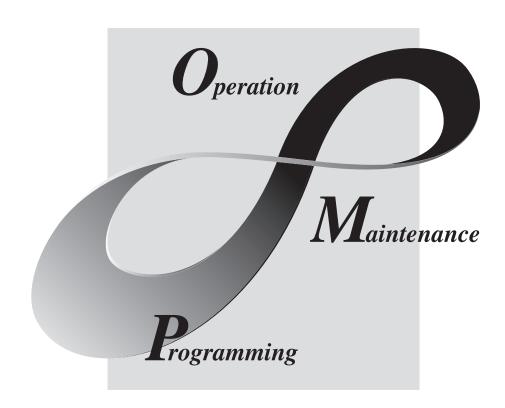
PX Developer Version 1

MITSUBISHI

Operating Manual

(Programming Tool))





SAFETY PRECAUTIONS ●

(Always read these instructions before using this equipment.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the CPU module user's manual. In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".



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



Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the \triangle CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[Startup and Maintenance Precautions]



Always read this manual carefully and ensure safety before online operation.
 Failure to do so may cause incorrect operation, resulting in damage to a machine or an accident.

REVISIONS

*The manual number is given on the bottom left of the back cover.

*Manual number	Revision
SH (NA)-080369E-A	First edition
SH (NA)-080369E-B	Modifications
	Section 6.14, Section 7.12.1
SH (NA)-080369E-C	New additions
	Section 5.6.8, Section 5.7.7, Section 6.9.2, Section 7.7.3, Section 7.14.3, Chapter 10, Section 13.2.3, Section 15.5.7, Appendix 3.2 Partial modifications and additions
	Section 1.2, Section 2.1.3, Section 2.1.4, Section 2.2, Section 3.1, Section 3.2, Section 3.3, Section 5.1, Section 5.5, Section 5.6.3, Section 5.7.1, Section 6.9, Section 6.14, Section 7.2.4, Section 7.3.1, Section 7.5.1, Section 7.7, Section 7.7.2, Section 7.10.1, Section 7.10.2, Section 7.12.1, Section 7.14.1, Section 7.14.2, Section 8.2.2, Section 8.3, Chapter 13, Section 15.3, Appendix 3 Section 6.9 changed to Section 6.9.1 Section 7.7.2 and Section 7.7.3 integrated Chapter 10 to 14 changed to Chapter 11 to 15
SH (NA)-080369E-D	Addition model
	Q12PRHCPU, Q25PRHCPU
	New additions
	Section 11.5
	Partial modifications and additions
	Generic Terms, Abbreviations and Terms, Section 1.1 to 1.2, Section 2.1 to 2.2, Section 4.1, Section 5.3, Section 5.5, Section 5.7.4 to 5.7.5, Section 5.8.1, Section 5.10, Section 6.2 to 6.3, Section 6.12, Section 6.14, Section 7.4.3, Section 7.5.4, Section 7.6.1, Section 7.6.3, Section 7.14.1 to 7.14.2, Section 8.2.2, Section 8.3, Section 10.1.4 to 10.1.5, Section 11.2 to 11.4, Section 11.6 to 11.7, Section 12.1 to 12.3, Section 13.3, Section 13.8, Section 14.1, Section 15.5, Appendix 2 to 3
SH (NA)-080369E-E	New additions
	Section 10.2, Section 12.1, Section 12.2, Section 12.4.1, Section 12.4.2, Section 12.4.3, Section 12.5, Section 12.6, Section 13.6.1, Appendix 4
	Partial modifications and additions
	Section 2.2, Section 3.2, Section 3.3, Section 5.3, Section 5.5, Section 5.6, Section 5.7.4, Section 7.5.1, Section 7.5.4, Section 7.5.5, Section 10.2.1, Section 10.2.2, Section 11.4, Section 11.7, Section 13.1, Section 13.2.1, Section 13.3, Section 13.6, Appendix 3, Section 12.1 changed to Section 12.3 Section 12.2 changed to Section 12.4 Section 12.3 changed to Section 12.7 Section 13.6 changed to Section 13.6.2
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*The manual number is given on the bottom left of the back cover.

Print date	*Manual number	Revision
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		Section 6.15, Section 10.2.3
		Partial modifications and additions
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		Partial modifications and additions
		Generic Terms, Abbreviations and Terms, Section 2.1.2, Section 2.1.3, Section 2.1.4, Section 2.2, Section 3.2, Section 3.3, Section 5.1, Section 5.5, Section 5.6.2, Section 5.7.4, Section 5.8.1, Section 6.14, Section 6.15.7, Section 7.3.1, Section 7.4.1, Section 7.5.1, Section 7.6.1, Section 7.7.1, Section 7.8.1, Section 7.12.3, Section 8.3, Section 11.4, Section 12.3, Section 12.4.2, Section 12.4.3, Section 13.8.1, Chapter 15, Section 15.5.3, Appendix 2, Appendix 3, Appendix 4.1, Appendix 4.2, INDEX Section 10.2.1 to 10.2.3 are summarized in Section 10.2.
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		Q02PHCPU, Q06PHCPU
		Partial modifications and additions
		MANUALS, GENERIC TERMS, ABBREVIATIONS, AND TERMS, Section 1.1, Section 2.1.1, Section 2.1.2, Section 2.1.4, Section 2.2, Section 5.1, Section 5.3, Section 5.10, Section 6.2, Section 6.14, Section 6.16, Section 7.12.2, Section 8.3, Section 8.4.2, Section 11.7, Section 12.1, Section 12.3, Section 12.4.3, Section 12.5.2, Section 13.5, Section 13.8.1, Section 15.5.2, Appendix 3, Appendix 4.1

Japanese manual version SH-080259-P

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INTRODUCTION

Thank you for choosing the Mitsubishi MELSOFT series Integrated FA software. Read this manual and make sure you understand the functions and performance of MELSOFT series thoroughly in advance to ensure correct use.

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MANUALS

The following manuals are also related to this product. Refer to the following table for ordering a manual.

Related manuals

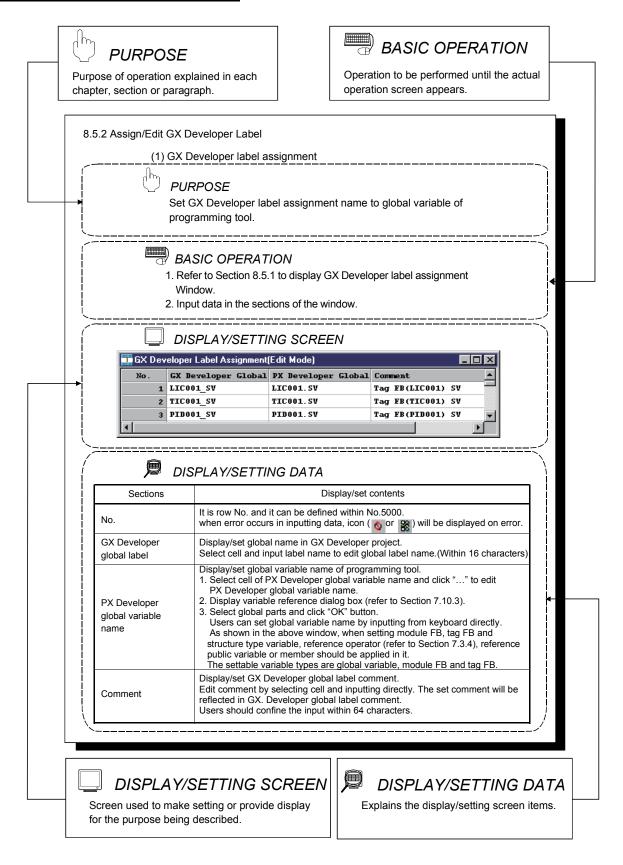
Manual name	Manual number (model code)
PX Developer Operating Manual (Monitor Tool) Explains the operation methods of the monitor tool and methods for monitoring and controlling DDC processing with tag FB. (Sold separately.)	SH-080370E (13JU39)
PX Developer Programming Manual Explains details of programming with PX Developer, lists of FB parts, and the PID instructions. (Sold separately.)	SH-080371E (13JW00)
PX Developer Operating Manual (GOT Screen Generator) Explains the generation procedure for GOT screen project and details about generated screen. (Sold separately.)	SH-080772ENG (13JU61)
PX Developer Operating Manual (SCADA Interaction) Explains the interaction between PX Developer monitor tool and SCADA software. (Sold separately.)	SH-080773ENG (13JU62)

CAUTION

- Please note that we do not guarantee commercially available software compatible with Microsoft[®] Windows[®] Operating System introduced in this manual
- The software copyright of this product belongs to Mitsubishi Electric Corporation.
- No contents in this manual can be reproduced or duplicated in any form or by any means without permission.
- Although we make utmost efforts, this manual may not completely follow the revisions of the software and hardware.
- In principle, this software should be purchased by one set per personal computer or by license purchase.
- This product (including this manual) can only be used under the software license agreement.
- Please note that we are not responsible for any influence resulting from operating this product (including this manual).
- The contents of this manual are subject to change without notice.

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HOW TO USE THIS MANUAL



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There are also the following types of explanations.



HELPFUL OPERATION

Explains the practical operation under the condition that the BASIC OPERATION or DISPLAY/SETTING DATA is not applicable although the purpose is in conformity.



HELPFUL CORRECTIVE ACTIONS

Explains the processing methods for executing operations abnormally according to "BASIC OPERATION" or "DISPLAY/SETTING DATA".

POINT			

Informs items to be noted and useful functions relevant to the contents in the chapter or section.

The following table explains symbols in this manual and their description.

Symbol	Description
	Expresses the menu names in the menu.
r 1	[] $ ightarrow$ [] expresses the drop-down menu.
[]	Example: [Project] → [New Project] menu
	[Online] → [Monitor] → [Start Monitor] menu
	Expresses the tool buttons of the toolbar corresponding to the drop-down menu.
()	Examples: [Project] → [Save] menu (🖫)
, ,	[Online] → [Monitor] → [Start Monitor] menu (📳)
" "	Expresses a command button.
	Example: "OK" button
4455	Expresses dialog box tab.
<< >>	Example: < <change password="">> tab</change>

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MANUAL ORGANIZATION

This manual consists of 15 chapters and appendices.

This manual is organized assuming that PX Developer is used and executed according to following sequence from DDC processing of CPU module system programming to running.

<Operating procedures before running the process control system>

Operating procedure 1: Setting and wiring of the process control system	Reference
Setting and wiring between PLC (CPU module, network module and I/O module, etc.) and process-control device as well as other external device setting.*	QCPU User's Manual (Hardware Design, Maintenance and Inspection) QCPU User's Manual(Function Explanation, Program Fundamentals)

*: The parameter settings necessary to use the network module and intelligent function module should be made in advance using GX Developer, GX Configurator, etc.

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Operating procedure 2: Confirm the basis of programming by FBD language in PX Developer programming tool.	Reference	
Confirm the usable FBD parts and their functions in programming tool.	PX Developer Programming Manual	



Operating procedure 3: Install PX Developer.	Reference	
Confirm the usable system for PX Developer.	Chapter 2	
	Method of installing the PX	
Install PX Developer on a personal computer.	Developer	
	(Included with the product)	



Operating procedure 4: Make a project and program with PX Developer programming tool.	Reference		
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Learn the screen configuration and basic operations of the programming tool. Chapter 5			
Make a PX Developer project.	Chapter 6		
 Start GX Developer from PX Developer (refer to Section 7.14.1) and configure GX 	GX Developer Operating		
Developer project (PLC parameters or network parameters).	Manual		
Set PX Developer project parameters.	Chapter 6		
 Program in programming tool and in FBD language. Make the ladder program by GX Developer when necessary. 	Chapter 7 to Chapter 9		
Set the execution conditions of the program.	Section 7.12		



(To the next page)

(From the <u>previous page</u>)



Operating procedure 5: Convert (compile) and execute the finished programs.	Reference		
Convert (compile) the FBD program with the programming tool.	Chapter 11		
Connect the programming tool with CPU module.			
Specify the destination of PLC connection.			
Write the program compiled by the programming tool in CPU module.	Chapter 12		
Write the ladder program and PLC parameters to CPU module when making the			
ladder program by GX Developer.			



Operating procedure 6: Confirm the online operation and program operation by programming tool.	Reference
 Switch the programming tool to MONITOR mode, then start monitoring. Change the current value of the variable according to needs. Pause FB and confirm the program operation. 	Chapter 13
Execute the FBD program diagnosing if necessary.	Chapter 14



Operating procedure 7: Monitor the processing being executed on CPU module with PX Developer monitor tool.	Reference		
Start the monitor tool, and change the ENGINEER mode.			
Confirm the screen configuration and basic operations.			
Set the monitor target project * and PLC transfer setup on the monitor tool			
setting screen.	PX Developer		
Set the monitor objects and monitor type.	Operating Manual		
Confirm the contents of tag data by monitoring on the faceplate.	(Monitor Tool)		
Test operation and tuning.			
Change the monitor tool mode into the operator mode.			
Monitor the processing executed on CPU module.			

^{*:} When PLC download has been performed with the programming tool, reload the monitor target project with the monitor tool.

GENERIC TERMS, ABBREVIATIONS, AND TERMS

The following table shows the generic terms, abbreviations, and terms in this manual.

(1) Generic terms and abbreviations

Generic ter	m/abbreviation	Description			
PX Developer		Abbreviation for PX Developer Version 1 (SW1D5C-FBDQ-E)			
GX Developer		Abbreviation for GX Developer Version 7 (SW7D5C-GPPW-E Version 7.20W) or later			
FBD program		Generic term for a program created in FBD language			
FBD part		Generic term for parts (FB part, function part, variable part, constant part, comment part, etc.)			
T BD part		used by the programming tool			
Global part		Generic term for module FB, tag FB, and global variable			
Peripheral device	e	Generic term for the personal computer on which PX Developer can be used			
		Generic term for Microsoft® Windows Vista® Home Basic Operating System,			
		Microsoft® Windows Vista® Home Premium Operating System,			
Windows Vista®		Microsoft® Windows Vista® Business Operating System,			
		Microsoft® Windows Vista® Ultimate Operating System, and			
		Microsoft® Windows Vista® Enterprise Operating System			
Windows® XP		Generic term for Microsoft® Windows® XP Professional Operating System and			
		Microsoft® Windows® Home Edition Operating System			
QCPU		Generic term for Q00J, Q00, Q01, Q02(H), Q02PH, Q02U, Q03UD, Q04UDH, Q06H, Q06PH,			
		Q06UDH, Q12H, Q12PH, Q12PRH, Q25H, Q25PH, and Q25PRHCPUs			
Process CPU		Generic term for Q02PHCPU, Q06PHCPU, Q12PHCPU, and Q25PHCPU			
Redundant CPU		Generic term for Q12PRHCPU and Q25PRHCPU			
CPU module		Generic term for the Process CPU and Redundant CPU			
PC CPU module		Abbreviation for MELSEC-Q series-compatible PC CPU module manufactured by CONTEC CO. ,			
	T	LTD.			
Computer link	For A series	Generic term for A1SJ71C24-R2, A1SJ71C24-R4, A1SJ71C24-PRF, A2CCPUC24,			
module		A2CCPUC24-PRF, and A1SCPUC24-R2			
	For AnU series	Generic term for AJ71UC24, A1SJ71UC24-R2, A1SJ71UC24-R4, and A1SJ71UC24-PRF			
Serial	For QnA series	Generic term for AJ71QC24, AJ71QC24-R2, AJ71QC24-R4, AJ71QC24N, A1SJ71QC24,			
communication	·	A1SJ71QC24-R2, AJ71QC24N-R2, AJ71QC24N-R4, A1SJ71QC24N, and A1SJ71QC24N-R2			
module	For Q series	Generic term for QJ71C24, QJ71C24-R2, QJ71C24N, QJ71C24N-R2, and QJ71C24N-R4			
	extension base unit	Abbreviation for Q65WRB extension base unit for redundant system			
CC-Link IE contr module	oller network	Generic term for QJ71GP21-SX and QJ71GP21S-SX			
MELSECNET/H	module	Generic term for QJ71LP21, QJ71LP21-25, QJ71LP21S-25, QJ71LP21G, and QJ71BR11			
Ethernet module		Generic term for E71, QE71, and Q series-compatible E71			
		Generic term for AJ71E71-S3, A1SJ71E71-B2-S3, A1SJ71E71-B5-S3, AJ71E71N-B2,			
E71		AJ71E71N-B5T, A1SJ71E71N-B2, A1SJ71E71N-B5T, AJ71E71N-T, A1SJ71E71N-T,			
		AJ71E71N-B5, A1SJ71E71N-B5, AJ71E71N3-T, and A1SJ71E71N3-T			
		Generic term for AJ71QE71, AJ71QE71-B5, A1SJ71QE71-B2, A1SJ71QE71-B5, AJ71QE71N-T,			
QE71		A1SJ71QE71N-T, AJ71QE71N-B5, A1SJ71QE71N-B5, AJ71QE71N-B2, A1SJ71QE71N-B2,			
		AJ71QE71N-B5T, A1SJ71QE71N-B5T, AJ71QE71N3-T, and A1SJ71QE71N3-T			
Q series-compat	ible E71	Generic term for QJ71E71-100, QJ71E71-B5, QJ71E71-B2, and QJ71E71			
CC Limbs man advila		Generic term for AJ61BT11, A1SJ61BT11, AJ61QBT11, A1SJ61QBT11, QJ61BT11, and			
CC-Link module		QJ61BT11N			
C24		Generic term for computer link module and serial communication module			
G4 module		Abbreviation for AJ65BT-G4(-S3) peripheral connection module			
ACPU		Generic term for the programmable controller CPU that can be used with MELSEC-A series			
CC-Link IE controller network		Abbreviation for CC-Link IE controller network system compatible with the Q series			
MELSECNET/H		Abbreviation for MELSECNET/H network system compatible with the Q series			
MELSECNET/10		Abbreviation for MELSECNET/10 network system compatible with the AnU, QnA/Q4AR			
MELOCONET')	Abbreviation for function and performance-compatible mode so that the MELSECNET/H network			
MELSECNET/10 compatible mode		system can have upward compatibility to existing MELSECNET/10 network system			

Generic term/abbreviation	Description
CC-Link IE controller network board	Generic term for Q80BD-J71GP21-SX and Q80BD-J71GP21S-SX
CC-Link ie controller network board	Abbreviation for CC-Link IE controller network interface board
MELSECNET/H board	Abbreviation for MELSECNET/H interface board
MELSECNET/10 board	Abbreviation for MELSECNET/10 interface board
Ethernet board	Generic term for Ethernet PC card and Ethernet interface board supported by Windows®
CC-Link board	Generic term for A80BDE-J61BT11, A80BDE-J61BT13, and Q80BD-J61BT11N
Personal computer	Generic term for IBM-PC/AT-compatible personal computer
Programming tool	Abbreviation for PX Developer programming tool
Monitor tool	Abbreviation for PX Developer monitor tool

(2) Terms

Term	Description
DDC	Abbreviation for Direct Digital Control
DDC	This designates control that fulfils controller's functions with digital device.
FB	Abbreviation for Function Block
FB	This designates function block unit in a program.
	Function Block Diagram language specified in IEC61131-3
FBD	Programs are made by wiring specifically processed blocks, variables, and constants so that they can follow
	a flow of data signal.
Project	Unit that gathers and manages a series of data necessary for configuration of FBD programs executed by
Fioject	the CPU module
Tag	Identification symbol attached to each DDC processing defined by JIS
ray	This can be likened to a tag attached to process control equipment.
Sequence control	Control that processes each control step according to preset order and procedures
Loop control	Control method that repeatedly executes processing of specific parts
Member	Basic data items in structure type data (For details of structure, refer to Chapter 9.)
	Data that data attached to DDC processing indicated with a tag (process condition data/process status data)
Tag data	is summarized
	Accessing the tag data can monitor status and set conditions of the relevant DDC.
Tag FB	Function block works as a controller and indicator including tag data
Module FB	Function block for inputting/outputting data of analog I/O module, digital I/O module, and high-speed counter
Wodule I D	module connected to the base unit on which the programmable controller is mounted or CC-Link field bus
Faceplate	Gauge window on which such as a controller is displayed in image format
Тассріаіс	Tag data values can be operated on this window.
	Programmable controller device required for executing FBD programs, used for automatically assigning
System resource	variables
	(This cannot be used in ladder programs.)
Ladder program	Program method designed so that contact sequence can be applied to programmable controller language
Edddor program	Draw two vertical control bus lines and describe a contact between the buses for programming.
	Part names (such as VAR) that cannot be used as various element names (variable name, FB variable
Reserved word	name, and structure name, etc.).
	For reserved word, refer to Appendix 1.
Cross reference	List that shows where variables are declared and used
Assignment information	'*.mdb' file created when compilation is executed with the programming tool
database	This file stores assignment information of variables for storing such as tag data and device information of the
	CPU module.
	Mode for determining the operation method of the redundant system
Operation mode	The following three modes are available.
	Backup mode
	Separate mode Paleur mode
	Debug mode Made for a great an artists of the restrict o
	Mode for normal operation of the redundant system
Backup mode	If a failure or an error occurs in the control system, the standby system switches to the control system to
	continue the control of the redundant system.
<u> </u>	The operation mode can be switched to the separate mode using GX Developer.

Term	Description
Separate mode	Mode for maintaining a system (partial modification of a program, replacement of modules mounted on the main base unit) without stopping the control during run of the redundant system. During this mode, different programs can be executed in the control system and standby system. System switching cannot be made in this mode (User switching is possible). The operation mode can be switched to the backup mode using GX Developer.
Debug mode	Mode for performing a debug using a single system prior to redundant system operation. This permits operations without connecting tracking cables. In this mode, the CPU module is fixed to system A, control system. (Tracking of the redundant system is not performed.) Set/cancel this mode in the redundant parameter setting of GX Developer.
Operation mode change	Switching of the operation mode for system A and system B using GX Developer while the redundant system is running. The operation mode can be switched between the backup mode and separate mode.
System A	System to which system A connector for tracking cable is connected in the redundant system
System B	System to which system B connector for tracking cable is connected in the redundant system
System switching System switching User switching	Control switching to backup system to continue system control and network communication when a trouble occurs in the system that performs control in the redundant system (when a failure or an error occurs in the power supply system, mounted module, or network). (Switching between control system and standby system to avoid system down) The following two types are available. System switching Automatic system switching by the redundant system when a trouble occurs User switching System switching by sequence program/GX Developer
Control system	A system that performs program operation, system control, and network communication in the redundant system When system A and system B start concurrently in the backup mode, the system A will be the control system. (Concurrent startup: One system starts within three seconds after the other system has started.) When the system A and system B start separately, a system that starts first will be the control system.
Standby system	Backup system to continue system control in case of a failure or an error in the module in the control system in the redundant system (The CPU module in the standby system does not calculate programs.) When system A and system B start concurrently in the backup mode, the system B will be the standby system. (Concurrent startup: One system starts within three seconds after the other system has started.) When the system A and system B start separately, a system that starts later will be the standby system.
Tracking transfer function	Data transfer function that keeps the data of control system and standby system consistent. This function enables the standby system to serve as the control system to continue the system control in case of system down of the control system. The Redundant CPU can perform tracking transfer without making the tracking settings, as it tracking transfer setting data has been set by default. (Change tracking transfer setting data using GX Developer.)
Redundant system	System configured using Redundant CPUs This system consists of two basic systems including CPU modules, power supply modules, and network modules. (If module error occurs in one system, the other system continues the system control. Thus, system reliability is improved.) To configure the redundant system, prepare two sets of the systems where the above modules of the same models are mounted on the base unit, and connect the CPU modules with tracking cables.
Redundant parameter	Parameter for setting operation mode of Redundant CPU system and tracking transfer setting data (tracking setting) Use GX Developer to set the parameter.

MEMO

1 OVERVIEW

1.1 Overview

This manual explains the functions and operations of PX Developer Programming Tool. As for monitor tool, please refer to PX Developer Operating Manual (Monitor Tool).

This programming tool has the following functions:

- Create and edit FBD programs in accordance with the IEC61131-3 International Standard
- Compile from FBD program to ladder program
- Monitor the programs (ladder programs converted from FBD language) executed on CPU module

Following are the communication routes applicable for this programming tool:

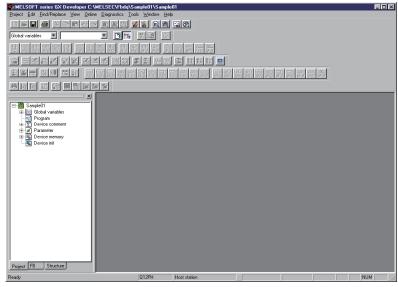
- Serial/USB
- Ethernet
- MELSECNET/10 (it is necessary to set Process CPU as MELSECNET/10 compatibility mode. Inapplicable to Redundant CPU, as the device is incompatible.)
- MELSECNET/H
- CC-Link IE controller network
- CC-Link

GX Developer is required to run the PX Developer programming tool.

Note that the combination of GX Developer and PX Developer varies with the CPU module connected as shown below.

Connected CPU	PLC type	Using the CC-Link IE controller network connection		Not using the CC-Link IE controller network connection	
	7.	GX Developer	PX Developer	GX Developer	PX Developer
Process CPU	Q02PHCPU, Q06PHCPU	Version 8.68W	on 8.68W Version 1.18U	Version 8.68W	Version 1.18U
	Q12PHCPU, Q25PHCPU			Version 7.20W	Version 1.00A
Redundant CPU	Q12PRHCPU, Q25PRHCPU			Version 8.18U	Version 1.06G





GX Developer starts!

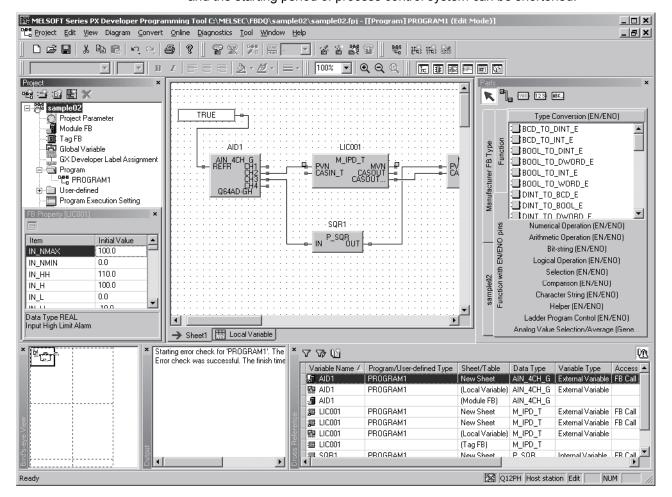
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The programming tool has the following modes:

- Edit mode
- Monitor mode

1.2 Features

(1) Easy programming only by arranging and connecting FB It is very complex and troublesome to describe DDC processing in the ladder program, but it is possible to make a visually understandable program by the programming tool with FBD language in accordance with the IEC61131-3 International Standard. Thus the time and cost of programming can be saved, and the starting period of process control system can be shortened.



(2) Cooperation with ladder program

In a batch processing system that integrates sequence and loop control, a ladder program for the sequence control can coexist with a FBD program that can simply describe the loop control in a single CPU module.

(3) Shorten DDC processing time by supplying tag FB The users are provided with an applicable loop processing FB (tag FB) integrating CPU module dedicated commands for process control and tag data,

(4) Shorten the man-hours for program access by providing FB for modules access processing

so as to shorten the DDC processing time.

It is unnecessary to make a ladder program for input/output access because FB (module FB) has provided for the access of Q series I/O modules and analog modules in CPU module.

(5) Automatically assign device No. (Physical address) FBD program can be created without considering PLC device. Moreover, the boring device assignment task can be saved through automatic assignment of PLC devices in FBD program.

(6) Easily confirm the influence on other processings when modifying FBD program modifications

As the programming tool provides "Cross reference function" that displays a list of variables used in FBD programs, the users can easily confirm the influence on other processing by tracing the relevant variables in the list, when modifying FBD programs. Furthermore, it includes the filter display function that displays a list of the variables used in specific programs.

These features help to reduce the man-hours for FBD program modification.

(7) Application to Redundant CPU

Programs can be created for the redundant system including Redundant CPUs. By changing the PLC type, projects for Process CPU module can be used as Redundant CPU programs.

2 SYSTEM CONFIGURATION

2.1 System Configuration

This chapter explains the system configuration of PX Developer programming tool and the peripheral devices.

2.1.1 Supported CPU

Process CPU: Q02PHCPU, Q06PHCPU, Q12PHCPU, Q25PHCPU Redundant CPU:Q12PRHCPU, Q25PRHCPU

2.1.2 Communication route

(1) Connecting to Process CPU QnPHCPU+ Serial communication module **QnPHCPU** MELSECNET/H remote I/O module RS-232 cable 1)-2 MELSECNET/10(H) (remote I/O network) RS-232 cable QnPHCPU + 1)-3 CC-Link IE controller network, QnPHCPU MELSECNET/H module RS-232 cable USB cable 1)-1 G4 modue CC-Link IE controller network, QnPHCPU + CC-Link module MELSECNET/10(H) board PX CC-Link IE controller network, RS-422 evelope conversion MELSECNET/10(H) cable (PLC network) **2**) 3) 4) 5) Twisted pair cable 8) 6) 7) Commercially available Ethernet board CC-Link board QnPHCPU + Ethernet module Twisted pair cable USB cable RS-232 cable Ethernet GOT **QnPHCPU**

2

[Supported route when using Process CPU]

No.	Connection method		Precautions for connection
1)-1	Serial/USB	CPU module	One CPU module can be connected from one personal computer by a USB cable. *1
1)-2		C24	_
1)-3	connection	MELSECNET/10(H) remote	_
1)-4		G4 module	Use the type of AJ65BT-G4-S3.
2)	MELSECNET/10 connection (When using the MELSECNET/10 board)		The PLC must be set to the MELSECNET/10 compatibility mode.
3)	MELSECNET/	10 connection	The MELSECNET/H board and PLC must be set to the
3)	(When using th	e MELSECNET/H board)	MELSECNET/10 compatibility mode.
4)	MELSECNET/H connection		_
5)	CC-Link IE controller network connection		CC-Link IE controller network compatible version of Process CPU is required.* ² The driver for CC-Link IE controller network board whose version supports Process CPU is required.* ³
6)	Ethernet connection		_
7)	CC-Link connection		CC-Link Ver.1 and Ver.2 boards cannot be used together with the same PC.
8)	GOT transparent connection*4		Connection method via GOT is the same as that of GX Developer.

^{*1:} Refer to POINT in Section 2.1.3.

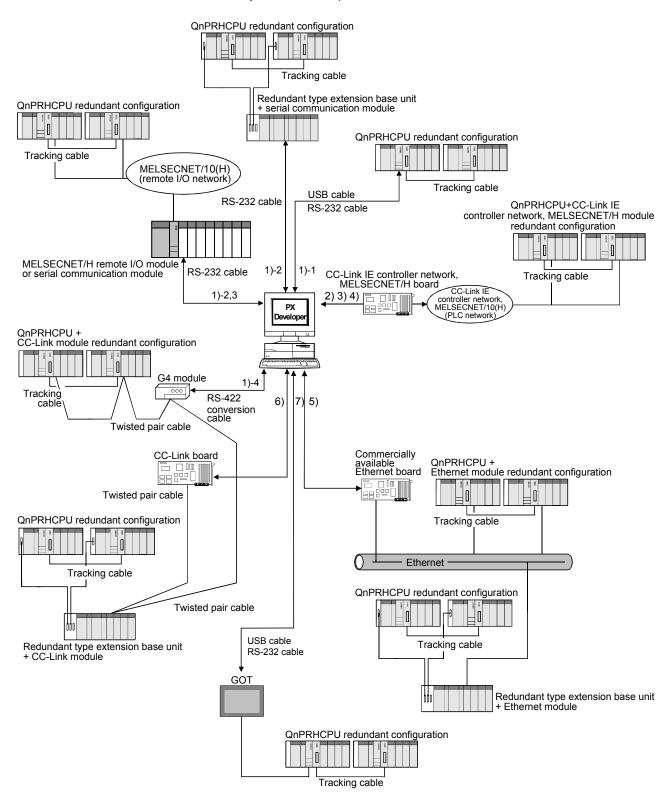
- GOT1000 Series Connection Manual
- GOT-A900 Series User's Manual (Connection System Manual)
- GOT-F900 SERIES HARDWARE MANUAL [Connection]

^{*2:} The Process CPU whose first five digits of serial number is 10042 or later is required.

^{*3:} To connect to the Q02PH or Q06PHCPU, the driver (SW1DNC-MNETG-B) Ver.1.03D or later is required. (When connecting to other CPUs, the driver for QnHCPU can be used.)

^{*4:} For details of GOT transparent function, refer to the following manuals:

(2) Connecting to Redundant CPU of redundant system (backup mode/separate mode)



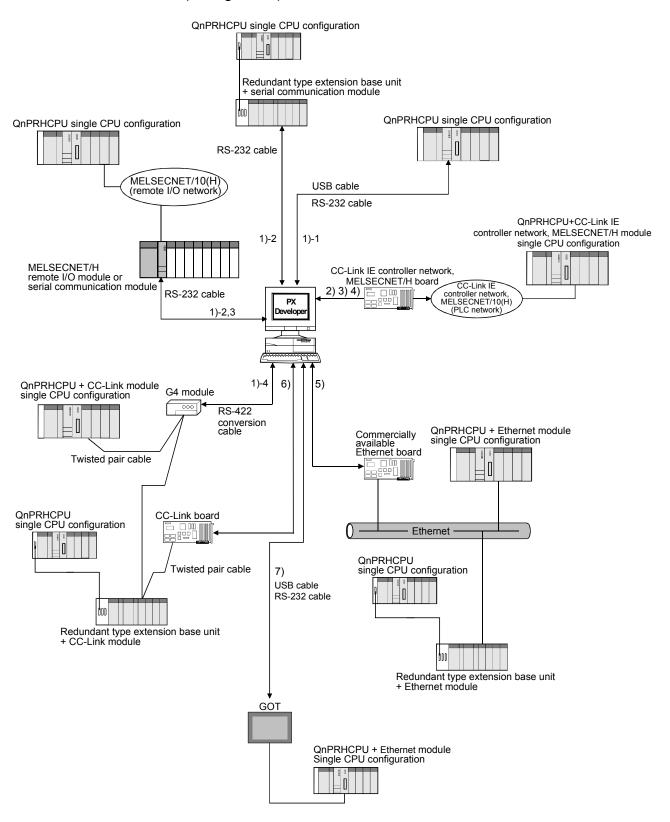
[Supported route when using Redundant CPU (redundant configuration)]

No.	Connection method		Precautions for connection
1)-1		CPU module	Connect a cable to the CPU module in either of system A or system B. (The communication is performed to the CPU module of another system via tracking cable.) One CPU module can be connected from one personal computer by a USB cable. *1
1)-2	Serial/USB connection	C24	When connecting via the serial communication module mounted to the redundant type extension base unit, the version of Redundant CPU needs to be compatible with the redundant type extension base unit. *6
1)-3	1	MELSECNET/10(H) remote	_
1)-4		G4 module	Use the type of AJ65BT-G4-S3.
2)	MELSECNET/10 connection* ² (When using the MELSECNET/H board)		The MELSECNET/H board and PLC must be set to the MELSECNET/10 compatibility mode. The driver for MELSECNET/H interface board and the MELSECNET/H module whose version supports Redundant CPU is required. *3
3)	MELSECNET/H connection		The driver for MELSECNET/H interface board and the MELSECNET/H module whose version supports Redundant CPU is required. *3
4)	CC-Link IE controller network connection		CC-Link IE controller network compatible version of Redundant CPU is required.* ⁴ The CC-Link IE controller network module whose version supports Redundant CPU is required. * ⁵
5)	Ethernet connection		The Ethernet module of function version D or later is required to support the Redundant CPU. When connecting via the Ethernet module mounted to the redundant type extension base unit, the version of Redundant CPU needs to be compatible with the redundant type extension base unit. *6
6)	CC-Link connection		The driver for CC-Link Ver.1 board and CC-Link module whose versions support Redundant CPU are required. * ⁷ CC-Link Ver.1 and Ver.2 boards cannot be used together with the same PC. When connecting via the CC-Link module mounted to the redundant type extension base unit, the version of Redundant CPU needs to be compatible with the redundant type extension base unit. * ⁶
7)	GOT transparent connection*8		Connection method via GOT is the same as that of GX Developer.

- *1: Refer to POINT in Section 2.1.3.
- *2: The MELSECNET/10 board is inapplicable, as the driver (SW□DNF-MNET10) is incompatible with the Redundant CPU.
- *3: For MELSECNET/H interface board, refer to Section 2.1.4 (1). For MELSECNET/H module, the function version D or later is required.
- *4: The Redundant CPU whose first five digits of serial number is 10042 or later is required.
- *5: The CC-Link IE controller network module whose first five digits of serial number is 10041 or later is required.
- *6: The Redundant CPU whose first five digits of serial number is 09012 or later is required.
- *7: For CC-Link Ver.1 board, refer to Section 2.1.4 (3). For CC-Link module, the QJ61BT11N whose first five digits is 06052 or later is required.

- *8: For details of GOT transparent function, refer to the following manuals:
 - GOT1000 Series Connection Manual
 - GOT-A900 Series User's Manual (Connection System Manual)
 - GOT-F900 SERIES HARDWARE MANUAL [Connection]

(3) Connecting to Redundant CPU of single CPU configuration (debug mode)



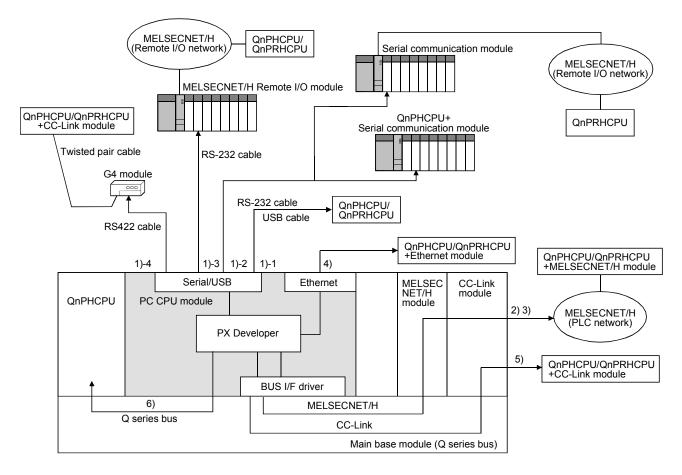
[Supported route when using Redundant CPU (single CPU configuration)]

No.	Connection method		Precautions for connection
1)-1		CPU module	One CPU module can be connected from one personal computer by a USB cable. *1
1)-2	Serial/USB connection	C24	When connecting via the serial communication module mounted to the redundant type extension base unit, the version of Redundant CPU needs to be compatible with the redundant type extension base unit. *6
1)-3	•	MELSECNET/10(H) remote	_
1)-4		G4 module	Use the type of AJ65BT-G4-S3.
2)	MELSECNET/10 connection* ² (When using the MELSECNET/H board)		The MELSECNET/H board and PLC must be set to the MELSECNET/10 compatibility mode. The driver for MELSECNET/H interface board and the MELSECNET/H module whose version supports Redundant CPU is required. *3
3)	MELSECNET/H connection		The driver for MELSECNET/H interface board and the MELSECNET/H module whose version supports Redundant CPU is required. *3
4)	CC-Link IE controller network connection		CC-Link IE controller network compatible version of Redundant CPU is required. *4 The CC-Link IE controller network module whose version supports Redundant CPU is required. *6
5)	Ethernet connection		The Ethernet module of function version D or later is required to support the Redundant CPU. When connecting via the Ethernet module mounted to the redundant type extension base unit, the version of Redundant CPU needs to be compatible with the redundant type extension base unit. *6
6)	CC-Link connection		The driver for CC-Link Ver.1 board and CC-Link module whose versions support Redundant CPU are required. * ⁷ CC-Link Ver.1 and Ver.2 boards cannot be used together with the same PC. When connecting via the CC-Link module mounted to the redundant type extension base unit, the version of Redundant CPU needs to be compatible with the redundant type extension base unit. * ⁶
7)	GOT transparent connection*8		Connection method via GOT is the same as that of GX Developer.

- *1: Refer to POINT in Section 2.1.3.
- *2: The MELSECNET/10 board is inapplicable, as the driver (SW□DNF-MNET10) is incompatible with the Redundant CPU.
- *3: For MELSECNET/H interface board, refer to Section 2.1.4 (1). For MELSECNET/H module, the function version D or later is required.
- *4: The Redundant CPU whose first five digits of serial number is 10042 or later is required.
- *5: The CC-Link IE controller network module whose first five digits of serial number is 10041 or later is required.
- *6: The Redundant CPU whose first five digits of serial number is 09012 or later is required.
- *7: For CC-Link Ver.1 board, refer to Section 2.1.4 (3). For CC-Link module, the QJ61BT11N whose first five digits is 06052 or later is required.

- *8: For details of GOT transparent function, refer to the following manuals:
 - GOT1000 Series Connection Manual
 - GOT-A900 Series User's Manual (Connection System Manual)
 - GOT-F900 SERIES HARDWARE MANUAL [Connection]

(4) Using the PC CPU module



[Supported route when using PC CPU module]

No.	Connection method		Precautions for connection
1)-1		CPU module	
1)-2	Serial/USB	C24	Same with the precautions for Serial/USB connection of (1) to (3).
1)-3	connection	MELSECNET/H remote	Same with the precautions for Senairosp connection of (1) to (3).
1)-4		G4 module	
2)	MELSECNET/10 connection		Same with the precautions for MELSECNET/10 connection of (1)
2)	(When using the MELSECNET/H board)		to (3). *1
3)	MELSECNET/H connection		Same with the precautions for MELSECNET/H connection of (1) to (3). $^{\star 1}$
4)	Ethernet connection		Same with the precautions for Ethernet connection of (1) to (3).
5)	CC-Link connection		Same with the precautions for CC-Link connection of (1) to (3). *1
6)	Q series bus connection		Specifying the PLC No. of a multiple CPU is required. *2

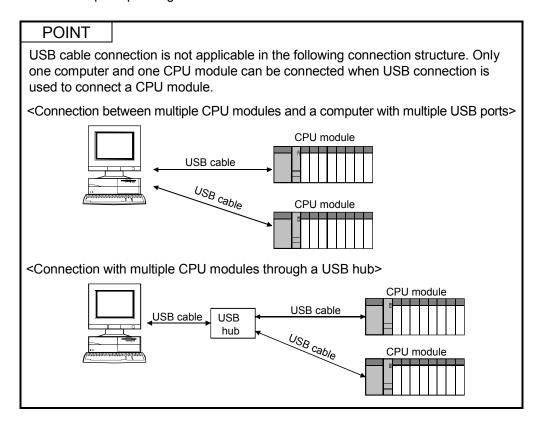
^{*1:} If accessing other station via MELSECNET/H module and CC-Link module, the PC CPU must be set to control the network modules.

^{*2:} Cannot be used as a Redundant CPU does not support multiple CPU configuration.

2.1.3 Serial/USB connection

(1) Connection cables for serial/USB connection

The connection method of serial/USB connection cable is the same when they are connected to GX Developer. For the applicable cables, refer to the GX Developer Operating Manual.



(2) Precautions on USB connection

- A communication error may occur when the personal computer communicates with the CPU module after setting the resume function, suspend setting, power-saving function or standby mode.
 Do not set any of the above functions for communication with the CPU module.
- 2) A communication error may occur and normal operation 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 PX Developer to the offline status except in unavoidable cases when connecting and disconnecting a USB cable, resetting the CPU module or turning the power ON/OFF.

The offline status is the status that PX Developer is not communicating with the CPU module.

When a communication error occurs and normal operation is not recovered, remove a USB cable from the CPU module, and then reconnect it after more than five seconds.

(Even after this operation, an error may occur at the initial communication. Communication, however, will be performed normally at the second time and later.)

2 - 10 2 - 10

2.1.4 Network board

(1) MELSECNET/10, MELSECNET/H, CC-Link IE controller network board

Network	Board	Driver
MELSECNET/10	A70BD-J71QLP23 (For PC/AT, optical) A70BD-J71QBR13 (For PC/AT, coaxial)	SW3DNF-MNET10 (For PC/AT, optical) *1, *2
MELSECNET/10 *4 MELSECNET/H	Q80BD-J71LP25 (For PC/AT, optical) * ⁵ Q80BD-J71BR11 (For PC/AT, coaxial) * ⁵	SW0DNC-MNETH(-B) (For PC/AT, optical) *3, *6
CC-Link IE controller network	Q80BD-J71GP21-SX * ^{7,} * ⁸ Q80BD-J71GP21S-SX (With external power supply) * ^{7,} * ⁸	SW1DNC-MNETG-B *9

- *1: The MELSECNET/10 board is inapplicable to the Redundant CPU.
- *2: The SW3DF-MNET10 is inapplicable to the following operation systems: Microsoft® Windows® Millennium Edition Operating System, Microsoft® Windows® 2000 Professional Operating System, Windows® XP and Windows Vista®.
- *3: The SW0DNC-MNETH(-B) is inapplicable to the Microsoft® Windows® Millennium Edition Operating System.
- *4: Should be used in the MELSECNET/10 compatibility mode.
- *5: The product whose first five digits of serial number is "06032" or later is required to connect to the Redundant CPU.
- *6: The SW0DNC-MNETH(-B) of Ver.90K or later is required to connect to the Redundant CPU.
- *7: When connecting with the following CPUs, the CPU module whose first five digits is 10042 or later is required. Q12PHCPU, Q25PHCPU, Q12PRHCPU, Q25PRHCPU
- *8: When connecting with Redundant CPU, the CC-Link IE controller network module whose first five digits is 10041 or later is required.
- *9: To connect to the Q02PHCPU or Q06PHCPU, the SW1DNC-MNETG-B Ver.1.03D or later is required. (When connecting to other CPUs, the driver for QnHCPU can be used.)

(2) Ethernet board

The following table shows the Ethernet board/card whose operations are guaranteed by us.

Maker	Model
3COM	EthernetLinkIII LAN PC Card
Allied Telesis	CentreCOM LA-PCM Ethernet PC Card LAN Adapter
Allied Telesis	RE2000 (ISA)
TDK	10BASE-T LAN card (Model: LAN-CD021BX)

If there are restrictions on Ethernet module to Ethernet board, follow the restrictions.

2 - 11 2 - 11

(3) CC-Link board

Network	Board	Driver
CC-Link Ver.1	A80BDE-J61BT11 (Ver.1 Board) *2 A80BDE-J61BT13 (Ver.1 Board) *2	SW4DNF-CCLINK-B (for PC/AT) *1, *3
CC-Link Ver.1 CC-Link Ver.2	Q80BD-J61BT11N (Ver.2 Board) *2	SW1DNC-CCBD2-B (for PC/AT)

- *1: If connecting to a Redundant CPU, the SW4DNF-CCLINK-B of version G or later is required.
- *2: CC-Link Ver.1 and Ver.2 boards cannot be used together with the same PC.
- *3: The SW4DNF-CCLINK-B is not compatible with Microsoft® Windows® Millennium Edition Operating System, Microsoft® Windows XP® Home Edition and Windows Vista® .

2 - 12 2 - 12

2.2 Operating Environment

The following table describes the operating environment.

Items		Contents
Computer		PC/AT compatible machine where Microsoft® Windows® Operating System runs.
	CPU	Refer to the table of the next page "Applicable system software and the corresponding
	Required memory	required personal computer performance".
Harc	I disk free space	When installing: Hard disk 200MB or more
		When operating: Free space of virtual memory 100MB or more
\vdash	Drive	CD-ROM disk drive
Disp	lay	Resolution: 800 × 600 pixels (256 colors) or more *1
Com	nmunication Interface	One of the following is required <serial connection="" usb=""> RS-232 port USB port <network route=""> Ethernet board MELSECNET/10 interface board MELSECNET/H interface board CC-Link IE controller network board CC-Link board</network></serial>
Poin	ting Device	Double-button mouse or the compatible pointing device
Syst	em Software * ⁴	 Microsoft® Windows® 98 Operating System (English Version) *² Microsoft® Windows® Millennium Edition Operating System (English Version) Microsoft® Windows NT® Workstation 4.0 Operating System (English Version) Service Pack 3 or later *3 Microsoft® Windows® 2000 Professional Operating System (English Version) Microsoft® Windows® XP Professional Operating System (English Version) Service Pack1 or later Microsoft® Windows® XP Home Edition Operating System (English Version) Service Pack1 or later Microsoft® Windows Vista® Home Basic Operating System (English Version) Microsoft® Windows Vista® Home Premium Operating System (English Version) Microsoft® Windows Vista® Business Operating System (English Version) Microsoft® Windows Vista® Ultimate Operating System (English Version) Microsoft® Windows Vista® Enterprise Operating System (English Version)
 Process CPU programming GX Developer Version 7 (Version 7.20W or later is required.) GX Developer Version 8 (SW8D5C-GPPW Version 8.03D or later) is required to ex download/upload of the symbolic data. Redundant CPU programming For Redundant CPU, GX Developer Version 8 (Version 8.18U or later) is required. Note, however, that GX Developer Version 8 (SW8D5C-GPPW Version 8.45X or later) 		 Process CPU programming GX Developer Version 7 (Version 7.20W or later is required.) GX Developer Version 8 (SW8D5C-GPPW Version 8.03D or later) is required to execute download/upload of the symbolic data. Redundant CPU programming For Redundant CPU, GX Developer Version 8(Version 8.18U or later) is required. Note, however, that GX Developer Version 8 (SW8D5C-GPPW Version 8.45X or later) is required for connecting a Redundant CPU via a module mounted to the redundant type

^{*1:} A resolution of 1024 x 768 pixels or more is required to display an illustration for FB property page.

2 - 13 2 - 13

^{*2:} Windows® 98 Second Edition Operating System is included.

^{*3:} USB cannot be used with Microsoft® Windows NT® Workstation 4.0 Operating System. If used, a communication error will occur.

*4: An installation of the latest version of Microsoft® Internet Explorer and the Service Pack is recommended.

Big fonts (Details setting of Screen properties) are not supported.

Applicable system software and the corresponding personal computer performance

System Software	Required Personal Computer Performance		
System Software	CPU * ⁵	Required memory	
Windows® 98 (including Windows® 98 Second Edition Operating System)	Pentium® 133MHz or more *6	64MB or more	
Windows® Me	Pentium® 150MHz or more *6	64MB or more	
Windows NT® Workstation 4.0 Operating System (Service Pack 3 or later)	Pentium® 133MHz or more *6	64MB or more	
Windows® 2000 Professional	Pentium® 133MHz or more *6	64MB or more	
Windows® XP (Service Pack 1 or later)	Pentium® 300MHz or more	128MB or more	
Windows Vista®	Pentium® 1GHz or more	1GB or more	

^{*5:} Cannot be used in the multi processor environment.

POINT

• Folder and file access enable

This product may make change access to the files of the installation destination folder and sub-folder.

Hence, when any of the following operating systems is used, file change access enable must have been set for these folders and files by the user who uses this product.

If file change access enable has not been set, this product may not operate normally.

Microsoft[®] Windows NT[®] Workstation Operating System Version 4.0 Microsoft[®] Windows[®] 2000 Professional Operating System Windows[®] XP

Windows Vista®

When this product is used, it is recommended to log on as the user of the administrators group who has the authority to control all of the computer.

• When Windows® XP or Windows Vista® is used, the following new functions cannot be used.

If any of the following new functions is used, this product may not operate normally.

Start of application in Windows® compatible mode

Fast user switching

Remote desktop

64-bit OS

2 - 14 2 - 14

^{*6:} Pentium® 300MHz or more is recommended.

3 - 1

3 FUNCTION OVERVIEW

3.1 Function Overview

This chapter mainly describes PX Developer programming tools.

(1) Manage program elements through project.

Manage programs (created by programming tools), parameters and user-defined FB parts in a centralized way through project to realize administration of program data.

(2) Programming with FBD language

By FBD language, which is in accordance with IEC61131-3 standard, users can create program through simple operations as configuring parts and establishing direct connection. Additionally, users can also change input pin number (function part).

FBD parts can be reconfigured, thus it is possible to edit which FBD part shall be displayed in front.

(3) Cross reference function

A list that shows where variables are declared and used by the programming tool. As it includes the sort and filter display functions, which are helpful to trace the relevant variables, the users can easily confirm the variables that will be affected by program modification.

(4) FBD program convert function (compile)

FBD programs made by programming tools can be converted into executable codes in a CPU module (ladder program or PLC parameter). Error check is automatically executed before conversion.

Additionally, if online change compile is executed (refer to Section 11.4), online change will be executed after compile. Before conversion, error check will be performed automatically.

(5) Online function

Through online connection between programming tool and CPU module, not only can users monitor the status of created programs, local variables, I/O value of tag FB and global variables in real time, but also change the current value of the variable during processing. Additionally, as for tag FB, the faceplate can be displayed for monitoring the monitor value (refer to Section 13.5).

(6) Diagnostics function

Diagnose the created FBD programs. When an error is found in the program, the error position can be displayed on the screen and the related details can also be displayed when you double-click the displayed error. (It can be displayed only when the contents containing information about the editing or setting screen of FBD sheet is selected.)

Additionally, it can diagnose created programs as well as CPU module. It makes timely recovery work possible as the current error status and error history can be displayed.

3.2 Function List

Major functions of programming tools are listed in the following table.

Functions		Contents	Mode *1	Reference
	Project Parameter Setting	To set system resource, program execution interval and event notification.	E	Section 6.14
	Module FB Declaration	Register module FB. (To create data programs without considering module-data input X/Y device and buffer memory address)	E	Section 8.3.2
	Tag FB Declaration	Register module FB. (To create a program for DDC processing easily by pasting registered tag in the program/FB definition window)	Е	Section 8.4.2
	Global variable declaration	Register global variable. (Global variable is the variable that can be referred to in any FBD program and the value can be changed by FBD program)	Е	Section 8.2.2
	GX Developer label assignment	To set global tag names (in GX Developer project) for PX Developer global parts. (Data exchange between FBD programs and user-created ladder programs can be realized)	E	Section 8.5.2
Project	Program	To create FBD language programs.	E	Chapter 7
rioject	User-defined	To create user-defined FB type/tag FB type/ structure type.	E	Section 6.8
	Add New FB type	To add user-defined FB type.	Е	Section 7.13
	Add New Tag FB type	To add user-defined tag FB type.	Е	Section 8.4.4
	Add New Structure Type	To add user-defined structure type.	E	Section 9.2
	Program Execution Setting	To set program execution timing and conditions.	E	Section 7.12
	GX Developer project	To open GX Developer project in the PX Developer project, set parameters and create ladder programs.	E/M	Section 7.14
	Print	To print (make printer setting on tables and FBD sheets print respectively).	E/M	Chapter 15
	Copy Data to Other Project	To copy program or user-defined FB type/tag FB type/structure type data to the other project.	Е	Section 6.9.2
	Set Login Password	Set the password for logging in to a project.	E/M	Section 6.15.4
	Set Permissions	Set the permission for accessing the data in a project.	Е	Section 6.15.5
Display	Zoom in/out	To zoom in/out the FBD sheets.	E/M	Section 7.9.6
Display	Display/Hide	To display/hide the tool bar or status bar.	E/M	Section 5.6.1 (2)
Diagram	FBD sheet	To add, delete, rename, move and copy FBD sheets moreover, to set execution conditions of FBD sheets.	E	Section 7.9.2 to 7.9.5, Section 7.11
2.agraiii	Change input pin number setting	To increase/decrease the input pin number of function parts. (Only fit for those function parts whose input pin numbers are changeable)	E	Section 7.6.3

*1: E ... Applicable in edit mode; M ... Applicable in monitor mode

	Functions	Contents	Mode *1	Reference
	Cross reference	To display where variables are declared and used.	E/M	Section 10.1
Cross	Build cross reference information	To build the information on where various variables are declared and used, which will be displayed in the cross reference window.	E/M	Section 10.1.2
reference	Operation for cross reference window display data	To interchange cross reference window columns, and to sort display data.	E/M	Section 10.1.5
	Edit/display filter	To display only the data that match the filter condition by editing the filter condition.	E/M	Section 10.1.6
FB property page	FB property page	FB property page is displayed.	Е	Section 10.2
	Error check	To check errors before compile FBD programs.	E	Section 11.1
	Cold-start compile	To convert FBD programs to executable codes in a CPU module.	E	Section 11.2
Convert	Hot-start compile	To convert FBD programs to executable codes in a CPU module without changing the device assignment of the existing variables.	E	Section 11.3
	Online change compile	Adding or changing processing can be executed on FBD program without stopping system.	E	Section 11.4
	Transfer setup	To execute the transfer setup of CPU module.	Е	Section 12.3
	Download	To download PX Developer program files, parameters and initial value data into a CPU module.	E	Section 12.4
	Download Setup	To set the target memory for download symbolic data and the compression rate.	E	Section 12.4.3
	Upload	To upload the symbolic data from CPU module for project restorations.	E	Section 12.5
	Delete PLC Data	To delete the symbolic data in CPU module.	E	Section 12.6
	Check project consistency	To confirm whether data in PX Developer project and GX Developer project, or PX Developer project and CPU module are identical.	E	Section 12.7
Online	Monitor	To monitor the current values such as local variables in programs/FB definition windows and Entry variable monitor windows, I/O values of tag FB and global variables etc.	М	Chapter 13
	Change current value	To change the current variable value.	M * ²	Section 13.3
	Pause FB	To stop operation of FB parts during execution. (To paused one front FB of the FB part to be verified, and to confirm program execution by changing the current output variable value of paused FB)	М	Section 13.4.1
	Restart FB	To restart the operation of paused FB parts.	M	Section 13.4.2
	Paused FB list	To view the list of all the paused FB parts in the output window.	М	Section 13.4.3
	Faceplate	To monitor tag data status in tag FB with faceplate.	M	Section 13.5
	Read current value of FB property	To read FB property current value.	М	Section 13.6
Diagnostics	FBD program Diagnostics	To check the error that occurs on a CPU module and diagnostics FBD program.	М	Chapter 14

^{*1:} E ... Applicable in edit mode; M ... Applicable in monitor mode

^{*2:} Applicable only when variable parts and FB parts are selected.

3.3 Menu List

Following is a list of drop-down menus of menu bar.

Project	View
New Project · · · · · Section 6.2	-Zoom
Open Project····· Section 6.3	Zoom In Section 7.9.6
Close Project····· Section 6.4	Zoom Out · · · · · Section 7.9.6
- Save · · · · · Section 6.5	Equal · · · · · Section 7.9.6
-Save As · · · · · Section 6.6	- Toolbar
Edit Project Comment · · · · · Section 6.7	Standard · · · · · Section 5.6.2
- Edit Data	Online · · · · · Section 5.6.3
-Add New	Zoom ····· Section 5.6.5
New Program····· Section 6.7	Format····· Section 5.6.6
New FB Type····· Section 6.7	Convert · · · · · Section 5.6.7
New Tag FB Type · · · · · Section 6.7	└ Window · · · · · Section 5.6.8
New Structure Type····· Section 6.7	- Status Bar · · · · Section 5.8
Add Copy····· Section 6.8	└─ Window
Delete····· Section 6.9	- Project · · · · · Section 5.7.2
Rename·····Section 6.10	- Parts · · · · · Section 5.7.3
Edit Comment · · · · · · Section 6.11	FB Property Section 5.7.4
Set Permissions · · · · · · Section 6.15.5	Output Section 5.7.5
- Change PLC Type · · · · · Section 6.15	Bird's-eye View····· Section 5.7.6
Set Login Password · · · · · Section 6.15.4	Cross reference · · · · · Section 5.7.7
-Change Password······ Section 6.14	Diagram
Print Setup (Table) · · · · · · · Section 15.1	FBD sheet
Print Setup (FBD Sheet)······ Section 15.1	Add Section 7.9.2
Print · · · · · Section 14.2	Delete·····Section 7.9.3
Exit PX Developer Section 4.2	Rename · · · · · · Section 7.9.5
Edit	Move or Copy · · · · · Section 7.9.4
Undo ······ Section 7.9	Set Execution Condition · · · · · Section 7.11.2
Redo Section 7.9	Display Execution Order of FBD parts · · · · · Section 7.5.1
-Cut····· Section 7.2.4	Rename Variable*3 Section 7.6.1
- Copy Section 7.2.4	- Display FB Definition Section 7.5.5
- Copy	Change No. of Input Pins · · · · · Section 7.6.3
- Delete · · · · · · · · · Section 7.2.4	Bring to Front · · · · · Section 7.9
	Bring Forward · · · · · Section 7.9
Insert Row Section 5.8.1*1	Send Backward····· Section 7.9
- Delete Row · · · · · · Section 5.8.1*1	Send to Back · · · · · Section 7.9
Find Section 5.8.1*2	
Edit Mode · · · · Section 7.1	Convert
Clear Output Window · · · · · Section 5.7.5	Error Check · · · · · · · Section 11.1
Refer to Variable Section 7.3.5	- Cold-start Compile · · · · · · · · Section 11.2
	Hot-start Compile · · · · · Section 11.3
	- Compile (Online Change) · · · · · · · · Section 11.4
	☐ Build Cross Reference Information · · · · · · Section 10.1.2

Online	
-Transfer Setup····· Section 12.3	
-Upload · · · · · Section 12.5	
-Download · · · · · Section 12.4	
- Delete PLC Data · · · · · Section 12.6	
-Check Project Consistency · · · · · Section 12.7	
-FB Property Management · · · · · Section 13.6.	1
Monitor	
Start Monitor (All Windows) Section 13.1.	1
Stop Monitor (All Windows) · · · · · · Section 13.1.2	
Start Monitor Section 13.1.	
-Stop Monitor Section 13.1.1	2
-Change Current Value · · · · · Section 13.3	
Pause FB · · · · · Section 13.4.	
Restart FB · · · · · Section 13.4.	
Paused FB List · · · · · Section 13.4.3	3
Faceplate · · · · Section 13.5	
Read Out FB Property · · · · · Section 13.6.2	2
Entry Variable Monitor · · · · · Section 13.7	
Diagnostics	
FBD Program Diagnostics····· Section 14.1	
Tool	
Options ····· Section 5.11	
Window	
Next · · · · · Section 5.9	
Previous · · · · Section 5.9	
-Cascade · · · · Section 5.9	
Tile Horizontally Section 5.9	
Tile Vertically Section 5.9	
-Arrange Icons · · · · · Section 5.9	
More Windows · · · · · Section 5.9	
Help	
PLC Error Section 5.10	
Online Manual	
Operating Manual · · · · · Section 5.10	
Programming Manual · · · · · · · Section 5.10	
-About PX Developer · · · · · · Section 5.10	
· ·	
Connect to MELFANSweb · · · · · Section 5.10	

*1: Menu options cannot be selected in the Local Variable Sheet.

Also, menu options cannot be selected during sorting in the Global Variable Declaration window.

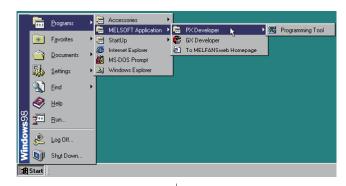
- *2: Menu option can be selected only in the following windows:
 - Module FB Declaration window
 - Tag FB Declaration window
 - Global Variable Declaration window
 - GX Developer Label Assignment window
 - Structure Type Definition Window
- *3: Menu option name changes depending on the FBD parts selection status: "Rename Variable" when FB parts or variable parts are selected, "Change Value" when constant parts are selected, "Edit Comment" when comment parts are selected, and "Rename Variable" when no FBD parts are selected.

7

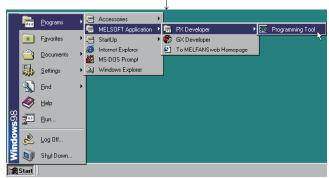
4 START AND EXIT

4.1 Starting Programming Tool

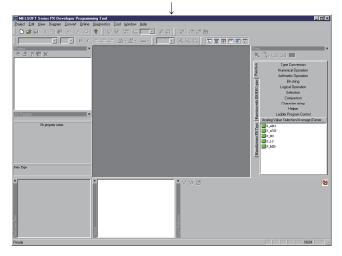
This section explains method for starting PX Developer programming tool from the start menu. (The following screen is an example of Microsoft [®] Windows [®] 98 Operating System screen).



 Select [Start] → [Program] → [MELSOFT Application] → [PX Developer].



2) Click [Programming Tool].



3) Start programming tool.

POINT

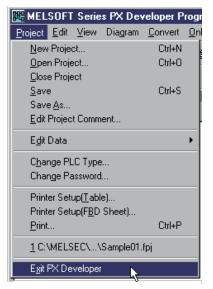
- GX Developer (in Section 1.1) is required to start the programming tool.
- Multiple programming tools can be started simultaneously.

4 - 1 4 - 1

4.2 Exiting Programming Tool

This section explains method for closing programming tool.

(1) Exit from menu.



Click [Project] \rightarrow [Exit PX Developer] in the menu to exit programming tool.

(2) Exit from title bar.



Click and select [Close].

Or click x at the right top of title bar.

POINT

 A dialog box will be displayed to confirm saving if any change is made on the project without saving.

Please click "No" button if saving is unnecessary. Click "Yes" button if saving is necessary.

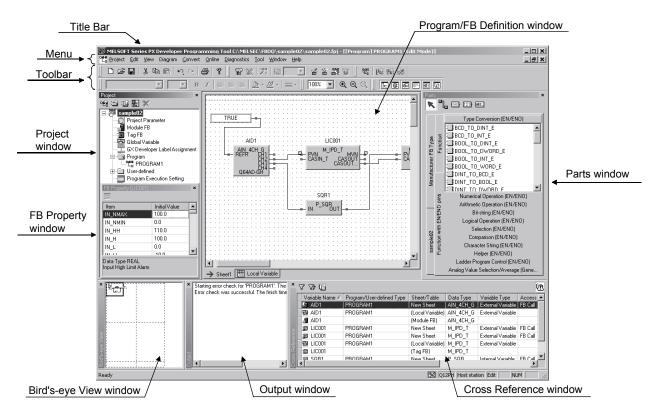
 When GX Developer is started with programming tool, once programming tool is to be closed, users will be asked by a dialog box to confirm this operation.

5 SCREEN CONFIGURATION AND BASIC OPERATIONS

This chapter explains screen configuration, switching between displaying of various parts and window arrangement etc. of PX Developer programming tool.

5.1 Overview of Screen Configuration

(1) Screen configuration of the programming tool main window

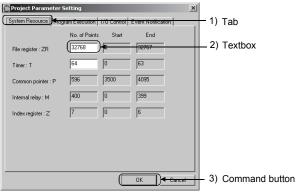


Relevant contents of the items above-mentioned are described in the following table.

Items	Contents
Title bar	Display currently opened project path etc.
Menu	Display workable functions list of the programming tool.
Toolbar	Frequent operations (save, copy, paste, etc.) can be executed by clicking the buttons on it instead of opening the menu.
Project window	The window used for opening various setting windows, program/FB definition window etc.
FB Property window	The window used for setting initial value of public variable of FB parts (refer to Section 7.5).
Bird's-eye View window	Display active programs/the bird's-eye view of FBD sheet in the FB definition window.
Output window	The window for displaying messages when executing error check or compile.
Cross reference window	The window for displaying the where variables are declared and used by the programming tool.
Parts window	The window for list display of parts pasted in FBD sheet of the Program/FB definition window.
Program/FB Definition window	The window for editing programs and displaying the local variable sheet in FBD sheet.

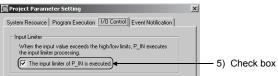
5 - 1 5 - 1

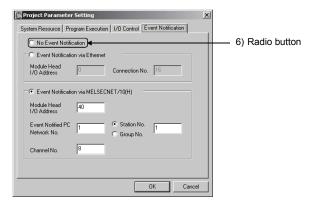
(2) Basic operation of dialog box

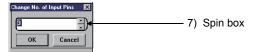












- Click the set item name to execute conversion.
- 2) Textbox For Input of numerals/characters.
- 3) Command button Click the command buttons before executing "OK", "cancel" etc or displaying dialog box.
- 4) List box Click **▼**, then the items to be selected after the selection list is displayed.
- 5) Check box Before executing an item, click "" to mark it with a ✓.
- 6) Radio button Click one "o" from among multiple options to select this option.

7) Spin box

Sometimes it is necessary to directly input values, sometimes to click "= " to change numeral values.

When inputting values directly, please click the interior part of the spin box then input values with keyboard.

When modifying values by clicking "; the numeral value will be increased accordingly if clicking "-", and be decreased accordingly if clicking "...".

POINT

In keyboard operation, the setting item can be selected with "Tab" key. Multiple items selection can be fulfilled operation through " \leftarrow "," \rightarrow "," \uparrow " or " \downarrow " key.

5 - 2 5 - 2

(3) Use keyboard to execute focus moving

Use "Alt" key to move focus towards menu.

Press " \leftarrow " or " \rightarrow " to move focus on the menu.

Besides, if " \downarrow " is pressed when the focus is on the menu, a drop-down menu will be displayed on the screen.

(4) List of shot-cut keys

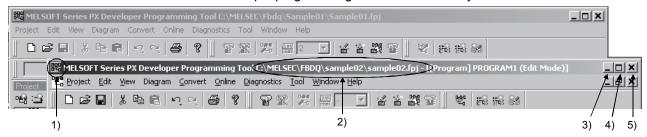
The list of shot-cut keys of the programming tool is shown as follows.

