowspan="2">System-defined variables</th><th colspan="2">Variable</th><th colspan="2">Data type</th><th colspan="2">Name</th></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><th rowspan="4">Cause and correction</th><th colspan="2">Assumed cause</th><th colspan="2">Correction</th><th colspan="2">Prevention</th></tr>
<tr><td colspan="2">Parameter error</td><td colspan="2">If there is a mistake with the specifications of the connected server, correct the server specifications and download them again.</td><td colspan="2">Make sure that the connected server is specified correctly.</td></tr>
<tr><td colspan="2">Server is down</td><td colspan="2">Check if the server at the remote connection is operating normally and set it to operate normally if it is not.</td><td colspan="2">Check to make sure that the server at the remote connection is operating normally.</td></tr>
<tr><td colspan="2">An error occurred in the communications path.</td><td colspan="2">Check the communications path to the server and take corrective measures if there are any problems.</td><td colspan="2">None</td></tr>
<tr><th>Attached information</th><td colspan="6">None</td></tr>
<tr><th>Precautions/ Remarks</th><td colspan="6">None</td></tr>
</table>

<table>
<tr><td>Event name</td><td colspan="3">TCP/IP Basic Setting Error (Local Port 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>Communication 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 rowspan="2">Effects</td><td rowspan="2">User program</td><td rowspan="2">Continues.</td><td rowspan="2">Operation</td><td colspan="3">When Fail-soft Operation Is Set to Fail-soft
• EtherNet/IP Coupler Unit, EtherNet/IP Communications
Ethernet communication stops.
• NX Bus
(1) NX Safety Standalone mode
I/O refreshing to the NX Units continues.
(2) Remote I/O mode.
I/O refreshing to the NX Units stops.
Messages cannot be sent to the NX Units in the Slave Terminal.</td></tr>
<tr><td colspan="3">When Fail-soft Operation Is Set to Stop
• EtherNet/IP Coupler Unit, EtherNet/IP Communications
Ethernet communication stops.
• NX Bus
(1) NX Safety Standalone mode
I/O refreshing to the NX Units stops.
(2) Remote I/O mode.
I/O refreshing to the NX Units 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">IP address setting error or power was interrupted when a download was in progress for the TCP/IP basic setting</td><td colspan="2">Perform either of the following and then cycle the power supply to the EtherNet/IP Coupler Unit or reset the EtherNet/IP Coupler Unit.
• Identify the error from the attached information, correct the setting, and then download the settings again.
• Perform the Memory All Clear operation or download the settings again.</td><td colspan="2">Verify the IP address settings before download.
Make sure the power supply to the EtherNet/IP Coupler is stable during download.</td></tr>
<tr><td>Attached information</td><td colspan="6">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)</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">None</td></tr>
</table>

Event name	NTP Client Setting Error			Event code	35510000 hex	
Meaning	An error was detected in the NTP client settings					
Source	EtherNet/IP		Source details	Communication Coupler Unit	Detection timing	At power ON or Slave Terminal reset
Error attributes	Level	Observation	Recovery	Cycle power to the EtherNet/IP Coupler Unit or restart the Slave Terminal.	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	
	Power was interrupted when a download was in progress for the NTP client settings.		Perform either of the following and then cycle the power supply to the EtherNet/IP Coupler Unit or reset the EtherNet/IP Coupler Unit. • Identify the error, correct the setting, and then download the settings again. • Perform the Memory All Clear operation or download the settings again.		Verify the NTP client settings before download. Make sure the power supply to the EtherNet/IP Coupler is stable during download.	
	Memory error					
Attached information	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	None					

Event name	Link OFF Detected			Event code	84540000 hex	
Meaning	The Ethernet link status turned OFF					
Source	EtherNet/IP		Source details	Communication Coupler Unit	Detection timing	After link is established
Error attributes	Level	Observation	Recovery	Automatic 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	
	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.		Correct the settings so that the same link speed is used as for the remote communication nodes.		Set the same link speed as for the remote communications nodes.	
	Noise		Implement noise countermeasures if there is excessive noise.		Implement noise countermeasures.	
	One of the following operations was performed. • The Identity object was reset. • Settings were downloaded from the Network Configurator and EtherNet/IP was restarted.		None This error occurs when the operations on the left are performed.		None This error occurs when the operations on the left are performed.	
Attached information	None					
Precautions/ Remarks	None					

Event name	Link Detected			**Event code**	98100000 hex	
Meaning	Establishment of an Ethernet link was detected					
Source	EtherNet/IP		**Source details**	Communication Coupler Unit	**Detection timing**	When establishing link
Error attributes	**Level**	Information	**Recovery**	Automatic 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**	Communication Coupler Unit	**Detection timing**	At power ON or Slave Terminal reset
Error attributes	**Level**	Information	**Recovery**	Automatic 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	The configured IP address can be retrieved here if the IP address is unknown.					

Event name	Unit Configuration Information Error			**Event code**	35000000 hex	
Meaning	An error occurred in the Unit configuration information in the EtherNet/IP 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**	The Slave Terminal stops in Pre-Operational state. 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**	
	The power supply to the Communication Coupler Unit was turned OFF or Sysmac Studio communications were disconnected during a downloading of the Unit configuration information.		Clear all of memory in the Communication Coupler Unit, and then download the Unit configuration information again.		Do not turn OFF the power supply to the Communication Coupler Unit or disconnect Sysmac Studio communications during a downloading of the Unit configuration information.	
Attached information	None					
Precautions/ Remarks	None					

Event name	Unit Configuration Verification Error			**Event code**	35010000 hex	
Meaning	There is an inconsistency between the Unit configuration information in the Communication 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 Communication Coupler Unit.					
Source	EtherNet/IP		**Source details**	EtherNet/IP Coupler Unit	**Detection timing**	When power is turned ON to the EtherNet/IP Coupler Unit, when the Slave Terminal is restarted, or during NX bus communications
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* and Fail-soft Operation Is Possible • EtherNet/IP Coupler Unit, NX Bus I/O refreshing for the NX Units that have a verification error in the Slave Terminal stops. Messages cannot be sent to the NX Units that have a verification error in the Slave Terminal.		
				When Fail-soft Operation Is Set to *Fail-soft* and Fail-soft Operation Is Not Possible The operation is the same as when fail-soft operation is set to *Stop*.		
				When Fail-soft Operation Is Set to *Stop* • EtherNet/IP Coupler Unit, EtherNet/IP Communications A Slave Application Error occurs. Pre-Operational state is entered. • EtherNet/IP Coupler Unit, NX Bus 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 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. Or, connect the Sysmac Studio, unregister the unconnected NX Unit from the Unit configuration information, and download the Unit configuration information to the Communication Coupler Unit.	Download the Unit configuration information that contains the actually connected configuration to the Communication 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. Or, connect the Sysmac Studio, change the Unit configuration information to reflect the actually connected NX Units, and download the Unit configuration information to the Communication 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. Or, connect the Sysmac Studio, add the unregistered NX Unit to the Unit configuration information, and download the Unit configuration information to the Communication Coupler Unit.	

Cause and correction	A Unit that is disabled in the Unit configuration information is mounted.	Remove the Unit that is disabled in the Unit configuration information. Or, connect the Sysmac Studio, enable the disabled Unit in the Unit configuration information, download the Unit configuration information to the Communications Coupler Unit, and mount the enabled Unit.	Remove the Unit that is disabled in the Unit configuration information. Or, connect the Sysmac Studio, enable the disabled Unit in the Unit configuration information, 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 Sysmac Studio 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 Communication Coupler Unit.
Attached information	Attached information 1: Unit number of the NX Unit where the error was detected Attached Information 2: Error details 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. 1: A Unit that is registered in the Unit configuration information is not connected. 2: A Unit that is not registered in the Unit configuration information is connected.		
Precautions/ Remarks	None		

