

HITACHI

SOFTWARE MANUAL

OPERATION

HI-FLOW For Windows[®]

The logo for SIOV Programmable Controller is displayed on a blue, textured rectangular background. The word "SIOV" is written in a large, bold, white sans-serif font. Below it, the words "Programmable Controller" are written in a smaller, white sans-serif font.

SIOV

Programmable Controller

SVE-3-132(G)

SOFTWARE MANUAL

OPERATION

HI-FLOW For Windows[®]

The logo for SIOV, featuring the letters 'SIOV' in a bold, white, sans-serif font. The letters are set against a blue background that has a fine, pebbled texture, similar to paper or a light fabric. The 'S' and 'I' are connected, and the 'O' and 'V' are also connected. The 'V' has a sharp, pointed bottom right corner.

SIOV

Programmable Controller

First Edition, May 2005, SVE-3-132(D) (out of print)
Second Edition, August 2006, SVE-3-132(E) (out of print)
Third Edition, March 2009, SVE-3-132(F) (out of print)
Fourth Edition, April 2013, SVE-3-132(G)

All Rights Reserved, Copyright © 2005, 2013, Hitachi, Ltd.

The contents of this publication may be revised without prior notice.


No part of this publication may be reproduced in any form or by any means without permission in writing from the publisher.


Printed in Japan.


BI<IC> (FL-MW2007)

SAFETY PRECAUTIONS



- Read this manual thoroughly and follow all the safety precautions and instructions given in this manual before operations such as system configuration and program creation.
- Keep this manual handy so that you can refer to it any time you want.
- If you have any question concerning any part of this manual, contact your nearest Hitachi branch office or service engineer.
- Hitachi will not be responsible for any accident or failure resulting from your operation in any manner not described in this manual.
- Hitachi will not be responsible for any accident or failure resulting from modification of software provided by Hitachi.
- Hitachi will not be responsible for reliability of software not provided by Hitachi.
- Make it a rule to back up every file. Any trouble on the file unit, power failure during file access or incorrect operation may destroy some of the files you have stored. To prevent data destruction and loss, make file backup a routine task.
- Furnish protective circuits externally and make a system design in a way that ensures safety in system operations and provides adequate safeguards to prevent personal injury and death and serious property damage even if the product should become faulty or malfunction or if an employed program is defective.
- If an emergency stop circuit, interlock circuit, or similar circuit is to be formulated, it must be positioned external to the programmable controller. If you do not observe this precaution, equipment damage or accident may occur when this programmable controller becomes defective.
- Before changing the program, generating a forced output, or performing the RUN, STOP, or like procedure during an operation, thoroughly verify the safety because the use of an incorrect procedure may cause equipment damage or other accident.
- This manual contains information on potential hazards that is intended as a guide for safe use of this product. The potential hazards listed in the manual are divided into four hazard levels of danger, warning, caution, and notice, according to the level of their severity. The following are definitions of the safety labels containing the corresponding signal words DANGER, WARNING, CAUTION, and NOTICE.

 **DANGER** : This safety label identifies precautions that, if not heeded, will result in death or serious injury.

 **WARNING** : Identifies precautions that, if not heeded, could result in death or serious injury.

 **CAUTION** : Identifies precautions that, if not heeded, could result in minor or moderate injury.

NOTICE : This safety label without a safety alert symbol identifies precautions that, if not heeded, could result in property damage or loss not related to personal injury.

Failure to observe any of the  and  statements used in this manual could also lead to a serious consequence, depending on the situation in which this product is used. Therefore, be sure to observe all of those statements without fail.

The following are definitions of the phrases “serious injury,” “minor or moderate injury,” and “property damage or loss not related to personal injury” used in the above definitions of the safety labels.

Serious injury: Is an injury that requires hospitalization for medical treatment, has aftereffects, and/or requires long-term follow-up care. Examples of serious injuries are as follows: vision loss, burn (caused by dry heat or extreme cold), electric-shock injury, broken bone, poisoning, etc.

Minor or moderate injury: Is an injury that does not require either hospitalization for medical treatment or long-term follow-up care. Examples of minor or moderate injuries are as follows: burn, electric-shock injury, etc.

Property damage or loss not related to personal injury: Is a damage to or loss of personal property. Examples of property damages or losses not related to personal injury are as follows: damage to this product or other equipment or their breakdown, loss of useful data, etc.

The safety precautions stated in this manual are based on the general rules of safety applicable to this product. These safety precautions are a necessary complement to the various safety measures included in this product. Although they have been planned carefully, the safety precautions posted on this product and in the manual do not cover every possible hazard. Common sense and caution must be used when operating this product. For safe operation and maintenance of this product, establish your own safety rules and regulations according to your unique needs. A variety of industry standards are available to establish such safety rules and regulations.

1.  Hazard Warning Statements

The following are the hazard warning statements contained in this manual.

1.1 NOTICE Statements

(chapter 1, page 1-3)

NOTICE

This product allows a program or internal register values to be rewritten while running the PCs. Note that the unnecessary rewriting of a program or register values may result in equipment damage or a serious accident. Therefore, before rewriting any program or values, be sure to confirm normal equipment status.

(chapter 2, page 2-2)

NOTICE

- The files to be loaded for installing this product include the DII file related to the MFC. Accordingly, if a compiler of a different version is installed, this product may not operate.
- Before installing the HI-FLOW system, be sure to quit all Windows® programs. Be sure to quit programs that are resident in memory, such as virus monitoring software. Otherwise, an error will occur. In such case, uninstall the HI-FLOW system according to 2.2, “Uninstalling the HI-FLOW System,” and then quit all Windows® programs. Then install the HI-FLOW system again.

(chapter 4, page 4-28)

NOTICE

If the S10V power supply is turned off or the switch is reset while a process is being sent, the HI-FLOW program will be written to flash memory in an imperfect status and the HI-FLOW system may malfunction. Should the power supply be turned off or the switch be reset while sending a process, be sure to resend all processes after replacing the HI-FLOW system (*).

If the tool cannot be connected due to HI-FLOW system malfunction, it can be recovered to normal status by following the procedure below.

- ① Turn off the S10V power supply and set the T/M switch of the CMU module to A.
- ② Turn on the S10V power supply to start the HI-FLOW system without loading it from flash memory.
- ③ Connect the tool and replace the HI-FLOW system (*). Then resend all the processes.
- ④ Turn off the S10V power supply, reset the T/M switch of the CMU module, and then turn on the S10V power supply.

(*) For information on how to replace the HI-FLOW system, see “(8) Reloading the interpreter” in 2.5.2, “Reinstalling the HI-FLOW system and reloading the interpreter.”

(chapter 4, page 4-30)

NOTICE

The “free forced occupancy” function can also be executed even if the PCs are occupied by another user. However, even if this function is executed while the PCs are occupied by another user, the release of occupancy status can not be determined. Accordingly, multiple accesses may be made to the same PCs in some cases of operation. To prevent this, be sure to confirm that the PCs are not occupied by another user by observing any warning message.

(chapter 4, page 4-82)

NOTICE

The run-status rewriting function may adversely affect the equipment if used improperly. Therefore, an operator who lacks a complete understanding of HI-FLOW program processing should not use the run-status rewriting function while running the CPU, but should perform rewriting after stopping the CPU.

(chapter 4, page 4-91)

NOTICE

- There is a deference between rewriting the process and rewriting steps in terms of operation.
Therefore, perform operations carefully.
- Because of a time lag, the PCs finishes rewriting the process earlier than its recognition by the HI-FLOW system while you are waiting for its process end to be reached. During the time lag, if a cancel request is issued to cancel the already issued rewrite request, it may not be processed.
- If a cancel request is issued to cancel your already issued rewrite request, the edited process currently displayed on-screen will remain as is thereafter, but it will not be rewritten to the PCs, resulting in the old process still running on the PCs. This non-matching condition of the process between the HI-FLOW system and the PCs must be eliminated by its reception from the PCs. (To accomplish this, choose [Offline] from the [Mode] menu, and then choose [Online] – [Receive] from the same menu.)

(chapter 4, page 4-98)

NOTICE

HI-FLOW programs (processes) ended by a non-synchronous process end may be transmitted from a conventional tool (*1) to the PCs on which processes ended by a non-synchronous process end are running. In this case, the existing processes on the PCs will be automatically overwritten with the transmitted ones without presenting any warning message to you. This may result in a “CMU down” condition. To avoid this, be sure to use a new tool (*2) when sending or receiving HI-FLOW programs (processes) ended by a non-synchronous process end.

(chapter 4, page 4-100)

NOTICE

The “free forced occupancy” function can also be executed even if the PCs are occupied by another user. However, even if this function is executed while the PCs are occupied by another user, the release of occupancy status can not be determined. Accordingly, multiple access may be made to the same PCs in some cases of operation. To prevent this, be sure to confirm that the PCs are not occupied by another user by observing any warning message.

This Page Intentionally Left Blank

This manual provides information on the following program product:

<Program product>

S-7895-03, S10V HI-FLOW SYSTEM, 02-09

Revision record

(1/2)

Revision No.	Revision record (revision details and reason for revision)	Month, Year	Remarks
E	Description of the OPTET module is added as an additional module for Ethernet communication.	August 2006	S10V HI-FLOW System (01-07) or later
E	Motion support is newly added.	August 2006	S10V HI-FLOW System (02-02) or later
E	User-friendliness is improved.	August 2006	S10V HI-FLOW System (02-03) or later
F	<ul style="list-style-type: none"> • Non-synchronous process-end instruction is newly supported. • Delayed run-status rewriting (or run-time editing) of a process, waiting for its process end to be reached, is newly supported. 	March 2009	S10V HI-FLOW System (02-04) or later
F	<ul style="list-style-type: none"> • Ladder and HI-FLOW integrated device listing is newly supported. • Ladder and HI-FLOW integrated cross-referencing is newly supported. • Motion basic-settings deletion is newly supported. • Motion communication-task deletion is newly supported. 	March 2009	S10V HI-FLOW System (02-05) or later
	New procedures for starting and upgrading the HI-FLOW system are made available.		S10V HI-FLOW System (02-05) or later

Revision No.	Revision record (revision details and reason for revision)	Month, Year	Remarks
G	<ul style="list-style-type: none">• All the safety precautions and instructions in this manual have been reviewed and necessary changes are added to them.• Windows® 7 (32-bit) operating system is newly supported.	April 2013	S10V HI-FLOW System (02-10) or later

In addition to the above changes, all the unclear descriptions and typographical errors found are also corrected without prior notice.

This Page Intentionally Left Blank

PREFACE

Thank you very much for purchasing the S10V HI-FLOW system.

This system runs on a personal computer and is used as a tool for creating and correcting HI-FLOW application programs.

This manual explains how to operate the HI-FLOW system.

This manual applies to the following system version:

System name and version
S10V HI-FLOW System for Windows® 02-10

For HI-FLOW programs (explanation of instruction words), refer to the following manual:
The S10V HI-FLOW system's motion functionality does not support Microsoft® Windows® 7 (32-bit) operating system.

<Related manual>

- SOFTWARE MANUAL PROGRAMMING HI-FLOW For Windows®
(manual number SVE-3-122)
- SOFTWARE MANUAL OPERATION S10V LADDER CHART For Windows®
(manual number SVE-3-131)

<Trademarks>

- Microsoft® Windows® operating system, Microsoft® Windows® 2000 operating system, Windows® XP operating system, Microsoft® Windows® 7 (32-bit) operating system are registered trademarks of Microsoft Corporation in the United States and/or other countries.
- Ethernet® is a registered trademark of Xerox Corp.

<Note for storage capacity calculations>

- Memory capacities and requirements, file sizes and storage requirements, etc. must be calculated according to the formula 2^n . The following examples show the results of such calculations by 2^n (to the right of the equals signs).
1 KB (kilobyte) = 1,024 bytes
1 MB (megabyte) = 1,048,576 bytes
1 GB (gigabyte) = 1,073,741,824 bytes
- As for disk capacities, they must be calculated using the formula 10^n . Listed below are the results of calculating the above example capacities using 10^n in place of 2^n .
1 KB (kilobyte) = 1,000 bytes
1 MB (megabyte) = $1,000^2$ bytes
1 GB (gigabyte) = $1,000^3$ bytes

<Definitions of terms>

Process: HI-FLOW program that has been converted into a format executable on PCs by pasting symbols on the sheet displayed on the PC.

Compile: To convert a HI-FLOW application program into a format (process) executable on PCs.

Build: To compile only a corrected application program.

Rebuild: To compile all existing application programs.

Sheet: Form used to create a HI-FLOW application program that is controlled on the PC.

PCs: Abbreviation for Programmable Controllers.

Generic term for such PLCs as the S10V, S10 α , and S10mini series.

PLC: Abbreviation for Programmable Logic Controller.

This refers to industrial electronic equipment that performs sequence control by using the stored program system.

The S10V, S10 α , and S10mini series are PLCs.

CONTENTS

1	GENERAL INFORMATION FOR OPERATING THE SYSTEM	1-1
1.1	Overview of HI-FLOW for Windows®.....	1-2
1.2	Hardware and Software Required	1-2
2	OPERATIONS BEFORE STARTING THE SYSTEM	2-1
2.1	Installing the HI-FLOW System	2-2
2.2	Uninstalling the HI-FLOW System	2-4
2.3	Starting the System	2-5
2.3.1	HI-FLOW system start procedure	2-5
2.4	Terminating the System	2-6
2.5	Reinstalling the HI-FLOW System and Reloading the Interpreter as Necessary	2-7
2.5.1	Reinstalling the HI-FLOW system	2-7
2.5.2	Reinstalling the HI-FLOW system and reloading the interpreter.....	2-8
3	HI-FLOW SHEET.....	3-1
3.1	Relationship with Files of the Existing HI-FLOW System	3-2
3.2	HI-FLOW Sheet Configuration.....	3-2
3.3	HI-FLOW Process Sheet.....	3-3
3.4	HI-FLOW Sheet	3-4
4	FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET.....	4-1
4.1	Creating a HI-FLOW Process Sheet	4-2
4.2	File Functions of the HI-FLOW Process Sheet.....	4-4
4.3	Editing Functions of the HI-FLOW Process Sheet	4-5
4.3.1	Searching for symbols	4-7
4.3.2	Replacing symbols with new ones.....	4-9
4.3.3	Replacing specified series of symbols with new ones.....	4-11
4.3.4	Device usage listing.....	4-14
4.3.5	Cross-referencing HI-FLOW only.....	4-18
4.3.6	Cross-referencing both ladder and HI-FLOW	4-20
4.4	Display Functions of the HI-FLOW Process Sheet	4-25
4.5	Build Functions of the HI-FLOW Process Sheet	4-26
4.6	Mode Functions of the HI-FLOW Process Sheet	4-27
4.7	Utility Functions of the HI-FLOW Process Sheet	4-29
4.7.1	Converting the program from the existing system	4-31

4.8	Motion Functions of the HI-FLOW Process Sheet	4-32
4.8.1	Basic parameters for motions	4-33
4.8.2	Parameter block setting	4-44
4.8.3	Motion monitoring.....	4-50
4.8.4	Motion trace.....	4-55
4.8.5	Motion communication error trace	4-64
4.8.6	Motion communication accumulated information	4-67
4.8.7	Communication task deletion	4-71
4.9	Window Functions of the HI-FLOW Process Sheet	4-72
4.10	Creating a HI-FLOW Sheet	4-73
4.10.1	Pasting a HI-FLOW symbol.....	4-74
4.11	File Functions of the HI-FLOW Sheet.....	4-76
4.12	Editing Functions of the HI-FLOW Sheet	4-77
4.13	Display Functions of the HI-FLOW Sheet.....	4-79
4.14	Build Function of the HI-FLOW Sheet.....	4-80
4.15	Mode Functions of the HI-FLOW Sheet.....	4-81
4.15.1	Outline of run-status rewriting	4-82
4.15.2	Process execution after run-status rewriting.....	4-93
4.15.3	Other things to remember when using run-status rewriting	4-94
4.15.4	Notes on using a tool not supporting non-synchronous process ends	4-97
4.16	Utility Functions of the HI-FLOW Sheet.....	4-99
4.16.1	Ethernet communication setting	4-101
4.17	Motion Functions of the HI-FLOW Sheet	4-108
4.18	Window Functions of the HI-FLOW Sheet	4-109

FIGURES

Figure 4-1	The “Renewal mode during RUN” Dialog Box.....	4-87
Figure 4-2	The “Renewal of process during RUN (Waiting for process-end)” Dialog Box...	4-88
Figure 4-3	The “Renewal of process during RUN (Immediate renewal)” Dialog Box.....	4-89
Figure 4-4	The “Renewal of process during RUN (Stop of renewal)” Dialog Box	4-89
Figure 4-5	The Normal-End-of-Rewrite Message.....	4-90
Figure 4-6	The Cancellation Message	4-90

This Page Intentionally Left Blank

1 GENERAL INFORMATION FOR OPERATING THE SYSTEM

This manual is intended for customers who use Windows® PC Programming.

1.1 Overview of HI-FLOW for Windows®

HI-FLOW for Windows® (hereinafter called the HI-FLOW system) is a tool used to create, correct, monitor, and debug HI-FLOW application programs of the S10V series by utilizing operations equivalent to those of general Windows® applications.

1.2 Hardware and Software Required

To use the HI-FLOW system, the following hardware and software are required:

- Personal computer (or PC) containing a Pentium 300 MHz or faster CPU, or a 1 GHz or faster CPU (for using Windows® 7 (32-bit version))
- Display unit with a resolution of 800 × 600 dots (SVGA) or more
- Microsoft® Windows® 2000 operating system, Microsoft® Windows® XP operating system or Microsoft® Windows® 7 (32-bit) operating system
- At least 64 MB of RAM (for using Windows® 2000)
- At least 128 MB of RAM (for using Windows® XP)
- At least 1 GB of RAM (for using Windows® 7 (32-bit))
- At least 20 MB of free hard disk capacity
- S10 series LPU and CMU
- S10V series power supply and backboard
- Connecting cable (LAN cable) between a personal computer and PCs
- Remote I/O station, motion controller, power supply, backboard, card, and wiring cable as required

NOTICE

This product allows a program or internal register values to be rewritten while running the PCs. Note that the unnecessary rewriting of a program or register values may result in equipment damage or a serious accident. Therefore, before rewriting any program or values, be sure to confirm normal equipment status.

The user of this product must be knowledgeable about the Windows® environment and user interface. This system conforms to the Windows® standard. This manual is intended for users who are familiar with how to operate Windows®, which is the basis for operating this product.

- When using a PC having a suspend function, turn off the suspend function. Note that operating the suspend function while running the system may inhibit normal system operation.
- Insufficient RAM capacity may cause an application error. Should an application error occur, check the free memory capacity and install additional RAM in case of insufficient free memory capacity.

This Page Intentionally Left Blank

2 OPERATIONS BEFORE STARTING THE SYSTEM

2.1 Installing the HI-FLOW System

To install the HI-FLOW system, click “setup.exe” stored in the DISK1 folder of the HI-FLOW system CD.

After installing the system, the screen of the installed program does not appear. Paste a shortcut on the desktop as required.

Click the button and choose [(All) Programs] – [Hitachi S10V] – [S10V HI-FLOW SYSTEM] – [S10V HI-FLOW SYSTEM] from the [Start] menu on the Windows® screen.

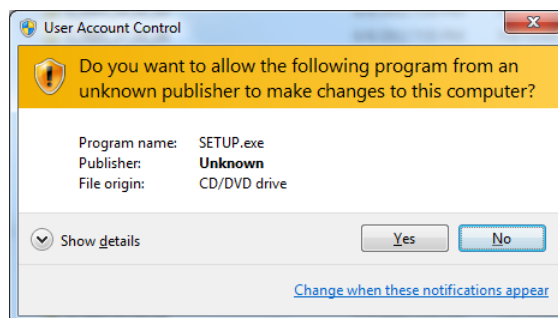
Click and hold the right mouse button on the [S10V HI-FLOW SYSTEM] and move the pointer to the desktop. Then, choose [Copy Here] from the pop-up menu.

NOTICE

- The files to be loaded for installing this product include the DII file related to the MFC. Accordingly, if a compiler of a different version is installed, this product may not operate.
- Before installing the HI-FLOW system, be sure to quit all Windows® programs. Be sure to quit programs that are resident in memory, such as virus monitoring software. Otherwise, an error will occur. In such case, uninstall the HI-FLOW system according to 2.2, “Uninstalling the HI-FLOW System,” and then quit all Windows® programs. Then install the HI-FLOW system again.

<Notes on installing in Windows® 7 (32-bit)>

Installing the S10V HI-FLOW system in Windows® 7 (32-bit) operating system requires prior logging onto the operating system with an appropriate Administrator account, which is the Administrator account first created in the initial condition of your personal computer. When you have so logged on, you can then double-click “setup.exe” that is stored in the DISK 1 folder on the S10V HI-FLOW System CD. When “setup.exe” is started, the dialog box as shown below will appear. Click the button to continue the execution of the setup program.



The S10V HI-FLOW system cannot be installed on a per-user basis. To install the S10V HI-FLOW system successfully, the user must first log onto the operating system with an appropriate Administrator account, which is the Administrator account first created in the initial condition of your personal computer.

The S10V HI-FLOW system may not be installed properly in any of the following cases: 1) administrator permission is acquired by using User Account Control(*) with a standard user account and 2) logon is made with an Administrator account that has been created using User Account Control with a standard user account. If you make a logon with a user account that is different from the one you have used for the installation of the S10V HI-FLOW system, the installed program may be missing from the program menu displayed. In this case, you should perform the following series of steps: 1) make a logon again with the Administrator account first created in the initial condition of your personal computer; 2) uninstall the installed program; and 3) install the program again.

When you want to create a new account, be sure to make a logon with an Administrator account. Do not use User Account Control at that time.

(*) User Account Control is a Microsoft Windows feature that temporarily grants administrative rights to standard user accounts.

A message reporting a read-only file detected may be displayed during the reinstallation of the S10V HI-FLOW system. In this case, click the button to set off overwriting.

2.2 Uninstalling the HI-FLOW System

The existing S10V HI-FLOW system needs to be uninstalled when, for instance, you want to upgrade it. The procedure required for uninstalling it is as follows:

(1) Uninstalling from Windows® 2000

Click on button on your Windows desktop and choose [Settings] – [Control Panel]. When the Control Panel opens, double-click on [Add/Remove Programs]. Then, choose “HI-FLOW SYSTEM” (for S10mini controllers) or “S10V HI-FLOW SYSTEM” (for S10V controllers) in the [Change or Remove Programs] tab and click the button. When the [Confirm File Deletion] dialog box appears, click the button.

(2) Uninstalling from Windows® XP

Click on button on your Windows desktop and choose ([Settings] –) [Control Panel]. When the Control Panel opens, double-click on [Add/Remove Programs]. Then, choose “HI-FLOW SYSTEM” (for S10mini controllers) or “S10V HI-FLOW SYSTEM” (for S10V controllers) in the [Change or Remove Programs] tab and click the button. When the [Confirm File Deletion] dialog box appears, click the button.

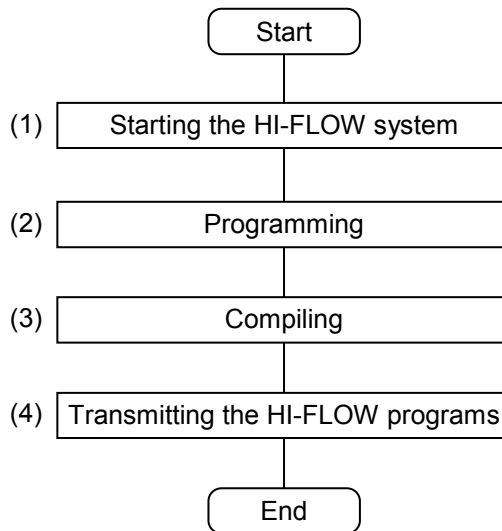
(3) Uninstalling from Windows® 7 (32-bit) -- for S10V controllers only

Click on button on your Windows desktop and choose [Control Panel]. When the Control Panel opens, click [Programs and features]. Then, select “S10V HI-FLOW SYSTEM” and click button. When the [Confirm File Deletion] dialog box appears, click the button.

- If the “Remove Shared File?” screen appears while the system is uninstalled from Windows®, do not remove the shared file by clicking the button.
- When you want to reinstall the HI-FLOW System, be sure to first uninstall the system, then install it again.

2.3 Starting the System

2.3.1 HI-FLOW system start procedure



(1) Starting the HI-FLOW system

To start the HI-FLOW system, click the **Start** button on the Windows® desktop and choose [(All) Programs] – [Hitachi S10V] – [S10V SYSTEM] – [S10V HI-FLOW SYSTEM] from the displayed [Start] menu.

(2) Programming

Programming can be done by two steps: 1) create a HI-FLOW process sheet in the HI-FLOW system and display it on-screen, and 2) prepare a HI-FLOW program. Information on how to create and display a HI-FLOW process sheet is provided in 4.1, “Creating a HI-FLOW Process Sheet,” and that on how to prepare a HI-FLOW program is provided in 4.10, “Creating a HI-FLOW Sheet.”

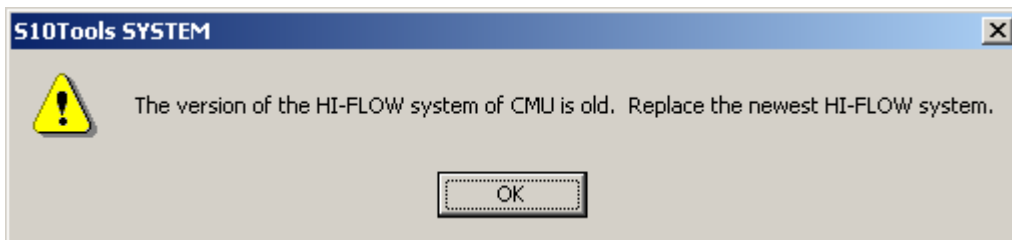
(3) Compiling

To compile a prepared HI-FLOW program, choose [Build] – [Build] on the HI-FLOW process sheet. If the requested compilation fails due to an error detected in the program, correct the error according to the error message displayed in the Output bar and then try again.

2 OPERATIONS BEFORE STARTING THE SYSTEM

(4) Transmitting the HI-FLOW programs

To transmit all of the completed HI-FLOW programs to the PCs, choose [Mode] – [Online] – [Send] – [All processes] on the HI-FLOW process sheet. Then, if the message shown below is displayed during the transmission, it indicates that part of the new, additional functionality transmitted needs to be made ready for service. To make it ready for service, you should upgrade the interpreter currently used on the PCs. Upgrading can be accomplished by performing the procedure described in 2.5, “Reinstalling the HI-FLOW System and Reloading the Interpreter as Necessary.”



2.4 Terminating the System

To stop the HI-FLOW system, choose [Application termination] from the [File] menu. When it is stopped, the Windows® desktop becomes active again.

2.5 Reinstalling the HI-FLOW System and Reloading the Interpreter as Necessary

Reinstalling the HI-FLOW system, including its upgrading and downgrading, can be accomplished as described below. When reinstalling the system, check out its accompanying material to see if the interpreter's version is the same as its currently used one. If it is not, you should also reload the interpreter to the PCs. Without reloading it, a problem may arise. For example, you will not be able to use part of the new, additional functionality of the HI-FLOW system's new version installed.

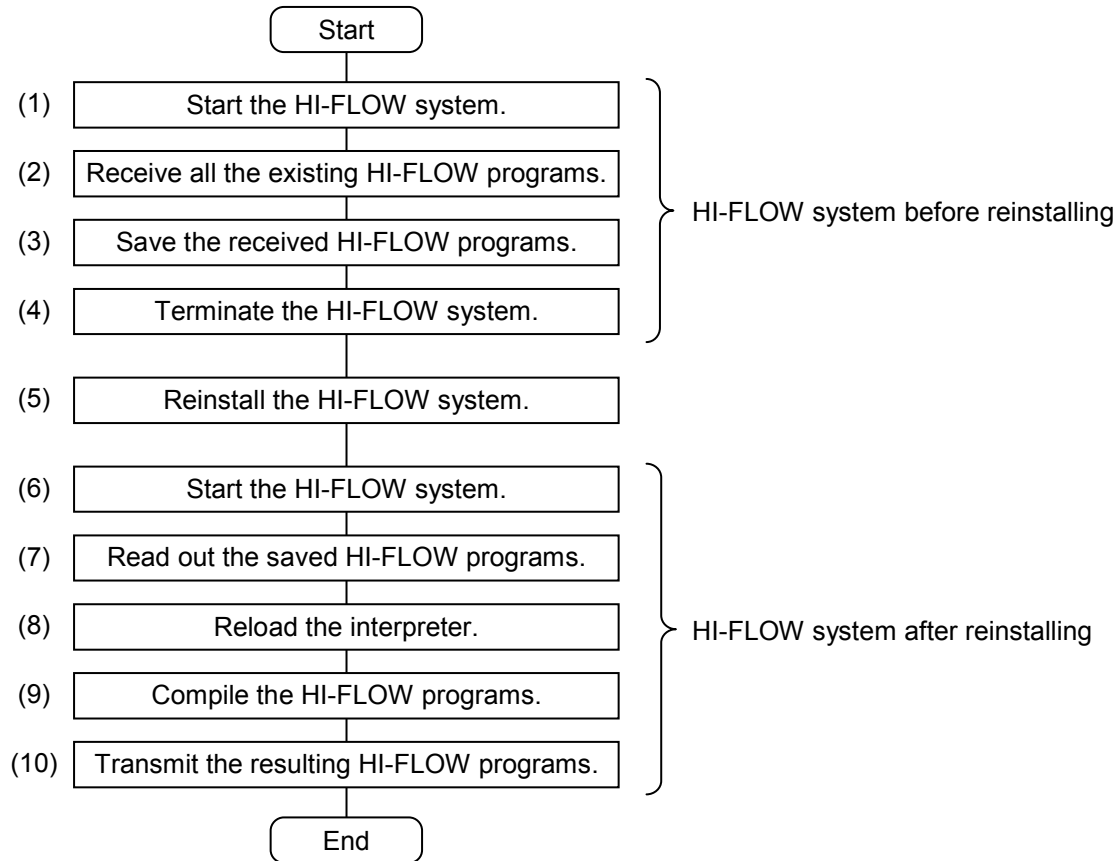
2.5.1 Reinstalling the HI-FLOW system

Reinstalling the HI-FLOW system can be done by two steps: 1) uninstall the currently used version of HI-FLOW system and 2) install the HI-FLOW system again. Any attempt to reinstall the HI-FLOW system without prior uninstalling of the currently used version may fail, resulting in the HI-FLOW system's abnormal operation due to remaining application debris. For information on how to uninstall and install the HI-FLOW system, see 2.2, "Uninstalling the HI-FLOW System," and 2.1, "Installing the HI-FLOW System," respectively.

2 OPERATIONS BEFORE STARTING THE SYSTEM

2.5.2 Reinstalling the HI-FLOW system and reloading the interpreter

The procedure for reinstalling (upgrading or downgrading) the HI-FLOW system and reloading the interpreter to the PCs is shown below.



Description of the Procedure Steps:

(1) Starting the HI-FLOW system

Start the HI-FLOW system before replacing it with the new or old version. For information on how to start the system, see “(1) Starting the HI-FLOW system” of 2.3.1, “HI-FLOW system start procedure.”

(2) Receiving the HI-FLOW programs

To receive all of the existing HI-FLOW programs (processes) from the PCs, choose [Mode] – [Online] – [Receive] – [All processes] on the HI-FLOW process sheet. When the HI-FLOW programs are all received, the HI-FLOW system’s communication line automatically enters an online state. Put the communication line back into an offline state by choosing [Mode] – [Offline] on the HI-FLOW process sheet.

(3) Saving the received HI-FLOW programs

To save in a file the HI-FLOW programs that have been received in Step (2), choose [File] – [Save file] on the HI-FLOW process sheet.

(4) Terminating the HI-FLOW system

Terminate the HI-FLOW system according to the instructions given in 2.4, “Terminating the System.”

(5) Reinstalling the HI-FLOW system

Reinstall the HI-FLOW system according to the instructions given in 2.5.1, “Reinstalling the HI-FLOW system.”

(6) Starting the HI-FLOW system

Start the HI-FLOW system according to the instructions given under “(1) Starting the HI-FLOW system” in 2.3.1, “HI-FLOW system start procedure.”

(7) Reading out the saved HI-FLOW programs

To read out the HI-FLOW programs that have been saved in Step (3), choose [File] – [Open file] on the HI-FLOW process sheet and specify the file.

(8) Reloading the interpreter

Reload the interpreter -- a system program for the HI-FLOW system -- to the PCs. Without reloading it, a problem may arise. For example, you will not be able to use part of the new, additional functionality of the HI-FLOW system’s new version installed.

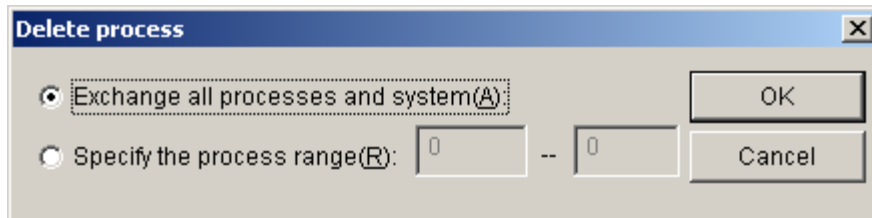
2 OPERATIONS BEFORE STARTING THE SYSTEM

<Procedure>

The interpreter can be reloaded by performing the following procedure:

- ① Choose [Utility] – [PCs] – [Delete process of PCs] on the HI-FLOW process sheet.

The “Delete process” dialog box as shown below then appears.



- ② On the “Delete process” dialog box, select the “Exchange all processes and system” radio button and click the **OK** button. The interpreter on the PCs will then be reloaded.

When the interpreter is reloaded, all the existing HI-FLOW programs (processes) on the PCs will be automatically deleted. For this reason, be sure to save all the existing HI-FLOW programs on the PCs to the personal computer before reloading it.

(9) Compiling the HI-FLOW programs

Compile the read-out HI-FLOW programs according to the instructions given under “(3) Compiling” in 2.3.1, “HI-FLOW system start procedure.”

(10) Transmitting the resulting HI-FLOW programs

Transmit the completed HI-FLOW programs to the PCs according to the instructions given under “(4) Transmitting the HI-FLOW programs” in 2.3.1, “HI-FLOW system start procedure.”

3 HI-FLOW SHEET

3 HI-FLOW SHEET

The HI-FLOW system handles application programs in the form of sheets on the PC.

3.1 Relationship with Files of the Existing HI-FLOW System

The HI-FLOW system can read the source files of the existing HI-FLOW system in memory. [Converter] on the [Utility] menu is used for this purpose.

