OMRON

Machine Automation Controller

NJ-series

FINS Command Technical Guide

NJ501-1□□□
NJ301-1□□□
CJ1W-EIP21
CJ1W-SCU□2

SYSMAC
always in control

W518-E1-01

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Introduction

This Guide describes how to execute FINS commands for NJ-series CPU Units and provides precautions for the use of FINS commands.

Precautions for correct use are not provided.

Before you actually use FINS commands, obtain the user's manuals for the models that you are using, read the precautions for correct use and other relevant information, and sufficiently test operation.

Intended Audience

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

- Personnel that use FINS commands.

Applicable Products

This manual covers the following products.

- NJ-series CPU Units
- CJ-series EtherNet/IP Units that are mounted in an NJ-series Controller
- CJ-series Serial Communications Units that are mounted in an NJ-series Controller

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Read and Understand this Manual

Please read and understand this manual before using the products. Please consult your OMRON representative if you have any questions or comments.

CPU Units of NJ-series Machine Automation Controllers

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WARRANTY

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

Sysmac Studio Automation Software

● Warranty

(1) Warranty Period
The warranty period for this software is one year from either the date of purchase or the date on which the software is delivered to the specified location.

(2) Scope of Warranty

a) Customers who agree to the terms of use for this software and discover a defect in the software (a significant difference from the information that is provided in the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504)) can return their copy of the software to OMRON for a replacement copy of the software without the defect. OMRON may also elect to provide a method to download a copy of the software without the defect from an OMRON website. If a problem is discovered with the storage media containing the software and the media is returned to OMRON, OMRON shall provide a replacement storage media containing the software free of charge.

b) If OMRON is unable to eliminate the defect from the software for any reason, OMRON shall return the amount paid for the software to the customer.

● Limitations of Liability

(1) The purchase price refund and exchange defined in the preceding article represent the limits of the warranty for this software. OMRON shall not be held responsible for any direct, indirect, or consequential damages or losses to the customer as a result of any defect in this software.

(2) OMRON shall not be held responsible for any defects resulting in the modification of this software by any party other than OMRON.

(3) OMRON shall not be held responsible for software developed based on this software by any party other than OMRON or for the results of that software.

● Application of the Software

Do not use this software for any purpose other than those described in the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).

● Changes to Specifications

Specifications and accessories for this software may be changed as needed to improve the product or for any other reason.

● Scope of Service

The price of this software does not include service costs, such as dispatching technical staff.

● Range of Applicability

The above warranty assumes that this software is purchased and used in Japan. Consult with your OMRON representative if you purchase or use this software outside of Japan.

Precautions

- When building a system, check the specifications for all devices and equipment that will make up the system and make sure that the OMRON products are used well within their rated specifications and performances. Safety measures, such as safety circuits, must be implemented in order to minimize the risks in the event of a malfunction.
- Thoroughly read and understand the manuals for all devices and equipment that will make up the system to ensure that the system is used safely. Review the entire contents of these materials, including all safety precautions, precautions for safe use, and precautions for correct use.
- Confirm all regulations, standards, and restrictions that the system must adhere to.

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Software Licenses and Copyrights

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

Related Manuals

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

Manuals Related to FINS Commands

Manual name	Cat. No.	Model numbers	Application	Description
CS/CJ/CP/NSJ Series Communications Commands Reference Manual	W342	CS1G/H-CPU□□H CS1G/H-CPU□□-EV1 CS1D-CPU□□H CS1D-CPU□□S CS1W-SCU□□-V1 CS1W-SCB□□-V1 CJ1H-CPU□□H-R CJ1G/H-CPU□□H CJ1G-CPU□□P CJ1M-CPU□□ CJ1G-CPU□□ CJ2H-CPU6□-EIP CJ2H-CPU6□ CJ2M-CPU□□ CJ1W-SCU□□-V1 CP1H-X□□□□-□ CP1H-XA□□□□-□ CP1H-Y□□□□-□ CP1L-M/L□□□-□ CP1E-E□□D□-□ CP1E-N□□D□-□ NSJ□-□□□□(B)-G5D NSJ□-□□□□(B)-M3D	Leaning about the communications commands that are addressed to CS-series, CJ-series, and CP-series CPU Units and NSJ Controllers.	This manual describes 1) C-mode commands and 2) FINS commands in detail. Refer to this manual for detailed information on communications commands (C-mode commands and FINS commands) that are addressed to CPU Units. **Note** This manual describes the communications commands that are addressed to CPU Units. The communications paths are not relevant. (The communications commands can be sent through serial communications ports on CPU Units, through communications ports on Serial Communications Boards/Units, or through other Communications Units.) For the commands that are addressed to a Special I/O Unit or CPU Bus Unit, refer to the operation manual for the specific Unit.

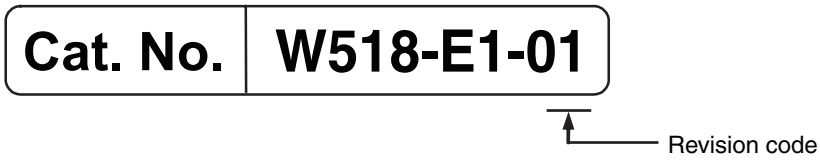
Manuals Related to NJ-series Products

Manual name	Cat. No.	Model numbers	Application	Description
NJ-series CPU Unit Hardware User's Manual	W500	NJ501-□□□□ NJ301-□□□□	Learning the basic specifications of the NJ-series CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided.	An introduction to the entire NJ-series system is provided along with the following information on a Controller built with a CPU Unit. • Features and system configuration • Introduction • Part names and functions • General specifications • Installation and wiring • Maintenance and inspection Use this manual together with the *NJ-series CPU Unit Software User's Manual* (Cat. No. W501).

Manual name	Cat. No.	Model numbers	Application	Description
NJ-series CPU Unit Software User's Manual	W501	NJ501-□□□□ NJ301-□□□□	Learning how to program and set up an NJ-series CPU Unit. Mainly software information is provided.	The following information is provided on a Controller built with an NJ-series CPU Unit. • CPU Unit operation • CPU Unit features • Initial settings • Use this manual together with language specifications that are based on IEC 61131-3 and the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500).
NJ-series CPU Unit Built-in EtherNet/IP Port User's Manual	W506	NJ501-□□□□ NJ301-□□□□	Using the built-in EtherNet/IP port on an NJ-series CPU Unit.	Information on the built-in EtherNet/IP port is provided. Information is provided on the basic setup, tag data links, and other features. Use these manuals together with the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500) and *NJ-series CPU Unit Software User's Manual* (Cat. No. W501).
CJ-series EtherNet/IP Units Operation Manual for NJ-series CPU Unit	W495	CJ1W-EIP21	Using a CJ-series EtherNet/IP Unit.	Information is provided on how to use an EtherNet/IP Unit that is mounted in an NJ-series Controller. Information is provided on the basic setup, tag data links, and other features. Use these manuals together with the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500) and *NJ-series CPU Unit Software User's Manual* (Cat. No. W501).
CJ-series Serial Communications Units Operation Manual for NJ-series CPU Unit	W494	CJ1W-SCU22 CJ1W-SCU32 CJ1W-SCU42	Learning the hardware and serial communications modes that you can use for a CJ-series Serial Communications Unit in an NJ-series Controller. Learning about OMRON components and standard system protocols.	This manual describes the hardware and serial communications modes that you can use for a CJ-series Serial Communications Unit in an NJ-series Controller. It also describes the standard system protocols. Refer to the *CX-Protocol Operation Manual* (Cat. No. W344) for details on user-created protocol macros.
Sysmac Studio Version 1 Operation Manual	W504	SYSMAC-SE-2□□□	Learning about the operating procedures and functions of the Sysmac Studio.	This manual describes the operating procedures of the Sysmac Studio.