<table>
<tr><th>Event name</th><td colspan="3">NX Unit Communications Timeout</td><th>Event code</th><td colspan="2">84C00000 hex</td></tr>
<tr><th>Meaning</th><td colspan="6">An error occurred in I/O data communications with the NX Units.</td></tr>
<tr><th>Source</th><td colspan="2">EtherNet/IP</td><th>Source details</th><td>EtherNet/IP Coupler Unit</td><th>Detection timing</th><td>Continuously</td></tr>
<tr><th>Error attributes</th><th>Level</th><td>Minor fault</td><th>Recovery</th><td>Reset error in EtherNet/IP Coupler Unit.</td><th>Log category</th><td>System log</td></tr>
<tr><th rowspan="2">Effects</th><th rowspan="2">User program</th><td rowspan="2">Continues.</td><th rowspan="2">Operation</th><td colspan="3">When Fail-soft Operation Is Set to Fail-soft
Not affected.</td></tr>
<tr><td colspan="3">When Fail-soft Operation Is Set to Stop
• EtherNet/IP Coupler Unit, EtherNet/IP Communications
A Slave Application Error occurs.
Pre-Operational state is entered.
• EtherNet/IP Coupler Unit, NX Bus
I/O refreshing for the NX Units in the Slave Terminal stops.</td></tr>
<tr><th rowspan="2">System-defined variables</th><th colspan="2">Variable</th><th colspan="2">Data type</th><th colspan="2">Name</th></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><th rowspan="3">Cause and correction</th><th colspan="2">Assumed cause</th><th colspan="2">Correction</th><th colspan="2">Prevention</th></tr>
<tr><td colspan="2">An NX Unit is not mounted properly.</td><td colspan="2">Mount the NX Units and End Cover securely and secure them with End Plates.</td><td colspan="2">Mount the NX Units and End Cover securely and secure them with End Plates.</td></tr>
<tr><td colspan="2">An NX Unit has failed.</td><td colspan="2">If the error occurs again even after you make the above correction, replace the NX Unit.</td><td colspan="2">None</td></tr>
<tr><th>Attached information</th><td colspan="6">Attached information 1: Unit number of the NX Unit where the error was detected</td></tr>
<tr><th>Precautions/ Remarks</th><td colspan="6">None</td></tr>
</table>

Event name	NX Unit Initialization Error			Event code	84C10000 hex	
Meaning	Initializing 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, an NX Unit is restarted, or an error is reset in the EtherNet/IP Coupler Unit
Error attributes	Level	Minor fault	Recovery	Reset error in EtherNet/IP Coupler Unit.	Log category	System
Effects	User program	Continues.	Operation	When Fail-soft Operation Is Set to *Fail-soft* • EtherNet/IP Coupler Unit, NX Bus I/O refreshing for all of the NX Units that have an initialization error in the Slave Terminal stops. When Fail-soft Operation Is Set to *Stop* • EtherNet/IP Coupler Unit, EtherNet/IP Communications A Slave Application Error occurs. Pre-Operational state is entered. • EtherNet/IP Coupler Unit, NX Bus 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 error occurred in processing the Communication Coupler Unit.		Set and save the Unit configuration information in the Communication 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.		Correctly set NX Units and I/O data mapping information, and set and save the Unit configuration information in the Communication Coupler Unit.	
	An initialization error occurred in an NX Unit.		Cycle the power supply to the relevant NX Unit. If the error occurs again, replace the NX Unit.		None	
	The Channel Enable/Disable Setting for all channels of the Analog Input Unit are set to *Disable*. The Enabled Channel Settings for all channels of the Analog Output Unit are set to *Disable*.		Set the Enabled Channel Setting to *Enable* for at least one channel.		Set the Enabled Channel Setting to *Disabled* for only the unused channels.	
Attached information	Attached information 1: Unit number of the NX Unit where the error was detected					
Precautions/ Remarks	None					

<table>
<tr><th>Event name</th><td colspan="3">NX Unit Startup Error</td><th>Event code</th><td colspan="2">84C50000 hex</td></tr>
<tr><th>Meaning</th><td colspan="6">Starting an NX Unit failed.</td></tr>
<tr><th>Source</th><td colspan="2">EtherNet/IP</td><th>Source details</th><td>EtherNet/IP Coupler Unit</td><th>Detection timing</th><td>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</td></tr>
<tr><th>Error attributes</th><th>Level</th><td>Minor fault</td><th>Recovery</th><td>Cycle the power supply to the EtherNet/IP Coupler Unit or restart the EtherNet/IP Coupler Unit.</td><th>Log category</th><td>System</td></tr>
<tr><th rowspan="2">Effects</th><th rowspan="2">User program</th><td rowspan="2">Continues.</td><th rowspan="2">Operation</th><td colspan="3">When Fail-soft Operation Is Set to Fail-soft
• EtherNet/IP Coupler Unit, NX Bus
I/O refreshing for all of the NX Units that have a startup error in the Slave Terminal stops.
Messages cannot be sent to the NX Units that have an initialization error in the Slave Terminal.</td></tr>
<tr><td colspan="3">When Fail-soft Operation Is Set to Stop
• EtherNet/IP Coupler Unit, EtherNet/IP Communications
A Slave Application Error occurs.
Pre-Operational state is entered.
• EtherNet/IP Coupler Unit, NX Bus
I/O refreshing for the NX Units in the Slave Terminal stops.
Messages cannot be sent to the NX Units that have a startup error in the Slave Terminal.</td></tr>
<tr><th rowspan="2">System-defined variables</th><th colspan="2">Variable</th><th colspan="2">Data type</th><th colspan="2">Name</th></tr>
<tr><td colspan="2">None</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><th rowspan="2">Cause and correction</th><th colspan="2">Assumed cause</th><th colspan="2">Correction</th><th colspan="2">Prevention</th></tr>
<tr><td colspan="2">A startup error occurred in an NX Unit.</td><td colspan="2">Cycle the power supply to the Communication Coupler Unit. If this error occurs again even after you cycle the power supply, replace the NX Unit.</td><td colspan="2">None</td></tr>
<tr><th>Attached information</th><td colspan="6">Attached information 1: Slot number of the NX Unit where the error occurred</td></tr>
<tr><th>Precautions/ Remarks</th><td colspan="6">None</td></tr>
</table>

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 Sysmac Studio and download the configuration information.		None	
Attached information	None					
Precautions/ Remarks	This event occurs only when the EtherNet/IP Coupler Unit is in Free-Run Mode.					

<table>
<tr><td>Event name</td><td colspan="3">NX Message Communications Error</td><td>Event code</td><td colspan="2">80220000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">An error was detected in message communications and the message frame was discarded.</td></tr>
<tr><td>Source</td><td colspan="2">EtherNet/IP</td><td>Source details</td><td>Communication Coupler Unit</td><td>Detection timing</td><td>During message communications</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Observation</td><td>Recovery</td><td>---</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">Not affected.</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="4">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 message communications load is high.</td><td colspan="2">Reduce the number of times instructions are used to send NX messages.</td><td colspan="2">Reduce the number of times instructions are used to send NX messages.</td></tr>
<tr><td colspan="2">The communications cable is disconnected or broken.
This cause does not apply if attached information 2 is 0 (NX bus).</td><td colspan="2">Connect the communications cable securely.</td><td colspan="2">Connect the communications cable securely.</td></tr>
<tr><td colspan="2">Message communications were cut off as the result of executing a synchronization or restoration operation on the Sysmac Studio or as the result of disconnecting an EtherNet/IP slave.</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td>Attached information</td><td colspan="6">Attached information 1: System information
Attached Information 2: Type of communications where error occurred
0: NX bus
1: EtherCAT
2: Serial communications (USB)
3: EtherNet/IP
65535: Internal Unit communications (routing)</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">None</td></tr>
</table>

Event name	Event Log Cleared			Event code	9040 0000 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 1: The system event log was cleared. 2: The access event log was cleared.					
Precautions/ Remarks	None					

Event name	Restart Executed			Event code	9042 0000 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 0: The Slave Terminal was restarted. 1: An NX Unit was restarted. Attached information 2: Unit number of the NX Unit where the restart was executed					
Precautions/ Remarks	None					

<table>
<tr><td>Event name</td><td colspan="3">Memory All Cleared</td><td>Event code</td><td colspan="2">90430000 hex</td></tr>
<tr><td>Meaning</td><td colspan="6">The Unit settings were cleared.</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 commanded from user</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Information</td><td>Recovery</td><td>---</td><td>Log category</td><td>Access</td></tr>
<tr><td>Effects</td><td>User program</td><td>Continues.</td><td>Operation</td><td colspan="3">The Unit settings were cleared.</td></tr>
<tr><td rowspan="2">Sys-tem-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 Clear All Memory operation was executed.</td><td colspan="2">---</td><td colspan="2">---</td></tr>
<tr><td>Attached information</td><td colspan="6">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.
Attached information 2 and 4: Execution results
0: Successful
1: Hardware error
2: Initialization failed
3: Initialization not possible</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">Refer to the attached information for the results of the Clear All Memory operation.</td></tr>
</table>

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 Sysmac Studio	Resetting errors	All errors in the Slave Terminal	Reset the error from the Troubleshooting Dialog Box on the Sysmac Studio.
		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. Refer to *A-1 Supported CIP Objects* on page A-2 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 Terminals are reset.

