e-Front runners

MICREX-SX series

SPH

USER'S MANUAL

SX-Programmer Expert (D300win) Reference <Type: NP4H-SEDBV3>

FEH257n

Preface

Thank you for purchasing Fuji Electric Programmable Controller MICREX-SX Series.
This User's Manual explains the functions and operations of SX-Programmer Expert (D300win), type: NP4H-SEDBV3, that is a programming support tool for the MICREX-SX series. Read this manual carefully to ensure correct operation.
When using modules or peripheral devices, be sure to read the corresponding user's manual listed below.

* In this manual, the SX-Programmer Expert (D300win) is referred to simply as the D300win.

Title	Manual No.	Contents
User's Manual Instructions, MICREX-SX series SPH	FEH200	Explains the system configuration, hardware specifications and operations of modules in the MICREX-SX series SPH.
User's Manual Hardware, MICREX-SX series SPH	FEH201	Explains the system configuration, the specifications and operations of modules in the MICREX-SX series SPH.
Guide to MICREX-SX, MICREX-SX series	FEH253-1	Self-study guide for understanding basic use of MICREX-SX.
Guide to Constructing a Redundant MICREX-SX System, MICREX-SX series	FEH253-2	Self-study guide for constructing a MICREX-SX redundanct system to improve system reliability.
Guide to ST Language, MICREX-SX series	FEH253-3	Self-study guide for high-level language (ST language) used for FA.
User's Manual SX-Programmer Expert (D300win) <LD/FBD Editor Operations>, MICREX-SX series	FEH257-1	Explains the operating instructions of the LD/FBD editor added to SX-Programmer Expert (D300win).

* In addition to the above manuals, the following Fuji Electric Systems Co., Ltd. site offers various manuals and technical documents associated with MICREX-SX.

URL http://www.fesys.co.jp/eng/

Notes

1. This manual may not be reproduced in whole or part in any form without prior written approval by the manufacturer.
2. The contents of this manual (including specifications) are subject to change without prior notice.
3. If you find any ambiguous or incorrect descriptions in this manual, please write them down (along with the manual No. shown on the cover) and contact FUJI.

Safety Precautions

Be sure to read the “Safety Precautions” thoroughly before using this product.

Caution : Incorrect handling of the device may result in minor injury or physical damage.

Even some items indicated by “Caution” may result in a serious accident.
These safety instructions provide important information. Be sure to strictly observe them.
The items to be cared most are shown below:

Caution

- ❑ Do not use parts which are found to be damaged or distorted when unpacking the unit because use of such parts may cause failure or malfunction.
- ❑ Do not apply shock to the product by dropping or falling, etc. because to do so may cause damage to or failure of the product.
- ❑ Do not bring a floppy disk close to magnetized objects because magnetism may cause failure.
- ❑ The product CD is a CD-ROM. Never reproduce it using a audio CD player.
  Large sound volume may cause damage to the ear or audio equipment.
- ❑ Perform disk check periodically. Use of damaged floppy disk or hard disk may cause failure or malfunction of created data and system.
- ❑ Be sure to attach and lock certainly the connector of the loader cable because failure to do so may cause malfunction.
- ❑ Do not get dust at connectors because dust may cause malfunction or failure.
- ❑ Insert the CD-ROM, loader connector, etc. into the right direction because failure to do so may cause malfunction or failure.
- ❑ Fully check safety before modifying the program during operation, performing forced output, activating or deactivating the equipment, or performing other operations because failure to do so may cause mis-operation resulting in damage to the equipment or accident.
- ❑ Do not turn off the power during loader operation (during access to hard disk or floppy disk, during communication with the PLC) because to do so may cause loss of data, failure or malfunction of the product, damage to the equipment, or accident.
- ❑ Use the equipment in a software operation environment described in the manual because failure to do so may cause failure or malfunction.
- ❑ Upgrade the software according to descriptions in the manual.
- ❑ When unplugging the loader cable or power cable, do not hold the cord because to do so may cause failure or malfunction.
- ❑ Operate the loader in a stable place where there is no risk of dropping because failure to do so may cause accident.
- ❑ When discarding this product, handle it as industrial waste.

Revisions

*The manual number is printed at the bottom right of the cover of this manual.

Printed on	*Manual No.	Revision contents
November, 2002	FEH257	First edition (Products Version 3.0.xxx)
June, 2003	FEH257a	Description of the new function that was added to this by version up. ◆ Description of the operation method of SPB system soft utility in appendix 2. ◆ Description of the new function that was added to SX control utility. ◆ Showing/editing function of letter data and time data ◆ Text file input-output function of backup data ◆ Verify function at the time of monitor
October, 2003	FEH257b	Description of the new function that was added to this by version up. ◆ Sampling trace function was added.
February, 2005	FEH257c	Description of the new function that was added to this or improved by version up. (from previous version to V3.2.0.0) ◆ Improvements of the function/FB definition dialog were added. ◆ Improvements of the operation of the variable workaheet were added. ◆ POU group function was added. ◆ Message window saving function was added. ◆ History saving function was added.
May, 2005	FEH257d	Description of the new function that was added to this or improved by version up. (from previous version to V3.2.1.0) ◆ Additional functions for improving operability of the variables editor were added. ◆ Drag-and-drop function for moving nodes in a project tree was added. ◆ Configuration check function in Failure Diagnosis was added.
July, 2005	FEH257e	Description of the new function that was added to this or improved by version up. (from previous version to V3.3.0.0) ◆ Specifications for SPH2000 were added. ◆ Improvements of module "no equipment " setting function in the system definition were added.
December, 2005	FEH257f	Description of the new function that was added to this or improved by version up. (from previous version to V3.3.2.0) ◆ Specifications of password function expanded were added.
March, 2006	FEH257g	Description of the new function that was added to this or improved by version up. (from previous version to V3.3.3.0) ◆ Function that allows customization of the access restriction by password was added. ◆ Function of printing a program with cross reference was added.
August, 2006	FEH257h	Considerations about the configuration check function (failure diagnosis) were added.
September, 2006	FEH257i	Description of the new function that was added to this or improved by version up. (from previous version to V3.3.6.0) ◆ IP address list network device search function was added.
November, 2006	FEH257j	Description of the new function that was added to this or improved by version up. (from previous version to V3.3.7.0) ◆ Memory allocation setting for SPH2000 was added.
January, 2007	FEH257k	Description of the new function that was added to this or improved by version up. (from previous version to V3.4.0.0) ◆ Project compering function was added. ◆ Multielement variable (array, structure) function of the watch window was added.
July, 2007	FEH257m	Description of the new function that was added to this or improved by version up. (from previous version to V3.4.2.0) ◆ Automatic analysis function of failure diagnosis was added.
February, 2009	FEH257n	Description of the new function that was added to this or improved by version up. (from previous version to V3.5.0.0) ◆ Windows Vista was supported. ◆ SPH3000 was supported.

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Section 1 General

1-1 Special Notes

(1) Cautions in creating, changing or downloading a project

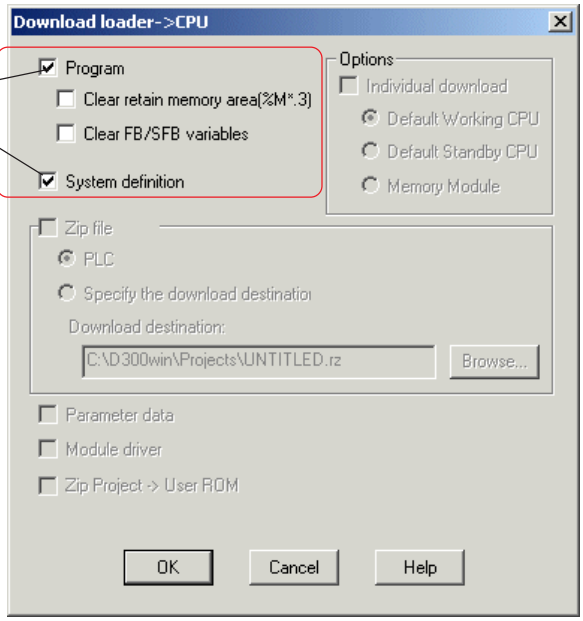
In the MICREX-SX series, a PLC program created by a user is called a “project”. A project consists of “system definition” and “program (user application)” as shown in the figure below.

Project

System definition	• Module registration • CPU memory size • CPU running definition etc.
Program	• Program • User FB (function block) • User function

In the system definition, modules and the memory size of the CPU are registered, which are closely related to addresses that are used in the program. When downloading a project, the program must match the system definition. Therefore, when downloading a new project to the PLC, be sure to download the program and system definition at the same time and reset the system.

Be sure to check both.



<Steps to follow in changing a project>

Operation	Step to follow	
Changing both system definition and program	Download both the system definition and program, and reset the PLC system.	(Note)
Changing system definition only	Download both the system definition and program, and reset the PLC system.	(Note)
Changing program only	Download the program, and start the PLC system.	

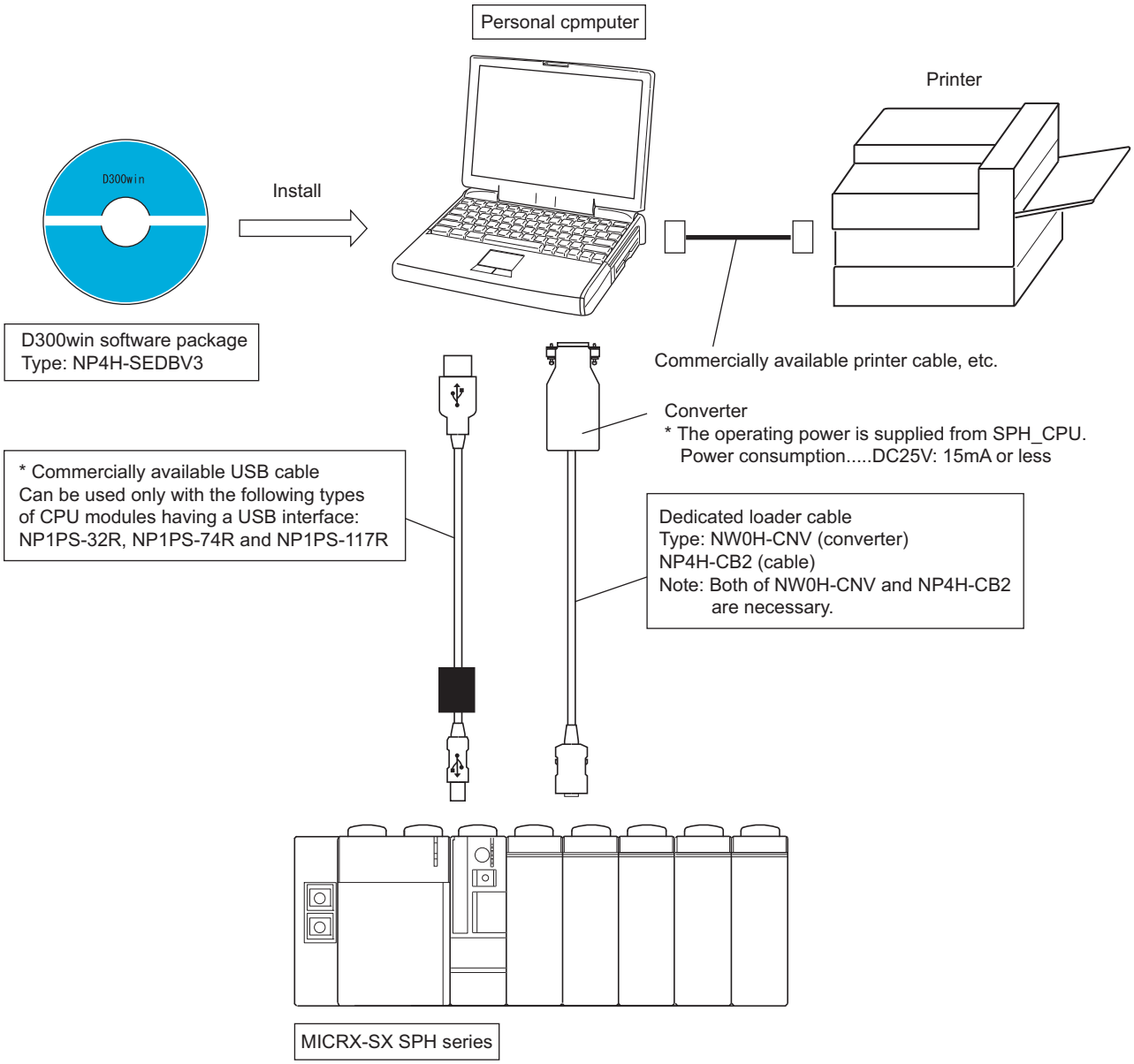
Note: Changing “no equipment” setting of a module in the module registration is also regarded as a change of system definition.

Section 1 General

1-2 System Configuration

1-2-1 Basic configuration for connecting to D300win

When the system software of D300win is installed in a personal computer, the personal computer can be used as a programming support tool (program loader) for MICREX-SX series.



<List of CPU modules with a USB interface>

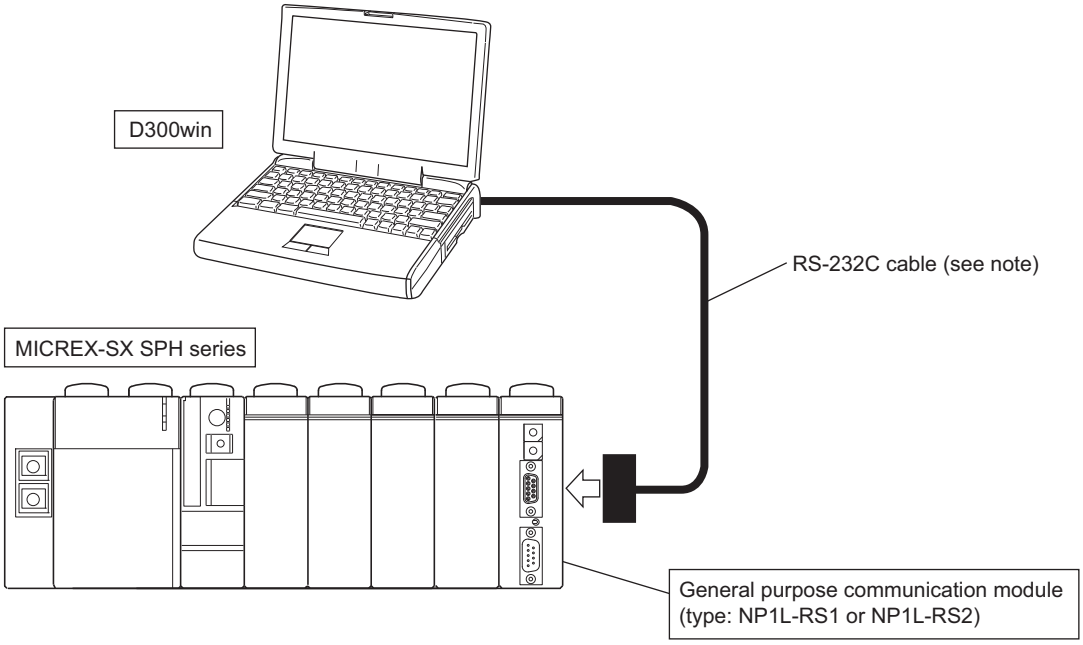
CPU type	USB connector type of the CPU module
NP1PS-32R NP1PS-74R NP1PS-117R NP1PS-245R	B type
NP1PM-48R NP1PM-48E NP1PM-256E NP1PM-256H NP1PU-048E NP1PU-256E	mini-B type

Section 1 General

1-2 System Configuration

1-2-2 Connection via general purpose communication module

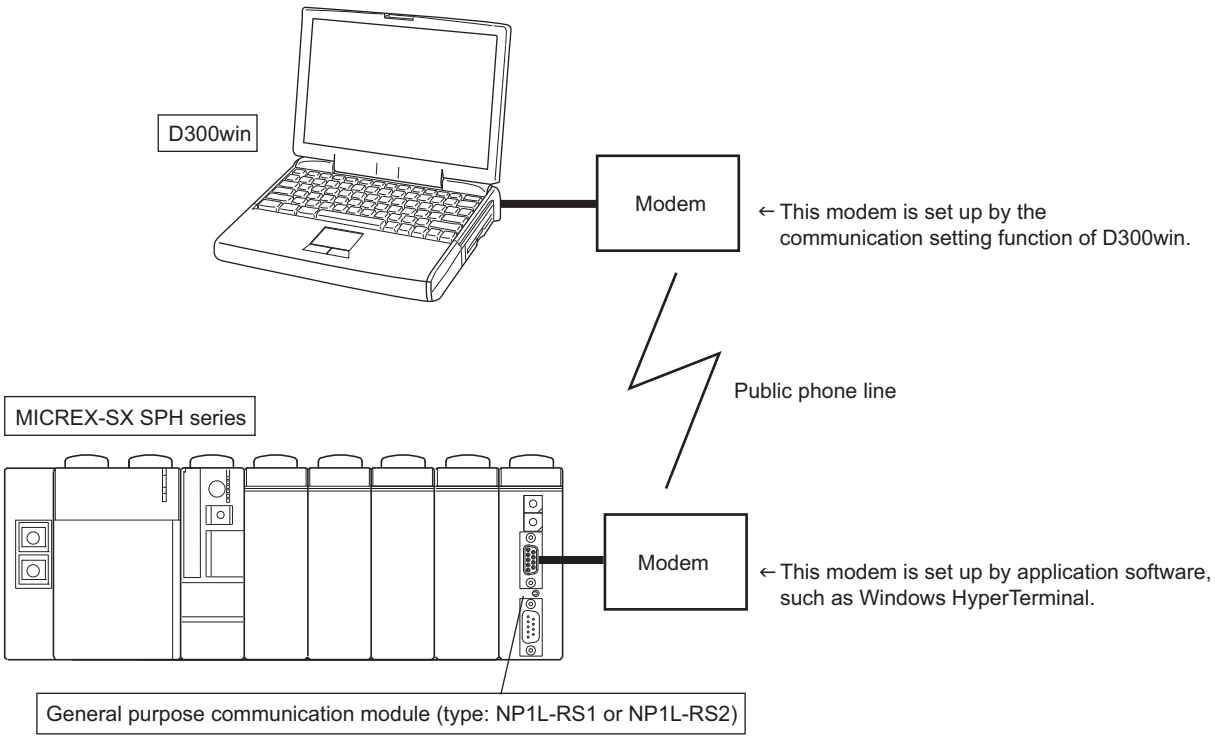
It is possible to connect the CPU with D300win via a general purpose communication module.



Note: For more information about the specification, such as signal arrangement of the cable and switch setting of the general purpose communication module, see the “User’s Manual <General Purpose Communication Module>” (FEH225).

1-2-3 Connection via a modem

It is possible to connect the CPU with D300win via a modem that is connected to the general purpose communication module.



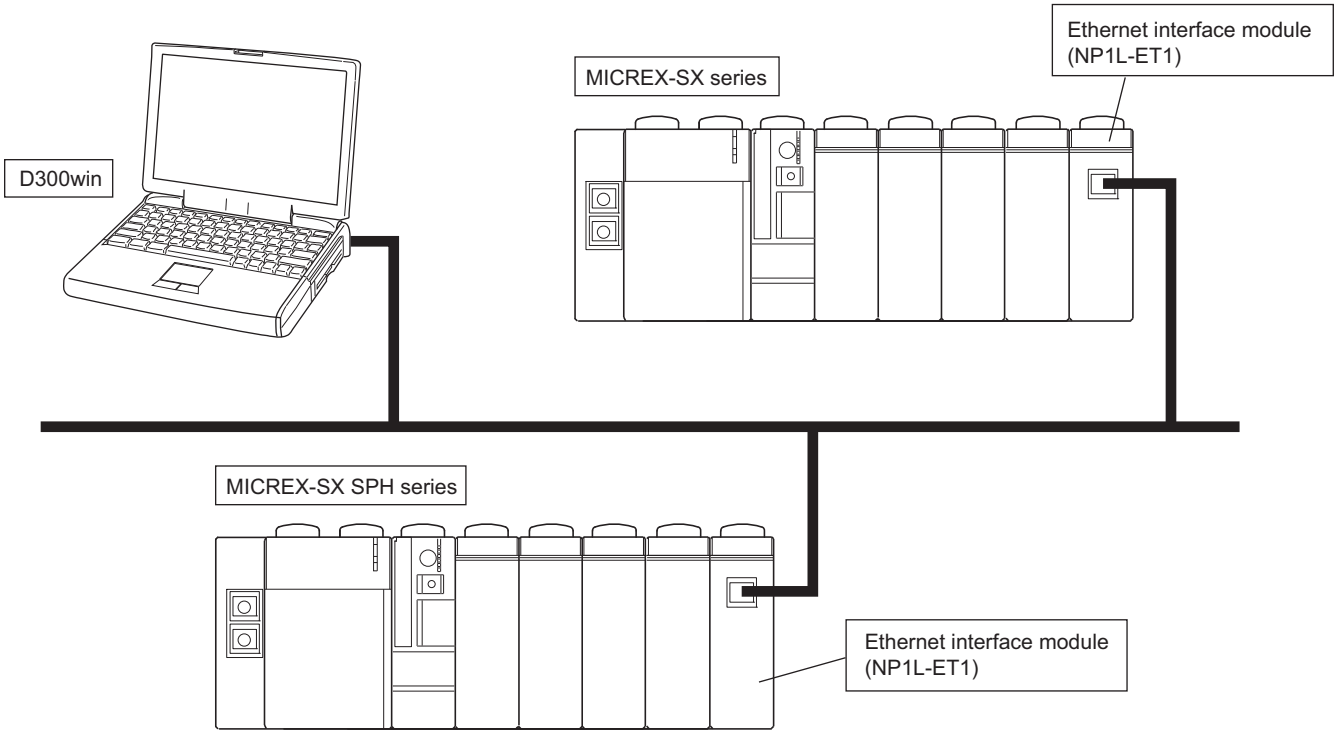
Note: For more information about the communication setting when a modem is used on the D300win side, see “4-3-3 Communication settings”.
For more information about the specification, such as how to set the MICREX-SX side modem, see the “User’s Manual <General Purpose Communication Module>” (FEH225).

Section 1 General

1-2 System Configuration

1-2-4 Connection via Ethernet

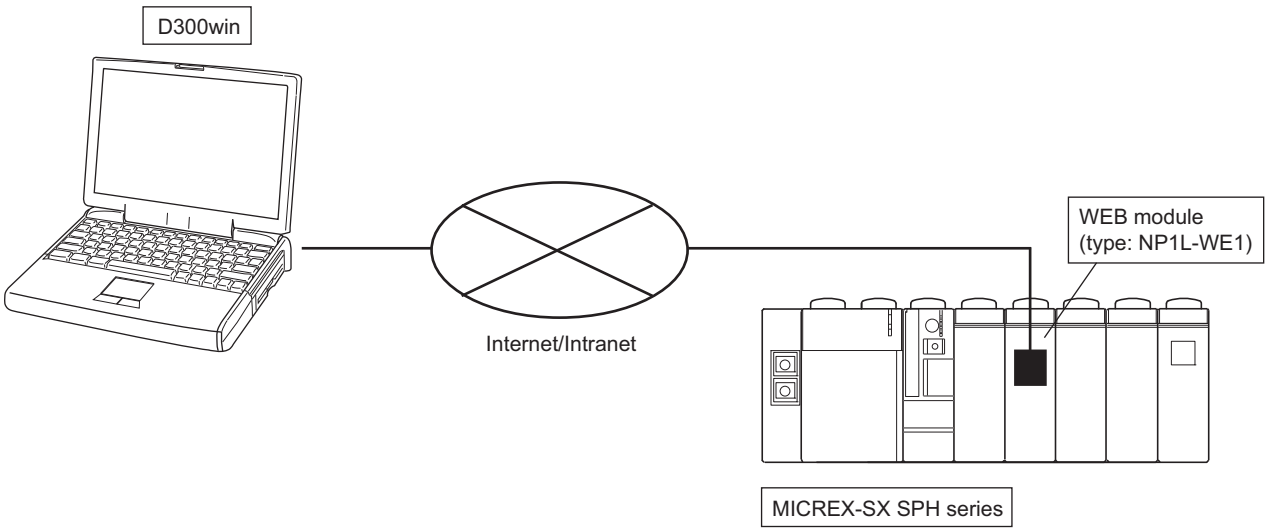
It is possible to connect the CPU with D300win via Ethernet. For this, Ethernet interface module (type: NP1L-ET1) is necessary on the SX system side.



* For more information about the communication setting for connecting D300win to Ethernet, see “4-3-3 Communication settings”.

1-2-5 Connection via Internet

By using the WEB module (NP1L-WE1), it is possible to connect the CPU with D300win via Internet.



* For more information about the setting procedure, see the “User’s Manual <WEB Module>” (FH258).

Section 1 General

1-3 Precautions for Upgrading

1-3-1 Handling projects created with old versions of D300win

The following procedure applies to the D300win user upgrading an old version of D300win system (Version 1.x or 2.x) to a new version (Version 3.x). Since the functions are greatly changed in the new version, carefully read this manual to correctly use the system.
New D300win users can skip this section and proceed to Section 2.

> Note: Before upgrading your D300win system, it is recommended to zip projects with the old version system and store them as zipped project files. For the method to zip projects, see “3-6-2 Zip of project files”.

<About the compatibility of the project file>

(1) D300win V3 is maintaining upper compatibility of the project file. The project of the previous version can be used by converting for V3 automatically at the time of loading it. The project used with V3 cannot be used in the previous version.

(2) There are the following three patterns when the project of the previous version is converted to V3.
Please confirm the following content before converting.

Convert the project			Re-compilation	Re-download	Program verify result
V2.* → V3	Pattern 1)	When converting to the new LD/FBD editor	Necessary	Necessary	NG
	Pattern 2)	When using LD/FBD-V2 compatible editor	Necessary	Unnecessary	OK
V1.* → V3	Pattern 3)	When converting to the new LD/FBD editor	Necessary	Necessary	NG
		When using LD/FBD-V2 compatible editor			

<Pattern 1)>

In D300win V3, the LD/FBD editor is improved to the grid fixation form. The compiler is improved in this new LD/FBD editor. Therefore, the generated program code is different when the project of the previous version is converted to the new LD/FBD editor and compiled. In this case, please confirm the operation of the system for attention after downloading the program again.

<Pattern 2)>

The LD/FBD-V2 compatible editor is prepared as an editor equal with D300win V2.*. The same program code as previous version (V2.*) is generated even if it compiles when the project of the previous version is used continuously in this editor. Therefore, because complete compatibility of the project is maintained, the program need not be downloaded again.

Note: Please set it as follows before compiling the project of the previous version again after converting.
1) Select “Memory allocation setting” of “Resource setting” menu, and display “Memory allocation setting” dialog.
2) Set “Do not change the address of the variable which has been compiled last time” check box to ON.

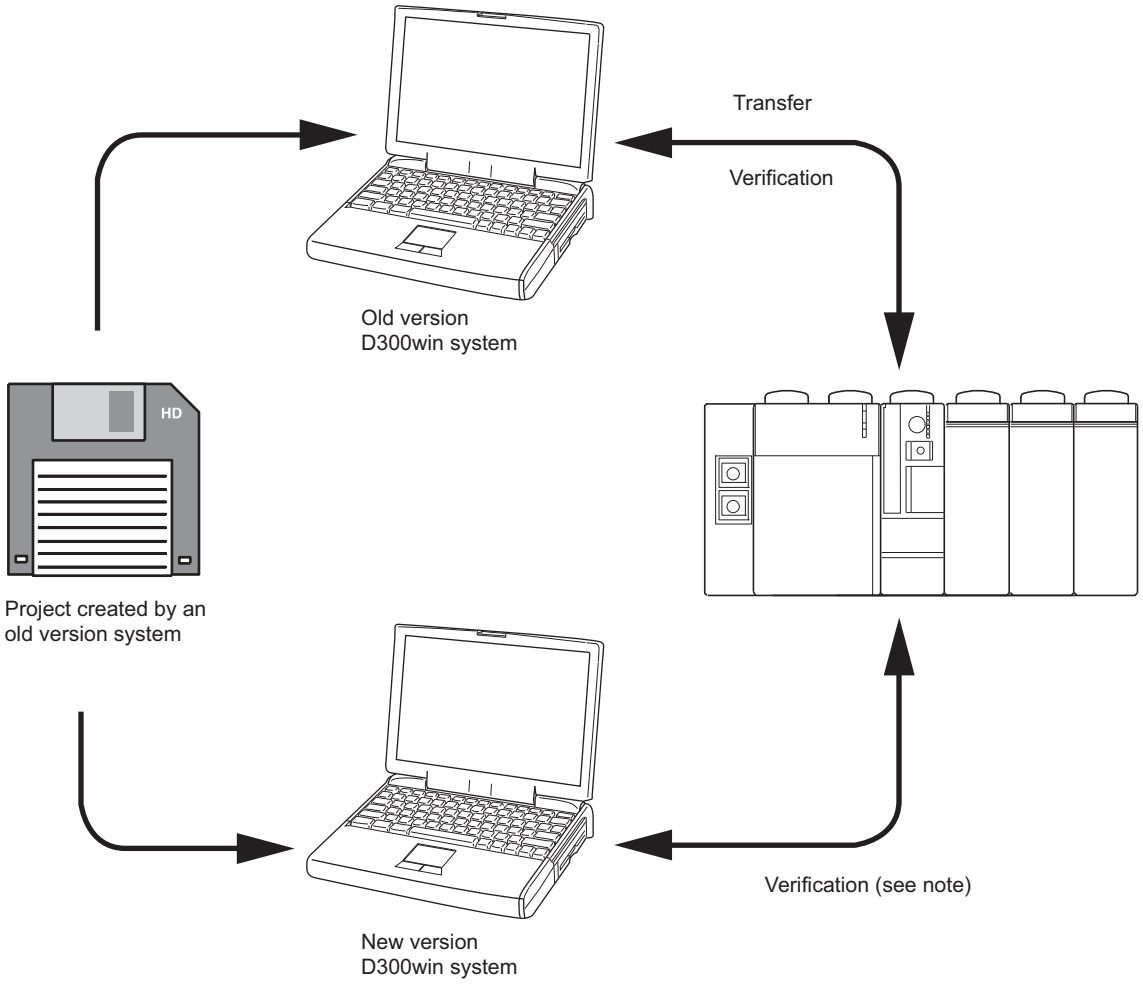
<Pattern 3)>

The generated program code is different when compiling regardless of the use of a new LD/FBD editor and LD/FBD-V2 compatible editor when the project of D300win V1.* is used. In this case, please confirm the operation of the system for attention after downloading the program again.

Case of 1), 3), if a program that is downloaded into a CPU using an old version system is verified on-line with the corresponding program that was compiled by the new version system, a verification error will occur.

Section 1 General

1-3 Precautions for Upgrading



Note: When a zipped project is unzipped and verified as it is, it will result in matching; when unzipped program is verified after compilation, a mismatch will result. Therefore, when a project that was zipped with an old version D300win system is used on a new version D300win system, it should be verified as zipped (without compilation).

1-3-2 Procedure for upgrading from old version to new version system

Use the following procedure to upgrade the D300win system:

1) Uninstall the old version D300win system.
2) Uninstall the standard expansion function block (FB) and other expansion function blocks for the old version D300win system.
3) Install the new version D300win system.
4) Make backup copies of projects created with the old version D300win system.
5) Install the standard expansion FB and other expansion FB for the new version D300win system.
6) Convert the projects created with the old version D300win system to those for the new version D300win system.

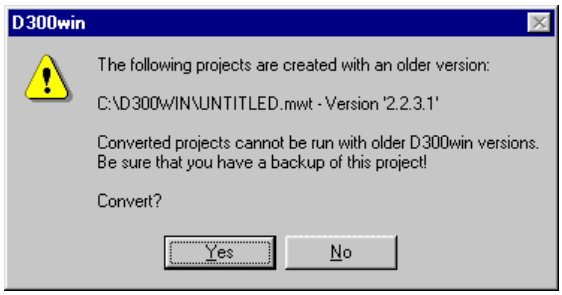
Note: For more information of the method for uninstalling the old version D300win system and the standard expansion FB for the old version D300win system, see the “User’s Manual <Reference>”.

Section 1 General

1-3 Precautions for Upgrading

1-3-3 Procedure for converting of project made by old system version

◆ The project that was made with an old version (V2.* or older) are converted automatically to V3 when you open the project. In this case the following message is displayed.



◆ If you click the [Yes] button, the old project is converted for D300winV3 and the project will displayed.

1) In this case that the user library is registered in the project.

If the user defined project (project B) is registered in the converted project (project A), please convert that project B to V3 and compile.

2) In the case that the expansion FB's library is registered in the project.

In the case that FUJI's expansion FB is registered to the converting project, please eliminate expansion FB for an old version from the project and register expansion FB for V3 with project once again.

Note: Attention of case when converting the compressed project
In the case that standard expansion FB and various kinds expansion FB are included to the zip project, overwrite confirmation dialogue will displayed at the time of unzipping. In this case please select "NO" and do not select "overwrite". If you select "Yes", FB will replaced to old version and this project will not able to use with D300winV3.

Section 2 Installation

2-1 Personal Computer Environment Necessary for D300win 2-1

2-2 Installing D300win 2-2

2-3 Changing D300win System 2-8

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2-4-1 Exit Message Manager 2-10
2-4-2 Uninstall 2-10

Section 2 Installation

2-1 Personal Computer Environment Necessary for D300win

Item		Specifications
Personal computer		IBM-AT compatible machine
CPU		Intel Pentium 400 MHz or higher recommended * 800 MHz or higher is recommended.
Hard disk		220 MB or more in empty area (120 MB for D300win and 100 MB or more for standard expansion FB) (note 1)
External storage devices		Necessary for installation
	Floppy disk drive	Minimum one drive, 1.25 M or 1.44 M bytes (3.5 inches)
	CD-ROM drive	Minimum one drive (quadruple speed or more recommended)
Memory capacity		64 MB or more *256 MB or more recommended
Communications interfaces		Communications interfaces supported by D300win should be supported. RS-232C, USB (note 2) , Ethernet
Mouse		At least USB, serial, bus, or PS2 mouse should be supported.
Keyboard		101 keyboard
Display		Resolution: 800 x 600 dots (1024 x 768 dots or more recommended)
Operating system		Windows NT V4.0, Japanese or English Edition SP6 or up Note) Not supported by V3.5.0.0 or later version
		Windows 2000 Japanese or English Edition
		Windows XP Japanese or English Edition
		Windows Vista Japanese or English Edition Note) Supported by V3.5.0.0 or later version
Other software		Internet Explorer5.0 or up .NET Framework2.0 (note 3)
Installer		Windows-specific installer

Note 1: Empty area of 320MB or more (140MB for D300win and 180MB or more for standard expansion FB) is necessary for the FAT16 format.

Note 2: USB communications are subject to the restrictions given below.

- For communications using the USB port and USB cable, the USB driver should be installed. Use the USB driver bundled with D300win.
- For operating system Windows 2000, the [Device removal warning] dialog appears when the USB communications have stopped (by CPU reset, system power OFF, etc.). In this case, click the [OK] button.
- Avoid carrying out the operations given below during online monitoring:
  - Turning PLC power OFF
  - Disconnecting USB cable
  - Batch reset of CPUs connecting the SC matrices from another loader
  - Batch reset of CPUs from another loader by multi-resourcing
- For some USB host controller types, carrying out the operations given below from D300win (including SX control utility) will disable recovery from unconnected state. In this case, restart the personal computer.
  - Resetting CPU
  - Switching between operation and standby when N:1 redundant system is set

Note 3: .NET Framework is necessary to use the “failure analysis” function supported from V3.4.2.0.
It is contained in the product CD-ROM of V3.4.2.0 or later versions.

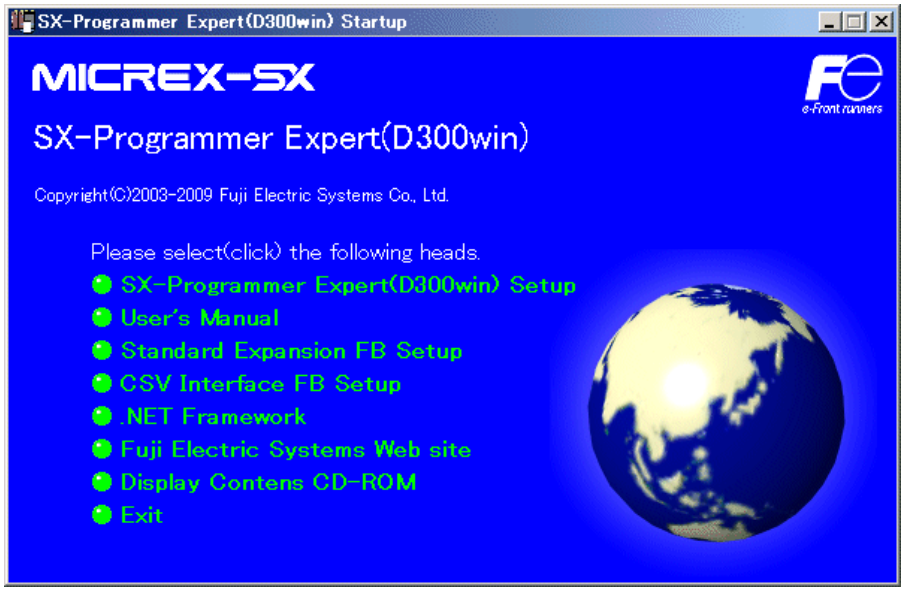
Section 2 Installation

2-2 Installing D300win

This section describes how to install D300win in the personal computer that runs on operating system Windows XP for example. The standard expansion FB can also be installed in the same procedure. For other operating systems such as Windows 2000, D300win can be installed in the same way.

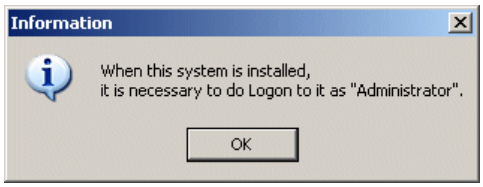
◆ Stop other application software, virus detection software, or screen savers running, if any.

◆ While Windows is running, inserting the product CD-ROM into the CD-ROM drive automatically displays the screen shown below.



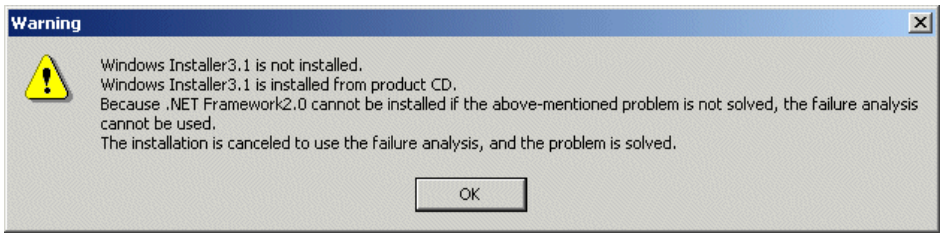
Note: If the startup screen does not appear, carry out the procedure given below.
Click Windows [Start] → [Run...], enter the name of the drive where the CD-ROM is inserted (:\autorun.exe), and then click the [OK] button.

◆ Clicking “D300win Setup” on the startup screen starts the installer and displays the following screen.



Note 1: Installation should be done by “Administrator.”

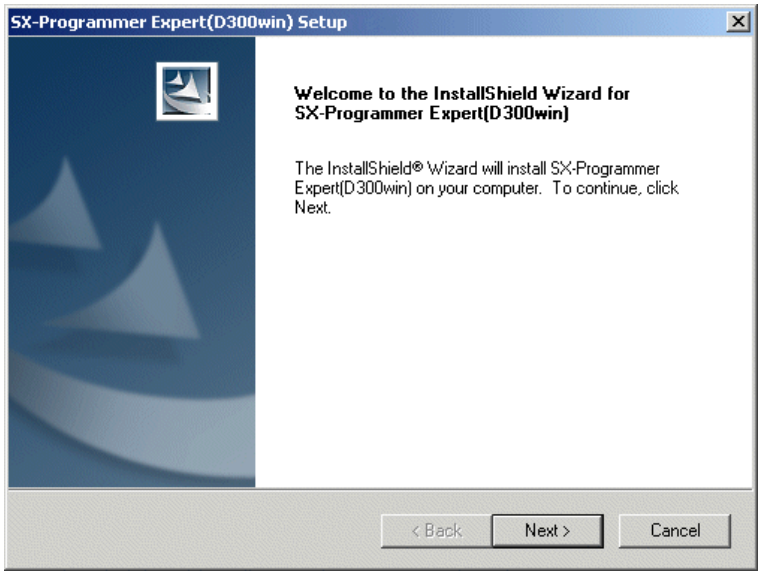
Note 2: If the warning dialog box shown below appears during installation onto a personal computer whose OS is Windows2000, install the Windows Installer first by clicking [.NET Framework] on the initial screen → [Windows Installer3.1(2000/XP)]. Then, set up D300win again.



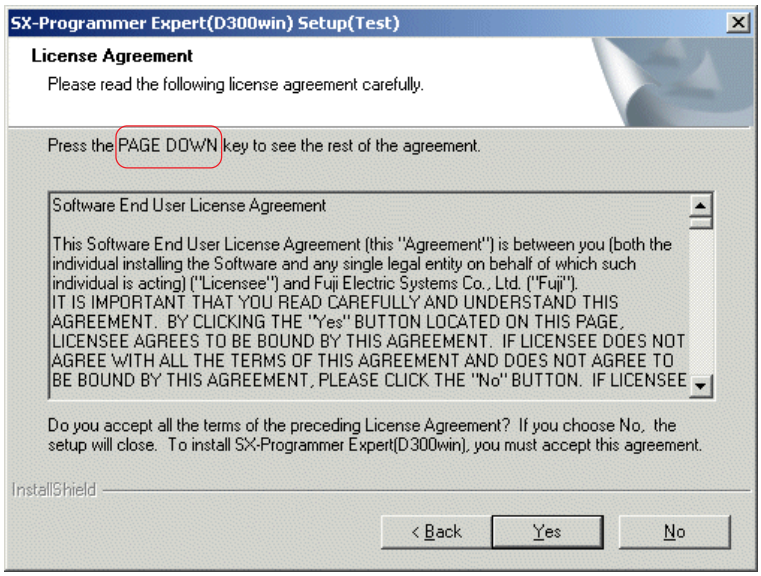
Section 2 Installation

2-2 Installing D300win

◆ Clicking the [OK] button on the information screen starts the installer.



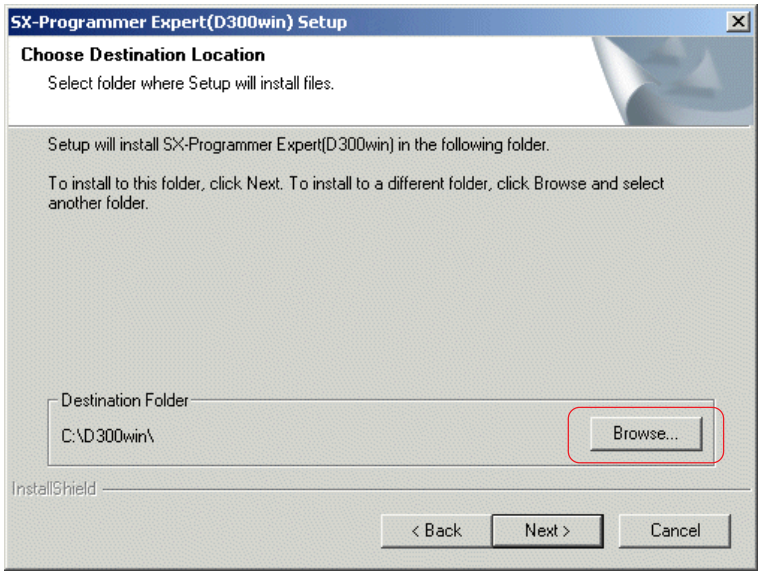
◆ Clicking the [Next>] button displays the [License Agreement] screen. Read the screen contents and click the [Yes] button when you accept the agreement.



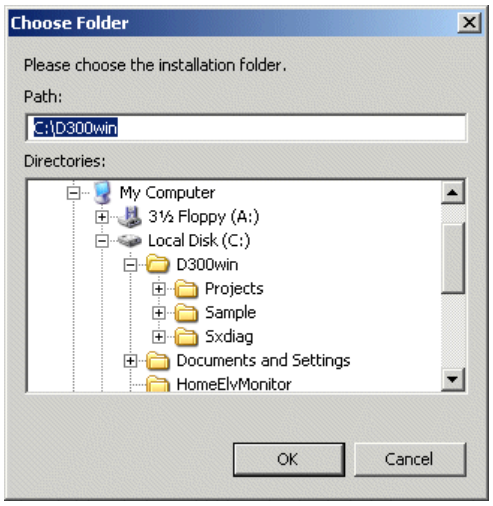
Section 2 Installation

2-2 Installing D300win

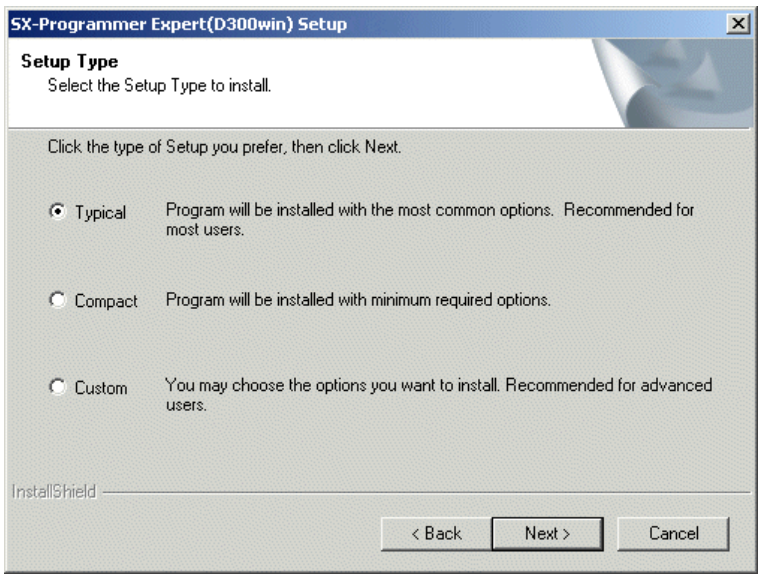
◆ The [Chose Destination Location] screen appears. The default destination folder is “C:\D300win\.” To use the default folder, click the [Next>] button.



◆ To change the installation destination folder from the default, click the [Browse...] button to display the [Choose Folder] dialog. From this dialog, select or enter any folder name and click the [OK] button.



◆ The [Setup Type] screen appears. Select the setup type from “Typical”, “Compact”, or “Custom” and click the [Next>] button.



Section 2 Installation

2-2 Installing D300win

<About setup types>

The contents of Typical, Compact, and Custom setup types are given below.

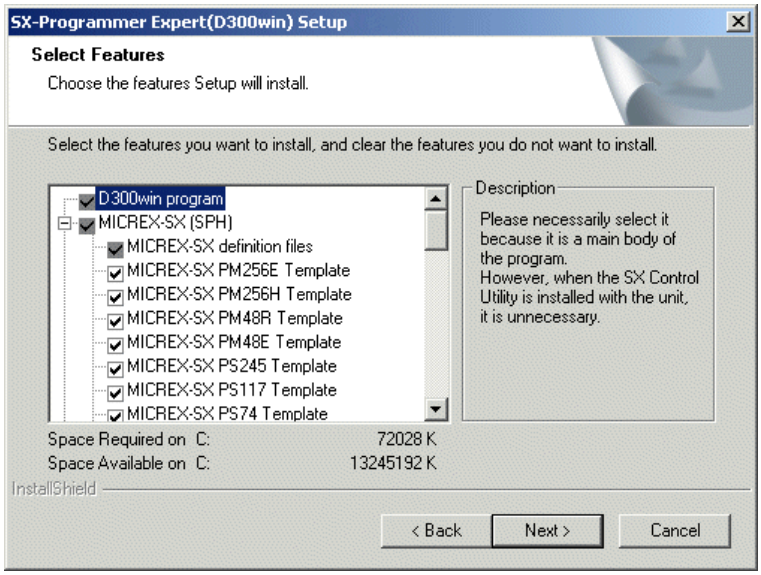
■ Typical setup installs the following components:

- SX-Programmer Expert (D300win) program
- MICREX-SX definition file
- MICREX-SX PU256E template
- MICREX-SX PU048E template
- MICREX-SX PS245 template
- MICREX-SX PS117 template
- MICREX-SX PS74 template
- MICREX-SX PS74D template
- MICREX-SX PS32 template
- MICREX-SX PM256E template
- MICREX-SX PM256H template
- MICREX-SX PM48R template
- MICREX-SX PM48E template
- MICREX-SX PH16 template
- MICREX-SX PH08 template
- MICREX-SX SPB definition file
- MICREX-SX NW60C template
- MICREX-SX NW60 template
- MICREX-SX NW40C template
- MICREX-SX NW40 template
- MICREX-SX NW30 template
- MICREX-SX NW20 template
- Board controller definition file
- MICREX-SX NW32-42C template
- MICREX-SX NW16-42C template
- MICREX-SX NW08-41C template
- Training template
- Page layout
- SX control utility
- POD link support

■ Compact setup installs the following components:

- SX-Programmer Expert (D300win) program
- MICREX-SX definition file
- MICREX-SX PU256E template
- MICREX-SX PU048E template
- MICREX-SX PS245 template
- MICREX-SX PS117 template
- MICREX-SX PS74 template
- MICREX-SX PS74D template
- MICREX-SX PS32 template
- MICREX-SX PM256E template
- MICREX-SX PM256H template
- MICREX-SX PM48R template
- MICREX-SX PM48E template
- MICREX-SX PH16 template
- MICREX-SX PH08 template
- MICREX-SX SPB definition file
- MICREX-SX NW60C template
- MICREX-SX NW60 template
- MICREX-SX NW40C template
- MICREX-SX NW40 template
- MICREX-SX NW30 template
- MICREX-SX NW20 template
- Board controller definition file
- MICREX-SX NW32-42C template
- MICREX-SX NW16-42C template
- MICREX-SX NW08-41C template
- SX control utility

■ Custom setup allows the user to select the components to be installed.
From the [Setup Type] screen, select “Custom” and click the [Next>] button to display the [Select Features] screen.

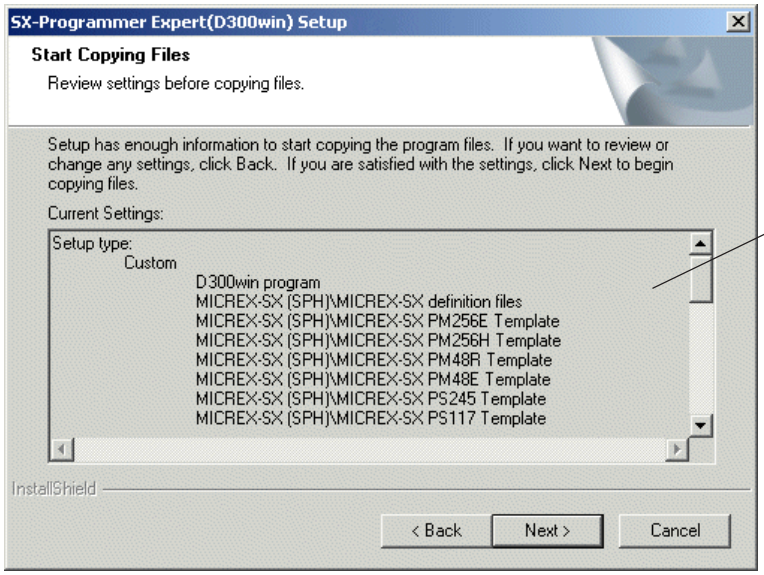


◆ Select the components to be installed and click the [Next>] button.

Section 2 Installation

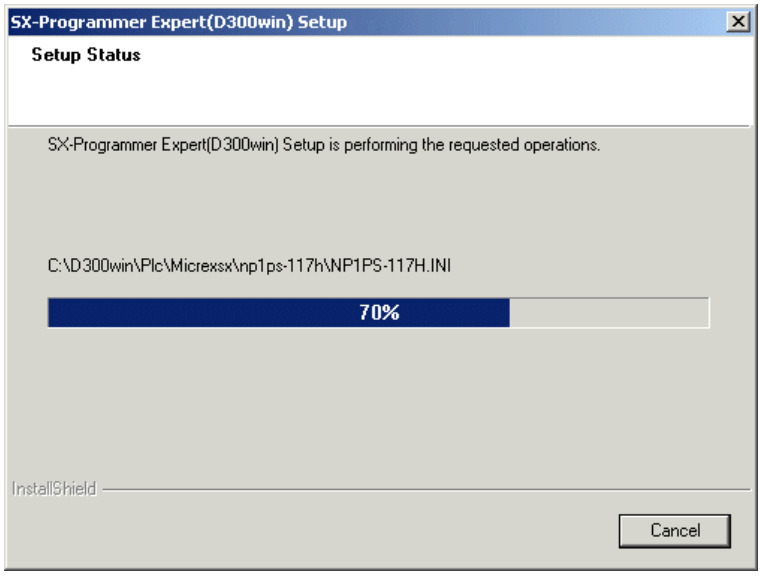
2-2 Installing D300win

◆ The [Start Copying Files] screen appears. After confirming the contents, click the [Next>] button.



From this screen, you can confirm the components to be installed, the setup destination folder, and the folder where the icons are to be registered.

◆ D300win setup starts.



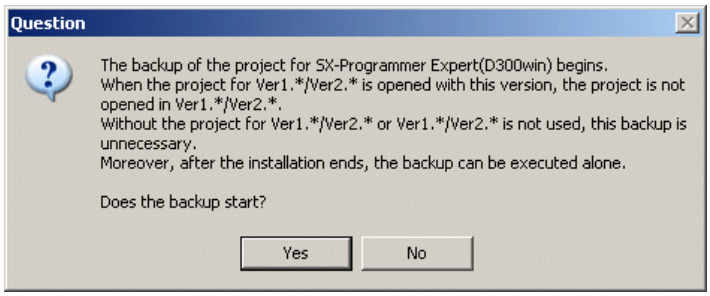
Note: When installing D300win with the product CD-ROM of V3.4.2.0 or later versions, [.NET Framework] is automatically installed if it has not been installed in the destination personal computer. It takes a few minutes or sometimes more than ten minutes to install [.NET Framework]. (The time required for installation depends on the performance of the personal computer.)

◆ During file copy, information screen “A locked file has been detected.” may appear.
This screen indicates that an attempt has been made to write to a file used by Windows. In this case, click the [OK] button as instructed by the dialog and click the [Restart] button from the [Detecting locked file] dialog.

Section 2 Installation

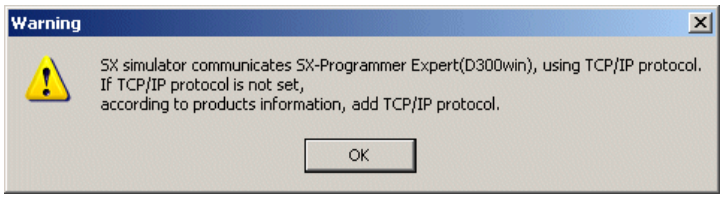
2-2 Installing D300win

◆ When setup has completed, the [Question] dialog appears asking whether or not to make backup of the project created by D300win Version 1 or 2. Click the [Yes] button to make backup now or the [No] button to make backup later or making backup is not necessary.

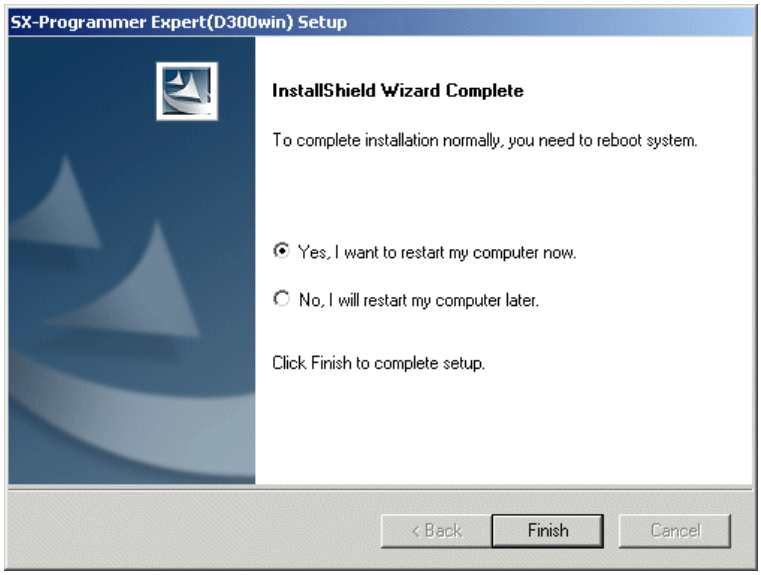


Note: For the backup procedure, see Section 13-5-2 “Backup Utility.”

◆ When installing the SX simulator, the warning dialog shown below appears indicating that the TCP/IP protocol is necessary for using the SX simulator.



◆ From the warning dialog, clicking the [OK] button displays the screen shown below.
The personal computer should be reset for starting D300win. Select “Yes, I want to restart my computer now.” and click the [Finish] button. Now, D300win installation has completed.

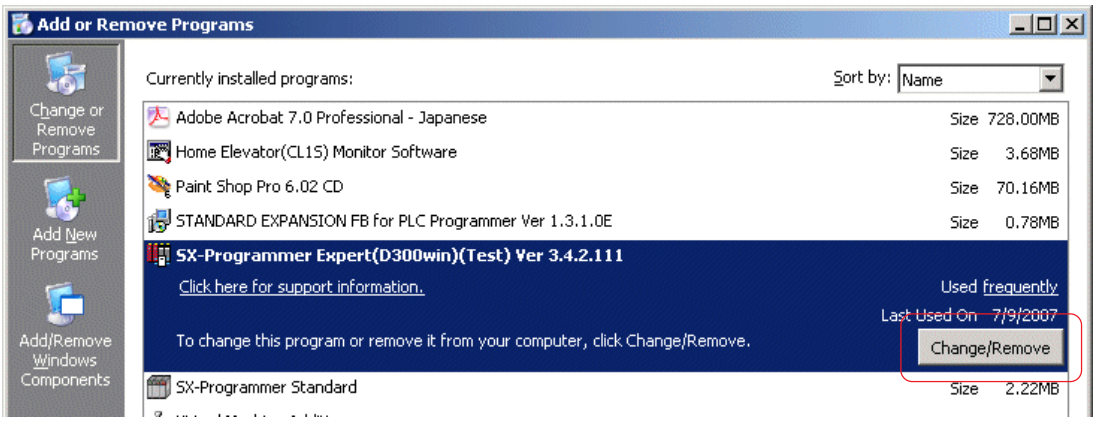


Section 2 Installation

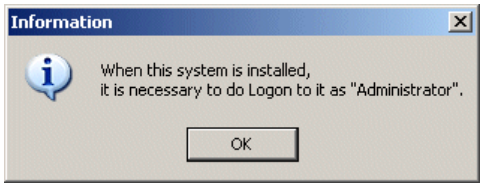
2-3 Changing D300win System

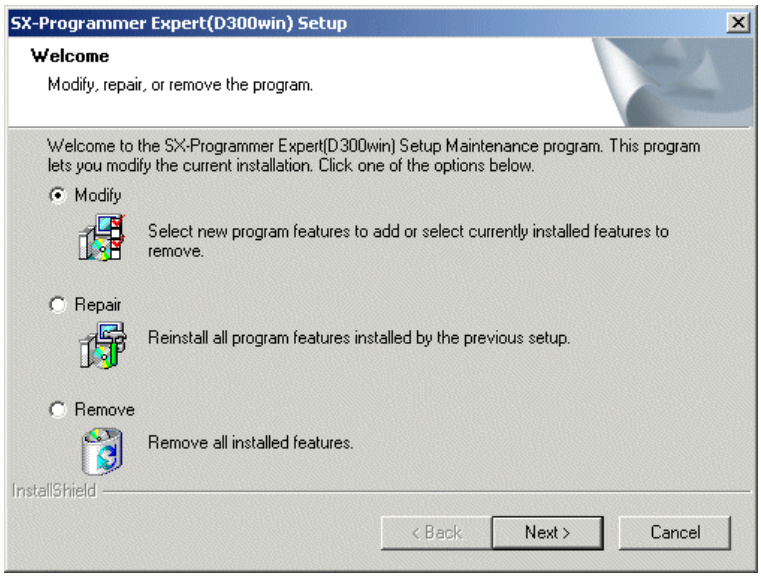
Optional programs can be added to or deleted from installed D300win or the programs already setup can be re-installed.

◆ Display the [Add/Remove Programs] screen from the [Control] panel and select D300win. From this screen, click the [Modify/Remove] button.



◆ When the [Welcome] screen appears, select [Modify] and click the [Next>] button.

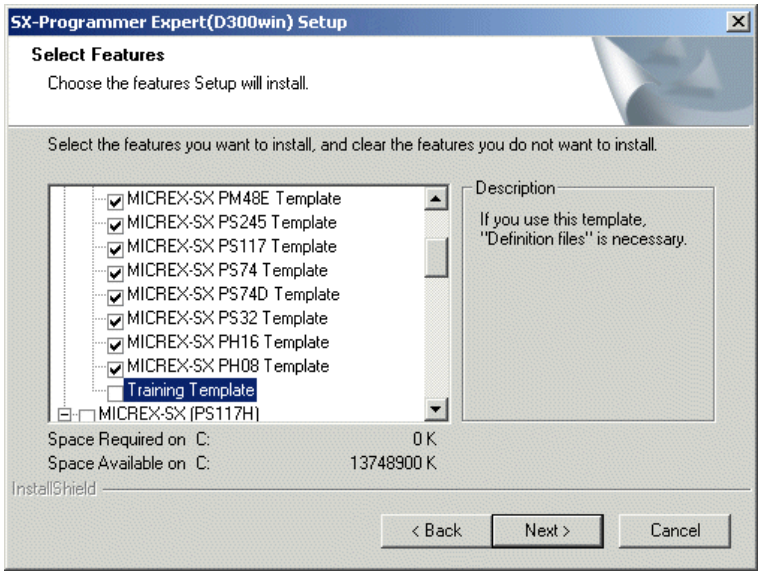




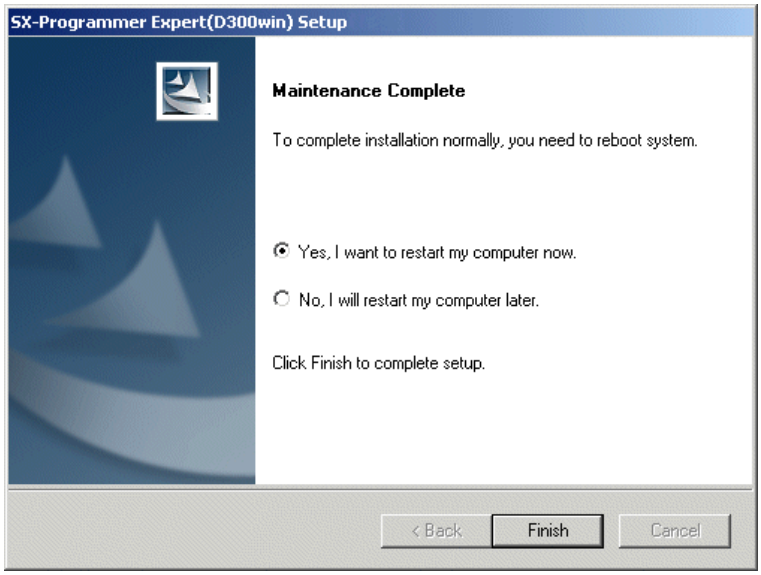
Section 2 Installation

2-3 Changing D300win System

◆ The [Select Features] screen appears. From the list of components displayed on this screen, check the check box ON for the items to be added and OFF for those to be deleted and then click the [Next>] button.



