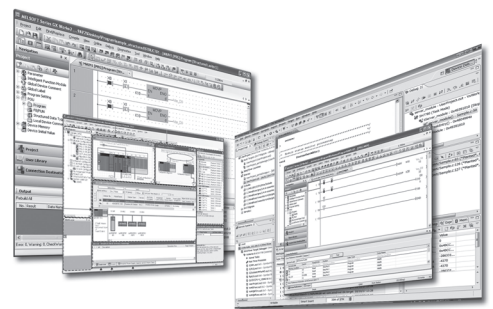


Engineering Software

GX Works3 Operating Manual

-SW1DND-GXW3-E



SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual carefully and pay full attention to safety to handle the product correctly. The precautions given in this manual are concerned with this product only. For the safety precautions for the programmable controller system, refer to the user's manual for the module used and the MELSEC iQ-R Module Configuration Manual. In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

WARNING

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

CAUTION

Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

WARNING

- When data change, program change, or status control are performed from a personal computer to a running programmable controller, create an interlock circuit outside the programmable controller to ensure that the whole system always operates safely.
Furthermore, for the online operations performed from a personal computer to a programmable controller CPU, the corrective actions against a communication error due to such as a cable connection fault should be predetermined as a system.
-

[Startup and Maintenance Precautions]

CAUTION

- The online operations performed from a personal computer to a running CPU module (program change while a CPU module is in RUN, operating status changes such as RUN-STOP switching, and remote control operation) must be executed after the manual has been carefully read and the safety has been ensured.
 - When changing a program while a CPU module is in RUN (online program change), it may cause a program corruption in some operating conditions. Fully understand the precautions before use.
 - The positioning test functions of OPR, JOG, inching, or testing positioning data of positioning test function must be executed with the controller set to STOP after the manual has been carefully read and the safety has been ensured.
Specially when executing the function on the network system, ensure the safety thoroughly since the machinery whose operation cannot be checked by an operator may be activated. The operation failure may cause the injury or machine damage.
-

CONDITIONS OF USE FOR THE PRODUCT

- (1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
- i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
 - ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.
- (2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries. MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.

("Prohibited Application")

Prohibited Applications include, but not limited to, the use of the PRODUCT in;

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTS are required. For details, please contact the Mitsubishi representative in your region.

INTRODUCTION

Thank you for purchasing the Mitsubishi FA software, MELSOFT series.

This manual describes the programming and functions required when using GX Works3.

Before using this product, please read this manual carefully, and develop familiarity with the functions and performance of GX Works3 to handle the product correctly.

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RELEVANT MANUALS

Manual name [manual number]	Description	Available form
GX Works3 Operating Manual [SH-081215ENG] (this manual)	Explains the system configuration of GX Works3, parameter setting, and operation method for the online function.	e-Manual EPUB PDF

Point

e-Manual refers to the Mitsubishi FA electronic book manuals that can be browsed using a dedicated tool.

e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- The hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Control CPU	A CPU module that controls connected I/O modules and Intelligent function modules. In a multiple CPU system, a CPU module by which a module is controlled can be set for each module.
Direct connection	A connection using a USB/serial/Ethernet port of a CPU module
Ethernet built-in CPU	A generic term for a CPU that has an Ethernet port
Execution program	A converted program that can be executed on a CPU module
FB instance	A function block pasted on a sequence program
FX5CPU	A generic term for FX5UCPU and FX5UCCPU
GX Configurator	A generic product name for GX Configurator-AD/DA/SC/CT/TC/TI/FL/PT/AS/QP
GX Developer	A generic product name for SWnD5C-GPPW, SWnD5C-GPPW-A, SWnD5C-GPPW-V, and SWnD5C-GPPW-VA ('n' indicates version.)
GX Works2	A generic product name for SWnDNC-GXW2 ('n' indicates version.)
GX Works3	A generic product name for SWnDND-GXW3 ('n' indicates version.)
High-speed universal model QCPU	A generic term for Q03UDVCP, Q04UDVCP, Q06UDVCP, Q13UDVCP, and Q26UDVCP
Intelligent function module	A generic term for modules which has functions other than input and output, such as A/D converter module and D/A converter module
MELSOFT Library	A generic term for components (FB library, sample programs, drawing data) which provide easy operation of programmable controller related modules and GOTs, and various devices that are connected to them To obtain components of MELSOFT Library, please consult your local Mitsubishi representative.
MELSOFT Navigator	A product name for the integrated development environment included in SWnDND-IQWK (MELSOFT iQ Works) ('n' indicates version.)
Member	A local label defined in a structure or a function block.
Personal computer	A generic term for personal computer on which Windows® operates
RCPU	A generic term for R04CPU, R08CPU, R08PCPU, R16CPU, R16PCPU, R32CPU, R32PCPU, R120CPU, and R120PCPU
RnPCPU	A generic term for R08PCPU, R16PCPU, R32PCPU, and R120PCPU
Slave station	Stations other than master station (local station, remote I/O station, remote device station, intelligent device station, etc.)
Universal model QCPU	A generic term for Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q03UDECPU, Q03UDVCP, Q04UDHCP, Q04UDEHCP, Q04UDVCP, Q06UDHCP, Q06UDEHCP, Q06UDVCP, Q10UDHCP, Q10UDEHCP, Q13UDHCP, Q13UDEHCP, Q13UDVCP, Q20UDHCP, Q20UDEHCP, Q26UDHCP, Q26UDEHCP, Q26UDVCP, Q50UDEHCP, and Q100UDEHCP
Windows® 7	A generic term for Microsoft® Windows® 7 Starter Operating System, Microsoft® Windows® 7 Home Premium Operating System, Microsoft® Windows® 7 Professional Operating System, Microsoft® Windows® 7 Ultimate Operating System, and Microsoft® Windows® 7 Enterprise Operating System
Windows® 7 or later	A generic term for Windows® 7, Windows® 8, and Windows® 8.1
Windows® 8	A generic term for Microsoft® Windows® 8 Operating System, Microsoft® Windows® 8 Pro Operating System, and Microsoft® Windows® 8 Enterprise Operating System

Term	Description
Windows® 8.1	A generic term for Microsoft® Windows® 8.1 Operating System, Microsoft® Windows® 8.1 Pro Operating System, and Microsoft® Windows® 8.1 Enterprise Operating System
Windows® 8 or later	A generic term for Windows® 8 and Windows® 8.1
Windows Vista®	A generic term for Microsoft® Windows Vista® Home Basic Operating System, Microsoft® Windows Vista® Home Premium Operating System, Microsoft® Windows Vista® Business Operating System, Microsoft® Windows Vista® Ultimate Operating System, and Microsoft® Windows Vista® Enterprise Operating System
Windows Vista® or later	A generic term for Windows Vista®, Windows® 7, Windows® 8, and Windows® 8.1
Windows® XP	A generic term for Microsoft® Windows® XP Home Edition Operating System, and Microsoft® Windows® XP Professional Operating System

MEMO

This part explains the screen configuration and basic operations of GX Works3.

1 BEFORE USING THIS PRODUCT

2 SCREEN CONFIGURATION AND BASIC OPERATIONS

1 BEFORE USING THIS PRODUCT

GX Works3 is an engineering tool for configuring the settings, programming, debugging, and performing the maintenance for programmable controllers such as MELSEC iQ-R series/MELSEC iQ-F series.

The usability is much better than the existing GX Works2 because the functions and their operability have been improved.

1.1 Main Functions of GX Works3

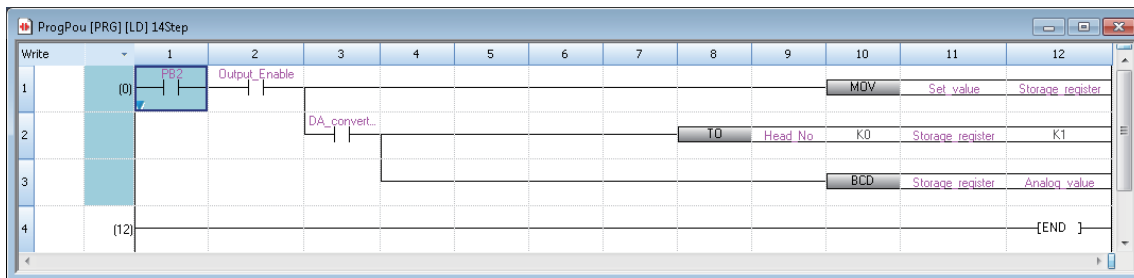
GX Works3 manages programs and parameters in unit of project for each CPU module.

GX Works3 has the functions shown below.

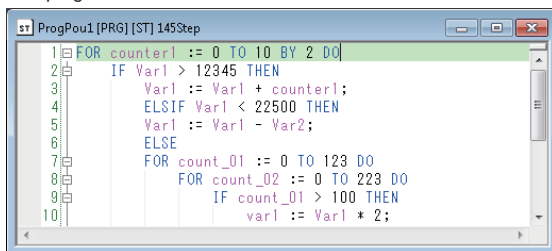
Program creation function

Programming languages such as Ladder Diagram, Structured Text, and Function Block Diagram/Ladder Diagram can be used in accordance with the processing content.

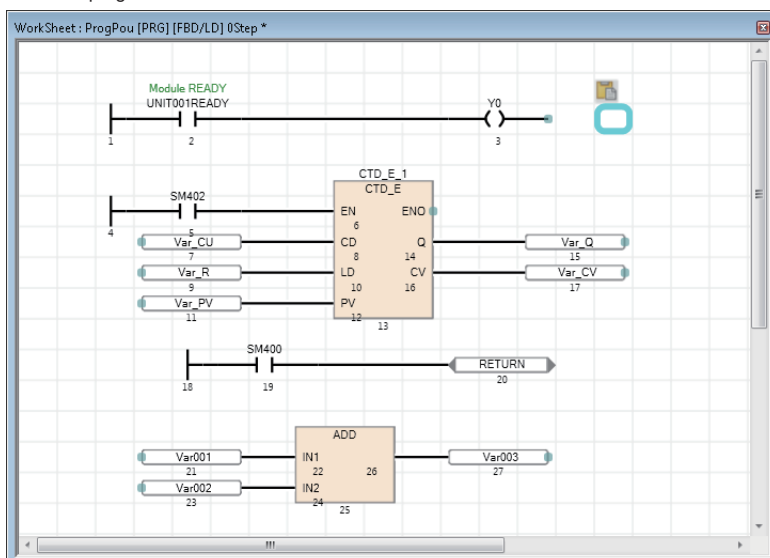
<Ladder program>



<ST program>

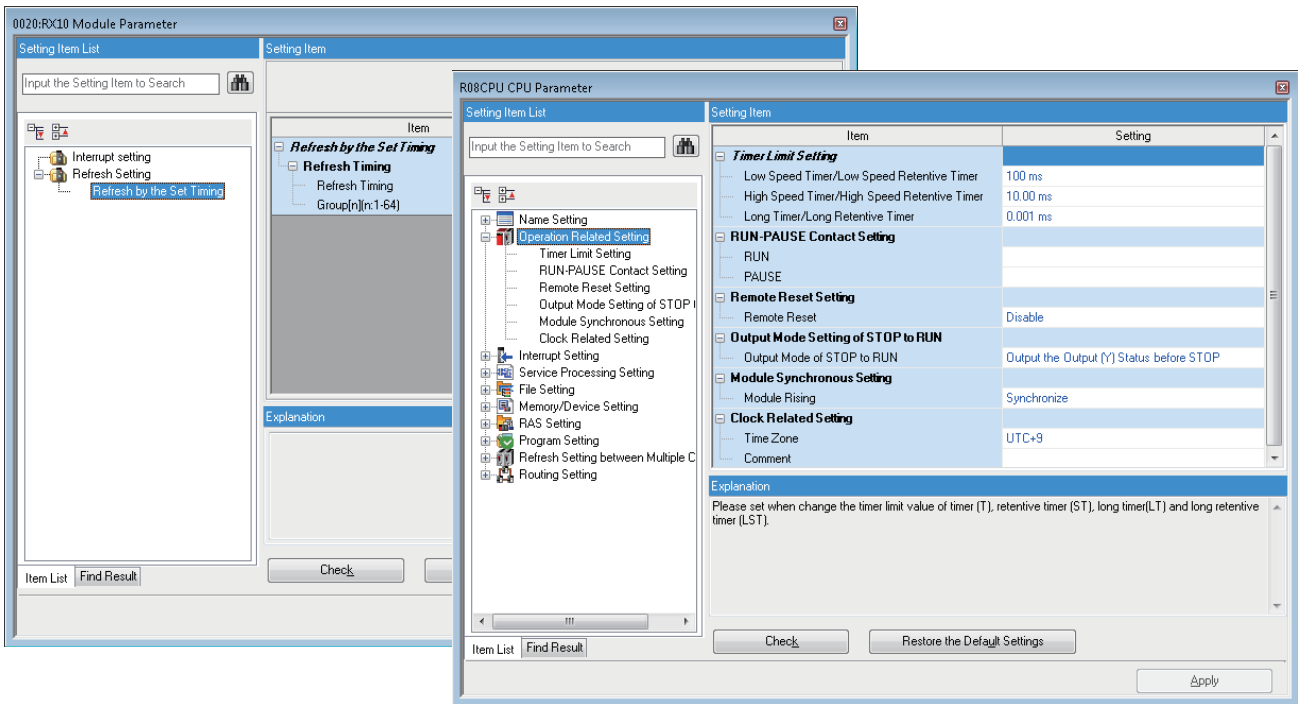


<FBD/LD program>



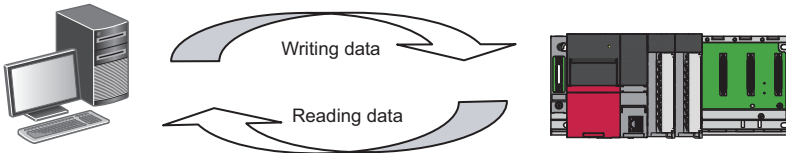
Parameter setting function

Parameters of CPU modules, I/O modules, and Intelligent function modules can be set.



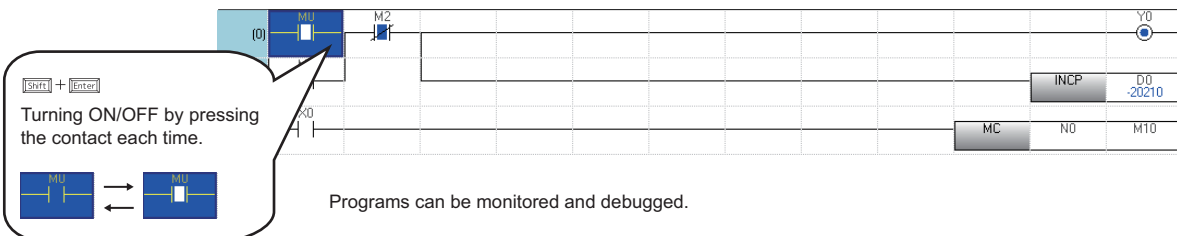
Write to PLC/Read from PLC function

Created sequence programs can be written to/read from a CPU module with the Write to PLC/Read from PLC function. In addition, the sequence programs can be modified while the CPU module is in RUN by performing online program change.



Monitor/debug function

After writing the created sequence programs to a CPU module, device values at operation can be monitored online/offline. The virtual programmable controller (the Simulation function) is used for the offline monitoring/debugging.

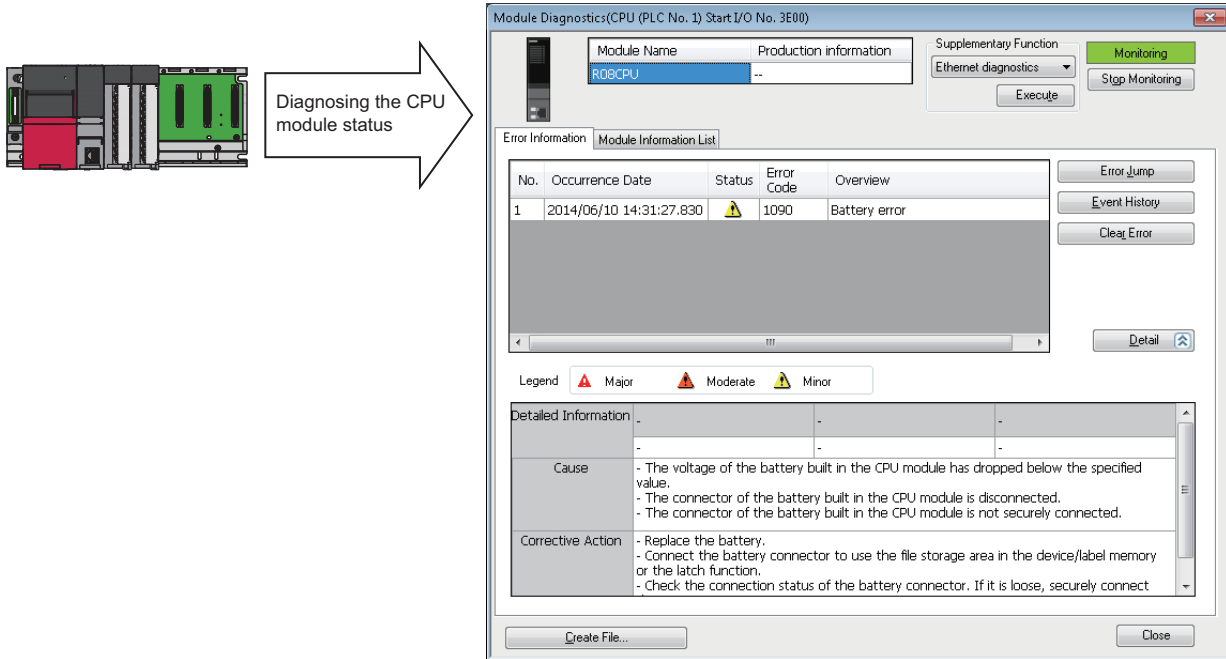


Diagnostic function

The current error status and the error history of the CPU module or the network can be diagnosed. By using the Diagnostic function, recovery work can be completed in a short time.

By using the System Monitor function, the detailed information of modules such as Intelligent function module can be obtained. This helps to shorten the recovery work time when an error occurs.

Diagnosing the CPU module ("Module Diagnostics" screen)



The diagram illustrates the process of diagnosing a CPU module. On the left, a physical CPU module is shown with a red battery cover. An arrow points from the module to a software window titled "Module Diagnostics(CPU (PLC No. 1) Start I/O No. 3E00)".

The software window displays the following information:

- Module Name:** ROB-CPU
- Production information:** --
- Supplementary Function:** Ethernet diagnostics (dropdown menu)
- Monitoring:** (Active, green button)
- Buttons:** Execute, Stop Monitoring, Error Jump, Event History, Clear Error, Detail

Error Information Table:

No.	Occurrence Date	Status	Error Code	Overview
1	2014/06/10 14:31:27.830	Minor	1090	Battery error

Legend: Major (Red triangle), Moderate (Yellow triangle), Minor (Green triangle)

Detailed Information:

Category	Information
Cause	- The voltage of the battery built in the CPU module has dropped below the specified value. - The connector of the battery built in the CPU module is disconnected. - The connector of the battery built in the CPU module is not securely connected.
Corrective Action	- Replace the battery. - Connect the battery connector to use the file storage area in the device/label memory or the latch function. - Check the connection status of the battery connector. If it is loose, securely connect

Buttons: Create File..., Close

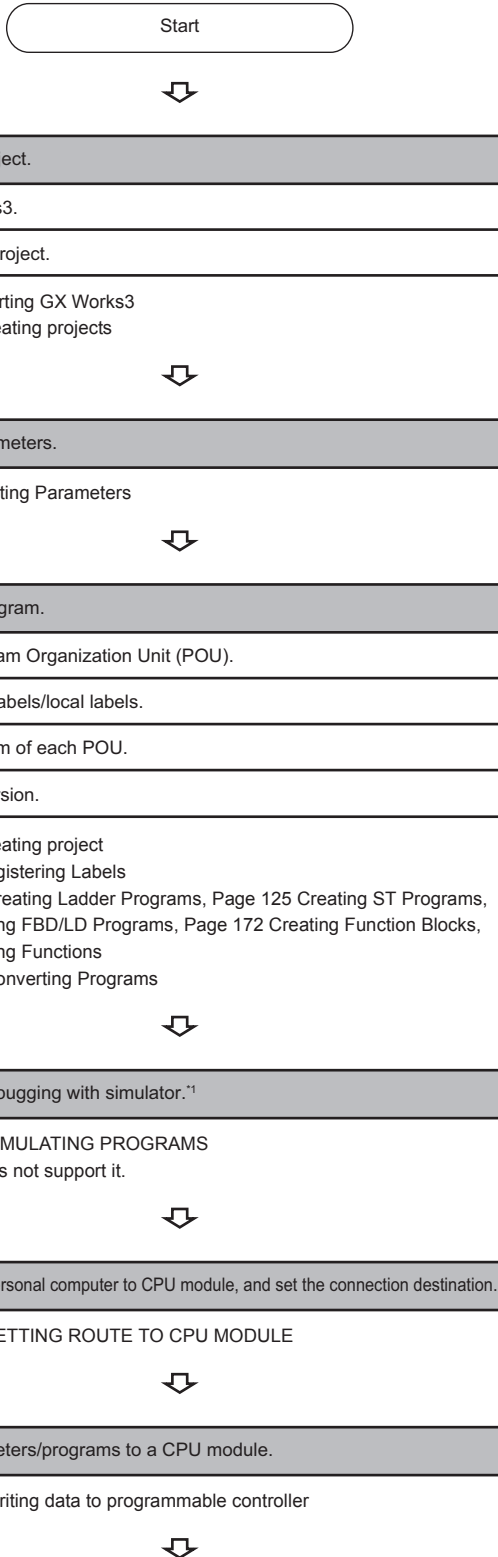
1.2 Procedure from Project Creation to CPU Module Operation

The operation procedure from creating programs up to operating a CPU module is shown below.

For the operation methods of CPU module, refer to the following manual.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

📖 MELSEC iQ-F FX5 User's Manual (Application)



7. Check the operation.

Monitor the execution status and device contents of the sequence program to check the operation.

Check the error occurrence in CPU module.

☞ Page 214 Check Execution Programs on Program Editor

☞ Page 249 Diagnosing CPU Module



8. Operate the system.

1.3 Learning Operation Method of GX Works3

This section explains how to learn the operation methods of GX Works3.

Displaying Help



Display Help to learn about operations and functions, and check the error codes of a CPU module.

Operating procedure

Select [Help] ⇒ [GX Works3 Help] (🔍).

e-Manual Viewer is started up and a manual is displayed.




Find Help function

Enter a character string in  on the toolbar and press the  key to start searching on e-Manual Viewer. The entered character string can be searched in the manuals which have been registered in e-Manual Viewer.

Help of instructions/FBs and special relays/special registers

The corresponding location in the manual can be displayed from a program editor or each screen.

■Program editor

- Place the cursor on the instruction (ladder editor: the cell with the instruction, ST editor: the character string of the instruction), press the  key.
- Place the cursor on the element on the FBD/LD editor, and press the  key.
- Place the cursor on the FB cell on the ladder editor, and press the  key

■"Enter Ladder" screen and argument editing screen

Click the [Manual] button on each screen.

■Element Selection window

Select the instruction or the module FB in the list, and press the  key.

Connecting to MITSUBISHI ELECTRIC FA Global Website

Display the MITSUBISHI ELECTRIC FA Global Website in Web browser.

Connect the personal computer to Internet in advance.

Operating procedure

Select [Help] ⇒ [Connection to MITSUBISHI ELECTRIC FA Global Website].

Checking version of GX Works3

Display the information such as the software version of GX Works3.

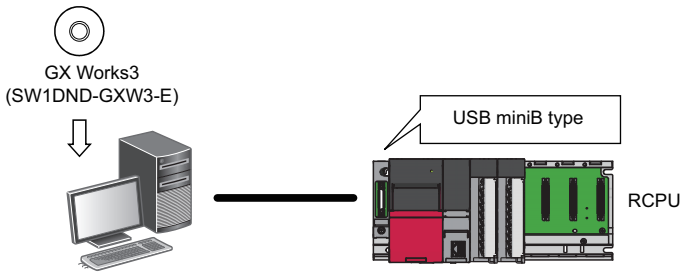
Operating procedure

Select [Help] ⇒ [Version Information].

1.4 Connection Configurations between Personal Computer and CPU Module

The configurations when connecting a personal computer and a CPU module are shown below.

Connection via USB port



FX5CPU does not support this connection.

The USB cables of which the operation is ensured by Mitsubishi Electric Corporation are shown below.

When using a USB cable for the first time, install the USB driver.

For details, refer to the following section.

☞ Page 283 USB Driver Installation Procedure

Product name	Model	Manufacturer
USB cable (USB A type — USB B type)	AU230	BUFFALO KOKUYO SUPPLY INC.
USB cable (USB A type — USB miniB type)	KU-AMB530	SANWA SUPPLY INC.
	KU-AMB550	
USB adapter (USB B type — USB miniB type)	AD-USBBFTM5M	ELECOM Co., Ltd.

For the considerations when accessing a CPU module, refer to the following section.

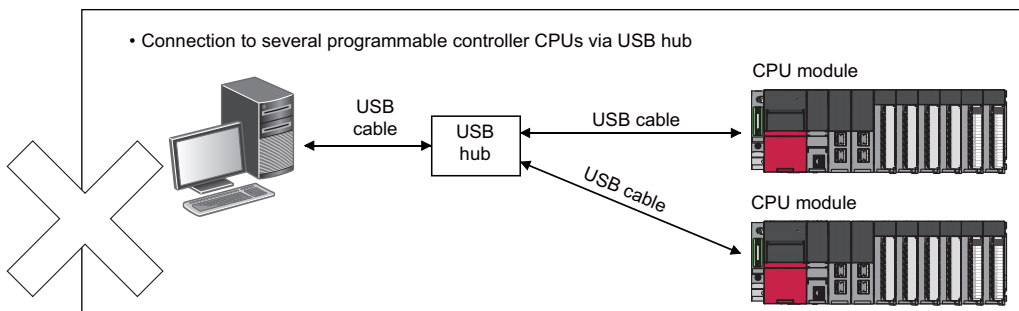
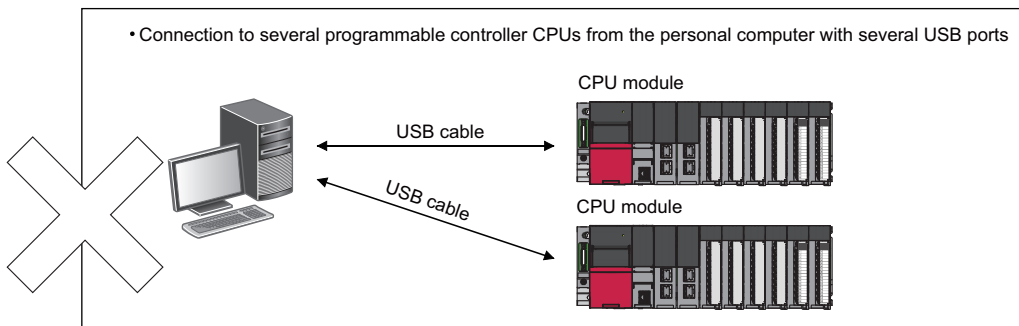
☞ Page 195 Considerations of communication with the CPU module using a USB cable

■ Configuration of USB connection

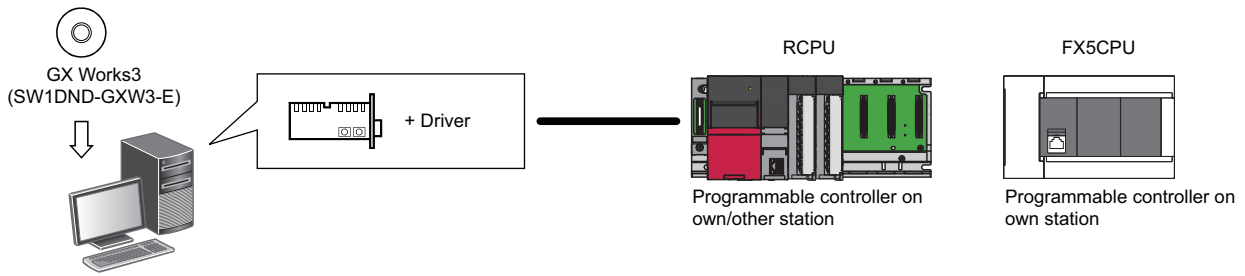
Only one CPU module can be connected to a personal computer at the same time.

Connection to a CPU module is not applicable for the following configuration.

<Inapplicable configurations>

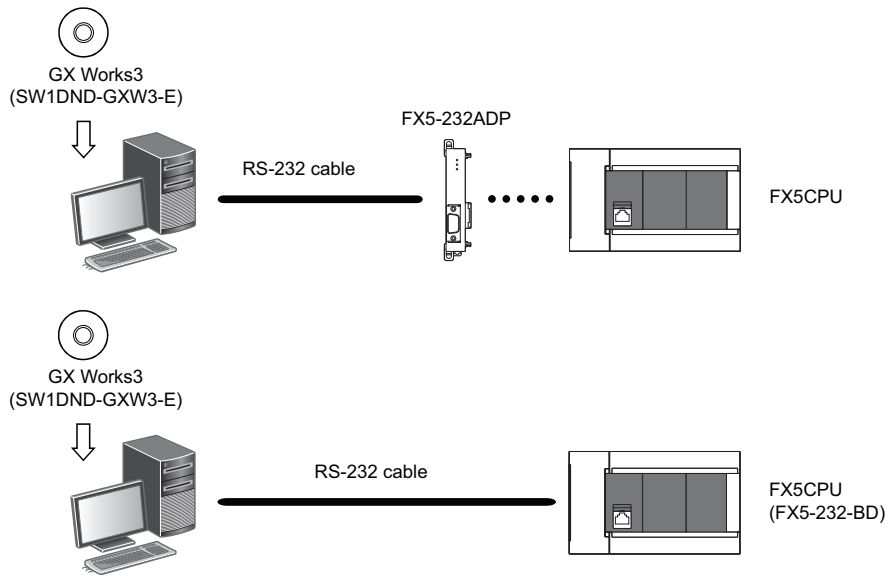


Connection via Ethernet board



Use an Ethernet board that is built-in to a personal computer or commercially available.

Connection via serial port



RCPU does not support this connection.

Product name	Model	Manufacturer
RS-232 cable	GX-232CAB-1	Mitsubishi Electric Corporation

2 SCREEN CONFIGURATION AND BASIC OPERATIONS

This chapter explains the screen configuration and basic operations of GX Works3.

2.1 Starting and Exiting GX Works3

This section explains the operation methods for starting and exiting GX Works3.

Starting GX Works3

Operating procedure

Select [MELSOFT Application] ⇒ [GX Works3] ⇒ [GX Works3] from Windows® Start*1.

*1 Select [All apps] on the Start screen or [Start] ⇒ [All Programs].

Exiting GX Works3

Operating procedure

Select [Project] ⇒ [Exit GX Works3].

Point

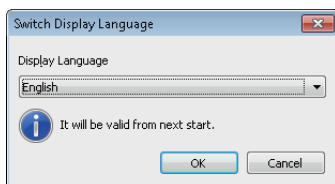
GX Works3 can also be started/exit from MELSOFT Navigator.

2.2 Switching Displayed Language

Since GX Works3 supports multiple languages, switching the languages on the menu bar is available on the personal computer.

Window

[View] ⇒ [Switch Display Language]



Precautions

If the display language differs from the one for the operating system, the text may get cut off.

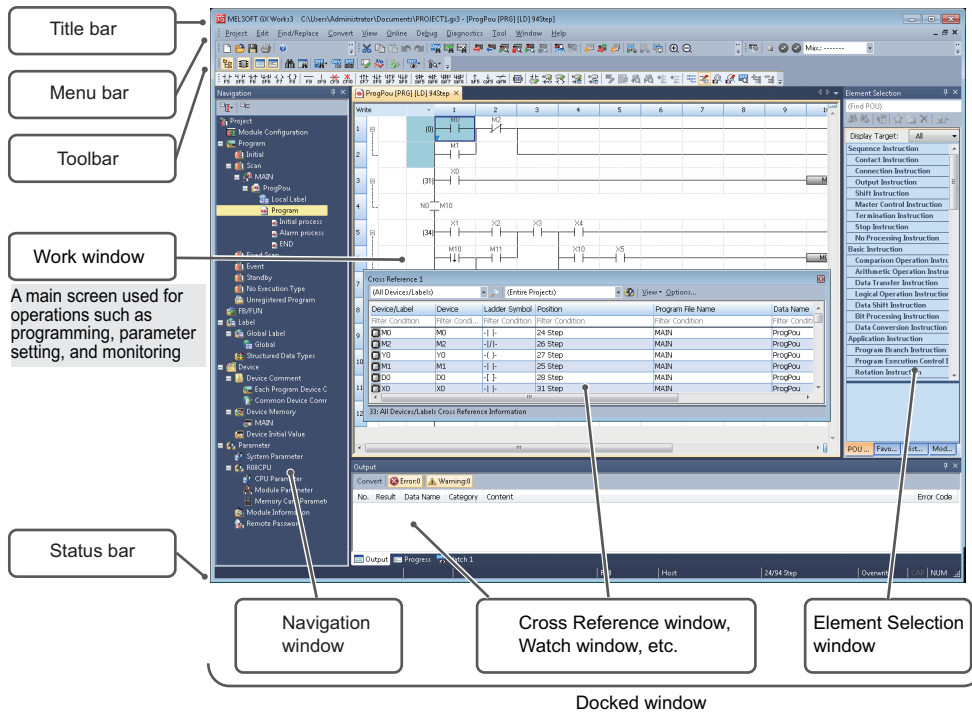
2.3 Screen Configuration

This section explains the screen configuration of GX Works3 that is displayed when it is started up.

Main frame

The main frame configuration is shown below.

The following screen shows a main frame configuration on which a work window and docked windows are displayed.



Window operation

■ Displaying docked windows

[View] ⇒ [Docking Window] ⇒ [(target item)]

■ Switching docked window and work window

The windows or files can be switched by pressing the **Ctrl** key and **Tab** key.

Select it by pressing the **Ctrl** key and **←** key / **→** key / **↑** key / **↓** key.

■ Arranging work windows

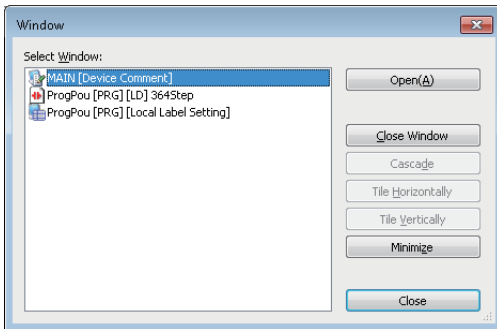
The list of windows being open is displayed.

Open and arrange the specific window.

Arranging the windows improves display efficiency while opening multiple windows.

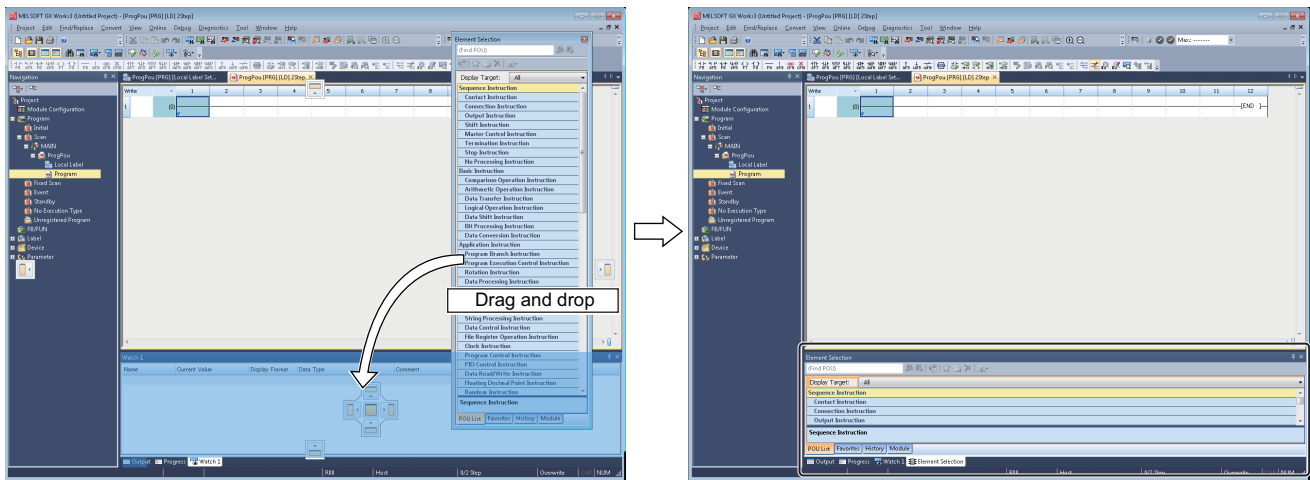
Window

[Window] ⇒ [Window]



■ Docking/floating dockable windows

- Docked display: Drag the title bar of a floating dockable window and drop it to the guidance to dock the main frame.



Drag a dockable window to the guidance

A new tab appears after the window is docked.

- Floating display: Drag the title bar of a docked window and drop it to the arbitrary position to float from the main frame.

■ Docking/floating work windows

- Docked display: Select the floating work window and select [Window] ⇒ [Docking].
- Floating display: Select the docked work window and select [Window] ⇒ [Floating].

Point

Docked windows can be switched from docked to floating or vice versa by double-clicking the title bar.


Customizing/resetting toolbars

Set the types of tool buttons to be displayed on each toolbar.

The selected tool buttons on the list are displayed on the tool bar.

Operating procedure

■ Customizing toolbar

1. Click  on the toolbar, and select [Show/Hide Buttons] ⇒ [(toolbar name)].
2. Select the tool button to be displayed from the list.

■ Resetting toolbar

Click  on the toolbar, and select [Show/Hide Buttons] ⇒ [Reset].

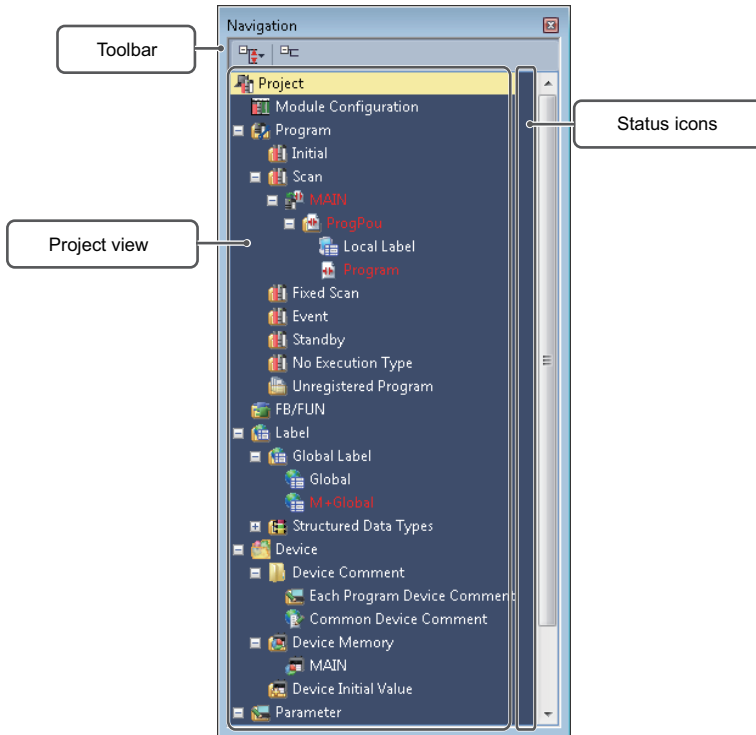
Navigation window

Navigation window is the screen that displays the content of a project in a tree format. Operations such as creating new data and displaying editing screens can be performed on the tree. For details, refer to the following section.

☞ Page 48 PROJECT MANAGEMENT

Window

[View] ⇒ [Docking Window] ⇒ [Navigation] ()



The character color on the Project view displays red when the program is not converted.

Displayed items

Name	Description	Reference
Status icons	Displays icons which indicate status of the project.	Page 27 Status icons

Sorting data

Sort the data displayed in tree format.

Operating procedure

1. Open a folder on the Project view and select the data for sorting.
2. Right-click and select [Sort] ⇒ [(sort type)] from the shortcut menu.

Point

Data can be sorted by dragging and dropping the data or selecting [Order] ⇒ [Move Up]/[Move Down] from the shortcut menu.


Creating folders

Create a folder in order to manage the created data.

Operating procedure



1. Select a program file and [Project] ⇒ [Data Operation] ⇒ [New Folder].
2. Change a folder name.
3. Select the program to be stored, and drag and drop it to the created folder.

Simple display

Click  on the toolbar to hide the unused folders.

Status icons


The icons that indicate the state of the project are as follows:

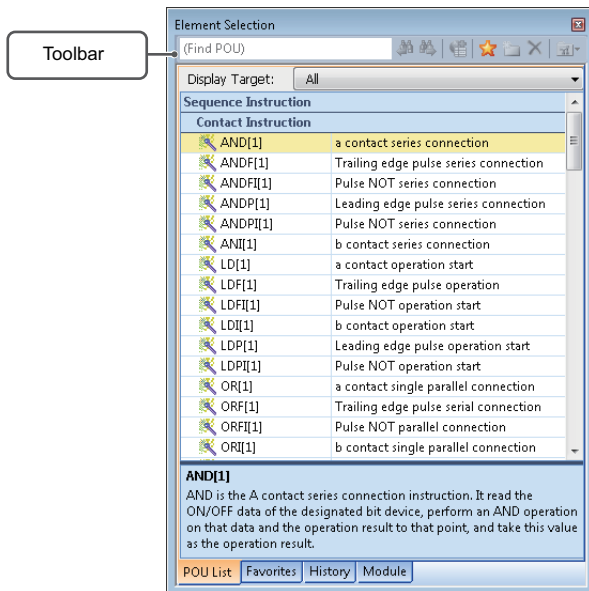
Icon	Status	Display timing	Item	Description
	Parameter mismatched	Offline	Module folder	Displays when a mismatch is detected between the system parameters and the property of module.
	Unconfirmed required settings		Module parameter	Displays when the [Apply] button has never been pressed on the setting screen of module parameter (network) that is required to be set.

Element Selection window

The Element Selection window is the window that displays elements (such as instructions and general functions/function blocks) for program creation in a list format.

Window

[View] ⇒ [Docking Window] ⇒ [Element Selection] ()



The focus is moved to the element of which character string match with the entered character string (element name or keyword included in the element description) to the toolbar.

The elements which are included in the selected category is displayed from the display target.

Pasting elements

■Pasting elements in a program

When the program editor is activated, the elements which can be pasted are displayed in the Element Selection window. The elements can be pasted in the program editor by dragging and dropping from the list to a program.

Point

For ST editor, select an element and press the  key to paste the element at the cursor position.


■Pasting objects in Module Configuration Diagram

When the Module Configuration Diagram is activated, the module parts (objects) which can be pasted are displayed in the Element Selection window.

The objects can be pasted by dragging and dropping from the list to the Module Configuration Diagram.

Favorites


The frequently used elements (devices, labels, instructions, FB instances, functions) can be registered to [Favorites] tab by classification.

Create a folder to be classified by clicking  on the toolbar, and drag and drop it to move or change the name.

Operating procedure

■Adding from element list

Instructions, functions, and function blocks can be added to Favorites.

1. Select an element to be added from the list of the Element Selection window, and click  on the toolbar.
2. Select the registration destination on the "Register to Favorites" screen, and click the [OK] button.

■Adding from the Project view

Functions and function blocks can be added to Favorites.

1. Select an element to be added on the Project view, and drag and drop it onto the Element Selection window.
2. Select the registration destination on the "Register to Favorites" screen, and click the [OK] button.

■Adding from ladder editor

Devices, labels, instructions, and FB instances can be added to Favorites.

1. Select the cell of the element to be added, and drag the border of the cell and drop it onto the Element Selection window.
2. Select the registration destination on the "Register to Favorites" screen, and click the [OK] button.


■Adding from ST editor

Devices, labels, and FB instances can be added to Favorites.

1. Select the token of a part to be added, and drag and drop it onto the Element Selection window.
2. Select the registration destination on the "Register to Favorites" screen, and click the [OK] button.

■Adding from FBD/LD editor

Devices, labels, and FB instances can be added to Favorites.

1. Select the element to be added, and drag and drop it onto the Element Selection window with the  key held down.
2. Select the registration destination on the "Register to Favorites" screen, and click the [OK] button.

■Adding from label editor


Labels can be added to Favorites.

1. Select a line header of the label to be added, and drag and drop it onto the Element Selection window.
2. Select the registration destination on the "Register to Favorites" screen, and click the [OK] button.

■ Adding templates classified by purpose

GX Works3 provides templates ("Category by Target Template") that are categorized by purpose to which register the arbitrary elements as a favorite in batch.

By deleting unnecessary elements after registering the templates, the elements can be placed on efficiency. FX5CPU does not support it.

1. Select the [Favorites] tab on the Element Selection window.
2. Select  from the tool bar ⇒ [Import Favorites] ⇒ [Category by Target Template] in the Element Selection window.

Point

By importing the exported file (*.xml), the elements registered as favorite can be used on other personal computer.

Select  on the toolbar ⇒ [Export Favorites]/[Import Favorites]

History

By selecting the [History] tab, the previously used elements are displayed in order of the date used. The display order can be changed in order of the number of times used from the pulldown list.

Module

By selecting the [Module] tab, the module labels and module FBs currently registered in the project are displayed.

2.4 Menu List

Basic menus

[Project]	
⇒ [New]	Page 53 Creating projects
⇒ [Open]	Page 54 Opening projects
⇒ [Close]	—
⇒ [Save]	Page 59 Overwriting projects
⇒ [Save As]	Page 59 Saving projects under the specified name
⇒ [Delete]	Page 60 Deleting projects
⇒ [Project Verify]	Page 65 Verifying Projects
⇒ [Change Module Type]	Page 64 Changing Module Type of Project
⇒ [Data Operation] ⇒ [New Data]	Page 61 Creating project
⇒ [Data Operation] ⇒ [New Folder]	Page 27 Creating folders
⇒ [Data Operation] ⇒ [Rename Data]	Page 62 Changing data names
⇒ [Data Operation] ⇒ [Delete Data]	Page 62 Deleting data
⇒ [Data Operation] ⇒ [Copy Data]	Page 62 Copying/pasting data
⇒ [Data Operation] ⇒ [Paste Data]	
⇒ [Data Operation] ⇒ [Add New Module]	Page 80 Setting parameters of Intelligent function module Page 86 Simple motion module setting tool
⇒ [Data Operation] ⇒ [Properties]	Page 63 Property
⇒ [Intelligent Function Module] ⇒ [Module Parameter List]	Page 82 Checking/changing the number of Intelligent function module parameters
⇒ [Open GX Works2 Format Project]	Page 55 Opening GX Works2 format projects
⇒ [Security] ⇒ [Security Key Setting]	Page 239 Registering security key in program files Page 241 Writing/deleting security key to/from CPU module
⇒ [Security] ⇒ [Security Key Management]	Page 237 Creating/deleting security keys
⇒ [Security] ⇒ [Block Password Setting]	Page 234 Setting block password
⇒ [Security] ⇒ [File Password Setting]	Page 244 Setting file password
⇒ [Printer Setup]	Page 43 Printing Data
⇒ [Page Setup]	
⇒ [Print Preview]	
⇒ [Print]	
⇒ [Recent Projects] ⇒ [(recently used project 1 to 10)]	—
⇒ [Start GX Works2]	
⇒ [Exit GX Works3]	Page 22 Exiting GX Works3
[Edit]	
⇒ [Undo]	—
⇒ [Redo]	
⇒ [Cut]	
⇒ [Copy]	
⇒ [Paste]	
[Find/Replace]	
⇒ [Cross Reference]	Page 169 Creating/displaying cross reference information
⇒ [Device List]	Page 171 Displaying Device Usage List
⇒ [Find Device/Label]	Page 162 Searching/Replacing Devices/Labels
⇒ [Find Instruction]	Page 164 Searching/Replacing Instructions
⇒ [Find Contact or Coil]	
⇒ [Find String]	Page 165 Searching/Replacing Character Strings
⇒ [Replace Device/Label]	Page 162 Searching/Replacing Devices/Labels

[Find/Replace]	
⇒ [Replace Instruction]	Page 164 Searching/Replacing Instructions
⇒ [Replace String]	Page 165 Searching/Replacing Character Strings
⇒ [Change Open/Close Contact]	Page 166 Changing Contacts Between Open Contact and Closed Contact
⇒ [Device Batch Replace]	Page 167 Batch Replacing of Devices and Labels
⇒ [Register to Device Batch Replace]	—
[Convert]	
⇒ [Convert]	Page 146 Converting/converting all programs
⇒ [Online Program Change]	Page 206 Writing data after changing programs partially while CPU module is in RUN (Online program change)
⇒ [Rebuild All]	Page 146 Converting/converting all programs
⇒ [Setting]	—
[View]	
⇒ [Toolbar] ⇒ [Standard]	Page 23 Main frame
⇒ [Toolbar] ⇒ [Program Common]	
⇒ [Toolbar] ⇒ [Docking Window]	
⇒ [Toolbar] ⇒ [Monitor Status]	
⇒ [Statusbar]	
⇒ [Color and Font]	Page 40 Checking and Changing Colors and Fonts
⇒ [Docking Window] ⇒ [Navigation]	Page 26 Navigation window
⇒ [Docking Window] ⇒ [Element Selection]	Page 27 Element Selection window
⇒ [Docking Window] ⇒ [Output]	Page 23 Main frame
⇒ [Docking Window] ⇒ [Progress]	—
⇒ [Docking Window] ⇒ [Find/Replace]	—
⇒ [Docking Window] ⇒ [Find Results]	—
⇒ [Docking Window] ⇒ [(Cross Reference 1 to 2)]	Page 169 Creating/displaying cross reference information
⇒ [Docking Window] ⇒ [Device List]	Page 171 Displaying Device Usage List
⇒ [Docking Window] ⇒ [Device Reference]	Page 81 Checking refresh devices assigned to modules
⇒ [Docking Window] ⇒ [Input the Configuration Detailed Information]	—
⇒ [Docking Window] ⇒ [Result of Power Supply Capacity and I/O Points Check]	—
⇒ [Docking Window] ⇒ [Module Start I/O No. Related Area]	—
⇒ [Docking Window] ⇒ [(Watch 1 to 4)]	Page 219 Checking Current Values by Registering Devices/Labels
⇒ [Docking Window] ⇒ [Intelligent Function Module Monitor] ⇒ [(Intelligent Function Module Monitor 1 to 10)]	Page 224 Checking Current Values in Intelligent Function Module
⇒ [Zoom] ⇒ [Set Zoom Factor]	—
⇒ [Zoom] ⇒ [Zoom In]	—
⇒ [Zoom] ⇒ [Zoom Out]	—
⇒ [Switch Display Language]	Page 22 Switching Displayed Language
⇒ [Multiple Comment Display Setting]	Page 41 Setting Comment Display
[Online]	
⇒ [Specify Connection Destination]	Page 183 Specification of Connection Destination
⇒ [Read from PLC]	Page 196 Writing/Reading Programmable Controller Data
⇒ [Write to PLC]	
⇒ [Verify with PLC]	Page 204 Verifying Programmable Controller Data
⇒ [Remote Operation]	Page 260 Remote Operation of CPU Module
⇒ [CPU Memory Operation]	Page 261 Checking Memory Usage
⇒ [Delete PLC Data]	Page 196 Configuration of Online Data Operation screen
⇒ [User Data] ⇒ [Read]	Page 209 Reading/Writing/Deleting User Data
⇒ [User Data] ⇒ [Write]	
⇒ [User Data] ⇒ [Delete]	
⇒ [Set Clock]	Page 259 Setting Clock in CPU Module

[Online]	
⇒ [Monitor] ⇒ [Monitor Mode]	Page 109 Read mode/Write mode/Monitor read mode/Monitor write mode
⇒ [Monitor] ⇒ [Monitor (Write Mode)]	
⇒ [Monitor] ⇒ [Start Monitoring (All Windows)]	Page 212 Starting/stopping monitoring
⇒ [Monitor] ⇒ [Stop Monitoring (All Windows)]	
⇒ [Monitor] ⇒ [Start Monitoring]	
⇒ [Monitor] ⇒ [Stop Monitoring]	
⇒ [Monitor] ⇒ [Change Value Format (Decimal)]	Page 212 Changing display format of word devices
⇒ [Monitor] ⇒ [Change Value Format (Hexadecimal)]	
⇒ [Monitor] ⇒ [Device/Buffer Memory Batch Monitor]	Page 217 Checking Device/Buffer Memory in Batch
⇒ [Monitor] ⇒ [Program List Monitor]	Page 222 Checking Processing Time of Program
⇒ [Monitor] ⇒ [Interrupt Program List Monitor]	Page 223 Checking Execution Counts of Interrupt Programs
⇒ [Watch] ⇒ [Start Watching]	Page 219 Checking Current Values by Registering Devices/Labels
⇒ [Watch] ⇒ [Stop Watching]	
⇒ [Watch] ⇒ [Register to Watch Window] ⇒ [(watch window 1 to 4)]	
[Debug]	
⇒ [Simulation] ⇒ [Start Simulation]	Page 181 Starting/Stopping Simulation
⇒ [Simulation] ⇒ [Stop Simulation]	
⇒ [Simulation] ⇒ [Simulation Environmental Setting]	Page 181 Environmental setting
⇒ [Modify Value]	Page 215 Changing current values
⇒ [Change History of Current Value]	
⇒ [Memory Dump] ⇒ [Setting]	Page 226 Saving and Checking Device Value
⇒ [Memory Dump] ⇒ [Read Results]	
⇒ [Memory Dump] ⇒ [Display Result]	
[Diagnostics]	
⇒ [System Monitor]	Page 248 Checking Module Status of System
⇒ [Module Diagnostics (CPU Diagnostics)]	Page 249 Diagnosing CPU Module
⇒ [Ethernet Diagnostics]	Page 251 Ethernet diagnostics
⇒ [CC-Link IE Control Diagnostics (Optical Cable)]	Page 252 CC-Link IE Controller Network diagnostics
⇒ [CC-Link IE Control Diagnostics (Twisted Pair Cable)]	
⇒ [CC-Link IE Field Diagnostics]	Page 254 CC-Link IE Field Network diagnostics
⇒ [CC-Link Diagnostics]	Page 255 CC-Link diagnostics
[Tool]	
⇒ [Check Program]	Page 145 Checking Programs
⇒ [Check Parameter]	Page 78 Checking parameters
⇒ [Module Tool List]	Page 86 Displaying module tool list
⇒ [Register Profile]	Page 67 Registering Profiles
⇒ [Sample Library Registration]	Page 176 Utilizing sample libraries
⇒ [Shortcut Key]	Page 39 Checking and Changing Shortcut Keys
⇒ [Predefined Protocol Support Function]	Page 87 Predefined Protocol Support Function
⇒ [Circuit Trace]	Page 88 Circuit Trace Function
⇒ [Options]	Page 42 Setting Options
[Window]	
⇒ [Cascade]	—
⇒ [Tile Vertically]	
⇒ [Tile Horizontally]	
⇒ [Arrange Icons]	
⇒ [Close All Windows]	
⇒ [Reset Window Layout Back to Initial Status]	
⇒ [Split]	
⇒ [Restore Split]	

[Window]	
⇒ [Floating]	Page 23 Window operation
⇒ [Docking]	
⇒ [(Window information being displayed)]	
⇒ [Window]	
[Help]	
⇒ [GX Works3 Help]	Page 19 Displaying Help
⇒ [Connection to MITSUBISHI ELECTRIC FA Global Website]	Page 19 Connecting to MITSUBISHI ELECTRIC FA Global Website
⇒ [Version Information]	Page 19 Checking version of GX Works3

Applicable menus for Module Configuration Diagram

[Edit]	
⇒ [Delete]	—
⇒ [Select All]	
⇒ [Bring to Front]	
⇒ [Send to Back]	
⇒ [Module Status Setting (Empty)]	Page 71 Module status setting (empty)
⇒ [Display Module Information]	Page 72 Check model names on module objects
⇒ [Check] ⇒ [Power Supply Capacity and I/O Points]	Page 76 Checking power supply capacity and I/O points
⇒ [Check] ⇒ [System Configuration]	Page 76 Checking system configurations
⇒ [Parameter] ⇒ [Fix]	Page 73 Setting parameters on the Module Configuration Diagram
⇒ [Parameter] ⇒ [Input Detailed Configuration Information Window]	—
⇒ [Start XY Batch Input]	Page 76 Inputting start XY in batch
⇒ [Default Points Batch Input]	Page 76 Inputting default points in batch
[View]	
⇒ [Toolbar] ⇒ [Module Configuration Diagram]	—
[Online]	
⇒ [Read Module Configuration from PLC]	Page 71 Reading module configuration from actual system

Applicable menus for parameter editor

[Edit]	
⇒ [Set Maximum Value]	The menus to be displayed differ depending on the module.
⇒ [Set Minimum Value]	
⇒ [Copy Positioning Data]	
⇒ [Paste Positioning Data]	
⇒ [Channel Copy]	
⇒ [Copy Axis]	
⇒ [Refresh Batch Setting] ⇒ [Enable All]	
⇒ [Refresh Batch Setting] ⇒ [Disable All]	
⇒ [Refresh Batch Setting] ⇒ [Back to User Default]	
⇒ [Auto-assignment]	
⇒ [Setting Method] ⇒ [Start/End]	
⇒ [Setting Method] ⇒ [Points/Start]	
⇒ [Device Assignment Method] ⇒ [Start/End]	
⇒ [Device Assignment Method] ⇒ [Points/Start]	
⇒ [Word Device Setting Value Input Format] ⇒ [Decimal]	
⇒ [Word Device Setting Value Input Format] ⇒ [Hexadecimal]	
⇒ [IP Address Input Format] ⇒ [Decimal]	
⇒ [IP Address Input Format] ⇒ [Hexadecimal]	

Applicable menus for ladder editor

[Edit]	
⇒ [Continuous Paste]	Page 123 Pasting device number/label name consecutively
⇒ [Insert and Paste]	Page 122 Pasting elements
⇒ [Delete]	—
⇒ [Insert Row]	
⇒ [Delete Row]	
⇒ [Insert Column]	
⇒ [Delete Column]	
⇒ [NOP Batch Insert]	Page 122 Inserting/deleting NOP instruction
⇒ [NOP Batch Delete]	
⇒ [Ladder Edit Mode] ⇒ [Read Mode]	Page 109 Read mode/Write mode/Monitor read mode/
⇒ [Ladder Edit Mode] ⇒ [Write Mode]	Monitor write mode
⇒ [Ladder Symbol] ⇒ [Open Contact]	—
⇒ [Ladder Symbol] ⇒ [Close Contact]	
⇒ [Ladder Symbol] ⇒ [Open Branch]	
⇒ [Ladder Symbol] ⇒ [Close Branch]	
⇒ [Ladder Symbol] ⇒ [Coil]	
⇒ [Ladder Symbol] ⇒ [Application Instruction]	
⇒ [Ladder Symbol] ⇒ [Vertical Line]	
⇒ [Ladder Symbol] ⇒ [Horizontal Line]	
⇒ [Ladder Symbol] ⇒ [Delete Vertical Line]	
⇒ [Ladder Symbol] ⇒ [Delete Horizontal Line]	
⇒ [Ladder Symbol] ⇒ [Pulse Contact Symbol] ⇒ [Rising Pulse]	
⇒ [Ladder Symbol] ⇒ [Pulse Contact Symbol] ⇒ [Falling Pulse]	
⇒ [Ladder Symbol] ⇒ [Pulse Contact Symbol] ⇒ [Rising Pulse Branch]	
⇒ [Ladder Symbol] ⇒ [Pulse Contact Symbol] ⇒ [Falling Pulse Branch]	
⇒ [Ladder Symbol] ⇒ [Pulse Contact Symbol] ⇒ [Rising Pulse Close]	
⇒ [Ladder Symbol] ⇒ [Pulse Contact Symbol] ⇒ [Falling Pulse Close]	
⇒ [Ladder Symbol] ⇒ [Pulse Contact Symbol] ⇒ [Rising Pulse Close Branch]	
⇒ [Ladder Symbol] ⇒ [Pulse Contact Symbol] ⇒ [Falling Pulse Close Branch]	
⇒ [Ladder Symbol] ⇒ [Invert Operation Results]	
⇒ [Ladder Symbol] ⇒ [Operation Result Rising Pulse]	
⇒ [Ladder Symbol] ⇒ [Operation Result Falling Pulse]	
⇒ [Inline Structured Text] ⇒ [Insert Inline Structured Text Box]	Page 116 Inserting inline structured text
⇒ [Inline Structured Text] ⇒ [Display Template]	Page 129 Displaying syntax templates
⇒ [Inline Structured Text] ⇒ [Mark Template (Left)]	
⇒ [Inline Structured Text] ⇒ [Mark Template (Right)]	
⇒ [Inline Structured Text] ⇒ [Register Label]	Page 129 Registering undefined labels
⇒ [Inline Structured Text] ⇒ [Comment Out of Selected Range]	Page 129 Batch comment out/uncomment of a program
⇒ [Inline Structured Text] ⇒ [Disable Comment Out of Selected Range]	
⇒ [Edit FB Instance]	Page 113 Editing FB instance names
⇒ [Change FB/FUN Data]	Page 113 Replacing FB instances Page 115 Replacing functions
⇒ [I/O Argument] ⇒ [Increment Argument]	Page 115 Adding/deleting arguments
⇒ [I/O Argument] ⇒ [Delete Argument]	
⇒ [Documentation] ⇒ [Edit Device/Label Comment]	Page 118 Entering/editing comments
⇒ [Documentation] ⇒ [Edit Statement]	Page 119 Entering/editing statements
⇒ [Documentation] ⇒ [Edit Note]	Page 121 Entering/editing notes
⇒ [Documentation] ⇒ [Delete Device/Label Comment]	—
⇒ [Documentation] ⇒ [Statement/Note Batch Edit]	Page 119 Entering/editing statements Page 121 Entering/editing notes
⇒ [Documentation] ⇒ [Show/Hide of Navigation Window]	Page 120 Line statement to be displayed in the tree

[Edit]	
⇒ [Easy Edit] ⇒ [Connect Horizontal Line to Right-Side Ladder Symbol]	—
⇒ [Easy Edit] ⇒ [Connect Horizontal Line to Left-Side Ladder Symbol]	
⇒ [Easy Edit] ⇒ [Enter/Delete Horizontal Line to Rightward]	
⇒ [Easy Edit] ⇒ [Enter/Delete Horizontal Line to Leftward]	
⇒ [Easy Edit] ⇒ [Enter/Delete Vertical Line to Downward]	
⇒ [Easy Edit] ⇒ [Enter/Delete Vertical Line to Upward]	
⇒ [Easy Edit] ⇒ [Switch Ladder Symbol Invert]	
⇒ [Easy Edit] ⇒ [Switch Pulse/Switch SET and RST Instructions]	
⇒ [Easy Edit] ⇒ [Change Statement/Note Type]	
⇒ [Easy Edit] ⇒ [Instruction Partial Edit]	

[Find/Replace]	
⇒ [Line Statement List]	Page 120 Displaying list
⇒ [Jump]	Page 124 Jump
⇒ [Jump to Next Ladder Block Start]	—
⇒ [Jump to Previous Ladder Block Start]	

[View]	
⇒ [Toolbar] ⇒ [Ladder]	—
⇒ [Comment Display]	Page 118 Entering/editing comments
⇒ [Statement Display]	Page 119 Entering/editing statements
⇒ [Note Display]	Page 121 Entering/editing notes
⇒ [Display Lines of Monitored Current Value]	—
⇒ [Display Format for Device Comment]	
⇒ [Change Display Format of Device/Label Name] ⇒ [1 Cell Display]	Page 106 Configuration of ladder editor
⇒ [Change Display Format of Device/Label Name] ⇒ [Wrapping Ladder Display]	
⇒ [Outline] ⇒ [Expand/Collapse of Outlines]	—
⇒ [Outline] ⇒ [Expand/Collapse of All Outlines]	
⇒ [Outline] ⇒ [Show/Hide of Outlines]	Page 106 Configuration of ladder editor
⇒ [Display Device]	
⇒ [Text Size] ⇒ [Bigger]	—
⇒ [Text Size] ⇒ [Smaller]	
⇒ [Open Label Setting of Selected Element] ⇒ [Open in Front]	
⇒ [Open Label Setting of Selected Element] ⇒ [Tile Horizontally]	
⇒ [Open Program Body of Selected Element] ⇒ [Open in Front]	
⇒ [Open Program Body of Selected Element] ⇒ [Tile Horizontally]	
⇒ [Open Label Setting] ⇒ [Open in Front]	
⇒ [Open Label Setting] ⇒ [Tile Horizontally]	
⇒ [Instruction Help]	Page 123 Displaying instruction help

Applicable menus for ST editor

[Edit]	
⇒ [Delete]	—
⇒ [Comment Out of the Selected Range]	Page 129 Batch comment out/uncomment of a program
⇒ [Disable Comment Out of Selected Range]	
⇒ [Register Label]	Page 129 Registering undefined labels
⇒ [Display Template]	Page 129 Displaying syntax templates
⇒ [Mark Template (Left)]	
⇒ [Mark Template (Right)]	

[Find/Replace]	
⇒ [Jump]	Page 130 Jump

[View]	
⇒ [Toolbar] ⇒ [ST]	—
⇒ [Open Label Setting of Selected Element] ⇒ [Open in Front]	
⇒ [Open Label Setting of Selected Element] ⇒ [Tile Horizontally]	
⇒ [Open Program of Selected Element] ⇒ [Open in Front]	
⇒ [Open Program of Selected Element] ⇒ [Tile Horizontally]	
⇒ [Open Label Setting] ⇒ [Open in Front]	
⇒ [Open Label Setting] ⇒ [Tile Horizontally]	
⇒ [Outline] ⇒ [Expand/Collapse of Outlines]	
⇒ [Outline] ⇒ [Expand/Collapse of All Outlines]	
⇒ [Outline] ⇒ [Show/Hide of Outlines]	Page 125 Configuration of ST editor

Applicable menus for FBD/LD editor

[Edit]	
⇒ [Delete]	—
⇒ [Select Network]	
⇒ [Add Element] ⇒ [Open Contact]	
⇒ [Add Element] ⇒ [Close Contact]	
⇒ [Add Element] ⇒ [Open Branch]	
⇒ [Add Element] ⇒ [Close Branch]	
⇒ [Add Element] ⇒ [Coil]	
⇒ [Add Element] ⇒ [Left Power Rail]	
⇒ [Add Element] ⇒ [Pulse Contact Symbol] ⇒ [Rising Pulse]	
⇒ [Add Element] ⇒ [Pulse Contact Symbol] ⇒ [Falling Pulse]	
⇒ [Add Element] ⇒ [Pulse Contact Symbol] ⇒ [Rising Pulse Branch]	
⇒ [Add Element] ⇒ [Pulse Contact Symbol] ⇒ [Falling Pulse Branch]	
⇒ [Add Element] ⇒ [Pulse Contact Symbol] ⇒ [Rising Pulse Close]	
⇒ [Add Element] ⇒ [Pulse Contact Symbol] ⇒ [Falling Pulse Close]	
⇒ [Add Element] ⇒ [Pulse Contact Symbol] ⇒ [Rising Pulse Close Branch]	
⇒ [Add Element] ⇒ [Pulse Contact Symbol] ⇒ [Falling Pulse Close Branch]	
⇒ [Add Element] ⇒ [Open Contact and Coil]	
⇒ [Add Element] ⇒ [Variable]	
⇒ [Add Element] ⇒ [Connector]	
⇒ [Add Element] ⇒ [Jump]	
⇒ [Add Element] ⇒ [Jump Label]	
⇒ [Add Element] ⇒ [Return]	
⇒ [Add Element] ⇒ [Comment]	
⇒ [Change Name]	
⇒ [Change FB/FUN Data]	Page 135 Replacing function element/function block element
⇒ [Update FB/FUN]	Page 136 Updating undefined FB/FUN
⇒ [I/O Argument] ⇒ [Increment Argument]	Page 135 Adding/deleting arguments
⇒ [I/O Argument] ⇒ [Delete Argument]	
⇒ [Easy Edit] ⇒ [Invert Contact (Open/Close)]	Page 136 Inverting contact on the input/output
⇒ [Easy Edit] ⇒ [Switch Pulse]	—
⇒ [Easy Edit] ⇒ [Switch SET and RST]	

[View]	
⇒ [Toolbar] ⇒ [FBD/LD]	—
⇒ [Comment]	
⇒ [Display Execution Order]	
⇒ [Open Label Setting of Selected Element] ⇒ [Open in Front]	
⇒ [Open Label Setting of Selected Element] ⇒ [Title Horizontally]	
⇒ [Open Program Body of Selected Element] ⇒ [Open in Front]	
⇒ [Open Program Body of Selected Element] ⇒ [Title Horizontally]	
⇒ [Open Label Setting] ⇒ [Open in Front]	
⇒ [Open Label Setting] ⇒ [Title Horizontally]	

Applicable menus for label editors (global label, local label, task, structure)

[Edit]	
⇒ [Delete]	—
⇒ [Select All]	
⇒ [New Declaration (Before)]	Page 91 Editing rows
⇒ [New Declaration (After)]	
⇒ [Delete Row]	
⇒ [Import File]	Page 97 Importing/exporting files
⇒ [Export to File]	
⇒ [System Label] ⇒ [Reservation to Register System Label]	Page 100 Registering labels in system label database
⇒ [System Label] ⇒ [Reservation to Release System Label]	Page 100 Releasing system labels
⇒ [System Label] ⇒ [Import System Label]	Page 100 Importing system labels in system label database to GX Works3
⇒ [System Label] ⇒ [Reflect to System Label Database]	Page 100 Registering labels in system label database
⇒ [System Label] ⇒ [Check the changes of the System Label Database]	Page 101 Importing the changes of system label database
⇒ [System Label] ⇒ [Execute Verification Synchronous with System Label]	Page 101 Verifying system label information
⇒ [Copy Device Comment]	Page 96 Copying device comments
⇒ [Delete Blank Rows]	Page 91 Moving a row upward

[View]	
⇒ [Toolbar] ⇒ [Label]	—
⇒ [Show/Hide of Label Item]	
⇒ [Display Program Editor]	

Applicable menus for device memory editor

[Edit]	
⇒ [Delete]	—
⇒ [Enter Character String]	Page 155 Setting character strings
⇒ [Clear All (All Devices)]	Page 155 Clearing whole memory of device memory
⇒ [Clear All (Displayed Devices)]	
⇒ [FILL]	Page 154 Setting values in batch
⇒ [Register/Import Device Initial Value]	Page 156 Interaction with device initial value

[View]	
⇒ [Display Format Detailed Setting]	—

Applicable menus for device comment editor

[Edit]	
⇒ [Delete]	—
⇒ [Select All]	
⇒ [Detect the Mismatched Comment]	Page 141 Detecting devices with empty cell
⇒ [Read from Sample Comment]	Page 144 Reading sample comments

[Edit]	
⇒ [Delete Unused Device Comment]	Page 142 Deleting unused device comments
⇒ [Clear All (All Devices)]	Page 142 Clearing all device comments
⇒ [Clear All (Displayed Devices)]	
⇒ [Import File]	Page 143 Importing to/exporting from files
⇒ [Export to File]	
⇒ [Hide All Bit Specification Information]	—
⇒ [Show All Bit Specification Information]	
⇒ [Cut the Range Including Hidden Bit Specification Information]	Page 141 Creating device comments
⇒ [Copy the Range Including Hidden Bit Specification Information]	
⇒ [Paste the Range Including Hidden Bit Specification Information]	

Applicable menus for Verify Result screen

[Edit]	
⇒ [Export to File]	Page 67 Exporting data to file
[Find/Replace]	
⇒ [Next Unmatched]	Page 66 Checking verification result
⇒ [Previous Unmatched]	
[View]	
⇒ [Return to Result List]	—
⇒ [Close Detailed Result]	
⇒ [Close All Detailed Result]	

Applicable menus for Device/Buffer Memory Batch Monitor screen

[View]	
⇒ [Display Format Detailed Setting]	—

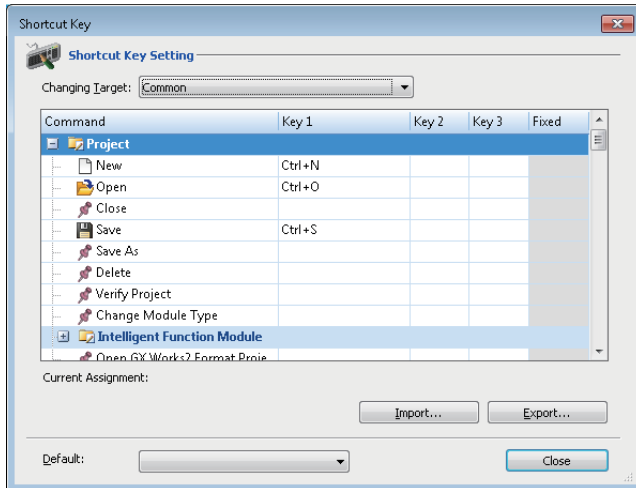
2.5 Checking and Changing Shortcut Keys

The shortcut keys of each function can be checked and changed on the "Shortcut Key" screen.
Up to 3 shortcut keys can be assigned to one command.