Shot-cut keys	Functions (Corresponding menu)	Tool button	Shot-cut keys	Functions (Corresponding menu)	Tool button
Ctrl+N	New project		Alt+1	Display/Hide parts window	1
Ctrl+O	Open project	=	Alt+2	Display/Hide FB property window	2
Ctrl+S	Save		Alt+3	Display/Hide output window	
Ctrl+P	Print	3	Alt+4	Display/Hide bird's-eye view window	•
Ctrl+Z	Undo	KŲ.	Alt+5	Display/Hide cross reference window	1
Ctrl+Y	Redo	Ci	Ctrl+ Shift+F	Bring to front	_
Ctrl+X	Cut	*	Ctrl+ Shift+B	Send to back	_
Ctrl+C	Сору		F4	Error check	₩.
Ctrl+V	Paste		Ctrl+F3	Start monitor (All windows)	_
Delete	Delete	_	Ctrl+Alt+F3	Stop monitor (All windows)	_
Shift+Ins	Insert Row	_	F3	Start monitor	
Shift+Del	Delete Row	_	Alt+F3	Stop monitor	**
Ctrl+F	Find	M	F6	Next (Switch to the next window)	_
F2	Edit Mode	0.0-0 Ø-0	Shift+F6	Previous (Display the previous window)	_
Alt+0	Display/Hide project window	E	Alt+F4	Exit PX Developer/Close windows (such as dialog box)	_

5.2 Title Bar

The title bar is the section that is displayed at the top of the application window. The currently edited project name and the destination for saving this project etc. will display in the title bar so that multiple activated programming tools can be conveniently specified.

<Activate multiple programming tools simultaneously>



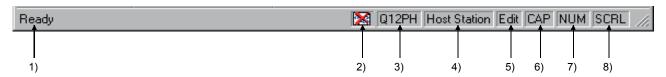
No.	Contents
1)	Change the size of the programming tool, or execute CLOSE operation.
2)	Display the project name and the path name.
3)	Minimize the application window.
4)	Maximize the application window. It can also restore the maximized application window to its original size.
5)	Exit the programming tool.

5 - 4 5 - 4

5.3 Status Bar

Status bar, which shows the programming tool status, is located at the top of application window.

Display/Hide the bar by selecting [View] → [Status bar].



[Explanation]

- 1) The current cursor position is displayed.
- 2) The current compile status is displayed*1.

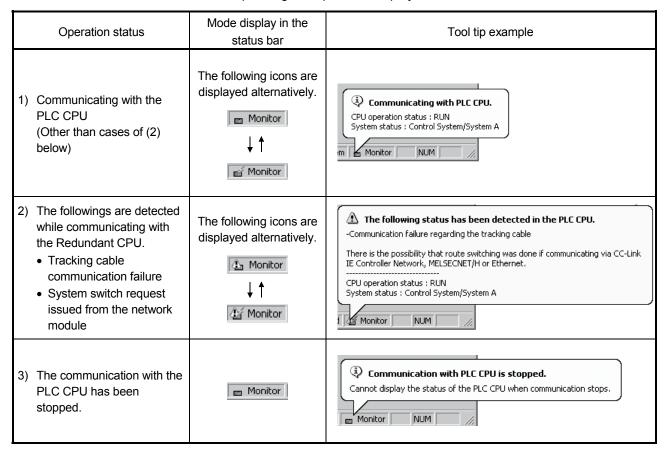
Icon	Compile status	
4-14-63-3	Compiled	
12.00	Invalid initial value*2	
	Non-compiled	

- 3) The CPU type is displayed*1.
- 4) The connected CPU is displayed*1,*3.
- 5) The current mode is displayed*1,*4.
- 6) The Cap Lock status is displayed.
- 7) The NumLock status is displayed.
- 8) The Scroll Lock status is displayed.
 - *1: Not displayed when no protect is opened.
 - *2: This icon will be displayed in the following cases.
 - Right after executing substitute all with FB property management window on the compiled status.
 - · Right after uploading.
 - *3: The following provides a display example of connected CPU in a redundant system.

Ready

Q25PRH Host station No Choice made Edit CAP NUM SCRL

*4: In monitor mode, an icon is displayed before the mode name, as shown below. In addition, when the cursor is placed on the mode display area, the corresponding tool tip will be displayed.



If Monitor Monitor is displayed on the mode display area of status bar while monitoring the Redundant CPU online, this might indicate that the communication route has been automatically switched.

In this case, check the followings and remove the cause of route switching. For details, refer to the POINT provided in Section 13.8.

- Check the Redundant CPU for an error.
- Check the tracking cable status and whether the tracking cable is correctly connected.
- Check the relevant network module for an error and the network where the relevant network module is connected for an error.

POINT

In monitor mode, the programming tool continuously communicates with the PLC CPU to monitor the CPU operation status. However, when a communication error occurs and monitoring is disabled, it stops the communication with the PLC CPU. To resume the communication with the PLC CPU, remove the error cause and perform online operation.

5 - 6 5 - 6

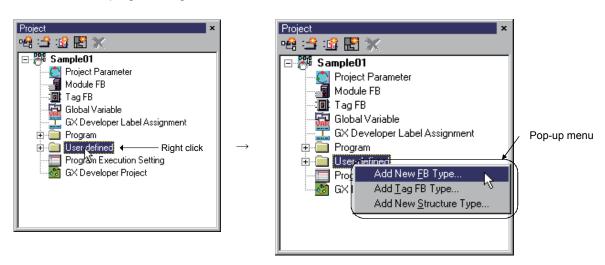
5.4 Menu

The menu is located under the title bar and the list of workable functions of the programming tools is shown.

Please refer to Section 3.3 for the menu structure.

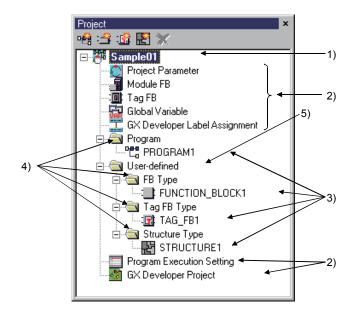
5.5 Pop-up Menu

Pop-up menu will display when right-click the mouse at a specific place of the window. This section will describe relevant contents of the workable pop-up menus in the programming tool window.



(1) Pop-up menus of project window

The pop-up menu displayed when right-clicking the "tree" icon in the project window is explained as follows.



5-7 5-7

1) When right-click the icon of project name.

Item of Menu	Contents	Reference
Edit project comment	Edit the project comment	Section 6.7

 When right-click any icon of project parameters, module FB, Tag FB, global variable, GX Developer label assignment, program execution settings, or GX Developer project.

Item of menu	Contents	Reference
<u>O</u> pen	Open the window of the selected item	Section 5.7.2

3) When right-click the compiled programs and user-defined (FB type, tag FB type, structure type) icons.

Item of menu	Contents	Reference
<u>O</u> pen	Open the window of the selected project	Section 5.7.2
Add New □□□* Type	Add □□□ in the project *	Section 6.8
Add <u>C</u> opy	Copy the data in the project	Section 6.9
<u>D</u> elete	Delete the data in the project	Section 6.10
<u>R</u> ename	Rename the data in the project	Section 6.11
Edit comment	Edit the comment of the data in project	Section 6.12
Set Permissions (<u>E</u>)	Set the permission for accessing the data in a project	Section 6.15.5

4) When right-click the icons of programs, FB type, Tag FB type, or structure type folders.

Item of menu	Contents	Reference
Add New □□□* Type	Add □□□ in the project*	Section 6.8

5) When right-clicking the icons of user-defined folders.

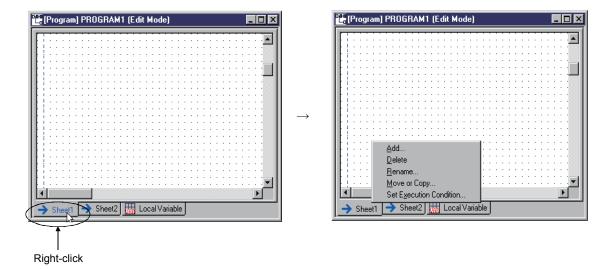
Item of menu	Contents	Reference
Add New FB type	Add FB type in the project	Section 6.8
Add New Tag FB type	Add Tag FB type folders in the project	Section 6.8
Add New Structure type	Add structure type in the project	Section 6.8

^{*:} \square \square is the name of currently selected item.

5 - 8 5 - 8

(2) Pop-up menu on FBD sheet tab

This section describes the relevant contents of pop-up menus displayed when right-clicking FBD sheet tab.



Item of menu	Contents	Reference
<u>A</u> dd	Add FBD sheet	Section 7.9.2
<u>D</u> elete	Delete the selected FBD sheet	Section 7.9.3
Rename	Rename the selected FBD sheet	Section 7.9.5
Move or copy	Move or copy the selected FBD sheet	Section 7.9.4
Set Execution Condition	Set the execution conditions of the selected FBD sheet	Section 7.11

POINT

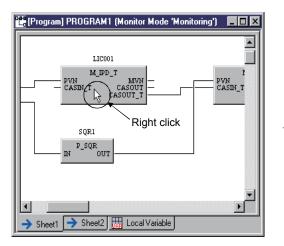
- Pop-up menus will be hidden after right-clicking the <<Local Variable>> tab.
- FBD sheet can be added up to the maximum of 32 pieces.

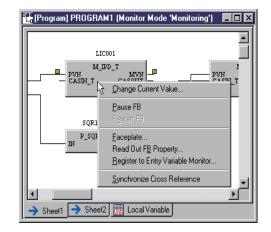
5-9 5-9

(3) Pop-up menus of variable part/FB part in Monitor Mode

Following is an illustration of the relevant contents of the pop-up menus displayed when right-clicking the variable parts/FB parts in the program/FB definition window in MONITOR mode.

(Refer to Section 7.5.1 for the pop-up menu at the edit mode.)





(When right-clicking FB)

Item of menu	Contents	Reference
Change Current Value*1	Change the current values of variables	Section 13.3
Pause FB	Stop the operation of FB	Section 13.4.1
Restart FB	Restart the operation of FB	Section 13.4.2
<u>F</u> aceplate* ²	Display the faceplate	Section 13.5
Read Out FB Property	Upload and display the FB property current values of FB parts selected from CPU module	Section 13.6.2
Register to Entry Variable Monitor*1	Register the selected variables to the entry variable monitor window	Section 13.7
Synchronize Cross Reference	Display the corresponding item in the cross reference window	Section 10.1.5

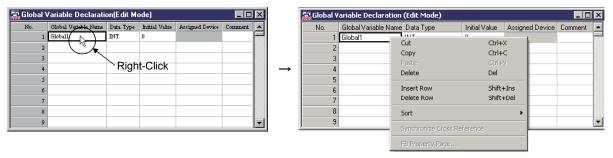
^{*1:} When right-clicking the variable parts, only [Change Current Value] and [Register to Entry Variable Monitor] are displayed.

5 - 10 5 - 10

^{*2:} The faceplate only displays when the Tag FB is right-clicked.

(4) Pop-up menu for table

The pop-up menu explained here is displayed when the right mouse button is clicked in the declaration window, GX Developer label assignment window, structure type definition window or local variable sheet.



(When right mouse button is clicked in global variable declaration window)

Ite	em of menu	Contents	Reference	
Cut *1		Places the target data on the clipboard.	Section 5.8.1	
<u>C</u> opy		Copies the target data onto the clipboard.	Section 5.8.1	
Paste *1		Pastes the data from the clipboard.	Section 5.8.1	
Delete *1		Delete the selected range.	Section 5.8.1	
Insert Row *1	1*2	Insert a row in the cursor position.	Section 5.8.1	
Delete Row	_* 1 _* 2	Delete the row in the cursor position.	Section 5.8.1	
	Ascending	Based on the selected column, sorts rows in ascending order.		
Sort *3 Descending Based on the selected		Based on the selected column, sorts rows in descending order.	Section 8.2.3	
Remove Sorting (Cancels sorting and returns the order to No. ascending.		
Synchronize Cross Reference		Display the corresponding item in the cross reference window.	Section 10.1.5	
FB Property	roperty Page*4 Display the FB property page. Se		Section 10.2	

- *1: Can be selected in the edit mode only. Cannot be selected in the monitor mode.
- *2: Cannot be selected in the Local Variable Sheet. Cannot be selected during sorting in the Global Variable Declaration window either.
- *3: Can be displayed only in the Global Variable Declaration window.
- *4: Selection possibility of this menu in respective mode of each list is as follows.

Table type	Edit mode	Monitor mode
Module FB declaration window	×	×
Tag FB declaration window	Δ	×
Global variable declaration window	×	×
GX Developer label assignment window	×	×
Structure Type Definition Window	×	×
Local Variable Sheet	Δ	×

× : Impossible to be selected

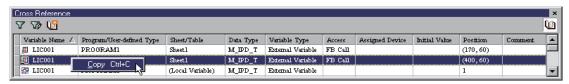
 Δ : Possible to be selected depending upon condition (Selectable only when the FBs described in Section 10.2 are selected.)

5 - 11 5 - 11

(5) Pop-up menu in Cross Reference window

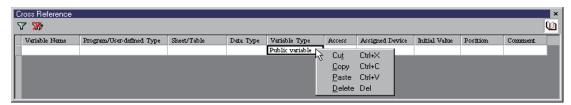
The pop-up menu explained here is displayed when the right mouse button is clicked in the Cross Reference window.

(a) When list is displayed



Item of menu	Contents	Reference
Сору	Copies the target data onto the clipboard.	Section 5.8.1

(b) When filter condition editing screen is displayed



Item of menu	Contents	Reference
Cu <u>t</u>	Places the target data on the clipboard.	Section 5.8.1
<u>C</u> opy	Copies the target data onto the clipboard.	Section 5.8.1
<u>P</u> aste	Pastes the data from the clipboard.	Section 5.8.1
<u>D</u> elete	Delete the selected range.	Section 5.8.1

(6) Other pop-up menus

Besides the menus described in (1) to (5) of this section, there are still other popup menus available. Each item of various pop-up menus will be explained here. The list of other pop-up menus is shown as below.

Other pop-up menus	Reference
Pop-up menus on variable parts	Section 7.3.1
Pop-up menus on constant parts	Section 7.4.1
Pop-up menus on FB parts	Section 7.5.1
Pop-up menus on Function parts	Section 7.6.1
Pop-up menus of connector	Section 7.7.1
Pop-up menus of comment parts	Section 7.8.1

5 - 12 5 - 12

5.6 Toolbar

The toolbar is the section under the menus displaying centralized small buttons. Here the relevant contents of operation procedure and functions of the toolbar are described.

5.6.1 Common operation of toolbar

(1) Split/Merge toolbars



PURPOSE

Split/Merge toolbars under menus as toolbar windows.

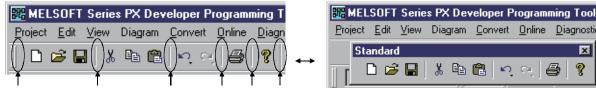


BASIC OPERATION

- 1. Double click the background or portions marked with vertical lines, or press "Ctrl" key and drag and drop with mouse at the same time, and then the toolbar can be split.
- 2. If the split tool bar needs to be merged again, you may double-click the portions mentioned above or drag and drop with mouse.
- 3. Users can arbitrarily change the configuration of the merged toolbar by dragging the toolbar.

DISPLAY/SETTING SCREEN

Split/Merge



Use mouse to drag toward left or right.

Double click areas the arrows point to or hold "ctrl" key while drag and drop with mouse at the same time.

Move the configuration of toolbar



5 - 13 5 - 13

(2) Display/Hide toolbars



PURPOSE

To display/hide the switch of toolbar.



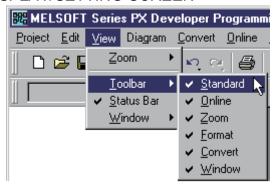
BASIC OPERATION

- 1. Select [View] \rightarrow [Toolbar] from the menu.
- 2. Select the items of the toolbar to be displayed/hidden from the displayed submenu.

The currently displayed toolbar is marked with a **!!**.



DISPLAY/SETTING SCREEN



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(3) Customize toolbar



PURPOSE

Set the buttons displayed in the toolbar.

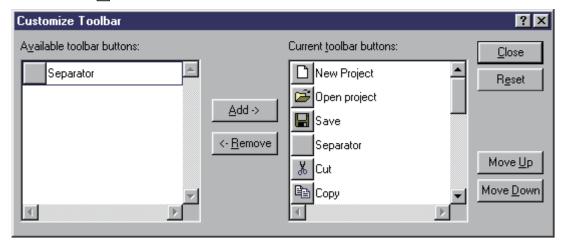


BASIC OPERATION

- 1. Right-click the mouse on the toolbar or toolbar window where the buttons to be changed is displayed.
- 2. Display the toolbar's "Customize Toolbar" dialog box.
- 3. If it is wanted to add buttons into the toolbar, you can select wanted buttons to be added into the toolbar from the button list of "Available toolbar buttons". If wanted to delete buttons, you can select wanted buttons to be deleted from the toolbar from the button list of "Current toolbar buttons".
- 4. Click "Add →" or "← Remove" button.
- 5. Buttons are added into the button list of "Current toolbar buttons".
- 6. To change the position of added button, select the added button then click "Move Up" button or "Move Down" button.
- 7. Click "Close" button to close the "Customize Toolbar" dialog box.



DISPLAY/SETTING SCREEN



POINT

To restore the changed toolbar buttons setting to its original status, users can click the "Reset" button.

5 - 15 5 - 15

5.6.2 Standard toolbar

The button and function list of the standard toolbars is shown as follows.

Tool button	Function
	New Project
=	Open Project
	Save
*	Cut
	Сору
	Paste
ĸj	Undo
Ci.	Redo
M	Find
	Print
8	About PX Developer

5.6.3 Online toolbar

The list of online toolbar's buttons and their functions is shown as follows.

Tool button	Function
	Start Monitor
8	Stop Monitor
0.0-0	Edit Mode
VAR	Entry Variable Monitor
7	Number of digits after the decimal point for REAL type
	Download
**	Upload
	Check Project Consistency
	FB Current Value Display

5 - 16 5 - 16

5.6.4 Project toolbar

Following is a list of project toolbar buttons and their functions.

Tool button	Function
마스	Add Program
4	Add FB Type
:18	Add Tag FB Type
E	Add Structure Type
*	Delete Data

5.6.5 Zoom toolbar

Following is a list of zoom toolbar buttons and their functions.

Tool button	Function
200% 🔻	Display FBD sheet with specified magnification
•	Zoom In
Q	Zoom Out
@	Equal

^{*:} The buttons of zoom toolbar are only valid to FBD tables.

5.6.6 Format toolbar

Following is a list of format toolbar buttons and their functions.

Tool button	Function
Arial	Change character font of selected comment parts
9	Change character size of selected comment parts
В	Set characters of selected comment parts to bold
I	Set characters of selected comment parts to italic
	Paragraphs flush left
■	Paragraphs centred
=	Paragraphs flush right
<u></u> ₾	Change background color
₩ -	Change text color
	Change thickness of border line

^{*:} The buttons of format toolbars are only valid to the comment of comment parts.

5 - 17 5 - 17

5.6.7 Convert toolbar

Following is a list of conversion toolbar buttons and their functions.

Tool button	Function	
**	Error Check	
橙	Cold-start Compile	
FR	Hot-start Compile	
83	Compile (Online Change)	

5.6.8 Window toolbar

Following is a list of window toolbar buttons and their functions.

Tool button	Function
E	Display/hide the project window.
•	Display/hide the parts window.
	Display/hide the FB property window.
	Display/hide the output window.
97	Display/hide the bird's-eye view window.
(1)	Display/hide the cross reference window.

^{*:} With the window being displayed, click the corresponding button on the window toolbar to hide the displayed window.

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5.7 Helper Windows

The so-called helper windows contain the following 6 windows: project window, parts window, FB property window, output window, bird's-eye view window and cross reference window.

Operation methods about helper windows will be explained here.

5.7.1 Common operations for helper window

(1) Split/merge helper windows.



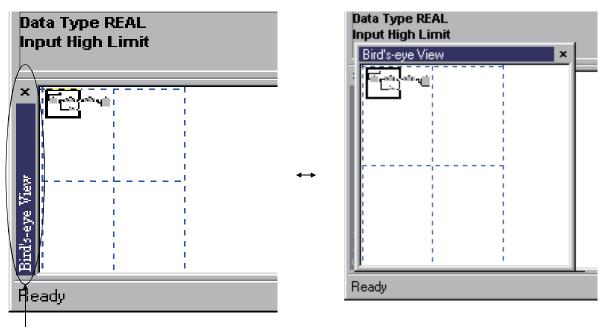
PURPOSE

To split or merge helper windows set around the main window of programming tool.



BASIC OPERATION

- 1. To split a helper window, double-click its title bar or draw it with mouse while pressing "Ctrl" key.
- 2. To remerge the split helper windows, double-click the part mentioned in step 1 or drag the split windows in the main window of programming tool.



Double-click this part or drop it with mouse while pressing "Ctrl"

5 - 19 5 - 19

(2) Display/ hide helper windows.



PURPOSE

To display the hidden helper windows

(a) Display/hide from display menu



BASIC OPERATION

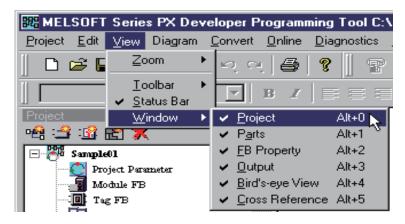
- 1. Select [View] → [Window] in the menu.
- 2. Select the item with the requirement of displaying/hiding helper window from displayed submenu.

The displayed window can also be hidden by clicking the " \times " button on the title bar of the corresponding window.

The currently displayed toolbar is marked with a



DISPLAY/SETTING SCREEN



POINT

The shortcut keys ("Alt" + "0" to "Alt" + "5") can be used to display/hide the corresponding helper windows.

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(b) Display/hide from toolbar



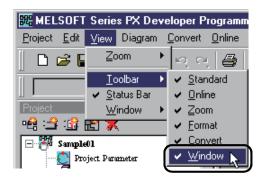
BASIC OPERATION

- When the window toolbar is not displayed, select [View] → [Window] to display
 the window toolbar.
- 2. Click the button of the helper window, to be displayed/hidden, on the window toolbar.

The displayed window can also be hidden by clicking the "x" button on the title bar of the corresponding window.

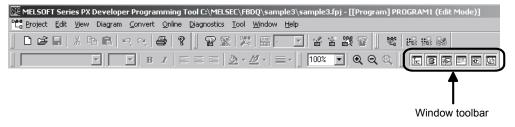


DISPLAY/SETTING SCREEN



When the window toolbar is not displayed, select [View]→[Toolbar]→ [Window] to display the window toolbar.





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5.7.2 Project window

Project window is a window to display the defined or set data in a project in a list in the

For details, please refer to Chapter 6.



PURPOSE

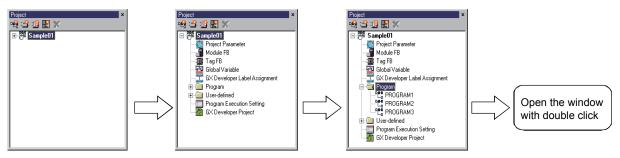
To display a series of data that are administrated by a project in a project window.



BASIC OPERATION

- 1. Double-click the icons or text label in a project window.
- 2. Display the Edit/Set screen of double-clicked item.





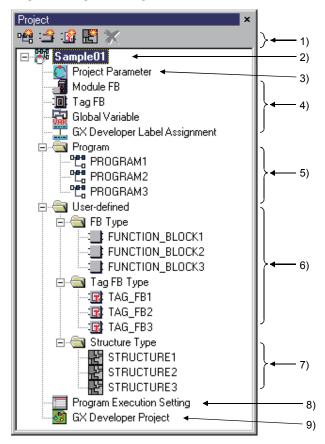
Double-click "Sample 01"

Double-click "program"

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DISPLAY/SETTING DATA

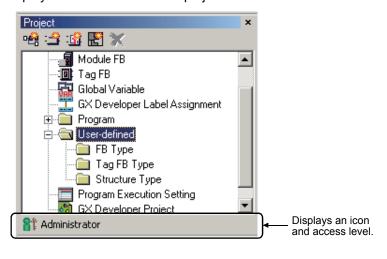


No.	Display/contents	
1)	Project toolbar. (refer to Section 5.6.4)	
2)	To display project name.	
3)	To display "Project Parameter Setting" dialog box. (refer to Section 6.14)	
4)	To display Module FB declaration window, Tag FB declaration window, Global variable	
	declaration window, GX Developer label assignment window.	
5)	To display Program definition window.	
6)	To display User-defined FB Definition Window. (refer to Section 7.13)	
7)	To display Structure Type Definition Window. (refer to Section 9.1)	
8)	To display Program execution timing window. (refer to Section 7.12.2)	
9)	To run GX Developer project created for PX Developer project. (refer to Section 7.14.1)	

5 - 23 5 - 23

POINT

- The data (program, FB type, tag FB type, structure type) in the project window can be copied. (They can also be copied to the other project.)
 Refer to Section 6.9 for details.
- GX Developer will be started when the project window is double-clicked. However, there are following restrictions in using GX Developer:
- 1) Following projects cannot be run on GX Developer:
 - New project
 - Open project
 - Close project
 - Change PLC type
- 2) Ladder program [#FBDQ...] converted by programming tools cannot be edited on GX Developer.
- 3) In data processing of programs, you CANNOT:
 - Name [#FBDQ...] to new-added data.
 - Name destination data with [#FBDQ...] when copying data.
 - Delete on GX Developer the ladder program that has been converted by programming tool.
 - Use present project names on the programming tool to rename data.
 - When data protection is enabled, an icon and the access level during login are displayed on the bottom of the project window.



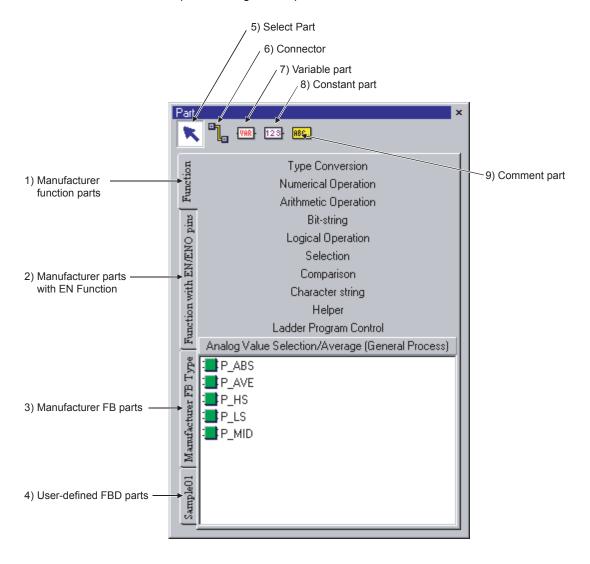
5 - 24 5 - 24

5.7.3 Parts window

Parts window is used to list FBD parts that are pasted on the FBD sheet in the program/FB definition window when FBD language is used for programming. There are four tabs in a parts window and each tab can be further split according to its functions and purposes. Users can select one part from parts window and draw it into the FBD sheet to create FBD programs.

To select FBD parts, users are to follow such steps: Click one of the four tabs <<Function>>, <<Function with EN/ENO pins>>, <<Manufacturer FB Type>> and <<((Project Name)>>on the left side of the parts window, then click function name displayed on the right side of the tab. Once function name is clicked, a parts list will be shown under it. Thus users can select parts with mouse and draw them into the FBD sheet in the program/FB definition window (refer to Section 7.1).

The name and content of each part in parts window will be explained here. For details about FBD parts arrangement, please refer to Section 7.2.



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Name and contents of each part are as follows:

Code	Name	Content
1)	Manufacturer function parts	To display function tags provided by manufacturers. It can be classified into following 11 types: Type conversion Numerical operation Arithmetic operation Bit-string Logical operation Selection Comparison Character string Helper Ladder program control Analog value selection/average (General process)
2)	Manufacturer parts with EN function	To display tags with EN function provided by manufacturers. It can be classified into following 11 types: Type conversion (with EN/ENO pins) Numerical operation (with EN/ENO pins) Arithmetic operation (with EN/ENO pins) Bit-string (with EN/ENO pins) Logical operation (with EN/ENO pins) Selection (with EN/ENO pins) Comparison (with EN/ENO pins) Character string (with EN/ENO pins) Helper (with EN/ENO pins) Ladder program control (with EN/ENO pins) Analog value selection/Average value (General process) (with EN/ENO pins)
3)	Manufacturer FB parts	To display FB type parts provided by producer. It can be classified into following 12 types: Bistable FB Edge Detection FB Counter FB Timer FB Communication control FB Correction operation FB (general process) Arithmetic operation FB (general process) Comparison operation FB (general process) Control operation FB (general process) I/O control operation FB (tag access) Loop control operation FB (tag access) Special FB (tag access)
4)	User-defined FBD parts (project name)	To display user instructed global parts and user defined FB type tag. It can be classified into following 4 types. It cannot be drawn into the FBD sheet when content is not correctly explained. Module FB: to show explained content in module FB declaration window Tag FB: to show contents in tag FB declaration window Global variable: to show explained content in global variable declaration window User-defined FB type: to show the new FB type on project trees
5)	Select part	To operate the pasted FBD parts on the FBD diagram, click this button and then select FBD component.
6)	Connector	Select it when connector is to be pasted on FBD sheet. In addition to clicking the "Connector" button, a connector can also be extended directly from the output pin of an FBD part. (refer to Section 7.7.3.)
7)	Variable part	Select it when variable parts are pasted on FBD sheet.
8)	Constant part	Select it when constant parts are pasted on FBD sheet.
9)	Comment part	Select it when comment parts are pasted on FBD sheet.

5.7.4 FB property window

FB property window is used for displaying/setting initial/current value of FB type/tag FB type/Module FB type public variable (operation constant, tag data etc.).



PURPOSE

To display/set the initial/current value of public variable of FB/tag FB/Module FB, type through FB property window.



BASIC OPERATION

- Select the edit mode to display initial value of FB property or the monitor mode to monitor display current value.
- 2. Select the FB by performing either of the following operations.
 - Select the FB parts of the FBD sheet on the Program/FB definition window.
 - Select the line declaring the tag FB on the tag FB declaration window.
 - Select the line declaring the module FB on the module FB declaration window.
 - · Select the FB variable on the local variable sheet.
- 3. Items displayed in the FB property window.
- 4. If it is in Edit mode, select an intended item to change its initial value.
- 5. When the monitor mode is selected, perform the following operations 1) to 4) to change the current value.
 - 1) Select an item to be changed its current value, and crick the ... button or press the space key.
 - 2) "Change Current Value" dialog box is displayed.
 - 3) Change the current value of FB property.
 - 4) Crick the "Set" button.

Generally, nothing will be shown in the FB property window unless either initial/current value-displayable/settable FB parts are selected or public variables are used in user-defined FB/tag FB type.

However, the initial/current value cannot be display/set when the public variable is of ADR REAL or structure type.

As for public variable initial value-settable FB parts, please refer to "PX Developer Programming Manual" for details.

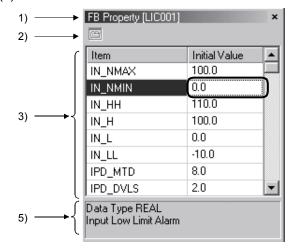
POINT

When changing current value in the FB property window in monitor mode, it is not reflected to the initial value of a project. If downloading to PLC After performing cold-start and compile, setting value is initialized by the initial value of a project. To reflect current value to initial value, read current value of FB property (refer to Section 13.6).

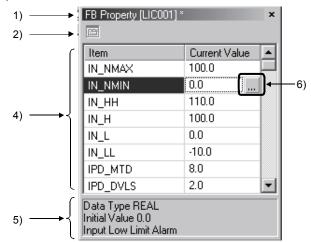
5 - 27 5 - 27

□ DISPLAY/SETTING SCREEN

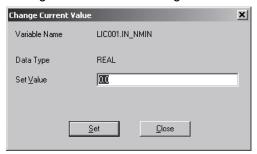
(1) in edit mode



(2) in monitor mode



(3) "Change Current Value" dialog box



DISPLAY/SETTING DATA

Code	Display/contents		
1)	"FB property [FB Variable Name] " is displayed. When monitoring on the monitor mode, "*" flickers beside of the letter string above.		
	Tool bar is display	ved.	
2)	Button	Contents	
		B property page is displayed. ne button is enabled only when the FBs described in Section 10.2 are selected in edit mode.)	
3)	The item name and initial value of public variable (operation constant and tag data etc) of selected FB parts are displayed. To display nothing if selected FB parts has no public variable. If using a BOOL type, the initial value setting is executed with the list box. If using other data types, input a value directly.		
4)	The item name and current value of public variable (operation constant and tag data, etc.) of selected FB parts are displayed. To display nothing if selected FB parts has no public variable. Using "Change Current Value" dialog box changes the current value.		
	To display explana	ation of public variable selected.	
5)	Mode	Contents	
	Edit mode	To display data type and comment of selected public variable	
	Monitor mode	To display data type, initial value and comment of selected public variable	
6)	To display the button at the current value area of selected public variable. Click the button to display "Change Current Value" dialog box.		

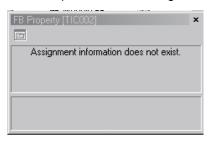
5 - 28 5 - 28



HELPFUL OPERATION

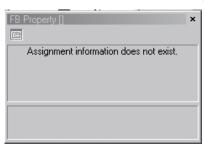
The message [Assignment information does not exist.] may appear on the monitoring FB property window in any of the following cases.

(1) If adding the FB variable with FB property to declaration window or FBD sheet after compile, and monitoring its FB variable.



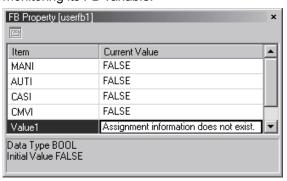
For monitoring added FB variable, execute download after compile.

(2) If deleting the FB variable name of FB variable with FB property by using declaration window, and monitoring its FB variable.



In this case, the FB variable name is not displayed on the title of FB property window.

(3) If adding the public variable to be FB property to FB type after compile, and monitoring its FB variable.



Perform download to monitor the current value of added public variable after compile.

POINT

 In execution of hot-start compile or online change compile, the public variable initial value that is set under FB property window may not be substituted in a CPU module.

Please refer to Section 11.6.1 for details.

• Nothing will be displayed on FB property, if more than one FB part are selected. For details about how to select multiple FB parts, please refer to Section 7.2.1.

5.7.5 Output window

Output window is used for displaying processing phase, error or warning message and other kinds of information during the course of compile.

Basic operations on output window will be explained here. Please check for details in Chapter 11.



PURPOSE

All kinds of information are displayed in the output window. Such information can be copied/pasted into a text file and also deleted.

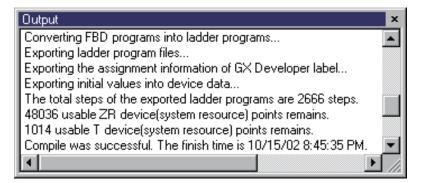


BASIC OPERATION

- 1. Select the part that users want to copy.
- 2. Select [Edit] → [Copy]() in menu. (Or press "Ctrl" + "C" button)
- 3. Start a text editor such as Microsoft® Windows® Operating System notebook, and paste content copied in step.
- 4. Select [Edit] → [Clear Output Window] to delete all in output window or right click the mouse in output window.



DISPLAY/SETTING SCREEN



POINT

- The font or character size shown in output window can be changed by setting options.
 - Please refer to Section 5.11.1 for details.
- If users double-click the lines covering editing screen (such as FBD sheet) or setting screen information, the corresponding screen will be shown.
- More than one line can be selected at the same time in output window.
- With output window separated from the programming tool (refer to Section 5.7.1 (1)), copy cannot be executed from [Edit] \rightarrow [Copy] ($\stackrel{\blacksquare}{\blacksquare}$) in the menu. When output window has been separated from the programming tool, execute copy from [Copy] in the right-click menu (or by pressing the "Ctrl" + "C" buttons).

5 - 305 - 30

5.7.6 Bird's-eye view window

Bird's-eye view window displays the bird's-eye view of FBD sheet in the currently activated program/FB definition window.

The zoom-out scale of FB sheet can also be adjusted in bird's-eye view window. When screen is not big enough to accommodate the FBD program, bird's-eye view window shows its extreme convenience.



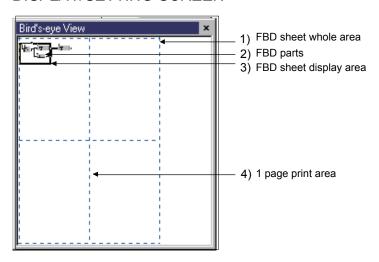
PURPOSE

Users can adjust the size and position of display area while watching the overall arrangement of FBD sheet in bird's-eye view window.

How to adjust the size and position of display area will be explained here.



DISPLAY/SETTING SCREEN





DISPLAY/SETTING DATA

No.	Items	Display/contents	
1)	FBD sheet whole area	To display the whole activated FBD sheet field.	
2)	FBD parts	To display the activated FBD parts in FBD sheet.	
3)	FBD sheet display area	To display the outline border of FBD sheet display area. The outline border size will change with the size modification of program/FB definition window. The FBD sheet display area will be zoomed in/out when users draw the angles of the outline border with mouse. Further more, if users move mouse within the outline border, the arrow will be changed into ‡. In this way, users can move the display area in FBD sheet by drawing mouse.	
4)	1 page print area	It equals to one page area in printing according to selected paper size in printing settings (refer to Section 15.1) of FBD sheet.	

5 - 31 5 - 31

5.7.7 Cross reference window



PURPOSE

To display where variables are declared and used by the programming tool.



BASIC OPERATION

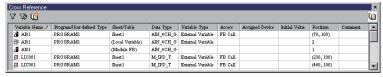
- 1. Select [View] \rightarrow [Window] \rightarrow [Cross Reference] (\boxed{M}) in the menu.
- 2. The cross reference window is displayed.

DISPLAY/SETTING SCREEN



Select [View] \rightarrow [Window] \rightarrow [Cross Reference] in the menu. Alternatively, click the button on the toolbar.





The cross reference window is displayed.

5 - 325 - 32

5.8 Table

5.8.1 General operations of table

General table operations used by programming tool will be explained here.

(1) Move of cursor



PURPOSE

To move the cursor in a table.



BASIC OPERATION

- There are altogether 3 ways in moving cursor.
- Use direction key on keyboard ("↑", "↓", "←", "→").
- Use mouse.
- Use "Enter" key on keyboard.
- (2) Input data into tables



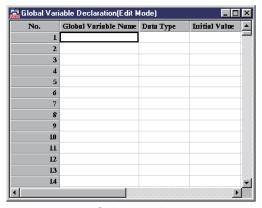
DISPLAY/SETTING SCREEN

To input data into table, please follow steps listed below.

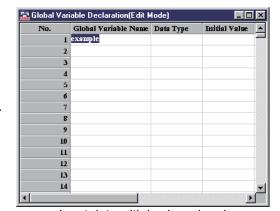


BASIC OPERATION

- 1. Select a cell in which data will be input.
- 2. Input data with keyboard.
- 3. Press direction key (" \uparrow ", " \downarrow ") or "Enter" to confirm the input data.
- Display/set screen.



Select a cell



Input data with keyboard and press "Enter" for confirmation

5 - 335 - 33

(3) Select row/column



PURPOSE

To select a row/column of a table.

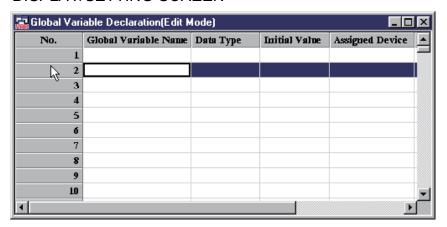


BASIC OPERATION

- 1. Click left side or the top of cells to select a column or row.
- 2. If selecting a particular part of a row/column, users should select a cell at first and then draw it to the intended position.
- 3. Press "Delete" key to delete content in the high-lighted area.



DISPLAY/SETTING SCREEN



(4) Select multiple cells



PURPOSE

To select multiple cells.

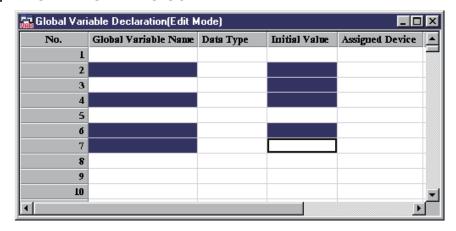


BASIC OPERATION

Click a cell while pressing "Ctrl" key.



DISPLAY/SETTING SCREEN



5 - 34 5 - 34

(5) Add/delete a row



PURPOSE

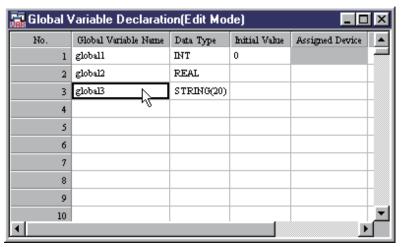
To add/delete rows in table.



BASIC OPERATION

- 1. Select the next row of the intend-to-add part to add a new row. Select the intend-to-delete row to delete one row.
- If a new row is to be added, users should select [Edit] → [Insert Row] in menu, or right-click mouse and select [Insert Row].
 If a row is to be deleted, users should select [Edit] → [Delete Row] in menu, or right-click mouse and select [Delete Row].

DISPLAY/SETTING SCREEN



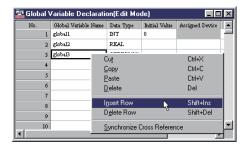
Select row to be added or deleted



Or







Right-click the cell

5 - 35 5 - 35

(6) Cut/copy/paste data



PURPOSE

To cut, copy and paste some data in tables.

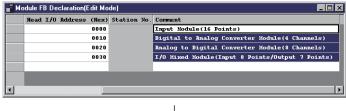
To paste the declaration list of the parts or variables pre-edited in Microsoft® Excel into the table of programming tools.

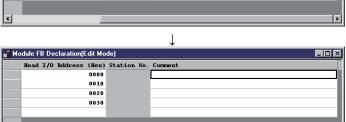


BASIC OPERATION

(a) Cut

Cut the selected area.

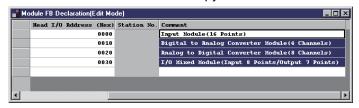




- 1) Select the intend-to-cut part.
- Click [Edit] → [Cut] () in the menu.
 Or right-click the cell and select [Cut] in the pop-up menu.

(b) Copy

Copy the selected content onto the clipboard of Windows®.



- 1) Select the intend-to-copy part.
- 2) Click [Edit] → [Copy] () in the menu or right-click the cell and select [Copy] in the pop-up menu.

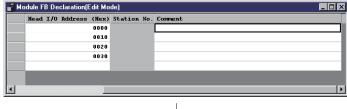
5 - 36 5 - 36

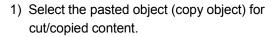
(c) Paste

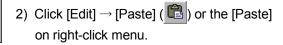
To paste cut or copied content into the selected area.

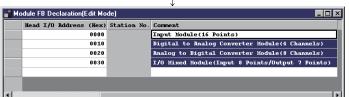
Users should pay attention to following situations in which pasting may be unavailable.

- The table form is different from the data of cut or copied object and pasted object data.
- Cut or copied item is different from the pasted object item.







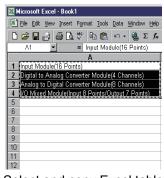


3) Selected area is replaced by cut (copied) content.

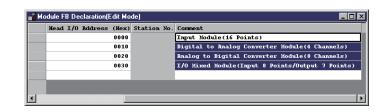
(d) Copy from Microsoft® Excel and paste

Copy from Microsoft® Excel and paste it into programming tool table.

(The examples of copying/pasting of to programming tool table from Microsoft® Excel)



Select and copy Excel table



Select the high-lighted area and click [Edit] \rightarrow [Paste] (in Menu.

5 - 37 5 - 37

(7) Change and automatic adjustment of column widths



PURPOSE

Change the column widths of the table.

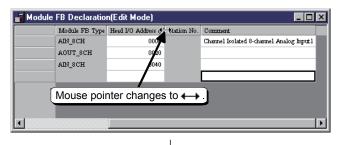
The can also be adjusted automatically.

Automatic adjustment adjusts the column widths automatically so that the data of each cell is not broken midway.

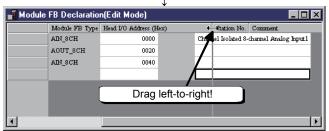


BASIC OPERATION

(a) Change of column width

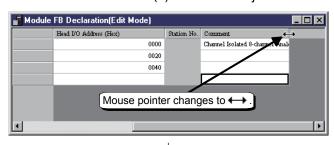


- Move the mouse pointer to the vertical line between the columns of the Item row. (Refer to the left screen.)
- 2) The mouse pointer changes to ←.

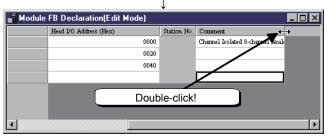


 In the status in above 2), drag the mouse left-to-right to change the column widths of the table.





- Move the mouse pointer to the vertical line between the columns of the Item row. (Refer to the left screen.)
- 2) The mouse pointer changes to ↔.

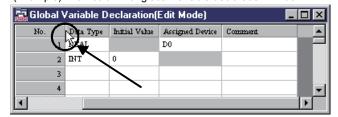


 Double-click in the status in above 2). This automatically adjusts the column widths so that the data of each cell is not broken midway.

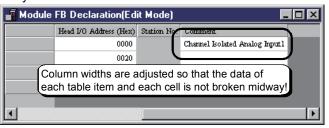
5 - 38 5 - 38



The width of a fixed column cannot be changed.
 (Example) "No." column of global variable declaration window



 Automatic adjustment adjusts column widths automatically within the onscreen row range so that the data of each table item and each cell is not broken midway.



5 - 39 5 - 39

(8) Find cell data



PURPOSE

To search for the cell including the specified character string in the active window (searchable window).



BASIC OPERATION

- 1. Display the search target window.
- 3. Enter the character string to be searched for.
- 4. Select a search direction and click the Find Next button.
- 5. The corresponding cell is selected when the cell including the character string to be searched for exists.



DISPLAY/SETTING SCREEN



POINT

When searching for module FB variables of CC-Link slave stations in the Module FB Declaration window, if the matched cell is hidden, expand rows, and then display and select the cell.

5 - 40 5 - 40

5.9 General Operations of Child Windows

This section mainly describes the general operations on child windows of program/FB definition window in the main window of programming tool.



PURPOSE

Manage the child windows displayed in the main window of the programming tool.



BASIC OPERATION

The arrangement and management of child windows are mainly operated on [Window] menu.

(1) The next one

Select [Window] → [Next] in the menu or press " F6" to display next child window.

(2) The previous one

Select [Window] → [Previous] in the menu or press "Shift"+"F6" to display the last displayed child window.

(3) Cascade display

Select [Window] → [Cascade], the opened child windows will be displayed in an cascading way.

(4) Tile horizontally

Select [Window] → [Tile Horizontally], the current opened child windows will be arrayed in column.

(5) Tile vertically

Select [Window] → [Tile Vertically], the current opened child windows will be arrayed in line.

(6) Arrange icons

Select [Window] → [Arrange Icon], the icons of opened child windows will be arranged with an equal interval.

5 - 41 5 - 41

(7) Other windows

If over 10 child windows are displayed, selecting [More Window] at the bottom of the [Window] menu, following dialog box will be displayed.



The above [Select Window] dialog box will list all the current opened child windows. If users double-click the window names that they want to activate or click "OK" button when the window is selected, the selected window will be displayed in the front.

5 - 42 5 - 42

5.10 Help



PURPOSE

To identify following contents with "Help" function.

- PLC error
 - The list of error code.
- Online Manual
 - Display PDF manual.
- About PX Developer PX Developer Version.
- Connect to MELFANSweb Open MELFANSweb homepage.



BASIC OPERATION

Click [Help] → [PLC Error]/[Online Manual]/[About PX Developer]/[Connected to MELFANSweb] on the menu.

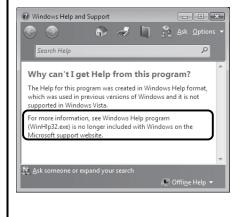
POINT

Acrobat® Reader must be installed before users read online manual (PDF data). Refer to readme.txt in the "Manual" folder stored in the CD-ROM of this product.

5 - 43 5 - 43

POINT

When Help is run using Windows Vista®, the following "Windows Help and Support" screen may appear, and the Help screen is not displayed. Perform the following procedure to install "WinHlp32.exe" which is needed to display the Help screen. (Note: The personal computer needs to be connected to the internet.)



- (1) Click the Help button.
- (2) The screen shown left opens. Click the link section.
- (3) The Microsoft Support Knowledge
 Base page opens.

 (http://support.microsoft.com/kb/9176
 07/en-us)
 Follow the instruction and download
 the Windows Help program for
 Windows Vista® (WinHlp32.exe).
- (4) Install the file that has been downloaded.

5 - 44 5 - 44

5.11 Option Setting

This section mainly describes option setting of programming tools.

5.11.1 Format setting



PURPOSE

To change the font or background color of the programming tool windows.

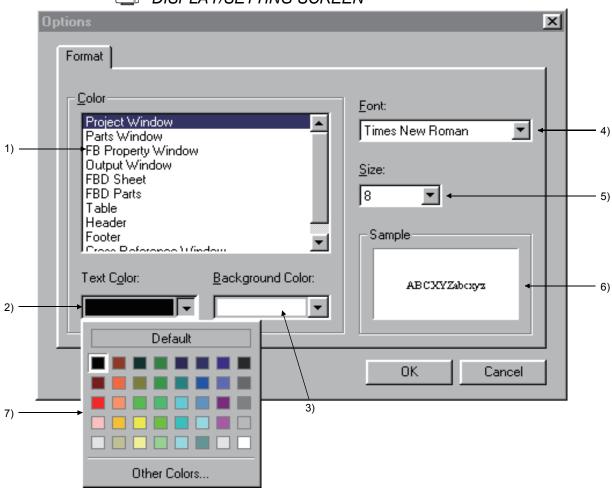


BASIC OPERATION

- 1. Select [Tool] → [Options] on the menu to display the option dialog box.
- 2. Select the item for modification.
- 3. Set font and background color.
- 4. Click "OK" button, settings in step 3 will work.

 Click "Cancel" button, the settings will not take effect. Close the dialog box.

DISPLAY/SETTING SCREEN



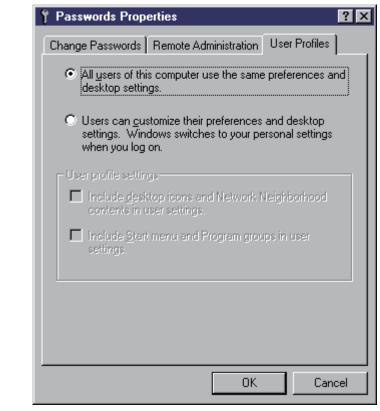
5 - 45 5 - 45

No.	Item	Display/setting contents
1)	Setting target	To select item for modification
2)	Text color	To change the text color
3)	Background color	To change background color
4)	Font	To change font
5)	Size	To change character size
6)	Sample	To display changed font and color sample in 2) to 5)
7)	Color selection	Click in 2), 3) to have it displayed. To change it into other colors than the prepared in advance, click "Other colors" If users choose "Default", the initial color setting will be restored.

POINT

The options can be saved for different users.

However, when the operating system is Windows® 98 or Windows® Me, and if the [Password] on the [Control Panel] is "All users of this computer use the same preferences and desktop settings." the different settings for different users will not be saved. In this circumstance, it will be saved as default value. (The following is an example in Windows® 98 screen.)



5 - 46 5 - 46

6

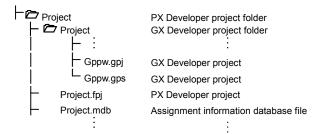
6 CREATING A PROJECT

The so-called PX Developer project is a project to integrate the FBD programs made by PX Developer programming tool and parameters, while the GX Developer project is a project to integrate the ladder programs converted from FBD programs by compile programs, ladder programs and parameters created by the user (PLC parameters, network parameters).

The created FBD programs and parameters can be both managed by the project.

6.1 Relation Between PX Developer Project and GX Developer Project

The folder with the same name as the project can be created inside the PX Developer project folder when creating a new project by programming tools. Besides, GX Developer project is still saved in this folder.



When changing the setting to execute the compile the PX Developer project side, the project setting of GX Developer is changed as well. For instance, the global variables of the programming tool will be reflected on the GX Developer global labels when GX Developer global label assignment (refer to Section 8.5.2) is set and compile is executed Therefore, data can be exchanged between the FBD program created by the programming tool and the ladder program created by GX Developer. So PX Developer project and GX Developer project can be operated together interactively.

POINT

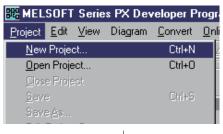
 The GX Developer project in PX Developer project is different from the normal GX Developer project. Therefore, operating project directly from GX Developer should be avoided. Besides, operating the [Gppw. gpj] file or [Gppw. gps] file from the Explorer in Microsoft® Windows® Operating System should also be avoided.



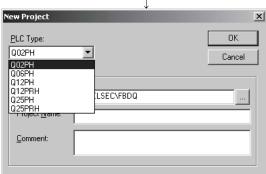
Once the cold-start compile is executed, the [*.mdb] file will be created in PX
Developer project folder. This file is the assignment information database file
which saves device and variable assignment information. This file can be also
used in hot-start compile, online change compile, change MONITOR mode
changing or PLC downloading.

6.2 Creating a New Project

A project should be created before programming with the programming tool. How to create a new project will be explained below.

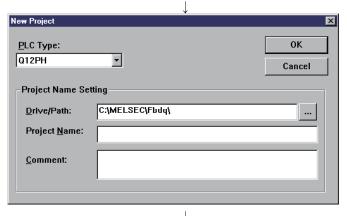


Click [Project] → [New Project] in the menu.

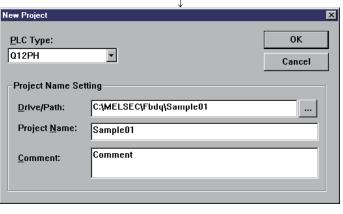


2. Click the list box

and select PLC type in the "New Project" dialog box.



 Set the drive/path when change the project saving place.
 Please refer to the next page "HELPFUL OPERATION" for the detailed changing method.



4. Set the project name.
When setting the project name, the total

characters of the drive/path and project name should be within 149 characters. When setting the drive/path and project name, the total characters should be set within 149 characters. On the left is the screen with the project name "Sample 01".

- Set the comment according to needs.
 The comment can be set within 64 characters. The set comment on the left is a dialog box displayed when opening the project (refer to Section 6.3).
- 6. Click the button "OK".

 New project can be created.

6

POINT

 When executing the [New project], the following symbols, character string project names and space characters can not be use in the specified project name and drive/path.

(Symbols)

(Character string)

COM□ LPT□ AUX CON PRN NUL CLOCK\$

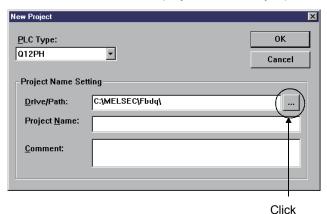
- There are numbers in □.
- "." Dot character can be used in the drive/path.
- When using the monitor tool to monitor, do not assign the same project name.
 (Disabled when the drive/path is different.)



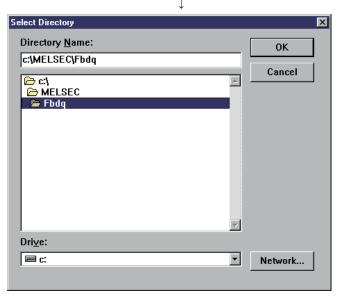
HELPFUL OPERATION

Execute the modification of the drive/path while confirming the project tree. Click the button "..." set by project name when executing the Step 3 on the previous page.

The following dialog box is displayed. At this time, select the drive/path from the project tree, or key input to set.



1. Click the button "..." at the right side of the drive/ path textbox.



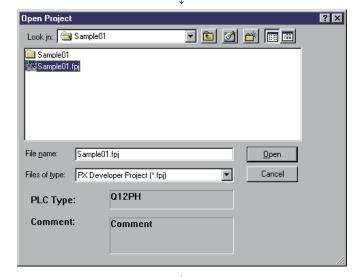
- 2. The dialog box shown as the left screen is displayed.
- 3. Click the list box and select the drive when changing the drive.
- 4. Click the icon at the centre of the screen and move the project to the level in demand when using a mouse to change the saving place. Input the drive/path of the saving place in the direct textbox through a keyboard.
- 5. Click the button "OK".

6.3 Opening a Project

The detailed operations for opening the saved project will be explained as follows.



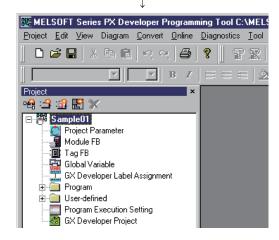
Click [Project] → [Open Project] in the menu.



- 2. Click the project name.
- 3. Click the button "Open".



4. The left window is displayed if the data protection function is enabled in a project. Refer to Section 6.15.2 for the method of enabling data protection.



5. Open the specified project.

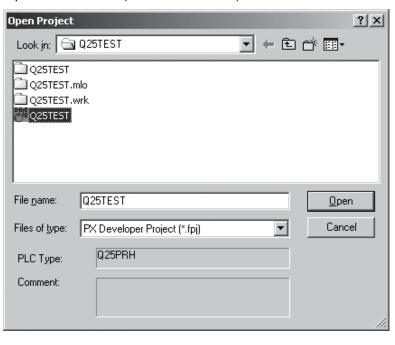


• A project can also be opened by double clicking the [*. fpj] file in PX Developer project folder on the Windows® explorer.

 The recently opened project file can also be opened from the history record.
 4 pieces of the latest history records can be displayed. The initial setting is [Recently Used Project] menu.



 Redundant CPU projects can be displayed but cannot be opened on the PX Developer Version 1.04E (SW1D5C-FBDQ-E) or earlier.



6.4 Closing a Project



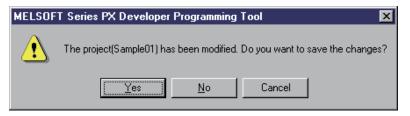
PURPOSE

To close the opened project



BASIC OPERATION

- 1. Click the [Project] \rightarrow [Close Project] in the menu.
- 2. After the project contents are modified, a dialog box confirming whether to save the project will display. If clicking the button "Yes", the modification will be saved and the project is closed. If clicking the button "No", the modification will not be saved when the project is closed.



3. When content setting is not modified, the following dialog box will be displayed. At this time,

Clicking the button "Yes" means to close the project.

Clicking the button "No" means to continue editing the project.



6.5 Saving a Project



PURPOSE

Overwrite and save the project file in the current editing.



BASIC OPERATION

Click [Project] → [Save] on menu. (🖫)

6.6 Saving a Project with a New Name



PURPOSE

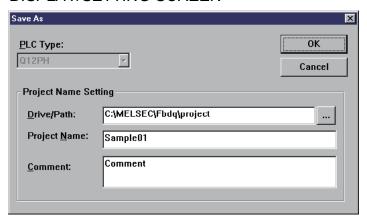
Rename and save the project currently edited.



BASIC OPERATION

- 1. Click [Project] → [Save As] on menu.
- 2. Set the driver and path where the project is saved.
- 3. Set project name.
- 4. Set comments.
- Click "OK" button.Click "Cancel" button to close the dialog box and the change will not be saved.

DISPLAY/SETTING SCREEN



POINT

- If project shares the same driver/path and project name with that of the recently opened project, it can not be saved. If project shares the same driver/path and project name with that of the recently opened project, project overwriting and saving will be executed. (refer to Section 6.5)
- The project file (*.fpj file and *.mdb file) created by this operation is optimised in saving. The size of project file may be reduced before saving.
- Limits for setting driver/path and project name are the same with that in creating a new project, please refer to points in Section 6.2 for details of a new project, please refer to points in Section 6.2 for details.

6.7 Editing Project Comments



PURPOSE

To edit project comment.

The comment set here can be specified in the dialog box (refer to Section 6.3) displayed in opening a project.



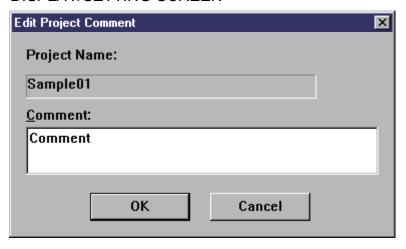
BASIC OPERATION

- 1. Click [Project] → [Edit Project Comment] on the menu.
- 2. Enter comment.

Maximum 64 characters can be set.

3. Click "OK" button. Click "Cancel" button to close the dialog box and the change will not be saved.

DISPLAY/SETTING SCREEN



6 - 8 6 - 8

6.8 Adding New Data to Project



PURPOSE

To add a new program, data of FB type, tag FB type and structure type to a project.

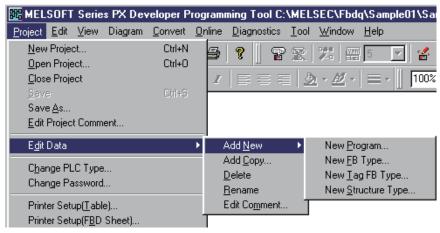
(1) Add new data in the menu



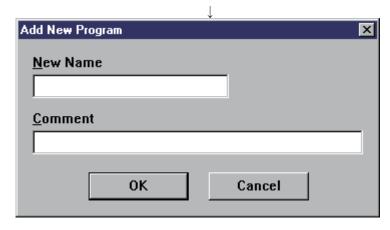
BASIC OPERATION

- 1. Open the submenu [Project] \rightarrow [Edit Data] \rightarrow [Add New] in the menu.
- 2. In the submenu opened in Step 1, select the data to be added.
- 3. Display the "Add" dialog box of all data.
- 4. Input the new name (within 32 characters).
- 5. Input the comment if necessary (within 64 characters).
- 6. Select the tag type from the list box under the condition of tag FB type (Please refer to Section 8.4.3 (1)).
- 7. Click the "OK" button.

DISPLAY/SETTING SCREEN



Select the project to which data will be added



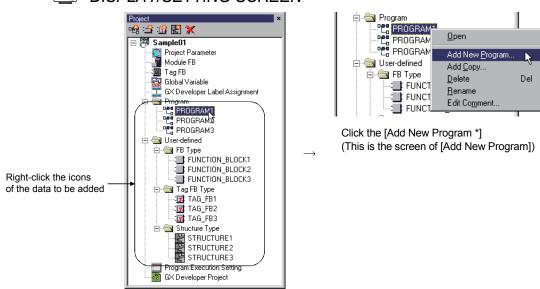
(2) Right-click the icon in the project window to add new data



BASIC OPERATION

- 1. In the project window, right-click the program for adding data.
- 2. Click the [Add New (each data name) *] after the pop-up menu is displayed.
- 3. Display the "Add" dialog box of each data.
- 4. Input the new name. (Within 32 characters)
- 5. Input the comment if necessary (within 64 characters).
- 6. Select the tag type from the list box under the condition of tag FB type (Please refer to Section 8.4.3 (1)).
- 7. Click the "OK" button.

DISPLAY/SETTING SCREEN



*: There are selectable data type names in the part of (each data name).

6 - 106 - 10 (3) Add new data with project toolbar icons

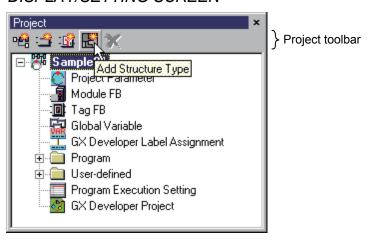


BASIC OPERATION

- 1. Click the data-adding button of project toolbar at the top of the project window (refer to Section 5.6.4).
- 2. An "Add" dialog box of data will display.
- 3. Input new names (Within 32 characters).
- 4. Input the comment if necessary (within 64 characters).
- 5. Select the tag type from the list box under the condition of tag FB type (refer to Section 8.4.3 (1)).
- 6. Click the "OK" button.

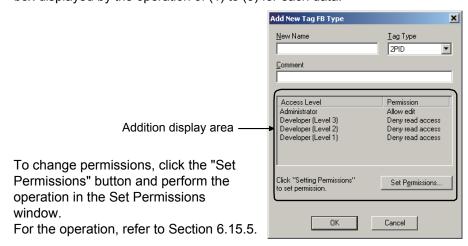


DISPLAY/SETTING SCREEN



POINT

- Do not set the same name in the data names with those of program, userdefined FB type/tag FB type/structure type, elementary data type, function, and manufacturer FB type.
 - Besides, do not use invalid symbols or reserved words. Please refer to Appendix 1 for the details of invalid symbols or reserved words.
- Maximally 200 new programs can be added.
- If data protection is enabled in a project, the display of access permission to each access level and the "Set Permissions" button are added to the addition dialog box displayed by the operation of (1) to (3) for each data.



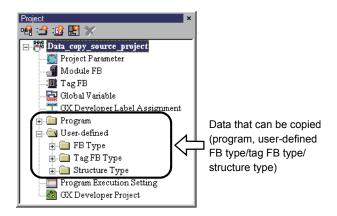
6 - 11 6 - 11

6.9 Copying Data in Project



PURPOSE

To copy data (program, user-defined FB type/tag FB type/structure type) in a project for use in other parts of the same project or the other project.



6.9.1 Copying data in the same project

This section explains the method of copying data (program, user-defined FB type/tag FB type/structure type) within the same project.

(1) Copy data in the menu



BASIC OPERATION

- 1. Click and select the data icon to be copied in the project window.
- Click the [Project] → [Edit Data] → [Add Copy] of the menu.
 Display the "Copy" dialog box of each data.
- 4. Input the name of the copied destination (within 32 characters).
- 5. When adding/modifying the comment, input the comment if necessary (Within 64 characters).
- 6. Click the "OK" button.

6 - 12 6 - 12

DISPLAY/SETTING SCREEN

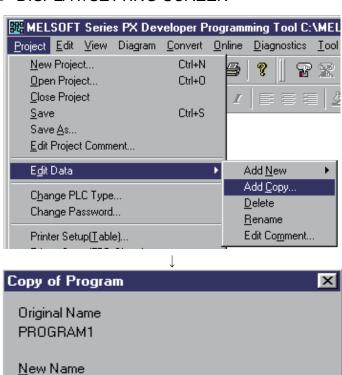
PROGRAM2

Program comment

0K

Cancel

Comment

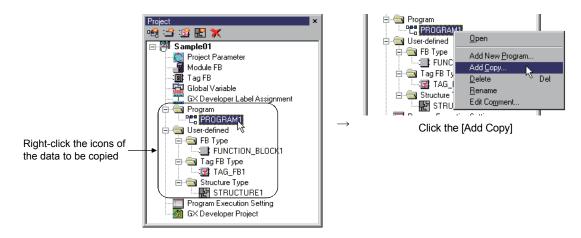


(2) Right-click the icon in the project window to copy data



BASIC OPERATION

- 1. Right-click the icons of the data to be copied in the project window.
- 2. Click the [Add Copy] after the pop-up menu is displayed.
- 3. Display the "Copy" dialog box of each data.
- 4. Input the name of the copied destination. (Within 32 characters)
- 5. When adding/modifying the comment, input the comment if necessary (Within 64 characters).
- 6. Click the "OK" button.



POINT

- Do not set the same name in the data names with those of the program, userdefined FB type/tag FB type/structure type, elementary data type, function, and manufacturer FB type.
 - Besides, do not use invalid symbols or reserved words.
 - Please refer to Appendix 1 for the invalid symbols or reserved words.
- Up to 200 programs can be added.

6 - 14 6 - 14

6.9.2 Copying data to other project

This section explains the method of copying data (program, user-defined FB type/tag FB type/structure type) to the other project, the data that can be copied, and the precautions for data copy.



PURPOSE

To use the program or user-defined FB type/tag FB type/structure type for the other project.



BASIC OPERATION

- 1. Start two programming tools. (refer to Section 4.1)
- 2. In one programming tool, open the data copy source project.

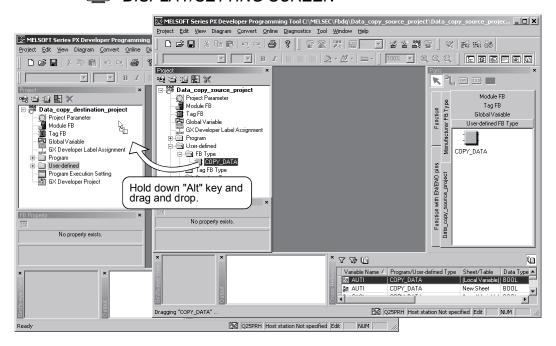
 In the other programming tool, open the data copy destination project.
- 3. If the project is displayed with the project window hidden, display the project window.(refer to Section 5.7.1 (2).)
- 4. Hold down the "Alt" key and drag the icon (or text label) of the data to be copied onto the copy destination project window.
- 5. When the icon is over the copy destination project window, the mouse cursor changes to $\mbox{$\frac{1}{2}$}_{\text{cl.}}$

Make sure that it has changed to $\frac{1}{2}$, and then drop it.

Press the "ESC" key to cancel data copy during a drag and drop. Alternatively, when the mouse cursor is shown as \bigcirc , release the mouse button to cancel data copy.



DISPLAY/SETTING SCREEN



POINT

For details of the data that can be copied and the copy range, refer to (1) in this section.

When data cannot be copied to the other project, refer to (2) in this section.

For details of the precautions for data copy, refer to (3) in this section.

