MELSOFT

Engineering Software

GX Works2 Version 1
Operating Manual
(Simple Project)

-SW1DND-GXW2-E
-SW1DNC-GXW2-E
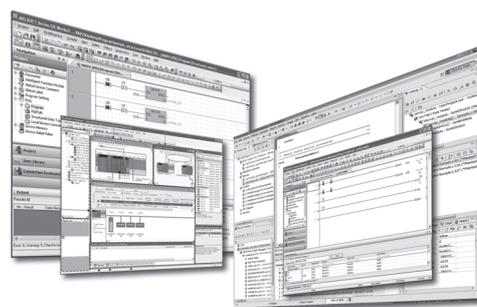
● SAFETY PRECAUTIONS ●

(Always read these instructions before using this product.)

Before using this product, thoroughly read this manual and the relevant manuals introduced in this manual and pay careful attention to safety and handle the products properly. If products are used in a different way from that specified by manufacturers, the protection function of the products may not work properly.
The precautions given in this manual are concerned with this product. For the safety precautions of the programmable controller system, refer to the User's Manual for the CPU module.

In this manual, the safety precautions are ranked as "⚠ WARNING" and "⚠ CAUTION".

⚠ WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Note that the ⚠ CAUTION level may lead to serious consequences according to the circumstances. Always follow the precautions of both levels because they are important for personal safety.

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

[Design Instructions]

⚠ WARNING

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

[Security Precautions]

⚠ WARNING

● To maintain the security (confidentiality, integrity, and availability) of the programmable controller and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

[Startup/Maintenance Instructions]

⚠ CAUTION

● The online operations performed from a personal computer to a running programmable controller CPU (Program change when a programmable controller CPU is RUN, operating status changes such as forced input/output operation and RUN-STOP switching, and remote control operation) must be executed after the manual has been carefully read and the safety has been ensured.
When changing a program while a programmable controller CPU is RUN, it may cause a program corruption in some operating conditions. Fully understand the precautions described in GX Works2 Version 1 Operating Manual (Common) before use.
● The positioning test functions of OPR, JOG, inching or positioning data for QD75/LD75 positioning module must be executed with the programmable controller set to STOP after the manual has been carefully read and the safety has been ensured. Specially when executing the function on the network system, ensure the safety thoroughly since the machinery whose operation cannot be checked by an operator may be activated. The operation failure may cause the injury or machine damage.

● CONDITIONS OF USE FOR THE PRODUCT ●

(1) MELSEC programmable controller ("the PRODUCT") shall be used in conditions;

    i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and

    ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI ELECTRIC SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI ELECTRIC USER'S, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")

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

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.

- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.

- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

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

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

REVISIONS

Print date	Manual number*1	Revision
Jul. 2008	SH(NA)-080780ENG-A	First edition
Jan. 2009	SH(NA)-080780ENG-B	**Model Addition** Q00UJ, Q00U, Q01U, Q10UDH, Q10UDEH, Q20UDH, Q20UDEH, FX series **Addition** MANUALS, Section 2.2.8, Section 2.2.9, Section 5.2.2, Section 5.3.5, Section 11.3.4 **Correction** GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.1, Section 1.3.1, Section 1.3.2, Section 2.1, Section 3.1, Section 5.2.1, Section 5.2.3, Section 5.3.3, Section 5.4, Section 5.6, Section 5.6.2, Section 7.1.1, Section 7.1.2, Section 7.1.5, Section 7.1.6, Section 8.2, Section 8.2.1, Section 8.3, Section 8.4, Section 8.5.1, Section 9.2, Section 9.3, Section 9.4, Section 9.5, Section 9.8, Section 9.8.1, Section 10.1, Section 11.1, Section 11.3.2, Section 12.2, Appendix 1.1, Appendix 1.5, Appendix 1.6 **Modification** Section 5.1 → Chapter 5, Section 5.2 → Chapter 6, Chapter 6 to 11 → Chapter 7 to 12
Jul. 2009	SH(NA)-080780ENG-C	**Model Addition** Q00J, Q00, Q01 **Addition** Chapter 4, Section 6.4, Section 6.5, Section 6.15, Section 9.5 **Correction** MANUALS, GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.2, Section 1.3, Section 2.1.1, Section 2.2, Section 2.2.3, Section 2.2.7, Section 2.3.1, Section 3.1, Section 5.1, Section 5.2, Section 5.3, Section 5.4, Section 5.5, Section 5.6.1, Section 5.7, Section 6.2.1, Section 6.2.4, Section 6.3.4, Section 7.1, Section 7.2, Section 7.3, Section 7.4, Section 7.5, Section 7.8, Section 7.9, Section 7.10, Section 7.11, Section 8.2, Chapter 10, Section 11.1, Section 12.5, Section 13.2, Appendix 1 **Modification** Chapter 4 to Chapter 12 → Chapter 5 to Chapter 13, Section 5.4 to Section 5.12 → Section 5.6 to Section 5.14 **Deletion** Section 7.1.1, Section 7.1.2, Section 7.1.3, Section 7.1.5
Oct. 2009	SH(NA)-080780ENG-D	**Correction** MANUALS, GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.3.1, Section 5.1, Section 5.2, Section 5.3, Section 5.4, Section 6.4.5, Section 13.1, Section 13.2, Appendix 1.2
Jan. 2010	SH(NA)-080780ENG-E	**Model Addition** L02, L26-BT **Addition** CONDITIONS OF USE FOR THE PRODUCT **Correction** MANUALS, GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.2, Section 1.3, Section 2.1, Section 2.2.9, Section 4.1, Section 5.2, Section 6.2.2, Section 6.3.2, Section 6.4, Section 6.10, Section 6.15, Section 7.9, Section 7.11.2, Section 9.2.1, Section 9.4, Section 9.7, Section 10.2.1, Section 11.1, Section 12.4, Chapter 13, Appendix 1
Apr. 2010	SH(NA)-080780ENG-F	**Model Addition** Q50UDEH, Q100UDEH, LJ72GF15-T2 **Addition** Section 2.3.3, Section 2.3.6, Section 7.2, Section 7.8.2, Section 7.8.3, Section 7.13, Section 7.14 **Correction** MANUALS, GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.2, Section 1.3, Section 2.3.1, Section 5.2, Section 5.3, Section 5.4, Section 5.5.2, Section 5.7, Section 6.15, Section 7.1, Section 7.3.1, Section 7.3.2, Section 7.3.3, Section 7.3.4, Section 7.3.5, Section 7.3.6, Section 7.3.7, Section 7.3.8, Section 7.3.9, Section 7.9, Section 8.2.5, Section 10.2.1, Section 10.2.2, Section 10.2.5, Section 12.5.1, Section 13.2, Appendix 1.1, Appendix 1.2, Appendix 1.6 **Modification** Section 2.3.3 to Section 2.3.4 → Section 2.3.4 to Section 2.3.5, Section 7.2 to Section 7.11 → Section 7.3 to Section 7.12

Print date	Manual number*1	Revision

Sept. 2010	SH(NA)-080780ENG-G	**Addition**
		    Section 5.8
		Correction
		    Section 1.2, Section 1.3.1, Section 1.3.2, Section 1.3.3, Section 1.3.4, Section 2.1,
		    Section 5.2, Section 5.3, Section 5.4, Section 5.5.2, Section 5.7, Section 6.2.1,
		    Section 6.2.3, Section 6.2.4, Section 6.2.6, Section 6.3.6, Section 6.4.3, Section 6.4.5,
		    Section 6.15, Section 7.1, Section 7.9.2, Section 7.9.3, Section 7.12.2, Section 8.1.2,
		    Section 8.2.3, Section 9.3, Section 9.6.2, Section 10.2.1, Section 10.2.2, Section 10.2.3,
		    Section 10.2.5, Section 11.1, Section 12.5.1, Section 13.1.2, Section 14.2, Appendix 1.2,
		    Appendix 1.6

Jan. 2011	SH(NA)-080780ENG-H	**Addition**
		    TERMS, Section 5.5.1, Section 5.5.2, Section 6.16
		Correction
		    MANUALS, GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.2,
		    Section 1.3.1, Section 2.1, Section 2.2.6, Section 4.1, Section 5.1, Section 5.2, Section 5.3,
		    Section 5.4, Section 5.5.3, Section 5.6.1, Section 6.2.7, Section 6.3.1, Section 6.3.3,
		    Section 6.3.5, Section 6.4.2, Section 6.10.1, Section 7.1, Section 7.3.7, Section 8.1.2,
		    Section 10.2.1, Section 10.2.2, Section 12.4, Section 13.1, Section 13.2, Appendix 1
		Modification
		    Section 5.5.1 to Section 5.5.2 → Section 5.5.3 to Section 5.5.4

Mar. 2011	SH(NA)-080780ENG-I	**Addition**
		    Section 10.3
		Correction
		    MANUALS, Section 1.3.1, Section 1.3.3, Section 5.4, Section 5.5.2, Section 5.5.3,
		    Section 5.7, Section 5.7.1, Section 6.2.1, Section 6.3.6, Section 6.4.5, Section 7.13,
		    Section 10.2.1, Section 11.1, Section 13.2, Appendix 1, Appendix 1.1, Appendix 1.6
		Modification
		    Section 10.3 → Section 10.4

Jul. 2011	SH(NA)-080780ENG-J	**Model Addition**
		    L02-P, L26-PBT
		Addition
		    Section 2.2.5, Section 6.1.2, Section 8.1.1, Section 8.2.2, Section 9.5, Appendix 1.2
		Correction
		    GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.2, Section 1.3.1,
		    Section 1.3.2, Section 1.3.3, Section 2.1, Section 2.2.1, Section 2.2.6, Section 2.2.8,
		    Section 2.3.1, Section 4.1, Section 5.2, Section 5.3, Section 5.4, Section 5.7.1,
		    Section 6.1.1, Section 6.2.4, Section 6.2.6, Section 6.2.7, Section 6.4.1, Section 6.4.2,
		    Section 6.4.3, Section 6.4.4, Section 6.6.2, Section 6.8.2, Section 7.9.1, Section 8.1,
		    Section 9.2.1, Section 9.2.2, Section 9.2.3, Section 9.3, Section 9.5, Section 10.2.1,
		    Section 10.2.2, Section 10.3.3, Section 11.1, Section 12.1, Section 12.5.1, Section 13.1,
		    Section 13.2, Appendix 1
		Modification
		    Section 2.2.6 to Section 2.2.9 → Section 2.2.7 to Section 2.2.10,
		    Section 8.1.1 to Section 8.1.2 → Section 8.1.2 to Section 8.1.3,
		    Section 8.2.2 to Section 8.2.5 → Section 8.2.3 to Section 8.2.6,
		    Section 9.6 to Section 9.7 → Section 9.7 to Section 9.8,
		    Section 10.2.5 → Section 10.3.3, Section 12.3.3 → Section 12.2.5,
		    Appendix 1.2 to Appendix 1.8 → Appendix 1.3 to Appendix 1.9

Sept. 2011	SH(NA)-080780ENG-K	**Correction** Section 1.3.1, Section 2.2.5, Section 6.6.2, Section 6.8.2, Section 8.2.2

Print date	Manual number[*1]	Revision
Nov. 2011	SH(NA)-080780ENG-L	**Addition** Section 6.11.4, Section 6.16, Section 7.11.1, Section 7.11.2, Section 10.1.4, Section 12.3.2, Section 12.3.3, Section 12.4.1, Section 12.4.2, Section 12.4.3 **Correction** MANUALS, Section 1.2, Section 1.3, Section 1.3.1, Section 1.3.2, Section 1.3.3, Section 2.1, Section 2.2.2, Section 2.2.9, Section 2.3.2, Section 2.3.5, Section 5.2, Section 5.5.3, Section 5.5.4, Section 5.6.1, Section 5.6.3, Section 5.6.4, Section 6.2.1, Section 6.3, Section 6.4.1, Section 6.6.2, Section 6.8.2, Section 6.9.4, Section 6.11.3, Section 6.14, Section 7.3.1, Section 7.3.10, Section 7.4.2, Section 7.9.1, Section 7.10, Section 7.11, Section 7.11.3, Section 7.11.4, Section 7.12.2, Section 9.2.2, Section 9.3, Section 9.4, Section 9.7.1, Section 10.1.1, Section 10.2.1, Section 10.3.3, Section 12.4.5, Section 13.1, Section 13.2, Appendix 1.1, Appendix 1.2, Appendix 1.3 **Modification** Section 6.16 → Section 6.17, Section 7.11.1 to Section 7.11.4 → Section 7.11.3 to Section 7.11.6, Section 10.1.4 → Section 10.1.5, Section 12.3 to Section 12.5 → Section 12.2 to Section 12.4, Chapter 13 → Chapter 12 Appendix 1.3 → Appendix 1.2, Appendix 1.7 → Appendix 1.3 **Deletion** Section 1.3.5, Appendix 1.2, Appendix 1.4, Appendix 1.5, Appendix 1.6, Appendix 1.8, Appendix 1.9, The content regarding the methods for using function blocks are moved to GX Works2 Version 1 Operating Manual (Simple Project, Function Block).
Jan. 2012	SH(NA)-080780ENG-M	**Model Addition** FX3GC **Correction** Section 1.3.1, Section 5.5.4, Section 5.7.1, Section 5.8, Section 6.14, Section 11.1, Section 13.2
May 2012	SH(NA)-080780ENG-N	**Model Addition** Q02PH, Q06PH, Q12PH, Q12PRH, Q25PH, Q25PRH **Addition** Section 2.2.9, Section 2.2.10, Section 2.3.3, Section 5.5.4, Section 5.5.6, Section 6.2.8, Section 6.11.5 **Correction** GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.3.1, Section 1.3.2, Section 1.3.3, Section 2.1, Section 2.2.3, Section 2.2.8, Section 3.1, Section 5.2, Section 5.5.3, Section 5.6.1, Section 5.6.3, Section 5.6.4, Section 5.7.1, Section 6.2.1, Section 6.4.1, Section 6.4.5, Section 7.9.1, Section 7.11.1, Section 7.11.2, Section 8.2.1, Section 8.2.5, Section 10.3.3, Section 12.3.2, Section 13.2, Appendix 1.1, Appendix 1.2, Appendix 1.3 **Modification** Section 2.2.9 to Section 2.2.10 → Section 2.2.11 to Section 2.2.12 Section 2.3.3 to Section 2.3.6 → Section 2.3.4 to Section 2.3.7 Section 5.5.4 → Section 5.5.5
Sept. 2012	SH(NA)-080780ENG-O	**Addition** Section 5.7 **Correction** Section 1.3.1, Section 2.2.7, Section 2.2.10, Section 2.3.1, Section 3.1, Section 6.2.7, Section 6.12, Section 10.2.1, Section 10.2.2, Section 10.2.4, Section 10.3.2, Section 12.3.1, Section 13.1, Section 13.2 **Modification** Section 5.7 to Section 5.8 → Section 5.8 to Section 5.9

Print date	Manual number*1	Revision
Feb. 2013	SH(NA)-080780ENG-P	**Model Addition** Q03UDV, Q04UDV, Q06UDV, Q13UDV, Q26UDV, L02S, L06, L26 **Addition** Section 8.1.2, Section 12.3.2 **Correction** GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.3.1, Section 1.3.2, Section 2.1, Section 5.5.5, Section 5.5.6, Section 6.2.8, Section 6.4.5, Section 6.11, Section 7.11, Section 7.11.1, Section 8.1.1, Section 9.5.2, Section 10.1.4, Section 10.2.4, Section 12.3.1, Section 13.2, Appendix 1.1, Appendix 1.3 **Modification** Section 12.3.2 → Section 12.5
May 2013	SH(NA)-080780ENG-Q	**Model Addition** L02S-P, L06-P, L26-P, FX3S **Correction** GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 2.1, Section 5.5.2, Section 6.2.1, Section 10.3.3, Section 12.5, Section 13.2
Sept. 2013	SH(NA)-080780ENG-R	**Correction** Section 5.5.6, Section 12.4.1, Section 13.2
Dec. 2013	SH(NA)-080780ENG-S	**Correction** Section 2.2.2, Section 2.3.2, Section 4.1, Section 5.6.4, Section 7.12.2, Section 13.1, Section 13.2
Mar. 2014	SH(NA)-080780ENG-T	**Correction** Section 5.5.3, Section 9.4, Section 12.1, Section 12.3.1
Jun. 2014	SH(NA)-080780ENG-U	**Correction** Section 5.2, Section 5.5.1, Section 10.1.5, Section 10.2.2, Section 13.1, Section 13.2
Sept. 2014	SH(NA)-080780ENG-V	**Correction** Section 6.1.2, Section 6.2.4, Section 6.4.5, Section 12.4.1, Section 13.2, Appendix 1.3
Dec. 2014	SH(NA)-080780ENG-W	**Correction** Section 10.2.1, Section 10.2.2
Mar. 2015	SH(NA)-080780ENG-X	**Correction** Section 7.7, Section 10.3, Section 12.1, Section 12.2.2, Section 13.2
Dec. 2015	SH(NA)-080780ENG-Y	**Correction** Section 1.3.3, Section 2.3.1, Section 6.2.4, Section 7.11.2, Section 12.4.1, Section 12.4.4, Section 13.2
Dec. 2016	SH(NA)-080780ENG-Z	**Correction** Section 2.2.8
Jan. 2018	SH(NA)-080780ENG-AA	**Addition** Section 8.2.6 **Correction** GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 1.3.4 **Modification** Section 8.2.6 → Section 8.2.7
Jun. 2018	SH(NA)-080780ENG-AB	**Correction** SAFETY PRECAUTIONS, Section 1.3.2, Section 6.4.5
Dec. 2018	SH(NA)-080780ENG-AC	**Correction** SAFETY PRECAUTIONS, Section 1.3.2, Section 1.3.3, Section 6.1.2, Appendix 1.3
Jun. 2020	SH(NA)-080780ENG-AD	**Correction** Section 5.8.1

Print date	Manual number[*1]	Revision

Sept. 2022	SH(NA)-080780ENG-AE	**Model Addition**
		  Q04UDPV, Q06UDPV, Q13UDPV, Q26UDPV
		Addition
		  COPYRIGHTS
		Correction
		  SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT,
		  GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL, Section 13.2

May 2023	SH(NA)-080780ENG-AF	**Correction** SAFETY PRECAUTIONS, Section 2.1

*1 :   The manual number is written at the bottom left of the back cover.

INTRODUCTION

Thank you for purchasing the engineering software, MELSOFT series.
Before using the product, thoroughly read this manual to develop full familiarity with the functions and performance to ensure correct use.

CONTENTS

1   OVERVIEW

2   SCREEN CONFIGURATION

3   PROGRAMMING PROCEDURE

4   PROGRAM CONFIGURATIONS

5   SETTING LABELS

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7   EDITING SFC PROGRAMS

8   SEARCH AND REPLACE

9   EDITING COMMENTS/STATEMENTS/NOTES

10 CONVERTING/COMPILING PROGRAMS

11 WRITING/READING DATA TO/FROM PROGRAMMABLE CONTROLLER CPU

12 MONITORING

13 SETTING OPTIONS

APPENDIX

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TRADEMARKS

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■ MANUALS

Related manuals are separately issued according to the purpose of their functions in GX Works2.

● **Related manuals**

The manuals related to this product are shown below.
Refer to the following tables when ordering required manuals.

1) Operation of GX Works2

Manual name	Manual number (Model code)
GX Works2 Version 1 Operating Manual (Simple Project) Explains methods for such as creating and monitoring programs in Simple project of GX Works2. (Sold separately)	SH-080780ENG (13JU64) (this manual)
GX Works2 Version 1 Operating Manual (Common) Explains the system configuration of GX Works2 and the functions common to Simple project and Structured project such as parameter setting, operation method for the online function. (Sold separately)	SH-080779ENG (13JU63)
GX Works2 Version 1 Operating Manual (Simple Project, Function Block) Explains methods for such as creating function blocks, pasting function blocks to sequence programs, and operating FB library in Simple project of GX Works2. (Sold separately)	SH-080984ENG (13JU72)
GX Works2 Version 1 Operating Manual (Structured Project) Explains methods for such as creating and monitoring programs in Structured project of GX Works2. (Sold separately)	SH-080781ENG (13JU65)
GX Works2 Version 1 Operating Manual (Intelligent Function Module) Explains methods of intelligent function module for such as parameter setting, monitoring programs, and predefined protocol support function in GX Works2. (Sold separately)	SH-080921ENG (13JU69)
GX Works2 Beginner's Manual (Simple Project) Explains fundamental methods for such as creating, editing, and monitoring programs in Simple project for users inexperienced with GX Works2. (Sold separately)	SH-080787ENG (13JZ22)
GX Works2 Beginner's Manual (Structured Project) Explains fundamental methods for such as creating, editing, and monitoring programs in Structured project for users inexperienced with GX Works2. (Sold separately)	SH-080788ENG (13JZ23)

2) Structured Programming

Manual name	Manual number (Model code)
MELSEC-Q/L/F Structured Programming Manual (Fundamentals) Explains the programming methods, types of programming languages, and other information required to create structured programs. (Sold separately)	SH-080782ENG (13JW06)
MELSEC-Q/L Structured Programming Manual (Common Instructions) Explains the specifications and functions of common instructions such as sequence instructions, basic instructions, and application instructions, that can be used in structured programs. (Sold separately)	SH-080783ENG (13JW07)
MELSEC-Q/L Structured Programming Manual (Application Functions) Explains the specifications and functions of application functions that can be used in structured programs. (Sold separately)	SH-080784ENG (13JW08)
MELSEC-Q/L Structured Programming Manual (Special Instructions) Explains the specifications and functions of special instructions such as module dedicated instruction, PID control instruction, and built-in I/O function dedicated instruction, that can be used in structured programs. (Sold separately)	SH-080785ENG (13JW09)
FXCPU Structured Programming Manual [Device & Common] Explains the devices and parameters provided in GX Works2 for structured programming. (Sold separately)	JY997D26001 (09R925)
FXCPU Structured Programming Manual [Basic & Applied Instruction] Explains the sequence instructions provided in GX Works2 for structured programming. (Sold separately)	JY997D34701 (09R926)

Manual name	Manual number (Model code)

FXCPU Structured Programming Manual [Application Functions]
    Explains the application functions provided in GX Works2 for structured programming.
                                                                                      (Sold separately)
	JY997D34801
	(09R927)

3) Operation of iQ Works

Manual name	Manual number (Model code)

Let's start iQ Works Version 2
    Explains fundamental methods for such as managing the system using MELSOFT Navigator and using
    system labels for users inexperienced with GX Works2.   (Sold separately)
	SH-081261ENG
	(13JZ79)

Point

The Operating Manuals are included on the DVD and CD of the software package in a PDF file format.
Manuals in printed form are sold separately for single purchase. Order a manual by quoting the manual number (model code) listed in the table above.

● **Purpose of this manual**

This manual explains the operations for creating sequence programs in Simple project using the functions supported by GX Works2.
Manuals for reference are listed in the following table according to their purpose.
For information such as the content and number of each manual, refer to the list of 'Related manuals'.

1) Installation of GX Works2 and USB driver

Purpose	GX Works2 Installation Instructions	GX Works2 Version 1 Operating Manual
		Common
Learning the operating environment and installation method	Details	
Learning a USB driver installation method		Details

2) Operation of GX Works2

Purpose	GX Works2 Beginner's Manual		GX Works2 Version 1 Operating Manual				
	Simple Project	Structured Project	Common	Simple Project		Structured Project	Intelligent Function Module
					Function Block		
Learning all functions of GX Works2			Outline				
Learning the project types and available languages in GX Works2			Outline				
Learning the basic operations and operating procedures when creating a simple project for the first time	Details						
Learning the basic operations and operating procedures when creating a structured project for the first time		Details					
Learning the operations of available functions regardless of project type.			Details				
Learning the functions and operation methods for programming			Outline	Details		Details	
Learning the operations and operating procedures when creating function blocks (FB) in Simple project.					Details		
Learning data setting methods for intelligent function module							Details

3) Operations in each programming language

For details of instructions used in each programming language, refer to the section 4 and the section 5 on the following pages.

Purpose		GX Works2 Beginner's Manual		GX Works2 Version 1 Operating Manual	
		Simple Project	Structured Project	Simple Project	Structured Project
Simple Project	Ladder Diagram	Outline		Details	
	Sequential Function Chart	Outline *1		Details	
	Structured Text		Outline		Details
Structured Project	Ladder Diagram	Outline		Details	
	Sequential Function Chart	Outline *1		Details	
	Structured Ladder /FBD		Outline		Details
	Structured Text		Outline		Details

*1 : MELSAP3 and FX series SFC only

4) Details of instructions in each programming language (for QCPU (Q mode)/LCPU)

Purpose		MELSEC-Q/L/F Structured Programming Manual	MELSEC-Q/L Structured Programming Manual			MELSEC-Q/L Programming Manual	MELSEC-Q/L/QnA Programming Manual		Manual for module to be used
		Fundamentals	Common Instructions	Special Instructions	Application Functions	Common Instruction	PID Control Instructions	SFC	-
All languages	Learning details of programmable controller CPU error codes, special relays, and special registers					Details			
Using Ladder Diagram	Learning the types and details of common instructions					Details			
	Learning the types and details of instructions for intelligent function modules								Details
	Learning the types and details of instructions for network modules								Details
	Learning the types and details of instructions for the PID control function						Details		
Using Sequential Function Chart	Learning details of specifications, functions, and instructions of SFC (MELSAP3)							Details	
Using Structured Ladder/ FBD or Structured Text	Learning the fundamentals for creating a structured program	Details							
	Learning the types and details of common instructions		Details						
	Learning the types and details of instructions for intelligent function modules			Outline					Details
	Learning the types and details of instructions for network modules			Outline					Details
	Learning the types and details of instructions for the PID control function			Outline			Details		
	Learning the types and details of application functions				Details				

5) Details of instructions in each programming language (for FXCPU)

Purpose		MELSEC-Q/L/F Structured Programming Manual	FXCPU Structured Programming Manual			FXCPU Programming Manual		
		Fundamentals	Device & Common	Basic & Applied Instruction	Application Functions	FX0,FX0S, FX0N,FX1, FXU,FX2C	FX1S,FX1N, FX2N,FX1NC, FX2NC	FX3S, FX3G,FX3U, FX3GC,FX3UC
Using Ladder Diagram	Learning the types and details of basic/ application instructions, descriptions of devices and parameters					Details	Details	Details
Using Sequential Function Chart	Learning details of specifications, functions, and instructions of SFC					Details	Details	Details
Using Structured Ladder/ FBD or Structured Text	Learning the fundamentals for creating a structured program	Details						
	Learning the descriptions of devices, parameters, and error codes		Details					
	Learning the types and details of sequence instructions			Details				
	Learning the types and details of application instructions				Details			

● How to read this manual

2.2 Ladder Editor

This section explains the screen display of the GX Works2 ladder editor and its basic operations.

2.2.1 Editing screen

Q CPU L CPU FX

The following explains the editing screen used for creating ladders.

Screen display

● **For a project without labels**
Select Project view ⇒ "POU" ⇒ "Program" ⇒ "(program)".
● **For a project with labels**
Select Project view ⇒ "POU" ⇒ "Program" ⇒ "(program)" ⇒ "Program".

Title bar — [PRG]Write MAIN 52 Step
Step number
AvaData=[D0+D1+D2+D3+D4+D5+D6+D7+D8+D9+D10+D11+D12]/12;
Inline structured text box
Cursor
END line
Left power rail
Right power rail

Display contents

Name	Description
Title bar	Display a data type, data name, and/or other information of the open data.
Step number	Display a start step number of the ladder block.
Inline structured text box	An area for editing ST programs on the ladder editor in a project with labels. (⇨ Section 6.4)
Cursor	Data at the cursor position are edited.
Left power rail	Power rails of ladder programs.
Right power rail	
END line	Indicate the end of a ladder program. Programs cannot be created beyond the END line.

2.2.1 Editing screen   2 - 5

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Supported CPU

Supported programmable controller CPUs are shown in icons under the section title.

Screen display

Describes the screen display procedure.
Follow the ⇒and select [(menu)] to open the screen.
*Screen display may differ depending on the CPU type.
In that case, typical example is described.

Chapter heading

Index on the right of the page number clarifies the chapter of currently open page.

Display contents

Describes the display contents on the screen.

Section title

Clarifies the section of currently open page.

Screen display

Select [Tool] ⇒ [Options].

Options - (Unset Project)
Project
 Common Setting
 Automatic Save
 Change History
Program Editor
Device Comment Editor
Label Setting Editor
Parameter
Monitor
PLC Read/Write
Online Change
Symbolic Information
Compile
Intelligent Function Module
iQ Works Interaction
System Label Setting

Language Setting
Automatically change language according to system

Explanation

Back to System Default   Back to User Default   Set as User Default   OK   Cancel

Operating procedure

• **Set the items on the screen.**
When the cursor is placed on a setting item, an explanation of the item is displayed on the "Explanation" field.
Details of the setting items ⇨ Section 13.2

Screen button

● Back to System Default
Restores the initial settings.

● Back to User Default
Restores the user default settings.

● Set as User Default
Stores the current settings as the user default and applies them to a new project.

Operating procedure

Describes the operating procedure of the function.

Reference location

☞ leads to the reference location and reference manual.

Screen button

Describes the buttons on the screen.

The following table explains the CPU module icons that indicate the function availability.

Icon			Description
QCPU (Q mode)	LCPU	FXCPU	
Q CPU	**L CPU**	**FX**	Normal icons indicate that the corresponding function is available.
Q CPU *1	-	-	Icons with * (asterisk) symbol indicate that the corresponding function is available with restrictions such as CPU types.
Q CPU ✕	L CPU ✕	FX ✕	Icons with × symbol indicate that the corresponding function is not available.

This manual also uses the following columns:

Point

This indicates notes requiring attention or useful functions relating to the information given on the same page.

Restrictions

This indicates restrictions relating to the information given on the same page.

● **Symbols used in this manual**

The following shows the symbols used in this manual with descriptions and examples.
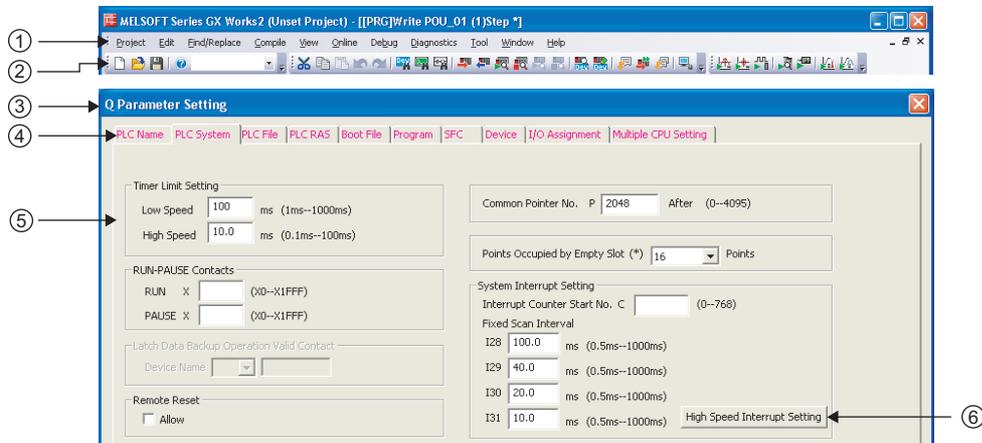
No.	Symbol	Description	Example
①	[ ]	Menu name on a menu bar	[Project]
②	▯	Toolbar icon	▤
③	(Underline)	Screen name	Q Parameter Setting screen
④	<< >>	Tab name on a screen	<<PLC System>>
⑤	" "	Item name on a screen	"Timer Limit Setting"
⑥	▭	Button on a screen	High Speed Interrupt Setting button
-	▭	Keyboard key	Ctrl

■ GENERIC TERMS AND ABBREVIATIONS IN THIS MANUAL

The following are the generic terms/abbreviations of such as software packages and programmable controller CPUs used in this manual.

Generic term and abbreviation	Description
GX Works2	Generic product name for SWnDND-GXW2-E and SWnDNC-GXW2-E (n: version)
GX Developer	Generic product name for SWnD5C-GPPW-E, SWnD5C-GPPW-EA, SWnD5C-GPPW-EV, and SWnD5C-GPPW-EVA (n: version)
MELSOFT Navigator	Product name for the integrated development environment included in SWnDNC-IQWK and SWnDND-IQWK (MELSOFT iQ Works) (n: version)
iQ Works	Abbreviation for MELSOFT iQ Works
Personal computer	Generic term for personal computers on which Windows® operates
Basic model QCPU	Generic term for Q00J, Q00, and Q01
High Performance Model QCPU	Generic term for Q02, Q02H, Q06H, Q12H, and Q25H
Process CPU	Generic term for Q02PH, Q06PH, Q12PH, and Q25PH
Redundant CPU	Generic term for Q12PRH and Q25PRH
Universal model QCPU	Generic term for Q00UJ, Q00U, Q01U, Q02U, Q03UD, Q03UDE, Q03UDV, Q04UDH, Q04UDEH, Q04UDV, Q04UDPV, Q06UDH, Q06UDEH, Q06UDV, Q06UDPV, Q10UDH, Q10UDEH, Q13UDH, Q13UDEH, Q13UDV, Q13UDPV, Q20UDH, Q20UDEH, Q26UDH, Q26UDEH, Q26UDV, Q26UDPV, Q50UDEH, and Q100UDEH
High-speed Universal model QCPU	Generic term for Q03UDV, Q04UDV, Q06UDV, Q13UDV, and Q26UDV
Universal model process CPU	Generic term for Q04UDPV, Q06UDPV, Q13UDPV, and Q26UDPV
QCPU (Q mode)	Generic term for Basic model QCPU, High Performance model QCPU, Process CPU, Redundant CPU, and Universal model QCPU
LCPU	Generic term for L02S, L02S-P, L02, L02-P, L06, L06-P, L26, L26-P, L26-BT, and L26-PBT
FXCPU	Generic term for FX0S, FX0, FX0N, FX1, FX1S, FX1N, FX1NC, FXU, FX2C, FX2N, FX2NC, FX3S, FX3G, FX3GC, FX3U, and FX3UC
FXGP(WIN)	Abbreviation for SW0PC-FXGP/WIN
MELSAP3	Abbreviation for the SFC function in MELSAP3 display format
MELSAP-L	Generic term for the SFC function in MELSAP-L (instruction format) and MELSAP-L (start conditions format)
SFC	Generic term for MELSAP3, MELSAP-L, and FX series SFC

■ TERMS

The following are the terms used in this manual.

Term		Description
Execution program		A compiled program created in a project with labels A program that can be executed on a programmable controller CPU
Actual device		An actual device assigned to label after compiling a project with labels, or a device that is not described using a label
Common instruction		Generic term for sequence instructions, basic instructions, application instructions, data link instructions, multiple CPU dedicated instructions, and multiple CPU high-speed transmission dedicated instructions
Special instruction		Generic term for module dedicated instructions, PID control instructions, socket communication function instructions, built-in I/O function instructions, and data logging function instructions
Simple project		Generic term for projects created using Ladder Diagram/Sequential Function Chart/Structured Text
	Without labels	Generic term for projects created without selecting "Use Label" when creating new projects
	With labels	Generic term for projects created with selecting "Use Label" when creating new projects
Structured project		Generic term for projects created using Ladder Diagram/Sequential Function Chart/Structured Text/Structured Ladder/FBD
Project without labels		Generic term for Simple projects that do not use labels
Project with labels		Generic term for Simple projects that use labels and Structured projects
Project with security		Generic term for projects whose securities are set
List format		An input format to input mnemonic language in a ladder program

1   OVERVIEW

This manual describes the programming method using Simple project and the operation method of the related functions.
For the features and functions of GX Works2, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**

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SEARCH AND REPLACE

1.1 What is Simple Project?

The Simple project is used to create sequence programs using instructions for programmable controller CPUs.
Programs in Simple project can be created in a similar way with GX Developer.

1.2 Features of Simple Project

This section explains the features of the Simple project.

■ Inheritance of operational performances and enhanced use of program assets

GX Works2 inherits excellent operational performances from GX Developer.

GX Works2
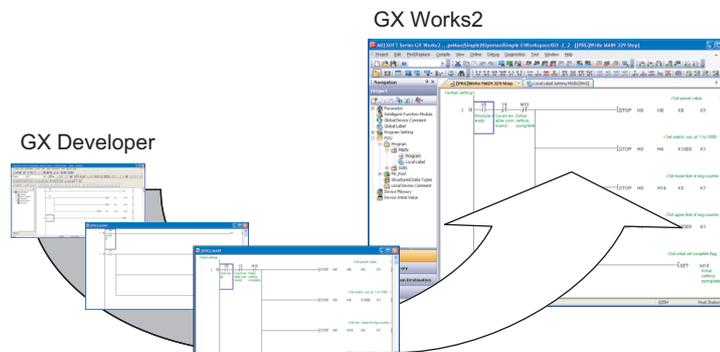
GX Developer

Therefore, GX Works2 can edit the sequence programs created by GX Developer, making it possible to utilize program assets effectively.

■ Program components using function blocks

The function blocks can be used to convert and register ladder blocks that are used repeatedly as components.
Therefore, registered ladder blocks can be easily utilized when creating sequence programs.

Function blocks can be used only for a project with labels.
For details of method for using function blocks, refer to the following manual.
☞ GX Works2 Version 1 Operating Manual (Simple Project, Function Block)

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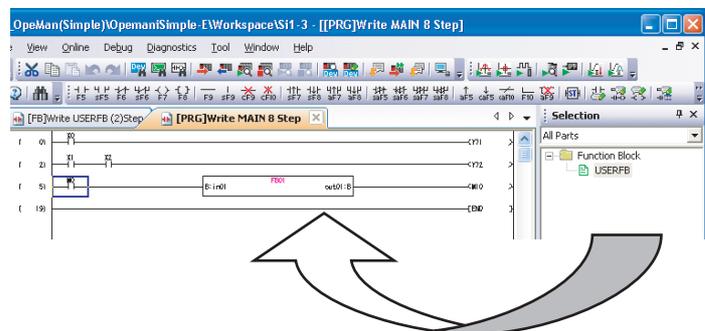
■ ST program editing on ladder editor

ST programs can be edited/monitored on the ladder editor by using the Inline structured text function.
The Inline structured text function can be used only for a project with labels.

1.3 List of Functions

This section shows the list of functions to create programs using Ladder Diagram and Sequential Function Chart.
For all the functions of GX Works2, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**
For (Common) and (FB) indicated in the Reference column, refer to the following manuals respectively:

(Common) … GX Works2 Version 1 Operating Manual (Common)
(FB)   … GX Works2 Version 1 Operating Manual (Simple Project, Function Block)

1.3.1 List of functions common to Simple project and Structured project

This section explains the functions common to Simple project and Structured project.

■ List of common functions

The following tables show functions that are available regardless of the type of editing or setting target.

Project (common function)		Reference
Object		-
New	Add data to the project.	(Common)
Rename	Rename the selected data.	
Delete	Delete the selected data.	
Copy	Copy the selected data.	
Paste	Paste the copied data.	
Set as Default Connection	Specify data in selected connection destination as a connection destination for regular use.	
Property	Display the selected data properties.	
Library		-
Install	Import an FB library to the project.	(FB)
Export FB to Library (Project)	Export FBs to other project	

Edit (common function)		Reference
Undo	Restore the previous processing status.	-
Redo	Restore the processing deleted with [Undo].	
Cut	Cut the selected data.	
Copy	Copy the selected data.	
Paste	Paste the cut or copied data at the cursor position.	

Compile (common function)		Reference
Build	Convert/compile a program being edited.	Section 10.1.1 Section 10.2.1
Online Program Change	Write sequence programs to a programmable controller CPU after the conversion/compilation.	(Common)
Rebuild All	Convert/compile all programs in the project.	Section 10.1.2 Section 10.2.2

View (common function)		Reference
Docking Window		-
Navigation	Display/hide the Navigation window.	(Common)
Element Selection	Display/hide the Element Selection window. Select a part such as function block and function on the window for utilizing it to a program.	(FB)
Output	Display/hide the Output window. The conversion (compilation) result is displayed.	Section 10.4

Online (common function)		Reference
Read from PLC	Read data from the programmable controller CPU.	Section 11.1
Write to PLC	Write data to the programmable controller CPU.	
Monitor		-
Monitor Mode	Switch the mode of the open window to "Monitor Mode" during monitoring.	Section 6.1.2
Monitor (Write Mode)	Switch the mode of the open window to "Monitor (Write Mode)" during monitoring.	
Start Monitoring (All Windows)	Start monitoring the programs of all open windows.	(Common)
Stop Monitoring (All Windows)	Stop monitoring the programs of all open windows.	
Start Monitoring	Start monitoring the program of the open window.	Section 12.1
Stop Monitoring	Stop monitoring the program of the open window.	
Change Value Format (Decimal)	Display the current device value in decimal in program monitoring.	Section 12.3.1
Change Value Format (Hexadecimal)	Display the current device value in hexadecimal in program monitoring.	
Change Instance (Function Block)	Select an instance of the function block to be monitored.	(FB)
SFC All Block Batch Monitoring	Batch monitor all blocks in the SFC program.	Section 12.4.4
SFC Auto Scroll	Scroll the screen to display active steps automatically when they are out of the screen during monitoring.	Section 12.4.1

Tool (common function)		Reference
Check Program	Check programs of the project without labels and display errors.	Section 10.1.5
Check Device Duplication of Global Label	Check duplications of devices assigned to global labels, and display the result.	Section 5.7
Device/Label Automatic-Assign Setting	Set device range to be automatically assigned to a label.	Section 5.8
Options	Set various options.	Chapter 13

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■ List of functions for setting labels

The following table shows the functions for setting and editing labels.

Edit (function for label setting)		Reference
Delete	Delete the selected data.	-
Select All	Select all items.	Section 5.5.5
New Declaration (Before)	Add a row above the cursor position.	
New Declaration (After)	Add a row below the cursor position.	
Delete Row	Delete the row at the cursor position.	
Read from CSV File	Read label settings from the CSV file.	Section 5.9
Write to CSV File	Write label settings to the CSV file.	
System Label		-
	Reservation to Register System Label	Reserve the selected global label for registration as a system label.	Section 5.2
	Reservation to Release System Label	Reserve the selected global label for deregistration of system label.	
	Import System Label	Import system label information and apply it to global labels.	
	Reflect to System Label Database	Apply the registration-reserved/deregistration-reserved global labels to the system label data base.	
	Check the changes of the System Label Database	Apply system label information changed in another project to global labels.	-
	Execute Verification Synchronous with System Label	Resolve a mismatch when system label information contains it.	
Sort		-
	Class	Sort the labels in ascending/descending order with the selected item.	Section 5.5.5
	Label Name		
	Data Type		
	Constant		
	Device		
	Comment		
	Remark		
Unused label list	Extract and display unused labels. Extracted unused labels can be deleted in batch.	Section 5.5.6

1.3.2 List of functions for editing in Ladder Diagram

The following tables show the functions for editing with the ladder editor.

Edit (function for editing in Ladder Diagram)		Reference
Continuous Paste	Increment the device number of device in the cut/copied ladder block and paste it consecutively.	Section 6.11.4
Delete	Delete the selected data.	-
Restore After Ladder Conversion	Return the ladder program being edited to the last converted status.	Section 6.13
Insert Row	Insert a row at the cursor position.	Section 6.9
Delete Row	Delete the row at the cursor position.	
Insert Column	Insert a column at the cursor position.	
Delete Column	Delete the column at the cursor position.	
NOP Batch Insert	Insert an NOP in front of the ladder block at the cursor position.	Section 6.10
NOP Batch Delete	Batch-delete NOPs in the program being edited.	
Edit Line	Enter a line at the cursor position.	Section 6.6.1
Delete Line	Delete the line at the cursor position.	Section 6.8.1
Change TC Setting	Batch-change timer/counter setting values used in the program.	Section 6.15
Ladder Edit Mode		-
Read Mode	Switch the mode of the open window to "Read Mode".	Section 6.1.2
Write Mode	Switch the mode of the open window to "Write Mode".	
Read Mode (All Windows)	Switch the mode of all open windows to "Read Mode".	
Write Mode (All Windows)	Switch the mode of all open windows to "Write Mode".	
Ladder Symbol		-
Open Contact	Insert ⊣⊢ (F5) at the cursor position.	Section 6.2
Close Contact	Insert ⊣/⊢ (F6) at the cursor position.	
Open Branch	Insert (sF5) at the cursor position.	
Close Branch	Insert (sF6) at the cursor position.	
Coil	Insert ( ) (F7) at the cursor position.	
Application Instruction	Insert [ ] (F8) at the cursor position.	
Vertical Line	Insert (sF9) at the cursor position.	Section 6.6.2
Horizontal Line	Insert (F9) at the cursor position.	
Delete Vertical Line	Insert (cF10) at the cursor position.	Section 6.8.2
Delete Horizontal Line	Insert (cF9) at the cursor position.	
Pulse Contact Symbol		-
Rising Pulse	Insert (sF7) at the cursor position.	Section 6.2
Falling Pulse	Insert (sF8) at the cursor position.	
Rising Pulse Branch	Insert (aF7) at the cursor position.	
Falling Pulse Branch	Insert (aF8) at the cursor position.	
Rising Pulse Close	Insert (saF5) at the cursor position.	
Falling Pulse Close	Insert (saF6) at the cursor position.	
Rising Pulse Close Branch	Insert (saF7) at the cursor position.	
Falling Pulse Close Branch	Insert (saF8) at the cursor position.	
Invert Operation Results	Insert (caF10) at the cursor position.	
Operation Result Rising Pulse	Insert (aF5) at the cursor position.	
Operation Result Falling Pulse	Insert (caF5) at the cursor position.	

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Edit (function for editing in Ladder Diagram)		Reference
Inline Structured Text		-
	Insert Inline Structured Text Box	Insert an inline structured text box.	Section 6.4.2
	Display Template	Insert a template corresponds to the instruction, function, or control syntax.	(Structured)
	Mark Template (Left)	Set an argument of the template in the selected status from the left by selecting the menu each time.	
	Mark Template (Right)	Set an argument of the template in the selected status from the right by selecting the menu each time.	
Edit FB Instance	Rename an FB instance name.	(FB)
Documentation		-
	Device Comment	Edit device comments.	(Common)
	Statement	Edit statements.	Section 9.2
	Note	Edit notes.	
	Statement/Note Batch Edit	Batch-edit the statements/notes in the program.	Section 9.3
Easy Edit		-
	Connect Line to Right-Side Symbol	Connect a horizontal line to the instruction or the line at the right of the cursor position.	Section 6.6
	Connect Line to Left-Side Symbol	Connect a horizontal line to the instruction or the line at the left of the cursor position.	
	Enter/Delete HLine Rightward	Enter/delete a line at the right of the cursor position.	
	Enter/Delete HLine Leftward	Enter/delete a line at the left of the cursor position.	
	Enter/Delete VLine Downward	Enter/delete a line at the downward of the cursor position.	
	Enter/Delete VLine Upward	Enter/delete a line at the upward of the cursor position.	
	Switch Open/Close Contact	Switch between an open contact and a closed contact.	(Common)
	Switch Statement/Note Type	Change the type of the statement/note.	Section 9.4
	Instruction Partial Edit	Display the Enter Symbol screen in which the first argument is in the selected status.	Section 6.2
	Edit List for Ladder Block	Display/edit the ladder block in list format.	Section 6.2.8
Read from CSV File	Read a list format program from a CSV file and display it as a ladder program.	Section 6.16
Write to CSV File	Write a ladder program to a CSV file in list format.	

Find/Replace (function for editing in Ladder Diagram)		Reference
Change Module I/O No.	Replace the start module I/O number of the buffer memory address instruction.	Section 8.1.4
Switch Statement/Note Type	Change the type (PLC/Peripheral) of a statement/note.	Section 9.4
Line Statement List	Display a list of line statements used in the program.	Section 9.6
Jump	Move the cursor to the specified step position.	Section 8.1.3
Jump to Next Ladder Block Start	Move the cursor from the current position to the start of the next ladder block.	Section 6.5
Jump to Previous Ladder Block Start	Move the cursor from the current position to the start of the previous ladder block.	
Next Device	Move the cursor to the same device as the one at the cursor position.	Section 8.1.2
Next Contact	Move the cursor to the contact where the same device as the one at the cursor position is used.	
Next Coil	Move the cursor to the coil where the same device as the one at the cursor position is used.	
Back	Return the cursor to the previous position before the [Next Device]/[Next Contact]/[Next Coil] function execution.	

View (function for editing in Ladder Diagram)		Reference
Comment	Display device comments or label comments.	Section 2.2.4
Statement	Display statements.	
Note	Display notes.	
Display Lines of Monitored Current Value	Open the Options screen and display/hide the lines of monitored current value.	Section 2.2.5
Display Format for Device Comment	Open the Options screen and set the display format for device comment.	Section 2.2.6
Display Ladder Block		-
	Hide Ladder Block	Hide the ladder block at the cursor position.	Section 2.2.11
	Display Ladder Block	Display the hidden ladder block at the cursor position.	
	Hide All Ladder Block	Hide all ladder blocks.	
	Display All Ladder Block	Display all hidden ladder blocks.	
Device Display		-
	Device Display	Display the device assigned by compilation.	Section 2.2.8
	Batch Device Display	Batch-change the label display on the program editors to the device display.	
	Cancel All Device Display	Cancel the device display on the program editors, and display data in the format at the time of data entry.	
Display Compile Result	Display the compilation result of the program on the inline structured text box in a list format.	Section 6.4.3
Zoom	Change the display magnification of the ladder program.	Section 2.2.2
Text Size		-
	Bigger	Enlarge the text display size on the editing screen.	Section 2.2.3
	Smaller	Reduce the text display size on the editing screen.	
Open Other Window		-
	Open Reference Window	Open the reference window of the ladder editor.	Section 12.3.2
	Update Reference Window	Apply the most recent ladder program to the reference window.	
	Open Reference Source Window	Display the source ladder editor of the reference window.	
	Tile FB Horizontally	Tile the ladder editor and the function block program editor horizontally.	(FB)
	Open Label Setting	Open the Local Label Setting screen for the program being edited.	Section 6.2.6
	Back to Zoom SFC Block	Display the SFC diagram of the Zoom editor window.	-
Move SFC Cursor		-
	Up	Move the cursor on the SFC diagram upward.	Section 2.3.1
	Down	Move the cursor on the SFC diagram downward.	
	Left	Move the cursor on the SFC diagram to the left.	
	Right	Move the cursor on the SFC diagram to the right.	
Open Instruction Help	Display the Instruction Help screen.	Section 6.2.2
ST Monochrome Display	Switch the text color (color or monochrome) in inline structured text boxes.	Section 6.4.5

Online (function for editing in Ladder Diagram)		Reference
Monitor		-
	Monitor Condition Setting	Set a condition to start monitoring.	Section 12.3.2
	Monitor Stop Condition Setting	Set a condition to stop monitoring.	
	Entry Ladder Monitor	Register and monitor ladder blocks.	Section 12.3.3
	Delete All Entry Ladder	Delete all registered ladder blocks.	

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1.3.3 List of functions for editing SFC diagrams

The following tables show the functions for editing SFC diagrams.

Edit (function for editing SFC diagrams)		Reference
Delete	Delete the selected data.	-
Arrange SFC	Redisplay the SFC diagram.	Section 7.8
Insert Row	Insert a row at the cursor position.	Section 7.3.11
Delete Row	Delete the row at the cursor position.	
Insert Column	Insert a column at the cursor position.	
Delete Column	Delete the column at the cursor position.	
Edit Line		-
Vertical Line Segment	Insert ⊥aF5 at the cursor position.	Section 7.3.10
Selection Divergence	Insert aF7 at the cursor position.	
Simultaneous Divergence	Insert aF8 at the cursor position.	
Selection Convergence	Insert aF9 at the cursor position.	
Simultaneous Convergence	Insert aF10 at the cursor position.	
Delete Line	Delete the line at the cursor position.	
Change TC Setting	Batch-change timer/counter setting values used in the program.	Section 6.15
Ladder Edit Mode		-
Read Mode	Switch the mode of the open window to "Read Mode".	Section 6.1.2
Write Mode	Switch the mode of the open window to "Write Mode".	
Read Mode (All Windows)	Switch the mode of all open windows to "Read Mode".	
Write Mode (All Windows)	Switch the mode of all open windows to "Write Mode".	
SFC Step Attribute		-
No Attribute	Set the step attribute to No Attribute.	Section 7.5
Stored Coil	Set the step attribute to Stored Coil.	
Stored Operation (without Transition Check)	Set the step attribute to Stored Operation (SE).	
Stored Operation (with Transition Check)	Set the step attribute to Stored Operation (ST).	
Reset	Reset the step attribute.	
SFC Symbol		-
[STEP] Step	Insert F5 at the cursor position.	Section 7.3.1
[B] Block Start Step (with END Check)	Insert F6 at the cursor position.	Section 7.3.2
[BS] Block Start Step (without END Check)	Insert sF6 at the cursor position.	
[JUMP] Jump	Insert F8 at the cursor position.	Section 7.3.8
[END] END Step	Insert F7 at the cursor position.	Section 7.3.9
[DUMMY] Dummy Step	Insert sF5 at the cursor position.	Section 7.3.1
[TR] Transition	Insert F5 at the cursor position.	Section 7.3.3
[--D] Selection Divergence	Insert F6 at the cursor position.	Section 7.3.4
[==D] Simultaneous Divergence	Insert F7 at the cursor position.	Section 7.3.5
[--C] Selection Convergence	Insert F8 at the cursor position.	Section 7.3.6
[==C] Simultaneous Convergence	Insert F9 at the cursor position.	Section 7.3.7
[	] Vertical Line	Insert sF9 at the cursor position.	-
Sort SFC Step No.	Sort the SFC step/transition numbers in ascending/descending order.	Section 7.7

Edit (function for editing SFC diagrams)		**Reference**
Documentation		-
SFC Step/Transition Comment	Change to the SFC step/transition comment editing mode.	Section 9.8

Find/Replace (function for editing SFC diagrams)		**Reference**
Jump	Move the cursor to the specified position.	Section 8.2.1
Find Jump Step	Move to the jump source step.	Section 8.2.2
Change SFC Step No.	Replace the SFC step number.	Section 8.2.4

Compile (function for editing SFC diagrams)		**Reference**
Convert Block	Convert a single block.	Section 10.1.4

View (function for editing SFC diagrams)		**Reference**
Program Display	Display MELSAP-L programs.	Section 2.3.4
SFC Step/Transition Comment	Display the SFC step/transition comments.	Section 2.3.5
Zoom	Change the display magnification ratio of the SFC diagram.	Section 2.3.2
Text Size		-
Bigger	Enlarge the text display size on the editing screen.	Section 2.3.3
Smaller	Reduce the text display size on the editing screen.	Section 2.3.3
SFC Row Setting	Set the number of rows of SFC diagram.	Section 2.3.6
Open SFC Blocklist	Display the SFC block list screen.	Section 7.11
MELSAP3 Display	Display SFC in MELSAP3 format.	Section 2.3.7
MELSAP-L (Instruction Format) Display	Display SFC in MELSAP-L (instruction format).	Section 2.3.7
MELSAP-L (Start Conditions Format) Display	Display SFC in MELSAP-L (start conditions format).	Section 2.3.7
Open Zoom/Start Destination Block	Display the Zoom editor window or the start destination block.	Section 7.9
Back to Start SFC Block	Display the SFC block of the start source.	-
Open Header	Open the Local Label Setting screen for the program being edited.	-
Reset the Window Position to its Default	Returns the display position of the SFC diagram editor window and the Zoom editor window to the initial status.	Section 2.3.1

Online (function for editing in SFC diagrams)		**Reference**
Monitor		-
Monitor Condition Setting	Set a condition to start monitoring.	Section 12.3.2
Monitor Stop Condition Setting	Set a condition to stop monitoring.	Section 12.3.2

1.3.4 List of functions for editing SFC block list

The following tables show the functions for editing SFC block list.

Find/Replace (function for editing SFC block list)		**Reference**
Jump	Move the cursor to the specified block number.	Section 8.2.5
Find Block No.	Search for a block number.	Section 8.2.6
Block Information Find Device	Search for a device.	Section 8.2.7

View (function for editing SFC block list)		**Reference**
SFC Block List Comment	Display comments of the SFC block list.	Section 7.11.3
Device Display	Display devices.	Section 7.11.4
Open SFC Body	Open the SFC diagram.	Section 7.11.5
Open Header	Display the label setting editor.	Section 7.11.6

Side tab markers:
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MEMO

2 SCREEN CONFIGURATION

This chapter explains the screen configuration of GX Works2.

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2.1   Overview of Screen Configuration

2 - 2

Q CPU   L CPU   FX

This section explains the main frame (basic screen) of GX Works2 that is displayed when it is started up.
The following screen shows a main frame configuration on which a work window and docked windows are displayed.

Screen display

Title bar →
Menu bar →
Toolbar →

Navigation window →

Work window →

Status bar →

Element Selection window ←

Docked window ←

Display contents

Name	Description	Reference
Title bar	Display a project name.	-
Menu bar	Display menu options for executing each function.	-
Toolbar	Display tool buttons for executing each function.	Appendix 1
Work window	A main screen used for operations such as programming, parameter setting, and monitoring.	GX Works2 Version 1 Operating Manual (Common)
Docking window	A sub screen to support operations performed on a work window.	
Navigation	Display contents of a project in tree format.	
Element Selection	Display a list of functions (such as function blocks) used for programming.	GX Works2 Version 1 Operating Manual (Simple Project, Function Block)
Output	Display compilation and check results (such as errors and warnings).	Section 10.4
Cross Reference	Display cross reference results.	GX Works2 Version 1 Operating Manual (Common)
Device List	Display the device list.	
Device Reference	Display assignments of refresh devices and link devices specified for the parameters of CC-Link IE Field Network and CC-Link.	
	Display assignments of refresh devices and input/output devices specified for the AnyWireASLINK parameter.	GX Works2 Version 1 Operating Manual (Intelligent Function Module)
Watch 1 to 4	A screen used for monitoring and changing current device values.	GX Works2 Version 1 Operating Manual (Common)
Intelligent Function Module Monitor 1 to 10	A screen used for monitoring intelligent function modules.	
Find/Replace	A screen used for searching and replacing character strings in the project.	
Debug	A screen used for setting the debug which uses the simulation function.	
Status bar	Display information about a project being edited.	

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2.2 Ladder Editor

**This section explains the screen display of the GX Works2 ladder editor and its basic operations.**

2.2.1 Editing screen

The following explains the editing screen used for creating ladder programs.

Screen display

● **For a project without labels**
  Select Project view ⇒ "POU" ⇒ "Program" ⇒ "(program)".

● **For a project with labels**
  Select Project view ⇒ "POU" ⇒ "Program" ⇒ "(program)" ⇒ "Program".

Display contents

Name	Description
Title bar	Display a data type, data name, and/or other information of the open data.
Step number	Display a start step number of the ladder block.
Inline structured text box	An area for editing ST programs on the ladder editor in a project with labels. (☞ Section 6.4)
Cursor	Data at the cursor position are edited.
Left power rail	Power rails of ladder programs.
Right power rail	
END line	Indicate the end of a ladder program. Programs cannot be created beyond the END line.

■ Displaying title bar

The following items are displayed on a title bar.

| Item	Description
Nesting number of master control	Display a nesting number when the cursor position is on the nesting of master control.
Data type	Display a data type of data being open.
Ladder editing mode	Display the ladder editing mode. (☞ Section 6.1.2) For when programs are monitored and for when programs are not monitored, "Monitoring" and "Stop Monitoring" are appended respectively. When "Execute online change by Compile" is selected in the option setting, "R" is prefixed to the ladder editing mode.
Data name	Display a data name of data being open.
Instance name	Display an instance name when a program of FB instance is displayed on a program.
Title	Display when a title is set on the property.
Read-only display	Display in the following cases. • When a write protection is set with the security setting • When a program is a device display (☞ Section 2.2.8) • When the mode is switched to the read mode or the monitor mode with the ladder editing mode
Number of steps	Display the number of steps of program. Display with the parentheses for the programs with function block or uncompiled status.
Compilation status	Display "*" when a program of project with labels is uncompiled.

<Title bar example of program>

MC:N1 [PRG]Read MAIN Title of program (Read Only) 27 Step

<Title bar example of FB instance opened in a program>

[FB]Write U_FB1(SUB1.U_FB1_1) Title of U_FB1 (2)Step

■ Nesting number of master control

When the cursor position is on the nesting of master control, the nesting number of master control is displayed on a title bar. The nesting number of innermost master control is displayed in a master control with nesting architecture.
The following figure shows the range where the nesting number of master control is displayed.
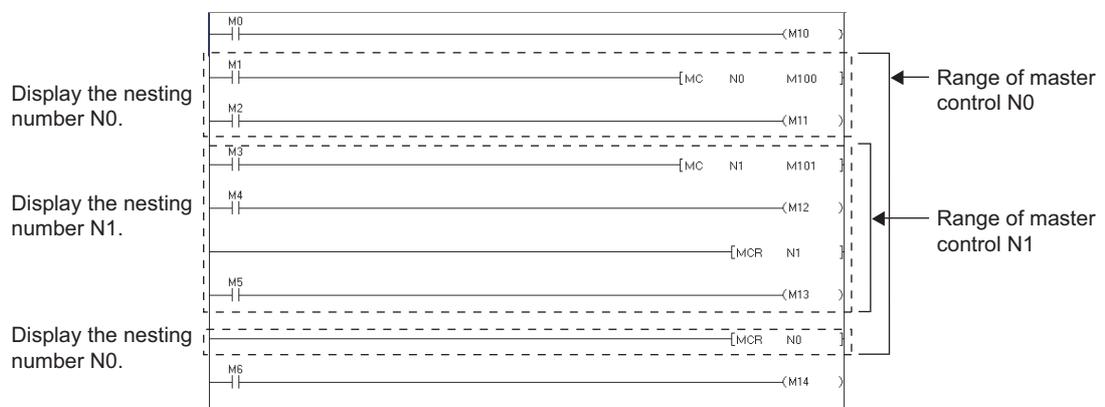
2.2.2 Changing display size of editing screen

Q CPU   L CPU   FX

Change the display size of the open editing screen.

Screen display

Select [View] ⇒ [Zoom] (🔍).

Operating procedure

- **Set the items on the screen.**

| Item	Description
Magnification	-
150%, 100%, 75%, 50%	Change the display size according to the selected zoom ratio.
Specify	Change the display size according to the specified zoom ratio. (50 to 150%)
Auto	Adjust the width of the ladder program automatically to display whole rungs from the left power rail to the right power rail.
Option	-
Reflect Setting on the Same Program Language Window	Select whether to reflect the display magnification set to the editor being opened to other editors of the same program language. The display magnification set to ladder editor is not reflected to Zoom editor, and the display magnification set to Zoom editor is not reflected to ladder editor as well.

2.2.3 Changing text size on editing screen

`Q CPU` `L CPU` `FX`

Change the text size displayed on the editing screen.

Operating procedure

- **Select [View] ⇒ [Text Size] ⇒ [Bigger]/[Smaller].**

  The change is applied to all ladder editors currently opened.
  The text size is changed one step at each setting within the range of 11 steps.

Point

● **When enlarging the text display size**
  A typographic error may occur when enlarging the text display size.
  When the error occurs, adjust the text display size.

2.2.4 Displaying/hiding comments

`Q CPU` `L CPU` `FX`

Display/hide device comments (label comments), notes, and statements.

Operating procedure

- **Select [View] ⇒ [Comment]/[Statement]/[Note].**

Point

● **Displaying/hiding comments**
  Comments also can be displayed/hidden by selecting the item(s) on the Options screen displayed by the following operation.
  Select [View] ⇒ [Display Format for Device Comment].

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2.2.5   Displaying/hiding areas for monitored current values

Q CPU L CPU FX

Display/hide the areas for monitored current values of word type variables.
By hiding the areas for monitored current values, the number of rows displayed on a single screen is increased, and therefore, a larger number of rows can be checked.
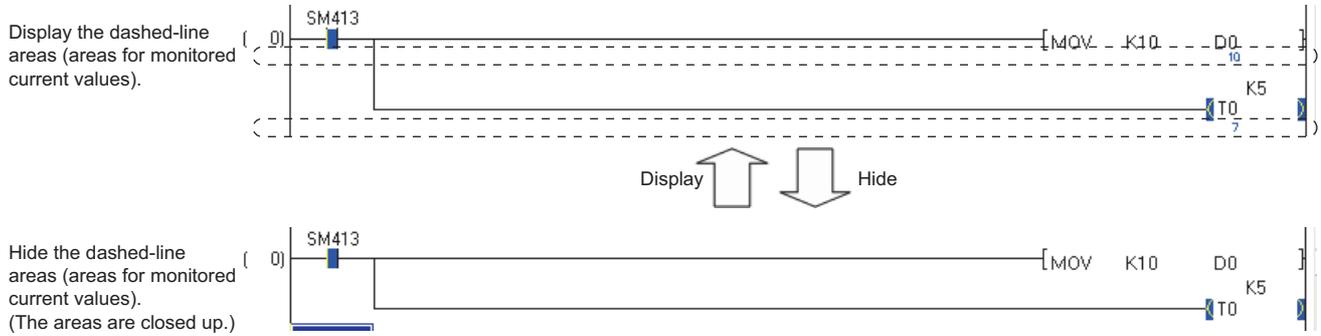
Screen display

Select [View] ⇒ [Display Lines of Monitored Current Value].

Operating procedure

- **Set the item on the screen.**

Item	Description
Display Lines of Monitored Current Value	Select whether to display areas for monitored current value.

2.2.6 Setting number of rows and columns for displayed comments

Set the number of rows and columns for displayed a device comment using the option setting.

Screen display

Select [View] ⇒ [Display Format for Device Comment].

Device Comment Display Format
Row 4 ▼   Column 8 ▼   Total Characters: 32

Operating procedure

- **Set the items on the screen.**

Item	Description
Row	Set the number of display rows in the range from 1 to 4 rows.
Column	Set the number of display columns to 5 or 8 columns.

Example:

4 rows × 8 columns
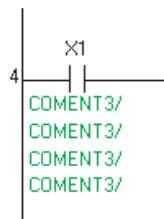
2 rows × 5 columns
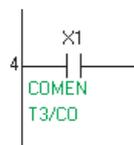
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2.2.7 Setting number of contacts to be displayed on ladder programs

Q CPU L CPU FX

Set the number of contacts to be displayed on a single rung using the option setting. The default setting is 11 contacts.

Screen display

Select [Tool] ⇒ [Options] ⇒ **"Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram".**
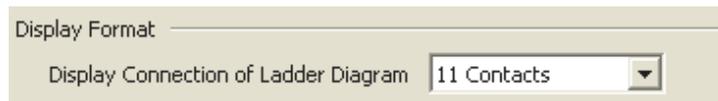
Operating procedure

* **Set the item on the screen.**

| Item	Description
Display Connection of Ladder Diagram	Select the number of contacts to be displayed on a single rung. • 9 contacts • 11 contacts • 13 contacts • 17 contacts • 21 contacts

Point

● **Considerations when changing the number of contacts to be displayed**

When the number of contacts is changed from the one used to create a ladder program to a less number of contacts, the program is not displayed properly in the following conditions. In this case, set the number of contacts back to the original setting.

- When an instruction cannot be placed in the input circuit or output circuit of function block.
- When the number of rows for a single ladder block exceeds 24.

The following is an example of program in which instructions cannot be placed at the input circuit of function block when a program created with 17 contacts is changed to 11 contacts.

< Display with 17 contacts >
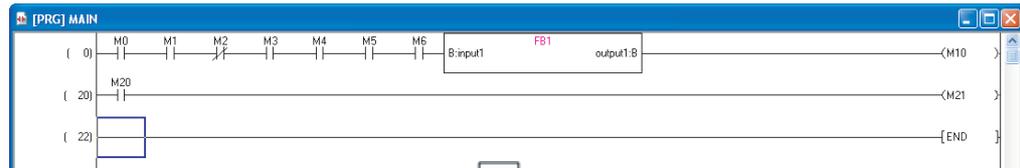
< Display with 11 contacts >
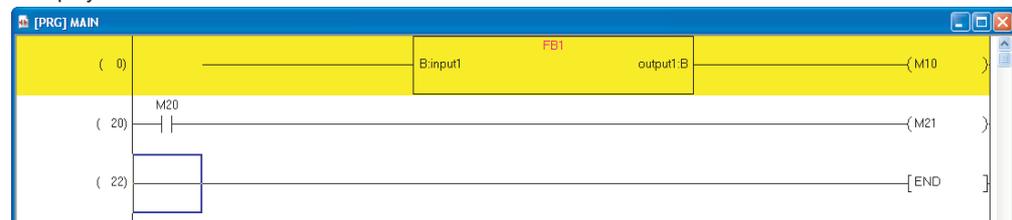
● **Ladder program with 13 contacts or more**

The selection of 13 contacts or more is available from GX Works2 Version 1.48A or later.
When using GX Developer concurrently or using GX Works2 Version 1.43V or earlier, change the setting as follows:

- set the same setting as the product running concurrently for "Display Connection of Ladder Diagram" in the option setting.
- for a program with 13 contacts or more, adjust the program for number of contacts to be 11 or less.

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■　Setting number of contacts to be displayed on the Zoom editor window

Set the number of contacts to be displayed on a single rung using the option setting.

Screen display

Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "Zoom".

Display Format

Number of Action/Transition Contacts(P)　　Same as Ladder Diagram setting　▼

Operating procedure

- **Set the item on the screen.**

Item	Description
Number of Action/Transition Contacts	Select the number of contacts to be displayed on a single rung. • Same as Ladder Diagram setting[*1] • 5 contacts • 9 contacts • 11 contacts • 13 contacts • 17 contacts • 21 contacts

*1 :　The number of contacts to be displayed is set according to the setting for Ladder Diagram.

2.2.8 Switching display between label names and devices

Q CPU **L CPU** **FX**

Switch the display of a program that uses labels between label name display and device display.
If label comments or device comments are set, the corresponding comments are displayed.
Devices assigned by the compilation can be checked by switching the program display from label name display to device display.
For displaying label names and devices simultaneously, refer to Section 2.2.9.

Operating procedure

- **Select [View] ⇒ [Device Display] ⇒ [Device Display] (🔍).**

    Example:

Label name display   Device display
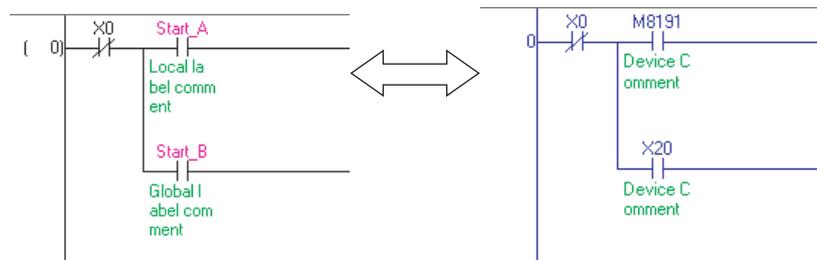
Point

- **Displaying/hiding label comments and device comments**
  To check the set label comments and device comments, set the setting to display comments. (☞ Section 2.2.4)
- **When a block password to which the execution program protection setting was enabled is set to a program**
  The device display is not available for the program.To use the device display, all block passwords need to be unlocked.
  For the method for unlocking a block password, refer to the following manual.
  ☞ GX Works2 Version 1 Operating Manual (Common)

■ Changing display of all program editors to device display in batch

Change the display of all currently-opened program editors to the device display.

Operating procedure

- **Select [View] ⇒ [Device Display] ⇒ [Batch Device Display].**

    The display of all currently-opened program editors (except for ST) is changed to the device display.

■ Canceling device display of all program editors

Cancel the device display of all currently-opened program editors.

Operating procedure

- **Select [View] ⇒ [Device Display] ⇒ [Cancel All Device Display].**

    The device display of all program editors is canceled and data are displayed in the format at the time of data entry.

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## 2.2.9 Displaying labels and devices simultaneously

Q CPU L CPU FX

Change the view mode to display the labels and devices simultaneously by setting the option.

Operating procedure

1. **Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram".**

2. **Select "Display labels and devices".**

The devices assigned to labels are displayed.

<Display labels>

<Display labels and devices>
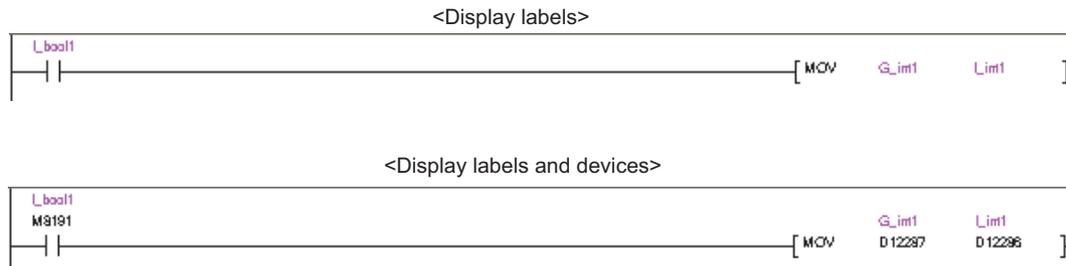
Point

● **Devices not to be displayed**
The devices are not displayed in the following cases even the option is set.
  • When the program is never compiled
  • When the labels are used for array element
  • When structure labels are used

When a label is used for the second argument in the Timer/ Counter/Retentive Timer instruction, the device of the second argument is not displayed simultaneously.

● **Edit and find/replace when the labels and devices are displayed simultaneously**
When the labels and devices are displayed simultaneously, only labels can be the target of edit and find/replace.

2.2.10 Setting display content of tooltips

`Q CPU` `L CPU` `FX`

Content defined on the label setting editor is displayed as tooltip by placing the cursor on a label name on the program editor.
Content excluding label names displayed on the tooltips can be set by the following operation.

Operating procedure

1. **Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder/SFC" ⇒ "Tool Hint".**

2. **Set the following items.**

Item		Description	Example
Tool hint display items	Monitored value	Display a monitoring result. When the labels are used for array element, or when the elements are not specified for array or structure, the monitoring values are not displayed.	(Displayed only during monitoring)
	Class	Display a label class.	VAR_GLOBAL
	Device	Display a device or a device assigned to the label.	X1
	Device comment	Display a device comment. Device comments of devices assigned to labels are not displayed.	X1 comment
	Data type	Display a data type of the label.	Bit
	Constant value	Display a constant value of the label.	FALSE
	Label comment	Display label comments.	GLOBAL1 comment
	Remark	Display a remark of the label. (Global labels only)	GLOBAL1 remark
Tool hint display format	Single line	Display tool tips in a single line.	
	Multiple lines	Display tool tips in multiple lines.	

\<Single line\>

\<Multiple lines\>
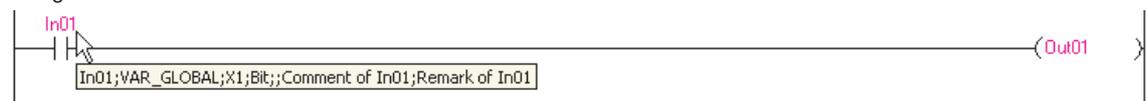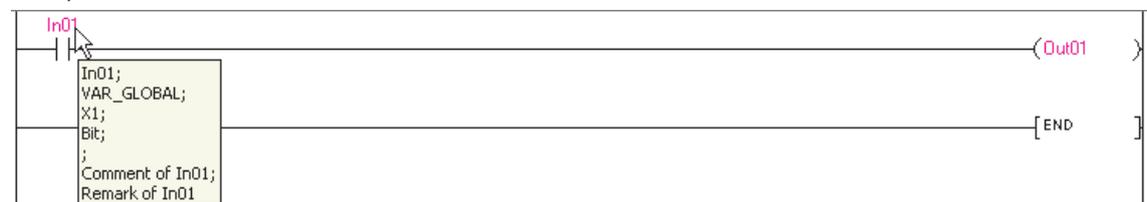
Point

● **Displaying constant values**
The constant values of tooltip are displayed when "VAR_GLOBAL_CONSTANT" or VAR_CONSTANT is selected for "Class" of label.
Note that the constant values are not displayed for function block labels.

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2.2.11   Hiding ladder blocks

Q CPU   L CPU   FX

Hide converted ladder blocks.
If statements are set to ladder blocks, they are remained displayed while ladder blocks are hidden.
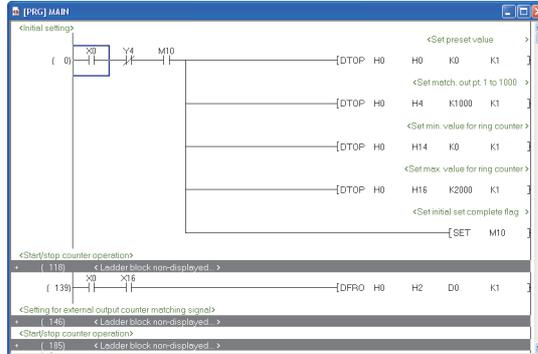

### ■   Hiding ladder blocks

Hide ladder blocks.

Operating procedure

1. **Move the cursor to the ladder block to be hidden.**
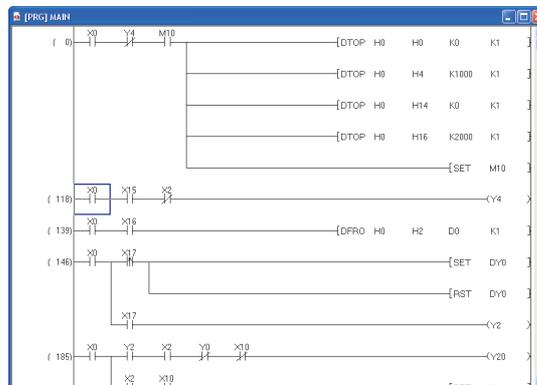
2. **Select [View] ⇒ [Display Ladder Block] ⇒ [Hide Ladder Block].**

The ladder block is hidden.

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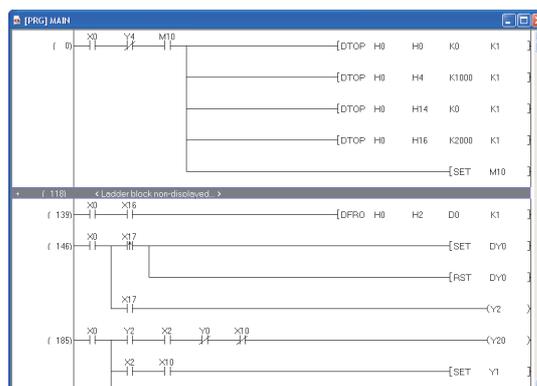
■ Displaying hidden ladder blocks

Display hidden ladder blocks.

### Operating procedure

1. **Move the cursor on the gray line of the hidden ladder block.**
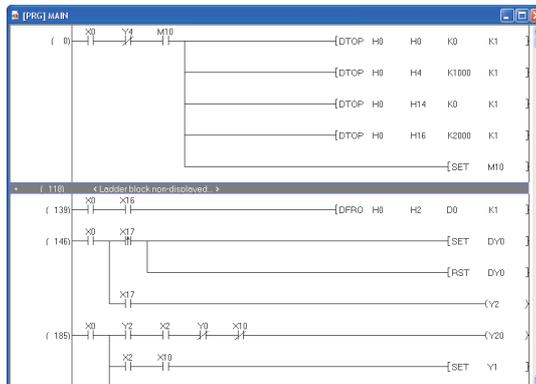
2. **Select [View] ⇒ [Display Ladder Block] ⇒ [Display Ladder Block].**

The hidden ladder block is displayed.
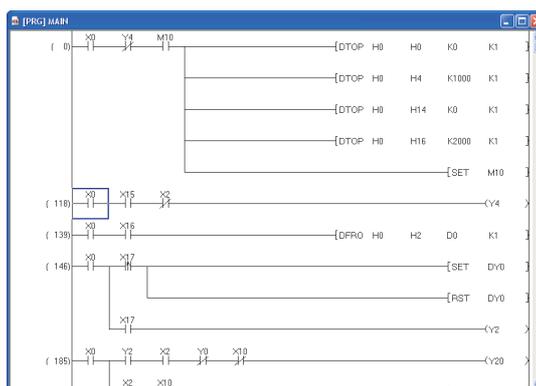
Point

● **Displaying/hiding ladder blocks**
- Multiple ladder blocks can be selected to display/hide.
- All ladder blocks are displayed/hidden by selecting [View] ⇒ [Display Ladder Block] ⇒ [Display All Ladder Block]/ [Hide All Ladder Block].
- Ladder blocks can also be displayed/hidden by right-clicking and selecting [Display Ladder Block]/[Hide Ladder Block] from the shortcut menu.
- A hidden ladder block can be displayed by double-clicking the gray line of the hidden ladder block.

## 2.2.12   Displaying step ladder (STL) instruction in contact format

For FXCPU projects without labels, whether to display step ladder instructions in contact format can be selected by setting the option.

Screen display

Select [Tool] ⇒ [Options] ⇒ **"Program Editor"** ⇒ **"Ladder"** ⇒ **"Ladder Diagram".**

☑ Display STL instruction in contact format. * Only applies to the FXCPU

Example:
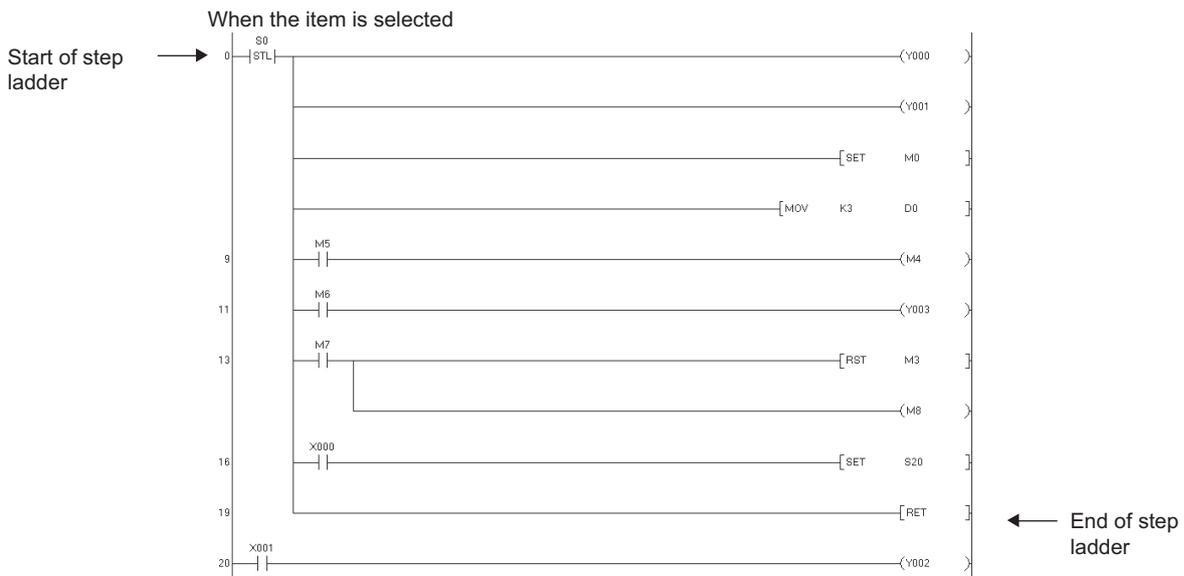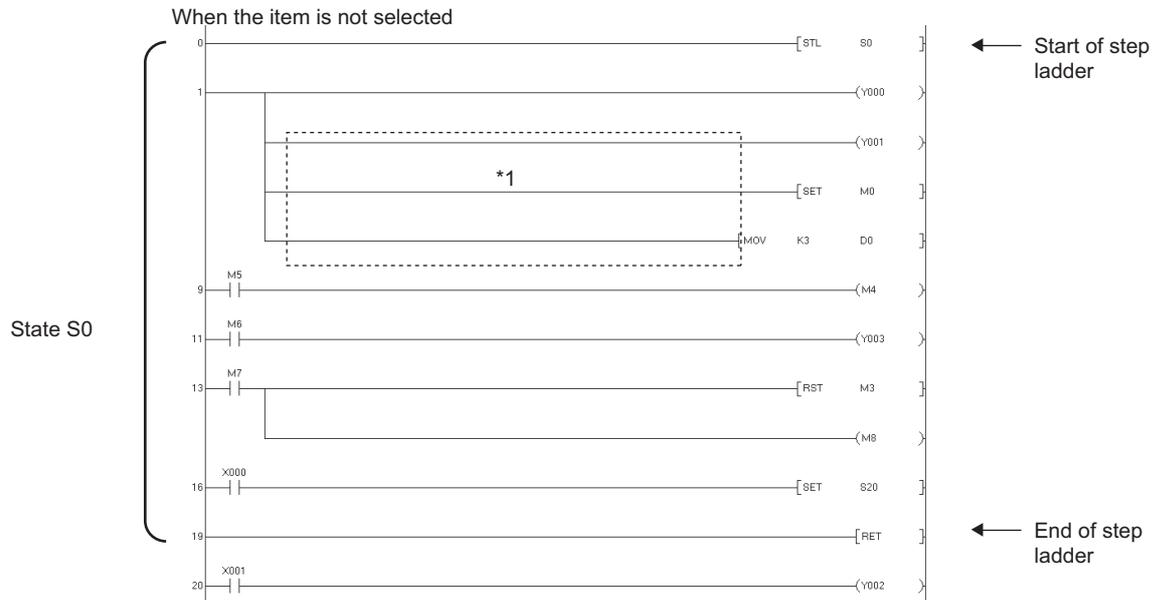
*1:   When entering the coil instruction after entering the STL instruction, do not enter a coil within the area with the dotted line.
(A ladder program to which a contact is entered cannot be displayed in this method.)
When entering contacts, enter them from the power rail.