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

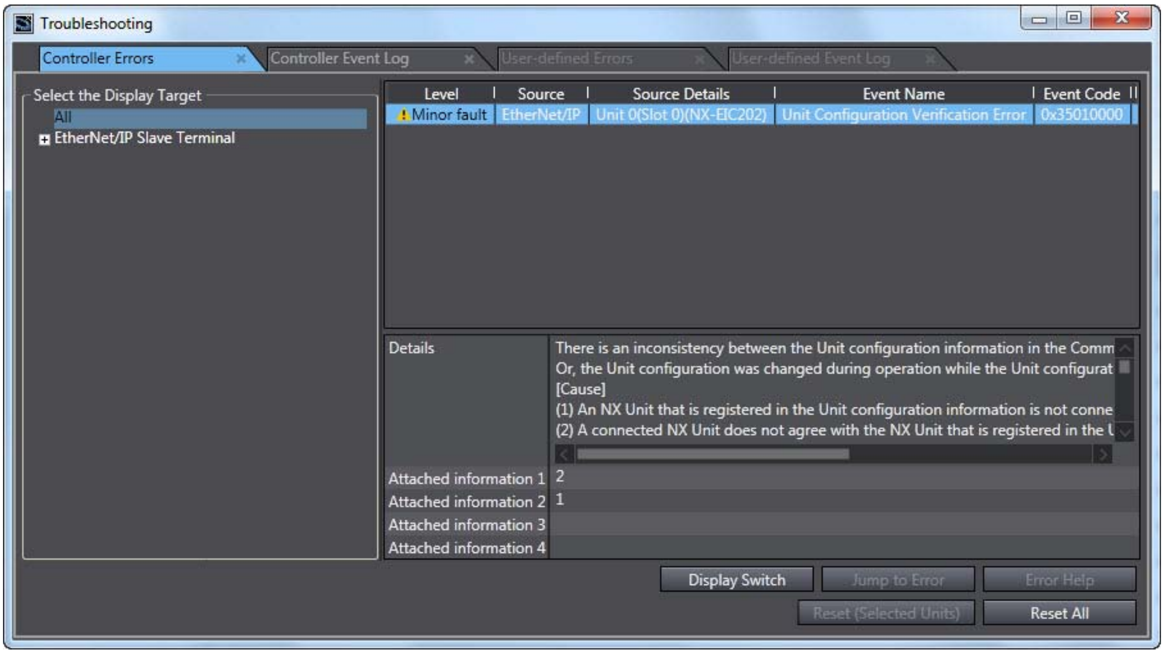
The current errors and the contents of the event logs in the online Controller are read and reset in the Troubleshooting Dialog Box. Use the Sysmac Studio.

Resetting Errors Individually in Units in the EtherNet/IP Slave Terminal

1 Connect the computer on which the Sysmac Studio is installed to the peripheral USB port on the EtherNet/IP Coupler Unit and go online.

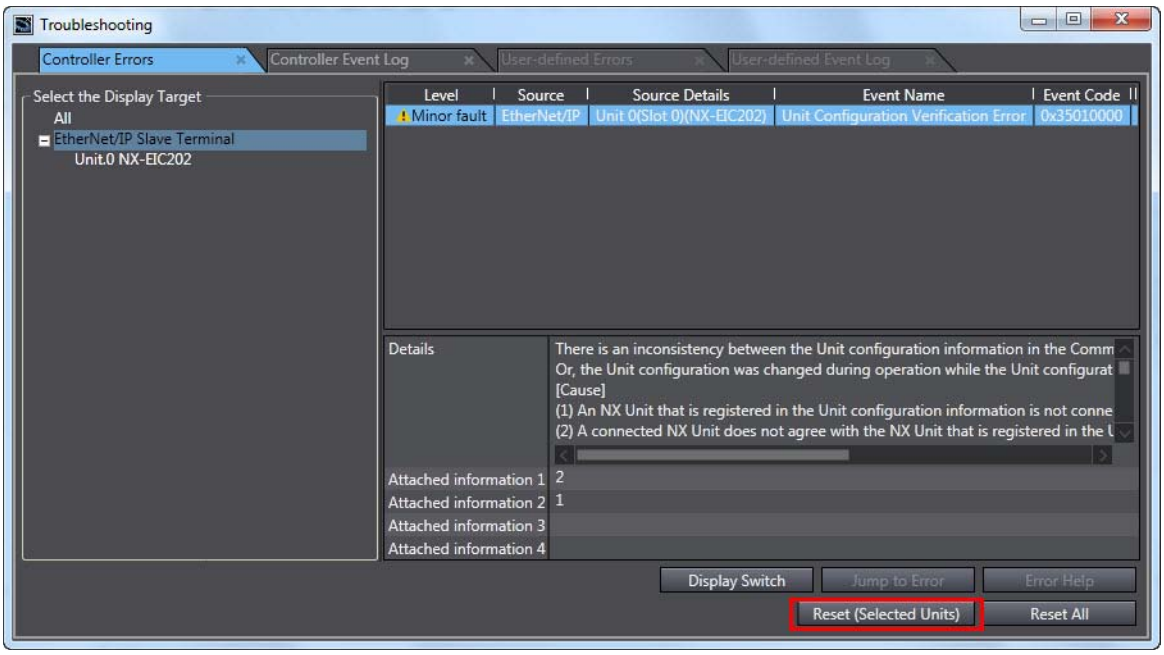
2 Select ***Troubleshooting*** from the Tools Menu while online. You can also click the **Trouble-shooting** button in the toolbar.

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

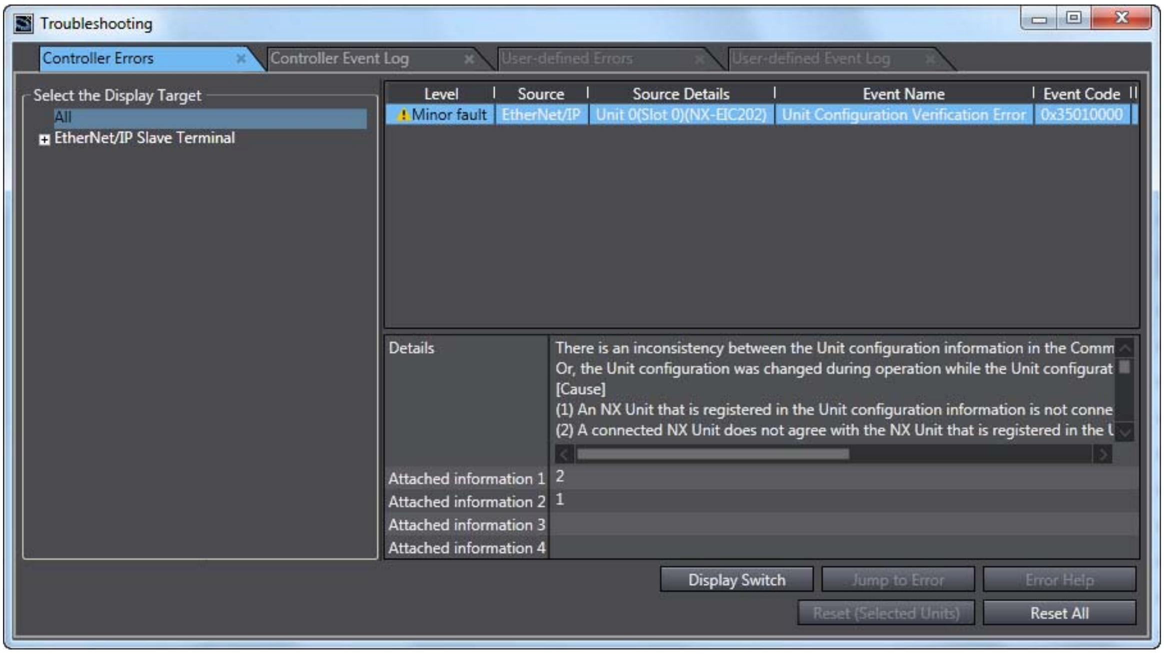
If you select the EtherNet/IP Slave Terminal or EtherNet/IP Coupler Unit, errors are reset for the entire EtherNet/IP Slave Terminal.

