SYSMAC-SE2□

Sysmac Studio

Sysmac Studio for machine creators

The Sysmac Studio provides one design and operation environment for configuration, programming, simulation and monitoring.

- One software for safety, drives, vision and I/O
- Fully compliant with open standard IEC 61131-3
- Supports Ladder, Structured text and In-Line ST 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

System requirements

Item	Requirement
Operating system (OS)[*1] [*2]	Windows XP (Service Pack 3 or higher, 32-bit version) / Vista (32-bit version) / 7 (32-bit/64 bit version) / 8 (32-bit/64-bit version)
CPU	Windows computers with Celeron 540 (1.8 GHz) or faster CPU Core i5 M520 (2.4 GHz) or equivalent or faster recommended
Main memory[*3]	2 GB min. 4 GB min. recommended
Recommended video memory / video card for using 3D motion trace	Video memory: 512 MB min. Video card: Either of the following video cards: • NVIDIA® GeForce® 200 series or higher • ATI RadeonHD5000 series or higher
Hard disk	At least 1.6 GB of available space
Display	XGA 1024 x 768, 16 million colors WXGA 1280 x 800 min. recommended
Disk drive	DVD-ROM drive
Communication ports	USB port corresponded to USB 2.0 or Ethernet port[*4]
Supported languages[*5]	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, Windows 7 or Windows 8.

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
CX-Designer	If a new Windows Vista, Windows 7 or Windows 8 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 Vista, Windows 7 or Windows 8 imposes the following restrictions on the use of the software after installation. • If another user logs in, the applications data will need to be installed again. • The CPS files will not be automatically updated. 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 CPU unit for hardware connection methods and cables to connect the computer and CPU unit.

[*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.

Function specifications

Common specifications

Item			Function	Sysmac Studio
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-series CPU unit 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 the coupler units. 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
		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-series CPU unit 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-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.	
		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 and power consumption of a slave terminal are 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 CPU unit.	
	CPU/Expansion rack configuration and setup	–	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.	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	The model number, unit number and slot number are displayed.	
		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	The rack widths, current consumption and power consumption are displayed based on the unit configuration information.	
		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 to the CPU unit. The synchronize function is used.	
		Printing the unit configuration information	The unit configuration information is printed.	
	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.	
		Operation settings	The startup mode, SD memory card diagnosis at startup, write protection at startup, controller error level changes[*1] and other settings are made.	
		Transferring operation settings	Use the synchronize operation to transfer the operation settings to the NJ-series CPU unit.	
		Built-in EtherNet/IP port settings	These settings are made to perform communications using the built-in EtherNet/IP port of the NJ-series CPU unit.	
		Transferring built-in EtherNet/IP port settings	Use the synchronize operation to transfer the built-in EtherNet/IP port settings to the NJ-series 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.	
		Axis settings	Axes are added to the project.	
		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.	
	Axes group settings	–	You can setup axes to perform interpolated motions as an axes group.	
		Axes group basic settings	Set the axes group number, wether 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.	

Item			Function	Sysmac Studio
Setting parameters	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	Cam data settings are added to the project.	
		Editing cam data	You can set properties and node points for cam data settings.	
		Transferring cam data	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 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 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-series CPU unit 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-series CPU unit.	
		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 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.	
		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.	
	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.	
		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. Refer to "**Vision sensor functions**" section for more details.	Ver. 1.01 or higher
	Displacement sensor settings		You can set and calibrate displacement sensors. Refer to "**Displacement sensor functions**" section for more details.	Ver. 1.05 or higher
	DB connection function settings		You can set and transfer the DB connection function settings. Refer to "**DB connection functions**" section for more details.	Ver 1.06 or higher with NJ501-1□20
	EtherNet/IP connection settings		You can make settings related to tag data links (connections) in an EtherNet/IP network. Refer to "**EtherNet/IP connection functions**" section for more details.	Ver. 1.10 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.	
		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 paste rung components.	
		Inserting and deleting jump labels and jumps	You can insert a jump label in the rung to jump 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[*2]	A specified variable comment can be displayed with each variable of rung components on the ladder diagrams. You can change the length of the displayed variable comments to make them easier to read.[*3]	Ver. 1.01 or higher

