Automation Software

# Sysmac Studio Ver.1.□□

CSM_Sysmac_Studio_DS_E_18_37

## Sysmac Studio for machine creators

The Sysmac Studio provides an integrated development environment to set up, program, debug, and maintain NJ/NX-series CPU Units, NY-series Industrial PC, and other Machine Automation Controllers, as well as EtherCAT slaves.

## Features

- One software for motion, logic, safety, drives, vision and HMI
- Fully compliant with open standard IEC 61131-3 and Japanese standard JIS B3503
- Supports Ladder, Structured Text and Function Block programming with a rich instruction set
- CAM editor for easy programming of complex motion profiles
- One simulation tool for sequence and motion in a 3D environment
- Advanced security function with 32 digit security password

# Ordering Information

## Automation Software

A license is required to use Sysmac Studio. There are two types of licenses: Network Licenses for the 64-bit application and Standalone Licenses for the 32-bit application.
The installer for the Sysmac Studio 64-bit application is available on the website, License Portal. If you want an installer DVD for the Sysmac Studio 32-bit or 64-bit application, please purchase the Sysmac Studio DVD.
You can try out all the features for free for 30 days after installation. You do not need to register a license during the trial period.

### Network Licenses (64-bit application only)

Sign up as a user on the License Portal site and download the installer image file after purchasing a new Network License. For more information, visit this site: https://license-user.automation.omron.com/.

| Product name | Specifications | | Model |
|---|---|---|---|
| | | Number of licenses | |
| **Sysmac Studio Basic License** | Sysmac Studio is an integrated development environment for configuring, programming, debugging, and maintaining our machine automation controllers including the NJ/NX-series CPU Units and the NY-series Industrial PCs, EtherCAT Slave Units, and HMIs. | 1 license | **SYSMAC-BA201L** |
| **Sysmac Studio Advanced License** | This license allows you to use the 3D Simulation Option and the Team Development Option in addition to the functions covered by the Basic License. | 1 license | **SYSMAC-AD201L** |
| **Sysmac Studio Upgrade License for Advanced** | This license upgrades your Basic License to the Advanced License. | 1 license | **SYSMAC-AD501L** |

### Standalone Licenses

If you use the Sysmac Studio 32-bit application, purchase a Standalone License. We recommend a Network License for customers using the Sysmac Studio 64-bit application.

| Product name | Specifications | | Model |
|---|---|---|---|
| | | Number of licenses | |
| **Sysmac Studio Standard Edition Ver.1.□□** | Sysmac Studio is the software that provides an integrated development environment: setting, programming, debugging and maintenance for Machine Automation Controllers (NJ/NX-series CPU Units, NY-series Industrial PC), EtherCAT Slaves, and HMIs. | 1 license | **SYSMAC-SE201L** |
| | | 3 licenses | **SYSMAC-SE203L** |
| | | 10 licenses | **SYSMAC-SE210L** |
| | | 30 licenses | **SYSMAC-SE230L** |
| | | 50 licenses | **SYSMAC-SE250L** |
| **Sysmac Studio Vision Edition Ver.1.□□** | Sysmac Studio Vision Edition is the license providing only the necessary functions for settings of FH, FHV7 and FQ-M Series Vision Sensors. This edition is valid for FH, FHV7 and FQ-M Series Vision Sensors only. | 1 license | **SYSMAC-VE001L** |
| **Sysmac Studio Measurement Sensor Edition Ver.1.□□** | Sysmac Studio Measurement Sensor Edition is the license providing only the necessary functions for settings of ZW-series Measurement Sensors. This edition is valid for ZW-series Measurement Sensors only. | 1 license | **SYSMAC-ME001L** |
| | | 3 licenses | **SYSMAC-ME003L** |
| **Sysmac Studio NX-I/O Edition Ver.1.□□** | Sysmac Studio NX-IO Edition is the license providing only the necessary functions for settings of couplers for EtherNet/IP and PROFINET. This edition is valid for couplers of EtherNet/IP and PROFINET only. | 1 license | **SYSMAC-NE001L** |
| **Sysmac Studio Drive Edition Ver.1.□□** | Sysmac Studio Drive Edition is the license providing only the necessary functions for settings of drive units. This edition is valid for 1S/ G5-series units only. | 1 license | **SYSMAC-DE001L** |
| **Sysmac Studio Safety Edition Ver.1.□□** | Sysmac Studio Safety Edition is the license providing only the necessary functions for settings of a safety control system. This edition is valid for communication controllers and EtherNet/IP couplers only. | 1 license | **SYSMAC-FE001L** |

## Optional Licenses for Standalone Licenses

These products are applicable to Sysmac Studio Standard Edition only.
Optional licenses cannot be applied to network licenses.
For the use of function corresponding to those below in the case of a network license, please purchase Sysmac Studio Advanced License (SYSMAC-AD201L) or Sysmac Studio Upgrade License for Advanced (SYSMAC-AD501L).

| Product name | Specifications | | Model |
|---|---|---|---|
| | | Number of licenses | |
| **Sysmac Studio Team Development Option** | Sysmac Studio Team Development Option is the license to enable the project version control functionality. | 1 license | **SYSMAC-TA401L** |
| | | 3 licenses | **SYSMAC-TA403L** |
| | | 10 licenses | **SYSMAC-TA410L** |
| | | 30 licenses | **SYSMAC-TA430L** |
| | | 50 licenses | **SYSMAC-TA450L** |
| **Sysmac Studio 3D Simulation Option** | Sysmac Studio 3D Simulation Option is the license to enable the 3D Simulation functionality. The option is valid for the 64-bit Sysmac Studio only. | 1 license | **SYSMAC-SA401L-64** |
| | | 3 licenses | **SYSMAC-SA403L-64** |
| | | 10 licenses | **SYSMAC-SA410L-64** |
| | | 30 licenses | **SYSMAC-SA430L-64** |
| | | 50 licenses | **SYSMAC-SA450L-64** |

## Sysmac Studio DVD

License keys are not included. Licenses are required listed above.

| Product name | Specifications | | Model |
|---|---|---|---|
| | Supporting OS | Number of licenses | |
| **Sysmac Studio Ver.1.□□ 32-bit DVD** | Windows 7 (32/64-bit)/8.1 (32/64-bit)/10 (32/64-bit)/11 (64-bit) | – (Installation media only. A license of each edition is required.) | **SYSMAC-SE200D** |
| **Sysmac Studio Ver.1.□□ 64-bit DVD** | Windows 10 (64-bit)/11 (64-bit) | | **SYSMAC-SE200D-64** |

**Note:** You can also download the installer image file for installation by signing up as a user on the License Portal site.
For more information, visit this site: https://license-user.automation.omron.com/.

# Components

## DVD (SYSMAC-SE200D/SYSMAC-SE200D-64)

| Components | Details |
|---|---|
| **Introduction** | An introduction about components, installation/uninstallation, user registration and auto update of the Sysmac Studio is provided. |
| **Setup disk (DVD-ROM)** | 1 |

## License (SYSMAC-BA2□□L/AD2□□L/AD5□□L/SE2□□L/VE0□□L/ME0□□L/NE0□□L/DE0□□L/TA4□□L/FE0□□L/SA4□□L-64)

| Components | Details |
|---|---|
| **License agreement** | The license agreement gives the usage conditions and warranty for the Sysmac Studio. |
| **License card** | A model number, version, license number, and number of licenses are described. |
| **User registration card ✻1** | Two cards are contained. One is for users in Japan and the other is for users in other countries. |

**✻1.** Not come with SYSMAC-BA2□□L, AD2□□L, and AD5□□L.

# Included Support Software

DVD media of Sysmac Studio includes the following support software.

| Included Support Software | | Outline |
|---|---|---|
| **CX-Designer** | **Ver.3.**□ | The CX-Designer is used to create screens for NS-series PTs. ✻1 |
| **CX-Integrator** | **Ver.2.**□ | The CX-Integrator is used to set up FA networks. |
| **CX-Protocol** | **Ver.2.**□ | The CX-Protocol is used for protocol macros for Serial Communications Units. |
| **Network Configurator** | **Ver.3.**□ | The Network Configurator is used for tag data links on the built-in EtherNet/IP port. |
| **SECS/GEM Configurator** | **Ver.1.**□ | The SECS/GEM Configurator is used for SECS/GEM settings. |
| **Adept Robot IP Address Setting Tool** | **Ver.1.**□ | The Adept Robot IP Address Setting Tool is used for setting IP address of Adept Robot. |
| **CX-ConfiguratorFDT** | **Ver.3.**□ | The software that sets the IO-Link devices. |
| **IODD DTM Configurator** | **Ver.3.**□ | The software that adds and deletes IODD files for the IO-Link devices. |

**✻1.** Please use the Sysmac Studio to create the project of the NA Series.

# System Requirements

| Item | Requirement | |
|---|---|---|
| | 32-bit version | 64-bit version |
| **Operating system (OS) ✻1 ✻2** | Windows 7 SP1 (32-bit/64-bit) ✻3/<br>Windows 8.1 (32-bit/64-bit) ✻4/<br>Windows 10 version 1607 or higher (32-bit/64-bit)/<br>Windows 11 (64-bit) | Windows 10 version 1607 or higher (64-bit)/<br>Windows 11 (64-bit) |
| **CPU ✻2** | DOS/V (IBM AT compatible machines) personal computers equipped with Intel® Core™ i5 M520 (2.4 GHz) or equivalent/ faster processors are recommended. | DOS/V (IBM AT compatible machines) personal computers equipped with Intel® Core™ i5-3xxx (3rd generation: Ivy Bridge) or equivalent/later processors are required. |
| **Main memory ✻2** | 2 GB min.<br>4 GB min. recommended. | 4 GB min.<br>8 GB min. recommended |
| **Hard disk** | • Installing Software: Minimum 12 GB of disk space is required.<br>• Auto-update ✻5: Minimum 15 GB of disk space is required. | • Installing Software: Minimum 15 GB of disk space is required.<br>• Auto-update ✻5: Minimum 18 GB of disk space is required. |
| **Display** | XGA 1024 × 768, 16 million colors.<br>WXGA 1280 × 800 min. recommended | |
| **Disk drive** | DVD-ROM drive | |
| **Communications ports** | USB port corresponded to USB 2.0, or Ethernet port ✻6 | |
| **Supported languages** | Japanese, English, German, French, Italian, Spanish, simplified Chinese, traditional Chinese, Korean | |

**✻1.** The applications listed in the table below have restrictions.

| Application | Restriction |
|---|---|
| **Sysmac Studio** | When the Sysmac Studio does not start up with the Windows administrative authority, the following restrictions are imposed.<br>• The simulation functions of NC Integrated Controller and the controllers with unit versions 1.09 or earlier are disabled.<br>• Calibration for running time estimation is not available on the controllers with unit versions 1.09 or earlier.<br>• The simulation function of NA-series Programmable Terminals is not available.<br>• ESI files cannot be installed.<br>• The license cannot be registered. |
| **CX-Designer** | If a new Windows 7, Windows 8.1, Windows 10, or Windows 11 font (e.g., Meiryo) is used in a project, the font size on labels may be bigger and protrude from the components if the project is transferred from CX-Designer running on a Windows XP or earlier OS to the NS/NSJ. |
| **CX-Integrator/ Network Configurator** | Although you can install CPS files, EDS files, Expansion Modules, and Interface Modules, the virtual store function of Windows 7, Windows 8.1, Windows 10, or Windows 11 imposes the following restrictions on the use of the software after installation.<br>• If another user logs in, the applications data will need to be installed again.<br>• The CPS files will not be automatically updated.<br>These restrictions will not exist if application data is installed using Run as Administrator. |

**✻2.** If you create a user program with a memory size over 20 MB, the personal computer equipped with Intel® Core™ i7 or an equal/faster processor and the RAM of 8 GB or more is recommended.
**✻3.** Windows 7 Update (KB4474419 and KB4490628) must be applied.
**✻4.** Windows 8.1 Update (KB2919355) must be applied.
**✻5.** This is the required disk space when clicking [Install] button in the Auto-update [OMRON Automation Software Upgrade Utility].
**✻6.** For hardware (e.g. PC and CPU unit) connection methods and cables, refer to each hardware manuals.
**Note:** System environment for 3D Simulation Option is as follows.

- DOS/V (IBM AT compatible machines) personal computers equipped with Intel® Core™ i5 8250U (1.60-3.40 GHz) or equivalent/faster processors Intel® Core™ i7 9750H min. recommended.
- 8 GB RAM min.
  16 GB RAM min. recommened
- 1920 X 1080, 16 million colors full HD display min.
- Video card: A video card that supports DirectX11 (NVIDIA® GeForce®, AMD Radeon™, etc.). NVIDIA is recommended.

# Common Function Specifications

| Item | | | Function | Applicable versions |
|---|---|---|---|---|
| Setting Parameters | EtherCAT Configuration and Setup | | You can create a configuration in the Sysmac Studio of the EtherCAT slaves connected to the built-in EtherCAT port of the NJ/NX-series CPU Unit or NY-series Industrial PC, and set the parameters for the EtherCAT masters and slaves. | All versions |
| | | Registering slaves | You can set up devices by dragging slaves from the device list displayed in the Toolbox Pane to the locations where you want to connect them. | |
| | | Changing the Coupler model | You change the model number or unit version of a Coupler Unit. Use this function to change the model number and version of the Coupler Unit registered in the project to the new model number and version when replacing a Coupler Unit. | Ver. 1.09 or higher |
| | | Changing the Servo Driver model | You can change the model number or the unit version of a Servo Driver registered in a project when replacing an actual Servo Driver. | Ver. 1.40 or higher |
| | | Setting master parameters | You set the common parameters of the EtherCAT network (e.g., the fail-soft operation and wait time for slave startup settings). | All versions |
| | | Setting slave parameters | You set the standard slave parameters and assign PDOs (process data objects). | |
| | | Comparing and merging network configuration information | The EtherCAT network configuration information in the NJ/NX-series CPU Unit or NY-series Industrial PC and in the Sysmac Studio are compared and the differences are displayed. | |
| | | Transferring the network configuration information | The EtherCAT network configuration information is transferred to the NJ/NX-series CPU Unit or NY-series Industrial PC. Or, the EtherCAT network configuration information in the CPU Unit or PC is transferred to the Sysmac Studio and displayed in the EtherCAT Editor. | |
| | | Installing ESI files | ESI (EtherCAT slave information) files are installed. | |
| | EtherCAT Slave Terminal Configuration and Setup | | The configuration of any Slave Terminal that is connected to an EtherCAT network is created on the Sysmac Studio. The NX Units that compose the Slave Terminal are set in the configuration. | Ver. 1.06 or higher |
| | | Registering NX Units | A Slave Terminal is built by dragging NX Units from the device list displayed in the Toolbox to the locations where you want to mount them. | |
| | | Setting NX Units | The I/O allocations, mounting settings, and Unit operation settings of the NX Units are edited. | |
| | | Displaying the width of a Slave Terminal configuration | The width of a Slave Terminal is displayed based on the Unit configuration information. | |
| | | Comparing and merging the Slave Terminal configuration information | When online, you can compare the configuration information in the project with the physical configuration. You can also select the missing Units and add them to the project. | |
| | | Transferring the Slave Terminal configuration information | The Unit configuration information is transferred to the NJ/NX-series CPU Unit or NY-series Industrial PC using the synchronize function. | |
| | CPU/Expansion Rack Configuration and Setup | | You create the configuration of the Units mounted in the CPU Rack and Expansion Racks of the following CPU Units: NJ-series, NX102, NX1P2, and NX502. Then you set the Special Units. | All versions |
| | | Registering Units | A Rack is built by dragging Units from the device list displayed in the Toolbox Pane to the locations where you want to mount them. | |
| | | Creating Racks | An Expansion Rack (Power Supply Unit, I/O Interface Unit, and End Cover) is added. | |
| | | Switching Unit displays | For NJ-series CPU Units, model numbers, unit numbers, and slot numbers are displayed.<br>For NX102, NX1P2, and NX502 CPU Units, model numbers and unit numbers are displayed. ✻1 | |
| | | Setting Special Units | The input time constants are set for Input Units and parameters are set for Special Units. | |
| | | Displaying Rack widths, current consumption, and power consumption | For NJ-series CPU Units, rack width, current consumption, and power consumption are displayed based on the Unit configuration information.<br>For NX102, NX1P2, and NX502 CPU Units, rack width is displayed based on the Unit configuration information. ✻1 | |
| | | Comparing the CPU/ Expansion Rack configuration information with the physical configuration | When online, you can compare the configuration information in the project with the physical configuration. You can also select the missing Units and add them. | |
| | | Transferring the CPU/ Expansion Rack configuration information | The Unit configuration information is transferred using the synchronization function. | |
| | | Printing the Unit configuration information | The Unit configuration information is printed. | |

✻1. Version 1.17 or higher.