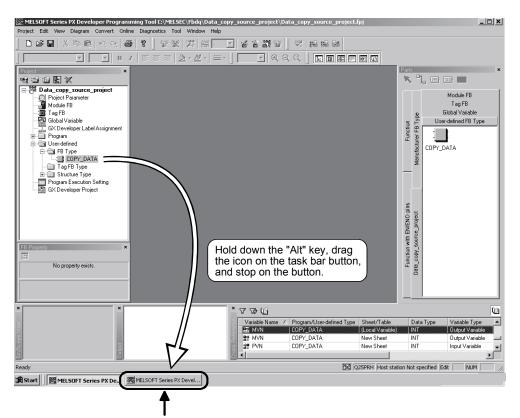


HELPFUL OPERATION

When the programming tool of the data copy destination is hidden behind the other window, drag the icon onto the button on the task bar of Windows $^{\tiny{(8)}}$, and stop on the button.

The programming tool hidden behind is displayed at the front.

When the programming tool is displayed at the front, drop the icon onto the project window.

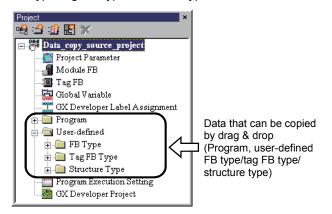


Button of the programming tool hidden behind

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(1) Data that can be copied and copy range

The data that can be copied by a drag and drop are program and user-defined FB type/tag FB type/structure type data.



Data other than the program and user-defined FB type/tag FB type/structure type cannot be copied by a drag and drop.

For more in information, refer to the table below.

Data that can be copied	Data that is copied	Data that is not copied
Program	 FBD sheet Local variable sheet FBD sheet execution condition setting Program execution setting 	 (a) Any of the following global part corresponding declaration window data, i.e., settings that the external variable (used in the data to be copied) refers to. Global variable declaration Module FB declaration Tag FB declaration (b) User-defined FB/tag FB/structure type data used in the data to be copied
User-defined FB type	 FBD sheet Local variable sheet FBD sheet execution condition setting 	
User-defined tag FB type		
User-defined structure type	All definition data of structure type definition window	

POINT

When the "data that is not copied" indicated in the above table is included in the data that can be copied (program, user-defined FB type/tag FB type), the "data that is not copied" must be separately copied to the copy destination project. For details, refer to "(3) Precautions for data copy" in this section.

(2) When data copy cannot be executed

When data cannot be copied to the other project, check the following points.

Cause of data copy disabled	Resolution	Reference
The copy destination project is not opened.	Open the copy destination project.	Section 6.3
The project window is not displayed in the copy destination project.	Display the project window.	Section 5.7.2
An attempt is made to copy the data that cannot be copied.	The data that can be copied are the program and user- defined FB type/tag FB type/structure type. The other data cannot be copied by a drag and drop.	(1) in this section
In monitor mode	Select [Edit] \rightarrow [Edit Mode] (\bigcirc) in the menu to change to the edit mode.	Section 13.1.1
An attempt is made to copy multiple data simultaneously.	Multiple data cannot be copied simultaneously. To copy multiple data, copy data one by one.	
The project parameter setting or other dialog box is displayed.	Copy data after closing the displayed dialog box.	
The data name is being changed in the project window.	Copy data after completion of data name change is completed.	Section 6.11
The programming tool is performing processing, such as compile or PLC download.	Copy data after completion of processing, such as compile or PLC download.	
The copy destination project includes the data whose data name is the same but whose type (e.g. "User-defined FB type" and "Structure type") is different. *1	Perform either of the following operations and copy data. (a) Change the data name of the copy source project. (b) Change the data name of the copy destination project.	Section 6.11

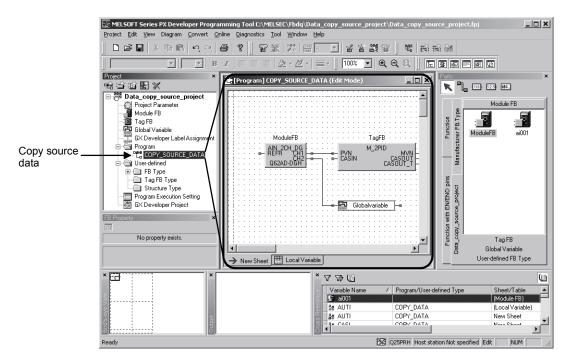
^{*1:} When the data name and type (e.g. "User-defined FB type" and "Structure type") are the same, data can be copied over the copy destination.

(3) Precautions for data copy

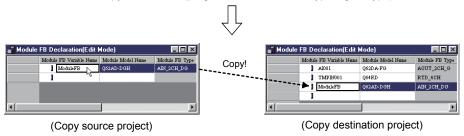
When copying data to the other project, note the following points.

- (a) When data copy is executed, the copy destination project is put in the uncompiled status (refer to Section 5.3).
 After data copy is compiled, compile the project and perform PLC download.
- (b) When global parts (global variable, module FB, tag FB) are included in the copy source data (program, user-defined FB type/tag FB type), add the declarations of the used global parts to the copy destination project (copy the declaration window data).

This also applies to the declaration of the global parts (global variable, module FB, tag FB) set in the execution condition within the program execution setting.



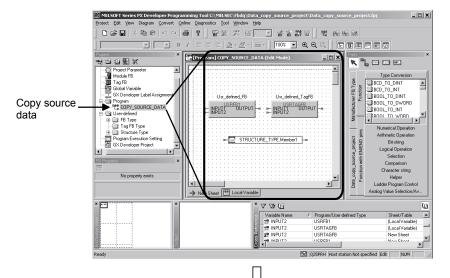
When global parts (global variable, module FB, tag FB) are included in the copy source data (program, user-defined FB type/tag FB type)



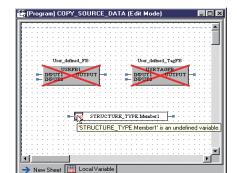
Copy the declaration window data of the global parts (module FB, tag FB, global variable) included in the copy source data to the copy destination project.

6 - 19 6 - 19

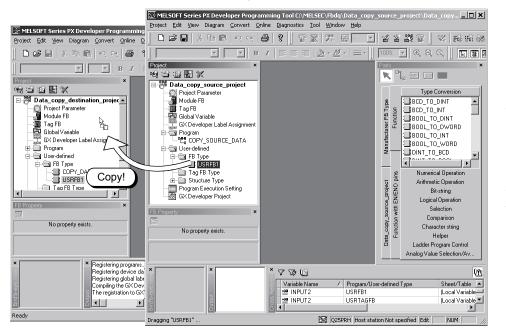
(c) When the user-defined FB/tag FB and structure type are included in the copy source data (program, user-defined FB type/tag FB type), also copy the used user-defined FB/tag FB and structure type data.



When the user-defined FB/tag FB and structure type are included in the copy source data (program, user-defined FB type/tag FB type)



The user-defined FB type/tag FB type part that does not have the definition source is marked as " X " on the FBD sheet of the copy destination. For the structure type, "Undefined variable." is displayed when the mouse pointer is moved onto the structure type part.



The user-defined FB/tag FB marked as " X " on the FBD sheet and the structure type data displayed as "Undefined variable." are also copied to the copy destination project.

6.10 Deleting Data in Project



PURPOSE

To delete data in a project.



BASIC OPERATION

Any one of the following methods can be used to delete data in a project.

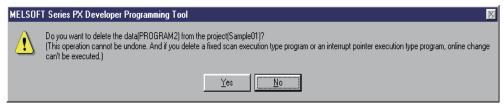
- Click [Project] → [Edit Data] → [Delete] in the menu after selecting the icons of the data to be deleted in the project window.
- Select and right click the data icon for deletion in the project window. A pop-up menu will be displayed. Then click the [Delete] in the menu.
- Click the "Delete" button after selecting the icons of the data to be deleted in the project window.
- Click the "Delete" button () of the project toolbar at the top of the project window after selecting the icons of the data to be deleted in the project window.

If any one of the methods mentioned above applied, a dialog box will display for confirming whether to delete the data or not. At this time, clicking "Yes" means to delete the data.

Clicking "No" means not to delete the data.



DISPLAY/SETTING SCREEN



POINT

- After data is deleted, compile is executed when there is no program, compile error will occur.
- Online change cannot be executed in deleting constant interval fixed scan execution type or interrupt pointer execution type program.

6.11 Changing Data Name in Project



PURPOSE

To change the data names in a project.



BASIC OPERATION

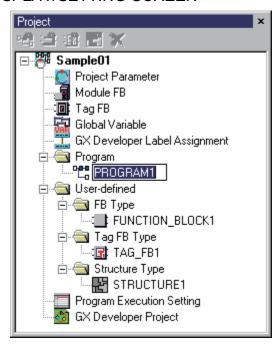
Any one of the following methods can be applied to change the data names in a project.

- Click [Project] → [Edit Data] → [Rename] in the menu after selecting the icons
 of the data whose names need to be changed in the project window.
- Select and right click the icons of the data whose names need to be changed in the project window. A pop-up menu will be displayed. Then click the [Rename] in the menu.
- Left click the part of Data names after selecting the icons of the data whose names need to be changed in the project window.

A screen for name input as shown below will be displayed after using any one of the methods mentioned above. Please input data names and press the "Enter" key to confirm the data input.



DISPLAY/SETTING SCREEN



POINT

Do not set the same names in the data names with those of the program, userdefined FB type/tag FB type/structure type, elementary data type, function, and manufacturer FB type. Besides, do not use invalid symbols or reserved words. Please refer to Appendix 1 for the invalid symbols or reserved words.

6.12 Editing Data Comments in Project



PURPOSE

To edit the data comments in a project.

The comments set here can be seen in "Select Data Type" dialog box (refer to Section 7.10.4).



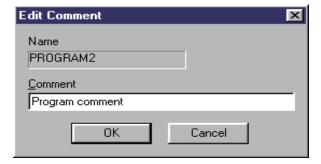
BASIC OPERATION

Any one of the following methods can be used to edit the data comments in a project.

- Click the [Project] → [Edit Data] → [Edit Comment] in the menu after selecting the icons of the data whose comments need to be edited in the project window.
- Select and right click the icons of the data whose comments need to be edited in the project window. A pop-up menu will be displayed. Then click the [Edit Comment] in the menu.
 - 1) In either of the above methods, display the "Edit Comment" dialog box and input comments. (Within 64 characters).
 - 2) Click the "OK" button.



DISPLAY/SETTING SCREEN



6.13 Displaying the Data Editing Screen in Project

Double-click the data icons or text label in a project window or press "Enter" key to make the editing screen of this project displayed.

The main editing screens are listed as below.

Item names in the project window	Displayed Screens	Reference
item names in the project window	,	reference
Project parameter	"Project parameter setting" dialog box	Section 6.14
Module FB	Module FB declaration window	Section 8.3.1
Tag FB	Tag FB declaration window	Section 8.4.1
Global variable	Global variable declaration window	Section 8.2.1
GX Developer label assignment	GX Developer label assignment window	Section 8.5.1
Program	Program definition window	Section 7.1
FB type	FB definition window (FB type)	Section 7.1
Tag FB type	FB definition window (tag FB type)	Section 7.1
Structure type	Structure type definition window	Section 9.1
Program execution setting	Program execution timing window	Section 7.12.2
GX Developer project	GX Developer application	Section 7.14.1

6.14 Setting Project Parameters



PURPOSE

To set the necessary system resources, program execution and event notification used for PX Developer project.



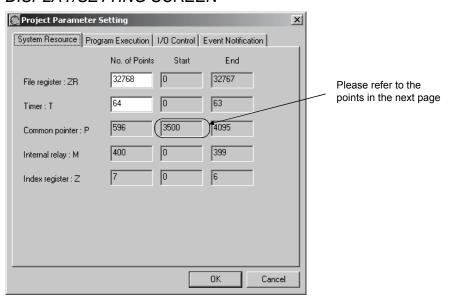
BASIC OPERATION

- 1. Double click the project parameter icons in the project window.
- 2. Click the project setting tab in the project parameters setting window to execute setting.
- Click the "OK" button after setting. Various tabs will be explained below.

(1) System Resource setting



DISPLAY/SETTING SCREEN





DISPLAY/SETTING DATA

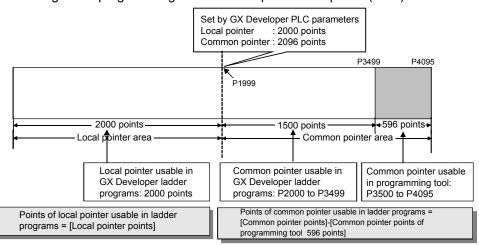
Items	Display/setting data		
File register: ZR	To set the range of the file register (ZR) consumed for variables automatic assignment. The settable range is 3000 to 1041408. But the maximum number of the set points cannot exceed the file register points set in the PLC file of the GX Developer PLC parameters. (Errors may occur when compile)		
Timer: T	To set the range of the timer (T) consumed in timer FB. The settable range is 10 to 2048.		
Common pointer: P	To display the range of the common pointer (P) consumed in processing the subprogram call destination management supplied to FB by manufacturers. (User is not allowed to set)		
Internal relay: M	To display the range of the internal relay (M) used temporarily by programming tool in internal processing. (User is not allowed to set)		
Index register: Z	To display the range of the index register (Z) used by programming tool in internal processing. (User is not allowed to set)		

POINT

The common pointer (P) set by the system resource indicates the points of the common pointer used by programming tool in the P device 4096 points. Starting No. of the common pointer set in the GX Developer PLC parameters should be less than that of the programming tool (refer to 1) in the previous page).

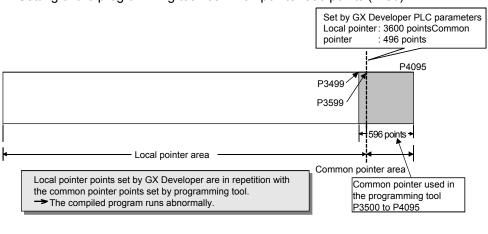
 The correct setting example
 Setting of the GX Developer PLC parameters: common pointer P2000 (Local pointer P0 to P1999, common pointer P2000 to 4095).

Setting of the programming tool: common pointer 596 points (fixed).



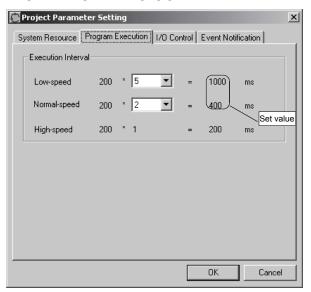
 The wrong setting example
 Setting of the GX Developer PLC parameters: common pointer P3600 (Local pointer P0 to P3599, common pointer P3600 to P4095).

Setting of the programming tool: common pointer 596 points (fixed).



(2) Program Execution Setting

DISPLAY/SETTING SCREEN

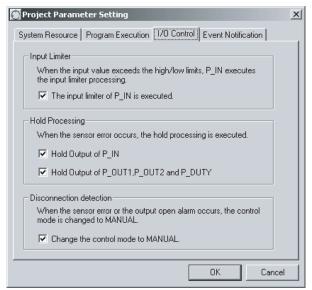


DISPLAY/SETTING CONTENTS

Items	Display/setting contents	
	To set the type of program execution interval in the < <program execution="">> tab. To set the low-speed or normal speed execution interval by changing the set value. (The execution interval of high-speed is fixed as 200ms)</program>	
Execution interval	[Low-speed interval setting] The settable values are 5, 10, 20, 25, 50. [Normal speed interval setting] The settable values are 2, 3, 4, 5.	

(3) I/O Control Setting



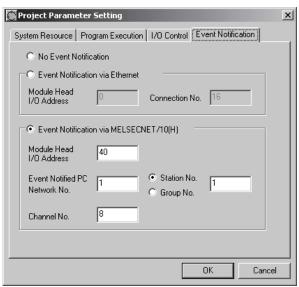


DISPLAY/SETTING CONTENTS

Items	Display/setting contents	
Input Limiter	To set whether to output a value, which is the output value of P_IN multiplied by the limiter, when a value outside the input high/low limit is input to P_IN input value.	
Hold Processing	To set whether to use the last output value (Hold) as the output of P_IN, P_OUT1, P_OUT2, and P_DUTY When an error occurs in the input range check of P_IN.	
Disconnection detection	To set whether to change the control mode to MANUAL when a sensor error or output open alarm occurs.	

(4) Event Notification Setting





! CAUTION

• If the modules set by event notification do not exist or there are some errors in setting, an event occurrence will bring a CPU module stop error. It is recommended that when adjusting the system, the user should not only confirm no influence existing on the actual system, but also let the event happen and confirm that no errors mentioned above occurred through the operation of switching to the faceplate control mode (Example: MANUAL—AUTO, AUTO—MANUAL).

DISPLAY/SETTING CONTENTS

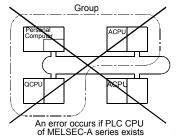
Items	Display/setting contents		
No event notification	When this item is selected, it would not inform the monitor tool of the event notification *1 even if events (including alarm) occurred in a CPU module, Only the low-speed tag data collection *2 can be used to monitor the periodical alarms/events without the event notification.		
Event notification via Ethernet	Ethernet can be used to inform the monitor tool of the events (including alarm) in a CPU module. Input the head I/O address and contact No. of Ethernet module after selecting this item.		
Event notification via MELSECNET/10 (H)	MELSECNET/10 (H) can be used to inform the monitor tool of the events (including alarm) in a CPU module. Execute setting according to the following sequence. 1. Input the module head I/O address. (Always specify 0 in the last digit.) 2. Input the network No. Of CPU module and the monitor (computer MELSECNET/10 (H) ports) at the events notification place. 3. Select the radio button "Station No." when specifying the station No. To notify, and select the radio button. Group "No." when specifying the group No. To notify. 4. Input the Station No. Or Group "No". In the textbox at the right of the radio button. 5. Input the Channel No. (The settable range) Module head I/O address: 0 to FF0 Network No.: 1 to 239 Station No.: 1 to 64 Group No.: 1 to 32 Channel No.: 1 to 8		

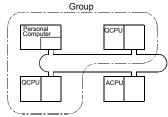
- *1: A CPU module is a communication method to notify the monitor tool after detecting the signal changes of the alarm/event in the tag data.
- *2: All tags registered in the monitor tool are collected via reading one piece of tag data per second.

POINT

- If the modules set by event notification do not exist or there are some errors in setting, an event occurrence will bring the followings:
 - (a) CPU module stops for error.
 - (b) Network module communication error occurs.
 - (c) Event notification cannot be received.
 - It is recommended that when adjusting the system, the user should not only confirm no influence existing on the actual system, but also let the event occur and confirm again that no events mentioned above occurred through the operation of switching to the faceplate control mode (Example: MANUAL \rightarrow AUTO, AUTO \rightarrow MANUAL).
- When specifying the MELSECNET /10 (H) group No. to notify events, an error
 will occur once the MELSEC-A series PLC CPU exists in the specified group No..
 In this case, make a group so that the MELSEC-A series PLC CPU is not
 included in the same group. (Only the MELSEC-Q series PLC CPUs should be
 included in the same group.)

Please refer to Q Corresponding MELSECNET/H Network System Reference Manual (PLC To PLC network) for details about the MELSECNET/10 (H) group functions.

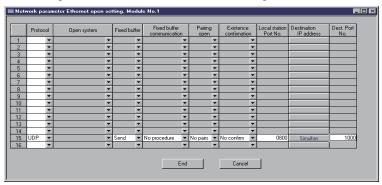




Execute the grouping of the nonexistent of CPU of MELSECNET-A series and specify the corresponding group No.

 Event notification via Ethernet is a communication method applying UDP/IP to broadcast. Therefore, the broadcasting setting with UDP/IP can be executed by the open setting of GX Developer network parameters. At this time, the [Destination port No.] Should be set as the [Event Notification UDP Port No.] of the monitor tool.

Please refer to [PX Developer Operating Manual (Monitor Tool)] for details about the [Event Notification UDP Port No.] setting of the monitor tool. Please refer to [Q Corresponding Ethernet Interface Module User's Manual (Basic)] for details about the setting method at the time of broadcasting.



- Make sure to use the PX Developer Version 1.06G or later monitor tool to monitor the CPU module that includes ladder programs compiled by the PX Developer Version 1.06G or later programming tool.
 Note that the PX Developer Version 1.04E or earlier monitor tool does not receive the event notification sent from ladder programs compiled by the PX Developer Version 1.06G or later programming tool.
- Do not specify an Ethernet module mounted on the redundant type extension base unit of Redundant CPU to be used for event notification.
 If such a module is specified, an stop error (error code: 4122) occurs on the Redundant CPU.
- CC-Link IE controller network cannot be used for the event notification.

6.15 Data protection in the project

Data protection is to avoid mistakenly editing data (e.g. Program, User-defined FB type) and releasing data to the unrelated users.

Data can be protected by enabling of disabling edit/display operation setting to the each data in a project.

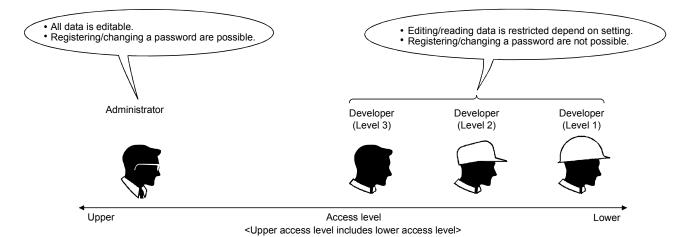
6.15.1 Setting access level and permissions

(1) Access level

Access level refers to the target given authority such as edit permission in data protection.

There are four access levels and lower access level is included in upper level. Access level is divided Administrator having authority for editing all data and Developer (Level 3 to Level 1) editing and reading data are restricted depend on setting.

Registering and changing a password are only possible when access level is Administrator.



(2) Setting permissions

Set "Enable/Disable" for reading from the access level that permitting edit or lower access level.

For the setting procedure of permissions, refer to Section 6.15.5.

(3) Target data to be protected

The following data will be the target of data protection.

- Program
- User-defined FB
- User-defined tag FB
- Structure

(4) Relationship between access level and access permission The editable data in the low access level can be edited from the upper access

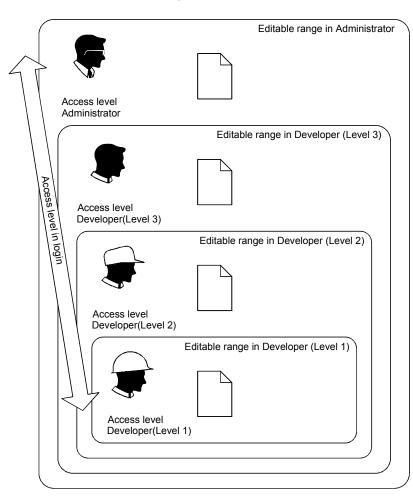
The editable data in the low access level can be edited from the upper access level.

<Example>

The data with permission setting in Developer (Level 2) is editable by the user logged in Developer (Level 2) or more than Developer (Level 2) (Administrator, Developer (Level 3), Developer (Level 2)).

When the reading from the lower access is set to "Enable", data reference is possible whatever access level a user login in.

The following shows the relationship between access level and access permission.



The data to be targeted for data protection of PX Developer project (Program/user-defined FB/user-defined tag FB/structure)

Access level	Edit	Read
Administrator	0	0
Developer (Level 3)	×	×
Developer (Level 2)	×	×
Developer (Level 1)	×	×

Access level	Edit	Read
Administrator	0	0
Developer (Level 3)	0	0
Developer (Level 2)	×	○* ¹
Developer (Level 1)	×	○* ¹

*1: The case that read from the lower level is permitted

Access level	Edit	Read
Administrator	0	0
Developer (Level 3)	0	0
Developer (Level 2)	0	0
Developer (Level 1)	×	×

Access level	Edit	Read
Administrator	0	0
Developer (Level 3)	0	0
Developer (Level 2)	0	0
Developer (Level 1)	0	0

6.15.2 Enabling/disabling protection data

(1) Enabling data protection in a project

To enable data protection, set the login password for Administrator in "Set Login Password".

For login password setting, refer to Section 6.15.4.

(2) Disabling data protection in a project

To disable data protection, delete the login password space (remain the space blank) for Administrator.

POINT

- If a project password has been set to the project created with the PX Developer Version 1.08J or earlier, the project password becomes the login password for Administrator and data protection is enabled.
- Data protection will not be enabled even if a password is set to the access level other than Administrator.

6.15.3 Login to the project



PURPOSE

When data protection is enabled, password authentication is performed to open a project.



BASIC OPERATION

- 1. Open the project. (For the operations for opening a project, refer to Section 6.3.)
- 2. When data protection is enabled, the Login window appears.
- 3. Select an access level from the list box.
- 4. Enter a login password set for the access level.
- 5. Click the "OK" button.



DISPLAY/SETTING SCREEN





DISPLAY/SETTING CONTENTS

No.	Item/Button	Display/Setting	
1)	Access Level	Select an access level from the list box to login.	
2)	Password	Enter a password set for the access level.	
3)	ОК	Checks the password. If the password is correct, the access level is accepted and the Login window is closed.	
4)	Cancel	Cancels the current setting and closes the Login window.	

POINT

- If the login password is lost or forgotten, you cannot login to the project. Be careful not to lose or forget the password.
 - When a login password for Developer (Level 3) or lower is lost, login to the project with "Administrator" and set a password again.
- When a login password for "Administrator" has been set for a new project created (restored) by Uploading from PLC, the Login window is displayed immediately after the Uploading from PLC.

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6.15.4 Set login password



PURPOSE

To set a login password for each access level of the projects.



BASIC OPERATION

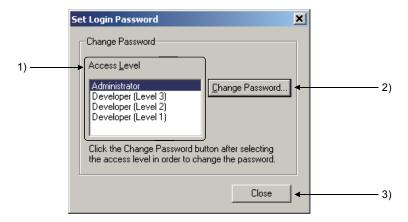
- 1. Click [Project] → [Set Login Password] from the menu.
- 2. The Set Login Password window appears.
- 3. Select an access level for which the password is to be set or changed.
- 4. Click the "Change Password" button.
- 5. The Change Password window appears.
- 6. Type a password in the New Password field.
- 7. Enter the same password in the Confirm Password field.
- 8. Click the "Change" button.

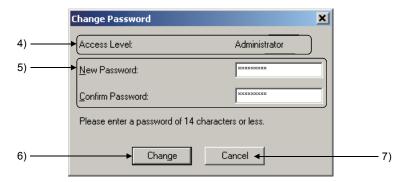
POINT

The [Set Login Password] menu is not selectable when the access level used to login is Developer (Level 3) or lower.

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DISPLAY/SETTING SCREEN





DISPLAY/SETTING CONTENTS

No.	Item/Button	Display/Setting	
1)	Access Level	Select an access level for which the password is to be set or changed.	
2)	Change Password	Displays the Change Password window.	
3)	Close	Closes the Set Login Password window.	
4)	Access Level	Displays the access level for which a password is set.	
5)	Password entry	Enter a password for the selected access level using 14 alphanumerical characters of less.	
6)	Change	Compares the password entered in New Password with the one in Confirm Password. If they are matched, registers the password and closes the Change Password window.	
7)	Cancel	Cancels the setting and closes the Change Password window.	

6.15.5 Set permissions



PURPOSE

For each protected data, set access levels where editing is allowed and whether read access from the lower access levels is allowed or denied.



BASIC OPERATION

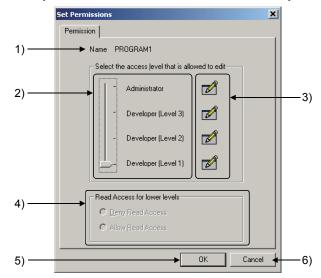
- 1. If Monitor mode is currently active, change it to Edit mode referring to Section 13.1.3.
- 2. In the project window, select a program or user definition (FB type, tag FB type, structure type) for which access permission is to be set or changed.
- Click [Project] → [Edit Data] → [Set Permissions] from the menu.
 Or, right-click the target item in the project window, and then click [Set Permissions] in the pop-up menu.
- 4. The Set Permissions window is displayed.
- 5. By dragging the slider, select an access level where editing is to be allowed.
- 6. In the Read Access for lower levels area, select either Deny Read Access or Allow Read Access with its radio button.
- 7. Click the "OK" button.
- 8. A message appears to notify that the Set Permissions setting is complete.

POINT

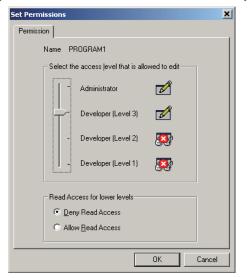
- [Set Permissions] is not selectable if data protection is disabled.
- The Set Permissions setting cannot be changed in the following cases:
 - a) An access level higher than the one used for the current login has been set.
 - b) The access level of the current login is Developer (Level 1).

DISPLAY/SETTING SCREEN

When the access level that is allowed to edit is Developer (Level 1) or higher



(When the access level that is allowed to edit is Developer (Level 3) or higher

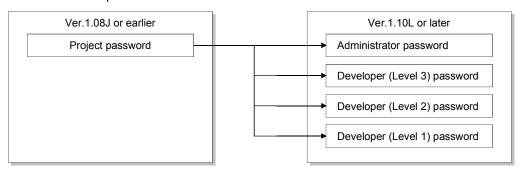


DISPLAY/SETTING CONTENTS

No.	Item/Button	Display/Setting		
1)	Name	Displays the name of a program, user-defined FB type, user-defined tab FB type or structure type.		
2)	Select the access level that is allowed to edit	By dragging the slider, set the access level for the target program or data to enable the editing. In the access level selected by the slider or higher level, editing is enabled. The slider can only be dragged within the area of the current access level and lower ones.		
		Displays the operation permitted for each access level as an icon. Displayed icons are changed according to the slider position and the Read Access for lower levels setting.		
		Icon	Permission	Condition for display
			Allow edit	The access level is the one selected by the slider or higher
3)	3) Access permission status display		Allow read access	The access level is lower than the one selected by the slider, and Read Access for lower levels is set to "Allow Read Access".
			Deny read access	The access level is lower than the one selected by the slider, and Read Access for lower levels is set to "Deny Read Access".
				_
4)	Read Access for lower levels	Select either Allow Read Access or Deny Read Access with its radio button to allow or deny read access from lower levels in which editing is not allowed.		
5)	OK	Accepts the setting and closes the Set Permissions window.		
6)	Cancel	Cancels the setting and closes the Set Permissions window.		

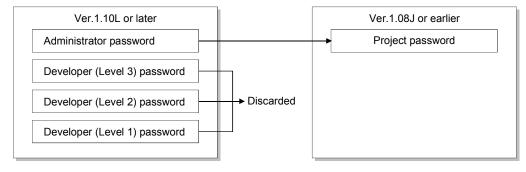
6.15.6 Password handling among different versions

- (1) When opening a project created by Version 1.08J or earlier using Version 1.10L or later
 - (a) When a project password was set on Version 1.08J or earlier The project password is effective for all access levels of Version 1.10L or later products.



- (b) When no project password was set on Version 1.08J or earlier No password is set for all access levels of Version 1.10L or later products, and thereby the Login window is not displayed when the project is opened.
- (2) When opening a project created by Version 1.10L or later using Version 1.08J or earlier

The Administrator password set on Version 1.10L or later becomes a project password of Version 1.08J or earlier products. Passwords set for Developer (Level 3) to Developer (Level 1) are discarded.



6.15.7 Function performing data protection

The following list shows the contents of data protection performed to the read only/read forbidden data when data protection is enabled.

Function	Contents	Reference
Parts window	The following operations cannot be performed in edit mode. • Selecting the toolbar on the Parts window in read only data.	Section 5.7.3
	Dropping when trying to paste FB parts by drag and drop and the data to be dropped is read only.	Section 7.2
FB property window	dow The initial value of the FB parts with local variable is unchangeable to the read only data in edit mode.	
FB Property Page	Property Page The initial value of the FB parts with local variable is unchangeable to the read only data in edit mode.	
Output window	ut window A jump to the error point in read forbidden data cannot be performed.	
Copying data in the same project	The operation to read forbidden data cannot be performed. Note that permission status of original data is not copied to the data to be copied.	Section 6.9.1
Deleting data in project	The operations to read only/read forbidden data cannot perform.	Section 6.10
Changing data name in project	The operations to read only/read forbidden data cannot perform.	Section 6.11
Editing data comments in project	Editing a comment in read only/read forbidden data is impossible.	Section 6.12
Displaying the data editing screen in project	Editing screen of read forbidden data is not displayed.	Section 6.13
Copying data to other project	The operation to read forbidden data cannot be performed. Note that permission status of original data is not copied to the data to be copied.	Section 6.9.2
Program/FB definition windows	If opening in read only, the grid of FBD sheet is not displayed in edit mode.	Section 7.1
	The following operations cannot be performed if read only data is opened in edit	
Moving FBD parts	mode.Move operation using mouse.Selecting Bring Forward/Send Backward in the diagram menu.	Section 7.2.2
Cutting/copying/pasting/deleting FBD parts	The following operations cannot be performed if read only data is opened in edit mode. • Selecting the Cutting/Pasting/Deleting menu. • Copying by [press "Ctrl" key and drag and drop FBD parts with mouse at the same time]. • Copying in a project or to other project by [press "Alt" key and drag and drop FBD parts with mouse at the same time].	Section 7.2.4
Inserting variable parts	The following operations cannot be performed if read only data is opened in edit mode. Inserting new variable parts from the Parts window. Inserting new/existing variable parts by paste operation.	Section 7.3.2
Definition of new variable	The following operations cannot be performed if read only data is opened in edit mode. • Selecting the Rename Variable menu about existing variable parts. • Adding new variable parts by paste operation.	Section 7.3.3
Refer to Variable	If read only data is opened in edit mode, the Refer to Variable menu is not selectable to existing variable parts.	Section 7.3.5
Inserting constant parts	The following operations cannot be performed if read only data is opened in edit mode. Inserting new variable parts from the Parts window. Inserting new/existing constant parts by paste operation.	Section 7.4.2
Editing value of constant parts	The following operations cannot be performed if read only data is opened in edit mode. • Starting edit by double click. • Selecting the Change Value menu to existing constant parts.	Section 7.4.3
Inserting FB parts	The following operations cannot be performed if read only data is opened in edit mode. Inserting new FB parts from the Parts window. Inserting new/existing FB parts by paste operation.	Section 7.5.2
Definition of new FB parts	The following operations cannot be performed if read only data is opened in edit mode. • Selecting the Change Value menu to existing FB parts. • Adding new FB parts by paste operation.	Section 7.5.3

Function	Contents	Reference
Setting FB property	If read only data is opened in edit mode, the initial value of the FB parts with local variable is unchangeable.	
Referring to definition of FB parts	Ÿ	
The following operations cannot be performed if read only data is opened in edit mode. Inserting new function parts from the Parts window. Inserting new/existing function parts by paste operation.		Section 7.6.2
Inserting a connector	The following operations cannot be performed if read only data is opened in edit mode. Inserting new connector parts from the Parts window. Inserting new/existing connector parts by paste operation.	
Connecting a connector	The following operations cannot be performed if read only data is opened in edit mode. • Moving the port of a connector. • Extracting a connector from output pin.	Section 7.7.2 Section 7.7.3 Section 7.7.5
Adjusting the bending position of connector	If read only data is opened in edit mode, bending position cannot be edited using movement grip.	Section 7.7.4
Inserting comment parts	The following operations cannot be performed if read only data is opened in edit mode. Inserting new comment parts from the Parts window. Inserting new/existing comment parts by paste operation.	Section 7.8.2
Editing text of comment parts	The following operations cannot be performed if read only data is opened in edit mode. • Selecting the Edit Comment menu about existing comment parts. • Selecting the all functions on the format tool bar.	Section 7.8.3 Section 5.6.6
Adding an FBD sheet		Section 7.9.2
Deleting an FBD sheet	If read only data is opened in edit mode, the operation menus of each function	Section 7.9.3
Moving/copying an FBD sheet	cannot be selected.	Section 7.9.4
Changing an FBD sheet name		Section 7.9.5
Editing declaration information of local variable sheet	The following operations cannot be performed if read only data is opened in edit mode. • Editing cells. • Changing variable type and line position by drag and drop.	Section 7.10.2
"Select Data Type" dialog box	If read only data is opened in edit mode, the calling button for "Select Data Type"	
"FBD Sheet Execution Condition Setting" dialog box	FBD Sheet Execution Condition If read only data is opened in edit mode, although the "FBD Sheet Execution Condition Setting" dialog box is displayed, the edited contents are not reflected.	
Defining/editing a structure type Definition Window	The following operations cannot be performed if read only data is opened in edit mode.	
Operations performed in cross reference window	perations performed in cross A jump to the variable in read forbidden data cannot be performed	
Error Check	A jump to the error point in read forbidden data cannot be performed (Error check for read only data is executable).	Section 11.1
Cold-start compile		Section 11.2
Hot-start compile		
Online change compile		Section 11.4
Reflection of FB property current value of specified FB parts to initial value	on of FB property current specified FB parts to	
Batch reflection of FB property current value to initial value		
FBD program diagnostics	A jump to the error point in read forbidden data cannot be performed in monitor mode.	
Printing programs/user-defined FBs	Read forbidden program and user-defined FB cannot be printed. (The checkbox of print target in the "Print" dialog box cannot be checked).	Section 15.5.5
Printing structure type	Read forbidden structure cannot be printed.	Section 15.5.6

6.15.8 Restrictions on data protection

(1) Unprotectable data with data protection

The following data is unprotectable even if data protection is enabled.

- · Project parameter
- Global variable declaration
- Module FB declaration
- · Tag FB declaration
- GX Developer label assignment
- · Program execution setting
- · Various data of GX Developer project
- Setting data independent of processing description by FBD program (e.g. Transfer setup, print setting, project comment)

(2) Functions display the variable in read forbidden data

The following shows the functions display the variable in read forbidden data.

- Cross reference
- FBD Program Diagnostics
- Entry Variable Monitor·····registering the variable and changing the current value in read forbidden data are possible.

(3) Restrictions on data copy between projects

When copying editable data or read only data from a project to other project, the permissions setting in the original project are not reflected to the copied data. Along with creating a new data, the copied data can be edited in the access level greater or equal to the one during login.

To protect the copied data in the same setting with the original project, permission setting is required in the target project.

6.16 Changing the PLC Type



PURPOSE

To change the PLC type setting in a project being edited.

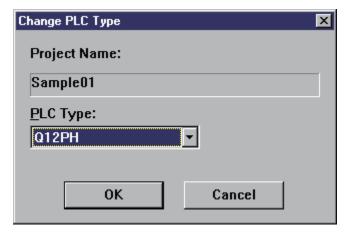


BASIC OPERATION

- 1. Click the [Project] → [Change PLC Type] in the menu.
- 2. Click the () in the list box after the "Change PLC Type" dialog box is displayed.
- 3. Select the PLC type to be changed.
- 4. Click the "OK" button.



DISPLAY/SETTING SCREEN



POINT

- Cold-start compile must be executed again if PLC type has been changed.
- Do not change PLC type in editing GX Developer project. Please save GX Developer project at first when editing GX Developer project in changing PLC type.

Please change PLC type after the above operation.

- PX Developer project and GX Developer project will be automatically saved.
- When changing the PLC type to PLC type that has different file register capacity, adjust the file register capacity as necessary.

The table below shows the maximum file register capacity when using a standard RAM for each CPU type.

PLC type	Maximum file register capacity when using standard RAM
Q02PH,Q06PHCPU	64K points
Q12PH,Q25PH,Q12PRH,Q25PRHCPU	128K points

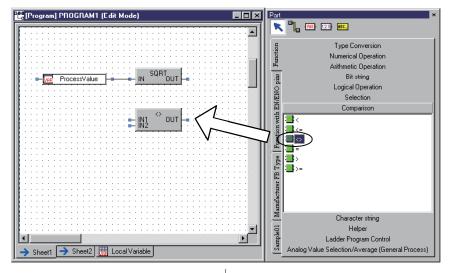
6 - 426 - 42

7

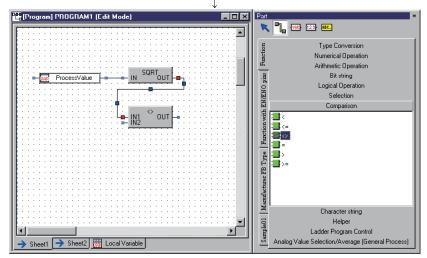
7 EDITING A PROGRAM/FB DEFINITION

This chapter mainly deals with how to make FBD programs by PX Developer programming tool or how to set variables.

This programming tool uses FBD language, which is prescribed in IEC61131-3, to make a program. The FBD language is a kind of "graphical language", which connect the block, variable and constant by data or signal flow to program for a special processing.



Arrange Parts



Connect the parts with connector to make programs!

The following is a list of FBD parts used in the programming tool. For general operation methods of FBD parts, please refer to Section 7.2. For their insertion methods and details, please refer to "Reference" item in the following list.

E	
FBD parts type	Reference
Variable parts	Section 7.3
Constant parts	Section 7.4
FB parts	Section 7.5
Function parts	Section 7.6
Connector	Section 7.7
Comment parts	Section 7.8

7.1 Program/FB Definition Windows

Program/FB definition window consists of FBD sheet and local variable sheet. It makes programs and defines FB type/tag FB type as well as setting all kinds of variables. Switch to edit mode when making a FBD program. (When programming tool is started, it is in edit mode.)

If it is in the monitor mode, please click [Edit] → [Edit Mode] in the menu or press "F2" to return to edit mode. When it is in the monitor mode, the current window is in the monitor status. (For detailed functions of monitor mode, please refer to Chapter 13)

(1) Open a program/FB definition window



PURPOSE

Open a program/FB definition window.



🗒 BASIC OPERATION

- 1. If a project is not opened, please open it. To make a new project, please refer to Section 6.2.
- 2. Open program/FB definition window in the project window. If the project window is not displayed, please refer to Section 5.7.1(2) to display it.
- 3. Open program folder icon or user-defined folder icon in the project window.
- 4. Double-click edited program/user-defined FB type icons. If there is no FB program, please refer to Section 6.8 to add a new FBD program in the project.

DISPLAY/SETTING SCREEN



Click ⊞ to open icons



Double-click an icon to display program/FB definition window

7

(FBD sheet) ☐ [Tag FB Type(2PID)] USR_TAGFB1 (Edit Mode) 2) 3) 6) 7) 10) 11) 5) 8) 9) (Local variable sheet) 😨 [Tag FB Type(2PID)] USR_TAGFB1 (Edit Mode) Internal Variable | Input Variable | Output Variable | Public Variable | Public Variable | Tag Member | External Variable | Variable Name Data Type 1 No FUNC INT Tag Function Code 3 NR AUT BOOL Operation Mode: AUTO Operation Mode: CASCADE 4 Ne CAS BOOL

Operation Mode: Computer MV

Operation Mode: Computer SV

Disable Mode Change: Disable MANUAL

Disable Mode Change: Disable CASCADE

Disable Mode Change: Disable COMPUTER MV

Disable Mode Change: Disable COMPUTER SV

Dirable Mode Change: Dirable AUTO

<Program/FB Definition Window>

DISPLAY/SETTING SCREEN

BOOL

BOOL

BOOL

BOOL

BOOL

5 Ne CMV

7 Pus MANI

8 NB AUTI

9 Ne CASI

10 Ne CMVI

11 Ne csvi

Number	Item	Display/set contents	
1)	Sheet tab	To display sheet names on tabs. The maximum length of sheet names is 64 characters. But the last sheet (the sheet on the right end) will always be << Local Variable>> tab.	
2)	Grip	To display it around the currently selected FBD parts. Drag this grip with mouse to change its size.	
3)	Constant parts	This part stores a constant internally, please refer to Section 7.4 for details.	
4)	Comment parts	To add notes or comments in the sheet. The settable maximum length of character string is 64KB.	
5)	FB/Function parts	To execute some particularly processed parts, please refer to Section 7.5, 7.6 for details.	
6)	Connection point	To connect FBD part points with connectors. The number of connection points can be deceased or increased in some functions.	
7)	Grid	To be displayed in grey in FBD sheet. Basically, FBD parts can adjust themselves to point the four angles correctly to the grid automatically provided that they are moved or changed in size.	
8)	Connector	This part is used for connection part with another part. The connector route should be adjusted automatically to avoid overlapping with other FBD parts (comment part excluded). Connectors should have directions and they cannot be connected directly.	
9)	Variable parts	To save variable parts. Please refer to Section 7.3 for details.	
10)	Tool tip	To display contents of FBD parts when mouse is moved upon them.	
11)	Title bar	To display the target program/FB type name. Also to display the current mode (edit/monitor) after the program/FB type name.	

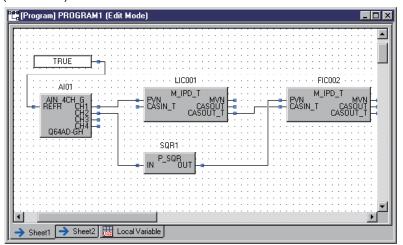
POINT

When a program is being opened in allow read only access setting, [Read-only] is displayed in the title bar.

7.1.1 Relation between local variable sheet and FBD sheet

The content of each part will be automatically displayed in the local variable sheet when variable name, variable type and data type have been arranged on FB parts or variable parts. Therefore, all the variables in FBD sheet can be managed through local variable sheet in a centralized way.

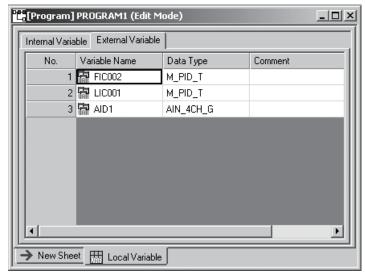
(FBD Sheet)



Insert parts

Displayed automatically!

(Local Variable Sheet)



Displayed as local variables

7.2 General Operations of FBD Parts

This section mainly deals with operation methods of FBD parts such as how to copy and paste them.

7.2.1 Selecting FBD parts



PURPOSE

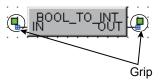
To select FBD parts arranged on FBD sheet.



BASIC OPERATION

- Select FBD parts with mouse
 - 1. To select a single FBD part, just click the wanted one.
 - To select more than 1 FBD part, click the parts while pressing "Shift" key, or press the left button of mouse after locating the cursor in the background of FBD sheet and then pull the mouse in oblique direction to have wanted FBD parts selected.
- Select FBD parts by keyboard
 - 1. Press "Tab" key. Each time one FBD part will be selected in the order by which it is pasted.
 - 2. Press "Shift" + "Tab" keys. Each time one FBD part will be selected in the converse order by which it is pasted.

The grip will be displayed around the FBD part after it is selected by either of the above two ways.



🔲 DI

DISPLAY/SETTING SCREEN

<Example of selecting multiple FBD parts with mouse>



Press left button of mouse while dragging it in oblique direction.

Once the button is released, multiple FBD parts will be selected.

POINT

Multiple FBD parts cannot be selected simultaneously in monitor mode.

7.2.2 Moving FBD parts



PURPOSE

To move FBD parts arranged on FBD sheet.

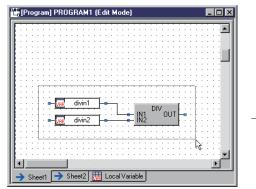


BASIC OPERATION

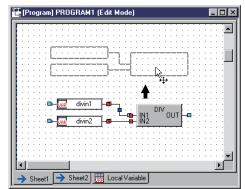
- Move FBD parts with mouse
 - 1. To move a single FBD part, click the wanted FBD part with mouse.
 - 2. When mouse pointer is transformed into \Leftrightarrow please drag the FBD part.
 - 3. To move multiple FBD parts, please refer to Section 7.2.1 to select multiple FBD parts at first.
 - 4. Move the mouse pointer to one of the selected FBD parts (cursor is transformed into ♣) and drag it with mouse.
- Move FBD parts with keyboard
 - 1. Select a FBD part (refer to Section7.2.1).
 - 2. In FBD parts selecting status, FBD part can be moved with "↑", "↓", "←", "→" keys on keyboard.
 - 3. Use "↑","↓","←","→" keys while pressing "Ctrl" key to move FBD parts by grid as unit.

DISPLAY/SETTING SCREEN

<Example of moving multiple FBD parts with mouse>



Select multiple FBD parts with mouse.



After selecting multiple FBD parts, drag the mouse pointer onto one of the parts.

7.2.3 Changing size of FBD parts



PURPOSE

To change the size of FBD parts arranged on FBD sheet.

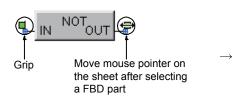


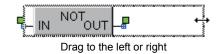
BASIC OPERATION

- Change the size of FBD parts with mouse
 - 1. Select the FBD part for size change (refer to Section 7.2.1).
 - 2. A grip will be displayed around the selected FBD part.
 - 3. Once mouse pointer is moved onto the grip, it will be transformed into↔.
 - 4. Drag mouse to the left or right.
- Change the size of FBD parts by keyboard Select the wanted FBD part (refer to Section 7.2.1).
 Move it with "←","→" keys while pressing "Shift" key.



DISPLAY/SETTING SCREEN





POINT

Only the right-to-left size of FBD parts can be changed.

While the top-to-bottom size of comment parts can be changed.

7.2.4 Cutting/Copying/Pasting/Deleting FBD parts

(1) Cut a FBD part



PURPOSE

To cut a FBD part arranged on FBD sheet.

The cut part can be pasted by executing step [(3) Paste] in this section.



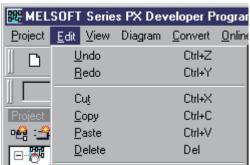
BASIC OPERATION

FBD parts can be cut in following three ways:

- Select the to-be-cut FBD part and then click [Edit] → [Cut] (🐰) in menu.
- Select the to-be-cut FBD part and then press "Ctrl" + "X".
- Right-click the to-be-cut FBD part and then select [Cut] from the pop-up menu.

DISPLAY/SETTING SCREEN

<[Edit] menu>



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(2) Copy a FBD part



PURPOSE

To copy a FBD part arranged on FBD sheet.

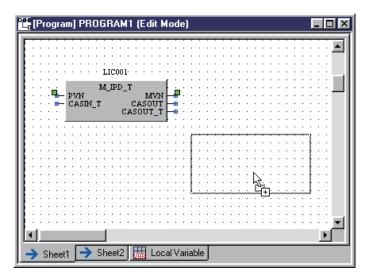
The copied FBD part can be pasted by executing step [(3) paste] in this section.



BASIC OPERATION

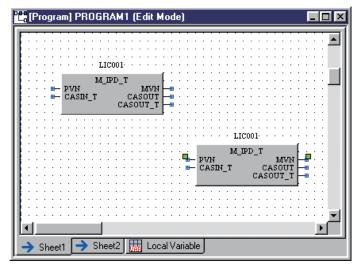
FBD parts can be copied in following four ways.

- Select the to-be-copied FBD part and then click [Edit] → [Copy] (□) in menu.
- Select the to-be-copied FBD part and then press "Ctrl" + "C".
- Right-click the to-be-copied FBD part and select [Copy] from the pop-up menu.
- If the copy-paste operation is for a single FBD sheet, just drag the FBD part to the target place while pressing "Ctrl" key.



Hold down the "Ctrl" key and drag the FBD part!





The FBD part is copied!

(3) Paste a FBD part



PURPOSE

To paste the cut/copied FBD part to a FBD sheet.



♥ BASIC OPERATION

FBD parts can be pasted in following three ways.

- Open the FBD sheet in the paste place then click [Edit] → [Paste] (□) in menu.
- Open the FBD sheet in the paste place then press "Ctrl" + "V".
- Right-click the FBD sheet in the paste place then select [Paste] in the pop-up menu.
- If the cut-paste operation is within the same FBD sheet, just drag & drop the FBD part to the target position while pressing "Ctrl" key.

POINT

- When a copied FBD part is pasted to another FBD sheet, the corresponding declaration about the local variable is pasted too.
- When a copied FBD part is pasted to another FBD sheet where there exists a homonymous FBD part with different variable and data types, the pasted FBD part will be renamed to [???] automatically. (FBD parts without the same variable and data type cannot be arranged in this operation.)
- In a single FBD sheet, FBD parts with the same variable name, variable type and data type can be arranged.

(4) Delete FBD parts



PURPOSE

To delete the FBD parts arranged on FBD sheet.



BASIC OPERATION

FBD part can be deleted in the following three ways.

- Select a to-be-deleted part and click [Edit] → [Delete] in menu.
- Select a to-be-deleted part and press "Delete" key.
- Right-click a to-be-deleted part and select [Delete] in the pop-up menu.

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7.2.5 Pasting FBD parts to other applications



PURPOSE

To paste FBD part graph displayed in programming tools into other applications. This chapter mainly deals with how to paste it into "Paint" on Microsoft® Windows® Operating System.

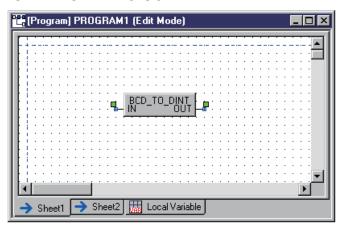


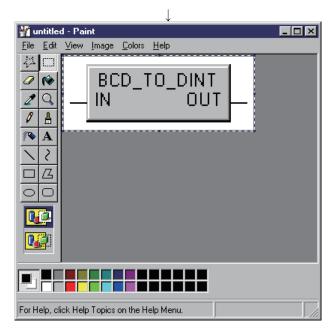
BASIC OPERATION

- 1. Cut/copy FBD parts by the method mentioned in step (1) or (2) of Section 7.2.4.
- 2. Click "Start" button in Windows® and move cursor to [Program] → [Accessories].
- 3. Click [Paint].
- 4. Click [Edit] → [Paste] in menu after paint is started.
- 5. Paste FBD part images.



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7.3 Variable Parts

Variable is used for storing data. The variable with specified data type can only store data (value) of such type.

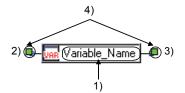
This section mainly explains displaying contents or insertion of variable and adding/or referring to a declaration.

7.3.1 Displaying contents of variable parts

(1) List of variable and its displaying contents The following is a variable part list.

Variable type	Contents	Displaying contents on FBD sheet
Internal Variable	It is applicable in a program, user-defined FB type/tag FB type. It cannot be accessed from an external FBD program. Data is saved in the internal memory.	■— <mark>UAR</mark> Variable_Name —■
Input Variable	To serve as input value (input pin of user-defined FB type/tag FB type) in user-defined FB type/tag FB type.	■— <mark>WAR</mark> Variable_Name —■
Output Variable	To serve as output value (input pin of user-defined FB type/tag FB type) in user-defined FB type/tag FB type.	■— <mark>WAR</mark> Variable_Name —■
Public Variable	It can be accessed from the inside of a certain FB type/tag FB type or from the outside of an adjacent FBD program. Data is saved in the internal memory.	e—Pus Variable_Name —■
External Variable	To refer to the variable of global part. The type of external variable must be consistent with that of global part name.	■— Variable_Name —

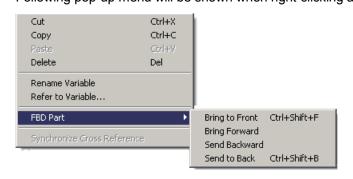
Names and functions of different parts in a variable part.



- 1) Variable name
- 2) Input connection point and input pin
- 3) Output connection point and output pin
- 4) Grip

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(2) The pop-up menu of variable parts (in edit mode)
Following pop-up menu will be shown when right-clicking a variable part.



Item	Content	
Cut		
Сору	D 6-4-06704	
Paste	Refer to Section 7.2.4.	
Delete		
Rename Variable	To rename a selected variable part.	
Refer to Variable	"Variable Reference" dialog box is displayed. (refer to Section 7.10.3)	
FBD Part	To change the priority of FBD parts.	
Synchronize Cross Reference	To display the corresponding item in the cross reference window. (refer to Section 10.1.5.)	

^{*:} For the details about the pop-up menu in monitor mode, refer to Section 5.5(3).

POINT The tool tip contents will be displayed when mouse pointer is moved on variable parts. Variable_Name(INT)

Display format of the tool tip is [Variable name (data type)].

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7.3.2 Inserting variable parts



PURPOSE

To insert a variable part into a FBD sheet.

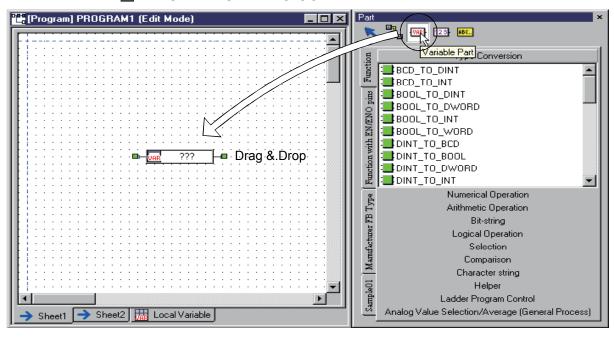


BASIC OPERATION

Variable parts can be inserted into a FBD sheet by following two methods.

- By dragging and dropping mouse
 - 1. Click "Variable Part" in the part window.
 - 2. Drag the variable part into FBD sheet.
 - 3. Drop the variable part in FBD sheet.
 - 4. Insert a FBD part (with [???] as its variable name) into FBD sheet.
- By clicking mouse
 - 1. Click "Variable Part" in parts window.
 - 2. Move variable part to the arrangement place when mouse pointer is transformed into ——.
 - 3. Click the mouse in FBD sheet and FBD part named [???] will be inserted.

DISPLAY/SETTING SCREEN



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7.3.3 Definition of new variable



PURPOSE

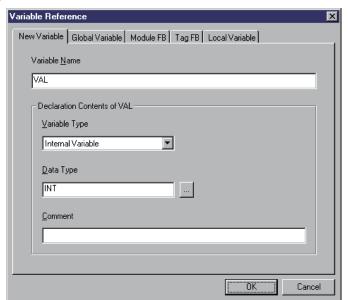
To define the new variable parts arranged on FBD sheet.



BASIC OPERATION

- 1. Click variable part in FBD sheet.
- 2. Move mouse pointer within the range of variable names. When cursor is transformed into the symbol \(\) (\(\begin{array}{c} \left\ \ \extrm{???} \\ \extrm{---} \extrm{---} \), double-click the mouse. Users can also right-click variable part and select [Rename Variable] in the pop-up menu.
- 3. Input the new variable name and press "Enter".
- If variable parts share no common variable name in the same program/userdefined FB type/tag FB type, the "Variable Reference" dialog box will be displayed.
- 5. Set variable name, variable type, data type and comments.
- 6. Click "OK" button.





POINT

- Please refer to Appendix 1 for information about restrictions for naming a FB variable (invalid character string or symbol).
- In the above-mentioned basic operation 4, users cannot name variable that share the same name but differ in variable type or data type in the local variable with declaration.
- In the case of programs, input variable, output variable and public variable cannot be specified.
- When a variable of a variable part or a FB part is renamed, even if its comment contains 65 characters or more, it will be truncated to 64 characters on the <<New Variable>>tab.

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7.3.4 Definition of variable using reference operator



PURPOSE

When users input a variable name, they can refer to structure member of structure type or input variable, output variable and public variable in FB part by applying reference operator [.]. This section will explain the definition method of the variable with reference operator.



BASIC OPERATION

Specify variable name in format of [FB variable name. Variable name](They are [Structure type variable name. Member name] in structure type) when inputting a variable name.

Express variable name in format of [FB variable name. Structure type variable name. Member name] when the reference target input variable, output variable and open variable on the reference operator are of structure type.

For detailed information about the structure member of structure type, please refer to Section 9.3.

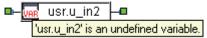
(Example) An user-defined input variable [u_in] with reference variable name: FB variable name [usr]



Under this situation, the variable name should be like this:



When users make reference to a variable using reference operator if the variable specified by [variable name] of [FB variable name. Variable name] do not exist, is displayed on the tool tip [FB variable name. Variable is an undefined variable].



POINT

- Reference variable name (structure type variable name and structure member name included) is case-sensitive when users enter variable or structure member name in use of reference operator. If variable name or structure name does not accord in case, users cannot refer to variable or structure member.
- When users defines variable with reference operator, the character strings prior to reference operator will be displayed in the variable name part of local variable sheet (Please refer to Section 7.10).

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7.3.5 Referring to the existing variables



PURPOSE

To change the variable name of variable parts arranged on FBD sheet into that of other declared variable name for referring to the variable with reference operator (refer to Section 7.3.4).

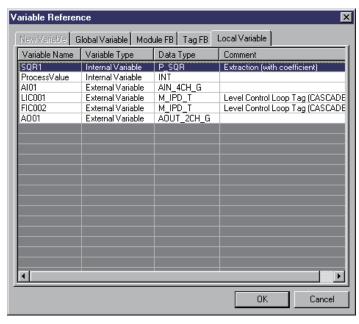


BASIC OPERATION

- Click the to-be-renamed variable part and select [Edit] → [Refer to Variable] in menu.
 - Alternatively, right-click variable part to be renamed and select [Refer to Variable] in the pop-up menu.
- 2. Dialog box of reference variable will be showed (refer to Section 7.10.3).
- 3. Select any variable from the list of declared local variable or global variable and click "OK".



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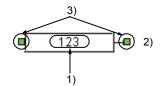
7.4 Constant Parts

This section mainly explains the display content or increment of constant parts, adding constant parts and editing constant parts value.

7.4.1 Displaying contents of constant parts

(1) The component name of constant parts

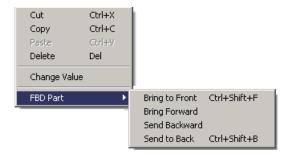
The following is the name and function of constant parts components.



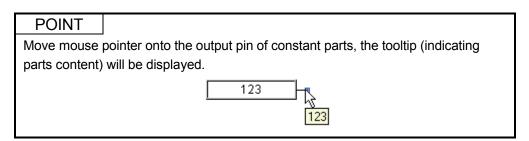
- 1) Constant value
- 2) Output joint point and output pin
- 3) Grip

(2) Pop-up menu of constant parts

Right-click constant parts and the pop-up menu will be displayed as follows:



Item	Content	
Cut		
Сору	Refer to Section 7.2.4.	
Paste		
Delete		
Change Value	To change the value of selected constant parts.	
FBD Part	To change the priority of FBD parts.	



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7.4.2 Inserting constant parts



PURPOSE

To insert a constant part into FBD sheet.

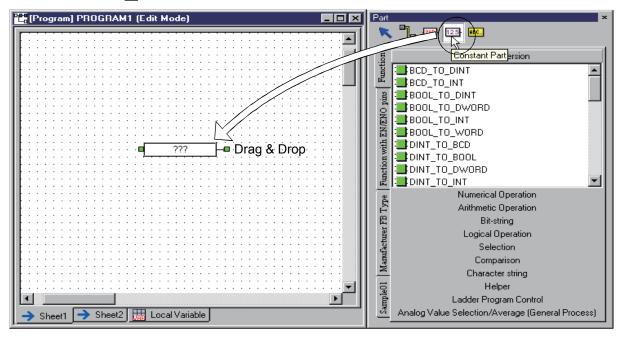


BASIC OPERATION

Constant parts can be inserted into FBD sheet in the following two ways.

- By dragging and dropping mouse
 - 1. Click "Constant Parts" in parts window.
 - 2. Drag a constant part from the parts window into FBD sheet.
 - 3. Drop constant part in the FBD sheet.
 - 4. Insert into FBD sheet the FBD part named [???].
- By mouse-clicking
 - 1. Click "Constant Parts" in parts window.
 - 2. Move the constant part to the wanted place with mouse, meanwhile mouse pointer is transformed into \dashv -.
 - 3. Insert the FBD part name [???] by clicking on the FBD sheet.

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7.4.3 Editing value of constant parts



PURPOSE

To input or modify value of constant parts.



) BASIC OPERATION

- 1. Click constant parts on the FBD sheet.
- 2. Double-click when mouse pointer is transformed into ☐ symbol



Alternatively, right-click the constant part and select [Change Value] in the popup menu.

- 3. Input constant value. Please refer to the following table for format of constants that can be input.
- 4. Press "Enter" key.

The input format of constant value

Input form to parts	Data type candidate	Input format/input examples
Character string	STRING	Embrace the character string with double quotation marks (") before inputting it. Its maximum length is 32 character. Example: "ABC"
Decimal integral	REAL, INT, DINT, WORD DWORD, BOOL	Number could be input with a minus mark. Example: 10, -10
Decimal real number	REAL	Number could be input with a decimal point or briefly as [.3(=0.3)] or [3. (=3.0)] or in index. Example: 10.0, 1.005E+008
Hexadecimal integral	INT, DINT, WORD, DWORD BOOL	Add [H] to value header and input it. Example: H10
True or false	BOOL	Input TRUE or FALSE. 0 (=FALSE), 1(=TRUE) can be input as decimal or hexadecimal number to specify TRUE or FALSE. Example: TRUE, FALSE, 0,1,H0 and H1



POINT

The data type of adjacent FBD part determines the one of constant part. If the value (data) input in constant part does not accord with the input variable data type of FBD part, error will occur once compile. For details, please refer to Section 11.7 (3).

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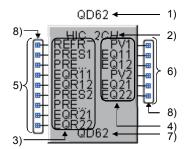
7.5 FB Parts

This section deals with insertion or display contents of FB parts, definition of new FB parts and FB performance setting.

7.5.1 Displaying contents of FB parts

(1) Each component name of FB parts

The following is a list of names and functions of components of FB parts.



- 1) FB variable name
- 2) FB type name
- 3) Input variable name defined in FB
- 4) Output variable name defined in FB
- 5) Input joint point and input pin
- 6) Output joint point and output pin
- 7) Module type name (only module FB displayed)
- 8) Grip

(2) Pop-up menu of FB parts (in edit mode)

Right-click FB part and the following pop-up menu will be displayed.



Item	Contents	
Cut		
Сору	Defer to Section 7.2.4	
Paste	Refer to Section 7.2.4.	
Delete	1	
Rename Variable	To rename a selected FB part.	
Display FB Definition	To show program-definition window of FB part definition source. (Only when user-defined FB/tag FB is selected)	
FBD Part	To change the priority of FBD parts.	
Synchronize Cross Reference	To display the corresponding item in the cross reference window. (refer to Section 10.1.5.)	
FB property page	To display FB property page. (The menu can be selected only when the FBs described in Section 10.2 are selected in edit mode.)	

^{*:} For more information about pop-up menu in monitor mode please refer to Section 5.5 (3).

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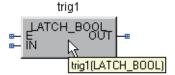
POINT

When user-defined FB/tag FB is pasted in FBD sheet, "x" will appear on user-defined FB/tag FB on FBD sheet if content of user-defined FB/tag FB type definition is changed (example: delete input variable).



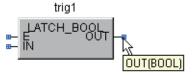
At that time, please reinsert the changed user-defined FB/tag FB in FBD sheet or put the definition of user-defined FB/Tag FB Type back together.

- No compile error occurs even if input pin and output pin of FB part are not connected.
- FB name will be displayed in tool tips when mouse pointer is placed on the parts except for I/O pins of FB part.



The tooltip is shown in [FB variable name (FB name)] format.

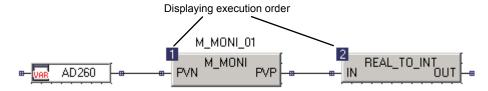
• The variable name and data type of a pin will be shown by tooltip when mouse pointer is placed on the input pin or output pin.



The tooltip is shown in [I/O variable name (data type)] format.

 Whether or not to display the execution order of FB parts and function parts can be switched by selecting [Diagram] → [Display Execution Order of FBD parts] in menu.

To establish the order, select [Convert] → [Error Check] menu.



The following shows the three types of the execution order display.

Display	Status
1 (Blue)	Error check is successful and order is established.
(Red)	An order is undecided as the FBD sheet whose order is established has been edited.
? (Red)	An order is unclear (e.g. FB/function parts are newly added. Error check is not performed).

Note that the display is discarded once closing a project. Perform error check to display it in restarting a project.

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7.5.2 Inserting FB parts



PURPOSE

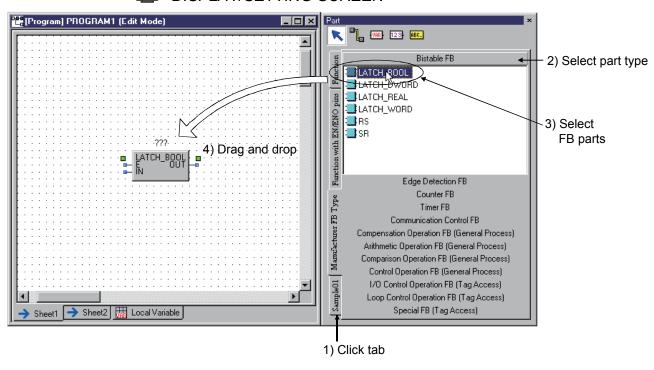
To insert FB parts into FBD sheets.



BASIC OPERATION

- 1. Display parts window.
- 2. Click tag to display FB parts (example: <<Manufacturer FB Type>> tab).
- 3. Select the type of parts to be inserted.
- 4. Select the to-be-inserted FB part from the displayed FB parts list.
- 5. Drag the FB part from parts window into the FBD sheet.
- 6. Drop FB part in FBD sheet.

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POINT

Following FB parts need different operations when users insert a FB part The operation is explained as below.

Module FB

Local variable sheet will automatically reflect the external variable of module FB when the Module FB is inserted into FBD sheet. Here, the external variable comment is in declaration window (refer to Section 8.3.1) of module FB.

Tag FB

The external variable of tag FB will be automatically displayed in local variable sheet once tag FB is inserted. Here, the external variable comment is arranged in declaration window (refer to Section 8.4.1) of tag FB.