Item			Function	Sysmac Studio
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 of parameters, each character that you enter from the keyboard narrows the list of candidates that is displayed for selection.	
	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 more 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.	
	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	–	The programs in the project are converted into a format that is executable in the NJ-series CPU unit.	
		Rebuilding	A rebuild is used to build project programs that have already been built.	
		Aborting a build operation	You can abort a build operation.	
Reuse functions	Library	–	You can create functions, function block definitions, programs*4 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.	
File operations	File options	Creating, opening, saving or rename a project file	You can create, open, save or save under a different name a project file.	All versions
		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*5. You can also export a project to a previous project file format, i.e., .smc or .csm*6.	All versions
		Importing a project file	You can import a project from an .smc2*5, .csm2*5, .smc or .csm*6 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
		Offline comparison	Compares the data for an open project with the data for a project file and displays the results. You can also compare the open project with an exported .smc2 or .smc project file. Or, you can merge detailed comparison results*7.	Ver. 1.02 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
	Synchronize		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.	
	Batch transfer		You transfer data between the computer and NJ-series CPU unit that are connected online. You can select the same data to transfer as in the synchronization operation. Unlike the synchronization, the data is transferred in the specified direction without displaying the comparison results.	Ver 1.09 or higher
	Printing		You can print various data. You can select the items to print.	All versions
	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-series CPU unit and to copy files between the SD memory card and computer.	
		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 is 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 PC	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.	

Item			Function	Sysmac Studio
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-series CPU unit. 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[*8]		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.	
	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.	
	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 meet, 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 NJ-series CPU unit 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. You can change the line colors on the graph.[*9] You can consecutively read and display continuous trace results from more than one file.[*10]	
		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. Refer to "**Vision sensor functions**" section for more details.	Ver. 1.01 or higher
	Debugging displacement sensors		You can debug displacement sensors offline. Refer to "**Displacement sensor functions**" section for more details.	Ver. 1.05 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 a 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 and continuous control program[*11].	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[*12]	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 monitor function.	All versions
		3D motion monitor display mode	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	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-series CPU unit 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 NJ-series CPU unit 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.	

Item			Function	Sysmac Studio
Monitoring information	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 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		An estimate of 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 the controller's memory.	
	Setting clock information		You can read and set the NJ-series CPU unit's clock. The computer's clock information is also displayed.	
	DB connection function		You can monitor information for the DB connection. Refer to "**DB connection functions**" section for more details.	Ver 1.06 or higher with NJ501-1□20
Communications	Going online with a controller		An online connection is established with the controller. 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.*5	All versions
	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.	
	Backup functions	–	You can back up, restore and compare the user program and other NJ-series controller data to replace hardware, such as the CPU unit, or to restore device data.	
		Variables and memory backup	You can back up the contents of retained memory to a file and restore the contents of the backup file. You can individually select the retained variables to restore.*13	
		Controller backup	You can backup 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 data in the NJ-series CPU unit to an SD memory card mounted in the controller or compare the data in the NJ-series controller to data in the SD memory card.	
		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 NJ-series CPU unit names and serial IDs	If the name or the serial ID is different between the project and the NJ-series 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 five operation authorities (administrator, planning engineer, maintainer, operator and observer) to restrict the operations that can be performed according to the operation authority of the user.	
		Write protection of the CPU unit	You can prevent rewriting of data in the CPU unit from the Sysmac Studio.	
	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.	
		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
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-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.	

*1 Changing event levels for controller errors is supported by version 1.04 or higher.
*2 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.
*3 Changing the length of the displayed variable comments is supported by version 1.05 or higher.
*4 Creating programs in a library file is supported by version 1.06 or higher.
*5 Supported only by the Sysmac Studio version 1.08 or higher.
*6 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.
*7 Merging detailed comparison results is supported by version 1.03 or higher.
*8 Changing present values in the ladder editor or ST editor is supported by version 1.03 or higher.
*9 Changing the colors of graph lines is supported by version 1.01 or higher.
*10 Consecutively reading and displaying continuous trace results from more than one file is supported by version 1.05 or higher.
*11 MATLAB®/Simulink R2013a or higher is required.
*12 CX-Designer version 3.41 or higher is required.
*13 Individual selection of the retained variables to restore is supported by version 1.05 or higher.

DB connection functions

Item			Description
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. 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.

Safety control unit functions

Item			Description
Setting parameters	Safety I/O settings	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.
	Slave I/O settings	Exposed variable settings	You set wether to expose global variables of the safety CPU unit. The values of exposed variables can be referenced from NJ-series CPU units.
	Safety task	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 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.
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	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/Deleting functions/ 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.
	Creating variables		You create variables used in safety programs in the global or local variable table,
	Creating function blocks		You create user-defined function blocks.
	Searching and replacing		You can search for and replace strings in the variable tables, programs and function blocks of a safety CPU unit.
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. You can use forced refreshing on the FBD editor or watch tab page.
	Offline debugging*1		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.
	User memory usage monitor*2		The memory usage of the safety control system and usage of safety network such as I/O data size are displayed.
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 operation 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.
Security measures	Setting the node name		You set a unique name for each safety CPU unit to confirm that you operate the correct safety CPU unit.
	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.

