

HITACHI

Software Manual

Operation

HI-FLOW for Windows®

S10VE

SEE-3-132 (A)

Software Manual

Operation

HI-FLOW for Windows®

SIOVE

First Edition, May 2020, SEE-3-132 (A)

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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.



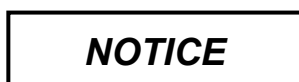
: This safety label identifies precautions that, if not heeded, will result in death or serious injury.





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



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



: 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  **CAUTION** and  **NOTICE** 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.

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.

(See page 1-2.)

- Use an administrator account to install or uninstall the HI-FLOW system. You might not be able to successfully install or uninstall the HI-FLOW system with the standard account.
- 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.
- Do not specify any of the following folders (protected by User Account Control) as the installation destination for the HI-FLOW system:
 - Program Files folders (such as C:\Program Files)
 - System root folders (such as C:\Windows)
 - System drive root folders (such as C:\)
 - Program data folders (such as C:\ProgramData)

(See page 2-2.)

- The HI-FLOW SYSTEM/S10VE cannot be installed on a per-user basis. To install the HI-FLOW SYSTEM/S10VE 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 HI-FLOW SYSTEM/S10VE 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 HI-FLOW SYSTEM/S10VE, 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.

(See page 2-4.)

NOTICE

- 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.

(See page 2-8.)

- If the S10VE 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. If you turn off or reset the S10VE while a process is being sent, replace the HI-FLOW system(*) and resend all the processes.

(*) For details about how to replace the HI-FLOW system, see 4.7.6, "Deleting the PCs processes."

(See page 4-38.)

- Release occupancy is performed with priority even if the HI-FLOW system on another personal computer is accessing the PCs in question. As a result, the programs stored in the PCs or the contents of memory might become inconsistent. To prevent such problems, check the status of the PCs and whether other users are currently using the PCs before you release occupancy.

(See page 4-41.)

- 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.

(See page 4-48.)

- 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 ladder.

(See page 4-87.)

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. Send the modified process to the PCs or receive the old process from the PCs so that the process in the personal computer and the process in the PCs match.

(See page 4-94.)

- 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.

(See page 4-109.)

Revision History

Revision No.	History (revision details)	Issue date	Remarks
A	First edition	May 2020	

PREFACE

Thank you very much for purchasing the HI-FLOW SYSTEM/S10VE.

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/S10VE.
This manual applies to the following system version:

System name and version
HI-FLOW SYSTEM/S10VE 01-00

For HI-FLOW programs (explanation of instruction words), refer to the following manual.

<Related manual>

S10VE Software Manual Programming HI-FLOW for Windows®
(manual number SEE-3-122)

<Trademarks>

- Microsoft® and Windows® are registered trademarks of Microsoft Corporation in the United States and 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
 - 1 TB (terabyte) = 1,099,511,627,776 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
 - 1 TB (terabyte) = $1,000^4$ 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 S10VE, 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 S10VE, S10V, S10 α , and S10mini series are PLCs.

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CHAPTER 1 GENERAL INFORMATION FOR OPERATING THE SYSTEM

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

1.1 Overview of HI-FLOW SYSTEM/S10VE

HI-FLOW SYSTEM/S10VE (hereinafter called the HI-FLOW system) is a tool used to create, correct, monitor, and debug HI-FLOW application programs of the S10VE 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 with an Intel x64 processor
- Microsoft® Windows® 7 (64-bit) operating system, Microsoft® Windows® 10 (64-bit) operating system and the environment that allows the operation of the OS
- Microsoft .NET Framework 4
- Microsoft Visual C++ 2010 redistribution package (x64)
- S10VE CPU
- S10VE power supply and backboard
- Connecting cable (LAN cable) between a personal computer and PCs
- Remote I/O station, power supply, backboard, card, and wiring cable as required

1. GENERAL INFORMATION FOR OPERATING THE SYSTEM

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.

CHAPTER 2 OPERATIONS BEFORE STARTING THE SYSTEM

2.1 Installing the HI-FLOW System

First, check whether you have the correct CD-ROM. The HI-FLOW system runs under the Microsoft® Windows® 7 (64-bit) operating system, and Microsoft® Windows® 10 (64bit) operating system. We do not guarantee the correct operation of the HI-FLOW system under other operating systems.

2.1.1 Notes on installation

Before you install the HI-FLOW system in a personal computer, make sure that BASE SYSTEM/S10VE (program product model: S-7898-38) is already installed. If BASE SYSTEM/S10VE is not installed, install it (you cannot install the HI-FLOW system unless BASE SYSTEM/S10VE is installed).

For the HI-FLOW system to run, the following runtime version must be installed beforehand. If the runtime version is not installed, download it from the Microsoft Download Center.

- Microsoft Visual C++ 2010 redistribution package (x64)

- BASE SYSTEM/S10VE is required to run the HI-FLOW system. If BASE SYSTEM/S10VE is not installed, the HI-FLOW system cannot be installed.
- If you attempt to start the HI-FLOW system when the Microsoft Visual C++ 2010 redistribution package (x64) is not installed, an error message: "The program cannot start because the computer does not have MSVCR100.DLL. To resolve this problem, reinstall the program." appears while the HI-FLOW system is starting or running and ends abnormally.

NOTICE

- Use an administrator account to install or uninstall the HI-FLOW system. You might not be able to successfully install or uninstall the HI-FLOW system with the standard account.
- 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.
- Do not specify any of the following folders (protected by User Account Control) as the installation destination for the HI-FLOW system:
 - Program Files folders (such as C:\Program Files)
 - System root folders (such as C:\Windows)
 - System drive root folders (such as C:\)
 - Program data folders (such as C:\ProgramData)

2.1.2 Installing

This subsection describes how to install the HI-FLOW system.

To install the HI-FLOW system, make sure that you log on using the administrator account.

(1) To install the HI-FLOW system, in the CD (HI-FLOW SYSTEM/S10VE), in the S789803 folder, double-click “setup.exe” to execute the setup program.

(2) When the window appears saying “Welcome to HI-FLOW SYSTEM/S10VE InstallShield Wizard,” click the [Next] button.

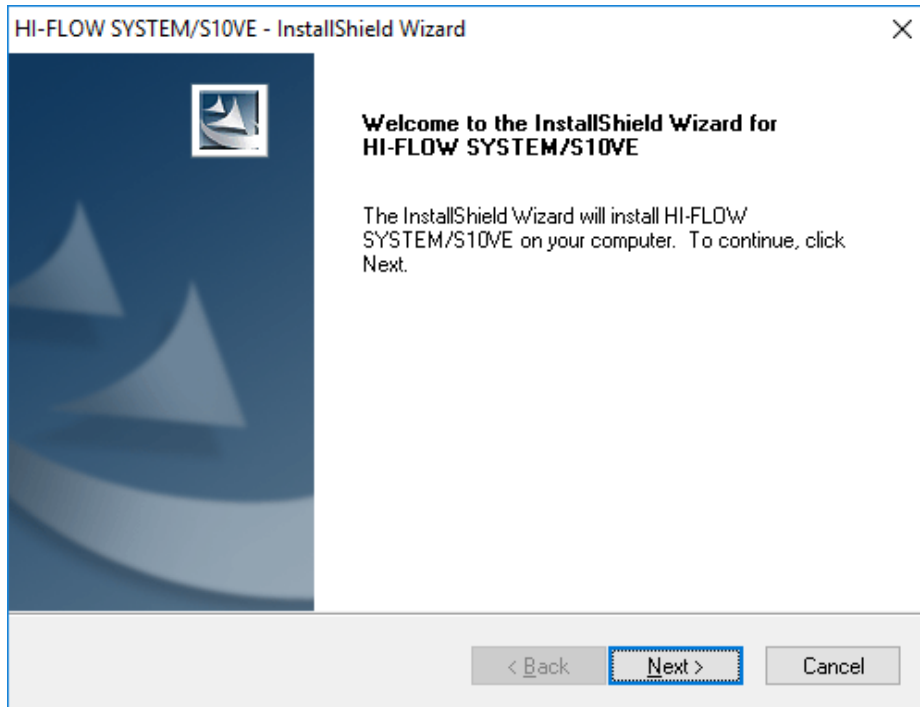


Figure 2-1 Window for Choosing Whether to Install HI-FLOW SYSTEM/S10VE

When you click the [Cancel] button, a message (“Do you want to cancel the setup?”) appears. Click the [Yes] button or the [No] button.

[Yes]: Cancels the installation of the HI-FLOW system.

In the “InstallShield Wizard Completion” window, click the [Complete] button.

[No]: Resumes the installation of the HI-FLOW system.

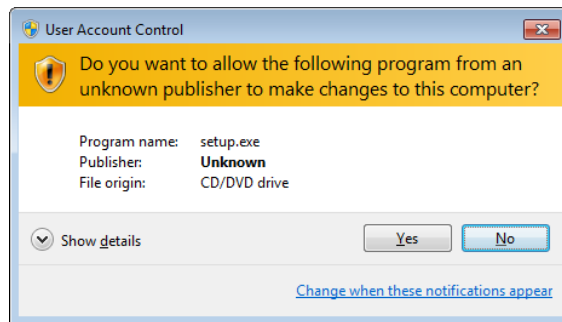
(3) The “Setup Status” window appears.

(4) When you complete the installation, the “InstallShield Wizard Completion” window appears. Click the [Complete] button.

2. OPERATIONS BEFORE STARTING THE SYSTEM

<Note on installation>

When you execute “setup.exe”, the following dialog box might appear. Click the [Yes] button to execute the setup program.



NOTICE

The HI-FLOW SYSTEM/S10VE cannot be installed on a per-user basis. To install the HI-FLOW SYSTEM/S10VE 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 HI-FLOW SYSTEM/S10VE 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 HI-FLOW SYSTEM/S10VE, 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.

2.2 Uninstalling the HI-FLOW System

This section describes how to uninstall the HI-FLOW system.

To uninstall the HI-FLOW system, log on using an administrator account.

(1) Click [Start] and then [Control Panel]. Click [Uninstall a program] and double-click “HI-FLOW SYSTEM/S10VE”.

When a message (“Are you sure you want to completely remove the selected application and all its components?”) appears, click the [Yes] button. The HI-FLOW system will be uninstalled.

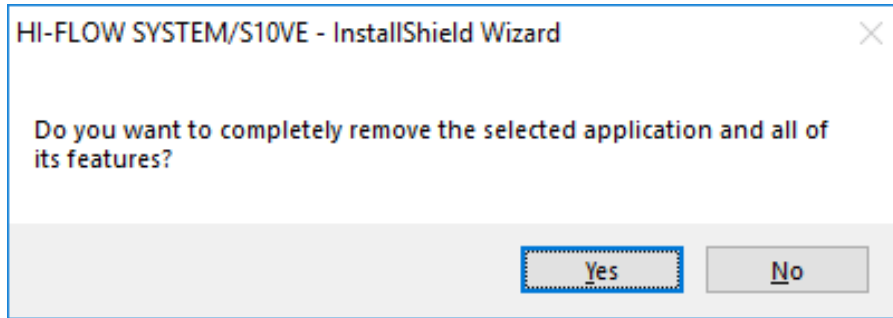


Figure 2-2 Window for Choosing Whether to Uninstall HI-FLOW SYSTEM/S10VE

When you click the [Yes] button, the uninstallation is performed.

When you click the [No] button, the uninstallation is canceled.

(2) When the uninstallation is completed, a message appears indicating that uninstallation is completed. Click the [Complete] button.

2. OPERATIONS BEFORE STARTING THE SYSTEM

2.3 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.

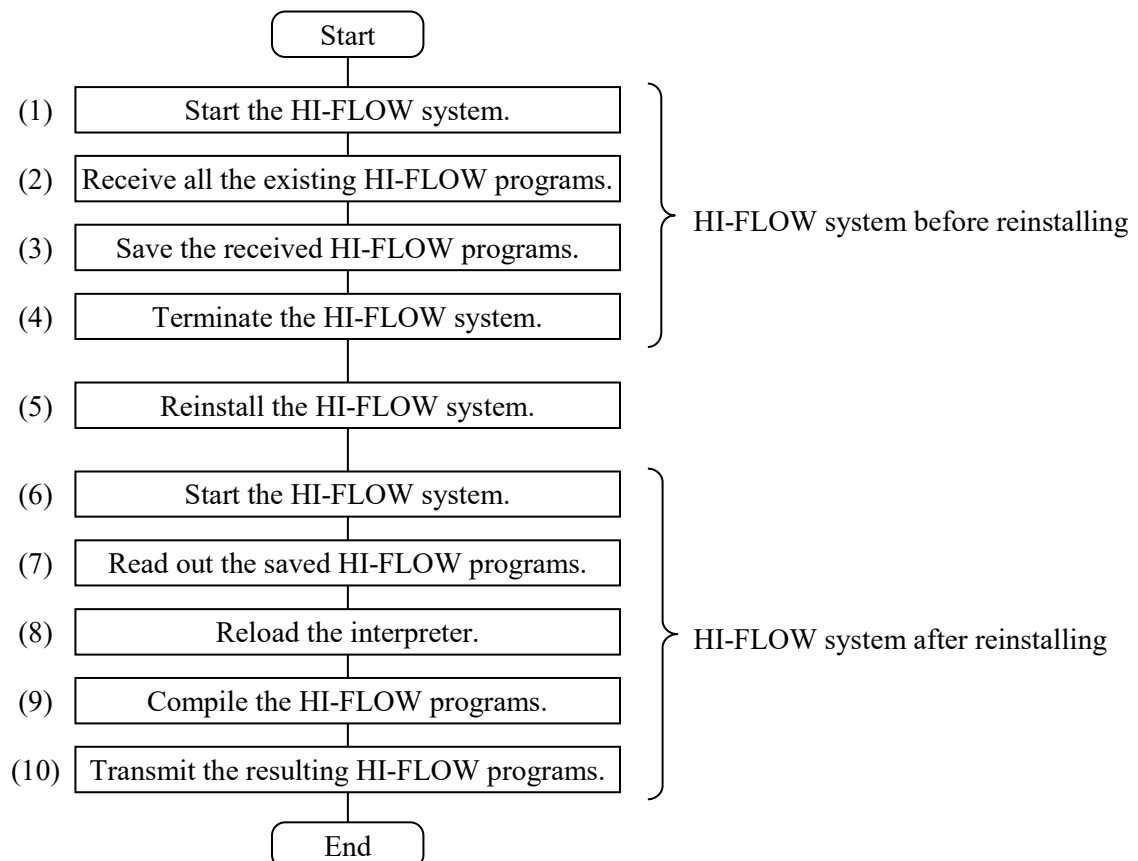
2.3.1 Reinstalling the HI-FLOW system

If you want to reinstall the HI-FLOW system, make sure that you uninstall it first. 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.

If a message appears indicating that the file is read-only when you attempt to reinstall the HI-FLOW system, click the [Yes] button and overwrite the file.

2.3.2 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:

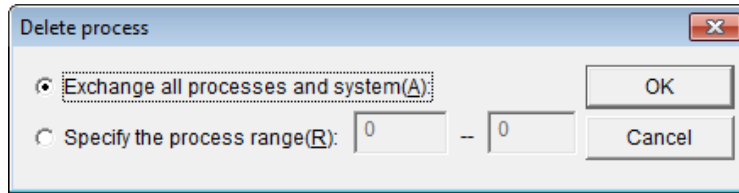
- (1) Starting the HI-FLOW system
Start the HI-FLOW system before replacing it with the new or old version. For information on how to start the system, see 2.4, “Starting the system.”
- (2) Receiving the HI-FLOW programs
To receive all of the existing HI-FLOW programs (processes) from the PCs, choose [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 2.5, “Terminating the System.”
- (5) Reinstalling the HI-FLOW system
Reinstall the HI-FLOW system according to the instructions given in 2.3.1, “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 2.4, “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 for reloading the interpreter>

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.

NOTICE

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 2.6, “Procedure for Developing HI-FLOW Programs.”

- (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 2.6, “Procedure for Developing HI-FLOW Programs.”

2.4 Starting the System

You can start the HI-FLOW system from BASE SYSTEM/S10VE or from the [Start] menu of Windows®.

If you want to use the HI-FLOW system without installing CPMS/S10VE (S-7898-05), start the HI-FLOW system from the [Start] menu of Windows®.

(1) Starting the HI-FLOW system from BASE SYSTEM/S10VE

For details about how to start the HI-FLOW system from BASE SYSTEM/S10VE, refer to 8.3.1, “Starting tools” in the “S10VE User’s Manual General Description (manual number SEE-1-001).”

(2) Starting the HI-FLOW system from the [Start] menu of Windows®

In Windows®, click [Start] - [All Programs] - [Hitachi S10VE] - [S10VETool].
The HI-FLOW system starts (see Figure 2-3).

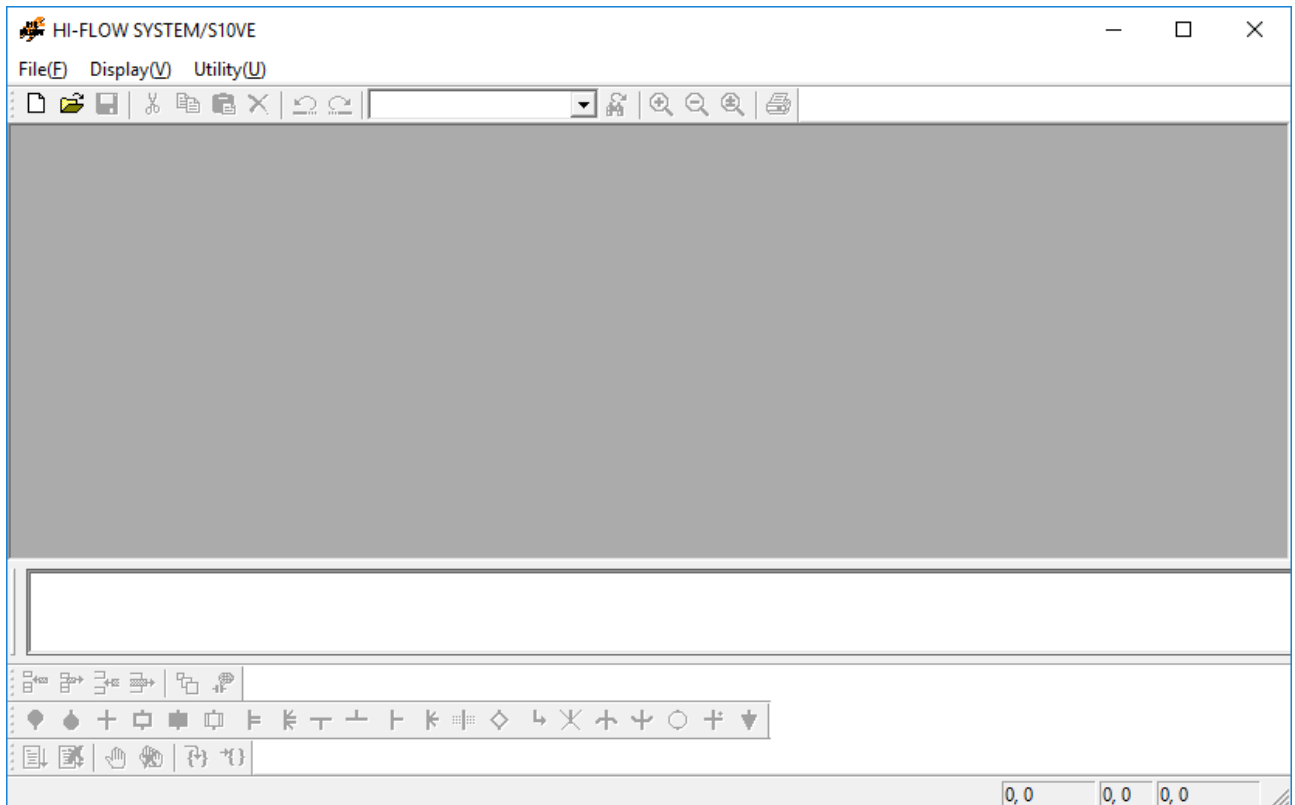


Figure 2-3 HI-FLOW System Startup Window

2. OPERATIONS BEFORE STARTING THE SYSTEM

2.5 Terminating the System

To end the HI-FLOW system, click [File] - [Application termination] (see Figure 2-4). When the HI-FLOW system ends (when its window closes), you see the Windows® desktop again.

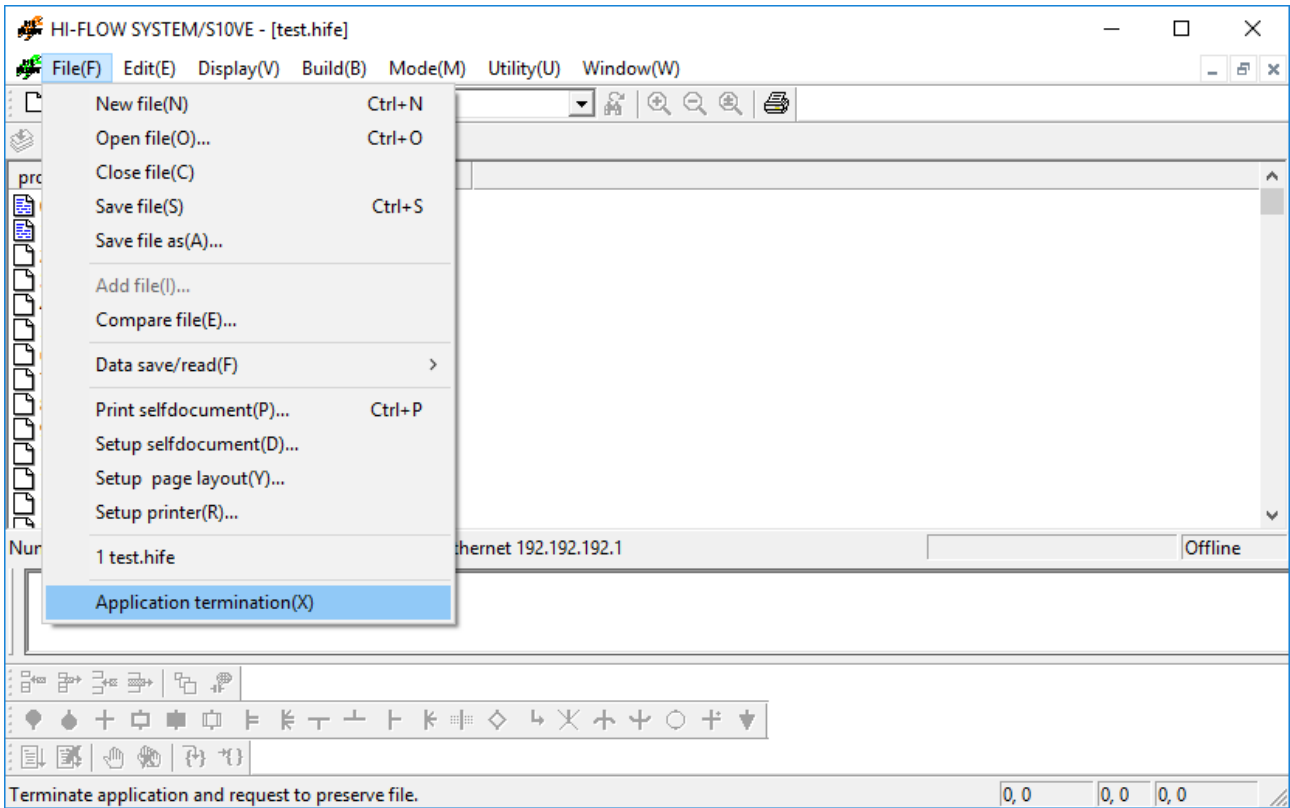
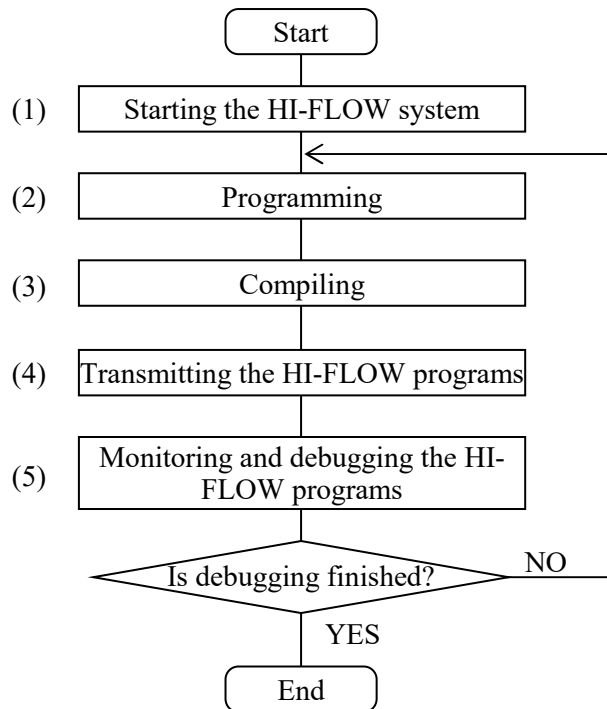


Figure 2-4 Ending the HI-FLOW System

2.6 Procedure for Developing HI-FLOW Programs

Developing a program using the HI-FLOW system is no different from developing usual programs.

The following chart shows the basic procedure for developing HI-FLOW programs.



(1) Starting the HI-FLOW system

Start the HI-FLOW system.

For details, see 2.4, “Starting the System.”

(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 4.9, “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 window and then try again.

(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.

(5) Monitoring and debugging the HI-FLOW programs

Monitor and debug the operation of the created HI-FLOW programs.

For details, see 4.6, “Mode Functions of the HI-FLOW Process Sheet.”

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CHAPTER 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] (Currently, the converter function is not supported.) 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. HI-FLOW 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.

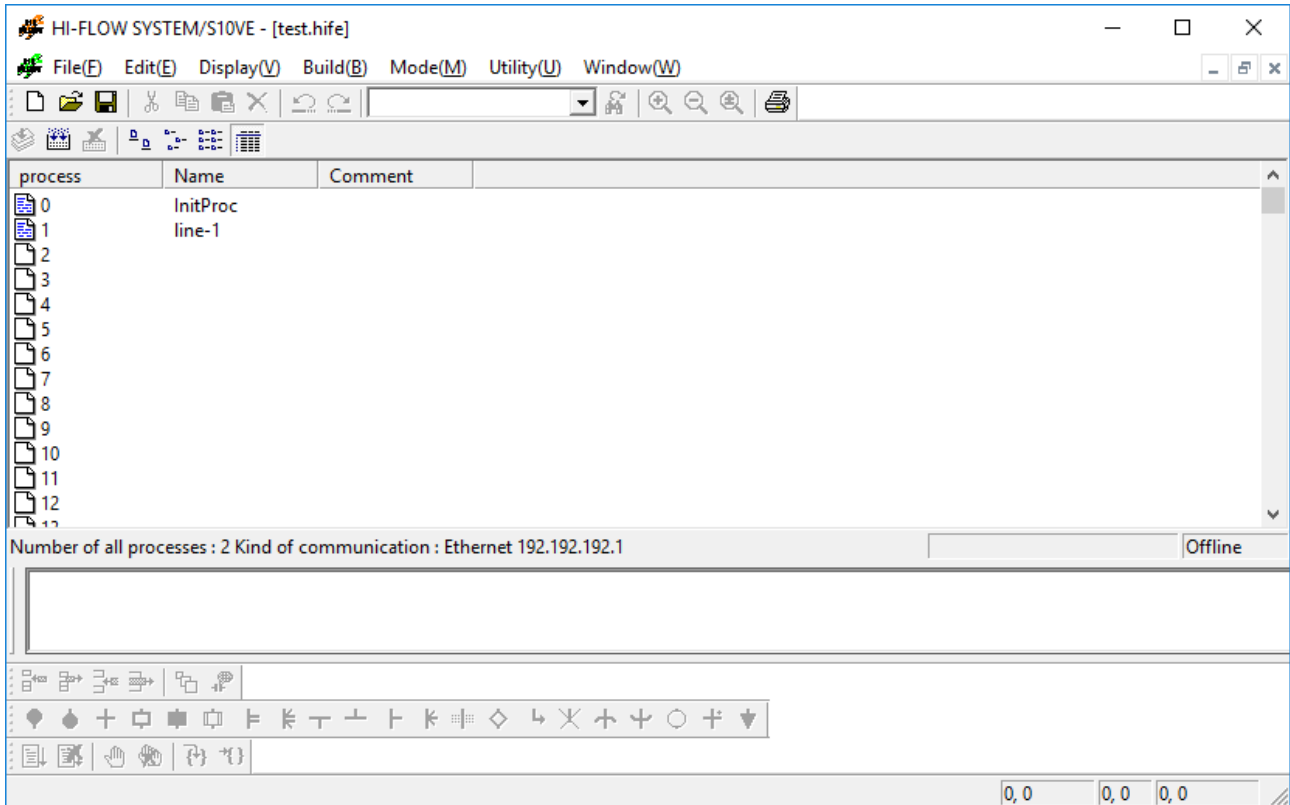


Figure 3-1 HI-FLOW Process Sheet

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

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CHAPTER 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.

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.