Resetting the Errors in All Units in the EtherNet/IP Slave Terminal at the Same Time

1 Connect the computer on which the Sysmac Studio 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 **Trouble-shooting** button in the toolbar.

The following Troubleshooting Dialog Box is displayed.



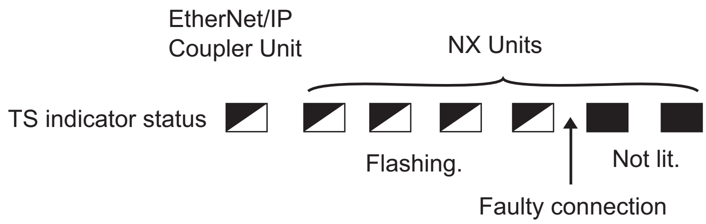
The current Controller errors are displayed on the Controller Errors Tab Page (observations and information are not displayed).

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.

<table>
<tr><th>Status</th><th>Possible cause and correction</th></tr>
<tr><td>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.</td><td>The NX bus connector on the left side of the Units where the TS indicators are not lit is not connected properly.
Connect it properly and cycle the power supply.

</td></tr>
<tr><td>• All TS indicators on the EtherNet/IP Slave Terminal (EtherNet/IP Coupler Unit and NX Units) are lit green.
• 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.
• 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.</td><td>• The power supply to the Additional NX Unit Power Supply Unit is not turned ON. Check the wiring and turn ON the power supply.
• The NX bus connectors between the Units are not connected properly. Make sure that the Unit hookup guides are properly engaged.
• The wiring for the I/O power supply is disconnected. Check the wiring.</td></tr>
</table>

13

Maintenance and Inspection

This section describes the procedures for cleaning, inspecting, and replacing EtherNet/IP Coupler Units.

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13-1-1 Cleaning . . . 13-2

13-1-2 Periodic Inspections . . . 13-2

13-2 Maintenance Procedures . . . 13-4

13-2-1 Importing and Exporting Data . . . 13-4

13-2-2 Replacement Procedure for the EtherNet/IP Coupler Unit . . . 13-4

13-2-3 Basic Replacement Procedure for NX Units . . . 13-6

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 Points

No.	Item	Inspection	Criteria	Action
1	External power supplies	Measure the power supply voltage at the terminal blocks, and make sure that they are within the criteria voltage.	The voltage must be within the power supply voltage range.	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring voltage of the supplied power to within the power supply voltage range.
2	I/O power supplies	Measure the power supply voltages at the input and output terminal blocks, and make sure that they are within the criteria voltage.	The voltages must be within the I/O specifications for each NX Unit.	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring voltage of the I/O power supplies to within the I/O specifications of each Unit.

No.	Item	Inspection	Criteria	Action
3	Ambient environment	Check that the ambient operating temperature is within the criteria.	0 to 55°C	Use a thermometer to check the temperature and ensure that the ambient temperature remains within the allowed range of 0 to 55°C.
		Check that the ambient operating humidity is within the criteria.	10 to 95% With no condensation.	Use a hygrometer to check the humidity and ensure that the ambient humidity remains between 10% and 95%. Check that condensation does not occur due to rapid changes in temperature.
		Check that the EtherNet/IP Coupler Unit is not in direct sunlight.	Not in direct sunlight	Protect the EtherNet/IP Coupler Unit if necessary.
		Check for accumulation of dirt, dust, salt, or metal powder.	No accumulation	Clean and protect the EtherNet/IP Coupler Unit if necessary.
		Check for water, oil, or chemical sprays hitting the EtherNet/IP Coupler Unit.	No spray	Clean and protect the EtherNet/IP Coupler Unit if necessary.
		Check for corrosive or flammable gases in the area of the EtherNet/IP Coupler Unit.	No corrosive or flammable gases	Check by smell or use a gas sensor.
		Check that the EtherNet/IP Coupler Unit is not subject to direct vibration or shock.	Vibration and shock must be within specifications.	Install cushioning or shock absorbing equipment if necessary.
		Check for noise sources nearby the EtherNet/IP Coupler Unit.	No significant noise sources	Either separate the EtherNet/IP Coupler Unit and noise source or protect the EtherNet/IP Coupler Unit.
4	Installation and wiring	Check that the DIN Track mounting hooks on all Units are securely locked.	No looseness	Securely lock all DIN Track mounting hooks.
		Check that cable connectors are fully inserted and locked.	No looseness	Correct any improperly installed connectors.
		Check that the screws on the End Plates (PFP-M) are tight.	No looseness	Tighten loose screws with a Phillips screwdriver.
		Check that each Unit is connected along the hookup guides, and fully inserted until it contacts the DIN Track.	The Units must be connected and securely in place on the DIN Track.	Connect each Unit along the hookup guides, and insert each Units until it contacts the DIN Track.
		Check for damaged external wiring cables.	No visible damage	Check visually and replace cables if necessary.

Tools Required for Inspections

Required Tools

- Flat-blade screwdriver
- Phillips screwdriver
- Voltage tester or voltmeter
- Industrial alcohol and clean 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 Sysmac Studio.

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

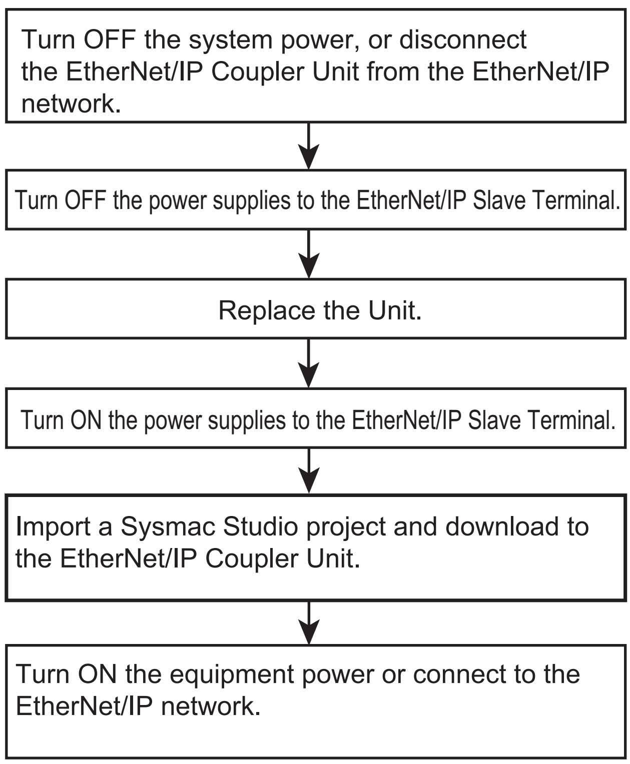
You can use the Sysmac Studio to export and import the Slave Terminal settings and NX Unit settings as files. This allows you to reuse settings from an Slave Terminal or NX Units for other Slave Terminals or NX Units such as:

- Unit configuration information
- I/O allocation information
- Unit operation settings
- Hardware switch information

Refer to *9-2-6 Sysmac Studio Functions Used as Required* on page 9-24 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 Sysmac Studio project, download and verify data for the EtherNet/IP Coupler Unit using Sysmac Studio.

6 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 Number of the EtherNet/IP Coupler Unit

If the Serial Number Check Method setting on the EtherNet/IP master is set to *Setting = Actual device*, temporarily change this setting to *None*, and then replace the EtherNet/IP Coupler Unit. Get the serial number of the new EtherNet/IP Coupler Unit, and then set the Serial Number Check Method setting on the EtherNet/IP master to *Setting = Actual device* again.
If you replace the EtherNet/IP Coupler Unit with the Serial Number Check Method setting set to *Setting = Actual device*, a Network Configuration Verification Error will occur.

Refer to *Unit Versions* on page 24 for details on the serial number check method for the EtherNet/IP master and details on getting the serial numbers of the EtherNet/IP Coupler Unit.