Revision History

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



Revision code	Date	Revised content
01	May 2012	Original production

1

Introduction

This section outlines the FINS commands that can be addressed to an NJ-series CPU Unit and describes the required system configuration.

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1-2 Applicable System Configuration 1-3

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1-2-3 Unit Versions That Support FINS Commands 1-4

1-1 Introduction to Applicable FINS Commands

An NJ-series CPU Unit can receive FINS commands* that are sent from an external device, such as a host computer.

However, the following restrictions apply when you use FINS commands that are addressed to NJ-series CPU Units.

Classification	Types of FINS commands
Applicable FINS commands	CONNECTION DATA READ, CLOCK READ, CLOCK WRITE, access right commands, file memory commands, and force-set/reset commands
FINS command that can be used with some functional restrictions	MEMORY AREA READ, MEMORY AREA WRITE, RUN, STOP, CPU UNIT DATA READ, CPU UNIT STATUS READ, and CYCLE TIME READ
FINS commands that you cannot use	PROGRAM AREA READ, PROGRAM AREA WRITE, PARAMETER AREA READ, PARAMETER AREA WRITE, MESSAGE READ, ERROR LOG READ, and some file memory commands

* "FINS" stands for Factory Interface Network Service. It is an original OMRON command system for information exchange between controllers on OMRON FA networks. It is not dependant on the physical or data link layers.

Additional Information

Accessing Variables in NJ-series CPU Units

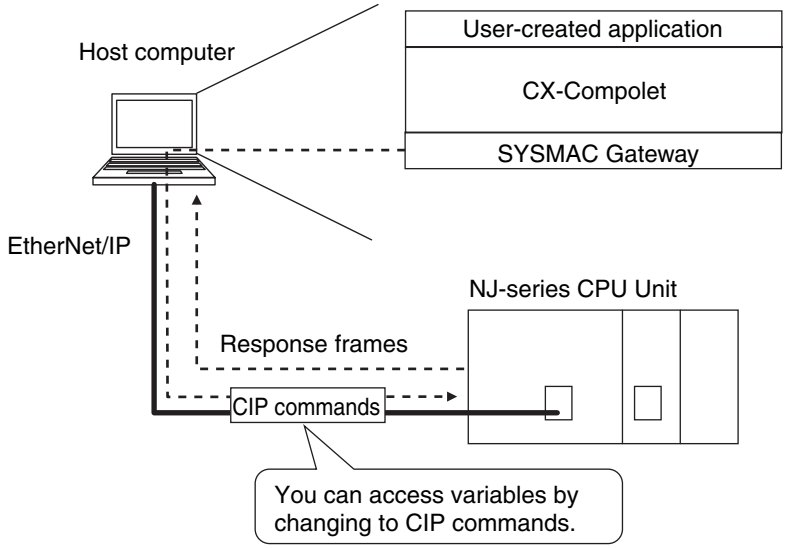
You cannot use FINS commands to access variables in an NJ-series CPU Unit.

To access variables, change from FINS to CIP commands.

You can use CIP commands to access variables by addressing them to the NJ-series CPU Unit through an EtherNet/IP network.

OMRON provides the following software as a development environment for CIP commands.

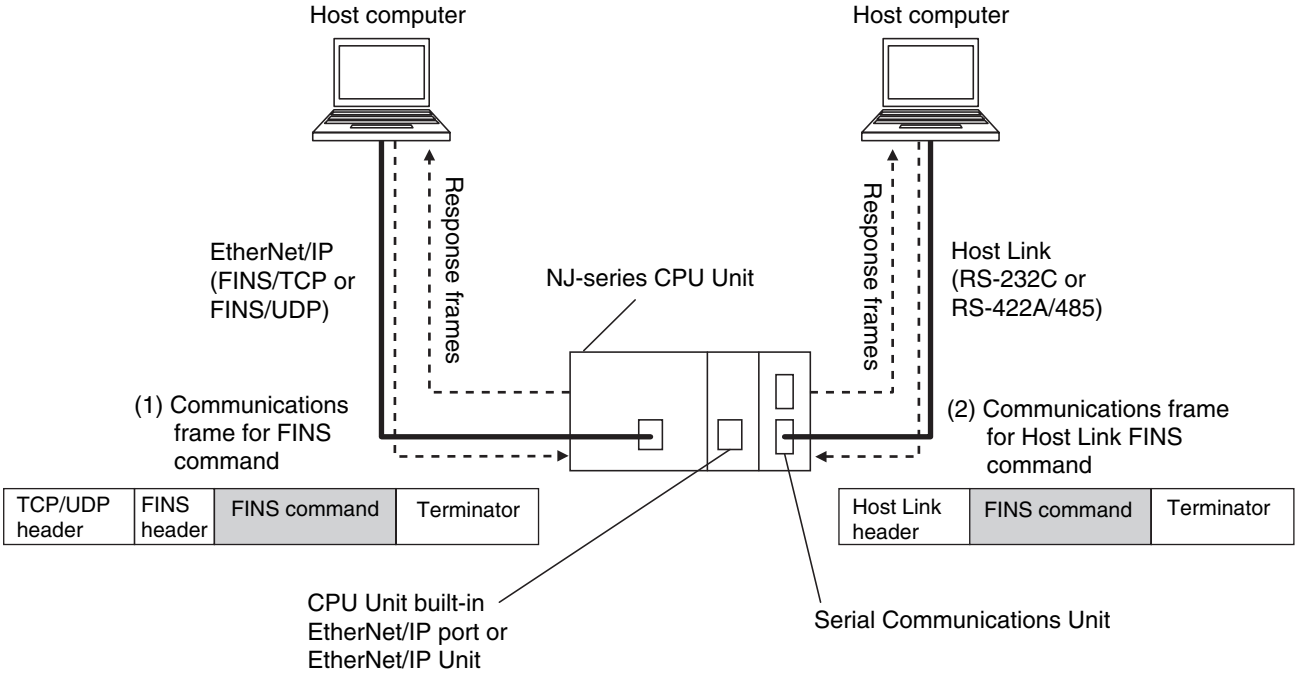
Product	Model number	Description
CX-Compolet (provided with SYSMAC Gateway)	WS02-CPLC1	This software allows you to easily read and write Controller data with Visual Basic .NET or Visual C# .NET.



1-2 Applicable System Configuration

1-2-1 System Configuration for Using FINS Commands Addressed to NJ-series CPU Units

In the following system configuration, you can send FINS commands to the NJ-series CPU Unit.



NJ-series CPU Units support the following two types of commands.

(1) FINS commands (FINS/TCP or FINS/UDP) that are addressed to an NJ-series CPU Unit through a built-in EtherNet/IP port or an EtherNet/IP Unit

(2) Host Link FINS commands that are addressed to an NJ-series CPU Unit through a Serial Communications Unit

1-2-2 Networks for Using FINS Commands Addressed to NJ-series CPU Units

FINS commands that are addressed to NJ-series CPU Units are supported for the following networks and Units.