2

Window

[Tool] ⇒ [Shortcut Key]



Operating procedure

1. Double-click the command cell that will change the shortcut key to edit.
2. Press the key to be assigned on the keyboard.
3. Click the [Close] button.

Change to default setting

The assignment of the shortcut keys can be changed to the default format by selecting the format from "Default" pull-down list.
The available formats are as follows:

- Change to GX Works3 Format: Change to the default setting.
- Change to GPPA Format: Batch change the shortcut key setting of all command keys to the same setting of GPPA
- Change to GPPW Format: Batch change the shortcut key setting of all command keys to the same setting of GX Developer.
- Change to MEDOC Format: Batch change the shortcut key setting of all command keys to the same setting of MELSEC MEDOC.

Point

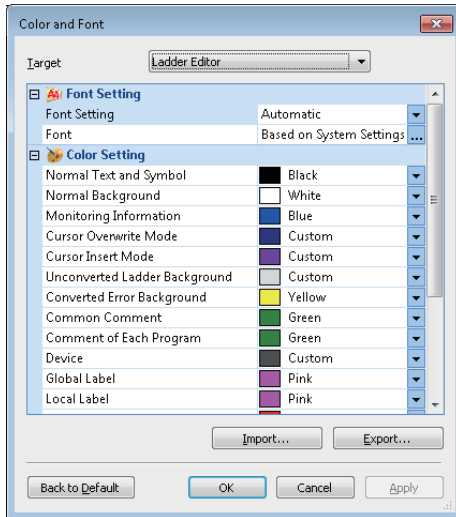
By importing the exported file (*. gks), the settings can be utilized in other personal computers.
The setting files exported from GX Works2 can be imported.

2.6 Checking and Changing Colors and Fonts

The colors and fonts used in each editor can be checked and changed on the "Color and Font" screen. The changed color and font settings are saved in a logon user unit.

Window

[View] ⇒ [Color and Font]



Operating procedure

1. Select "User Setting" in the pull-down list of "Font Setting".
2. Set the items on the "Font" screen, and click the [OK] button.
3. Select the color from "Color Setting" to be changed, and click the [Apply] button.
4. Click the [OK] button.

Point

By importing the exported file (*. gcs), the settings can be utilized in other personal computers. The setting files exported from GX Works2 can be imported. However, the name of the color may differ.

Precautions

Some fonts may be displayed as garbled characters. Change the setting to another font if this happens.

2.7 Setting Comment Display

Create multiple comments and select the comments to be displayed on each editor and each monitor screen on the "Multiple Comments Display Setting" screen.

Only 5 comment titles (number 1 to 5) can be set.

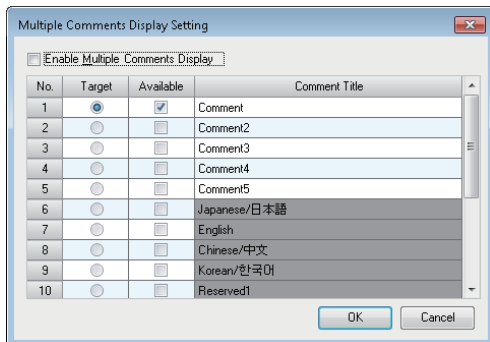
The comment number 6 to 9 are used for entering comments of predefined language.

Do not use the range of comment number 10 to 16 (Reserved1 to Reserved7).

2

Window

[View] ⇒ [Multiple Comment Display Setting]



Operating procedure

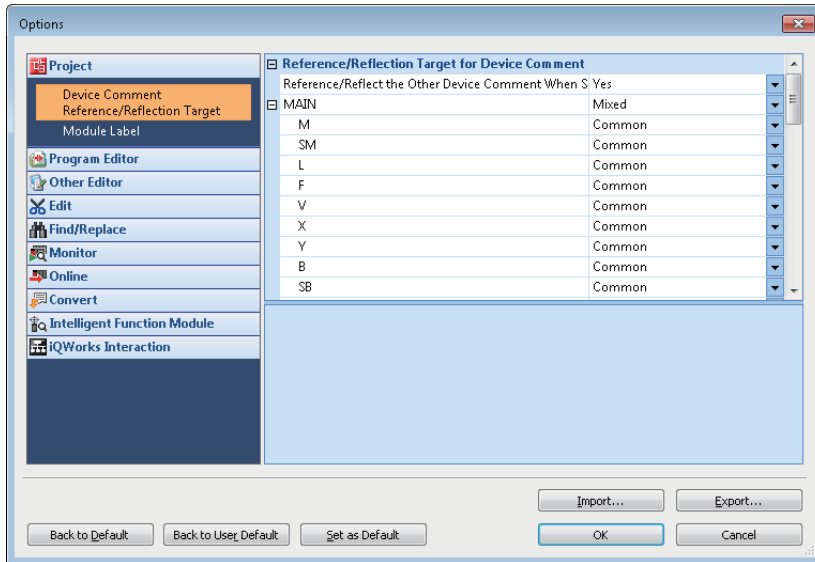
1. Select "Enable Multiple Comments Display".
2. Select "Available", and enter a comment title.
3. Select the comment to be displayed on the program editor or each monitor screen in "Target", click the [OK] button.
4. Enter comments in each row on the device comment editor.

2.8 Setting Options

Some functions and editors have an option setting function. Changing option settings enables the change of a screen display format and the settings of detailed operation for each function.

Window

[Tool] ⇒ [Options]



Operating procedure

Set the items and click the [OK] button.

Point

By importing the exported file (*. gos), the settings can be utilized in other personal computers.
The setting files exported from GX Works2 can be imported.
The setting items set to "Project" ⇒ "Device Comment Reference/Reflection Target" are not exported.

Precautions

After changing the following option setting, performing "Rebuild All" is required.

- [Tool] ⇒ [Options] ⇒ "Other Editor" ⇒ "Label Editor Common" ⇒ "Data Type Setting"

As a precautionary measure, perform the following operation before switching the CPU module to RUN.

1. Reset the CPU module.
2. Clear values of devices/labels to '0' (Including latch).
3. Clear values of file registers to '0'.

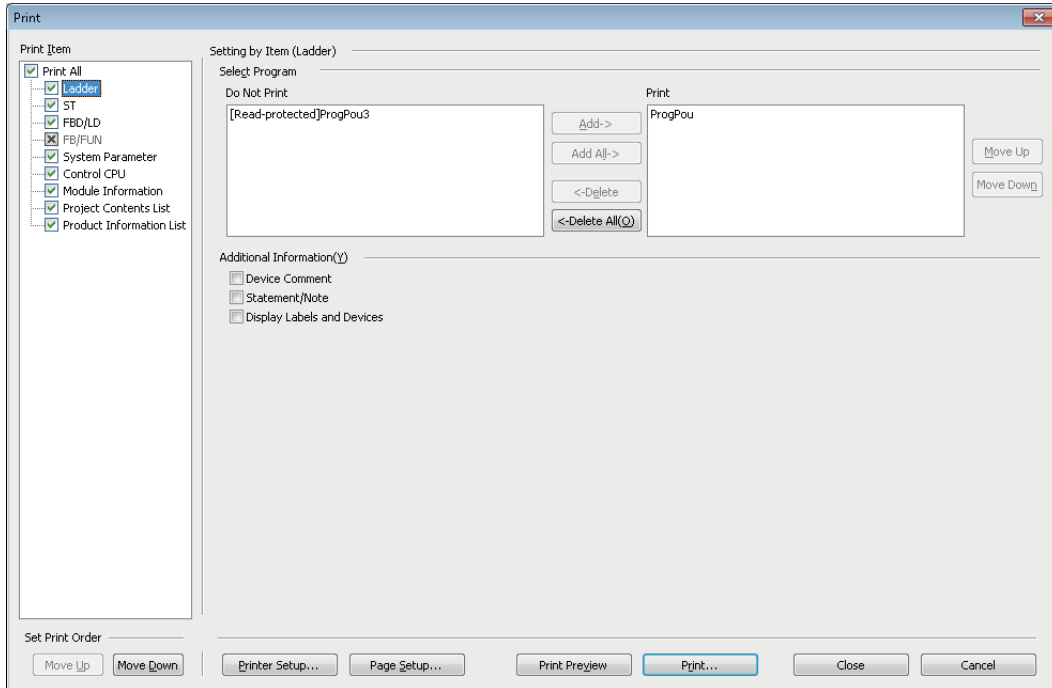
2.9 Printing Data

This section explains how to print the data created in GX Works3.

Window

[Project] ⇒ [Print] (🖨️)

2



When no data exist or only read protect data exist in "Print" and "Do Not Print" list, × is displayed on the checkbox of the Print Item.

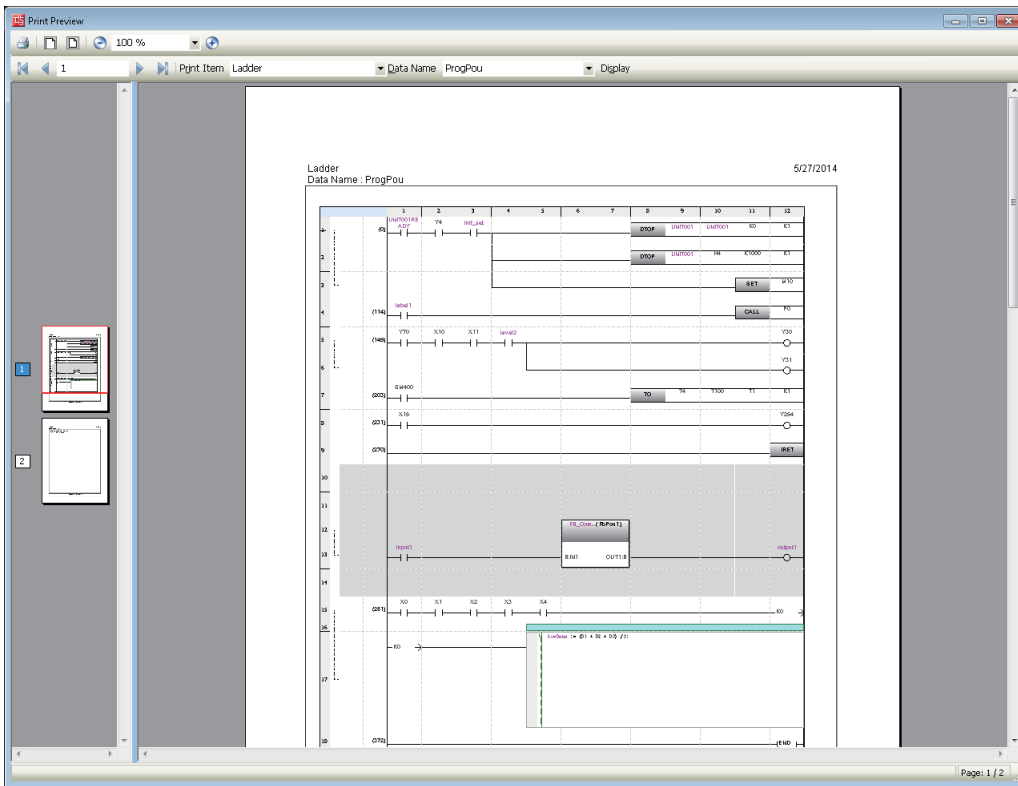
Operating procedure

1. Select the data to be printed, and configure each setting.
2. Set the printer and page by clicking the [Printer Setup] button and [Page Setup] button.
3. Click the [Print] button.

Previewing print images

Check the print images of each data.

Window



Operating procedure

1. Select [Project] ⇒ [Print Preview].
2. Click the [Print Preview] button on the "Print" screen.
3. When switching the data to be previewed, select "Print Item" and "Data Name", and click the [Display] button.

Considerations

■ Display of print previews and printing data

Displaying print previews and printing data cannot be performed in the following situations.

- The print target data do not exist
- The print target screen is being monitored (Start printing after stopping the monitoring.)

■ Printing large volume data

Large volume data may not be printed at all or printed half way due to the limitations of printer driver or Windows® print spooler. In this case, print the data by any of the following methods.

- Split the data by setting a print range
- Select "Print directly to the printer" in the [Advanced] tab of the property screen (select [Control Panel] ⇒ [Devices and Printers] from Windows® Start*1)
- Set "Output by Item" for the print job output on the "Printer Setup" screen.

*1 Select [All apps] on the Start screen or [Start] ⇒ [All Programs].

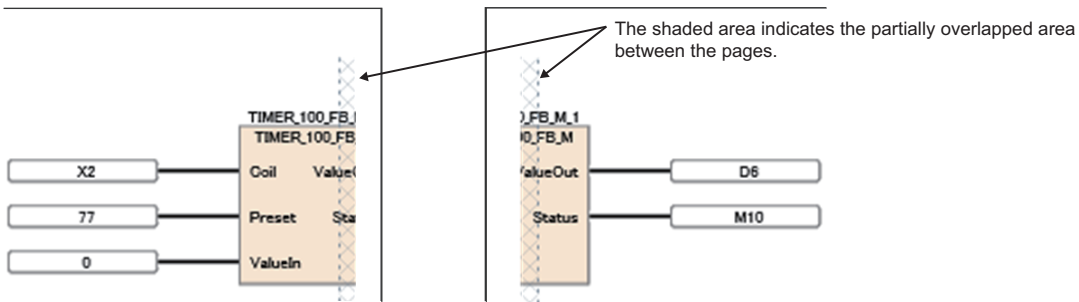
■Outputting the print contents on a file

- When the print content is output to a file, the "Save As" screen may be displayed in the background of other screen.
Press the **Alt** and **Tab** keys or **Alt** and **Esc** keys to bring the screen in the foreground.
- GX Works3 does not respond when the GX Works3 operation is performed while the "Save As" screen is displayed.
When the message is displayed, select "Wait for the program to respond". Selecting "Close the program" results in loss of unsaved data.

■Printing FBD/LD programs

Since elements can be placed at will on the FBD/LD editor, an element may be divided into several pages and printed out as shown below.

Displays print previews and check the image before printing out the data.



■Printing the product information list

The information in the specified CSV file is printed out within the range of 500 rows × 20 columns.

PART 2

SYSTEM DESIGN AND SETTINGS

This part explains the system design such as project management and parameter/label settings.

3 PROJECT MANAGEMENT

4 CREATING MODULE CONFIGURATION DIAGRAM AND SETTING PARAMETERS

5 REGISTERING LABELS

3 PROJECT MANAGEMENT

This chapter explains basic operations and management of projects.

3.1 Project Files and Data Configuration

The projects created in GX Works3 are saved in the workspace format or the single file format. The data created in the project are displayed on the Project view.

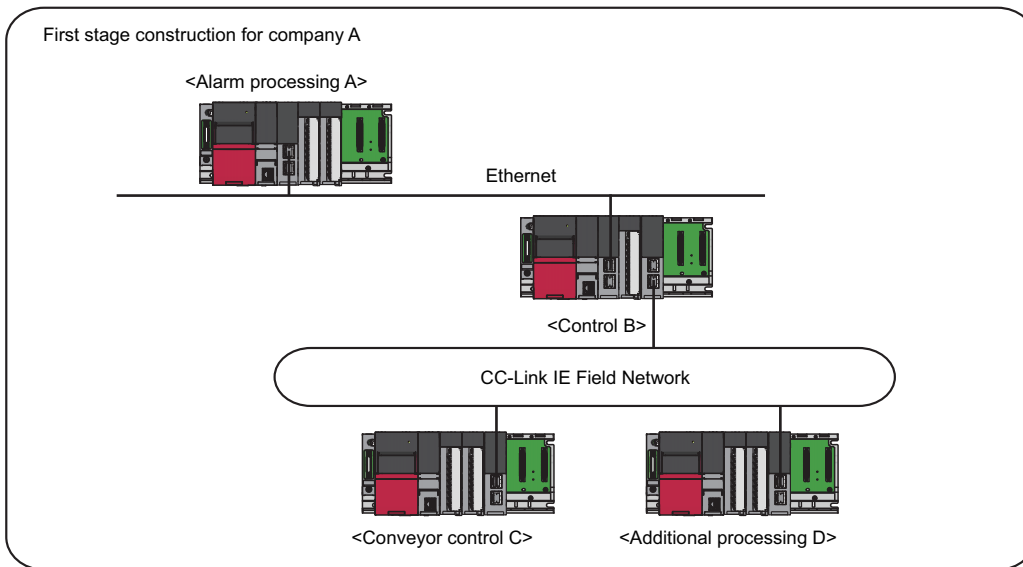
File format

Workspace format

A workspace manages multiple projects at once.

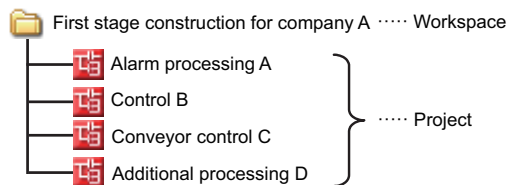
When configuring a system containing multiple CPU modules, a project needs to be created for each CPU module. However, by saving projects in the workspace format, projects in the same system can be managed.

<System configuration example>

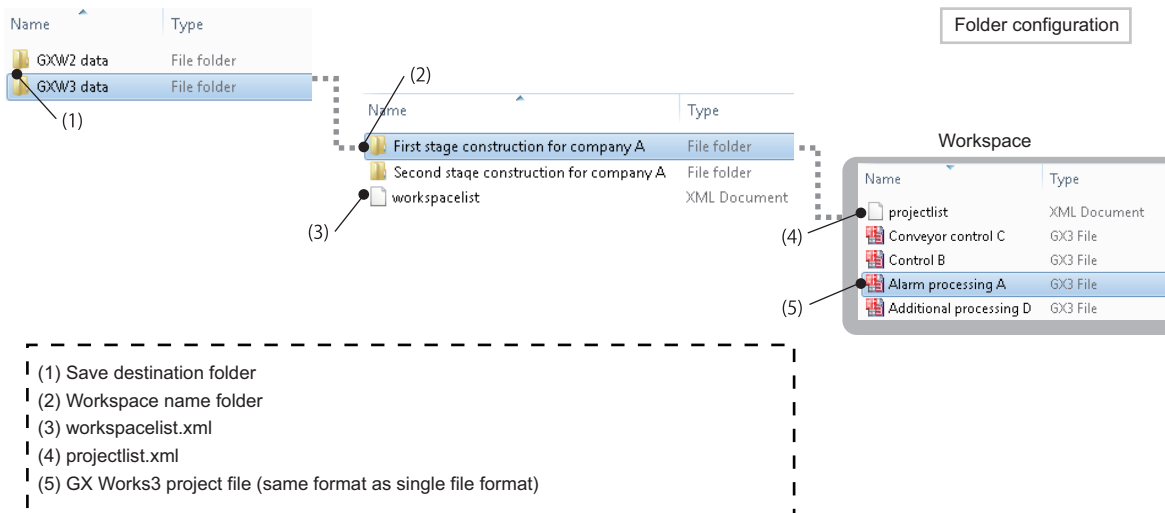


Batch-manage projects in the workspace format

<GX Works3 project management>



■ Configuration of workspace/project



● When editing configurations or names

Do not change or delete workspace configuration or project names using an application such as Windows® Explorer. The projects without containing actual data may remain in a project list of the function such as the "Open Project" function. (Select [Project] ⇒ [Delete] to delete the project.)

● When copying a project

For copying a project using Windows® Explorer, perform either of the following operations.

The configuration of workspace/project will not be collapsed.

- Copy the entire save destination folder ((1) above).
- Copy the target workspace name folder ((2) above) and "workspacelist.xml" ((3) above).
- Copy the GX Works3 project file that has the same name.

Single file format

Single file format is a format that does not need a workspace.

Projects can be managed without being aware of the folder configuration and the file configuration by saving projects in the single file format.

Thereby, operations such as changing project names, copying and pasting projects, and sending and receiving data, can easily be performed using an application such as Windows® Explorer.


Data configuration

Data displayed on the Project view

The data displayed on the Project view in tree format are as shown below. (The data names are default.)

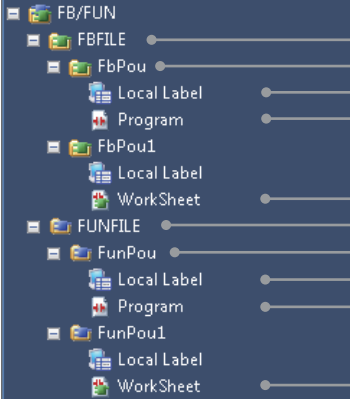
Module configuration data

Creation method: [Page 69 Creating Module Configuration Diagram](#)

Figure	Item	Description
 Module Configuration	Module Configuration Diagram	A data that displays target system of a project graphically.

Program data

Creation method: [Page 61 Managing Project Data](#)

Figure	Item	Description	
 <ul style="list-style-type: none"> Execution type Program file Program block Local label Program Worksheet (Program) Execution type Unregistered program 	Execution types	A setting for when a program operates. When executing programs in CPU module, registering to any of the execution types is required. Page 104 Setting method	
	Program file	A file that manages programs. Create the file in unit of execution process. The created files are written to a CPU module in unit of program files.	
	Program block (POU)	A data that composes a program.	
	Local label	A label data that can be used only in the defined program block.	
	Program	A program data that is created using Ladder Diagram or Structured Text.	
	Worksheet (Program)	A program data that is created using Function Block Diagram/Ladder Diagram.	
	Unregistered program	A folder that temporarily stores program files of which execution type is undefined. The stored program files will not be executed even when writing them to a programmable controller.	
	 <ul style="list-style-type: none"> FB file Function block Local label Program Worksheet (Program) FUN file Function Local label Program Worksheet (Program) Function (POU) Local label Program Worksheet (Program) 	FB file	A file that manages function blocks. The FB files are written to a CPU module in unit of FB file. Page 172 Creating Function Blocks
		Function block (POU)	A data that configures the program of function block.
		Local label	A label data that can be used only in the defined function block.
Program		A function block data that is created using Ladder Diagram or Structured Text. This data is referred to as 'FB program' in this manual.	
Worksheet (Program)		A function block data that is created using Function Block Diagram/Ladder Diagram.	
FUN file		A file that manages functions. The function files are written to a CPU module in unit of FUN file. Page 177 Creating Functions	
Function (POU)		A data that configures programs of function.	
Local label		A label data that can be used only in the defined function.	
Program		A function data that is created using Ladder Diagram or Structured Text. This data is referred to as 'FUN program' in this manual.	
Worksheet (Program)		A function data that is created using Function Block Diagram/Ladder Diagram.	

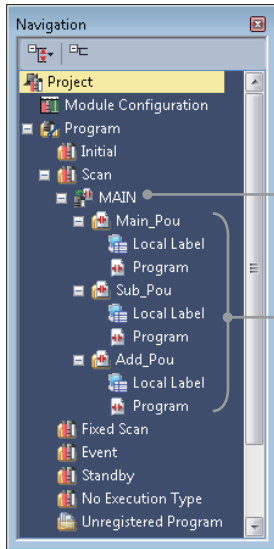
Precautions

The program blocks in the program file is executed in order of the name of the program blocks.

When changing the execution order of the programs, change the program name on the Project view.

The execution order of the program can be checked by right-clicking the program file and select [Sort] ⇒ [Name] to sort the program block names in ascending order.

Ex.



Program file

Program block

The program blocks in the figure execute in the following order.

- 1 Add_Pou
- 2 Main_Pou
- 3 Sub_Pou

Label data

Creation method: Page 61 Managing Project Data

Figure	Item	Description
	Global label	A label data that can be accessed from all the program blocks and function blocks in the project. Page 90 Registering Labels
	Module label	A label to access I/O signals or buffer memory of modules. Page 98 Registering Module Labels
	System structure	A structure registered in the system label database.
	Defined structure	A data that defines structure as data type. This can be used as a data type for all labels which can be defined in the project except for recursive definitions in the defined structure.
	Structures required for module labels	The structures required for module labels are registered automatically.

Device data

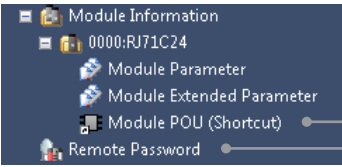
Creation method: Page 61 Managing Project Data

Figure	Item	Description
	Each program device comment	A device comment data that can be used in the program files which have the same name. Page 138 Registering Device Comments
	Common device comment	A device comment data that can be commonly used in multiple programs. Page 138 Registering Device Comments
	Device memory	A data that includes the values to be written to/read from devices in a CPU module. Page 151 SETTING DEVICE MEMORY
	Device initial value	A data that defines values which are set to devices when CPU module is in RUN. Page 157 SETTING DEVICE INITIAL VALUES

Parameter data

The structure of the tree and the creation methods: [Page 77 Setting Parameters](#)

Other data


Figure	Item	Description
 <p>Module Information 0000:RJ71C24 Module Parameter Module Extended Parameter Module POU (Shortcut) — Module POU (Shortcut) Remote Password — Remote password</p>	Module POU (Shortcut)	A shortcut to the module POU that has been registered to the Element Selection window.
	Remote password	By setting a password for the CPU module, accessing from the modules other than specified RJ71EN71, serial communication module, and built-in Ethernet CPU can be prohibited. Page 245 Restricting Access from Other Than Specific Communication Route

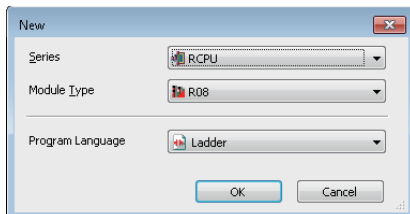
3.2 Creating Project Files

This section explains basic operations of GX Works3 such as creating, opening, and saving projects.

Creating projects

Window

[Project] ⇒ [New] ()



When the series (QCPU (Q mode), LCPU, FXCPU) which are not supported by GX Works3 is selected, GX Works2 is started up and create a new project in it.

Operating procedure

Set the items and click the [OK] button.

Restriction


When GX Works2 is installed on the personal computer, it will be started up automatically.

If it is not installed, execute the 'setup.exe' in the installation DVD-ROM (Disc 2) of GX Works3.

Creating new project by data read from programmable controller

When the Read from PLC function is performed without creating a new project, a new project is created by data read from the CPU module and Intelligent function modules.

Operating procedure

1. Start GX Works3 and select [Online] ⇒ [Read from PLC] ().
2. Select the series to be read on the "Series Selection" screen, and click the [OK] button.
3. Set the communication route to access the CPU module on the "Specify Connection Destination" screen, and click the [OK] button.
4. Perform the Read from PLC function on the "Online Data Operation" screen.

For the method for performing the Read from PLC function on the "Online Data Operation" screen, refer to the following section.

 Page 201 Reading data from programmable controller

Precautions

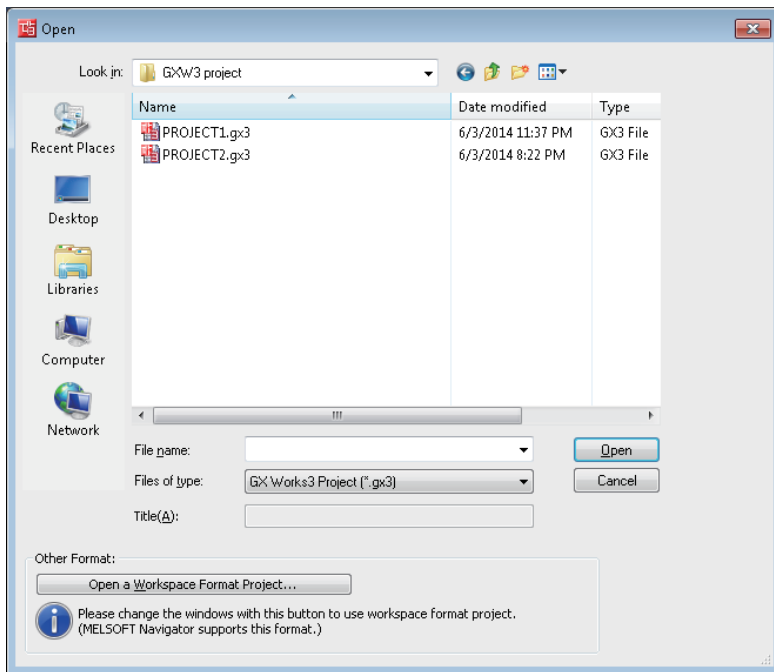
When parameters are not read from the programmable controller with data to create a new project, default parameters will be set. Check the parameter setting.

Opening projects

Read the project saved on the personal computer or another data storage device.

Window

[Project] ⇒ [Open] (📁)



Operating procedure

Set the items and click the [Open] button.

Precautions

■ Changing work space name and folder configuration

Do not change the file names and storage location of a workspace and project folders and files using an application such as Windows® Explorer.

■ Opening projects being edited by other users

The project can be opened as a read-only project. However, the following functions cannot be used.

- Saving projects
- Changing module type

■ Projects saved on a network drive or a removal media

Do not open the project directly. Open it after saving it to the personal computer or another data storage device.

■ Project including FBD/LD programs

A project cannot be opened with GX Works3 of which version is 1.006G or earlier.

Opening GX Works2 format projects

Open a project created in GX Works2 by changing the module type with GX Works3.

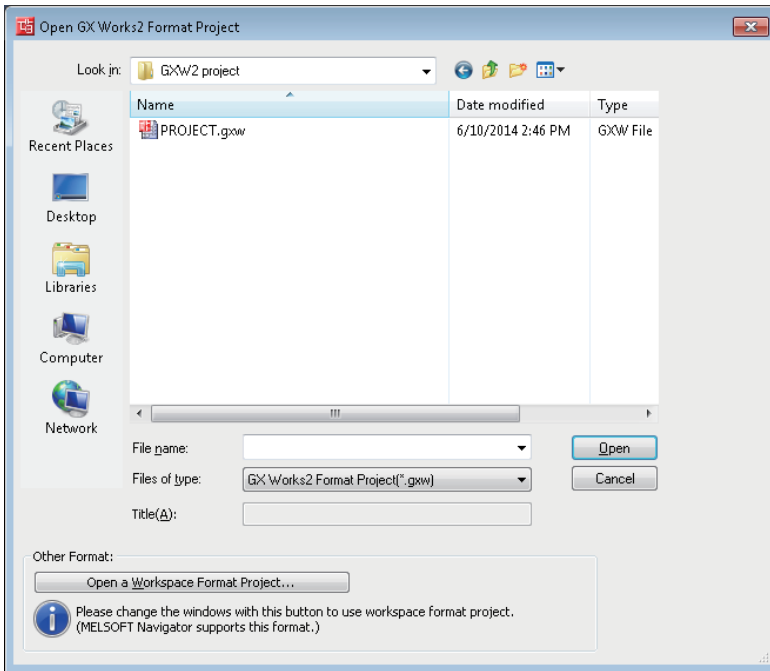
This function supports only projects created with Universal model QCPU/High-speed universal model QCPU/FXCPU (FX3U/FX3UC).

After changing the module type, QCPU will be R120CPU, and FXCPU will be FX5UCPU.

Window

[Project] ⇒ [Open GX Works2 Format Project]

3



Operating procedure

1. Specify the project and click the [Open] button.
2. Read the displayed message, and click the [OK] button.

The changed content of the project data is displayed on the Output window.

Precautions

- If a program that contains a compilation error exists in GX Works2, the project cannot be opened. Check if the program can be compiled in GX Works2.
- The project to which the user management or access authority is set cannot be opened. Clear the setting in GX Works2.
- Once the module type is changed, "Label Area Capacity" and "Latch Label Area Capacity" of the CPU parameters are set to "0 K Word". Set the capacity in accordance with the label capacity of the project.

■Data that is changed at changing module type

Operation at changing module type	Setting items of GX Works2		Remarks	
Changed in accordance with the target module type	• PLC Parameter	PLC System ^{*1,*2}	Check the settings after the change.	
		PLC File ^{*1}		
		PLC RAS ^{*1}		
		Program ^{*1}		
		Device ^{*1,*2}		
		I/O Assignment ^{*3}		
		Multiple CPU Setting ^{*1,*3}		
	• Network Parameter	CC-Link IE setting		
		Ethernet setting		
		CC-Link setting ^{*2}		
	• Intelligent Function Module ^{*1,*2}	Switch Setting		
		Parameter		
		Auto Refresh		
<ul style="list-style-type: none"> • FB/FUN • Structured Ladder/FBD program^{*4} • Device comment for devices other than SM/SD^{*5} 				
Returns to default/ Data are deleted	• PLC Parameter	PLC Name	Set with GX Works3.	
		PLC RAS		
		Boot File		
		Built-in Ethernet Port Setting		
	<ul style="list-style-type: none"> • Options (other than "Device Comment Reference/Reflection Target") • System label • Device comments of SM/SD^{*5} • Connection destination • Remote password 			
Deleted	• PLC Parameter	Communication Head Setting	Not supported by GX Works3.	
		SFC		
		Built-in I/O Function Setting		
		Serial Communication		
		Built-in Serial Setting		
		Adapter Serial Setting		
		Memory Capacity		
		Special Function Block		
		Positioning		
		Operation Setting		
	• Redundant Parameters	Operation mode setting		
		Tracking setting		
	• Network Parameter	MELSECNET/10 and MELSECNET/H setting		
		MELSECNET/H Remote I/O setting		
	<ul style="list-style-type: none"> • Programs of user library that are not registered to the program setting • SFC program • Task settings • Device/Label Automatic-Assign Setting • Project Revision • Device memory (Only when the module type is changed to FX5UCPU) 			

*1 Check/set with GX Works3 after the change since some items are returned to the default or their data are deleted.

*2 The data are deleted when the module type is changed to FX5UCPU.

*3 The items which are not supported by GX Works3 are deleted.

*4 To read Structured Ladder/FBD programs, GX Works2 of which version is 1.519R or later is required to be installed on the personal computer.

*5 The data are moved to SM8000 or higher/SD8000 or higher when the module type is changed to FX5UCPU.

■Instructions that are not supported by MELSEC iQ-R series/MELSEC iQ-F series modules

If an instruction which is not supported by MELSEC iQ-R series/MELSEC iQ-F series modules is included in the program created with GX Works2, the instruction will be changed to the program in which SM4095/SD4095 is used.

In addition, the FBs/FUNs that are not supported by the FBD/LD editor will be undefined FBs/FUNs.

Modify the program with the instruction equivalent to the one supported by MELSEC iQ-R series/MELSEC iQ-F series.

📖 MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

📖 MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks)

■Number of device points and start/end device

The setting range for the number of device points may differ between the CPU type of a project created with GX Works2 and a MELSEC iQ-R series/MELSEC iQ-F series module. When the value which has been set to the parameter cannot be set for MELSEC iQ-R series/MELSEC iQ-F series modules, it will be corrected to the value configurable by a MELSEC iQ-R series module, or it will be returned to the default value of MELSEC iQ-F series after changing the module type.

■Increase of the number of device points due to the differences in local device setting units

Although the bit devices and word devices of local devices are set in one point units for Q series, the bit devices, word devices (excluding T/ST/C), and T/ST/C for MELSEC iQ-R series are set in 64-point units, 4-point units, and 32-point units, respectively. Since the setting units are different between Q series and MELSEC iQ-R series, the CPU parameters are automatically changed after changing the module type, resulting in the increase of the number of device points.

■Devices that are not supported by MELSEC iQ-R series/MELSEC iQ-F series module

- When the devices, which are not supported by MELSEC iQ-R series/MELSEC iQ-F series module, are used in a program created with GX Works2, they are changed to SM4095/SD4095. In addition, when GX Works2 project consists of ladder programs, the devices which are changed to character string by an instruction are changed to "SM4095"/"SD4095". To search character strings, refer to the search function. (🔍 Page 165 Searching/Replacing Character Strings)
- When S devices or R devices have been set to the device memory data/device initial value data created with GX Works2, they are deleted.

■Device name and label name display

- For a device that has been set as the local device with GX Works2, '#' is added in front of the device name.
- When a label used in GX Works2 has a name starting with "M+" or "P+", the "+" of the label name is replaced with "_".

■Execution order

The execution order is handled differently between Structured Ladder/Function Block Diagram language in GX Works2 and Function Block Diagram/Ladder Diagram language in GX Works3. Display the execution order and check it.

■Return element

A return element operates differently between Structured Ladder/Function Block Diagram language in GX Works2 and Function Block Diagram/Ladder Diagram language in GX Works3. For details on the return element in GX Works3, refer to the following section.

🔍 Page 133 Common element

■Undefined FBs/FUNs in Function Block Diagram/Ladder Diagram


The number of I/O arguments of some function elements/function block elements is different between Structured Ladder/Function Block Diagram language in GX Works2 and Function Block Diagram/Ladder Diagram language in GX Works3. In this case, the element is displayed as undefined FB/FUN. Select [Edit] ⇒ [Update FB/FUN] to update the definition information, and correct the program.

■Member of general FBs

When a program in which members of general FB are referenced is created in Structured Ladder/Function Block Diagram of GX Works2, a conversion error may occur after opening the program with GX Works3. In this case, check the member name and class of the general FB, and correct the program.

■Inverting contact in Function Block Diagram/Ladder Diagram

Inverting the contact is available for I/O arguments of function elements/function block elements in Function Block Diagram/Ladder Diagram language in GX Works3. For more details, refer to the following section.

 Page 136 Inverting contact on the input/output

When the contact on the elements other than above is inverted in a Structured Ladder/FBD program of GX Works2, the connectors of those elements are deleted. Correct the program to provide the equivalent operation to the Structured Ladder/FBD program.

■Wired OR

Function Block Diagram/Ladder Diagram language in GX Works3 does not support wired OR of FBD elements. Correct the program to provide the equivalent operation to the Structured Ladder/FBD program of GX Works2 since a conversion error is caused.


■Input/output connection point of function

When the output variables (excluding ENO) of CPU module instructions and module dedicated instructions are connected to the input variables of other function (or function block), a conversion error occurs.

■Pointer branch instructions/jump/subroutine programs

When a pointer branch instruction (CJ, SCJ, JMP), a jump, or a subroutine program is used, a conversion error may occur.

For more details, refer to the following manual.

 MELSEC iQ-R Programming Manual (Program Design)

■Program layout

The program layout may be slightly changed due to the difference between the Structured Ladder/FBD editor of GX Works2 and the FBD/LD editor of GX Works3. Correct the layout.

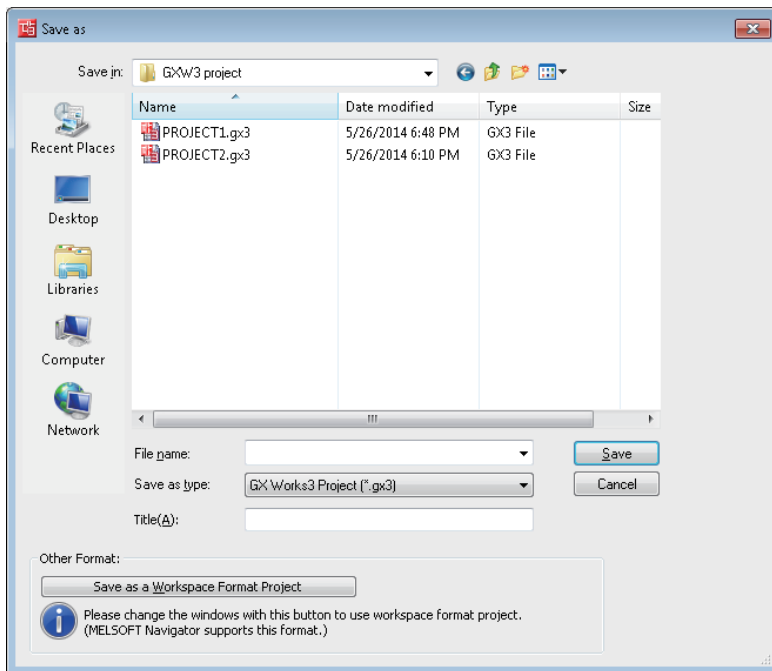
Saving projects

Save the project on the personal computer or another data storage device.

Saving projects under the specified name

Window

[Project] ⇒ [Save As]



When saving the project with the workspace format, click the [Save as a Workspace Format Project] button to switch the screen.

Operating procedure

Set the items and click the [Save] button.

Overwriting projects

Operating procedure

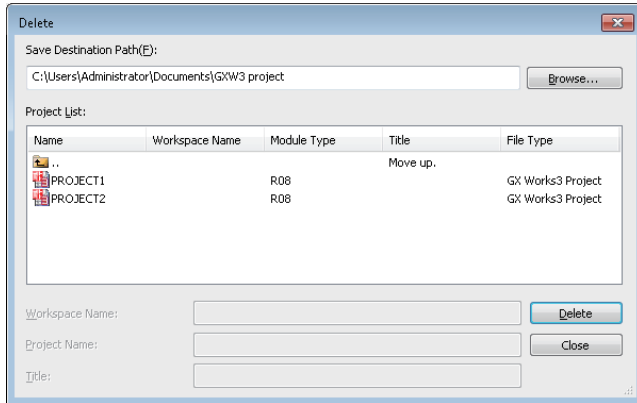
Select [Project] ⇒ [Save] (💾).

Deleting projects

Delete the project saved on the personal computer or another data storage device.

Window

[Project] ⇒ [Delete]



Operating procedure

Select the project () to be deleted, and click the [Delete] button.

Precautions

When the project file does not exist after deleting a workspace format project, the message to confirm whether to delete the workspace itself is displayed. If the project is deleted, the workspace folder is deleted, but workspacelist.xml remains.

3.3 Managing Project Data

This section explains how to create each data.

About project data

■Character strings that cannot be used

Refer to the following section.

☞ Page 265 Character Strings that cannot be Used for Label Names and Data Names

■Maximum number of data that can be created in one project

The number of data that can be created in each data type is as follows:

Data type name	RCPU	FX5CPU
Program block	2048	2048
Function block and function	8192	960
FB file	256	15
Other data	800	800

Precautions

For data names, use the characters in the Unicode Basic Multilingual Plane.

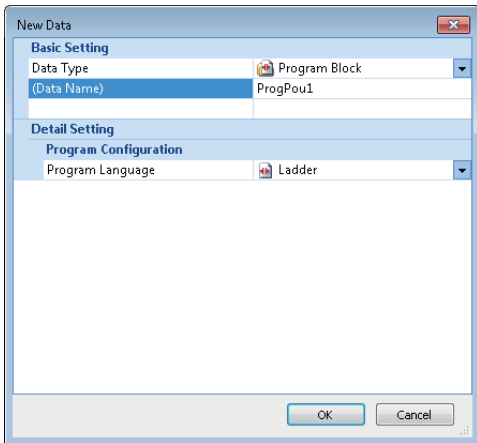
If the characters outside the Unicode Basic Multilingual Plane are specified, they may not be edited in the program.

Creating project

Create a new data in the project.

Window

[Project] ⇒ [Data Operation] ⇒ [New Data] (📄)



Operating procedure

Set the items and click the [OK] button.

For the setting items when "Function Block" or "FB File" is selected as data type, refer to the following section.

☞ Page 173 Creating function blocks

For the setting items when "Function" is selected as data type, refer to the following section.

☞ Page 177 Creating functions

Precautions


When function block and function data are added by the above method, the FB file and FUN file will be in the unconverted state.

Once the FB file and FUN file is changed from the converted state to the unconverted state, all programs in which the function blocks and functions are used will be in the unconverted state.

Editing project

Changing data names

Operating procedure



1. Select the data name to be changed on the Project view.
2. Select [Project] ⇒ [Data Operation] ⇒ [Rename Data].
3. Change the data name and press the  key.

Copying/pasting data

Utilize data of a project being edited or other projects.

For projects in which module type is different between copy source and copy destination, data cannot be copied/pasted.

Operating procedure

1. Select the data name to be copied on the Project view.
2. Select [Project] ⇒ [Data Operation] ⇒ [Copy Data] (.
3. Select the target folder (one-level upper hierarchy of the copy source data) on the Project view or other project.
4. Select [Project] ⇒ [Data Operation] ⇒ [Paste Data] (.

If the same data name exists in the folder where the data is to be pasted, the pasted data is named automatically.

Precautions

- The pasted program will be in the unconverted state.
- The structures/function blocks used in the global label cannot be copied.
If the same structure/function block name does not exist in the folder where the data is to be pasted, the pasted data will be an undefined data type.
- Pasting of global label data is canceled when the maximum number of labels (20480) is exceeded. Adjust the number of global labels in the copy destination and the copy source, and retry pasting data.

■Program file

When copying a program file, the program blocks under the selected program file will be copied.

When pasting data to other project, the common device comments can also be copied by setting the following option.

- [Tool] ⇒ [Options] ⇒ "Edit" ⇒ "Copy" ⇒ "Operational Setting"

Deleting data

Delete a data in the open project.

Operating procedure

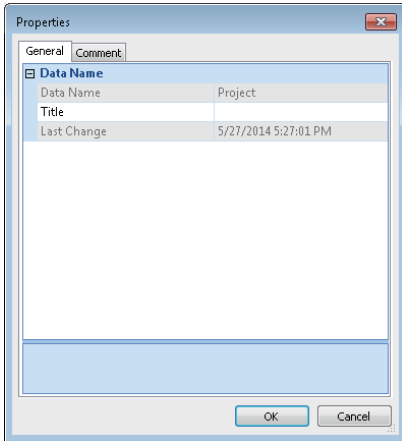
1. Select the data name to be deleted on the Project view.
2. Select [Project] ⇒ [Data Operation] ⇒ [Delete Data].

Property

Display the properties of data such as folders, parameters, and programs.
Titles and comments can be added to each data.

Window

[Project] ⇒ [Data Operation] ⇒ [Properties] (🔑)



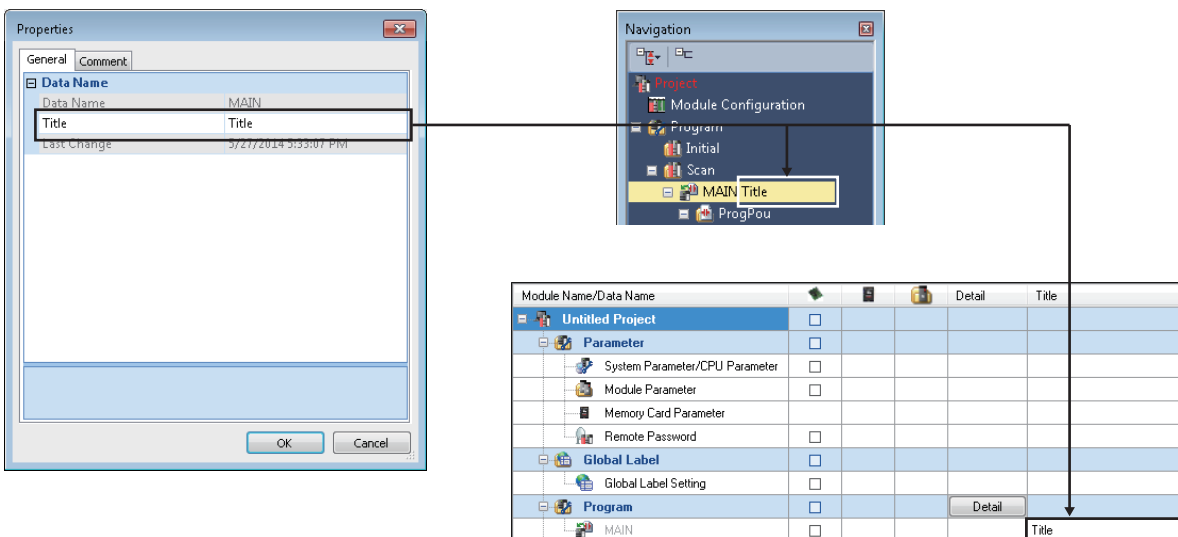
Operating procedure

Set the items and click the [OK] button.

Titles

The title set to a data is displayed with a data name on the Navigation window.

The title is also displayed on the "Online Data Operation" screen when writing/reading data to/from the programmable controller.



3.4 Changing Module Type of Project

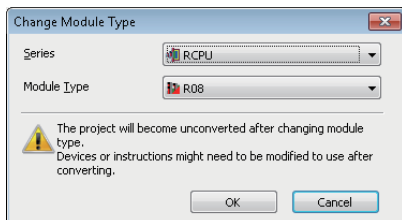
Change the module type of the project being edited to other module type.

The module type cannot be changed while performing monitoring function such as program monitor and the Device/buffer memory batch monitor.

FX5CPU does not support this function.

Window

[Project] ⇒ [Change Module Type]



Operating procedure

Select the module type to be changed, and click the [OK] button.

Precautions

- The changed module type cannot be restored. Save the project data in advance before changing the module type. Note that, the project after the change will be in unsaved state.
- When module labels of CPU module are used, the module labels before changing the module type are deleted, and the module labels after changing the module type are added. Therefore, the program may be required to be corrected after the module type is changed.

3.5 Verifying Projects

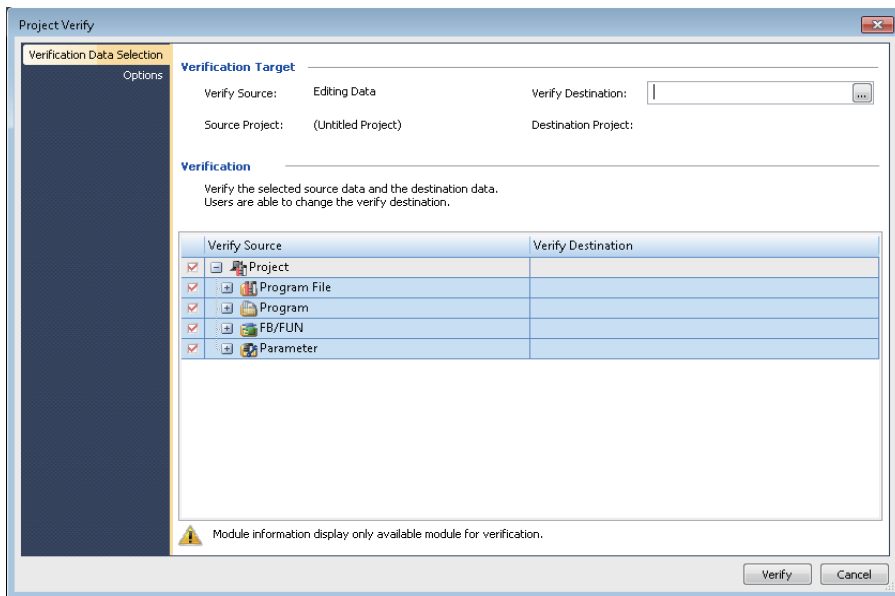
Verify the open project against the other project.

Use this function to compare the content of two projects or to locate the changes made in programs.

Performing verification

Window

[Project] ⇒ [Project Verify]



Operating procedure

1. Specify the project to "Verify Destination" in [Verification Data Selection].
2. Select the data to be verified, and click the [Verify] button.

Point

The target project file can be specified by dragging and dropping it.

Precautions

- Verification with GX Works2/GX Developer project cannot be performed.
- Projects to which the security is set can be verified when both verify source data and verify destination data are not read-protected.

Parameters

■ Verification levels

Select the parameter verification level from [Options] tab on the "Project Verify" screen.

Checking verification result

Check the details of mismatched data on the Verify Result screen.

Updated verify source data is displayed in the verification results.

Therefore, the verification result of updated verify source data can be checked without performing the Project Verify function again after mismatched data is modified.

Operating procedure

1. Double-click the row of the data to display the details on the Verify Result screen.
2. Select [Find/Replace] ⇒ [Next Unmatched] (🔍)/[Previous Unmatched] (🔍).

Point

Font color, background color, and fonts can be changed.

👉 Page 40 Checking and Changing Colors and Fonts

Precautions

For verification of program files, the verification result may be inconsistent due to the difference of the conversion results if the version of GX Works3 with which the program files have been converted differs between the verify source and verify destination. In this case, convert the all programs in both the verify source and the verify destination with the same version GX Works3, and perform the verification again.

Ladder programs

Double-click a program displayed on the Verify Result screen to display the details of the ladder program of the verification target in a list format.

■Detailed display (list format)

- Double-click an instruction in the list to jump to the corresponding instruction on the ladder editor.
- When the program which contains inline structured text program is verified, "STB" is displayed on the row of the inline structured text.

Double-click the "STB" to move the cursor to the corresponding row of the inline structured text.

- When the program which includes functions/function blocks is verified, the result is displayed as follows:

Function: A row of "*" ; FUN BLK START" to "*" ; FUN BLK END"

Function block: A row of "*" ; FB BLK START" to "*" ; FB BLK END"

ST programs

■Detailed display

By double-clicking a row on the verification result, the cursor is moved to the corresponding row on the ST editor.

FBD/LD programs

Double-click a FBD/LD program displayed on the Verify Result screen to display the details of the FBD/LD program of the verification target in a list format.

However, the detailed display in a list format is not available for the Verify with PLC function, or the Project Verify function without performing "Rebuild All" to the FBD/LD programs read from the CPU module.

■Detailed display (list format)

- Double-click an instruction in the list to jump to the corresponding instruction on the FBD/LD editor.
- When the program which includes functions/function blocks is verified, the result is displayed as follows:

Function: A row of "*" ; FUN BLK START" to "*" ; FUN BLK END"

Function block: A row of "*" ; FB BLK START" to "*" ; FB BLK END"

Parameters

When the same profile is not registered to the verify destination and the verify source, the verification result may be a mismatch.

Exporting data to file

Export the data displayed on the Verify Result screen to a file.

Operating procedure

Select [Edit] ⇒ [Export to File] (📄).

3.6 Registering Profiles

Register profiles in GX Works3.

Profiles are the data in which the connected device information (such as model names) is stored.

The profiles are managed by each personal computer, and shared within GX Works3 and MELSOFT Navigator. Therefore, profiles registered in GX Works3 are applied to MELSOFT Navigator.

Before registering profiles, log on the personal computer as the user having the administrator authority, and close the project in advance.

Operating procedure

1. Select [Tool] ⇒ [Register Profile].
2. Select the file on the "Register Profile" screen, and click the [Register] button.

4 CREATING MODULE CONFIGURATION DIAGRAM AND SETTING PARAMETERS

In GX Works3, parameters of a programmable controller can be set on the Module Configuration Diagram, as if to configure the actual system.

The parameters can be configured on the Project view in the same manner as GX Works2.

About Module Configuration Diagram

By using the Module Configuration Diagram, the following operations can easily be performed.

Item	Reference
Display an actual programmable controller system configuration visually	Page 69 Creating Module Configuration Diagram
Set parameters for modules	Page 73 Setting parameters on the Module Configuration Diagram
Input start XY in batch ^{*1}	Page 76 Inputting start XY in batch
Input default points in batch ^{*1}	Page 76 Inputting default points in batch
Check a power supply capacity and I/O points ^{*1}	Page 76 Checking power supply capacity and I/O points
Check a system configuration	Page 76 Checking system configurations

*1 Not supported by FX5CPU.

About parameter settings

There are two methods for setting parameters; use the Module Configuration Diagram or use the Project view.

For the operation methods, refer to the following sections.

 Page 73 Setting parameters on the Module Configuration Diagram, Page 77 Setting Parameters

4.1 Creating Module Configuration Diagram

Place the module parts (object) with the same configuration as an actual system configuration on the Module Configuration Diagram.

The Module Configuration Diagram of GX Works3 can be configured within the range that can be managed by the CPU module of a project.

Editor configuration of Module Configuration Diagram



Display settings can be changed by setting the following option.
[Tool] ⇒ [Options] ⇒ "Other Editor" ⇒ "Module Configuration Diagram"

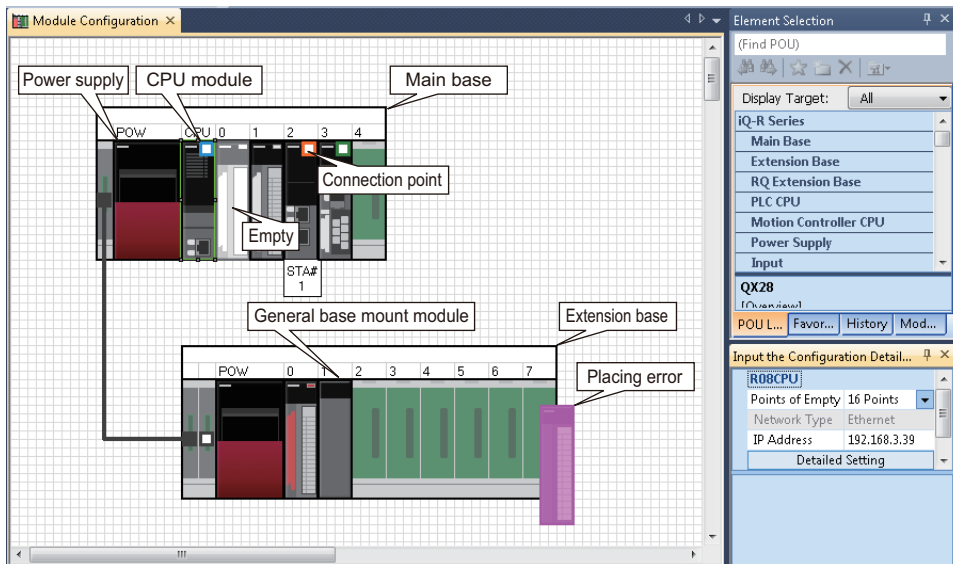
Window

Double-click "Module Configuration" on the Project view.

●Toolbar



●Module Configuration Diagram



Displayed items

Screen name	Item	Description
Module Configuration Diagram	iQ-R series	An object of MELSEC iQ-R series module supported by GX Works3.
	FX5 series	An object of MELSEC iQ-F FX5 series module supported by GX Works3.
	Q series	An object of Q series module supported by GX Works3.
	General module	An object of module for which the start XY and point can be set arbitrarily by each module type. The same points as empty slot points can be assigned as an initial value. Select this when using a module which is not displayed in the Element Selection window.
	Figure (Straight Line, Rectangle, Ellipse, Text Box)	An object that is used when adding information such as description on the Module Configuration Diagram.
	Connection line	An object of a bus cable to be connected to a base unit.
	Connection point	A point to be connected with a connection line. The connection point located at the upper right on the module is used when importing a project using MELSOFT Navigator. It is not used in GX Works3.
	Module status setting (empty)	A module to be used when operating system by placing modules on the Module Configuration Diagram without mounting actual modules. The module placed on the Module Configuration Diagram and its related parameters will also be set as "(Empty)". (Reserved status)
	Object placement error	The module object which is not placed properly is highlighted.
Element Selection window	A list of objects which can be used on the Module Configuration Diagram.	
Input the Configuration Detailed Information window	A window to enter the information such as start XY or station number of the module placed on the Module Configuration Diagram.	

Placing objects

Placing module objects

Operating procedure

1. Select a main base from the Element Selection window, and drag and drop it onto the Module Configuration Diagram.
2. Select a module from the Element Selection window, and drag and drop it on the base unit placed on the Module Configuration Diagram in the Step 1.

The available locations are highlighted while dragging the module.

Precautions

- GOT2000/GOT1000 series, general modules, image diagrams, and link files supported by MELSOFT Navigator are not supported.
- Only bus cables are available. Network connection and serial connection are not available.
- For FX5CPU, bus cables are not supported. In addition, a base unit (slot) is not required. Select the module, and drag and drop it on the Module Configuration Diagram directly.

■Moving placed modules

If a module is removed from the main base or extension base, the object information such as start I/O and parameter information is retained. Therefore, when the removed module is placed on the base unit again, the retained parameter information will be set automatically.

The module removed from the Module Configuration Diagram is deleted from the I/O Assignment Setting screen.

For FX5CPU, the setting cannot be fixed in the state where a module has been removed from the CPU module.

■Deleting placed modules

When a module is deleted, the module information displayed on the Project view after fixing parameters is deleted as well.

For a single CPU system, a CPU module object cannot be deleted.

As for a multiple CPU configuration, the host CPU cannot be deleted.

■ Copying and pasting modules

The parameter information of the copy source is succeeded to the pasted module.

If the CPU module placed on the base unit in a multiple CPU configuration is copied and pasted, the CPU number will be unspecified status.

The copied objects can be pasted to the Module Configuration Diagram in other project.

Placing symbol objects

The symbols and text boxes can be placed on the Module Configuration Diagram.

The symbols placed on the Module Configuration Diagram are not written to a CPU module. They are saved only in the project.

Operating procedure

Select a figure in "Figure" in the Element Selection window, and drag and drop it onto the Module Configuration Diagram. Change the text and color of a symbol object on the "Properties" screen.

Changing model name of CPU module

The model name of the CPU module placed on the Module Configuration Diagram can be changed.

RCPU does not support it.

Operating procedure

1. Select the placed CPU module. Then, right-click and select [Change CPU Model Name] from the shortcut menu.
2. Select the model name after the change on the "Change CPU" screen.

Module status setting (empty)

Set this when operating a system without mounting actual modules.

The module is displayed in a pale color.

FX5CPU does not support this setting.

Operating procedure

Select the module to be set to empty, and [Edit] ⇒ [Module Status Setting (Empty)].

Reading module configuration from actual system

The Module Configuration Diagram can be configured by the information read from CPU module.

FX5CPU does not support it.

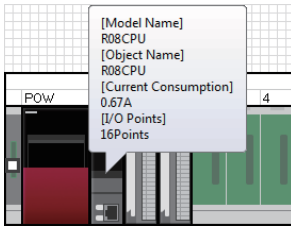
Operating procedure

Select [Online] ⇒ [Read Module Configuration from PLC].

Checking module information


Check on a balloon help

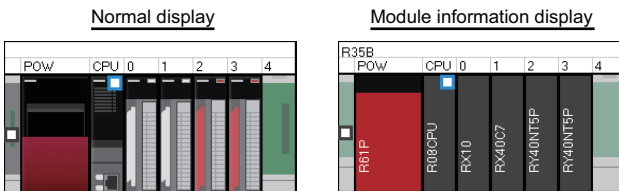
Place the cursor on the object (such as module and symbol) to display a balloon help on the Module Configuration Diagram.



Check model names on module objects

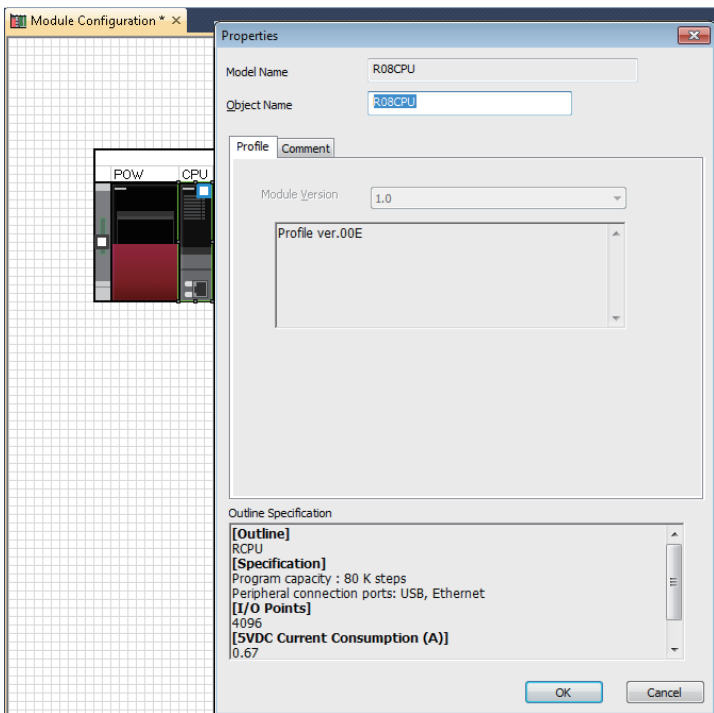
Operating procedure

Select [Edit] ⇨ [Display Module Information] ().



Check on the "Properties" screen

A model name, object name, and outline of a specification can be checked on the "Properties" screen. Additionally, a comment can be entered.




Operating procedure

Select a module on the Module Configuration Diagram, right-click and select [Property] from the shortcut menu.

Setting parameters on the Module Configuration Diagram

Set the parameter of the control CPU and module on the Module Configuration Diagram.

Operating procedure

1. Select the module to edit the parameters.
2. Set the items on the Input the Configuration Detailed Information window.
3. Select [Edit] ⇒ [Parameter] ⇒ [Fix] ().

When setting details of the module, click the [Detailed Setting] button to display the parameter editor.

■Fixing parameters

After editing an object on the Module Configuration Diagram, the parameters of the edited object will be undefined status. The operations that the parameters become undefined are as follows:

- Adding or deleting a module
- Removing a module from the slot, or placing the removed module on the slot
For FX5CPU, removing/connecting a module from/to the CPU module
- Cutting and pasting modules
- Connecting modules
- Performing undo/redo
- Changing property of a module
- Performing the Start XY Batch Input function
- Performing the Default Points Batch Input function
- Setting the Module status setting (empty)
- Operations on the Input the Configuration Detailed Information window

The fixed parameters are reflected to the following screens.

