

## Sysmac Studio for machine creators

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



## Features

- One software for motion, drives and vision
- Fully compliant with open standard IEC 61131-3
- 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

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## Ordering Information

### Automation Software

Please purchase a DVD and licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. The license does not include the DVD.

Product	Specifications	Number of licenses	Media	Model	Standards
<b>Sysmac Studio Standard Edition Ver.1.□□</b>	The Sysmac Studio provides an integrated development environment to set up, program, debug, and maintain NJ-series Controllers and other Machine Automation Controllers, as well as EtherCAT slaves.  Sysmac Studio runs on the following OS. Windows XP (Service Pack 3 or higher, 32-bit version) / Vista (32-bit version) / 7 (32-bit/64-bit version)	– (Media only)	DVD *1	<b>SYSMAC-SE200D</b>	–
		1 license	–	<b>SYSMAC-SE201L</b>	–
		3 licenses	–	<b>SYSMAC-SE203L</b>	–
		10 licenses	–	<b>SYSMAC-SE210L</b>	–
		30 licenses	–	<b>SYSMAC-SE230L</b>	–
		50 licenses	–	<b>SYSMAC-SE250L</b>	–
<b>Sysmac Studio Vision Edition Ver.1.□□ *2</b>	Sysmac Studio Vision Edition is a limited license that provides selected functions required for FQ-M-series Vision Sensor settings.	1 license	–	<b>SYSMAC-VE001L</b>	–

**Note:** Site licenses are available for users who will run Sysmac Studio on multiple computers. Ask your OMRON sales representative for details.

\*1. The same media is used for both the Standard Edition and the Vision Edition.

\*2. With the Vision Edition, you can use only the setup functions for FQ-M-series Vision Sensors.

## Components

### DVD (SYSMAC-SE200D)

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-SE2□□L/VE0□□L)

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	Two cards are contained. One is for users in Japan and the other is for users in other countries.

## Included Support Software

DVD media of Sysmac Studio includes the following software.

Included Support Software	Outline
<b>CX-Designer</b> Ver.3.□	The CX-Designer is used to create screens for NS-series PTs.
<b>CX-Integrator</b> Ver.2.□	The CX-Integrator is used to set up FA networks.
<b>CX-Protocol</b> Ver.1.□	The CX-Protocol is used for protocol macros for Serial Communications Units.
<b>Network Configurator</b> Ver.3.□	The Network Configurator is used for tag data links on the built-in EtherNet/IP port.

## System Requirements

Item	Requirement
<b>Operating system (OS)</b> *1 *2	Windows XP (Service Pack 3 or higher, 32-bit version)/Vista(32-bit version)/7(32-bit/64-bit version)
<b>CPU</b>	Windows computers with Celeron 540 (1.8 GHz) or faster CPU. Core i5 M520 (2.4 GHz) or equivalent or faster recommended
<b>Main memory *3</b>	2 GB min.
<b>Recommended video memory / video card for using 3D motion trace</b>	Video memory: 512 MB min. Video card: Either of the following video cards: <ul style="list-style-type: none"> <li>• NVIDIA® GeForce® 200 Series or higher</li> <li>• ATI RadeonHD5000 Series or higher</li> </ul>
<b>Hard disk</b>	At least 1.6 GB of available space
<b>Display</b>	XGA 1024 × 768, 16 million colors. WXGA 1280 × 800 min. recommended
<b>Disk drive</b>	DVD-ROM drive
<b>Communications ports</b>	USB port corresponded to USB 2.0, or Ethernet port *4
<b>Supported languages *5</b>	Japanese, English, German, French, Italian, Spanish, simplified Chinese, traditional Chinese, Korean

\*1. Sysmac Studio Operating System Precaution: System requirements and hard disk space may vary with the system environment.

\*2. The following restrictions apply when Sysmac Studio is used with Microsoft Windows Vista or Windows 7.

1) Some Help files cannot be accessed.