◆ When setup has completed, the [Maintenance Complete] screen appears. Clicking the [Finish] button restarts the personal computer. Now, changing the D300win system has completed.



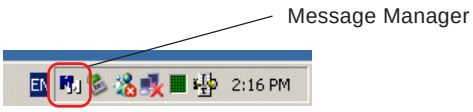
Section 2 Installation

2-4 Uninstalling D300win

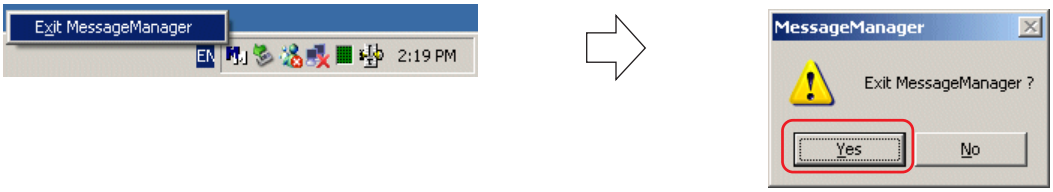
From the personal computer hard disk, delete the D300win system files.

2-4-1 Exit Message Manager

If Message Manager is executed, exit Message Manager, then uninstall D300win. (Mesage Manager is executed when you make on-line communication such as porgram transfer or monitor.)



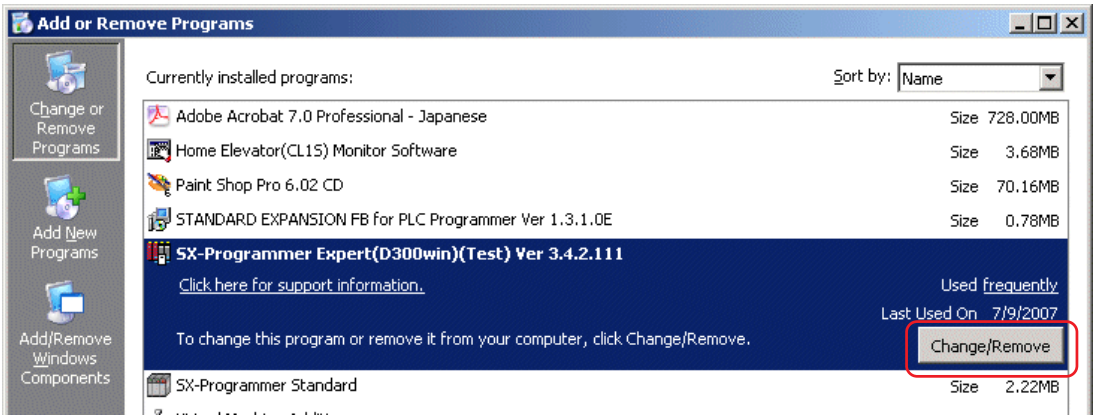
◆ Right click Message Manager icon, then [Exit Message Manager] dialog is shown. Click this command, then below message appears.



◆ Click [Yes] button to exit Message Manager.

2-4-2 Uninstall

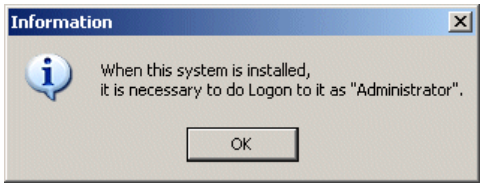
◆ Display the [Add/Remove Programs] screen from the [Control] panel and select D300win. From this screen, click the [Modify/Remove] button.

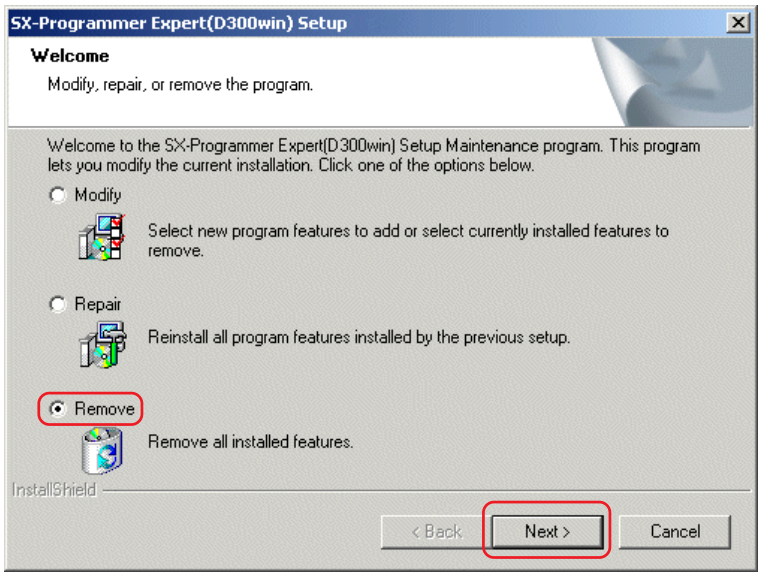


Section 2 Installation

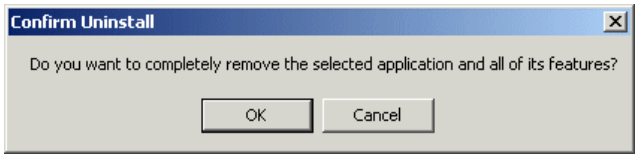
2-4 Uninstalling D300win

◆ Below dialog appears. Click [OK] button, then [Welcome] screen appears. Select [Remove] and click the [Next>] button.





◆ The [Confirm Uninstall] message box appears. Clicking the [OK] button starts file deletion processing.

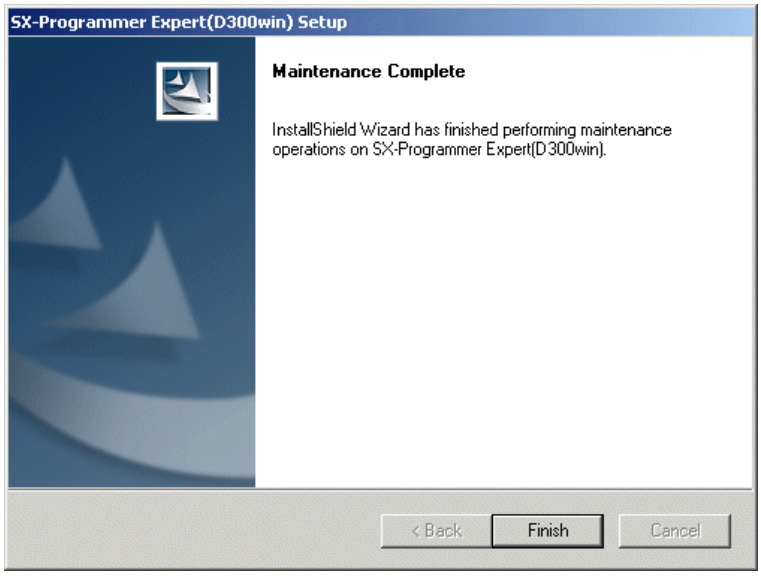


* If message box “A locked file has been detected.” appears during deletion processing, click the [OK] button and then click the [Restart] button from the [Detecting locked file] dialog.

Section 2 Installation

2-4 Uninstalling D300win

◆ When deletion processing has completed, the [Maintenance Complete] screen appears. Clicking the [Finish] button. Now, changing the D300win system has completed.



* None of the project or other files created or saved by the user are deleted by uninstalling.

Section 3 Basic Operation of D300win

3-1 Starting and Exiting D300win 3-1

3-1-1 Starting D300win 3-1
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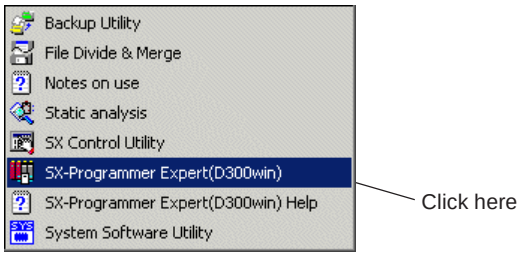
Section 3 Basic Operation of D300win

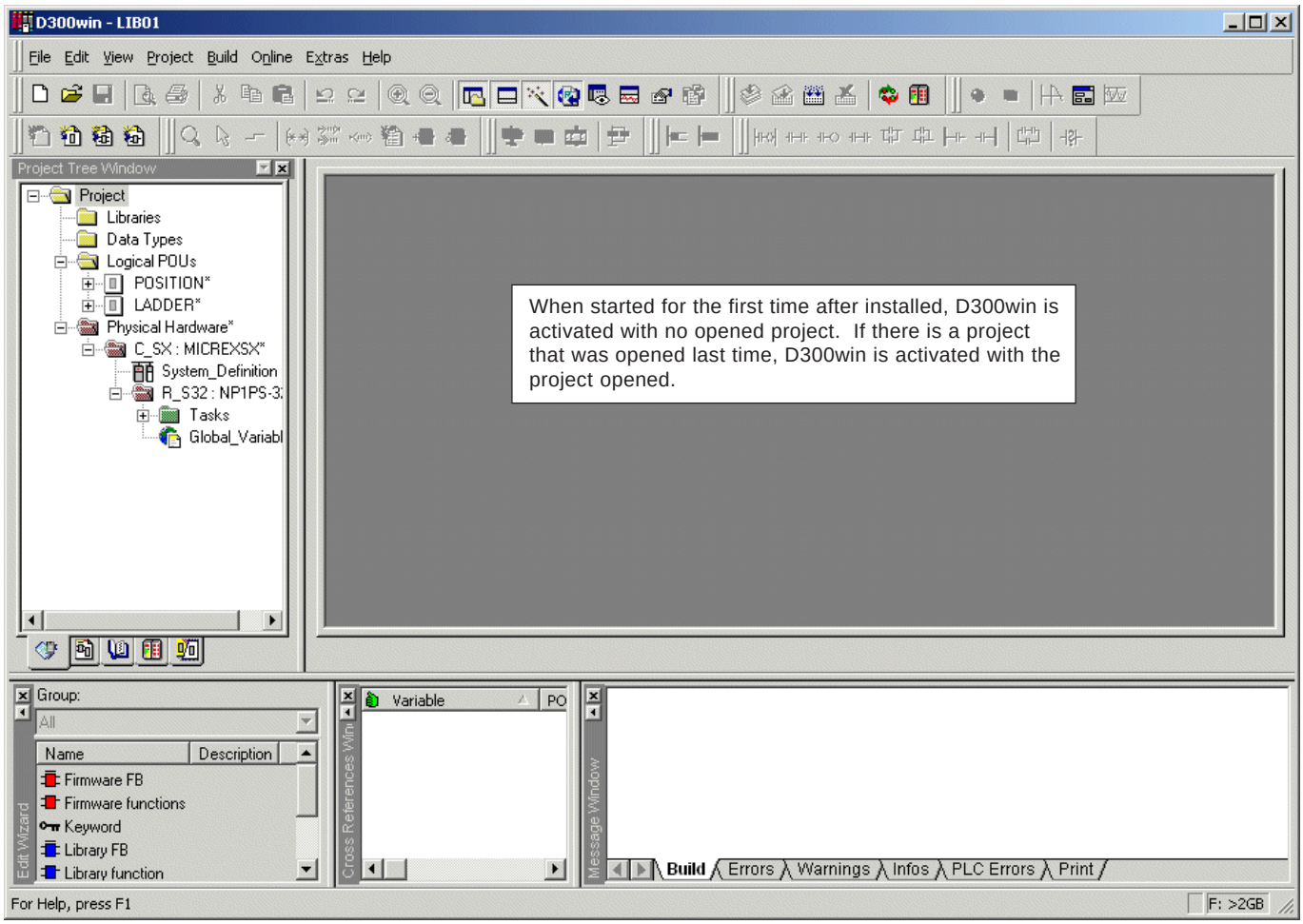
3-1 Starting and Exiting D300win

3-1-1 Starting D300win

◆ Execute [D300win] in the Windows program group [D300win].



◆ D300win is started.

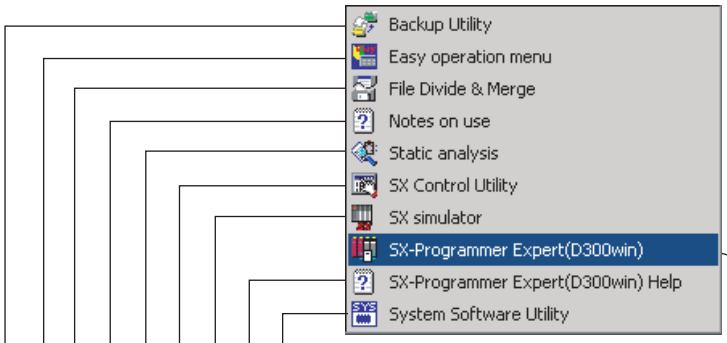


Section 3 Basic Operation of D300win

3-1 Starting and Exiting D300win

<D300win program group>

When D300win is installed, the [D300win] program group is created, as shown below.



Note) SX simulator and Easy operation menu is installed when you select at custom setup.

Starts D300win.

Activates the program for making backup copies of project files.

Enables you to select basic D300win operation items from a menu, which saves labor by eliminating troublesome manipulation on D300win.
(For more information, see Section 3-3-3 Easy operation menu.)

Activates the program for dividing/merging files. If a zipped project file cannot be stored in a floppy disk, with this function, you can divide the zipped project file into multiple files for storage, or merge divided files into a single file.
(For more information, see Section 13-5-1 Dividing/Merging Files.)

Displays the restrictions on using D300win. Please read this text through because it contains important information for using D300win.

Activates the program for static analysis, which are used to statically analyze created projects (for example, checking for a duplicately written variable.)
(For more information, see Section 13-1 Static analysis.)

Activates the SX Control Utility, which is used to monitor the data of MICREX-SX system I/O memory or internal memory or to write data in these memories.
(For more information, see Section 11-5 SX Control Utility.)

Activates the SX simulator.
Even when there is no CPU, you can create a project and check program operation with this function.
(For more information, see FEH253-1 MICREX-SX Introductions.)

Displays the help screen for D300win.

Used to change SPB firmware
(For more information, see Appendix2)

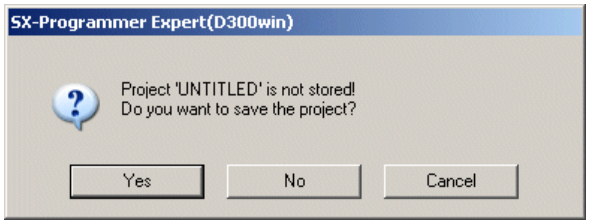
Section 3 Basic Operation of D300win

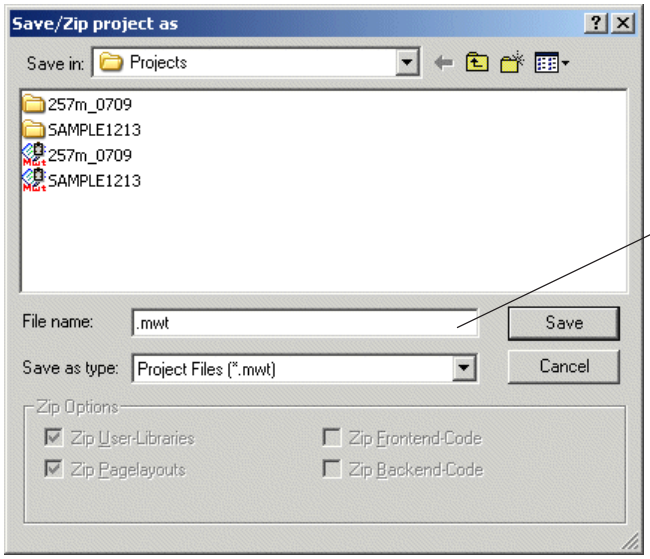
3-1 Starting and Exiting D300win

3-1-2 Exiting D300win

You can exit D300win at any time. Even when you are editing a code worksheet or the like and the content of your work is not yet saved, a confirmation dialog box for saving is displayed, and you safely exit D300win after saving the content.

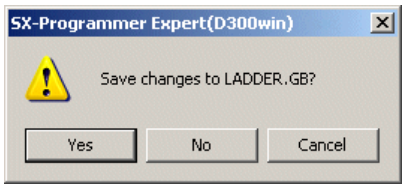
- ◆ Click the [Exit] command in the [File] menu. Otherwise, click the [Close] button at upper right on the D300win screen.
- ◆ If the project is not yet named (continues to be “UNTITLED”), the dialog box for saving projects is displayed. When you click the [Yes] button on this dialog box, the screen for saving projects is displayed. On the other hand, when you click the [No] button on the dialog box, you will exit D300win without saving the project.





Enter a project name (maximum 24 single-byte characters).

- ◆ When you enter a project name and then click this button, the project is saved and you exit D300win.
- ◆ If there is a worksheet the editing of which is not completed and its content is not yet saved, the confirmation dialog box is displayed, asking you whether or not to save the worksheet. When you click the [Yes] button on this dialog box, the worksheet is saved and you exit D300win. On the other hand, when you click the [No] button, you will exit D300win without saving the worksheet.

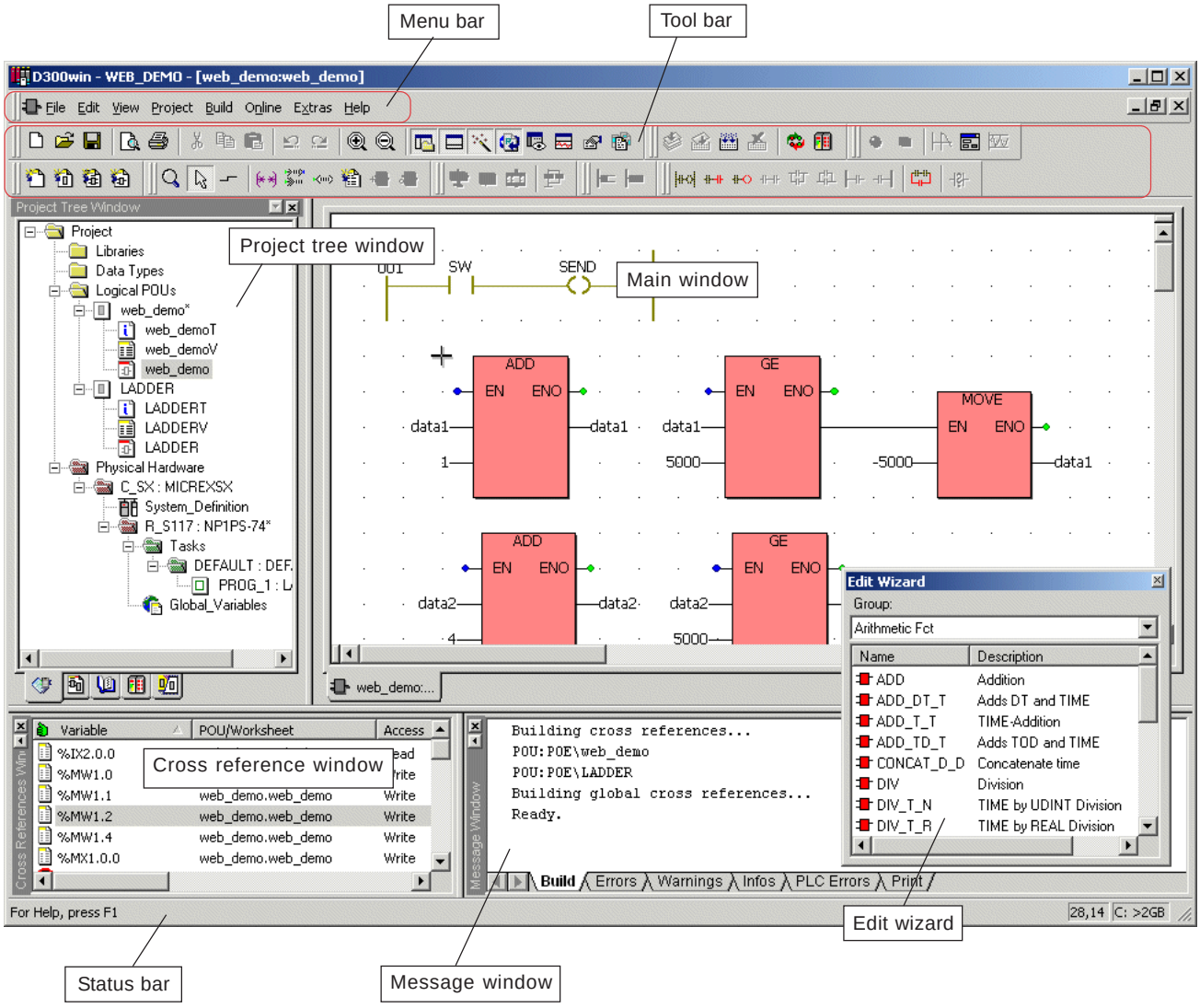


Section 3 Basic Operation of D300win

3-2 Screen Structure of D300win

3-2-1 Screen structure overview

When D300win is started up, the following screen appears. The D300win screen comprises menu bar, tool bar, main window (in which code worksheet or variable worksheet is displayed), project tree window, message window, edit wizard, cross reference window, watch window, logic analyzer, properties windows, and status bar. For these user interfaces, you can changeover between “viewing” and “hiding” or select “allow” or “not allow” of docking.



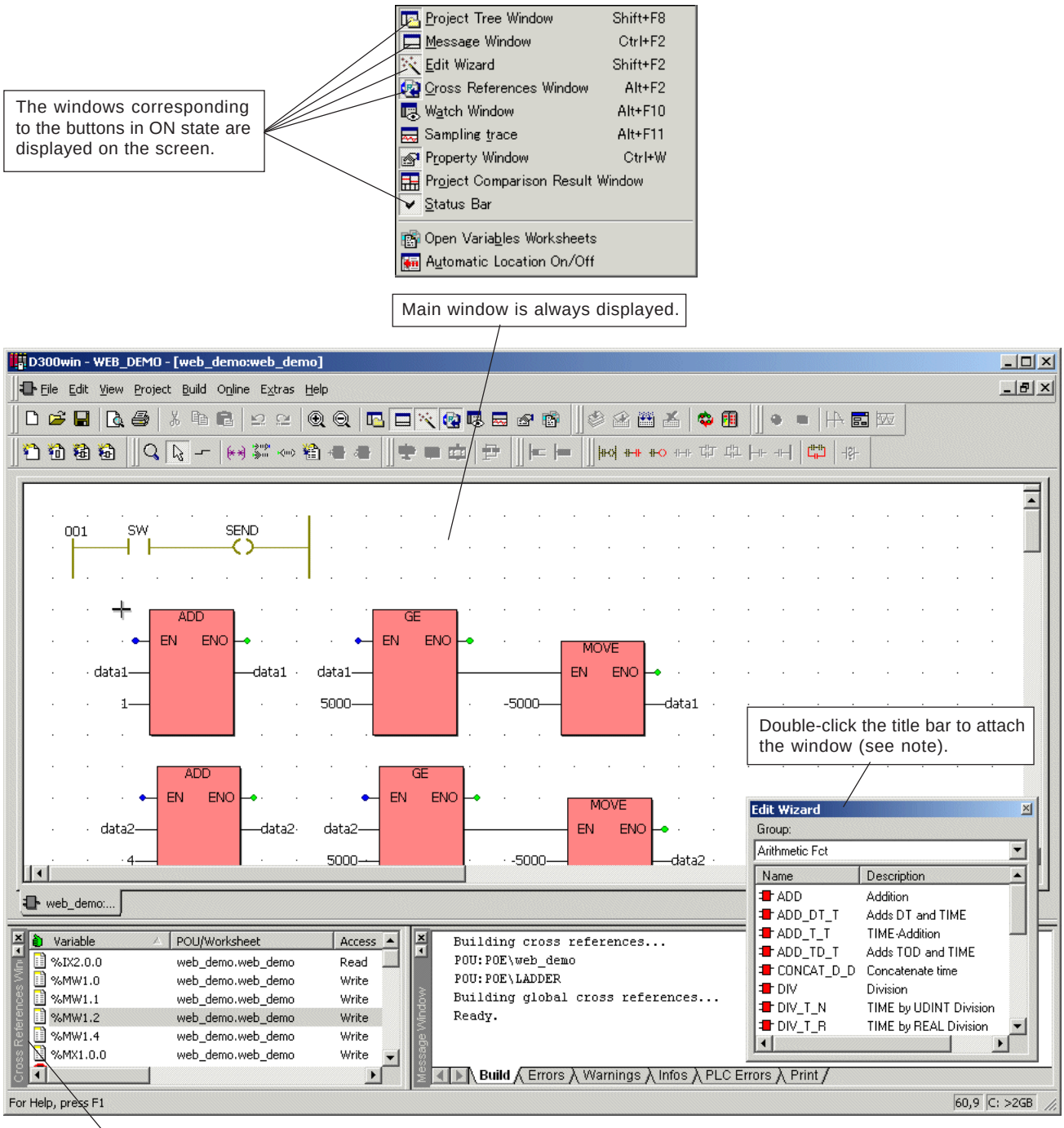
Section 3 Basic Operation of D300win

3-2 Screen Structure of D300win

3-2-2 Window layout

The windows (project tree window, message window, cross reference window, etc.) that are displayed on the D300win screen are docking windows, each of which can be detached or attached. A window can be detached to optionally change its size or display position.

<Displayed menu>



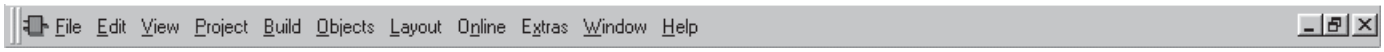
Note: If the window cannot be attached by double-clicking, right-click a point below the title bar and check “Allow Docking” in the short cut menu. You can drag the window to attach it at arbitrary location on the screen.

Section 3 Basic Operation of D300win

3-2 Screen Structure of D300win

3-2-3 Menu bar

[D300win] menu contains various commands. With these commands, various processing necessary for creating a project or operating D300win can be executed. The commands contained in individual submenu are briefly explained below. The menu and submenu items vary with the working status.



<Description of commands contained in each menu>

- [File] ..... Contains the commands for creating, saving or printing projects.
- [Edit] ..... Contains the commands for editing, such as object selection, cut, paste, search and replace.
- [View] ..... Changes over between “viewing” and “hiding” of individual window.
- [Project] ..... Contains the commands for editing a project tree. (Library, data type, POU, etc. are added.)
- [Build] ..... Contains the commands for compiling a project.
- [Objects] ..... Contains the commands for editing a program (function/function block, contact, coil, etc.)
- [Layout] ..... Contains the commands for designing a display layout.
- [Online] ..... Contains online mode commands and various utilities.
- [Extras] ..... Contains the commands for setting basic D300win operations.
- [Window] ..... Contains the commands for changing the window display.
- [Help] ..... Contains the commands for activating the help function.

Note: Commands contained in these menus or submenus vary with the editor selected.

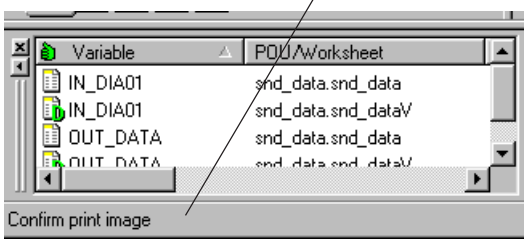
3-2-4 Tool bar

The tool bar contains multiple buttons. By using these buttons, frequently used functions can be executed easily. All these functions can be executed from menu or with shortcut icon.

* Buttons contained in the tool bar can be optionally customized. For the method to customize the tool bar items, see “*-*-* etting the tool bars and commands”.

If you cannot understand the function of a button from its symbol, place the mouse pointer on the button. Then the tool name (command name) will be displayed below the mouse pointer.

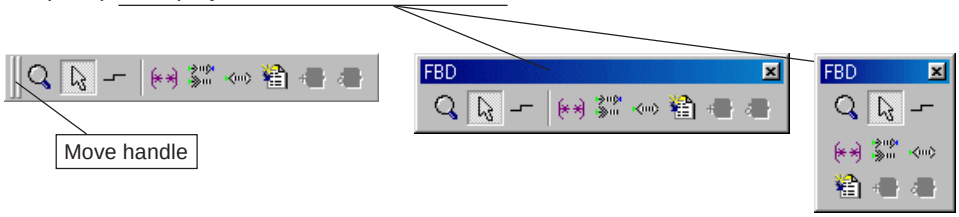
In addition, the description of the command is displayed on the status bar.



Section 3 Basic Operation of D300win

3-2 Screen Structure of D300win

The tool bar is a free tool bar. The move handle at the edge of the tool bar can be dragged and dropped to the main window (workspace) to display the tool bar as a window.



3-2-5 Status bar

On the status bar, various messages are displayed for the currently executed D300win operation.
At lower left corner of the status bar, the information of executed operation or D300win system message (the content specified by the mouse) is displayed.

<Example of displayed error status>

<Example of displayed compilation result>

<Example of displayed progress of download>

Section 3 Basic Operation of D300win

3-3 Operability Improving Functions

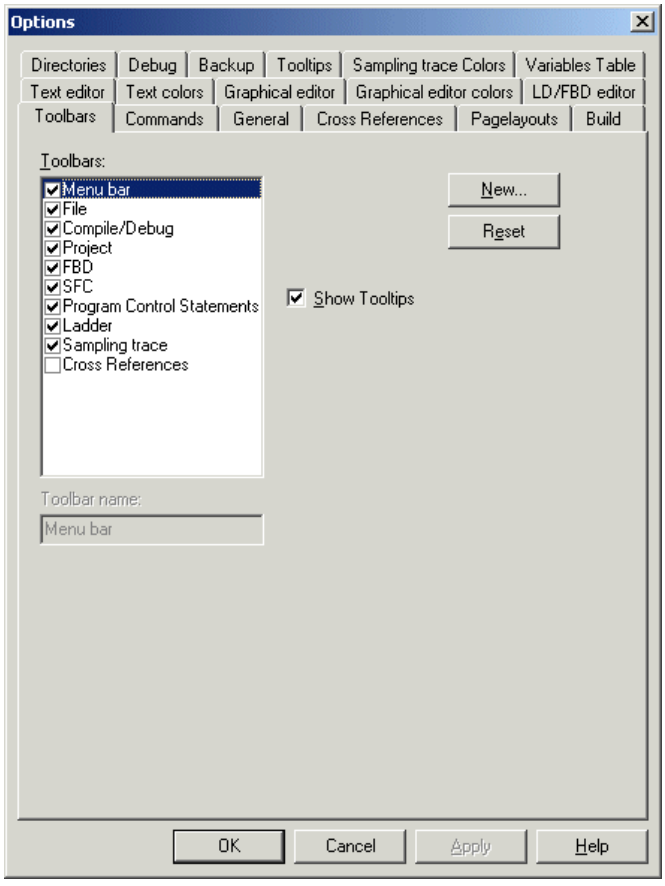
3-3-1 Operation from keyboard

A keyboard shortcut is a function to execute, from the keyboard, the same operation as by using the tool bar. Keyboard shortcuts can be operated with a single key or a combination of multiple keys. For D300win, the user can optionally customize keyboard shortcut keys.

◆ When the <Alt> + <X> keys are pressed on the keyboard, the [Extras] menu is displayed.

◆ With the [Extras] menu displayed on the screen, pressing the <0> key displays the [Options] dialog box.

◆ Individual item in the dialog box can be selected with the <Tab> key. You can change activate tab window of the dialog box, using the “Up”, “Down”, “Right” or “Left” arrow key or pressing the <Ctrl> + <PageUp>/<PageDown> keys.

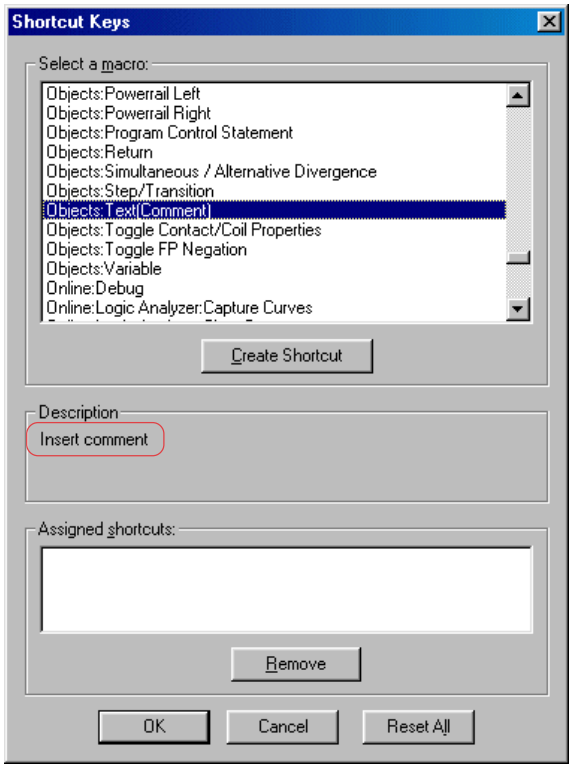


Section 3 Basic Operation of D300win

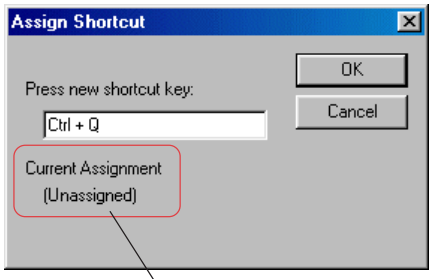
3-3 Operability Improving Functions

<Procedure for customizing shortcut keys>

◆ Left-click the [Shortcuts...] command in the [Extras] menu. The [Shortcut Keys] dialog box is displayed.
◆ From the [Select a macro:] list box, select a macro to which a shortcut key is to be assigned. In this example, a shortcut key is assigned to “Objects: Text (Comment)”.



◆ Select “Objects: Text (Comment)” and click the [Create Shortcut] button. The [Assign Shortcut] dialog box is displayed. Press a key to which you want to assign a shortcut, and click the [OK] button. In the figure below for this example, the <Ctrl> and <Q> keys are pressed at the same time.



When the pressed shortcut key is not yet defined,
“(Unassigned)” is displayed below “Current Assignment”.

Note: When a shortcut key is already defined, its macro name is displayed. In such case, assign the shortcut to other key. If the [OK] button is clicked without doing so, the already defined shortcut key will be deleted and <Q> keys are pressed at the same time.

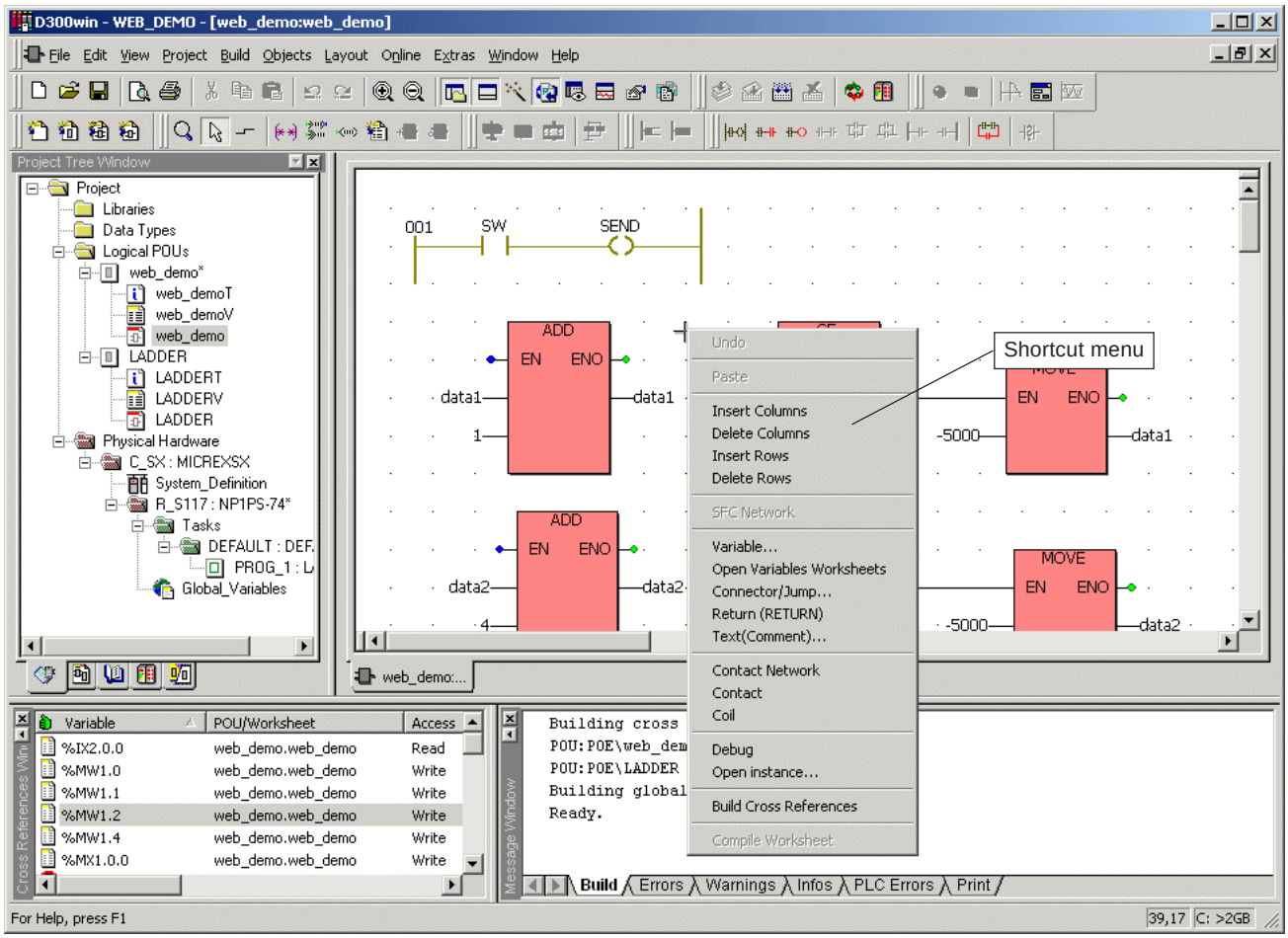
Section 3 Basic Operation of D300win

3-3 Operability Improving Functions

3-3-2 Shortcut menu

The shortcut menu contains frequently used functions that are available for the selected object (item). The shortcut menu can be used for almost all selectable objects. The shortcut menu can be displayed by right-clicking an arbitrary object.

<Sample screen displayed by right-clicking on the LD/FBD code worksheet>



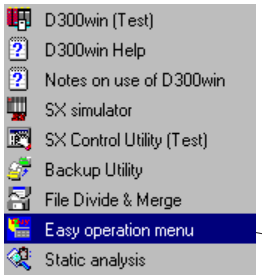
Section 3 Basic Operation of D300win

3-3 Operability Improving Functions

3-3-3 Easy operation menu

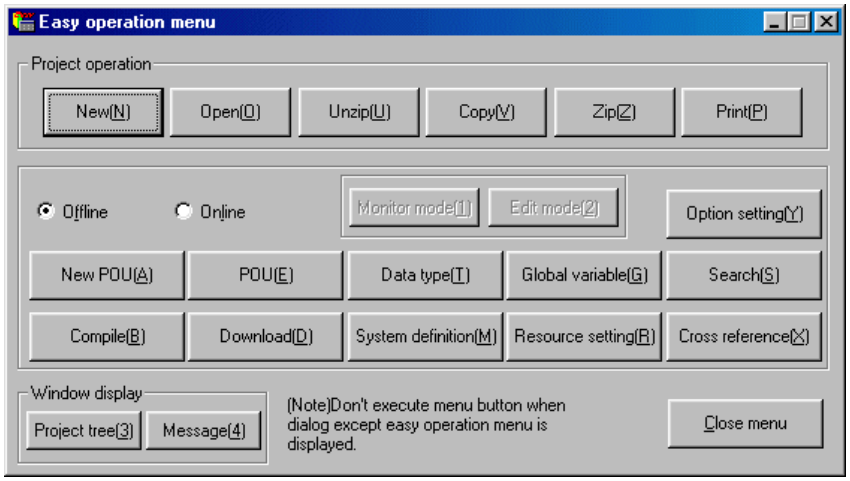
Easy operation menu enables you to select basic D300win operations simply from the menus (by clicking the corresponding button). Using this function, troublesome manipulations on D300win are unnecessary.

◆ Click [Easy operation menu] in the [D300win] program group.

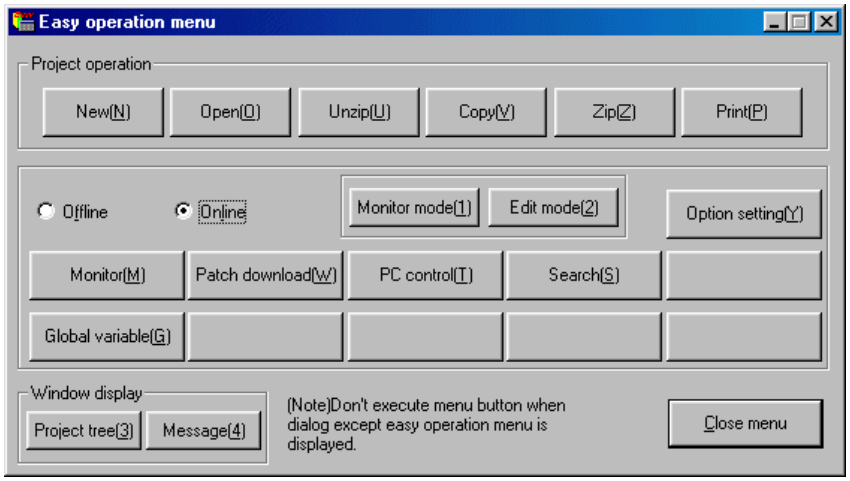


Note: To use the easy operation menu, select “Custom” installation method with the D300win installer, and select “Easy operation menu”. If the “Typical” or “Compact” installation method is selected, the easy operation menu function cannot be installed.

◆ The [Easy operation menu] dialog box is displayed. It is also possible to open the [Easy operation menu] window from the [Extras] menu after starting up D300win.



When the optional [Online] button is turned on, the following menu is displayed.



Section 3 Basic Operation of D300win

3-3 Operability Improving Functions

<Function list of individual operation menu>

Classification	Button name	Description
Project operation	New (N)	Creates a new project.
	Open (O)	Opens an existing project.
	Unzip (U)	Unzips a zipped project.
	Copy (V)	Names and saves the currently opened project.
	Zip (Z)	Zips and saves the currently opened project.
	Print (P)	Displays the dialog box for printing projects.
Menu change operation	Offline	Changes to the offline menu.
	Online	Changes to the online menu.
Offline operation	New POU (A)	Inserts/adds a new POU.
	POU (E)	Displays the code worksheet for specified POU.
	Data type (T)	Displays a data type worksheet.
	Global variable (G)	Displays a global variable worksheet.
	Search (S)	Executes local or global search.
	Compile (B)	Compiles the currently opened project.
	Download (D)	Displays the resource control dialog box.
	System definition (M)	Displays the system configuration definition window.
	Resource setting (R)	Displays the resource setting dialog box.
	Cross reference (X)	Creates a cross reference.
	Option setting (Y)	Make the operation settings for the easy operation menu, the settings for All compile/Make, or the settings for local or global search.
Online operation	Monitor mode (1)	Changes to the project monitor mode.
	Edit mode (2)	Changes to the project edit mode.
	Monitor (M)	Displays the code worksheet for specified POU in monitor mode.
	Patch download (W)	Writes the POU changed online into the CPU that is currently running.
	PC control (T)	Displays the resource control dialog box.
	Search (S)	Executes local or global search.
	Option setting (Y)	Make the operation settings for the easy operation menu, the settings for All compile/Make, or the settings for local or global search.
Windows operation	Project tree (3)	Changes between viewing and hiding the project tree window.
	Message (4)	Changes between viewing and hiding the message window.
Other	Close menu	Closes the easy operation menu.

<Notes on using the easy operation menu>

- Do not execute any menu button when a dialog or message box other than the easy operation menu is displayed.
- The easy operation menu cannot be used when multiple D300win systems are active at the same time.
- The easy operation menu cannot be used for the SX simulator/SPS.
- When the easy operation menu is used on a personal computer with Microsoft Visual Test installed, the Visual Test Viewport window may be displayed. However, this will cause no problem with the use of the easy operation menu. Use this window reducing it into an icon.
- This function cannot be used with Windows Vista.

Section 3 Basic Operation of D300win

3-4 Search and Replace Functions

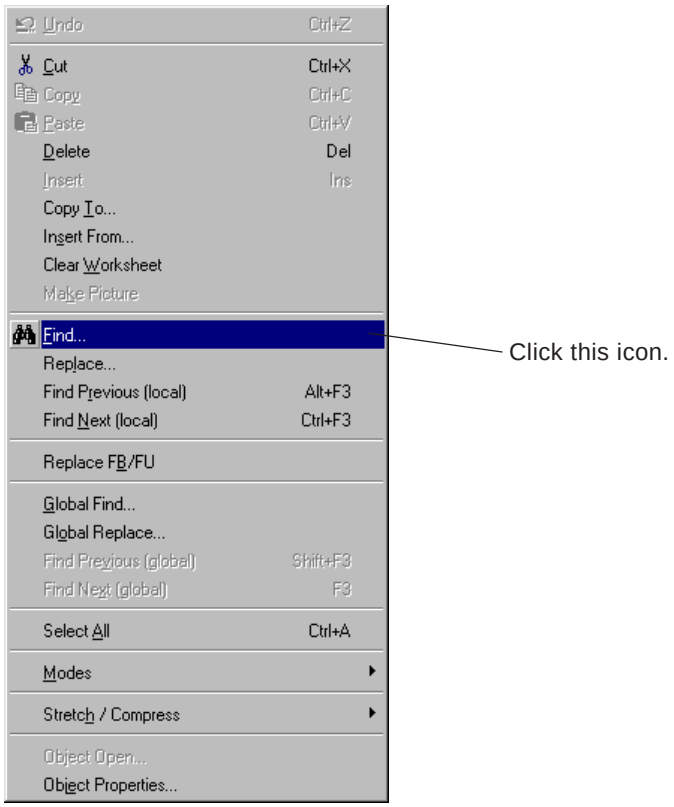
There are two modes of the Search and Replace functions of D300win: “Global search and replace” the target of which is a whole project; and “local search and replace” the target of which is an active window or worksheet.

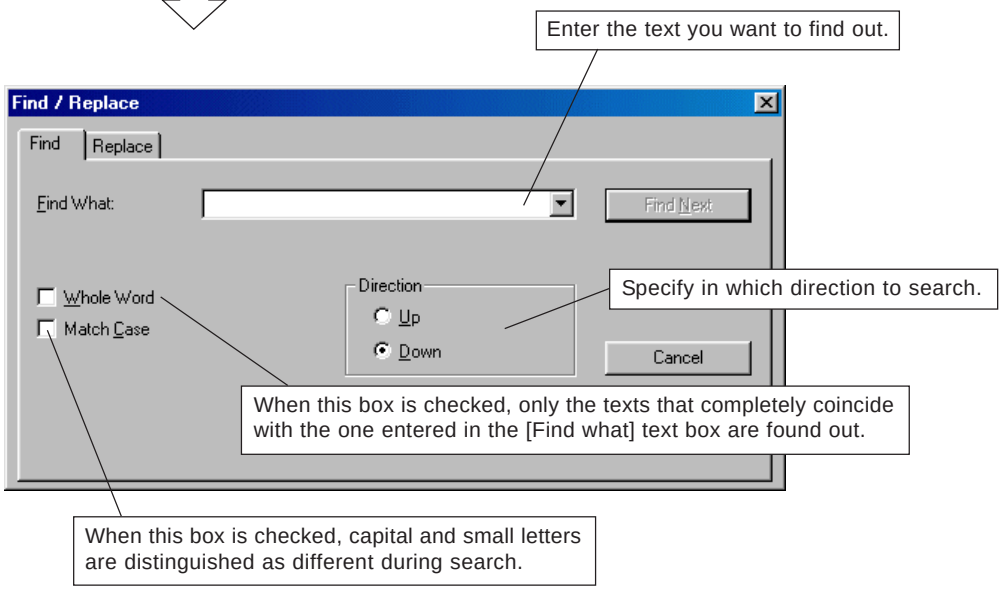
3-4-1 Local search and replace

(1) Local search

This function is used to search the active window or worksheet for text elements.

◆ Select a worksheet (or window) to be searched, and click the [Find...] command in the [Edit] menu.
The [Find/Replace] dialog box is displayed.





◆ Enter the text you want to find out and click the [Find Next] button. The [Find/Replace] dialog box disappears, and the text that is found out is highlighted on the window or worksheet.
◆ When the [Find Next (local)] command is clicked in the [Edit] menu, search is continued to find the next matching text.

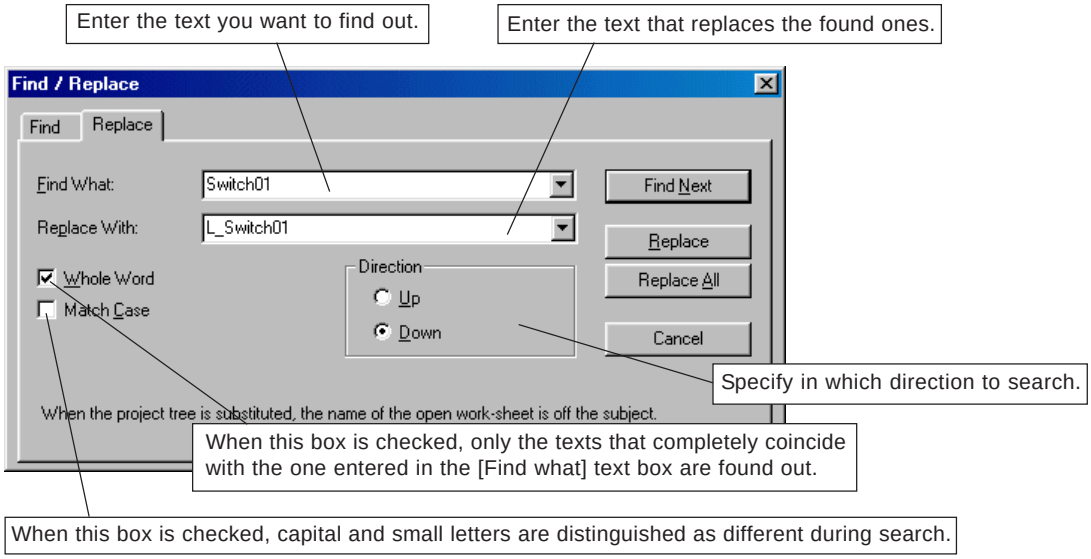
Section 3 Basic Operation of D300win

3-4 Search and Replace Functions

(2) Local replace

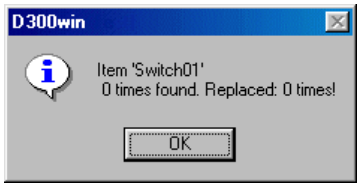
This function searches the active window or worksheet for specified text element and replaces the found ones with your desired text.

◆ Select a worksheet to be searched, and click [Replace...] in the [Edit] menu.
The [Find/Replace] dialog box is displayed.



◆ Enter the text you want to find out and then the text that replaces the found ones.
◆ Click the [Find Next] button and, when a text is found, click the [Replace] button.
If the text found out needs not be replaced, click the [Find Next] button.

* When the [Replace All] button is clicked, all the found texts are replaced with the one entered in the [Replace with] text box.
When replacement is completed, a window showing the result of search and replacement is displayed.



Section 3 Basic Operation of D300win

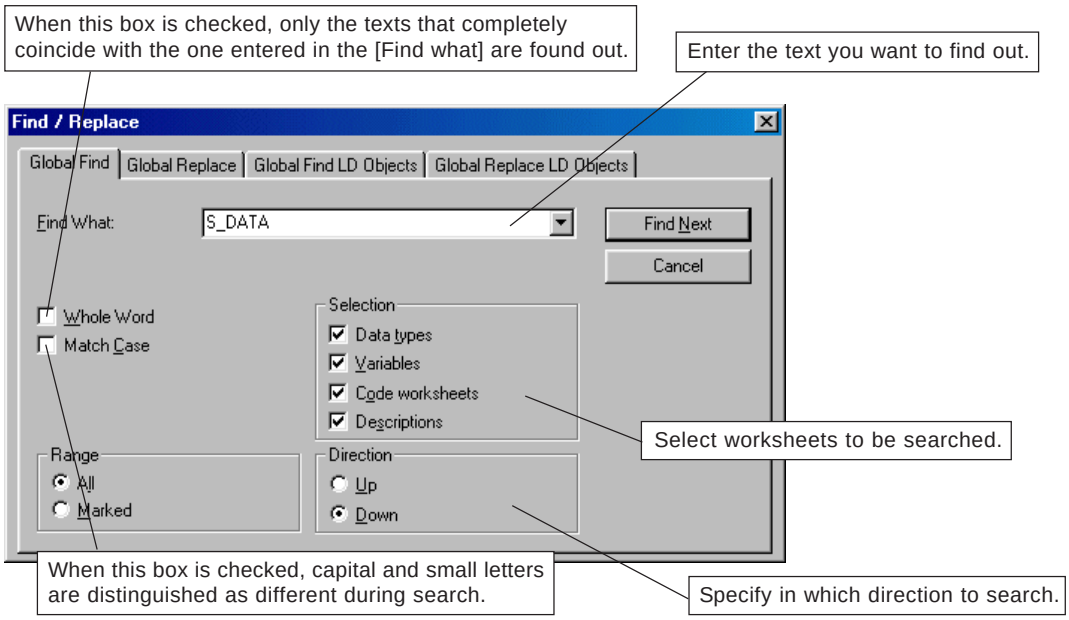
3-4 Search and Replace Functions

3-4-2 Global search and replace

(1) Global search

This function is used to search all opened projects for specified text. The search range includes data type worksheet, code worksheet, variable worksheet and description worksheet.

◆ Click the [Global Find...] command in the [Edit] menu, and the [Find/Replace] dialog box is displayed.



◆ Enter the text you want to find out and click the [Find Next] button. The text that is found out is highlighted on the worksheet.
◆ To continue searching to find out the next matching text, click the [Find Next] button or click the [Find Next (local)] command in the [Edit] menu.

Note: No text can be searched for in the projects that are registered in a project library.

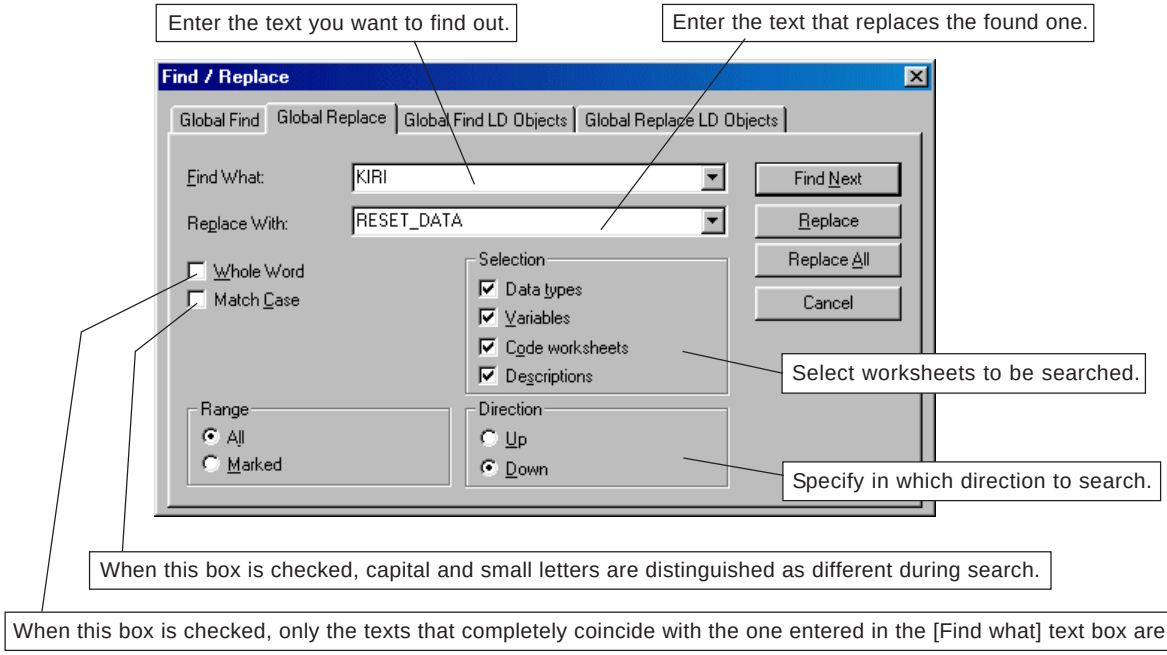
Section 3 Basic Operation of D300win

3-4 Search and Replace Functions

(2) Global replace

This function is used to search all opened projects for specified text and replace all the found ones with your desired text. The search range includes data type worksheet, code worksheet, variable worksheet and description worksheet.

◆ Click the [Global Replace...] command in the [Edit] menu, and the [Find/Replace] dialog box is displayed.



◆ Enter the text you want to find out and then the text that replaces the found ones.
◆ Click the [Find Next] button and, when a text is found out, click the [Replace] button. If the found out text needs not be replaced, click the [Find Next] button.

* When the [Replace All] button is clicked, all the found texts are replaced with the one entered in the [Replace with] text box. When replacement is completed, a window showing the result of search and replacement is displayed.

Section 3 Basic Operation of D300win

3-5 Preparation for Creating a New Project

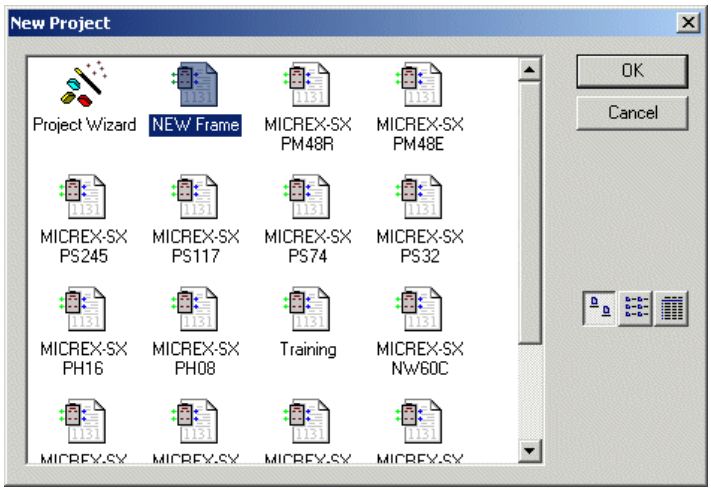
3-5-1 Creating a new project

When creating a new project, it is necessary to create a project tree in advance. There are two methods for creating a project tree: the method to use a template and the method to use the project wizard.

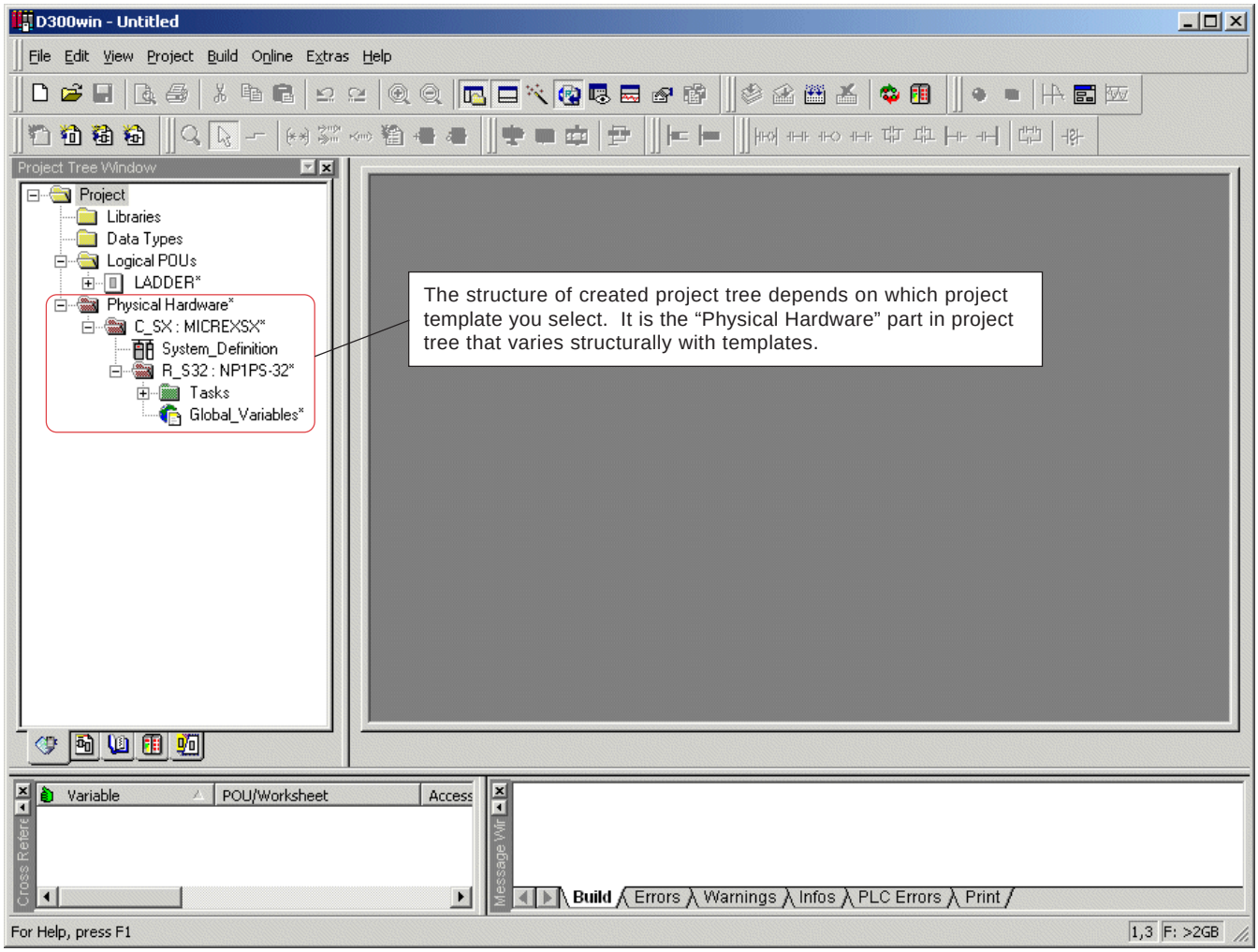
(1) The method to use a template

This method uses a template that matches the type of the CPU module to be used.

◆ Left-click [New Project...] in the [File] menu. The [New Project] dialog box is displayed.



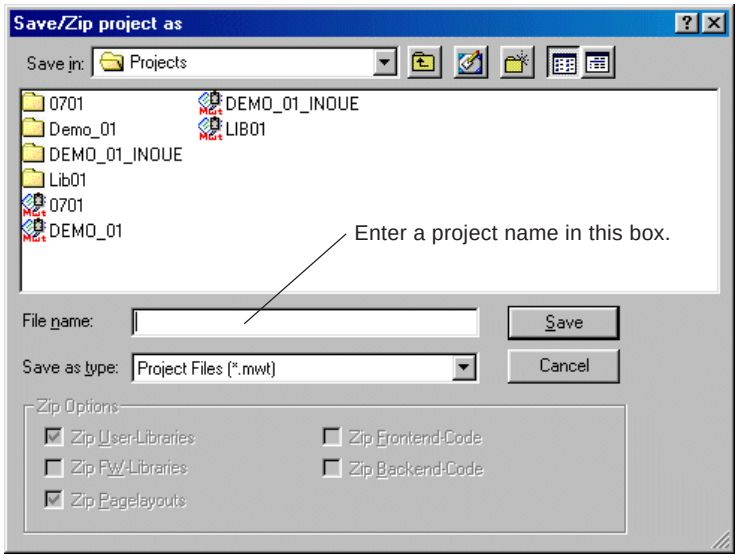
◆ Select the icon for the CPU module to be used, and click the [OK] button. Then a project tree that matches the CPU (resource) is prepared.