- Project view (For a new module information, the module information is added to the Project view.)
- Parameter editor
- I/O Assignment Setting screen

■List of changed location of start XY number

When the start XY number of a module is changed on the Module Configuration Diagram, the list of data which will be affected by the change are displayed on the "Module Start I/O No. Related Area" window.

FX5CPU does not support it.

Check the display content, and correct the corresponding data.

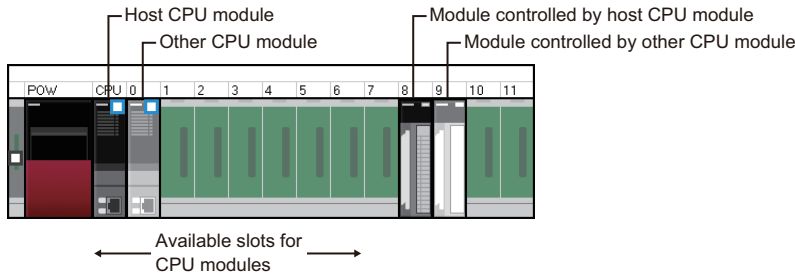
- Target data: Program, FB program, system parameter, CPU parameter, module parameter, global label, structure, module label
- Target device: The start XY devices (X, Y, DX, DY, U, G) specified in the arguments of FROM (P), TO (P), DFRO (P), or DTO (P) instructions

About multiple CPU configuration

FX5CPU does not support it.

Multiple CPU configuration

The multiple CPU configuration can be set on the Module Configuration Diagram.



Item	Description
Host CPU module	For a multiple CPU configuration, only one project which is set as a host CPU can be set.
Other CPU module	Set the CPU module which is not set as a host CPU to other station. The module is displayed in a pale color, same as when the module state setting (empty) is set.
Module controlled by the host CPU module	A module that is controlled by the CPU module set as a host CPU.
Module controlled by the other station CPU module	A module that is controlled by the CPU module set as other station. The module is displayed in a pale color, same as when the module state setting (empty) is set.
Available slots for CPU modules	Up to four CPU modules can be placed for CPU slot and slot 0 to 6. The placed CPU modules will be in order from CPU No.1 to 4, from left to right.

Setting multiple CPU configuration

In the multiple CPU configuration, place more than two CPU modules on the base unit.

When changing the control CPU of the module, use the Input the Configuration Detailed Information window.

The following explains how to change a single CPU configuration to a multiple CPU configuration, and vice versa.

■When changing a single CPU configuration to a multiple CPU configuration

Drag and drop the CPU module from the Element Selection window with a single CPU configuration (one CPU is placed on the base unit), and place the second CPU module on the base unit.

■When changing a multiple CPU configuration to a single CPU configuration

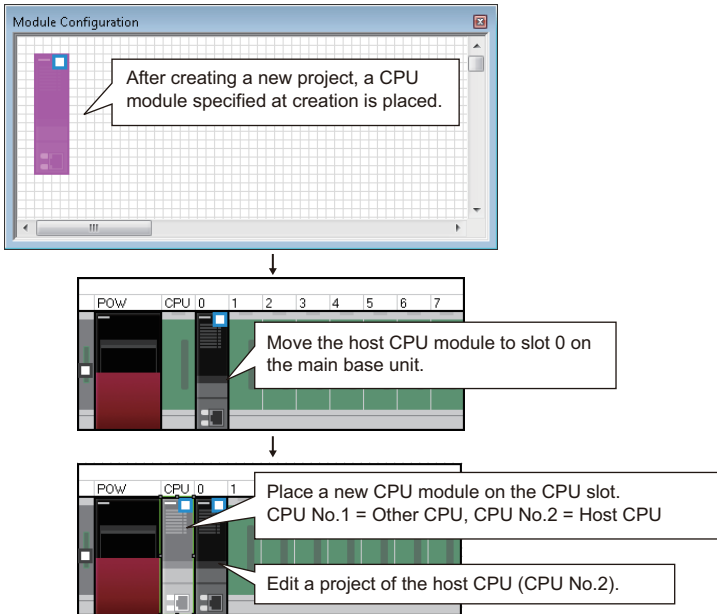
In a multiple CPU configuration (two or more CPU modules are placed on a base unit), delete (or remove) the CPU modules from the slot and remain only one module.

Changing CPU number of the CPU module set as a host CPU

For a multiple CPU configuration, the CPU number of a CPU module is set in order from left on the base unit.
When changing the CPU number, change the position of the CPU module.

■Operation for single CPU system

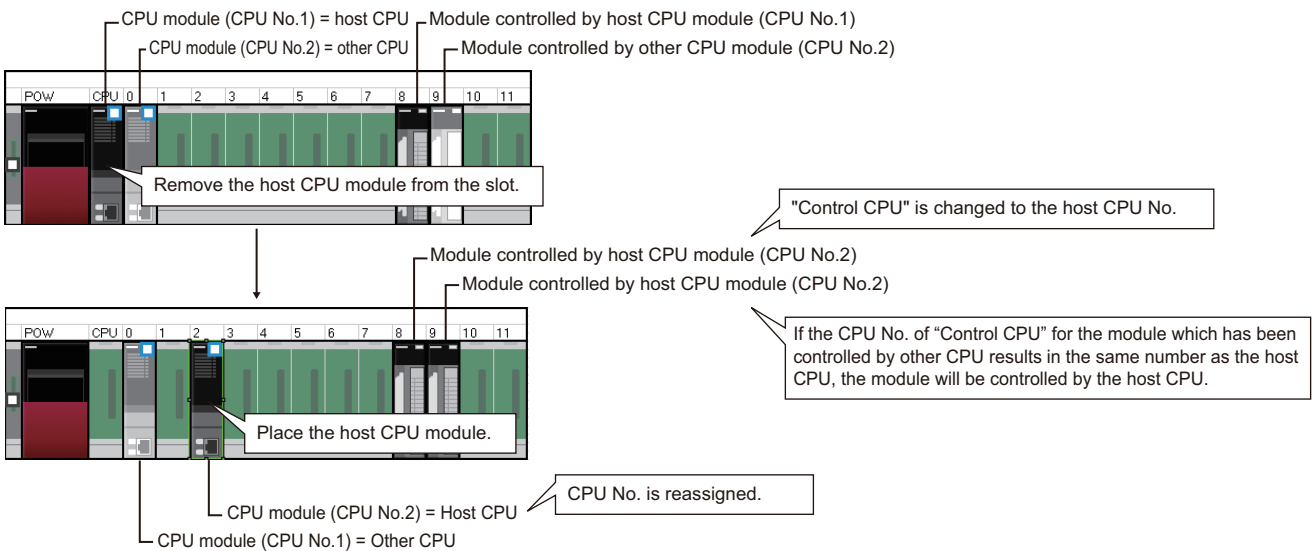
Move the CPU module placed on the CPU slot to an empty slot, and place a new CPU module on the empty slot.



■Operation for multiple CPU configuration

Exchange the CPU module on the CPU slot and the CPU module on other slot.

Since the parameter information of the modules removed from the base unit is retained, the retained information is succeeded when the removed modules are placed again.



Inputting start XY in batch

Set the start XY of each module in order of the slot number in batch.

FX5CPU does not support it.

Operating procedure

Select [Edit] ⇒ [Start XY Batch Input] ()

Inputting default points in batch

Change the points, points occupied by empty slot, and empty slot side points (for a module occupies two or more slots) in all the modules and empty slots on the Module Configuration Diagram to default in batch.

FX5CPU does not support it.

Operating procedure


Select [Edit] ⇒ [Default Points Batch Input].

Checking power supply capacity and I/O points

Check if the power capacity and I/O points in the configuration on the Module Configuration Diagram exceed the upper limit.

FX5CPU does not support it.


Operating procedure

1. Select [Edit] ⇒ [Check] ⇒ [Power Supply Capacity and I/O Points] ()
2. Check the result displayed on the Result of Power Supply Capacity and I/O Points Check window.

Checking system configurations

Check if the layout of each module on the Module Configuration Diagram is proper. The result is displayed on the Output window.

Operating procedure

1. Select [Edit] ⇒ [Check] ⇒ [System Configuration] ()
2. Check the result displayed on the Output window.

Operation for Write to PLC/Read from PLC

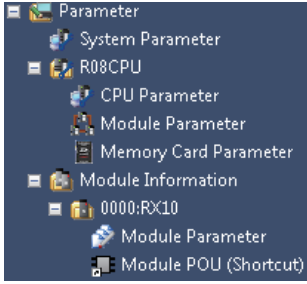
Only parameters of the modules in the information of Module Configuration Diagram can be read/written.

After reading data from a programmable controller, the coordinate position of the modules on the Module Configuration Diagram are displayed by default status.

The information of symbols is deleted.

4.2 Setting Parameters

To operate a programmable controller, setting parameters for the modules is required. The following explains the settings of parameters on the Project view.

Project view	Item	Description	Reference
	System Parameter	Set the items which are required to configure the system such as a module configuration. The 'system' here indicates the system configured with a main base unit, extension base unit, and RQ extension base unit connected with the extension cable for RCPU, and the system configured with a module and adapter connected to the module for FX5CPU.	Page 79 Setting system parameters
	(Parameter of control CPU)	Set the operation of the function of a CPU module itself. This includes the file setting, memory/device setting, and program setting.	Page 79 Setting parameters of control CPU
	Module Information	Parameters that is set to an I/O module and Intelligent function module. This includes initial values and refresh settings of each module. There are two kinds of parameters; 'Module Parameter' and 'Module Extended Parameter'. <ul style="list-style-type: none"> • Module parameter: A parameter that is set to an I/O module and Intelligent function module. The initial setting values and refresh settings are included. • Module extended parameter: A parameter that is set to a specific Intelligent function module. This parameter is read/written separately from module parameters. 	Page 80 Setting parameters of Intelligent function module

Common operations of parameter settings

Operation for parameter editor

The parameter items of the system parameter, control CPU parameter, and module information are displayed corresponding to their purpose.

Set the items refer to the information displayed in "Explanation".

Enter the keyword to search from the setting items and "Explanation".

Status color [color/ background color]

- No errors
Default setting: Blue/White
Other than default: Black/White
- With errors: White/Red
- No settings required: Black/Gray

Status icons

- ✔ Changed from default
- ✘ Error

Checking parameters

There are two methods for checking parameters:




- Check if there is an input error on the parameter editor.
Click the [Check] button on the parameter editor.
- Check if there is an error in the parameter set in the project.
Select [Tool] ⇒ [Check Parameter].

Setting system parameters

Set the parameters such as I/O Assignment Setting, Multiple CPU Setting, and Synchronization Setting within the Modules that affect whole system.

FX5CPU does not support the Multiple CPU Setting and Synchronization Setting within the Modules.

For details on the setting items of the parameters, refer to the following manuals.

- I/O Assignment:  MELSEC iQ-R Module Configuration Manual, MELSEC iQ-F FX5 User's Manual (Application)
- Multiple CPU Setting:  MELSEC iQ-R CPU Module User's Manual (Application)
- Synchronization Setting within the Modules:  MELSEC iQ-R Inter-Module Synchronization Function Reference Manual

Setting parameters

Operating procedure

1. Double-click "Parameter" ⇒ "System Parameter" on the Project view.
2. Select the items to be set in the [I/O Assignment] tab, [Multiple CPU Setting] tab, or [Synchronization Setting within the Modules] tab.
3. Set the items and click the [OK] button.



■When module is deleted in I/O Assignment Setting

The parameter of the deleted module is displayed as "Unset" on the Project view. To restore the state of the parameter (to display in I/O Assignment Setting again), select the mount position on the "Properties" screen.

Setting parameters of control CPU

Set the parameters related to CPU module (the host CPU for a multiple CPU configuration).

For details on the setting items of the parameters, refer to the following manuals.

- CPU parameters, memory card parameters:  MELSEC iQ-R CPU Module User's Manual (Application), MELSEC iQ-F FX5 User's Manual (Application)
- Module parameters:  MELSEC iQ-R Ethernet User's Manual (Application), MELSEC iQ-F FX5 User's Manual (Application)

Setting parameters

Operating procedure

1. Double-click "Parameter" ⇒ "(PLC type of the project)" ⇒ "CPU Parameter"/"Module Parameter"/"Memory Card Parameter" on the Project view.
2. Set the items on the parameter editor.
3. Click the [Apply] button or [OK] button.

Point

The setting screen can also be opened by double-clicking the object of a module on the Module Configuration Diagram.

Precautions

For the setting values of the parameters, use the characters in the Unicode Basic Multilingual Plane.

If the characters outside the Unicode Basic Multilingual Plane are specified, they may not be edited in the program.

- File Register Setting in File Setting: File Name
- Initial Value Setting in File Setting: Global Device Initial Value File Name
- Program Setting in Program Setting: Program Name
- FB/FUN File Setting in Program Setting: FB/FUN File Name

Setting parameters of Intelligent function module

Set the parameters of Intelligent function module.

Set the switch settings and refresh settings of Q series module on the parameter editor.

For details of the items for parameters, refer to the user's manual of each module.

Setting parameters

Operating procedure

1. Select "Parameter" ⇒ "Module Information" in the Project view, and select [Project] ⇒ [Data Operation] ⇒ [Add New Module].
2. Select the items on the "Add New Module" screen.
3. Double-click the created parameter.

Creating external device configuration/network configuration

Set the network configuration of Ethernet, CC-Link IE Field, and CC-Link on each network configuration diagram.

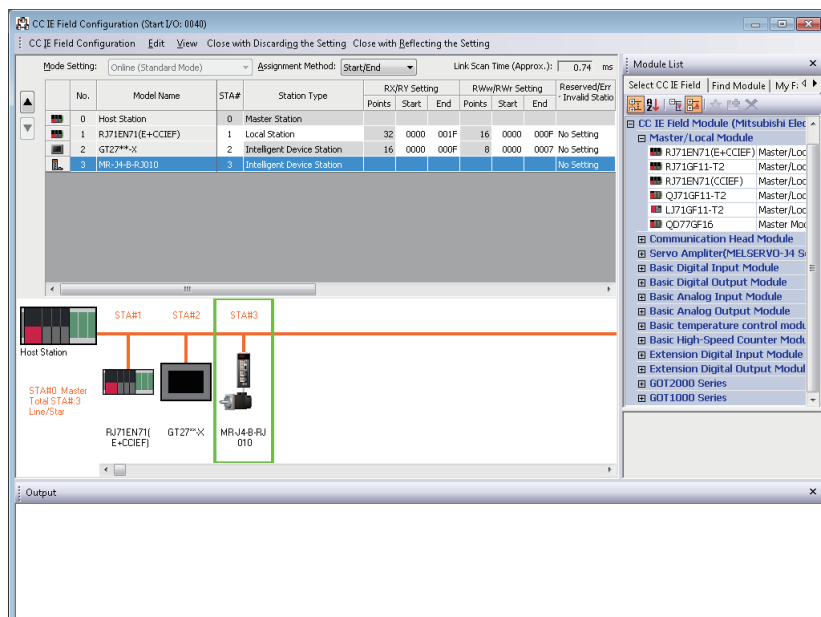
For details on the settings, refer to the user's manual of each network.

Window

The configuration setting screen is displayed from one of the following module parameter items.

- Ethernet: External Device Configuration of Basic Settings
- CC-Link IE Field (master station)*1: Network Configuration Settings of Basic Settings
- CC-Link (master station)*1: Network Configuration Settings of Basic Settings

*1 Not supported by FX5CPU.



Property

Depending on the selected module, the image diagram can be changed on the "Properties" screen displayed by right-clicking and selecting [Property] from the shortcut menu.

Configuration applications, setting files, and manuals can be linked to the modules. Double-click the added module to open the linked application or file.


Checking refresh devices assigned to modules

Display a list of the refresh devices assigned to each CC-Link module.

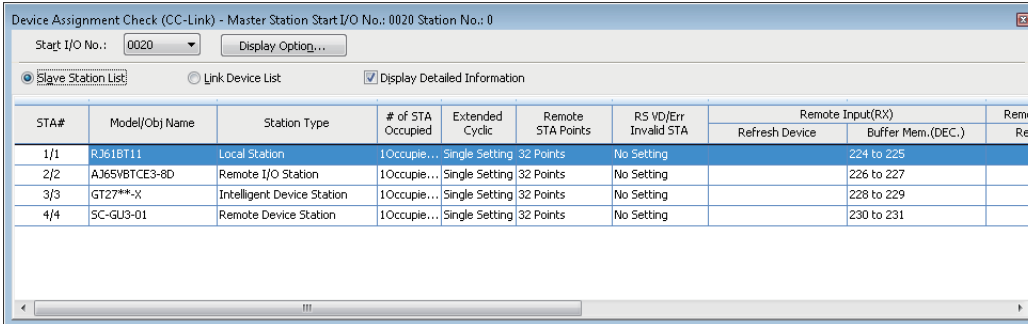
Set the CC-Link configuration from the parameter of CC-Link module in advance.

FX5CPU does not support it.

Window

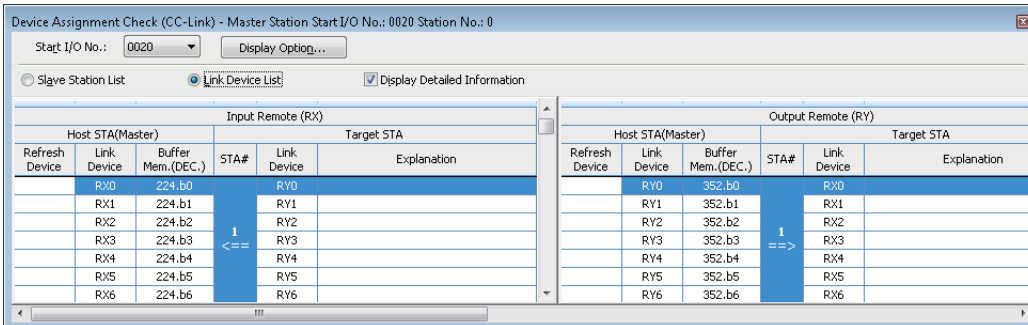
[View] ⇒ [Docking Window] ⇒ [Device Reference] ()

●List of slave stations



STA#	Model/Obj Name	Station Type	# of STA Occupied	Extended Cyclic	Remote STA Points	RS VD/Err Invalid STA	Remote Input(RX)		Rem
							Refresh Device	Buffer Mem.(DEC.)	
1/1	R361BT11	Local Station	1	Single Setting	32 Points	No Setting	224 to 225		
2/2	A365VBTCE3-8D	Remote I/O Station	1	Single Setting	32 Points	No Setting	226 to 227		
3/3	GT27*-X	Intelligent Device Station	1	Single Setting	32 Points	No Setting	228 to 229		
4/4	5C-GU3-01	Remote Device Station	1	Single Setting	32 Points	No Setting	230 to 231		

●List of link devices



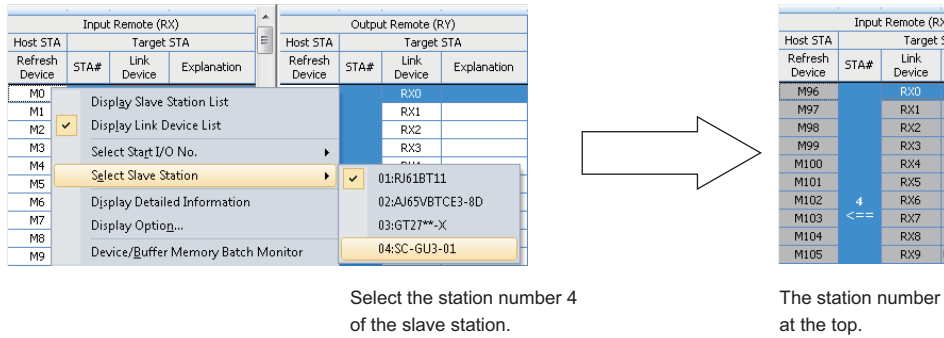
Input Remote (RX)						Output Remote (RY)					
Host STA(Master)			Target STA			Host STA(Master)			Target STA		
Refresh Device	Link Device	Buffer Mem.(DEC.)	STA#	Link Device	Explanation	Refresh Device	Link Device	Buffer Mem.(DEC.)	STA#	Link Device	Explanation
	RX0	224.b0	1	RY0			RY0	352.b0	1	RX0	
	RX1	224.b1		RY1			RY1	352.b1		RX1	
	RX2	224.b2		RY2			RY2	352.b2		RX2	
	RX3	224.b3		RY3			RY3	352.b3		RX3	
	RX4	224.b4		RY4			RY4	352.b4		RX4	
	RX5	224.b5		RY5			RY5	352.b5		RX5	
	RX6	224.b6		RY6			RY6	352.b6		RX6	

"Displayed Content for Model Name" and "Buffer Memory Display Format" can be selected by clicking the [Display Option] button.

Displayed items

Item	Description
Start I/O No.	Select the start I/O number of master station or local station to be displayed on the list.
Slave Station List	Displays the information of the slave stations and the range of the refresh devices assigned to the own station. Multiple devices are displayed in accordance with the link refresh settings of the Module Parameter. When refresh devices are not assigned, the cells of the refresh device range will be blank.
Link Device List	Displays the assignment status of refresh devices on the own station and link devices on the target station. When link devices are not assigned, the cells of the link device range will be blank. The cells of "Explanation" will be blank when profile is not registered.

- The arbitrary slave station can be displayed on top of the cell by right-clicking on the list of link devices and selecting [Select Slave Station] from the shortcut menu.



- The "Device/Buffer Memory Batch Monitor" screen is displayed by right-clicking a refresh device or buffer memory from the list of link devices and selecting [Device/Buffer Memory Batch Monitor] from the shortcut menu.

Checking/changing the number of Intelligent function module parameters

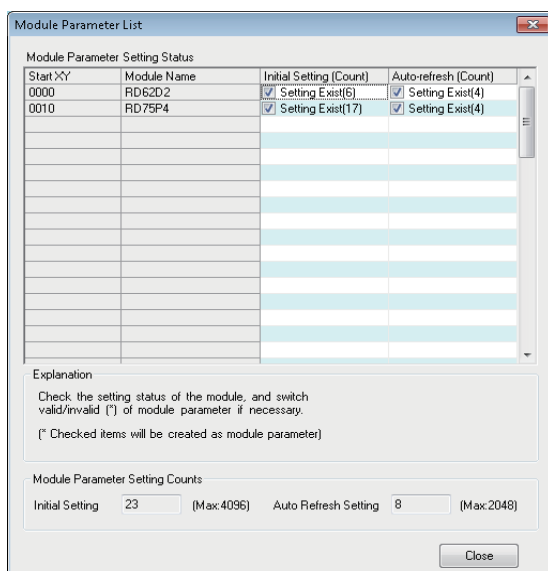
Display the setting information of the start XY addresses, initial settings, and auto refresh settings of Intelligent function modules in a list.

Intelligent function module parameters perform the following operations by writing parameters in a CPU module.

- Initial setting: The parameters of the individual Intelligent function module data are set as an initial setting. The data is registered to the CPU module parameters and written to the Intelligent function module automatically when the CPU module turns to the RUN state.
- Auto refresh: For the buffer memory of an Intelligent function module set to auto refresh, the data is written to/read from the specified devices automatically when the END instruction is executed on the CPU module.

Window

[Project] ⇒ [Intelligent Function Module] ⇒ [Module Parameter List]



■ Enabling/disabling parameters

Set whether to enable/disable the initial setting and auto refresh as an intelligent function module parameter.

Since a CPU module limits the number of parameters that can be set for the mounted Intelligent function modules, check the setting information using this function, and enable/disable the parameters so that the number of set parameters is within the allowable range.

For details on the number of the parameter settings, refer to the manuals of respective Intelligent function modules.

Operating procedure

Set the items and click the [Close] button.


Item	Description	
Initial Setting (Count)	Unselect the item if it is not set as an intelligent function module parameter. For a module with no initial settings, "-" is displayed.	
Auto-refresh (Count)	Unselect the item if it is not set as an intelligent function module parameter. For a module for which auto refresh is not set, "No Setting" is displayed.	
Module Parameter Setting Counts	Initial Setting	Displays the number of initial settings set as intelligent function module parameters.
	Auto Refresh Setting	Displays the number of auto refreshes set as intelligent function module parameters.

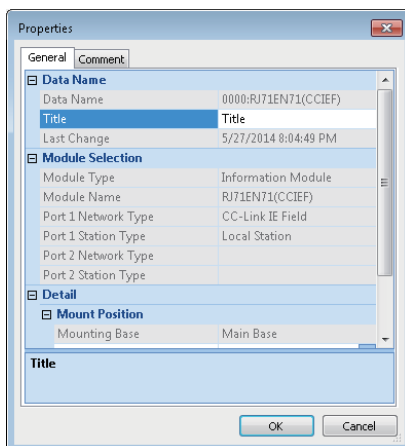
Checking property information

Check the setting information of Intelligent function module.

By this operation, the mounting slot number, start I/O number, and title (up to 32 characters) for RCPU, and the mounting position number and title (up to 32 characters) for FX5CPU can be changed.

Window

Select "Parameter" ⇒ "Module Information" ⇒ "(module name)" on the Project view, and select [Project] ⇒ [Data Operation] ⇒ [Properties] ().



Operating procedure

Set the items and click the [OK] button.

Module dedicated menus for the parameter editor

Depending on the setting items of each module, the input format and device assignment method can be selected from one of the following menus.

- [Edit] ⇒ [IP Address Input Format] ⇒ [Decimal]/[Hexadecimal]
- [Edit] ⇒ [Device Assignment Method] ⇒ [Start/End]/[Points/Start]
- [Edit] ⇒ [Word Device Setting Value Input Format] ⇒ [Decimal]/[Hexadecimal]

Parameter interaction with MELSOFT Navigator

By using the parameter interaction function of MELSOFT Navigator, the parameter consistency can be ensured between MELSOFT Navigator and GX Works3.

The operation is performed with MELSOFT Navigator. For details, refer to the HELP of MELSOFT Navigator.

4.3 Using Configuration Function

A function to perform parameter settings, monitoring, and testing of Intelligent function module is referred to as 'configuration function' in this manual.

This section explains about configuration function other than parameter settings.

For details on the parameter settings, refer to the following section.

☞ Page 77 Setting Parameters

List of supported modules

■MELSEC iQ-R series

Supported module	Function name	Reference
Analog input module	Offset/gain setting	📖 MELSEC iQ-R Analog-Digital Converter Module User's Manual (Startup)
Analog output module	Offset/gain setting	📖 MELSEC iQ-R Digital-Analog Converter Module User's Manual (Startup)
	Create wave output data	
Temperature input module	Offset/gain setting	📖 MELSEC iQ-R Channel Isolated Thermocouple Input Module/Channel Isolated RTD Input Module User's Manual (Startup)
Pulse I/O, positioning module	Preset	📖 MELSEC iQ-R High-Speed Counter Module User's Manual (Application)
	Positioning monitor	📖 MELSEC iQ-R Positioning Module User's Manual (Application)
	Positioning test	

■MELSEC iQ-F series

Supported module	Function name	Reference
Analog adapter module	Analog input - offset/gain setting	—
	Analog output - offset/gain setting	

■Q series

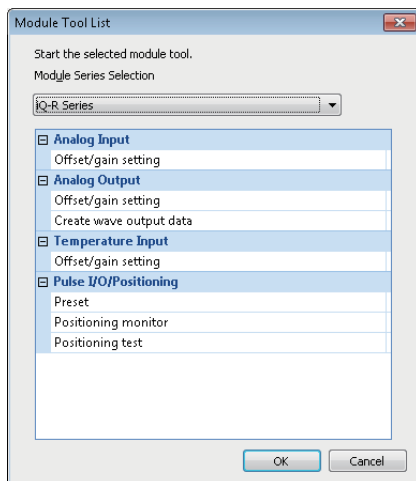
Supported module	Function name	Reference
Analog module	Offset/gain setting	📖 User's manual of the module used
	Q61LD two-point calibration setting	
	Q61LD default setting	
	Create wave output data	
Temperature input module	Offset/gain setting	📖 User's manual of the module used
Temperature control module	Auto-tuning	
	Sensor correction function	
Counter module	Preset	📖 User's manual of the module used

Displaying module tool list

The configuration functions can be performed on the "Module Tool List" screen.

Window

[Tool] ⇒ [Module Tool List]



Simple motion module setting tool

Set parameters and positioning data of simple motion module using the simple motion module setting tool.

For details on the operation methods and setting items, refer to the help of Simple Motion Module Setting Tool.

Operating procedure





1. Select "Parameter" ⇒ "Module Information" in the Project view, and select [Project] ⇒ [Data Operation] ⇒ [Add New Module].
2. Select the items on the "Add New Module" screen.
3. Double-click the added simple motion module setting.

Precautions

The simple motion module settings are saved in the project of GX Works3 when saving the GX Works3 project.

4.4 Predefined Protocol Support Function

Start the Predefined Protocol Support Function from GX Works3, and set the protocol and read/write data from/to a module. For details, refer to the following manuals.

-  MELSEC iQ-R Serial Communication Module User's Manual (Application)
-  MELSEC iQ-R Ethernet User's Manual (Application)
-  MELSEC iQ-F FX5 User's Manual (Serial Communication)
-  MELSEC iQ-F FX5 User's Manual (Ethernet Communication)

Point

Although the files saved with GX Works2 can be read using the Predefined Protocol Support Function of GX Works3, they are read with the packet setting set as "Variable Unset".

Starting and exiting predefined protocol support function

Start and exit the predefined protocol support function.

Starting Predefined Protocol Support Function

Operating procedure

1. Select GX Works3 menu [Tool] ⇒ [Predefined Protocol Support Function].
2. Set the items on the "Predefined Protocol Support Function" screen, and click the [OK] button.

Exiting Predefined Protocol Support Function

Operating procedure

Select [File] ⇒ [Exit] on the protocol setting screen.

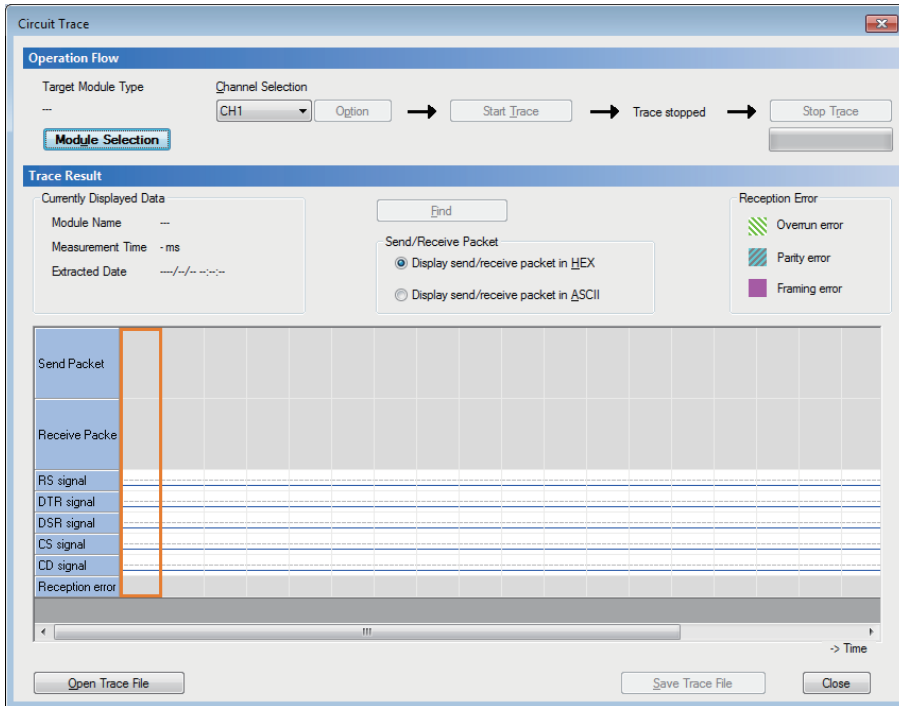
4.5 Circuit Trace Function

Trace the send/receive data and communication control signal between C24 and a target device.
For details, refer to the following manual.

 MELSEC iQ-R Serial Communication Module User's Manual (Application)

Window

[Tool] ⇒ [Circuit Trace]



5 REGISTERING LABELS

This chapter explains the overviews and registration methods of labels.


5.1 About Labels


There are three types of label; labels registered on the label editor (global label and local label), and a module label which is prepared as the dedicated label for each module (global label).

Global labels can be registered as system label.

Type	Description	Creation method	Reference
Global label	Labels that can be used in all programs in a project.	Create them on the global label editor.	Page 90 Registering Labels
Local label	Labels that can be used in each program.	Create them on the local label editor.	
Module label	Labels in which the I/O signals and buffer memory of a module to be used are already defined. By using the module labels, easy-to-use programs can be created without considering the internal address in the module.	Add module labels when adding the module information. Module labels are created as global labels.	Page 98 Registering Module Labels
System label	Labels that can be shared among iQ Works supported products. These labels are controlled by MELSOFT Navigator.	Register global labels as system labels on the global label editor.	Page 99 Registering System Label

For details on the label types, classes, and data types, refer to the following manual.

 MELSEC iQ-R Programming Manual (Program Design)

 MELSEC iQ-F FX5 Programming Manual (Program Design)

5.2 Registering Labels

This section explains how to register the labels.

Configuration of label editor

This section explains the configuration of the label editor.

The editor to be displayed will differ depending on the label types.

Point

The display format and details of operation settings for each function can be set by setting the following option.

[Tool] ⇒ [Options] ⇒ "Other Editor" ⇒ "Label Editor Common"

Window

Global label

Project view ⇒ "Label" ⇒ "Global Label" ⇒ "(global label)"

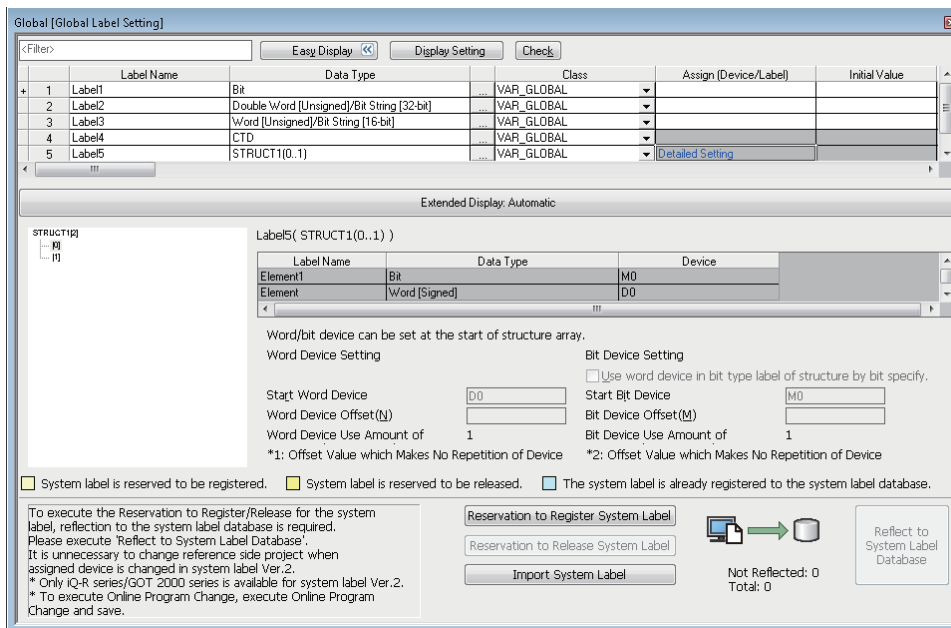
Local label

Project view ⇒ "Program" ⇒ "(execution type)" ⇒ "(program file)" ⇒ "(program block)" ⇒ "Local Label"

Toolbar



Label editor (global editor)



- Click the [Display Setting] button to select the items to be displayed.
- Click the [Check] button to check errors before converting programs.
- When the data type is structure or function block, the corresponding hierarchy of labels is displayed.

Point

Font color, background color, and fonts can be changed.

☞ Page 40 Checking and Changing Colors and Fonts

Editing rows

■ Adding rows

When using the New Declaration (After) function, the selected label is copied and added to the row right after the specified row, with a value appended.

If a value is already appended after the label name, the data is copied with an incremented value.

When devices are set for global labels, the data is copied with an incremented device number.

For adding blank rows or setting increment regulation (decimal/hexadecimal), set the following option.

- [Tool] ⇒ [Options] ⇒ "Other Editor" ⇒ "Label Editor Common" ⇒ "Editor Setting"

Operating procedure

Select [Edit] ⇒ [New Declaration (Before)]()/[New Declaration (After)]()

■ Deleting rows (deleting labels)

Operating procedure

Select [Edit] ⇒ [Delete Row]()

■ Displaying all lines or first line of comments

For the "Comment" columns, data can be entered in multiple lines.

Double-click "+" or "-" to switch the display between all lines or only the first line.

6	Global_data6	Bit(0..5)	Global_data6	Only the first line is displayed.
6	Global_data6	Bit(0..5)	Global_data6 Element0 = group 1 Element0 = group 2 Element0 = group 3 Element0 = group 4 Element0 = group 5	All lines are displayed.

■ Sorting labels

Labels can be sorted by clicking a title name of label editor.

For ascending order,  is displayed, and as for descending order,  is displayed in the title name.

■ Filtering display

- If the wild card ("*", "?") is specified as a filtering condition, it is not applied as a filtering condition but displayed strings which are used "*" and "?".
- To select the filtering target column, click the boundary on the right side of the column to as shown below and perform filtering.

<Filter>	
	Label Name
1	G_uLabel1
2	bLabel2
3	bLabel3
4	

- When filtering columns by selecting "Access from External Device", specify '1' after selecting "Access from External Device". As for it is not selected, specify '0'.

■ Moving a row upward

Delete an empty row automatically, and move upward on the label editor.

Operating procedure

Select [Edit] ⇒ [Delete Blank Rows]. ()

Entering information

Label name

Set label names except for the following names:

- A label name that includes a space.
- A label name that begins with a numeral.
- A label name which is same as the one used for devices.

Precautions

For label names, constants, and device initial values, use the characters in the Unicode Basic Multilingual Plane.

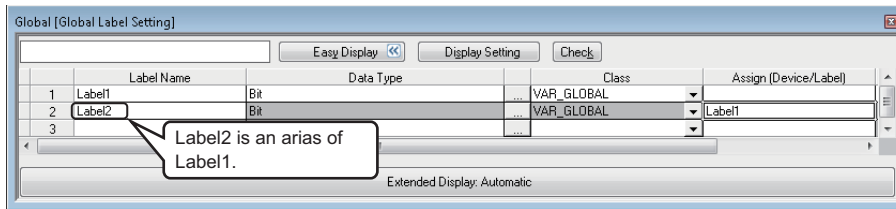
If the characters specified with the characters outside the Unicode Basic Multilingual Plane are specified for label names and constants, they may not be used in programs (ladder, ST, and FBD/LD).

The initial values specified with the characters outside the Unicode Basic Multilingual Plane may not be edited in the program.

Alias

An alternative name for label that is assigned to a label is referred to as 'alias'.

For the data types, classes, initial values, and constants to which the alias function is set, the information of assigned devices/ labels will be succeeded.



Automatic naming rule

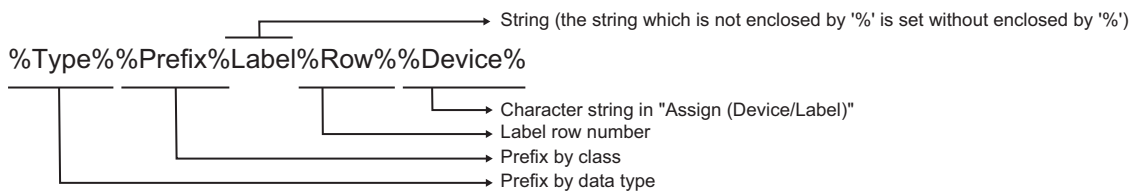
By selecting the row of "Data Type" or "Class" when the label name is blank, label name is set automatically.

Set the automatic naming rules in the following option setting.

- [Tool] ⇒ [Options] ⇒ "Other Editor" ⇒ "Label Editor Common" ⇒ "Editor Setting"

The automatic naming rules are as follows.

Defined characters



*The character other than the defined one enclosed by '%' will be blank.

The prefixes for each data type are as follows.

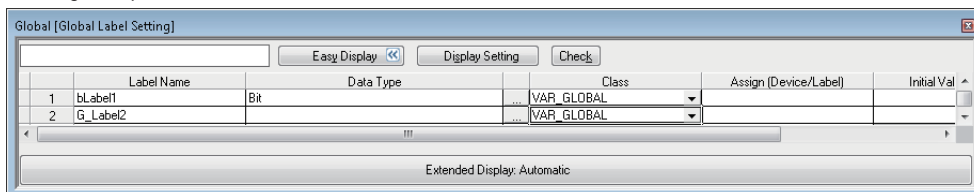
Data type	Prefix
Bit	b
Word [Unsigned]/Bit String [16-bit]	u
Double Word [Unsigned]/Bit String [32-bit]	ud
Word [Signed]	w
Double Word [Signed]	d
FLOAT [Single Precision]	e
FLOAT [Double Precision]	le
Time	tm
String	s
String [Unicode]	ws
Pointer	pd
Timer	td

Data type	Prefix
Counter	cd
Long Counter	lcd
Retentive Timer	std
Long Retentive Timer	lstd
Long Timer	ltd
Structure	st
FB	fb

The prefixes that are added depending on the selected class are as follows.

Class	Prefix
VAR_GLOBAL	G_
VAR_GLOBAL_RETAIN	GR_
VAR_GLOBAL_CONSTANT	GC_
VAR	Not added.
VAR_RETAIN	r_
VAR_CONSTANT	c_
VAR_INPUT	i_
VAR_OUTPUT	o_
VAR_IN_OUT	io_
VAR_OUTPUT_RETAIN	or_
VAR_PUBLIC	pb_
VAR_PUBLIC_RETAIN	pbr_


●Setting example



- When "Bit" is specified to data type: bLabel1
Prefix 'b' that indicates the bit type + character string 'Label' + label row number '1'
- When "VAR_GLOBAL" is selected to the class: G_Label2
Prefix 'G_' that indicates the class + character string 'Label' + label row number '2'

■Automatic synchronization

When label names/alias names are changed on the label editor, the changed label names/alias names used in a program editor or each editor will also be replaced automatically.

The labels are distinguished between global labels and local labels in the automatic synchronization. ( Page 105 Entering global labels/local labels)

The programs in which the replaced labels are used will be in the unconverted state.

If labels names/alias are changed, check if the change affects control programs using the Cross Reference function.

Data type

A data type can be selected on the "Data Type Selection" screen displayed by clicking [...] in the data type column on each label editor as well as the direct input.

There are three kinds of data types; "Simple Types", "Structured Data Type", and "Function Block". The data types that can be specified differ.

Array can be set for the specified data type.

For details on the data types, structures, and arrays, refer to the following manual.

MELSEC iQ-R Programming Manual (Program Design)

MELSEC iQ-F FX5 Programming Manual (Program Design)

Simple type

Specify a data type in "Data Type".



Enter the data length of the string data type directly.

	Label Name	Data Type	Class
1	L_string1	String(32)	VAR
2	L_string2	String(16)	VAR
3			

Change these values directly.

The initial value of the data length of a string data type can be set in the option setting.

- [Tool] ⇒ [Options] ⇒ "Other Editor" ⇒ "Label Editor Common" ⇒ "Data Type Setting"

Structure

When specifying a structure data as a data type, creating a definition of the structure is required in advance. (Page 96 Creating structure definition)

After creating a structure definition, specify the structure name in "Data Type".

Function block

When specifying a function block data as a data type, creating a function block is required in advance.

For details, refer to the following section.

Page 172 Creating Function Blocks

After creating a function block, specify the function block name in "Data Type".

Setting arrays for data type

Select "ARRAY", and enter the number for "Element".

Set the data type of the array element in the same manner as setting the normal data type.

The method of how to edit the arrays on each editor is as follows.

Description	Operating procedure																
Change the offset	<p>To change the offset ([Array start value].[Array end value]) to a value other than '0', edit the offset value by entering the array declaration directly in text. Minus values can be set for offset.</p> <table border="1"> <thead> <tr> <th></th> <th>Label Name</th> <th>Data Type</th> <th>Class</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Initial Setting_A</td> <td>Bit(-5..2)</td> <td>VAR_GLOBAL</td> </tr> <tr> <td>2</td> <td>Initial Setting_B</td> <td>Bit(2..5)</td> <td>VAR_GLOBAL</td> </tr> <tr> <td>3</td> <td>Initial Setting_C</td> <td>String(32)</td> <td>VAR_GLOBAL</td> </tr> </tbody> </table>		Label Name	Data Type	Class	1	Initial Setting_A	Bit(-5..2)	VAR_GLOBAL	2	Initial Setting_B	Bit(2..5)	VAR_GLOBAL	3	Initial Setting_C	String(32)	VAR_GLOBAL
	Label Name	Data Type	Class														
1	Initial Setting_A	Bit(-5..2)	VAR_GLOBAL														
2	Initial Setting_B	Bit(2..5)	VAR_GLOBAL														
3	Initial Setting_C	String(32)	VAR_GLOBAL														
Change the array to a two- or three-dimensional array	<p>Enter the array declaration directly in text. For details, refer to the following manual. MELSEC iQ-R Programming Manual (Program Design)</p> <table border="1"> <thead> <tr> <th></th> <th>Label Name</th> <th>Data Type</th> <th>Class</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Initial Setting_A</td> <td>Bit(0..2)</td> <td>VAR_GLOBAL</td> </tr> <tr> <td>2</td> <td>Initial Setting_B</td> <td>Bit(2..6)</td> <td>VAR_GLOBAL</td> </tr> <tr> <td>3</td> <td>Initial Setting_C</td> <td>Bit(0..2.0..2.0..2)</td> <td>VAR_GLOBAL</td> </tr> </tbody> </table>		Label Name	Data Type	Class	1	Initial Setting_A	Bit(0..2)	VAR_GLOBAL	2	Initial Setting_B	Bit(2..6)	VAR_GLOBAL	3	Initial Setting_C	Bit(0..2.0..2.0..2)	VAR_GLOBAL
	Label Name	Data Type	Class														
1	Initial Setting_A	Bit(0..2)	VAR_GLOBAL														
2	Initial Setting_B	Bit(2..6)	VAR_GLOBAL														
3	Initial Setting_C	Bit(0..2.0..2.0..2)	VAR_GLOBAL														

Class

Select the class in the pull-down list of "Class".

For details on the classes, refer to the following manual.

MELSEC iQ-R Programming Manual (Program Design)

MELSEC iQ-F FX5 Programming Manual (Program Design)

Assignment (devices/labels)

Assign the arbitrary devices/labels to the global labels. (Undefined labels can also be assigned.)

A digit-specified bit device (K4M0) and digit-specified word device (D0.1) can be specified. The module labels can also be assigned as a label.

If do not assign a device/label to the label, a label memory is assigned instead. For details on the label memory, refer to the following manual.

 MELSEC iQ-R CPU Module User's Manual (Application)

 MELSEC iQ-F FX5 User's Manual (Application)

Precautions

When specifying a timer or counter device to "Assign (Device/Label)", the assigned device is regarded as a contact (TS, STS, CS) if a bit type device is specified to "Data Type".

When "Data Type" is a word type, specified devices are regarded as current values (TN, STN, CN).

■When data type is structure

A device can be assigned to the structure element on the Structure Device Setting Window displayed when clicking the "Detailed Setting" button. (The color of "Detailed Setting" is displayed in pink when no setting exists, and is displayed in blue when the items have been set.)

When the structure array is specified, device numbers can be set in a fixed interval for each element of the structure array by specifying offset. When '0' is specified for the offset, the same device number set to the start device data is set to all data in the array.

Initial value

Set an initial value to the label.

FX5CPU does not support it.

However, if a device is assigned to a global label, the label does not operate with the initial value of the label.

The availability of initial values differs depending on the data types and classes.

The entry method of an initial values is the same as that of the constants of labels. For details, refer to the following manuals.

 MELSEC iQ-R Programming Manual (Program Design)

■Applicable range of label initial value

Initial values of labels will be set when the CPU module is at STOP to RUN. If the values of labels are changed by program, the program operates with the changed initial values.

■Initial values of label of which data type is array

Different initial values for the respective array elements cannot be set. When setting the different values for each array, set the initial value by program.


Constant

Constant can be set when "VAR_GLOBAL_CONSTANT" or "VAR_CONSTANT" is specified to the class.

The availability of the constants differs depending on the data type and class.



For details on how to enter the constants, refer to the following manual.

 MELSEC iQ-R Programming Manual (Program Design)

 MELSEC iQ-F FX5 Programming Manual (Program Design)


Comment

Append a comment to the defined labels.

When entering comments on the label editor, press the  key and  key to insert a line feed (two characters are used) in a cell.

Two or more comments can be set for one label. Set the display settings of the multiple comments on the "Multiple Comments Display Setting" screen.

For details, refer to the following section.

 Page 41 Setting Comment Display

■ Copying device comments

The comment of the device assigned to the selected label can be copied to the label editor.

Operating procedure

Select [Edit] ⇒ [Copy Device Comment] ().

Accessing from external devices

Select this to monitor devices/labels from external devices connected to the CPU module.

FX5CPU does not support it.

If the selection status of "Access from External Device" is changed, the change will not be reflected to the assigned devices/labels.

An error occurs when accessing from an external device to the CPU module in any of the following condition.

- Data type is pointer type/FB
- Class is "VAR_GLOBAL_CONSTANT"
- Indexed devices

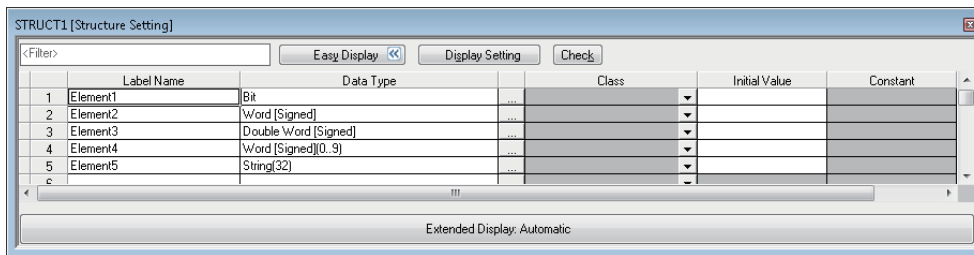
Creating structure definition

Set the structure elements.

Be sure to create the data for structure definition in advance. ( Page 61 Creating project)

Window

Project view ⇒ "Label" ⇒ "Structured Data Types" ⇒ "(structure)"



- Click the [Display Setting] button to select the items to be displayed.
- Click the [Check] button to check errors before converting programs.

Importing/exporting files

Import/export the data of the label editor to/from a file.

Operating procedure

1. Open the label editor.
2. Select [Edit] ⇒ [Import File] (📄) / [Export to File] (📄).

Formatting CSV files

The header titles (Class, Label Name, Data Type, etc.) of a label editor and a CSV file are linked.

- The data of which header title matches with that of the CSV file is imported to the label editor. When excluding the specific data, delete the column from the CSV file.
- When importing the CSV file exported from GX Works3 with different language than the CSV file, edit the header title name of the CSV file to match the header title in the label editor of the import target GX Works3.
- The data can be imported even when the column order in CSV file does not match with that in the label editor.
- When "Access from External Device" is selected, '1' is output. As for it is not selected, '0' is output. When editing a CSV file, set '1' or '0'.

Point

The files exported from GX Works2 can be imported to GX Works3.

Before importing the CSV file exported from GX Works2, edit the header title name of the CSV file to match the header title in the label editor of GX Works3.

5.3 Registering Module Labels

This section explains how to register the module labels.

Registering to global label

Module labels are registered by clicking the [Yes] button on the confirmation screen displayed after performing either of the following operations.

- Place a module on the Module Configuration Diagram and fix the parameters.
- Add a new module from the Project view.

The registered module labels are displayed in "Global Label" in the Project view and in the [Module] tab of the Element Selection window.

When using a module label in a program, enter a module label name directly or drag and drop it from the Element Selection window.



To use a module label under arbitrary name, set alias to the module label.

Precautions

■ Considerations when registering module labels

Since all the registered module labels are written to a CPU module, the memory capacity of the CPU module may be exceeded. In this case, perform any of the following operations.

- Delete the module labels that are not used. (☞ Page 91 Deleting rows (deleting labels))
- Change the write target of the global labels to SD memory card.
- For FX5CPU, the writable capacity is the same as that of the CPU module even when data is written to an SD memory card.

■ Module label with the name that starts with 'zReserve'

Do not write data to the module label with the label name that starts with 'zReserve' among the module labels. Doing so may cause malfunction of the programmable controller systems.

Ex.

'Instance name'_'Module number'.'Label name' GF11_1.zReserveAreaSB00007

Editing module labels

The module labels which are registered to the global label cannot be edited.

However, they can be deleted. Delete the rows on the label editor.

Re-registering deleted module labels

When registering the module labels which are once deleted from the global label editor, select a module name displayed in the [Module] tab of the Element Selection window and right-click it and select [Add Module Label] from the shortcut menu.

Editing structures

When module labels are registered, the definition of the structure in the module labels are registered in "Structured Data Types" of the Project view.

A defined structure can be copied on the Project view. The copied defined structure name of the module label is changed from "+" to "_".

5.4 Registering System Label

This section explains how to register the global labels as the system labels.

System label

Using the system labels controlled by MELSOFT Navigator enables programming with the same label names among the iQ Works supported products (GX Works3, MT Developer2, GT Designer3).

Once a workspace is saved with MELSOFT Navigator, a database to manage system labels is created in the workspace. System labels cannot be used in a workspace without the system label database.

Precautions

Since module labels are read only, they cannot be registered as system label.

System label version

There are two types of system labels for MELSOFT Navigator: system label ver.1 and system label ver.2.

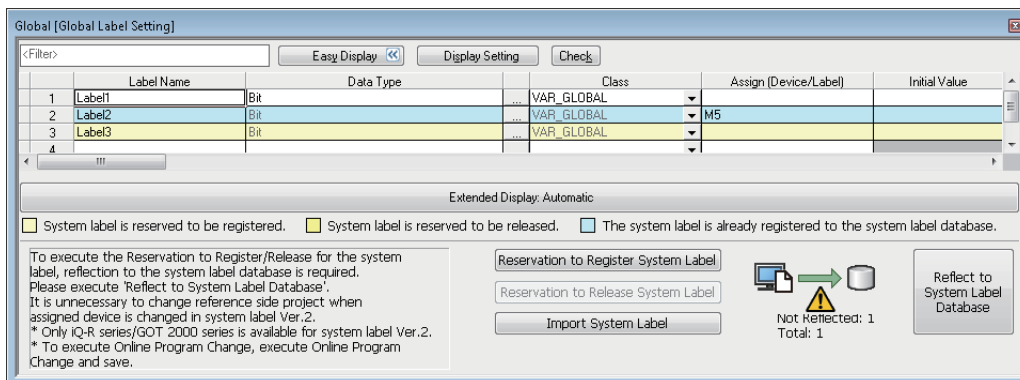
FX5CPU only supports system label ver.1.

For more details on the differences between system label ver.1 and system label ver.2, and creation methods for each system label database, refer to the Help of MELSOFT Navigator.

Configuration of label editor

Window

Project view ⇒ "Label" ⇒ "Global Label" ⇒ "(global label)"



Displayed items

Item	Description
System Label Relation	Displays the relation between the global label and the system label. <ul style="list-style-type: none"> • Disclose: The status in which the global labels are open as the system labels • Reference: The status in which the system labels opened by other projects are imported in the global labels • Blank: The status in which the global labels is not related to the system labels
System Label Name	Displays the system label name related to the global labels.
Attribute	Displays the attribute of the system label which is related to the global labels.

Registering labels in system label database

Disclose global labels created with GX Works3 as system labels.

When registering in the system label database at the first time, create a workspace with MELSOFT Navigator and save projects of GX Works3 in the workspace in advance.

Operating procedure

1. Display the global label editor.
2. Select the labels to be registered as system label, and click the [Reservation to Register System Label] button.
3. Click the [Reflect to System Label Database] button.
The "Check before registering in system label data base" screen is displayed.
4. Check the list of labels to be registered, and click the [Register] button.

Precautions

The structure array type global labels to which "Structure Array Offset Value" is set cannot be registered as system labels.

Importing system labels in system label database to GX Works3

Import the system labels registered with MELSOFT Navigator or other projects to a project.

Operating procedure

1. Display the global label editor.
2. Click the [Import System Label] button.
The "Import System Labels to Project" screen is displayed.
3. Select the system labels to be imported, and click the [Import] button.

Releasing system labels

Release the relation with the system label database, and restore system labels to normal global labels.

Operating procedure

1. Display the global label editor.
2. Select the labels of which relation is to be released from the labels registered as system labels.
3. Click the [Reservation to Release System Label] button.
4. Click the [Reflect to System Label Database] button.
The "Check before registering in system label data base" screen is displayed.
5. Check the list of labels to be released, and click the [Register] button.

Verifying system label information

Compare the system label information of GX Works3 projects to the system label database, and check if there is any difference.

If differences exist, correct the system label information of the GX Works3 projects, and synchronize the information with the system label database.

Operating procedure

1. Select [Edit] ⇒ [System Label] ⇒ [Execute Verification Synchronous with System Label].
2. Check and correct information on the "Execute Verify and Synchronize with system label" screen.
3. Click the [Reflection] button.

Importing the changes of system label database


Import the changed contents to the GX Works3 projects when the system labels used in a project have been changed in other projects.

Importing the changes automatically

Operating procedure

Click the [Yes] button on the message to confirm whether or not import the changed contents, which appears when any of the following operations is performed in a state where a system label change notification has been received.

- Opening a project
- Saving a project
- Reflecting labels to system label database
- Displaying the "Online Data Operation" screen
- Starting the Simulation function

Click the [No] button to import them after checking the changed contents. ( Page 101 Importing after checking the changes)

Importing after checking the changes

When the system label information in the GX Works3 projects is different from the system label database, the icon to notify the changes is displayed at the lower-left corner of the GX Works3 screen.

Check the contents that have been changed when the icon is displayed. In addition, import the changed contents to the GX Works3 projects.

Operating procedure

1. Select [Edit] ⇒ [System Label] ⇒ [Check the changes of System Label Database].
2. Check the information on the "Import Change Contents of System Label Database" screen.
3. Click the [Import] button.

PART 3 PROGRAMMING

This part explains the functions of the editor to edit a sequence program and the settings of device memory/ device initial values.

6 CREATING PROGRAMS

7 SETTING DEVICE MEMORY

8 SETTING DEVICE INITIAL VALUES

9 SEARCHING DATA

10 ENHANCED USE OF POU S

6 CREATING PROGRAMS

This chapter explains how to create programs.

6.1 About Programming Function

Features and types of programming language

The programming languages supported by GX Works3 are as follows:

Program language	Name	Description	Reference
Ladder	Ladder Diagram	A graphic language using ladder programs composed of contacts and coils. The inline structured text functions to edit ST programs on the ladder editor can be used.	Page 106 Creating Ladder Programs
ST	Structured Text	Control syntax such as selection branch by conditional syntax or repetitions by iterative syntax can be controlled, as in the high-level language such as C language. By using these syntax, concise programs can be written.	Page 125 Creating ST Programs
FBD/LD	Function Block Diagram/Ladder Diagram	A graphic language for creating a control program only by placing and connecting an element.	Page 131 Creating FBD/LD Programs

Features and types of POU

The POUs which can be used in a program are as follows.

POU	Description	Reference
Function block	Outputs an operation result in accordance with values of the internal memory.	Page 172 Creating Function Blocks
Function	Always outputs the same operation result against the same input value.	Page 177 Creating Functions

Execution types of program

One of the following execution types can be specified to a program: Initial, Scan, Fixed Scan, Event, Standby, or No Execution Type.

For details, refer to the following manual.

 MELSEC iQ-R CPU Module User's Manual (Application)

 MELSEC iQ-F FX5 User's Manual (Application)

■Setting method

To set the execution type, right-click the program name of which execution type to be set, and select [Register Program] ⇒ [Initial]/[Scan]/[Fixed Scan]/[Event]/[Standby] from the shortcut menu or drag and drop it on the Project view.

The execution type set on the Project view is applied to "Program" of the CPU parameter.

Inputting global devices/local devices

To use global devices and local devices individually, enter the devices as follows:

Note that FX5CPU does not support local devices.

- Global device: Enter a device name (Example: D10)
- Local device: Prefix '#' to the device name (Example: #D10)

For details of the global device/local device, refer to the following manual.

 MELSEC iQ-R CPU Module User's Manual (Application)

Entering global labels/local labels

When a label with the same name exists in both global labels and local labels, the label in a program is handled as follows:

- After a global label and a local label are registered, the label names are entered in the program: Treated as a local label.
- After a global label is registered, the label name is entered in the program, and then a local label with the same name is registered: Treated as a global label.
- After a local label is registered, the label name is entered in the program, and then a global label with the same name is registered: Treated as a local label.

The global labels and local labels can be distinguished by setting the different color on the "Color and Font" screen.

6.2 Creating Ladder Programs

This section explains how to create ladder programs.

Point

The display format and detailed operations for each function can be set by the following option setting.
[Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder Editor"

Configuration of ladder editor

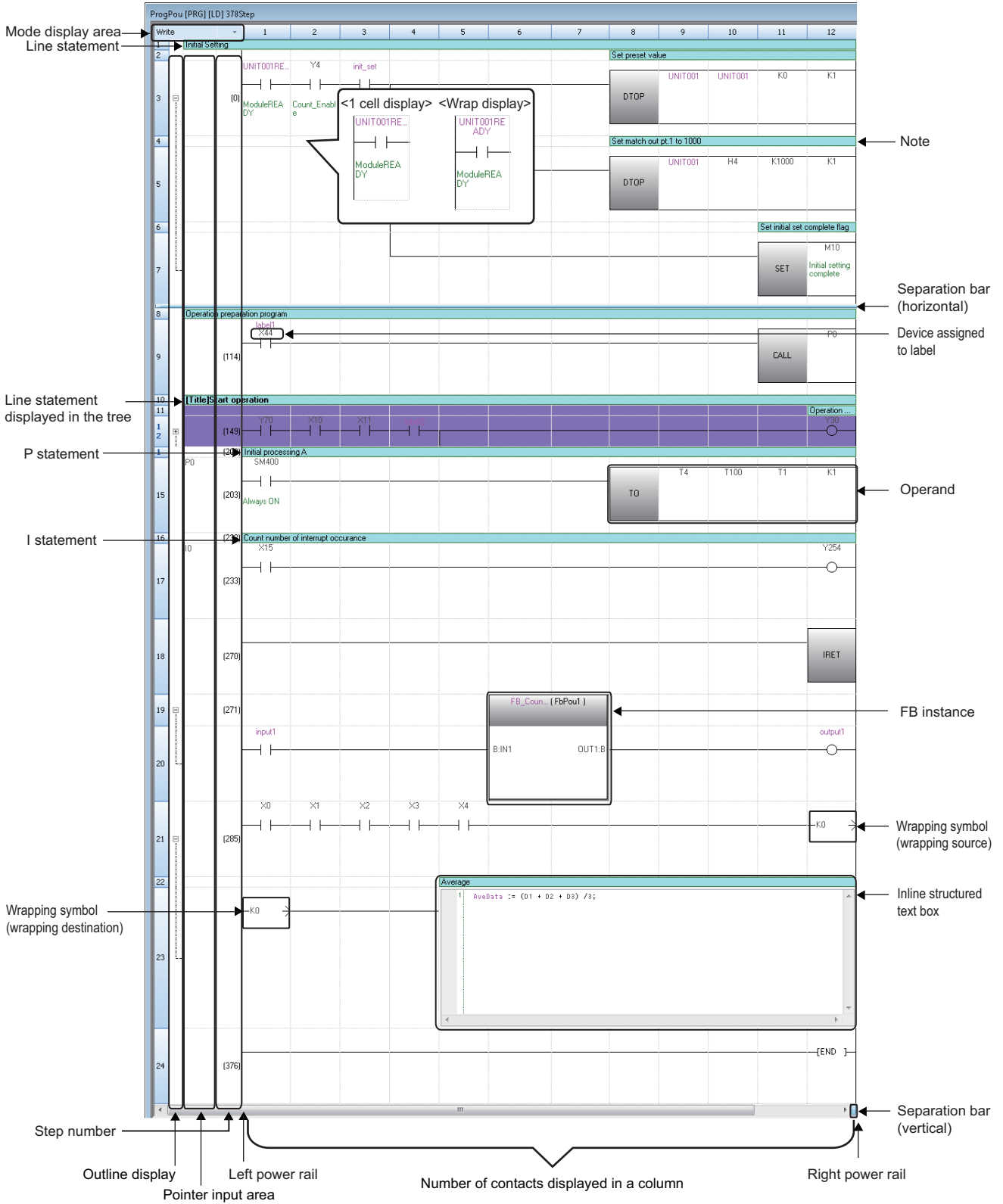
Window

Project view ⇒ "Program" ⇒ "(execution type)" ⇒ "(program file)" ⇒ "(program block)" ⇒ "Program"


●Toolbar



●Ladder editor



Displayed items

Item	Description	Related operation
Mode display area	An area that displays mode such as Write/Read/Write Mntr/Read Mntr.	<ul style="list-style-type: none"> ■ Switching mode ☞ Page 109 Read mode/Write mode/Monitor read mode/Monitor write mode
Step number.	The start step number of a ladder block.	—
Device assigned to label	<p>A device assigned to a label. Editing and searching/replacing labels displayed on a ladder editor are available.</p> <p>A device with any of the following conditions is not displayed.</p> <ul style="list-style-type: none"> • A device that is assigned by converting the program • When a label is used for array elements • When using a structure label 	<ul style="list-style-type: none"> ■ Settings ☞ Page 90 Registering Labels ■ Displaying/hiding [View] ⇨ [Display Device] ()
Alias	<p>An alternative name for a label. Editing and searching/replacing can be performed for the labels displayed on the ladder editor.</p>	
Comment	A comment set to a device/label.	<ul style="list-style-type: none"> ■ Entering elements ☞ Page 118 Entering comments/statements/notes
Line statement	A comment that is appended to a ladder block.	<ul style="list-style-type: none"> ■ Displaying/hiding [View] ⇨ [Comment Display]/[Statement Display]/[Note Display]
Line statement displayed in the tree	A line statement that is displayed in the tree of the Project view.	
P statement	A comment that is appended to a pointer number.	
I statement	A comment that is appended to an interrupt pointer number.	
Note	A comment that is appended to a coil/application instruction in the program.	
Inline structured text box	An area that can edit ST programs on the ladder editor.	<ul style="list-style-type: none"> ■ Insertion ☞ Page 116 Inserting inline structured text
FB instance	An entity of a function block used in a ladder program.	<ul style="list-style-type: none"> ■ Insertion ☞ Page 111 Inserting function blocks, Page 115 Inserting functions
Operand	A value or label name/device name to be operated.	—
Outline display	A symbol that indicates the status (collapse/expand) of a ladder block.	<ul style="list-style-type: none"> ■ Displaying/hiding • [Tool] ⇨ [Options] ⇨ "Program Editor" ⇨ "Ladder Editor" ⇨ "Ladder Diagram" ⇨ "Display Format" • [View] ⇨ [Outline] ⇨ [Show/Hide of Outlines]
1 cell display	The rest of a device/label name is omitted by ellipses "...". in order for the name to be fit in one cell.	<ul style="list-style-type: none"> ■ Switching display [View] ⇨ [Change Display Format of Device/Label Name] ⇨ [1 Cell Display]/[Wrapping Ladder Display]
Wrap display	A long device/label name is wrapped to be fit in one cell. If the label name still cannot be displayed in one cell, the rest of the name is omitted by ellipsis "...".	
Left power rail	The power rails of a ladder program.	—
Right power rail		
Tool hint	<p>The information on device/label where the mouse cursor is placed over is displayed.</p> <p>The display contents can be changed.</p>	<ul style="list-style-type: none"> ■ Changing display contents [Tool] ⇨ [Options] ⇨ "Program Editor" ⇨ "Ladder Editor" ⇨ "Tool Hint"
Number of contacts displayed in a column	<p>The maximum number of cells which are occupied with contacts, coils, and instructions.</p> <p>When the maximum number of contacts is exceeded, the line will be wrapped automatically.</p>	<ul style="list-style-type: none"> ■ Changing number of contacts [Tool] ⇨ [Options] ⇨ "Program Editor" ⇨ "Ladder Editor" ⇨ "Ladder Diagram" ⇨ "Display Format"
Wrapping symbols	<p>The wrapping symbols are displayed at wrapping source and wrapping destination.</p> <p>The same numbers (serial numbers) are assigned to the wrapping source symbol and the wrapping destination symbol that are created in pairs.</p> <p>Wrapping lines cannot be created on the input and output circuits of an FB instance.</p>	—



A font color, background color, and fonts can be changed.