| Item | | | Function | Applicable versions |
|---|---|---|---|---|
| Setting Parameters | Controller Setup | | The Controller Setup is used to change settings related to the operation of the Controller. The Controller Setup contains PLC Function Module operation settings and built-in EtherNet/IP Function Module port settings. | All versions |
| | | Operation Settings | The Startup Mode, SD Memory Card diagnosis at Startup, Write Protection at Startup, Controller Error Level Changes ✻2, and other settings are made. | |
| | | Transferring Operation Settings | The synchronization function is used to transfer the operation settings to the NJ/NX-series CPU Unit or NY-series Industrial PC. | |
| | | Built-in EtherNet/IP Port Settings | These settings are made to perform communications using the built-in EtherNet/IP port of the NJ/NX-series CPU Unit or NY-series Industrial PC. | |
| | | Transferring Built-in EtherNet/IP Port Settings | The synchronization function is used to transfer the Built-in EtherNet/IP Port Settings to the NJ/NX-series CPU Unit or NY-series Industrial PC. | |
| | | Built-in I/O Settings | You make the settings related to built-in I/O of the NX1P2 CPU Unit. | Ver. 1.17 or higher |
| | | Transferring Built-in I/O Settings | The synchronization function is used to transfer the built-in I/O settings to the NX1P2 CPU Unit. | |
| | | Option Board Settings | You make the settings related to the option boards mounted on the NX1P2 CPU Unit. | |
| | | Transferring Option Board Settings | The synchronization function is used to transfer the option board settings to the NX1P2 CPU Unit. | |
| | | Memory Settings | You make the settings related to the memory area for CJ-series Units in the NX102, NX1P2, NX502, and NX701-1□20 CPU Units. | |
| | | Transferring Memory Settings | The synchronization function is used to transfer the memory settings to the CPU Unit. | |
| | Motion Control Setup | | The Motion Control Setup is used to create the axes to use in motion control instructions, assign those axes to Servo Drives and encoders, and set axis parameters. | All versions |
| | | Axis Settings | Axes are added to the project. | |
| | | Importing Axis Settings | You can add or update new axis settings by importing an XML file. | Ver. 1.57 or higher |
| | | Exporting Axis Settings | You can export multiple axis settings in a project all together to an XML file. | |
| | | Deleting Multiple Axis Settings | You can delete selected axis settings in a project at once. | |
| | | Axis Setting Table | The Axis Setting Table is a table of all registered axis parameters. You can edit any axis parameters here just as you can on the Axis Settings Tab Page. | All versions |
| | Axes Group Settings | | You can set up axes to perform interpolated motions as an axes group. | |
| | | Axes Group Basic Settings | Set the axes group number, whether to use the axes group, the composition, and the composition axes. | |
| | | Operation Settings | Set the interpolated velocity, the maximum interpolated acceleration and deceleration, and the interpolated operation settings. | |
| | | Import | By importing an XML file, it is possible to add or update new axes group settings. | Ver. 1.57 or higher |
| | | Export | You can export multiple axes group settings in a project all together to an XML file. | |
| | | Deleting Multiple Items | You can delete all selected axes group settings in a project at once. | |
| | Cam Data Settings | | The Cam Data Settings are used to create electronic cam data. When you build the project for the Controller, a cam table is created according to the Cam Data Settings. | All versions |
| | | Registering cam data settings | Cam data settings is added to the project. | |
| | | Editing cam data settings | You can set properties and node points for cam data settings. | |
| | | Transferring cam data settings | You can select to transfer all or part of the cam data. | |
| | | Importing cam data settings | You can import cam data settings from a CSV file. | |
| | | Exporting cam data settings | You can export cam data to a CSV file. | |
| | | Registering cam definitions | You add new cam definitions to change a cam table in the program. | Ver.1.09 or higher |
| | | Editing cam definitions | You set cam definitions. | |
| | | Transferring cam definitions | You transfer cam definitions to the Controller. | |
| | | Exporting cam tables | You can export a cam table to a CSV file. | All versions |
| | | Transferring cam tables from the Controller to files | You can save a cam table in the NJ/NX-series CPU Unit or NY-series Industrial PC to a CSV file. | |
| | | Transferring cam tables from files to the Controller | You can transfer a cam table that is saved in a CSV file to update the contents of a cam table that is already in the NJ/NX-series CPU Unit or NY-series Industrial PC. | |
| | | Superimposing Cam Table | You can superimpose the cam table from a CSV file on the cam profile curve position graph that is currently displayed. | |
| | Task Settings | | Programs are executed in tasks in the NJ/NX-series CPU Unit or NY-series Industrial PC. The Task Settings define the execution period, the execution timing, the programs executed by the task, the I/O refreshing performed by the task, and which variables to share between tasks. | |
| | | Registering tasks | The tasks, which are used to execute programs, are registered. | |
| | | Setting task I/O | The task I/O settings define what Units the task should perform I/O refreshing for. | |
| | | Assigning programs | Program assignments define what programs a task will execute. | |
| | | Setting exclusive control of variables in tasks | You can specify if a task can write to its own values (known as a refreshing task) or if it can only access them (an accessing task) for global variables. This ensures concurrency for global variable values from all tasks that reference them. | |

✻2. Changing event levels for Controller errors is supported by version 1.04 or higher.

| Item | | | Function | Applicable versions |
|---|---|---|---|---|
| Setting Parameters | I/O Map Settings | | The I/O ports that correspond to the registered EtherCAT slaves and to the registered Units on the CPU Rack and Expansion Racks are displayed. The I/O Map is edited to assign variables to I/O ports. The variables are used in the user program. | All versions |
| | | Displaying I/O ports | I/O ports are displayed based on the configuration information of the devices (slaves and Units). | |
| | | Assigning variables | Variables are assigned to I/O ports. | |
| | | Creating device variables | Device variables are created in the I/O Map. You can either automatically create a device variable or manually enter the device variable to create. | |
| | | Checking I/O assignments | The assignments of external I/O devices and variables are checked. | |
| | Vision Sensor Settings | | You can set and calibrate Vision Sensors.<br>Refer to "**Function Specifications of Vision Sensor Functions**". | Ver.1.01 or higher |
| | Displacement Sensor Settings | | You can set Displacement Sensors.<br>Refer to "**Function Specifications of Displacement Sensor Functions**". | Ver.1.05 or higher |
| | DB Connection Function Settings | | You can set and transfer the DB connection function settings.<br>Refer to "**Function Specifications of DB Connection Function**". | Ver. 1.06 or higher |
| | EtherNet/IP Connection Settings | | You can make settings related to tag data links (connections) in an EtherNet/IP network. Refer to "**Function Specifications of EtherNet/IP Connection Settings**". | Ver. 1.10 or higher |
| | EtherNet/IP Slave Terminal Settings | | You can make and transfer settings for EtherNet/IP Slave Terminals. Refer to "**Functional Specifications of EtherNet/IP Slave Terminal Settings**" for details. | Ver. 1.11 or higher |
| | PROFINET Slave Terminal Settings | | You can make settings for a PROFINET Slave Terminals and transfer them. Refer to "**Function Specifications of PROFINET Slave Terminals.**" | Ver. 1.45 or higher |
| | NA-series Programmable Terminal (PT) Settings | | You can make settings and transfer projects for NA-series Programmable Terminals. Refer to "**Functional Specifications of HMI**". | Ver. 1.11 or higher |
| Programming | Instruction list (Toolbox) | | A hierarchy of the instructions that you can use is displayed in the Toolbox. You can drag the required instruction to a program in the Ladder Editor or ST Editor to insert the instruction. | All versions |
| | Programming ladder diagrams | | Ladder diagram programming involves connecting rung components with connecting lines to build algorithms. Rung components and connecting lines are entered in the Ladder Editor. | All versions |
| | | Starting the Ladder Editor | The Ladder Editor for the program is started. | |
| | | Showing/hiding Ladder Editor Guide | Sysmac Studio displays the operation guide on the Ladder Editor for editing programs. You can arrange circuit parts, re-connect lines, and add lines following the guide. | Ver. 1.55 or higher |
| | | Showing shortcut key list | This function shows a list of shortcut keys for editing ladder diagrams. | |
| | | Adding and deleting sections | You can divide your ladder diagrams into smaller units for easier management. These units of division are called sections. | All versions |
| | | Inserting rung components | You insert rung components in the Ladder Editor to create an algorithm. | |
| | | Inserting and deleting function blocks | You can insert a function block instruction or user-defined function block into the Ladder Editor. | |
| | | Inserting and deleting functions | You can insert a function instruction or user-defined function into the Ladder Editor. | |
| | | Inserting and deleting inline ST | You can insert a rung component in a ladder diagram to enable programming in ST. This allows you to include ST in a ladder diagram. | |
| | | Editing rung components | You can copy and past rung components. | |
| | | Inserting and deleting jump labels and jumps | You can insert a jump label in the rung to jump to and then specify that jump label when you insert a jump. | |
| | | Inserting and deleting bookmarks | You can add bookmarks to the beginning of rungs and move between them. | |
| | | Rung comments | You can add comments to rungs. | |
| | | Displaying rung errors | When you enter a rung component, the format is always checked and any mistakes are displayed as errors. If there are any errors, a red line is displayed between the rung number and the left bus bar. | |
| | | Entry assistance | When you enter instructions or parameters, each character that you enter from the keyboard narrows the list of candidates that is displayed for selection. | |
| | | Displaying variable comments ✻3 | A specified variable comment can be displayed with each variable of rung components on the ladder diagrams.<br>You can change the length of the displayed variable comments to make them easier to read. ✻4 | Ver.1.01 or higher |
| | | Element comment | You can add an element comment on the ladder circuit parts. | Ver.1.25 or higher |
| | | Rung comment list | Displays a list of rung comments for a ladder program. Double-click a comment in the list to go to the related rung. | Ver. 1.40 or higher |
| | | Rung pattern copy | You can duplicate a rung pattern (logic part). Variable names in a copied rung can be set automatically according to the variable name generation rules. | Ver. 1.55 or higher |

✻**3.** Displaying comments for members of arrays, structures, and unions and displaying long comments for variables (up to five lines) are supported by version 1.04 or higher.
✻**4.** Changing the length of the displayed variable comments is supported by version 1.05 or higher.

| Item | | | Function | Applicable versions |
|---|---|---|---|---|
| Programming | Programming structured text | | You combine different ST statements to build algorithms. | All versions |
| | | Starting the ST Editor | The ST Editor for programs or for functions/function blocks is started. | |
| | | Editing ST | You combine different ST statements to build algorithms. | |
| | | Entering calls to functions and function blocks | You can enter the first character of the instance name of the function or the function block in the ST Editor to call and enter a function or function block. | |
| | | Entering constants | You can enter constants in the ST Editor. | |
| | | Entering comments | Enter "(*" at the beginning and "*)" at the end of any text to be treated as a comment in the ST Editor. If you only want to comment out a single line, enter a double forward slash (//) at the beginning of the line. | |
| | | Copying, pasting, and deleting ST elements | You can copy, paste, and delete text strings. | |
| | | Indenting | You can indent nested statements to make them easier to read. | |
| | | Moving to a specified line | You can specify a line number to jump directly to that line. | |
| | | Bookmarks | You can add bookmarks to any lines and move between them. | |
| | | Entry assistance | When you enter instructions or parameters, each character that you enter from the keyboard narrows the list of candidates that is displayed for selection. | |
| | Namespaces | | Namespaces allow you to group and nest the names of functions, function block definitions, and data types so that you can manage them. This reduces the chance of duplicated names and makes the entities easier to access. | Ver.1.02 or higher |
| | Variable Manager | | A list of the variables in the global and local variable tables is displayed in a separate window. You can display variable usage, sort and filter the variables, edit and delete variables, or move variables while displaying another editing view. | Ver.1.04 or higher |
| | Changing variable comments and data type comments | | You can globally change variable comments and data type comments to other comments. You can change the comments to different language for users in a different country. | |
| | Exporting/importing variable comments | | You can export/import variable comments, comments of structure members and union members, and variable element comments of array variables to an Office Open XML file (xlsx file). | Ver.1.27 or higher |
| | Sorting and filtering variables | | You can sort and filter the variables in each variable table. | Ver.1.08 or higher |
| | Searching and replacing | | You can search for and replace strings in the data of a project. | All versions |
| | Retrace searching | | You can search for the program inputs and the input parameters to functions or function blocks that use the selected variable if the selected variable is used as a program output or as the output parameter of a function or function block. Also, you can search for the program outputs and the output parameters to functions or function blocks that use the selected variable if the selected variable is used as a program input or as the input parameter of a function or function block. | Ver.1.01 or higher |
| | Jumping | | You can jump to the specified rung number or line number in the program. | All versions |
| | Building | Building | The programs in the project are converted into a format that is executable in the NJ/NX-series CPU Unit or NY-series Industrial PC. | |
| | | Rebuilding | A rebuild is used to build project programs that have already been built. | |
| | | Aborting a build operation | You can abort a build operation. | |
| | Creating applications for NA-series PTs | | You can create and transfer pages and subroutines for NA-series Programmable Terminals.<br>Refer to "**Functional Specifications of HMI**". | Ver.1.11 or higher |
| Reuse Functions | Library | | You can create functions, function block definitions, programs ✻5, and data types in a library file to use them as objects in other projects. | Ver.1.02 or higher |
| | | Creating libraries | You can create library files to enable using functions, function block definitions, and data types in other projects. | |
| | | Using libraries | You can access and reuse objects from library files that were created in other projects. | |

✻**5.** Creating programs in a library file is supported by version 1.06 or higher.

| Item | | | Function | Applicable versions |
|---|---|---|---|---|
| Project Management | File operations | Creating a project file | A project file is created. | All versions |
| | | Opening a project file | A project file is opened. | |
| | | Saving the project file | The project file is saved. | |
| | | Saving a project file under a different name | A project file is saved under a different name. | |
| | | Project update history management | You can assign numbers to projects to manage the project history. | Ver.1.03 or higher |
| | | Exporting a project file | You can export a project to an .smc2 or .csm2 project file ✻6. You can also export a project to a previous project file format, i.e., .smc or .csm.✻7. | All versions |
| | | Importing a project file | You can import a project from an .smc2 ✻6, .csm2 ✻6, .smc, or .csm ✻7 project file. | |
| | | Importing a ST project file | Import of ST program files created by the Simulink® PLC Coder™ (version R2013a or higher) from MathWorks® Inc. | Ver.1.04 or higher |
| | | IEC 61131-10 XML | You can import program/function/function block POUs of the IEC 61131-10 XML format, global variables and data types. | Ver.1.30 or higher |
| | | IEC 62714 AutomationML | You can create a controller configuration or device variable through importing an AutomationML file which is created with EPLAN Electric P8, an electric CAD software. | Ver.1.50 or higher |
| | | Offline comparison | You can compare the data for an open project with the data for a project file and display the results. You can also compare the open project with an exported .smc2 ✻6 or .smc project file.<br>Or, you can merge detailed comparison results. ✻8<br>You can print out the differences between compared ladder programs. ✻9 | Ver.1.02 or higher |
| | | Importing motor sizing tool results | You can import the EtherCAT configuration and motion control settings created by the motor sizing tool. | Ver.1.16 or higher |
| | Cutting, copying, and pasting | | You can cut, copy, or paste items that are selected in the Multiview Explorer or any of the editors. | All versions |
| | Printing | | You can print various data. You can select the items to print. | |
| | Data sharing | Creating a derivative device | You can copy a controller in a project. The copied controller program (POU, Data-type, global variables) are shared with the source controller. | Ver.1.20 or higher |
| | | Setting a shared program between devices | You can share a program (POU, Data-type, global variables) between controllers in a project. | |
| Debugging | Monitoring | | Variables are monitored during ladder program execution. You can monitor the TRUE/FALSE status of inputs and outputs and the present values of variables in the NJ/NX-series CPU Unit or NY-series Industrial PC. You can monitor operation on the Ladder Editor, ST Editor, Watch Tab Page, or I/O Map. | All versions |
| | Differential monitoring | | You can detect the number of times the specified BOOL variable or BOOL member changes to TRUE or FALSE and display the count in the Differential Monitor Window. You can check if bits turn ON and OFF and the number of times that they turn ON and OFF. | Ver.1.04 or higher |
| | Changing present values and TRUE/FALSE | | You can change the values of variables that are used in the user program and settings to any desired value, and you can change program inputs and outputs to TRUE or FALSE. This allows you to check the operation of the user program and settings. | All versions |
| | Changing the present values of variables ✻10 | | You can change the present values of user-defined variables, system-defined variables, and device variables as required. You can do this in the Ladder Editor, ST Editor, Watch Tab Page or I/O Map. | All versions |
| | Forced refreshing | | Forced refreshing allows the user to refresh external inputs and outputs with user-specified values from the Sysmac Studio. The specified value is retained even if the value of the variable is overwritten from the user program. You can use forced refreshing to force BOOL variables to TRUE or FALSE in the Ladder Editor, Watch Tab Page, or I/O Map. | |
| | Online editing | | Online editing allows you to edit programs on systems that are currently in operation. Online editing can be used to edit only POUs and global variables. User-defined data types cannot be edited with online editing. | |
| | Cross Reference Tab Page | | Cross references allow you to see the programs and locations where program elements (variables, data types, I/O ports, functions, or function blocks) are used. You can view all locations where an element is used from this list. | |