3.2 HI-FLOW Sheet Configuration

The HI-FLOW system manages the following sheets:

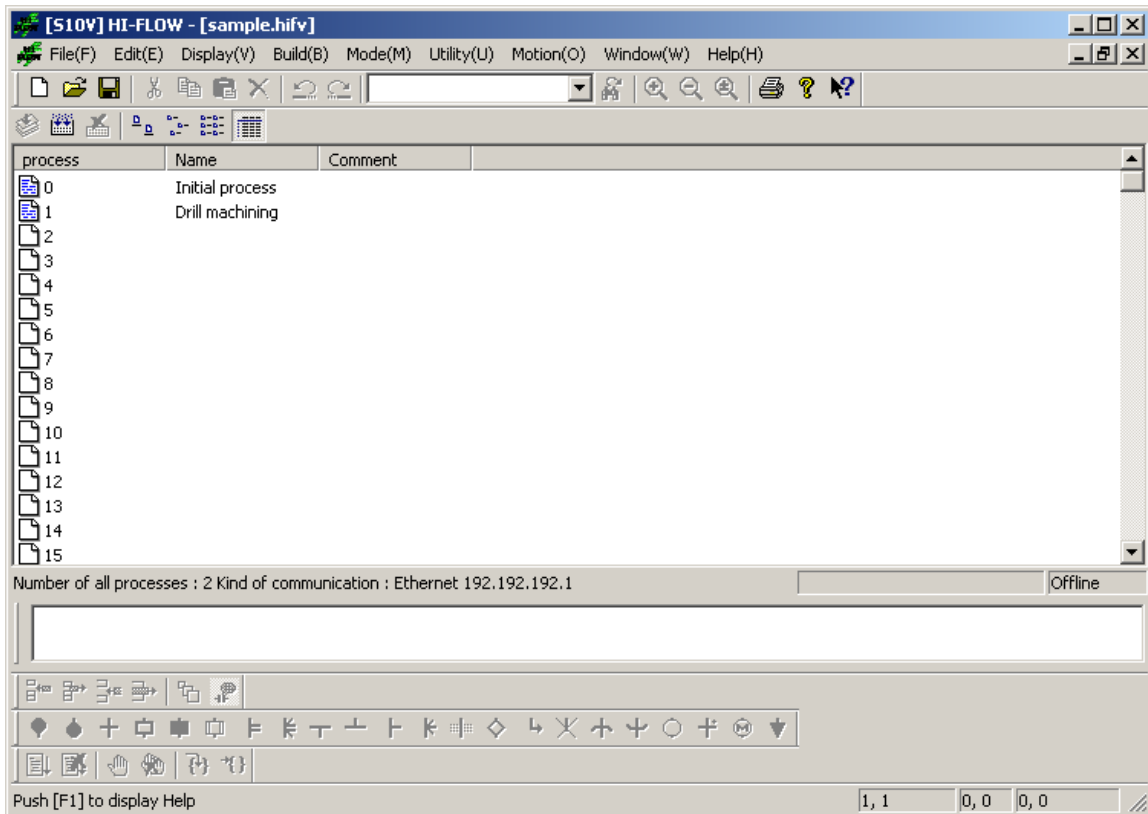
- HI-FLOW process sheet
- HI-FLOW sheet

To create a new sheet or open an existing one, be sure to specify the type of sheet.

3.3 HI-FLOW Process Sheet

The HI-FLOW system manages the HI-FLOW program by process in visible form. The HI-FLOW process sheet includes information about managing these multiple processes in visible form.

The HI-FLOW process sheet corresponds to the DOS version of the process list screen.

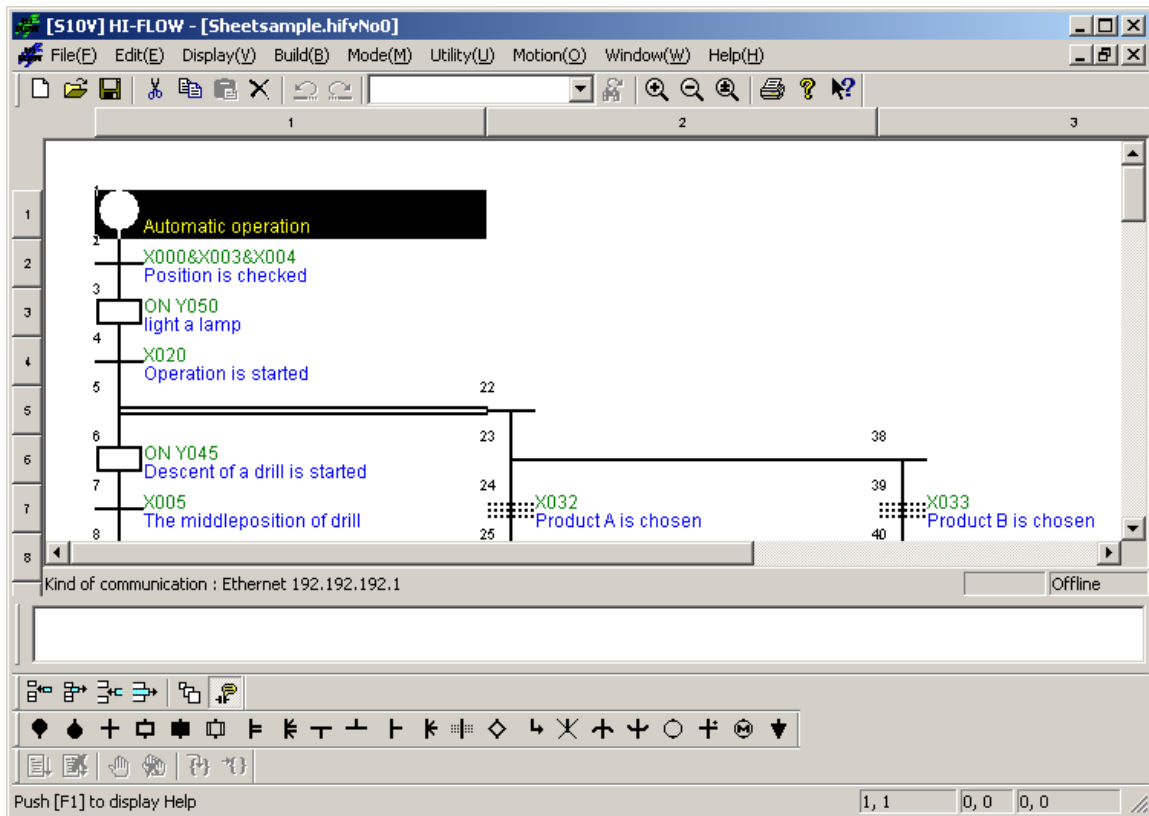


Clicking a process icon on the process sheet opens the corresponding HI-FLOW sheet.

3 HI-FLOW SHEET

3.4 HI-FLOW Sheet

The HI-FLOW programs that are managed as HI-FLOW process sheets exist on HI-FLOW sheets. A HI-FLOW sheet can describe up to 255 rows (999 steps max.) and up to 256 HI-FLOW sheets can be created.



A HI-FLOW symbol must be entered to create a HI-FLOW program. Paste each symbol by dragging and dropping it from the symbol bar on which the HI-FLOW symbols are registered.

<HI-FLOW symbol bar>



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/HI-FLOW SHEET

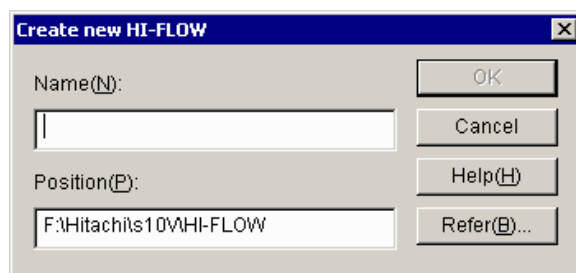
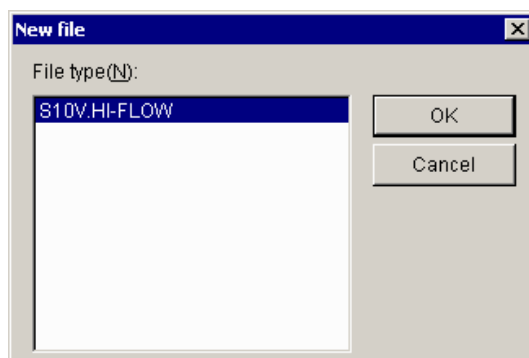
4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

This chapter outlines the functions of the HI-FLOW process sheet/HI-FLOW sheet and explains how to use these sheets. For details, refer to the online help of the HI-FLOW system. The online help can be accessed from the [Help] menu.

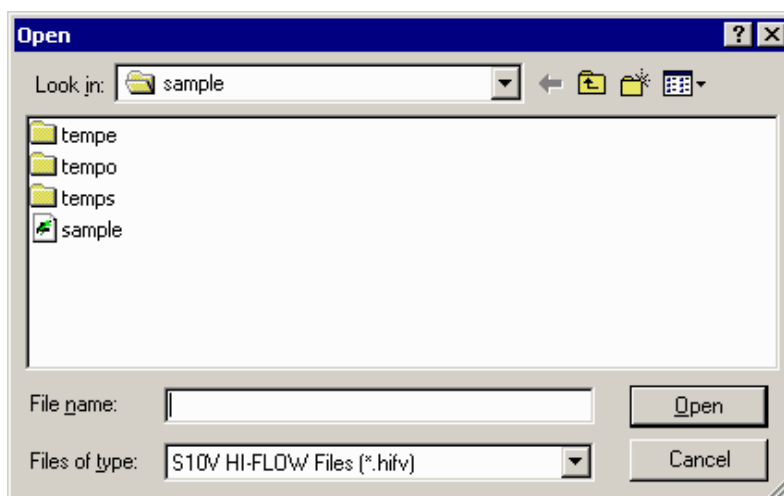
4.1 Creating a HI-FLOW Process Sheet

The HI-FLOW process sheet manages existing HI-FLOW sheets by process in visible form. Select [New file] from the [File] menu to create a HI-FLOW process sheet.

Click the **OK** button on the [New file] screen and enter the name of the sheet to be created on the [Create new HI-FLOW] screen.

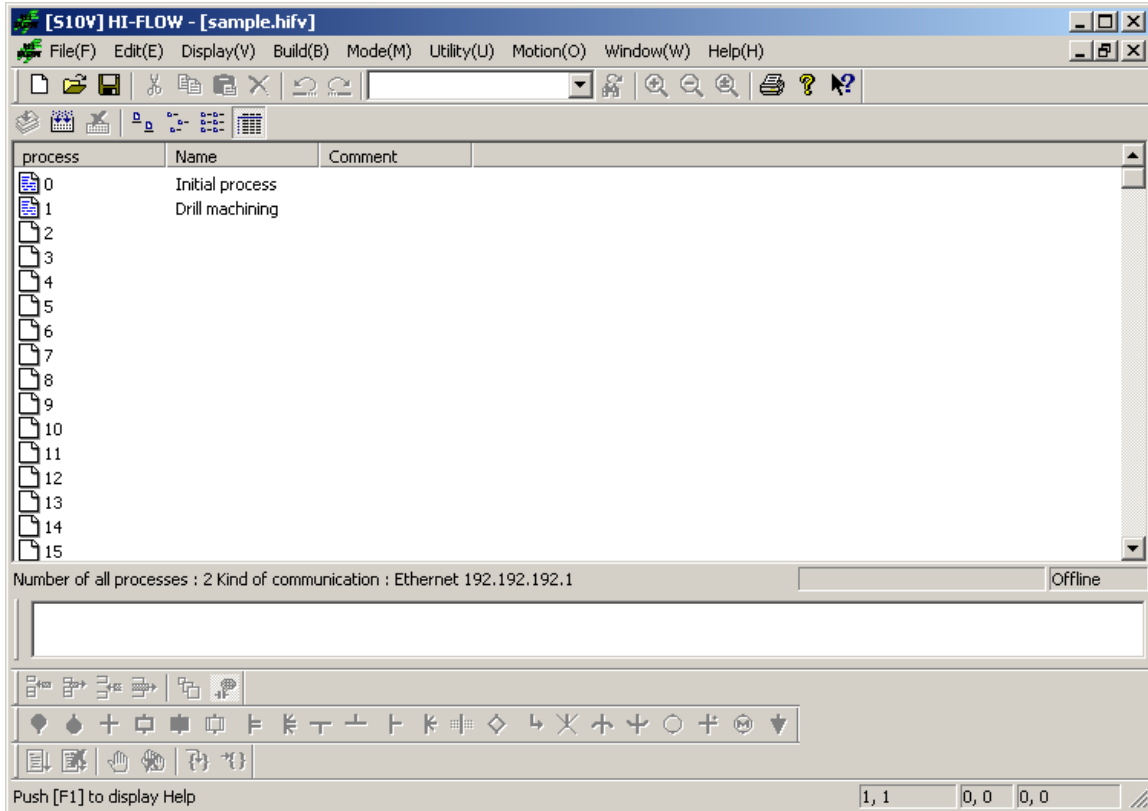


To open an existing HI-FLOW process sheet, select [Open] on the [File] menu.



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

Once a HI-FLOW process sheet has been created, a process sheet without a program is opened. Once an existing HI-FLOW process sheet has been opened (by selecting [Open file] on the [File] menu), a process sheet is opened in closed status.



Only one HI-FLOW process sheet can be opened at a time. To open a HI-FLOW program from the HI-FLOW process sheet, use the mouse to double-click the HI-FLOW sheet icon on the HI-FLOW process sheet.

The HI-FLOW process sheet has nine main menus as follows:

File: Menu of file functions including saving, reading, and printing a HI-FLOW process sheet

Edit: Menu of editing functions for a HI-FLOW process

Display: Menu of functions related to display format of the HI-FLOW system

Build: Menu of compiling functions of a HI-FLOW program

Mode: Menu of functions related to sending and receiving HI-FLOW programs with the PCs

Utility: Menu of various utility functions

Motion: Menu of motion functions related to their settings and RAS (Reliability, Availability, Serviceability)

Window: Menu of functions for the HI-FLOW process sheet window

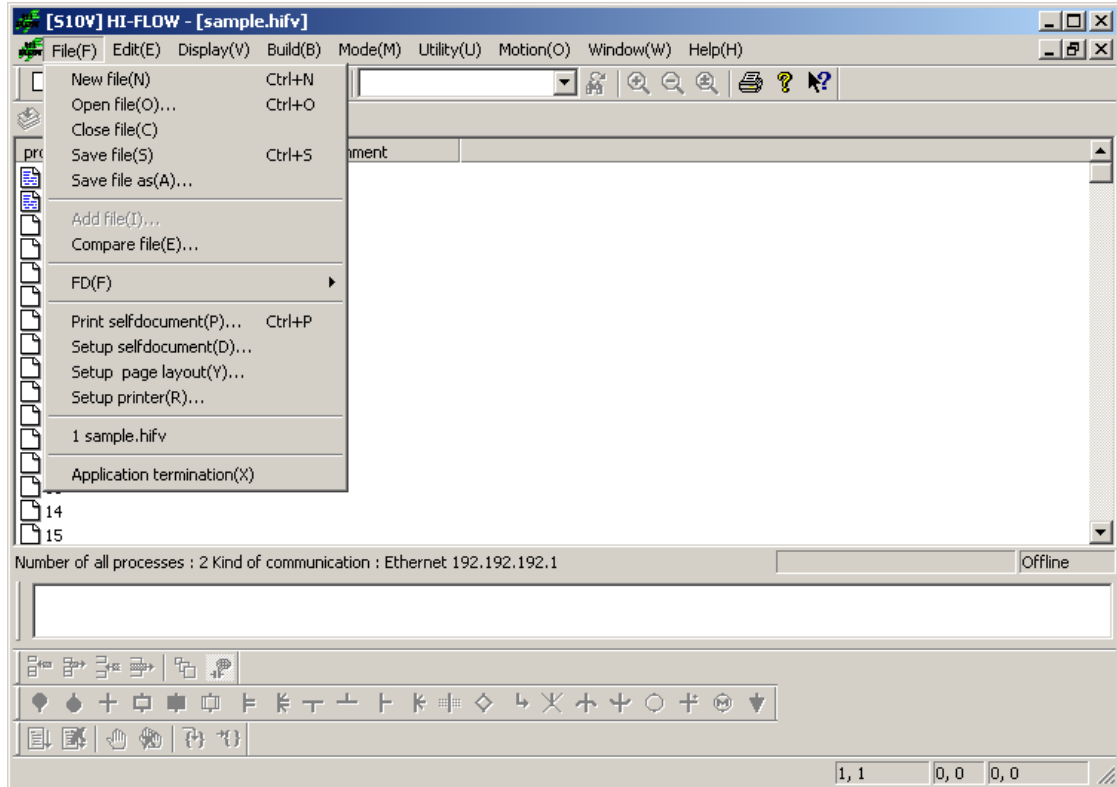
Help: Menu of help functions

The tool bar also has the same functions as the menus.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.2 File Functions of the HI-FLOW Process Sheet

The pull-down menu under [File] provides the file functions of the HI-FLOW process sheet.

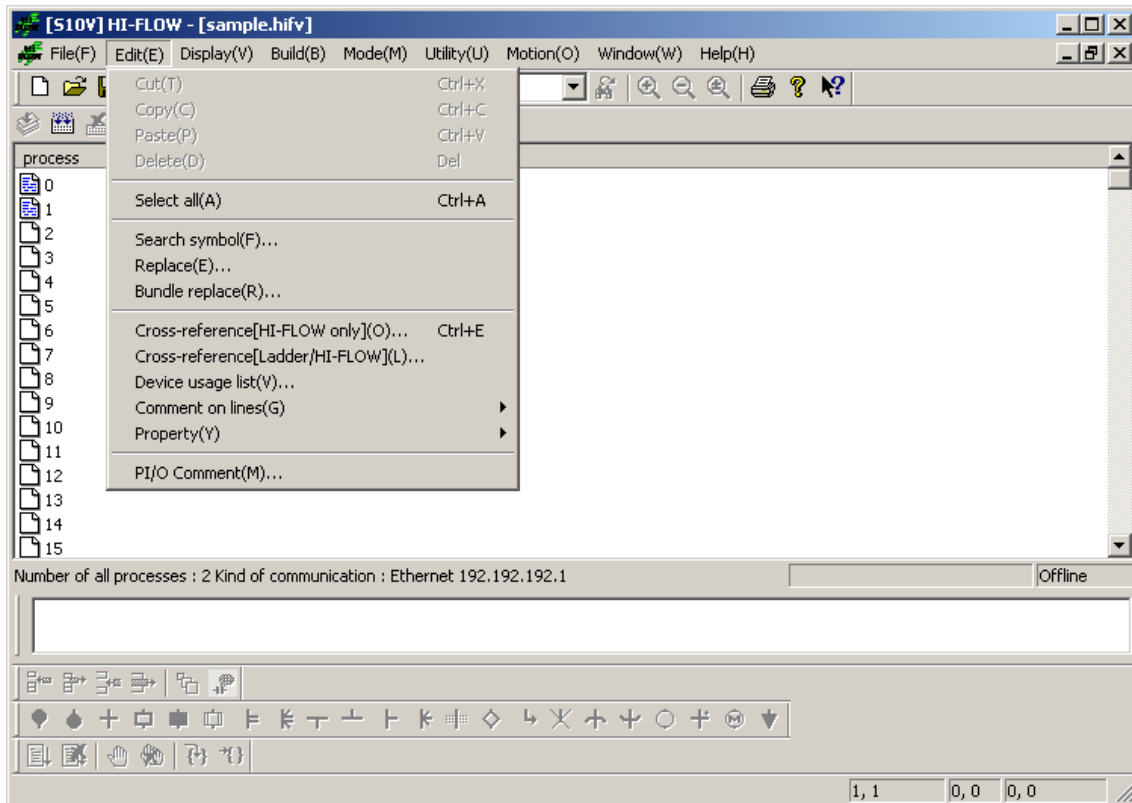


The following table lists the items and brief descriptions of the file functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	File	New file		Opens a new program creating window.
2		Open file		Reads a specified program file.
3		Close file		Closes the currently active window.
4		Save file		Overwrites and saves the program data and comment data of the currently active window.
5		Save file as		Saves the program data of the currently active window after naming it.
6		Add file		Adds a process.
7		Compare file		Compares processes. (Object base)
8		FD	Save	Saves the program data of the currently active window on a FD.
9			Read	Reads a program file from a FD.
10		Print self document		Prints a self-document.
11		Setup self document		Sets the method of printing a self-document.
12		Setup page layout		Sets a page layout.
13		Setup printer		Sets the methods of selecting and printing for the printer.
14		File name 1, 2, 3, 4...		Displays files that were used in the past.
15		Application termination		Terminates this software.

4.3 Editing Functions of the HI-FLOW Process Sheet

The pull-down menu under [Edit] provides the editing functions of the HI-FLOW process sheet. The editing functions “Cut”, “Copy”, “Paste”, and “Delete” are provided for HI-FLOW processes, not for HI-FLOW programs. Accordingly, processes can be copied to and deleted from this sheet.



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

The following table lists the items and brief descriptions of the editing functions.

No.	Level 1	Level 2	Level 3	Outline of function	
1	Edit	Cut		Deletes the contents of a specified process and copies them to the clipboard.	
2		Copy		Copies the contents of a specified process to the clipboard.	
3		Paste		Copies the data of the clipboard to a specified position.	
4		Delete		Deletes the contents of a specified process.	
5		Select all		Places all process icons into selected status.	
6		Search symbol		Searches for a specified symbol.	
7		Replace		Replaces a specified symbol.	
8		Bundle replace		Replaces a specified series of symbols used in a specified process(es), all at once.	
9		Cross-reference [HI-FLOW only]		Searches a given set of HI-FLOW programs for requested symbol information.	
10		Cross-reference [Ladder/HI-FLOW]		Searches both a given set of HI-FLOW programs and a given set of ladder programs for requested symbol information.	
11		Device usage list		Searches all existing processes or a specified process for the symbols used therein and displays the result in list form.	
12		Comment on lines	All processes		Copies the symbol syntax of every process.
13			Designated process		Copies the symbol syntax of a specified process.
14		Property	Property		Sets the properties of the file comment.
15			Process		Sets the properties of the sheet.
16		PI/O Comment			Edits the PI/O comment information.

4.3.1 Searching for symbols

The [Search symbol] option under [Edit] searches the HI-FLOW program(s) currently displayed on screen for every occurrence of a specified string. The process(es) to be searched are as follows:

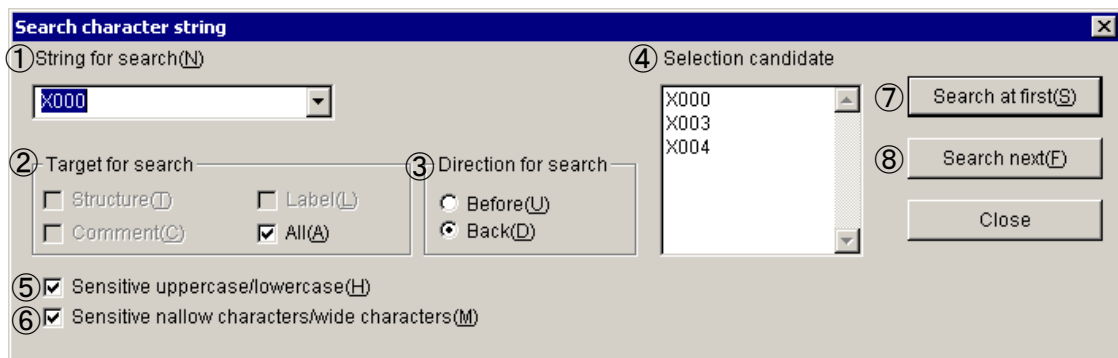
<HI-FLOW process sheet>

All existing processes in the HI-FLOW process sheet are searched. If a matching string is found in a process(es) whose corresponding HI-FLOW sheet(s) are not currently open, the details windows for those processes will automatically open, except when the HI-FLOW system is running in online mode. In online mode, only the processes registered in the PCs are searched.

<HI-FLOW sheet>

The process currently selected is searched.

When you choose the [Search symbol] option, the following dialog box then appears on screen:



where:

- ① The “String for search” input field:
Allows you to enter directly a string to be searched for or choose such a string from the pull-down list. You can enter a maximum of 71 characters (bytes) as the search string. The search string may contain no more than one wild card (?).
- ② The “Target for search” check boxes:
Are checked to select one of the following types of search targets:
Structure: Selects syntax structure as the search target.
Label: Selects label as the search target.
Comment: Selects comment as the search target.
All: (Default option) selects all of syntax structure, label, and comment as the search target.
- ③ The “Direction for search” radio buttons:
Are clicked to select one of the following directions of search:
Before: Searches in the forward direction from the current position of the cursor.
Back: (Default option) searches in the backward direction from the current position of the cursor.

④ The “Selection candidate” scroll box:

After the symbol under the cursor has been automatically analyzed by this option, displays a list of the device name(s) and applied instruction(s) used in the syntax structure and label, if any. If any of those device names is used in a one-dimensional array specification, long length specification, or an indirect specification, it is displayed in one of the following forms: X000 (5) -- if used in a one-dimensional array specification; [X000] -- if used in a long length specification; and @FW000 -- if used in an indirect specification.

When you select an item in the list, it will appear in the “String for search” input field as an input.

⑤ The “Sensitive uppercase/lowercase” check box:

Is checked when you want to distinguish between uppercase and lowercase letters. By default, this item is checked already (i.e., “case-sensitive”).

⑥ The “Sensitive narrow characters/wide characters” check box:

Is checked when you want to distinguish between narrow (half-size) characters and wide (full-size) characters. By default, this item is checked already (i.e., “size-sensitive”).

⑦ The button:

Is clicked to search for a given search string from the beginning or end of each of the existing processes or the selected process. If the “Before” radio button is selected as the direction of search, the search will proceed from the beginning of the process(es) to the end. If the “Back” radio button is selected instead, the search will proceed from the end of the process(es) to the beginning.

⑧ The button:

Is clicked to search for a next occurrence of the search string in the specified direction of search, starting from, but not including, the currently found occurrence. If you take any of the actions listed below, the search will end with the “Symbol ‘xxx’ cannot be found.” message dialog box displayed.

- Clicking the button during the forward ([Before]) direction of search in which the first matching string is currently found again.
- Clicking the button during the backward ([Back]) direction of search in which the last matching string is currently found again.

The procedure used to search for symbols is as follows:

- (1) Enter the desired search string into the “String for search” input field.
- (2) Select the desired target of search.
- (3) Select the desired direction of search.
- (4) Deselect the “Sensitive uppercase/lowercase” check box, if necessary.
- (5) Deselect the “Sensitive narrow characters/wide characters” check box, if necessary.
- (6) Click either the button or the button to start or continue the search.

4.3.2 Replacing symbols with new ones

The [Replace] option under [Edit] replaces every occurrence of a specified string with a new one in the HI-FLOW program(s) currently displayed on screen. This option can be used only when the HI-FLOW system is running in offline mode. It cannot be used for motion control instructions. The process(es) to be searched for string replacement are as follows:

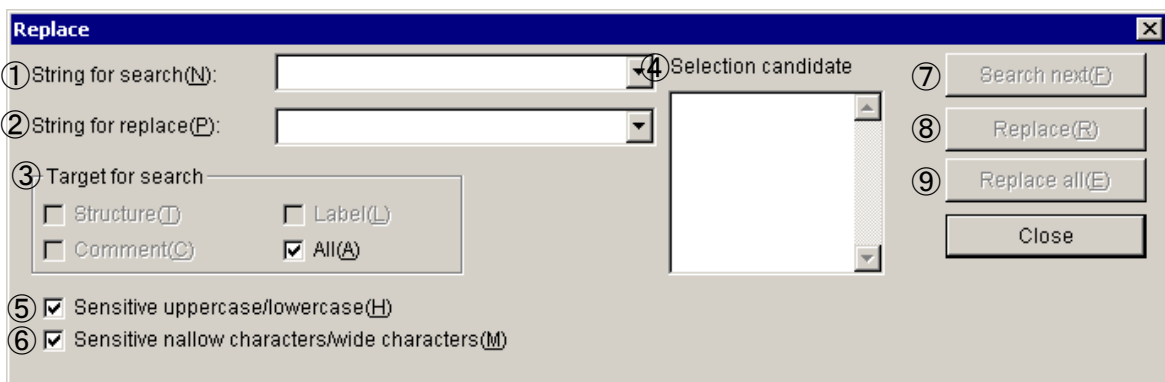
<HI-FLOW process sheet>

All existing processes in the HI-FLOW process sheet are searched for string replacement. If a matching string is found in a process(es) for which a details window is not displayed, the details window for that process will be automatically opened.

<HI-FLOW sheet>

The process currently selected is searched for string replacement.

When you choose the [Replace] option, the following dialog box then appears on screen:



where:

- ① The “String for search” input field:
Allows you to enter directly a string to be searched for or choose such a string from the pull-down list. You can enter a maximum of 71 characters (bytes) as the search string. The search string may contain no more than one wild card (?).
- ② The “String for replace” input field:
Allows you to enter directly a string to replace every occurrence of the specified string with or choose such a string from the pull-down list. You can enter a maximum of 71 characters (bytes) as the replacement string.
- ③ The “Target for search” check boxes:
Are checked to select one of the following types of replacement targets:
Structure: Selects syntax structure as the replacement target.
Label: Selects label as the replacement target.
Comment: Selects comment as the replacement target.
All: (Default option) selects all of syntax structure, label, and comment as the replacement target.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

④ The “Selection candidate” scroll box:

After the symbols selected by moving the cursor have been analyzed, displays a list of the device names and applied instructions used in syntax structures and/or labels. If any of those device names is used in a one-dimensional array specification, long length specification, or an indirect specification, it is displayed in one of the following forms:

X000 (5) -- if used in a one-dimensional array specification;

[X000] -- if used in a long length specification; and

@FW000 -- if used in an indirect specification.

When you select an item in the list, it will appear in the “String for search” input field as an input.

⑤ The “Sensitive uppercase/lowercase” check box:

Is checked when you want to distinguish between uppercase and lowercase letters. By default, this item is checked already (i.e., “case-sensitive”).

⑥ The “Sensitive narrow characters/wide characters” check box:

Is checked when you want to distinguish between narrow (half-size) characters and wide (full-size) characters. By default, this item is checked already (i.e., “size-sensitive”).

⑦ The button:

Is clicked to search for a next occurrence of the search string, starting from, but not including, the currently found occurrence.

⑧ The button:

Is clicked to replace the currently found occurrence of the search string with the replacement string.

⑨ The button:

Is clicked to replace all occurrences of the search string with the replacement string at once.

The procedure used to replace symbols with new ones is as follows:

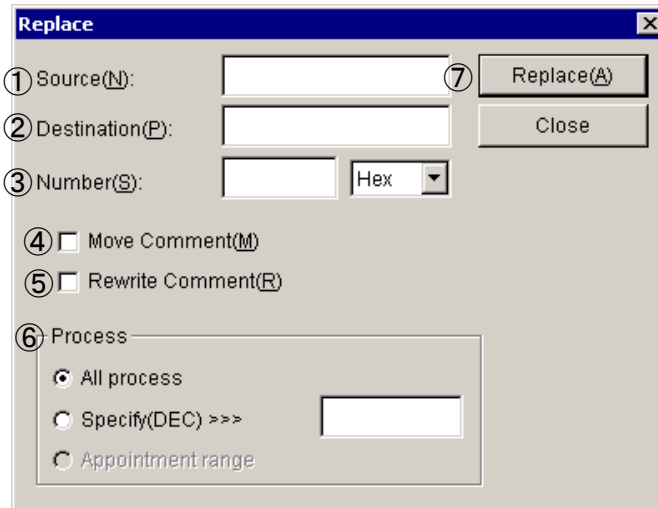
- (1) Enter the desired search string into the “String for search” input field.
- (2) Enter the desired replacement string into the “String for replace” input field.
- (3) Select the desired target of search.
- (4) Deselect the “Sensitive uppercase/lowercase” check box, if necessary.
- (5) Deselect the “Sensitive narrow characters/wide characters” check box, if necessary.
- (6) Click either the , , or the button to continue the search or replace the currently found occurrence or all occurrences of the search string with the replacement string at once.
- (7) If the button is clicked, a confirmation dialog box will then appear. Click the button in the dialog box.

4.3.3 Replacing specified series of symbols with new ones

The [Bundle replace] option under [Edit] replaces a series of register names used in a HI-FLOW program(s) with a new one, all at once, where the old and new register names and process(es) are specified by the user. The result of the replacement will be displayed in an output window and a message dialog box.

This option can be used only when the HI-FLOW system is running in offline mode.

When you choose the [Bundle replace] option, the following dialog box then appears on screen:



where:

- ① The “Source” input field:
Allows you to specify the first existing device name in the series you want to replace with a new one.
- ② The “Destination” input field:
Allows you to specify the first new device name to replace the first existing one with.
- ③ The “Number” input field:
Allows you to enter a count of the number of data points for which you want to replace the existing device names all at once. This count must be a value specified in decimal or hexadecimal form. (By default, the hexadecimal form is used.)

<Example>

Suppose that the first existing device name, first new device name, and the number of data points you want to replace the existing device names all at once are X000, X100, and 10 (in decimal), respectively. Then, the result of the replacement is as follows:

- X000 is replaced with X100
- X001 is replaced with X101
- X002 is replaced with X102
- }
- X009 is replaced with X109

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

④ The “Move Comment” check box:

Is checked to move all the comments given for the existing register names to the new register names. This item is not selected by default (i.e., no comment movement will take place).

<Example>

Suppose that the registers X000 through X009 are given the comments Comment000 through Comment009, respectively, and that the first existing device name, first new device name, and the number of data points specified are X000, X100, and 10 (in decimal), respectively. Then, the result of the replacement is as follows:

- X000 is replaced with X100, with Comment000 for X000 moved to X100
- X001 is replaced with X101, with Comment001 for X001 moved to X101
- X002 is replaced with X102, with Comment002 for X002 moved to X102

- X009 is replaced with X109, with Comment009 for X009 moved to X109

⑤ The “Rewrite Comment” check box:

Is checked to change all existing register names used in the moved comments to the new register names. This item is not selected by default (i.e., no rewriting will take place).

<Example>

Suppose that the first existing device name, first new device name, and the number of data points specified are X000, X100, and 10 (in decimal), respectively, and that register names are used in the comments to be moved. Then, the requested replacement changes the existing device names in the comments to the following:

- X000 is changed to X100
- X001 is changed to X101
- X002 is changed to X102

- X009 is changed to X109

⑥ The “Process” selection radio buttons:

Are clicked to select the process(es) for which you want to perform symbol replacement using this option, and are as follows:

All process: (Default option) selects all existing processes in the HI-FLOW process sheet.

Specify(DEC): Selects only the process identified by a specified process number (in decimal).

Appointment range: Selects only a specified range of steps in a given process. To use this option, you must specify your desired range of steps in the currently displayed HI-FLOW sheet with the mouse before displaying the “Replace” dialog box on screen.

⑦ The Replace button:

Is clicked to start replacing a specified series of register names all at once.

Note: All user-provided settings in the “Replace” dialog box are initialized every time the dialog box is displayed on screen.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

The following restrictions are imposed on replacements using the [Bundle replace] option if the option is used to replace the device names of devices of one type with those of devices of another type:

- Bit registers cannot be converted to word registers and vice versa.
- Timers can be converted to devices of the same type. This is also the case with counters.

The table below shows all allowable combinations of device types for device conversion.