2.3 SFC Editor

This section explains the screen display of the SFC editor and its basic operations.

2.3.1 Editing screen

The following explains the editing screen used for creating SFC diagrams.
A display format can be selected for QCPU (Q mode)/LCPU.
Select MELSAP3 to edit operation output and transition condition programs on the Zoom editor window.
Select MELSAP-L (instruction format) or MELSAP-L (start conditions format) to edit operation output and transition condition programs on the SFC editor window.
For switching the display format, refer to Section 2.3.7.

Screen display

Select Project view ⇒ "POU" ⇒ "Program" ⇒ "(program)" ⇒ "(block)" ⇒ "Program".
<MELSAP3/FXCPU>

SFC editor window   Zoom editor window
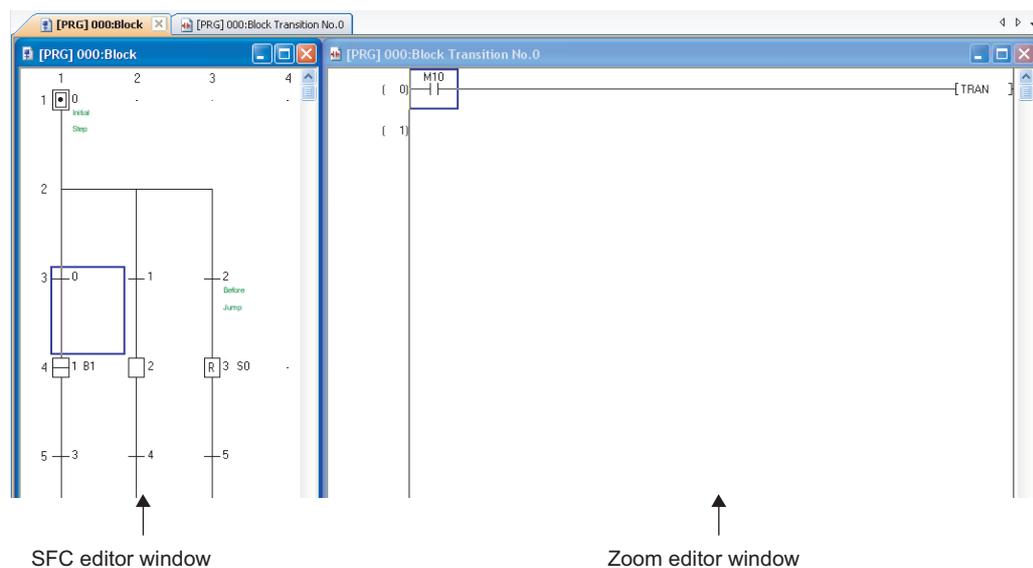
Display contents

Item	Description
SFC editor window	Used to edit SFC diagrams.
Zoom editor window	Used to edit operation output and transition condition programs.

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● **Displaying SFC editor window and Zoom editor window**
  By the following setting, the Zoom editor window can be automatically displayed side by side when the SFC editor window is opened. The display of SFC editor and Zoom editor can be selected from Tiling Horizontally or Tiling Vertically.
  Select "Tile SFC and Zoom vertically" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "SFC 1".
  When this setting is valid, the setting of "Open Zoom with New Window" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "Zoom" becomes invalidated.
● **Moving the cursor of the SFC editor window on the Zoom editor window**
  With the activated Zoom editor window, the cursor of the SFC editor window can be moved.
  Select the direction to move the cursor by selecting [View] ⇒ [Move SFC Cursor] ⇒ [Up] / [Down] / [Left] / [Right] (Shift + Alt + ↑ / ↓ / ← / →).
  When the cursor of the SFC editor window is moved, the cursor of the Zoom editor window moves to the corresponding position.

■ Displaying SFC editor window and Zoom editor window side by side

The window display operations of the SFC editor window and the Zoom editor window can be linked.

Operating procedure

- **Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "SFC 1" ⇒ "Tile SFC and ZOOM vertically".**

● **Positioning**
  When the SFC editor window is moved, the Zoom editor window corresponds to the selected SFC diagram moves simultaneously.
  In a similar way, when the Zoom editor window is moved, the corresponding SFC editor window moves simultaneously.

When the SFC editor window is moved downward, the corresponding Zoom editor window moves simultaneously.
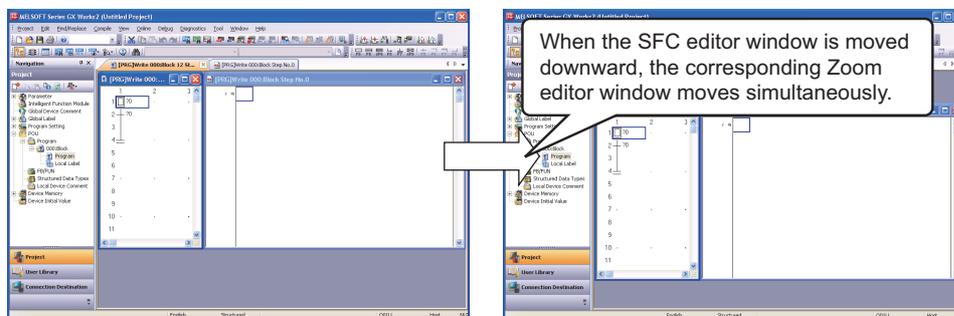
● **Resizing**
  Dragging the boundary of the SFC editor window and the Zoom editor window changes the size of the windows.
  When the size of one of the windows is enlarged, the size of the other window is reduced.

Drag the boundary of the SFC editor window and the Zoom editor window to the right.

The sizes of the windows are changed.
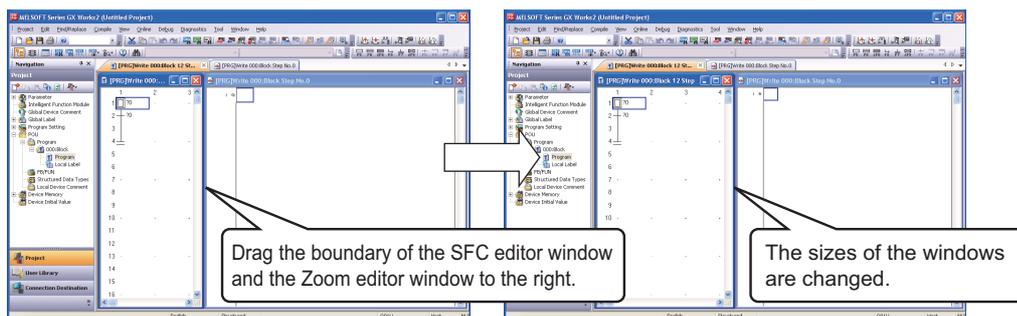
● **Initializing the window position**

Returns the display position of the SFC diagram editor window and the Zoom editor window to the initial status[1].

> *1 : Set the initial status by using the following options.
> Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "SFC 1" ⇒ "Arrange Windows for MELSAP3", and set "Arrange" and "SFC Display Window Ratio".

Operation

- **Activate SFC editor window, and select [View] ⇒ [Reset the Window Position to its Default].**
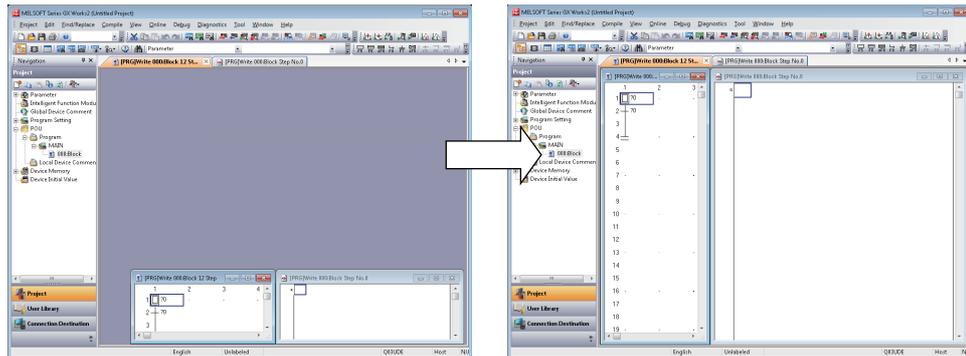
Point

● **Displaying the SFC editor window and the Zoom window**
When executing the following operation, the SFC editor window and the Zoom editor window may not be displayed on the top at the same time, or either of the windows may be moved behind another window.

- Switching windows by pressing the Ctrl + Tab keys, the Ctrl + Shift + Tab keys, or the Ctrl + F6 keys.
- Reopening the project after closing the project while the multiple SFC editor windows or the SFC editor window and other editors are cascaded.

● **When Zoom editor window is hidden**
When executing the following operation, the Zoom editor window may be hidden.

- Deleting an operation output/transition condition on the SFC editor window.
- Pasting a dummy step on the SFC editor window.
- Reopening the project after closing the project while the cursor is at the position other than the operation output/ transition condition on the SFC editor window.

● **When the performance on the editor window is slow**
When executing the following operation, the performance on the editor window may be slow.

- Minimizing the SFC editor window and minimizing the Zoom editor window as well.
- Switching windows by pressing the Ctrl + Tab keys or the Ctrl + Shift + Tab keys or the switching order does not match with that of displayed tab.

● **When multiple windows are open**
When the number of open windows exceeds the maximum while opening a project saved with GX Works2 Version 1.87R or earlier, the message "Number of opening windows are too much. Please close needless window." may be displayed.

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■ SFC editor window

The following explains the screen for editing an SFC diagram.

● MELSAP3/FXCPU
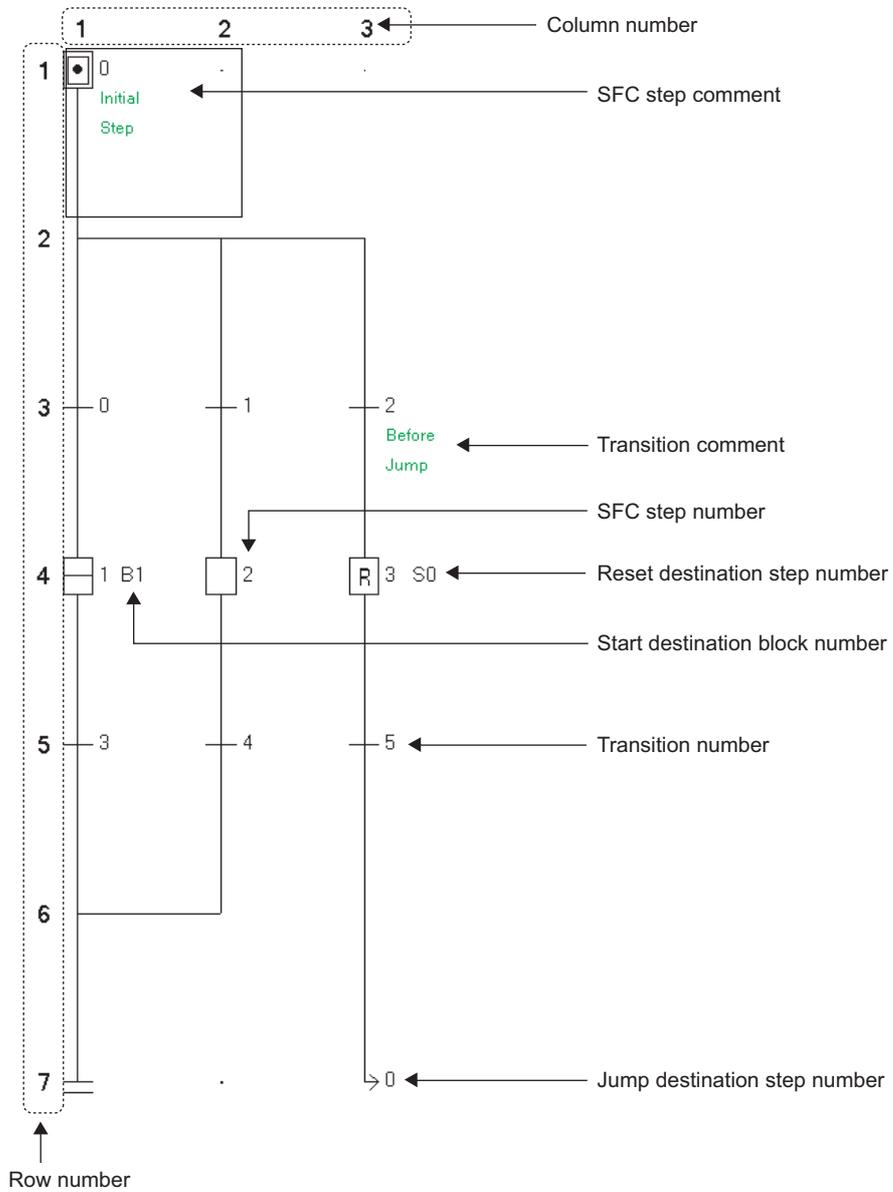
● **MELSAP-L (instruction format)**
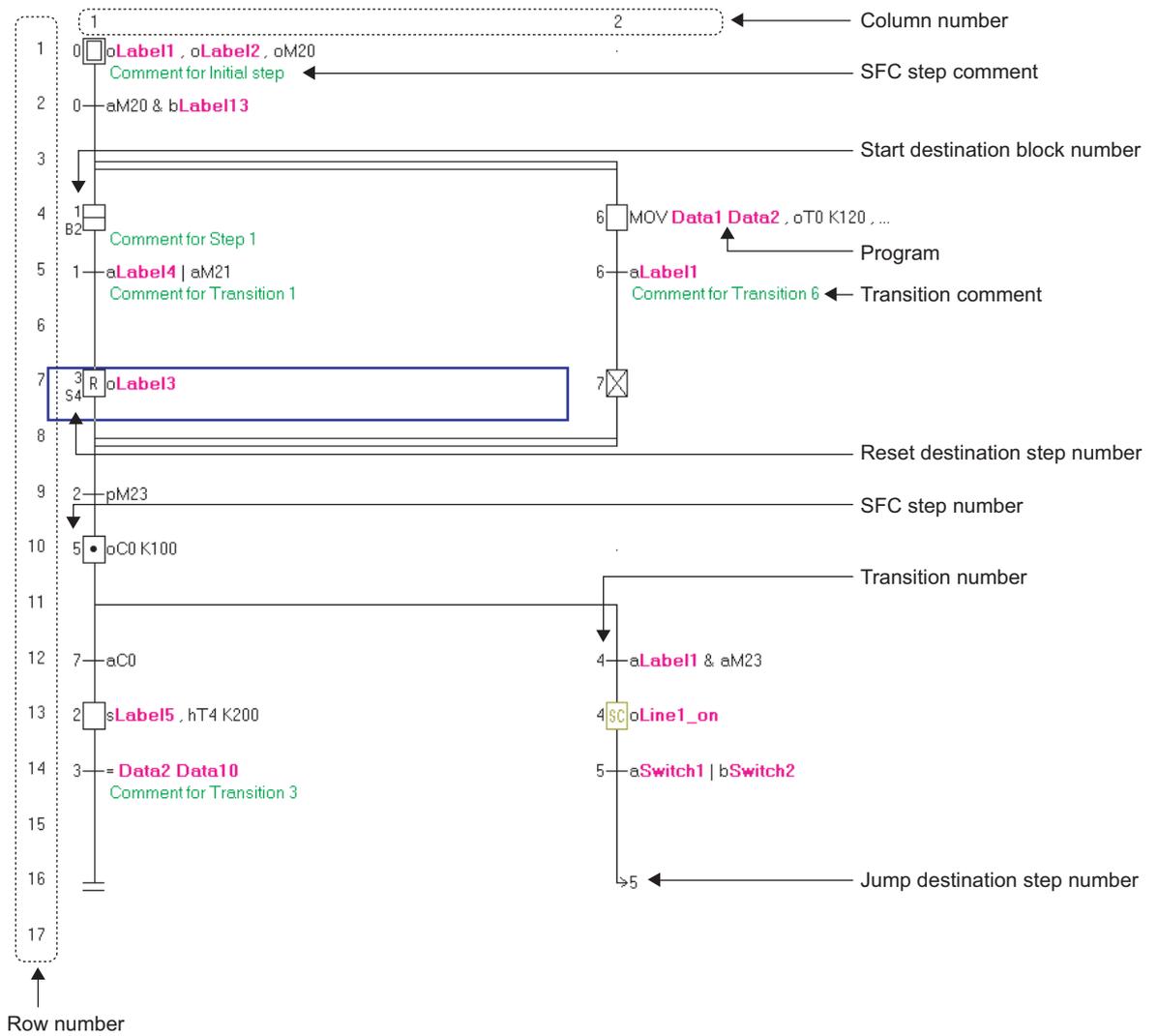
Column number
SFC step comment
Start destination block number
Program
Transition comment
Reset destination step number
SFC step number
Transition number
Jump destination step number

Row number

Side tab navigation:

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● **MELSAP-L (start conditions format)**

Column number
SFC step comment
Start destination block number
Reset destination step number
Transition comment
SFC step number
Transition number
Program
Jump destination step number
Row number
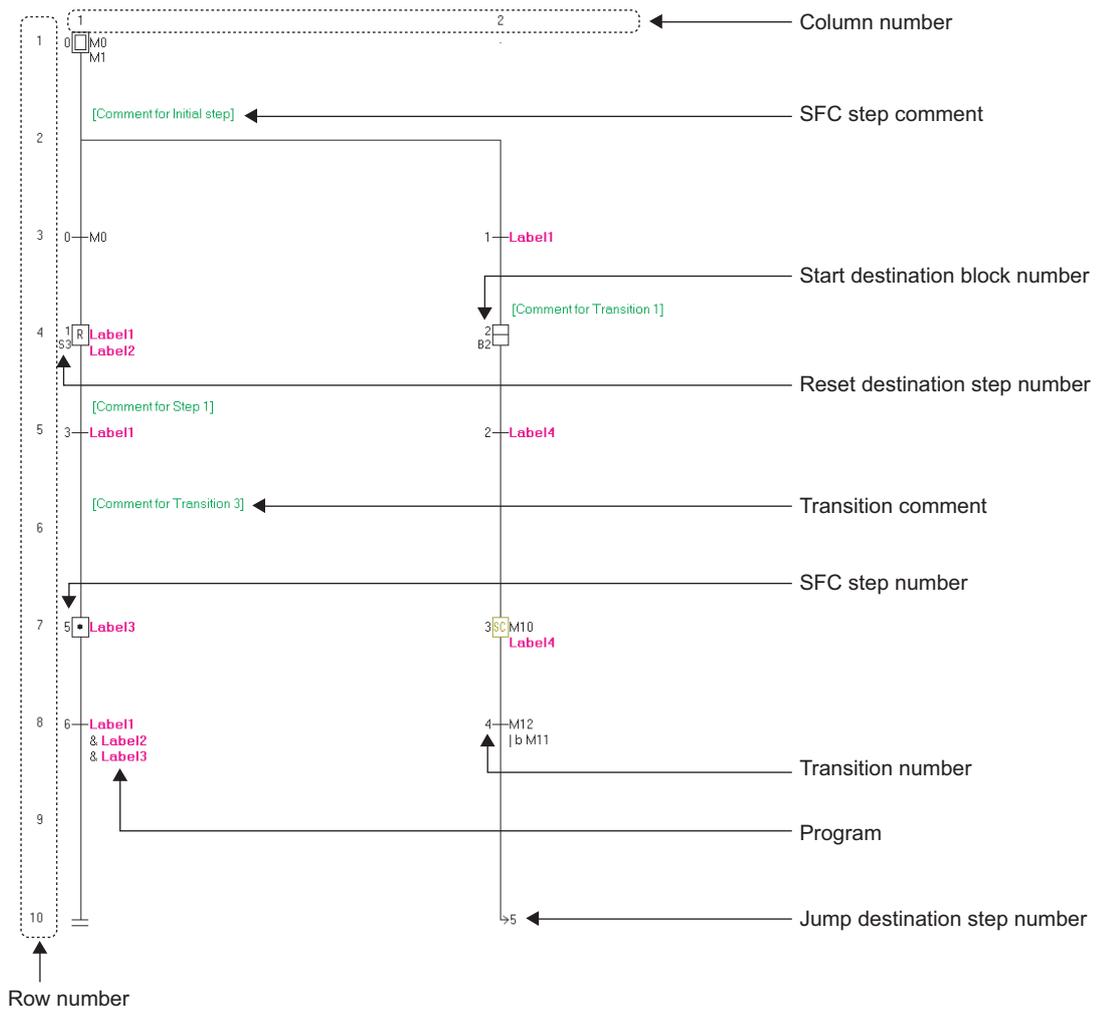
Display contents

| Item	Description
Row number	Display row numbers on the SFC diagram.
Column number	Display column numbers on the SFC diagram.
SFC step number	Display SFC step numbers for each step.
Transition number	Display transition numbers for each transition.
Start destination block number[*1]	Display start destination block numbers for the block start step.
Reset destination step number[*1]	Display reset destination step numbers for the reset step.
Jump destination step number	Display jump destination step numbers for the jump step.
SFC step comment	Display comments for each SFC step.
Transition comment[*1]	Display comments for each transition.
Program	Display MELSAP-L programs.

*1 :   Not supported by FXCPU.

2.3.2   Changing display size of editing screen

Change the display size of the editing screen.

Screen display

Select [View] ⇒ [Zoom] (🔍).

Display contents

Item	Description
Magnification	-
150%, 100%, 75%, 50%	Change the display size according to the selected zoom ratio.
Specify	Change the display size according to the specified zoom ratio. (50 to 150%)
Auto	Change the display size according to the specified number of columns. (1 to 10 columns)
Option	-
Reflect Setting on the Same Program Language Window	Select whether to reflect the display magnification set to the editor being opened to other editors of the same program language.

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2.3.3 Changing text size on editing screen

Change the text size displayed on the editing screen.

Operating procedure

- **Select [View] ⇒ [Text Size] ⇒ [Bigger]/[Smaller].**

  Change the text size displayed on the SFC diagrams.
  For MELSAP3 display, the text size is changed one step at each setting within the range of 7 steps.
  For MELSAP-L display, the text size is changed one step at each setting within the range of 3 steps.
  < MELSAP3/FXCPU >
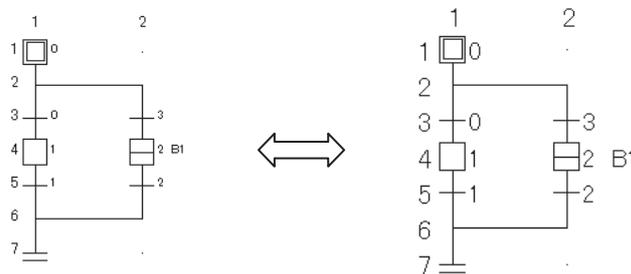
2.3.4 Displaying MELSAP-L programs on SFC diagram

Display programs on the SFC diagram when editing in MELSAP-L.

Operating procedure

- **Select [View] ⇒ [Program Display] (Alt + Ctrl + F5).**

  Select the menu again to hide the programs.
  "?" marks are displayed for programs that cannot be displayed in MELSAP-L.
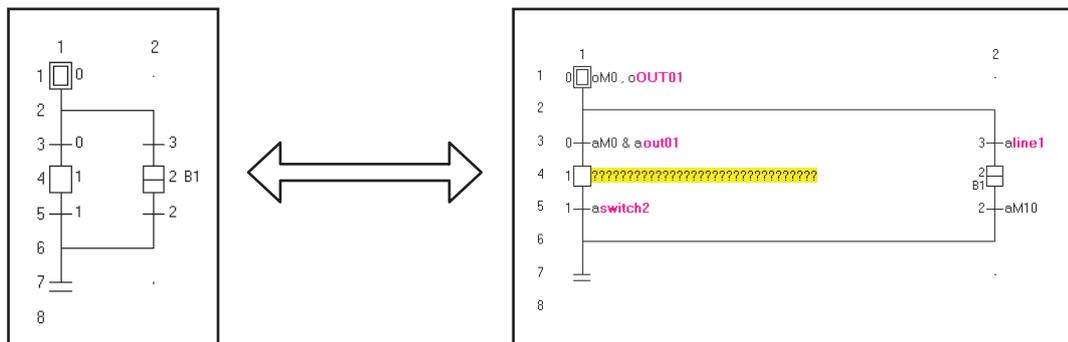
2.3.5 Displaying/hiding SFC step/transition comments

Display/hide SFC step/transition comments on the created SFC diagram.

Operating procedure

- **Select [View] ⇒ [SFC Step/Transition Comment] (Ctrl + F5).**

 Select the menu again to hide SFC step/transition comments.
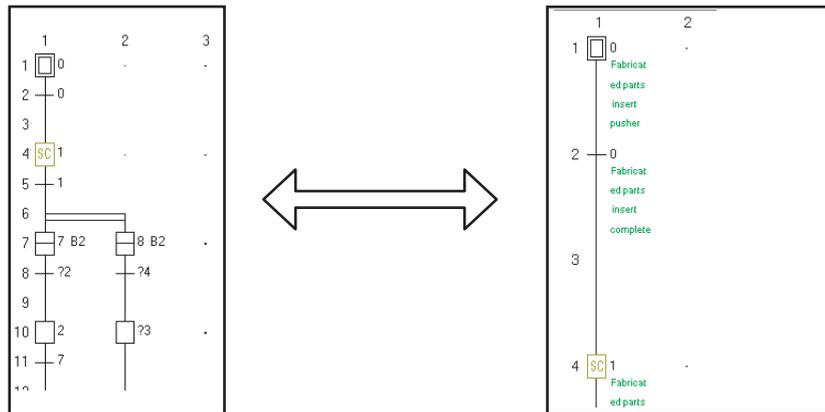
2.3.6 Setting number of columns for SFC diagram display

Set the number of divergences that can be edited and displayed for the SFC diagram.

Screen display

Select [View] ⇒ [SFC Row Setting].
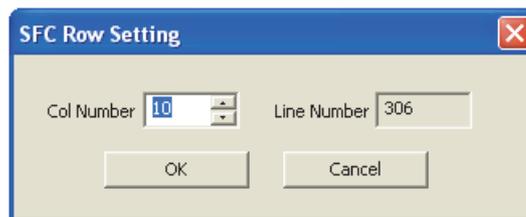
Operating procedure

1. **Set the item on the screen.**

Item	Description
Col Number	Enter the number of columns. (QCPU (Q mode)/LCPU: 1 to 32, FXCPU: 1 to 16)
Line Number	Display the number of rows. The value is changed automatically according to the specified number of columns.

2. **Click the ⟨ OK ⟩ button.**

The SFC diagram is displayed according to the specified number of columns.

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2.3.7 Changing SFC display format

Change the SFC display format.
For Simple project, a display format can be selected for each program.
For Structured project, a single display format is selected for a project.
This function is not supported by FXCPU.

■ Displaying programs in MELSAP3

Set the SFC display format to MELSAP3.

> **Operation**

- **Select [View] ⇒ [MELSAP3 Display].**
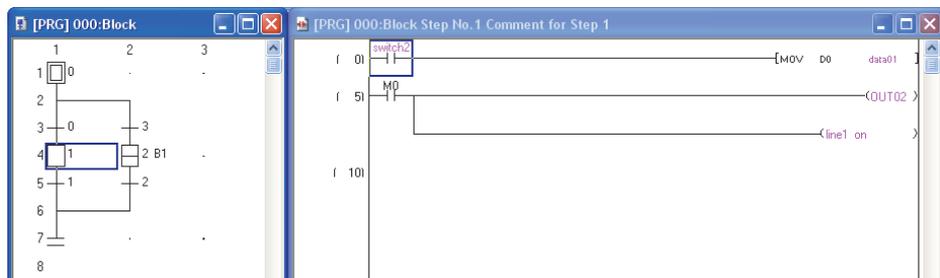
■ Displaying programs in MELSAP-L (instruction format)

Set the SFC display format to MELSAP-L (instruction format).

> **Operation**

- **Select [View] ⇒ [MELSAP-L (Instruction Format) Display].**
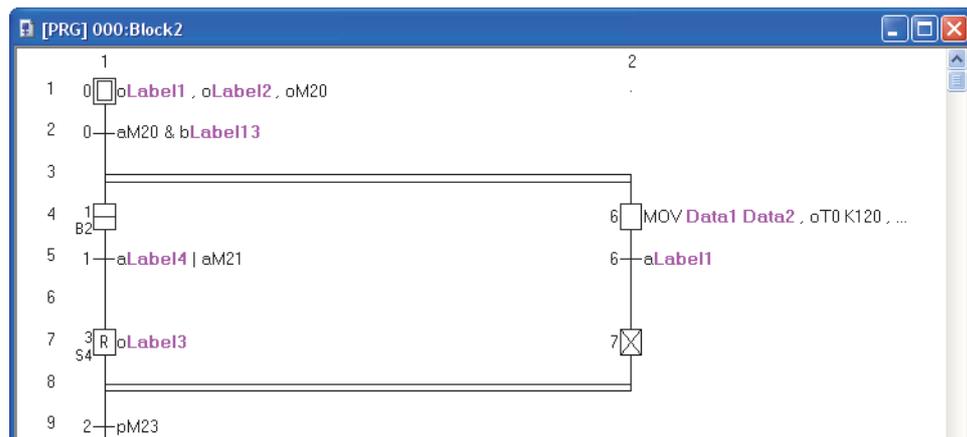
## ■ Displaying programs in MELSAP-L (start conditions format)

Set the SFC display format to MELSAP-L (start conditions format).

Operation
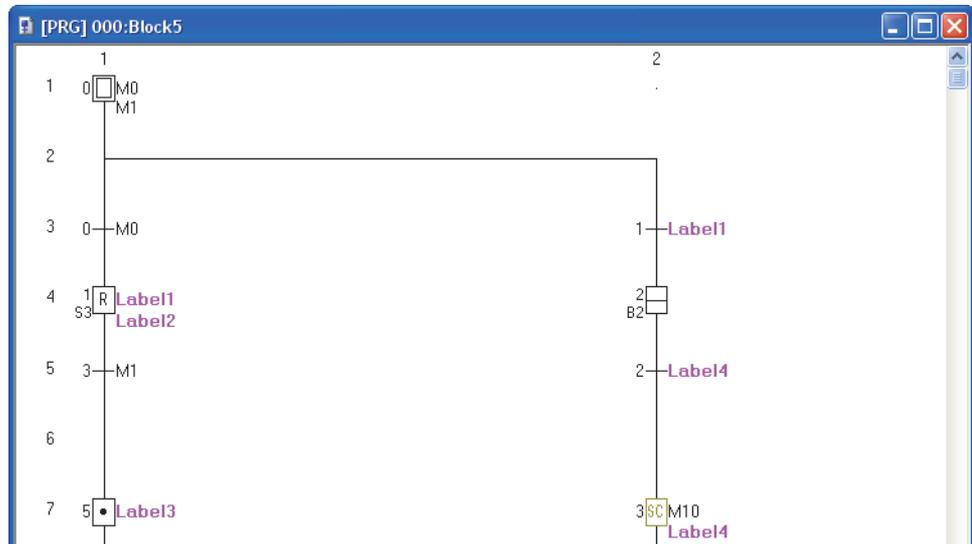
- **Select [View] ⇒ [MELSAP-L (Start Conditions Format) Display].**

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3 PROGRAMMING PROCEDURE

This chapter explains a procedure for creating programs in Simple project.

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3.1 Creating Programs

Q CPU L CPU FX

This section explains the general operating steps from the creation of a program in Simple project to the execution of the created program on the programmable controller CPU.

Operating procedure

1. Creating a new project

Procedure	Reference
Start up GX Works2.	GX Works2 Version 1 Operating Manual (Common)
Create a new Simple project. To utilize an existing Simple project, open that Simple project.	

⇩

2. Setting parameters

Procedure	Reference
Set parameters.	GX Works2 Version 1 Operating Manual (Common)
Check parameters.	

⇩

3. Setting labels (when using labels) *1

Procedure	Reference
Define global labels.	Chapter 5
Define local labels.	

*1 : For FXCPU, a project with labels does not support Sequential Function Chart.

⇩

4. Editing and converting/compiling programs (for ladder programs)

Procedure	Reference
Edit ladder programs.	Chapter 6
Convert programs. (For projects without labels)	Chapter 10
Check programs. (For projects without labels)	
Compile a program, or compile all programs. (For projects with labels)	

⇩

(To the next page)

(From the previous page)

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5. Editing and converting/compiling programs (for SFC programs)

Procedure	Reference
Edit SFC diagrams. For FXCPU, enter a ladder block to turn ON the initial step.	Chapter 7
Edit operation output programs and convert them.	Chapter 7, Chapter 10
Edit transition condition programs and convert them.	
Set properties of SFC programs and SFC blocks.	Chapter 7
Check programs. (For projects without labels)	Chapter 10
Compile a program, or compile all programs. (For projects with labels)	

⬇

6. Connecting a personal computer to the programmable controller CPU

Procedure	Reference
Connect a personal computer to the programmable controller CPU.	GX Works2 Version 1 Operating Manual (Common)
Set the connection destination.	

⬇

7. Writing data to the programmable controller CPU

Procedure	Reference
Write parameters to the programmable controller CPU.	Chapter 11
Write sequence programs to the programmable controller CPU.	

⬇

8. Checking the operation

Procedure	Reference
Monitor the execution status of sequence programs.	Chapter 12

⬇

9. Ending the project

Procedure	Reference
Save the project.	GX Works2 Version 1 Operating Manual (Common)
Exit GX Works2.	

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4   PROGRAM CONFIGURATIONS

This chapter explains the program configurations of Simple project.

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## 4.1   Program Configurations of Simple Project

This section explains the configurations of Simple project that are displayed in a tree format on the Project view.
The display contents differ according to the programmable controller type and the project type. The following is an example for QCPU (Q mode).
For (Common) and (Intelligent) indicated as the reference, refer to the following manuals respectively:

(Common)   … (Common) GX Works2 Version 1 Operating Manual (Common)
(Intelligent)   … (Intelligent) GX Works2 Version 1 Operating Manual (Intelligent Function Module)

< Simple project (without labels) >

```
Parameter                              · · · · · · · · · · · ☞  (Common)
Intelligent Function Module *1         · · · · · · · · · · · ☞  (Intelligent)
Global Device Comment                  · · · · · · · · · · · ☞  (Common)
Program Setting *2
  Initial Program
    MAIN
      MAIN
  Scan Program
    MAIN1                              · · · · · · · · · · · Define the program execution type. ☞  (Common)
    MAIN2
  Standby Program
  Fixed Scan Program
  No Execution Type
POU                                    · · · · · · · · · · · · · · · · · · · · · · · · · · · · · Define POUs.
  Program                              · · · · · · · · · · · · · · · · · · · · · · · · · · · · · Program
    MAIN                               · · · · · · · · · · · · · · · · Write a program in the desired programming language. ☞ *3
    MAIN1
      000:Block
      001:Block1
    MAIN2
      Program
      Control 21525651                 · · · · · · · · · · · · · · · · Line statement list ☞ *4
      Automatic operation program
      Initial processing A
      Count the number of interrupt occurrences.
      END
  Local Device Comment
Device Memory                          · · · · · · · · · · · ☞  (Common)
Device Initial Value *5
```

Program configuration

*1 :   For FXCPU, "Special Module (Intelligent Function Module)" is displayed.

*2 :   For FXCPU, no classification for program execution type. Only "Execution Program" is displayed.

*3 :   ☞ Chapter 6, ☞ Chapter 7

*4 :   When "Tree Display" is set for a line statement list, the line statement list is displayed on a tree view. (☞ Section 9.5.1)

*5 :   For FXCPU, this item is not displayed.

< Simple project (with labels) >

Parameter · · · · · · · · · · · ☞ (Common)
Intelligent Function Module *1 · · · · · · · · · · · ☞ (Intelligent)
Global Device Comment · · · · · · · · · · · ☞ (Common)
Global Label
  Global1 · Define labels shared among POUs. ☞*4
Program Setting *2, *3
  Initial Program
    MAIN
      MAIN
  Scan Program · · · · · · · · · · · Define the program execution type. ☞ (Common)
    MAIN1
    MAIN2
  Standby Program
  Fixed Scan Program
  No Execution Type

Program configuration

POU
  Program · Define POUs.
    MAIN · Program
      Program · · · · · · · · · · · · · · · · Write a program in the desired programming language. ☞*5
      Local Label · · · · · · · · · · · · · · · · Define labels. ☞*6
    MAIN1
      000:Block
      001:Block1
    MAIN2
      Program
      Control 21525651
      Automatic operation program · · · · · · · · · · Line statement list ☞*7
      Initial processing A
      Count the number of interrupt occurrences.
      END
      Local Label
  FB_Pool
    FB01 · Function block (FB)
      Program · · · · · · · · · · · · · · · · Write a program in the desired programming language. ☞*5
      Local Label · · · · · · · · · · · · · · · · Define labels. ☞*8
    Structured Data Types · · · · · · · · · · · · · · · · Define structures. ☞*9
      Struct1
  Local Device Comment
Device Memory · · · · · · · · · · · ☞ (Common)
Device Initial Value *10

*1 : For FXCPU, "Special Module (Intelligent Function Module)" is displayed.
*2 : For FXCPU, no classification for program execution type. Only "Execution Program" is displayed.
*3 : For FXCPU Simple projects (with labels), "Execution Program" can be divided into multiple programs.

Program Setting
  Execution Program
    MAIN
      MAIN
        Program
        Local Label
      MAIN1
        Program
        Local Label
      MAIN2
        Program
        Local Label
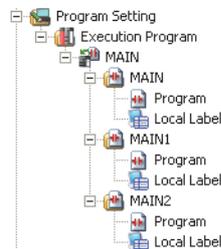
*4 : ☞ Section 5.2
*5 : ☞ Chapter 6, ☞ Chapter 7
*6 : ☞ Section 5.3
*7 : When "Tree Display" is set for a line statement list, the line statement list is displayed on a tree view. (☞ Section 9.5.1)
*8 : ☞ Section 5.4
*9 : ☞ Section 5.6
*10 : For FXCPU, this item is not displayed.

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5 SETTING LABELS

This chapter explains how to set labels.

5.1 The Type of Label Setting Editor

This section shows label setting screens.
When "Use Label" is selected on the <u>New Project</u> screen, labels are created as shown below.
Labels are set on each screen according to the type of label.
For FXCPU, a project with labels does not support Sequential Function Chart.
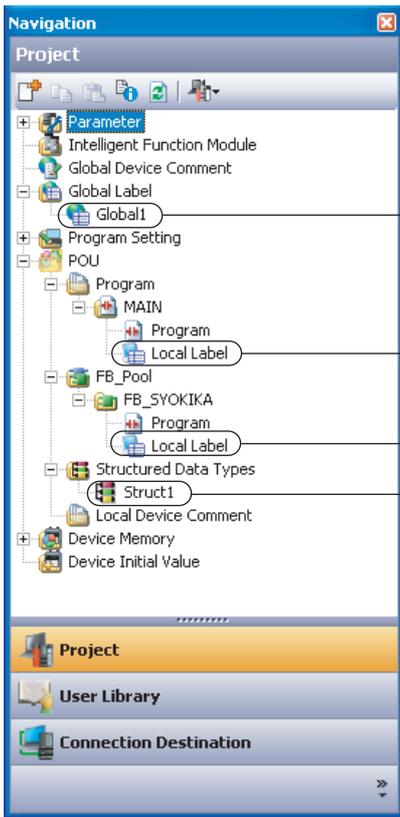
Global Label Setting screen

> Define labels that can be used for all sequence programs in the project. (☞*1)

Local Label Setting screen

> Define labels that can be used only for each sequence program. (☞*2)

Function/FB Label Setting screen

> Define labels that can be used only for function blocks. (☞*3)

Structure Setting screen

> Define structures to be used in the label setting. (☞*4)

*1 :　☞ Section 5.2
*2 :　☞ Section 5.3
*3 :　☞ Section 5.4
*4 :　☞ Section 5.6.1

5.2 Setting Global Labels

Q CPU L CPU FX

This section explains how to set global labels.
Global labels can be used in iQ Works supported products (GX Works2, MT Developer2, GT Designer3) by registering them as system labels.
For details of system labels, refer to the following manual.
(☞ iQ Works Beginner's Manual)

Point

● **System labels**
  Same label names can be used in programming among GX Works2, MT Developer2, and GT Designer3 by using system labels.
● **System label data base**
  A system label data base is a data base to manage system labels.
  A system label data base is created in the workspace when the workspace is saved in MELSOFT Navigator.
  System labels cannot be used in the workspace which does not contain a system label data base.

Screen display

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

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Operating procedure

- **Set the items on the screen.**

Item	Description	Maximum number of characters
Class	Select a label class from the list displayed by clicking ▼ . (☞ Section 5.5.1)	-
Label Name	Enter a desired label name.	• Ladder/ST/SFC: 32 (FB instance name: 16)
Data Type	Specify a data type from the Data Type Selection screen displayed clicking ... . (☞ Section 5.5.3) It can also be entered directly.	128
Constant	Enter a constant value when "VAR_GLOBAL_CONSTANT" is selected for "Class" and simple type is selected for "Data Type".	128
Device	Set a specific device to be assigned to the label when "VAR_GLOBAL" is selected for "Class". • A device is automatically assigned when the cell is blank. • When the data type is structure, click the "Detail Setting" cell and set devices on the Structure Device Setting screen. (☞ Section 5.6.3)	50
Comment[1, 2]	Enter a label comment. Comments can be displayed on the program editor by switching display/hide of comments. (☞ Section 2.2.4)	1024
Remark[1, 2]	Enter supplementary information for label comments. This item is not displayed on the program editor.	1024
Relation with System Label[3]	Displays the relation between the global label and system label. <table><tr><th>Class</th><th>Description</th></tr><tr><td>Disclose</td><td>The global label is disclosed as a system label.</td></tr><tr><td>Browse</td><td>The global label refers the system label which is disclosed by another project.</td></tr><tr><td>Blank</td><td>There is no relation with a system label.</td></tr></table>	-
System Label Name[3]	Displays the name of the system label which relates to the global label.	-
Attribute[3]	Displays the attribute of the system label which relates to the global label.	-

*1 : A new line can be inserted into a cell by pressing the `Ctrl` + `Enter` keys.

*2 : The compilation is not necessary after editing.

*3 : For FXCPU, these items are supported by FX3s, FX3G, FX3GC, FX3U, and FX3UC only.

Screen button

● Reservation to Register System Label **(For FXCPU, this button is supported by FX3s, FX3G, FX3GC, FX3U, and FX3UC only.)**

Reserves the selected global label for registration as a system label.

● Reservation to Release System Label **(For FXCPU, this button is supported by FX3s, FX3G, FX3GC, FX3U, and FX3UC only.)**

Reserves the selected global label for deregistration of system label.

After the deregistration of the system label is confirmed, the global label becomes a normal global label.

● Import System Label **(For FXCPU, this button is supported by FX3s, FX3G, FX3GC, FX3U, and FX3UC only.)**

Imports system labels to the project.

Operating procedure

1. **Click the** Import System Label **button.**

The Import System Labels to Project screen is displayed.
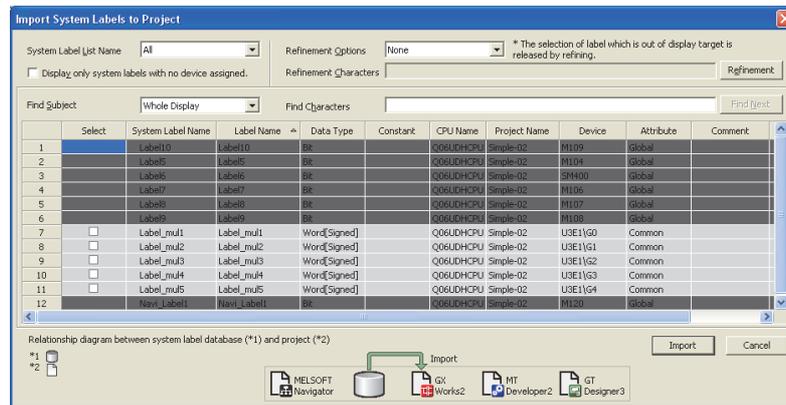
2. **Select the check box(es) of "Select" of a system label to import to the project.**

3. **Click the** Import **button.**

4. **The following message is displayed.**

5. **Click the** OK **button.**

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● **(For FXCPU, this button is supported by FX3S, FX3G, FX3GC, FX3U, and FX3UC only.)**
Applies the registration-reserved/deregistration-reserved system label information to the system label data base, and confirm the registration/deregistration.

Operating procedure

1. **Click the** **button.**

The following message is displayed.
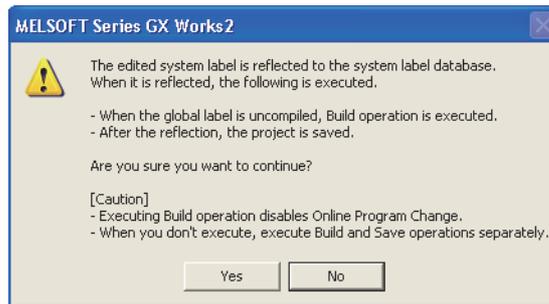
2. **Click the** [Yes] **button.**

The build and the save functions are performed automatically.

3. **The** <u>Check before registering in system label database</u> **screen is displayed.**
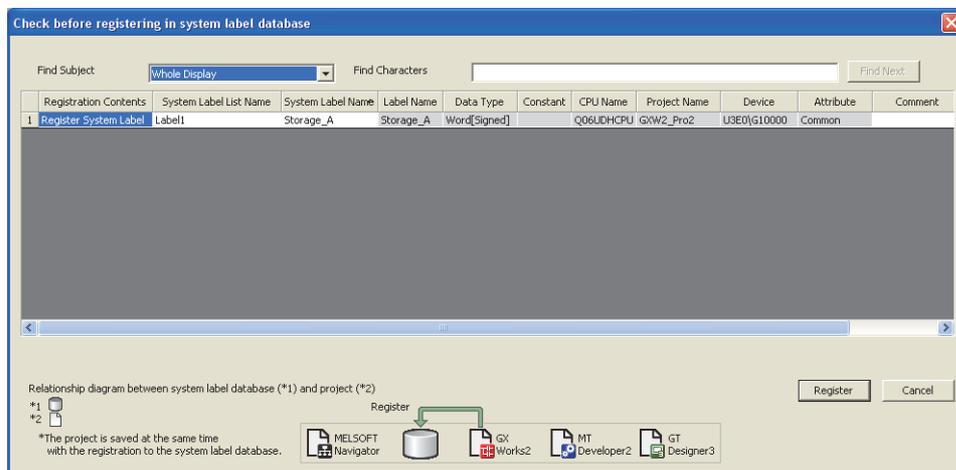
4. **Confirm the registration information, and click the** [Register] **button.**

After the system label information is applied to the system label data base, the icon displayed on the <u>Global Label Setting</u> screen is updated to indicate the number of items that are not updated and the updated results as shown below.
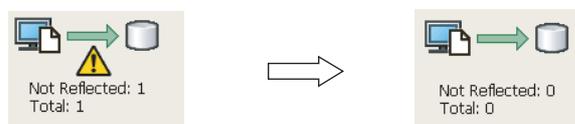
Point

● **Class setting**

When an item other than the class, such as a label name and data type, is set in a blank column, "VAR_GLOBAL" is automatically set for "Class". Change it if necessary.

● **Characters that cannot be used for label names**

Any of the following label names causes an error at compilation.

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

For characters that cannot be used for label names, refer to the following manual.

☞ GX Works2 Version 1 Operating Manual (Common)

● **Specifying devices/addresses**

The digit-specified bit device (K4M0) or bit-specified word device (D0.1) can be specified for devices/addresses.

● **Using extended data registers (D) or extended link registers (W)**

When assigning a data register (D) or a link data register (W) to a global label, set it not to overlap the border between the internal user device and the extended data register (D)/extended link register (W).

● **Specifying timer/counter devices**

When "Data Type" is a bit type, specified devices are treated as contacts (TS, STS, CS).
When "Data Type" is a word type, specified devices are treated as current values (TN, STN, CN).

● **Assigning devices automatically**

Devices are automatically assigned to labels which are not set devices when compiling a program. The device assignment range can be changed on the Device/Label Automatic-Assign Setting screen. (☞ Section 5.8)
The assigned devices can be checked with the cross reference function.
(☞ GX Works2 Version 1 Operating Manual (Common))

● **System label**

- When performing Online program change, perform the function by selecting [Compile] ⇒ [Online Program Change] and then save the project.

  When the ▢ Reflect to System Label Database button is clicked after registering, deregistering, or importing system labels, Online program change cannot be performed.

- System labels whose "Attribute" is set to "Common" are not supported by LCPU.

- System labels whose "Attribute" is set to "Common" or "Link" are not supported by FXCPU.

- Importing system labels with MELSOFT Navigator may cause an error at compilation with GX Works2.
  Check the corresponding error location and correct the error as instructed by the error message displayed on the output window.

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5.3 Setting Local Labels for Programs

Q CPU　L CPU　FX

This section explains how to set local labels used for each program.

Screen display

Select Project view ⇒ **"POU"** ⇒ **"Program"** ⇒ **"(program)"** ⇒ **"Local Label"**.

Operating procedure

- **Set the items on the screen.**

Item	Description	Maximum number of characters
Class	Select a label class from the list displayed by clicking ▾. (☞ Section 5.5.1)	-
Label Name	Enter a desired label name.	• Ladder/ST/SFC: 32 (FB instance name: 16)
Data Type	Specify a data type from the Data Type Selection screen displayed clicking ┄ . (☞ Section 5.5.3) It can also be entered directly.	128
Constant	Enter a constant value when "VAR_CONSTANT" is selected for "Class" and simple type is selected for "Data Type".	128
Device	This item cannot be set for local labels. When the data type is structure, click the "Detail Setting" cell and set devices on the Structure Device Setting screen. (☞ Section 5.6.3)	-
Comment*1, *2	Enter a comment. Comments can be displayed on the program editor by switching display/hide of comments. (☞ Section 2.2.4)	1024

*1 : A new line can be inserted in a cell by pressing the Ctrl + Enter keys.
*2 : The compilation is not necessary after editing.

Point

● **Class setting**

When an item other than the class, such as a label name or data type, is set in a blank column, "VAR" is automatically set for "Class". Change it if necessary.

● **Characters that cannot be used for label names**

Any of the following label names causes an error at compilation.

• A label name that includes a space.

• A label name that begins with a numeral.

• A label name which is same as the one used for devices.

For characters that cannot be used for label names, refer to the following manual.

(☞ GX Works2 Version 1 Operating Manual (Common))

● **Assigning devices automatically**

Devices are automatically assigned to labels when a program is compiled. The device assignment range can be changed on the Device/Label Automatic-Assign Setting screen. (☞ Section 5.8)

The assigned devices can be checked with the cross reference function.

(☞ GX Works2 Version 1 Operating Manual (Common))

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5.4   Setting Local Labels for Function Blocks

Q CPU   L CPU   FX

This section explains how to set local labels for each function block.
Create a new function block in advance.
For the method for creating new function blocks, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**

Screen display

Select Project view ⇒ **"POU"** ⇒ **"FB_Pool"** ⇒ **"(function block)"** ⇒ **"Local Label"**.

Operating procedure

- **Set the items on the screen.**

Item	Description	Maximum number of characters
Class	Select a label class from the list displayed by clicking ▼. (☞ Section 5.5.1)	-
Label Name	Enter a desired label name.	• Ladder/ST/SFC: 32 (Input/output label: 16)
Data Type	Specify a data type from the Data Type Selection screen displayed clicking ⬚. (☞ Section 5.5.3) It can also be entered directly.	128
Constant	Enter a constant value when "VAR_CONSTANT" is selected for "Class" and simple type is selected for "Data Type".	128
Comment*1, *2	Enter a comment. Comments can be displayed on the program editor by switching display/hide of comments. (☞ Section 2.2.4)	1024

*1 :   A new line can be inserted in a cell by pressing the Ctrl + Enter keys.
*2 :   The compilation is not necessary after editing.

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● **When label setting is changed after utilizing function blocks**
When the label setting of function block which is utilized to the ladder program is changed, compile the program or all programs. The change of input/output label is applied to the ladder program.
Note that the change is not applied when the FB instance is not registered in the global label setting or local label setting.

● **Class setting**
When an item other than the class, such as a label name or data type, is set in a blank column, "VAR" is automatically set for "Class". Change it if necessary.

● **Characters that cannot be used for label names**
Any of the following label names causes an error at compilation.
• A label name that includes a space.
• A label name that begins with a numeral.
• A label name which is same as the one used for devices.

For characters that cannot be used for label names, refer to the following manual.
☞ GX Works2 Version 1 Operating Manual (Common)

● **Assigning devices automatically**
Devices are automatically assigned to labels when a program is compiled. The device assignment range can be changed on the Device/Label Automatic-Assign Setting screen. (☞ Section 5.8)
The assigned devices can be checked with the cross reference function.
(☞ GX Works2 Version 1 Operating Manual (Common))

■ Maximum number of input/output labels

The maximum number of input/output labels can be used in a function block differs according to programming languages.
When setting input/output labels with local label setting of function block, set within the number of the input/output labels shown in the following table.

Programming language	Function block label	
	Input	Output
Ladder Diagram	1 to 24*1 (Including input/output labels)	1 to 24*1 (Including input/output labels)
Structured Text	0 to 253 (Including input/output labels)	

*1 : The input/output label is counted that each of input /output labels is one label.

5.5 Common Operations for Setting Labels

Q CPU L CPU FX

This section explains the common operations for each label setting editor.

5.5.1 Classes

A label class indicates the POU applicability and the usage of label.
Selectable classes differ according to the type of label setting editor.
The following table shows selectable classes for each label setting editor.

○: Applicable, ×: Not applicable

Class	Description	Editor to set labels		
		Global label	Local label of a program block	Local label of a function block
VAR_GLOBAL	Select this class to make a label usable in the program blocks and function blocks commonly in the project.	○	×	×
VAR_GLOBAL_CONSTANT	Select this class to make a label with a constant value usable in the program blocks and function blocks commonly in the project.	○	×	×
VAR	Select this class to make a label usable in the program block or function block.	×	○	○
VAR_CONSTANT	Select this class to make a label with a constant value usable in the program block or function block.	×	○	○
VAR_RETAIN[1]	Select this class to make a latch type label usable in the program block or function block.	×	○	○
VAR_INPUT	Select this class to make a label usable for input variables in the function block. Its value cannot be changed in a POU.	×	×	○
VAR_OUTPUT	Select this class to make a label usable for output variables in the function block.	×	×	○
VAR_IN_OUT	Select this class to make a label usable for both input and output variables in the function block. Its value can be changed in a POU.	×	×	○

[1] : Not supported by FXCPU.

5.5.2 Data types

Data types of label are described in the following table.
For details such as value ranges of each data type, refer to the following manuals.
☞ MELSEC-Q/L/F Structured Programming Manual (Fundamentals)
☞ MELSEC-Q/L Programming Manual (Common Instruction)
☞ User's Manual (Function Explanation, Program Fundamentals) of the CPU module to be used.

Note that data types differ according to the programming language (Ladder Diagram/Sequential Function Chart/Structured Text).
The following table shows data types that can be used for each programming language.

○: Applicable, ×: Not applicable

Data type	Programming language	
	Ladder Diagram/Sequential Function Chart	Structured Text
Bit	○	○
Word (signed)	○	○
Double word (signed)	○	○
Word (unsigned)/16-bit string	×	○
Double word (unsigned)/32-bit string	×	○
Single-precision real[*1]	○	○
Double-precision real[*2]	○	○
String[*3]	○	○
Time	×	○
Timer	○[*5]	×
Counter	○[*5]	×
Retentive timer[*4]	○[*5]	×
Pointer	○[*5]	×

*1 : For FXCPU, this item is supported by FX2N, FX2NC, FX3S, FX3G, FX3GC, FX3U, and FX3UC only.
*2 : Supported by Universal model QCPU/LCPU only.
*3 : For FXCPU, this item is supported by FX3U and FX3UC only.
*4 : For FXCPU, this item is supported by FX1N, FX1NC, FX2N, FX2NC, FX3S, FX3G, FX3GC, FX3U, and FX3UC only.
*5 : For Ladder Diagram, these items cannot be used in an inline structured text program.

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5.5.3   Selecting data types

Select a data type.
A data type can be specified by directly entering the type in text or selecting it on the <u>Data Type Selection</u> screen.

Screen display

Click [...] on the data type entry field on each label setting editor.
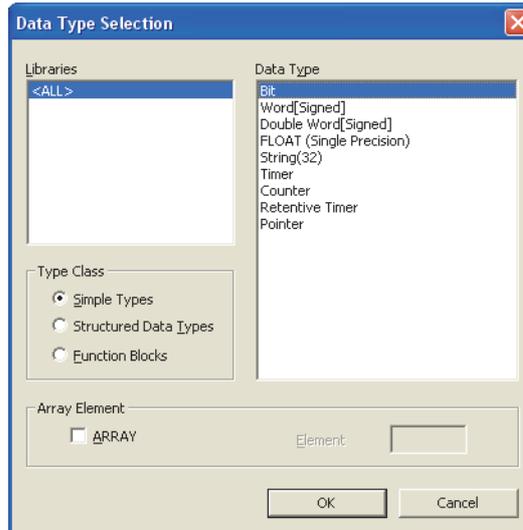
Operating procedure

1. **Select a type for "Type Class".**

Item	Description
Simple Types	Specify this to select a data type from basic types such as bit and word.
Structured Data Types	Specify this to select a data type from the defined structures. (Grayed out for structure settings)
Function Blocks	Specify this to select a data type from the defined function blocks. (Grayed out for structure settings)

2. **On the "Libraries" field, select the reference source such as the defined structure that is used as the data type.**

Item	Description
<ALL>	Browse data types and structures/function blocks defined in the project, and all libraries.
<Project>	Browse data types and structures/function blocks defined in the project. (Not displayed when "Simple Types" is selected.)

3. **On the "Data Type" field, select the data type, structure, or function block name.**

4. **Click the [OK] button when the setting is completed.**

The settings are displayed on the "Data Type" column on the label setting editor.

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● **Method for displaying the** <u>Data Type Selection</u> **screen**

The <u>Data Type Selection</u> screen can be opened by any of the following operations when [...] is in the selected status.

• Press the ⟦Enter⟧ key.
• Press the ⟦Space⟧ key.
• Press the ⟦F2⟧ key.

■ Setting arrays for data type

Define the data type as an array.
To define a data type as an array, set the items of "Array Element" on the <u>Data Type Selection</u> screen.

Operation

1. **Click [...] on the data type entry field on each label setting editor.**

2. **Select "ARRAY" under "Array Element".**

3. **Enter the number of elements for "Element".**

4. **Set the data type of the array element in the same manner as setting the normal data type.**
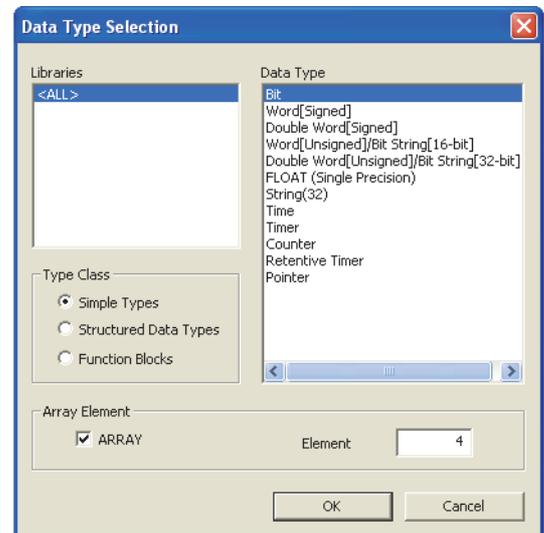
● **To change the offset**

To change the offset ([Array start value]..[Array end value]) to a value other than 0, edit the offset value by directly entering the array declaration in text on each label setting editor.

	Class		Label Name	Data Type	
1	VAR_GLOBAL	▼	Initial Setting_A	Bit[0..2]	...
2	VAR_GLOBAL	▼	Initial Setting_B	Bit[2..6]	...
3	VAR_GLOBAL	▼	Initial Setting_C	String(32)	...

● **To change the array to a two- or three-dimensional array**

Edit two- or three-dimensional array by directly entering the array declaration in text on each label setting editor.

For details of array declarations, refer to the following manual.

☞ MELSEC-Q/L/F Structured Programming Manual (Fundamentals)

		Class		Label Name	Data Type	
1	VAR_GLOBAL	▼	Initial Setting_A	Bit[0..2]	...
2	VAR_GLOBAL	▼	Initial Setting_B	Bit[2..6,2..6]	...
3	VAR_GLOBAL	▼	Initial Setting_C	Bit[0..2,0..2,0..2]	...

> **Point** 🔑
>
> ● **When a constant type is set for class**
>   For labels whose classes are set as VAR_CONSTANT or VAR_GLOBAL_CONSTANT, arrays cannot be set for the data type. If they are set, an error occurs at compilation.
> ● **Offset values**
>   Minus values can be set for offset values.
> ● **Using arrays in ladder programs**
>   The labels of two- or three-dimensional array and structure array cannot be used in ladder programs.
>   In addition, devices and labels cannot be used for indexes in array.

■ Setting data length of character string data type

To change the data length of the character string data type, directly edit the data length on each label setting editor.

The initial value of data length of the character string data type is set on the option setting.

● **Changing data length on the label setting editor.**

> **Operation**
>
> • **Change the data length on the "Data Type" column on the label setting editor.**

	Class		Label Name	Data Type	
1	VAR	▼	l_string1	String(32)	...
2	VAR	▼	l_string2	String(16)	...

Change these values directly.

● **Changing initial value of data length**

> **Operation**
>
> • **Select [Tool] ⇒ [Options] ⇒ "Label Setting Editor" ⇒ "Default Length of String Date Type", and set the data length.**

Data Type Setting

Default Length of String Data Type | 32 | ▲▼
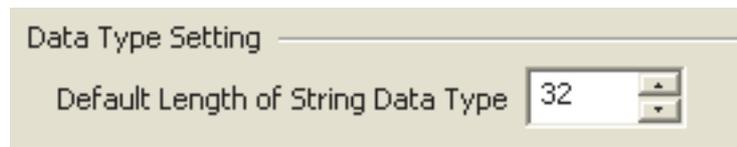
5.5.4　Label comments

Append a comment to a defined label.
Label comments can be displayed on the ladder editor.
Select [View] ⇒ [Comment] to display label comments.
Label comments are not applied to device comments even when a program is compiled.

5.5.5　Editing rows

Edit rows on the label setting editor.

■　Adding rows

Add a row on the label setting editor.

● **New Declaration (Before)**

Insert a row above the selected row.

| Operation |

- **Select [Edit] ⇒ [New Declaration (Before)] (📊).**

● **New Declaration (After)**

Insert a row below the selected row.

| Operation |

- **Select [Edit] ⇒ [New Declaration (After)] (📊).**

Point

● **New Declaration (After)**
When using the New Declaration (After) function, the setting of added rows can be specified whether to leave cells blank or to enter label names or data types automatically.
Select [Tool] ⇒ [Options] ⇒ "Label Setting Editor" ⇒ "Editor Setting".

- When "Automatic copy and increment when inserting a row" is selected
  Copy the class and label name, append a value after the label name, and add a row with the copied data below the specified row. If a value is already appended after the label name, the data is copied with an incremented value. When devices are set for global labels, the data is copied with an incremented device number.
- When "Copy data type/comment items" is selected
  Copy the data type, comment, and remark, and add a row with the copied data below the specified row.

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■   Deleting rows

Delete a row on the label setting editor.

> **Operation**

- **Select [Edit] ⇒ [Delete Line] (icon).**

	Class	Label Name
1	VAR_GLOBAL ▼	data1
2	VAR_GLOBAL ▼	data2
3	VAR_GLOBAL_CONSTANT ▼	data3

	Class	Label Name
1	VAR_GLOBAL ▼	data1
2	VAR_GLOBAL_CONSTANT ▼	data3
3	▼	

■   Displaying all lines or first line of comments and remarks

For the "Comment" and "Remark" columns, data can be entered in multiple lines. The 'all lines/first line display' function switches the display between all lines and only the first line by double-clicking "+" or "-".

⊕ 2 VAR_GLOBAL ▼ Global_data2 Bit[1..5] ... | Global_data2

Only the first line is displayed.

⊙ 2 VAR_GLOBAL ▼ Global_data2 Bit[1..5] ... Global_data2
Element1=Group1
Element2=Group2
Element3=Group3
Element4=Group4
Element5=Group5

All lines are displayed.

■   Selecting all rows

All rows can be selected by the following operation.

> **Operation**

- **Select [Edit] ⇒ [Select All].**

Function/FB Label Setting FB_SYOKIKA [FB]
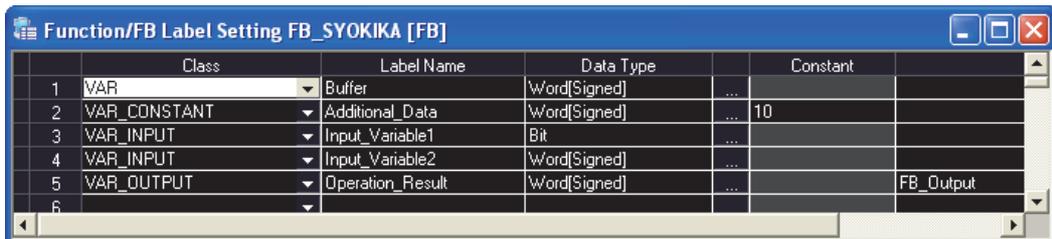
	Class	Label Name	Data Type		Constant	
1	VAR ▼	Buffer	Word[Signed]	...		
2	VAR_CONSTANT ▼	Additional_Data	Word[Signed]	...	10	
3	VAR_INPUT ▼	Input_Variable1	Bit	...		
4	VAR_INPUT ▼	Input_Variable2	Word[Signed]	...		
5	VAR_OUTPUT ▼	Operation_Result	Word[Signed]	...		FB_Output
6	▼					

■ **Sorting labels**

Sort the labels in ascending/descending order by selecting a label item.
Applicable to only local labels of program and global labels.

| **Operation** |

1. **Select [Edit] ⇒ [Sort] ⇒ [Class]/[Label Name]/[Data Type]/[Constant]/[Device]/[Comment]/ [Remark].**
The following confirmation message is displayed.
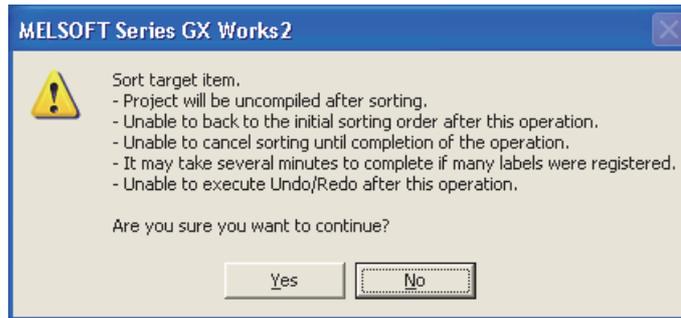
2. **Click the** [Yes] **button.**

Sort the selected item in ascending order. [△] is displayed on the title name for ascending order.

For descending order, select the same item again. [▽] is displayed on the title name for descending order.
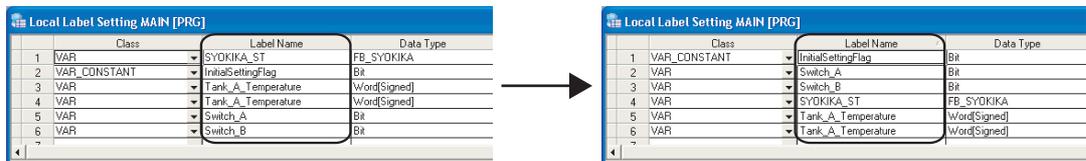
| *Point* |

● **Sorting labels with label setting editor**
Labels can be also sorted by clicking a title name of label setting editor.
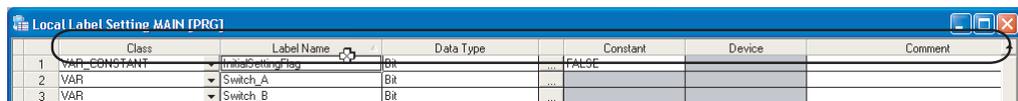
● **Considerations for sorting labels**
The following are the considerations for sorting labels.
• After sorting labels, the programs relating to the sorted labels are in the uncompiled status.
• After sorting labels, [Edit] ⇒ [Undo]/[Redo] cannot be selected.

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■   **Displaying one last blank row only**

Display only one blank row under the label of last row on the label setting editor.
Applicable to only local labels of program and global labels.

Operation

- **Select [Tool]** ⇒ **[Options]** ⇒ **"Label Setting Editor", and select "Display last blank row".**
  Only one blank row is displayed under the label of last row.

Point

● **Operation for editing rows**
  When the cursor is on the last blank row on the label setting editor, [Edit] ⇒ [New Declaration (Before)]/[New Declaration (After)]/[Delete Line] cannot be selected.
  Select a row other than the last row for adding or deleting rows.

● **Adding rows under the last row where a label is set**
  When "Automatic copy and increment when inserting a row" is not set under [Tool] ⇒ [Options] ⇒ "Label Setting Editor", executing the New Declaration (After) function on the last row where a label is set adds a row with class. "VAR_GLOBAL" for global label, "VAR" for local label is set. Change it if necessary.

5.5.6　　Deleting unused labels

Extract unused labels from the set labels on the label setting editor, and delete them in batch. Unused labels are searched from the cross reference information.
Target labels for this operation are local labels in programs of POU and global labels.

Operating procedure

1. **Select [Edit] ⇒ [Unused label list].**

The following message is displayed.
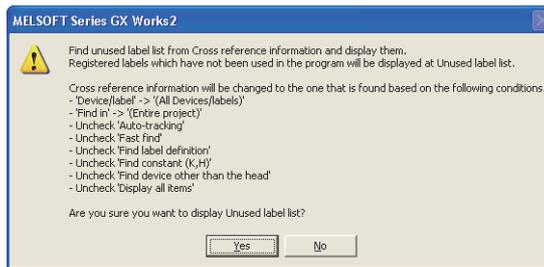
2. **Click the ｜ Yes ｜ button.**

Unused labels are extracted.

3. **The <u>Unused label list</u> screen is displayed.**

Select unused labels to be deleted under "Label name".

Click the ｜ Select all ｜ button to select all unused labels.

Click the ｜ Cancel All Selections ｜ button to cancel the selection of all unused labels.

4. **Click the ｜ Delete label ｜ button.**

The following message is displayed.

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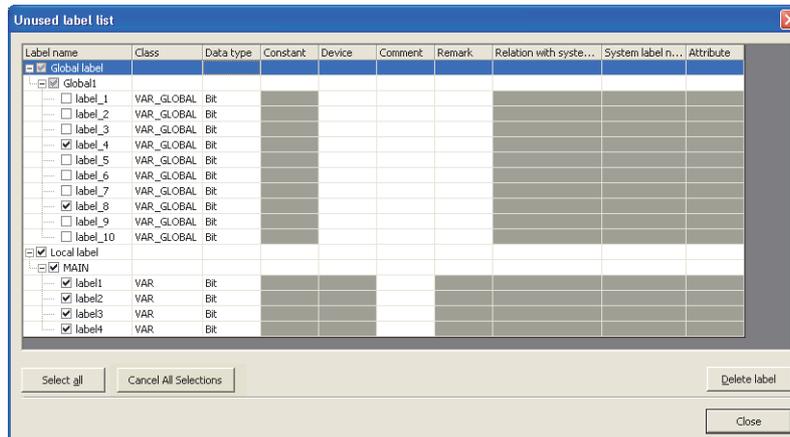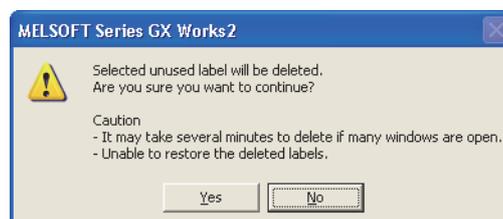
5. **Click the** `Yes` **button.**

The selected unused labels are deleted.
The program becomes uncompiled status after the unused labels are deleted, however, the operation to delete unused labels can be continued while the <u>Unused label list</u> screen is being displayed.

Point

● **Considerations when deleting unused labels**
   The following are the considerations when deleting unused labels.
   • After unused labels are deleted, programs related to the deleted unused labels become uncompiled status.
   • The [Undo]/[Redo] operation under [Edit] cannot be selected after unused labels are deleted.
   • Labels in user libraries and functions/function blocks are not displayed on the <u>Unused label list</u> screen.
   • When "Create cross reference information after completion compile" is selected under [Tool] ⇒ [Options] ⇒ "Compile" ⇒ "Basic Setting", the <u>Unused label list</u> screen cannot be displayed.

5.6 Setting Structure Labels

Q CPU L CPU FX

This section explains how to set structure labels.

5.6.1 Setting structures

Set the elements of the structure on the Structure Setting screen.

Screen display

Select Project view ⇒ "POU" ⇒ "Structured Data Types" ⇒ "(structure)".

Operating procedure

- **Set the items on the screen.**

Item	Description	Maximum number of characters
Label Name	Enter a desired label name.	32
Data Type	Set a data type from the Data Type Selection screen displayed by clicking [...]. (☞ Section 5.5.3) It can also be entered directly.	128
Constant	Constant values are not displayed on the Structure Setting screen.	128
Comment[*1, *2]	Enter a comment. Comments can be displayed on the program editor by switching display/hide of comments. (☞ Section 2.2.4)	1024

*1 : A new line can be inserted in a cell by pressing the Ctrl + Enter keys.
*2 : The compilation is not necessary after editing.

Point

● **Creating new structure data**
   Create structure data using the Project view.
   (☞ GX Works2 Version 1 Operating Manual (Common))

● **When registering structure to the data type of system label**
   Elements of the structure registered to the data type of system label cannot be edited.
   Elements of structure can be added and comments can be edited.
   However, when the edited information is applied to the system label data base, all references of the system labels which use the edited structure are deregistered. Register the canceled system labels again.

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5.6.2　Defining data type of label as structure

To define the data type of label as a structure, set a structure in the data type entry field on each label setting editor. In addition to direct text entry, a structure can be selected on the <u>Data Type Selection</u> screen (☞ Section 5.5.3).

5.6.3　Assigning devices to structure labels

Devices of the structure global labels are set on the <u>Structure Device Setting</u> screen.
If a structure is set for data type on the <u>Global Label Setting</u> screen, "Detail Setting" is displayed on the "Device" column. Click "Detail Setting" to display the <u>Structure Device Setting</u> screen.

Screen display

Click "Detail Setting" on the label setting editor.

Operating procedure

- **Set the items on the screen.**

Item	Description
Label Name	Display label names defined in the structure.
Data Type	Display data types set to label names.
Device	Set device names to be assigned.
Automatic Filling	Select this to set devices automatically to cells in which devices are not set with the same data type.
Use Bit Designation	Select this to enter device names automatically to bit devices using bit specification of word device.

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● **Display on the Local Label Setting screen**
 For the Structure Device Setting screen, the read-only screen is displayed.

● **Setting devices of global labels**
 Devices assigned to structure are not cleared even when elements of structure are changed on the Structure Setting screen.
 However, devices of member whose data type is changed or devices of member whose data type is changed to the one with different bit array are cleared.

■ Entering device names automatically

The Automatic filling function can be used when setting series of devices for the data on the Structure Device Setting screen.
When using the Automatic filling function, whether to use bit specification of word device can be selected.

Operation

1. **Click "Detail Setting" on the label setting editor.**
 The Structure Device Setting screen is displayed.

2. **Enter the device name to the "Device" column.**
 Series of devices are automatically set in the cells following the one entered, skipping the cells where devices are already set.

● **When using bit specification**
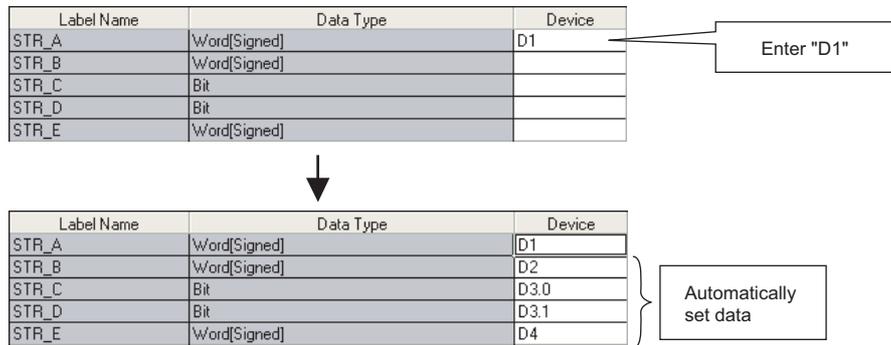
● **When not using bit specification**
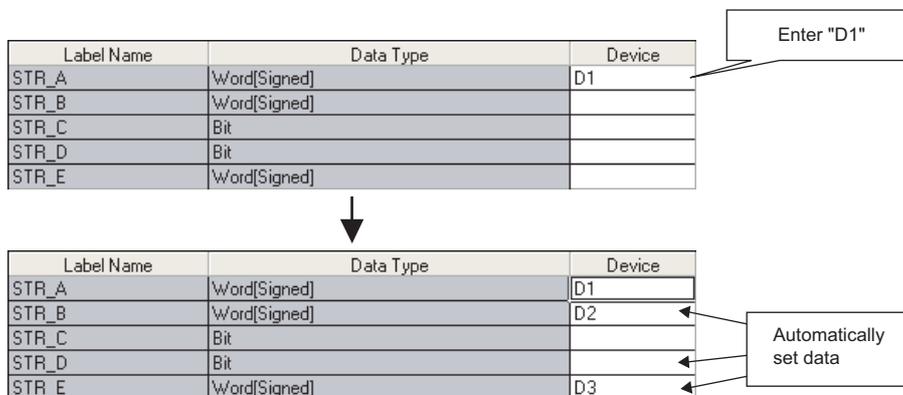
Point

● **When not using bit specification**
 When the bit specification is not used, clear "Use Bit Designation" on the Structure Device Setting screen.

5.6.4　　Assigning devices to structure array labels

Set devices for structure array global labels on the <u>Structure Device Setting</u> screen.
When VAR_GLOBAL is set for "Class" and the structure array is set for "Data Type" on the <u>Global Label Setting</u> screen, "Detail Setting" is displayed on the "Device" column. Click "Detail Setting" to display the <u>Structure Device Setting</u> screen.

Screen display

Click "Detail Setting" on the label setting editor.

Operating procedure

- **Set the items on the screen.**

Item		Description
Structure Array		Display elements of the structure array in tree format. The device setting of the element selected from the tree is displayed on the right area of the screen.
Label Name		Display label names defined in the structure.
Data Type		Display data types set to label names.
Device		Set device names to be assigned. Device names can be entered for the start array element only. For the subsequent array elements, device names offset from the device number set for the start element are automatically set.
Structure Array Offset Value	Word Device/Bit Device	Specify the device offset value to be set in the array element.
	Use Bit Designation	Select this to specify a bit device with bit-specified word device.

5.6 Setting Structure Labels

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Point

● **Display on the Local Label Setting screen**
  For the Structure Device Setting screen, the read-only screen is displayed.
● **Setting devices of global labels**
  Devices assigned to structure are cleared when elements of structure are changed on the Structure Setting screen.
  However, devices of member whose data type is changed to the one with the same bit array are not cleared.
● **Considerations when using system labels**
  Structure array global labels on which "Structure Array Offset Value" is set cannot be registered as a system label.

■ Entering device names automatically by setting offset values

On the Structure Device Setting screen, device numbers to be entered automatically can be set in fixed spacing for each array element of the structure array. Specify the difference in device numbers between the array elements as an offset value for the start device.

Operation

1. Click "Detail Setting" on the label setting editor.
The Structure Device Setting screen is displayed.

2. Set the device name for the start element data of the array.
Devices are set to the data of the same data type on the editing screen and in the subsequent array elements.

・ Offset value is not specified.

\<Array [0]\>

Label Name	Data Type	Device
STR_A	Double Word[Signed]	D1
STR_B	Double Word[Signed]	D3
STR_C	Bit	X1
STR_D	Bit	X2
STR_E	Double Word[Signed]	D5

Enter "D1"

\<Array [1]\>

Label Name	Data Type	Device
STR_A	Double Word[Signed]	D7
STR_B	Double Word[Signed]	D9
STR_C	Bit	X3
STR_D	Bit	X4
STR_E	Double Word[Signed]	D11

Devices starting from "D7" are assigned.

3. Set "Structure Array Offset Value".

Structure Array Offset Value

Word Device: 10   Bit Device: 5

☐ Use Bit Designation

By setting an offset value, devices to which the offset value is added are set to devices in the subsequent array elements.

・ Offset value is 10.

<Array [0]>

Label Name	Data Type	Device
STR_A	Double Word[Signed]	D1
STR_B	Double Word[Signed]	D3
STR_C	Bit	X1
STR_D	Bit	X2
STR_E	Double Word[Signed]	D5

Enter "D1"

<Array [1]>

Label Name	Data Type	Device
STR_A	Double Word[Signed]	D11
STR_B	Double Word[Signed]	D13
STR_C	Bit	X6
STR_D	Bit	X7
STR_E	Double Word[Signed]	D15

Devices starting from "D11" are assigned.

● **Using bit specification**

Devices can be set by specifying a bit device of word device when entering devices automatically.

Operation

1. **Click "Detail Setting" on the label setting editor.**
   The Structure Device Setting screen is displayed.

