OMRON

Machine Automation Controller

NJ/NX-series

CPU Unit

OPC UA
User's Manual

NJ501-1□00
NX102-□□□□
NX502-1□00
NX701-1□□□

SYSMAC
always in control

W588-E1-15

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Introduction

Thank you for purchasing an NJ/NX-series CPU Unit.
This manual contains information necessary to use the OPC UA with an NJ/NX-series CPU Unit or the OPC UA server with the Sysmac Studio's Simulator. Please read this manual and make sure you understand the functionality and performance of the NJ/NX-series CPU 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 products.

- NX-series CPU Units NX701-1□□□ (Unit version 1.24 or later)
- NX-series CPU Units NX502-1□00 (Unit version 1.60 or later)
- NX-series CPU Units NX102-□□□□ (Unit version 1.30 or later)
- NJ-series CPU Units NJ501-1□00 (Unit version 1.17 or later)
- Sysmac Studio SYSMAC-SE2□□□
  (NX701-1□□□: Version 1.44 or higher, NX502-1□00: Version 1.54 or higher, NX102-□□00: Version 1.23 or higher, NX102-□□20: Version 1.24 or higher, and NJ501-1□00: Version 1.21 or higher)

Part of the specifications and restrictions for the CPU Units are given in other manuals. Refer to *Relevant Manuals* on page 2 and *Related Manuals* on page 20.
For information on models that support the OPC UA Server function with the Sysmac Studio's Simulator, refer to *Supported Models and Project Unit Versions* on page A-30.

Relevant Manuals

The following table provides the relevant manuals for the NJ/NX-series CPU Units. Read all of the manuals that are relevant to your system configuration and application before you use the NJ/NX-series CPU Unit.

The built-in EtherNet/IP port in the NJ/NX-series CPU Unit is used for this product. For details on how to use the built-in EtherNet/IP port, refer to the *NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual (Cat. No. W506)*.

Most operations are performed from the Sysmac Studio Automation Software. Refer to the *Sysmac Studio Version 1 Operation Manual (Cat. No. W504)* for information on the Sysmac Studio.

Purpose of use	Manual											
	Basic information											
	NX-series CPU Unit Hardware User's Manual	NX-series NX502 CPU Unit Hardware User's Manual	NX-series NX102 CPU Unit Hardware User's Manual	NJ-series CPU Unit Hardware User's Manual	NJ/NX-series CPU Unit Software User's Manual	NJ/NX-series Instructions Reference Manual	NJ/NX-series CPU Unit Motion Control User's Manual	NJ/NX-series Motion Control Instructions Reference Manual	NJ/NX-series CPU Unit Built-in EtherCAT Port User's Manual	NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual	NJ-series CPU Unit OPC UA User's Manual	NJ/NX-series Troubleshooting Manual
Introduction to NX701 CPU Units	○											
Introduction to NX502 CPU Units		○										
Introduction to NX102 CPU Units			○									
Introduction to NJ-series Controllers				○								
Setting devices and hardware	○	○	○	○								
Using motion control							○					
Using EtherCAT									○			
Using EtherNet/IP										○		
Software settings												
Using motion control							○					
Using EtherCAT					○				○			
Using EtherNet/IP										○		
Using OPC UA											○	
Writing the user program												
Using motion control							○	○				
Using EtherCAT					○	○			○			
Using EtherNet/IP										○		
Programming error processing												○
Using OPC UA											○	
Testing operation and debugging												
Using motion control							○					
Using EtherCAT					○				○			
Using EtherNet/IP										○		
Using OPC UA											○	