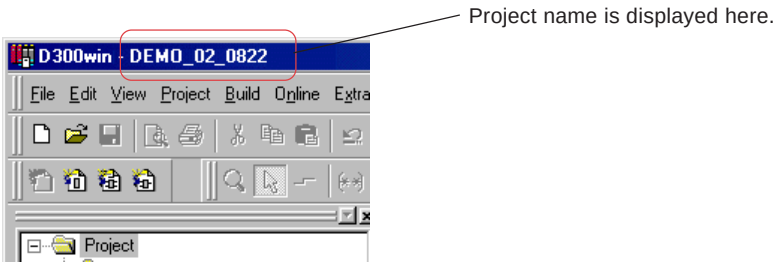
Section 3 Basic Operation of D300win

3-5 Preparation for Creating a New Project

◆ Then, the project needs to be named.
Click [Save Project As/Zip Project As...] in the [File] menu. The [Save/Zip project as] dialog box is displayed.



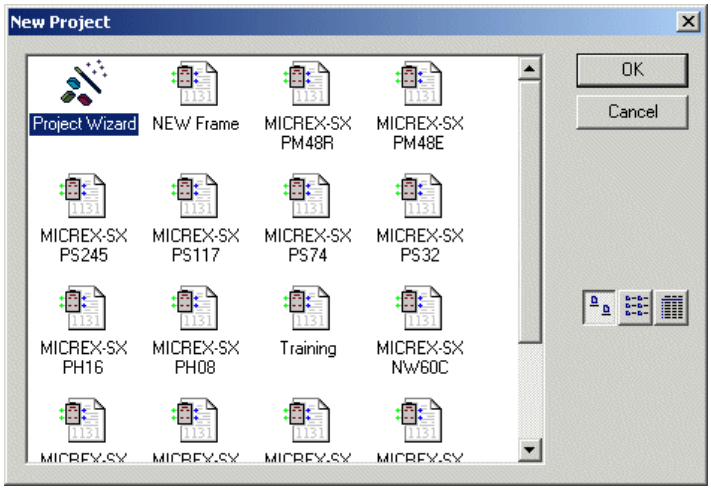
◆ Enter a project name and click the [Save] button. Maximum length of project name is 24 characters.



(2) The method to use the project wizard

With this method, you can create a project interactively.

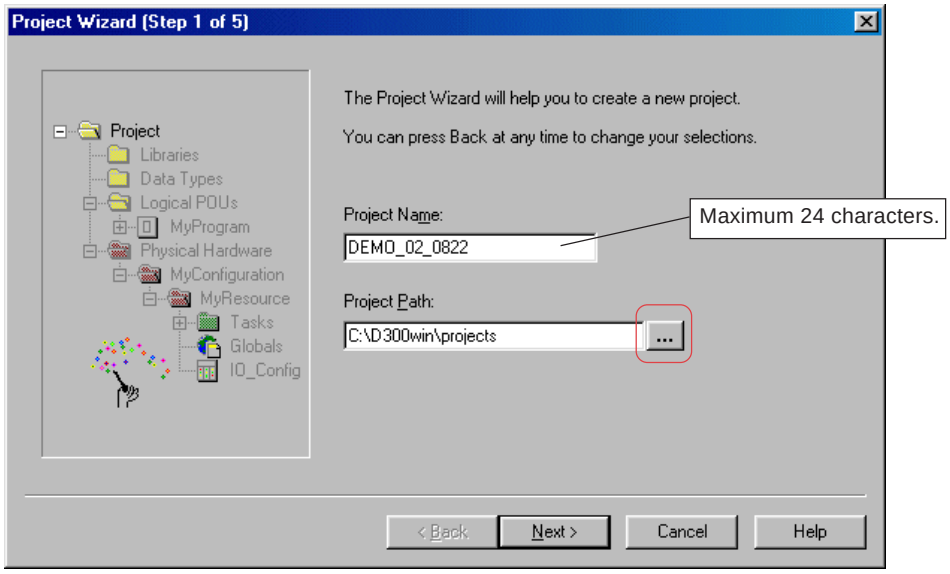
◆ Click [New Project...] in the [File] menu. The [New Project] dialog box is displayed.



Section 3 Basic Operation of D300win

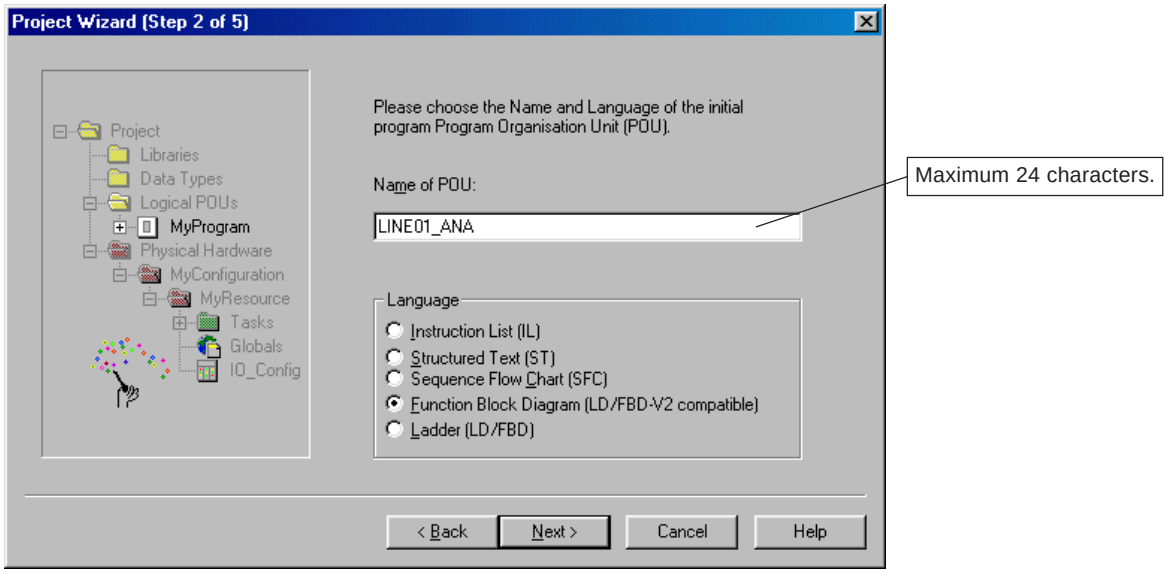
3-5 Preparation for Creating a New Project

◆ Select “Project Wizard” and click the [OK] button. The wizard is activated to display the [Project Wizard (Step 1 of 5)] dialog box. On this dialog box, first enter a project name.



◆ When you want to change the path that is displayed in the [Project Path] text box, enter a new path directly in the text box, or left-click the [...] button to display the [Select Directly] dialog box and specify a new path.

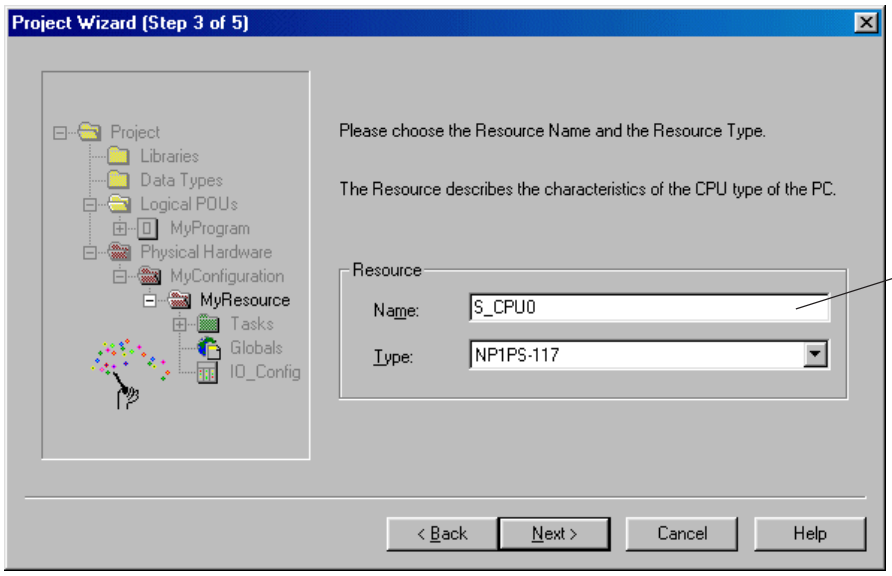
◆ Click the [Next] button to display the [Project Wizard (Step 2 of 5)] dialog box. Enter a POU name and select a program language to be used.



Section 3 Basic Operation of D300win

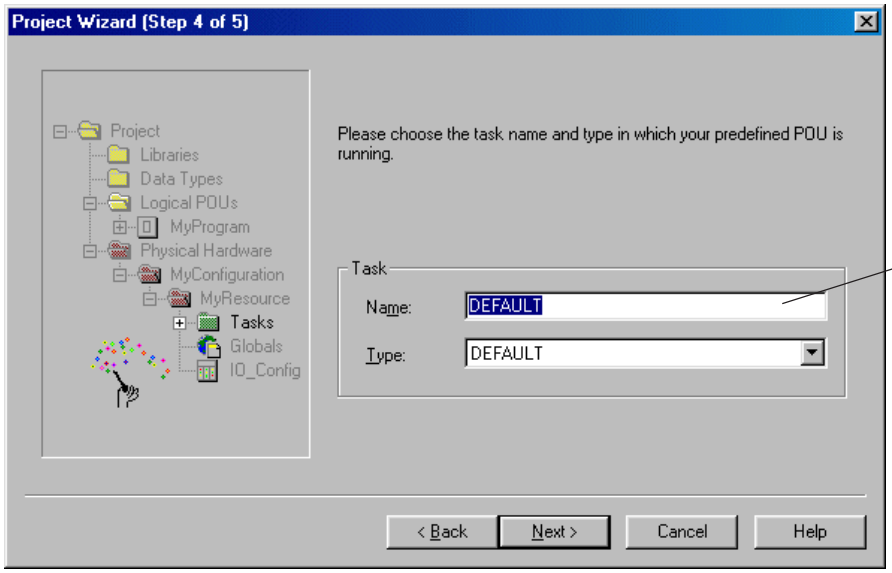
3-5 Preparation for Creating a New Project

◆ Click the [Next] button to display the [Project Wizard (Step 3 of 5)] dialog box. Enter a resource name and select a CPU to be used.



Maximum 24 characters.

◆ Click the [Next] button to display the [Project Wizard (Step 4 of 5)] dialog box. Enter a task name and select a type for the task.

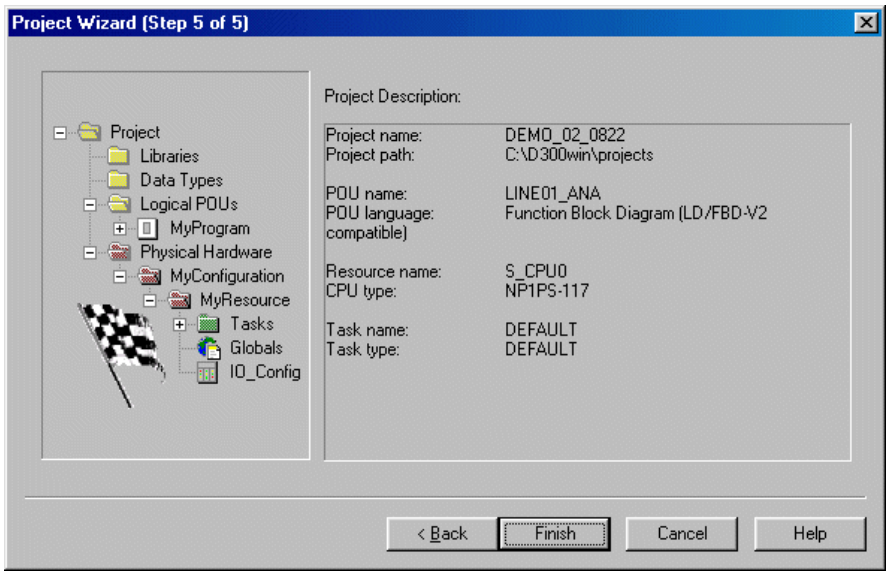


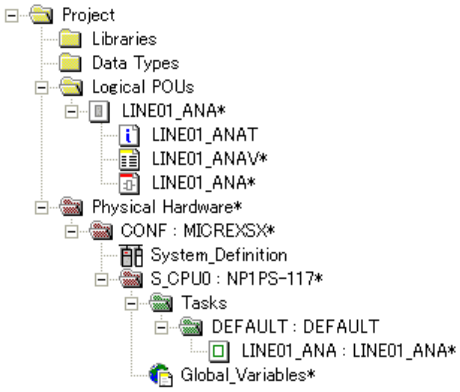
Maximum 7 characters.

Section 3 Basic Operation of D300win

3-5 Preparation for Creating a New Project

◆ Click the [Next] button to display the [Project Wizard (Step 5 of 5)] dialog box, in which all entered values are displayed. After checking their content, click the [Finish] button. Then a project tree is created.





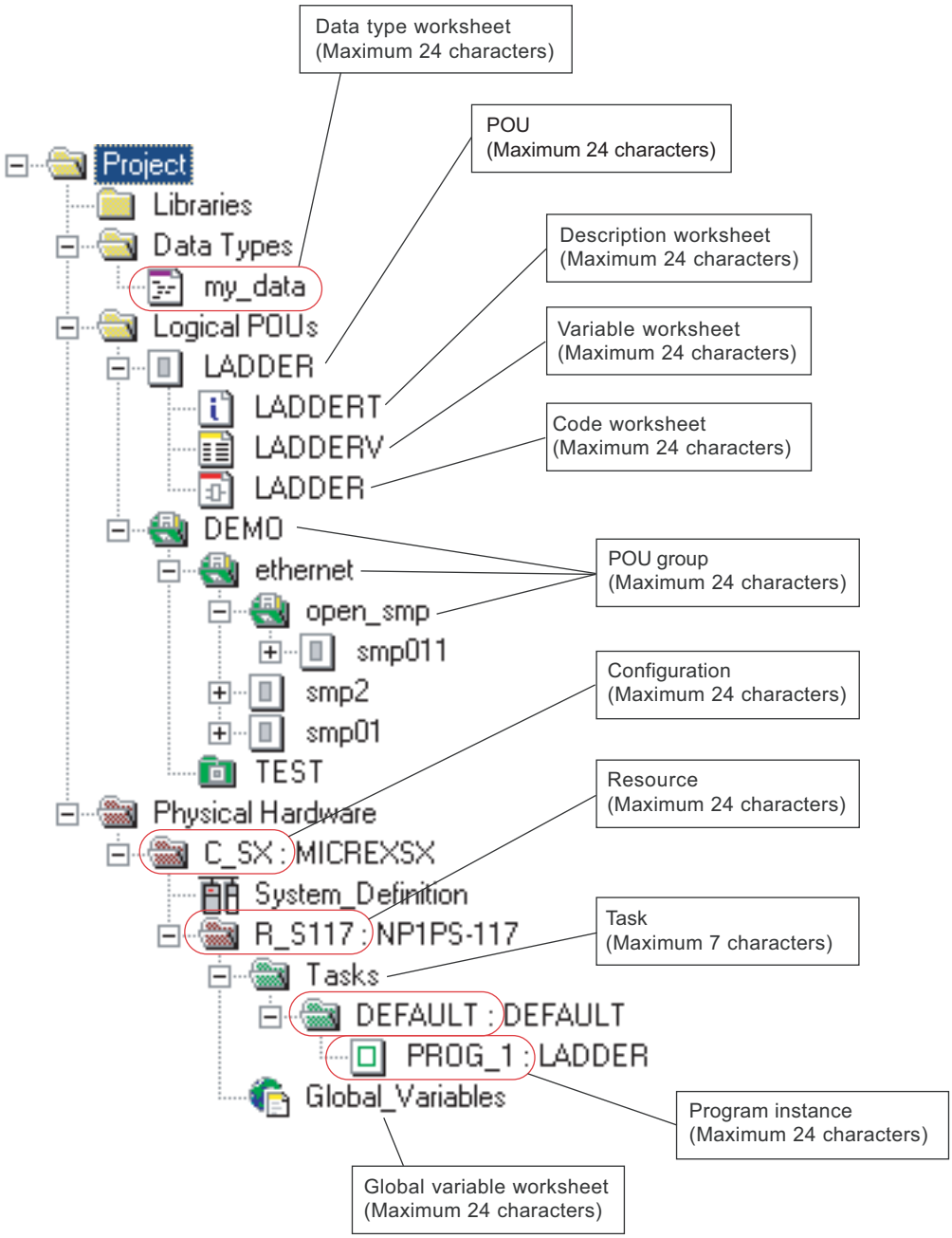
Section 3 Basic Operation of D300win

3-5 Preparation for Creating a New Project

3-5-2 Project tree

(1) Structure of project tree

The project trees that are displayed on the D300win screen are structured as follows. Individual folder name or worksheet name is restricted as shown below:



* "POU group function" was added to D300win V3.2.0.0. By using this function, you can categorize the POU into arbitrary folders to display and control them.

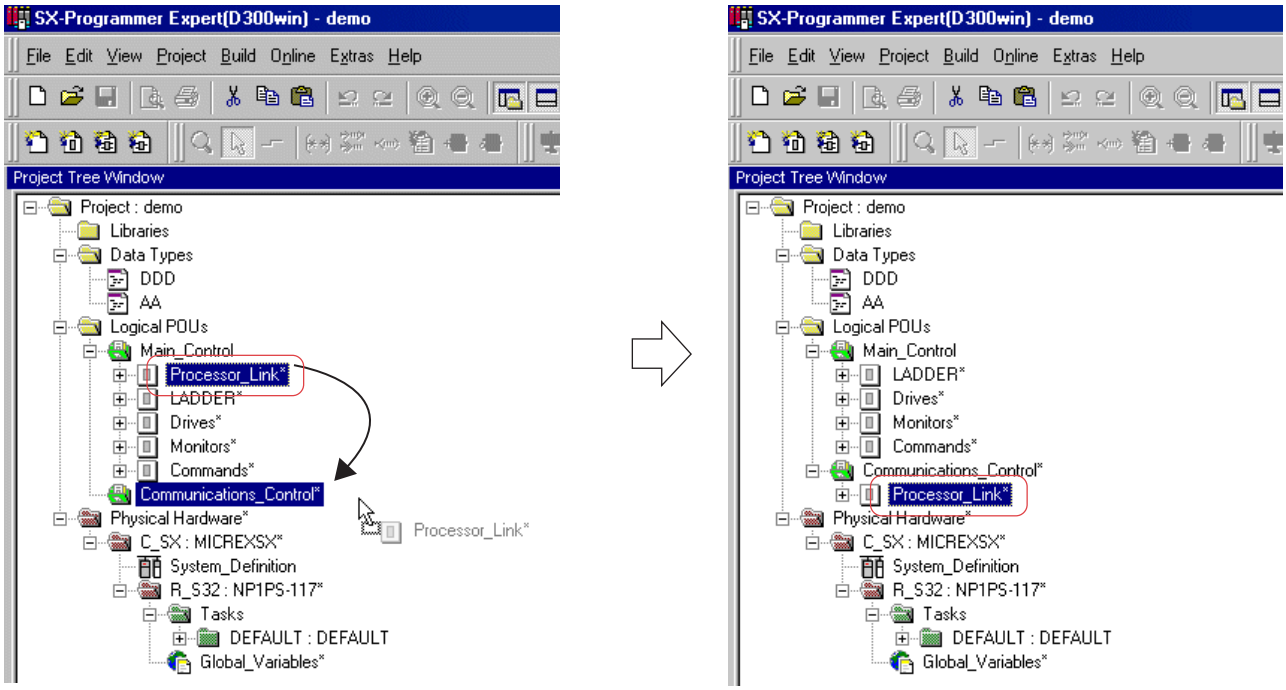
Section 3 Basic Operation of D300win

3-5 Preparation for Creating a New Project

(2) Moving a project tree node (V3.2.1.0 or later)

A node (POU, resource, configuration, task, each worksheet, etc.) comprising the project tree can be moved by using drag-and-drop.

◆ Click and select a node that you want to move and drag it to the desired position while clicking it. Then, release the left mouse button there. The selected node is moved.



* If you drag and drop a node while holding down the <Ctrl> button, the node is copied.
* If you drag a node to the position where a node cannot be moved (where a node cannot be dropped), ⃠ mark is indicated on the cursor.

Section 3 Basic Operation of D300win

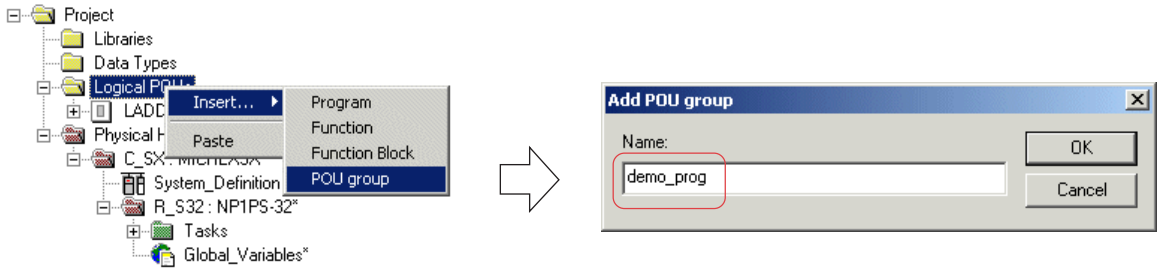
3-5 Preparation for Creating a New Project

3-5-3 inserting a POU

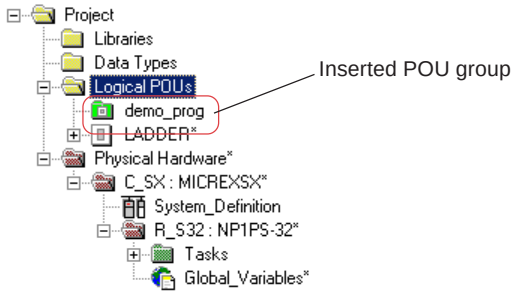
How to add a new POU to the current project tree is explained below:

(1) Inserting a POU group

◆ Right-click the “Logical POUs” icon in the project tree, and execute [Insert] command in the menu. Another menu is displayed. When you execute [POU group] command in it, the [Add POU group] dialog box is displayed.

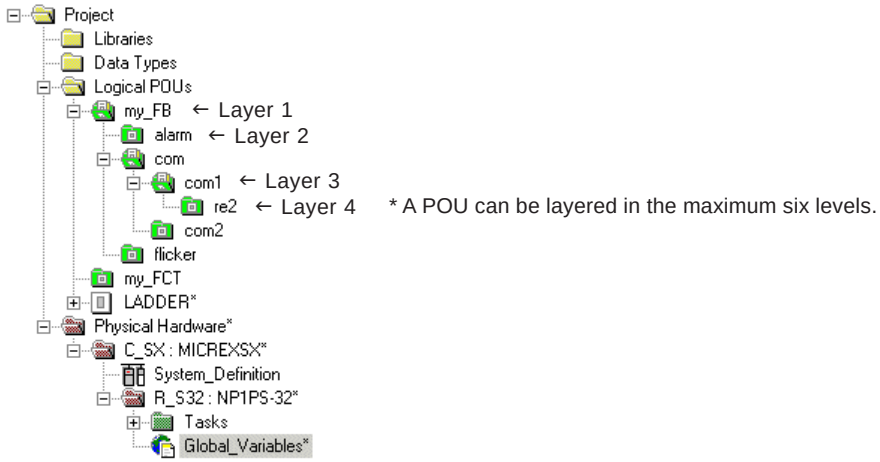


◆ On the [Add POU group] dialog box, input a POU group name, and then click the [OK] button. The POU group is displayed.



<What is a “POU group” ?>

A POU group is used to make POUs created in the Logical POUs in the project tree easier to see and to manage. As shown in the following figure, POUs can be layered.

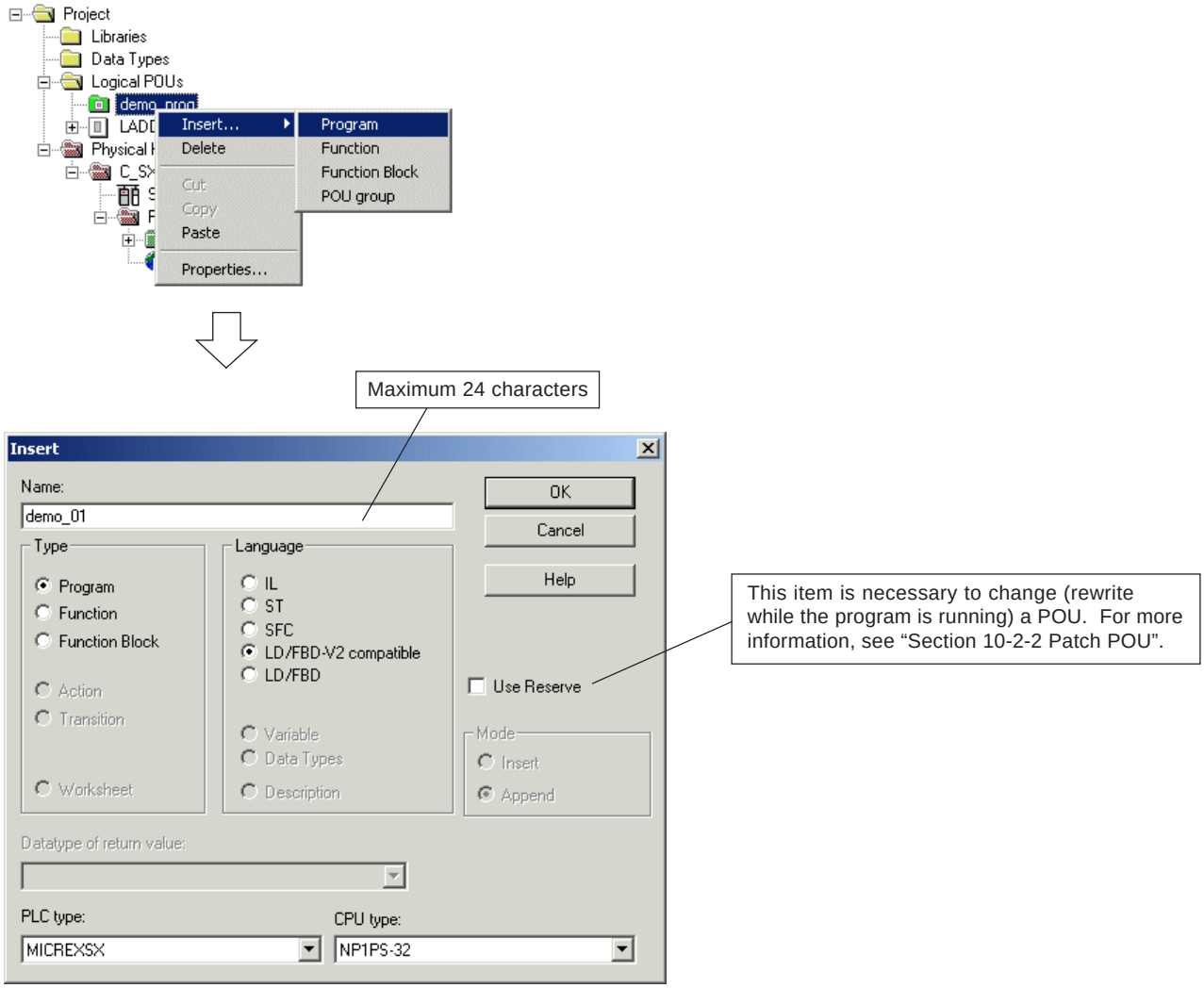


Section 3 Basic Operation of D300win

3-5 Preparation for Creating a New Project

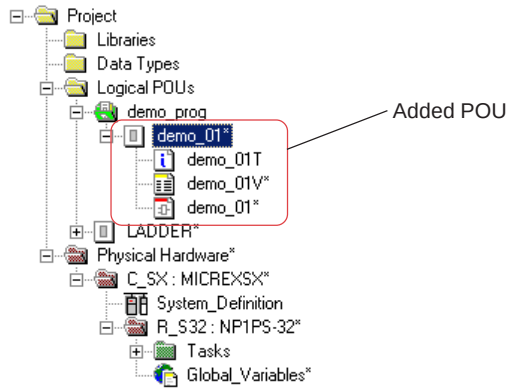
(2) Adding/inserting a POU

◆ Right-click the “demo_prog” icon in the project tree, and execute [Insert] command in the menu. Another menu is displayed. When you execute [Program] command in it, the [Insert] dialog box is displayed. Input a POU name, and select a type of POU, a program language to be used, and a CPU type.



Note: Set [PLC type] to “MICREXSX”. If “Independent” is selected, no original function or FB of MICREX-SX series can be used.

◆ After setting all necessary items, click the [OK] button. A new POU is added to the project tree.



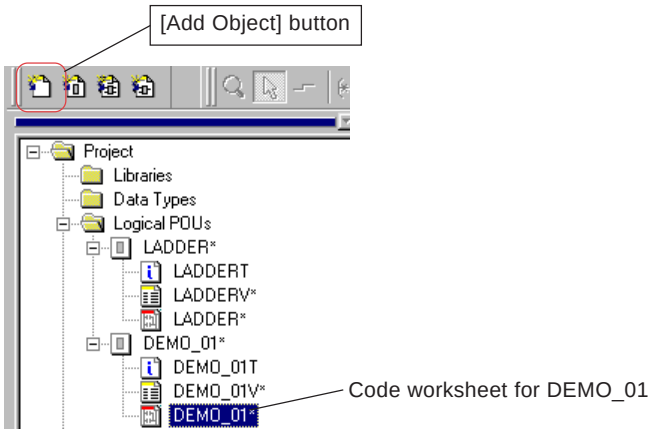
Section 3 Basic Operation of D300win

3-5 Preparation for Creating a New Project

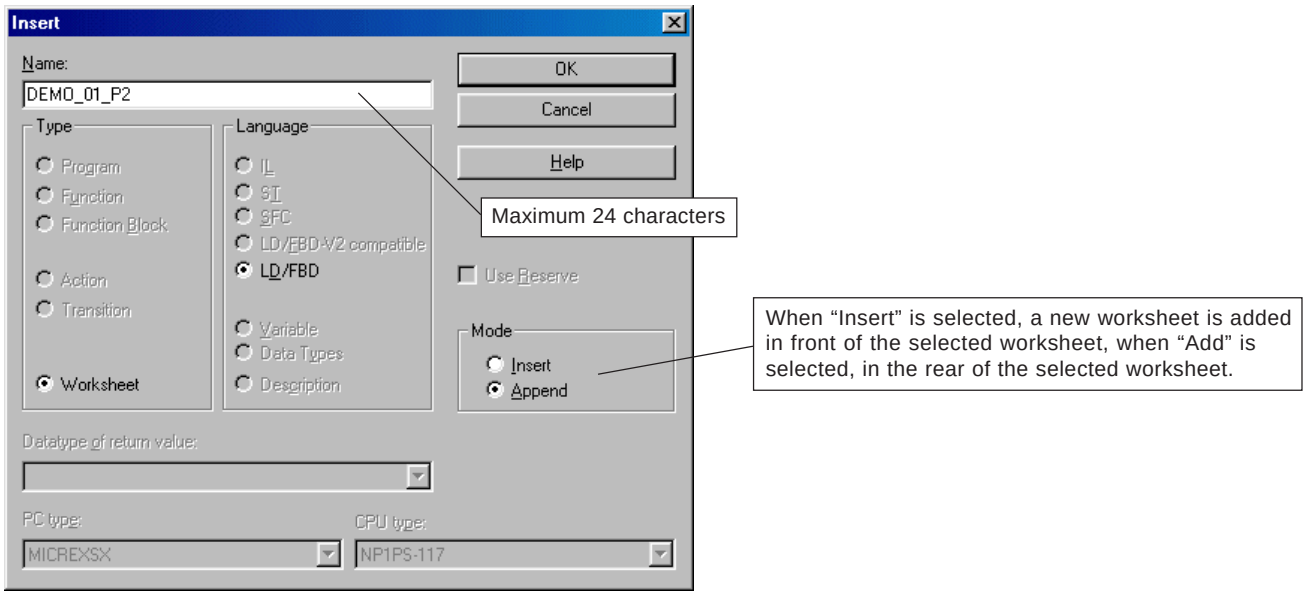
(3) Adding/inserting a worksheet

An additional worksheet can be inserted in an already existing POU (normally consisting of description worksheet, variable worksheet, and code worksheet.) Concerning code worksheet, however, only those can be inserted that use the same programming language as specified when adding or inserting a POU. (For example, for a POU that had the LD/FBD language selected, only a worksheet of LD/FBD language can be inserted.)

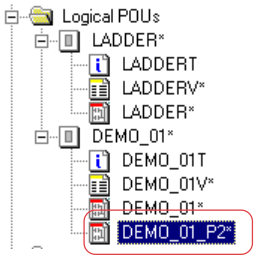
◆ In this example, a code worksheet is added to the POU “DEMO_01”.
Select the code worksheet for the POU “DEMO_01”, and click the [Add Object] button or press the <Insert> key.



◆ The [Insert] dialog box is displayed, which is almost the same as the [Insert] dialog box for inserting a POU, except that setting items are only worksheet name and “Mode”.



◆ After checking the content of your setting, click the [OK] button. Then a code worksheet is added to the POU.



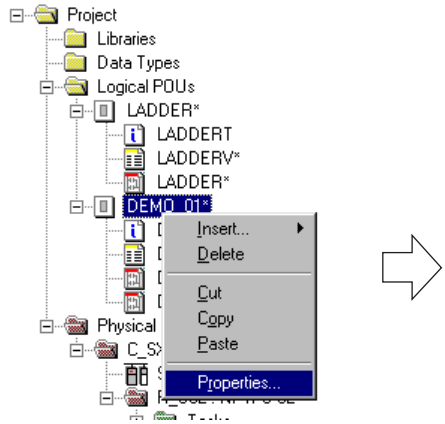
* In the same way, you can add or insert a description worksheet.

Section 3 Basic Operation of D300win

3-5 Preparation for Creating a New Project

(4) Changing the properties of a POU or worksheet

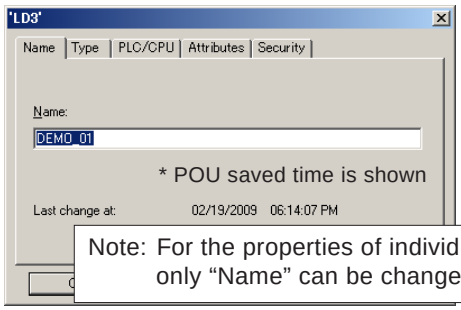
◆ Right-click the icon for the POU or worksheet the properties of which you want to change, and a shortcut menu will be displayed. Click the [Properties...] command in this shortcut menu to display the [Properties] dialog box. After setting the items of properties that you want to change, click the [OK] button.



By clicking a corresponding tab, you can change the active tab window.

<[Name] tab window>

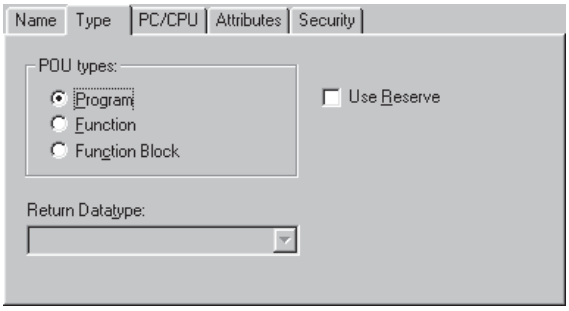
On this tab window, you can set the name of the POU or worksheet.



Note: For the properties of individual worksheet, only “Name” can be changed.

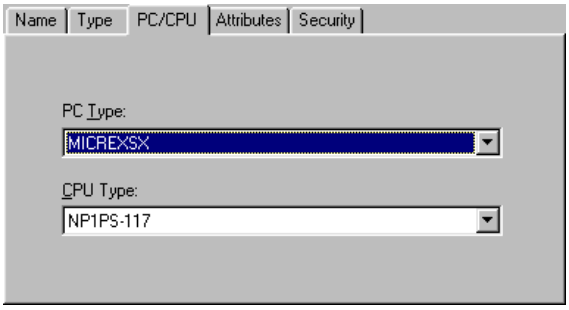
<[Type] tab window>

On this tab window, you can set the type of POU (Program, Function Block, or Function). When “Function” is selected, it is necessary to set “Return Datatype:”.



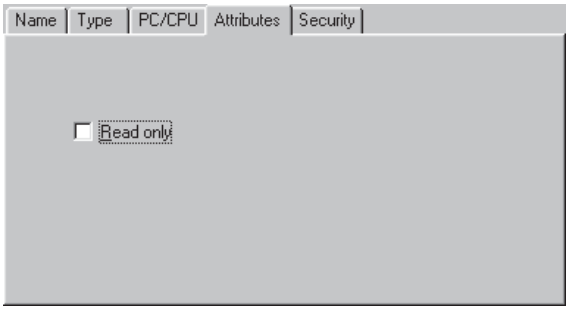
<[PLC/CPU] tab window>

On this tab window, you can set PLC type and CPU type.



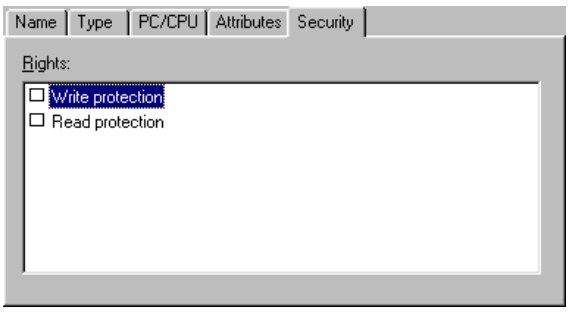
<[Attributes] tab window>

On this tab window, you can set the POU to “read only” mode. When set to “Read only” mode, the POU cannot be changed.



<[Security] tab window>

On this tab window, you can set “Write protection” and/or “Read protection”. For more information, see “Section 13-2 Security Function”.

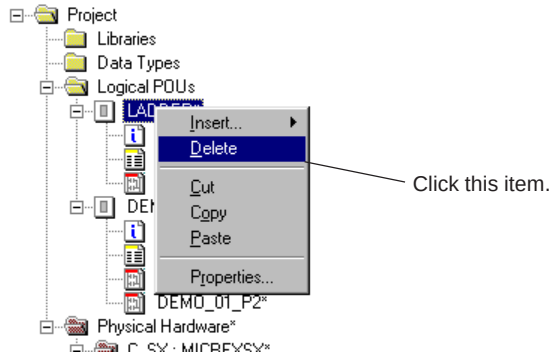


Section 3 Basic Operation of D300win

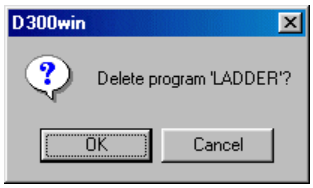
3-5 Preparation for Creating a New Project

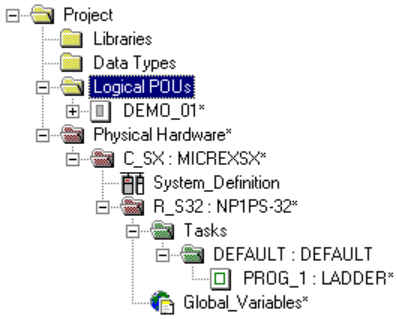
(5) Deleting a POU or worksheet

◆ Right-click the icon for the POU that you want to delete, and click the [Delete] command in the shortcut menu.



◆ A confirmation dialog box is displayed. The selected POU is deleted when the [OK] button is clicked.





Note: Once deleted, the data can no longer be restored. Therefore, you must be careful when using this function.

* In the same way, a worksheet and a POU group can be deleted.

Section 3 Basic Operation of D300win

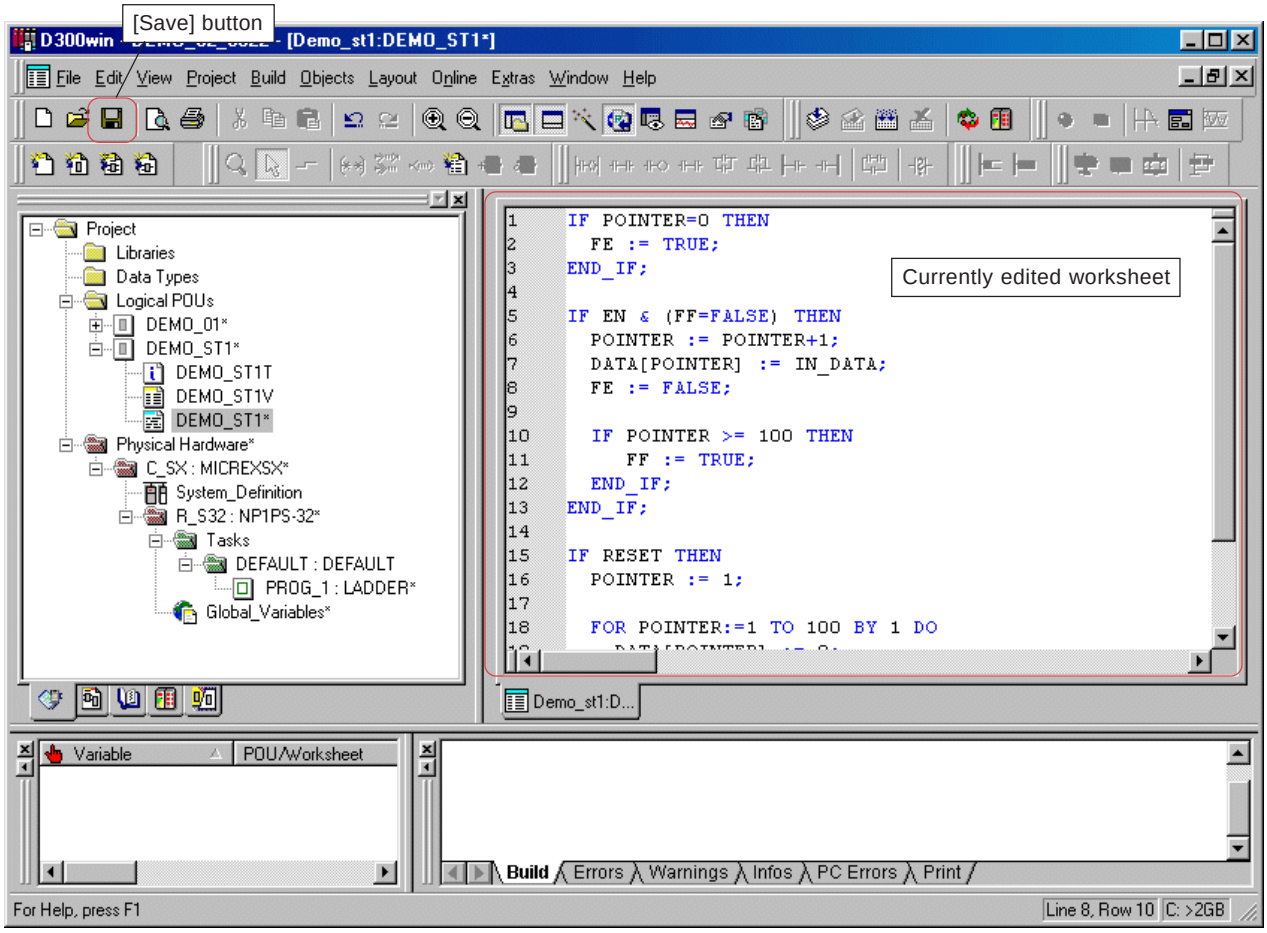
3-6 Saving a Project

3-6-1 Saving a project

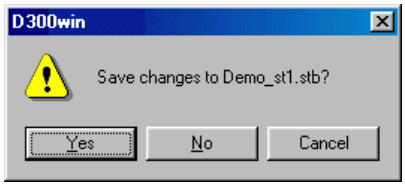
A project created by D300win consists of multiple files. Therefore, when worksheets are closed after editing code worksheet or variable worksheet, it is necessary to save the content of individual worksheet.

(1) Saving the edited version of a worksheet

◆ Click the [Save] button on the tool bar, or click the [Save] command in the [File] menu. The content of the currently edited worksheet is saved.



◆ If it is attempted to close a worksheet without saving its content or to close a project that contains a worksheet the content of which is not yet saved, the following confirmation dialog box will be displayed, asking you whether or not to save the worksheet.



◆ When the [Yes] button is clicked, the worksheet or the project will be closed after the content of the worksheet is saved.

* When you want to save the contents of all opened worksheets, click the [Save All] command in the [File] menu.

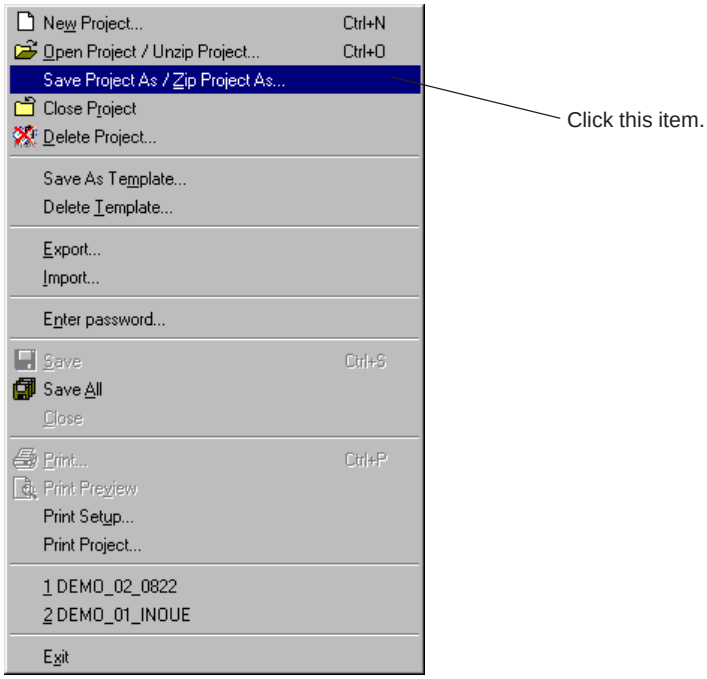
Section 3 Basic Operation of D300win

3-6 Saving a Project

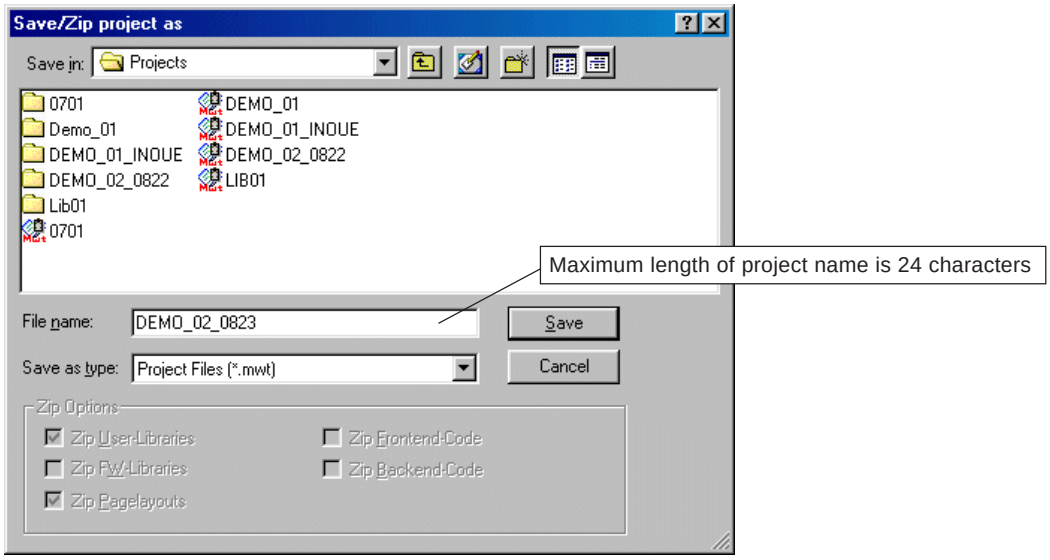
(2) Saving a project

How to save an edited (created) project is explained below. In this example, the method for saving a new project or saving a project by other name is shown. When the content of an already saved project is changed, changes are saved automatically.

◆ Click the [Save Project As/Zip Project As...] command in the [File] menu.



◆ The [Save/Zip project as] dialog box is displayed.
Specify a folder to save the project, enter the file name (project name), and click the [Save] button.



Section 3 Basic Operation of D300win

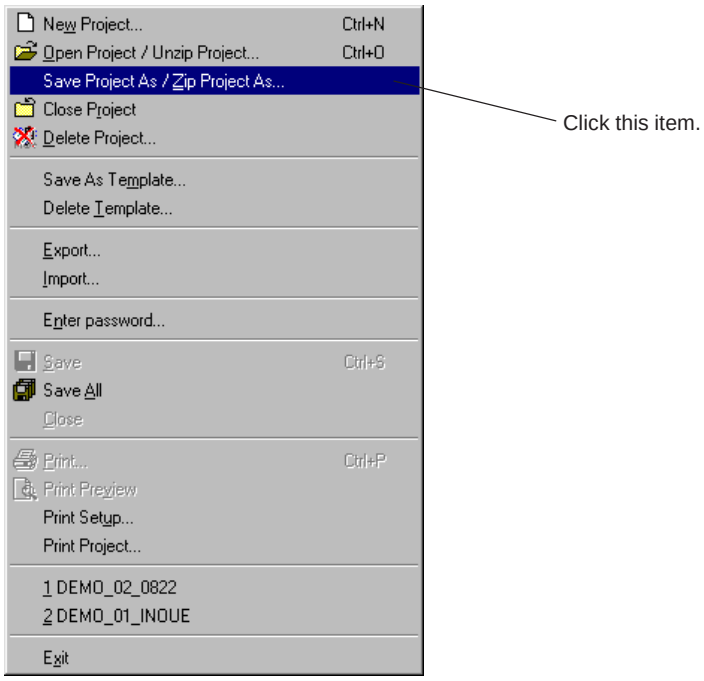
3-6 Saving a Project

3-6-2 Zipping/unzipping a project

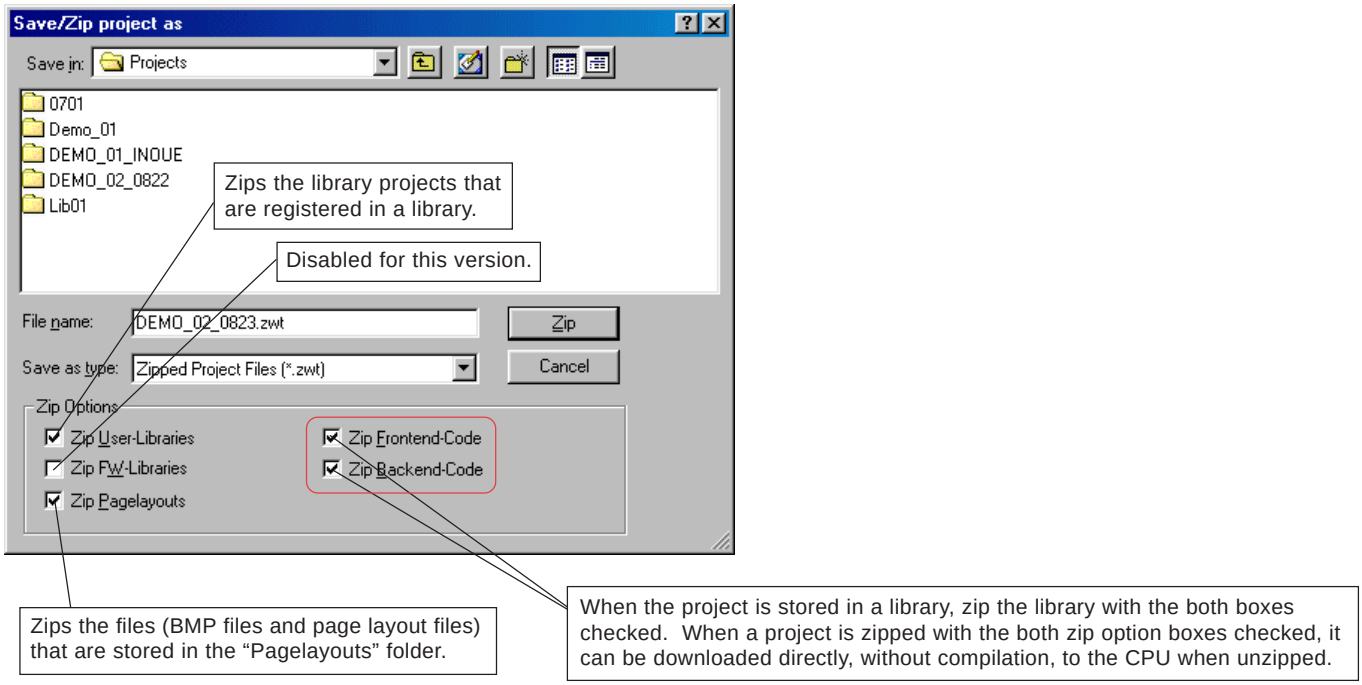
A project created by D300win consists of multiple files. When a project is saved in a removable medium, such as a floppy disk, the project needs to be zipped into a single file.

(1) Zipping a project

◆ Click the [Save Project As/Zip Project As...] command in the [File] menu.



◆ The [Save/Zip project as] dialog box is displayed.
Select “Zipped Project Files (*.zwt)” for “Save as type”. Then specify a folder to save the project, enter the file name (zipped project name), and click the [Zip] button.



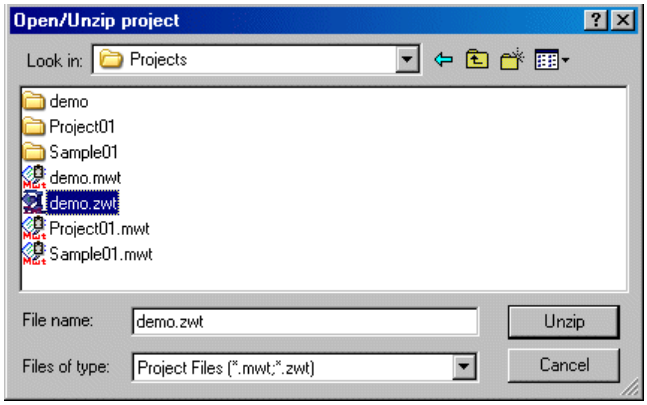
Section 3 Basic Operation of D300win

3-6 Saving a Project

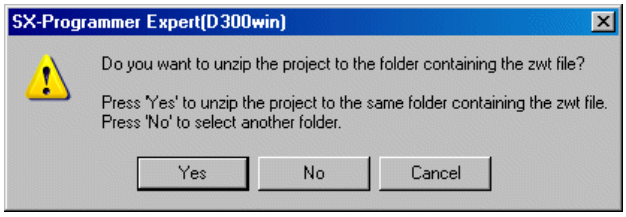
(2) Unzipping a project

Use the following procedure to unzip a zipped project (*.zwt):

◆ Click the [Open Project/Unzip Project...] command in the [File] menu. The [Open/Unzip project] dialog box is displayed.



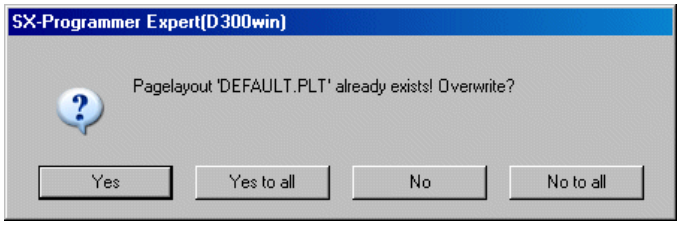
◆ Zipped project files are displayed with the extension “zwt” attached.
Select a zipped project file that you want to unzip, and click the [Unzip] button. The following dialog box is displayed.



<When unzipping the project to the same folder containing the zipped prpject file>

◆ To unzip the project to the same folder containing the zipped project file (*.zwt), click the [Yes] button.
For the projrct file to be unzipped (*.zwt), the project name of the zipped project file is restored. If there is a file that has the same project name in the folder, the following dialog is displayed.

◆ Click the [Yes] button to unzip the zipped project file. When the unzipping of a project will result in overwriting existing data except the project file, the confirmation dialog box is displayed, as shown below.

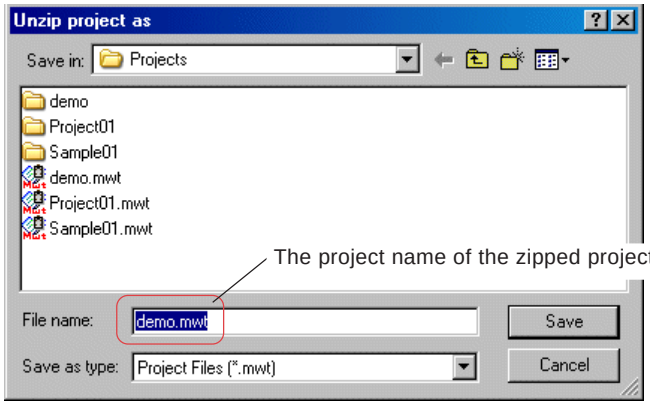


Section 3 Basic Operation of D300win

3-6 Saving a Project

<When unzipping the project to another folder (not containing the zipped file)>

◆ To unzip the project to another folder (not containing the zipped project file (*.zwt)), click the [No] button.
When you click the [No] button, the following dialog is displayed.



◆ You can set an arbitrary folder and filename.
After setting them, click the [Save] button.

Section 4 System Configuration and Operation Definition

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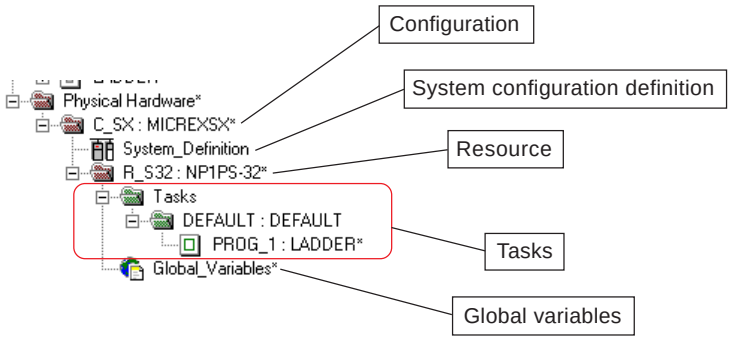
Section 4 System Configuration and Operation Definition

This section explains how to set the “Physical Hardware” part of a project tree.

4-1 Physical Hardware Overview

Physical Hardware consists of at least one configuration. In addition, “System_Definition” and resources exist in the layer just below the configuration layer; “Tasks” and “Global_Variables”, in the layer jest below the resource layer.



A system that includes the modules and units that are connected to one SX bus as well as the units that are connected to the I/O master are referred to as a configuration. Therefore, for a configuration, the data of all the modules and all the units that are included in the configuration is registered.

Section 4 System Configuration and Operation Definition

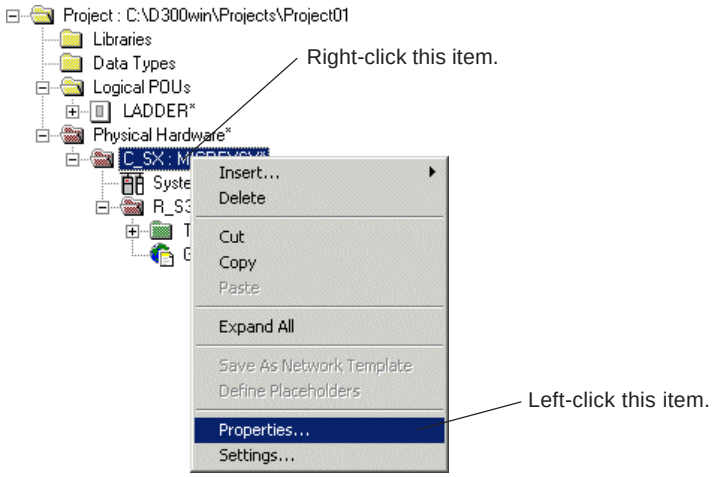
4-2 Configuration

4-2-1 Properties of a configuration

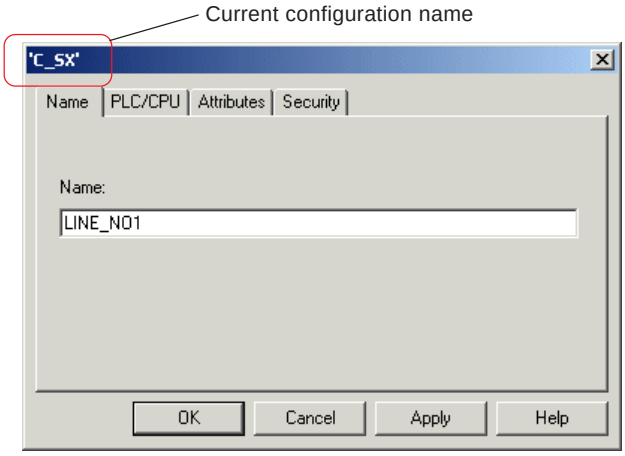
(1) Changing the name of a configuration

When a project is created using a template, the default name “C_SX” is given to the configuration. The configuration name can be changed.

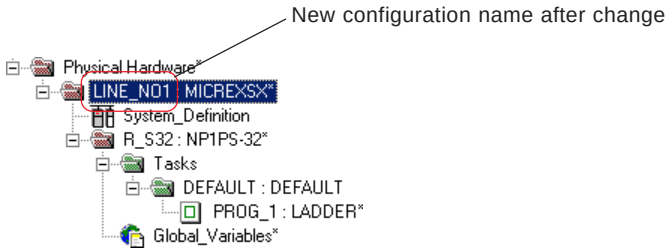
◆ Right-click the configuration, and left-click the [Properties...] command in the shortcut menu.



◆ The [Properties] dialog box is displayed. Enter a desired configuration name in the [Name] text box, and click the [OK] button. Maximum length of configuration name is 24 characters.



◆ The configuration name is changed.



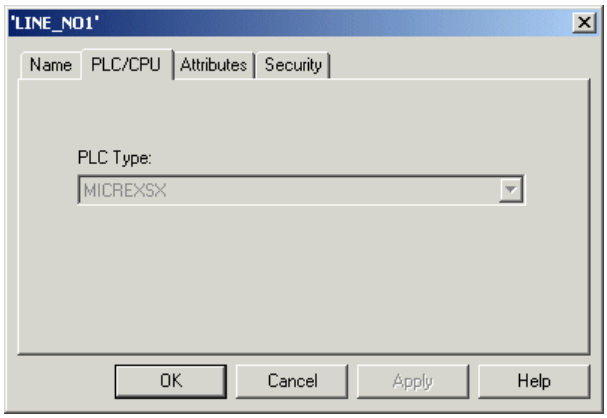
Section 4 System Configuration and Operation Definition

4-2 Configuration

(2) PLC type

This tab window is used to set series code for the target programmable controller. This item is fixed to “MICREXSX”.