Applicable network	Applicable Units	Model numbers
EtherNet/IP	Built-in EtherNet/IP ports on NJ-series CPU Units	NJ501-1300 NJ501-1400 NJ501-1500 NJ301-1200 NJ301-1100
	CJ-series EtherNet/IP Units	CJ1W-EIP21
Host Link	CJ-series Serial Communications Units	CJ1W-SCU22 CJ1W-SCU32 CJ1W-SCU42

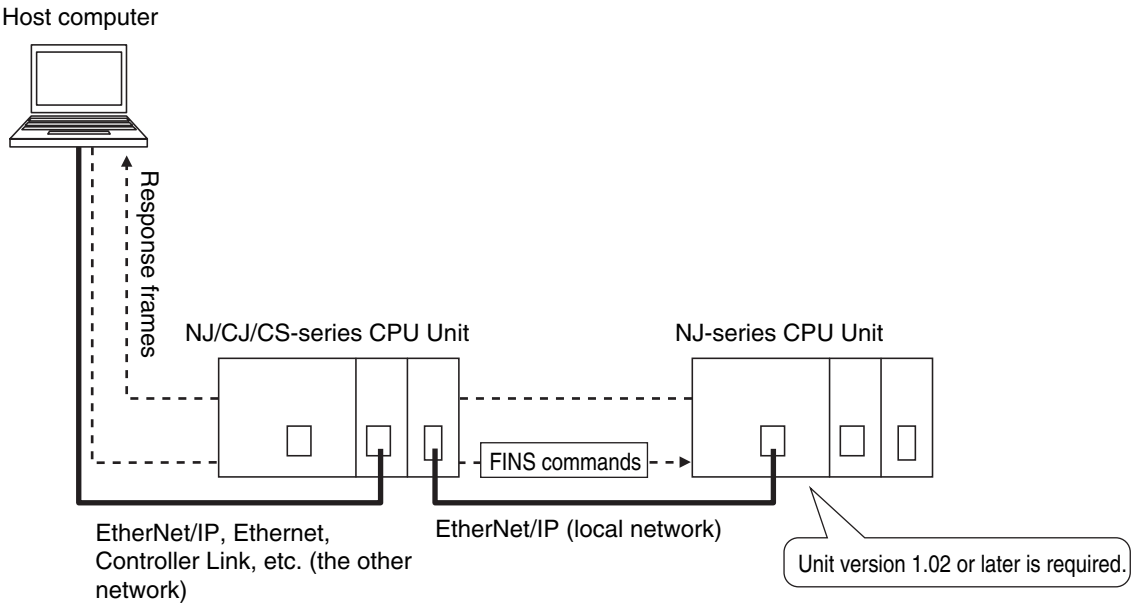
1-2-3 Unit Versions That Support FINS Commands

The unit versions of NJ-series CPU Units and Special Units that support FINS commands are given in the following table.

Product	Model numbers	Applicable unit version
NJ-series CPU Units	NJ501-1□□□ NJ301-1□□□	Unit version 1.01 or later*
CJ-series EtherNet/IP Unit	CJ1W-EIP21	Unit version 2.1 or later
CJ-series Serial Communications Units	CJ1W-SCU22 CJ1W-SCU32 CJ1W-SCU42	Unit version 1.0 or later

* An NJ-series CPU Unit with unit version 1.02 or later is required to receive FINS commands from other networks. FINS routing tables must be set to send FINS commands across network layers.
Refer to the following sections for details.

- FINS routing table specifications: *Section 3 FINS Routing*
- Setting FINS routing tables: *Section 4 Procedure for Sending FINS Commands*



2

FINS Command List and Memory Correspondence

This section lists the FINS commands that are addressed to NJ-series CPU Units. It also describes how I/O memory corresponds to the memory used for CJ-series Units.

2-1 FINS Commands Addressed to NJ-series CPU Units 2-2
2-2 I/O Memory and Memory Used for CJ-series Units 2-8
2-3 AT Specifications to Memory Used for CJ-series Units 2-9

2-1 FINS Commands Addressed to NJ-series CPU Units

This section lists the FINS commands that are addressed to NJ-series CPU Units, shows which commands can be used and which commands have restrictions, and describes the execution conditions for the commands.

Applicable and Restricted FINS Commands Addressed to NJ-series CPU Units

Some of the FINS commands that are addressed to NJ-series CPU Units can be used and some of them cannot be used. There are restrictions for some of the commands that can be used. This is shown in the following table.

Command code (hex)		Command name	Applicability when addressed to an NJ-series CPU Unit	Normal response code	Restrictions when addressed to an NJ-series CPU Unit
01	01	MEMORY AREA READ	Restricted	0000 hex	You can use these commands with the following restrictions. • Access is possible for the memory used for CJ-series Units. • You cannot access memory areas that do not exist in the memory used for CJ-series Units. Refer to *2-2 I/O Memory and Memory Used for CJ-series Units* for the correspondence between the memory used for CJ-series Units and the I/O memory in a CS/CJ-series CPU Unit.
01	02	MEMORY AREA WRITE			
01	03	MEMORY AREA FILL			
01	04	MULTIPLE MEMORY AREA READ			
01	05	MEMORY AREA TRANSFER			
02	01	PARAMETER AREA READ	No	0000 hex	You cannot use these commands. • However, the normal response code is returned if you execute any of these FINS commands.
02	02	PARAMETER AREA WRITE			
02	03	PARAMETER AREA FILL (CLEAR)			
03	06	PROGRAM AREA READ	No	0401 hex (undefined command)	You cannot use these commands.
03	07	PROGRAM AREA WRITE			
03	08	PROGRAM AREA CLEAR			

Command code (hex)		Command name	Applicability when addressed to an NJ-series CPU Unit	Normal response code	Restrictions when addressed to an NJ-series CPU Unit
04	01	RUN	Restricted	0000 hex	You can use these commands with the following restriction. • You can use this command only in RUN or PROGRAM mode.
04	02	STOP		0401 hex (undefined command)	In the following cases, an undefined command response (0401 hex) is returned and the operating mode changes to RUN mode. • When the command is specified in MONITOR mode • When only the command code or only the command code and program number are sent

05	01	CPU UNIT DATA READ	Restricted	0000 hex	You can use this command with the following restrictions.
					• You can read only the following data.
					  • CPU Unit model
					  • Number of DM words
					  • Maximum number of EM banks
					  • EM size
					  • IOM size
					• Fixed values are returned for the following data.
					  • DIP switch data: Always 0.
					  • Program area size: Always 14 hex.
					  • Timer/counter size: Always 08 hex.
					  • Memory card type: Always 04 hex, regardless of whether there is an SD Memory Card.
					  • Memory card size: Always FFFF hex if an SD Memory Card is inserted and 00 hex if an SD Memory Card is not inserted.
					  • Remote I/O data: Always 0.

05	02	CONNECTION DATA READ	Yes	0000 hex	You can use this command. The following information on the built-in EtherNet/IP port is read. • The unit address is always returned as FA hex. • The model number will be NJ-EIP21.

Command code (hex)		Command name	Applicability when addressed to an NJ-series CPU Unit	Normal response code	Restrictions when addressed to an NJ-series CPU Unit

06	01	CPU UNIT STATUS READ	Restricted	0000 hex	You can use this command with the following restrictions.
					• You can read only the following data.
					  • Operating status
					  • Operating mode
					• The following two items are processed as NJ-series error information.
					  • Fatal error data: This is treated as the major fault level, and 0000 hex (normal) or 0001 hex (error) is returned.
					  • Non-fatal error data: This is treated as the partial fault level or minor fault level, and 0000 hex (normal) or 0001 hex (error) is returned.
					• The following data is always 0. CPU status, battery status, built-in flash memory access, message yes/no, and error code
					• Error message: Sixteen ASCII spaces (20 hex) are returned, i.e., you cannot use the error message.