		Device after conversion																																				
		X	Y	G	A	R	K	M	E	Z	S	J	Q	HH	LB	XW	YW	GW	AW	RW	KW	MW	EW	ZW	SW	JW	QW	LBW	DW	FW	LWW	LXW	WT	PT	CN			
Device before conversion	X	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	
	Y	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	G	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	A	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	R	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	K	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	M	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	E	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	Z	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	S	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	J	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	Q	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	HH	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	LB	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	XW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	YW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	GW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	AW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	RW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	KW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	MW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	EW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	ZW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	SW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	JW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	QW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	LBW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	DW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	FW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	LWW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	LXW	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	nc	nc	nc
	WT	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	nc	nc
PT	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	nc	
CN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	√	

√: Can be converted.

nc: Cannot be converted.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.3.4 Device usage listing

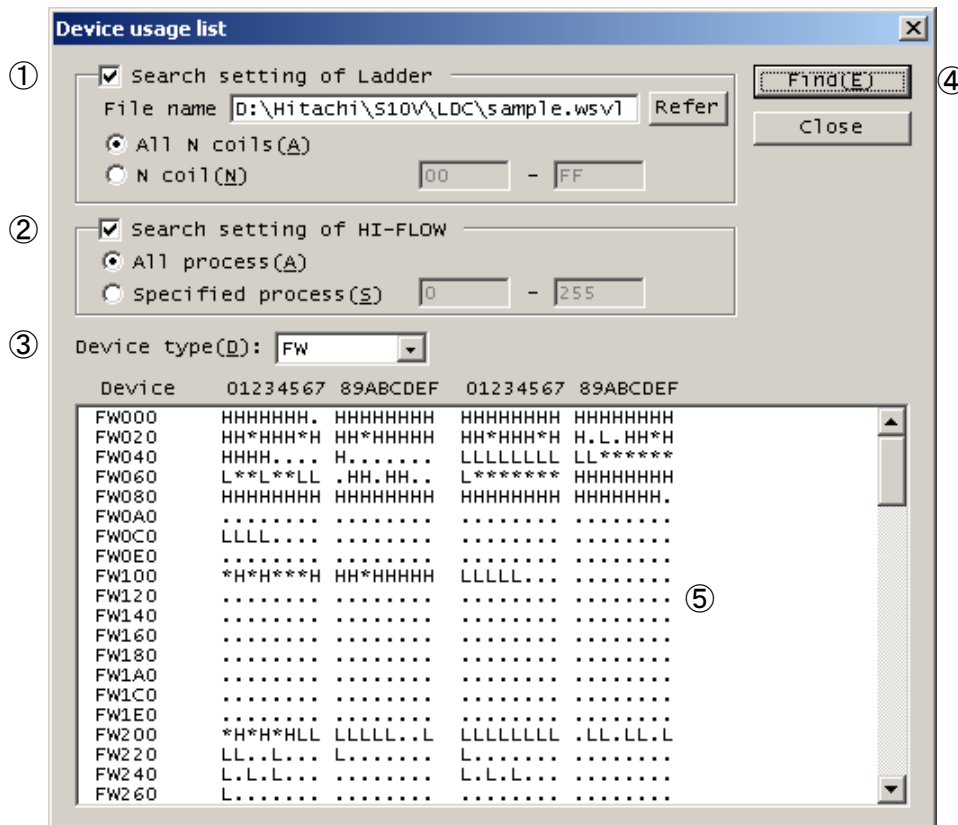
(1) Outline

The [Device usage list] option under [Edit] finds all devices (registers) used in both a specified set of ladder programs and a specified set of HI-FLOW programs and displays a list of usage information for those devices.

(2) How to display the “Device usage list” dialog box

Choose [Device usage list] from the [Edit] menu. The “Device usage list” dialog box will then appear.

(3) “Device usage list” dialog box



where:

① The “Search setting of Ladder” check box:

Is selected when you want to find the devices used in a desired set of ladder programs.

This check box, when selected, allows you to specify the following:

- File name: The file name of a ladder program (wsvl) file to be searched. The wild card (*) may not be used when specifying the file name.
- All N coils: A radio button that is selected when you want to search all N coils used in the programs -- this option setting is the default.
- N coil: A radio button that is selected to specify an N coil or a range of N coils (with their coil numbers in the range 0 to FF [hexadecimal]) to be searched. The coil number of the first N coil in the given range specification must be smaller than or equal to that of the last N coil in the same range specification.

② The “Search setting of HI-FLOW” check box:

Is selected when you want to find the devices used in a desired set of HI-FLOW programs. This check box, when selected, allows you to specify the following:

- All process: A radio button that is selected when you want to search all the existing processes -- this option setting is the default.
- Specified process: A radio button that is selected to specify a process or a range of processes (with their process numbers in the range 0 to 255 [decimal]) to be searched. The process number of the first process in the given range specification must be smaller than or equal to that of the last process in the same range specification.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

③ The “Device type” list box:

Allows you to select from the displayed pulldown list the desired type of devices that you want to view in a list form. The table below shows all specifiable types of devices, any one of which you can specify for search in the ladder or HI-FLOW programs.

Device name	Device type	Ladder	HI-FLOW
External input	X	√	√
Transfer register	J	√	√
External output	Y	√	√
Receive register	Q	√	√
ON-delay timer	T	√	nf
One-shot	U	√	nf
Counter	C	√	nf
Internal register	R	√	√
Internal register	M	√	√
Keep	K	√	√
Global register	G	√	√
Communication link register	A	√	√
Edge contact	V	√	nf
N coil	N	√	nf
Process coil	P	√	nf
Event register	E	√	√
Z register	Z	√	√
System register	S	√	√
Function work register	FW	√	√
Internal register	B	√	nf
Function data register	DW	√	√
Work register	LB	√	√
Extension function work register	LWW	√	√
Long-word work register	LLL	√	nf
Single-precision floating-point work register	LF	√	nf
Backup word work register	LXW	√	√
Backup long-word work register	LML	√	nf
Backup single-precision floating-point work register	LG	√	nf
Converter-use internal register	LR	√	nf
Converter-use edge contact register	LV	√	nf
Other register	HH	nf	√
Parallel timer	PT	nf	√
Wait timer	WT	nf	√
Counter	CN	nf	√

√: Can be found

nf: Cannot be found

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

④ The button:

Is clicked to start a search for the employed devices.

⑤ The device usage list pane:

Presents a list of usage information for the devices found by a search. The use of each device found is indicated by the following information:

- Used only in ladder : L
- Used only in HI-FLOW : H
- Used in both ladder and HI-FLOW: * (asterisk)
- Not used in either : . (period)

- Device usage listing is not usable when you are editing your program. It can be used only when you have compiled the program.
- Search for the devices used in a ladder program requires the Ladder Chart System, Ver-Rev 01-09 or later, installed in your user system

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.3.5 Cross-referencing HI-FLOW only

(1) Outline

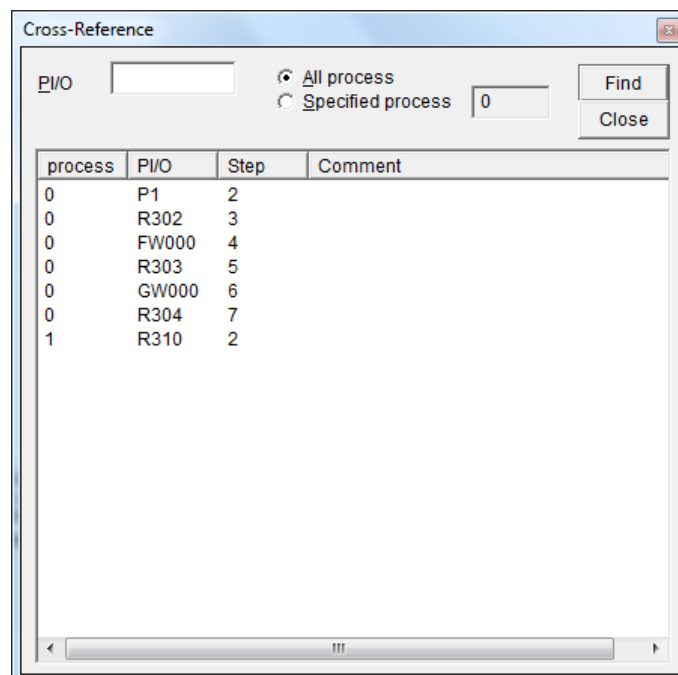
The [Cross-reference [HI-FLOW only]] option under [Edit] searches the currently open HI-FLOW program file for all symbols using an optionally specified PI/O register or process, and displays the result of the search in a list form. In addition to this, the option also allows you to select a desired line (row) of information in the search result, in order to move the cursor to the corresponding symbol location in the HI-FLOW sheet.

(2) How to display the “Cross-Reference” dialog box

The “Cross-Reference” dialog box can be displayed by performing either of the following steps:

- Displaying it from the HI-FLOW process sheet or HI-FLOW sheet
Choose [Cross-reference [HI-FLOW only]] from the [Edit] menu of either the HI-FLOW process sheet or HI-FLOW sheet. The “Cross-Reference” dialog box will then appear.
- Displaying it from the popup menu
Move the mouse pointer onto the HI-FLOW process sheet or HI-FLOW sheet and right-click the mouse. From the displayed popup menu, choose [Cross-reference [HI-FLOW only]]. The “Cross-Reference” dialog box will then appear.
- Displaying it by operating the shortcut key
Press the [Ctrl] + [E] shortcut key. The “Cross-Reference” dialog box will then appear.

(3) “Cross-Reference” dialog box



Description of the displayed result:

process: Each is the process number of a searched PI/O process.

PI/O: Each is the register name of a found PI/O register instance or the process number of a found PI/O process instance.

Step: Each is the step number of a step (symbol) in which the found PI/O register instance or process instance is present.

Comment: Each is a comment given to the found PI/O register instance.

(4) Operation method

① Specifying PI/O

In the “PI/O” edit box, specify as a search key a PI/O register name or process number for which to obtain cross-reference information. If nothing is specified in the edit box, all existing PI/O registers and processes are assumed by default.

② Specifying what to search

- All process: A radio button that is selected when you want to search all existing processes -- this option setting is the default.
- Specified process: A radio button that is selected when you want to specify a particular process (with its process number in the range 0 to 255 [decimal]).

③ Starting a cross-reference operation

To start a cross-reference operation, click the button. Every string of characters matching the specified PI/O register name, when found in the process(es), is displayed as cross-reference information in the search result list within the “Cross-Reference” dialog box.

④ Moving the cursor to the corresponding symbol location

Double-click on any line of cross-reference information in the search result list within the “Cross Reference” dialog box. Then, the cursor will move to the corresponding symbol location in the HI-FLOW sheet.

⑤ Closing the “Cross Reference” dialog box

To close the “Cross Reference” dialog box, click either the or the button in the dialog box.

Cross-referencing HI-FLOW only is not usable when you are editing your program. It can be used only when you have compiled the program.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.3.6 Cross-referencing both ladder and HI-FLOW

(1) Outline

The [Cross-reference [Ladder/HI-FLOW]] option under [Edit] searches both a specified ladder and a specified HI-FLOW program file for all symbols using a specified symbol (PI/O register), and displays the result of the search in a list form. In addition to this, the option also allows you to select a desired line (row) of information in the search result, in order to move the cursor to the corresponding symbol location in the ladder sheet or HI-FLOW sheet.

(2) How to display the “Cross-Reference (Ladder/HI-FLOW)” dialog box

The “Cross-Reference (Ladder/HI-FLOW)” dialog box can be displayed by performing either of the following steps:

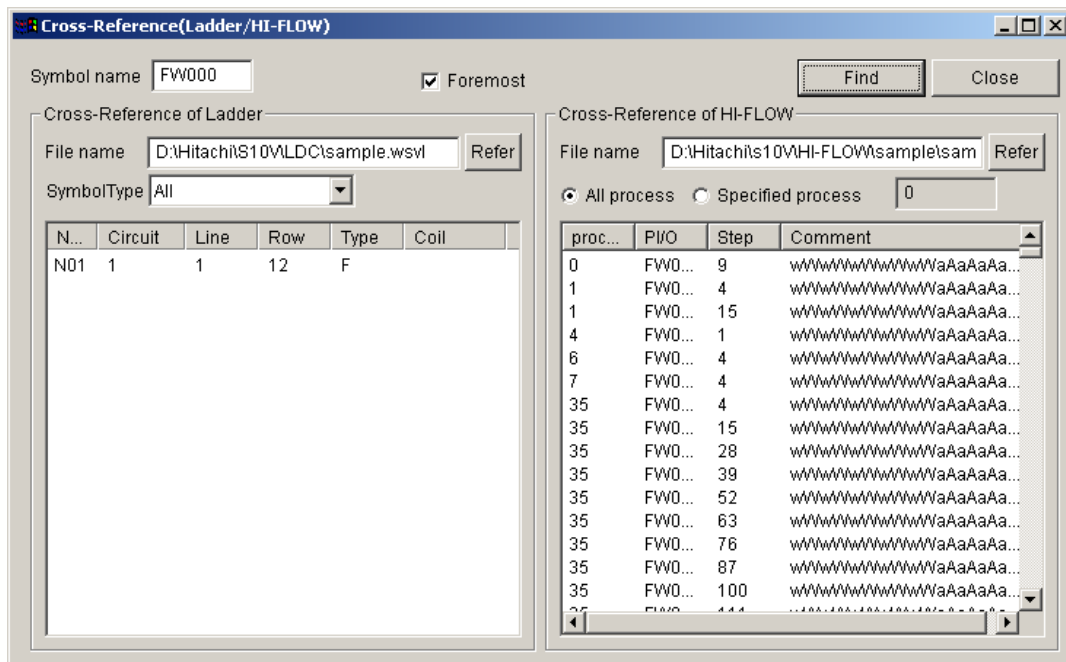
- Displaying it from the HI-FLOW process sheet or HI-FLOW sheet

Choose [Cross-reference [Ladder/HI-FLOW]] from the [Edit] menu of either the HI-FLOW process sheet or HI-FLOW sheet. The “Cross-Reference (Ladder/HI-FLOW)” dialog box will then appear.

- Displaying it from the popup menu

Move the mouse pointer onto the HI-FLOW process sheet or HI-FLOW sheet and right-click the mouse. From the displayed popup menu, choose [Cross-reference [Ladder/HI-FLOW]]. The “Cross-Reference (Ladder/HI-FLOW)” dialog box will then appear.

(3) “Cross-Reference (Ladder/HI-FLOW)” dialog box



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

Description of the displayed result:

■ Cross-referencing of ladder

N no.: Each is the coil number of the N coil in which an instance of the specified symbol is found.

Circuit: Each is the circuit number of the circuit in which an instance of the specified symbol is found within the N coil.

Line: Each is the line number of the line in which an instance of the specified symbol is found within the circuit of the N coil.

Row: Each is the column number of the column in which an instance of the specified symbol is found within the circuit of the N coil.

Type: Each indicates the type of a found instance. Type is one of the following:

No.	Type code	Meaning
1	A	A-contact
2	B	B-contact
3	U	Rising-edge contact
4	D	Falling-edge contact
5	C	Coil
6	S	Set coil
7	R	Reset coil
8	F	Arithmetic function
9	CEQ	Comparison -- EQU
10	CNE	Comparison -- NEQ
11	CLT	Comparison -- LT
12	CGT	Comparison -- GT
13	CLE	Comparison -- LE
14	CGE	Comparison -- GE
15	L	Label

Coil: Each, displayed only when the specified symbol type is contact or label, is the output coil of the circuit in which an instance of the specified symbol is found.

■ Cross-referencing of HI-FLOW

process: Each is the process number of a searched PI/O process.

PI/O: Each is the register name of a found PI/O register instance.

Step: Each is the step number of a step (symbol) in which the found PI/O register instance is present.

Comment: Each is a comment given to the found PI/O register instance.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

(4) Operation method

① Specifying a symbol name

In the “Symbol name” edit box, specify as a search key a PI/O register name (e.g., X000) for which to obtain cross-reference information. If nothing is specified in the edit box, all existing PI/O registers are assumed by default.

② Specifying what to search in ladder

- File name: An edit box in which to specify a ladder program file, or a wsvl file, to be searched for cross-reference information.
- Symbol type: An edit box in which to specify (select) a type of “relay”, such as contact, coil, or edge, to be searched for cross-reference information. The symbol type you can specify is one of the seven listed below. The default is “All”.

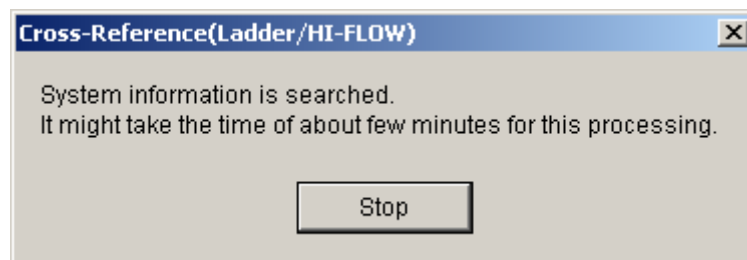
Specified symbol type	Resulting search
Contact	A search of every employed N coil for any register(s) of existing a- and/or b-contacts matching the register name specified in the “Symbol name” edit box. When a matching register(s) are found, the displayed result of the search shows their associated N coil numbers, circuit numbers, line numbers, row numbers, symbol type codes, and output coil names (e.g., the ID names of normal coils, set coils, reset coils, arithmetic functions, etc.).
Edge	A search of every employed N coil for any register(s) of existing rising-edge and falling-edge contacts matching the register name specified in the “Symbol name” edit box. When a matching register(s) are found, the displayed result of the search shows their associated N coil numbers, circuit numbers, line numbers, row numbers, and symbol type codes -- no output coil names are shown in this case.
Coil	A search of every employed N coil for any register(s) of existing normal coils, set coils, and reset coils matching the register name specified in the “Symbol name” edit box. When a matching register(s) are found, the displayed result of the search shows their associated N coil numbers, circuit numbers, line numbers, row numbers, and symbol type codes -- no output coil names are shown in this case.
Label	A search of every employed N coil for any jump destination label(s) matching the label name specified in the “Symbol name” edit box. When a matching label(s) are found, the displayed result of the search shows their associated N coil numbers, circuit numbers, line numbers, row numbers, symbol type codes, and output coil names.
Function	A search of every employed N coil for any register(s) of existing arithmetic functions and arithmetic function parameters matching the register name specified in the “Symbol name” edit box. When a matching register(s) are found, the displayed result of the search shows their associated N coil numbers, circuit numbers, line numbers, row numbers, and symbol type codes -- no output coil names are shown in this case.
Index/Comp	A search of every employed N coil for any register(s) of existing index registers and comparison-symbol parameters matching the register name specified in the “Symbol name” edit box. When a matching register(s) are found, the displayed result of the search shows their associated N coil numbers, circuit numbers, line numbers, row numbers, and symbol type codes -- no output coil names are shown in this case.
All	A search of every employed N coil for any register(s), including index registers, or arithmetic function(s) matching the character string specified in the “Symbol name” edit box. When a matching register(s) or function(s) are found, the displayed result of the search shows their associated N coil numbers, circuit numbers, line numbers, row numbers, symbol type codes, and output coil names -- these output coil names are shown only when the matching symbol is either an a-contact or a b-contact.

③ Specifying what to search in HI-FLOW

- File name: An edit box in which to specify a HI-FLOW program file, or an hifv file, to be searched for cross-reference information.
- All process or Specified process: Each is a radio button that is selected to specify a process, a range of processes, or all existing processes to be searched for cross-reference information.

④ Searching for cross-reference information

To search for cross-reference information, click the button. Then, the search process starts, displaying the message shown below. If you want to stop the search process in progress, click the button in the dialog box.



⑤ Search result displayed

If any instance(s) of the specified symbol are found, they will be displayed in a list form. Otherwise, nothing will be displayed.

⑥ Sorting the search result (only in HI-FLOW)

To sort the search result, click any one of the column titles (“process”, “PI/O”, “Step”, or “Comment”) of the search result list pane. Then, the search result is sorted in terms of the selected column title.

⑦ Displaying the program

Click a desired line of cross-reference information in the search result. Then, the corresponding step in the program appears on the screen.

By default, the “Cross-Reference (Ladder/HI-FLOW)” dialog box is displayed foremost. If you want to view the whole display of the corresponding step, deselect the “Foremost” check box.

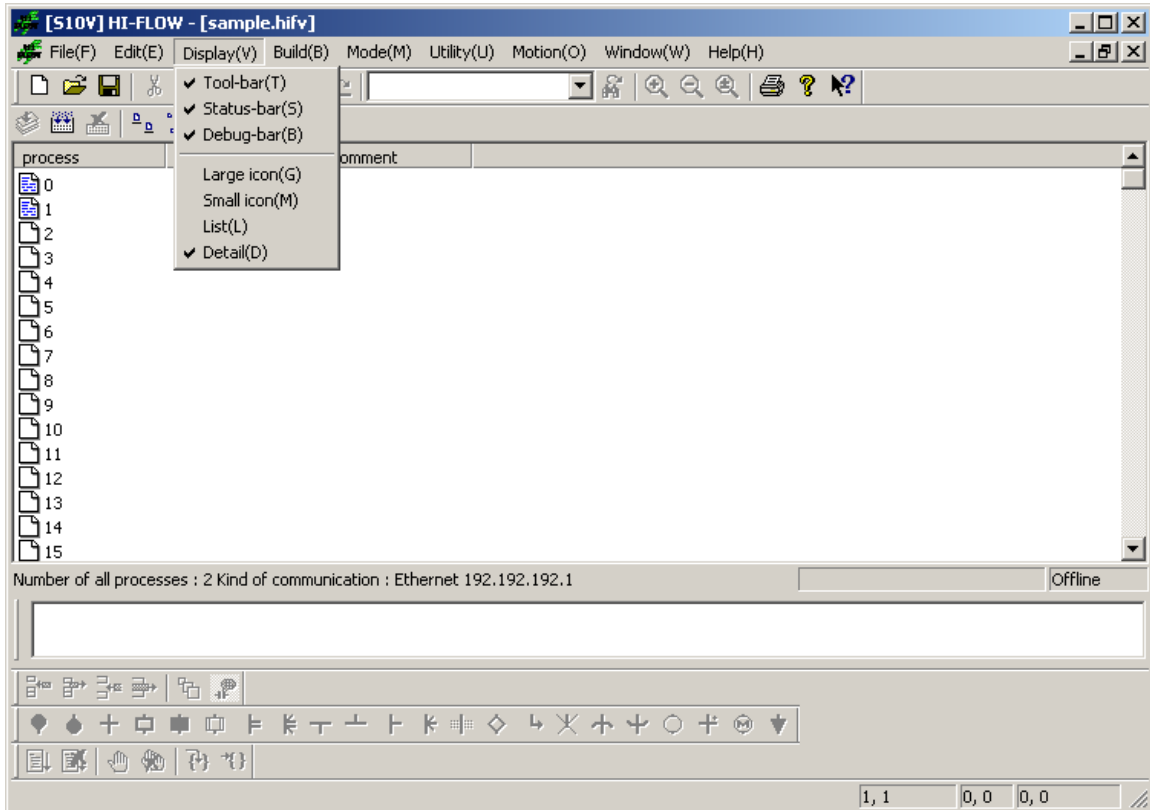
At the end of Step ⑦, you can repeat Steps ① through ④ to make another search.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- Cross-referencing both ladder and HI-FLOW is not usable when you are editing your program. It can be used only when you have compiled the program.
- The requested search of a specified file is started only when the Ladder Chart or HI-FLOW system is up and running. If they are not up and running, or the ladder or HI-FLOW program file to be searched is not displayed on-screen yet, then the requested search of that program file will be started upon the completion of their start.
- Cross-referencing both ladder and HI-FLOW is not available if the installed ladder chart system is not of Ver-Rev 01-19 or later.

4.4 Display Functions of the HI-FLOW Process Sheet

The pull-down menu under [Display] provides the display functions of the HI-FLOW process sheet.



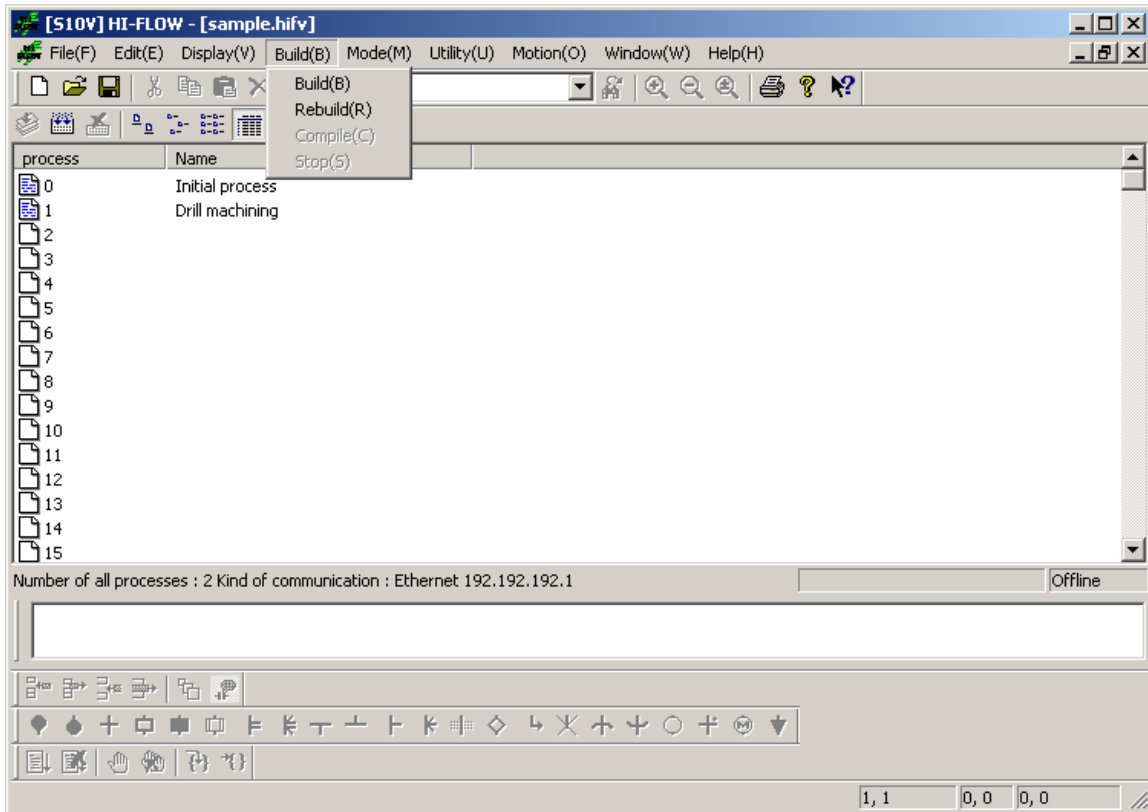
The following table lists the items and brief descriptions of the display functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	Display	Tool-bar		Selects display or non-display of the toolbar.
2		Status-bar		Selects display or non-display of the statusbar.
3		Debug-bar		Selects display or non-display of the debugbar.
4		Large icon		Displays processes as large icons.
5		Small icon		Displays processes as small icons.
6		List		Displays a list of processes.
7		Detail		Displays the details of a process.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.5 Build Functions of the HI-FLOW Process Sheet

The pull-down menu under [Build] provides the build functions of the HI-FLOW process sheet.



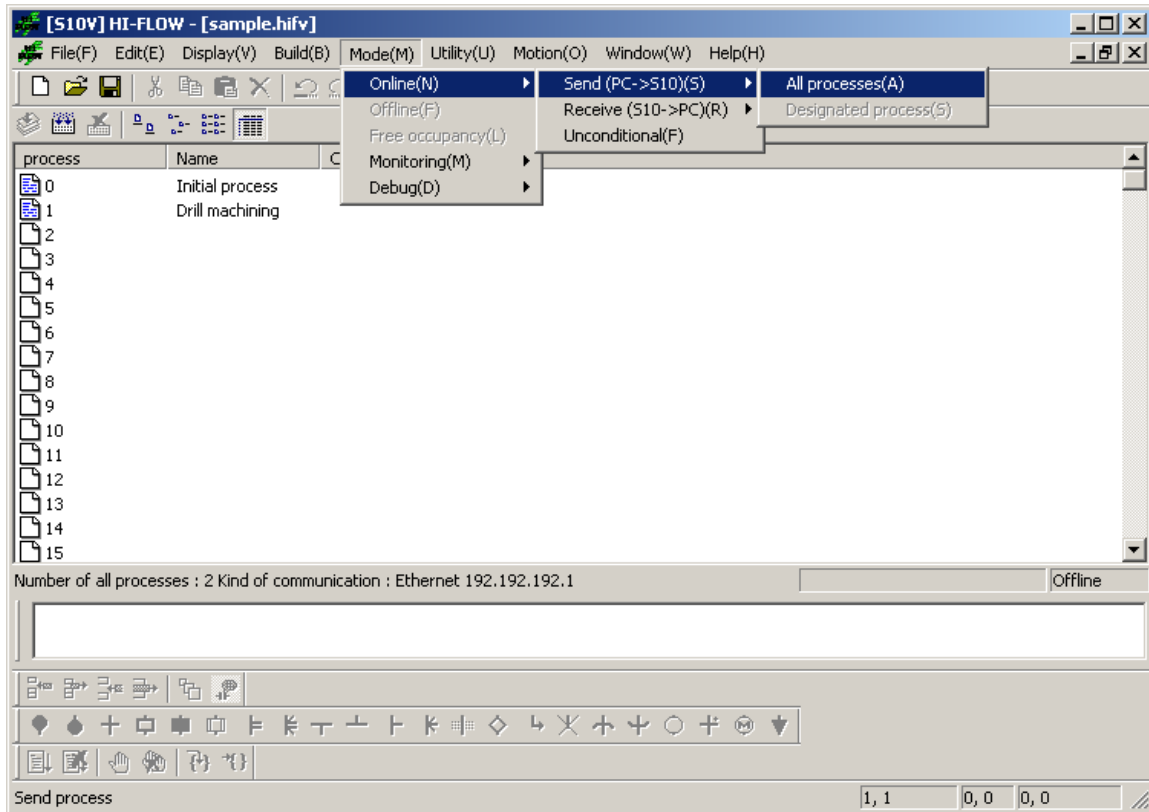
The following table lists the items and brief descriptions of the build functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	Build	Build		Compiles all processes that are not yet compiled.
2		Rebuild		Compiles all processes regardless of whether already compiled or not.
3		Compile		Compiles a specified process(es).
4		Stop		Stops compiling.

When executing compile processing, place at least one process in selected status. To specify multiple processes, use the mouse to click the HI-FLOW sheet icon while holding down the [Shift] key and [Ctrl] key.

4.6 Mode Functions of the HI-FLOW Process Sheet

The pull-down menu under [Mode] provides the mode functions of the HI-FLOW process sheet.



Note that the processing target and executable functions vary depending on online/offline mode.

- Offline mode

The editing target is PC memory or a file.

- Online mode

The editing target is PC memory or a file matched with the PCs. To select online mode, sending or receiving must be matched with the PCs.

At HI-FLOW system startup, offline mode is unconditionally set. Use the pull-down menu to switch to the desired mode.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

The following table lists the items and brief descriptions of the mode functions.

No.	Level 1	Level 2	Level 3		Outline of function
1	Mode	Online	Send	All processes	Sends all processes to the PCs to set online mode.
2				Specified process	Sends a specified process to the PCs to set online mode.
3			Receive	All processes	Receives all processes of the PCs to set online mode.
4				Specified process	Receives a specified process of the PCs to set online mode.
5			Unconditional	Sets online mode unconditionally.	
6		Offline	Switches the mode to offline mode.		
7		Free occupancy	Releases occupancy by the self-PC.		
8		Monitoring	Start monitoring	Starts monitoring.	
9			Stop monitoring	Stops monitoring.	
10		Debug	Trace	Traces and displays process movement between the starting condition and ending condition.	
11			Time monitor	Monitors the time elapsed between the starting condition and ending condition.	
12			Breakpoint	Sets and resets a breakpoint.	

The HI-FLOW system has an occupancy function matched with the network. This function is intended to prevent multiple HI-FLOW systems on the network from accessing the same PCs. Therefore, when online mode is specified, the PCs of the connecting destination are occupied. This occupancy is released when the user selects the occupancy release menu. If the HI-FLOW system of another PC already occupies the PCs, specify online mode for the same PCs. This will display an error message and invalidate the online specification.

When changed or transferred, the HI-FLOW program is written in the CMU flash memory. The written data is loaded into main memory of the CMU at restart.

NOTICE

If the S10V power supply is turned off or the switch is reset while a process is being sent, the HI-FLOW program will be written to flash memory in an imperfect status and the HI-FLOW system may malfunction. Should the power supply be turned off or the switch be reset while sending a process, be sure to resend all processes after replacing the HI-FLOW system (*).

If the tool cannot be connected due to HI-FLOW system malfunction, it can be recovered to normal status by following the procedure below.

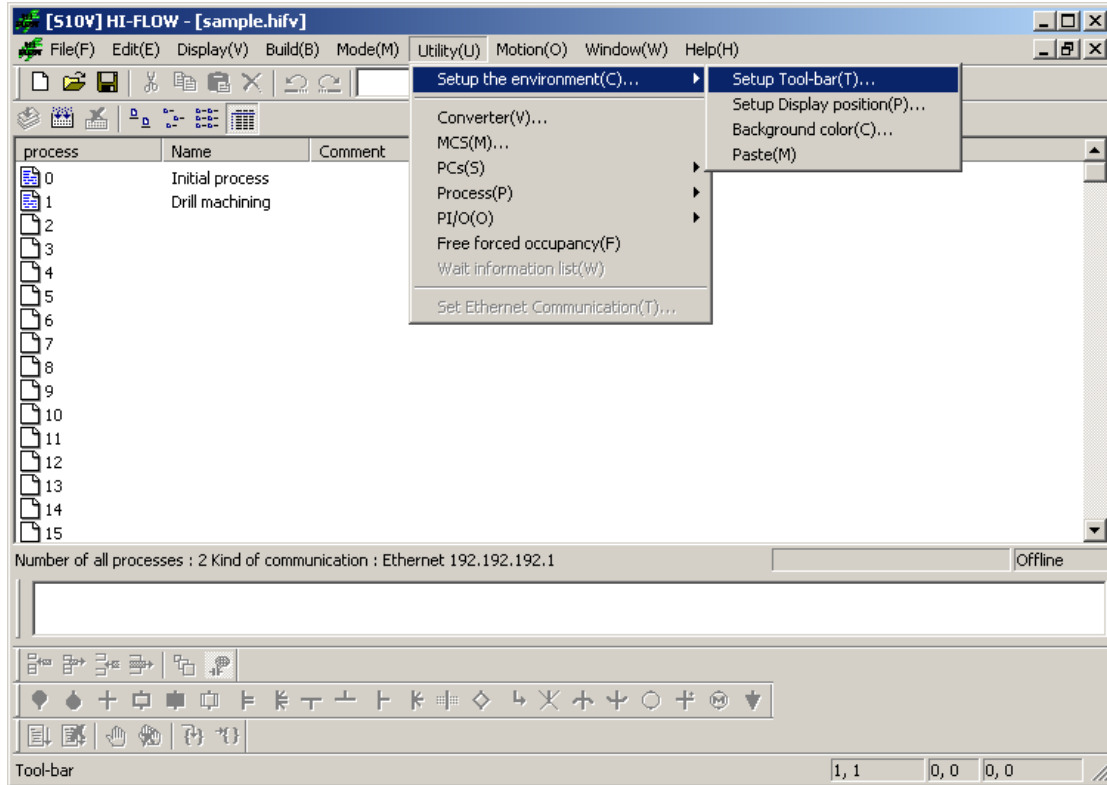
- ① Turn off the S10V power supply and set the T/M switch of the CMU module to A.
- ② Turn on the S10V power supply to start the HI-FLOW system without loading it from flash memory.
- ③ Connect the tool and replace the HI-FLOW system (*). Then resend all the processes.
- ④ Turn off the S10V power supply, reset the T/M switch of the CMU module, and then turn on the S10V power supply.