• Tag FB/module FB

Comment of tag FB/module FB can be changed in the local variable sheet. Therefore even the same part may have different comment in different program/FB definition window. (Even if users change comments of module FB or tag FB that is arranged in program/FB definition window, it has nothing to do with the comments in FB declaration windows).

- Tag access FB of manufacture FB
 Tag access FB beyond user-defined tag FB type cannot be inserted.

 Additionally, tag access FB that does not support user-defined FB-type tag
 cannot be inserted either. The detailed information about tag access FB and
 paste-able tag type are in Appendix 2.
- Please do not use tag FB, general process FB or tag access FB for scan programs and interrupt pointer execution type programs (in terms of execution type by timer execution type). Otherwise, error will occur during operation. (It is the save when use user-defined FB type/tag FB type using above mentioned FB in program).

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7.5.3 Definition of new FB parts



PURPOSE

To define FB parts arranged on a FBD sheet.



BASIC OPERATION

- 1. Click FB parts on a FBD sheet.
- 2. Move mouse pointer within variable name (refer to Section 7.5.1) and doubleclick the mouse when the cursor is transformed into

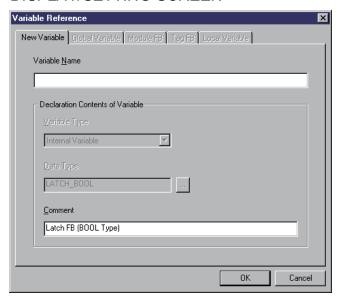


Variable] in the displayed pop-up menu.

- 3. Input FB variable name and press "Enter" key.
- 4. "Variable Reference" dialog box will be displayed if there are no variable parts with a common name in the same program, user-defined FB type/tag FB type. When there are comments for FB parts in advance, those comments are displayed in the comment text box.
- 5. Set variable names and the comment.
- 6. Click "OK" button.



DISPLAY/SETTING SCREEN



POINT

- For information about restrictions for on defining a variable name (invalid character string or symbol), please refer to Appendix 1.
- Variable type and data type of FB parts cannot be changed.
- For information about the definition of module FB and tag FB, please refer to Section 8.3.2 and 8.4.2 respectively.
- When a variable of a variable part or a FB part is renamed, even if its comment contains 65 characters or more, it will be truncated to 64 characters on the <<New Variable>>tab.

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7.5.4 Setting FB property



PURPOSE

To display/set the initial value of FB type/Tag FB type/Module FB type public variable.

The set public variable is processed as the property of FB type/Tag FB type/Module FB type.

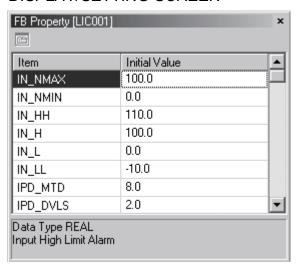


BASIC OPERATION

- If FB Property Window is hidden, select [View] → [Window] → [FB Property]
 in the menu to display it or press key "Alt" + "2".
- 2. Click FB/Tag FB/Module FB in FBD sheet.
- 3. Set FB properties when the property contents are displayed.



DISPLAY/SETTING SCREEN



POINT

- Refer to Section 5.7.4 for display/set contents of FB Property window.
- When executing hot-start compile or online change compile, sometimes the initial values of public variables set in FB property window may not be reflected to a CPU module.

For detailed information, please refer to Section 11.6.1.

 For public variables with FB type/tag FB type/Module FB type, please refer to PX Developer Programming Manual.

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7.5.5 Referring to definition of FB parts



PURPOSE

To display definition window in user-defined FB/Tag FB arranged on a FBD sheet.



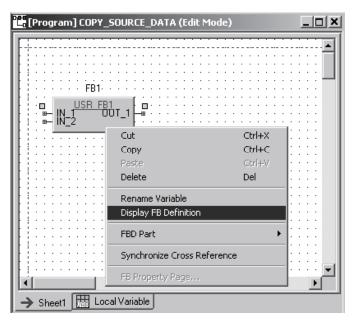
BASIC OPERATION

- Move the mouse pointer onto the FB type name of User-defined FB/Tag FB on the FBD sheet to display the hand pointer, and then click it.
 Or, select [Display FB definition] from the pop-up menu displayed by rightclicking user-defined FB/Tag FB.
- 2. Display the definition window of selected user-defined FB/Tag FB.

DISPLAY/SETTING SCREEN



Display the hand pointer and click.



Select from the pop-up menu.

POINT

- Only in user-defined FB/Tag FB can FB part definition resource be displayed.
- FB type name of FB parts that can display definition resource will be displayed in blue and underlined.

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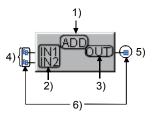
7.6 Function Parts

This section mainly deals with display or insertion of function parts, and the adding and deletion of input pin number.

7.6.1 Displaying contents of function parts

(1) Names of each unit of function parts

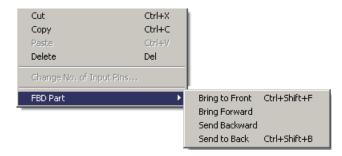
The following are names and functions of each unit.



- 1) Function name
- 2) Input variable name defined in function
- 3) Output variable name defined in function
- 4) Input connection point and input pin
- 5) Output connection point and output pin
- 6) Grip

(2) Pop-up menu of function part

Right-click function part and the following pop-up menu will be displayed.



Item	Content	
Cut		
Сору	Defeate Coeffice 7.2.4	
Paste	Refer to Section 7.2.4.	
Delete		
Change No. of Input Pins	To change input variable number (input pin number) of selected function part.	
FBD Part	To change the front-back position of FBD parts.	

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(3) Function with EN/ENO

Functions can be classified into two types: one is with EN/ENO pins the other without. Function with EN/ENO pins means adding EN and ENO pins function respectively in I/O variable of general functions.

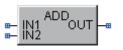
Function with EN is only executed when TRUE is input in EN. Normally, the ENO output is TRUE in operation processing. On the contrary, the ENO output is FALSE when operation errors occur.

If FALSE is input in EN, the output from ENO will be FALSE.

Users can select function with EN/ENO pins in <<Function with EN/ENO pins>> tab of parts window.

Usually [_E] is attached at the end of the function name with EN/ENO pins.

DISPLAY/SETTING SCREEN





General functions

Function with EN/ENO pins

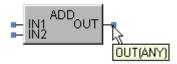
7 - 29 7 - 29

POINT

• The function name is displayed through tool tips indicating parts contents if mouse pointer is moved onto the parts except I/O pins of function parts.



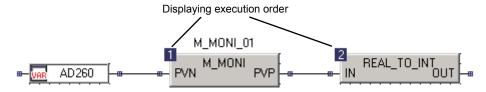
 The tool tips indicating parts contents will be displayed when mouse pointer is moved to input/output pin of function parts.



That tool tips are displayed in the format of [Input/output Variable Name (Data Type)].

- Connectors must be connected with input pins of function part. However, errors
 may also occur in compile even when connectors and input pins are connected.
 For the details, please refer to Section 11.7 (1). (Errors will not occur if the input
 pins (EN and P excluded) of functions, such as BIND, CALL_DINT,
 CALL_REAL, BIND_E, CALL_DINT_E and CALL_REAL_E, are not connected
 with connectors)
- Connectors do not have to be connected with output pins of function parts but they must be connected with output pins of BIND and BIND_E functions (Errors may occur in compile).
- For details of functions, such as BIND, CALL_DINT, CALL_REAL, BIND_E, CALL_DINT_E and CALL_REAL_E, please refer to [PX Developer Programming Manual].
- Whether or not to display the execution order of FB parts and function parts can be switched by selecting [Diagram] → [Display Execution Order of FBD parts] in menu.

To establish the order, select [Convert] → [Error Check] menu.



The following shows the three types of the execution order display.

Display	Status
1 (Blue)	Error check is successful and order is established.
(Red)	An order is undecided as the FBD sheet whose order is established has been edited.
(Red)	An order is unclear (e.g. FB/function parts are newly added. Error check is not performed).

Note that the display is discarded once closing a project. Perform error check to display it in restarting a project.

7 - 30 7 - 30

7.6.2 Inserting function parts



PURPOSE

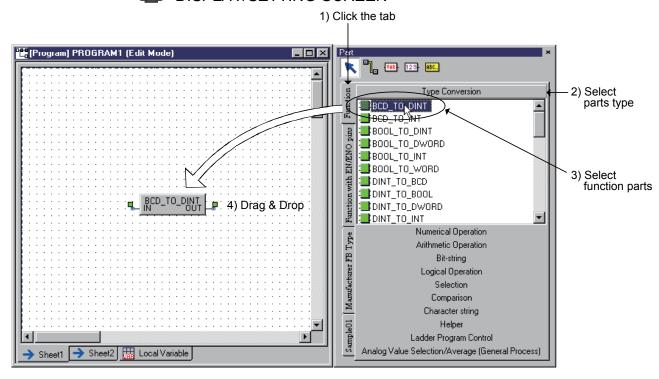
To insert function parts in a FBD sheet.



BASIC OPERATION

- 1. Display parts window.
- 2. Click <<Function>>/<<Function with EN/ENO pins>> tab to display parts.
- 3. Select to-be-inserted part type.
- 4. Select to-be-inserted part from the displayed function parts list.
- 5. Drag the function part from parts window to FBD sheet.
- 6. Drop the function part onto the FBD sheet.

DISPLAY/SETTING SCREEN



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7.6.3 Adding and deleting input pins



PURPOSE

To add and delete input pins in function parts whose input pin number can be changed.

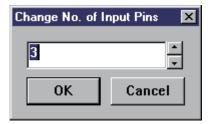


🖷 BASIC OPERATION

- 1. Click the function part for adding/deletion of input pins.
- 2. Click [Diagram] → [Change No. of Input Pins] in the menu or right-click the function part and select [Change No. of Input Pins] from the pop-up menu.
- 3. Display the "Change No. of Input Pins" dialog box for setting input pin number.
- 4. Input input pin number in the textbox or add/decrease input pins by using spin box button.
- 5. Click "OK" button.



DISPLAY/SETTING SCREEN



POINT

- When function part goes beyond the area (blue dotted line) of FBD sheet after the number of input pins is changed, errors will occur.
 - At this time, please move function parts from the blue dotted line part and set the input pins number again.
- Function parts whose input pins number can be changed are listed as follows.
 Function parts that are not listed in the following form allow no change on its input pins number.

Additionally, the input pins number can be set in the following range.

Function parts	The settable input pins number *
ADD, MUL, AND, OR, XOR, MAX, MIN, >, >=, =, <=, <	2 to 8
ADD_E, MUL_E, AND_E, OR_E, XOR_E, MAX_E, MIN_E, >_E, >=_E, =_E, <=_E, <_E, MUX	3 to 9
MUX_E	4 to 10
P_HS, P_LS, P_MID, P_AVE	2 to 16
P_HS_E, P_LS_E, P_MID_E, P_AVE_E	3 to 17

^{*:} Number of all input pins including EN, K pins etc.

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7.7 Connector

This section explains display contents of a connector, how to insert it, and how to connect FBD parts.

FBD parts can be connected by either of the following ways.

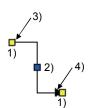
- Use "Connector" button to insert a connector. (refer to Section 7.7.2.)
- Extend a connector from the output pin of an FBD part. (refer to Section 7.7.3.)

In the former way, click the "Connector" button to connect FBD parts one by one. In the latter way, extend a connector from an output pin of an FBD part, and then connect it to other FBD part. (It is not necessary to click the "Connector" button.)

7.7.1 Displaying contents of connectors

(1) Each part name of connector

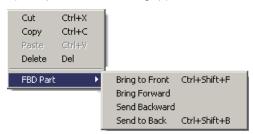
Name and function of each part on the connectors is explained as follows.



- 1) Connection point and grip
- 2) Movement grip
- Output pins connection port (Connected with the output point of the FBD parts)
- 4) Input pins connection point (Connected with the input pins of the FBD parts)

(2) Pop-up menu of the connector

(a) The following pop-up menu will be displayed by right clicking the connector. (Except for movement grip)



Item	Content	
Cut		
Сору	Refer to Section 7.2.4.	
Paste	Refer to Section 7.2.4.	
Delete		
FBD Part	To change the priority of FBD parts.	

(b) When right-clicking the movement grip



Item	Content
Fix Position	Set whether to fix the bending position of connectors.

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7.7.2 Using "Connector" button to insert a connector



PURPOSE

To insert connectors in FBD sheet to connect FBD parts.



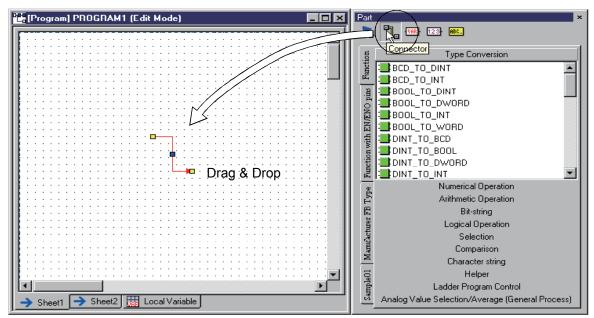
BASIC OPERATION

- 1. Insert the connector in FBD sheet
 - There are two ways as shown below to insert the connectors in the FBD sheet.
- (a) To insert by dragging and dropping with mouse.
 - Click the "Connector" button in the parts window.
 - Drag the connector from the parts window to the FBD sheet.
 - Drop the connector in the FBD sheet.
- (b) To insert by clicking the mouse.
 - Click the "Connector" button in the parts window.
 - Move the connector by mouse pointer to the arrangement place. At this time the mouse pointer becomes --.
 - Click the mouse in the FBD sheet to insert a connector.
- 2. Select a connector with mouse click.
- 3. Move the mouse pointer to the grip of the output pins connection point (refer to Section 7.7.1) of the connectors. At this time, the mouse pointer will transform into (Please refer to the following diagram).
- 4. Drag the mouse and drop to the output pins of FBD parts after Step 3. Thus the connection with an output pin is established.
- 5. Operating method for connecting connector with input pin is the same as Step 2 to 4.

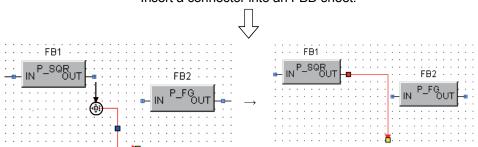
The color of connector will change from red to black after completing the connection normally; otherwise, the color does not change.

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DISPLAY/SETTING SCREEN



Insert a connector into an FBD sheet.



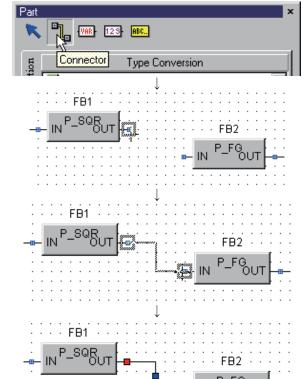
Click the connector and move the mouse point to the end point.

Drag and drop to the I/O pin of FBD parts.

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POINT

During the operation of Step 3., clicking the mouse on the output pins of the FBD parts can enable the insertion of connector as well as establish connection between connectors and output pins. Besides, the user just needs one operation to establish connection of the output pins to →input pins by dragging and dropping the mouse to the output pins.



- 1. Click the "Connector" button.
- Press the left button of the mouse on the output pins.
- Press the left button of mouse, and drag & drop to the input pins.
- 4. Complete the connection of wires.
- The connector only consists of the vertical and horizontal wire (no diagonal wire).
- Connection is not allowed between connectors.
- The input pin connection point can only connect with the input pins of FBD parts. Similarly, the output pins connection port can only connect with the output pins.
- The input pin of FBD parts can only connect one connector, However, the output pins of FBD parts can connect several connectors.
- The output pin and input pin for FBD Parts connected by the connector must be the same data type.
 - If connected by different data type, it may cause compile error.
- When connecting with FBD parts, or moving the already-connected FBD parts, the connection route will be automatically adjusted in order to avoid the overlapping of connectors and other FBD parts. (Except for comment parts)
- The connection cannot be established between two overlapped connection points of FBD parts. Please use connector to connect FBD parts.



- The connection cannot be established between two overlapped connection points of FBD parts.
- The connection is established by connector.

7 - 36 7 - 36

7.7.3 Extending from output pin



PURPOSE

To extend a connector from an output pin of an FBD part on the FBD sheet to connect the FBD part to other one.

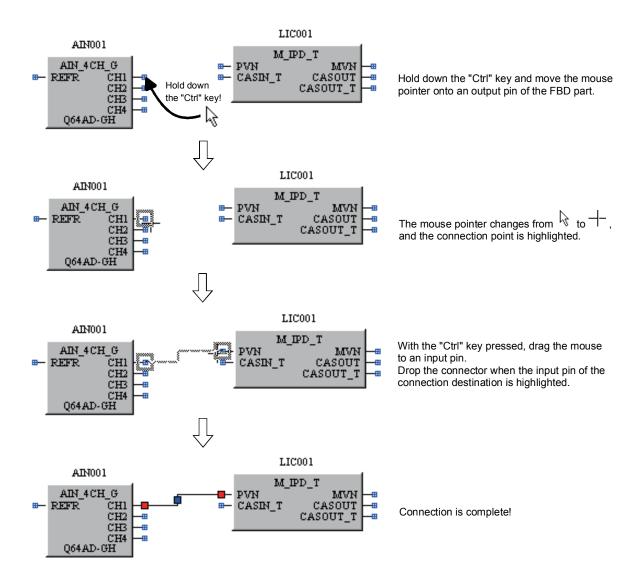


BASIC OPERATION

1. Hold down the "Ctrl" key and move the mouse pointer onto an output pin of an FBD part.

- 2. With the "Ctrl" key pressed, drag the mouse to an input pin.
- 3. Drop the connector when the input pin of the connection destination is highlighted.

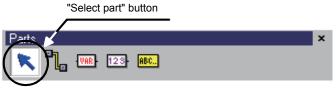
DISPLAY/SETTING SCREEN



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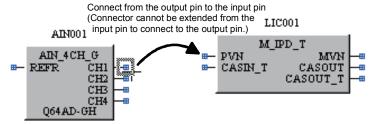
POINT

 A connector can be extended from an output pin when the "Select part" button on the parts window is ON.

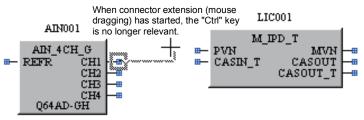


 Extend a connector from the connection point of an output pin to that of an input pin.

A connector cannot be extended from an input pin side to connect an output pin side

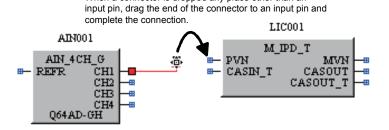


 When connector extension (mouse dragging) has started, this ensures wiring between the pins; the "Ctrl" key is no longer relevant.

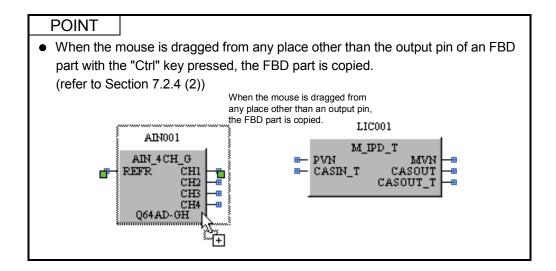


If a connector is dropped at any place other than an input pin, the connection will
not be completed. The connector will turn red and remain within the FBD sheet.
 In this case, drag the end of the connector to an input pin and complete the
connection by reference to Section 7.7.2.

When a connector is dropped any place other than an



7 - 38 7 - 38



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7.7.4 Adjusting the bending position of connector

(1) Adjust the bending position of connector



PURPOSE

To adjust the bending position of connector.

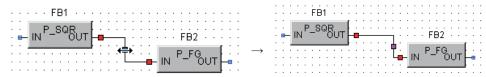


BASIC OPERATION

- 1. Click and select the connector needed to be adjusted the bending position.
- 2. Move mouse onto the movement grip. At this time, the pointer changes to $\hat{\downarrow}$ or \leftrightarrow
- 3. Drag the connectors.



DISPLAY/SETTING SCREEN



Move the mouse cursor to the movement grip.

Drag the movement point to adjust the bending position.

POINT

- As shown above, the connectors that have been connected with FBD parts can be moved only when the two ends have right-angled parts.
- Users need not to bend the connector for the bending part is automatically formed.

7 - 40 7 - 40

(2) Fix the position



PURPOSE

To fix the bending position of connector.



BASIC OPERATION

The bending position of the connector can be fixed by the following operations:

- Click the movement grip.
- Drag the movement grip and adjust the bending position.
- Right-click the movement grip and select (Fix Position) on the displayed pop-up menu. (refer to Section 7.7.1(2) (b))

If the position of connector is fixed, the color of the movement grip turns from blue to magenta.

To unfix the bending position of connector, users may right-click the movement grip and then select [Fix Position] on the displayed pop-up menu.

DISPLAY/SETTING SCREEN



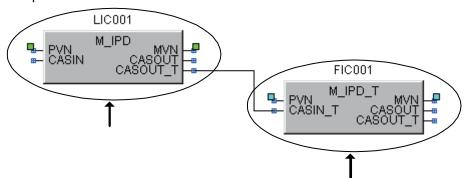
- Click the movement grip.
- Drag the movement grip.
- Right-click the movement grip and select [Fix Position] on the displayed pop-up menu.

The color of movement grip turns from blue to magenta.

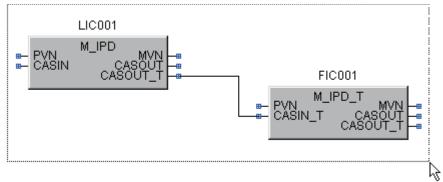
7 - 41 7 - 41

POINT

- The fixing of bending position is available in the status of normal wiring.
 The fixing bending position is disabled if FBD parts are unconnected with both ends of connectors.
- The following indicates: The fixture of bending position will be cancelled if the connecting position of connectors is changed or moved.
 - 1) When the connecting position of connectors is changed. (refer to Section 7.7.5)
 - 2) Only the FBD parts at 2 ends of connectors will be moved for moving FBD parts.



The fixture of bending position will be cancelled if the connecting position of connectors is moved.



The fixture of bending position will be kept when moving the connecting position of connectors after all the FBD parts selected.

3) At the time of moving connectors to reconnect the same parts.

7 - 42 7 - 42

7.7.5 Changing the connection position



PURPOSE

To change the connection position with FBD parts.

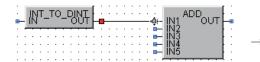


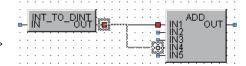
BASIC OPERATION

- 1. Click and select the connector for connection position changing.
- 2. Move the mouse pointer to the pins of the FBD parts connected by the connector.
- 3. The mouse pointer changes to Φ (refer to the diagram below).
- 4. Move the mouse pointer and drop to the pins of FBD parts after the status described in Step 3. is displayed.



DISPLAY/SETTING SCREEN





Move the mouse pointer to the I/O pins of FBD parts.

Change the connection position by dragging and dropping the mouse pointer.

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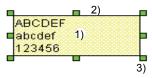
7.8 Comment Parts

This section explains the display contents, insertion and comment editing of the comment parts.

7.8.1 Displaying contents of comment parts

(1) Part names of the comment parts

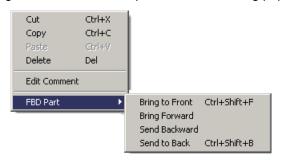
The following table explains the name of each part and function of in comment parts.



No.	Contents
1)	To display the comment contents. The font and background of this part can be set in the format toolbar. (Please refer to Section 5.6.6)
2)	Border line of comment parts.
3)	It is a grip. By dragging this part users can change the size of comment part. What is different from other FBD parts is that the width of the comment parts can be changed.

(2) Pop-up menu on the comment parts

Right-click the comment part and the following pop-up menu will be displayed.



Items	Contents	
Cut		
Сору	Refer to Section 7.2.4.	
Paste	Refer to Section 7.2.4.	
Delete		
Edit Comment	To edit the comment of the selected part.	
FBD Part	To change the priority of FBD parts.	

7 - 44 7 - 44

7.8.2 Inserting comment parts



PURPOSE

To insert comment parts to FBD sheet.



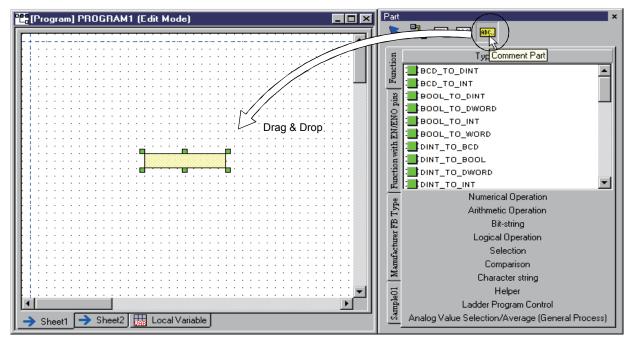
BASIC OPERATION

User can use the following two ways to insert comment parts to FBD sheet.

- To insert by dragging and dropping the mouse.
 - 1. Click the "Comment Part" in the parts window.
 - 2. Drag the comment parts from the parts window to the FBD sheet.
 - 3. Drop the comment parts in the FBD sheet.
- To insert by mouse click.
 - 1. Click the "Comment Part" in the parts window.
 - 2. Move the mouse pointer and move the comment parts to the arrangement place when the mouse pointer transforms into \dashv -.
 - 3. Click in the FBD sheet to insert the comment part.



DISPLAY/SETTING SCREEN



POINT

The comment parts can be inserted to the connectors.

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7.8.3 Editing text of comment parts



PURPOSE

To insert and edit the comments in the comment parts.



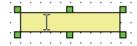
BASIC OPERATION

- 1. Click and select a comment part in FBD sheet.
- Move the pointer to the comment part, and double click it when the mouse pointer transforms into I (Please refer to the following diagram).
 Or right-click the comment part and select [Edit Comment] from the displayed pop-up menu.
- 3. Input the comment. During this, users can change to a new line by pressing the key "Enter".
- 4. Click the part outside the comment part after the input. (Remove the focus from the comment part.)

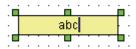
Thus the comment is set.



DISPLAY/SETTING SCREEN







Move the pointer to the comment part and double click it after selecting the comment part. Input the comment. Click the part outside the comment part after the input.

POINT

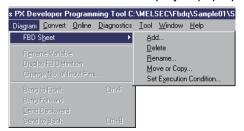
The comment will be automatically return to the right side when the input character width exceeds the comment part width. The user needs to extend its size vertically in order to display all the returned comments.

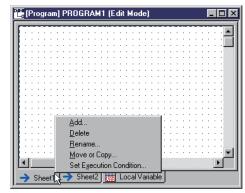
7 - 46 7 - 46

7.9 FBD Sheet

This section explains various operations in FBD sheet.

Execute the [Diagram] → [FBD Sheet] in the menu or right click the FBD Sheet tab and add FBD Sheet on the displayed pop-up menu.





Menu [Diagram] → [FBD Sheet]

Right-click the FBD Sheet tab (refer to Section 5.5 (2))

7.9.1 Switching between FBD sheets



PURPOSE

To switch between several existed FBD sheets.



BASIC OPERATION

Click the FBD Sheet tab that needs to be switched in the FBD sheet. Or switch FBD sheet by pressing "Ctrl" + "PageUp" (switch to the tab at the left side), and "Ctrl" + "PageDown" (switch to the tab at the right side).

7 - 47 7 - 47

7.9.2 Adding an FBD sheet



PURPOSE

To add FBD sheets in the program/FB definition window.

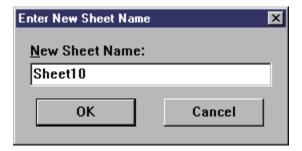


BASIC OPERATION

- 1. Display the program/definition window for adding FBD sheets.
- 2. Click [Diagram] \rightarrow [FBD Sheet] \rightarrow [Add] in the menu. Or right click the FBD Sheet tab and then click [Add] in the displayed pop-up
- 3. A dialog box for inputting the sheet name will be displayed once the Step 2 is executed.
- 4. Input the added FBD sheet name (within 64 characters).
- 5. Click "OK" button.



DISPLAY/SETTING SCREEN



POINT

- Do not give an existing name to a new-added FBD sheet.
- Maximally 32 FBD sheets can be added.
- After the FBD sheet is added, select [Edit] → [Undo] to recover the FBD sheet to its previous status before adding.

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7.9.3 Deleting an FBD sheet



PURPOSE

To delete FBD sheets in the program/FB definition window.



BASIC OPERATION

- 1. Display the FBD sheet that needs to be deleted.
- 2. Click [Diagram] \rightarrow [FBD Sheet] \rightarrow [Delete] in the menu. Or right click the FBD Sheet tab that needs be deleted, and then click [Delete] on the displayed pop-up menu.
- 3. A dialog box for confirming deletion will be displayed. Click "Yes" to cancel the FBD sheet.

POINT

- $\bullet\;$ After the FBD sheet is deleted, select [Edit] \to [Undo] in menu to recover the FBD sheet to its previous status before deleting.
- Users are not allowed to delete the previous FBD sheet.

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7.9.4 Moving/Copying an FBD sheet



PURPOSE

To move or copy a FBD sheet in the program/FB definition window.

(1) Move FBD Sheet

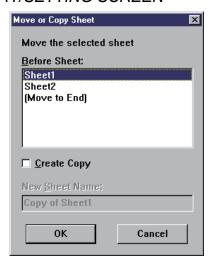


BASIC OPERATION

- 1. Display the FBD sheet which needs to be moved.
- Click [Diagram] → [FBD Sheet] → [Move or Copy] in the menu.
 Or right click the tab of FBD Sheet which needs to be moved, and then click [Move or Copy] in the displayed pop-up menu.
- 3. "Move or Copy Sheet" dialog box will be displayed once the operation in Step 2 is executed.
- 4. Select the before sheet name of the moved FBD sheet.
- 5. Click "OK" button.



DISPLAY/SETTING SCREEN



POINT

After the FBD sheet is moved, select [Edit] \rightarrow [Undo] in the menu to return to the status before moving.

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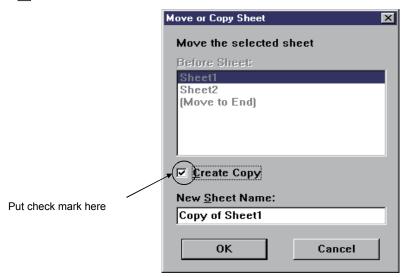
(2) Copy a FBD sheet



BASIC OPERATION

- 1. Display the FBD Sheet that needs to be copied.
- 2. Click [Diagram] → [FBD Sheet] → [Move or Copy] in the menu. Or right click the FBD Sheet tab which needs to be copied, and then click the [Move or Copy] in the displayed pop-up menu.
- 3. "Move or copy sheet" dialog box will be displayed once the Step 2 is executed.
- 4. Input the selection mark in the check box of [Create Copy].
- 5. Input the copied FBD sheet name (within 64 characters).
- 6. Click the "OK" button.

DISPLAY/SETTING SCREEN



POINT

- The existing FBD sheet name cannot be specified when copying a FBD sheet.
- After the FBD sheet is copied, select [Edit] → [Undo] in menu to recover the FBD sheet to its previous status.
- The name which add [Copy of] at the beginning of the copied sheet name has been input in "New Sheet Name" textbox when opening the dialog box mentioned above, if the original sheet name exceeds 57 characters. The new sheet name exceeds the character limit (64 characters) by adding

[Copy of]. In this case, characters exceeding the limit will be deleted at the end of the sheet name.

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7.9.5 Changing an FBD sheet name



PURPOSE

To change FBD sheet names in the program/FB definition window.

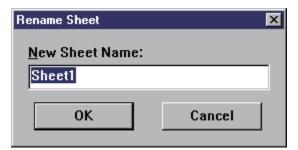


BASIC OPERATION

- 1. Display the FBD sheet that needs to be renamed.
- 2. Click [Diagram] \rightarrow [FBD Sheet] \rightarrow [Rename] in the menu. Or right click the FBD Sheet tab which needs to be renamed, and then click [Rename] in the displayed pop-up menu.
- 3. "Rename sheet" dialog box will be displayed once the Step 2 is executed.
- 4. Input the new name
- 5. Click the "OK" button.



DISPLAY/SETTING SCREEN



POINT

- Users are not allowed to rename the FBD sheet with an existing name.
- After the name is changed, select [Edit] → [Undo] in menu to recover the FBD sheet to its previous status before changing.

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7.9.6 Changing the displaying magnification of FBD sheet



PURPOSE

To change the display magnification of FBD sheet.



BASIC OPERATION

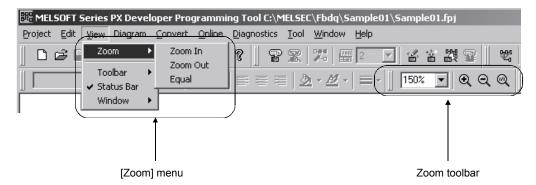
Firstly display the FBD sheet that needs changing.

Then the display magnification of the FBD sheet can be changed by one of the following methods.

- Click [Zoom in]/[Zoom out]/[Equal] of the [View] → [Zoom] in the menu.
- Change the display magnification from the zoom toolbar. (Please refer to **Section 5.6.5)**
- Change the display magnification by bird's-eye view window. (Please refer to **Section 5.7.6)**
- Drag the mouse to the background part of the FBD sheet while pressing "Alt"



DISPLAY/SETTING SCREEN



POINT

- The magnification of the display setting is saved in each FBD sheet.
- The setting range is 50% to 400%.
- The detailed magnification can be set by directly inputting value in the zoom toolbar.

7 - 53 7 - 53

7.10 Local Variable Sheet

There are two types of variables: Local variable and global variable (refer to Section 8.2). The local variables mentioned in this section mean the variables used by each program and user-defined FB type/Tag FB type.

The local variables sheet lists the variables in the FBD sheet. It is displayed in the previous sheet of the program/FB definition window.

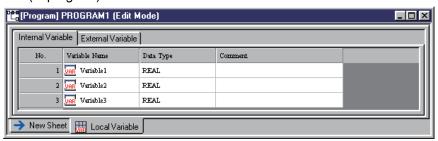
This section explains the local variable sheet used in the local variables declaration.

7.10.1 Displaying contents of local variable sheet

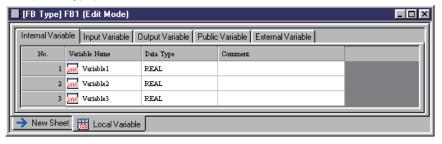
The display contents of the local variable sheet vary with the data types which are displayed currently.

DISPLAY/SETTING SCREEN

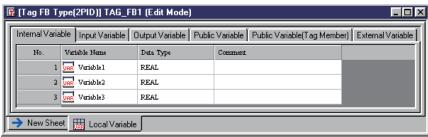
(In program)



(In FB type)



(In tag FB type)



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DISPLAY/SETTING DATA

Items	Display/Setting data				
Variable Type Tab	To switch and display the variables used in program/FB type/Tag FB type by sheets according to the different variable types. In program Internal variable and external variable. In FB type Internal variable and input variable, output variable, public variable and external variable. In Tag FB type Internal variable and input variable, output variable, public variable, public variable and external variable and input variable, output variable, public variable, public variable (Tag member) and external variable. (Display the tag data of public variable as << Public Variable (Tag Member)>> tab.)				
No.	Line No. Select and drag the No. cell to select multiple lines. When multiple lines have been selected, only copy is enabled. (refer to Section 5.8.1 (6) (b).)				
Variable Name	To display the variable names. The icon corresponding to the variable type is displayed on the left of the variable name. The following icons are displayed.				
	Variable type Internal variable Input variable Output variable Public variable Public variable (tag member) External variable				
Data Type	To display the variable data type of the declaration.				
Comment	To display the comments to the variables.				

POINT

- In the local variable sheet of user-defined FB type/Tag FB type, the of the input pins/output pins in the user-defined FB/ Tag FB order corresponds to that of the I/O variables. Please refer to the main points of Section 7.13.
- In the local variable sheet, by drag and drop of the icon in the "Variable Name" field, the corresponding variable data can be shifted to other line within the same variable type tab, or moved into other variable type tab (variable type change). (refer to Section 7.10.2 (4) and (5).)

7 - 55 7 - 55

7.10.2 Editing declaration information of local variable sheet

The user can edit declaration information such as variables names, data types, comments, variable type and declaration position of variable in the local variable sheet. In the local variable sheet, multiple cells or lines can be selected and copied to a Excel table, etc. (refer to Section 5.8.1)

New variables cannot be added to or deleted from the local variable sheets but from the FBD sheet.

Besides, the items in the << Public Variable (Tag Member)>> tab of Tag FB and in the monitor mode cannot be edited.

This section explains the editing methods and restrictions for the variables.

(1) Rename



PURPOSE

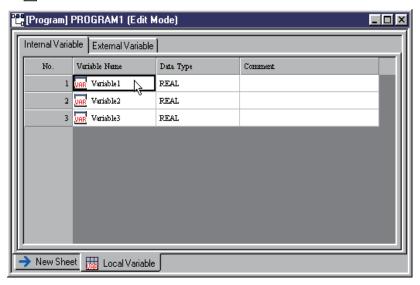
To rename a FBD part.



開 BASIC OPERATION

- 1. Double click the cell of the variable name that needs to be changed.
- 2. Input the variable name.
- 3. Press the key "Enter" to confirm the input variable name. Once the variable name is changed, all the parts with the same variable name arranged on the FBD sheet will be changed.

DISPLAY/SETTING SCREEN



POINT

- The variable name that is the same as other local variable cannot be used.
- Please refer to Appendix 1 for details about the restrictions (invalid character string or symbols) in defining the variable names.

7 - 56 7 - 56

(2) Change The Data Types



PURPOSE

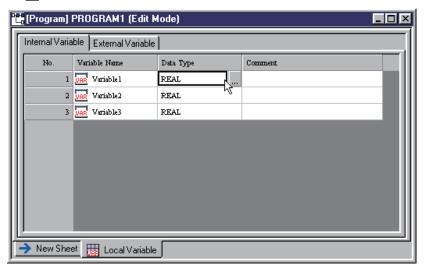
To change the data types of variables.



BASIC OPERATION

- 1. Click the cell of data type.
- 2. Once the Step 1. is executed, button "..." will be displayed. Then click "...".
- 3. Select a data type and click the "OK" button after displaying a dialog box in which the data type can be selected (Please refer to Section 7.10.4). All parts with the same variable name arranged on the FBD sheet will be changed.

DISPLAY/SETTING SCREEN



POINT

When one or more variables of the same type are pasted as FB parts on the FBD sheet, the variable type cannot be changed.

7 - 57 7 - 57

(3) Change the comments



PURPOSE

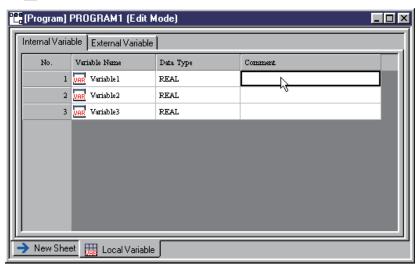
To change the comments of the variables.



BASIC OPERATION

- 1. Double click the cell of the comment.
- 2. Input the comment.
- 3. Press the "Enter" key to confirm the input comment.

DISPLAY/SETTING SCREEN



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(4) Change the variable type



PURPOSE

To change the variable type.



BASIC OPERATION

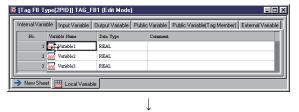
- 1. Move the mouse pointer to the icon corresponding to the variable of which type to be changed.
 - The mouse pointer changes to 4.
- 2. Drag the variable type tab that needs to be changed.
- 3. Display the variable list defined by the dragged variable type.
- 4. Draw onto the variable type tab when adding data at the end of the displayed variable list.

Drop onto the row that needs to be added when adding data to a random row. During dragging, a highlighted line is displayed between the rows where data will be inserted.

Once the variable type is changed, The icons of the variable parts placed in the FBD sheet and local variable sheet change according to the newly selected type. In the meantime all parts with the same variable name arranged in the FBD sheet will be changed as well. Please refer to Section 7.3.1 for details about relations between variable types and icons.

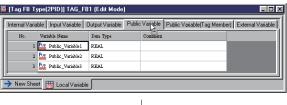


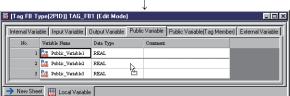
DISPLAY/SETTING SCREEN



Move the mouse pointer to the icon corresponding to the variable of which type to be changed.

The mouse pointer changes to \clubsuit .





Drag to the variable type tab which needs to be changed, thus a variable list of the change target will be displayed. (The left screen is a list of <<Public Variable>> tab)

Drop to the position of the line that needs to be inserted. During dragging, a highlighted line is displayed between the rows where data will be inserted.

(The left screen shows the case of inserting to the second line.)

7 - 59 7 - 59

POINT

- The arrangement of the variables in the local variable sheet can also be changed by dragging and dropping the icon in the "Variable Name" field (refer to (5) in this Section)
- Multiple variables cannot be simultaneously changed in (variable) type. Change one variable in type at a time.
- Press the "ESC" key to cancel the variable type change during drag and drop operation.
 - When the mouse cursor is displayed as \bigcirc , release the mouse button to cancel a variable type change.
- When one or more variables of the same type are pasted as FB parts on the FBD sheet, the variable type cannot be changed.
 - The variable types that can be changed are follows; Elementary data type (except Public variable (Tag member)) and Structure type.

7 - 60 7 - 60

(5) Change the variable declaration position



PURPOSE

To move the row where the variable has been declared.



BASIC OPERATION

1. Move the mouse pointer onto the icon of the variable name cell of the variable whose row position is desired to be changed.

The mouse pointer changes to +.

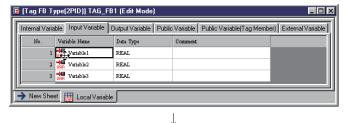
2. In this status, start dragging.

During dragging, a highlighted line is displayed between the rows where data will be inserted.

Drop onto the position of the destination row.



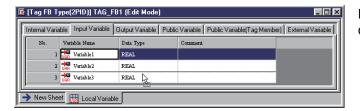
DISPLAY/SETTING SCREEN



Move the mouse pointer onto the icon of the variable name cell of the variable whose row position is desired to be changed.

The mouse pointer changes to

In this status, start dragging. During dragging, a highlighted line is displayed between the rows where data will be inserted.

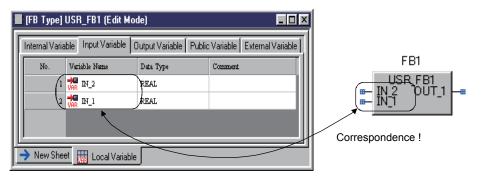


Drop onto the position of the destination row.

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POINT

- Multiple variables cannot be simultaneously changed in (variable) line.
 Change one declaration position of variable at a time.
- Press the "ESC" key to cancel the variable type change during drag and drop operation.
 - When the mouse cursor is displayed as **(S)**, release the mouse button to cancel a declaration position change of variable.
- The arrangement of the input pins/output pins of a user-defined FB/tag FB corresponds to the sequence of input/output variable lines in the local variable sheet.



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7.10.3 "Variable Reference" dialog box



PURPOSE

Refer to the declared variables (global variables, module FB, tag FB and local variables) in various declaration windows. Besides, it can also be used for changing the variable names of the variable parts arranged in the FBD sheet to the declared variable names. (refer to Section 7.3.5)

As a result, users not only can refer to the declared variables, but also can refer to the output variables and public variables of the FB parts.



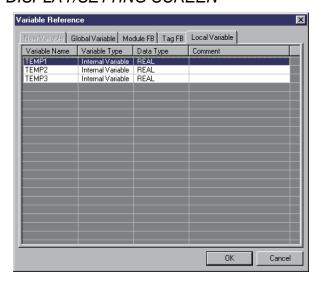
BASIC OPERATION

"Variable Reference" dialog box of will be displayed in the following cases:

- When inputting the variable name after arranging variable parts or FB in the FBD sheet and executing the declaration.
- When clicking [Edit] → [Refer to Variable] in menu in selecting variable parts.
- When right clicking the variable parts of FBD sheet and clicking the [Refer to Variable] in the displayed pop-up menu.
- When clicking the button "..." displayed in selecting the cell of the PX Developer global variable names in the GX Developer label assignment window (refer to Section 8.5).
- When clicking the button "..." displayed in selecting the cell of the variable names in the entry variable monitor window (refer to Section 13.7).
- When clicking the button "..." displayed in selecting the left/right cell of the dialog box of the FBD sheet execution conditions setting (refer to Section 7.11.2).
- When clicking the button "..." displayed in selecting the left/right cell of the dialog box of the program execution setting (refer to Section 7.12.3).



DISPLAY/SETTING SCREEN



POINT

- Users are not allowed to edit items in "Variable Reference" dialog box.
- When an error occurs in the declaration contents of the global parts (global variables, module FB, tag FB), an error icon will be displayed on the left of the variable name of this part. The variable that corresponds to the icon cannot be selected. Here, please clear this error in the declaration window of the global parts. (refer to Chapter 8)

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7.10.4 "Select Data Type" dialog box



PURPOSE

To select data type easily in "Select Data Type" dialog box when new variable is declared.



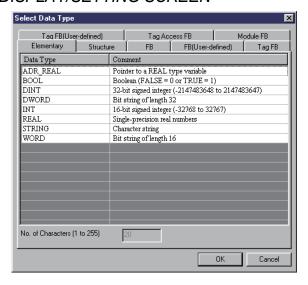
BASIC OPERATION

The "Select Data Type" dialog box will be displayed in the following cases:

- When selecting the data type in declaring a new variable. (refer to Section 7.3.3).
- When clicking the button "..." displayed in selecting the data type cell in the local variables window (refer to Section 7.10.2 (3)).
- When clicking the button "..." displayed in selecting the data type cell in the global variables declaration window (refer to Section 8.2.1).
- When clicking the button "..." displayed in selecting the tag FB type cell in the tag FB declaration window (refer to Section 8.4.1).
- When clicking the button "..." displayed in selecting the data type cell in the structure type definition window (refer to Section 9.1).
- 1. Click the type tag of the data type that needs to be selected, and select one displayed data type.
- 2. Input the No. of character (the setting range is 1 to 255) in the text bar below the dialog box when selecting STRING type (character string) in the data type.
- 3. Click the "OK" button or double click the selected data type to determine the data type.



DISPLAY/SETTING SCREEN



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7.11 FBD Sheet Execution Condition Setting

In program/FB definition window, programs are executed in order from the left FBD sheet to the right FBD sheet when there are several sheets in a certain program and user-defined FB type/Tag FB type. Execution conditions can be set to each FBD sheet in programming tool.

This section explains the execution conditions setting of each FBD sheet in one program/ FB definition window.

The execution conditions can be set for programs as unit in the programming tool. Please refer to the Section 7.12 for details.

7.11.1 Execution state

Execution conditions of the FBD sheet can be classified into the following 3 types. Once execution conditions of the FBD sheet are set, the FBD Sheet tab icon will be changed as follows:

Execution Conditions	Execution results	Sheet tab Icon	
Execute	To execute the processing defined by the FBD sheet.	→	
Do not execute	Not to execute the processing defined by the FBD sheet.	0	
Execute conditionally	To execute the processing defined by the FBD sheet only when the input execution conditions are met.	- 71	

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7.11.2 "FBD Sheet Execution Condition Setting" dialog box



PURPOSE

To set the execution conditions on each FBD sheet, and control the programs execution.

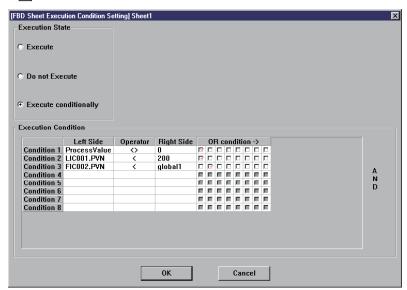


BASIC OPERATION

- 1. Select the FBD sheet that needs to be set the execution conditions.
- Click the [Diagram] → [FBD Sheet] → [Set Execution Condition] in menu.
 Or right click the FBD sheet, click the [Set Execution Condition] from the displayed pop-up menu.
- 3. Display the FBD sheet execution condition setting dialog box of the FBD sheet.
- 4. Select the execution state.
- 5. Select the "Execution conditionally" in the execution state, and set the execution condition. (refer to the next page for details)
- 6. Click the "OK" button.



DISPLAY/SETTING SCREEN



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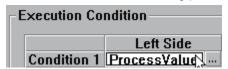
DISPLAY/SETTING DATA

	Items	Display / Set Contents				
	Execute	To execute the processing defined by the FBD sheet.				
Execution	Do not execute	Do not execute the processing defined by the FBD sheet.				
State	Execute conditionally	To execute the processing defined by the FBD sheet only when the input execution conditions are met. Please refer to the following contents for the execution condition setting.				
	Left side	To input the declared variable name in the local variable sheet.				
Execution	Right side	To input the declared variables in the local variable sheet or constants*.				
Condition	Operator	To select the comparison operator (=, <>, <, >, <=, >=).				
	Conditions combination (OR, AND conditions)	To set the conditions combination by selecting in the check box.				

*: Constants can only be input to the right side.

Please refer to Section 7.4.3 for the input format of the constants.

The setting procedure of the execution conditions is shown as follows:

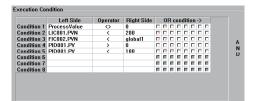


- 1. Set the execution conditions. Select the cell of the [Left Side].
- 2. Directly input the declared variable name in the local variables sheet.

Or select the [Left side] cell, click the button "...". Then in the displayed variables reference dialog box, select the variable item that needs to be set in the left side condition and click the "OK" button, or double click the variable item.



Operator 🔾



- 3. Select the cell of the [Right side].
- 4. Input the variable name or directly input constants as the Step 2. mentioned above.
- Set the items for comparison operation. Select the cell [Operator], a button () will be displayed. Then click this button to set the comparison operator of the left item and right item.
- Set the combination of the conditions. Various conditions with AND or OR can be combined by selecting in the check box on the right of the execution conditions.

Vertical direction corresponds to AND conditions and horizontal direction corresponds to OR conditions.

The left screen is

[(Condition 2 AND Condition 3) OR (Condition 1 AND Condition 3 AND Condition 5) OR (Condition 4 AND Condition 5)].

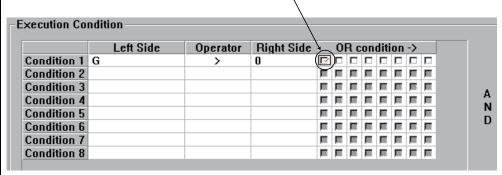
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POINT

- Only the execution conditions of local variables can be set.
- Conditions combination check boxes are not available when the left side, right side and comparison operator items are not input completely in.
- The user should set the execution conditions when selecting the "Execute conditionally" in the execution state. Otherwise, an error will occur.
- The sheet operation method in the dialog box of the FBD sheet execution condition setting is the same as [Section 5.8 Table].
- The conditions combination should be checked even if only one condition needs to be set.

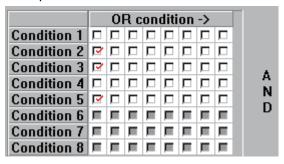
Example: when the FBD sheet needs to be executed provided that there is only one execution condition (global variable G is bigger than 0) and it is true:

- 1. Input [G] to the left side of the condition 1.
- 2. Select [>] in operator item.
- 3. Input [0] to the right side.
- 4. Input a check mark at the left top (1st row 1st column) of the conditions combination check box.



 Vertical direction corresponds to AND conditions and horizontal direction corresponds to OR conditions in the execution conditions check box.

Example 1: Condition 2 AND condition 3 AND condition 5



Example 2: Condition 2 OR condition 3 OR condition 5

		01	Rс	on	diti	on	->		П	
Condition 1										
Condition 2	P									
Condition 3		P								
Condition 4										
Condition 5			E							
Condition 6	100									
Condition 7	100									
Condition 8	100		100	100				<u> </u>		

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7.12 Program Execution Setting

The period and timing of executing the created program can be set in the programming tool.

This section explains the execution setting of programs.

Execution conditions can be set in FBD sheet in the program/FB definition window in the programming tool. Please refer to Section 7.11 for details.

7.12.1 Execution type

There are two methods to execute the programs, one is the timer execution, and the other is the interrupt execution. They are explained as follows.

(1) Timer execution

Timer execution means to control the start timing by adding up the CPU module scan times.

The period of the timer execution can be selected from the following four types.

Normal	Contents
High speed	To execute with a period of 200 ms.
Normal speed	To execute with a period of [(high-speed execution type period 200 ms) \times n1] ms. (n1=2, 3, 4, 5)
Low speed	To execute with a period of [(high-speed execution type period 200 ms) \times n2] ms. (n2=5, 10, 20, 25, 50)
Scan	From the next scan of executing the initial execution type program (when power is switched from ON to RUN, or the program that is executed only once when power is switched from STOP to RUN), to execute at each scan interval.

^{*:} n1, n2 can be set in the project parameter setting. Please refer to [Section 6.14 (2) Program Execution Setting] for details.

(2) Interrupt execution

The interrupt execution can be classified into two types, one is the fixed scan execution type that uses CPU module fixed scan execution type programs, and the other is the interrupt pointer execution type that uses the interrupt pointer.

Execution state	Contents
Fixed scan execution	To execute within each period set by users (execution interval).
Interrupt pointer execution	Temporarily interrupt the other programs execution to execute when the interrupt factor that
	corresponds to the CPU module interrupt pointer (I) occurs.

POINT

 Do not use Tag FB, general Process FB and Tag access FB in the following programs

Timer execution type program whose speed dependent is "Scan".

Interrupt pointer execution type program.

(It's the same when using the user-defined FB type/Tag FB type which have FB in the above-mentioned type programs.)

 Timer execution of other than the scan type will produce an error of up to +1 scan time, which is greater than interrupt execution.

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7.12.2 Program execution timing window



PURPOSE

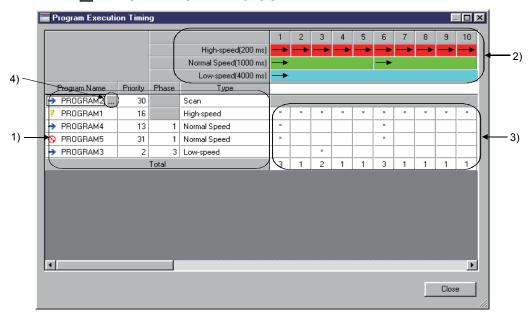
To display how to set the program execution timing is set.



BASIC OPERATION

- 1. Display the project window when it is not displayed. (Please refer to Section 5.7.1 (2)).
- 2. Double click the [Program Execution Setting] in the project window.
- 3. Display the program execution timing window.

DISPLAY/SETTING SCREEN



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DISPLAY/SETTING SCREEN

No.	Display Contents					
	To display the program names, execution state (the icon is displayed on the left of the program name), priority (execution type: only the timer execution), phase (speed dependent: only the normal speed and low-speed) which are set in the programs execution setting dialog box (refer to Section 7.12.3) and execution types of the programs. compare to display the icon is displayed on the left of the program of the execution setting dialog box (refer to Section 7.12.3) and execution types of the programs.</p					
	Execution state	Execution results	Icons			
	Execute	To execute program processing.	→			
	Do not execute	Not to execute program processing.	0			
1)	Execute conditionally	To execute program processing only when the conditions are met.	Y			
	 The indication priority order of the program in project window is as follows. Programs are displayed in alphabetical order if their conditions are the same in each following type programs. 1. The programs are displayed from small pointer number to big pointer number in the programs of interrupt pointers execution. 2. The programs are displayed according to their periods from short to long in the programs of fixed scan execution. 3. The programs are displayed in order of scan/high speed/normal speed/low-speed (when their speed dependent are the same, they are displayed according to the sequence from the short phase to the high priority) in the programs of execution timer. *: The execution state has nothing to do with the display sequence. 					
2)	To display the period of time	er execution type set by the project parame	eters.			
3)	[*] is used for expressing the execution timing of each program. The total of programs which is started in each timing (timer execution type) is displayed in "Total" column.					
4)	The programs execution setting dialog box will be displayed when clicked. (Please refer to Section 7.12.3)					

POINT

The number of settable programs for fixed scan execution differs depending on the PLC type.

When the number of programs that exceeds the maximum number of programs is set, a compile error occurs, not an error in the program execution setting.

PLC type	Maximum number of programs				
Q02PHCPU	15				
Q06PHCPU	30				
Q12PH,Q12PRH,Q25PH,Q25PRHCPU	100				

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7.12.3 "Program Execution Setting" dialog box



PURPOSE

To perform the execution setting (execution state, execution type, execution condition) of each program.

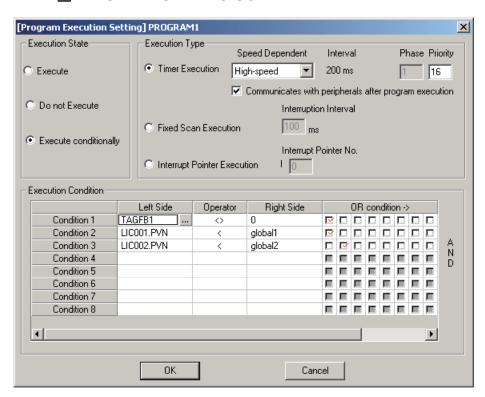


BASIC OPERATION

- 1. Refer to Section 7.12.2 and display the program execution timing window.
- 2. Click the program name cell for execution setting.
- 3. Click the button "..." displayed on the right of the cell after completing Step 2.
- 4. Display the "Program Execution Setting" dialog box.
- 5. Click the radio button to select the item to be set.
- 6. Set the selected item.(refer to the next page)
- 7. Click the "OK" button to apply the changes and close the dialog box. Click the button "Cancel" or "×" not to apply the changes but close the dialog box.



DISPLAY/SETTING SCREEN



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DISPLAY/SETTING DATA

	Set Items	Display/Set Contents			
	Execute	To execute the selected program. The timer execution, fixed scan execution, and interrupt pointer execution can be selected. (Please refer to sections in this list for setting methods.)			
Execution	Do not execute	Not to execute the selected program.			
State	Do not execute	To execute the selected program if the input conditions are met.			
	Execute conditionally	The timer execution, fixed scan execution, and interrupt pointer execution can be selected. Besides, the execution conditions should be set. (Please refer to sections in this list for the setting methods.)			
Execution Type	Timer execution	[Speed dependent] To click the list box (▼) of the speed dependent, select one of the high speed/normal speed/low speed/scan. The period will be displayed after selecting. The period (n times of [high-speed execution type period 200 ms]) is the value set previously by the project parameters (Please refer to Section 6.14 (2)) when selecting the normal speed or low speed. [Phase] To input value in the phase textbox. The phase width is fixed as n times of 200 ms. Input the value of n. The settable range is 1 to n. (n is the value set by project parameters (refer to Section 6.14 (2)). Please refer to [PX Developer Programming Manual] for details about the phase. [Priority] To input value to the priority textbox. The settable range is 0 to 31. The closer to 0 the numeric value is, the higher the priority level is. The setting of the priority level is valid only in the programs with the same execution types. On the contrary, the priority level is not valid in the programs with different execution types. [Communicates with peripherals after program execution] By checking the check box, improve monitor response of monitor tools and indicators. Uncheck the check box so that data can not be changed due to communication with peripheral devices during the execution of more than one program. (Refer to the POINT.) The initial values are high-speed for Speed dependent, 1 for Phase, 10 for Priority, and checked for Communicates with peripherals after program execution.			
	Fixed scan execution	[Interruption Interval] To input value to the interruption interval textbox. The settable range is 1 to 999 ms.			
	execution	The initial value is 10.			
	Interrupt pointer execution	[Interrupt Pointer No.] To input value in the interrupt pointer number textbox. The settable range is 0 to 255. Errors will occur in compile when the interrupt pointer number is used in other programs. The initial value is I0.			
	Left side	To input the variable name of the global parts (global variables, tag FB, module FB). The reference operator (please refer to Section 7.3.4) should be used to refer to the public variables when inputting the variable name of module FB and tag FB. Otherwise, errors will occur in compile.			
Execution Condition	Right side	To input the variable name or constant * of the global parts (global variables, tag FB, module FB). The reference operator (please refer to Section 7.3.4) should be used to refer to the public variables when inputting the variable name of module FB and tag FB. Otherwise, errors will occur in compile.			
	Operator	To select the operator (=, <>, <, >, <=, >=).			
	Conditions combination	To set the conditions combination by inputting check marks in the check box. Please refer to Section 7.11.2 for details.			

^{*:} Constants can be only input to the right side.
Please refer to Section 7.4.3 for the input format of constants.

POINT

• The following shows the example that the response to the monitoring system improves when "Communicates with peripherals after program execution" is checked for FBD programs.

If "Communicates with peripherals after program execution" is not checked, consistency of data is kept between the program being executed and next program since no communication is performed with peripheral devices until the execution of next program is completed.

<Execution program>

1) User ladder program

Execution type: Scan execution (Set in PLC parameter of GX Developer.)

2) FBD program a, b, c

Interval: High-speed (200ms)

Communicates with peripherals after program execution: a, c · Checked b ····· Unchecked

3) FBD program d

Interval: Normal-speed (600ms), Phase: 1

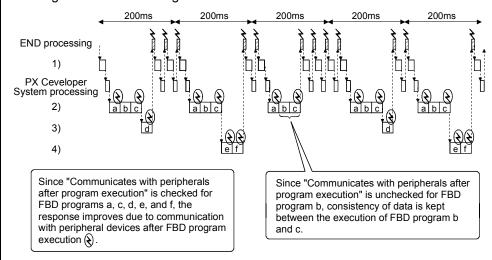
Communicates with peripherals after program execution: Checked

4) FBD program e, f

Interval: Normal-speed (600ms), Phase: 2

Communicates with peripherals after program execution: Checked

<Program execution timing>



- ₹ : Communication with peripheral devices at END processing
- (2): Communication with peripheral devices after FBD program execution
- When project files created with PX Developer Version 1.12N or earlier are opened in PX Developer Version 1.13P or later, "Communicates with peripherals after program execution" for those files is unchecked.

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7.13 User-defined FB type

The user's own FB type can be defined in the programming tool. The creation time of the FBD programs can be shortened by defining the processing used frequently in the program as a FB in advance.

User-defined FB type is composed of the previously-prepared function parts, FB parts (tag access FB excluded), etc.

This section explains how to create a FB type.

Please refer to Section 8.4.4 for the user-defined tag FB type and refer to Chapter 9 for the structure type.



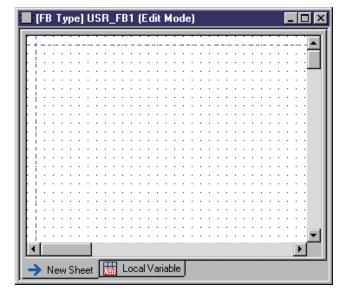
PURPOSE

To create the user-defined FB type.





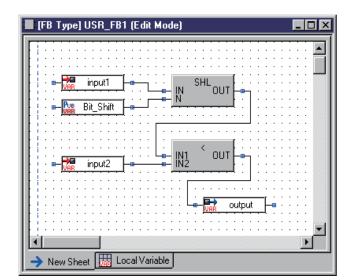
- Add the data of the user-defined FB type to the project window. (Please refer to Section 6.8)
- 2. Double click the icon of user-defined FB type added to the project window.



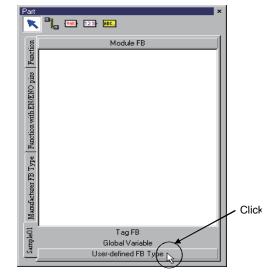
3. The added FB definition window will be displayed after completing Step 2.

(To the next page)

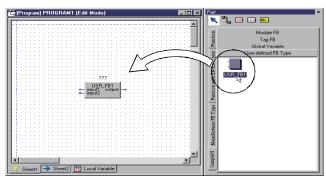
7 - 75 7 - 75



 Arrange the FBD parts in the displayed FB type definition window, and create the processing contents of the userdefined FB type.



 Click the <<Project Name>> tab in the part window (the left screen is [Sample 01]). Then click "User-defined FB Type".



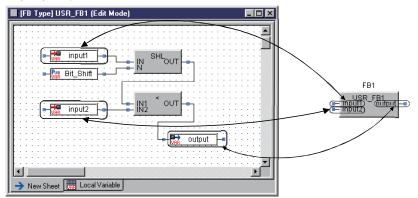
 The icon of the user-defined FB type will be displayed after completing Step 5.
 The defined FB type can be used by dragging and dropping the icon in the FBD sheet.

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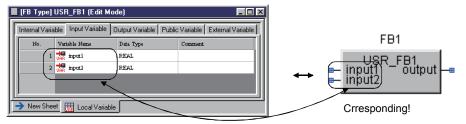
POINT

- The user-defined FB cannot be pasted to the definition window of the FB (it should not be pasted on itself).
- The input/output of the user-defined FB type can be realized by input/output variables.

(The input variables correspond to input pins, and output variables correspond to output pins.)

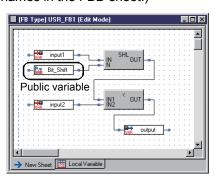


• The order of input pins/output pins of the user-defined FB corresponds to order the order of Input/Output variables in the local variables sheet.



 The initial value of the public variables can be changed in the FB property window after arranging the user-defined FB. Besides, the public variables in the user-defined FB can be referred to with the variable parts. (refer to Section 7.4.3).

However, the initial value cannot be set if the public variable is ADR_REAL type or structure type. (The initial value of the public variable should be set in the FB property window after inserting the user-defined FB type and setting FB variable names in the FBD sheet.)





7.14 Cooperation with Ladder Program

The processing (such as the interlock processing) which is difficult to describe in the FBD programs can be described in the ladder programs. Besides, the data can be changed between FBD programs and ladder programs. (Please refer to [Section 8.5 Export Data to GX Developer Global Label])

7.14.1 Opening a GX Developer project in the PX Developer project



PURPOSE

To make ladder programs by GX Developer. The GX Developer project in the PX Developer should be started in order to create the user's own ladder programs and set the PLC parameters and network parameters.



BASIC OPERATION

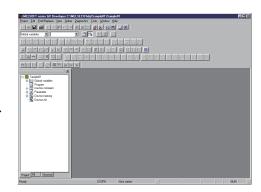
- 1. Start the GX Developer project in the PX Developer project from the project window. Please refer to Section 5.7.1 (2) to display the project window when it is not displayed.
- 2. Double click the "GX Developer Project" icon in the project window.
- 3. Start the GX Developer project.



DISPLAY/SETTING SCREEN



Double click the "GX Developer Project" icon!



Open the GX Developer project in the PX Developer project!

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POINT

• A program named [#FBDQ...] will be created when compile has been executed and starting the GX Developer project in the PX Developer project.



The program named [#FBDQ...] is a ladder program compiled and converted by programming tool. Do not add the name [#FBDQ...] in the program name created by the user.

 The following restrictions apply when editing compiled PX Developer projects using GX Developer.

Menu/Screen	Restrictions
Change PLC type menu	Unusable.
Edit data menu	Programs of which name starting with "#FBDQ" are read-only.
Edit data-New menu	Do not assign the program name starting with "#FBDQ" to the data name that will be newly added.
Delete project screen	The program name starting with "#FBDQ" is not displayed at the delete data name list box.
Rename screen	 Programs of which name starting with "#FBDQ" are deleted from the original data name list box. Do not enter the program name starting with "#FBDQ" into the new data name list box.
Copy screen	Do not assign the program name starting with "#FBDQ" to the copy target data.
Replace screen	Replacement operation is disabled for programs of which name starting with "#FBDQ".
Redundant parameter screen	 Some operations of tracking settings are disabled. The tracking device setting method is fixed to "Device detail Setting". Device range setting of tracking block No.33 to 64 and edit of file register file setting are disabled.*1

- *1: Use tracking block No.1 to 32 to make the following tracking device settings.
 - Output Y device
 - B device, W device for host station transmission
 - Various devices for user ladder programs (including the device range of "Auto device setting" of GX Developer)

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7.14.2 Creating a ladder program



PURPOSE

To make the ladder programs using GX Developer.

(1) Create Ladder Program



BASIC OPERATION

- 1. Start the GX Developer project from the programming tool. (refer to Section 7.14.1.)
- Create a ladder program.
 Please refer to [GX Developer Operating Manual] for how to create ladder programs and how to make relevant setting using GX Developer.

POINT

- The QDRSET(P) instruction (setting of file for file register) must not be included in the user-created ladder program. If included, FBD program will not normally operate when the file for file register is renamed by the QDRSET(P) instruction.
- Programming tool reads/downloads the following devices in processing.
 Please be sure not to change device value from user-created ladder program.

Device for programming tool	Change-forbidden range of device value
ZR (or R)	Range set by the system resource in the project parameter* ¹ (However, the items of tag data* ² included in the rage can be changed by ZR specification.)
Т	Range set by the system resource in the project parameter setting
Р	P3500 to P4095
М	M0 to M399
Z	Z0 to Z6
SD	SD0 to SD8, SD16 to SD19, SD203, SD1500 to SD1505
SM	SM1, SM390, SM701, SM1500 to SM1501, SM1552 to SM1583

^{*1:} For details of project parameter setting, refer to Section 6.14.(1).

- With the programming tool, the data (value) of a global part in the FBD program can be exchanged with the data (value) in the ladder program. (refer to Section 8.5.)
- Up to 122 ladder programs can be created. However, if the fixed scan type program is created using the programming tool, this will affect the number of ladder programs, i.e., it will decrease by the number of the created fixed scan type programs.
- The FB created using GX Developer is not compatible with the FB used in PX Developer.