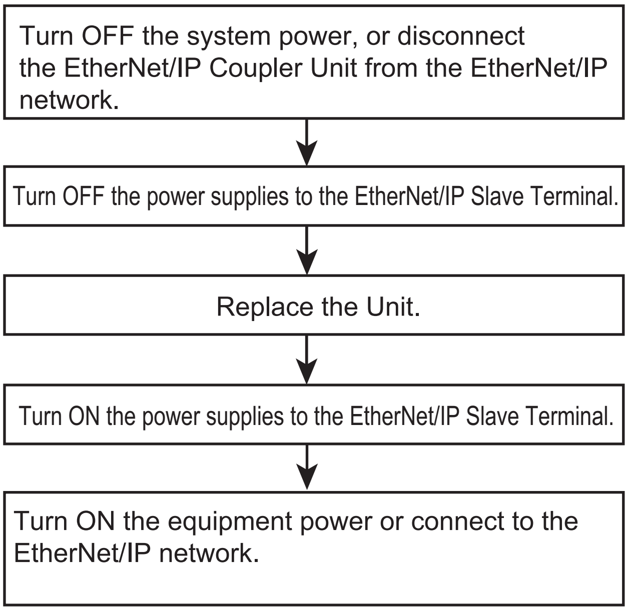
Additional Information

- 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 16 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 9-7 for details on the Serial Number Check Method setting for the EtherNet/IP Coupler Unit, and to *9-2-6 Sysmac Studio Functions Used as Required* on page 9-24 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 16 for the procedures to disconnect and connect the EtherNet/IP Coupler Unit from and to the EtherNet/IP network.

A

Appendices

The appendices provide extra detailed information on CIP objects, programming examples, configuration, dimensions, and Terminal Block Model Numbers.

A-1 Supported CIP Objects A-2

A-1-1 Clear Error Explicit Message Example Using CMND(490) A-2

A-1-2 Response Codes A-5

A-2 UDP/IP and TCP/IP Message Service Interface A-9

A-2-1 General Message Service Applications A-9

A-2-2 General Message Service Configuration Procedure A-11

A-2-3 Detailed Message Service Configuration Procedure A-12

A-2-4 General Message Services Specifications A-13

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A-3 Programming Example To Detect Valid I/O Data A-19

A-4 Configuration Procedure Without Sysmac Studio A-20

A-4-1 Basic Procedure A-20

A-5 Dimensions A-21

A-5-1 EtherNet/IP Coupler Unit A-21

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A-6 Terminal Block Model Numbers A-23

A-6-1 Model Number Notation A-23

A-6-2 Models A-23

A-1 Supported CIP Objects

The following table provides details of the supported CIP objects for a Slave Terminal. All values are in hexadecimal format.

Services	Service Code	Class ID	Instance ID	Attribute ID	Name	Details	Value
Get Attribute Single	0E	04	64	03	Data	Read the Input Data of the EtherNet/IP Coupler Unit	Input Data (See Note 2)
			94	03	Data	Read the Output Data of the EtherNet/IP Coupler Unit	Output Data (See Note 2)
		74	01	01	Output data size	Read the byte size of the Output Data	0 to 01F8
				02	Input data size	Read the byte size of the Input Data	0 to 01F8
Set Attribute Single	10	04	94	03	Data	Write the Output Data of the EtherNet/IP Coupler Unit (See Note 1)	Output Data (See Note 2)
Clear Error	32	74	01	---	Clear error	Clears the NX Error Status (See Note 3)	---

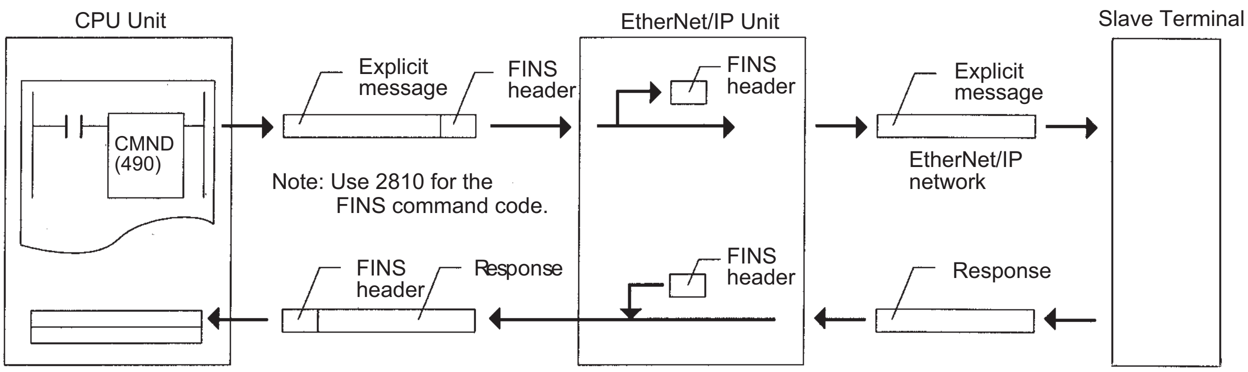
Note 1. Writing output data is only possible when a Safety Control Unit is included in the Slave Terminal. Refer to the *NX-series Safety Control Unit User's Manual* (Cat. No. Z930) for more information.

2. Refer to *9-2-3 I/O Allocation Information* on page 9-12 for more information.

3. Refer to *12-4 Resetting Errors* on page 12-45 for more information.

A-1-1 Clear Error Explicit Message Example Using CMND(490)

With an EtherNet/IP Unit, a CMND(490) instruction in the PLC CPU Unit's ladder 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.

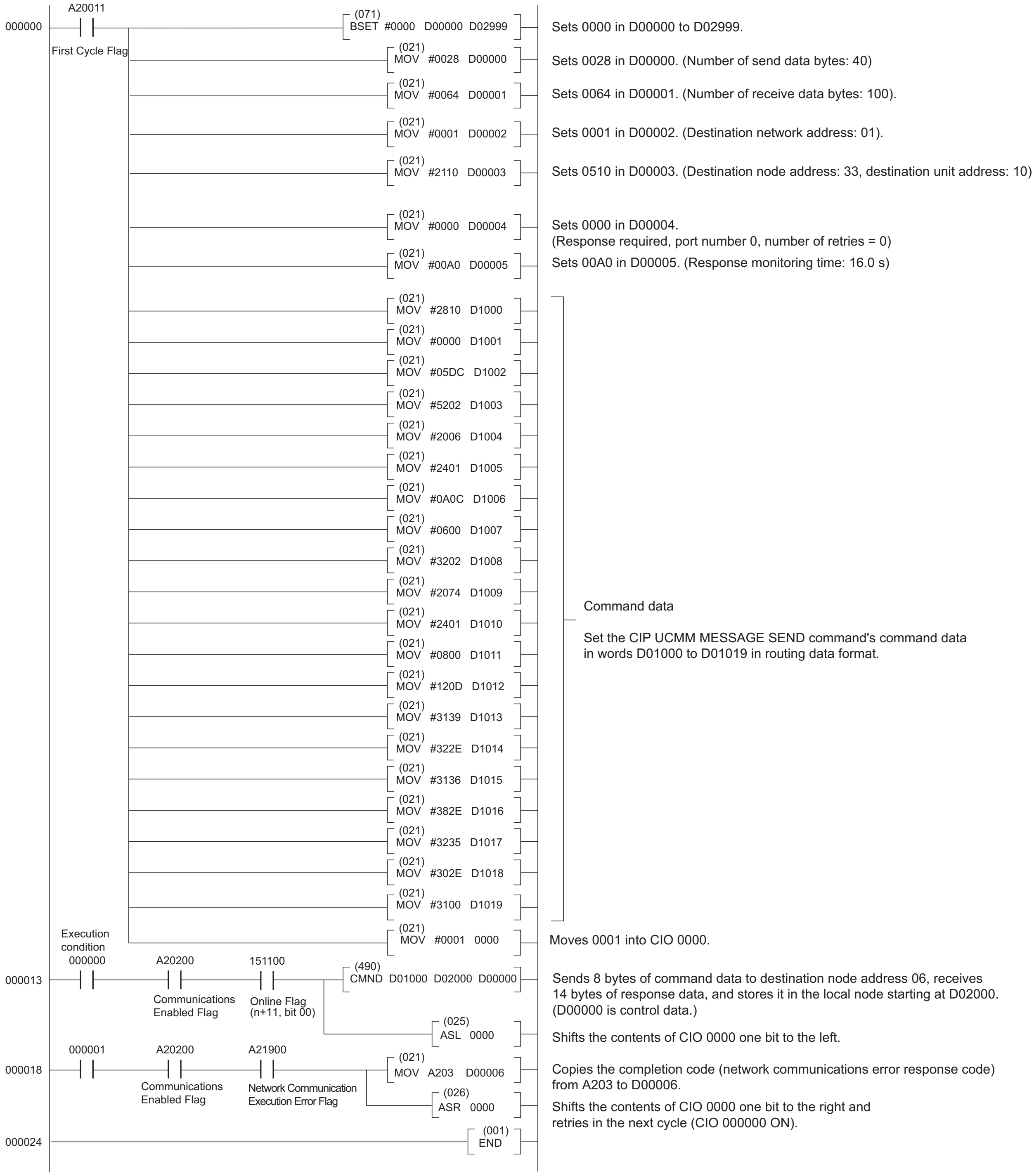
The command data is stored in the DM Area starting at DM01000, and the response data is stored in the DM Area starting at D02000. If the command ends with an error, the end code is stored in D00006 and command transmission is retried.