✻**6.** Version 1.08 or higher.
✻**7.** The .csm format is supported by version 1.04 or higher. The size of a csm file is smaller than the size of the smc file.
✻**8.** Merging detailed comparison results is supported by version 1.03 or higher.
✻**9.** Version 1.49 or higher.
✻**10.**Changing present values in the Ladder Editor or ST Editor is supported by version 1.03 or higher.

| Item | | | Function | Applicable versions |
|---|---|---|---|---|
| Debugging | Data tracing | | Data tracing allows you to sample the specified variables and store the values of the variables in trace memory without any programming. You can choose between two continuous trace methods: a triggered trace, where you set a trigger condition and data is saved before and after that condition is met, or a continuous trace, in which continuous sampling is performed without any trigger and the results are stored in a file on your computer. However, you can still display data retrieved on the Sysmac Studio and save those results to a file even if you use a triggered trace. These same functions can be used with the Simulator as well. | All versions |
| | | Setting sampling intervals | The interval to perform sampling on the target data is set. Sampling is performed for the specified task period, at the specified time, or when a trace sampling instruction is executed. | |
| | | Setting triggers | To perform a triggered trace, you set a condition to trigger sampling. A suitable trigger condition is set to record data before and after an event. | |
| | | Setting a continuous trace | The method to save the data traced during a continuous trace is set. | |
| | | Setting variables to sample | The variables to store in trace memory are registered. The sampling intervals can also be set. | |
| | | Starting and stopping tracing | The data trace settings are transferred to the NJ/NX-series CPU Unit or NY-series Industrial PC and the tracing starts. If you selected *Trigger (Single)* as the trace type, tracing waits for the trigger to begin sampling. If you selected Continuous, sampling begins immediately and all traced data is transferred to the computer as it is gathered and saved to a file. | |
| | | Displaying trace results | You view the results of the traced data in either a chart or the 3D Motion Monitor. After sampling begins, sample data is immediately transferred and drawn on the graph. The trace target variable table shows the maximum, minimum, and average values for each variable.<br>You can change the line colors on the graph. ✻11<br>You can consecutively read and display continuous trace results from more than one file. ✻12 | |
| | | Exporting/ Importing trace results | Trace results are saved within your project automatically when you save the project on the Sysmac Studio. If you want to save this data as a separate file, you can export the data to a CSV file.You can import trace results that you have exported. | |
| | | Printing trace results | You can print out data trace settings along with digital and analog charts. | |
| | Debugging Vision Sensors | | You can debug the Vision Sensor offline.<br>Refer to "**Function Specifications of Vision Sensor Functions**". | Ver.1.01 or higher |
| | Debugging Displacement Sensors | | You can debug Displacement Sensors offline.<br>Refer to "**Function Specifications of Displacement Sensor Functions**". | Ver.1.05 or higher |
| | Output Factor Search | | This function searches for the rungs that causes an output among the elements of a ladder program in the Controller, and displays them in a tree structure. | Ver.1.55 or higher |
| Simulation | Programs for debugging | | You can create programs for debugging that are used only to execute simulations and specify virtual inputs for simulation. | All versions |
| | Executing a simulation | Selecting what to simulate | You can select the programs to simulate from all of the programs in the Sysmac Studio. Programs can be dragged to select them. | |
| | | Setting breakpoints | You can set breakpoints to stop the simulation in the Program Editor. | |
| | | Executing and stopping simulations | You can control simulation execution to monitor the user program or to check operation through data tracing. Step execution and pausing are also possible. | |
| | | | You can perform a linked simulation between sequence control and continuous control (operations controlled by Simulink) to debug the sequence control program and continuous control program. ✻13 | Ver.1.09 or higher |
| | | Changing the simulation speed | You can change the execution speed. | All versions |
| | | Task period simulation | You can display the task periods. | |
| | | Batch transfer of the present values of variables | You can save the values of variables at specific times during simulations in a file, or you can write the values of variables that were saved in a file back to the Simulator. This allows you to write the initial values of variables, e.g., for test applications, before you start a simulation. | Ver.1.02 or higher |
| | | Integrated NS-series PT simulation ✻14 | You can simulate the linked operation of a sequence program and an NS-series Programmable Terminal to debug the sequence program and screen data offline. | |
| | | Simultaneous simulation of Controller and NA-series PT | You can simultaneously simulate sequence control and NA-series PT operation, including displaying pages and subroutines created with Visual Basic and debugging the sequence programming. | Ver.1.11 or higher |
| | | Safety Integrated Simulation ✻15 | You can simulate the linked operation of a sequence program and Safety CPU Unit to debug the sequence program and safety program offline. | Ver.1.62 or higher |
| | | OPC UA Server Functions ✻15 | By executing an OPC UA Server function on Simulator, the OPC UA Client can read and write variables during simulation. | |

✻**11.**Changing the colors of graph lines is supported by version 1.01 or higher.
✻**12.**Consecutively reading and displaying continuous trace results from more than one file is supported by version 1.05 or higher.
✻**13.**MATLAB®/Simulink R2013a or higher is required.
✻**14.**CX-Designer version 3.41 or higher is required.
✻**15.**Version 1.62 or higher.

| Item | | | Function | Applicable versions |
|---|---|---|---|---|
| Simulation | Setting the virtual equipment | Creating 3D equipment models ✻16 | You can create a 3D equipment model at the control target to monitor with the 3D Motion Monitor function. | All versions |
| | | 3D Motion Monitor Display Mode ✻16 | You set the axis variables for each element of the 3D equipment model, and then set the 3D equipment into motion according to those axis motions. | |
| | | Displaying 2D paths ✻16 | You can display the 2D paths of the markers for the projections in the 3D display. | |
| Monitoring Information | Displaying unit production information | | You can display the production information of the NJ/NX-series CPU Unit or NY-series Industrial PC, and Special Units, including the models of the Units and unit versions. | All versions |
| | Monitoring task execution times | | You can monitor the execution time of each task when the user program is executed on an NJ/NX-series CPU Unit, NY-series Industrial PC, or in the Simulator. When the Simulator is connected, you can also monitor the real processing time of tasks. This allows you to perform a Controller performance test. | |
| | Troubleshooting | | You can use troubleshooting to check the errors that occurred in the Controller, display corrections for the errors, and clear the errors. | All versions |
| | | Controller errors | Any current Controller errors are displayed. (Observations and information are not displayed.) | |
| | | User-defined errors | Information is displayed on current errors. | |
| | | Controller event log | You can display a log of Controller events (including Controller errors and Controller information). (You cannot display logs from EtherCAT slaves.) | |
| | | User-defined event log | The log of user-defined events that were stored for the Create User-defined Error (SetAlarm) instruction and the Create User-defined Information (SetInfo) instruction is displayed. | |
| | | Event Settings Table | The Event Setting Table is used to register the contents displayed on the Sysmac Studio and on HMIs for User-defined events that occur for execution of the Create User-defined Error (SetAlarm) instruction and the Create User-defined Information (SetInfo) instruction. | |
| | User memory usage monitor | | The space that is used by the user program that you are editing in the Sysmac Studio is displayed in relation to the size of memory for the NJ/NX-series CPU Unit or NY-series Industrial PC. | All versions |
| | Setting clock information | | You can read and set the clock of NJ/NX-series CPU Unit or NY-series Industrial PC. The computer's clock information is also displayed. | |
| | DB connection function | | You can monitor information for the DB connection.<br>Refer to "**Function Specifications of DB Connection Function**". | Ver. 1.06 or higher |
| Communi-cations | Going online with a Controller | | An online connection is established with the Controller.<br>You also can transfer a project from the connected Controller to the computer with a simple operation without creating a new project or opening an existing project. ✻6 | All versions |
| | Checking for forced refreshing | | When you go offline, any forced refreshing is cleared. | |
| | Synchronize | | The data (project file) in the computer is compared with the data in the NJ/NX-series CPU Unit and NY-series Industrial PC that are connected online, the difference is displayed in a list, and batch transfer can be performed for the individually-specified data. | |
| | Batch transfer | | You transfer data between the computer and NJ/NX-series CPU Unit or NY-series Industrial PC that are connected online. You can select the same data to transfer as in the synchronization operation. Unlike the synchronization operation, the data is transferred in the specified direction without displaying the comparison results. | Ver. 1.09 or higher |
| Maintenance | Changing the operating mode of the Controller | | There are two operating modes for NJ/NX-series CPU Unit or NY-series Industrial PC, depending on if control programs are executed or not. These are RUN mode and PROGRAM mode. | All versions |
| | Resetting the Controller | | The operations and status when the power supply to the Controller is cycled are emulated. This can be performed only in PROGRAM mode. You cannot reset the Controller in RUN mode. | |
| | Clear All Memory | | The Clear All Memory Menu command is used to initialize the user program, Controller Configurations and Setup, and variables in the CPU Unit to the defaults from the Sysmac Studio. | |
| | SD Memory Cards | | The following procedures are used to execute file operations for the SD Memory Card mounted in the NJ/NX-series CPU Unit or the virtual SD Memory Card of the NY-series Industrial PC (hereinafter called SD Memory Card), and to copy files between the SD Memory Card and computer. | All versions |
| | | Formatting the SD Memory Card | The SD Memory Card is formatted. | |
| | | Displaying properties | The properties of the selected file or folder in the SD Memory Card are displayed. | |
| | | Copying files and folders in the SD Memory Card | The selected file or folder in the SD Memory Card is copied to the SD Memory Card. | |
| | | Copying files and folders between the SD Memory Card and the computer | The selected file or folder in the SD Memory Card is copied to the computer. Or, the selected file or folder in the computer is copied to the SD Memory Card. | |

**✻6.** Version 1.08 or higher.

**✻16.** This function is supported only by Sysmac Studio (32 bit). The recommended video memory and video cards for the 3D motion tracing function are listed below.

Video memory: 512 MB min.

Video card: either of the following

- NVIDIA® GeForce® 200 series or higher
- ATI RadeonHD5000 series or higher

| Item | | | Function | Applicable versions |
|---|---|---|---|---|
| Maintenance | Backup functions | | You can back up, restore, and compare the user program and other data of the NJ/NX-series CPU Unit or NY-series Industrial PC to replace hardware, such as the CPU Unit, or to restore device data. | All versions |
| | | Variables and memory backup | You can back up the contents of retained memory to a file and restore the contents of the backup file.<br>You can individually select the retained variables to restore. ✻17 | |
| | | Controller backup | You can back up data (user program and settings, variable values, memory values, Unit settings, and slave settings) from a Controller to a file and restore the backed up data from the file to the Controller. | Ver.1.04 or higher |
| | | SD Memory Card backup | You can backup the Controller data to an SD Memory Card mounted in the NJ/NX-series CPU Unit or to the Virtual SD Memory Card of the NY-series Industrial PC, or compare the Controller data to the data in these SD Memory Cards. | |
| | | Importing/exporting to/from backup files | You can import the data in a backup file created for a Controller backup or SD Memory Card backup to a project. Also, you can export project data to a backup file. | |
| Security Measures | Prevention of incorrect connections | Confirming CPU Unit names and serial IDs | If the name or the serial ID is different between the project and the CPU Unit when an online connection is established, a confirmation dialog box is displayed. | All versions |
| | Prevention of incorrect operation | Operation authority verification | You can set any of five levels of operation authority (Administrator, Designer, Maintainer, Operator, and Observer) for a Sysmac Studio project file or NJ/NX-series CPU Unit or NY-series Industrial PC to restrict the operations that can be performed according to the operation authority of the user. | All versions |
| | | User authentication | Sysmac Studio requires authorizing each user when establishing the online connection and identifies users who perform online operations. | Ver.1.50 or higher |
| | | Write protection of the CPU Unit | You can prevent rewriting of data in the CPU Unit from the Sysmac Studio. | All versions |
| | | Firmware update prohibition | You can choose Use or Do not use the Firmware update prohibition option. | Ver.1.53 or higher |
| | Prevention of the theft of assets | Authentication of user program execution IDs | You can ensure that a user program cannot be operated on another CPU Unit even if copied. | All versions |
| | | User program transfer with no restoration information | The program source code is not transferred. If this option is selected, programs are not displayed even if uploaded from another computer. However, variables and settings are transferred even if this option is selected. | |
| | | Password protection for project files | You can place a password on the file to protect your assets. | |
| | | Data protection | You can set passwords for individual POUs (programs, functions, and function block definitions) to prohibit displaying, changing, and copying them. | Ver.1.02 or higher |
| | | Library Without Source Code | You can create a library without source code. This library prevents leakage of source code from the library. | Ver.1.60 or higher |
| | | Secure communications | Encrypting and hashing the data sent and received between Sysmac Studio and the Controller can prevent a third party from sniffing and falsifying data. | Ver.1.50 or higher |
| | | Secure communication version | The protection level of secure communication can be set depending on the secure communication version. | Ver.1.63 or higher |
| | | TCP/UDP port close | To block unnecessary packets, you can close a TCP/UDP port for the built-in EtherNet/IP port. | Ver.1.50 or higher |
| | | Packet filter | You can filter IP packets in the receiving process in the built-in EtherNet/IP port to limit access from an external device. | |
| | | Secure socket settings | The settings enable the secure socket services for the built-in EtherNet/IP port. | Ver.1.53 or higher |
| | Non-repudiation | Access logging | Sysmac Studio records an operation that a user made for the Controller using a tool as an access log. In the case the user authentication is enabled, you can register usernames to critical access logs for security reasons.<br>This function allows you to confirm when who did what and works as the non-repudiation. | Ver.1.50 or higher |
| | | Firmware update log | You can confirm the firmware update log in the Controller. | Ver.1.53 or higher |
| Customizing Function | Option settings | | You can change the color theme, display of each program editor, and program check method as required. | All versions |
| | | Import/Export | You can export option settings and import them to another environment. | Ver. 1.55 or higher |
| | Shortcut key allocation | | You can change the shortcut keys allocated for the main menu and context menus of the ladder editor. | Ver.1.24 or higher |
| Window Operation | Docking | | You can dock and undock configuration tab pages, program editors, Watch Tab Pages, Cross Reference Tab Page, and other window parts to/from the main Sysmac Studio window. | Ver.1.09 or higher |
| Online Help | Sysmac Studio help system | | You can access Sysmac Studio operating procedures. | All versions |
| | Instructions reference | | Information is provided on how to use the instructions that are supported by the NJ/NX-series CPU Unit or NY-series Industrial PC. | |
| | System-defined variable reference | | You can display a list of descriptions of the system-defined variables that you can use on the Sysmac Studio. | |
| | Keyboard mapping reference | | You can display a list of convenient shortcut keys that you can use on the Sysmac Studio. | |
| | Manual download | | You can access manual download page of the web site from the Sysmac Studio and download the latest related manuals. | Ver.1.24 or higher |

✻17.Individual selection of the retained variables to restore is supported by version 1.05 or higher.

# Function Specifications of OPC UA Function

| Item | | | Function |
|---|---|---|---|
| **Setting parameters** | | | – |
| | **OPC UA Settings** | | Settings for OPC UA. |
| | | **OPC UA Server Settings** | Settings for OPC UA Server operation set from the OPC UA Server Settings tab. |
| | | **Settings and display for Certificate** | Displays Server Certificate and allows uses to manipulate it.<br>Also displays Client and Issuer Authentication of Certificate List and Revocation List , and allows users to manipulate them. |
| | | **Security Settings** | Sets up user name or password to authenticate, prohibits or permits anonymous login, sets security policy to permit as a server and transfers the settings to the CPU Unit. |
| **Programming function** | | | – |
| | **Creation of variables for OPC UA communications** | | Creates variables to be used for OPC UA communications. |
| | | **Publishing of variables to OPC UA communications** | To publish variables to the OPC UA communications, the Network Publish attribute of the variables is set to Publish Only, Input, or Output. |
| | **Shutdown instruction** | | Requests termination of OPC UA Server and make the system power down safely.<br>Instruction name: OPCUA_Shutdown |
| **Monitoring information** | | | – |
| | **Server Status** | | Displays the operating status of the OPC UA Server and terminates (shutdown) the OPC UA Server. |
| | **Operation Log Window** | | Displays the list of operation logs and allows users to manipulate them. |

**Note:** This function can be used if NJ501-1500, NJ501-1400, or NJ501-1300 is selected in Sysmac Studio version 1.21 or higher.
This function can be used if NX102-□□□□ is selected in Sysmac Studio version 1.23 or higher.
This function can be used if NX701-1□□□ is selected in Sysmac Studio version 1.44 or higher.
This function can be used if NX502-□□□□ is selected in Sysmac Studio version 1.54 or higher.