☞ Page 40 Checking and Changing Colors and Fonts

Read mode/Write mode/Monitor read mode/Monitor write mode

The program cannot be edited directly when the mode is switched to the Read mode/Monitor read mode.

However, performing any of the following operations changes the programs.

- When the source function block name is changed or the function block is deleted
- When input/output labels of the source function block are changed and converted
- When the devices/labels are replaced with the replacement function by specifying the whole project

To prohibit editing the program, use the security function.

Point

- The mode can be changed from the pull-down list on the mode display area.
- When "No" is selected in the following option, the ladder editor can be edited directly same as Write mode in Read mode.

[Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder Editor" ⇒ "Ladder Diagram" ⇒ "Display Format" ⇒ "Use the Switching Ladder Edit Mode (Read, Write, Monitor, Monitor (Write))"

Entering ladder programs

This section explains how to enter ladder programs.

For details of ladder symbols, refer to the following manual.

📖 MELSEC iQ-R Programming Manual (Program Design)

📖 MELSEC iQ-F FX5 Programming Manual (Program Design)

Inserting contacts, coils, instructions, arguments

Operating procedure

■ Inserting from the element entry dialog

Enter an instruction and arguments on the element entry dialog^{*2} displayed by selecting a cell^{*1} to be entered or edited, and double-clicking or pressing the **Enter** key.

*1 For the "Insert mode" (press the **Insert** key to switch to the Overwrite mode), instructions are inserted on the cursor position. Therefore, if an instruction is already inserted in the selected cell, the existing instruction will be moved back.

*2 The cursor position on the ladder editor can be moved by clicking the **Ctrl** + **←** keys/**→** key/**↑** key/**↓** key.

The selection of instruction/argument can be moved by pressing the **Alt** + **↑** keys/**↓** key.

The options of instruction/label can be displayed by pressing the **Space** key while pressing the **Ctrl** key.

■ Inserting from the "Enter Ladder" screen with description

Select an instruction^{*1} and enter arguments on the "Enter Ladder" screen displayed by clicking the [ExtD Dsp] button on the element entry dialog.

*1 The frequently used instructions can be registered as "Favorites" by right-clicking and selecting [Add to Favorites] from the shortcut menu. The instructions added to "Favorites" can be selected in the lowest cell of "List" in the pull-down list.

■ Inserting from the Element Selection window

Select a contact, coil, or instruction displayed in the Element Selection window, and drag and drop it on the ladder editor. After that, edit the arguments.

■ Editing arguments directly

Select a cell where an argument is inserted, and press the **F2** key to edit the argument.

Point

- The labels to be input as an argument can also be input using aliases.
- A device number/label name can be incremented (+1)/decremented (-1) by pressing the **Alt** + **↑** keys/**↓** key.
- When inserting an instruction without entering the arguments, '?' is added automatically. ('?' can be entered as an argument.)
The arguments can be entered later.

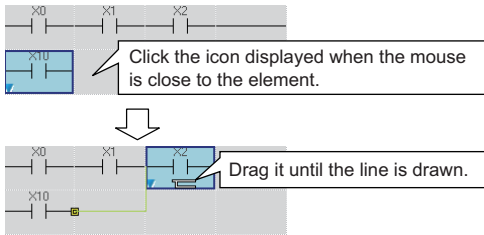
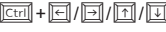
■ Switching methods for contacts/instructions

Switching contacts and instructions	Shortcut key	Pull-down list
Switching open/close contact, raising/falling pulse		Select a symbol from the pull-down list displayed when clicking the blue triangle at the bottom left in the cell.
Switching operation result rising/falling pulse		
Switching SET/RST instructions		

Drawing lines

Draw a line in the program.


If a line has already been drawn, the line will be deleted.

Operation	Draw line
Drag and drop	
Keyboard	 <p>Press the Ctrl + Shift + ← keys/ → key to enter the horizontal lines from the cursor position to the next contact/coil/line connection point consecutively.</p>

Inserting function blocks

Paste a function block as a part, and then name (FB instance name) and insert it into a sequence program.

For the creation methods of a program of a function block, refer to the following section.

 Page 172 Creating Function Blocks

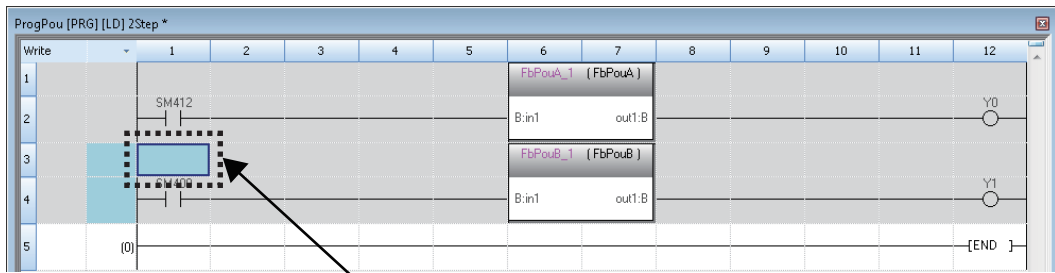
Operating procedure

1. Drag and drop a function block element to an arbitrary cell on the sequence program from the Project view or Element Selection window.
2. Select which to register the function block either as a global label or as a local label in the list of "FB Instance Name" screen.

When the function block is pasted, the FB instance name is automatically registered as a label on the selected label setting screen.

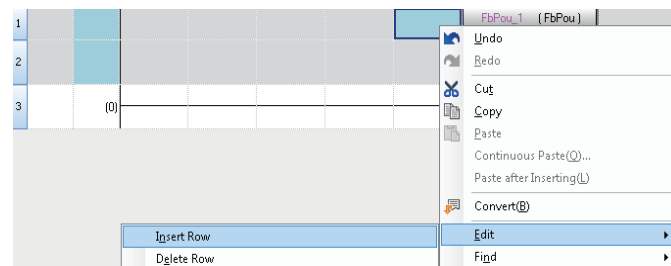
3. Connect the input and output to the FB instance.

- By entering 'fb.' in the element entry dialog, the options of function block elements are displayed. A function block element can be entered by selecting it from the options.
- To insert a function block between two consecutive FB instances, select [Edit] ⇒ [Insert Row] above the second FB instance first, and then insert the function block on the inserted row.



Place the cursor in the row on which the second FB instance exists, and insert a row.

- To insert a row above an FB instance/function, select a cell on the row with the definition name as shown below, and select [Edit] ⇒ [Insert Row].



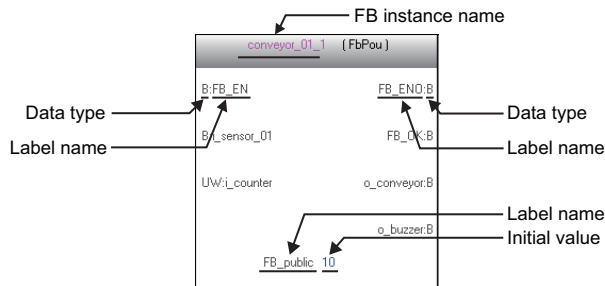
- To insert a row when either of the input argument or output argument for FB instance/function is other than BOOL data type, convert the argument to BOOL data type and insert a row, and then return the data type to the one other than BOOL.

Precautions

Pasting a function block to a sequence program causes the file size to increase.
 Pasting the same function blocks to one sequence program repeatedly also causes the size increase of the sequence program in accordance with the number of pasted function blocks.

■Displaying FB instance

On the pasted FB instance, label names of I/O variables and their corresponding data types are displayed.



The following are the representation of data types.

- B : Bit
- W : Word
- D : Double word [signed]
- E : FLOAT (Single Precision)
- L : FLOAT (Double Precision)
- S : String

The initial values set on the label editor when creating FB program are also displayed. The initial values set to each FB instance are not displayed.

■Editing FB instance names

Operating procedure

1. Move the cursor to an FB instance.
2. Select [Edit] ⇒ [Edit FB Instance].
3. Enter a new FB instance name.

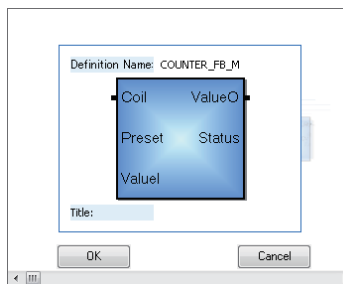
Point

- The name can be changed directly by moving the cursor on the FB instance and pressing the **[F2]** key.
- The data of the function block can be edited directly by moving the cursor on the FB instance and pressing the **[F7]** key.

■Replacing FB instances

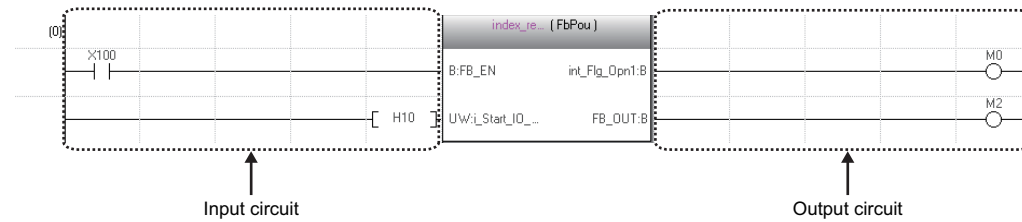
Operating procedure

1. Move the cursor to an FB instance.
2. Select [Edit] ⇒ [Change FB/FUN Data].
3. Scroll the displayed screen and select the function block to be replaced, and click the [OK] button.



■ Creating input and output circuits of FB instances

Create input and output circuits of the FB instance pasted to a sequence program.



The number of contacts occupied by input circuits/output circuits of an FB instance differs depending on the setting of the following option.

- [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder Editor" ⇒ "Ladder Diagram" ⇒ "Display Format" ⇒ "Display Connection of Ladder Diagram"

Setting of the number of displayed contacts	Number of contacts in input circuit	Number of contacts in output circuit
9 contacts	4 contacts	3 contacts + 1 coil
11 contacts	5 contacts	4 contacts + 1 coil
13 contacts	6 contacts	5 contacts + 1 coil
17 contacts	8 contacts	7 contacts + 1 coil
21 contacts	10 contacts	9 contacts + 1 coil
33 contacts	16 contacts	15 contacts + 1 coil
45 contacts	22 contacts	32 contacts + 1 coil

Instructions that exceed the number of occupied contacts cannot be entered.

When instructions cannot be placed by changing the number of displayed contacts, the ladder block may not be displayed properly.

Operating procedure

1. Select [Convert] ⇒ [Convert] ().

The ladder block is converted, and lines are connected to the input and output labels of the FB instance.

2. Edit the input circuits.

Enter an element to the input circuit in the same manner as creating normal ladder programs. Create a program in accordance with the data type of input variable.

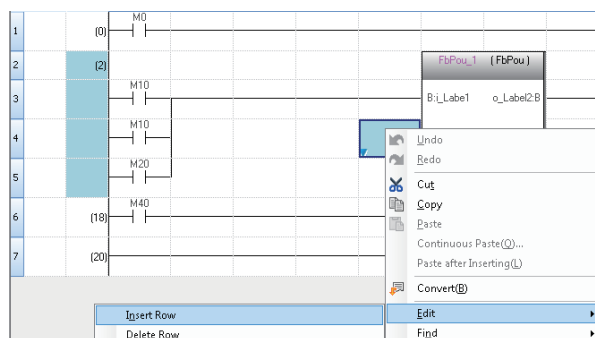
3. Enter elements to the output circuit in the same manner as the input circuit.

Edit the program other than function blocks as well. After complete editing, convert the program.

Point

A parallel circuit can be created in the input circuit on the FB instance.

To create a parallel circuit, select a cell under the input circuit as shown below, and select [Edit] ⇒ [Insert Row] to enter the element in the added row.

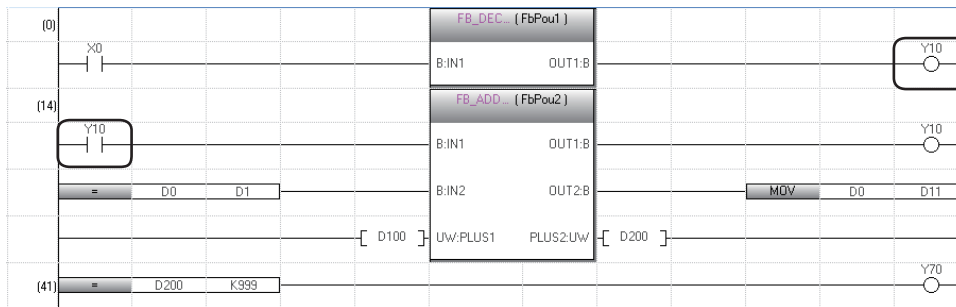


■ Considerations for using function blocks

- A single function block can be pasted to a single ladder block.

The output of an FB instance cannot be directly connect to the input of another FB instance.

When connecting function blocks each other, use a coil to initially receive the output of a single function block, and then connect the contact of the coil to the input of the other function block.



- When the label settings of a function block is changed, convert the program or all programs.

Inserting functions

Insert a function in a ladder program.

For the creation methods of functions, refer to the following section.

☞ Page 177 Creating Functions

Operating procedure

1. Drag and drop a function element to an arbitrary cell on the sequence program from the Project view or Element Selection window.
2. Connect an input and an output to the function.

Point

- By entering 'fun.' in the element entry dialog, the options of function elements are displayed. A function element can be entered by selecting it from the options.
- To insert a row after a function was inserted, refer to the point in "Inserting function blocks". (☞ Page 111 Inserting function blocks)

■ Adding/deleting arguments

Only for functions of which number of arguments can be changed, the arguments can be added/deleted.

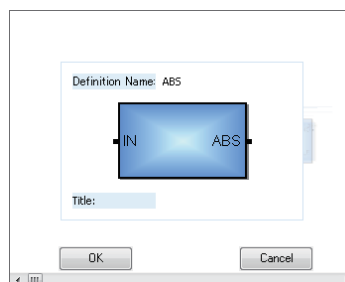
Operating procedure

1. Move the cursor to a function.
2. Select [Edit] ⇒ [I/O Argument] ⇒ [Increment Argument] (➕)/[Delete Argument] (➖).

■ Replacing functions

Operating procedure

1. Move the cursor to a function.
2. Select [Edit] ⇒ [Change FB/FUN Data].
3. Scroll the screen and select the function block to be replaced, and click the [OK] button.





Inserting inline structured text

Inline structured text is a function to edit/monitor a program by creating an inline structured text box that displays an ST program, at the coil instruction area on the ladder editor.

With this function, a numeric value operation or a character string process can be created easily in the ladder program. Up to 2048 characters can be entered in an inline structured text box. (Two characters are used as the line feed.)

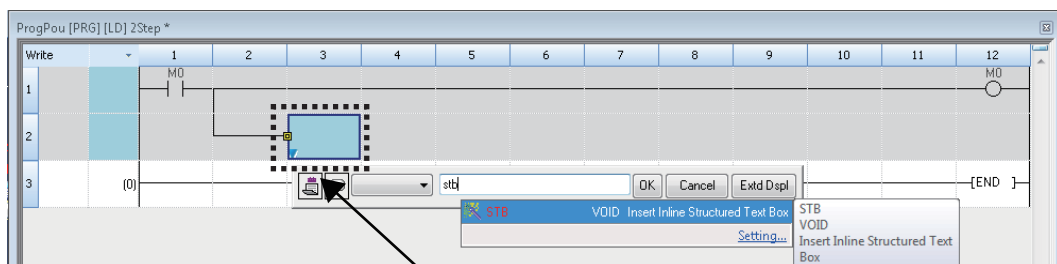
Operating procedure

Select [Edit] ⇒ [Inline Structured Text] ⇒ [Insert Inline Structured Text Box] ().

The editing method of the inline structured text program is the same as that of Structured Text. ( Page 127 Entering programs)

Point

- Enter 'STB' on the element entry dialog to insert an inline structured text box.
- When inserting inline structured text as a parallel circuit, draw lines for the parallel circuit first, and then insert the inline structured text box.



Insert an inline structured text box on the position of the parallel circuit.

Precautions

- Both an FB and inline structured text box cannot be used entered in a ladder block.
- Inline structured text box cannot be connected to the input/output of FB instance.
- The label of which data type is pointer cannot be used in the inline structured text.
- If the row that includes an inline structured text box is deleted, the whole ladder block is deleted.

Pasting from each screen

Paste a label name/device name by dragging and dropping from the editor such as label editor and device comment editor. By dragging and dropping a bit type label/device in a blank cell, a contact is inserted automatically and its label name/device name is displayed.

Additionally, when dragging and dropping a bit type label/device to the right end of the cell, a coil is inserted automatically and its label name/device is displayed.

A word type device/label can be pasted by dragging and dropping on the operand of an instruction.

Registering undefined labels

When an undefined label is entered, the "Undefined Label Registration" screen is displayed and it can be registered on the label editor.

Checking the duplicated coils

Check the duplicated coils in the same program when entering a coil in the program.

Set whether to check the duplicated coils by setting the following option.

- [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder Editor" ⇒ "Enter Ladder" ⇒ "Operational Setting"

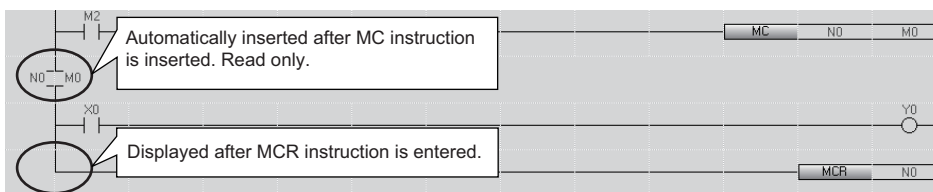
The availability of the combination of devices and instructions to check the duplicated coils are as shown below. (The devices assigned to labels are not checked.)

○: Available, ×: Not available

Device	Instruction								
	DELTA	EGP EGF	FF	MC	OUT	SET	SFT	PLS	PLF
Y, M, L, B, F, SM, SB	×	×	○	○	○	○	○	○	○
D, SD, W, SW, R, ZR	×	×	○	○	○	○	○	○	○
DY	○	×	○	○	○	○	○	○	○
T, C	×	×	×	×	○	×	×	×	×
V	×	×	×	×	×	×	×	×	×

Displaying MC/MCR instructions

When the MC instruction is inserted to a ladder program, the double-line symbol is displayed on the left vertical line. As for MCR instruction, the left vertical line is delimited.



Entering comments/statements/notes

This section explains the basic operations for editing comments, statements, and notes.

Entering/editing comments


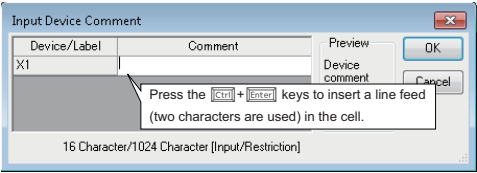


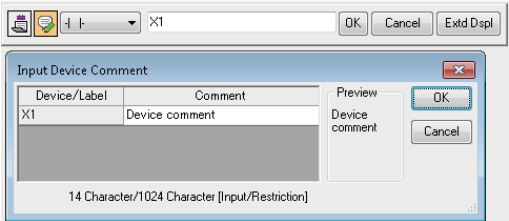


Enter or edit a device/label comment.

To check the entered comments on the ladder editor, change the setting to display comments.

- [View] ⇒ [Comment Display]

The device comments edited or added on the ladder editor are reflected to the device comments set to the following option.

- [Tool] ⇒ [Options] ⇒ "Project" ⇒ "Device Comment Reference/Reflection Target"

How to enter/edit	Operating procedure
<p>On the "Input Device Comment" screen</p>	<ol style="list-style-type: none"> 1. Select [Edit] ⇒ [Documentation] ⇒ [Edit Device/Label Comment].  2. Select the cell and press the [Enter] key or double-click it. 3. Enter a comment in the "Comment" column.  <p>After entering comments is completed, select [Edit] ⇒ [Documentation] ⇒ [Edit Device/Label Comment]  again.</p>
<p>On the element entry dialog</p>	<ol style="list-style-type: none"> 1. Select a cell and press the [Enter] key. 2. Click  on the element entry dialog and click the [OK] button. 3. Enter the comment to "Comment" column. 
<p>With the keyboard</p>	<ol style="list-style-type: none"> 1. Display the comments. 2. Select the cell and press the [F2] key twice. 3. Enter a comment directly.
<p>From each editor</p>	<p>Label editor:  Page 90 Configuration of label editor Device comment editor:  Page 141 Creating device comments</p>

Entering/editing statements

Add a comment to a ladder block using the statement (line statement, P statement, or I statement) in order to make the processing flow easy to understand.

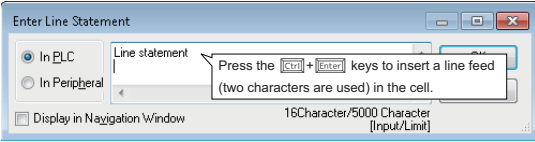
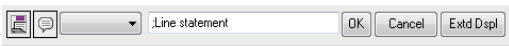
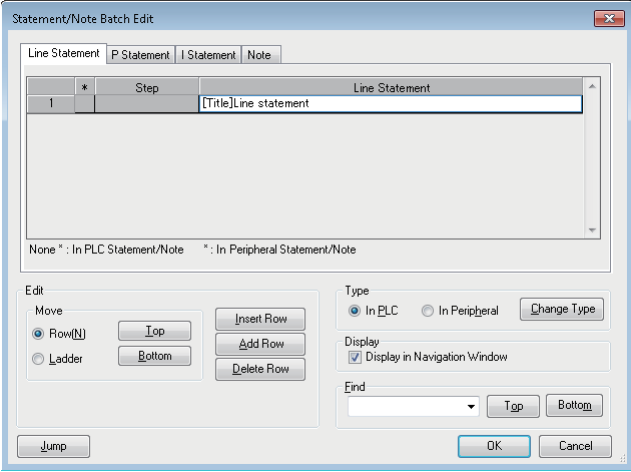
To check the entered statements on the ladder editor, change the setting to display the statements.

- [View] ⇒ [Statement Display]

For details on the statements, refer to the following manual.

MELSEC iQ-R Programming Manual (Program Design)

MELSEC iQ-F FX5 Programming Manual (Program Design)

How to enter/edit	Operating procedure
<p>On the Enter Statement screen</p>	<ol style="list-style-type: none"> 1. Select [Edit] ⇒ [Documentation] ⇒ [Statement]. 2. Select the cell and press the [Enter] key, or double-click it. 3. Enter a statement. <p>Before entering P statement/I statement, select the cell of a pointer number or interrupt pointer number.</p>  <p>When "Display in Navigation Window" is selected, "[Title]" is added in front of the line statement. After entering statements is completed, select [Edit] ⇒ [Documentation] ⇒ [Edit Statement] again.</p>
<p>On the element entry dialog</p>	<ol style="list-style-type: none"> 1. Select the cell and press the [Enter] key. 2. Enter a statement after entering ';' for 'In PLC' and ';*' for 'In Peripheral'. <p>When displaying a statement on the Navigation window, enter [Title] after ';' or ';*'. For P statement/I statement, enter a statement following the entry of the displayed pointer number or interrupt pointer number.</p> 
<p>On the "Statement/Note Batch Edit" screen</p>	<ol style="list-style-type: none"> 1. Select [Edit] ⇒ [Documentation] ⇒ [Statement/Note Batch Edit]. 2. Enter a statement.  <p>[Insert Row] button: Inserts a row above the cursor position. [Add Row] button: Inserts a row below the cursor position.</p>
<p>With the keyboard</p>	<ol style="list-style-type: none"> 1. Select the cell of a statement, and press the [F2] key. 2. Enter a statement directly.

Precautions

';' cannot be prefixed to a line statement.

■Editing statements


After editing a statement, the program will be in the unconverted state.

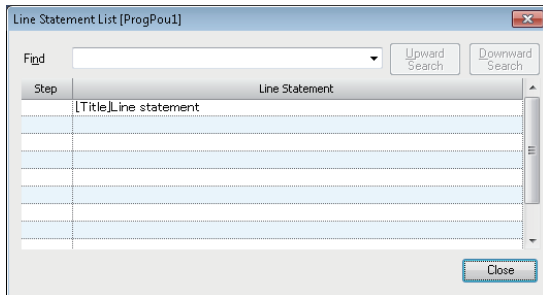
■Displaying list

Display the line statements used in the ladder program in a list format.

The cursor is moved to the location where the selected line statement is used.

Window

[Find/Replace] ⇒ [Line Statement List] ()

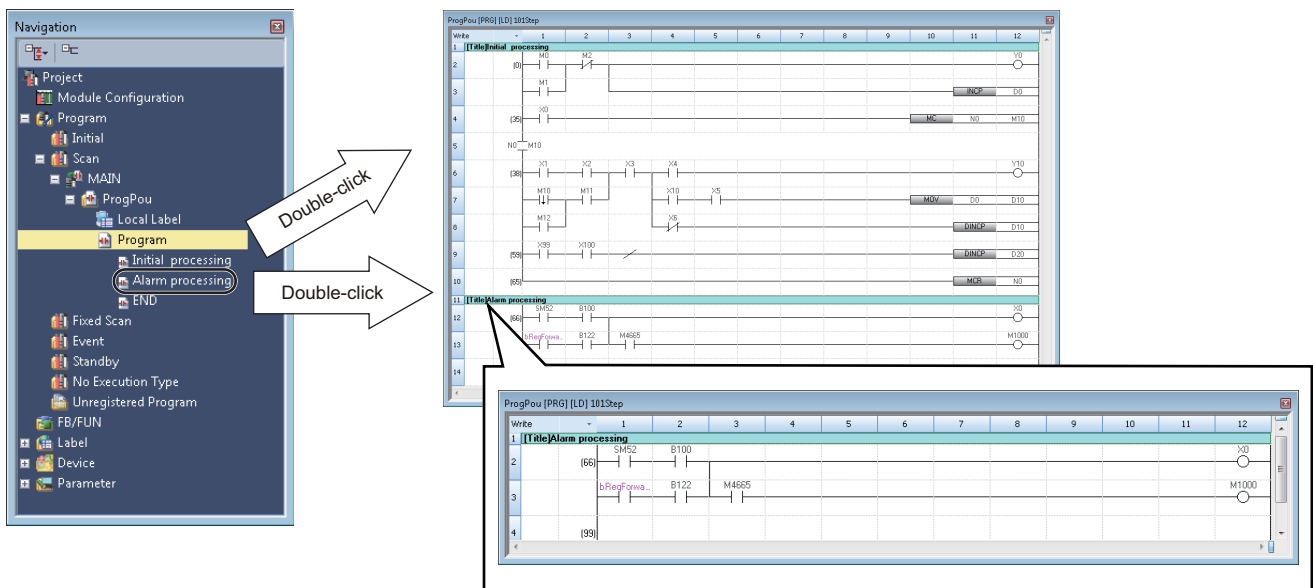


■Line statement to be displayed in the tree

Select a line statement and select [Edit] ⇒ [Document] ⇒ [Show/Hide of Navigation Window] to switch display/hide the line statement on the Navigation window.

When copying/deleting the line statement displayed in the tree, the ladder blocks before the next line statement in the tree are copied/deleted.

Double-click a line statement in the tree to move the cursor to the corresponding ladder block.



■Consideration when using statements in an FB program

When the name of a statement used in an FB program is changed, all programs in which the function block is used in the unconverted state.

Entering/editing notes

Append a comment to coils/application instructions using Note in the program in order to make it easier to understand the content of program.

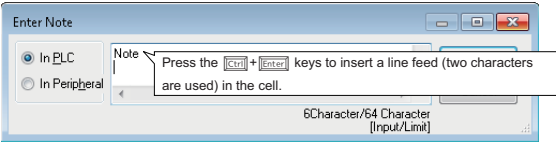
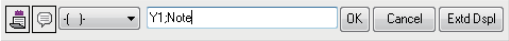
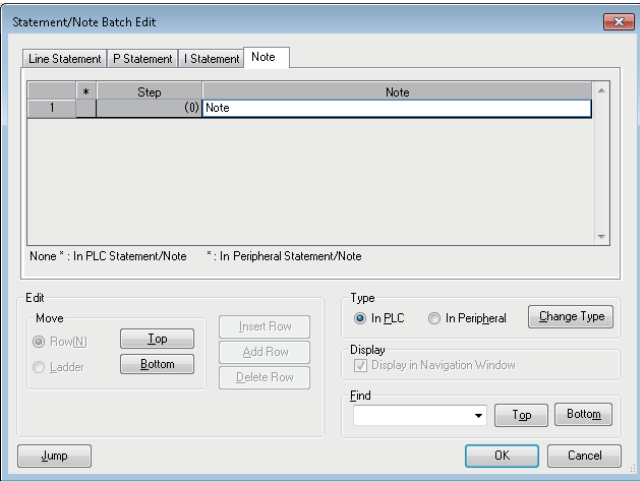
To check the entered notes on the ladder editor, change the setting to display the notes.

- [View] ⇒ [Note Display]

For details on the notes, refer to the following manual.

MELSEC iQ-R Programming Manual (Program Design)

MELSEC iQ-F FX5 Programming Manual (Program Design)

How to enter/edit	Operating procedure
On the "Enter Note" screen	<ol style="list-style-type: none"> 1. Select [Edit] ⇒ [Documentation] ⇒ [Edit Note]. 2. Select the cell and press the key or double-click it. 3. Enter a note.  <p>After entering notes is completed, select [Edit] ⇒ [Documentation] ⇒ [Edit Note] again.</p>
On the element entry dialog	<ol style="list-style-type: none"> 1. Press the key. 2. Enter notes following the displayed device/instruction after entering ';' for 'In PLC' and ';' for 'In Peripheral'. 
On the "Statement/Note Batch Edit" screen	<ol style="list-style-type: none"> 1. Select [Edit] ⇒ [Documentation] ⇒ [Statement/Note Batch Edit]. 2. Enter a note.  <p>[Insert Row] button: Inserts a row above the line statement. [Add Row] button: Inserts a row below the line statement.</p>
With the keyboard	<ol style="list-style-type: none"> 1. Select the cell of a note, and press the key. 2. Enter a note directly.

Inserting/deleting NOP instruction

Insert or delete a NOP instruction to adjust step numbers of a program.

The step number changed by the NOP instruction is reflected to the ladder editor after converting the program.

Operating procedure

■Batch insertion

1. Select a cell to be insert.
2. Select [Edit] ⇒ [NOP Batch Insert].
3. Set the number of NOPs on the "NOP Batch Insert" screen and click the [OK] button.

■Batch deletion

1. Select [Edit] ⇒ [NOP Batch Delete].
2. Click the [Yes] button.

Copying and pasting elements

Cutting/coping elements

Select an instruction, range, or ladder block, and cut/copy it.

Select a row when copying a function/function block.

Pasting elements

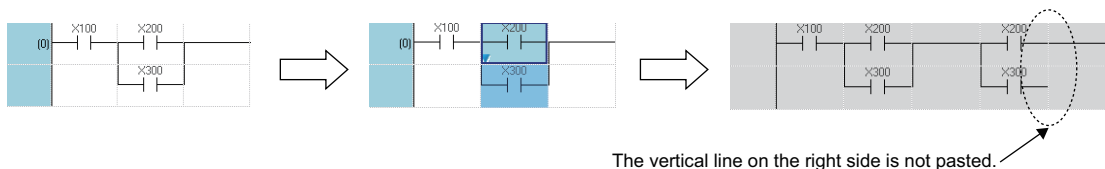
Paste the cut/copied elements.

For "Insert mode" (press the key to switch for "Overwrite mode"), the rung is inserted above the position of the cursor.

For "Overwrite mode", the row/column will be inserted automatically and pasted by selecting [Edit] ⇒ [Insert and Paste].

Precautions

If the elements as shown below are selected to set a range, the vertical line on the right side cannot be pasted.



In such case, draw a vertical line after pasting the elements.

Pasting device number/label name consecutively

Increment (+1) and paste a device number and label name consecutively in the cut/copied ladder block.

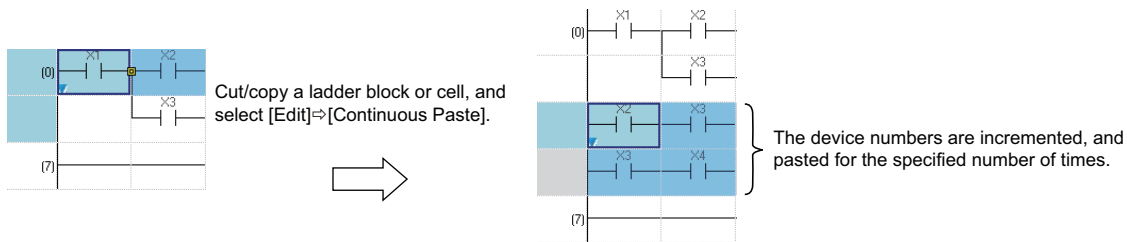
Operating procedure

1. Select [Edit] ⇒ [Continuous Paste].
2. Set the items on the "Continuous Paste" screen, and click the [Execute] button.

Ex.

Set the following on the "Continuous Paste" screen.

Number of Continuous Pastings: 2, Increment Value: 1, Paste direction: Down



Displaying instruction help

Check the instructions used in the ladder program on e-Manual Viewer.

To check the instructions, the files of the corresponding programming manuals are required to be registered to e-Manual Viewer.

Operating procedure

1. Select the cell where the target instruction is entered.
2. Press the **F1** key.

Searching for/replacing data in programs


The search functions that can be used in ladder editor are as follows.

Function name	Description	Reference
Simple search for instruction devices/labels	Search for a device/label and move the cursor.	Page 124 Simple search for instruction devices/labels
Jump	Move the cursor on the specified step number.	Page 124 Jump
Cross reference	Checks the device and label declaration location and referenced location in a list.	Page 160 SEARCHING DATA
Device list	Checks the usage of devices.	
Search and replace	<ul style="list-style-type: none">• Searches for and replaces a device name, label name, instruction name, and character strings.• Changes open/close contact.• Replaces devices in batch.	

Simple search for instruction devices/labels

Search for a device/label and move the cursor on the ladder editor.

Operating procedure

1. Press the  key on the ladder editor.
2. Enter the device/label and click the [Find] button on the "Find" screen.

Jump

Specify the step number, and move the cursor on the ladder editor.

Operating procedure

1. Select [Find/Replace] ⇒ [Jump].
2. Specify a step number on the "Jump" screen, and click the [OK] button.

Point

On the program editor, pressing a numeric key on the keyboard enables to display the Jump screen.

6.3 Creating ST Programs

This section explains how to create ST programs.

Point

The display format and detailed operations for each function can be set by the following option setting.
[Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "ST Editor"

Configuration of ST editor

The ST editor is a language editor in text format for creating programs in Structured Text.

Spaces, tabs, and line feeds can be entered between keywords and variable names of the ST control syntax.

Terms and symbols that configure the program is referred to as a token.

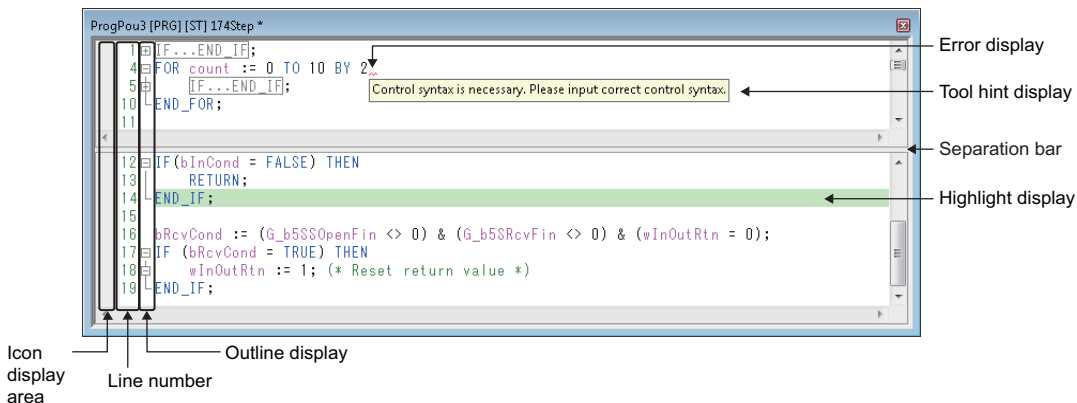
Window

Project view ⇒ "Program" ⇒ "(execution type)" ⇒ "(program file)" ⇒ "(program block)" ⇒ "Program"

●Toolbar



●ST editor



Displayed items

Item	Description	Setting
Icon display area	The area to display icons.	<ul style="list-style-type: none"> ■Types of icon ☞ Page 126 Types of icon
Line number	The line numbers of a program.	<ul style="list-style-type: none"> ■Changing display contents
Highlighted display	The line on which the cursor is placed is highlighted.	[Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "ST Editor" ⇒ "Editor Display Items"
Error display	A syntax error of the program is displayed.	
Outline display	Symbols to display/hide the text blocks are displayed.	<ul style="list-style-type: none"> ■Displaying/hiding • [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "ST Editor" ⇒ "Editor Display Items" • [View] ⇒ [Outline] ⇒ [Show/Hide of Outlines]
Tool hint display	The information where the mouse cursor is placed over is displayed. The display contents can be checked and changed by the option setting.	<ul style="list-style-type: none"> ■Checking/changing display contents [Tool] ⇒ [Options] ⇒ [Program Editor] ⇒ "ST Editor" ⇒ "Tool Hint"

■ Colors of programs (default)

Figure	Description	Default color
<pre> 1 IF M12 THEN 2 g_btn01 := TRUE; 3 ELSE 4 g_btn01 := FALSE; 5 END_IF 6 7 FB (input1 := bool1, input2 := K1, input3 := "ABC"); 8 (* LDFBI Functionblock *) </pre>	(1) Syntax	Blue
	(2) Device	Black
	(3) Operator	Black
	(4) Global label	Magenta
	(5) Error	Red
	(6) Local label	Magenta
	(7) Constant	Black
	(8) String constant	Black
	(9) Comment	Green

Point

A font color, background color, and fonts can be changed.

☞ Page 40 Checking and Changing Colors and Fonts

■ Types of icon

Icon	Description
	This icon is displayed on the line jumped from the Cross Reference window.
	This icon is displayed on the error line jumped from the Output window.

■ Keywords for collapse and automatic indent


A line can be outlined and displayed collapsed by using the keywords shown below. Additionally, pressing the `Enter` key in a control syntax inserts an indent automatically.


Category	Start	End	Automatic indent
Comment texts	(*	*)	×
	/*	*/	×
Selection statement	IF	END_IF	○
	CASE	END_CASE	○
While loop	FOR	END_FOR	○
	WHILE	END_WHILE	○
	REPEAT	END_REPEAT	○

Entering programs




This section explains how to enter ST programs.

For the functions/instructions used in ST programs, refer to the following manual.

 MELSEC iQ-R Programming Manual (Program Design)

 MELSEC iQ-F FX5 Programming Manual (Program Design)

Point

Press the  +  +  keys to enter an assignment operator (:=).

Precautions

When an ST editor is set to read-only or monitoring, the program cannot be edited.

Inserting instructions, functions, and control syntaxes

Instructions, functions, and control syntaxes can be entered by entering text using keyboard or by dragging and dropping them.

The input control syntaxes, operands, devices, and TRUE/FALSE are changed to the upper-case characters automatically.


Labels can be entered with aliases.

■ Specification method for data type of device

Normally, the data type of a word device is handled as INT (Word [Signed]).

By adding a suffix that indicates data type (type specifier) to a device name, the devices in which 32-bit integer or real number is stored can be described directly in the operation formula without defining labels.

For details, refer to the following manual.

 MELSEC iQ-R Programming Manual (Program Design)

Inserting function blocks

Insert a function block to an ST program.

For the creation methods of a program in a function block, refer to the following section.

☞ Page 172 Creating Function Blocks

Operating procedure

1. Drag and drop a function block to an arbitrary position on the ST editor from the Project view or Element Selection window.
2. Enter the information of a label (FB instance) on the "Undefined Label Registration" screen.
3. Enter the values for the input variables and output variables.

Ex.

When the defined function block is "TIMER"

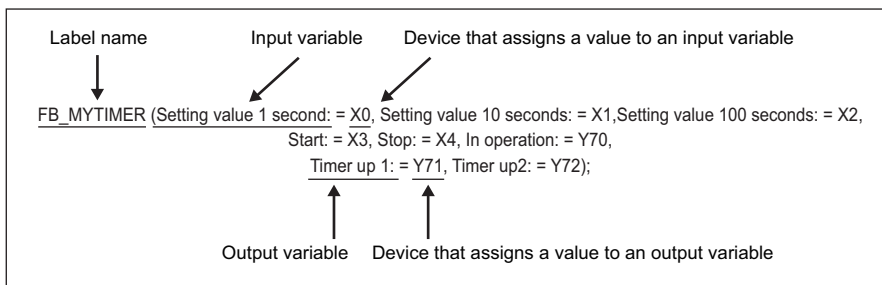
[Details of defined function block]

Label name: FB_MYTIMER

Input variable: Setting value 1 second, Setting value 10 seconds, Setting value 100 seconds, Start, Stop

Output variable: In operation, Timer up 1, Timer up 2

The example of entering ST program are shown below.



The output of the function block can be obtained by specifying the output variable name with a period (.) suffixed to the function block name.

Enter an instruction to obtain the output after performing the function block call.

```
Y70: = FB_MYTIMER. In operation;
```

Inserting functions

Insert a function in an ST program.

For the creation methods of FB programs, refer to the following section.

☞ Page 177 Creating Functions

Operating procedure

1. Drag and drop a function to an arbitrary location on the ST editor from the Project view or Element Selection window.
2. Enter the arguments.

Inserting indentation

A tab is inserted as an indentation at the head of a new line automatically when a line feed is inserted during program editing.

The tabulator length can be set in the following option setting.

- [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "ST Editor" ⇒ "Edit Operation"

Inserting comments

Enter comments which do not affect the program processing. Or, comment out/uncommented the already entered programs in batch.

Operating procedure

■ Entering a comment

- When the line is one: Enter a comment after entering slashes '//'.
 • When specifying the range: Enclose the comment in '/*' and '*/', or '(*' and '*)'.

■ Batch comment out/uncomment of a program

1. Select a range to be commented out or uncommented. (Multiple lines can be selected.)
2. [Edit] ⇒ [Comment Out of Selected Range] (📄) / [Disable Comment Out of Selected Range] (📄)

Registering undefined labels

Register an undefined label on the label editor.

Operating procedure

1. Enter the label name to be registered on the ST editor.
2. Select the token of a label name, and select [Edit] ⇒ [Register Label] (📄).
3. Set the items on the "Undefined Label Registration" screen, and click the [OK] button.

Displaying syntax templates

Syntax template is a format that defines data type of arguments and format of control syntaxes which are defined in each instruction, function, and operator.

The syntax template of the inserted instruction can be displayed on the ST editor.

Operating procedure

1. Select the token of which syntax is to be displayed.
2. Select [Edit] ⇒ [Display Template] (📄).
3. Enter the arguments in accordance with the displayed template.

Delete the data type name enclosed with '?', and enter a label name or device corresponding to its data type.

Point

Select [Edit] ⇒ [Mark Template (Left)] (📄) / [Mark Template (Right)] (📄), or press the **Ctrl** + **Alt** + **←** keys / **→** keys to set an argument of the template in the selected status one by one.

Displaying instruction help


Check the instructions used in an ST program on e-Manual Viewer.

To check the instructions, the files of the corresponding programming manual must be registered to e-Manual.

The applicability of help display is shown below.

Token type	Applicability
Operator	×
Control syntax	×
FB	×
Function	○
Constant, variable, comment	×

Operating procedure

1. Place the cursor on the token of the target instruction.
2. Press the  key.

Searching for/replacing data in program

The search functions that can be used in ST editor are as follows.

Name	Description	Reference
Jump	Specify the line number on an ST editor and move to the corresponding line.	Page 130 Jump
Cross reference	Checks the device ^{*1} and label declaration location and referenced location in a list.	Page 160 SEARCHING DATA
Device list	Checks the usage of devices ^{*1} .	
Search and replace	<ul style="list-style-type: none">• Searches for and replaces a device name^{*1}, label name, instruction name, and character strings.• Changes open/close contact.• Replaces devices in batch.	

*1 Search with a device name except for the device suffix part.

Jump

Specify the line number and move the cursor on the ST editor.

Operating procedure

1. Select [Find/Replace] ⇒ [Jump].
2. Enter a line number of the program on the "Jump" screen, and click the [OK] button.

6.4 Creating FBD/LD Programs

This section explains how to create FBD/LD programs.

Point

The display format and detailed operations for each function can be set by the following option setting.
 [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "FBD/LD Editor"

Configuration of FBD/LD editor

The FBD/LD editor is a language editor in graphic format to create programs by combining Function Block Diagram language with Ladder Diagram language.

Programs can be created only by placing the prepared elements vertically and horizontally, and connecting them.

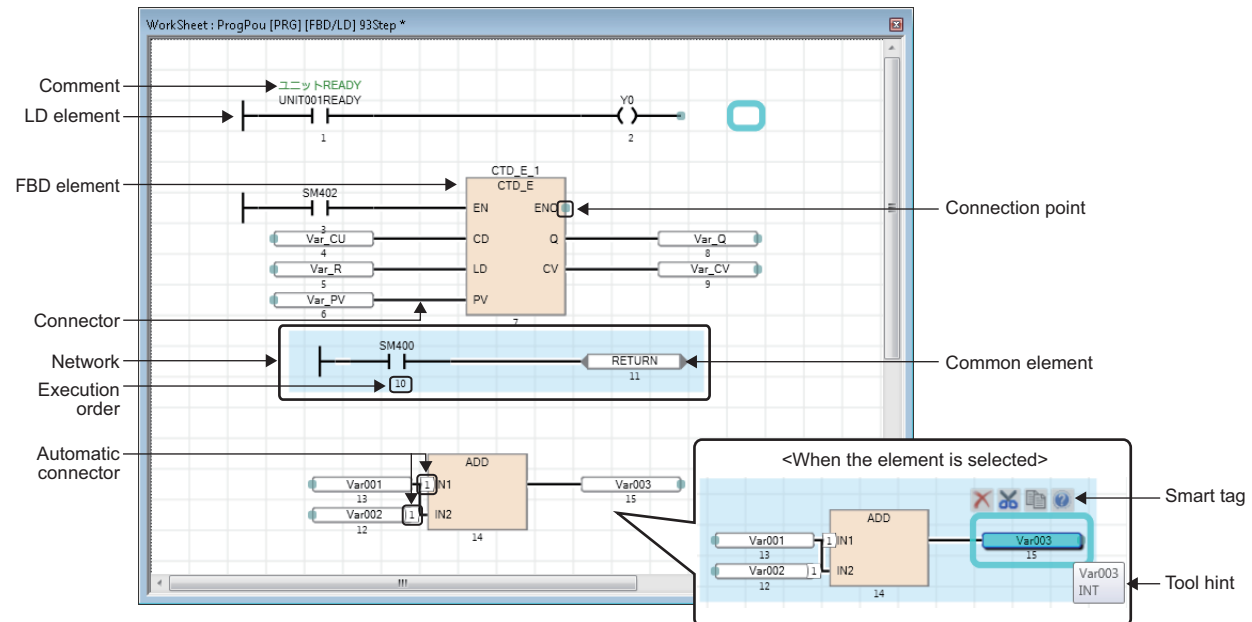
Window

Project view ⇒ "Program" ⇒ "(execution type)" ⇒ "(program file)" ⇒ "(program block)" ⇒ "(worksheet)"

●Toolbar



●FBD/LD editor



Displayed items

Item	Description	Related operation
Comment	A comment set to a device/label.	■Displaying/hiding [View] ⇒ [Comment Display]
LD element	An element that constitutes a ladder program.	■Types of element ☞ Page 132 LD element
FBD element	An element that constitutes a FBD program.	■Types of element ☞ Page 132 FBD element
Common element	A common element used regardless of program language.	■Types of element ☞ Page 133 Common element
Connector	A line that connects the connection points between elements. It is displayed by placing an element to be connected closer to the connection point on the connection target.	—
Network	A single network (a single block) composed of all elements connected together.	■Releasing from a network Select the element to be released, and move it with the key held down.

Item	Description	Related operation
Execution order	The execution order of a program is displayed.	■Displaying/hiding [Display] ⇨ [Display Execution Order]
Automatic connector	When a connector cannot be displayed due to the conditions where an element is placed, a number is displayed automatically. The same number of automatic connector indicates that they are connected.	—
Connection point	A terminal point to connect elements with a connector. By adding an element while a connection point is being selected, the element can be added with it connected already.	■Inverting contact ☞ Page 136 Inverting contact on the input/output
Smart tag	An operation button displayed around the selected element. Relevant functions can be performed by clicking it.	■Displaying/hiding [Tool] ⇨ [Options] ⇨ "Program Editor" ⇨ FBD/LD Editor" ⇨ "Smart Tag"
Tool hint	The information on device/label and FB/FUN where the mouse cursor is placed over is displayed.	■Changing display contents [Tool] ⇨ [Options] ⇨ "Program Editor" ⇨ "FBD/LD Editor" ⇨ "Tool Hint"

Point

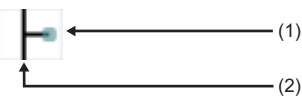
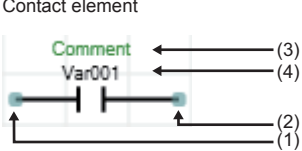
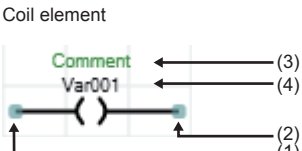
A font color, and fonts can be changed. However, this dose not apply to the comment elements.

☞ Page 40 Checking and Changing Colors and Fonts

Element

The elements that can be used in FBD/LD program are shown below:

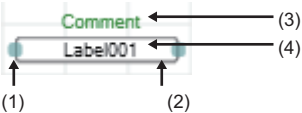

■LD element

Element	Name of each part	Description
Left power rail element 	(1) Output connection point (2) Left power rail	The position of a left power rail can be placed at will, and it will be the starting point for creating a ladder program.
Contact element 	(1) Input connection point (2) Output connection point (3) Label comment/device comment*1 (4) Device/label	Specify the device/label. It transmits the ON/OFF signal according to the specified information. For details on the element, refer to the following manual. ☞ MELSEC iQ-R Programming Manual (Program Design) ☞ MELSEC iQ-F FX5 Programming Manual (Program Design)
Coil element 	(1) Input connection point (2) Output connection point (3) Label comment/device comment*1 (4) Device/label	Specify the device/label. It outputs the signal to the specified device/label according to the transmitted ON/OFF signal. For details on the element, refer to the following manual. ☞ MELSEC iQ-R Programming Manual (Program Design) ☞ MELSEC iQ-F FX5 Programming Manual (Program Design)

*1 Displaying/hiding a comment is switched by the following option setting.

[Tool] ⇨ [Options] ⇨ "Program Editor" ⇨ FBD/LD Editor" ⇨ "Comment" ⇨ "Display Label/Device Comment"

■FBD element

Element	Name of each part	Description
Variable element 	(1) Input connection point (2) Output connection point (3) Label comment/device comment*1 (4) Device/label	Specify the device/label. Information can be obtained/stored in the specified device/label. It is switched to a constant element by entering a constant.
Constant element 	(1) Output connection point (2) Constant value	Specify a constant. The specified constant can be output. It is switched to a variable element by entering a device/label.

Element	Name of each part	Description
Function block element 	(1) Input connection point (2) Output connection point (3) FB instance name (label) (4) Label comment (5) Data type (6) Input/output label (VAR_IN_OUT) (7) Input/output label (other than VAR_IN_OUT)	It indicates a block for function corresponding to the data type. It is used with an FB instance name assigned to each element. For details on the element, refer to the following section. Page 172 ENHANCED USE OF POUS
Function element 	(1) Input connection point (2) Output connection point (3) Data type (4) Input/output label (argument) (5) Return value	It indicates a block for function corresponding to the data type. The name is not displayed in the return value. For details, refer to the following section. Page 172 ENHANCED USE OF POUS

*1 Displaying/hiding a comment is switched by the following option setting.

[Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ FBD/LD Editor" ⇒ "Comment" ⇒ "Display Label/Device Comment"

Common element

For a jump element and a return element, inverting contact on its connection point is not available.

Element	Name of each part	Description
Jump element 	(1) Input connection point (2) Label*1	It is used to jump the execution processing from a jump element to a jump label element.
Jump label element 	(1) Label*1	Enter a label to be specified as the jump destination.
Connector element 	(1) Input connection point (2) Output connection point (3) Connector label	It is used instead of a connector when placing a network in the display range/print range on the editor. The same connector label indicates that they are connected.
Return element 	(1) Input connection point (2) Character string, "RETURN" (Uneditable)	It is used to suspend the processing in the middle of processing.
Comment element 	(1) Comment display area	It is used to enter a comment. Changing size <ul style="list-style-type: none"> • Drag and drop it with a mouse cursor placed on the frame of the element to change the size. • Double-click it with a mouse cursor placed on the frame of the element in order for the size to be adjusted automatically according to the character string.

*1 Only local label of which data type is pointer can be specified.

Entering programs

This section explains how to enter FBD/LD programs.

Adding an element

Operating procedure

■Using the edit box

Select*1 a cell to which an element is to be added, and enter a label name or data type of FB/FUN directly. An element name and label name can be edited directly by selecting a placed element and pressing the **[F2]** key. The following items can be entered:

- Device/label
- Constant
- FB/FUN

*1 The options of instruction/label can be displayed by pressing the **[Ctrl]** and **[Space]** keys.

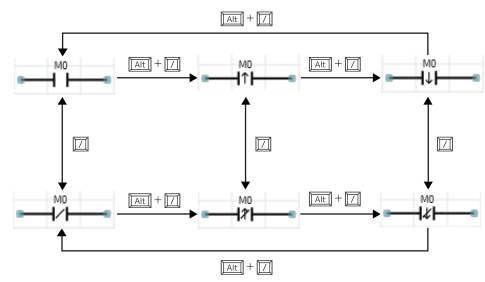
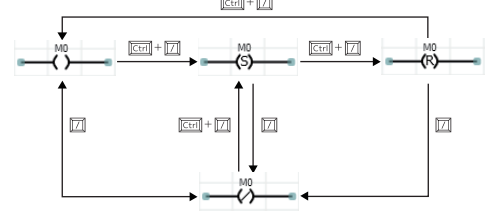
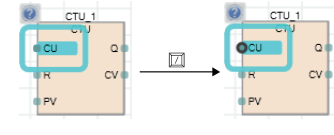
■Inserting from the menu/tool bar

Select a cell to which an element is to be added on the FBD/LD editor, select [Edit] ⇒ [Add Element] ⇒ [(element)]. Or, select an element from the tool bar.

■Inserting from the Element Selection window

Select an element from the Element Selection window, and drag and drop it on the FBD/LD editor.

■Switching methods for contacts/instructions

Switching contacts and instructions	Shortcut key	Remarks
Switching open/close contact, raising/falling pulse		—
Inverting contact, switching SET/RST instructions		—
Inverting contact on connection point of FB/FUN		Only when the data type of the connection point is one of the following: <ul style="list-style-type: none"> • Bit • Word [Unsigned]/Bit String [16-bit] • Double Word [Unsigned]/Bit String [32-bit] • ANY_BIT • ANY_BOOL

■Specification method for data type of device

On the FBD/LD editor, word device as the data type can be specified. By adding a suffix that indicates data type (type specifier) to a device name, the data type can be identified. For details, refer to the following manual.

 MELSEC iQ-R Programming Manual (Program Design)

Common operation of element

Operation		Operating procedure	
		Mouse	Keyboard
Select	To select a single element	Click the element to be selected.	Place the cursor on the element to be selected.
	To select multiple elements	<ul style="list-style-type: none"> Click multiple elements with the Ctrl/Shift key held down. Click the background of the FBD/LD editor, and drag diagonally. 	Select multiple elements by moving the cursor with the Shift key held down.
	To select in unit of network	—	Select an element and press the Ctrl + Shift + A keys.
	To select whole elements	The operation is same as the one to select multiple elements.	Press the Ctrl key and A key.
Change a name		Double-click the element of which name is to be changed, and enter a name.	Select the element of which name is to be changed, and press the Enter ^{*1} / F2 key, or enter a name.
Move		Click the element to be moved, and drag and drop it on the desired position. (By moving an element with the Shift key held down, it can be separated from the network and moved.)	Select the element to be moved, and press the Ctrl + Shift + ← / → / ↑ / ↓ keys.
Connector	To connect	<ul style="list-style-type: none"> Click a connection point, and drag it to a target connection point. Click the element to be connected, and drag it closer to a target connection point. 	—
	To replace	—	Select a connector with the Shift key held down, and drag and drop it on a connection point of an element.
	To insert an element	Click an element, and move it to a connected connector with the Shift key held down. (Only an element which has a connection point on the same level at the input/output side)	—

*1 For function element and function block element, this follows the operation for double-clicking, which is selected from [Tool] ⇒ [option] ⇒ "Program Editor" ⇒ "FBD/LD Editor".

Replacing function element/function block element

Operating procedure

1. Select a function element/function block element.
2. Select [Edit] ⇒ [Change FB/FUN Data], and enter the data type to be changed.

Point



The element also can be replaced by dragging an element from the Element Selection window and dropping it on the element to be changed.

For function elements, similarly, the data type can be changed by selecting a function element and entering a new data type directly.

Adding/deleting arguments

Only for functions of which number of arguments can be changed, the arguments can be added/deleted.

Operating procedure

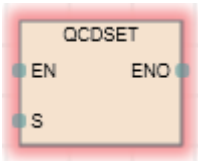
1. Move the cursor to a function element.
2. Select [Edit] ⇒ [I/O Argument] ⇒ [Increment Argument]()/[Delete Argument]().

Updating undefined FB/FUN

When a definition of a pasted element is unsure due to its deletion or change, or an element without the definition information is pasted, it is displayed as shown below resulting in an error.

Select [Edit] ⇒ [Update FB/FUN], and update the definition information.

When the data type of FB/FUN has been changed, select [Edit] ⇒ [Update FB/FUN].



Adjusting position automatically

The position is automatically adjusted to avoid overlap of elements when an element is added/moved.

When a rectangle area of network (an area comprises elements connected with connectors and additional one cell to each direction) overlaps with other area, the position is automatically adjusted so that the entire network does not overlap.

However, comment elements can be superimposed since it is not subject for the automatic adjustment.

Pasting from each screen

Paste a label name/device name by dragging and dropping from the label editor and the device comment editor.

Registering undefined labels

When an undefined label is entered, the "Undefined Label Registration" screen is displayed and it can be registered on the FBD/LD editor.

Inverting contact on the input/output

Invert the contact on an input to an element or an output from an element.

Inverting contact is available for only the input label, output label, and input/output label of FB/FUN with the following data type.

- BOOL, WORD, DWORD, ANY_BIT, ANY_BOOL

Operating procedure


Select the element of which contact is to be inverted, and select [Edit] ⇒ [Easy Edit] ⇒ [Invert Contact (Open/Close)] (🔗).

Displaying Help

Check the elements used in the FBD/LD program on e-Manual Viewer.

To check, the files of the corresponding programming manuals are required to be registered in e-Manual Viewer.

Operating procedure

1. Select the element to be checked.
2. Press the  key.

Searching for/replacing data in programs

The search functions that can be used in FBD/LD editor are as follows.

Function name	Description	Reference
Cross reference	Checks the device and label declaration location and referenced location in a list.	Page 160 SEARCHING DATA
Device list	Checks the usage of devices.	
Search and replace	<ul style="list-style-type: none">• Searches for and replaces a device name, label name, and character strings.• Changes open/close contact.• Replaces devices in batch.	

6.5 Registering Device Comments

This section explains the features and setting methods for device comments.

About device comment

There are two kinds of device comments; Common device comment and device comment for each program ('Each program device comment').

GX Works3 supports global device comment/local device comment of GX Works2, and comment/comment by program of GX Developer.

Up to 16 comments can be set for one device. (☞ Page 41 Setting Comment Display)

Set the comments in Japanese, English, and Chinese and apply then by switching the language.

■ Difference between device comment and label comment

Device comment is a comment data to be added to devices, and read from/write to CPU module.

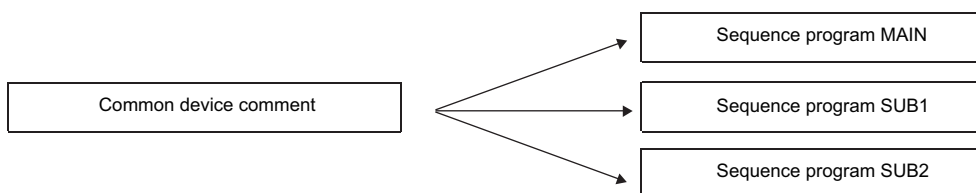
Label comment is a comment to be added to the defined labels.

Common device comment

Common device comment is a device comment that is created automatically when creating a new project.

Use this comment data when using device comments commonly in multiple programs.

The common device comments can be used if multiple programs do not exist.

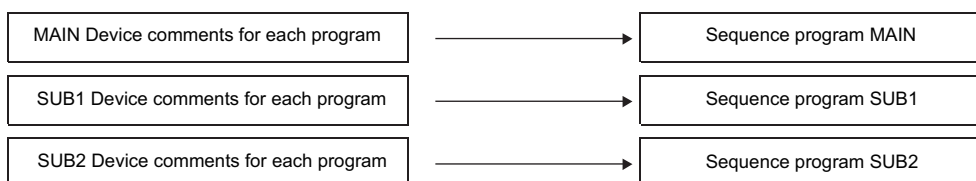


Each program device comment

'Each program device comment' is a device comment that can be created arbitrarily.

Create the device comments under the same data name as the program, and use them linked with the program.

Create a new each program device comment if necessary. (☞ Page 61 Creating project)



'Each program device comment' can be created under the different data name from the sequence program. However, the comment will not be linked with the sequence program.

To make the comments relate to the sequence program, the comments should have the same data names as the program name.

Precautions

For FX5CPU, 'each program device comment' cannot be written to the CPU module.

■Setting device comments for each program

When comments are set both in Common Device Comment and in Each Program Device Comment, specify the comment to be displayed on the program editor by setting the following option.

- [Tool] ⇒ [Options] ⇒ "Project" ⇒ "Device Comment Reference/Reflection Target"

Ex.

When different device comments are set for the same device (M)

Common device comment (COMMENT)

Device Name	Comment
M0	
M1	Initial Start 1
M2	Initial Start 2

Device comments for each program (MAIN)

Device Name	Comment
M0	
M1	Stop Device 1
M2	Stop Device 2

The display differs as shown below according to the option setting.

●When the reference of the device M in the sequence program MAIN is set to the common device comment <Options>

Reference/Reflection Target for Device Comment	
Reference/Reflect the Other Device Comment When S Yes	
MAIN	Mixed
M	Common

↓

<Sequence program MAIN>

The global device comment, 'Initial Start 1', is displayed as a device comment for M1.

●When the reference of the device M in the sequence program MAIN is set to the device comment for each program <Options>

Reference/Reflection Target for Device Comment	
Reference/Reflect the Other Device Comment When S Yes	
MAIN	Mixed
M	Each Program

↓

<Sequence program MAIN>

The local device comment, 'Stop Device 1', is displayed as a device comment for M1.

If a comment does not exist in the device comment set for "Device Comment Reference/Reflection Target", the other comment is displayed.

List of applicable devices

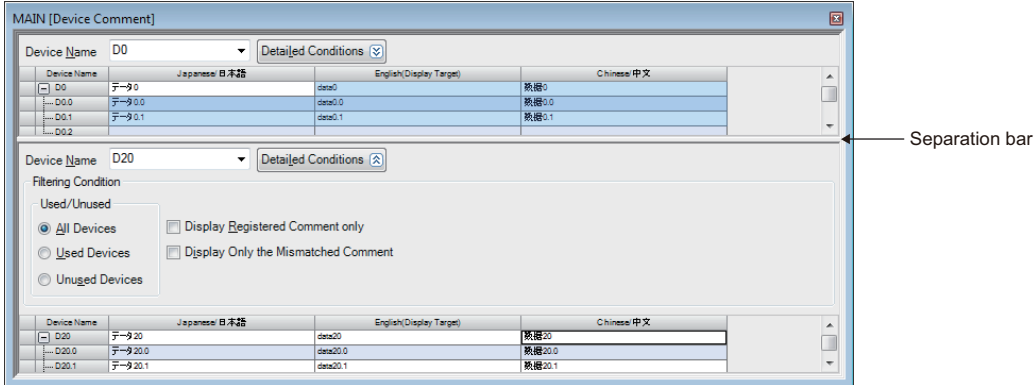
For the device types and comment setting availability, refer to the following section.

📖 Page 266 List of Applicable Devices in GX Works3

Configuration of device comment editor

Window

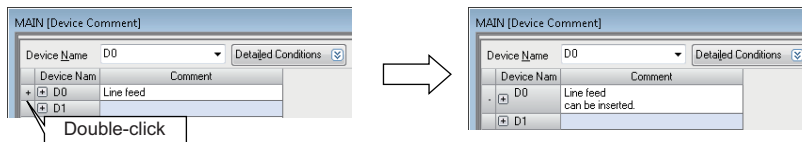
- For common device comment: Project view ⇒ "Device" ⇒ "Device Comment" ⇒ "Common Device Comment"
- For device comment for each program: Project view ⇒ "Device" ⇒ "Device Comment" ⇒ "Each Program Device Comment" ⇒ "(data name)"



Pressing the **Ctrl** + **Enter** keys creates a line break in a comment column.

Point

- The hidden comment is displayed by double-clicking + in the device name column.



- Fonts can be changed. (☞ Page 40 Checking and Changing Colors and Fonts)

Creating device comments

Create device comments for each device on the device comment editor.

Adding device comments make it easy to understand the content of program processing.

When less number of characters are entered, the data size to be written to CPU module can be reduced.

Set the applicable number of characters in the following option.

- [Tool] ⇒ [Options] ⇒ "Other Editor" ⇒ "Device Comment Editor" ⇒ "Number of Device Comment Editing/Displaying Characters"

When creating device comments for each program, create a device comment data in advance. (📖 Page 61 Creating project)

The comments can be entered on a ladder editor. For details, refer to the following section.

📖 Page 118 Entering/editing comments

Operating procedure

1. Enter the device of which comment is to be set in "Device Name".
2. Enter a comment for "Comment".

Point

- By selecting two or more consecutive cells in which the comment with number is inserted, and dragging the '+' symbol displayed at the lower right corner of the cell, the data of which number is incremented can be entered.
- When cutting/copying the hidden bit-specified word device comments, select the range and [Edit] ⇒ [Cut the Range Including Hidden Bit Specification Information]/[Copy the Range Including Hidden Bit Specification Information].
The bit-specified comments can also be pasted regardless of the setting of display/hidden by selecting [Edit] ⇒ [Paste the Range Including Hidden Bit Specification Information].

Creating multiple comments and setting display target

For details, refer to the following section.

📖 Page 41 Setting Comment Display

Detecting devices with empty cell

When comments are set in the multiple rows, detect the devices with empty cells.

Operating procedure

■ Detect comments from device data being displayed on the device comment editor

Select "Display Only the Mismatched Comment" in the filter condition on the device comment editor.

■ Detect comments from all device data in the device comment data

Select [Edit] ⇒ [Detect the Mismatched Comment].

Double-click "NG" on the displayed "Detect the Matched Comment of All Devices" screen to edit the device comment editor.

Deleting unused device comments

Delete unused comments in batch in a program. To delete the comments, open the device comment editor.

Operating procedure

Select [Edit] ⇒ [Delete Unused Device Comment].

Deletion target

Device comment type	Deletion target
Common device comment	Unused device comments in all programs
Each program device comment	Unused device comments in the corresponding program
	Device comments in all programs

The comments specified to bit-specified word device are not deleted.

Clearing all device comments

Delete the comments set to device comment data in batch.

Operating procedure

■Delete all device data in the device comment data

Select [Edit] ⇒ [Clear All (All Devices)].

■Delete device data being displayed on the device comment editor

Select [Edit] ⇒ [Clear All (Displayed Devices)].

Importing to/exporting from files

Export/import device comments from/to file.

When multiple comments are set, the comments selected in "Available" on the "Multiple Comments Display Setting" screen are output.

Operating procedure

1. Open the device comment editor.
2. Select [Edit] ⇒ [Import File]/[Export to File].
3. Click the [Extended Setting] button.
4. Set the items on the "Device Comment Extended Setting" screen, and click the [OK] button.
5. Click the [Yes] button.

Precautions

When a device comment, for which number of characters exceeds applicable amount, is set on the device comment editor, a warning message is displayed on the Output window and characters exceeded the applicable amount are deleted.

Formatting CSV files

The column headers of device comment editor and header names of a CSV file are linked.

- On the device comment editor, only the data of which column titles matches with header names in the CSV file is imported.
- Data can be imported even when the sorted order of CSV file does not match with the sorted order of the device comment editor.
- When importing a CSV file that is exported from GX Works3 with different language, edit the header title name in the CSV file to match the header title in the device comment editor of the import target GX Works3.