2. **Set the device name to the start element word device data of the array.**
   Devices are set for the same data type on the editing screen and in the subsequent array elements.

3. **Select "Use Bit Designation".**
   Bit-specified word devices are set to the bit devices.

Label Name	Data Type	Device
STR_A	Double Word[Signed]	D1
STR_B	Double Word[Signed]	D3
STR_C	Bit	D5.0
STR_D	Bit	D5.1
STR_E	Double Word[Signed]	D6

Point

● **Data for which device name can be entered**
For structure arrays, a device name can be entered only for the start element of array.
For the subsequent array elements, device names offset from the device number set for the start element are automatically set.

● **Offset values**
• An expression such as '1\0' or '0\2' can be specified for an incremental value of device such as U0\G0. However, the incremental values cannot be specified to both sides of \, such as '1\2'.
• When 0 is specified for the incremental value, the device number same as the data set to the start of devices is set to all data in the array.

5.7 Checking Duplications of Devices Assigned to Global Labels

Q CPU **L CPU** **FX**

This section explains how to check duplications of devices assigned to global labels. The result of the duplication check is displayed on the Output window.

■ Checking duplications of device names

Operating procedure

1. **Select [Tool] ⇒ [Check Device Duplication of Global Label].**

Duplications of device names set on the device columns of the Global Label Setting screen are checked. The result is displayed on the Output window.

2. **Double-click the result displayed on the Output window.**

The corresponding error location in the program is displayed. The duplicated devices are displayed in red.

For checking duplication results, refer to Section 10.4.
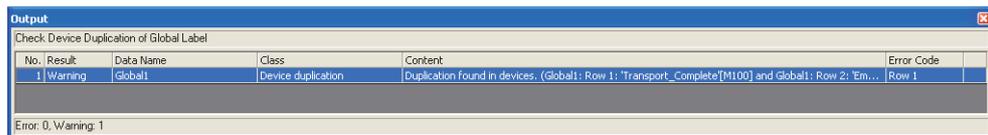
Point

● **Device names to be checked for duplications**
Character strings set on the device columns of the Global Label Setting screen are checked.
All global label data in a project are the target.
Note that, however, if the character strings set on the device columns are not supported by GX Works2, those devices are not checked.

● **Corresponding error location of duplication check**
When the duplication of device names is found between global labels in single global label file, the device cell with lower row number is displayed.

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5.8 Setting Ranges for Devices Assigned Automatically

Q CPU | L CPU | FX

This section explains how to set the ranges for devices that are automatically assigned to local labels. The devices set as automatically assigned device are assigned to labels when a program is compiled. (☞ Section 10.3)

■ QCPU (Q mode)/LCPU

Screen display

Select [Tool] ⇒ [Device/Label Automatic-Assign Setting].

Latch selection field

Operating procedure

- **Set the items on the screen.**

Item		Description
Latch selection field		Select latch (1) or latch (2). This item can be selected when the range of latch (1) or latch (2) is set on the <<Device>> tab of PLC parameter.
Device		Display the devices to be assigned automatically.
Digit		Display whether the range of device assignment setting is in decimal or hexadecimal.
Assignment Selection		Select the devices to be assigned automatically. Multiple devices can be set.
Assignment Range	Start	Enter the range of device points to be assigned automatically.
	End	
Total Points		Display the total points of each device range for VAR and VAR_RETAIN.

PLC Parameter Device Setting Range		Display the device point range set on the <<Device>> tab of PLC parameter.
		When the latch range is set, display the device point range with the latch range.
		    Example: When D: 0 to 12287, latch D: 5000 to 6000 are set on the
		              <<Device>> tab of PLC parameter, display range of D: 0 to 12287,
		              range of latch D: 5000 to 6000.

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■   FXCPU

Screen display

Select [Tool] ⇒ [Device/Label Automatic-Assign Setting].
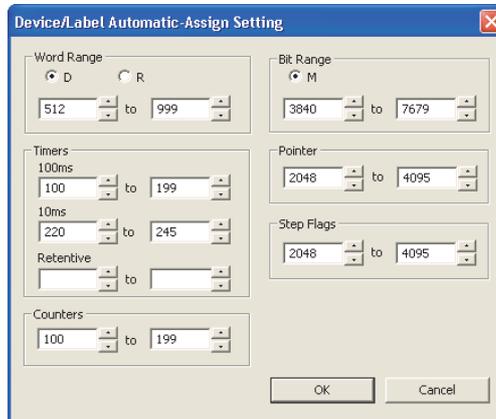
Operating procedure

- **Select the device type, and set the start and end addresses to be assigned automatically.**

5.8.1   Considerations of automatically assigned devices

● **Considerations when changing automatically assigned devices**

All programs need to be compiled when the range of automatically assigned device is changed.
Compiling all programs changes the device assignment to labels. Therefore, device values set before
the program change remain on the device-assigned labels.
Perform the following operation as a precautionary measure.

- For QCPU (Q mode)/LCPU
  After writing data to the programmable controller CPU, reset the programmable controller CPU,
  clear all device memories including latches, clear all file registers, then switch the programmable
  controller CPU to RUN.

- For FXCPU
  After writing data to the programmable controller CPU, clear the device memory of the
  programmable controller CPU with the PLC memory clear function, then switch the programmable
  controller CPU to RUN.

  (☞ GX Works2 Version 1 Operating Manual (Common))
  For the considerations for compiling all programs, refer to Section 10.3.3.

● **Assigning devices with the "Device/Label Automatic-Assign Setting" function**

Assign devices to labels with the "Device/Label Automatic-Assign Setting" function when a program
is compiled. For details, refer to Section 10.3.
The assigned devices can be checked with the cross reference function.
(☞ GX Works2 Version 1 Operating Manual (Common))
Devices within the range set on the Device/Label Automatic-Assign Setting screen cannot be used in
a program.

● **Considerations when the multiple types of devices are assigned automatically (QCPU (Q mode)/LCPU)**

Refer to considerations of compilation.
(☞ Section 10.3.3)

● **Device types and setting ranges**

The types of automatically assigned devices differ by the type of CPU.
The setting ranges depend on the number of device points set in PLC parameter.
For details of PLC parameter, refer to the following manual.
☞ GX Works2 Version 1 Operating Manual (Common)

● **Considerations when displaying the Device/Label Automatic-Assign Setting screen**

When displaying the Device/Label Automatic-Assign Setting screen, an error message may be displayed.
In this case, terminate GX Works2, copy "vsflex8n.ocx" stored in the folder of GX Works2 installation destination to "C:\WINDOWS\system32," and restart GX Works2.

● **Timers of Device/Label Automatic-Assign Setting function for FXCPU (100ms, 10ms, retentive timer)**

When a program created with FXCPU is compiled, devices set to "100ms" under "Timers" are automatically assigned to the timer type labels.
For assigning 10ms timer devices or retentive timer devices to the timer type labels, define the global label and specify the device number directly.
Devices set to "10ms" and "Retentive" under "Timers" are used respectively in the following function blocks of FXCPU Structured project in Structured Text or Structured Ladder.

 • TIMER_10_FB_M   : 10ms timer
 • TIMER_CONT_FB_M : Retentive timer

5.9 Writing/Reading Data to/from CSV Files

Q CPU **L CPU** **FX**

This section explains how to write the label setting data to the CSV file and how to read the label setting data from the CSV file.

■ Writing label setting data

Write label setting data to CSV files.

Operating procedure

1. **Select [Edit] ⇒ [Write to CSV File] (🖳).**

The following message is displayed.
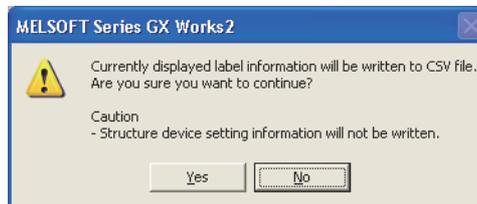
2. **Click the ⎿ Yes ⏌ button.**
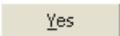
The Write to CSV File screen is displayed.
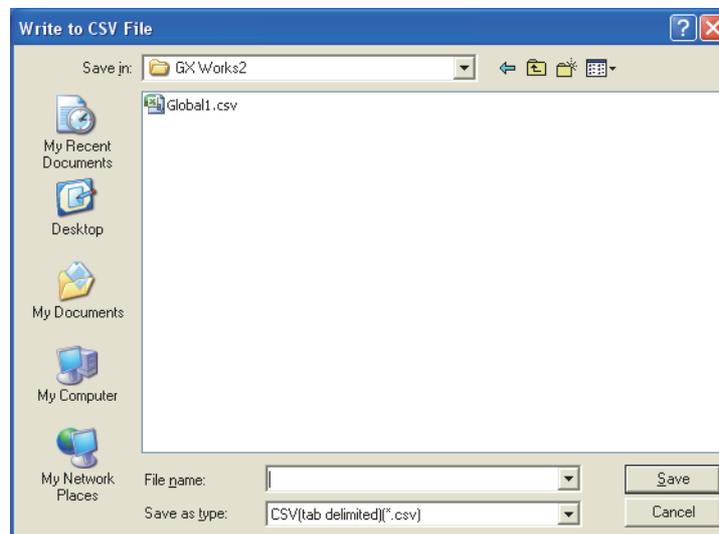
3. **Enter the file name to be saved and click the ⎿ Save ⏌ button.**

The label setting data is saved in the save destination.

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■ Reading label setting data

Read label setting data from CSV files.

Operating procedure

1. **Select [Edit] ⇒ [Read from CSV File] (📲).**

The <u>Read from CSV File</u> screen is displayed.
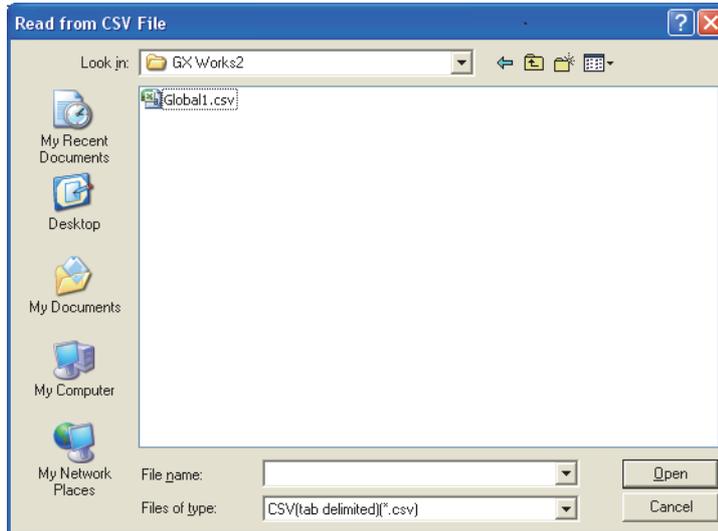
2. **Select the file name to be read and click the** <u>Open</u> **button.**

The following message is displayed.
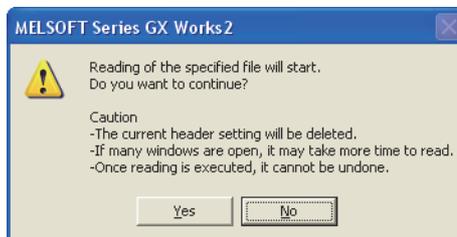
3. **Click the** <u>Yes</u> **button.**
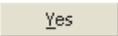
The label setting data is read to the project.

■ CSV file format

The title name of label setting editor links with the title name of the CSV file.

• Data of column which coincides in the title name of label setting editor in the CSV file is read to label setting editor.

• Data of column which does not coincide in the title name of label setting editor cannot be read to the CSV file.

• Columns order of the CSV file can be read even if it does not coincide in the columns order of label setting editor.
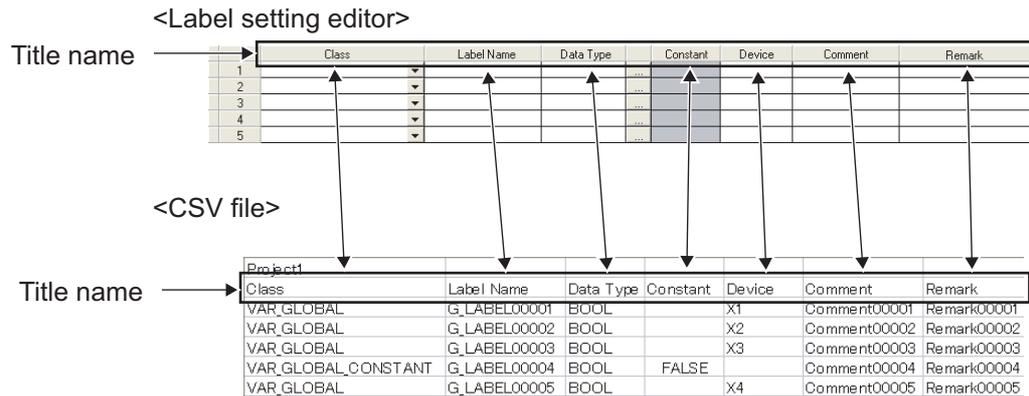
Restrictions

● **When multi-byte characters are used in the label name**

Do not use multi-byte characters for a label name when using a CSV file created in Japanese version of GX Works2 in other language version of GX Works2.

When a CSV file which contains multi-byte characters is read in GX Works2 with the language version other than Japanese, the program cannot be compiled properly.

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6   EDITING LADDER PROGRAMS

This chapter explains the functions of the ladder editor for editing ladder programs.

6.1 Creating Ladder Programs

This section explains how to create ladder programs and related functions.

6.1.1 Switching between overwrite mode and insert mode

Switch between 'Overwrite mode' and 'Insert mode'. Select the appropriate mode to create programs. The operating procedures in this chapter are explained under the 'Overwrite mode' as the basic setting.

Operating procedure

- **Press the** ⌨Insert **key.**

  The mode switches alternately between 'Overwrite' and 'Insert' each time the key is pressed. The color of the cursor on the editing screen changes according to the active mode.
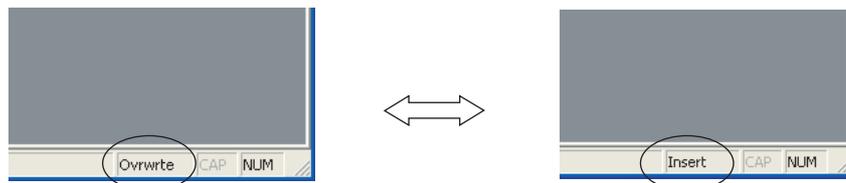
- In the 'Overwrite mode', contacts, coils, or application instructions newly input at the cursor position overwrite the existing ones.

  Example: Changing X20 to a horizontal line in the 'Overwrite mode'.
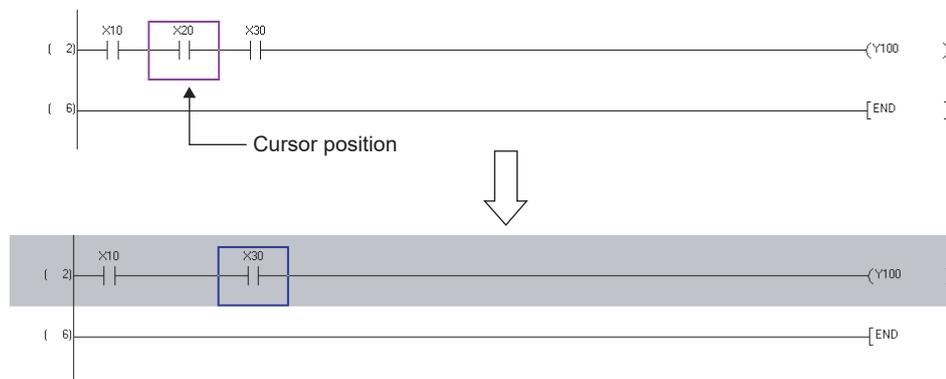
● In the 'Insert mode', contacts, coils, or application instructions newly input at the cursor position are inserted in front of the cursor.

Example: Inserting X15 in front of X20 in the 'Insert mode'.

Cursor position
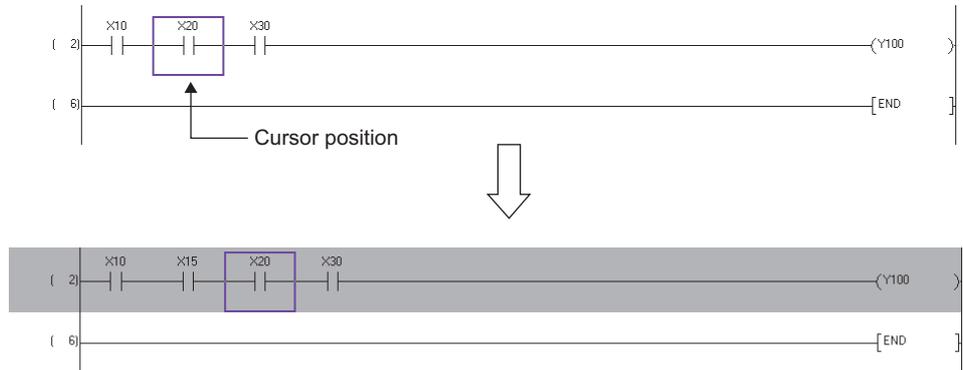
6.1.2   Switching between write mode and read mode

Switch between write mode and read mode or monitor (write mode) and monitor mode.
Switch the mode to avoid editing programs directly.

● **Write mode/monitor (write mode)**
  Select when editing ladder programs.
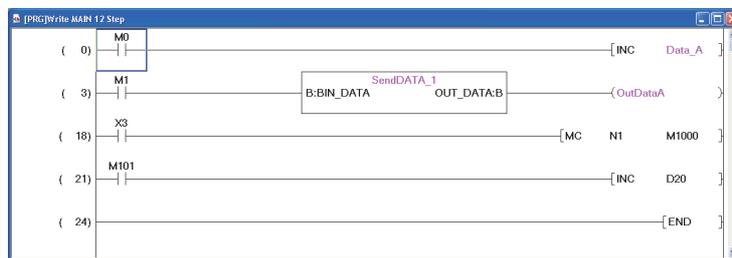
● **Read mode/monitor mode**
  Select when operating other than editing ladder programs.
  Enter a device directly on the program editor to display the <u>Find</u> screen, and search for a device.
  The color of the cursor turns to dark blue as shown below in the read mode/monitor mode.
  "Read only" is displayed on the screen title.
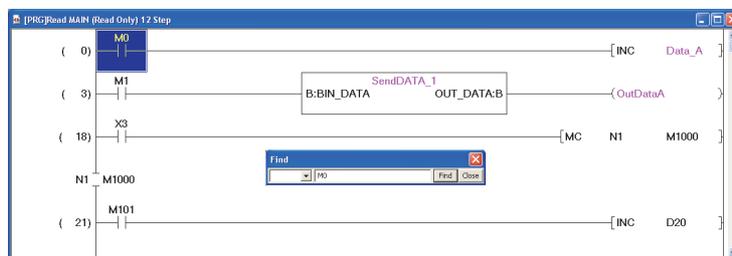
■ **Switching between read mode and write mode**

Switch between 'Read Mode' and 'Write Mode' on the active program editor.

Operating procedure

- **Select [Edit] ⇒ [Ladder Edit Mode] ⇒ [Read Mode] (⊞)/[Write Mode] (🖉).**

  The mode is switched between 'Read mode' and 'Write mode'.

■ **Switching between read mode and write mode on all windows**

Switch between 'Read Mode' and 'Write Mode' on all open program editors.

Operating procedure

- **Select [Edit] ⇒ [Ladder Edit Mode] ⇒ [Read Mode (All Windows)]/[Write Mode (All Windows)].**

  The mode is switched between 'Read Mode' and 'Write Mode' on all windows.

■ **Switching between monitor mode and monitor (write mode)**

Switch between 'monitor mode' and 'monitor (write mode)' on the active program editor during monitoring. For details of monitoring, refer to Chapter 12.

Operating procedure

1. **Select [Online] ⇒ [Monitor] ⇒ [Monitor Mode] (🔍)/[Monitor (Write Mode)] (🔍).**

   When switched to 'monitor (write mode)', the message shown below is displayed.
   Clear the check boxes if the function displayed on a message is not executed when switching the mode.
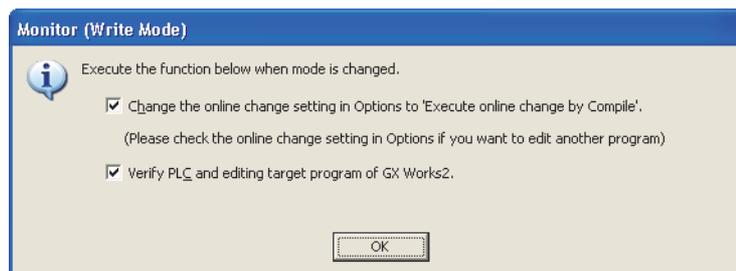
2. **Click the [OK] button.**

   The mode is switched between 'Monitor mode' and 'Monitor (write mode)'.

Point

● **Switching between Write Mode and Read Mode, Write Mode (All Windows) and Read Mode (All Windows), or Monitor (write mode) and Monitor Mode**

When "Use the Switching Ladder Edit Mode (Read, Write, Monitor, Monitor (Write))" is cleared under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram", the program can be edited directly with the same operation as that in the 'Write Mode' for ladder program editing and the 'Monitor (Write Mode)' for monitoring.

● **Switching between write mode and monitor (write mode)**

Switching between 'write mode' and 'monitor (write mode)' can be performed while an unconverted ladder block exists in the program.

Additionally, when performing verification by selecting "Verify PLC and editing target program of GX Works2" at switching the mode to 'monitor (write mode)' while an unconverted ladder block exists, the program before editing and the program in the programmable controller CPU will be verified.

● **Considerations of 'read mode'/'monitor mode'**

The programs cannot be edited directly in the 'read mode'/'monitor mode'. However, executing the following operation may change the programs.

 • When the source FB name is changed or the FB is deleted

 • When input/output labels of the source FB are changed and compiled

 • When the devices or labels are replaced with the replacement function by specifying the whole project

 • When TC setting change is executed

Use the security function to prevent editing the programs.

(☞ GX Works2 Version 1 Operating Manual (Common))

● **Displaying in 'read mode'/'monitor mode'**

When the master control instructions are used in the ladder program, the nesting numbers are displayed as shown below.

For details of nesting number of master control, refer to Section 2.2.1.
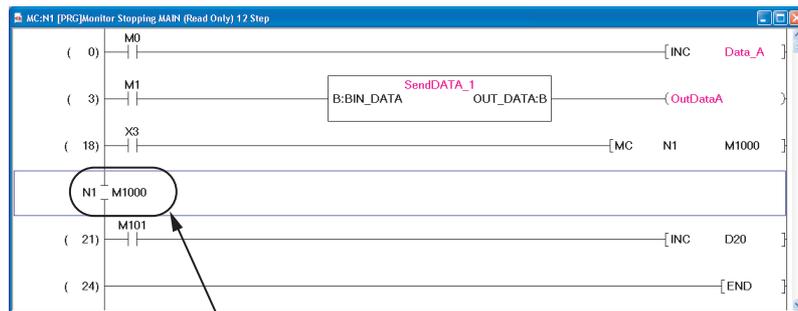
A nesting number is displayed.

● **Assigning shortcut keys**

When "Use the Switching Ladder Edit Mode (Read, Write, Monitor, Monitor (Write))" is selected under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram", the functions assigned to the shortcut keys are changed as shown below table.

If the shortcut keys are assigned to other functions, the settings shown in the table are given priority, and the assigned shortcut keys are ignored.

Use the key customize function to set/change the shortcut keys.

(☞ GX Works2 Version 1 Operating Manual (Common))

Shortcut key	Cleared	Selected
F2	-	Write mode
Shift + F2	-	Read mode
F3	Start Monitoring	Monitor mode
Shift + F3	Start Watching	Monitor (write mode)

Point

● **Monitor (write mode) for FXCPU**

'Monitor (write mode)' is not supported by FXCPU in the following conditions.

• When using FX0, FX0S, or FX1

• When using SFC programs

• When the simulation function is being performed

The "Verify PLC and editing target program of GX Works2" function is not supported when the mode is changed to 'monitor (Write mode)' in a project with labels. Verify the program with the Verify with PLC function before changing the mode to 'monitor (write mode)'.

(☞ GX Works2 Version 1 Operating Manual (Common))

6.2 Entering Instructions

This section explains how to enter instructions using menus. For other entering methods, refer to the Points of each section.

6.2.1 Entering contacts, coils, and application instructions

Q CPU **L CPU** **FX**

Enter contacts, coils, and application instructions.
Contacts, coils, and application instructions are entered by using the Enter Symbol screen.

Item		Toolbar	Shortcut key
Element	Open contact	⊣⊢ F5	F5
	Open contact branch	⊣⊢ sF5	Shift + F5
	Closed contact	⊣/⊢ F6	F6
	Closed contact branch	⊣/⊢ sF6	Shift + F6
	Coil	( ) F7	F7
	Application instruction	[ ] F8	F8
	Rising pulse[*1]	↑ sF7	Shift + F7
	Falling pulse[*1]	↓ sF8	Shift + F8
	Rising pulse branch[*1]	↑ aF7	Alt + F7
	Falling pulse branch[*1]	↓ aF8	Alt + F8
	Rising pulse close[*2]	↑ saF5	Shift + Alt + F5
	Falling pulse close[*2]	↓ saF6	Shift + Alt + F6
	Rising pulse close branch[*2]	↑ saF7	Shift + Alt + F7
	Falling pulse close branch[*2]	↓ saF8	Shift + Alt + F8
	Operation result rising pulse[*3]	↑ aF5	Alt + F5
	Operation result falling pulse[*3]	↓ caF5	Alt + Ctrl + F5
	Invert operation results[*1]	⊣/ caf10	Alt + Ctrl + F10

*1 : Not supported by FX0, FX0S, FX0N, FX1, FXU, and FX2C
*2 : Supported by Universal model QCPU/LCPU only.
*3 : Not supported by FX0, FX0S, FX0N, FX1, FXU, FX2C, FX1S, FX1N, FX1NC, FX2N, and FX2NC.

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Operating procedure

1. **Move the cursor to the position where an element is entered.**

2. **Select [Edit] $\Rightarrow$ [Ladder Symbol] $\Rightarrow$ [(element)].**

The Enter Symbol screen is displayed.

Consecutive element entry button

Consecutive device comment entry button

Element selection field

Instruction device entry field
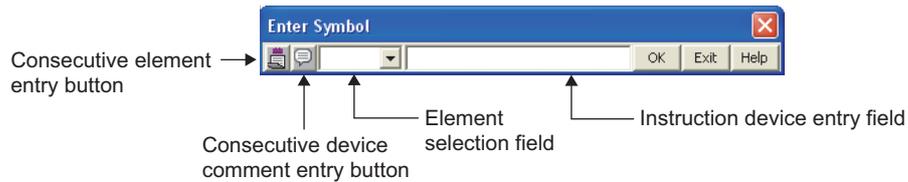
The following table shows the display contents of the screen.

Name	Description
Consecutive element entry button	Allow consecutive entry of elements by changing the setting to consecutive entry status. Consecutive entry ON, Consecutive entry OFF
Consecutive device comment entry button	Allow device comment entry after element by changing the setting to consecutive entry status. (☞ Section 6.2.4) Consecutive entry ON, Consecutive entry OFF
Element selection field	Allow changing the setting of elements. Clicking the ▼ button displays the list of elements.
Instruction device entry field	Enter an instruction and/or a device.

3. **Enter an instruction and/or a device.**
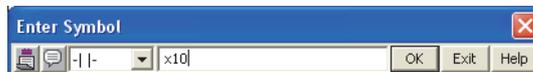
4. **Click the OK button.**

The entered element is displayed on the editing screen.

Point

● **Displaying the Enter Symbol screen**
  The Enter Symbol screen can be displayed by pressing the [Enter] key.

■ Simple editing of devices/labels when entering elements

Edit a device/label on the Enter Symbol screen.

● Open the Enter Symbol screen while the device/label is selected.

<div>

Operation

- **Press the** ⎡Ctrl⎤ **+** ⎡Alt⎤ **+** ⎡Enter⎤ **keys.**

</div>
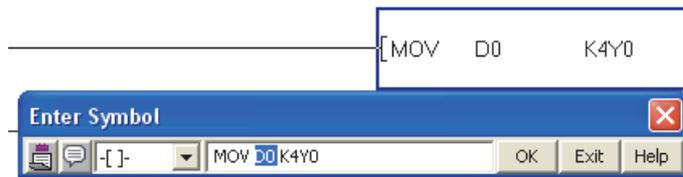
● Move the selection of the device/label.

<div>

Operation

- **Press the** ⎡Alt⎤ **+** ⎡←⎤ **/** ⎡→⎤ **keys.**

</div>
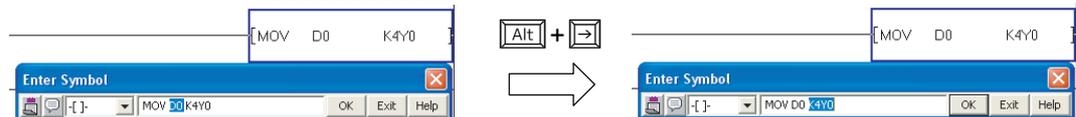
● Increment/decrement the device/label.

<div>

Operation

- **Press the** ⎡Alt⎤ **+** ⎡↑⎤ **/** ⎡↓⎤ **keys.**

</div>
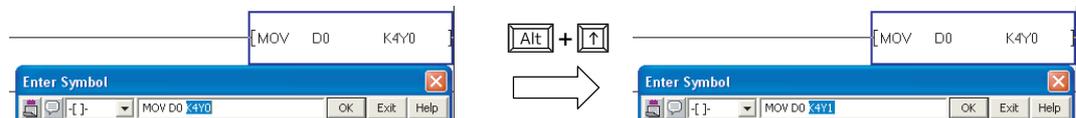
Point

● Increment and decrement
- When incrementing a label that does not have a number, 0 is suffixed to it.
- For a device in hexadecimal format, it is incremented/decremented in the hexadecimal format.
  For X or Y device of FXCPU, it is incremented/decremented in the octal format.

● Displaying instructions/labels
If the entry field is blank, an instruction/label can be selected by pressing the ⎡Ctrl⎤ + ⎡Space⎤ keys.

● Instruction tooltip
When the instruction is entered, the argument that is used for that instruction is displayed on the tooltip.
The next instruction option is displayed by clicking the tooltip or by pressing the ⎡Ctrl⎤ + ⎡Shift⎤ + ⎡Alt⎤ + ⎡Enter⎤ keys.
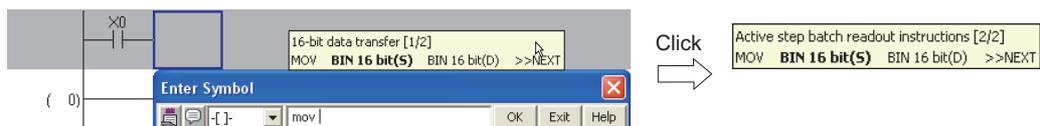
● Displaying/hiding instruction tooltips
Instruction tooltips can be displayed/hidden by selecting the following option: "Display available instruction tool hints in entering instruction", "Display available instructions in entering instruction", or "Display available labels in entering instruction" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder/SFC" ⇒ "Enter ladder" ⇒ "Display setting".

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■ Registering undefined labels during program creation

When the label that is entered on the Enter Symbol screen is not defined, it can be registered to the label setting editor following the element entry.
For registering a new label following the element entry, "Open Undefined Label Registration dialog at ladder entry" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram" needs to be selected.

Operating procedure

1. **Enter the undefined label on the Enter Symbol screen.**
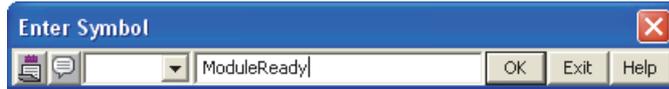
2. **Click the ⌈ OK ⌋ button.**

The Undefined Label Registration screen is displayed.

3. **Set the items on the screen.**

Item		Description
Label Name		Display the label name entered on the Ladder Symbol screen.
Label Setting Information		Select a label setting editor name to be registered from the list displayed by clicking ▼ .
	Class	Select a label class from the list displayed by clicking ▼ .
	Data Type	Set the data type on the Data Type Selection screen by clicking ⌈ ... ⌋ . (☞ Section 5.5.3) Direct data entry is also possible.
	Constant	Display the constant value of the selected data type. When "VAR_GLOBAL_CONSTANT" is selected for "Class" and simple type is selected for "Data Type", the constant value can be set.
	Comment*1	Enter label comments. Switch display/hide label comments to display the label comments on the program editor. (☞ Section 2.2.4)

*1 :   A new line can be inserted in a cell by pressing the ⌈Ctrl⌋ + ⌈Enter⌋ keys.

4. **Click the ⌈ OK ⌋ button.**

The undefined label is registered to the label setting editor.

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Point

● **Entering contacts and coils**

Elements can also be entered by entering only devices/labels at the specified position. They are entered as coils when they are connected to the right power rail, or output devices (Y, DY) are entered. For other circumstances, they are entered as contacts.

● **Allowable number of rows for creating ladder programs**

- A maximum number of rows that can be used for a single ladder block is 24.
- A maximum number of rows that can be processed in a single ladder conversion operation is 48.
  Perform ladder conversion appropriately during editing so that the number of rows that has not been converted does not exceed over 48.

● **Scrolling on the ladder editor**

When ladder programs that have not been converted exist, the scroll on the ladder editor cannot be performed. Convert the programs, and then scroll with no unconverted ladder programs exist.

● **Wrapping a line**

The maximum number of contacts that can be created in a single rung is "Display Connection of Ladder Diagram" + 1 coil. Set "Display Connection of Ladder Diagram" by selecting [Ladder Diagram] under [Tool] ⇒ [Options] ⇒ [Program Editor] ⇒ [Ladder] ⇒ [Ladder Diagram]. (☞ Section 2.2.7)

When the maximum number of contacts is exceeded, the wrapping source symbol (->) and the wrapping destination symbol (>-) are automatically created and the line is wrapped.

The same numbers (serial numbers) are assigned to the wrapping source symbol (->) and the wrapping destination symbol (>-) that are created in pairs.
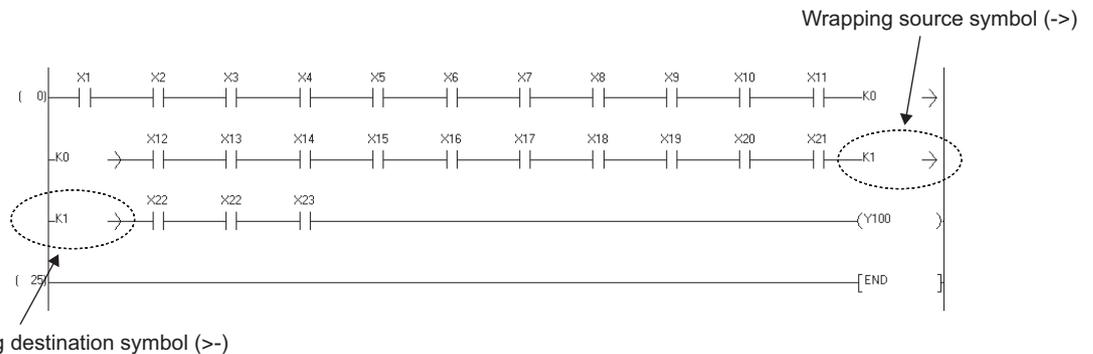
Wrapping source symbol (->)

Wrapping destination symbol (>-)

● **Changing the cursor position on the editing screen while the Enter Symbol screen is displayed**

Use the $\boxed{Ctrl}$ + $\boxed{\uparrow}$ $\boxed{\downarrow}$ $\boxed{\leftarrow}$ $\boxed{\rightarrow}$ keys to change the cursor position on the editing screen.
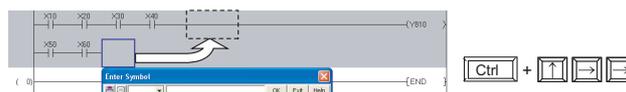
● **Displaying the Instruction Help screen at the occurrence of element entry error**

The Instruction Help screen can be displayed automatically by the following setting. (☞ Section 6.2.2)
Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram", and select "Display Instruction Help at symbol error occurrence".

6.2.2 Instruction help

Q CPU   L CPU   FX

The following explains the help function that supports entering elements. The help function can be used on the ladder editor only.

Operating procedure

1. **Click the** Help **button on the Enter Symbol screen.**

   The <<Instruction Selection>> tab on the Instruction Help screen is displayed.

2. **Select the instruction type from "Type List".**

   The instructions of the selected type are displayed on "Instruction List".
   (For details of the <<Find Instruction>> tab, refer to Point.)
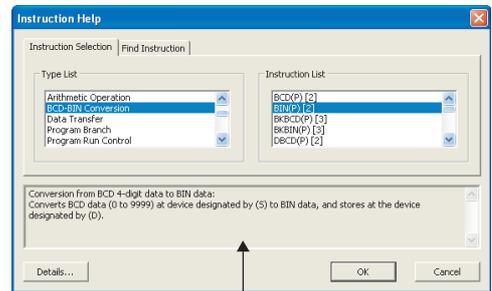
3. **Select an instruction from "Instruction List".**

   The information of the selected instruction is displayed on the instruction detail field.

4. **Click the** Details **button.**

   The Detail Instruction Help screen is displayed.

5. **Set the items on the screen.**

Item	Description
Pulse Form	Select this item to convert the instruction into pulse.
Input Device	Enter devices. Indication of the symbols: " * " : Applicable " - " : Not applicable
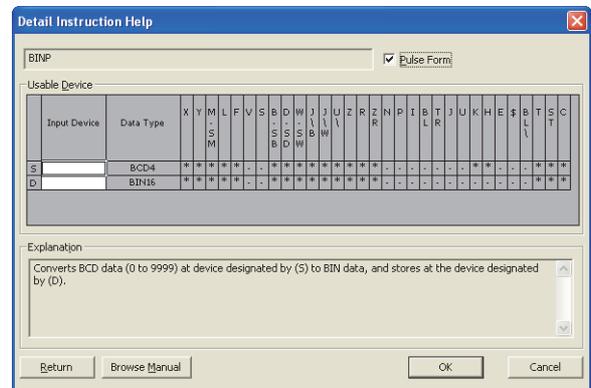
6. **Click the** OK **button on the Detail Instruction Help screen.**

   The instruction is entered at the cursor position.

Point

● **Instruction help function**
The Instruction help function has the <<Instruction Selection>> and <<Find Instruction>> tabs.
The <<Instruction Selection>> tab is displayed when no instruction is entered in the device instruction entry field of the Enter Symbol screen, and the <<Find Instruction>> tab is displayed when an instruction is entered in the instruction device entry field.

● **Instruction retrieval function**
If the instruction is entered incompletely or the entered instruction is not supported, the <<Find Instruction>> tab is displayed on the Instruction Help screen when "Display Instruction Help at symbol error occurrence" is selected in the option setting.
If the starting characters of the instructions match with the entered characters, the corresponding instructions are displayed.

Search method can be switched by clicking the [Forward Match] or [Partial Match] button.
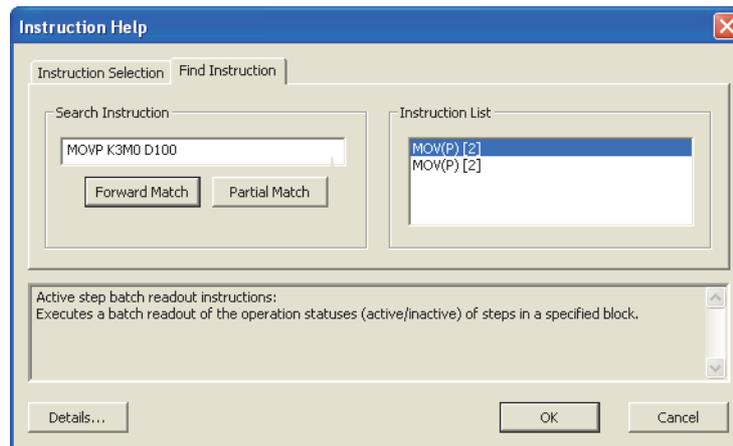
● **Checking instructions**
The specified instruction can be checked on the Instruction Help screen displayed by right-clicking and selecting [Open Instruction Help] from the shortcut menu.

● **Details of instruction**
Details of the instruction can be displayed by clicking the [Browse Manual] button on the Detail Instruction Help screen.
(☞ GX Works2 Version 1 Operating Manual (Common))

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6.2.3 Selecting the duplicated coil check function

<div align="right">

`Q CPU` `L CPU` `FX`

</div>

Check duplicated coils in the same program when entering a coil to a converted ladder program.
The duplicated-coil check function can be set by setting the option.

Screen display

Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder/SFC" ⇒ "Enter ladder".

```
Operational Setting
  ☑ Check duplicated coil
  ☐ Enter label comment and device comment
```

Operating procedure

- **Select "Check duplicated coil".**

  When a coil is entered, duplicated coils are checked.

  ○: Available ×: Not available -: Not supported

Device		Instruction								
		DELTA	EGP EGF	FF	MC	OUT	SET	SFT	PLS	PLF
QCPU (Q mode)/ LCPU	Y, M, L, B, F, SM, SB	×	×	○	○	○	○	○	○	○
	D, SD, W, SW, R, ZR	×	×	○	○	○	○	○	○	○
	DY	○	×	○	○	○	○	○	○	○
	T, C	×	×	×	×	○	×	×	×	×
	V	×	○	×	×	×	×	×	×	×
	BL	×	×	×	×	×	○	×	×	×
FXCPU	Y, M	-	-	-	○	○	○	-	○	○
	S	-	-	-	×	○	○	-	×	×
	T, C	-	-	-	×	○	×	-	×	×

6.2.4 Entering device comments

`Q CPU` `L CPU` `FX`

Enter a device comment following the entry of a contact, coil, or application instruction.

Screen display

Select [Tool] ⇒ [Options] ⇒ **"Program Editor"** ⇒ **"Ladder/SFC"** ⇒ **"Enter ladder"**.

Operational Setting
☐ Check duplicated coil
☑ Enter label comment and device comment

Operating procedure

- **Select "Enter label comment and device comment".**

  The Input Device Comment screen is displayed by clicking the [OK] button after entering a
  contact, coil, or application instruction.

  Enter Symbol
  | | MOV D1 D2 | OK | Exit | Help |

  Input Device Comment
Device/Label	Device/Label Comment	Preview	OK
D1			Cancel
D2			
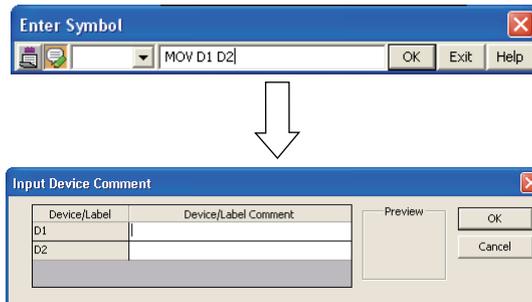
For the method for entering device comments, refer to the following manual.
☞ GX Works2 Version 1 Operating Manual (Common)

Point

● **Entering device comments**

  A device comment can be entered following the element entry by clicking 💬 on the Enter Symbol screen.
  (☞ Section 6.2.1)

● **Editing status of Input Device Comment screen**
  The cursor is in the "Device/Label Comment" field (editing status) when the Input Device Comment screen is displayed.
  The comment can be edited directly.
  For copying comments repeatedly, it is useful to set the "Device/Label Comment" field to be displayed in selecting
  status using the following option.
  Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder/SFC" ⇒ "Enter ladder", and select "Do not leave the Device/
  Label Comment field editing status".

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6.2.5 Entering pointer numbers and interrupt pointer numbers

Q CPU   L CPU   FX

Enter a pointer number or an interrupt pointer number.
Pointer numbers or interrupt pointer numbers are entered by using the Enter Symbol screen.

Operating procedure

1. **Move the cursor to the position where a pointer number or an interrupt pointer number is entered.**

Enter a pointer number or an interrupt pointer number at the position where a step number is displayed.
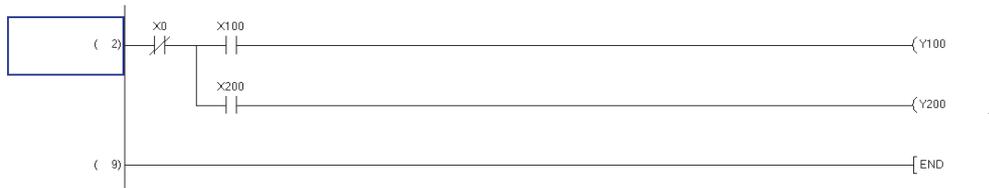
2. **Press the** Enter **key.**

The Enter Symbol screen is displayed.

3. **Enter a pointer number or an interrupt pointer number.**

4. **Click the** OK **button.**

The entered pointer number or interrupt pointer number is displayed on the editing screen.
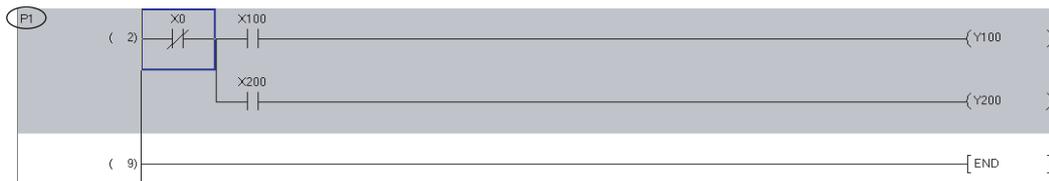
6.2.6 Opening local label setting screen for program being edited

Q CPU L CPU FX

Open the Local Label Setting screen for the program being edited.

Operating procedure

- Select [View] ⇒ [Open Other Window] ⇒ [Open Label Setting].
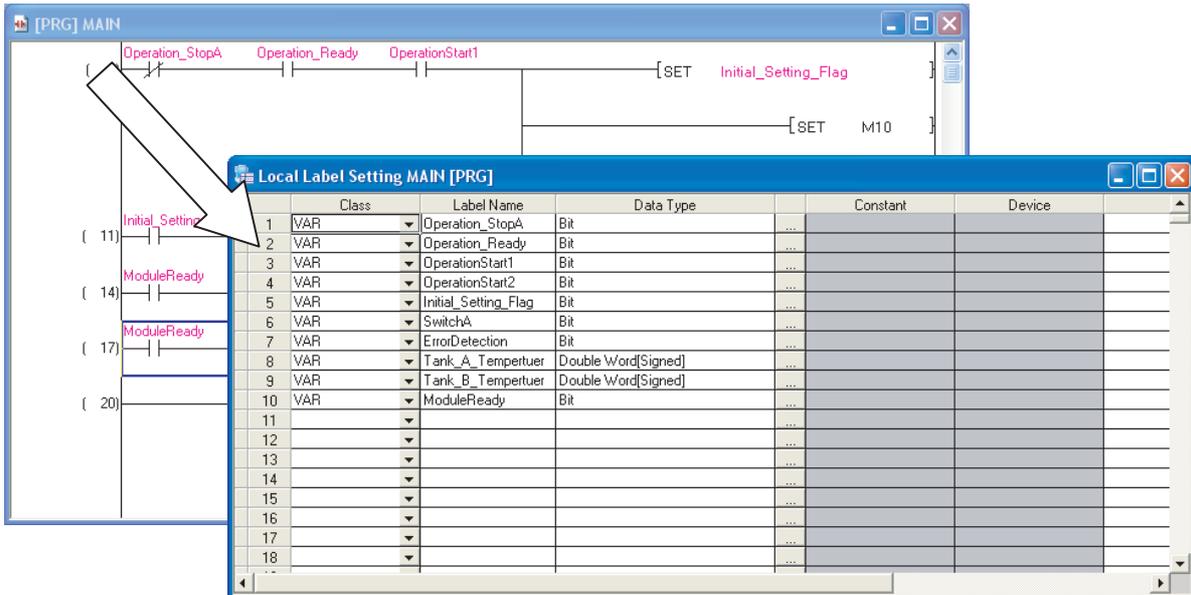
6.2.7 Creating wrapping lines

Q CPU L CPU FX

Wrapping symbols are automatically created if wrapping of a line is required when creating a ladder block. They can also be entered manually.

Operating procedure

1. **Move the cursor to the position where a wrapping source symbol (->) is entered.**

When entering a wrapping source symbol (->), move the cursor to the second or subsequent columns.
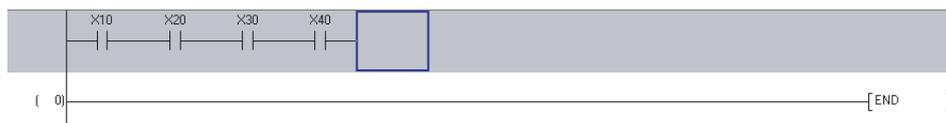
2. **Select [Edit] ⇒ [Ladder Symbol] ⇒ [Horizontal Line] (F9).**

The Enter HLine screen is displayed.

3. **Enter 'K (+ desired number)'.**

4. **Click the** OK **button.**

The wrapping source symbol (->) is entered and the line is wrapped.

Wrapping source symbol (->)
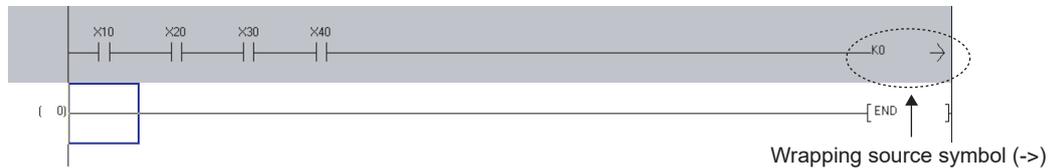
5. **Move the cursor to the position where a wrapping destination symbol (>-) is entered.**

When entering a wrapping destination symbol (>-), move the cursor to the first column.
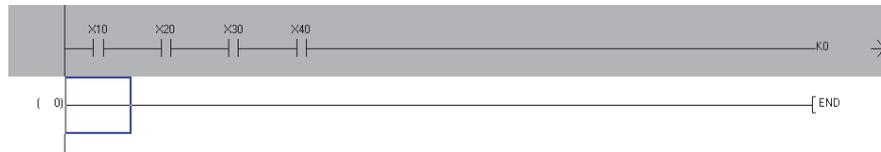
6. **Select [Edit] ⇒ [Ladder Symbol] ⇒ [Horizontal Line] (F9).**

The Enter HLine screen is displayed.

7. **Enter 'K (+ number input in step 3)'.**

A wrapping source symbol (->) and a wrapping destination symbol (>-) are used in pairs for wrapping symbols.
Enter the same number for the paired wrapping symbols.

8. **Click the** ⬚OK⬚ **button.**

The wrapping destination symbol (>-) is entered.
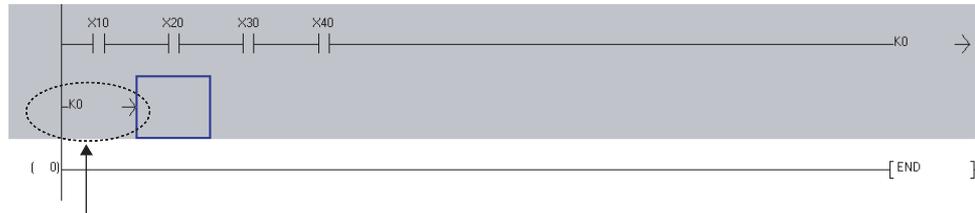
Wrapping destination symbol (>-)

Point ℘

● **Changing the number of contacts displayed on a ladder program**
The number of contacts (9, 11, 13, 17, or 21) displayed on a single rung can be changed.
(☞ Section 2.2.7)

● **A situation when wrapping symbols are deleted**
When a ladder program is converted, instructions are shifted forward.
As the result, the unnecessary wrapping symbols are deleted.
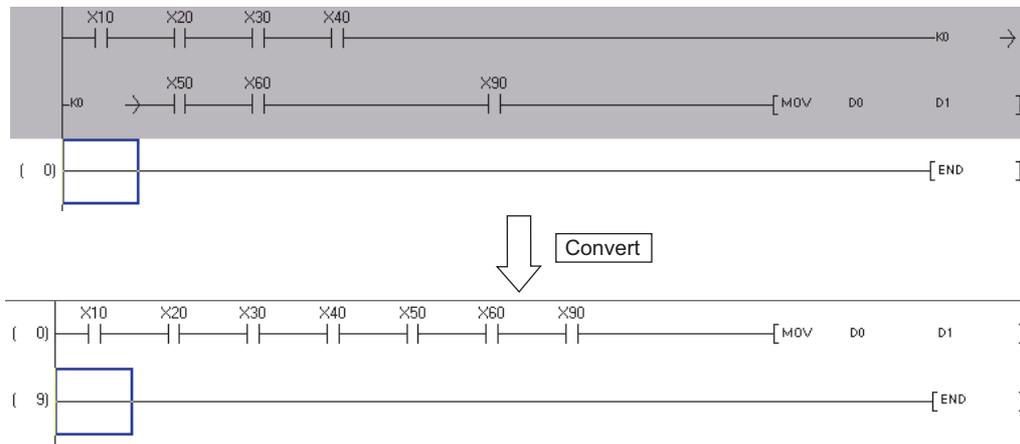
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6.2.8   Displaying/editing ladder blocks in list format

Q CPU **L CPU** **FX**

Display/edit ladder programs in the list format.

Operating procedure

1. **Move the cursor to the ladder block to be displayed in the list format.**
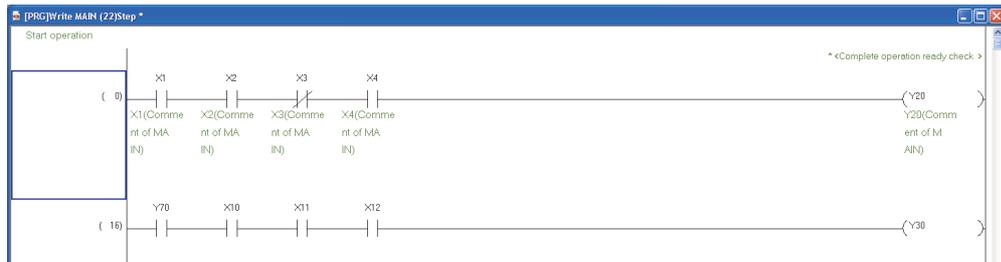
2. **Select [Edit] ⇒ [Easy Edit] ⇒ [Edit List for Ladder Block].**

The Edit List of Ladder Block screen is displayed.
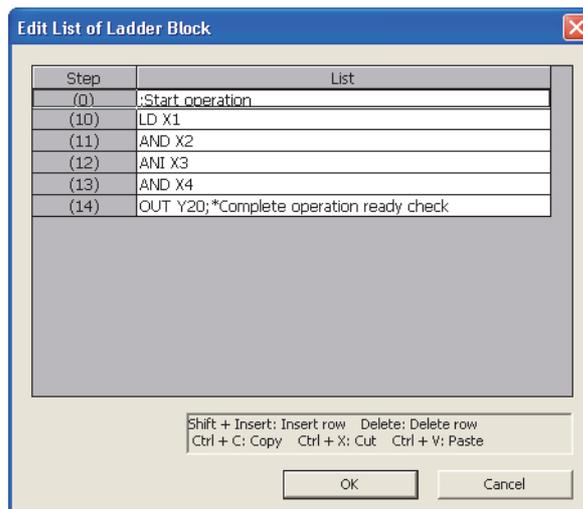
3. **Move the cursor to the row to be edited in the list format, and press the ⟦Enter⟧ key.**

The Enter List screen is displayed.

4. **Enter an instruction and click the ⟦ OK ⟧ button.**

The instruction is applied to the data on the Edit List of Ladder Block screen.

5. **Click the** OK **button.**

The edited content is applied to the ladder block.
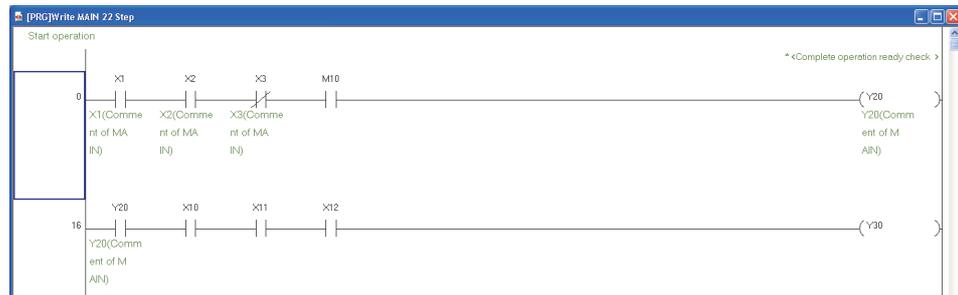
Screen button

● Help

Displays the <u>Instruction Help</u> screen. (☞ Section 6.2.2)

Point

● **Considerations when editing programs in list format**

The following are the considerations when editing programs in the list format.

• A maximum number of rows that can be used per ladder block is 24 in the ladder program.
When the number of rows of ladder block exceeds 24 as the result of editing in the list format, the ladder block is displayed in yellow.

• If an unconverted ladder block exists in a ladder program, the program cannot be edited even when the selected ladder block has been converted.

• END instructions cannot be edited.

• Ladder blocks that contain function blocks can be displayed in the list format, but cannot be edited.

• Device comments and line statements displayed on a tree view of the Navigation window are not displayed on the <u>Edit List of Ladder Block</u> screen.

• The width of column on the <u>Edit List of Ladder Block</u> screen cannot be changed.

● **Number of characters that can be entered**

The following table shows the number of characters that can be entered when editing a program in the list format.

Item	Number of characters
Global label Local label Structure member label	32 characters
FB input/output label	16 characters
Defined FB name	32 characters
Statement	64 characters
Note	32 characters

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6.3   Using Function Blocks

`Q CPU` `L CPU` `FX`

This section explains how to utilize function blocks as components in sequence programs.
To use function blocks, select "Use Label" when creating a new project.
For details of method for using function blocks, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Simple Project, Function Block)**

6.4 Using Inline Structured Text

Q CPU **L CPU** **FX**

This section explains the Inline structured text function.

6.4.1 Feature of Inline structured text

Inline structured text is a function to edit/monitor a program by creating an inline structured text box that displays an ST program, at the coil instruction area on the ladder editor of the project with labels.
With this function, a numeric value operation or a character string process can be easily created in the ladder program.

Select "Enable calling function block and using inline ST" under [Tool] $\Rightarrow$ [Options] $\Rightarrow$ "Compile" $\Rightarrow$ "Basic Setting" to use the Inline structured text function.

For considerations for using the Inline structured text function, refer to Section 6.4.5.

< Using ladder program >
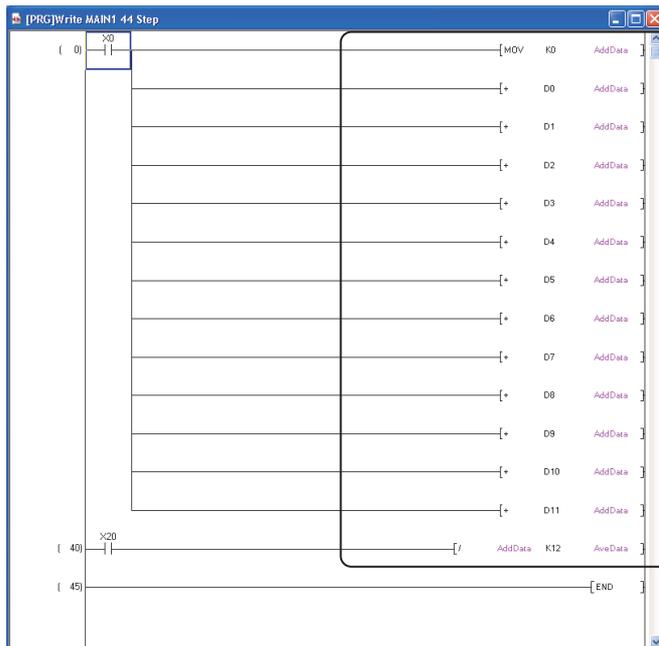
< Using Inline structured text >
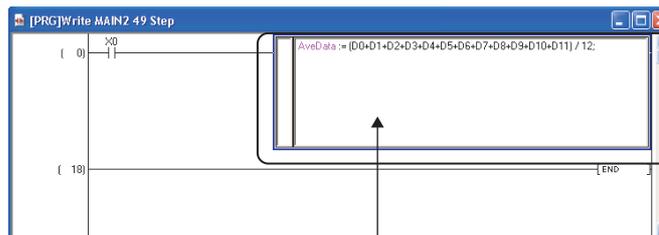
Inline structured text box (STB)

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6.4.2 Inserting inline structured text box

Insert an inline structured text box on the ladder editor.

Operating procedure

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

  An inline structured text box is inserted.
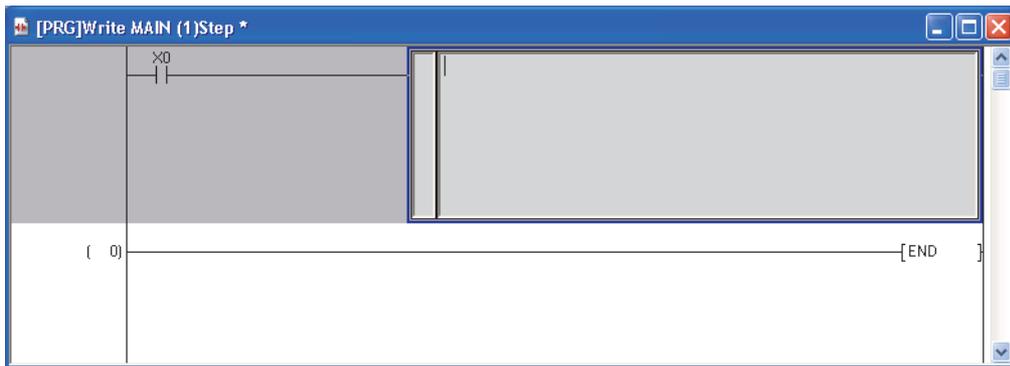
Point

● **Inserting an inline structured text box**
An inline structured text box can be also inserted by entering "STB" on the <u>Enter Symbol</u> screen.
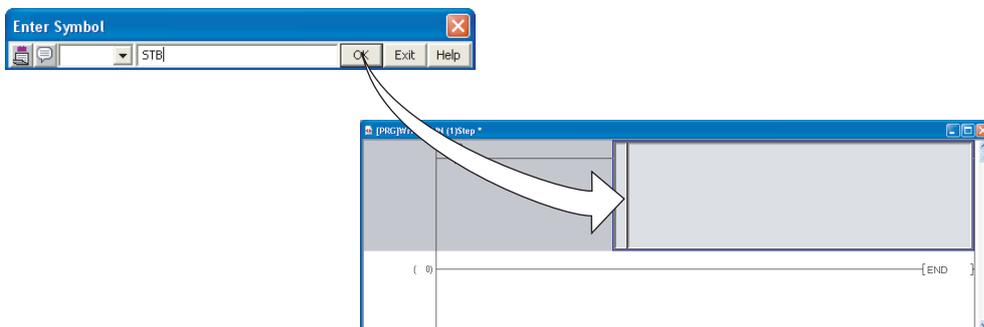
- An inline structured text box can be also inserted by pressing the [Ctrl] + [B] keys.
- A maximum number of inline structured text boxes that can be inserted is 100 per program, and 400 per project.

6.4.3 Editing inline structured text program

Edit an inline structured text program.

Operating procedure

1. **Double-click the inline structured text box, or press the** Enter **key.**

The inline structured text box becomes editing status.
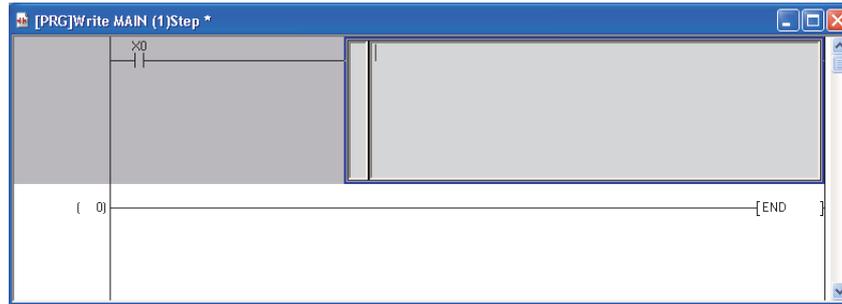
2. **Edit the inline structured text program.**

The editing method of the inline structured text program is the same as that of Structured Text.
For editing programs in Structured Text, refer to the following manuals.
☞ GX Works2 Version 1 Operating Manual (Structured Project)
☞ MELSEC-Q/L/F Structured Programming Manual (Fundamentals)

3. **Click the area other than the inline structured text box, or press the** Esc **key.**

The editing of the inline structured text program ends.

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- **Editing inline structured text programs**
  The editing status can be switched by pressing the [F2] key.
- **Displaying instructions/labels in inline structured text**
  When displaying instructions/labels in the inline structured text, the following options must be set.
  Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "ST" ⇒ "Instruction/label name prediction".
  For details of displaying instructions/labels, refer to ☞ Section 6.2.1.
- **Displaying inline structured text program in a list format**
  The compiled inline structured text program can be displayed in a list format. Select an inline structured text box to be displayed, and select [View] ⇒ [Display Compile Result].

Compile Result

Instance Name | MAIN

Step	Compile Result
0	LD SM400
1	CJ P2048
3	LD SM401
4	OUT M8191
5	JMP P2049
7	P2048
8	LD SM400
9	MOV D2 D1
11	LD SM400
12	MOV D4 D2
14	LDI M2
15	CJ P2050
17	LD SM400
18	MOV D8 D6
20	P2050
21	P2049

Update Close
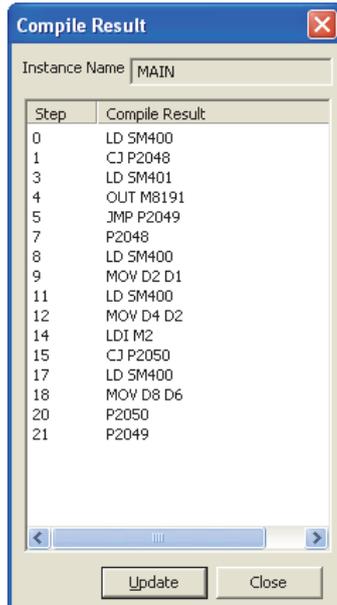
The compilation result is not displayed
when the compilation target is
an assignment command in which
the source data and the target data are the same.
Example in Structured Text: M0 :=M0;

6.4.3 Editing inline structured text program

6.4.4 Deleting inline structured text box

Delete an inline structured text box.

Operating procedure

1. **Select an inline structured text box to be deleted.**
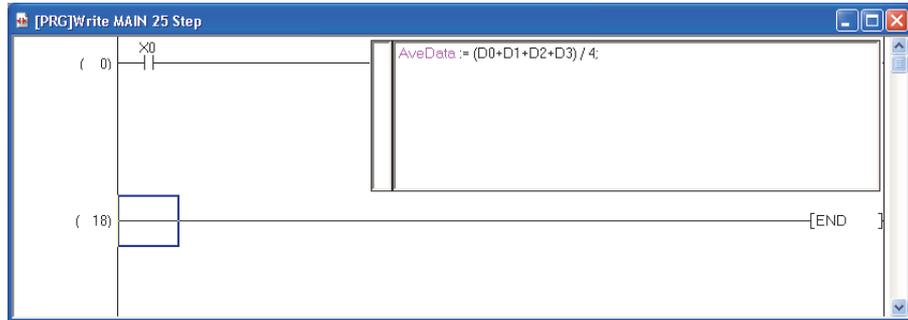
2. **Select [Edit] ⇒ [Delete], or press the Delete key.**

One ladder block containing the inline structured text box is deleted.

Point

● **Range selection when deleting an inline structured text box**
When deleting a ladder block containing a inline structured text box, include the left side of the left power rail. If this area is not selected, a ladder block cannot be deleted.
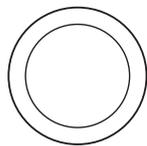
Can be deleted.
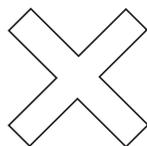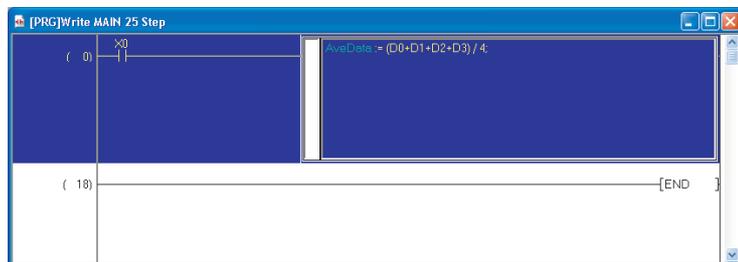
Cannot be deleted.
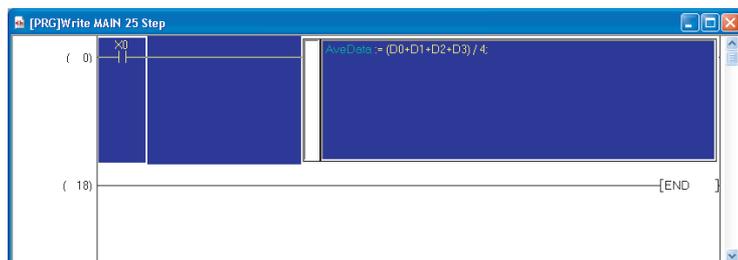
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6.4.5　　　Considerations for using Inline structured text function

The following explains the considerations for using the Inline structured text function.

1)　**Considerations for creating ladder programs**
   - One inline structured text box can be created for one ladder block.
   - An FB and an inline structured text box cannot be used both in a ladder block.
   - When the creation of an inline structured text box is attempted at the contact instruction area, an inline structured text box is created at the coil instruction area.
   - A ladder program cannot be edited if the ladder block including an unconverted inline structured text program exists on the ladder editor. Edit a program after converting it.
   - Function blocks using inline structured text programs cannot be used in programs other than Ladder Diagram.

2)　**Considerations for editing in inline structured text box**
   - A maximum number of characters that can be entered is 2048. However, two characters are used as the line feed.
   - 23 local labels can be used in an inline structured text box. (Except for constants)
   - The following data type labels cannot be used.
     - Counter
     - Timer
     - Retentive timer
     - Pointer
     - Structure
     - Array
     - Function block
   - By setting the option, lower-case device names can be used as labels only for device names which are out of the range set on the <<Device>> tab of PLC parameters.
   - Instructions cannot be entered using the Element Selection window.
   - The editing status cannot be recovered to the previous status by the operation such as selecting [Edit] ⇒ [Undo].
   - Word device indirect specification (@D0) cannot be executed.

3)　**Copying inline structured text box**
   When copying an inline structured text box, select a ladder block including the left side of the left power rail. Contacts of a ladder block containing an inline structured text box only or an inline structured text box only, cannot be copied.
   A ladder block containing an unconverted inline structured text box also cannot be copied. Copy a ladder block after converting the program. (☞ Chapter 10)

4)　**Re-pasting after deleting inline structured text box**[1]
   When compiling with re-pasting the data which existed in the deleted inline structured text box, the compile result will not be the same program as before deleting the inline structured text box.
   The devices to be assigned automatically are changed when a program is compiled.
   Therefore, verifying the re-pasted project may cause the verification inconsistency.
   　　*1 :　Re-paste is to create or paste the same data as deleted inline structured text box.

5) Using rise instructions or fall instructions in an inline structured text box

Inline structured text controls programs using a CJ instruction at compilation. Therefore, using rise instructions or fall instructions in an inline structured text box may cause an improper operation.[2]

Category	Instruction
Rise instruction	□P instruction (such as MOVP instruction), PLS, etc.
Fall instruction	PLF, LDF, ANDF, ORF, MEF, FCALLP, EFCALLP, etc.
Special timer	STMR, TTMR

> [2] : For details, refer to the following manual.
> ☞ MELSEC-Q/L Programming Manual (Common Instruction)

6) When the performance of inline structured text boxes is slow

Display inline structured text boxes in a single color[1] by selecting [View] ⇒ [ST Monochrome Display].

> [1] : Indicates the color of "Normal Text and Symbol" for "Ladder Editor" from [View] ⇒ [Color and Font]

```
(*start*)
IF X0 THEN
  H_BOOL := TRUE;
  H_INT := 10000;
  X0 := FALSE;
  D0 := D0 +1;
ELSE
  H_BOOL := FALSE;
  H_INT := 20000;
```

Color

```
(*start*)
IF X0 THEN
  H_BOOL := TRUE;
  H_INT := 10000;
  X0 := FALSE;
  D0 := D0 +1;
ELSE
  H_BOOL := FALSE;
  H_INT := 20000;
```

Monochrome

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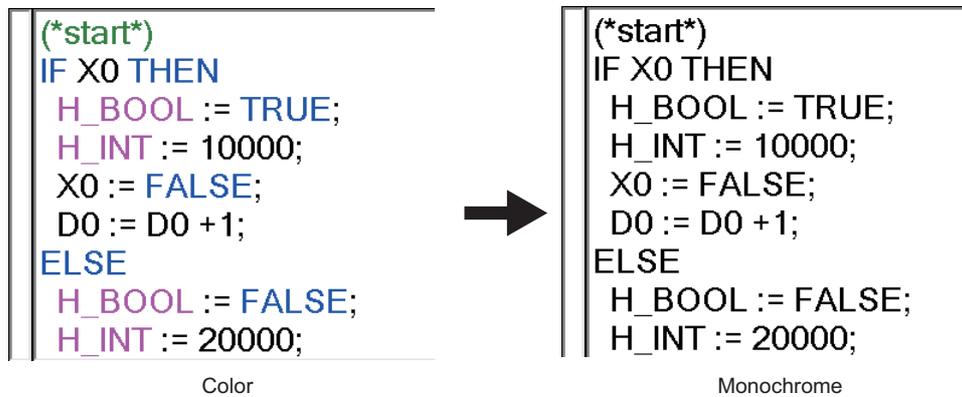
6.5   Moving Cursor to Start of Ladder Block

Q CPU   L CPU   FX

This section explains how to move the cursor from the current position to the start of the next/ previous ladder block.

Operating procedure

- **Select [Find/Replace] ⇒ [Jump to Next Ladder Block Start]/[Jump to Previous Ladder Block Start].**

  The cursor moves to the start of the ladder block.

    Example: When jumping to the start of the next ladder block

The cursor moves to the start of the next ladder block.
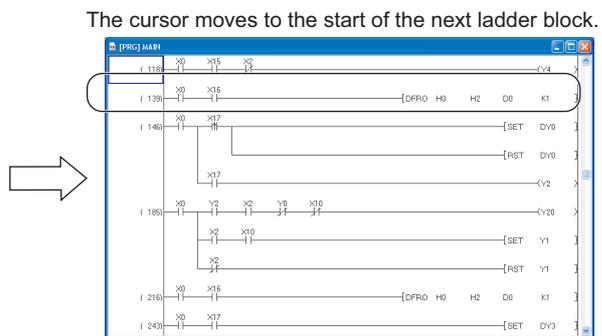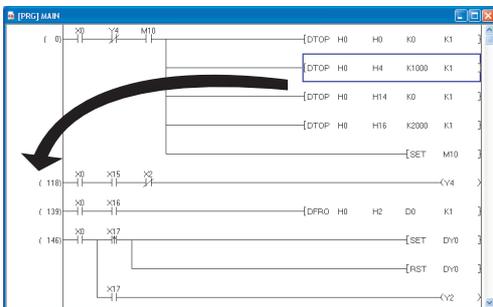
Point

● **Moving the cursor**

The cursor can be also moved to the start of the next/previous ladder block by pressing the 〚Ctrl〛 + 〚Alt〛 + 〚PgDown〛 / 〚PgUp〛 keys.

6.6 Drawing Lines

Q CPU **L CPU** **FX**

This section explains how to draw lines.

| Item	Toolbar	Shortcut key
Edit Line	☐ F10	F10
Vertical Line	☐ sF9	Shift + F9 Ctrl + ↓ / ↑
Horizontal Line	☐ F9	F9 Ctrl + ← / →
Enter horizontal line consecutively	-	Ctrl + Shift + ← / →

6.6.1 Drawing lines

Draw vertical and horizontal lines consecutively.

Operating procedure

1. **Move the cursor to the position where a vertical line is drawn.**

A line is drawn taking the left edge of the cursor as a base point.
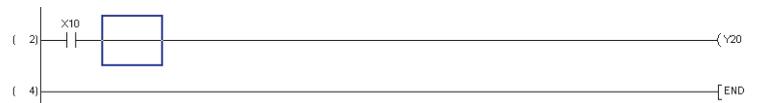
2. **Select [Edit] ⇒ [Edit Line] (☐).**

3. **Drag the cursor to the line drawing direction.**
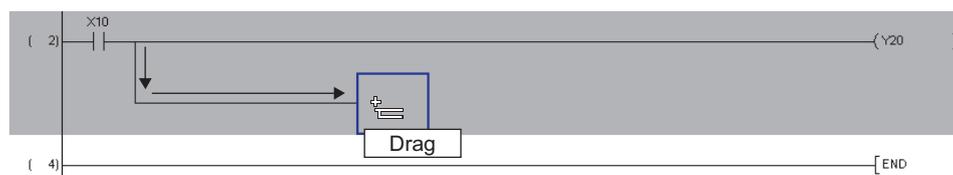
4. **The line is drawn upon completion of dragging.**

5. **To end the line drawing function, select [Edit] ⇒ [Edit Line] (☐) again.**

The edit line mode is disabled.

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6.6.2 Entering vertical or horizontal lines

Enter a vertical or horizontal line.

■ Entering vertical or horizontal lines by specifying the number of rows or columns

Operating procedure

*1.* **Move the cursor to the position where a vertical or horizontal line is entered.**

A vertical line is entered taking the left edge of the cursor as a base point.
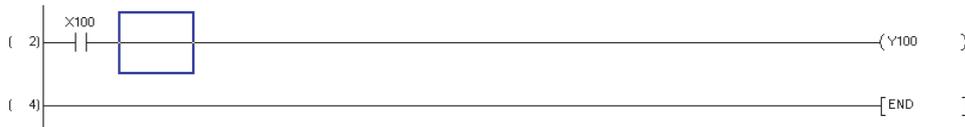
2. **Select [Edit] ⇒ [Ladder Symbol] ⇒ [Vertical Line] (▯).**

The Enter VLine screen is displayed.

To enter a horizontal line, select [Edit] ⇒ [Ladder Symbol] ⇒ [Horizontal Line] (▭).

The maximum number of horizontal lines from the cursor position is displayed on the title of the Enter HLine screen.

3. **Set the items on the screen.**

Name	Description
Consecutive entry button	Allow consecutive entry of vertical or horizontal lines by changing the status. 📋Consecutive entry ON, 📄Consecutive entry OFF
Number of rows or columns	Enter the number of rows or columns to be entered. The applicable number of rows or columns to enter lines toward the down or right direction is displayed when the screen is opened. Change the value as required. For entering horizontal line, enter minus value to insert horizontal lines toward left direction.
Stop at the connection point	Select this to stop data entry on a connecting point when the connecting points such as instructions and vertical lines exist while entering the horizontal lines for the columns entered to "Number of rows or columns". Set when entering the horizontal lines. This item links with "Stop at the connection points (Instruction/Vertical Line) when enter or delete horizontal line" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram".

4. **Click the** OK **button.**

The entered vertical line or horizontal line is displayed on the editing screen.

■ **Entering vertical or horizontal lines with shortcut key**

Operating procedure

1. **Move the cursor to the position where a vertical or horizontal line is entered.**

A vertical line is entered taking the left edge of the cursor as a base point.
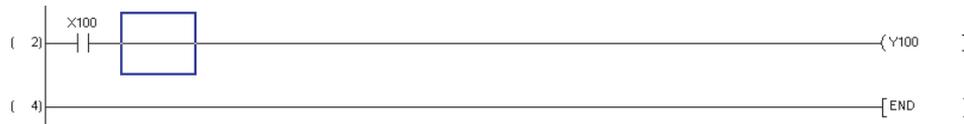
2. **Press the** Ctrl **+** ↑/↓/←/→ **keys.**

A vertical or horizontal line is entered.
However, the position where a vertical or horizontal line is already inserted is deleted.
The following is an example when the Ctrl + ↓ keys are pressed three times.
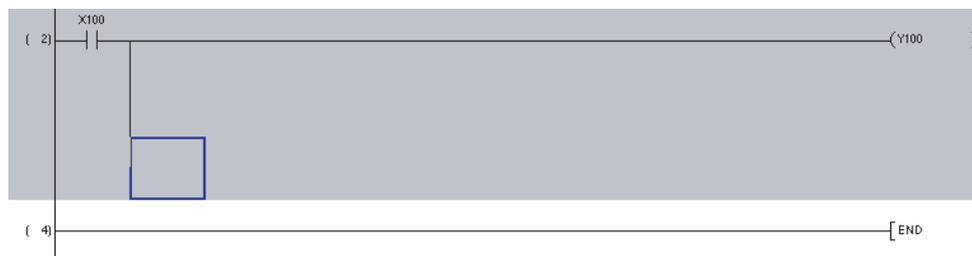
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● **Initial values of 'number of rows or columns'**

The initial value of the Enter HLine screen can be set to 1 with option settings.
Select "Set initial value to '1' for Enter HLine/Delete HLine dialog" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram".

● **Changing the cursor position on the editing screen while the Enter VLine screen or Enter HLine screen is displayed**

Use the Ctrl + ↑ ↓ ← → keys to change the cursor position on the editing screen.
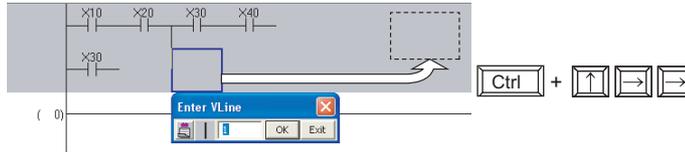
● **Entering horizontal lines consecutively**

Use the Ctrl + Shift + ← / → keys to enter the horizontal lines from the cursor position to the next contact/coil/line connection point consecutively .
The position where a horizontal line is already inserted is deleted.
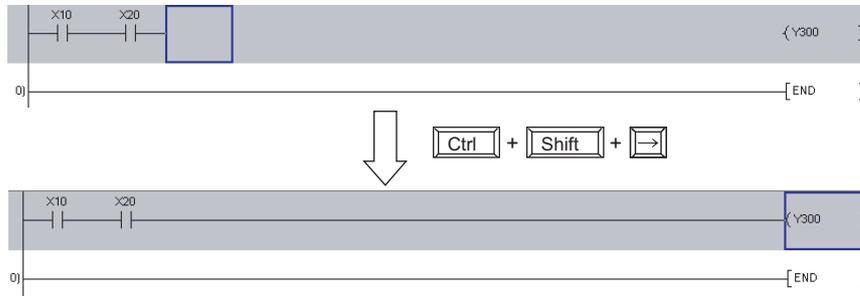
6.7 Deleting Contacts, Coils, and Application Instructions

Q CPU L CPU FX

This section explains how to delete contacts, coils, and application instructions.

6.7.1 Deleting contacts, coils, and application instructions in unit of instruction

Delete a contact, coil or application instruction in unit of instruction.