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) • Request path size: 2 words
	D01004	2006	• Request path: 20 06 24 01 hex (Connection Manager) • Class ID: 06 hex • Instance ID: 01 hex
	D01005	2401	
	D01006	0A0C	• Priority/Time_Tick: 0A hex • Timeout Ticks: 0C hex
	D01007	0600	Message request size: 6 bytes
	D01008	3202	• Service: 32 hex (Clear Error) • Request path size: 2 words
	D01009	2074	• 8-bit class ID: 20 hex • Class ID: 74 hex
	D01010	2401	• 8-bit instance ID: 24 hex • Instance ID: 01 hex (Identity Object)
	D01011	0800	Route path size: 8 words
	D01012	120D	• Extended link address size: 1 hex • 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” • 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 • 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-1-2 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.

General status code (hex)	Status name	Description
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.
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.

General status code (hex)	Status name	Description
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.
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 UDP/IP and TCP/IP Message Service Interface

The EtherNet/IP Coupler Unit supports a message service interface alternative to the standard EtherNet/IP Tag Data Link interface only when a Safety Control Unit is included in the Slave Terminal. Message services can be used to send/receive data between general-purpose applications and Slave Terminals. 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.

A device that supports explicit messaging with TCP/IP or UDP/IP protocol can access CIP objects in the EtherNet/IP Coupler Unit to issue request commands (refer to *A-1 Supported CIP Objects* on page A-2 for details on request commands).

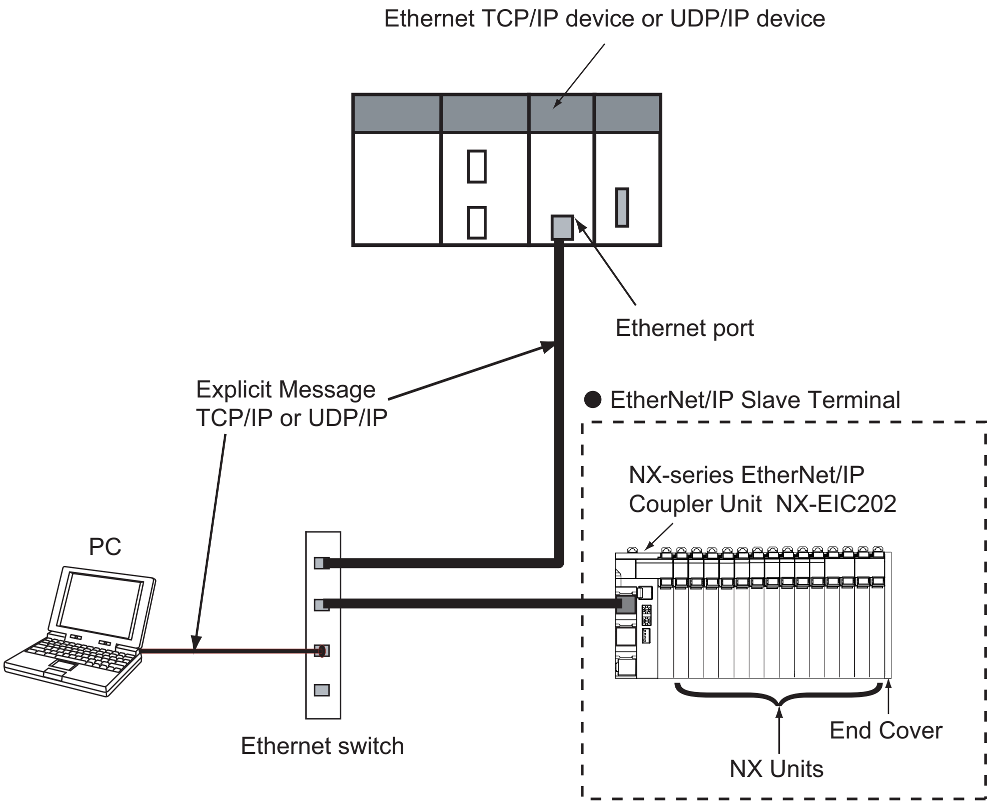
Use DIP switch pin 3 to set the network interface type for message services. Refer to *4-3-2 DIP Switch* on page 4-8 for more information.

Precautions for Correct Use

Reading input data and writing output data is 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.

A-2-1 General Message Service Applications

Use the message service function when devices that do not support EtherNet/IP need to communicate with the an EtherNet/IP Coupler Unit. 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-2 for details on CIP objects) as shown in the image below.


Ethernet TCP/IP device or UDP/IP device
Ethernet port
Explicit Message
TCP/IP or UDP/IP
● EtherNet/IP Slave Terminal
NX-series EtherNet/IP
Coupler Unit NX-EIC202
PC
Ethernet switch
End Cover
NX Units

A-2-2 General Message Service Configuration Procedure

This section describes how to use EtherNet/IP Slave Terminals with message services.

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 • *3-1 Specifications* on page 3-2 • *Section 5 Designing the Power Supply System* • *6-1-3 Installation Orientation* on page 6-8 • *Manuals for the specific NX Units*
2. Making Hardware Settings and Wiring the Slave Terminal	• *4-3 Hardware Switch Settings* on page 4-8 • *6-1 Installing Units* on page 6-2 • *Section 7 Wiring*
3. Configuring the Slave Terminal and Making the Operation Settings	*9-2 Setting Slave Terminal Parameters* on page 9-7
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 • *11-3-3 Automatic Clock Adjustment* on page 11-11 • *A-2-5 TCP/IP and UDP/IP Port Number Setting* on page A-16
6. Checking Indicators	*4-2 Indicators* on page 4-5
7. Confirming Operation by Checking the Wiring	*Manual for the specific NX Units*
8. Programming for TCP/IP or UDP/IP communications with message services.	*Manual for the Controller*

A-2-3 Detailed Message Service Configuration Procedure

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 • *Manuals for the specific NX Units*
		Confirming Suitability of Slave Terminal Specifications	Confirm that the following specific restrictions for the Slave Terminal are met. • Number of NX Units • Send/receive PDO data sizes • Design conditions for the NX Unit power supply and I/O power supply • Installation orientation	• *3-1 Specifications* on page 3-2 • *Section 5 Designing the Power Supply System* • *6-1-3 Installation Orientation on page 6-8*
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. 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 4-8 • *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 4-8
		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. • Connect the communications cables. • Connect the Unit power supply. • Connect the I/O power supply. • Connect the ground wire. • Connect the external I/O devices.	*Section 7 Wiring*
3	Configuring the Slave Terminal and Making the Operation Settings		Set up the Slave Terminal (create the configuration and set the parameters) with the Sysmac Studio.	*9-2 Setting Slave Terminal Parameters* on page 9-7
		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 9-7
		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 Sysmac Studio.	*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. You can also use the switch settings to set the IP address. Refer to *9-4 Setting IP Address* on page 9-31. Set the Automatic Clock with the Network Configurator. Set the Port Number with the Network Configurator.	• *9-4 Setting IP Address* on page 9-31 • *11-3-3 Automatic Clock Adjustment* on page 11-11 • *A-2-5 TCP/IP and UDP/IP Port Number Setting* on page A-16
6	Checking Indicators	Ethernet Unit	Check the following indicators on the Ethernet Unit. • RUN • 100M • ERC • ERH • SD • RD • LNK • TCP • FTP • 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. • MS • NS • TS • L/A P1 • L/A P2 • UNIT PWR • I/O PWR	• *4-2 Indicators* on page 4-5 • *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* • *Manual for the specific NX Units*
8	Programming		Write the program for TCP/IP or UDP/IP communications with message services.	*Manual for the Controller*

A-2-4 General Message Services Specifications

The EtherNet/IP Coupler Unit provides message service functions based on the following specifications.