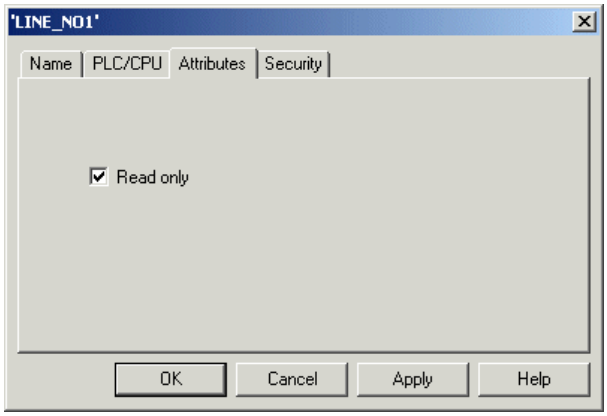
◆ Click the [PLC/CPU] tab to display the [PLC/CPU] tab window.

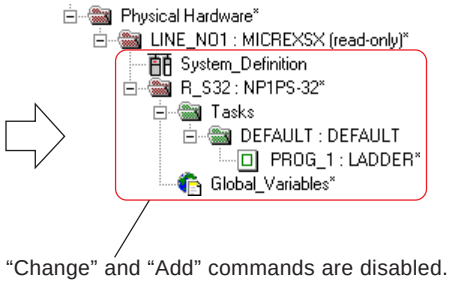


(3) Attributes

This tab window is used to temporarily set write protection.

◆ Click the [Attributes] tab to display the [Attributes] tab window. When the [Read only] box is checked and the [Apply] button is clicked on this window, “Change” and “Add” commands are disabled for this configuration.



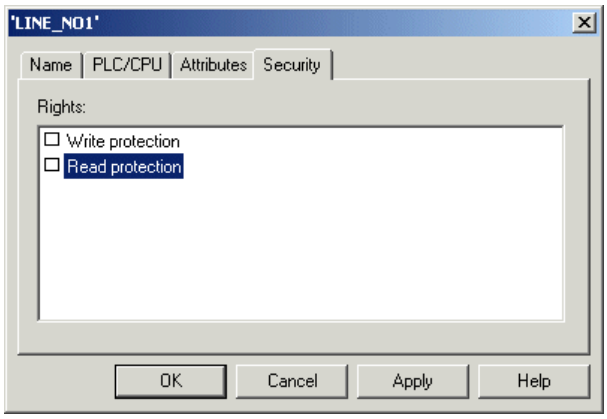


“Change” and “Add” commands are disabled.

(4) Security

This tab window is used to set write protection and/or read protection, which can be activated using password.

◆ Click the [Security] tab to display the window for setting write protection and read protection. Check the [Write protection] box and/or the [Read protection] box to set your desired protection for the configuration.



Note: To enable the protective functions set above, a password needs to be set with the [Enter password...] command in the [File] menu.

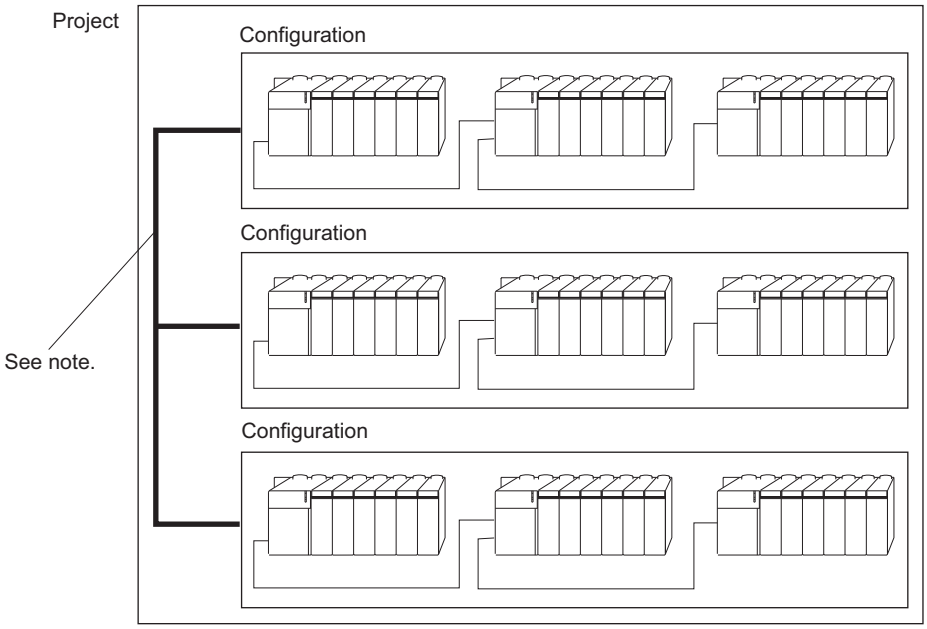
* For more information of the specifications or the operating method, see “Section 13-2 Security Function”.

Section 4 System Configuration and Operation Definition

4-2 Configuration

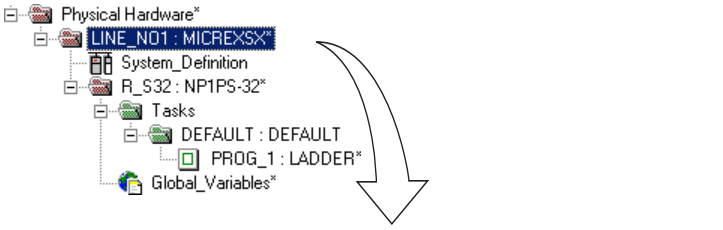
4-2-2 Adding/inserting a configuration

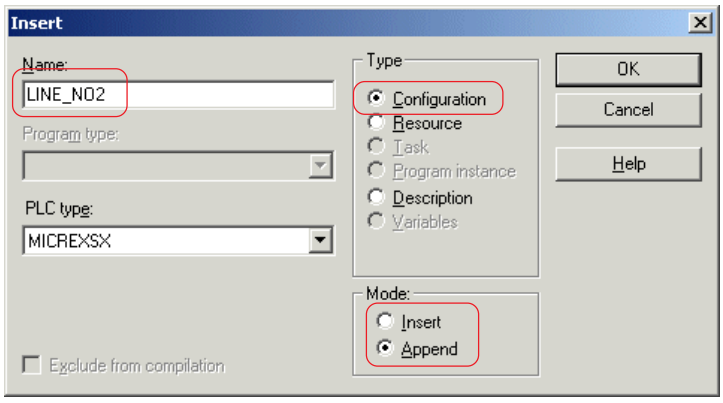
D300win allows you to register multiple configurations for one project.



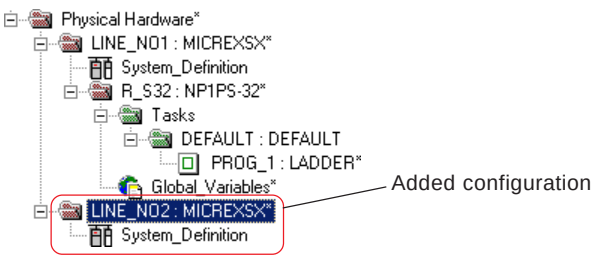
Note: Controller level network such as FL-net is used to connect between configurations.

◆ In the condition that a configuration is selected, as shown in the figure below, press the <Insert> key or click the [Add Object] button. The [Insert] dialog box is displayed.





◆ On the [Insert] dialog box, enter a configuration name and click the [OK] button. A new configuration is added in the rear of the selected configuration, as shown in the figure below. (When “Insert” is selected for [Mode], the new configuration is added in front of the selected configuration.)



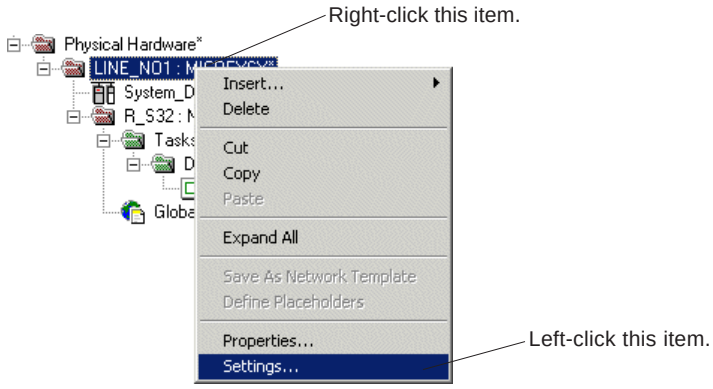
Section 4 System Configuration and Operation Definition

4-2 Configuration

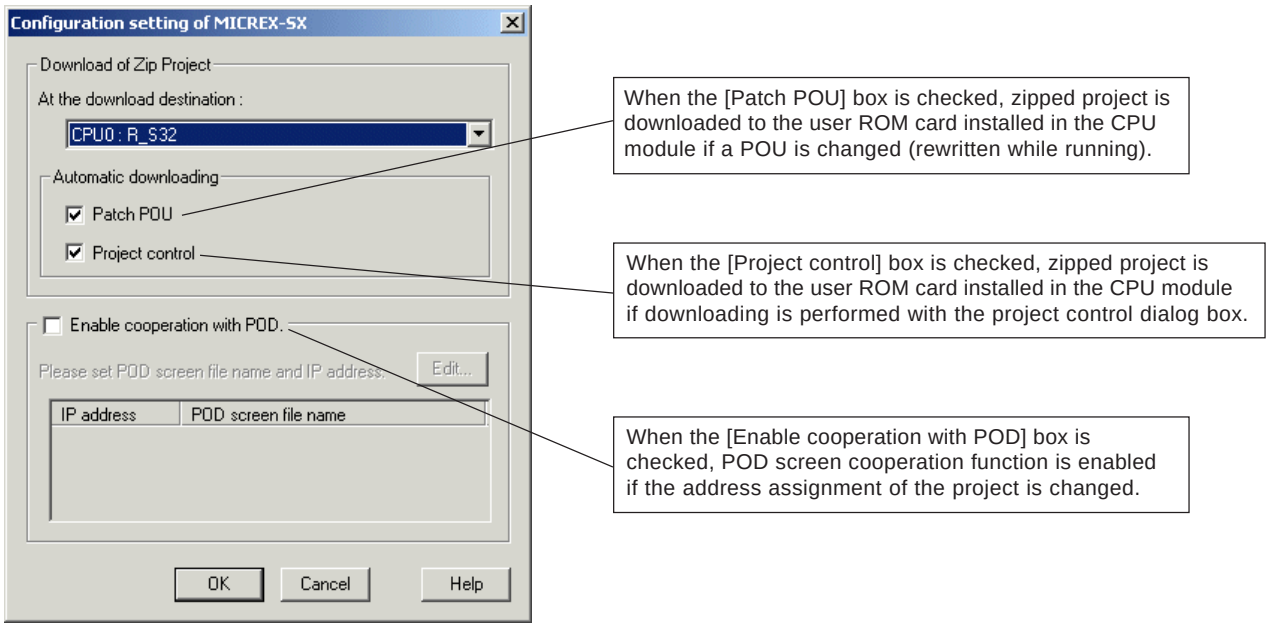
4-2-3 Configuration setting

In this process, it is set whether or not to download a zipped project to the user ROM card (compact flash-memory card) installed in the CPU module when a POU is changed. This function can be used only with user ROM card adapted SPH300 (type: NP1PS-32R/74R/117R/245R) , SPH2000 (type: NP1PM-48R/48E/256E) and SPH3000 (type : NP1PU-048E/256E) .

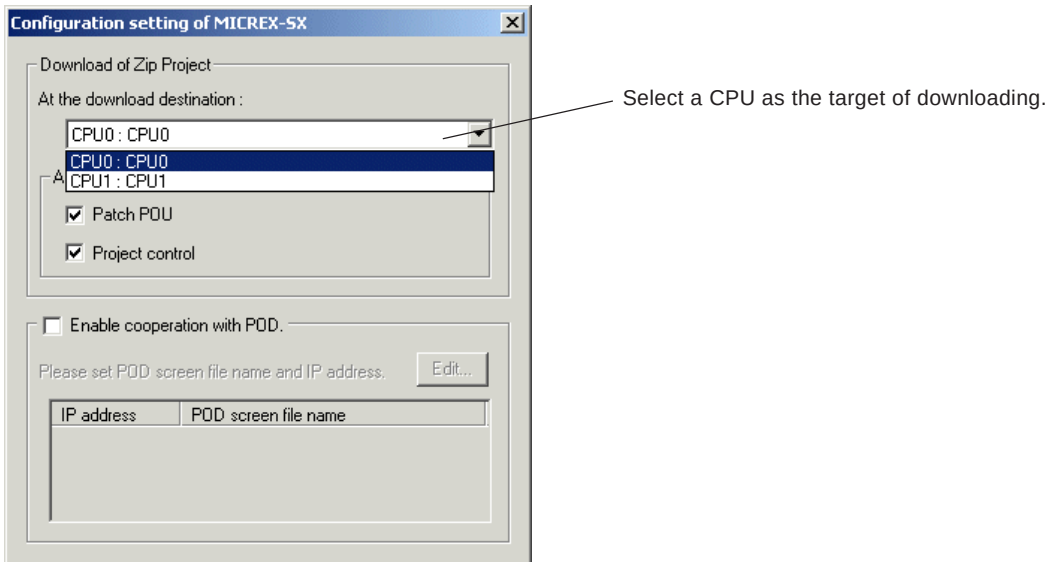
◆ Right-click a configuration, and left-click the [Settings...] command in the shortcut menu.



◆ The [Configuration setting of MICREX-SX] dialog box is displayed.



◆ When one configuration contains multiple resources (multi-CPU system), the target CPU for downloading is selected.



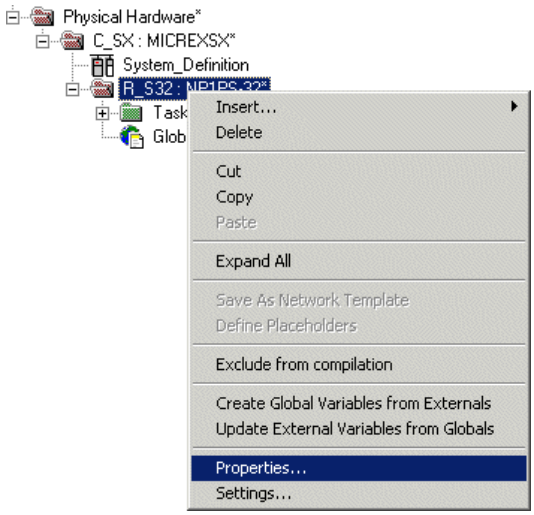
Section 4 System Configuration and Operation Definition

4-3 Resources

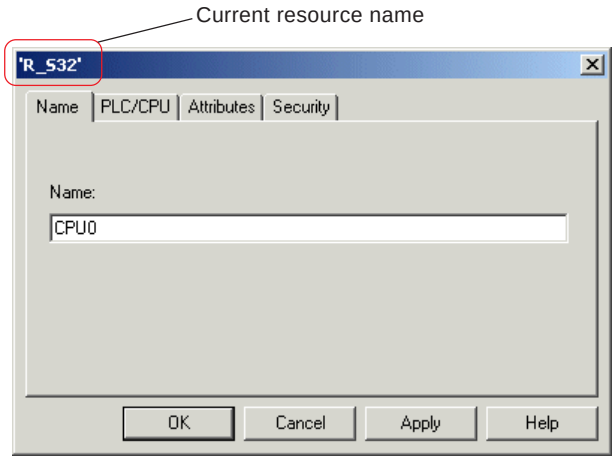
4-3-1 Properties of a resource

(1) Changing the name of a resource

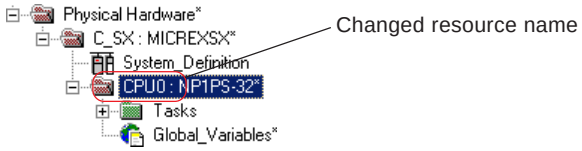
◆ Right-click a resource, and left-click the [Properties...] command in the shortcut menu.



◆ The [Properties] dialog box is displayed. Enter a resource name in the [Name] text box and click the [OK] button. Maximum length of resource name is 24 characters.



◆ Resource name is changed.

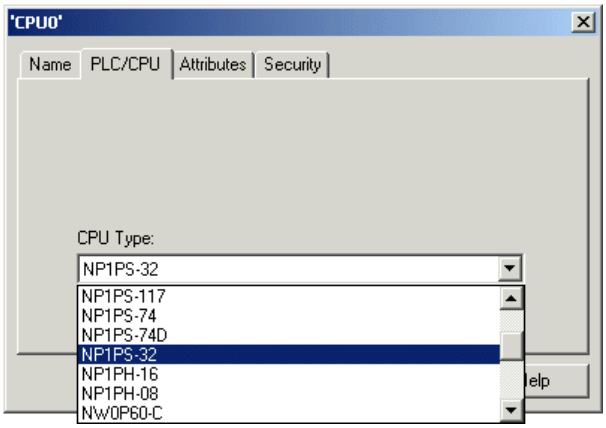


Section 4 System Configuration and Operation Definition

4-3 Resources

(2) CPU type

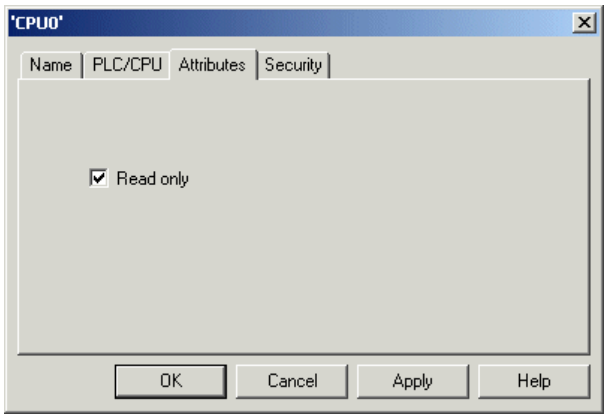
CPU types are displayed on this tab window.

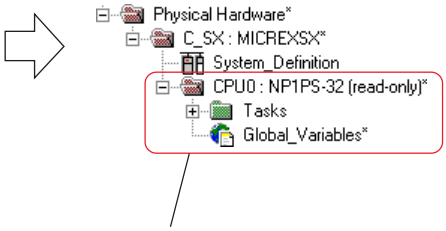


(3) Attributes

This tab window is used to temporarily set write protection.

◆ Click the [Attribute] tab to display the [Attributes] tab window. When the [Read only] box is checked and the [Apply] button is clicked on this window, “Change” and “Add” commands are disabled for this configuration.



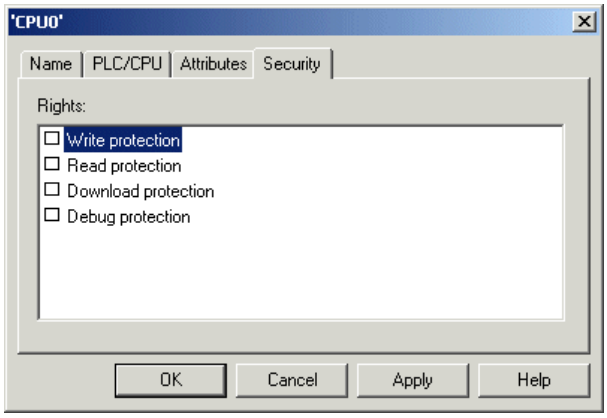


“Change” and “Add” commands are disabled.

(4) Security

This tab window is used to set write protection and/or read protection, which can be activated using password.

◆ Click the [Security] tab to display the window for setting write protection and read protection. Check the [Write protection] box and/or the [Read protection] box to set you desired protection for the configuration.



Note: To enable the protective functions set above, a password needs to be set with the [Enter password...] command in the [File] menu.

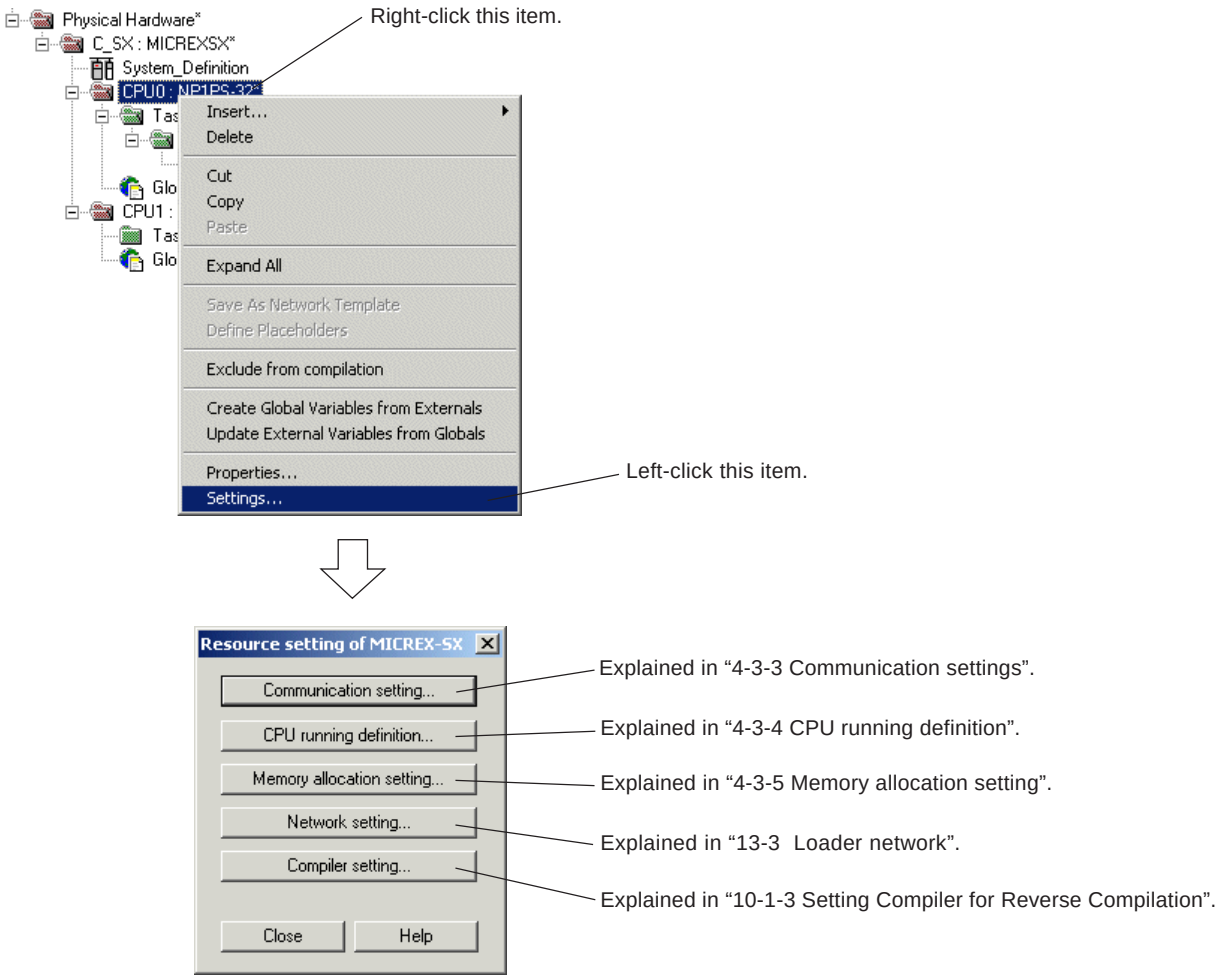
* For more information of the specifications or the operating method, see “Section 13-2 Security Function”.

Section 4 System Configuration and Operation Definition

4-3 Resources

4-3-2 Resource setting

The resource setting process includes the setting of basic items such as memory allocation of CPU module as well as the setting for communication with D300win. Individual setting is made with the [Resource setting of MICREX-SX] dialog box, as shown below.



Section 4 System Configuration and Operation Definition

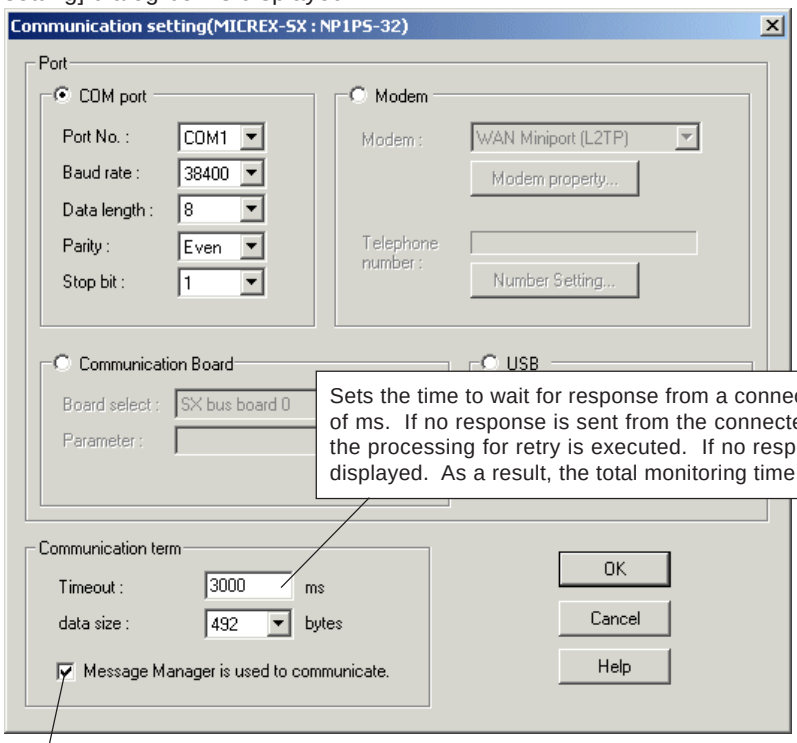
4-3 Resources

4-3-3 Communication settings

The method for communication between D300win and the CPU module is set. The following 4 communication methods are available:

- The method to use COM port of personal computer
- The method to use modem
- The method to use communication board
- The method to use USB

◆ Click the [Communication setting...] button on the [Resource setting of MICREX-SX] dialog box. The [Communication setting] dialog box is displayed.



Sets the time to wait for response from a connected device (CPU module, modem, etc.) in units of ms. If no response is sent from the connected device even when the set time has elapsed, the processing for retry is executed. If no response is sent nevertheless, "Timeout" is displayed. As a result, the total monitoring time of response is "the set value of [Timeout] x 2".

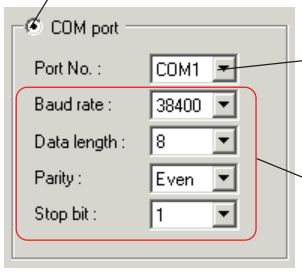
When this box is checked, communication is performed via message manager. Message manager lies between application program, such as D300win, and SX to control communication. When a message manager is used, a communication port can be shared by application programs. For example, when the [Message Manager is used to communicate] box is checked for D300win, the MICREX-SX can simultaneously communicate with D300win as well as with other application programs that uses the message manger, using one RS-232C port. (When COM port or modem is used)

◆ The communication setting between the CPU module and D300win is completed when the [OK] button is clicked after all necessary items are set.

<How to set individual interface>

1) When COM port is used

Turn on the optional [COM port] button.



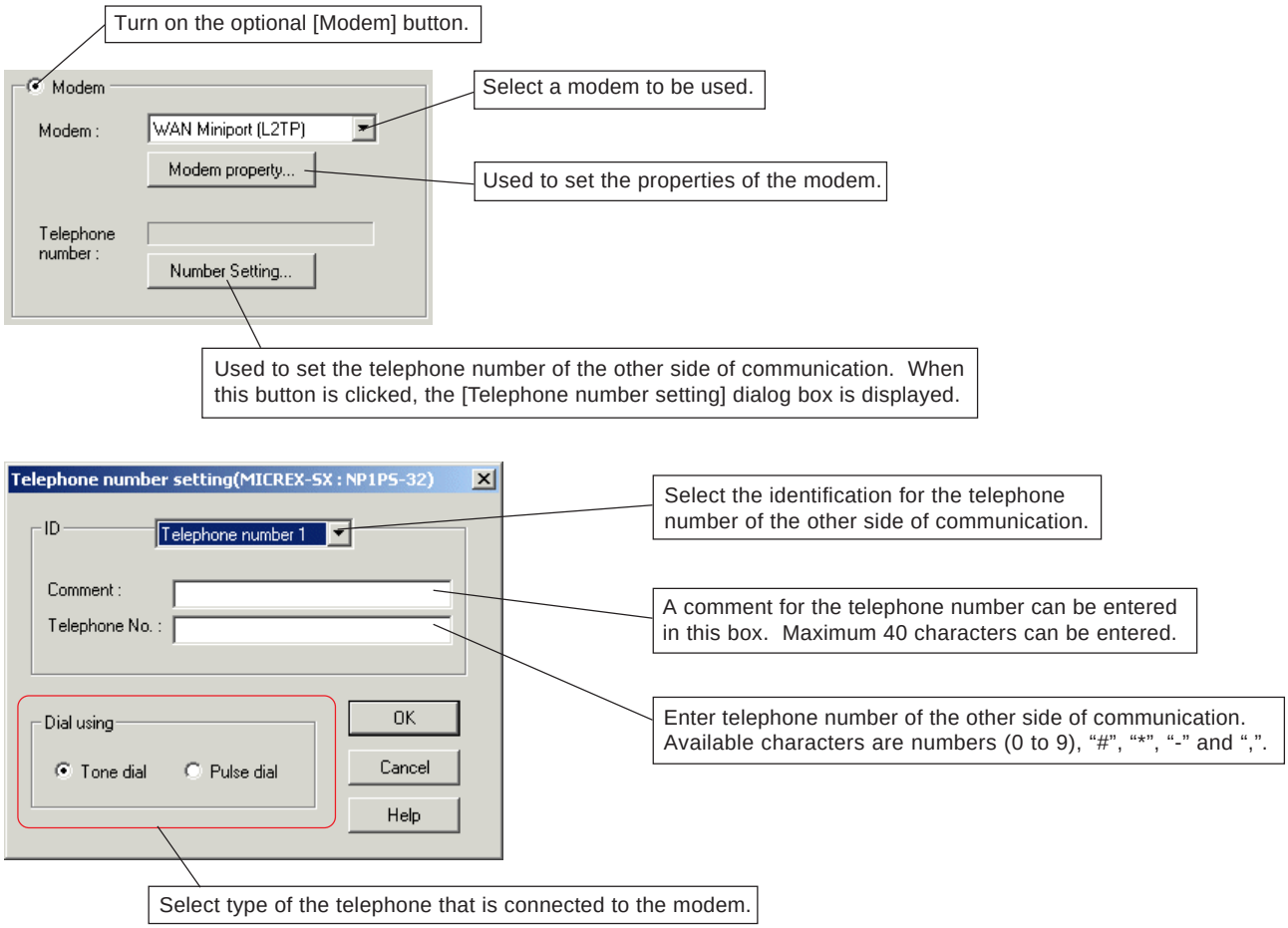
This setting must coincide with the COM port number to use of the personal computer. Setting range is COM 1 to COM 9.

When communicating with the CPU module, "Baud rate" is fixed to 38400, "Data length" to 8, "Parity" to Even, and "Stop bit" to 1, respectively.

Section 4 System Configuration and Operation Definition

4-3 Resources

2) When modem is used



* Modem connecting method is Windows' standard TAPI (Telephony Application Programming Interface).

Note: If an error occurred during communication via modem, adjust the setting of the modem, using the following procedure:

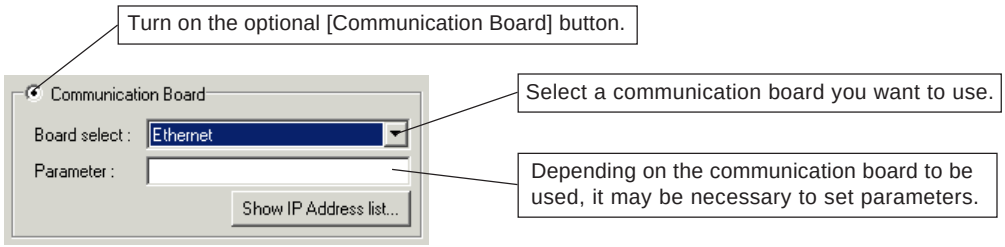
1) Click the [Modem property...] button on the [Communication setting] dialog box to open the [Modem property] dialog box.
2) On the [General] tab window, set maximum speed to "19200".
3) On the [Connection] tab window, click the [Detail] button to display the [Detail Setting of Connection] dialog box. On this dialog box, uncheck the [Zip Data] box.

* If error still recurs, decrease the maximum speed to 9600 or less.

Section 4 System Configuration and Operation Definition

4-3 Resources

3) When communication board is used

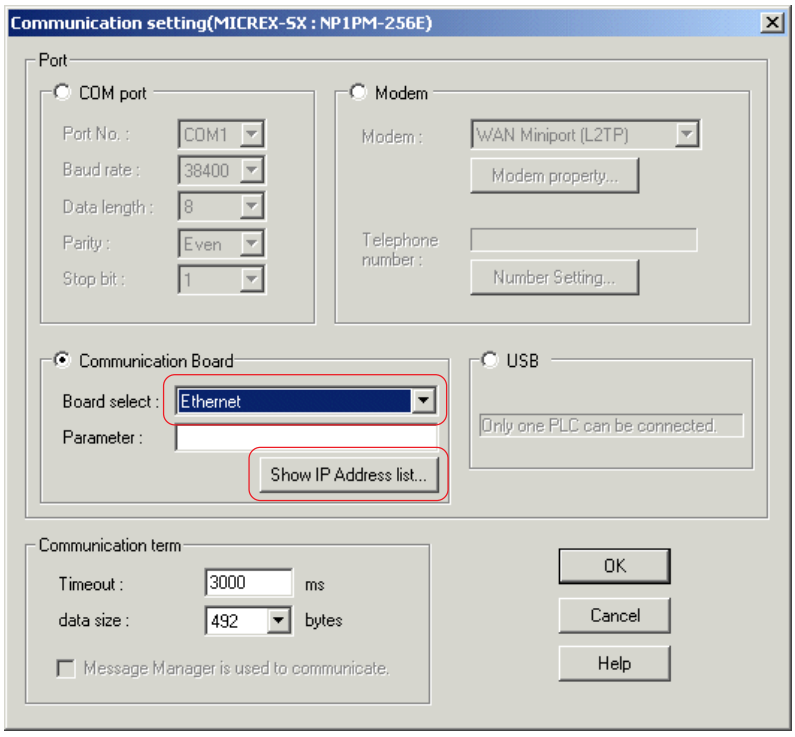


<Parameter setting table>

Board name	Required parameter setting
SX bus board	Parameter setting unnecessar
P-link board	P-link station number of the other side of communication needs to be set. Example: Set "15" when the P-link station number of the other side of communication is 15.
PE-link board	PE-link station number of the other side of communication as well as that of the local station need to be set. Example: Set "63 0" when station number of the other side is 63 and that of the local station is 0.
ISA bus PLC board	Parameter setting unnecessary
Ethernet (WEB module)	IP address and port number of the other side of communication need to be set. Example: Set "192. 0. 0. 507" when IP address of the other side is 192. 0. 0. 507. * IP address list network device search function was added to V3.4.0.0.
PCI bus SX bus board	Parameter setting unnecessary
PCI bus PLC board	Parameter setting unnecessary
PCI bus FL-net board	Parameter setting unnecessary
LE-net board	LE-net loop station number of the other side of communication needs to be set. Example: Set "63" when the station number of the other side of communication is 63.

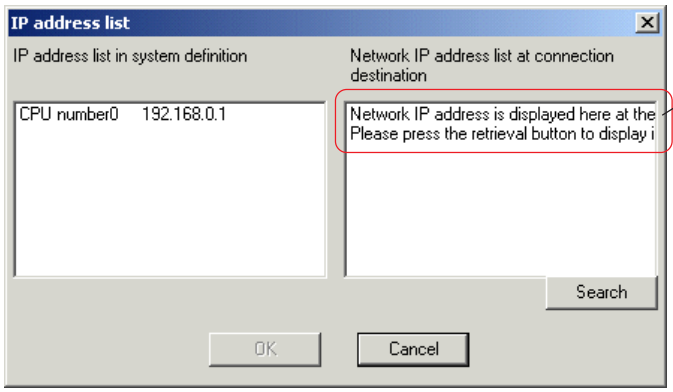
* IP address list network device search function
This function searches Ethernet communication modules in the network to which the personal computer executing Expert is connected and displays them in list form. By selecting a port to connect from the list, the IP address and communication port of Ethernet can be set.

◆ Select “Ethernet” from the [Board select] list box. The [Show IP Address list...] button appears.



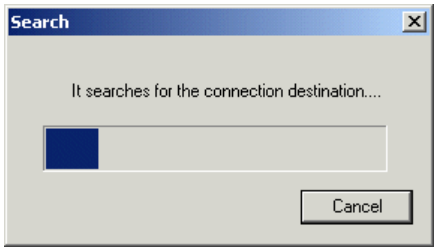
4-3 Resources

◆ Click the [Show IP Address list...] button to display the [IP address list] dialog box.

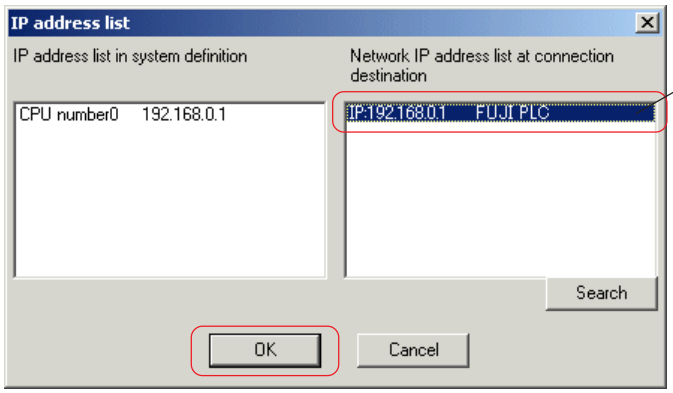


This message appears when the dialog box opens for the first time. For the second and subsequent times, the previous search results are displayed.

◆ After connecting the personal computer (Expert) to Ethernet, click the [Search] button. The following screen is displayed and search is started.

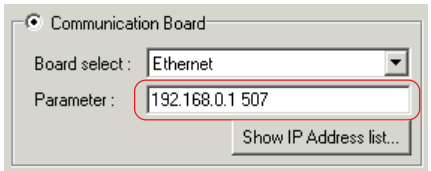


Search operation will take about 140 seconds at a maximum.
If you click the [Cancel] button to stop search operation, search results up to that point are displayed.



IP addresses of Ethernet devices existing in the LAN to which the personal computer is connected are displayed.
If Fuji PLC is detected, “FUJI PLC” is displayed.

◆ After selecting a device to connect, click the [OK] button. The IP address and communication port are set in the parameter box. (The communication port is automatically added.)
* A device to connect can also be selected from the “address list in the system definition”.

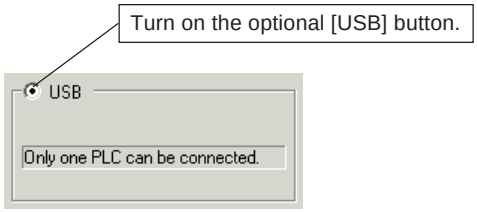


* About communication port No. automatically added

- When selecting from the IP address list in the system definition
  A value set for “Self port standard No.” in the system definition plus 251 is added. “Self port standard No.” is set to 256 by default. If you do not change the setting, 256 + 251 = 507 is added.
- When selecting from the “Network IP address list at connection destination”
  Port No. is fixed to 507. If a value other than default value (256) is set for the self port standard No. of the destination Ethernet, it is not possible to establish communication by the port No. “507”. In this case, set to the set self port standard No. + 251.

4-3 Resources

4) When USB is used



Note 1: When USB port is used, only USB adapted CPU modules SPH300 (type: NP1PS-32R/74R/117R/245R), SPH2000(type : NP1PM-48R/48E/256E/256H) and SPH3000 (type : NP1PU-048E/256E) become the target.

Note 2: [USB] cannot be selected (turned on) when no USB driver is installed. Install the USB driver for MICREX-SX series, using the following procedure:

<Installation procedure>

Turn on the power supply for the MICREX-SX system, and connect the personal computer and the SX-CPU by a USB cable. Then, the plug and play function is automatically started up to install the USB driver for MICREX-SX. Follow the directions displayed on the screen to install the driver. The USB driver for MICREX-SX is included in the CD-ROM that was used when D300win was installed.

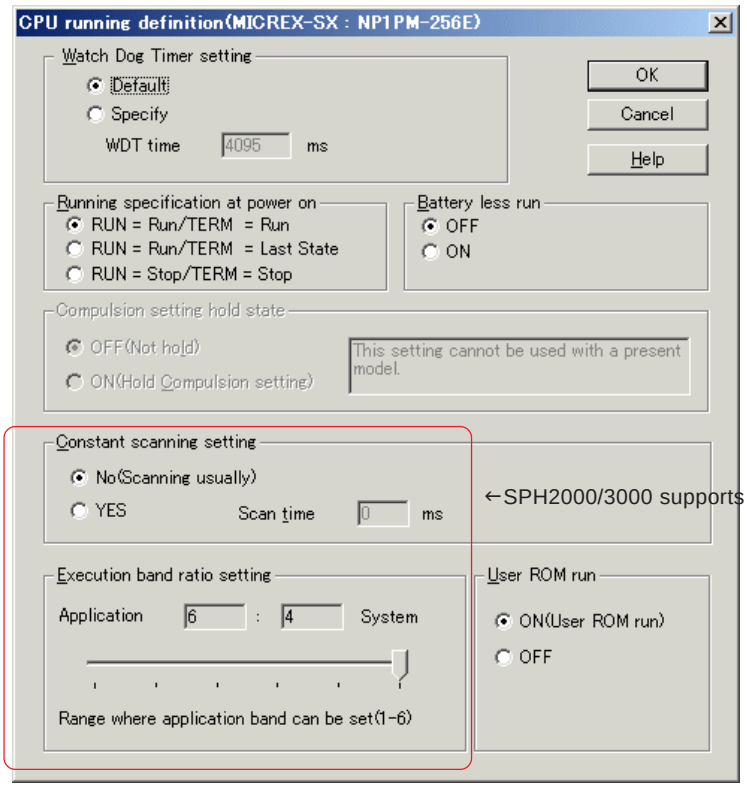
Section 4 System Configuration and Operation Definition

4-3 Resources

4-3-4 CPU running definition

In the CPU running definition process, watch dog timer, running specification at power on and battery-less operation are set.

◆ Click the [CPU running definition...] button on the [Resource setting of MICREX-SX] dialog box. The [CPU running definition] dialog box is displayed.



←SPH2000/3000 supports these functions.

◆ After setting all necessary items, click the [OK] button.

<Description of individual setting item>

1) Watch Dog Timer setting

Watch dog timer can be set in the range from 1 ms to 4095 ms. Default setting is 4095 ms.

2) Running specification at power on

This item specifies the way the CPU module works at system power-on when the key switch on the front panel of the CPU module is set at the RUN or TERM position. The table below shows the operation of the CPU module relative to this setting and the position of the key switch on the front panel of the CPU module.

System definition setting	Operation	
	RUN	Term
RUN = Run/TERM = Run	Running	Running
RUN = Run/TERM = Last State	Running	Last state (Note)
RUN = Run/TERM = Stop	Stopped	Stopped

Note: “Last state” means the state in which the CPU had been when the system was shut down. The last state is “Running” if the CPU had been running or “Stopped” if the CPU had been stopped.

3) Battery-less run

When “ON” is selected for “Battery-less run”, the CPU module will initialize the entire memory before starting a cold start sequence. Data backup errors won’t be monitored. Default is “OFF”.

Note: Battery-less run is not available for standard CPUs unless the user ROM card (type: NP8PMF-16) is installed.

4) Constant scanning setting (for SPH2000/3000 only)

Processing of the default task (input + operation + output) is executed at regular intervals (scan time specified here).
The setting range is as follows: 1 takt time <= (set time) <= 2550ms. Set an integral multiple of the takt time of the system.
* By default, “No” is selected for the constant scanning setting.

5) Execution band ratio (for SPH2000/3000 only)

This item specifies the ratio of processing time of an application to that of the system in one takt.
The setting range is as follows: application : system = 1:9, 2:8, 3:7, 4:6, 5:5, 6:4.
* By default, this is set at “6:4”.

6) User ROM run

This item specifies whether or not to run the system with the user ROM card inserted in the CPU module.
* By default, “Yes” is selected for “ROM”.

Note: Even if the user ROM run is disabled, reading or writing of data from an application program to a user ROM card is possible.

7) Compulsion setting hold state (with V65 or later software version of SPH300)

In this mode, operation is started with compulsion settings for I/O held. By default, the compulsion setting state when energized last time is cleared when the power of the CPU module is turned on (including reset). However, if the “compulsion setting hold state” is set ON, the compulsion settings are not cleared and operation is started with the compulsion settings held. When the “compulsion setting hold state” is set ON, the system memory (%MX10.256.14) is set ON. In addition, when there is a compulsion setting to hold, the system memory (%MX10.256.15) is set ON.
* By default, “OFF” is selected for “compulsion setting hold state”.

Section 4 System Configuration and Operation Definition

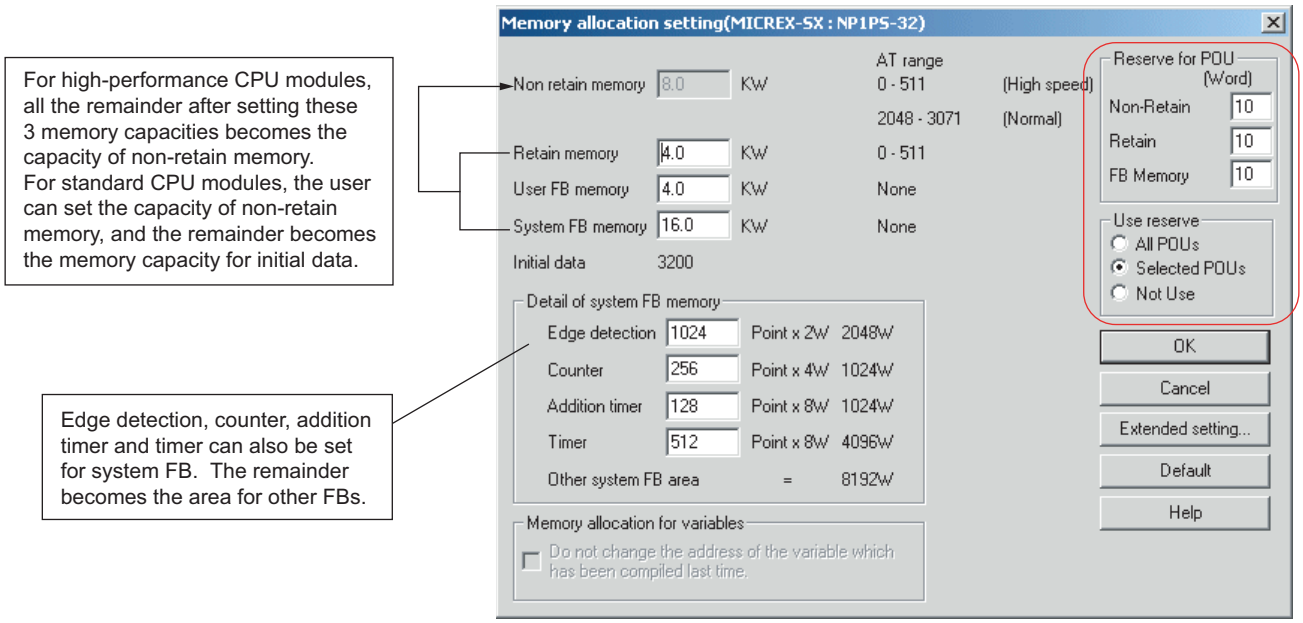
4-3 Resources

4-3-5 Memory allocation setting

In the memory allocation process, the size of the data memory in the CPU module is set.
The default size of data memory is predetermined for each CPU module, but you can change the size of individual memory area in 0.5-k word steps as needed. For more information of the memory of individual CPU module, see the “User’s Manual <Instruction>” (FEH200).

(1) CPU memory allocation

◆ Click the [Memory allocation setting...] button on the [Resource setting of MICREX-SX] dialog box. The [Memory allocation setting] dialog box is displayed.



◆ Enter the size of each memory in the text box. Click the [Default] button when you want to reset to default values.

Note: Reserved memory area is used when a POU is changed (rewritten while the system is running). For details regarding the setting of reserve size, see “Section 10-2-2 Patch POU”.

(2) Memory allocation for variables

D300win automatically allocates memory areas to variables when a project is compiled. The memory allocation is performed optimally in the order of variable declarations. Therefore, if compilation is performed after the allocation is changed, the memory addresses allocated to the variables may change. The scope where allocated addresses are kept unchanged is as follows:

- The variables that have the same variable names as last time when compiled successfully are allocated to the same addresses as last time.
- The variables that were allocated to a reserve area when a POU was changed (online) are allocated to the same addresses as last time.

◆ This function is used when the addresses that were allocated to the variables when compiled last time should not be changed. To use this function, “reserve” settings and compilation must be completed. When this box is checked, the setting of other items on this dialog box cannot be changed.

Section 4 System Configuration and Operation Definition

4-3 Resources

(3) Memory allocation for SPH2000/3000

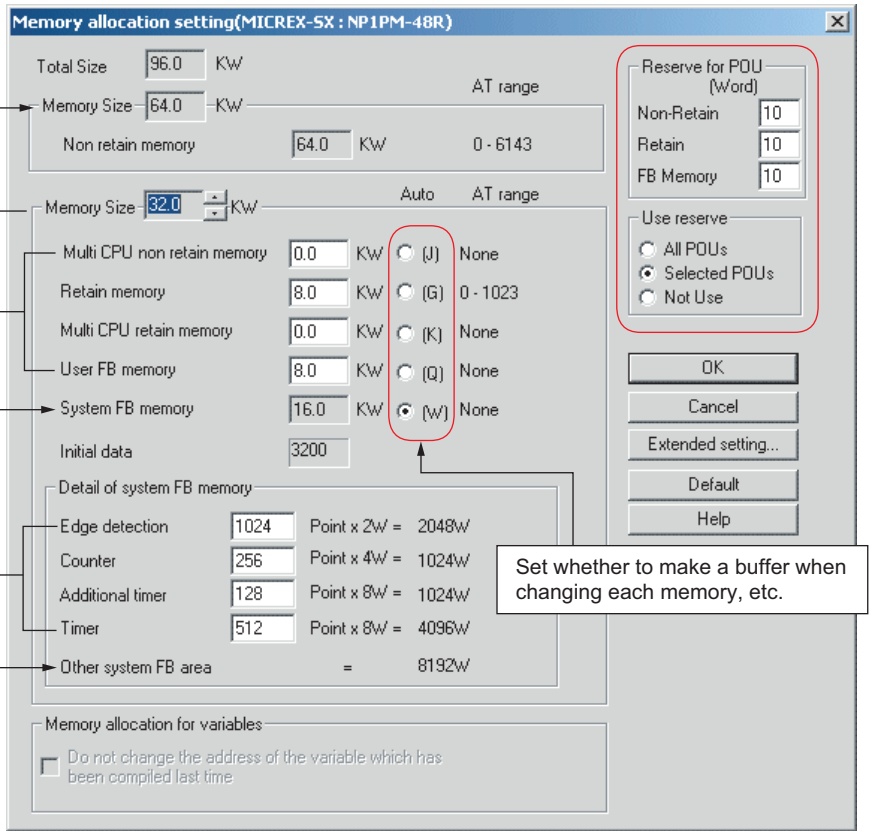
1) Memory allocation example for NP1PM-48R/48E

◆ Click the [Memory allocation setting...] button on the [Resource setting of MICREX-SX] dialog box. The [Memory allocation setting] dialog box is displayed.

If memory other than non-retain general memory is changed, the non-retain general memory and memory selected via the automatic calculation button become a buffer, increasing or decreasing in size.

In the example of the right figure, when the multi-CPU non-retain memory, retain memory, multi-CPU retain memory, or user FB memory is changed, the system FB memory selected via the automatic calculation button automatically grows or shrinks.

If the number of edge detection, counter, or addition timer points is changed, the system-FB capacity other than that grows or shrinks.



◆ Enter the size of each memory in the text box. Click the [Default] button when you want to reset to default values.

Note: Reserved memory area is used when a POU is changed (rewritten while the system is running). For details regarding the setting of reserve size, see “Section 10-2-2 Patch POU”.

* If inter-CPU memory access is performed using a processor bus on a SPH2000/3000 series multi-CPU system,
General memory → memory area must be reserved in multi-CPU non-retain memory.
Retain memory → memory area must be reserved in multi-CPU retain memory.
The reserved memory addresses are as follows.
- Multi-CPU non-retain memory
  - NP1PM-48R/48E Starting at %MW☐. 1.98304
  - NP1PM-256E/256H Starting at %MW☐. 1.2097152
  - NP1PU-048E Starting at %MW☐. 1.262144
  - NP1PU-256E Starting at %MW☐. 1.2097152
- Multi-CPU retain memory: all CPU modules starting at %MW☐. 3.32768

The CPU number is entered in ☐.

Section 4 System Configuration and Operation Definition

4-3 Resources

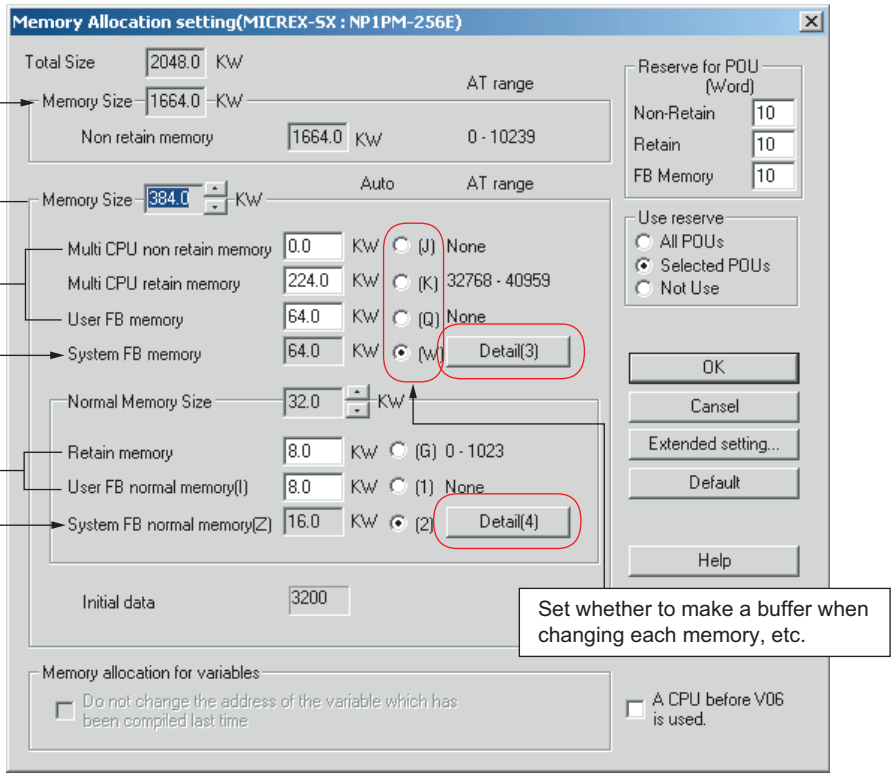
2) Memory allocation example for NP1PM-256E

◆ Click the [Memory allocation setting...] button on the [Resource setting of MICREX-SX] dialog box. The [Memory allocation setting] dialog box is displayed.

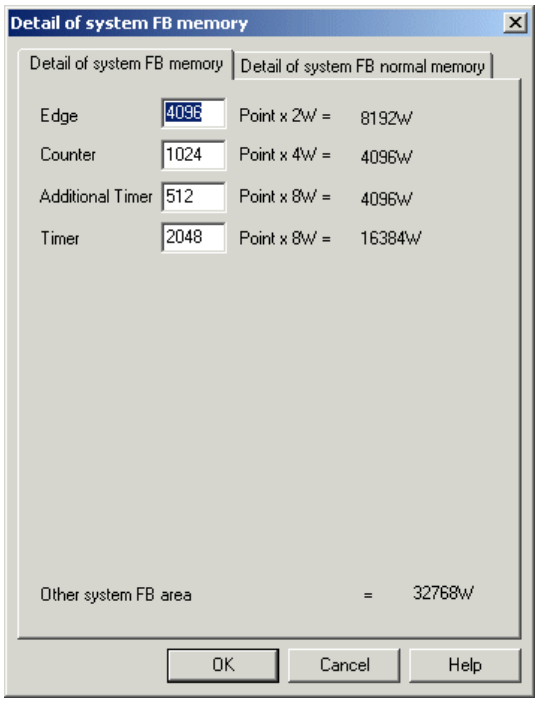
If the memory size is changed, the non-retain general memory and memory selected via the automatic calculation button become a buffer, increasing or decreasingin size.

In the example of the right figure, when the multi-CPU non-retain memory, retain memory, multi-CPU retain memory, or user FB memory is changed, the system FB memory selected via the automatic calculation button automatically grows or shrinks.

In the example of the right figure, when the retain memory, or user FB normal memory is changed, the system FB normal memory selected via the automatic calculation button automatically grows or shrinks.



◆ To change the number of edge detection, counter, addition timer or timer points, click the [Detail] button. The [Detail of system FB memory] dialog box appears. By clicking the corresponding tab, display the [Detail of system FB memory] window or [Detail of system FB normal memory] window.
On this dialog, change the numbers of points of arbitrary items. If the number of points is changed, the word size of the “Other system FB area” indicated at the bottom of the dialog is also changed. Click the [OK] button to complete the setting.



Section 4 System Configuration and Operation Definition

4-3 Resources

◆ Enter the size of each memory in the text box. Click the [Default] button when you want to reset to default values.

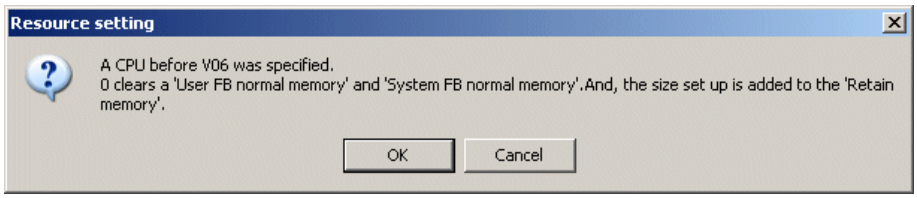
Note: Reserved memory area is used when a POU is changed (rewritten while the system is running). For details regarding the setting of reserve size, see “Section 10-2-2 Patch POU”.

<Note>

With V07 or later software version of NP1PM-256E, the memory arrangement has been changed for high-speed access of the system FB memory. The combinations of CPU version and loader version with which the system FB memory high-speed access function can be used are as follows.
In the user FB memory and system FB memory, user FB normal memory and system FB normal memory are accessible at high speed. When using user FBs, the user FB normal memory and system FB normal memory are used first.

Software version of NP1PM-256E	Loader version	
	Earlier than V3.3.7.0	V3.3.7.0 or later
V06 or earlier	Not supported (conventional mode)	Not supported (conventional mode)
V07 or later	Not supported (conventional mode)	High-speed access supported

◆ When using V6 or earlier software version of NP1PM-256E, check the [A CPU before V06 is used] check box ON.
If the check box is checked ON, the following window appears.



◆ Click the [OK] button to complete the setting.

Note: When using V6 or earlier software version of NP1PM-256E, be sure to check this check box ON. Otherwise, programs cannot be loaded to the CPU.

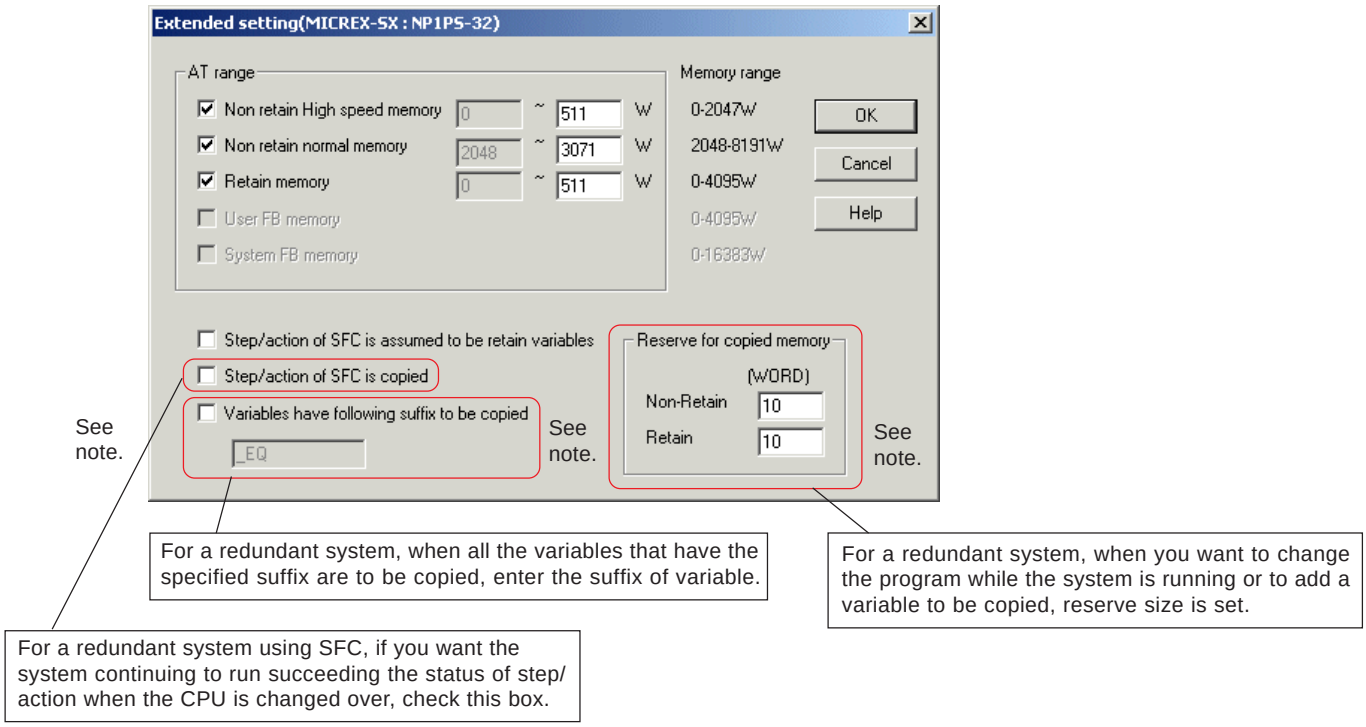
Section 4 System Configuration and Operation Definition

4-3 Resources

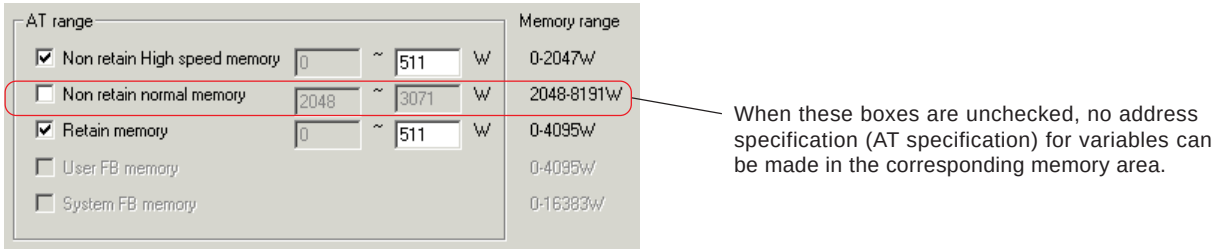
(4) Extended setting

In the extended setting process, AT range specification for data memory, whether or not step/action of SFC is assumed to be retain variable, and memory copy range of a redundant system are set.