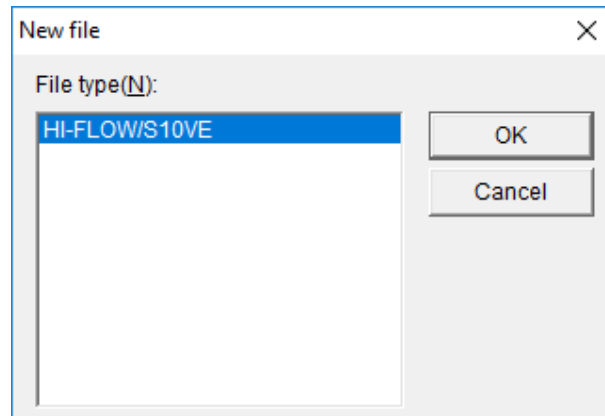


Figure 4-1 [New file] Screen

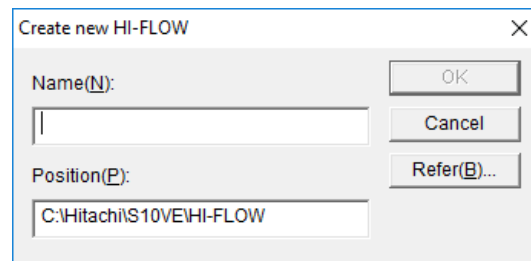


Figure 4-2 [Create new HI-FLOW] Screen

If you want to open an existing HI-FLOW process sheet, click [File] and then [Open file]. In the “Open file” dialog box, select the desired S10VE HI-FLOW file.

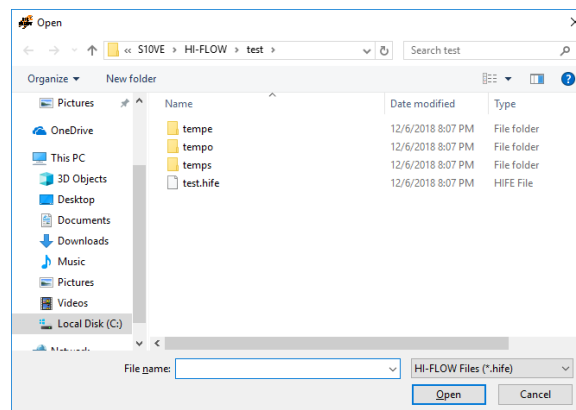


Figure 4-3 “Open file” Dialog Box

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.

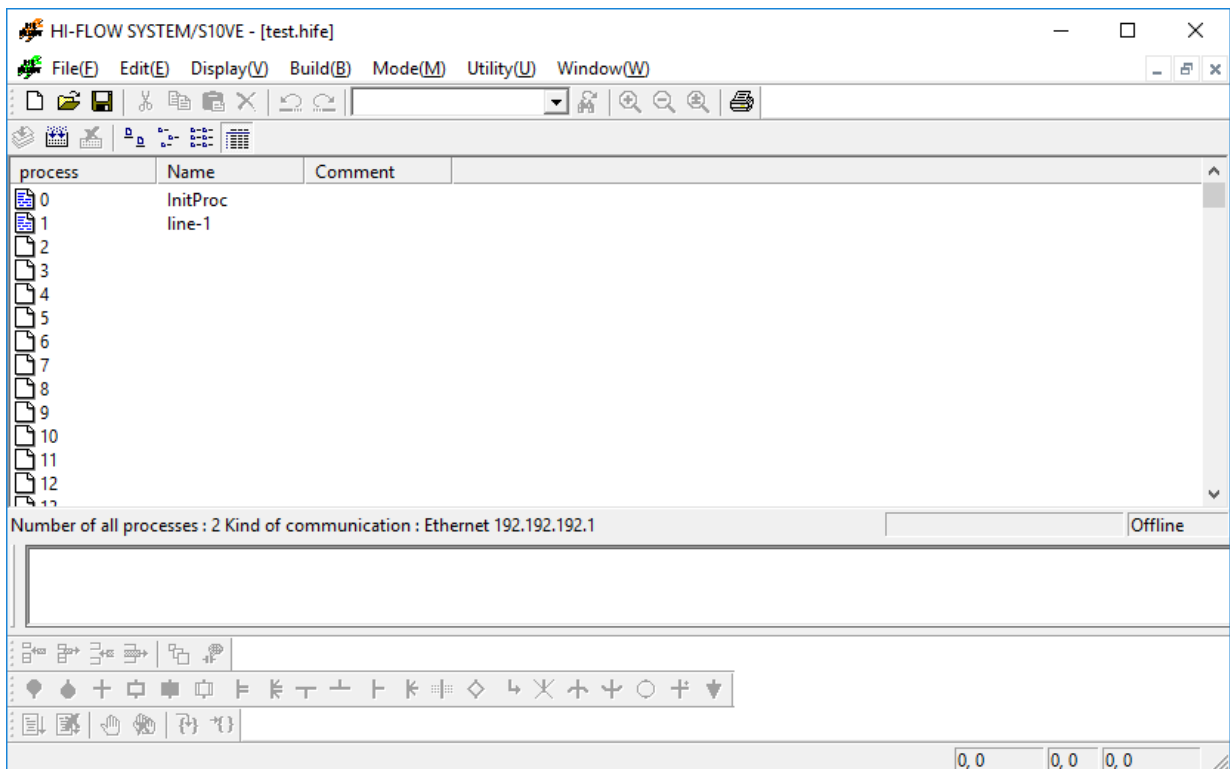


Figure 4-4 HI-FLOW Process Sheet

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

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

4.1.1 Process information editing area

This subsection describes the area used for editing the information about HI-FLOW processes.

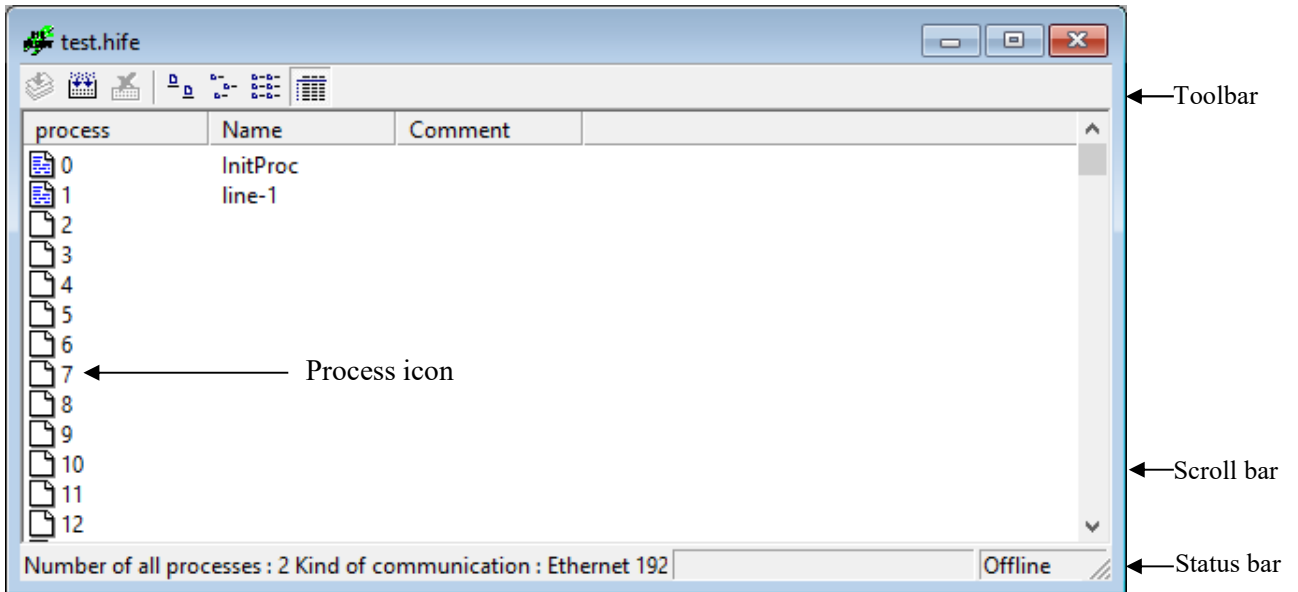


Figure 4-5 Process Information Editing Area

The HI-FLOW process information editing area shows different information depending on the mode it is in. In detailed display mode, the area displays the following three items, for each HI-FLOW process:

- (1) Process icon
- (2) Process name
- (3) Comment

<Sequence of processes>

You can specify 0 to 255 processes. Process 0 is the initial process that is executed first. In the process information editing area, processes are listed in the order of 0, 1, 2, 3, 4, ... 255 from the top.

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

<Process icons>

The shape of a process icon changes depending on whether a program (process) is written in the corresponding sheet or whether the program is executed. See below for the types of process icons and the descriptions of the icons.




	No program	
	Program exists (not compiled)	
	Program exists (compiled)	
STP	Forcibly stopped] These icons indicate that the processes are being monitored.
RUN	Running	
RST	RESET status	
CST	CALL STOP status	
CRM	CALL RUN status	
CRS	CALL RESET status	

Figure 4-6 Types of Process Icons

<Process names>

Process names are specified by users. You can enter a maximum of 16 single-byte characters for a process name. You can omit process names if they are not necessary. Processes without names cause no problems in the system. Sometimes, the full process name is not displayed. If so, drag the line between the process name and the comment to the right to widen the process name field and you will be able to see the entire process name.

<Process comments>

Comments on processes are specified by users. You can enter a maximum of 132 single-byte characters for a comment. You can omit comments if they are not necessary. Processes without comments cause no problems to the system. Sometimes, the full comment is not displayed. If so, drag the line between the process name and the comment to the left to widen the comment field and you will be able to see the entire comment (sometimes, this might not be possible depending on the screen resolution).

4.1.2 Editing the information about processes

This subsection describes how to edit the information about HI-FLOW processes. You can edit the names and comments for HI-FLOW processes. See below for the procedure.

<Entering the name and comment for a process>

Perform the following procedure to enter the name and comment for a process:

- (1) Click a process to select it.
- (2) Click [Edit] - [Property] - [Process]. The following dialog box appears on screen:

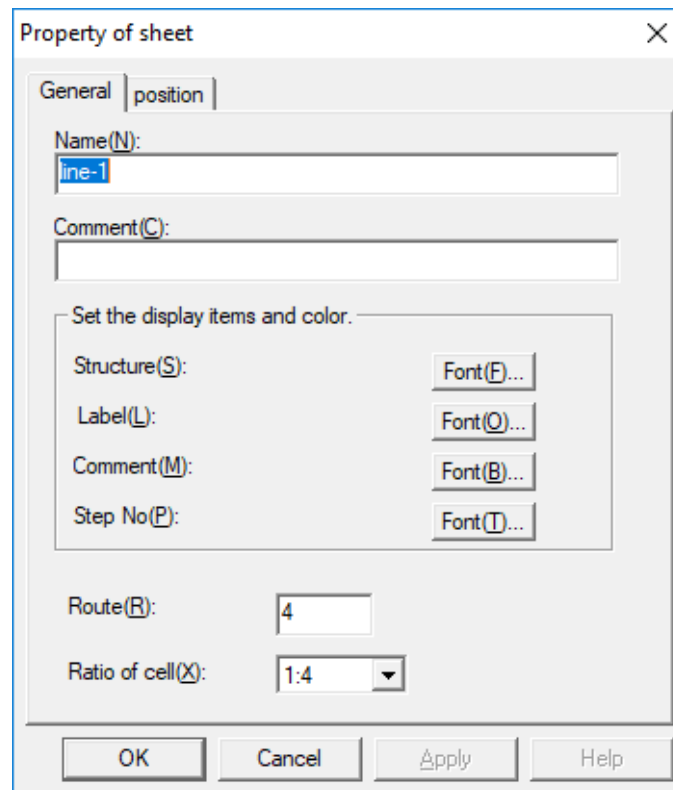


Figure 4-7 “Sheet Properties” Dialog Box

- (3) In the “Name” box, enter the name of the process. In the “Comment” box, enter a comment.
- (4) When you close this dialog box, the name and the comment for the process appear in the HI-FLOW process sheet.

You cannot specify a name or a comment for a sheet in which there is no HI-FLOW program (process) written (when the icon indicates a blank sheet).

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

<Manipulating processes>

In the HI-FLOW process sheet, you can copy, paste, delete, or move HI-FLOW processes by using the process icons displayed in the process information editing area. You can select multiple process icons at the same time.

Table 4-1 Actions for Manipulating Processes

No.	Action	[Edit] menu item	Key or mouse operation
1	Selecting one process	-	Click the target process or use arrow keys to select the target process.
2	Selecting multiple successive processes	-	Click the first process, hold down the [Shift] key, and click the last process. Alternatively, use arrow keys to move the cursor to the first process, hold down the [Shift] key, and move the cursor until you reach the last process.
3	Selecting multiple non-successive processes	-	Click a process, hold down the [Ctrl] key, and click another process.
4	Selecting all processes	[Select all]	Click process 0, hold down the [Shift] key, and click process 255. Alternatively, use arrow keys to move the cursor to process 0, hold down the [Shift] key, and move the cursor until you reach process 255.
5	Deleting one or multiple processes	[Delete]	[Delete] key
6	Copying a process (multiple processes cannot be copied at one time)	[Copy]	Select the target process, hold down the [Ctrl] key, and press the [C] key. Alternatively, copy the target process to a desired location using a drag-and-drop operation.
7	Pasting a process (multiple processes cannot be pasted at one time)	[Paste]	[Ctrl] + [V]
8	Cutting one or multiple processes	[Cut]	[Ctrl] + [X]

Be careful when you perform the above operations as they cannot be undone.

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.

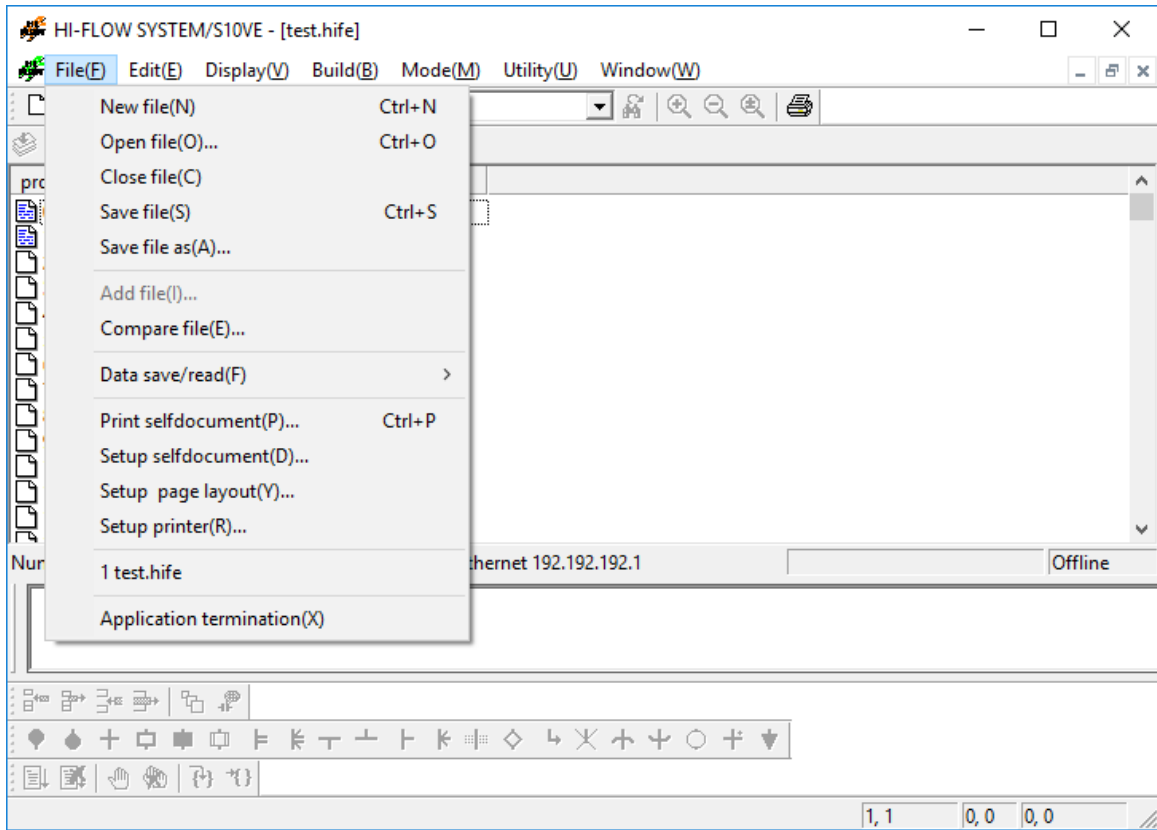


Figure 4-8 [File] Menu in the HI-FLOW Process Sheet

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 file functions.

Table 4-2 [File] Menu Items in the HI-FLOW Process Sheet

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		Save/read data	Save	Saves the program data of the currently active window on a folder.
9			Read	Reads a program file from the specified folder.
10		Print self document		Prints the current document (process list, process details, cross-reference list, or interrelation chart).
11		Setup self document		Allows the user to specify the print range and type of the print-target document.
12		Setup page layout		Allows the user to set page layout.
13		Setup printer		Allows the user to specify printer settings such as selecting a 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.

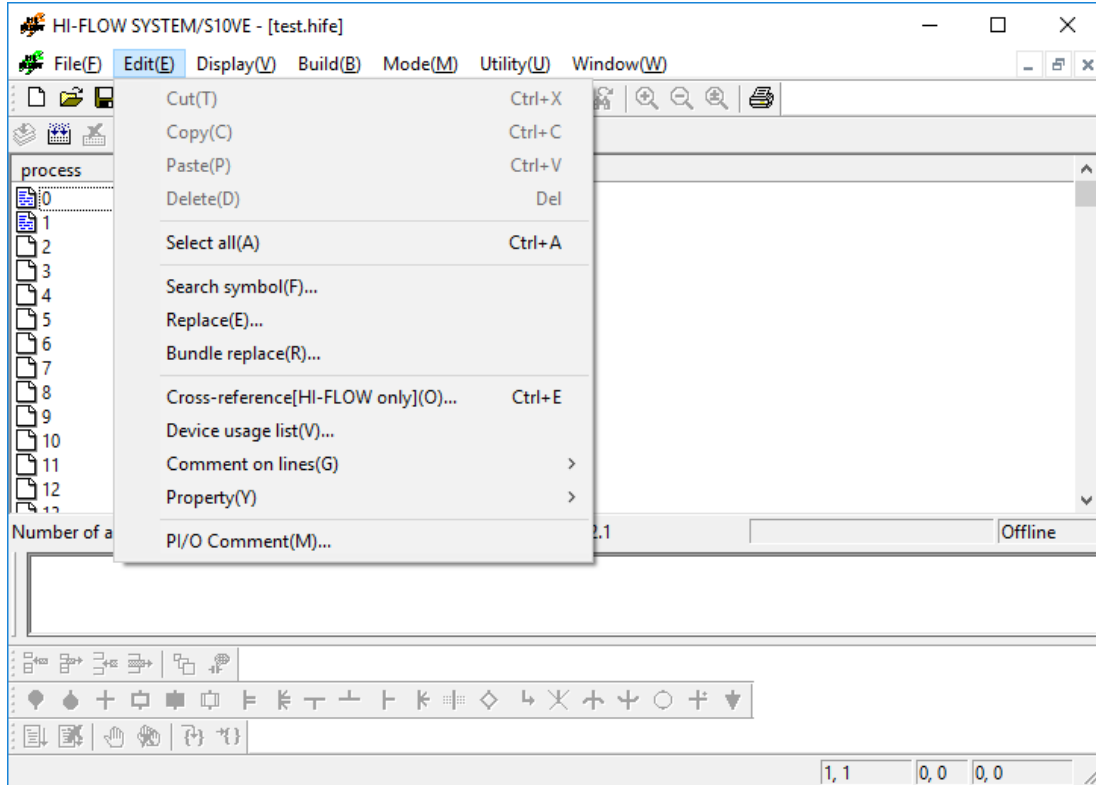


Figure 4-9 [Edit] Menu in the HI-FLOW Process Sheet

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.

Table 4-3 [Edit] Menu Items in the HI-FLOW Process Sheet

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]		Currently not supported.
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. Make sure that the number of characters in a file comment is an even number of bytes (you can adjust the number of bytes by adding single-byte spaces at the end).
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:

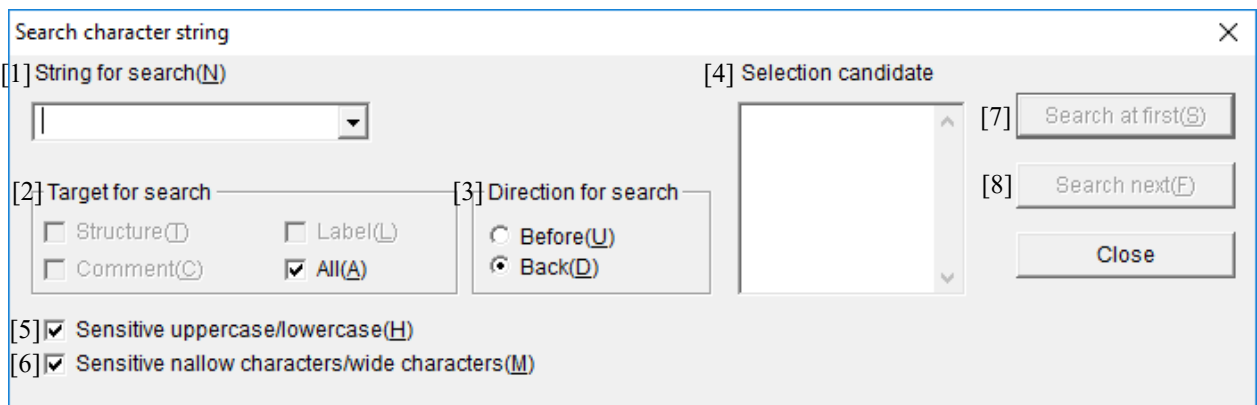


Figure 4-10 “Search for Symbols” Dialog Box

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

[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 [Search at first] 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 [Search next] 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 [Search next] button during the forward ([Before]) direction of search in which the first matching string is currently found again.
- Clicking the [Search next] 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 [Search at first] button or the [Search next] 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. 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:

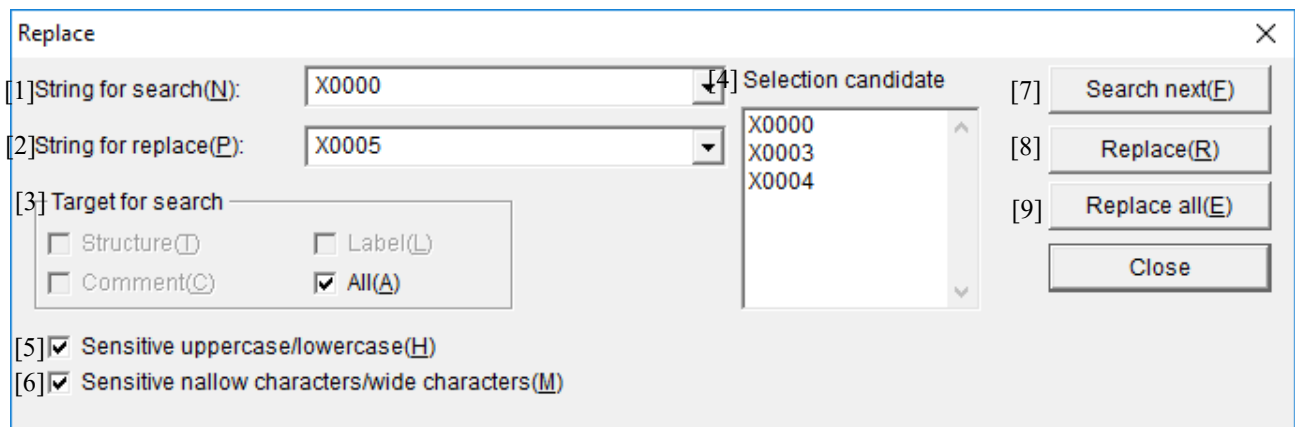


Figure 4-11 “Replace” Dialog Box

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 [Search next] button:

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

[8] The [Replace] button:

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

[9] The [Replace all] 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 [Search next], [Replace], or the [Replace all] 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 [Replace all] button is clicked, a confirmation dialog box will then appear. Click the [OK] 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:

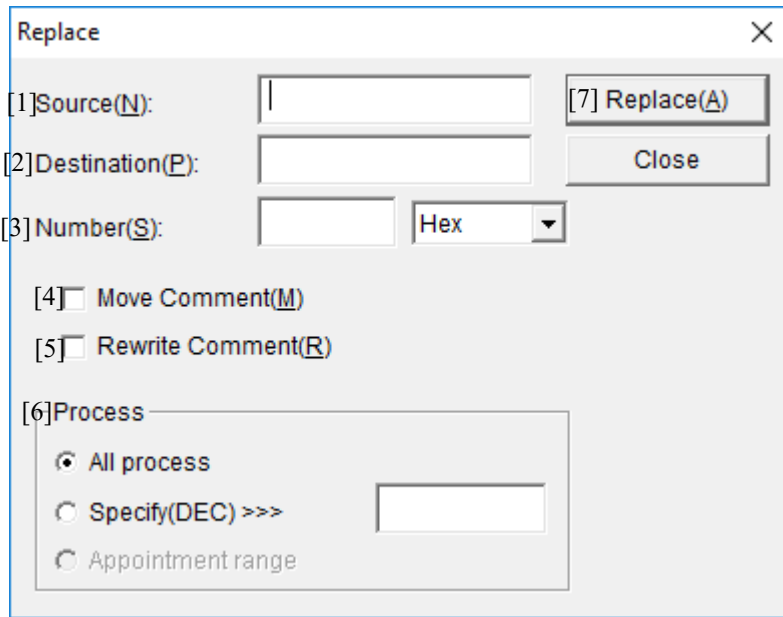


Figure 4-12 “Replace” Dialog Box

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 X0000, X0100, and 10 (in decimal), respectively. Then, the result of the replacement is as follows:

- X0000 is replaced with X0100
- X0001 is replaced with X0101
- X0002 is replaced with X0102
- }
- X0009 is replaced with X0109

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 X0000 through X0009 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 X0000, X0100, and 10 (in decimal), respectively. Then, the result of the replacement is as follows:

- X0000 is replaced with X0100, with Comment000 for X0000 moved to X0100
- X0001 is replaced with X0101, with Comment001 for X0001 moved to X0101
- X0002 is replaced with X0102, with Comment002 for X0002 moved to X0102

- X0009 is replaced with X0109, with Comment009 for X0009 moved to X0109

[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 X0000, X0100, 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:

- X0000 is changed to X0100
- X0001 is changed to X0101
- X0002 is changed to X0102

- X0009 is changed to X0109

[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

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

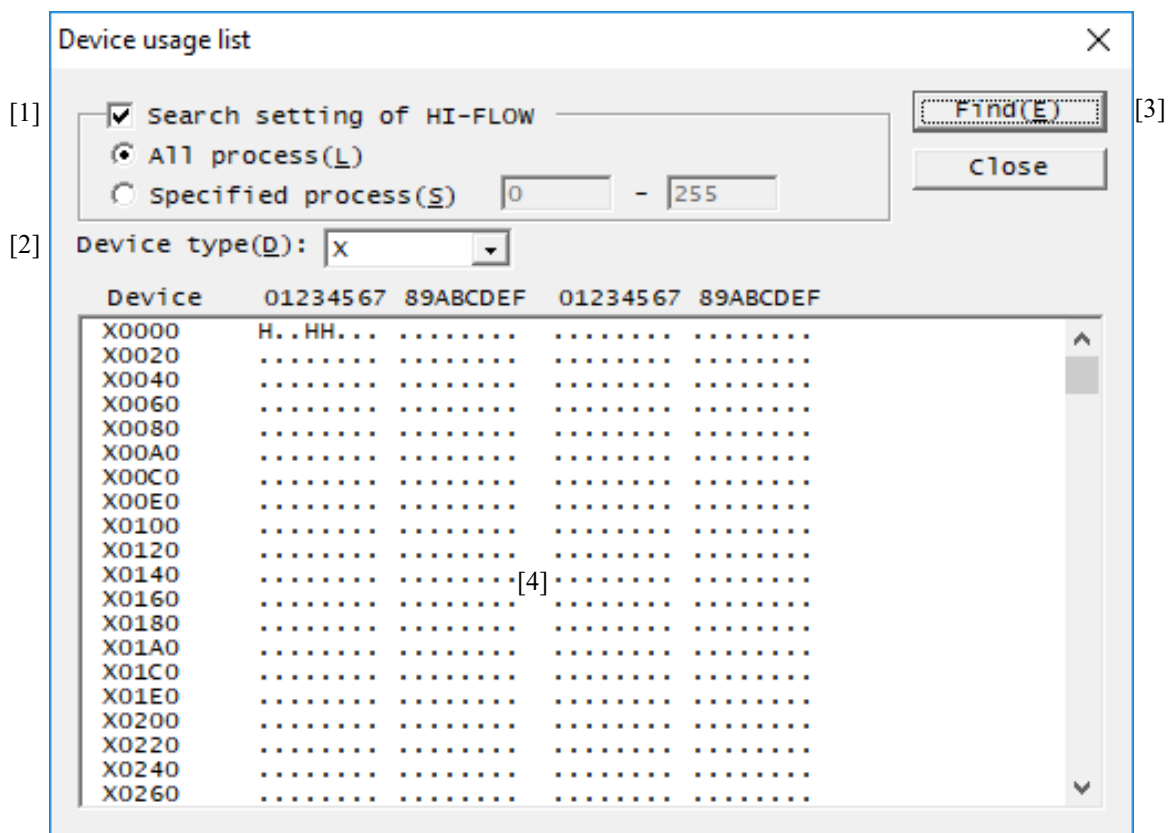


Figure 4-13 “Device usage list” Dialog Box

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

[1] 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.

[2] 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. Note that WTS is treated as WT and CNE is treated as CN.

Table 4-5 Devices That Can be Searched for in the “Device usage list” Dialog Box

Device name	Device type	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	√
Parallel timer	PT	√
Wait timer	WT	√
Counter	CN	√

√: Can be found
nf: Cannot be found

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

[3] The [Find] button:

Is clicked to start a search for the employed devices.

[4] 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.