The Help files can be accessed if the Help program distributed by Microsoft for Windows (WinHlp32.exe) is installed. Refer to the Microsoft homepage listed below or contact Microsoft for details on installing the file. (The download page is automatically displayed if the Help files are opened while the user is connected to the Internet.)

<http://support.microsoft.com/kb/917607/en-us>

2) The following restrictions apply to some application operations.

Application	Restriction
<b>CX-Designer</b>	If a new Windows Vista or Windows 7 font (e.g., Meiryō) 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.
<b>CX-Integrator/Network Configurator</b>	Although you can install CPS files, EDS files, Expansion Modules, and Interface Modules, the virtual store function of Windows Vista or Windows 7 imposes the following restrictions on the use of the software after installation. <ul style="list-style-type: none"> <li>• If another user logs in, the applications data will need to be installed again.</li> <li>• The CPS files will not be automatically updated.</li> </ul> These restrictions will not exist if application data is installed using Run as Administrator.

\*3. The amount of memory required varies with the Support Software used in Sysmac Studio for the following Support Software. Refer to user documentation for individual Support Software for details.

CX-Designer, CX-Protocol, and Network Configurator

\*4. Refer to the hardware manual for your Controller for hardware connection methods and cables to connect the computer and Controller.

\*5. Supported only by the Sysmac Studio version 1.01 or higher about German, French, Italian and Spanish.

Supported only by the Sysmac Studio version 1.02 or higher about simplified Chinese, traditional Chinese and Korean.

# Common Function Specifications

	Category	Function
Setting Parameters	<b>EtherCAT Configuration and Setup</b>	You create a configuration in the Sysmac Studio of the EtherCAT slaves connected to the built-in EtherCAT port of the Controller, and setup the EtherCAT masters and slaves in that configuration.
	<b>Registering slaves</b>	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.
	<b>Setting master parameters</b>	You set the common parameters of the EtherCAT network (e.g., the fail-soft operation and wait time for slave startup settings).
	<b>Setting slave parameters</b>	You set the standard slave parameters and assign PDOs (process data objects).
	<b>Comparing and merging network configuration information</b>	The EtherCAT network configuration information in the NJ-series CPU Unit and in the Sysmac Studio are compared and the differences are displayed.
	<b>Transferring the network configuration information</b>	The EtherCAT network configuration information is transferred to the NJ-series CPU Unit. Or, the EtherCAT network configuration information in the NJ-series CPU Unit is transferred to the Sysmac Studio and displayed in the EtherCAT Editor.
	<b>Importing ESI files</b>	ESI (EtherCAT slave information) files are imported.
	<b>CPU/Expansion Rack Configuration and Setup</b>	You create the configuration in the Sysmac Studio of the Units mounted in the NJ-series CPU Rack and Expansion Racks and the Special Units. You can build a Rack by dragging Units from the device list displayed in the Toolbox Pane to the locations where you want to mount them.
	<b>Registering Units</b>	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.
	<b>Creating Racks</b>	An Expansion Rack (Power Supply Unit, I/O Interface Unit, and End Cover) is added.
	<b>Switching Unit displays</b>	The model number, unit number, and slot number are displayed.
	<b>Setting Special Units</b>	The input time constants are set for Input Units and parameters are set for Special Units.
	<b>Displaying Rack widths, current consumption, and power consumption</b>	The Rack widths, current consumption, and power consumption are displayed based on the Unit configuration information.
	<b>Comparing the CPU/Expansion Rack configuration information with the physical configuration</b>	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.
	<b>Transferring the CPU/Expansion Rack configuration information</b>	The Unit configuration information is transferred to the CPU Unit. The synchronize function is used.
	<b>Printing the Unit configuration information</b>	The Unit configuration information is printed.
	<b>Controller Setup</b>	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.
	<b>Operation Settings</b>	The Startup Mode, SD Memory Card diagnosis at Startup, Write Protection at Startup, and other settings are made.
	<b>Transferring Operation Settings</b>	Use the synchronize operation to transfer the operation settings to the Controller.
	<b>Built-in EtherNet/IP Port Settings</b>	These settings are made to perform communications using the built-in EtherNet/IP port of the Controller.
	<b>Transferring Built-in EtherNet/IP Port Settings</b>	Use the synchronize operation to transfer the Built-in EtherNet/IP Port Settings to the Controller.
	<b>Motion Control Setup</b>	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.
	<b>Axis Settings</b>	Axes are added to the project.
	<b>Axis Setting Table</b>	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.
	<b>Axes Group Settings</b>	You can set up axes to perform interpolated motions as an axes group.
	<b>Axes Group Basic Settings</b>	Set the axes group number, whether to use the axes group, the composition, and the composition axes.
	<b>Operation Settings</b>	Set the interpolated velocity, the maximum interpolated acceleration and deceleration, and the interpolated operation settings.
	<b>Cam Data Settings</b>	The curve that defines the relationship between the phases and displacements of the cam data is called the cam profile curve. You can create cam profile curves with the Cam Editor.
	<b>Creating cam data</b>	Cam data is added to the project.
	<b>Editing cam data</b>	The profile data is set.
	<b>Transferring cam data</b>	You can select to transfer all or part of the cam data.
	<b>Importing cam data settings</b>	You can import cam data settings from a CSV file.
	<b>Exporting cam data settings</b>	You can export cam data to a CSV file.
<b>Exporting cam tables</b>	You can export cam data in the data format of the master and slave axes that is used by the Controller.	