06	20	CYCLE TIME READ	Restricted	0000 hex	You can use this command with the following restrictions. • The task period of the primary periodic task is given for the cycle time. • The task period of the primary periodic task is given for the average, minimum, and maximum times. • You cannot initialize the task execution time for the primary periodic task.
07	01	CLOCK READ	Yes	0000 hex	You can use these commands.
07	02	CLOCK WRITE			
09	20	MESSAGE READ/CLEAR (to clear messages)	No	0000 hex	You cannot use this command. • However, the normal response code is returned if you execute this FINS command. • If you use this command to read a message, 16 ASCII spaces (20 hex) are returned. • You cannot use this command to clear messages.

Command code (hex)		Command name	Applicability when addressed to an NJ-series CPU Unit	Normal response code	Restrictions when addressed to an NJ-series CPU Unit
0C	01	ACCESS RIGHT ACQUIRE	Yes	0000 hex	You can use these commands.
0C	02	ACCESS RIGHT FORCED ACQUIRE			
0C	03	ACCESS RIGHT RELEASE			
21	01	ERROR CLEAR	No	0000 hex	You cannot use these commands. • However, the normal response code is returned if you execute this FINS command.
21	02	ERROR LOG READ			
21	03	ERROR LOG CLEAR			
22	01	FILE NAME READ	Restricted	0000 hex	You can use these commands with the following restrictions. • The commands apply to the SD Memory Card. • These commands cannot be used for EM file memory because the NJ-series CPU Units do not support it.
22	02	SINGLE FILE READ			
22	03	SINGLE FILE WRITE			
22	04	FILE MEMORY FORMAT			
22	05	FILE DELETE			
22	07	FILE COPY			
22	08	FILE NAME CHANGE			
22	0A	MEMORY AREA-FILE TRANSFER	No	0401 hex (undefined command)	You cannot use these commands.
22	0B	PARAMETER AREA-FILE TRANSFER			
22	0C	PROGRAM AREA-FILE TRANSFER			
22	15	DIRECTORY CREATE/DELETE	Restricted	0000 hex	You can use this command with the following restrictions. • The commands apply to the SD Memory Card. • These commands cannot be used for EM file memory because the NJ-series CPU Units do not support it.
23	01	FORCED SET/RESET	Restricted	0000 hex	You can use this command with the following restrictions. • You can use the command only for the memory used for CJ-series Units. • Execution is performed for the forced refreshing function of the NJ-series CPU Unit.
23	02	FORCED SET/RESET CANCEL	Yes	0000 hex	You can use this command. • You can use the commands only for the memory used for CJ-series Units and for the I/O ports for EtherCAT slaves.

Execution Conditions for FINS Commands

● Execution Conditions for NJ-series CPU Units

The following table shows the execution conditions for FINS commands that are addressed to an NJ-series CPU Unit.

Execution condition	Execution for NJ-series CPU Unit	Remarks
RUN mode	OK	---
MONITOR mode	No	There is no MONITOR mode in the operating modes.
PROGRAM mode	OK	---
Access right at other device	OK	---
UM read protection	No	Not supported for NJ-series CPU Units.
DIP switch UM write protection	No	Not supported for NJ-series CPU Units.
Network write protection	No	Not supported for NJ-series CPU Units.

● Execution Conditions for FINS Commands

The following table shows the execution conditions for the FINS commands that you can use, including those that can be used with restrictions.

OK: The FINS command can be executed.

No: The FINS command cannot be executed.

Command code (hex)		Name	Execution condition		
MR	SR		RUN mode	PROGRAM mode	Access right at other device
01	01	MEMORY AREA READ	OK	OK	OK
01	02	MEMORY AREA WRITE	OK	OK	OK
01	03	MEMORY AREA FILL	OK	OK	OK
01	04	MULTIPLE MEMORY AREA READ	OK	OK	OK
01	05	MEMORY AREA TRANSFER	OK	OK	OK
04	01	RUN	OK	OK	No
04	02	STOP	OK	OK	No
05	01	CPU UNIT DATA READ	OK	OK	OK
05	02	CONNECTION DATA READ	OK	OK	OK
06	01	CPU UNIT STATUS READ	OK	OK	OK
06	20	CYCLE TIME READ	OK	No	OK
07	01	CLOCK READ	OK	OK	OK
07	02	CLOCK WRITE	OK	OK	No
0C	01	ACCESS RIGHT ACQUIRE	OK	OK	No
0C	02	ACCESS RIGHT FORCED ACQUIRE	OK	OK	OK
0C	03	ACCESS RIGHT RELEASE	OK	OK	OK
22	01	FILE NAME READ	OK	OK	OK
22	02	SINGLE FILE READ	OK	OK	OK
22	03	SINGLE FILE WRITE	OK	OK	No
22	04	FILE MEMORY FORMAT	OK	OK	No

Command code (hex)		Name	Execution condition		
MR	SR		RUN mode	PROGRAM mode	Access right at other device
22	05	FILE DELETE	OK	OK	No
22	07	FILE COPY	OK	OK	No
22	08	FILE NAME CHANGE	OK	OK	No
22	15	DIRECTORY CREATE/DELETE	OK	OK	No
23	01	FORCED SET/RESET	OK	OK	OK
23	02	FORCED SET/RESET CANCEL	OK	OK	OK

2-2 I/O Memory and Memory Used for CJ-series Units

The I/O memory in a CS/CJ-series CPU Unit corresponds to the memory used for CJ-series Units in an NJ-series CPU Unit.

This is shown in the following table.

I/O memory area in a CS/CJ-series CPU Unit		Support in memory used for CJ-series Units in an NJ-series CPU Unit
Core I/O Area	CIO	Yes
Work Area	WR	Yes
Holding Area	HR	Yes
Auxiliary Area	AR	Partially supported.*
Timer Area	TIM	No
Counter Area	CNT	No
DM Area	DM	Yes
EM Area	EM	Yes
Task Flags	TK	No
Index Registers	IR	No
Data Registers	DR	No
Clock Pulses		No
Condition Flags		No

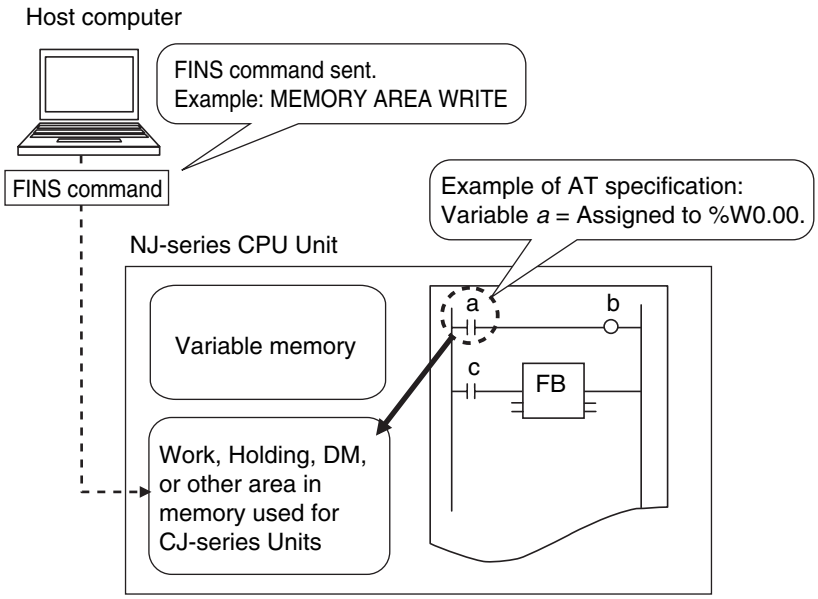
* The following addresses in the Auxiliary Area can be accessed in an NJ-series CPU Unit. They correspond to system-defined variables in the PLC Function Module (category name: _CJB).
You cannot use any other addresses in the Auxiliary Area.