<Cases where the area where a device is used differs from the area shown in the device usage listing>

The following shows cases in which the area where a device is used differs from that shown in the device usage listing:

[1] If consecutive registers of different types are used, only the registers of the first type are displayed as used ones, and the other registers are not displayed as used ones.

For example, if registers from XWFFE0 to YW0010 are used, registers XWFFE0 to XWFFF0 are displayed as used ones, but registers YW0000 to YW0010 are not displayed as used ones.

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

[2] The type of the parameters specified in the MOM instruction affects the range of registers that are to be used. The following table shows examples of ranges for each parameter type. Note that the following table shows only examples of cases where the source and destination parameters have the same type. In cases where the source and destination parameters have different types, determine the range from a combination of the examples for the relevant types.

Format: MOM S, n, D

S: Source

n: Number of transfer words

D: Destination

Table 4-6 Ranges of used registers (for the MOM instruction)

No.	Source/destination parameter type	Number of transfer words	Behavior	Example
1	Registers in words (direct)	Constant	The specified number of words from a specified register are used.	MOM XW0000, 4, YW0000 → X0000 to X003F and Y0000 to Y003F are used.
2	Registers in words (direct)	Register	Only the specified registers are used.	MOM XW0000, RW000, YW0000 → X0000 to X000F, R000 to R00F, and Y0000 to Y000F are used.
3	Registers in words (indirect) (*)	Constant	The two words from a specified register are used.	MOM @DW000, 4, @FW000 → DW000 to DW001 and FW000 to FW001 are used.
4	Registers in words (indirect) (*)	Register	The two words from a specified register are used.	MOM @DW000, RW000, @FW000 → DW000 to DW001, R000 to R00F, and FW000 to FW001 are used.
5	Registers in long words (direct)	Constant	The specified number of transfer words (in long words) from a specified register are used.	MOM [XW0000], 4, [YW0000] → X0000 to X007F and Y0000 to Y007F are used.
6	Registers in long words (direct)	Register	The one long word from a specified register is used.	MOM [XW0000], RW000, [YW0000] → X0000 to X001F, R000 to R00F, and Y0000 to Y001F are used.
7	Registers in long words (indirect) (*)	Constant	The one long word from a specified register is used.	MOM @[DW000], 4, @[FW000] → DW000 to DW001 and FW000 to FW001 are used.
8	Registers in long words (indirect) (*)	Register	The one long word from a specified register is used.	MOM @[DW000], RW000, @[FW000] → DW000 to DW001, R000 to R00F, and FW000 to FW001 are used.

(*) In the case of indirect specification, bit-type registers (such as X registers) cannot be used.

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[3] The type of the parameters specified in the SEG instruction affects the range of registers that are to be used. The following table shows examples of ranges for each parameter type. Note that the following table shows only examples of cases where the source and destination parameters have the same type. In cases where the source and destination parameters have different types, determine the range from a combination of the examples for the relevant types.

Format: SEG S, R

S: Source

R: Result

Table 4-7 Ranges of used registers (for the SEG instruction)

No.	Source/destination parameter type	Behavior	Example
1	Registers in words (direct)	Only the register specified in S is used. The two words from the register specified in R are used.	SEG XW0000, YW0000 → X0000 to X000F and Y0000 to Y001F are used.
2	Registers in words (indirect) (*)	The two words from the register specified in S are used. The two words from the register specified in R are used.	SEG @DW000, @FW000 → DW000 to DW001 and FW000 to FW001 are used.
3	Registers in long words (direct)	The two words from the register specified in S are used. The four words from the register specified in R are used.	SEG [XW0000], [YW0000] → X0000 to X001F and Y0000 to Y003F are used.
4	Registers in long words (indirect) (*)	The two words from the register specified in S are used. The two words from the register specified in R are used.	SEG @[DW000], @[FW000] → DW000 to DW001 and FW000 to FW001 are used.

(*) In the case of indirect specification, bit-type registers (such as X registers) cannot be used.

[4] The type of the parameters specified in the ASP instruction affects the range of registers that are to be used. How the type of the parameters affects the range is the same as for the SEG instruction.

Format: APB S, R

S: Source

R: Result

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

[5] The type of the parameters specified in the ASU instruction affects the range of registers that are to be used. The following table shows examples of ranges for each parameter type. Note that the following table shows only examples of cases where the source and destination parameters have the same type. In cases where the source and destination parameters have different types, determine the range from a combination of the examples for the relevant types.

Format: ASU S, R

S: Source

R: Result

Table 4-8 Ranges of used registers (for the ASU instruction)

No.	Source/destination parameter type	Behavior	Example
1	Registers in words (direct)	Only the register specified in S is used. The four words from the register specified in R are used.	ASU XW0000, YW0000 → X0000 to X000F and Y0000 to Y003F are used.
2	Registers in words (indirect) (*)	The two words from the register specified in S are used. The two words from the register specified in R are used.	ASU @DW000, @FW000 → DW000 to DW001 and FW000 to FW001 are used.
3	Registers in long words (direct)	The two words from the register specified in S are used. The eight words from the register specified in R are used.	ASU [XW0000], [YW0000] → X0000 to X001F and Y0000 to Y007F are used.
4	Registers in long words (indirect) (*)	The two words from the register specified in S are used. The two words from the register specified in R are used.	ASU @[DW000], @[FW000] → DW000 to DW001 and FW000 to FW001 are used.

(*) In the case of indirect specification, bit-type registers (such as X registers) cannot be used.

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

[6] The type of the parameters specified in the APB instruction affects the range of registers that are to be used. The following table shows examples of ranges for each parameter type. Note that the following table shows only examples of cases where the source and destination parameters have the same type. In cases where the source and destination parameters have different types, determine the range from a combination of the examples for the relevant types.

Format: APB S, R

S: Source

R: Result

Note that a bit-type register (such as an X register) cannot be used for S.

Table 4-9 Ranges of used registers (for the APB instruction)

No.	Source/destination parameter type	Behavior	Example
1	Registers in words (direct)	The two words from the register specified in S are used. Only the register specified in R is used.	APB DW000, FW000 → DW000 to DW001 and FW000 are used.
2	Registers in words (indirect) (*)	The two words from the register specified in S are used. The two words from the register specified in R are used.	APB @DW000, @FW000 → DW000 to DW001 and FW000 to FW001 are used.
3	Registers in long words (direct)	The four words from the register specified in S are used. The two words from the register specified in R are used.	APB [DW000], [FW000] → DW000 to DW003 and FW000 to FW001 are used.
4	Registers in long words (indirect) (*)	The two words from the register specified in S are used. The two words from the register specified in R are used.	APB @[DW000], @[FW000] → DW000 to DW001 and FW000 to FW001 are used.

(*) In the case of indirect specification, bit-type registers (such as X registers) cannot be used.

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

- [7] The type of the parameters specified in the AUB instruction affects the range of registers that are to be used. The following table shows examples of ranges for each parameter type. Note that the following table shows only examples of cases where the source and destination parameters have the same type. In cases where the source and destination parameters have different types, determine the range from a combination of the examples for the relevant types.

Format: AUB S, R

S: Source

R: Result

Table 4-10 Ranges of used registers (for the AUB instruction)

No.	Source/destination parameter type	Behavior	Example
1	Registers in words (direct)	The four words from the register specified in S are used. Only the register specified in R is used.	AUB DW000, FW000 → DW000 to DW003 and FW000 are used.
2	Registers in words (indirect) (*)	The two words from the register specified in S are used. The two words from the register specified in R are used.	AUB @DW000, @FW000 → DW000 to DW001 and FW000 to FW001 are used.
3	Registers in long words (direct)	The eight words from the register specified in S are used. The two words from the register specified in R are used.	AUB [DW000], [FW000] → DW000 to DW007 and FW000 to FW001 are used.
4	Registers in long words (indirect) (*)	The two words from the register specified in S are used. The two words from the register specified in R are used.	AUB @[DW000], @[FW000] → DW000 to DW001 and FW000 to FW001 are used.

(*) In the case of indirect specification, bit-type registers (such as X registers) cannot be used.

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

[8] The register area is used according to the type of the specified parameters. The type of the parameters specified in the APB instruction affects the range of registers that are to be used.

The following table shows examples of ranges (when the applied instruction ADD is used) for each parameter type. Note that the following table shows only examples of cases where the parameter types do not change according to the argument position. In cases where the parameter types change according to the argument position, determine the range from a combination of the examples for the relevant types.

Table 4-11 Ranges of used registers

No.	Source/destination parameter type	Behavior	Example
1	Registers in words (direct)	Only the specified registers are used.	ADD XW0000, RW000, YW0000 → X0000 to X000F, R000 to R00F, and Y0000 to Y000F are used.
2	Registers in words (indirect) (*)	The two words from a specified register are used.	ADD @DW000, @DW100, @FW000 → DW000 to DW001, DW100 to DW101, and FW000 to FW001 are used.
3	Registers in long words (direct)	The two words from a specified register are used.	ADD [XW0000], [RW000], [YW0000] → X0000 to X001F, R000 to R01F, and Y0000 to Y001F are used.
4	Registers in long words (indirect) (*)	The two words from a specified register are used.	ADD @[DW000], @[DW100], @[FW000] → DW000 to DW001, DW100 to DW101, and FW000 to FW001 are used.

(*) In the case of indirect specification, bit-type registers (such as X registers) cannot be used.

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

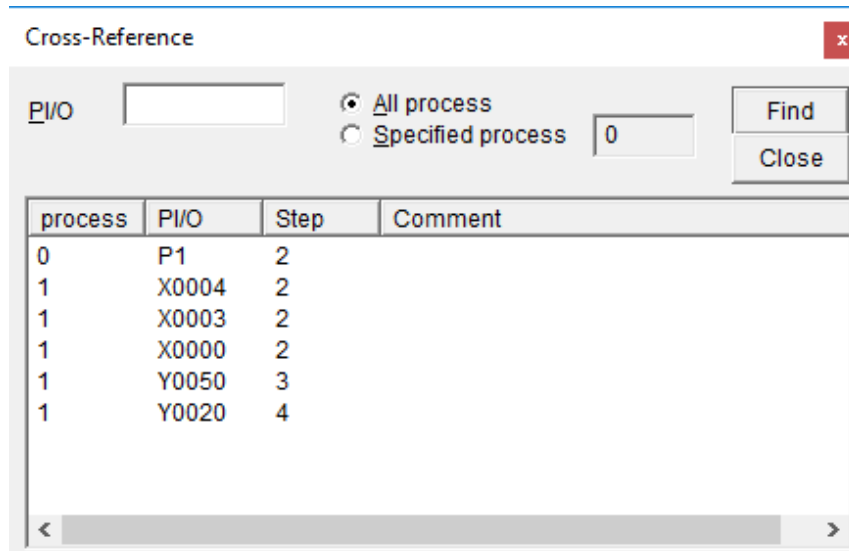


Figure 4-14 “Cross-Reference” Dialog Box

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

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. Note that WTS is treated as WT and CNE is treated as CN.

[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 [Find] 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 [Close] or the [X] 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.

4.3.6 Commenting

(1) Outline of commenting

This function allows you to enter, display, and save (in a file) a comment on each PI/O. You can enter a comment consisting of a maximum of 32 single-byte characters for each PI/O register.

All the PI/Os that can be used in HI-FLOW programs support comments.

(2) Dialog boxes for handling comments

You can perform the following operations on comments using three dialog boxes:

- “PI/O” dialog box

Allows you to read, save, and edit PI/O comments.

To call this dialog box, in the HI-FLOW process sheet, click [Edit] and then [PI/O Comment].

- “Comment on Lines” dialog box

Allows you to create a PI/O comment for all the selected symbols in a HI-FLOW program.

To call this dialog box, in the target HI-FLOW process sheet or HI-FLOW sheet, click [Edit] and then [Comment on lines].

- “Property of symbol” dialog box

Replaces the comments on the PI/Os for the selected symbol with the comments that are specified in the “PI/O” dialog box and displays them in the “Comment” section by clicking the [Comment] button in the “Property of symbol” dialog box.

Example: syntax structure

X0000 & X0001 & X0002

Comments specified in the “PI/O” dialog box

X0000 Switch 1

X0001 Switch 2

X0002

When you click the [Comment] button in the “Property of symbol” dialog box, the “Comment” section displays the following:

Switch 1 & Switch 2 & X0002

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

(3) Handling comments

[1] Reading PI/O comments from a PI/O comment file

- Click [Edit] and then [PI/O Comment]. The following dialog box appears on screen:

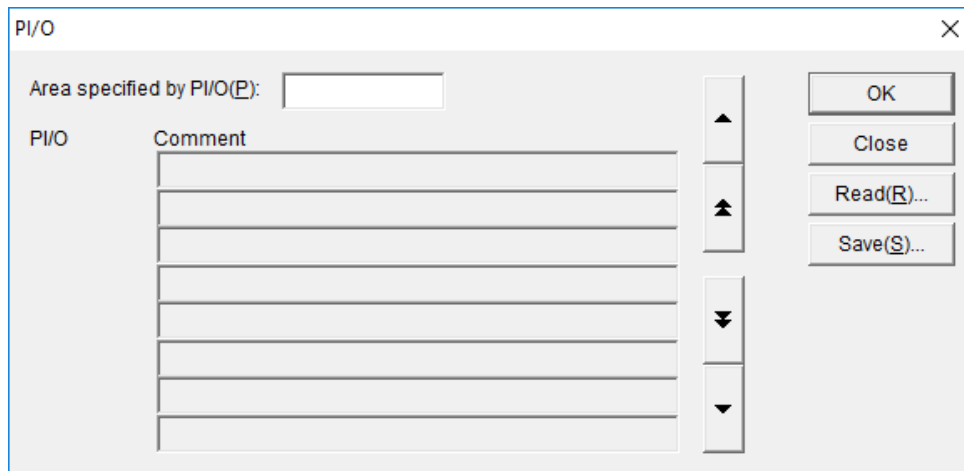


Figure 4-15 “PI/O” Dialog Box for Specifying Comments

- In this dialog box, click the [Read] button to select the comment file from which you want to read comments.
The extension of a comment file is “.cmt”.

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

[2] Editing PI/O comments

- Click [Edit] and then [PI/O Comment] (to display the dialog box shown in Figure 4-15).
- In the dialog box of Figure 4-15, in the “PI/O specification area” box, enter the name of the PI/O for which you want to enter a comment. Click the [OK] button.
- If you read a comment file by clicking the [Read] button and the file contains the comment for the PI/O specified in the “PI/O specification area” box, the content of the file, including the comment for the specified PI/O, is shown in the “Comment” boxes.
- The “PI/O” dialog box shown in Figure 4-16 below is an example of when you enter “X0000” in the “PI/O specification area” box.

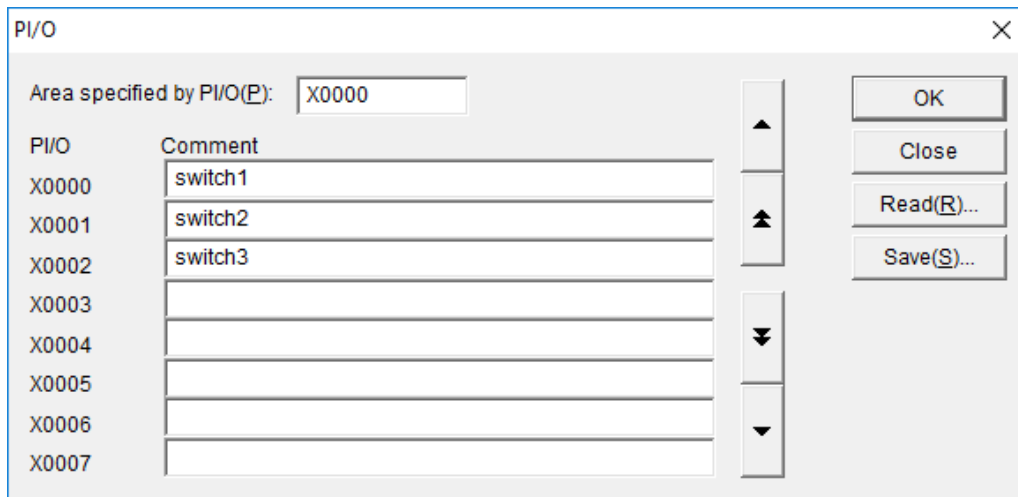


Figure 4-16 “PI/O” Dialog Box for Specifying Comments

- In this dialog box, you can enter or change comments, each consisting of up to 32 single-byte characters or 16 two-byte characters

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

[3] Saving PI/O comments

- Click [Edit] and then [PI/O Comment] (to display the dialog box shown in Figure 4-16).
- In the dialog box of Figure 4-16, click the [Save] button and enter the name of the file.
- Note the following when you save a comment file:

When a ladder program and a HI-FLOW program share a comment file and the HI-FLOW system reads the comment file, the HI-FLOW system ignores the PI/O information that is specific to the ladder program. As a result, if you save the comment file with the same name in the HI-FLOW system, the HI-FLOW system deletes the ignored comments specific to the ladder program. Use caution when saving the comment file.

[4] Inserting PI/O comments for multiple steps in a HI-FLOW program

- Click [Edit] and then [Comment on lines].

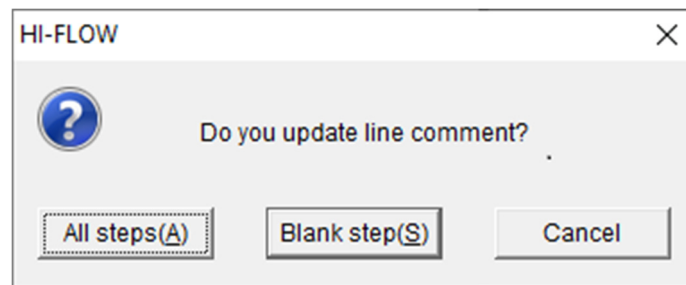


Figure 4-17 “Comment on Lines” Dialog Box

- When you select “All steps” in the “Comment on Lines” dialog box, the comments that are specified in the “PI/O” dialog box are inserted for registers in all the steps (existing comments are replaced if a register already has a comment). When you select “Blank steps” in the “Comment on Lines” dialog box, the specified comments are inserted for the steps that do not have comments.

When you use the “Comment on Lines” dialog box to insert comments, you can choose whether to insert comments for all the symbols including those that already have comments or only for the symbols that do not have comments. When you perform this operation, if the total number of characters used for the syntax structure, comment, and label for a symbol exceeds the limit, the comment is shown using only the allowed number of characters. As a result, only part of a comment might be displayed in some cases.

[5] Displaying the comment for the symbol that is being edited

- In the “Property of symbol” dialog box, click the [Comment] button.
- The comment for the symbol appears in the “Comment” section in the “Property of symbol” dialog box.
- When you close the “Property of symbol” dialog box, the HI-FLOW system checks the number of characters used in the comment. If the number of characters exceeds the limit, the HI-FLOW system displays a warning message. In this case, shorten the comment.

(4) Comment files

<About comment files>

You can enter comments one by one in the “PI/O” dialog box. Comments are stored in a text file. By using a commercial general-purpose text editor, you can create a comment file so that you can efficiently enter comments.

The following describes how to create a comment file using a general-purpose text editor:

<How to create a comment file>

- [1] Note that each comment consists of one line.
- [2] At the beginning of a line, write the name of a register. Insert a space or spaces and then write a comment consisting of up to 32 single-byte characters.
- [3] Change the extension of the text file containing comments to “.cmt”.

```

<<Example comments in a comment file>>
X0000  comment-comment-comment-comment-
X0001  comment-AAAAAAAAAAAAAAAAA-for-X0001
YFFFF  YFFfYfffYFFfYfffYFFfYfffYFFfYfff
:
:
Z3FF   Z3FFz3ffZ3FFz3ffZ3FFz3ffZ3FFz3ff
```

(A) (B)

- (A) At the beginning of a line, use single-byte characters to write the name of the register for which you want to write a comment.
- (B) On the same line, enter one or more spaces followed by a comment consisting of up to 32 single-byte characters.

<Notes on creating a comment file>

- You can write register names in any sequence regardless of their numbers. When the HI-FLOW system reads a comment file, it automatically sorts the register names in it. Once the HI-FLOW system reads a comment file and you save the file, you will see the register names are sorted in the sequence as managed by the HI-FLOW system the next time you open the comment file.
- If a comment contains more than 32 characters, only the first 32 characters are valid and the HI-FLOW system ignores the rest.
- If you write a register name that is not defined, the HI-FLOW system ignores the data on that line.
(If a ladder program and a HI-FLOW program share a comment file, the HI-FLOW system ignores the PI/O information that is specific to the ladder program.)

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

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.

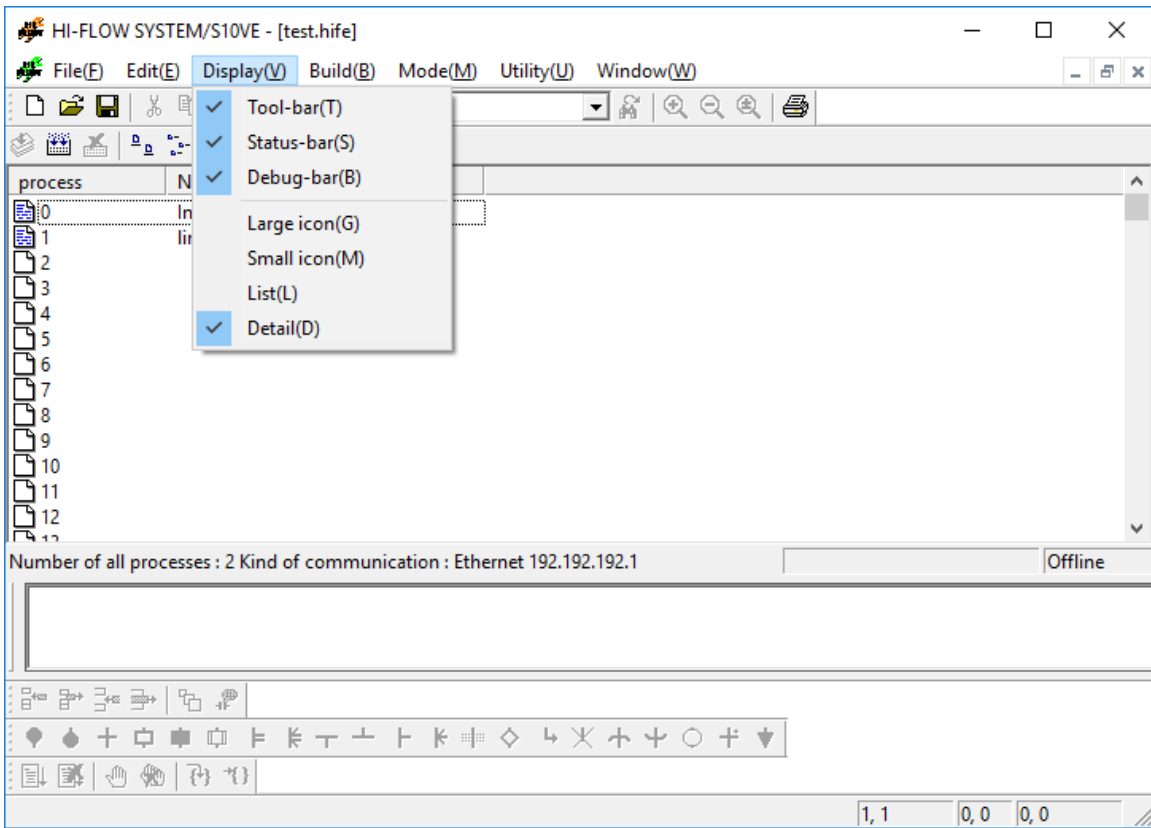


Figure 4-18 [Display] Menu in the HI-FLOW Process Sheet

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

Table 4-12 [Display] Menu Items in the HI-FLOW Process Sheet

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.

4.5 Build Functions of the HI-FLOW Process Sheet

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

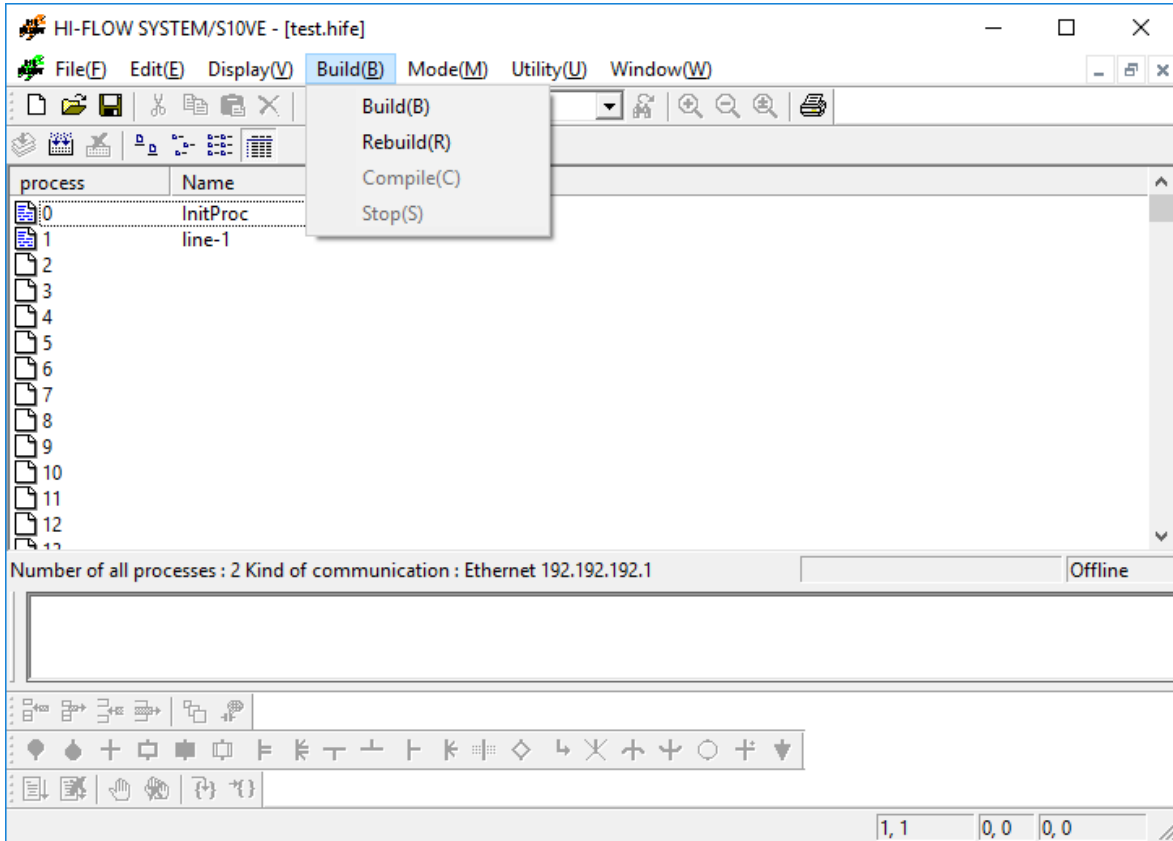


Figure 4-19 [Build] Menu in the HI-FLOW Process Sheet

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

Table 4-13 [Build] Menu Items in the HI-FLOW Process Sheet

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

4.5.1 Compiling

This subsection describes how to compile HI-FLOW programs. The method of compiling a program differs depending on the type of sheet being displayed.

(1) HI-FLOW process sheet in offline mode

[Build]: Compiles all the programs that are edited by the user but not compiled yet.

[Rebuild]: Compiles all the programs listed in the HI-FLOW process sheet.

[Compile]: Compiles the selected program.

[Stop]: Cancels the build, rebuild, or compile operation.

(2) HI-FLOW sheet in offline mode

[Compile]: Compiles the selected program.

Compiling converts the target program into a format that can be transferred to PCs. At the same time, the HI-FLOW system performs a syntax structure check. The major check items are as follows:

- Checking the program structure
- Checking the length of syntax structures, comments, and labels
- Checking the names of registers in syntax structures
- Checking the applied instructions and operators in syntax structures
- Checking the relationship between the types of registers and operators in syntax structures

If an error is found, it is displayed in the Output window. When you double-click a compile error displayed in the Output window, the HI-FLOW system automatically takes you to the source of the error.

If the error occurred in a program file that is not open in the window, the HI-FLOW system automatically opens the file and indicates the position of the error.

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.