*1 Supported only by the Sysmac Studio version 1.08 or higher.

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

Note: Supported only by Sysmac Studio version 1.07 or higher.

Vision sensor functions

FQ-M vision sensor

Item			Description
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 a 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. You can select from the following inspection items: 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. 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-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.

FH vision sensor

Item			Description
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 RS232C/422 communications settings.
		Ethernet communication settings	Makes the Ethernet communication settings.
		EtherNet/IP communication settings	Makes the EtherNet/IP communication settings.
		EtherCAT communication settings	Makes the EtherCAT communication 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[*1]	Edits the security settings of the sensor.
		Scene group save destination setting tool[*1]	Sets the destination to save the scene group data.
		Image file save tool[*1]	Saves the logging images and image files stored in the sensor memory.
		Registered image management tool[*1]	Saves the images used for model registration and reference registration as registered images.
		Reference position update tool[*1]	Edits all reference positions of more than one processing unit.
		Scene group data conversion tool[*1]	Creates the scene group data with more than 128 scenes.
		Scene control macro tool[*1]	Makes a setting for complementing and expanding the measurement flow and scene control.

Item		Description
Debugging	Offline debugging of sensor operation	Simulates measurements offline without connecting 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*2	Simulates the linked operation of the sequence controls in the NJ-series controller and FH-series sensor operation for an EtherCAT system. 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*3	Prevents unauthorized access by setting an account password for online operations.

*1 Supported only by the Sysmac Studio version 1.10 or higher.
*2 Supported only by the Sysmac Studio version 1.08 or higher.
*3 Supported only by the Sysmac Studio version 1.09 or higher.

Note: Supported only by the Sysmac Studio version 1.07 or higher.

Displacement sensor functions

Item			Description
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. 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.
		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 communication settings	Sets up Ethernet communications and field bus parameters.
		RS-232C communication settings	Sets up RS-232C communications.
		Data output settings	Sets serial output parameters for holding values.
Debugging		Offline debugging of sensor control programs and sensor operation	Performs a linked simulation between the sequence control of an NJ-series controller and the operation of a ZW sensor in EtherCAT configuration systems. 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: Supported only by the Sysmac Studio version 1.05 or higher.

EtherNet/IP connection functions

Item			Description
EtherNet/IP connection settings	Connection settings		Functions related to tag data links (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.

Web support services

Category	Function
Online user registration	You can register online as a user of Sysmac Studio.
Automatic update	With the automatic update function of Sysmac Studio, the latest update information for your computer environment can be searched for and applied using the Internet. Your Sysmac Studio can be constantly updated to the latest state.

Ordering information

Automation software

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

Product	Specifications			Model
	Description	Number of licenses	Media	
Sysmac Studio Standard Edition Ver. 1.□□	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 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) / 8 (32-bit/64-bit version)	– (Media only)	DVD*1	SYSMAC-SE200D
		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.□□*2,*4	Sysmac Studio Vision Edition is a limited license that provides selected functions required for FQ-M series and FH-series vision sensor settings.	1 license	–	SYSMAC-VE001L
Sysmac Studio Measurement Sensor Edition Ver. 1.□□*3,*4	Sysmac Studio Measurement Sensor Edition is a limited license that provides selected functions required for ZW-series displacement sensor settings.	1 license	–	SYSMAC-ME001L
		3 licenses	–	SYSMAC-ME003L

*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 and FH-series vision sensors.
*3 With the Measurement Sensor Edition, you can use only the setup functions for ZW-series displacement sensors.
*4 This product is a license only. You need the Sysmac Studio Standard Edition DVD media to install it.

Note: Site licenses are available for users who will run Sysmac Studio on multiple computers. The license number for a robot is required to use this CPU unit. Ask your OMRON sales representative for details.

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/ME0□□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 support software:

Included support software		Outline
CX-Designer	**Ver. 3.□□**	The CX-Designer is used to create screens for NS-series PTs.
CX-Integrator	**Ver. 2.□□**	The CX-Integrator is used to set up FA networks.
CX-Protocol	**Ver. 1.□□**	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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I181E-EN-05 In the interest of product improvement, specifications are subject to change without notice.