◆ Click the [Extended setting...] button on the [Memory allocation setting] dialog box. The [Extended setting] dialog box is displayed.



◆ The memory areas in which AT range can be specified are non-retain high-speed memory (high-speed area of normal memory), non-retain normal memory (normal memory area) and retain memory.



◆ AT range is set in 2-word steps.

◆ When SFC language is used and SFC program operation is to be continued, check the [Step/action of SFC is assumed to be retain variables] box.

◆ After setting all necessary items, click the [OK] button to finish the extended setting.

Note: The items “Step/action of SFC is copied”, “Variables have following suffix to be copied” and “Reserve for copied memory” are set for a redundant system. When no redundant system is used, these items need not be set. For more information of redundant system, see “Redundancy System Configuration Text” (FEH253-2).

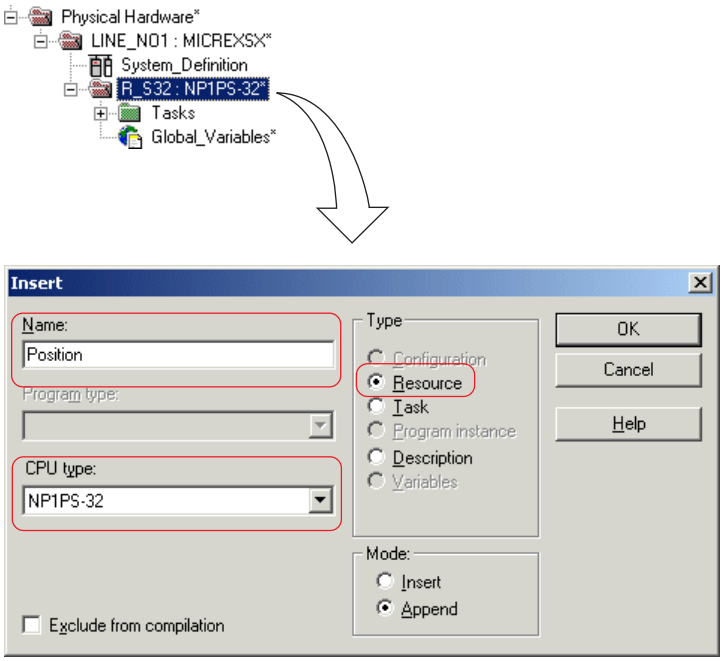
Section 4 System Configuration and Operation Definition

4-3 Resources

4-3-6 Inserting/adding a resource

With MICREX-SX, you can construct a multi-CPU system that uses multiple CPU modules in a single configuration. When creating a project for a multi-CPU system, it is necessary to insert or add a resource (CPU module) below the configuration layer.

◆ In the condition that a resource in a project tree is selected, press the <Insert> key or click the [Add Object] button. The [Insert] dialog box is displayed.



◆ After confirming that the optional [Resource] button is turned on in the [Type] box, enter a desired resource name in the text box. Maximum length of resource name is 24 characters.

◆ Select a desired CPU type, and click the [OK] button. The resource will be added in the rear of the highlighted resource. (When “Insert” is selected for [Mode], the resource will be added in front of the highlighted resource.)

Section 4 System Configuration and Operation Definition

4-4 Tasks

A task is the time schedule for executing POUs. In order to determine in which way to execute POUs, the POUs that are to be executed must be assigned to a task. For high-speed CPU module, maximum 128 POUs can be assigned to a task; for standard CPU module, maximum 64 POUs.

4-4-1 Types of task

The following 3 types of task are available for MICREX-SX.

<Default (DEFAULT) task>

A default task runs cyclically at all times. The POUs that do not require periodicity during its computation process are assigned to this task.

<Fixed-cycle (FIXED_CYCLE) task>

- This task runs once during a specified cycle time (1 to 3200 ms). The POUs that require high-speed response in order to track a controlled event or that need to run cyclically at fixed intervals, such as those using a filter or integral instruction, are assigned to this task
- The priority of tasks is set in 4 levels (Level 0 to Level 3, Level 0 being the highest).
- The unit being ms, a fixed cycle must be set by an integer multiple of tact time.
  For example, if the tact period is 1 ms, the minimum period of the fixed-cycle interrupt task will be 1 ms. If the tact period is 0.5 ms, the minimum period of the fixed-cycle interrupt task will be the period for 2 tacts, or 1 ms.

Note: For details regarding the setting of tact time, see “4-5-4 System properties”.

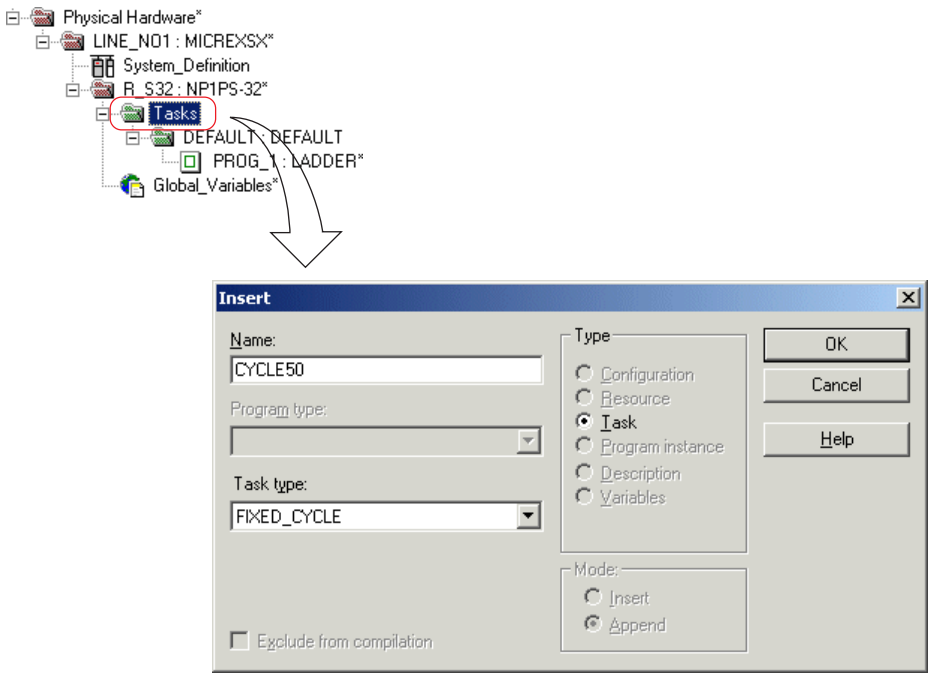
<Event (EVENT) task>

- This task runs once when the status of a specified Boolean variable changes to “TRUE”. The POUs that service interrupts arising from an input module or high-speed counter module are assigned to this task.
- The priority of tasks is set in 4 levels (Level 0 to Level 3, Level 0 being the highest).

4-4-2 Inserting and setting tasks

Tasks are inserted in the layer just below the [Tasks] layer in a project tree.

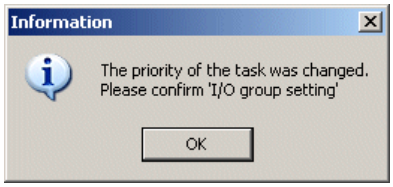
◆ In the condition that “Tasks” is selected in the project tree, press the <Insert> button or click the [Add Object] button. The [Insert] dialog box is displayed.



Section 4 System Configuration and Operation Definition

4-4 Tasks

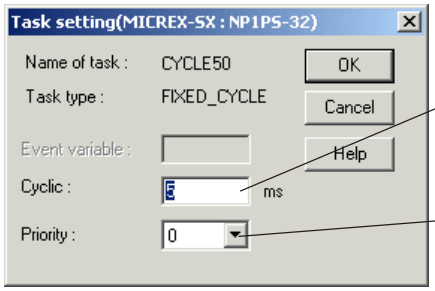
◆ Select “Task” for [Type], and enter a desired task name in the [Name] text box. Maximum length of task name is 7 single-byte characters.
◆ Then select a desired task type and click the [OK] button. The confirmation dialog box as shown below is displayed.



← The confirmation dialog box as shown at left is displayed whenever a task is added or inserted. When a task is added, be sure to confirm or set I/O group in the system definition.

◆ Click the [OK] button on the [Information] dialog box to display the [Task setting] dialog box. The items to be set on this dialog box vary with the type of task.

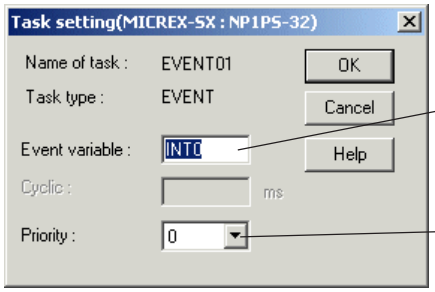
<For FIXED_CYCLE (fixed-cycle interrupt task)>



Set the period of the task, which must be an integer multiple of tact time. Setting range is from 1 to 3200 ms.

Set the priority of task in 4 levels, from 0 to 3. The height of priority is in the following order: 0 > 1 > 2 > 3.

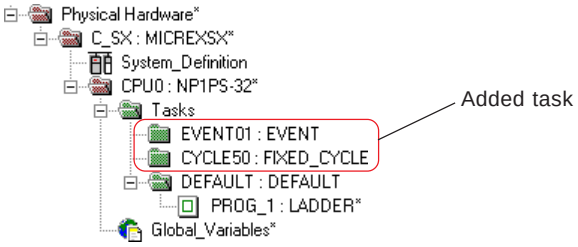
<For EVENT (event task)>



Enter the conditional variable (Boolean) to start the event task.

Set the priority of task in 4 levels, from 0 to 3. The height of priority is in the following order: 0 > 1 > 2 > 3.

◆ On the [Task setting] dialog box, set necessary items and click the [OK] button. Then the task will be added.



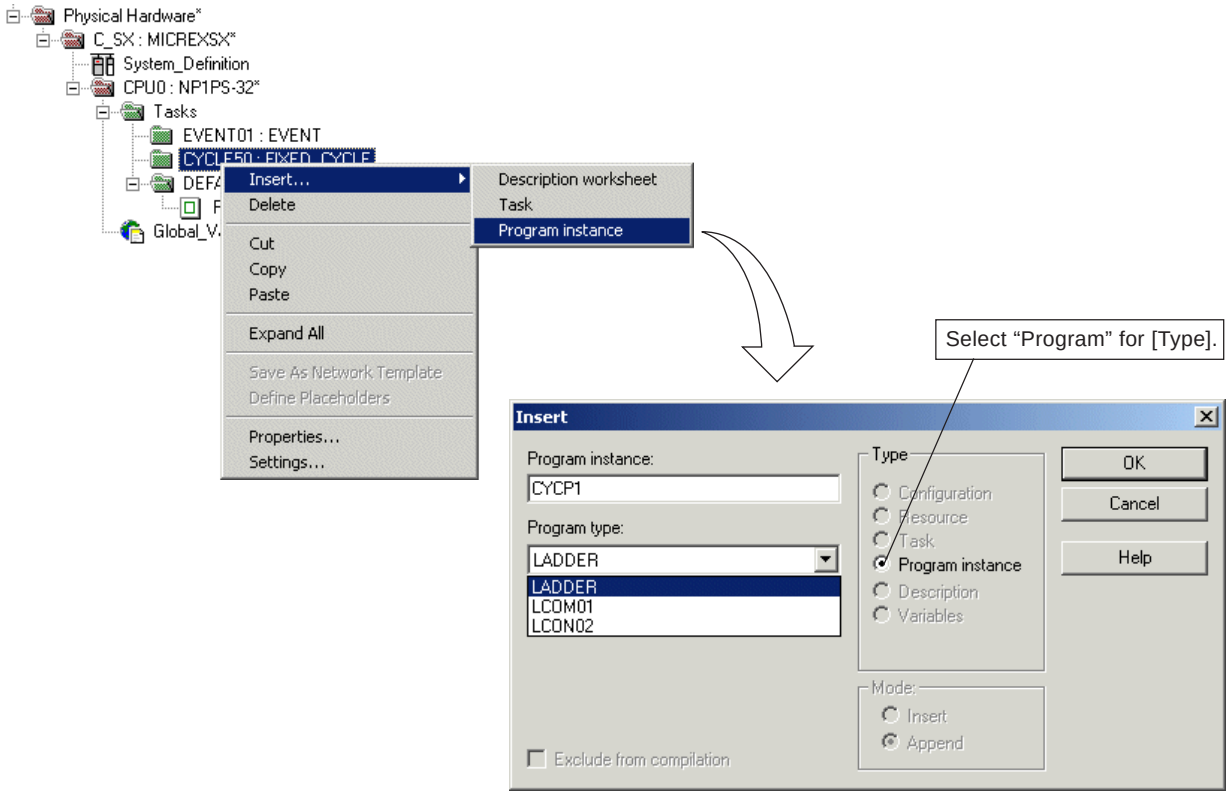
Section 4 System Configuration and Operation Definition

4-4 Tasks

4-4-3 Registering a program to a task

In this process, the program to be executed is assigned to a task.

◆ Right-click a task to which you want to assign the program, and left-click the [Program instance] command in the submenu for the [Insert...] command in the shortcut menu. The [Insert] dialog box is displayed.

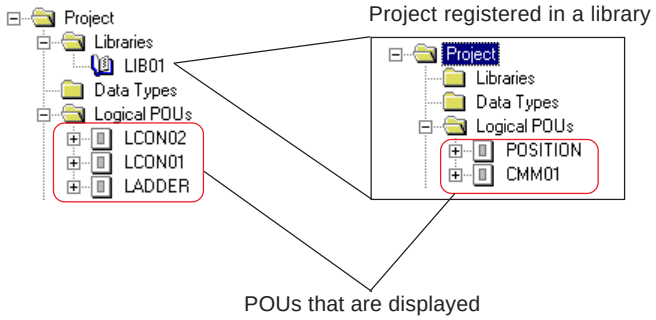


◆ Enter a desired name in the [Program instance:] text box. Maximum length of program instance name is 24 characters.

◆ Set the program type. For this, select a corresponding program (POU) from the [Program type:] list box.

<POUs displayed in the [Program type:] list box>

In the [Program type:] list box, the POUs whose type is program and that can be used in the resource are displayed. The POUs of a project that is registered in a library are also displayed.



Section 4 System Configuration and Operation Definition

4-5 System Definition

MICREX-SX sets operations of a whole system, registers the modules that are used in configurations, and sets parameters. This paragraph explains how to operate the D300win. For more information of detail specifications in the system definition, see the “User’s Manual <Instruction>” (FEH200).

4-5-1 Items to be set for system definition

In the system definition process, the following items are set:

- Registering modules
  - Registration of modules to use → See “4-5-2 Registering modules”.
  - CPU parameters
    - I/O group setting
    - Fail-soft operation setting

  → See “4-5-3 Setting CPU parameters”.
- System properties
  - System running definition — See “4-5-4 System properties”.
  - System redundancy → See “4-6 Redundant CPU System”. (See note)
  - Fail-soft startup operation → See “4-5-4 System properties”.

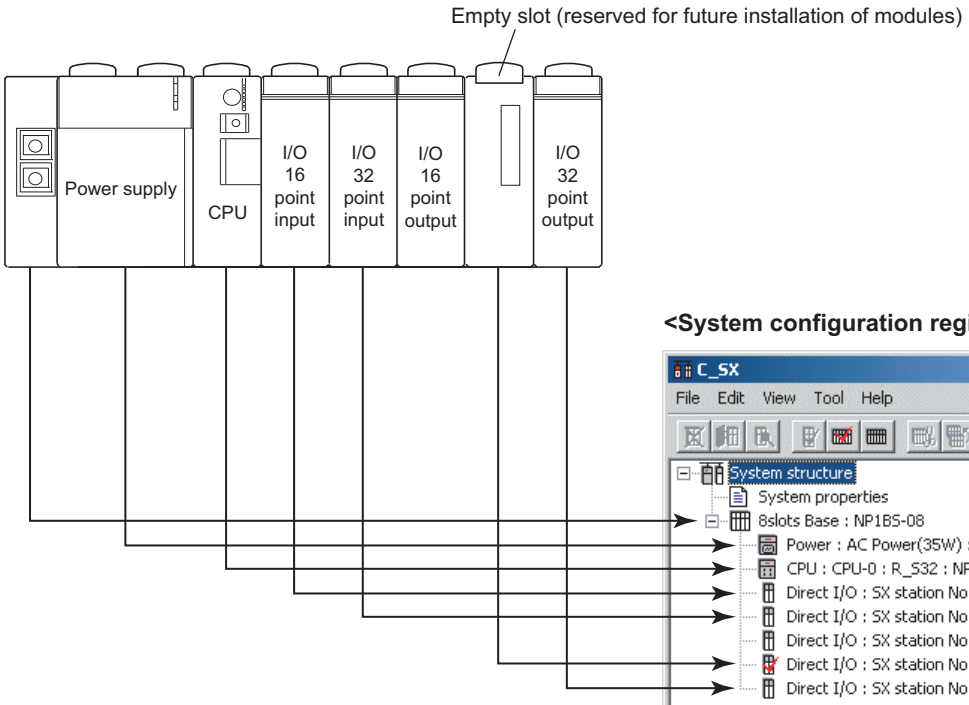
Note: For details regarding the specifications or operation method related to redundancy system, see the “Redundancy System Configuration Text” (FEH253-2).

4-5-2 Registering modules

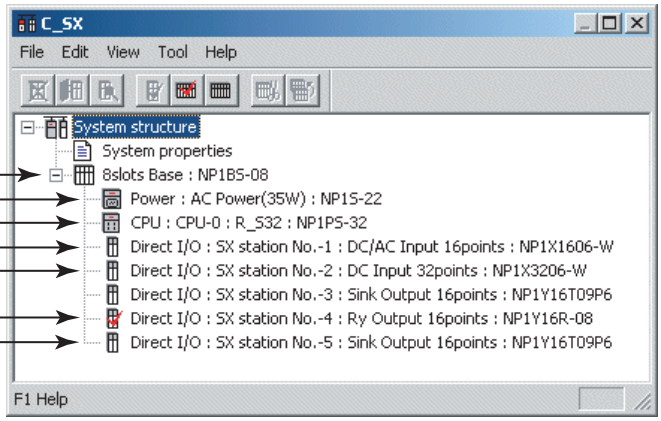
(1) Registering modules

For MICREX-SX, it is necessary to register all the modules that are used in one configuration. How to register modules is explained below, taking the system configuration as shown below for example.

<Example of system configuration>



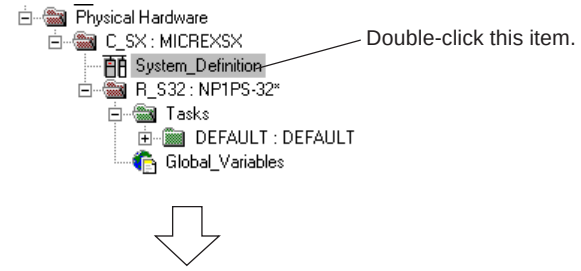
<System configuration registration screen>

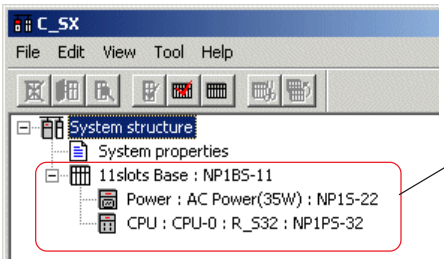


Section 4 System Configuration and Operation Definition

4-5 System Definition

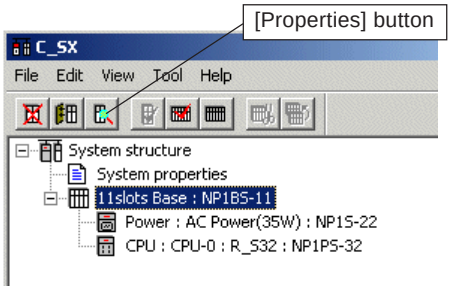
◆ Double-click [System_Definition] in the project tree. The system definition screen is displayed.

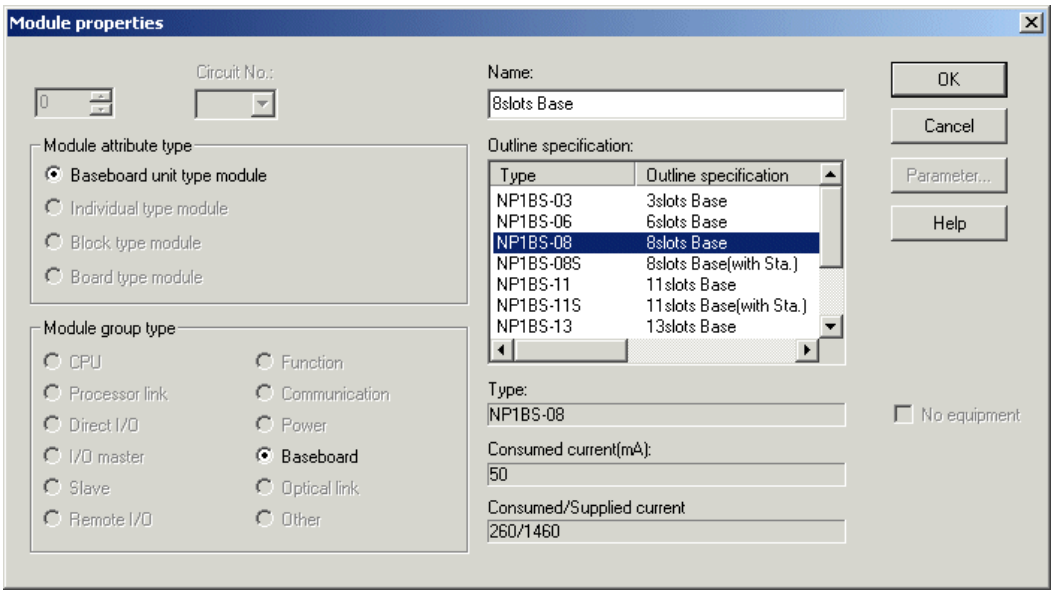




When a project is created using a template, one piece of AC power supply module and one piece of CPU module are registered as default to the 11-slot base board.

◆ First, the base board is changed to a 8-slot type that is actually used. Select the base board and click the [Properties] button. The [Module properties] dialog box is displayed.

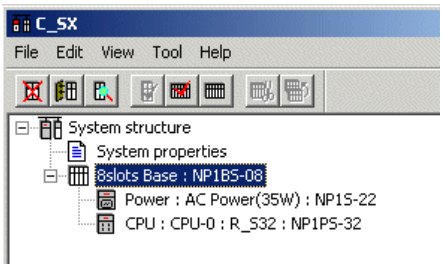




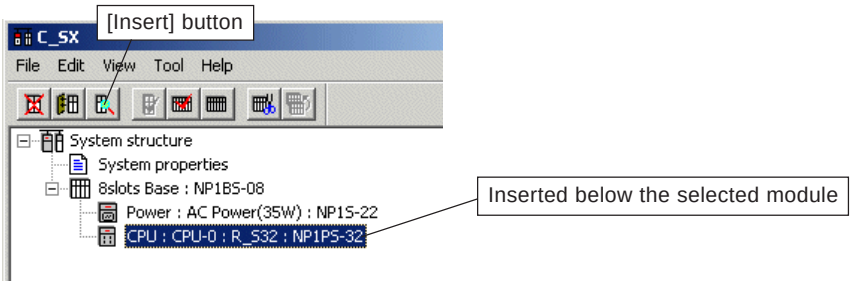
Section 4 System Configuration and Operation Definition

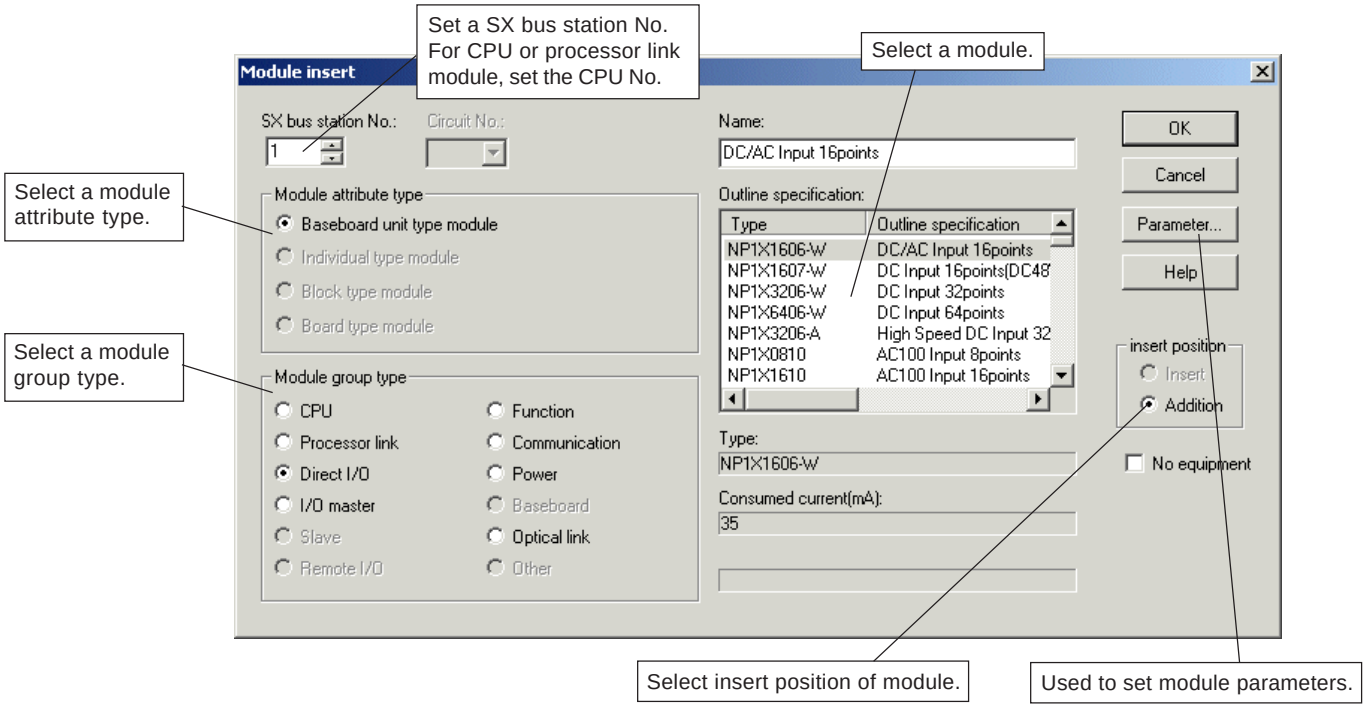
4-5 System Definition

◆ Select “NP1BS-08 8 slots Base” from the [Outline specification:] list box and click the [OK] button. Then the base board displayed on the screen changes to the selected 8-slot base board.



◆ Modules must be registered from the leftmost one on the base board in order. Because power supply and CPU module are already registered by default, 16 points input module needs to be registered. As this module is to be registered (added) below the CPU module, select the CPU module and click the [Insert] button. The [Module insert] dialog box is displayed.

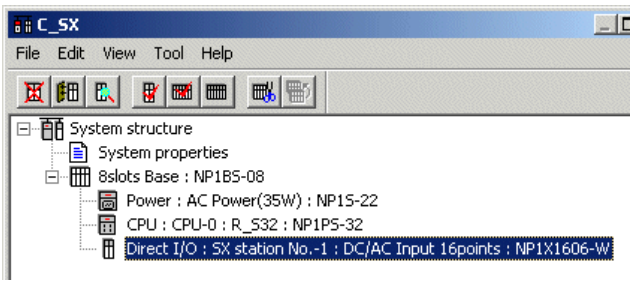




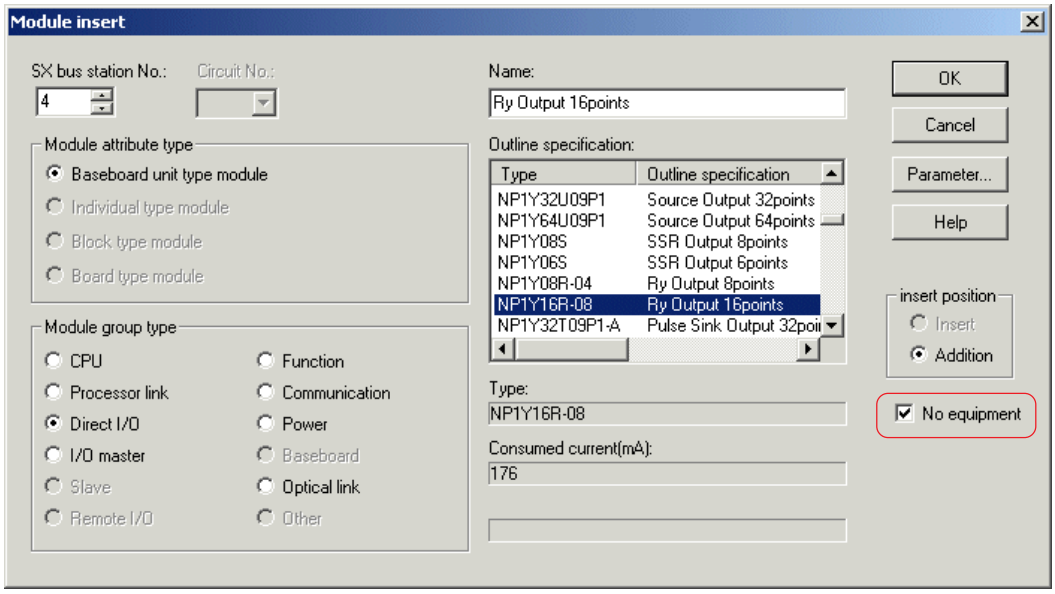
Section 4 System Configuration and Operation Definition

4-5 System Definition

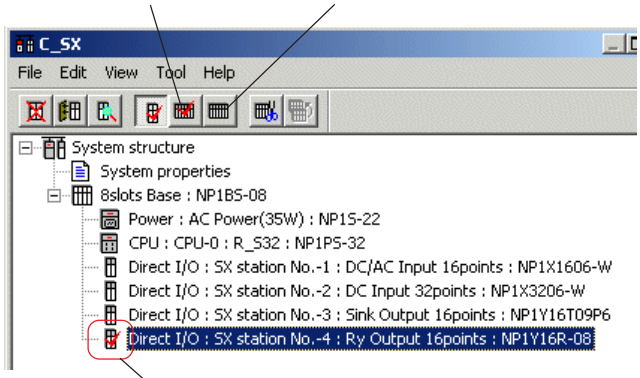
◆ Select a module (NP1X1606-W: DC/AC input 16 points) so as to match the actual configuration. Though SX bus station number can be set arbitrarily in the range from 1 to 238, in general, 1, 2, 3, ... are assigned from the one on the right of the CPU module in order. Select a module and click the [OK] button. The module is registered.



◆ Other modules are registered in the same way. When there is unused slots for future installation of modules, as in the sample system configuration, SX station numbers and the modules that are to be installed in the future are set, the same as with other modules, and then the [No equipment] box is checked and the [OK] button is clicked.



[No equipment batch setting] button [No equipment batch release] button



This module is registered with the [No equipment] mark indicated on the icon.

* With V3.3.0.0 or later version, no equipment registration of modules/units registered in the system definition can be collectively made or cancelled on the system registration screen. When collectively making/cancelling no equipment registration of the entire system, press the button with the “System structure” selected. Likewise, when collectively making/cancelling no equipment registration of modules/units on a base board, press the button with the base board selected. For units connected to a remote I/O master module, press the button with the remote I/O master selected.

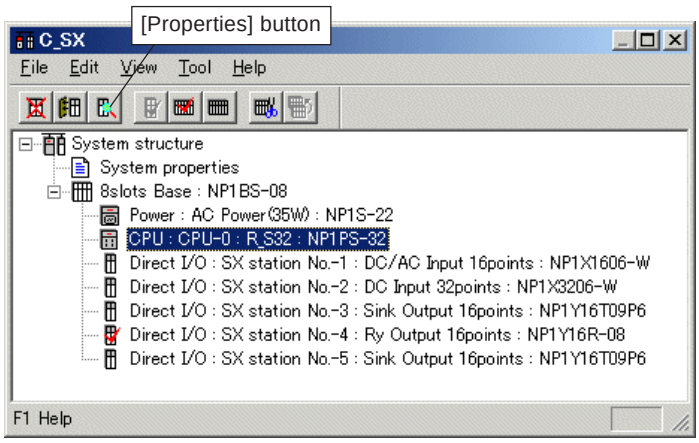
Section 4 System Configuration and Operation Definition

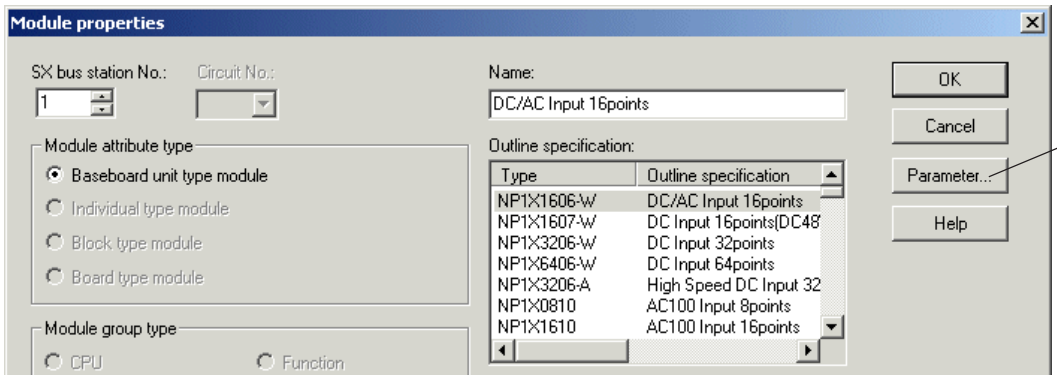
4-5 System Definition

(2) Setting module parameters

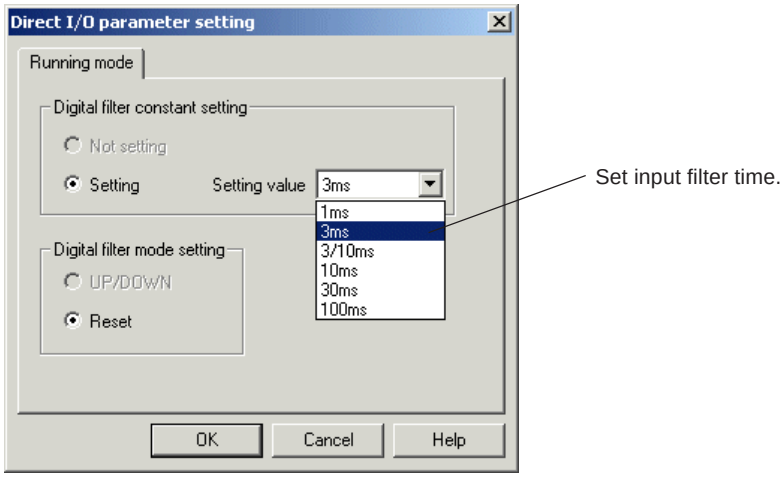
Then the parameters of MICREX-SX modules are set. In this paragraph, how to set parameters for the input and output modules is explained. The method for setting parameters for the CPU module is described in “4-5-3 Setting CPU parameters”. For other modules, see the corresponding manuals.

◆ On the system configuration registration screen, select a module for which you want to set parameters, and click the [Properties] button. The [Module properties] dialog box is displayed.





◆ Click the [Parameter...] button to display the parameter setting screen for the module. Parameter setting screen varies with module types. The figure below shows the setting screen for the input module.



4-5 System Definition

◆ After setting all necessary items, click the [OK] button. Then you return to the previous [Module properties] dialog box. On this dialog box, click the [OK] button to finish the registration.

Note: The parameters for individual module can also be set when the module is registered.

<Setting parameters for the output module>

For the digital output module, two parameters can be set.

1) Hold Definition

This parameter is set when the output status just before the occurrence of error should be retained or the output status just before the CPU stopped should be kept while the CPU stops, should the system become abnormal to stop the CPU module.

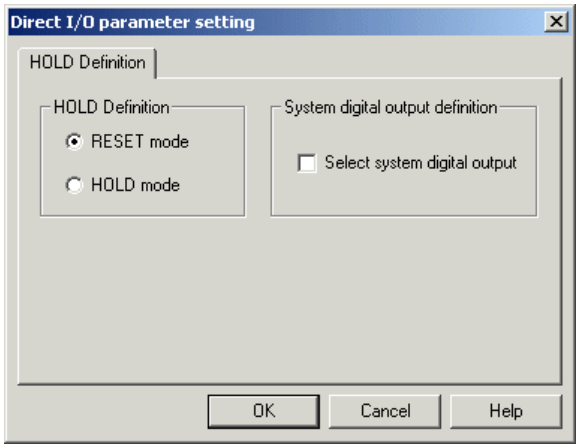
2) System digital output definition

One bit per configuration can be defined to output the operating status of the system, independent of application programs. This bit is set ON when the entire system is operating normally and set OFF if abnormality (fatal fault or non-fatal fault) occurred on the system. Only bit zero of the output module can be used for this purpose.

<Operation>

◆ On the system configuration registration screen, select a digital output module for which you want to set parameters, and click the [Properties] button. The [Module properties] dialog box is displayed.

◆ Click the [Parameter...] button. The [Direct I/O parameter setting] dialog box for the output module is displayed.



◆ When you want to use the [Hold Definition] function, turn on the optional [Hold mode] button.

◆ When you want to use the [System digital output definition] function, check the [Select system digital output] box.

◆ When parameter setting is competed, click the [OK] button.

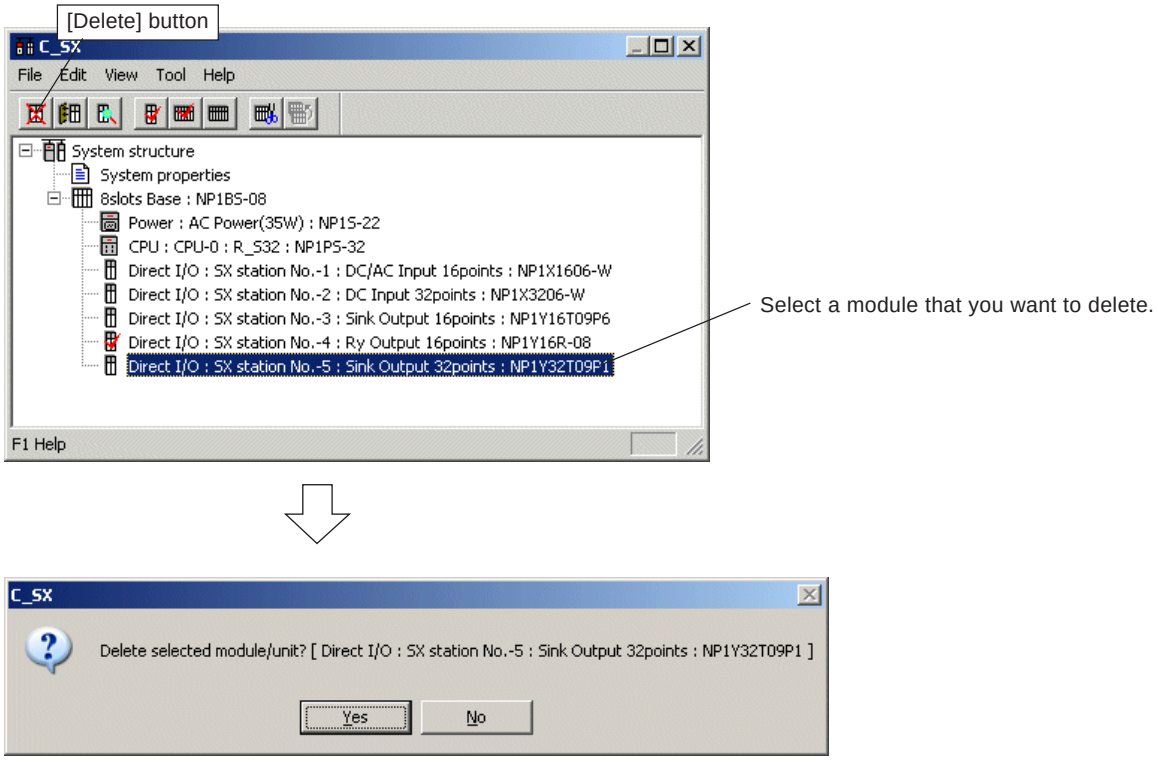
Section 4 System Configuration and Operation Definition

4-5 System Definition

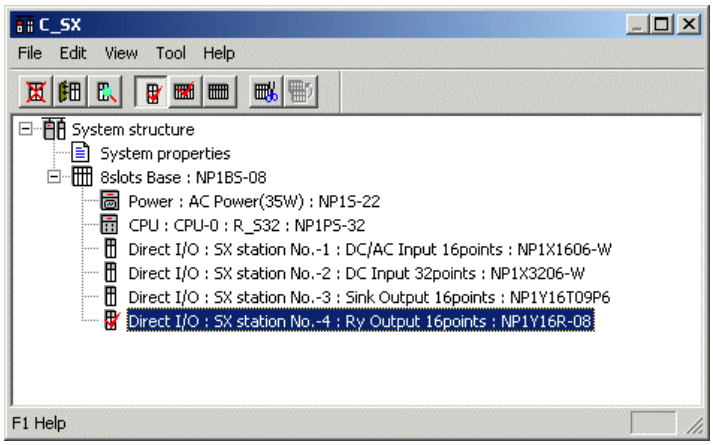
(3) Deleting a module

To delete a registered module, use the following procedure:

◆ On the module registration screen, select a module that you want to delete, and click the [Delete] button. The confirmation dialog box is displayed.



◆ When the [Yes] button is clicked, the module is deleted.



Section 4 System Configuration and Operation Definition

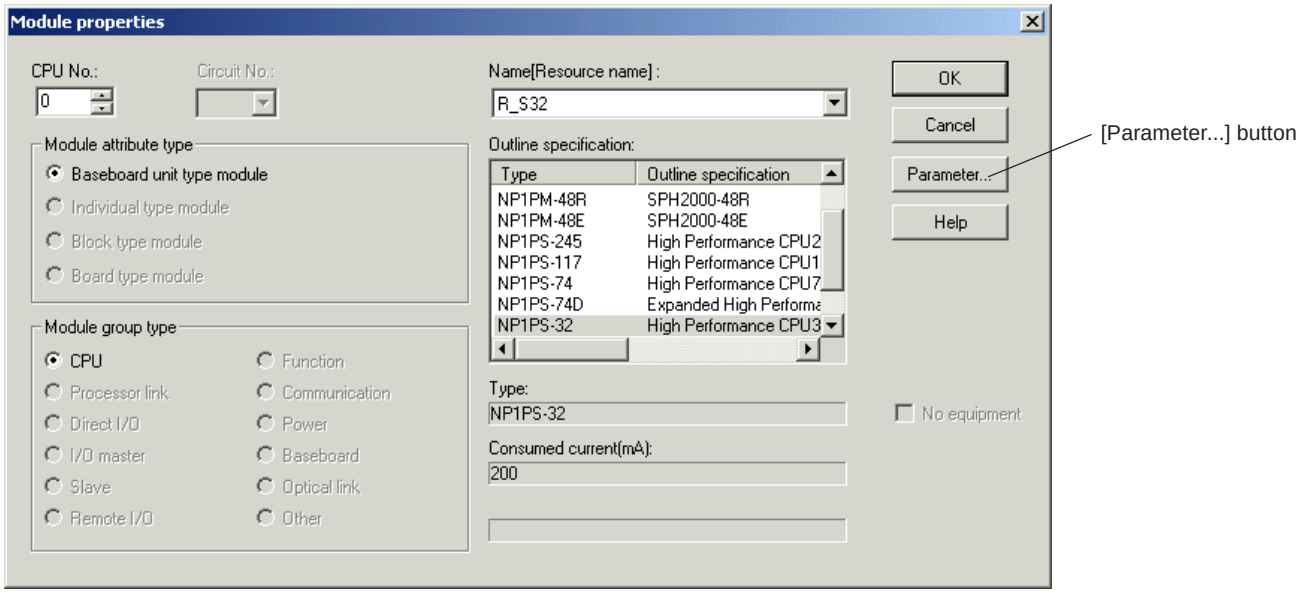
4-5 System Definition

4-5-3 Setting CPU parameters

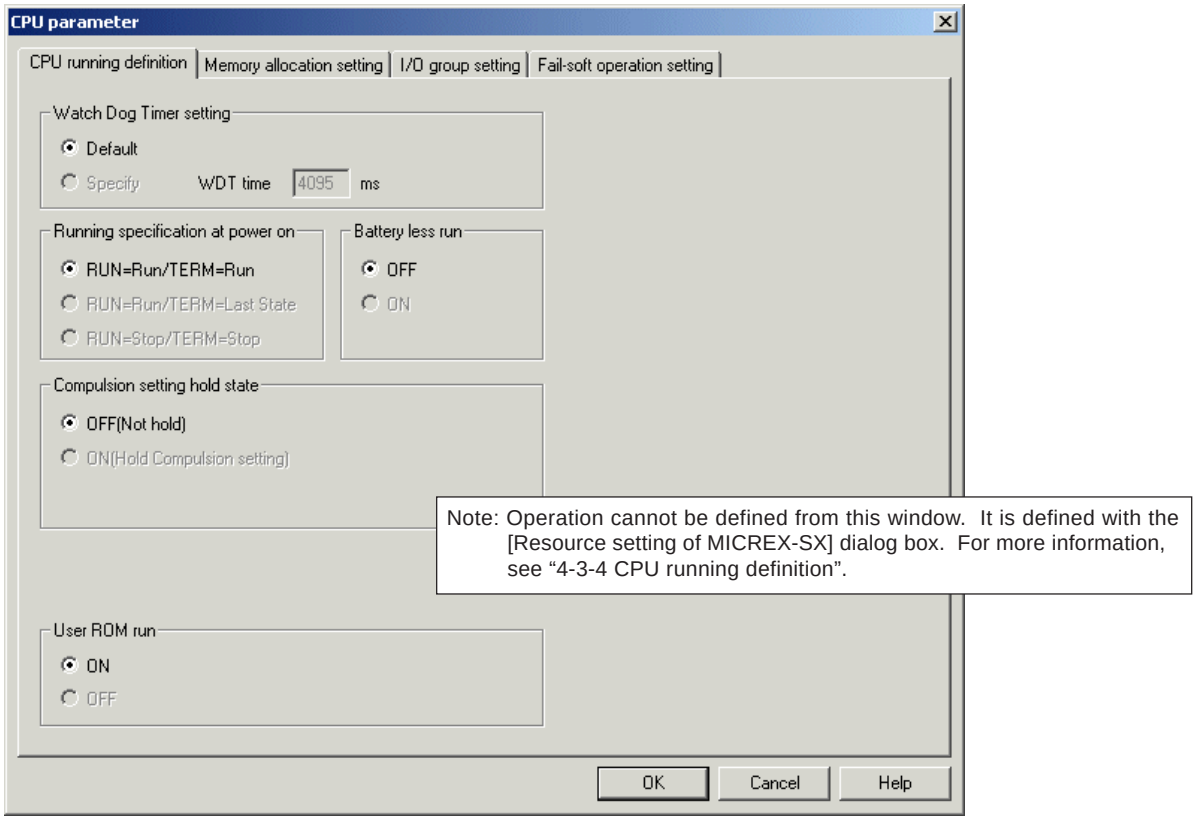
The items “I/O group setting” and “Fail-soft operation setting” are set using the parameters for the CPU module. In addition, the contents of “CPU running definition” and “CPU memory size definition” that were set from the [Resource setting of MICREX-SX] dialog box can be confirmed on the [CPU parameter] dialog box.

(1) Displaying CPU running definition and CPU memory size definition

◆ On the system configuration screen, select a CPU and click the [Properties] button. The [Module properties] dialog box for the CPU is displayed.



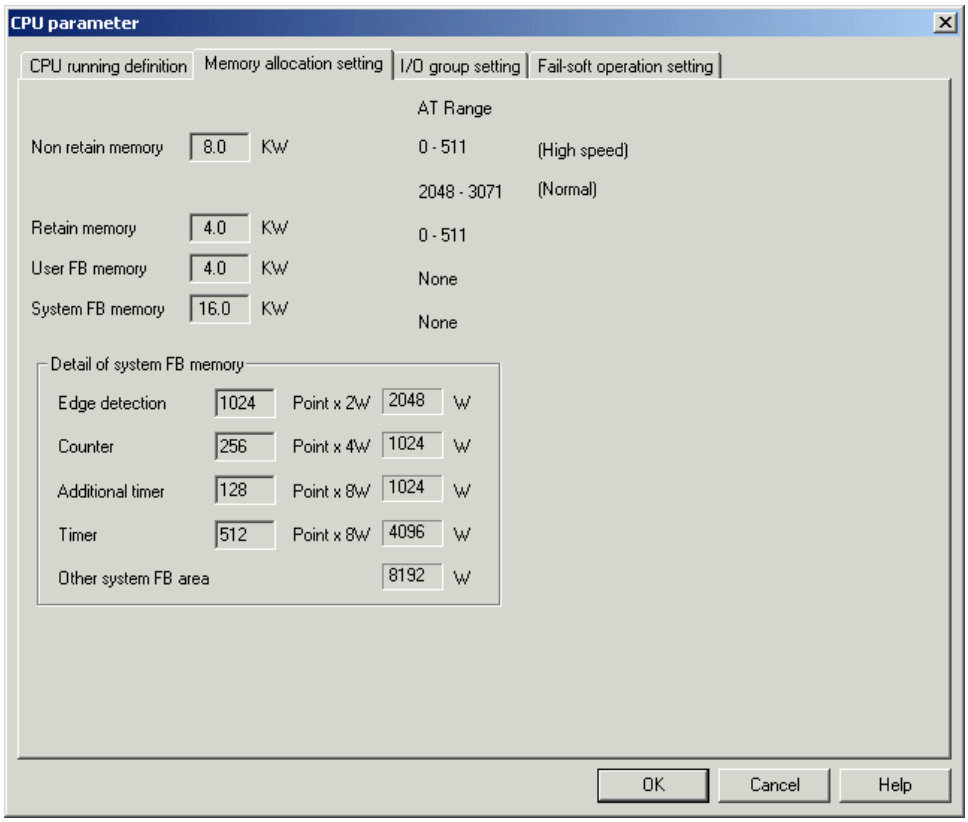
◆ Click the [Parameter...] button. The [CPU parameter] dialog box is displayed.
This dialog box consists of 4 tab windows, and the [CPU Running Definition] tab window is active just after the dialog box is displayed.



Section 4 System Configuration and Operation Definition

4-5 System Definition

◆ Double-click the [CPU Memory Size Definition] tab. The [CPU Memory Size Definition] tab window is displayed.



Note: Memory size cannot be set from this window. It is set with the [Resource setting of MICREX-SX] dialog box. For more information, see “4-3-5 Memory allocation setting”.

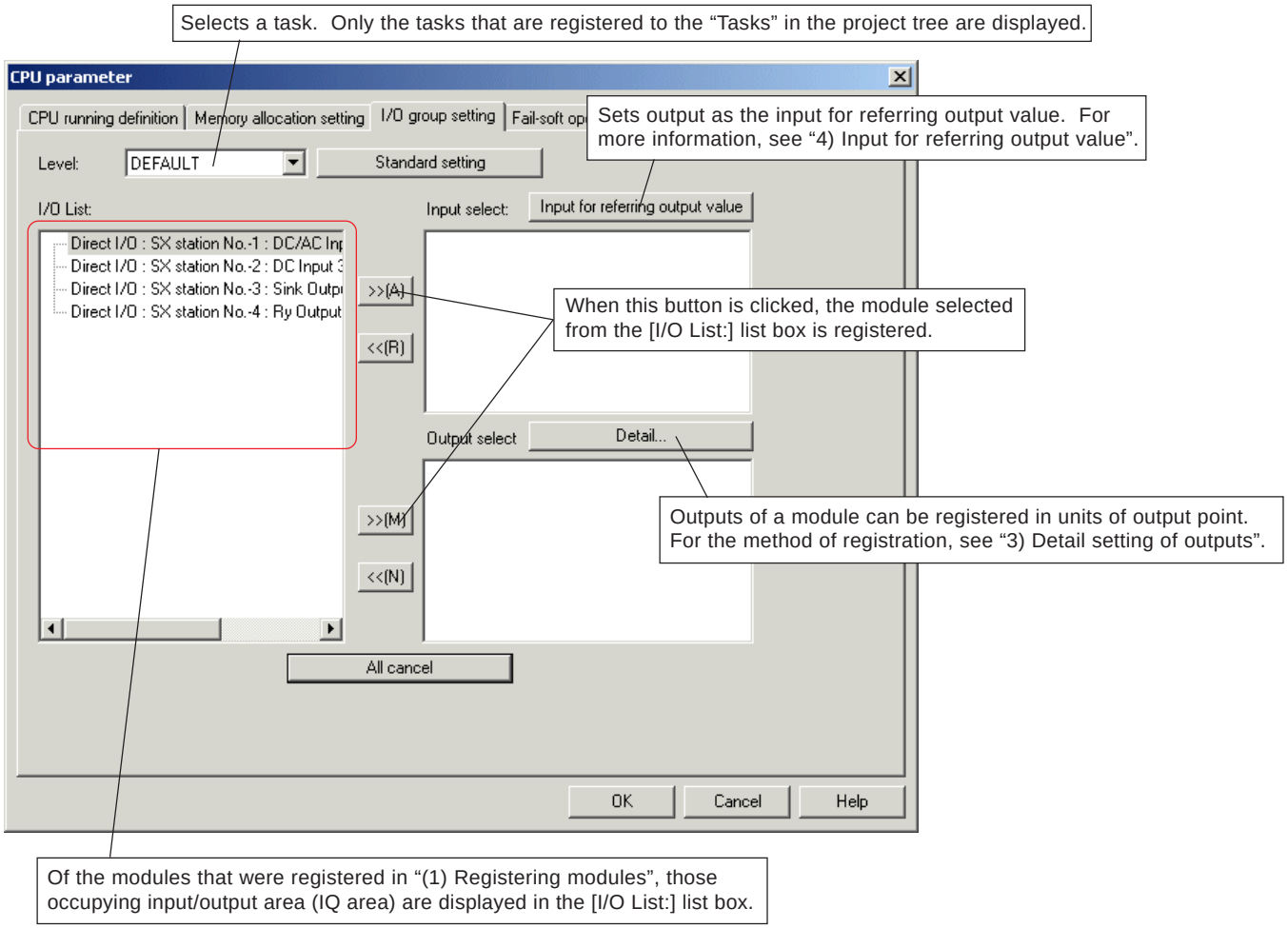
Section 4 System Configuration and Operation Definition

4-5 System Definition

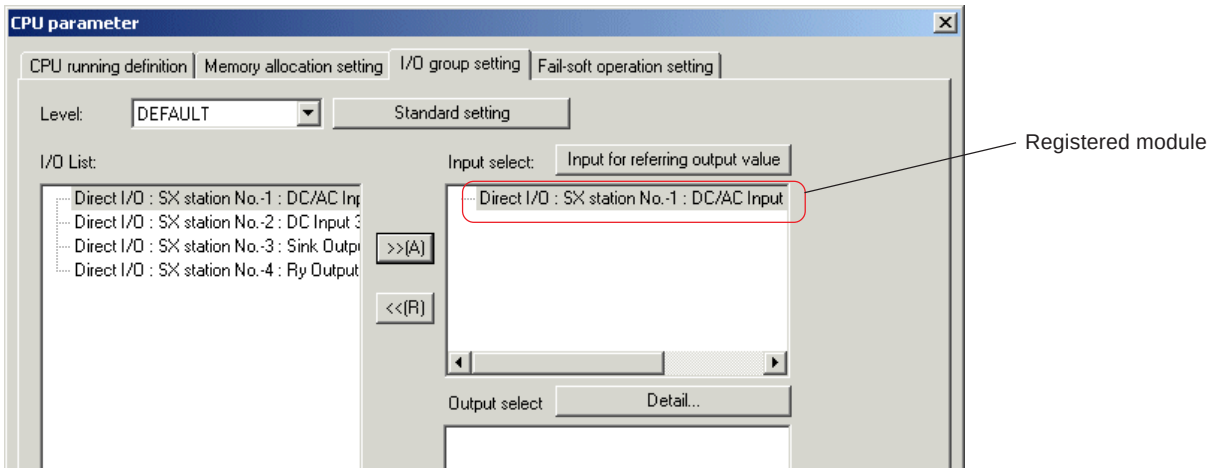
(2) I/O group setting

In this process, it is set which task of which CPU controls the input/output modules existing in a configuration. This setting is important for a CPU module to access the I/O's of a module.

◆ On the [CPU parameter] dialog box, click the [I/O Group Setting] tab. The [I/O Group Setting] tab window is displayed.



◆ Select a module from the [I/O List:] list box, and click the registration button. The selected module will be registered.



◆ After the modules as control target are registered, click the [OK] button.

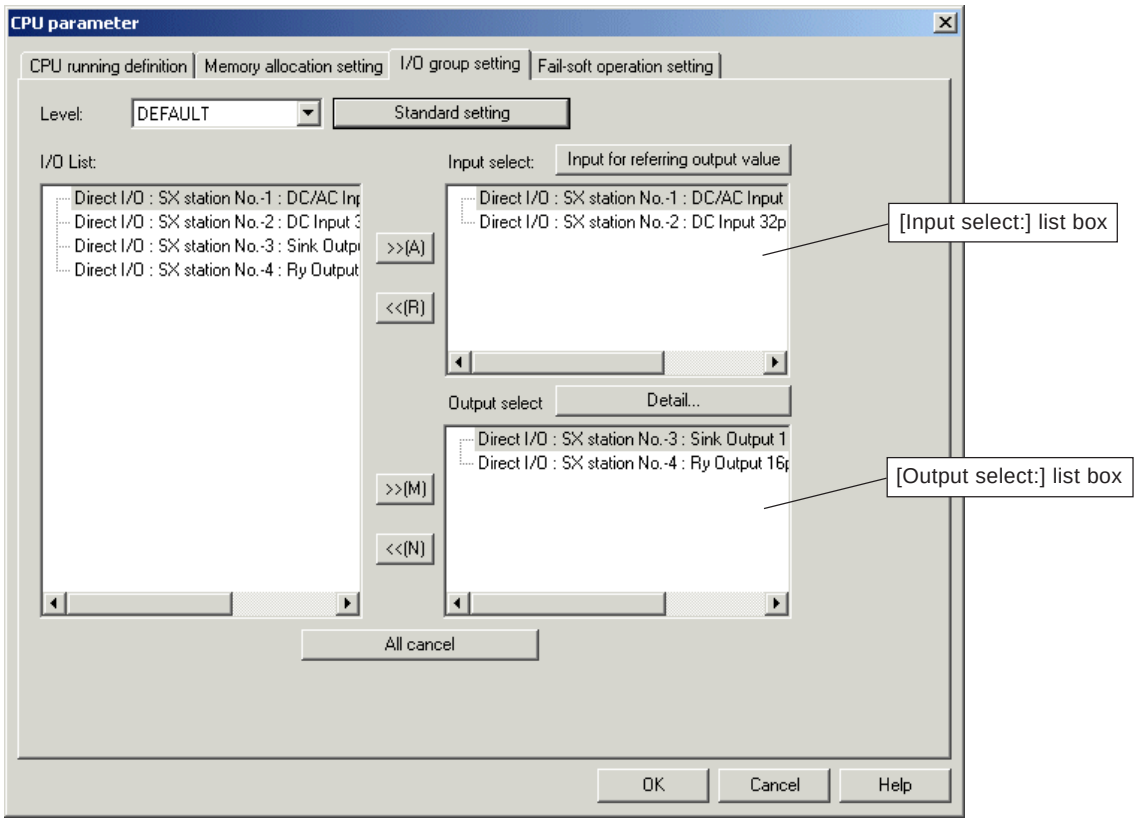
Section 4 System Configuration and Operation Definition

4-5 System Definition

2) Standard setting

When only one CPU is registered to a configuration and only “DEFAULT” task controls the I/O’s, modules can be registered as a batch.

◆ Select “DEFAULT” for [Level:] and click the [Standard setting] button. Then the modules are automatically registered to [Input select:] and/or [Output select:] list boxes.



Note 1: The modules that have I/O area, such as high-speed counter and positioning module, can be registered to both the [Input select:] and [Output select:] list boxes.

Note 2: With a multi-CPU system, when an output module registered to other CPU module is referred to, the output module needs to be registered to the [Input select:] list box. An output module that is registered to the [Output select:] list box of other CPU module cannot be duplicately be registered.

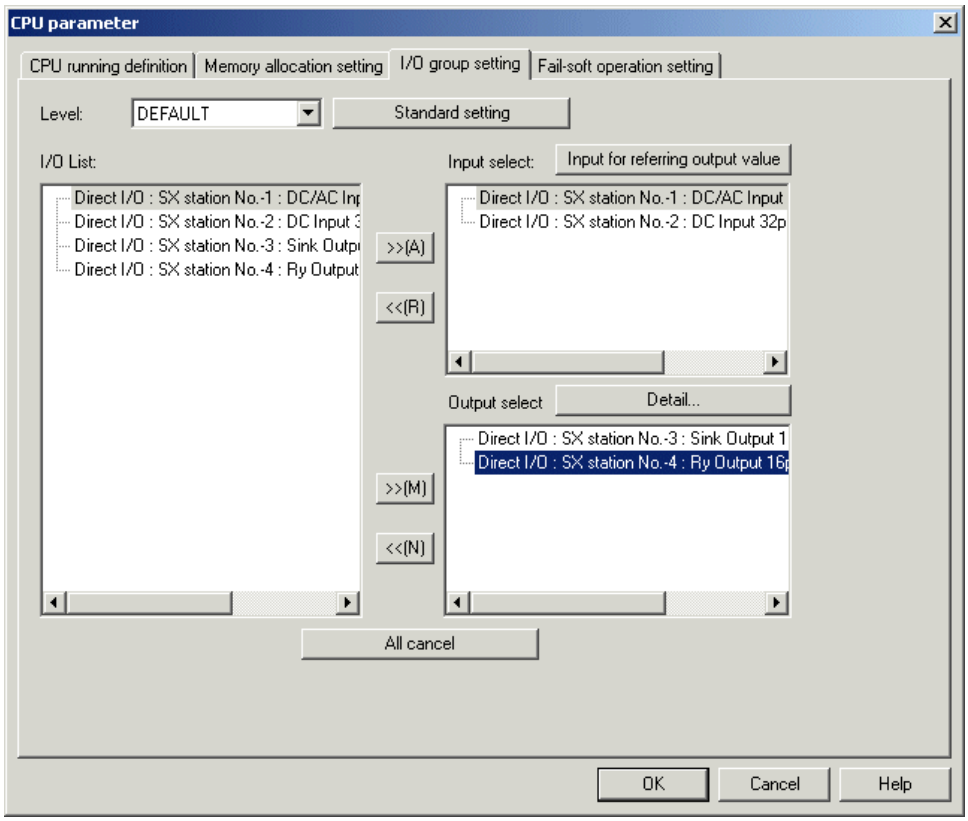
Section 4 System Configuration and Operation Definition

4-5 System Definition

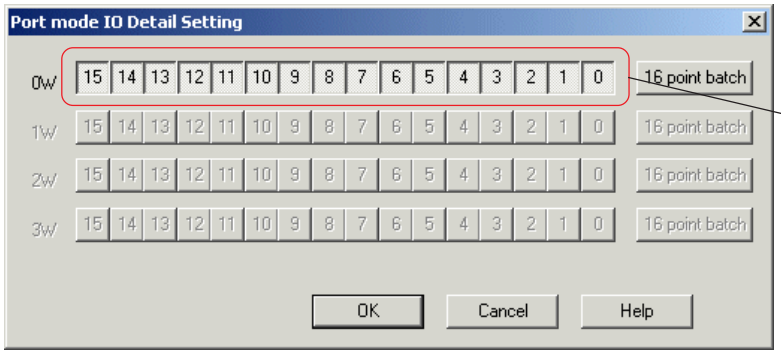
3) Detail setting of outputs

For a multi-CPU system, it can be set in units of bit or word which CPU should control the outputs of a module.