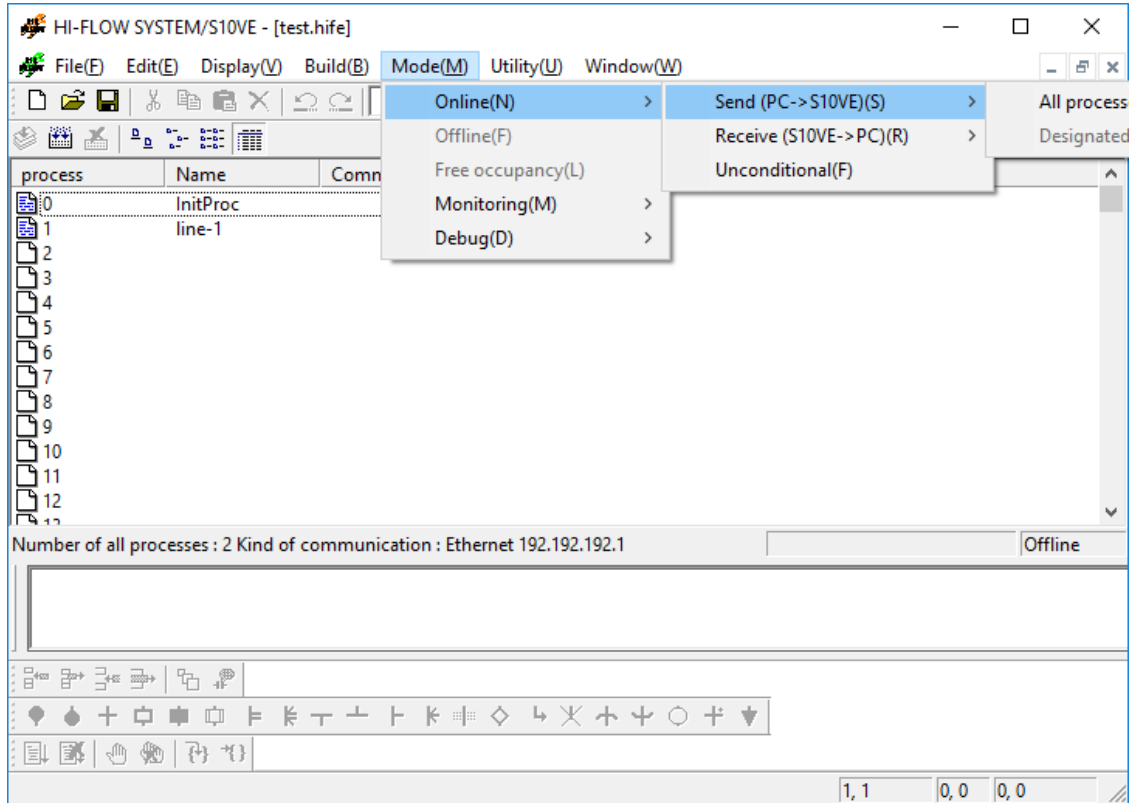


Figure 4-20 [Mode] Menu in the HI-FLOW Process Sheet

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.

Table 4-14 [Mode] Menu Items in the HI-FLOW Process Sheet

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		
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.

(*) This function does not support HI-FLOW equalization.

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 CPU flash memory. The written data is loaded into main memory of the CPU at restart.

NOTICE

If the S10VE 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. If you turn off or reset the S10VE while a process is being sent, replace the HI-FLOW system(*) and resend all the processes.

(*) For details about how to replace the HI-FLOW system, see 4.7.6, "Deleting the PCs processes."

4.6.1 Sending and receiving programs

<Description>

Use the following [Mode] menu items to send and receive programs to and from PCs:

- [Send]: Sends the displayed programs to the PCs.
- [Receive]: Receives the programs from the PCs to the HI-FLOW system.

<Procedures>

(1) Sending the displayed programs (already compiled) to the PCs

- [1] Click [Mode] - [Online] - [Send]. Click [All processes] or [Specified process].
- [2] When a transmission confirmation message appears, click the [Yes] button.

(2) Receiving the programs from the PCs

- [1] Click [Mode] - [Online] - [Receive]. Click [All processes] or [Specified process].
- [2] When a reception confirmation message appears, click the [Yes] button.

<Notes on the procedures>

- (1) When you receive programs from PCs, all the programs displayed in the HI-FLOW process sheet are overwritten by the received programs.
- (2) If you attempt to send a program that is not compiled, the HI-FLOW system automatically performs a build for the program. If no error is found, the HI-FLOW system sends the program to the PCs.
- (3) If you attempt to send a program while the PCs is in RUN status, the HI-FLOW system displays a message prompting you to set the PCs in STOP status before it sends the program.

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

4.6.2 Supporting the network

<Description>

When you remotely load HI-FLOW programs to PCs or save HI-FLOW programs in PCs from a personal computer via the network, special measures must be taken.

The special method is called an occupancy function. The occupancy function prevents the HI-FLOW system on a different personal computer from accessing the PCs you are currently using. The HI-FLOW system also provides a function that forcibly releases the PCs that remain occupied due to a line error or for other reasons.

<Procedure>

(1) [Mode] - [Online] - [Send]

[Mode] - [Online] - [Receive]

[Mode] - [Online] - [Unconditional]

Perform one of the above operations. The HI-FLOW system on the self-PC occupies the target PCs.

(2) To release the occupancy of the PCs in offline mode, click [Mode] - [Free occupancy].

(3) If the connection with the PCs is severed while it is occupied due to a line error in online mode or for other reasons, restore the line connection and click [Utility] - [Free forced occupancy] to release the occupancy of the PCs.

<Notes on the procedure>

(1) The HI-FLOW system does not release occupancy of PCs unless the user does so by clicking [Mode] - [Free occupancy] or [Utility] - [Free forced occupancy].

(2) When you click [Mode] - [Free occupancy], if a message appears indicating that releasing occupancy failed, occupancy of the PCs is forcibly released from another personal computer.

NOTICE

Release occupancy is performed with priority even if the HI-FLOW system on another personal computer is accessing the PCs in question. As a result, the programs stored in the PCs or the contents of memory might become inconsistent. To prevent such problems, check the status of the PCs and whether other users are currently using the PCs before you release occupancy.

4.6.3 Monitoring processes

<Description>

Use the [Mode] menu items to monitor the status of the HI-FLOW processes running on PCs. The results are displayed in the HI-FLOW process sheet.

Figure 4-21 below is an example display of processes that are being monitored.

process	Name	Comment	Status
RUN 0		No.40	ACT Start from zone Under RUN status.
1		No.40	Not yet started.Under STOP status.
2	test		Not yet started.Under STOP status.
3	test		Not yet started.Under STOP status.
4			<u>Not yet started.Under STOP status.</u>
5			
6			

Icon of the process being monitored

Startup status of the process

Current status of the process

Figure 4-21 Example of Monitoring Processes

In the following figure, the six process icons from the bottom indicate that the processes are being monitored:




	No program	
	Program exists (not compiled)	
	Program exists (compiled)	
STP	Forcibly stopped] These icons indicate that the processes are being monitored.
RUN	Running	
RST	RESET status	
CST	CALL STOP status	
CRM	CALL RUN status	
CRS	CALL RESET status	

Figure 4-22 Icons of the Processes Being Monitored

<Procedure>

- (1) Receive programs from the PCs (or send programs to the PCs).
- (2) In the HI-FLOW process sheet, click [Mode] - [Monitoring] - [Start].
- (3) To stop monitoring, click [Mode] - [Monitoring] - [Stop].

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

<Notes on the procedure>

- (1) When you monitor processes, you can enter online mode by clicking [Mode] - [Online] - [Unconditional]. However, in this case, the user must make sure that the processes in the PCs and the processes being displayed in the HI-FLOW process sheet match.
- (2) You can scroll the HI-FLOW process sheet while processes are being monitored.
- (3) If you want to select a specific background color for monitoring, see “(3) Dialog box for specifying background colors” in 4.7.3, “Environment settings.”
- (4) If you scroll the HI-FLOW process sheet or change the size of the window while processes are being monitored, the ON indication temporarily changes to OFF. This change of status is only for display and has nothing to do with the actual online status.
- (5) This function is only available in online mode.

4.6.4 Tracing

<Description>

Use the [Mode] menu item as shown below to trace and display the operation of HI-FLOW processes between the start condition and the end condition that are specified by the user.

Tracing does not support HI-FLOW equalization. If HI-FLOW equalization is enabled in the “HI-FLOW Equalization Settings” window of BASE SYSTEM/S10VE, tracing cannot be performed.

<Procedure>

- (1) Put the HI-FLOW system online.
- (2) Click [Mode] - [Debug] - [Trace].

The following dialog box appears on screen:

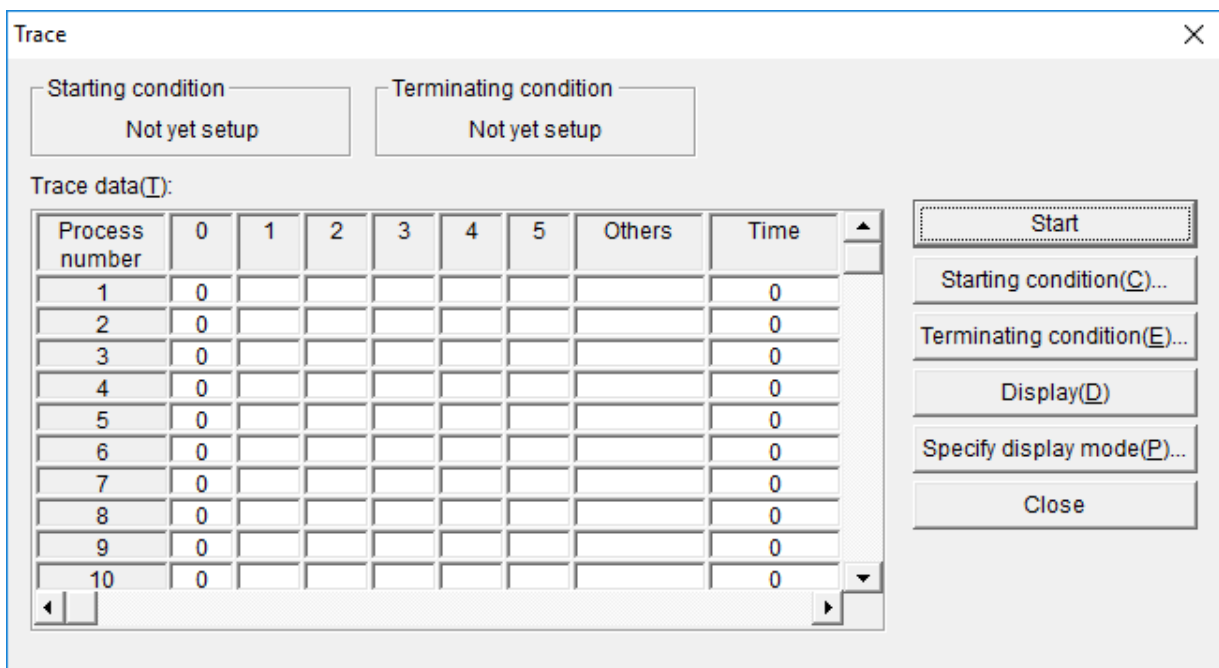


Figure 4-23 “Trace” Dialog Box

The left-most column in the “Trace” dialog box indicates the number of steps in a process and it also indicates the sequence of tracing. The top row indicates the processes to be traced. Process No. 0 to No. 5 are shown as the processes to be traced by default.

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

- (3) If the start condition and the end condition are not already specified in the “Trace” dialog box, click the [Start Condition] button or the [End Condition] button to specify them. The following “Trace Conditions” dialog box appears on screen:

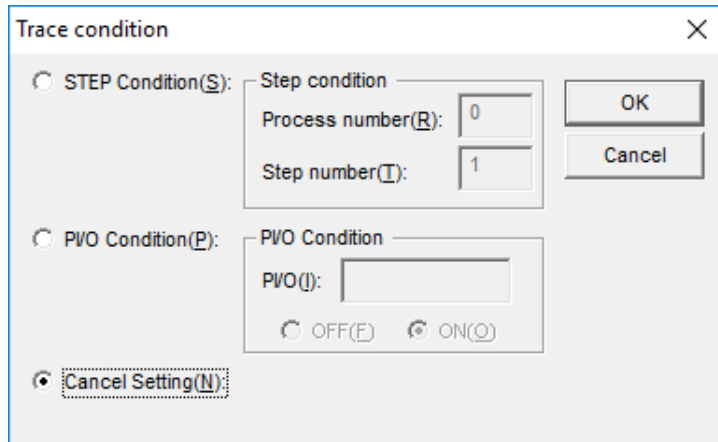


Figure 4-24 “Trace Conditions” Dialog Box

- As the start condition, you can specify the execution of a specific step in a specific process or the change of ON/OFF status of the specified PI/O.
 - Specify the end condition in the same manner.
 - When you click the “Clear settings” radio button, the existing conditions are cleared.
- (4) When you finish specifying the start condition and the end condition, specify the processes to be traced. When you click the [Specify Displayed Processes] button in the “Trace” dialog box, the “Specify Processes to be Displayed” dialog box (Figure 4-25) appears. In this dialog box, you can specify the processes you want to trace by clicking the numbers of the processes to be traced.
- If you do not specify the processes to be traced in the “Specify Processes to be Displayed” dialog box, process No. 0 to No. 5 are shown in the “Trace” dialog box by default. The processes you specify in the “Specify Processes to be Displayed” dialog box are cleared when you close the “Trace” dialog box shown in Figure 4-23.

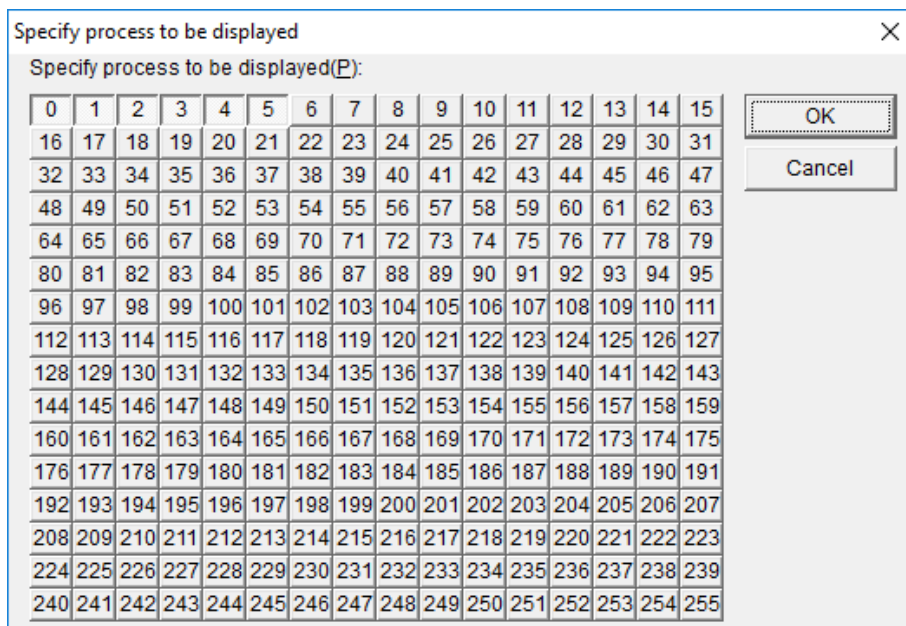


Figure 4-25 “Specify Processes to be Displayed” Dialog Box

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

- (5) When all the settings are completed, click the [Start] button to start tracing. Note that the “Trace” dialog box does not display the result of tracing. To display the result of tracing, click the [Show] button. The result of tracing at the time when you click the [Show] button is displayed.

The [Show] button in the “Trace” dialog box is used to receive trace data. The button does not update trace data in real time. For this reason, you need to click the [Show] button several times if you want to see the result of tracing in progress before the end condition is satisfied.

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

4.6.5 Time monitor

<Description>

Use the [Mode] menu item as shown below to measure the length of time between the establishment of the start condition and the end condition of the HI-FLOW programs in PCs.

<Procedure>

- (1) Put the HI-FLOW system online.
- (2) Click [Mode] - [Debug] - [Time monitor].
The following dialog box appears on screen:

	Starting condition		Terminating condition		Upper limit value	Lower limit value	ON coil	Current value
1	P1	1	P10	10	100	10	R001	0
2								
3								
4								
5								

Figure 4-26 “Time Monitor” Dialog Box

- (3) Specify the start condition and the end condition by specifying either of the following two combinations:
 - A process number and a step number
 - A PI/O name and ON or OFF status
- (4) Specify the upper limit, the lower limit, and the ON coil for time measurement.
- (5) After you specify the settings, click the [Start] button to start time measurement.
- (6) If you want to check the result of time measurement, click the [Monitor] button.

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.

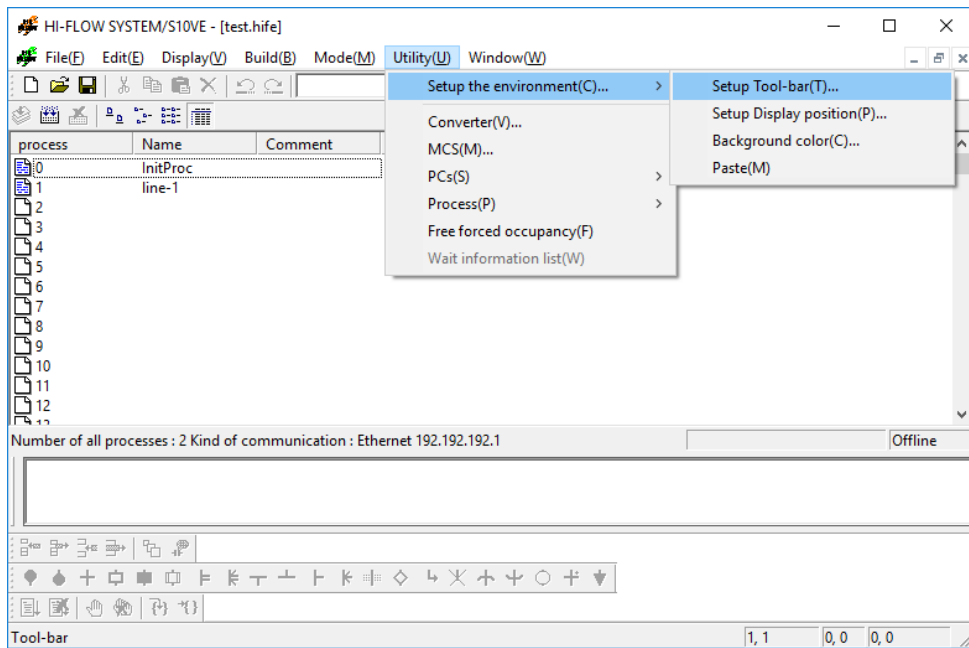


Figure 4-27 [Utility] Menu in the HI-FLOW Process Sheet

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

Table 4-15 [Utility] Menu Items in the HI-FLOW Process Sheet (1/2)

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 file that was created by S10mini or S10V HI-FLOW or a common file (*).
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.

(*) The common file that can be converted is as follows:

- extd002

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

Table 4-15 [Utility] Menu Items in the HI-FLOW Process Sheet (2/2)

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		Free forced occupancy		Forcibly releases the occupancy status of the PCs.
20		Wait information list		Displays the symbol figures, syntax structure, etc. of the process stop step.
21		Set Ethernet Communication		Currently not supported.

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 Manipulating processes

<Description>

Use the [Utility] menu items to forcibly stop or execute the HI-FLOW processes in PCs. The following table lists the actions you can perform for the processes.

Table 4-16 Permitted Actions for Processes

Action on process	Process status						Description
	Not started	STOP	RUN	CALL RUN	CALL STOP	RESET	
[Process ACT]	Possible	Not possible	Not possible	Not possible	Not possible	Not possible	Starts the specified process from the specified step.
[Process STP]	Not possible	Not possible	Possible	Possible	Not possible	Not possible	Forcibly stops the specified process.
[Restart process]	Not possible	Possible	Not possible	Not possible	Possible	Possible	Forcibly restarts the specified process.
[Process RST]	Not possible	Possible	Possible	Possible	Possible	Possible	Forcibly resets the specified process.
[Process CLR]	Not possible	Possible	Not possible	Not possible	Possible	Possible	Clears the PI/O value that is output by the specified process.

<Procedure>

- (1) Put the HI-FLOW system online.
- (2) In the HI-FLOW process sheet, click:
 - [Utility] - [Process] - [Process ACT]
 - [Process STP]
 - [Restart process]
 - [Process RST]
 - [Process CLR]
- (3) After you click a menu item, enter a process number (or a step number) in the applicable dialog box.

Two methods are available to start processes: zone startup and master reset startup. Zone startup does not clear the PI/O values when the started process ends. Master reset startup clears the PI/O values when the started process ends.

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

4.7.2 Chart describing the interrelation of processes

<Description>

Use the [Utility] menu item as shown below to display the relationship between the HI-FLOW processes in PCs. The displayed chart shows the number of the step that calls the specified process and the number of the process the step belongs to as well as the number of the process called by the specified process and the number of the step in the specified process where the call is made.

The dialog box shown in Figure 4-28 below displays the chart that shows the interrelation of processes.

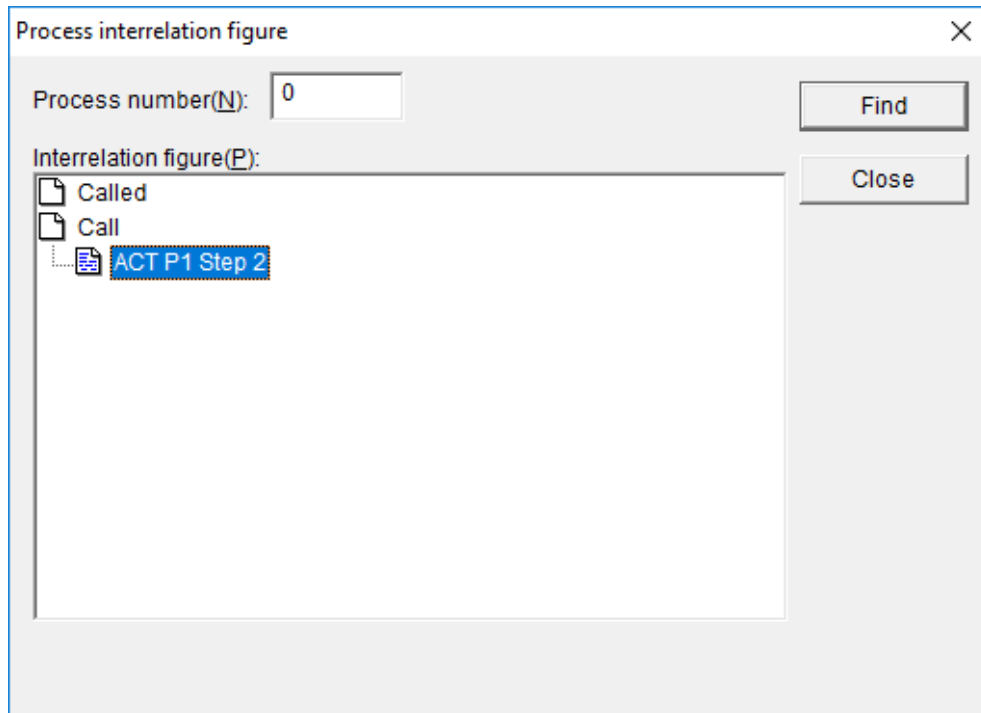


Figure 4-28 “Interrelation Chart of Processes” Dialog Box

In the above dialog box, process 0 calls process 1 during the syntax structure of step 2.

<Procedure>

- (1) Put the HI-FLOW system offline.
- (2) In the HI-FLOW process sheet, click [Utility] - [Process] - [Interrelation chart of processes]. In the displayed dialog box, enter the number of a process and click the [Search] button.
- (3) In the chart, click the Called icon or the Call icon to display the called process icon.

4.7.3 Environment settings

This subsection describes the dialog boxes that are used to specify environment settings.

(1) Dialog box for configuring the toolbar

<Description>

You can use this dialog box to specify or change the buttons that are contained in the toolbar.

<Procedure>

In the HI-FLOW process sheet, click [Utility] - [Setup the environment] - [Setup toolbar].

The following “Change Toolbar” dialog box appears on screen:

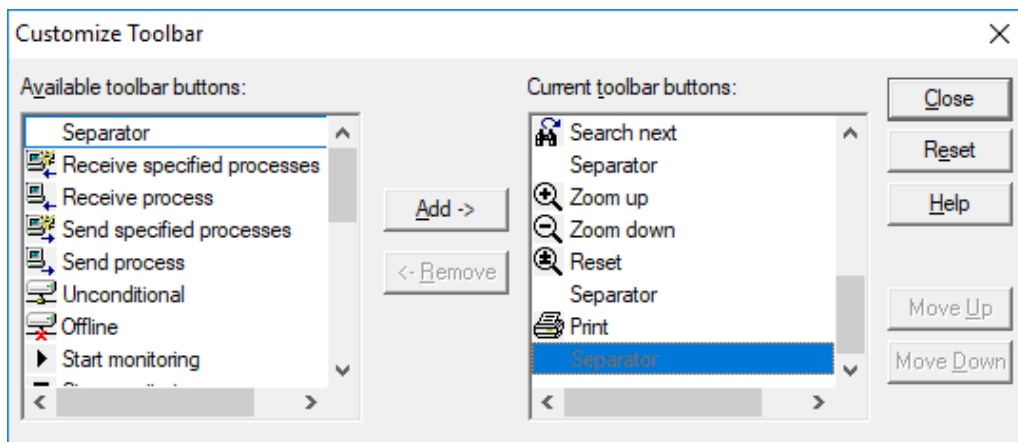


Figure 4-29 “Change Toolbar” Dialog Box

- To add a button to the toolbar, in the “Available toolbar buttons” section on the left, select the desired button and click the [Add] button. The selected button moves to the “Current toolbar buttons” section on the right.
- To delete a button from the toolbar, in the “Current toolbar buttons” section on the right, select the desired button and click the [Delete] button. The selected button moves to the “Available toolbar buttons” section on the left.
- To restore the toolbar to the status when the dialog box was opened, click the [Reset] button.
- To change the display sequence of buttons in the toolbar, use the [Up] and [Down] buttons.

If the toolbar contains too many buttons, it might become longer than the width of the window. In that case, drag the toolbar to the editing area and make it a window in which all the buttons will be shown.

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

(2) Dialog box for specifying the positions of text for symbols

<Description>

You can use this dialog box to specify the default display positions for the syntax structure, comment, label, and step number for symbols in HI-FLOW programs.

<Procedure>

In the HI-FLOW process sheet, click [Utility] - [Setup the environment] - [Setup display position].

The following “Default” dialog box appears on screen:



Figure 4-30 “Default” Dialog Box

- To change the default display positions, drag “Syntax structure”, “Comment”, “Label”, and “Step No.” in the editing area to the desired locations. This action determines the default display positions of the syntax structure, comment, label, and step number for symbols.
- To specify whether to show or hide syntax structures, comments, labels, and step numbers, use the check boxes on the right. When you select a check box, the item is shown. When you clear a check box, the item is hidden.
- To change the font for syntax structures, comments, labels, and step numbers, use the corresponding [Font] button.

The default display positions you specify here have lower priority to the display positions that are specified using the property windows. If you specify display positions in the property windows that differ from the display positions specified here, the display positions specified in the property windows take precedence. The display positions you specify in the “Default” dialog box are valid when you create a HI-FLOW program for the first time. The information you specify in the “Default” dialog box is transferred to PCs. As a result, when you receive HI-FLOW programs from PCs, the transferred default display positions are used for displaying symbols.

(3) Dialog box for specifying background colors

<Description>

You can use this dialog box to customize the background color for the HI-FLOW process sheets and HI-FLOW sheets for each mode.

<Procedure>

In the HI-FLOW process sheet, click [Utility] - [Setup the environment] - [Background color].

The following “Background Color” dialog box appears on screen:

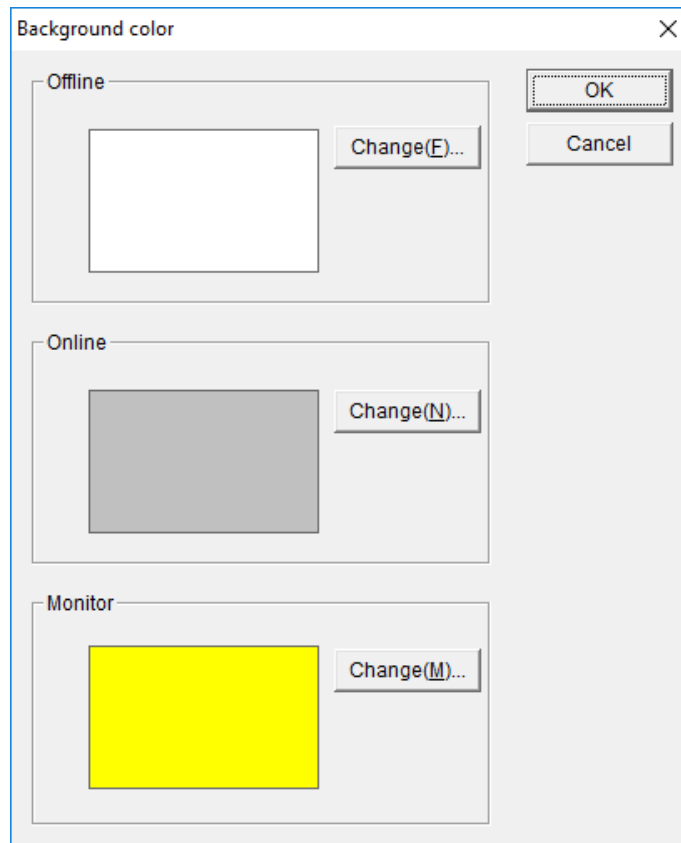


Figure 4-31 “Background Color” Dialog Box

- You can change background colors for offline, online, and monitoring modes. To change the background color for a mode, click the corresponding [Change] button.
- After you change the background color, click the [OK] button to close the dialog box. When the dialog box closes, the new background color takes effect.

When the system setting is 256 colors, if you specify a neutral color as the background color, the display colors for the icon and process name fields in the HI-FLOW process sheet might differ from the specified colors.

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

(4) Dialog box for specifying modes for pasting

<Description>

You can use this dialog box to specify the mode for pasting the text for symbols when you edit HI-FLOW programs.

<Procedure>

In the HI-FLOW process sheet, click [Utility] - [Setup the environment] - [Paste]. The following “Modes for Pasting” dialog box appears on screen:

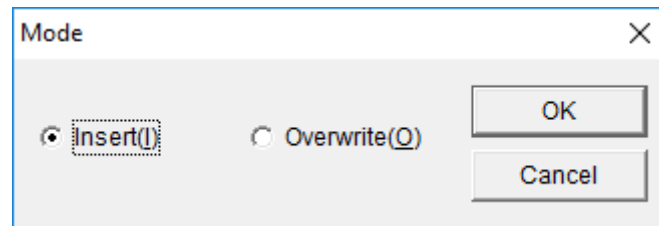


Figure 4-32 “Modes for Pasting” Dialog Box

- Click “Insert mode” or “Overwrite mode”. After you make a selection and click the [OK] button, the selected mode takes effect.
- The default mode is Insert mode.