(*) For information on how to replace the HI-FLOW system, see "(8) Reloading the interpreter" in 2.5.2, "Reinstalling the HI-FLOW system and reloading the interpreter."

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.7 Utility Functions of the HI-FLOW Process Sheet

The pull-down menu under [Utility] provides the utility functions of the HI-FLOW process sheet.



The following table lists the items and brief descriptions of the utility functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	Utility	Setup the environment	Setup tool-bar	Sets the tool-bar buttons.
2			Setup display position	Sets the default display positions of syntax structure, label, and comment.
3			Background color	Sets the background color of the sheet in each mode.
4			Paste	Sets Overwrite or Insert in paste mode.
5		Converter		Converts a source created by the DOS version of the HI-FLOW system.
6		MCS		Reads from and writes to memory.
7		PCs	Change connection of PCs	Sets the type of communication with the PCs.
8			Change PCs status	Forcibly stops and clears the PCs.
9			System edition	Sets the conditions and environment that enables operation on the PCs.
10			Delete process of PCs	Changes or deletes the HI-FLOW system.
11			Layout system bits	Sets the bit-type PI/O into which the execution status on the PCs is incorporated.
12		Process	Interrelation chart of processes	Displays the process connection and process name.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

No.	Level 1	Level 2	Level 3	Outline of function
13	Continuation of Utility	Continuation of Process	Total process capacity	Displays the total process capacity.
14			Restart process	Forcibly restarts the process on the PCs from the current status.
15			Process ACT	Starts the process on the PCs from the current status.
16			Process RST	Resets the process on the PCs from the current status.
17			Process STP	Stops the process on the PCs from the current status.
18			Process CLR	Clears the process on the PCs from the current status.
19		PI/O	Delete unused PI/O	Deletes the unused PI/O.
20		Free forced occupancy		Forcibly releases the occupancy status of the PCs.
21		Wait information list		Displays the symbol figures, syntax structure, etc. of the process stop step.
22		Set Ethernet Communication		Displays the [Ethernet Communication Setting List] screen to list parameter information about Ethernet communication application instructions.

Free forced occupancy is a function related to the function to match the network as described in 4.6, “Mode Functions of the HI-FLOW Process Sheet.” Should connection with the PCs be cut off for some reason while the HI-FLOW system occupies the PCs, this occupancy status may be retained. In such case, the system cannot make a subsequent connection to any PC due to occupancy. Therefore, use the “free forced occupancy” function to forcibly release occupancy status.

NOTICE

The “free forced occupancy” function can also be executed even if the PCs are occupied by another user. However, even if this function is executed while the PCs are occupied by another user, the release of occupancy status can not be determined. Accordingly, multiple accesses may be made to the same PCs in some cases of operation. To prevent this, be sure to confirm that the PCs are not occupied by another user by observing any warning message.

4.7.1 Converting the program from the existing system

This HI-FLOW system has upward compatibility with the existing HI-FLOW system. Therefore, the program must be converted at the source level. The following explains how to perform this conversion.

- (1) For conversion from existing Windows® version or PC98 version (DOS version)
 - ① Copy a set of source files saved by the existing HI-FLOW tool to the PC on which the S10V HI-FLOW system runs.
 - ② Specify Source file- by using the converter function on the [Utility] menu of the S10V HI-FLOW system, and then read it into memory.

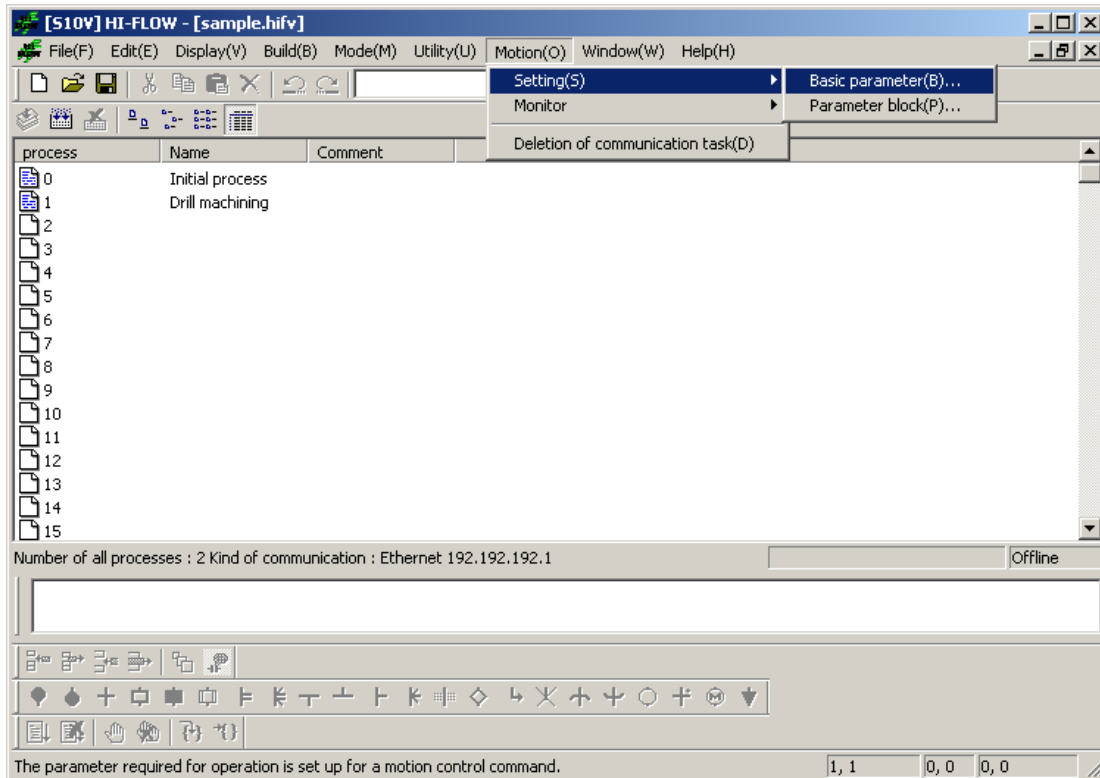
- (2) For conversion from PSEα (though the PC98 version (DOS version) tool)
 - ① Convert the HI-FLOW program created by PSEα by using the converter function of the HI-FLOW tool of the PC98 version (DOS version).
 - ② Copy a set of source files converted in ① to the PC on which the S10V HI-FLOW system runs.
 - ③ Specify Source file- by using the converter function on the [Utility] menu of the S10V HI-FLOW system, and then read it into memory.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.8 Motion Functions of the HI-FLOW Process Sheet

The pull-down menu under [Motion] provides the motion functions of the HI-FLOW process sheet.

The motion functionality does not support Microsoft® Windows® 7 (32-bit) operating system.



The following table lists the items and brief descriptions of the motion functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	Motion	Setting	Basic parameter	Displays the “List of motion basic setup” window that contains parameters essential for execution of motion control instructions under HI-FLOW.
2			Parameter block	Displays the “List of parameter block setup” window that allows you the advance setting of parameters for motion control instructions.
3		Monitor	Monitor parameter	Displays the “Set motion monitor” window that allows you to specify the monitor parameters to be displayed on screen.
4			Motion trace	Displays the “Setting of motion trace” window that is used to specify motion registers in which to obtain trace data.
5			Communication error trace	Displays the “Motion communication error trace” window that presents error trace information related to communication tasks.
6			Communication accumulated information	Displays the “Motion communication accumulated information” window that shows you accumulated error count information related to communication tasks.
7		Deletion of communication task		Deletes the communication task from the CMU.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.8.1 Basic parameters for motions

Description: The [Basic parameter] option under [Motion] allows you to set parameters essential for execution of motion control instructions under HI-FLOW.

Operation: The procedure required for using this option is as follows:

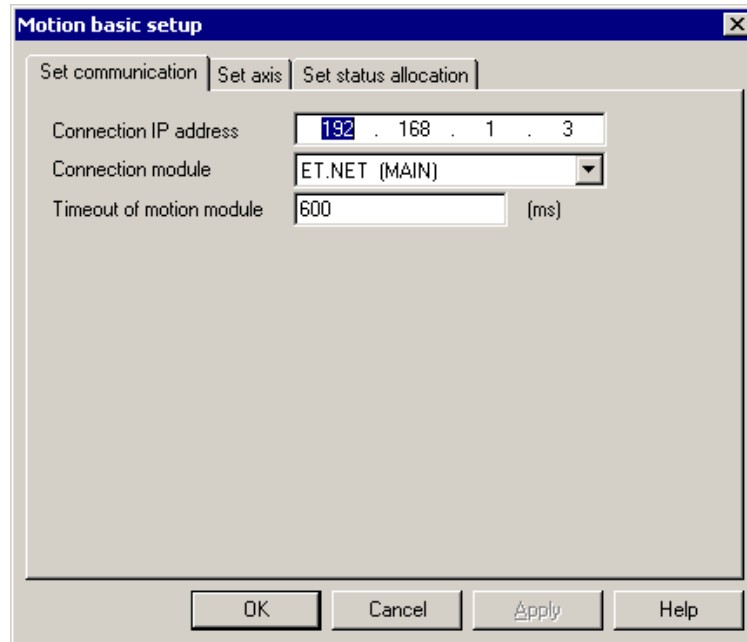
- (1) Choose [Motion] – [Setting] – [Basic parameter] from the menu bar in the HI-FLOW process sheet or HI-FLOW sheet currently displayed on screen.
- (2) The “List of motion basic setup” window as shown below appears. To add changes to the current settings, click the **Edit of setup** button.

Axis	Mod...	Serv...	Action flag	Pause flag	Error flag	Command...	Drive Status	Motion Cc
1	1	1	R000	R020	R040	RW100	LBW0020	LBW0030
2	1	2	R001	R021	R041	RW110	LBW0120	LBW0130
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								

[List of motion basic setup] Window

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- (3) If you click the “Set communication” tab, the “Set communication” tab pane appears. In this tab pane, you can set the items needed to establish a connection between the S10V controller and the MP2000 motion controller for intercommunication.



■ Connection IP address

For this item, enter the IP address of the MP2000 controller to connect with the S10V controller.

■ Connection module

Allows you to specify whether the ET.NET module to connect with the MP2000 controller is the main module or submodule.

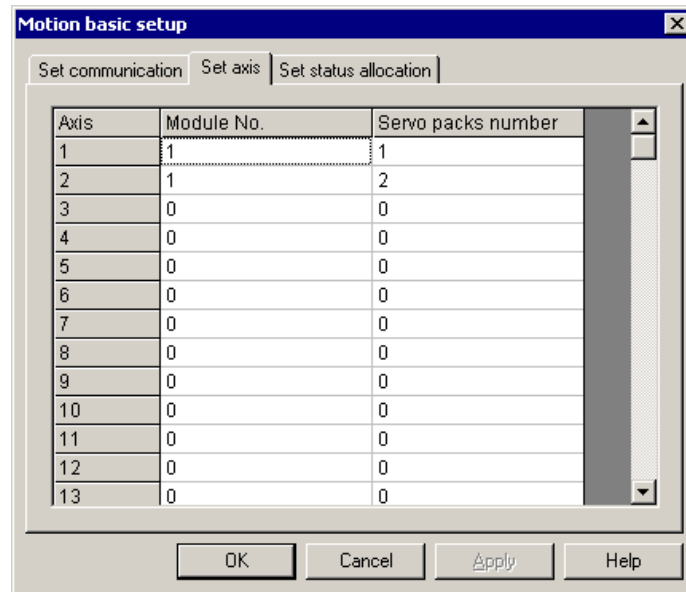
Option	Remarks
ET.NET (MAIN)	Initial value
ET.NET (SUB)	

■ Timeout of motion module

Is used by the MP2000 controller to constantly monitor the activeness of the S10V controller. It is a time period to detect any abnormality that makes it impossible to communicate with the S10V controller. When the MP2000 controller detects a timeout condition, it stops all the axes currently in operation (by turning off their servos). The initial value of this item is 600 (ms). You can specify the desired value in the range 150 to 60000 (ms). If the smallest allowable value (150) is specified for this item, and last communication needs to be retried to continue monitoring the activeness of the S10V controller, then only one or two retries will be automatically performed.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- (4) If you click the “Set axis” tab, the “Set axis” tab pane appears. In this tab pane, you can provide settings for the axes used in motion control instructions.



■ Axis

Under this heading, you can select the axis numbers used in motion control instructions. Axis numbers are the ID numbers of axes (servo packs) that identify which axis of which module of the ones connected to the MP2000 controller. These axis numbers are ones that are used in programming.

Range of choice	1 to 32
-----------------	---------

■ Module No.

Under this heading, you can set the module numbers (or line numbers) of motion modules connected to the MP2000 controller.

Range of choice	1 to 16
-----------------	---------

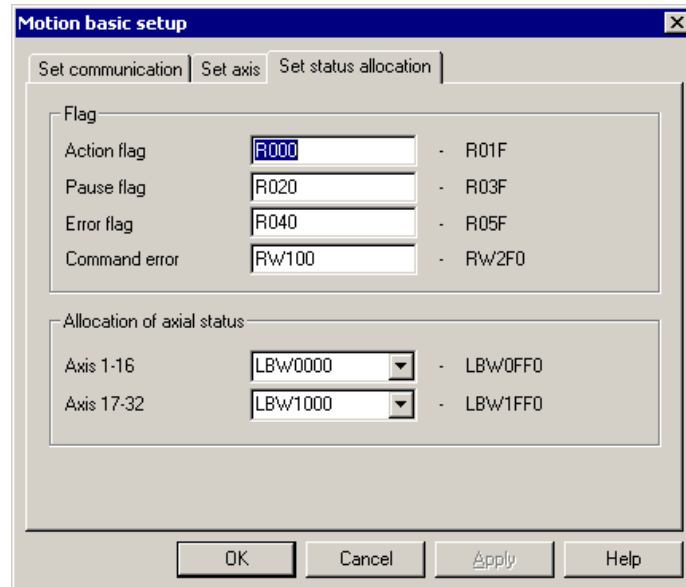
■ Servo packs number

Under this heading, you can set the servo pack numbers of servo packs connected to the MP2000 controller.

Range of choice	1 to 16
-----------------	---------

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- (5) If you click the “Set status allocation” tab, the “Set status allocation” tab pane appears. In this tab pane, you can set storage areas in which to store motion control instructions’ execution results and motion status information.



[Flag]

In the “Flag” box:

- Action flag, Pause flag, Error flag

These flags are provided for status management of motion control instructions. They are bit registers selected by the user from among the ones listed in the table below.

No.	Register name	Symbol	Range of setting
1	External input	X	X000 - XFE0
2	External output	Y	Y000 - YFE0
3	Internal register	R	R000 - RFE0
4	Internal register	M	M000 - MFE0
5	Keep-relay	K	K000 - KFE0
6	Communication link register	G	G000 - GFE0
7	Communication link register	A	A000 - AFE0
8	Internal register	E	E000 - EFE0
9	HI-FLOW-ladder inter-shared register	J	J000 - JFE0
10	HI-FLOW-ladder inter-shared register	Q	Q000 - QFE0
11	S10V extension register	LB	LB0000 - LBFFE0

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- Command error

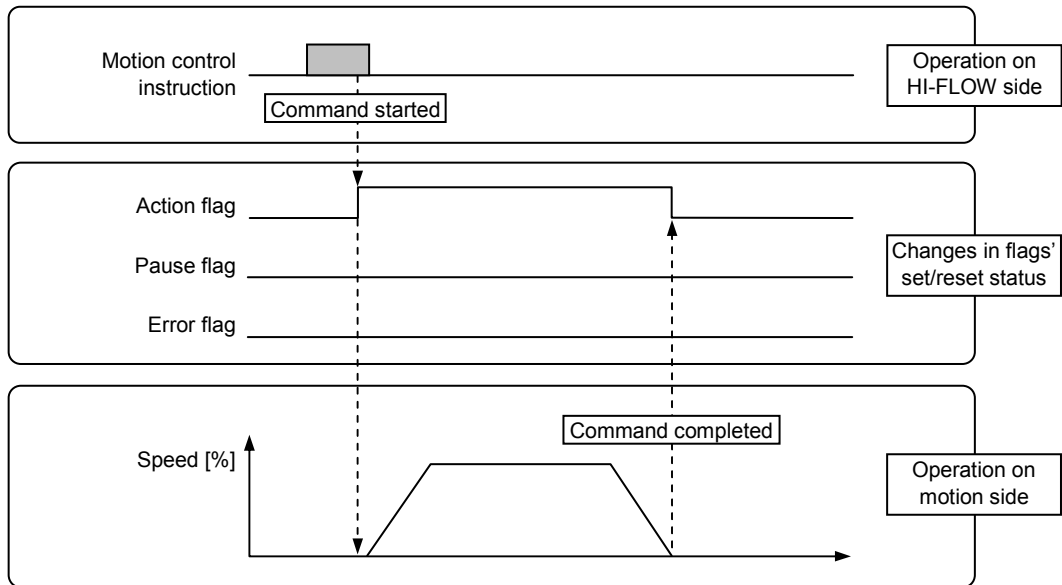
This flag is an error code generated at the time of execution of motion control instructions and can be stored in a user-specified word register, which is one of the following:

No.	Register name	Symbol	Range of setting
1	External input	X	XW000 - XWE00
2	External output	Y	YW000 - YWE00
3	Internal register	R	RW000 - RWE00
4	Internal register	M	MW000 - MWE00
5	Keep-relay	K	KW000 - KWE00
6	Communication link register	G	GW000 - GWE00
7	Communication link register	A	AW000 - AWE00
8	Internal register	E	EW000 - EWE00
9	HI-FLOW-ladder inter-shared register	J	JW000 - JWE00
10	HI-FLOW-ladder inter-shared register	Q	QW000 - QWE00
11	S10V extension register	LB	LBW0000 - LBWF000
12	Work register	FW	FW000 - FWBE0
13	Data register	DW	DW000 - FWFE0
14	S10V extension register	LWW	LWW0000 - LWWFFE0
15	S10V extension register	LXW	LXW0000 - LXW3FE0

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

■ Action flag

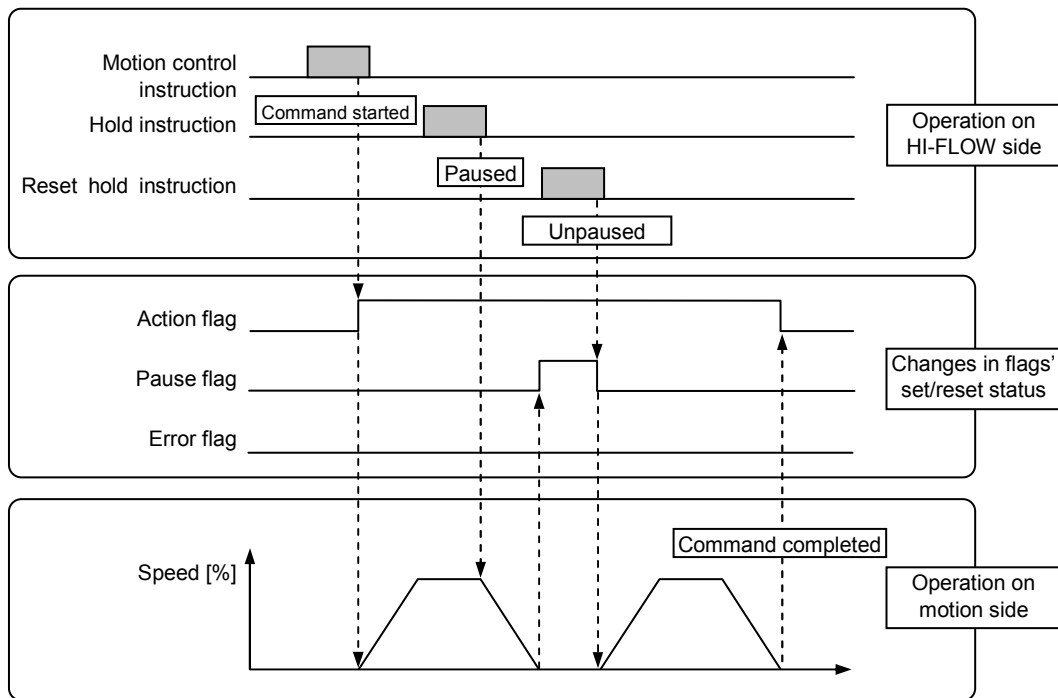
The Action flag is provided for the purpose of checking and managing the execution status of commands. It is set (= 1) when the execution of a command starts, and is reset (= 0) when it ends. By monitoring the set/reset status of this flag, you can learn the time when the execution of a motion control instruction is completed.



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

■ Pause flag

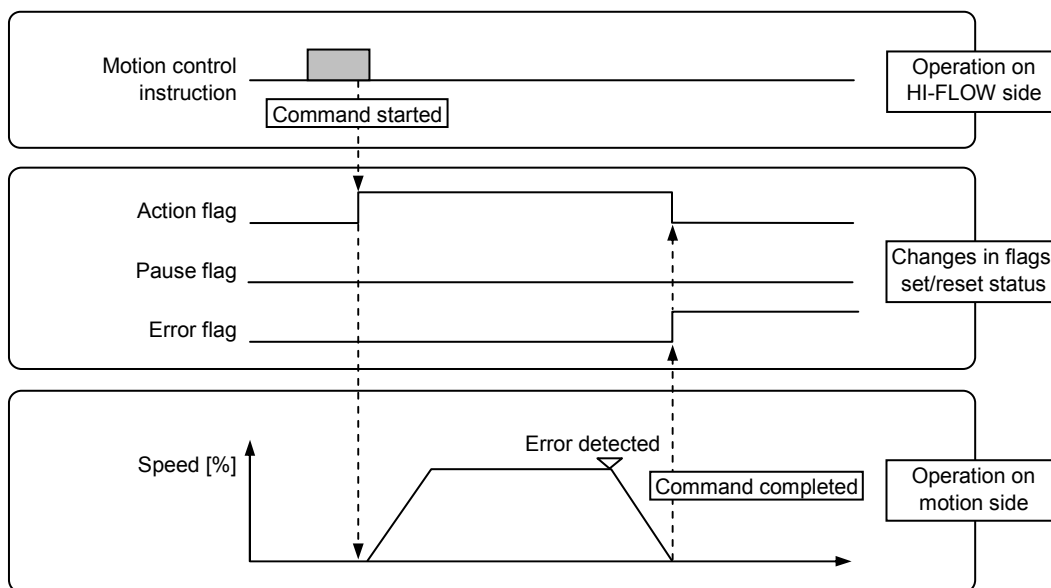
The Pause flag is provided for the purpose of checking and managing the pause status of commands. It is set when a command is placed in pause state, and is reset when it is taken out of the pause state. By monitoring the set/reset status of this flag, you can see if the execution of a motion control instruction is currently in pause state.



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

■ Error flag

The Error flag is provided for the purpose of checking and managing the success or failure of commands. It is reset (= 0) when the execution of a command is terminated normally, and is set (= 1) when the execution of a command is terminated abnormally. By monitoring the set/reset status of this flag, you can see if the execution of a motion control instruction is done error-free.



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

■ Command error

The Command error flag is an error code generated on HI-FLOW side and is stored in a user-specified area. It is used when the Error flag is set. The purpose of this is to get information on the error detected on HI-FLOW side. (Users who want to get information on errors detected on motion side have to refer to the corresponding alarms or warnings presented as axis status information.)

All possible error codes reported as Command errors are as follows:

(1/2)

Error code	Error type	Description	Required user action
0x2002	Parameter error	An error was detected in a specified command parameter.	Check the specified parameters to the relevant command.
0x2003	Axis alarm being issued	An alarm is being generated concerning the axis for which a command has been issued.	Issue an alarm clear command to clear the alarm condition.
0x2004	Inappropriate motion command being executed	When a servo-ON command was issued, the MP2000 controller's motion command being executed was other than the NOP command.	Issue an alarm clear command and change the motion command to NOP.
0x2005	Alarm-clear in progress	The alarm-clear process is currently being executed, so no command can be issued for execution.	Wait for the alarm-clear process to be completed. When it is completed, issue a command.
0x2006	Axis already in use	A next command was issued for an axis that was already executing a command not allowing overwriting.	Wait for the command to be completed, then issue a next command.
0x2007	A command attempted in servo-OFF state	Although a command was issued for an axis, the servo of that axis was in OFF state.	Turn on the servo, then issue a command.
0x2008	Operation preparation not finished yet	Although a servo-ON command was issued, the motion module was not ready for operation.	Check if the MECHATROLINK cable is not disconnected.
0x2009	Non-connected module specified	A command was issued for an axis of a module not connected yet.	Check the axis definition to see if an attempt is made to issue a command to a module not connected yet. If there is no problem with the axis definition, check if the MECHATROLINK cable is not disconnected.
0x200A	Incorrect addition attempted	A speed-position control command is used incorrectly for either a positioning command or an external positioning command.	If the MP2000 controller's encoder type setting is incremental encoder, and a "Positioning" or "External positioning" command specifying absolute values is issued, then the "Speed-position control" command cannot be issued. Review and correct the program.
0x2100	Non-supported command received	A received command is found not supported in the HI-FLOW system.	The communication task may have been corrupted. Load it in again.
0x2101	Communication timeout detected	A timeout condition is detected in the MP2000 controller.	If this problem persists even after the communication has been retried, power down the MP2000 controller and then power it up again.
0x2102	Communication preparation not finished yet	The MP2000 controller is not ready for communication.	Wait for the MP2000 controller to become ready for communication. When it becomes ready, issue a command.
0x2103	Command size too small	The number of words actually transmitted as a communication header was found smaller than expected.	The communication task may have been corrupted. Load it in again.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

(2/2)

Error code	Error type	Description	Required user action
0x2104	Command size too large	The number of words actually transmitted as a communication header was found larger than expected.	The communication task may have been corrupted. Load it in again.
0x2105	Non-matching command entry size detected	The command entry actually transmitted as communication data was found not matching the expected one.	
0x4001	Attempt made to do more communication retries than permitted	No response from the motion module was detected during command transmission.	Check if the MP2000 controller is up and running, and if its connecting cable is not disconnected.
0x8001	ET.NET abnormality	An error was detected by the ET.NET handler.	The ET.NET may have stopped due to an error. Replace the ET.NET.
0x8100	Timeout period setting error on motion side	The set value of the timeout period on motion side was found destroyed.	By using your tool, correct the set value of "Timeout of motion module" in the "Set communication" tab pane of the "Motion basic setup" window.

[Allocation of axial status]

The "Allocation of axial status" box allows you to select the starting address of an area in the LPU's memory to which to transfer motion status information. A 512-byte area will be automatically allocated for such information transfer, starting from the selected starting address. For details on the memory allocation for each parameter, see the allocation information presented in the "List of motion basic setup" window.

The starting addresses that can be specified in this box are as follows:

No.	Register name	Symbol	Range of setting
1	External input	X	XW000
2	External output	Y	YW000
3	Internal register	R	RW000
4	Internal register	M	MW000
5	Keep-relay	K	KW000
6	Communication link register	G	GW000
7	Communication link register	A	AW000
8	Internal register	E	EW000
9	HI-FLOW-ladder inter-shared register	J	JW000
10	HI-FLOW-ladder inter-shared register	Q	QW000
11	S10V extension register	LB	LBW0000 - LBWF000

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- (6) To register all the specified values in the system, click the button in the “Motion basic setup” window and then click the button in the “List of motion basic setup” window. If you click the button instead in the “Motion basic setup” or the “List of motion basic setup” window, all the specified values will be discarded.
- (7) To delete all of the currently registered motion basic settings at once, click the button in the “List of motion basic setup” window and then click the button in the same window. If the communication line is currently in online state, clicking the button will immediately delete the motion basic settings from the PCs. If it is in offline state, they will not be deleted immediately, but instead they will be deleted later at the transmission of the HI-FLOW programs to the PCs.

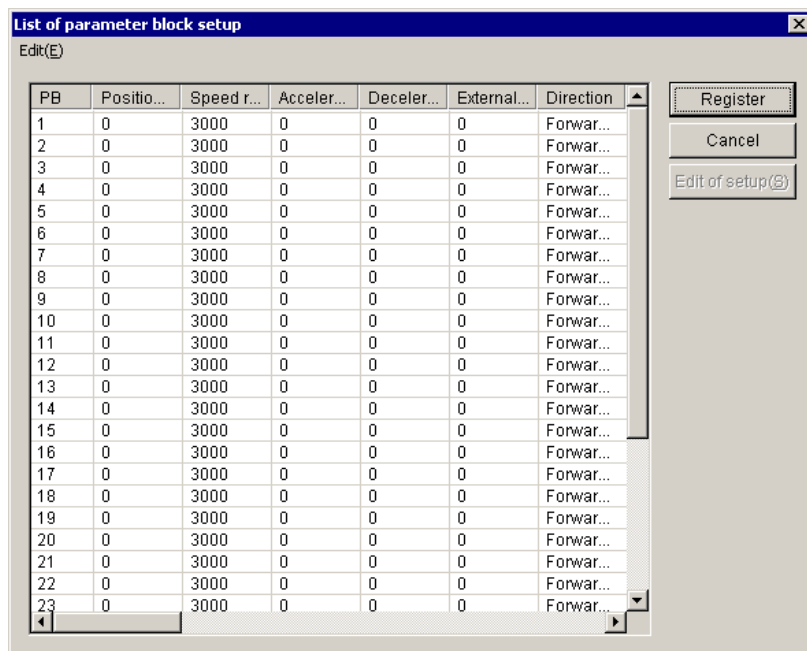
4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.8.2 Parameter block setting

Description: The [Parameter block] option under [Motion] allows you to register standard collections of parameters for axes in system-provided parameter blocks (PBs) in advance. Once such a collection of parameters is so registered for an axis, you can set the parameters for the desired axis easily by specifying the ID number of their parameter block to motion instructions. If you want to set different parameters than those specified in the parameter block, you can set the new parameters directly for the axis. The new parameters specified this way have priority over the old ones specified in the parameter block.

Operation: The procedure required for using this option is as follows:

- (1) Choose [Motion] – [Setting] – [Parameter block] from the menu bar in the HI-FLOW process sheet or HI-FLOW sheet currently displayed on screen.
- (2) The “List of parameter block setup” window as shown below appears. Choose the PB number of a parameter block you want to edit, and then click the **Edit of setup** button.



[List of parameter block setup] Window

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- (3) If you click the “Common” tab, the “Common” tab pane appears. In this tab pane, you can set parameter block values that will be used commonly in motion control instructions.

The screenshot shows a dialog box titled "Parameter block setup" with a close button (X) in the top right corner. It has five tabs: "Common", "Home position return", "Torque", "Gain", and "Set unit". The "Common" tab is selected. The dialog contains the following parameters and their values:

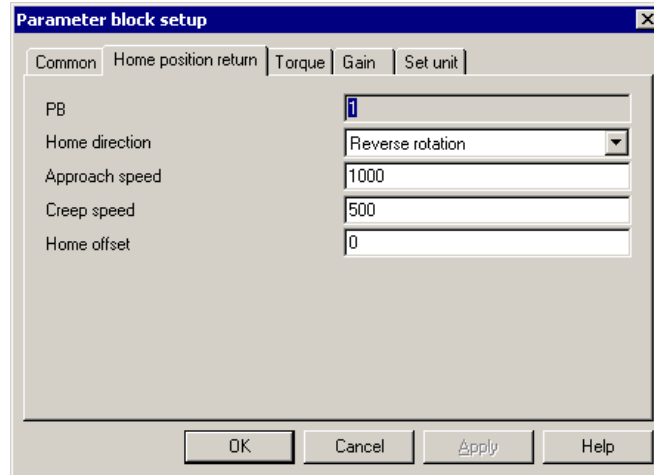
Parameter name	Value
PB	1
Position reference	0
Speed reference	3000
Acceleration time	0
Deceleration time	0
External positioning move distance	0
Direction	Forward rotation
Speed override	0

At the bottom of the dialog are four buttons: "OK", "Cancel", "Apply", and "Help".

Parameter name	Range of setting	Default
Position reference	-2147483648 to 2147483647	0
Speed reference	-2147483648 to 2147483647	3000
Acceleration time	0 to 2147483647	0
Deceleration time	0 to 2147483647	0
External positioning move distance	-2147483648 to 2147483647	0
Direction	<ul style="list-style-type: none"> • Forward rotation • Reverse rotation 	Forward rotation
Speed override	0 to 32767	0

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

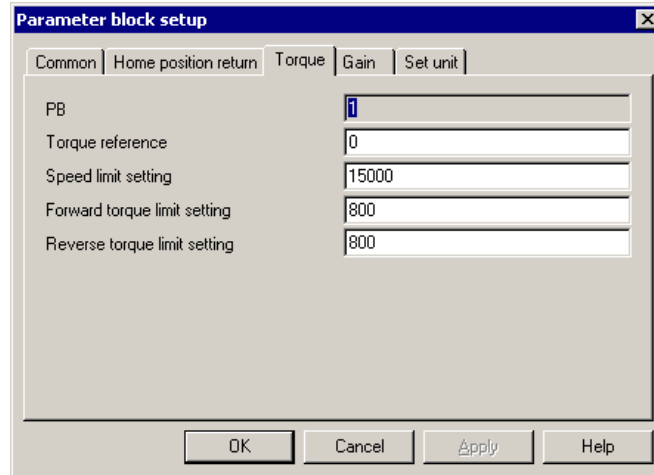
- (4) If you click the “Home position return” tab, the “Home position return” tab pane appears. In this tab pane, you can set parameter block values that will be used in home position return instructions.