◆ From the [Output select:] list box, select a module for which you want to set outputs in details, and click the [Detail...] button.

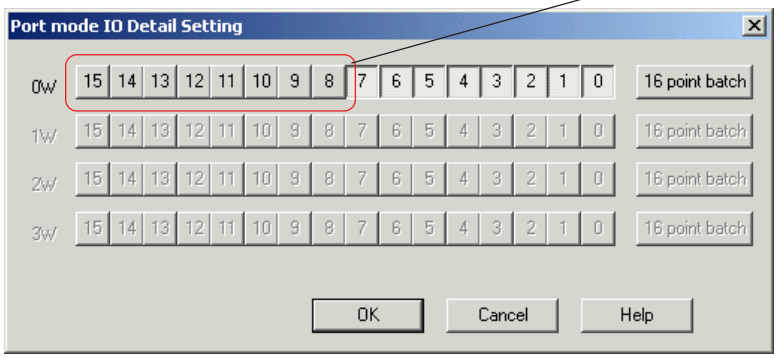


◆ When a digital output module is selected, the [Port mode IO Detail Setting] dialog box is displayed.



Default is the selection of all bits.

◆ Click the bits that are to be controlled by other CPUs to set the buttons OFF.

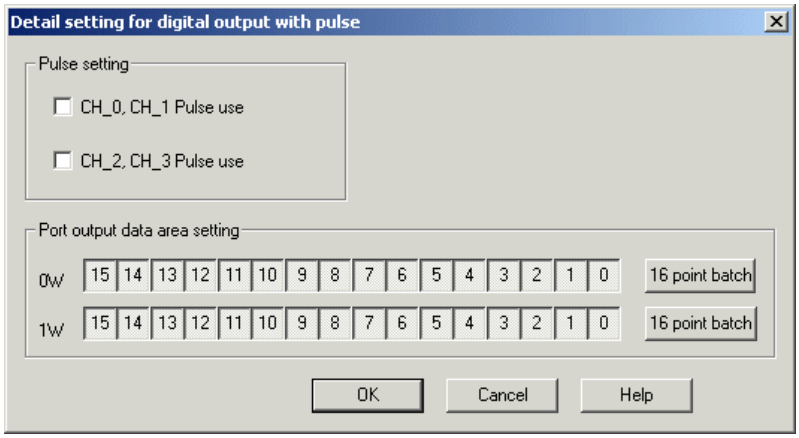


Section 4 System Configuration and Operation Definition

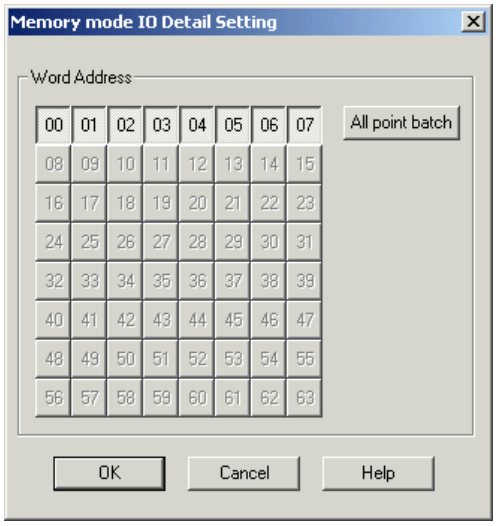
4-5 System Definition

Note 1: The dialog box that is displayed when the [Detail...] button is clicked varies with the modules selected.

<When digital output module with pulse is selected>



<When analog output module is selected>



Note 2: If a module for which the “detail setting of outputs” function is not available is selected, the detail setting dialog box won’t be displayed even when the [Detail...] button is clicked.

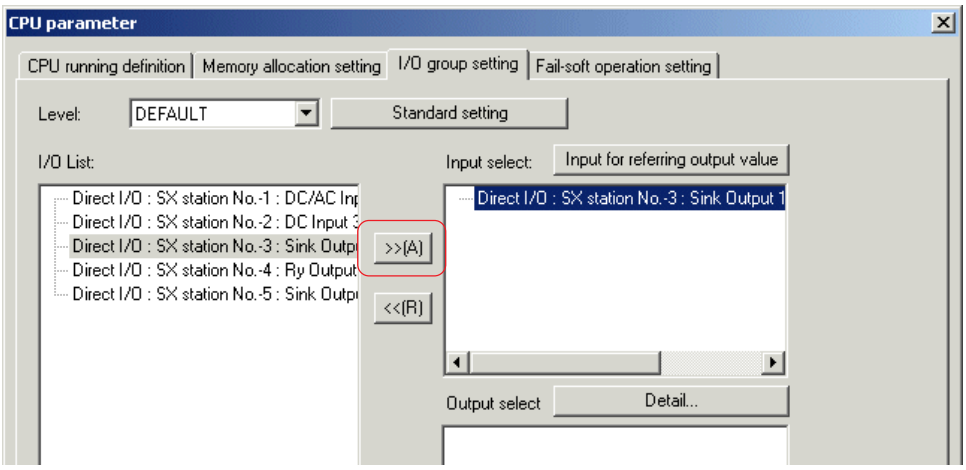
Section 4 System Configuration and Operation Definition

4-5 System Definition

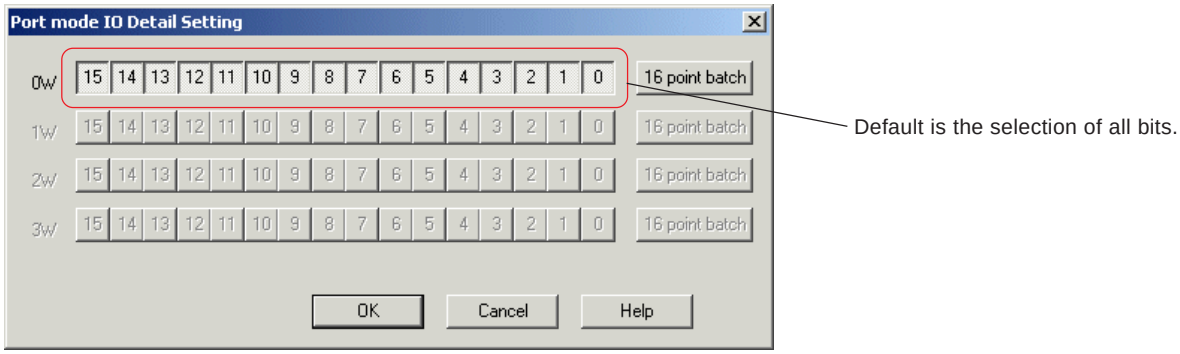
4) Input for referring output value

With a multi-CPU system, when you want to use the outputs of the output module that are used by other CPU as the inputs for the application program running on your CPU, the bits or words are registered to the [Input select:] list box for the I/O group of your CPU.

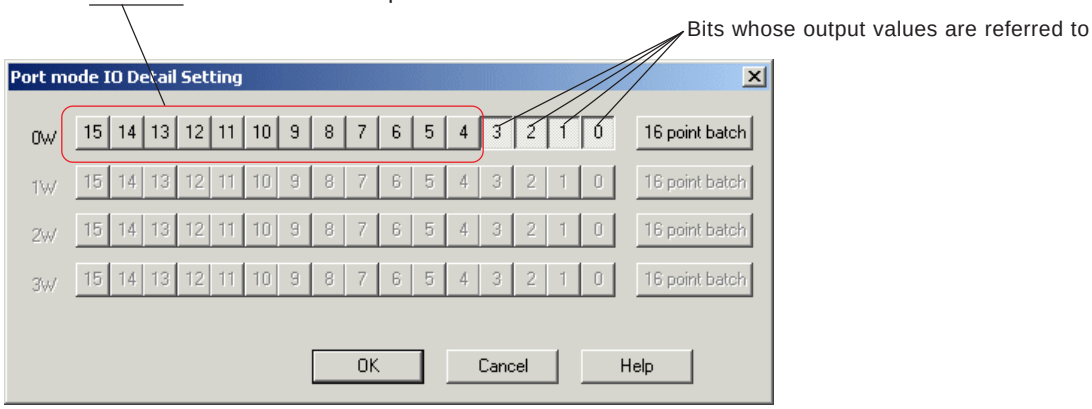
◆ After selecting an output module that is to be referred to, click the [>>] button to register it to the [Input select:] list box.



◆ Click the [Input for referring output value] button. The [Port mode IO Detail Setting] dialog box is displayed.



◆ Click to set OFF the bits whose output values are not referred to.

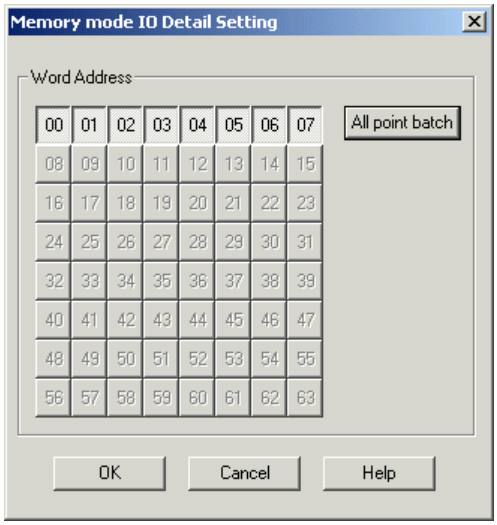


◆ After setting, click the [OK] button.

Section 4 System Configuration and Operation Definition

4-5 System Definition

Note: When referring to the value of analog output, etc., setting must be made in units of word. In such case, the [Memory mode IO Detail Setting] dialog box is displayed.



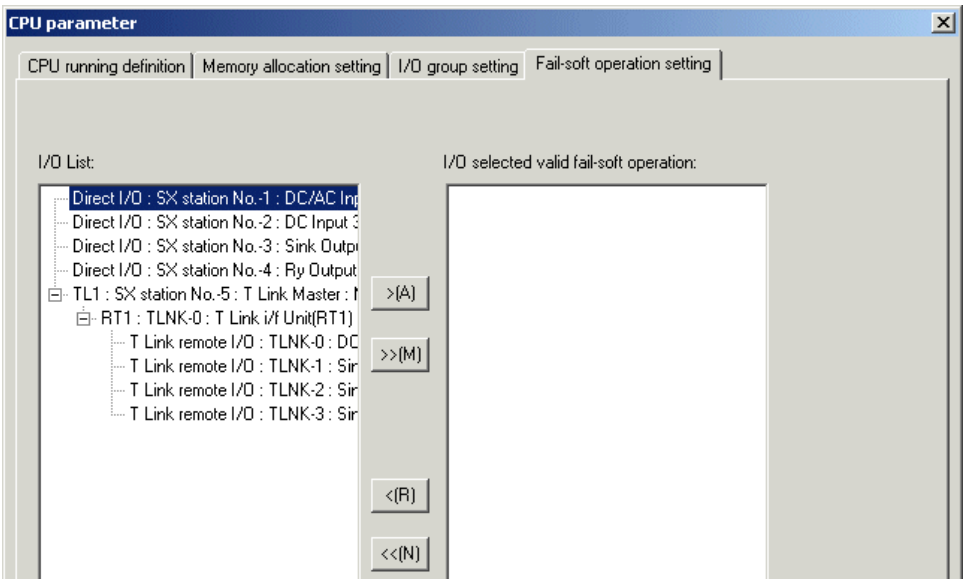
Section 4 System Configuration and Operation Definition

4-5 System Definition

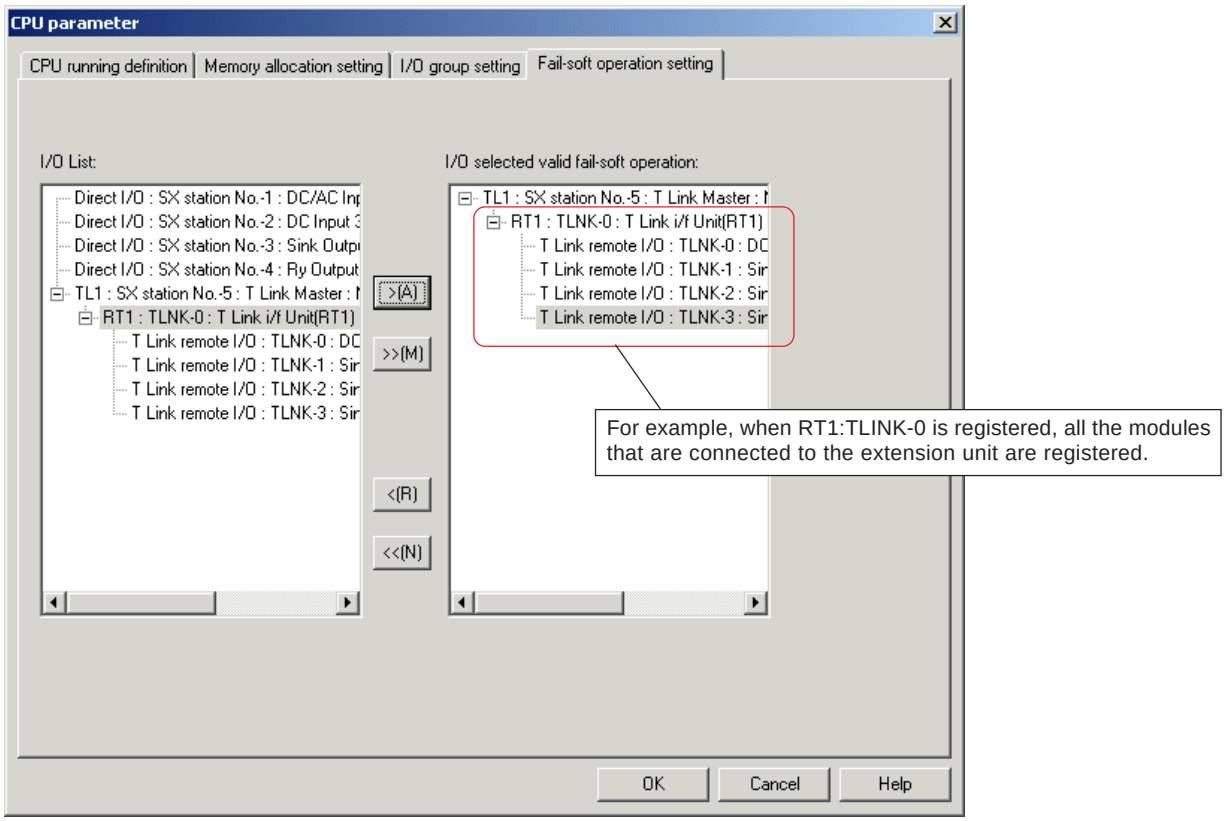
(3) Fail-soft operation setting

The mode that the operation of other normal modules and units is continued even when an error occurred on a module or a unit on the SX bus or the remote I/O (T-link, etc.) is referred to as “fail-soft”.

◆ Click the [Fail-Soft Operation Setting] tab in the [CPU parameter] dialog box to display the [Fail-Soft Operation Setting] tab window.



◆ Select a module for which you want to set fail-soft operation mode, and click the [>] button.



◆ After setting, click the [OK] button.

Note: For the extension units on remote I/O, registration of fail-soft operation can be made by the unit, not by the module.

Section 4 System Configuration and Operation Definition

4-5 System Definition

4-5-4 System properties

In the system properties process 3 items are set, i.e. “System Running Definition”, “Redundancy setting”, and “Fail-soft operation setting”. This paragraph describes the method for System Running Definition setting and Fail-soft operation setting. For details regarding “Redundancy setting”, see “4-6 Redundant CPU System”.

(1) System running definition

System running definition includes 3 setting items: “SX bus tact”, “Waiting time for structure check”, and “Select initialization method”.

1) SX bus tact:

“SX bus tact” is the time for a data transfer to and from a module (such as an I/O module) connected to the SX bus. Tact time is selected from 0.5, 1, 1.5, 2, 2.5, ..., 9.5 and 10 ms. Default is 1.0 ms.

2) Waiting time for structure check:

When the system is powered up, the CPU module starts structure check for all the modules (such as I/O module) that are connected to the SX bus. The system is started when all these modules are started within the set “Waiting time for structure check”. When a system consists of multiple base boards and the timing of power-on varies with these base boards, the difference can be adjusted by the “Waiting time for structure check”.
(Setting range of “Waiting time for structure check” is from 1 to 180 seconds, and default is 20 seconds.)

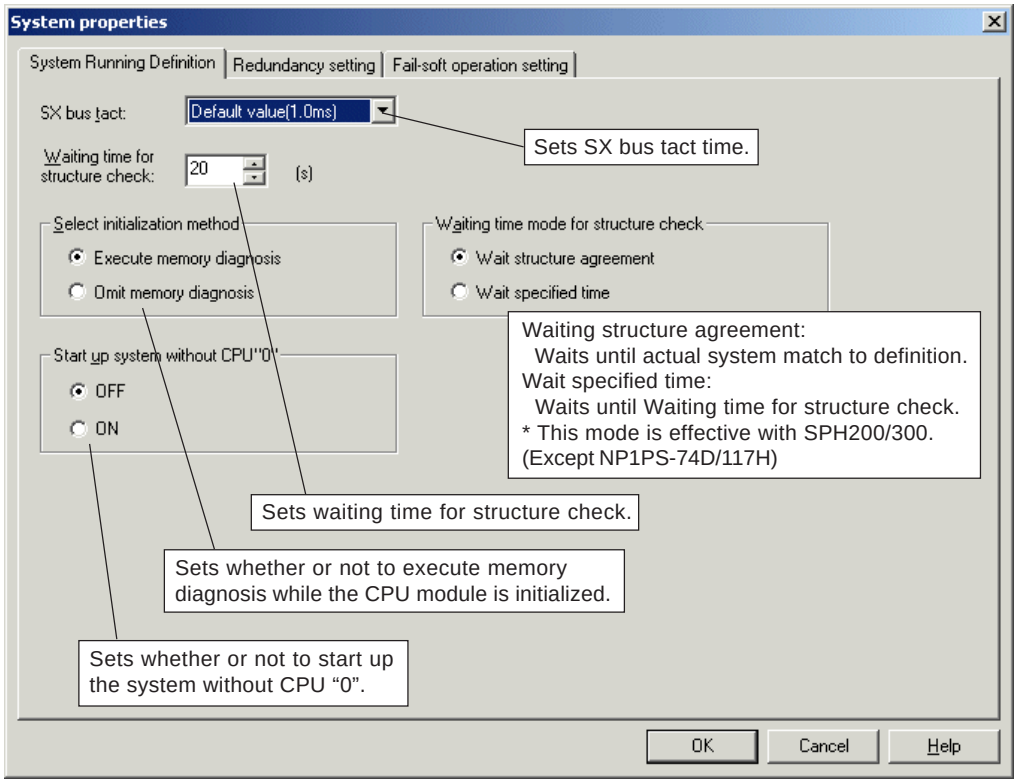
3) Select initialization method

When the system is powered up, the CPU module is initialized. This item specifies whether or not to diagnose the internal memory of the CPU module while it is initialized.

4) Start up system without CPU “0”

This item specifies whether or not to start up the system when CPU 0 does not exist such as in a redundant system.

◆ On the system configuration definition screen, select “System properties” and click the [Properties] button. The [System properties] dialog box is displayed, on which the [System Running Definition] tab window is active.



◆ After setting all necessary items, click the [OK] button.

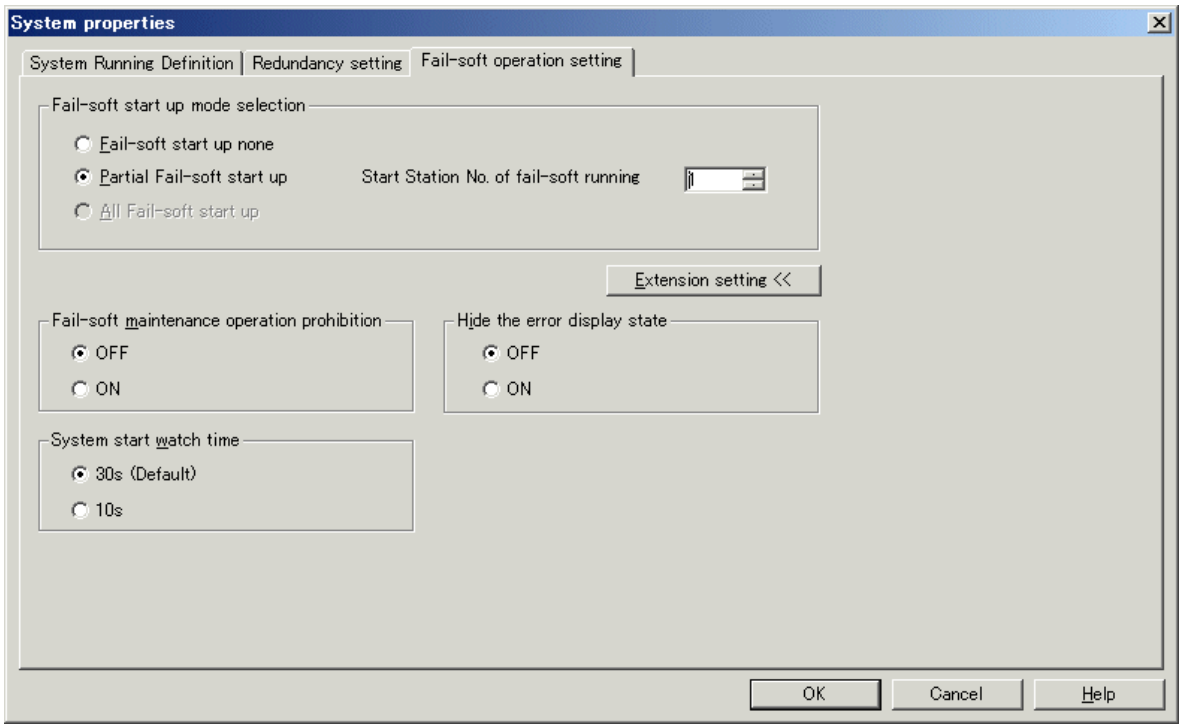
Section 4 System Configuration and Operation Definition

4-5 System Definition

(2) Fail-soft start up setting

If part of the modules cannot be powered up during startup of the MICREX-SX system (the target modules of fail-soft operation, such as servo module), the system can be started up excluding those modules after the set “Waiting time for structure check” elapses. The system starts running in non-fatal fault condition.

◆ On the [System properties] dialog box, click the [Fail-soft operation setting] tab. The [Fail-soft operation setting] tab window is displayed.



◆ When there is a device that is subject to fail-soft operation, select “Partial Fail-soft startup”, and enter the SX bus station number for starting fail-soft operation in the [Start Station No. of fail-soft running] entry box.

◆ After setting all necessary items, click the [OK] button.

<Extensions>

1) “Fail-soft maintenance operation prohibition” mode

Even if the actual configuration does not agree with the system configuration in fail-soft start up mode, additional connection /reconnection of a module are not performed. By setting this, even if an unpowered module exists in the configuration, takt drift can be minimized.
When this mode is set, the operation maintenance is not performed. Therefore, if a module is added or reconnected, you need to start up the system again. (Ditto for replacement of a CPU in a redundant system)

2) “Hide the error display state” mode

Even if a module with fail-soft start up enabled does not exist, the system does not go into a nonfatal fault state.
When using this function in a multi-CPU system or redundant system, if CPUs are individually started up due to replacement of a CPU etc., mask information of each CPU may be different. CPUs must be start up all together, or if started up individually, each system must be in the same state.

3) System start watch time

This item is used to shorten the start-up time of a system in which the main power of an inverter/servo directly connected to the SX bus is turned ON after the system is started up, by using the “fail-soft start-up” function. The default is “30s”. If “10s” is selected, the system start-up time can be shortened by 20 seconds. In addition, if “10s” is selected, the system memory (%MX10.256.5) is set ON.

Section 4 System Configuration and Operation Definition

4-6 Redundant CPU System

A redundant CPU system is a system that runs a standby CPU module to continue operation if the working CPU module has failed.

* Fore more information of redundant MICREX-SX system, see the “Redundancy System Configuration Text” (FEH253-2).

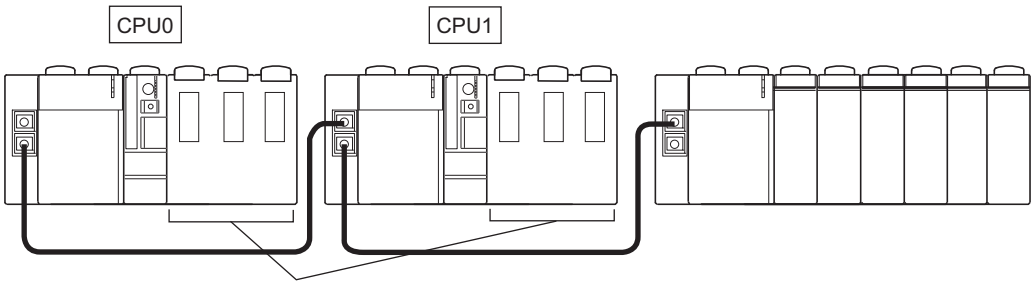
4-6-1 Redundant CPU system overview

(1) 1:1 redundant system

1:1 redundant system has one standby CPU module for each working CPU module to ensure redundancy. Each of the pairs CPU0-CPU1, CPU2-CPU3, CPU4-CPU5 and CPU6-CPU7 makes a combination of working and standby CPU modules. Therefore, to construct a “1:1 redundant multi-CPU system”, the maximum number of multi-CPU modules is 4. They use same application program.

<Example of redundant system configuration>

In general, as shown in the figure below, working CPU module and standby CPU module are installed in different base boards, and other modules that are controlled by these CPU modules are prepared on a different base board. The reason for this is to facilitate the replacement of failed CPU in case the working CPU module should fail and operation be continued by the standby CPU module.

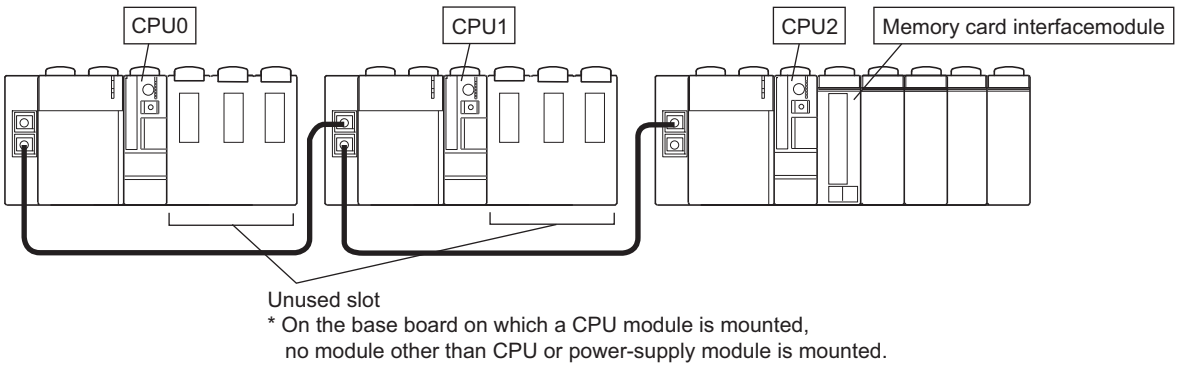


Note: It is possible to construct a redundant system in which working CPU module and standby CPU module are mounted on a same base board. In this case, however, standby CPU module cannot be replaced while the system is running.

(2) N:1 redundant system

This system has one standby CPU module for multiple (2 to 7) working CPU modules to ensure redundancy. Maximum two groups of N:1 redundant system can be defined for one configuration. In a registered group, the CPU module that has the greatest CPU number becomes standby.

<Example of N:1 redundant system>



Section 4 System Configuration and Operation Definition

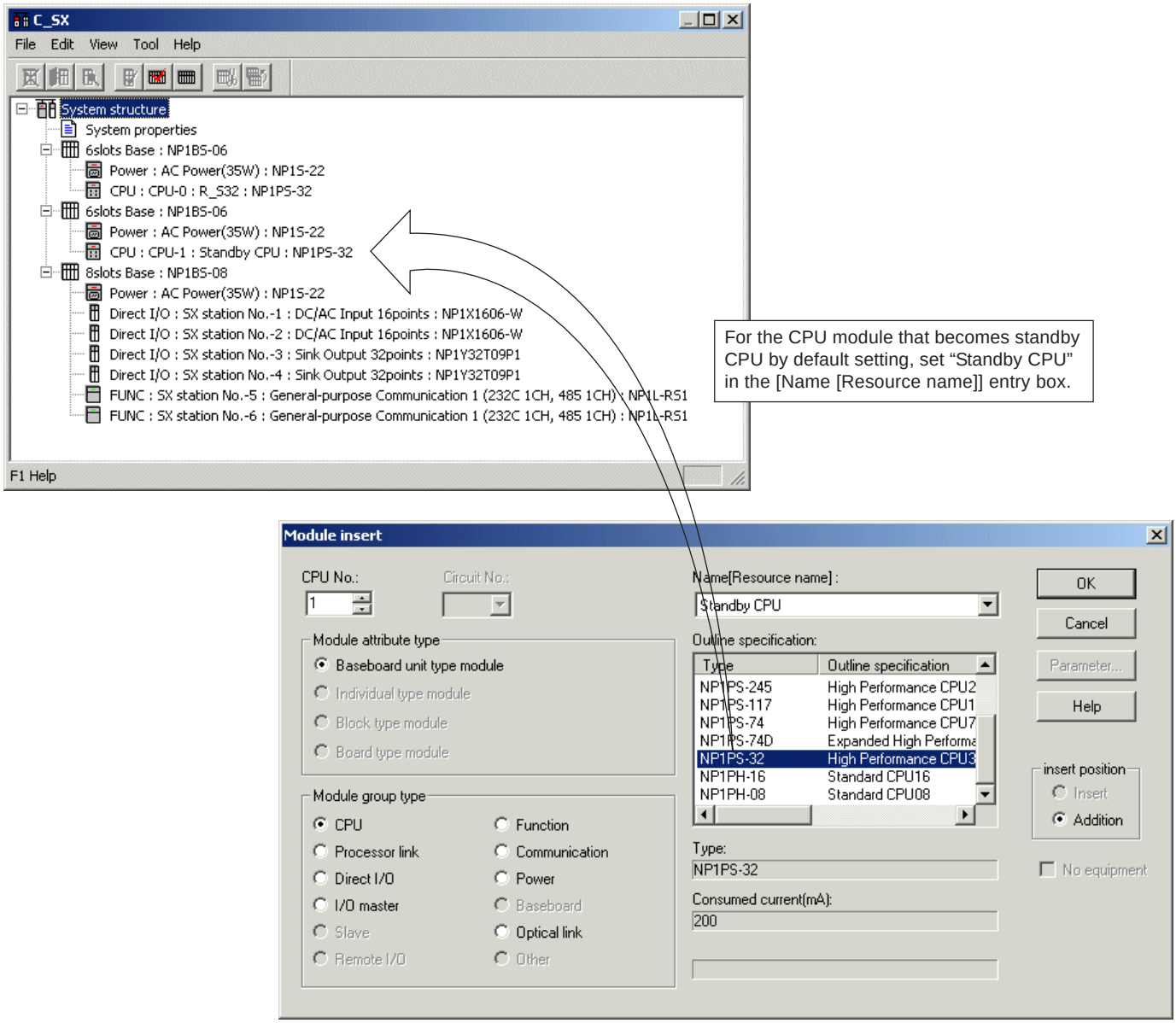
4-6 Redundant CPU System

4-6-2 Redundancy setting

(1) Registering modules

The same as with ordinary systems, actually installed modules or units need to be registered.

◆ Double-click [System_Definition] in the project tree to display the system definition screen. Register modules so as to match the actual system configuration, as shown in the figure below.



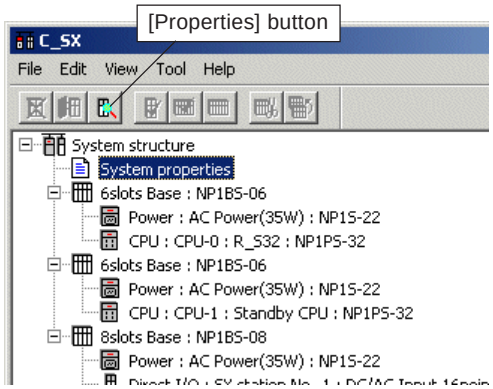
Section 4 System Configuration and Operation Definition

4-6 Redundant CPU System

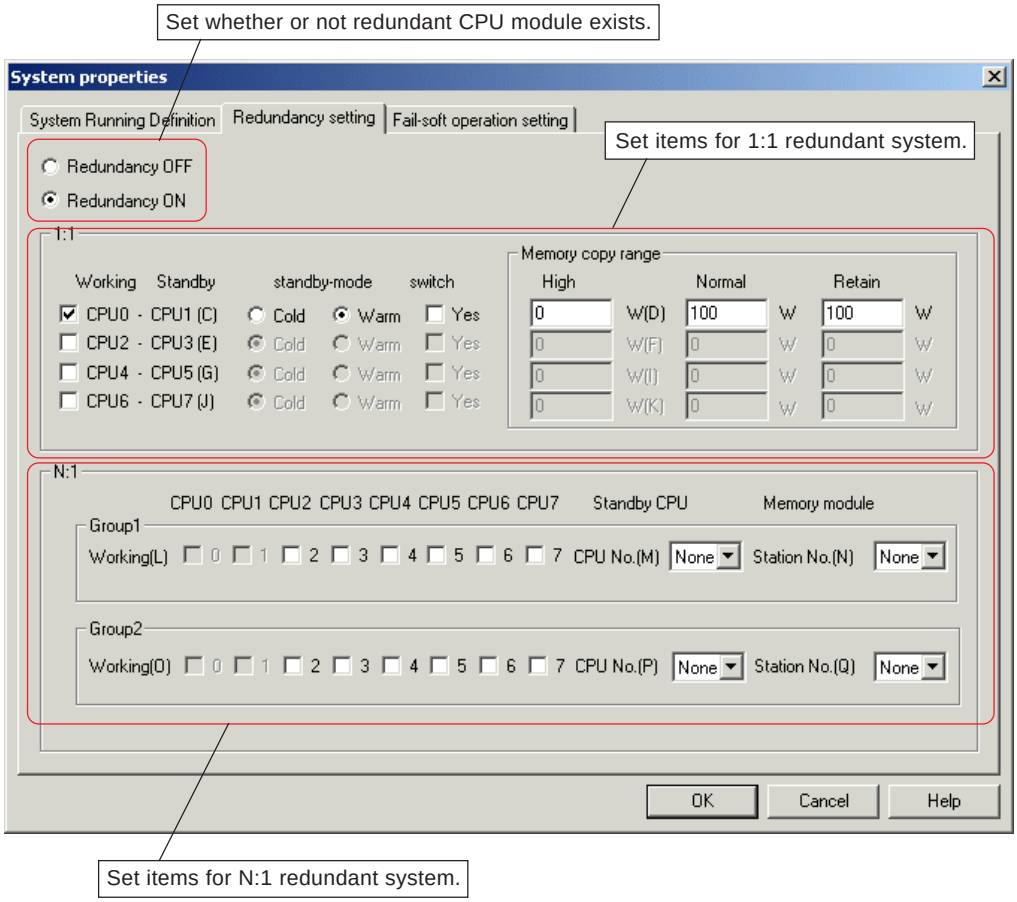
(2) Redundancy setting

On the [Redundancy setting] tab window of the [System properties] dialog box, whether redundant CPU exists or not as well as the type of redundancy (1:1 redundancy or N:1 redundancy) are set.

◆ On the system configuration definition screen, select [System properties] in the project tree and click the [Properties] button. The [System properties] dialog box is displayed.



◆ On the [System properties] dialog box, click the [Redundancy setting] tab. The [Redundancy setting] tab window is displayed. On this tab window, set necessary items and click the [OK] button.

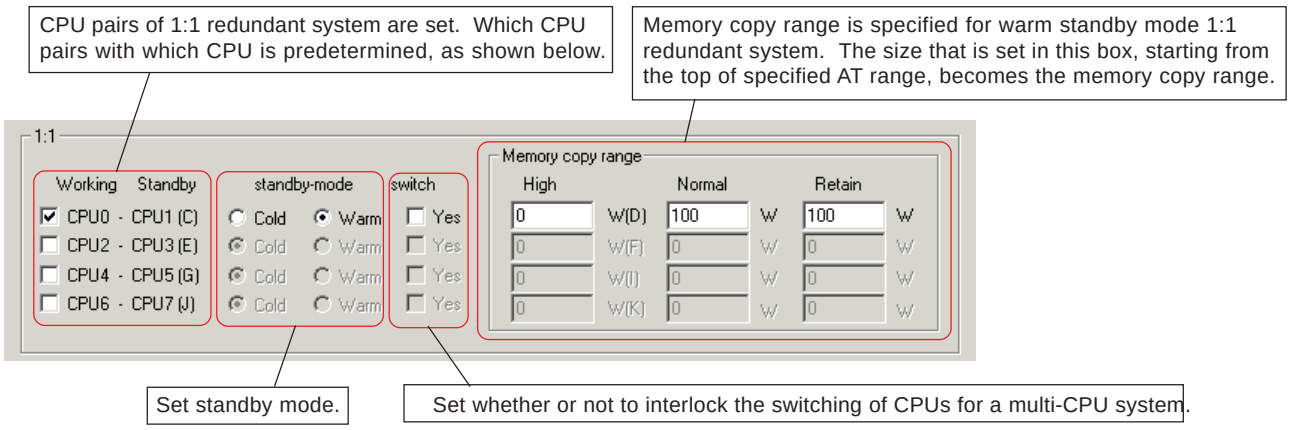


Section 4 System Configuration and Operation Definition

4-6 Redundant CPU System

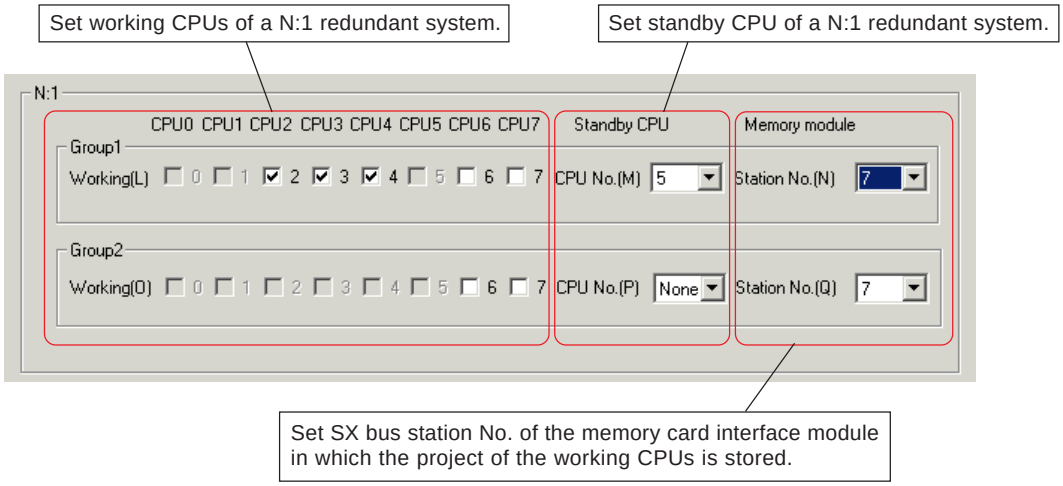
<Setting items for 1:1 redundant system>

Detail items of 1:1 redundant system are set. For a 1:1 redundant system, which CPU pairs with which CPU is predetermined. Maximum 4 pairs can be set.



<Setting items for N:1 redundant system>

Detail items of N:1 redundant system are set. Maximum 2 groups of N:1 redundant system can be constructed.



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(1) Execution order of networks 5-30
(2) Precautions for describing LD and FBD objects 5-33

Section 5 Editing Codes in LD Language/FBD Language

IEC 61131-3 specifies, as graphic language, LD (Ladder Diagram) language, FBD (Function Block Diagram) language, and SFC (Sequential Function Chart) elements. This section explains the method for editing codes in LD or FBD language.
There are two methods for editing codes in LD or FBD language: the method to use the “LD/FBD-V2 compatible mode editor” and the method to use the “LD/FBD editor”.
The LD/FBD-V2 compatible mode editor can place objects, such as command symbols and comments, at arbitrary location on a worksheet. When accustomed to programming, you will be able to create expressive program codes with this editor.
On the other hand, the LD/FBD editor can move the cursor in units of cell, so that you can easily program by manipulating on the keyboard. In addition, with this editor, you can use program control statements that are used in ST language or express variables with comments attached or with addresses assigned.

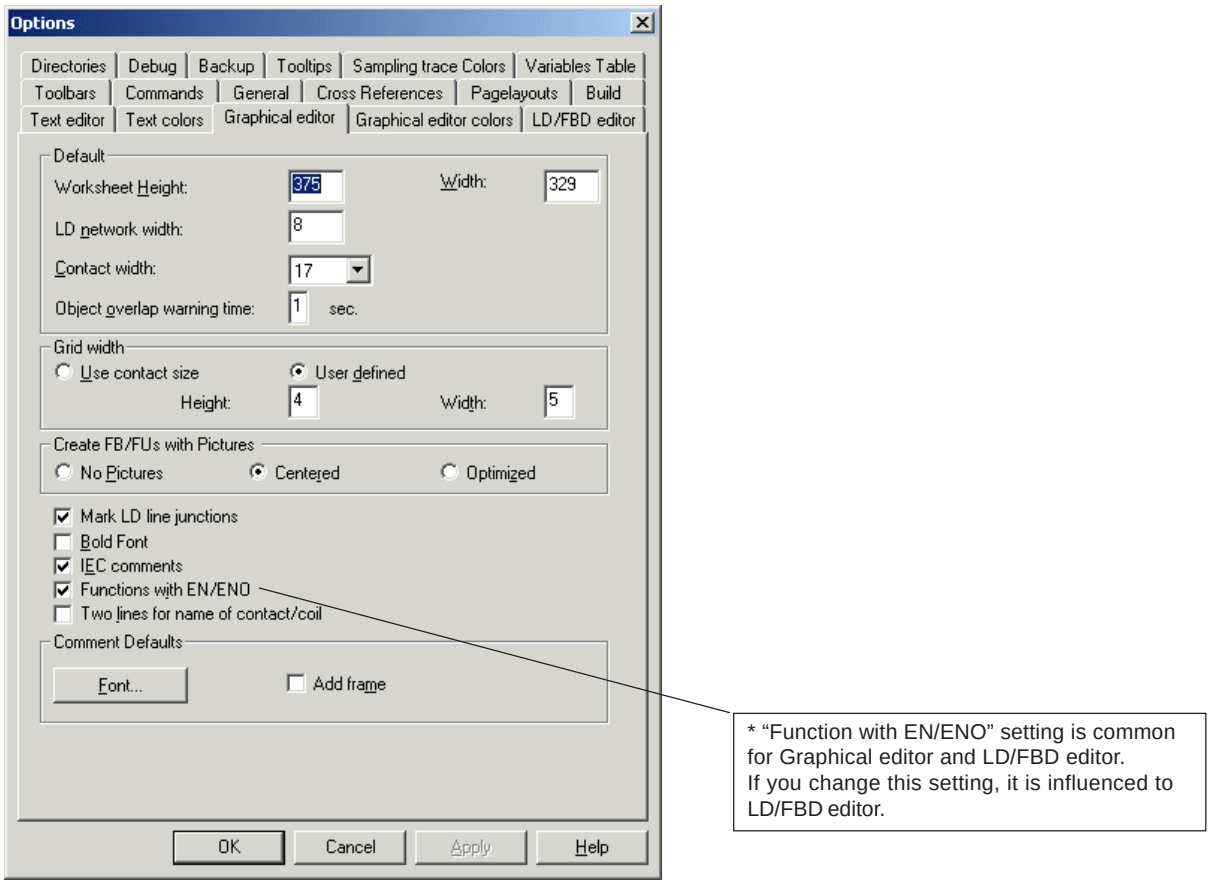
*** For more information of the method for editing codes with the LD/FBD editor, see the “D300win LD/FBD Editor Operations” (FEH257-1).**

5-1 Setting Up the Environment for Graphical Editor

5-1-1 Graphical editor setup

In this process, the items related to graphical editor that are necessary for making a program using LD or FBD language and SFC elements.

◆ Click the [Options...] command in the [Extras] menu, and the [Options] dialog box will be displayed. On this dialog box, click the [Graphical editor] tab to display the following screen.



◆ After setting all necessary items, click the [OK] button to finish the setup.

Note: The content of the set items does not have any influence on already existing POUs.

Section 5 Editing Codes in LD Language/FBD Language

5-1 Setting Up the Environment for Graphical Editor

<Setting items>

- **Worksheet Height:/Width:**

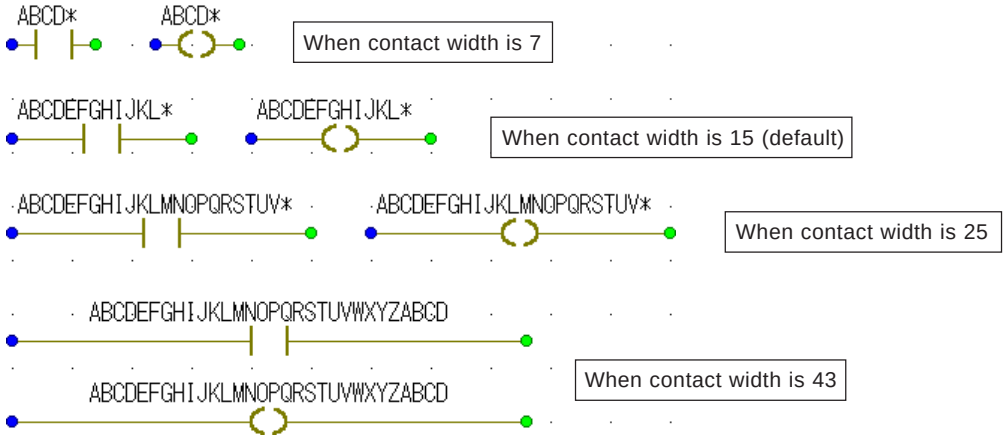
  Sets the size of code worksheet in units of dot. Default value is 375 in height and 329 in width. Available range is 100 to 9999 in height and 20 to 999 in width. This item is enabled only when the LD/FBD-V2 compatible mode editor is used.

- **LD network width:**

  In creating a LD network, when the [Insert Contact network] button is clicked, an LD network consisting of one contact and one coil is created on the worksheet. This item sets the size of that network. Default value is 8. With this size, the whole circuit is displayed when the code worksheet is displayed over the whole screen of the personal computer. This item is enabled only when LD/FBD-V2 compatible mode editor is used.

- **Contact width:**

  The number of characters of the variable or comment that is attached to a contact (coil) varies with the width of the contact (coil). When the width of a contact (coil) is small, variables and comments are displayed to the extent that is possible within the limited length. This item is enabled only when the LD/FBD-V2 compatible mode editor is used.



Note: When the variable name displayed is followed by an asterisk (*), it means that the name continues further.
(A variable name can be set up to 30 characters, but all of the set characters may not be displayed, depending on the setting of “Contact width:”.

- **Object overlap warning time:**

  On a graphical worksheet, if two objects are overlapped or in contact with each other, the editor waits till the set delay time elapses and then returns the object that causes the collision to the original position (moves existing object) or moves it to a free space (insert a new object) to automatically avoid the collision. This items sets the delay time for this purpose. Setting range is from 0 to 9 seconds. This item is enabled only when the LD/FBD-V2 compatible mode editor is used.

- **Grid width**

  When editing a graphic language code with the LD/FBD-V2 compatible mode editor, you can create a more visible program by snapping (adsorbing) objects into the displayed grids. This item sets the distance of grid lines.

  <Use contact size>
  The value set by “Contact width” becomes the grid width (default).

  <User defined>
  “Width:” (grid width) and “Height:” (grid height) can arbitrarily be set.

- **Create FB/FUs with Pictures**

  This item is set when you want to display pictures for user defined FBs or functions. For the method to create a picture, see “Section 9-3 FB/FUNCTIONS with Pictures”.

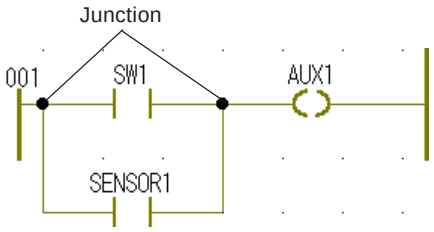
Section 5 Editing Codes in LD Language/FBD Language

5-1 Setting Up the Environment for Graphical Editor

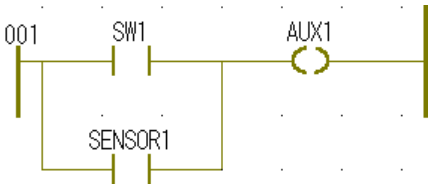
- **Mark LD line junctions**

  Sets “view” or “hide” of junctions of LD network. This item is enabled only when the LD/FBD-V2 compatible mode editor is used.

View



Hide



- **Bold Font**

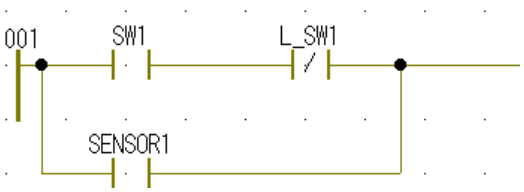
  Check this box when you want to indicate variable names by bold. This item is enabled only when the LD/FBD-V2 compatible mode editor is used.

- **IEC comments**

  Sets whether or not to enclose by “(*” and “*)” the comments displayed on code worksheet. When this box is checked, comments are displayed enclosed by “(*” and “*)”.

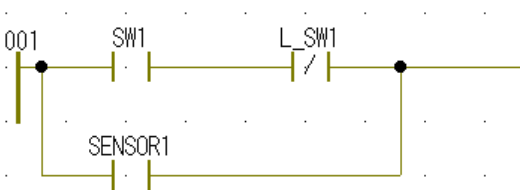
IEC comments “viewing”

(* Monitoring circuit *)



IEC comments “hiding”

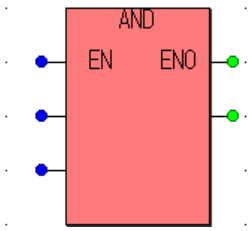
Monitoring circuit



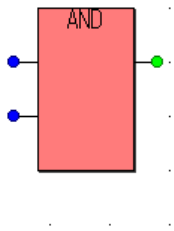
- **Functions with EN/ENO**

  Sets whether or not to add “EN” (enable) input terminal and “ENO” (enable out) output terminal to functions. When they are to be added, check this box.

With EN/DNO



Without EN/ENO



- **Two lines for name of contact/coil**

  Sets contact/coil name in two lines.

- **Comment default (add font, frame)**

  Sets default font and frame appearance of new comment. These settings are used when you insert new comment on LD/FBD-V2 compatible or SFC worksheet. It does not affect to existing comment.

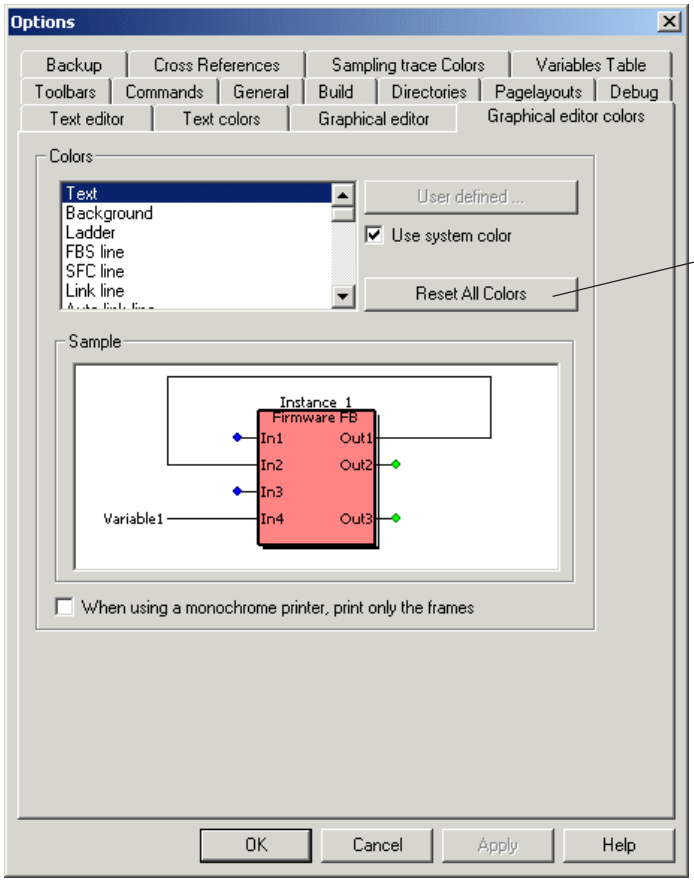
Section 5 Editing Codes in LD Language/FBD Language

5-1 Setting Up the Environment for Graphical Editor

5-1-2 Color setting for graphical editor

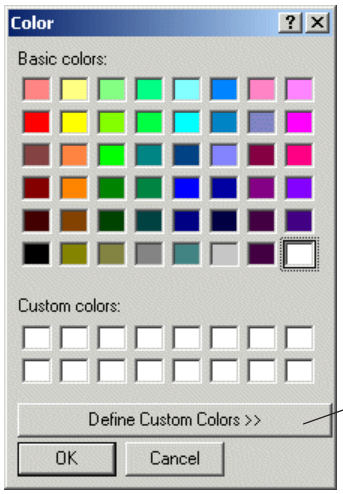
In this process, the color of individual object is set for LD language, FBD language and SFC elements.

◆ Click the [Options...] command in the [Extras] menu, and the [Options] dialog box will be displayed. On this dialog box, click the [Graphical editor colors] tab to display the following screen.



Resets the color of all objects to their default values.

◆ On this screen, you can set colors for the objects related to the graphical editor. Select an object the color of which you want to change, check the [Use system color] box, and then click the [User defined...] button. The [Color] dialog is displayed. Click your desired one of the colors shown in the “Basic colors:” and “Custom colors:” boxes, and click the [OK] button. You will return to the previous [Graphical editor colors] tab window of the [Options] dialog box. On this tab windows, click the [OK] button or the [Apply] button. The object will change to your specified color.



Use this button when you want to create a color different from the basic colors.

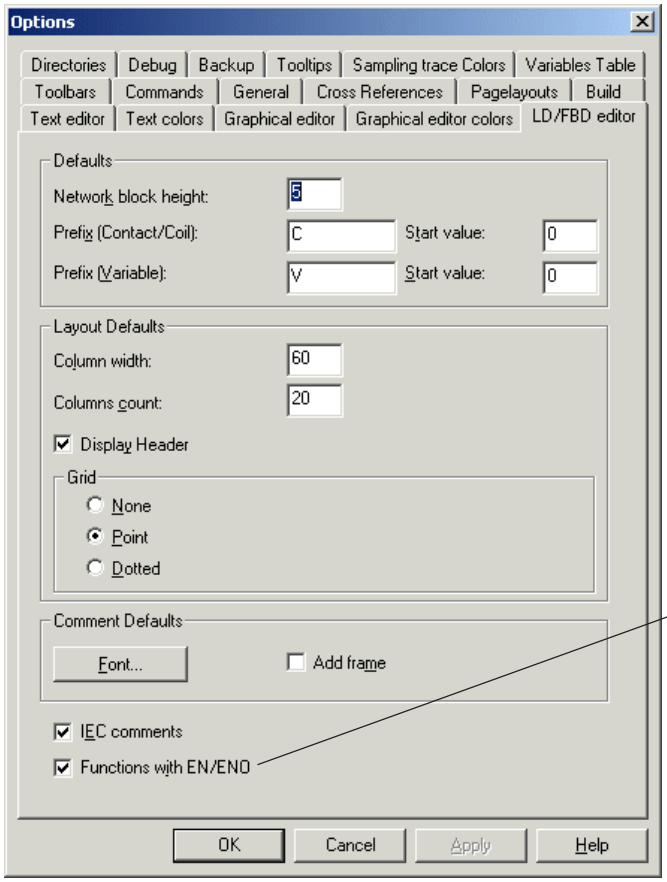
Section 5 Editing Codes in LD Language/FBD Language

5-1 Setting Up the Environment for Graphical Editor

5-1-3 LD/FBD editor setting

In this process, default setting of LD/FBD editor is defined.

◆ Click the [Options...] command in the [Extras] menu, and the [Options] dialog box will be displayed. On this dialog box, click the [LD/FBD editor] tab to display the following screen.



* "Function with EN/ENO" setting is common for Graphical editor and LD/FBD editor. If you change this setting, it is influenced to Graphical editor.

- **Network block height**

  In LD/FBD editor mode, this item sets the default number of junctions for network block (left power rail).

- **Prefix (Contact/Coil), Start value / Prefix (Variable), Start value**

  Sets variable with specified prefix and number automatically when insert contact / coil or variable. This setting is effective when insert contact / coil. This setting also valid when insert new variable. It is not applied for exsisting POU.

- **Layout defaults**

  Applied to newly inserted LD worksheet. It is not affected to exsisting worksheet.
  Colum width : Sets default column width.
  Columns count : Defines column number
  Display header : Label is shown in alphabetical order for colum, numbering order for row.
  Grid : Define grid type

- **IEC comments**

  Sets whether or not to enclose by "(*" and "*)" the comments displayed on code worksheet. When this box is checked, comments are displayed enclosed by "(*" and "*)".

- **Comment default (add font, frame)**

  Sets default font and frame appearance of new comment. These settings are used when you insert new comment on LD/FBD-V2 compatible or SFC worksheet. It does not affect to existing comment.

- **Functions with EN/ENO**

  Sets whether or not to add "EN" (enable) input terminal and "ENO" (enable out) output terminal to functions. When they are to be added, check this box.

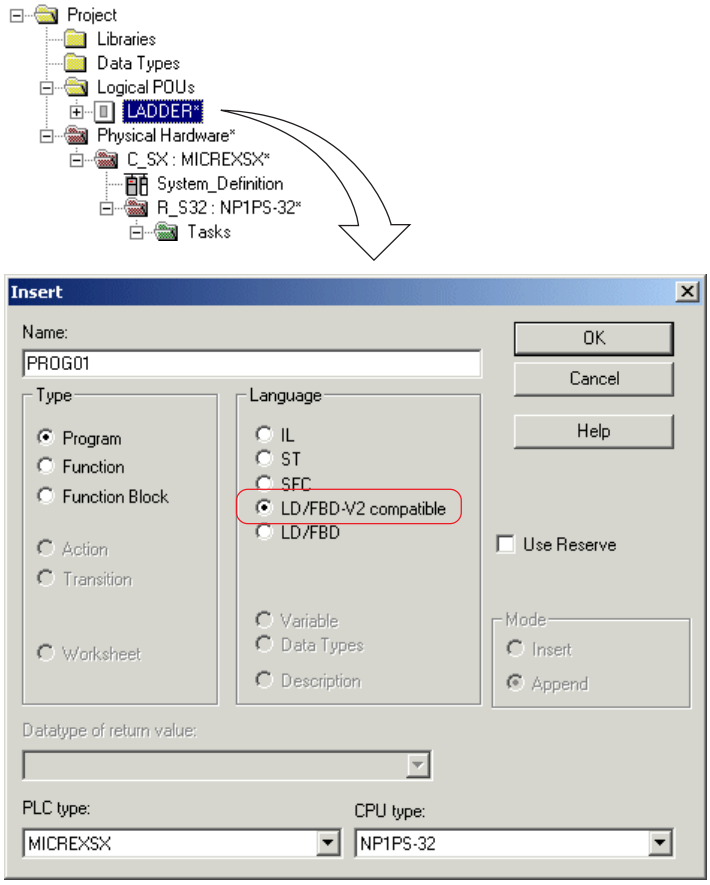
Section 5 Editing Codes in LD Language/FBD Language

5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

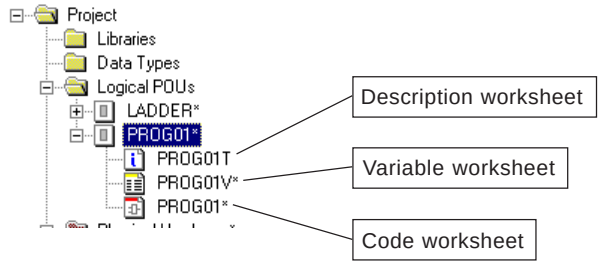
5-2-1 Inserting a POU

When creating a circuit with the LD/FBD-V2 compatible mode editor, the programming language to use must be “LD/FBD-V2 compatible”. FBD language and LD language may be used mixedly in a same POU.

◆ In this example, a POU created in LD/FBD language is inserted in the “Logical POUs” folder in the project tree, next to the POU “LADDER”. Select “LADDER” and click the [Add Program] button or press the <Insert> key. The [Insert] dialog box will be displayed.



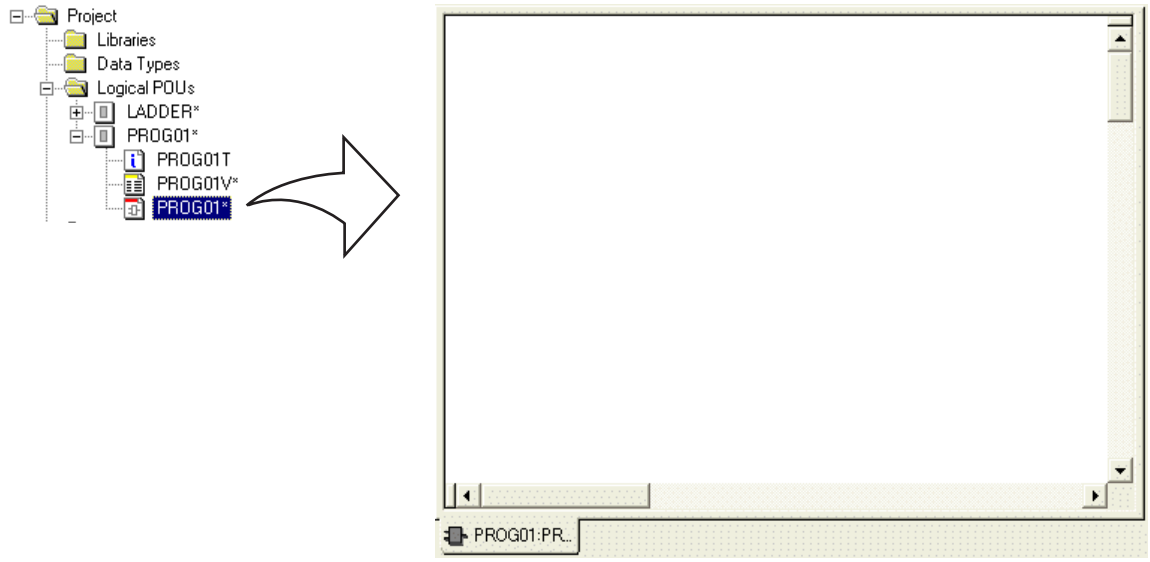
◆ Enter a desired POU name, and select “LD/FBD-V2 compatible” for [Language]. Then select “MICREXSX” for [PLC type:] and “Current CPU type” for [CPU type:], respectively, and click the [OK] button. Then a POU will be added to the project tree.