4.7.4 Editing the operating environment of PCs

<Description>

You can use this dialog box to display and specify the operating environment of PCs. The settings are read and written from and to PCs. For this reason, make sure that you maintain the line connection with the PCs although you perform this procedure in offline mode.

The dialog box allows you to check and specify the following items:

- (1) Displaying and specifying the range of user memory areas
 You can display and specify the memory areas where you load HI-FLOW programs. The default range is H7C080000 to H7C800000. You can change the areas for storing HI-FLOW programs only within this range.
- (2) Choosing whether to maintain or clear the start condition when PCs change their status
 You can choose whether to maintain or clear the start condition when PCs change their status from STOP to RUN.
- (3) Choosing whether to maintain or clear the process status when transferring HI-FLOW programs
 You can choose whether to maintain or clear the process status when you transfer HI-FLOW programs.
- (4) Choosing whether to permit or prohibit the rewrite of HI-FLOW programs during execution
 You can choose whether to permit or prohibit the rewrite of HI-FLOW programs while PCs are running.

<Procedure>

In the HI-FLOW process sheet, click [Utility] - [PCs] - [System edition].

The following “Editing System Settings” dialog box appears on screen:

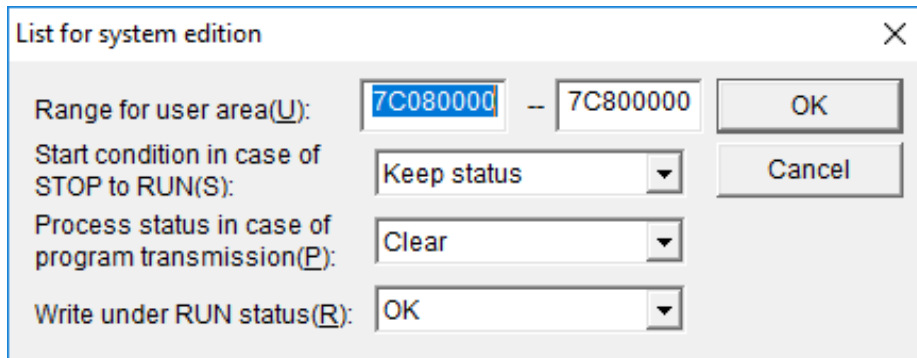


Figure 4-33 “Editing System Settings” Dialog Box

- In the “User area range” section, enter hexadecimal numbers in the boxes.

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

4.7.5 Changing the PCs status

<Description>

This procedure allows you to change the status of PCs from the HI-FLOW system. Before you perform this procedure, you must check the status of the PCs and the facilities involved.

Table 4-17 Allowed Status Changes for PCs

Setting of the LADDER RUN/STOP switch	Current status of the PCs	Status change by the HI-FLOW system	New status
STOP	STOP	Not possible	-
RUN	STOP	Possible	RUN
RUN	RUN	Possible	STOP

The RUN or STOP status of PCs is initially set by using the LADDER RUN/STOP switch.

<Procedure>

In the HI-FLOW process sheet, click [Utility] - [PCs] - [Change connection of PCs].

A message box appears indicating the current status of the applicable PCs and the new status of the same PCs.

Click the [OK] button to change the status of the PCs.

4.7.6 Deleting the PCs processes

<Description>

You can use this dialog box to delete the HI-FLOW processes in PCs. In addition to deleting processes, you can also replace the interpreter in the PCs.

<Procedure>

In the HI-FLOW process sheet, click [Utility] - [PCs] - [Delete process of PCs]. The following “Delete process” dialog box appears on screen:

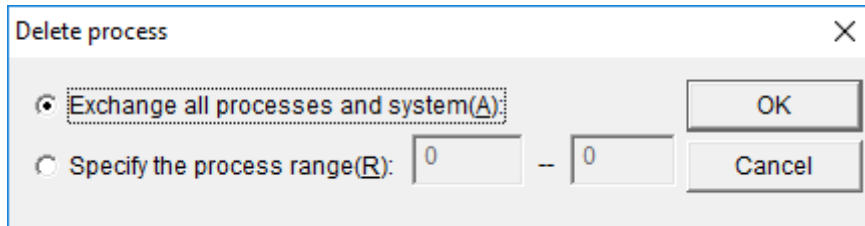


Figure 4-34 “Delete process” Dialog Box

- (1) If you want to delete specific processes in the PCs, click “Specify process range” and enter the numbers of the beginning and ending processes in the boxes.
- (2) If you want to replace the interpreter in the PCs and delete all the processes in the PCs, click “Exchange all processes and system”.
- (3) Click the [OK] button.

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4.7.7 Laying out the system bits

<Description>

Usually, registers are managed by the HI-FLOW system. However, you can use this dialog box to change the register used for displaying the results of control boxes and the registers for storing the status of processes and steps.

<Procedure>

In the HI-FLOW process sheet, click [Utility] - [PCs] - [Layout system bits].
The following “Layout System Bits” dialog box appears on screen:

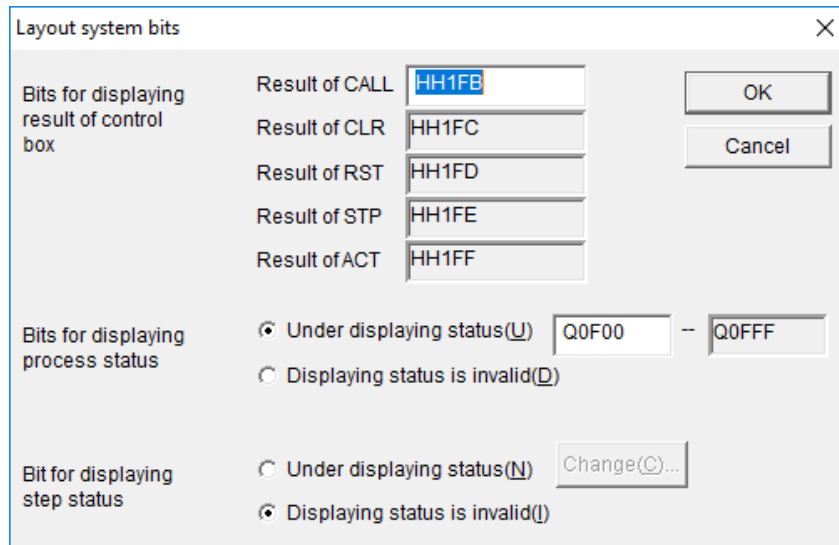


Figure 4-35 “Layout System Bits” Dialog Box

- (1) If you want to change the register used for displaying the results of control boxes, in the “Control box result display bits” section, in the “CALL result” box, specify the desired register.
- (2) If you want to change the registers used for displaying the status of processes, in the “Process status display bits” section, specify the beginning register in the left box.

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

- (3) If you want to enable the registers used for displaying the status of steps, in the “Step status display bits” section, click “Status display in progress” and click the [Change] button. The following “Registers for Steps” dialog box appears on screen:

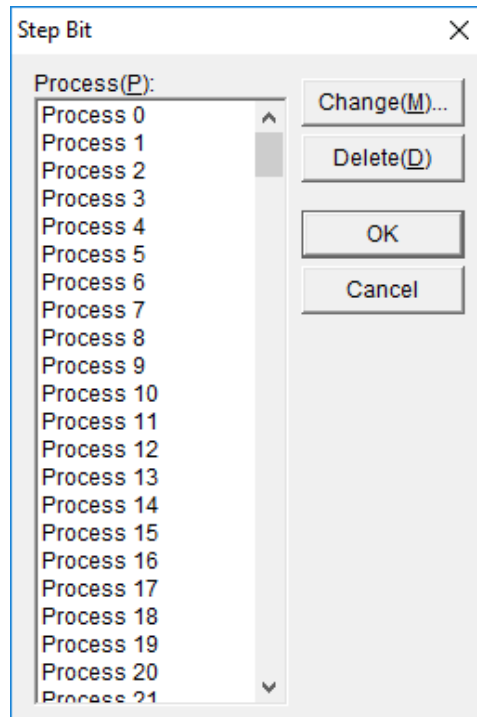


Figure 4-36 “Registers for Steps” Dialog Box

- (4) In the “Registers for Steps” dialog box, select the process for which you want to change the register and click the [Change] button. The following dialog box appears on screen:

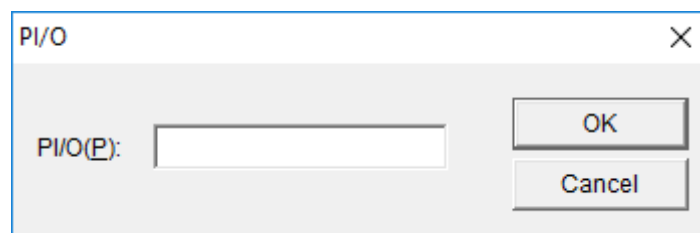


Figure 4-37 “PI/O” Dialog Box

- (5) In this dialog box, enter the desired register and click the [OK] button.
(6) If you want to delete a register, in the “Registers for Steps” dialog box, select the process for which you want to delete the register and click the [Delete] button.

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4.7.8 Listing inactive processes and steps

<Description>

You can use this dialog box to list the currently inactive HI-FLOW processes and steps in the PCs. This procedure can be performed only in online mode.

<Procedure>

In the HI-FLOW process sheet, click [Utility] - [Wait information list].

The “Wait Information List” dialog box shown in Figure 4-38 below appears.

(1) Click the [Refresh] button to list the currently inactive processes and steps.

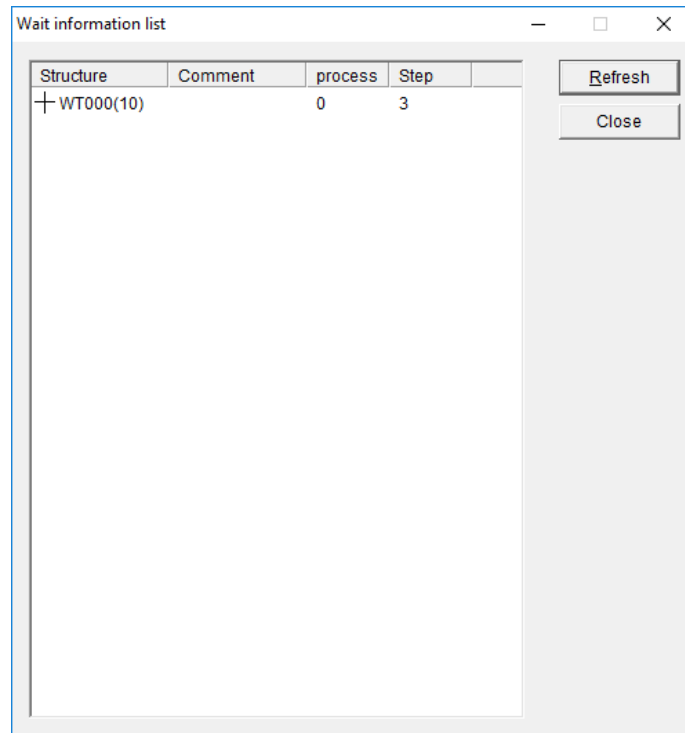


Figure 4-38 “Wait Information List” Dialog Box

The information displayed in the dialog box is updated when you click the [Refresh] button. This information is not automatically updated.

4.7.9 Converting the S10V files

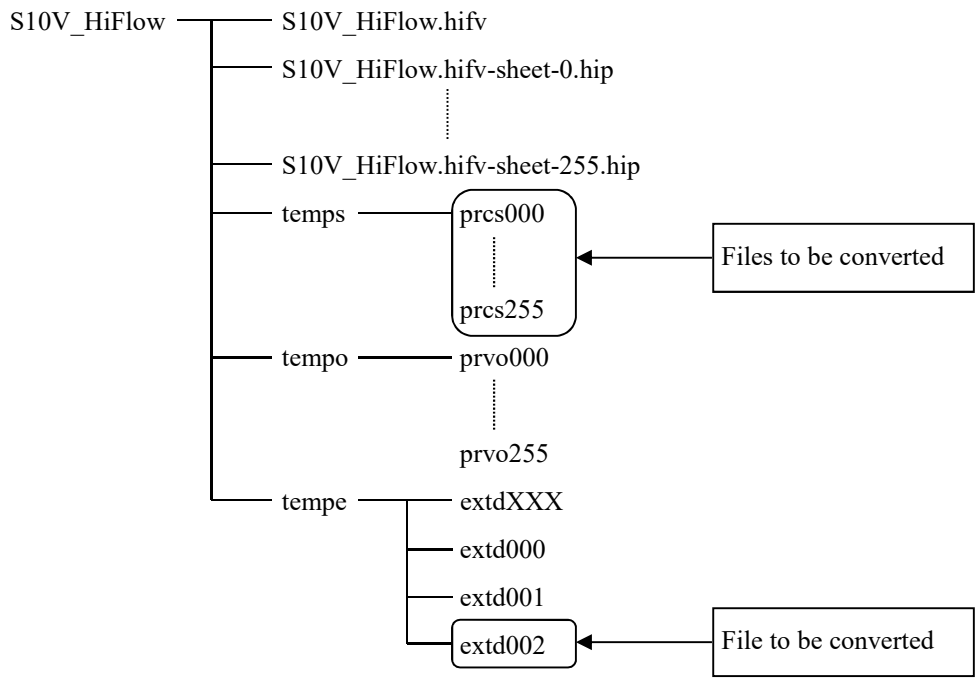
<Description>

This procedure converts the source files (prcs000 to prcs255) that were created by using the S10V HI-FLOW system and the extd002 common file so that they can be used by HI-FLOW SYSTEM/S10VE.

Other files cannot be converted using this procedure. The source files to be converted contain the HI-FLOW programs that were created by users using HI-FLOW sheets. The extd002 file contains file comments for the HI-FLOW process sheet. Source files and extd002 are compatible between the S10VE and the S10V.

The figure below shows an example configuration of HI-FLOW program files that are created by using the S10V HI-FLOW system.

In the example shown below, the name of the HI-FLOW process sheet is S10V_HiFlow.



Example Configuration of HI-FLOW Program Files

In regard to the PI/O comments that are not converted by this procedure, in the HI-FLOW process sheet, click [Edit] and then [PI/O Comment] to display the “PI/O” dialog box and directly edit the comments. Alternatively, in the “PI/O” dialog box, click the [Read] button and specify the comment file of the S10V.

After the conversion, in the HI-FLOW process sheet, click [Build] and then [Build] or [Rebuild]. The converted source files are compiled and objects are created.

This procedure can be performed only in offline mode.

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<Procedure>

(1) In the HI-FLOW process sheet, click [Utility] - [Converter].

The following “Open file” dialog box appears on screen:

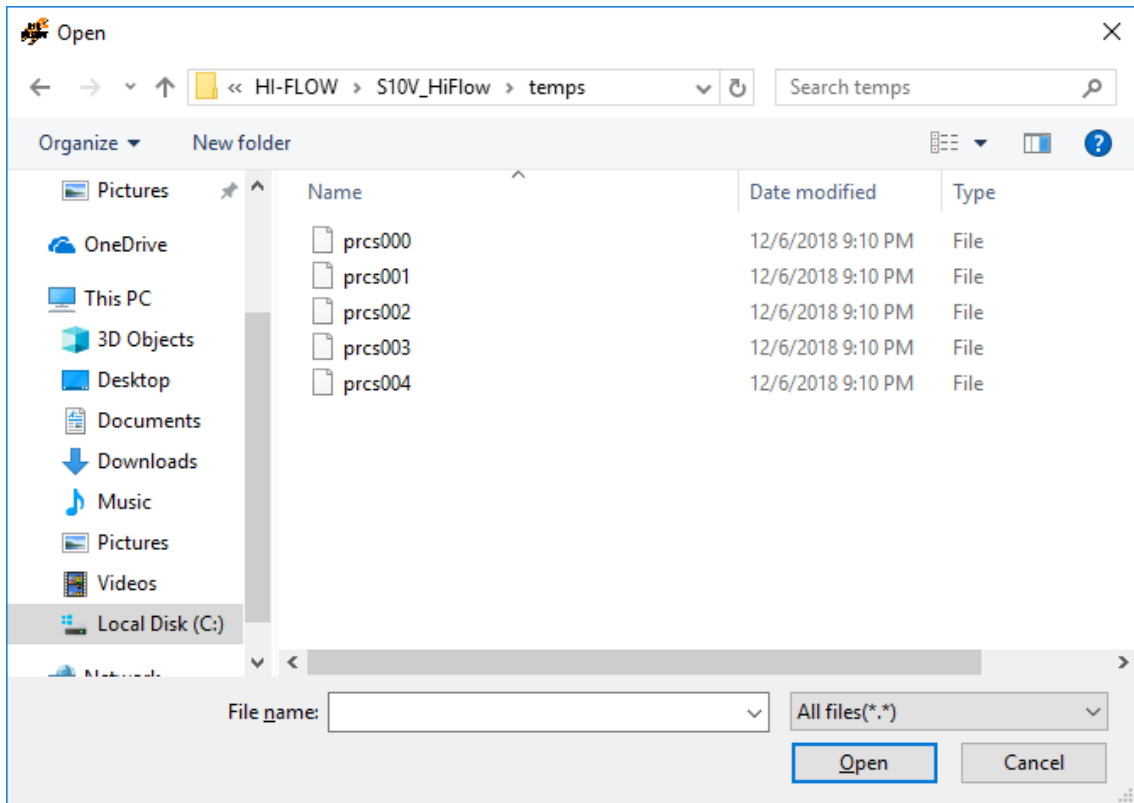


Figure 4-39 “Open file” Dialog Box

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

(2) Select the source file or the extd002 common file (*) to be converted.

You can select multiple source files (see Figure 4-40).

(*) If the number of characters in a file comment for the HI-FLOW program to be converted is an odd number of bytes, the last character will not be correctly converted when the extd002 file is converted.

For this reason, after you convert the extd002 file, open the “Properties” dialog box and replace the last character in the file comment with the last character in the file comment displayed in the “Properties” dialog box of the original file.

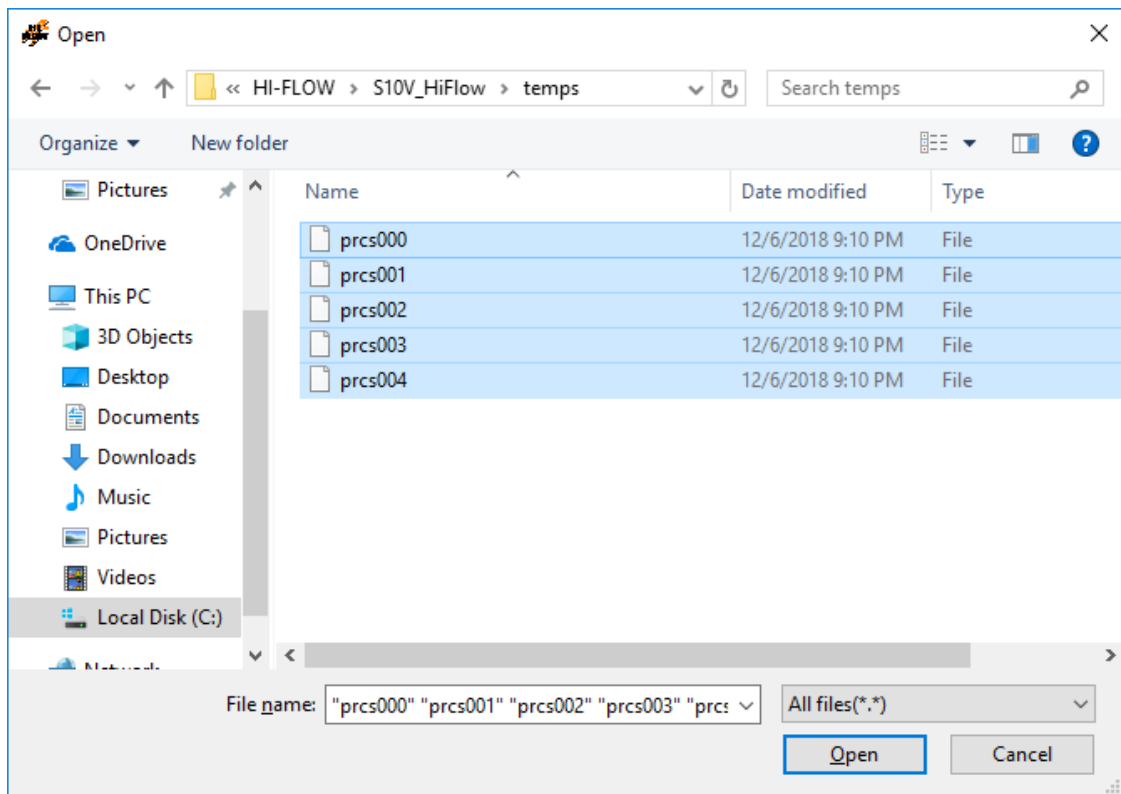


Figure 4-40 “Open file” Dialog Box (When Multiple Source Files are Selected)

(3) In the “Open file” dialog box, click the [Open] button.

The Output window displays the status of conversion. Also, note that the corresponding process icons appear in the HI-FLOW process sheet in non-compiled status (see Figure 4-41).

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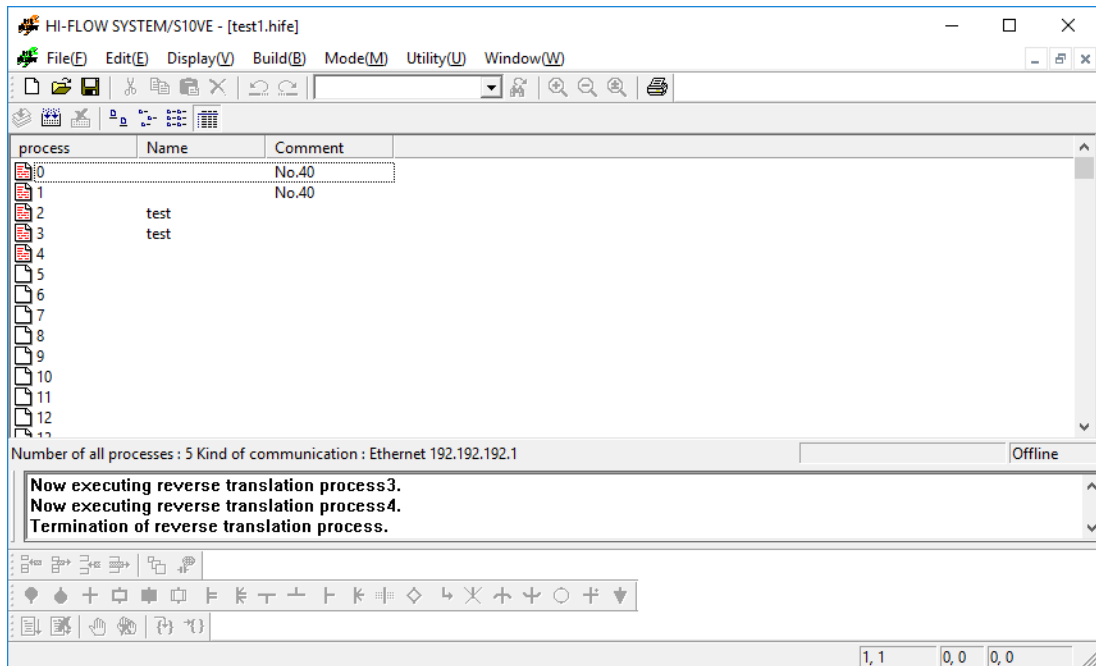


Figure 4-41 Display Example of the Output Window (Showing the Status of Conversion)

If you select a file that cannot be converted in the “Open file” dialog box and click the [Open] button, the following error message appears on screen:

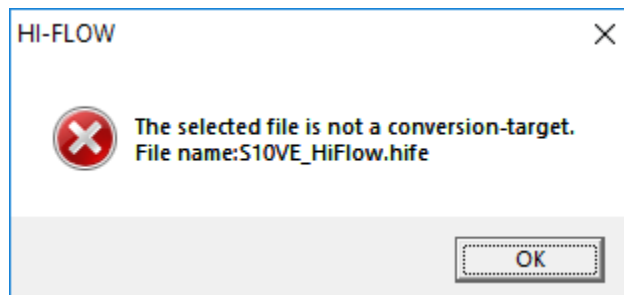


Figure 4-42 Example Error Message That Appears When You Select a File That Cannot be Converted

If you perform conversion while editing a HI-FLOW program, the source file of the HI-FLOW program being edited is overwritten without a confirmation message.

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- (4) In the HI-FLOW process sheet, click [Build] and then [Build].
The process icons of the selected source files appear as compiled in the HI-FLOW process sheet.
The result of the build appears in the Output window (see Figure 4-43).

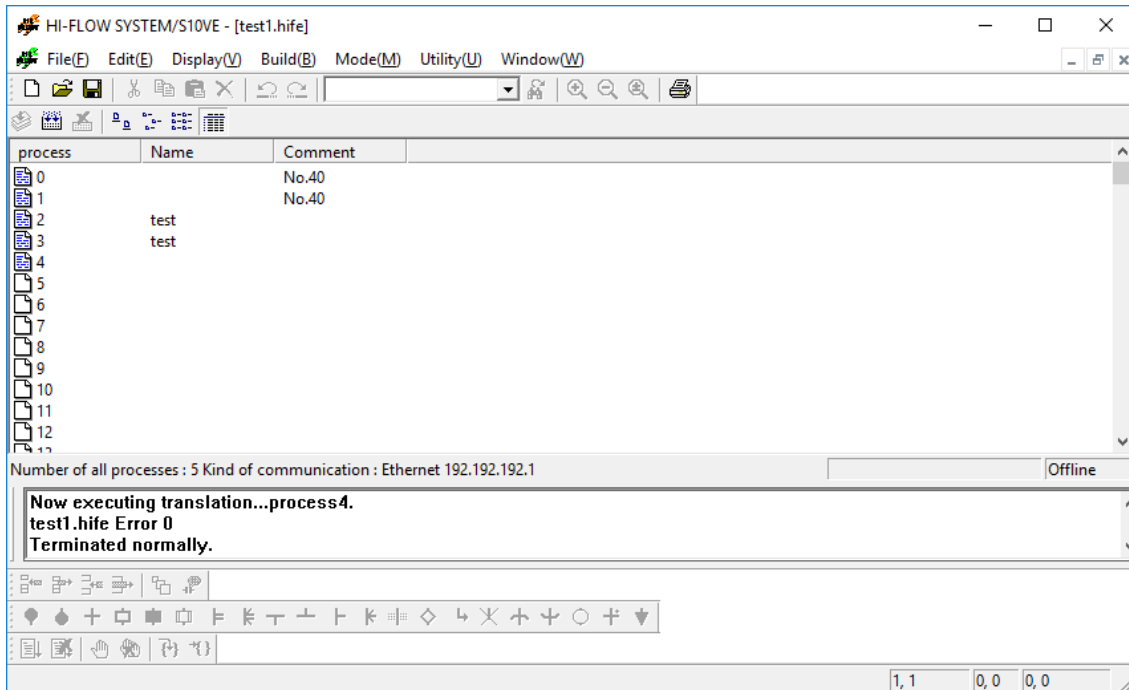


Figure 4-43 Example Display When the Process Icons Indicate Compiled Status

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4.8 Window Functions of the HI-FLOW Process Sheet

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

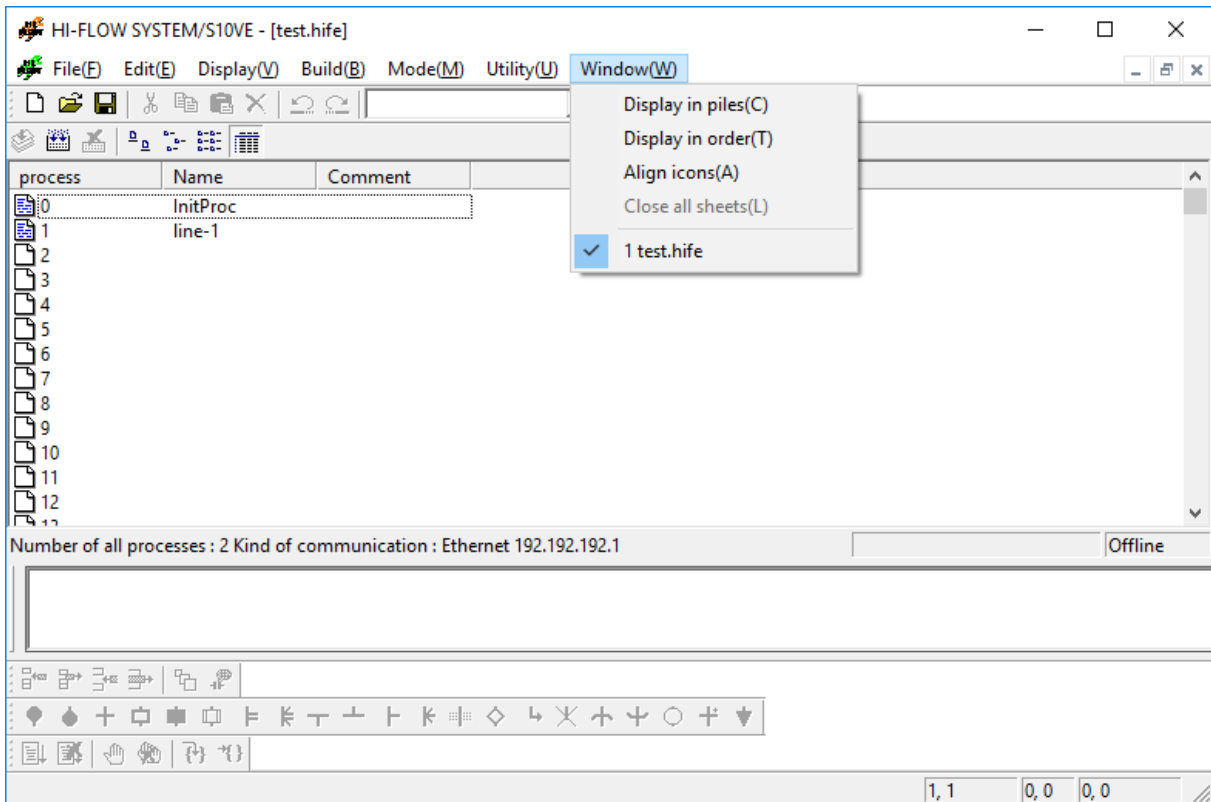


Figure 4-44 [Window] Menu in the HI-FLOW Process Sheet

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

Table 4-18 [Window] Menu Items in the HI-FLOW Process Sheet

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.