Category		Function	
Setting Parameters	Cam Data Settings	Transferring cam data from the Controller to files	You can save a cam table that was transferred to the Controller to a file in the data format of the master and slave axes.
		Transferring cam data from files to the Controller	You can transfer the data from a cam data file in the data format of the master and slave axes to update the contents of the cam data that is already in the Controller.
	Task Setup		Programs are executed in tasks in an NJ-series CPU Unit. 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.
	I/O Map Settings		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.
			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.
		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.
		Setting Vision Sensor *1	You can set and calibrate the Vision Sensor. Refer to " <b>Function Specifications of Vision Sensor Functions</b> ".
	Programming	Instruction list (Toolbox)	
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.
		Starting the Ladder Editor	The Ladder Editor for the program is started.
		Adding and deleting sections	You can divide your ladder diagrams into smaller units for easier management. These units of division are called sections.
		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 *1		A specified variable comment can be displayed with each variable of rung components on the ladder diagrams.	
Programming structured text			You combine different ST statements to build algorithms.
		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.		

\*1. Supported only by the Sysmac Studio version 1.01 or higher.

Category		Function	
Programming	<b>Finding and replacing</b>	You can search for and replace strings in the data of a project.	
	<b>Retrace searching *1</b>	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.	
	<b>Jumping</b>	You can jump to the specified rung number or line number in the program.	
	<b>Building</b>	<b>Building</b>	The programs in the project are converted into a format that is executable in the Controller.
		<b>Rebuilding</b>	A rebuild is used to build project programs that have already been built.
<b>Aborting a build operation</b>		You can abort a build operation.	
Reuse Functions *2	<b>Library</b>	You can create functions, function block definitions, and data types in a library file to use them as objects in other projects.	
		<b>Creating libraries</b>	You can create library files to enable using functions, function block definitions, and data types in other projects.
		<b>Using libraries</b>	You can access and reuse objects from library files that were created in other projects.
File Operations	<b>File operations</b>	<b>Creating a project file</b>	A project file is created.
		<b>Opening a project file</b>	A project file is opened.
		<b>Saving the project file</b>	The project file is saved.
		<b>Saving a project file under a different name</b>	A project file is saved under a different name.
		<b>Exporting a project file</b>	You can convert a project file to a .smc file and export it.
		<b>Importing a project file</b>	You can import a project file that was saved in .txt format.
		<b>Offline comparison *2</b>	Compares the data for an open project with the data for a project file and displays the results.
	<b>Cutting, copying, and pasting</b>	You can cut, copy, or paste items that are selected in the Multiview Explorer or any of the editors.	
	<b>Synchronize</b>	The project file in the computer is compared with the data in the online NJ-series CPU Unit and any differences are displayed. You can specify the transfer direction for any type of data and transfer all of the data.	
	<b>Printing</b>	You can print various data. You can select the items to print.	
	<b>Clear All Memory</b>	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.	
	<b>SD Memory Cards</b>	The following procedures are used to execute file operations for the SD Memory Card mounted in the Controller and to copy files between the SD Memory Card and computer.	
		<b>Formatting the SD Memory Card</b>	The SD Memory Card is formatted.
		<b>Displaying properties</b>	The properties of the selected file or folder in the SD Memory Card are displayed.