Parameter name	Range of setting	Default
Home direction	<ul style="list-style-type: none"> • Reverse rotation • Forward rotation 	Reverse rotation
Approach speed	-2147483648 to 2147483647	1000
Creep speed	-2147483648 to 2147483647	500
Home offset	-2147483648 to 2147483647	0

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

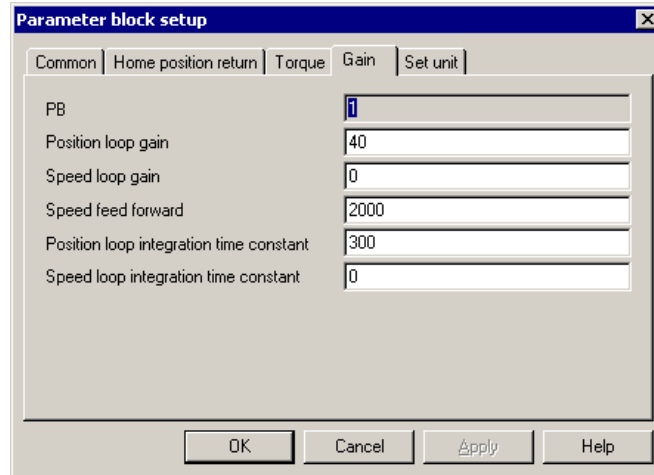
- (5) If you click the “Torque” tab, the “Torque” tab pane appears. In this tab pane, you can set parameter block values to be used in “torque reference” instructions and “change torque limit” instructions.



Parameter name	Range of setting	Default
Torque reference	-2147483648 to 2147483647	0
Speed limit setting	-32768 to 32767	15000
Forward torque limit setting	0 to 800	800
Reverse torque limit setting	0 to 800	800

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

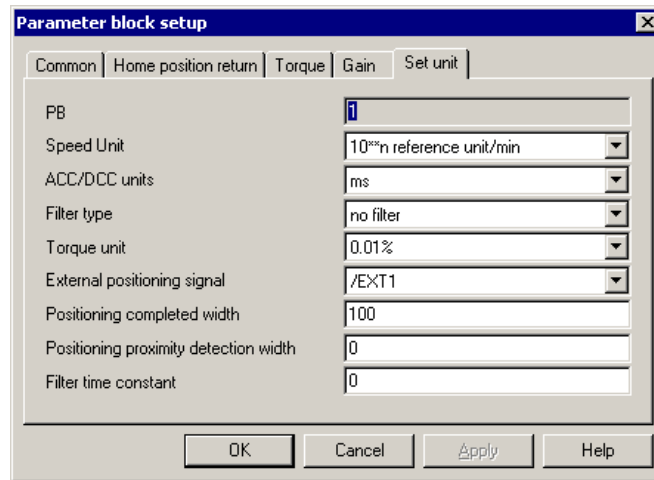
- (6) If you click the “Gain” tab, the “Gain” tab pane appears. In this tab pane, you can set parameter block values to be used in “change speed loop gain” instructions and “change position loop gain” instructions.



Parameter name	Range of setting	Default
Speed loop gain	0 to 2000	40
Speed feed forward	0 to 32767	0
Speed loop integration time constant	15 to 65535	2000
Position loop gain	0 to 32767	300
Position loop integration time constant	0 to 32767	0

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- (7) If you click the “Set unit” tab, the “Set unit” tab pane appears. In this tab pane, you can set parameter block values to be used in “set unit” instructions.



Parameter name	Range of setting	Default
Speed unit	<ul style="list-style-type: none"> • Reference unit/sec • 10**n reference unit/min • 0.01% • 0.0001% 	10**n reference unit/min
ACC/DCC units	<ul style="list-style-type: none"> • Reference unit/sec**2 • ms 	ms
Filter type	<ul style="list-style-type: none"> • no filter • Exponential ACC/DCC filter • Movement averaging (moving average) filter 	no filter
Torque unit	<ul style="list-style-type: none"> • 0.01% • 0.0001% 	0.01%
External positioning signal	<ul style="list-style-type: none"> • Phase-C pulse input signal • /EXT1 • /EXT2 • /EXT3 	/EXT1
Positioning completed width	0 to 65535	100
Positioning proximity detection width	0 to 65535	0
Filter time constant	0 to 65535	0

- (8) To register all the specified values in the system, click the **OK** button in the “Parameter block setup” window and then click the **Register** button in the “List of parameter block setup” window. If you click the **Cancel** button instead in the “Parameter block setup” or the “List of parameter block setup” window, all the specified values will be discarded.

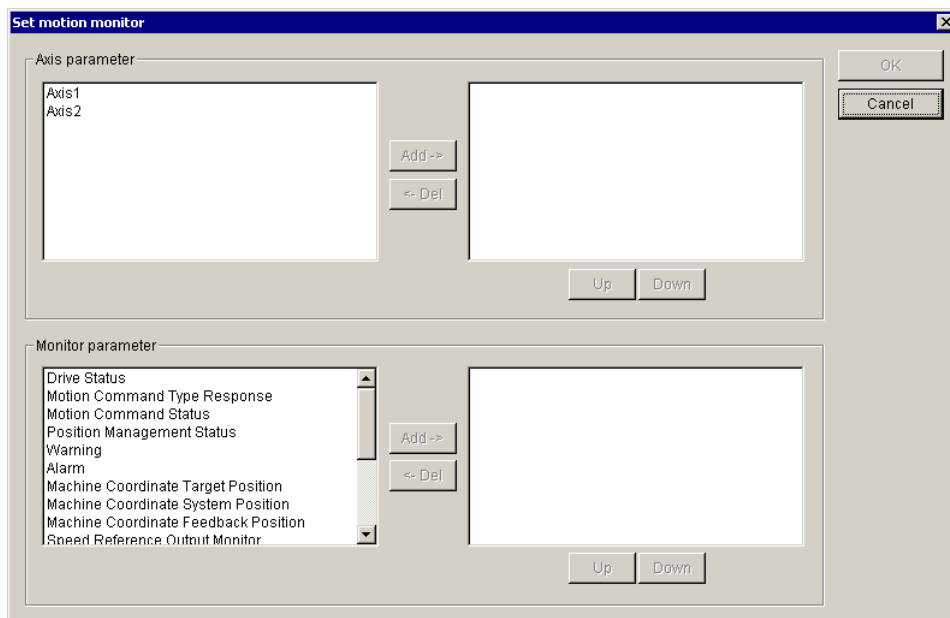
4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.8.3 Motion monitoring

Description: The [Monitor parameter] option under [Motion] enables you to monitor the various parameters of motion for a selected axis (or axes) and thereby check the status of motion for each axis.

Operation: The procedure required for using this option is as follows:

- (1) Choose [Motion] – [Monitor] – [Monitor parameter] from the menu bar in the HI-FLOW process sheet or HI-FLOW sheet currently displayed on screen.
- (2) The “Set motion monitor” window as shown below appears.



- (3) In the “Axis parameter” box, the left pane shows a list of axis numbers selectable by the user and the right pane shows a list of selected axis numbers. So, select the axis number(s) whose axis (or axes) you want to monitor in the “Set motion monitor” window. To select an axis number, click the desired axis number in the left pane and click the **Add** button. To deselect a selected axis number, click it in the right pane and click the **Del** (delete) button.
- (4) In the “Monitor parameter” box, the left pane shows a list of motion parameters selectable by the user and the right pane shows a list of selected motion parameters. So, select the motion parameter(s) you want to monitor in the “Set motion monitor” window. To select a motion parameter, click it in the left pane and click the **Add** button. To deselect a selected motion parameter, click it in the right pane and click the **Del** button. The following table shows all the parameters selectable by the user.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

(1/3)

Parameter name	Parameter content
Drive Status	Bit0: Motion Controller Operation Ready
	Bit1: Running (Servo ON)
	Bit2: System Busy
	Bit3: Servo Ready
Motion Command Type Response	Shows the command name of the command currently being executed.
Motion Command Status	Bit0: Command Executing Flag (BUSY)
	Bit1: Command Hold Completed (HOLD)
	Bit3: Command Error Occurrence (FAIL)
	Bit8: Command Executing Completed (COMPLETE)
Position Management Status	Bit0: Distribution Completed (DEN)
	Bit1: Positioning Completed (POSCOMP)
	Bit2: Latch Completed (LCOMP)
	Bit3: Position Proximity (NEAR)
	Bit4: Zero Point Position (ZERO)
	Bit5: Zero Point Return (Setting) Completed
	Bit6: Machine Lock (MLKL)
	Bit7: Absolute Position Read Completed
	Bit8: ABS system Infinite Length Position Control Information LOAD Completed (ABSLDEL)
	Bit9: POSMAX Turn Number Presetting Completed (TPRSE)
BitA: Rotational Direction of Absolute Encoder	
Warning	Bit0: Excessively Following Error
	Bit1: Setting Parameter Error
	Bit2: Fixed Parameter Error
	Bit3: Servo Driver Error
	Bit4: Motion Command Setting Error
	Bit6: Positive Overtravel
	Bit7: Negative Overtravel
	Bit8: Servo Not ON
	Bit9: Servo Driver Communication Warning
Alarm	Bit0: Servo Driver Error
	Bit1: Positive Overtravel
	Bit2: Negative Overtravel
	Bit3: Positive Software Limit
	Bit4: Negative Software Limit
	Bit5: Servo OFF
	Bit6: Positioning Time Over
	Bit7: Excessive Positioning Moving Amount
	Bit8: Excessive Speed
	Bit9: Excessive Following Error
	BitA: Filter Type Change Error
	BitB: Filter Time Constant Change Error
	BitD: Zero Point Not Set
BitE: Zero Point Set during Travel	

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/
HI-FLOW SHEET

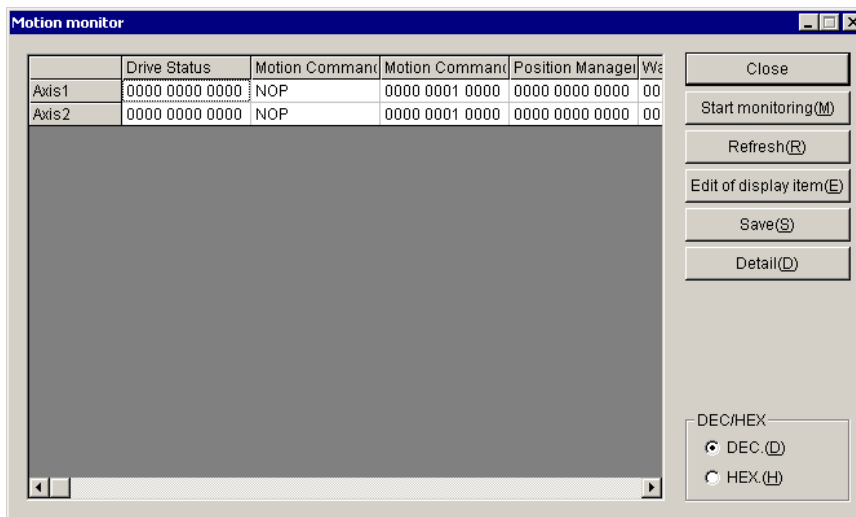
(2/3)

Parameter name	Parameter content
Alarm	BitF: Servo Driver Parameter Setting Error
	Bit10: Servo Driver Synchronization Communication Error
	Bit11: Servo Driver Communication Error
	Bit12: Servo Driver Command Timeout Error
	Bit13: ABS Encoder Count Exceeded
	Bit14: PG Disconnected Error
	Bit15: Accumulated Rotations Receive Error
Machine Coordinate Target Position	Indicates a target position in the machine coordinate system maintained by the motion module.
	Is set to 0 at power-on time.
	Is updated even in a locked state of the machine.
Machine Coordinate System Position	Indicates a reference position in the machine coordinate system maintained by the motion module.
	Is set to 0 at power-on time.
	Is not updated in a locked state of the machine.
Machine Coordinate Feedback Position	Indicates a feedback position in the machine coordinate system maintained by the motion module.
	Is set to 0 by the execution of a home position return instruction.
Speed Reference Output Monitor	Shows the speed reference value being output.
Network Servo Status	Bit0: Alarm Occurred
	Bit1: Warning Occurred
	Bit2: Command Ready
	Bit3: Servo ON
	Bit4: Main Power ON
	Bit5: Machine Lock
	Bit6: Zero Point Position
	Bit7: Positioning Completed/Speed Coincidence
	Bit8: Distribution Completed/Zero Speed
	Bit9: Torque Being Limited
	BitA: Latch Completed
	BitB: Position Proximity/Speed Limit
	BitC: Positive Software Limit
	BitD: Negative Software Limit
Servo Alarm Code	Shows an alarm code of the servo pack.
Network Servo I/O Monitor	Bit0: Positive Drive Prohibited Input
	Bit1: Negative Drive Prohibited Input
	Bit2: Zero Point Return Deceleration Limit Switch Input
	Bit3: Encoder Phase-A Input
	Bit4: Encoder Phase-B Input
	Bit5: Encoder Phase-C Input
	Bit6: First External Latch Input
	Bit7: Second External Latch Input
	Bit8: Third External Latch Input

Parameter name	Parameter content
Network Servo I/O Monitor	Bit9: Brake Output
	BitC: CN1 input signal (IO12)
	BitD: CN1 input signal (IO13)
	BitE: CN1 input signal (IO14)
	BitF: CN1 input signal (IO15)
Feedback Speed	Indicates the feedback speed used.
Torque Reference Monitor	Indicates the torque reference value used.
Forward Torque Limit	Indicates the position used to detect the soft limit in forward direction during the execution of a “torque reference” instruction.
Reverse Torque Limit	Indicates the position used to detect the soft limit in reverse direction during the execution of a “torque reference” instruction.

(5) If you want to view the current value(s) of the selected monitor parameter(s) for the selected axis (or axes), click the **OK** button to open the “Motion monitor” window. If you want to discard all of the selected axis (or axes) and monitor parameter(s) and exit the “Set motion monitor” window, click the **Cancel** button instead.

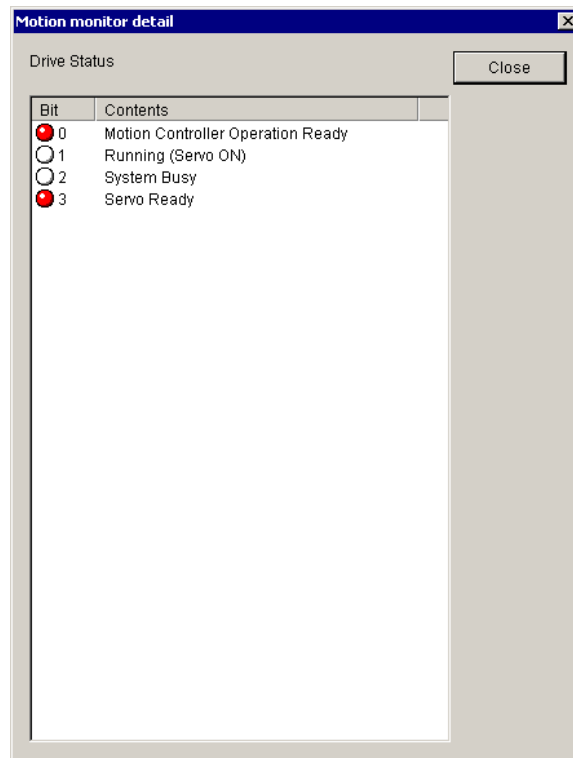
(6) The “Motion monitor” window as shown below appears.



(7) When updating the motion parameter(s), click the **Refresh** button. When monitoring the monitor parameter(s), click the **Start monitoring** button. When stopping the monitoring process, click the **Stop monitoring** button.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- (8) When changing any of the selected axis (or axes) and monitor parameter(s), click the button. The “Set motion monitor” window then appears.
- (9) If you want the selected monitor parameter(s) to be displayed in decimal format, click the [DEC.] radio button. If you want them to be displayed in hexadecimal format, click the [HEX.] radio button.
- (10) If you want to save the current value(s) of the motion parameter(s) being displayed on screen to a text file, together with the selected axis (or axes), click the button.
- (11) If you want to view detail information on the selected axis (or axes) and motion parameter(s) on-screen, click the button. The “Motion monitor detail” window as shown below then appears.



- (12) When exiting the “Motion monitor” window, click the button.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.8.4 Motion trace

Description: The [Motion trace] option under [Motion] traces changes in the value(s) of a specified motion parameter(s) on MP2000 side and presents the result in the form of graphs.

Operation: The procedure required for using this option is as follows:

- (1) Choose [Motion] – [Monitor] – [Motion trace] from the menu bar in the HI-FLOW process sheet or HI-FLOW sheet currently displayed on screen.
- (2) The “Setting of motion trace” window as shown below appears. Set necessary values in the “Trace definition”, “Specification trace data”, and “Trigger conditions” boxes.

Setting of motion trace

Group-1 | Group-2 | Group-3 | Group-4

Trace definition

The number of trace cases / interval

The number of trace acquisition cases(N)

The number of trace stop delay(S)

Trace interval(I)

Operation at the time of trace start

Data of acquisition being completed initialization(I)

Data of acquisition being completed is taken over(Q)

Operation at the time of trace buffer full

Overwrite and continue from old data(W)

Automatic stop(P)

Specification trace data

Axis	Motion parameter
1	Machine Coordinate Feedback Positi...
2	Machine Coordinate Feedback Positi...
1	Feedback Speed
2	Feedback Speed
1	Command Executing Flag
2	Command Executing Flag

Edit(E)

Trigger conditions

Start trigger

Condition	Axis	Motion parameter	Reference	Condition	Comparison data	Trigger conditions
Condition1(1)	<input type="text"/>	<input type="text"/>	Reference	=	<input type="text" value="0"/>	<input type="radio"/> AND <input checked="" type="radio"/> OR
Condition2(2)	<input type="text"/>	<input type="text"/>	Reference	=	<input type="text" value="0"/>	<input type="radio"/> AND <input checked="" type="radio"/> OR
Condition3(3)	<input type="text"/>	<input type="text"/>	Reference	=	<input type="text" value="0"/>	<input type="radio"/> AND <input checked="" type="radio"/> OR
Condition4(4)	<input type="text"/>	<input type="text"/>	Reference	=	<input type="text" value="0"/>	<input type="radio"/> AND <input checked="" type="radio"/> OR

Condition expression

Stop trigger

Condition	Axis	Motion parameter	Reference	Condition	Comparison data	Trigger conditions
ConditionA(A)	<input type="text"/>	<input type="text"/>	Reference	=	<input type="text" value="0"/>	<input type="radio"/> AND <input checked="" type="radio"/> OR
ConditionB(B)	<input type="text"/>	<input type="text"/>	Reference	=	<input type="text" value="0"/>	<input type="radio"/> AND <input checked="" type="radio"/> OR
ConditionC(C)	<input type="text"/>	<input type="text"/>	Reference	=	<input type="text" value="0"/>	<input type="radio"/> AND <input checked="" type="radio"/> OR
ConditionD(D)	<input type="text"/>	<input type="text"/>	Reference	=	<input type="text" value="0"/>	<input type="radio"/> AND <input checked="" type="radio"/> OR

Condition expression

Save trace define(S) Load trace define(L) Execute trace(E) Display trace(D) Close

The error message "Trace communication timeout error" might be presented when you are displaying the "Setting of motion trace" window on-screen. In this case, one of possible causes is that the MP2000 controller is disconnected from the S10V controller. If this is not the case, another possible cause is that an error exists in the MP2000 controller's communication settings. Check the communication settings according to the information supplied in Supplement 6, "MP2300H System Reconfiguration Procedure," of the SOFTWARE MANUAL PROGRAMMING HI-FLOW For Windows® (manual number SVE-3-122).

■ The number of trace acquisition cases

Is the number of cases of tracing to be done. If this item is set to 0, tracing will proceed until stopped manually.

■ The number of trace stop delay

Is the number of cases of tracing to be done during a time period that begins when a given set of trace stop conditions is met and ends when the tracing is stopped accordingly. (This item may be set in the range 0 to 10000.)

■ Trace interval

Is the time period between traces. The item must be a multiple of the motion control cycle. (It may be set in the range 1 to 65535.)

■ Operation at the time of trace start

Indicates whether to clear already obtained trace data at the start of tracing or not (i.e., new trace data will be added to the existing one). This item is effective only at the start of tracing.

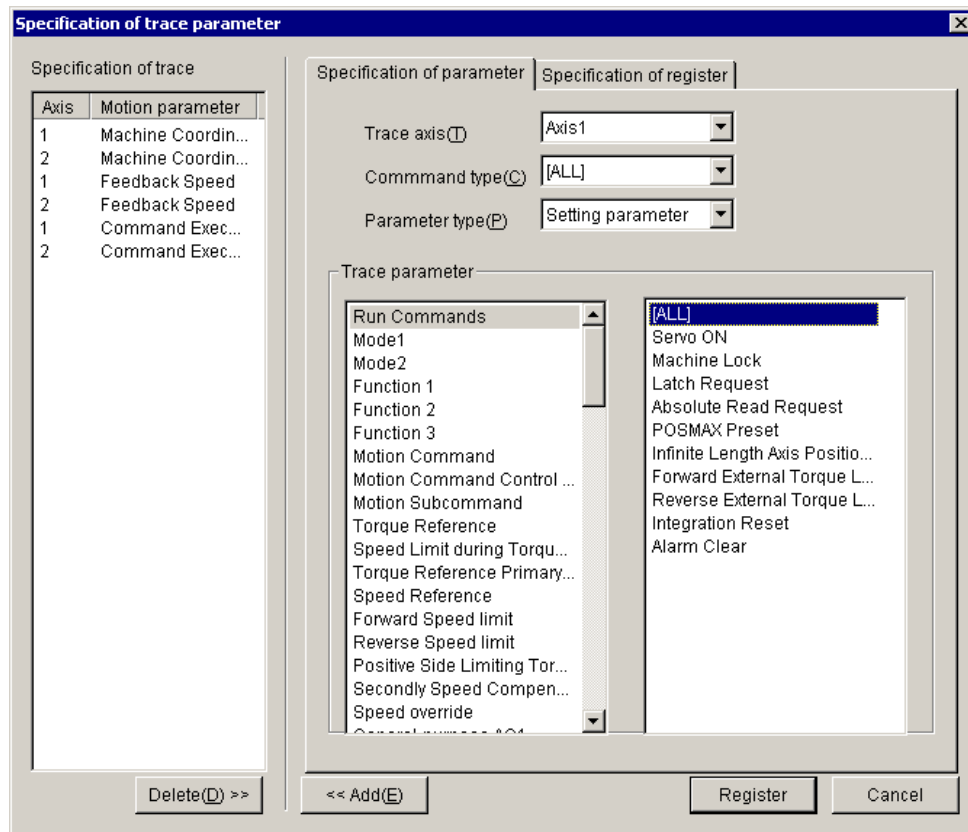
■ Operation at the time of trace buffer full

When the trace buffer becomes full, indicates whether to continue processing by overwriting any old data in the buffer with new one or stop tracing.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

■ Specification trace data

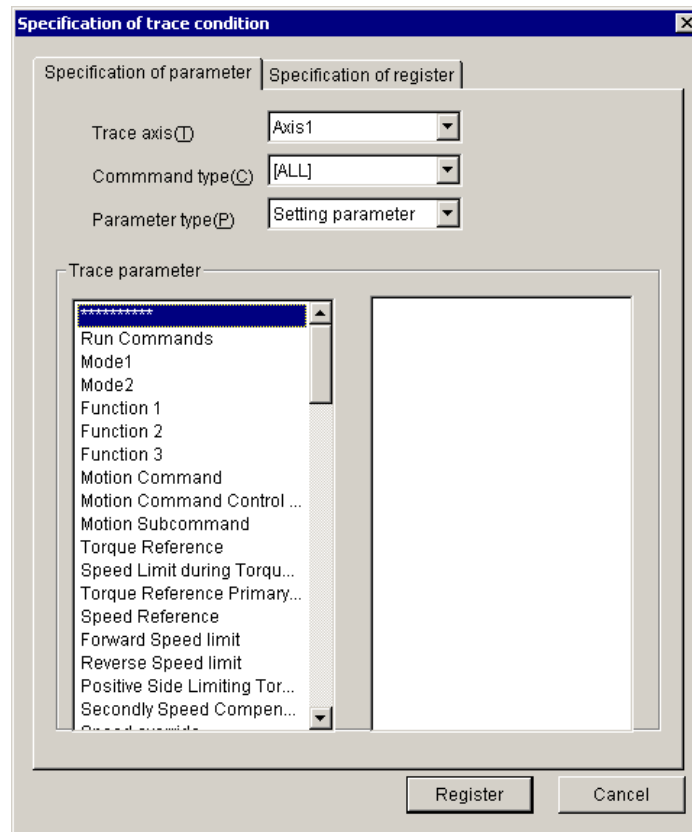
This box presents a list of motion parameters for which to collect trace data. If you want to edit the current settings for these parameters, click the **Edit** button. The “Specification of trace parameter” window then appears. Click the “Specification of parameter” tab and specify parameters for which you want to trace changes in value. (Do not use the “Specification of register” tab; this tab is provided for maintenance purposes.)



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

■ Motion parameter

This item is presented along with the axis number(s) used in testing whether to start or stop tracing. If you want to edit the current settings for these axes and motion parameters, click the **Reference** button. The “Specification of trace condition” window then appears.



■ Condition

Under “Condition”, you can choose relational symbols to be used in comparisons of registers and comparison data. The relational symbols specifiable for such comparisons are as follows:

< ≤ = ≠ ≥ >

■ Comparison data

Under “Comparison data”, you can enter decimal numbers to compare with a given motion parameter.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

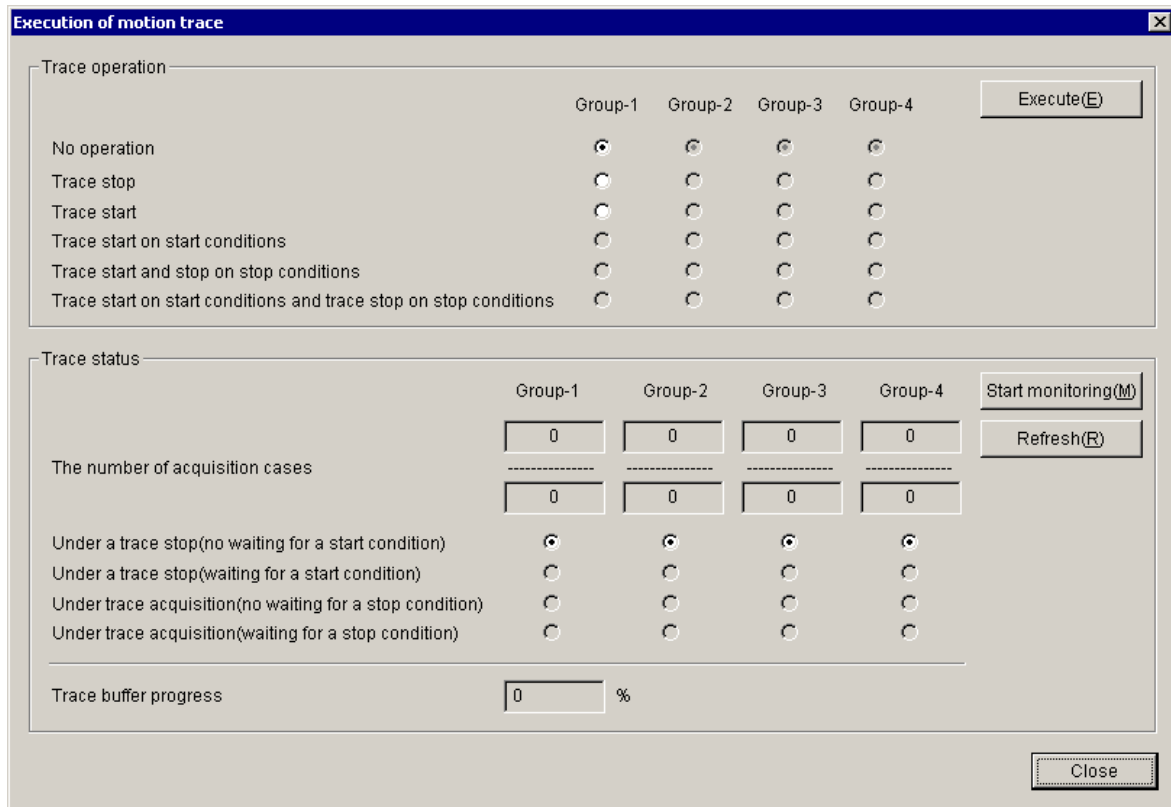
■ **Trigger conditions**

In the “Trigger conditions” box, you can specify start conditions as Condition1 through Condition4 and stop conditions as ConditionA through ConditionD. If both of the logical operators AND and OR are used as start conditions, AND has priority over OR. The same is true when they are used as stop conditions.

■ **Condition expression**

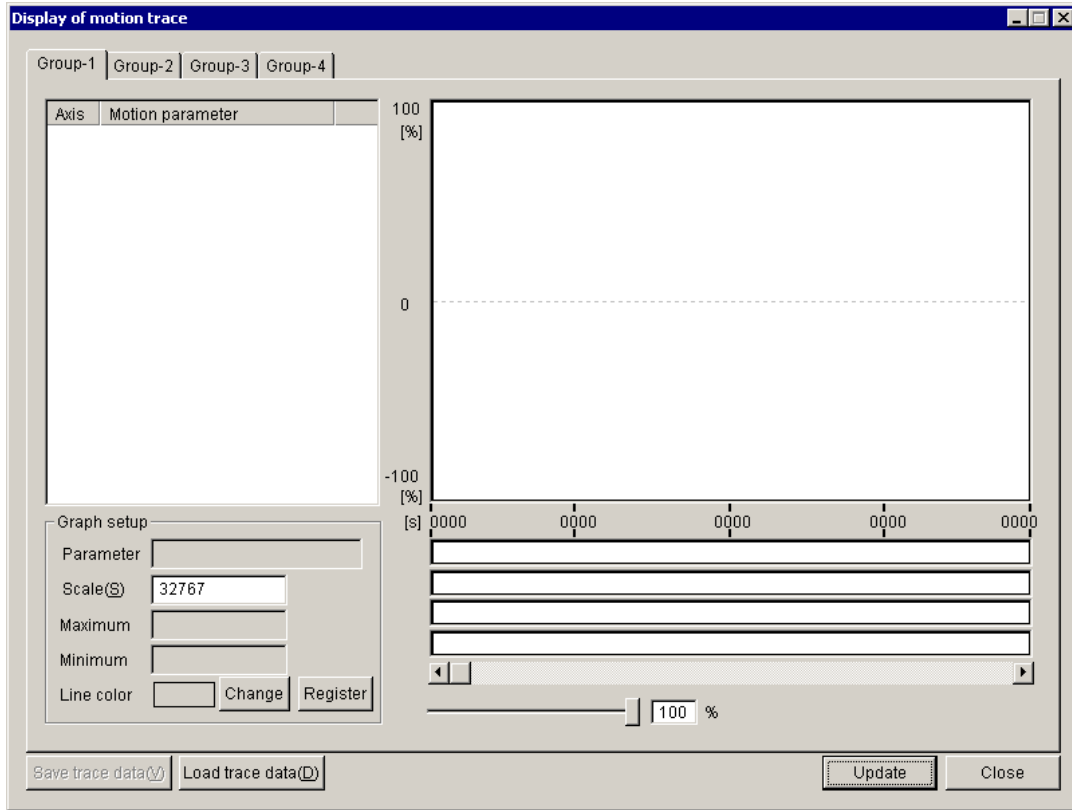
Is a conditional expression used as a start trigger or stop trigger. The four conditions, if specified, are identified in the condition expression by the digits “1” through “4” for start triggers and by the capital letters “A” through “D” for stop triggers.

- (3) If you want to execute tracing using the specified items, click the Execute trace button. The “Execution of motion trace” window then appears. If necessary, you can immediately execute a trace operation to collect trace data. When the collection is completed, stop the trace operation in progress so that the collected trace data may be viewed on-screen. The item “The number of acquisition cases” as shown below presents the following values:
 Upper row: Shows the group-wise numbers of cases currently obtained.
 Lower row: Shows the group-wise maximum numbers of cases that can be obtained.



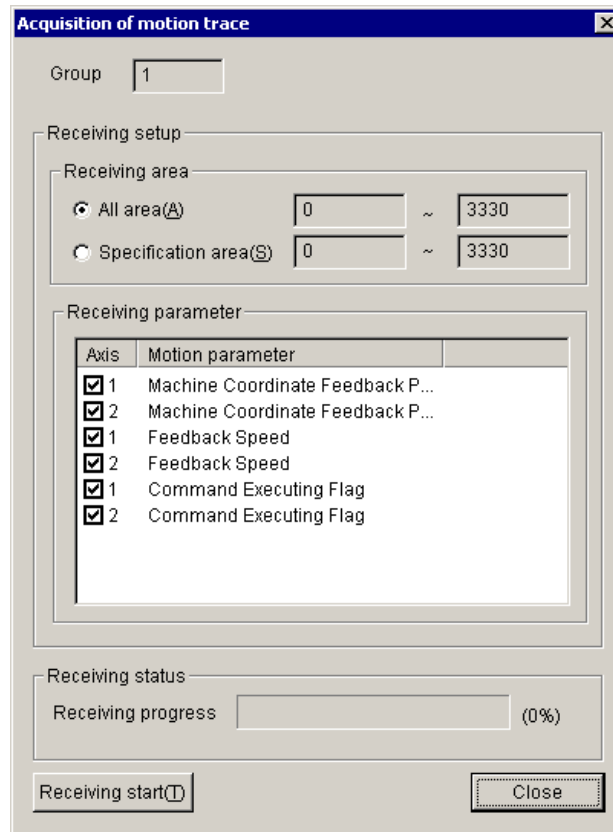
4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- (4) If you want to view the trace data obtained in the “Execution of motion trace” window in the form of graphs, click the **Display trace** button. The “Display of motion trace” window then appears. At this moment, no trace data is graphed in the window.



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

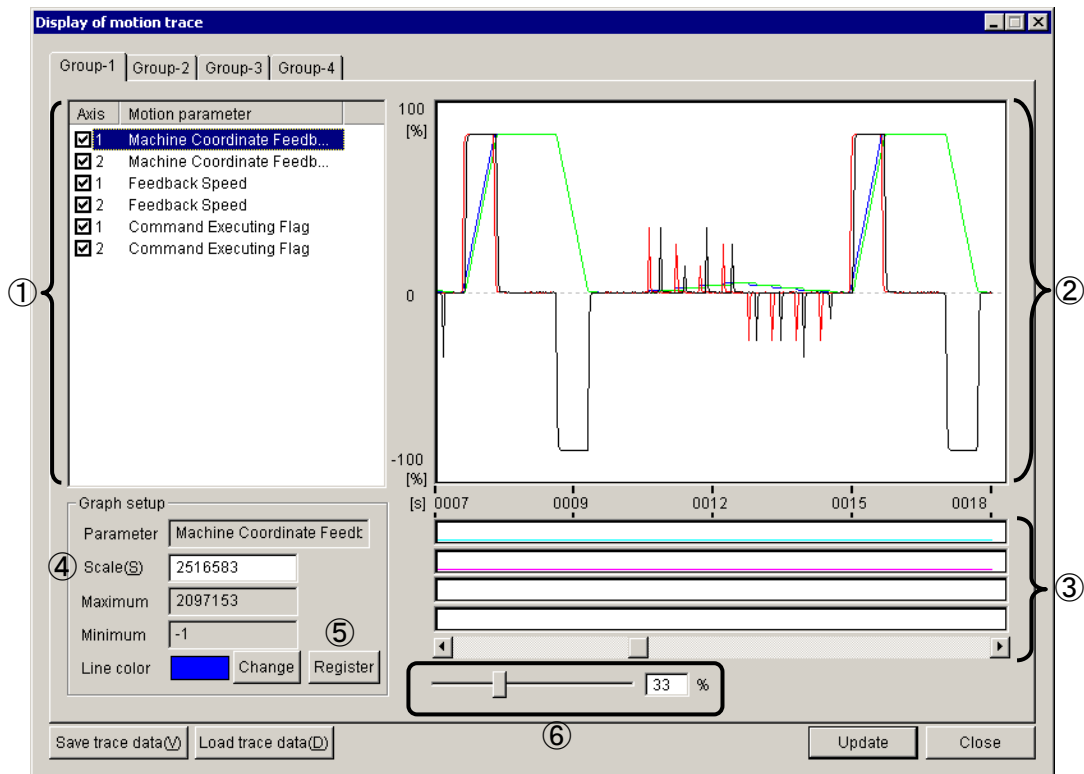
- (5) Click the **Update** button in the “Display of motion trace” window. The “Acquisition of motion trace” window as shown below then appears.