4.9 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>

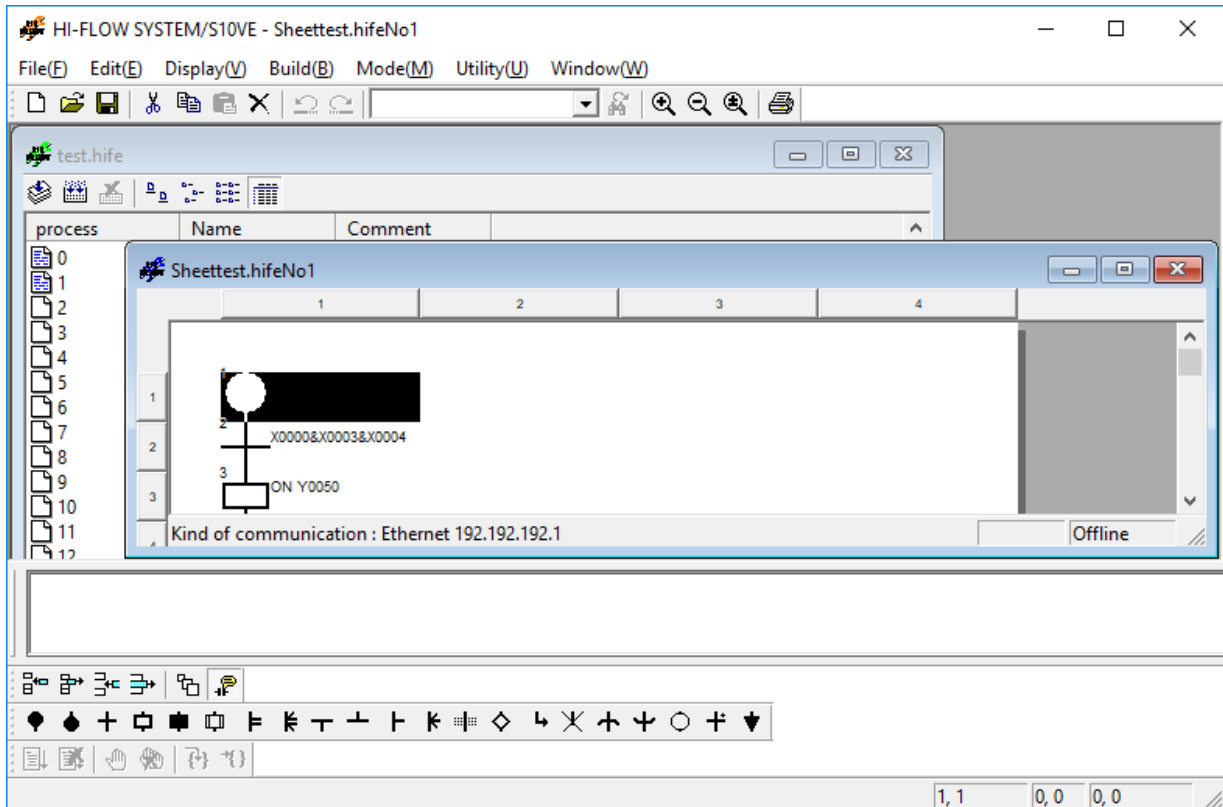


Figure 4-45 HI-FLOW Process Sheet and HI-FLOW Sheet

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<HI-FLOW symbol bar>

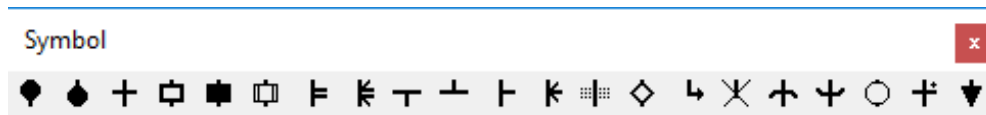


Figure 4-46 HI-FLOW Symbol Bar

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, and Non-synchronous process end.

4.9.1 Program editing area

This subsection describes the area where you edit HI-FLOW programs.

The program editing area for the HI-FLOW system is a lattice of n columns and m rows. In the HI-FLOW system, each rectangle is called a cell.

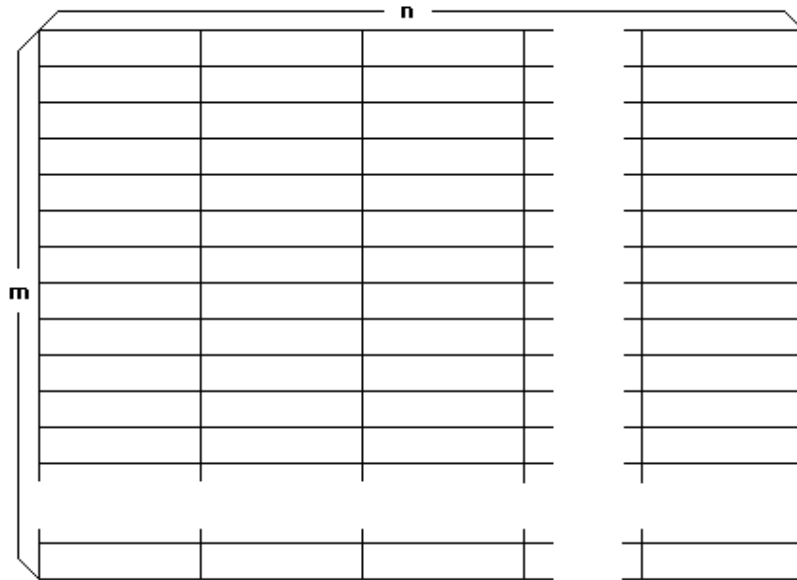


Figure 4-47 Cells for Editing HI-FLOW Programs

<Explanation of cells>

A cell in the above lattice is the minimum editing unit for HI-FLOW programs. You can change the width of a cell. Five sizes of cells are available and each size is expressed in the ratio of the height to the width of a cell. These variations in cell sizes do not affect the size of programs. Select a cell size depending on the number of characters in a syntax structure or a comment so that the cells do not overlap.

(1) 1:1

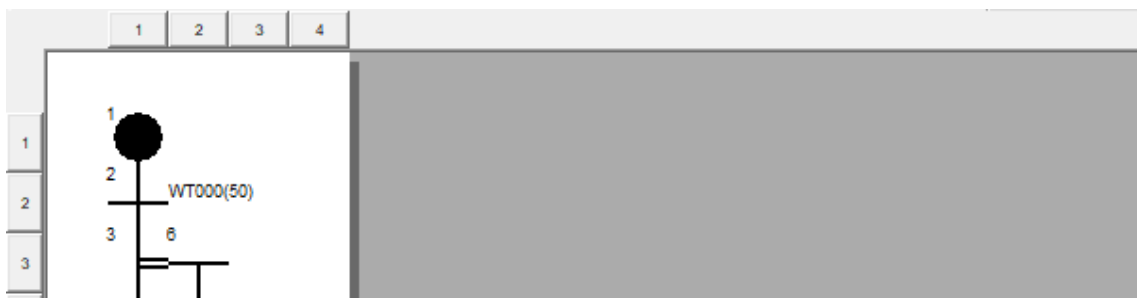


Figure 4-48 1:1 Cell

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(2) 1:2

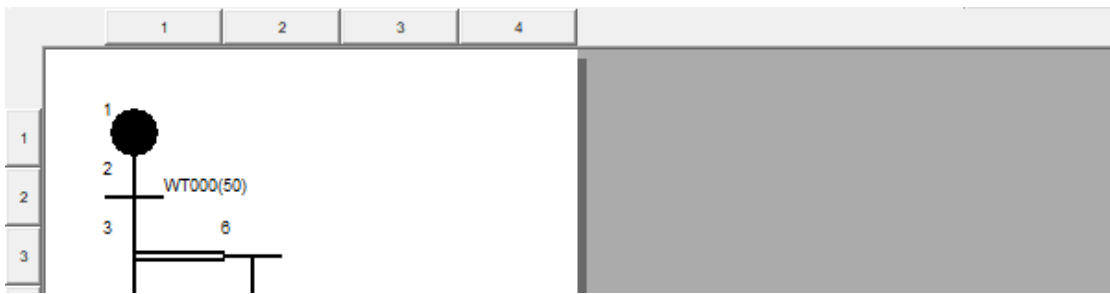


Figure 4-49 1:2 Cell

(3) 1:4

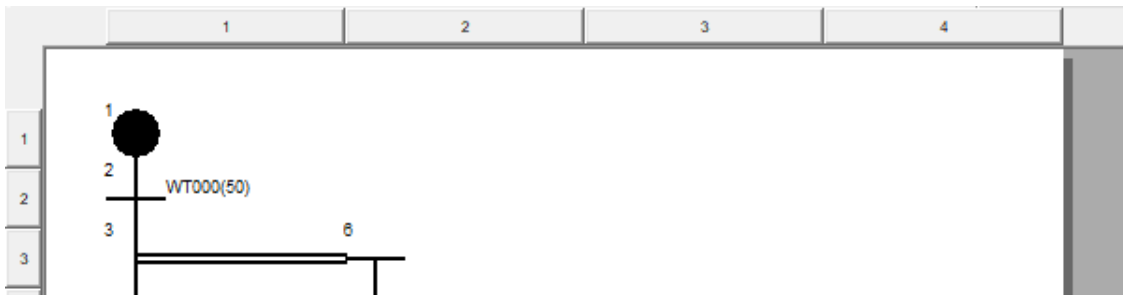


Figure 4-50 1:4 Cell

(4) 1:8



Figure 4-51 1:8 Cell

(5) 1:16

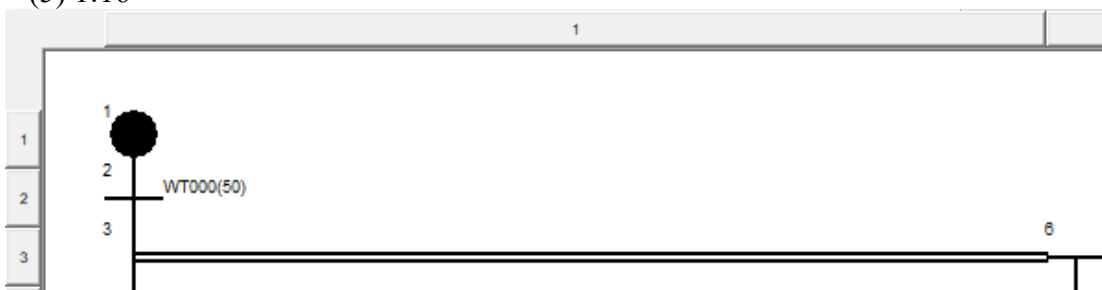


Figure 4-52 1:16 Cell

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

To change the cell size, in the HI-FLOW sheet, move the cursor to a cell containing no symbols and click [Edit] - [Property] to display the “Sheet Properties” dialog box. Alternatively, right-click an empty cell to display the “Sheet Properties” dialog box.

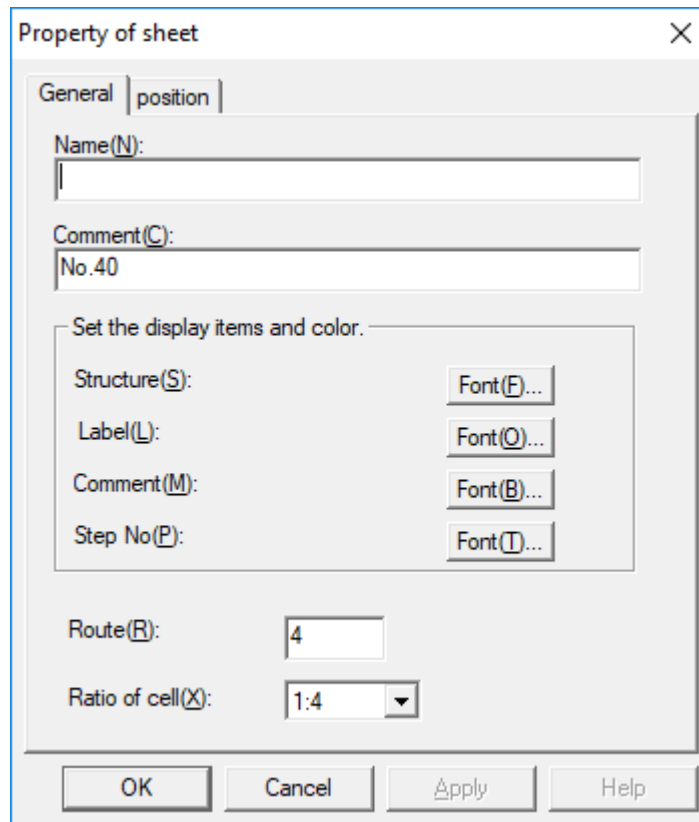


Figure 4-53 “Sheet Properties” Dialog Box

<Contents of cells>

In each cell, you can enter a step which is the minimum unit of a HI-FLOW program. Each step consists of the following five elements:

- Symbol: Specified by the user
- Syntax structure: Specified by the user
- Comment: Specified by the user
- Label: Specified by the user
- Step number: Automatically assigned by the system

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

<Attributes of step elements>

Each step element has attributes which can be freely customized by users.
The following table lists the attributes of the step elements.

Table 4-19 Attributes of the Elements in Steps in Cells

Step element	Font	Display color	Text size	Display position
Symbol	-	-	-	-
Syntax structure	Can be changed	Can be changed	Can be changed	Can be changed
Comment	Can be changed	Can be changed	Can be changed	Can be changed
Label	Can be changed	Can be changed	Can be changed	Can be changed
Step number	Can be changed	Can be changed	Can be changed	Can be changed

Font: You can change the font for syntax structures, comments, labels, and step numbers.

Display color: You can change the display color for syntax structures, comments, labels, and step numbers.

Text size: You can change the text size for syntax structures, comments, labels, and step numbers.

Display position: You can change the display positions of syntax structures, comments, labels, and step numbers in relation to the symbols.

<Size of the editing area>

You can change the size of the lattice-like area used for editing HI-FLOW programs.

To increase the height of the area, click [Edit] - [Insert line]. To decrease the height of the area, click [Edit] - [Delete line]. The maximum height is 255 rows.

To change the width of the area, click [Edit] - [Property] to open the "Sheet Properties" dialog box and select a desired size in the "Height to width ratio" box (the maximum width is 31 columns).

The editing area influences the size of a program that is transferred to the PCs.
Keep in mind that addition of rows and/or columns will increase the program size.

4.9.2 Editing programs

This subsection describes how to edit HI-FLOW programs. To edit a HI-FLOW program, you enter symbols, syntax structures, comments, and labels in the cells of the editing area. See below for the procedure.

<Modes for entering the components of a HI-FLOW program>

There are two modes for entering the components of a HI-FLOW program.

Depending on the [Edit] menu item you click, the procedure slightly differs.

- [Edit] - [Consecutively]: When you click this menu item, the symbol you select in the symbol bar remains selected after you paste it to a cell in the editing area.
- [Edit] - [Input]: When you click this menu item, the “Property of symbol” dialog box automatically appears after you paste a symbol to a cell in the editing area.

Depending on how you want to enter the components of a HI-FLOW program, select the appropriate mode.

- (1) If you want to paste a symbol and immediately enter the text (such as a syntax structure) for the symbol
Click [Edit] - [Input] ([Input] is chosen by default).
- (2) If you want to paste the same symbol in multiple cells consecutively and then enter the text (such as a syntax structure) for that symbol
Click [Edit] - [Consecutively].
- (3) If you want to paste all the symbols first and then enter text (such as a syntax structure) afterward
Cancel the selection of [Input].
[Input] is chosen by default and [Consecutively] is not chosen by default.

<Entering symbols and text>

- (1) Move the cursor to the cell where you want to enter a symbol.
- (2) Use the mouse to select the desired symbol in the symbol bar.
If you want to use the keyboard to select symbols, click [Utility] - [Keyboard] to assign key combinations to the symbols.
- (3) If you want to specify text such as the syntax structure and comment for the pasted symbol, double-click the symbol.
- (4) In the “Property of symbol” dialog box shown in Figure 4-54, enter the syntax structure, comment, and label.

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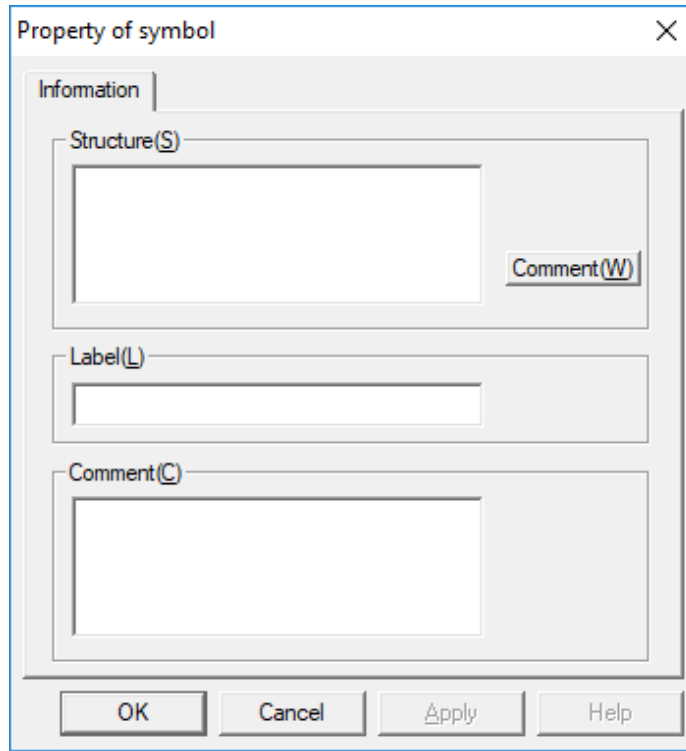


Figure 4-54 “Property of symbol” Dialog Box

<Defining the structure of the program>

After you finish entering text for the pasted symbols, enter the relationship between the symbols to define the structure of the HI-FLOW program.

A program consists of the start symbol, intermediate symbols, branches (simultaneous and alternative branches), merge, and end symbol.

Fully understand the meaning of each symbol and complete the HI-FLOW program.

<Manipulating a group of cells in the editing area>

When you edit a HI-FLOW program, you can select a group (rectangle) of cells and copy, paste, delete, or move it within the same process or between different processes. The group (rectangle) can contain multiple cells.

Table 4-20 Actions for Manipulating a Group of Cells

No.	Action	[Edit] menu item	Key or mouse operation
1	Selecting a group of cells	-	Hold down the [Shift] key at the position of the cursor and use the arrow keys to select the desired cells.
2	Selecting all cells	[Select all]	-
3	Deleting	[Delete]	[Delete] key
4	Copying	[Copy]	[Ctrl] + [C]
5	Pasting	[Paste]	[Ctrl] + [V]
6	Cutting	[Cut]	[Ctrl] + [X]
7	Moving	-	Drag the selected cells to the desired location.

<Manipulating rows>

You do not need to select the row you want to manipulate in advance. If you want to delete a row, simply move the cursor to the target row.

Table 4-21 Actions for Manipulating Rows

No.	Action	[Edit] menu item	Key or mouse operation
1	Selecting the target row	-	Move the cursor to the row you want to delete.
2	Deleting rows	[Delete line]	-
3	Inserting rows	[Insert line]	-

<Manipulating steps>

You do not need to select the step you want to manipulate in advance. If you want to delete a step, simply move the cursor to the target step.

Table 4-22 Actions for Manipulating Steps

No.	Action	[Edit] menu item	Key or mouse operation
1	Selecting the target step	-	Move the cursor to the step you want to delete.
2	Deleting steps	[Delete step]	-
3	Inserting steps	[Insert step]	-

- Deletion and cutting seem the same on screen. However, when you cut an item, it is written to the Clipboard. As a result, you can reuse the item later for pasting. When you delete an item, it is not written to the Clipboard. As a result, you cannot reuse the item later for pasting. When you delete or cut an item, the space previously occupied by the item becomes blank.
- For pasting, you can choose Insert mode or Overtyping mode. To choose either mode, in the HI-FLOW process sheet, click [Utility] - [Setup the environment] - [Paste]. The default mode is Insert mode. When you paste an item in Insert mode, if another program already exists in the paste destination, the existing program moves downward.
- When you delete a row or a step, the rows below the deleted row move up.

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

4.9.3 Pasting HI-FLOW symbols

You can choose from several methods when you paste HI-FLOW symbols to a sheet. Use whatever method you prefer.

(1) Drag-and-drop operation using the mouse

Select a symbol in the symbol bar and drag it to the desired location.

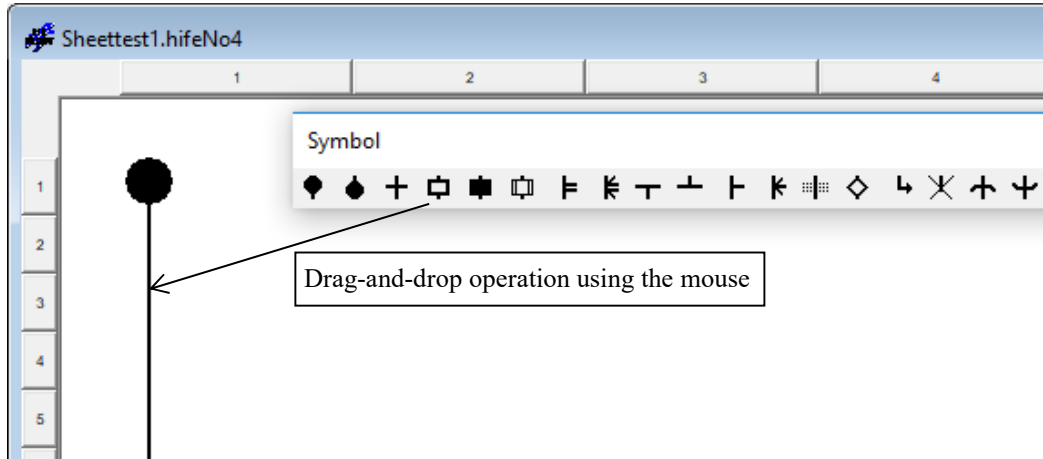


Figure 4-55 Pasting a Symbol by Using the Drag-and-Drop Operation of the Mouse

(2) Pasting a symbol at the position of the symbol cursor

Place the symbol cursor at the desired location. Click a symbol in the symbol bar. The selected symbol appears at the position of the symbol cursor.

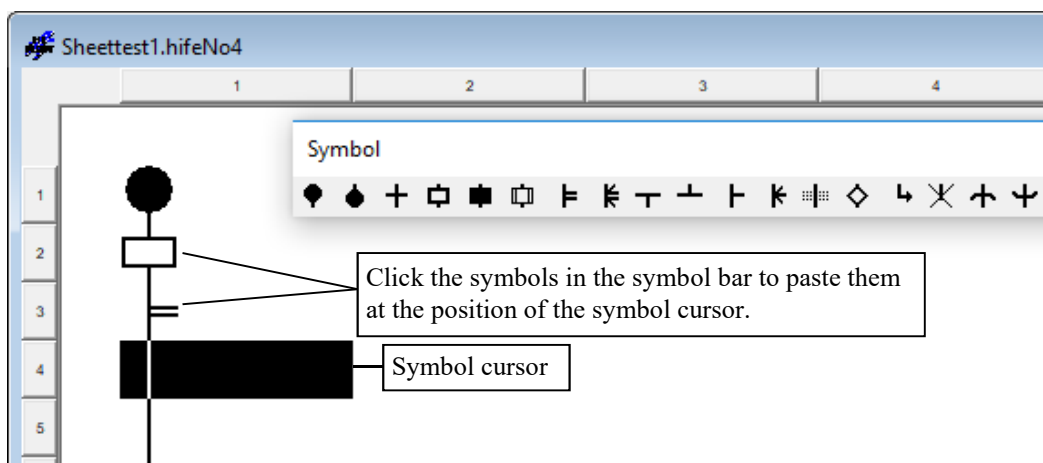




Figure 4-56 Pasting a Symbol at the Position of the Symbol Cursor

(3) Pasting the same symbol at multiple locations consecutively

When you click  ([Consecutively]) in the edit bar, you can enter the selected symbol in multiple locations consecutively. Simply click at the positions in the sheet where you want to paste the selected symbol. To cancel consecutive entry, click  ([Consecutively]) again in the edit bar.

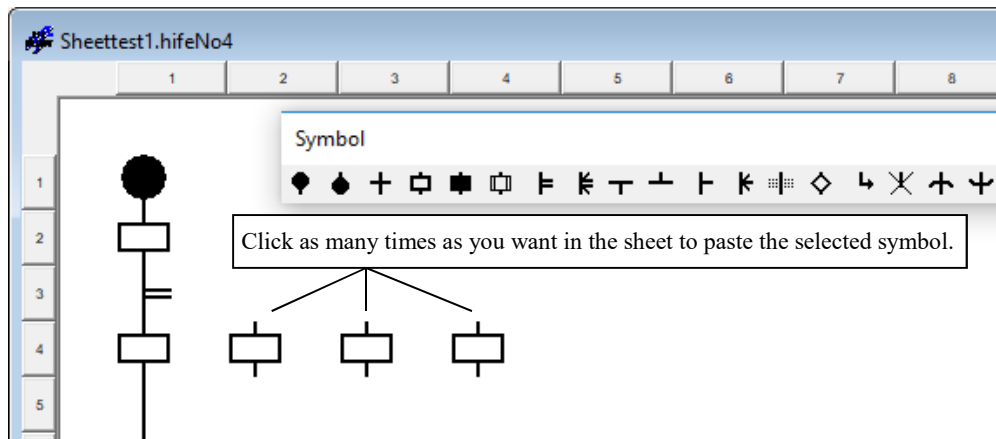


Figure 4-57 Pasting the Same Symbol at Multiple Locations Consecutively

(4) Using the keyboard keys to paste symbols

Certain key combinations are assigned to symbols. These key combinations allow you to paste symbols at the position of the symbol cursor on the sheet by pressing the applicable keys. To move the symbol cursor, use ←, →, ↑, and ↓. To change the key combinations for symbols, click [Utility] and then [Keyboard].

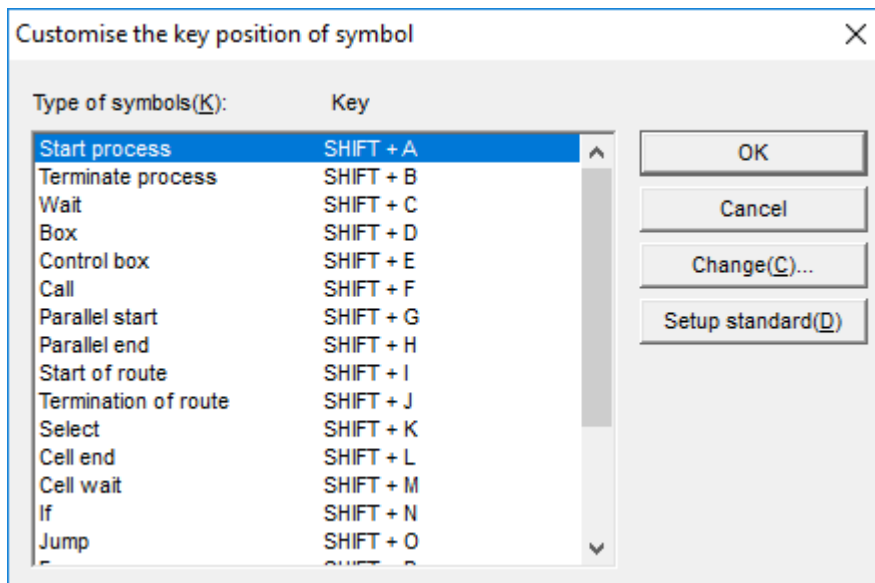


Figure 4-58 “Customizing Keys for Symbols” Dialog Box

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

4.10 File Functions of the HI-FLOW Sheet

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

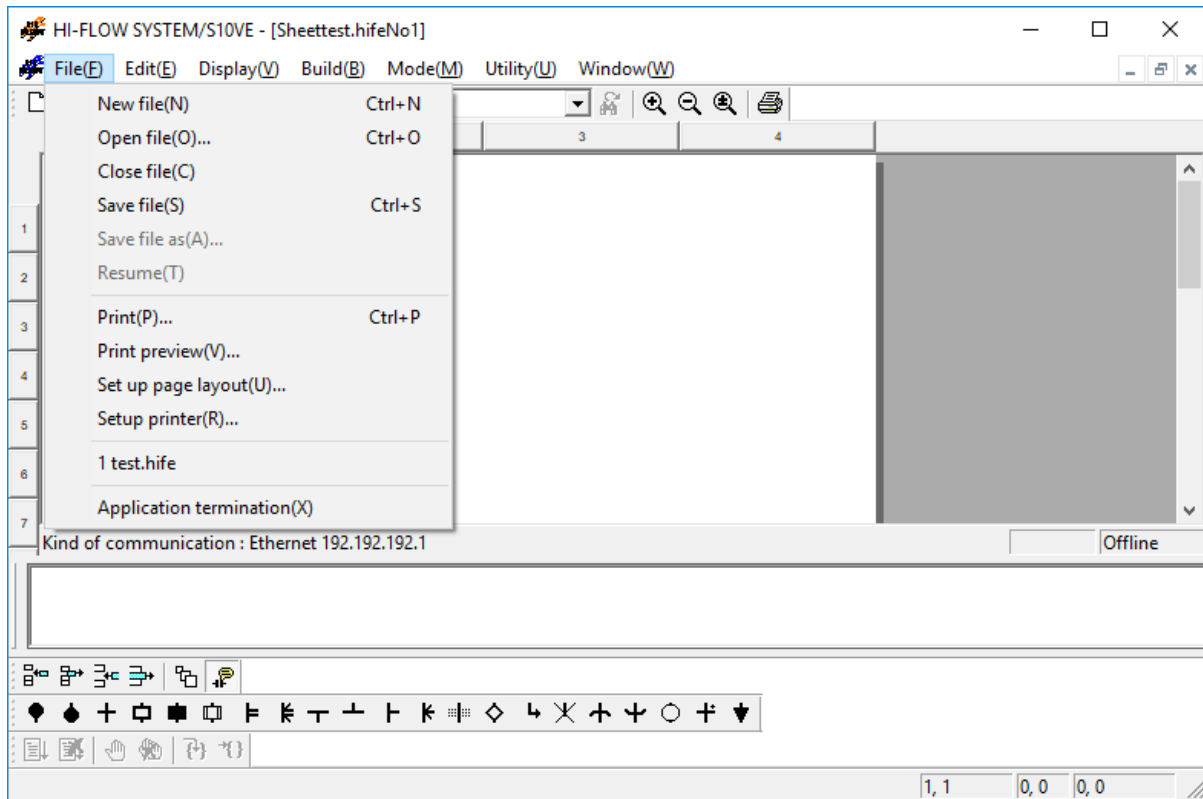


Figure 4-59 [File] Menu in the HI-FLOW Sheet

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 file functions.