Point

The CSV files exported with GX Works2 can be imported in GX Works3.

When multiple comment display setting is set, import the CSV file after editing the header names in the CSV file exported from GX Works2 to match the header titles in the device comment editor of GX Works3.

Searching device comments

When searching device comments, refer to the following section.

📖 Page 165 Searching/Replacing Character Strings

Reading sample comments

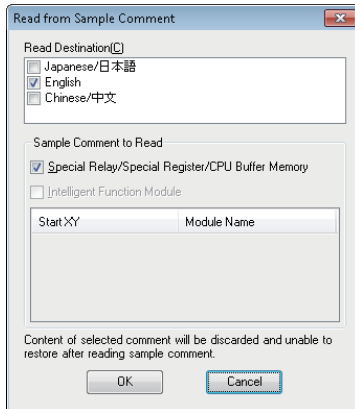
Set the sample comments of special relays/special registers/CPU buffer memory and Intelligent function modules automatically.

Open the device comment editor in advance.

FX5CPU does not support sample comments of CPU buffer memory.

Window

[Edit] ⇒ [Read from Sample Comment]



Precautions

When reading sample comments of Intelligent function module, the data size may exceed the memory capacity of the CPU module and data may not be written to a CPU module. In this case, prepare an SD memory card.

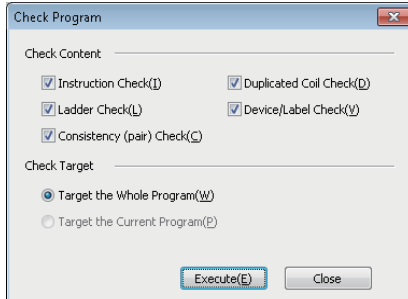
For FX5CPU, the writable capacity is the same as that of the CPU module even when data is written to an SD memory card.

6.6 Checking Programs

This section explains how to check if improper input or inconsistency of programs exists.
FX5CPU does not support this function.

Window

[Tool] ⇒ [Check Program]



When the check result has an error, the error message is displayed on the Output window. Take corrective actions according to the displayed contents.

6.7 Converting Programs



This section explains how to convert a created program into a code that can be executed.
The unconverted program name is displayed red in the Project view.

Converting/converting all programs

Convert the unconverted programs in the project. Check the program at the same time.
The differences in operation between "Convert" and "Rebuild All" are shown below:

Item	Conversion target	Label assignment target	Checking program
Convert	Newly added and changed location of the program	Newly added and changed labels	Whether or not to perform the Check Program function can be specified in "Basic Setting" by selecting [Tool] ⇒ [Options] ⇒ "Convert".
Rebuild All	All the programs in the project regardless of the change	Whether to retain or reassign the labels can be selected on the "Rebuild All" screen. However, newly added labels, or labels of which data types are changed will be reassigned even when "Retain" is selected.	Whether or not to perform the Check Program function can be specified on the "Rebuild All" screen.

Operating procedure

1. Select [Convert] ⇒ [Convert] ()/[Rebuild All] ().
2. For converting all programs, specify the respective items for "Label Assignment" and "Check Program" on the "Rebuild All" screen, and click the [OK] button.

Point

The unconverted data can be displayed on the Project view by selecting global label/POU/program file, and right clicking it and selecting [Expanded/Collapse Tree] ⇒ [Open Unconverted Data] from the shortcut menu to display the status of unconverted data.

Considerations for conversion

■Canceling conversion

The conversion is canceled in a program file unit. Therefore, even when the [Cancel] button is clicked during the conversion, the conversion will not be canceled until the conversion for one program file is completed.

Note that a large-scale program file with multiple function blocks/functions requires a longer time to cancel the conversion.

■When creating a sequence program with multiple instructions

'LD SM400' may be added in the beginning of the program in order to execute the program.

Operations that requires conversion for all programs

All programs need to be converted when one of the following operations is performed.

- Change of system parameter (Fixed Scan Communication Area Setting)
- Changing CPU parameters (File Register Setting, Device/Label Memory Area Setting, Index Register Setting, Refresh Memory Setting, Pointer Setting, Program Setting, FB/FUN File Setting, Refresh Setting (At I45 Exe))
- Changing option settings ("Data Length of Character String Data Type" in "Label Editor Common", "Convert")
- Changing module type

Considerations after converting (reassigning) all programs

When all programs are converted (reassigned), the label memory area is reassigned to all POUs. If all the converted programs are written to the CPU module and RUN as they are, the programs may be processed with the device values set before the program change.

After converting all programs, initialize the labels by the following procedure.

Operating procedure

1. Switch the CPU module to STOP.
2. Select "Device/Label Memory" on the "Memory Management" screen displayed by selecting [Online] ⇒ [CPU Memory Operation] to clear the values.
3. Select [Online] ⇒ [Write to PLC] (📁) to write the changed program files. When the initial values are set to the labels used in the program, write the label initial value file as well.
4. Reset the CPU module.

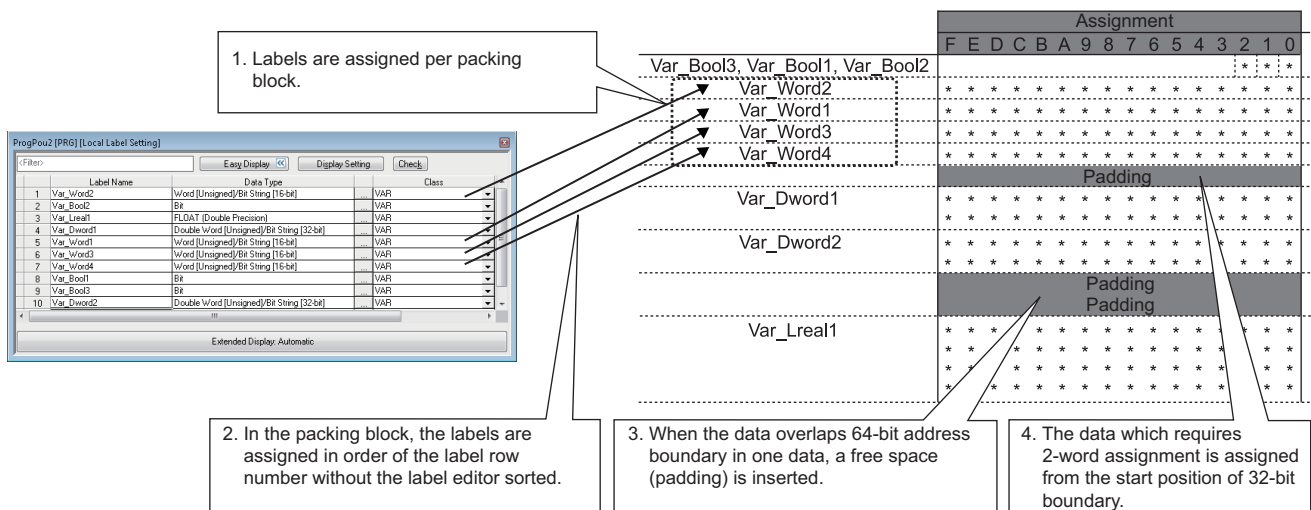
It can also be reset by selecting [Online] ⇒ [Remote Operation].

The labels are reset to '0' or initialized with the values set to the label initial value file.

Memory assignment of labels

When converting/converting all programs, the labels registered to the label editor are assigned to the memory in packing block (which is classified as type and data type, and set them in consecutive order of line numbers) unit.

Ex.



The types of packing blocks and assignment order is shown below.

They are arranged in ascending order due to minimize the useless space.

Assignment order	Packing block	Data type	Remarks
1	Bit	Bit	☞ Page 148 Assignment of bit type
2	Word	Word [Unsigned]/Bit String [16-bit] Word [Signed]	—
3	String	String	Padding is not inserted because a packing block is assigned per one word unit, though the assignment amount differs depending on the number of character strings.
4	String [Unicode]	String [Unicode]	
5	VAR_IN_OUT	All data types except for bit	Since the packing block is a reference type of 32-bit (2 words) other than bit type, it will be regarded as VAR_IN_OUT packing block.
6	Double Word	Double Word [Unsigned]/Bit String [32-bit] Double Word [Signed]	—
7	Time	Time	—

Assignment order	Packing block	Data type	Remarks
8	FLOAT [Single Precision]	FLOAT [Single Precision]	—
9	Timer	Timer	☞ Page 149 Assignment of timer/retentive timer/counter
10	Retentive Timer	Retentive Timer	
11	Counter	Counter	
12	FLOAT [Double Precision]	FLOAT [Double Precision]	—
13	Long Timer	Long Timer	☞ Page 149 Assignment of timer/retentive timer/counter
14	Long Retentive Timer	Long Retentive Timer	
15	Long Counter	Long Counter	
16	Array	All	☞ Page 148 Assignment of array
17	Structure	All	☞ Page 149 Assignment of structure
18	FB instance	All	—

■Assignment of bit type

If the number of bit type labels exceeds 16, the labels will be assigned to the next memory area consecutively.

Ex.

■Assignment of array

For a bit type array, the memory is assigned from the start address (0 bit) of the array, and continuous bits for one-dimensional element are assigned in word unit. As for the two-dimensional element or later, the same area as the one-dimensional element is assigned for the number of the dimensional elements continuously.

For an array other than bit type, the area which is required for the element is assigned for the memory of the data type continuously. A padding is not inserted between the array elements.

Ex.

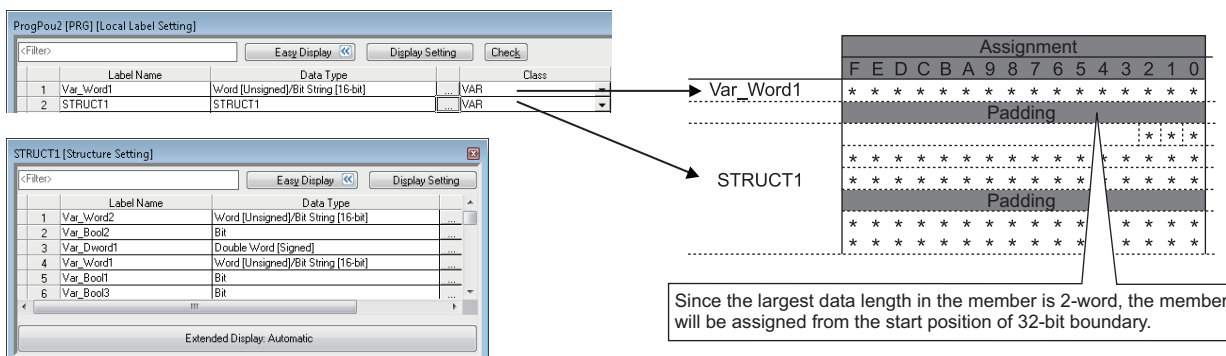
<Assignment example of bit type two-dimension array_Bit (0..n, 0..m)>

<Assignment example of word type two-dimension array_Word (0..n, 0..m)>

■Assignment of structure

A member of structure is assigned in order of the assignment of the packing blocks. When a structure is declared in the member of structure, it will be assigned in the order of the packing block. The start assignment position will be decided depending on the data type which has the largest data length in the structure to be assigned.

Ex.



■Assignment of timer/retentive timer/counter

- Timer, retentive timer, counter

Timer type, retentive timer type, and counter type are the maker-defined structures that have the same data type as MELSEC 16-bit timer device (T), bit retentive timer device (ST), and bit counter device(C). The member configurations of each data type are as follows:

Type	Member	Data type	Description
Timer	S	Bit type	The same operation as the contact (TS) of the timer device.
	C	Bit type	The same operation as the coil (TC) of the timer device.
	N	Word [Unsigned]/Bit String [16-bit]	The same operation as the current value (TN) of the timer device.
Retentive timer	S	Bit type	The same operation as the contact (STS) of the retentive timer device.
	C	Bit type	The same operation as the coil (STC) of the retentive timer device.
	N	Word [Unsigned]/Bit String [16-bit]	The same operation as the current value (STN) of the retentive timer device.
Counter	S	Bit type	The same operation as the contact (CS) of the counter device.
	C	Bit type	The same operation as the coil (CC) of the counter device.
	N	Word [Unsigned]/Bit String [16-bit]	The same operation as the current value (CN) of the counter device.

Each of timer, retentive timer, and counter requires 2 words.

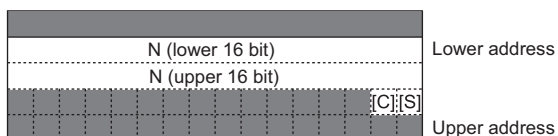


● Long timer, long retentive timer, long counter

Long timer type, long retentive timer type, and long counter type are the maker-defined structures that have the same data type as MELSEC 32-bit timer device (LT), bit retentive timer device (LST), and bit counter device(LC). The member configurations of each data type are as follows:

Type	Member	Data type	Description
Long timer	S	Bit type	The same operation as the contact (LTS) of the timer device.
	C	Bit type	The same operation as the coil (LTC) of the timer device.
	N	Double Word [Unsigned]/Bit String [32-bit]	The same operation as the current value (LTN) of the timer device.
Long retentive timer	S	Bit type	The same operation as the contact (LSTS) of the retentive timer device.
	C	Bit type	The same operation as the coil (LSTC) of the retentive timer device.
	N	Double Word [Unsigned]/Bit String [32-bit]	The same operation as the current value (LSTN) of the retentive timer device.
Long counter	S	Bit type	The same operation as the contact (LCS) of the counter device.
	C	Bit type	The same operation as the coil (LCC) of the counter device.
	N	Double Word [Unsigned]/Bit String [32-bit]	The same operation as the current value (LCN) of the counter device.

Each of long timer, long retentive timer, and long counter requires 4 words.



Performing online program change simultaneously with conversion

For the operation methods for performing online program change simultaneously with conversion, refer to the following section.

☞ Page 205 Writing Programs While CPU is in RUN

Checking for errors and warnings

When the program is converted, the target programs and label settings are checked and the result is displayed on the Output window.

The corresponding error location can be referred on the Output window.

Operating procedure

1. Double-click the error/warning message displayed on the Output window.
2. Check the corresponding error location and modify the error as instructed by the error/warning message.

7 SETTING DEVICE MEMORY

This chapter explains the features and settings of the device memory.

7.1 About Device Memory

The device memory managed by GX Works3 is a data that reads/writes values from/to the device memory on a CPU module. By reading device memory, the state of device memory in a CPU module can be checked. It can be used for offline debugging.

Additionally, the current values of device memory in a CPU module can be changed in batch by writing device memory to a CPU module.

Read/write device memory on the "Online Data Operation" screen.

For details, refer to the following section.

☞ Page 196 Writing/Reading Programmable Controller Data

List of applicable devices

For devices that can be set on the Device Memory editor, refer to the following section.

☞ Page 266 List of Applicable Devices in GX Works3

Writing device memory to global devices/local devices

Device memory does not distinguish the global devices and the local devices.

Write device memory to a programmable controller by each of the following methods.

FX5CPU does not support local devices.

- Global device: Create a device memory data with the different name as the program file, and write it to a programmable controller
- Local device: Create a device memory with the same name as a program file, and write it to a programmable controller

7.2 Configuration of Device Memory Editor

This section explains the screen configuration of the Device Memory editor.

Window

Project view ⇒ "Device" ⇒ "Device Memory" ⇒ "(data name)"

●Toolbar



●Device memory editor

MAIN [Device Memory]

Device Name: D0 [Detailed Conditions]

Detailed Condition

Device Initial Value: Do Not Specify Range

Device Comment: Display (MAIN)

Device Name	+0	+1	+2	+3	+4	+5	+6	+7	String	Comment
D0	0	0	0	0	0	0	0	0	Comment 1
D8	0	0	0	0	0	0	0	0	Comment 2
D16	0	0	0	0	0	0	0	0	

← Separation bar

Device Name: X0 [Detailed Conditions]

Device Name	+0	+16	+32	+48	+64	+80	+96	+112	String	Comment
X0	0	0	0	0	0	0	0	0	
X80	0	0	0	0	0	0	0	0	
X100	0	0	0	0	0	0	0	0	
X180	0	0	0	0	0	0	0	0	

Only the range of the device initial value is displayed when selecting "Specify Range" from "Device Initial Value".

Point

Fonts can be changed.


☞ Page 40 Checking and Changing Colors and Fonts

Setting display format

Set the display format (Display Unit Format, Data Display Format, String Display Format, Value, Bit Order, Switch No. of Points) of the device value being displayed.

Operating procedure

1. Select [View] ⇒ [Display Format Detailed Setting] ().
2. Set the items on the "Display Format" screen, and click the [OK] button.

The setting can be performed by clicking .

7.3 Setting Device Memory

This section explains how to set the devices and device values.

Precautions

- If a deletion is executed after selecting a cell, the device value is cleared to '0'.
- When performing the copy/paste operation on the Device Memory editor, the result is as follows:
The value is pasted in a 16-bit integer [signed] or decimal format string delimited by tab, and displayed with the format of the editor to be pasted.
- The entering method by prefixing '#' to a device name to regard it as a local device is not supported.
Select "Global Label" or "Local Label" when reading device memory from the CPU module.

Setting device values in units of points

Set a device and device value in units of points.

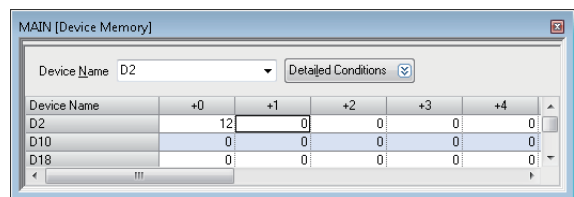
Ex.

Set the following value in a word multi-point format.

Device: D2, Device value: 12

Operating procedure

1. Set the display format. (☞ Page 152 Setting display format)
2. Enter 'D2' in "Device Name".
3. Enter '12' to the device 'D2'.



Point

When the display unit format is bit, the device value can be changed by double-clicking a cell.

Setting values in batch



Set the same value to consecutive devices.

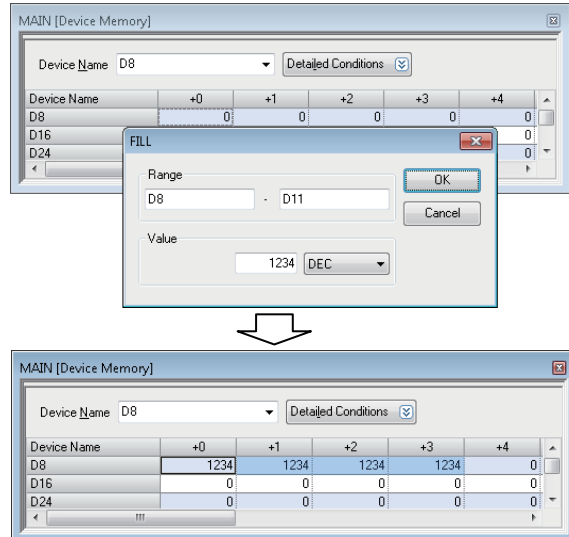
Ex.

Set the following values in a word multi-point format.

Device: D8 to D11, Device value: 1234

Operating procedure

1. Set the display format. ( Page 152 Setting display format)
2. Enter 'D8' to "Device Name", and select the range of the device value to be set.
3. Select [Edit] ⇒ [FILL] .
4. Set the items on the "FILL" screen, and click the [OK] button.



Setting character strings

Set a character string to a device.

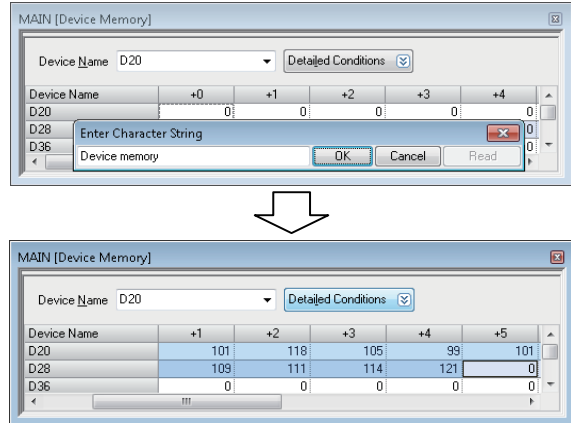
Ex.

Set the following value in a word multi-point format.

Device: D20, Character string: Device memory

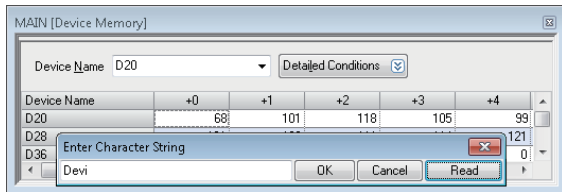
Operating procedure

1. Set the display format. (☞ Page 152 Setting display format)
2. Enter 'D20' to "Device Name", and select [Edit] ⇒ [Enter Character String].
3. Enter a character string on the "Enter Character String" screen, and click the [OK] button.



Point

- Character string can be entered to "String" column directly.
- Click the [Read] button on the "Enter Character String" screen to read the set device values (string) one by one.



Precautions

For device memory, use the characters in the Unicode Basic Multilingual Plane.

If the characters outside the Unicode Basic Multilingual Plane are specified, they may not be edited in the program.

Clearing whole memory of device memory

Clear the data set to device memory data to '0' in batch in the project.

Operating procedure

■Delete all data in the device memory data

Select [Edit] ⇒ [Clear All (All Devices)].

■Delete the devices displayed on the Device Memory editor

Select [Edit] ⇒ [Clear All (Displayed Devices)].



Interaction with device initial value

Device memory function registers/utilizes values to/from the device initial value.
Create a device initial value data to be registered in advance.

Operating procedure

1. Click the [Detailed Conditions] button.
2. Select "Specify Range" in the detailed conditions of "Device Initial Value".
3. Select [Edit] ⇒ [Register/Import Device Initial Value].

The Device Initial Value editor is displayed. For details on the Device Initial Value editor, refer to the following sections.

- Registering the value of the device memory to device initial value:  Page 159 Setting device initial values
- Utilizing values from device initial values to device memory:  Page 159 Registering to device memory

7.4 Writing/Reading Data to/from CPU Module

When writing/reading the value of device memory to/from the CPU module, perform them on the "Online Data operation" screen in file unit.

8 SETTING DEVICE INITIAL VALUES

This chapter explains how to set the device initial values.

8.1 About Device Initial Values

The device initial value managed by GX Works3 is a data that can be read from/write to the device in a CPU module.

For details of device initial values, refer to the following manual.

MELSEC iQ-R CPU Module User's Manual (Application)

MELSEC iQ-F FX5 User's Manual (Application)

For devices that can be set on the Device Initial Value editor, refer to the following section.

Page 266 List of Applicable Devices in GX Works3

Writing device initial values to global devices/local devices

Device initial value does not distinguish the global device and local device.

Write device initial values to each device in a programmable controller by the following methods.

FX5CPU does not support local devices.

- Global device: Create a device initial value data with the different name as the program file, and write it to a programmable controller
- Local device: Create a device initial value data with the same name as a program file, and write it to a programmable controller

The devices which cannot be used as local devices are not written even when they are set to device initial values.

8.2 Configuration of Device Initial Value Editor

The configuration of the Device Initial Value editor is shown below.

Window

Project view ⇒ "Device" ⇒ "Device Initial Value" ⇒ "(data name)"

Points	Start	End	Comment
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

The device range and the device data that is set above will be written to CPU as initial value. Users are required to execute 'Device Memory Diversion' operation if the device initial range setting is changed.

Setting Method: Start/End Points/Start

Device Memory Register Diversion: Device Memory for Register Diversion

Buttons: Register to Device Memory, Device Memory Diversion, OK, Cancel

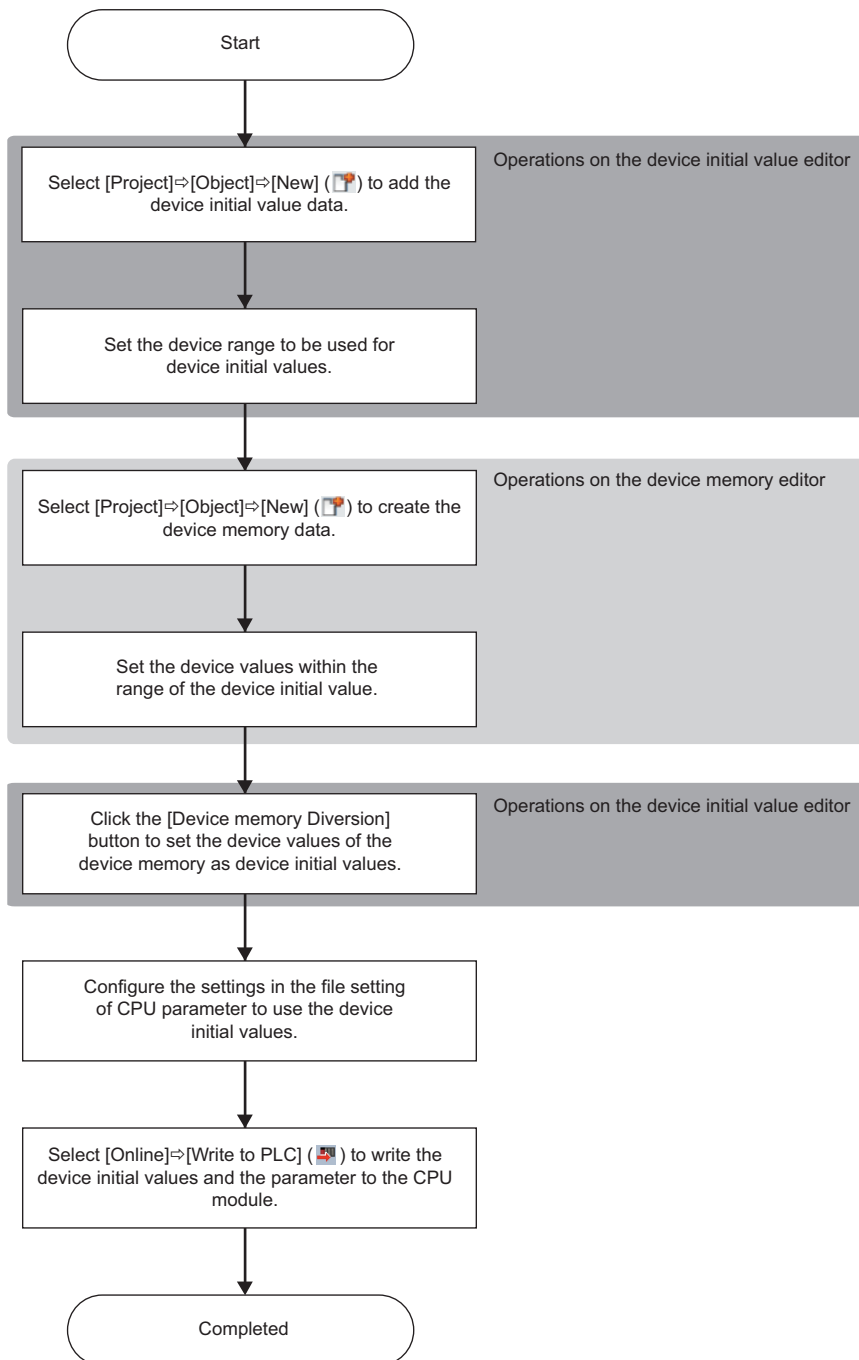


When editing start/last/comment column, press the key and key to display the shortcut menu.

8.3 Setting Device Initial Values

This section explains how to set device values set in the device memory as device initial values.

Setting procedure for device initial values



Setting device initial values

Set the device values set in the device memory as device initial values.

Create a device initial value data in advance. (📖 Page 61 Creating project)

Operating procedure

1. Set the items on the Device Initial Value editor.
2. Select the data to be utilized from the pull-down list in "Device Memory for Register Diversion", and click the [Register to Device Memory] button.
3. Click the [OK] button.

■Using device initial values

If using the device values of which ranges have been set as initial values at the CPU module startup, specify the file name to be used for the initial values in the "File Setting" tab of the CPU Parameter.

■Device range

The devices that can be set for device initial values are within the range set to "Memory/Device Setting" of the CPU Parameter.

Registering to device memory

The data range set on the Device Initial Value editor is registered to device memory.

Operating procedure

1. Select "Device Memory for Register Diversion".
2. Click the [Register to Device Memory] button.

If the registered data is modified on the device memory, it will not be applied to device initial values. Click the [Device Memory Diversion] button on the Device Initial Value editor again.

Point

To check the values of the device initial values, create a new device memory data and perform "Register to Device Memory" to it.

9 SEARCHING DATA

This section explains how to search for and replace character strings, devices, labels, instructions, etc. in each editor.

Function	Supported editor	Purpose	Reference
Find Device/Label Replace Device/Label	<ul style="list-style-type: none"> • Ladder editor • ST editor • FBD/LD editor • Label editor 	Used for searching for/replacing devices or labels in a program.	Page 162 Searching/Replacing Devices/Labels
Find Instruction/ Replace Instruction	<ul style="list-style-type: none"> • Ladder editor • ST editor • FBD/LD editor 	Used for searching for/replacing instructions in a program.	Page 164 Searching/Replacing Instructions
Find String/Replace String	<ul style="list-style-type: none"> • Ladder editor • ST editor • FBD/LD editor • Device comment editor • Label editor 	Used for searching for/replacing character strings used in a program, label, and device comment.	Page 165 Searching/Replacing Character Strings
Change Open/Close Contact	<ul style="list-style-type: none"> • Ladder editor • FBD/LD editor 	Used for switching the contact type of a specified device in a program from normal to negation, or from negation to normal.	Page 166 Changing Contacts Between Open Contact and Closed Contact
Device Batch Replace	<ul style="list-style-type: none"> • Ladder editor • ST editor • FBD/LD editor 	Used for searching for/replacing devices or labels in a program in batch.	Page 167 Batch Replacing of Devices and Labels
Cross Reference	<ul style="list-style-type: none"> • Ladder editor • ST editor 	Used for checking the device and label declaration location and referenced location in a list.	Page 169 Creating/displaying cross reference information
Device List	<ul style="list-style-type: none"> • FBD/LD editor • Label editor • Parameter editor 	Used for checking the usage of devices.	Page 171 Displaying Device Usage List
Search/Replace in a program	• Ladder editor	Used for searching devices and labels, or moving the cursor to the specified step number in a ladder program.	Page 124 Searching for/replacing data in programs
	• ST editor	Used for moving the cursor to the specific line number on an ST editor.	Page 130 Searching for/replacing data in program

- The Find/Replace window can also be displayed by selecting [View] ⇒ [Docking Window] ⇒ [Find/Replace] (🔍).
- Search/replace can also be switched by selecting from the pull-down list on the "Find and Replace" screen.
- One point of device can be searched/replaced when searching/replacing labels.
- The search starts from the top of the program in the inline structured text box regardless of the cursor position.

Precautions

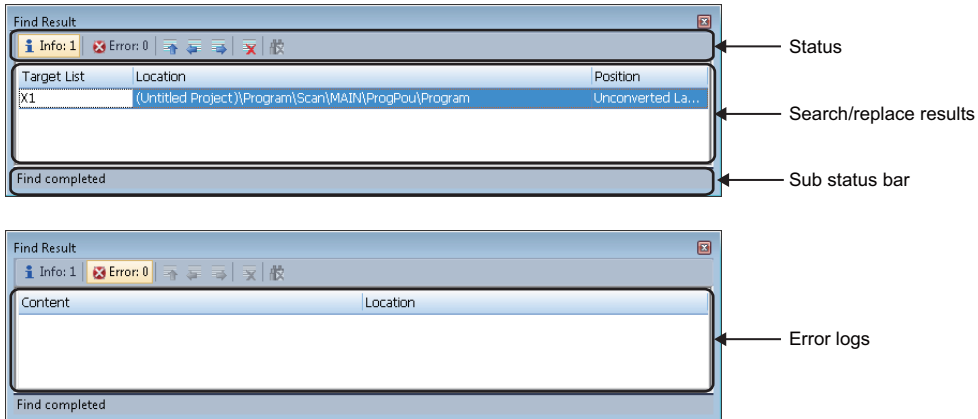
- The program will be in converted state after the replacement.
- The Replace function cannot be performed during monitoring. Perform the function after ending the monitoring. However, it can be performed when the ladder editor is in the Monitor write mode.
- The Find/Replace function cannot be performed for the read-protected data. Perform the function after setting the data in editable mode by disabling the security.

Displaying results and error logs

After the All Find/Replace All function is performed, the results and error logs are displayed.

Window

Click the [All Find] button/[Replace All] button on each Find/Replace screen.



Displayed items

Item	Description
Status	Displays the number of error logs and the search error.
Search/replace results	Displays the position information to specify the location where the search/replace function is performed.
Sub status bar	Displays the search/replace result.
Error logs	Displays the errors in search/replace results.

Point

The jump function is used to jump from any row of search/replace results or logs to the corresponding character strings.

Right-click the selected row and select [Jump] from the shortcut menu, or double-click the selected line.


9.1 Searching/Replacing Devices/Labels

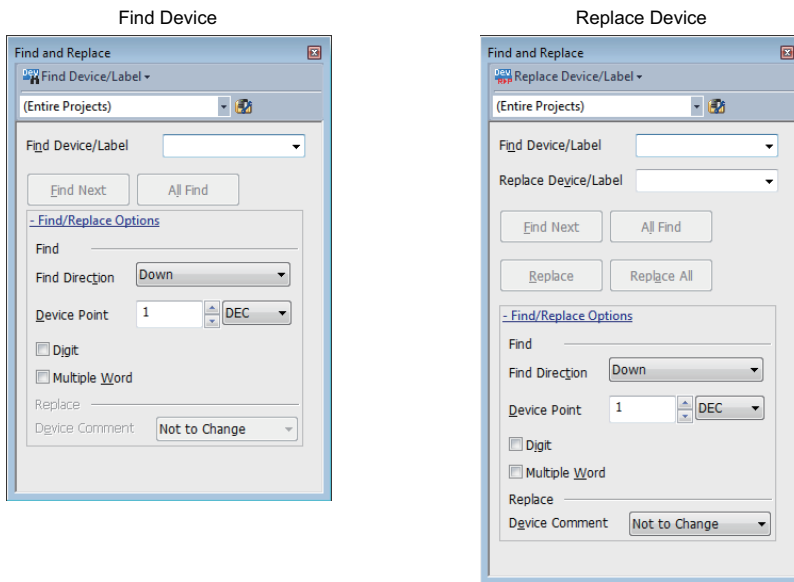
Search for/replace devices/labels in the program.

Supported editors: Ladder editor, ST editor, FBD/LD editor, and label editor

When searching a device name, the global label to which the device is assigned will also be found.

Window

[Find/Replace] ⇒ [Find Device/Label]/[Replace Device/Label] 



Operating procedure

Set the items on the screen and click the [Find Next] button.

Item		Description	
Find/Replace Options	Search	Device point	Enter the number of points to be searched/replaced, counted from the device entered in the "Find Device/Label" field. When a label is entered for "Find Device/Label" or "Replace Device/Label", enter 1. Example) When X50 for "Find Device", X100 for "Replace Device", 3 for "Device Point", and "DEC" for entered value are set The devices are replaced as follows: X50→X100, X51→X101, X52→X102
		Digit	Select this to search for the entered device and digit-specified bit devices that include the entered device.
		Multiple word	Select this to search for the entered device and the double-word format word devices that include the entered device.
Replace	Device comment	Select this to move a device comment of "Find Device/Label" to "Replace Device/Label". When multiple comments are set, only the display target comment is moved.	

Examples of device search

■ Options

- Option: None

Device specification	Search result
M0	<u>M0</u> , <u>K4M0</u> , <u>M0Z0</u> , <u>K4M0Z0</u>
K4M0	<u>K4M0</u> , <u>K4M0Z0</u>
D0	<u>D0</u> , <u>D0Z0</u> , <u>D0.1</u>
D0.1	<u>D0.1</u>
J1\B0	<u>J1\B0</u> , <u>J1\B0Z0</u> , <u>J1Z0\B0</u> , <u>J1Z0\B0Z0</u> , <u>J1\K4B0</u> , <u>J1\K4B0Z0</u> , <u>J1Z0\K4B0</u> , <u>J1Z0\K4B0Z0</u>

- Option: Digit

Device specification	Search result
X0 to X3	K1X0
X0 to X0F	K4X0
X0 to X1F	K8X0
X0Z0	X0Z0, K1X0Z0, K4X0Z0, K8X0Z0

- Option: Multiple words

Device specification	Search result
D0 to D1	DMOV K1 <u>D0</u> , EMOV E1 <u>D0</u> , MOV K1 <u>@D0</u>
D0 to D9	BMOV <u>D0</u> D100 K10
J1\W0 to J1\W1	DMOV K1 <u>J1\W0</u>
@D0 to @D1	DMOV K1 <u>@D0</u>
T0 to T1	DMOV K1 <u>T0</u>

■ Device suffix representation (for ST editor and FBD/LD editor only)

Device specification	Search result	Remarks
D100	<u>D100</u> : = 1; <u>D100</u> : D: = 1; <u>D100</u> : E:= 0.1;	Devices are searched regardless of suffix.
D100: D	<u>D100</u> : = 1; <u>D100</u> : D: = 1; <u>D100</u> :E := 0.1;	Only specified devices with suffix are searched.

9.2 Searching/Replacing Instructions

Search for/replace instructions in a program.

Supported editors: ladder editor, ST editor, and FBD/LD editor (LD element and FBD element (FB/FUN) only)

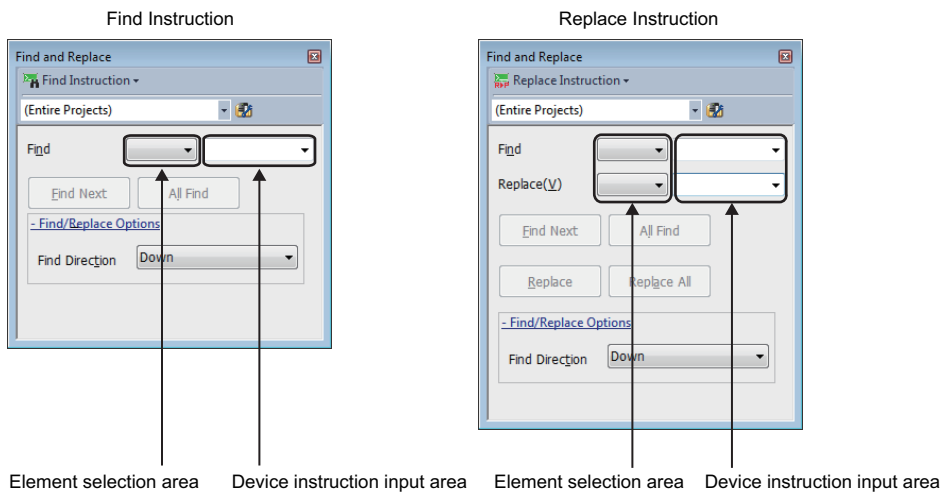
The NOP instructions used in the ladder programs cannot be searched.

The following application instructions can also be searched as an output instruction.

SET, RST, PLS, PLF, FF, SFT, SFTP, MC

Window

[Find/Replace] ⇒ [Find Instruction] ()/[Replace Instruction]/[Find Contact or Coil] ()



Operating procedure

Set the items on the screen and click the [Find Next] button.

Examples of instruction search

Example of instruction specification *1	Search result
MOV	<u>MOV</u> , <u>MOVP</u>
MOVP	<u>MOVP</u>
MOV D0 K4Y0	<u>MOV D0 K4Y0</u> , <u>MOVP D0Z1 K4Y0</u> , <u>MOV D0 K4Y0Z1</u> , <u>MOVP D0Z1 K4Y0Z1</u>
MOVP D0 J1W0	<u>MOVP D0 J1W0</u> , <u>MOVP D0Z1 J1W0</u> , <u>MOVP D0 J1Z1W0Z1</u> , <u>MOVP D0Z1 J1Z1W0Z1</u>

*1 The search specifying an argument can only be performed in ladder programs.

9.3 Searching/Replacing Character Strings

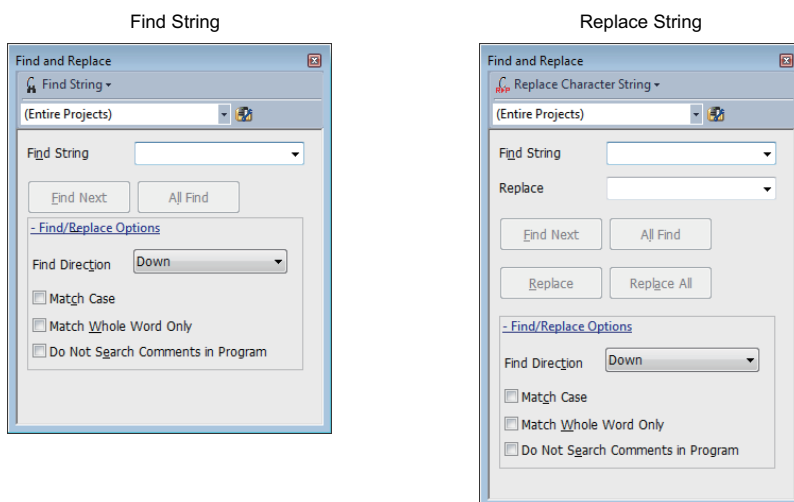
Search for/replace character strings of the data in the project.

Target editor	Searchable character string	Replaceable character string
Ladder editor	All character strings *1	Character strings except for instruction names
ST editor	Character strings except for the following <ul style="list-style-type: none"> Monitoring part (displayed on the right side of the screen during monitoring) The omitted portion of the collapsed display (example: IF...END_IF) 	
FBD/LD editor	All character strings	Character strings except for the following <ul style="list-style-type: none"> Data type of a function Data type of a function block Input/output label of FB/FUN Character string, "RETURN" of a return element
Label editor	Character strings except for class name	Character strings except for the following <ul style="list-style-type: none"> Class name, data type, device name
Device comment editor	Character strings in the comment column	

*1 The NOP instructions used in the ladder programs cannot be searched.

Window

[Find/Replace] ⇒ [Find String]/[Replace String]



Operating procedure

Set the items on the screen and click the [Find Next] button.

Search/replace data by matching whole word only

The whole word means a string separated by the break characters.

The character string which is completely match with the character string entered in "Find String" is searched.

Break characters are shown as below.

- Space, tab, line feed, operand in ST editor

Ex.

Search for a device comment 'abc ; def' by the following character strings.

String to be searched for	Search result	
	Unselected	Selected
a	<u>a</u> bc; def	Nothing is found.
abc	<u>abc</u> ; def	<u>abc</u> ; def
bc	<u>bc</u> ; def	Nothing is found.
abc ; def	<u>abc ;</u> def	<u>abc ;</u> def

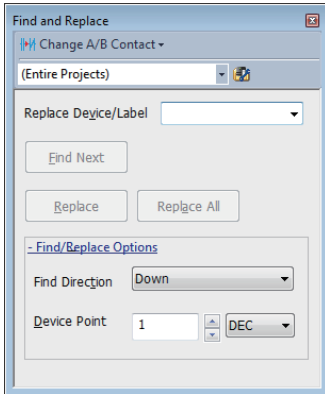
9.4 Changing Contacts Between Open Contact and Closed Contact

Change contact types from open contact to closed contact, and vice versa.

Supported editors: Ladder editor and FBD/LD editor

Window

[Find/Replace] ⇒ [Change Open/Close Contact]



Operating procedure

1. Set the items on the screen and click the [Find Next] button.

Item		Description
Find/Replace Options	Device Point	Enter the number of points to be replaced, counted from the device/label entered in the "Replace Device/Label" field. When a label is entered for "Replace Device/Label", enter 1. Example) When X100 for "Replace Device", 3 for "Device Point", and "DEC" for entered value are set The open/close contact of X100, X101, and X102 will be replaced.

2. Click the [Replace] or [Replace All] button to change the contact type.

9.5 Batch Replacing of Devices and Labels

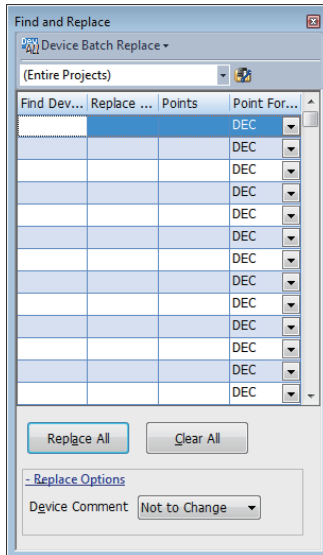
For devices that can be replaced in batch, refer to the following section.

☞ Page 162 Searching/Replacing Devices/Labels

Supported editors: Ladder editor, ST editor, and FBD/LD editor

Window

[Find/Replace] ⇒ [Device Batch Replace]



Operating procedure

Set the items on the screen, and click the [Replace All] button.

Item	Description
Points	Points: Enter the number of points to be replaced, counted from the device specified for "Find Device".
Point Format	When a label is entered for "Find Device" or "Replace Device", enter 1. Example) When X0 for "Find Device", X10 for "Replace Device", 5 for "Points", and "DEC" for "Point Format" are set The devices are replaced as: X0 → X10, X1 → X11, X2 → X12, X3 → X13, X4 → X14
Replace Options	Device Comment
	Select whether to copy/move a device comment in "Find Device" to "Replace Device".

Point

Select a range of device/label on the program editor by a drag-and-drop operation to register multiple devices/labels in batch.

9.6 Displaying Reference Information List of Devices/Labels

Search for devices/labels and display information where the selected devices/label are used in the project in a list.

The Cross Reference window is displayed horizontally when it is docked on top or bottom of the main frame, and displayed vertically when it is docked on left or right of the main frame.

Point

The display format and detailed operations for each function can be set by the following option setting.
[Tool] ⇒ [Options] ⇒ "Find/Replace" ⇒ "Cross Reference"

Target data for creating cross reference information

Cross reference information is created based on devices used in the following data.

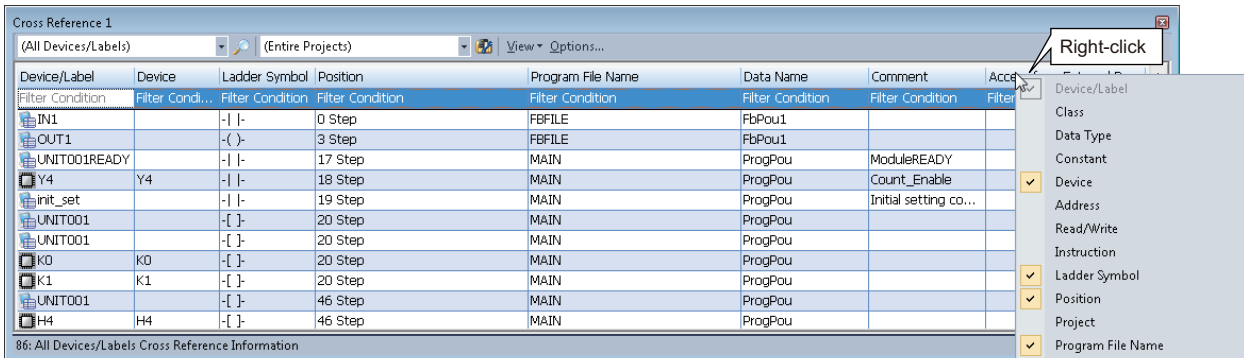
- Ladder
- ST
- FBD/LD
- Global label
- Local label
- Structure
- Multiple CPU refresh setting of the CPU parameter
- Refresh setting of module parameters

Creating/displaying cross reference information

Create and display the cross reference information of the devices/labels used in the project.
Supported editors: Ladder editor, ST editor, FBD/LD editor, label editor, and parameter editor

Window

[View] ⇒ [Docking Window] ⇒ [Cross Reference1/Cross Reference2]



Up to two Find result screens can be displayed.

Up to 80,000 creation results of the cross reference information is displayed.

Operating procedure

1. Set the display format from the pull-down list displayed by clicking [View] as necessary.
2. Enter a device/label to be searched for in (All Devices/Labels) column.

To specify the range to be searched, select the search location of devices/labels by clicking on the tool bar. (Two or more locations can be selected.)

By pressing the **[Enter]** key after selecting a row in the result list, or double-clicking or right-clicking the selected row and selecting [Jump] from the shortcut menu, the editor in which the device/label is used opens and the corresponding device/label will be in the selected status.

Point

- Pressing the **[F12]** key (**[Ctrl]** + **[.]**) moves the focus between the editor and the Cross Reference window.
- Pressing the **[F11]** key (**[Ctrl]** + **[.]**) / **[Shift]** + **[F11]** keys (**[Ctrl]** + **[Shift]** + **[.]**) moves the cursor to the previous/next row.

■Displaying comments

For a ladder, the comments specified in [Tool] ⇒ [Options] ⇒ "Project" ⇒ "Device Comment Reference/Reflection Target" are displayed as device comments.

Page 138 About device comment

■Creating cross reference information

Cross reference information can also be created by right-clicking a device/label on the program editor, and selecting [Cross Reference] from the shortcut menu.

After the Cross Reference window is displayed, cross reference information can be created based on all devices/labels by selecting "(All Devices/Labels)" and press the **[Enter]** key.

■Automatic synchronization

A function to create the cross reference information of devices/labels selected on the editor automatically.

By clicking "Option" on the Cross Reference window, the Cross Reference window to display the result of automatic synchronization can be specified in "Operational Setting" of Option.

Displaying cross reference information

■Display after creation of cross reference information is completed

- The data protected by security function cannot be displayed.
- If the program or the option setting is changed, the cross reference information does not correspond with the program. In order to update the cross reference information, create it again.
- The columns can be sorted in ascending/descending order by clicking the column header. However, the sort cannot be performed if the structure/array/function block is displayed in the tree.
To clear the display in the tree, unselect [Display Hierarchically] from the pull-down list of [View].

■When data is deleted after conversion

The deleted data may be displayed as a search result.

To display the most recent cross reference information, convert the program and create the cross reference information again.

Filtering display

Filter the created cross reference information.

Operating procedure

Enter/select the filter condition, and press the key.

■Filtering condition

The previously entered keywords can be selected from the pull-down list.

For "Data Name" and "Program File Name", search results can also be selected from the list as well as previously entered keywords.

■Tree display of filtering condition

Only data of which components match with the filtering conditions are displayed in the tree format when filtering display is performed for the structure data names or the instance names of the function block.

■Deleting filtering condition

Filtering display of the column can be canceled by deleting the keyword entered in each filtering condition column.

■Keywords for filtering condition

The wild card characters can be used in a filtering condition as shown below.

When the filtering condition is set for the device/label column.

Wild card	Search target	Example	Search result
*	Specify any character string.	*30*	ready301, K4X30, K1Y30, K4Y30
?	Specify any one character.	K4?30	K4X30, K4Y30
[]	Specify any one of those characters.	[XY]8	X8, Y8
[!]	Specify any one of characters except for the characters in the bracket.	K4X[!3]0	K4X40
[-]	Specify character strings within the range in the bracket.	D[0-2]	D0, D1, D2

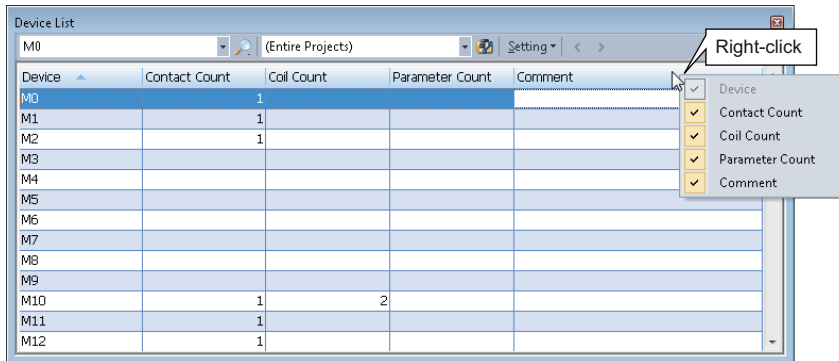
9.7 Displaying Device Usage List

Display the usage of the specified devices.

Supported editors: Ladder editor, ST editor, FBD/LD editor, label editor, and parameter editor


Window

[Find/Replace] ⇒ [Device List].



Operating procedure

Set the items and press the **Enter** key.

To specify the range to be searched, select the search location of devices/labels by clicking  on the tool bar. (Two or more locations can be selected.)

Considerations for search in Device List

■ Searching for coil instructions

As output instructions, the following application instructions can also be the target of search.

SET, RST, PLS, PLF, FF, SFT, SFTP, and MC

■ Searching for R device and ZR device

R device and ZR device are distinguished in the Device List.

Specify them separately when searching for R device or ZR device.

FX5CPU does not support ZR devices.

■ Confirming locations of devices

The location of the device used can be checked by opening the Cross Reference window from the device in the Device List.


To open the Cross Reference window, select a row in the Device List and follow any of the following operations.

- Press the **Ctrl** + **E** keys or press the **Enter** key
- Double-click the row
- Right-click ⇒ select [Cross Reference] from the shortcut menu

For details on the Cross reference function, refer to the following section.

 Page 168 Displaying Reference Information List of Devices/Labels

■ Displaying comments







- When searching for data with a selection of one program, the comments specified for "Device Comment Reference/Reflection Target" under [Tool] ⇒ [Options] ⇒ "Project" ⇒ "Device Comment Reference/Reflection Target" are displayed. ( Page 138 About device comment)
- When searching for data with a selection of multiple programs, common device comments are displayed.

10 ENHANCED USE OF POU

The programs can be utilized in the sequence program repeatedly by segmenting the processing program into program parts (POUs).

The efficient program development reduces program errors, thus the program quality will be improved.

There are two types of POU:

POU	Description
Function block	<p>Outputs an operation result in accordance with a value of the internal memory. Create a program using labels which are defined as input labels, internal labels, and output labels.  Page 172 Creating Function Blocks</p> <p>There are three types of function blocks listed below in addition to the function block created by the user.</p> <ul style="list-style-type: none">■General function block A function block that can be used in general. It is prepared in GX Works3 in advance. ( Page 27 Element Selection window)■Module FB A function block that includes the processing dedicated for a certain module. It is prepared in GX Works3 in advance. ( Page 175 Enhanced use of module FBs)■Sample library*¹ A collection of function blocks prepared as MELSOFT Library. ( Page 176 Utilizing sample libraries) To obtain the sample libraries, please consult your local Mitsubishi representative.
Function	<p>Always outputs the same operation result against the same input value. Create a program using labels which are defined as input labels and output labels.  Page 177 Creating Functions</p> <p>There is the following type of functions in addition to the functions created by the user.</p> <ul style="list-style-type: none">■General function A function that can be used in general. It is prepared in GX Works3 in advance. ( Page 27 Element Selection window)

*1 Not supported by FX5CPU.


10.1 Creating Function Blocks

This section explains how to create sequence programs using function blocks.





About function blocks

For details of the function blocks, refer to the following manual.

 MELSEC iQ-R Programming Manual (Program Design)

 MELSEC iQ-F FX5 Programming Manual (Program Design)

Procedure to use

1. Create a data of function block. ( Page 173 Creating function block data)
2. Set the local labels to be used in the program of a function block. ( Page 173 Setting labels)
3. Create a program using labels. ( Page 174 Creating function block programs)
4. Paste the function block on the sequence program. ( Page 111 Inserting function blocks, Page 128 Inserting function blocks)

Creating function blocks

The following explains how to create function blocks.

■ Number of function blocks that can be created

R04CPU (other than R04CPU): Up to 8192 in conjunction with function data

R04CPU: Up to 4096 in conjunction with function data

FX5CPU: Up to 960 in conjunction with function data



However, the maximum number of data that can be created may not be reached depending on the configuration of FB files and FUN files.

Precautions

When changing line statements of a function block on the tree, all programs in which the changed FB instances are used will be in the unconverted state.

Creating function block data

Create a function block data in the project on the "New Data" screen.

Item		Description		
Detail Setting	Inherent Property	Use MC/MCR in EN Control*1	Yes	Applies function block program codes using the MC/MCR instruction to each location where instances are used at conversion.
			No	Applies function block program codes using the CJ instruction to each location where instances are used at conversion.
		Use EN/ENO	Yes	Becomes a function block with EN/ENO. EN/ENO labels can be used in the project without registering in the local labels. For details on EN/ENO, refer to the following manuals.  MELSEC iQ-R Programming Manual (Program Design)  MELSEC iQ-F FX5 Programming Manual (Program Design)
			No	Becomes a function block without EN/ENO.
	FB File	FB Type	Macro Type	Stores the program of a function block to the FB file to which the call source program block or program of the function block is stored.
			Subroutine Type	Stores the program of a function block to an FB file.
FB File of Add Destination		Select a storage destination file of a function block to be created. The storage destination files can be created by entering file name directly.		

*1 This item can be selected only when both "Yes" is selected to "Use EN/ENO" and "FB Type" is "Macro Type".

Precautions

If the function block in which the MC/MCR instruction is used is not executed, the outputs and the current values of timers in the function block will be reset. (If the instruction is not used, the current values are retained).

Setting labels

Set the labels to be used in the program on the label editor.

The operations on the screen is the same as that of other label editor. For details, refer to the following section.

 Page 90 Registering Labels

Operating procedure

Select "FB/FUN" ⇒ "(file name)" ⇒ "(FB)" ⇒ "Local Label" on the Project view.

Creating function block programs

Create a program of a function block using labels.

Both local labels of the function block and global labels can be used.

The method for entering programs is the same as that of ladder programs, ST programs, or FBD/LD programs.

Operating procedure

1. Select "FB/FUN" ⇒ "(file name)" ⇒ "(FB)" ⇒ "Program" on the Project view.
2. Configure the programs.

Converting function blocks

- Function blocks (POUs) will not be in the converted state even if the conversion was attempted as long as FB instance has not been created, or FB instance has been created only in unregistered programs.
- The FB file will be in the unconverted state when function blocks are edited. Once the FB file is changed from the converted state to the unconverted state, all programs in which the function blocks are used will be in the unconverted state.

Considerations when creating FB programs

■Use of devices

Using labels is recommended for creating FB programs.

If an FB program which uses devices (X10, Y10, etc.) is used at multiple locations, the program may not operate normally.

In addition, if an FB program which uses devices for the OUT instruction is used at multiple locations, duplicated coil is resulted. Duplicated coil can be avoided with the SET/RST instruction.

■When using master control instructions

When using a master control instruction in an FB program, use the MC instruction and the MCR instruction together.

■When using function blocks for a sequence program to be executed multiple times in a single scan

If a function block, which contains a rising instruction/falling instruction, or an instruction that requires multiple scans before the execution completion, is used in a sequence program to be executed multiple times in a single scan, the program may not operate normally.

Item	Description
Program type to be executed multiple times in a single scan	<ul style="list-style-type: none">• Fixed scan execution type program• Interrupt program• Subroutine program• FOR-NEXT instruction program
Unusable instructions for FBs which are used for above programs	Instructions which require multiple scans before the execution completion (JP.READ/JP.WRITE instruction, SORT instruction, SP.FREAD/SP.FWRITE instruction, etc.)
	Rising instruction (□P instruction (such as MOVP instruction), PLS, etc.)
	Falling instruction (PLF, LDF, ANDF, ORF, MEF, FCALLP, EFCALLP, etc.)

Enhanced use of module FBs

In GX Works3, 'Module FB', in which the processing of Intelligent function modules is segmented (function block), is provided. By using the module FBs, the operation settings can easily be performed without programming the processing of each module.

Importing module FBs in project

Module FBs are displayed in the [Module] tab in the Element Selection window when one of the following operations is performed.

- Place the modules on the Module Configuration Diagram and fix the parameters
- Add a new module from the Project view

Point

The manual of a module FB can be displayed from the Element Selection window. Select a module FB and right-click it and select [Help] from the shortcut menu.

Using module FBs in programs

Operating procedure

1. Drag and drop a module FB from the [Module] tab of the Element Selection window onto the program.
2. Enter an FB instance name.

After creating the FB instance, the created function block (Local Label, Program) is registered to "M_FBLIB" on the Project view.

Precautions

Registering the module FBs to be used in advance (at creation of new project) is recommended.

If the module FB to be used is not registered, it may take time to display the module FB after dragging and dropping it.

Setting operation parameter of module FB

After creating FB instance of a module label, display it on the label editor and enter the value in "Initial Value" displayed in "Extended Display".

However, the initial value of an array type label cannot be set in the operation parameter. Set the operation parameter by a program.

When the operation parameter of module FB set in the label initial value is changed by program, the module FB operates with the changed value. Before changing the label values of a module FB, check the influence of the change using the Cross Reference function.

Editing module FB

The local label and program of a module FB cannot be edited.

However, a module FB can be copied in the Project view and it can be edited.

The copied module FB name is changed from '+' to '_'.

Utilizing sample libraries

The following explains how to utilize the sample libraries of GX Works3 prepared as MELSOFT Library in GX Works3. To obtain the sample libraries, please consult your local Mitsubishi representative. FX5CPU does not support it.

Utilizing sample libraries for GX Works3

Operating procedure

1. Select [Tool] ⇒ [Sample Library Registration].
 2. Select a sample library file on the "Open Sample Library" screen and click the [OK] button.
- The function blocks of the sample library is displayed on the Project view (for the sample libraries of Mitsubishi Electric FA products, 'M_FBLIB' is attached, and as for that of the partner products, 'P_FBLIB' is attached).

Precautions

Before utilizing sample libraries, confirm that the types of the current project (CPU module) used is supported by the sample libraries.

10.2 Creating Functions

This section explains how to create a sequence program using functions.

About functions

For details of the functions, refer to the following manual.

📖 MELSEC iQ-R Programming Manual (Program Design)

📖 MELSEC iQ-F FX5 Programming Manual (Program Design)

Procedure to use

1. Create a data of function. (🔗 Page 177 Creating function data)
2. Set the local labels to be used in the FUN program. (🔗 Page 177 Setting labels)
3. Create a FUN program using labels. (🔗 Page 178 Creating function programs)
4. Paste the function onto a sequence program. (🔗 Page 115 Inserting functions, Page 128 Inserting functions)

Creating functions

The following explains how to create functions.

■ Number of function blocks that can be created

RCP (other than R04CPU): Up to 8192 in conjunction with function block data

R04CPU: Up to 4096 in conjunction with function block data

FX5CPU: Up to 960 in conjunction with function block data

However, the maximum number of data that can be created may not be reached depending on the configuration of FB files and FUN files.

Creating function data

Create a function data in the project on the "New Data" screen.

Item			Description
Detail Setting	Use EN/ENO	Yes	Become a function with EN/ENO. EN/ENO labels can be used in the project without registering in the local labels. For details on EN/ENO, refer to the following manuals. 📖 MELSEC iQ-R Programming Manual (Program Design) 📖 MELSEC iQ-F FX5 Programming Manual (Program Design)
		No	Become a function with EN/ENO.
	FUN File of Add Destination		Select a storage destination file of a function to be created. The storage destination files can be created by entering file name directly.

Setting labels

Set the labels to be used in the program on the label editor.

The operations on the screen is the same as that of other label editor. For details, refer to the following section.

🔗 Page 90 Registering Labels

Operating procedure

Select "FB/FUN" ⇨ "(file name)" ⇨ "(Function)" ⇨ "Local Label" on the Project view.

Creating function programs

Create a program of a function using labels.

The labels set to the local label of the function can be used.

The method for entering programs is the same as that of ladder programs, ST programs, or FBD/LD programs.

Operating procedure

1. Select Project view ⇒ "FB/FUN" ⇒ "(file name)" ⇒ "(function)" ⇒ "Program".
2. Configure the programs.

Converting functions

- Functions (POUs) will not be in the converted state even if the conversion was attempted as long as functions are not used in the program, or functions are used only in unregistered programs.
- The FUN file will be in the unconverted state when functions are edited. Once the FUN file is changed from the converted state to the unconverted state, all programs in which the functions are used will be in the unconverted state.

This part explains the communication route setting to access a CPU module, reading/writing data, and monitoring the execution status.

11 SIMULATING PROGRAMS

12 SETTING ROUTE TO CPU MODULE

13 WRITING/READING DATA TO CPU MODULE

14 CHECKING OPERATION OF PROGRAMS

11 SIMULATING PROGRAMS

This chapter explains how to debug programs offline using the Simulation function.

For information on CPU modules supporting the Simulation function, refer to the following section.

☞ Page 269 Using Simulation Function

11.1 Simulation Function

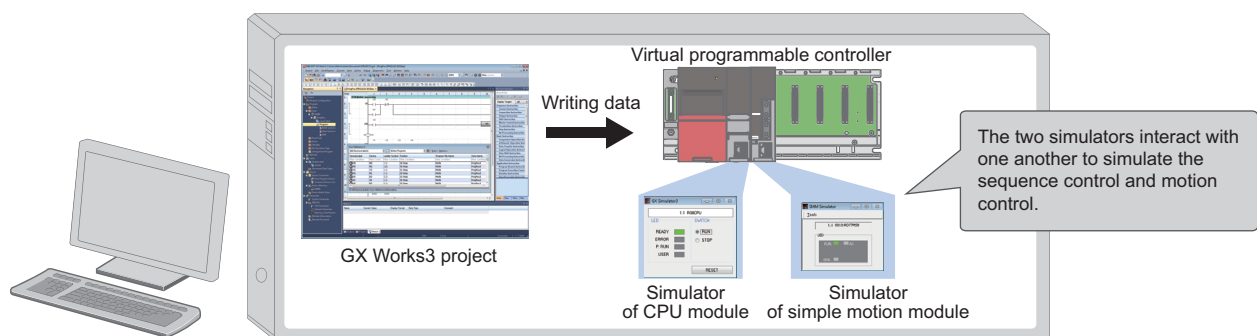
The Simulation function debugs programs using a virtual programmable controller on a personal computer.

GX Simulator3 is used for the Simulation function.

This function is useful to check programs before operating them actually since it enables debugging without the connection with CPU module.

For the considerations for using the Simulation function, refer to the following section.

☞ Page 280 Considerations



Safety and handling considerations

⚠ CAUTION

- The Simulation function simulates the actual module to debug a created sequence program. However, this function does not guarantee the operation of the debugged program.
- The Simulation function uses the memory for simulation to input and output data to/from the I/O module and Intelligent function module. Some instructions/functions and device memory are not supported. Therefore, the operation results obtained with the virtual programmable controller may differ from those obtained using the actual module.

After debugging programs using the Simulation function, the normal program debugging, which is performed with the module connected before the actual operation, is required.

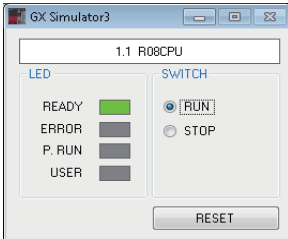
11.2 Starting/Stopping Simulation

Start/stop the Simulation function.

The connection destination is GX Simulator3 during simulation, and "Simulation ((system number of the simulator).(CPU number))" is displayed on the status bar.

Window

[Debug] ⇒ [Simulation] ⇒ [Start Simulation] (🖱️)/[Stop Simulation] (🖱️)



Operating procedure

Select the checkbox of the data to be written on the "Online Data Operation" screen displayed, and click the [Execute] button.

Cooperative simulation

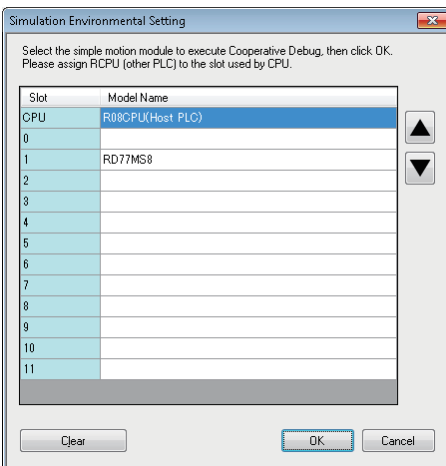
The cooperative simulation between the simulator of a simple motion module (SMM Simulator) and the simulator of GX Works3 (GX Simulator3) is available.

Environmental setting

Specify the target before starting simulation in order to simulate the cooperative operations of a sequence program and a motion control (simple motion module).

Window

[Debug] ⇒ [Simulation] ⇒ [Simulation Environmental Setting] (🖱️)



Operating procedure

Select the target module to be run together, and click the [OK] button.