Operating procedure

1. **Move the cursor to the position where the instruction is deleted.**
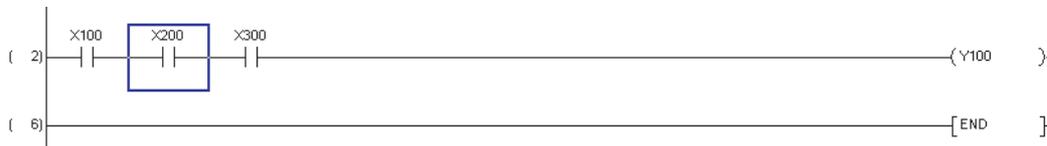
2. **Press the ⌈Delete⌉ key.**

The instruction is deleted.
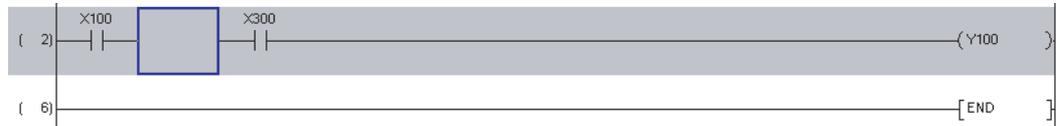
> *Point*
>
> ● **Deletion in the 'Insert mode'**
> If the instruction is deleted in the 'Insert mode', the instructions that follow the deleted instruction are shifted forward.
> With wrapping lines, the instructions are shifted when the ladder program is converted.

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6.7.2 Deleting contacts, coils, and application instructions by setting a range

Delete contacts, coils, and/or application instructions by setting a range.

Operating procedure

1. **Set the range by dragging the cursor from the start position of deletion.**
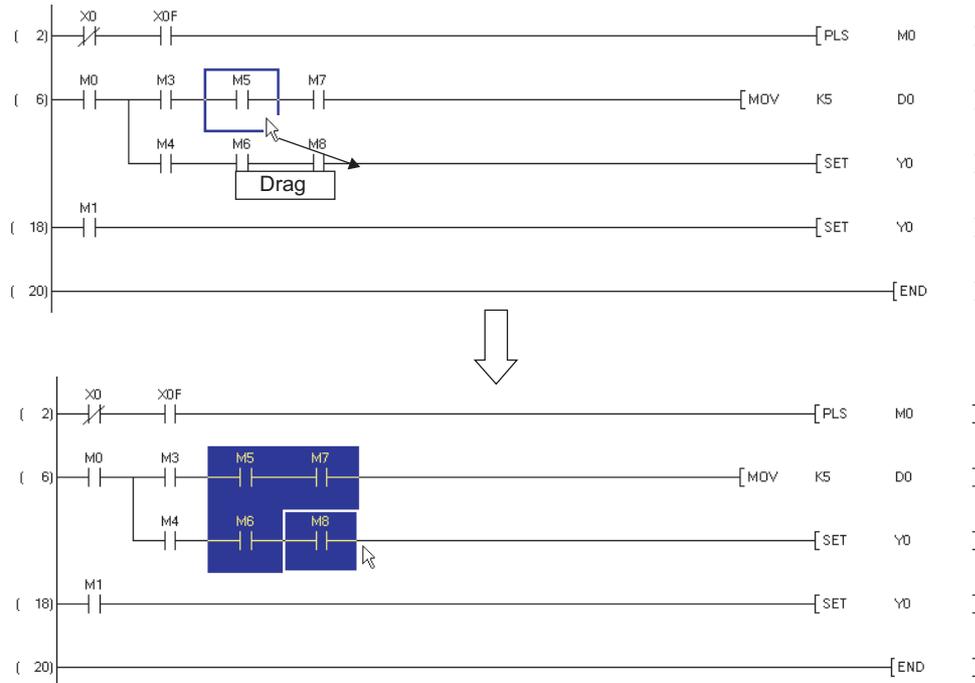
2. **Press the ⌨Delete key.**

The elements in the set range are deleted.
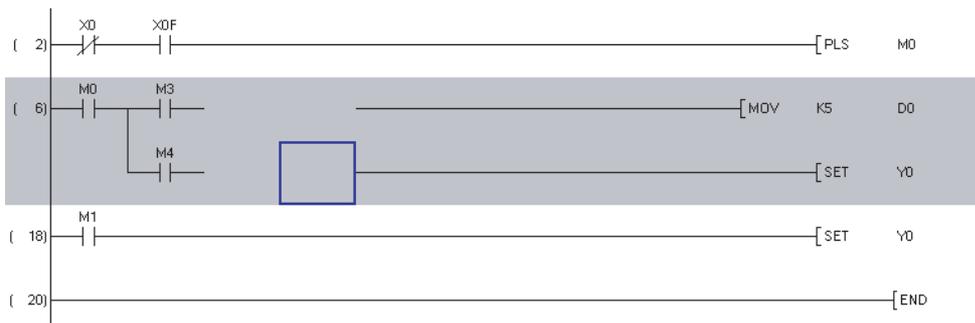
Point

● **The range can be set by pressing the ⌨Shift + ↑ ↓ ← → keys.**
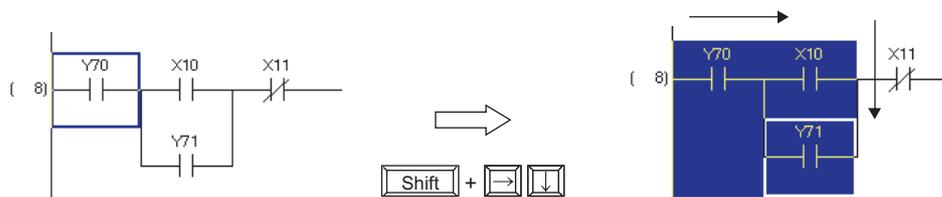
6.7.3 Deleting a ladder block

Delete one ladder block at a time.

Operating procedure

1. **Place the cursor at the start position of deletion and drag it up or down to set the range.**

Specify the range of a ladder block at the position where step numbers are displayed.
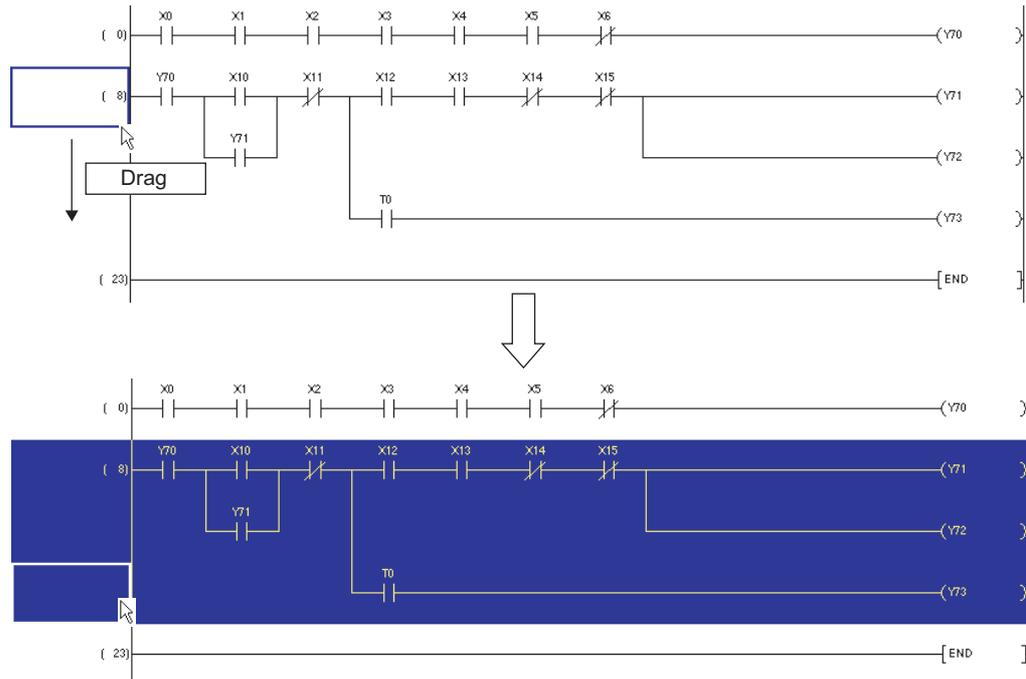
2. **Press the ⌷Delete⌷ key.**

The ladder block is deleted.
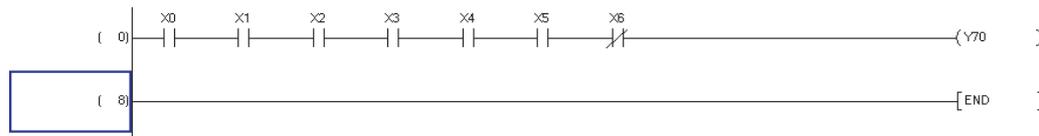
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6.8 Deleting Lines

Q CPU   L CPU   FX

This section explains how to delete lines.

Item	Toolbar	Shortcut key
Delete Line		Alt + F9
Delete Vertical Line		Ctrl + F10 Ctrl + ↓/↑
Delete Horizontal Line		Ctrl + F9 Ctrl + ←/→
Delete horizontal line consecutively	-	Ctrl + Shift + ←/→

6.8.1 Deleting lines

Delete vertical and horizontal lines consecutively.

Operating procedure

1. **Move the cursor to the position where the lines are deleted.**

The vertical line is deleted taking the left edge of the cursor as a base point.
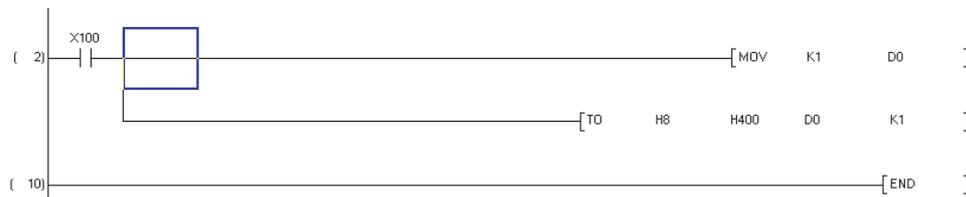
2. **Select [Edit] ⇒ [Delete Line] ( ).**

3. **Drag the cursor to the line deletion direction.**

The selected lines are displayed in yellow.

4. **The lines are deleted upon completion of dragging.**

5. **To end the Delete Line function, select [Edit] ⇒ [Delete Line] ( ) again.**

The delete line mode is disabled.

6.8.2 Deleting vertical or horizontal lines

Delete a vertical or horizontal line.

■ Deleting vertical/horizontal lines by specifying the number of rows or columns

Operating procedure

1. **Move the cursor to the start of the vertical or horizontal line to be deleted.**

The vertical line is deleted taking the left edge of the cursor as a base point.
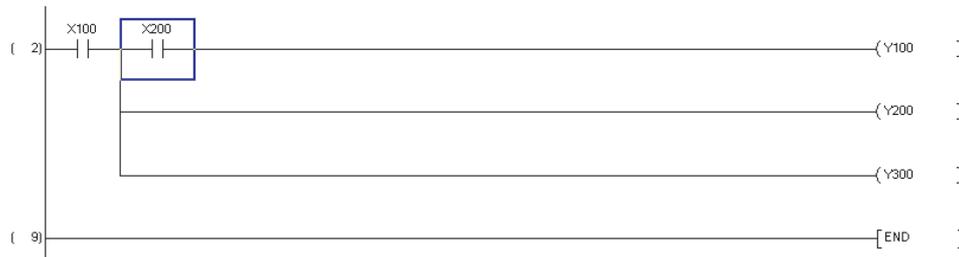
2. **Select [Edit] ⇒ [Ladder Symbol] ⇒ [Delete Vertical Line] ( ).**

The Delete VLine screen is displayed.

To enter a horizontal line, select [Edit] ⇒ [Ladder Symbol] ⇒ [Delete Horizontal Line] ( ).

3. **Set the items on the screen.**

Name	Description
Consecutive entry button	Allow consecutive deletion of vertical lines by changing the status. Consecutive entry ON, Consecutive entry OFF
Deletion number of rows or columns	Enter the number of rows or columns to be deleted. The applicable number of rows or columns to delete lines toward the down or right direction is displayed when the screen is opened. Change the value as required.
Stop at the connection point	Select this to stop deletion on a connecting point when the connecting points such as instructions and vertical lines exist while deleting the horizontal lines for the columns entered to "Deletion number of rows or columns". Set when deleting the horizontal lines. This item links with "Stop at the connection points (Instruction/Vertical Line) when enter or delete horizontal line" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram".

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4. **Click the** OK **button.**

Vertical or horizontal lines are deleted.
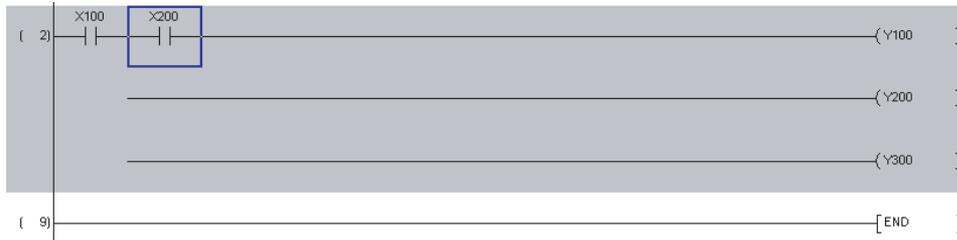
Point

● **Initial values of 'deletion number of rows or columns'**
The initial value of the Delete HLine screen can be set to 1 with option settings.
Select "Set initial value to '1' for Enter HLine/Delete HLine dialog" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Ladder Diagram".

● **Changing the cursor position on the editing screen while the Delete VLine screen or Delete HLine screen is displayed.**
Use the Ctrl + ↑ ↓ ← → keys to change the cursor position on the editing screen.
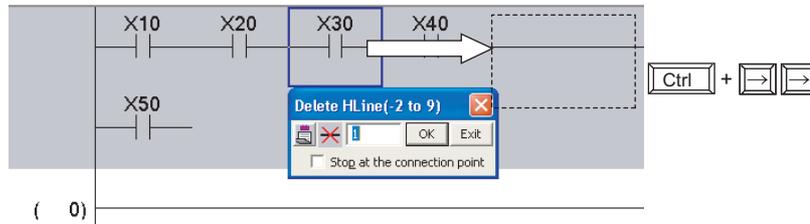
■ **Deleting vertical or horizontal lines with shortcut key**

Operating procedure

1. **Move the cursor to the start of the vertical or horizontal line to be deleted.**

The vertical line is deleted taking the left edge of the cursor as a base point.
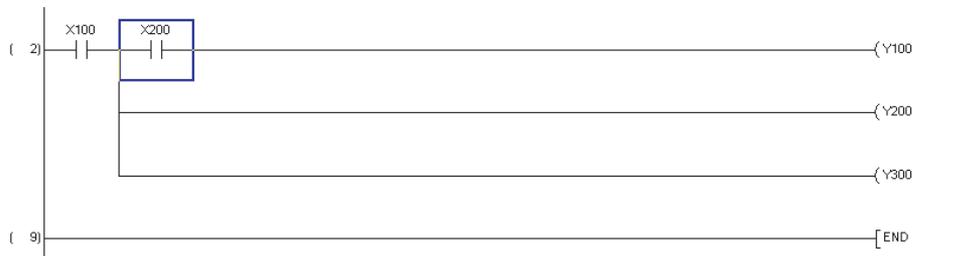
2. **Press the `⌈Ctrl⌉` + `↑`/`↓`/`←`/`→` keys.**

Vertical or horizontal lines are deleted.
However, a vertical or horizontal line is inserted to the position where a vertical or horizontal line is not inserted.
The following is an example when the `⌈Ctrl⌉` + `↑` keys are pressed twice.
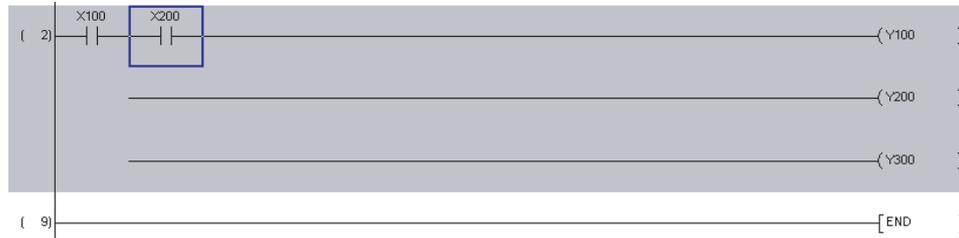
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6.9　Inserting and Deleting Rows and Columns

Q CPU **L CPU** **FX**

This section explains how to insert and delete rows and columns.

Item	Shortcut key
Insert Row	⟦Shift⟧ + ⟦Insert⟧
Delete Row	⟦Shift⟧ + ⟦Delete⟧
Insert Column	⟦Ctrl⟧ + ⟦Insert⟧
Delete Column	⟦Ctrl⟧ + ⟦Delete⟧

6.9.1　Inserting rows

Insert rows.

Operating procedure

1. **Move the cursor to the position where a row is inserted.**
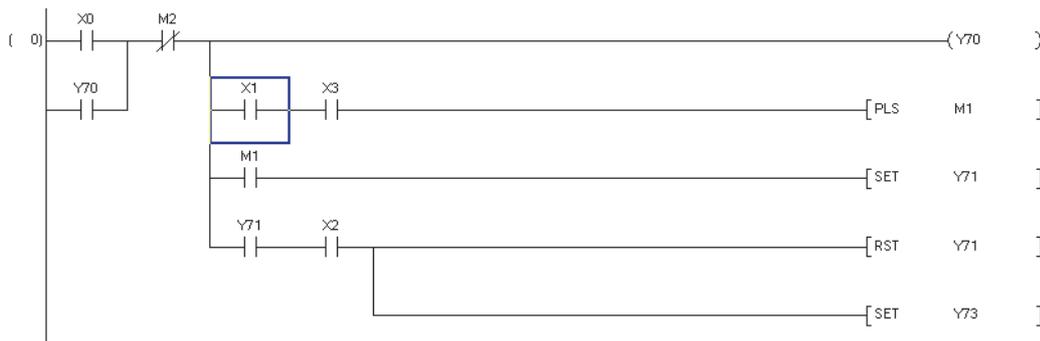
2. **To insert multiple rows, drag the cursor and set the range corresponding to the number of rows to be inserted.**

The rows in the set range are inserted.
To insert a single row, it is not necessary to set the range.
In the screen image below, the range for inserting three rows is set.

3. **Select [Edit] ⇒ [Insert Row].**

A space is inserted above the cursor position.
The screen image below shows insertion of a space for three rows.
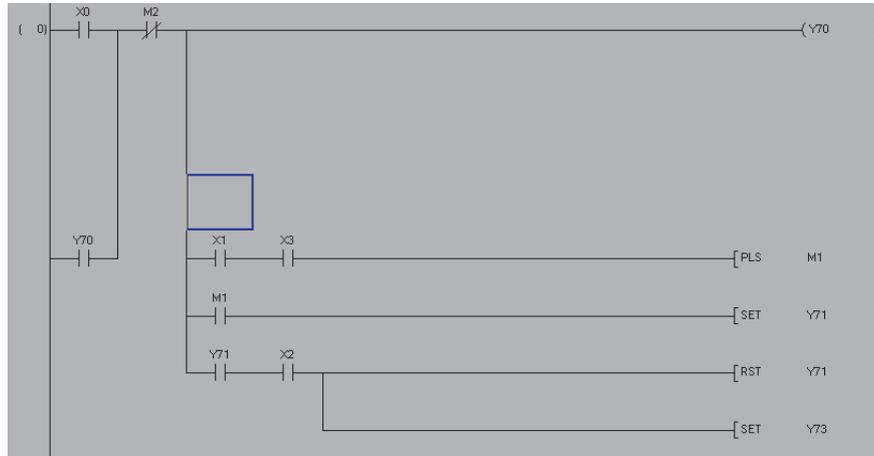
6.9.2 Deleting rows

Delete rows.

Operating procedure

1. **Move the cursor to the position where the row is deleted.**
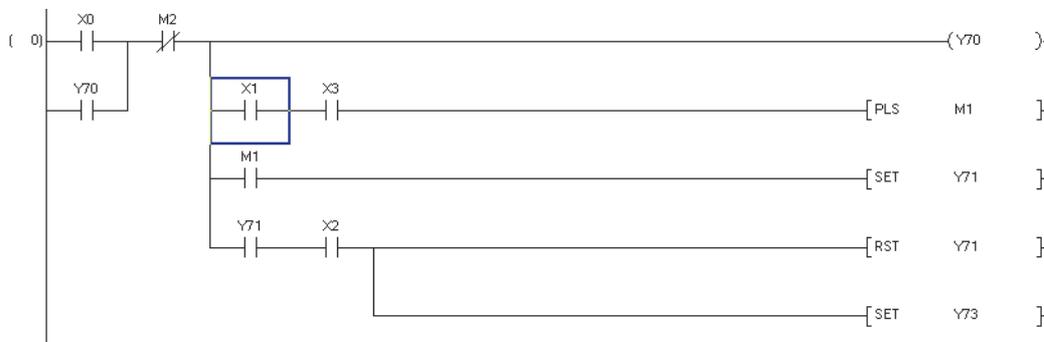
2. **To delete multiple rows, drag the cursor and set the range corresponding to the number of rows to be deleted.**

The rows in the set range are deleted.
To delete a single row, it is not necessary to set the range. The row at the cursor position is deleted.

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3. **Select [Edit] ⇒ [Delete Row].**

The rows are deleted.

6.9.3 Inserting columns

Insert columns. Columns are inserted through the whole rows of ladder block.

Operating procedure

1. **Move the cursor to the position where a column is inserted.**

A column is inserted in front of the cursor position.
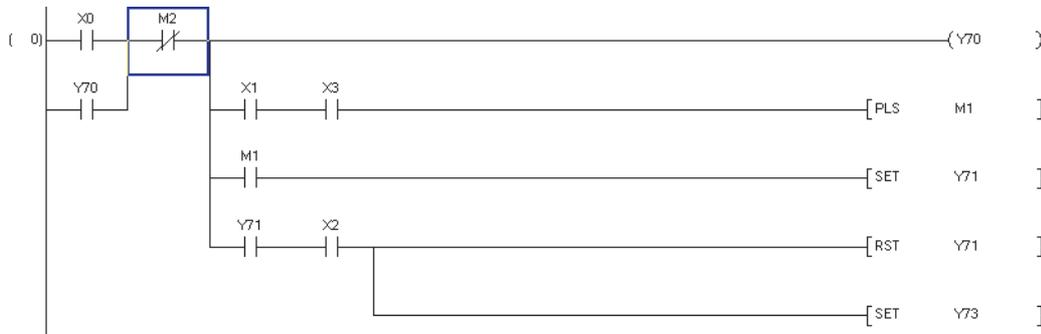
2. **To insert multiple columns, drag the cursor and set the range corresponding to the number of columns to be inserted.**

The columns in the set range are inserted.
On the screen image below, the range for inserting three columns is set.

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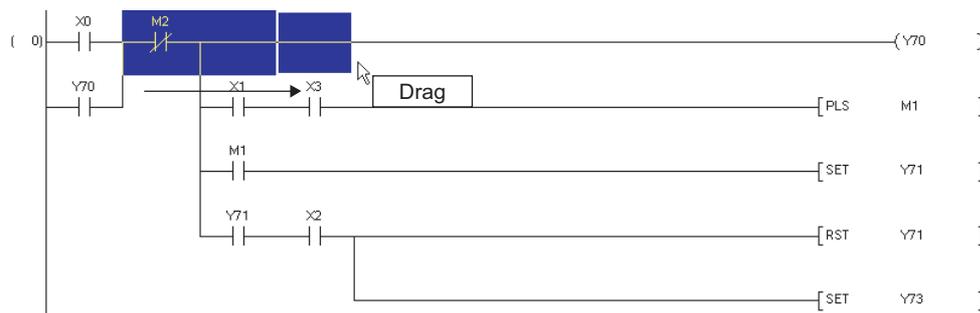
3. **Select [Edit] ⇒ [Insert Column].**

The columns are inserted. The screen image below shows the insertion of three columns.
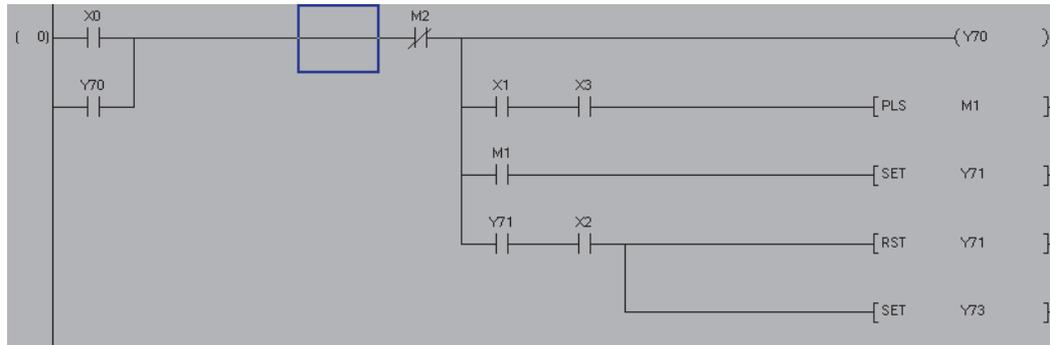
6.9.4 Deleting columns

Delete columns. Columns are deleted within the ladder block.

Operating procedure

1. **Move the cursor to the position where the column is deleted.**
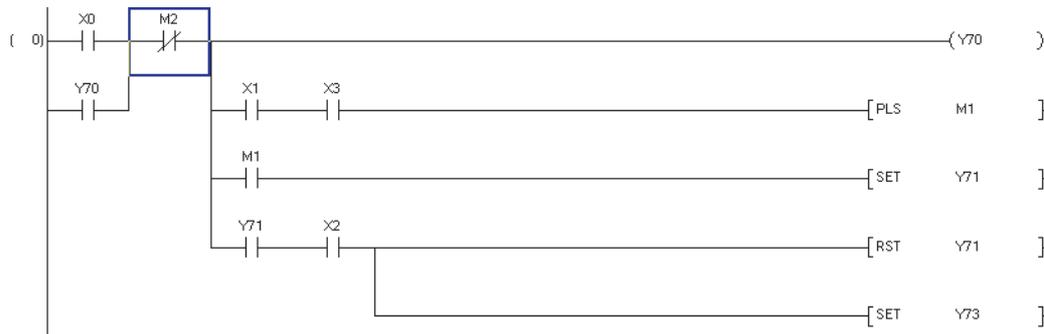
2. **To delete multiple columns, drag the cursor to set the range corresponding to the number of columns to be deleted.**

The columns in the set range are deleted.
To delete a single column, it is not necessary to set the range. The column at the cursor position is deleted.
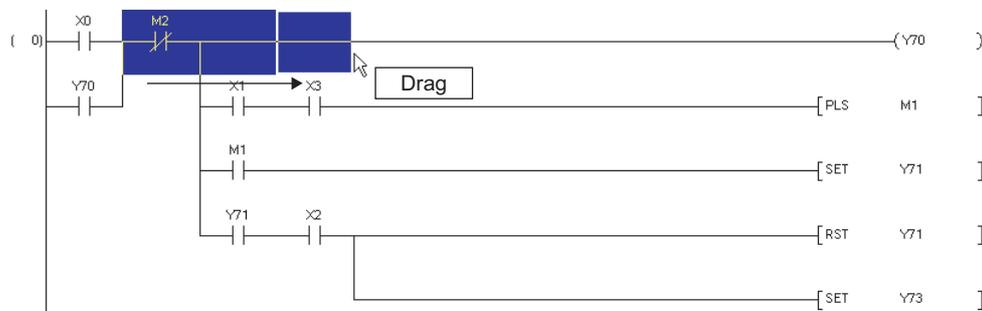
3. **Select [Edit] ⇒ [Delete Column].**

The following message is displayed.

> **MELSOFT Series GX Works2** ✕
>
> ⚠ Execute the row deletion?
>
> [Yes]   [No]

4. **Click the [Yes] button.**

The columns are deleted. The screen image below shows the deletion of three columns.

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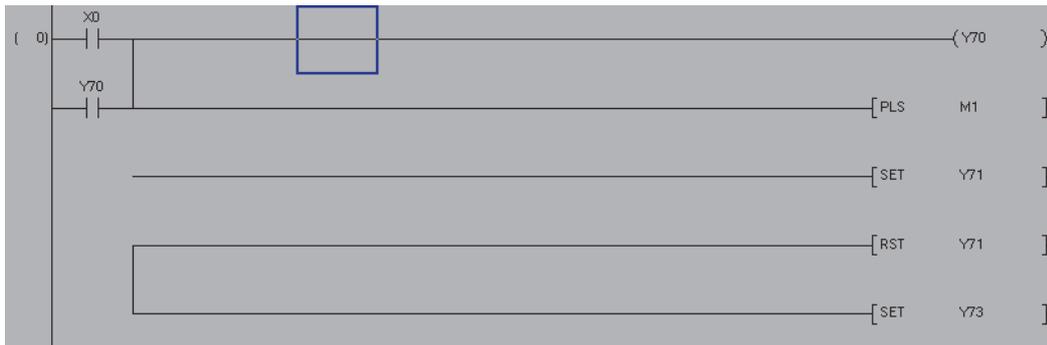
6.10 Batch Inserting and Deleting NOP Instructions

Q CPU L CPU FX

This section explains how to batch insert and delete NOP instructions.

6.10.1 Batch inserting NOP instructions

Step numbers of the program can be adjusted by batch inserting NOP instructions.

Operating procedure

1. **Move the cursor to the position where NOP instructions are inserted.**

NOP instructions are inserted in front of the cursor position.
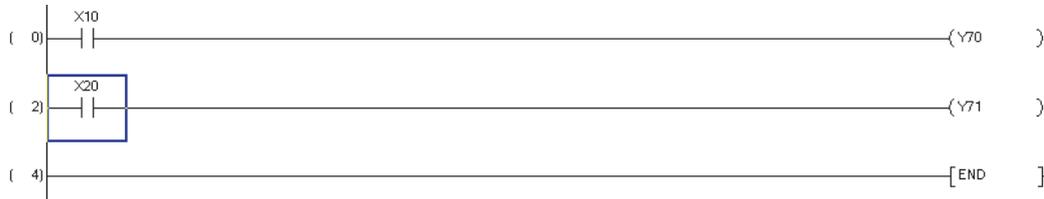
2. **Select [Edit] ⇒ [NOP Batch Insert].**

The NOP Batch Insert screen is displayed.
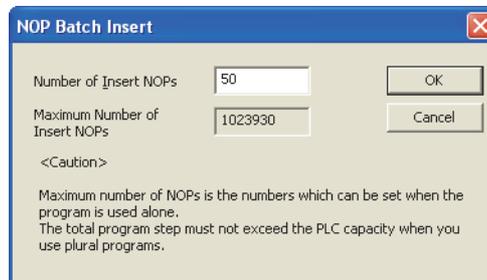
3. **Set the item on the screen.**

Item	Description
Number of Insert NOPs	Set the number of NOP instructions to be inserted.
Maximum Number of Insert NOPs	Display a maximum number of NOP instructions that can be inserted.

4. **Click the OK button.**

The set number of NOP instructions is inserted in the program.
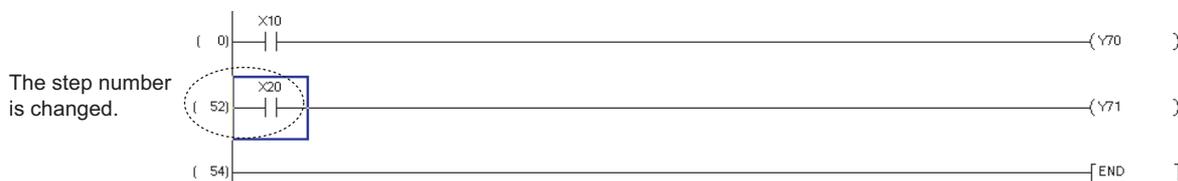
6.10.2 Batch deleting NOP instructions

Batch-delete NOP instructions in the program.

Operating procedure

1. **Select [Edit] ⇒ [NOP Batch Delete].**

The confirmation message is displayed.

2. **Click the** [Yes] **button.**

All NOP instructions in the program are deleted.

The step number is changed.
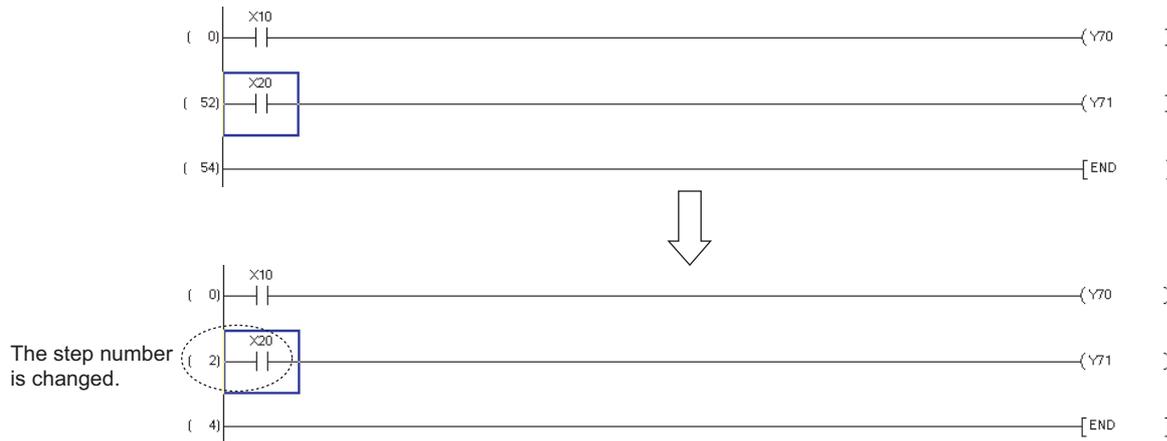
6.11 Cutting, Copying, and Pasting Ladder Programs

Q CPU **L CPU** **FX**

This section explains how to cut, copy, and paste existing ladder programs.

Item	Toolbar	Shortcut key
Cut	✂	Ctrl + X
Copy	📋	Ctrl + C
Paste	📋	Ctrl + V

Point

● **Cutting/copying/pasting between different series**
When copying a rung element from the existing FX/A series project, and pasting it to the Q/L series project, the rung element is pasted as a Peripheral statement/note.

6.11.1 Pasting cut or copied elements in unit of instruction

Paste a cut or copied element in unit of instruction.

Restrictions

Cutting and copying in unit of instruction are applicable to contacts, coils, application instructions, device comments, and notes. Cutting and copying are not applicable to line statements, P and I statements, and END instructions.

Operating procedure

1. **Move the cursor to the position where the instruction is cut or copied.**
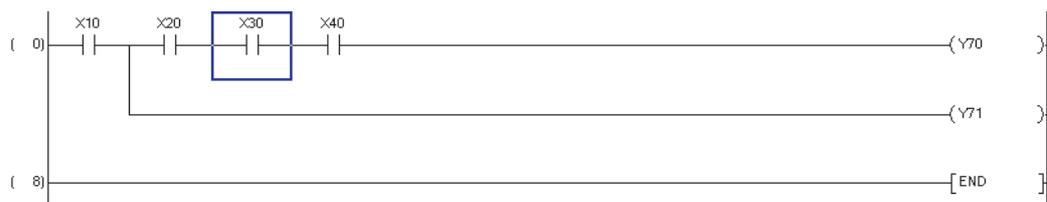
2. **Select [Edit] ⇒ [Cut] (✂) or [Copy] (📋).**

When [Cut] (✂) is selected, the instruction at the cursor position is deleted.

3. **Move the cursor to the position where the cut or copied instruction is pasted.**
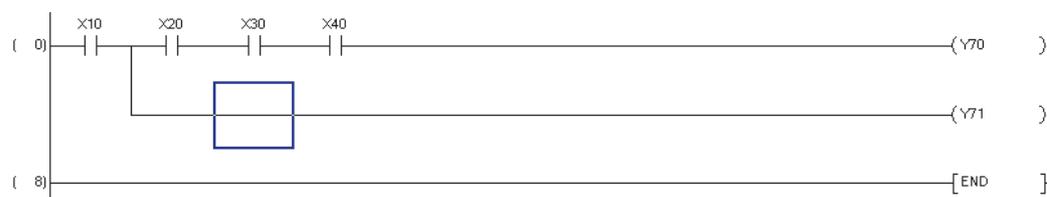
4. **Select [Edit] ⇒ [Paste] (🖺).**

The element is pasted.
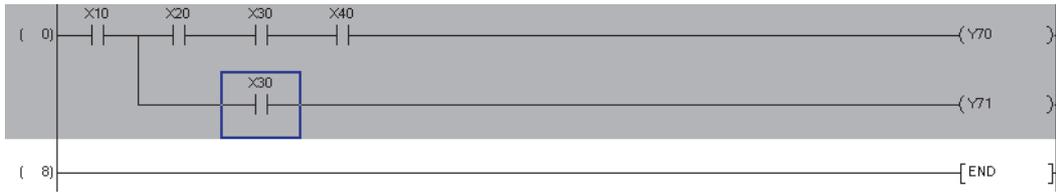
Point

● **Pasting in the 'Insert mode'**

A row is inserted at the cursor position and the element is pasted there.

Pasting position
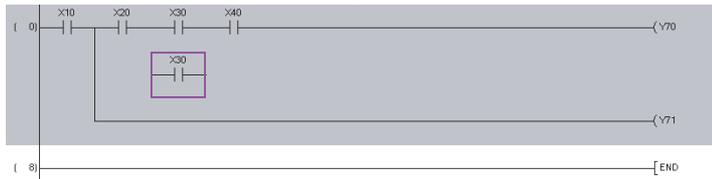
6.11.2 Pasting cut or copied elements by setting a range

Paste cut or copied elements by setting a range.

Operating procedure

1. **Set the range by dragging the cursor from the start position of cut or copy.**
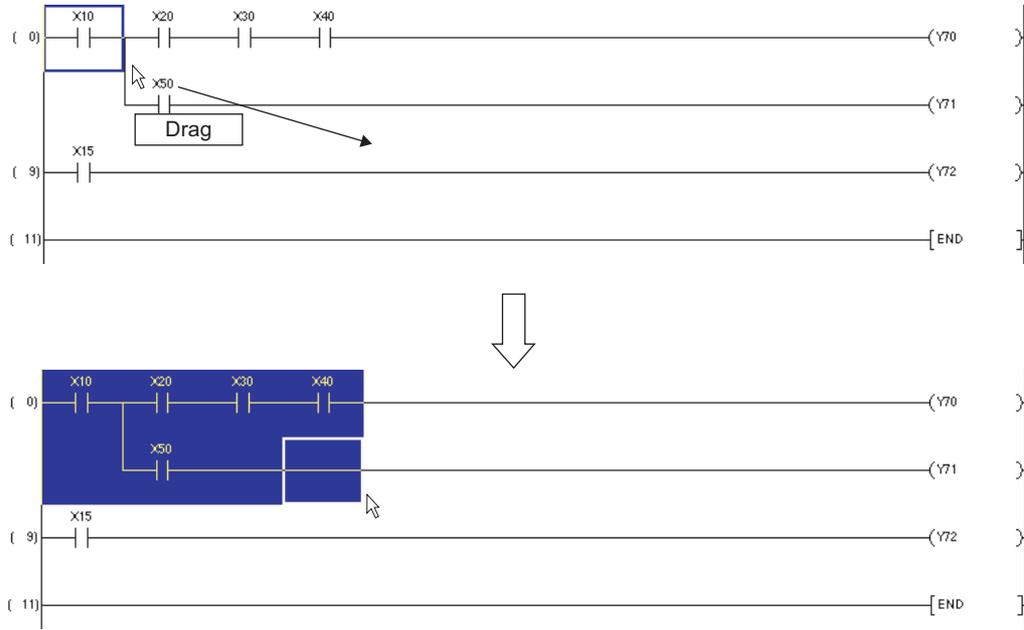
2. **Select [Edit] ⇒ [Cut] (✂) or [Copy] (📋).**

When [Cut] (✂) is selected, the elements in the set range are deleted.

3. **Move the cursor to the position where the cut or copied elements are pasted.**
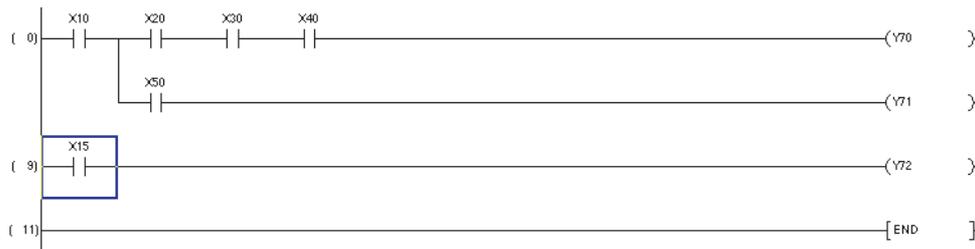
4. **Select [Edit] ⇒ [Paste] (📋).**

The elements are pasted.
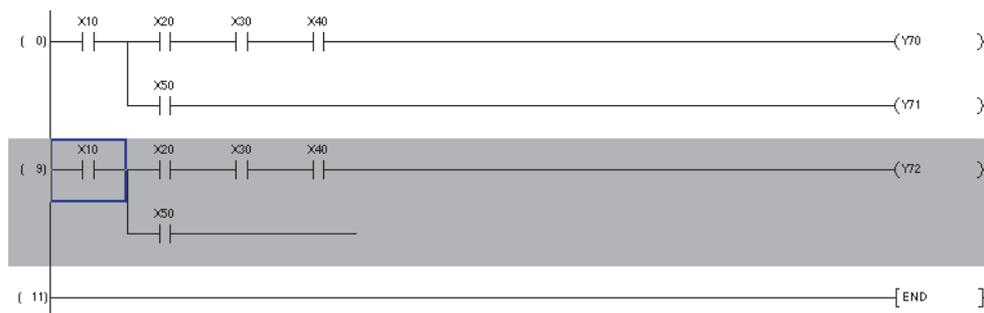
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6.11.3   Pasting cut or copied ladder blocks

Paste a cut or copied ladder block.

Operating procedure

1. **Move the cursor on a step number of ladder block to be cut or pasted.**
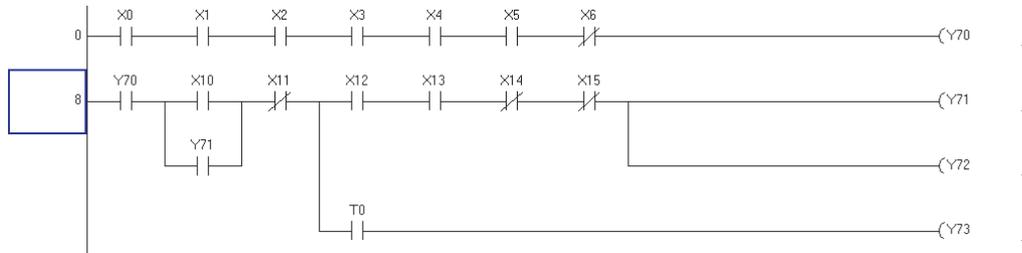
For selecting multiple ladder blocks, specify the range by dragging the cursor down from the start position of cut or copy.
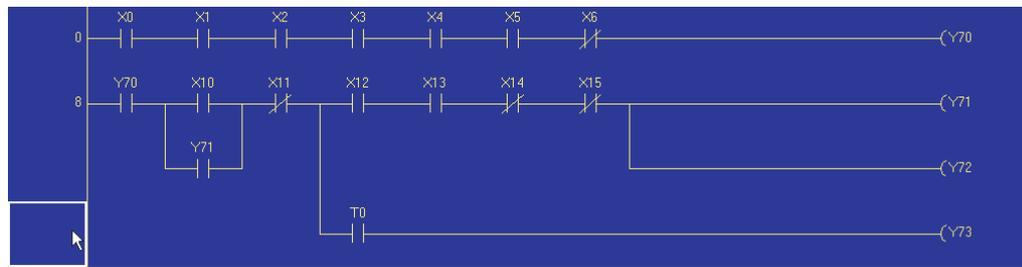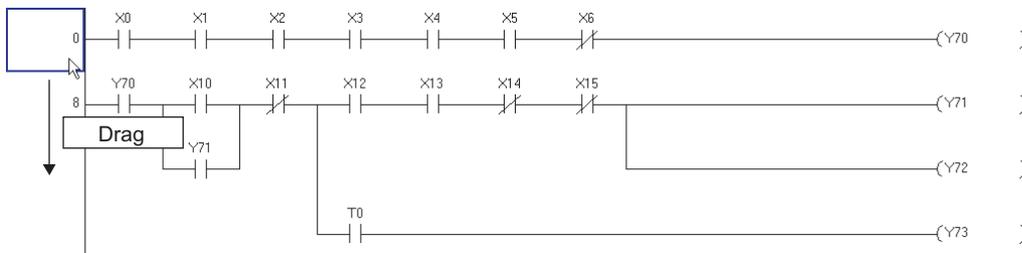
2. **Select [Edit] ⇒ [Cut] (✂) or [Copy] (📄).**

When [Cut] (✂) is selected, the ladder block in the set range is deleted.

3. **Move the cursor to the position where the cut or copied ladder block is pasted.**

The position where a step number is displayed can be the pasting position.
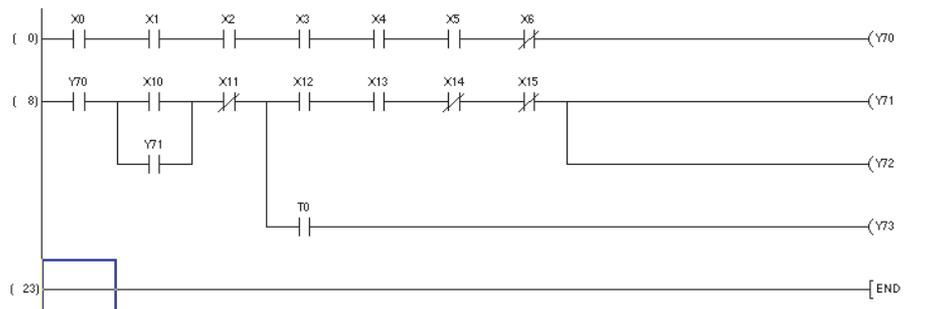
4. **Select [Edit] ⇒ [Paste] (📋).**

The ladder block is pasted.
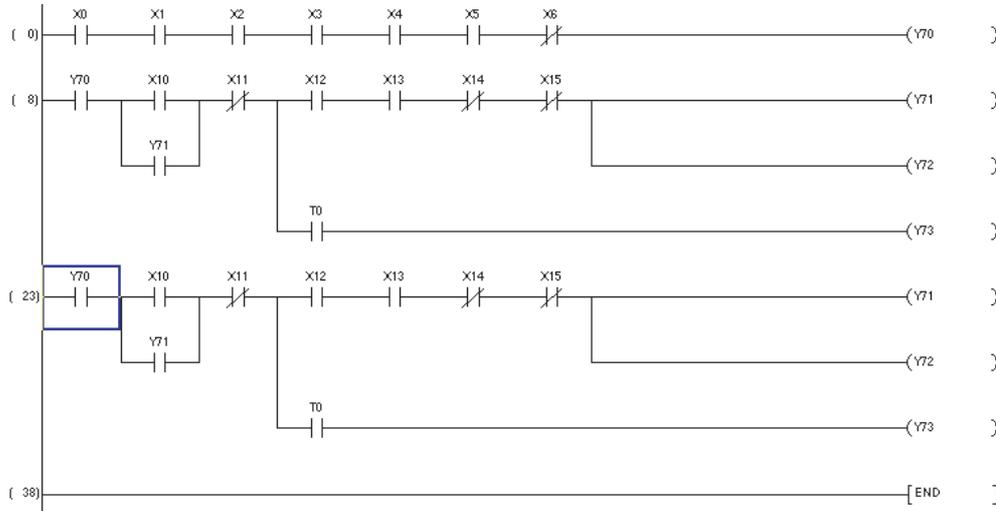
Point

● **The range can be set by pressing the** [Shift] **+** [↑] [↓] [←] [→]**keys.**
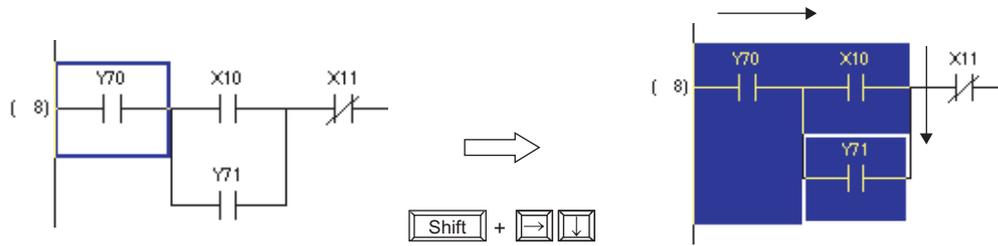
● **Pasting in the 'Insert mode'**
  Elements are inserted above the cursor position.

[Cut] or [Copy]

Pasting position
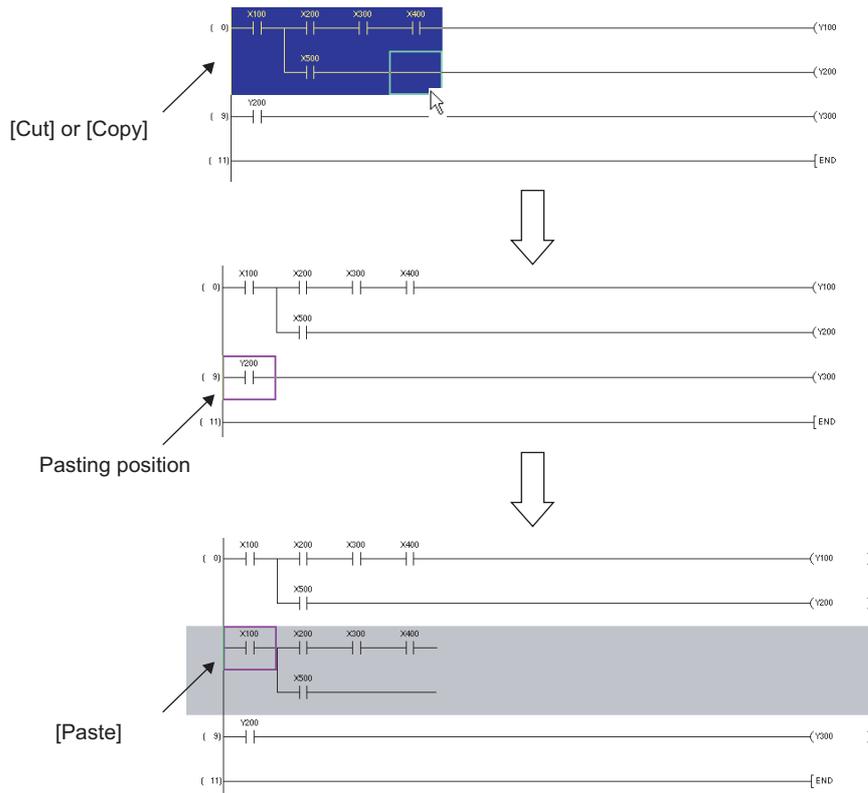
[Paste]

● **If elements shown below are selected by setting a range, the vertical line on the right side cannot be copied or pasted.**

The vertical line on the right side is not pasted.
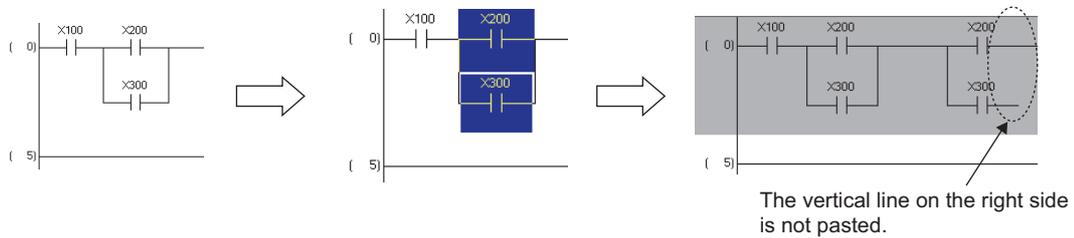
In such a case, set the range as shown below to copy or paste the elements.
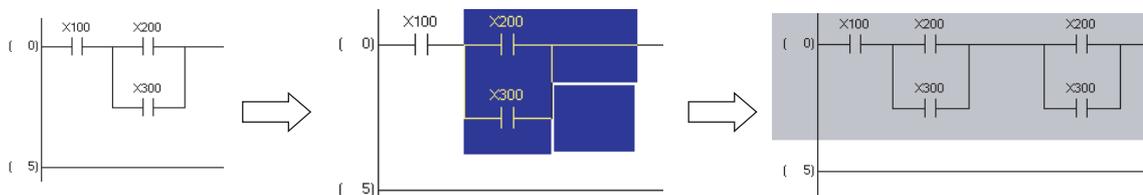
6.11.4   Pasting ladder blocks consecutively

Increment a device number of device in the cut/copied ladder block, and paste consecutively.

Cut/copy, and select [Edit] ⇒ [Continuous Paste].

The device numbers are incremented, and pasted for the specified number of times.
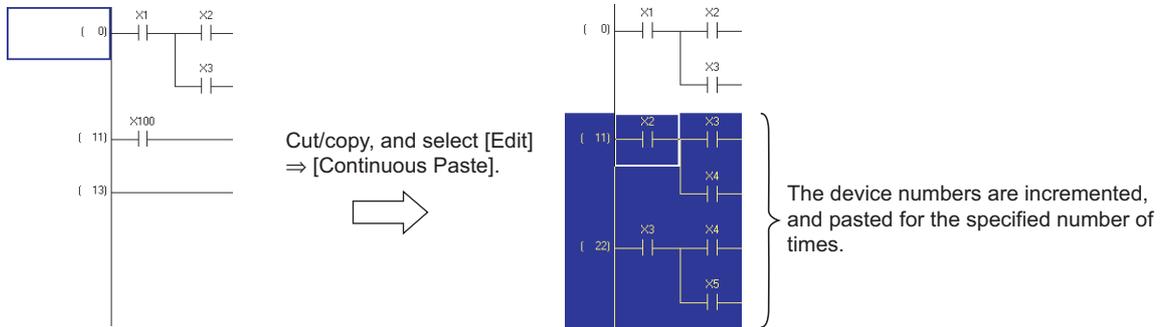
The following explains how to paste in unit of ladder block consecutively.

Operating procedure

1. **Cut/copy a ladder block to be pasted consecutively.**

For details of method for cutting/copying, refer to Section 6.11.3.
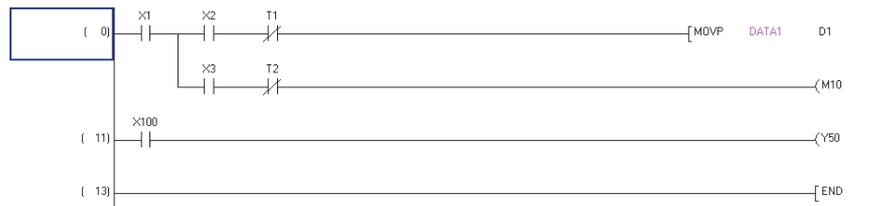
2. **Move the cursor to the position to be pasted.**

Pasting position
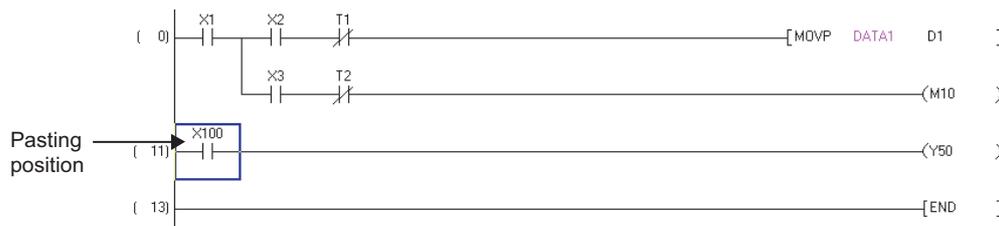
3. **Select [Edit] ⇒ [Continuous Paste].**

The Continuous Paste screen is displayed.

4. **Set the items on the screen.**

Item	Description
Number of Pasting Operations	Enter the number of ladder blocks to be pasted consecutively.
Copy Source Device	Display devices in the cut/copied ladder block.
After Increment	The device number of devices listed on "Copy Source Device" are incremented for the value entered to "Increment Value" are displayed. Display "?" when a device after increment is out of device range, or within the range of automatically assigned device.
Increment Value	Enter a value of device number increment. 1 or more: increment the device number. 0: do not change the device number. -1 or less: decrement the device number.

5. **Click the** `Execute` **button.**

The ladder block is pasted under the cursor position.

The following is an example when "Number of Pasting Operations" is set to 2.

Screen button

● `Increment Value Batch Setting`
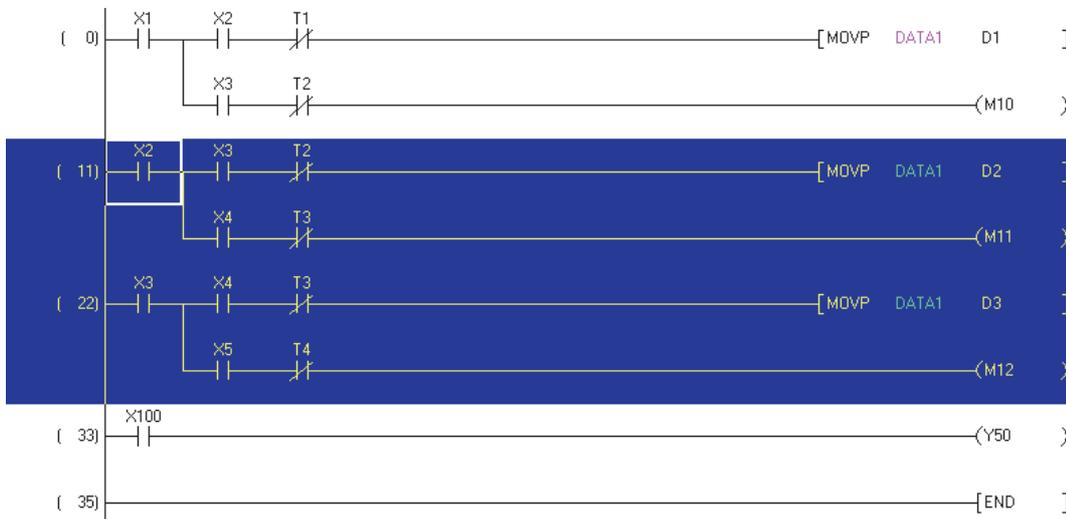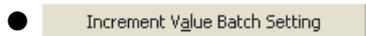
When multiple devices are cut/copied, displays the screen to set the number of increments of all the devices displayed on "Copy Source Device" in batch.

Enter the number of increments, and click the `OK` button.

Point

● **Pasting function blocks consecutively**
When multiple function blocks exist in a cut/copied ladder block, the Edit FB Instance Name screens for the number of cut/copied function blocks are displayed after setting the consecutive pasting.

● **When canceling the consecutive pasting of function blocks**
When multiple function blocks exist in a cut/copied ladder block, cancel only with the first Edit FB Instance Name screen as shown in the example below.

Example: When copying a ladder block where function blocks exist, and setting "Number of Pasting Operations" to 2.
Cancellation can be executed only with the Edit FB Instance Name screen of 1 and 3.
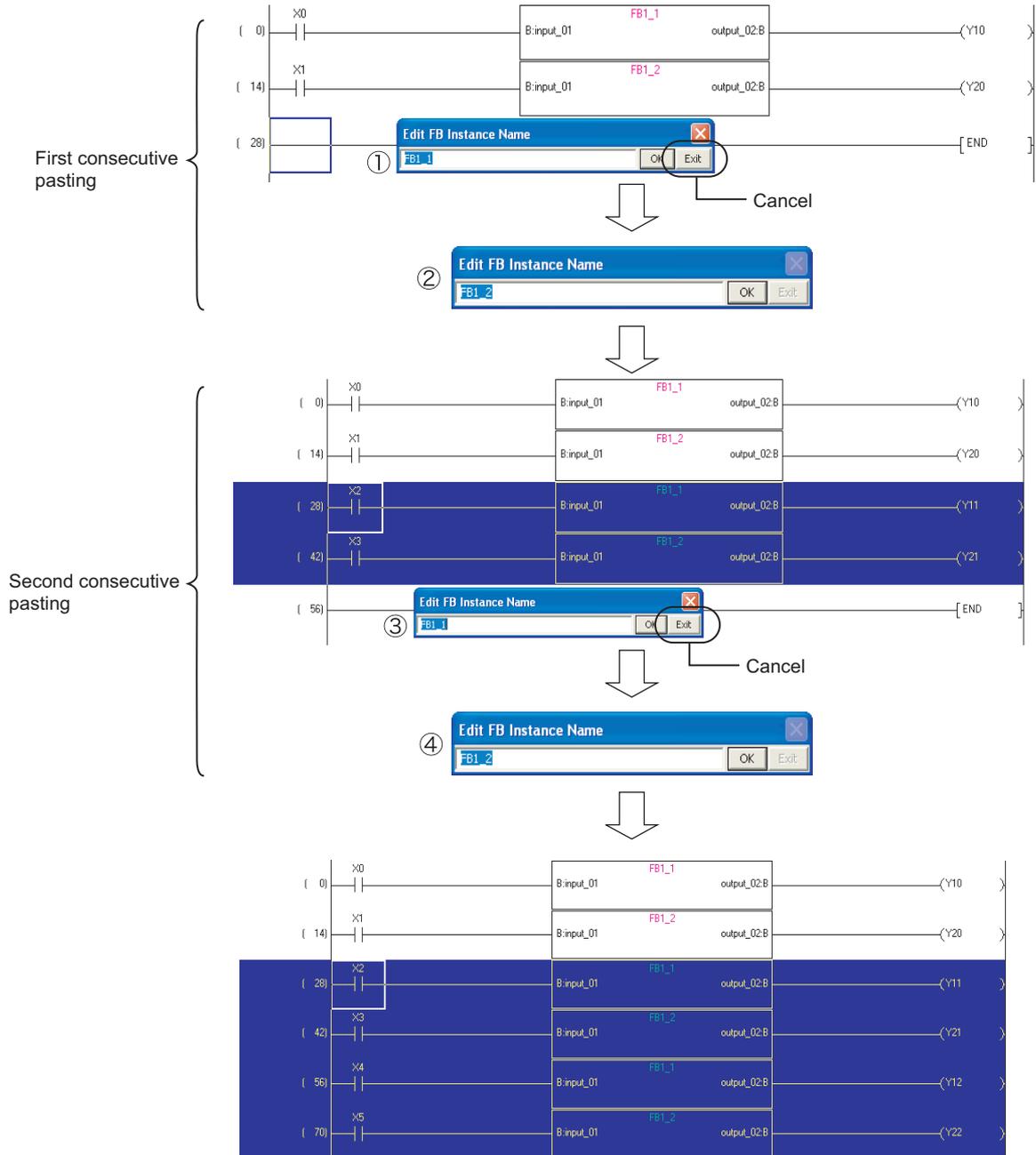
■ **Considerations for consecutive pasting**

The following explains the considerations for consecutive pasting.

When the number of device characters changes from the number of contacts of copied ladder block by increment, it cannot be pasted consecutively.
In this case, cancel the consecutive pasting, correct the number of device characters after pasting, and execute "Continuous Paste" again.

Example: When copying a ladder block with BL100\S8, and setting "Number of Pasting Operations" to 3.
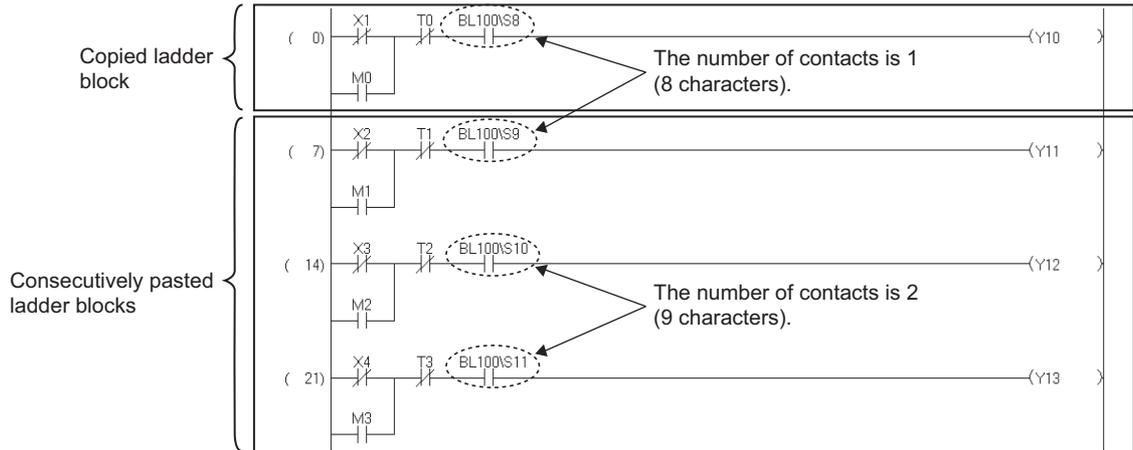
The number of device characters is changed from 8 to 9, and the number of contacts is changed from 1 to 2 by incrementing from BL100\S8 to BL100\S10. Therefore, the consecutive pasting is canceled.
If canceled, execute the consecutive pasting with the following procedure.

Operation

1. The consecutive pasting is canceled, and the following message is displayed.

Select ⬚ No ⬚ , and paste up to BL100\S9.
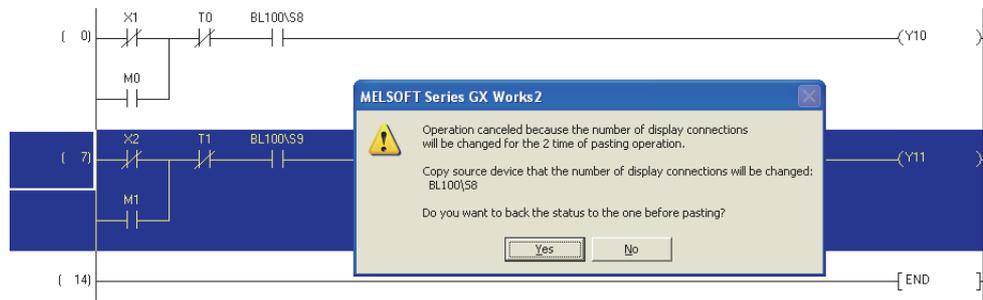
2. Copy a ladder block with BL100\S9, and execute the consecutive pasting.
Set "Increment Value" of BL100\S9 to 0.

Copied ladder block

Continuous Paste

Continuously paste the selected range downward from current cursor position with device No. increments which is included in cut or copied ladder.

Number of Pasting Operations (1 to 99): [1] times

Increment Value Batch Setting

Copy Source Device		After Increment	Increment Value
X2	>>	X3	1
M1	>>	M2	1
T1	>>	T2	1
BL100\S9	>>	BL100\S9	0
Y11	>>	Y12	1

Set the number of increments to 0.

* Setting range for increment value is within the range of -9999 to 9999 (DEC).
* Real constant, devices in inline ST will not be incremented.
* Paste under Insert Mode.

Execute   Cancel

3. Correct BL100\S9 to BL100\S10 with a ladder block after pasting.

Enter Symbol
-| |-   BL100\S10   OK   Exit   Help

4. Copy a ladder block with BL100\S10, and execute "Continuous Paste" again.

Execute "Continuous Paste".

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6.11.5 Copying elements and devices simultaneously

When pasting copied elements to the program, paste the device comments of the elements simultaneously.

Operating procedure

1. **Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "Ladder" ⇒ "Comment".**

2. **Select "Copy device comment in copying ladder".**
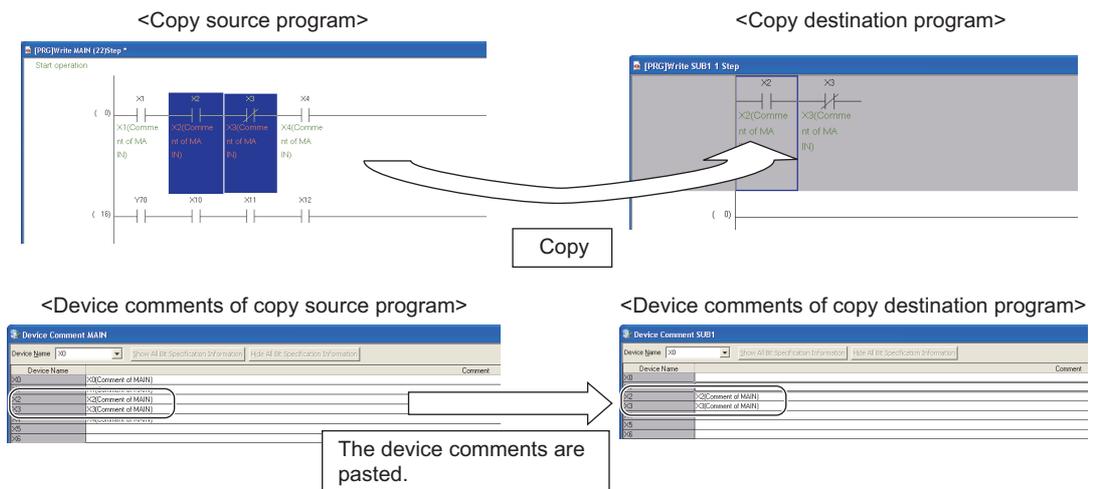
6.12 Canceling Previous Operation

Q CPU **L CPU** **FX**

This section explains how to cancel the previous operation to restore the previous status.

Item	Toolbar	Shortcut key
Undo		Ctrl + Z

Operating procedure

- **Select [Edit] ⇒ [Undo] ( ) immediately after editing a ladder program.**

  The processing status just before the last operation is restored.
  This operation is valid for up to 30 times only when the program is in the editing status before the ladder conversion.

6.12.1 Operation applicability

The following table shows the operation applicability of the Undo function.

Operation applicability of the Undo function	Reference
Create and delete contacts, coils, and application instructions	Section 6.2 Section 6.7
Insert and delete rows	Section 6.9
Insert and delete columns	
Edit and delete lines	Section 6.6 Section 6.8
Enter and delete vertical lines	Section 6.6.2 Section 6.8.2
Enter and delete horizontal lines	
Cut and paste by setting ranges	Section 6.11

Point

● **Canceling previous operation**

- When a program is edited after selecting [Edit] ⇒ [Restore After Ladder Conversion]
  The processing status just after selecting the [Restore After Ladder Conversion] function can be restored.
- When an inline structured text box is deleted, the undo operation can be performed only once.
  When the ladder program is edited after the delete operation, the processing status just after the deleting operation can be restored.
- The undo operation cannot be performed in any of the following situations.
  - An unconverted ladder program is discarded and does not exist.
  - An inline structured text box is inserted.
  - A program in an inline structured text box is edited. (Only when the inline structured text program is edited for the first time after any editing is performed on the program, or after converting the program.)
  - An error occurred when editing a program.
    When the ladder program is edited after the error occurrence, the processing status just after the error occurrence can be restored.
  - A program is copied.

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6.13   Restoring Ladder Programs to the Status of After Conversion

Q CPU L CPU FX

This section explains how to restore the currently edited ladder programs to the status of immediately after the ladder conversion.

Operating procedure

1. **Select [Edit] ⇒ [Restore After Ladder Conversion].**

The confirmation message is displayed.

MELSOFT Series GX Works2

⚠ This will abort the ladder editing and it will restore the ladder to status just after ladder conversion. All right?

Yes   No
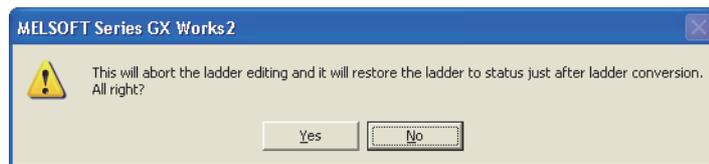
2. **Click the   Yes   button.**

The ladder program is restored to the status before editing the program.

Status after ladder conversion
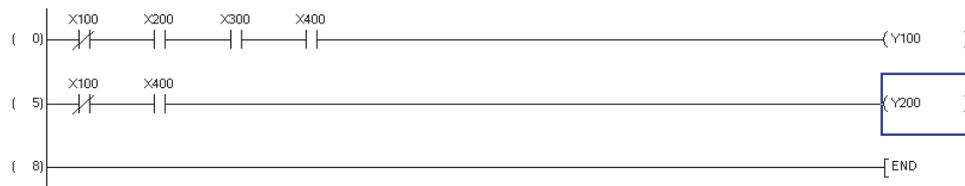
Edit the program.
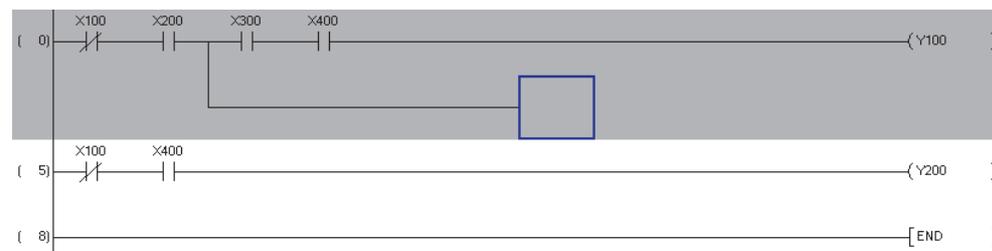
Execute [Restore After Ladder Conversion].
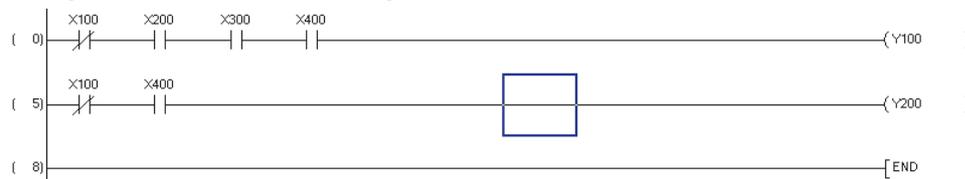
Point

● **Converted ladder programs cannot be restored to the status before conversion.**

6.14 Considerations for Editing Ladder Programs

Q CPU **L CPU** **FX**

The following explains the considerations for editing ladder programs.

1) **For a program with a ladder block consisting of two or more lines, if one instruction cannot be fitted in a single line, create wrapping symbols and create the instruction in the next line as shown below. For creating wrapping symbols, refer to the following section.**
   ☞ Section 6.2.7 "Creating wrapping lines"

   Example: To enter the following instruction:
   ECALL "abcdefghijklmnopqrstuvw" P1000 ZR111111 ZR222222 ZR333333 ZR444444 ZR555555
   An instruction that does not fit in a line cannot be entered in the line ①.
   If attempted, the error message is displayed.
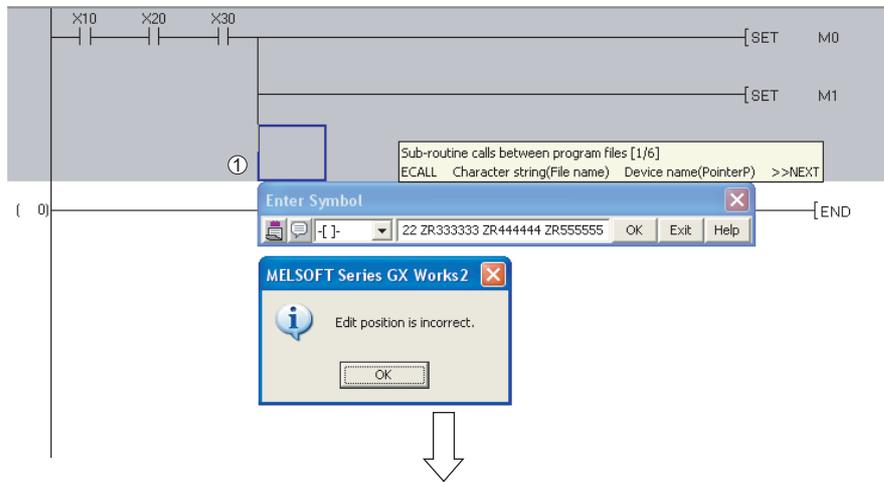
Wrapping the line ① by creating the wrapping symbols.
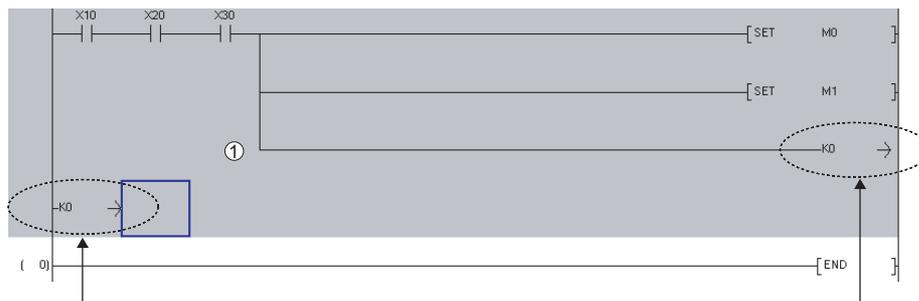
Create a wrapping destination symbol (>-).

Create a wrapping source symbol (->).

Enter the instruction in the line ②.

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2) **If wrapping occurs due to the insertion of a contact in the first column, a contact cannot be inserted.**
In this case, move the element to the next line and insert the contact in the first column after connecting the contact with the wrapping symbols.

Example) To enter "LD X11" to the first column.
The contact cannot be inserted in the first column of the line of ①.
If attempted, the error message is displayed.

A contact cannot be inserted in the first column because there is no space in the line.

Move the element to the next line.

Create a wrapping destination symbol (>-).

Create a wrapping source symbol (->).

Insert a contact.
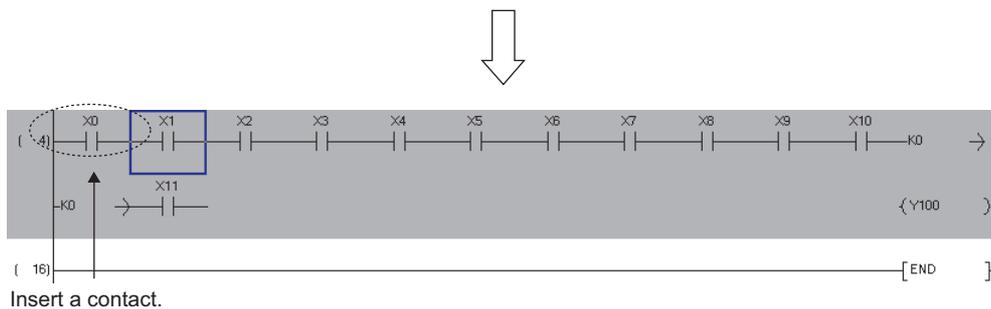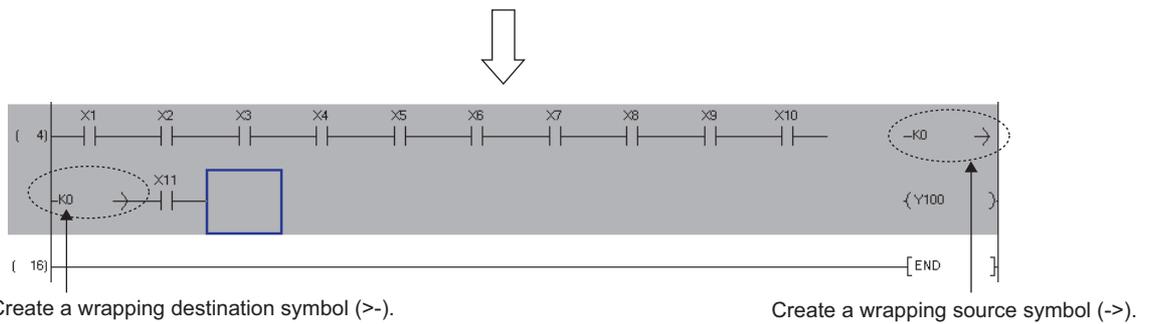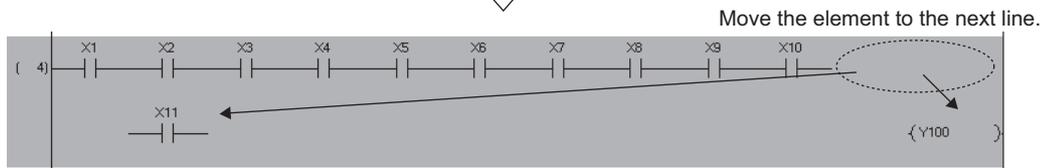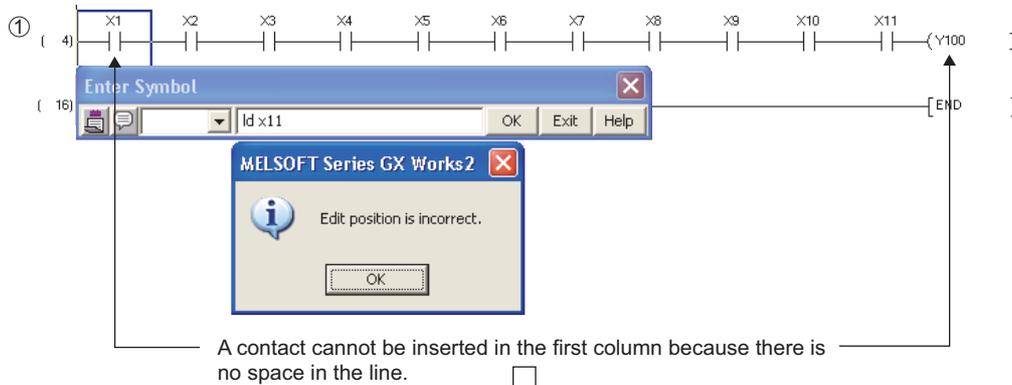
3) **When there are two or more wrapping lines, an instruction that causes more wrapping cannot be created.**
In this case, insert a new line below the existing lines and enter the instruction in that line. Then, adjust the wrapping symbol numbers.

Example) To enter the following instruction:
ECALL "abcdefg" P1000 ZR1000000 ZR1000001 ZR1000002 ZR1000003 ZR1000004
An instruction that does not fit in a line cannot be created in the line ①
If attempted, the error message is displayed.
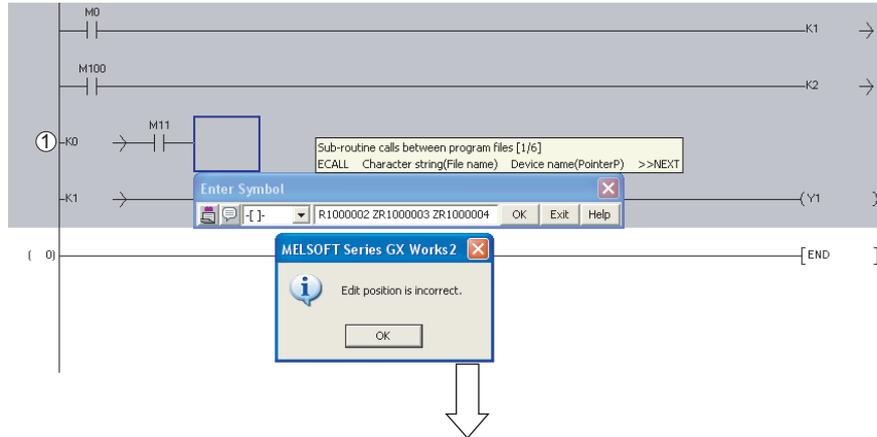
In this case, insert a new line and enter the instruction.