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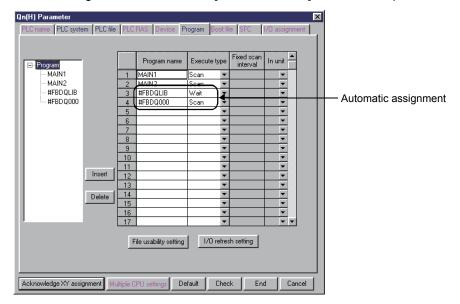
^{*2:} The device assigned to tag data can be checked from the tag FB declaration window.

(2) Setting on GX Developer



BASIC OPERATION

When using GX Developer to create ladder programs, make the settings for them in the <<Pre>rogram>> tab within the [PLC Parameter] of GX Developer.



Please refer to [GX Developer Operating Manual] for details of the setting methods.

POINT

- Do not change the program setting named [#FBDQ...] in the [PLC parameter] of GX Developer.
- When making various parameter settings to the GX Developer project in the project created with the programming tool, always start GX Developer from the programming tool.

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7.14.3 Precautions for ladder programming

For the precautions for various parameter settings, etc. made by user ladder creation or using GX Developer, refer to "2.2.4 Cooperation with GX Developer" in the PX Developer Programming Manual.

8

8 GLOBAL PARTS

Global parts are variables/parts that can be referred to in any program/FB type. Global parts are classified as global variable, module FB and tag FB.

There are declaration windows in the above three types of global parts. Once declaration is done in declaration window of programming tool, parts will be added into the parts window and global parts can be used in FBD program.

This chapter explains these three types of global parts.

8.1 Relation Between Global Parts and Program/FB Type

Once users drag and drop the global parts from the parts window into a FBD sheet after global parts have been declared in declaration windows, the parts information will be automatically shown as external variable in the local variable sheet.

However, even if the declaration is changed in the declaration window of global parts, the added external variable in the local variable sheet will not reflect the change.

Therefore, global parts (external variable) on FBD sheet will mismatch the declaration in declaration window. (The changed contents will not be reflected on global parts on FBD sheet.) In this case, try in the following ways to accord declaration in declaration window with declaration of global parts (external variable) in local variable sheet.

The external variable of the global parts in local variable sheet has been referred to for

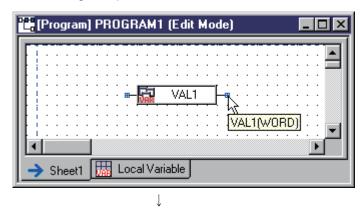
The external variable of the global parts in local variable sheet has been referred to fo change. The change is the same as that made in declaration window of global parts. Or delete from FBD sheet the global parts whose declaration has been changed and then paste it to the parts window again.

The change contents of the local variable sheet and parts items that must be pasted again when change in declaration windows are listed as follows. (Items that are not in the following list are declarations that don't need to be changed in the local variable sheet)

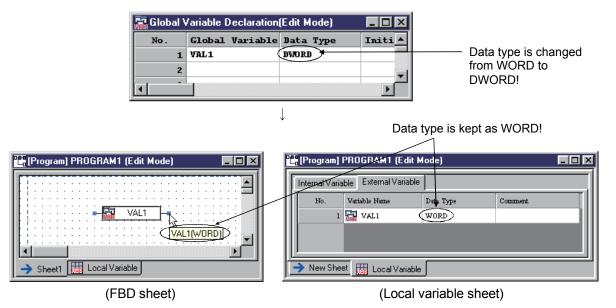
- Changing global variable declaration Global variable name, data type
- Changing tag FB declaration
 Tag FB variable name, tag FB type (re-paste parts in changing tag FB)
- Changing module FB declaration
 Module FB variable name, module type name (re-paste parts in changing module type name)

Similarly, in changing declaration of global parts (external variable) on local variable sheet, global parts (external variable) on local variable sheet will disaccord with global parts declaration on declaration windows. (The change on the local variable sheet will not be reflected in the declaration windows.) Here, please change declaration on declaration windows to conform them to declaration on local variable sheet.

(Example) When the change contents on global variable declaration window are not reflected in global parts on FBD sheet.



Change the declaration window contents when pasting global parts on FBD sheet



Even if declaration on global variable declaration window is changed, the change will not be reflected on the global part on FBD sheet and in the local variable sheet. (Changing WORD to DWORD is not reflected)

In the above case, please refer to the previous page to conform the declaration of global parts (external variable) on local variable sheet to declaration on global variable declaration window.

POINT

Errors will occur in compile when users make reference to unspecified variable in global parts in external variable.

8.2 Global Variable

Global variable means variable that can be referred to in all FBD programs. Global variable can be accessed with external variable.

For the local variable, only the data (value) defined in FBD program can be accessed. While as for global variable, data (value) can be accessed even between the different FBD programs.

8.2.1 Global variable declaration window



PURPOSE

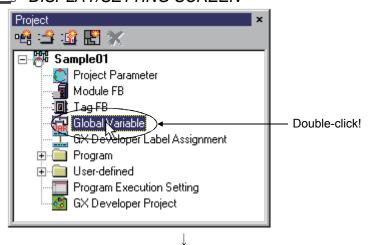
To display windows for global variable declaration.

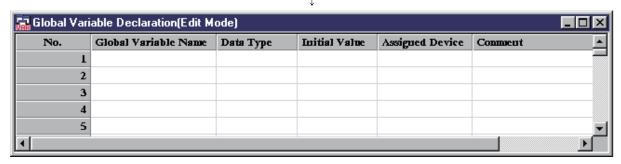


BASIC OPERATION

- 1. Double-click the global variable icon on the project window.
- 2. Display global variable declaration window.

DISPLAY/SETTING SCREEN





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8.2.2 Declaring/Editing a global variable

(1) Global Variable Declaration



PURPOSE

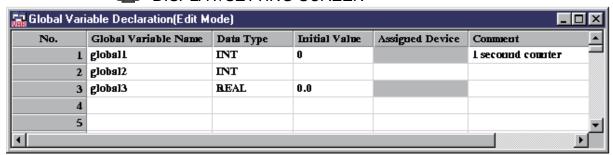
To declare a global variable in order to use it

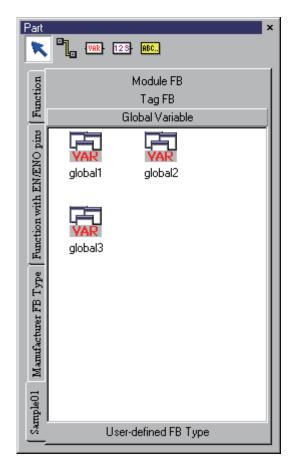


BASIC OPERATION

- 1. Refer to Section 8.2.1 to display global variable declaration window.
- 2. Input data or value in each item.
- 3. Declared variable will be added to the "Global Variable" item in parts window after global variable is declared.

☐ DISPLAY/SETTING SCREEN







DISPLAY/SETTING CONTENTS

Item	Display/Setting contents		
	It's a row No. that can be defined within No.32000.		
No.	When an error occurs in the declared global variable, icon (or o		
	corresponding to the error content.		
Global variable name	Display/set global variable name.		
Global variable name	Select the cell and enter the variable name (Within 32 characters).		
	Display/set data type.		
	Select the data type cell and press the "" button to edit data type.		
Data tuna	Display "Select Data Type" dialog box (refer to Section 7.10.4).		
Data type	3. Select data type and click "OK" button.		
	Users can also set data type by inputting directly with keyboard.		
	The settable data type consists of elementary data type and structure type.		
	Display/set initial value of elementary data type global variable.		
Initial value	Select the cell and input value in editing the initial value. The input format is the same as the		
Irilliai value	constant input format.		
	Please refer to Section 7.4.3 for constant input format.		
	Display/set the PLC device assigned to global variable. Select the cell and input data in		
	editing PLC device. Users can set intelligent function module device (UO\GO) and link direct		
	device (JO\OO), but the intelligent function module device and link direct device cannot be		
Assigned device	set in the STRING type global variable assigned device.		
Assigned device	Please refer to (2) in this section for details about the range of the devices that can be input.		
	Devices will be assigned automatically when assigned devices are not set in compile.		
	Device will be assigned in the head member in structure type.		
	Please refer to [QCPU User's Manual] for details about PLC devices.		
Comment	Display/set comments of global variable.		
	Select the cell and directly input the comments for editing. The corresponding set comments		
	will be displayed when mouse pointer is placed on the parts on parts window.		
	Within 64 characters.		

POINT

- When users paste global variable parts (external variable in reference to global variable) on a FBD sheet and change the declaration in global variable declaration window, the change will not be reflected by the part on the FBD sheet. Please refer to Section 8.1 for details.
- The maximum number of defined global variables is 32000.
- The initial value and assigned device cannot be set at the same time.
- The structure members will not be displayed.
- When errors occur in declared data, error icon will be displayed at the left side of the No. (refer to (3) in this Section).
 - Once the error line is selected, the error content will be displayed in the status bar.
- Global variable cannot share the same name with tag FB variable or module FB variable.

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(2) The Settable Device Range

The following is a list of settable range in assigned device in a global variable declaration window.

Classification	Classification Type	Device name	Douise name Initial		Range set by	Error check range
Classification		Points	Points	Range of use	parameter setting	Ellor check range
		Input	8192 points	X0 to X1FFF	Not allowed	X0 to X1FFF
		Output	8192 points	Y0 to Y1FFF	Not allowed	Y0 to Y1FFF
	D:4	Internal relay	8192 points	M0 to M8191 *3	Ob an analytic state in	M0 to M32767
	Bit device	Latch relay	8192 points	L0 to L8191	Changeable within 29K words	L0 to L32767
Internal user device	acvice	Annunciator	2048 points	F0 to F2047	291 Words	F0 to F32767
		Step relay	8192 points	S0 to S511/Block	Not allowed	S0 to S511/Block
		Link relay	8192 points	B0 to B1FFF	Changachla within	B0 to B7FFF
	Word	Data register	12288 points	D0 to D12287	Changeable within 29K words	D0 to D25983
	device	Link register	8192 points	W0 to W1FFF	291 Words	W0 to W657F
	Bit	Special relay	2048 points	SM0 to SM2047 *3		SM0 to SM2047
Internal system	device	Special link relay	2048 points	SB0 to SB7FF	Not allowed	SB0 to SB7FF
device	Word	Special register	2048 points	SD0 to SD2047 *3	Not allowed	SD0 to SD2047
	device	Special link register	2048 points	SW0 to SW7FF		SW0 to SW7FF
Direct device	Bit	Direct input	4096 points	DX0 to DXFFF	Not allowed	DX0 to DXFFF
Direct device	device	Direct output	4096 points	DY0 to DYFFF	Not allowed	DY0 to DYFFF
		Link input	8192 points	Jn\X0 to Jn\X1FFF		Jn\X0 to Jn\X1FFF
	Bit	Link output	8192 points	Jn\Y0 to Jn\Y1FFF		Jn\Y0 to Jn\Y1FFF
	device	Link relay	16384 points	Jn\B0 to Jn\B3FFF		Jn\B0 to Jn\B3FFF
Link direct device *2	Link direct device *2 Spec Word Link I	Special link relay	512 points	Jn\SB0 to Jn\SB1FFF	Not allowed	Jn\SB0 to Jn\SB1FFF
		Link register	16384 points	Jn\W0 to Jn\W3FF		Jn\W0 to Jn\W3FF
		Special link register	512 points	Jn\SW0 to Jn\SW1FF		Jn\SW0 to Jn\SW1FF
Intelligent function module device *2	Word device	Buffer register	65536 points	Un\G0 to Un\G65535 *1	Not allowed	Un\G0 to Un\G65535 *1
File register	Word device	File register *4	1042432 points	ZR0 to ZR1042431 *3	Not allowed	ZR0 to ZR1042431

^{*1:} Practically workable points vary with intelligent function modules.

^{*2:} N for link direct device Jn ranges 1 to 255, and for intelligent function module device Un ranges 0 to 1FF.

^{*3:} Within some range the device value cannot be changed. For details, please refer to point in the next page.

^{*4:} When the file register is specified, the R device cannot be used. Use the ZR device.

POINT

- Users are not allowed to use timer (T), retentive timer (ST), counter(C), file register(R) and device BL and TR of SFC.
- When setting file register (ZR) and internal relay (M) in assigned devices, the
 device range should not be duplicated with the range set by project parameter
 system resource (refer to Section 6.14 (1)).
- The file register (R) cannot be used with the programming tool. Use the ZR device.
 - The file register (R) can be used in user-created ladder programs. However, when using the file register (R) in a user-created ladder program, do not use the file register (ZR) in the range set by the system resource of the project parameter (refer to Section 6.14 (1)).
- Programming tool uploads/downloads the following devices in processing.
 Please be sure not to change device value from global variable or user-created ladder program.

Device for programming tool	Change-forbidden range of device value
ZR (or R)	Range set by the system resource in the project parameter * ¹ (However, the items of tag data* ² included in the rage can be changed by ZR specification.)
Т	Range set by the system resource in the project parameter setting
Р	P3500 to P4095
М	M0 to M399
Z	Z0 to Z6
SD	SD0 to SD8, SD16 to SD19, SD203, SD1500 to SD1505
SM	SM1, SM390, SM701, SM1500 to SM1501, SM1552 to SM1583

^{*1:} Refer to Section 6.14 (1) for details of the project parameter setting.

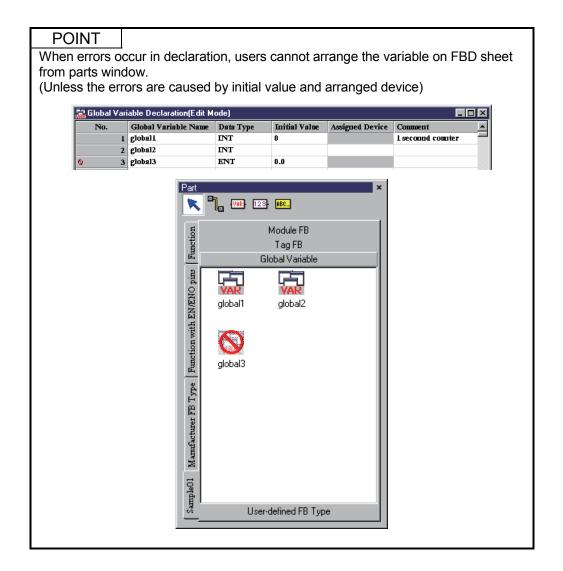
^{*2:} The device assigned to tag data can be checked from the tag FB declaration window.

(3) Error list of global variable declaration window

The following is a list of errors in global variable declaration window.

Items	Error items and contents	Error icon
	 Variable name duplication error Occurring in setting the declared global variable name, module FB variable name, and tag FB variable name. 	88
Global variable name	 Variable name no specification error Occurring when all the other items have been set except global variable name. Variable name format error Occurring when illegal characters (including reserved words*) are used in global variable name. 	
Data type	 Data type no specification error Occurring when all the other items have been set except data type. Data type format error Occurring when illegal characters are used in data type. Data type specification error Occurring when the data type which can't be specified in data type (elementary data type and structure type excluded) is specified. 	ø
Initial value	 Initial value format error Occurring when illegal characters are used in initial value. Initial value type mismatch error Occurring when the specified data type does not accord with input data type of initial value. 	
Assigned device	 Assigned device type mismatch error Occurring when the specified data type does not accord with input data type of assigned device or illegal characters are used in assigned devices. 	

^{*:} For details about reserved words please refer to Appendix 1.



(4) Editing operations in global variable declaration window.



PURPOSE

To paste the global variable declaration list made by Microsoft® Excel onto the global variable declaration window when users are to delete a row or execute row inserting and row deleting in the global variable declaration window.



BASIC OPERATION

For detailed operation methods please refer to [Section 5.8.1 "General Operations on Sheet].

POINT

- Users can delete a global variable when reference is made by an external variable.
 - Please delete the external variable which refers to the global variable in program/FB definition window as well when deleting the global variable declaration. Otherwise, an error may occur in compile when the external variable reference target does not exist.
- Click [Edit] → [Undo] in menu to recover to the previous status before changing.

8.2.3 Sorting global variable declaration



PURPOSE

To sort global variable declaration according to global variable name and assigned device.

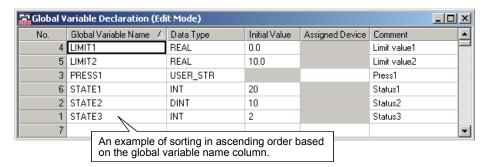


BASIC OPERATION

- (1) Operation for sorting global variable declaration
 - 1. Select any cell in the column to be sorted.
 - Display the pop-up menu to select either [Sort] → [Ascending] or [Sort] → [Descending].
 - 3. Global variable declarations are sorted in ascending order or descending order based on the selected column.
- (2) Operation for removing sort of global variable declaration
 - 1. Select any cell.
 - 2. Display the pop-up menu to select [Sort] → [Remove Sorting].
 - 3. Cancels sorting if sorted and returns the order to No. ascending.



DISPLAY/SETTING SCREEN



* Either of the following icons is displayed next to the sorted item name.

Icon	Description
Δ	Indicates that sort is performed in ascending order.
∇	Indicates that sort is performed in descending order.

POINT

- When Sort or Remove Sorting is performed, [Edit] → [Undo], [Edit] → [Redo] in menu cannot be operated since previous operations are not stored.
- \bullet When Sort is performed, [Edit] \to [Insert Row], [Edit] \to [Delete Row] in menu cannot be operated.

8.3 Module FB

Module FB realizes data I/O processing of modules such as analog I/O, digital I/O and high-speed counter. These modules are connected with PLC base unit.

Once module is declared in module FB declaration window, module FB will be added to module FB section in parts window and module FB can be used in FBD program. Users can make a program for data I/O processing using module FB and don't have to care about address of buffer memory or X/Y device for data I/O in module.

The following is a list of workable module model names in programming tool.

Classification		Corresponding module model name
I/O module		QX10, QX28, QX40, QX40-S1, QX41, QX41-S1, QX42, QX42-S1, QX50, QX70, QX71, QX72, QX80, QX81, QX82, QX82-S1,QY10, QY18A, QY22, QY40P, QY41P, QY42P, QY50, QY68A, QY70, QY71, QY80, QY81P, QH42P, QX48Y57
Analog module		Q64AD, Q68ADV, Q68ADI, Q62AD-DGH, Q66AD-DG, Q64AD-GH, Q68AD-G, Q62DA, Q62DAN, Q64DA, Q64DAN, Q68DAV, Q68DAVN, Q68DAI, Q68DAIN, Q64AD-GH, Q62AD-DGH, Q62DA-FG
Temperature input module		Q64TD, Q64TDV-GH, Q68TD-G-H01, Q64RD, Q64RD-G, Q68RD3-G
Counter module		QD62, QD62E, QD62D, QD60P8-G
Remote module via CC-Link master module *1	Master module	QJ61BT11, QJ61BT11N
	For remote I/O station	CC-Link Remote (1 to 4 stations occupied)
	For remote device station	CC-Link Remote (1 to 4 stations occupied)

^{*1:} Incompatible with CC-Link Ver. 2.

8 - 11 8 - 11

(1) To use module FB

The startup of the module must have been completed to use the module FB. Refer to (1) (a) in this section for the setting necessary to use the module. When the setting necessary to use the module is completed and the startup of the module is completed, declare the module FB with the programming tool. When the module FB declaration is completed, the module FB can be used in an FBD program. (refer to (1) (b) in this section.)

(a) Setting using GX Developer and GX Configurator

The following are the settings necessary to use the analog module, temperature input module and counter module.

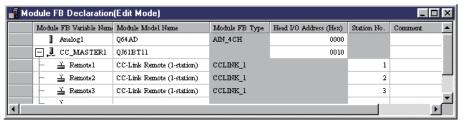
- Intelligent function module switch setting (set using GX Developer)
- Initial setting (set using GX Configurator or initial value write ladder program)

Use GX Developer to make the network parameter setting necessary to use the CC-Link remote module.

For details of the setting procedure and setting method of each module, refer to the manual of the used module.

(b) Setting using programming tool

By declaring the module to be used in the module FB declaration window, the module FB part declared in the module FB item of the part window is added, making the module FB usable in the FBD program.



POINT

- In the module where the module FB is performing data I/O processing, do not
 use the auto refresh function with the PLC device using GX Configurator. If the
 auto refresh function is used, the output value of the output module will be illegal.
- The module FB is incompliant with the intelligent function module mounted in the MELSECNET/H remote station.

For details, refer to Section 2.10.2 in PX Developer Version1 programming manual.

8 - 12 8 - 12

8.3.1 Module FB declaration window



PURPOSE

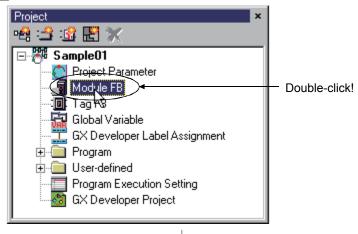
To display module FB declaration window.

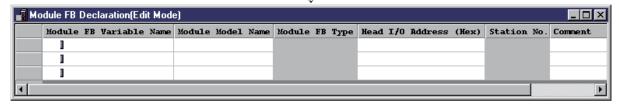


BASIC OPERATION

- 1. Double-click module FB icon in project window.
- 2. Display module FB declaration window.







8 - 13 8 - 13

8.3.2 Declaring/Editing a module FB

(1) Module FB declaration



PURPOSE

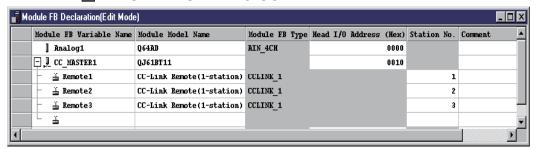
To declare module FB in order to use it.

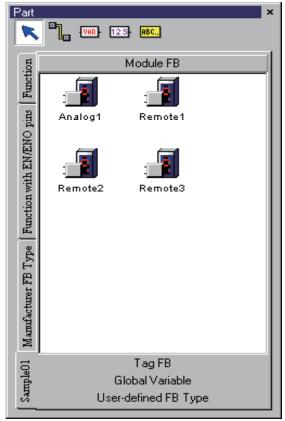


BASIC OPERATION

- 1. Refer to Section 8.3.1 to display module FB declaration window.
- 2. Input value or data into each item.
- 3. Parts will be added to module FB item in the parts window after module FB is declared.

DISPLAY/SETTING SCREEN





8 - 14 8 - 14



DISPLAY/SETTING DATA

Sections	Display/Setting data
Module FB variable name	Display/Set module FB variable name. Select a cell and input variable name to edit it. (Within 32 characters)
Module model name	Display /set module model name. 1. Select the cell of the module model name and click to edit module FB. 2. Display the module list. 3. Select module model name in the list. On occasion of CC-Link, only the sub-station list will be displayed.
Module FB type	Display/set automatically the module FB type name corresponding to module model name. However, it displays nothing when the selected module model name is CC-Link master module. (This item cannot be edited)
Head I/O address (Hex.)	Display head I/O address. Select the cell and edit head I/O address by inputting 4-bit hexadecimal number. (The first bit should be 0. Only 0 to 9 or A to F can be input) This section cannot be edited in CC-Link remote module.
Station No.	It only can be input in CC-Link remote module. Edit module station No. The number ranges is 1 to 64.
Comment	Display /set comments of module FB. Select the cell and directly input comment. When users place mouse pointer to parts on parts window, comments set on this part will be displayed or a comment should be input within 64 characters.

POINT

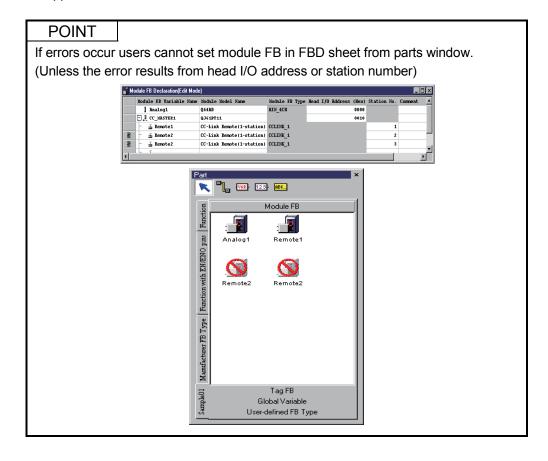
- If the declaration is changed in module FB declaration window after module FB is pasted in FBD sheet, parts in FBD sheet will not reflect the change.
 Please refer to Section 8.1 for detailed information.
- The declaration order of module FB does not have to accord with the installation order in base unit.
- If CC-Link master module has been declared, the declared CC-Link master module will not be displayed in the parts window.
- If module model name is changed into another one in CC-Link master module, data on the CC-Link remote module connected with it will be deleted.
- If error occurs in the declared data, error icon will be displayed at the left end of the line. (refer to (2) in this Section)
 - If the error line is selected, the error will be displayed in the status bar.
- The module FB cannot share the same name with global variable or tag FB variable.

(2) Error list in module FB declaration window

The following table summarizes the possible errors in module FB declaration window.

Item	Error items and contents	Error icon
	 Variable name duplication error Occurring when declared global variable name, module FB variable name and tag FB variable name have been set. 	888
Module FB Variable Name	 Variable name no specification error Occurring when all the other sections have been set except the module FB name. Variable name format error Occurring when illegal characters (including reserved words*) are used in module FB variable name. 	
Module Model Name	Module model name no specification error Occurring when all the other sections have been set except module model name.	
Head I/O address (Hex.)	 Head I/O address defining error Occurring when value out of the range 0 to 1FF0 is specified for head I/O address. Additionally, error occurs when the first bit is not 0. Head I/O address no specification error Occurring when all the other sections have been set except initial I/O address. 	0
Station No.	 Station number no specification error Occurring when all the other sections have been set except station number. Station number specification error Occurring when value out of the range 1 to 64 is specified to station number. 	

^{*:} Please refer to Appendix 1 for detailed information about reserved words.



(3) Editing operations in module FB declaration window



PURPOSE

To perform the operations of deleting a row of item (delete module FB declaration), inserting or deleting a row, and paste a module FB declaration list made by Microsoft® Excel onto the module FB declaration window.



BASIC OPERATION

Please refer to [Section 5.8.1 General Operations of Table] for detailed operation methods.

POINT

- If users select Row Insertion in setting CC-Link remote row, a row for CC-Link remote module will be added.
- If the set CC-Link master module row is deleted in row deletion, the adjacent CC-Link remote module row will be deleted as well.
- Errors may occur when the pasted data content is incorrect. (refer to (2) in this
- Only the selectable module model name can be pasted in the part of module model name.
- In the row where CC-Link master module has been set, if the user pastes module type name row contents beyond the CC-Link master module, the adjacent CC-Link row will be deleted as well.
- When the items are set at the last row, a new row will be added automatically. When the items are set at the last row of CC-Link remote module, a new row for CC-Link remote module will be added.
- When deleting module FB declaration, please delete module FB on program/ FB definition window as well. Otherwise errors may occur in compile.

8 - 17 8 - 17

8.4 Tag FB

Tag is an identification symbol given to various kinds of DDC processing in process control system. Tag data relates with DDC processing and is expressed in tag. Through tag FB users can install tags with great ease.

Once the tag FB is declared in tag FB declaration window, the declared tag FB will be added to tag FB section in parts window. Additionally, users can easily create the program with DDC processing.

The tag data in tag FB and operating constant value of processing control instructions can be set in FB property window (refer to Section 8.4.3)

The faceplate can be used to monitor and control the tag data DDC processing status (refer to Section 13.5).

The following list shows the differences between tag FB type and FB type.

Item	Tag FB type	FB type
Tag data	Each tag type has defined structure tag data.	Tag types no tag data.
Variable declaration	Be declared as global variables.	Only be declared as local variables.
User definition	It can be defined by using all function parts and FB parts.	It can be defined by using all function parts and FB parts except tag access FB.

8 - 18 8 - 18

8.4.1 Tag FB declaration window



PURPOSE

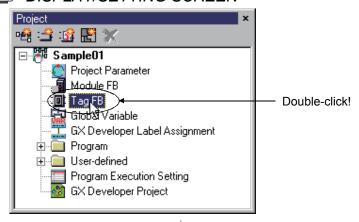
To display tag FB declaration window.

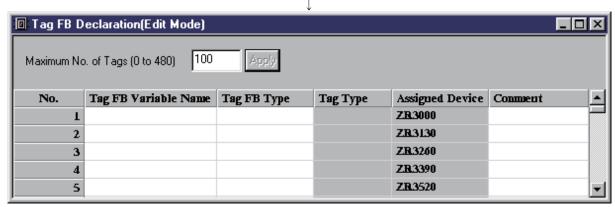


BASIC OPERATION

- 1. Double-click tag FB icon on the project window.
- 2. Display tag FB declaration window.

DISPLAY/SETTING SCREEN





8 - 19 8 - 19

8.4.2 Declaring/Editing a tag FB

(1) Tag FB declaration



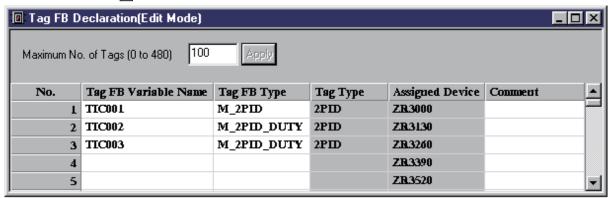
PURPOSE

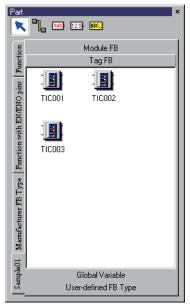
Declare a tag FB to use it.



BASIC OPERATION

- 1. Refer to Section 8.4.1. Display tag FB declaration window.
- 2. Input data in each item.
- 3. Parts will be added to tag FB item in parts window after tag FB is declared.
- DISPLAY/SETTING SCREEN





8 - 20 8 - 20



DISPLAY/SETTING CONTENTS

Item	Display/Setting contents
Marian Na aftana	Display/Set maximum tag FB number that can be used. The setting range is 0 to 480. (0 to 120 for Q02PH and Q06PHCPU)
Maximum No. of tags	To set the number, just select any value within the range and click "Apply" button. The initial value is 100.
No.	It is a row number. Only rows (No.) that have been set by the above maximum No. of tags can be shown. When error occurs in declared tag FB, icons (or or or occurs) will be displayed in the corresponding place.
Tag FB variable name	Display/Set tag FB variable name. Tag FB variable name is tag name. Select a cell and input variable name for editing. (Within 32 characters)
Tag FB type	Display/set tag FB data type. 1. Select the cell of tag FB and click "" button to edit tag FB. 2. Display "Select Data Type" dialog box. (refer to Section 7.10.4) 3. Select tag FB type and click "OK" button. Tag FB type can be set by inputting with keyboard.
Tag type	Display tag type of the corresponding tag FB type. (This item cannot be edited)
Assigned device	Display head address of tag data area in the CPU module used by tag FB type. One tag FB uses 130 points device. (This item cannot be edited)
Comment	Display /Set tag FB comments. Select a cell and input comment for editing. When the mouse is placed onto the parts on parts window or the faceplate is displayed, comments will be displayed. (refer to Section 13.5) Comments should be within 64 characters.

POINT

- If the declaration in tag FB declaration window is changed after the tag FB is pasted in FBD sheet, the change will not be reflected in FBD sheet.
 Refer to Section 8.1 for details.
- If error occurs in the declared data, an error icon will display at the left side of No. (refer to (2) in this section)
 - Once the error row is selected, error contents will be displayed in the status bar.
- Tag FB variable cannot share the same name with global variable or module FB variable.
- Errors will occur in hot-start compile (refer to Section 11.3) or online change compile (refer to Section 11.4) after maximum No. of tags or tag type is changed. At this time, please execute cold-start compile. If users want to hold variable current value that is saved in a CPU module, please return to the maximum No. of tags or tag type before changing.
- If tag FB name is changed, the settings on FB properties will be held.
 But if the change is made on tag FB type, the settings will not be held.

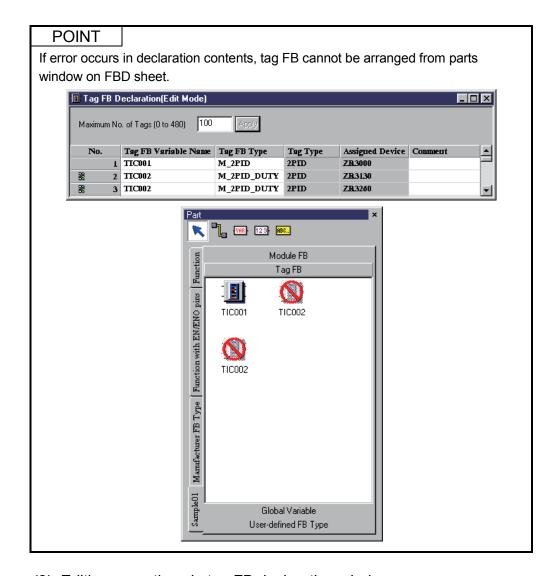
8 - 21 8 - 21

(2) Error list of tag FB declaration window

Following list displays possible errors in tag FB declaration window.

Item	Error items and contents	Error icon
Maximum No. of tags	Maximum No. of tag error Error occurs when a minor number of assigned tags are set as the maximum tag number.	-
	Tag variable name duplication error Error occurs when the existing name as either of global variable name, module variable name and tag FB variable name are set.	88
Tag FB variable name	 Tag variable name no specification error Error occurs when all the other items have been set except tag FB variable name. Tag variable name format error Error occurs when invalid characters (including reserved words*) are used in tag FB variable name. 	
Tag FB type	 Data type no specification error Error occurs when all the other items have been set except tag FB type. Data format error Error occurs when invalid characters are used in tag FB type. Data type definition error Error occurs when invalid data type (except tag FB type) is set in tag FB type. 	0

^{*:} Refer to Appendix 1 for reserved words.



(3) Editing operations in tag FB declaration window



PURPOSE

To delete an item of the row, insert or delete a row and paste a tag FB declaration list made by Microsoft® Excel onto tag FB declaration window.



BASIC OPERATION

Please refer to [Section 5.8.1 General Operations of Table] for details.

POINT

• Users can delete tag FB when it is referred to by external variable. When deleting tag FB declaration, please delete tag FB on program/FB definition window.

Otherwise error may occur.

Users can click [Edit] → [Undo] in menu to recover sections to the status before changing.

8 - 23 8 - 23

8.4.3 Tag data/operation constant setting

The initial value of tag data/operation constant in manufacturer tag FB type can be set in FB property window (refer to Section 5.7.4). In order to set them in FB property window, users can select tag FB in tag FB declaration window or select tag FB part on FBD sheet. After the selection, the settable tag data/operation constant will be displayed in FB property window.



PURPOSE

To set Tag data/Operation constants.

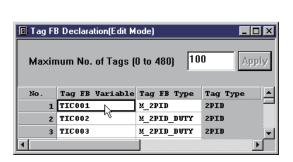


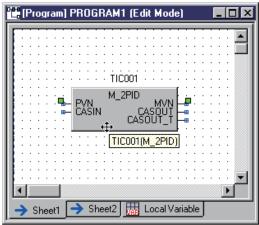
BASIC OPERATION

- 1. Select a FB part in tag FB declaration window or select FB parts on FBD sheet.
- 2. Once the item in step "1" is completed, a list of settable tag data/operation constants will be displayed in FB property window.
- 3. Set initial value of tag data/operation constants in FB property window. (refer to **Section 5.7.4)**

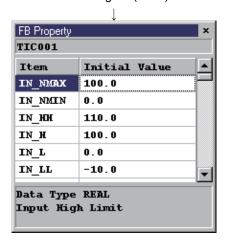


DISPLAY/SETTING SCREEN





Select tag FB (Parts)



8 - 24 8 - 24

(1) Tag Type

Tag type can be classified into four types: loop tag, status tag, message tag and alarm tag.

Tag classification	Contents
Loop tag	Used for loop control processing. Considered as process control dedicated instructions (PID instructions) for CPU module.
Status tag	Used for monitoring and controlling ON/OFF status.
Message tag	Used for informing guidance message.
Alarm tag	Used for notify alarm.

A list of tag type and manufacturer tag FB in each tag type

Tag classification	Tag type	Name	Manufacturer tag FB
	PID	Elementary PID Control	M_PID(_T), M_PID_DUTY(_T)
	2PID	2-degree-of-freedom PID Control	M_2PID(_T), M_2PID_DUTY(_T)
	2PIDH	2-degree-of-freedom Advanced PID Control	M_2PIDH(_T)_
	PIDP	Position Type PID Control	M_PIDP(_T), M_PIDP_EX(_T)_
	SPI	Sample PI Control	M_SPI(_T)
	IPD	I-PD Control	M_IPD(_T)
	BPI	Blend PI Control	M_BPI(_T)
	R	Ratio Control	M_R(_T)
Loop tag	ONF2	2 Position ON/OFF Control	M_ONF2(_T)
	ONF3	3 Position ON/OFF Control	M_ONF3(_T)
	PGS	Program Setter	M_PGS
	MOUT	Manual Output	M_MOUT
	MONI	Monitor	M_MONI
	MWM	Manual Output With Monitor	M_MWM
	SEL	Loop Selector	M_SEL(_T1)(_T2)
	BC	Batch Counter	M_BC
	PSUM	Pulse Integrator	M_PSUM
	NREV	Motor Irreversible Control	M_NREV
	REV	Motor Reversible Control	M_REV
	MVAL1	ON/OFF Control 1 (Without Semi-Open Status)	M_MVAL1
	MVAL2	ON/OFF Control 2 (With Semi-Open Status)	M_MVAL2
Status tag	TIMER1	Timer 1 (Timer stops when COMPLETE flag is ON)	M_TIMER1
	TIMER2	Timer 2 (Timer continues when COMPLETE flag is ON)	M_TIMER2
	COUNT1	Counter 1 (Counter stops when COMPLETE flag is ON)	M_COUNTER1
	COUNT2	Counter 2 (Counter continues when COMPLETE flag is ON)	M_COUNTER2
Alarm tag	ALM	Alarm	M_ALARM
Message tag	MSG	Message	M_MESSAGE

(2) Operation Constant

Users can set all operation constants of the dedicated PID instructions in manufacturer tag FB type according to each tag.

Please refer to <<PX Developer Programming Manual>> for details about operation constant of tag FB.

Please refer to Section 8.4.4 about how to attach operation constant to user-defined tag FB.

8.4.4 User-defined tag FB type

User-defined tag FB can be defined in programming tool.

User-defined tag FB type consists of function parts and FB parts which are pre-defined in programming tool.

This section explains the methods of creating user-defined tag FB. Please refer to Section 7.13 and Chapter 9.

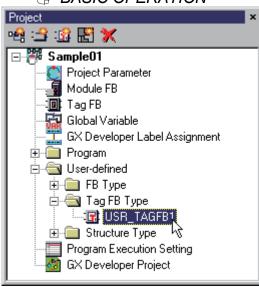
(1) Create user-defined tag FB type.



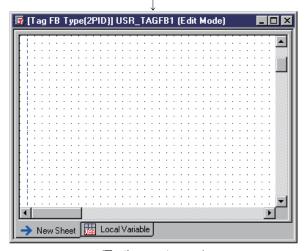
PURPOSE

To create user-defined tag FB type.



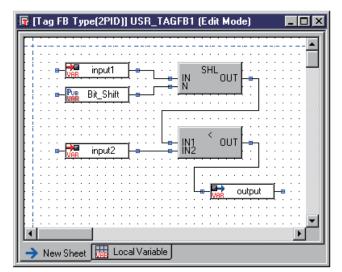


- Add data of user-defined tag FB type in project window (refer to Section 6.8).
- 2. Double-click the added user-defined tag FB type icon in project window.

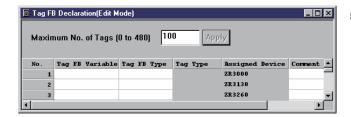


(To the next page)

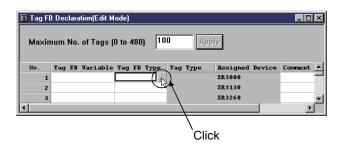
Once step 2 is completed, the definition window for the added tag FB type will be displayed.



 Arrange FBD parts in the tag FB type sheet of the added tag FB type definition window.

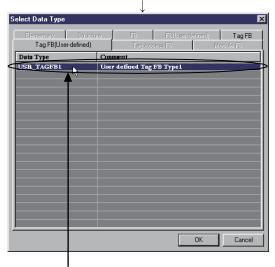


 Open tag FB declaration window. (refer to Section 8.4.1)



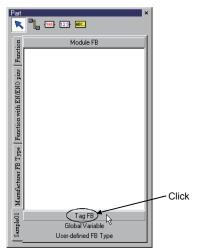
 Declare tag FB and input data such as tag FB variable name.

Here, please choose the defined tag FB type in step 1 for data type.

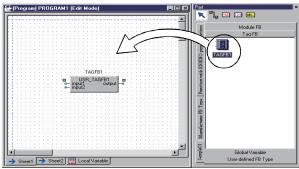


Click "OK" button after inputting all the items.

Select the user-defined tag FB type specified in step 1.



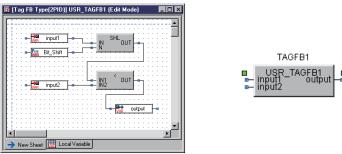
 Click Project Name tab ([sample01] in left screen) in parts window and click "Tag FB".



 Once step 8 is completed, declared tag FB icon in step 6 will be displayed. To use defined tag FB please drag and drop this icon on FBD sheet.

POINT

- Defined tag FB cannot be pasted (cannot be self-pasted) on the FB definition window.
- Tag access FB can be used in user-defined tag FB type. However, if the used tag access FB does not support the tag type of the user-defined tag FB type, the tag access FB cannot be used. Please refer to Appendix 2 for details about tag type that can be pasted with tag access FB.
- I/O variable are used to realize input/output to the user-defined tag FB.
 (Input variable is compatible with input pin and output variable is compatible with output pin.)



 User-defined tag FB input pin/output pin order corresponds with the order of I/O variables in local variable sheet.



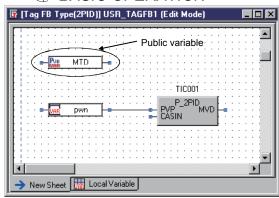
(2) How to hold operation constant (public variable) in user-defined tag FB type



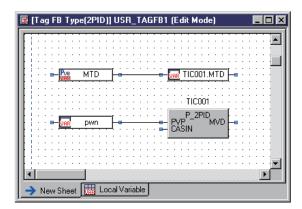
PURPOSE

To set initial value of tag FB operation constant that is used in user-defined tag FB directly from user-defined tag.

BASIC OPERATION



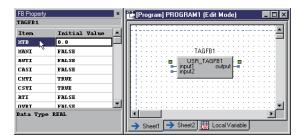
 Define public variable (refer to Section 7.3.3) in making user-defined tag FB type.



- Substitute declared public variable
 with operation constant of tag access
 FB. Use variable parts in the
 substitution.
 For example, when operation
 constant [MTD] named [TIC001] is
 substituted with tag FB variable
 name, the variable name of the
 variable part is defined as
 [TIC001.MTD].
 Connect public variable and variable
- Declare tag FB in tag FB declaration window (refer to (1) in this section).
 Select user defined tag FB type in settings of tag FB type.

[TIC001.MTD].

- 4. Arrange tag FN (defined above) FB in FBD sheet.
- Select the set user-defined tag FB.
 Users can specify [MTD] in FB property window.



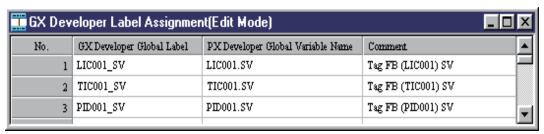
POINT

Users can access public variable of FB parts by attaching [.] to variable name. Please refer to Section 7.3.4 for details.

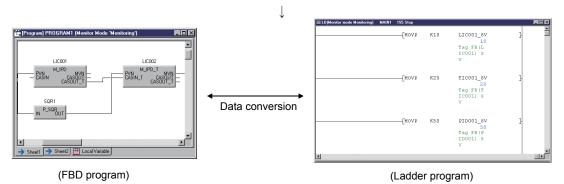
8.5 Exporting Data to GX Developer Global Label

Users can set global label name in GX Developer project to global parts of programming tool by programming tool. Thus, global part data (value) can exchange with ladder program data (value).

For example, if users want to change set value (SV value and the like) in ladder program, they can refer to the set value (PV value and the like) of tag in ladder program.



Set in the GX Developer label assignment window.



Data in FBD program can exchange with data in ladder program!

POINT

Users can use FBD program to record loop control in Programming tool and use ladder program to record PLC control in GX Developer. Users also can exchange data by using GX Developer label assignment setting.

8.5.1 GX Developer label assignment window



PURPOSE

To exchange data (value) in global part of FBD program and ladder program, the GX Developer label assignment setting must be executed.

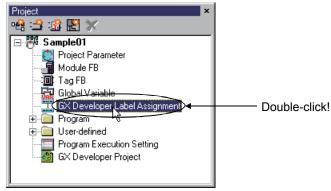
Users can make label program in GX Developer by using global part data (value) in programming tool. Please refer to [GX Developer Operating Manual] for details about label programming.

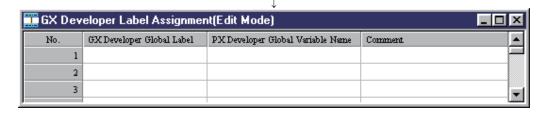


BASIC OPERATION

- 1. Double-click GX Developer label assignment icon on project window.
- 2. Display GX Developer label assignment window.







8.5.2 Assigning/Editing a GX Developer label

(1) GX Developer label assignment



PURPOSE

Set GX Developer label assignment name to global variable of programming tool.



BASIC OPERATION

- 1. Refer to Section 8.5.1 to display GX Developer label assignment window.
- 2. Input data in the sections of the window.

DISPLAY/SETTING SCREEN

GX Developer Label Assignment(Edit Mode)			_ 🗆 ×	
No.	GX Developer Global Label	PX Developer Global Variable Name	Comment	A
1	LIC001_SV	LIC001.SV	Tag FB (LIC001) SV	
2	TIC001_SV	TIC001.SV	Tag FB (TIC001) SV	
3	PID001_SV	PID001.SV	Tag FB (PID001) SV	
		İ	İ	

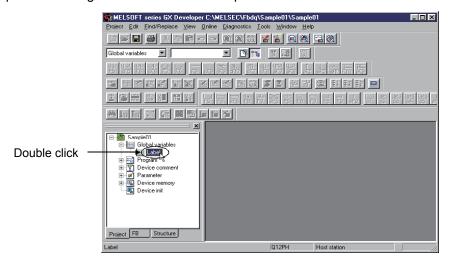
DISPLAY/SETTING DATA

Sections	Display/Setting data
NI.	It is row No. and it can be defined within No.5000.
No.	When error occurs in input data, icon (₭ or) will be displayed on error.
OV December 2012 and a standard	Display/set global label name in GX Developer project.
GX Developer global label	Select cell and input label name to edit global label name. (Within 16 characters)
	Display/set global variable name of programming tool.
	Select cell of PX Developer global variable name and click "" to edit PX Developer
	global variable name.
	2. Display variable reference dialog box (refer to Section 7.10.3).
PX Developer global	Select global parts and click "OK" button.
variable name	Users can set global variable name by inputting from keyboard directly.
	As shown in the above window, when setting module FB, tag FB and structure type
	variable, reference operator (refer to Section 7.3.4), reference public variable or
	member should be applied in it.
	The settable variable types are global variable, module FB and tag FB.
	Display/set GX Developer global label comment.
Comment	Edit comment by selecting cell and inputting directly. The set comment will be reflected in
Comment	GX Developer global label comment.
	Comment should be within 64 characters.

8 - 32 8 - 32

POINT

 In GX Developer label assignment, only global label registration and overwriting can be carried out in GX Developer. Even if users delete sections in GX Developer label assignment window, the global label at GX Developer side cannot be deleted. (Even if executing compile after sections are deleted) Here, please delete global label at GX Developer side.



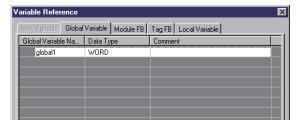
- Users can register global label in GX Developer by Auto External. Refer to [GX Developer Operating Manual] for detailed information about Auto External.
- The maximum number of settable label assignment is 5000.
- When error occurs in set data of programming tool, error icon (refer to (3) in this section) will be displayed at the left side of No.

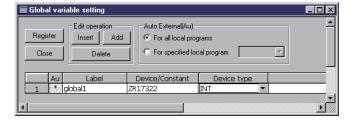
Once the error row is selected, the error content will be displayed in status bar.

(2) The corresponding data type GX Developer label assignment Following list summarizes the corresponding data type in programming tool and GX Developer (device type).

Data type (programming tool)	Device type (GX Developer)
BOOL	BOOL
INT	INT
DINT	DINT
WORD	INT
DWORD	DINT
REAL	REAL
STRING (Within 50 characters)	STRING (Within 50 characters)







(Programming tool)

(GX Developer)

POINT

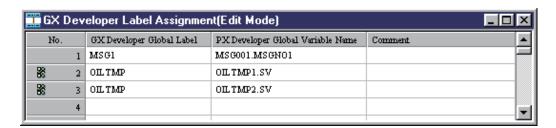
- Error will occur if things (that are not included in the above list) data type at compile.
- If the registered global variable in GX Developer and tag FB public variable are STRING type (character string), the character number should be within 50.
 Otherwise error may occur in compile.

(3) Error list of GX Developer label assignment window

Following list summarizes the possible errors in GX Developer label assignment window.

Section	Error section and content	Error icon
	Variable name duplication error Occurring when declared GX Developer is set.	88
GX Developer global label	 Variable name no specification error Occurring when all the other sections have been set except GX Developer global label. Variable name format error Occurring when illegal characters (including reserved word*) are used in GX Developer global label. 	
PX Developer global variable name	 Global variable no specification error Occurring when all the other sections have been set except PX Developer global name. Global variable format error Occurring when illegal characters are used in PX Developer global variable Name. 	•

^{*:} Please refer to Appendix 1 about reserved words.



(4) Editing operations in GX Developer label assignment window



PURPOSE

To delete a row of sections, insert a row, delete a row or paste label assignment list made by Microsoft® Excel onto the GX Developer label assignment window.



BASIC OPERATION

Please refer to [Section 5.8.1 General Operation of Table] for detailed information.

POINT

The user can return to the previous status before changing by clicking the [Edit] \rightarrow [Undo] in the menu after changing.

9 STRUCTURE

This chapter explains the structure definition in the PX Developer programming tool. The so-called structure is a variables (members) aggregation of the different data types.

9.1 Structure Type Definition Window



PURPOSE

To define the structure type in order to use the structure type data in FBD programs.

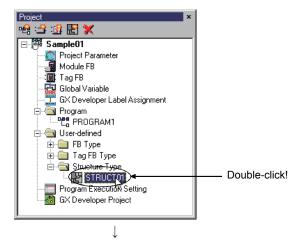


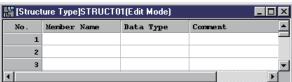
BASIC OPERATION

- The structure type definition window will be displayed when double clicking the icon of the definition target structure type in the project window.
 Therefore, the structure type data shall be added in the project window at first. (refer to Section 6.8)
- 2. Double-click the icon of the added structure type in the project window.
- 3. Display the structure type definition window.



DISPLAY/SETTING SCREEN





POINT

When a structure type is being opened in allow read only access setting, [Read-only] is displayed in the title bar.

9

(1) Definition of the members



PURPOSE

9.2 Defining/Editing a Structure Type Definition Window

To define the members of the structure type.

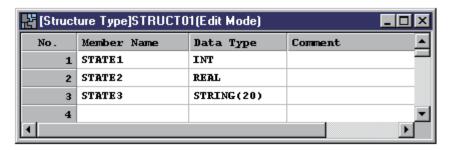


BASIC OPERATION

- 1. Refer to Section 9.1 and display the structure type definition window.
- 2. Input the data or value to each item.



DISPLAY/SETTING SCREEN





DISPLAY/SETTING CONTENTS

Items	Display/Setting contents	
	It is the row No. It can be defined within No. 255.	
No.	When an error occurs in the declared member contents, the icon (or on or occurs in the declared member contents, the icon (or occurs in the declared member contents, the icon (or occurs in the declared member contents).	
	the corresponding contents.	
Member Name	To display the member name.	
	To select the cell to input the member name in define/edit member name. (Within 32	
	characters)	
	To display data type.	
	1. Select the data type cell and click the button "" in the definition/editing of data types.	
Data Typo	2. Display the "Select Data Type" dialog box (refer to Section 7.10.4).	
Data Type	3. Select the data type and click the "OK" button.	
	The data type can also be directly input from the keyboard.	
	Only the elementary data type can be set.	
Comment	To display the comments of the members.	
	To select the cell and directly input the comment.	
	To input within 64 characters.	

9 - 2 9 - 2

POINT

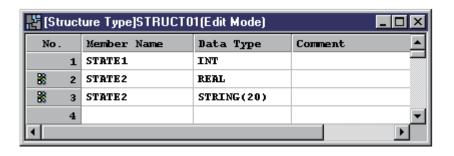
- 255 members of the structure type can be defined in maximum.
- An error icon will be displayed on the left of the No. When an error occurs in the declared data (refer to (2) in this section), error contents will be displayed in the status bar if selecting the error line.
- Do not use the same name as that of the program or data type in the member name of the structure type.
- After the member of the structure type is changed, an error will occur if
 executing the hot-start compile (refer to Section 11.3) or online change compile
 (refer to Section 11.4). Please execute the cold-start compile under this
 condition. And please return to the changed contents before changing it if the
 current value of the variable stored in CPU module needs to be maintained.

(2) Error list in the structure type definition window

The error list in the structure type definition window is shown as below.

Items	Error Items and Contents	Error Icons
	Member name duplication error This occurs when the defined member name has already been used.	
Member Name	 Member name no specification error This occurs when the member name has not been set and at least one item exists. Member name format error This occurs when the incorrect characters (including the reserved words) are used in the member name. 	
Data Type	 Data type no specification error This occurs when the data type has not been set and at least one item exists. Data type format error This occurs when the incorrect characters are used in the data type. Data type specification error This occurs when the data type except elementary data type has been specified in the data type. 	

*: Please refer to Appendix 1 for details about the reserved word.



(3) Edit operations in the structure type definition window



PURPOSE

To delete one row, insert row and delete row in the structure type definition window, then paste the structure type definition list previously-made by sheets such as Microsoft® Excel to the structure type definition window.



BASIC OPERATION

Please refer to [Section 5.8.1 General operation of Table] for details about the operation methods.

POINT

• The member of the structure type can be deleted under the condition that it is refer to by the external variables reference in the program/FB definition window. The reference to member variable parts in the program/FB definition window should be deleted simultaneously when deleting the member of the structure type.

An error will occur when executing the compile in the status of the nonexistent member of the reference target.

The user can return to the previous status before changing by clicking the [Edit] \rightarrow [Undo] in the menu after changing.

9 - 4 9 - 4

9.3 Reference of Structure Type



PURPOSE

To refer to a member of the structure type in the FBD programs. This section explains how to refer to the structure in FBD programs.



BASIC OPERATION

Methods for referring to the member [STATE1] of the structure type [STRUCT01] will be explained with examples as below.

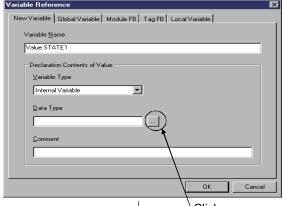
- 1. Refer to Section 9.1 and 9.2 to define the structure type (STRUCT 01) and member.
- 2. Arrange the variable parts in the FBD sheet. (refer to Section 7.3.2)
- 3. Input the variable name. (refer to Section 7.3.3) Add [.Member name] at the end of

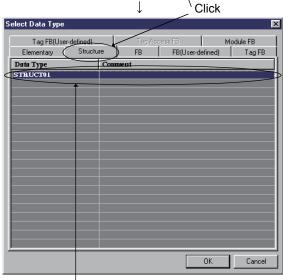
the variable name when inputting the variable name. That means to add [.STATE1] at the end of the variable name when referring to the member [STATE1].

Example: [Value. STATE1]

Input the variable name and press key "Enter" to display "Refer to variable" dialog box.

4. Select the data type and structure type data here (refer to the left screen).

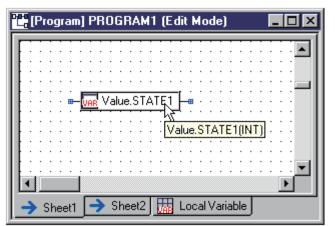




Select the structure type (STRUCT 01) defined in the Step 1.

(To the next page)

9 - 5 9 - 5



Arrange the variable parts
 referring to the member
 [STATE1] of the structure type
 [STRUCT01] on the FBD
 sheet.

POINT

- By attaching [.] to the variable name, the member of the structure type can be referred to as mentioned above, and the public variables of the FB parts can be referred to as well.
 - Please refer to Section 7.3.4 for details.
- Place the mouse cursor on the variable part to display the referred member data type when the referred member of the structure type is correct.
- In the Step 4, the member cannot be referred to if the elementary data type (such as INT) has been selected. The data of the structure type should be selected when data type is selected.

10 CONVENIENT FUNCTIONS

This chapter explains the functions that helps to create and edit FBD programs with the PX Developer programming tool.

10.1 Cross Reference Function

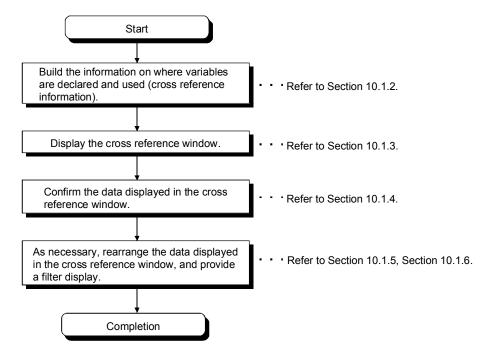
The cross reference function is designed to display where variables are declared and used by the programming tool.

By tracing related variables when modifying of FBD programs, the influence on other processing can be confirmed.

Furthermore this function includes the filter display function that displays only the data that satisfy the specified condition.

10.1.1 Procedure for using the cross reference function

This section explains the procedure for using the cross reference function.



POINT

- Cross reference information must be builded to list positions where variables are declared and used in the cross reference window.
 - To use the cross reference function, first build the cross reference information.
- Use of the cross reference function does not affect the compile status.

10

10.1.2 Building cross reference information



PURPOSE

To build the information on where variables are declared and used, that will be displayed in the cross reference window.



BASIC OPERATION

- 1. Select [Convert] \rightarrow [Build Cross Reference Information] in the menu.
- 2. The creation of the cross reference information starts. While the cross reference information is being builded, the progress dialog box is displayed. To stop this operation, press the "Ctrl" + "Break" keys while the progress dialog box is being displayed.
- 3. When the creation of the cross reference information is complete, the cross reference status icon (refer to Section 10.1.4) in the cross reference window changes to .



DISPLAY/SETTING SCREEN



Select [Convert]→[Build Cross Reference Information] in the menu.





To stop creation of the cross reference information, press the "Ctrl" + "Break" keys while the progress dialog box is being displayed.



Cross reference status icon



When the creation of the cross reference information is complete, the cross reference status icon in the cross reference window changes to (12).

10 - 2

10

POINT

- Creation of cross reference information does not affect the compile status.
- Cross reference information can be builded in the status where an error exists in an FBD program, etc. (status that will result in a compile error).
- If the project is closed without being saved after creation of the cross reference information, the cross reference information may not match the project data.
 In this case, build the cross reference information again.
- Cross reference information can also be builded in the monitor mode.

10.1.3 Cross reference window displaying method



PURPOSE

To display where variables are declared and used by the programming tool.



BASIC OPERATION

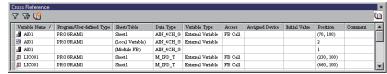
- 1. Select [View] \rightarrow [Window] \rightarrow [Cross Reference] (\boxed{M}) in the menu.
- 2. The cross reference window is displayed.

DISPLAY/SETTING SCREEN



Select [View] \rightarrow [Window] \rightarrow [Cross Reference] in the menu, or click the button on the toolbar.





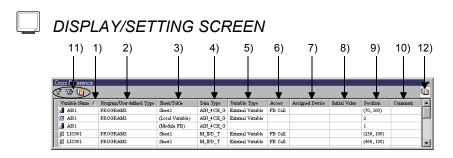
The cross reference window is displayed.

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10.1.4 Data displayed in cross reference window

This section explains the cross reference window construction, i.e., each part name and display/setting contents as well as variables listed there.

(1) Part names of cross reference window and the display/setting contents



DISPLAY/SETTING CONTENTS

No.	Item	Contents
1)	Variable Name	Displays the variable name or member name. The icon corresponding to the declared or used variable type is displayed on the left of the variable name. (refer to (2) in this section for details of the displayed icons.) The variable name that uses a reference operator (refer to Section 7.3.4) is also displayed. In this case, the data type displayed in "4) (Data Type)" is that of the variable indicated by the reference operator.
2)	Program/User-defined Type	Displays the name of the program, user-defined FB type/tag FB type or structure type that has declared or uses the variable.
3)	Sheet/Table	Displays the name of the declaration window or FBD sheet that has declared or uses the variable. On the line of the declared variable, the declaration window name (module FB, GX Developer label assignment, etc.) is displayed. On the line of the variable used in the FBD sheet, etc., the FBD sheet name is displayed.
4)	Data Type	Displays the data type of the variable. On the line of the variable that uses the reference operator, the data type of the variable indicated by the reference operator is displayed.
5)	Variable Type	Displays the type of the variable.

No.	Item		Co	ontents				
		Displays how the variable	e is used.					
		The display contents are	e as follows.					
		Ite	m	Contents				
		Position where varial	ole part is used	Read ^{*1} Write ^{*2} Read/Write ^{*3}				
		Position where FB pa	art is used	Read/write FB Call				
6)	Access	Used in condition exp		1 B Gdiii				
		sheet execution cond program execution so	dition setting or	Left Side Right Side				
		Other than above	og	(No indication)				
		*1: Indicates the varia	ble part that perfo	· · · · · · · · · · · · · · · · · · ·				
		*2: Indicates the varia	-					
		*3: Indicates the varia	*3: Indicates the variable part that performs data read/write.					
		Displays the PLC device declaration window or ta	g FB declaration w	ariable declared in the global variable vindow.				
		Variable type		Contents				
7)	Assigned Device	Global variable	Set the assigne	device of the global variable is displayed. ed device of the global variable in the declaration window.				
,	3	Tag FB type	The assigned device of the tag FB type displayed in the tag FB declaration window is displayed. However, the assigned device of the tag FB used in the FBD sheet is not displayed.					
		Other than above	(No indication)					
		Displays the initial value	Displays the initial value of the variable set in the global variable declaration window or FE					
		property window. The display contents are	as follows					
			as follows.					
		Variable type	The state of the land	Contents				
8)	Initial Value	Global variable		e of the global variable is displayed. alue of the global variable in the global ation window.				
		Public variable		e of the public variable set in the FB				
		Other than above	(No indication)					

No.	Item			(Contents				
			•	sition where the variable i tents are as follows.					
				Item	Contents				
9)	Position	Var	riable use	ed in FBD sheet	The coordinate of the FBD part placed in the FBD sheet (based on the top left of the FBD sheet defined as the origin (0. 0)) is displayed.				
J)	9) Position			slared in corresponding window (e.g. global variab window)	The line number in the corresponding declaration window is displayed.				
		FBI	D sheet e	ed in condition expression execution condition setting execution setting					
10)	Comment		splays the comment of the variable. t the comment in the corresponding declaration window.						
		Click th		s on this toolbar to edit the	e filter condition and build the cross reference				
			Button	Item	Contents				
			7	Filter	Click this button to make the filter display valid or invalid.				
			V	Edit Filter Condition	Click this button to edit the filter condition. (refer to Section 10.1.6.)				
11)	Toolbar			Build Cross Reference Information	Click this button to build the cross reference information. (refer to Section 10.1.2.)				
			7	Apply Filter	The cross reference window is displayed under the filter condition edited in filter condition editing. This button is displayed only while the filter condition is being edited.				
			36	Cancel Filter Editing	The edited filter condition are discarded. This button is displayed only while the filter condition is being edited.				
		Display	s whether	er the cross reference info	ormation has been updated or not.				
			Icon		Contents				
			1	The cross reference info window has been update	rmation displayed in the cross reference				
12)	Cross reference status		<u>M</u>	The FBD program has be reference information. He cross reference informat To update the cross refe	een modified after creation of the cross ence, the FBD program does not match the ion. rence information, build the cross reference				
			24	information. (refer to Section 10.1.2.) The cross reference function cannot be used. The cross reference information may not exist. To use the cross reference function, build the cross reference information. (refer to Section 10.1.2.)					

POINT

• If the FBD program is modified, it does not match the cross reference information.

In this case, the cross reference status icon changes to (()). To update the cross reference information, build the cross reference information again.

- Immediately after the cross reference information is builded, the data are displayed with the filter display invalid.
 - (All data are displayed in the cross reference window.)
 - To make the filter display valid, click the "Filter" button (\(\nabla\)).
- Icons in the "Variable Name" filed shows whether the variables displayed in the cross reference window has been declared in the position such as declaration window or used in the position such as FBD sheet
 - "I" mark is displayed with the icons, if they are used in an FBD sheet or other position.

(2) Variables listed in cross reference window

The cross reference window lists all variables declared in the declaration windows and variables used in the FBD sheets, etc.

The following variables are displayed in the cross reference window.

Declared/Used	Positions where listed variables are declared/used	Variable type	Icon	Reference		
		Internal variable	VAR			
		Input variable	VAR			
	Local variable sheet	Output variable	VaR	(3) (a) in this section		
		Public variable Public variable (tag member)	Pus VAR			
Variable declared in declaration window,		External variable	Van			
etc.	Global variable declaration window	Global variable	Van			
	Module FB declaration window	Module FB type	2	(3) (b) in this section		
	Tag FB declaration window	Tag FB type				
	Structure type definition window (Structure type member)	_		(3) (c) in this section		
		Internal variable	ya R			
		Input variable				
	Variable part in FBD sheetCondition expression of FBD	Output variable	■→ ☑RR			
	sheet execution condition setting	Public variable Public variable (tag member)	Pys ≇RR	(3) (d) in this section		
		External variable	Si.	(3) (e) in this section		
Variable used in FBD sheet, etc.		Module FB type	7			
,	FB part in FBD sheet	Tag FB type	1			
		Other FB types *	,			
		Global variable	1			
	Condition expression of program execution setting	Module FB type	7	(3) (f) in this section (3) (g) in this section		
	GX Developer label assignment	Tag FB type	1			

^{*:} FB parts other than the module FB type and tag FB type. (Manufacturer FB type, user-defined FB type/tag FB type)

(3) Display contents for each position where variable is declared/used Variable details are displayed in the cross reference window according to where the variable is declared/used as shown below.

The items of the following tables correspond to those of the cross reference windows.

(a) When the variable registered to the local variable sheet is displayed

Variable Name	Program/User- defined Type	Sheet/Table	Data Type	Variable Type	Access	Assigned Device	Initial Value	Position	Comment
Variable name	Name of program/user- defined FB type/ tag FB type that uses the variable	(Local Variable)	Data type	Variable type ^{*1}	No indication	No indication	No indication	Line No. in local variable sheet	Comment

(b) When the variable declared in the global variable/module FB/tag FB declaration window is displayed

Variable Name	Program/User- defined Type	Sheet/Table	Data Type	Variable Type	Access	Assigned Device	Initial Value	Position	Comment
Variable name	No indication	(module FB)/ (Tag FB)	Data type/ module FB type name/tag FB type name		No indication	Assigned device is displayed ²	Initial value is displayed*3	Line No. in corresponding declaration window	Comment

(c) When the structure type member is displayed

Variable Name	Program/User- defined Type	Sheet/Table	Data Type	Variable Type	Access	Assigned Device	Initial Value	Position	Comment
Member name	User-defined structure type name	(Structure)	Data type	No indication	No indication	No indication	No indication	Line No. in structure type definition window	Comment

(d) When the variable part in the FBD sheet or the FB part in the FBD sheet is displayed

Variable Name	Program/User- defined Type	Sheet/Table	Data Type	Variable Type	Access	Assigned Device	Initial Value	Position	Comment
Variable name ^{*4}	defined FB	Name of used FBD sheet that uses the variable	Data type	Variable type ^{*1}	Read, Write, Read/Write, FB Call	Assigned device is	Initial value is displayed*5	Coordinate of FBD part placed in FBD sheet	Comment

- *1: Any of the internal variable, input variable, output variable, public variable, public variable (tag member) and external variable is displayed.
- *2: Displayed only in the case of the global variable or tag FB type.
- *3: Displayed only in the case of the global variable.
- *4: The variable name that uses the reference operator (refer to Section 7.3.4) is also displayed.
 - In this case, the data type displayed in the "Data Type" field is that of the variable indicated by the reference operator.
- *5: In the case of the global variable, the initial value set in the global variable declaration window is displayed.
 - In the case of the "FB variable name, public variable", the initial value of the public variable set in the FB property declaration window is displayed.