		<b>Copying files and folders in the SD Memory Card</b>	The selected file or folder in the SD Memory Card is copied to the SD Memory Card.
		<b>Copying files and folders between the SD Memory Card and the computer</b>	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.
	Debugging	<b>Monitoring</b>	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 Controller. You can monitor operation on the Ladder Editor, ST Editor, Watch Tab Page, or I/O Map.
<b>Changing present values and TRUE/FALSE</b>		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.	
<b>Changing the present values of variables</b>		You can change the present values of user-defined variables, system-defined variables, and device variables as required. You can do this in the Watch Tab Page or I/O Map.	
<b>Forced refreshing</b>		You select a BOOL variable and make the assigned I/O port or AT specification bit in memory for CJ-series Units change to TRUE or FALSE to force refreshing with external devices. 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.	
<b>Online editing</b>		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.	
<b>Cross Reference Tab Page</b>		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.	

\*1. Supported only by the Sysmac Studio version 1.01 or higher.

\*2. Supported only by the Sysmac Studio version 1.02 or higher.

Category		Function	
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.	
		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 Controller and the tracing starts. If you selected <i>Trigger (Single)</i> 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 in 3D Motion Trace Display Mode. 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. You can change the line colors on the graph. *1
		Exporting 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.
	Printing trace results	You can print out data trace settings along with digital and analog charts.	
Debugging Vision Sensors *1		You can debug the Vision Sensor offline. Refer to " <b>Function Specifications of Vision Sensor Functions</b> ".	
Simulation	Programs for debugging		You can create programs for debugging that are used only to execute simulations and specify virtual inputs for simulation.
	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.
		Changing the simulation speed	You can change the execution speed.
		Task period simulation	You can display the task periods.
		Batch transfer of the present values of variables *2	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.
	Integrated NS-series PT simulation *2 *3	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.	
	Setting the virtual equipment	Creating 3D device models	You can create a 3D device model at the control target to monitor with the 3D motion trace function.
		Displaying 3D motion traces	You set the axis variables for each element of the 3D device model, and then set the 3D device into motion according to those axis motions.
Displaying 2D paths		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 Controller and Special Units, including the models of the Units and unit versions.
	Monitoring task execution times		You can monitor the execution time of each task when the user program is executed on a Controller or in the Simulator. When you are connected to the Simulator, 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.
		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 HMI for userdefined events that occur for execution of the Create Userdefined Error (SetAlarm) instruction and the Create Userdefined Information (SetInfo) instruction.
User memory usage monitor		The space that is used by the project file you are editing in the Sysmac Studio is displayed in relation to the size of the Controller's memory. The file cannot be transferred to the Controller if the files size exceeds the available space.	
Setting clock information		You can read and set the Controller's clock. The computer's clock information is also displayed.	

\*1. Supported only by the Sysmac Studio version 1.01 or higher.

\*2. Supported only by the Sysmac Studio version 1.02 or higher.

\*3. Supported only by the CX-Designer version 3.41 or higher.