Applicable Auxiliary Area addresses	Name	Corresponding system-defined variables
A50.00 to A69.15	Basic I/O Unit Information	_CJB_IOUnitInfo
A302.00 to A302.15	CPU Bus Unit Initializing Flags	_CJB_CBU00InitSta to _CJB_CBU15InitSta
A330.00 to A335.15	Special I/O Unit Initializing Flags	_CJB_SIO00InitSta to _CJB_SIO95InitSta
A501.00 to A501.15	CPU Bus Unit Restart Bits	CJB_CBU00Restart to _CJB_CBU15Restart
A502.00 to A507.15	Special I/O Unit Restart Bits	CJB_SIO00Restart to _CJB_SIO95Restart
A620.01 to A620.02 and A621.01 to A635.02	Serial Communications Unit Port Settings Changing Flags	CJB_SCU00P1ChgSta _CJB_SCU00P2ChgSta to _CJB_SCU15P1ChgSta _CJB_SCU15P2ChgSta

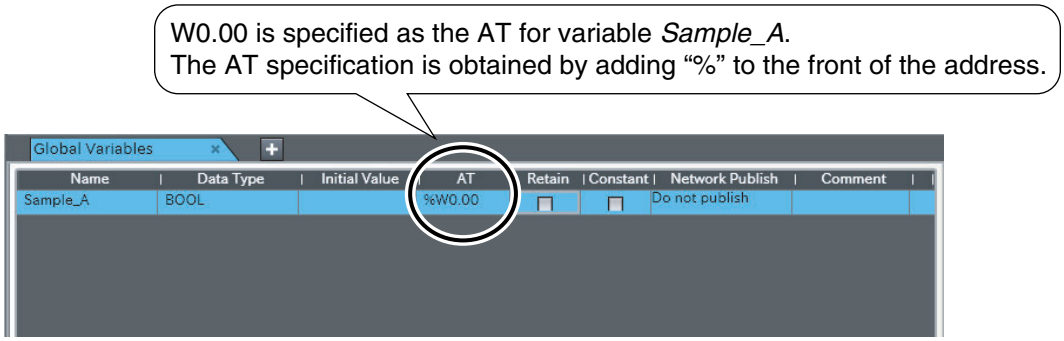
2-3 AT Specifications to Memory Used for CJ-series Units

● AT Specifications

In the user program, you must use variables with AT specifications to specify the memory used for CJ-series Units that was accessed with a FINS command. You set AT specifications with the Sysmac Studio.



Sysmac Studio Setting Example: In the *AT* column for the variable in the variable table, specify the address in the memory used for CJ-series Units. For example, to specify 0.00 in the Work Area for variable *Sample_A*, enter %W0.00 in the *AT* column. Always add "%" to the front of the address.



Additional Information

The memory used for CJ-series Units is accessed for FINS commands during the primary periodic task.

3

FINS Routing

This section describes FINS routing for NJ-series CPU Units and provides the FINS routing specifications.

3-1 Introduction 3-2

3-2 Differences in FINS Routing Specifications between CJ-series PLCs and NJ-series Controllers 3-3

3-3 Restriction on Specifications of FINS Routing for NJ-series Controllers 3-5

3-1 Introduction

This section introduces FINS routing tables* for NJ-series CPU Units.

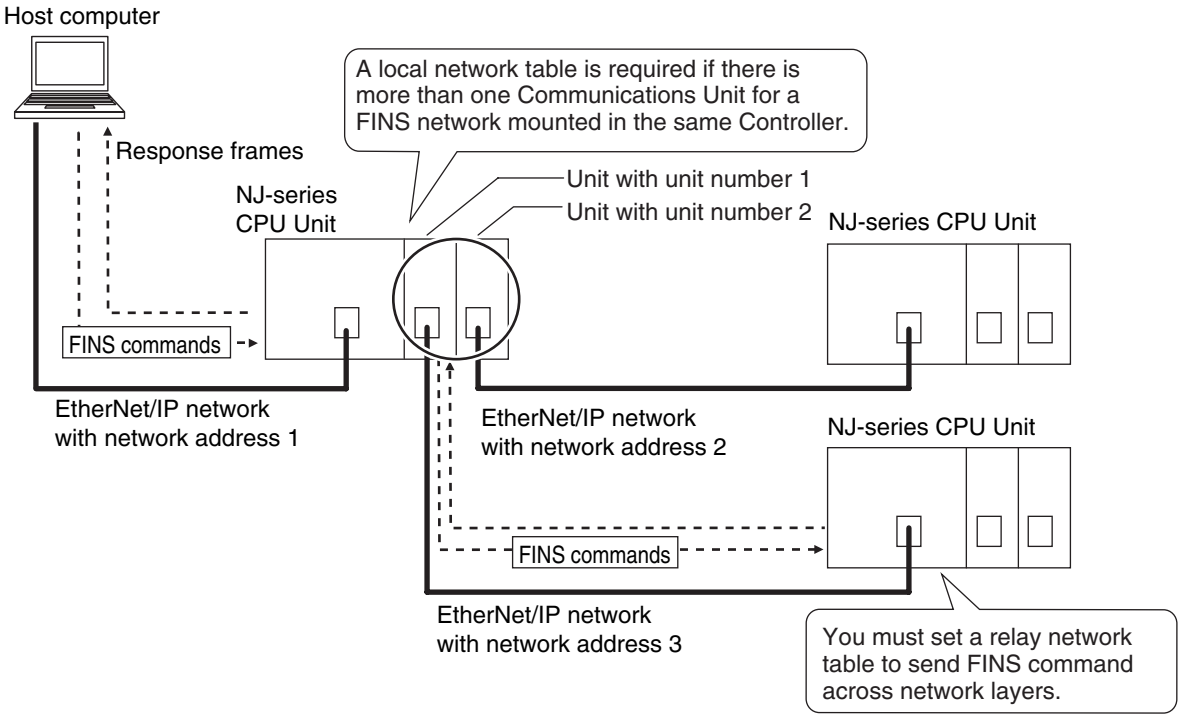
* FINS routing tables define the path settings for FINS commands when there is more than one network.

Precautions for Correct Use

- An NJ-series CPU Unit with unit version 1.02 or later is required to use FINS routing tables. Routing of FINS commands may not be correct with a CPU Unit with unit version 1.01 or earlier.
- Use Sysmac Studio version 1.03 or higher to set the FINS routing tables. You cannot use the CX-Integrator to set them.