(e) When the variable used in the condition expression of the FBD sheet execution condition setting is displayed

Variable Name	Program/User- defined Type	Sheet/Table	Data Type	Variable Type	Access	Assigned Device	Initial Value	Position	Comment
Variable name ^{*3}	defined FB	Name of FBD sheet that uses the variable	Data type	Variable type ^{*1}	Left Side/Right Side	Assigned device is displayed ^{*2}	Initial value is displayed*4	Condition expression No. in FBD sheet execution condition setting	Comment

(f) When the global part (global variable, module FB type, tag FB type) used in the condition expression of the program execution condition setting is displayed

Variable Name	Program/User- defined Type	Sheet/Table	Data Type	Variable Type	Access	Assigned Device	Initial Value	Position	Comment
Variable name ^{*3}		(Program Execution Condition)	Data type	Global Variable/ Module FB/ Tag FB	Left Side/Right Side	Assigned device is displayed *2	Initial value	Condition expression No. in program execution setting	Comment

(g) When the PX Developer global variable name used in the GX Developer label assignment window is displayed

Variable Name	Program/User- defined Type	Sheet/Table	Data Type	Variable Type	Access	Assigned Device	Initial Value	Position	Comment
PX Developer global variable name	No indication	(GX Developer Label Assignment)	Data type	Global Variable/ Module FB/ Tag FB	No indication	Assigned device is displayed ^{*2}	Initial value is displayed*4	Line No. in GX Developer label assignment window	Comment

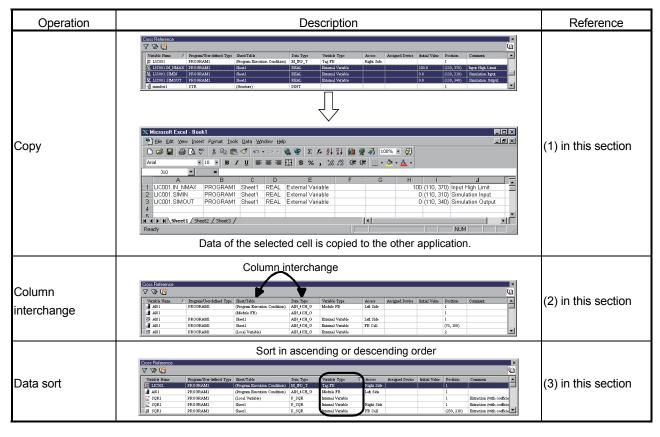
- *1: Any of the internal variable, input variable, output variable, public variable, public variable (tag member) and external variable is displayed.
- *2: Displayed only in the case of the global variable.
- *3: The variable name that uses the reference operator (refer to Section 7.3.4) is also displayed.
 - In this case, the data type displayed in the "Data Type" field is that of the variable indicated by the reference operator.
- *4: In the case of the global variable, the initial value set in the global variable declaration window is displayed.
 - In the case of the "FB variable name. public variable", the initial value of the public variable set in the FB property declaration window is displayed.

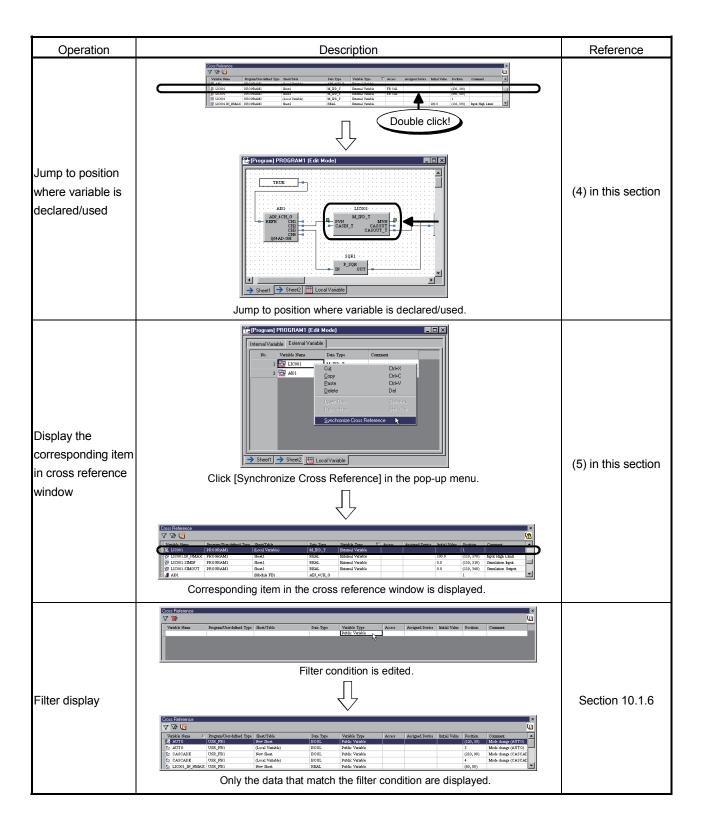
10.1.5 Operations performed in cross reference window



PURPOSE

To execute copy, sort, etc. of the data displayed in the cross reference window. The following operations can be performed in the cross reference window.





(1) Data copy

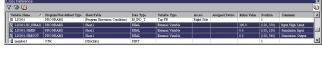


PURPOSE

To copy the data displayed in the cross reference window and paste it onto other application.

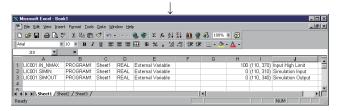


BASIC OPERATION





- Select the area to be copied.
 When copying the data of multiple lines, select multiple lines. (refer to Section 5.8.1)
- Select [Edit] → [Copy] () in the menu.
 Alternatively, click [Copy] in the right-click menu.



3. Paste the data copied in the above step 2. to Microsoft® Excel, etc.

POINT

- In the cross reference window, only copy of the data in the selected cell is allowed.
 - Other operations such as cut and paste of the data are not allowed.
- In the cross reference window, data can be selected in units of line.
 (This does not apply when editing filter conditions.)
- With cross reference window separated from the programming tool (refer to Section 5.7.1 (1)), copy cannot be executed from [Edit] → [Copy] (Email) in the menu. When cross reference window has been separated from the programming tool, execute copy from [Copy] in the right-click menu (or by pressing the "Ctrl" + "C" buttons).

10 - 14 10 - 14

(2) Column interchange



PURPOSE

To interchange the columns in the cross reference window.



BASIC OPERATION

Drag and drop the header part of the column with the mouse.





(3) Data sort



PURPOSE

To sort (rearrange) the data displayed in the cross reference window.



BASIC OPERATION

Double-click the header of the column.

The data are sorted on the basis of the double-clicked column in ascending or descending order.

(The sorting order is switched between ascending and descending by doubleclick.)





POINT

- The order of the interchanged display columns is not saved. Exiting the programming tool returns to the initial status.
- Data can be sorted based on one column. To sort data based on multiple columns, use filter display function (refer to Section 10.1.6) together with sort function.

10 - 15 10 - 15

(4) Jump to position where variable is declared/used



PURPOSE

To display where the variable displayed in the cross reference window is declared/used.



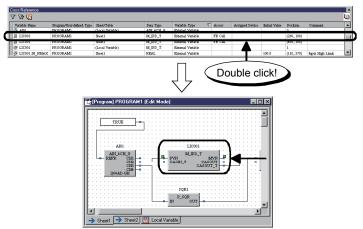
BASIC OPERATION

Double-click any line in the cross reference window. The position where the variable is declared/used is displayed.

When it is displayed, the corresponding variable is selected.



DISPLAY/SETTING SCREEN



Jump to position where variable is declared/used.

POINT

- When the cross reference status is not the latest (M), a jump may not be made to the correct location of variable declaration/use.
 - In this case, build the cross reference information again.
- When the row of the variable used in the condition expression of FBD sheet execution condition setting or program execution setting is double-clicked, the corresponding variable is not selected.

In this case, the following dialog box is displayed.

Row double-clicked in cross reference window	Displayed dialog box
Variable used in the condition expression of FBD sheet execution condition setting	Corresponding FBD sheet execution condition setting dialog box (refer to Section 7.11.2)
Variable used in the condition expression of program execution setting	Program execution timing window (refer to Section 7.12.2) *

- *: The corresponding variable can be searched for in the following procedure.
 - 1. Confirm the program name of the variable double-clicked in the "Program/User-defined type" field of the cross reference window.
 - 2. In the program execution timing window, select the program name that was confirmed in above step 1.
 - 3. Click the button, which is displayed when the program name is selected, to display the program execution setting dialog box (refer to Section 7.12.3).

(5) Display of corresponding item in cross reference window

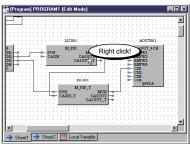


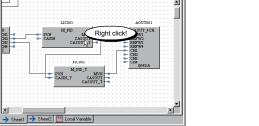
PURPOSE

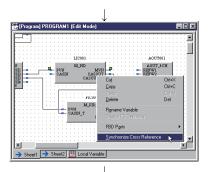
To display the corresponding item of the cross reference window from the variable declared/used in the global variable declaration/module FB declaration/tag FB declaration window, GX Developer label assignment window, structure type definition window, FBD sheet or local variable sheet.

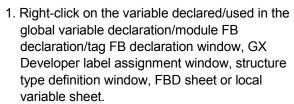


BASIC OPERATION









Two or more corresponding items of the cross reference window cannot be displayed simultaneously.

Select the items and parts one by one.

2. Click [Synchronize Cross Reference] in the popup menu displayed by right-clicking.



3. The corresponding item in the cross reference window is displayed.

10 - 17 10 - 17

POINT

- The corresponding item of the cross reference window cannot be displayed from the variable used in the FBD sheet execution condition setting dialog box or program execution setting dialog box.
- During filter condition editing (refer to Section 10.1.6), the corresponding item of the cross reference window cannot be displayed.
- For other than the variables displayed in the cross reference window (refer to Section 10.1.4 (2)), the corresponding item of the cross reference window cannot be displayed.
- When the corresponding item of the cross reference window could not be found, the following dialog box is displayed.



In this case, check either of the following.

- 1. When the cross reference status is not the latest (1000), the corresponding item may not be displayed correctly.
 - In this case, build the cross reference information again.
- 2. The corresponding item of the cross reference window can be displayed for only the variable displayed in the cross reference window.
 - For the variable hidden by the filter display function, the corresponding item of the cross reference window cannot be displayed.
 - In this case, cancel the filter display and then execute [Synchronize Cross Reference].

10.1.6 Filter display function



PURPOSE

To display only the data, which satisfy the specified filter condition, in the cross reference window.

Use this function to list only the variables used in a specific program, for example.



BASIC OPERATION

- 1. Click the "Edit Filter Condition" button () in the cross reference window.
- 2. The cross reference window changes to the filter condition editing screen. If a filter condition was previously specified, the filter condition is displayed.
- 3. Enter the filter condition. (refer to (1) in this section.)
- 4. When the entry of the filter condition is completed, click the "Apply Filter" button ().

The data that match the filter condition are displayed as a list.

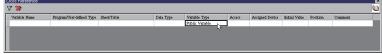
To discard the entered filter condition, click the "Cancel Filter Editing" button ().



DISPLAY/SETTING SCREEN





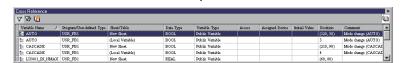


Enter the filter condition on the filter condition editing screen.



Click the "Apply Filter" button!





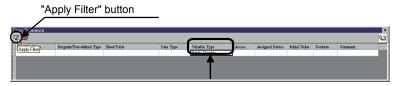
With the filter valid, the cross reference window is displayed.

(1) Editing the filter condition

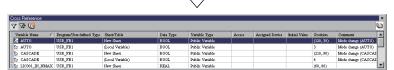
Specify the filter condition using a character string, numeral or wildcard character (refer to (a) below).

On the filter condition editing screen, display data can be cut, copied, pasted and/or deleted in the [Edit] menu or in the pop-up menu displayed with a right-click. (refer to Section 5.5 (5).)

(Example) When displaying only the variables whose variable type as public variable



Enter Public variable in the "Variable Type" field and click the "Apply Filter" button.



Only the variables typed as public variable are displayed.

(a) Editing the filter condition using a wildcard character A wildcard character can indicate one or more characters. The following wildcard characters can be used for editing the filter condition.

Wildcard characters applicable for editing the filter condition

Wildcard character	Description
?	Indicates any one character (including numeral). For example, when "P_?" is specified as the filter condition, "P_<", "P_=", "P_>", etc. match the filter condition.
*	Indicates any characters (0 or more characters). For example, when "M_2PID*" is specified as the filter condition, "M_2PID", "M_2PID_T", "M_2PID_DUTY", "M_2PIDH_", "M_2PIDH_T_", etc. match the filter condition.
#	Indicates any one numeral. For example, when "M_TIMER#" is specified as the filter condition, "M_TIMER1", "M_TIMER2", etc. match the filter condition.
[Character string]	 Indicates characters in a specific range when "-" (hyphen) is used within []. For example, when "[a-z]" is specified as the filter condition, a to z and A to Z (alphabets) match the filter condition. Indicates any one character within []. It is used to specify a wildcard character as the filter condition. For example, when "[*]" is specified as the filter condition, "*" matches the filter condition.
[!Character string]	Indicates a character string that does not correspond to the above [Character string]. For example, when "[!a-z]" is specified as the filter condition, character strings other than alphabets match the filter condition.

POINT

- The filter condition is case insensitive.
 For example, when "[a-z]" is specified as the filter condition, a to z and A to Z match the filter condition.
- When specifying a range as in [a-z], specify the range in ascending order.
 When a range is specified in descending order as in [z-a], the filter condition is invalid.
- Blank characters, which are entered at both ends of the filter condition, are ignored.
- The filter condition can be specified for multiple columns together.
 When the filter condition is specified for multiple columns, the AND condition of the multiple columns is the filter condition.
- When the variable that does not include an initial value (the area where the blank in the cross reference window) is used as the filter condition, enter [] as the filter condition.

(b) Filter condition entry example

The entry examples of the filter condition are indicated below.

Entry example	Examples that match the filter condition	Examples that do not match the filter condition
a?a	aaa, aba, aAa	abca, aAAa
ab*	abc, abcdefg	cab, acb
a*a	aa, aba, ABa, aBBCCa	abc, aBC
ab	abc, AABB, Eab, EAB, abE	Eac, aac
a[*]a	a*a	aa, aba, ABa, aBBCCa
a#a	a0a, a1a, a2a	aaa, a10a
[a-z]	a, A, b, B, c, C	1, 2, <, &
[!a-z]	1, 2, <, &	a, A, b, B ,c, C
[!0-9]	a, A, <, &	0, 1, 2, 9
a[!a-c]# ad0, Ae0, a71		aa0, aB1

10.2 FB Property Page



PURPOSE

To input and display FB Property easily with dedicated screen. The following shows the target FBs.

Category I	Category II	FB
	Tag FB	2-Degree-of-Freedom Advanced PID Control (M_2PIDH(_T)_)
Manufacture FB		Program Setter (M_PGS)
		Multi-Point Program Setter (M_PGS2)
	General process FB	Function Generator (P_FG)
		Inverse Function Generator (P_IFG)
User defined FB	Tag FB	FB whose tag type is "PGS"

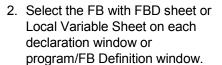






nal Variable External Variable

1. Set to the edit mode. (Refer to Section 13.1.3)



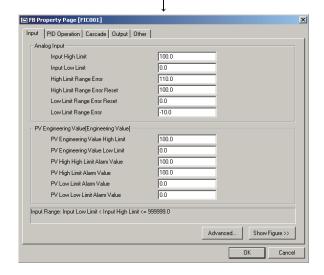
FB Property [FIC001] IN NMAX 100.0 IN_NMIN IN_HH 110.0 100.0 IN H -10.0 IN_LL TPC_SQR TPC_PVTEMP TPC_PVPRES nπ TPC_TEMP TPC_B1 0.0 273.15 TPC_PRES Data Type REAL Input High Limit



(Local Variable Sheet)

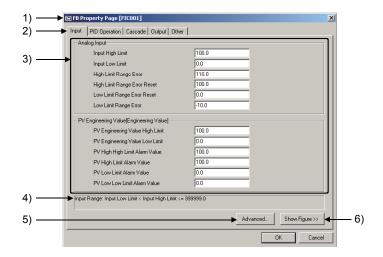
3. Click the button on the FB
Property Window or select [FB
Property Page] on the pop-up
menu displayed by right-clicking.





FB Property Page will be displayed.

DISPLAY/SETTING SCREEN



DISPLAY/SETTING DATA

No.	Items	Display/contents	
1)	Title Bar	Displays the target FB variable name in [].	
2)	Setting item tab	Displays the function classification of the target setting item.	
3)	Setting data display	Displays the setting target data. The contents differ depending on FB type.	
4)	Input range, error detail display	Displays the input range and error message on the target FB property item. (For errors during input check, refer to (1) in this Section.)	
5)	Advanced Setting button	Displays the screen for advanced function setting.	
6)	Show Figure/Hide Figure switching button	Displays the illustration for the FB property item being selected. The illustration differs depending on the item type. (For display example of the screen, refer to (2) in this Section.)	

POINT

• For details on each setting item, refer to "PX Developer Version1 Programming Manual".

(1) Error and warning in input check

The input value of FB property is checked if it is valid. The following table shows the background color to the check result.

Input check result	Background color
Valid	White
Error	Red
Warning	Yellow

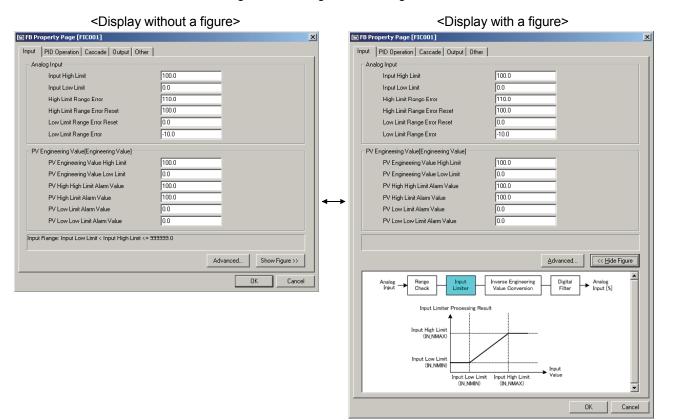
If the result is "Error"

The set value is inconsistent or provokes CPU abnormal operation. Click an error point and correct the value following the error detail displayed in the error detail display. The window cannot be closed with the OK button without correction.

If the result is "Warning"
 The set value is not within value range and other than the use to be recommended. Click the warning point and confirm the contents in explanation display.

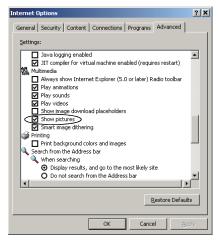
(2) Switching Show Figure/Hide Figure

The following diagrams show the example when switching a display with the "Show Figure"/"Hide Figure" switching button.



POINT

- When displaying a dialog box at maximum size during diagram display, the diagram will not be displayed any longer (While a dialog box is displayed at maximum size, the Show Figure/Hide Figure switching button is disabled).
- To display a figure, check the [Show pictures] in the Advanced Tab of Microsoft[®] Internet Explorer property (checked at default).



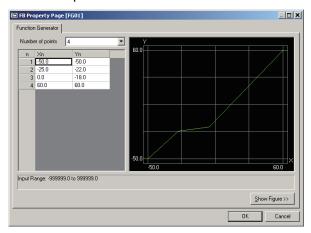
(3) Screen transition

A screen display changes by switching the tabs in the following table. Clicking the "Set" button on the <<Other>> tab switches the screen.

FB type	Tab name	Advanced setting tab/screen
	Input	PV Engineering Value, Temperature Pressure Compensation, Function Generator, First Order Lag, and PV Compensation
	PID Operation	2-degree-of-freedom PID Operation and SV Setting
M_2PIDH(_T)_	Cascade	_
	Output	MV Output, MV Output Selection, and MV Compensation
	Other	Mode Disablement, Disable Alarm Detection, Alarm Level, and Monitor Tool Display
M DCC Tog types of year	Program Setting Device	_
M_PGS, Tag types of user- defined tag FB (PGS)	Other	Mode Disablement, Disable Alarm Detection, Alarm Level, and Monitor Tool Display
	Program Setting Device	General
M_PGS2_	Other	Mode Disablement, Disable Alarm Detection, Alarm Level, and Monitor Tool Display
P_FG, P_IFG	Function Generator	_

(4) Setting coordinates for Function Generator

Coordinates for a Function Generator can only be entered by the number set in Number of points as the screen below.



Coordinates for the Function Generator can only be reflected to a FB by the number of displayed points.

All undisplayed coordinates are set as (0, 0) to the FB.

Coordinates for a Function Generator can be copied from such as Excel[®] and be pasted on the screen.

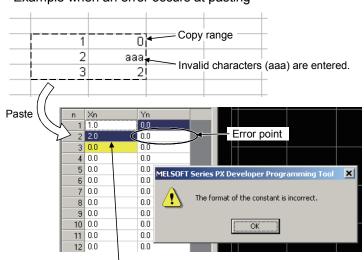
When multiple coordinates for a Function Generator are entered with the paste function at a time and an input error occurs in a setting item, all entries before the setting item is fixed.

(An entry processing after the error point is canceled.)

After the entry is fixed, the color of the fixed cell is inverted.

Correct the error cause in the cell next to the one inverted and reenter the coordinate.

<Example when an error occurs at pasting>



Coordinates in the third line cannot be entered due to an error of Y coordinate in the second line.

11 COMPILING FBD PROGRAM

The FBD programs created by PX Developer programming tool can be checked with the error check function before compile.

The FBD programs created by programming tool can be converted to executable code (the ladder program) by compile.

The compile methods can be classified as the following three types.

- Cold-start compile (refer to Section 11.2)
- Hot-start compile (refer to Section 11.3)
- Online change compile (refer to Section 11.4)

This section first explains how to check for errors of programs created by the programming tool, how to compile the programs and the error examples caused by compile operation.

11.1 Error Check



PURPOSE

With error check, the FBD program error can be found out before compile. Besides, errors can be checked in compile.

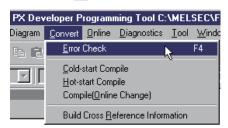
The errors can be found out and corrected in the program/FB definition module by checking one FBD program beforehand.



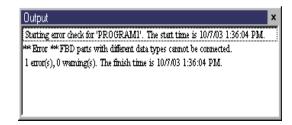
BASIC OPERATION

- 1. Activate the program/FB definition window for error check.
- Click the [Convert] → [Error Check] () in the menu.
 Or press the "F4" key.
- 3. Error check will be executed immediately after performing the Step 2. The results of the error check are displayed in the output window (refer to Section 5.1).
- Double click the error messages or warning in the output window to display the screen of the error positions (only when selecting the message including the editing screen or setting screen of the FBD sheet).





Click the [Convert] \rightarrow [Error Check] in the menu or click ($^{\mbox{\colored}}$) button on the toolbar.



Display the error check results in the output window.

POINT

The error check is only for one program/FB.

11.2 Cold-start Compile



PURPOSE

The cold-start compile means to convert the FBD programs to the executable codes (ladder programs, PLC parameters) in a CPU module. The cold-start compile should be first executed when creating and compile the FBD programs. Then the hot-start compile (refer to Section 11.3) or online change compile (refer to Section 11.4) should be executed for maintaining the current status during the process of running, and adding or changing the FBD program processing.

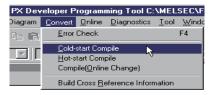


BASIC OPERATION

- 1. Click the [Convert] \rightarrow [Cold-start Compile] (R) in the menu.
- 2. Display the "Confirm" dialog box to confirm starting cold-start compile. Click the "Yes" button to start the cold-start compile.
- 3. Start the cold-start compile.
- 4. Results of the cold start compile are displayed in the output window (refer to
- 5. When detecting an error or compile failure, shoot the trouble with the reference to warnings or error messages displayed in the output window. Then execute the compile once again.

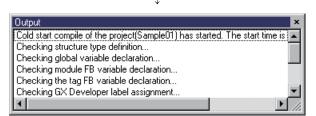
11 - 2 11 - 2

DISPLAY/SETTING SCREEN





Click "Yes" button on the dialog box to confirm starting cold-start compile.



Display the project name and compile type when starting to compile.







(When the compile fails)



HELPFUL OPERATION (1)

The following dialog box will be displayed if label program on GX Developer side is not converted or compile is executed when PLC parameter/global label setting screen is displayed.



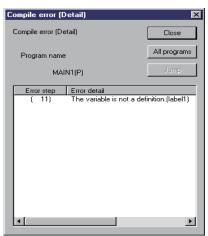
In this case please convert GX Developer program or close the PLC parameter/global label setting screen.

Convert GX Developer program by [Convert] \rightarrow [Compile]. For detailed information, please refer to "GX Developer Operating Manual".



HELPFUL OPERATION (2)

The following dialog box will be displayed at the end of compile if compile is executed by programming tool when errors exist in label program of GX Developer.



(Jumping into the error position is disabled by clicking "Jump" button)

At this time, please execute compile again after modifying the error part of label program of GX Developer.

POINT

- The variable value assigned to file register (ZR) by cold-start compile will be held even when power is turned off or the PLC is reset.
 - The PLC download must be executed after cold-start compile to initialize the variable value.
- PX Developer project and GX Developer project will be automatically overwritten and saved when compiled.
- All errors in the FBD programs and parameters will be automatically checked for errors before compile.
- PLC download cannot be executed if cold-start compile is not completed normally.
- Double click the error information or warning in the output window to display the
 error part screen. (However, it is applicable only when lines that conclude the
 information of editing and setting screen of FBD sheet are selected.)

11.3 Hot-start Compile

POINT

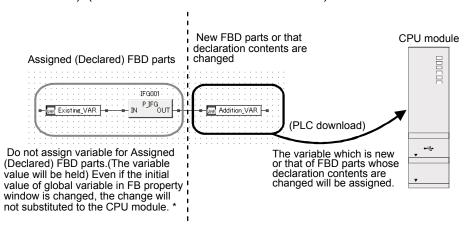
- There are some restrictions in hot-start compile.
 For details about the restriction of hot-start compile please refer to Section 11.6.
- PX Developer project and GX Developer project will be automatically overwritten and saved when compiled.



PURPOSE

Hot-start compile is a function that compiles the project without changing the assigned devices of variable of FBD parts compile the project on FBD sheet. It is used in system operation that is to hold the current status while adding processing to FBD program or changing it. (Arranged variable value of FBD parts will be held.)

On the contrary, current status will not be held in cold-start compile (refer to Section 11.2). (All variable values return to initial values)



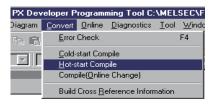
*: Please refer to Section 11.6.1 for details.



BASIC OPERATION

- 1. Click [Convert] → [Hot-start Compile] (ເ in menu.
- 2. Display start confirmation dialog box of hot-start compile. Click "Yes" button to start hot-start compile.
- 3. The progressing status and result of hot-start compile will be displayed on the output window (refer to Section 5.1).
 - Press "Ctrl" + "Break" button during compile to interrupt hot-start compile.
- 4. When error is detected and when the compile fails, please refer to the warnings and error information displayed on the output window and compile the project again.

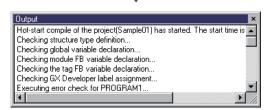
DISPLAY/SETTING SCREEN



Click [Convert] \rightarrow [Hot-start Compile] in menu. And click button ($\stackrel{\longleftarrow}{\bowtie}$) on the toolbar.



Display hot-start compile start "Confirm" dialog box. Click "Yes" button.



Display project name and compile type when compiled.



(When the compile is successful)



(When the compile fails)

11.4 Online Change Compile

/ CAUTION

The CPU module control will change in online change.
 Please ensure safety before carrying out online change.

POINT

- There are some restrictions in online change compile.
 For detailed information about restrictions of online change compile, please refer to Section 11.6.
- Online change of programming tool is a function which converts ladder programs into executable code and download them to the CPU module without stopping the CPU. In this case, it will not overwritten the original ladder program (#FBDQ000, #FBDQLIB) in the CPU module but download data to the blank area in the CPU module once for all.

Therefore, a blank area that is equal to steps of the bigger converted ladder program (#FBDQ000, #FBDQLIB) must be reserved on program register or memory card (SRAM card or ATA card).

The steps of converting ladder program (#FBDQ000, #FBDQLIB) can be specified by GX Developer.



 In online change, the scan time will be prolonged as showed in the following table:

Section	PX Developer → Online change CPU module	
Blank area ensured on program memory ensured	Maximum prolonged time of scan time (ms) = 4.0× (k step of #FBDQ000)+0.8 However, if the calculated time is less than 97ms, 97ms shall b taken as the maximum prolonged time of scan time.	
Blank area ensured on memory card ensured (except for ATA card*)	Maximum prolonged time of scan time (ms) = 5.1× (k step of #FBDQ000)+0.8 However, if the calculated time is less than 97ms, 97ms shall be taken as the maximum prolonged time of scan time.	

*: Scan time will be prolonged for 1.25s every 30k steps if ATA card is used. Therefore, it is recommended to use SRAM card rather than ATA card in online change.

POINT

 Please use Process CPU whose serial number's upper 5 digits is 04042 or higher to execute online change.

If online change is executed in situation that the above conditions are not satisfied, the following error message will be displayed.



The Process CPU serial No. can be confirmed via the plate at the side of Process CPU, or by the following steps [Diagnotics] \rightarrow [System Monitor] \rightarrow "Product Inf. List".

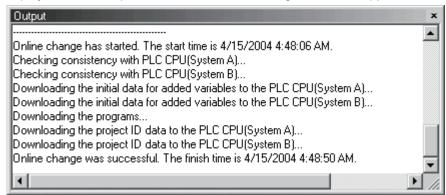
For detailed information about serial No., please refer to "Process CPU User's Manual" or "GX Developer Operating Manual".

• Even when online change fails due to user operation or communication failure, the CPU module operate normally.

However, the project consistency check (refer to Section 12.3) may result in "inconsistent".

In this case, execute online change compile again.

During the process of online change compile, the following message is displayed on the output window, and online change check is skipped.



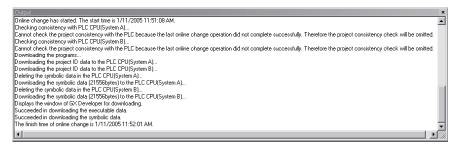
- Executing online change compile automatically overwrites PX Developer projects and GX Developer projects.
- Online change is disabled if download to PLC has not been executed after coldstart compile or hot-start compile.

POINT

 During the execution of online change, even if online change fails which may result from improper user operation or communication failure, the CPU module will continue its operation normally.

However, project consistency check results are not identical (refer to Section 12.7). In this case, please execute online change compile again.

During the process of one more online change compile again, following message will be displayed on the output window and check of online change will be skipped.



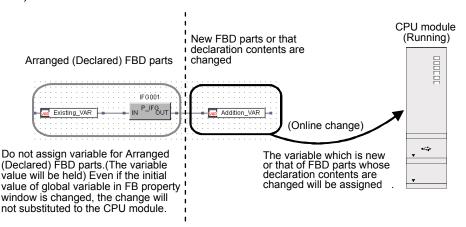
- PX Developer project and GX Developer project will be automatically overwritten and saved in online change compile.
- Online change cannot be executed when PLC download is not executed after cold-start compile or hot-start compile.



PURPOSE

Online change compile is to execute compile not changing the assigned devices of FBD parts that have been arranged on FBD sheet, and rewrite the function of CPU module in RUN.

It is used in the case that adding/changing processing in FBD program whiling not stopping system is preferred. (Variable value of arranged FBD parts will be held)



: Please refer to Section 11.6.1 for details.

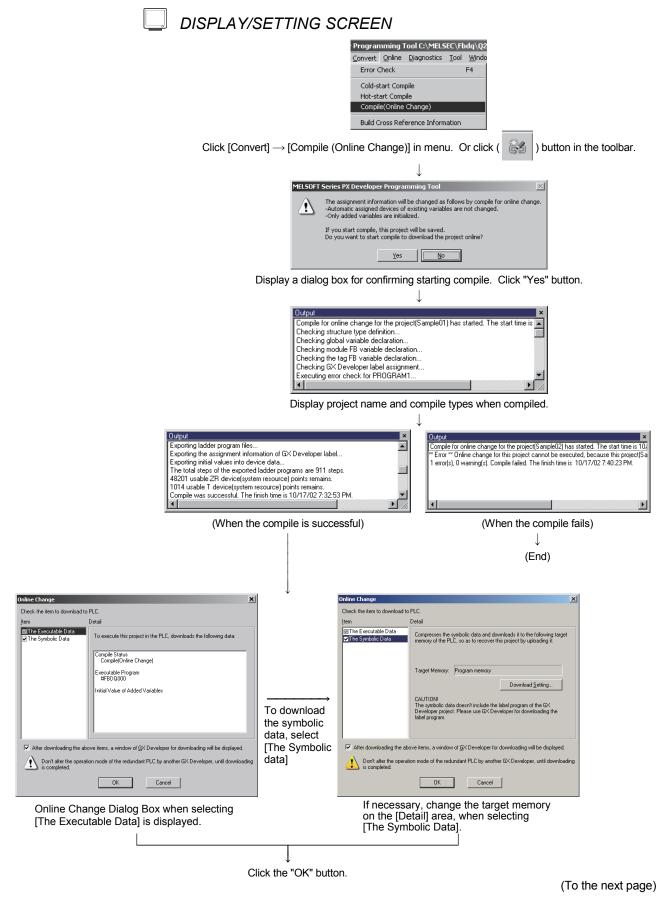


BASIC OPERATION

- 1. Click [Convert] → [Compile (Online Change)] () in menu.
- Display compile start confirmation dialog box.
 Click "Yes" button to start compile.
 Press "Ctrl" + "Break" keys during compile to interrupt it.
- 3. When the compile is successful, Online Change Window is displayed.
- 4. To download the Symbolic Data, input the selection mark in the check box of [The Symbolic Data].
 - (The selection mark of [The Executable Data] cannot be removed.)
- To download the label program of GX Developer, input the selection mark in the check box of [After downloading the above items, a window of GX Developer for downloading will be displayed.].
- 6. Click the "OK" button to close the Online Change Window and start online change.
- 7. If the check box of [After downloading the above items, a window of GX Developer for downloading will be displayed.] is selected on the Online Change Window, the window of GX Developer for downloading is displayed. Close this window after downloading the required data.

POINT

- Refer to Section 12.1 for the executable data and the symbolic data.
- Display/Set data of online change window is the same as download window.
 Refer to Section 12.4.
- The download of the symbolic data of PX Developer side and the label program of GX Developer side is required to restore PX Developer project.

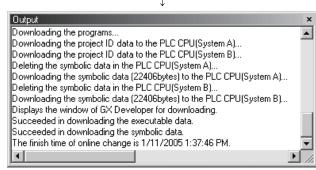


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Display online change start confirmation dialog box when the CPU module is in RUN status. $\label{eq:confirmation}$

Click "Yes" button. *1



Start online change.

*1: Clicking "No" button displays the following dialog box.



Clicking "Yes" button executes download to PLC after setting the CPU to the remote STOP status.

In Redundant CPU configuration, online change is executed as shown below. Operation mode Backup mode Online change Online change is executed for both systems. (Control/Standby) However, if an error occurs, online change is not executed. Separate mode/ Debug mode Online change is executed only for the PLC CPU specified in the target system field of the transfer setup screen.

11.5 Compile of Redundant CPU projects

When cold-start compile or hot-start compile is executed in a Redundant CPU, the device range within system resource is automatically registered into the tracking setting of GX Developer project redundant parameters. This enables the operation to be continued after the control system is switched when executing FBD programs in a Redundant CPU.

However, devices used in user ladder need tracking setting. For details, refer to PX Developer programming manual.

POINT

If compile is executed after the device range within system resource was changed, the tracking setting of GX Developer redundant parameters will be changed. Therefore, reset the Redundant CPU after download to PLC.

11.6 Restrictions for Hot-start compile/Online Change Compile

Following paragraphs mainly deal with the information about restrictions of hot-start compile and online change compile.

- (1) Restrictions on reflection of variable initial value and initialization. (refer to Section 11.6.1)
 - As for the variable which assigned devices have not been changed, even if its initial value is changed in the FB property window or global variable declaration window, the changed initial value will not be reflected on the CPU module.
- (2) Restrictions on project setting (refer to Section 11.6.2) Changing one of the project settings will cause compile error.
- (3) Other restrictions (refer to Section 11.6.3)
 Other restrictions not included in above (1) and (2).

11.6.1 Restrictions about substitution of variable initial value and variable initialization

Following paragraphs mainly describes substitution of variable initial value and restrictions on initialization.

(1) Relation between devices assignment of variable and variable initialization.

Variable initialization is to reflect the initial value if the variable has initial values or reset the value to 0, 0.0, FALSE or "" (blank character) if the variable has initial value.

However, public variable which assigned devices have been specified to will not be initialized. (Not to be reset either)

 (a) About device assignment and variable initialization in cold-start compile

All the variables will be assigned to devices in cold-start compile. Therefore, variable initialization will be carried out to all the variables during PLC download after cold-start compile.

(b) About device assignment and variable initialization in hot-start compile or online change compile.

To above (a), in hot-start compile or online change compile, assigned devices of variable that have been used (declaration) in FBD program will not be changed. Changing assigned devices can be carried out to the variables that satisfy any of the following conditions:

- Local variable that is newly added by inserting FB parts or variable parts to FBD sheet or changing variable name. (Except for external variable)
- Variables that are added to the declaration windows of global parts or variables which names are changed in the declaration windows of global parts.
- Variables that have been used declared in FBD program and one of the following properties have been changed: data type, character number (only for STRING type variable) and assigned devices specified/not specified (only for global variable).

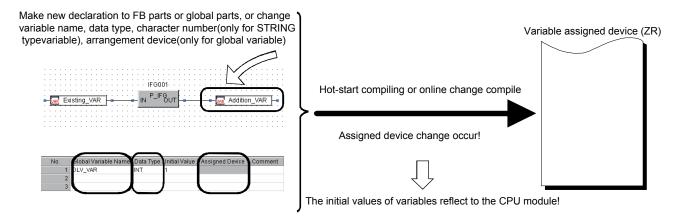
For variables that satisfy the above conditions, assigned devices will be changed. Therefore, variable initialization will be carried out in PLC download after hot-start compile or online change compile.

On the other hand, variable initialization will not be carried out on the variables which assigned devices are not changed and the current value of this variable will be used to continue processing by CPU module.

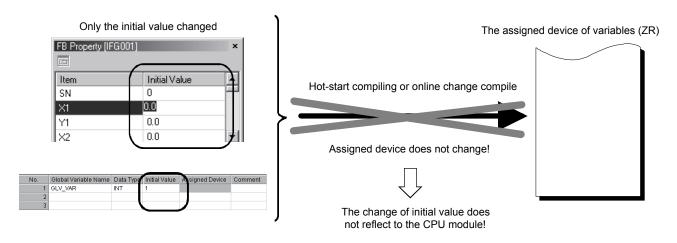
(2) Restrictions for variable initial value changing

In PLC download after hot-start compile or online change compile, initial value substitution or variable initialization will be only carried out on the variables whose assigned devices have been changed. Therefore, to variables whose assignment devices are not changed, even if their initial value is changed under FB property window and declaration window of global variable, the changed initial value will not be substituted to the CPU module.

When FB parts or global variable is re-declared, or one of the following sections is changed (when initial value is substituted): variable name, data type, character number (only for STRING type variable), assigned devices specified/not specified (only for global variable).



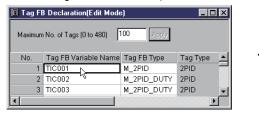
If the specification of variable name, data type, character number (only for STRING type), as well as assigned device (only for global variable) is not changed, only initial value is changed. (In case that initial value change is not substituted)

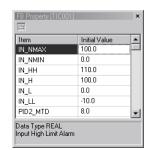


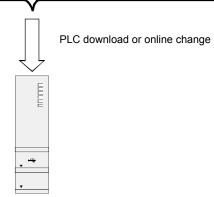


When the initial value of declared tag FB or global variable is changed, no
matter whether they have been arranged on FBD sheet, the changing of initial
value will not be substituted on the CPU module. (The same situation when tag
FB and global variable have been arranged to FBD sheet after initial value is
changed.)

Change the initial value of declare tag FB and global variable. (including the case when tag FB and global variable are not configured on FBD sheet)





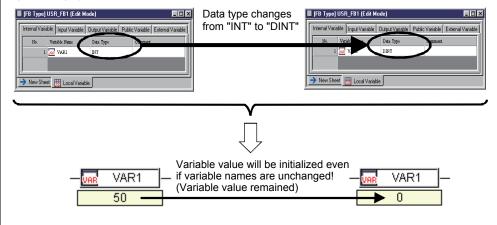


The change of initial value is not reflected to the CPU module!

To variable that has been used (declaration) on FBD program, even if its
variable name has not been changed, the variable will be initialized when any of
the following properties is changed: data type, character number (only for
STRING type variable) and assignment devices specified/not specified (only for
global variable).

(Variable value will not be held)

(For example) at the occasion of local variable



11.6.2 Restriction for project setting change

The restriction of project setting change is elaborated below.

After the setting changes listed in the following table, hot-start compile or online change compile will cause compile error.

(1) At the time of hot-start compile

The setting changes causing compile errors	Solution (Execute (a) or (b))	Reference
"File register: ZR" or "Timer: T" points are reduced in project parameter setting window.	(a) Execute hot-start compile Prior to file register points change or after the point increment.(b) Execute cold-start compile.	Section 6. 14
PLC type is changed.	(a) Return the PLC type to the condition before the change for executing hot-start compile.(b) Execute cold-start compile.	Section 6. 16
"Maximum No. of tags" is changed in tag FB declaration window.	(a) Return the status prior to maximum tag number change for hot-start compile.(b) Execute cold-start compile.	Section 8.4.2
The declaration position of tag FB is changed in tag FB declaration window.	(a) Return the status prior to the change of declaration position for executing hot-start compile.(b) Execute cold-start compile.	Section 8.4.2
"Tag FB" type is changed to different tag FB type in tag FB declaration window.	(a) Return the status prior to the change or set the same tag FB type of tag type for executing hotstart compile (b) Execute cold-start compile.	Section 8.4.2
The members of structure type are changed in structure type definition window.	(a) Return the status prior to the change of structure type change for executing hot-start compile.(b) Execute cold-start compile.	Section 9.2

^{*1:} For the details about the relationship between tag type and tag FB type, please refer to Section 8.4.3(1).

(2) At the time of online change compile

The setting change causing compile errors	Solution (Execute (a) or (b))	Reference
Add the fixed scan execution type or interrupt pointer execution type program in project windows.	(a) Delete the added programs and execute online change compile.(b) Execute cold-start compile or hot-start compile.	Section 6. 8
Delete fixed scan execution type or interrupt point execution type programs.	(a) Execute cold-start compile or hot-start compile.	Section 6. 10
"File register: ZR" or "Timer: T" points are reduced in project parameter setting window.	(a) Return to the status prior to the file register points change for online change compile.(b) Execute cold-start compile.	Section 6. 14
PLC type is changed.	(a) Return to the status prior to the PLC type change for online change compile.(b) Execute cold-start compile.	Section 6. 16
"Execution type" is changed in the program executing setting window.	(a) Return to the status prior to the execution type change for online change compile.(b) Execute cold-start or hot-start compile.	Section 7.12.1
The "Interruption interval" of fixed scan execution is change in program execution setting window.	(a) Return to the status prior to the interruption interval change for online change compile.(b) Execute cold-start or hot-start compile.	Section 7.12.3
"Execution condition" is changed when choosing fixed scan execution in program execution setting window.	(a) Return to the status prior to the execution condition change for online change compile.(b) Execute cold-start or hot-start compile.	Section 7.12.3
The execution state of fixed scan execution program is changed in program execution setting window.	(a) Return to the status prior to the executing state change for online change compile.(b) Execute cold-start or hot-start compile.	Section 7.12.3
Change the assigned object device of variable*which is referred to the execution condition by fixed scan execution start type program in program execution setting window.	(a) Return to the status prior to the change of reference variable data type for online change compile.(b) Execute cold-start or hot-start compile.	Section 7.12.3
Change the assigned device of reference global variable which is referred to the execution condition by fixed scan execution type program in program execution setting window.	(a) Return to the status prior to the group variable assignment device change for online change compile.(b) Execute cold-start or hot-start compile.	Section 7.12.3
"Maximum No. of tags" is changed in tag FB declaration window.	(a) Return to the status prior to the maximum tag number change for online change compile.(b) Execute cold-start compile.	Section 8.4.2
The declaration position of tag FB is changed in tag FB declaration window.	(a) Return to the status prior to the declaration position change for online change compile.(b) Execute cold-start compile.	Section 8.4.2
"Tag FB" type is changed to different tag FB type in tag FB declaration window.	(a) Return to the status prior to the tag FB type for online change compile or set the same tag FB type of tag type.(b) Execute cold-start compile.	Section 8.4.2

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The setting change causing compile errors	Solution (Execute (a) or (b))	Reference
The definition content is changed in GX Developer label assignment windows. (Except blank line insertion, deletion or line exchanging)	(a) Return to the status prior to definition content change.(b) Execute cold-start or hot-start compile.	Section 8.5.2
Edit the assigned device of reference variable in GX Developer label assignment windows. *3	(a) Return to the status prior to data type change of reference variables for online change compile.(b) Execute cold-start or hot-start compile.	Section 8.5.2
Edit the global variable assigned device Which GX Developer label assignment window refers to.	(a) Return to the status prior to global variable assigned device changes for online change compile.(b) Execute cold-start or hot-start compile.	Section 8.5.2
Change the members of structure in structure definition window.	(a) Return to the status prior to structure type member changes for online change.(b) Execute cold-start compile.	Section 9.2

- *2: For the relationship between tag types and tag FB type, please refer to Section 8.4.3(1).
- *3: The change of assigned target device will occur when the data type in the "assignment reference expression" of following table.

Settable variable reference expression	Assignment specified reference expression
Elementary data type global variable	Elementary data type global variable
Structure type global variable. Member variable	Structure type global variable
Module FB variable. Input variable	Module FB variable
Module FB variable. Output variable	Module FB variable
Module FB variable. Public variable	Module FB variable
Manufacture tag FB variable. Input variable	Manufacture tag FB variable
Manufacture tag FB variable. Output variable	Manufacture tag FB variable
Manufacture tag FB variable. Public variable (Except tag member variable).	Manufacture tag FB variable
Manufacture tag FB variable. Public variable (Except tag member variable).	Manufacture tag FB variable
User-defined tag FB variable. Elementary data type input variable	Elementary data type input variable
User-defined tag FB variable. Elementary data type output variable	Elementary data type output variable
User-defined tag FB variable. Elementary data type public variable (Except tag member variable).	Elementary data type public variable (Except tag member variable).
User-defined tag FB variable. Elementary data type public variable (Tag member variable).	User-defined tag FB variable
User-defined tag FB variable.	User-defined tag FB variable.
Structure type input variable. Member name	Structure type input variable
User-defined tag FB variable.	User-defined tag FB variable.
Structure type input variable. Member name	Structure type input variable
User-defined tag FB variable.	User-defined tag FB variable.
Structure type public variable. Member name	Structure type public variable

11.6.3 Other restriction

The following explains the restriction except the restriction mentioned in Section 11.6.1 and Section 11.6.2.

(1) At the time of hot-start compile

Cause of compile error	Measurement	Reference
Cold-start compile is not executed after newly creating.	Execute PLC download after cold-start compile	Section 11.2 Section 12.4
PLC download is not executed after cold-start compile.	Execute PLC download after cold-start compile	Section 12.4

(2) At the time of online change compile

Cause of compile error	Measurement	Reference
Cold-start compile is not executed after projects are newly creating.	Execute PLC download after cold-start compile	Section 11.2 Section 12.4
After executing cold-start compile or hot-start compile, online change compile was performed without executing PLC download.	After executing cold-start compile or hot-start compile, execute PLC download and then online change compile.	Section 11.2 Section 11.3 Section 12.4
After uploading, the uploading of label program is not executed with GX Developer.	Perform either of the following operations. Upload the label program and parameter with GX Developer. Download after executing the Cold-start Compile or the Hot-start Compile.	Section 11.2 Section 11.3 Section 12.4

^{*:} The programming tool version can be confirmed by selecting About PX Developer.

For details, refer to "Section 5.10 Help".

11.7 Error Example in Compile

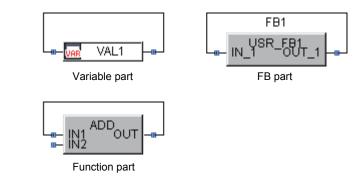
(1) Error examples in error check/compile

The followings are examples of error check and error in compile.

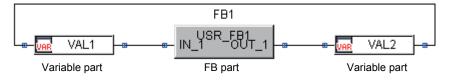
(a) Closed loop

Error may occur when the following loops exist in FBD program.

(Example 1) The loop onto itself

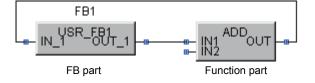


(Example 2) The loop with FB part in the middle

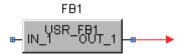


*: Error will occur even if both sides of FB part are not variable parts as showed in the above figure.

(Example 3) The loop from function part to FB part

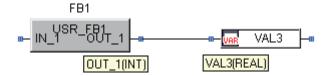


(b) When the one or both end of the connector is not connected with parts



(c) When the data types on the both sides of the connector are different

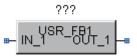
Errors will occur when the data types of the parts connected with the two ends of the connector are different.



(d) When the input pins are not connected with the function parts Errors will occur even if only one of the input pins in the function parts is not connected. However, the functions BIND (_E), CALL_DINT (_E), CALL_REAL (_E) should be excluded (EN, P pins need connection). Please refer to [PX Developer Programming Manual] for details about the function parts.



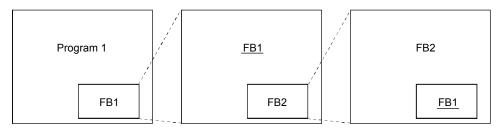
(e) When the variable names and FB variable names are not set Errors will occur when the variable names, FB variable names and constant values of the constant parts are not set.



(2) Error examples in compile

(a) When the recursive call exists

The programming tool can be used to realize structuralized programming by combining the user-defined FB type and tag FB type. However, the program itself defined in the upper hierarchy cannot be called from the lower hierarchy (recursive call is not permitted).



*: FB 1 is a recursive call under this condition.

(b) When the created program exceeds the capacity set by the project parameters.

In system resource setting of the project parameters (refer to Section 6.14 (1)), an error will occur when the created program exceeds the set points.

- (c) When the variable names of the global parts are duplicated An error will occur in compile under the condition that the variable names are duplicated have been declared in the global variable declaration window, Module FB declaration window and tag FB declaration window.
- (d) When an error occurs in setting the FBD sheet execution conditions

An error will occur in compile when no local variables in the program/FB type are specified, or when there is an error in the execution condition under the condition that the constants at the left side are specified. (Refer to Section 7.11 for details about the FBD sheet execution condition setting)

- (e) When the mismatch occurs in the program execution setting An error will occur in compile when variables beyond the global parts are specified, or when there is an error in the execution condition expression under the condition that the constants at the left side are specified. An error will occur as well when the programs whose execution types are set as the fixed scan execution type exceed 101(16 for the Q02PHCPU and 31 for the Q06PHCPU). (Refer to Section 7.12 for details about the program execution setting)
- (f) When the number of program/FB hierarchy is larger than 8 The programming tool can be used to realize structuralized programming by using the user- defined FB and tag FB (For example, to paste the other userdefined FB in the user- defined FB type). An error will occur in compile when the program/FB hierarchies exceeds 8.
- (g) When no program exists

An error will occur under the condition that no program exists by deleting all programs in the project (refer to Section 6.10).

(3) Data type setting of the constant parts

The data type of constant part cannot be determined by itself, but determined by the data type of FBD parts connected as constant part.

In the constant parts, the relations between the input value and data type candidate are listed as below.

Classification Input Values		Data Type Candidate						
Classification	Classification input values		INT	DINT	WORD	DWORD	REAL	BOOL
Character String	" " (Example: "ABC")	0	_	_	_	_	_	_
	0	_	0	0	0	0	0	0
	1	_	0	0	0	0	0	0
Decimal	2 to 32767		0	0	0	0	0	_
Integer	-32768 to -1		0	0	0	0	0	_
	32768 to 2147483647		ı	0	_	0	0	_
	-2147483648 to 32769		ı	0	_	0	0	_
	H0		0	0	0	0	_	0
Hexadecimal	H1		0	0	0	0	_	0
Tiexadecimai	H2 to HFFFF		0	0	0	0	_	_
H10000 to HFFFFFFF			ı	0	_	0	_	_
Real Number	Numbers with decimal points or of exponential-type (Example: 1.0 1.005E+ 0.08)	-	1	_	П	_	0	_
TRUE or FALSE	TRUE	_	-	_	_	_	_	0
TRUE OF FALSE	FALSE	_	_	_	_	_	_	0

(a) Examples of determining the data type of constant parts

(Example 1)



In the above graph, the constant part value is ["ABC"], so the data type of the constant part should be the STRING type. Therefore, the connected variable part data type except STRING will lead to the data type mismatch. Thus, an error will occur.

(Example 2)



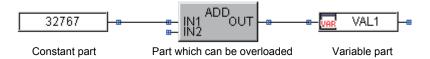
In the above graph, the constant part value is [0], so the data type of the constant part should be the INT, DINT, WORD, DWORD, REAL, BOOL types. Therefore, the connected variable part data type except INT, DINT, WORD, DWORD, REAL, BOOL types will lead to the data type mismatch. Thus, an error will occur.

(b) Overload

In the function parts, one part can correspond to several data types. For example, the numerical function ABS can process I/O parameters of the INT, DINT, and REAL types. Such function parts are called the function parts which can be overloaded. The data type as mentioned above will be displayed as [ANY] in tooltip when the I/O variables of the function parts correspond to the multiple data types.



(Example 1)

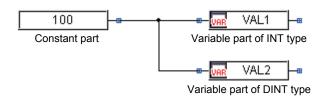


In the above graph, the constant part value is [32767], so the data type of the constant part should be the INT, DINT, WORD, DWORD, REAL types. However, the function part (ADD) connected with the constant part can be overloaded, and the input pins have three data type candidates of INT, DINT, and REAL types. In this case, the data types of the constants are determined not only by the input pins, but also by the variable part data type connected with the output pins.

An error will occur when the data types of the variable part connected with the output pins are except the INT, DINT, and REAL types.

(c) Error examples caused by constant parts

(Example 1)



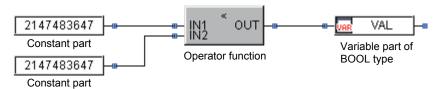
In the above graph, the constant part value is [100], so the data type of the constant part should be INT, DINT, WORD, DWORD, REAL types. However, an error will occur, because one constant part is connected with multiple data types, and the data type cannot be determined as only one.

(Example 2)



In the above graph, the constant part value is [32767], so the data type candidates of the constant part should be the INT, DINT, WORD, DWORD, REAL types. However, an error will occur, because the data types of the constant part cannot be determined when the output pins are not connected with any data type.

(Example 3)



In the above graph, the constant part value is [2147483647], so the data type of the constant part should be the DINT, DWORD, REAL types. However, the function part (<) connected with the constant part can be overloaded, and the output pin is fixed as BOOL type, so the data type cannot be determined by the output pins.

In this case, the parts which can determine the constant part data type should exist in either of the input pins. But in the case of above graph, in any one of the constant parts, there are multiple data type candidates of the DINT, DWORD, and REAL types, so the data types of the constant parts cannot be determined. An error will occur under this condition.

POINT

Please connect the function input pins with the parts which can determine the data types of the constant parts when the input pins of the operator function (<, <=, <>, =, >, >=) are connected with the constant parts of the constant values for – 2147483648 to 2147483647 (Decimal integer) or H0 to HFFFF (Hexadecimal).

12 PLC CONNECTION

This chapter explains the following.

- Download/Upload of projects and data to be used in Download/Upload.
- Operations needed to connect programming tool with CPU module.
- Operations to download the program made with programming tool to PLC CPU.
- Operations to download/upload the data needed for restoration of project.

12.1 Download/Upload

For performing the process control on PLC system, it is necessary to execute the data that has been user-created with PX Developer and generated with compile on PLC CPU.

This section describes Download/Upload, and data to be used in Download/Upload.

(1) Download

Download is designed to store the data created/generated with programming tool to PLC CPU.

Download is due to PX Developer or GX Developer.

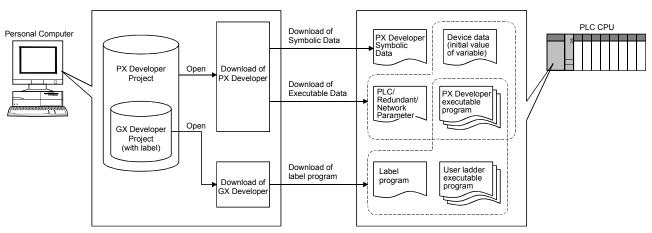
The following two data are downloaded with PX Developer.

- Data needed to execute on PLC CPU(Executable Data).
- Data needed to restore the project(Symbolic Data).

In addition, user ladder executable program and label program are downloaded with GX Developer.

Label program is also needed to restore the project.

Data to be downloaded to PLC CPU



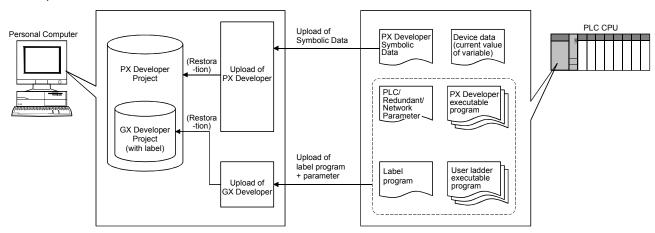
(2) Upload

Upload is designed to load the data stored in PLC CPU to PX Developer. If the data needed to restore the projects are stored in PLC CPU with downloading, the project can be stored by uploading without project data on personal computer side.

Upload is due to PX Developer or GX Developer.

PX Developer uploads the symbolic data, and GX Developer uploads the label program.

Data uploaded from PLC CPU



(3) Data to be used in Upload/Download

Data (dealt by user	Contents
Executable Data		Data needed to execute FBD Program on PLC CPU. It contains the following data created by the compile of programming tool. • PC/Network(/Redundant) parameter • PX Developer executable program
PX Developer Data	Symbolic Data	Device data (initial value of variable) *1 Data needed to restore PX Developer project with upload. The compressed information about symbolic drawing of FBD program and variable assignment that are not contained in the Executable Data is stored. Program memory, or memory card (SRAM card and ATA card) can be specified for the download target memory. (Refer to Section 12.4.3)
CV Dovolonor	User ladder executable program	Data needed to execute sequence program on PLC CPU.
GX Developer Data	Label Program	Data needed to execute the program created by label in place of device on PLC CPU. In addition, it is needed to restore the PX Developer Project with upload.

*1: The device data (initial value of variable) cannot be uploaded to personal computer.

However, the device data (current value of variable) on PLC CPU processing, can be uploaded with Reading Current Value of FB Property. (Refer to Section 13.6.)

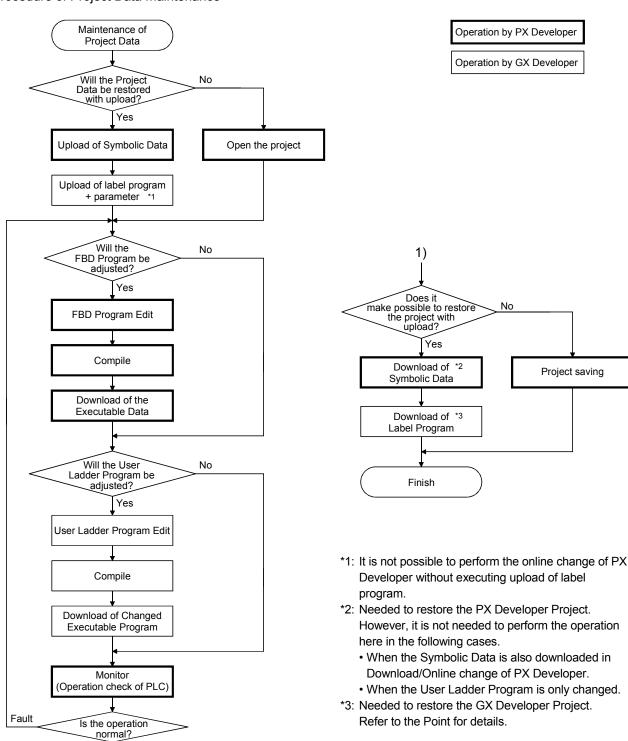
12.2 Procedure for restoration and maintenance of Project Data

This chapter describes the procedure to restore the PX Developer Project and GX Developer Project in personal computer side based on the data saved in PLC CPU and to execute the maintenance.

Procedure of Project Data maintenance

Normal

1)



POINT

- The download of label program is needed to restore the project of GX Developer.
 - When the download/Online change of PX Developer is executed, download the latest label program with GX Developer, as the "#FBDQ***" Executable Program in PLC CPU has been changed.
- To execute the download/upload of [Symbolic Data], GX Developer Version 8.03D or later, which corresponds to download/upload of label program, is needed.
- PX Developer Version 1.08J or later can download/upload of the [Symbolic Data].
- When the download of [Symbolic Data] of PX Developer is executed, it will be stored in program memory or memory card (SRAM card or ATA card) as the file name, "#FBDQINF.BIN".
 - Never change or delete the [Symbolic Data] written in ATA card, otherwise the upload with PX Developer cannot be executed.
- Right after executing the upload of [Symbolic Data], the following contents of Project Data is vary to the data on downloading.
 Reset, if necessary.

Data	Contents right after uploading		
Transfer setup	The contents of Transfer setup, which have been set up on uploading, are stored. However the contents will return to default setting (PLC direct coupled setting), if the restored PLC type varies to the PLC type specified on uploading.		
GX Developer Project	To be returned to the contents on the writing a new program.		

12.3 Specifying PLC Transfer Setup



PURPOSE

The PLC transfer setup of CPU module should be specified in order to download the FBD programs created by programming tool in CPU module and monitor the current values of the variables by online monitor. This chapter explains methods for specifying the transfer setup.

Please refer to Section 2.1.2 for communication routes supported by programming tool.



BASIC OPERATION

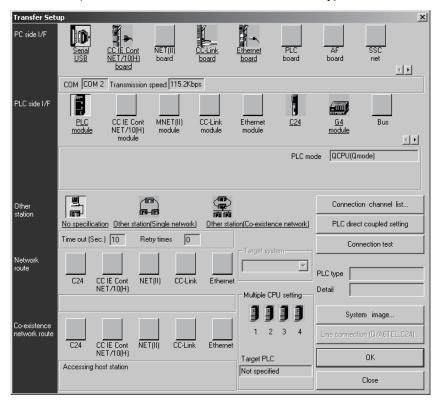
- 1. Click [Online] → [Transfer Setup] in menu.
- 2. Display the "Transfer Setup" window.
- 3. Select the computer interface in [PC side I/F]. Then double-click the icon to execute the detailed setting.
- 4. Click the interface of PLC in [PLC side I/F]. Then double-click the icon to execute the detailed setting.
- 5. Double-click the icon in [Other station] to execute the detailed setting.
- 6. Double-click the icon in [Network route] to execute the detailed setting.
- 7. Specify the PLC No. which is installed in Process CPU accessed from programming tool under the condition of multiple CPU system configuration. Click the PLC No. icon of the once-clicked multiple CPU under the condition of no specification and returning to the multiple CPU. (Specific to Process CPU)
- 8. In the case of redundant system configuration, select from the following options for Redundant CPU.
 - "Not specified", "Control System", "Standby System", "System A", "System B"
- 9. Click the button "OK".

The background color of the selected item icons is yellow. Please refer to GX Developer version 8 Operating Manual for details about setting.

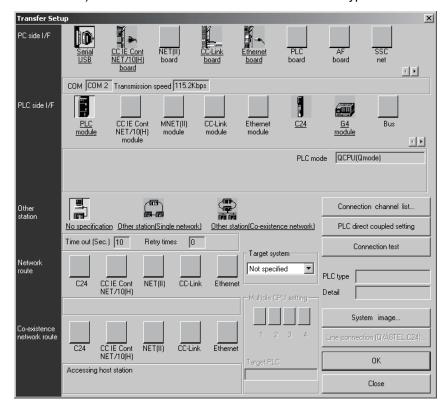
12 - 512 - 5

DISPLAY/SETTING SCREEN

1) When Process CPU is selected as PLC type



2) When Redundant CPU is selected as PLC type





DISPLAY/SETTING DATA

Items or Buttons	Contents			
PC side I/F	To specify PC side I/F. PC side I/F which can be specified is serial USB, CC IE Cont NET/10(H) board, CC-Link board, Ethernet board, and Q series bus. Then double click the icons to execute the detailed setting.			
PLC side I/F	To display the PLC side interface. The following contents will be displayed after specifying the PC side I/F. PC side I/F is serial USB: PLC module, C24, G4 module, MNET/10(H) remote PC side I/F is CC IE Cont NET/10 (H) board: CC IE Cont NET/10 (H) module PC side I/F is CC-Link board: CC-Link module PC side I/F is Ethernet board: Ethernet module PC side I/F is Q series bus: PLC module Double click the displayed icons to execute detailed settings. (The detailed settings cannot be executed under the condition of [MNET/10 (H) module]).			
Other station	To display the specification status of the local station or other stations. The following contents will be displayed by specifying the PC side I/F. PC side I/F is serial USB and PLC side IF is CPU module or C24: No specification, Other station (Single network), Other station (Co-existence network) PC side I/F is Q series bus: No specification Other than the above: Other station (Single network), Other station (Co-existence network) Double click the selected icons to execute the detailed settings.			
Network route	To display network communication route. Selectable when Other station (Single network) or Other station (Co-existence network) is selected in Other station. Double click the selected icons to execute the detailed settings.			
Co-existence Network route	Selectable when Other station (Co-existence network) is selected in Other station with the network route predetermined. By double-clicking a selected icon, detailed settings can be made.			
Multiple CPU setting (Specific to Process CPU)	To specify the PLC No. which is set in Process CPU accessed by programming tool in multiple CPU system configuration. To specify [No choice made] or [PLC No. 1] in single-CPU system configuration.			
	Specify the connection target from the following when configuring a system using Redundant CPUs. *1			
	Options Connection target.			
Target system (Specific to Redundant CPU)	Not specified CPU direction connection: The CPU module directly connected to personal computer. Via a module mounted to the main base unit: The CPU module of station in which the network module corresponding to the station No. specified in Network communication path is mounted. Via a module mounted to the redundant type extension base unit: The CPU module in the control system			
	Control System The CPU module in the control system			
	Standby System The CPU module in the standby system			
	System A The CPU module to which the A side connector of tracking cable is connected.			
	System B The CPU module to which the B side connector of tracking cable is connected.			
PLC direct coupled setting	To set as CPU module direct connection (RS-232).			
Connection test	To test whether PLC can communicate with a CPU module when the current transfer setup is specified.			
OK	To substitute the set transfer setup and close the "Transfer setup" window.			
Close	Not to reflect the set connection destination but to close the "Transfer setup" window.			

12 - 7 12 - 7 *1 When connected to the Redundant CPU via a module mounted to the redundant type extension base unit, some functions shown in the table below cannot be executed.

Target system Function	System A, System B	Not specified, Control System, Standby System	Restrictions
Upload	0	Δ	FBD programs can be restored since uploading of symbolic data is enabled, but such as PLC/redundant/network parameters and label programs cannot be restored since uploading by GX Developer is disabled.
Online change compile	×	×	_
Download	×	×	_
Project consistency check	0	×	_

O: Executable \triangle : Executable with restrictions X: Not executable

POINT

First specify the connection setup of the CPU module to download the FBD programs created with the PX Developer Ver.1.04E or earlier programming tool or to monitor the current values of the variables by online monitor.
 The following dialog box will be displayed in PLC downloading or online operation without specifying the transfer setup.



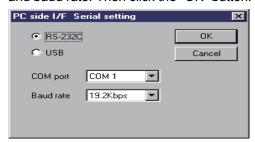
 For detailed settings of each network route in the Transfer Setup window, refer to the GX Developer Operating Manual.

(1) Detail setting for CPU module direct connection (RS-232, USB)

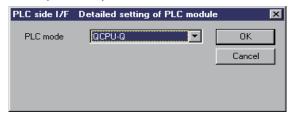


BASIC OPERATION

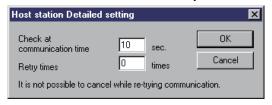
- 1. Display the "Transfer setup" window.
- 2. Specify "Serial USB" in [PC side I/F].
- 3. Double click the "Serial USB" icon to set the connection interface, COM port and baud rate. Then click the "OK" button.



4. Double click the "PLC module" icon in [PLC side I/F] and select CPU module mode (QCPU-Q).



5. Double click the "No specification" icon in [Other station] to check the communication time and set retry times.



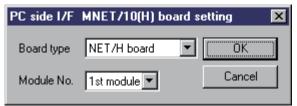
POINT

- In the detailed setting for "Serial USB", the high-speed communication will not be realized if the user's computer baud rate is not suitable for communication speed of 115.2/57.6kbps. Please lower the baud rate setting and communicate again in case that communication retry speed becomes slow or a communication error occurs.
 - There are some restrictions when communicating by USB. Please refer to Section 2.1.3 (2) for details.