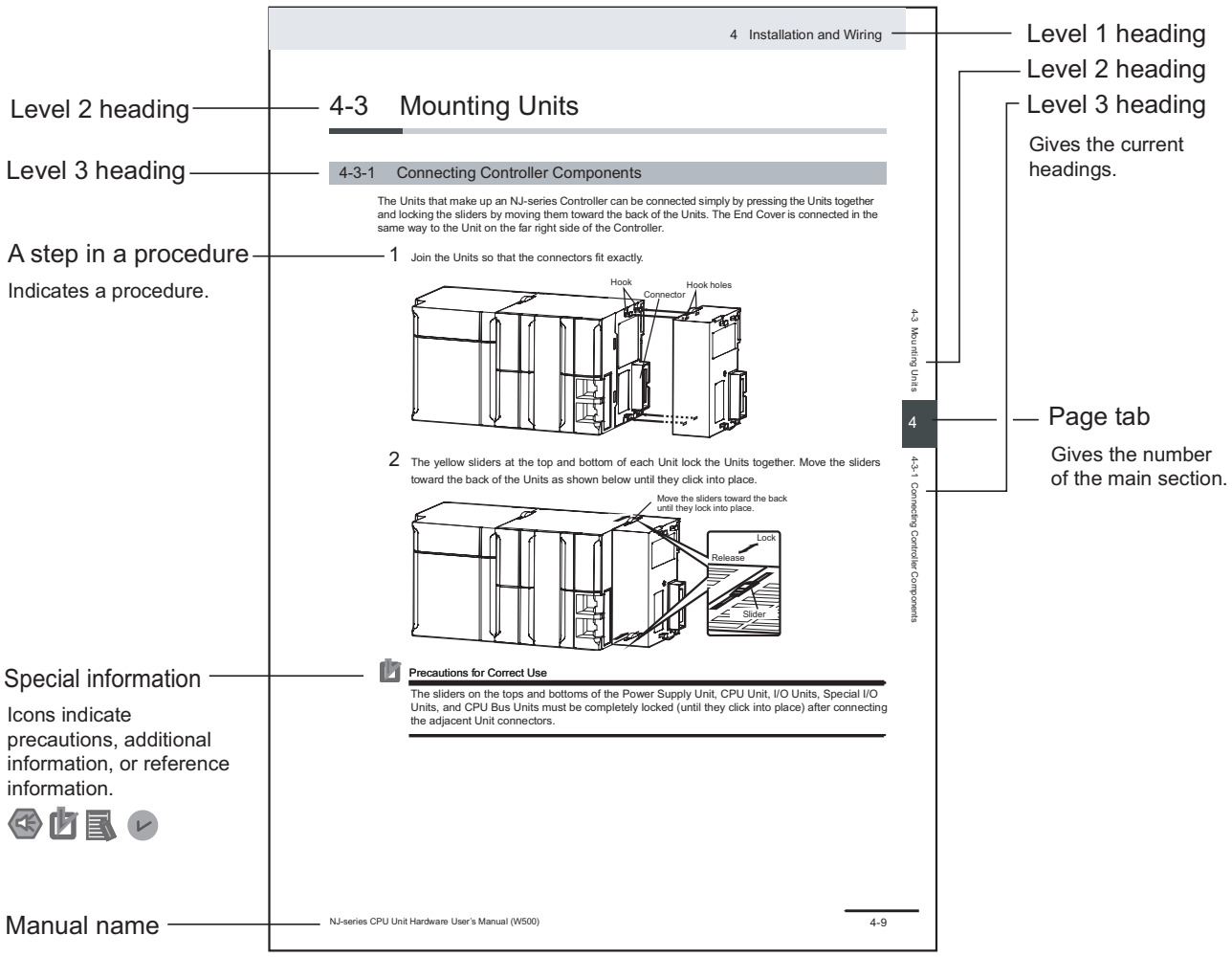
Purpose of use	Manual											
	Basic information											
	NX-series CPU Unit Hardware User's Manual	NX-series NX502 CPU Unit Hardware User's Manual	NX-series NX102 CPU Unit Hardware User's Manual	NJ-series CPU Unit Hardware User's Manual	NJ/NX-series CPU Unit Software User's Manual	NJ/NX-series Instructions Reference Manual	NJ/NX-series CPU Unit Motion Control User's Manual	NJ/NX-series Motion Control Instructions Reference Manual	NJ/NX-series CPU Unit Built-in EtherCAT Port User's Manual	NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual	NJ-series CPU Unit OPC UA User's Manual	NJ/NX-series Troubleshooting Manual
Learning about error management and corrections*1	△	△	△	△	△		△		△			○
Maintenance	○	○	○	○								
Using motion control							○					
Using EtherCAT									○			
Using EtherNet/IP										○		

*1. Refer to the *NJ/NX-series Troubleshooting Manual (Cat. No. W503)* for the error management concepts and an overview of the error items. Refer to the manuals that are indicated with triangles for details on errors for the corresponding Units.

Manual Structure

Page Structure

The following page structure is used in this manual.



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

Special Information

Special information in this manual is classified as follows:

Precautions for Safe Use

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

Precautions for Correct Use

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

 **Additional Information**

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

 **Version Information**

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

Precaution on Terminology

- In this manual, *built-in EtherNet/IP port* refers to the following port.
  Built-in EtherNet/IP port (PORT 1) of the NX-series CPU Units NX701-1□□□
  Built-in EtherNet/IP port (PORT 1) of the NX-series CPU Units NX502-1□00
  Built-in EtherNet/IP port (PORT 1) of the NX-series CPU Units NX102-□□□□
  Built-in EtherNet/IP port of the NJ-series CPU Units NJ501-1□00
- In this manual, *download* refers to transferring data from the Sysmac Studio to the physical Controller and *upload* refers to transferring data from the physical Controller to the Sysmac Studio.
  For the Sysmac Studio, *synchronization* is used to both *upload* and *download* data. Here, *synchronize* means to automatically compare the data for the Sysmac Studio on the computer with the data in the physical Controller and transfer the data in the direction that is specified by the user.