■ In multiple CPU configuration

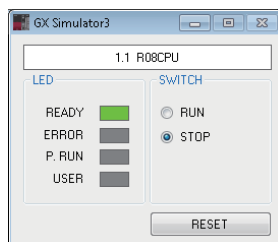
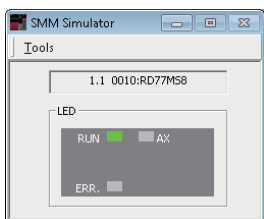
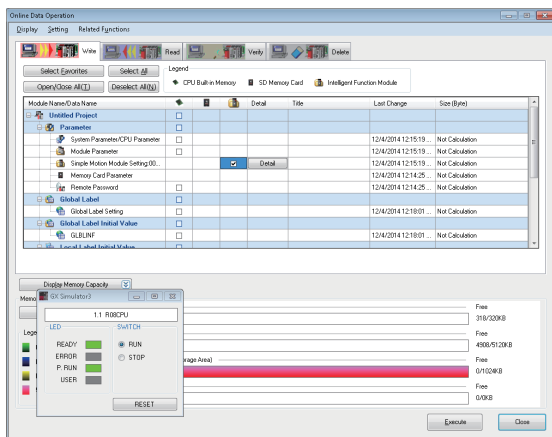
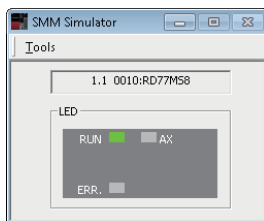
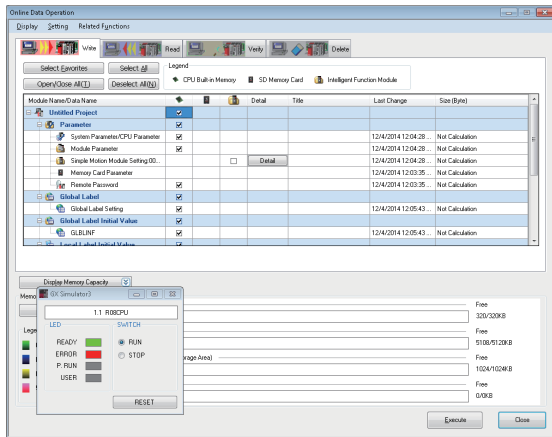
Select the other CPUs in accordance with the module configuration set to the project.

Starting cooperative simulation

The following shows how to operate GX Simulator3 and SMM Simulator with them interacted with each other.

Starting simulation

Operating procedure



1. Select [Debug] ⇒ [Simulation] ⇒ [Start Simulation] ().
2. Select the checkbox of the programmable controller program data to be written on the "Online Data Operation" screen displayed, and click the [Execute] button. (Do not write "Simple Motion Module Setting" at this time.)
3. Close the screen once writing data has been completed.

The "SMM Simulator" screen is displayed.

4. Select [Online] ⇒ [Write to PLC] () to display "Online Data Operation" screen again.
5. Select the checkbox of the "Simple Motion Module Setting" to be written on the "Online Data Operation" screen displayed, and click the [Execute] button.
6. When the "Write to Module" screen is displayed and the message to confirm whether or not to overwrite the contents in the flash ROM appears, click the [Yes] button.

7. Click the [RESET] button on the "GX Simulator3" screen.

The cooperative simulation is started.

12 SETTING ROUTE TO CPU MODULE

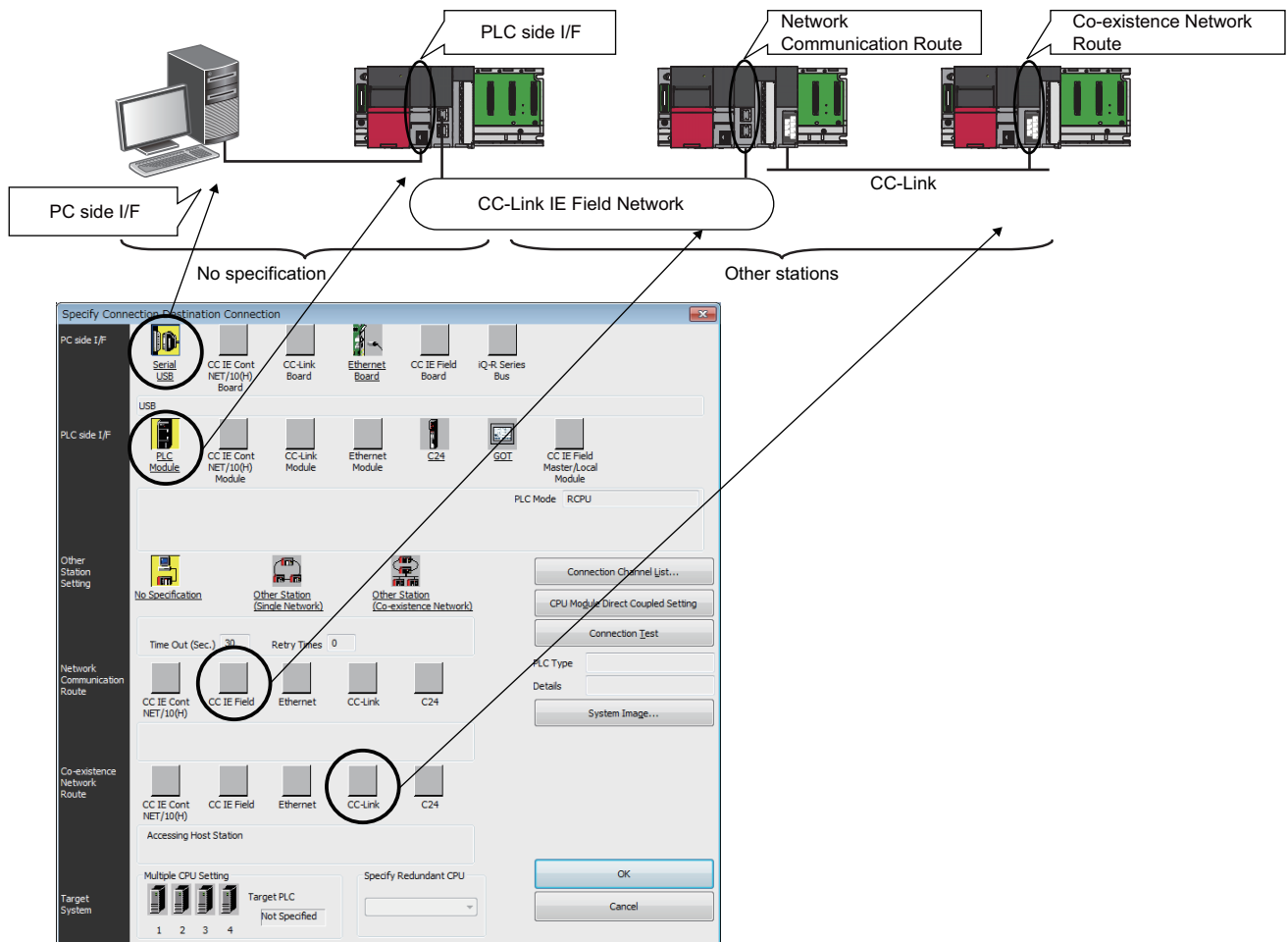
This chapter explains how to set the connection destination for accessing a CPU module from GX Works3.

12.1 Specification of Connection Destination

This section explains how to set communication routes, including the interfaces both the personal computer and CPU module, and the routing networks, for accessing a CPU module on the "Specify Connection Destination" screen. The module type of a project must be set to that of the CPU to be accessed.

Window

[Online] ⇒ [Specify Connection Destination]



- Double-click the items underlined on the screen to set the details of each item.
- The icons colored yellow indicate that the settings have been applied.
- For FX5CPU, the icons of the unsettingable connection destination route are not displayed.

Displayed items

Item	Description	
Other Station Setting	No Specification	Specify this to access the CPU module directly connected to a personal computer.
	Other Station (Single Network) *1	Specify this to access the CPU module on other station via only one kind of network (including a multi-tier system). Since Ethernet is regarded as equivalent to CC-Link IE Controller Network, CC-Link IE Field Network, and MELSECNET/10(H), specify "Single Network" for a system in which those are mixed.
	Other Station (Co-existence Network) *1	Specify this to access the CPU module on other station via two kinds of network.

Item	Description
Network Communication Route	Select the network type, network number, station number, and start I/O number of the network that is routed for accessing the CPU module on other station. The setting items differ depending on the selected network type.
Co-existence Network Route	Select the network type, network number, station number, and start I/O number of the network to access. The setting items differ depending on the selected network type.
Target System	Specify the access target in the multiple CPU system.

*1 To specify the own station, select "No Specification".

Display the illustration of the connection route

Click the [System Image] button to display the set connection route in an illustration to check the route.

12.2 Direct Connection

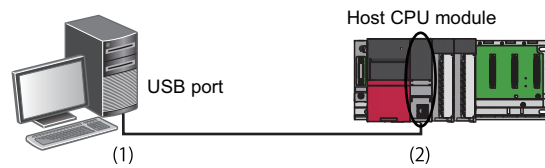
This section explains the setting method for accessing the CPU module directly connected to a personal computer.

Point

Click the [CPU Module Direct Coupled Setting] button on the "Specify Connection Destination" screen to change the settings to direct connection.

USB connection

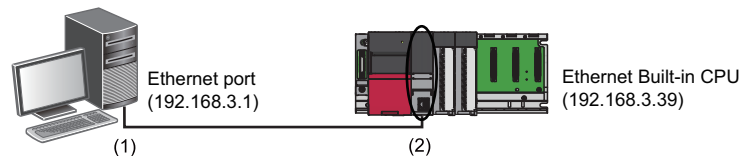
The following shows the setting example for accessing the CPU module on the own station with USB from GX Works3. FX5CPU does not support this connection.



No.	Item	Item to be selected	Internal setting	Input value
(1)	PC side I/F	Serial/USB	USB	—
(2)	PLC side I/F	PLC Module	PLC Mode	RCPU
	Other Station Setting	No Specification	Check at Communication Time	30 seconds
			Retry Times	0 time

Ethernet connection

The following shows the setting example for accessing the built-in Ethernet CPU with Ethernet from GX Works3.



No.	Item	Item to be selected	Internal setting	Input value
(1)	PC side I/F	Ethernet Board	Network No.*1	—
			Station No.*1	—
			Protocol*1	TCP
(2)	PLC side I/F	PLC Module	Ethernet Port Direct Connection	—
	Other Station Setting	No Specification	Check at Communication Time	30 seconds
			Retry Times	0 time

*1 For FX5CPU, these setting items are not available.

Point

For FX5CPU, the Ethernet adapter at the personal computer side, which is used for the Ethernet port direct connection, can be specified.

Click the [CPU Module Direct Coupled Setting] button on the "Specify Connection Destination" screen, and select an adapter displayed on the "CPU Module Direct Coupled Setting" screen.

Precautions

Windows Vista® or later

A warning message may appear.

Click the [Unblock] button for Windows Vista®, and click the [Allow access] button for Windows® 7 or later to unblock the program (permit the access) and continue the operation.

■When the same IP addresses are displayed

When the [Find] button is clicked on the "PLC side I/F Detailed Setting of PLC Module" screen, the same IP addresses may be displayed in the list of the connection destination CPU.

Two or more IP addresses may be set to the [IP Settings] tab on the "Advanced TCP/IP Settings" screen of Windows® network settings. Set only one IP address.

■When the personal computer does not allow to communicate with GX Works3 by the Windows® Firewall

When the Windows® Firewall is enabled and not allowed to communicate with GX Works3, a timeout may occur.

To allow the communication, set the personal computer as shown below.

When using other software with a firewall function, refer to the manual of the software and allow the communication with GX Works3.

Ex.

For Windows Vista®

1. Select [Control Panel] ⇒ [Security] ⇒ [Windows Firewall] ⇒ [Allow a program through Windows Firewall] from the Start menu of Windows®.
2. Click the [Add Program] button in the [Exception] tab.
3. Select "GX Works3" on the "Add a Program" screen, and click the [OK] button.
4. Select "GX Works3"*1 in the list, and click the [OK] button.

*1 'gwx3' may be displayed when RCPU/Ethernet module is searched on the network and access through the Windows® firewall is set to allow before Ethernet port direct connection.

Ex.

For Windows® 7 or later

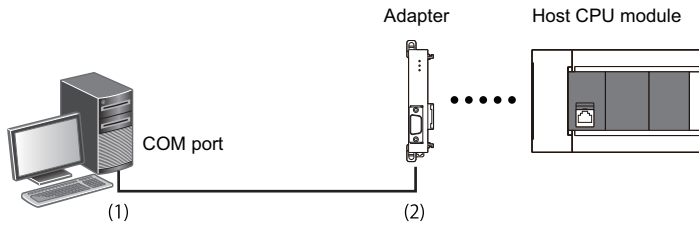
1. Select [Control Panel] ⇒ [System and Security] ⇒ [Windows Firewall] ⇒ [Allow a program*1 or feature through Windows Firewall] from Windows® Start.
2. Click the [Change settings] button, and click the [Allow another program*1] button.
3. Select "GX Works3" on the "Add a Program*1" screen, and click the [Add] button.
4. Select "Domain", "Home/Work (Private)", and "Public" of the added GX Works3*2 in the list, and click the [OK] button.

*1 For Windows® 8 or later, "Apps" is displayed.

*2 'gwx3' may be displayed when RCPU/Ethernet module is searched on the network and access through the Windows® firewall is set to allow before Ethernet port direct connection.

Serial connection

The following shows the setting example for accessing a CPU module on the own station via a serial port from GX Works3. RCPN does not support this connection.

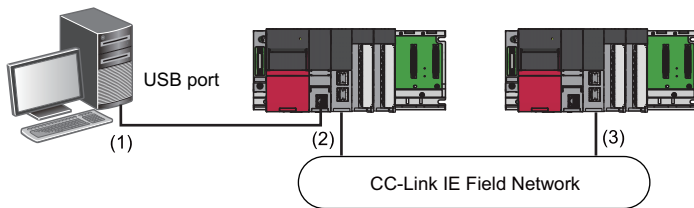


No.	Item	Item to be selected	Internal setting	Input value
(1)	PC side I/F	Serial/USB	RS-232C	—
			COM port	COM1
			Transmission Speed	115.2Kbps
(2)	PLC side I/F	PLC Module	PLC Mode	FX5CPU
	Other Station Setting	No Specification	Check at Communication Time	30 seconds
			Retry Times	0 time

12.3 Accessing via Network (Single Network)

The following shows the setting example for accessing the CPU module on other station via single network from a personal computer.

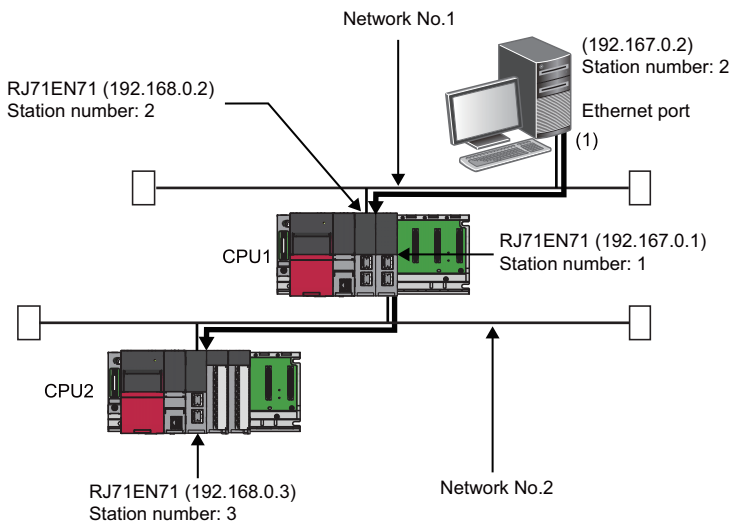
FX5CPU does not support it.



No.	Item	Item to be selected	Internal setting	Input value
(1)	PC side I/F	Serial/USB	USB	—
(2)	PLC side I/F	PLC Module	PLC Mode	RCPU
	Other Station Setting	Other Station (Single Network)	Check at Communication Time	30 seconds
			Retry Times	0 time
(3)	Network Communication Route	CC IE Field	Network No.	1
			Station No.	0

Access via Ethernet module

The following shows the setting example for accessing the CPU module via CC-Link IE built-in Ethernet module from GX Works3.



No.	Item	Item to be selected	Internal setting	Input value		
(1)	PC side I/F	Ethernet Board	Network No.	1		
			Station No.	2		
			Protocol	TCP		
(2)	PLC side I/F	Ethernet Module	PLC Type	RJ71EN71		
			Network No.	—		
			Station No.	1		
			IP Address	192.167.0.1		
			IP Input Format	DEC		
			Station No. <-> IP Information	Automatic Response System		
			Other Station Setting	Other Station (Single Network)	Check at Communication Time	30 seconds
					Retry Times	0 time
(3)	Network Communication Route	Ethernet	Access to other station in the same loop or multi-tier system	Network No. 2		
			Station No.	3		

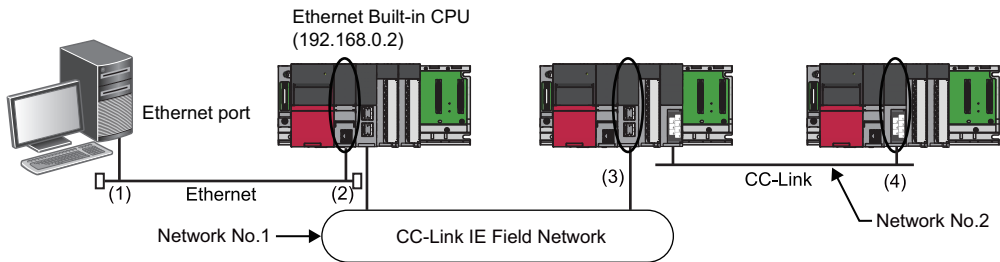
Precautions

- When communicating with multiple GX Works3s, use TCP/IP or DP/IP communication.
- For a multiple network system, setting the network dynamic routing is required.

📖 MELSEC iQ-R Ethernet User's Manual (Application)

12.4 Accessing via Network (Co-existence Network)

The following shows the setting example for accessing the CPU module via co-existence network from a personal computer. FX5CPU does not support it.



No.	Item	Item to be selected	Internal setting	Input value	
(1)	PC side I/F	Ethernet Board	Network No.	1	
			Station No.	1	
			Protocol	TCP	
(2)	PLC side I/F	PLC Module	Connection via HUB	IP Address	192.168.0.2
				Response Wait Time	2 seconds
	Other Station Setting	Other Station (Co-existence Network)	Check at Communication Time	30 seconds	
			Retry Times	0 time	
(3)	Network Communication Route	CC IE Field	Network No.	1	
			Station No.	0	
(4)	Co-existence Network Route	CC-Link	Start I/O	20	
			Station No.	1	

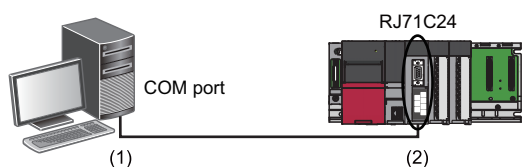
12.5 Accessing via Serial Communication Module

This section explains the setting method for accessing the CPU module on the own station or on other station via a serial communication module.

FX5CPU does not support it.

Connection on a 1:1 basis

The following shows the setting example for accessing the CPU module by connecting a personal computer and the serial communication module.



No.	Item	Item to be selected	Internal setting	Input value
(1)	PC side I/F	Serial/USB	COM port	COM1
			Transmission Speed	115.2Kbps
(2)	PLC side I/F	C24	PLC Type	RJ71C24
			Station No.*1	—
			Parity	—
			Sum Check	—
	Other Station Setting	No Specification	Check at Communication Time	—
			Retry Times	—

*1 Set the same station number as RJ71C24.
Set the station number on the Module Parameter screen.

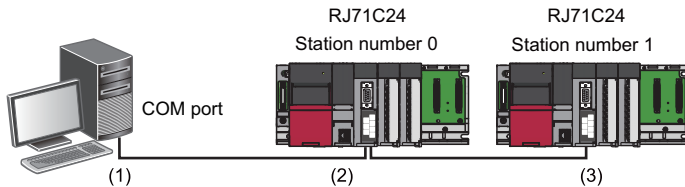
Connection on a 1:n basis

The following explains how to access the CPU module on other station from GX Works3 in a system composed of multiple CPU module stations.

Access via a serial communication module

The following shows the setting example for accessing the CPU module on other station via serial communication module. When connecting via serial communication module, the module parameter for MELSOFT connection is required. For details, refer to the following manual.

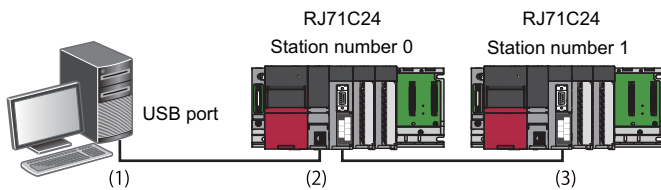
📖 MELSEC iQ-R Serial Communication Module User's Manual (Application)



No.	Item	Item to be selected	Internal setting	Input value
(1)	PC side I/F	Serial/USB	COM port	COM1
			Transmission Speed	115.2Kbps
(2)	PLC side I/F	C24	PLC Type	RJ71C24
			Station No.	0
			Parity	Odd
			Sum Check	—
			Other Station Setting	Other Station (Single Network)
(3)	Network Communication Route	C24	Start I/O	20
			Station No.	1

Direct connection of a CPU module

The following shows the setting example for accessing the CPU module on other station via serial communication module by connecting a personal computer and CPU module directly.



No.	Item	Item to be selected	Internal setting	Input value		
(1)	PC side I/F	Serial/USB	USB	—		
(2)	PLC side I/F	PLC Module	PLC Mode	RCPU		
			Other Station Setting	Other Station (Single Network)	Check at Communication Time	30 seconds
			Retry Times	0 time		
(3)	Network Communication Route	C24	Start I/O	20		
			Station No.	1		

12.6 Accessing via GOT (GOT Transparent Function)

This section explains how to access the CPU module from GX Works3 via GOT using the GOT transparent function.

Precautions

■ Considerations when performing online operations from GX Works3

Do not perform online operations from GT Designer2 or GT Designer3 to GOT (such as downloading project data) when online operations are being performed from GX Works3 to the CPU module using the GOT transparent function.

■ When GOT does not monitor normally

The GOT transparent function cannot be used in the following cases.

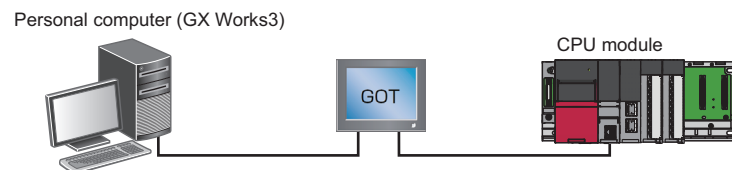
- When GOT does not monitor normally due to CPU module errors or communication errors between the CPU module and GOT
- During the period of time between turning ON or resetting the CPU module or GOT and the start of GOT monitoring

Check the following items if GOT does not monitor normally.

Item	Reference
Does the CPU module operates normally?	☞ Page 249 Diagnosing CPU Module
Is the CPU module connected to GOT normally?	📖 Manual of GOT used

Accessing via GOT

The following shows the setting for accessing the CPU module via GOT.



The availability of connection differs depending on the GOT series and the connection condition between the personal computer and GOT.

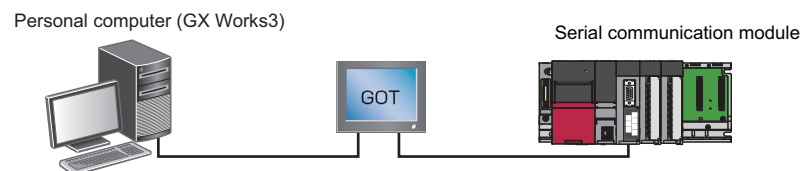
For details, refer to the following manuals.

📖 GOT2000 Series Connection Manual (Mitsubishi Products) For GT Works3 Version1

📖 GOT1000 Series Connection Manual (Mitsubishi Products) for GT Works3

Accessing via module

The following shows the setting of GX Works3 for accessing the CPU module via GOT and serial communication module. FX5CPU does not support it.



The availability of connection differs depending on the GOT series and the connection condition between the personal computer and GOT.

For details, refer to the following manuals.

📖 GOT2000 Series Connection Manual (Mitsubishi Products) For GT Works3 Version1

📖 GOT1000 Series Connection Manual (Mitsubishi Products) for GT Works3


12.7 Accessing to Multiple CPU System

This section explains the setting method for accessing the CPU module (host CPU) directly connected to the personal computer or other CPU modules (other CPUs) in the multiple CPU system.

The setting method for accessing the multiple CPU system on other station via a network is also explained.

FX5CPU does not support it.

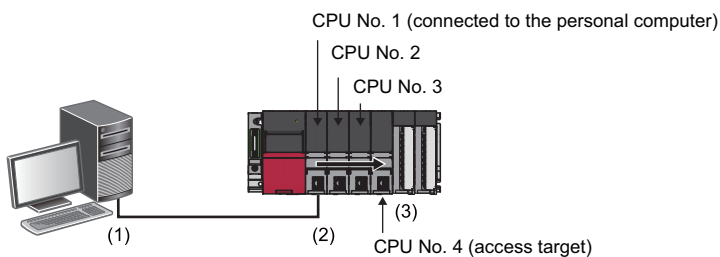
Accessing host CPU

The setting for accessing the host CPU is the same as that for accessing the CPU module on the own station. ( Page 185 Direct Connection)

Accessing other CPUs

In the multiple CPU system, specify the CPU number (PLC No.1 to 4) of the access target at "Multiple CPU Setting" when accessing a CPU module that is not directly connected to the personal computer.

The following shows the setting for accessing the CPU No.4 by connecting a personal computer to CPU No.1.



No.	Item	Item to be selected	Internal setting	Input value
(1)	PC side I/F	Serial/USB	USB	—
(2)	PLC side I/F	PLC Module	PLC Mode	RCPU
			Check at Communication Time	30 seconds
	Other Station Setting	No Specification	Retry Times	0 time
(3)	Target System	Multiple CPU Setting	Target PLC	PLC No.4

Accessing via network

The following explains the setting method for accessing the CPU module in a multiple CPU system on other station via a network.

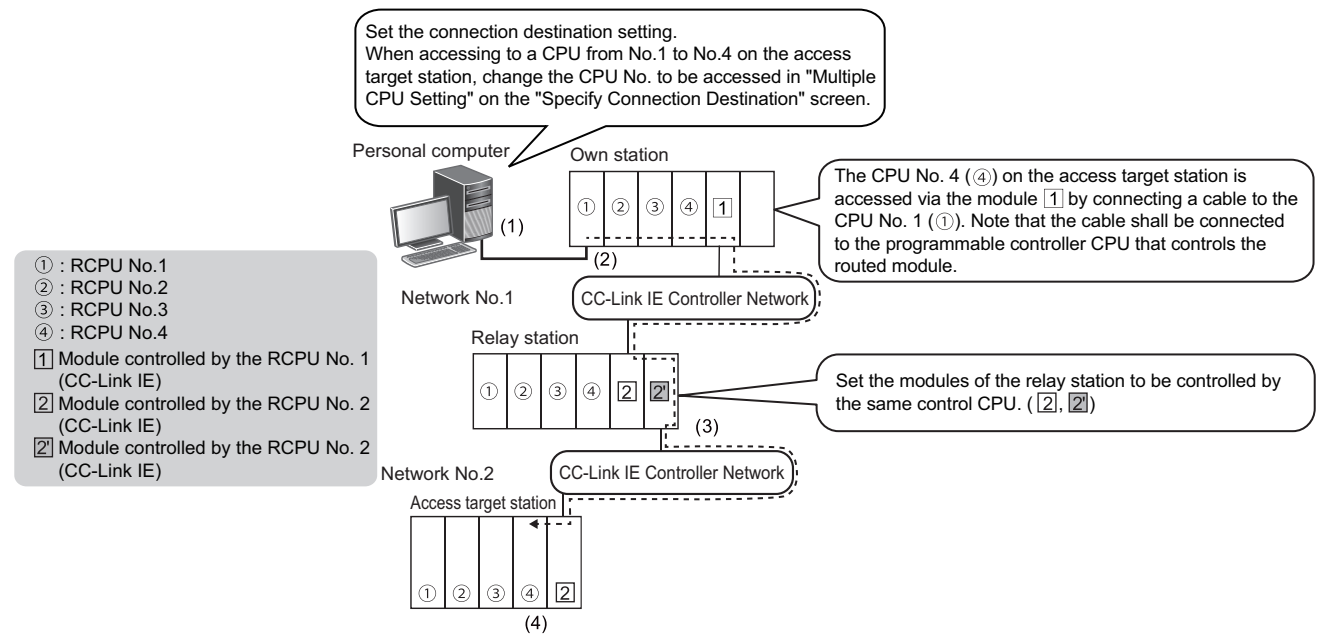
■Relay station

Set the parameters so that the module mounted on the relay station is controlled by the same CPU module. (In the figure below, PLCNo. 2 is the control CPU.)

■Access target station

Set the PLC number in "Multiple CPU Setting" on the "Specify Connection Destination" screen when the access target station is the multiple CPU system.

The following shows the setting for accessing the PLC No.4 in the multiple CPU system on the access target station via a network.



No.	Item	Item to be selected	Internal setting	Input value
(1)	PC side I/F	Serial/USB	USB	—
(2)	PLC side I/F	PLC Module	PLC Mode	RCPU
		Other Station Setting	Other Station (Single Network)	Check at Communication Time
(3)	Network Communication Route	CC IE Cont NET/10(H)	Network No.	2
			Station No.	0
(4)	Target System	Multiple CPU Setting	Target PLC	PLC No.4

12.8 Considerations of Communication with CPU module

This section explains the considerations of communication with the CPU module.

Refer to the considerations described in each section as well as the descriptions in this section.

Considerations of communication via multiple network systems

When accessing RCPU via multiple network systems, all the connected station and relay stations must be RCPU.

Connected station: Station directly connected from GX Works3

Relay station: Stations to be routed on network system

Considerations of communication with the CPU module using a USB cable

■Connect and disconnect a USB cable, reset the CPU module, and turn the power ON/OFF

A communication error may occur and it may not be recovered if connecting and disconnecting a USB cable, resetting the CPU module, or turning the power ON/OFF is performed frequently during communication with the CPU module.

Be sure to set GX Works3 to offline status as much as possible during these operations. 'Offline' indicates the state other than below.

- Write to PLC/Read from PLC, Monitor, and PLC diagnostics

If the operation is not recovered from an error, remove the USB cable. Then, connect it again after five or more seconds.

(Even after this operation, an error may occur at initial communication. However, communication will be successful after that.)

Click the [OK] button on the warning message, and remove a USB cable from the personal computer.

■Combination of personal computers and USB cables

A communication error may occur depending on the combination of personal computers and USB cables.

If an error occurs, take appropriate actions in accordance with the message displayed on the screen.

Other considerations

■High-speed communication using an RS-232 cable

Communication may fail depending on the performance of the personal computer when high-speed communication is attempted by changing the transmission speed at the serial port of the personal computer (personal computer side interface).

Communication speed may also slow down due to communication retries.

Decrease the transmission speed if high-speed communication cannot be performed normally.

■Resume function, suspend setting, power saving function, and standby mode of the personal computer

A communication error may occur during communication with the CPU module when any of the settings shown above are enabled.

Disable these settings for communication with the CPU module.

13 WRITING/READING DATA TO CPU MODULE

This section explains the operations for writing/reading data to/from a CPU module or memory card, and verifying projects. For the methods for writing the clock setting to a CPU module, refer to the following section.

☞ Page 259 Setting Clock in CPU Module

13.1 Writing/Reading Programmable Controller Data

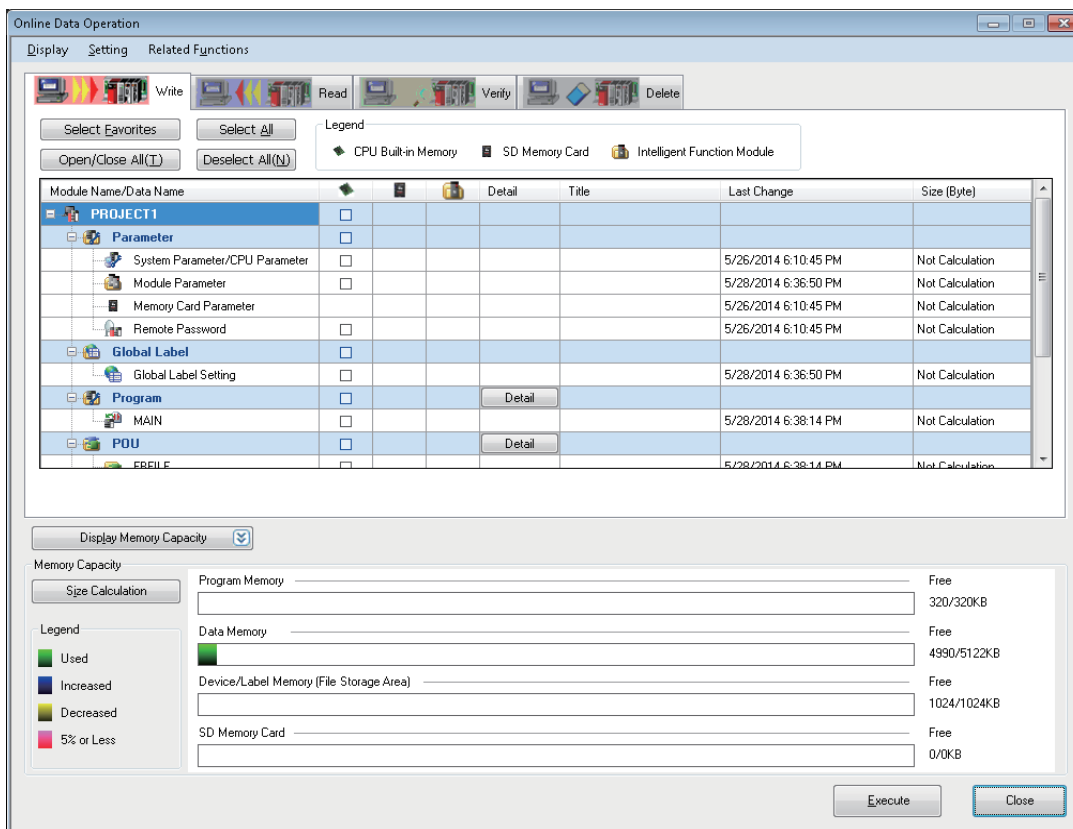
Write the created data to/read from a CPU module or a memory card on the "Online Data Operation" screen.

Configuration of Online Data Operation screen

Window

[Online] ⇒ [Write to PLC] ⇒ (📄)/[Read from PLC] (🗑️)/[Delete PLC Data]

The example of writing data is shown below.



- The data name displayed in gray indicates that it is in the unconverted state.
- When a data is written to the programmable controller, the target memory capacity may be displayed smaller than the actual file size.
- Update the graph of the memory capacity by clicking the [Size Calculation] button.

Precautions

■Memory capacity display for FX5CPU

- Program memory (The capacity of program memory is displayed in unit of step.)
- Data memory (The program, restored information, parameters, and device comments are displayed separately.)
- SD memory card (The capacity of the entire SD memory card is displayed.)
- SD memory card (The program, restored information, parameters, and device comments are displayed separately.)

■Data to be written and write target

○: Writable, ×: Not writable

Data name		Write target		
		CPU built-in memory	SD memory card	Intelligent function module
System Parameter/CPU Parameter		○	○	×
Module Parameter		○	○	×
Module Extended Parameter		○	○	○
Memory Card Parameter		×	○	×
Remote Password		○	○	×
Global Label	Global Label Setting	○	○	×
	Global Label Assignment Information ^{*1}	○	○	×
Program File		○	○	×
FB File/FUN File		○	○	×
Label Initial Value File ^{*1}		○	○	×
Device Memory (File Register)		○	×	×
Device Initial Value		○	○	×
Device Comment ^{*2}		○	○	×

*1 Not supported by FX5CPU.

*2 FX5CPU only supports common device comments and does not support each program device comments.

■How to check the data size to be written

The data size to be written can be displayed on the "Size (Byte)" column by enabling the file size display.

Select [View] ⇒ [Display File Size] on the "Online Data Operation" screen to enable the file size display.

■Display of memory capacity

The display content differs depending on the setting of file size display.

Disabled: The current memory capacity of the write target is displayed.

Enabled: The memory capacity, to which the data size to be written/deleted has been reflected, is displayed.

Writing data to programmable controller

Write data to a programmable controller.

For the considerations for writing, refer to the following section.

☞ Page 203 Considerations for Online data operation

Operating procedure

1. Select the [Write] tab on the "Online Data Operation" screen.
2. Select a file to be written and write destination.
3. Click the [Detail] button to set the details such as a range to be written.
4. Click the [Execute] button.

Point

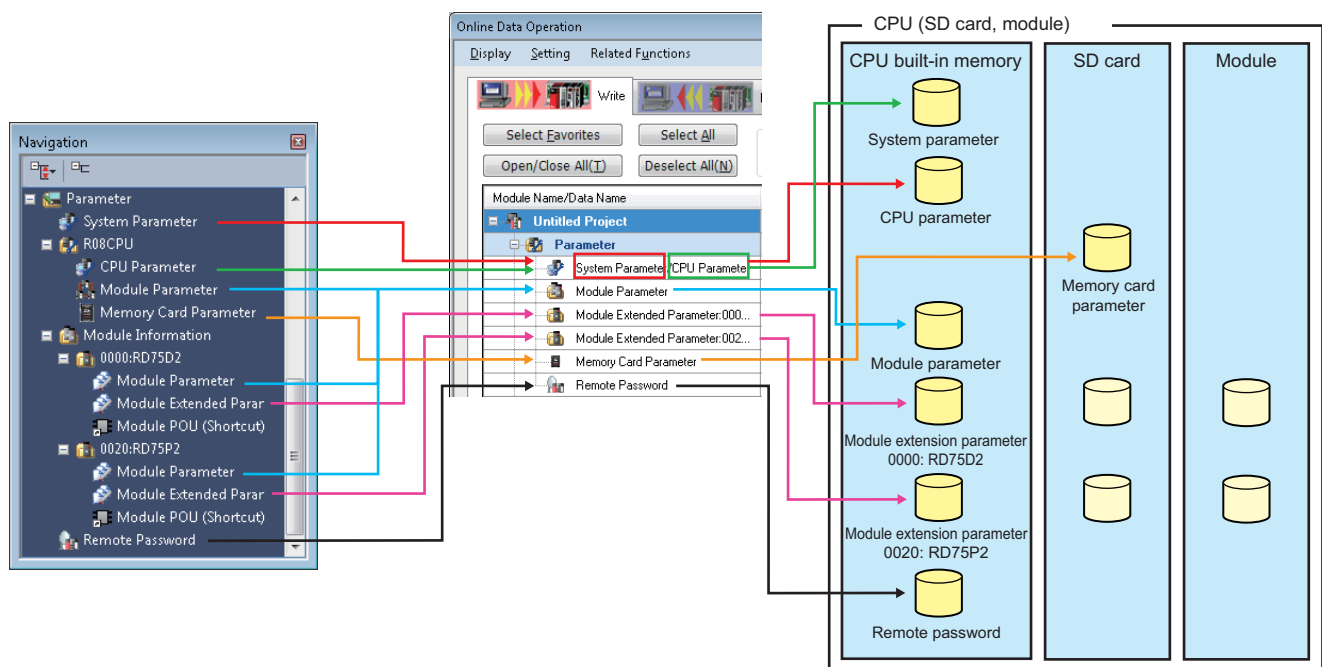
When more than one program is written to the CPU module, the programs categorized as "No Execution Type" will never be executed on the CPU module. For saving the memory capacity of the CPU module, removing them from the target data at writing data is recommended.

Parameter

Write "Parameter" in accordance with the operation or change of the system.

■Relation between module parameter on the Project view and module parameter in CPU module

Module parameters are written with all other parameters displayed on the Project view in one file.



Therefore, when module parameters exist in the CPU module, the parameter file is overwritten.

Ex.

When writing four module parameters to the CPU module in which module parameters of five modules exist; the settings of five modules are overwritten with the settings of four modules, and one setting that does not exist in the project will be deleted.

■Consistency of parameters

When writing a part of the parameters additionally or writing parameters after changing the parameters, the consistency of the parameters are required. Consistency means making the information of I/O assignment (start I/O number, slot number, etc.) between the system parameters and each parameter match.

There are two methods to keep the consistency.

- Read the system parameter and each parameter, then modify them. After that, write them to the programmable controller. Resetting the CPU module is required to change the system parameter.
- Read the parameters to be changed, and change them to match the consistency with the system parameter in the project. After that, write only the changed parameters to the programmable controller. Basically, resetting CPU module is not required, however, some modules are required to reset the CPU module after changing parameters. For details, refer to the manual of the module used.

■Modules with start I/O number unset

The unset module parameters cannot be written to a programmable controller.

Programs

After creating a program (local label, program), write "Program".

When the column of "Initial Value" is set on the local label editor, write "Local Label Initial Value".

FX5CPU does not support initial value of label.

When a general function or general function block is used in the program, write "SlibFbFile" of POU.

■Setting the secured steps for online program change

Set the range of program (program file) to be written and steps for online program change to a CPU module on the "Program Detail Setting" screen displayed by clicking the [Detailed] button of "Program".

FX5CPU does not support this setting.

Item	Description
Allocating memory for online program change	<p>Writing programs while the CPU module is in RUN affects scan time due to the change of number of steps.</p> <p>Enter the secured steps for online program change to handle the change of number of steps when performing online program change.</p> <p>When the number of program steps is changed, the capacity of program files is not changed if the changed number of steps are within the range of the number of the secured steps for online program change.</p>

Global label

After setting global labels, write "Global Label Setting".

When the column of "Initial Value" is set in the global label editor, write "Global Label Initial Value".

When "Access from External Device" is selected on the global label editor, write "Global Label Assignment Information".

FX5CPU does not support the initial value of labels nor the setting for accessing from external device.

Precautions

The sample comments are included in the write target. If the data size to be written exceeds the memory capacity of the CPU module at writing data, prepare an SD memory card.

For FX5CPU, the writable capacity of the SD memory card is the same as that of CPU module.

Device memory

When writing values to the device memory area of the CPU module after setting device memory, write "Device Memory".

The device memory which has the same name as the program is written to a local device.

In contrast, the device memory which has the different name as the program is written to a global device.

Only one device memory for a global device can be selected.

Precautions

FX5CPU does not support local devices.

The device memory is written to a global device regardless of whether or not it is consistent with the program name.

■Setting write target devices and their ranges

Set the type and range of device memory to be written to the CPU module on the "Device Data Detail Setting" screen displayed by clicking the [Detailed] button of "Device Memory".

Devices that can be written are as follows:

○: Writable, ×: Not writable, —: No corresponding device

Device	Global device	Local device ^{*1}
M, V ^{*1} , T, ST, C, D, S ^{*2} , R ^{*2}	○	○
L, B, F, SB, LT ^{*1} , LST ^{*1} , LC, W, SW, Z, LZ, RD ^{*1}	○	—
X, Y, SD, SM	×	—

*1 Not supported by FX5CPU.

*2 Not supported by RCP.

File register

When writing the device memory which has been set as a file register, write "File Register".

FX5CPU does not support this setting.

■Setting range to be written

Set the range of file register to be written to the CPU module on the "File Register Detail Setting" screen displayed by clicking the [Detailed] button of "File Register".

If two or more file registers are selected, the value of each file register is written/read in the same range.

Device initial values

After setting device initial values, write "Device Initial Value".

The device initial value which has the same name as the program is written as a file for the local device. The devices which cannot be used as a local device cannot be written.

The device initial values which have difference name as the program will be written as a file for a global device.

FX5CPU does not support local devices.

The device initial values are written to a global device regardless of whether or not it is consistent with the program name.

Device comment

After setting device comments, write "Common Device Comment" or "Each Program Device Comment".

For FX5CPU, each program device comment cannot be written to CPU module.

■Setting range to be written

Set the range of "Common Device Comment"/"Each Program Device Comment" to be written to a CPU module on the "Device Comment Detail Setting" screen displayed by clicking the [Detailed] button of "Common Device Comment" or "Each Program Device Comment".

Set this setting to limit the writing range of device comments in cases such as when the CPU module has small free capacity.

When the range of device comments is not set, all device comments are written.

Item	Description
Number of characters per 1 comment	Set the maximum number of comments to be written to a CPU module. When the character length of an input value is less than the number of characters of device comment set for the project, the device comment with less number of characters is written to a CPU module. Therefore, mismatched data may be detected when verifying project data.

Precautions

When the sample comments are read to device comments, all the sample comments are written to the CPU module.

Therefore, the data size to be written may exceed the memory capacity of the CPU module. In this case, perform any of the following operations.

- Delete the device comments of unused devices.
- Set the write destination of device comments to SD memory card.
For FX5CPU, the writable capacity of SD memory card is the same as that of CPU module.
- Set the range to be written.

Reading data from programmable controller

Read data from the programmable controller.

For the considerations for reading data, refer to the following section.

☞ Page 203 Considerations for Online data operation

Operating procedure

1. Select the [Read] tab on the "Online Data Operation" screen.
2. Select the files to be read and read destination.
3. Click the [Detail] button to set the details such as a range to be read.
4. Click the [Execute] button.

Point

Data can be read when a project is not opened.

☞ Page 53 Creating new project by data read from programmable controller

13

Precautions

- When accessing SD memory card frequently using the data logging function or database function, the reading operation from the programmable controller (to open the "Online Data Operation" screen) may be slow.
- A project created with GX Works3 of which version is 1.005F or later cannot be read with Version 1.002C or earlier. In addition, FBD/LD programs cannot be read with Version 1.006G or earlier.

Parameters

■Unsupported modules

The module parameters that are not supported by GX Works3 cannot be read.

Program

When reading a program (local labels, program), read "Program".

■Initial values of local labels

The operation differs between writing to and reading from the programmable controller.

FX5CPU does not support it.

- When writing data to a programmable controller; write the local labels as "Local Label Initial Value".
- When reading data from a programmable controller; read the program to read "Initial Value" of local labels

■Execution type which is overwritten at reading program

- When reading CPU parameters and program file at once: The program file is overwritten with the execution type in accordance with the program setting of the read CPU parameter.
- When reading only a program file: The program file s overwrite in accordance with the parameter settings in GX Works3.
- When the CPU parameter setting does not exist in both CPU module and GX Works3: The program file is overwritten with "No Execution Type".

■Setting read range

Set the range of a program (program file) to be read from a CPU module on the "Program Detail Setting" screen displayed by clicking the [Detailed] button.

In addition, the secured steps for online program change can be obtained from CPU module.

FX5CPU does not support it.

Global label

■Initial value, accessing from external device

The operation differs between writing to and reading from the programmable controller.

FX5CPU does not support the initial value of labels nor the setting for accessing from external device.

- When writing data; global labels are written as "Local Label Initial Value" and "Global Label Assignment Information".
- When reading data; the information of "Initial Value" and "Access from External Device" of local labels are read with global labels by reading programs.

Restriction

When reading only a program in which global labels are used, the label definitions used in the program may not exist in the project. This may cause the disappearance of the labels on the ladder editor. In this case, read the global label and program together.

Device memory

The device memory, which have the same name as the program, will be read as a file for a local device.

The device memory, which have the different name as the program, will be read as a file for a global device.

Only one device memory for a global device can be selected.

FX5CPU does not support local devices.

The device memory is read as a file for a global device regardless of whether or not it is consistent with the program name.

■Setting read target devices and their read ranges

Set the type and range of device memory to be read from a CPU module on the "Device Data Detail Setting" screen displayed by clicking the [Detailed] button.

Device memory can be read from link memory or buffer memory.

The devices that can be read are as follows:

○: Readable, —: No corresponding device

Device	Global device	Local device ^{*1}
M, V ^{*1} , T, ST, C, D, S ^{*2} , R ^{*2}	○	○
L, B, F, LT ^{*1} , LST ^{*1} , LC, W, SD, SW, Z, LZ, RD ^{*1}	○	—
X, Y, SB, SM	○	—

*1 Not supported by FX5CPU.

*2 Not supported by RCP.

Device comment

■Setting read range

Set the range of Common device comments/Each program device comments to be read from a programmable controller on the "Device Comment Detail Setting" screen displayed by clicking the [Detail] button.

Device initial values

Even when the device initial value read from the CPU module is local device, it is not displayed as a local device (# is not added) on GX Works3.

Deleting data in CPU module

Delete the data such as programs and parameters in the CPU module.

Operating procedure


Select the file to be deleted from the list on the "Online Data Operation" screen, and click the [Execute] button.

Considerations for Online data operation

Unlocking a remote password

The confirmation message for unlocking the remote password is displayed when the remote password is set to the CPU module to be accessed. Unlock the password by following the message.

For details, refer to the following section.

 Page 245 Restricting Access from Other Than Specific Communication Route

13.2 Verifying Programmable Controller Data

This section explains how to verify the open project against the data in the CPU module.

The Verify with PLC function is used to compare the content of two projects or to locate the changes made in programs. Projects to which the security is set can be verified when both verify source data and verify destination data are not read-protected.

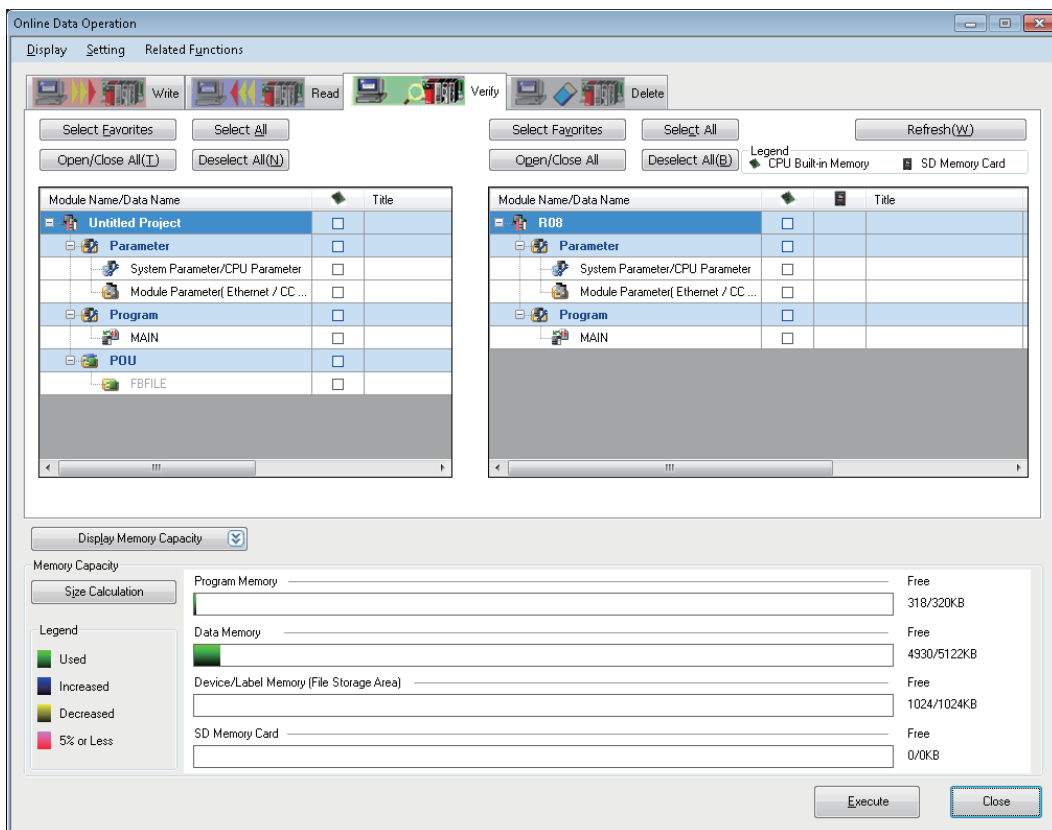
To verify data between two projects, use the Project Verify function.

For details, refer to the following section.

☞ Page 65 Verifying Projects

Window

[Online] ⇨ [Verify with PLC]



Operating procedure

Select the data to be verified, and click the [Execute] button.

The operation method for displaying the verification result is the same as the Project Verify function. Refer to the following section.

☞ Page 66 Checking verification result

Parameter

■ Verification of module parameters

The data which can be selected as verification target are as follows: Ethernet modules, CC-Link modules, CC-Link IE Controller Network modules, and CC-Link IE Field Network modules.

13.3 Writing Programs While CPU is in RUN

This section explains the operations for changing programs or data while the CPU module is in RUN (online program change). Before performing online program change, be sure to fully understand the descriptions below.

There are two ways to write data while CPU module is in RUN as shown below:

- Online program change: Change programs or data partially while the CPU module is in RUN
- File batch online change: Write data in file units while the CPU module is in RUN

Writing data while the CPU module is in RUN affects scan time due to the change of number of steps. Set the secured steps for online program change on the "Program Detail Setting" screen displayed by clicking the [Detailed] button of "Program". FX5CPU does not support the file batch online change nor the setting of the secured steps for online program change.

Considerations

- The program execution is suspended while performing online program change. The length of down time depends on the number of the changed steps.
- When writing programs which includes the rise instructions, fall instructions, SCJ instructions, and STMR instructions while the CPU module is in RUN, the system may not operate properly.
- Do not perform online program change for the same program from multiple GX Works3 at the same time.
- If failed to write data while the CPU module is in RUN, the project will be returned to the previous status before the conversion in order to make it possible to perform online program change again.
- Before performing online program change, make sure that the parameters between in the CPU module and in the project mach.
- Before performing online program change, make sure that the target files for writing are written to the CPU module.
- When "Check at Communication Time" has been set less than 90 seconds, the timeout will be checked in 90 seconds. If an error occurred, extend the timeout time on the Specify Connection Destination screen.
- Online program change will be continued if a warning occurred at conversion.
- When online program change is performed after changing the label names which can be accessed from external devices, the data before the change is remained in the global label assignment information. To delete the remaining data, write the global label assignment information from the "Online Data Operation" screen.
- When global labels are changed, the online program change can be performed for the program using global labels.

Design instructions

WARNING

■When data change, program change, or status control is performed from a personal computer to a running programmable controller, create an interlock circuit outside the programmable controller to ensure that the whole system always operates safely.

Furthermore, for the online operations performed from a personal computer to a CPU module, the corrective actions against a communication error due to such as a cable connection fault should be predetermined as a system.

Startup/Maintenance Instructions

CAUTION

■The online operations performed from a personal computer to a running CPU module (program change while a CPU module is in RUN, operating status change such as RUN-STOP switching, and remote control operation) have to be executed after the manual has been carefully read and the safety has been ensured.

When changing a program while the CPU module is in RUN, it may cause a program corruption in some operating conditions. Fully understand the precautions described in this section.

Writing data after changing programs partially while CPU module is in RUN (Online program change)

This function partially overwrites data such as program files in the CPU module. Before changing the program, check if the programs between in the CPU module and in the project match using the "Verify with PLC" function. If there is no target file in the CPU module, online program change cannot be performed.

The list of operations for the data which can perform online program change and the target files are as shown below.

○: Applicable, —: Not applicable


Operation		Online program change target file				
		Program	POU	Local label initial value ^{*1}	Global label (settings, assignment information ^{*1})	Global label initial value ^{*1}
Global label	Adding/changing global labels	—	—	—	○ ^{*2}	○ ^{*3}
Program block	Adding/changing local labels	○	—	○ ^{*3}	—	—
	Adding/changing/deleting programs	○	—	—	—	—
Function block	Adding/changing local labels	—	○	—	—	—
	Adding/changing/deleting programs	—	○	—	—	—
Function	Adding/changing/deleting local labels	—	○	—	—	—
	Adding/changing/deleting programs	—	○	—	—	—

*1 Not supported by FX5CPU.

*2 The operation for the assignment information can be performed only when the labels are set to be accessed from external devices.

*3 The operation for the label initial value file can be performed only when initial values are set to labels.

Operating procedure

1. Verify a program against a program on the programmable controller to ensure that they match.
If the program part to be written does not match with the program on the CPU module, online program change cannot be performed. Perform online program change in units of files. ( Page 208 Writing data in units of files while the CPU module is in RUN (file batch online change))
2. Modify a program.
3. Select [Convert] ⇒ [Online Program Change].
4. Select the target program, and click the [OK] button.

Point

Check the processing procedure and precautions for online program change by clicking the [Notes] button.

Online program change after editing device comments

When online program change is performed after editing device comments, the device comments are written after writing programs.

The operations below can be chosen for writing device comments by selecting [Tool] ⇒ [Options] ⇒ "Convert" ⇒ "Online Program Change".

Item	Value	Description
Check Device Comment Difference	No	The confirmation message does not appear, and all device comments are written.
	Yes	The confirmation message appears, and whether or not to write device comments can be selected.

However, online program change cannot be performed even if only device comments were edited with the program or labels unchanged.

When writing only device comments while the CPU module is in RUN, write data to the programmable controller from the "Online Data Operation" screen.

Online program change of global label/local label initial values (Version 1.000A only)

After adding/modifying global label initial values or local label initial values, writing the label initial value file to CPU module is required.

FX5CPU does not support the initial value of label.

When clearing all initial values, deleting the label initial value file to CPU module is required.

Furthermore, under booting, writing the label initial value file to SD memory card is required and deleting the label initial value file is also required from the Boot File Setting of the Memory Card Parameter when clearing all initial values. If do not write/delete the label initial value file to/from the CPU module, an error occurs at powering ON, resetting, or changing the status from RUN to STOP of the CPU module.

Online program change with the smallest configuration

The data with the smallest configuration can be written by setting the option as shown below. Set the option for saving the data capacity.

Note that, however, when the project with the smallest configuration is read from the programmable controller, the project cannot be restored completely. Always save the recent write source project.

- [Tool] ⇒ [Options] ⇒ "Convert" ⇒ "Online Program Change" ⇒ "Operational Setting"

Writing range for online program change

The range to be written differs depending on the editing methods of programs.

When a new ladder block is inserted, or a ladder block is deleted, the inserted program is written together with one instruction after the inserted ladder block to the CPU module.

Therefore, online program change may not be completed at a time depending on the number of program steps added or deleted steps before and after the program. In this case, reduce the number of steps written at a time and perform online program change in several times.

Execution of rising/falling instructions after performing online program change

When the raising/falling instructions in the subroutine FB program is modified or added, the modified or added instructions are not executed after performing online program change even if the condition has been satisfied.

The modified or added raising/falling instructions are executed when the execution condition is satisfied at the next time.

```
<Example of project configuration>
├─MAIN1          : Program file
│  └─FbPou1      : Subroutine FB program (Modified/added)
├─MAIN2          : Program file
│  └─FbPou2      : Subroutine FB program (Modified/added)
│     └─FbPou3    : Macro FB program (Modified/added)*1
```

*1 The macro FB program used in the subroutine FB program is the same as subroutine FB program.

Writing data in units of files while the CPU module is in RUN (file batch online change)

Write programs or data in units of files while the CPU module is in RUN.

Data such as sequence programs and device comments can be written by performing online program change.

FX5CPU does not support it.

Operating procedure

Select [Online] ⇒ [Write to PLC].

Precautions

The sequence program in which the global labels or FBs/FUNs are used and the global label setting file or FB files that are referred from the sequence program cannot be written simultaneously in file units while CPU module is in RUN. Change the CPU module status to STOP/PAUSE before writing the global label setting file or FB files.

13.4 Reading/Writing/Deleting User Data

Read/write/delete user data from/to the CPU built-in memory/SD memory card.
FX5CPU does not support it.

The files which have a three-character extension (example: csv, txt, bin, xml) can be handled as a user data.

Note that, the following files are excluded.

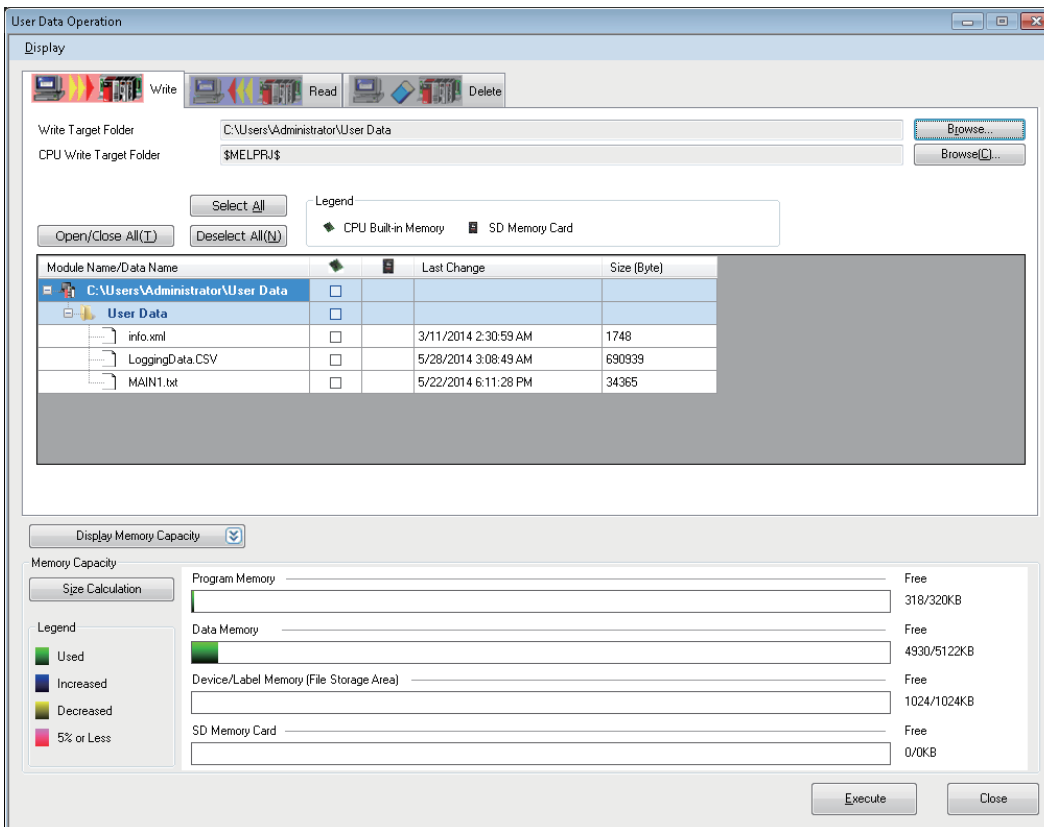
- SYS, PRG, PFB, PRM, DID, DCM, QDR, EVENT.LOG (includes file name), QST, IFG, LID, CAB, LCS, LIS, SYP, a file that '\$' is attached in front of the file name

The user data written to the CPU built-in memory/SD memory card can be used in sequence programs.

Window

[Online] ⇨ [User Data] ⇨ [Write]/[Read]/[Delete]

The following screen is an example when writing data.



Operating procedure

1. Select [Write], [Read], or [Delete] tab on the "User Data Operation" screen.
2. Select the target files and write/read destination.
3. Click the [Execute] button.

Creating/deleting folders, changing folder name

Folders can be created in the CPU built-in memory or SD memory card.

The created folder name can be changed and deleted.

Create/delete a folder, or change a folder name on the "Browse Folders" screen displayed by clicking the [Browse] button on the "User Data Operation" screen.

■Creating folders

Select the folder in which a folder is to be created on the "Browse Folders" screen, right click it and select [Create Folder] from the shortcut menu.

■Deleting folders/changing folder name

Select the target folder on the "Browse Folders" screen, right click it and select [Delete Folder]/[Change Folder Name] from the shortcut menu.

13.5 Deleting All Files (Initialization)

Perform initialization to delete files in a CPU module or a memory card.


This function is used to use the CPU module and the memory card for the first time, or to clear all data stored in them.

Once initialized, the following processing is performed to each memory:

- Data memory: Delete all folder/all files in the program memory and data memory.
- Device/label memory: Delete all files in the file storage area in the device/label memory.
- SD memory card: Delete all folders/all files in the SD memory card.

Operating procedure

Delete all files on the "CPU Memory Operation" screen. Refer to the following section.

 Page 262 Initializing/Clearing Memory

14 CHECKING OPERATION OF PROGRAMS

This chapter explains how to check the execution status of Intelligent function modules and CPU modules connected to a personal computer.

The functions to check the execution status are as follows:

Purpose	Function name	Reference
A function to check the status of the programs being executed on the program editor.	Monitor	Page 214 Check Execution Programs on Program Editor
A function to check the current values of the device or buffer memory in batch.	Device/Buffer Memory Batch Monitor	Page 217 Checking Device/Buffer Memory in Batch
A function to check the current values by registering devices and labels.	Watch	Page 219 Checking Current Values by Registering Devices/Labels
A function to check the processing time of programs being executed.	Program List Monitor ^{*1}	Page 222 Checking Processing Time of Program
A function to check the number of executions of interrupt programs used in a program.	Interrupt Program List Monitor ^{*1}	Page 223 Checking Execution Counts of Interrupt Programs
A function to check the I/O signals and the current value of buffer memory by registering the module information of Intelligent function module.	Intelligent Function Module Monitor ^{*1}	Page 224 Checking Current Values in Intelligent Function Module
A function to save and check the device values of a CPU module at any timing to a personal computer.	Memory Dump ^{*1}	Page 226 Saving and Checking Device Value

*1 Not supported by FX5CPU.

Some devices cannot be monitored (accessed) in a multiple CPU configuration. For more details, refer to the following manual.

 MELSEC iQ-R CPU Module User's Manual (Application)

Changing current values

Check the operation by changing the current value of devices, labels, and buffer memory using the Change Current Value function.

This function turns bit devices ON/OFF forcibly on the CPU module. The current values of the word device and buffer memory can be changed forcibly as well.

The current values can be changed on the following screens.

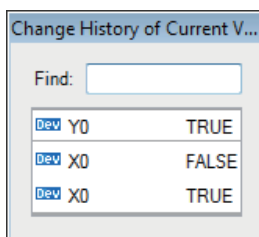
- Program editor
- "Device/Buffer Memory Batch Monitor" screen
- Watch window
- Intelligent Function Module Monitor window

Change history of current value

When the current values of bit device are changed, the change history can be checked.

Window

[Debug] ⇨ [Change History of Current Value]



14.1 Monitor Status

Check the operation status of the CPU module and Intelligent function modules using the monitoring function by connecting a personal computer.

Starting/stopping monitoring

Start/stop monitoring by selecting one of the following menus.

- [Online] ⇒ [Monitor] ⇒ [Start Monitoring (All Windows)]/[Stop Monitoring (All Windows)]
- [Online] ⇒ [Monitor] ⇒ [Start Monitoring]/[Stop Monitoring]
- [Online] ⇒ [Watch] ⇒ [Start Watching]/[Stop Watching]
- Select [Online] ⇒ [Monitor] ⇒ [Monitor Mode] on the active ladder editor

For a ladder editor, start monitoring by selecting a mode in the pull-down menu on the mode display area located at the upper left of the ladder editor.

■When monitoring multiple projects using a single personal computer

- If a communication error has been occurred in one of the projects, the monitoring speed of the other projects may become slow.

The operation speed will be back to normal after closing the error message displayed in the project in which the communication error occurred.

- The following functions may not be performed normally:
Program List Monitor and Interrupt Program List Monitor

■Monitoring buffer memory and link devices

Monitor the ON/OFF status of the buffer memory or link devices (example: U0\G0.1) by setting the following option.

- [Tool] ⇒ [Options] ⇒ "Monitor" ⇒ "Common Item"/"Ladder Editor"/"ST Editor"/"FBD/LD Editor" ⇒ "Operational Setting"

■Changing display format of word devices

Select [Online] ⇒ [Monitor] ⇒ [Change Value Format (Decimal)] / [Change Value Format (Hexadecimal)] to change the display format of the monitored values.

■FB instance

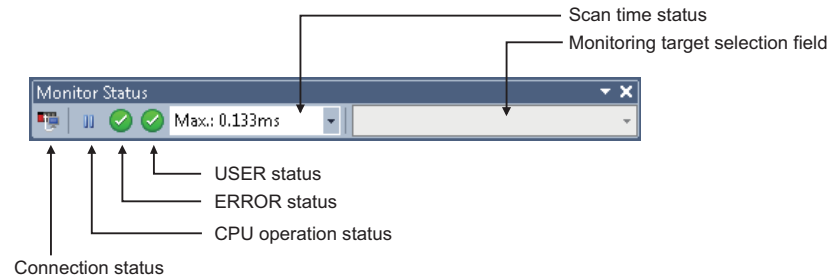
When monitoring the devices/labels in an FB instance, open the FB program and select the FB instance to be monitored from the monitor status bar.

Monitoring status

Monitoring status is displayed during monitoring on the work window.

Window

At the start of monitoring



Displayed items

Item	Description	Icon	Detail
Connection Status	Displays the connection status between a CPU module and personal computer. The "Specify Connection Destination" screen is displayed by clicking the icon. For more details, refer to the following section. ☞ Page 183 SETTING ROUTE TO CPU MODULE		When connected to a CPU module
Operation Status	Displays the CPU module status operated by the key switch on the CPU module or the remote operation from GX Works3. The "Remote Operation" screen is displayed by clicking the icon. For more details, refer to the following section. ☞ Page 260 Remote Operation of CPU Module		RUN
			STOP
			PAUSE
ERROR Status	Displays the ERROR LED status of CPU module. The "Module Diagnostics" screen is displayed by clicking the icon. For more details, refer to the following section. ☞ Page 249 Diagnosing CPU Module		ERROR is OFF.
			ERROR is ON.
			ERROR is flashing.
USER Status	Displays the USER.LED status of CPU module. The "Module Diagnostics" screen is displayed by clicking this icon. For more details, refer to the following section. ☞ Page 249 Diagnosing CPU Module		USER is OFF.
			USER is ON.
			USER is flashing.
Scan time status	Displays the current value, maximum value, and minimum value of the scan time by switching them from the pull-down list.		
Monitor target selection	When monitoring multiple FB programs, select the target FB instance to be monitored.		