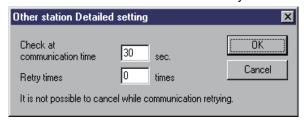
12 - 9 12 - 9 (2) Detail setting for MELSECNET/10 (H) connection



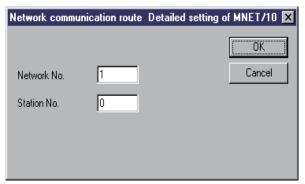
- 1. Display the "Transfer Setup" window.
- 2. Specify "NET/10 (H) board" in [PC side I/F].
- 3. Double click the "NET/10 (H) board" icon to set the board type and module No.



4. Double click the "Other station (single network)" icon in [Other station] to check the communication time and set the retry times.



5. Double click the "NET/10 (H)" icon in [Network communication route] to set the network No. and station No.

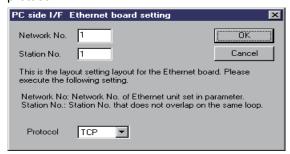


(3) Detail setting for Ethernet connection

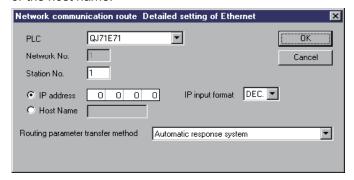


🗒 BASIC OPERATION

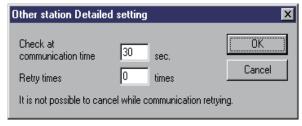
- 1. Display the "Transfer Setup" window.
- 2. Specify "Ethernet board" in [PC side I/F].
- 3. Double click the "Ethernet board" icon to set the network No., station No., and protocol.



4. Double click the "Ethernet module" icon in [PLC side I/F] to set the IP address or the host name.



5. Double click the "Other station (single network)" icon in [Other station] to check the communication time and set the retry times.



POINT

- Network parameters should be set in GX Developer side to realize the communication. Please start GX Developer from PX Developer and set the network parameters. Please refer to Section 7.14.1 and [GX Developer Operating Manual] for details about methods for starting and setting network parameters of GX Developer respectively.
- Please set the broadcast communication by UDP/IP when notifying the events to the monitor tool via Ethernet. Please refer to Section 6.14 (3) for the details.

12.4 Downloading to PLC



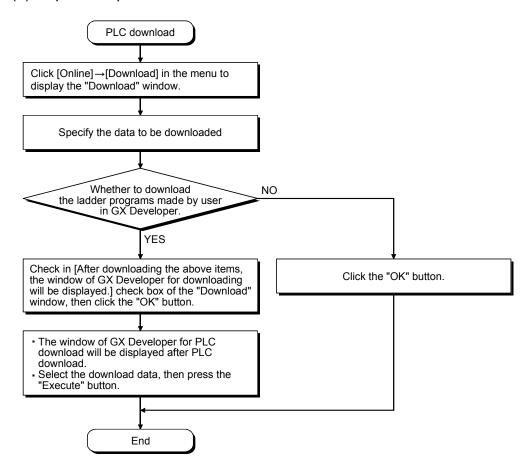
PURPOSE

To download the executable data (PX Developer program file or parameter) created by compile with programming tool and the symbolic data to the CPU module. If there is user-created ladder program at GX Developer side, the ladder program will be downloaded to the CPU module.



BASIC OPERATION

(1) Operation procedure of PLC download



*: Please refer to this Section (2) for detailed operations about how to display "Download" window.

POINT

When the monitor tool is used, download the monitor target project again in the monitor tool after executing PLC download with the programming tool.

POINT

Download to PLC is executed to the following PLC CPU in a redundant system.

Operation mode	Tracking status	Target PLC CPU	Remarks
Backup mode	No error*1	PLC CPUs of both systems (Control system to Standby system order)	
	Error has occurred*2	Target PLC	A message appears for confirming download to PLC of both systems is disabled.
Separate mode	Always	PLC CPU specified in the PLC connection destination	_
Debug mode	Always		

- *1: Downloading is performed to PLC CPUs of both systems even if a CPU stopping error occur on the other Redundant CPU.
- *2: Tracking error could be caused by any of the following:
 - The other Redundant CPU is powered OFF.
 - The other Redundant CPU is reset.
 - Tracking cable failure.

(2) PLC download methods

- 1. Click the [Online] → [Download] in the menu (**).
- 2. Display the "Download" window.
- 3. Input the selection mark in the check box of the [The Executable Data], if downloading the executable data.
- 4. Input the selection mark in the check box of the [The Symbolic Data], if downloading the symbolic data.
 - To change the target memory displayed on the [Detail] area in this case, click the ... button to display the Download Setting window and change the target memory.

Refer to Section 12.4.3.

- 5. Input the selection mark in the check box of [After downloading the above items, a window of GX Developer for downloading will be displayed], if downloading the ladder program and device comment created on the GX Developer side.
- 6. Click the "OK" button to close the download window and start downloading.
- 7. If the check box of [After downloading the above items, a window of GX Developer for downloading will be displayed] on the download window is selected, the window of GX Developer for downloading will be displayed. After downloading the required data, close this window.

12.4.1 Downloading the Executable Data



PURPOSE

Download the required data (PX Developer program file or parameter) for which FBD program is executed by PLC CPU to the CPU module.

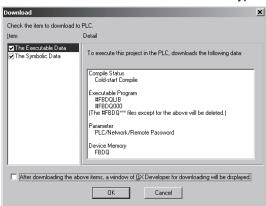


BASIC OPERATION

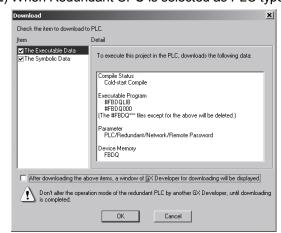
- 1. Display the "Download" window by the operation described in Section 12.4.
- 2. Input the selection mark in the check box [The Executable Data] in Item area and click the "OK" button.



1) When Process CPU is selected as PLC type.



2) When Redundant CPU is selected as PLC type.





DISPLAY/SETTING DATA

Items	Contents		
The Executable Data *1	To input the selection mark in the check box when downloading required data for which the project is executed by PLC CPU. To display the detailed information for executable data on [Detail] area when this item is		
	selected. However, this item cannot be selected when compile status is invalid initial value ().		
Compile Status	To display the latest-executed compile type (cold-start compile or hot-start compile). (Please refer to Section 11.2 and 11.3 for compile contents.)		
Executable Program	To display the program file name and make files automatically. The name for the automatically made file is [#FBDQ***].		
Parameter	To display the download parameter type.		
Device Memory (In Cold-start Compile) Initial Value of Added Variables (In Hot-start Compile)	To display the file name of the device memory in the cold-start compile status. To display [Initial Value of Added Variables] in the hot-start compile status.		
After downloading the above items, a window of GX Developer for downloading will be displayed.	To display the "Download" window of GX Developer after downloading when inputting the selection mark in this check box. To input the selection mark in the check box when downloading the files such as ladder programs or device comments made in GX Developer side.		

^{*1:} Please refer to Section 12.4.2 for downloading the symbolic data of project.

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12.4.2 Downloading the Symbolic Data



PURPOSE

Download required data for project restoration by uploading to CPU module.

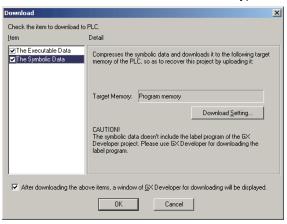


BASIC OPERATION

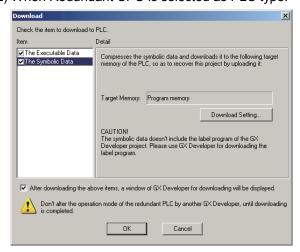
- 1. Display the "Download" window with the operation described in Section 12.4.
- 2. Input the selection mark on the check box [The Symbolic Data] and click the "OK" button.



1) When Process CPU is selected as PLC type.



2) When Redundant CPU is selected as PLC type.





DISPLAY/SETTING DATA

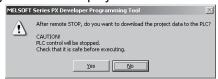
Items	Contents
The Symbolic Data* ¹	To input the selection mark in the check box when downloading required symbolic data for project restoration by uploading. To display the detailed information for symbolic data on [Detail] area when this item is selected.
Target memory	To display PLC CPU memory name that becomes a target of downloading for symbolic data. (It is the same name as that of the downloading setting (Refer to Section 12.4.3). To display the downloading setting window when clicking the button and target memory of symbolic data or compression rate setting can be changed.
"Download Setting" button	Displays the Download Setting window to change the settings for a target memory and compression rate of symbolic data.
After downloading the above items, a window of GX Developer for downloading will be displayed.	To display the "Download" window for GX Developer after downloading when input the selection mark in this check box. To check when downloading label program on GX Developer side.

^{*1:} Please refer to Section 12.4.1 for downloading the executable data of project.

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POINT

 In PLC download, PLC download can be executed after remote stop is executed on programming tool when the CPU module is in RUN status.
 The following dialog box will be displayed after PLC download.



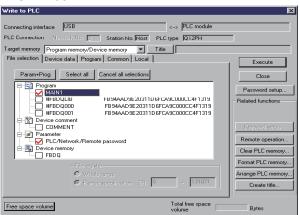
Here, the CPU module will remain the remote STOP status if clicking "NO" button. Please start GX Developer from programming tool in order to execute remote RUN (refer to Section 7.14.1), and execute remote RUN by "Remote operation" button in the "Write to PLC" window.

 When inputting "Check" in the "After downloading the above items, a window of GX Developer for downloading will be displayed." check box and executing PLC download, the "GX Developer Write to PLC" window will be displayed after downloading programming tool related files to PLC.

Here, the selected data will be downloaded in the CPU module if users select the user-created label programs and click the button "Execute".

Please click "Close" button when users are to end PLC download.

Please refer to [GX Developer Operating Manual] for operating methods about the "Write to PLC" window.



("Write to PLC" window)

- In a project, data can not be downloaded to the CPU module when users
 execute the hot-start compile in case that PLC download is never executed after
 the cold-start compile. Here, the PLC download should be executed after being
 compiled again by cold-start compile.
- Messages will be displayed before PLC download when GX Developer project is not compiled (such as when GX developer local volume label is not compiled by GX Developer after it is changed). At this time PLC download should be executed after being compiled by GX Developer. The compile in GX Developer can be executed by selecting [Convert] → [Convert] of GX Developer side in the menu. Please refer to [GX Developer Operating Manual] for details.
- GX Developer Version 8.03D or later that matches to downloading of label program is required to execute downloading of [symbolic data].
- If download to PLC is cancelled or an error occurs in this setting when the PLC type is Redundant CPU, programs written into the Redundant CPUs of both systems are inconsistent.
 - If the operation status is changed to RUN in the backup mode, the consistency check error will occur.
 - In this case, execute download to PLC again so that the programs will be consistent.
- Password authentication is required for uploading the symbolic data when downloading symbolic data of project that password is set.

12.4.3 Download Setting



PURPOSE

Set target memory and compression rate for downloading symbolic data. The compressed symbolic data size can be checked without executing Write to PLC.

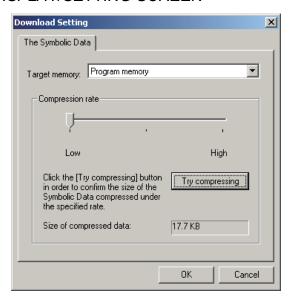


BASIC OPERATION

- Select the item [The Symbolic Data] on the "Download/Online Change" window and click "Download Setting" button in the [Detail] area.
- 2. Set "Target memory" and "Compression rate".
- 3. To check the size of the symbolic data after compression at the selected compression rate, click the "Try compressing" button.
- 4. Click the "OK" button.



DISPLAY/SETTING SCREEN





DISPLAY/SETTING DATA

Items	Display/contents		
	To select the PLC CPL	J memory stores symbolic data from the list box. *1	
	Target memory	Description	
Target memory	Program memory	Downloads to the program memory of CPU module.	
Target memory	Memory card (RAM)	Downloads to the SRAM card inserted in the memory card slot.	
	Memory card (ROM)	Downloads to the ATA card inserted in the memory card slot. (Flash card is not applicable.)	
Compression rate	To select compression rate of symbolic data from 3 stages. *1		
"Try compressing" button	Displays the symbolic data size at the selected compression rate.		

*1: Symbolic data cannot be downloaded when capacity of target memory is insufficient.

In that case, change target memory or increase compression rate. In the case of high compression rate, it will take longer time for compression.

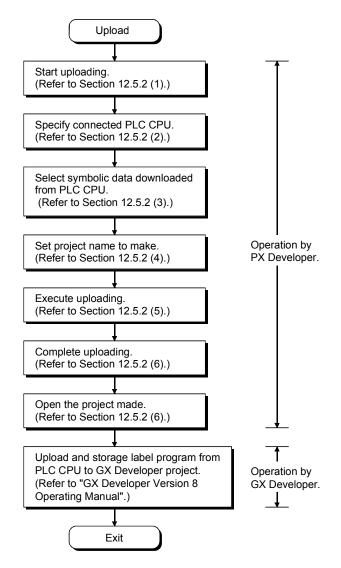
POINT

Even the same compression rate is specified to symbolic data, the size display
after compression varies in the range of several tens of bytes. The size of
symbolic data written to the PLC can be checked on the output window during
the execution of Write to PLC.

12.5 Uploading form PLC

Upload symbolic data from memory in PLC CPU and restore project.

12.5.1 Uploading procedure



POINT

- PX Developer Version1.08J or later is required to upload.
- Open the GX Developer project and perform uploading of label program and parameter after uploading of PX Developer is completed.
 Also, if there are Device comments or data, upload for those matters.
- GX Developer Version8.03J or later that matches to uploading of label program is required to execute uploading of [symbolic data].
- When PX Developer project is opened by PX Developer Version 1.08J or later right after being made with uploading, perform compile for executing download. However, online monitor can be executed without performing compile.

12.5.2 Uploading the Symbolic Data

(1) Start upload



BASIC OPERATION

- 1. Click [Online]-[Upload] (*\hat{\(\beta\)}\) on the menu.
- 2. When PX Developer project is opened, close PX Developer project.
- 3. The "Upload" window (transfer setup PLC CPU) is displayed. (Refer to display/ setting screen of (2).)
- (2) Specify connected PLC CPU.



PURPOSE

Specify connected PLC CPU.



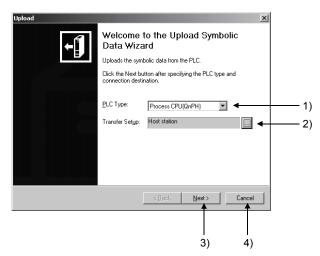
BASIC OPERATION

- 1. Display the "Upload" window (transfer setup PLC CPU) with the operation (1).
- 2. Select PLC type from list box.
- 3. Click the ... button to display the "Transfer setup" window. (Refer to display / setting screen of Section 12.3.)
- 4. Specify transfer setup CPU with the "Transfer setup" window and click the "OK" button.
- 5. Close the "Transfer setup" window, and transfer setup CPU is displayed.
- 6. Click the "Next" button.
- 7. "Upload" window (Select the Symbolic Data...) is displayed. (Refer to display / setting screen of (3).)

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DISPLAY/SETTING SCREEN





DISPLAY/SETTING DATA

No.	Items or Buttons	Display/contents
1)	PLC Type	To select PLC type of PLC CPU to be connected. (Select from Process CPU(QnPH) or Redundant CPU(QnPRH).)
2)	Transfer Setup	To specify connected PLC CPU. To click the button and display "Transfer setup" window.
3)	Next	To display the "Upload" window (Select the Symbolic Data).
4)	Cancel	To close the "Upload" window after making the setting contents invalid.

POINT

When changing PLC type, multiple PLC setting becomes "Not specified", and Target system becomes "Not specified".

(3) Select the symbolic data.



PURPOSE

Select the symbolic data to be uploaded from connected PLC CPU.



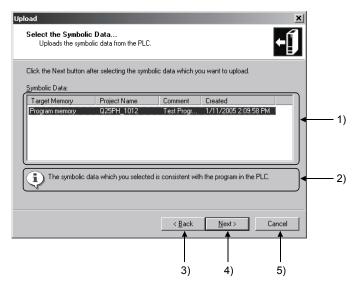
BASIC OPERATION

1. Display the "Upload" window (Select the Symbolic Data...) with the operation of (2).

Target memory in which symbolic data exist is displayed as a list. (The progress display window is displayed on processing.)

- 2. Select symbolic data to be uploaded, click the "Next" button.
- 3. The "Upload" window (Input a new Project Name...) is displayed. (Refer to display / setting screen of (4).)

DISPLAY/SETTING SCREEN



DISPLAY/SETTING DATA

No.	Items or Buttons	Display/contents			
1)	Symbolic data list	A list of symbolic data stored in target memory connected PLC CPU is displayed. Only one symbolic data to be uploaded can be selected. Default allows selecting symbolic data that match to program to be operated on PLC CPU.			
			To display the result as a message after comparing symbolic data selected with the list to program operated on PLC CPU.		
			Icon	Message	
2)	2) Message display	Matched	i	The symbolic data which you selected is consistent with the program in the PLC.	
		Mismatched *1	1	The symbolic data which you selected is not consistent with the program in the PLC.	
		*1: contains the case that symbolic data is broken down as well.			
3)	Back	To display the "Upload" window (Transfer Setup PLC CPU).			
4)	Next	To display the "Upload" window (Input a new Project Name). However, when symbolic data is not selected or symbolic data selected is illegal, the "Next" button cannot be selected.			
5)	Cancel	To close the "Upload"	To close the "Upload" window after making the setting contents invalid.		

POINT

When project name of symbolic data contains 32 characters or more, project name will be performed omission display.

(4) Input a new Project Name



PURPOSE

Based on symbolic data, set PX Developer project name to be newly created (restored).

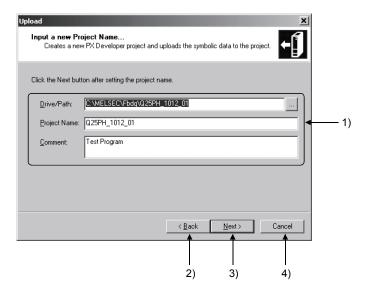


BASIC OPERATION

- Display "Upload" window (Input a new Project Name...) with operation of (3).
 Drive / path, project name and comment of PX Developer project to uploaded symbolic data are initially displayed.
- 2. Change drive / path, project name and comment if necessary and click the "Next" button.
- 3. Display progress display window. (Refer to display / setting screen of (5).)



DISPLAY/SETTING SCREEN





DISPLAY/SETTING DATA

No.	Items or Buttons	Display/contents
1)	Drive/Path, Project Name, Comment	To set drive / path, project name and comment of project to be newly created (restored). When project name of symbolic data to be uploaded is 32 characters or more, abbreviate it to 32 characters.
2)	Back	To display the "Upload" window (Select the Symbolic Data).
3)	Next	To upload symbolic data with displaying progress display window.
4)	Cancel	To close the "Upload" window after making the setting contents invalid.

POINT

Restriction on setting drive / path and project name is the same as that for creating new project. (Refer to Section 6.2.)

(5) Execute uploading from PLC



PURPOSE

Upload symbolic data from connected PLC CPU and newly create (restore) PX Developer project.



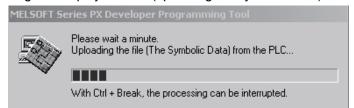
BASIC OPERATION

- Progress display window (uploading the symbolic data) is displayed by the operation of (4), and symbolic data is uploaded.
 Uploading of symbolic data can be interrupted with pressing the "Ctrl" + "Break" key.
- Restore [PX Developer project file] and [assigned information database] from symbolic data and save them into the specified drive / path after completing upload of symbolic data.
 - While executing this processing, progress display window (Creating the PX Developer project) is displayed.
- 3. When completing the upload processing, the "Upload" window (completion of upload) is displayed. (Refer to display / setting screen of (6).)

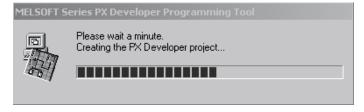


DISPLAY/SETTING SCREEN

1) Progress display window (uploading the symbolic data)



2) Progress display window (Creating the PX Developer project)



(6) Complete uploading from PLC



PURPOSE

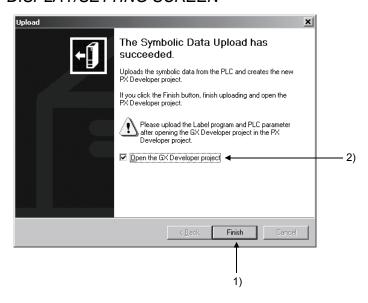
Complete the upload.



BASIC OPERATION

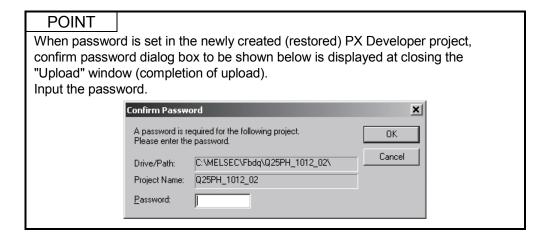
- 1. The "Upload" window (completion of upload) is displayed by the operation of (5).
- 2. Click the "Finish" button and close the "Upload" window (completion of upload).
- 3. The newly created (restored) PX Developer project is opened.
- 4. Open GX Developer project from PX Developer and execute upload of label program and parameter.

DISPLAY/SETTING SCREEN



DISPLAY/SETTING DATA

No.	Items or Buttons	Display/contents
1)	Finish	To close the "Upload" window (completion of upload) and open the created PX Developer project.
2)	Open the GX Developer project check box	To open PX Developer project and go on to open GX Developer project when selection mark is input in check box.



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12.6 Deleting the PLC Data



PURPOSE

Delete the symbolic data stored into memory within PLC CPU that is specified by transfer setup.

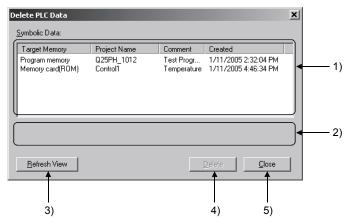


BASIC OPERATION

- (1) Display operation of the Delete PLC Data deletion window
 - 1. Click the [Online] [Delete PLC Data] on the menu.
 - 2. Upload symbolic data. (Refer to (3) 3.)
 - 3. Delete PLC Data window is displayed.
- (2) Deletion operation of symbolic data
 - 1. Select symbolic data to be deleted in symbolic data list of Delete PLC Data window.
 - 2. Click the "Delete" button.
 - 3. Message box to confirm the deletion is displayed.
 - 4. Click the "YES" button on message box to execute deletion of symbolic data.
 - 5. Symbolic data list is updated. (Refer to (3) 2 to 4.)
- (3) Update of symbolic data list.
 - 1. Click the "Refresh View" button on Delete PLC Data window.
 - 2. Display contents on symbolic data list are erased.
 - 3. Whether symbolic data exists or not into memory (program memory or memory card) within connected PLC CPU can be confirmed. (Progress display window is displayed on processing.)
 - 4. Memory in which symbolic data exists is displayed on symbolic data list.

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DISPLAY/SETTING SCREEN





No.	Items or Buttons			[Display/contents
1)	Symbolic data list		To display a list of memory connected PLC CPU which symbolic data is stored. Only one symbolic data to be deleted can be selected.		
			To display the result as a message after comparing symbolic data selected with the list to program operated on PLC CPU.		
				Icon	Message
2)) Message display		Matched	1	The symbolic data which you selected is consistent with the program in the PLC.
			Mismatched* ¹	i	The symbolic data which you selected is not consistent with the program in the PLC.
			*1: contains the case that symbolic data is broken down as well.		
3)	Refresh View	То	To update display contents for symbolic data list.		
		To delete symbolic data which exist in target memory selected from connected PLC 0		target memory selected from connected PLC CPU.	
4)	Delete	However, "Delete" button cannot be selected when symbolic data that becomes deletion target is not displayed on symbolic data list.			
5)	Close	То	To close Delete PLC Data window.		

POINT

- When project name of symbolic data is 32 characters or more, project name will be performed omission display.
- In the Redundant CPU, deletion target CPU will vary depending on operation mode as the following list.

Operation mode	Deletion target CPU
Backup mode	PLC CPU of both systems * ¹ (Target PLC only when tracking is generated illegally.)
Separate mode	PLC CPU of target system
Debug mode	PLC CPU of transfer setup

*1: Deletes both even if project contents that is stored in target memory will vary depending on target PLC or the other Redundant CPU on normally tracking.

12.7 Checking Project Consistency

Following paragraphs explain project consistency check function of programming tool (abbreviation: Project consistency check).

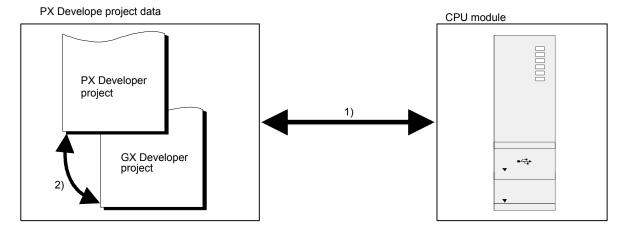
To execute project consistency check is to check whether the data of PX Developer project match that of CPU module.

In this way, PX Developer project data can be confirmed whether it is identical with data in CPU module.

12.7.1 Range of project consistency check

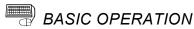
The project consistency check only checks the consistency between data in PX Developer Project and that in CPU module.

Contents of ladder program created by programming tool compile, user-created ladder program and parameter (PLC parameter and network parameter) are verified with PLC of GX Developer.



- Only properties of PX Developer project data and data in property in CPU module are checked. Contents of ladder program created by programming tool compile and user-createdladder program and parameter (PLC parameter and network parameter) user-treated are verifiy with PLC of GX Developer.
- Only attributes consistency of PX Developer project and GX Developer project are checked

12.7.2 Method of project consistency check



- 1. Click [Online] → [Check Project Consistency] (🛂) on the menu.
- 2. Dialog box for confirming starting project consistency check is displayed. Click "Yes" to start project consistency check.
- 3. The result of "Project Consistency Check" is displayed on the output window. (refer to Section 5.1)
- 4. In case of checking project for the part which has not been checked by the above "Project Consistency Check" function, execute GX Developer "Verify with PLC" function according to needs.
 - For detailed information about the check range of Project Consistency Check, please refer to Section 12.7.1.

DISPLAY/SETTING SCREEN



Click [Online] \rightarrow [Check Project Consistency] on the menu.

Or click (button on the toolbar.



Display dialog box for confirming starting project consistency check.

Click "Yes" button.



The result is displayed on the output window.

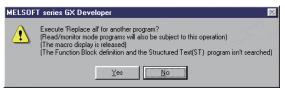


If the result of project consistency check is consistent, execute "Verify with PLC" after starting GX Developer from project window according to needs.

POINT

- Please do not edit the programs named [#FBDQ...] as indicated below.
 When the program named [#FBDQ...] is edited, the result of project consistency check may be identical even if not identical. (Correct project consistency check can't not be executed)
 - Do not upload the programs named [#FBDQ] during PLC downloading of individually started GX Developer.
 Project consistency can't be checked correctly if the program named [#FBDQ] is edited.
 - 2) Do not replace the device of [#FBDQ] programs in the GX Developer device replacement.

For example, when executing device replacement in user-created ladder programs, the following windows will be displayed if clicking "Replace all" button.

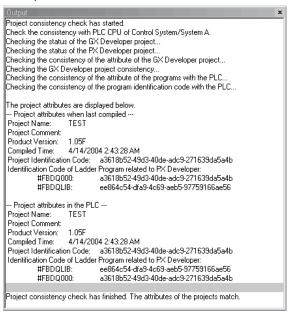


At this time, please click "No" button.

If the "YES" button is clicked, the device of the ladder program ([#FBDQ...]) created by programming tool compile will be replaced too. Therefore the project consistency check cannot be executed correctly.

In addition, please do not replace the device of [#FBDQ...] program when clicking "Replace" button during device replacement.

 After the project consistency check, the CPU module project attribute is displayed in the output window.



The project name and comment of the data in CPU module can be confirmed. For Redundant CPU, the system status (Control system/Standby system, system A/system B) is displayed.

However, "Unknown" is displayed if the system cannot be identified.

12.7.3 Operations for check failure and unmatched check

The following operation will cause inconsistency:

Operating area	The operation causing check inhibition or inconsistency
Programming tool	Project is not compiled.
GX Developer	 Open GX Developer from other project, then download ladder programs to PLC. Delete program files by "Delete PLC data". Delete file registers during PLC data deletion. Set the content of file register.
Explorer of Microsoft® Windows® Operating System	 Overwrite the GX Developer project which PX Developer project has with another GX Developer project. Overwrite the PX Developer [#FBDQ***.wpg] which PX Developer project has with another GX Developer project files.

13 ONLINE MONITOR

Once PX Developer programming tools are used, real time monitoring of the current value of each variable and the I/O values of tag FB are both available through online connection with CPU module, and, it is also applicable to change the current values of variables during online monitoring.

This chapter illustrates the operation procedure and functions of online monitoring.

↑ CAUTION

The assignment information database file (*.mdb) at the point of PLC download to the CPU
module of the monitor target is required for online monitor. (refer to Section 6.1.)
 If monitor is started after modifications made to FBD programs, etc. following PLC download,
the following dialog box is displayed since the contents of the assignment information database
file are not the latest.



If the "Yes" button is clicked to start monitor, an incorrect assignment destination device may be monitored or data may be changed.

The PLC system may malfunction if an incorrect assignment destination device is monitored or data is changed.

When the above dialog box is displayed, perform compile again, download data to the PLC, and then start online monitor.

13.1 Starting/Stopping Online Monitor

As to all displayed windows (Program/FB definition window and entry variable monitor) and each selected window (every program/FB definition window, Module FB/Tag FB declaration window, entry variable monitor), users can start/stop the online monitoring procedures of starting/stopping the online monitoring.

This section explains the method for starting/stopping online monitor.

13.1.1 Starting online monitor



PURPOSE

To real-time monitor current values of variables in real time so as to confirm states of FBD programs.



BASIC OPERATION

- If the programming tools cannot communicate with CPU module, please specify connection destination first so as to enable communication between them. (refer to Section 12.3)
- If monitoring of all windows is required, please click [Online] → [Monitor] → [Start Monitor (All windows)] in the menu or press "Ctrl"+"F3". Or if monitoring of each selected window is required, please activate this window, and then click [Online] → [Monitor] → [Start Monitor] () in menu, or press "F3".
- 3. Online monitoring will be started and switching the mode is switched from Edit Mode to Monitor Mode as well.

After running monitoring and from Edit mode to Monitor mode as well, the current values of variables will appear under variable parts, please refer to Points of this section the display format of the current value.

When it is to restart monitoring, please follow the same procedure as mentioned before.

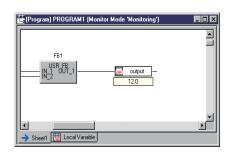
In Monitor mode, FBD sheets and each declaration window (except for entry variable monitor window) cannot be edited, some menus (change PLC type, error check) are also unavailable.



DISPLAY/SETTING SCREEN



Click [Online] \rightarrow [Monitor] \rightarrow [Start Monitor (All windows)]/ [Start Monitor] in the menu



Start monitor (switch to monitor mode)

POINT

- If programming tools cannot communicate with the CPU module (In [Section 12.3 Specify the destination of PLC connection], if no connection destination have been correctly set, or the CPU module is in reset status) monitoring cannot be started.
- The number of variable points (monitor points) that can be monitored is limited. When the number of monitor points exceeds the limit, corresponding messages will appear and monitoring will be stopped. In this case, please zoom out windows or close unnecessary windows to reduce the number of displayed variable parts.

Standard number of monitoring points (maximum number of monitoring points=1024 points).

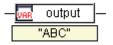
Data type	Points
INT	1
BOOL	1
DWORD	2
STRING (25)	13

 After PLC downloading, if FBD programs are changed and monitoring is started, such dialog boxes will appear as below.



In order to execute monitoring exactly, please start monitoring after compiling the project and downloading it to the PLC.

- If a user-defined FB/tag FB is not used in any program/FB type monitoring of the user-defined FB type/Tag FB type cannot be started.
- In monitor mode, the current values of variables will appear under variable parts or in entry variable monitor window (refer to Section 13.7).
 In this case, current values of variables will be displayed via their data type in the format as shown below.



(The above figure shows the case of STRING type.)

Data type	Display sample
REAL	1.23,1.005E+0.08
INT, DINT	123 (Decimal display)
WORD, DWORD	H001F (hexadecimal display)
STRING	"ABC"
BOOL	TRUE, FALSE
ADR_REAL	[This data type value is not accessible] appears

13.1.2 Stopping online monitor



PURPOSE

To stop refreshing of monitored value during online monitoring.



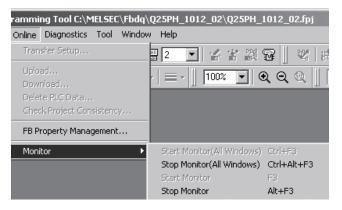
BASIC OPERATION

- If it is desirable to stop monitoring all of the displayed windows, please click [Online] → [Monitor] → [Stop Monitor (All windows)] in the menu or press "Ctrl"+"Alt"+"F3". And if it is desirable to stop monitoring each selected window, please activate this window first, then click [Online] → [Monitor] → [Stop Monitor] () in the menu or press "Alt"+ "F3".
- 2. Online monitor will be stopped.

If it is desired to restart monitoring after the previous monitoring is terminated, please execute the operation described in [13.1.1 Start Online Monitor].



DISPLAY/SETTING SCREEN



POINT

Even if all window monitoring is stopped, the monitor mode will not be cancelled. (It is the same as the case of closing all windows that are being monitored). Please refer to Section 13.1.3 for details of switching from Monitor mode back to Edit mode.

13.1.3 Switching from monitor mode to edit mode



PURPOSE

To shift Monitor mode to Edit mode.



BASIC OPERATION

Select [Edit] \rightarrow [Edit Mode] (\begin{cases}) in the menu and shift to Edit Mode. Users can also switch Edit mode by pressing "F2" key.

POINT

When switching from Monitor mode to Edit mode, displayed entry variable monitor window, faceplate and "FBD Program Diagnostics" dialog box will be automatically closed.

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13.2 Program/FB Monitor

This section describes the monitoring procedures and functions on FBD sheet.

13.2.1 FBD sheet monitor



PURPOSE

To monitor current values of variables on FBD sheets, as well as to confirm the status of FBD programs. This section will explain various monitoring procedures on FBD sheets.

(1) Display monitor value of variable parts

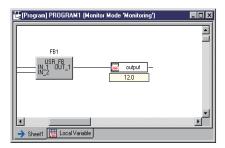


BASIC OPERATION

- 1. If it is in Edit mode, please refer to Section 13.1.1 to switch to Monitor mode.
- 2. The current values of variables will appear under variable parts.



DISPLAY/SETTING SCREEN





DISPLAY/SETTING DATA

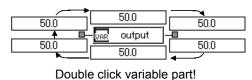
Variable current value can be showed in the following formats.

Data Type	Display Sample
REAL	1.23,1.005E+0.08 *1
INT, DINT	123 (Decimal display)
WORD, DWORD	H0001F (Hexadecimal display)
STRING	"ABCDEF"
BOOL	TRUE, FALSE
ADR_REAL, Structure type	[This data type value is not accessible] appears

^{*1:} Specifying the number of digits after the decimal point for REAL type changes the format. Refer to Section 13.2.3 for details.

POINT

When current values of variables in FBD sheets are displayed, their display locations can be moved by double clicking the variable parts. This operation is to remove the overlapped monitor values of other parts that are arranged in a nearby place.



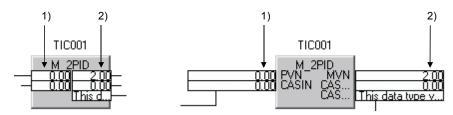
(2) Monitor display for Input / Output variable of FB parts.



- (a) Operation for displaying current value of FB parts.
 - 1. Switch to monitor mode. (Refer to Section 13.1.1.)
 - 2. Switch to display / hide for current value of FB parts by clicking the

 button on the online toolbar.
- (b) Operation for changing display position for current value of FB parts.
 - 1. Switch to monitor mode. (Refer to Section 13.1.1.)
 - 2. Current value of FB parts is displayed with the 🔞 button on the online toolbar.
 - 3. Switch display position current value of FB parts to the top of FB parts or pin by double-clicking on FB parts.

DISPLAY/SETTING SCREEN

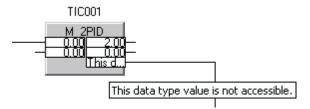


DISPLAY/SETTING DATA

No.	Item	Contents
1)	FB current value (input variable)	To display current value for input variable of FB parts. Display format for each data type is the same display as the current values of variables. (Refer to (1).)
2)	FB current value (output variable)	To display current value for output variable of FB parts. Display format for each data type is the same display as the current values of variables. (Refer to (1).)

POINT

 As shown in the following figure, when moving the mouse to current value of FB parts with monitor mode, display current value without omission.



- When maximum monitor points are exceeded by current value display of FB parts, error message is displayed, and status of stop monitor is switched.
 In this case, proceed with monitor after executing next operation.
- Close unnecessary window.
- Hide the current value with the
 B button on the online toolbar.

(3) Monitor current value with connector.

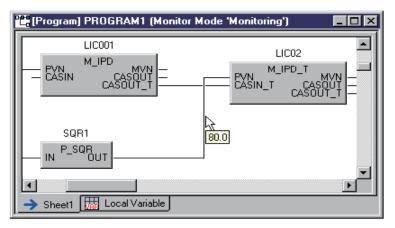


BASIC OPERATION

- 1. Place the mouse cursor on connector.
- 2. Display current values of variables on the connector by Tooltip.



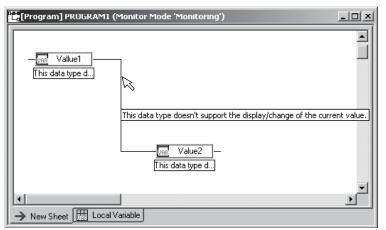
DISPLAY/SETTING SCREEN



POINT

 If the variable type is ADR REAL or structure type (when structure member is not specified), [This data type value is not accessible] will appear in the Tooltip.
 While in the case of constant parts, [Output value of constant part cannot be monitored] will appear.

And in the case of functions [The output value of the function cannot be monitored] will appear as well.



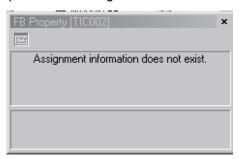
 The current value of the variable that is displayed on the tooltip isn't updated. The current value of the moment when mouse cursor is placed on the connector is displayed.



HELPFUL OPERATION

When selecting FB parts on the FBD sheet while monitoring, as shown below, [Assignment information does not exist.] may be displayed on FB Property window or [No property exists.] may be displayed even if FB property exists.

(a) If adding FB part with FB property to FBD sheet after compile, and selecting its part on monitoring.

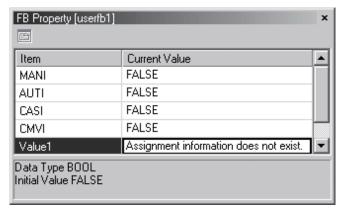


For monitoring added FB variable, execute download after compile.

(b) If deleting the FB variable name of FB part with FB property by using declaration window, and selecting its FB part on monitoring.



(c) If adding the public variable to be FB property to FB type after compile, and selecting its FB part on monitoring.



Perform download to monitor the current value of added public variable after compile.

13.2.2 Specifying the monitor target FB



PURPOSE

User defined FB/Tag FB can be used in more than one programs or in userdefined FB type. If one user-defined FB/Tag FB is used in more than one programs/FB, it will be applicable to monitor the current value of each user defined FB/Tag FB being used.

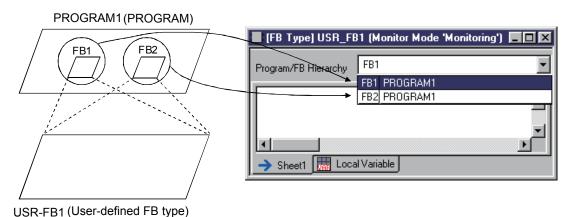


BASIC OPERATION

- 1. Display definition windows of user defined FB/Tag FB types that are to be monitored.
- 2. Refer to 13.1.1 to switch the mode to Monitor Mode.
- 3. Once monitoring is started, a list box will appear in the user-defined FB/Tag FB window.
- 4. A variable name in programs/FB and of program/FB hierarchy list will appear after clicking the list box.
- 5. Select program/FB hierarchy of user-defined FB/Tag FB to be monitored from the list.

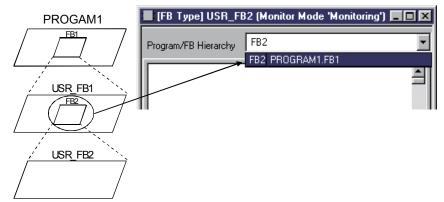


DISPLAY/SETTING SCREEN





• When the program/FB hierarchy of user-defined FB/Tag FB being monitored are relatively deeper, [.] will be used for displaying the hierarchy.



[PROGRAM1.FB1] in the figure shown above displays the part named [FB1] that is used in [PROGRAM1].

• If the list box of the program/FB hierarchy is not extended, only the variable name of user-defined FB/Tag FB will be displayed. After placing the mouse cursor on the display area, the program/FB hierarchy will be displayed in the Tool tip.



13.2.3 Specifying the number of decimal places in monitor value



PURPOSE

To specify the number of decimal places in the current variable value during monitoring.



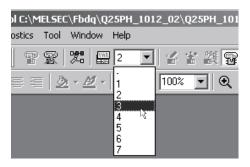
BASIC OPERATION

- 1. The number of decimal places can be specified in the monitor mode only. If the edit mode has been selected, shift to the monitor mode by reference to Section 13.1.1.
- 2. In the list box (Number of digits after the decimal point for REAL type) on the monitor tool bar, specify the number of decimal places in the current variable value.

The change in the number of decimal places will be reflected immediately.



DISPLAY/SETTING SCREEN





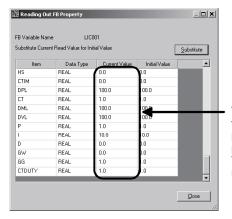
DISPLAY/SETTING CONTENTS

Item	Contents
	The number of decimal places is not specified.
_	If this is selected, the number of decimal places will be automatically
	set according to that used in the monitor value. (Up to 7)
1 to 7	Select the number of decimal places within the range of 1 to 7.

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POINT

- The specification of the number of decimal places is allowed for the REAL type (single precision floating point) current value display only.
- It is not necessary to execute compile or PLC download after specifying the number of decimal places. (This will not result in the uncompile status.)
- If the number of decimal places is specified, the monitor value is rounded off at the (the specified number minus 1) th decimal place and displayed during monitoring.
- If the integer part of the monitor value exceeds the number of effective (7 digits) digits for the REAL type, the monitor value is displayed in exponent format.
- When the current variable value is changed in the "Change Current Value" dialog box, the actually entered value is stored into the CPU module.
 On the programming tool, the monitor value is displayed with the specified number of decimal places (rounded off value).
- When the current value is read (the "Substitute" button is clicked) in the "Reading Out FB Property" dialog box, the current value displayed in the current value field will be used as the initial value of the FB property.



The current value displayed in the current value field by specification of the number of decimal places will be used as the initial value of the FB property.

The figure on the left shows the case where the number of decimal places is 2.

13.3 Changing a Current Value



PURPOSE

To check a FBD program operation through alter current values of variables in Monitor Mode.



BASIC OPERATION

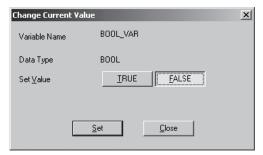
To change current values of variables in Monitor Mode. If not in Monitor Mode, please refer to 13.1.11 to switch the mode to Monitor Mode.

To change current values of variables in "Change Current Value" dialog box. There are three ways of displaying the dialog box.

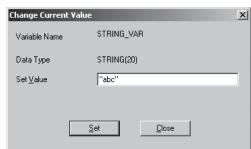
- Display/change through FBD sheets
 - 1. Right click the variable/FB part whose current value is to be changed.
 - 2. Click [Change Current Value] from the displayed pop-up menu.
 - 3. Display "Change Current Value" dialog box.
 - 4. Change the current value of the variable and click the button "Set".
- Display/change through entry variable monitor window
 - 1. In the entry variable monitor window (refer to Section 13.7), click the cell [Current Value].
 - 2. Click the button "...".
 - 3. Display "Change Current Value" dialog box for variables.
 - 4. Change the current value of the variable and click the button "Set".
- Display/alter through [Online] menu
 - 1. Click the variable/FB part whose current value is to be changed.
 - 2. Click [Online] → [Monitor] → [Change Current Value] in the menu.
 - 3. Display "Change Current Value" dialog box.
 - 4. Change the current value of the variable and click the button "Set".
- Changing method through FB property window
 - 1. In the FB property window (Refer to Section 5. 7. 4.), select the item of which current value is to be modified.
 - 2. Click the button "...".
 - 3. Display "Change Current Value" dialog box for variables.
 - 4. Change the current value of the variable and click the button "Set".

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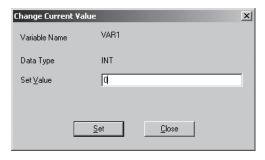
☐ DISPLAY/SETTING SCREEN



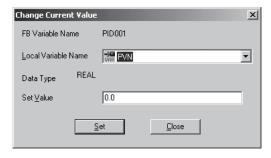
(BOOL type)



(STRING type)



(In the case of INT, DINT, WORD, DWORD, REAL type)



(In the case of FB part)



DISPLAY/SETTING DATA

Selected variable parts/FB parts	Item	Display/Setting data	
	Variable Name	Display the variable names of the selected variable parts.	
BOOL	Data Type	Display the data type of the selected variable parts.	
	Set Value	Click the toggle button (▼) to select TRUE or FALSE.	
	Variable Name	Display the variable names of the selected variable parts.	
	Data Type	Display the data type of the selected variable parts.	
STRING	Set Value	Input character strings with " ". Example: "abc". The No. of characters that can be input is referred to as the number of characters set in the "select data type" dialog box (refer to Section 7.10.4) when defining a variable part.	
	Variable Name	Display the variable names of selected variable parts.	
	Data Type	Display the data type of selected variable parts.	
INT, DINT, WORD, DWORD, REAL	Set Value	Input values When inputting hexadecimal values, please add "H" before the values (Please input Capital H). Example: H1F. When inputting decimal values, please input directly. Example: 10.	
	FB Variable Name	Display the variable names of selected variable parts	
FB parts	Local Variable Name	Click the list box (), and select the variable name which current value is to be input. Variables are shown with the following icons. Input variable: Output variable: Public variable: (Specific to items that appear in FB property window.)	
	Data Type	Display the data types of I/O variables selected in the above variable name item.	
	Set Value	Input data (value). The method for input is the same as that for selecting variable parts.	

POINT

 The value will be displayed in form shown as the following table, when current values of INT type, DINT type, WORD type, DWORD type, or REAL type is changed.

(Display sample)

Data type	Input value	Monitored value
REAL	15	15.0
INT, DINT	HF	15
WORD, DWORD	15	In the case of WORD type: H000F In the case of DWORD type: H0000000F

- If the data type is ADR_REAL type, the current value of variable can not be changed.
- Current value of structure type variable can not be changed if changed member is not specified.
- When the input variable of the variable part or FB part which you want to change value to is connected to the output variable of other function/FB part, current value is overwritten by the output variable even if you change the value by the output variable.
- "Change Current Value" dialog box is not closed until the "Close" button is pressed. Therefore current value can be changed continuously.
- Do not change data (values) of devices used in the programming tool system.
 As for details of the device used in the system, please refer to Section (2) of Point in Section 8.2.2.

13.4 Pause/Restart of FB Execution

13.4.1 Pausing an FB



PURPOSE

To pause the operation of the specified FB parts during monitoring and check the operation of FBD program.

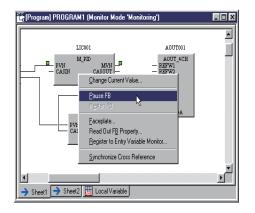


BASIC OPERATION

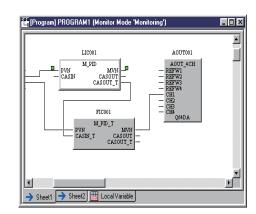
Pause operation on FB parts is executed in monitor mode. If it is not in monitor mode, please refer to Section 13.1.1 and switch the mode to monitor mode.

- 1. Right click the variable part with its operation to be paused.
- 2. Click [Pause FB] in the displayed popup menu or click [Online] \rightarrow [Monitor] \rightarrow [Pause FB] in the menu.
- 3. Now the color of FB part will turn white and pause the operation of FB part.

DISPLAY/SETTING SCREEN



Right click the variable part with its operation to be paused and click [Pause FB].



Pause operation of FB part. (The color of FB part turns white)



HELPFUL OPERATION

The figure shown below illustrates the method of changing current value of FB input variable (IN) in order to check the operation of FBD program.

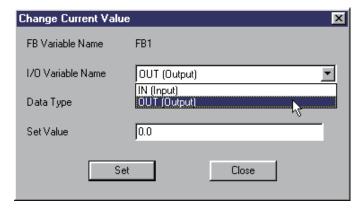


In the above figure, even if the current value of FB2 input variable (IN) is changed through the "Change Current Value" dialog box, it will also be overwritten by the output variable value of FB1. This is because FB1 is active.

In order to change the current value of FB2 input variable, the operation of FB1 must be paused.



Change the current value of FB1 output variable (OUT) after the operation of FB1 is paused. (refer to Section 13.3)



Change the current value of FB2 input variable.

POINT

When Tag FB/Module FB of that are global part are pasted into multiple programs, if the operation of one Tag FB/Module FB is paused, then operation of Tag FB/Module FB pasted in other programs/FB will be paused accordingly.

13.4.2 Restarting an FB



PURPOSE

To restart operation of the FB part which is temporally paused.

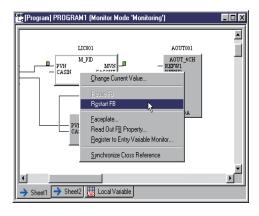


BASIC OPERATION

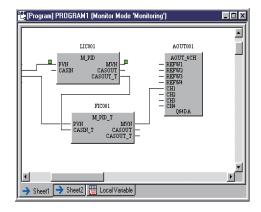
Restart operation of FB part in monitor mode. If it is not in monitor mode, please refer to Section 13.1.1 and switch the mode into monitor mode.

- 1. Right click the FB part that is to be restarted.
- Click [Restart FB] in the displayed popup menu or click [Online] → [Monitor] → [Restart FB].
- Now the color of FB part will turn from white to another color (the color will turn gray in the case of initial settings), which means restarting the operation of FB part.

DISPLAY/SETTING SCREEN



Right click the FB part that is to be restarted and click [Restart FB].



Restart operation of FB part.
(The color of FB part will turn from white another color)

POINT

When Tag FB/Module FB that are global parts are pasted into multiple programs, if operation of one Tag FB/Module FB is restarted, then operation of Tag FB/Module FB pasted in other programs/FB will be restarted accordingly.

13.4.3 Displaying a paused FB list



PURPOSE

To display the list of paused FB parts in output window (refer to Section 5.1).



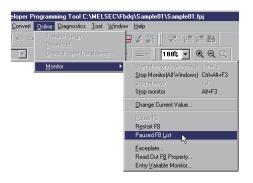
BASIC OPERATION

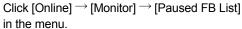
- 1. If it is not in monitor mode, please refer to Section 13.1.1 and switch the mode into monitor mode.
- 2. Click [Online] \rightarrow [Monitor] \rightarrow [Paused FB List] in the menu.
- 3. The list of paused FB will be displayed in the output window.

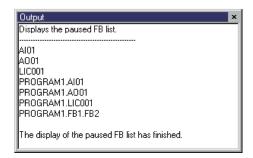
Please refer to Section 13.4.2 and restart operation of the FB part.



DISPLAY/SETTING SCREEN







The paused FB list will be displayed in the output window.

POINT

- In the output window, the hierarchy of paused FB will be shown by using [.](refer to the figure shown above).
- If the paused FB contains Tag FB/Module FB of global part, not only variable name of Tag FB/Module FB but also list that contains program/FB will be displayed.

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13.5 Monitoring a Tag FB with Faceplate



PURPOSE

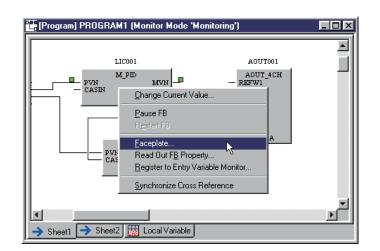
The faceplate of programming tool is used for monitoring state of Tag data and for changing SV value and MV value. Use monitor tool to execute more practical monitoring/controlling with faceplate.

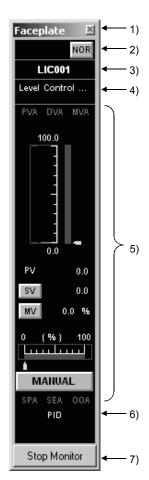


BASIC OPERATION

- 1. If it is in Edit mode, please refer to Section 13.1.1 and switch the mode to monitor mode.
- 2. Right click the Tag FB on the FBD sheet.
- 3. Click [Faceplate] in the displayed popup menu, or click [Online] \rightarrow [Monitor] \rightarrow [Faceplate].
- 4. The faceplate will be displayed.







Loop tag (M_PID)



No.	Item	Content	
1)	Title bar	To display titles. When a title is present with * flickering nearby, which indicates refreshing period. Moreover, when monitoring is stopped, no * appear.	
2)	I/O mode indication area	To display current mode when tag type is loop type or state type. Please refer to PX Developer Operating Manual (Monitor Tool) for details of I/O Mode.	
3)	Tag FB variable name display area.	To display Tag name (Tag FB variable name) which is currently being monitored.	
4)	Tag comment display area	To display tag comment.	
5)	The displayed contents in the faceplate vary depending on different tag type of tag FB. Please refer to PX Developer Operating Manual (Monitor Tool) for details.		
6)	Tag type display area	To display tag type.	
7)	Start monitor (all windows)/stop button	Click this button to start/stop monitor.	

POINT

- The faceplate cannot be used for other FB except tag FB.
- Maximum number of displayed faceplate is 2.

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13.6 Reading Current Value of FB Property

The FB property is the value, which the public variable of FB parts preserves, and is used as a parameter to determine the operation of FB parts.

This section describes the reading current value of FB property for performing the backup of FB parts executed on PLC CPU or using as initial value.

(1) Overview

- (a) This function is designed to read the current value of FB property from the PLC CPU on executing into PX Developer projects.
- (b) By using this function, the current value of FB property changed during the execution of PLC CPU can be saved (Backup) as initial value in programming tool side.

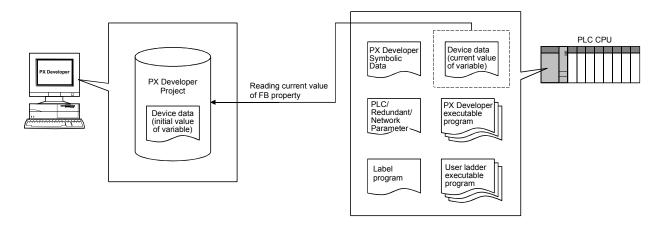
Moreover, the saved current value can be written as initial value of FB parts executed on PLC CPU after the cold-start compile.

(Example of use)

If performing auto tuning by tag FB for basic PID control of monitoring tool (Tag type: PID), 2-degree-of-freedom PID control (Tag type: 2PID) or 2-degree-of-freedom Advanced PID control (Tag type: 2PIDH), PID constant will be adjusted to approximately optimized value.

By performing the reading current value of FB property to this adjusted value, the adjusted value can be saved in programming tool side. Moreover, operation can be started with the adjusted value as initial value for FB parts executed on PLC CPU.*1

*1: By performing cold-start compile with programming tool and downloading the project, the current value of FB property in PLC CPU is overwritten with initial value in the project, and PID constant value modified by auto tuning will be lost.



(2) Method for Reading Current Value of FB Property

The reading current value of FB property can be performed by the methods of reading all with the FB Property Management window or reading from specified FB parts with the Reading Out FB property window.

Method for reading	Method for reading Contents	
Reading all with the FB Property Management window	For the following FB variables, the reading current value of FB property and the substitution for initial value can be performed in a centralized way. • FB variables defined on the module FB declaration table • FB variables defined on the tag FB declaration table • FB variables used with programs As operating in a centralized way, operation can be performed efficiently, and substitution failure can be prevented.	Section 13.6.1
Reading from specified FB parts with the Reading Out FB Property window	For FB parts directly specified on the FBD Sheet, the reading current value of FB property and substitution for initial value can be performed. For FB variables* ¹ that cannot be read with the FB Property Management window in a centralized way, the operation for reading/substitution current value of FB property can be also performed.	Section 13.6.2

^{*1:} This indicates FB variables used with user-defined FB type.

13.6.1 Reading All Current Value of FB Property



PURPOSE

The current value of FB property in PLC CPU can be read in a centralized way and substituted as initial value in project.

This section describes the following operations with the FB Property Management window.

- · Reading all current value of FB property
- · Substitution for initial value of FB property

The FB Property Management window can be used with monitor mode only. For switching to monitor mode, refer to Section 13.1.1.

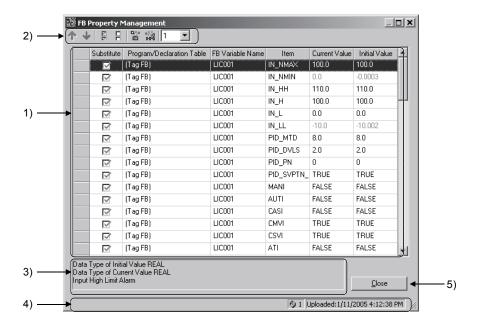
(1) Reading All Current Value of FB Property



BASIC OPERATION

- 1. Click [Online] → [FB Property Management...] in menu.
- 2. The FB Property Management window is displayed.
- 3. Click the "button on the tool bar.
- 4. The confirmation message for starting the reading all current value of FB property is displayed.
 - Click "Yes" to start the reading all current value of FB property.
- 5. The current value of FB property in PLC CPU can be read in a centralized way. During the reading all, the progress display window is displayed. The reading all can be interrupted with the "Ctrl" + "Break" keys.
- The completion message for the reading all current value of FB property is displayed, and then the list of FB property items is displayed in the FB Property Management window.

DISPLAY/SETTING SCREEN



No.	Items or Buttons	Display/contents		
	FB Property List	The list of FB property items read by the reading all is displayed. The following FB variables will be a target. • FB variables on the module FB declaration table • FB variables on the tag FB declaration table • FB variables within the program internal variables Property item of which data type is ADR_REAL type or structure is not displayed. The current value and initial value of difference line (The line that the current value and the initial value are different) is shown in red.		
		Clicking the mouse or pressing the space key checks FB property items which substitutes current value for initial value. By clicking the button on the tool bar, the current value of checked FB property item is substituted for initial value collectively. Although the check condition for FB property items becomes "Checked" for the first time, the condition when the FB Property Management window is closed will be kept after that. However, for the line which displays current value as follows (Invalid line) the error icon is displayed at the head of line, and the item of FB property is not be a target for the substitution in a centralized way.		
		Display current value	Contents	
	Substitute Check	Assignment information does not exist.	Corresponding property information does not exist in assignment information.	
	Program/Declaration Table	This data type value is not accessible.	Data type of current value is other than elementary data type (except ADD_REAL type).	
1)		This data type of this project does not match the data type of the assignment information.	On the project information and assignment information, the data type of corresponding property does not match.	
		This current value is invalid as initial value.	This current value cannot be input as initial value. Or with REAL type binary value cannot be represented as real number data.	
			The length of string exceeds 32 characters.	As the string length of current value exceeds 32 characters, the current value cannot be substituted for initial value.
		Where FB variable is declared is displayed. The displaying order will be Module FB > Tag FB > FB in program. Display contents are as follows.		
		Display contents	Where FB variable is declared	
		(Module FB)	Module FB declaration table	
		(Tag FB)	Tag FB declaration table	
		Program name	FB in program	
	FB variable Name	FB variable name is displayed.		
	Item	Name of FB property item in FB var	iable is displayed.	
	Current Value	The current value of FB property read from PLC CPU is displayed. For specification with data type, refer to "POINT" in Section 13.1.1.		
	Initial Value	Initial value of FB property obtained from project is displayed. Display specification is the same as that of FB property window.		

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No.	Items or Buttons		Display/contents	
	То	ool Bar	The operation button for the FB Property Management window	
		Previous Difference Line	Transfer the cursor from the current cursor position on the FB property list to previous different line (Line of which current value and initiate vale are different) or invalid line.	
		Next Difference Line	Transfer the cursor from the current cursor position on the FB property list to next different line (Line of which current value and initiate vale are different) or invalid line.	
		Select All	Input the selection mark in all substitute columns on FB property list. This is valid when there is a line for which the selection mark can be inputted in substitute column.	
2)		Cancel All Selections	Remove the selection mark from all substitute columns on FB property list. This is valid when there is a line for which the selection mark can be inputted in substitute column.	
		Read All	Read the current value of FB property from PLC CPU.	
		Substitute All	Substitute the current value of FB property inputted the selection mark in substitute column for initial value.	
		Number of digits after the decimal point for REAL type	Specify number of digits after the decimal point for the current value of REAL type. (Without specifying: -, With specifying: 1 to 7) Contents are the same as number of digits after the decimal point for monitor value.	
	Pr	operty information display area	Display the information of FB property in cursor position.	
3)		Data Type of Initial Value	Display data type of initial value for FB property item.	
3)		Data Type of Current Value	Display data type of current value for FB property item.	
		Comment	Display comments of FB property item.	
	Sta	atus Bar		
4)		Display of invalid line number	Display the error icon () and number of invalid line, when invalid line exists.	
-,	Display of reading date and time		Display the reading date and time for current value of FB property on the FB property list.	
5)	Close		Close the FB Property Management window.	



HELPFUL OPERATION

Perform Save/Print of FB property list with the following procedure.

- 1. Select a target line. (Refer to Section 5.8.1.)
- 2. Copy the selected line. (Refer to Section 5.8.1.)
- 3. Paste the copied data on application such as Excel and perform Save/Print.

POINT

- When opening the FB Property Management window, Module FB declaration window, Tag FB declaration window and Program/FB defined window are automatically closed.
- If monitoring with the following windows when reading all current value of FB property, processing time will be longer.

For shortening processing time of reading all, stop these monitoring or close the windows.

- Faceplate
- Entry Variable Monitor Window
- FBD Program Diagnostics
- As shortcut keys, "Shift" + "F7" for previous difference line and "F7" for next different line can be used.
- If number of digits is specified by number of digits after the decimal point for REAL type, the value displayed in the current value column is substituted for initial value when substituting in a centralized way.

(2) Substitute for initial value of FB property



BASIC OPERATION

- Select FB property item to perform the substitution in a centralized way from FB property list.
 - The line of which the selection mark is input in substitute check box will be a target for the substitution in a centralized way.
- 2. Click the iii button on the tool bar.
- 3. The confirmation message for starting the substitution of FB property in a centralized way is displayed.
 - Click "Yes" to start the substitution of FB property in a centralized way.
- 4. Substitute the current value of FB property on FB property list for initial value of project in a centralized way.
- 5. The completion message for the substitution of FB property in a centralized way is displayed.

POINT

- When performing the download project executable data after the substitution in a centralized way, perform the compile.
- For writing the initial value of FB property substituted in a centralized way into PLC CPU, perform the download after Cold-start Compile.
 - If performing the following operations after the substitution in a centralized way, initial value of FB property substituted in a centralized way cannot be written into PLC CPU.
 - 1) Download after Hot-start Compile
 - 2) Compile (Online Change)
- The display specification for current value of REAL type FB property follows the setting of number of digits after the decimal point for REAL type on the tool bar. At the substitution in a centralized way, the displayed current value is set as initial value.

13.6.2 Reading Current Value of FB Property from Specified FB Parts



PURPOSE

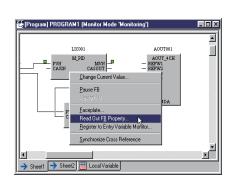
Specify FB parts monitored on FBD sheet respectively, read the current value of FB property from PLC CPU, and then substitute for initial value in project.

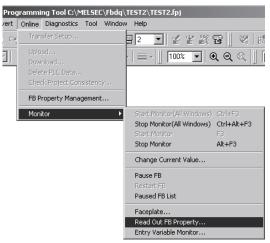


BASIC OPERATION

- In Edit mode, please check Section 13.1.1 and shift the mode to monitor mode.
- 2. Right click the FB part in FBD sheet, and click [] in the displayed pop-up menu or click [Online] → [Monitor] → [Read Out FB Property].
- 3. Read out FB property after dialog box of read out FB property is displayed.
- 4. Press button "Mirror", then current value of FB property that has been read out is to be mirrored in initial value and the dialog box is closed. Press button "Close", then current value of FB property that has been read out will not be mirrored in initial value and the dialog box is closed.

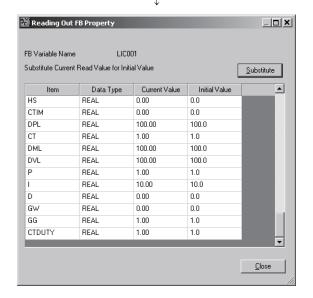
DISPLAY/SETTING SCREEN





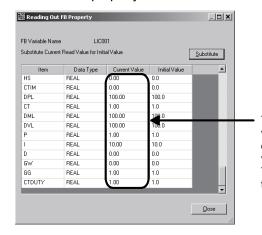
Right click variable part or FB part

Click [Online] \rightarrow [Monitor] \rightarrow [Read Out FB Property] in the menu



POINT

When the number of decimal places has been specified for the monitor value (refer to Section 13.2.3), the current value displayed in the current value field by specification of the number of decimal places is reflected unchanged as the initial value of the FB property.



The current value desplayed in the current value field by specification of the number of decimal places will be used as the initial value of the FB property.

The figure on the left shows the case where the number of decimal places is 2.

13.7 Monitoring with Entry Variable Monitor Window



PURPOSE

Display list of current value in entry variable monitor window and execute monitoring.

In order to execute monitoring in entry variable monitor window, the variable of object to be. Monitored must be registered. Once registration is completed, monitoring will be started. This section illustrates the methods for variable entry and monitoring in entry variable monitor window.

Entry variable monitor window is only applicable for monitor mode. If it is not in monitor mode, please refer to [Section 13.1.1 Start Online Monitor] to shift the mode to monitor mode and start monitoring.

(1) Local variable (Variable part or FB) registration



BASIC OPERATION

- 1. In FBD sheet, right click the local variable (Variable part or FB) to be add in the entry variable monitor window.
- 2. Click [Register to Entry Variable Monitor] in the displayed popup menu.
- 3. After the entry variable monitor window appears, variable registration is to be started.

It is necessary to refer to input variable, output variable and public variable in the case of FB. And in the case of structure type variable, please be sure to refer to structural member.

- Herein below are the methods for reference to various variables or structural member.
- 4. Double click the cell of variable name to be added after variable registration.
- 5. Input [.Variable name for reference (It should be structural member name in the case of structure type variable)] at the rear of variable name. As to input of variable name that applies reference operator, please refer to Section 7.3.4 for details.

(Example) In the case of reference to input variable [PVN] of FB part, [Variable name: PVN]

By right clicking variable in definition window of user-defined FB type/Tag type, users can register variables in user-defined FB type/Tag FB type. In this case, select a program/hierarchy from the list box at top of the definition window (refer to Section 13.2.2) before registering the variable.

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(2) Overall part (Global variable, module FB, Tag FB) registration



BASIC OPERATION

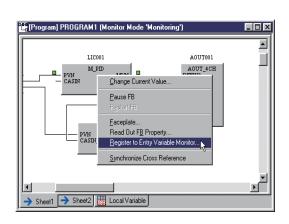
- 2. Entry variable monitor window appears.
- Input variable name and press "Enter". Or if you select cell of variable name, button "..." will appear. Click this button and then select global part to be registered from displayed variable reference dialog box.

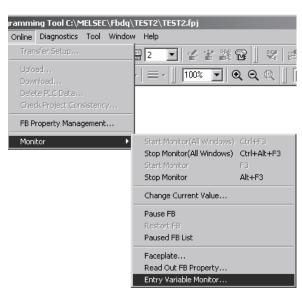
It is necessary to refer to input variable and output variable in the case of module FB.

And be sure to refer to input variable, output variable and public variable in the case of Tag FB. As to reference method of variable, please refer to the contents posterior to (1) 4.

After completion of variable registration, current value of variable will be displayed in the cell for [Current Value].

DISPLAY/SETTING SCREEN





Entry Variable Monitor (Monitor Mode 'Monitoring') Variable Name Program/FB Hierarchy Data Type Current Value LIC001.MANI PROGRAM1 BOOL FALSE AI01.CH1 REAL 0.0 VAR1 PROGRAM1 INT 0 LIC001.PVN PROGRAM1 REAL 0.0

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Item	Setting data	
Variable name	Display/name of input variable. Use reference operator [.] to input when monitoring input variables, output variables, public variables and structural member. (refer to Section 7.3.4). *1 The hierarchy that can use reference operator for reference to variables is of hierarchy 3. (up to two dot character can be used)	
Program/FB hierarchy	Display/Input program/FB level that has been registered. The level that can use reference operator for reference to variables is of hierarchy 8. (up to seven dot character can be used)	
Data type	Display registered variable data types.	
Current value	Display current values of registered variables. *2	

- *1: In item variable name, the hierarchy that can use reference operator for reference to variables is of hierarchy 3 (up to two dot character can be used). And in item Program/FB hierarchy, it is of hierarchy 8 (up to seven dot character can be used).
- *2: To alter current value in the "Change Current Value" dialog box (refer to Section 13.3), once the cell of [Current Value] is selected, the button "..." will appear. By clicking the button, the "Change Current Value" dialog box for current value will appear.