Item	Specification
Number of buffers (sockets)	8 message buffers for server functions are shared for UDP/IP messages and TCP/IP messages. No message buffers are available for client functions.
Maximum message size	Request: 492 bytes Response: 496 bytes
Maximum NX output data size	490 bytes **Note:** 2 bytes are used for the attribute field in the explicit message UDP/IP command and TCP/IP command.

Item	Specification
Maximum NX input data size	496 bytes **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 The port number can be changed by Network Configurator (restart required). Acceptable port number ranges are shown below in decimal format. • 1024 to 2221 • 2223 to 44817 • 44819 to 65535
Keep-alive	Use the keep-alive function for TCP/IP and UDP/IP sockets at the 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. 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 least-significant byte for multi-byte parameters is in the lower address.

The command format is shown below.

+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	Byte offset	Size (bytes)	Description
Message sequence number	0	2	Numbers are set to differentiate frames when there is more than one send frame. An arbitrary value is assigned by the device that sends the message. The same value is stored in the corresponding response. 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. Setting range: 6 to 498
Reserved 2	6	1	Always set to 0.

Parameter[*1]	Byte offset	Size (bytes)	Description
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.
Data[*2]	12	492 max.	The data is set here. The data that is set depends on the service code.

*1. Parameters in the command are in little endian order.

*2. If the command service requires identifying an attribute ID, it is set in the data parameter with a size of 2 bytes.

● Response Format

When a response is returned from the destination device on the network, the EtherNet/IP Coupler Unit sends the response (a TCP/IP message or UDP/IP message) to the device on Ethernet that sent the command.

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
+6	Data	496 bytes max.

Parameter[*1]	Byte 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 from the next parameter to the end of the data is stored. The unit is bytes. 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. 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.	The response data. If there is no error, the response data is returned here. If there is an error (general status > 0x00), this parameter contains the data for the additional status array.

*1. Parameters in the command are in little endian order.

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.

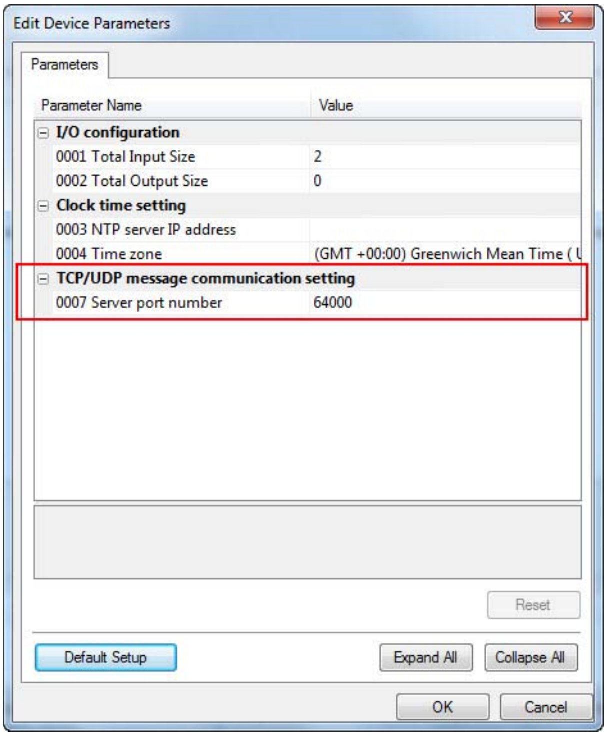
Procedure

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 General Message Services Specifications* on page A-13 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 General Message Services Specifications* on page A-13 for information on TCP/IP port number and UDP/IP port number setting ranges.

A-2-6 Troubleshooting Message Services

Use the following information to determine the cause and corrective actions of message service communication problems.

Observation	Error	Cause	Corrective action
Reading or writing data is not possible. An error response is returned by the EtherNet/IP Coupler Unit.	NOT_ENOUGH_DATA (0x13)	The total frame size is larger than 504 bytes (UDP/IP interface). The data-field size value does not match the actual received frame size (UDP/IP interface).	Ensure the frame size field is correctly calculated. Refer to *A-2-4 General Message Services Specifications* on page A-13 for more information.
	TOO_MUCH_DATA (0x15)	The data field size value does not match the actual received frame size (UDP/IP interface).	
	Standard CIP error	An unsupported class, instance or attribute ID is used.	Use only supported class, instance or attribute ID. Refer to *A-1 Supported CIP Objects* on page A-2 for more information.
		The frame size is valid, but contains an incorrect amount of data required by the class, instance or attribute ID.	Ensure the provided data has the correct length required for the specified class, instance or attribute ID. Refer to *A-2-4 General Message Services Specifications* on page A-13 for more information.
		Use of an unsupported Function Code.	Use only supported service codes. Refer to *A-1 Supported CIP Objects* on page A-2 for more information.

Observation	Error	Cause	Corrective action
Reading or writing data is not possible. No error response is returned by the Ether-Net/IP Coupler Unit.	---	The frame length is smaller than the minimum frame length of 12 bytes.	Ensure the size of the frame is within specifications.
	---	The data field size value does not match the actual transmitted number of bytes.	Ensure the size of the frame is the same as the specified number of bytes in the data field.
	---	Unstable network commu-nications (UDP/IP inter-face).	Check network connections and other sources of interfer-ence. Refer to *Section 7 Ether-Net/IP Network Wiring* for more information.
	---	UDP/IP communications and TCP/IP communica-tions have not been enabled on the Ether-Net/IP Coupler Unit (Tag Data Links enabled).	Check the position of DIP switch pin 3. Refer to *4-3-2 DIP Switch* on page 4-8 for more informa-tion.
	---	The frame is sent to an EtherNet/IP Coupler Unit with an incorrect port number setting.	Check the port number set-ting. Refer to *A-2-5 TCP/IP and UDP/IP Port Number Setting* on page A-16.
While using UDP/IP com-munications, an unex-pected limitation of frame size occurs.	---	The MTU/maximum data-gram size is less than the required frame length.	Ensure the maximum frame size is the same or less than the maximum allowed data-gram size on the client.
Cannot establish a TCP/IP connection.	Standard TCP error	A total of 8 active TCP cli-ents are already con-nected with the EtherNet/IP Coupler Unit.	Ensure there are less than 8 active connections when try-ing to establish a new TCP/IP connection.
		UDP/IP communications and TCP/IP communica-tions have not been enabled on the Ether-Net/IP Coupler Unit (Tag Data Links enabled).	Check the position of DIP switch pin 3. Refer to *4-3-2 DIP Switch* on page 4-8.
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 auto-matically closed.	Ensure the client connection remains active by setting the idle time to less than 30 sec-onds.

A-3 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.

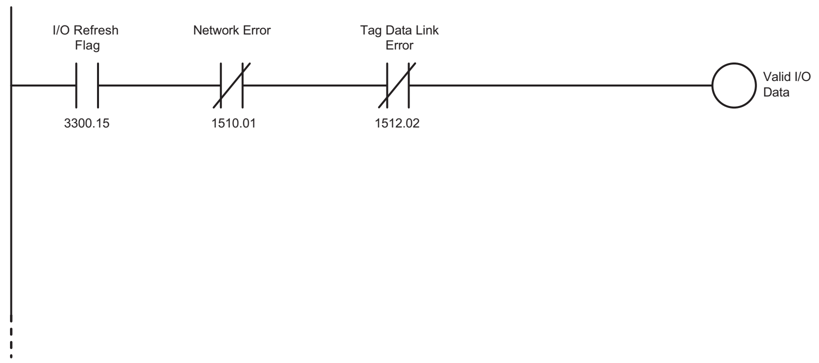
This example requires that the Slave Terminal Status is included in the I/O allocation for the Slave Terminal configuration. Refer to *9-2-3 I/O Allocation Information* on page 9-12 for more information.

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

Refer to the *CS and CJ Series EtherNet/IP Units Operation Manual* (Cat. No. W465) for more information about CIO area allocations.