Table 4-23 [File] Menu Items in the HI-FLOW Sheet

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		Allows the user to perform printing with specified settings such as printer and print range.
8		Print preview		Displays a preview of the print result.
9		Setup page layout		Allows the user to set page layout.
10		Setup printer		Allows the user to specify printer settings.
11		File name 1, 2, 3, 4...		Displays the files that were used in the past.
12		Application termination		Terminates this software.

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

4.11 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.

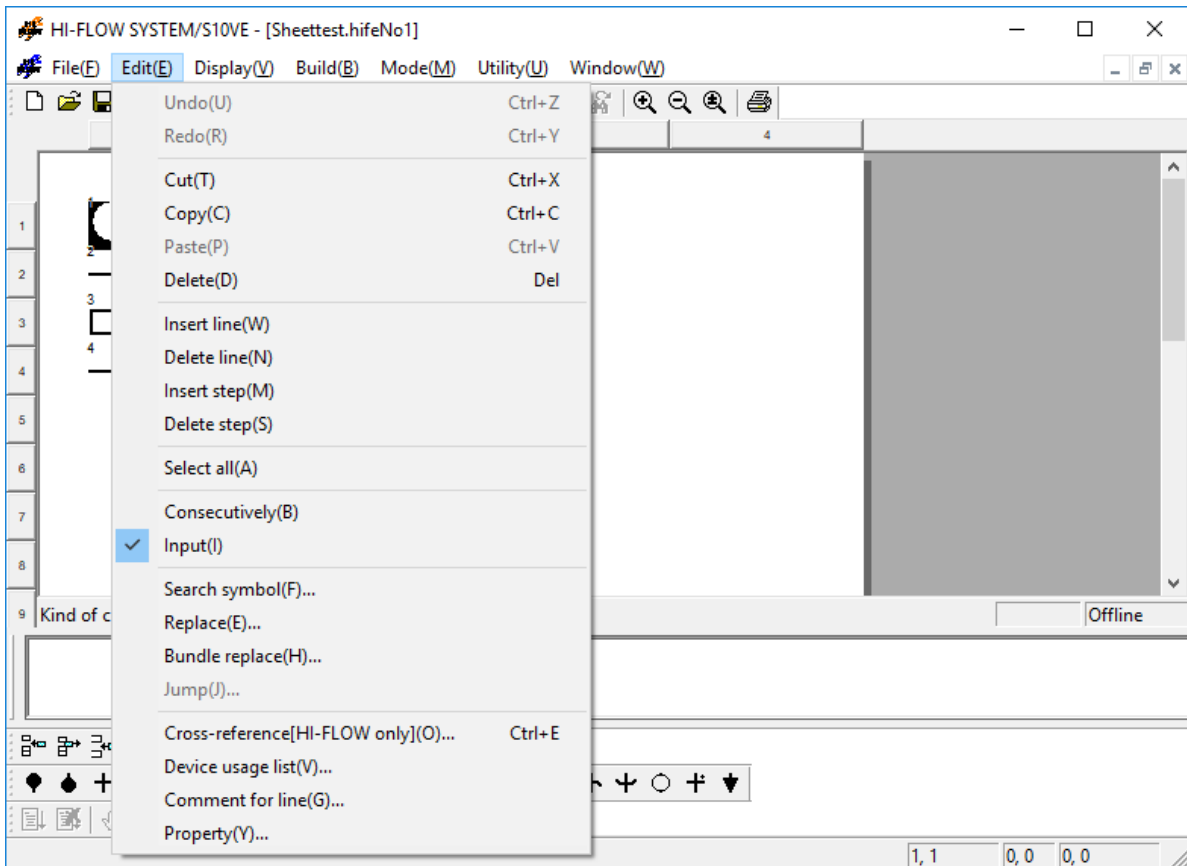


Figure 4-60 [Edit] Menu in the HI-FLOW Sheet

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.

Table 4-24 [Edit] Menu Items in the HI-FLOW Sheet

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.
11		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]		Currently not supported.
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

4.12 Display Functions of the HI-FLOW Sheet

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

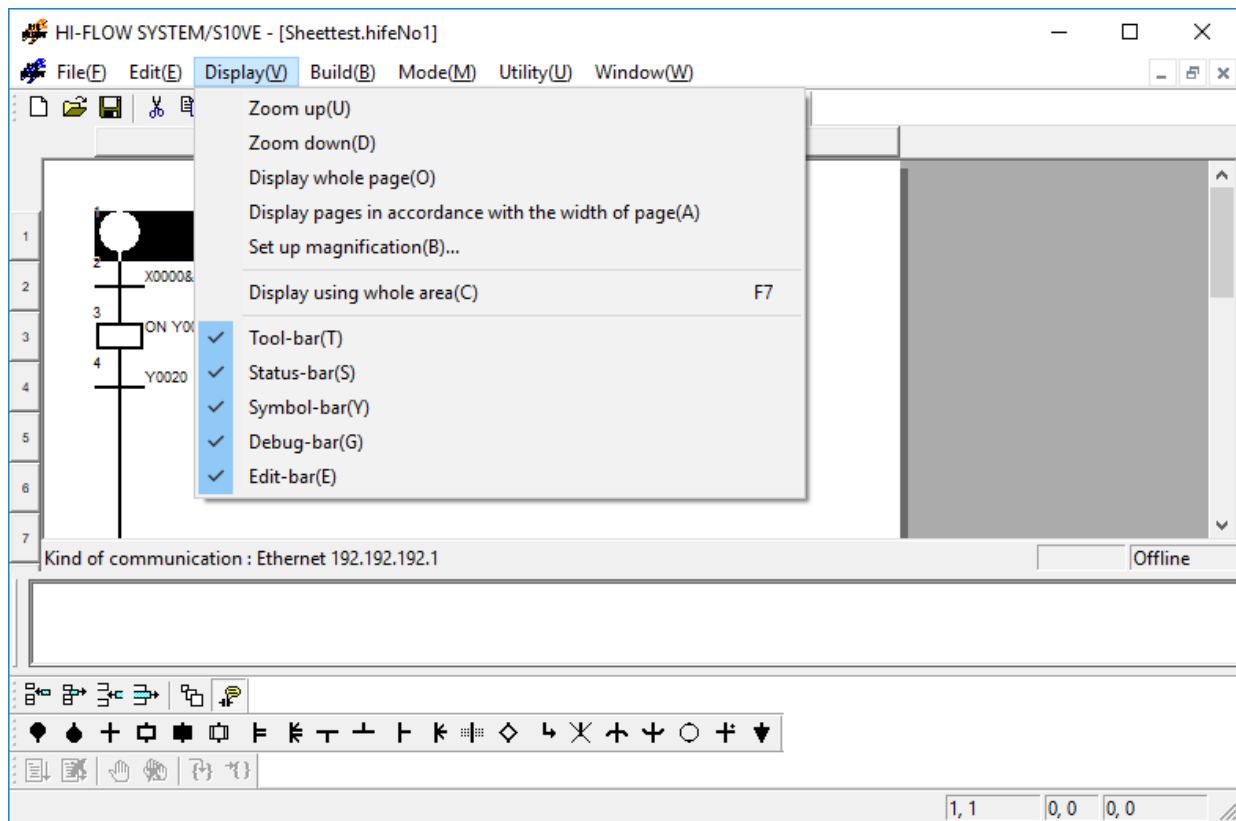


Figure 4-61 [Display] Menu in the HI-FLOW Sheet

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 display functions.

Table 4-25 [Display] Menu Items in the HI-FLOW Sheet

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

4.13 Build Function of the HI-FLOW Sheet

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

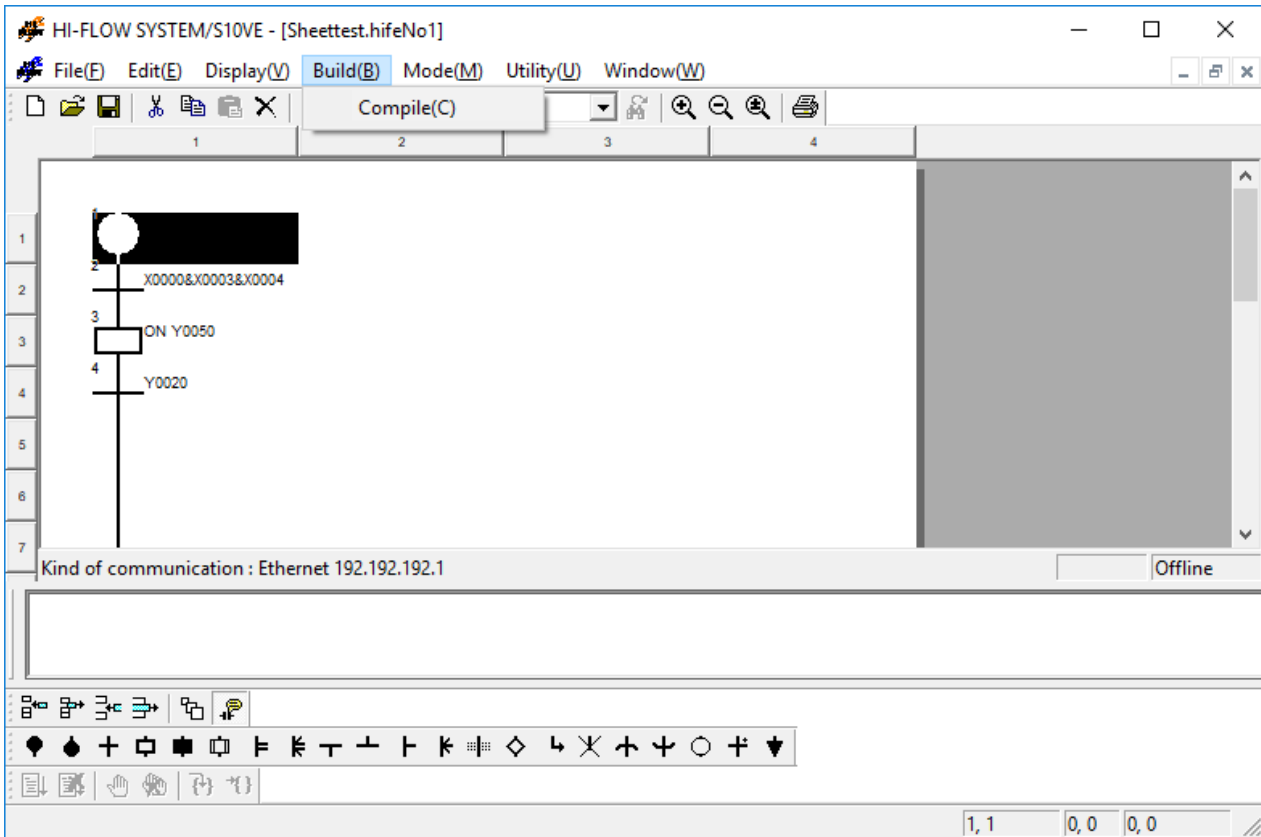


Figure 4-62 [Build] Menu in the HI-FLOW Sheet

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

Table 4-26 [Build] Menu Items in the HI-FLOW Sheet

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

4.14 Mode Functions of the HI-FLOW Sheet

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

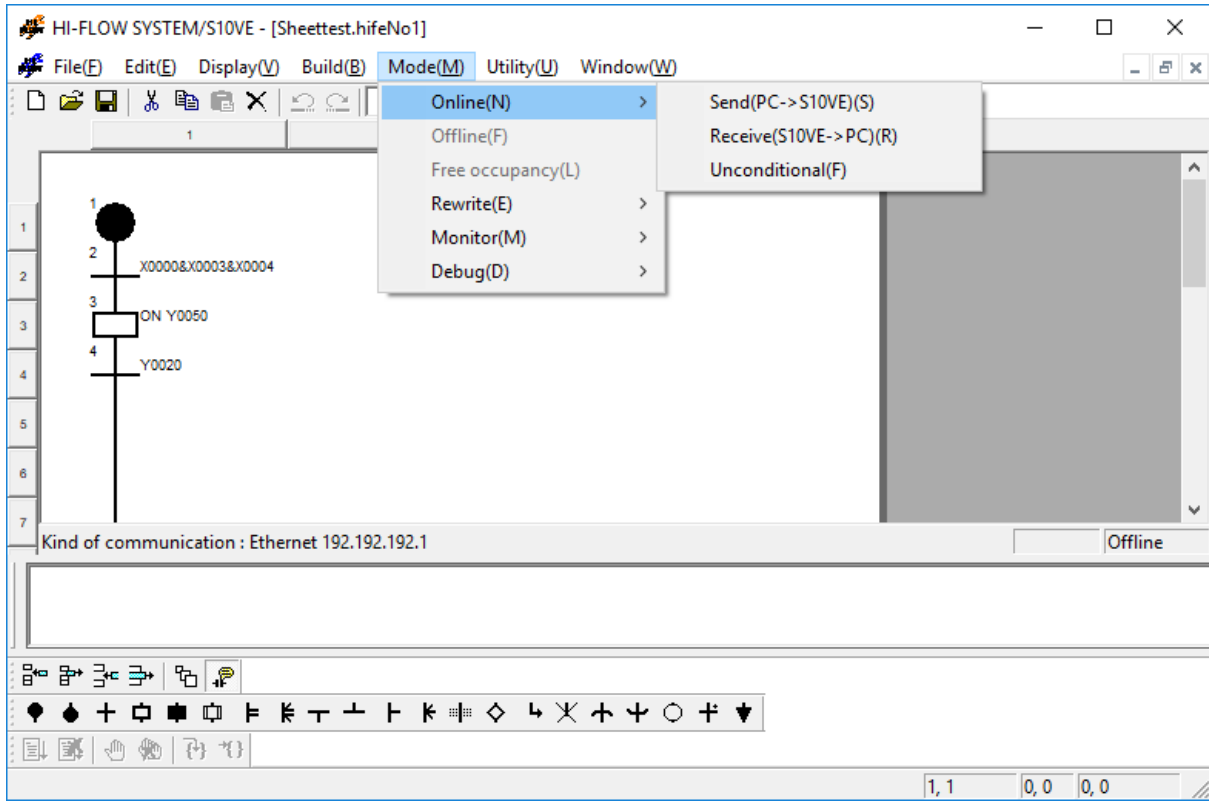


Figure 4-63 [Mode] Menu in the HI-FLOW Sheet

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 mode functions.

Table 4-27 [Mode] Menu Items in the HI-FLOW Sheet

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
10		Stop monitoring		Stops monitoring.
11		Step		Monitors the through-step.
12		I/O		Monitors the bit ON/OFF state.
13		Clear		Initializes the execution locus.
14		Debug (*)	Trace	Traces and displays process movement between the starting condition and ending condition.
15			Time monitor	Monitors the time elapsed between the starting condition and ending condition.
16			Breakpoint	Sets and resets the breakpoint.
17			Executing point	Moves the cursor to the executing point.

(*) This function does not support HI-FLOW equalization.

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.

4.14.1 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

<p>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 ladder.</p>

(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.

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

(3) Limitations

- **Rewriting steps**

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

(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	Calls P2 via P1 when the master is reset.
	CALL P2	
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.

Table 4-28 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.

Table 4-29 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 [OK] button.
- [6] A confirmation dialog box appears if requested by setting. Click the [Yes] 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.

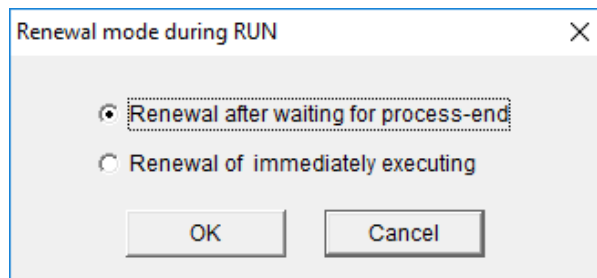


Figure 4-64 The “Renewal mode during RUN” Dialog Box

- [5] Select the desired rewrite method (renewal mode) from the two available and click the [OK] 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.

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

[7] If the “Renewal after waiting for process-end” radio button is clicked, 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.

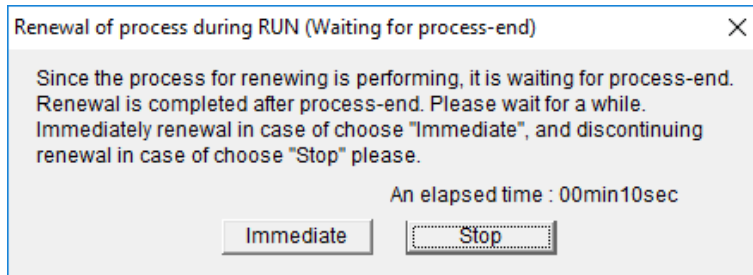


Figure 4-65 The “Renewal of process during RUN (Waiting for process-end)” Dialog Box

When the rewriting started at the process end is completed, the above dialog box closes and the message shown in Figure 4-68 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 4-68 appears in the output window.

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

<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 4-65. When it is clicked, the “Renewal of process during RUN (Immediate renewal)” dialog box shown in Figure 4-66 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 4-68 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.

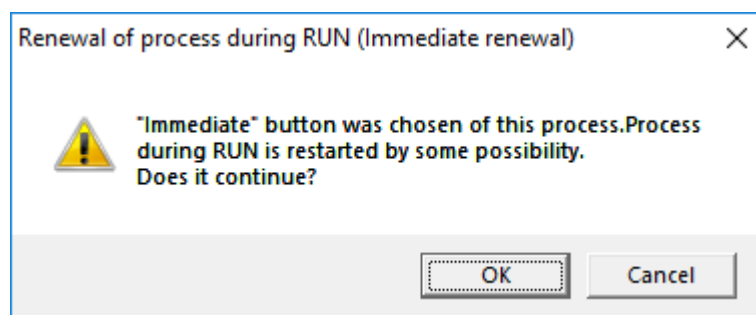


Figure 4-66 The “Renewal of process during RUN (Immediate renewal)” Dialog Box

<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 4-65. When it is clicked, the “Renewal of process during RUN (Stop of renewal)” dialog box shown in Figure 4-67 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 4-69. 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.

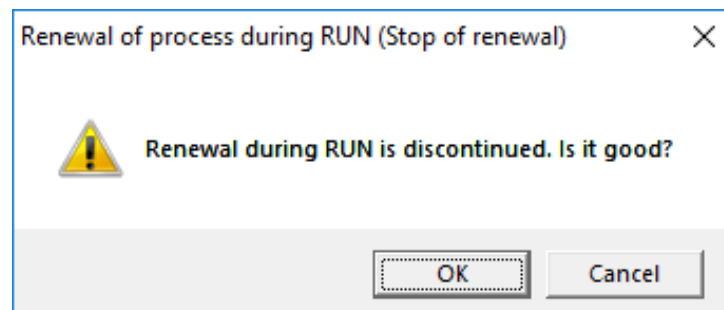


Figure 4-67 The “Renewal of process during RUN (Stop of renewal)” Dialog Box


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.

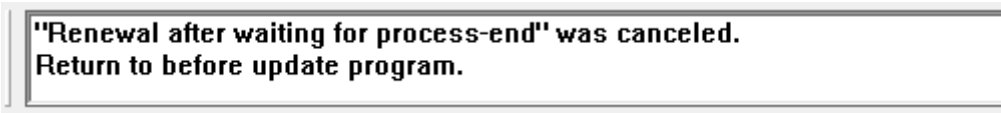


**Finished Renewal mode during RUN edit function.
Renewed process is already carried out.**

Figure 4-68 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 (4.14.1, “Outline of run-status rewriting”) is exited simultaneously.



**"Renewal after waiting for process-end" was canceled.
Return to before update program.**

Figure 4-69 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. Send the modified process to the PCs or receive the old process from the PCs so that the process in the personal computer and the process in the PCs match.

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

- Rewriting register values

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

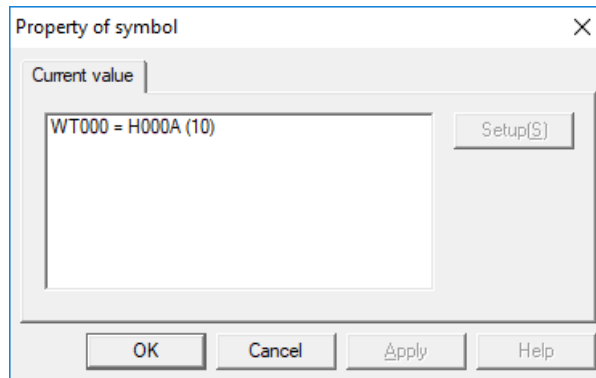


Figure 4-70 “Property of symbol” Dialog Box

- [2] In this dialog box, double-click the register whose value is to be rewritten. The “Setting Value” dialog box appears.

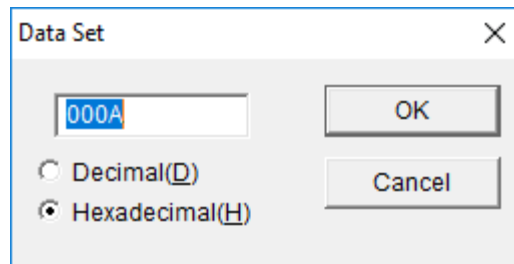


Figure 4-71 “Setting Value” Dialog Box

- [3] Enter a value and click the [OK] button.

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

(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.

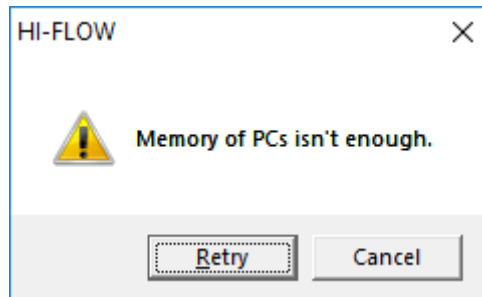


Figure 4-72 Message Indicating Insufficient Memory

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].

4.14.2 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-written 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.

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4.14.3 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: 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 4-73) 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.

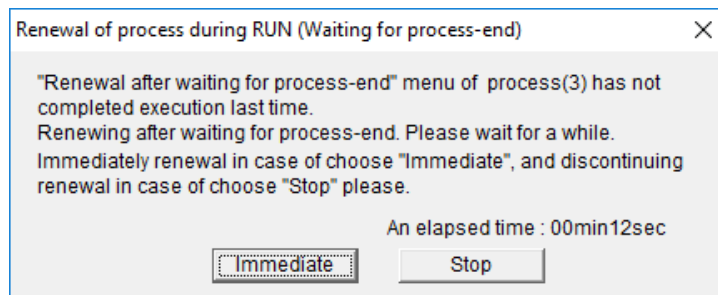


Figure 4-73 “Renewal of process during RUN (Waiting for process-end)” Dialog Box

Clicking the [Immediate] 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 [Stop] button in place of [Immediate] button, the requested rewrite process will be aborted with the dialog box closed.

If you click the [Immediate] button in the “Renewal of process during RUN (Waiting for process-end)” dialog box (Figure 4-73) 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.

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

- (2) Case 2: 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.

When you click the [OK] button in the above dialog box 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 4-64). If you click the [Cancel] button in place of [OK] button, the HI-FLOW system cancels the issued request and displays the cancellation message shown in Figure 4-69.

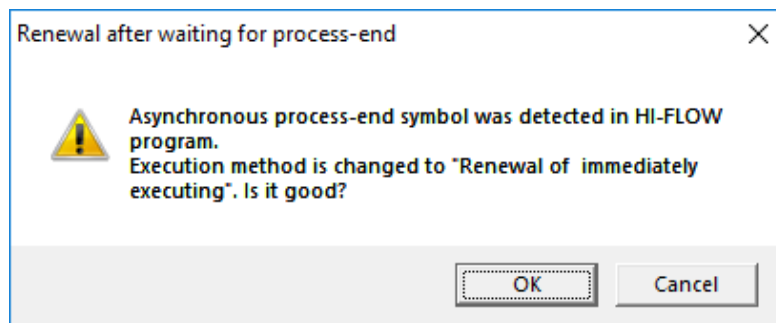


Figure 4-74 Message Indicating That a Non-synchronous Process End is Detected

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

- (3) Case 3: 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.

**PCs reset or PCs down was detected on the way of processing.
Please bring into operation [Mode]-[Rewrite]-[Process]menu again.**

Figure 4-75 Message Indicating That a “PCs Reset” or “PCs Down” Condition is Detected

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

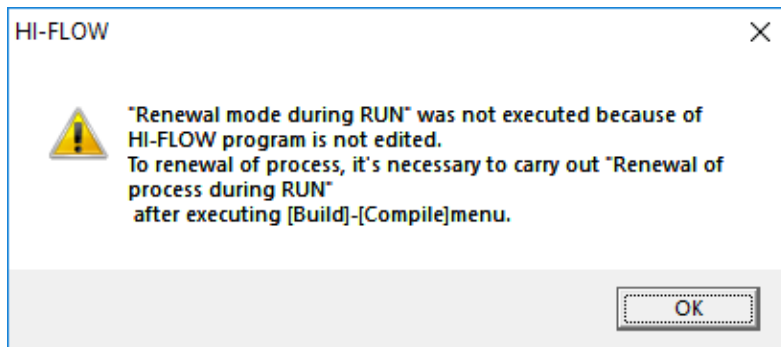


Figure 4-76 Message Indicating That the Program is Not Edited

4.14.4 Monitoring programs

<Description>

Use the [Mode] menu items to monitor the status of the HI-FLOW programs running on PCs. The results are displayed in the HI-FLOW sheets.

The following figure is an example display of a program that is being monitored.

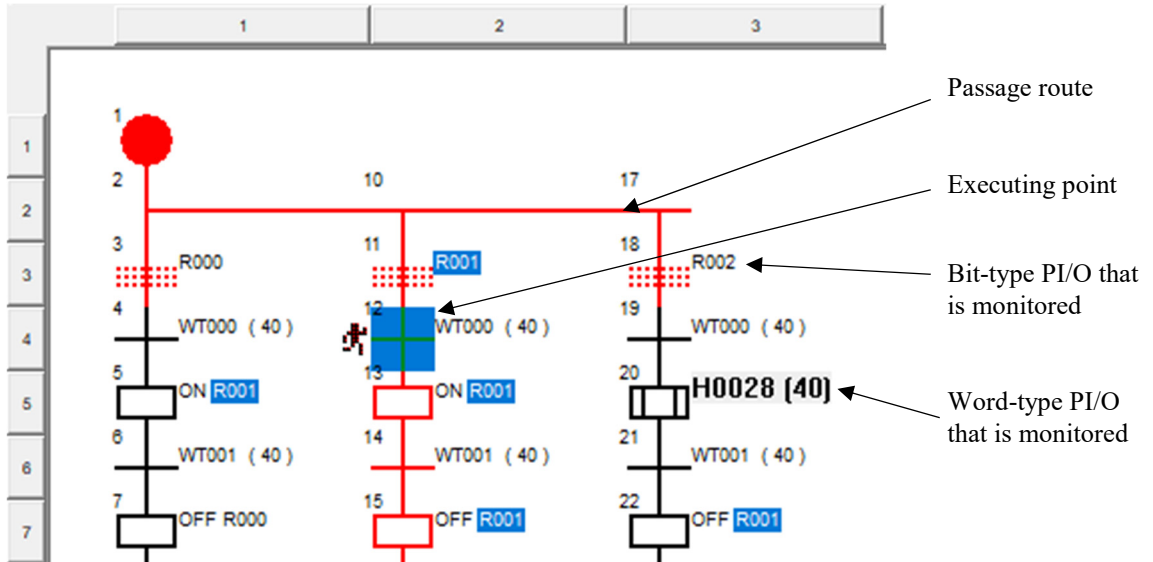


Figure 4-77 Example of Monitoring a Program

<Procedure>

- (1) Receive the program from the PCs (or send the program to the PCs).
- (2) In the HI-FLOW sheet, click [Mode] - [Monitoring] - [Start].
- (3) To stop monitoring, click [Mode] - [Monitoring] - [Stop].