You must set FINS routing tables to send FINS commands to an NJ-series CPU Unit in the following cases:

- A local network table must be set if there is more than one Communications Unit for a FINS network mounted to the same NJ-series Controller.
- A relay network table must be set if FINS commands are to be sent across network layers.



* A FINS network is a network that supports FINS commands. The following are FINS networks:

- EtherNet/IP
- Controller Link
- DeviceNet
- Ethernet
- SYSMAC LINK

Only EtherNet/IP networks are supported by the NJ-series Controllers.
Therefore, the final FINS network for FINS commands that are addressed to an NJ-series CPU Unit must be an EtherNet/IP network.

Additional Information

Refer to *Section 4 Procedure for Sending FINS Commands* for the setting procedures for FINS routing tables.

3-2 Differences in FINS Routing Specifications between CJ-series PLCs and NJ-series Controllers

The specifications of the FINS routing settings in NJ-series CPU Units differ from those for CS/CJ-series CPU Units as follows:

- Unit address of the built-in EtherNet/IP port
- Specifications for sending FINS commands to a CPU Unit under which a Communications Unit for a FINS network is mounted without setting a local network table
- Event log and error log
- Operation for routing tables for the Memory All Clear operation

Details are described in the rest of this section.

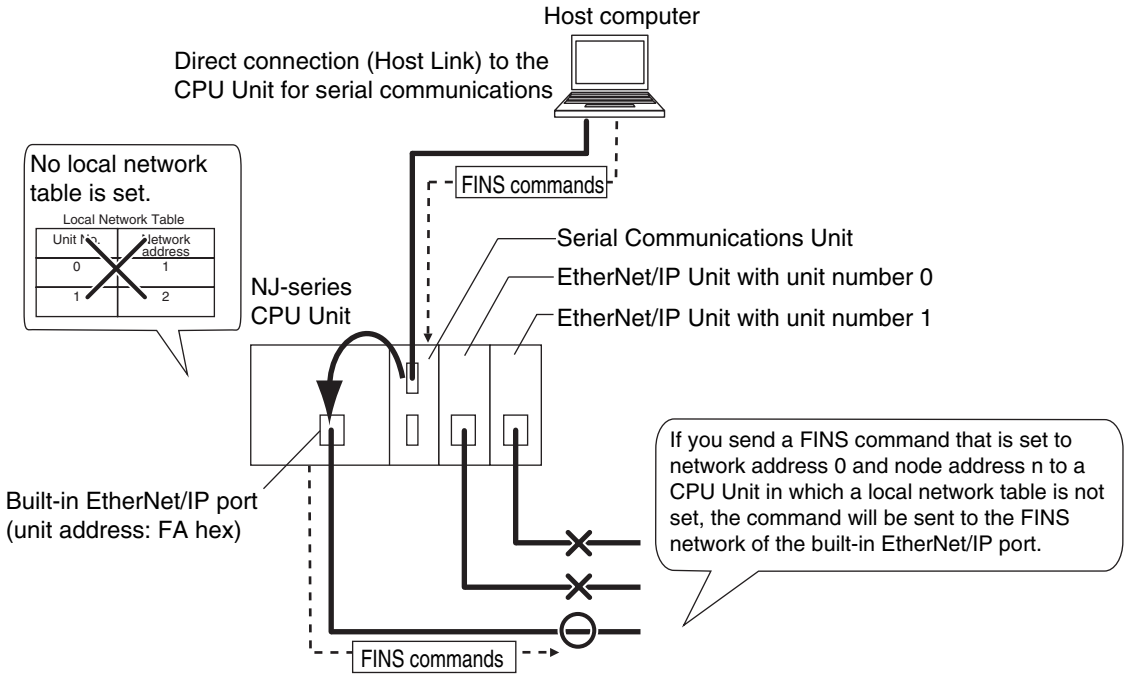
Unit Address of the Built-in EtherNet/IP Port

Set the unit address of the port to FA hex (250 decimal) when you set a FINS network for the built-in EtherNet/IP port on an NJ-series CPU Unit. Refer to *Section 4 Procedure for Sending FINS Commands* for the setting procedures.

Sending FINS Commands to a CPU Unit with a Communications Unit for a FINS Network without a Local Network Table

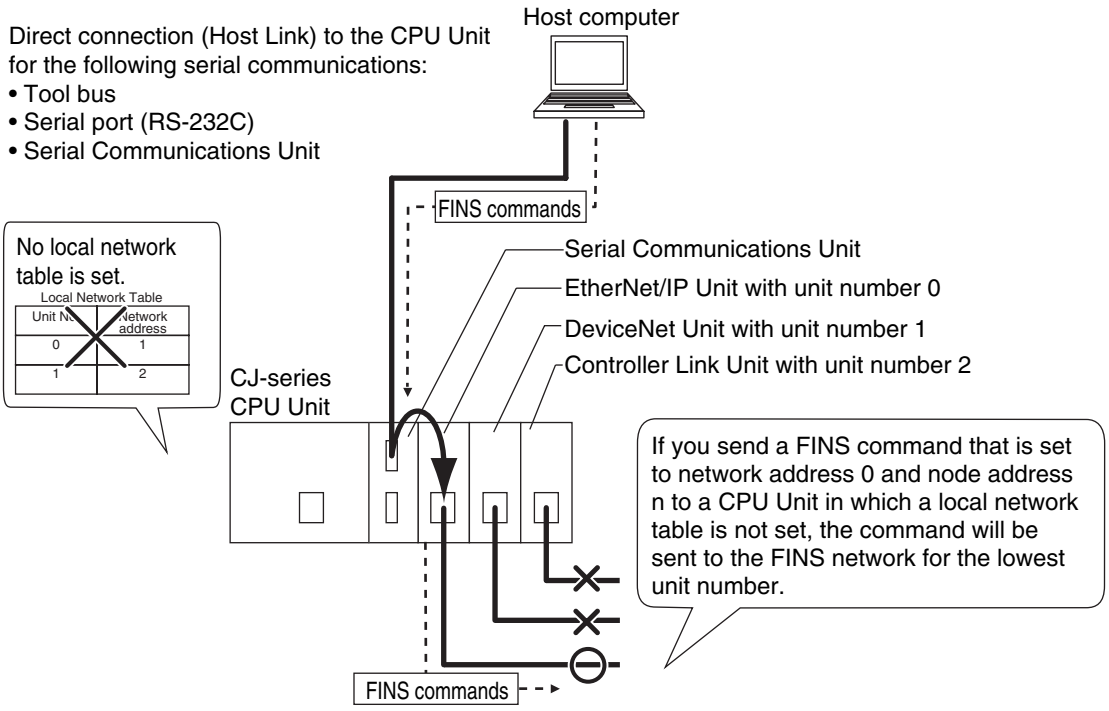
As an exception (e.g., when building the network), you can send FINS commands addressed to the node that is connected to the built-in EtherNet/IP port on a CPU Unit without registering a local network table even if there is one or more Communications Units mounted. The following condition must be met.

There must be a direct serial connection to the CPU Unit under which one or more Communications Units for FINS networks are mounted when a local network table is not set.



Additional Information

For a CS/CJ-series CPU Unit, the FINS command is sent to the network of the Communications Unit for a FINS network that has the lowest unit number.



Event Log and Error Log

Errors that are detected by the built-in EtherNet/IP port are recorded in the event log. Errors that are detected by the EtherNet/IP Unit are recorded in the error log and the event log. Details are given in the following table.