Category		Function	
Communications	Going online with a Controller	An online connection is established with the Controller.	
	Checking for forced refreshing	When you go offline, any forced refreshing is cleared.	
Maintenance	Changing the operating mode of the Controller	There are two operating modes for NJ-series Controllers, depending on if control programs are executed or not. These are RUN mode and PROGRAM mode.	
	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.	
	Backing up variables and memory	When you replace an NJ-series Controller, you can back up the retained memory in the Controller to a file and restore the backed up data from the file to the new Controller.	
Security Measures	Prevention of incorrect connections	Confirming Controller names and serial IDs	If the name or the serial ID is different between the project and the Controller when an online connection is established, a confirmation dialog box is displayed.
		Prevention of incorrect operation	Operation authority verification
	Prevention of the theft of assets		Write protection of the CPU Unit
		Authentication of user program execution IDs	You can ensure that a user program cannot be operated on another CPU Unit even if copied.
		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 *2	You can set passwords for individual POU's (programs, functions, and function block definitions) to prohibit displaying, changing, and copying them.		
Online Help	Sysmac Studio help system		You can access Sysmac Studio operating procedures.
	Instructions reference		Information is provided on how to use the instructions that are supported by the NJ-series CPU Units.
	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.

\*2. Supported only by the Sysmac Studio version 1.02 or higher.

## Function Specifications of Vision Sensor Functions

Item		Description
<b>Setting Parameters</b>		—
<b>Main Edit</b>	<b>General Settings</b>	Displays and sets basic information of the sensor.
	<b>Sensor connection</b>	Changes the connection status of the Sensor, and sets the conditions for communications with the Sensor.
	<b>Sensor control in online</b>	Performs various controls for the sensor mode change, data transfer/save, and monitoring.
	<b>Sensor error history</b>	Displays and clears the error history of an online Sensor.
	<b>Tool</b>	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.
<b>Scene data Edit</b>	<b>Image condition Settings</b>	Adjusts the image condition.
	<b>Specifies the calibration pattern</b>	Sets a registered calibration pattern.
	<b>Registers inspection item</b>	Registers the inspection item to use in the measurement. You can select from the following inspection items: Edge position, Search, Labeling, Shape search
	<b>Calculation Settings</b>	Makes a setting for basic arithmetic operations and function operations using inspection item judgment results and measurement data.
	<b>Logging Settings</b>	Makes a setting for logging measurement results of inspection items and calculation results.
	<b>Output Settings</b>	Makes a setting for data to output to external devices.
	<b>Run Settings</b>	Switch Sensor modes or monitors measurement results.
<b>Sensor system data Edit</b>	<b>Trigger condition Settings</b>	Sets the trigger type and image timing.
	<b>I/O Settings</b>	Sets the conditions of output signals. You can check the status of I/O signal while online.
	<b>Encoder Settings</b>	Make settings for the encoder such as common encoder settings, ring counter settings, and encoder trigger settings.
	<b>Ethernet communication Settings</b>	Makes Ethernet communication settings. You can select data communication from no-protocol data, PLC link data, and programmable no-protocol data.
	<b>EtherCAT communication Settings</b>	Makes the EtherCAT communication settings according to the communication settings of the EtherCAT master.
	<b>Logging condition Settings</b>	Sets the conditions to log to the internal memory of sensor.
	<b>Sensor Settings</b>	Makes the settings for startup scene control function, password setting function, and adjustment judgment function.
<b>Calibration Scene Data Settings</b>		Calculates, views, and edits the calibration parameters. The Vision Sensor supports general-purpose calibration and calibration for conveyor tracking.
<b>Debugging</b>	<b>Offline debugging of sensor operation</b>	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.
	<b>Offline debugging of the sensor control program and sensor operation</b>	Performs a linked simulation between the sequence control of an NJ-series Controller and the operation of an FQ-M Sensor in EtherCAT configuration systems. 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:** Supported only by the Sysmac Studio version 1.01 or higher.