POINT

- In structure type variable part, if structural member (variable part in the format of [Structure type variable name. Structural member name]) of structure type has been referred to, it is not necessary to specify structural member of structure type within entry variable monitor window.
- It is not necessary to set items for program/FB hierarchy in the case of global part registration in entry variable monitor window.
- When inputting variable name of FB part or of structure type only, [Unable to monitor] will appear in item current value. In this case, please refer to the contents posterior to (1) 4 and use reference operator [.] to input variable name.
- When arrangement variable part after compile and executing monitor in this status, [Assignment information does not exist.] will appear in the current value of the part.
- When using "Delete" key to delete items of variable names, program/FB hierarchy, the row of variable will be deleted too.

13.8 Online Operation to Redundant CPU

13.8.1 Route switching in the Redundant CPU system

If a communication failure occurs due to disconnection during online monitor of the Redundant CPU connected to one of the CC-Link IE controller network, MELSECNET/H or Ethernet network, the communication route is automatically switched so that the programming tool can continue the online monitor. The automatic switching of communication route is hereinafter referred to as route switching.

The conditions of route switching and an example of online monitor by route switching are explained below.

(1) Route switching conditions

When a communication failure occurs during monitoring under the following conditions, route switching occurs and the programming tool continues the online monitor of the Redundant CPU.

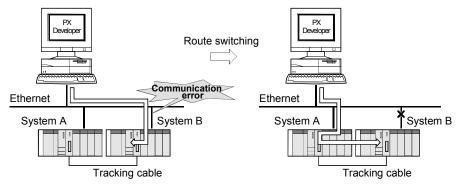
Conditions for continuation of online monitor		
Mounting location of network module	When connecting to the Redundant CPU via a CC-Link IE controller network module, MELSECNET/H module or Ethernet module mounted to the main base unit	
Operation mode	Backup mode, Separate mode	
Target System*1	Control System, Standby System, System A, System B	

However, when a tracking failure*² has occurred at the time of monitoring start, the programming tool cannot continue the online monitor through route switching even after the tracking is restored.

- *1: Set the target system in "Transfer Setup" screen as explained in Section 12.3.
- *2: Includes the cases where ether Redundant CPU has been powered OFF, or has been reset.

(2) Example of online monitor by route switching

The example of monitoring the Redundant CPU of system B through Ethernet connection is provided below.



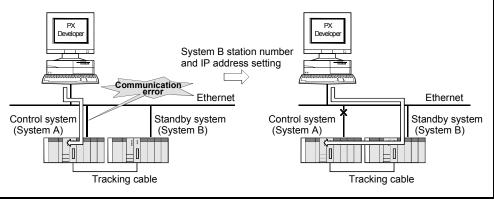
POINT

- (1) If a trouble has occurred in the communication with the target system at the time of monitor start, route switching will not occur. (This results in a communication error.)
- (2) Route switching will not occur during the following operations. If any of the following operations is performed during route switching, this results in a communication error.
 - Displaying the "PLC Diagnostics" screen of the GX Developer that has been called from the "FBD Program Diagnostics" screen.
 - Performing an online operation other than monitor, e.g., Write to PLC, Convert (Online change).
- (3) When performing any of the following operations in the condition where route switching might occur, note that the programming tool responds to the operations slower than usual, as taking long time to detect the communication failure.

Function	Operation	
	Open the screen.	
FBD Program Diagnostics	Click the "Refresh" button.	
	Click the "Refresh Error Status" button.	
	Open the screen.	
Change Current Value	Click the "Set" button.	
	Select an item in the "Local Variable Name" field.	
Change Current Value from the	Click the "Set" button.	
faceplate	Click the updown button.	
Read Out FB Property	Open the screen.	
Pause FB/Restart FB	Execute the function from the menu.	
Pause FB List	Execute the function from the menu.	

- (4) If the case of (1) to (3), remove the communication failure, or change the connection target to the station No. of the other Redundant CPU and resume the communication.
 - <Example> When the control system is set as the target system and the station number and IP address (host name) of the Ethernet module in System A is set as the PLC side I/F on the transfer setup screen If communication cannot be made with the Ethernet module of System A at the first connection to the programming tool, a communication error occurs without route switching being executed.

To start communication in this case, set the station number and IP address (host name) of the Ethernet module in System B as the PLC side I/F.



13.8.2 Automatic change of project identification codes in Redundant CPUs

If the following operations are performed for the Redundant CPU, PX Developer changes the project identification codes recorded in the Redundant CPUs in both systems.

No.	Redundant CPU operation	Redundant CPU project identification code after operation	Change of assignment information database
1	Copying memory to the Redundant CPU in standby system	The project identification code of control system is also recognized as that of standby system.	The project identification code of control system is overwritten to standby system.
2	Re-inserting both connectors of tracking cable into the different systems (Reset and Re-power operations are included.)	The project identification code of control system is recognized as that of standby system; the project identification code of standby system is recognized as that of control system.	
3	Changing the Redundant CPU in system B to the debug mode (Reset and Re-power operations are included.)	The project identification code of system B is recognized as that of system A. In the debug mode, the project identification code of the other system cannot be read.	Project identification code of the systems are exchanged.
4	Powering off the control system after copying memory to the Redundant CPU in standby system	The project identification code of control system is recognized as that of the other system (new control system). As the previous control system power is off, the project identification code of the other system cannot be read.	

Use "Redundant operation" dialog box of GX Developer Version 8.18U or later to change the operation mode (Debug mode/Backup mode/Separate mode) and to copy memory into the Redundant CPU of standby system. For details, refer to GX Developer Version 8 Operating Manual.

PX Developer determines if automatic change of assignment information database is necessary or not according to the Redundant CPU when online operation is started, displays the confirmation message as necessary and executes the change. Even if "No" is selected in the confirmation message and the change of assignment information database is not executed, online operation will be continued.

1) Project identification code

PX Developer uses the identification code to manage compiled projects. By executing download to PLC, the code is recorded into CPU module and the assignment information database of PX Developer project.

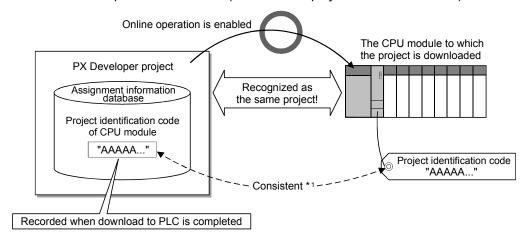
2) Application of project identification codes

The code is used to check if it is the CPU module for which PX Developer performed download to PLC at the previous time. With this operation, the online operation for wrong target CPU module can be prevented. The following online operations can be performed via PX Developer projects for only the CPU module to which PX Developer projects have been downloaded.

- · Download to PLC after hot-start compile
- Online change

PX Developer determines if download to PLC was previously performed for the CPU module or not by checking if the project identification code recorded in the CPU module is consistent with that recorded in the assignment information database of PX Developer project.

Online operation is enabled (Consistent in project identification code)

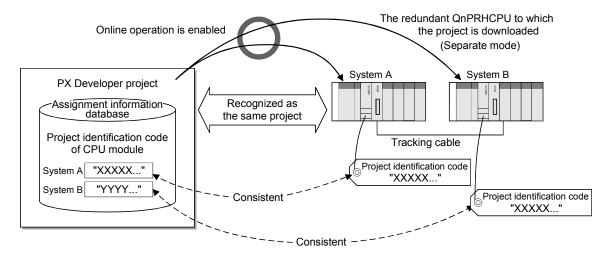


*1: By using project consistency check function, the consistency between the project identification code of CPU module and that of PX Developer project can be confirmed. When the check results in "Incosistent", online operation is disabled.

REMARK

When download to PLC or online change is executed after hot-start compile, only program change will be reflected on a CPU module. Therefore, online operation can be executed only for the CPU module for which download to PLC was executed at the previous time.

Management of project identification codes for Redundant CPU
 Project identification codes for Redundant CPU are recorded in the assignment information database as system A/system B-peculiar information.



POINT

- The assignment information database compatible with Redundant CPU is inapplicable with the Version 1.04E programming tool.
- When project consistency check function or online monitor is started, automatic change of assignment information database is not executed according to the Redundant CPU.

14 FBD PROGRAM DIAGNOSTICS

PX Developer programming tool can be used to confirm errors related to FBD programs occurring on CPU module.

This section explain how to confirm FBD program errors.

14.1 FBD Program Diagnostics



PURPOSE

To display the current status and the history of FBD program error.



BASIC OPERATION

FBD program diagnostics is executed through the "FBD Program Diagnostics" dialog box.

FBD program diagnostics can be executed in monitor mode. If in other mode than monitor mode, first switch the mode to monitor mode with the reference to Section 13.1.1.

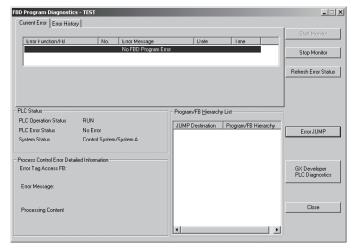
- 1. Click the [Diagnostics] \rightarrow [FBD Program Diagnostics] in the menu.
- 2. Display the "FBD Program Diagnostics" dialog box.
- 3. Click the <<Current Error>> tab if the current error content is to be seen. Click <<Error History>> tab if the current error is not completely displayed or the error history needs to be displayed.
- 4. Click the "Close" button to close the "FBD Program Diagnostics" dialog box.

An error occurs in a CPU module ([ERR.] LED on or flicker), without being displayed in the "FBD Program Diagnostics" dialog box. That means an unrelated error with FBD programs occurs. At this time, please click the "GX Developer PLC Diagnostics" button to execute CPU module PLC diagnostics from the diagnostics window in GX Developer.

Please refer to [GX Developer Operating Manual] for details about PLC Diagnostics dialog box in GX Developer.



DISPLAY/SETTING SCREEN



^{*1:}For Redundant CPU, the system status is displayed.

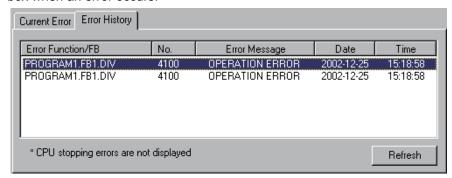


Items	Display/Setting contents		
Current Error	The current error content appears. This error will continue to be displayed even if it is cleared. Please click the "Refresh Error Status" button if only the current error needs to be displayed instead of the error display. Program/FB will be displayed with double clicking on error content when program/FB exists. [Error Function/FB] To display the program/FB hierarchy of the error occurrence. The error position can not be displayed when an error occurs without program/FB hierarchy. While [SYSTEM] will be displayed in the error position when an error occurs in the ladder code (schedule part) beyond the user-created part. [No.] To display the CPU module error code .The code and content of CPU module error can be referred to by clicking [Help] → [PLC Error] in the menu. [Error Message] To display the error message of CPU module.		
Error History	 [Date] To display the occurrence date. [Time] To display the time of error occurrence. Up to 5 errors can be displayed according to the recorded time sequence. This error will continue to be displayed even if being cleared. Please click the "Refresh Error Status" button if only the current error needs to be displayed instead of the error display. Please refer to Item [Current Error] in this table for details about some items (such as error position). Program/FB will be displayed with double clicking on error content when program/FB exists. 		
"Refresh" button (Only displayed when selecting < <error history="">> tab)</error>	To update displayed contents of the error history. After the displayed error is cleared, the error contents will not disappear even the button is clicked. (It is kept as history)		
PLC status	To display the operation status of CPU module and in connection, and display (RUN/STOP, etc) and whether an error occurs in CPU module. For Redundant CPU, the system status (Control system/Standby system, System A/System B, Unknown) is displayed.		
Process Control Error Detailed Information	To display the detailed error information of tag-accessing FR in tag FR when selecting		
Program/FB Hierarchy List	To display the selected error JUMP place and program/FB hierarchy in [Current Error] or [Error History]. The program/FB will be displayed by double clicking the item display when program/FB exists in JUMP place. Errors are displayed according to hierarchy sequence in the program/FB hierarchy list. Please first examine the function/ FB part (hierarchy displayed at the top of the list) of the error target if the error position needs to be specified. Please jump to the higher hierarchy and specify the error position if the error does not occur in this part but in the call source of user-defined FB part.		
"Start Monitor" button	To start the communication with a CPU module and monitoring the FBD Program Diagnostics.		
"Stop Monitor" button	To stop the communication with a CPU module and monitoring the FBD Program Diagnostics.		
"Refresh Error Status" button	Click this button to clear the [Error History] contents. The current error appears once again. Please click this button if the current error needs to be displayed.		
"Error JUMP" button	To display program/FB at the error position by clicking any one of the items [Current Error], [Error History], [Program/FB Hierarchy] after selecting the error contents.		
"GX Developer PLC Diagnostics" button	To display the PLC Diagnostics dialog box in GX Developer. An error occurs in a CPU module ([ERR.] LED on or flicker) without error message appearing in the "FBD Program Diagnostics" dialog box (an error occurs beyond the FBD program). At this time, please execute PLC diagnostics from the PLC diagnostics window in GX Developer. Please refer to [GX Developer Operating Manual] for details about PLC Diagnostics dialog box in GX Developer.		
"Close" button	Close the "FBD Program Diagnostics" dialog box.		

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POINT

- When an error occurs in user-defined FB type/tag FB type, FBD parts used in the type will be displayed in the "FBD Program Diagnostics" dialog box.
- In case that several function parts or FB parts (tag FB, module FB, tag access FB) are used in one program/FB, sometimes it is very difficult to recognize which part is with an error in the display of "FBD Program Diagnostics" dialog box when an error occurs.



In this case, the error part can be jumped to with "Error JUMP" button. After PLC download, the closest hierarchy displayed can be jumped to by deleting the error FBD part and jumping to the part by FBD program diagnostics.

- FBD program diagnostics cannot be executed correctly without compile or the PLC download after that. Therefore, the FBD program diagnostics should be executed after compile and PLC download.
- Update the [Error History] displayed in "FBD Program Diagnostics" dialog box by clicking the "Refresh" button.
- In the status of being displayed, the "FBD Program Diagnostics" dialog box will be automatically closed after the mode is changed into the edit mode.

15

15 PRINT

PX Developer programming tool can be used to print the project contents list, project parameters, global parts and program/FB definition, etc.

This chapter explains setting methods and operating methods for print functions of the programming tool.

15.1 Print Setting of Table/FBD Sheet



PURPOSE

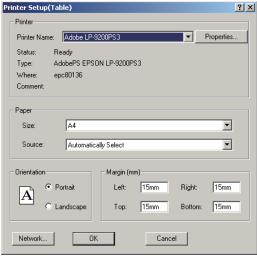
To setup the printer selection, paper size, print orientation, and scaling for printing. Two printer settings can be used separately in programming tool, one is used for tables print such as print global variable declaration window, and the other is used for FBD sheet print.



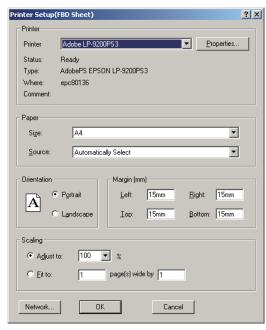
BASIC OPERATION

- Click the [Project] → [Print Setup (Table)] in the menu when executing the print setup (table). Or click the "Printer Setup (Table)" button in the "Print" dialog box displayed by clicking [Project] → [Print] in the menu (refer to Section 15.2). Click the [Project] → [Print Setup (FBD Sheet)] when executing the print setup (FBD Sheet). Or click the "Print Setup (FBD Sheet)" button in the "Print" dialog box displayed by clicking [Project] → [Print] in the menu.
- 2. View the Printer Setting dialog box.
- 3. Execute the printer setting.
- 4. Click the button "OK".

DISPLAY/SETTING SCREEN



(On the occasion of printer setup (table))



(On the occasion of printer setup (FBD sheet))



Items	Setting Contents	
	[Printer Name]	
Printer	To select the printer for printing.	
Fillitei	["Properties" button]	
	To execute the setting for the selected printer by printer name. *1	
	[Size]	
Paper	To select the paper size.	
Гареі	[Source]	
	To select the paper source for printer.	
Orientation To select the print orientation (vertical, horizontal).		
Margin	To set the print paper margin with mm as a unit.	
	Specify whether to zoom in or zoom out the project at printing with either of	
Scaling	the following items.	
Scaling	Setting scaling rate	
	• Specifying the number of pages (the number of width × length) *2	

- *1: The property setting for a printer varies with the different printer manufacturers and different printer types. Refer to Printer Operating Manual in use for details about setting.
- *2: The project is printed within the specified number of pages.

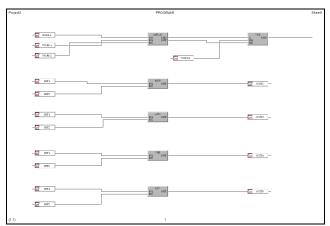
 If a project to be printed falls into the specified number of pages, it is not enlarged but printed at the scaling rate of 100 %.

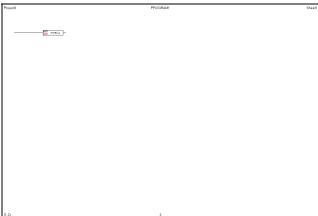
 Unnecessary blank pages are not printed.

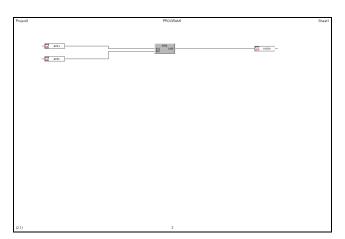
POINT

- The printer setting is saved by each project as a unit.
- When using Microsoft[®] Windows[®] 98 or Microsoft[®] Windows[®] Millennium Edition Operating System, the project cannot be printed/previewed with the zoom rate exceeding 100 %.
 - When specifying the zoom rate exceeding 100 %, the confirmation message is displayed, and the project is printed/previewed at the zoom rate of 100 %.

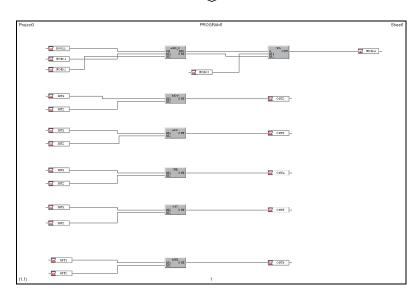
(Print example of FBD sheet) Printing a diagram drawn across 3 pages within 1page







Specifying 1 for both width and length



15.2 "Print" Dialog Box



PURPOSE

Print with programming tool is executed through "Print" dialog box.

This section explains how to display "Print" dialog box, as well as its functions.

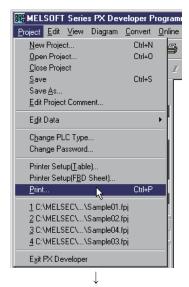


BASIC OPERATION

- 1. Click the [Project] \rightarrow [Print] in the menu.
- 2. Display the "Print" dialog box.



DISPLAY/SETTING SCREEN





Items	Contents	
"Printer Setup (Table)" button	To display the "Print Setup (Table)" dialog box. (refer to Section 15.1)	
"Printer Setup (FBD Sheet)" button	To display the "Print Setup (FBD Sheet)" dialog box. (refer to Section 15.1)	
"Print" button	To execute the printing. (refer to Section 15.5)	
"Print Preview" button	To display the print preview. (refer to Section 15.4)	
Print Range	Set the print preview range or the range to be printed. Select "All" or "Pages".	
"Header/Footer" button	To display the "Header /Footer Setting" dialog box. (refer to Section 15.3)	
"Close" button	To close the "Print" dialog box.	
< <pre><<pre>contents List>> tab</pre></pre>	To select when printing the Project Contents List. (refer to Section 15.5.1)	
< <project parameter="">> tab</project>	To select when printing the Project Parameter List. (refer to Section 15.5.2)	
< <module fb="">> tab</module>	To select when printing the Module FB List. (refer to Section 15.5.3 (1))	
< <tag fb="">> tab</tag>	To select when printing the Tag FB List. (refer to Section 15.5.3 (1))	
< <tag fb="" property="" setting="">> tab</tag>	To select when printing the Tag FB Property (Public Variable of Tag FB) List. (refer to Section 15.5.3 (2))	
< <global variable="">> tab</global>	To select when printing the Global Variable List. (refer to Section 15.5.3 (1))	
< <gx assignment="" developer="" label="">> tab</gx>	To select when printing the GX Developer Label Assignment List. (refer to Section 15.5.3 (1))	
< <cross reference="">> tab</cross>	To select when printing the data displayed in the cross reference window. (refer to Section 15.5.7.)	
< <program>> tab</program>	To select when printing the FBD sheet in program definition window or the Local Variable List in use. (refer to Section 15.5.5)	
< <user-defined fb="">> tab</user-defined>	To select when printing the FBD sheet in FB definition window or the Local Variable List in use. (refer to Section 15.5.5)	
< <pre><<pre>rogram Execution Setting>> tab</pre></pre>	To select when printing the Program Execution Setting and Program Execution Timing. (refer to Section 15.5.4)	
< <structure type="">> tab</structure>	To select when printing the defined Structure Type List. (refer to Section 15.5.6)	

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15.3 Header and Footer Setting



PURPOSE

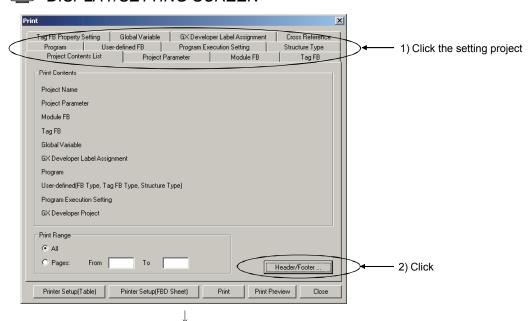
To set the paper titles and paper numbers for printing.

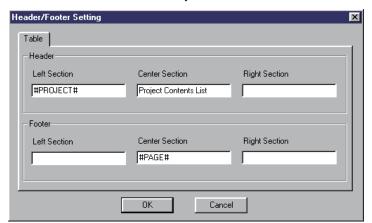


BASIC OPERATION

- 1. Refer to Section 15.2 to view the "Print" dialog box.
- 2. Click the project tab for header/footer setting.
- 3. Click the "Header/Footer" button.
- 4. Display the "Header/Footer" dialog box. Select <<Table>> or <<FBD Sheet>> tab when the <<Program>> or <<Userdefined FB>> tab has been selected in Step 2.
- 5. Execute the header/footer setting.
- 6. Click the "OK" button.

DISPLAY/SETTING SCREEN





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(1) The following form summarizes the character patterns that can be used for inputting in setting header/footer.

If a random character string is input to each textbox, printing can be executed in the status of placing the input string at the header/footer of the page.

Besides, if the following character patterns are input, the page number and date can be easily set.

Input character patterns	Functions/Print Contents	Settable Items in "Print" Dialog Box
#YYYY#	Year (4 digits AD)	All items can be set
#YY#	Year (first 2 digits of AD)	All items can be set
#MM#	Month	All items can be set
#DD#	Date	All items can be set
#PROJECT#	Project name	All items can be set
#PROJECT_COMMENT#	Project comment	All items can be set
#TAG#	Tag FB variable name	Tag FB property setting
#TAG_TYPE#	Tag type	User-defined FB/tag FB property setting
#TAG_COMMENT#	Comment of tag FB	Tag FB property setting
#PROGRAM#	Program name	Program
#PROGRAM_COMMENT#	Comment of program	Program
#FB#	User-defined FB/tag FB type name	User-defined FB
#FB_COMMENT#	Comment of user-defined FB/tag FB	User-defined FB
#SHEET#	FBD sheet name	FBD sheet in program/user-defined FB
#SHEET_PAGE#	FBD sheet page No. (when one FBD sheet is arranged with multiple-page FBD parts)	FBD sheet in program/user-defined FB
#PAGE#	Print page No.	All items can be set
#STRUCT#	Structure type name	Structure type
#STRUCT_COMMENT#	Comment of structure type	Structure type

^{*:} Please input all the character patterns mentioned above with capital characters.

Input examples of the character pattern and the display examples corresponding to these are shown as below.

(Input examples of the character pattern) (Actual print examples)

##M###DD###YYYY# \rightarrow 01/01/2002

Year #YYYY#.Month #MM#.Day #DD# \rightarrow Year 2002, Month 01, Day01

[Page - #PAGE#] \rightarrow (Page-1)

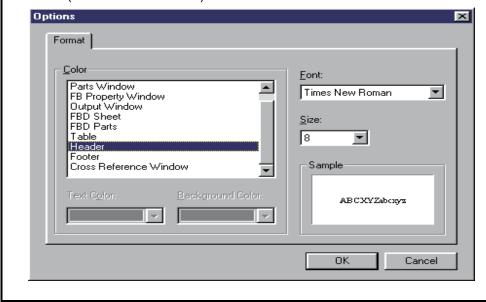
(2) Initial values of header/footer setting in each print dialog box

The following table indicates the initial values of the header/footer setting in each print dialog box.

Item		Header			Footer	
ILOI II	Left Section	Center Section	Right Section	Left Section	Center Section	Right Section
Project contents list	#PROJECT#	Project contents list	-	_	#PAGE#	_
Project parameter	#PROJECT#	Project parameter	_	_	#PAGE#	_
Module FB	#PROJECT#	Module FB	_	_	#PAGE#	_
Tag FB	#PROJECT#	Tag FB	_	_	#PAGE#	_
Tag FB property setting	#PROJECT#	#TAG#	#TAG_TYPE#	_	#PAGE#	_
Global variable	#PROJECT#	Global variable	_	_	#PAGE#	_
GX Developer label assignment	#PROJECT#	GX Developer label assignment	_	_	#PAGE#	_
Cross reference	#PROJECT#	Cross reference	_	_	#PAGE#	_
Program (table)	#PROJECT#	# PROGRAM#	_	_	#PAGE#	_
Program (FBD sheet)	#PROJECT#	# PROGRAM#	#SHEET#	#SHEET_PAGE#	#PAGE#	_
User-defined FB (Table)	#PROJECT#	#FB#	_	_	#PAGE#	_
User-defined FB (FBD sheet)	#PROJECT#	#FB #	#SHEET#	#SHEET_PAGE#	#PAGE#	_
Program execution setting	#PROJECT#	Program execution setting	_	_	#PAGE#	_
Structure type	#PROJECT#	#STRUCT#	_	_	#PAGE#	_

POINT

- There is no limit to the character numbers that can be set in header/footer.
 However, if the set character string is too long and it cascade with character strings of the header/footer set in other places, printing will be executed in this characters-cascade status.
- Font of the header/footer can be changed through [Tool] → [Options] in the menu. (refer to Section 5.11.1)



15 PRINT MELSOFT

15.4 Print Preview



PURPOSE

To preview the print before printing.

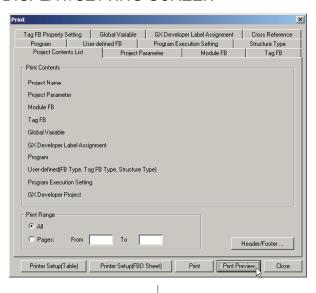


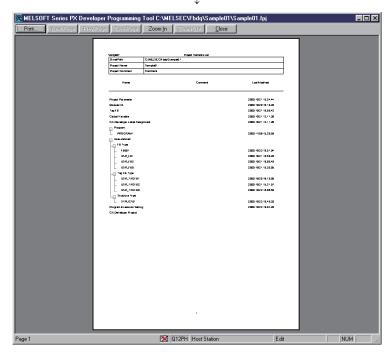
BASIC OPERATION

- 1. Refer to Section 15.2 to display the "Print" dialog box.
- 2. Click the tab of print preview item.
- 3. Specify the print range. (Can be specified with the starting and last pages.)
- 4. Click the button "Print Preview".
- 5. Display the print preview window.



DISPLAY/SETTING SCREEN







Items	Contents
"Print" button	To execute the printing for data displayed in the print preview window.
"Next Page" button	To display the preview window of the next page.
"Prev Page" button	To display the preview window of the previous page.
"Two Page" button ("1 Page" button in the status of 2 pages display)	To execute the switching of 1 page/2 pages view.
"Zoom In" button	To zoom in the print preview.
"Zoom Out" button	To zoom out the print preview.
"Close" button	To close the print preview window. *

^{*:}The print preview window can also be closed by pressing the button "×" or "Esc" key.

POINT

In the print preview window, the display will be zoomed in by clicking the mouse in the status.

The view will be standard display by clicking the mouse in the k status.

15.5 Print Start

To print the program/FB definition, declaration contents of global parts (global variable, tag FB, module FB), etc.

15.5.1 Printing project contents list



PURPOSE

To print the drive path of a project, project name, project comment, project contents list (project parameter, module FB, etc.), last modified date and time.

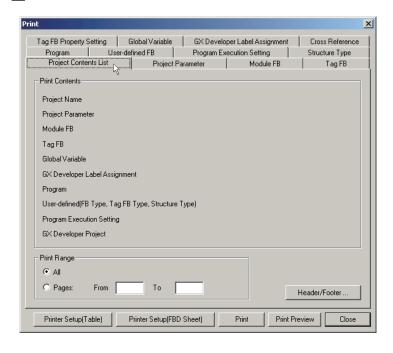


BASIC OPERATION

- 1. Refer to Section 15.2 to display the "Print" dialog box.
- 2. Click the << Project Contents List>> tab.
- 3. Print contents and print range are displayed. (Can be specified with the starting and last pages.)
- 4. Click the button "Print".



DISPLAY/SETTING SCREEN



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(Print Example)

Sample01	Project Contents List	
Drive/Path	C:\MELSEC\Fbdq\Sample01	
Project Name	Sample01	
Project Comment		
Name	Comment	Last Modified
Project Parameter		10/1/2003 9:46:15 AM
Module FB		10/25/2002 1:42:10 PM
Tag FB		10/1/2003 3:38:22 PM
Global Variable		10/25/2002 1:45:31 PM
GX Developer Label Assignmer	nt	10/25/2002 1:40:09 PM
Program PROGRAM1 PROGRAM2 PROGRAM3 User-defined FB Type USR_FB1 USR_FB2 USR_FB3 Tag FB Type		9/30/2003 6:26:06 PM 12/11/2002 3:35:44 PM 10/7/2003 3:14:08 PM 12/25/2002 3:09:40 PM 12/11/2002 3:55:33 PM 10/7/2003 3:14:24 PM
USR_TAGFB1 USR_TAGFB2 USR_TAGFB3 Structure Type STRUCTURE1 STRUCTURE2 STRUCTURE3	User-defined Tag FB Type1	12/11/2002 2:43:08 PM 10/7/2003 3:14:39 PM 10/7/2003 3:14:45 PM 10/7/2003 3:14:55 PM 10/7/2003 3:14:59 PM 10/7/2003 3:15:03 PM
Program Execution Setting		12/11/2002 3:35:59 PM
GX Developer Project		12/11/2002 0.30.00 FIVI

15.5.2 Printing project parameters



PURPOSE

To print the setting contents list of project parameter (refer to Section 6.14).

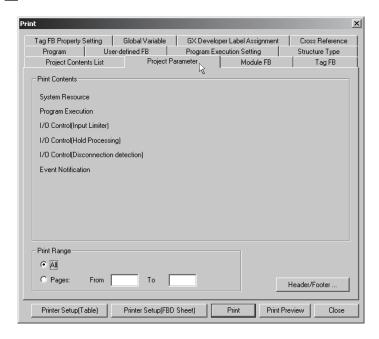


BASIC OPERATION

- 1. Refer to Section 15.2 to display the "Print" dialog box.
- 2. Click the << Project Parameter >> tab.
- 3. Print contents and print range are displayed. (Can be specified with the starting and last pages.)
- 4. Click the "Print" button.



DISPLAY/SETTING SCREEN



(Print Example)

Sample01 System Resource	Project Parameter	
File register(ZR)	Start	
	No. of Points	3276
	End	3276
Timer(T)	Start	
	No. of Points	6
	End	6
Common pointer(P)	Start	350
	No. of Points	59
	End	409
Internal relay(M)	Start	
	No. of Points	40
	End	39
Index register(Z)	Start	
	No. of Points	
	End	
Program Execution Low-speed	Inteval	
		1000 m
Low-speed	Interval	1000 m
Low-speed Normal-speed	Interval Interval	1000 m
Low-speed Normal-speed	Interval Interval	1000 m
Low-speed Normal-speed High-speed	Interval Interval Interval	1000 m
Law-speed Namal-speed High-speed NO Control(Input Limiter)	Interval Interval Interval	1000 m
Low-speed Normal-speed High-speed I/O Control(Input Limiter) Execute the input limiter processing of P.	Interval Interval Interval	1000 m
Low-speed Normal-speed High-speed I/O Control(Input Limiter) Execute the input limiter processing of P_ I/O Control(Hold Processing)	Interval Interval Interval	1000 m 400 m 200 m
Low-speed Normal-speed High-speed I/O Control(Input Limiter) Execute the input limiter processing of P_ I/O Control(Hold Processing) Hold Output of P_I/N	Interval Interval Interval	1000 m 400 m 200 m Yes
Low-speed Normal-speed High-speed I/O Control(Input Limiter) Execute the input limiter processing of P_ I/O Control(Hold Processing) Hold Output of P_I/N	Interval Interval Interval	1000 m 400 m 200 m Yes
Low-speed Namai-speed High-speed I/O Control(Input Limiter) Execute the input limiter processing of P_ I/O Control(Hold Processing) Hold Output of P_I/N Hold Output of P_OUT1, P_OUT2 and P_ I/O Control(Disconnection detection)	Interval Interval Interval	1000 m 400 m 200 m Yes Yes Yes
Low-speed Namai-speed High-speed I/O Control(Input Limiter) Execute the input limiter processing of P_ I/O Control(Hold Processing) Hold Output of P_I/N Hold Output of P_OUT1, P_OUT2 and P_ I/O Control(Disconnection detection)	Interval Interval Interval	1000 m 400 m 200 m Yes Yes Yes
Low-speed Namal-speed High-speed I/O Control(Input Limiter) Execute the input limiter processing of P_ I/O Control(Hold Processing) Hold Output of P_I/N Hold Output of P_OUT1, P_OUT2 and P_ I/O Control(Disconnection detection) Change the control mode to MANUAL	Interval Interval Interval	1000 m 400 m 200 m Yes Yes Yes
Low-speed Normal-speed High-speed NO Control(Input Limiter) Execute the input limiter processing of P_ NO Control(Hold Processing) Hold Output of P_IN Hold Output of P_OUT1, P_OUT2 and P_ NO Control(Disconnection detection) Change the control mode to MANUAL Event Notification via MELSECNET/10(H)	Interval Interval Interval Interval Interval Module Head I/O Address Network No.	1000 m 400 m 200 m Yes Yes Yes Yes
Low-speed Namal-speed High-speed I/O Control(Input Limiter) Execute the input limiter processing of P_ I/O Control(Hold Processing) Hold Output of P_I/N Hold Output of P_OUT1, P_OUT2 and P_ I/O Control(Disconnection detection) Change the control mode to MANUAL Event Notification	Interval Interval Interval Interval Interval Module Head I/O Address Network No.	1000 m 400 m 200 m Yes Yes Yes Yes

<When the event notification of project parameter setting is selected as "Event Notification by MELSECNET/10(H)">

15.5.3 Printing global parts/GX Developer label assignment/Tag FB property setting

 Print declaration list of module FB, tag FB, global variable, GX Developer label assignment



PURPOSE

To print declaration list of global parts (module FB, tag FB and global variable) and GX Developer label assignment.

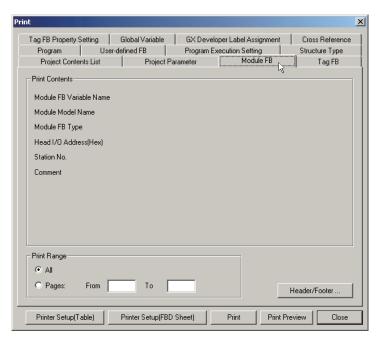


BASIC OPERATION

- 1. Display "Print" dialog box with the reference to Section 15.2.
- Click project tabs in declaration list of global parts or GX Developer label assignment (one of <<Module FB>> tab, <<Tag FB>> tab, <<Global Variable>> tab and <<GX Developer Label Assignment>> tab) that need to be printed.
- 3. Print contents and print range are displayed. (Can be specified with the starting and last pages.)
- 4. Click "Print" button.

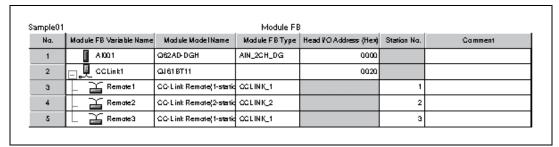


DISPLAY/SETTING SCREEN



(When<<module FB>>tab is selected)

(Print Example)



POINT

Even though Sort has been performed in the Global Variable Declaration window, the list is printed in ascending order of No.

(2) Tag FB property (public variable of tag FB) List Printing



PURPOSE

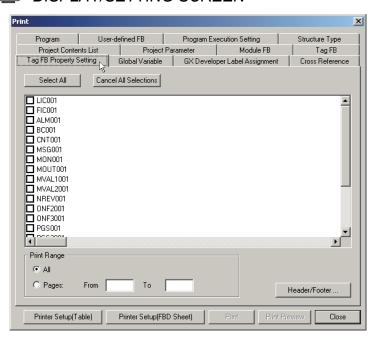
To print public variable list in tag FB.



BASIC OPERATION

- 1. Display "Print" dialog box with reference to Section 15.2.
- 2. Click << Tag FB Property Setting>> Tab.
- 3. The print range and list of the tag FB declared on the Tag FB Declaration screen (refer to Section 8.4.1) is displayed. (Can be specified with the starting and last pages.)
- 4. Select Tag FB variable name to be printed. Click the check box at the left side of tag FB variable name to mark it with ☑.
- 5. Click "Print" button.

DISPLAY/SETTING SCREEN

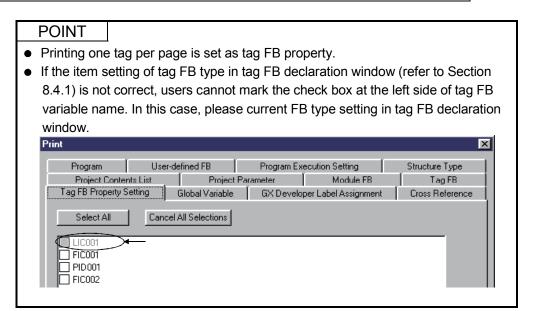


DISPLAY/SETTING DATA

Items	Display/Setting data					
"Select All" button	Select all currently displayed tag FB variable names.					
"Cancel All Selections" button	Cancel the selection of all tag FB variable names currently displayed.					

(Print Example)

Sample01		PIC001 2PIDTyp
łtem	Set Value	Comment
IN_NMAX	100.0	Input High Limit Alarm
IN_NMIN	0.0	Input Low Limit Alarm
IN_HH	110.0	High Limit Range Error
IN_H	100.0	High Limit Range Error Creared
IN_L	0.0	Low Limit Range Error Creared
IN_LL	-10.0	Low Limit Range Error
PID2_MTD	8.0	Derivative Gain
PID2_DVLS	2.0	Large Deviation Alarm Hysteresis
PID2_PN	0	Reverse Action/Direct Action
PID2_SVPTN_B0	TRUE	Set Value Used
OUT1_NMAX	100.0	Output Conversion High Limit
OUT1_NMIN	0.0	Output Conversion Low Limit
MANI	FALSE	Disable Mode Change: Disable MANUAL
AUTI	FALSE	Disable Mode Change: Disable AUTO
CASI	FALSE	Disable Mode Change: Disable CASCADE
CMVI	TRUE	Disable Mode Change: Disable COMPUTER MV
CSVI	TRUE	Disable Mode Change: Disable COMPUTER SV
ATI	FALSE	Disable Mode Change: Disable Auto Tuning
OVRI	FALSE	Disable Mode Change: Disable OVERRIDE
SIMI	FALSE	Disable Mode Change: Disable SIMULATION
MLI	FALSE	Disable Output Low Limit Alarm
мні	FALSE	Disable Output High Limit Alarm
DVLI	FALSE	Disable Large Deviation Alarm
DPNI	FALSE	Disable Negative Rate of Change Alarm
DPPI	FALSE	Disable Positive Rate of Change Alarm
PLI	FALSE	Disable Input Low Limit Alarm
PHI	FALSE	Disable Input High Limit Alarm
LLI	FALSE	Disable Input Low Low Limit Alarm
HHI	FALSE	Disable Input High High Limit Alarm



15.5.4 Printing program execution settings



PURPOSE

To print program execution setting list in "Program Execution Setting" dialog box (refer to Section 7.12.3).

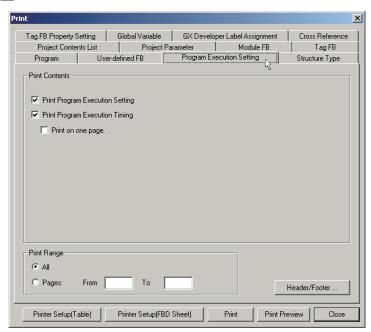


BASIC OPERATION

- 1. Display "Print" dialog box with the reference to Section 15.2.
- 2. Click << Program Execution Setting>>tab.
- 3. Print contents and print range are displayed. (Can be specified with the starting and last pages.)
- 4. Click the check box at the left side of the item to be printed and mark it with .
- 5. Click "Print" button.



DISPLAY/SETTING SCREEN

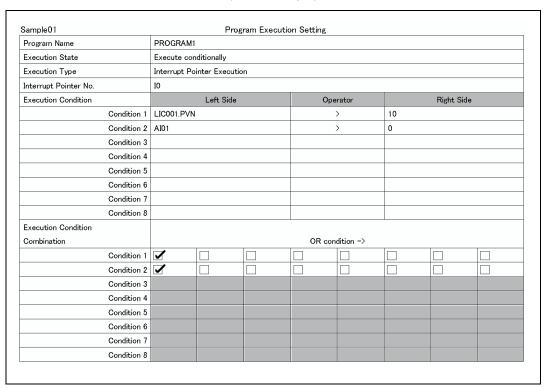




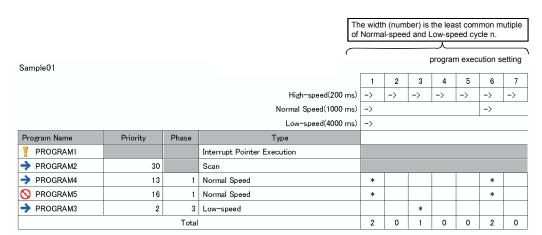
DISPLAY/SETTING DATA

Items	Display/Set contents
Print program execution setting	Mark the check box at the left side when printing program execution setting.
Print program execution timing	Mark the check box at the left side when printing program execution timing.
Print on one page	The program execution timing can be printed on one page after being zoomed out. Users can make selection when the "Print Program Execution Timing" check box is marked.

(Print Example)



In case of interrupt pointer execution type program (Execute or Execute Conditionally)



POINT

The printing order is the same as the order of program displayed on Program Execution Timing window (refer to Section 7.12.2).

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15.5.5 Printing programs/User-defined FBs



PURPOSE

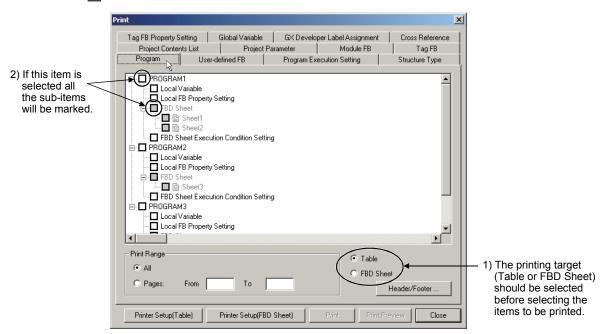
To print program or the execution condition setting of FBD sheet, local variable sheet and FBD sheet FB definition window.



BASIC OPERATION

- 1. Display "Print" dialog box with the reference to Section 15.2.
- 2. Click << Program>> tab or << User-defined FB>> tab.
- 3. Click radio button of print target (table or FBD sheet).
- 4. Select the print item. Click the check box at the left side of the item name to mark it with ✓.
- 5. Specify the print range. (Can be specified with the starting and last pages.)
- 6. Click "Print" button.

☐ DISPLAY/SETTING SCREEN



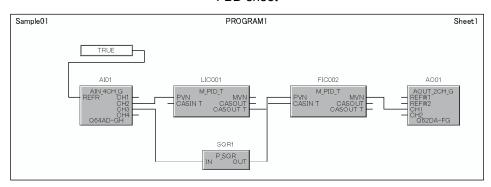
(When << Program>> tab clicked)

(Print example)

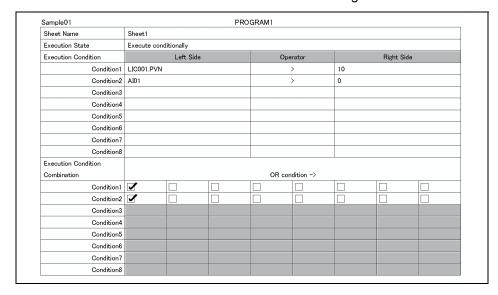
Sheet (Local Variable Sheet)

Variable Name	Variable Type	Data Type	Comment
VAR1	Internal Variable	REAL	
 BOOL_VAR	Internal Variable	BOOL	
FB1	Internal Variable	USR_FB1	· · · · · · · · · · · · · · · · · · ·
 STRING_VAR	Internal Variable	STRING(20)	
 FIC001	External Variable	M_PID_T	
 LIC001	External Variable	M_PID	

FBD sheet

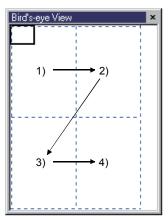


FBD sheet execution condition setting



POINT

When the print setup of FBD sheet is executed (refer to Section 15.1), one-pagesize print area in dotted blue lines will display in bird's-eye view window. If the set FBD parts cannot be loaded within one page, multiple pages will be printed in the following order: from left to right, up to down.



Bird's-eye view window

15.5.6 Printing structure type



PURPOSE

To print list of structure members, data types and comments defined in structure type definition window (refer to Section 9.1).

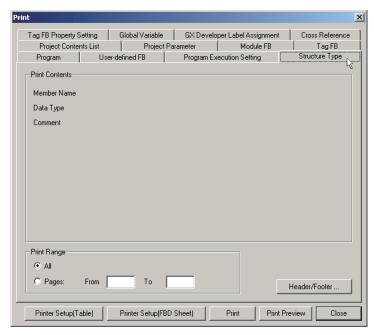


BASIC OPERATION

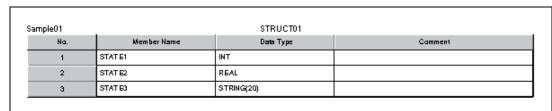
- 1. Display "Print" dialog box with the reference to Section 15.2.
- 2. Click <<Structure Type>> tab.
- 3. Print contents and print range are displayed. (Can be specified with the starting and last pages.)
- 4. Click "Print" button.



DISPLAY/SETTING SCREEN



(Print example)



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15.5.7 Printing cross reference



PURPOSE

To print the data displayed in the cross reference window.

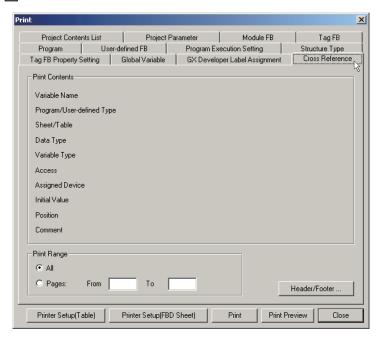


BASIC OPERATION

- 1. Refer to Section 15.2 and display the print dialog box.
- 2. Click the <<Cross Reference>> tab.
- 3. Print contents and print range are displayed. (Can be specified with the starting and last pages.)
- 4. Click the "Print" button.



DISPLAY/SETTING SCREEN



POINT

- If the cross reference information is not builded in advance, the cross reference will not be printed. Build the information by reference to section 10.1.2, and then print the cross reference.
- In cross reference printing, the data displayed in the cross reference window are printed as they are.
 - When the data are displayed using the filter display function, the data displayed under the edited filter condition are printed.
- The filter condition of the cross reference window is not printed.
- While the filter condition is being edited, the cross reference cannot be printed. Print the cross reference after closing the filter condition editing screen.

(Print example)

Sample@1			Cross Re	eterence					
Variable Name /	Program/User-defined Type	Sheet/Table	Data Type	Variable Type	Access	Assigned Device	Initial Value	Position	Comment
A101	PROGRAM1	(Local Variable)	AIN_4CH_G	External Variable	1			1	
A101	PROGRAMI	Sheet1	AIN_4CH_G	External Variable	FB Call			(100, 80)	
A101		(Module FB)	AIN_4CH_G	i				1	i
A0UT 001		(Module FB)	AOUT_4CH					2	
AOUTOO1	PROGRAM1	(Local Variable)	AOUT_4CH	External Variable	İ			2	1
AOUTOO1	PROGRAMI	Sheet I	AOUT_4CH	External Variable	FB Call			(270, 50)	
ARR BOOL_VAR	PROGRAM1	Sheet1	BOOL	Internal Variable	1			(180, 20)	
UAR BOOL_VAR	PROGRAMI	(Local Variable)	BOOL	Internal Variable	1			2	1
29R FBI VAR FBI	PROGRAMI	Sheet1	USR_FB1	Internal Variable	1			(60, 180)	
VAR FB1	PROGRAMI	(Local Variable)	USR_FB1	Internal Variable	1			3	
FICOOI	PROGRAMI	(Local Variable)	M_PID_T	External Variable	ľ			3	
F10001	PROGRAM1	Sheet1	N_PID_T	External Variable	FB Call			(220, 190)	
F10001		(Tag FB)	N_PID_T			ZR3130		2	-
F1C002	*	(Tag FB)	M_PID_T			ZR3390		4	
LICOOI	PROGRAM1	(Local Variable)	N_PID	External Variable				4	-
LICOO1		(Tag FB)	N_PID			ZR3000		1	
L ICOO1	PROGRAM1	Sheet1	N_P1D	External Variable	FB Call			(60, 220)	
PICO01		(Tag FB)	N_2PID		:	ZR3260		3	
AR STRING_VAR	PROGRAM1	Sheet1	STR ING (20)	Internal Variable				(260, 280)	-
VAR STRING_VAR	PROGRAM1	(Local Variable)	STRING (20)	Internal Variable	:	*		4	
ZAR VAR1	PROGRAM1	Sheet1	REAL	Internal Variable				(60, 50)	Ī
VAR VAR1	PROGRAMI	(Local Variable)	REAL	Internal Variable	.,			1	

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APPENDICES

Appendix 1 Invalid Character Strings in Variable Name

(1) Reserved Words

The following reserved word cannot be used in variable name if they are not sensitive to upper and lower case.

Reserved words list

	Reserved words						
А	ACTION, ANY, ANY_BIT, ANY_DATE, ANY_DERIVED, ANY_ELEMENTARY, ANY_INT, ANY-MAGNITUDE, ANY_NUM, ANY_REAL, ANY_SIMPLE, ANY_STRING, ARRAY, AT						
В	BOOL, BY, BYTE						
С	CASE, CONFIGUARATION, CONSTANT						
D	DATE, DATE_AND_TIME, DEVICE, DINT, DO, DS, DT, DWORD						
E	ELSE, ELSIF, ELSEIF, EN, END_ACTION, END_CASE, END_CONFIGURATION, END_FOR, END_FUNCTION, END_FUNCTION_BLOCK, END_IF, END_PROGRAM, END_REPEAT, END_RESOURCE, END_STEP, END_STRUCTURE, END_TRANSITION, END_TYPE, ENT_VAR, END_WHILE, ENO, EXIT						
F	FALSE, F_EDGE, FOR, FROM, FUNCTION, FUNCTION_BLOCK						
G	_						
Н	_						
I	IF, INT, INITIAL_STEP						
J	_						
K	_						
L	LINT, LREAL, LWORD						
М	_						
N	-						
0	OF, ON						
Р	PDD, PROGRAM						
Q	_						
R	READ_ONLY, READ_WRITE, REAL, R_EDGE, REPEAT, RETAIN, RETURN, RESOURCE						
S	SINT, STEP, STRING, STRUCT						
Т	TASK, THEN, TIME, TIME_OF_DAY, TO, TOD, TRANSITION, TRUE, TYPE						
U	UDINT, UINT, ULINT, UNTIL, USINT						
V	VAR, VAR_ACCESS, VAR_CONSTANT, VAR_EXT, VAR_EXTERNAL, VAR_EXTERANL_CONSTANT VAR_EXTERANAL_FB, VAR_EXTERANL_PG, VAR_GLOBAL, VAR_GLOBAL_CONSTANT, VAR_GLOBAL_FB VAR_GLOBAL_PG, VAR_IN_OUT, VAR_INPUT, VAR_OUTPUT, VAR_PUBLIC, VAR_TEMP						
W	WORD, WHILE, WITH, WSTRING						
Х	_						
Υ							
Z	-						

(2) Characters and Symbols That Can Be Used

Characters and symbols that can be used in variable name are as follows.

English alphabets and numbers, underline [_].

(3) Conditions

They cannot be used in following cases:

- Continual use of underline [_].
- Underline [_] is used at the end of variable name.
- Space between characters is used.
- Numbers (0 to 9) are used in initial character.
- Character string of over 33 characters is used in variable name.
- Constant is used (including [H to] hexadecimal notation).
- Program name, FB type name or function name is used.
- The existing data type is used.

Appendix 2 List of Corresponding Tag Type/Tag Access FB

Tag types of user-defined tag FB and corresponding tag access FB that can be pasted to these types are listed in the following table:

Туре	Tag type Tag access FB	PID	2PID	2PIDH	PIDP	SPI	IPD	BPI	R	ONF2	ONF3	PGS	PGS2	MOUT	MONI	MWM	SEL	ВС	PSUM
	P_IN	0	0	0	0	0	0	0	0	0	0	_	_	_	0	0		_	
	P_OUT1	0	0			0	0	0				_		_	_	_			_
	P_OUT2	_	_	_	_	_	_	_	0	_	_	_	_	_	_	_	_	_	_
I/O	P_OUT3_	_	_	0	_	_	_	_	_	_	_	_		_	_	_	_	_	_
control FB	P_MOUT											_		0	_	0			_
	P_DUTY	0	0	_	_	0	0	0	_	_	_	_	_	_	_	_	_	_	_
	P_PSUM					_						_		_	_	_		0	0
	P_BC					_						_		_	_	_		0	_
	P_PID(_T)	0	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
	P_2PID(_T)	_	0	_	_	_	_	_	_	_	_	_	_	_		_	_	_	_
	P_2PIDH(_T)_	_	_	0	_	_	_	_	_	_	_	_	_	_		_	_	_	_
	P_PIDP(_T)	-	_	_	0	_	-	-	_	_	_	_	_	_	_	_	-	-	_
	P_PIDP_EX(_T)_	_	_	_	0	_	_	_	_	_	_	_	_	_	_	_	_	_	_
	P_SPI(_T)					0								_	_	_			_
Loop control	P_IPD(_T)	-	_	_	_	_	0	-	_	_	_	_	_	_	_	_	-	-	_
operation	P_BPI(_T)		_	_	_	_	-	0	_	_	_	_		_	_	_	_	_	_
FB	P_R(_T)				-	_			0		_			_	_	_			_
	P_PHPL	0	0	0	0	0	0	0	0	0	0	_	_	_	0	0			_
	P_ONF2(_T)	_		_	_	_	_	_	_	0	_	_	_	_		_	_	_	_
	P_ONF3(_T)	_		_	_	_		_	_	_	0	_	_	_	_	_	_	_	_
	P_PGS	_	_	_	_	_	_	_	_	_	_	0	_	_	_	_	_	_	_
	P_PGS2_	-				-						-	0						_
	P_SEL(_T1)(_T2)	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	0	_	_
Special FB	P_MCHG	0	0	0	0	0	0	0	0	0	0	0	0	0	_	0	0	_	

○: Available —: Unavailable

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Appendix 3 Functions Included and Changed with the Upgrade

The following table indicates the functions included and changed with the upgrade.

Compatible version*	Included/changed function	Contents	Reference	
	Microsoft® Windows® XP compatibility	Compatible with Microsoft® Windows® XP Professional and Microsoft® Windows® XP Home Edition.	Section 2.2	
	Window toolbar	The window toolbar is included as a new toolbar. The helper window can be displayed/hidden from this toolbar.	Section 5.6.8	
	Helper window	The helper window can be displayed/hidden by selecting [View] \rightarrow [Window] in the menu.	Section 5.7.1	
	Cross reference window	The cross reference window is included as a new helper window. This window lists where variables are declared and used in list format.	Section 5.7.7	
	Data copy to other project	Program, user-defined FB type/tag FB type/structure type data are copied to the other project.	Section 6.9.2	
	Connector	A connector can be drawn from the output pin of an FBD part to connect FBD parts.	Section 7.7.3	
Version 1.04E	Local variable sheet	 The icons that indicate the variable types are added to the "Variable Name" field. From this version, the variable data and variable can be changed type can be rearranged in the local variable sheet by dragging and dropping the icon. Multiple lines and multiple items in the local variable sheet can be selected. The selected area can be copied to the other application by selecting [Edit] → [Copy] in the menu. 	Section 7.10	
	Global part	The module FB is added as a new global part. Compatible module model name: QX82, QX82-S1, Q64RD-G Use of the file register (R) is disabled in the setting of the global variable assignment device. When using the file register, use the ZR device.	Section 8.3	
	Cross reference function The positions where variables are declared and used are displayed in list format. This function includes the filter display function, which displays only data that satisfy the specified condition, and other functions.			
	Specification of number of digits after the decimal point in monitor value	The number of decimal places in the current value (REAL type only) of the variable displayed in monitor mode can be specified.	Section 13.2.3	
	Compile function	The program compiled with the programming tool of Version 1.04E or later is outperforms the program compiled with the programming tool of Version 1.03D or earlier as follows: Reduce the number of ladder program generated by compile Reduce the scan time of FBD program	Appendix 3.2	
	Initial settings of GX Developer project	Redundant parameter "Tracking setting" has been added.	Section 11.5	
	Cold-start compile Hot-start compile	Tracking processing has been added to ladder programs to generate. The device range with system resource is automatically registered into the Tracking setting of GX Developer project redundant parameters.	Section 11.5	
	Online change compile	Online change for Redundant CPU has been added.	Appendix 3 Section 11.4	
Version	Transfer Setup	"Transfer Setup" screen for Redundant CPU has been added.	Section 12.3	
1.06G	Download to PLC	Download to PLC function for Redundant CPU has been added.	Appendix 3 Section 12.4	
	Check Project Consistency	System status of Redundant CPU has been added to the consistency check results.	Section 12.7.2	
	Online Monitor	Online monitor for Redundant CPU has been added.	Appendix 3 Chapter 13	
	FBD Program Diagnostics	System status of Redundant CPU has been added to the diagnostics results.	Section 14.1	

^{*:} The compatible version can be confirmed by selecting About PX Developer. For details, refer to "Section 5.10 Help".

Compatible version*	Included/changed function	Contents	Reference
	Status Bar	Invalid initial value is added in compile status.	Section 5.3
	Online toolbar	Upload and FB current value display is added.	Section 5.6.3
	FB property window	It makes current value display / change performed with monitor mode. Toolbar is added.	Section 5.7.4
	Refer to FB parts definition	Operation for referring to FB parts definition is changed from double-clicking the FB parts to clicking user-defined type name that is displayed on FB parts. FB type name of FB parts that can display definition will be displayed in blue and underlined.	Section 7.5.5
	FB property page	The dedicated window for displaying points related to broken line by a graph is added.	Section 10.2
Version 1.08J	Online change compile	Online change dialog box is united with download and the required symbolic data download for project restoration is added.	Section 11.4
	Download	The required symbolic data download for project restoration is added.	Section 12.3
	Download setting	When downloading symbolic data on online change / download, the function for setting target memory and compression rate is added.	Section 12.3.3
	Upload	Symbolic data that is stored in the memory of PLC CPU is uploaded, and the function for restoring PX Developer project is added.	Section 12.4
	Delete PLC data	The function for deleting the symbolic data stored in the memory of PLC CPU is added.	Section 12.5
	FBD sheet monitor	The monitor display for input/output variables of FB part is added.	Section 13.2.1
	Read all for FB property current value	FB Property Management Window is added, and Reading all of Current Value of FB Property and substitute all for initial value are made to be executed.	Section 13.6.1
	Communication route	The following communication paths are extended. • C24 connection through serial/USB port, MELSECNET/H remote connection and G4 module connection • CC-Link connection • Q series bus connection • Co-existence network of other station	Section 2.1.2 Section 12.3
	Opening a Project	The Login screen can be displayed if data protection is enabled.	Section 6.3 Section 6.15.3
	Adding New Data to Project	When data protection is enabled, access permission display of each access level and the permission setting button have been added in the setting screen.	Section 6.8
	Data protection	Data protection can be performed when setting a login password and access permission.	Section 6.15
Version 1.10L	Set Login Password	The setting functions of login password for data protection have been added. The conventional project password setting/change functions have been deleted.	Section 6.15.4
	Set Permissions	The setting functions of access permission for data protection have been added. The permission for access level to edit data and the Enable/Disable setting of Read Access for lower levels can be set.	Section 6.15.5
	Variable Reference dialog box	When a variable of a variable part or a FB part is renamed, even if its comment contains 65 characters or more, it will be truncated to 64 characters on the < <new variable="">>tab.</new>	Section 7.3.3 Section 7.5.3
	Display Execution Order of FBD parts	The display function of FB/function parts execution order has been added.	Section 7.5.1 Section 7.6.1
	FB Property Page	The "Show Figure" button has been added.	Section 10.2
	T b T Toperty Fage	"2-degree-of-freedom Advanced PID control FB setting" has been added.	Section 10.2
	List of Corresponding Tag Type/Tag Access FB	2PIDH has been added.	Appendix 2

^{*:} The compatible version can be confirmed by selecting About PX Developer. For details, refer to "Section 5.10 Help".

Compatible version*	Included/changed function	Contents	Reference
	FB Property Page	The setting of Multi-Point Program Setter has been added.	Section 10.2
	Download Setting	The "Try compressing" button for checking compressed symbolic data size has been added.	Section 12.4.3
	Print	The Scaling setting and Print Range specification have been added.	Chapter 15
	List of Corresponding Tag Type/Tag Access FB	PGS has been added.	Appendix 2
Version	Program Execution Setting	Check box "Communicates with peripherals after program execution" has been added for timer execution.	Section 7.12.3
1.14Q	Communication route	Specifications of redundant type extension base unit are added.	Section 2.1.2 Section 2.2 Section 12.3 Section 13.8.1
	Find	Find is added to the Edit menu and standard toolbar.	Section 3.3 Section 5.6.2
	Sorting global variable declaration	Sort (Ascending, Descending, and Remove Sorting) is added to the pop-up menu for the Global Variable Declaration window.	Section 5.5 Section 8.2.3
	Supported OS	Windows Vista [®] is supported.	Section 2.1.4 Section 2.2 Section 11.2
., .	Supported CPU	Q02PHCPU and Q06PHCPU are supported.	Section 2.1.1
Version 1.18U	Communication route	CC-Link IE controller network is supported.	Chapter 2 Section 12.3 Section 13.8.1
	Setting Project Parameters	The < <i control="" o="">>tab has been added.</i>	Section 6.14 Section 15.5.2

^{*:} The compatible version can be confirmed by selecting About PX Developer. For details, refer to "Section 5.10 Help".

Appendix 4 Precautions for Differences in Programming Tool Versions

Since the functionality and performance of PX Developer's programming tool have been updated and improved occasionally, the project may have a different internal structure for saving the same program depending on the programming tool version. Therefore, careful attention to the compatibility and performance of each version must be taken when opening a project or downloading data to a PLC by a PX Developer version different from the one in which the project was saved.

The following describes precautions for version differences.

Appendix 4.1 Precautions for opening a project

The project may not open when it was saved on a different PX Developer version, depending on the combination of the relevant versions.

Version compatibility for opening projects is shown below.

(1) Version compatibility for added tag type

	Version in which the project was solved	Version used for opening the project					
	Version in which the project was saved	1.02C to 1.08J	1.10L or later				
1.02C to 1.08J		0	0				
4 401 or leter	User-defined tag FB in the added tag type* is not used.	0	0				
1.10L or later	User-defined tag FB in the added tag type*1 is used.	×	0				

O: Able to open the project.

*1: The following table shows the tag types added to each version.

Version	Tag type
1.10L	2PIDH
1.14Q	PGS2

(2) Version compatibility for added project parameter setting Depending on the setting status of project parameter items*², which are added to version 1.18U or later, a system ladder program according to the setting is created during compilation. When this compiled project file is opened by using a programming tool that is lower than the added version, the system ladder program remains in the #FBDQ000 until compiling. Therefore, when the program is executed, the system may operate unexpectedly.

*2: The following table shows the setting items that differ from the previous versions on the system ladder program processing.

Added version	Setting tab	Item	Setting status
		Input limiter	No check
1.18U	I/O Control	Disconnection detection	Checked

App- 6 App- 6

x: Unable to open the project.

Appendix 4.2 Precautions for the assignment information database

Operations such as monitoring or downloading to PLC may not be executed when the project was saved on a different PX Developer version, depending on the combination of the relevant versions. Also, in order to perform these operations, conversion of the assignment information database in the project may be required.

(1) Assignment information database

The assignment information database is one of the files included in projects of PX Developer. (Refer to Section 6.1.) Information such as which variable is assigned to which PLC device is stored in this database, and such information is required to access to a PLC.

The programming tool accesses this assignment information database when performing the following:

- Execute hot-start compile
- Execute online change compile
- · Switch to monitor mode
- Execute PLC download

When an access is made to the assignment information database stored by an old version of a different format, the programming tool will automatically activate the conversion function of the assignment information database.

(2) Version compatibility for access to the assignment information database

Depending on the version of the programming tool, there are some restrictions on access to the assignment information database. The following shows the version compatibility.

Version used for last compilation		Version used for access to assignment information database		
		1.02C to 1.04E	1.05F to 1.08J	1.10L or later
1.02C to 1.04E		0	Δ	Δ
1.05F to 1.08J		×	0	0
1.10L or later	Added tag type*1 is not used.	×	0	0
	Added tag type*1 is used	×	×	0

O: Accessible

^{*1:} The following table shows the tag types added to each version.

Version	Tag type
1.10L	2PIDH
1.14Q	PGS2

App- 7 App- 7

^{△:} Accessible only after conversion of the assignment information data base

x: Not accessible

POINT

How to convert the assignment information database is explained below. In accessing to the old-version assigned information database file, conversion function of assigned information database file will be started automatically. In accessing to old-version assigned information database file, following dialog box will be displayed.



Click "Yes" button to start converting assigned information database file. The converted assigned information database file is not applicable in programming tool that is lower than the version that is used to convert assigned information database file.

In this case, please execute either of the following operations.

- Use the programming tool that is used for conversion.
- Execute cold-start compile and create new assigned information database file (PLC download is necessary in switching to monitor mode.)

App- 8 App- 8

Appendix 4.3 Precautions on the addition of compile status (Invalid initial value)

When a project is opened in Version 1.07H or earlier with its Compile status set to "Invalid initial value", it will be handled as non-compiled. (The "Invalid initial value" option in Compile status was added in Version 1.08J.)

Project created in Version 1.08J or later	When handled in 1.07H or earlier
Compiled (Compiled ()
Invalid initial value ()	Non-compiled ()
Non-compiled ()	Non-complica ()

The Compile status icon is displayed on the status bar. (Refer to Section 5.3.)

Appendix 4.4 Precautions on the addition of the consistency check before downloading to PLC or online change

In Version 1.08J or later, the data consistency is checked before downloading to PLC or online change. This function checks whether the data produced when the PX Developer project was compiled last (execution data) are correctly contained in the corresponding GX Developer project or not.

This consistency check is not performed in Version 1.07H or earlier.

When a GX Developer project inside a PX Developer project was opened to upload a "Label program" from a PLC, it is recommended to ensure the consistency.

App- 10 App- 10

Appendix 4.5 Precautions on the compile function improvement

The programming tool includes the improved compile function from the new version (Version 1.04E or later).

Therefore, the FBD programs compiled by the new version outperform those compiled by the old version (Version1.03D or earlier) as follows;

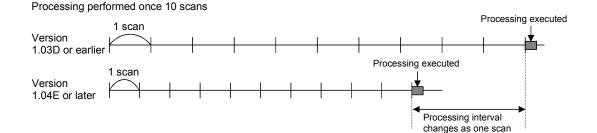
- Reduce the number of ladder program steps generated by compile.
- Reduce the scan time of the FBD program.

Note the following when utilizing the program created by the old version (Version1.03D or earlier).

Precautions on the reduced scan time of FBD program

Executed faster, the FBD programs compiled by the new version (Version 1.04E or later) require less scan time as compared with those complied by the old version (Version 1.03D or earlier).

Therefore, if the scan time-dependent processing is executed for scan execution FBD programs or the user-created ladder programs, the processing interval differs between the old version and new version (Version 1.04E or later).



POINT

The scan time can be confirmed on GX Developer.

For the confirmation method, refer to the GX Developer Operating Manual.

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PX Developer Version 1

Operating Manual (Programming Tool)

MODEL	SW1D5C-FBDQ-O-PRG-E	
MODEL CODE	13JU38	
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