# Function Specifications of DB Connection Function

| Item | | | Function |
|---|---|---|---|
| **Setting parameters** | | | – |
| | **DBMS settings** | | The database to connect is selected. |
| | **Run mode setting of the DB connection service** | | The Operation Mode is selected to send SQL statements when DB connection instructions are executed or Test Mode is selected to not send SQL statements when DB connection instructions are executed. |
| | **Spooling settings** | | You can set the service so that SQL statements are spooled when problems occur and resent when operation is restored. |
| | **Operation log settings** | | Settings are made for the execution log for execution of the DB connection service, the debug log for execution of SQL statements for the DB connection service, and the SQL execution failure log for SQL execution failures. |
| | **Database connection service shutdown settings** | | Settings are made to control operation in order to end the DB connection service after automatically storing the operation log files on an SD Memory Card. |
| **Programming** | | **DB connection instructions** | You can use the following DB connection instructions to write the user program for controlling the data in the database.<br>DB_Insert (Insert DB Record), DB_Select (Retrieve DB Record), DB_Update (Update DB Record), and DB_Delete (Delete DB Record) |
| **Monitoring information** | | | – |
| | **Monitoring the DB connection service** | | The status of the DB connection service is monitored. |
| | **Monitoring the DB connections** | | The status of each DB connection is monitored. |
| | **Displaying the operation logs** | | The contents of the execution log, debug log, and SQL execution failure log are displayed. |

**Note:** The DB connection service can be used if the NJ501-1□20 is selected with Sysmac Studio version 1.06 or higher.
The DB connection service can be used if the NJ101-□□20 is selected with Sysmac Studio version 1.14 or higher.
The DB connection service can be used if the NX701-1□20 is selected with Sysmac Studio version 1.21 or higher.
The DB connection service can be used if the NX502-□□□□ is selected with Sysmac Studio version 1.54 or higher.

# Function Specifications of EtherNet/IP Connection Settings

| Item | | | Function |
|---|---|---|---|
| EtherNet/IP Connection Settings | | | Functions related to tag data link (connection) settings in the EtherNet/IP network are provided. |
| | Setting Connections | Editing Tag Sets | You create tags and tag sets using network variables. |
| | | Editing Target Devices | You add target devices to connect to. |
| | | Editing Connections | You select tag sets from a list and create connections. |
| | | Adding EDS Files | You can add the types of EtherNet/IP devices that can be set as targets. |
| | Transferring Connections | Synchronized Transfer and Batch Transfer | All the connection settings in the Controller or the project are transferred at the same time. |
| | | Individual Transfer and Comparison | You can transfer or compare the connection settings of each EtherNet/IP device individually. |
| | Monitoring Connections | Status Monitor | The operating status of one or more connections is displayed. You can start or stop all the connections at the same time. |
| | | Tag/Tag Set Monitor | The detailed operation information of tags and tag sets, such as the presence or absence of tags and connection times of tag sets, is displayed. |
| | | Ethernet Information Monitor | The detailed operation information of EtherNet/IP devices, such as bandwidth usage (pps), is displayed. |

**Note:** Supported only by the Sysmac Studio version 1.10 or higher.

# Function Specifications of EtherNet/IP Slave Terminal Settings

| Item | | Function |
|---|---|---|
| EtherNet/IP Slave Terminal Configuration and Setup | | You create the configuration of Slave Terminal to be connected to the EtherNet/IP network on the Sysmac Studio and set the NX Units that compose the Slave Terminal. |
| | Registering the NX Units | You configure the Slave Terminal by dragging the NX Units from the device list displayed in the Toolbox to the positions where to mount the Units. |
| | Setting the NX Units | You edit the I/O allocation settings, mounting settings and Unit operation settings of the NX Units. |
| | Displaying the Width of Slave Terminal Configuration | The width of the Slave Terminal configuration is displayed based on the Unit configuration information. |
| | Comparing and Merging the Slave Terminal Configuration Information | You can compare the configuration information on the project with actual configuration online, select the Units with different information to correct, and merge the information. |
| | Transferring the Slave Terminal Configuration Information | You transfer the Unit configuration information to the Slave Terminal. |

**Note:** Supported only by the Sysmac Studio version 1.11 or higher.

# Function Specifications of PROFINET Slave Terminal Settings

| Item | | Function |
|---|---|---|
| PROFINET Slave Terminal Configuration and Setup | | You can create a configuration of the slave terminal connected to the PROFINET network on the Sysmac Studio, and can set the NX Units that compose the slave terminal. |
| | Registering the NX Units | Drag-and-drops of NX Units from the device list in the Toolbox enable to build an equipment. |
| | Setting the NX Units | You can edit the settings for I/O allocation, mounting, and operation of NX Units. |
| | Displaying the Width of the Slave Terminal Configuration | The width of the slave terminal configuration is displayed based on the Unit configuration information. |
| | Comparing and Merging the Slave Terminal Configuration Information | You can compare the configuration information on the project with the actual configuration online, and can merge the selected differences. |
| | Transferring the Slave Terminal Configuration Information | You can transfer the Unit configuration information to the slave terminal. |

**Note:** Supported only by the Sysmac Studio version 1.45 or higher.

# Function Specifications of Safety Control Units

| Item | | | Function |
|---|---|---|---|
| Project Management | Safety: Offline Comparison ✱1 | | You can compare the safety application data in currently opened project file and an exported project file. In addition, it is possible to merge programs and variable table in the detail comparison results. |
| Setting Parameters | Safety I/O Settings | | You make a setting for safety process data communications and connection with safety I/O devices. |
| | | Safety Process Data Communications Settings | You select Safety I/O Units to perform safety process data communications (FSoE communications) and make necessary settings. |
| | | Safety Device Allocation Settings | You set the connection between Safety I/O Units and safety devices. |
| | SRA Parameter Settings ✱2 | | You can configure safety functions and parameter settings of 1S-series Servo Drive. |
| | EtherNet/IP Safety Connection Settings ✱3 | | You can register target devices of EtherNet/IP Safety network and configure the connection settings. |
| | Standard I/O Settings | Exposed Variable Settings | You set whether to expose global variables of the Safety CPU Unit. The values of exposed variables can be referenced from NJ/NX-series CPU Units and NY-series Industrial PCs. |
| | | Standard Process Data Communications ✱4 | You set the devices and ports of the Standard I/O Units for the exposed variables of the Safety CPU Unit. |
| | Safety Task Settings | | You define the execution cycle and timing of the safety task and programs to be executed in the task. |
| | | Assigning Programs | You assign safety programs to execute to the task. |
| | I/O Map Settings | | The ports of Safety I/O Units used in safety process data communications are displayed. You assign device variables used in safety programs to the I/O ports. |
| | | Export/ Import ✱5 | I/O map settings can be exported to and imported from a CSV file. |
| Creating Safety Programs | Instruction List (Toolbox) | | A hierarchy of the functions and function blocks that you can use is displayed in the Toolbox. You can drag the required functions and function blocks onto the FBD editor to insert it to a safety program. |
| | FBD Programming | | You connect variables, functions, and function blocks with connecting lines to build networks. The FBD editor is used to enter them. |
| | | Adding FBD Networks | You create FBD networks on the FBD editor to create algorithms. |
| | | Inserting and Deleting Functions and Function blocks | You insert and delete functions and function blocks on the FBD editor. |
| | | Entry Assistance | When you enter functions, function blocks, or parameters, each character that you enter from the keyboard narrows the list of candidates that is displayed for selection. |
| | | Commenting Out FBD Networks | You can comment out each FBD network. When a network is commented out, it is no longer executed. |
| | | Program Pattern Copy ✱6 | You can duplicate an FBD program with the same program pattern (logic part). The variable name of the program can be set automatically according to the variable name generation rules. |
| | | Converting Programs into Function Blocks ✱3 | You can convert the safety program into user-defined function block. |
| | Automatic Programming ✱3 | | A safety programs can be automatically generated from input and output signals and expected values of the program. |
| | Creating Variables | | You create variables used in safety programs in the global or local variable table. |
| Creating Safety Programs | User-defined Function Blocks | | You create user-defined function blocks. |
| | | Help Reference ✱7 | You can display the user-defined function block help with the popup menu or shortcut key. |
| | Export/Import | | POUs can be exported and imported. |
| | | Programs ✱8 | You can export/import POUs. |
| | | User-defined Function Blocks ✱7 | You can export/import user-defined function blocks. |
| | | IEC 61131-10 XML ✱9 | You can import the IEC 61131-10-compliant XML programs, function block POUs, and global variables. |
| | Searching and Replacing | | You can search for and replace strings in the variable tables, programs, and function blocks of a Safety CPU Unit. |
| | Retrace Search ✱6 | | If the selected variable is used as an output in the program, you can jump to the place where the selected variable is used as an input. If the selected variable is used as an input in the program, you can jump to the place where the selected variable is used as an output. |
| | Deleting Unused Variables ✱6 | | You can delete all unused variables in a program at once. |
| | Variable Comment Switching ✱9 | | Variable Comments shown in safety program and variable table can be collectively replaced to other comments. You can switch the language of comments for users in other countries. |

| Item | | | Function |
|---|---|---|---|
| Debugging | Monitoring | | Variables are monitored during safety program execution. You can monitor the present values of device variables assigned to Safety I/O Units and user-defined variables. The values can be monitored on the FBD editor or Watch Tab Page. |
| | Changing the Present Values of Variables | | You can change the present values of user-defined variables and device variables as required. You can do this on the FBD editor or Watch Tab Page. |
| | Forced Refreshing | | The inputs from external devices and outputs to external devices are refreshed with a specified value on the Sysmac Studio. The specified value is retained even if the value of the variable is overwritten from the user program.<br>You can use forced refreshing on the FBD editor or Watch Tab Page. |
| | Cross References ✻6 | | It is possible to see in which programs and in which place a safety program variable is used. |
| | Offline Debugging ✻10 | | You can check if the control program logic works as designed in advance using a special debugging function for the Simulator without connecting online with the Safety CPU Unit. |
| | | Initial Value Settings ✻11 | You can set the initial values of variables when you start execution of simulation. |
| | | Feedback Settings ✻11 | You can set input status that is linked to changes in output status when simulator is running. |
| | | Simple Automatic Test ✻12 | You can check that expected values of the outputs to the inputs of the program are designed as intended using the Simulator functions of the Safety CPU Unit. |
| | User Memory Usage Monitor ✻11 | | The memory usage of the safety control system and usage of safety network such as I/O data size are displayed. |
| | Online Functional Test ✻3 | | This function helps you to check the safety functional operation of the safety system.<br>You can produce output device operation relative to the input and check whether the system operates as expected. It is possible to output the check results. |
| | Searching for Function Block related to the safety output Off in a Safety Program ✻1 | | You can search for a function block that may be related to the safety output Off in a currently running safety program. |
| | CIP Safety Monitor ✻9 | | You can monitor device status of the CIP Safety target devices, connection status to the Safety CPU Unit, and parameter values. |
| Safety | Safety Validation | | You append the "safety-validated" information to a safety program when you can ensure safety of the program after you complete debugging. |
| | Changing Operating Mode | | There are four operating modes; PROGRAM mode, DEBUG mode (STOPPED), DEBUG mode (RUN), and RUN mode. The RUN mode can be selected only for the validated safety programs. |
| Maintenance | Generating Safety Data Logging Settings File ✻3 | | Settings to use the safety data logging function can be generated as a file. |
| | Generating Safety Unit Restore File ✻3 | | A file of safety program and settings to be transferred to the Safety CPU Unit using an SD memory card is generated for Safety Unit Restore function. |
| Security Measures | Prevention of Incorrect Connections | Setting the Node Name | You set a unique name for each Safety CPU Unit to confirm that you operate the correct Safety CPU Unit. |
| | Prevention of Incorrect Operation | Safety Password | You can prevent unauthorized access to safety functions of Safety CPU Units by setting a safety password for online operations that affect the safety functions. |
| | Prevention of Theft of Assets | Data Protection (Programs) ✻8 | You can set passwords for individual programs to prohibit displaying or changing them. |
| | | Data Protection (User-defined Function Blocks) ✻7 | You can set passwords for individual user-defined function blocks to prohibit displaying or changing them. |

**Note:** Supported only by the Sysmac Studio version 1.07 or higher.
✻**1.** Supported only by the Sysmac Studio version 1.49 or higher.
✻**2.** Supported only by the Sysmac Studio version 1.27 or higher.
✻**3.** Supported only by the Sysmac Studio version 1.24 or higher.
✻**4.** Supported if the EtherNet/IP Coupler is selected with Sysmac Studio version 1.11 or higher.
✻**5.** Supported only by the Sysmac Studio version 1.40 or higher.
✻**6.** Supported only by the Sysmac Studio version 1.41 or higher.
✻**7.** Supported only by the Sysmac Studio version 1.12 or higher.
✻**8.** Supported only by the Sysmac Studio version 1.17 or higher.
✻**9.** Supported only by the Sysmac Studio version 1.29 or higher.
✻**10.**Supported only by the Sysmac Studio version 1.08 or higher.
✻**11.**Supported only by the Sysmac Studio version 1.10 or higher.
✻**12.**Supported only by the Sysmac Studio version 1.15 or higher.

# Function Specifications of HMI

## NA-series Programmable Terminals

| Item | | | Function |
|---|---|---|---|
| Parameter settings | Device references | | Devices, such as Controllers, through which the NA-series PT can read and write information with communications are created on the Sysmac Studio and settings are made for them. |
| | | Displaying internal devices | Controllers that were created in the project are displayed. |
| | | Registering external devices | Devices, such as Controllers, that were not created in the project are registered. The communications settings of the devices to communicate with the NA-series PT and information, such as variables and addresses within the devices that the NA-series PT will read and write, are also registered. |
| | Mapping variables | | The information on the devices registered in the device references, such as variables and addresses, are mapped to the global variables of the NA-series PT. |
| | HMI settings | | Settings for NA-series PT operation are made. |
| | | Device settings | Settings, such as the startup page, default language, layout of the USB keyboard, automatic logout, screen saver, screen brightness, and method to change to the System Menu, are made. |
| | | TCP/IP settings | Settings for the Ethernet port that is built-in to the NA-series PT are made. |
| | | FTP settings | Settings to communicate with FTP clients using the Ethernet port are made. |
| | | NTP settings | Settings to communicate with an NTP server using the Ethernet port are made. |
| | | FINS settings | Settings to communicate with devices that support FINS are made. |
| | | VNC settings | Settings to communicate with VNC clients using the Ethernet port are made. |
| | | Print settings ✻1 | Print settings are made. |
| | | Serial port settings ✻2 | Settings for the built-in serial port in the NA-series PT are made. |
| | Security settings | | Settings, such as user registration and permissions to restrict NA-series PT operation and displays, are made. |
| | | User account settings | The user names, login passwords, and permissions for each user to operate the NA-series PT are set. |
| | | Permission and access level settings | The range of information that can be accessed for different permissions are set. |
| | Troubleshooter ✻3 | | Troubleshooter settings are made. |
| | Language settings | | Language settings to perform multi-language displays on the NA-series PT are made. |
| | Operation log settings ✻4 | | Settings to take operation logs in the NA-series PT are made. |
| Creating data and programming | Editing pages | | The pages to display on the NA-series PT are edited. |
| | | Adding and deleting pages | Pages are added, deleted, or copied with the Multiview Explorer. Pages can also be copied to other projects. |
| | | Adding and deleting page groups | Groups to organize and manage pages on the Multiview Explorer are added and deleted. Pages can be added to or moved to the groups. |
| | | Page properties settings | The page type, overlapping, background color, etc., are set in the Properties Window. |
| | | Changing the display language | If using multiple languages is set in the language settings, the resources displayed on the Page Editor are displayed in the language set for each resource. |
| | | Changing the display status of each object ✻1 | You can check display status changes for lamp and other objects on the Page Editor. |
| | | Displaying object configuration | The objects and groups that were added to each page can be confirmed in a tree structure using the Page Explorer. |
| | | Adding objects | Objects, such as buttons or graphics, to display on a page are added by dragging them from the Toolbox to the Page Editor. |
| | | Grouping objects | Settings to operate multiple objects together as a group are made. |
| | | Aligning objects | Multiple objects are aligned. |
| | | Editing objects | Objects and groups can be copied within a page or to another page. Objects can also be deleted, and locations, sizes, rotations, and position relationships with other objects can be set. Also, labels can be edited ✻1. |
| | | Setting object entry order ✻1 | Entry order of Data Edit objects can be set. |
| | | Object property settings | Properties, such as the colors and shapes of objects and the mapped variables, can be changed. Properties are displayed and changed in the Properties Window. |
| | | Duplicating objects ✻5 | You can duplicate a specified number of objects. Offsets are set to the element numbers of the array set for the object. |
| | | Animation settings | An animation to change an object appearance dynamically can be set. Use the icon on the Properties window to show and change the animation settings. ✻6 |
| | | Event and action settings | The events that can be set for objects and the actions that can be executed when an event occurs are set. |
| | | Import and export ✻7 | Text, variables and conditional expressions of some objects can be imported from or exported to an Excel file. |
| | | Page import and export ✻4 | Pages can be imported and exported. |