A-4 Configuration Procedure Without Sysmac Studio

The following section describes the configuration procedure of a Slave Terminal without using Sysmac Studio. This configuration establishes default settings in the EtherNet/IP Coupler Unit and NX Units of the Slave Terminal. If other non-default settings are required, Sysmac Studio may be required.

Precautions for Correct Use

NX Unit operation settings are stored in the EtherNet/IP Coupler Unit. If an EtherNet/IP Coupler Unit has been previously configured, the memory needs to be cleared using the Clear All Memory option in Sysmac Studio before attempting this configuration procedure. Otherwise, stored settings for NX Units that were previously mounted may be automatically transferred to mounted NX Units. Refer to *9-5-4 Determine Tag Sizes* on page 9-39 for more information.

A-4-1 Basic Procedure

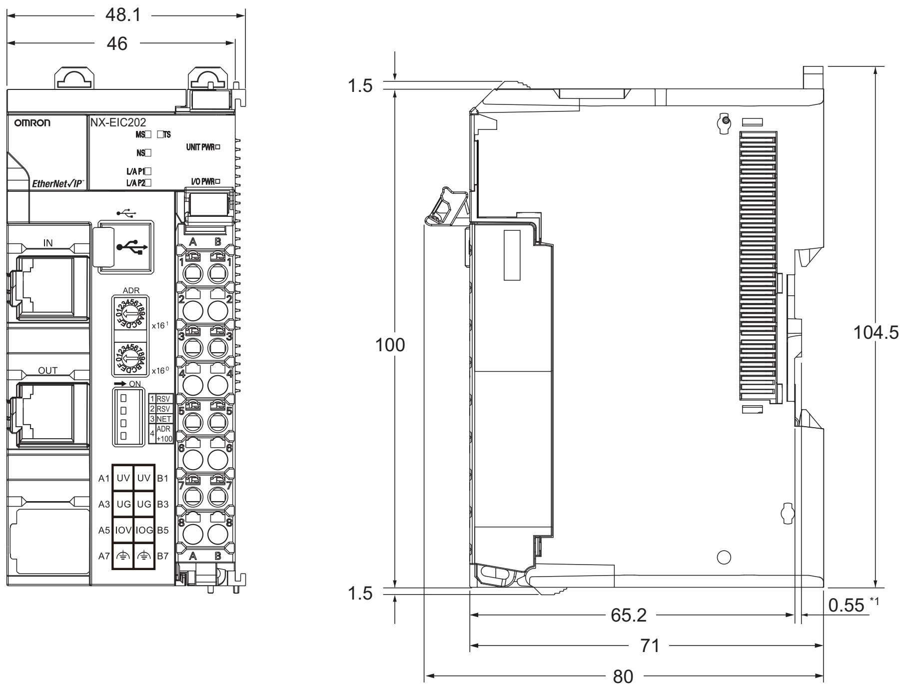
Procedure		Item	Description
1	Making Hardware Settings and Wiring the Slave Terminal	Switch Settings	Set the IP address of the EtherNet/IP Coupler Unit with the hardware switches. Refer to *4-3 Hardware Switch Settings* on page 4-8. You can also use the Network Configurator to set the IP address. Refer 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*. • Connect the communications cables. • Connect the Unit power supply. • Connect the I/O power supply. • Connect the ground wire. • 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. Connect to the EtherNet/IP Coupler Unit with Network Configurator and upload the parameters. Examine the I/O configuration that was automatically established during initialization. Refer to *9-5-4 Determine Tag Sizes* on page 9-39.
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 9-34.

A-5 Dimensions

A-5-1 EtherNet/IP Coupler Unit

● EtherNet/IP Coupler Unit Only

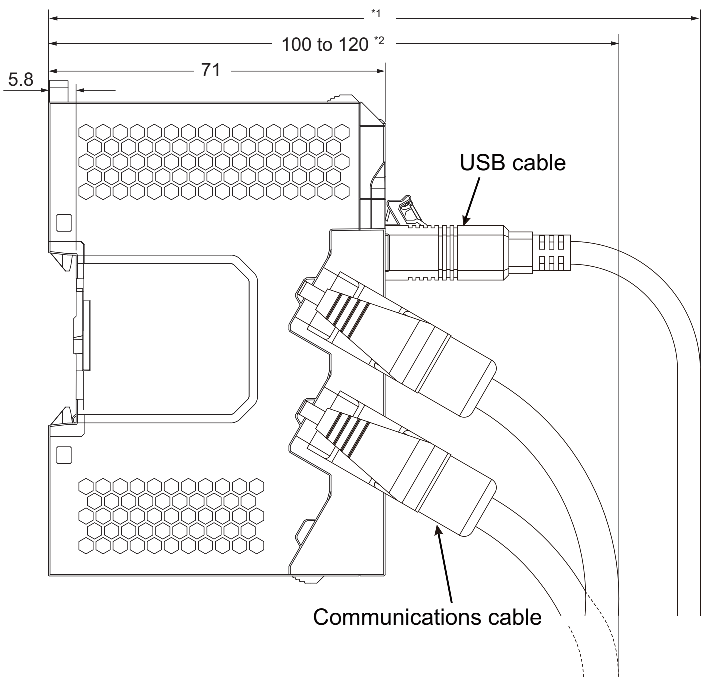
Unit: mm



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

● With Cables Connected

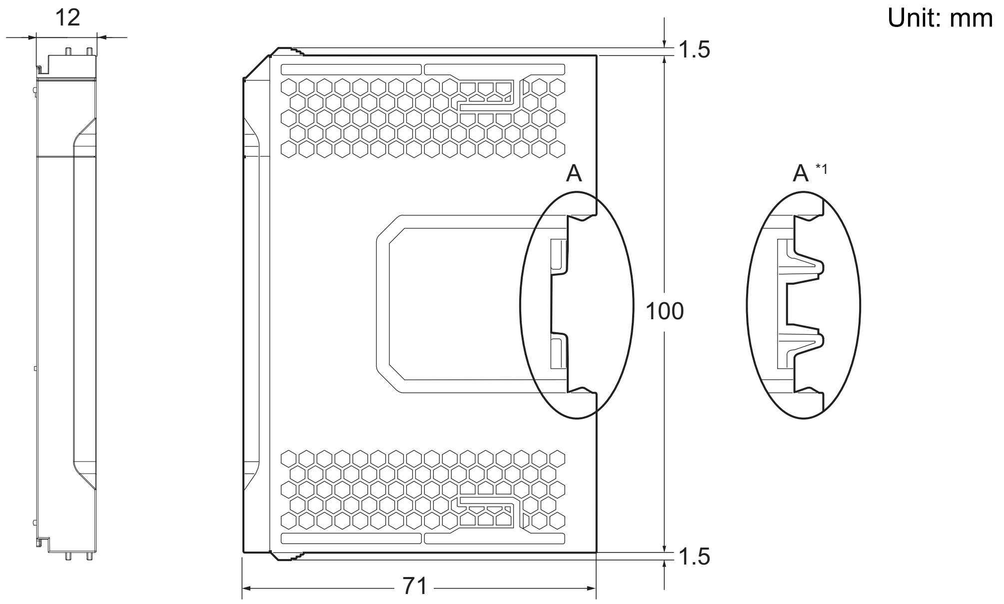
Unit: mm



*1.This dimension depends on the specifications of the commercially available USB 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-5-2 End Cover



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

A-6 Terminal Block Model Numbers

This section describes the models of Screwless Clamping Terminal Blocks for the EtherNet/IP Coupler Units and NX Units.

A-6-1 Model Number Notation

The Terminal Block model numbers are assigned based on the following rules.

NX-TB□□□□

Product Type
TB: Terminal block

Terminal Specification
A: Column number indications A and B, no functional ground terminals
B: Column number indications C and D, no functional ground terminals
C: Column number indications A and B, functional ground terminals

Number of Terminals
08: 8 terminals
12: 12 terminals
16: 16 terminals

Other Specification
1: Terminal current capacity of 4 A
2: Terminal current capacity of 10 A

A-6-2 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 4-12 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
NX-TBB162	16	None	10 A

Terminal Block model number	Number of terminals	Ground terminal mark	Terminal current capacity
NX-TBC082	8	Provided	10 A
NX-TBC162	16	Provided	10 A

Note When you purchase a Terminal Block, purchase an NX-TB□□□2.

I

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