- (6) Check the desired items in the “Receiving parameter” box for which to read in collected trace data on your tool, and then click the **Receiving start** button. The progress of the data reception is shown until all the necessary trace data has been received. Then, the “Acquisition of motion trace” window is automatically closed.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

(7) Graphs are drawn as shown below for the items you have checked in the trace data listing.



where:

① Trace data listing

Is a list of the trace data obtained.

② Word-/Long-type data display pane

Presents up to 16 cases of word- or long-type trace data according to your selections made in the trace data listing.

③ Bit-type data display bars

Presents up to four cases of bit-type trace data according to your selections made in the trace data listing.

④ Scale

Is a scale change value for trace data graphing. By changing this value, you can adjust the vertical amplitude of graphs. (This value indicates the 100% position in any graph(s) drawn.)

⑤ Register

This button is used to change the current display on the word-/long-type data display pane or bit-type data display bars according to the settings made in the “Graph setup”.

⑥ Scale adjustment slider

Is a control that is dragged to adjust the horizontal amplitude of trace data graphed in the data display pane. For example, if this slider is dragged to 100% position, the entire trace data will be graphed in the pane. If it is dragged to 50% position, it will be graphed at a scale factor of 2. If it is dragged to 1% position, it will be graphed at a scale factor of 100.

(8) If you want to save the current trace definition data (i.e., the data graphed on-screen, plus the current graphing settings) to a file, click the button. If you want to read the trace definition data from a file, click the button. These save and load operations can only be performed for individual trace groups.

(9) When exiting the “Display of motion trace” window, click the button.

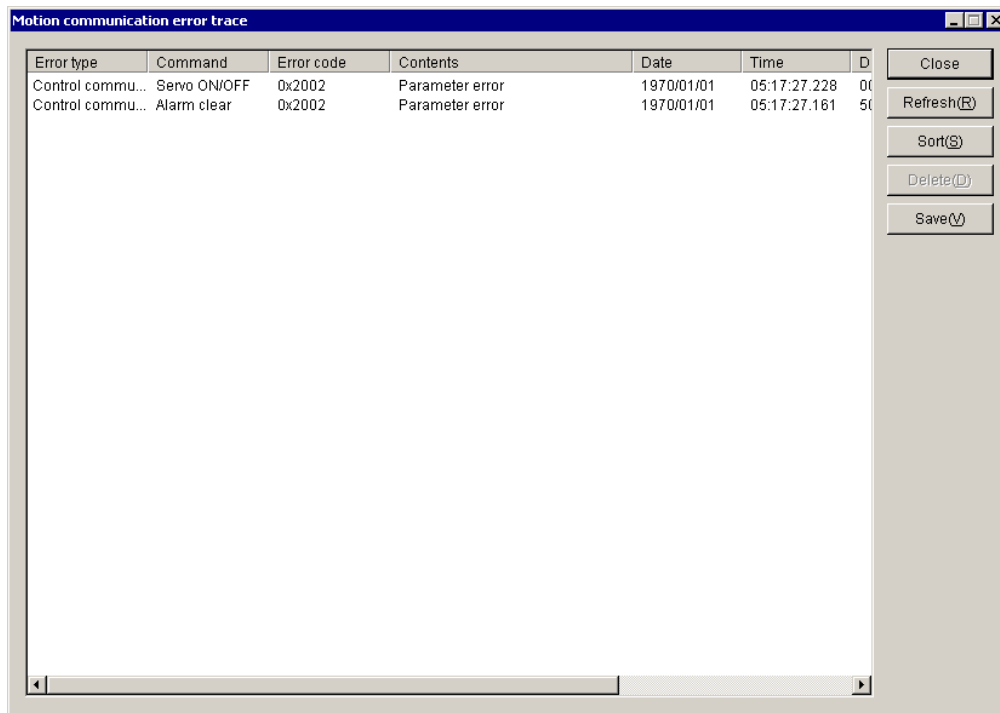
4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.8.5 Motion communication error trace

Description: The [Communication error trace] option under [Motion] presents error trace information that has been generated for errors detected during motion communications under control of the communication task.

Operation: The procedure required for using this option is as follows:

- (1) Choose [Motion] – [Monitor] – [Communication error trace] from the menu bar in the HI-FLOW process sheet or HI-FLOW sheet currently displayed on screen.
- (2) The “Motion communication error trace” window as shown below appears.



- (3) The error trace information presented in this window is as follows:

■ Error type

Under the heading “Error type” is a report on the type(s) of errors traced. Any reported error type is one of the following three:

No.	Error type
1	Control communication
2	Status communication
3	Trace communication

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

■ Command

Under “Command” is a list of the motion instruction(s) involved that are identified by their names. The following table lists the names of all available commands.

No.	Command name
1	Servo ON/OFF
2	Positioning
3	External positioning
4	Home position return
5	Constant-speed feed
6	Command Stop/Holding/Reset Hold
7	Speed control
8	Speed-position control
9	Torque control
10	Speed-override
11	Set unit
12	Read motion register
13	Write motion register (*)
14	Read monitor parameter
15	Alarm clear
16	Start communication

(*) Any error in this instruction is one that is detected during the execution of one of the following commands:

- Change torque limit
- Change speed loop gain
- Change position loop gain

■ Error code

Under “Error code”, the corresponding error code(s) are presented in hexadecimal form.

■ Contents

Under “Contents” is a brief description of the error(s) detected. For more information, see the description of the Command error flag in 4.8.1, “Basic parameters for motions.”

■ Date

Under “Date” is a list of the date(s) on which the error(s) were detected.

■ Time

Under “Time” is a list of the time(s) at which the error(s) were detected.

■ Data

Under “Data”, the first 16 bytes of data in the send/receive buffer are presented in hexadecimal form for the error or each of the errors detected.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- (4) If you want to update the error trace information currently presented in the window, click the button.
- (5) If you want to re-arrange the currently presented error trace information in reverse chronological order or back in normal chronological order, click the button. The order toggles between reverse and normal each time you click button.
- (6) If you want to delete all the error trace information at once, click the button. This deletion is possible only in a stop state of the PCs.
- (7) If you want to save the currently presented error trace information to a text file, click the button.
- (8) When exiting the “Motion communication error trace” window, click the button.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

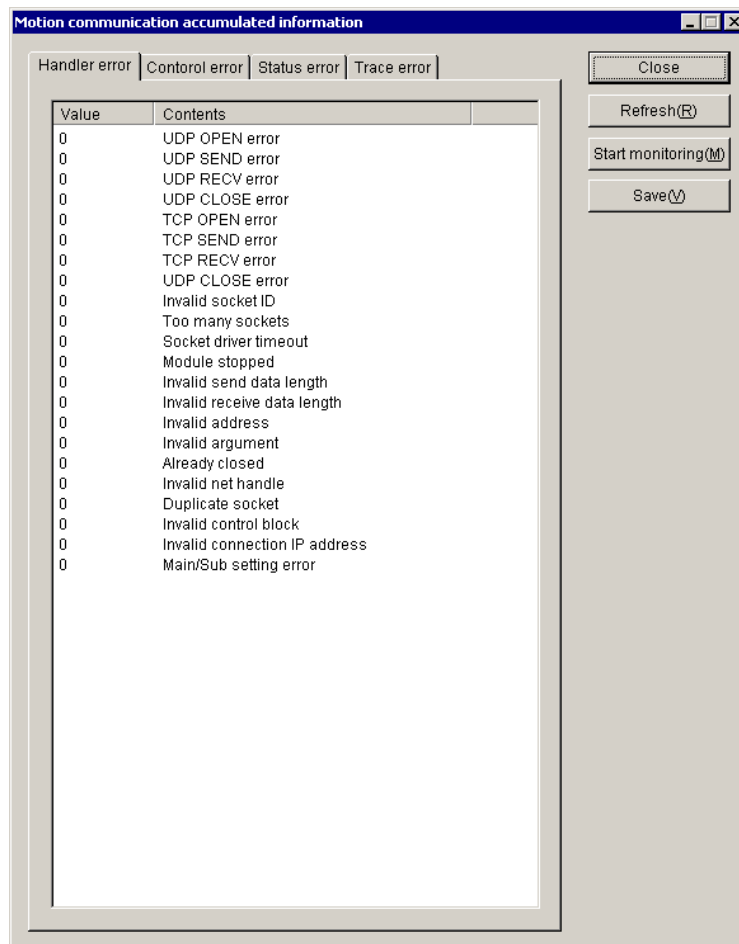
4.8.6 Motion communication accumulated information

Description: The [Communication accumulated information] option under [Motion] presents counts of errors that have occurred during motion communications under control of the communication task.

Operation: The procedure required for using this option is as follows:

- (1) Choose [Motion] – [Monitor] – [Communication accumulated information] from the menu bar in the HI-FLOW process sheet or HI-FLOW sheet currently displayed on screen.
- (2) The “Motion communication accumulated information” window as shown below appears. The motion communication accumulated information presented in this window is classified into four groups, namely, Handler error, Control error, Status error, and Trace error, each of which can be viewed by clicking the corresponding tab.

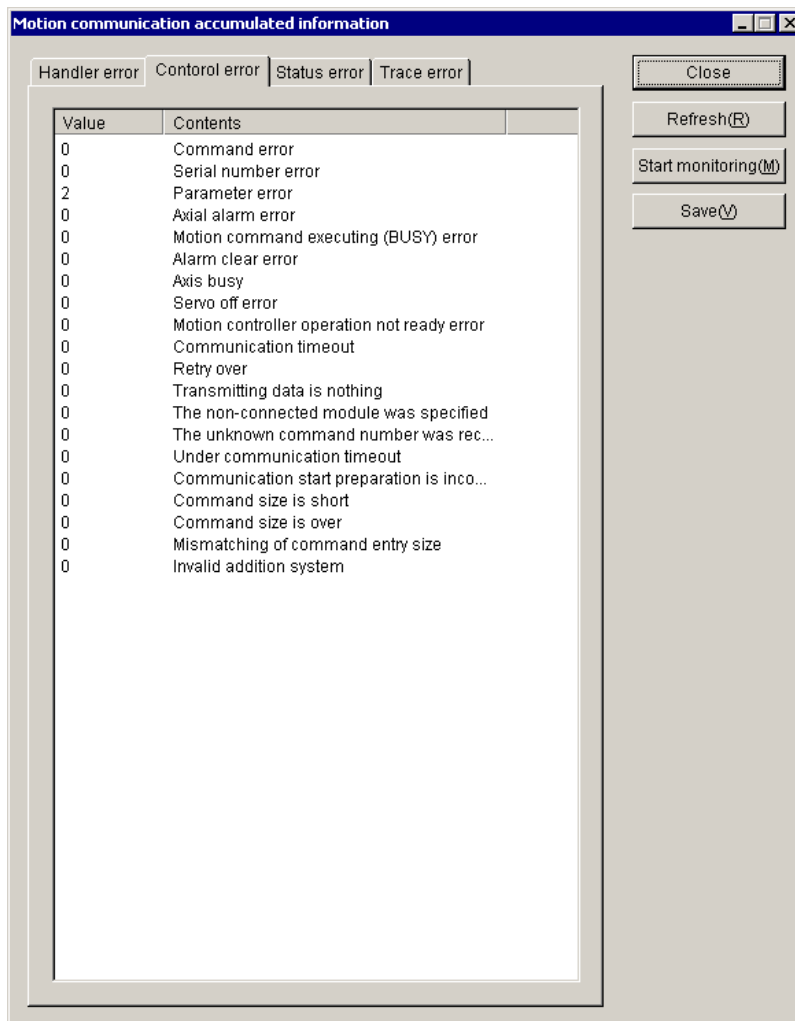
<Handler error>



If a non-zero handler error count(s) are listed in the above tab pane, a problem may exist with the connection of the S10V and the motion controller. Check if the connecting cable between them is not disconnected or connected loosely. If there is no problem with the connection, the ET.NET module may have been broken. Replace it with a new one.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

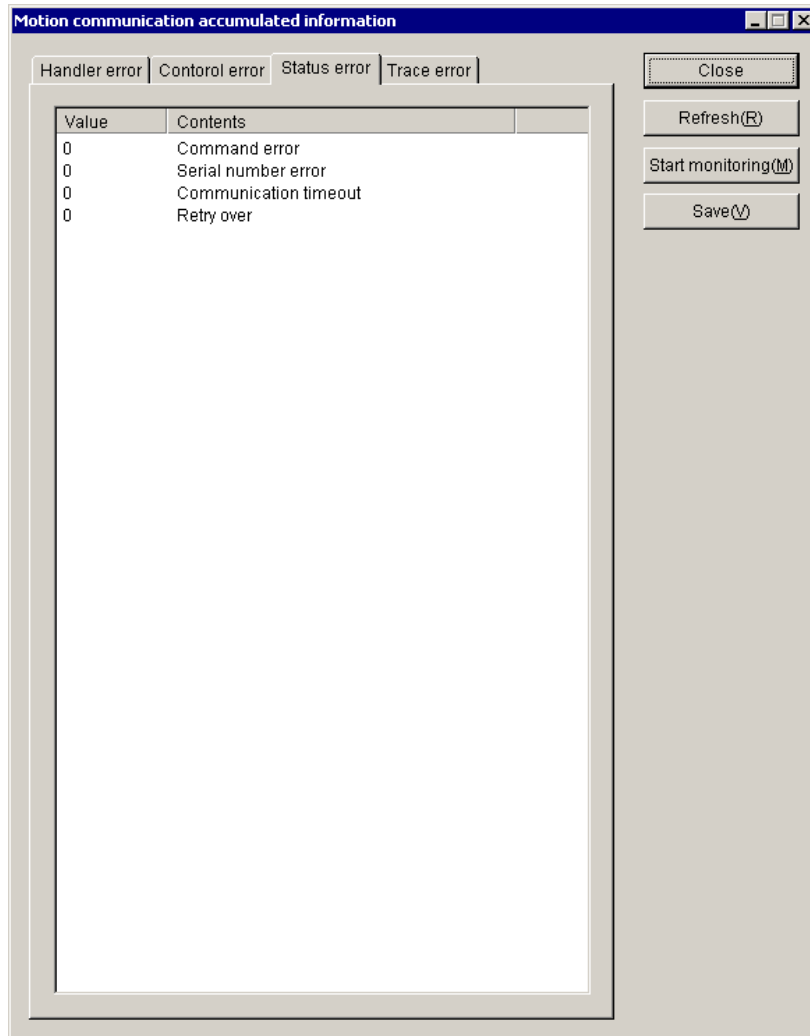
<Control error>



If the command error count and serial number error count presented are both non-zero, the communication task may have been destroyed. Load it in again. If troubleshooting is needed to solve any other problem, see the description of the Command error flag in 4.8.1, “Basic parameters for motions.”

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

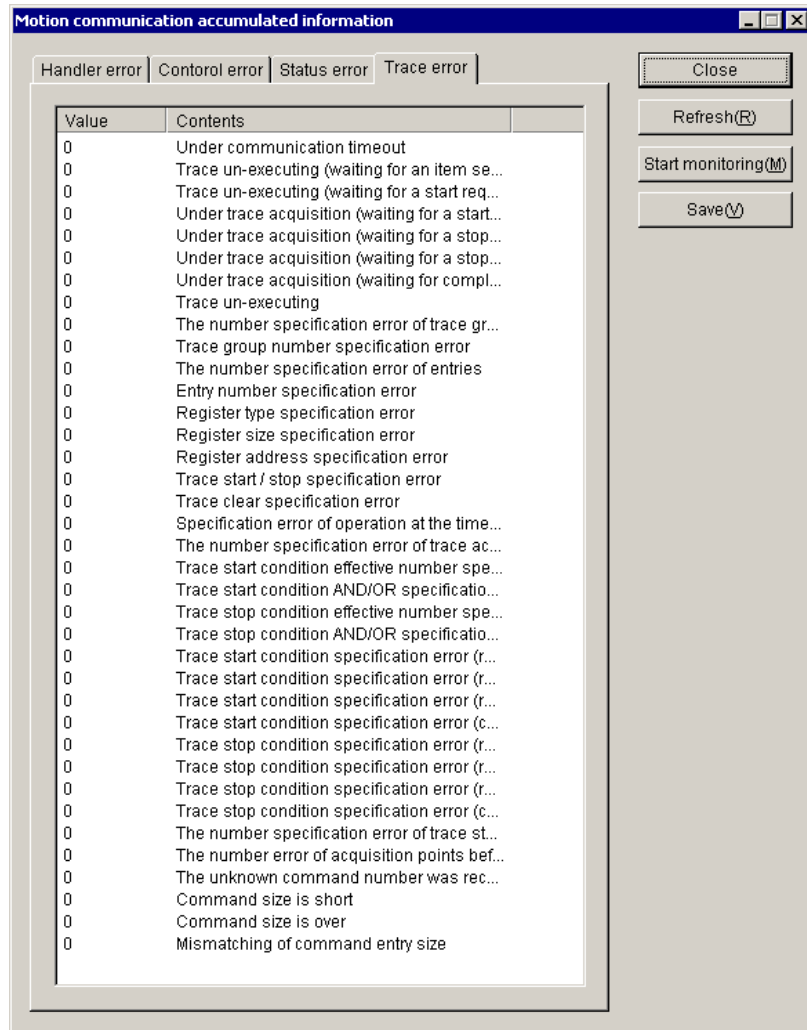
<Status error>



If the command error count and serial number error count presented are both non-zero, the communication task may have been destroyed. Load it in again. If any other non-zero error count is presented, a problem may exist with the connection of the S10V and the motion controller. Check if the connecting cable between them is not disconnected or connected loosely.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

<Trace error>



Trace errors occur during tracing and are counted as they occur. To clear these errors, take action according to the messages presented during tracing.

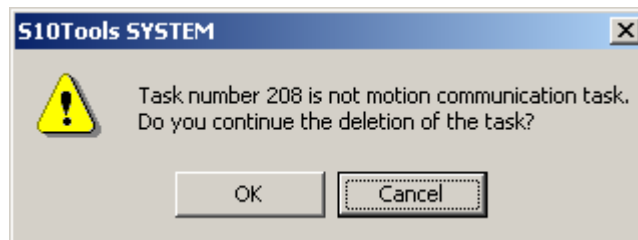
- (3) If you want to update the accumulated error count information currently presented, click the **Refresh** button. If you want to monitor the accumulated error count info, click the **Start monitoring** button. When stopping the monitoring, click the **Stop monitoring** button.
- (4) If you want to save the currently presented error count info to a text file, click the **Save** button.
- (5) When exiting the “Motion communication accumulated information” window, click the **Close** button.

4.8.7 Communication task deletion

Description: The [Deletion of communication task] option deletes the loaded communication task from the CMU.

Operation: The procedure required for using this option is as follows:

- (1) Choose [Motion] – [Deletion of communication task] from the menu bar in the HI-FLOW process sheet currently displayed on screen.
- (2) The communication task is deleted if it is already loaded with a task number given in the range 206 to 208.
- (3) If it is already loaded with a task number other than those in the range 206 to 208 given, the confirmation message shown below appears to confirm that you want to delete it. Click the button if you want to delete it. Otherwise, click the button, in which case this option simply exits without doing anything.



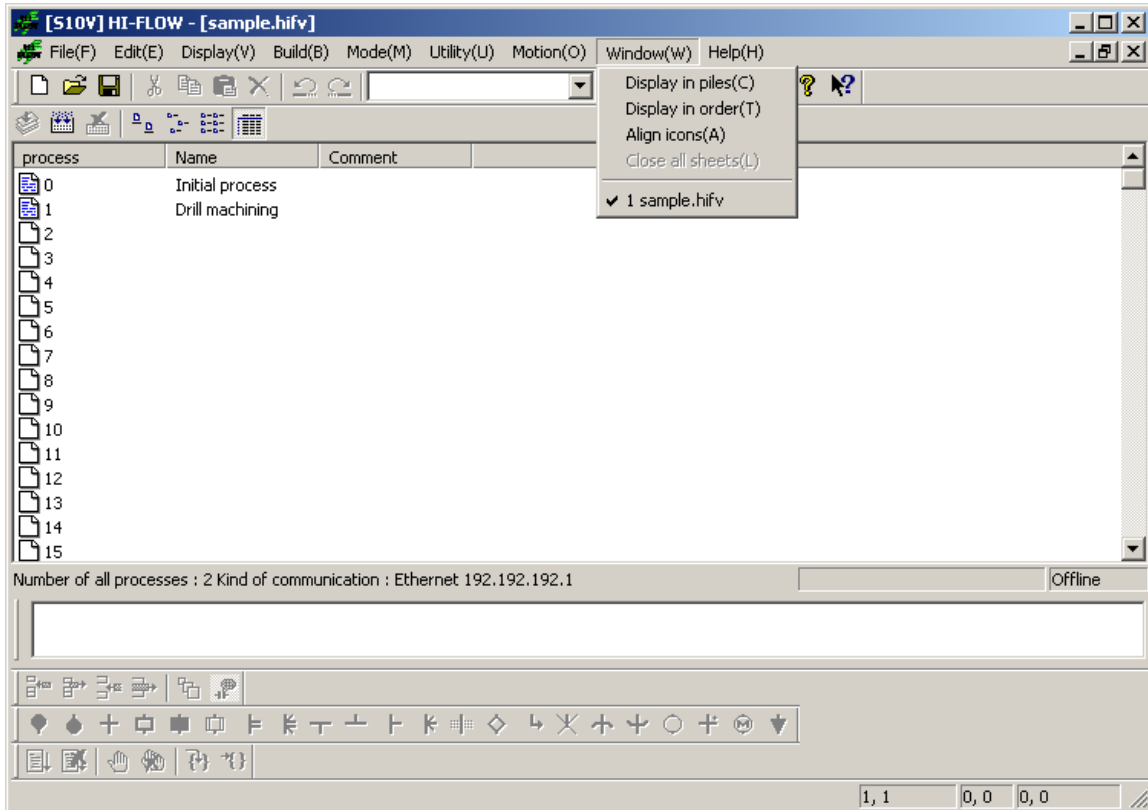
- (4) When the communication task is deleted successfully, the confirmation message shown below appears to confirm you want to reset the PCs. Reset the PCs by clicking button.



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.9 Window Functions of the HI-FLOW Process Sheet

The pull-down menu under [Window] provides the window functions of the HI-FLOW process sheet.



The following table lists the items and brief descriptions of the window functions.

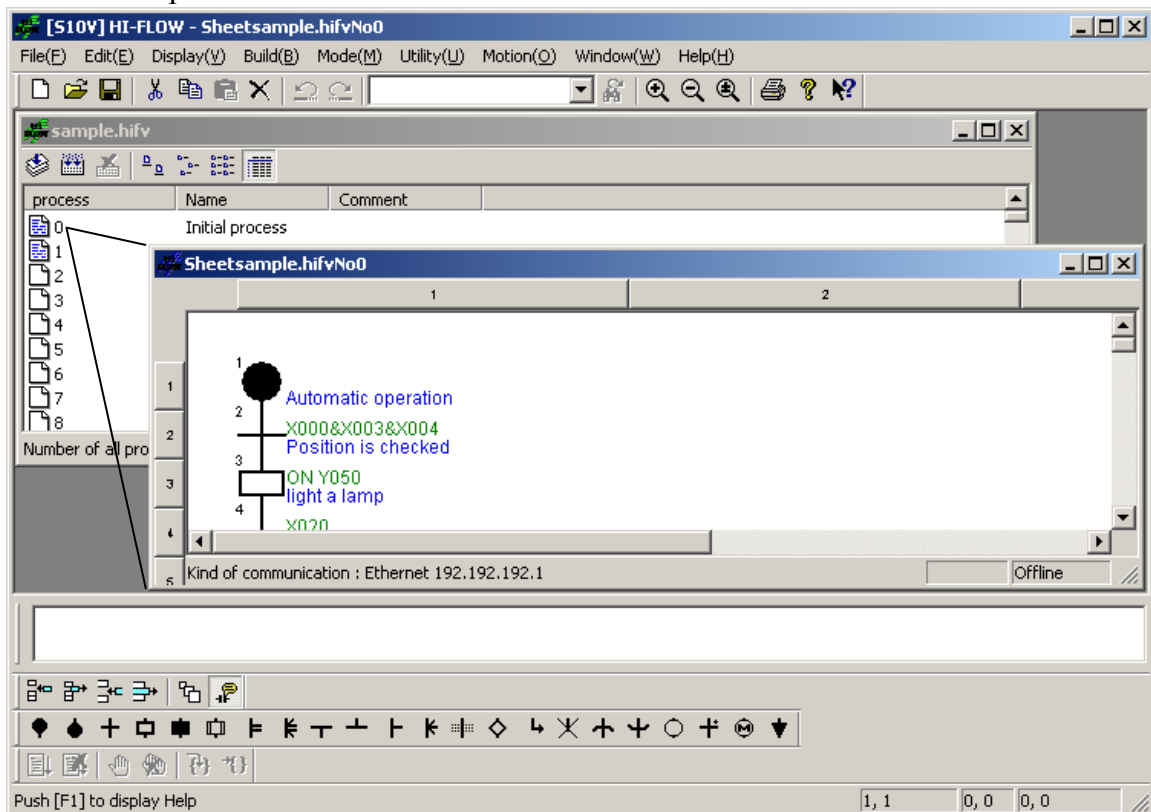
No.	Level 1	Level 2	Level 3	Outline of function
1	Window	Display in piles		Displays windows in piles.
2		Display in order		Displays windows in order.
3		Align icons		Aligns icons.
4		Close all sheets		Closes all currently open process detail sheets.
5		File name 1, 2...		Selects an active window.

4.10 Creating a HI-FLOW Sheet

There are multiple HI-FLOW sheets for 256 processes and each is opened from the HI-FLOW process sheet.

Double-clicking the sheet icon provided on the HI-FLOW process sheet opens a HI-FLOW sheet. Describe the HI-FLOW program on the HI-FLOW sheet and save it in memory, so that this HI-FLOW sheet is registered on the HI-FLOW process sheet.

<HI-FLOW process sheet and HI-FLOW sheet>



<HI-FLOW symbol bar>



From the left of the symbol bar:

Process start, Process end, Wait, Box, Control box, Call, Parallel start, Parallel end, Route start, Route end, Select, Cell end, Cell wait, If, Jump, Escape, Repeat start, Repeat end, Function, Pre-conditional wait, Motion, and Non-synchronous process end.

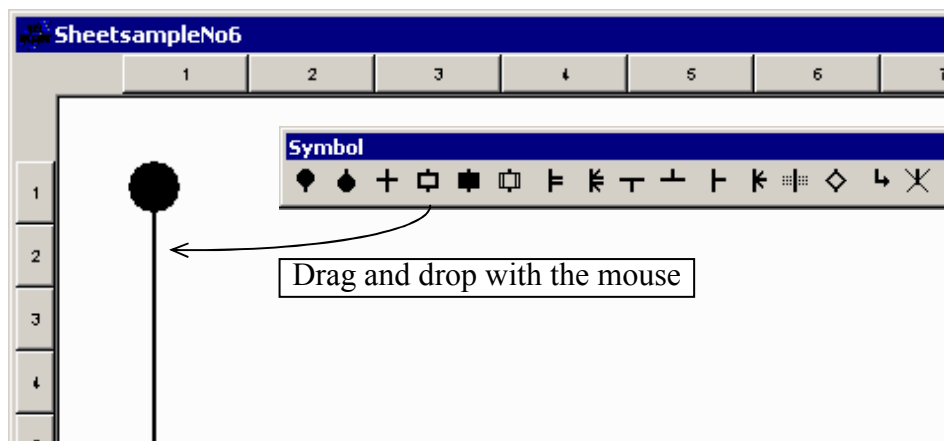
4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.10.1 Pasting a HI-FLOW symbol

There are different ways of pasting a HI-FLOW symbol on the sheet as described below. Paste HI-FLOW symbols by using the desired method.

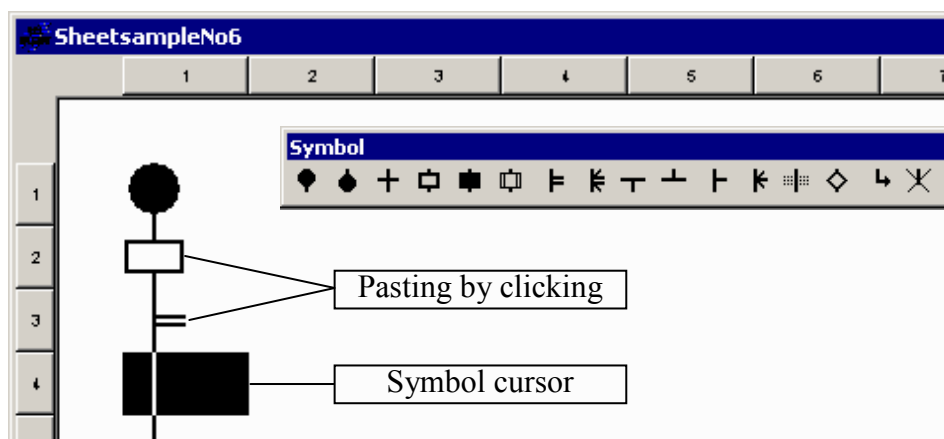
(1) Drag and drop with the mouse

Use the mouse to drag a symbol provided on the symbol bar to the pasting position and drop it at this position.





(2) Pasting according to the input cursor position with the mouse

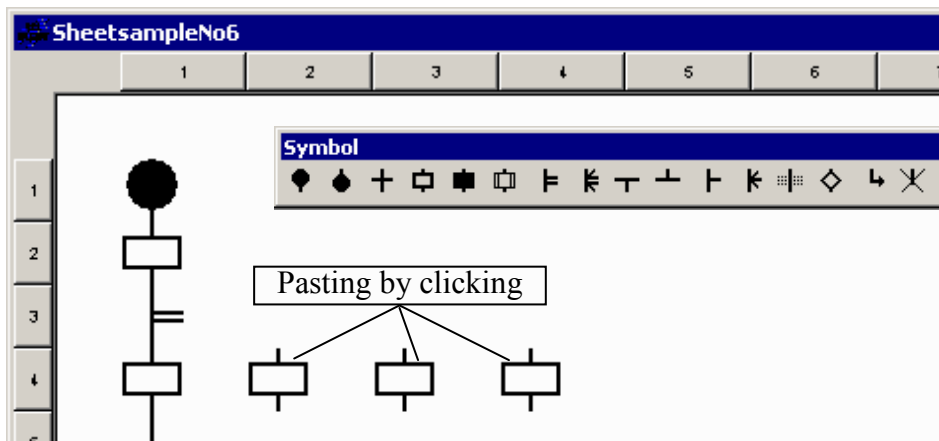
Use the mouse to click a symbol provided on the symbol bar. The clicked symbol will be pasted at the symbol cursor position.



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

(3) Consecutive input of specified symbol with the mouse

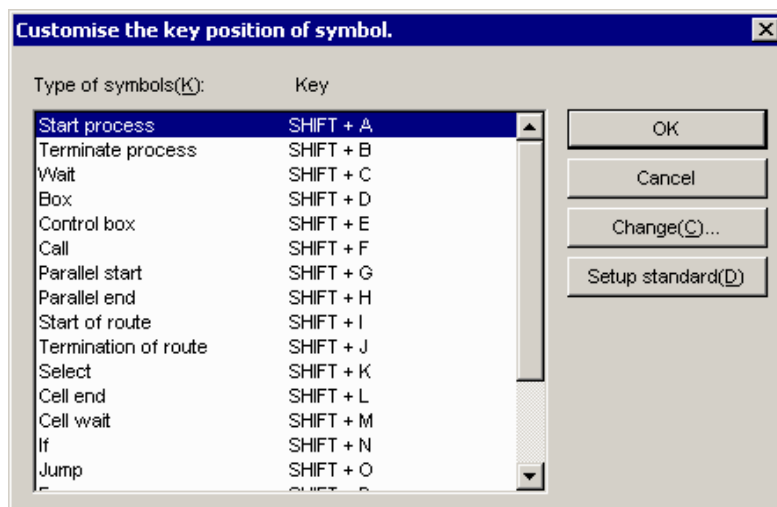
Select  (Consecutively) on the editing bar for consecutive input of the specified symbol. Use the mouse to click the pasting position on the sheet. The specified symbol will be pasted there. To reset consecutive input mode, select  (Consecutively) on the editing bar.



(4) Pasting by key

A symbol can be pasted at the symbol cursor position on the sheet by operating the designated key. The symbol cursor is moved by using the ←, →, ↑, or ↓ key. Key operations can be optionally customized (by selecting [Keyboard] from the [Utility] menu).

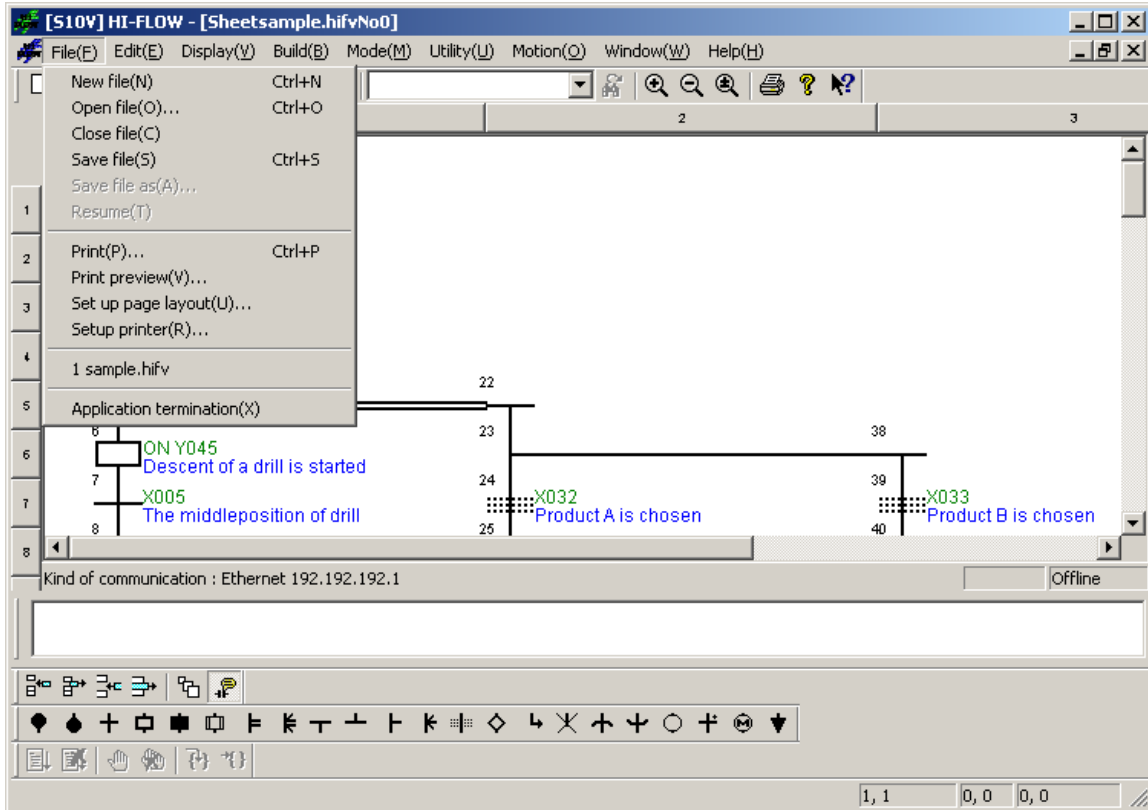
(Key customizing window)



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.11 File Functions of the HI-FLOW Sheet

The pull-down menu under [File] provides the file functions of the HI-FLOW sheet.