**Note:** These specifications are supported by Sysmac Studio version 1.11 or higher.
**✻1.** Supported only by the Sysmac Studio version 1.14 or higher.
**✻2.** Supported only by the Sysmac Studio version 1.54 or higher.
**✻3.** Supported only by the Sysmac Studio version 1.13 or higher.
**✻4.** Supported only by the Sysmac Studio version 1.40 or higher.
**✻5.** Supported only by the Sysmac Studio version 1.16 or higher.
**✻6.** Aninmation settings in the Sysmac Studio version 1.44 or lower were performed in the Animation window.
**✻7.** Supported only by the Sysmac Studio version 1.27 or higher.

| Item | | | Function |
|---|---|---|---|
| Creating data and programming | Programming with Visual Basic | | Subroutines are created with Visual Basic. |
| | | Language specifications | Visual Basic 2008 and NET Compact Framework 3.5 are supported. ✻8 |
| | | Adding subroutine groups | Groups to organize and manage global subroutines on the Multiview Explorer are added or deleted. Subroutines can be added or moved to the groups. |
| | | Editing subroutines | Subroutines are created using the Code Editor, which is optimized for Visual Basic. |
| | | Bookmarks | Bookmark can be added to any code line and you can move between the bookmarks. |
| | | Data entry assistance | The characters that are entered from the keyboard are used to display candidates when entering source code. |
| | User alarms | | Settings for detection conditions and displaying messages for user alarms are made. |
| | | Adding and deleting user alarm groups | Groups to organize and manage user alarms on the Multiview Explorer are added or deleted. User alarms can be created in the groups. |
| | | Registering and deleting User Alarm | Settings for detection conditions for user alarms and displaying messages or popup pages are made for user alarm groups. |
| | | Copying user alarms | User alarms can be copied within a group or to another group. |
| | | Event and action settings | Events and the actions that are executed when the events occur are set for the user alarms. Displaying and changing the settings for events and actions is performed in the Events and Actions Window. |
| | | Import and export ✻7 | User alarms and user-alarm text strings can be imported from or exported to an Excel file. |
| | Controller events ✻1 | User-defined event settings | Settings for pages that can be changed from user-defined events' display in Troubleshooter. |
| | Data logging | | Data logging is set to log specified data in the NA-series PT at the specified times. |
| | | Adding and deleting data sets | Data sets are added to perform data logging. |
| | | Log condition setting | Conditions to perform data logging and target global variables are set for the data sets. |
| | Broken-line graph ✻1 | | Settings for the data that is displayed in a broken-line graph. |
| | | Adding and deleting data groups | Data groups for which a broken-line graph is drawn are added and deleted. |
| | | Log condition setting | Conditions to display a broken-line graph and target global variables are set for data groups. |
| | Recipes | | Data groups that are retained in the NA-series PT and can be switched for user requests are set. |
| | | Adding and deleting templates | Data storage locations, value ranges, and data names are added or deleted. |
| | | Recipe data settings | The actual data is set for each recipe. |
| | Keypad customization ✻1 | | Keypads can be customized. |
| | Global events | | The events that are detected on any page and the actions that are executed when the events occur are set. |
| | Resource management | | All of the character strings and graphics that are displayed on pages are managed. Also, registered resources can be indirectly accessed. ✻1 |
| | | Registering and deleting general character strings | The character strings that are displayed on pages are registered and deleted, except for character stings used for user alarms. |
| | | Registering and deleting character strings for user alarms | The character strings used for user alarms are added or deleted. |
| | | Registering and deleting document files | Document files that are displayed with the Document Viewer are set or deleted. |
| | | Registering and deleting image files | Image files that are displayed for objects are set or deleted. |
| | | Registering and deleting movies | Movie files that are displayed for Media Player objects are set or deleted. |
| | | Importing and exporting | The general character strings and alarm character strings can be imported and exported using Excel files. |
| | | Exporting Image files ✻4 | The registered image files can be exported. |
| | Scaling ✻1 | | Values of variables and objects are converted by a specified a scaling factor set for them. |
| | Searching and replacing | | You can search all strings in a project to find and replace a specified string. |
| | Device replace ✻2 | | You can replace a device, which has been mapped by using a variable, with another device. |
| | Cross reference ✱1 | | Where a specified program element (variable, data type, page, or resource) is used in a project can be checked with a list.<br>You can access the use locations of the element from the list. |
| | Building | | The project is converted into a format that can be executed in the NA-series PT. |

**Note:** These specifications are supported by Sysmac Studio version 1.11 or higher.
**✻1.** Supported only by the Sysmac Studio version 1.14 or higher.
**✻2.** Supported only by the Sysmac Studio version 1.54 or higher.
**✻4.** Supported only by the Sysmac Studio version 1.40 or higher.
**✻7.** Supported only by the Sysmac Studio version 1.27 or higher.
**✻8.** There are restrictions on the functions that can be used.

| Item | | | Function |
|---|---|---|---|
| Reusability | IAGs (intelligent application gadgets) | | Multiple objects and subroutines are combined to create a reusable object. |
| | | Creating IAGs | An IAG that consists of multiple objects and subroutines is created as a functional unit in an IAG project. |
| | | Creating IAG collection files | A created IAG is built and saved as a module that can be distributed and reused. |
| | | Creating user-defined events ✻1 | You can create user-defined events that can be used in an IAG. |
| | | Using IAGs | IAG collection files are imported using the IAG Collection Manager. The imported IAGs are displayed in the Toolbox and can be used in the same way as other objects. |
| | | Replacing IAG ✻2 | You can replace an existing IAG with any other IAG. |
| | Custom objects | | The selected objects are registered in a reusable format in the Toolbox. |
| | | Registering custom objects | Objects or grouped objects are dragged to the Toolbox to register them. |
| | | Using custom objects | Custom objects are displayed on a page by dragging them from the Toolbox to the Page Editor. |
| File operations | Import/Export ✻9 | | The data in the NA-series PT can be exported and saved as a file and the data can be imported from the file to a project. |
| | Synchronization | | The data in the NA-series PT that is online is compared with the data in the Sysmac Studio. You can check the differences and then transfer the data after specifying the transfer direction. |
| | Transferring files via storage media | | The data in a storage media in the computer is compared with the data in the Sysmac Studio. You can check the differences and then transfer the data to the storage media. You can use the System Menu to transfer a saved project file to the NA-series PT. |
| | Clearing all memory | | All of the data except for the clock information is deleted from the NA-series PT. |
| Simulation | Executing simulations | | A project file on the computer is virtually executed to debug it. |
| | | Setting and clearing breakpoints | Breakpoints can be set at the specified positions in a subroutine. |
| | | Synchronized simulation with Controller Simulator | Sequence control and NA-series PT operation, such as displaying pages and subroutine operation, is simulated together to debug the application in the NA-series PT. |
| Monitoring information | Setting clock information | | The clock information in the NA-series PT can be checked and set. |
| Communications | Going online with NA-series PT | | The computer can be placed online with the NA-series PT. However, information in the NA-series PT, such as the values of variables, cannot be read. |
| | Upgrading system program | | When the Sysmac Studio is online with the NA-series PT, the system program in the NA-series PT can be upgraded as required. |
| Print ✻1 | Printing | | Settings of each project can be printed out. |
| Security | Preventing malfunctions | | If the name or serial ID of the project and the NA-series PT are different when the Sysmac Studio goes online, a confirmation dialog box is displayed. |
| | Preventing incorrect operation | | You can prevent data in the NA-series PT from being overwritten from the Sysmac Studio. |

**Note:** These specifications are supported by Sysmac Studio version 1.11 or higher.
**✻1.** Supported only by the Sysmac Studio version 1.14 or higher.
**✻2.** Supported only by the Sysmac Studio version 1.54 or higher.
**✻9.** Supported only by the Sysmac Studio version 1.24 or higher.

# Function Specifications of Vision Sensor Functions

## FH-series Vision Sensors

| Item | | | Function |
|---|---|---|---|
| Setting Parameters | | | – |
| | Main Edit | Sensor Information | Displays and sets basic information of the sensor. |
| | | Online | Changes the connection status of the sensor, and performs various controls such as sensor restart and initialization. |
| | Line Edit | Operation View | Monitors the measurement images of the sensor and detailed results of each process unit. |
| | | Scene Maintenance View | Edits, manages, and saves the scene groups and scenes. |
| | Scene Data Edit | Flow Edit | Creates the process flow in combination of user-specified units. |
| | | Process Unit Edit | Edits each process unit. |
| | Sensor System Data Edit | Camera Settings | Checks the camera connection status and sets the camera's imaging timing and communications speed. |
| | | Controller Settings | Makes the system environment settings for the sensor. |
| | | Parallel I/O Settings | Sets the conditions of output signals. |
| | | RS-232C/422 Settings | Makes the RS-232C/422 communications settings. |
| | | Ethernet Communication Settings | Makes the Ethernet communication settings. |
| | | EtherNet/IP Communication Settings | Makes the EtherNet/IP communications settings. |
| | | EtherCAT Communication Settings | Makes the EtherCAT communications settings. |
| | | PROFINET Communication Settings ✻1 | Makes the PROFINET communications settings. |
| | | Encoder Settings | Makes the encoder settings. |
| | Tools | Communication Command Customization Tool | Makes the settings for customized communication commands. |
| | | File Saving Tool | Copies and transfers the files in the sensor memory. |
| | | Calibration Support Tool | Checks the calibration information. |
| | | User Data Tool | Edits the data (user data) that can be shared and used in sensors. |
| | | Security Setting Tool ✻2 | Edits the security settings of the sensor. |
| | | Scene Group Save Destination Setting Tool ✻2 | Sets the destination to save the scene group data. |
| | | Image File Save Tool ✻2 | Saves the logging images and image files stored in the sensor memory. |
| | | Registered Image Management Tool ✻2 | Saves the images used for model registration and reference registration as registered images. |
| | | Reference Position Update Tool ✻2 | Edits all reference positions of more than one processing unit. |
| | | Scene Group Data Conversion Tool ✻2 | Creates the scene group data with more than 128 scenes. |
| | | Scene Control Macro Tool ✻2 | Makes a setting for complementing and expanding the measurement flow and scene control. |
| | | Conveyor Calibration Wizard Tool ✻3 | Calibrates cameras, conveyors, and robots in a conveyor tracking application. |
| | | Calibration Plate Print Tool ✻3 | Prints out calibration patterns that are used in the Conveyor Calibration Wizard. |
| | | Conveyor Panorama Display Tool ✻3 | Displays a panoramic image in a conveyor tracking application. |
| | | Variable Assignment List ✻1 | Shows a list of system and scene variable assignments registered to FH/FHV Vision Sensors. |
| | | Quick Access Setting Tool ✻4 | Defines identifier name, absolute path, and display name for Quick Access. Quick Access settings allows you to select Quick Access when specifying a file or folder path. Settings according to different environments enable path settings without considering environment-dependent drive configuration. |
| | | Error Log Management Tool ✻5 | Displays contents of the error log information files for the FH/FHV-series Vision Sensor while Sysmac Studio is online. |
| Debugging | | Offline Debugging of Sensor Operation | Simulates measurements offline without connecting to the sensor. You can use external image files and perform measurements under the conditions set in the offline settings, then display the results of those measurements. |
| | | Offline Debugging of Sensor Control Program and Sensor Operation ✻6 | Simulates the linked operation of the sequence controls in the NJ/NX-series CPU Unit or NY-series Industrial PC and FH-series Sensor operation for an EtherCAT system.<br>You can debug a series of operations offline to perform the measurement and other processing and output the results when a control signal such as measurement trigger is input to the Sensor. |
| Security | | Prevention of Incorrect Operation ✻7 | Prevents unauthorized access by setting an account password for online operations. |

**Note:** Supported only by the Sysmac Studio version 1.07 or higher.
**✻1.** Supported only by the Sysmac Studio version 1.25 or higher.
**✻2.** Supported only by the Sysmac Studio version 1.10 or higher.
**✻3.** Supported only by the Sysmac Studio version 1.14 or higher.
**✻4.** Supported only by the Sysmac Studio version 1.43 or higher.
**✻5.** Supported only by the Sysmac Studio version 1.53 or higher.
**✻6.** Supported only by the Sysmac Studio version 1.08 or higher.
**✻7.** Supported only by the Sysmac Studio version 1.09 or higher.

## FHV-series Vision Sensors

| Item | | | Function |
|---|---|---|---|
| **Setting Parameters** | | | – |
| | **Main Edit** | **Sensor Information** | Displays and sets basic information of the sensor. |
| | | **Online** | Changes the connection status of the sensor, and performs various controls such as sensor restart and initialization. |
| | **Line Edit** | **Operation View** | Monitors the measurement images of the sensor and detailed results of each process unit. |
| | | **Scene Maintenance View** | Edits, manages, and saves the scene groups and scenes. |
| | **Scene Data Edit** | **Flow Edit** | Creates the process flow in combination of user-specified units. |
| | | **Process Unit Edit** | Edits each process unit. |
| | **Sensor System Data Edit** | **Camera Settings** | Checks the camera connection status and sets the camera's imaging timing and communications speed. |
| | | **Controller Settings** | Makes the system environment settings for the sensor. |
| | | **Parallel I/O Settings** | Sets the conditions of output signals. |
| | | **RS-232C/422 Settings** | Makes the RS-232C/422 communications settings. |
| | | **Ethernet Communication Settings** | Makes the Ethernet communication settings. |
| | | **EtherNet/IP Communication Settings** | Makes the EtherNet/IP communications settings. |
| | | **EtherCAT Communication Settings** | Makes the EtherCAT communications settings. |
| | | **PROFINET Communication Settings** | Makes the PROFINET communications settings. |
| | | **Encoder Settings** | Makes the encoder settings. |
| | **Tools** | **File Saving Tool** | Copies and transfers the files in the sensor memory. |
| | | **Calibration Support Tool** | Checks the calibration information. |
| | | **Security Setting Tool** | Edits the security settings of the sensor. |
| | | **Registered Image Management Tool** | Saves the images used for model registration and reference registration as registered images. |
| | | **Scene Group Data Conversion Tool** | Creates the scene group data with more than 128 scenes. |
| | | **Variable Assignment List** | Shows a list of system and scene variable assignments registered to FH/FHV Vision Sensors. |
| | | **Error Log Management Tool ✻1** | Displays contents of the error log information files for the FH/FHV-series Vision Sensor while Sysmac Studio is online. |
| **Debugging** | | **Offline Debugging of Sensor Operation** | Simulates measurements offline without connecting to the sensor. You can use external image files and perform measurements under the conditions set in the offline settings, then display the results of those measurements. |
| | | **Offline Debugging of Sensor Control Program and Sensor Operation** | Simulates the linked operation of the sequence controls in the NJ/NX-series CPU Unit or NY-series Industrial PC and FHV-series Sensor operation for an EtherCAT system.<br>You can debug a series of operations offline to perform the measurement and other processing and output the results when a control signal such as measurement trigger is input to the Sensor. |
| **Security** | | **Prevention of Incorrect Operation** | Prevents unauthorized access by setting an account password for online operations. |

**✻1.** Supported only by the Sysmac Studio version 1.53 or higher.

## FQ-M-series Vision Sensors

| Item | | | Function |
|---|---|---|---|
| **Setting Parameters** | | | – |
| | **Main Edit** | **General Settings** | Displays and sets basic information of the sensor. |
| | | **Sensor connection** | Changes the connection status of the Sensor, and sets the conditions for communications with the Sensor. |
| | | **Sensor control in online** | Performs various controls for the sensor mode change, data transfer/save, and monitoring. |
| | | **Sensor error history** | Displays and clears the error history of an online Sensor. |
| | | **Tool** | Restarts and initializes the sensor, updates the firmware of the sensor, reads sensor data from a file, saves sensor data to a file, prints the sensor parameters, and displays help. |
| | **Scene data Edit** | **Image condition Settings** | Adjusts the image condition. |
| | | **Specifies the calibration pattern** | Sets a registered calibration pattern. |
| | | **Registers inspection item** | Registers the inspection item to use in the measurement.<br>You can select from the following inspection items:<br>Edge position, Search, Labeling, Shape search |
| | | **Calculation Settings** | Makes a setting for basic arithmetic operations and function operations using inspection item judgment results and measurement data. |
| | | **Logging Settings** | Makes a setting for logging measurement results of inspection items and calculation results. |
| | | **Output Settings** | Makes a setting for data to output to external devices. |
| | | **Run Settings** | Switch Sensor modes or monitors measurement results. |
| | **Sensor system data Edit** | **Trigger condition Settings** | Sets the trigger type and image timing. |
| | | **I/O Settings** | Sets the conditions of output signals.<br>You can check the status of I/O signal while online. |
| | | **Encoder Settings** | Make settings for the encoder such as common encoder settings, ring counter settings, and encoder trigger settings. |
| | | **Ethernet communication Settings** | Makes Ethernet communication settings. You can select data communication from no-protocol data, PLC link data, and programmable no-protocol data. |
| | | **EtherCAT communication Settings** | Makes the EtherCAT communication settings according to the communication settings of the EtherCAT master. |
| | | **Logging condition Settings** | Sets the conditions to log to the internal memory of sensor. |
| | | **Sensor Settings** | Makes the settings for startup scene control function, password setting function, and adjustment judgment function. |
| | **Calibration Scene Data Settings** | | Calculates, views, and edits the calibration parameters. The Vision Sensor supports general-purpose calibration and calibration for conveyor tracking. |
| **Debugging** | | **Offline debugging of sensor operation** | Simulates measurements offline without connecting to the Vision Sensor. You can use external image files and perform measurements under the conditions set in the offline settings, then display the results of those measurements. |
| | | **Offline debugging of the sensor control program and sensor operation** | Performs a linked simulation between the sequence control of an NJ/NX-series CPU Unit or NY-series Industrial PC and the operation of an FQ-M Sensor in EtherCAT configuration systems.<br>This allows you to debug operation offline from when measurements and other processing are performed for control signals such as measurement triggers through the output of processing results. |

**Note: 1.** Supported only by the Sysmac Studio version 1.01 or higher.
**Note: 2.** Supported by Sysmac Studio (32 bit).