## Applicable Models

Series		Unit version	Model
CPU	NJ-series	–	NJ501-1500/1400/1300 NJ301-1200/1100
Servo Drives	G5-series	Servo Drives with unit version 2.1 or higher recommended	R88D-KNA5L-ECT/KN01L-ECT/KN02L-ECT/KN04L-ECT R88D-KN01H-ECT/KN02H-ECT/KN04H-ECT/KN08H-ECT/KN10H-ECT/KN15H-ECT/ KN20H-ECT/KN30H-ECT/KN50H-ECT/KN75H-ECT/KN150H-ECT R88D-KN06F-ECT/KN10F-ECT/KN15F-ECT/KN20F-ECT/KN30F-ECT/KN50F- ECT/KN75F-ECT/KN150F-ECT
Inverters	MX2-series	Inverters with version 1.1 or higher *1	3G3MX2-A2001/A2002/A2004/A2007/A2015/A2022/A2037/A2055/A2075/A2110/ A2150 3G3MX2-A4004/A4007/A4015/A4022/A4030/A4040/A4055/A4075/A4110/A4150 3G3MX2-AB001/AB002/AB004/AB007/AB015/AB022
Vision Sensors	FQ-series	–	FQ-MS120/125 FQ-MS120-M/125-M FQ-MS120-ECT/125-ECT FQ-MS120-M-ECT/125-M-ECT
Fiber Sensors *2	E3X-HD0	–	E3X-HD0
Remote I/O Terminals	GX-series	Remote I/O Terminals with unit version 1.1 or higher recommended	GX-ID1611/1612/1621/1622/1618/1628/3218/3228 GX-OD1611/1612/1621/1622/1618/1628/3218/3228 GX-MD1611/1612/1621/1622/1618/1628/3218/3228 GX-OC1601 GX-AD0471 GX-DA0271 GX-EC0211/0241
HMI's	NS-series	To connect the NJ5 Controller : NS system version 8.5 or higher CX-Designer version 3.3 or higher To connect the NJ3 Controller : NS system version 8.61 or higher CX-Designer version 3.4 or higher	NS5-MQ11-V2/MQ11B-V2 NS5-SQ11-V2/SQ11B-V2 NS5-TQ11-V2/TQ11B-V2 NS8-TV01-V2/TV01B-V2 NS10-TV01-V2/TV01B-V2 NS12-TS01-V2/TS01B-V2 NS15-TX01S-V2/TX01B-V2

\*1. A communications unit for connecting to EtherCAT network (3G3AX-MX2-ECT with unit version 1.1 or higher) is additionally required.

\*2. A communications unit for connecting to EtherCAT network (E3X-ECT) is additionally required.

**Note:** For the Unit that can be connected, refer to "Unit Configuration" of "Machine Automation Controller NJ-Series" of System Design Guide on the Sysmac Catalogue (Cat. No. P072).

## Related Manuals

Cat. No.	Model	Manual name	Contents
W504	SYSMAC-SE2□□□	Sysmac Studio version 1 OPERATION MANUAL	An introduction to the Support Software is provided along with information on the installation procedure, basic operations, connection procedures, and procedures for the main features.
V099	–	CX-Designer Ver.3.□ USER'S MANUAL	This manual describes how to install the CX-Designer and the user interface. It also describes characteristic functions and application methods.
W464	–	CS/CJ/CP/NSJ Series CX-Integrator Ver.2.□ OPERATION MANUAL	This manual describes CX-Integrator operating methods.
W344	–	CX-Protocol OPERATION MANUAL	This manual describes the use of the CX-Protocol to create protocol macros as communications sequences to communicate with external devices.
W506	NJ501-□□□□ NJ301-□□□□	NJ-series CPU Unit Built-in EtherNet/IP Port User's Manual	This manual describes Network Configurator operating methods.
Z314	FQ-MS12□(-M)-ECT FQ-MS12□(-M)	FQ-M-series Specialized Vision Sensor for Positioning User's Manual	This manual describes the Sysmac Studio setting procedures for FQ-M-series Vision Sensors.

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