Section 5 Editing Codes in LD Language/FBD Language

5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

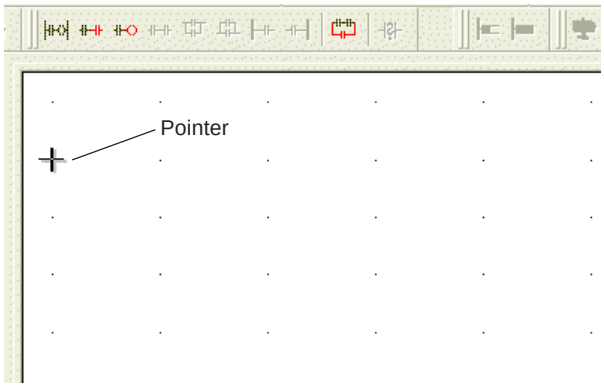
◆ When the code worksheet icon for the POU “PROG01” is double-clicked, the code worksheet is displayed.



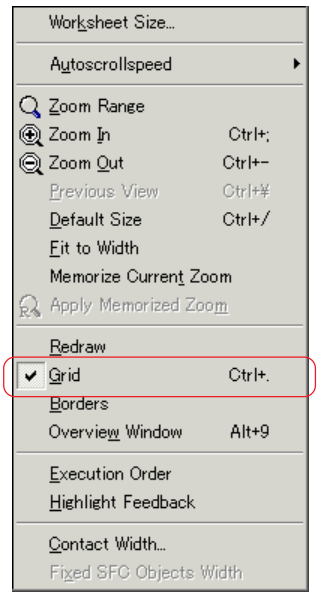
5-2-2 Creating an LD network

(1) Inserting a new LD network

◆ Click an arbitrary point on the code worksheet to place the pointer there.

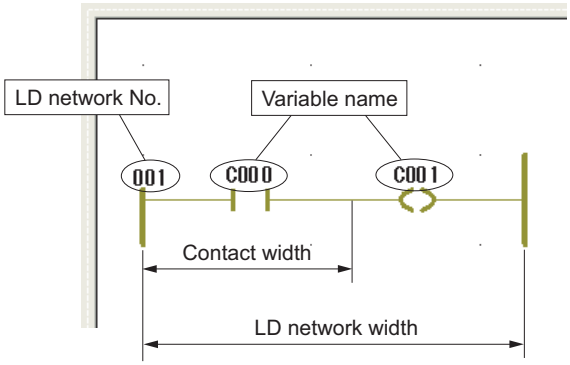


* In this example, grid is displayed so that you will be able to arrange networks at same intervals. When no grid is displayed, click [Grid] in the [Layout] menu to indicate a check mark in front of it. Then grid will appear on the screen.



5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

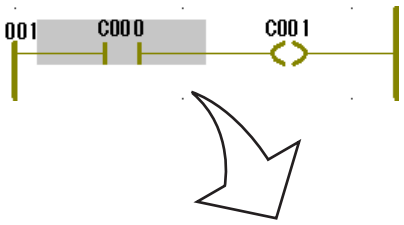
◆ Click the [Insert Contact network] button, and an LD network consisting of one contact and one coil will be pasted, as shown in the figure below.

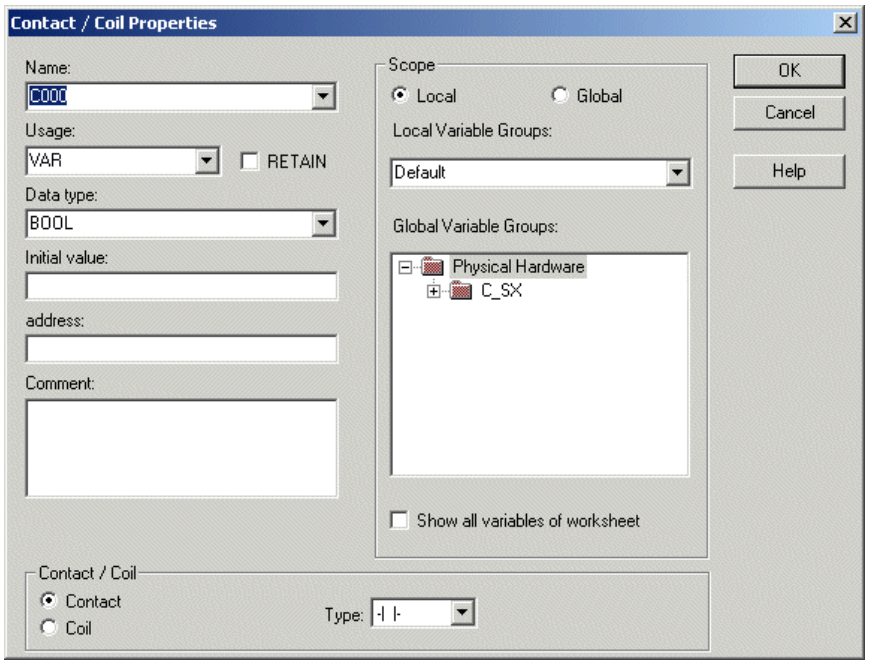


* Contact width and circuit width are set with the [Options...] command in the [Extras] menu. For more information, see “5-1 Setting Up the Environment for Graphical Editor”.

(2) Variable name for LD network

Any contact or coil is given a variable name “CXXX” when it is inserted, as shown in the figure above. This variable name, however, is a temporary name that is not yet declared. Therefore, variables need to be declared on the variable worksheet. Variables can be declared from the [Contact/Coil Properties] dialog box that is displayed when an object for which you want to declare variables is double-clicked.
For details regarding variables, see “Section 8 Variables Declaration”.

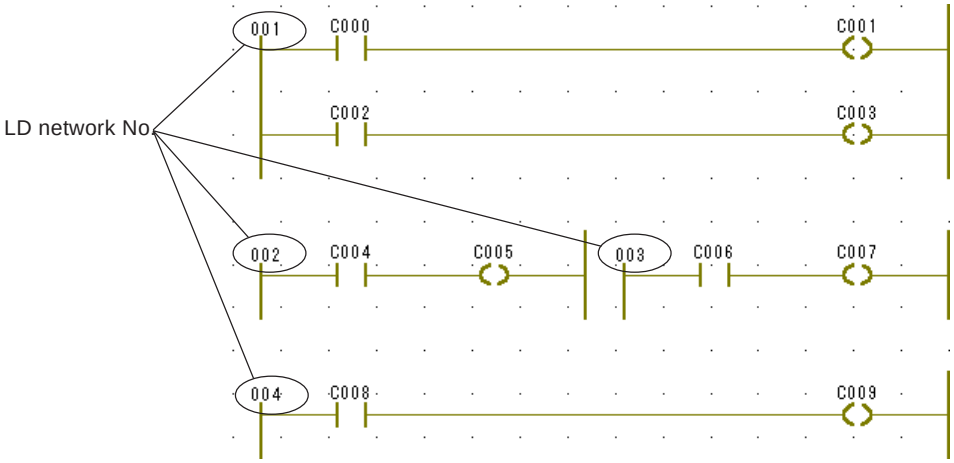




5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

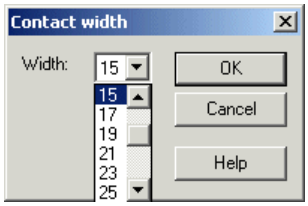
(3) LD network No.

"Network No." is dedicated to LD network. It is indicated above the left power rail. Network numbers are assigned according to the execution order of networks (from upper left toward lower right on the worksheet.)



(4) Contact width setting

◆ Click the [Contact width...] command in the [Layout] menu, and the [Contact width] dialog box will be displayed. On this dialog box, set the width of contact, and click the [OK] button.



Note: Width of the contact or coil that is already arranged on the worksheet cannot be changed. This setting takes effect on the contact or coil that is arranged after changing the width.

* Contact width can be set with the [Options...] command in the [Extras] menu. For more information of the operating method, see "5-1 Setting Up the Environment for Graphical Editor".

Section 5 Editing Codes in LD Language/FBD Language

5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

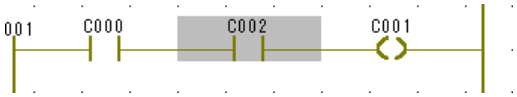
(5) Inserting a contact or a coil

A network created in LD language consists basically of series networks and parallel networks. This paragraph explains the method to insert a contact and/or a coil in an already existing network.

1) Inserting an AND contact

To insert an AND contact on the right of contact “C000” in the network as shown below, do as follows:

◆ Select contact “C000” and click the [Insert contact right] button. Then a contact will be inserted on the right of the selected contact “C000”. (When the [Insert contact left] button is clicked, the contact will be inserted on the left of the selected contact.)

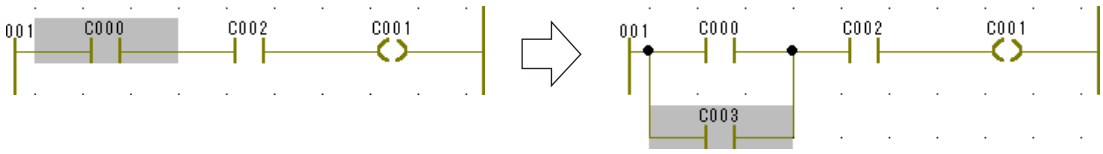


* Network width is automatically increased.

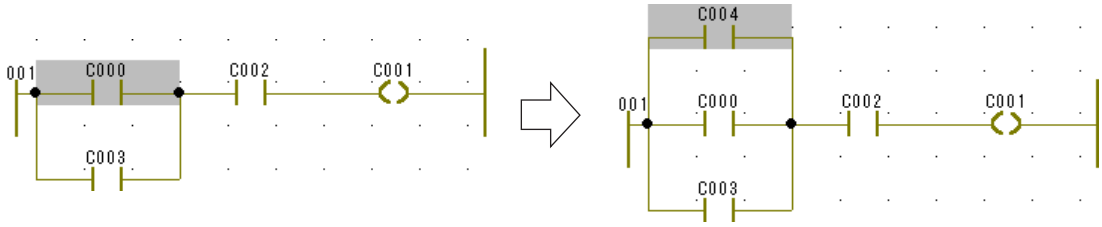
2) Inserting an OR contact

<Inserting parallel to one contact>

◆ Select contact “C000” and click the [Insert contact/coil below] button. Then a contact will be inserted below the selected contact “C000”.

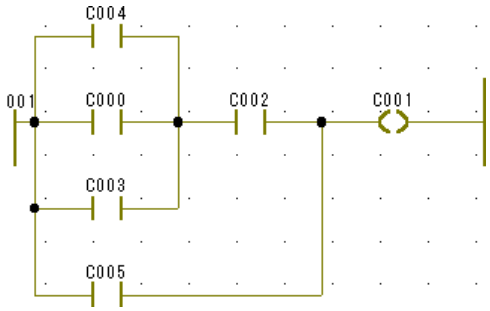


◆ Select contact “C000” and click the [Insert contact/coil above] button. Then a contact will be inserted above the selected contact “C000”.

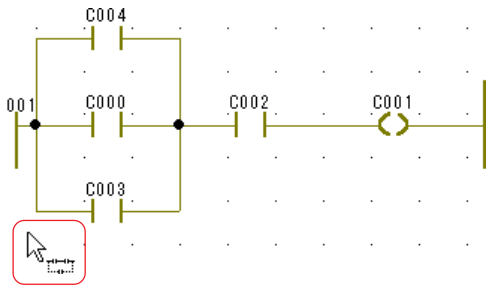


<Inserting parallel to multiple contacts>

To insert contact “C005” parallel to multiple contacts, as shown in the figure below, do as follows:

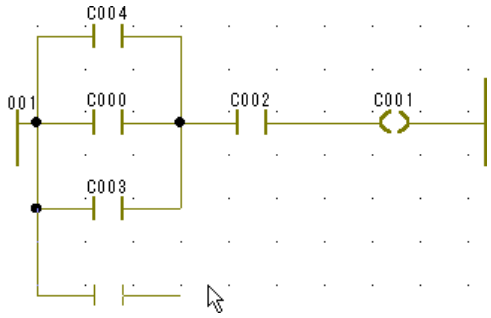


◆ Click the [Insert LD branch] button, and the pointer for [Insert LD branch] will be added to the cursor.

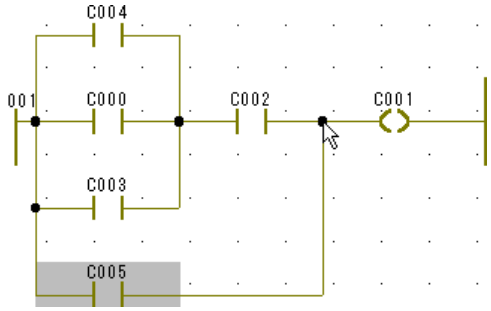


5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

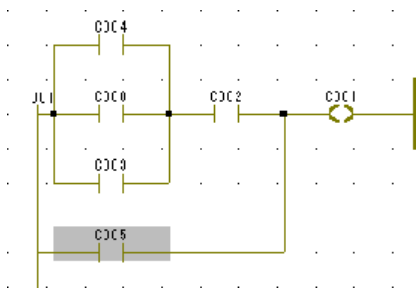
◆ Click a point that is to become the starting point of the parallel circuit, and move the pointer to a pint in the free space above or below the network.



◆ Click a point at which you want to place the new object, and move the mouse pointer to an arbitrary junction point and click the junction point.



* When you want the OR contact starting from the left power rail, as shown in the figure below, place the starting point of the OR contact on the left power rail.

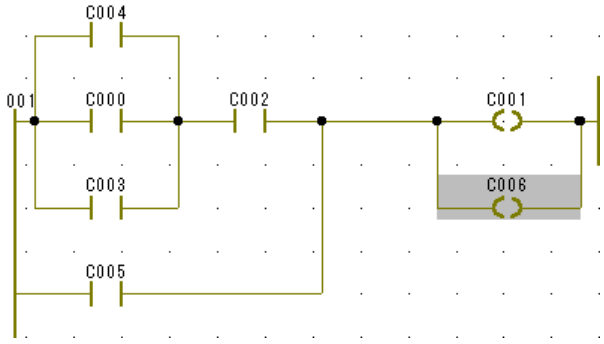


5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

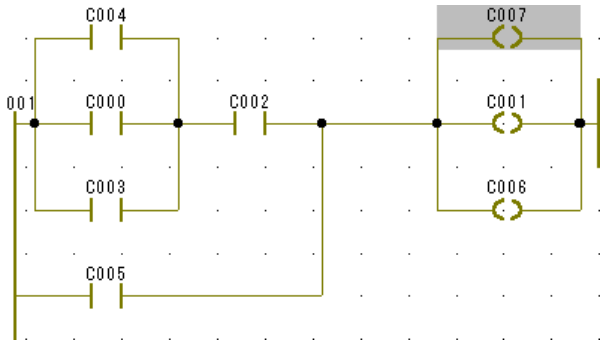
3) Inserting a coil

To insert a coil parallel to coil “C001”, do as follows:

◆ Select contact “C001” and click the [Insert contact/coil below] button. Then a coil will be inserted below the selected coil “C001”.



◆ Select contact “C001” and click the [Insert contact/coil above] button. Then a coil will be inserted above the selected coil “C001”.

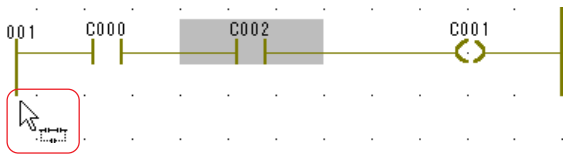


* When another network is located at upper part in the worksheet, it is necessary to secure a space enough to insert a coil. For this, place the mouse pointer in the dotted-line frame and right-click a point there, and then click the [Insert Rows] in the displayed shortcut menu.

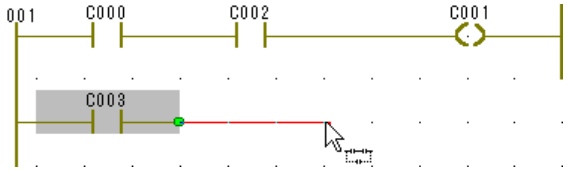
(6) Adding an LD network

To add a new LD network below or above an already created LD network, do as follows:

◆ Click the [Insert LD branch] button, and the pointer for LD branch edit mode will be added to the cursor. Click the left power rail.

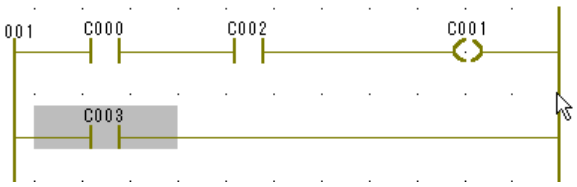


◆ Move the cursor, and click a point above or below the circuit, and a contact will be added, as shown in the figure below.

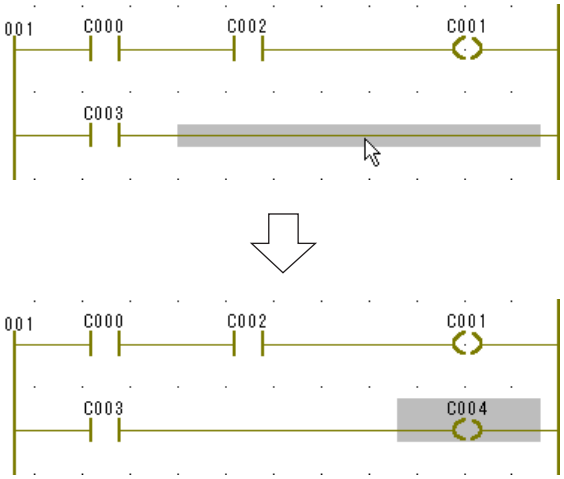


5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

◆ Move the cursor and click the right power rail, and the network becomes as shown below:

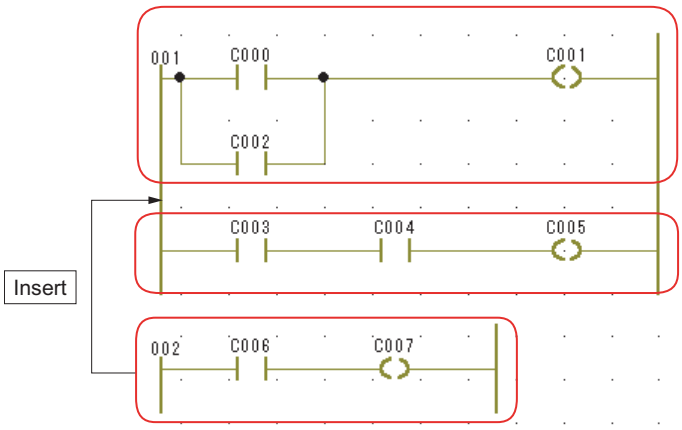


◆ Click the connecting line, and then click the [Insert coil right] button. A coil will be inserted.

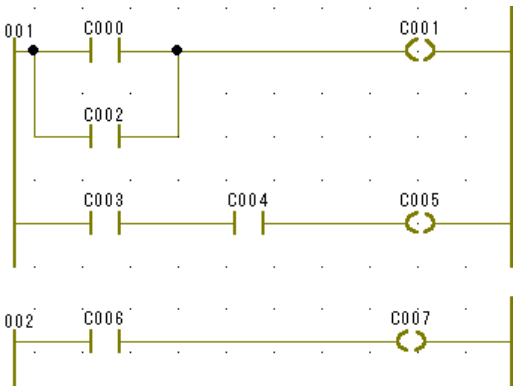


(7) Inserting a network between LD networks

To insert an additional LD network in between already existing LD networks, do as follows:

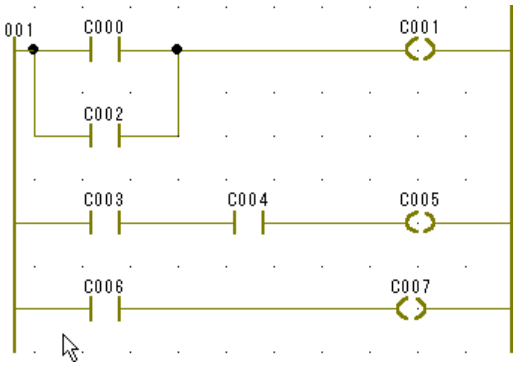


◆ Adjust the width of lower side network so as to match that of upper side network.

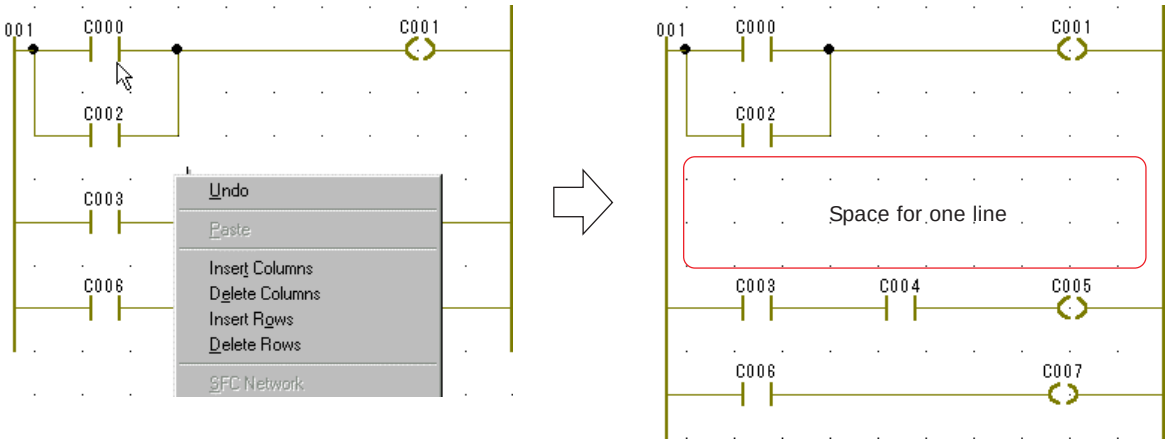


5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

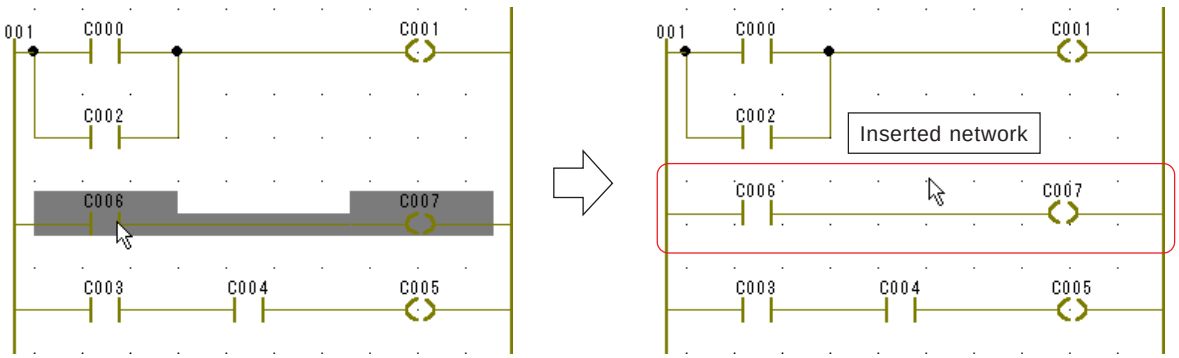
◆ Select the whole lower side network and drag it to merge with the upper side network. Then they become a single LD network, as shown in the figure below.



◆ Secure a space enough to insert a new network. Right-click a point at which you want to secure the space, and click the [Insert Rows] in the displayed shortcut menu. A space for one line will be secured there.



◆ Select a network that you want to insert, and drag it to a point where it should be inserted.



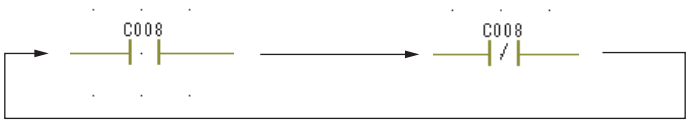
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

(8) Changing the properties of a contact or a coil

When an LD network is described with D300win, at first a network consisting of a normally open contact and a normal coil will be created. You can change the properties of these elements. You can also change the created normally open contact to a normally close contact or the created normal coil to a set coil.

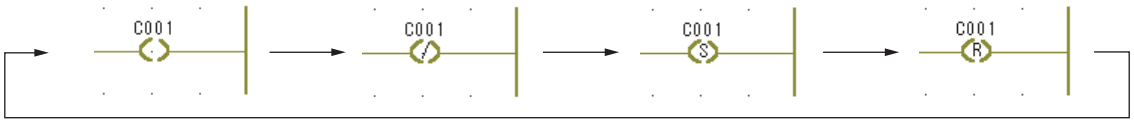
1) Changing the properties of a contact

◆ Select a contact the properties of which you want to change, and click the [Toggle properties of contact/coils] button. Then it will change to a normally close contact when it is a normally open contact, or vice versa. When this button is clicked repeatedly, the contact changes in the following manner:



2) Changing the properties of a coil

◆ Select a coil the properties of which you want to change, and click once the [Toggle properties of contact/coils] button. Then it will change to a negated coil. When this button is clicked repeatedly, the coil changes in the following manner:

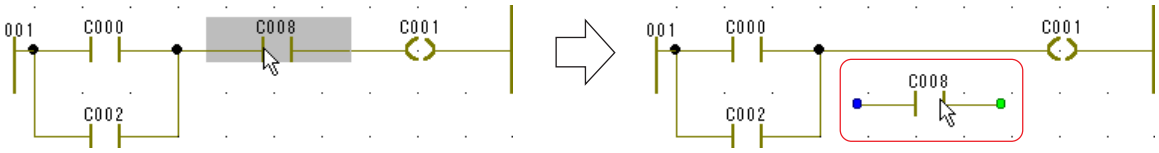


(9) Editing a network with the <Shift> or <Ctrl> key

Using the <Shift> or <Ctrl> key in combination with mouse operation, you can efficiently edit a program. The <Shift> key is used to move an object; the <Ctrl> key to copy an object.

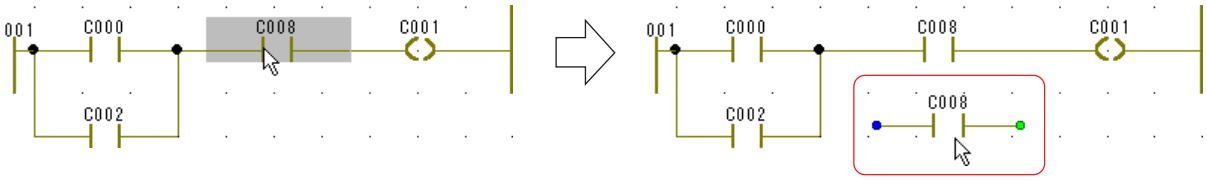
1) Moving an object

◆ Select an object that you want to move and, while pressing the <Shift> key, drag and drop the object to a desired point. Then the object will be separated from the network.



2) Copying an object

◆ Select an object that you want to copy and, while pressing the <Ctrl> key, drag and drop the object to a desired point. Then the object will be copied there.



Section 5 Editing Codes in LD Language/FBD Language

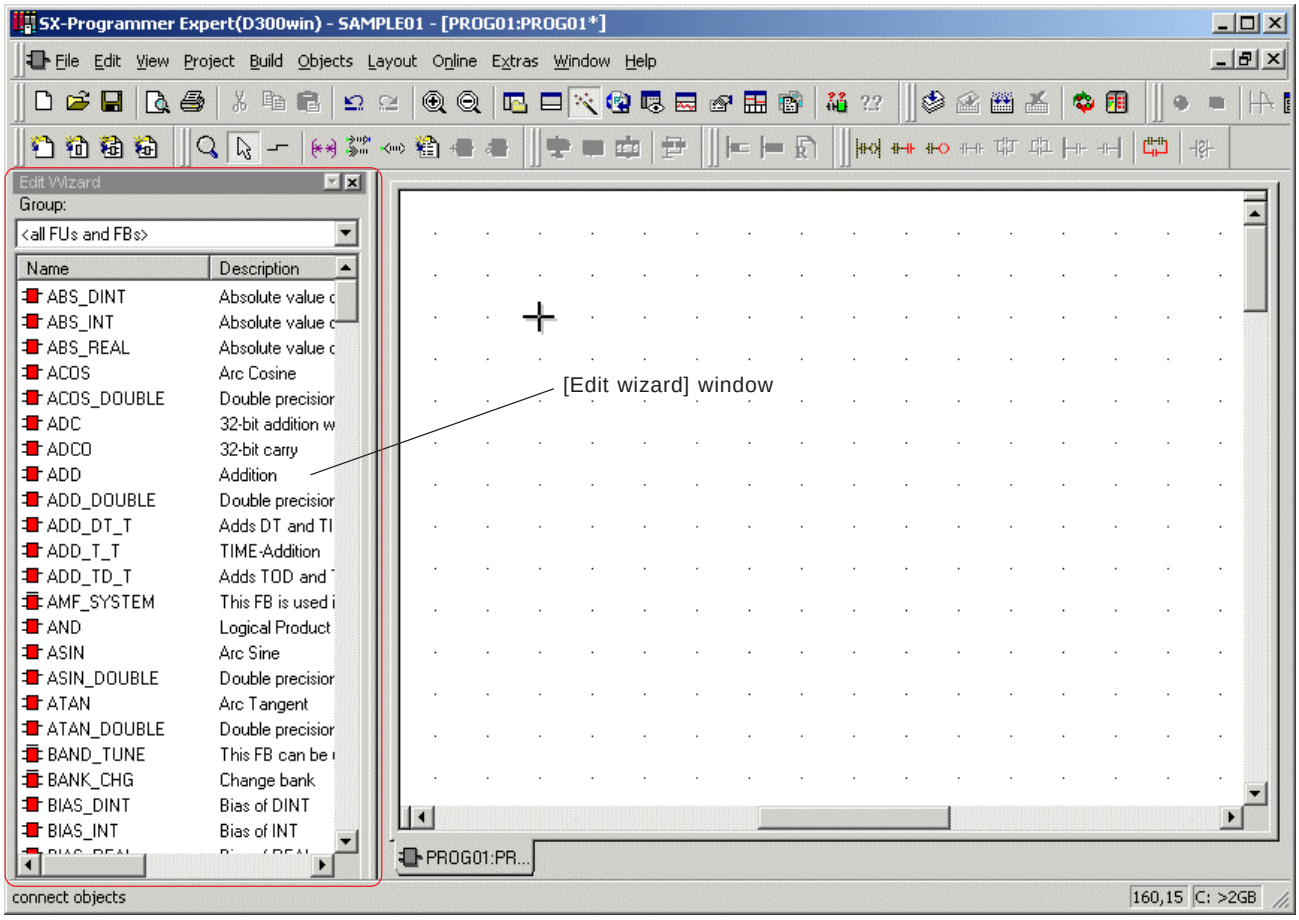
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

5-2-3 Creating an FBD network

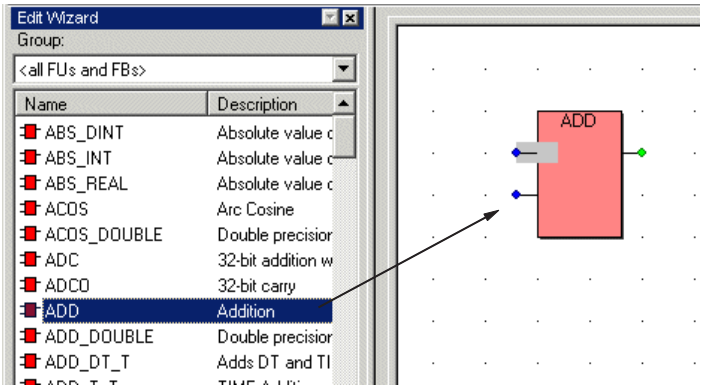
(1) Inserting a function or function block

Function or function block (hereinafter called FB) is selected from the [Edit Wizard] window.

◆ When no [Edit Wizard] window is displayed, press the <Shift> + <F2> keys. And the [Edit Wizard] window will be displayed on the screen.

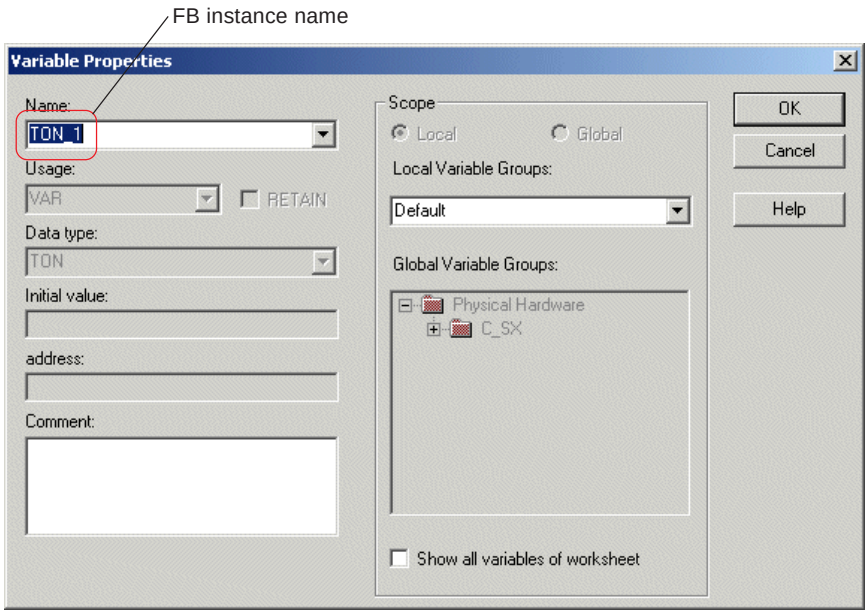


◆ In order to insert an object, click an arbitrary point on the code worksheet, select a function or FB you want to use from the edit wizard and double-click it. Then the object will be inserted on the worksheet.

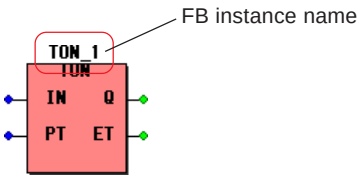


5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

◆ When inserting an FB, the [Variable Properties] dialog box is displayed. From this dialog box, you can change the instance name of the FB that is to be declared on the variable worksheet, set the group of variable worksheet, or set comments. For more information, see “Section 8 Variables Declaration”.



◆ When the [OK] button is clicked, the selected FB is inserted.



5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

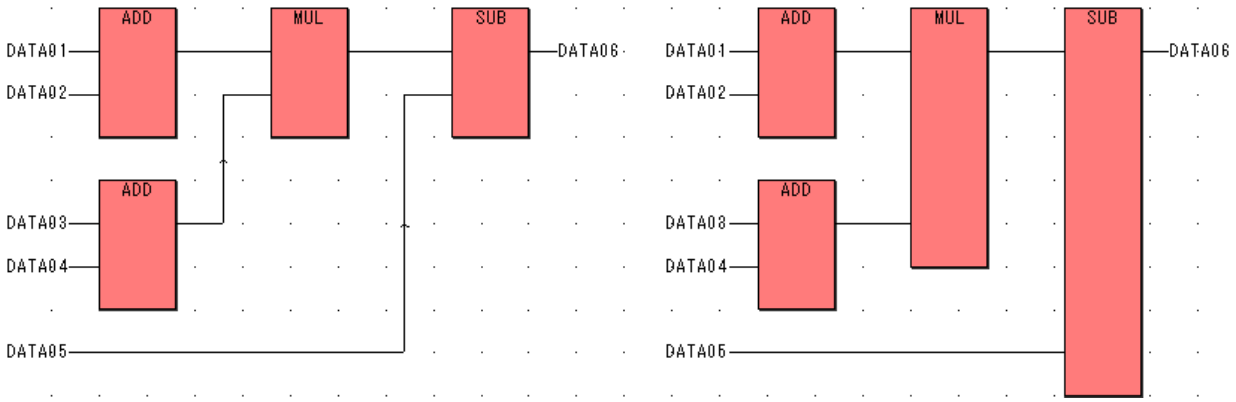
(2) Function/FB properties

From the [Function/FB Properties] dialog box, you can set or check the following items:

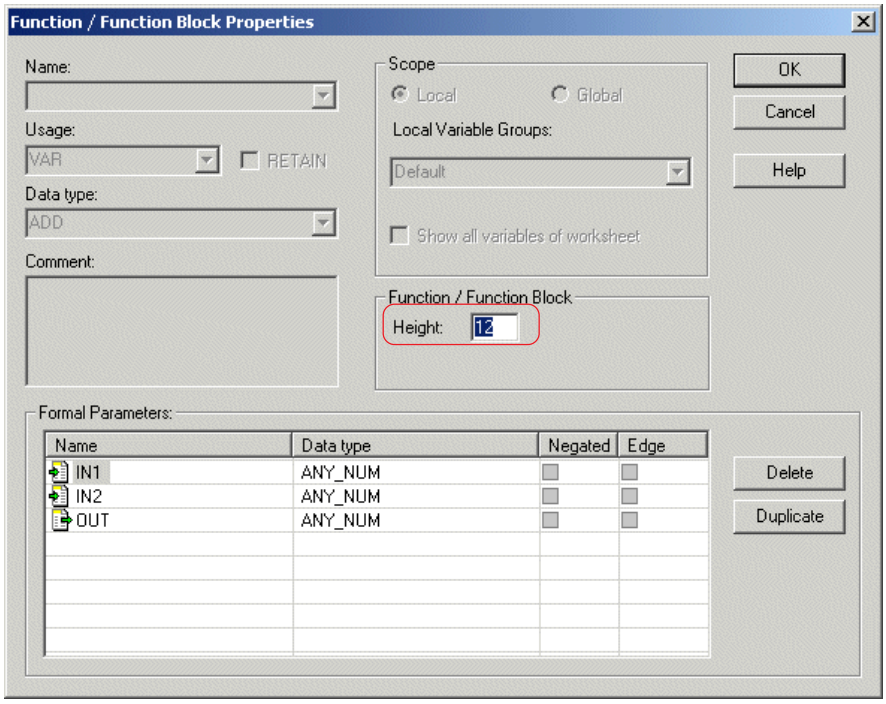
- Setting the height of a function or FB
- Logical setting of BOOL-type input/output terminals
- Expansion of input terminal (Expandable functions are limited)
- Setting FB instance name
- Creating a comment for FB instance
- Selecting a group to register FB instance

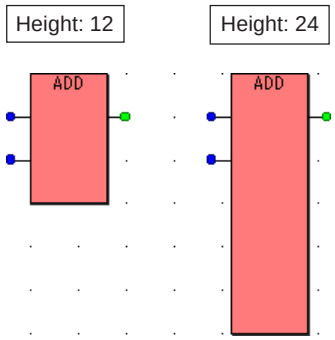
1) Setting the height of function or FB

Frame height of a function or FB can be changed. This function is useful when you want to clearly express the relationship with the objects connected to individual terminals. A sample case of changing the height of functions and FBs and then programming accordingly is shown below.



◆ Right-click an object the height of which you want to change, and click the [Object Properties...] command in the displayed shortcut menu. The [Function / Function Block Properties] dialog box will be displayed. On this dialog box, enter a desired height in the [Height:] entry box, and click the [OK] button.



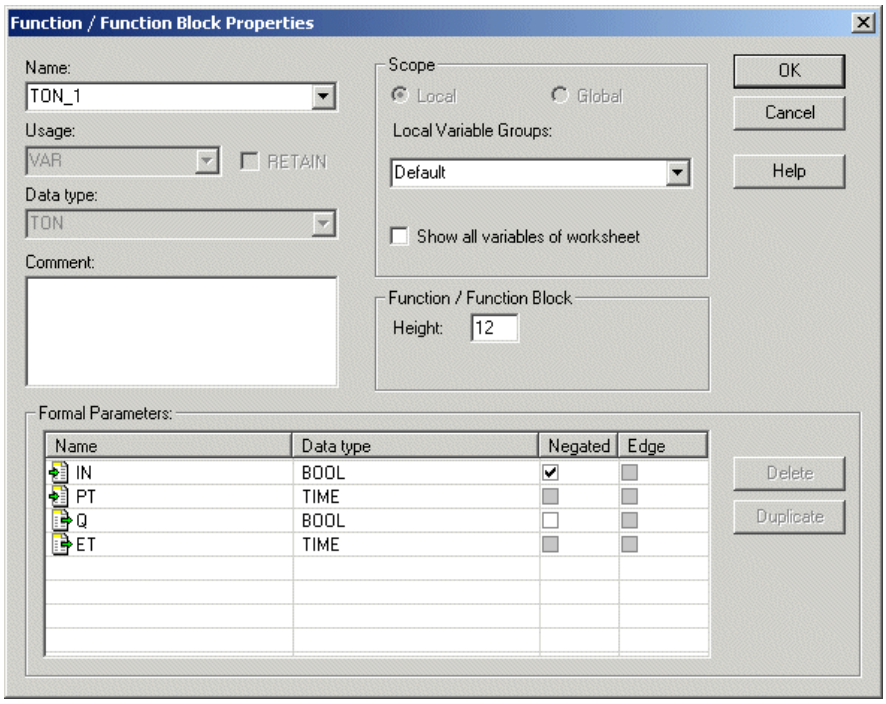


5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

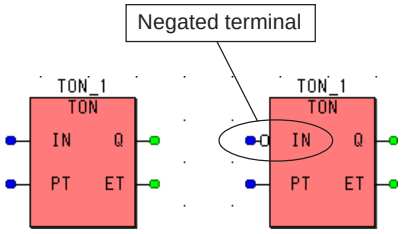
2) Logical setting of BOOL-type input/output terminals

Of the input and output terminals of a function or FB, those having the data type “BOOL” can be changed to negated terminals. This item changes the signal value of input or output terminal from ON to OFF, or vice versa.

◆ Right-click an object the logic of which you want to change, and click the [Object Properties...] command in the displayed shortcut menu. The [FB/FU Properties] dialog box is displayed. Activate the [FB/FU] tab window of this dialog box.



◆ For BOOL-type input and output terminals, the [Negated] box is unchecked. Check this box and click the [OK] button. Then the terminal will change to a negated terminal.

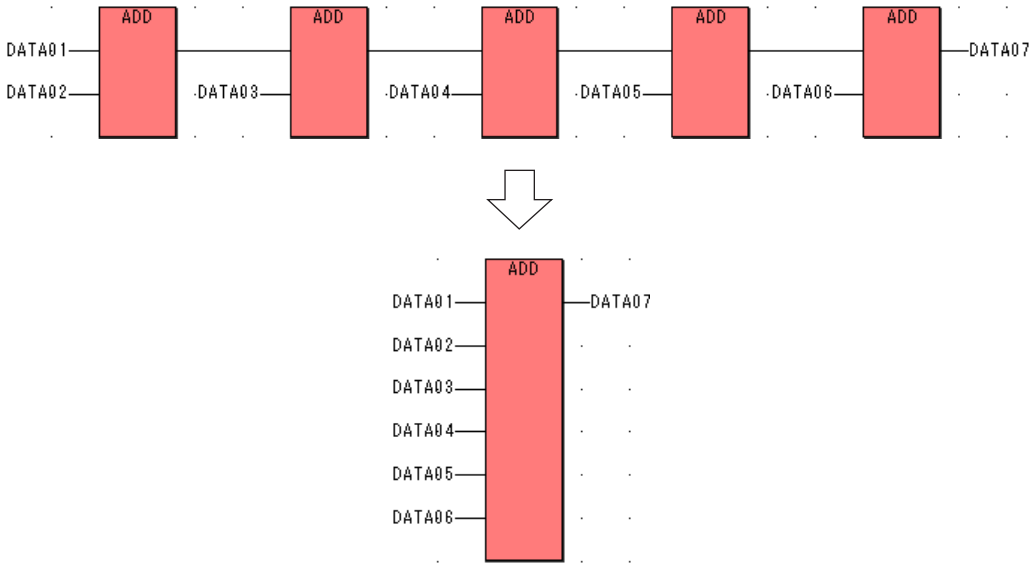


Section 5 Editing Codes in LD Language/FBD Language

5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

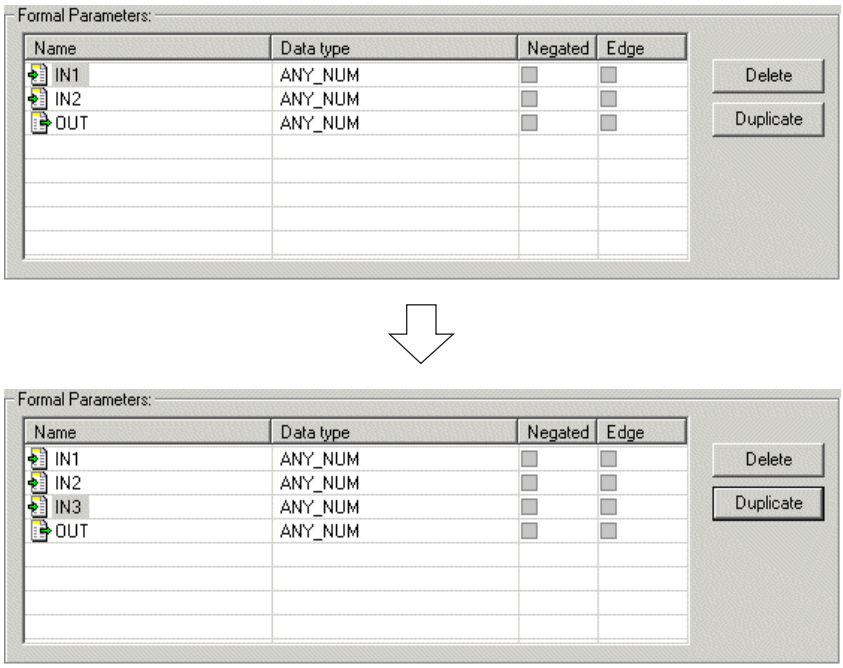
3) Expanding an input terminal

You can increase the number of input terminals (temporary parameter) of a function and thus make the program more understandable. While many functions (or FBs) can be described in a combination, as shown in the figure below, input terminals are described integrated in one block when an input terminal is expanded.



◆ Right-click a function the input terminal of which you want to expand, and click the [Object Properties...] command in the displayed shortcut menu. The [FB/FU Properties] dialog box will be displayed.

◆ Select the lowest input terminal and click the [Duplicate] button. An input terminal will be added. Each time the [Duplicate] button is clicked, one input terminal is added. Maximum 16 input terminals can be added.



Note: The functions whose input terminals can be expanded are limited.
For more information, see the “User’s Manual <Instruction>” (FEH200).

Section 5 Editing Codes in LD Language/FBD Language

5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

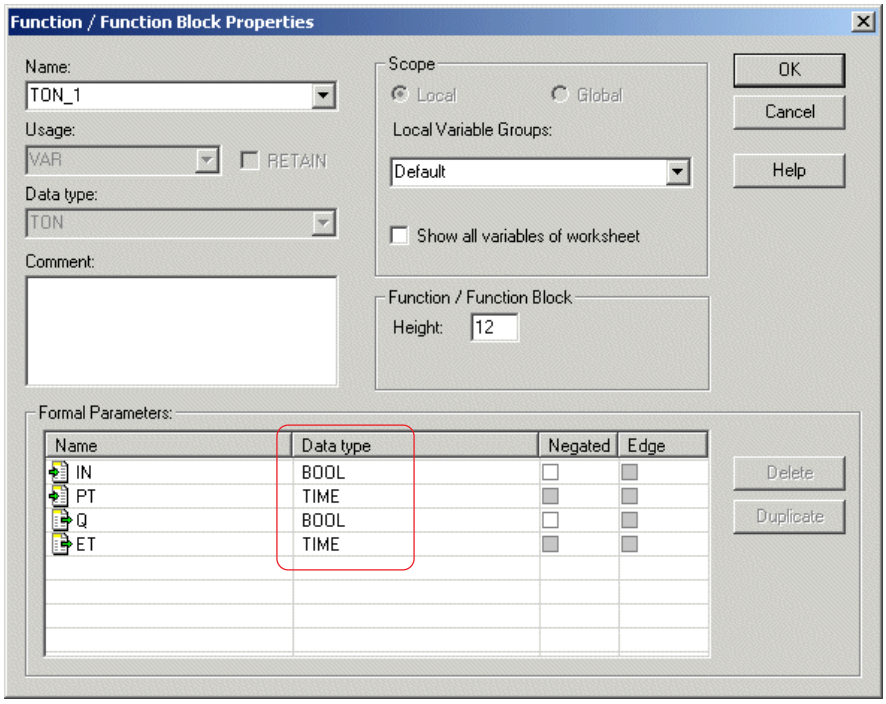
(3) Connecting an object to a function or FB terminal

The method for connecting between the terminals of a variable, contact, coil, function or FB and those (temporary parameter) of a function or FB is described below:

1) Checking whether or not the object can be connected to the terminal

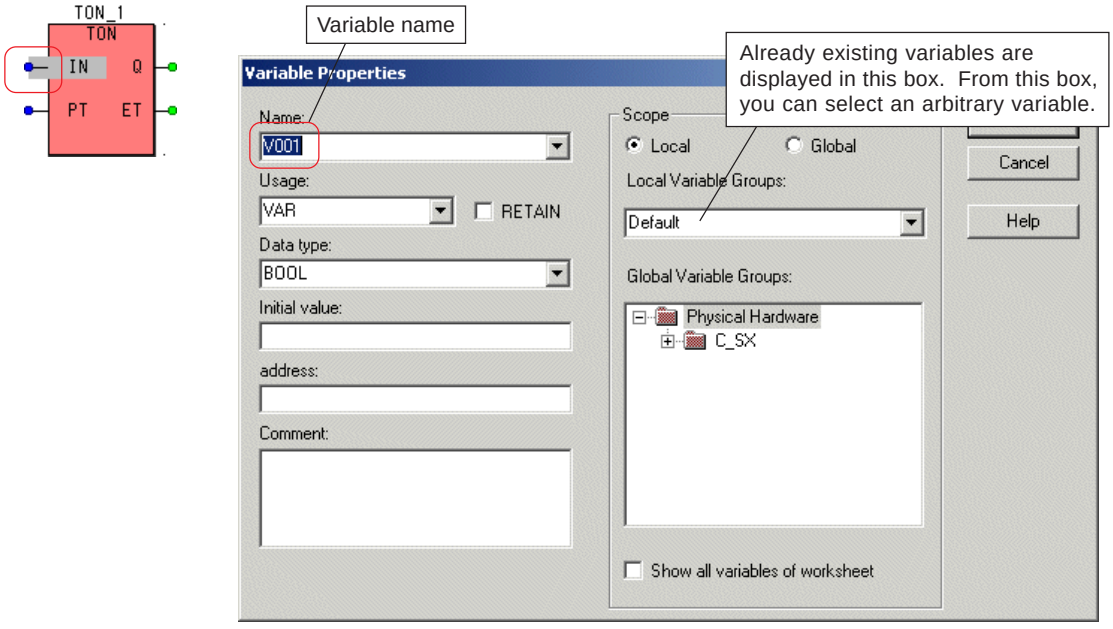
To a terminal of a function or FB, only the object having the same data type as is specified for the terminal can be connected. The data type of individual terminal can be checked in the following manner:

◆ Right-click an object the data type of which you want to check, and click the [Object Properties...] command in the displayed shortcut menu. The [FB/FU Properties] dialog box is displayed. In the case of FB, click the [FB/FU] tab. On the displayed [FB/FU] tab window, the data type of each terminal is indicated in the [Data type] column.



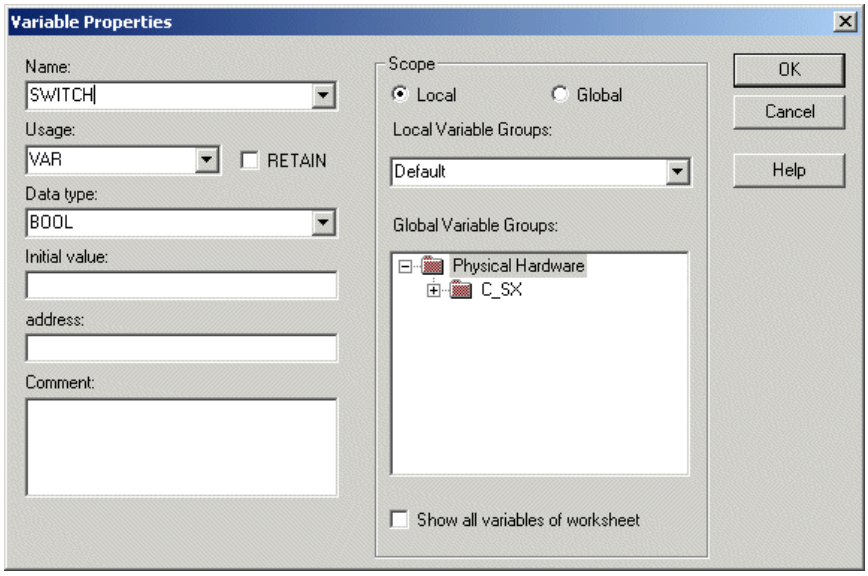
2) Connecting a variable to a terminal

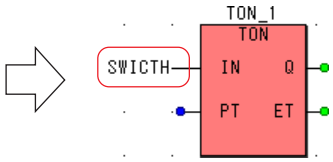
◆ Double-click a terminal to which you want to connect a variable, and the [Variable Properties] dialog box will be displayed.



5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

◆ Enter each necessary item; “variable name”, “variable type”, “data type”, “initial value”, and “address”. After setting these items, click the [OK] button. Then the variable will be connected to the terminal.

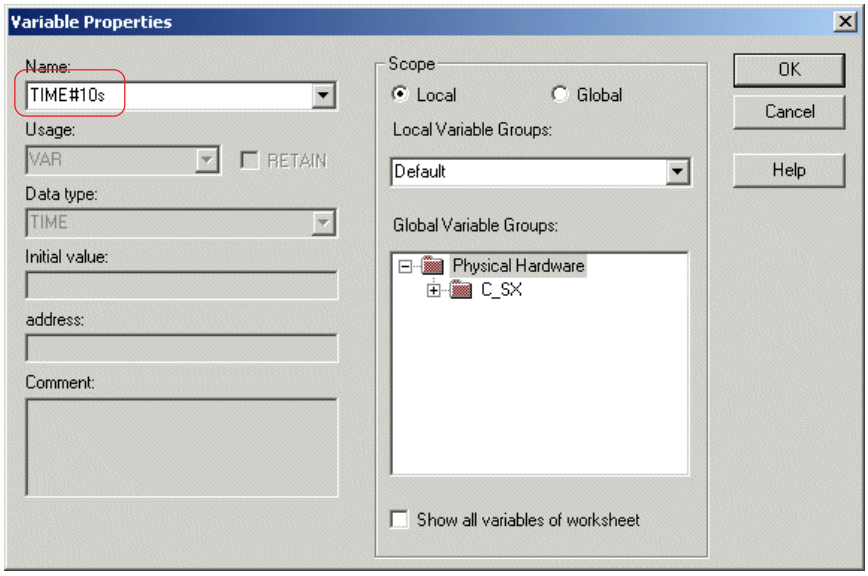


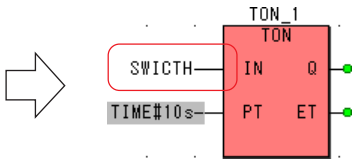


3) Connecting a constant to a terminal

◆ Double-click a terminal to which you want to connect a constant to display the [Variable Properties] dialog box. Enter a constant in the [Name:] text box. Basically, “#” is attached to data type name to express a constant. For details regarding the method for expressing constants of individual data type, see the “User’s Manual <Instruction>” (FEH200).

◆ After entering a constant, click the [OK] button. The constant will be connected to the terminal.

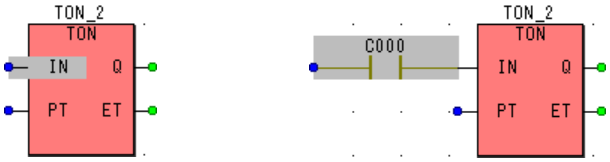




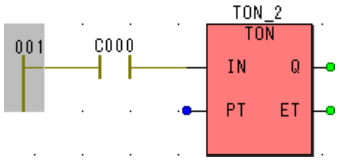
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

4) Connecting a contact to an input terminal

◆ Select a terminal to which you want to connect a contact, and click the [Insert contact left] button. A contact will be connected to the terminal.

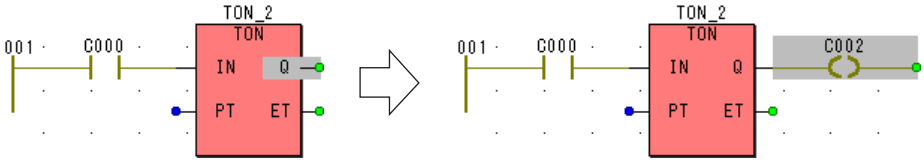


◆ In this conditions, when the [Left power rail] button is clicked, a left power rail is connected to the contact.

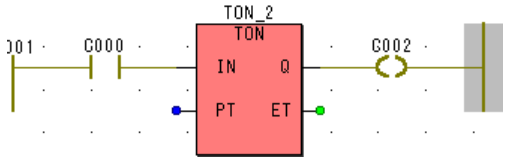


5) Connecting a coil to an output terminal

◆ Select a terminal to which you want to connect a coil, and click the [Insert coil right] button. A coil will be connected to the terminal.

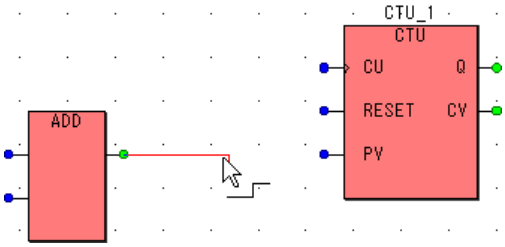


◆ In this conditions, when the [Right power rail] button is clicked, a right power rail is connected to the coil.

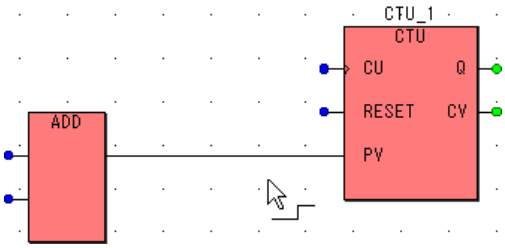


6) Connecting between terminals of FBD objects

◆ When you want to connect between terminals of two functions or FBs, click the [Connect objects] button and click a terminal to be connected.



◆ Drag the cursor and click the other terminal to be connected. The two terminals will be connected to each other.

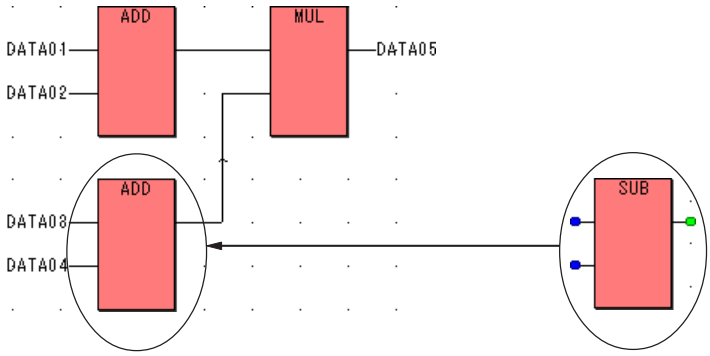


Section 5 Editing Codes in LD Language/FBD Language

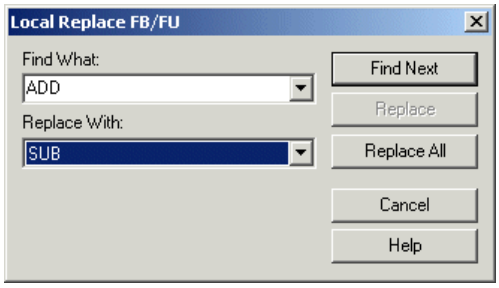
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

(4) Replacing a function or an FB

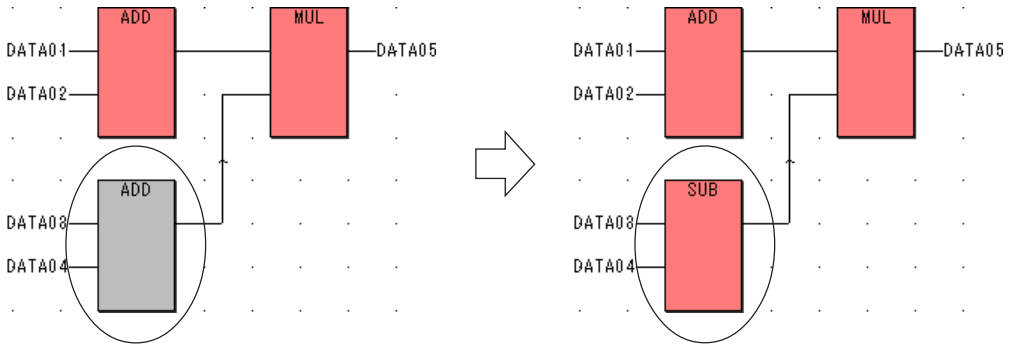
◆ It is possible to replace an already inserted function or FB with other function or FB. In this example, an ADD (addition) function is replaced with a SUB (subtraction) function, as shown in the figure below.



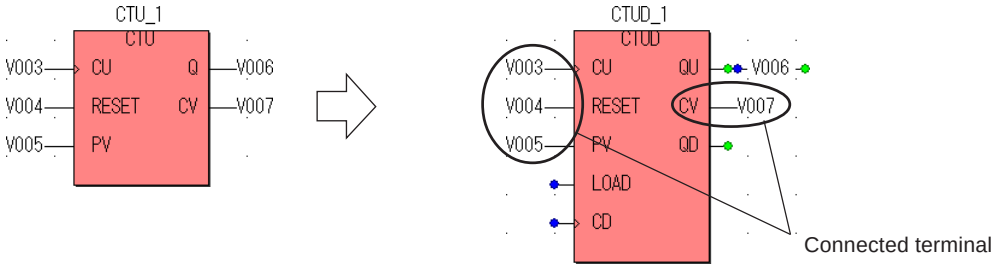
◆ Click the [Replace FB/FU] command in the [Edit] menu, and the [Local Replace FB/FU] dialog box will be displayed. On this dialog box, set the function or FB that you want to find out as well as the function or FB that replaces the found ones in respective text boxes, and click the [Find Next] button.



◆ Repeatedly click the [Find Next] button till the object to be replaced is found out. When the object to be replaced is found out, click the [Replace] button. The object will be replaced.



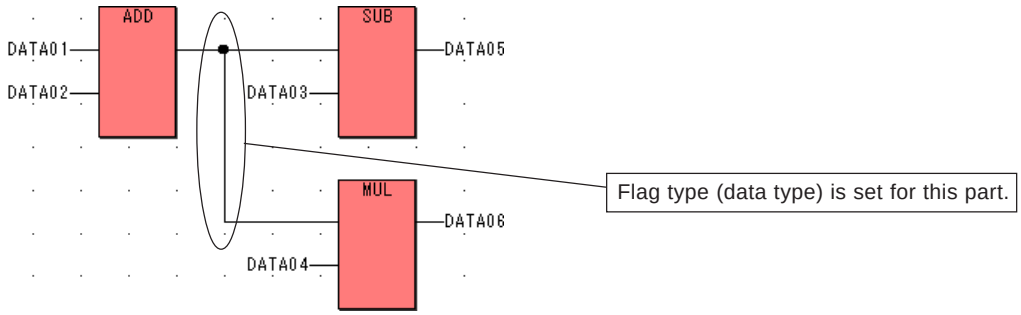
* If the number of terminals differs between the object to be replaced and that to replace it, all the terminals become disconnected as shown in the figure below. However, if terminal name is same, it is connected.