Sections in this Manual

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Section 1 Overview of OPC UA Server Function

Section 2 Structure of the OPC UA Server

Section 3 Settings of the OPC UA Server

Section 4 Starting and Checking the Status of the OPC UA Server

Section 5 Security Function of OPC UA Server

Section 6 Connecting from the OPC UA Client and Reading/Writing Variables

Section 7 Execution Log Functions

Section 8 Other Functions

Section 9 Troubleshooting

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Warranty, Limitations of Liability

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Safety Precaution

Refer to the following manuals for safety precautions.

- *NX-series CPU Unit Hardware User's Manual (Cat. No. W535)*
- *NX-series NX502 CPU Unit Hardware User's Manual (Cat. No. W629)*
- *NX-series NX102 CPU Unit Hardware User's Manual (Cat. No. W593)*
- *NJ-series CPU Unit Hardware User's Manual (Cat. No. W500)*
- *Sysmac Studio Version 1 Operation Manual (Cat. No. W504)*

Precautions for Safe Use

This section describes the precautions for the safe use of the OPC UA Server.

- Even if you accidentally add the client certificate of a client for which you do not want to permit connection in the *Trusted Certificate List*, the OPC UA Server of the NJ/NX-series Controller will permit connections from that client.
  As a result, confidential information on the server side may be leaked or unintended operation may be performed. Therefore, when you add a certificate to the *Trusted Certificate List* from the Sysmac Studio, make sure that all the certificates that you will register in the Trusted Certificate List are trusted client certificates.
- Even if a variable is set to Network Publish in the Sysmac Studio, the OPC UA client may not be able to refer to or read/write the variable in some cases depending on the limits set on variables that can be published to the OPC UA client of the OPC UA Server function.
  Refer to the event log or Execution Log, and review the variables to be published to the network depending on the cause of occurrence. For details on the restrictions on variables that can be published in the OPC UA client, refer to *Restrictions on Publishing to the OPC UA Client* on page 6-12 in *6-2-2 Reading/Writing the Variables of the CPU Unit* on page 6-5.

Refer to the following manuals for other precautions for safe use that are not described above.

- *NX-series CPU Unit Hardware User's Manual (Cat. No. W535)*
- *NX-series NX502 CPU Unit Hardware User's Manual (Cat. No. W629)*
- *NX-series NX102 CPU Unit Hardware User's Manual (Cat. No. W593)*
- *NJ-series CPU Unit Hardware User's Manual (Cat. No. W500)*
- *Sysmac Studio Version 1 Operation Manual (Cat. No. W504)*

Precautions for Correct Use

This section describes the precautions for the correct use of the OPC UA Server.

- If the IP address of the built-in EtherNet/IP port is changed after starting the use of the OPC UA Server, the OPC UA server certificate in the CPU Unit will be disabled, and it will not be possible to communicate with the OPC UA client. In that case, manually regenerate the server certificate, or set the IP address back to the original address.
- The server certificate is not applied for backup and restore because it is information belonging to individual CPU Units. If you replace the CPU Unit hardware, you cannot use the same server certificate for the new CPU Unit after the replacement.
  Even if you set the IP address of the built-in EtherNet IP port to the same value as the one for the previous CPU Unit, be sure to export the server certificate of the new CPU Unit and then perform installation again on the OPC UA clients.
- Even in cases where you recreate the server certificate by changing the IP address in the same CPU Unit, make sure to export the server certificate of the CPU Unit and install it at the OPC UA client side.
- The OPC UA Server is executed as a system service.
  Accordingly, if other system services are executed while the OPC UA Server is starting up, they may take longer.
  Moreover, if the system service execution time ratio is less (if it is below approx. 20%, as a reference), the response to the requests from the OPC UA client will be delayed. In such a case, design the task so that the system service execution time ratio increases.
- If you use the role function, check the operation for each role that you set for proper execution before you use it for actual operation. If it is incorrect, it may not be possible to change the variables related to the status of the devices, and it may be an unintended operation by the user.

Refer to the following manuals for other precautions for correct use that are not described above.

- *NX-series CPU Unit Hardware User's Manual (Cat. No. W535)*
- *NX-series NX502 CPU Unit Hardware User's Manual (Cat. No. W629)*
- *NX-series NX102 CPU Unit Hardware User's Manual (Cat. No. W593)*
- *NJ-series CPU Unit Hardware User's Manual (Cat. No. W500)*
- *Sysmac Studio Version 1 Operation Manual (Cat. No. W504)*

Regulations and Standards

Refer to the following manuals for regulations and standards.

- *NX-series CPU Unit Hardware User's Manual (Cat. No. W535)*
- *NX-series NX502 CPU Unit Hardware User's Manual (Cat. No. W629)*
- *NX-series NX102 CPU Unit Hardware User's Manual (Cat. No. W593)*
- *NJ-series CPU Unit Hardware User's Manual (Cat. No. W500)*

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