Instruction
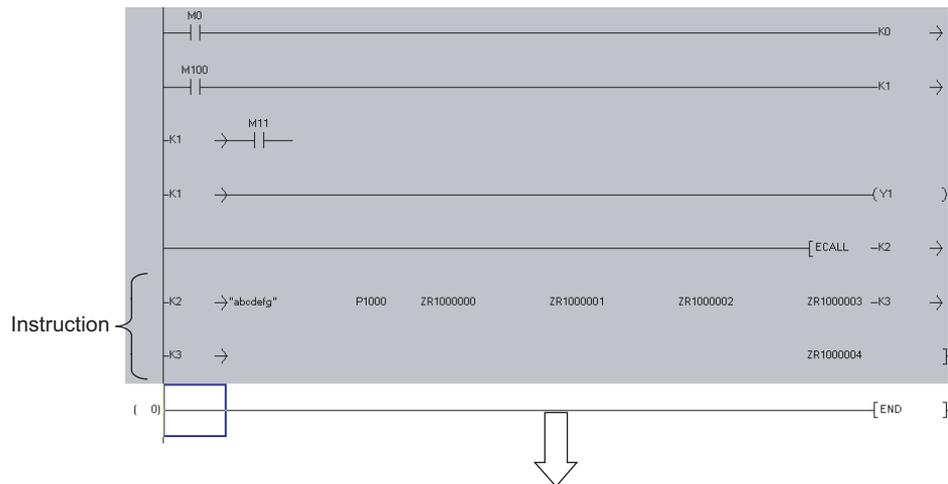
Create the wrapping source symbol (->) in the line ②, and create the wrapping destination symbol (>-) in the line ③.
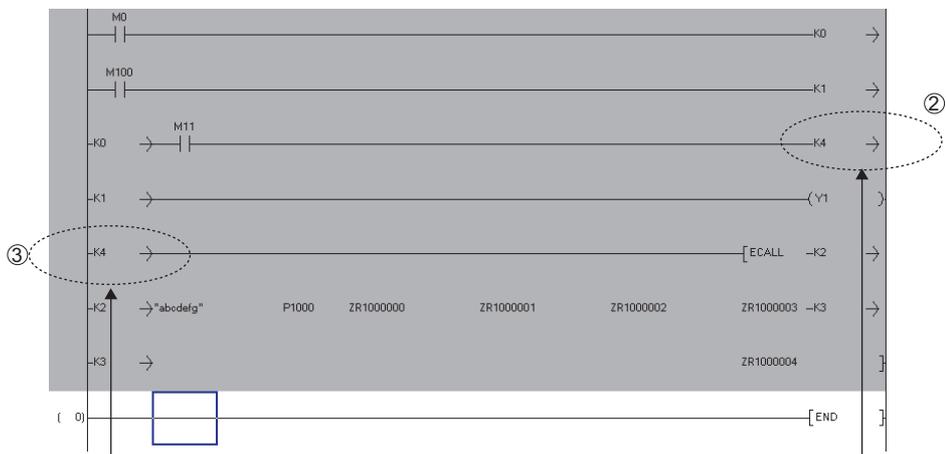
Create a wrapping destination symbol (>-).   Create a wrapping source symbol (->).

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4) **If a ladder program is edited (such as insertion and deletion of columns) in the middle step of a wrapped line, the line may not be wrapped correctly, which causes the conversion impossible. If this happens, make corrections so that the wrapping source symbol (->) number and the wrapping destination symbol (>-) number match correctly.**

Example) A column is inserted in front of [X0F]
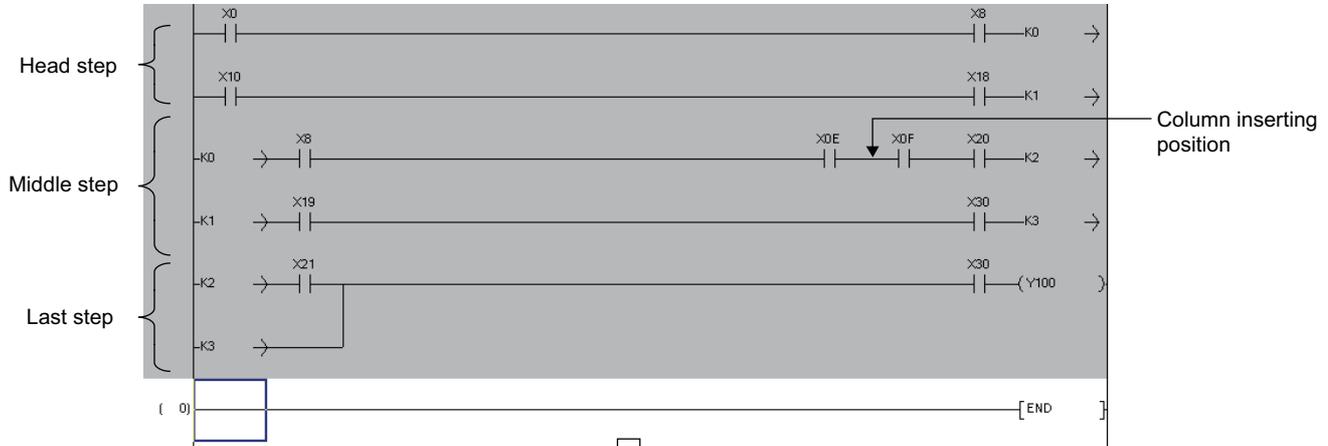
Wrapping source symbol (->) K4 and wrapping destination symbol (>-) K4 are automatically created.
This causes matching failure between the wrapping source symbol (->) K1 and the wrapping destination symbol (>-) K1.

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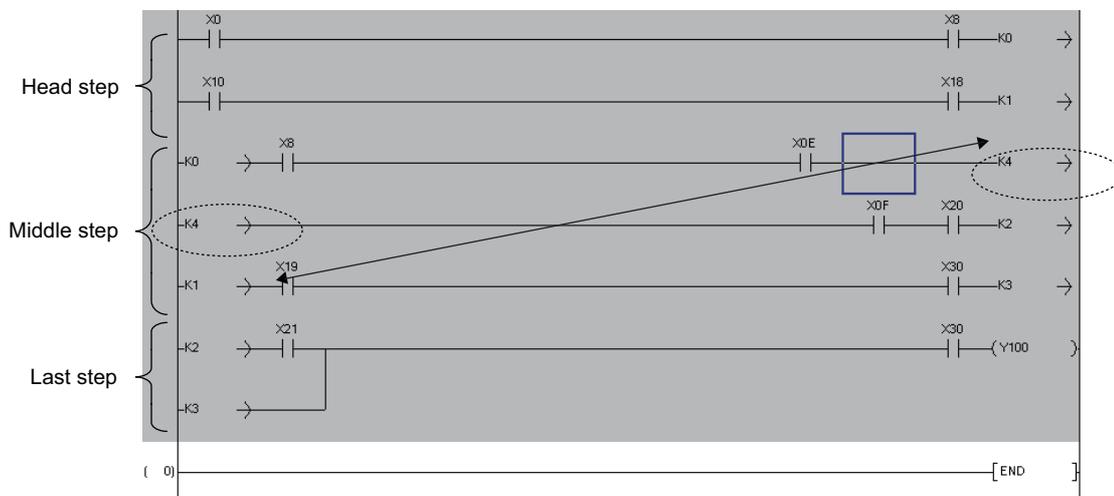
In this case, a correction needs to be made to the program so that the wrapping destination symbol (>-) K1 corresponds to the wrapping source symbol (->) K1.

Move the line ① below the line ②.
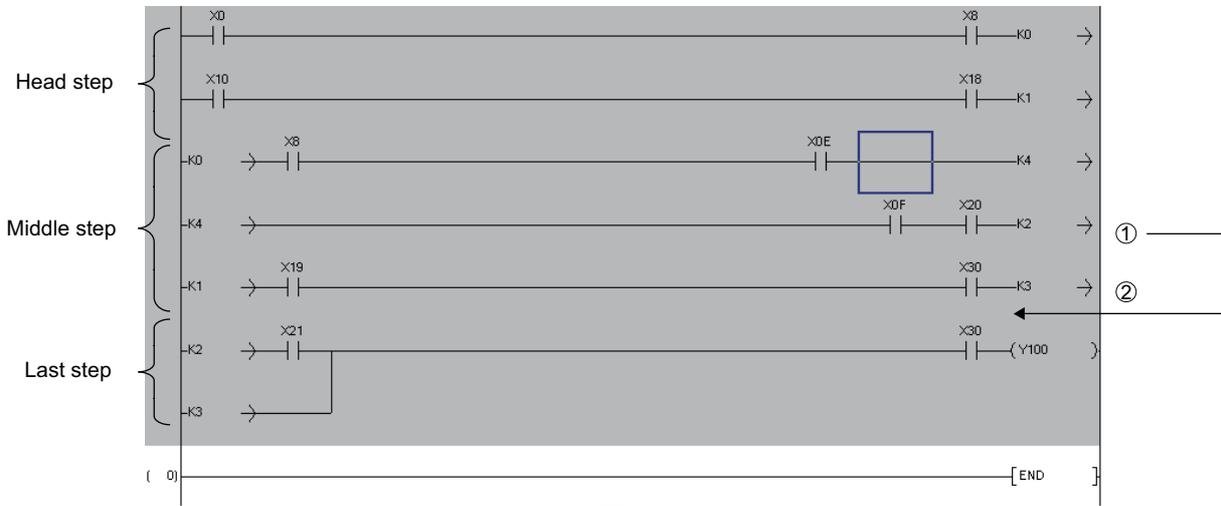
Insert a new line to ③, and create the wrapping source symbol (->) with K5 and wrapping destination symbol (>-) with K3.
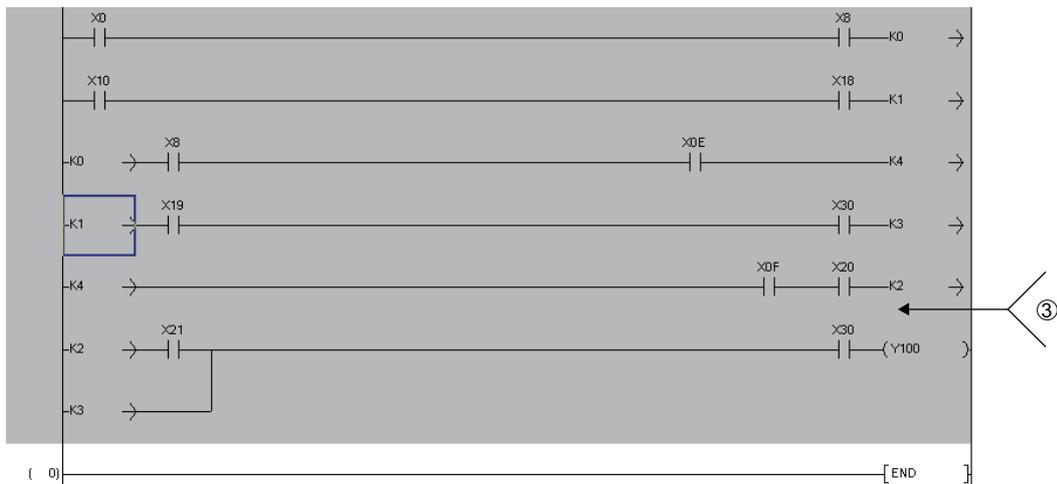
Change the wrapping symbol of the line ④ to K5.
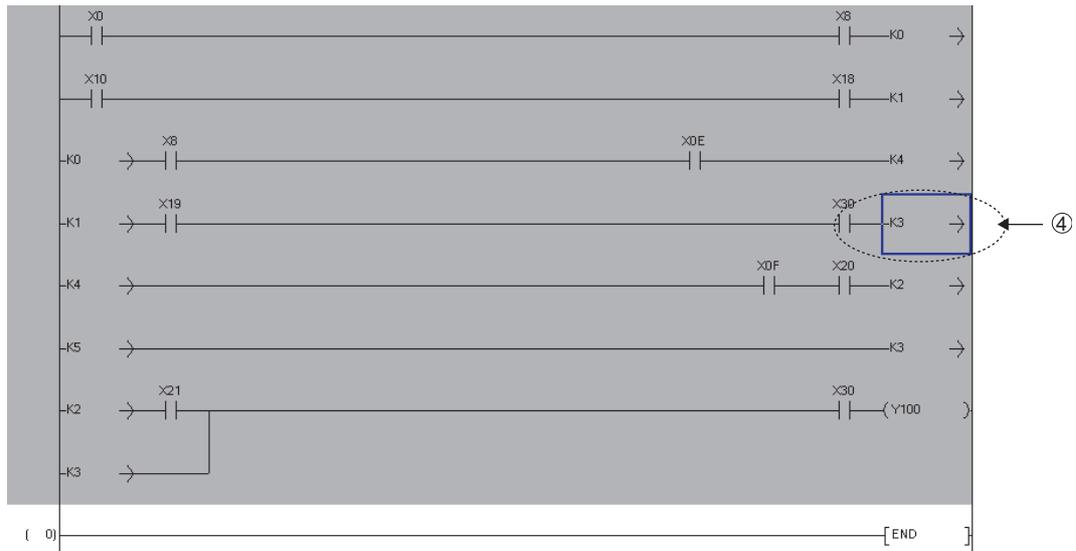
With the corrections above, correspondence between the wrapping source symbols (->) and the wrapping destination symbols (>-) is secured.
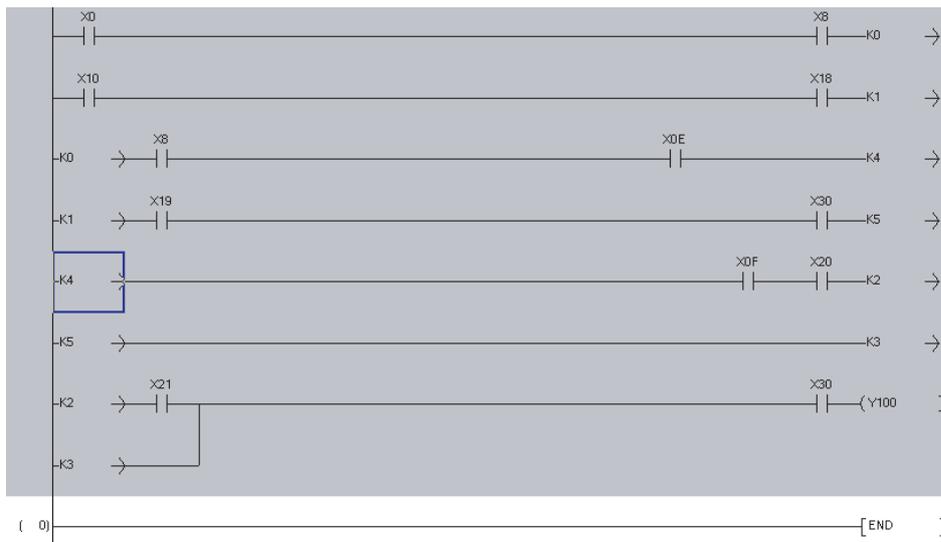
5) A contact or a column cannot be inserted in the middle of an instruction statement. If attempted, the error message is displayed.

Example
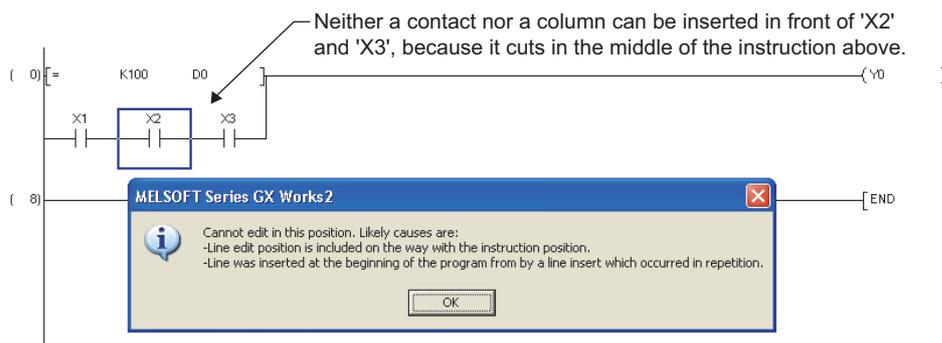
6) **When the ladder block is displayed in yellow, it indicates that the ladder block cannot be displayed properly or an error exists in the program. In this case, perform the program check or compilation to check the error, and correct the program.**

Example
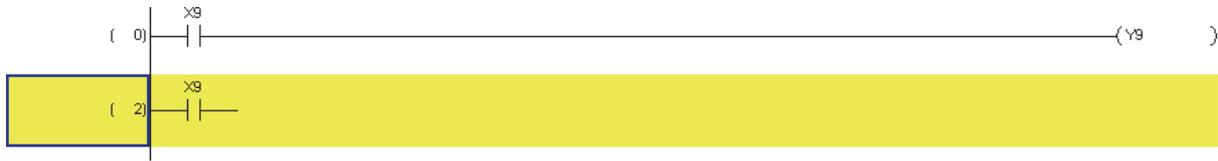
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6.15   Changing T/C Setting Values

`Q CPU` `L CPU` `FX`

This section explains how to display setting values of timer/counter used in the ladder/SFC (Zoom) program, and changing them in batch.

Screen display

Select [Edit] ⇒ [Change TC Setting].

List of timer/counter
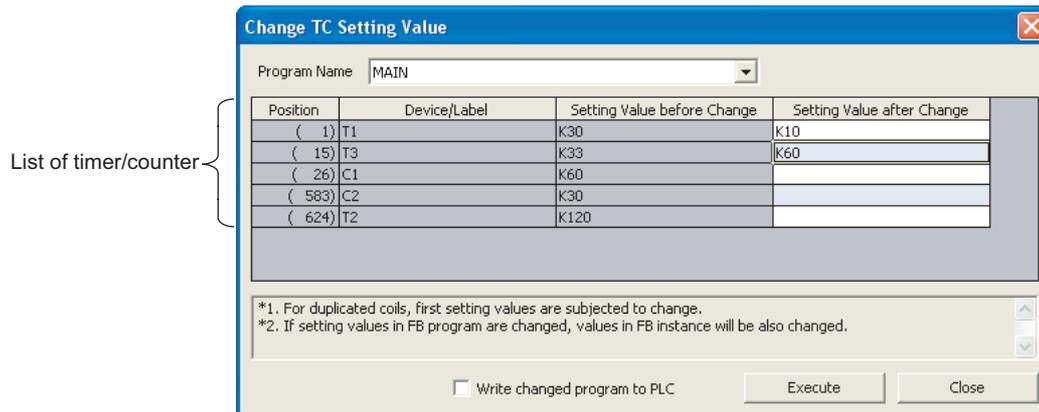
Operating procedure

1. Set the items on the screen.

Item	Description
Program Name	Select a program name whose setting values to be changed by clicking ▾ .
List of timer/counter	Display a list of timer/counter of the program selected for "Program Name".
Position	Display step numbers of timer/counter used in the program.
Device/Label	Display devices/labels of timer/counter.
Setting Value before Change	Display the setting values of timer/counter currently set.
Setting Value after Change	Enter the setting values of timer/counter to be changed.
Write changed program to PLC*1, *2	Select this to write the changes to the programmable controller CPU.

*1 :   This item cannot be selected after compiling all programs. For details, refer to Point in this section. For considerations when compiling all programs, refer to Section 10.3.3.
*2 :   For FXCPU, this item can be set only for ladder programs of the project without labels.

2. Click the [Execute] button.

The message shown on the right is displayed.

3. Click the [Yes] button.

The setting values are changed.

Point

● **Changing setting values**

  • Constants can be changed to devices, and devices can be changed to constants.
    For the high-speed counter of FXCPU, changing from constants to devices and from devices to constants cannot be performed online.

      Example: K10 to D0

  • When a ZR device is set or changed, the changed setting value cannot be written to the programmable controller CPU.

      Example) ZR100 to D100 cannot be set.

● **For Basic model QCPU**
  When the date of the personal computer is February 29, the TC setting values may not be changed.
  For measures when the TC values cannot be changed, refer to GX Works2 Version 1 Operating Manual (Common).

● **For Universal model QCPU/LCPU**

  • Whether to transfer content of the program cache memory to the program memory after setting TC values, can be selected by setting the option. Select "Transfer program cache memory to program memory" under [Tool] ⇒ [Options] ⇒ "Online Change".

  • The following functions cannot be executed while transferring the program memory after the TC setting value change.

    • Online program change (ladder program, SFC (Zoom) program, ST program, function block)[1]

    • TC setting value change (When "Write changed program to PLC" is selected)[1]

    • Write to PLC function (When program memory/device memory is the target memory)[1]

    • Program memory batch transfer

    • Set as default connection

    • Change PLC Type function

    • Parameter check

      [1] : For Universal model QCPU with a serial number of which the first five digits are 12012 or higher, the program memory batch transfer operation can be suspended.
            (GX Works2 Version 1 Operating Manual (Common))

● **Saving project automatically after writing program with changed TC setting values to the programmable controller CPU**
  Projects can be saved automatically after the Online program change by setting the option. Select "Save project after changes in TC setting values are written to PLC" under [Tool] ⇒ [Options] ⇒ "Project" ⇒ "Automatic Save".

● **"Write changed program to PLC" check box**
  When the check box of "Write changed program to PLC" is disabled after compiling all programs, select [Online] ⇒ [Write to PLC] and write programs to the programmable controller CPU to validate the check box.

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6.16   Writing/Reading List Format Programs

Q CPU   L CPU   FX

The following explains how to write/read a program to/from CSV file in a list format.
This function is supported by ladder program in Simple project (without labels).

■   Writing programs in list format

Write a program to a CSV file in a list format.

Operating procedure

1. **Select [Edit] ⇒ [Write to CSV File].**

The confirmation message for writing data is displayed.
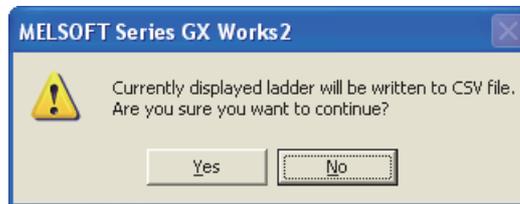
2. **Click the Yes button.**

The Write to CSV File screen is displayed.
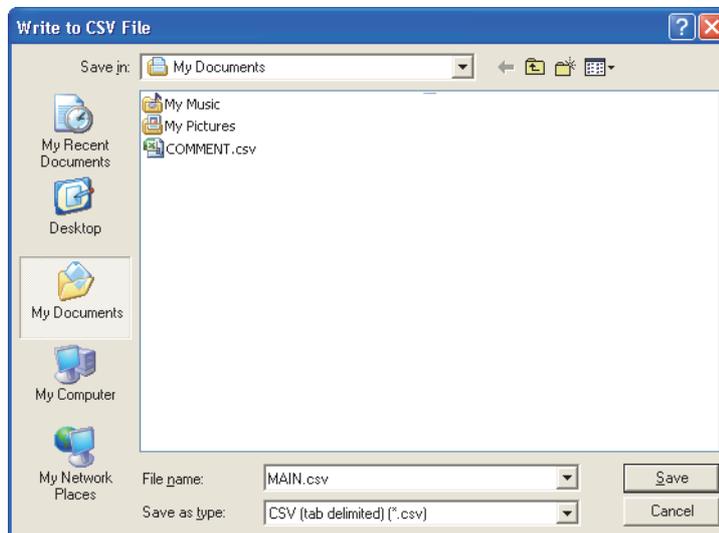
3. **Enter a file name of the data to be saved.**

4. **Click the Save button.**

The program is saved in the CSV file in a list format.

■ **Reading program in list format**

Read a program saved in a list format from a CSV file, and display in ladder program.

Operating procedure

1. **Select [Edit] ⇒ [Read from CSV File].**

The Read from CSV File screen is displayed.
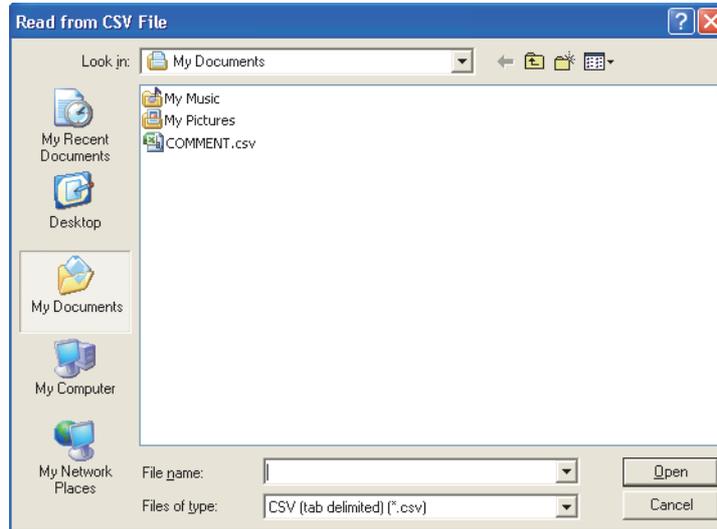
2. **Select a file to be read.**

3. **Click the [Open] button.**

The confirmation message for reading data is displayed.
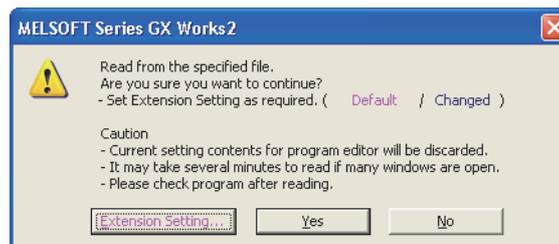
4. **Click the [Yes] button.**

The program is read from a CSV file, and displayed in ladder program.
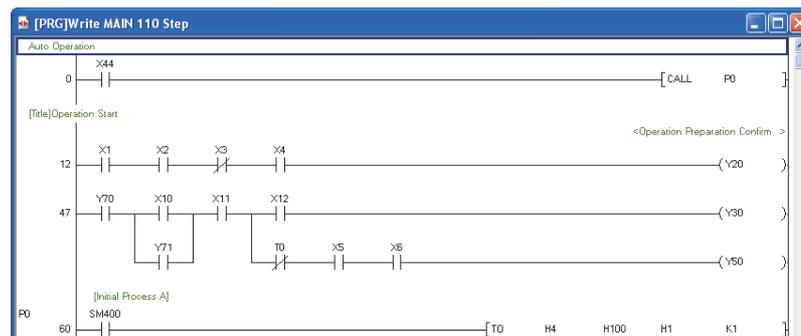
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■ Setting extended settings

Set a conversion type if an instruction error occurs when reading a program saved in a list format.

Screen display

Select the [Extension Setting...] button on the confirmation message for reading data.

```
Instruction List  Extension Setting                    [X]

 ┌─ Conversion method ──────────────────────────────────┐
 │                                                       │
 │  ┌─ Conversion Method for Incorrect Instruction ───┐  │
 │  │                                                  │  │
 │  │  Not convert                        [ ▼ ]        │  │
 │  │                                                  │  │
 │  └──────────────────────────────────────────────────┘  │
 │                                                       │
 │                                                       │
 │                                                       │
 │                                                       │
 │                                                       │
 │                                                       │
 │  ┌─ Explanation ───────────────────────────────────┐  │
 │  │ Select conversion method when incorrect          │  │
 │  │ instruction is found in instruction list.        │  │
 │  │ Do not convert: Will not be converted and        │  │
 │  │ discarded.                                       │  │
 │  │ Convert to line statement: Will be converted     │  │
 │  │ to line statement.                               │  │
 │  │ Convert to abnormal instruction code: Will be    │  │
 │  │ converted to abnormal                            │  │
 │  └──────────────────────────────────────────────────┘  │
 │                                                       │
 │           [ Default ]    [  OK  ]    [ Cancel ]       │
 └───────────────────────────────────────────────────────┘
```

Operating procedure

1. **Set an items on the screen.**

Item	Description
Conversion Method for Incorrect Instruction	Select a conversion type when an instruction error occurs.

2. **Click the [OK] button.**

Return to the confirmation message for reading data.

Screen button

● [Default]

Sets the items of extended setting to the default.

■ Formatting CSV file

The saved CSV file is displayed as shown below when it is opened in spreadsheet software.

< Ladder editor >

< CSV file >

● Details of CSV file

The following explains the details of CSV file format.

- The file format is Unicode (including UTF-16, Little Endian, and BOM).
- The delimiter of items is a tab (\t).
- Each item is enclosed in double quotation marks (").
- If the item contains double quotation marks ("), the double quotation marks in the item are expressed as two double quotation marks ("").
- A line feed is set at the end of the line. The line feed code is CR + LF.

Point

● Compatibility with GX Converter

The following are the considerations for using GX Converter.

- When using a CSV file created with GX Converter in GX Works2, correct to the format shown above.
  If programs exist in the first 3 rows, insert 3 blank rows. Otherwise those programs are skipped.
- When using CSV file written with GX Works2 in GX Converter, delete the first 3 rows, and save in ANSI format.

6.17 Setting Program Linkage Order (FXCPU)

Q CPU ✕   L CPU ✕   **FX**

For FXCPU Simple projects (with labels), execution program can be divided into multiple programs in unit of processes. These programs are linked as one program when writing them to a programmable controller CPU.
This section explains how to set the linkage order.
For creating a new program, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**
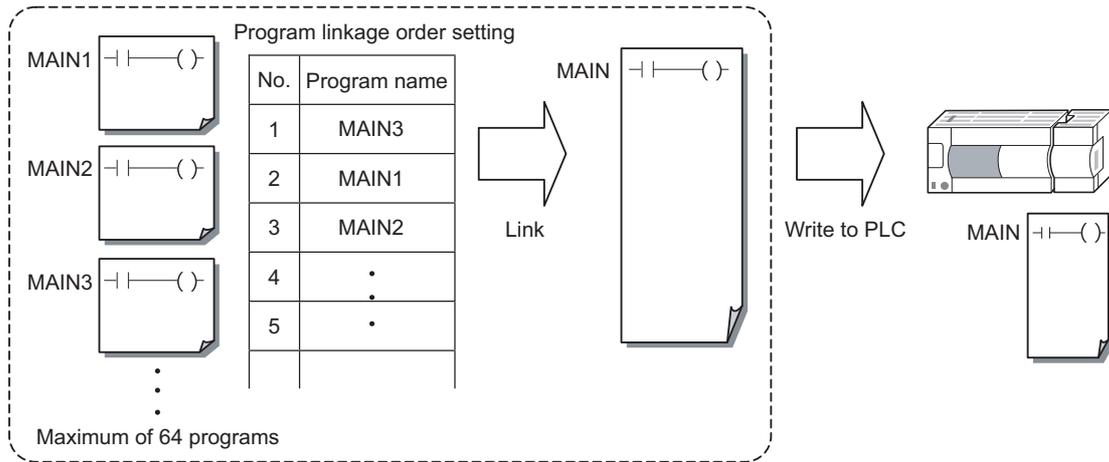
Screen display

Select Project view ⇒ "Program Setting" ⇒ "Execution Program" ⇒ "MAIN".
Right-click and select [Program Linkage Order Setting] from the shortcut menu.
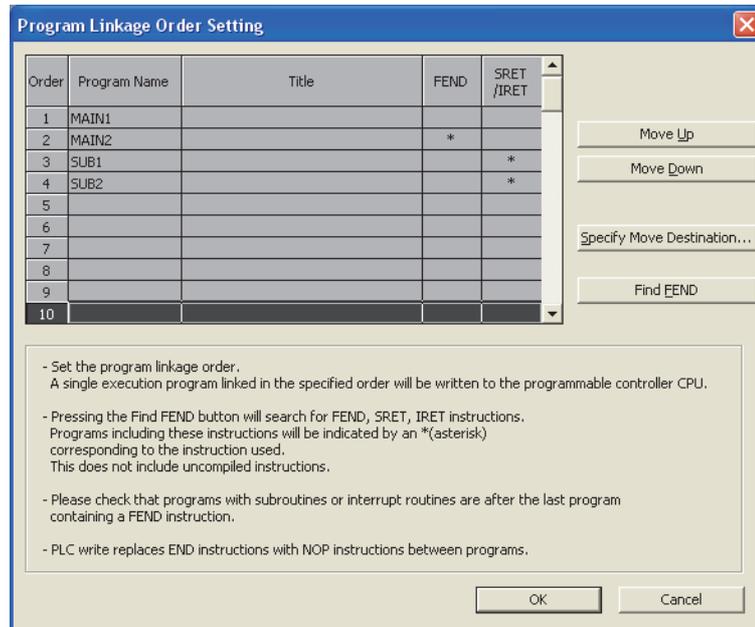
Operating procedure

- **Select a row and click the** `Move Up` **/** `Move Down` **button to change the order.**

Screen button

● Specify Move Destination...

Displays the Specify Move Destination screen.
Specify the destination for program to be moved.

Specify Move Destination

Moving Source Range	First	1 : MAIN1	Move
	End	2 : MAIN2	Cancel
Move Destination		4 : SUB2	
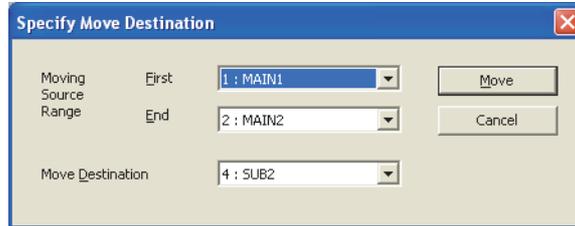
Operation

1. Set the items on the screen.

Item	Description
Moving Source Range	Select a first program and end program of moving source range.
Move Destination	Select a program of move destination, or "Move to End".

2. Click the [Move] button.

The programs selected for "Moving Source Range" are moved to the rows above the program selected for "Move Destination".
When "Move to End" is selected for "Move Destination", the programs are moved to the rows below the end row.

● Find FEND

Searches FEND, SRET, and IRET instructions in each program.
When the instructions exist in the programs, "*" symbols are displayed on the "FEND" or "SRET/IRET" column on the Program Linkage Order Setting screen.

Point

● **Number of programs that can be created**
A maximum number of programs that can be created is 64.
● **Subroutine and interrupt programs**
When creating a subroutine or an interrupt program individually, set the linkage order to execute those programs after the FEND instruction.
● **Program condition after linkage order change**
After the linkage order is changed on the Program Linkage Order Setting screen, all programs are in the uncompiled status.
● **Security setting**
The access authority cannot be set for the program linkage order setting.

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7 EDITING SFC PROGRAMS

This chapter explains the functions of the program editor for editing SFC programs.

7.1   List of SFC Elements

Q CPU   L CPU   FX

The following tables show the list of elements used in SFC programs.

■ QCPU (Q mode)/LCPU

Category	Name		Symbol		Remarks
			MELSAP3	**MELSAP-L**	
SFC step	Initial step	SFC step 0	☐0	0☐	Any one of these steps in a single block Initial step number at top left (first column) is fixed to 0. n: Reset destination step number
	Dummy initial step		⊠0	0⊠	
	Stored coil initial step		SC 0	0 SC	
	Stored operation - without transition check		SE 0	0 SE	
	Stored operation - with transition check		ST 0	0 ST	
	Reset initial step		R 0 Sn	Sn 0 R	
	Initial step	Initial step other than SFC step 0	☐ i	i ☐	Up to the total of 31 steps in a single block i: Step number (1 to 511) n: Reset destination step number
	Dummy initial step		⊠ i	i ⊠	
	Stored coil initial step		SC i	i SC	
	Stored operation - without transition check		SE i	i SE	
	Stored operation - with transition check		ST i	i ST	
	Reset initial step		R i Sn	Sn i R	
	Step	Other than initial step	☐ i	i ☐	Including initial steps, up to 512 steps in a single block (128 steps for Basic model QCPU) i: Step number (1 to 511) n: Reset destination step number m: Start destination step number
	Dummy step		⊠ i	i ⊠	
	Stored coil initial step		SC i	i SC	
	Stored operation - without transition check		SE i	i SE	
	Stored operation - with transition check		ST i	i ST	
	Reset step		R i Sn	Sn i R	
	Block start step (with END check)		⊟ i Bm	Bm i ⊟	
	Block start step (without END check)		⊟ i Bm	Bm i ⊟	
	End step		⊥	⊥	Multiple steps can be applied in a single block

Category	Name	Symbol		Remarks
		MELSAP3	MELSAP-L	
Transition	Series transition	+ a	a +	a, b: Transition condition number
	Selection divergence			
	Selection convergence			
	Selection convergence - simultaneous divergence			
	Simultaneous divergence			
	Simultaneous convergence			
	Simultaneous convergence - simultaneous divergence			
	Simultaneous convergence - selection divergence			
	Selection divergence - simultaneous divergence			
	Simultaneous convergence - selection convergence			
	Jump			a: Transition condition number j: Jump destination step number

Category	Name	Symbol		Remarks
		MELSAP3	MELSAP-L	
Transition	End step transition	a	a	a, b: Transition condition number j: Jump destination step number
	Simultaneous convergence - jump	a →j • j	a →j j •	
	Simultaneous convergence - selection divergence - jump	a →j b • j	a →j b j •	
	Simultaneous convergence - selection convergence - jump	a →j b • j	a →j b j •	
	Selection divergence - jump	a →j+1 b →j+2 • j+1 • j+2	a →j+1 b →j+2 j+1 • j+2 •	
	Selection convergence - jump	a →j b • j	a →j b j •	
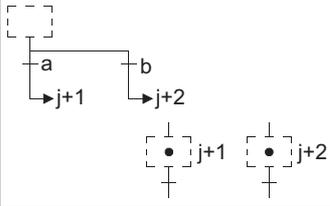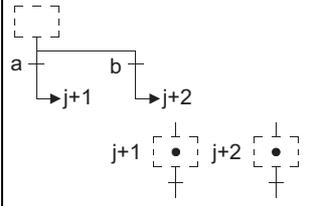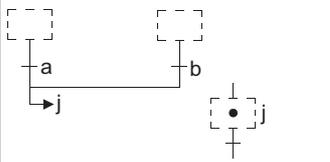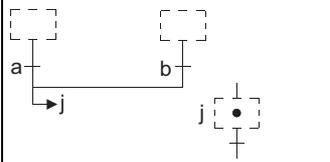
■ **FXCPU**

Category	Name	Symbol	Remarks
Ladder	Ladder block	□ LD	Up to 11 blocks in a block list
Step	Initial step	□ i	One step in each block i: Step number (0 to 9)
	Step	□ i ／ ? i	Up to 512 steps in each block i: Step number (10 to 999)
Transition	Series transition	┤ ／ ┤ ?	
	Selection divergence	(Left edge)　(Center)　(Right edge)	
	Selection convergence	(Left edge)　(Center)　(Right edge)	
	Simultaneous divergence	(Left edge)　(Center)　(Right edge)	
	Simultaneous convergence	(Left edge)　(Center)　(Right edge)	
	JUMP transition	i ● j → j	i: Step number j: Jump destination step number
	Reset JUMP	● i ← Self reset ▽ j	
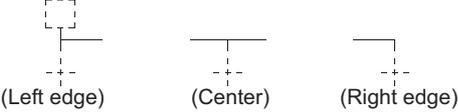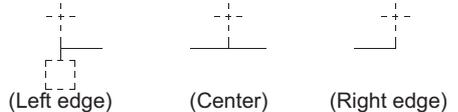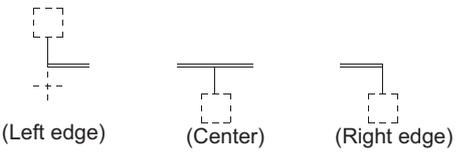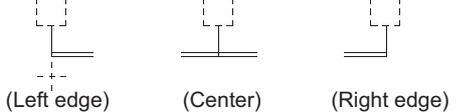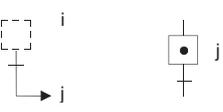
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7.2   Difference between MELSAP3 and MELSAP-L

Q CPU   L CPU   FX

This section explains the difference between MELSAP3 and MELSAP-L.

A display format can be selected for QCPU (Q mode)/LCPU.
For details, refer to Section 2.3.7.

■   MELSAP3

MELSAP3 is a description format which provides easy-to-understand configurations and controls of an entire program by describing the operating order of machines and equipment using SFC diagrams and creating operation outputs and transition conditions using ladder programs.
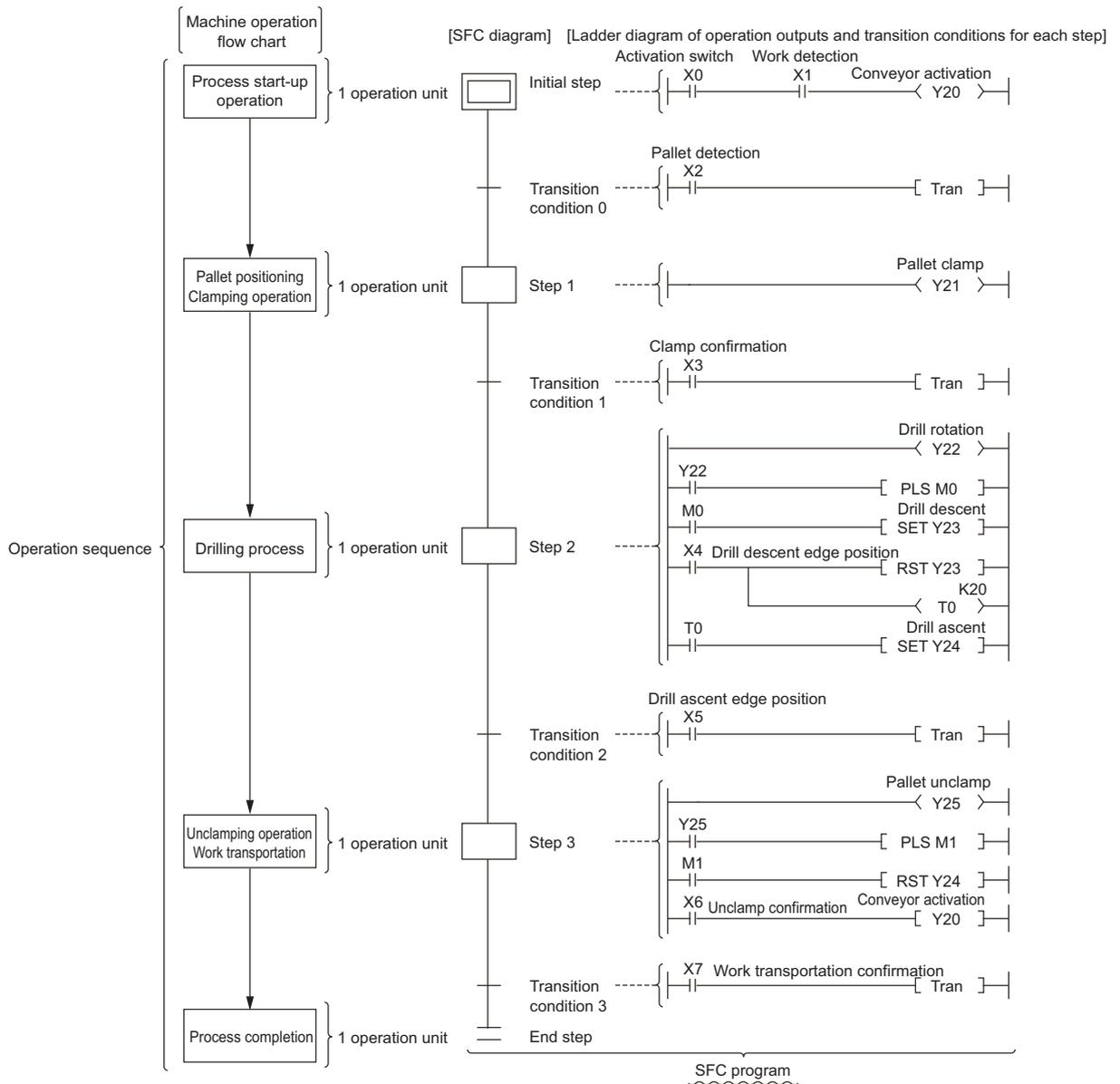
Create programs on the SFC editor window and the Zoom editor window when displaying SFC programs in MELSAP3.
Edit SFC diagrams on the SFC editor window and create operation output/transition condition programs on the Zoom editor window.
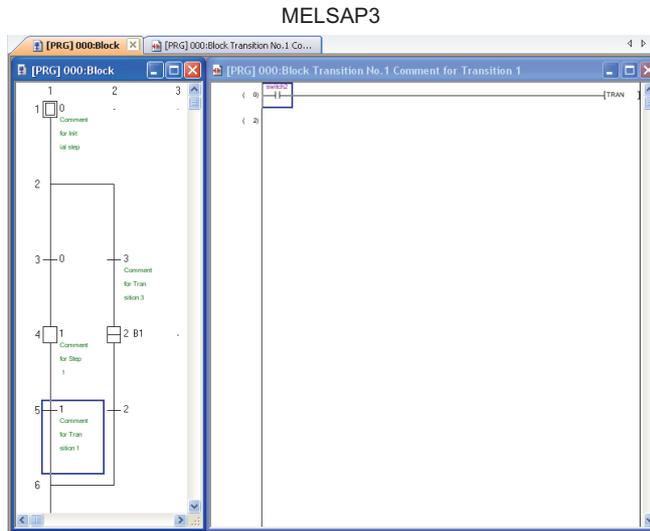
MELSAP3

■ MELSAP-L

MELSAP-L is a description format which supports development efficiency of sequence programming and establishment of program components.
Each machine control command can be established as a component by describing operation flow and machine controls separately, as in describing a machine operation sequence in MELSAP-L and controls with machine interlocks in sequence program.
Furthermore, since output conditions such as interlocks cannot be written in MELSAP-L steps, a corrective action can be performed instantly for a such trouble in which the step output cannot be detected even though the step is activated.
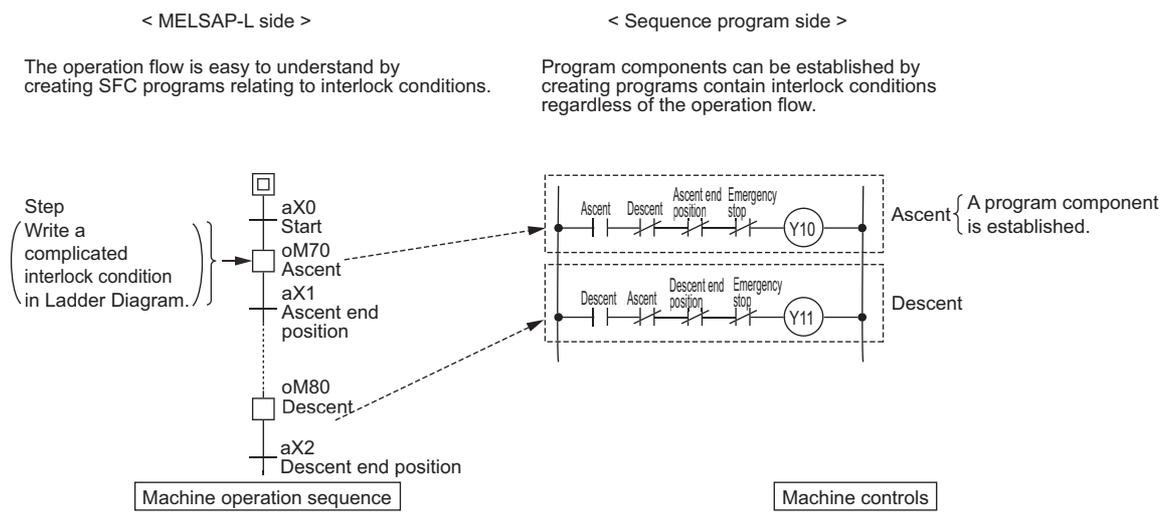
< MELSAP-L side >

The operation flow is easy to understand by creating SFC programs relating to interlock conditions.

< Sequence program side >

Program components can be established by creating programs contain interlock conditions regardless of the operation flow.

Create programs using only the SFC editor window when displaying SFC programs in MELSAP-L. Both operations of editing SFC diagrams and creating operation output/transition condition programs are performed on the SFC editor window.

● **MELSAP-L (instruction format)**

A format to describe control instructions and transition conditions in steps on the SFC diagram. Control programs and transition conditions can be checked on the SFC diagram.

● **MELSAP-L (start conditions format)**

A format to describe start conditions and transition conditions in steps on the SFC diagram. Operation outputs (OUT) and transition conditions (LD, LDI) can be easily entered using only devices/labels, and they can be checked on the SFC diagram.

MELSAP-L (instruction format)
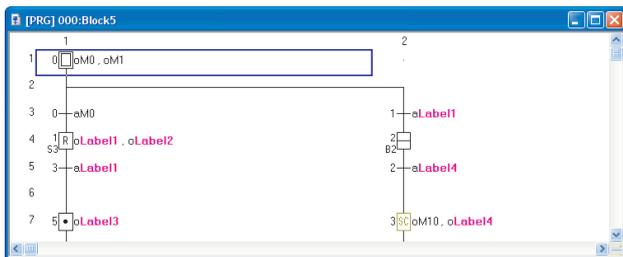
MELSAP-L (start conditions format)
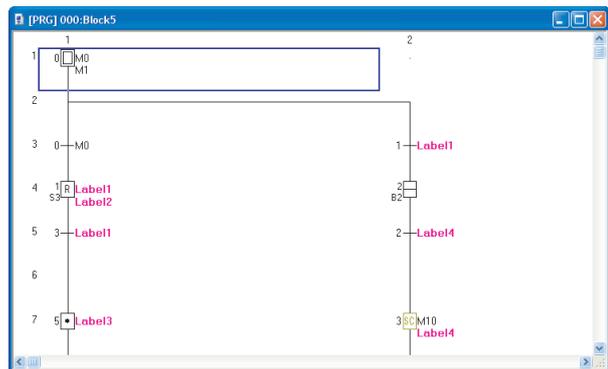
7.3 Creating SFC Diagrams

This section explains how to create SFC diagrams.
For FXCPU, a ladder block to activate the initial step of SFC program needs to be created separately from the SFC diagram.
☞ **GX Works2 Version 1 Operating Manual (Common)**
SFC elements are entered by using the Enter SFC Symbol screen.
SFC elements also can be entered by using the toolbar and shortcut keys. The following table shows the toolbar icons and the corresponding shortcut keys.

Item		Toolbar	Shortcut key
SFC Symbol	Step	F5	F5
	Block Start Step (with END Check)	F6	F6
	Block Start Step (without END Check)	sF6	Shift + F6
	Jump	F8	F8
	END Step	F7	F7
	Dummy Step	sF5	Shift + F5
	Transition	F5	F5
	Selection Divergence	F6	F6
	Simultaneous Divergence	F7	F7
	Selection Convergence	F8	F8
	Simultaneous Convergence	F9	F9
	Vertical Line	sF9	Shift + F9
SFC Step Attribute	No Attribute	c1	Ctrl + 1
	Stored Coil	c2	Ctrl + 2
	Stored Operation (without Transition Check)	c3	Ctrl + 3
	Stored Operation (with Transition Check)	c4	Ctrl + 4
	Reset	c5	Ctrl + 5
Edit Line	Vertical Line Segment	aF5	Alt + F5
	Selection Divergence	aF7	Alt + F7
	Simultaneous Divergence	aF8	Alt + F8
	Selection Convergence	aF9	Alt + F9
	Simultaneous Convergence	aF10	Alt + F10
Delete Line		cF9	Ctrl + F9
Documentation	SFC Step/Transition Comment		
Sort SFC Step No.			
Monitor	SFC All Block Batch Monitoring		
	SFC Auto Scroll		
View	Zoom		

7.3.1   Entering SFC steps (□)/(▣)/(⊠)

Q CPU   L CPU   FX

Enter an SFC step.

Operating procedure

1. **Move the cursor to the position where an SFC step is entered.**

2. **Select [Edit] ⇒ [SFC Symbol] ⇒ [Step]/[Dummy Step].**

The Enter SFC Symbol screen or the Enter SFC Symbol/Enter Program screen is displayed according to the display format setting.

\<MELSAP3/FXCPU\>

SFC step number

\<MELSAP-L (instruction format)\>

SFC step number

\<MELSAP-L (start conditions format)\>

SFC step number

3. **Set the items on the screen.**

Item	Description
Symbol	Select "STEP" or "DUMMY". Dummy steps are changed to the SFC step display automatically when the operation output program is created.
SFC step number	Enter an SFC step number.
Step Attribute	Select the SFC step attribute. This setting can be set when "STEP" is selected for "Symbol".
Reset[*1]	Enter a reset destination step number when the reset step "R" is selected for "Step Attribute".
Comment	Enter SFC step comments. Up to 32 characters can be entered. The created comments can be displayed by selecting [View] ⇒ [SFC Step/Transition Comment].
Program[*2]	Enter programs. For entering MELSAP-L programs, refer to the following section. (☞ Section 7.9.2, Section 7.9.3)

*1 : Not supported by FXCPU.
*2 : Applicable to MELSAP-L (instruction format) and MELSAP-L (start conditions format).

4. **Click the** OK **button.**

The entered SFC step element is displayed.

<Overwrite mode>

Enter SFC step 1

<Insert mode>

Enter SFC step 3

A vertical line is inserted automatically to the other divergence
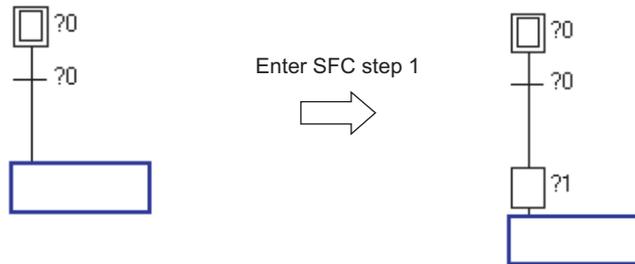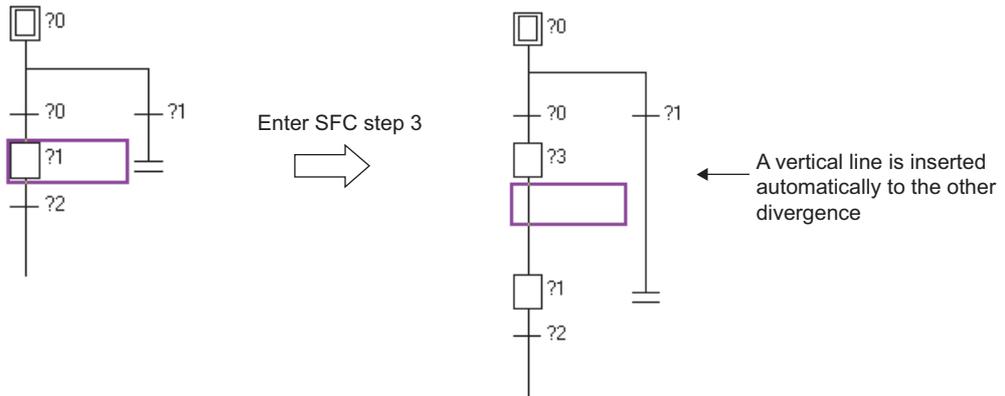
Point

● **Changing the SFC step attributes**
The SFC step attributes of created SFC steps can be changed by selecting [Edit] ⇒ [SFC Step Attribute] ⇒ [(SFC step attribute)]. (☞ Section 7.5)

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7.3.2 Entering block start steps (☐)/(☰)

Q CPU L CPU FX

Enter a block start step.

Operating procedure

1. **Move the cursor to the position where a block start step is entered.**

2. **Select [Edit] ⇒ [SFC Symbol] ⇒ [Block Start Step (with END Check)]/[Block Start Step (without END Check)].**

The Enter SFC Symbol screen or the Enter SFC Symbol/Enter Program screen is displayed according to the display format setting.

<MELSAP3/FXCPU>
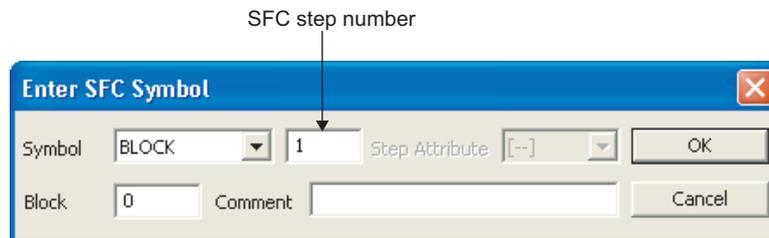
SFC step number

3. **Set the items on the screen.**

Item	Description
Symbol	Select "BLOCK" or "BLOCK-S".
SFC step number	Enter an SFC step number.
Step Attribute	(This setting is not required.)
Block	Enter a start destination block number.
Comment	Enter SFC step comments. Up to 32 characters can be entered.

4. **Click the OK button.**

The entered block start step element is displayed.

<Overwrite mode>

Enter block start step 1

<Insert mode>

Enter block start step 3

A vertical line is inserted automatically to the other divergence
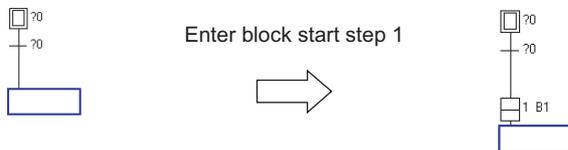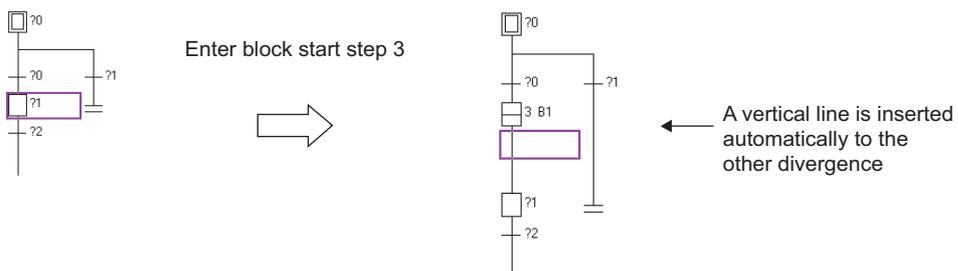
7.3.3 Entering series transitions (＋)

Q CPU   L CPU   FX

Enter a series transition.

Operating procedure

1. **Move the cursor to the position where a series transition is entered.**

2. **Select [Edit] ⇒ [SFC Symbol] ⇒ [Transition].**

The Enter SFC Symbol screen or the Enter SFC Symbol/Enter Program screen is displayed according to the display format setting.

<MELSAP3/FXCPU>

Transition number

<MELSAP-L (instruction format)>

Transition number

<MELSAP-L (start conditions format)>

Transition number

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3. **Set the items on the screen.**

Item	Description
Symbol	Select "TR".
Transition number	Enter a transition number.
Step Attribute	(This setting is not required.)
Block	(This setting is not required.)
Comment*1	Enter transition comments. Up to 32 characters can be entered.
Program*2	Enter programs. For entering MELSAP-L programs, refer to the following section. (☞ Section 7.9)

*1 : Not supported by FXCPU.
*2 : Applicable to MELSAP-L (instruction format) and MELSAP-L (start conditions format).

4. **Click the OK button.**

The entered series transition element is displayed.

<Overwrite mode>

Enter transition 1

<Insert mode>

Enter transition 3

A vertical line is inserted automatically to the other divergence
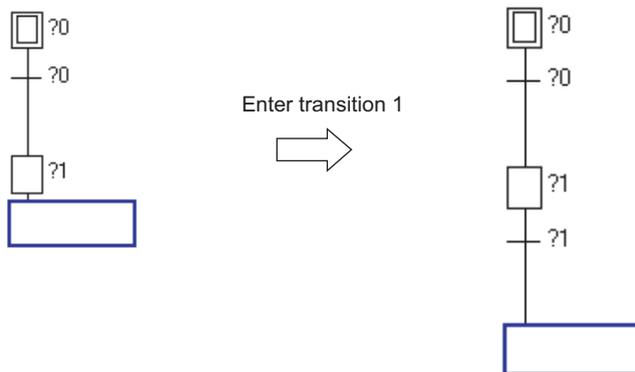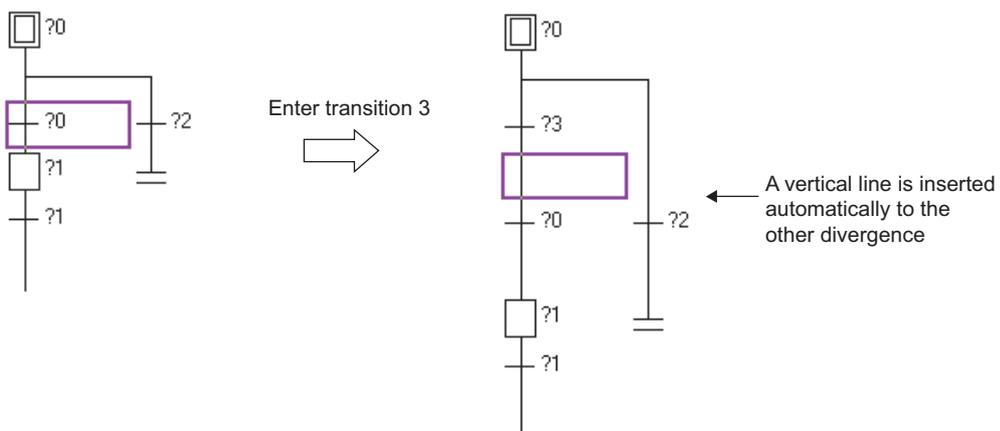
7.3.4 Entering selection divergences (⌐)

Q CPU L CPU FX

Enter a selection divergence.

Operating procedure

1. **Move the cursor to the position where a selection divergence is entered.**

2. **Select [Edit] ⇒ [SFC Symbol] ⇒ [Selection Divergence].**

The Enter SFC Symbol screen or the Enter SFC Symbol/Enter Program screen is displayed according to the display format setting.

Number of divergences

3. **Set the items on the screen.**

Item	Description
Symbol	Select "--D".
Number of divergences	Enter a number of columns of divergence line.
Step Attribute	(This setting is not required.)
Block	(This setting is not required.)
Comment	(This setting is not required.)

4. **Click the OK button.**

The entered selection divergence element is displayed.

<Overwrite mode>

Enter a selection divergence

<Insert mode>

Enter a selection divergence

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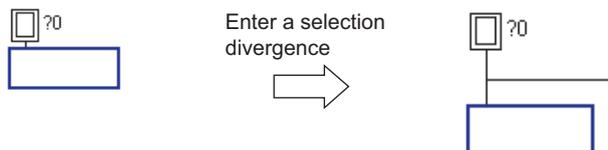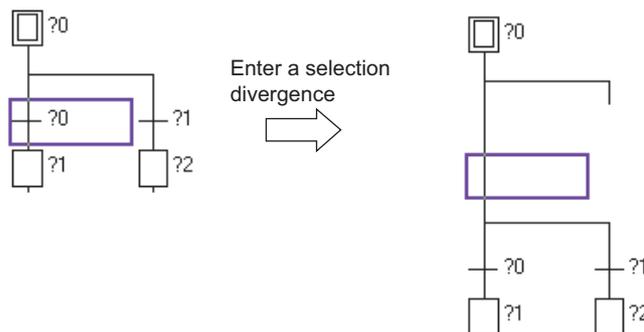
## 7.3.5 Entering simultaneous divergences (▭)

Q CPU   L CPU   FX

Enter a simultaneous divergence.

Operating procedure

1. **Move the cursor to the position where a simultaneous divergence is entered.**

2. **Select [Edit] ⇒ [SFC Symbol] ⇒ [Simultaneous Divergence].**

The Enter SFC Symbol screen or the Enter SFC Symbol/Enter Program screen is displayed according to the display format setting.

<MELSAP3/FXCPU>

Number of divergences

3. **Set the items on the screen.**

Item	Description
Symbol	Select "==D".
Number of divergences	Enter a number of columns of divergence line.
Step Attribute	(This setting is not required.)
Block	(This setting is not required.)
Comment	(This setting is not required.)

4. **Click the OK button.**

The entered simultaneous divergence element is displayed.

<Overwrite mode>

Enter a simultaneous divergence

<Insert mode>

Enter a simultaneous divergence
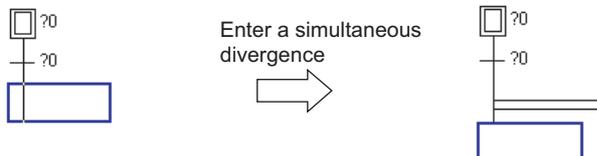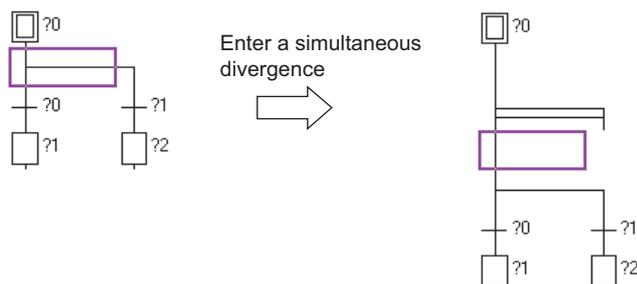
7.3.6　　Entering selection convergences (⎯⎯⌐)

Q CPU　L CPU　FX

Enter a selection convergence.

Operating procedure

1. **Move the cursor to the position where a selection convergence is entered.**

2. **Select [Edit] ⇒ [SFC Symbol] ⇒ [Selection Convergence].**

The Enter SFC Symbol screen or the Enter SFC Symbol/Enter Program screen is displayed according to the display format setting.

<MELSAP3/FXCPU>

Number of convergences

3. **Set the items on the screen.**

Item	Description
Symbol	Select "--C".
Number of convergences	Enter a number of columns of convergence line.
Step Attribute	(This setting is not required.)
Block	(This setting is not required.)
Comment	(This setting is not required.)

4. **Click the [OK] button.**

The entered selection convergence element is displayed.
<Overwrite mode>
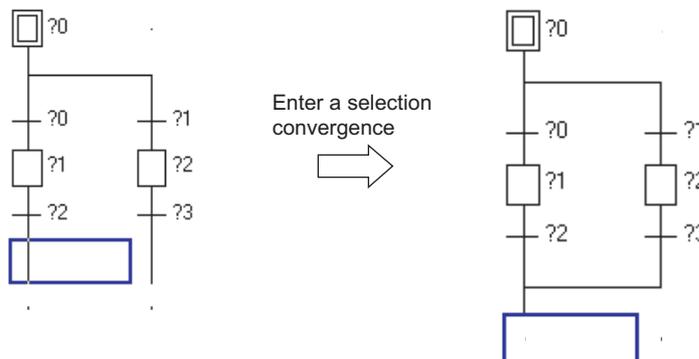
Enter a selection convergence

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<Insert mode>

Enter a selection
convergence
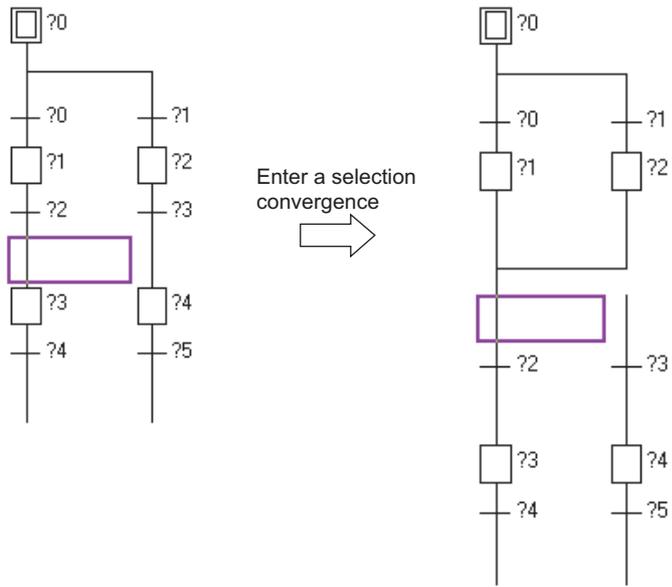
7.3.7　Entering simultaneous convergences (══)

Q CPU **L CPU** **FX**

Enter a simultaneous convergence.

Operating procedure

1. **Move the cursor to the position where a simultaneous convergence is entered.**

2. **Select [Edit] ⇒ [SFC Symbol] ⇒ [Simultaneous Convergence].**

The <u>Enter SFC Symbol</u> screen or the <u>Enter SFC Symbol/Enter Program</u> screen is displayed according to the display format setting.

<MELSAP3/FXCPU>

Number of convergences

Enter SFC Symbol

| Symbol | == C | ▼ | 1 | Step Attribute | [--] | ▼ | OK |
| Block | 0 | Comment | | | | | Cancel |

3. **Set the items on the screen.**

Item	Description
Symbol	Select "==C".
Number of convergences	Enter a number of columns of convergence line.
Step Attribute	(This setting is not required.)
Block	(This setting is not required.)
Comment	(This setting is not required.)

4. **Click the** OK **button.**

The entered simultaneous convergence element is displayed.

<Overwrite mode>

Enter a simultaneous convergence

<Insert mode>

Enter a simultaneous convergence

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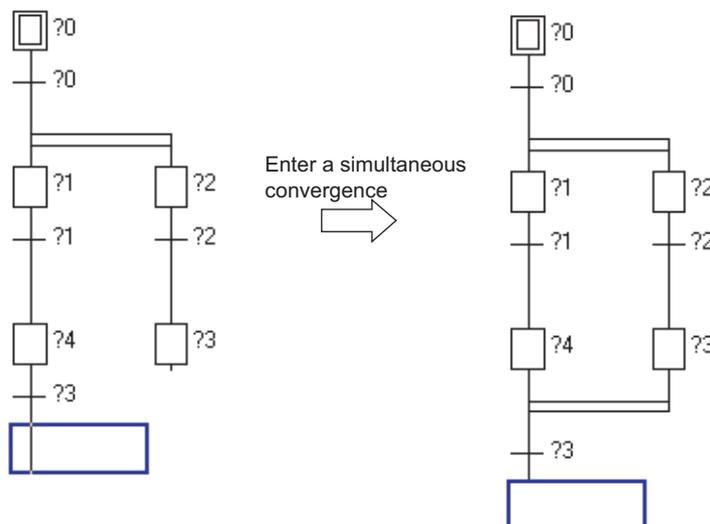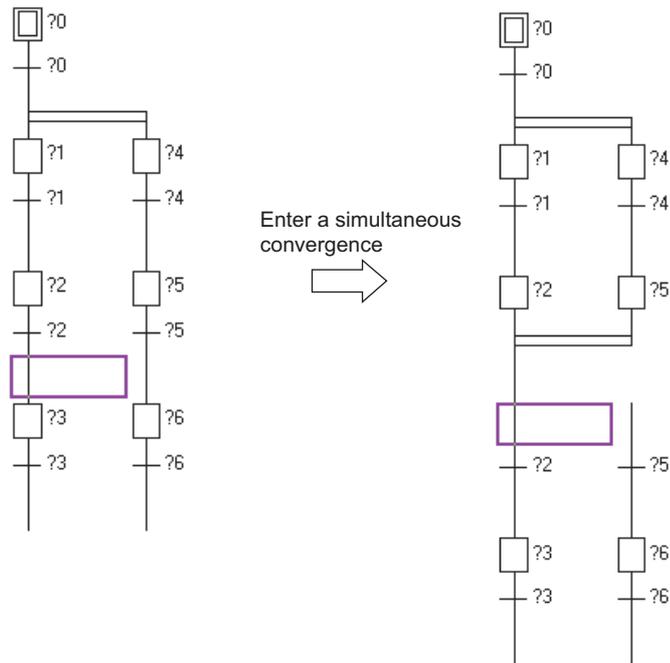
Point

● **Entering a divergence and a convergence in a single transition at the same time**
Reserve the area for one step using "|" (vertical line), then enter a divergence or convergence element. A vertical line can be inserted by selecting [Edit] ⇒ [Insert Row]. (☞ Section 7.3.11)

Example 1
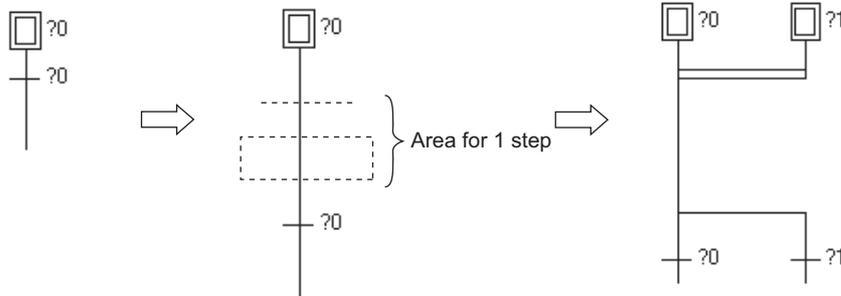
Example 2
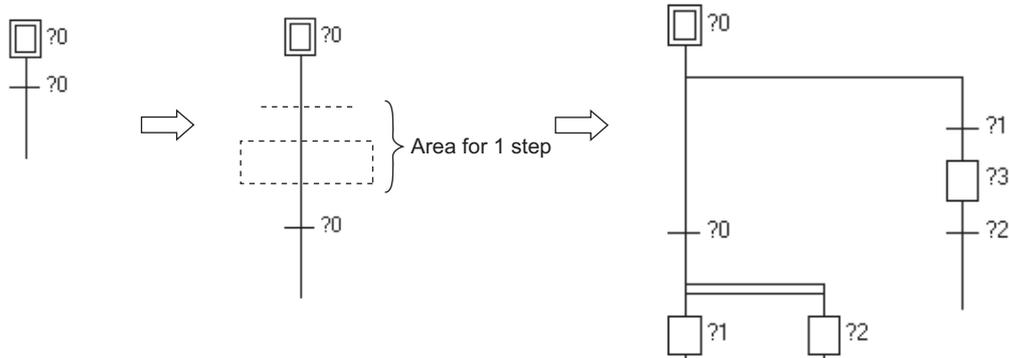
● **Number of divergences/convergences when entering divergence/convergence lines**
By entering '-n' for the number of divergences/convergences, divergence/convergence lines can be created from right to left without changing the cursor position.

● **Inserting divergences/convergences**
Inserting divergences/convergences may cause the SFC diagram to become a program that cannot be converted because of the combination of divergence and convergence. Edit the SFC diagram to be normal and convert the program.
The following SFC diagram cannot be converted because of the combination of simultaneous divergence and selection convergence.
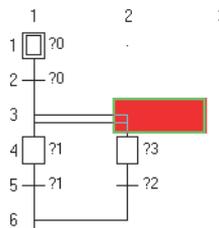
7.3.8   Entering jump transitions (↳)

Enter a jump transition.

Operating procedure

1. **Move the cursor to the position where a jump transition is entered.**

2. **Select [Edit] ⇒ [SFC Symbol] ⇒ [Jump].**

The Enter SFC Symbol screen or the Enter SFC Symbol/Enter Program screen is displayed according to the display format setting.

<MELSAP3/FXCPU>

Jump destination step number
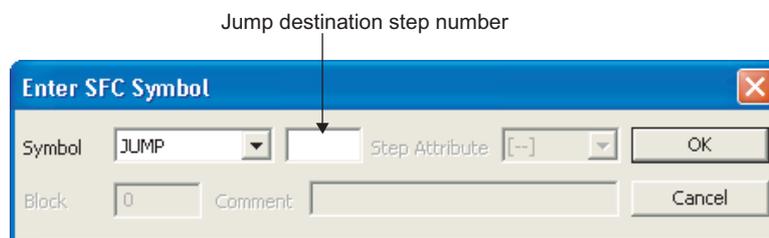
3. **Set the items on the screen.**

Item	Description
Symbol	Select "JUMP".
Jump destination step number	Enter a jump destination step number.
Step Attribute	(This setting is not required.)
Block	(This setting is not required.)
Comment	(This setting is not required.)

4. **Click the OK button.**

The entered jump transition element is displayed.

Enter a jump transition
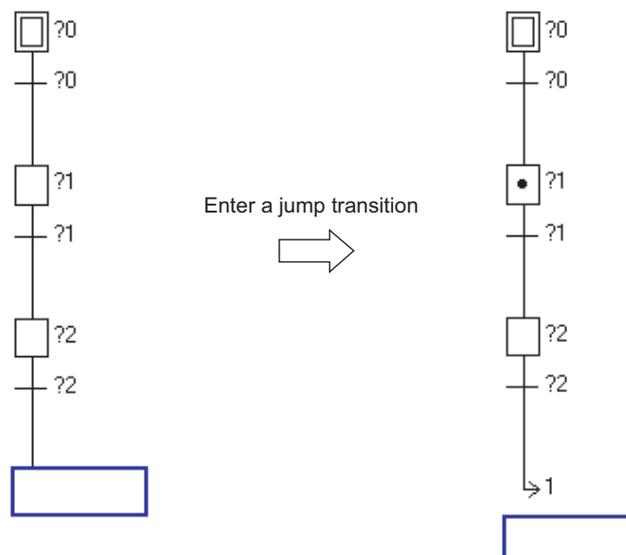
7.3.9   Entering end steps (⊥)

Enter an end step.
For FXCPU, since RET or END is written automatically at the program entry (conversion), this setting is not required.

Operating procedure

1. **Move the cursor to the position where an end step is entered.**

2. **Select [Edit] ⇒ [SFC Symbol] ⇒ [END Step].**

The Enter SFC Symbol screen or the Enter SFC Symbol/Enter Program screen is displayed according to the display format setting.

<MELSAP3>

SFC step number

Enter SFC Symbol

| Symbol | END | ▼ | | Step Attribute | [--] | ▼ | OK |
| Block | 0 | Comment | | | | | Cancel |

3. **Set the items on the screen.**

Item	Description
Symbol	Select "END".
SFC step number	(This setting is not required.)
Step Attribute	(This setting is not required.)
Block	(This setting is not required.)
Comment	(This setting is not required.)

4. **Click the ⌈ OK ⌋ button.**

The entered end step element is displayed.

Enter an end step

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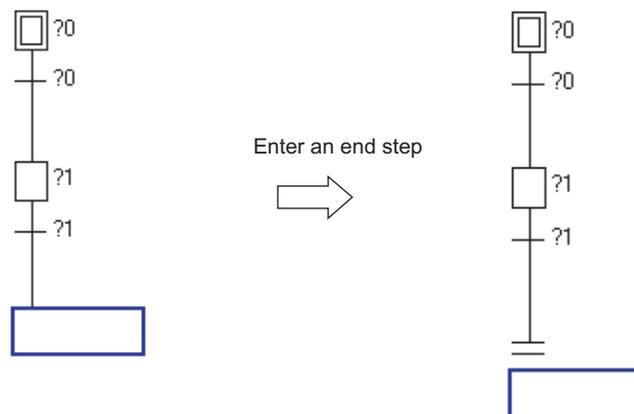
7.3.10　Drawing lines

Q CPU　L CPU　FX

Draw a divergence line and a convergence line by dragging the mouse.

Operating procedure

1. **Select [Edit] ⇒ [Edit Line] ⇒ [Vertical Line Segment]/[Selection Divergence]/ [Simultaneous Divergence]/[Selection Convergence]/[Simultaneous Convergence].**

2. **Drag the mouse from the start position for entering lines to the end position.**

When the Edit Line menu is selected, the status is remained until the same menu is selected again.
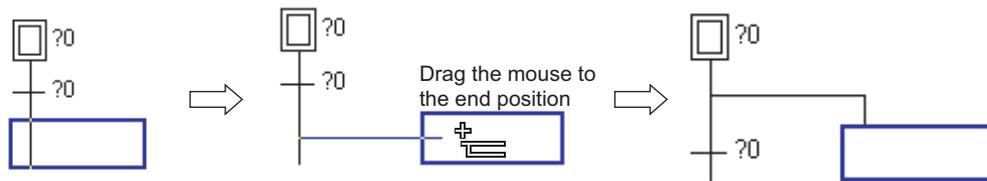
Point

● **Overwriting lines**
Even when lines are overwritten to the created SFC steps/transitions, SFC steps/transitions and sequence programs in the operation outputs/transition conditions are not deleted.

7.3.11   Inserting/deleting rows and columns

Q CPU   L CPU   FX

Insert/delete a row and a column.

Operating procedure

1. **Move the cursor to the position where a row or column is inserted/deleted.**

2. **Execute each operation as shown below.**
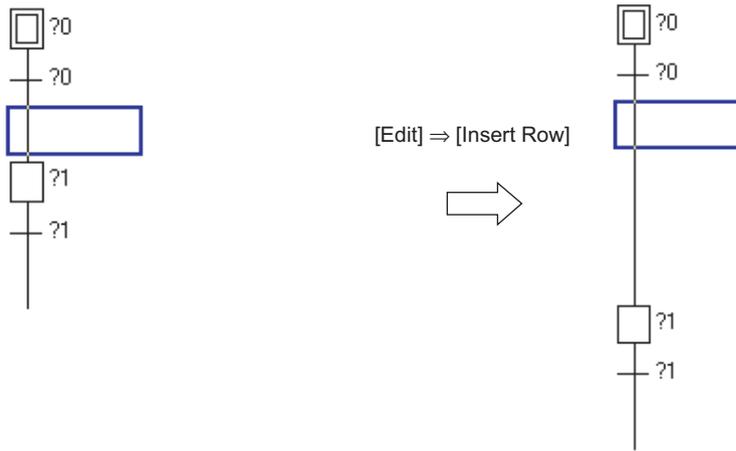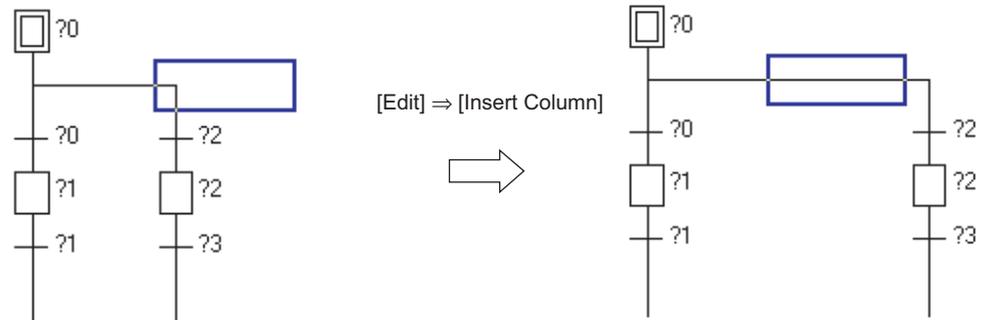
<Inserting a row>

[Edit] ⇒ [Insert Row]

<Inserting a column>

[Edit] ⇒ [Insert Column]

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\<Deleting a row\>

\<Deleting a column\>

7.3.11 Inserting/deleting rows and columns
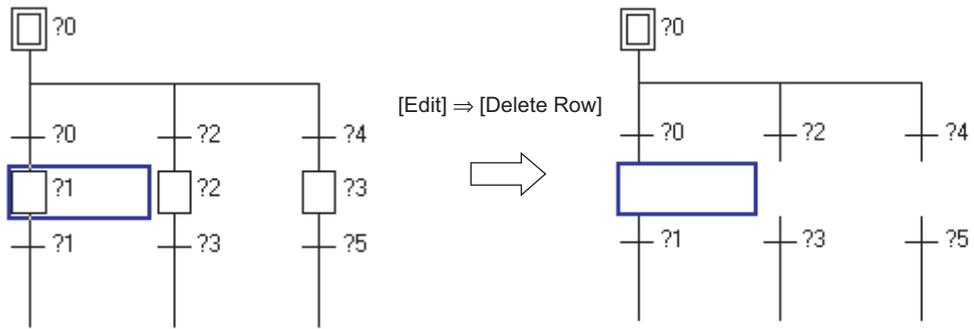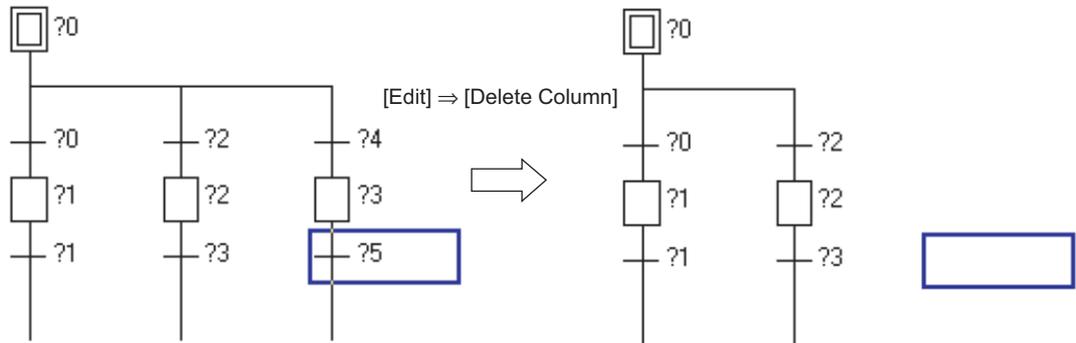
7.4   Deleting SFC Diagrams

Q CPU   L CPU   FX

This section explains how to delete entered SFC elements.