Unit or port	Storage location	Error	Reference manual
Built-in EtherNet/IP port on NJ-series CPU Unit	Event log	Errors detected by the built-in EtherNet/IP port	*14-2 Troubleshooting in the NJ-series CPU Unit Built-in EtherNet/IP Port User's Manual* (Cat. No. W506)
CJ-series EtherNet/IP Unit	Error log table in RAM or non-volatile memory	Errors detected by the EtherNet/IP Unit	*13-4 Error Log in the CJ-series EtherNet/IP Units Operation Manual for NJ-series CPU Unit* (Cat. No. W495)

Operation for Routing Tables for the Memory All Clear Operation

When the Memory All Clear operation is performed for an NJ-series CPU Unit, the routing tables (i.e., the local network table and relay network table) are cleared.

Additional Information

The operation for routing tables for the Memory All Clear operation is as follows for the CJ-series CPU Units:

- CJ2 CPU Unit: The routing tables are cleared.
- CJ1 CPU Unit: The routing tables are not cleared.

3-3 Restriction on Specifications of FINS Routing for NJ-series Controllers

The following restrictions apply to FINS routing tables that are set in NJ-series CPU Units.

Error Response Code for FINS Commands Sent Across Network Layers

If an error occurs when relaying a FINS command that is addressed to an NJ-series CPU Unit across a network, the relay error code will not be attached when the response code is returned.

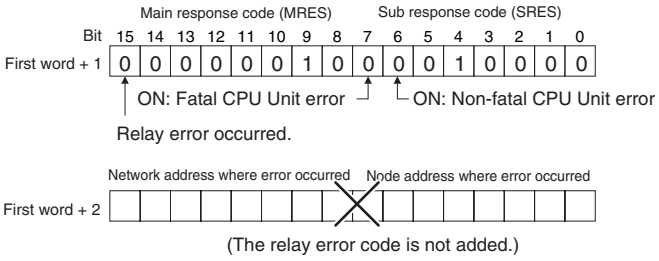
This applies only to the following error response codes.

● Error Response Code with Restrictions

Main response code (hexadecimal)		Sub response code (hexadecimal)		Restrictions when addressed to an NJ-series CPU Unit
Value	Meaning	Value	Meaning	
02	Remote Node Error	02	Specified Unit Does Not Exist	Bit 15, which indicates that an error occurred when relaying a FINS command, will be turned OFF, the relay error code will not be added, and the response code will be returned.
05	Routing Error	01	Remote Address Setting Error	

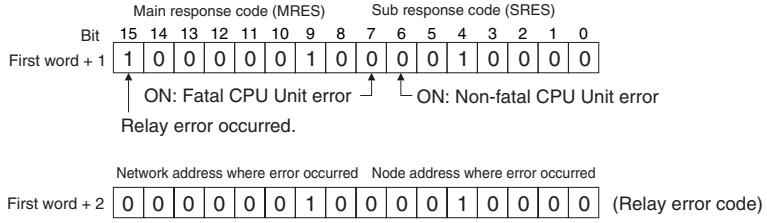
● Operation Example

If a FINS command is addressed to a non-existent Special I/O Unit (local network address 0, local node address 0, unit address 0 + 20 hex) through an EtherNet/IP Communications Unit or built-in EtherNet/IP port (network address 2 and node address 10), bit 15 will be turned OFF in the response code, the relay error code will not be added, and the response will be returned.



Additional Information

If a FINS command is addressed to a non-existent Special I/O Unit (local network address 0, local node address 0, unit address 0 + 20 hex) through built-in EtherNet/IP port on a CJ-series CPU Unit or CJ-series EtherNet/IP Unit, bit 15 will be turned ON in the response code, the relay error code (e.g., 0210 hex) will be added, and the response will be returned.



4

Procedure for Sending FINS Commands

This section provides the procedures that are required to send FINS commands.

4-1 Sending Commands through Built-in EtherNet/IP Ports 4-2
4-2 Sending Commands through EtherNet/IP Units 4-4
4-3 Sending Commands through a Serial Communications Unit 4-5

4-1 Sending Commands through Built-in EtherNet/IP Ports

Use the following procedure to send FINS commands through a built-in EtherNet/IP port.

Step 1: Set the FINS node address (required).

Step 2: Make other settings for the built-in EtherNet/IP port (as required).

Step 3: Set the FINS routing tables (as required).

Step 1: Setting the FINS Node Address (Required)

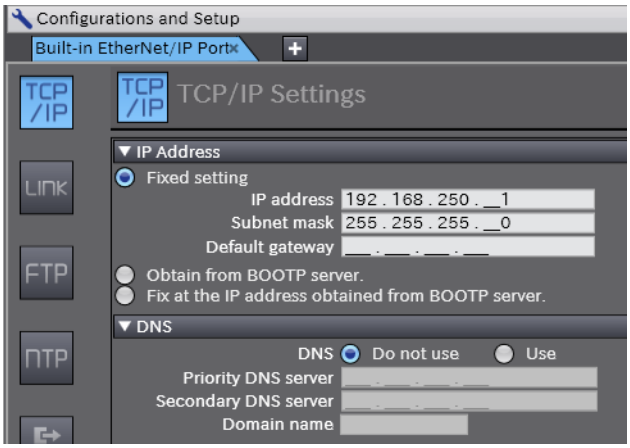
Set the FINS node address of the built-in EtherNet/IP port with the Sysmac Studio.

● Default Setting (IP Address-FINS Address Conversion Method Set for Automatic Generation)

The rightmost digits of the IP address that was set for the built-in EtherNet/IP port with the Sysmac Studio* is automatically used as the FINS node address.

* Set the IP address of the built-in EtherNet/IP port in the following **IP Address** setting in the Sysmac Studio.

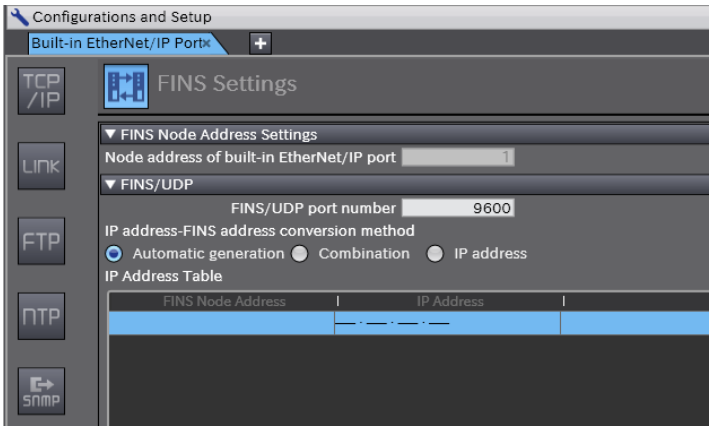
Configurations and Setup – **Controller Setup** – **Built-in EtherNet/IP Port Settings** – **TCP/IP Settings** – **IP Address**



● Other Settings

Set the FINS node address in the following FINS Node Address Settings in the Sysmac Studio.

Configurations and Setup – **Controller Setup** – **Built-in EtherNet/IP Port Settings** – **FINS Settings** – **FINS Node Address Settings**



Step 2: Making Other Settings for the Built-in EtherNet/IP Port (as Required)

Make other settings for the built-in EtherNet/IP port as required.