# Function Specifications of Displacement Sensor Functions

| Item | | | Function |
|---|---|---|---|
| **Setting Parameters** | | | – |
| | **Main Editing** | **General Settings** | Displays and sets basic information on the Sensor. |
| | | **Sensor Connection** | Changes the connection status of the Sensor, and sets the conditions for communications with the Sensor. |
| | | **Online Sensor Control** | Performs various controls for the Sensor (e.g., changing the mode, controlling internal logging, and monitoring). |
| | | **Tools** | Restarts and initializes the Sensor, updates the firmware in the Sensor, recovers ROM data, prints the Sensor parameters, and displays help. |
| | **Editing Bank Data** | **Setting Sensing Conditions** | Adjusts the light reception conditions for each measurement region. |
| | | **Setting Task Conditions** | Used to select the measurement items to use in measurements. You can select from the height, thickness, or calculations.<br>The following are set for the measurement items: scaling, filters, holding, zero-resetting, and judgement conditions. |
| | | **Setting I/O Conditions** | Sets parameters for outputting judgements and analog values to external devices. |
| | **Editing Bank Data** | **Sensor Settings** | Sets the following: ZW Sensor Controller's key lock, number of displayed digits below the decimal point, the bank mode, the analog output mode, and timing/reset key inputs. |
| | | **Ethernet Communications Settings** | Sets up Ethernet communications and field bus parameters. |
| | | **RS-232C Communications Settings** | Sets up RS-232C communications. |
| | | **Data Output Settings** | Sets serial output parameters for holding values. |
| **Monitoring** | | **Senor monitoring** | Monitors the light-detection status and the measurement results of the sensor. |
| | | **Trend monitoring** | Logs and monitors the measurement results that meet the specific conditions of the sensor. |
| **Debugging** | | **Offline Debugging of Sensor Control Programs and Sensor Operation** | Performs a linked simulation between the sequence control of an NJ/NX-series CPU Unit or NY-series Industrial PC and the operation of a ZW Sensor in EtherCAT configuration systems.<br>This allows you to simulate the operation of signals when timing signals and other control signals are input to the Sensor to debug the control logic offline. |

**Note:** The ZW-series can be used with the Sysmac Studio version 1.05 or higher.
The ZW-7000-series can be used with the Sysmac Studio version 1.15 or higher.
The ZW-5000-series can be used with the Sysmac Studio version 1.18 or higher.

# Function Specifications of Team Development Option

| Item | | | Function |
|---|---|---|---|
| **Project version control function** | | | You can control a project version in concert with the version control system (Git™). |
| | **History management** | **Showing the project log** | You can see the change history of project data in a branch, local repository, and remote repository. |
| | | **Comparing projects** | You can compare specific revisions from the project change history. |
| | | **Reverting a project** | You can restore a project to any revision. |
| | **Multiple-person development** | **Developing a program concurrently** | You can develop controller programs per POU concurrently. The changes of concurrent development are merged automatically. |
| | **Derivative development** | **Creating a branch** | You can create and edit data derived from a master project. |
| | | **Merging** | Changes in a branch are automatically reflected in the master data. |

**Note:** This option can be used by applying the Team Development Option to Sysmac Studio version 1.20 or higher.
Project version control function is supported by CPU Unit version 1.16 or later.

# Function Specifications of 3D Simulation Option (Sysmac Studio 64-bit Only)

| Item | | | Function |
|---|---|---|---|
| **3D Simulation** | | | This function enables to check the followings visually on a PC: behaviors of the equipment controlled by NJ/NX/NY Controllers and conveyance of parts to be processed or assembled. |
| | **Adding 3D object** | **3D CAD Data** | Adds 3D CAD data. |
| | | **Cylinder** | Adds a cylinder. |
| | | **Box** | Adds a box. |
| | | **Mechanical Component ✻1** | Adds a mechanical component controlled by I/O or motion axis. |
| | | **Virtual Part Detection Sensor** | Adds a virtual sensor to detect a part position. |
| | | **Custom Mechanics ✻2** | Adds custom mechanics that any movable parts can be configured. |
| | | **Parallel Link Model ✻2** | Adds a parallel link model. |
| | **Shape Script** | **Adding a program** | Adds a program to replicate the part behavior on a 3D simulation. |
| | | **Programming** | Edit a program with Shape Script Editor. |
| | | **Automatic generation of a virtual output program for a limit switch** | Automatically generate the Shape Script to replicate the behavior of a limit switch in a specific mechanism. |
| | | **Automatic program generation for Part Detection Sensor** | Automatically generate the Shape Script to replicate the behavior of Part Detection Sensor detecting a virtual part. |
| | | **Execution** | Executes Shape Script |
| | **Behaviors Settings ✻3** | **Behaviors Settings** | To move parts in Executing 3D Simulation, configures a 3D object behavior toward the parts. |
| | | **Bahaviors execution** | Simulates parts based on Behaviors Settings. |
| | **Executing 3D Simulation** | **Execution ✻1** | Executes 3D Simulation |
| | | **Collision detection** | Detects a contact between 3D objects (e.g. equipment components, part) during operation. |

**✻1.** 3D Simulation Option is required to operate the mechanical components in a 3D simulation.
**✻2.** Supported by Sysmac Studio version 1.47 or higher.
**✻3.** Supported by Sysmac Studio version 1.54 or higher.

# Function Specifications of Robot (Sysmac Studio 64-bit only)

| Item | | | Function |
|---|---|---|---|
| **Robot** | | | |
| | **Parameter Settings** | **EtherCAT Settings** | You can register an Omron robot as an EtherCAT node. |
| | | **Robot Common Settings** | You can assign I/O that controlled with V+ program written in a robot control language. |
| | | **Robot Basic Settings** | You can assign robot numbers to robots. |
| | | **Controller Settings** | You can configure common settings for robot controllers. |
| | | **Save Configuration** | You can configure the setting to save V+ programs, V+ variables, and task settings at startup to the Controller's non-volatile memory (SD memory card). |
| | | **Monitor Window** | You can issue a control command directly to a robot system. |
| | | **Robot Settings** | You can configure settings for each robot. |
| | **Programming** | **V+ Program Editor** | You can register, edit, and debug V+ programs. |
| | | **V+ Variables** | You can register and edit V+ variables. |
| | | **Search/Replace** | Search/replace in V+ program. |
| | **Communication** | **Online Connection** | You can establish an online connection between PC and Controller. |
| | | **Synchronization** | You can compare data in the PC (project file) with that in the online-connected Robot Integrated CPU Unit to see differences in a list. Also, you can transfer the specified data all at once, together with Robot Controller Common Settings and V+ programs.<br>It is possible to transfer an IEC program only with the transfer option. ✻1 |
| | | **Transfer All** | You can transfer data between the online-connected Robot Integrated CPU Unit and PC. The data to be transferred is the same as that of Synchronization. Unlike Synchronization, data is transferred to the specified direction without showing comparison result. Robot Controller Common Settings and V+ programs are also transferred at the same time.<br>It is possible to transfer an IEC program only with the transfer option. ✻1 |
| | | **V+ Program Synchronization** | You can compare data in the PC (project file) with that in the online-connected Robot Integrated CPU Unit, and differences are shown in a list. You can specify data to transfer at once. |
| | | **Push to V+ Memory** | You can transfer all V+ programs and V+ variables in the PC (project file) and online-connected Robot Integrated CPU Unit from PC to Controller at the same time. |
| | | **Pull from V+ Memory** | You can transfer all V+ programs and V+ variables in the PC (project file) and online-connected Robot Integrated CPU Unit from Controller to PC at the same time. |
| | **Project Management** | **Open in Emulation Mode** | Select this option before opening the project to configure Robot Control Function Module, edit V+ program and do offline debugging. |
| | | **Enable Emulation Mode** | You can enable the emulation mode and re-open the project. |
| | | **Disable Emulation Mode** | You can disable the emulation mode and re-open the project. |
| | | **Print** | You can print V+ programs, V+ variables, robot settings, and others. |
| | | **Application Sample** | You can create a sample of Pack manager or Robot Vision Manager as a project of Application Manager device, based on a robot configuration crated by EtherCAT Editor.<br>You can specify the version of an Application Manager device. ✻1 |
| | **Debugging** | **3D Visualizer** | You can check or change the robot's position. During a simulation, you can check movements of the robot. |
| | | **Task Status Control** | This user interface enables an online connection to Robot Control Function Module, robot's power state control, monitor speed setting, and activation of other debugging functions. |
| | | **Task Manager** | You can allocate V+ program to a task managed by Robot Control Function Module to control execution of the program. |
| | | **IO Watcher** | You can monitor robot's digital I/O in a list. |
| | | **Virtual Front Panel** | You can monitor robot's mode, power state, and emergency stop button state. This function is available in the emulation mode. |
| | | **V+ Jog Control** | You can determine a position of the selected robot checking the 3D Visualizer. Position of the robot's tip is to be registered to a location variable. |
| | **Information Monitoring** | **Troubleshooting/Event Log** | You can check errors in the Controller, instruct countermeasures, clear errors, or confirm it. |
| | | **System Monitor** | You can monitor robot's parameters in real time. |
| | | **eV+ Log** | You can display processing history of Robot Control Function Modules. |
| | **Maintenance** | **Hardware Diagnostics** | You can check robot's motor status. |
| | | **Data Collection** | You can display or save the robot system data. |
| | | **Motor Tuning** | You can send a square wave signal positioning command to the specified motor to monitor its response. |
| | | **V+ Version Setting ✻2** | You can update configured V+ versions of the online-connecting Controller and robot to an operable combination. |
| | **Security** | **Robot System Operation Authentication** | This function prevents illegal changes in Robot Control Function Module settings or V+ program editing both online and offline. |
| | **Customization** | **V+ Program** | You can define headers generated when creating a new V+ program, configure intellicences, etc. |

**✻1.** Supported only by the Sysmac Studio version 1.52 or higher.
**✻2.** Supported only by the Sysmac Studio version 1.50 or higher and Robot Integrated CPU Units Ver. 1.48 or later.
**Note:** Supported by Sysmac Studio version 1.42 or higher.

# Function Specifications of Application Manager (Sysmac Studio 64-bit only)

| Item | | | Function |
|---|---|---|---|
| **Application Manager** | | | |
| | **Setting** | **IP Address** | You can set Application Controller's IP address. |
| | | **Port Number** | You can set the port numbers of Application Manager running on the Application Controller. |
| | **3D Visualization Object** | **CAD Data** | You can add CAD data. |
| | | **Cylinder** | You can add cylinders. |
| | | **Box** | You can add boxes. |
| | | **Mechanical Component ✻1** | You can add mechanical components controlled by I/O or motion axes. |
| | | **Virtual Part Detection Sensor** | You can add virtual sensors that detect position of the part. |
| | | **Custom Mechanics ✻2** | You can add custom mechanics that any movable parts can be configured. |
| | | **Parallel Link Model ✻2** | You can add parallel link model. |
| | | **Batch Export 3D Visualization Objects ✻3** | You can export multiple 3D Visualization Objects in a project to a file. |
| | | **Import 3D Visualization Object ✻3** | You can import a file containing exported 3D Visualization Objects to a project. |
| | **Robot Vision Manager** | **Belt Latch Calibration** | You can calibrate the positional relation between the robot and latch. |
| | | **Belt Calibration** | You can calibrate the positional relation between the robot and conveyor belt. |
| | | **Camera Calibration** | You can calibrate the positional relation between the robot and camera. |
| | | **Gripper Offset Table** | You can define where on the part the robot can pick it and flange-centered relationship among pick spot, part model, and robot. |
| | | **Vision Sequence** | You can display the order and dependency of vision tools to be executed. |
| | | **Overlap Tool** | This function makes the part moving on the conveyor belt processed only once, even if it appears in multiple images. |
| | | **Communication Tool** | You can configure settings for sending results of image sensing associated with the belt to the Controller's queue to make the robot process them. |
| | **Camera Settings** | **Virtual Camera** | You can set a virtual camera that vision tools reference. During simulation, the emulation camera is used, but in the real machine, it switches to the Basler camera. |
| | | **Emulation Camera** | You can emulate saved images as if taken by a camera. |
| | | **Basler Camera** | You can configure settings to use the Basler camera. |
| | | **Sentech Camera** | You can configure settings to use the Sentech camera. |
| | | **Custom Device** | Using C# programs, you can acquire images from any camera device or external vision system. |
| | | **Virtual Capture Device ✻4** | Assigning the image data captured as 3D shape data in the 3D Visualizer to a virtual camera allows you to handle it as if the data were captured with a physical camera. |
| | **Configuration** | **Controller Connection Startup** | You can connect Application Manager running on the Application Controller to the Robot Integrated CPU Unit and configure settings to instruct controls, at a startup of Application Manager. |
| | | **Data Mapper** | Function that allows changes in the state of robot I/O or other to be assigned to other robot I/O or other process state changes. |
| | | **Note** | You can create text documents. |
| | | **OPC Container** | You can set an OPC container to communicate data with an external PC. |
| | | **Program System Startup** | You can specify C# program which run automatically when an Application Manager project running on the Application Controller is opened. |
| | | **Recipe Manager** | This function enables batch management of initial values of V+ variables, vision tools, cameras, and others, according to the objects handled by equipment. You can switch CAD data using Recipe Manager. ✻3 |
| | | **Recipe Manager Script** | You can manage recipes with C# script. |
| | **Feeders** | **AnyFeeder** | You can configure settings to use AnyFeeder. |
| | | **IO Feeder** | You can configure settings to use a general feeder. |
| | **Process** | **Part Buffer** | You can set a location where the part is temporarily stored if the target cannot be used to accept the part. |
| | | **Part Target** | You can configure settings of a part that the robot places, which handled in Process Manager. |
| | | **Part** | You can configure settings of a part that the robot picks, which handled in Process Manager. |
| | | **Belt** | You can configure a conveyor belt. |
| | | **Process Manager** | You can manage allocations and control queuing of multiple controllers, robots, conveyors, parts, and targets. |
| | | **Allocation Script** | You can create Custom Part Allocation Program used in Process Manager with C#. |
| | | **Pallet** | It is the base object to pick and place multiple parts. |
| | | **Vision Refinement Station** | With this function, you can configure position of upward-facing camera in order to adjust orientations of the part and gripper. |
| | **Vision** | **Finder** | This function creates a vectorized depiction of an object or object function and usually returns a result by coordinate. |
| | | **Inspection** | By identifying pixel information, you can check the various aspects of the detected objects or features, such as color deviations, defects, and product density. |
| | | **Reader** | You can acquire character string data from characters in code or image. |
| | | **Calculation** | You can create new entity in an image based on user-defined or existing entities. |
| | | **Image Process** | This function provides helpful operations and features to analyze and process images. |
| | | **Custom** | You can directly control processing methods for images and tools. |

| Item | | | Function |
|---|---|---|---|
| **Application Manager** | | | |
| | **Programs** | **C# Program** | You can reference and compute the data handled by Application Manager with C# program to create an application. |
| | | **Variables** | You can define a variable in the Variables section in Multiview Explorer when you need a variable shared with multiple C# programs. |
| | | **Search/Replace** | Search/replace in C# program. |
| | **Communication** | **Online Connection** | You can establish an online connection between PC and Application Manager on the Application Controller. |
| | | **Synchronization** | You can compare data in the PC (project file) with that in the online-connected Application Manager to see differences in a list. Also, you can transfer the specified data all at once. The option that omits 3D Shape Data from the transfer reduces the transfer time. ✻3 |
| | **Project Management** | **Open in Emulation Mode** | Select this option before opening the project to configure Application Manager, Robot Control Function Module, edit V+ program and do offline debugging. |
| | | **Enable Emulation Mode** | You can enable the emulation mode and re-open the project. |
| | | **Disable Emulation Mode** | You can disable the emulation mode and re-open the project. |
| | | **Print** | You can print settings of Application Manager and programs. |
| | **Debugging** | **3D Visualizer** | You can check or change position of the robot, belt, or other objects. During a simulation, you can check movements of the robot and parts. |
| | | **Task Status Control** | You can monitor and control Process manager of Application Manager and execution of C# program. This user interface enables an online connection to Robot Control Function Module, robot's power state control, monitor speed setting, and activation of other debugging functions. |
| | | **Task Manager** | You can allocate V+ program to a task managed by Robot Control Function Module to control execution of the program. |
| | | **IO Watcher** | You can monitor robot's digital I/O in a list. |
| | | **Virtual Front Panel** | You can monitor robot's mode, power state, and emergency stop button state. This function is available in the emulation mode. |
| | | **V+ Jog Control** | You can determine a position of the selected robot checking the 3D Visualizer. Position of the robot's tip is to be registered to a location variable. |
| | **Information Monitoring** | **System Monitor** | You can monitor Process Manager of Application Manager, execution status of C# program, and robot's parameters in real time. |
| | **Security** | **Robot System Operation Authentication** | This function prevents illegal changes in Application Manager Settings both online and offline. |

**Note:** Supported by Sysmac Studio version 1.42 or higher.
✻**1.** 3D Simulation Option is required to operate mechanical components during 3D simulation.
✻**2.** Supported by Sysmac Studio version 1.47 or higher.
✻**3.** Supported by Sysmac Studio version 1.54 or higher.
✻**4.** Supported by Sysmac Studio version 1.49 or higher.