7.4.1   Deleting SFC elements by setting a range

Delete SFC elements by setting a range.

Operating procedure

1. **Specify the range to be deleted by dragging the cursor.**
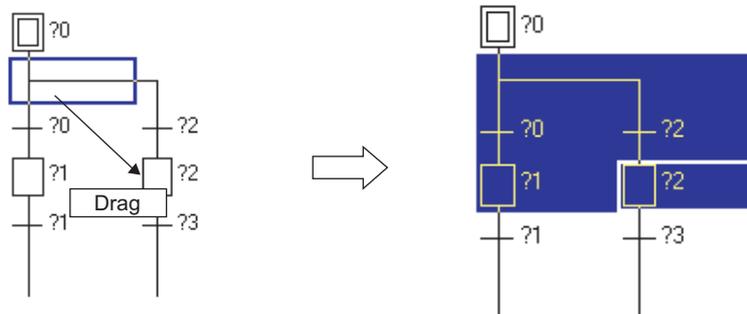
2. **Select [Edit] ⇒ [Delete].**

Point

● **Selecting a range**
The range can be selected by pressing the key ⌨Shift⌨ + ⌨↑⌨ / ⌨↓⌨ / ⌨←⌨ / ⌨→⌨ keys.

● **Deleting elements**
Elements can be deleted by pressing the ⌨Delete⌨ key, or by selecting [Edit] ⇒ [Cut].

● **Canceling the previous operation**
After deleting elements, the editing status before the deletion is restored by selecting [Edit] ⇒ [Undo].

7.4.2   Deleting only divergence/convergence/vertical lines

Delete a divergence/convergence/vertical line.

Operating procedure

1. **Select [Edit] ⇒ [Delete Line].**

2. **Specify the range to be deleted by dragging the cursor.**

After dragging, the lines in the specified range are deleted.
When the Delete Line menu is selected, the status is remained until the same menu is selected again.
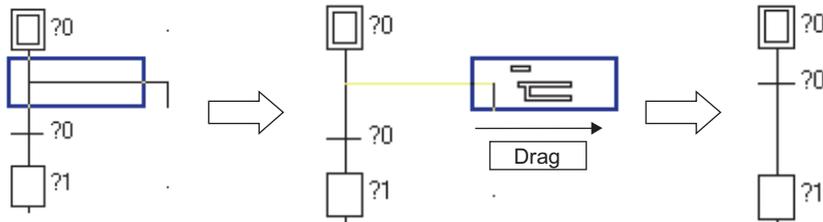
7.5 Changing SFC Step Attributes

Q CPU **L CPU** FX

This section explains how to change the SFC step attribute.

Operating procedure

1. **Move the cursor to the SFC step whose attribute is to be changed.**

2. **Select [Edit] ⇒ [SFC Step Attribute] ⇒ [No Attribute]/[Stored Coil]/[Stored Operation (without Transition Check)]/[Stored Operation (with Transition Check)]/[Reset].**
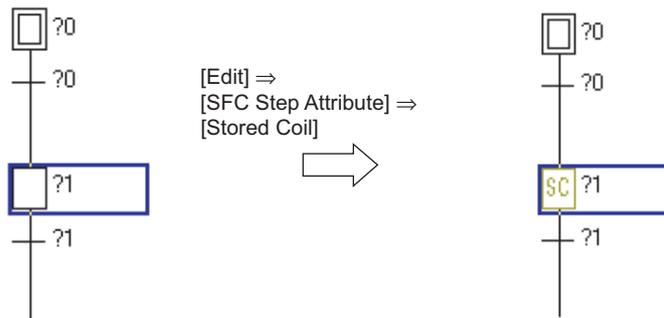
Point

● **Operation output sequence program after the SFC step attribute is changed**
Even when the SFC step attribute is changed, the operation output sequence program already created remains as it is.

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7.6   Cutting, Copying, and Pasting SFC Diagrams

This section explains how to cut, copy, and paste the SFC diagram.

Operating procedure

1. **Specify the range to be cut or copied.**
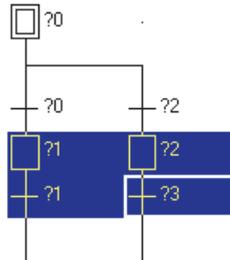
2. **Select [Edit] ⇒ [Cut]/[Copy], and cut or copy the SFC diagram in the specified range.**

3. **Move the cursor to the position where the cut/copied SFC diagram is pasted.**
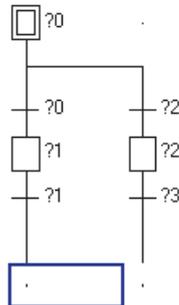
*4.* **Select [Edit] ⇒ [Paste].**

The Paste Data screen is displayed.
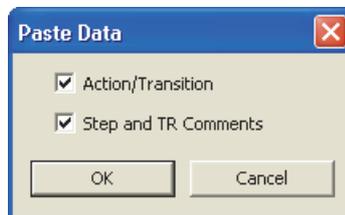
5. **Set the items on the screen.**

Item	Description
Action/Transition	Select this to paste the cut/copied data including operation output/transition condition sequence programs.
Step and TR Comments	Select this to paste the cut/copied data including SFC step/transition comments.

6. **Click the** OK **button.**

The cut/copied SFC diagram is pasted.

Note that the conversion error occurs when the divergence or convergence line is not correct after pasting data. Edit the SFC diagram and convert the program again.
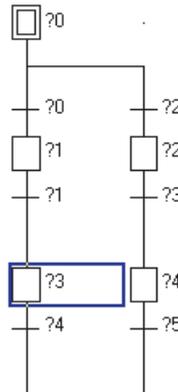
Point

● **Pasting position**

If the start position of the cut/copied SFC diagram is an SFC step, it cannot be pasted at the position of transition, and if the start position is a transition, it cannot be pasted at the position of SFC step. Change the pasting position one row up or down, and paste the data again.

● **Operation output/transition condition programs to be pasted**

Paste operation output/transition condition programs within approximate 2k steps.

For details of maximum number of sequence steps that can be created, refer to the following manual.

☞ MELSEC-Q/L/QnA Programming Manual (SFC)

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7.7   Sorting SFC Step/Transition Numbers

Q CPU   L CPU   FX

This section explains how to sort SFC step/transition numbers of created SFC diagram.

Screen display

Select [Edit] ⇒ [Sort SFC Step No.].
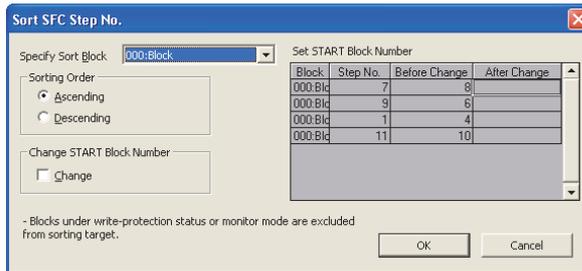
Operating procedure

1. **Set the items on the screen.**

Item	Description
Specify Sort Block	Specify the block to be sorted. All the blocks in the current SFC program can be specified by selecting "(All Blocks)".
Sorting Order	Select whether to sort SFC step/transition numbers in ascending or descending order.
Change START Block Number	Select this to change the start block number.
Set START Block Number	When "Change" is selected, set the start destination block number of the block start step that is changed when sorting SFC step/transition numbers.

2. **Click the [OK] button.**

The sorting of SFC step/transition numbers is executed according to the settings.

Point

● **Difference of sorting result according to the sort order**
   The following figures show the sorting results in ascending and descending order.

(Ascending order)   (Descending order)
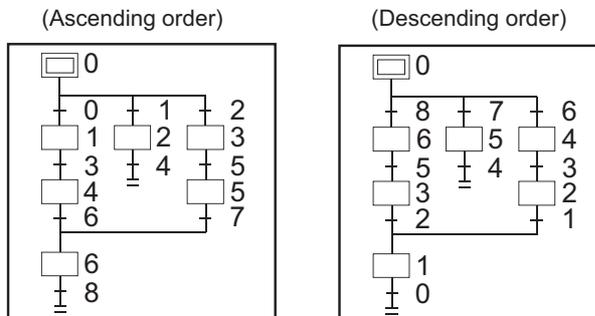
   • The "Undo" operation can be performed only once immediately after the sort execution.
   • The initial step is always set to '0' for either ascending or descending order.
● **SFC devices at the sorting operation**
   SFC devices used for operation outputs/transition conditions (such as BLm\Sn and BLm\TRn) are not sorted.
   Change them using the device replacing function.

7.8 Redisplaying SFC Diagrams

Q CPU **L CPU** **FX**

This section explains how to delete unused vertical/divergence/convergence lines in the converted SFC diagram.
If the unconverted SFC diagram is redisplayed, the unconverted SFC diagram is discarded and the latest converted status is restored.

Operating procedure

- **Select [Edit] ⇒ [Arrange SFC].**
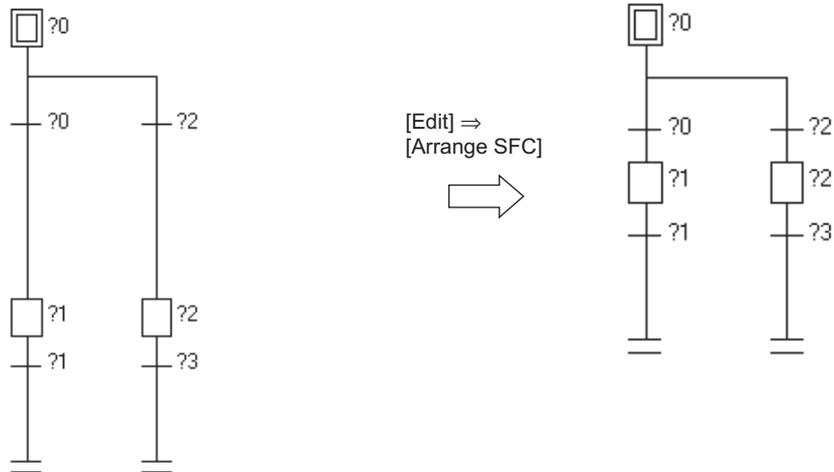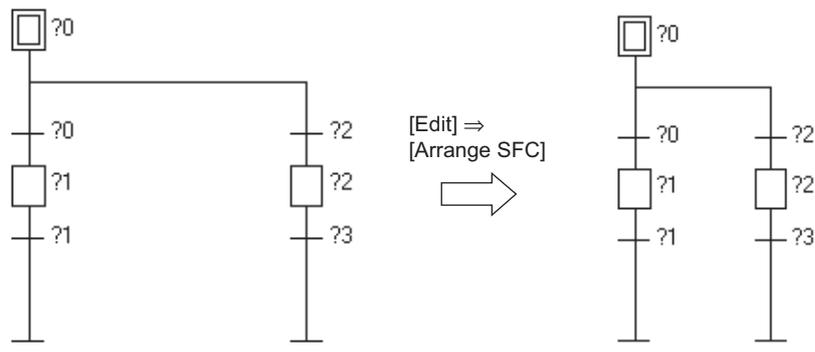
<Deleting a row section>

[Edit] ⇒
[Arrange SFC]

<Deleting a column section>

[Edit] ⇒
[Arrange SFC]

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7.9   Creating Operation Outputs and Transition Conditions

Q CPU   L CPU   FX

This section explains how to create operation output and transition condition programs.
Create operation output and transition condition programs on the Zoom editor window when editing in MELSAP3/FXCPU.
Create operation output and transition condition programs on the <u>Enter SFC Symbol/Enter Program</u> screen when editing in MELSAP-L.

7.9.1   Creating operation output and transition condition programs (MELSAP3/FXCPU)

Create operation output and transition condition programs in MELSAP3/FXCPU.

Operating procedure

1. **Move the cursor to the SFC step/transition where the program is created.**

2. **Move the cursor to the Zoom editor window.**

The editing operations on the Zoom editor window are the same as those of ladder editor.
(☞ Chapter 6)
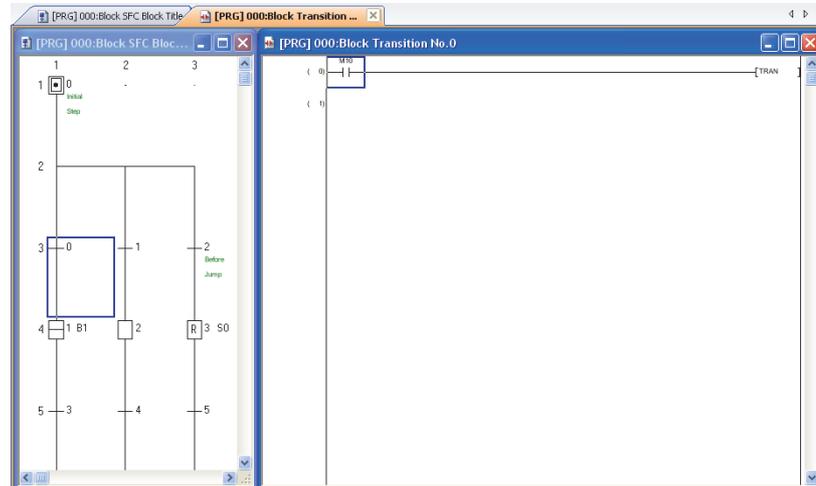
Point

● **Displaying SFC editor window and Zoom editor window**
By the following setting, the windows of SFC editor and the Zoom editor can be tiled automatically when the SFC editor window is opened. The display of SFC editor and Zoom editor can be selected from 'tile horizontally' or 'tile vertically'.
Select [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "SFC 1" ⇒ "Tile SFC and Zoom vertically".
When this setting is valid, the setting of "Open Zoom with New Window" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "Zoom" is invalidated.

● **Moving the cursor of the SFC editor window on the Zoom editor window**
With the activated Zoom editor window, the cursor of the SFC editor window can be moved.
Select the direction to move the cursor by selecting [View] ⇒ [Move SFC Cursor] ⇒ [Up] / [Down] / [Left] / [Right] (Shift + Alt + ↑/↓/←/→).
When the cursor of the SFC editor window is moved, the cursor of the Zoom editor window moves to the corresponding position.

● **Opening the Zoom editor window**
When "Tile SFC and Zoom vertically" is not selected under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "SFC 1", the Zoom editor window can be opened by selecting [View] ⇒ [Open Zoom/Start Destination Block].
To open the Zoom, hold the Ctrl key and double-click the corresponding SFC step/transition of the SFC diagram, or press the Ctrl and L keys.
To return to the SFC diagram from the Zoom editor window, press the Ctrl and R keys.

● **Instructions that can be used in the Zoom editor window**
For details of unavailable instructions for operation outputs/transition conditions, refer to the following manual.
☞ MELSEC-Q/L/QnA Programming Manual (SFC)
Statements and pointers cannot be entered. For transition conditions, notes cannot be entered as well.

● **Entering a dummy coil to transition conditions**
Only one dummy coil (⌐[TRAN]⌐) for the coil instruction can be entered.
To enter a dummy coil, select [Edit] ⇒ [Ladder Symbol] ⇒ [Coil], and clicking the [OK] button enters a dummy coil automatically.

● **When the cursor is placed at the block start step**
If [View] ⇒ [Open Zoom/Start Destination Block] is selected when the cursor is placed at the block start step, the SFC diagram of the start destination block is displayed.

● **Using function blocks in the Zoom editor window**
Only function blocks created in Ladder Diagram can be used for operation outputs.
Function blocks cannot be used for transition conditions.

● **Cutting/copying/pasting/consecutive pasting data**
Data can be cut, copied, pasted, and pasted consecutively between the ladder program and the program in the Zoom editor window. However, data containing instructions, statements, and pointers that cannot be used in the Zoom editor window cannot be pasted. A ladder program containing TRAN can be pasted to transition conditions only.

● **Editing SFC elements in MELSAP3**
By the following setting, the Enter SFC Symbol screen is displayed with selecting comment or step number when editing an SFC element in MELSAP3.
Select "Leave comment or step No. selected" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "SFC 2".

7.9.2 Creating operation output and transition condition programs (MELSAP-L (instruction format))

Create operation output and transition condition programs in MELSAP-L (instruction format).

For details of MELSAP-L (instruction format), refer to the following manual.
☞ MELSEC-Q/L Programming Manual (MELSAP-L)

Screen display

Select [Edit] ⇒ [SFC Symbol] ⇒ [Step]/[Dummy]/[Transition].
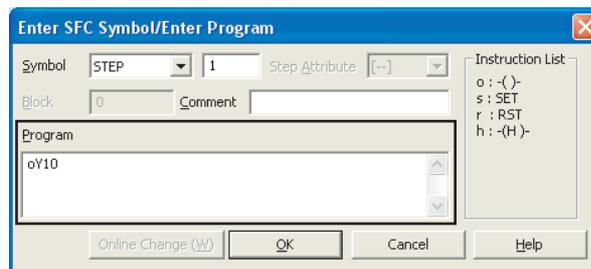
Operating procedure

1. **Set the item on the screen.**

Item	Description
Program	Enter an operation output or transition condition program.

2. **Click the [OK] button.**

Screen button

● [Online Change (W)]

Executes the Online program change on the changed program.

● [Help]

Displays the Instruction Help screen. (☞ Section 6.2.2)

Point

● **Online program change after compiling all programs**
The Online program change cannot be performed after compiling all programs.
Switch the programmable controller CPU to STOP, and perform [Online] ⇒ [Write to PLC].
For considerations for compiling all programs, refer to Section 10.3.3.

■ Operation output programs in MELSAP-L (instruction format)

● Operation output instructions

Operation output instructions are described in the following formats.
Both uppercase and lowercase letters can be used.

□□□: Indicates a device
**: Indicates a value

Instructions	Format	MELSAP-L description example	Ladder program example
Coil output	o□□□	oY70	⸺⸺⸺⸺⸺⸺⟨Y70 ⟩
Set output	s□□□	sM100	⸺⸺⸺⸺⸺[SET M100]
Reset output	r□□□	rM200	⸺⸺⸺⸺⸺[RST M200]
Timer Counter	o□□□ K**	oT0 K100 oC0 K200	K100 ⸺⸺⸺⸺⸺⟨T0 ⟩ K200 ⸺⸺⸺⸺⸺⟨C0 ⟩
High-speed timer	h□□□ K**	hT0 K100	H K100 ⸺⸺⸺⸺⟨T0 ⟩
Instructions other than above	Same as list format	MOV K100 D0	⸺⸺[MOV K100 D0]
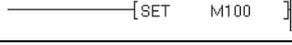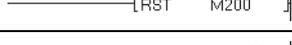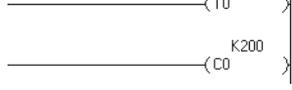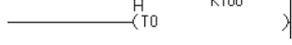
Delimit with "," to write multiple operation outputs in parallel within the same step.

MELSAP-L description example	Ladder program example
oY10, sM100, MOV K100 D0	⸺⸺⸺⸺⸺⟨Y10 ⟩ ⸺⸺[SET M100] ⸺⸺[MOV K100 D0]
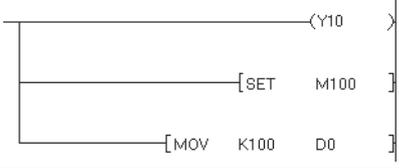
● Instructions which cannot be used in operation output programs

The following are the instructions which cannot be entered to operation output programs in MELSAP-L.
- NOP
- MPS, MRD, MPP
- Contact instructions
- Comparison operation instructions (such as =, <, >)

● Considerations when writing operation output programs

- Write instructions which do not require an execution condition (such as DI, EI) at the last of each operation output program.

  Example: oY70, MOV D0 D100, DI

- Up to 24 instructions can be written to a single operation output program.

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■ **Transition condition programs in MELSAP-L (instruction format)**

● **Transition condition instructions**

Transition condition instructions are described in the following formats.
Both uppercase and lowercase letters can be used.

□□□: Indicates a device

Instructions	Format	MELSAP-L description example	Ladder program example
Open contact	a□□□	aX0	
Closed contact	b□□□	bX10	
Rising pulse	p□□□	pM100	
Falling pulse	f□□□	fM200	
Contact-equivalent instruction	Same as list format	< D0 D100	
OR	□□□ | □□□	aX0 | aM0	
AND	□□□ & □□□	aX0 & aM0	

● **OR and AND instructions**

When the OR and AND instructions are combined, the AND instruction is given the priority.
Use "( )" to give the higher priority.

MELSAP-L description example	Ladder program example
aX0 | aM0 & aX1	
(aX0 | aM0) & aX1	
aX0 & aX1 | aM0 & aM1	
aX0 & (aX1 | aM0) & aM1	

● **Instructions which cannot be used in transition condition programs**

The following are the instructions which cannot be entered to transition condition programs in MELSAP-L.

• Instructions other than the contact instructions and comparison operation instructions

7.9.3 Creating operation output and transition condition programs (MELSAP-L (start conditions format))

Create operation output and transition condition programs in MELSAP-L (start conditions format).

Screen display

Select [Edit] ⇒ [SFC Symbol] ⇒ [Step]/[Dummy]/[Transition].
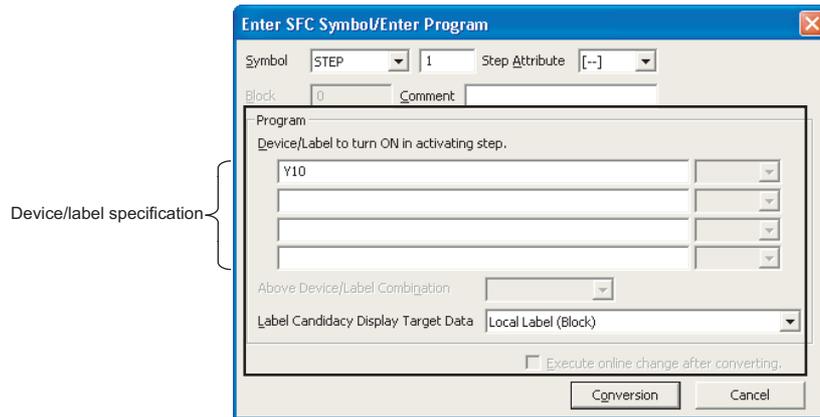
Operating procedure

1. **Set the items on the screen.**

Item		Description
Program		Enter items for an operation output or transition condition program.

	Device/label specification	• Operation output
		  Enter devices/labels.
		• Transition condition
		  Set devices/labels and ON/OFF.

	Above Device/Label Combination	Select AND or OR for each condition.
	Label Candidacy Display Target Data	Select the corresponding data of label options displayed for device/label specification.
Execute online change after converting.[1]		Select this to execute the Online program change on the changed program.

[1] : This item cannot be selected after compiling all programs. For details, refer to Point in this section.
For considerations when compiling all programs, refer to Section 10.3.3.

2. **Click the Conversion button.**

The program is converted and applied to the SFC diagram.

Point

● **"Execute online change after converting" check box**
When the check box of "Execute online change after converting" is disabled after compiling all programs, select [Online] ⇒ [Write to PLC] and write programs to the programmable controller CPU to validate the check box.

■ **Operation output programs in MELSAP-L (start conditions format)**

The following are the setting examples of operation output program.

MELSAP-L description example	Ladder program example
Program Device/Label to turn ON in activating step. Y10 Above Device/Label Combination Label Candidacy Display Target Data: Local Label (Block) ☐ Execute online change after converting.	————————————————(Y10)
Program Device/Label to turn ON in activating step. Y10 Y11 Y12 Y13 Above Device/Label Combination Label Candidacy Display Target Data: Local Label (Block) ☐ Execute online change after converting.	————————————————(Y10) ————————————(Y11) ————————(Y12) ————(Y13)

■ **Transition condition programs in MELSAP-L (start conditions format)**

The following are the setting examples of transition condition program.

MELSAP-L description example	Ladder program example
Program Device/Label that will be transition condition for next step. Tran001 — ON Tran002 — OFF Tran003 — ON Tran004 — OFF Above Device/Label Combination: AND Condition Label Candidacy Display Target Data: Local Label (Block) ☐ Execute online change after converting.	Tran001 Tran002 Tran003 Tran004 ——┤├———┤╱├———┤├———┤╱├——
Program Device/Label that will be transition condition for next step. Tran001 — ON Tran002 — OFF Tran003 — ON Tran004 — OFF Above Device/Label Combination: OR Condition Label Candidacy Display Target Data: Local Label (Block) ☐ Execute online change after converting.	Tran001 ——┤├—— Tran002 ——┤╱├—— Tran003 ——┤├—— Tran004 ——┤╱├——

7.10 Setting Block Information

Q CPU   L CPU   FX

This section explains how to set block information.
Block information is set on the Property screen of SFC block.
Select the SFC block to be set on the Project view in advance.

Screen display

Select [Project] ⇒ [Object] ⇒ [Property] ⇒ <<Details>>.

< QCPU (Q mode)/LCPU >   < FXCPU >
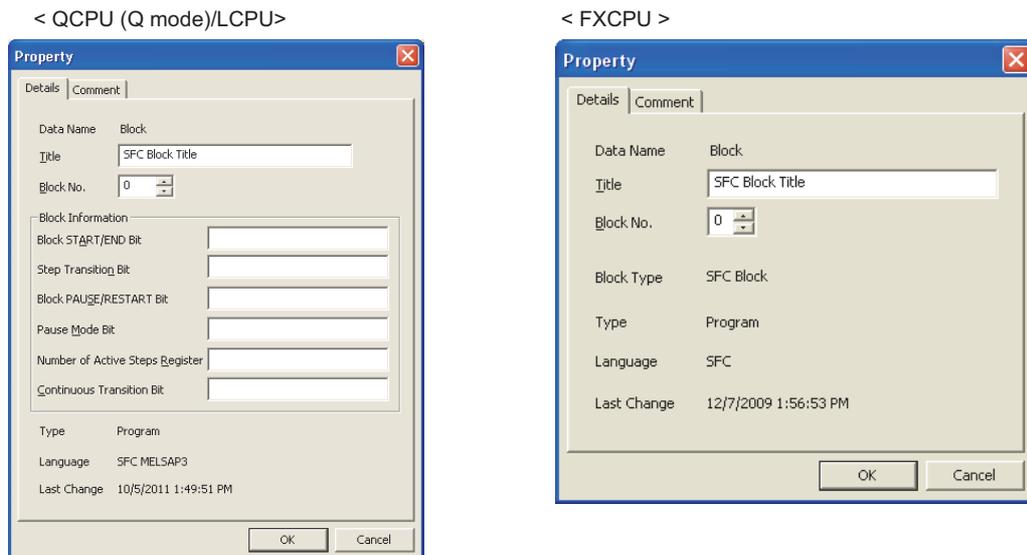
Operating procedure

- **Set the items related to the block information on the screen.**

Item	Description
<<Details>>	-
Title	Enter the title of the SFC block. (The number of applicable characters is 32.)
Block No.	Specify the SFC block number. (0 to 319. Note that 0 to 127 for Q02UCPU, and 0 to 24 for FXCPU.)
Block Information	Enter devices/labels to the required items as block information devices. (The number of applicable characters is 32.)
<<Comment>>	Enter a comment of SFC block. (The maximum number of characters is 5120.) A new line can be inserted by pressing the Ctrl + Enter keys.

Point

● **Title of SFC block (projects without labels)**
  The set block title is stored as a device comment of device BLm. A block title can be created/changed by entering "BLm" for the device name on the device comment editor. When setting block titles for each program, create comments by program.
  For creating and editing device comments, refer to the following manual.
  ☞ GX Works2 Version 1 Operating Manual (Common)

● **Title of SFC block (projects with labels)**
  When the block title is set, the confirmation message asking whether to copy the block title to the device comment of device BLm is displayed. Creating device comment for the device set as BLm on the device comment editor is not applied to the block title.

● **Block information**
  • For details of functions and operations of each item, refer to the following manual.
    ☞ MELSEC-Q/L/QnA Programming Manual (SFC)

  • When the block information is changed in the project with labels, the program becomes uncompiled status.

7.11 Displaying SFC Block List

This section explains how to display the list of the SFC program block information including the SFC diagram being edited.
Open the screen of the SFC diagram in advance.
The following operations can be executed in SFC block list.

- Creating new blocks
- Copying, pasting in unit of block[*1]
- Setting, correcting block information
- Displaying SFC diagram of specified block
- Monitoring SFC block list[*1]

    *1 : Not supported by FXCPU.

Screen display

Select [View] ⇒ [Open SFC Blocklist].

< QCPU (Q mode)/LCPU>

No.	Data Name	Title	Conversion Status	Block Start	Step Transition	Block PAUSE/RESTART	Pause Mode	Number of Active Steps	Continuous Transition Bit	Comment
0	Block	First Process	-	M0	M1	M2	M3		M4	Block0 Comment
1	Block1	Second Process	-	M10	M11	M12	M13		M14	Block1 Comment
2	Block2	Third Process	-	M20	M21	M22	M23		M24	Block2 Comment
3	Block10	In Process:Do not use	-							Block10 Comment

[PRG]Read MAIN 51 Step

< FXCPU >

No.	Data Name	Title	Conversion Status	Block Type	Comment
0	Block	First Process	*	SFC Block	
1	Block1	Second Process	*	SFC Block	
2	Block2	Third Process	*	SFC Block	

[PRG]Read MAIN (1)Step *

Display contents

Item	Description
No.	Display "Block No." set on the <u>Property</u> screen of SFC block.
Data Name	Display the block name.
Title	Display "Title" set on the <u>Property</u> screen of SFC block.
Conversion Status	Displaying the conversion status of block. *: Unconverted -: Converted
Block Type[*1]	Display either "SFC Block" or "Ladder Block".
Block Start[*2]	Display "Block START/END Bit" set on the <u>Property</u> screen of SFC block.
Step Transition[*2]	Display "Step Transition Bit" set on the <u>Property</u> screen of SFC block.
Block PAUSE/RESTART[*2]	Display "Block PAUSE/RESTART Bit" set on the <u>Property</u> screen of SFC block.
Pause Mode[*2]	Display "Pause Mode Bit" set on the <u>Property</u> screen of SFC block.
Number of Active Steps[*2]	Display "Number of Active Steps Register" set on the <u>Property</u> screen of SFC block.
Continuous Transition Bit[*2]	Display "Continuous Transition Bit" set on the <u>Property</u> screen of SFC block.
Comment	Display "Comment" set on the <u>Property</u> screen of SFC block.

*1 : Not supported by QCPU (Q mode)/LCPU.
*2 : Not supported by FXCPU.

7.11.1   Creating blocks with SFC block list

Q CPU **L CPU** **FX**

Create a block on the cursor position with the SFC block list.

Operating procedure

- **Double-click a position where a block is to be created.**

  A block is created, and the SFC diagram is displayed.
  The data name of the new block is "Block*". The lowest number that is not used is assigned to "*".

Point

- ● **Considerations for reading a project contains an SFC program**
  When reading an SFC program of Simple project (without labels) using the Read from PLC or the Read IC Memory
  Card function, the set block data name may be replaced with a default data name.

7.11.2   Copying/pasting blocks on SFC block list

Q CPU **L CPU** **FX**

Copy a block on the SFC block list, and paste it.

Operating procedure

1. **Move the cursor to a block to be copied.**

2. **Select [Edit] ⇒ [Copy].**

3. **Move the cursor to a position to be pasted.**

4. **Select [Edit] ⇒ [Paste].**

  The <u>Object to Paste</u> screen is displayed.

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5. **Select an item of pasting, and click the** [Execute] **button.**

The Data Paste screen is displayed.

Data Paste

Data Type: Program

Copy Source Data Name

Block

Data Name After Paste

[OK]   [Cancel]

6. **Enter a data name to "Data Name After Paste", and click the** [OK] **button.**

The block is pasted.

Point

● **When the block with the same name already exists in the block position to paste**
The block can be overwritten and pasted over even if a block with the same name already exists in the block.
However, for structured project, the block can not be overwritten and pasted over.

● **Copying blocks on tree view**
A block copied from a tree view can be pasted to the block list.
On the tree view, multiple blocks can be selected and copied simultaneously.
Note that blocks which exceed the last row are deleted when pasting.

7.11.3   Displaying comments on SFC block list

Q CPU   L CPU   FX

Display device/label comments on the SFC block list.

Operating procedure

• **Select [View] ⇒ [SFC Block List Comment].**
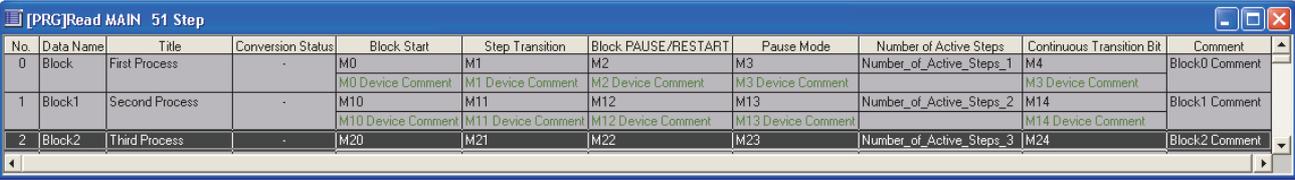
No.	Data Name	Title	Conversion Status	Block Start	Step Transition	Block PAUSE/RESTART	Pause Mode	Number of Active Steps	Continuous Transition Bit	Comment
0	Block	First Process	-	M0	M1	M2	M3	Number_of_Active_Steps_1	M4	Block0 Comment
				M0 Device Comment	M1 Device Comment	M2 Device Comment	M3 Device Comment		M3 Device Comment	
1	Block1	Second Process	-	M10	M11	M12	M13	Number_of_Active_Steps_2	M14	Block1 Comment
				M10 Device Comment	M11 Device Comment	M12 Device Comment	M13 Device Comment		M14 Device Comment	
2	Block2	Third Process	-	M20	M21	M22	M23	Number_of_Active_Steps_3	M24	Block2 Comment

Point

● **Displaying comments on the SFC block list**
Comments also can be displayed on the SFC block list by the following operation.
Select "Block List" under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "Comment".

Comment Display Items

☐ Block List
☐ Step/Transition

7.11.4   Displaying devices on SFC block list

Q CPU   L CPU   FX

Display devices assigned to labels on the SFC block list.
This function is available after the compilation of the SFC program.

Operating procedure

• **Select [View] ⇒ [Device Display].**

No.	Data Name	Title	Conversion Status	Block Start	Step Transition	Block PAUSE/RESTART	Pause Mode	Number of Active Steps	Continuous Transition Bit	Comment
0	Block	First Process	-	M0	M1	M2	M3		M4	Block0 Comment
1	Block1	Second Process	-	M10	M11	M12	M13		M14	Block1 Comment
2	Block2	Third Process	-	M20	M21	M22	M23		M24	Block2 Comment
3	Block10	In Process:Do not use	-							Block10 Comment

[PRG]Read MAIN 51 Step

Point

● **When SFC program becomes uncompiled status**
When the SFC program becomes uncompiled status, the device display is disabled.
● **Displayed comments**
When [SFC Block List Comment] is selected, displayed comments are changed from label comments to device comments.

7.11.5   Displaying SFC diagram from SFC block list

Q CPU   L CPU   FX

Display the SFC diagram of the block at the cursor position on the SFC block list.

Operating procedure

1. **Move the cursor to the block to be displayed.**

2. **Select [View] ⇒ [Open SFC Body], or double-click the block to be displayed.**

7.11.6   Displaying Local Label Setting screen from SFC block list

Q CPU   L CPU   FX

Display the Local Label Setting screen of the block at the cursor position on the SFC block list.

Operating procedure

1. **Move the cursor to the block to be displayed.**

2. **Select [View] ⇒ [Open Header].**

7.12   Setting Parameters for SFC Programs

| Q CPU | L CPU | FX |

This section explains how to set parameters for SFC programs among the parameter settings for operating the programmable controller CPU.

7.12.1   SFC settings in PLC parameter

Set parameters for SFC programs in PLC parameter.

Screen display

Select Project view ⇒ **"Parameter"** ⇒ **"PLC Parameter"** ⇒ **<<SFC>>.**
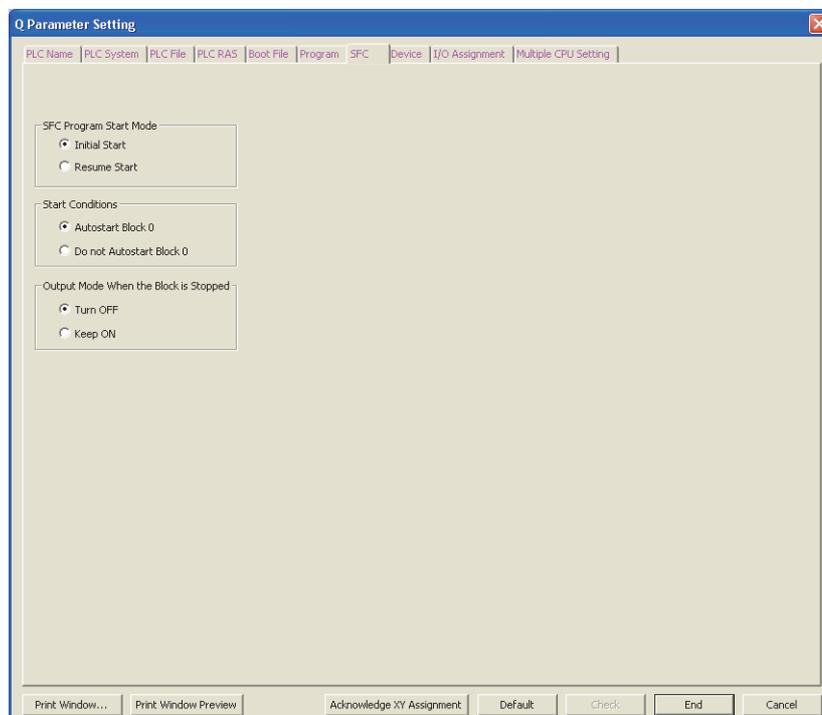
Operating procedure

- **Set the items on the screen.**

Item	Description
SFC Program Start Mode	Select to initial start or resume start the SFC program.
Start Conditions	Select whether to auto-start block 0 at the initial start of the SFC program.
Output Mode When the Block is Stopped	Select to stop the program by turning OFF the coil outputs that are turned ON by the OUT instruction, or to stop the program while they are remained ON, when the stop operation is requested to each block.

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7.12.2 Setting the property of SFC programs

Set the property of SFC programs.
Select the SFC program to be set in advance on the Project view.

Screen display

Select [Project] $\Rightarrow$ [Object] $\Rightarrow$ [Property].
The following is a screen of High Performance model QCPU.

Operating procedure

- **Set the items on the screen.**

Item	Description
<<Details>>	-
Title	Enter the title of the SFC program. (The number of applicable characters is 32.)
SFC Program Type Setting*1	Select "Normal SFC type" or "Control SFC type".
Periodic Execution Block*1	All blocks following the set block number become periodic execution blocks. To process all blocks in every scan, leave this field blank. The execution interval is entered within the range of 1 to 65535ms in unit of 1ms.
Act at Block Multi-Activated*2	When the blocks in the specified range is active, and the start operation is requested from another block, an error occurs and the operation of the programmable controller CPU stops. The operating mode at the multiple activation for blocks out of the specified range becomes 'standby'. To set the operating mode to 'standby' for all blocks, leave the start and end fields blank.
Act at Step Multi-Activated*1	When the multiple activation of SFC steps occurs, the SFC steps in the range specified for "Waiting Blocks" are set in standby status until the corresponding SFC steps become inactive. When the multiple activation of SFC steps occurs, the SFC steps in the range specified for "Stop Blocks" become error and the operation of the programmable controller CPU stops. When the multiple activation of SFC steps occurs, the SFC steps out of the specified range are forcibly transited.
<<Comment>>	-
Comment	Enter comments of the SFC program. (The maximum number of characters is 5120.) A new line can be inserted by pressing the ⎡Ctrl⎤ + ⎡Enter⎤ keys.
Explanation	When the cursor is placed on a setting item, an explanation of the item is displayed.

*1 : Not supported by Basic model QCPU, Universal model QCPU, and LCPU.
*2 : Not supported by Basic model QCPU, Q00U, Q00UJ, Q01U, Q02U, L02S/L02S-P, and L02/L02-P.

Point

● **Applicable range for the set data**
The data set in the property of SFC program are commonly applied to all blocks in SFC programs. Specific data cannot be set for each block.

● **Control SFC type program**
An SFC diagram can be created for the block 0 only in the control SFC type program.
If a block start step is entered to the block 0, an error occurs and the programmable controller CPU stops when the program is executed.

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7.13   Considerations for Creating Programs in MELSAP-L

Q CPU   L CPU   FX

The following explains the considerations for creating SFC programs in MELSAP-L.

1)   **For Simple project, either MELSAP3 or MELSAP-L format can be selected for each project. Note that however, MELSAP3 and MELSAP-L cannot be specified for each block of SFC program. For Structured project, select one format per project.**

2)   **Contact instructions and contact-equivalent instructions cannot be entered to operation output programs.**

3)   **Each operation output/transition condition program is displayed within 32 characters in an SFC diagram. If the program exceeds 32 characters, it is displayed up to 28th character and "..." is displayed after a space.**

4)   **Notes cannot be created.**

5)   **Device comments are not displayed on the SFC diagram. Device comments are edited and displayed on the device comment editor.**

6)   **SFC programs with different display formats can be verified when a project is verified.**

7)   **When a program created in MELSAP3 is displayed in MELSAP-L, the following operation outputs/transition conditions are displayed in "?" marks.**
    • Operation output/transition condition contains an NOP instruction
    • Operation output contains a contact instruction or contact-equivalent instruction
    • Operation output contains a note
    When "?" marks are displayed, change the format to MELSAP3 and check the ladder program. Programs created in MELSAP3 cannot be modified or monitored in MELSAP-L, however, a CPU processes them normally.
    To modify and monitor programs in MELSAP-L after they are checked in MELSAP3, delete programs displayed in "?" marks on the Enter SFC Symbol/Enter Program screen and enter them again in MELSAP-L.

MELSAP3

MELSAP-L

8) When a program created in MELSAP-L (instruction format) is displayed in MELSAP-L (start conditions format), the following operation outputs/transition conditions are displayed in "?" marks.

- Operation outputs which include the instructions other than OUT
- Transition conditions which include the instructions other than LD, AND, OR, LDI, ANI, ORI.
  When "?" marks are displayed, change the format to MELSAP-L (instruction format), and check the ladder program.
  Programs created in MELSAP-L (instruction format) cannot be modified or monitored in MELSAP-L (start conditions format), however, a CPU processes them normally.
  To modify and monitor programs in MELSAP-L (start conditions format) after they are checked in MELSAP-L (instruction format), delete programs displayed in "?" marks on the <u>Enter SFC Symbol/Enter Program</u> screen and enter them again in MELSAP-L (start conditions format).

MELSAP-L (instruction format)
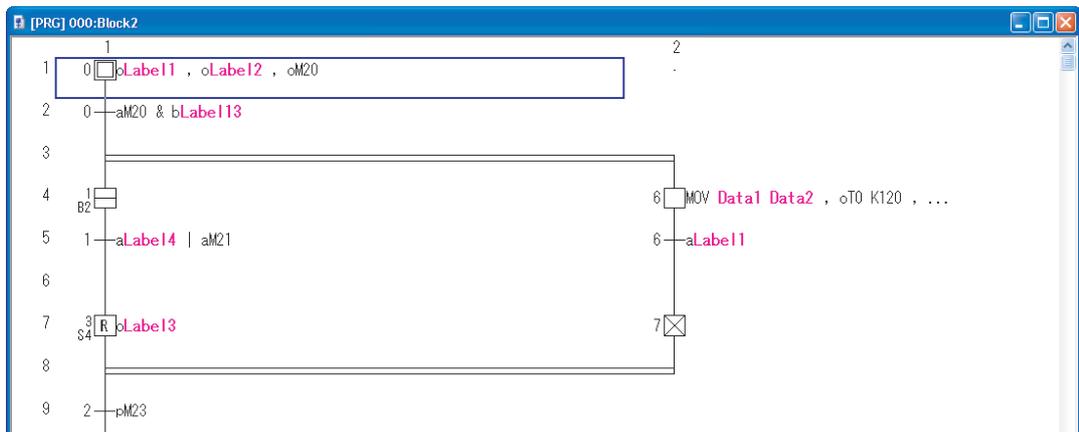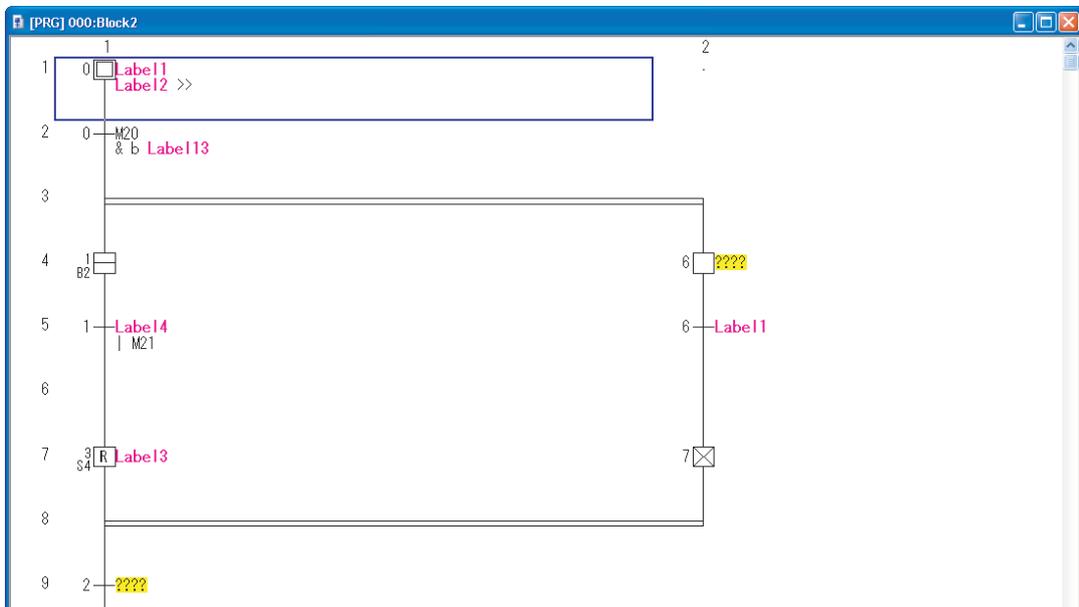
MELSAP-L (start conditions format)

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7.14 Changing T/C Setting Values

Q CPU L CPU FX

For displaying setting values of timer and counter used in SFC programs and changing them in batch, refer to the following section.
☞ **Section 6.15 "Changing T/C Setting Values"**

8 SEARCH AND REPLACE

This chapter explains basic operations of search, replace and batch-replace functions.

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8.1 Searching for and Replacing Data in Ladder Programs

Q CPU L CPU FX

This section explains how to search for and replace the specified device, instruction, and step number.

For the operations of device search/replace, instruction search/replace, and open/closed contact change functions, refer to the following manual.

☞ **GX Works2 Version 1 Operating Manual (Common)**

8.1.1 Searching for devices/labels with simple search function

Search for a specified device/label.

Operating procedure

1. **Press the ⌑Space⌑ key on the program editor.**

The Find screen is displayed.

— Instruction device entry field

— Element selection field
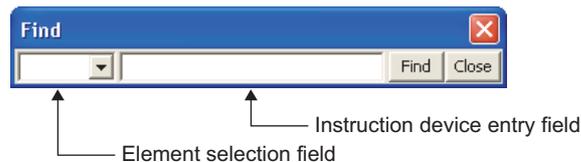
2. **Enter a device/label to be searched.**

Item	Description
Element selection field	Specify an element. Click ▼ to display the list of elements.
Instruction device entry field	Enter an instruction, a device, or a label. The search option of digit-specified device/multiple word device can be specified when searching devices. Suffix "/K" (digit-specified device) or "/D" (multiple word device) to a search word.

3. **Click the [Find] button.**

The cursor is moved to the specified device or label.

8.1.2 Moving to specified device/label

Move from the device/label, contact, or coil at the cursor position to the next position where the specified device/label, contact, or coil is used with the simple shortcut key operation.
The cursor can also be returned to the previous position before the [Next Device]/[Next Contact]/[Next Coil] function execution.
This function can be used to search for elements during monitoring to find the cause of a problem such as when a coil is not turning ON/OFF, and return the cursor to the previous position to search for the next corresponding elements.

■ Moving to next device

Move from the device/label at the cursor position to the next position where the specified device/label is used.

Operating procedure

1. **Place the cursor to the device/label to be searched.**

2. **Select [Find/Replace] ⇒ [Next Device]. (Ctrl + Alt + E)**

The cursor moves to the searched device/label.
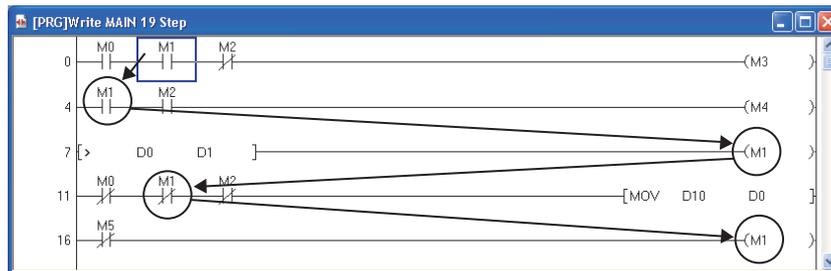
■ Moving to next contact

Move from the device/label at the cursor position to the next position where the specified device/label is used as a contact.

Operating procedure

1. **Place the cursor to the device/label to be searched.**

2. **Select [Find/Replace] ⇒ [Next Contact]. (Ctrl + Alt + D)**

The cursor moves to the searched contact.

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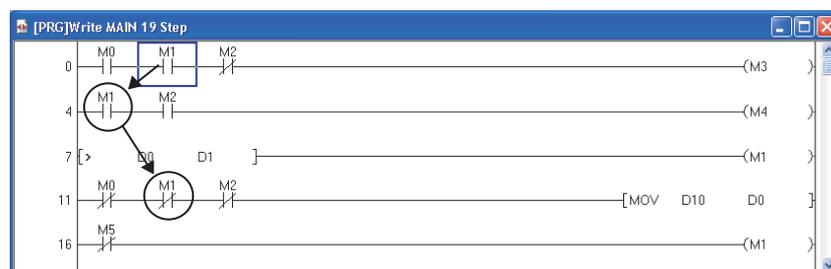
■　Moving to next coil

Move from the device/label at the cursor position to the next position where the specified device/label is used as a coil.

Operating procedure

1. **Place the cursor to the device/label to be searched.**

2. **Select [Find/Replace] ⇒ [Next Coil]. (Ctrl + Alt + F)**

The cursor moves to the searched coil.
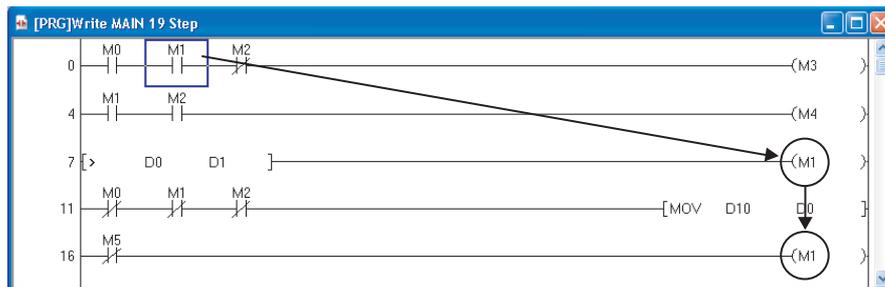
■　Return to previous position

Return the cursor to the previous position before the [Next Device]/[Next Contact]/[Next Coil] function execution.
The maximum number of times the cursor can be returned is 30.

Operating procedure

• **Select [Find/Replace] ⇒ [Next Coil]. (Ctrl + Alt + R)**

The cursor returns to the one previous position before the search.

Point

● **Selecting a device/label to be moved**
When two or more devices/labels are used for the instruction at the cursor, the screen to select the device/label to be moved is displayed. Select the device/label from the list.
The following is the screen when a device is selected.
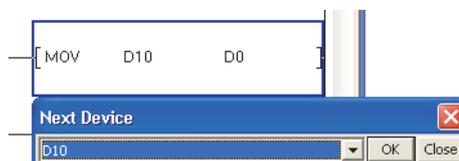
● **When the cursor does not return to the previous position by the [Back] function**
When any of the following operations is performed, the cursor does not return to the previous position even when [Find/Replace] ⇒ [Back] is selected after the jump.
 • When the step number is changed after the program is modified.
 • When the device is changed/deleted.
● **Operation of the [Next Device]/[Next Contact]/[Next Coil] function on the screen other than ladder and SFC (Zoom) editors**
When the [Next Device]/[Next Contact]/[Next Coil] function is performed on any of the following screens, the device is not searched in the screen but it is searched in the ladder and SFC (Zoom) editors in the project only.
 • Reference window
 • Entry Ladder Monitor screen

8.1.3   Jumping to specified step number

Jump to the specified step number.

Screen display

Select [Find/Replace] ⇒ [Jump].

Jump				
Step No.		▼	OK	Exit

Operating procedure

1. **Enter the jump destination step number.**

Item	Description
Step No.	Enter a program step number for the jump destination. Click ▼ to select from the list of ten step numbers entered previously.

2. **Click the [OK] button.**

The cursor jumps to the specified step number.

Point

● **Jump function**
On the program editor, pressing a numeric key on the keyboard enables to display the <u>Jump</u> screen.

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8.1.4 Changing the module start I/O numbers

Change the module start I/O number used for the arguments of the FROM(P), TO(P), DFRO(P), and DTO(P) instructions when a module I/O number is changed by changing the module mounting status. For FXCPU, the FROM(P), TO(P), DFROM(P), and DTO(P) instructions are the target instructions.

Screen display

Select [Find/Replace] ⇒ [Change Module I/O No.].

For FXCPU, "Old Module I/O No. Range (HEX)" is indicated as "Old Module I/O No. Range (0 - 7)", and "New Module Start Address (HEX)" is indicated as "New Module Start Address (0 - 7)".

Operating procedure

1. **Set the items on the screen.**

Item		Description
Old Module I/O No. Range (HEX)	Start	Enter a module start I/O number in the range to be changed. Click ▼ to select from the list of ten module I/O numbers entered previously.
	End	Enter a last module I/O number in the range to be changed. Click ▼ to select from the list of ten module I/O numbers entered previously.
New Module Start Address (HEX)		Enter a replaced module I/O number that corresponds to the module I/O number entered for "Start". Click ▼ to select from the list of ten module I/O numbers entered previously.
Find Direction	Down from Head	Select this to execute a search in the downward direction from the start of the program regardless of the current step position.
	Down from current step	Select this to execute a search in the downward direction from the current step position.
	Specify step range	Select this to execute a search in the range set by the entered step numbers.

2. **Click the** | Find Next | **button.**

The cursor moves to the searched old module I/O number.

3. **Click the** | Change | **or** | Change All | **button change the I/O number.**

The old module I/O numbers are replaced with the new module I/O numbers, and the search for the old module I/O numbers continues.

If the | Change All | button is clicked, all searched old module I/O numbers are batch replaced with the new module I/O numbers.

4. **Click the** | Close | **button to end the batch-replace function.**

■ **Considerations for replacing module start I/O numbers (QCPU (Q mode)/ LCPU)**

The following explains the considerations for replacing module start I/O numbers.

● **Specification of the module I/O number**

When specifying a module I/O number, specify the actual module I/O number.

Example

Power supply module	CPU module	QX10	QX10	QX10	QX10	Q68ADV	QY41P	QY10	QY10
		X0000 to X000F	X0010 to X001F	X0020 to X002F	X0030 to X003F	0040 to 004F	Y0050 to Y006F	Y0070 to Y007F	Y0080 to Y008F

Start input number of the read data: H40

● **Replacing module start I/O numbers of intelligent function module devices**

Use the device replacing function to replace the module start I/O numbers of intelligent function module devices. (☞ GX Works2 Version 1 Operating Manual (Common))
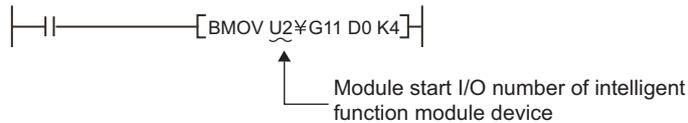
┤├────────[BMOV U2\G11 D0 K4]─

Module start I/O number of intelligent function module device

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8.2 Searching for and Replacing Data in SFC Programs

This section explains how to jump to the specified SFC step number or block number using the SFC diagram or SFC block list of the SFC program.
For the operations of device search/replace, instruction search/replace, and open/closed contact change functions, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**

8.2.1 Jumping to specified SFC step number/transition number on SFC diagram

Q CPU L CPU FX

Jump to the SFC step number/transition number in the specified block when the cursor is placed on the SFC diagram.

Screen display

Select [Find/Replace] ⟹ [Jump].

Operating procedure

1. **Set the items on the screen.**

Item		Description
Data Name		Select the block data name (title).
Block No.		Display the block number corresponds to "Data Name".
Step/Transition		Set the jump destination of the SFC step number/transition number.
	Step No.	Select this to jump to the specified SFC step number.
	Transition No.	Select this to jump to the specified transition number.

2. **Click the** OK **button.**

The cursor jumps to the SFC step number/transition number of the specified block.

8.2.2　　Searching for jump with step number on SFC diagram

Q CPU　L CPU　FX

Search for a jump of jump source with specifying the step number of jump destination when the cursor is placed on an SFC diagram.

Screen display
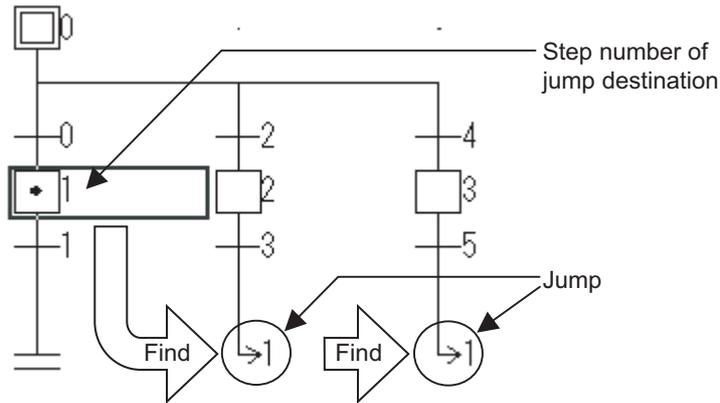
Select [Find/Replace] ⇒ [Find Jump Step].

Step number of jump destination ⟶

Operating procedure

1. **Enter a step number of jump destination.**

Item	Description
Step number of jump destination	Enter the step number of jump destination Click ▼ to select from the 10 step numbers of jump destination entered previously.

2. **Click the** [Find] **button.**

The cursor is moved to the jump of jump source.

Point

● **Jump**
Select [Find/Replace] ⇒ [Find Jump Step] to move the cursor to a jump of jump source when the cursor is placed on a step.

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8.2.3 Jumping to specified SFC step number/block number on SFC diagram

Jump to the SFC step number/block number when the cursor is placed on the SFC diagram.

Operating procedure

1. **Press the numeric key when the cursor is placed on the SFC diagram.**

Entry field ——→

2. **Set the items on the screen.**

Item	Description
Entry field	Display the number that is entered on the SFC diagram. Enter an SFC step number or block number of the jump destination.
Step No.	Select this to jump to the specified SFC step number.
Block No.	Select this to jump to the specified block number.

3. **Click the OK button.**

When "Step No." is selected, the cursor moves to the specified SFC step number in the block being edited.
When "Block No." is selected, the SFC diagram of the specified block number is displayed.

8.2.4 Replacing SFC step number on SFC diagram

Q CPU L CPU FX

Replace a jump destination step number or reset destination step number in each block.

Screen display

Select [Find/Replace] ⇒ [Change SFC Step No.].

Operating procedure

1. **Set the items on the screen.**

Item		Description
Data Name		Select the block data name.
Block No.		Display the block number corresponds to "Data Name".
Jump Destination Step		Enter old and new SFC step numbers when replacing the jump destination SFC step number.
	Old Step No.	Enter an old SFC step number. Click ▼ to select from the list of jump destination step numbers used within the block.
	New Step No.	Enter a new SFC step number.
Reset Destination Step*1		Enter old and new SFC step numbers when replacing the reset destination SFC step number.
	Old Step No.	Enter an old SFC step number. Click ▼ to select from the list of reset destination step numbers used within the block.
	New Step No.	Enter a new SFC step number.

*1 : Not supported by FXCPU.

2. **Click the Find Next button.**

The cursor moves to the searched SFC step number.

3. **Click the Replace or Replace All button.**

When the Replace button is selected, the old step number at the cursor position is replaced with the new step number. When the cursor is not at the old step number, it moves to the next searched step number.

When the Replace All button is selected, all old step numbers in the specified block are replaced with the new step number.

Point

● **Conversion/compilation status after replacing step numbers**
  After replacing step numbers, the program becomes unconverted/uncompiled status. Convert or compile the program.

8.2.5　Searching for blocks on SFC block list

<div align="right">

Q CPU　**L CPU**　**FX**

</div>

Search for a block or block title on the SFC block list.

Screen display

Select [Find/Replace] ⇒ [Jump].
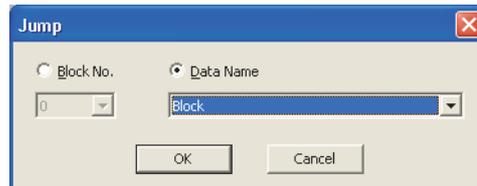
Operating procedure

1. **Set the items on the screen.**

Item	Description
Block No.	Select this to jump to the specified block number. When "Data Name" is selected, the block number corresponds to "Data Name" is displayed.
Data Name	Select this to jump to the specified data name (title). When "Block No." is selected, the data name corresponds to "Block No." is displayed.

2. **Click the** ＯＫ **button.**

The cursor moves to the specified block.

8.2.6　　Searching for block number on SFC block list

Search for a block number on the SFC block list.

Screen display

Select [Find/Replace] ⇒ [Find Block No.].

Find Block No.	✕
3| ▼	OK	Cancel
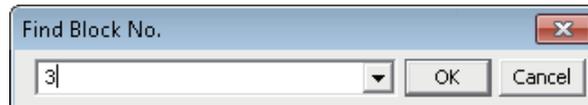
Operating procedure

1. **Set the items on the screen.**

Item	Description
Block No.	Enter a block number to be serached for.

2. **Click the** [OK] **button.**

The cursor moves to the searched block.

8.2.7   Searching for devices on SFC block list

Q CPU L CPU FX

Search for devices on the SFC block list.

Screen display

Select [Find/Replace] ⇒ [Block Information Find Device].

Operating procedure

1. **Set the items on the screen.**

Item		Description
Find Device		Enter a device/label to be searched for. Click ▾ to select from the list of ten devices entered previously.
Find Direction	Down from Head	Select this to search for devices in the downward direction from the start of the program regardless of the current cursor position.
	Down	Select this to search for devices in the downward direction from the cursor position.
	Up	Select this to search for devices in the upward direction from the cursor position.
Find Range	Displayed Data Only	Select this to search for devices only within the data that are being displayed.
	Include Assigned Data	Select this to search for devices including those assigned to labels.

2. **Click the** [Find Next] **button.**

The cursor moves to the searched device.

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9 EDITING COMMENTS/ STATEMENTS/NOTES

This chapter explains basic operation for editing device comments, statements, and notes.

9.1 Editing Device Comments

Q CPU   L CPU   FX

For the method for editing device comments and the related functions, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**

9.2 Editing Statements and Notes

Q CPU   L CPU   FX

This section explains how to edit statements and notes, and the related functions.

9.2.1 Statements and notes

The following explains the overview of statements and notes, and the considerations for editing.

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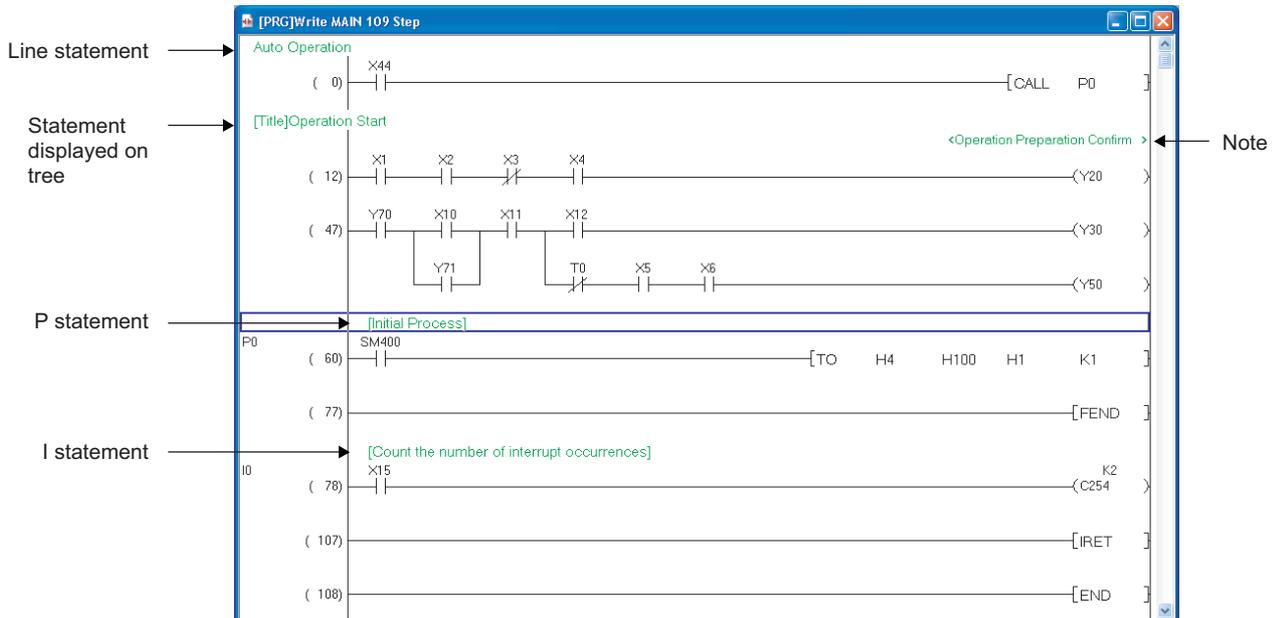
■ What is a statement?

A statement is a comment that is appended to a ladder block.
Appending statements makes the processing flow easy to understand.
Statements include line statements, P statements and I statements.
A line statement can be displayed on a tree view of the Navigation window.
(For details of the line statements displayed on a tree view ☞ Section 9.5)

- Line statement   : A comment appended to a ladder block as a whole.
- P statement   : A comment appended to a pointer number.
- I statement   : A comment appended to an interrupt pointer number.

■ What is a note?

A note is a comment that is appended to a coil and application instruction.
Appending notes makes the details of coils and application instructions easy to understand.

■ Number of characters that can be entered

The following table shows the number of characters that can be entered for a statement or note.

Name	Number of characters
Line Statement	64 characters
P Statement	64 characters
I Statement	
Note	32 characters

■ Types of statement and note

'PLC' and 'Peripheral' are the types of statement and note.

Name		Applicable model	Function
PLC	Line statement P statement I statement	QCPU (Q mode)/ LCPU	• Statements and notes can be stored on the programmable controller CPU. • PLC statement is counted as uses the following number of steps. $2 + \dfrac{\text{Number of characters}}{2}$ steps (Decimal fraction is rounded up)
	Note		
Peripheral	Line statement P statement I statement	QCPU (Q mode)/ LCPU/ FXCPU	• Statements and notes cannot be stored on the programmable controller CPU. (Only the position information can be stored.) Statements and notes must be saved on a peripheral. • One statement or note line is counted as one step. • A * symbol is prefixed to the entered text automatically.
	Note		

Point

● **Statement/note types for FXCPU**
Only the Peripheral statement/note function is available for FXCPU.
The settings regarding 'PLC/Peripheral' type described in this section cannot be used.

● **Considerations when editing Peripheral statements/notes on FXCPU**
- The positioning data cannot be stored on FXCPU.
- Steps are not counted as FXCPU projects without labels.

9.2.2 Entering statements

Enter line statements, P statements, and I statements.

■ Entering statements

Enter a line statement.

Item	Toolbar
Statement	🖳

Operating procedure

1. **Select [Edit] ⇒ [Documentation] ⇒ [Statement] (🖳).**

The statement entry mode is established.

2. **Move the cursor to the left end of the ladder block where a line statement is entered.**
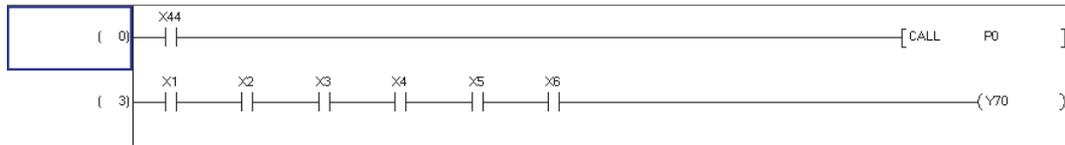
3. **Press the ⟦Enter⟧ key.**

The Enter Line Statement screen is displayed.
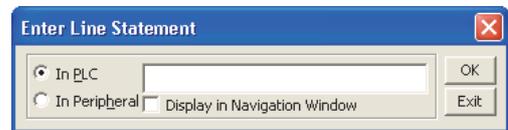
4. **Select the note type; "In PLC" or "In Peripheral".**

PLC statement is not supported by FXCPU.

5. **Enter a line statement.**

6. **Select "Display in Navigation Window" to display a line statement on a tree view of the Navigation window.**

"[Title]" is prefixed to the line statement.
This function is not supported by FXCPU projects without labels.
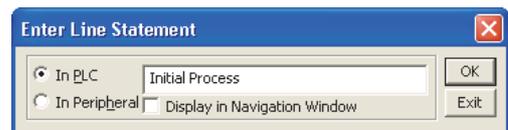
7. **Click the 〔 OK 〕 button.**

The entered line statement is displayed on the editing screen.
When "In Peripheral" is selected, '*' is automatically prefixed to the line statement.
When displaying a line statement on a tree view of the Navigation window, "[Title]" is prefixed to the line statement.
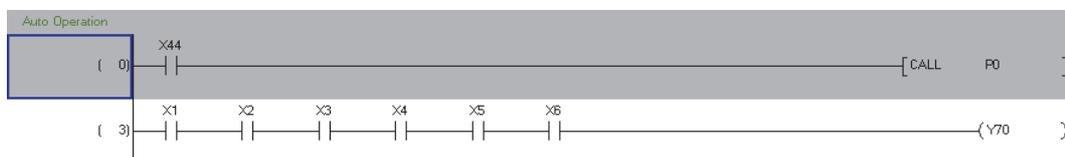
8. **To disable the line statement entry mode, select [Edit] ⇒ [Documentation] ⇒ [Statement] (▦) again.**

The statement entry mode is disabled.

Point

● **Characters that cannot be used for line statement**
";" cannot be prefixed to a line statement.
● **Entering line statements on the Enter Symbol screen.**
Move the cursor to the left end of the ladder block where a line statement is entered and press the ⟦Enter⟧ key.
The Enter Symbol screen is displayed. Enter a note as shown below.

Enter a line statement after entering ';' for PLC ', ';*' for Peripheral.
For FXCPU, enter a line statement after entering ';' for Peripheral.
When displaying a line statement on the Project view, enter [Title] after ';' or ';*'.
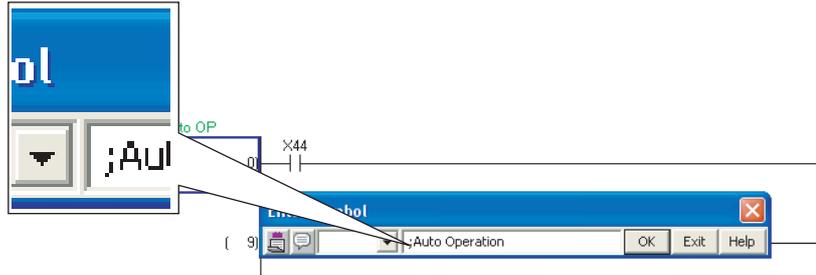
● **Displaying statements on the editing screen.**
Display/hide of statements can be switched by selecting [View] ⇒ [Statement]. (☞ Section 2.2.4)

■ Entering P statements and I statements

Enter a P statement or I statement.

Operating procedure

1. **Select [Edit] ⇒ [Documentation] ⇒ [Statement] (▦).**

The statement entry mode is established.

2. **Move the cursor to the pointer number or interrupt pointer number where a P statement or I statement is entered.**
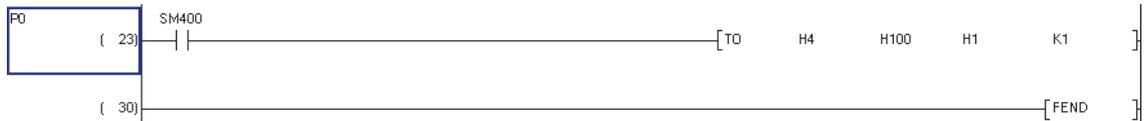
3. **Press the ⟦Enter⟧ key.**

The Enter P/I Statement screen is displayed.
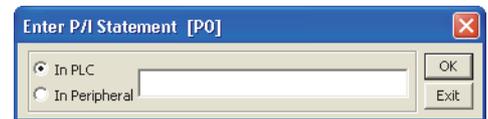
4. **Select the statement type; "In PLC" or "In Peripheral".**

PLC statement is not supported by FXCPU.

5. **Enter a P or I statement.**

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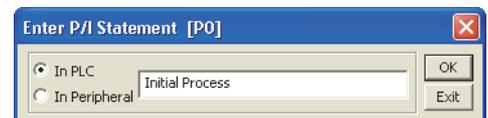
6. **Click the** OK **button.**

The entered P or I statement is displayed on the editing screen.
P and I statements are enclosed by brackets [ ].
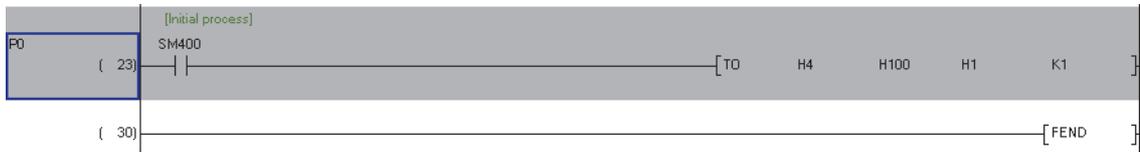
7. **To disable the P statement/I statement entry mode, select [Edit] ⇒ [Documentation] ⇒ [Statement] (⊟) again.**

The statement entry mode is disabled.

Point

● **Entering P or I statements on the Enter Symbol screen**

Move the cursor to the pointer number or interrupt pointer number where a P or I statement is entered and press the Enter key.
The Enter Symbol screen is displayed. Enter a line statement shown below.

Following the already entered pointer number or interrupt pointer number, enter ';' for 'PLC' and ';*' for 'Peripheral', and then enter a P or I statement. For FXCPU, enter a P or I statement after entering ';' for Peripheral.
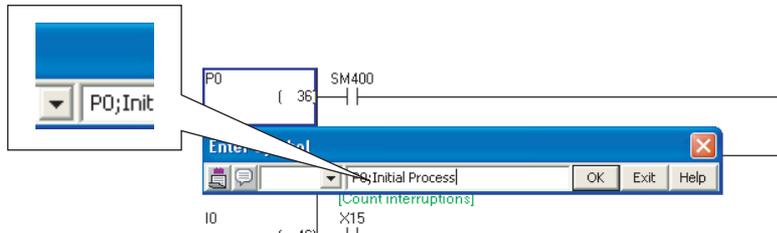
● **Displaying statements on the editing screen**

Display/hide of statements can be switched by selecting [View] ⇒ [Statement]. (☞ Section 2.2.4)

9.2.3 Modifying and deleting statements

Modify and delete statements.

■ Modifying statements

Modify a statement.

Operating procedure

1. **Select [Edit] ⇒ [Documentation] ⇒ [Statement] (icon).**

The statement entry mode is established.

2. **Move the cursor to the statement to be modified.**
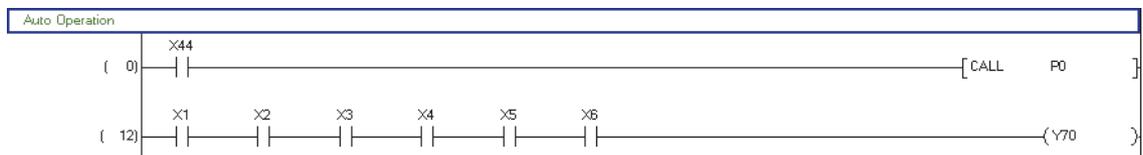
3. **Press the ⌷Enter⌷ key.**

For line statements, the Enter Line Statement screen is displayed.
For P and I statements, the Enter P/I Statement screen is displayed.
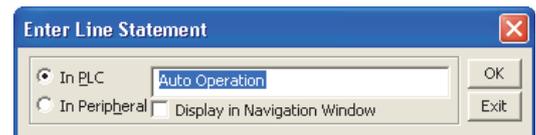
4. **Change the type and/or modify the statement.**
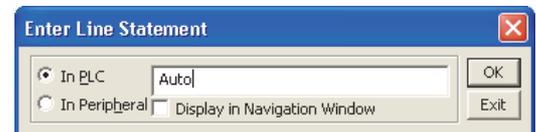
5. **Click the OK button.**

The modified statement is displayed on the editing screen.

6. **To disable the statement entry mode, select [Edit] ⇒ [Documentation] ⇒ [Statement] (icon) again.**

The statement entry mode is disabled.

Point

● **Modifying statements on the Enter Symbol screen**
Move the cursor to the statement to be modified and press the ⟦Enter⟧ key.
The Enter Symbol screen is displayed. Modify the statement as shown below.

Do not delete ';', pointer number or interrupt pointer number when modifying a statement.

・ When changing 'PLC' to 'Peripheral', enter '*' after ';'.
・ When changing 'Peripheral' to 'PLC', delete '*' postfixed to ';'.

Line statement   P statement   I statement
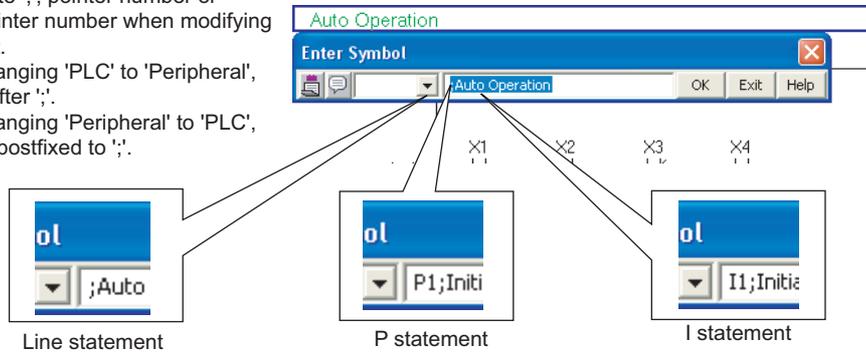
● **Displaying statements on the editing screen**
Display/hide of statements can be switched by selecting [View] ⇒ [Statement]. (☞ Section 2.2.4)

■ **Deleting statements**

Delete a line statement, P statement or I statement.

Operating procedure

1. **Move the cursor to the statement to be deleted.**
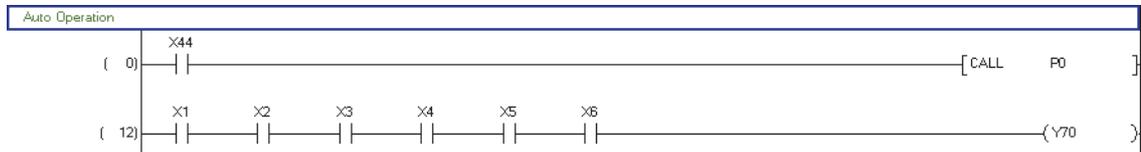
2. **Press the ⟦Delete⟧ key.**

The statement is deleted.

Point

● **Displaying statements on the editing screen**
Display/hide of statements can be switched by selecting [View] ⇒ [Statement]. (☞ Section 2.2.4)

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9.2.4 Entering notes

Enter a note in the program.

Item	Toolbar
Note	

Operating procedure

1. **Select [Edit] ⇒ [Documentation] ⇒ [Note] ().**

The note entry mode is established.

2. **Move the cursor to the coil or application instruction to which a note is appended.**
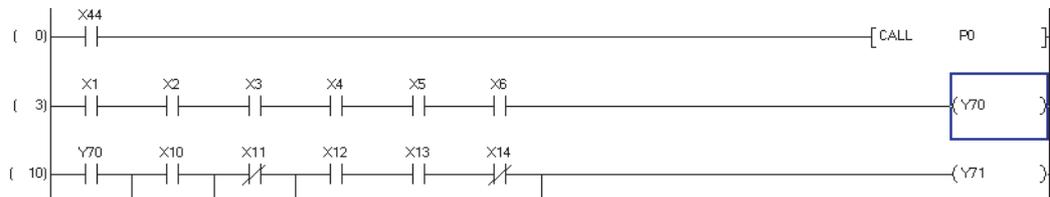
3. **Press the ⟦Enter⟧ key.**

The Enter Note screen is displayed.
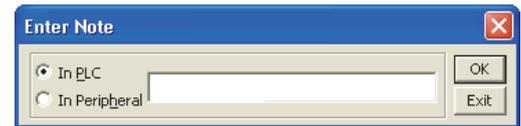
4. **Select the note type; "In PLC" or "In Peripheral".**

PLC note is not supported by FXCPU.

5. **Enter a note.**
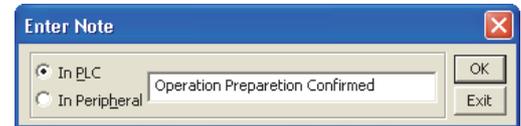
6. **Click the OK button.**

The entered note is displayed on the editing screen.
When "In Peripheral" is selected, '*' is automatically prefixed to the note.
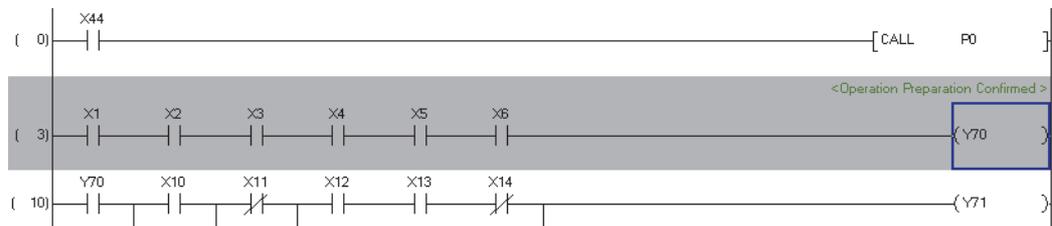
7. **To disable the note entry mode, select [Edit] ⇒ [Documentation] ⇒ [Note] () again.**

The note entry mode is disabled.

Point

● **Notes can be entered on the Enter Symbol screen**
Move the cursor to the coil or application instruction to which a note is appended and press the [Enter] key.
The Enter Symbol screen is displayed. Enter a note as shown below.