Monitor mode

Ladder editors are switched to monitor mode during monitoring.

☞ Page 106 Configuration of ladder editor

14.2 Check Execution Programs on Program Editor

Check the execution programs on a program editor using the Monitoring function.
Open the program editor to be monitored in advance.

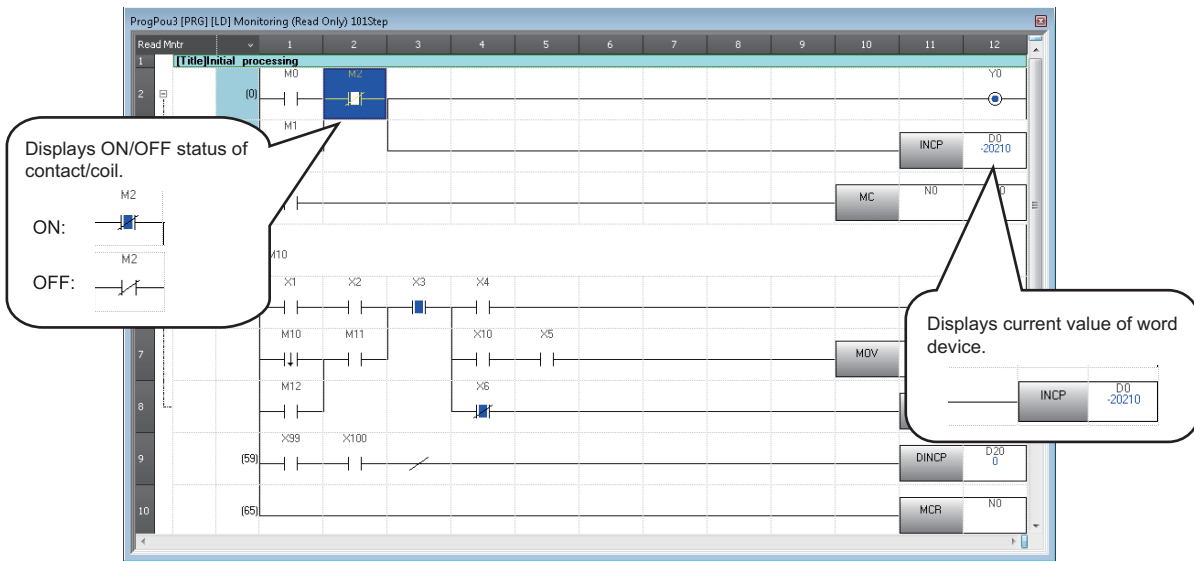


The display format and detailed operations for each function can be set by the following option setting.
[Tool] ⇒ [Options] ⇒ "Monitor"

Ladder editor

Operating procedure

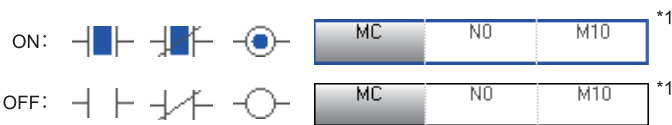
Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] ()/[Stop Monitoring] ().



When any values other than fixed value are specified to the element of an array, an indefinite value is displayed as the monitored value of the array.

ON/OFF status display

During monitoring, the ON/OFF status is displayed as shown in the following figure.



*1 Only comparison instructions that are equivalent to contacts and the instructions that are equivalent to coils are supported.
Comparison instructions equivalent to coil: BIN16-bit data comparison, BIN32-bit data comparison, floating-point data comparison, 64-bit float data comparison
Instructions equivalent to coil: SET, RST, PLS, PLF, SFT, SFTP, MC, FF, DELTA, DELTAP

Monitoring FB programs

Double-click the FB instance to monitor the FB program.

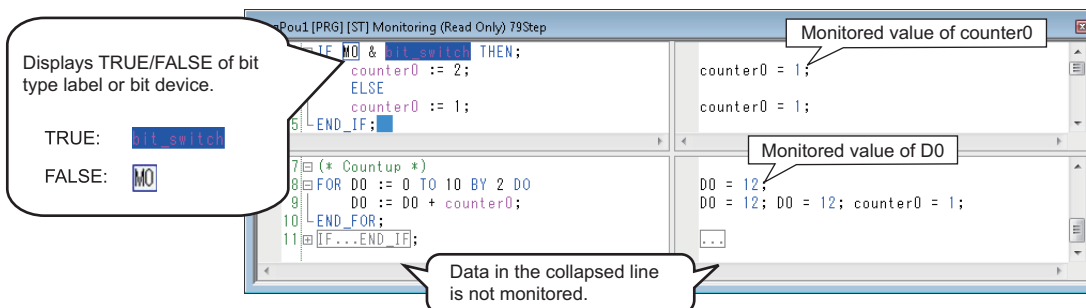
ST editor

The monitored values of bit type are displayed on a program, and the monitored values of labels other than bit type and word devices are displayed on the right side of the split window.

The monitored value is displayed on the tooltip by placing the cursor on a device/label name.

Operating procedure

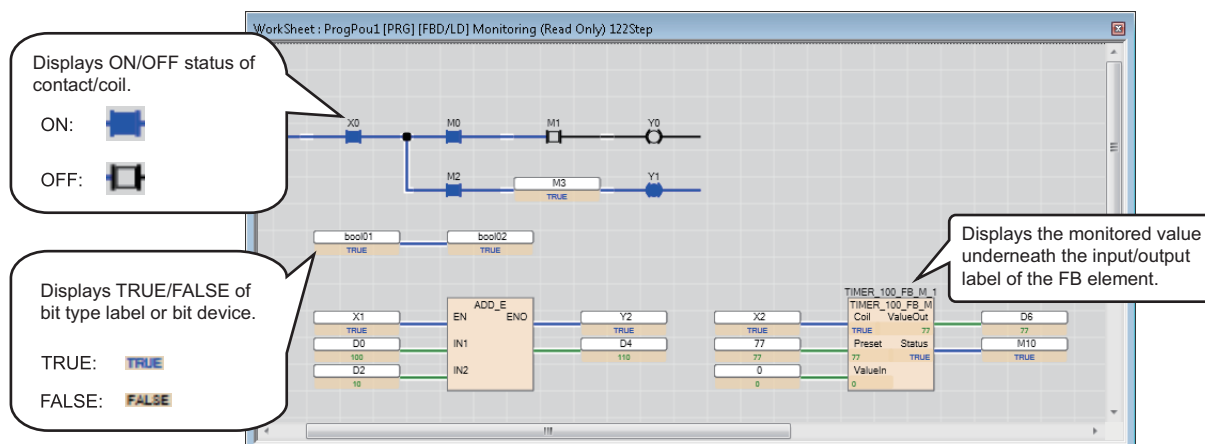
Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] ()/[Stop Monitoring] ().



FBD/LD editor

Operating procedure

Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] ()/[Stop Monitoring] ().



When the current values cannot be monitored, "---" is displayed.

Precautions

When the type of the defined function block is macro type, monitoring the input label depends on the monitor condition of the connected element. Therefore, the input label also cannot be monitored when the connected element cannot be monitored.

Changing current values

The current values can be changed by pressing the **Shift** and **Enter** keys while a cell on the ladder editor or the FBD/LD editor, or a token on the ST editor is being selected. The shortcut keys are changeable.

For word devices, change current values by registering the devices to be changed to the Watch window.

Considerations when monitoring file registers

When monitoring file registers while "Use File Register of Each Program" is selected in "File Setting" of the CPU Parameter, the monitor operation will differ depending on the setting of Device/Label Access Service Processing Setting.

Therefore, add the programs to transfer the file registers to be monitored to the devices before monitoring the transferred programs. Note that the number of steps and scan time will be lengthened for the added programs.

If the file register set to "Use File Register of Each Program" is used as a data with no latch (such that the data is set to clear to '0' at the first time), replacing the file registers to local devices avoids increase of number of steps and scan time due to the addition of the programs.

- When "Execute END Processing between Programs" is selected:

When monitor is requested after the program which is set not to use the file register, FFFFH (-1) will be monitored since the monitor is performed between programs or at the END process.

- When other than "Execute END Processing between Programs" is selected:

The value of the file register file that is enabled in the program executed at the right before the END processing is monitored.


Example) When the execution order of the program is 'A→B→C→(END processing)→A→B', monitor the value of the file register at execution of program C.

14.3 Checking Device/Buffer Memory in Batch

Check the devices and buffer memory using the Device/Buffer Memory Batch Monitor function.

When the multiple monitoring screens are opened, lead time to start monitoring and monitoring intervals may become longer. Multiple CPU shared memory (buffer memory) of multiple CPU system can be monitored only by the Device/Buffer Memory Batch Monitor function.

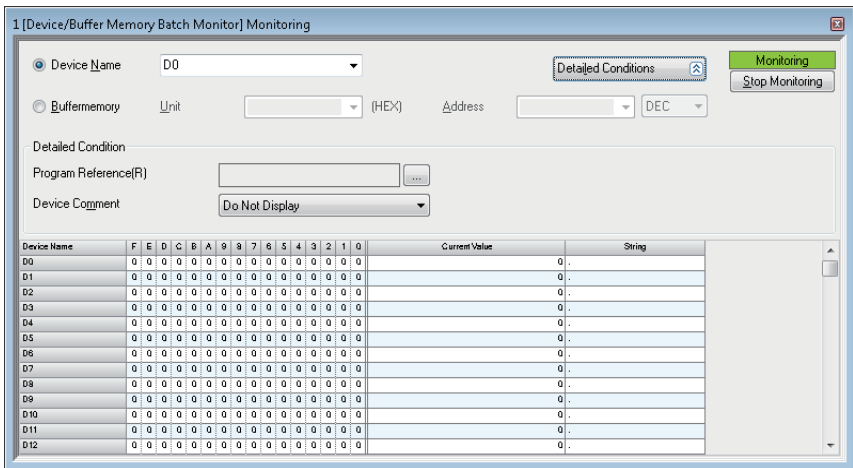
Window

[Online] ⇒ [Monitor] ⇒ [Device/Buffer Memory Batch Monitor] 

●Toolbar



●Device/Buffer Memory Batch screen



Up to 64 monitoring screens can be displayed. The number is displayed at the start of the screen title.

Operating procedure

■Monitoring devices in batch

Enter the target (start) in "Device name".

- Target device is global device: Enter a device name. (Example: D10)
- Target device is local device: Enter a device name by prefixing '#' (Example: #D10) and specify "Program Reference".
- When checking the TC setting values: Enter a device of timer, retentive timer, long timer, long retentive timer, counter, or long counter (Example: T10, ST10, LT10, LST10, C10, LC10) and specify "Program Reference".

■Monitoring buffer memory in batch

Enter the start I/O number and address of the Intelligent function module.

Item	Description
Unit	Enter the start I/O number of the Intelligent function module to be monitored in hexadecimal form. <ul style="list-style-type: none"> • For multiple CPU configuration Specify the CPU module to be monitored. CPU No.1: 3E00, CPU No.2: 3E10, CPU No.3: 3E20, CPU No.4: 3E30
Address	Enter the address of buffer memory in decimal or hexadecimal form.





Fonts can be changed.

☞ Page 40 Checking and Changing Colors and Fonts

Changing current values


The current value can be changed by double-clicking the cell of the device or pressing the  during monitoring.

For word devices, change current values by registering devices to be changed to the Watch window.

- For TC devices, only contacts and current values can be changed.
- Since the digit specification (Example: K4DX0) cannot be used for the following devices, the current values can be changed only when "Bit and Word" or bit order of '0-F' is specified in Display Format ().
DX, DY, FX, FY, J□\X□, J□\Y□, J□\B□, J□\SB□\
- Since the bit specification (example: Z0.0) cannot be used for Z device, the current values cannot be changed when "Bit and Word" in "Display format" or bit order of '0-F' is specified in Display Format (.

Considerations when monitoring file registers

The operation of file registers differ depending on the settings of the CPU parameters. Refer to the considerations in the following section.

 Page 216 Considerations when monitoring file registers

Specifying reference target of program

Specify the monitoring target program when monitoring the setting values of timer devices and counter devices, or local devices.

Operating procedure

1. Click the [Detailed Conditions] and click [...] in "Program Reference" on the "Device/Buffer Memory Batch Monitor" screen.
2. Set the items on the "Program Reference" screen, and click the [OK] button.

14.4 Checking Current Values by Registering Devices/Labels

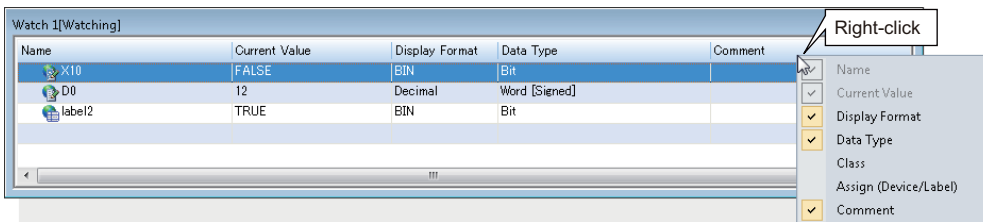
Check the current values by registering devices and labels using the Watch function. Register the target devices/labels on the Watch window.

Multiple devices/labels can be registered in batch by specifying a range.

Once devices/labels are registered and the project is saved, the registered devices/labels are displayed in registered status when the project is opened again.


Window

[View] ⇒ [Docking Window] ⇒ [Watch 1] to [Watch 4] ()



The display format can be selected per row from the pull-down list displayed when selecting the display format.

Operating procedure

1. Register the devices/labels to be monitored. ( Page 219 Register to Watch window)
2. Select [Online] ⇒ [Watch] ⇒ [Start Watching].

"[Watching]" is added on the Watch window title while monitoring.

Register to Watch window

Register the devices/labels to be monitored on the Watch window.

Operating procedure

■Enter to register

1. Display the watch window.
2. Enter the device/label to be registered to "Name", and press the  key.

The input format of devices/labels are as follows:

- Global device: Device name
- Local device: Program name/#Device name ('#' is not necessary for index register (Z))
- Global device: Label name
- Local device: Program block name/label name

When registering structures, function blocks, or arrays, specify them as follows:

Type	Target	Specification method
Structure	Label (Structure)	Label name
	Structure element	Label name.Element name
Function block	Label (Function block)	Label name
	Label in the function block	Label name.Label name in the function block
Array	Label (Array)	Label name excluding array notation
	Array element and the specific dimension part of array more than two-dimensional	Label name[one-dimensional element number][two-dimensional element number][three-dimensional element number]
Structure array	Label (Structure array)	Label name
	Specific member	Label name[one-dimensional element number][two-dimensional element number][three-dimensional element number].member name

Type	Target	Specification method
Nested function block	Label (Nested function block)	Label name
	Labels in the nested function block	Label name. label name in the function block. label name in the nested function block When nesting a label for one or more level deeper, the lower part of the label name which are divided by a dot '.' is regarded as a label name. (Example: MAIN_PRG_LD/ FB0_1.FB1_1.FB2_1.INOUT)
	When a function block includes array labels or structured labels	Follow the specification method of the array or structure.

■ Registering devices/labels from program editor/label editor

1. Select the devices/labels to be registered to the Watch window from the program editor/label editor.
2. Select [Online] ⇒ [Watch] ⇒ [Register to Watch Window] ⇒ [Watch 1] to [Watch 4].

Devices/labels can be registered by dragging and dropping on the Watch window.

- Ladder editor: Select the cells of devices/labels to be registered, and then drag and drop the border of the selected cells onto the Watch window
- Label editor: Select the header of a label to be registered, and then drag and drop it onto the Watch window

Point

Rectangular selection can be made by dragging the devices/labels while pressing the **[Alt]** key on the ST editor. The devices/labels only in the selected range can be registered.

Automatic registration to Watch window

Automatically register the devices/labels in the specified range on the program editor to the Watch window.

The registration target for watch window is updated each time when a specified range is changed.

The following table shows the range of automatic registration for each program language.

Program language	Range	Remarks
Ladder	Device/label on the ladder block which contains the selected cell	The devices/labels in FB and inline structured text are excluded.
Inline structured text	Devices/labels in the selected line within the selected inline structured box	It follows the option setting for the ladder editor.
ST	Devices/labels in the selected line	—

Operating procedure

1. Set the following option.
[Tool] ⇒ [Options] ⇒ "Monitor" ⇒ "Ladder Editor"/"ST Editor" ⇒ "Setting for Automatic Registration to Watch Window"
2. During monitoring, select the range included in devices/labels to be registered to the Watch window.

Changing current values

The value can be entered directly in the "Current Value" column during monitoring.

For a bit device, select a row and double-click it while pressing the **[Shift]** key or press the **[Shift]** key and **[Enter]** key to change the current value.

Precautions

When "Use File Register of Each Program" is selected in "File Setting" of the CPU parameter, the file register file that is available at END is changed. Therefore, changing the current values while specifying file registers for each program cannot be performed.

Importing to/exporting from file

Export/import the information displayed on the Watch window to/from a file.

Operating procedure

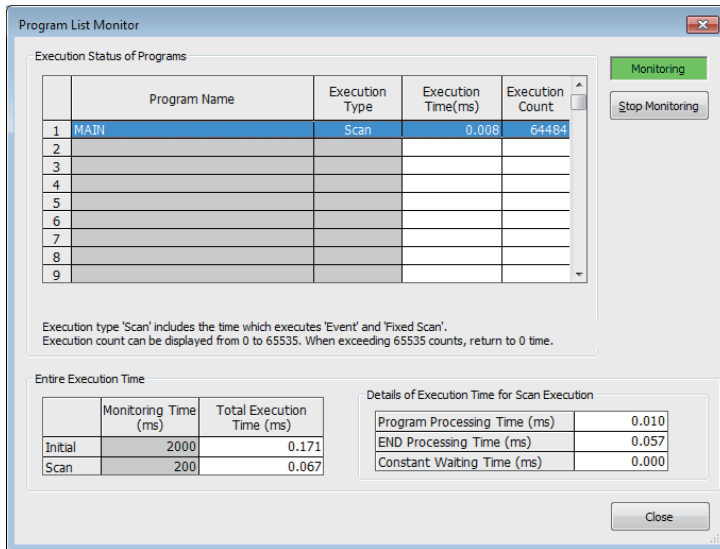
Select [Edit] ⇒ [Import File]/[Export to File].

14.5 Checking Processing Time of Program

Check the processing time of the program being executed using the Program List Monitor function.
FX5CPU does not support this function.

Window

[Online] ⇒ [Monitor] ⇒ [Program List Monitor]



Displayed items

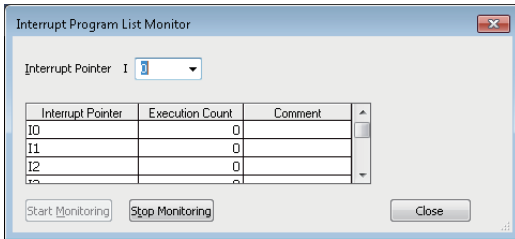
Item		Description
Execution Status of Programs	Execution Time (ms)	Displays the actual scan time (current value). The display contents are differ depending on the program execution type. At the program stop (standby) status: 0.000ms
	Execution Count	Displays the number of executions, counted from '0' at the point of turning the CPU module to the RUN status. It is stored even after the program stops.
Entire Execution Time	Monitoring Time (ms)	Displays the program execution monitoring time set to "PLC RAS" of the CPU parameter.
	Total Execution Time (ms)	Displays the total scan time of the programs executed in the CPU module.
Details of Execution Time for Scan Execution	Program Processing Time (ms)	Displays the total execution time of scan execution type program.
	End Processing Time (ms)	Displays the END processing time.
	Constant Waiting Time (ms)	Displays the waiting time of the constant scan when the constant scan is set.

14.6 Checking Execution Counts of Interrupt Programs

Check the execution count of interrupt programs used in a program using the Interrupt Program List Monitor function. FX5CPU does not support this function.

Window

[Online] ⇒ [Monitor] ⇒ [Interrupt Program List Monitor]



Operating procedure

Input the interrupt pointer number of which execution counts are to be displayed in "Interrupt Pointer".

Displayed items

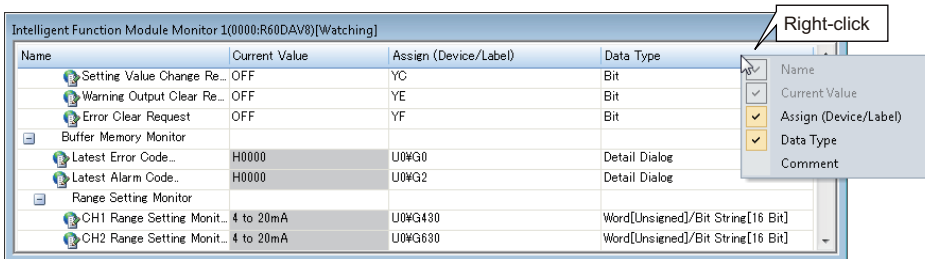
Item	Description
Execution Count	Starts counting when the CPU module turns to the RUN status and displays the execution counts. When reaching 65536, it returns to 0.

14.7 Checking Current Values in Intelligent Function Module

Check the I/O signals and the current values of buffer memory using the Intelligent Function Module Monitor function. FX5CPU does not support this function.

Window

[View] ⇒ [Docking Window] ⇒ [Intelligent Function Module Monitor] ⇒ [Intelligent Function Module Monitor 1] to [Intelligent Function Module Monitor 10]



Operating procedure

1. Register the Intelligent function module to be monitored. (👉 Registering Intelligent function modules)
2. Select [Online] ⇒ [Watch] ⇒ [Start Watching].

"[Watching]" is added on the Watch window title while monitoring.

Point

Select and right click the module information, select [Copy] from the shortcut menu to paste it to a text file.

Customizing monitoring items

Select the items on the Intelligent Function Module Monitor window, and right-click it and select [Cut]/[Copy]/[Paste]/[Delete] from the shortcut menu to customize the items.

If the customized project is saved, the customized items will not be retained when the project is opened next time.

The customized items cannot be restored again.

Precautions

The cut/copied items can only be pasted to the same project in the same window.

■Detailed display of history information

Display the details of history information during monitoring.

Double-click a "Data Type" row in which "Detailed Dialog" is displayed, or right-click it and select [Detailed Dialog] from the shortcut menu.

The unsupported menus for the module cannot be used.

■Detailed display of error codes/alarm codes

Display the details of an error code/alarm code on the Intelligent Function Module Monitor windows or Detailed Dialog.

Double-click a row in which an error code/alarm code is displayed, or right-click it and select [Detail Display] from the shortcut menu.

■ Customizing multiple Intelligent Function Module Monitor windows

Each axis of the positioning module can be monitored by activating multiple Intelligent Function Module Monitor windows and customizing each window.

Precautions

The Intelligent Function Module Monitor updates current values only within the range displayed on the window for monitoring acceleration.

When performing operation such as copy and paste on Excel®, "--" or the previously monitored current value is displayed for the data outside the range displayed on the window.

Registering Intelligent function modules

Register the Intelligent function module to be monitored to the Intelligent Function Module Monitor window.

Operating procedure

■ Register Intelligent function modules using shortcut menu from Project view

1. Select the Intelligent function module to be registered to the Intelligent Function Module Monitor window from the Project view.
2. Right-click ⇨ select [Register to Intelligent Function Module Monitor] from the shortcut menu.

■ Register Intelligent function modules by drag-and-drop operation from Project view

1. Select a module to be registered from the Project view.
2. Drag and drop it onto the Intelligent Function Module Monitor window.

■ Register Intelligent function modules using shortcut menu from Intelligent Function Module Monitor window

1. On the Intelligent Function Module Monitor window, right-click and select [Register Module Information] from the shortcut menu.
2. Select the module to be registered in "Module List", and click the [OK] button.

When a positioning module is selected in "Module List", select the item displayed in "Monitor Item Category List".

Point


The module information can be copied and pasted to a file such as a text file by right-clicking the arbitrary module information and selecting [Copy] from the shortcut menu on the Intelligent Function Module Monitor window.

14.8 Saving and Checking Device Value





Check the device values of a CPU module at any timing using the Memory Dump function of the CPU module. FX5CPU does not support this function.

By setting the trigger conditions, the data at a time when the conditions have been satisfied are collected and saved to the SD memory card. The saved device values can be checked with GX Works3.

For more details on the Memory Dump function of CPU module, refer to the following manual.

 MELSEC iQ-R CPU Module User's Manual (Application)

How to use the Memory Dump function

1. Set the internal buffer capacity of the CPU module to be used for the Memory Dump function. ( Page 226 Setting internal buffer capacity for the Memory Dump function)
2. Write the memory dump setting file. ( Page 227 Writing memory dump settings)
Once it is written, the memory dump result file is saved to SD memory card when the set trigger conditions are satisfied.
3. Read the memory dump result file to the personal computer. ( Page 228 Reading memory dump results)
4. Check the read memory dump result file. ( Page 229 Displaying memory dump results)

Setting internal buffer capacity for the Memory Dump function

Set the internal buffer memory capacity for the Memory Dump function using "Internal Buffer Capacity Setting" in "Memory/ Device Setting" of the CPU parameter. Write the parameter to the CPU module after the setting is configured.

However, set the capacity within the range that meets the following conditions when the Memory Dump function is used in conjunction with the data logging function and the realtime monitor function of CPU module.

The total of data logging buffer capacities + Memory dump buffer capacity + Realtime monitor buffer capacity \leq 3072KB

Each buffer capacity can be checked with the following:

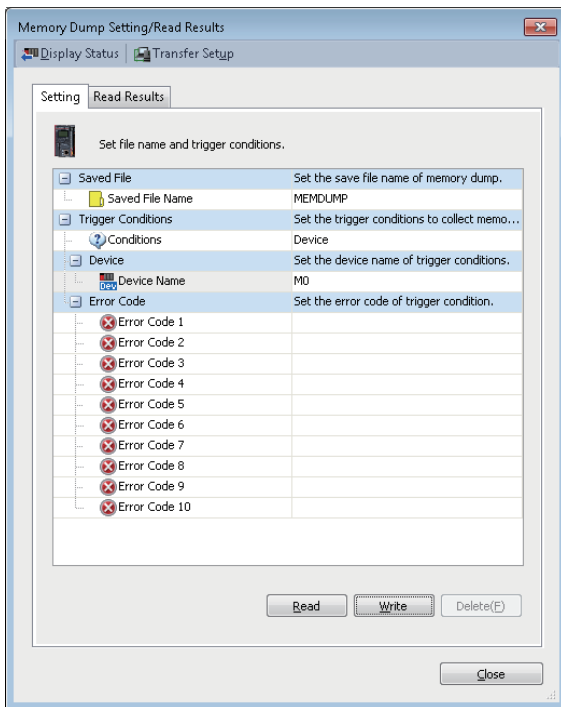
- Data logging buffer capacity, Memory dump buffer capacity: CPU parameter
- Realtime monitor buffer capacity: The realtime monitor setting of GX LogViewer

Writing memory dump settings

Once the memory dump setting file is written, the Memory Dump function is started and waits for a trigger. If the memory dump setting file has already been stored, the Memory Dump function is started by powering ON the CPU module.

Window

[Debug] ⇒ [Memory Dump] ⇒ [Setting]



Operating procedure

Set the items and click the [Write] button.

Item	Description
Saved File	Set a name of a file to be output when the Memory Dump function is performed. A number, '00' to '99' is added to the end of the set name for the file name to be output actually.
Trigger Conditions	Specify the trigger conditions to collect memory dump. <ul style="list-style-type: none"> • Device: Specify this to set the timing when the bit data of a specified device turns OFF → ON as the trigger condition. • Error Code: Specify this to set an error code of CPU module as the trigger condition. • Device/error Code: Specify this to set a device/error code as the trigger condition. The Memory Dump function is performed when any of multiple conditions is satisfied.
Device	Specify a device to be set as the trigger condition. Only global devices can be specified. <ul style="list-style-type: none"> ■ Device representation that can be specified • Bit device: X, Y, M, L, F, SM, V, B, SB, T (enter 'TS'), ST (enter 'SS/STS'), C (enter 'CS'), LT (enter 'LTS'), LST (enter 'LSS/LSTS'), LC (enter 'LCS'), FX, and FY • Word device (bit specification): D, SD, W, SW, R, ZR, FD, RD
Error Code	Specify a 4-digit error code to be set as the trigger condition in hexadecimal. The wild card, "*" can be specified for the 1st digit of an error code only.

Point

The number for annunciator cannot be specified as the error code to be set as the trigger condition. Use the device name in order to specify the number of annunciator.

Considerations for memory dump setting

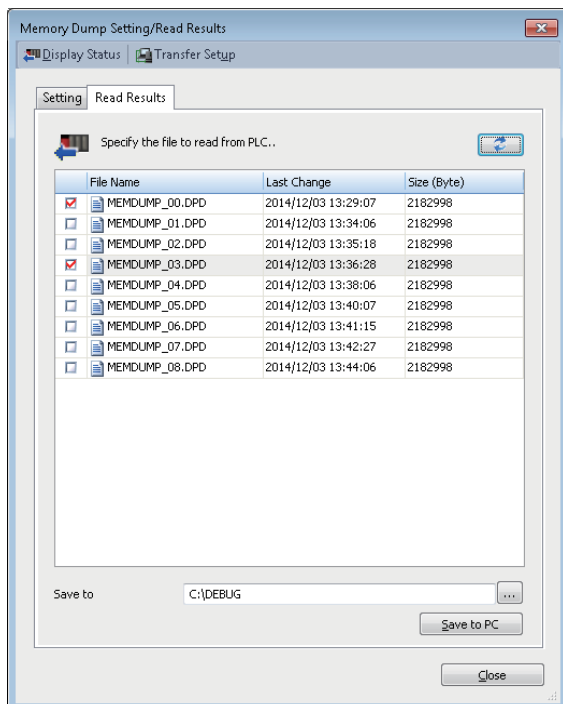
- Before writing the memory dump setting, check that the trigger condition has not already satisfied.
- When a file register is specified as the trigger condition, do not change the file register file name and the file register block No. once the memory dump setting has been written.

Reading memory dump results

To check the memory dump result file with GX Works3, read the memory dump file from SD memory card inserted in the CPU module and save it to the personal computer in advance.


Window

[Debug] ⇨ [Memory Dump] ⇨ [Read Results]



The current performance status of the Memory Dump function can be checked by selecting [Display Status].

Operating procedure

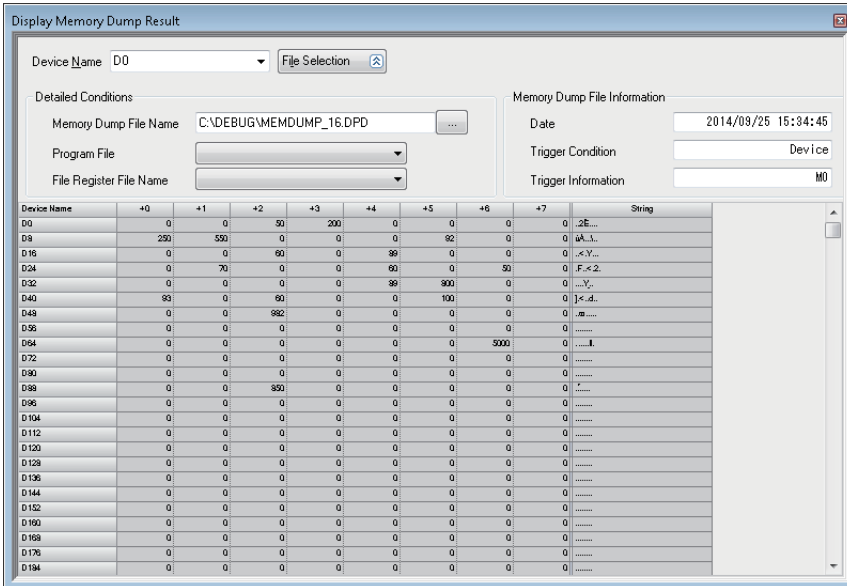
1. After clicking , specify the memory dump result file to be read.
2. Specify "Save Destination", and click the [Save to PC] button.

Displaying memory dump results

Display a memory dump result file save in the personal computer.

Window

[Debug] ⇨ [Memory Dump] ⇨ [Display Result]



Operating procedure

Enter the path for the memory dump result file to be displayed in "Memory Dump File Name".

- To specify a local device for "Device Name", select the program file to be referred in "Program File".
- To specify 'R' or 'ZR' for "Device Name", select the file register to be referred in "File Register File Name". When 'R' is specified, the device for the first block is displayed.
- To specify 'Z' or 'LZ' for "Device Name", select the program file to be referred in "Program File".

This part explains the maintenance and inspection methods such as a function to protect data (prevent from manipulation and data leakage) and display the system status of the CPU module.

15 PROTECTING DATA

16 DIAGNOSING MODULE

17 SAMPLING DEVICE DATA

18 CHECKING/CHANGING CPU MODULE OPERATION

15 PROTECTING DATA

This chapter explains how to protect the data in a project.

The functions to save the data are as follows:


Target	Purpose	Function name	Reference
Project	Prevents illegal access to programs (in POU unit). (Using password)	Block password function	Page 233 Preventing Illegal Access to Programs (Protected by Password)
	Prevents illegal access to programs (in program file unit). (Using security key)	Security key authentication function	Page 235 Preventing Illegal Access to Programs (Protected by Key)
CPU module	Prevents illegal execution of programs. (Using security key)		Page 240 Preventing Illegal Program Execution
	Prevents illegal read/write operation for files. (Using password)	File password function	Page 243 Preventing Illegal Data Reading/Writing
	Restricts access from other than specific communication route. (Using password)	Remote password function	Page 245 Restricting Access from Other Than Specific Communication Route
	Identifies the IP address of external devices via Ethernet to block access from an illegal IP address. (Setting with module parameters)	IP filter function	MELSEC iQ-R Ethernet User's Manual (Application)

15.1 Preventing Illegal Access to Programs (Protected by Password)

To prevent an illegal access to programs (in POU unit) by setting a password, use the Block password function.



Block password function

Restrict the operations by registering a password to POUs.

- The operation that can be restricted: Accessing to POU (The operations will be allowed while the program is authenticated even if a password has been registered.)
- Target data: Program blocks, function blocks, and functions ( Page 50 Data configuration)

How to use block password

Procedure to enable security

1. Set a block password to a POU. ( Page 234 Setting block password)
2. Save the project. ( Page 59 Saving projects)

After closing the project in which the block password is set, the POU cannot be accessed when the file is opened next time.

Procedure to make locked POUs accessible

1. Authenticate the block password set to the POU. ( Page 234 Authenticating block password)

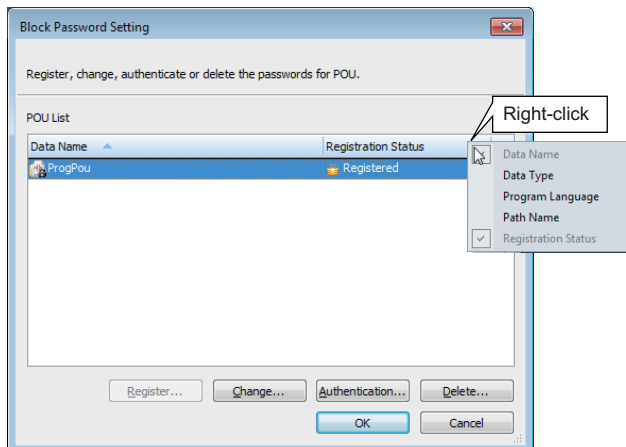
The POU can be accessed while the project is open.

Setting block password

Register a block password to POU.

Window

[Project] ⇒ [Security] ⇒ [Block Password Setting]



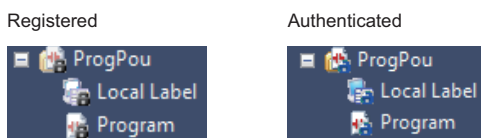
Registering/changing block password

Register/change a block password to POU.

Operating procedure

1. Select a POU to set a block password and click the [Register]/[Change] button.
2. Enter the password on the "Register Password" screen/"Change Password" screen, and click the [OK] button.

When a block password is registered, the icons are displayed on the Project view as shown below.



Point

By selecting multiple POU's in "Data Name", a block password can be registered to the selected POU's in batch.

Authenticating block password

Unlock the POU temporarily by authenticating the password which has been set to it.

Once the password is authenticated, the data can be accessed until the project is closed.

Operating procedure

1. Select the POU to authenticate the block password, and click the [Authentication] button.
2. Enter the password on the "Password Authentication" screen, and click the [OK] button.

Deleting block password

Delete the block password registered to a POU.

Operating procedure

1. Select the POU to delete the block password, and click the [Delete] button.
2. Enter the password on the "Delete Password" screen, and click the [OK] button.

15.2 Preventing Illegal Access to Programs (Protected by Key)

To prevent an illegal access to programs (in program file unit) with a key, use the Security key authentication function.

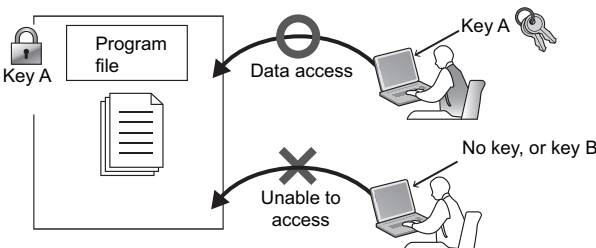
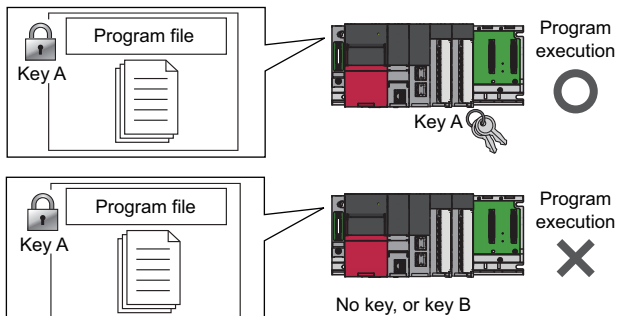
Security key authentication function

The operations can be restricted by using a security key.

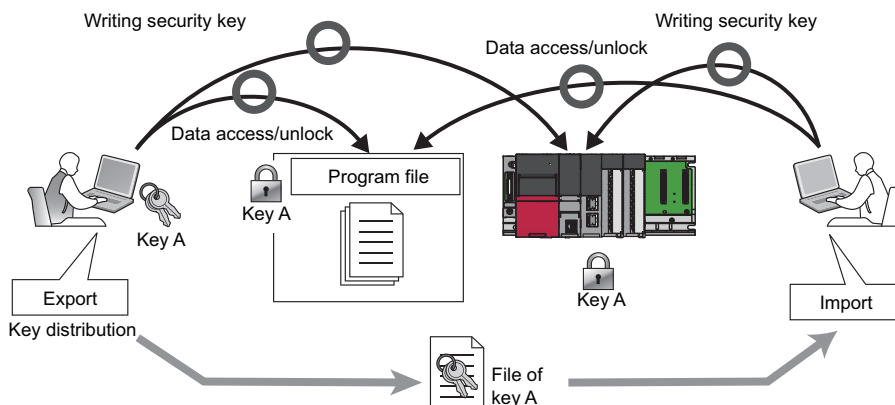
Security key setting target:

Target	Purpose
<p>■Program files (Program file, FB file, FUN file) (☞ Page 50 Data configuration)</p> <p>A security key can be registered in program file unit, however, all the program files in the project will be the same security key.</p>	<ul style="list-style-type: none"> • Restrict the access for program files in the project. • Restrict the execution of programs by CPU module.
<p>■Personal computer</p> <p>Multiple security keys can be registered in one personal computer.</p>	Enable the access for the program files protected by a security key.
<p>■CPU module</p> <p>Only one security key can be written to one CPU module.</p>	Enable the execution of the program restricted by a security key.

The following operations can be restricted:

Access to programs (Program file, FB file, FUN file)	Execution of programs in CPU module (STOP/PAUSE → RUN)
<p>Restrict the operations by detecting mismatches of the security key between the program file and personal computer.</p> 	<p>Restrict the operations by detecting mismatches of the security key between the program file written in a CPU module and CPU module.</p>  <p>The programs are not executed if any of the programs of which security key is unmatched in the CPU module exist. The security key written in the CPU module is retained after powering OFF.</p>
☞ Page 236 How to use the Security key authentication function (access prevention)	☞ Page 240 How to use the Security key authentication function (execution prevention)

Copy of security key: The security key registered to a personal computer can be copied by exporting/importing it from/to other personal computer. In addition, the expiration date of the security key can be set.



Setting method: ☞ Page 238 Copying security key

Precautions

The security key registered to a personal computer is not deleted even if GX Works3 is uninstalled. Delete the security key on the "Security Key Management" screen.

How to use the Security key authentication function (access prevention)

Procedure to enable security

1. Create a security key. (☞ Page 237 Creating/deleting security keys)
2. Register the security key in a program file. (☞ Page 239 Registering security key in program files)
3. Save the project. (☞ Page 59 Saving projects)

A personal computer which does not have the same security key as the one registered in the project cannot be accessed.

Procedure to make locked program files accessible

1. Copy the same security key as the saved program file. (☞ Page 238 Exporting security key)
2. Register the security key in a personal computer from which a program file is to be accessed. (☞ Page 238 Import)
3. Open the program file. (☞ Page 54 Opening projects)

A program file can be accessed when the security key between the program file and a personal computer is consistent.

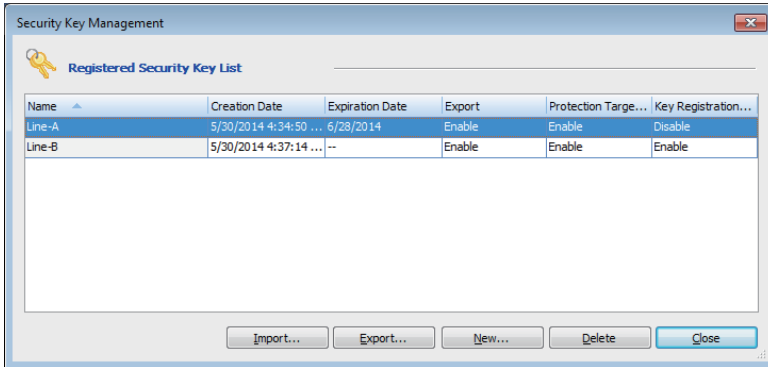
The operations shown above are not required for the personal computer with which a security key is registered in a program file. However, the above operations are required when the security key is deleted.

Creating/deleting security keys

Create/delete security keys on the "Security Key Management" screen.

Window

[Project] ⇒ [Security] ⇒ [Security Key Management]



Displayed items

Item	Description
Creation Date	Displays the registered date of the security key.
Expiration Date	Displays the expiration date set when the security key was exported.
Export	Displays "Enable/Disable" that indicates whether re-exporting the security key is enabled/disabled set when the security key was exported.
Protection Target Selection	Displays "Enable/Disable" that indicates whether selecting data to be protected is enabled/disabled set when the security key was exported.
Key Registration to CPU	Displays "Enable/Disable" that indicates whether writing data to CPU module is enabled/disabled set when the security key was exported.

Creating security key

Create a security key and register it to the personal computer.
Number of security key registration: The security keys can be created for each logon user. Up to 128 security keys combined with the created security keys and imported ones can be registered for each logon user.

Operating procedure

1. Click the [New] button.
2. Enter the security key name on the "New Security Key" screen and click the [OK] button.

Deleting security key

Delete the security key registered to the personal computer.
If the security key used to lock the project is deleted, the locked data in the project cannot be accessed/edited.
After deleting the security key, even when the security key with the same name as the deleted one is recreated, it will not be the same security key as the deleted one. Take extra caution when deleting a security key.

Operating procedure

1. Select the security key to be deleted on the "Security Key Management" screen.
2. Click the [Delete] button.

Copying security key

Copy (import/export) security keys on the "Security Key Management" screen.

Exporting security key

Export the security key registered to the personal computer to the file format (*.ity) which can be imported. Expiration date and restrictions for operations can be added to the security key to be exported.

Operating procedure

1. Select the security key to be exported on the "Security Key Management" screen.
2. Click the [Export] button.
3. Set the following items on the "Export" screen.

Item	Description
Restriction	Set whether to add restrictions to the security file to be exported.
Expiration Date	Set the expiration date for the security key to be exported.
Export	Set whether to allow exporting the security key after importing the exported security key.
Protection Target Selection	Set whether to allow registering the security key for the program files using the exported security key.
Key Registration to CPU	Select whether to allow writing the security key to the CPU module using the exported security key.

4. Set the password to be required when importing the security key, and click the [Export] button.

Precautions

- The exported security key files should be tightly controlled.
- The security key files created with GX Works3 are not compatible with that of GX Works2.

Import

Import the exported security key file in a personal computer, and register the security key.

Operating procedure

1. Click the [Import] button on the "Security Key Management" screen.
2. Select a file (*.ity) on the "Import Security Key" screen, and click the [Open] button.
3. Enter the password set when the security key was exported on the "Password Authentication" screen, and click the [OK] button.

■ Expiration date

- If the expiration date of the security key registered in a personal computer is expired, accessing programs, re-exporting security keys, registering security keys in program files, and writing security keys to CPU module cannot be performed.
- To use the same security key after the expiration date, export the security key from the exported personal computer again, and import it to the personal computer.

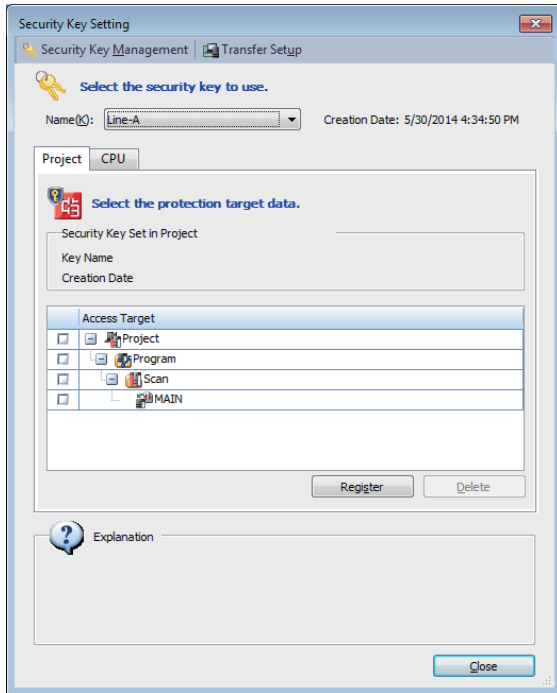
Registering security key in program files

Create a security key on the "Security Key Management" screen in advance.

A security key can be registered in program file unit, however, the same security key will be set to the program files in the project.

Window

[Project] ⇒ [Security] ⇒ [Security Key Setting]



Registering security key

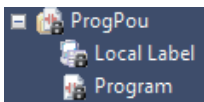
Operating procedure

1. Select a security key to be registered to a program file from "Name".
2. Select the program file to lock from the [Project] tab, and click the [Register] button.

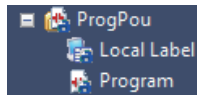
The security key registered in program files will be validate after saving the project.

The program file of which security key is registered is displayed in the Project view as follows:

When the security keys between in the personal computer and the project does not match



When the security keys between in the personal computer and the project matches



Security key lock for FB files

If the program, in which the function block of FB file locked with a security key is used, is opened on the personal computer with no corresponding security key exists, the FB program cannot be opened.

However, the instances of the locked FB can be created in the program on the personal computer in which the security key is not registered.

Deleting security key

Operating procedure

Click the [Delete] button in the [Project] tab.

15.3 Preventing Illegal Program Execution

To prevent an illegal execution for programs (STOP/PAUSE → RUN) written in a CPU module, use the Security authentication function.

For details on the Security key authentication function, refer to the following section.

☞ Page 235 Security key authentication function

How to use the Security key authentication function (execution prevention)

Procedure to enable security

1. Create a security key. (☞ Page 237 Creating/deleting security keys)
2. Register the security key in the program file to be written to the CPU module. (☞ Page 239 Registering security key in program files)
3. Write the program files to the CPU module. (☞ Page 198 Writing data to programmable controller)

A CPU module which does not have the same security key as the one registered in the program file cannot execute the programs.

Procedure to make locked programs executable

1. Set the Specify Connection Destination to access to the CPU module. (☞ Page 183 Specification of Connection Destination)
2. Write the same security key as the protected program file to the CPU module. (☞ Page 241 Writing/deleting security key to/from CPU module)

The programs can be executed unless otherwise the security key set to the program file or CPU module is changed.

Writing/deleting security key to/from CPU module

By writing the same security key to the CPU module, execution of the programs can be permitted.

Only one security key can be written to either a CPU module or an extended SRAM cassette.

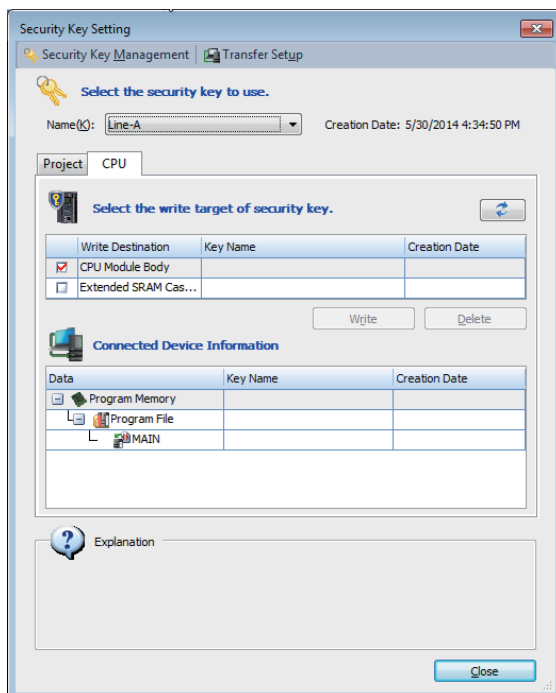
FX5CPU does not support an extended SRAM cassette.

Additionally, one security key can be written to multiple CPU modules.

When writing a security key, create a key on the "Security Key Management" screen and connect a personal computer and CPU module in advance. (Writing/deleting can be performed at 'STOP' status.)

Window

[Project] ⇒ [Security] ⇒ [Security Key Setting]



15

Writing security key

Operating procedure

1. Select the security key to be written from "Name".
2. Select the target to be written in the [CPU] tab, and click the [Write] button.

■When a security key is written to an extended SRAM cassette

When replacing the CPU module, the security key can be succeeded to the replaced CPU module only by replacing the extension SRAM cassette. Therefore, writing the security key again from the personal computer in which the security key is registered is unnecessary.

■For multiple CPU system configuration

When setting a security key for multiple CPU system configuration, write the security key to each CPU module. In addition, when using the same security key as CPU No.1 in CPU No.2 to CPU No.4 , write the same security key as CPU No.1 to each CPU module.

Deleting security keys

The security key written in the CPU module can be deleted on the personal computer in which the security key is not registered.

However, the program of which security key is registered in the CPU module exists, the security key cannot be deleted.

Operating procedure

Click the [Delete] button in the [CPU] tab.

15.4 Preventing Illegal Data Reading/Writing

To prevent data from being illegally read from/written to CPU module, use the File password function.

File password function

By registering a password to the files in the CPU module, the password authentication is required when reading/writing files. For FX5CPU, selecting "Permanent PLC Lock" will enable to keep the operation to read/write files prohibited and to prevent it from being canceled. Setting a password is not required when "Permanent PLC Lock" is selected.

There are two kinds of protections in password and "Permanent PLC Lock"; "Read Protection" and "Write Protection". Both of them can be set to one file.

■ Operations that require password authentication by setting a file password

○: Required, —: Not required

Online operation	Applicability	Password to be set
Read to a programmable controller	○	Read-protected password
Write to a programmable controller	○	Write-protected password
Online program change (Online Program Change, File batch online change)	○	Write-protected password
Verification with programmable controller	○	Read-protected password
File password setting (register/change/authentication/deletion)	○	Read-protected password, write-protected password
Delete data in a programmable controller	○	Write-protected password
CPU memory operation (initialization)	—	—

■ Target file

○: Available, ×: Not available

File name	Availability
System parameter, CPU parameter, module parameter, module extended parameter, memory card parameter	○
Remote password	×
Global label setting	○
Global label assignment information	×
Global label initial value	×
Local label initial value	×
Program file	○
POU (FB file/FUN file)	○
File register	×
Device initial value	○
Common device comment	○
Each program device comment	○

■ When accessing from external devices using function other than GX Works3

A file password is validate when accessing a file using the FTP server function. For details, refer to the following manual.

📖 MELSEC iQ-R Ethernet User's Manual (Application)

A file password is validate when accessing a file using MC protocols. For details, refer to the following manual.

📖 MELSEC iQ-R Serial Communication Module User's Manual (Application)

Precautions

- Keep passwords in a secure place.
If the registered password is lost, or "Permanent PLC Lock" set in FX5CPU is needed to be cancelled, initialize the CPU module using the CPU Memory Operation function (📖 Page 261 Checking Memory Usage) and write the project to the CPU module.
- To set "Permanent PLC Lock" to both of "Read Protection" and "Write Protection", configure the both settings at the time of the first registration. If only one of them was registered, the other cannot be registered later.

How to use file password

Procedure to enable security

1. Set the Specify Connection Destination to access to the CPU module. (☞ Page 183 Specification of Connection Destination)
2. Set a file password to the file in the CPU module. (☞ Page 244 Setting file password)

If the project in which the file password is set is closed, the file cannot be read and write when GX Works3 is started up next time.

Procedure to make locked files readable/writable

1. Set the Specify Connection Destination to access to the CPU module. (☞ Page 183 Specification of Connection Destination)
2. Authenticate the file password which has been set to the file in the CPU module. (☞ Page 244 Setting file password)

The file can be write and read while the project is open.

The files can also be read/written when entering a correct password in the "File Password Setting" screen displayed when accessing a file.

Setting file password

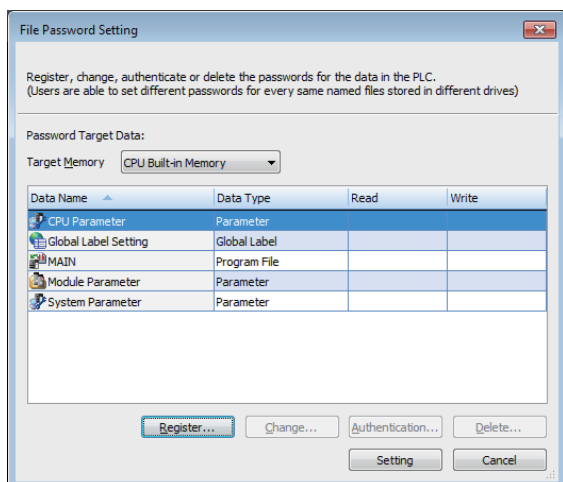
When registering a file password, connect a personal computer and CPU module in advance.

"Register", "Change", "Authentication", or "Delete" can be set on the setting screen of file password.

Setting	Operation
Registration	Restrict online operations by setting password to data in the CPU module. A password set to data in the transfer source memory of boot operation remains set in the transfer destination memory.
Change	Change the password set to data in the CPU module.
Authentication	Unlock the data in the CPU module temporarily by authenticating the password. By authenticating a password, the corresponding data in the CPU module can be read/written until the project is closed.
Deletion	Delete a password set to data in CPU module.

Window

[Project] ⇒ [Security] ⇒ [File Password Setting]



Operating procedure

1. Select the target data and click the [Register]/[Change]/[Authentication]/[Delete] button.
2. Set the items on the displayed screen, and click the [Completed] button.
3. Click the [Setting] button on the "File Password Setting" screen.

15.5 Restricting Access from Other Than Specific Communication Route

To restrict the access from other than specific communication route, use the Remote password function.

Remote password function

By setting a password for the CPU module, accessing via the specified RJ71EN71, serial communication module, and built-in Ethernet CPU is limited.

For the modules that support remote password setting and details on the remote password setting, refer to the user's manual used.

How to use remote password

Procedure to enable security

1. Set the remote password. (🔗 Page 246 Setting remote password)
2. Specify "Remote Password" and write the data to the CPU module. (🔗 Page 198 Writing data to programmable controller)

The access to the CPU module will be restricted.

Procedure to access CPU module locked by the security function

Entering the password is required in order to access the CPU module. The access is permitted when the entered password is correct.

1. Access to the CPU module (writing or reading operation). (🔗 Page 198 Writing data to programmable controller, Page 201 Reading data from programmable controller)
2. Unlock the remote password by following the message. (🔗 Page 246 Setting remote password)

When the entered password is correct, the access to the CPU module will be permitted.

Setting remote password

The remote password can be set for up to 8 modules. (Up to 8 CPU modules for a multiple CPU configuration)

Window

Project view ⇨ "Parameter" ⇨ "Remote Password"

No.	Product Name	Start I/O No.	Module Conditions
1			
2			
3			
4			
5			
6			
7			
8			

Operating procedure

1. Click the [Password] button.
2. Set the items on the "Register Password" screen, and click the [OK] button.

Item	Description
Product Name	Select the module of which remote connection is to be enabled.
Start I/O No.*1	Enter the start I/O number*1. (The specification using module labels is applicable.)
Module conditions	Set the remote password to enable/disable for the user connection number or system connection.

*1 For FX5CPU, "Intelligent Module No." is displayed.

16 DIAGNOSING MODULE

This function displays the state of modules, networks, and whole system. At an error occurrence, it displays an error content and corrective action.

The diagnostic functions of GX Works3 are as follows:

Function	Reference
System monitor ^{*1}	Page 248 Checking Module Status of System
Diagnosing CPU module	Page 249 Diagnosing CPU Module
Diagnosing network	Page 251 Ethernet diagnostics
	Page 252 CC-Link IE Controller Network diagnostics
	Page 254 CC-Link IE Field Network diagnostics
	Page 255 CC-Link diagnostics

*1 Not supported by FX5CPU.

16.1 Checking Module Status of System

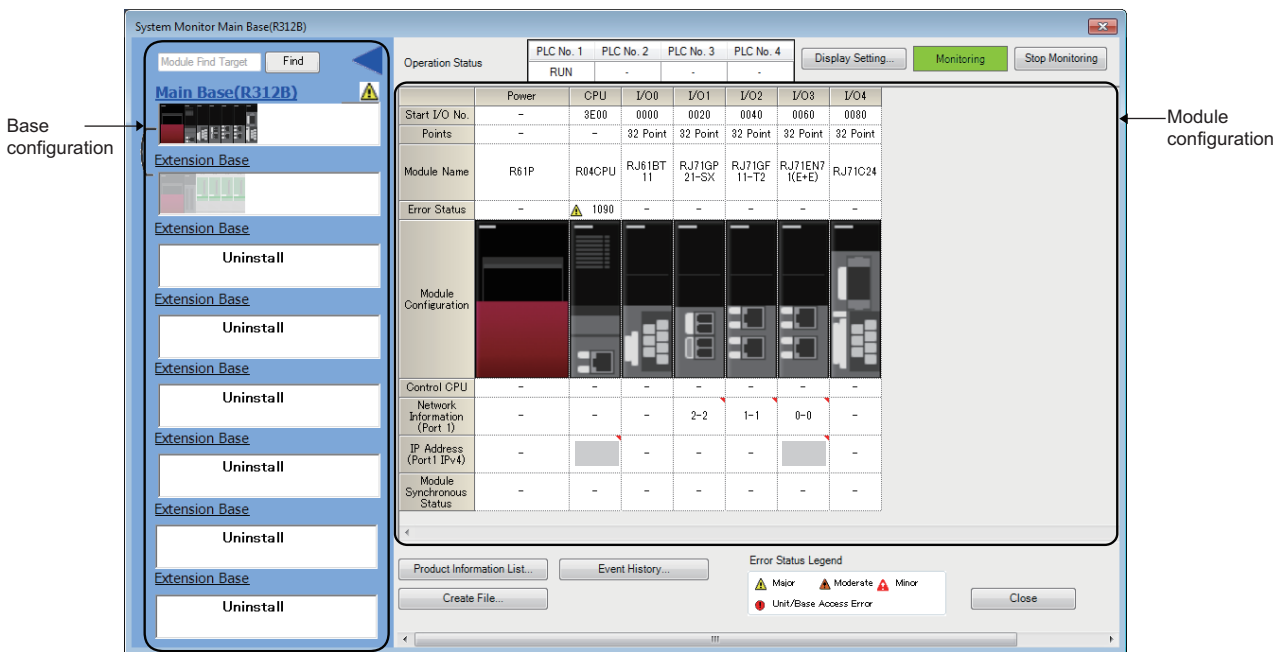
The System Monitor function displays the module configuration of the system in operation and detailed information of each module.

In addition, the error status can be checked and the module in which the error occurred can be diagnosed.

FX5CPU does not support this function.

Window

[Diagnostics] ⇒ [System Monitor]



- For Q series power supply, the model name is displayed as "Power" instead of their model name. Additionally, when using Q series module, the network information and IP address are not displayed.
- '?' is displayed on the module with no profile.
- To display the network information and IP address of the port 2 of the modules who have two ports, click the [Display Setting] button.

Automatic diagnosis function

This function starts up the System Monitor function automatically when connecting CPU module and a personal computer by USB connection.

Set whether to start up automatically on the task tray.

Check of module firmware version and product information

The firmware version and product information can be checked by pressing the [Product Information List] button on the "Product Information List" screen.

16.2 Diagnosing CPU Module

This section explains how to display the status and error codes of modules.
FX5CPU only supports the following 'Diagnosing CPU modules'.

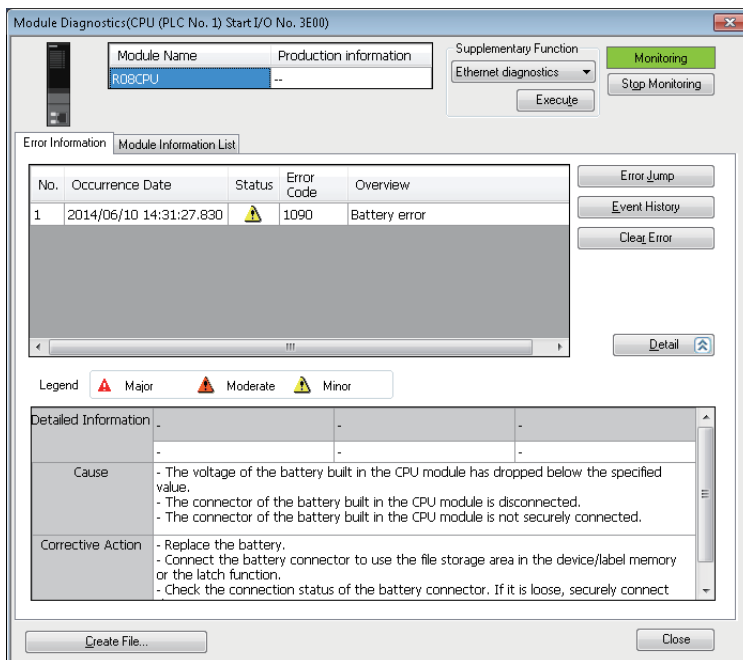
Window

■Diagnosing CPU modules

[Diagnostics] ⇒ [Module Diagnostics (CPU Diagnostics)]

■Diagnosing I/O modules and Intelligent function modules

Select the module to be diagnosed from the module configuration of the "System Monitor" screen and double-click one of the cells on the same column to display the "Module Diagnostics" screen.



For Q series module, '-' is displayed in Occurrence Date, Status, and Overview.

Precautions

Since the occurrence date depends on the time zone selected in "Clock Related Setting" for "Operation Related Setting" of the CPU parameter, it may be different from the time on the personal computer in use.

Error information

Display the error history registered to the diagnostic target module in the [Error Information] tab.

■Display content

The displayed information will differ depending on the module.

- CPU module: Up to 16 current errors will be displayed in the chronological order. The 17th and subsequent errors are not displayed.
- Other than CPU module: Up to 16 current errors are displayed.

If the same error as already displayed error code occurred, the display content is not updated.

For the errors of Q series module, occurrence date is not displayed.

■Error jump

Click the [Error Jump] button to jump to the selected error item.

Programs, function blocks, and each parameter are applicable for the Jump function.

A jump to parameters is available for the items supported by the Error jump function. The supported items differ depending on the module.

Precautions

In the following conditions, an error may not be found at the error jump destination.

- When the open project does not match with the data on the CPU module.
- When diagnosing programmable controller other than the one set as a connection destination in the project.

Ex.

When selecting a module from the "CC-Link IE Control Diagnostics" screen and activating the System Monitor function, and activating the "Module Diagnostics" screen from the activated "System Monitor" screen.

■Event history

☞ Page 256 Checking Error History/Operation History

■Clearing errors

After the errors displayed on the "Module Diagnostics" screen are cleared, click the [Clear Error] button to clear the error status of the module. (The LED that indicates error status on the front of the module turns OFF.)

The error content are also deleted from the list of the error information.

Module information list

The current LED information and switch information of the target module are displayed in the [Module Information List] tab.

16.3 Diagnosing Network

This section explains how to diagnose networks.

Ethernet diagnostics

Check the status of each connection, status of each protocol, and connection status.

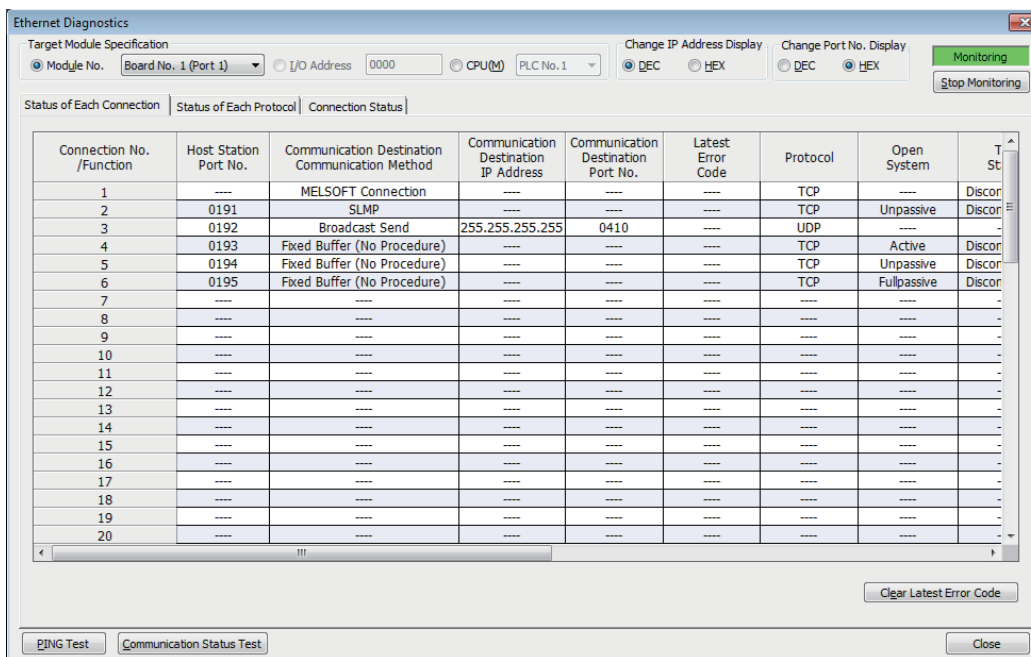
For details, refer to the following manual.

MELSEC iQ-R Ethernet User's Manual (Application)

MELSEC iQ-F FX5 User's Manual (Ethernet Communication)

Window

[Diagnostics] ⇒ [Ethernet Diagnostics]




CC-Link IE Controller Network diagnostics

Monitor the network information, diagnose the network status, and perform a test.

FX5CPU does not support it.

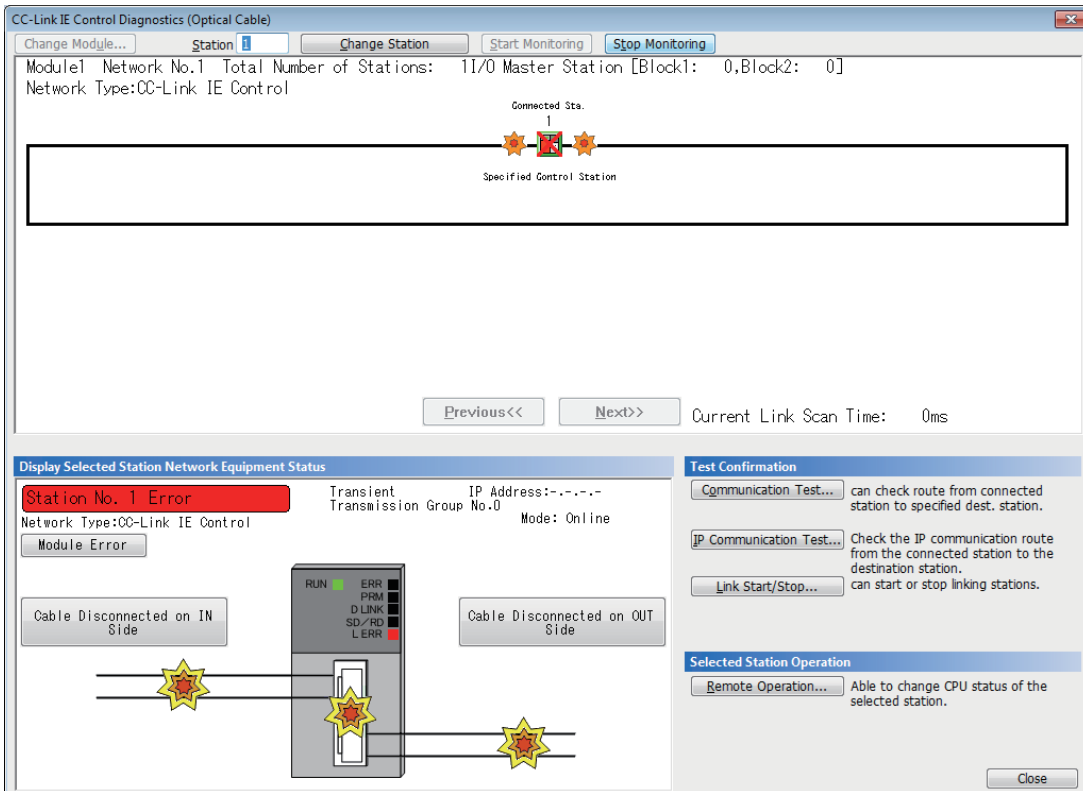
For details, refer to the following manual.

 MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application)

Window

■Optical cable

[Diagnostics] ⇒ [CC-Link IE Control Diagnostics (Optical Cable)]



■ Twisted pair cable

[Diagnostics] ⇒ [CC-Link IE Control Diagnostics (Twisted Pair Cable)]

CC-Link IE Control Diagnostics (Twisted Pair Cable)

Select Diagnostics Destination
 Module: Module 1 (Network No. 1) | Change Module... | Select Station: Station No. 1

Monitor Status
 Monitoring | Start Monitoring | Stop Monitoring
 Delete Disconnected Station(D...) | Legend...

Network Status
 Total No. of Stations (Parameter): 120 | Total No. of Stations (Connected): 3 | Current Link Scan Time: 2 ms | Number of Station Errors Detected: 0 | Constant Link Scan Setting Value: 0 ms
 I/O Master Station: Block 1 | Block 2: 0 | Network Type: CC-Link IE Control

Connected Sta.
 Specified Control Sta.: P1 | Normal Sta.: 3 | Normal Sta.: 2
 P2

Selected Station Communication Status Monitor (RJ71EN71)
 Sta. No. 1 | No Error | Mode: Online
 Network Type: CC-Link IE Control | Transient Transfer Group No.: 0
 MAC Address: |

Operation Test
 Communication Test... | Check the transient communication route from the connected station to the destination station.
 IP Communication Test... | Check the IP communication route from the connected station to the destination station.
 Cable Test... | Check the cable status between the connected station and the destination station.
 Link Start/Stop... | Start or stop the network data link.

Selected Station Operation
 Remote Operation... | CPU status of the selected station can be changed by starting remote operation of the selected station.

Data Unlinked
 Sta. No. 4
 Sta. No. 5
 Sta. No. 6

Close

CC-Link IE Field Network diagnostics

Monitor the network information, diagnose the network status, and perform a test.

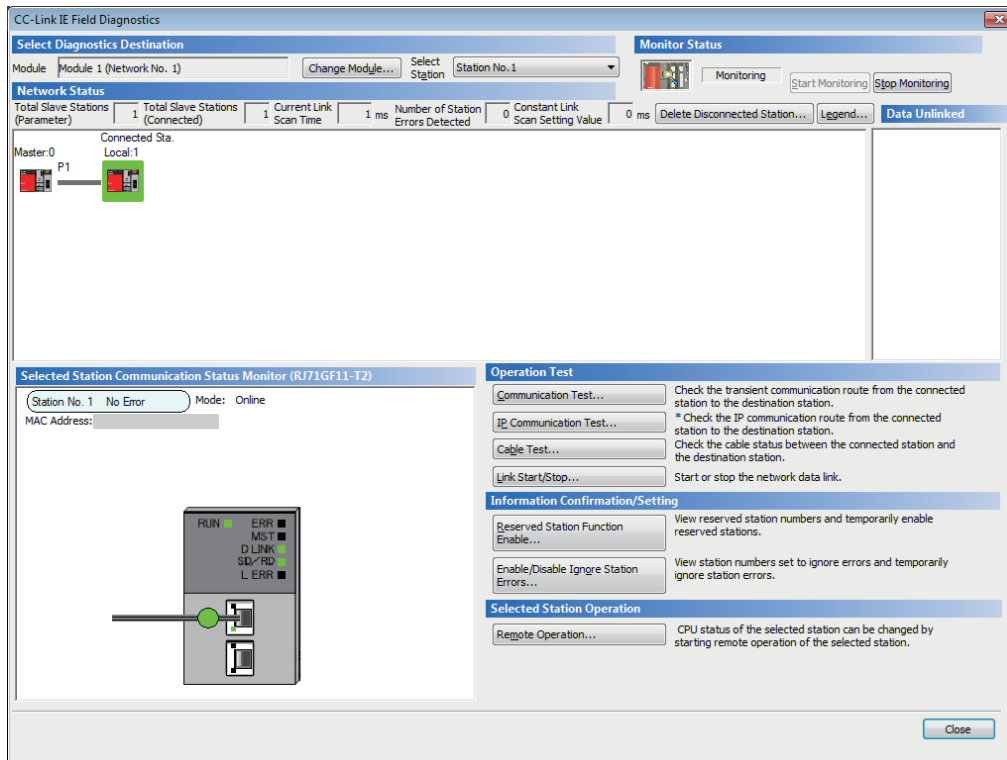
FX5CPU does not support it.

For details, refer to the following manual.

 MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

Window

[Diagnostics] ⇒ [CC-Link IE Field Diagnostics]



CC-Link diagnostics

Monitor the network information of each station, diagnose the network status, and perform a test.

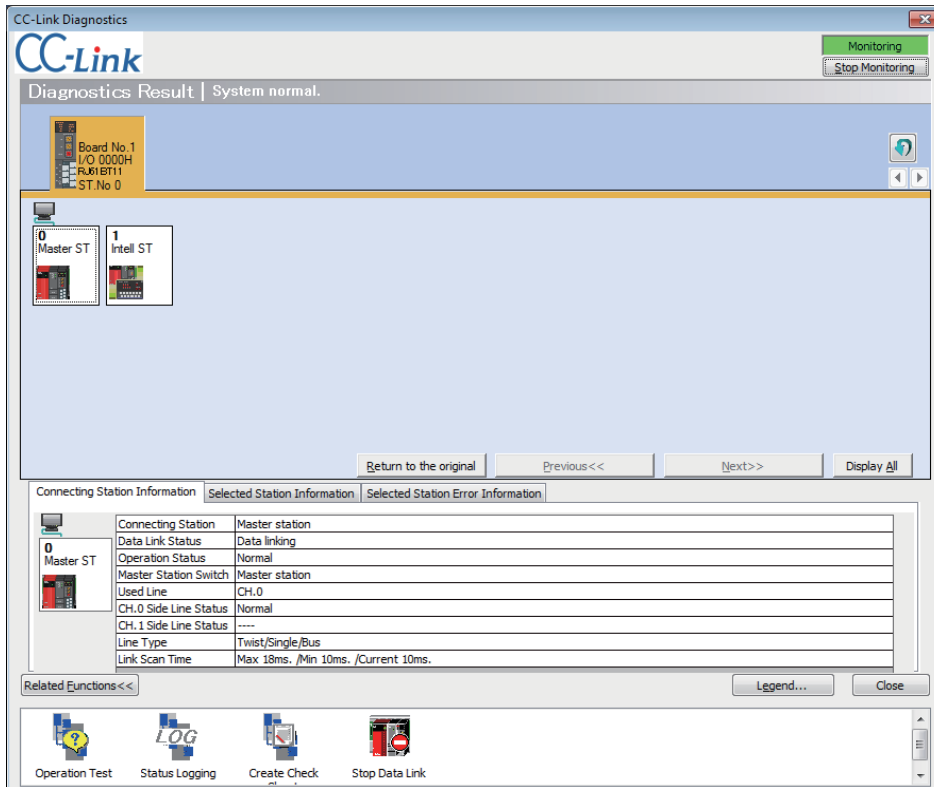
FX5CPU does not support it.

For details, refer to the following manual.

 MELSEC iQ-R CC-Link System Master/Local Module User's Manual (Application)

Window

[Diagnostics] ⇒ [CC-Link Diagnostics]



16.4 Checking Error History/Operation History

The module error information, operation history, and history of system information can be displayed using the Event History function.

The detailed information of the error history can be displayed when a CPU module and Intelligent function modules that support the Module error history collection function are used.

For the versions of modules that support this function, refer to the user's manual of each module.

FX5CPU does not support this function.

Operating procedure

Click the [Event History] button on the "Module Diagnostics" screen or "System Monitor" screen.

Precautions

Since the occurrence date for the Event History function depends on the time zone selected in "Clock Related Setting" for "Operation Related Setting" of the CPU parameter, it may be different from the time on the personal computer in use.

For MELSEC-iQ-R series CPU modules, data can be sampled by using the data logging function.

17.1 Data Logging Function

This section explains the label and device data logging methods.

How to use the data logging function

1. Set the internal buffer capacity of the CPU module, which is used for the data logging function. (📖 Page 257 Setting internal buffer capacity for the data logging function)
2. Configure the data logging settings with CPU Module Logging Configuration Tool, and write the setting to the CPU module.
3. Start data logging with CPU Module Logging Configuration Tool.
4. Check the data logging results with GX LogViewer.

For information on how to use CPU Module Logging Configuration Tool, refer to the following manual.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

For information on how to use GX LogViewer, refer to the following manual.

📖 GX LogViewer Version 1 Operating Manual

Setting internal buffer capacity for the data logging function

Set the internal buffer capacity for the data logging function using "Internal Buffer Capacity Setting" in "Memory/Device Setting" of the CPU parameter. Write the parameter to the CPU module after the setting is configured.

However, set the capacity within the range that meets the following conditions when the data logging function is used with the Memory Dump function and the realtime monitor function of CPU module.

The total of data logging buffer capacities + Memory dump buffer capacity + Realtime monitor buffer capacity \leq 3072 KB

Each buffer capacity can be checked with the following:

- Data logging buffer capacity, Memory dump buffer capacity: CPU parameter
- Realtime monitor buffer capacity: The realtime monitor setting of GX LogViewer

18 CHECKING/CHANGING CPU MODULE OPERATION

Check the operation status and change the operation of CPU module with GX Works3.

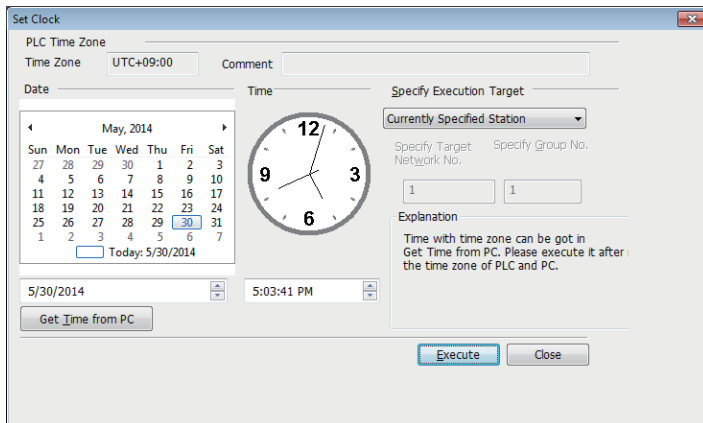
Purpose	Function name	Reference
Set the clock on CPU module.	Clock setting	Page 259 Setting Clock in CPU Module
RUN/STOP/PAUSE/RESET the CPU module connected to GX Works3.	Remote operation	Page 260 Remote Operation of CPU Module
Check the usage of data memory.	Memory management	Page 261 Checking Memory Usage
Clear the values of data memory.	Clear value	Page 262 Initializing/Clearing Memory

18.1 Setting Clock in CPU Module

This section explains how to set the clock on a CPU module.

Window

[Online] ⇒ [Set Clock]



Operating procedure

Set the items and click the [Execute] button.

Execution target	Description
Currently Specified Station	Select this to set the clock only upon the station specified in the connection destination setting.
All Stations Specified ^{*1}	Select this to perform the clock setting on the station specified in the connection destination setting and all the stations on the same network. Set a target network with "Specify Network No."
Specify Group No. ^{*1}	Select this to perform the clock setting on the station specified in the connection destination setting and each station of the specific group on the specified network. Set a target network in "Specify Target Network No.", and set a group number in "Specify Group No." The clock setting cannot be performed for CC-Link IE Field Network because it does not have group number.

*1 Not supported by FX5CPU.

Precautions

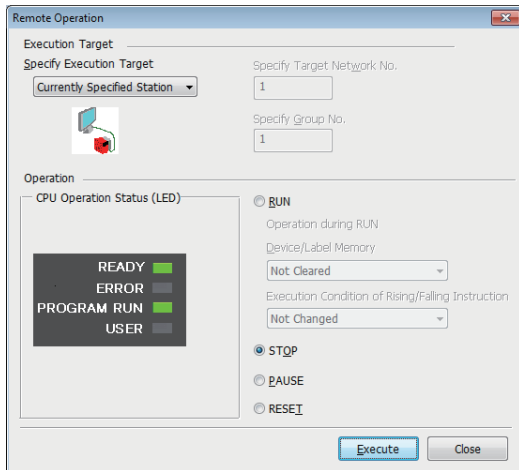
- The clock setting can be performed regardless of the ON/OFF status of the clock setting device 'SM210'.
Note that the ON/OFF status of 'SM210' does not change upon clock setting.
- In the clock setting, a time-lag may occur due to the time of transfer.
- When different time zones are specified between the connected station and other station, the same time in the CPU is set to the target CPU module.

18.2 Remote Operation of CPU Module

This section explains how to switch the RUN/STOP status of a CPU module from GX Works3.

Window

[Online] ⇨ [Remote Operation]



Operating procedure

Set the items and click the [Execute] button.

Execution target	Description
Currently Specified Station	Select this to perform the remote operation only on the station specified in the connection destination setting.
All Stations Specified ^{*1}	Select this to perform the remote operation on the station specified in the connection destination setting and all the stations on the same network. Set a target network in "Specify Target Network No.".
Specify Group No. ^{*1}	Select this to perform the remote operation on the station specified in the connection destination setting and each station of the specific group on the specified network. Set a target network in "Specify Target Network No.", and set a group number in "Specify Group No." The remote operation cannot be performed for CC-Link IE Field Network because it does not have group number.

^{*1} Not supported by FX5CPU.

Remote operation and RUN/STOP switch

When the operation to the CPU module differs by the remote operation, RUN/STOP switch, or remote RUN/PAUSE contact, the CPU module operates according to the priority shown below:

Operation to CPU module	Priority
STOP	1
PAUSE	2
RUN	3

The operating status after RUN/STOP switching on the CPU module or remote RUN/STOP contact operation are as follows.

Remote operation	CPU module switch		Remote RUN/STOP contact is ON (The CPU module is in STOP.)
	RUN	STOP	
RUN	RUN	STOP	STOP
STOP	STOP	STOP	STOP
PAUSE	PAUSE	STOP	STOP
RESET ^{*1}	Inoperable ^{*2}	RESET	RESET

^{*1} The remote reset operation must be enabled on "Operation Related Setting" of the CPU Parameter.

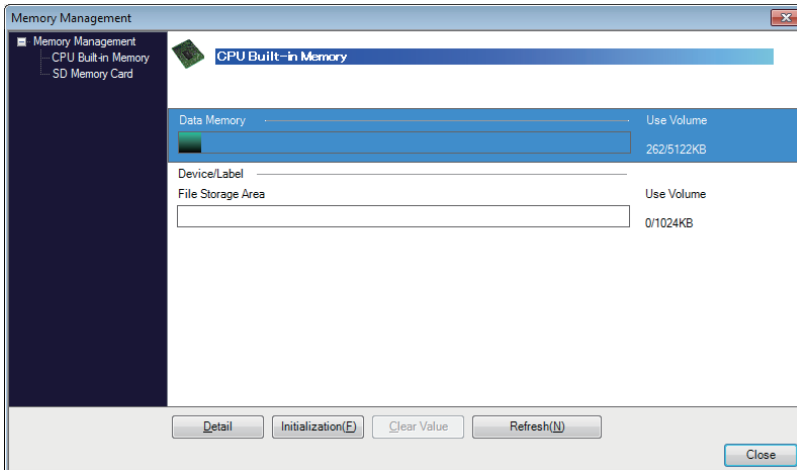
^{*2} Operable when the CPU module is switched to STOP by remote operation.

18.3 Checking Memory Usage

This section explains how to check the usage of data memory of CPU built-in memory, device/label memory, and SD memory card.

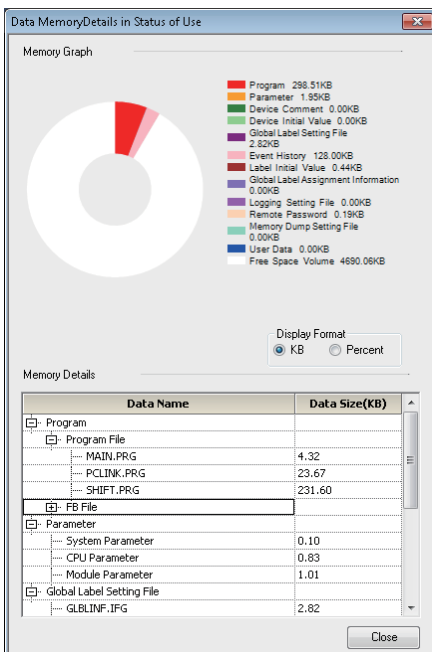
Window

[Online] ⇒ [CPU Memory Operation]



Details of memory usage


The details of current data memory, device/label memory, and data in an SD memory card can be checked by clicking the [Detail] button.



18.4 Initializing/Clearing Memory

This section explains how to initialize or clear the memory.

For details on the initialization and clearing to zero, refer to the following manual.


 MELSEC iQ-R CPU Module User's Manual (Application)

 MELSEC iQ-F FX5 User's Manual (Application)

Initializing data

Delete files in the data memory/device memory/label memory of the CPU module, or folders/files stored in the SD memory card.

Operating procedure

1. Select [Online] ⇒ [CPU Memory Operation]. ( Page 261 Checking Memory Usage)
2. Select "Data Memory" or "File Storage Area" on the "Memory Management" screen, and click the [Initialization] button. When initializing an SD memory card, select "SD Memory Card" displayed on the left of the screen.

Precautions


Format the memory card to be used for a CPU module by using this function.

If a memory card is formatted using the function such as Windows[®] format function, it may not be used on the CPU module.

Clearing values

Clear the values of devices, labels, and file registers to '0', and perform latch clear operation.

Operating procedure

1. Select [Online] ⇒ [CPU Memory Operation]. ( Page 261 Checking Memory Usage)
2. Select "Device/Label Memory" on the "Memory Management" screen, and click the [Clear Value] button.
3. Set the items on the "Clear Value" screen, and click the [Execute] button.

Point


When the device initial value file/label initial value file is written in the CPU module, it can be initialized by resetting the CPU module.

APPENDIX

Appendix 1 Functions Added to/Changed from Previous Version

The table below shows the main functions added/changed along with the upgrades.

Supported version	Main functions	Added/changed contents	Reference
Version 1.001B	—	<ul style="list-style-type: none"> The problems causing an error when Version 1.000A is used have been solved. 	—
	Online program change	<ul style="list-style-type: none"> Online program change on an instruction basis in ladder programs is supported. Online program change for ST programs is supported. Online program change after changing/deleting label initial values is supported. 	Page 205 Writing Programs While CPU is in RUN
Version 1.005H	Switching displayed language	<ul style="list-style-type: none"> Chinese Simplified is supported. 	Page 22 Switching Displayed Language
	Checking program	<ul style="list-style-type: none"> The Check Program function is supported. 	Page 145 Checking Programs
	Online program change	<ul style="list-style-type: none"> Performing/not performing the device comment difference check before online program change can be selected with option. 	Page 205 Writing Programs While CPU is in RUN
	Printing data	<ul style="list-style-type: none"> Printing the product information list is supported. 	Page 43 Printing Data
	Opening GX Works2 format projects	<ul style="list-style-type: none"> The automatic input of the start XY for I/O assignment is supported. The basic settings for I/O assignment (base, power supply, cable) is succeeded. The device memory and device default value are succeeded. 	Page 55 Opening GX Works2 format projects
	Interaction with iQ Works ^{*1}	<ul style="list-style-type: none"> The system label is supported. 	Page 89 REGISTERING LABELS
		<ul style="list-style-type: none"> The parameter reflection function of MELSOFT Navigator is supported. 	—
	Memory dump ^{*2}	<ul style="list-style-type: none"> The Memory Dump function is supported 	Page 226 Saving and Checking Device Value
	Module tool list	<ul style="list-style-type: none"> "Offset/gain setting" under "Temperature Input" for "iQ-R Series" is supported. "Q61LD Two-Point Calibration Setting" under "Analog Module" for "Q Series" is supported. "Q61LD Default Setting" under "Analog Module" for "Q Series" is supported. 	Page 85 Using Configuration Function
Diagnostics ^{*3}	<ul style="list-style-type: none"> The CC-Link IE Controller Network diagnostics (Twisted pair cable) is supported. 	Page 252 CC-Link IE Controller Network diagnostics	
Version 1.007H	Function Block Diagram/Ladder Diagram language	<ul style="list-style-type: none"> Function Block Diagram/Ladder Diagram language is supported. 	Page 131 Creating FBD/LD Programs
	RnPCPU	<ul style="list-style-type: none"> RnPCPU (R08PCPU, R16PCPU, R32PCPU, and R120PCPU) is supported. 	—
	FX5CPU	<ul style="list-style-type: none"> FX5CPU (FX5UCPU and FX5UCCPU) is supported. 	—
	Simulation	<ul style="list-style-type: none"> The Simulation function of RCP (R04CPU, R08CPU, R16CPU, R32CPU, and R120CPU) is supported. 	Page 180 SIMULATING PROGRAMS
	Opening GX Works2 format projects	<ul style="list-style-type: none"> The PLC file setting and the PLC RAS setting of PLC parameter are succeeded. Structured Ladder/FBD programs are succeeded. 	Page 55 Opening GX Works2 format projects
	Interaction with iQ Works	<ul style="list-style-type: none"> A system label change notification can be received automatically. 	Page 101 Importing the changes of system label database
	Module tool list	<ul style="list-style-type: none"> "Analog input - Offset/gain setting" under "Analog Adapter" for "FX5 Series" is supported. "Analog output - Offset/gain setting" under "Analog Adapter" for "FX5 Series" is supported. 	Page 85 Using Configuration Function
	Automatic detection of CC-Link IE Field Network connected devices	<ul style="list-style-type: none"> The connected devices on the CC-Link IE Field Network can be detected automatically. 	—

- *1 To use this function, it is required that MELSOFT Navigator supports the function. For information on the version of the supported MELSOFT Navigation, refer to the Help of MELSOFT Navigator.
- *2 To use this function, it is required that CPU module supports the function. For information on the firmware version of the supported CPU modules, refer to the following manual.
 MELSEC iQ-R CPU Module User's Manual (Application)
- *3 To use this function, it is required that the module supports the function. For information on the firmware version of the supported module, refer to the manual for respective modules.

Appendix 2 Character Strings that cannot be Used for Label Names and Data Names

Character strings used for application function names, common instruction names, special instruction names, instructions and so on are referred to as the reserved words.

These reserved words cannot be used for label names or data names.

If the character string defined as a reserved word is used for a label name or data name, an error occurs during registration or conversion.

Category	Character string
Symbol	(blank), !, ", #, \$, %, ', *, &, +, ,, ., /, :, ;, <, =, >, ?, @, [, \,], ^, ` , {, , }, ~
Windows® reserved word*1	COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8, COM9, LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, LPT9, AUX, CON, PRN, NUL, CLOCK\$, END_MARK
Data type reserved words	VAR, VAR_RETAIN, VAR_ACCESS, VAR_CONSTANT, VAR_INPUT, VAR_INPUT_RETAIN, VAR_OUTPUT, VAR_OUTPUT_RETAIN, VAR_IN_OUT, VAR_IN_EXT, VAR_EXTERNAL, VAR_EXTERNAL_CONSTANT, VAR_EXTERNAL_RETAIN, VAR_GLOBAL, VAR_GLOBAL_CONSTANT, VAR_GLOBAL_RETAIN, VAR_PUBLIC, VAR_PUBLIC_RETAIN, BOOL, BYTE, INT, SINT, DINT, LINT, UINT, USINT, UDINT, ULINT, WORD, DWORD, LWORD, ARRAY, REAL, LREAL, TIME, STRING, WSTRING, TIMER, LTIMER, RETENTIVETIMER, LRETENTIVETIMER, COUNTER, LCOUNTER, POINTER, ANY, ANY_NUM, ANY_BIT, ANY_REAL, ANY_INT, ANY_DATE, ANY_SIMPLE, ANY16, ANY32, DATE, DATE_AND_TIME, DT, TIME, TIME_OF_DAY, TOD, BODY_CCE, BODY_FBD, BODY_IL, BODY_LD, BODY_SFC, BODY_ST, END_BODY, END_PARAMETER_SECTION, PARAM_FILE_PATH, PARAMETER_SECTION, POW, LONGCOUNTER, LONGRETENTIVETIMER, LONGTIMER, Unknown, ANY_BITADDR, ANY_WORDADDR, ANY_STRING, ANYSTRING_SINGLE, ANYSTRING_DOUBLE, ANY_ELEMENTARY, ANY_ELEMENTARY_IEC, ANY_MAGNITUDE, ANY_BOOL, ANY_SIGNED, ANY_UNSIGNED, ANYREAL_64, ANYREAL_32, ANY_DERIVED, ANY16_S, ANY16_U, ANY32_S, ANY32_U, ANY64, ANY64_S, ANY64_U, ANY_STRUCT, ANYWORD_ARRAY, ANY16_ARRAY, ANY16_S_ARRAY, ANY16_U_ARRAY, ANY32_ARRAY, ANY32_S_ARRAY, ANY32_U_ARRAY, ANY64_ARRAY, ANY64_S_ARRAY, ANY64_U_ARRAY, ANY_REAL_ARRAY, ANY_REAL_32_ARRAY, ANY_REAL_64_ARRAY, ANY_STRING_ARRAY, ANYSTRING_SINGLE_ARRAY, ANYSTRING_DOUBLE_ARRAY, ANYBIT_ARRAY, UINT_WORD, UDINT_DWORD, ULINT_LWORD, TIME2, KBIT64, KBIT32, KBIT16, WDEVICE, BDEVICE, DUMMYDEVICE, FB, FUN, STRUCT_MEMBER, BIT_ARRAY, STRUCT_ARRAY, STRING_ARRAY, WSTRING_ARRAY, LINT_ARRAY, ULINT_LWORD_ARRAY, DINT_ARRAY, UDINT_DWORD_ARRAY, INT_ARRAY, UINT_WORD_ARRAY, REAL_ARRAY, LREAL_ARRAY, TIME_ARRAY, NONE, ANY16_OR_STRING_SINGLE, ANY_DT, ANY_TM, ANY_BOOL_OR_POINTER
IEC reserved word	NOT, MOD, LD, LDN, ST, STN, S, S1, R, R1, AND, ANDN, OR, ORN, XOR, XORN, ADD, SUB, MUL, DIV, GT, GE, EQ, NE, LE, LT, JMP, JMPC, JMPCN, CAL, CALC, CALN, RET, RETC, RETN, LDI, LDP, LDF, ANI, ANDP, ANDF, ANB, ORI, ORP, ORF, ORB, MPS, MRD, MPP, INV, MEP, MEF, EGP, EGF, OUT, OUTH, SET, RST, PLS, PLF, FF, DELTA, DELTAP, SFT, SFTP, MC, MCR, STOP, PAGE, NOP, NOPLF, RETURN, IF, THEN, ELSE, ELSIF, END_IF, CASE, OF, END_CASE, FOR, TO, BY, DO, END_FOR, WHILE, END_WHILE, REPEAT, UNTIL, END_REPEAT, EXIT, TYPE, END_TYPE, STRUCT, END_STRUCT, RETAIN, END_VAR, FUNCTION, END_FUNCTION, FUNCTION_BLOCK, END_FUNCTION_BLOCK, STEP, INITIAL_STEP, END_STEP, TRANSITION, END_TRANSITION, FROM, UNTILWHILE, ACTION, END_ACTION, CONFIGURATION, END_CONFIGURATION, CONSTANT, F_EDGE, R_EDGE, AT, PROGRAM, WITH, END_PROGRAM, READ_ONLY, READ_WRITE, RESOURCE, END_RESOURCE, ON, TASK, EN, ENO, SINGLE, TRUE, FALSE, INTERVAL
Character string recognized as device (Device name + numerals)	X0, etc.
Others	Maker-defined FB/FUN, MELSEC instructions

*1 Can be used for a label name.

Precautions

- A label name and data name are not case-sensitive.
- Device names cannot be used as function names.

Appendix 3 List of Applicable Devices in GX Works3

For RCPU

○: Applicable, △: Display only, ×: Not applicable —: Not available

Category	Device name	Symbol	Digit specification	Bit-specified word device	Device comment	Device memory	Device initial value
User device	Input	X	○	—	○	△	×
	Output	Y	○	—	○	△	×
	Internal relay	M ^{*1}	○	—	○	○	×
	Latch relay	L	○	—	○	○	×
	Link relay	B	○	—	○	○	×
	Annunciator	F	○	—	○	○	×
	Link special relay	SB	○	—	○	△	×
	Edge relay	V ^{*1}	○	—	○	○	×
	Timer	T ^{*1}	—	×	○	○	○
	Retentive timer	ST ^{*1}	—	×	○	○	○
	Long timer	LT ^{*1}	—	×	○	○	○
	Retentive long timer	LST ^{*1}	—	×	○	○	○
	Counter	C ^{*1}	—	×	○	○	○
	Long counter	LC ^{*1}	—	×	○	○	○
	Data register	D ^{*1}	—	○	○	○	○
	Link register	W	—	○	○	○	○
	Link special register	SW	—	○	○	○	○
System device	Function input	FX	×	—	×	×	×
	Function output	FY	×	—	×	×	×
	Special relay	SM	○	—	○	△	×
	Function register	FD	—	○	×	×	×
	Special register	SD	—	○	○	○	○
Link direct device (J□□)	Link input	X	○	—	○	△	×
	Link output	Y	○	—	○	△	×
	Link relay	B	○	—	○	△	×
	Link special relay	SB	○	—	○	△	×
	Link register	W	—	○	○	○	○
	Link special register	SW	—	○	○	○	○
Module access device (U□\G□)	Module access device	G	—	○	○	○	○
CPU buffer memory access device (U3E□\G□/HG□)	CPU buffer memory access device	G/HG	—	○	○	○	○
Index register	Index register	Z ^{*1}	—	×	×	○	×
	Long index register	LZ ^{*1}	—	×	×	○	×
File register	File register	R	—	○	○	×	×
		ZR	—	○	○	○	○
Module refresh register	Module refresh register	RD	—	○	○	○	○
Nesting	Nesting	N	—	—	×	×	×
Pointer	Pointer	P ^{*1}	—	—	○	×	×
	Interrupt pointer	I	—	—	○	×	×
Others	Network number specified device	J	—	—	○	×	×
	I/O number specified device	U	—	—	○	×	×
Constant	Decimal constant	K	—	—	×	×	×
	Hexadecimal constant	H	—	—	×	×	×
	Real constant	E	—	—	×	×	×
	String constant	—	—	—	×	×	×

*1 Writing to local devices is available.

Creating comments for module access devices

Device comments within the following range can be created in the buffer memory (3E00H to 3E30H) of CPU module in a multiple CPU system.

Supported range	Supported range
U0 (\G0) to U1FF (\G268435455)	U200 (\G0) to U3DF (\G268435455)
U3E0 (\G0) to U3E3 (\G268435455)	

For FX5CPU

○: Applicable, △: Display only, ×: Not applicable —: Not available

Category	Device name	Symbol	Digit specification	Bit-specified word device	Device comment	Device memory	Device initial value
User device	Input	X	○	—	○	△	×
	Output	Y	○	—	○	△	×
	Internal relay	M	○	—	○	○	×
	Latch relay	L	○	—	○	○	×
	Link relay	B	○	—	○	○	×
	Annunciator	F	○	—	○	○	×
	Link special relay	SB	○	—	○	△	×
	Timer	T	—	×	○	○	○
	Retentive timer	ST	—	×	○	○	○
	Counter	C	—	×	○	○	○
	Long counter	LC	—	×	○	○	○
	Data register	D	—	○	○	○	○
	Link register	W	—	○	○	○	○
	Link special register	SW	—	○	○	○	○
System device	Special relay	SM	○	—	○	△	×
	Special register	SD	—	○	○	○	○
Module access device (U□\G□)	Module access device	G	—	○	○	○	○
Index register	Index register	Z	—	×	×	○	×
	Long index register	LZ	—	×	×	○	×
File register	File register	R	—	○	○	○	○
Nesting	Nesting	N	—	—	×	×	×
Pointer	Pointer	P	—	—	○	×	×
	Interrupt pointer	I	—	—	○	×	×
Others	I/O number specified device	U	—	—	○	×	×
Constant	Decimal constant	K	—	—	×	×	×
	Hexadecimal constant	H	—	—	×	×	×
	Real constant	E	—	—	×	×	×
	String constant	—	—	—	×	×	×

Creating comments for module access devices

Device comments can be created within the range of U01 (\G0) to U10 (\G262143).

Appendix 4 Using Simulation Function

The CPU modules supporting the Simulation function are shown below:

Series	Model
MELSEC iQ-R series	R04CPU
	R08CPU
	R16CPU
	R32CPU
	R120CPU

Supported CPU module functions

The Simulation function of GX Works3 does not support some CPU module functions.

The following shows the functions that are supported by the Simulation function.

CPU module					
Function name			Remarks		
Basic function	Program related function	Executing a program (ladder, ST, and FBD/LD)		—	
		Scan time monitoring time (WDT) setting		The operation is not performed in actual time.	
	Clock function	Clock function	Clock function	The clock data is written to the internal time of a simulator. It differs from the time of a personal computer.	
			Time zone setting	The clock of a personal computer is copied to the internal time and used.	
		System clock function		The operation is not performed in actual time.	
	LED display function	LED display function		—	
	Writing to PLC/Reading from PLC	Writing to a programmable controller (including writing data while CPU module is in RUN)		—	
		Reading from a programmable controller			
	Diagnostic function	Self-diagnostic function	Error detection function	—	
			Module diagnostic function		Host CPU only.
	Monitor and test function	Basic monitor function	Monitoring a program (Circuit monitor)		—
		Test function	Testing device and label data (Changing values)	Testing device and label data (Changing values)	
				Testing local device and local label data	
Debug function	Changing program and parameter while CPU module is in RUN	Changing program while CPU module is in RUN (Changing ladder block)		—	

Function name				Remarks		
Operation function	Program related function	Program execution setting function	Program execution type setting function	—		
			Device/file usage setting			
		Interrupt function	Fixed cycle interval setting		The operation is not performed in actual time.	
			File register block number saving/recovering setting			—
			Interrupt permission setting during instruction execution			—
	PID control function		The operation is not performed in actual time.			
	Constant scan					
	Operation function	Remote operation function	Operation change function	—		
			RUN-PAUSE contact setting function			
	Device/data related function	Device/label memory area setting function (Device variable setting function)	Device/label memory area setting function (Device variable setting function)	—		
			Local device setting function			
			Refresh memory setting function			
		Internal buffer capacity setting function				
		Index register setting function				
		Device/label initial value setting function				
Device comment function						
File register setting function						
Timer device limit setting function						
Stop → RUN operation setting function of output (Y)						
Communication setting function	Device/label access service processing setting		—			
RAS function	Diagnostic function	Self-diagnostic application function	Error clear function	—		
	History function	Event history function (Error history/module error history collecting function)		Host CPU only.		
Maintenance function	Applied monitor function	(Interrupt) program list monitor		The operation is not performed in actual time.		
		Scan time monitor		The operation is not performed in actual time.		
		Buffer memory monitor function		—		
	Applied test function	Clearing device, label and file register		—		
Clearing latch device and label						

Series-common function

Function name				Remarks
System configuration function	System configuration setting function	Input/output number and point variable setting function		—
Module programming common function	Data communication function	Direct access function (U□\G□, J□\□)		Access with module FB (dedicated instruction) and module label is available.
	Program creation support function	Module label and module FB (device comment) auto-creation function		—
		Sample program display function (Template display function)		
Parameter auto-creation function (Initial setting and refresh setting)				
RAS function	History function	Event history function	Event history function	—
			(Error history/system error history function)	
	Diagnostic function	Module diagnostics		Host CPU only.



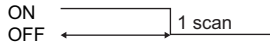
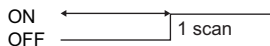
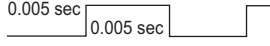
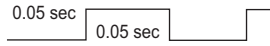

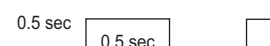
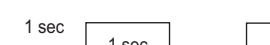
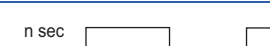

Supported devices

The devices supported by the Simulation function are the same as that of CPU module.

List of special relay

For details on special relays, refer to the following manual.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

No.	Name	Description
SM0	Latest self diagnostics error (including annunciator ON)	OFF: No error ON: Error state
SM1	Latest self diagnostics error (not including annunciator ON)	OFF: No error ON: Error state
SM50	Error reset	From OFF to ON: Error reset request From ON to OFF: Error reset complete
SM56	Instruction execution fault	OFF: Normal ON: Instruction execution fault state
SM62	Annunciator	OFF: Not detected ON: Detected
SM80	Detailed information 1: Flag in use	OFF: Not used ON: In use
SM112	Detailed information 2: Flag in use	
SM203	STOP contact	OFF: Other than STOP state ON: STOP state
SM204	PAUSE contact	OFF: Other than PAUSE state ON: PAUSE state
SM210	Clock data set request	From OFF to ON: setting request is detected From ON to OFF: setting is completed
SM211	Clock data set error	OFF: No error ON: Error state
SM213	Clock data read request	OFF: Non-processing On: Reading request
SM220	CPU No.1 preparation completed	OFF: CPU No.n preparation not completed ON: CPU No.n preparation completed
SM230	CPU No.1 error flag	OFF: CPU No.n normal ON: CPU No.n stop error state
SM400	Always ON	ON  OFF
SM401	Always OFF	ON OFF 
SM402	After RUN, ON for one scan only	ON  OFF
SM403	After RUN, OFF for one scan only	ON  OFF
SM409	0.01 second clock	
SM410	0.1 second clock	
SM411	0.2 second clock	
SM412	1 second clock	
SM413	2 second clock	
SM414	2n second clock	
SM415	2n (ms) clock	

No.	Name	Description
SM420	User timing clock No.0	
SM421	User timing clock No.1	
SM422	User timing clock No.2	
SM423	User timing clock No.3	
SM424	User timing clock No.4	
SM600	Memory card enabled/disabled flag	OFF: Disabled ON: Enabled
SM603	Memory card (drive 2) flag	OFF: No SD memory card inserted ON: SD memory card inserted
SM604	Memory card in-use flag	OFF: Not used ON: In use
SM626	Extended SRAM cassette insertion flag	OFF: Extended SRAM cassette is not attached ON: Extended SRAM cassette is attached
SM628	Program memory write error	OFF: Write error ON: No write operation/normal
SM629	Program memory write flag	OFF: Writing is in progress ON: No write operation
SM632	Data memory write error	OFF: Write error ON: No write operation/normal
SM633	Data memory write flag	OFF: Writing is in progress ON: No write operation
SM699	Dedicated instruction skip flag	OFF: Instruction is executing or completed ON: Instruction has not been executed
SM700	Carry flag	OFF: Carry OFF ON: Carry ON
SM701	Number of output characters selection	OFF: Outputs until reaching NULL code ON: Outputs 16 characters
SM702	Search method	OFF: Sequential search ON: Dichotomizing search
SM703	Sort order	OFF: Ascending ON: Descending
SM704	Block comparison	OFF: Mismatch is detected ON: Completely match
SM709	DT/TM instruction improper data detection flag	OFF: No improper data ON: Improper data is detected
SM752	Dedicated instruction End bit control flag	OFF: End bit automatically controlled ON: End bit not automatically controlled
SM753	File access in progress	OFF: File access is not in progress ON: File access is in progress
SM754	BIN/DBIN instruction error control flag	OFF: Executes error detection ON: No execute error detection
SM755	Scaling data check settings	OFF: Performs data check ON: Not perform data check
SM756	Module access completion wait control flag	OFF: Not wait the completion ON: Waits the completion
SM776	Local device setting at CALL	OFF: Disables local devices ON: Enables local devices
SM777	Local device setting in interrupt programs	OFF: Disables local devices ON: Enables local devices
SM1200	Auto logging setting file and registration status	OFF: Mismatch ON: Matching
SM1201	SD memory card setting file in use flag	OFF: Not used ON: In use
SM1202	Data memory setting file in use flag	OFF: Not used ON: In use
SM1210	Data logging setting No. 1 Data logging preparation	OFF: Not prepared ON: Prepared
SM1211	Data logging setting No. 1 Data logging start	OFF: Suspended/waiting for start ON: Start

No.	Name	Description
SM1212	Data logging setting No.1 Data logging data collection in progress	OFF: No data logging collection operation ON: Data logging data collection in progress
SM1213	Data logging setting No.1 Data logging completion	OFF: Data logging is not completed ON: Data logging is completed
SM1214	Data logging setting No.1 Data logging triggering	From off to on: triggering occurs
SM1215	Data logging setting No.1 Post data logging triggering	OFF: Not post triggering ON: Post triggering
SM1216	Data logging setting No.1 Data logging error	OFF: No error ON: Error state
SM1217	Data logging setting No.1 Data logging data saving into memory card in progress	OFF: Data saving is not in progress ON: Data saving is in progress
SM1218	Data logging setting No.1 Logging data storage file switching in progress	OFF: Storage file switching is not in progress ON: Storage file switching is in progress
SM1220 to SM1228	Data logging setting No.2	Same configuration as the setting No.1
SM1230 to SM1238	Data logging setting No.3	Same configuration as the setting No.1
SM1240 to SM1248	Data logging setting No.4	Same configuration as the setting No.1
SM1250 to SM1258	Data logging setting No.5	Same configuration as the setting No.1
SM1260 to SM1268	Data logging setting No.6	Same configuration as the setting No.1
SM1270 to SM1278	Data logging setting No.7	Same configuration as the setting No.1
SM1280 to SM1288	Data logging setting No.8	Same configuration as the setting No.1
SM1290 to SM1298	Data logging setting No.9	Same configuration as the setting No.1
SM1300 to SM1308	Data logging setting No.10	Same configuration as the setting No.1
SM1524	Initial processing successful completion state	OFF: The initial processing was completed successfully. ON: The initial processing was not completed successfully.
SM1525	Initial processing error completion state	OFF: The initial processing was completed with an error. ON: The initial processing was not completed with an error.

List of special register

For details on special registers, refer to the following manual.

 MELSEC iQ-R CPU Module User's Manual (Application)

No.	Name	Description
SD0	Latest self diagnostics error code	Latest self diagnostics error code
SD1	Clock time for self diagnosis error occurrence	Clock time for self diagnosis error occurrence
SD2		
SD3		
SD4		
SD5		
SD6		
SD7		

No.	Name	Description
SD10	Self diagnostics error code	Self diagnostics error code 1
SD11		Self diagnostics error code 2
SD12		Self diagnostics error code 3
SD13		Self diagnostics error code 4
SD14		Self diagnostics error code 5
SD15		Self diagnostics error code 6
SD16		Self diagnostics error code 7
SD17		Self diagnostics error code 8
SD18		Self diagnostics error code 9
SD19		Self diagnostics error code 10
SD20		Self diagnostics error code 11
SD21		Self diagnostics error code 12
SD22		Self diagnostics error code 13
SD23		Self diagnostics error code 14
SD24		Self diagnostics error code 15
SD25		Self diagnostics error code 16
SD62	Annunciator number	Annunciator number
SD63	Number of annunciators	Number of annunciators
SD64 to SD79	Table of detected annunciator numbers	Detected annunciator number
SD80	Detailed information 1 information category	Detailed information 1 information category code
SD81 to SD111	Detailed information 1	Detailed information 1
SD112	Detailed information 2 information category	Detailed information 2 information category code
SD113 to SD143	Detailed information 2	Detailed information 2
SD200	Switch status	CPU switch status
SD201	LED status	CPU-LED state
SD203	CPU module operating status	CPU module operating status
SD210	Clock data	Clock data (year)
SD211		Clock data (month)
SD212		Clock data (day)
SD213		Clock data (hour)
SD214		Clock data (minute)
SD215		Clock data (second)
SD216		Clock data (day of the week)
SD218	Time zone setting value	Time zone (in minutes)
SD241	Number of extension base units	0: base unit only 1 to 7: number of extension base units
SD242	Identification for whether or not Q series module can be mounted	Identification of the base type 0: Q series module cannot be mounted (There is no base unit that can mount the Q series unit) 1: Q series module can be mounted (There is a base unit that can mount the Q series unit)
SD243	Number of base slots	Number of base slots
SD244		
SD250	Latest I/O for implemented unit	Latest I/O number for implemented unit

No.	Name	Description
SD260	Number of points assigned to bit devices	X number of points assigned (L)
SD261		X number of points assigned (H)
SD262		Y number of points assigned (L)
SD263		Y number of points assigned (H)
SD264		M number of points assigned (L)
SD265		M number of points assigned (H)
SD266		B number of points assigned (L)
SD267		B number of points assigned (H)
SD268		SB number of points assigned (L)
SD269		SB number of points assigned (H)
SD270		F number of points assigned (L)
SD271		F number of points assigned (H)
SD272		V number of points assigned (L)
SD273		V number of points assigned (H)
SD274		L number of points assigned (L)
SD275		L number of points assigned (H)
SD280		Number of points assigned to word devices
SD281	D number of points assigned (H)	
SD282	W number of points assigned (L)	
SD283	W number of points assigned (H)	
SD284	SW number of points assigned (L)	
SD285	SW number of points assigned (H)	
SD288	Number of points assigned to timer-type devices	T number of points assigned (L)
SD289		T number of points assigned (H)
SD290		ST number of points assigned (L)
SD291		ST number of points assigned (H)
SD292		C number of points assigned (L)
SD293		C number of points assigned (H)
SD294		LT number of points assigned (L)
SD295		LT number of points assigned (H)
SD296		LST number of points assigned (L)
SD297		LST number of points assigned (H)
SD298		LC number of points assigned (L)
SD299		LC number of points assigned (H)
SD300	Number of points assigned to index registers	Z number of points assigned
SD302	Number of points assigned to long index registers	LZ number of points assigned
SD306	Number of points assigned to file registers	ZR number of points assigned (L)
SD307		ZR number of points assigned (H)
SD308	Number of points assigned to refresh devices	RD number of points assigned (L)
SD309		RD number of points assigned (H)
SD312	File register block number	File register block number
SD412	One second counter	The number of counts that is counted once per second.
SD414	2n second clock setting	Unit setting for 2n second clock
SD415	2nms second clock setting	Unit setting for 2nms second clock
SD420	Scan counter	The number of counts that is counted once for each scan
SD500	Execution program number	The execution type of the program being executed
SD518	Initial scan time	Initial scan time (unit: ms)
SD519		Initial scan time (unit: μ s)
SD520	Current scan time	Current scan time (unit: ms)
SD521		Current scan time (unit: μ s)
SD522	Minimum scan time	Minimum scan time (unit: ms)
SD523		Minimum scan time (unit: μ s)

No.	Name	Description
SD524	Maximum scan time	Maximum scan time (unit: ms)
SD525		Maximum scan time (unit: μ s)
SD526	END processing time	END processing time (unit: ms)
SD527		END processing time (unit: μ s)
SD528	Constant scan waiting time	Constant scan waiting time (unit: ms)
SD529		Constant scan waiting time (unit: μ s)
SD530	Scan program execution time	Scan program execution time (unit: ms)
SD531		Scan program execution time (unit: μ s)
SD600	Memory card mounting status	SD memory card type
SD604	SD memory card (drive 2) usage status	SD memory card (drive 2) usage status
SD606	SD memory card (drive 2) capacity	SD memory card (drive 2) capacity: the lower digit (unit: KB)
SD607		SD memory card (drive 2) capacity: the higher digits (unit: KB)
SD610	SD memory card (drive 2) free space	SD memory card (drive 2) free space: the lower digit (unit: KB)
SD611		SD memory card (drive 2) free space: the higher digits (unit: KB)
SD614	Device/label memory (drive 3) usage status	Device/label memory (drive 3) usage status
SD616	Device/label memory (drive 3) capacity	Device/label memory (drive 3) capacity: the lower digits (unit: KB)
SD617		Device/label memory (drive 3) capacity: the higher digits (unit: KB)
SD618	Device/label memory (file storage area) capacity	Device/label memory (file storage area) (drive 3) capacity: the lower digits (unit: KB)
SD619		Device/label memory (file storage area) (drive 3) capacity: the lower digits (unit: KB)
SD620	Data memory (drive 4) usage status	Data memory (drive 4) usage status
SD622	Data memory (drive 4) capacity	Data memory (drive 4) capacity: the lower digits (unit: KB)
SD623		Data memory (drive 4) capacity: the higher digits (unit: KB)
SD626	Extended SRAM cassette capacity identification information	Capacity identification information of the Extended SRAM cassette
SD629	Program memory write (transfer) status	Write (transfer) status display (percent)
SD633	Data memory write (transfer) status	Write (transfer) status display (percent)
SD757	Current interrupt priority	Current interrupt priority
SD758	Interrupt disabling for each priority setting value	Interrupt disabling for each priority setting value
SD771	Specification of the number of write instruction executions to data memory	Specification of the number of write instruction executions to data memory
SD1210	Data logging setting No.1	Latest storage file number
SD1211	Latest storage file number	
SD1212	Data logging setting No.1	Oldest storage file number
SD1213	Oldest storage file number	
SD1214	Data logging setting No.1 Internal buffer free space	Internal buffer free space size (KB)
SD1215	Data logging setting No.1 Number of processing overflow occurrences	Number of processing overflow occurrences
SD1216	Data logging setting No.1 Data logging error cause	Data logging error cause
SD1220 to SD1226	Data logging setting No.2	Same configuration as the setting No.1
SD1230 to SD1236	Data logging setting No.3	Same configuration as the setting No.1
SD1240 to SD1246	Data logging setting No.4	Same configuration as the setting No.1
SD1250 to SD1256	Data logging setting No.5	Same configuration as the setting No.1
SD1260 to SD1266	Data logging setting No.6	Same configuration as the setting No.1
SD1270 to SD1276	Data logging setting No.7	Same configuration as the setting No.1
SD1280 to SD1286	Data logging setting No.8	Same configuration as the setting No.1
SD1290 to SD1296	Data logging setting No.9	Same configuration as the setting No.1
SD1300 to SD1306	Data logging setting No.10	Same configuration as the setting No.1
SD1400 to SD1463	Interrupt pointer mask pattern	Mask pattern
SD1504	Open completion signal	Open completion
SD1505	Open request signal	Open request

Supported instructions

The instructions supported by the Simulation function are shown below:

Sequence instruction

Category	Symbol
Contact instruction	AND, ANDF, ANDFI, ANDP, ANDPI, ANI, LD, LDF, LDFI, LDI, LDP, LDPI, OR, ORF, ORFI, ORI, ORP, ORPI
Association instruction	ANB, EGF, EGP, INV, MEF, MEP, MPP, MPS, MRD, ORB
Output instruction	FF, OUT, OUT C, OUT F, OUT LC, OUT LT/LST, OUT T/ST, OUTH T/ST, PLF, PLS, RST, RST F, SET, SET F
Shift instruction	SFT(P)
Master control instruction	MC, MCR
Termination instruction	END, FEND
Stop instruction	STOP
No operation instruction	NOP, NOPLF

Basic instruction

Category	Symbol
Comparison operation instruction	AND□(□_U), ANDD□(□_U), BKCM□(□_U), DBKCM□(□_U), LD□(□_U), LDD□(□_U), OR□(□_U), ORD□(□_U)
Arithmetic operation instruction	*(P)(□_U), +(P)(□_U), -(P)(□_U), /(P)(□_U), B*(P), B+(P), B-(P), B/(P), BK+(P)(□_U), BK-(P)(□_U), D*(P)(□_U), D+(P)(□_U), D-(P)(□_U), D/(P)(□_U), DB*(P), DB+(P), DB-(P), DB/(P), DBK+(P)(□_U), DBK-(P)(□_U), DDEC(P)(□_U), DEC(P)(□_U), DINC(P)(□_U), INC(P)(□_U)
Data transfer instruction	BLKMOV(B)(P), BMOV(P), BMOVL(P), BXCH(P), CML(P), CMLB(P), DCML(P), DFMOV(P), DFMOVL(P), DMOV(P), DXCH(P), FMOV(P), FMOVL(P), MOV(P), MOV(B)(P), SWAP(P), XCH(P)
Logical operation instruction	BKAND(P), BKOR(P), BKXNR(P), BKXOR(P), DAND(P), DOR(P), DXNR(P), DXOR(P), WAND(P), WOR(P), WXNR(P), WXOR(P)
Data shift instruction	BSFL(P), BSFR(P), DSFL(P), DSFR(P), SFL(P), SFR(P), SFTBL(P), SFTBR(P), SFTWL(P), SFTWR(P)
Bit processing instruction	BKRST(P), BRST(P), BSET(P), DTEST(P), TEST(P)
Data conversion instruction	ASC2INT(P), BCD(P), BIN(P), BKBCD(P), BKBIN(P), BTOW(P), DABCD(P), DABIN(P)(□_U), DBCD(P), DBIN(P), DBL2DINT(P), DBL2INT(P), DBL2UDINT(P), DBL2UINT(P), DDABCD(P), DDABIN(P)(□_U), DECO(P), DGBIN(P)(□_U), DGRY(P)(□_U), DHABIN(P), DINT2INT(P), DINT2UDINT(P), DINT2UINT(P), DIS(P), DNEG(P), DVAL(P)(□_U), EMOD(P), ENCO(P), FLT2DINT(P), FLT2INT(P), FLT2UDINT(P), FLT2UINT(P), GBIN(P)(□_U), GRY(P)(□_U), HABIN(P), INT2DINT(P), INT2UDINT(P), INT2UINT(P), NDIS(P), NEG(P), NUNI(P), SEG(P), UDINT2DINT(P), UDINT2INT(P), UDINT2UINT(P), UINT2DINT(P), UINT2INT(P), UINT2UDINT(P), UNI(P), VAL(P)(□_U), WTOB(P)

Application instruction

Category	Symbol
Program branch instruction	CJ, GOEND, JMP, SCJ
Program execution control instruction	DI, EI, IMASK, IRET, SIMASK, WDT(P)
Rotation instruction	DRCL(P), DRCL(P), DROR(P), RCL(P), RCR(P), ROL(P), ROR(P)
Data processing instruction	DMAX(P)(□_U), DMEAN(P)(□_U), DMIN(P)(□_U), DSERDATA(P), DSORTD(□_U), DSUM(P), DWSUM(P)(□_U), MAX(P)(□_U), MEAN(P)(□_U), MIN(P)(□_U), SERDATA(P), SORTD(□_U), SUM(P), WSUM(P)(□_U)
Structure creation instruction	BREAK(P), CALL(P), ECALL(P), EFCALL(P), FCALL(P), FOR, NEXT, RET, XCALL
Data table operation instruction	FDEL(P), FIFR(P), FIFW(P), FINS(P), FPOP(P)
Debugging and failure diagnostic instruction	LEDR
String processing instruction	\$(P), \$MOV(P), \$MOV(P)_WS, AND\$□, BCDDA(P), BINDA(P)(□_U), BINHA(P), DBCDDA(P), DBINDA(P)(□_U), DBINHA(P), DSTR(P)(□_U), ESTR(P), INSTR(P), INT2ASC(P), LD\$□, LEFT(P), LEN(P), MIDR(P), MIDW(P), OR\$□, RIGHT(P), SJS2WS(P), SJS2WSB(P), STR(P)(□_U), STRDEL(P), STRINS(P), WS2SJS(P)
Data control instruction	BAND(P)(□_U), DBAND(P)(□_U), DLIMIT(P)(□_U), DSCL(P)(□_U), DSCL2(P)(□_U), DZONE(P)(□_U), LIMIT(P)(□_U), SCL(P)(□_U), SCL2(P)(□_U), ZONE(P)(□_U)
File register operation instruction	ADRSET(P), QDRSET(P), RSET(P), ZRRDB(P), ZRWRB(P)
Clock instruction	ANDDT□, ANDTM□, DATE+(P), DATE-(P), DATERD(P), DATEWR(P), LDDT□, LDTM□, ORDT□, ORTM□, S(P).DATE+, S(P).DATE-, S(P).DATERD, SEC2TIME(P), TIME2SEC(P)
Program control instruction	POFF(P), PSCAN(P), PSTOP(P)
PID control instruction	PIDCONT(P), PIDINIT(P), PIDPRMW(P), PIDRUN(P), PIDSTOP(P), S(P).PIDCONT, S(P).PIDINIT, S(P).PIDPRMW, S(P).PIDRUN, S(P).PIDSTOP

Category	Symbol
Reading/writing data instruction	S(P).DEVLD, SP.DEVST, SP.FREAD, SP.FWRITE
Real number instruction	ACOS(P), ACOSD(P), ANDE□, ANDED□, ASIN(P), ASIND(P), ATAN(P), ATAND(P), BACOS(P), BASIN(P), BATAN(P), BCOS(P), BDSQRT(P), BSIN(P), BSQRT(P), BTAN(P), COS(P), COSD(P), DBL2FLT(P), DEG(P), DEGD(P), DINT2DBL(P), DINT2FLT(P), E*(P), E+(P), E-(P), E/(P), ED*(P), ED+(P), ED-(P), ED/(P), EDMAX(P), EDMIN(P), EDMOV(P), EDNEG(P), EDSQRT(P), EMAX(P), EMIN(P), EMOV(P), ENEG(P), EREXP(P), ESQRT(P), EVAL(P), EXP(P), EXPD(P), FLT2DBL(P), INT2DBL(P), INT2FLT(P), LDE□, LDED□, LOG(P), LOG10(P), LOG10D(P), LOGD(P), ORE□, ORED□, POW(P), POWD(P), RAD(P), RADD(P), SIN(P), SIND(P), TAN(P), TAND(P), UDINT2DBL(P), UDINT2FLT(P), UINT2DBL(P), UINT2FLT(P)
Random number instruction	RND(P), SRND(P)
Index register instruction	ZPOP(P), ZPUSH(P)
Special counter instruction	UDCNT1, UDCNT2
Special timer instruction	STMR, TTMR
Shortcut control instruction	ROTC
Ramp signal instruction	RAMP
Pulse related instruction	PLSY, PWM, SPD
Matrix input instruction	MTR
Database access instruction	DBCLOSE(P), DBCOMMIT(P), DBDELETE(P), DBEXPORT(P), DBIMPORT(P), DBINSERT(P), DBOPEN(P), DBROLBAK(P), DBSELECT(P), DBTRANS(P), DBUPDATE(P)
Direct read/write in 1-byte unit	ZRRDB(P), ZRWRB(P)
Indirect address read	ADRSET(P)
Timing check instruction	DUTY, TIMCHK
Module access instruction	DFROM(P), DFROMD(P), DTO(P), DTOD(P), FROM(P), FROMD(P), TO(P), TOD(P), TYPER(D), UNINFRD(P)
Logging instruction	LOGTRG, LOGTRGR

Enabled/disabled parameter items

The Simulation function does not support some parameter setting items.

The following shows the parameter setting items that are supported by the Simulation function.

System parameter

Setting item		
I/O Assignment	Base/Power/Extension Cable Setting	Slots
	I/O Assignment Setting	Module Name
		Module Status Setting
		Module/Points/Start XY
		Control PLC Setting

CPU parameter

Setting item	
Operation Related Setting	Timer Limit Setting
	RUN-PAUSE Contact Setting
	Remote Reset Setting
	Output Mode Setting of STOP to RUN
	Clock Related Setting
Interrupt Settings	Fixed Scan Interval Setting
	Fixed Scan Execution Mode Setting
	Interrupt Enable Setting in Executing Instruction
	Block No. Save/Recovery Setting
Service Processing Setting	Device/Label Access Service Processing Setting
File Setting	File Register Setting
	Initial Value Setting
	File Setting for Device Data Storage

Setting item			
Memory/Device Setting	Device/Label Memory Area Setting	Extended SRAM Cassette Setting	
		Device/Label Memory Area Capacity Setting	
		Device/Label Memory Area Detailed Setting	Points
			Local Device
	Latch Range Setting		
	Latch Type Setting of Latch Type Label		
	Index Register Setting		
Refresh Memory Setting			
Pointer Setting			
Internal Buffer Capacity Setting			
RAS Setting	Scan Time Monitoring Time (WDT) Setting		
	Constant Scan Setting		
	Error Detections Setting		
	CPU Module Operation Setting at Error Detected		
	LED Display Setting		
	Event History Setting		
Program Setting	Program Setting	Program Setting	Program Name
			Execution Type
			Detailed Setting Information (Fixed Scan)
			Detailed Setting Information (Event)
			Device/File Use or not
	FB/FUN File Setting		

Module buffer memory

The following shows the number of points of buffer memory (U□\G□) for a module supported by the Simulation function.

Series	Module	Points	
MELSEC iQ-R series	Programmable controller CPU	524288	
	Motion controller CPU	524288	
	Input	512	
	Output	512	
	I/O	512	
	Analog input	131072	
	Analog output	131072	
	Simple motion	131072	
	Pulse I/O, Positioning	131072	
	Information module	Serial communication	65536
		Ethernet	2097152
	Network module	CC-Link	32768
		CC-Link IE Field Network	65536
		CC-Link IE Controller Network	2097152
Q series	Analog input	131072	
	Analog output		
	Pulse I/O and Positioning		
	Information module		
	Network module		
	Analog I/O		
	Temperature input		
	Temperature control module		
	Loop control		
	Energy measuring module		

Link devices of network module

The following shows the link devices and the number of points for network module supported by the Simulation function.

Series	Module		Device type	Points
MELSEC iQ-R series	Network module	Ethernet (When CC-Link IE Field Network is used)	J□\SB	512
			J□\SW	512
			J□\X	16384
			J□\Y	16384
			J□\W	16384
		CC-Link IE Controller Network	J□\SB	512
			J□\SW	512
			J□\X	8192
			J□\Y	8192
			J□\B	32768
		CC-Link IE Field Network	J□\SB	512
			J□\SW	512
			J□\X	16384
			J□\Y	16384
			J□\W	16384

Considerations

The following describes the considerations on debugging programs using the Simulation function.

Simulation time

Since the instruction processing speed differs between the Simulation function and CPU module, the simulator operates as follows.

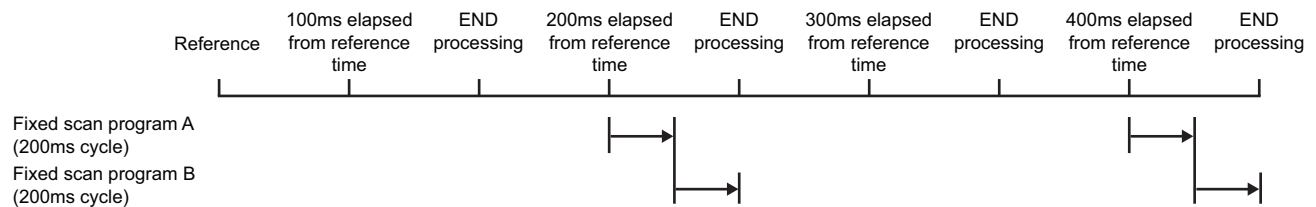
- The simulation time is calculated by adding the average execution time per one instruction, which is calculated based on the PC MIX value, at every internal instruction execution of a CPU module.

The simulator operates behind the actual time when the simulation time takes longer than the actual time due to the performance of the personal computer. The simulation time gains in accordance with the actual time when the actual time takes longer than the simulation time.

Operation of fixed cycle execution program

The program is executed in accordance with the Simulation time.

The timer and the fixed cycle interrupt are the same.



Handling of floating point

A rounding error may occur in the operation result of an instruction using floating point. The result will not be the same as that of a CPU module.

Module

■I/O module

The Simulation function does not support I/O module.

■Intelligent function module

The buffer memory for Intelligent function module is reserved by the system parameter setting, "I/O Assignment Setting".

The buffer memory (U□\G□) cannot be accessed when the I/O assignment setting is not configured.

By selecting an Intelligent function module as the module type and setting the number of points in the I/O assignment setting, the buffer memory according to the specified number of points is created.

If the module type is not specified, it becomes an empty slot.

If the module type is specified but the number of point is not specified, the specified number of points for the module becomes equivalent to one specified for "Setting of Points Occupied by Empty Slot" of system parameter.

Network

The Simulation function does not support the network.

Watchdog timer

It operates in accordance with the simulation time.

Attachment of extended SRAM cassette

The simulator operates as if an extended SRAM cassette (8 MB) was attached.

Drive usage

The data in the ROM drive of CPU module (program memory/data memory) is stored in a temporary folder in the hard disk of a personal computer.

The ROM drive usage per data depends on the hard disk of a personal computer.

Enabling the remote RESET

The simulator operates as if "Enable" was set to "Remote Reset" in the Simulation function regardless of "Remote Reset Setting" under "Operation Related Setting" of the CPU parameter.

Writing parameters to Intelligent function module

When writing parameters on the "Online Data Operation" screen, the availability differs according to the interaction with an Intelligent function module.

○: Writable, ×: Not writable, —: Not supported

Parameter	Cooperated	Not cooperated
Simple motion module setting	○	×
Other than above	—	×

CPU number

The Simulation function only supports CPU No.1.

The Simulation function is performed by handling CPU No.1 as the host CPU when the host CPU is set to CPU No.2 to CPU No.4 in "I/O Assignment Setting" of the system parameter.

Ex.

The host CPU is set to CPU No.4 in "I/O Assignment Setting".

CPU number	I/O assignment setting	Simulation
CPU No.1	R04CPU	R32CPU (host CPU)
CPU No.2	R08CPU	R08CPU
CPU No.3	R16CPU	R16CPU
CPU No.4	R32CPU (host CPU)	R32CPU

Clock function

It operates in accordance with the simulation time.

The clock of a personal computer is reflected to the time of the clock function every time the CPU module is reset.

Appendix 5 USB Driver Installation Procedure

To communicate with a CPU module via USB, installing a USB driver is required.

The procedure of USB driver installation is as shown below.

If multiple MELSOFT products are installed previously, refer to their installed location.

Windows® XP

Operating procedure

1. Connect the personal computer and a CPU module with a USB cable, and power the programmable controller CPU.
2. Select "Install from a list or specific location (Advanced)" on the "Found New Hardware Wizard" screen.
3. Select "Search for the best driver in these locations" on the next screen. Select "Include this location in the search", and specify 'MELSOFT\Easysocket\USBdrivers' in the folder where GX Works3 has been installed.

Precautions

If the driver cannot be installed, check the following settings on Windows®.

The USB driver may not be installed when "Block—Never install unsigned driver software" is selected in [Control Panel] ⇒ [System] ⇒ [Hardware] ⇒ [Driver Signing].

Select "Ignore — Install the software anyway and don't ask for my approval", or "Warn — Prompt me each time to choose an action" in [Driver Signing], and execute the USB driver installation.

Windows Vista®

Operating procedure

1. Connect the personal computer and a CPU module with a USB cable, and power the programmable controller CPU.
2. Select "Locate and install driver software (recommended)" on the "Found New Hardware Wizard" screen.
3. Select "Browse my computer for driver software (advanced)" on the "Found New Hardware" screen.
4. Select "Search for the best driver in these locations" on the displayed screen. Select "Include subfolders" and specify 'MELSOFT\Easysocket\USBdrivers' in the folder where GX Works3 has been installed.

Precautions

When "Windows can't verify the publisher of this driver software" is displayed during the installation, select "Install this driver software anyway".

Windows® 7 or later

Operating procedure

1. Connect the personal computer and a CPU module with a USB cable, and power the programmable controller CPU.
2. Select [Control Panel] ⇒ [System and Security] ⇒ [Administrative Tools] ⇒ [Computer Management] ⇒ [Device Manager] from Windows® Start*1. Right-click "Unknown device" and click "Update Driver Software".
3. Select "Browse my computer for driver software" on the "Update Driver Software" screen, and specify 'MELSOFT\Easysocket\USBdrivers' in the folder where GX Works3 has been installed on the next screen.

*1 Select [All apps] on the Start screen or [Start] ⇒ [All Programs].

MEMO

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