# Function Specifications of CNC Functions

| Item | | | Function | Applicable versions |
|---|---|---|---|---|
| **Setting Parameters** | **CNC Setup** | | You can register the CNC coordinate system and CNC motors to use with CNC instruction.<br>You can also assign the Servo Drives to the CNC motors and configure the CNC motor parameters. | Ver.1.20 or higher with NJ501-5300 / NY532-5400 |
| | | **CNC Coord Settings** | The coordinate system is added to the project and you can assign CNC motor to the coordinate system. | |
| | | **CNC Motor Settings** | The CNC motor is assigned to the project and you can configure its parameters. | |
| | | **CNC Motor Compensation Table** | The CNC Motor Compensation Table is assigned to the project and you can set the CNC motor compensation data. | |
| **Programming** | **NC Programming** | | You can create the NC Program by using G Code language. | Ver.1.20 or higher with NJ501-5300 / NY532-5400 |

# Function Specifications of Automation Playback

| Item | | | Function |
|---|---|---|---|
| **Setting Parameters** | | | --- |
| | **Operation Settings** | **Automation Playback Settings** | Basic settings of Automation Playback regarding variable data collection are configured. Also you can set the variable data to collect and the method to output variable data to a variable log. |
| **Monitoring** | | **Automation Playback Operation Monitor** | You can check the operation status of Automation Playback. Automation Playback Operation Monitor shows the sampling time margin, sampling status, etc. |
| **Automation Playback** | | | --- |
| | **Playback** | | You can play, stop, and perform backward/forward playback data. Playback data is played so that the play operation of the playback data is synchronized with the monitor display of the ladder or ST program and the Watch tab page. |
| | **Playback Chart** | | You can display changes in variable values during playback in a graph, and play the video. You can also compare their waveforms with those of other playback data. |
| | **Video Playback Window** | | Video Playback Window plays video data. You can play the data in synchronization with playback data. |
| | **Search Playback Data** | | You can search for playback data by specifying variable search conditions, such as the rising edge of a variable. You can jump to the timing when a device variable changes and check the behavior of the device. |

**Note:** Automation playback is supported only by the Sysmac Studio version 1.55 or higher.
You need to select NX502-□□□□.

# Version Information

Please refer to "Change history" in the website at: www.fa.omron.co.jp/ss_rev_e/.

# Applicable Models

| Series | | Unit version | Model | Applicable versions |
|---|---|---|---|---|
| Machine Automation Controllers | NX-series | --- | NX1P2-□□□□ | Ver.1.17 or higher |
| | | | NX102-□□□□ | Ver.1.23 or higher |
| | | | NX502-□□□□ | Ver.1.54 or higher |
| | | | NX502-1600/1700 | Ver.1.58 or higher |
| | | | NX701-1□00 | Ver.1.13 or higher |
| | | | NX701-1□20 | Ver.1.21 or higher |
| | NJ-series | --- | NJ501-1□00 | All versions |
| | | | NJ501-1□20 | Ver.1.07 or higher |
| | | | NJ501-1340 ✻1 | Ver.1.11 or higher |
| | | | NJ501-4□00/NJ501-4□10 | Ver.1.04 or higher |
| | | | NJ501-4320 | Ver.1.10 or higher |
| | | | NJ501-5300 | Ver.1.20 or higher |
| | | | NJ501-R□□□ | Ver.1.42 or higher |
| | | | NJ301-□□□□ | Ver.1.02 or higher |
| | | | NJ101-□000 | Ver.1.13 or higher |
| | | | NJ101-□020 | Ver.1.14 or higher |
| Industrial PC Platform | NY-series | --- | NY5□□-1□□□ | Ver.1.17 or higher |
| | | | NY532-5400 | Ver.1.20 or higher |
| IPC Application Controller | AC-Series | --- | AC1-152000 | Ver.1.42 or higher |
| Servo Drives | G5-series | Servo Drives with unit version 2.1 or later recommended | R88D-KN□-ECT<br>R88D-KN□-ECT-L | All versions |
| | 1S-series | --- | R88D-1SN□-ECT | Ver.1.16 or higher |
| | | | R88D-1SN□-ECT-51 | Ver.1.59 or higher |
| | | | R88D-1SAN□-ECT | Ver.1.27 or higher |
| Inverters | MX2-V1 ✻2 | Inverters with version 1.1 or later | 3G3MX2-A□□□□-V1 | Ver.1.05 or higher |
| | MX2-V2 ✻2 | Inverters with version 1.1 or later | 3G3MX2-A□□□□-V2 | Ver.1.60 or higher |
| | RX-V1 ✻3 | Inverters with version 2.0 or later | 3G3RX-A□□□□-V1 | Ver.1.03 or higher |
| | RX2 ✻4 | --- | 3G3RX2-A□□□□ | Ver.1.47 or higher |
| Vision Sensors | FH-series | --- | FH-1□□□<br>FH-1□□□-□□<br>FH-3□□□<br>FH-3□□□-□□ | Ver.1.07 or higher |
| | | | FH-2□□□<br>FH-2□□□-□□<br>FH-5□□□<br>FH-5□□□-□□ | Ver.1.25 or higher |
| | FHV-series | --- | FHV7□-□□□□□-C<br>FHV7□-□□□□□-S□□<br>FHV7□-□□□□□-S□□-□□<br>FHV7□-□□□□□-H□□<br>FHV7□-□□□□□-H□□-□□ | Ver.1.30 or higher |
| | FQ-series ✻5 | --- | FQ-MS12□-ECT<br>FQ-MS12□-M-ECT<br>FQ-MS12□<br>FQ-MS12□-M | Ver.1.01 or higher |
| Displacement Sensors | ZW-series | --- | ZW-CE1□<br>ZW-CE1□T<br>ZW-C1□<br>ZW-C1□T | Ver.1.05 or higher |
| | | | ZW-7000<br>ZW-7000T | Ver.1.15 or higher |
| | | | ZW-5000<br>ZW-5000T | Ver.1.18 or higher |
| | | | ZW-8000<br>ZW-8000T | Ver.1.22 or higher |
| Fiber Sensors, Laser Sensors ✻6 | N-Smart<br>E3NX<br>E3NC | --- | E3NX-FA0/CA0 ✻7<br>E3NC-LA0/SA0 | Ver.1.05 or higher |
| Fiber Sensors, Laser Photoelectric Sensors, Proximity Sensors ✻8 | E3X<br>E3C<br>E2C | --- | E3X-HD0/MDA0<br>E3C-LDA0<br>E2C-EDA0 | Ver.1.02 or higher |
| Modular Temperature Controller | EJ1 | --- | EJ1N-HFUC-ECT | Ver.1.15 or higher |

| Series | | Unit version | Model | Applicable versions |
|---|---|---|---|---|
| **EtherCAT Coupler Unit** | **NX-series** | --- | NX-ECC20□ | Ver.1.06 or higher |
| **EtherNet/IP Coupler Unit** | **NX-series** | --- | NX-EIC202 | Ver.1.11 or higher |
| **PROFINET Coupler Unit** | **NX-series** | --- | NX-PNC202 | Ver.1.45 or higher |
| **Communication Control Unit** | **NX-series** | --- | NX-CSG□□□ | Ver.1.24 or higher |
| **NX Units ✻9** | **NX-series** | --- | NX-ID□□□□<br>NX-IA□□□□<br>NX-OC□□□□<br>NX-OD□□□□<br>NX-AD□□□□<br>NX-DA□□□□<br>NX-TS□□□□<br>NX-PD1□□□<br>NX-PF0□□□<br>NX-PC0□□□<br>NX-TBX□□<br>NX-EC0□□□<br>NX-ECS□□□<br>NX-PG0□□□<br>NX-PG01□□ | Ver.1.06 or higher |
| | | | NX-MD□□□□ | Ver.1.10 or higher |
| | | | NX-CIF□□□ | Ver.1.15 or higher ✻10 |
| | | | NX-PG02□□<br>NX-PG03□□ | Ver.1.15 or higher |
| | | | NX-HB□□□□<br>NX-RS□□□□<br>NX-ILM□□□ | Ver.1.16 or higher |
| | | | NX-TC□□□□ | Ver.1.21 or higher |
| | | | NX-HAD□□□ | Ver.1.23 or higher |
| | | | NX-V680C□ | Ver.1.25 or higher |
| | | | NX-ECT□□□ | Ver.1.50 or higher |
| | | | NX-HTC□□□□ | Ver.1.54 or higher |
| | | | NX-CT□□□□ | Ver.1.65 or higher |
| **Safety Control Units ✻11** | **NX-series** | --- | NX-SL3500 ✻12<br>NX-SL3300 ✻13<br>NX-SIH400 ✻13<br>NX-SID800<br>NX-SOH200<br>NX-SOD400 | Ver.1.07 or higher |
| | | | NX-SL5700<br>NX-SL5500 | Ver.1.24 or higher |
| **Remote I/O Terminals** | **GX-series** | Remote I/O Terminals with unit version 1.1 or later recommended | GX-ID16□2/OD16□2/MD16□2<br>GX-□D16□1/OC1601<br>GX-AD0471/DA0271<br>GX-EC0211/EC0241 | All versions |
| **IO-Link Master Units** | **GX-series** | Remote I/O Terminals with unit version 1.1 or later recommended. | GX-□□□ | Ver.1.16 or higher |
| | **NXR series** | --- | NXR-ILM08C-ECT | Ver.1.57 or higher |
| | | | NXR-ILM08C-EIT | Ver.1.40 or higher |
| | **GD-series** | --- | GD-ILM16C-MLP<br>GD-ILM16E-MLP | Ver.1.66 or higher |
| **Programmable Terminals (PT)** | **NS-series** | To connect to NJ501-□□□□:<br>NS system version 8.5 or later<br>CX-Designer version 3.3 or higher<br>To connect to NJ301-□□□□/NJ101-□□□□:<br>NS system version 8.61 or later<br>CX-Designer version 3.4 or higher<br>To connect to NX701-□□□□:<br>NS system version 8.9 or later<br>CX-Designer version 3.64 or higher<br>To connect to NX1P2-□□□□:<br>NS system version 8.93 or later<br>CX-Designer version 3.64 or higher | NS5-MQ11(B)-V2/-SQ11(B)-V2/-TQ11(B)-V2<br>NS8-TV01(B)-V2<br>NS10-TV01(B)-V2<br>NS12-TS01(B)-V2<br>NS15-TX01S-V2/-TX01B-V2 | All versions |
| | **NA-series** | To connect to NX701-□□□□/NJ101-□□□□:<br>NA system version 1.02 or later<br>Sysmac Studio version 1.13 or higher<br>To connect to NY512-□□□□/NY532-□□□□:<br>NA system version 1.06 or later<br>Sysmac Studio version 1.17 or higher<br>To connect to NX1P2-□□□□:<br>NA system version 1.07 or later<br>Sysmac Studio version 1.17 or higher<br>To connect to NX102-□□□□:<br>NA system version 1.09 or later<br>Sysmac Studio version 1.23 or higher<br>To connect to NX502-□□□□:<br>NA system version 1.17 or later<br>Sysmac Studio version 1.54 or higher | NA5-15W□□□□<br>NA5-12W□□□□<br>NA5-9W□□□□<br>NA5-7W□□□□ | Ver.1.11 or higher |
| | | | NA5-15W□□□□-V1<br>NA5-12W□□□□-V1<br>NA5-9W□□□□-V1<br>NA5-7W□□□□-V1 | Ver.1.40 or higher |
| | | | NA5-15W□□□□-V2<br>NA5-12W□□□□-V2<br>NA5-9W□□□□-V2<br>NA5-7W□□□□-V2 | Ver.1.65 or higher |

| Series | | Unit version | Model | Applicable versions |
|---|---|---|---|---|
| **Programmable Terminals (PT)** | **Soft-NA** | To connect to NX701-□□□□/NJ101-□□□□:<br>NA system version 1.02 or later<br>Sysmac Studio version 1.13 or higher<br>To connect to NY512-□□□□/NY532-□□□□:<br>NA system version 1.06 or later<br>Sysmac Studio version 1.17 or higher<br>To connect to NX1P2-□□□□:<br>NA system version 1.07 or later<br>Sysmac Studio version 1.17 or higher<br>To connect to NX102-□□□□:<br>NA system version 1.09 or later<br>Sysmac Studio version 1.23 or higher<br>To connect to NX502-□□□□:<br>NA system version 1.17 or later<br>Sysmac Studio version 1.54 or higher | NA-RTLD□□ | Ver.1.40 or higher |

**∗1.** To use the SECS/GEM service of the SECS/GEM CPU Unit, the SECS/GEM Configurator (WS02-CGTL1) is additionally required.
**∗2.** A communications unit for connecting to EtherCAT network (3G3AX-MX2-ECT with unit version 1.1 or higher) is additionally required.
**∗3.** A communications unit for connecting to EtherCAT network (3G3AX-RX-ECT) is additionally required.
**∗4.** A communications unit for connecting to EtherCAT network (3G3AX-RX2-ECT) is additionally required.
**∗5.** This device is supported by Sysmac Studio (32 bit).
**∗6.** A communications unit for connecting to EtherCAT network (E3NW-ECT) is additionally required.
**∗7.** The E3NX-CA0 can be used with the Sysmac Studio version 1.16 or higher.
**∗8.** A communications unit for connecting to EtherCAT network (E3X-ECT) is additionally required.
**∗9.** The EtherCAT Coupler Unit (NX-ECC20□ with unit version 1.0 or later) or EtherNet/IP Coupler Unit (NX-EIC202 with unit version 1.0 or later) is additionally required. For details, refer to the NX-series "Version Information".
**∗10.** The serial communications instructions for the Communications Interface Units are supported by the CPU Units with unit version 1.11 or later and the Sysmac Studio version 1.15 or higher. If the serial communications instructions are not used, Communications Interface Units can be used with the combination of CPU Units with unit version 1.10 or later and the Sysmac Studio version 1.12 or higher. Refer to the *NJ/NX-series Instructions Reference Manual* (Cat. No. W502-E1-15 or later) for the serial communications instructions for the CIF Units.
**∗11.** The EtherCAT Coupler Unit (NX-ECC20□ with unit version 1.1 or later) or EtherNet/IP Coupler Unit (NX-EIC202 with unit version 1.0 or later. The NX-3500 cannot be connected.) is additionally required. For details, refer to the "Version Information" of NX-series Safety Control Units.
**∗12.** The NX-SL3500 with unit version 1.0 or later can be used with the Sysmac Studio version 1.08 or higher, and unit version 1.1 or later can be used with the Sysmac Studio version 1.10 or higher.
**∗13.** The Safety Control Units with unit version 1.1 can be used with the Sysmac Studio version 1.10 or higher.
**Note:** Including models no longer available to order.