Following the already entered device/instruction, enter ';' for, 'PLC' and ';*' for 'Peripheral' first, and then enter a note.
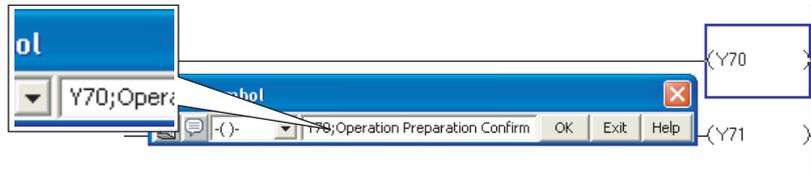
● **Displaying notes on the editing screen**
Display/hide of notes can be switched by selecting [View] ⇒ [Note]. (☞ Section 2.2.4)

9.2.4 Entering notes

9.2.5 Modifying and deleting notes

Modify and delete notes.

■ Modifying notes

Modify a note.

Operating procedure

1. **Select [Edit] ⇒ [Documentation] ⇒ [Note] (📝).**
The note entry mode is established.

2. **Move the cursor to the note to be modified.**
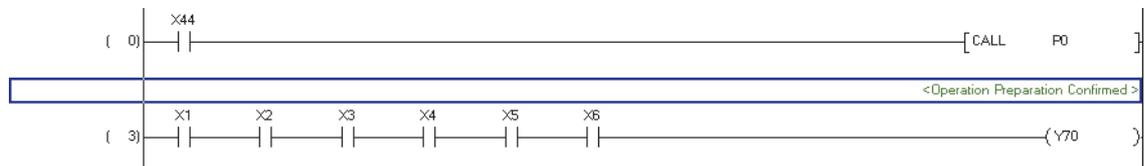
3. **Press the ⟦Enter⟧ key.**
The Enter Note screen is displayed.

4. **Change the type and/or modify the note.**

5. **Click the ⟦ OK ⟧ button.**
The modified note is displayed on the editing screen.

6. **To disable the note entry mode, select [Edit] ⇒ [Documentation] ⇒ [Note] (📝) again.**
The note entry mode is disabled.

■ Deleting notes

Delete a note.

Operating procedure

1. **Move the cursor to the note to be deleted.**
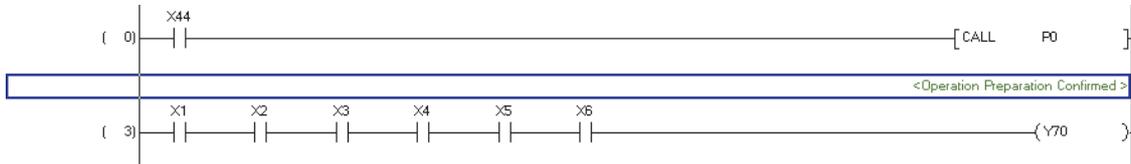
2. **Press the ⌶Delete⌶ key.**

The note is deleted.

Point

● **Notes can be modified or deleted on the Enter Symbol screen**
Move the cursor to the coil or application instruction whose note is deleted or modified and press the ⌶Enter⌶ key.
The Enter Symbol screen is displayed. Modify or delete the note as shown below.
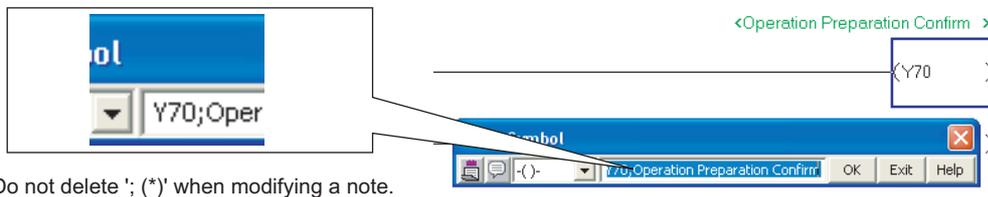
Do not delete '; (*)' when modifying a note.
Delete '; (*)' as well when deleting a note.
・ When changing 'PLC' to 'Peripheral', enter
'*' after ';'.
・ When changing 'Peripheral' to 'PLC', delete
'*' postfixed to ';'.

● **Displaying notes on the editing screen**
Display/hide of notes can be switched by selecting [View] ⇒ [Note]. (☞ Section 2.2.4)

9.3 Batch Editing Statements and Notes

Q CPU **L CPU** **FX**

This section explains how to batch edit statements and notes.

Restrictions

Batch editing of statements and notes cannot be performed when function blocks or inline structured text are used in a program.

Screen display

Select [Edit] ⇒ [Documentation] ⇒ [Statement/Note Batch Edit] (🖳).
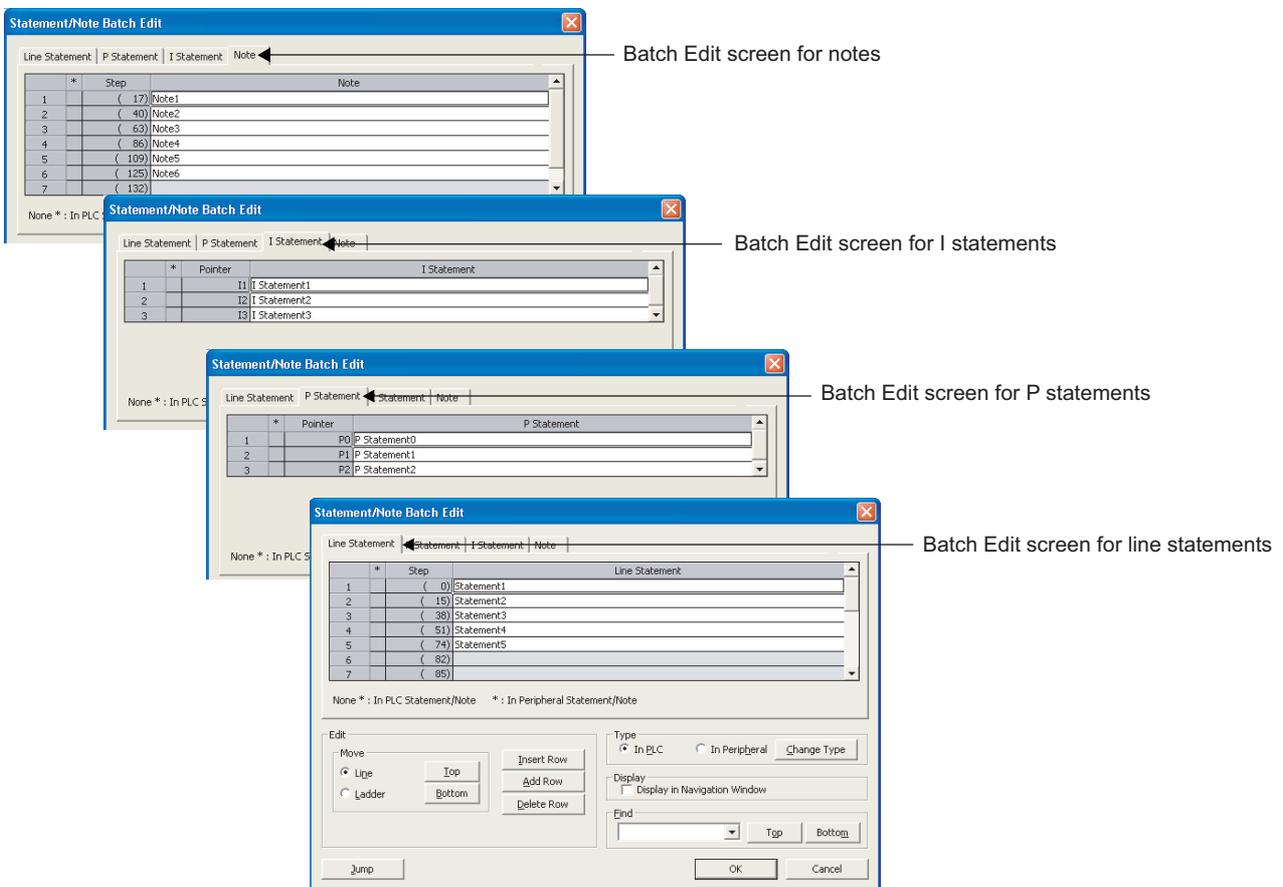
Batch Edit screen for notes

Batch Edit screen for I statements

Batch Edit screen for P statements

Batch Edit screen for line statements

Display contents

	Item	Description
Tab	Line Statement	Display the batch-edit screen for line statements.
	P Statement	Display the batch-edit screen for P statements.
	I Statement	Display the batch-edit screen for I statements.
	Note	Display the batch-edit screen for notes.
Step	Line Statement	Display the start step numbers of all ladder blocks in the program.
	Note	Display the step numbers of all coils and application instructions in the program.
Pointer	P Statement	Display all pointer numbers in the program.
	I Statement	Display all interrupt pointer numbers in the program.

Screen button

● Change type

Changes the type between 'PLC' and 'Peripheral'.
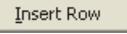
● Insert Row

Inserts a row above the selected line statement.

● Add Row

Inserts a row below the selected line statement.

● Delete Row

Deletes a line statement.

● Top / Top

"Edit": Moves statement/note under a row where the cursor is placed to one row or ladder block above.

"Find": Executes search in the upward direction from the selected statement or note.

● Bottom / Bottom

"Edit": Moves statement/note above a row where the cursor is placed to one row or ladder block below.

"Find": Executes a search in the downward direction from the selected statement or note.
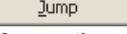
● Jump

Moves the cursor to the selected statement or note on the editing screen.

Point

● **Considerations when editing statements/notes in FXCPU.**
The PLC statement/note function is not available for FXCPU.
Thus the settings regarding 'PLC/Peripheral' type described in this section cannot be used.
For details of the 'PLC/Peripheral' type, refer to Section 9.2.1.

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■ Modifying statements and notes

Modify a statement or note.

Operating procedure

1. **Select a statement or note to be modified.**

Select

2. **Modify the statement or note.**

■ Changing the type of statements and notes

Change the 'PLC' or 'Peripheral' type of a statement or note.

Operating procedure

1. **Select a range in which the type is changed.**

2. **Select the statement/note type; "In PLC" or "In Peripheral".**

3. **Click the** `Change type` **button.**
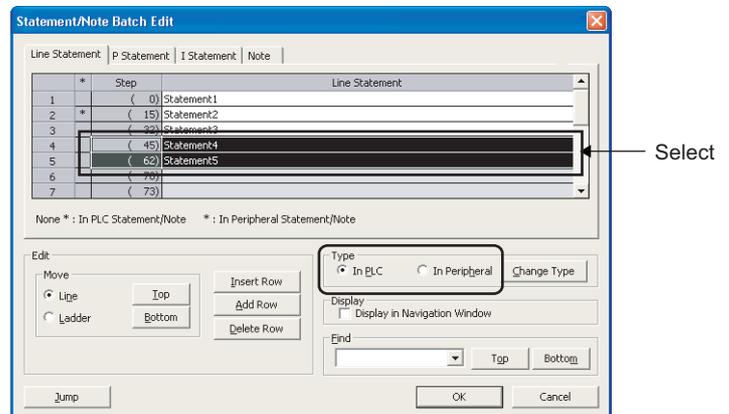
The type is changed.
A * symbol is appended to a statement or note set as 'Peripheral'.

Select

Change from 'PLC' to 'Peripheral'

■ **Displaying Line Statements on Tree View**

Display a line statement on a tree view of the Navigation window.
This function is not supported by FXCPU projects without labels.

Operating procedure

1. **Select a line statement to be displayed on a tree view.**

2. **Select "Display in Navigation Window".**

"[Title]" is prefixed to the line statement.
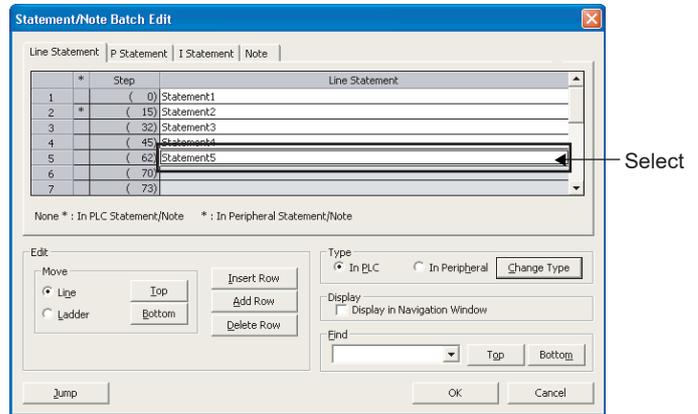
Select

■ **Inserting rows within line statements**

Insert a row within line statements.

Operating procedure

1. **Select a statement for which a row is to be inserted.**

2. **Select the statement type; "In PLC" or "In Peripheral".**
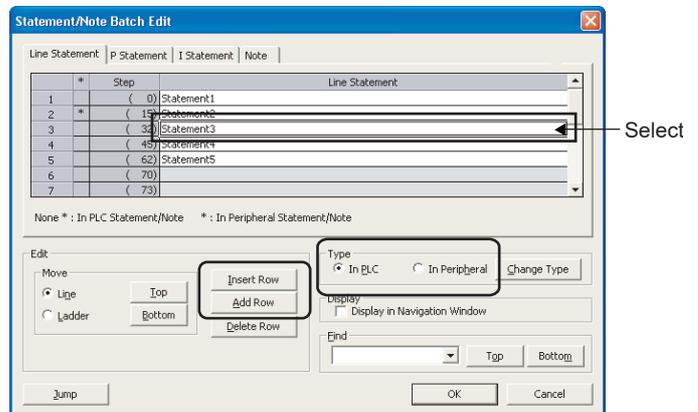
Select

3. **Click the** Insert Row **or** Add Row **button.**

Insert Row : Inserts a blank row above the cursor position.

Add Row : Inserts a blank row below the cursor position.

4. **Select the inserted row and enter a statement.**

■ Deleting rows of line statements

Delete a row of line statements.

Operating procedure

1. **Select the line statement to be deleted.**

Select

None * : In PLC Statement/Note   * : In Peripheral Statement/Note
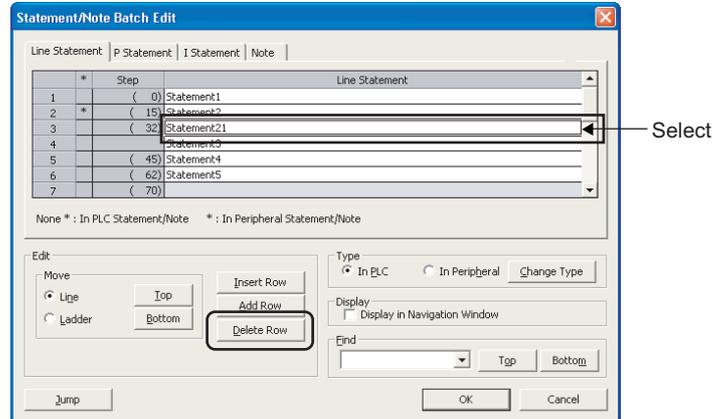
2. **Click the [Delete Row] button.**

The selected line statement is deleted.

2	*	(15)	Statement2
3		(32)	Statement3
4		(45)	Statement4

■ Moving statements or notes

Move a statement or note.

Operating procedure

1. **Select a statement or note to be moved.**

Select

None * : In PLC Statement/Note   * : In Peripheral Statement/Note

2. **To move a line statement, select the type; "Line" or "Ladder".**

"Line"   : Moves the selected line statement in unit of row.
"Ladder" : Moves the selected line statement in unit of ladder block.

3. **Click the [Top] or [Bottom] button.**
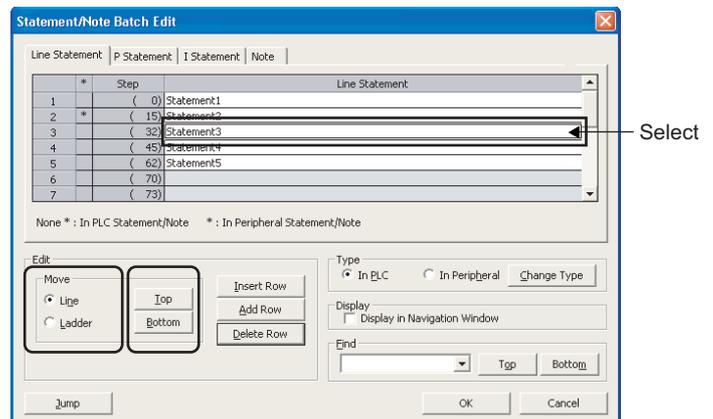
[Top] : Moves statement/note under a row where the cursor is placed to one row or ladder block above.

[Bottom] : Moves statement/note above a row where the cursor is placed to one row or ladder block below.

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Editing examples
Move Step 60 <u>upward in unit of row</u>

Select

Select

The line statement one above the selected statement is deleted, and under the selected statement moves upward.

Move Step 60 <u>upward in unit of ladder block</u>

The unit of line statements of ladder block above the selected statement is deleted, and the selected statement below the cursor position moves one ladder block upward.

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■   Searching for statements and notes

Search for a statement or note.

Operating procedure

1. **Enter a statement or note to be searched for in the "Find" field.**

2. **Click the** Top **or** Bottom **button.**

Top : Starts searching in the upward direction from the selected position.

Bottom : Starts searching in the downward direction from the selected position.

Enter
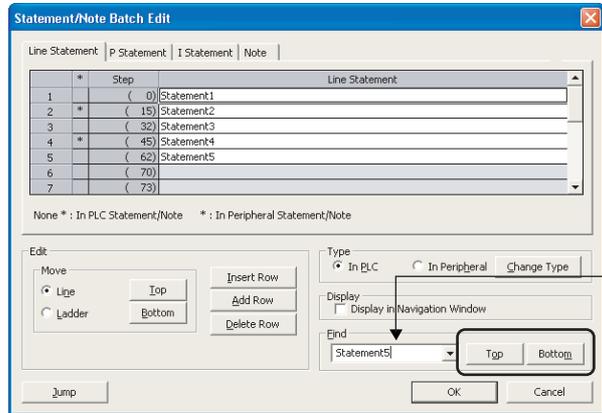
3. **The cursor moves to the searched statement or note.**

Searched statement

■   Jumping to specified statement and note

Jump to a specified statement or note.

Operating procedure

1. **Select a statement or note for the jump target.**
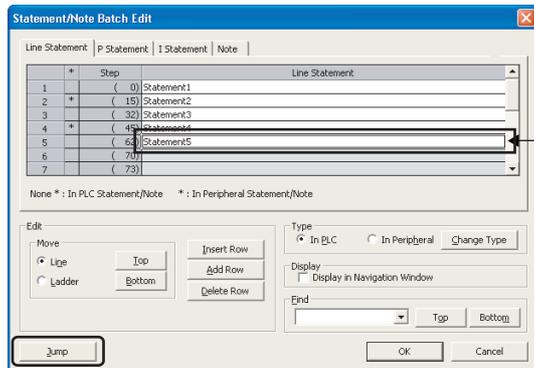
Select

2. **Click the** Jump **button.**

The cursor jumps to the selected statement or note on the editing screen.
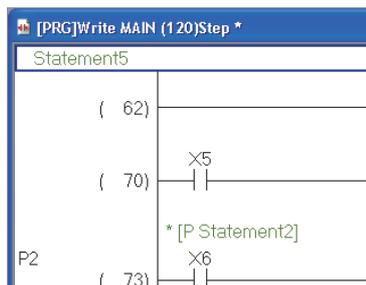
9.4 Changing the Type (PLC/Peripheral) of Statement/Note

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Q CPU L CPU FX

This section explains how to change the statement/note type of the converted program to PLC or Peripheral.

Screen display

Select [Find/Replace] ⇒ [Switch Statement/Note Type].
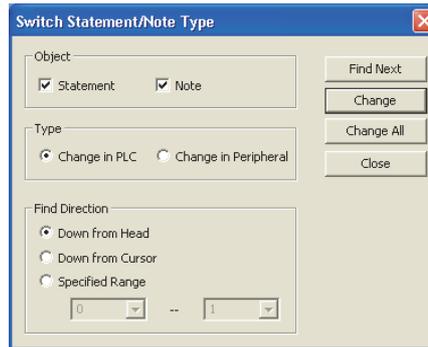
Operating procedure

- **Set the items on the screen.**

Item		Description
Object		Select this to select the target whose type is to be changed. Multiple objects can be selected.
Type	Change in PLC	Select this to change 'Peripheral' to 'PLC'.
	Change in Peripheral	Select this to change 'PLC' to 'Peripheral'.
Find Direction	Down from Head	Select this to execute a search in the downward direction from the start of the program regardless of the current cursor position.
	Down from Cursor	Select this to execute a search in the downward direction from the cursor position.
	Specified Range	Select this to execute a search in the range set by the entered step numbers.

Screen button

● Find Next

Searches for the next statement/note whose type is to be changed in the program being edited.

● Change

Changes the statement/note type searched by clicking the Find Next button or the Change button, and searches for the next statement/note whose type is to be changed in the program being edited.

● Change All

Changes the target statement/note type in all programs in batch.

Point

● **Switch statement/note type function**
The statement/note type at the cursor position can also be changed by pressing the 🄲🅃🅁🄻 + ⬚ keys.
When the type of statement/note is changed, the program becomes in an unconverted/uncompiled status.
Compile the program.

● **When statements/notes are not entered at the right position**
When statements/notes are not entered at the right position even after the merge process is performed, correct their positions using the statement/note batch editing function. (☞ Section 9.3)

9.5 Displaying Line Statements on Tree View

Q CPU   L CPU   FX

This section explains a line statement displayed on a tree view of the Navigation window.
This function is not supported by FXCPU projects without labels.

9.5.1 Line statements on tree view

The line statements can be displayed on a tree view of the Navigation window.
Displaying the line statements on a tree view provides the easy-to-understand general program flow.
Since the program where the line statement is set can be displayed with the line statements on a tree view, the quick search of ladder blocks is also possible.
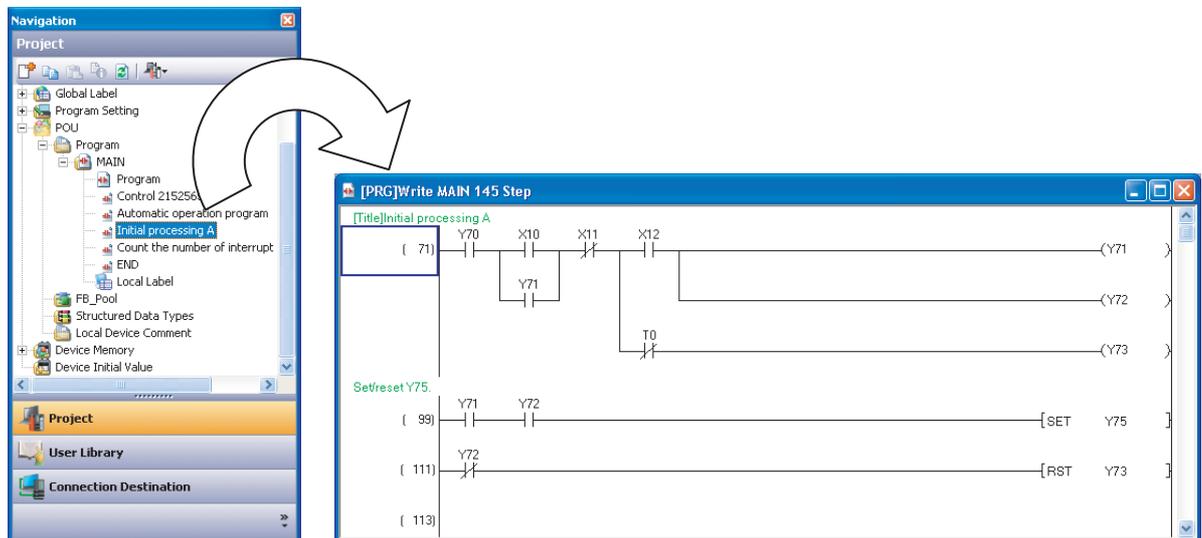
Point

● **Program range which can be displayed with line statements on tree view**
Double-click a line statement on a tree view to jump to a ladder block where corresponding line statement is set.
The programs before the next line statement on a tree view are displayed by the jump function.
If there are no next line statements on a tree view, the programs before the END instruction are displayed.
Double-click "Program" under Project view ⇒ "POU" ⇒ "Program" ⇒ "(program)" ⇒ "(block)" ⇒ "Program" of the Navigation window to display a whole program.
● **Copying/pasting line statements on tree view**
When copying or pasting the line statements on a tree view, the ladder blocks from a line statement on a tree view on a ladder to the programs before the next line statement on a tree view are copied or pasted.

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9.5.2　　　Displaying line statements on tree view

Display a line statement on a tree view of the Navigation window.

Operating procedure

1. **Select [Edit] ⇒ [Documentation] ⇒ [Statement] (🖼).**

The statement entry mode is established.

2. **Move the cursor to a line statement to be displayed on a tree view.**
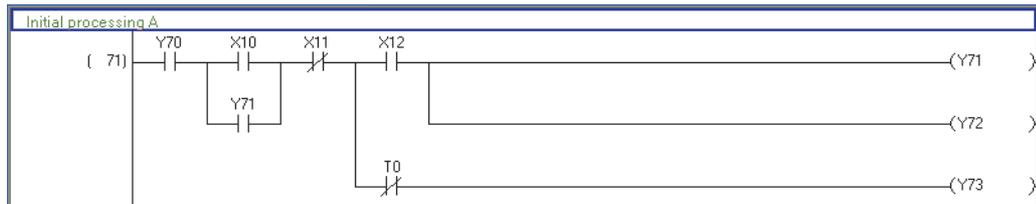
3. **Press the ⌜Enter⌟ key.**

The Enter Line Statement screen is displayed.
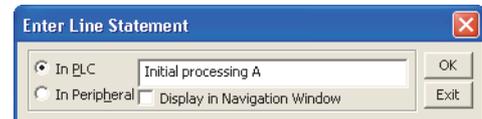
4. **Select "Display in Navigation Window", or enter "[Title]" in front of the line statement.**
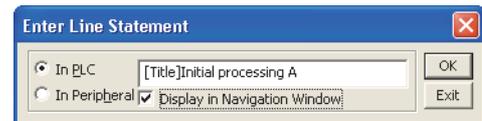
5. **Click the ⌜OK⌟ button.**

6. **Select [Compile] ⇒ [Build].**

The line statement is displayed on a tree view.
When multiple line statements on a tree view exist in single ladder block, only the uppermost line statement is displayed on a tree view.
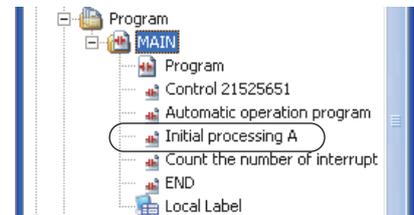
Point

● **Displaying line statements of POUs on tree view**
Only the line statements of programs can be displayed on a tree view.
Even if entering "[Title]" in front of the line statement of function block, the line statements cannot be displayed on a tree view.

● **Maximum number of line statements on tree view**
The maximum number of line statements on a tree view in single program is 100.
The maximum number of line statements on a tree view in single project is 800.
When multiple line statements on a tree view exist in single ladder block, only the uppermost line statement is displayed and the others are not, however, all line statements are counted as the number of line statements on a tree view.

● **Displaying spaces of line statements on tree view**
• The spaces that exist before and after the line statement on the ladder are not displayed on the tree view.
• The spaces that exist before and after the line statement are deleted by changing the data name of line statement on the tree view.

9.5.3 Disabling setting of line statements on tree view

Change the setting of line statements on a tree view to hide.

Operating procedure

1. **Select [Edit] ⇒ [Documentation] ⇒ [Statement] (🖼).**
The statement entry mode is established.

2. **Move the cursor to a line statement on a tree view.**
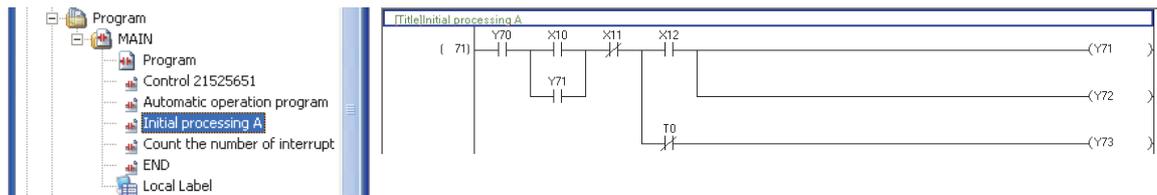
3. **Press the ⏎Enter⏎ key.**
The Enter Line Statement screen is displayed.
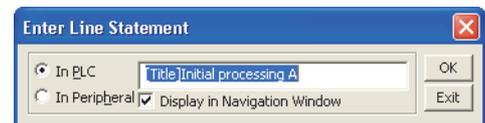
4. **Clear "Display in Navigation Window", or delete "[Title]" in front of the line statement.**

5. **Click the OK button.**

6. **Select [Compile] ⇒ [Build].**
The line statement is deleted from the tree.
If there are no line statements on a tree view in a program, the END instructions are also deleted from a tree.
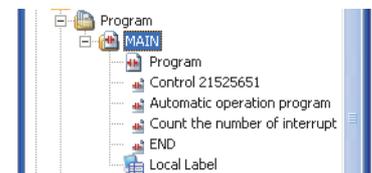
Point

● **Considerations for deleting line statements on tree view**
When deleting the line statements on the Navigation window, the ladder blocks from a line statement on a tree view on a ladder to the programs before the next line statement on a tree view are also deleted.
(☞ Section 9.5.5)

9.5.4 Moving ladder blocks on tree view

Move the ladder blocks on a tree view of the Navigation window from a line statement on a tree view to the programs before the next line statement on a tree view.

Operating procedure

1. **Select a line statement on a tree view on the Navigation window.**

2. **Drag and drop the line statement to the desired position on the program.**

The ladder blocks from the selected line statement on a tree view to before the next line statement on a tree view are moved.
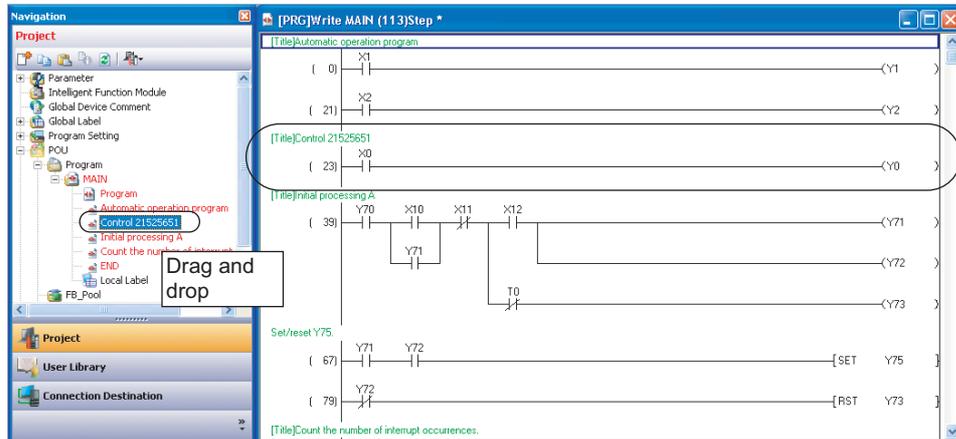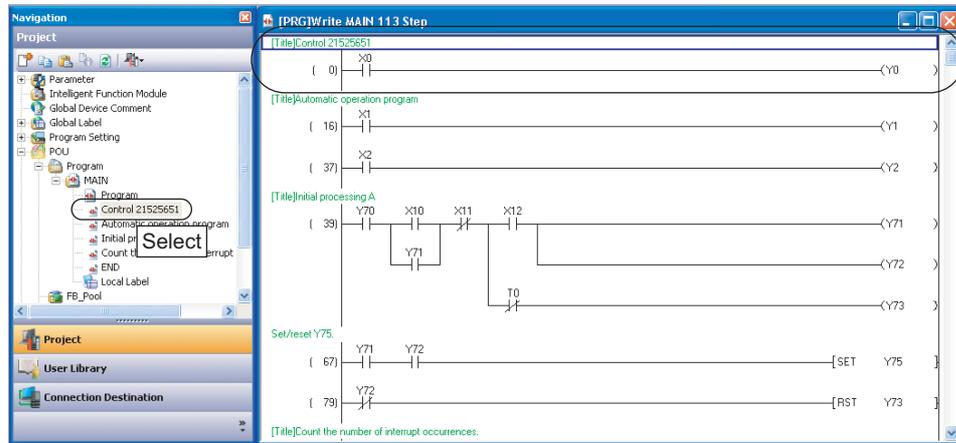
Point

● **Copying to other programs**

When copying the ladder blocks within the range from a line statement on a tree view to the programs before the next line statement on a tree view to other programs, drag and drop the line statement on a tree view of other programs. The copied ladder blocks are pasted in front of the END instruction.

9.5.5 Deleting ladder blocks on tree view

Delete the ladder blocks on a tree view of the Navigation window from a line statement on a tree view to the programs before the next tree-displayed line statement.

Operating procedure

1. **Select a line statement on a tree view on the Navigation window.**

2. **Select [Project] ⇒ [Object] ⇒ [Delete].**

The ladder blocks from the selected line statement on a tree view to the programs before the next line statement on a tree view are deleted.
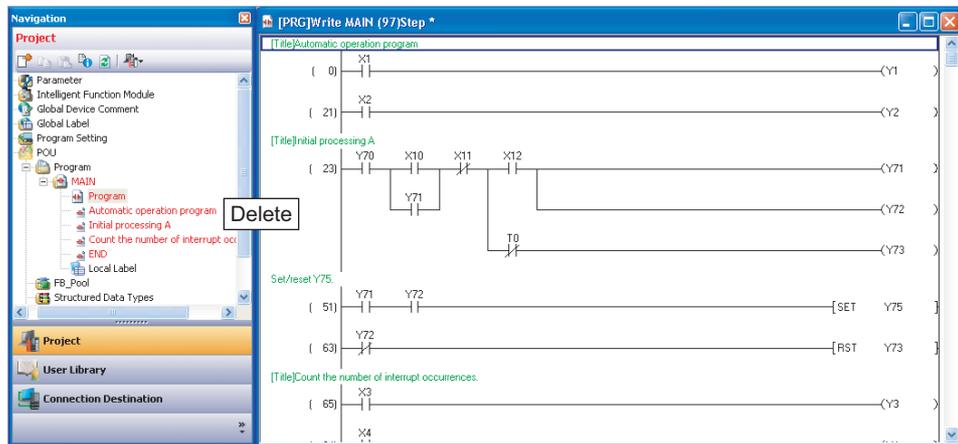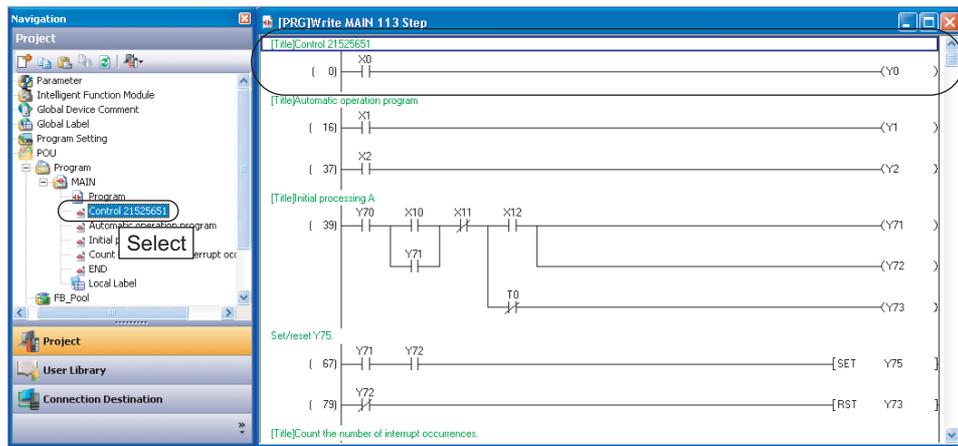
9.6   Jumping from Line Statement List

Q CPU **L CPU** **FX**

This section explains the function that displays line statements used in the ladder program and searches for a specified line statement.
The corresponding line statement in the program is displayed by jumping from the list.

Screen display

Select [Find/Replace] ⇒ [Line Statement List] (⬚).

Line statement list
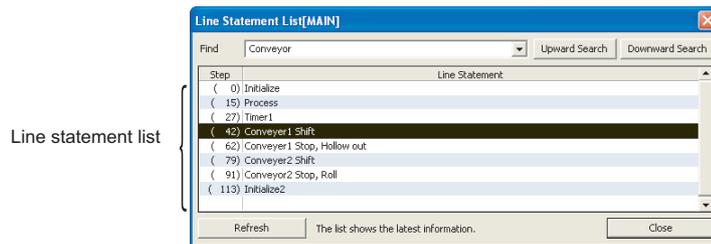
Operating procedure

1. **Set the item on the screen.**

Item		Description
Find		Enter a character string of the line statement to be searched for. Click ▾ to select from the list of character strings searched previously.
Line statement list		Display a list of line statements used in the program.
	Step	Display step numbers to which the line statements are set.
	Line Statement	Display line statements used in the program.

2. **Double-click the selected row in the line statement list.**

The position jumps from the line statement list to the corresponding line statement on the program editor.

Screen button

● [Upward Search] / [Downward Search]
Searches for line statements that contain the character string entered in the "Find" field toward up/down direction from the cursor.

● [Refresh]
Updates the line statement list.

## 9.7 Merge Process when Reading Programs from Programmable Controller CPU

This section explains the merge process when reading sequence programs contain Peripheral statements/notes created in the project without labels from the programmable controller CPU.
For FXCPU, the merge process is executed automatically when reading data from a programmable controller CPU. Thus the setting is not necessary.

9.7.1 Merge process

`Q CPU` `L CPU` `FX`

The character data of Peripheral statements/notes are not written to the programmable controller CPU when sequence programs are written to the programmable controller CPU.
By executing the merge process when reading sequence programs from the programmable controller CPU, the character data of Peripheral statements/notes saved on the personal computer are merged with the sequence programs stored on the programmable controller CPU and displayed on the ladder program.
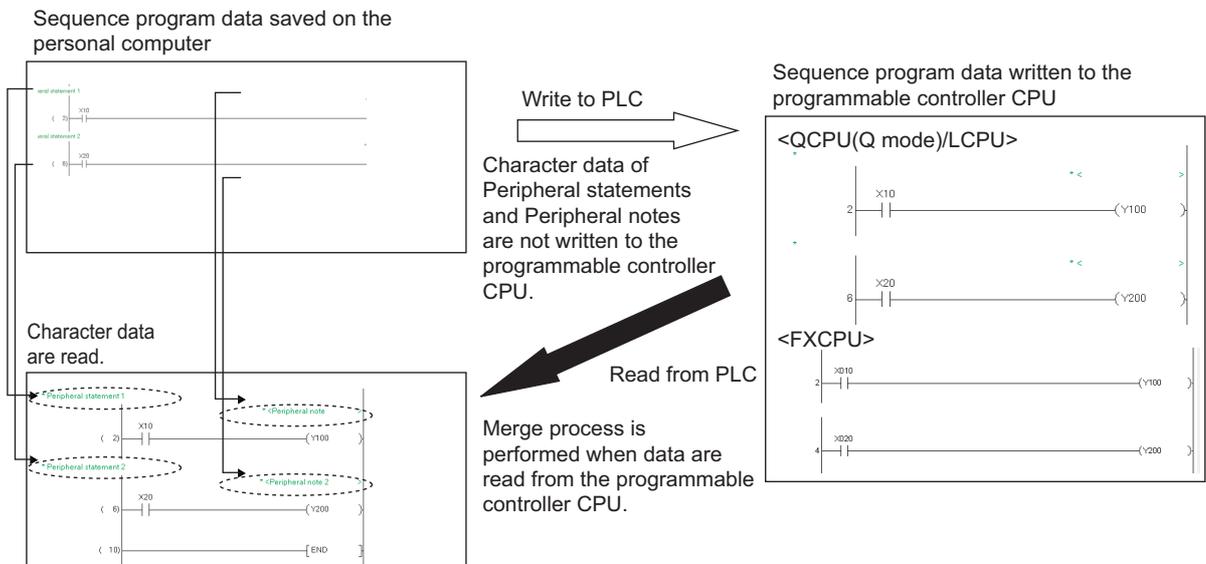
The following table shows the different process status with the execution of the merge process when reading programs from the programmable controller CPU.
For FXCPU, the merge process is executed automatically, and character data of the step position where data can be displayed, are read.

Setting	CPU type	Type	Process status
Not executing the merge process	QCPU (Q mode)/LCPU	Peripheral statement	Character data are not merged.
		Peripheral note	
Executing the merge process	QCPU (Q mode)/LCPU	Peripheral statement	Character data are merged.
		Peripheral note	

9.7.2 Performing merge process

Q CPU L CPU FX

Perform the merge process when reading sequence programs from the programmable controller CPU.

Operating procedure

1. **Open the sequence program (project) saved on the personal computer.**

Open the sequence program (project) which is the same data as the sequence program (project) to be read from the programmable controller CPU.
For the method for opening a project, refer to the following manual.
☞ GX Works2 Version 1 Operating Manual (Common)

2. **Select [Online] ⇒ [Read from PLC] (🖳).**

The Online Data Operation screen is displayed.
For details of the Read from PLC function, refer to the following section.
(☞ Section 11.1)

3. **Select "Merge Peripheral Statement/Note" under "Option" on the Program Detail Setting screen, and execute the Read from PLC function.**
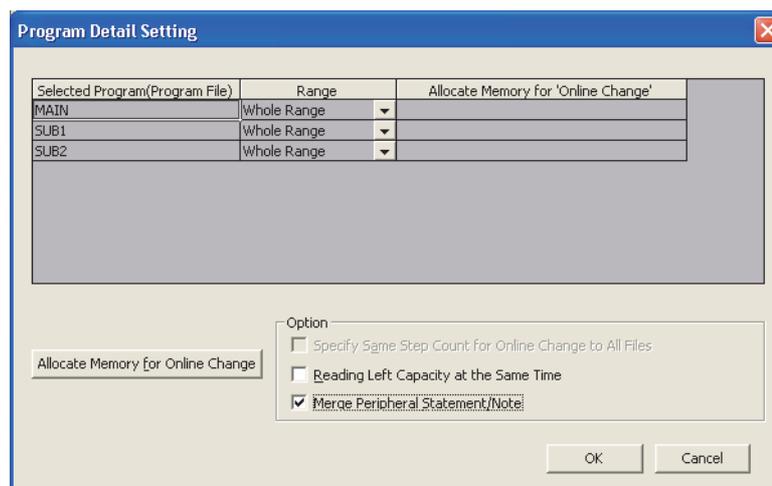
4. **Confirm if the statements and/or notes of the read sequence program are entered at the correct positions.**

> *Point* 🔑
>
> ● **When a statement or note is not entered at the correct position**
> Correct the statement and note positions by the statement/note batch editing function if the statement or note is not entered at the correct position after performing the merge process. (☞ Section 9.3)

9.8 Editing SFC Comments

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9.8 Editing SFC Comments

Q CPU L CPU FX

This section explains how to create and edit SFC comments.
SFC comment is a generic term for 'SFC step comments' that are appended to SFC steps, and
'transition comments' that are appended to transitions in the created SFC diagrams.
The following shows the example of entering 'Step comment' at 'Block: 0, SFC step: 1'.
'Transition comment' is not supported by FXCPU.

Operating procedure

1. **Select [Edit] ⇒ [Documentation] ⇒ [SFC Step/Transition Comment].**

The editing screen changes to the SFC comment editing mode.

2. **Move the cursor to the position where the SFC comment is entered.**
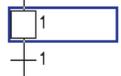
3. **Press the** ⎡Enter⎤ **key.**

The Input Device Comment screen is displayed.
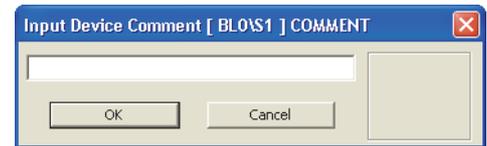
4. **Enter the SFC comment.**

The line wrapping of the SFC comment display can be
checked when the comment is entered.
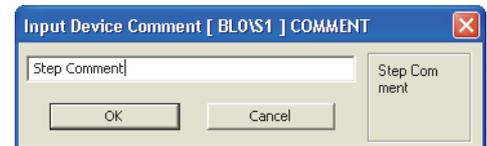
5. **Click the** ⎡OK⎤ **button.**

The entered SFC step comment is displayed as shown on the right.
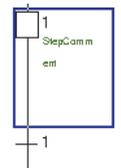
Point

● **Disabling the SFC comment editing mode**
To disable the SFC comment editing mode, select [Edit] ⇒ [Documentation] ⇒ [SFC Step/Transition Comment] again
and clear the check box.

● **Creating SFC comments**
SFC comments can be created on the Enter SFC Symbol screen when entering SFC elements, or by using the device
comment editor. When creating SFC comments on the device comment editor, specify the device name as shown
below.

m : Block number
n: SFC step/transition number

SFC comment	QCPU (Q mode)/LCPU	FXCPU
SFC step comment	BLm\Sn	Sn
Transition comment	BLm\TRn	-

● **Saving SFC comments**
The created SFC comments are saved in the device comment data.
To recover SFC comments when reading SFC programs from the programmable controller CPU, write/read device
comments to/from the programmable controller CPU.

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10 CONVERTING/ COMPILING PROGRAMS

This chapter explains how to convert/compile created programs.
Programs are converted/compiled to sequence programs that can be executed on the programmable controller CPU.

10.1 For Projects without Labels

This section explains how to convert a ladder block created in the project without labels.
The ladder conversion confirms edited content of the ladder block.

10.1.1 Converting created programs

`Q CPU` `L CPU` `FX`

Convert a created program.

Operating procedure

- **Select [Compile] ⇒ [Build] (🗒).**

  The unconverted ladder block is converted.
  For SFC program, all the unconverted blocks are converted.
  For details of converting only one block under editing, refer to Section 10.1.4.

Unconverted ladder block is displayed in gray.
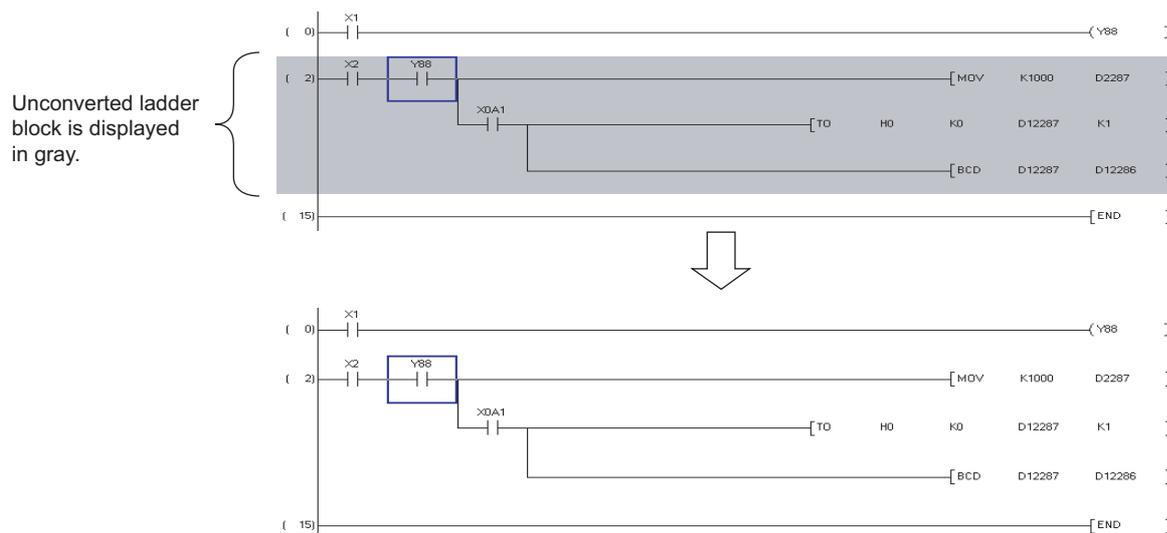
10.1.2 Converting all programs

`Q CPU` `L CPU` `FX`

Batch-convert all unconverted programs in the project.

Operating procedure

- **Select [Compile] ⇒ [Build All] (🗒).**

  All unconverted programs are converted.

10.1.3   Executing online program change simultaneously with ladder conversion

For the operation for executing the Online program change simultaneously with the ladder conversion, refer to the following manual.

☞ GX Works2 Version 1 Operating Manual (Common)

10.1.4   Converting only one block

When editing the SFC program, convert only one block.

Operating procedure

• **Select [Compile] ⇒ [Convert Block].**

   Only one block is converted.

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10.1.5   Checking programs

Q CPU   L CPU   FX

Check errors, such as duplicated coils and device range, in the created programs.
The check result is displayed on the Output window.

Screen display

Select [Tool] ⇒ [Check Program].
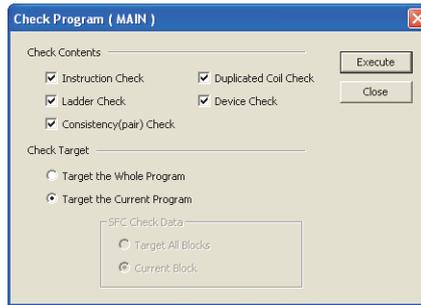

Operating procedure

1. **Set the items on the screen.**

Item			Description
Check			Select the item(s) for checking the program.
	Instruction Check		Check if the instruction can be used for the CPU type of the project being edited.
	Ladder Check		Check if the ladder program is created properly.
	Consistency (pair) Check		Check the program consistency for such case as no pointer at the jump destination or no RET instruction in the subroutine program.
	Duplicated Coil Check		Check the duplicated coils.
	Device Check		Check if the device being used is within the range set in the parameter.
Check Target			-
	Target the Whole Program*1		Select this to check all programs in the project.
	Target the Current Program		Select this to check only the program being displayed.
	SFC Check Data		-
		Target All Blocks	Select this to check the SFC block list that includes the SFC blocks being displayed.
		Current Block	Select this to check only SFC blocks being displayed.

*1 :   Not supported by FXCPU.

2. **Click the Execute button.**

The program is checked and the result is displayed on the Output window.
By double-clicking the result, the corresponding error location in the program is displayed.
For checking errors, refer to Section 10.4.
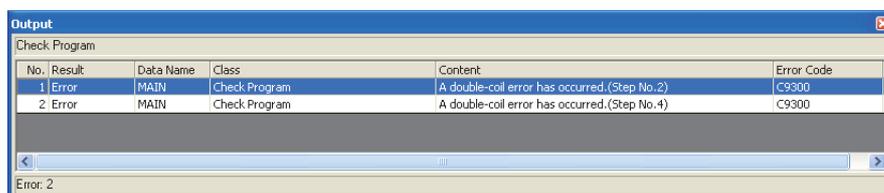
Point

● **When do not check duplicated coils for SET instruction**
By setting the following option, SET instructions will not be detected as duplicated coils.
Select "Do not target the SET instruction for duplicated coil check" under [Tool] ⇒ [Options] ⇒ "Check Program".

## 10.2 For Projects with Labels

Q CPU **L CPU** **FX**

This section explains how to convert/compile the uncompiled programs created in the project with labels.

10.2.1 Converting/compiling created programs

Convert/compile a created program.
Since this process compiles only uncompiled programs, the compiling time can be reduced.
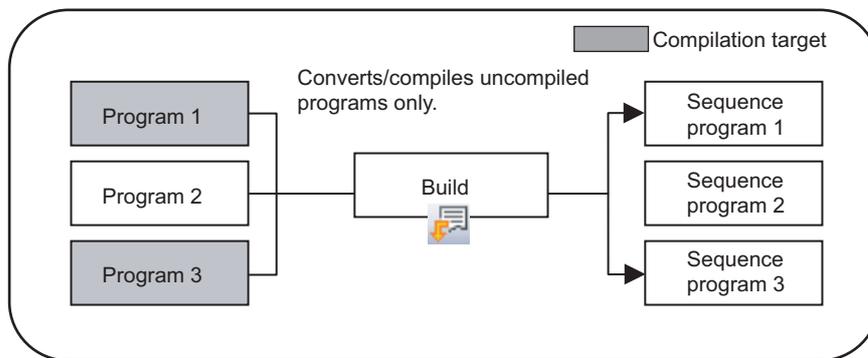
Point

● **Conversion and compilation**
The following explains the difference between conversion and compilation.
Conversion: Confirms edited content of ladder/SFC programs.
Compilation: Assigns devices to labels and creates a code to execute the program on a programmable controller CPU.

Operating procedure

1. **Select [Compile] ⇒ [Build] (📰).**

The Confirm Build Method screen is displayed.
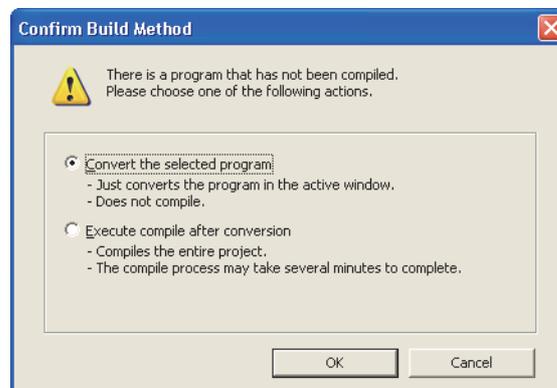
2. **Select "Execute compile after conversion", and click the** <kbd>OK</kbd> **button.**

Programs are compiled simultaneously with the conversion, and the result is displayed on the Output window.
By double-clicking the result (errors/warnings only), the corresponding error location in the program is displayed.
For checking errors/warning, refer to Section 10.4.
For SFC program, all the unconverted blocks are converted/compiled.
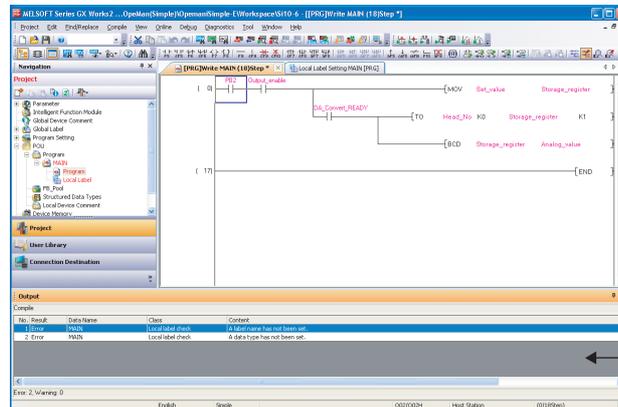
Output window

Point

● **Build function**
Only the program being edited is converted when "Convert the selected program" is selected on the <u>Confirm Build Method</u> screen.
The conversion operation is the same as the one for the project without labels. (☞ Section 10.1.1)
When two or more changes are required in a program, and if "Execute compile after conversion" is selected every time program is changed, processing time is required for each compilation.
To reduce compilation processing time, select "Convert the selected program" first, and select "Execute compile after conversion" after all changes are made in a program.
● **Compiling programs when adding/changing labels**
For considerations for compiling programs when adding/changing labels, refer to Section 10.3.3.
● **Saving project automatically after compiling programs**
A project can be saved automatically after compiling programs by setting the option.
Select "Save project after compiling" under [Tool] ⇒ [Options] ⇒ "Project" ⇒ "Automatic Save".


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10.2.2 Compiling all programs

Batch-convert/-compile all programs in the project.

Operating procedure

1. **Select [Compile] ⇒ [Rebuild All] (⬚).**

The following message is displayed.
Clear the check box if the duplicated coil check, ladder program check, and consistency (pairing) check are not performed after the compilation.
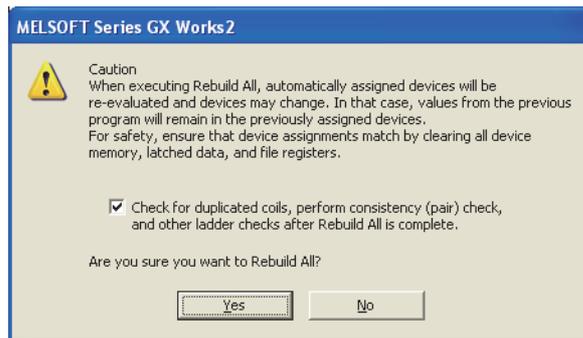
2. **Click the [Yes] button after reading and understanding the considerations described on the message.**

All programs are converted/compiled and the result is displayed on the Output window.
By double-clicking the result (errors/warnings only), the corresponding error location in the program is displayed.
For checking errors/warning, refer to Section 10.4.
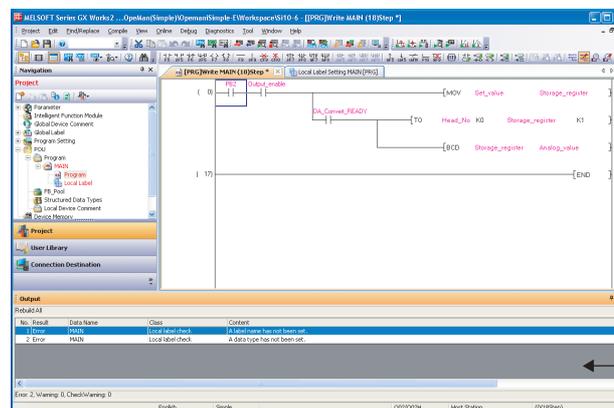
— Output window

Point ℘

● **Assigning devices to labels when compiling all programs**
For assigning devices to labels when compiling all programs, refer to Section 10.3.

● **When do not check duplicated coils for SET instruction**
By setting the following option, SET instructions will not be detected as duplicated coils.
Select "Do not target the SET instruction for duplicated coil check" under [Tool] ⇒ [Options] ⇒ "Compile" ⇒ "Basic Setting".

● **Saving project automatically after compiling programs**
A project can be saved automatically after compiling programs by setting the option.
Select "Save project after compiling" under [Tool] ⇒ [Options] ⇒ "Project" ⇒ "Automatic Save".

10.2.3 Executing online program change simultaneously with conversion/compilation

For the operation for executing the Online program change simultaneously with the conversion/compilation, refer to the following manual.

☞ GX Works2 Version 1 Operating Manual (Common)

10.2.4 Changing operating conditions of compilation

Change the operating conditions of compilation.

■ Changing the number of errors and warnings that stops compilation

The number of errors and warnings that stops compilation can be changed.
If the number of errors and warnings that occurred during compilation reaches the specified value, the compilation is aborted.

Screen display

Select [Tool] ⇒ [Options] ⇒ "Compile" ⇒ "Output Result".

```
Stop Build
   Stop Build by        Error     25  ▲▼
                        Warning   100 ▲▼
```
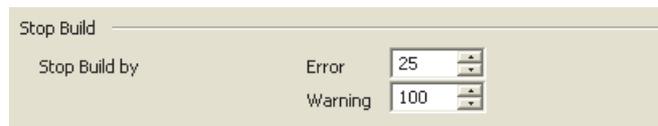
Operating procedure

- **Set the items on the screen.**

Item	Description
Error	Set the number of errors that stops compilation (1 to 9999).
Warning	Set the number of warnings that stops compilation (1 to 9999).

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■ Hiding warning messages

Messages displayed on the Output window when compiling programs can be hidden.
The registered warnings are not displayed on the Output window.

Screen display

Select [Tool] ⇒ [Options] ⇒ "Compile" ⇒ "Output Result".

Operating procedure

• **To register the warnings, enter the warning code and click the [Add] button.**

The registered warnings are not displayed on the Output window.

To cancel the registration, select the warning code and click the [Delete] button.
The unregistered warnings are displayed on the Output window.

Point

● **Warning codes**
Warning codes and their content can be checked on the Output window when compiling programs.
(☞ Section 10.4)
● **Maximum number of warnings to be invalidated**
A maximum number of warnings to be invalidated is 100.

■ Using VAR_OUTPUT for an argument of function block

Use VAR_OUTPUT for an argument of function block in an ST program.

Operating procedure

1. **Select [Tool] ⇒ [Options] ⇒ [Compile] ⇒ "ST" ⇒ "Compile Condition 1".**

2. **Select "Allow VAR_OUTPUT at FB call (ST)".**

If this check box is cleared, an error occurs when compiling programs.

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10.3 Compilation

Q CPU L CPU FX

By compilation operation, the labels are assigned to devices, and programs created in project with labels are converted to executable programs on a programmable controller CPU.

● **Checking the compilation status**

The compilation status can be checked on the Project view.

Data before compilation and data in which a compilation error occurs are displayed in red. After the compilation, the data other than compilation target are displayed in blue.

Uncompiled data can be displayed on the Project view by right-clicking on global label/POU/program file, and selecting [Open Uncompiled Data] from the shortcut menu. Uncompiled data status is displayed on the Project view.

The characters on the title bar are displayed in red when the project is uncompiled.

Data before compilation and a data in which a compilation error occurs are displayed in red.

Data other than compilation target is displayed in blue.

The characters on the title bar are displayed in white after compilation is completed.

Data other than compilation target is displayed in blue.

10.3.1 Compilation target data when compiling all programs

When compiling all programs, compilation target data are determined according to the registration/usage status of data type.

The following table shows the compilation target data.

○: Compiled, ×: Not compiled

Compilation target data type	Registration/usage status of compilation target data type	Compilation target when compiling all programs
Global label data	-	○
Program (program file)	Registered to any of the following programs. • Initial program • Scan program • Wait program • Fixed interval program • No execution type	○
Function block	Declared in the label setting editor.	○
	Not declared in the label setting editor.	×
Structure	Declared in the label setting editor.	○
	Not declared in the label setting editor.	×

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10.3.2　Assigning devices

Assign the devices to the labels set with the "Device/Label Automatic-Assign Setting" function during compilation.
For details of device assignment when inline structured text or ST is used, and considerations, refer to the following.
☞ GX Works2 Version 1 Operating Manual (Structured Project)

■　Assigning devices defined on the label setting editor to the labels

The following explains the device assignment to the labels defined on the label setting editor.
For global labels, only labels whose "Device" is blank on the label setting editor can be assigned.
When both global labels and local labels are assigned, global labels are assigned to devices first, and then local labels are assigned to devices.

● Assigning only one type of device automatically

Assign the devices in top down order on the label setting editor.
Devices are assigned in descending order on the screen (assigned from higher number of a device number) of device range set with the "Device/Label Automatic-Assign Setting" function.
For pointer (P), devices are assigned in ascending order (assigned from lower number of a device number).

Example: <Device automatic-assign setting>
　Set the following device range.
　　• D device: 8000 to 8191

<Label setting>

	Class		Label Name	Data Type
1	VAR	▼	Label_A	Word[Signed]
2	VAR	▼	Label_B	Word[Signed]
3	VAR	▼	Label_C	FLOAT (Double Precision)
4	VAR	▼	Label_D	FLOAT (Double Precision)

<Devices to be assigned to labels>

Definition order	Label name	Data type	Example of devices to be assigned	
1	Label_A	Word (signed)	D8191	Descending order
2	Label_B	Word (signed)	D8190	
3	Label_C	Double-precision real	D8186	
4	Label_D	Double-precision real	D8182	

● **Assigning multiple types of device automatically (QCPU (Q mode)/LCPU)**

Assign the devices in top down order on the label setting editor.

Devices are assigned in descending order (assigned from higher number of a device number) of device range set with the "Device/Label Automatic-Assign Setting" function.

When the number of devices is less than the number of devices required for one label, devices are assigned in descending order of the next device's device range.

When the following label requires the devices which are within the above device range, the previous devices which are not assigned are assigned.

Example 1: <Device automatic-assign setting>

Set the following device range.

- D device: 8000 to 8002
- ZR device: 0 to 1023

<Label setting>

	Class	Label Name	Data Type
1	VAR	Label_A	Word[Signed]
2	VAR	Label_B	Word[Signed]
3	VAR	Label_C	FLOAT (Double Precision)
4	VAR	Label_D	FLOAT (Double Precision)

<Devices to be assigned to labels>

Definition order	Label name	Data type	Example of devices to be assigned	
1	Label_A	Word (signed)	D8002	Descending order
2	Label_B	Word (signed)	D8001	
3	Label_C	Double-precision real	ZR1020[*1]	
4	Label_D	Double-precision real	ZR1016	

*1 :   Since double-precision real requires four devices, one device of D8000 is not enough. Therefore, the next device ZR is assigned.

Example 2: <Device automatic-assign setting>

Set the following device range.

- D device: 8000 to 8002
- ZR device: 0 to 1023

<Label setting>

	Class	Label Name	Data Type
1	VAR	Label_A	Word[Signed]
2	VAR	Label_B	FLOAT (Double Precision)
3	VAR	Label_C	Word[Signed]
4	VAR	Label_D	FLOAT (Double Precision)

<Devices to be assigned to labels>

Definition order	Label name	Data type	Example of devices to be assigned	
1	Label_A	Word (signed)	D8002	Descending order
2	Label_B	Double-precision real	ZR1020[*1]	
3	Label_C	Word (signed)	D8001[*2]	
4	Label_D	Double-precision real	ZR1016[*3]	

*1 :   Double-precision real requires four devices, two device of D8000 to D8001 are not enough. Therefore, the next device ZR is assigned.

*2 :   Since word (signed) requires one device, D8001 can be assigned. Therefore, return to the previous device (D device), and the device is assigned to the label.

*3 :   Since double-precision real requires four devices, one device of D8000 is not enough. Therefore, the next device ZR is assigned.

■ **Assigning to temporary variable (automatically assigned device to other than label)**

For details of device assignment to temporary variable, and considerations when inline structured text or ST is used, refer to the following.
☞ GX Works2 Version 1 Operating Manual (Structured Project)

■ **Checking usage of automatically assigned devices**

The usage of devices within the range set on the <u>Device/Label Automatic-Assign Setting</u> screen can be checked when compiling programs.
After programs are compiled, the usage of device points and device assignment range are displayed on the Output window.
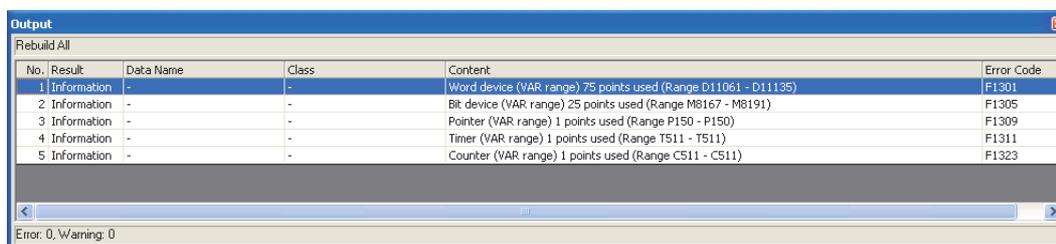
Output						
Rebuild All						
No.	Result	Data Name	Class	Content		Error Code
1	Information	-	-	Word device (VAR range) 75 points used (Range D11061 - D11135)		F1301
2	Information	-	-	Bit device (VAR range) 25 points used (Range M8167 - M8191)		F1305
3	Information	-	-	Pointer (VAR range) 1 points used (Range P150 - P150)		F1309
4	Information	-	-	Timer (VAR range) 1 points used (Range T511 - T511)		F1311
5	Information	-	-	Counter (VAR range) 1 points used (Range C511 - C511)		F1323
Error: 0, Warning: 0						

Point

● **Displaying usage of device assignment range**
   Assigned devices from the minimum number to the maximum number are displayed for the usage of device assignment range.
   When [Build] is executed repeatedly after changing/deleting labels, the devices which are not used are included in the usage points.
   Execute [Rebuild All] to display the correct usage of the device assignment range.

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10.3.3   Considerations of compilation

● **When the multiple types of devices are assigned automatically (QCPU (Q mode)/LCPU)**

Since the devices assigned once cannot be used, if a program or label is changed and executed "Build" repeatedly, the number of used devices is increased and the number of assignable devices is decreased. Execute "Rebuild All".
When D, W, R, ZR are selected as automatically assigned device concurrently, devices are assigned from D, W. If the number of D, W is not enough, devices are assigned from R, ZR.
Note that since the operation processing times of D, W, and R differ from that of ZR, the control timing may change depending on the program content.
For details of operation processing time, refer to the following manual.
☞ MELSEC-Q/L Structured Programming Manual (Common Instructions)

● **The "Device/Label Automatic-Assign Setting" function**

Devices in the range set with on the "Device/Label Automatic-Assign Setting" function (automatically assigned devices) cannot be used in the program.
If automatically assigned devices are used in a program, a compilation error occurs.
(For the "Device/Label Automatic-Assign Setting" function ☞ Section 5.8)

● **When array labels are used**

When devices/labels are used for indexes in array labels, the compilation result is created with the devices shown below.
Note that the device values may be overwritten when the following devices are used in user programs.

• Basic model QCPU, High Performance model QCPU: Z0, Z1

• Universal model QCPU, LCPU: Z16 to 19

• FXCPU: Z0, V0

● **Projects which use devices/labels for indexes in structure array labels**

The accessible number of array elements differs between GX Works2 Version 1.98C or earlier and GX Works2 Version 1.492N or later according to the programmable controller type and the index modification.
Review the program where over 65,536 array elements are accessed because the program operation may be changed if the project created in GX Works2 Version 1.98C or earlier is compiled.

● **Checking labels used for arguments of instruction**

The label checking method differs according to the programming language.

• For Ladder Diagram and Sequential Function Chart (Zoom), check if the devices are applicable to the instruction.

• For Structured Text, check if the data type is applicable to the instruction.

● **Canceling the compilation**

The compilation is canceled in a program file unit. Therefore, even when the [Cancel] button is clicked during the compilation, the compilation will not be canceled until the compilation of one program file is completed.
Note that a large-scale program file with multiple function blocks requires a longer time to cancel the compilation.

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● **Assigning devices to labels when compiling all programs**

All programs need to be compiled when the following operations are performed.

- Changing the following PLC parameters[*1]
  - "Common Pointer No." and "Timer Limit Setting" on the <<PLC System>> tab
  - "File Register" and "File for Local Device" on the <<PLC File>> tab
  - Settings on the <<Device>> tab
- Changing the following option settings
  - "Default Length of String Data Type" in "Label Setting Editor"
  - Settings in "Compile"
- Changing automatically assigned devices
- Changing PLC type
- Changing project type
- Reading data from programmable controller CPU (except for when reading symbolic information and parameters at the same time)
- Reading data written to the programmable controller CPU by GX Developer
- Using Open Other Project function

When all programs are compiled, devices are reassigned to labels in all POUs. If all the compiled programs are written to the programmable controller CPU and run as they are, the programs may be processed with the device values set before the program change.

After compiling all programs, clear the device values set before the program change by the following procedure.

Note that, by setting the following option, device values in the range set in the "Device/Label Automatic-Assign Setting" function can be automatically cleared to 0 after writing programs to the programmable controller CPU.

- [Tool] ⇒ [Options] ⇒ "PLC Read/Write" ⇒ "When writing to PLC after a Rebuild All operation, clear the device ranges set in the Device/Label Auto-Assign setting to 0"
  - [*1] : For QCPU (Q mode)/LCPU only

- **QCPU (Q mode)/LCPU**

  Operation

  1. **Switch the programmable controller CPU to STOP.**

  2. **Select [Online] ⇒ [Write to PLC], and write programs to the programmable controller CPU.**

  3. **Switch the programmable controller CPU to RESET.**
     It can also be reset by selecting [Compile] ⇒ [Remote Operation].

  4. **Select [Online] ⇒ [PLC Memory Operation] ⇒ [Clear PLC Memory] to clear the memories.**
     If VAR_RETAIN is set with the "Device/Label Automatic-Assign Setting" function, clear all device memories including latches.
     If file registers are set with the "Device/Label Automatic-Assign Setting" function, clear all file registers.

- **FXCPU**

  Operation

  1. **Switch the programmable controller CPU to STOP.**

  2. **Select [Online] ⇒ [Write to PLC], and write programs to the programmable controller CPU.**

  3. **Select [Online] ⇒ [PLC Memory Operation] ⇒ [Clear PLC Memory] to clear the device memories.**

The remote RUN function when writing data to programmable controller CPU after all the compiled programs can be disabled by setting the following option. Select "Turn PLC to STOP at time of PLC write after executing Rebuild All and do not execute remote RUN" under [Tool] ⇒ [Options] ⇒ "PLC Read/Write".

● **Compiling programs when adding/changing labels**

When programs are compiled after adding/changing labels, devices are assigned for added/changed labels. Device assignments of labels which are not added or changed do not change.
Since previous device values may remain among the devices reassigned to labels, clear the previous device values by the following procedure when adding/changing labels.

| Operation |

1. **Add/change labels only.**
   (Do not edit the programs.)

2. **Select [Compile] ⇒ [Build], and compile the programs.**

3. **Register added/changed labels to the Watch window and clear the current values to 0.**

4. **Edit the programs and select [Compile] ⇒ [Online Program Change].**

● **Modification of global labels and function blocks**

If global labels and/or function blocks are modified, multiple programs become the compilation targets. Write all program of the compilation targets to the programmable controller CPU to apply the modifications.

Example: Compiling programs after modifying Function block 1 in the following program configuration.
Function block 1 is compiled and the program MAIN and SUB1 are modified.
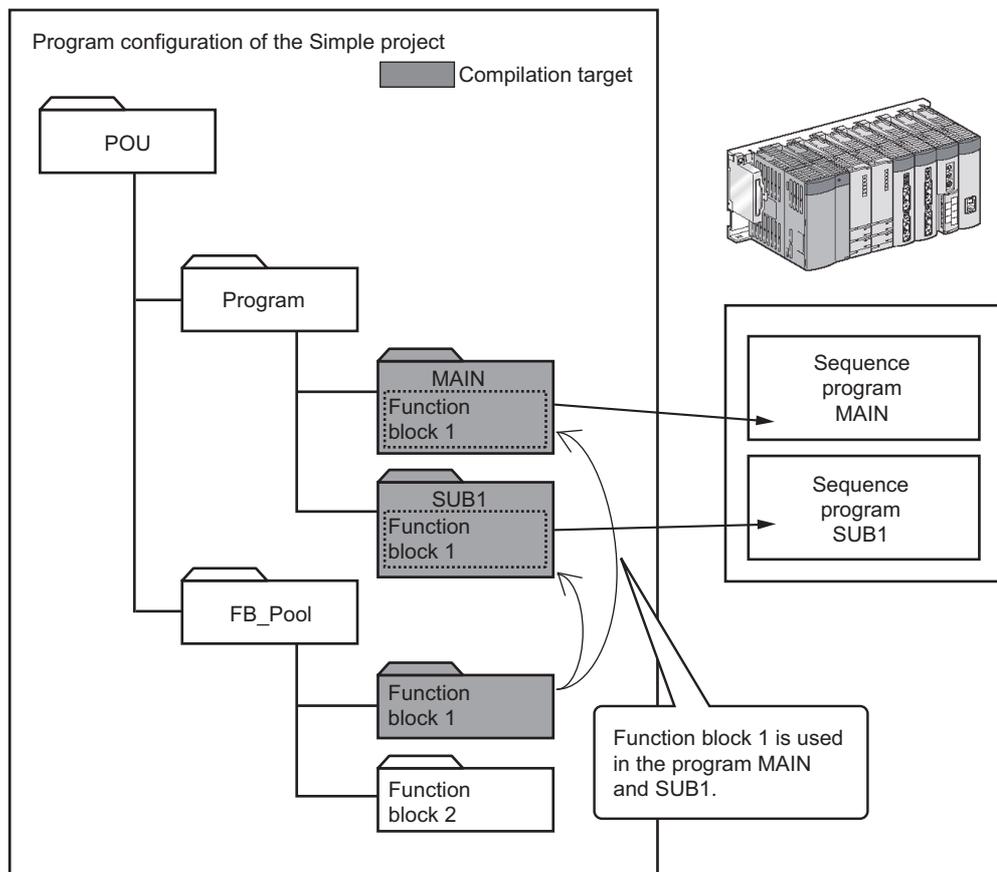
● **Input arguments of function block**

Data cannot be written to input arguments (VAR_INPUT) of function block.
If data are written to input arguments, a compilation error occurs.

● **Step numbers of label program**

Each step number of the label program is enclosed in parenthesis.
Step numbers may increase/decrease when the program is compiled.
Step numbers actually written to a programmable controller CPU are step numbers displayed on the device display. When writing the program to a programmable controller CPU, check the step numbers by displaying devices after the compilation.

\<Label display\>
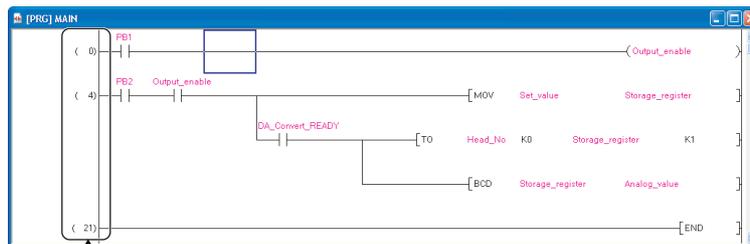
Step numbers of label program

\<Device display\>
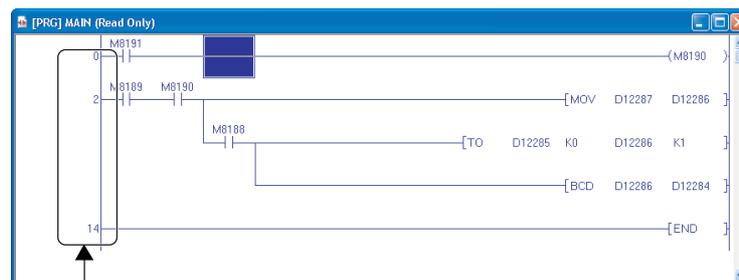
Step numbers of sequence program

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10.4   Checking for Errors and Warnings

<div style="text-align: right">**Q CPU** **L CPU** **FX**</div>

When the program check or the compilation is executed, the target programs and label settings are checked and the results are displayed on the Output window.
The following explains the checking method for errors displayed on the Output window.

Screen display
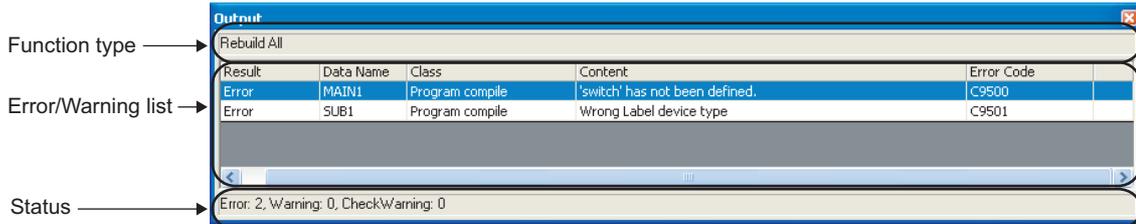
Display contents

Item		Content
Function type		Display the name of the executed function.
Error/warning list		-
	Result	Display the check results. Display "Error" or "Warning". Display "Check Warning" for the duplicated coil check/ladder program check/consistency check warnings.
	Data Name	Display data names with errors and warnings.
	Class	Display check types such as the compilation and program check.
	Content	Display descriptions of errors and warnings.
	Error Code	Display error code numbers.
Status		Display the total number of errors and warnings.

10.4.1　Correcting errors and warnings

Check and correct errors/warnings.

Operating procedure

1. **Double-click the error/warning message displayed on the Output window.**

The corresponding error location in the program is displayed.
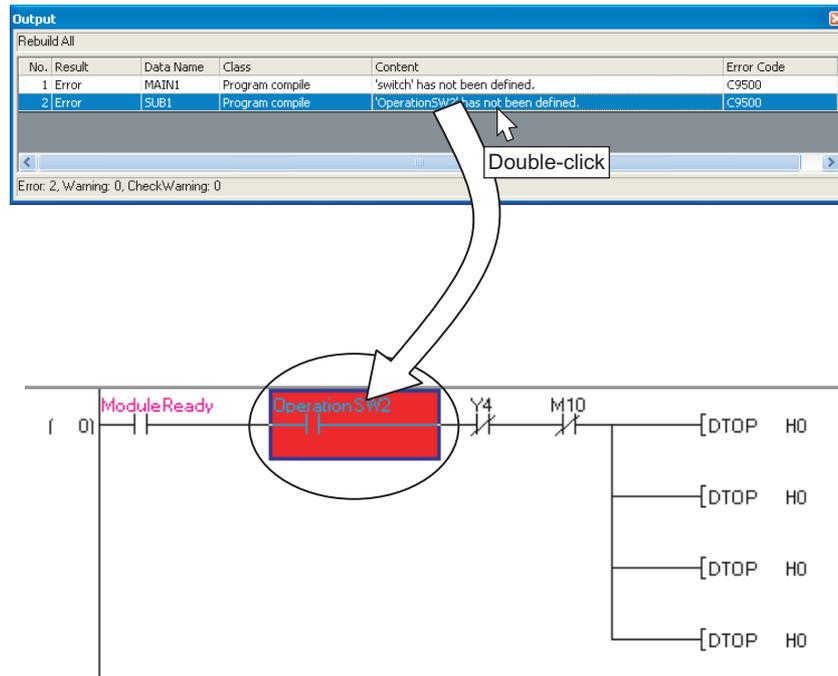
2. **Check the corresponding error location and correct the error as instructed by the error/warning message.**

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11 WRITING/READING DATA TO/FROM PROGRAMMABLE CONTROLLER CPU

This chapter explains how to write/read sequence programs to/from the programmable controller CPU or memory card.
For the overview of the data write/read operation, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**

11.1   Writing/Reading Data to/from Programmable Controller CPU

Q CPU **L CPU** **FX**

This section explains how to write the Simple project data to the programmable controller CPU or memory card, and how to read the data from the programmable controller CPU or memory card to the project.

For FXCPU projects with labels, created project data can be read from FX3U/FX3UC version 3.00 or later only.

Screen display

Select [Online] ⇒ [Write to PLC] (🖥)/[Read from PLC] (🖥).

\<Write to PLC screen for the project without labels>

\<Write to PLC screen for the project with labels>
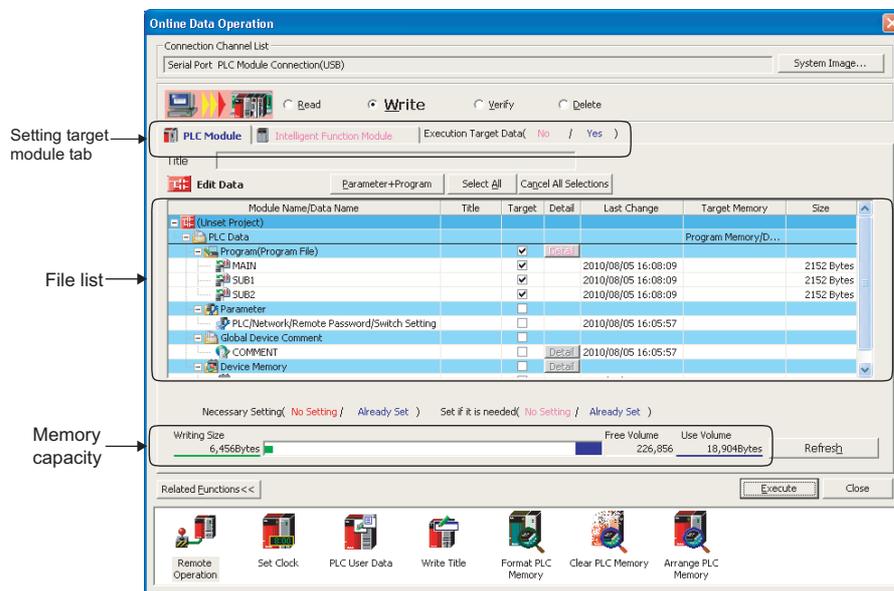
For QCPU (Q mode)/LCPU/FXCPU (FX3U/FX3UC version 3.00 or later), symbolic information is displayed on the file list.