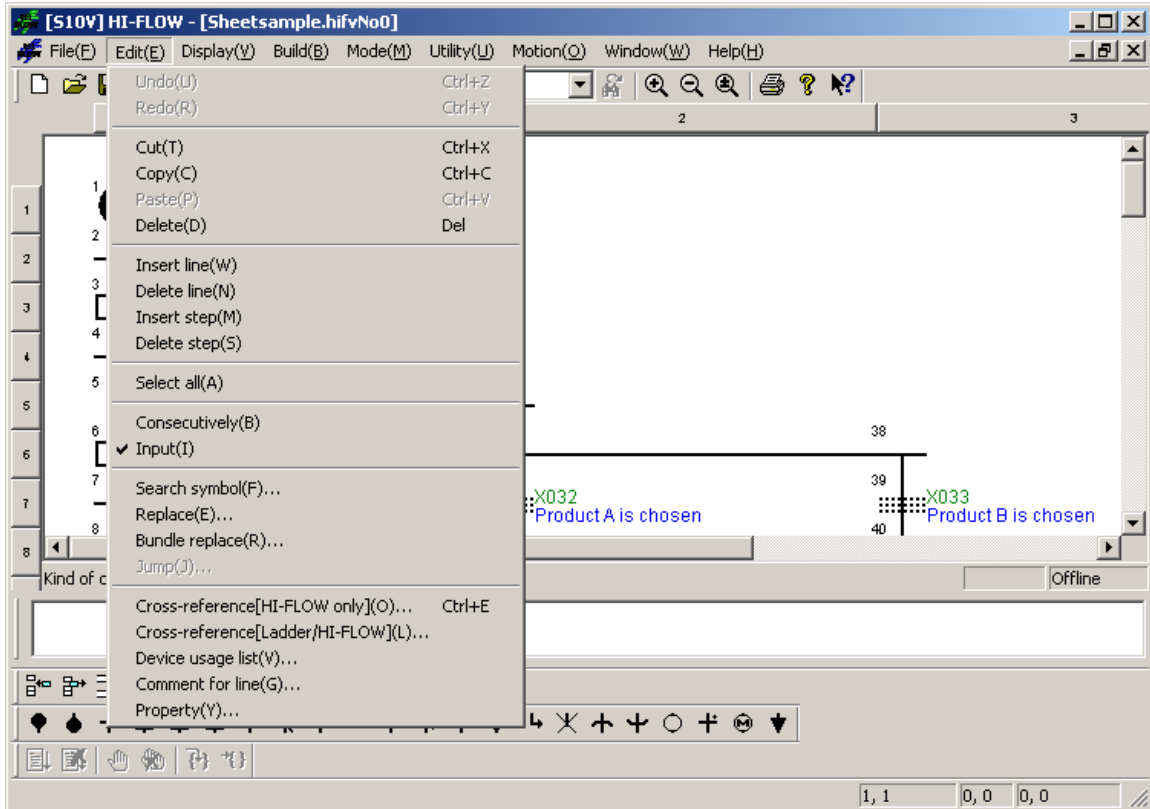


The following table lists the items and brief descriptions of the file functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	File	New file		Opens the new program creating window.
2		Open file		Reads a specified program file into memory.
3		Close file		Closes the currently active window.
4		Save file		Overwrites and saves the program data and comment data of the currently active window.
5		Save file as		Saves the program data of the currently active window after naming it.
6		Resume		Returns the window to open status.
7		Print		Sets the printing range, printer, etc. and performs printing.
8		Print preview		Displays a print image on the screen.
9		Setup page layout		Sets the page layout.
10		Setup printer		Sets the printer.
11		File name 1, 2, 3, 4...		Displays the files that were used in the past.
12		Application termination		Terminates this software.

4.12 Editing Functions of the HI-FLOW Sheet

The pull-down menu under [Edit] provides the editing functions of the HI-FLOW sheet. The editing functions “Cut”, “Copy”, “Paste”, and “Delete” are provided for HI-FLOW programs, not for HI-FLOW processes. Accordingly, it is possible to copy and delete steps, rows, symbols, and syntax structures on this sheet.



The following table lists the items and brief descriptions of the editing functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	Edit	Undo		Cancels the operation that was just executed.
2		Redo		Cancels operations in order of previous execution.
3		Cut		Deletes data in a specified range and copies it to the clipboard.
4		Copy		Copies data in a specified range to the clipboard.
5		Paste		Copies data on the clipboard to a specified position.
6		Delete		Clears data in a specified range.
7		Insert line		Inserts a row on the sheet.
8		Delete line		Deletes a specified row.
9		Insert step		Inserts one step on the sheet.
10		Delete step		Deletes a specified step.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

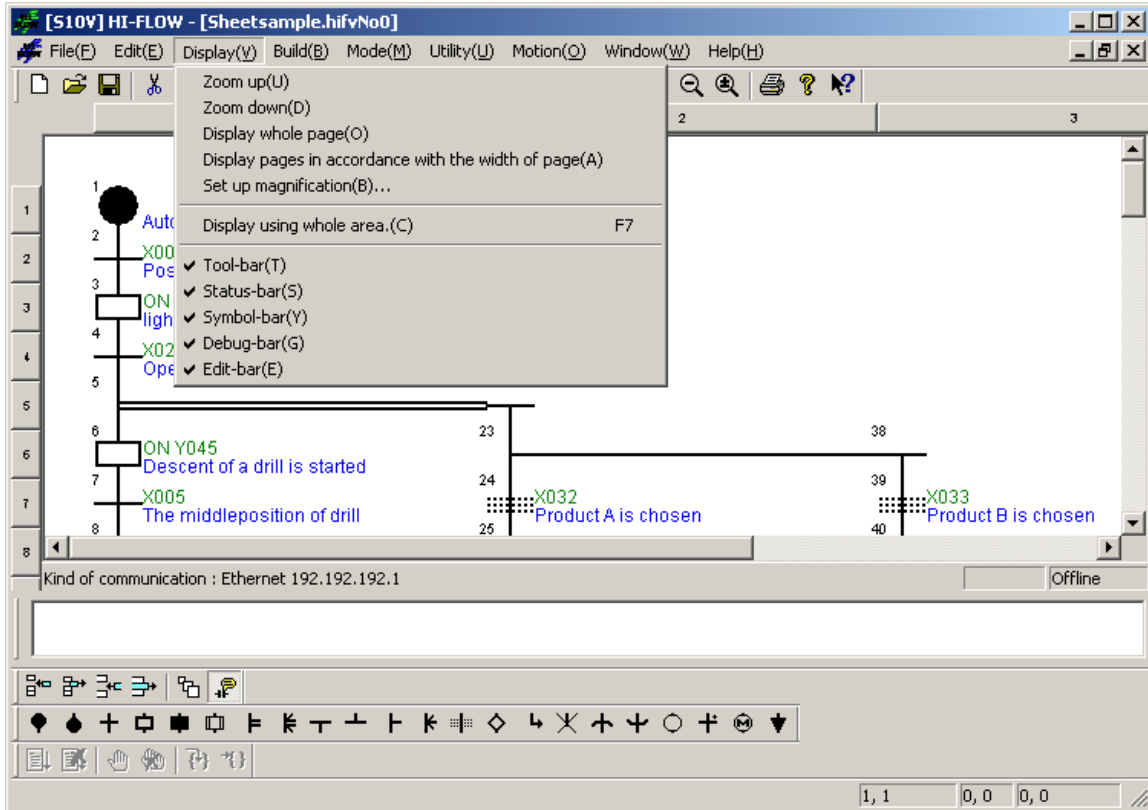
No.	Level 1	Level 2	Level 3	Outline of function
11	Continuation of Editing	Select all		Selects all.
12		Consecutively		Draws a specified symbol consecutively.
13		Input		Opens the input window when the symbol is definitively selected.
14		Search symbol		Moves the cursor to a specified symbol.
15		Replace		Replaces a specified syntax structure.
16		Bundle replace		Replaces a specified series of symbols used in a specified process(es), all at once.
17		Jump		Moves the cursor to a specified step No.
18		Cross-reference [HI-FLOW only]		Searches a given set of HI-FLOW programs for requested symbol information.
		Cross-reference [Ladder/HI-FLOW]		Searches both a given set of HI-FLOW programs and a given set of ladder programs for requested symbol information.
19		Device usage list		Searches a specified process(es) for the device information used therein and displays the result in list form.
20		Comment for line		Copies the symbol syntax to the comment.
21	Property		Sets the properties of the sheet.	

For descriptions of the Search symbol, Replace, Bundle replace, Device usage list, and cross-reference functions listed above, see 4.3.1, “Searching for symbols,” 4.3.2, “Replacing symbols with new ones,” 4.3.3, “Replacing specified series of symbols with new ones,” 4.3.4, “Device usage listing,” and 4.3.5, “Cross-referencing HI-FLOW only,” 4.3.6, “Cross-referencing both ladder and HI-FLOW,” respectively.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.13 Display Functions of the HI-FLOW Sheet

The pull-down menu under [Display] provides the display functions of the HI-FLOW sheet.



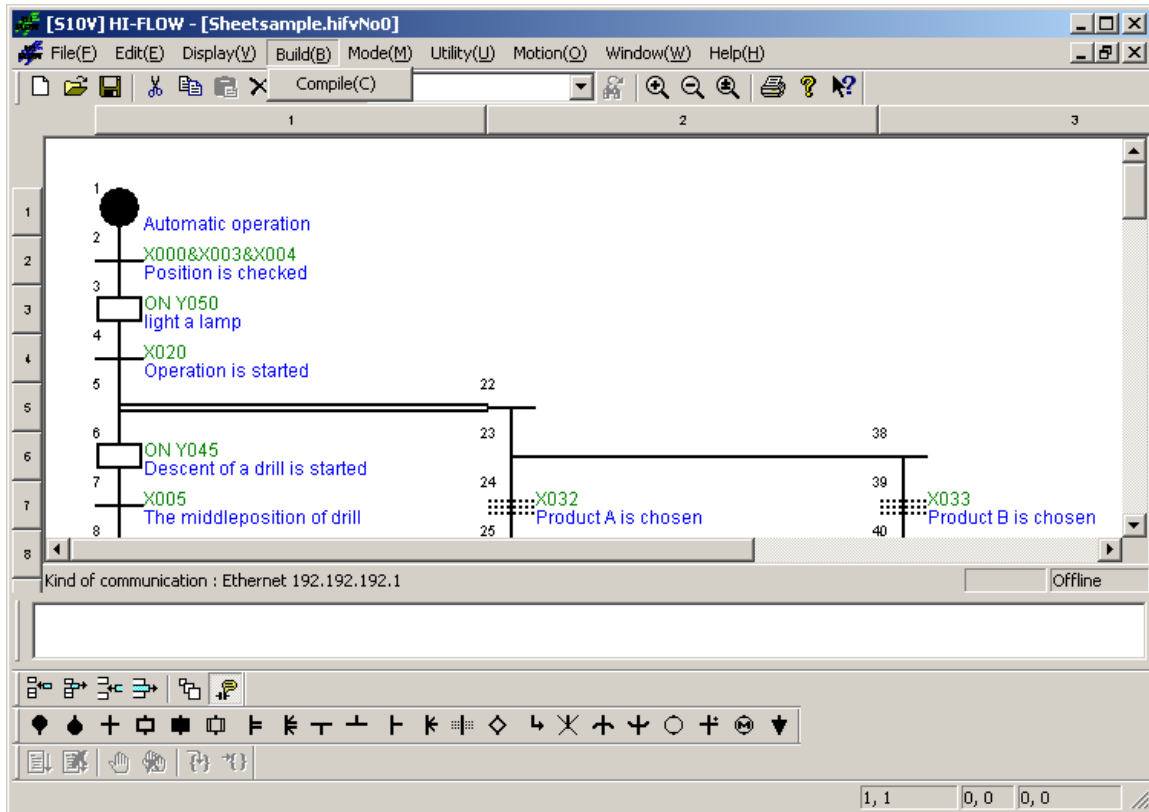
The following table lists the items and brief descriptions of the display functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	Display	Zoom up		Displays in enlarged form.
2		Zoom down		Displays in reduced form.
3		Display whole page		Displays the entire page.
4		Display pages in accordance with the width of page		Displays pages according to page width.
5		Set up magnification		Sets up the magnification.
6		Display using whole area		Displays using whole screen area.
7		Tool-bar		Selects display or non-display of the tool bar.
8		Status-bar		Selects display or non-display of the status bar.
9		Symbol-bar		Selects display or non-display of the symbol bar.
10		Debug-bar		Selects display or non-display of the debug bar.
11		Edit-bar		Selects display or non-display of the editing bar.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.14 Build Function of the HI-FLOW Sheet

The pull-down menu under [Build] provides the build function of the HI-FLOW sheet.



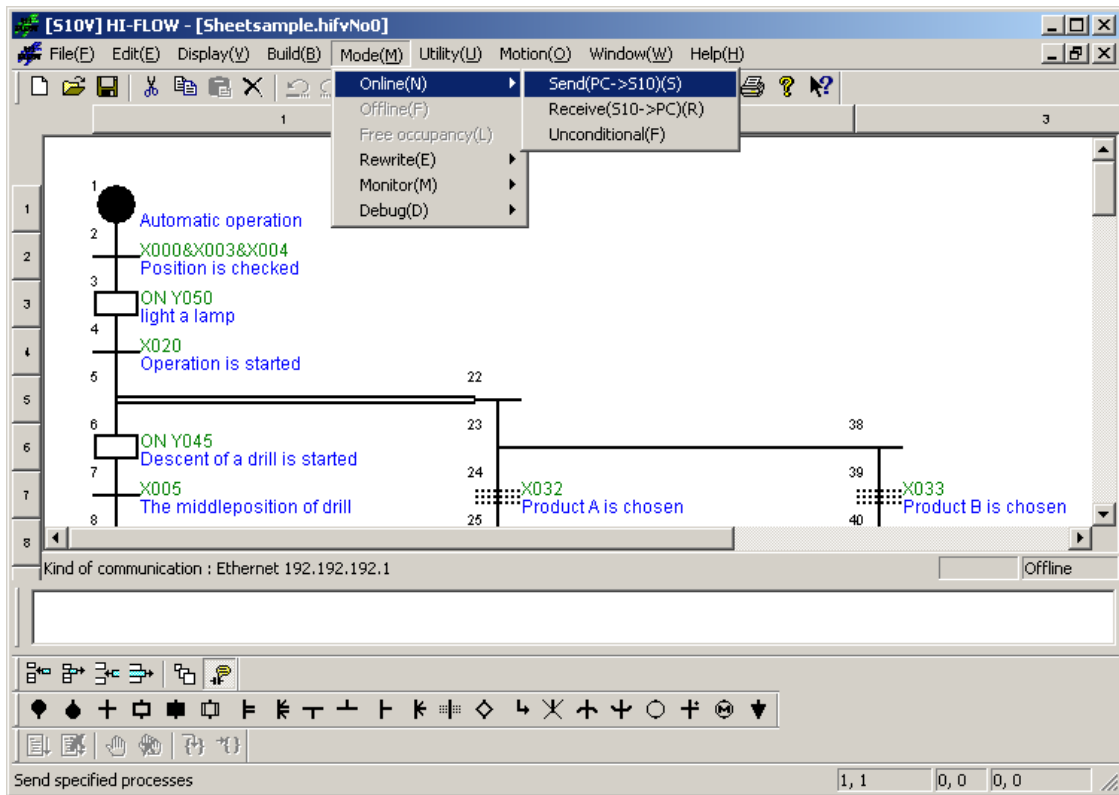
The following table lists the items and brief descriptions of the build function.

No.	Level 1	Level 2	Level 3	Outline of function
1	Build	Compile		Performs compiling.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.15 Mode Functions of the HI-FLOW Sheet

The pull-down menu under [Mode] provides the mode functions of the HI-FLOW sheet.



The following table lists the items and brief descriptions of the mode functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	Mode	Online	Send	Sends a process to the PCs and sets online mode.
2			Receive	Receives a process from the PCs and sets online mode.
3			Unconditional	Sets online mode unconditionally.
4		Offline		Switches the mode over to offline mode.
5		Free occupancy		Releases occupancy by the self-PC.
6		Rewrite	Step	Rewrites the contents of the PCs. (The target is a step syntax structure/comment.)
7			Process	Rewrites the contents of the PCs. (The target is all items in the process.)
8			Confirm step rewrite	Toggles between display or non-display of confirmation messages at the time of step rewriting.
9		Monitor	Start monitoring	Starts monitoring.
10			Stop monitoring	Stops monitoring.
11			Step	Monitors the through-step.
12			Token	Monitors the token.
13			I/O	Monitors the bit ON/OFF state.
14			Clear	Initializes the execution locus.
15		Debug	Trace	Traces and displays process movement between the starting condition and ending condition.
16			Time monitor	Monitors the time elapsed between the starting condition and ending condition.
17			Breakpoint	Sets and resets the breakpoint.
18			Executing point	Moves the cursor to the executing point.

The HI-FLOW system has an occupancy function matched with the network. This function is intended to prevent multiple HI-FLOW systems on the network from accessing the same PCs. Therefore, when online mode is specified, the PCs of the connecting destination are occupied. This occupancy is released when the user selects the occupancy freeing menu.

Note that specifying online mode for the same PCs when the HI-FLOW system of another personal computer already occupies the PCs will display an error message and invalidate the online specification.

4.15.1 Outline of run-status rewriting

Unlike other functions, the run-status rewriting function may adversely affect the equipment if used improperly. Accordingly, this section explains this function in detail.

NOTICE

The run-status rewriting function may adversely affect the equipment if used improperly. Therefore, an operator who lacks a complete understanding of HI-FLOW program processing should not use the run-status rewriting function while running the CPU, but should perform rewriting after stopping the CPU.

(1) Function

This function rewrites the HI-FLOW program (in online mode) in run status. The run-status rewriting function enables three types of rewriting operation: rewriting steps, rewriting the process, and rewriting register values.

(2) Outline of run-status rewriting

- Rewriting steps

Select [Rewrite] – [Step] on the [Mode] menu to invoke step-rewriting status. Select [Rewrite] – [Step] on the [Mode] menu again to clear step-rewriting status.

This type of rewriting only rewrites the syntax structure in a step. Increasing comment capacity is not allowed for this type of rewriting.

- Rewriting the process

Select [Rewrite] – [Step] on the [Mode] menu to invoke process-rewriting status. Select [Rewrite] – [Step] on the [Mode] menu again to clear process-rewriting status.

The entire duration of this rewriting condition of a process is called the run-status rewrite mode. When the run-status rewrite mode ends, rewriting of the process on the PCs will start if the program in the HI-FLOW sheet has been edited.

The method of process rewriting you can selectively use (as shown in Figure 4-1) is one of the following two:

- Delayed run-status rewriting of a process, waiting for its process end to be reached
- Immediate run-status rewriting of a process

The run-status rewriting of a process can make use of all edit functions available in offline state, such as the size increase (in terms of parameters), addition, and deletion of steps.

- **Rewriting register values**

The register rewriting function changes a register value in the HI-FLOW program in online mode. Double-click a symbol in online mode to display a list of registers (used by the corresponding symbol) for changing the desired register value.

(3) Limitations

- **Rewriting steps**

Increasing syntax structure and comment capacity in a step is not allowed when rewriting steps.

Rewriting a step of a motion instruction cannot rewrite any parameter value in a PB (parameter block) not directly specified. If an attempt is made to rewrite such a parameter value, the error message “The renewal of construction, label and comment to increase of volume isn’t completed.” will appear in the output window.

- **Rewriting the process**

- There are no limitations on editing in the process detail window. However, changing the interaction right for the detail window and changing the interaction right for the list window are not allowed when rewriting the process.
- Setting run-status rewriting mode cannot be selected in monitoring status or debugging status.

- **Rewriting register values**

This type of rewriting is not allowed in offline mode and process rewriting mode.

(4) Synchronization of program execution status at program rewriting

When the immediate run-status rewriting of a process is requested, the conditions for synchronization listed below are tested before satisfying the request.

<Conditions for synchronization>

- No symbol figure of the program is added, deleted, or changed.
- No label (label or free label) is added, deleted, or changed. (Changes can be made, however, at the jump source.)
- No route structure is added, deleted, or changed.

If the above conditions are all met, the execution status of the process will remain unchanged (synchronized) before and after the rewriting. Otherwise, the execution status will be cleared and the process will be started over from the beginning, which is the same as a process restart.

When the delayed run-status rewriting of a process is requested, the execution status of the process will remain unchanged (synchronized) before and after the rewriting, regardless of whether or not the synchronization conditions are all met.

- In run-status rewriting mode of the HI-FLOW program, note that monitoring and debugging cannot be done.
- Even if run status is rewritten, PI/O status can be retained. Therefore, rewrite run status only after carefully examining the program operations in this case.
- If the run-status rewriting of a process is performed with no synchronization conditions met, and the rewritten process has called another process, then the called process, including its nested process(es), will be initialized.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

(5) Timer/loop counter processing after process rewriting

The following explains the timer/loop counter processing that follows rewriting of the process. The timer/loop counter is processed regardless of whether the conditions for synchronization in (4) are satisfied as follows:

- The parallel timer (PTxxx) and wait timer (WTxxx) used in the rewritten process are reset (with the value of time elapsed cleared to 0 and the timer stopped) regardless of the process starting condition (TUP, TRS, or no specification). The specified PI/O status of the parallel timer invoked before rewriting is retained. When the wait timer has an executing point and the conditions for synchronization are satisfied, the count is restarted from 0.
- The loop counter (CNxxx) that was started in the rewritten process is reset (with the value of time elapsed coming to the end value) unconditionally. As a result, the counter exits the loop due to the loop check made after rewriting. This means that the counter exits the loop when there is an executing point between the start and end of the loop, and the conditions for synchronization are satisfied after the process is rewritten.
- Note that using a box symbol in the ON statement in the rewritten process when the process starting condition is MRST clears the register used in the ON statement. In the case of non-specification, the register is not cleared.
- If a CALL symbol is used in the process being rewritten, and the execution of the called process is discontinued due to the rewriting, then the execution of the called process will be resumed from the very beginning. The timer of the CALL destination, loop counter, and register used in the ON statement are processed according to the CALL starting condition. If the parallel timer in the process of the CALL destination is called without being specified, the timer is retained. Accordingly, the system enters wait status until the pre-rewriting timer is released. To avoid this, the timer must be called by using the TRS or TUP specification. When the wait timer and loop counter are called without this specification, the value of time elapsed is retained. However, when the process is executed again, the count starts from 0.

[Example]

Process	Processing	Explanation
P0	ACT P1, MRST, TUP	Starts P1 via P0 when the master is reset or time elapses.
P1	ON MFF0 CALL P2	Calls P2 via P1 when the master is reset.
P2	ON Y000	(Executing)

<User's operation>

After process P1 is rewritten, compile it and then send it. (For details of the operating method, see (7), "Run-status rewriting method," below.)

<Internal processing>

- Since P1 is started by MRST, MFF0 of P1 is reset to 0 but Y000 of P2 is retained.
- When P1 uses the timer, timer reset processing is performed regardless of the TUR specification of P0 (route process of the CALL source). When P2 uses the timer, reset processing is not performed.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

The following lists the timer status, loop counter status, and PI/O status after process rewriting.

List of timer status and loop counter status after process rewriting

	Process start-up condition	Timer/loop counter
Target process for rewriting	Not specified	Unconditional resetting (The parallel timer is stopped, the wait timer is restarted from 0, the value of time elapsed comes to an end, and the loop counter exits the loop.)
	TUP	
	TRS	
Process of CALL destination	Not specified	The value of time elapsed is retained, with the timer and counter as follows when the process is executed again. Parallel timer: The parallel timer waits until the time on the pre-rewriting timer is up. Wait timer: The count is restarted from 0. Loop counter: The count is restarted from 0.
	TUP	Time is up.
	TRS	Reset.

List of PI/O status after process rewriting

	Process start-up condition	PI/O
Target process for rewriting	Not specified	The status invoked before rewriting is retained.
	MRST	The process is cleared to 0.
Process of CALL destination	Not specified	The status invoked before rewriting is retained.
	MRST	The process is cleared to 0.

(6) Breakpoint setting at process rewriting

When the process has been rewritten, the breakpoint setting is deleted regardless of whether synchronization is performed and whether a break occurs.

(7) Run-status rewriting method

● Rewriting steps

- ① Select [Rewrite] – [Step] on the [Mode] menu on the process detail screen in online mode.
- ② Select a step to be rewritten.
- ③ Display the editing dialog box.
- ④ A syntax structure or comment can be edited here. The editing method is the same as in offline mode.
- ⑤ When the rewriting of the step is completed, click the button.
- ⑥ A confirmation dialog box appears if requested by setting. Click the button. Then, compilation and transmission will be automatically performed.
- ⑦ If a confirmation is not requested by setting, compilation and transmission will be automatically performed immediately, the confirmation dialog box being not presented.
- ⑧ You can toggle between the display and non-display of the confirmation dialog box by selecting [Rewrite] – [Confirm step rewrite] on the Mode menu on the process detail screen.

● Process rewriting

- ① Select [Rewrite] – [Process] on the [Mode] menu on the process detail screen in online mode.
- ② The target symbol figure or syntax can be edited. The operating method is the same as in offline mode.
- ③ After the completion of rewriting, select [Compile] on the [Build] menu.
- ④ Choose [Rewrite] – [Process] from the [Mode] menu. The “Renewal mode during RUN” dialog box as shown below then appears.

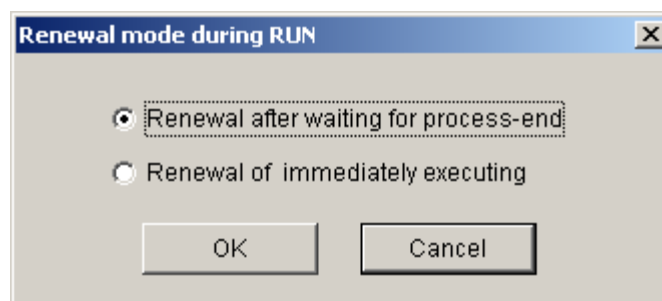


Figure 4-1 The “Renewal mode during RUN” Dialog Box

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

- ⑤ Select the desired rewrite method (renewal mode) from the two available and click the button. Rewriting by the selected method then starts.
- ⑥ If the “Renewal of immediately executing” radio button is selected, rewriting starts immediately without waiting for the process end to be reached.
- ⑦ If the “Renewal after waiting for process-end” radio button is selected, rewriting is delayed waiting for the process end to be reached. During the delay, the “Renewal of process during RUN (Waiting for process-end)” dialog box shown below stays active on the screen and the elapsed time is counted. Elapsed-time counting can be continued up to 59 minutes and 59 seconds. Thereafter, no counting will be made, but the rewriting process will be monitored continuously.

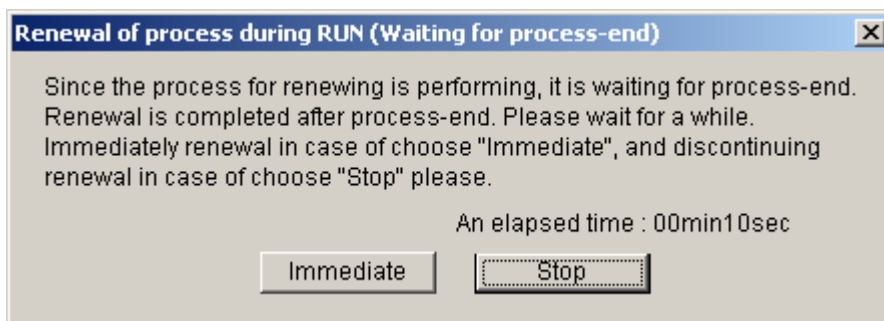


Figure 4-2 The “Renewal of process during RUN (Waiting for process-end)” Dialog Box

When the rewriting started at the process end is completed, the above dialog box closes and the message shown in Figure 4-5 appears to tell you that the rewriting is done successfully. At this moment, the up-to-date processes on the PCs are normally in operation.

If any process on the PCs is detected that is not in operation or is in a stopped state (including an LPU stop), then the above “Renewal of process during RUN (Waiting for process-end)” dialog box closes and immediate rewriting is automatically performed as done in Step ⑥. When the rewriting started immediately is completed, the message shown in Figure 4-5 appears in the output window.

<Action to take when you want to rewrite immediately because of waiting too long>

It is not uncommon that you are waiting too long for the process end to be reached. In this case, you can click the **Immediate** button in the “Renewal of process during RUN (Waiting for process-end)” dialog box shown in Figure 4-2. When it is clicked, the “Renewal of process during RUN (Immediate renewal)” dialog box shown in Figure 4-3 appears. Clicking the **OK** button in the dialog box starts immediate rewriting as done in Step ⑥. When the rewriting started immediately is completed, the message shown in Figure 4-5 appears to tell you the rewriting is done successfully.

If the **Cancel** button is clicked in place of **OK** button in the former dialog box, the request is canceled and the “Renewal of process during RUN (Waiting for process-end)” dialog box is active again, the counting of the elapsed time being resumed.

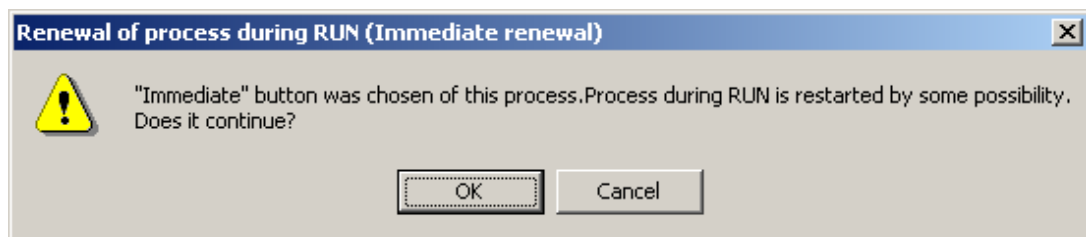


Figure 4-3 The “Renewal of process during RUN (Immediate renewal)” Dialog Box

<Action to take when you want to stop waiting>

You can stop waiting for the process end to be reached. Just click the **Stop** button in the “Renewal of process during RUN (Waiting for process-end)” dialog box shown in Figure 4-2. When it is clicked, the “Renewal of process during RUN (Stop of renewal)” dialog box shown in Figure 4-4 appears. Clicking the **OK** button in the dialog box closes both the former and latter dialog boxes, aborts the rewriting process, and displays the cancellation message shown in Figure 4-6. If the **Cancel** button is clicked in place of **OK** button in that dialog box, the “Renewal of process during RUN (Waiting for process-end)” dialog box becomes active again.

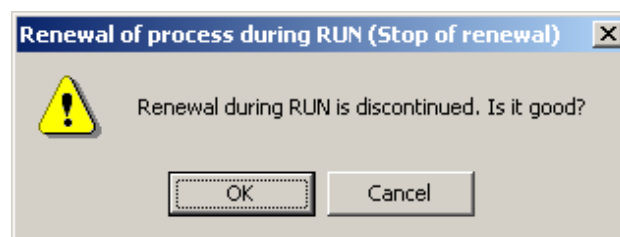


Figure 4-4 The “Renewal of process during RUN (Stop of renewal)” Dialog Box

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

<Common operation messages>

The operation messages listed below are displayed in the “Output” window. These messages report the result of an action you have taken in the run-status rewrite session.

- Normal-end-of-rewrite message

The message shown below is displayed when the requested run-status rewriting of a process is completed successfully.

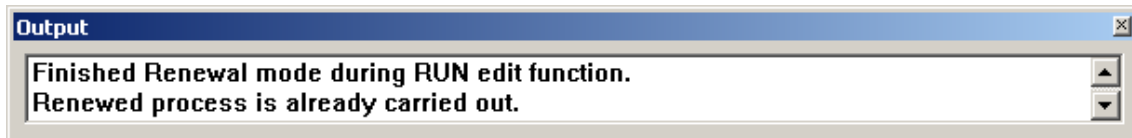


Figure 4-5 The Normal-End-of-Rewrite Message

- Cancellation message

When an issued run-status rewrite request is canceled, the message shown below is displayed and the run-status rewrite mode (4.15.1, “Outline of run-status rewriting”) is exited simultaneously.

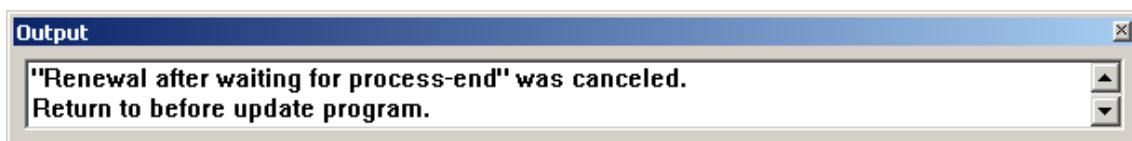


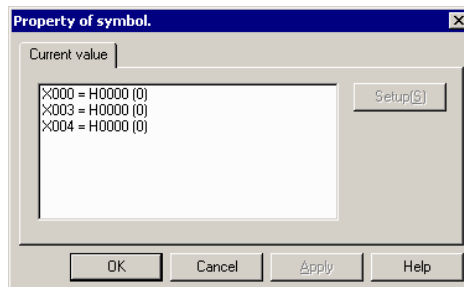
Figure 4-6 The Cancellation Message

NOTICE

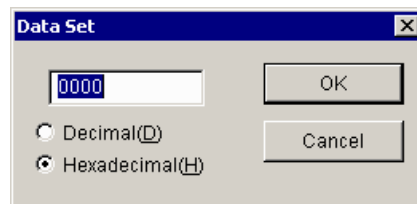
- There is a deference between rewriting the process and rewriting steps in terms of operation.
Therefore, perform operations carefully.
- Because of a time lag, the PCs finishes rewriting the process earlier than its recognition by the HI-FLOW system while you are waiting for its process end to be reached. During the time lag, if a cancel request is issued to cancel the already issued rewrite request, it may not be processed.
- If a cancel request is issued to cancel your already issued rewrite request, the edited process currently displayed on-screen will remain as is thereafter, but it will not be rewritten to the PCs, resulting in the old process still running on the PCs. This non-matching condition of the process between the HI-FLOW system and the PCs must be eliminated by its reception from the PCs. (To accomplish this, choose [Offline] from the [Mode] menu, and then choose [Online] – [Receive] from the same menu.)