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

<Notes on the procedure>

- When you monitor programs, you can enter online mode by clicking [Mode] - [Online] - [Unconditional]. However, in this case, the user must make sure that the programs in the PCs and the programs being displayed in the HI-FLOW sheets match.
- You can scroll the HI-FLOW sheet while the program is being monitored.
- If you want to select a specific background color for monitoring, see “(3) Dialog box for specifying background colors” in 4.7.3, “Environment settings.”
- If you scroll the HI-FLOW sheet or change the size of the window while the program is being monitored, the ON indication temporarily changes to OFF. This change of status is only for display and has nothing to do with the actual online status.
- If you reduce the size of the window by clicking [Display] - [Zoom down], the number of points to be monitored increases. In that case, the refresh time for monitoring becomes longer. Use caution when you change the size of the window.
- This function is only available in online mode.
- If you want to monitor bit-type PI/Os or word-type PI/Os, double-click the applicable step or select the applicable step and then click [Edit] - [Property]. The “Property of symbol” dialog box appears listing the current values of PI/Os. In this dialog box, you can change the values of PI/Os.
- For WTS (*1) and CNE (*2), values are displayed but they cannot be changed.

(*1) WTS is a symbol that is used to change the value specified for the timer being used using a box. For details, see 4.4, “Boxes” in the programming manual.

(*2) CNE is a symbol that is used to change the end value of a counter in the syntax structure of the repeat start or the repeat end using a box. For details, see 4.4, “Boxes” in the programming manual.

4.14.5 Monitoring execution steps

<Description>

Use the [Mode] menu items to monitor the execution steps in the HI-FLOW programs running on a programmable controller. The applicable symbols in the program are shown in red during monitoring.

The following figure is an example display of monitoring execution steps.

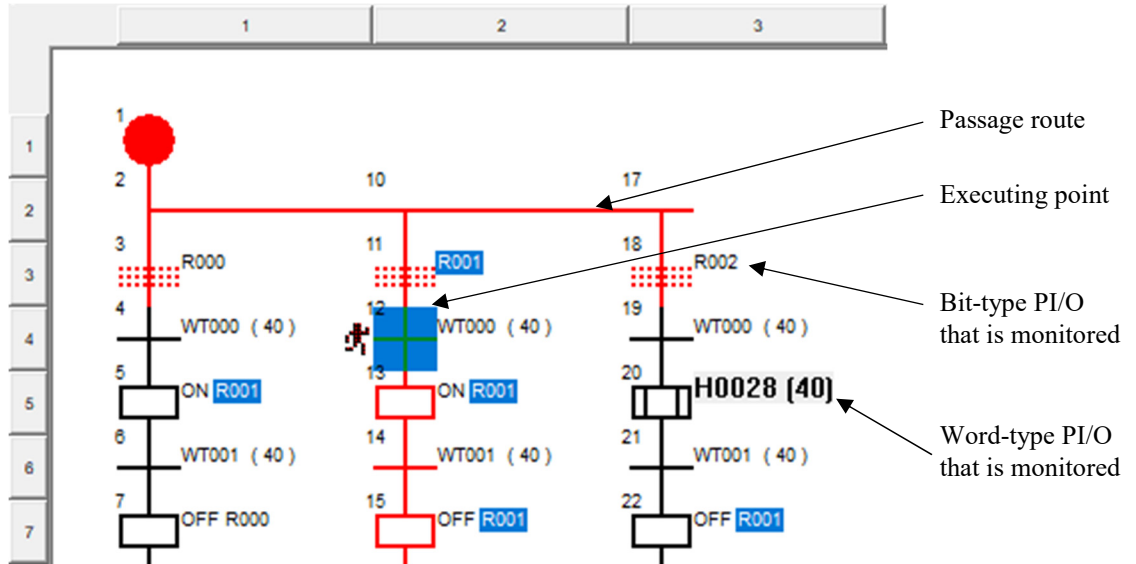


Figure 4-78 Example of Monitoring Execution Steps

<Procedure>

- (1) Receive the program from the PCs (or send the program to the PCs).
- (2) In the HI-FLOW sheet, click [Mode] - [Monitoring] - [Start].
- (3) In the HI-FLOW sheet, click [Mode] - [Monitoring] - [Step] ([Step] is chosen by default).

To stop monitoring, click [Mode] - [Monitoring] - [Step] again.

If you want to change the color of symbols from red to the normal color, click [Mode] - [Monitoring] - [Clear].

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

4.14.6 Setting Breakpoints

<Description>

Use the following [Mode] menu item to set breakpoints in HI-FLOW programs in PCs. When a program is suspended at a breakpoint, the status bar shows the program is in break mode. During monitoring, the token is displayed at the step where the breakpoint exists.

In the following figure, the status bar shows the program is in break mode.

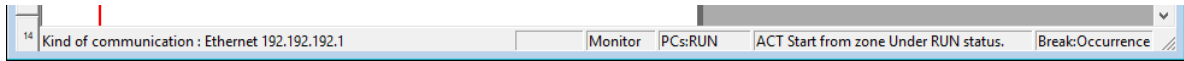


Figure 4-79 Status Bar Indicating That the Program is in Break Mode

<Procedure>

- (1) Put the HI-FLOW system online.
- (2) Click [Mode] - [Debug] - [Breakpoint].
The following dialog box appears.

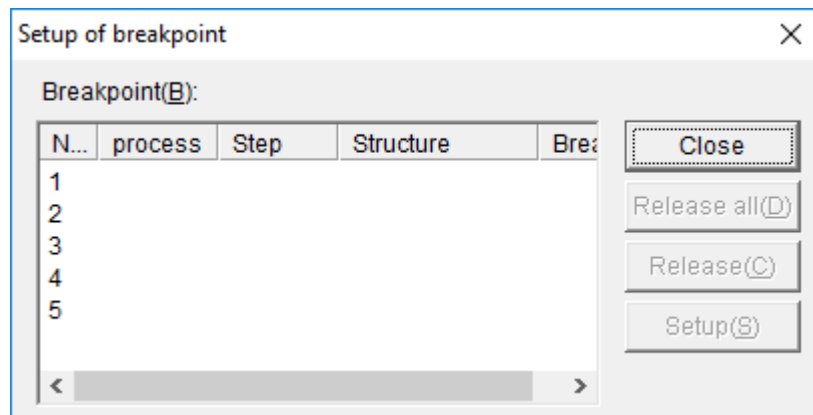


Figure 4-80 “Setting Breakpoints” Dialog Box

- (3) In the list, double-click a number in the “No.” column or select a number in the “No.” column and click the [Set] button. A dialog box appears allowing you to add a breakpoint. In this dialog box, enter the process number and the step number for the breakpoint.
If you want to cancel breakpoints, in the “Setting Breakpoints” dialog box, click the [Cancel All] button or select a number in the “No.” column and click the [Cancel] button.

To set or cancel the breakpoints, using the debug bar (see Figure 4-81) is recommended.

4.14.7 Jumping to the specified step or the executing point

<Description>

You can jump to a desired step or the executing point in a HI-FLOW program in online mode.

When you specify jump, the cursor moves to the specified step or the current executing point and displays that specified step or current executing point.

The debugging function does not support HI-FLOW equalization. When HI-FLOW equalization is enabled in the “HI-FLOW Equalization Settings” window of BASE SYSTEM/S10VE, the debugging function cannot be used.

<Procedure>

(1) Jumping to the specified step

During online mode, in the HI-FLOW sheet, click [Edit] - [Jump]. In the displayed dialog box, enter the jump destination step.

(2) Jumping to the executing point

During online mode, in the HI-FLOW sheet, click [Mode] - [Debug] - [Executing point]. The cursor moves to the executing point and the point is displayed. This action is also possible when you are not monitoring a program or when you are monitoring a program and you want to see the executing point that is not currently displayed.

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

4.14.8 Debug bar

<Description>

Use the debug bar to debug HI-FLOW programs in online mode.

There is no equivalent menu for this function. You need to use the debug bar or the toolbar to perform the procedure described here.

<Explanation of the buttons>

See below for the meaning of the buttons on the debug bar.

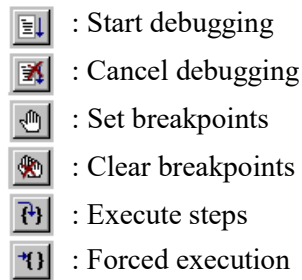


Figure 4-81 Buttons on the Debug Bar

- (1) Start debugging: Starts debugging. Clicking this button allows you to start setting breakpoints.
- (2) Cancel debugging: Cancels debugging.
- (3) Set breakpoints: Sets a breakpoint at the current cursor position. When a breakpoint is set for a symbol, the display color of the symbol changes. When you use this button to set a breakpoint, the breakpoint automatically enters a table of breakpoints in the same manner when you click [Mode] - [Debug] - [Breakpoint].
- (4) Clear breakpoints: Cancels all the breakpoints that are set.
- (5) Execute steps: Executes the program from the current executing point step by step. When you click this button, the HI-FLOW system executes one step, moves the breakpoint to the next step, and stops the program.
- (6) Forced execution: Performs the same function as the [Execute steps] button. However, if the program stops at a symbol with a condition, the [Forced execution] button ignores the condition and moves to the next step.

<Procedure>

Click the button you want.

- You can click the [Execute steps] button only after the program stops at a breakpoint.
- When you click the [Execute steps] button at a branch to a subroutine, the HI-FLOW system only moves the breakpoint to the main route, not to the subroutine.
- When you click the [Execute steps] button, the execution step is not displayed.
- When you click the [Execute steps] button, if the program stops at a symbol with a condition, the breakpoint does not move to the next step unless the condition is satisfied. If you want to ignore the condition and move the breakpoint to the next step, use the [Forced execution] button.

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

4.15 Utility Functions of the HI-FLOW Sheet

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

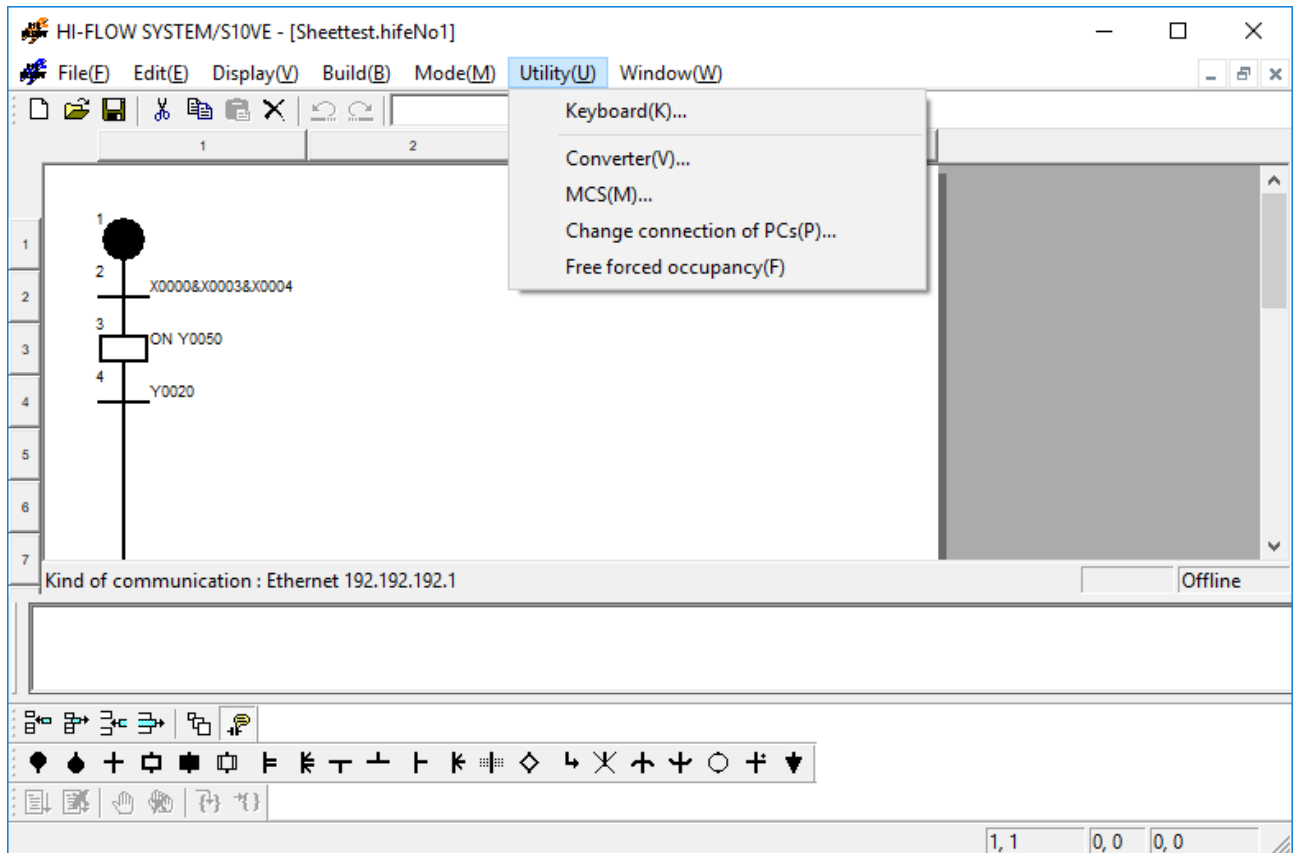


Figure 4-82 [Utility] Menu in the HI-FLOW Sheet

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 utility functions.

Table 4-30 [Utility] Menu Items in the HI-FLOW Sheet

No.	Level 1	Level 2	Level 3	Outline of function
1	Utility	Keyboard		Sets a symbol input from the keyboard.
2		Converter		Converts a source file that was created using the S10V HI-FLOW system so that it can be used in the S10VE. You cannot specify multiple source files.
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		Currently not supported.

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.

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

4.15.1 Keyboard

<Description>

This function allows you to assign key combinations to symbols so that you can use the keyboard to enter symbols in HI-FLOW programs.

<Procedure>

In the HI-FLOW sheet, click [Utility] - [Keyboard].

The following “Customizing Keys for Symbols” dialog box appears on screen:

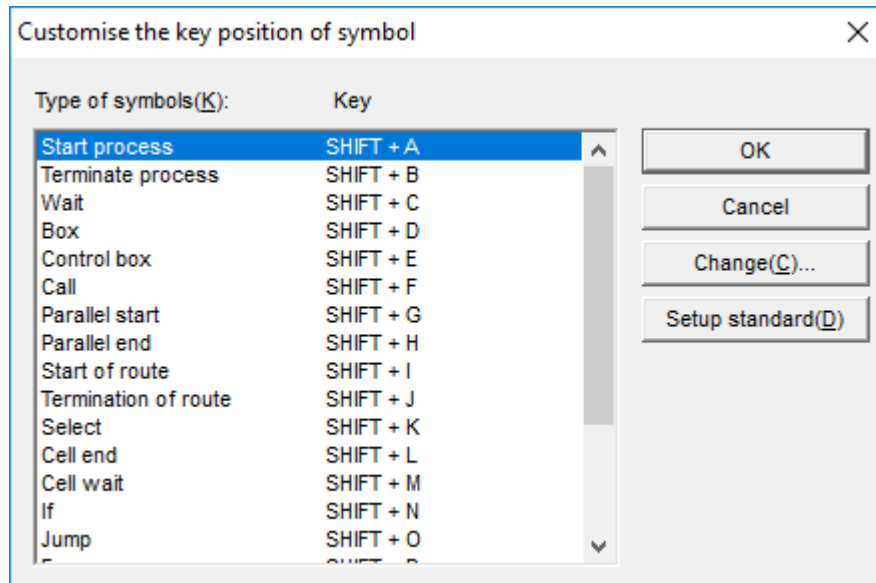


Figure 4-83 “Customizing Keys for Symbols” Dialog Box

- (1) Key combinations are assigned to symbols by default. If you want to change a default key combination, double-click the target symbol. The following “Key Settings” dialog box appears on screen:

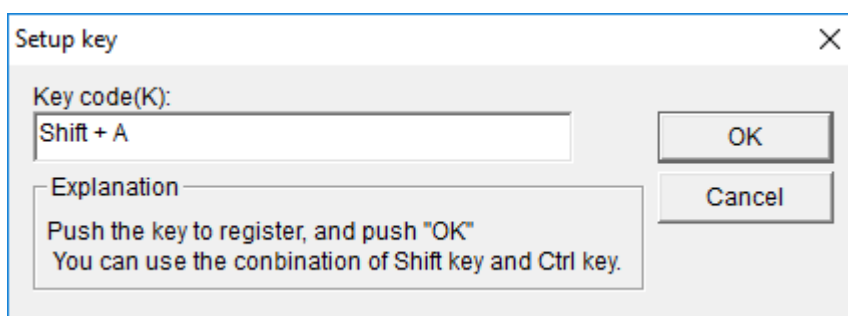


Figure 4-84 “Key Settings” Dialog Box

Enter the desired key combination in the box.

4.15.2 Converting the S10V files

<Description>

This procedure converts the source files that were created by using the S10V HI-FLOW system so that they can be used by HI-FLOW SYSTEM/S10VE.

Source files are compatible between the S10VE and the S10V. If you want to convert multiple source files, in the HI-FLOW process sheet, click [Utility] - [Converter]. For details, see 4.7.9, “Converting the S10V files.”

This procedure can be performed only in offline mode.

<Procedure>

(1) In the HI-FLOW sheet, click [Utility] - [Converter].

The following “Open file” dialog box appears on screen:

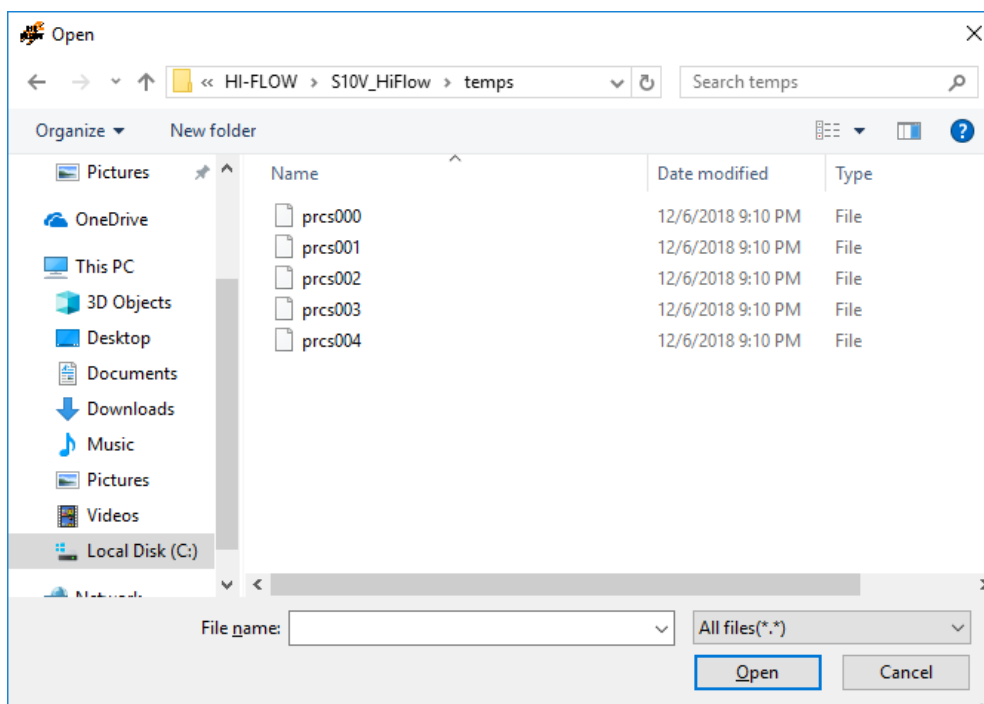


Figure 4-85 “Open file” Dialog Box

(2) Select the source file to be converted.

You cannot select multiple source files (see Figure 4-86).

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

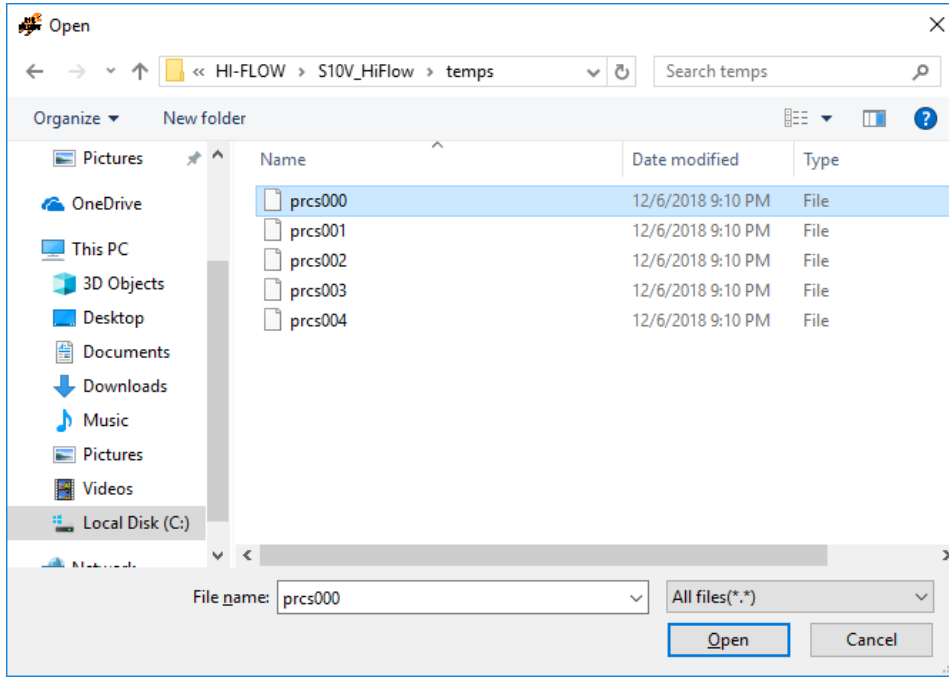


Figure 4-86 “Open file” Dialog Box (When a Source File is Selected)

- (3) In the “Open file” dialog box, click the [Open] button.
The Output window displays the status of conversion.
The converted HI-FLOW program is displayed in the HI-FLOW sheet (see Figure 4-87).

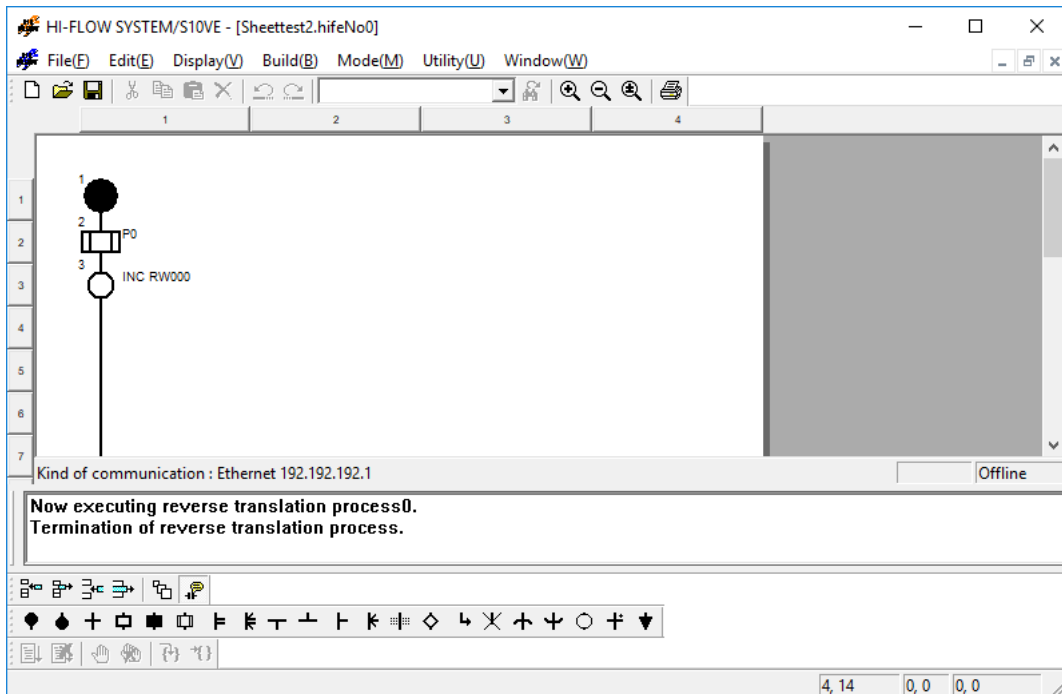


Figure 4-87 Example Source File Converted and Displayed in the HI-FLOW Sheet

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

If you select a file that cannot be converted in the “Open file” dialog box and click the [Open] button, the error message of Figure 4-88 appears.

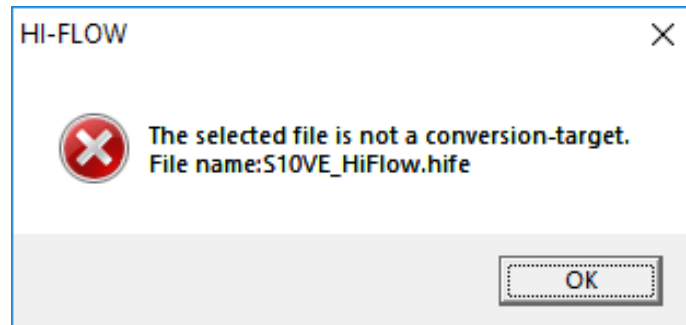


Figure 4-88 Example Error Message That Appears When You Select a File That Cannot be Converted

If you perform conversion while editing a HI-FLOW program, the source file of the HI-FLOW program being edited is overwritten without a confirmation message.

- (4) In the HI-FLOW sheet, click [Build] and then [Compile].
The Output window displays the status of compilation. For details about compilation, see 4.13, “Build Function of the HI-FLOW Sheet.”

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

4.16 Window Functions of the HI-FLOW Sheet

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

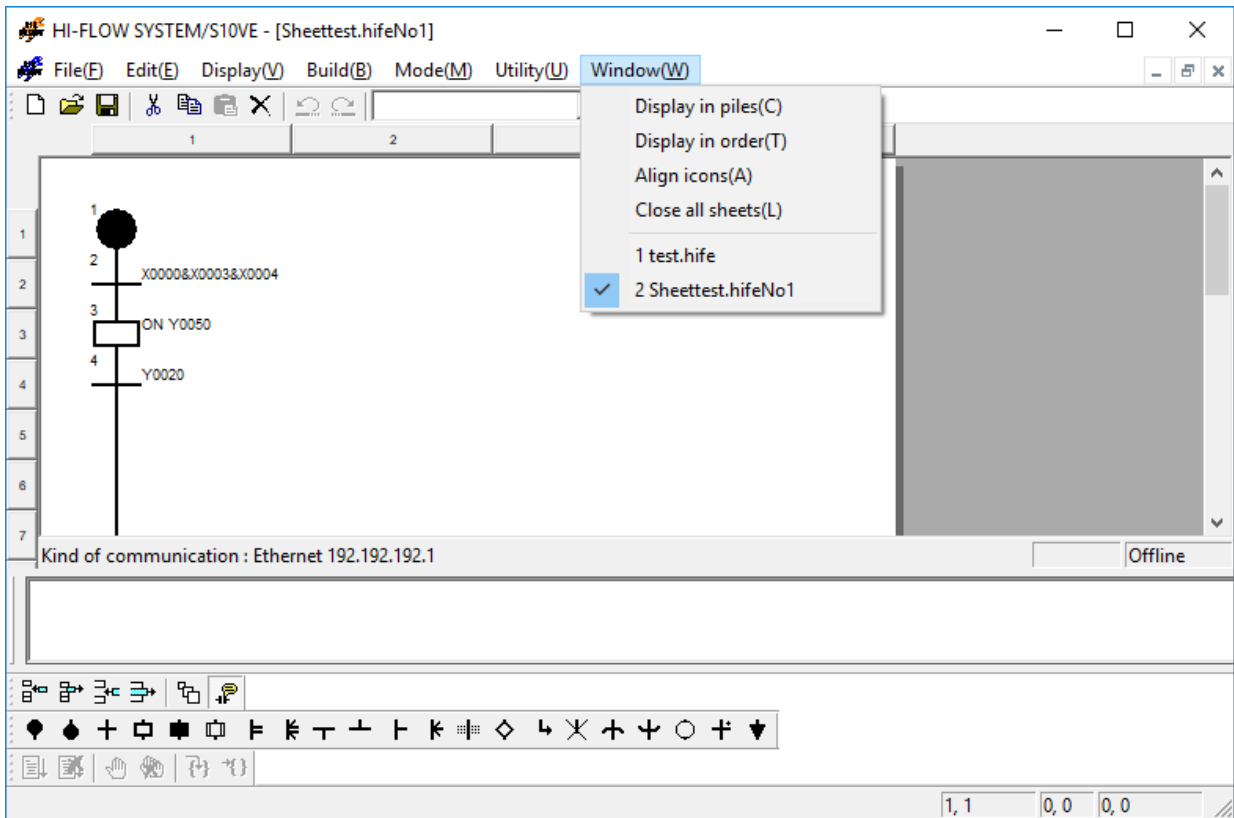


Figure 4-89 [Window] Menu in the HI-FLOW Sheet

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

Table 4-31 [Window] Menu Items in the HI-FLOW Sheet

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 HI-FLOW sheets.
5		File name 1, 2...		Selects an active window.