# Related Manuals

| Cat. No. | Model | Manual name | Application | Description |
|---|---|---|---|---|
| W504 | SYSMAC-SE2□□□ | Sysmac Studio Version 1 Operation Manual (this manual) | Learning about the operating procedures and functions of the Sysmac Studio. | Describes the operating procedures of the Sysmac Studio. |
| I589 | SYSMAC-SE2□□□<br>SYSMAC-DE□□□L | Sysmac Studio Drive Functions Operation Manual | Learning about the Servo Drive related functions of the Sysmac Studio. | Describes the Servo Drive related operating procedures and functions among those of the Sysmac Studio. |
| W589 | SYSMAC-SE2□□□<br>SYSMAC-TA4□□□ | Sysmac Studio Project Version Control Function Operation Manual | Learning the overview of the Sysmac Studio project version control function and how to use it. | Outlines the Sysmac Studio project version control function, and describes how to install, basic operation, and how to operate its major functions. |
| W618 | SYSMAC-SE2□□□<br>SYSMAC-SA4□□L-64 | Sysmac Studio 3D Simulation Function Operation Manual | Learning the overview of Sysmac Studio 3D simulation and how to use it. | Outlines Sysmac Studio 3D Simulation, and describes the operating procedure and how to operate it. |
| W595 | SYSMAC-SE2□□□<br>SYSMAC-SE200D-64 | Sysmac Studio Robot Integrated System Building Function with Robot Integrated CPU Unit Operation Manual | Learning about the operating procedures and functions of the Sysmac Studio to configure Robot Integrated System using Robot Integrated CPU Unit. | Describes the operating procedures of the Sysmac Studio for Robot Integrated CPU Unit. |
| W621 | SYSMAC-SE2□□□<br>SYSMAC-SE200D-64 | Sysmac Studio Robot Integrated System Building Function with IPC Application Controller Operation Manual | Learning about the operating procedures and functions of the Sysmac Studio to configure Robot Integrated System using IPC Application Controller. | Describes the operating procedures of the Sysmac Studio for IPC Application Controller. |
| W464 | --- | CX-Integrator CS/CJ/CP/NSJ/NJ-series Network Configuration Tool Operation Manual | Learning how to configure networks (data links, routing tables, Communications Unit settings, etc.). | Describes operating procedures for the CX-Integrator. |
| V099 | --- | CX-Designer User's Manual | Learning to create screen data for NS-series Programmable Terminals. | Describes operating procedures for the CX-Designer. |
| W344 | --- | CX-Protocol Operation Manual | Creating data transfer protocols for general purpose devices connected to CJ-series Serial Communications Units. | Describes operating procedures for the CX-Protocol. |
| W535 | NX701-□□□□ | NX-series CPU Unit Hardware User's Manual | Learning the basic specifications of the NX701 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | Provides an introduction to the entire NX701 system and information on the CPU Unit. |
| W629 | NX502-□□□□ | NX-series NX502 CPU Unit Hardware User's Manual | Learning the basic specifications of the NX502 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | Provides an introduction to the entire NX502 system and information on the CPU Unit. |
| W593 | NX102-□□□□ | NX-series NX102 CPU Unit Hardware User's Manual | Learning the basic specifications of the NX102 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | Provides an introduction to the entire NX102 system and information on the CPU Unit. |
| W578 | NX1P2-□□□□ | NX-series NX1P2 CPU Unit Hardware User's Manual | Learning the basic specifications of the NX1P2 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | Provides an introduction to the entire NX1P2 system and information on the CPU Unit. |
| W500 | NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | NJ-series CPU Unit Hardware User's Manual | Learning the basic specifications of the NJ-series CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | Provides an introduction to the entire NJ-series system and information on the CPU Unit. |
| W501 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | NJ/NX-series CPU Unit Software User's Manual | Learning how to program and set up an NJ/NX-series CPU Unit. Mainly software information is provided. | Provides information on the NJ/NX-series CPU Unit. |

| Cat. No. | Model | Manual name | Application | Description |
|---|---|---|---|---|
| W579 | NX1P2-□□□□ | NX-series NX1P2 CPU Unit Built-in I/O and Option Board User's Manual | Learning about the details of functions only for an NX-series NX1P2 CPU Unit and an introduction of functions for an NJ/NX-series CPU Unit. | Describes the functionality of NX1P2 CPU Unit. An introduction of the functions for an NJ/NX-series CPU Unit is also provided. |
| W502 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | NJ/NX-series Instructions Reference Manual | Learning detailed specifications on the basic instructions of an NJ/NX- series CPU Unit. | Describes the instructions in the instruction set (IEC 61131-3 specifications). |
| W507 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | NJ/NX-series CPU Unit Motion Control User's Manual | Learning about motion control settings and programming concepts. | Describes the settings and operation of the CPU Unit and programming concepts for motion control. |
| W508 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | NJ/NX-series Motion Control Instructions Reference Manual | Learning about the specifications of the motion control instructions that are provided by OMRON. | Describes the motion control instructions. |
| W505 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual | Using the built-in EtherCAT port on an NJ/NX-series CPU Unit. | Provides information on the built-in EtherCAT port. This manual provides an introduction and information on the configuration, features, and setup. |
| W506 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | NJ/NX-series CPU Unit Built-in EtherNet/IP™ Port User's Manual | Using the built-in EtherNet/IP port on an NJ/NX-series CPU Unit. | Describes the operating procedures of the Network Configurator. |
| W588 | NX701-1□□□<br>NX502-□□□□<br>NX102-□□□□<br>NJ501-1□00 | NJ/NX-series CPU Unit OPC UA User's Manual | Using the OPC UA. | Information on the OPC UA provided. |
| W596 | NX701-□□20<br>NX502-□□□□<br>NX102-□□□□ | NX-series CPU Unit FINS User's Manual | Using the FINS function of an NX-series CPU Unit. | Describes the FINS function of an NX-series CPU Unit. |
| W639 | NX502-1□00 | NX-series CPU Unit Automation Playback User's Manual | Learning how to operate Automation Playback and its features. | Describes how to operate Automation Playback. |
| W527 | NX701-□□20<br>NX502-□□□□<br>NX102-□□20<br>NJ501-□□20<br>NJ101-□□20 | NJ/NX-series Database Connection CPU Units User's Manual | Learning how to use the database connection function. | Describes how to use the database connection service with the Sysmac Studio. |
| W528 | NJ501-1340 | NJ-series SECS/GEM CPU Units User's Manual | Using the GEM Services with NJ-series Controllers. | Provides information on the GEM Services. |
| W539 | NJ501-4□□□ | NJ-series NJ Robotics CPU Unit User's Manual | Controlling robots with NJ-series CPU Units. | Describes the functionality to control robots. |
| O037 | NJ501-R□□□ | NJ-series Robot Integrated CPU Unit User's Manual | Using the NJ-series Robot Integrated CPU Unit. | Describes the settings and operation of the CPU Unit and programming concepts for OMRON robot control. |
| O030 | NJ501-53□□<br>NY532-54□□ | NJ/NY-series NC Integrated Controller User's Manual | Learning how to use the numerical control with NJ/NY series. | Describes how to setup/use the NC functions. |
| W503 | NX701-□□□□<br>NX502-□□□□<br>NX102-□□□□<br>NX1P2-□□□□<br>NJ501-□□□□<br>NJ301-□□□□<br>NJ101-□□□□ | NJ/NX-series Troubleshooting Manual | Learning about the errors that may be detected in an NJ/NX-series Controller. | Describes concepts on managing errors that may be detected in an NJ/NX-series Controller and information on individual errors. |
| W557 | NY532-□□□□ | NY-series IPC Machine Controller Industrial Panel PC Hardware User's Manual | Learning the basic specifications of the NY-series Industrial Panel PCs, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | Provides an introduction to the entire NY-series system and information on the Industrial Panel PC. |

| Cat. No. | Model | Manual name | Application | Description |
|---|---|---|---|---|
| W556 | NY512-□□□□ | NY-series IPC Machine Controller Industrial Box PC Hardware User's Manual | Learning the basic specifications of the NY-series Industrial Box PCs, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | Provides an introduction to the entire NY-series system and information on the Industrial Box PC. |
| W568 | NY532-□□□□<br>NY512-□□□□ | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Setup User's Manual | Learning the initial settings of the NY-series Industrial PCs and preparations to use Controllers. | Provides an introduction to the entire NY-series system. |
| W558 | NY532-□□□□<br>NY512-□□□□ | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual | Learning how to program and set up the Controller functions in an NY-series Industrial PC. | Provides information on the NY-series Controller. |
| W560 | NY532-□□□□<br>NY512-□□□□ | NY-series Instructions Reference Manual | Learning detailed specifications on the basic instructions of an NY- series Industrial PC. | The instructions in the instruction set (IEC61131-3 specifications) are described. |
| W559 | NY532-□□□□<br>NY512-□□□□ | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Motion Control User's Manual | Learning about motion control settings and programming concepts of an NY-series Industrial PC. | The settings and operation of the Controller and programming concepts for motion control are described. |
| W561 | NY532-□□□□<br>NY512-□□□□ | NY-series Motion Control Instructions Reference Manual | Learning about the specifications of the motion control instructions of an NY-series Industrial PC. | The motion control instructions are described. |
| W562 | NY532-□□□□<br>NY512-□□□□ | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherCAT® Port User's Manual | Using the built-in EtherCAT port in an NY-series Industrial PC. | Information on the built-in EtherCAT port is provided.<br>This manual provides an introduction and provides information on the configuration, features, and setup. |
| W563 | NY532-□□□□<br>NY512-□□□□ | NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Built-in EtherNet/IP™ Port User's Manual | Using the built-in EtherNet/IP port in an NY-series Industrial PC. | Information on the built-in EtherNet/IP port is provided.<br>Information is provided on the basic setup, tag data links, and other features. |
| W564 | NY532-□□□□<br>NY512-□□□□ | NY-series Troubleshooting Manual | Learning about the errors that may be detected in an NY-series Industrial PC. | Concepts on managing errors that may be detected in an NY-series Controller and information on individual errors are described. |
| W519 | NX-ECC□□□ | NX-series Communications Coupler Unit User's Manual | Leaning how to use an NX-series Communications Coupler Unit and Slave Terminals | Introduces the system, configuration methods, Unit hardware, setting methods, and functions of Slave Terminals that consist of a Communications Coupler Unit and NX Units. |
| W536 | NX-EIC□□□ | | | |
| W623 | NX-PNC□□□ | NX-series PROFINET Coupler Unit User's Manual | | |
| W525 | NX-□□□□ | NX-series Data Reference Manual | 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. |
| W521 | NX-ID□□□□<br>NX-IA□□□□<br>NX-OC□□□□<br>NX-OD□□□□<br>NX-MD□□□□ | NX-series NX Units User's Manuals | Learning how to use NX Units. | Describe the hardware, setup methods, and functions of the NX Units. Manuals are available for the following Units. Digital I/O Units, Analog I/O Units, System Units, Position Interface Units, Communications Interface Units, Load Cell Input Units, and IO-Link Master Units. |
| W522 | NX-AD□□□□<br>NX-DA□□□□ | | | |
| W592 | NX-HAD□□□ | | | |
| W566 | NX-TS□□□□<br>NX-HB□□□□ | | | |
| W523 | NX-PD1□□□<br>NX-PF0□□□<br>NX-PC0□□□<br>NX-TBX□□ | | | |
| W524 | NX-EC0□□□<br>NX-ECS□□□<br>NX-PG0□□□ | | | |
| W540 | NX-CIF□□□ | | | |
| W565 | NX-RS□□□□ | | | |
| W567 | NX-ILM□□□ | | | |
| Z401 | NX-V680C□ | | | |
| H228 | NX-TC□□□□ | | | |
| H238 | NX-HTC□□□□ | | | |
| W626 | NX-ECT□□□ | | | |
| W647 | NX-CT□□□□ | | | |
| Z930 | NX-SL□□□□<br>NX-SI□□□□<br>NX-SO□□□□ | NX-series Safety Control Unit User's Manual | Learning how to use NX-series Safety Control Units. | Describes the hardware, setup methods, and functions of the NX-series Safety Control Units. |

| Cat. No. | Model | Manual name | Application | Description |
|---|---|---|---|---|
| Z395 | NX-SL5□□□<br>NX-SI□□□□<br>NX-SO□□□□<br>NX-CSG□□□ | NX-series Safety Control Unit / Communication Control Unit User's Manual | Learning how to use the NX-series Safety Control Units and Communications Control Units. | Describes the hardware, setup methods, and functions of the NX-series Safety Control Units and Communications Control Units. |
| Z396 | NX-CSG□□□ | NX-series Communication Control Unit Built-in Function User's Manual | Learning about the built-in functions of an NX-series Communications Control Unit. | Describes the software setup methods and communications functions of an NX-series Communications Control Unit. |
| W627 | NX-EIP201 | NX-series EtherNet/IP™ Unit User's Manual | Learning how to use the NX-series EtherNet/IP Unit. | Information on the NX-series EtherNet/IP Unit is provided. Information is provided on the basic setup, tag data links, and other features. |
| W570 | NX-ILM□□□<br>GX-ILM□□□ | NX/GX-series IO-Link System User's Manual | Learning how to use an IO-Link Master Unit. | Describes information necessary for constructing an IO-Link system using an NX series IO-Link Master Unit or GX series IO-Link Master Unit. |
| W640 | NXR-ILM08C-ECT | NXR-series IO-Link Master Unit for EtherCAT User's Manual | Learning how to use an IO-Link Master Unit. | Describes information necessary for using an NXR-series EtherCAT-ready IO-Link Master Unit. |
| W619 | NXR-ILM08C-EIT | NXR-series IO-Link Master Unit for EtherNet/IP™ User's Manual | Learning how to use an IO-Link Master Unit. | Describes information necessary for using an NXR-series EtherNet/IP-ready IO-Link Master Unit. |
| Z512 | GD-ILM16C-MLP<br>GD-ILM16E-MLP | GD Series<br>IO-Link Master Unit<br>(Multi-Network Compatible)<br>User's Manual Common Edition | Learning how to use an IO-Link Master Unit. | Information on common functions, performance, and operation of the GD series of IO-Link master units is described. |
| Z514 | GD-ILM16C-MLP<br>GD-ILM16E-MLP | GD Series<br>IO-Link Master Unit<br>(Multi-Network Compatible)<br>User's Manual EtherNet/IP™ Edition | Learning how to use an IO-Link Master Unit. | Functions, performance, and operation of the GD Series of IO-Link master Unit on "EtherNet/IP™" network is described. |
| Z314 | FQ-MS12□(-M)-ECT<br>FQ-MS12□(-M) | FQ-M-series Specialized Vision Sensor for Positioning User's Manual | Learning about the setting procedures for FQ-M-series Vision Sensors. | Describes the Sysmac Studio setting procedures for FQ-M-series Vision Sensors. |
| Z343 | FH-1□□□<br>FH-1□□□-□□<br>FH-2□□□<br>FH-2□□□-□□<br>FH-3□□□<br>FH-3□□□-□□<br>FH-5□□□<br>FH-5□□□-□□<br>FHV7□-□□□□□-C<br>FHV7□-□□□□□-S□□<br>FHV7□-□□□□□-S□□-□□<br>FHV7□-□□□□□-H□□<br>FHV7□-□□□□□-H□□-□□ | Vision System FH/FHV Series Operation Manual for Sysmac Studio | Learning about the setting procedures for FH-series and FHV-series Vision Sensors. | Describes the Sysmac Studio setting procedures for FH-series and FHV-series Vision Sensors. |
| Z332 | ZW-CE1□□ | ZW-series Confocal Fiber Type Displacement Sensor User's Manual | Learning the setting procedures for ZW-series Displacement Sensors. | Describes the Sysmac Studio setting procedures for ZW-series Displacement Sensors. |
| Z362 | ZW-7000□<br>ZW-5000□ | ZW-7000/5000-series Confocal Fiber Type Displacement Sensor User's Manual | Learning the setting procedures for ZW-7000/5000-series Displacement Sensors. | Describes the Sysmac Studio setting procedures for ZW-7000/5000-series Displacement Sensors. |
| Z363 | ZW-7000□<br>ZW-5000□ | ZW-7000/5000-series Confocal Fiber Type Displacement Sensor User's Manual for Communication Settings | Learning the communication setting procedures for ZW-7000/5000-series Displacement Sensors. | Describes the Sysmac Studio setting procedures for ZW-7000/5000-series Displacement Sensors. |
| V117 | NA5-□W□□□□ | NA-series Programmable Terminal Hardware User's Manual | Learning the installation and connection with peripheral devices for NA-series PT. | Describes how to install NA-series PT and to connect it with peripheral devices. |
| V118 | NA5-□W□□□□(-V□) | NA-series Programmable Terminal Software User's Manual | Learning about NA-series PT pages and object functions. | Describes the pages and object functions of the NA-series Programmable Terminals. |
| V119 | NA5-□W□□□□(-V□) | NA-series Programmable Terminal Device Connection User's Manual | Learning the methods to connect NA-series PT with each device. | Describes how to connect NA-series PT with other devices. |
| V125 | NA5-□W□□□□-V1 | NA-series Programmable Terminal Hardware User's Manual | Learning the installation and connection with peripheral devices for NA-series PT. | Describes how to install NA-series PT and to connect it with peripheral devices. |
| V128 | NA5-□W□□□□-V2 | NA-series Programmable Terminal Hardware User's Manual | Learning the installation and connection with peripheral devices for NA-series PT. | Describes how to install NA-series PT and to connect it with peripheral devices. |
| V126 | NA-RTLD□□ | NA-series Programmable Terminal Soft-NA User's Manual | Learning the basic use of Soft-NA and the differences from NA-series PT. | Describes the basic use of Soft-NA and the differences from NA-series PT. |

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