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Operating procedure

1. **Set the items on the screen.**

Item		Description
Connection Channel List		Display the information on the set connection destination.
Setting target module tab		Switch the setting target module. If the target data of write/read exists, the color of the tab name is displayed in blue.
	PLC Module	Set to write the data to the programmable controller CPU.
	Intelligent Function Module*1	Set to write the data of the intelligent function module to buffer memory/flash ROM of the intelligent function module. ☞ GX Works2 Version 1 Operating Manual (Common)
Title*1		Display the title of the target memory by clicking the [Refresh] button.
Option*2		-
	Display Size	Select this to display "Size" in the file list and the memory capacity.
File list		-
	Target	Select the data to be written/read.
	Target Memory	Select the memory from the list (▼) by clicking the cell under "Target Memory". For details of the memory card application, refer to the following manual. ☞ QCPU User's Manual (Hardware Design, Maintenance and Inspection) ☞ MELSEC-L CPU module User's Manual (Hardware Design, Maintenance and Inspection)
Memory capacity*3		-
	Writing Size	Display the total size of written data selected in "Target".
	Free Volume	Display the free space volume of the target memory.
	Use Volume	Display the used space volume of the target memory.

*1 : Not supported by FXCPU.
*2 : Displayed only when writing data to the programmable controller PLC using a project with labels.
*3 : For FXCPU, program size and symbolic information data size are displayed when executing the Write to PLC function. Symbolic information size is displayed on the screen for projects with labels of FX 3U/FX3UC version 3.00 or later only.

When a program (program file), device comment, or device memory is selected, the range can be set by clicking the [Detail]/[Detail] button.
When reading data from the programmable controller CPU, and the device memory is selected, the detailed settings are required.
For details, refer to the following manual.
☞ GX Works2 Version 1 Operating Manual (Common)

2. **Click the [Execute] button.**

When the Write to PLC function is executed, the specified data are written to the target memory.
When the Read from PLC function is executed, the specified data are read from the target memory.

Screen button

● System Image...
  Displays the illustration of the connection channel list.

● Parameter + Program
  Selects the parameters and all programs displayed on the list.

● Select All
  Selects all data displayed on the list.

● Cancel All Selections
  Cancels the selection status of all data displayed on the list.

● Related Functions>> / Related Functions<<
  Switches display/hide of the Related functions button.
  For details of the related functions, refer to the following manual.
  ☞ GX Works2 Version 1 Operating Manual (Common)

● Acquire Symbolic Information Project Name **(Read from PLC, Delete PLC Data only)**
  Displays the project name of the symbolic information on the Title/Project Name column.
  It is not displayed for projects without labels and FXCPU.

● Refresh
  Updates file list on the Online Data Operation screen.
  For QCPU (Q mode)/LCPU, updates writing size, free space volume, and used space volume.
  When multiple personal computers are connected to the programmable controller CPU, update the
  target memory before reading data from the programmable controller CPU.

■ **Symbolic information**

The symbolic information is data that store the program configuration such as structures and labels.
To restore these data included in the symbolic information when reading a program from the programmable controller CPU, write/read the symbolic information to/from the programmable controller CPU.
Data such as structures and labels included in the symbolic information cannot be restored if only sequence programs are read.

The following table shows the program data included in the symbolic information.

Item	Included data	
Symbolic information	Global label	
	POU	
		Program
		Local label
		Function block
		Structure

Point

● **Compile status when the symbolic information is read**
  • When the symbolic information and parameters are read simultaneously, and the data in the symbolic information match with parameters and programs (program files) on the programmable controller CPU, the read data are in compiled status.
  • When only the symbolic information is read, the read data are in uncompiled status.
  • When the symbolic information of GX Developer or GX IEC Developer is read, the read data are in uncompiled status. Compile the program again after executing the Read from PLC function.

● **Considerations for reading symbolic information**
  For the considerations for reading label programs (symbolic information) of the existing application using GX Works2, or reading label programs (symbolic information) of GX Works2 using the existing application, refer to the following manual.
  (☞ GX Works2 Version 1 Operating Manual (Common))

● **For FXCPU**
  • Symbolic information can be read from/write to a programmable controller CPU in a project of FX3U/FX3UC version 3.00 or later only.
  • When a memory cassette to which the symbolic information has been written is used on an FXCPU other than FX3U/FX3UC version 3.00 or later, the memory cassette can be used, however, the symbolic information cannot be read from the memory cassette.
  When the symbolic information is written to a memory cassette on an FXCPU other than FX3U/FX3UC version 3.00 or later, the symbolic information may be corrupted.

● **Saving project automatically after writing data to programmable controller CPU**
  A project can be saved automatically after writing data to the programmable controller CPU by setting the option.
  Select "Save project after writing to PLC" under [Tool] ⇒ [Options] ⇒ "Project" ⇒ "Automatic Save".

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12 MONITORING

This chapter explains how to monitor the program execution status of the programmable controller CPU using the program editor.
For the overview of monitoring, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**

12.1 Starting and Stopping Monitoring Programs

`Q CPU` `L CPU` `FX`

This section explains how to monitor a program.
Open the program editor to be monitored in advance.

■ Starting monitoring programs

Start monitoring the program.

Operating procedure

- **Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] (🖳).**

  The monitoring starts.

■ Stopping monitoring programs

Stop monitoring the program.

Operating procedure

- **Select [Online] ⇒ [Monitor] ⇒ [Stop Monitoring] (🖳).**

  The monitoring stops.

> **Point** 🔎
>
> ● **Monitoring when "Use the Switching Ladder Edit Mode (Read, Write, Monitor, Monitor (Write))" is selected in the option setting**
>   - During monitoring the programs, ladder programs cannot be edited since the ladder editing mode becomes 'monitor mode'.
>   Switch to 'monitor (write mode)' to edit the ladder programs. (☞ Section 6.1.2)
>   - After stop monitoring, the monitor can be restarted by pressing the shortcut keys (F3 / Shift + F3) of 'monitor mode' or 'monitor (write mode)'.
>
> ● **Changing current values**
>   During monitoring, bit devices can be forced ON/OFF and the current values of devices, buffer memories, and labels can be changed.
>   For forcing bit devices ON/OFF and changing current values, refer to the following manual.
>   ☞ GX Works2 Version 1 Operating Manual (Common)
>
> ● **ON/OFF status display**
>   During monitoring, the ON/OFF status of bit device is displayed as shown below.
>
> ON : ─■─ ─▨─ ─◀ ▶─ ─▐ ▐─ *1
>
> OFF : ─┤├─ ─┤╱├─ ─( )─ ─[ ]─ *1
>
>   *1 : The following comparison instructions that are equivalent to contacts and instructions that are equivalent to coils are supported.
>   Comparison instructions equivalent to contacts: 16-bit BIN data comparison instructions, 32-bit BIN data comparison instructions, 32-bit floating-point data comparison instructions, 64-bit floating-point data comparison instructions
>   Instructions equivalent to coils: SET, RST, PLS, PLF, SFT, SFTP, MC, FF, DELTA, DELTAP
>
> ● **Monitoring buffer memory and link direct device**
>   To monitor the ON/OFF status of the buffer memory and link direct device (example: U0\G0.1), select [Tool] ⇒ [Options] ⇒ "Monitor" ⇒ "Ladder" ⇒ "Operational Setting" and select "Monitor buffer memory and link direct device".
>
> ● **Monitoring in FX series**
>   The GX Works2 display format can be switched to the FXGP(DOS)/FXGP(WIN) display format in FX series. For details of switching the display format, refer to Section 12.2.3.

12.2 Changing Display Conditions of Monitoring

Q CPU   L CPU   FX

This section explains how to change the display conditions of monitoring.

12.2.1 Changing current value display format (decimal/hexadecimal) of word type variable

Change the current value display format of word type variable displayed during monitoring.

■ Changing display format during monitoring

Change the current value display format of word type variable during monitoring.

Operating procedure

- **Select [Online] ⇒ [Monitor] ⇒ [Change Value Format (Decimal)] / [Change Value Format (Hexadecimal)].**
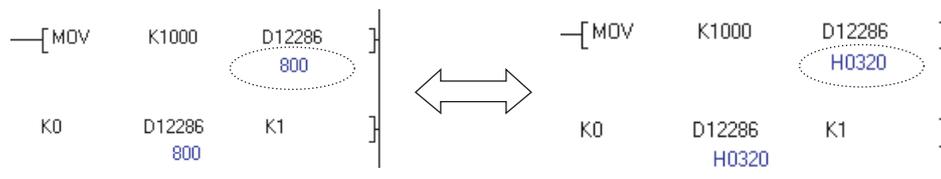
■ Changing display format before starting monitoring

Change the current value display format by setting the option.
The monitoring starts with the set display format.

Operating procedure

- **Select [Tool] ⇒ [Options] ⇒ "Monitor" ⇒ "Ladder" ⇒ "Display Format of Monitoring Value" ⇒ "Decimal"/"Hexadecimal".**

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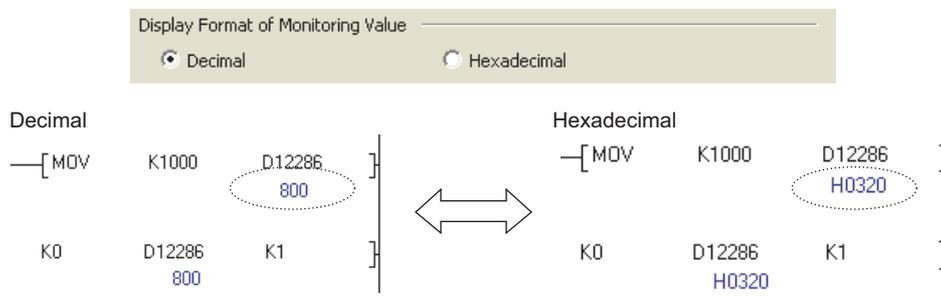
12.2.2   Monitoring buffer memory and link direct device

Select whether to monitor the buffer memory and link direct device at monitoring.
The scan time of the programmable controller CPU can be reduced by not monitoring the buffer memory and link direct device.
For FXCPU, this function is supported by FX3U and FX3UC only.

Operating procedure

- **Select [Tool] ⇒ [Options] ⇒ "Monitor" ⇒ "Ladder" ⇒ "Operational Setting", and select or clear "Monitor buffer memory and link direct device".**

12.2.3 Switching to FXGP(DOS)/ FXGP(WIN) display format (FXCPU)

Switch the GX Works2 display format to the FXGP(DOS)/FXGP(WIN) display format by setting the option.
As either display is selected, it does not influence the actual FXCPU operations.

Operating procedure

• **Select [Tool] ⇒ [Options] ⇒ "Monitor" ⇒ "Ladder" ⇒ "Operational Setting" ⇒ "FXGP format Ladder monitor".**

■ Comparing monitor display

Example
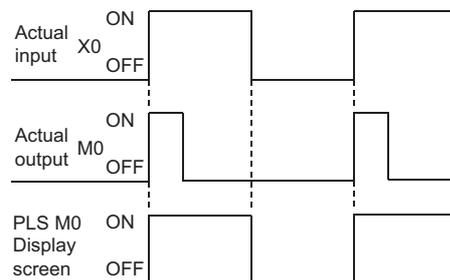
```
        X000
   0 ───┤ ├──────────────────────────────────────────[ PLS    M0    ]

        X001
   3 ───┤ ├──────────────────────────────────────────[ PLF    M1    ]
```

<Monitor display for the PLS instruction>

・GX Works2 format display   ・FXGP(DOS), FXGP(WIN) format display

<Monitor display for the PLF instruction>

・GX Works2 format display   ・FXGP(DOS), FXGP(WIN) format display
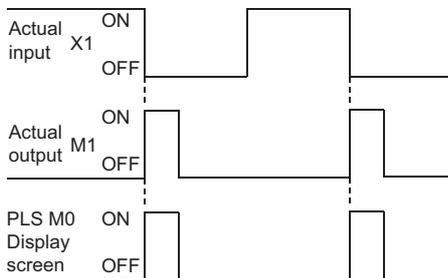
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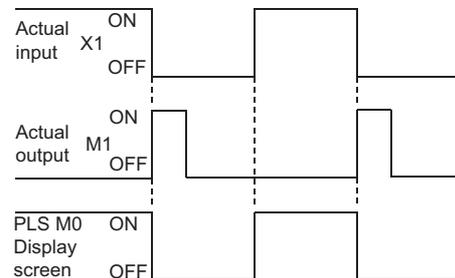
12.3   Monitoring Ladder Programs

This section explains how to monitor a ladder program.
Open the program editor to be monitored in advance.

12.3.1   Monitoring ladder programs

`Q CPU`   `L CPU`   `FX`

Start monitoring a ladder program.

Operating procedure

- **Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] (🔍).**

  The monitoring starts.

12.3 Monitoring Ladder Programs

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● **ON/OFF status display**
During monitoring, the ON/OFF status of bit device is displayed as shown below.

ON : ■ ▮ ◀ ▶ ▮ ▮ *1

OFF : ─┤ ├─ ─┤/├─ ─( )─ ─[ ]─ *1

*1 : The following comparison instructions that are equivalent to contacts and instructions that are equivalent to coils are supported.
Comparison instructions equivalent to contacts: 16-bit BIN data comparison instructions, 32-bit BIN data comparison instructions, 32-bit floating-point data comparison instructions, 64-bit floating-point data comparison instructions
Instructions equivalent to coils: SET, RST, PLS, PLF, SFT, SFTP, MC, FF, DELTA, DELTAP

● **Word device monitor values**
When the current value is a large value, "..." is appended to the value as shown below to omit the following numbers. The omitted numbers can be checked by any of the following operations.
• Place the cursor on the monitor value, and display the tooltip.
• Select [View] ⇒ [Zoom].
• Select [View] ⇒ [Text Size] ⇒ [Smaller]. (Hold the ⎡Ctrl⎤ key and rotate the mouse middle scroll button backward)

─────────────[DINC   D0   ]
                       21159263...
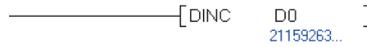
● **Monitor display at use of master control instructions**
In GX Works2, the set/reset status of the master control is not displayed on the left power rail of the ladder program during monitoring.
It is displayed on the title bar of the tab.

Set/reset status of
the master control
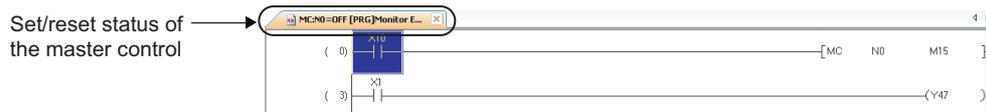
Restrictions

● **Monitoring values of indirectly specified devices**
When monitoring the indirectly specified devices, effective monitoring values are only word, even though double word unit is displayed.

Effective
monitoring value

■ Displaying ON/OFF status with devices of contacts and coils

Display the ON/OFF status with devices of contacts/coils being monitored by setting the option.

Operating procedure

- **Select [Tool] ⇒ [Options] ⇒ "Monitor" ⇒ "Ladder" ⇒ "Operational Setting" ⇒ "Display monitored value by device/label name of contact/coil instruction".**

● **Available contact/coil instructions**
The following table shows the display availability of ON/OFF status of contact/coil instructions.

○: Available, ×: Not available

Contact/coil instruction	Toolbar	Display availability of ON/OFF status
Open contact	⊣⊦ F5	○
Open contact branch	⊔⊔ SF5	○
Closed contact	⊣⊬ F6	○
Closed contact branch	⊔⊬ SF6	○
Coil (except for Timer/Counter)	⟨⟩ F7	○
Coil (Timer/Counter)	⟨⟩ F7	×
Application instruction	⟨⟩ F8	×
Rising pulse	⊣↑⊦ SF7	○
Falling pulse	⊣↓⊦ SF8	○
Rising pulse branch	⊔↑⊔ aF7	○
Falling pulse branch	⊔↓⊔ aF8	○
Rising pulse close	⊣↑⊬ saF5	○
Falling pulse close	⊣↓⊬ saF6	○
Rising pulse close branch	⊔↑⊬ saF7	○
Falling pulse close branch	⊔↓⊬ saF8	○
Operation result rising pulse	↑ aF5	○
Operation result falling pulse	↓ caF5	○
Invert operation results	⊣/⊦ caF10	×
MC display (read mode)	-	○
Bit display in comparison operation instruction	-	×
Contact display in STL instruction	-	×

Point

● **ON/OFF status display**
During monitoring, the ON/OFF status is displayed as shown below.

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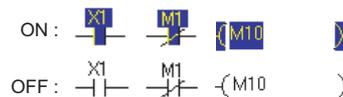
12.3.2 Monitoring programs with reference window

Q CPU L CPU FX

Different sections of the same program can be monitored simultaneously by monitoring the program with the reference window.
The reference window is displayed as another window of the active ladder editor.
Note that the reference window can be displayed only when the ladder editor is not using any inline structured text program, and the program cannot be edited on the reference window.

■ Open the reference window from ladder editor

Screen display

Select [View] ⇒ [Open Other Window] ⇒ [Open Reference Window].

Reference source window

Reference window
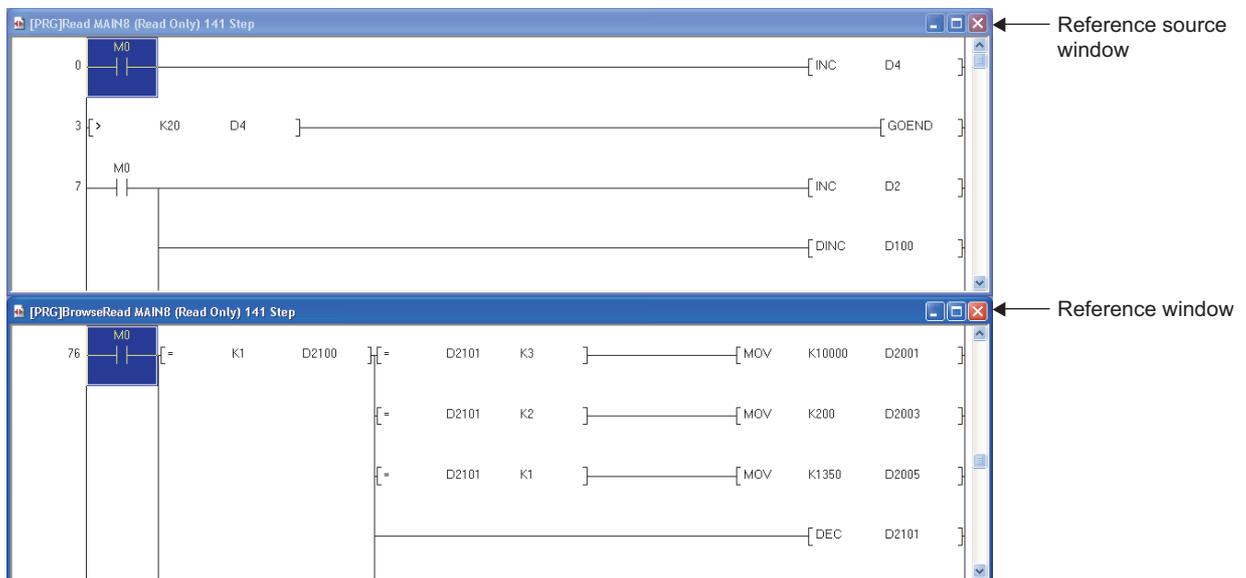
Restrictions

● **Considerations on the search function**
The search function can be used in the following conditions only.
• When "(Current Window)" is selected for "Find In" on the Find/Replace screen.
• When the screen for the simple search function is activated from the reference window.

■ **Updating the reference window**

Operating procedure

- **Select [View] ⇒ [Open Other Window] ⇒ [Update Reference Window].**

  The program on the reference window is updated with the information edited on the reference source window.

■ **Opening the reference source window**

Operating procedure

- **Select [View] ⇒ [Open Other Window] ⇒ [Open Reference Source Window].**

  The reference source window is displayed.

12.3.3   Monitoring registered ladder blocks

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`Q CPU` `L CPU` `FX`

The Entry Ladder Monitor function allows monitoring ladder blocks of multiple programs in batch.
Register and monitor ladder blocks of the ladder program on the Entry Ladder Monitor screen.
Note that only ladder programs of project without labels can be registered.

■   Registering and monitoring ladder blocks

Register ladder blocks and monitor them.

Screen display

Select [Online] ⇒ [Monitor] ⇒ [Entry Ladder Monitor].

Registered ladder block information

Registered ladder block
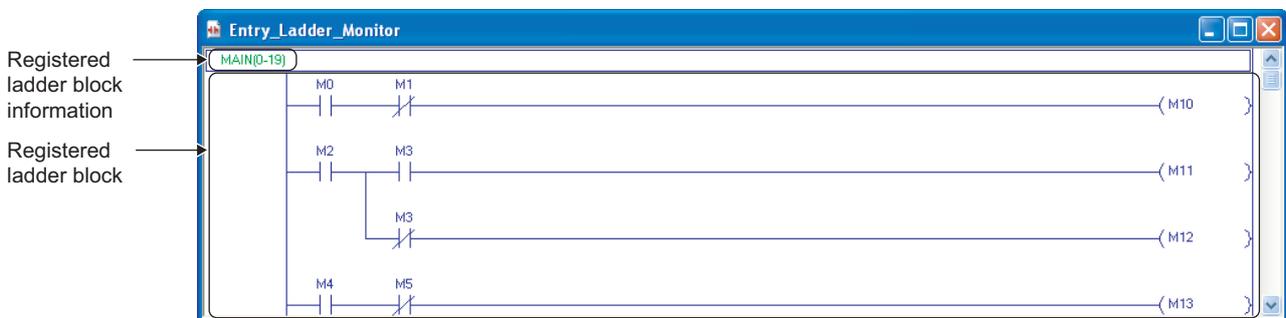
Display contents

Item	Description
Registered ladder block information	Display the information of registered ladder block in the following format. • 'program name' ('start step number' - 'end step number')
Registered ladder block	Display the registered ladder block. The registered ladder blocks cannot be edited.

Operating procedure

1. **Select a ladder block in the ladder program.**

2. **Select [Edit] ⇒ [Copy].**

3. **Select [Edit] ⇒ [Paste] on the Entry Ladder Monitor screen.**
The copied ladder block is pasted.

4. **Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] (🔍).**
The monitoring of the registered ladder block starts.

Point

● **Applicable size for ladder block registration**
   The maximum applicable size for the ladder block registration is 6k steps.
● **Functions which can be performed on the Entry Ladder Monitor screen**
   The following functions can be performed on the Entry Ladder Monitor screen.
   • Searching for devices, instructions, and character strings
   • Displaying comments, statements, and notes
   • Changing current values
   • Dragging and dropping ladder blocks/contacts/coils to the Watch window
   • Dragging and dropping ladder blocks/contacts/coils to the ladder editor

■ Deleting registered ladder blocks

Delete registered ladder blocks.

● **Deleting a specified ladder block**

Operation

- **Select a ladder block to be deleted, and select [Edit] ⇒ [Delete].**
  The specified ladder block is deleted.

● **Deleting all ladder blocks**

Operation

- **Select [Online] ⇒ [Monitor] ⇒ [Delete All Entry Ladder].**
  All registered ladder blocks are deleted.

12.4 Monitoring SFC Programs

This section explains how to monitor SFC diagrams and SFC block list of SFC program.
Open the program editor to be monitored in advance.
The monitoring of the Zoom editor window is same as monitoring of ladder programs.
(☞ Section 12.3)

12.4.1 Monitoring SFC diagrams

Q CPU **L CPU** **FX**

Monitor active steps, inactive steps, and steps being on hold on the SFC diagram.

■ Starting monitoring programs of SFC diagram

Start monitoring the program of the SFC diagram.

Operating procedure

- **Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] (🔍).**

  The monitoring starts.
  <MELSAP3/FXCPU>

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<MELSAP-L (instruction format)>

<MELSAP-L (start conditions format)>
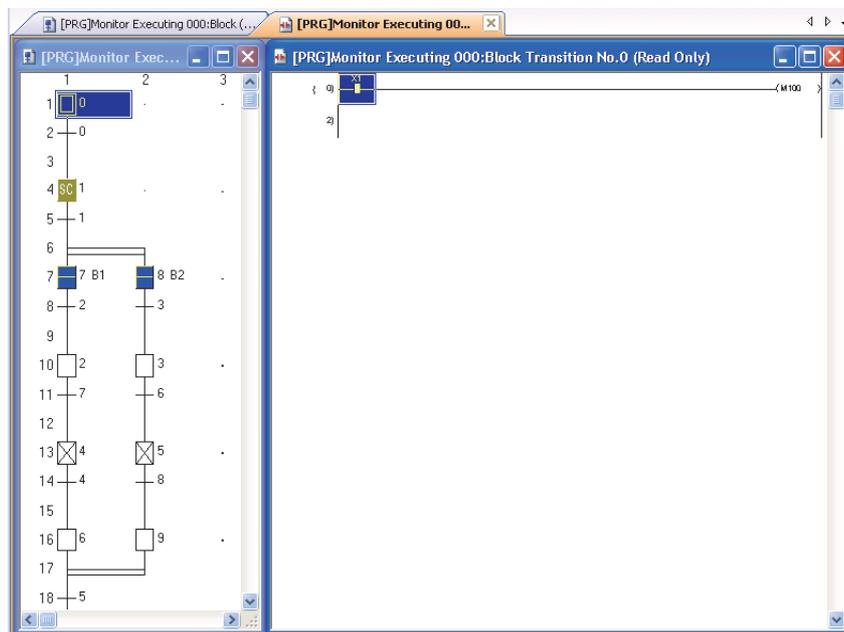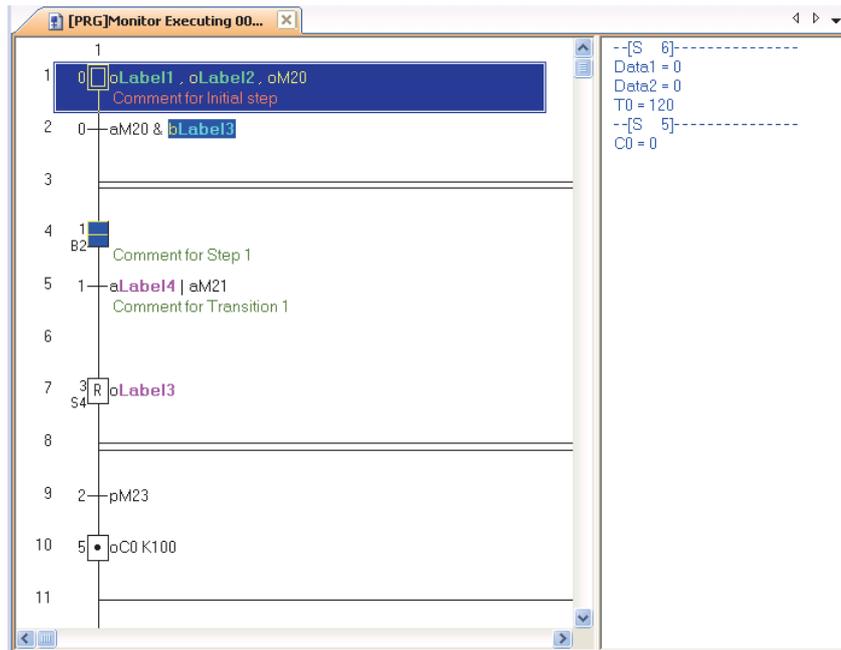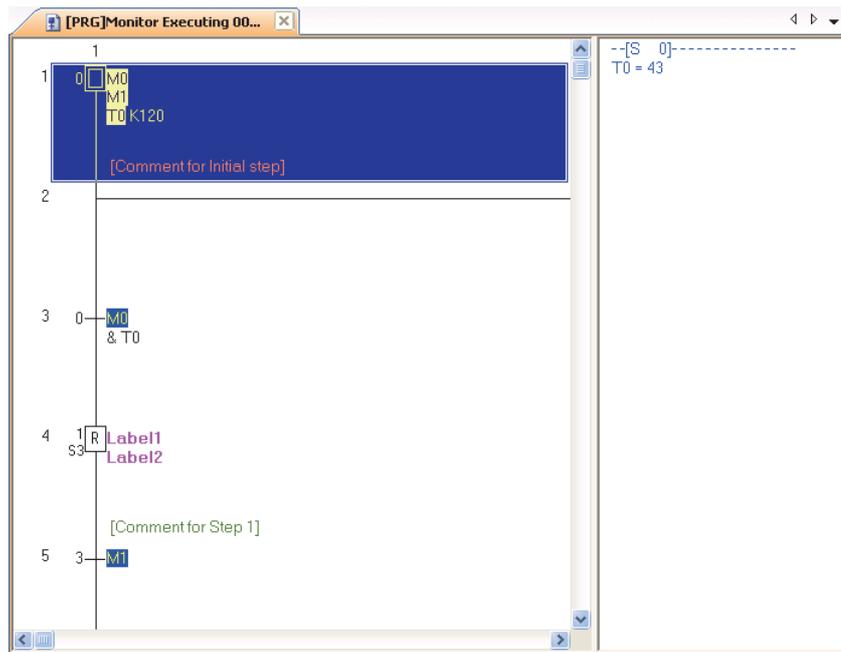
Display contents

Item	Description
■ (Blue)	Active step
□ (White)	Inactive step
▨ (Yellow)[*1]	A step specified as a hold step and being on hold.

*1 :   Not supported by FXCPU.

12.4 Monitoring SFC Programs

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● **Monitoring SFC diagram in MELSAP-L**

Bit devices/labels can be monitored on the SFC diagram.
The following table shows the highlighted display examples when the bit device/label of the operation output is conducting.

Instructions	Display example of monitoring[1]
<MELSAP-L (instruction format)>	–
Coil output, set output	oY70, sM100
Reset output (when the bit device to be reset is OFF)	rM200
When timer, counter, or high-speed timer is ON	oT0 K100, oC0 K200, hT0 K100
When time, counter, or high-speed timer is time up/ count up	oT0 K100, oC0 K200, hT0 K100
Bit device in application instruction is ON (except for the digit-specified bit device)	ENCOP M0 D8 K3
<MELSAP-L (start conditions format)>	–
Coil output	M0
When timer/counter is conducting	T0 K100, C0 K100
When timer times up/counter counts up	T0 K100, C0 K100

*1 : The bit device/label being displayed by "..." for the device name is not highlighted.

The following table shows the highlighted display example when the bit device/label of the transition condition is conducting.

Instructions	Display example of monitoring[1]
<MELSAP-L (instruction format)>	–
Open contact	aX0
Closed contact	bX10
Rising pulse	pM100
Falling pulse	fM200
Comparison operation instruction[2]	< D1 D100
<MELSAP-L (start conditions format)>	–
Open contact	M1
Closed contact	b M1

*1 : The bit device/label being displayed by "..." for the device name is not highlighted.
*2 : The string comparison operation instructions is not highlighted.

● **Monitoring word devices in MELSAP-L**

Word devices/labels can be monitored on the right side of the split window of an SFC diagram.
The split window will be displayed at start of monitoring.
The data type of the word device is displayed as follows.

Data type	Display	Display example of monitoring
16-bit integer	Displayed the specified device as it is.	D100 = 10
32-bit integer	Displayed with (D) added	D100(D) = 64
Single-precision real	Displayed with (E) added	D100(E) = 0.123
Double-precision real	Displayed with (ED) added	D100(ED) = 1.234e-012

■   **Displaying start destination blocks**

Display the start destination block when there is a block start step on the SFC diagram being monitored.

Operating procedure

- **Move the cursor to the block start step, and select [View] ⇒ [Open Zoom/Start Destination Block].**
  The start destination block is displayed.

Point

● **Another method for displaying start destination blocks**
   A start destination block can be also displayed by double-clicking the block start step while pressing the Ctrl key.

■ Auto scroll monitoring

Scroll the screen to display active steps automatically when they are out of the screen during monitoring.

Operating procedure

1. **Select [Online] ⇒ [Monitor] ⇒ [SFC Auto Scroll] (🔍).**

2. **Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] (🔍).**

While the auto scroll monitoring function is activated, active steps are scrolled on to the screen automatically when they are out of the screen.

Point

● **Starting method for the auto scroll monitoring function**

The auto scroll monitoring function also can be started by selecting [Online] ⇒ [Monitor] ⇒ [SFC Auto Scroll] (🔍) during monitoring.

● **When the auto scroll monitoring function is disabled**

When [Start Monitoring (All Windows)] is selected while the auto scroll monitoring function is being activated, the setting of the auto scroll monitoring function is disabled and a normal monitoring starts.

● **When multiple steps are active in series**

For multiple active steps in series caused by the stored operation steps, active steps close to initial steps are displayed when the auto scroll monitoring function is activated.

● **Operations when setting options**

When "Open Zoom with New Window" is selected under [Tool] ⇒ [Options] ⇒ "Program Editor" ⇒ "SFC" ⇒ "Zoom", and the auto scroll monitoring function is executed, the following message is displayed. If click the [Yes] button, the SFC diagram and the Zoom editor window are synchronized, and the operation output/transition condition programs that correspond to the active steps are monitored automatically. If the [No] button is clicked, only the SFC diagram is monitored.

Note that the program cannot be edited on the Zoom editor window that is displayed when the auto scroll monitoring function is activated.

● **Displaying a start destination block and starting monitoring during the auto scroll monitoring.**

For QCPU (Q mode)/LCPU, when the active step is moved to the start destination block during the auto scroll monitoring, the SFC editor of the start destination block can be opened and monitored automatically by selecting "Monitor block start with new window" under [Tool] ⇒ [Options] ⇒ "Monitor" ⇒ "SFC" ⇒ "SFC Auto Scroll Setting".

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12.4.2　Monitoring transitions

Q CPU　L CPU　FX

Monitor SFC steps that do not transfer after passing the specified time using the transition monitoring function.

Operating procedure

1. **Select [Tool] ⇒ [Options] ⇒ "Monitor" ⇒ "SFC", and set the items of "Transition Watch Monitor".**

For details of the setting items, refer to Section 13.2.
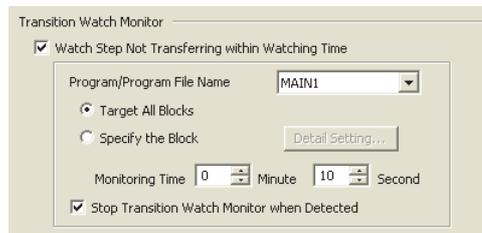
2. **Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] (🖳).**

While the transition monitoring function is activated, the following warning message is displayed when an SFC step that does not transfer after passing the specified time is detected.
Note that the display of the warning message may be delayed from the specified time depending on the operating system of the personal computer.
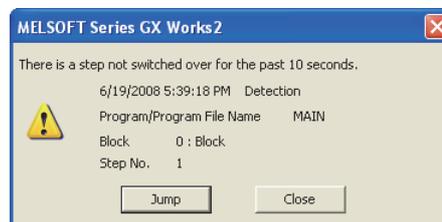
- The corresponding SFC step on the SFC diagram is displayed by clicking the [Jump] button.
- When "Stop Transition Watch Monitor when Detected" is selected in the "Transition Watch Monitor" setting, the transition monitoring function is stopped by the detection of an error step, but the normal monitoring continues operating.

12.4.3 Monitoring operation outputs and transition conditions

Q CPU L CPU FX

Monitor operation outputs/transition conditions of SFC steps/transitions on the Zoom editor window.

Operating procedure

1. **Select [View] ⇒ [Open Zoom/Start Destination Block].**

The Zoom editor window is displayed.

2. **Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] (📊).**

The monitoring starts.
For details of the monitoring, refer to Section 12.3.

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12.4.4 Batch monitoring all blocks, monitoring active steps

Q CPU L CPU FX

Monitor the active/inactive status of all blocks and step active/inactive status of the specified block in the list display during the execution of the SFC program.

■ Batch monitoring all blocks

Monitor the active/inactive status of all blocks in the list display.

Operating procedure

- **Select [Online] ⇒ [Monitor] ⇒ [SFC All Block Batch Monitoring] ( ).**

  The <u>SFC All Block Batch Monitoring</u> screen is displayed.
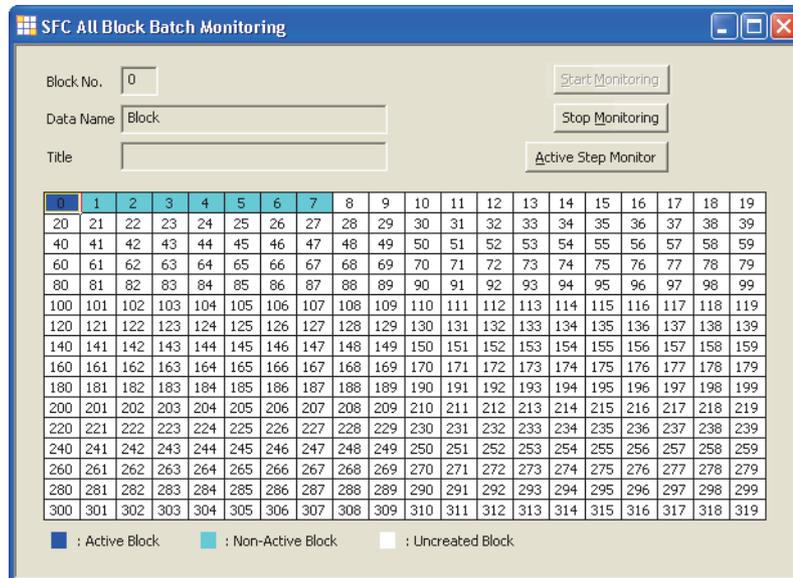
Display contents

Item	Description
Block No.	Display the block number at the cursor position.
Data Name	Display the data name of the block.
Title	Display the title of the block.

Screen button

- Active Step Monitor

  Monitors the SFC step active/inactive status of the specified block.

  ☞ ■ Monitoring SFC step active/inactive status of the specified block

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■ **Monitoring SFC step active/inactive status of the specified block**

Monitor the SFC step active/inactive status in the list display.

Operating procedure

- **Place the cursor at the block to be monitored on the <u>SFC All Block Batch Monitoring</u> screen, and click the [Active Step Monitor] button.**

  The <u>Active Step Monitor</u> screen is displayed.
  If the program is monitored with the programmable controller CPU set to STOP, the status at the STOP setting is displayed as the monitoring result.
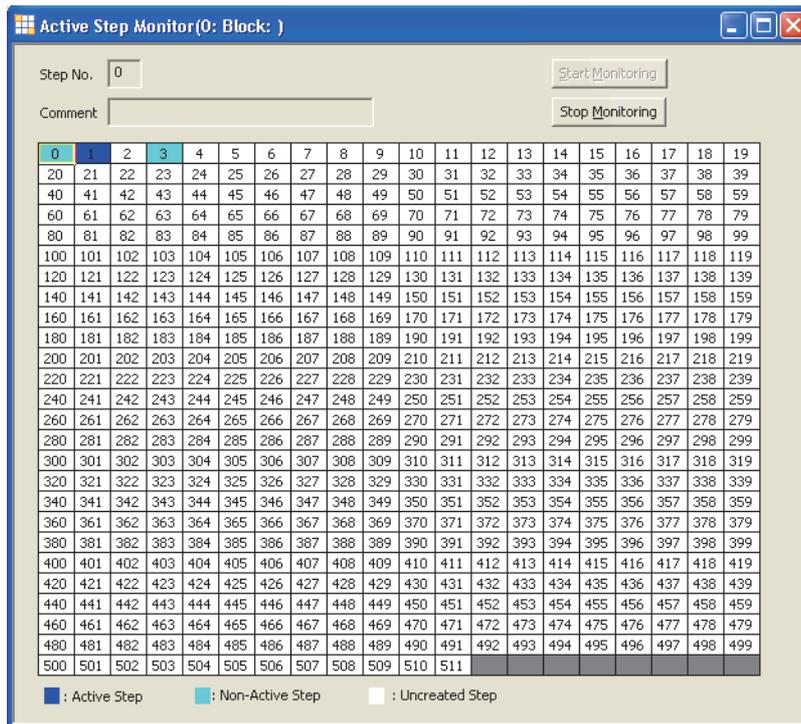
12.4.5 Monitoring SFC block list

Q CPU | L CPU | FX

Monitor an SFC block list.

Operating procedure

1. **Select [View] ⇒ [Open SFC Blocklist].**

The SFC block list is displayed.

2. **Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] ( ).**

The columns of the active block are displayed in blue.
When the block information is set, the ON/OFF status of the block information device/label can be checked on the SFC block list.
When the block information is not set, the program is not monitored.
By double-clicking the block column during monitoring, the SFC diagram of the specified block is displayed.

No.	Data Name	Title	Conversion Status	Block Start	Step Transition	Block PAUSE/RESTART	Pause Mode	Number of Active Steps	Continuous Transition Bit	Comment
0	Block	The first process	-	M0	M1	M2	M3	1	M4	Comment of Block0
1	Block1	The second process	-	M10	M11	M12	M13	0	M14	Comment of Block1
2	Block2	The third process	-	M20	M21	M22	M23	0	M24	Comment of Block2
3										
4										

[PRG]Read MAIN1 30 Step

12.5   Setting monitoring condition/monitoring stop condition

^{*1}

Q CPU   L CPU   FX

*1 : Not supported by Basic model QCPU, Q00UJCPU, Q00UCPU, and Q01UCPU.

Set a monitoring condition or monitoring stop condition.
Monitoring starts/stops when the specified condition is satisfied.

Screen display

Select [Online] ⇒ [Monitor] ⇒ [Monitor Condition Setting]/[Monitor Stop Condition Setting].

● **Monitoring condition setting**
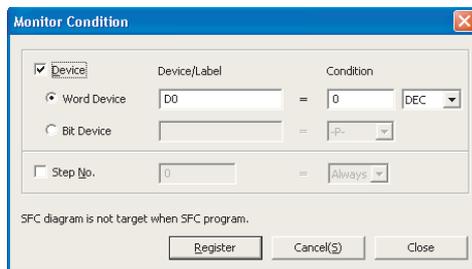
< Ladder, SFC (Zoom) >
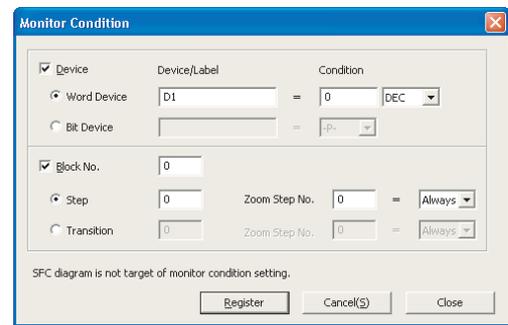
< SFC diagram >

● **Monitoring stop condition setting**

< Ladder, SFC (Zoom) >
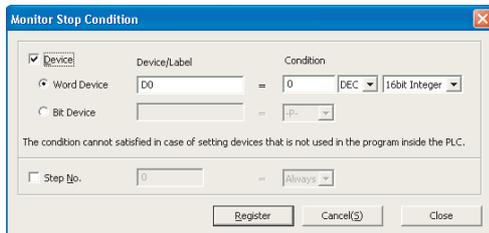
< SFC diagram >

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Operating procedure

1. **Set the items on the screen.**

Item		Description
Device		Select this to set a device/label for condition.
	Word Device	Select this to set a word device. Enter a device/label for "Device/Label". Enter a value for "Condition", and select decimal or hexadecimal by clicking ▼. When setting a monitoring stop condition, select 16-bit integer, 32-bit integer, or actual number by clicking ▼.
	Bit Device	Select this to set a bit device. Enter a device/label for "Device/Label", and select ↑ (Rise) or ↓ (Fall) for "Condition" by clicking ▼.
Step No.*1		Select this to set a step number for condition. Enter a step number, and select ↑ (Rise), ↓ (Fall), ON, OFF, or Always by clicking ▼. When "Always" is selected, the condition is not satisfied if the specified step number is skipped.
Block No.*2		Select this to set a block number for condition. Enter a block number.
	Step	Select this to set a step number or transition condition number of SFC diagram. Enter a step number or a transition condition number, and enter a step number of SFC (Zoom).
	Transition	Select ↑ (Rise), ↓ (Fall), ON, OFF, or Always by clicking ▼. When "Always" is selected, the condition is not satisfied if the specified step number is skipped.

*1 :   For ladder programs and SFC (Zoom) programs only
*2 :   For SFC programs only

2. **Click the** [Register] **button.**

The monitoring condition/monitoring stop condition is registered.
When the monitoring condition is registered, the monitoring stops.
The monitoring starts/stops when the specified condition is satisfied.

Click the [Cancel(S)] button before closing the Monitor Condition Setting screen or Monitor Stop Condition Setting screen.

Screen button

● [Cancel(S)]
Cancels the registered condition.

Point

● **Monitoring condition setting/monitoring stop condition setting**

- Monitoring values are not updated by registering a monitoring condition. They are updated when the registered condition is satisfied.
- Devices of inline structured text cannot be set for a monitoring condition or monitoring stop condition.
- A monitoring condition or monitoring stop condition cannot be set if the display format of SFC is MELSAP-L. Change the display format to MELSAP3. (☞ Section 2.3.7)
- When "Device" is selected, or both "Device" and "Step No." are selected, monitoring may not be stopped at the first satisfaction of the condition after the monitoring stop condition is set.

● **For High Performance model QCPU, Process CPU, and Redundant CPU**

- A monitoring condition or monitoring stop condition cannot be set when any of the following communication routes are used between a programmable controller CPU and a connection target.
  - CC-Link IE Field Network
  - Ethernet
  - CC-Link
  - C24
- When an online operation such as an SFC program monitoring is performed on the same network while registering the monitor condition, the canceling process of the monitor condition may require longer time.

MEMO

13 SETTING OPTIONS

This chapter explains the functions of options for setting screen display format or detailed operations of each function.

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13.1   Basic Operations

This section explains how to set options.

Screen display
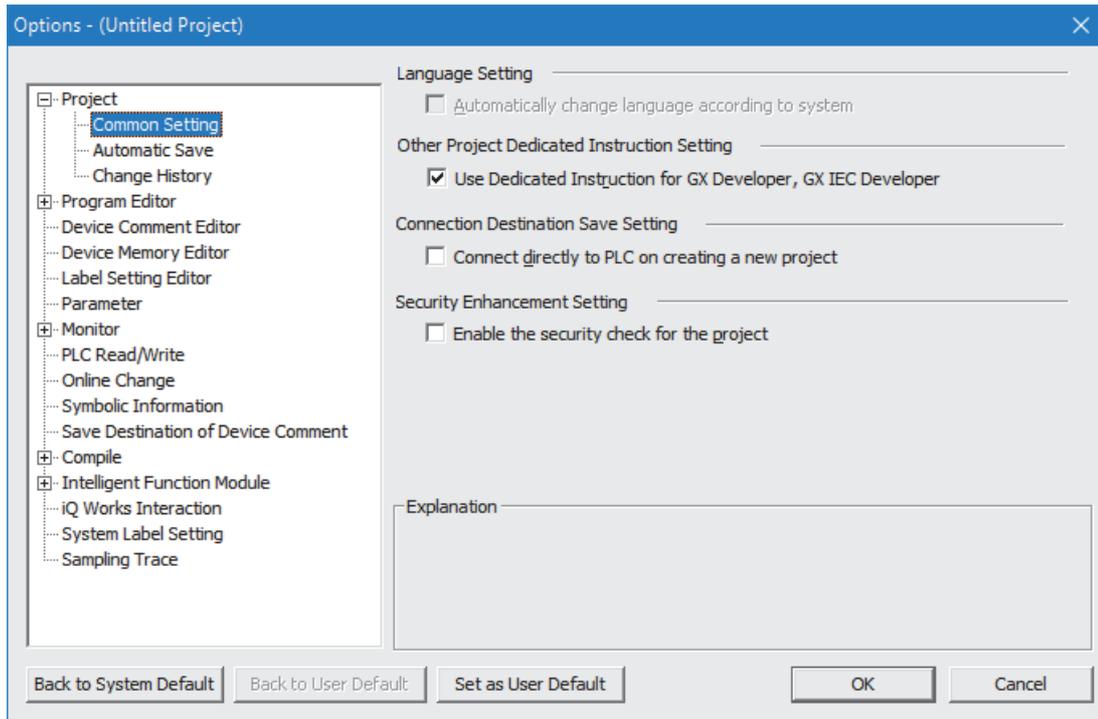
Select [Tool] ⇒ [Options].

Operating procedure

- **Set the items on the screen.**

    When the cursor is placed on a setting item, an explanation of the item is displayed on the "Explanation" field.
    Details of the setting items ☞ Section 13.2

Screen button

● Back to System Default
  Restores the initial settings.

● Back to User Default
  Restores the user default settings.

● Set as User Default
  Stores the current settings as the user default and applies them to a new project.

13.2 Option Setting List

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Q CPU **L CPU** **FX**

The following table shows the option setting items.
For the default setting of each item, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**
For "(Common)", "(FB)", "(Structured)" indicated in the Reference column, refer to the following
manuals respectively.

(Common)   … GX Works2 Version 1 Operating Manual (Common).
(FB)   … GX Works2 Version 1 Operating Manual (Simple Project, Function Block)
(Structured)   … GX Works2 Version 1 Operating Manual (Structured Project)

Tree item			Item	Explanation	Reference
Project				☞ GX Works2 Version 1 Operating Manual (Common).	
Program Editor	All Editors	Device Comment	Program/Program File Name	Set a reference/reflection target of device comment of each program/program file.	(Common)
			Specify the Reference/ Reflection	Set a reference/reflection target according to the local device range of PLC parameter when set to "PLC parameter setting". Within the local device range: local device comment Outside the local device range: global device comment	
			Reference/reflect the other, when device comment is not set.	The behavior of each device will be the one as follows: (1) Global/Local comment will be referred. (2) If comment does not exist, the behavior will be: • specified to Global: refer Local comment. • specified to Local: refer Global comment.	
			Apply to all programs	Apply the current setting of reference/ reflection target for device comment to all programs/program files.	
			Global	Set all reference/reflection target to 'global' for device comment of selected program/ program file name.	
			Local	Set a all reference/reflection target to 'local' for device comment of selected program/ program file name.	
			PLC Parameter Setting	Set all reference/reflection targets for device comment of target device of the selected program/program file name to "PLC parameter setting". Target Device: Device can be specified within the local device range in the device setting of PLC parameter	

Tree item			Item	Explanation	Reference
Program Editor	Ladder/SFC	Enter ladder	Check duplicated coil	Select whether to check duplicated coils when entering instruction. Unconverted ladder is not the object for duplicated coil check.	Section 6.2.3
			Enter label comment and device comment	Select whether to enter label comment or device comment continuously after entering instructions.	Section 6.2.4
			Do not leave the Device/Label Comment field editing status	Set whether to leave the Device/Label Comment field editing status after opening the comment input dialog. Able to edit comments if users uncheck this setting. Able to copy entire comments if users check this setting.	Section 6.2.4
			Do not display note in Enter Symbol screen when edit coil instructions	Select whether to display note in Enter Symbol screen when edit coil instructions.	-
			Check special relay/ special register compatible with A-PLC	When A-PLC Compatible Setting of PLC Parameter setting has not be enabled at the time of instruction inputting, check whether to display a confirming message to input special relay/special register compatible with A-PLC. MELSAP-L is an exception.	-
			Display available instruction tool hints in entering instruction	Select whether to automatically display available instruction tool hints in entering instruction.	Section 6.2.1
			Display available instructions in entering instruction	Select whether to automatically display available instructions in entering instruction.	
			Display available labels in entering instruction	Select whether to automatically display available defined labels in entering instruction.	
	Ladder/SFC	Tool Hint	Monitored Value	Select display item in tool hint when mouse cursor is placed over label name. * Options for simple project (with label) or label program of structured project. * As for function block, devices are excluded from display target in tool hint.	Section 2.2.10
			Class		
			Device		
			Device Comment		
			Data Type		
			Constant Value		
			Label Comment		
			Remark		
			Tool Hint Display Format	Select the number of display lines in tool hint. * Will be wrapped in 64 single-byte characters or 32 double-byte characters.	

Tree item			Item	Explanation	Reference
Program Editor	Ladder	Comment	Device Comment	Select whether to display the label comment or the device comment at ladder editor.	Section 2.2.4
			Note	Select whether to display the note comment at ladder editor.	
			Statement	Select whether to display the statement comment at ladder editor.	
			Device Comment Display Format	Set the display rows and columns for label comment or device comment.	Section 2.2.6
			Copy device comment in copying ladder	Select whether to copy device comment in copying ladder. * Pasting will be executed by comment reference/reflection setting. * Pasting will not be executed between different PLC. * Copy or pasting will not be executed for protected comments.	Section 6.11.5
		Ladder Diagram	Display Connection of Ladder Diagram	Set the number of contacts. ([Program Editor] ⇒ [SFC] ⇒ [Zoom])	Section 2.2.7
			Use the Switching Ladder Edit Mode (Read, Write, Monitor, Monitor (Write))	Select whether to switch Ladder Edit Mode (Read, Write, Monitor and Monitor (Write)). Will be the same operation as the ladder edit mode of GX Developer. * Unable to set when security setting is enabled.	Section 6.1.2
			Display labels and devices	Select whether to display labels, and devices assigned to label. (Exclude function block.) * Devices are excluded from Find/Replace target. * Options for simple project (with label) or label program of structured project.	Section 2.2.9
			Display STL instruction in contact format * FXCPU Only	Select whether to display STL instruction in contact format. This is valid for simple projects (Not using labels) only. Contact format ladder block display for STL instruction is not wrap displayed.	Section 2.2.12
			Display Instruction Help at symbol error occurrence	Select whether to automatically display Instruction Help when symbol errors occur.	Section 6.2.2
			Open Undefined Label Registration dialog at ladder entry	Select whether to open Undefined Label Registration dialog when labels used at ladder entry are undefined.	Section 6.2.1
			Set initial value to '1' for Enter HLine/Delete HLine dialog.	Select whether to set initial value to '1' when Enter HLine/Delete HLine dialog is opened.	Section 6.6.2
			Stop at the connection points (Instruction/Vertical Line) when enter or delete horizontal line.	Select whether to edit line by connection point (Instruction/Vertical Line) when Enter HLine/Delete HLine is executed.	

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Tree item			Item	Explanation	Reference
Program Editor	ST*1		Monitored Value	Select display item in tool hint when mouse cursor is placed over label/device name.	(Structured)
			Class		
			Device		
			Address		
			Data Type		
			Constant Value		
			Comment		
			Remark		
			Tool Hint Display Format	Select display lines on tool hint.	
			Auto Indention	Select whether to use the automatic indent when beginning a new line after entering ST control syntax such as IF or FOR, and when displaying template of inline structured text.	
			Instruction/label name prediction	Select whether to display listed label names starting with the input character when a character is input.	
			Tabulator Length	Set tabulator length. It is not available with inline structured text.	
	SFC	Comment	Block List	Display device comment on SFC block list.	Section 7.11
			Step/Transition	Display step/transition comment on SFC editor.	Section 2.3.5
		SFC 1	SFC Edit Area	Set SFC edit area when create SFC. Please change by "SFC Row Setting" after creating a SFC.	Section 2.3.6
			Tile SFC and Zoom vertically	Select whether to tile Zoom windows at the cursor position on SFC when creating SFC diagram. Checking this option changes the [Open Zoom with New Window] option into unchecked.	Section 7.9
			Arrange	Select the type of tile for SFC and ZOOM window.	
			SFC Display Window Ratio	Select window display ratio for SFC when Tile Vertically is selected.	
			MELSAP-L label/device Display Format	Set display lines for MELSAP-L program.	
			Jump to start destination block	Set whether to jump to start destination block when cursor is moved to block start step.	
		SFC 2	Leave comment or step No. selected	Select whether to leave comment or step No. selected in Enter SFC symbol window when changing SFC symbol in MELSAP3. Block or symbol must be left selected in Enter SFC symbol window when newly entering SFC symbol.	
		Zoom	Open Zoom with New Window	Select whether to open a new window for each Zoom or to change the display in the fixed window when opening Zoom. Checking this option changes the "Tile SFC and Zoom vertically" option into unchecked.	
			Number of Action/ Transition Contacts	Set the number of contacts.	Section 2.2.7
Device Comment Editor				☞ GX Works2 Version 1 Operating Manual (Common)	
Device Memory Editor					

Tree item		Item	Explanation	Reference
Label Setting Editor		Automatic copy and increment when inserting a row	Select whether to copy the texts in the upper row after incrementing it when inserting a row.	Section 5.5.5
		Copy data type/comment items	Select if the data type, comment, and remark shall be object for auto copy.	
		Default Length of String Data Type	Set the default string length for string data type.	Section 5.5.3
		Display last blank row	Select whether to display last blank row. This setting is valid for global label and local label except the local label of function block, function and structured data type.	Section 5.5.5
Check Program		Do not target the SET instruction for duplicated coil check	Select whether to set the SET instruction as the target for duplicated coil check.	Section 10.1.5
Parameter			☞ GX Works2 Version 1 Operating Manual (Common)	
	Common			
Monitor	Ladder/SFC	Set automatic registration destination	Ladder block label (ladder) contained in cursor, labels of action/transition step (SFC), or device will be registered to watch window in automatic registration destination while monitoring watch window. (Caution 1: Cursor move will be slow under the setting. 2: Select FB instance for function block.)	(Common)
	Ladder	Display Format of Monitoring Value	Select the display format of the monitored value in decimal or hexadecimal.	Section 12.2.1
		Monitor buffer memory and link direct device * Only applies to the QCPU, LCPU, FX3U(C)	Select whether to monitor buffer memory and link direct device during Ladder-monitoring. Scan time of PLC will be lengthened depending on the setting.	Section 12.2.2
		FXGP format Ladder monitor * Only applies to the FXCPU	PLS/PLF instruction is displayed in GP(DOS) and FXGP(WIN) formats. If it is not checked, it is displayed in GX Developer form.	Section 12.2.3
		Display monitored value by device/label name of contact/coil instruction.	In monitoring ladder, select whether to highlight contact/coil instruction based on the monitored value displayed by device/label name.	Section 12.3.1
		Display Lines for Monitoring Current Value	Select whether to display rows of the current value monitor during Ladder-monitoring.	Section 12.2.3

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Tree item		Item	Explanation	Reference
Monitor	ST[*1]	Display Format of Monitoring Value	Select whether to display monitored value in Decimal or Hexadecimal.	(Structured)
		Monitor buffer memory and link direct device * QCPU, LCPU, FX3U(C) only	Select whether to monitor buffer memory and link direct device during monitoring. Scan time of PLC will be lengthened depending on the setting.	
		Character String Monitor Setting	Set the number of displayable characters to monitor character-string data.	
		Verify with PLC setting before starting monitoring	• When "Always Verify with PLC" is selected. Verify with PLC before starting monitoring. However, do not verify if simulator is running, selecting uncompiled program's POU, or unchanged POU (Last verification status is held while editor is open). • When "Not Always Verify with PLC" is selected. Start monitoring without verifying with PLC. • When "Confirm whether to Verify with PLC" is selected. Show a confirmation box whether to verify with PLC before starting monitoring. However, the confirmation box will not be displayed and do not verify if simulator is running, selecting uncompiled program's POU, or unchanged POU (Last verification status is held while editor is open).	
	SFC[*1]	Watch Step Not Transferring within Watching Time	Select whether to display a warning dialog when detect a step that does not transfer even if specified time passes while monitoring. It is excluded from the target of [Set as User Default] function.	Section 12.4.2
		Program/ Program File Name	Select watch target program/program file. It is excluded from the target of [Set as User Default] function.	
		Target All Blocks	Specify watch target block. It is excluded from the target of [Set as User Default] function.	
		Specify the Block	Specify watch target block. It is excluded from the target of [Set as User Default] function.	
		Stop Transition Watch Monitor when Detected	Select whether to detect other step that does not transfer while displaying warning dialog.	
		Monitor block start with new window	Select whether to open a corresponding SFC window to monitor when the active step transfers to a block start step.	Section 12.4.1
PLC Read/Write			☞ GX Works2 Version 1 Operating Manual (Common)	
Online Change				
Symbolic Information				

Tree item			Item	Explanation	Reference
Compile	Basic Setting		Enable calling function block and using inline ST	Enable calling function block from ladder to ST or vice versa, from ladder to Structured Ladder/FBD or vice versa, using inline ST in ladder, reducing steps when using function block. * Input label for VAR_IN_OUT remains equal to output label.	(Structured)
			Do not execute duplicated coil check, ladder check and consistency (pair) check after Build or Online Program Change	Check when program check is not needed after Build or Online Program Change. It can reduce the compile time depending on the setting.	-
			Do not target the SET instruction for duplicated coil check	Select whether to set the SET instruction as the target for duplicated coil check.	Section 10.2.2
			Use the same label name in global label and local label	Select whether to use the same label name in global label and local label. When the same label is selected, local label will be given priority.	-
			Create cross reference information after completion compile.	Creating cross reference information after completion of compiling enables to reduce find time for cross reference. Cross reference information can be found even the project is uncompiled. Specified find conditions will be treated as filter conditions. This setting will be canceled when find mode in cross reference condition setting is set to 'Fast Find'.	(Common)
	Output Result		Stop Build	Set the number of error and warning to stop the compile.	Section 10.4.1
			Disable Warning and Notification Message	Register warning codes to invalidate. The registered warning code shall not be displayed in output window.	
			Display the Use Status Notification of Automatic-Assign Device in Output Result	The use status of device automatic-assign is displayed in output window.	-
	ST*1	Compile Condition 1	Use lower-case device names as labels*2	Select whether to use device names typed with lower case as labels. Only the device name outside device range is valid for Inline Structured Text.	(Structured)
			Function Output Setting	Select whether to connect directly from the objective function output to other input.	
			Allow VAR_OUTPUT at FB call (ST)	Select whether to allow VAR_OUTPUT at FB call. Check: Able to specify VAR_OUTPUT as FB argument. (e.g. FBInst(FBVarOUT:= Variable);) Uncheck: Compile error C8015 returns if VAR_OUTPUT is specified as FB argument.	Section 10.2.4
		Compile Condition 2	(D)INT_TO_BOOL_E, (D)WORD_TO_BOOL_E, TIME_TO_BOOL_E	Check the box to generate code that holds the output (SET). When unchecked, the instruction word output will be treated as a coil (OUT).	(Structured)
			NOT_E		
			LIMITAION_E, MAXIMUM_E, MINIMUM_E		
			EQ_E, NE_E, GT_E, GE_E, LT_E, LE_E		
			AND_E, OR_E, XOR_E		

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Tree item	Item	Explanation	Reference
Intelligent Function Module[*1]	☞ GX Works2 Version 1 Operating Manual (Intelligent Function Module)		
iQ Works Interaction	☞ GX Works2 Version 1 Operating Manual (Common)		
System Label Setting[*3, *4]	Use MELSOFT Navigator Option Information	Checking this option enables use of the option setting of MELSOFT Navigator. The option setting specified in MELSOFT Navigator at the time of opening this project is used.	Section 5.2
	System Label Name Setting	Set how to name system labels. When system labels are entered, system label names are determined based on this setting at the time of project save.	
Sampling Trace	☞ GX Works2 Version 1 Operating Manual (Common)		

*1 : Not supported by FXCPU.
*2 : Not supported by Simple project.
*3 : Not supported by Universal model process CPU.
*4 : For FXCPU, this item is supported by FX3S, FX3G, FX3GC, FX3U, and FX3UC only.

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Appendix 1   List of Toolbars and Shortcut Keys

Q CPU   L CPU   FX

This section shows the list of toolbars and shortcut keys that can be used in Simple project.
For details of functions which are not described in this section, refer to the following manual.
☞ **GX Works2 Version 1 Operating Manual (Common)**
For "(Common)", "(FB)", "(Structured)", indicated in the Reference column, refer to the following manuals respectively:

(Common)   … GX Works2 Version 1 Operating Manual (Common)
(FB)   … GX Works2 Version 1 Operating Manual (Simple Project, Function Block)
(Structured) … GX Works2 Version 1 Operating Manual (Structured Project)

Appendix 1.1   Common toolbars and shortcut keys

The following explains the toolbars that are available regardless of the editing target and the corresponding shortcut keys.

■   "Program Common" toolbar icons

The following table shows the "Program Common" toolbar icons and the corresponding shortcut keys.

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
✂	Ctrl + X	Cut	Cut the selected data.	Section 6.11
📋	Ctrl + C	Copy	Copy the selected data.	
📋	Ctrl + V	Paste	Paste the cut/copied data at the cursor position.	
↩	Ctrl + Z	Undo	Cancel the previous operation.	Section 6.12
↪	Ctrl + Y	Redo	Perform the operation canceled by [Undo].	-
🔺	-	Write to PLC	Write data to the programmable controller CPU.	Section 11.1
🔻	-	Read from PLC	Read data from the programmable controller CPU.	
🔍	-	Start Monitoring (All Windows)	Start monitoring all windows being opened.	(Common)
🔍	-	Stop Monitoring (All Windows)	Stop monitoring all windows being opened.	
🔍	F3	Start Monitoring	Start monitoring the window being operated.	Section 12.1
🔍	Alt + F3	Stop Monitoring	Stop monitoring the window being operated.	
📝	F4	Build	Convert/compile the program being edited.	Section 10.2.1
📝	Shift + F4	Online Program Change	Convert/compile a sequence program and write it to the programmable controller CPU.	(Common)
📝	Shift + Alt + F4	Rebuild All	Compile/convert all programs in the project.	Section 10.2.2
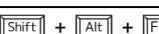
■   **"Docking Window/Switch Project Data" toolbar icons**

The following table shows the "Docking Window/Switch Project Data" toolbar icons.

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
-	-	Select data type	Select a data type and data name to be displayed.	(Common)
-	-	Select data name		
🗋	-	Display	Display the editing screen of the selected data type and data name.	
🗂	-	Navigation	Display/hide the Navigation window.	(Common)
▦	-	Element Selection	Display/hide the Element Selection window.	(FB)
▤	-	Output	Display/hide the Output window.	Section 10.4

■   **Other shortcut keys**

The following table shows other shortcut keys that are available regardless of the editing target.

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
-	F2	Rename	Change the name of the selected data or library on the Navigation window.	(Common)
		Rename (Library)		(Structured)
-	Delete	Delete	Delete the selected data.	(Common)
-	Ctrl + Shift + C	Copy	Copy data in the project.	
-	Ctrl + Shift + V	Paste	Paste the copied data to a folder.	

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Appendix 1.2   Toolbar icons and shortcut keys for setting labels

The following explains the toolbar icons and the corresponding shortcut keys for setting labels.

■　"Label" toolbar icons

The following table shows the "Label" toolbar icons and the corresponding shortcut keys.

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
	Shift + Insert	New Declaration (Before)	Add a row above the cursor position.	Section 5.5.5
	-	New Declaration (After)	Add a row below the cursor position.	
	Shift + Delete	Delete Row	Delete the row at the cursor position.	
	-	Read from CSV File	Read label settings from the CSV file.	Section 5.9
	-	Write to CSV File	Write label settings to the CSV file.	
	-	Check the changes of the System Label Database	Apply system label information changed in another project to global labels.	Section 5.2
	-	Import System Label	Import system label information and apply it to global labels.	
	-	Reservation to Register System Label	Reserve the selected global label for registration as a system label.	
	-	Reservation to Release System Label	Reserve the selected global label for deregistration of system label.	

■　Other shortcut keys

The following table shows other shortcut keys for setting labels.

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
-	Ctrl + A	Select All	Select all rows.	Section 5.5.5
-	Ctrl + + / Ctrl + Num + *1	-	Display all lines of comment and remark of the selected line.	
-	Ctrl + - / Ctrl + Num - *1	-	Display only the first line of comment and remark of the selected line.	

*1 :　'Num' indicates keys in the numeric keypad.

Appendix 1.3   Toolbar icons and shortcut keys for program editors

The following explains the toolbar icons and the corresponding shortcut keys for program editors.

■   "Ladder" toolbar icons and shortcut keys

The following table shows the toolbar icons and the corresponding shortcut keys for the ladder editor.

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
F5	F5	Open Contact	Insert an open contact at the cursor position.	
sF5	Shift + F5	Open Branch	Insert an open contact branch at the cursor position.	
F6	F6	Close Contact	Insert a closed contact at the cursor position.	
sF6	Shift + F6	Close Branch	Insert a closed contact branch at the cursor position.	Section 6.2
F7	F7	Coil	Insert a coil at the cursor position.	
F8	F8	Application Instruction	Insert an application instruction at the cursor position.	
F9	F9	Horizontal Line	Insert a horizontal line at the cursor position.	Section 6.6.2
sF9	Shift + F9	Vertical Line	Insert a vertical line at the cursor position.	
cF9	Ctrl + F9	Delete Horizontal Line	Delete the horizontal line at the cursor position.	Section 6.8.2
cF10	Ctrl + F10	Delete Vertical Line	Delete the vertical line at the cursor position.	
sF7	Shift + F7	Rising Pulse	Insert a rising pulse at the cursor position.	
sF8	Shift + F8	Falling Pulse	Insert a falling pulse at the cursor position.	
aF7	Alt + F7	Rising Pulse Branch	Insert a rising pulse branch at the cursor position.	
aF8	Alt + F8	Falling Pulse Branch	Insert a falling pulse branch at the cursor position.	
saF5	Shift + Alt + F5	Rising Pulse Close	Insert a rising pulse close at the cursor position.	
saF6	Shift + Alt + F6	Falling Pulse Close	Insert a falling pulse close at the cursor position.	Section 6.2
saF7	Shift + Alt + F7	Rising Pulse Close Branch	Insert a rising pulse close branch at the cursor position.	
saF8	Shift + Alt + F8	Falling Pulse Close Branch	Insert a falling pulse close branch at the cursor position.	
aF5	Alt + F5	Operation Result Rising Pulse	Insert an operation result rising pulse at the cursor position.	
caF5	Ctrl + Alt + F5	Operation Result Falling Pulse	Insert an operation result falling pulse at the cursor position.	
caF10	Ctrl + Alt + F10	Invert Operation Results	Insert an operation result inversion at the cursor position.	
F10	F10	Edit Line	Input a line at the cursor position.	Section 6.6
aF9	Alt + F9	Delete Line	Delete a line at the cursor position.	Section 6.8
ST	Ctrl + B	Insert Inline Structured Text Box	Insert an inline structured text box.	Section 6.4.2
	-	Device Comment	Edit device comments.	(Common)

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Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
	-	Statement	Edit statements.	Section 9.2
	-	Note	Edit notes.	
	-	Statement/Note Batch Edit	Batch edit statements/notes.	Section 9.3
	Ctrl + L	Line Statement List	Display the list of line statements used in the program.	Section 9.6
	Ctrl + Alt + F1	Display Template	Insert a template corresponds to the instruction/function/control syntax.	(Structured)
	Alt + ←	Mark Template (Left)	Set an argument of the template in the selected status from the left by selecting the menu each time.	
	Alt + →	Mark Template (Right)	Set an argument of the template in the selected status from the right by selecting the menu each time.	
	Shift + F2	Read Mode	Switch the mode of the open window to "Read Mode".	Section 6.1.2
	F2	Write Mode	Switch the mode of the open window to "Write Mode".	
–	Ctrl + Shift + F2	Read Mode (All Windows)	Switch the mode of all open windows to "Read Mode".	
–	Ctrl + F2	Write Mode (All Windows)	Switch the mode of all open windows to "Write Mode".	
	F3	Monitor Mode	Switch the mode of the open window to "Monitor Mode" during monitoring.	Section 12.2
	Shift + F3	Monitor (Write Mode)	Switch the mode of the open window to "Monitor (Write Mode)" during monitoring.	
	Alt + Ctrl + F6	Device Display	Display devices assigned by compilation.	Section 2.2.8
	-	Zoom	Change the display magnification ratio of the ladder program.	Section 2.2.2
-	Ctrl + Alt + V	Continuous Paste	Increment device numbers of cut/copied ladder block and paste it consecutively.	Section 6.11.4
-	Shift + Insert	Insert Row	Insert a row at the cursor position.	Section 6.9
-	Shift + Delete	Delete Row	Delete the row at the cursor position.	
-	Ctrl + Insert	Insert Column	Insert a column at the cursor position.	
-	Ctrl + Delete	Delete Column	Delete the column at the cursor position.	
-	Ctrl + Shift + →	Connect Line to Right-Side Symbol	Connect a horizontal line to the element at the right of the cursor position.	Section 6.6
-	Ctrl + Shift + ←	Connect Line to Left-Side Symbol	Connect a horizontal line to the element at the left of the cursor position.	
-	Ctrl + →	Enter/Delete HLine Rightward	Enter/delete a line at the right of the cursor position.	
-	Ctrl + ←	Enter/Delete HLine Leftward	Enter/delete a line at the left of the cursor position.	
-	Ctrl + ↓	Enter/Delete VLine Downward	Enter/delete a line at the downward of the cursor position.	
-	Ctrl + ↑	Enter/Delete VLine Upward	Enter/delete a line at the upward of the cursor position.	
-	Ctrl + /	Switch Open/Close Contact	Switch a open contact to closed contact, and vice versa.	(Common)
-	Ctrl + .	Switch Statement/Note Type	Change the type of a statement/note.	Section 9.4

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
-	⟦Ctrl⟧ + ⟦Alt⟧ + ⟦Enter⟧	Instruction Partial Edit	Open the Enter Symbol screen in which the first argument is in the selected status.	Section 6.2
-	⟦Alt⟧ + →/←	-	Select a device/label on the Enter Symbol screen. Switch the device/label to be selected using the →/← button.	
-	⟦Alt⟧ + ↑/↓	-	Increment/decrement a device/label on the Enter Symbol screen.	
-	⟦Ctrl⟧ + ⟦Space⟧	-	Display options of instruction/label on the Enter Symbol screen.	
-	⟦Ctrl⟧ + ↑/↓/→/←	-	Move the cursor on the editing screen while the Enter Symbol screen is displayed.	
-	⟦Ctrl⟧ + ⟦G⟧	Jump	Display the specified row.	Section 8.1.3
-	⟦Ctrl⟧ + ⟦Alt⟧ + ⟦PgDown⟧	Jump to Next Ladder Block Start	Move the cursor from the current position to the start of the next ladder block.	Section 6.5
-	⟦Ctrl⟧ + ⟦Alt⟧ + ⟦PgUp⟧	Jump to Previous Ladder Block Start	Move the cursor from the current position to the start of the previous ladder block.	
-	⟦Ctrl⟧ + ⟦Alt⟧ + ⟦E⟧	Next Device	Move the cursor to the same device as the one at the cursor position.	Section 8.1.2
-	⟦Ctrl⟧ + ⟦Alt⟧ + ⟦D⟧	Next Contact	Move the cursor to the contact where the same device as the one at the cursor position is used.	
-	⟦Ctrl⟧ + ⟦Alt⟧ + ⟦F⟧	Next Coil	Move the cursor to the coil where the same device as the one at the cursor position is used.	
-	⟦Ctrl⟧ + ⟦Alt⟧ + ⟦R⟧	Back	Return the cursor to the previous position before the [Next Device]/[Next Contact]/[Next Coil] function execution.	
-	⟦Ctrl⟧ + ⟦F5⟧	Comment	Display device comments.	Section 2.2.4
-	⟦Ctrl⟧ + ⟦F7⟧	Statement	Display statements.	
-	⟦Ctrl⟧ + ⟦F8⟧	Note	Display notes.	
-	⟦Ctrl⟧ + −/ ⟦Ctrl⟧ + Num −*1	Non-Display Ladder Block	Hide a ladder block.	Section 2.2.11
-	⟦Ctrl⟧ + +/ ⟦Ctrl⟧ + Num +*1	Display Ladder Block	Display a hidden ladder block.	
-	⟦Ctrl⟧ + turn mouse scroll wheel upward	Bigger	Change the display size of text larger on the editing screen.	Section 2.2.3
-	⟦Ctrl⟧ + turn mouse scroll wheel downward	Smaller	Change the display size of text smaller on the editing screen.	
-	⟦Ctrl⟧ + ⟦Shift⟧ + ⟦Enter⟧	Tile FB Horizontally	Tile the ladder editor and the function block program editor horizontally.	(FB)
-	⟦Ctrl⟧ + ⟦R⟧	Back to Zoom SFC Block	Open the SFC diagram corresponds to the program on the Zoom editor window.	Section 7.9
-	⟦Shift⟧ + ⟦Alt⟧ + ↑/↓/←/→	Moves up/ down/ left/ right	Move the cursor toward up/down/left/right of the SFC diagram.	-
-	⟦Ctrl⟧ + ⟦F1⟧	Open Instruction Help	Display the Instruction Help screen.	Section 6.2.2
-	⟦Space⟧	-	Display the Find screen.	Section 8.1.1
-	⟦Ctrl⟧ + ⟦Q⟧	ST Monochrome Display	Switch the text color (color or monochrome) in inline structured text boxes.	Section 6.4.5
-	⟦F1⟧	-	Display the instruction help of GX Works2 or reference manual of FB library.	(Common) (FB)
-	⟦Ctrl⟧ + ⟦Shift⟧ + ⟦=⟧	-	Enter an assignment operator (:=) when editing the inline structured text program.	(Structured)

*1 : 'Num' indicates keys in the numeric keypad.

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■ "SFC" toolbar icons and shortcut keys

The following table shows the toolbar icons and the corresponding shortcut keys for the SFC editor.

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
F5	F5	[STEP] New Step	Insert at the cursor position.	Section 7.3.1
F6	F6	[B] Block Start Step (with END check)	Insert at the cursor position.	Section 7.3.2
sF6	Shift + F6	[BS] Block Start Step (without END check)	Insert at the cursor position.	
F8	F8	[JUMP] Jump	Insert at the cursor position.	Section 7.3.8
F7	F7	[END] END Step	Insert at the cursor position.	Section 7.3.9
sF5	Shift + F5	[DUMMY] Dummy Step	Insert at the cursor position.	Section 7.3.1
F5	F5	[TR] Transition	Insert at the cursor position.	Section 7.3.3
F6	F6	[--D] Selection Divergence	Insert a selection divergence.	Section 7.3.4
F7	F7	[==D] Simultaneous Divergence	Insert a simultaneous divergence.	Section 7.3.5
F8	F8	[--C] Selection Convergence	Insert a selection convergence.	Section 7.3.6
F9	F9	[==C] Simultaneous Convergence	Insert a simultaneous convergence.	
sF9	Shift + F9	[	] Vertical Line	Insert a vertical line.	Section 7.3.10
c1	Ctrl + 1	No Attribute	Set the step attribute to No Attribute.	Section 7.5
c2	Ctrl + 2	Stored Coil	Set the step attribute to Stored Coil.	
c3	Ctrl + 3	Stored Operation (without Transition Check)	Set the step attribute to Stored Operation (SE).	
c4	Ctrl + 4	Stored Operation (with Transition Check)	Set the step attribute to Stored Operation (ST).	
c5	Ctrl + 5	Reset	Reset the step attribute.	
aF5	Alt + F5	Vertical Line (Draw Line)	Insert at the cursor position.	Section 7.3.10
aF7	Alt + F7	Selection Divergence (Draw Line)	Insert at the cursor position.	
aF8	Alt + F8	Simultaneous Divergence (Draw Line)	Insert at the cursor position.	
aF9	Alt + F9	Selection Convergence (Draw Line)	Insert at the cursor position.	
aF10	Alt + F10	Simultaneous Convergence (Draw Line)	Insert at the cursor position.	
cF9	Ctrl + F9	Delete Line	Delete a line at the cursor position.	Section 7.4
	-	SFC Step/ Transition Comment	Edit the SFC step/transition comments.	Section 9.8
	-	Sort SFC Step No.	Sort the SFC block step numbers.	Section 7.7
	-	SFC All Block Batch Monitoring	Batch monitor all blocks in the SFC program.	Section 12.4.4
	-	SFC Auto Scroll	Scroll the screen to display active steps automatically when they are out of the screen during monitoring.	Section 12.4.1

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
(icon)	[Shift] + [F2]	Read Mode	Switch the mode of the open window to "Read Mode".	Section 6.1.2
(icon)	[F2]	Write Mode	Switch the mode of the open window to "Write Mode".	
–	[Ctrl] + [Shift] + [F2]	Read Mode (All Windows)	Switch the mode of all open windows to "Read Mode".	
–	[Ctrl] + [F2]	Write Mode (All Windows)	Switch the mode of all open windows to "Write Mode".	
(icon)	[F3]	Monitor Mode	Switch the mode of the open window to "Monitor Mode" during monitoring.	Section 12.2
(icon)	[Shift] + [F3]	Monitor (Write Mode)	Switch the mode of the open window to "Monitor (Write Mode)" during monitoring.	
(icon)	-	Zoom	Change the display magnification ratio of the SFC diagram.	Section 2.3.2
-	[Ctrl] + turn mouse scroll wheel upward	Bigger	Enlarge the text display size on the editing screen.	Section 2.3.3
-	[Ctrl] + turn mouse scroll wheel downward	Smaller	Reduce the text display size on the editing screen.	
-	[Shift] + [Insert]	Insert Row	Insert a row at the cursor position.	Section 7.3.11
-	[Shift] + [Delete]	Delete Row	Delete the row at the cursor position.	
-	[Ctrl] + [Insert]	Insert Column	Insert a column at the cursor position.	
-	[Ctrl] + [Delete]	Delete Column	Delete the column at the cursor position.	
-	[Ctrl] + [G]	Jump	Move the cursor to the SFC step number/transition number in the specified block.	Section 8.2.1
-	[Ctrl] + [M]	Find Jump Step	Move the cursor to the step of the jump source.	Section 8.2.2
-	Numeric key	-	Move the cursor to the SFC step number/transition number.	Section 8.2.3
-	[Ctrl] + [Alt] + [F4]	Convert Block	Convert a single block only.	Section 10.1.4
-	[Ctrl] + [F5]	SFC Step/Transition Comment	Display the SFC step/transition comments.	Section 2.3.5
-	[Ctrl] + [L]/ [Ctrl] + double-click	Open Zoom/Start Destination Block	Display the Zoom editor window or the start destination block.	Section 7.9
-	[Space]	-	Display the start destination block.	
-	[Ctrl] + [R]	Back to Start SFC Block	Display the start source block.	
-	[Ctrl] + [Alt] + [F8]	Program Display	Display programs on the SFC diagram when editing in MELSAP-L.	Section 2.3.4

■ SFC block list shortcut keys

The following table shows the shortcut keys for the SFC block list.

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
-	[Ctrl] + [G]	Jump	Jump to the specified block number/data name.	Section 8.2.1
-	Numeric key	-	Jump to the selected block number.	
-	[Ctrl] + [F5]	SFC Block List Comment	Display comments of the SFC block list.	Section 7.11

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■ Other shortcut keys

The following table shows other shortcut keys for program editors.

Toolbar icon	Shortcut key	Corresponding menu	Description	Reference
-	↑/↓/→/←	-	Move the cursor in the arrow direction.	-
-	PgUp	-	Scroll up the screen.	
-	PgDown	-	Scroll down the screen.	
-	Ctrl + PgUp	-	Scroll the screen to the left.	
-	Ctrl + PgDown	-	Scroll the screen to the right.	
-	Home	-	Move the cursor to its leftmost position in the row.	
-	End	-	Move the cursor to its rightmost position in the row.	
-	Ctrl + Home	-	Move the cursor to the start of the program.	
-	Ctrl + End	-	Move the cursor to the end of the program.	
-	Shift + ↑/↓/→/←	-	Set a range.	
-	Ctrl + Shift + Home	-	Select the range from the current position up to the start of the program.	
-	Ctrl + Shift + End	-	Select the range from the current position down to the end of the program.	
-	Delete	-	Delete the selected target.	

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