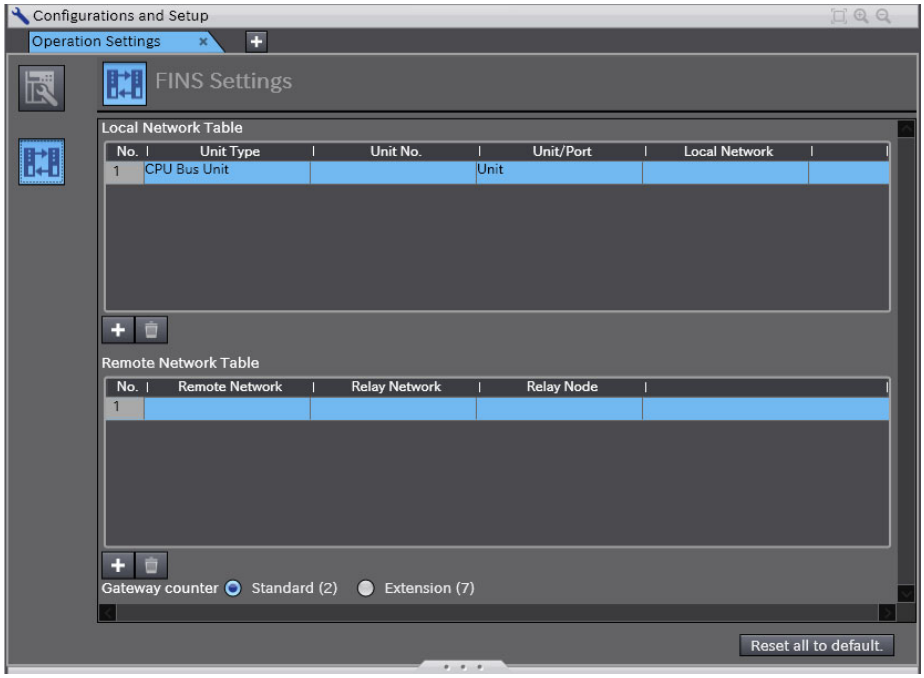
Step 3: Setting the FINS Routing Tables (as Required)

Set the FINS routing tables as required.

You must set FINS routing tables only if there is more than one EtherNet/IP Unit mounted or if commands are routed through the NJ-series Controller.

Set the FINS routing tables in the following FINS Settings in the Sysmac Studio.

Configurations and Setup – **Controller Setup** – **Operation Settings** – **FINS Settings**



Additional Information

You cannot use the CX-Integrator to set FINS routing tables for NJ-series Controllers.

4-2 Sending Commands through EtherNet/IP Units

Use the following procedure to send FINS commands through an EtherNet/IP Unit.

Step 1: Set the FINS node address (required).

Step 2: Set the parameters in the EtherNet/IP Unit (required).

Step 3: Set the FINS routing tables (as required).

Step 1: Setting the FINS Node Address (Required)

Set the FINS node address of the EtherNet/IP Unit on the rotary switches on the front panel of the EtherNet/IP Unit.

Step 2: Setting the Parameters in the EtherNet/IP Unit (Required)

Edit the Special Unit Setup in the Unit Configuration of the Sysmac Studio and set the parameters of the EtherNet/IP Unit.

Configurations and Setup – **CPU/Expansion Racks** – **Edit Special Unit Settings**

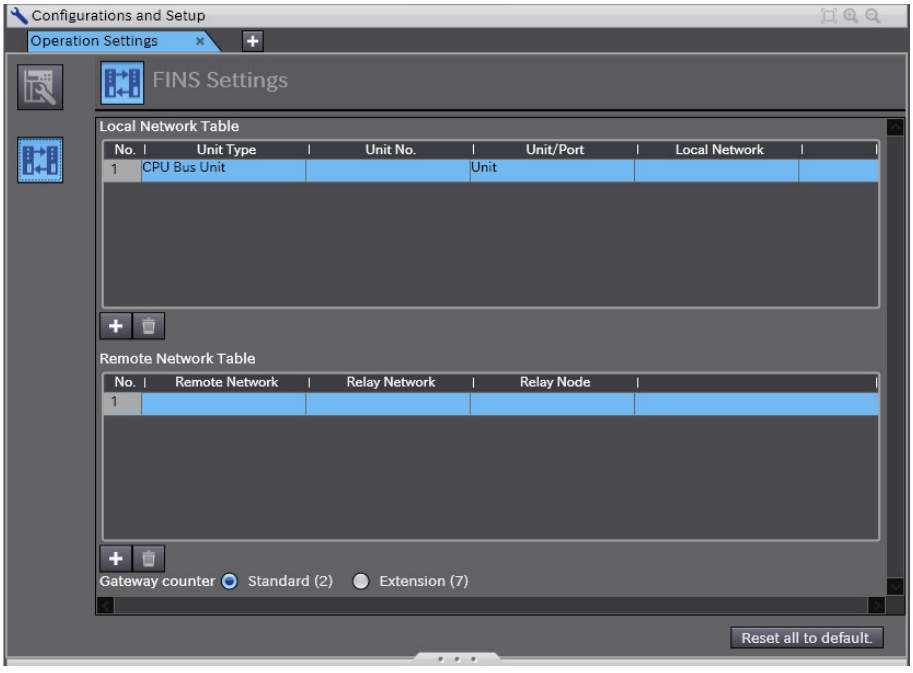
Step 3: Setting the FINS Routing Tables (as Required)

Set the FINS routing tables as required.

You must set FINS routing tables only if there is more than one EtherNet/IP Unit mounted or if commands are routed through the NJ-series Controller.

Set the FINS routing tables in the following FINS Settings in the Sysmac Studio.

Configurations and Setup – **Controller Setup** – **Operation Settings** – **FINS Settings**



Additional Information

You cannot use the CX-Integrator to set FINS routing tables for NJ-series Controllers.

4-3 Sending Commands through a Serial Communications Unit

Use the following procedure to send FINS commands through a Serial Communications Unit.

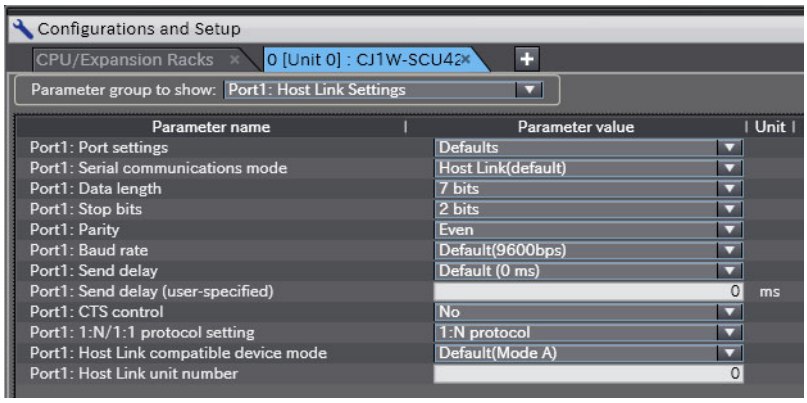
Step 1: Set the parameters in the Serial Communications Unit (required).

- Serial communications mode: Host Link (default)
- Host Link unit number setting: 00 to 31

Step 1: Setting the Parameters in the Serial Communications Unit (Required)

Edit the Special Unit Setup in the Unit Configuration of the Sysmac Studio and set the parameters of the Serial Communications Unit.

Configurations and Setup – **CPU/Expansion Racks** – **Edit Special Unit Settings**



Make the following settings.

- Serial communications mode: Host Link (default)
- Host Link unit number: 00 to 31

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