- Rewriting register values

- ① Double-click a symbol in online mode to display the [Property of symbol] dialog box in online mode.



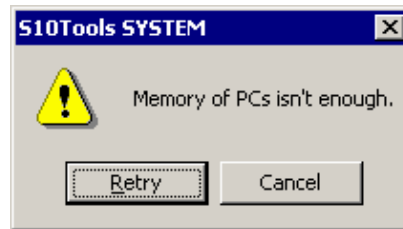
- ② In this dialog box, double-click the register whose value is to be rewritten. The dialog box for rewriting the value then appears.



- ③ Enter a value and click the **OK** button.

(8) Action to be taken for insufficient memory at run-status rewriting

The run-status process is rewritten by using a free area in the Hi-FLOW user program area on the PCs side while running the HI-FLOW program. (The user program area is the area specified by using the user area range after selecting [Utility] – [PCs] – [System edition].) Accordingly, if run status is repeatedly rewritten, the following message regarding insufficient memory capacity may appear.



If this message appears, send all processes to the PCs by following the procedure below. Then, recovery from insufficient memory status can be made. However, the PCs must be stopped.

- ① Stop the PCs.
- ② Place the PCs and HI-FLOW system into offline mode. ([Mode] – [Offline])
- ③ Send all processes to the PCs. ([Mode] – [Online] – [Send] – [All processes])
- ④ Start the PCs.

If you do not want to stop the PCs, set a larger user program area in [System edition].

If the problem of insufficient memory on the PCs side cannot be resolved by the operations above, extend the user program area or install additional expansion memory.

4.15.2 Process execution after run-status rewriting

There are two ways of rewriting in run status: executing synchronization and not executing synchronization. This subsection clarifies the difference between run-status rewriting with synchronization and run-status rewriting with no synchronization and thereby helps you use run-status rewriting safely.

(1) Executing synchronization

The synchronization here means that the process which has been rewritten at a particular point (step) in its execution time is controlled to have its discontinued execution resumed at that point after the rewriting.

When all the conditions below are satisfied, synchronization is executed.

[Conditions for synchronization]

- No program symbol figure is added, deleted, or changed.
- No label (label or free label) is added, deleted, or changed.
- No route structure is added, deleted, or changed.

Synchronization has significance when there is an executing point in the process rewritten in run status. Accordingly, the following risks may be posed:

- Because the stop conditions are rewritten or the process is initially executed, an accident may occur due to equipment malfunction.
- Because the stop conditions are rewritten or the process is initially executed, the equipment may not be properly synchronized.
- Because the control process numbers of the ACT, RST, STP, and CLR parameters in the control box are changed, an accident may occur due to equipment malfunction.
- Because the target process to be called in the control box is changed, an accident may occur due to equipment malfunction.

(2) Executing initialization

When any of the conditions for synchronization above is not satisfied, initialization is executed.

[Conditions for initialization]

- No program symbol figure is added, deleted, or changed.
- No label (label or free label) is added, deleted, or changed.
- No route structure is added, deleted, or changed.

Initialization has significance when there is an executing point in the process for which run status is rewritten. When the target process to be rewritten is executed, it is executed from the beginning regardless of the executing point (step) in the pre-rewritten process.

Accordingly, the following risk may be posed:

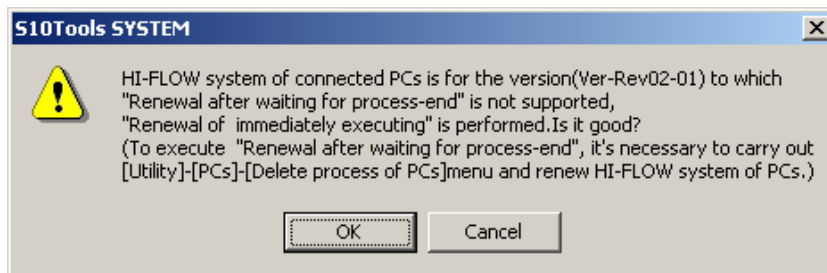
- Because the rewritten process, including the process(es) directly (or indirectly) called by it, is forcibly terminated and re-executed from its beginning, an accident may occur due to an abnormal synchronization of the processes involved.

4.15.3 Other things to remember when using run-status rewriting

This subsection describes other special cases in which the use of run-status rewriting may impose risk. Users are advised to consider these special cases for safe and effective use of run-status rewriting.

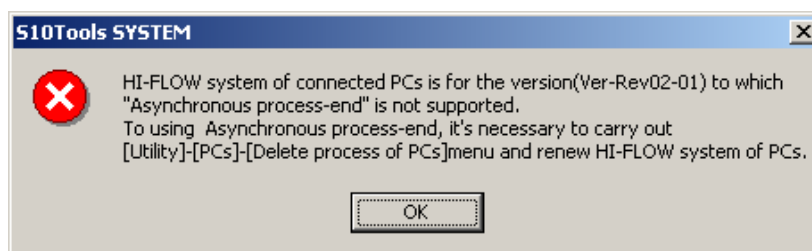
(1) Case 1: the existing interpreter is old:

Before writing a corrected process to the PCs by using run-status rewriting, the existing interpreter's version running on the PCs is automatically checked. If the version is 02-01 or earlier, the dialog box shown below appears. If you click the button in the dialog box, rewriting will be performed in the same way as done when the "Renewal of immediately executing" radio button is clicked in the "Renewal mode during Run" dialog box (Figure 4-1). If you click the button in place of button, the run-status rewrite process displays the message shown below and terminates.



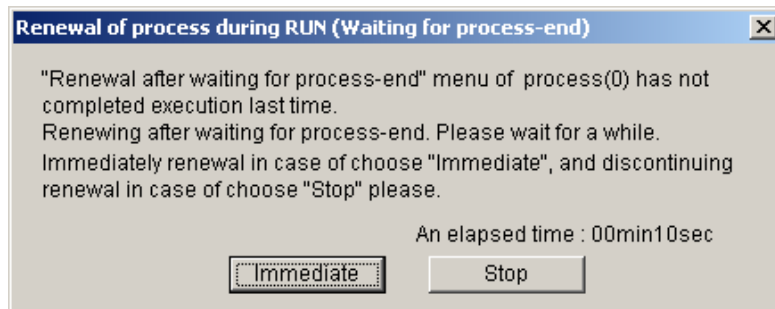
<What if the old interpreter is found along with a non-synchronous process end?>

If a non-synchronous process end is detected in the process sheet while the existing interpreter's version is being checked before rewriting that process, the dialog box shown below appears, indicating that the HI-FLOW system is unable to perform run-status rewriting. The action you can take to clear this error condition is to place the HI-FLOW system's communication line in offline state and then perform either of the following steps: 1) upgrade the interpreter to the version 02-02 or later or 2) change the non-synchronous process end (▼) to the conventional process end (●) in the process under editing, compile the process, and then transmit the resulting process to the PCs.



(2) Case 2: HI-FLOW system is ended abruptly while waiting for the process end:

After you have issued a run-status rewrite request, your personal computer might go down or you would abruptly terminate the HI-FLOW system via the task manager while the “Renewal of process during RUN (Waiting for process-end)” dialog box (Figure 4-2) stays active on the screen. In this case, when you restart the HI-FLOW system and place it in online mode (by selecting [Online] – [Receive]/[Unconditional] from the [Mode] menu), the dialog box shown below will appear if the PCs has not yet detected that the process end is reached.



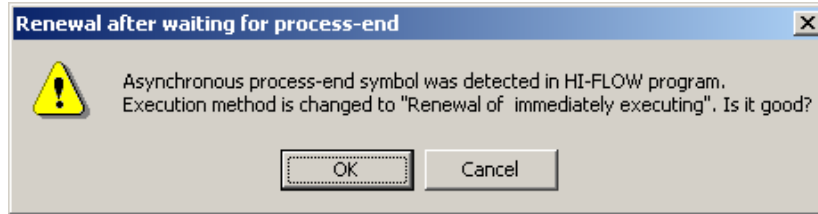
Clicking the button in the above dialog box satisfies the issued rewrite request immediately without waiting for the process end to be reached. If you click the button in place of button, the requested rewrite process will be aborted with the dialog box closed.

If you click the button in the “Renewal of process during RUN (Waiting for process-end)” dialog box (Figure 4-2) from which you have aborted the rewriting process during waiting for the process end to be reached, the process whose process end was being awaited will be initialized, regardless of whether or not a set of synchronization conditions is given.

(3) Case 3: an attempt is made to rewrite a process in run status that is ended by a non-synchronous process end.

If a “Renewal after waiting for process-end” request is issued to rewrite a process that is ended by a non-synchronous process end, it is denied and the warning dialog box shown below appears. The reason for this is as follows: a process ended by a non-synchronous process end is usually accompanied by a subroute or called process (another process called by that process) which is running asynchronously with that process and which may still be running when the process end is reached.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET



When you click the button in the above dialog box, the HI-FLOW system will change the renewal mode to “Renewal of immediately executing” and then will start rewriting. (This is the same result as you will get when you select the [Renewal of immediately executing] radio button in the [Renewal mode during RUN] window [Figure 4-1].) If you click the button in place of button, the HI-FLOW system cancels the issued request and displays the cancellation message shown in Figure 4-6.

- (4) Case 4: The PCs has been reset or has gone down during run-status rewriting. If the HI-FLOW system detects a “PCs reset” or “PCs down” condition while loading (rewriting) to the PCs or waiting for the process end to be reached, it aborts the requested rewrite process and displays the error message shown below. In these cases, the current process sheet is still under editing condition and you have to try rewriting again.



Choose [Rewrite] – [Process] from the [Mode] menu and then do the same as you did previously. The dialog box shown below appears. Click button to end the run-status rewrite process in progress. To try run-status rewriting again, follow the instruction given in the dialog box.



4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.15.4 Notes on using a tool not supporting non-synchronous process ends

This subsection presents notes on using a conventional tool (*1) -- a tool not supporting non-synchronous process ends -- for performing online operations on the PCs on which processes ended by a non-synchronous process end are running.

(1) Sending and receiving processes ended by a non-synchronous process end

The use of non-synchronous process ends requires a new tool (*2) supporting non-synchronous process ends. By using such a new tool, you can ensure that the processes ended by a non-synchronous process end will run on the PCs. However, you can send and receive processes with the PCs by using a conventional tool (*1) as well. This poses a potential risk of overwriting of an existing non-synchronous process end with a conventional (synchronous) process end. The table below shows a list of send and receive operations using a conventional tool (*1) on the PCs on which non-synchronous process ends are functioning and of their results.

Send and Receive Operations Using a Conventional Tool (*1) on the PCs with Non-Synchronous Process Ends Running on It and Their Results:

Operation	Menu and option selection	Result of operation
Send	[Online] – [Send] – [All processes]	This operation causes the HI-FLOW program(s) running on the PCs to be overwritten unconditionally with a new one. (See NOTE.)
	[Online] – [Send] – [Specified process] (This selection is made on the HI-FLOW process sheet.)	
	[Online] – [Send] (This selection is made on the HI-FLOW sheet.)	
Receive	[Online] – [Receive] - [All processes]	Once the process(es) ended by a non-synchronous process end are received, the process end(s) will no longer be displayed in the process sheet.
	[Online] – [Receive] – [Specified process]	
	[Online] – [Receive] (This selection is made on the HI-FLOW sheet.)	
Unconditional	[Online] – [Unconditional]	No display of a received non-synchronous process end will result in a compilation error.

Versions Supporting or Not Supporting Non-Synchronous Process Ends:

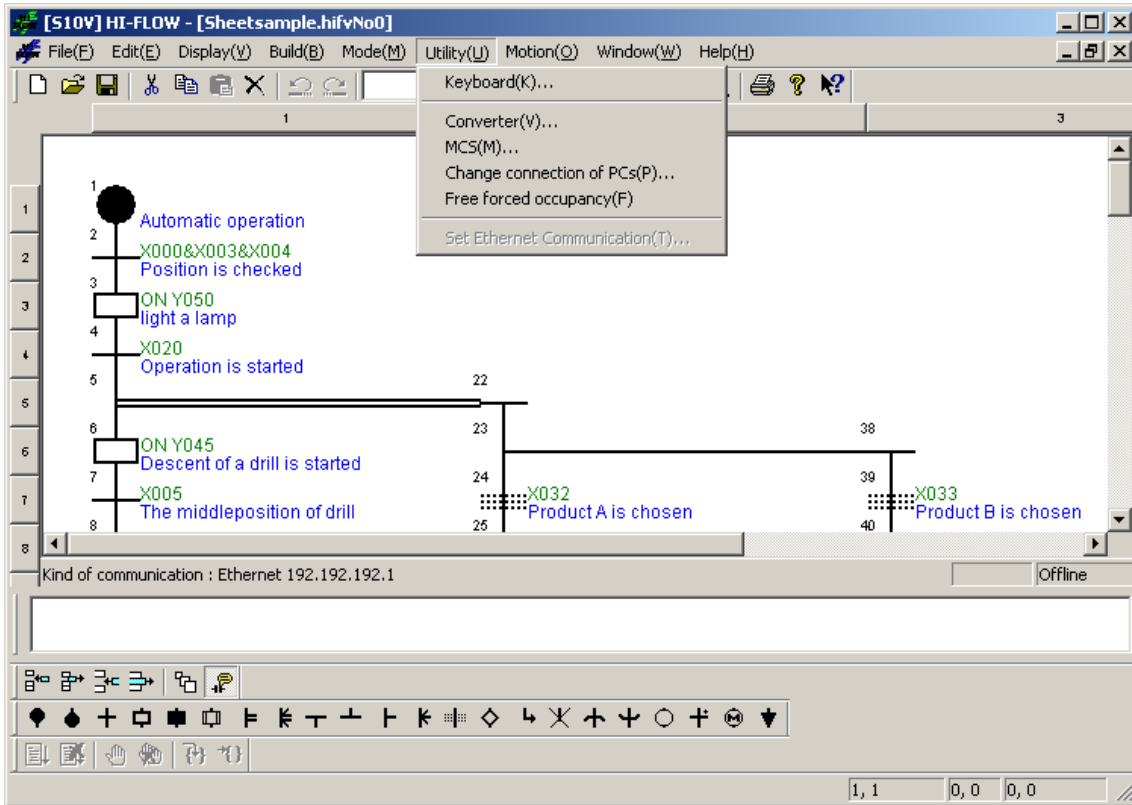
	Ver-Rev of tool	Ver-Rev of interpreter	Non-synchronous process ends supported or not
(*1) Conventional tool	02-03 or earlier	02-01 or earlier	Not supported
(*2) New tool	02-04 or later	02-02 or later	Supported

NOTICE

HI-FLOW programs (processes) ended by a non-synchronous process end may be transmitted from a conventional tool (*1) to the PCs on which processes ended by a non-synchronous process end are running. In this case, the existing processes on the PCs will be automatically overwritten with the transmitted ones without presenting any warning message to you. This may result in a “CMU down” condition. To avoid this, be sure to use a new tool (*2) when sending or receiving HI-FLOW programs (processes) ended by a non-synchronous process end.

4.16 Utility Functions of the HI-FLOW Sheet

The pull-down menu under [Utility] provides the utility functions of the HI-FLOW sheet.



The following table lists the items and brief descriptions of the utility functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	Utility	Keyboard		Sets a symbol input from the keyboard.
2		Converter		Converts the source created by the DOS version of the HI-FLOW system.
3		MCS		Reads from and writes to memory.
4		Change connection of PCs		Sets the type of communication with the PCs.
5		Free forced occupancy		Forcibly releases occupancy of the PCs.
6		Set Ethernet Communication		Displays the [Ethernet Communication Setting List] screen that lists parameter information for Ethernet communication application instructions.

Free forced occupancy is a function related to the function to match the network as described in 4.6, “Mode Functions of the HI-FLOW Process Sheet.” Should connection with the PCs be cut off for some reason while the HI-FLOW system occupies the PCs, this occupancy status may be retained. In such case, the system cannot make a subsequent connection to any personal computer due to occupancy. Therefore, use the “free forced occupancy” function to forcibly release occupancy status.

NOTICE

The “free forced occupancy” function can also be executed even if the PCs are occupied by another user. However, even if this function is executed while the PCs are occupied by another user, the release of occupancy status can not be determined. Accordingly, multiple access may be made to the same PCs in some cases of operation. To prevent this, be sure to confirm that the PCs are not occupied by another user by observing any warning message.

For converting the program from the existing system, see 4.7.1, “Converting the program from the existing system.”

4.16.1 Ethernet communication setting

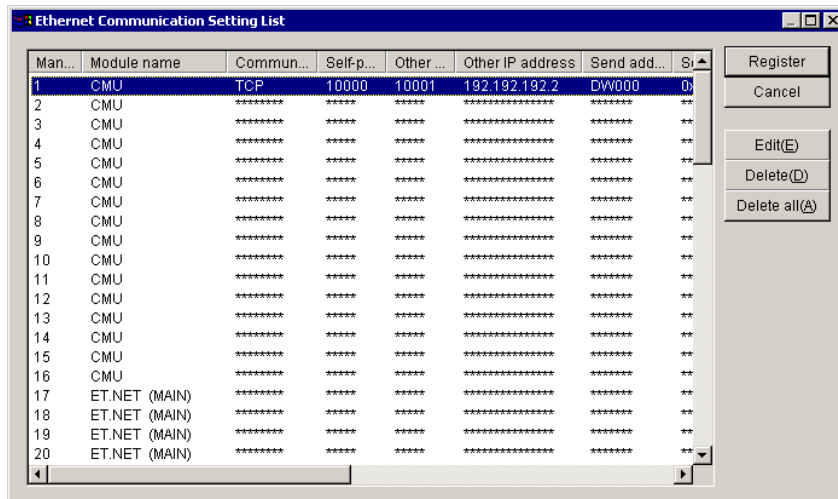
(1) Ethernet communication setting list

This list provides functions to display and edit the listed parameter information for Ethernet communication application instructions. “Management No.” indicates fixed numbers 1 to 80 that are associated with available sockets. “Module name” indicates the fixed name of each communication module that is available for the corresponding management number. For the other items, “*” is indicated for unused items.

Ethernet communication setting can only be selected in online mode.

<Operations>

- ① Select [Set Ethernet Communication] on the [Utility] menu in the process list window/process detail window.
- ② The [Ethernet Communication Setting List] screen then appears.



- ③ To quit the [Ethernet Communication Setting List] screen after saving the Ethernet communication setting information in the PCs, click the **Register** button.
- ④ To quit the [Ethernet Communication Setting List] screen without saving the Ethernet communication setting information in the PCs, click the **Cancel** button.
- ⑤ Select the row of Ethernet communication setting information to be edited and click the **Edit** button. Clicking the **Edit** button displays the [Set Ethernet Communication] screen. Unless a row is selected, no operations can be performed. Double-clicking a row of Ethernet communication setting information also displays the [Set Ethernet Communication] screen.
- ⑥ To delete an item of Ethernet communication setting information, select the row of Ethernet communication setting information to be deleted and click the **Delete** button.
- ⑦ To delete all Ethernet communication setting information, click the **Delete all** button. Unless parameter information is set, no operations can be performed.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

<Precautions>

- Operating the button or button only places the indication of Ethernet communication setting of the selected row in non-setting status. To actually incorporate the setting into the PCs, the operator must click the button.
- Before the [Set Ethernet Communication] screen is displayed, the LPU, CMU, ET.NET, and OPTET versions are checked to determine whether Ethernet communication instructions are available. At that time, one of the following warning messages is displayed. Note that this screen is not displayed if a line error occurs.

Condition		Warning message	Remarks
Offline		To use Ethernet communication instructions, mount the ET.NET or CMU of Ver-Rev 04-00 or later.	Parameters can be set.
Online	Earlier than LPU version 02-02	The LPU version is not supported by Ethernet communication of ET.NET.	Parameters can be set.
	CMU not mounted	The CMU is not mounted.	Parameters can be set.
	Earlier than CMU version 03-01	The CMU version is not supported by Ethernet communication.	Parameters can be set.
	Earlier than CMU version 04-00	The CMU version is not supported by ET.NET.	Parameters can be set.
	ET.NET (main) not mounted	The ET.NET main module is not mounted.	Parameters can be set.
	ET.NET (sub) not mounted	The ET.NET sub-module is not mounted.	Parameters can be set.
	OPTET not mounted	The OPTET is not mounted.	Parameters can be set.
	Others	Not displayed.	

- Because Ethernet communication setting information is set directly in the PCs, it is not saved in the HI-FLOW process sheet file. Accordingly, use the ladder chart system to save or read Ethernet communication setting information into memory, and use the FD function to save or read a ladder sheet into memory.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

(2) Ethernet communication setting

Click the **Edit** button or double-click Management No. in the Ethernet communication setting list box on the [Ethernet Communication Setting List] screen. The following [Set Ethernet Communication] screen then appears.

Set the Ethernet communication parameter information of the designated management number.

Set Ethernet Communication

Management No. : 1

Module name : CMU

Communication mode(C) : TCP

Connection information

Self-port No.(M) : 10000

Other port No.(O) : 10001

Other IP address(I) : 192 . 192 . 192 . 2

Send/Receive area

Send address(S) : DW000 ~ DW07F

Send size(D) : / 100 Byte

Receive address(R) : FW000 ~ FW0FF

Receive size(Z) : / 200 Byte

Receive timeout(T) : 10 (*100ms)

Result storing area

Execution flag(P) : R000

Details result code(E) : LWL0000

Socket disconnection mode(K) : Waiting for non-sent data sending

OK

Cancel

<Operations>

- ① Set each item and click the **OK** button to incorporate the indicated value onto the [Ethernet Communication Setting List] screen.
- ② Click the **Cancel** button to quit the [Set Ethernet Communication] screen without incorporating the indicated value.

<Items>

Management No.:

Indicates the management number designated on the [Ethernet Communication Setting List] screen.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

Module name:

Indicates the module for communication designated on the [Ethernet Communication Setting List].

The module number is fixed for Management No. and the following modules are indicated:

When selecting an OPTET module whose Management No. is in the range 49 to 80, specify the module number of that OPTET module.

Management No.	Device name
1 to 16	CMU
17 to 32	ET.NET (main)
33 to 48	ET.NET (sub)
49 to 80	OPTET (Module 0 to 3)

Communication mode:

Select a communication method (“TCP” or “UDP”) in the combo box.

The default is “TCP.” This selection item is associated with the open instruction of Ethernet communication.

Self-port No.:

Specify the port number for communication in decimal notation. (Specifying range: 1 to 65,535)

The default is NUL. (A range of 10,000 to 59,999 is recommended. Note that 60,000 and higher numbers are reserved by the system.)

Other port No.:

Specify the port number used by the opposite communication side in decimal notation. (Specifying range: 1 to 65,535)

The default is NUL. (A range of 10,000 to 59,999 is recommended. Note that 60,000 and higher numbers are reserved by the system.)

Other IP address:

Specify the IP address of the opposite communication side. To perform broadcast transmission by using UDP transmission, specify the node address by using 255, for example, as 255.255.255.255. The default is NUL.

Send address:

Specify the starting address of send data in PI/O word format (long/float format for a long/float register). An area that is not assigned as a bit-type register or PI/O, and an area extending over different registers cannot be specified. The default is NUL.

The ending address of send data is calculated from Send address and Send size, and then its result is displayed.

Send size:

Specify the send size of data in hexadecimal notation. The default is NUL.

The unit is bytes. The following sizes can be specified for each type of communication:

TCP: 0x0 to 0x1000 (0 to 4096)

UDP: 0x0 to 0x5C0 (0 to 1472)

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

Receive address:

Specify the starting address of the area for saving received data in PI/O word format (long/float format for a long/float register). An area that is not assigned as a bit-type register or PI/O, and an area extending over different registers cannot be specified. The default is NUL. The ending address of received data is calculated from Receive address and Receive size, and then its result is displayed.

Receive size:

Specify the receive size of data. The default is NUL.

The unit is bytes. The following sizes can be specified for each type of communication:

TCP: 0x0 to 0x1000 (0 to 4096)

UDP: 0x0 to 0x5C0 (0 to 1472)

Receive timeout:

Specify the waiting time for receive data to arrive (if receive data cannot be received by issuing a receive instruction).

The setting range is 0 to 100 (0 to 10 sec.). Set Receive timeout in units of 100 ms. (0: No timeout)

The default is 10 (1 sec.).

Execution flag:

Specify the area used to indicate whether Ethernet communication instruction processing is being executed, by using a bit-type register.

Details result code:

Specify the area used to save the detailed result code of the result of Ethernet communication instruction processing, by using a long-type register. The default is NUL.

Socket disconnection mode:

This item can only be specified when "TCP" is the communication method. Select Socket disconnection mode from "Waiting for non-sent data sending" or "Non-sent data destruction." The default is "Waiting for non-sent data sending." The selection items and meanings are described below.

Waiting for non-sent data sending: When there is data remaining to be sent, the system waits until the data flows out. The data yet to be read is discarded.

Non-sent data destruction: When there is data remaining to be read, the communication path is disconnected to release the socket without waiting for the remaining data to flow out. In this case, RST is sent to the TCP of the opposite host. Because this differs from the usual method of disconnection, be careful with the operation (reporting to the UP upon receipt of RST) to be performed when the opposite host receives RST.

The received data yet to be read is discarded.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

The following table lists the registers that can be specified by Ethernet communication setting.

<Setting register list>

(1/2)

No.	Item	Symbol	Send address	Receive address	Execution flag	Details result code
1	External input	X	√	√	√	√
2	External output	Y	√	√	√	√
3	Internal register	R	√	√	√	√
4	Keep relay	K	√	√	√	√
5	ON delay timer	T	√	√	√	√
6	One-shot timer	U	√	√	√	√
7	Up/down counter	C	√	√	√	√
8	Global link register	G	√	√	√	√
9	Nesting call	N	√	√	√	√
10	Process register	P	√	√	√	√
11	Event register	E	√	√	√	√
12	Edge contact	V	√	√	√	√
13	Z register	Z	√	√	√	√
14	System register	S	√	√	√	√
15	Data register	DW	√	√	ns	√
16	Work register	FW	√	√	ns	√
17	Internal register	M	√	√	√	√
18	Internal register (long word)	BD	ns	ns	ns	ns
19	For high-speed remote I/O input	I	√	√	ns	√
20	For high-speed remote I/O output	O	√	√	ns	√
21	Between HI-FLOW and ladder	J	√	√	√	√
22	Shared data register	Q	√	√	√	√

√: Can be specified

ns: Cannot be specified

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

(2/2)

No.	Item	Symbol	Send address	Receive address	Execution flag	Details result code
23	Work register	LB	√	√	√	√
24	Work register for word	LW	√	√	ns	√
25	Work register for long word	LL	√	√	ns	√
26	Work register for single-precision floating point	LF	√	√	ns	√
27	Work register for word (retained at power outage)	LX	√	√	ns	√
28	Work register for long word (retained at outage)	LM	√	√	ns	√
29	Work register for single-precision floating point (retained at outage)	LG	√	√	ns	√
30	Work register for latter converter	LR	√	√	√	√
31	Work register for ladder converter (for edge contact)	LV	√	√	√	√

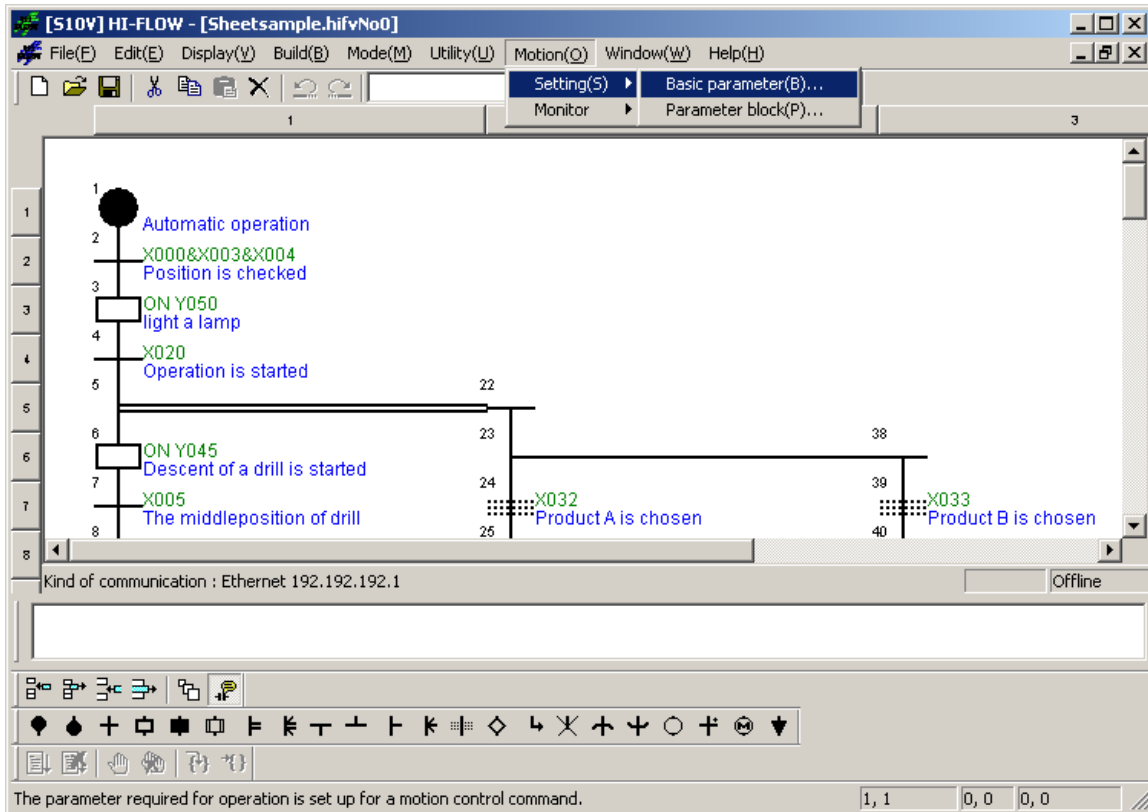
√: Can be specified

ns: Cannot be specified

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.17 Motion Functions of the HI-FLOW Sheet

The pull-down menu under [Motion] provides the motion functions of the HI-FLOW sheet.



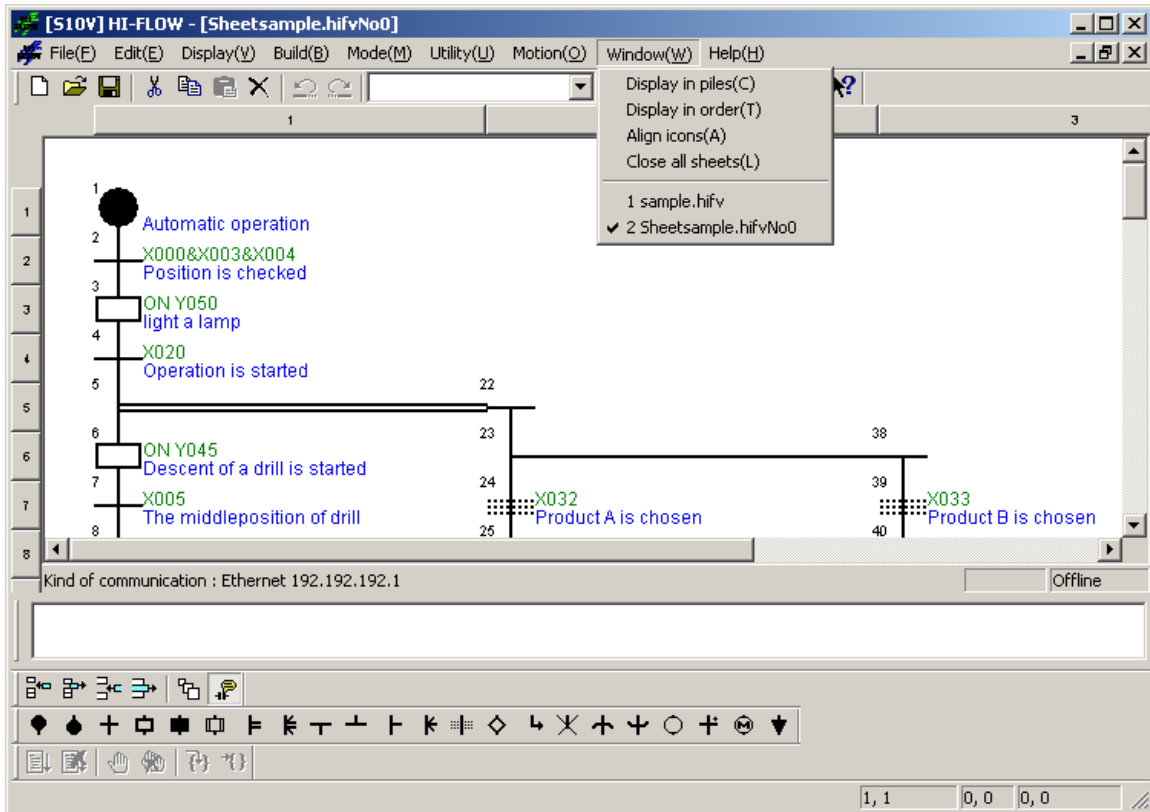
The following table lists the items and brief descriptions of the motion functions. (For details on the motion functions, see 4.8, “HI-FLOW Functions of the HI-FLOW Process Sheet.”)

No.	Level 1	Level 2	Level 3	Outline of function
1	Motion	Setting	Basic Parameter	Displays the “List of motion basic setup” window that contains parameters essential for execution of motion control instructions under HI-FLOW.
2			Parameter block	Displays the “List of parameter block setup” window that contains default values for motion control instructions.
3		Monitor	Monitor parameter	Displays the “Set motion monitor” window that allows you to specify the monitor parameters to be displayed on screen.
4			Motion trace	Displays the “Setting of motion trace” window that is used to specify motion registers in which to obtain trace data.
5			Communication error trace	Displays the “Motion communication error trace” window that presents error trace information related to communication tasks.
6			Communication accumulated information	Displays the “Motion communication accumulated information” window that shows you accumulated error count information related to communication tasks.

4 FUNCTIONS OF AND HOW TO USE THE HI-FLOW PROCESS SHEET/ HI-FLOW SHEET

4.18 Window Functions of the HI-FLOW Sheet

The pull-down menu under [Window] provides the window functions of the HI-FLOW sheet.



The following table lists the items and brief descriptions of the window functions.

No.	Level 1	Level 2	Level 3	Outline of function
1	Window	Display in piles		Displays windows in piles.
2		Display in order		Displays windows in order.
3		Align icons		Aligns icons.
4		Close all sheets		Closes all currently open process detail sheets.
5		File name 1, 2...		Selects an active window.

This Page Intentionally Left Blank