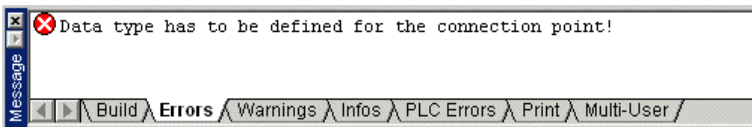
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

(5) Setting flag type

For FBD networks, depending on the network structure of function or FB, the compiler may not be able to determine internal flags or data type. In such case, you have to manually set them. In general, after compiling and checking the content of the compile error list, flag type is set. A sample network that requires setting of flag type is shown below.

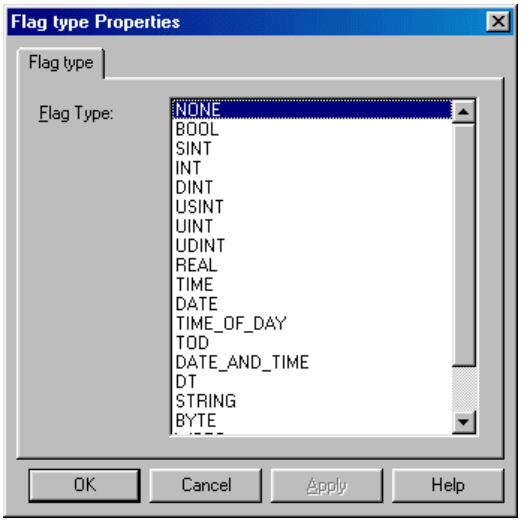


When compiled, the following message is displayed in the error list on the message window.



<Operation>

◆ Double-click the connecting line to display the [Flag type Properties] dialog box.



◆ Select the data type that you want to set from the [Flag type:] list box, and click the [OK] button.

Section 5 Editing Codes in LD Language/FBD Language

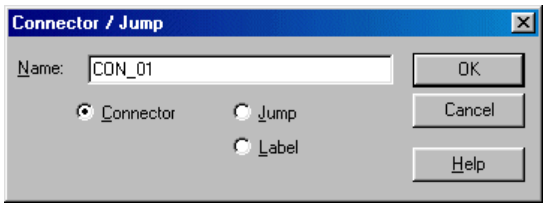
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

5-2-4 Inserting a connector, a jump, and a label

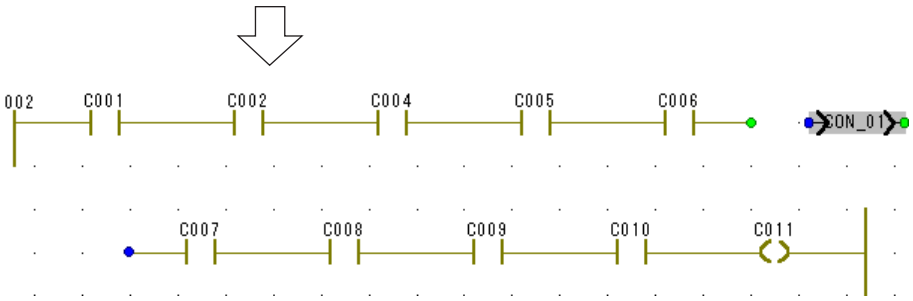
(1) Inserting a connector

When describing an LD network that has many contacts, you can make the network more understandable by using connectors. Connectors are also used when multiple networks that use the same interlock conditions are described.

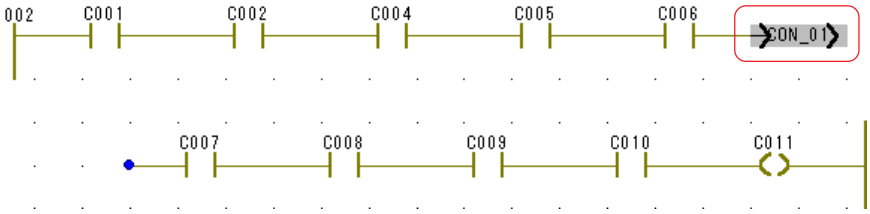
◆ Click an arbitrary point on the worksheet, and click the [Connector/Jump or Label] button. Then the [Connector/Jump] dialog box will be displayed. On this dialog box, turn on the optional [Connector] button, enter a desired name (maximum 30 single-byte characters) in the [Name] text box, and click the [OK] button. A connector will be inserted.



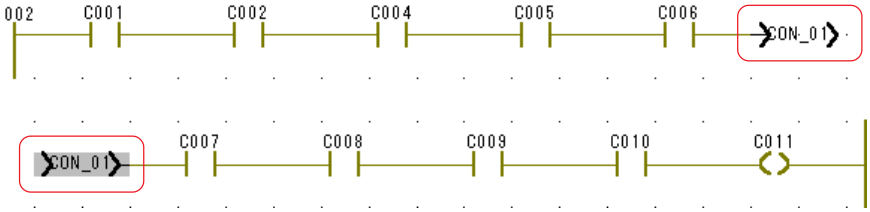
* Jumps and labels can also be inserted by the same operation.



◆ Drag the connector to the object you want to connect.

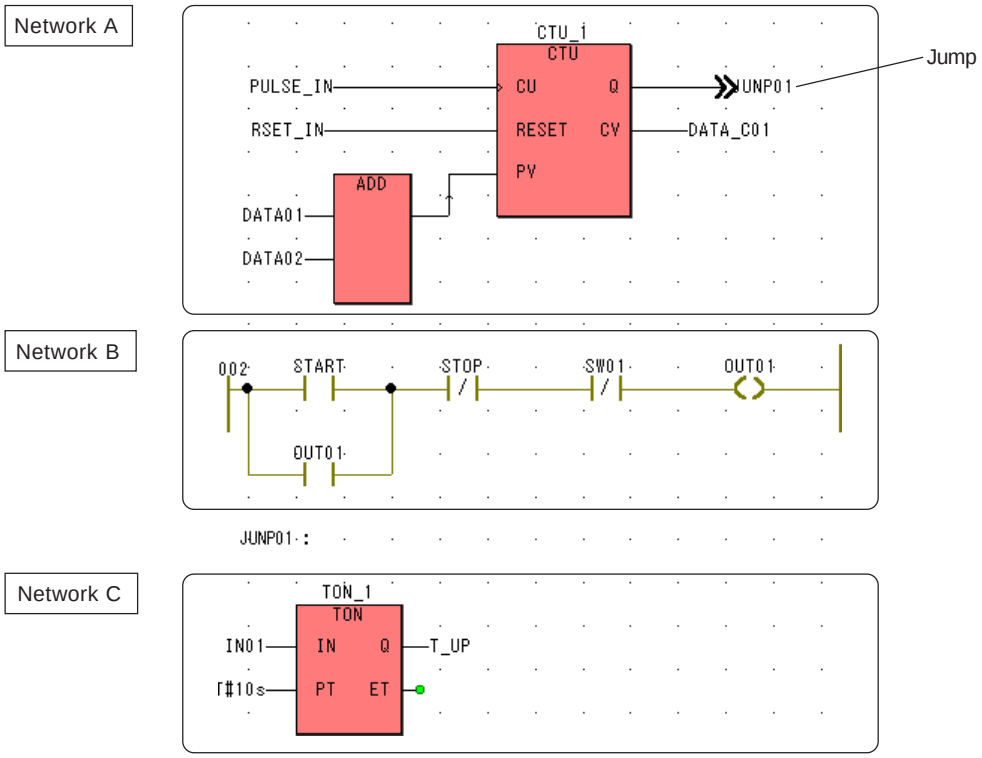


◆ In the same way, connect a connector having the same name to the other side of connection.



5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

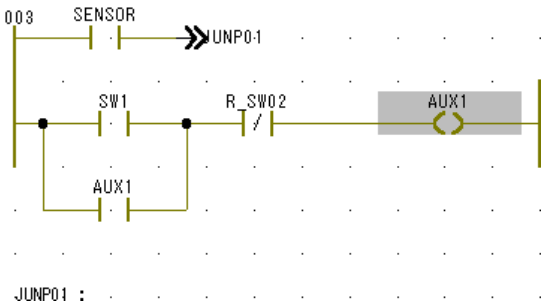
(2) Example of a network that uses a jump and a label



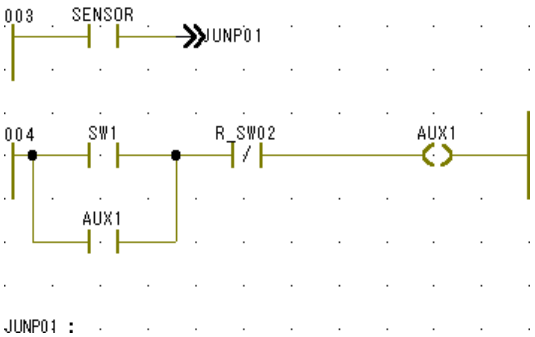
In the above network, when the counter “CTU_1” counts up, network B won’t be executed, and instead network C that is described after label “JUMP01” will be executed.

<Precautions for using jump and label>

When a jump exists in a network, as shown in the figure below, it will be evaluated after the whole network is executed.



Self-holding networks always run, whether the status of jump condition “SENSOR” is ON or OFF. To prevent such operation, separate the network, as shown in the figure below.



Section 5 Editing Codes in LD Language/FBD Language

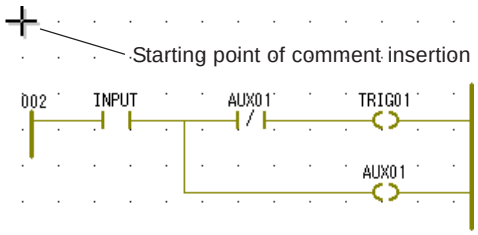
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

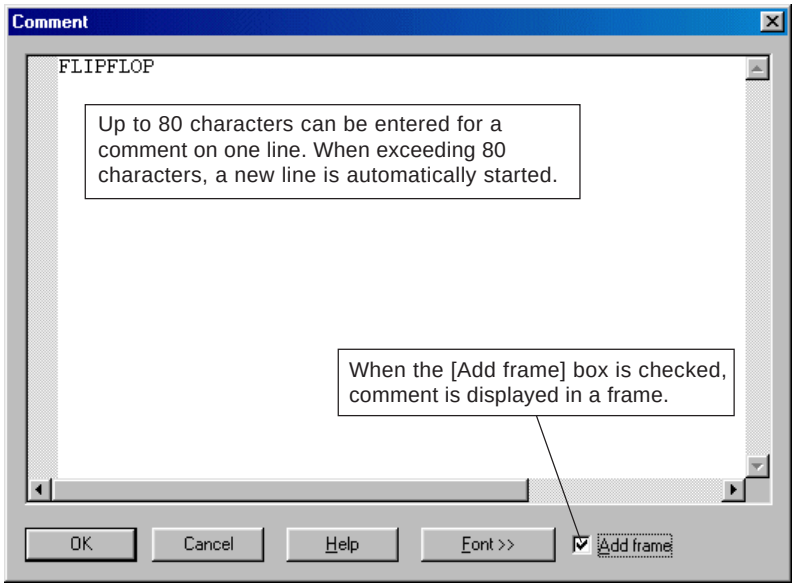
5-2-5 Inserting a comment

(1) Inserting a comment on the worksheet

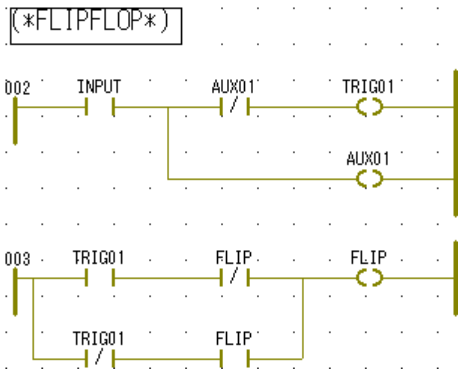
Of graphical editors, when the LD/FBD-V2 compatible mode editor is used, comments on code worksheet can also freely be laid out.

◆ Click an arbitrary point (at which you want to insert a comment) on the code worksheet, and then click the [Insert comment] button. The [Comment] dialog box is displayed.





◆ Enter your desired comment in the text box, and click the [OK] button. The comment will be inserted on the code worksheet.



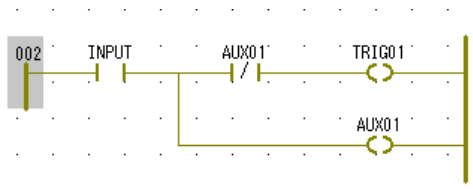
* When a comment that is inserted on the code worksheet is double-clicked, the [Comment] dialog box is displayed. You can edit the comment from this dialog box.

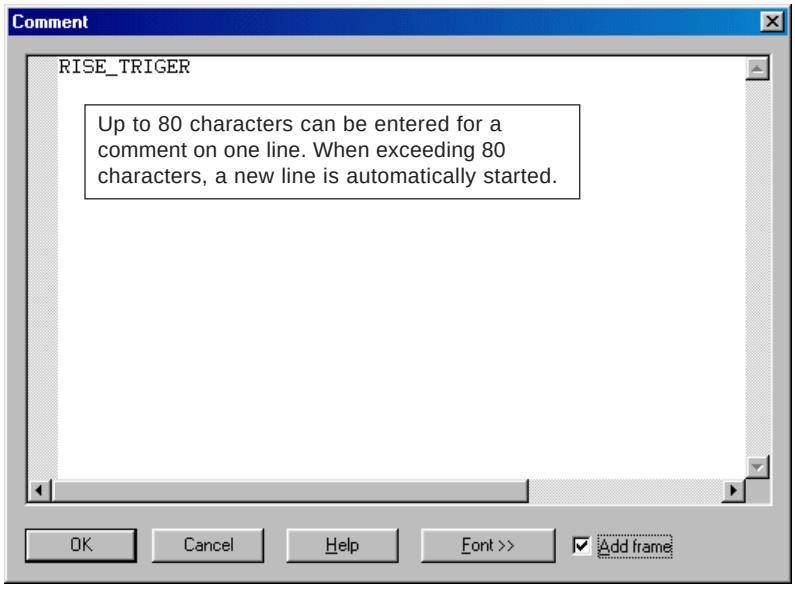
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

(2) Network comment

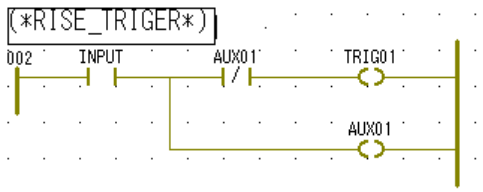
For LD network, all the objects that are connected to a left power rail are regarded as belonging to a unit network.
A comment that is given to such network is called “network comment”. A network comment is treated as one object of the network. Therefore, if the left power rail is moved, the network comment is also moved.

◆ Double-click the left power rail of the LD network in which you want to insert a comment, and the [Comment] dialog box will be displayed.

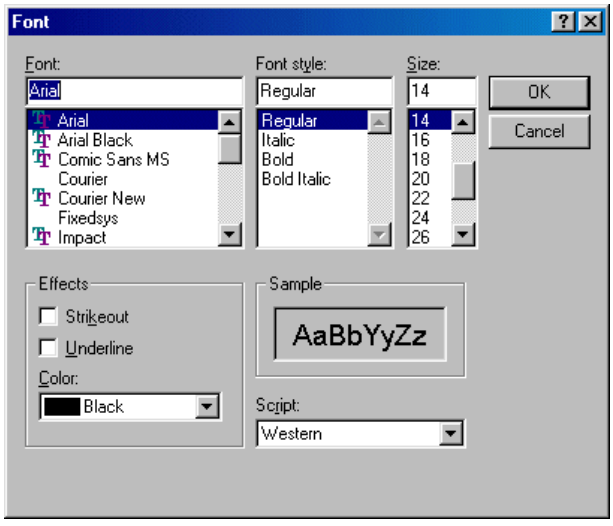




◆ Enter your desired comment in the text box, and click the [OK] button. The comment will be inserted above the left power rail of the LD network.



* When the [Font>>] button is double-clicked on the [Comment] dialog box, the [Font] dialog box is displayed. On this dialog box, you can set the font, character size, font style and display color that you want to use.



Section 5 Editing Codes in LD Language/FBD Language

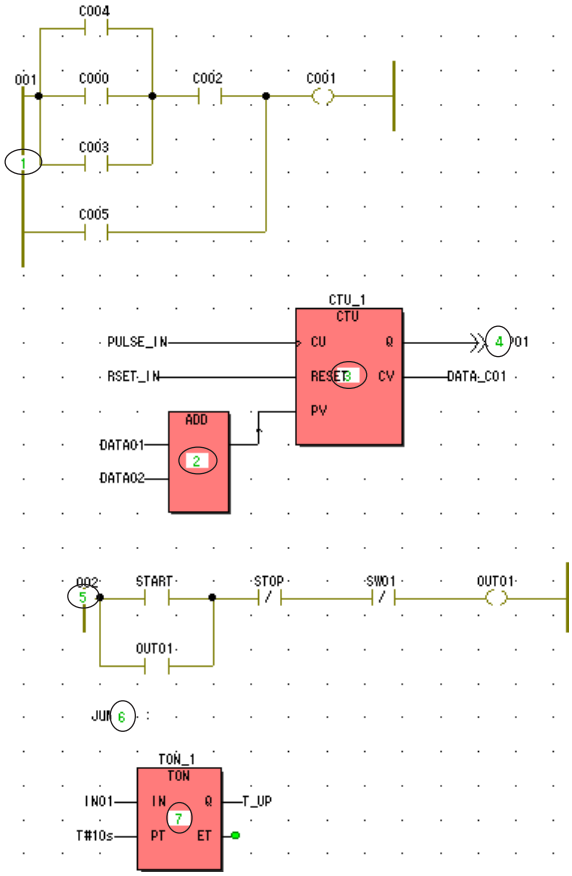
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

5-2-6 Precautions for programming

(1) Execution order of networks

When programming with the LD/FBD-V2 compatible mode editor, you must carefully arrange the objects. Objects, such as LD networks, functions and FBs, are executed in the order from upper left toward lower right on the worksheet. With D300win, you can display the execution order of the objects, such as LD networks, functions and FBs that are laid out on the worksheet.

- ◆ To display the execution order of networks, the worksheet must already be compiled. When you want to display execution order for an uncompiled worksheet, click the [Compile Worksheet], [Make], or [Rebuild Project] command in the [Build] menu.
- ◆ When compilation is completed, click the [Execution Order] command in the [Layout] menu. The execution order of networks, functions and FBs will be displayed.



Section 5 Editing Codes in LD Language/FBD Language

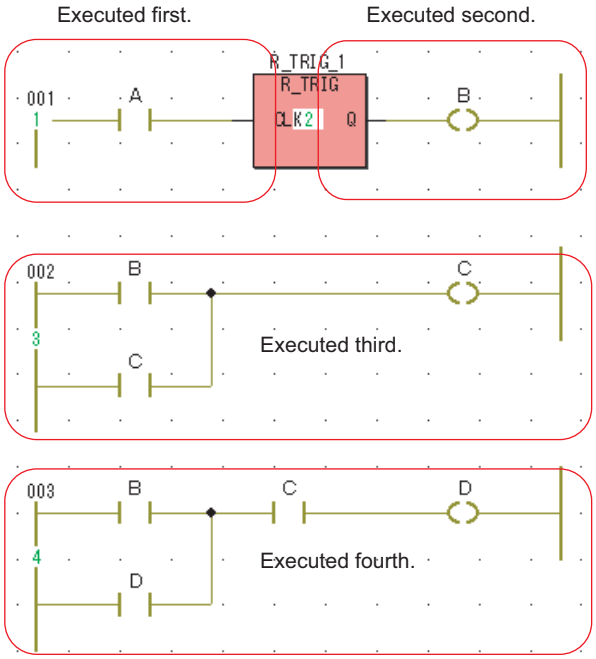
5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

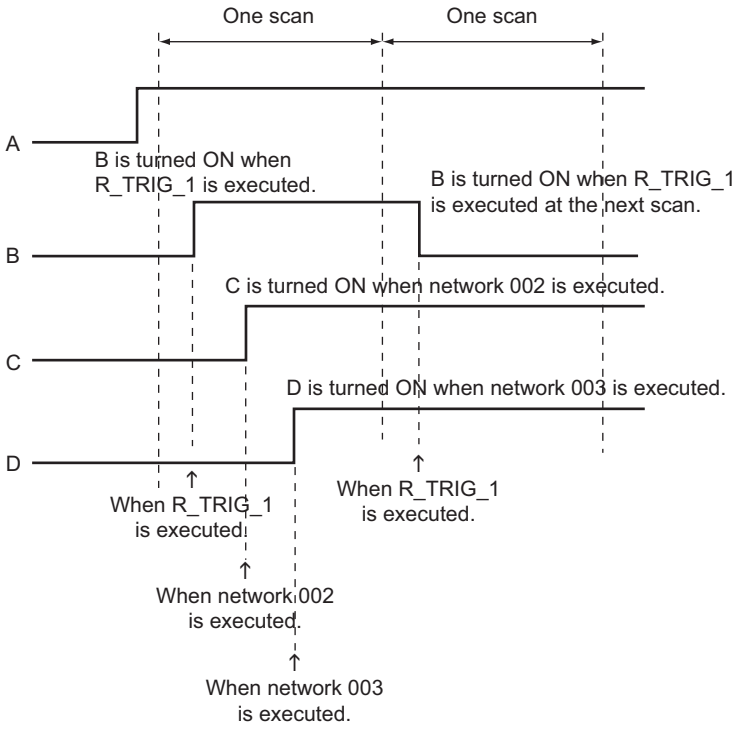
<Precautions for execution order of ladder networks>

The following three networks are similar. However, their execution orders are different, so that they operate differently. The purpose of the network operation is to leave the coil D ON when the contact A is turned ON.

1) Ladder 1

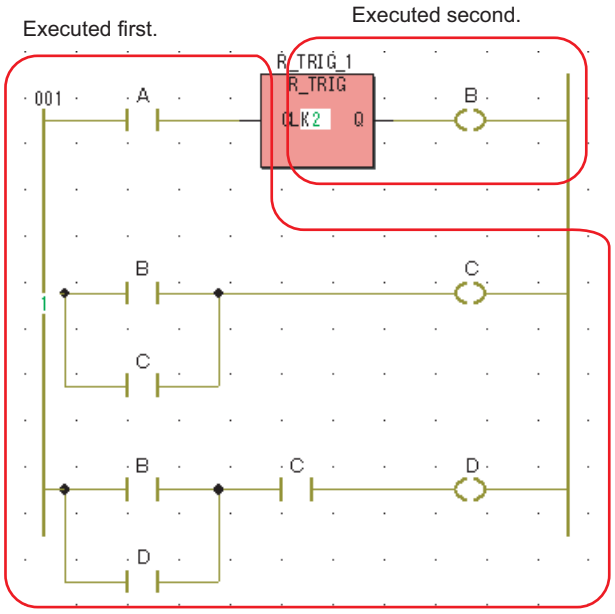
When A is turned ON, D is turned ON within one scan period.

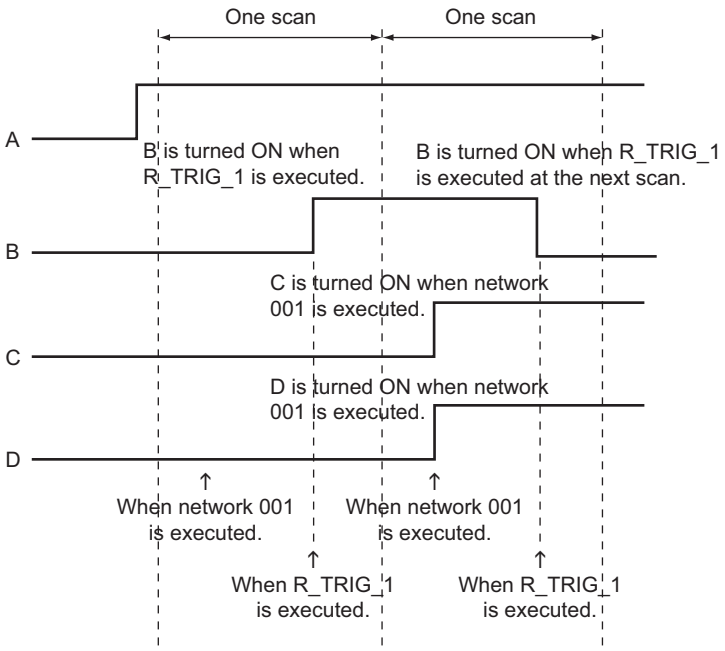




2) Ladder 2

When A is turned ON, the differential instruction is executed after the ladder network is executed, so that D is turned ON at the next scan period.

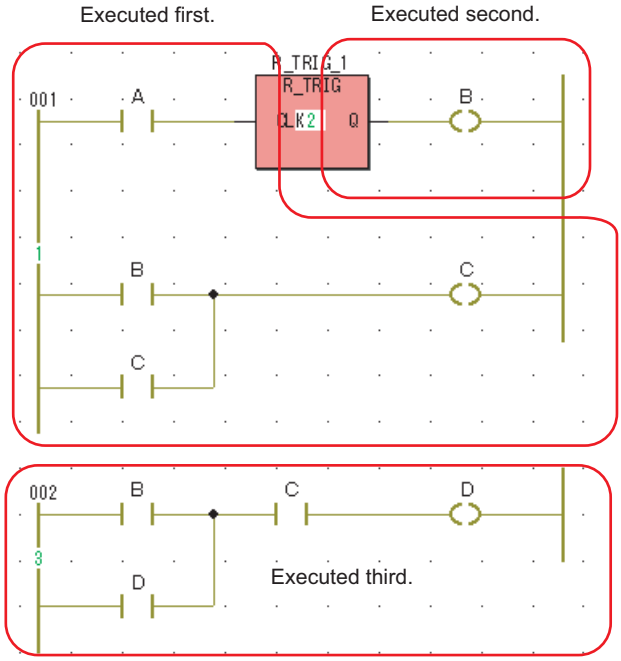


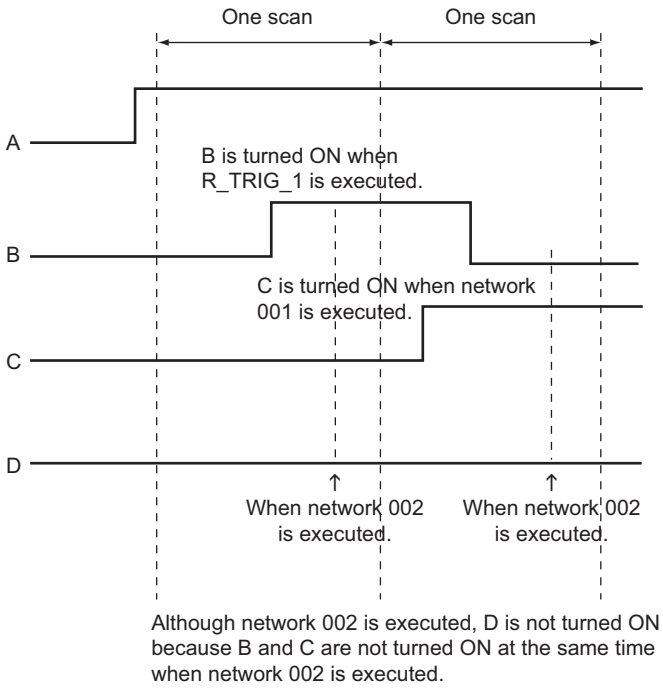


5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

3) Ladder 3

D is not turned ON even if A is turned ON; conditions for turning D ON are not met when the network 002 is executed due to the different execution order of the networks.



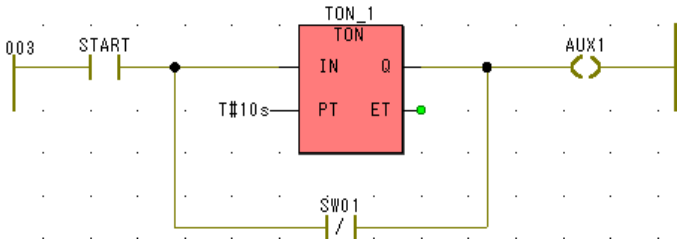


Although network 002 is executed, D is not turned ON because B and C are not turned ON at the same time when network 002 is executed.

5-2 Editing with the LD/FBD-V2 Compatible Mode Editor

(2) Precautions for describing LD and FBD objects

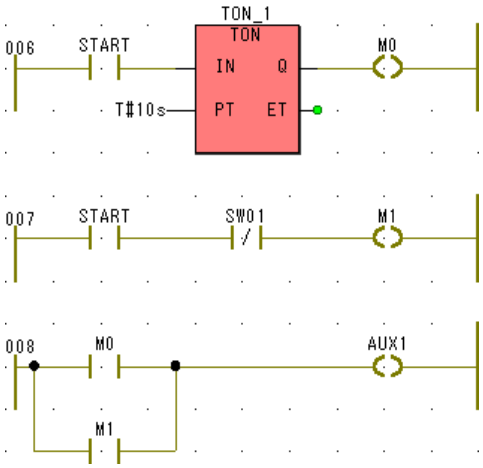
Graphic language allows FBD and LD programs to coexist on a same worksheet. Mostly LD language and FBD language are combined to create a POU (program, etc.) On worksheet, by connecting their junctions, a network in combination of the two languages can be created. However, no network as shown below can be created.



* For a network that consists of a contact, a function and an FB, an OR network cannot be inserted such that it encloses the function or FB. In such case, separate the outputs of the network, as shown in the figure below:

<Remedy>

Separate the networks according to the figure below:



Section 6 Editing Codes in ST Language or IL Language

6-1 Setting Up the Environment for Text Editor 6-1

6-1-1 Text editor setup 6-1

6-1-2 Setting text colors 6-3

6-2 ST Language 6-5

6-2-1 ST language overview 6-5

6-2-2 Describing an ST code 6-6

(1) Inserting a POU 6-6

(2) Basic description codes 6-7

(3) Style for describing codes 6-8

(4) Describing a code using the edit wizard 6-8

6-3 IL Language 6-10

6-3-1 IL language overview 6-10

6-3-2 Describing an IL code 6-11

(1) Inserting a POU 6-11

(2) Basic description codes 6-12

(3) Style for describing codes 6-13

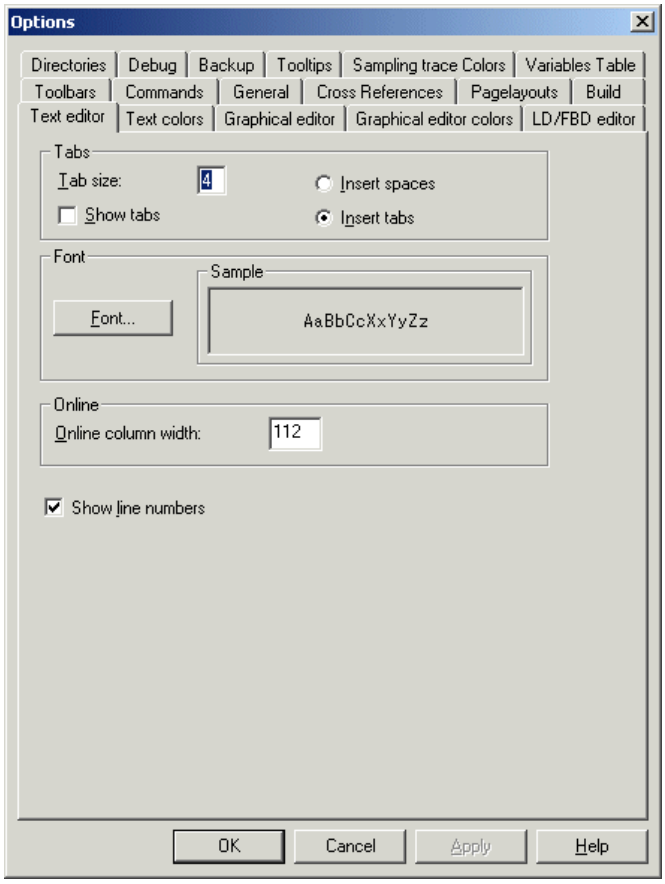
Section 6 Editing Codes in ST Language or IL Language

6-1 Setting Up the Environment for Text Editor

6-1-1 Text editor setup

In this process, the items are set that are related to the text editor that is used with ST or IL language or for defining data type.

◆ Click the [Options...] command in the [Extras] menu, and the [Options] dialog box will be displayed. On this dialog box, click the [Text editor] tab to display the following screen.



◆ After all necessary items are set, click the [OK] button to finish the setup.

<Setting items>

- **Tabs**

  Tabs are used for justification of entered text. To make a program that is easy to see and understand, the justification of text by tabs is an effective means.

  <Tab size:>

  Sets tab size in units of space.

  <Show tabs>

  Displays tab symbol (>>) and space symbol (•) on worksheet.

When the [Show tabs] box is checked

```
START:
»    LD» START_SW
»    AND»LSW_S_POINT
»    OR» LSW_ON
»    ST» OPERATION
```

When the [Show tabs] box is unchecked

```
START:
     LD   START_SW
     AND  LSW_S_POINT
     OR   LSW_ON
     ST   OPERATION
```

<Insert spaces/Insert tabs>

Select either “Insert spaces” or “Insert tabs”. This item determines whether a space or a tab is inserted when the tab key is pressed.

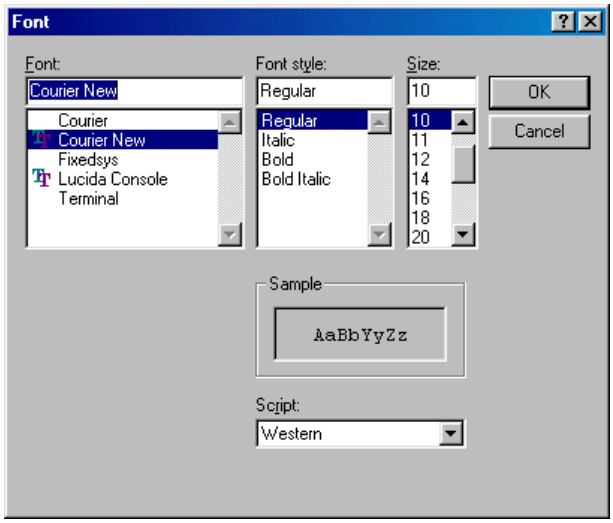
Section 6 Editing Codes in ST Language or IL Language

6-1 Setting Up the Environment for Text Editor

- **Font**

  Sets font for the text that is input on the code worksheet. In the [Sample] text box, the currently set font is displayed.

  ◆ Double-click the [Font] button, and the [Font] dialog box will be displayed.



  ◆ After setting font, font style and size that you want to use, and click the [OK] button.

- **Online**

  When a text worksheet is online monitored (connecting to an CPU module), this item sets the width of the monitor area that is displayed on the left side. This setting becomes the default value, which can be changed while monitoring.

- **Show line numbers**

  When this box is checked, line numbers are indicated on the left side of the worksheet.

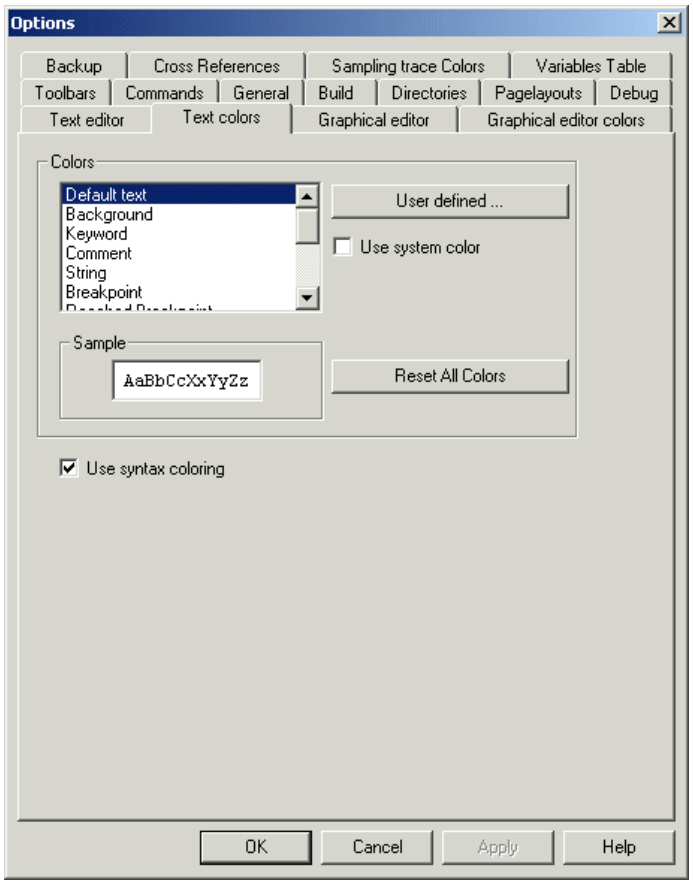
Section 6 Editing Codes in ST Language or IL Language

6-1 Setting Up the Environment for Text Editor

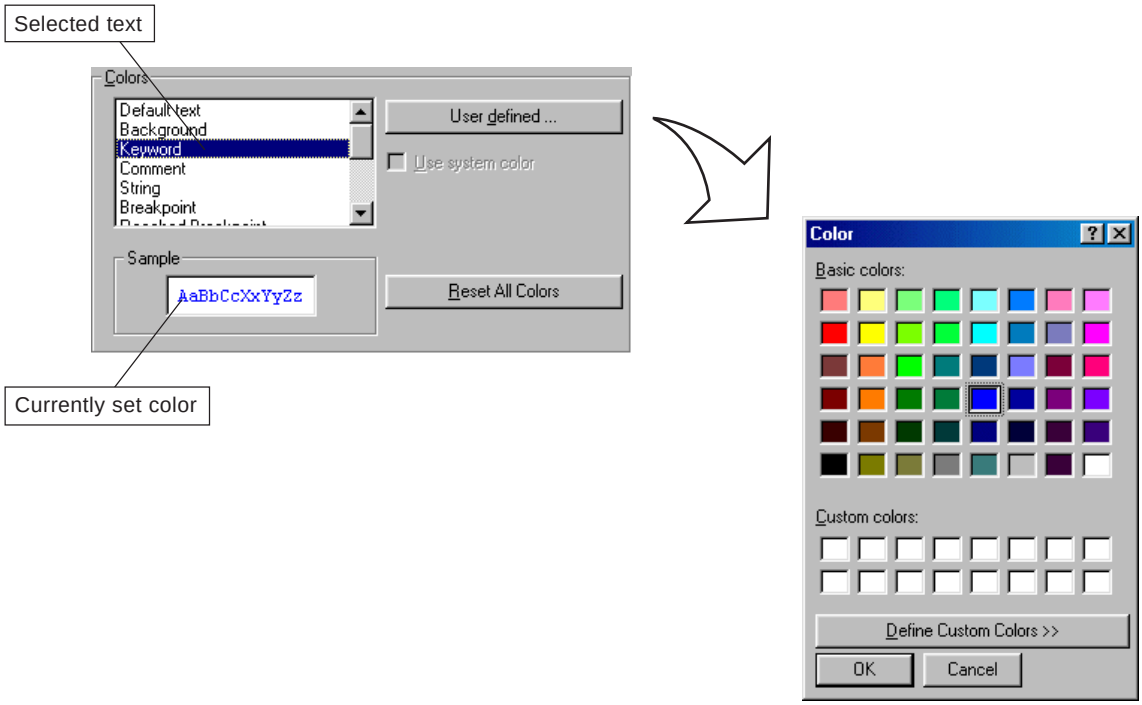
6-1-2 Setting text colors

You can set the color of an object, such as keyword, variable and comment that is expressed as a text in a programming language (ST language or IL language).

◆ Click the [Options...] command in the [Extras] menu, and the [Options] dialog box will be displayed. On this dialog box, click the [Text colors] tab to display the following screen.



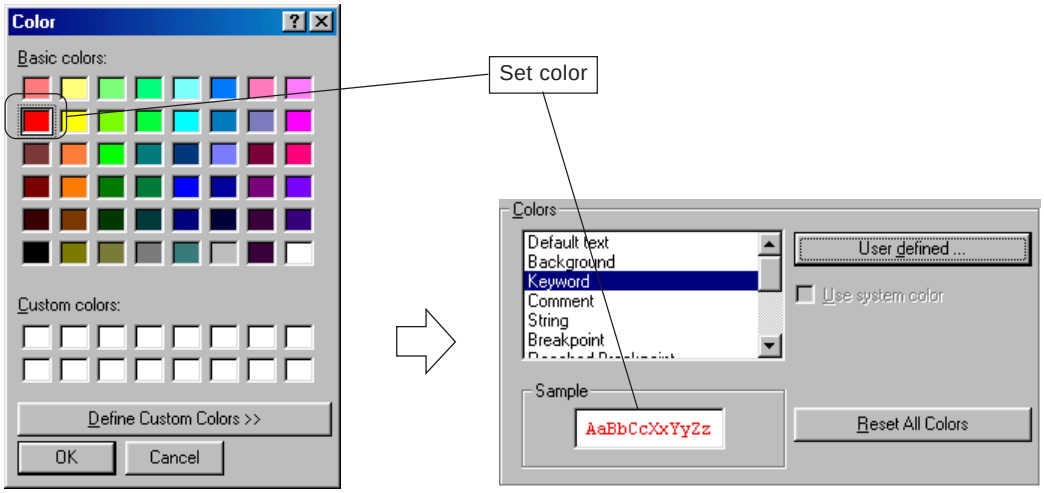
◆ From the list box, select a text the color of which you want to change. In the [Sample] box, the text is displayed in the currently set color. Click the [User defined...] button, and the [Color] dialog box will be displayed.



Section 6 Editing Codes in ST Language or IL Language

6-1 Setting Up the Environment for Text Editor

◆ On the [Color] dialog box, select a color that you want to use, and click the [OK] button.



◆ On the [Options] dialog box, click the [OK] or [Apply] button.

<Other setting items>

- **Use system color**

  This item applies only to “default text” and “background color”. When this box is checked, clicking the [Apply] or [OK] button resets the color of default text to black and that of background to white.

- **Reset All Colors**

  When this button is clicked, the color of all texts is reset to the default setting.

- **Use syntax coloring**

  When this box is checked, text is displayed in the set color. When unchecked, all texts are displayed in black.

Section 6 Editing Codes in ST Language or IL Language

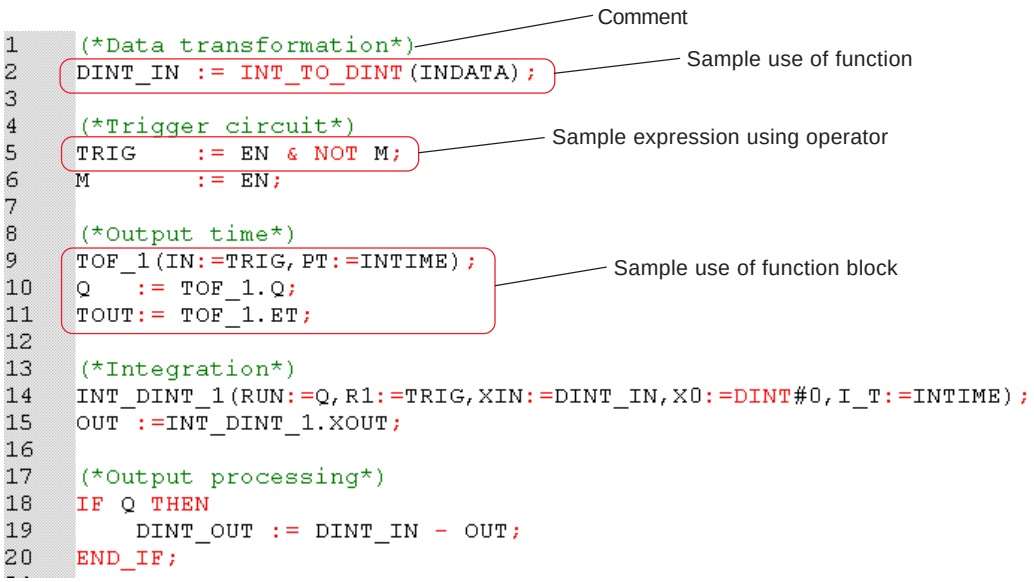
IEC 61131-3 specifies, as text language, ST (Structured Text) language and IL (Instruction List) language.

6-2 ST Language

6-2-1 ST language overview

ST language is a powerful programming language with excellent ability of expression for programmable controllers that are developed for industrial control use. Programs are created combining expressions using operators, statements, variables, and constants.

<Example of a program written in ST language>




```
1   (*Data transformation*)
2   DINT_IN := INT_TO_DINT(INDATA);
3
4   (*Trigger circuit*)
5   TRIG    := EN & NOT M;
6   M       := EN;
7
8   (*Output time*)
9   TOF_1(IN:=TRIG,PT:=INTIME);
10  Q   := TOF_1.Q;
11  TOUT:= TOF_1.ET;
12
13  (*Integration*)
14  INT_DINT_1(RUN:=Q,R1:=TRIG,XIN:=DINT_IN,X0:=DINT#0,I_T:=INTIME);
15  OUT :=INT_DINT_1.XOUT;
16
17  (*Output processing*)
18  IF Q THEN
19      DINT_OUT := DINT_IN - OUT;
20  END_IF;
```

* For detail specifications related to ST language, see the “User’s Manual <Instruction>” (FEH200).

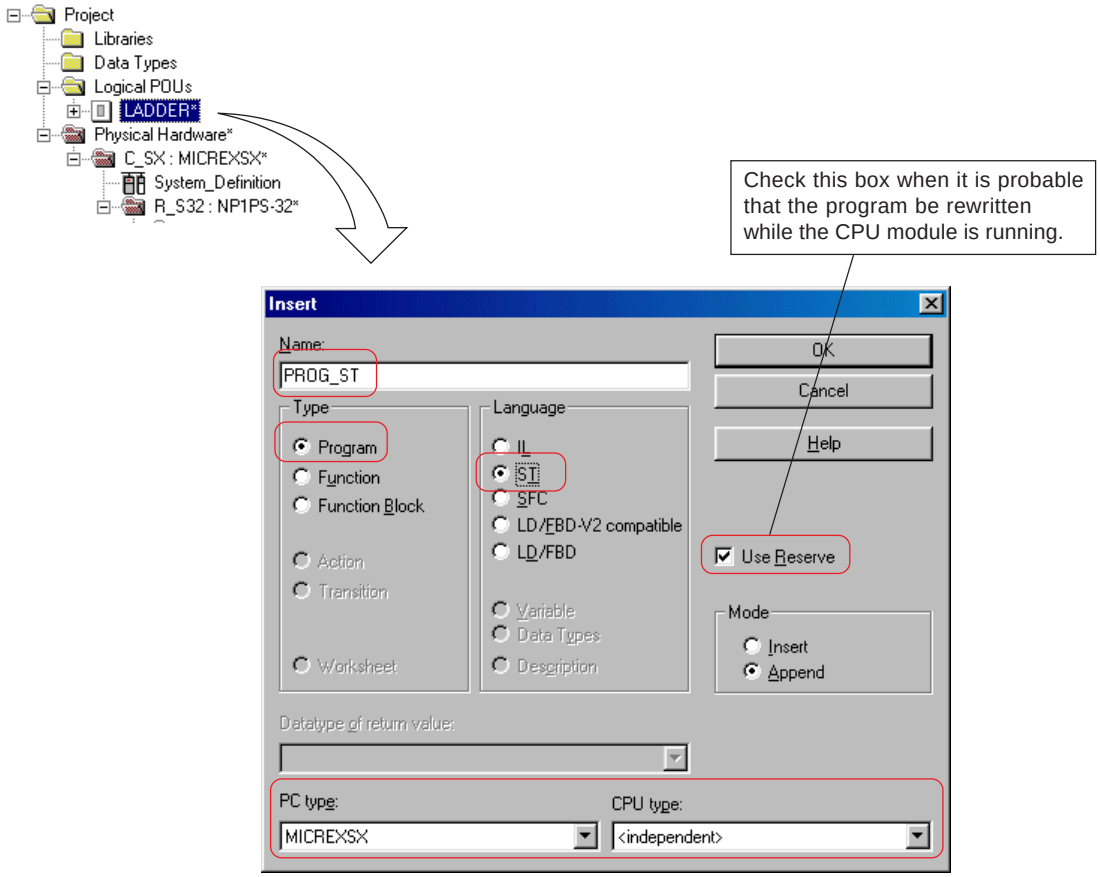
Section 6 Editing Codes in ST Language or IL Language

6-2 ST Language

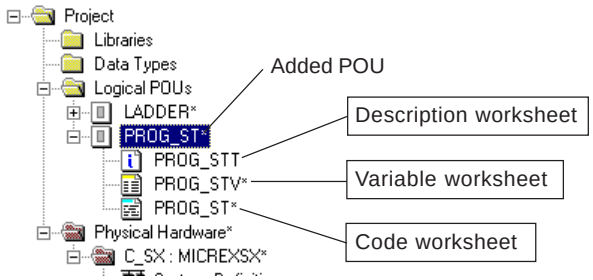
6-2-2 Describing an ST code

(1) Inserting a POU

◆ A POU that is to be created in ST language is inserted in the [Logical POUs] folder in the project tree. In this example, a POU that is to be created in ST language is inserted after the POU “LADDER”.
Select “LADDER” and click the [Add Program] button or press the <Insert> key. Then the [Insert] dialog box will be displayed.

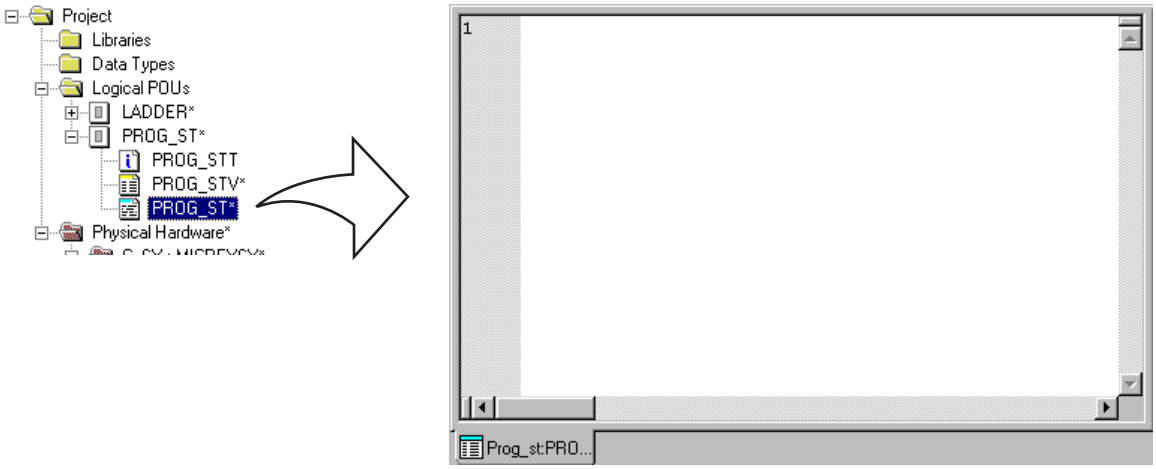


◆ On the [Insert] dialog box, enter a desired POU name (maximum 24 characters) in the [Name] text box, and select “Program” for [Type] and “ST” for [Language]. Select “MICREXSX” for [PLC type:] and “Current CPU type” for [CPU type:], respectively. After all these items are set, click the [OK] button. The POU “PROG_ST” will be added to the project tree.



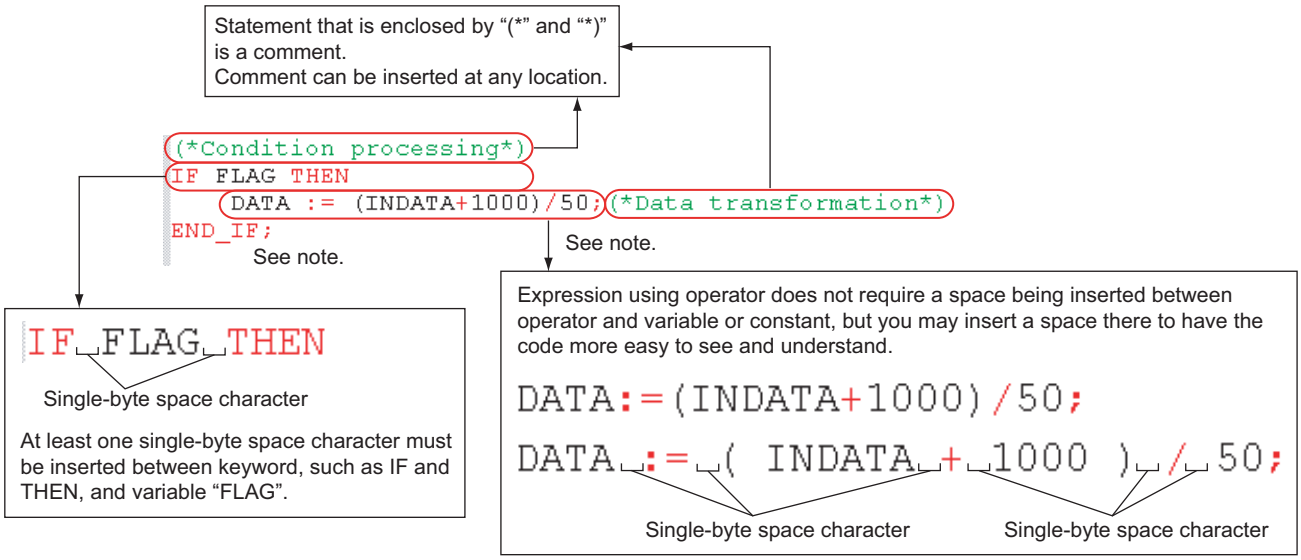
6-2 ST Language

◆ Double-click the code worksheet icon for the POU “PROG_ST”, and the code worksheet will be displayed.



(2) Basic description of codes

There are few restrictions on expressing codes in ST language, so that you can comparatively freely describe codes. This paragraph explains the rules for expression, taking the description of an operation using IF statement for example.



Note: Be sure to place “;” (semicolon) at the end of one instruction execution statement.

Section 6 Editing Codes in ST Language or IL Language

6-2 ST Language

(3) Style for describing codes

ST language does not restrict the location to start writing a code or the number of execution statements that can be described on one line.

Example of an execution statement indented by tab

```
(*Condition processing*)
IF FLAG THEN
    DATA:=(INDATA+1000)/50;(*Data transformation*)
END_IF;

IF SENSOR >= 1000 THEN
    FLAG := TRUE;  LAMP0 := TRUE;
END_IF;
```

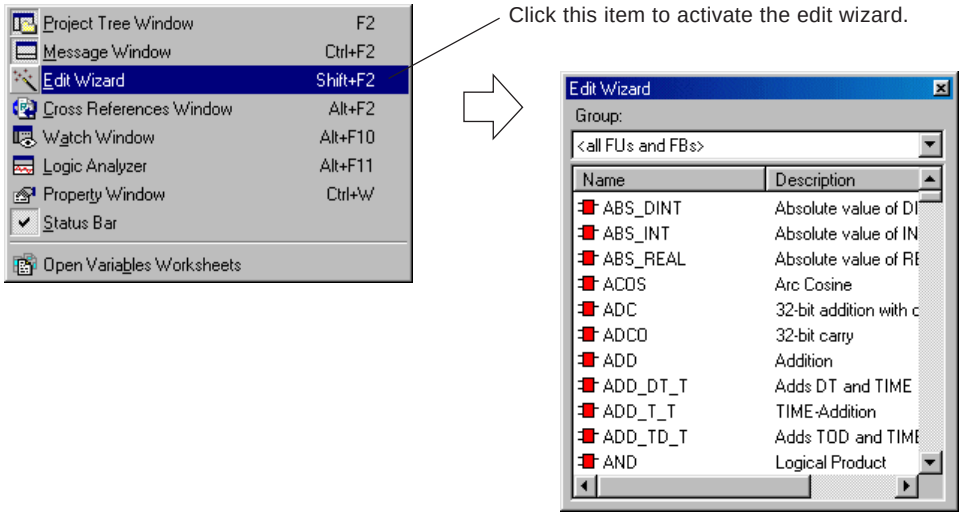
Example of placing one blank line after the end of a processing

Example of describing multiple execution statements on one line.

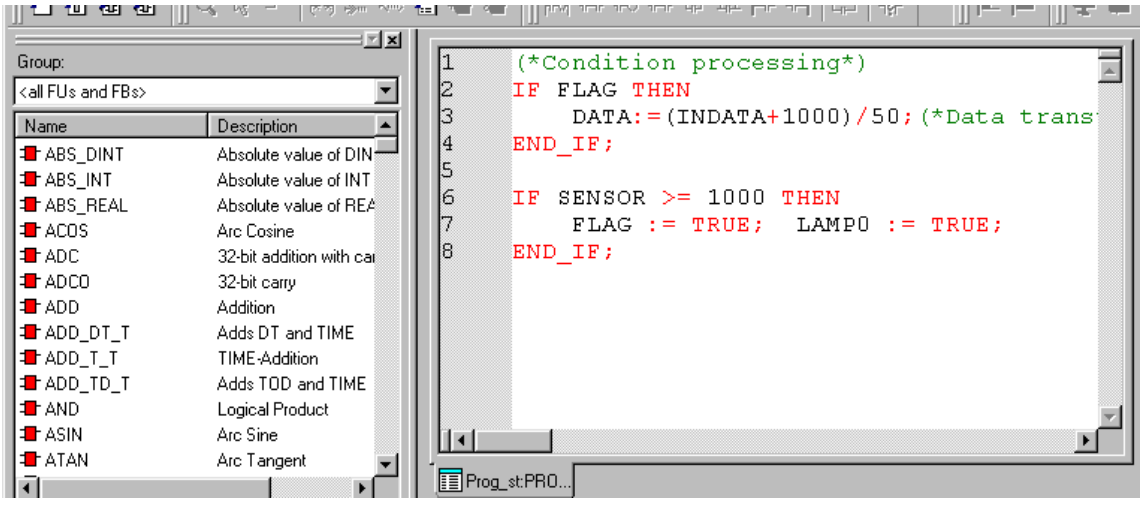
(4) Describing a code using the edit wizard

When programming in ST language, the program is coded in the format described in (1) and (2). To facilitate and simplify editing, and to prevent programming errors, D300win prepares the edit wizard.

◆ When no edit wizard is displayed on the D300win screen, fist you must display the edit wizard. Click [View] on the menu bar, and then click the [Edit Wizard] command in the [View] menu. Then the [Edit Wizard] window will be displayed on the screen.



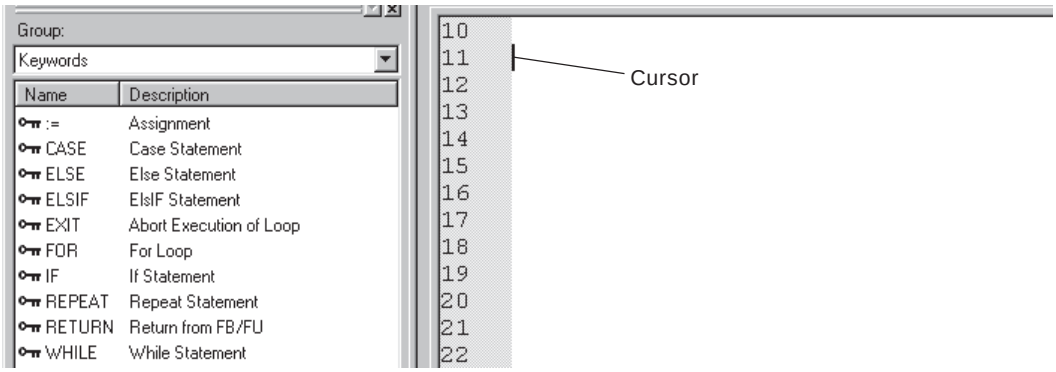
◆ While the [Edit Wizard] window can be used as an independent window, it can also be attached on the D330win screen, like code worksheet.

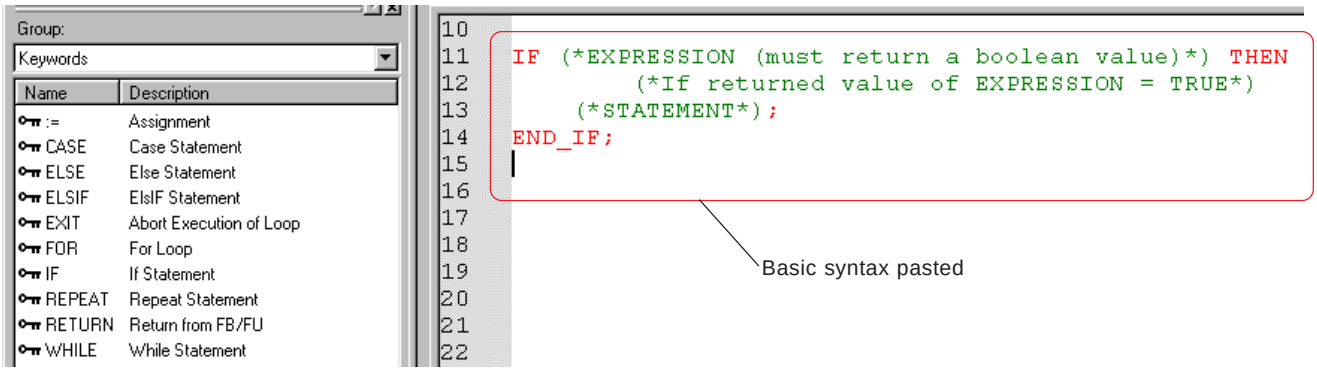


Section 6 Editing Codes in ST Language or IL Language

6-2 ST Language

◆ Place the cursor at a location at which you want to describe a code, and double-click the keyword or instruction that you want to use. Then the basic syntax of the selected keyword or instruction will be described on the code worksheet. You can make a program by rewriting the part enclosed by "(*" and "*)".





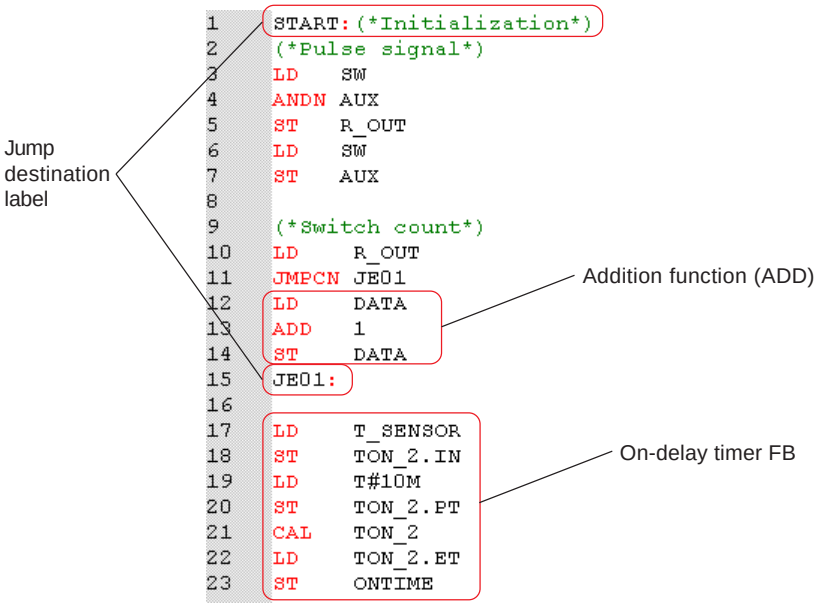
Section 6 Editing Codes in ST Language or IL Language

6-3 IL Language

6-3-1 IL language overview

IL language is a text language that has the language structure similar to that of assembler. Program is made by describing one instruction on one line.

<Example of a program written in IL language>



* For detail specifications related to IL language, see the “User’s Manual <Instruction>” (FEH200).

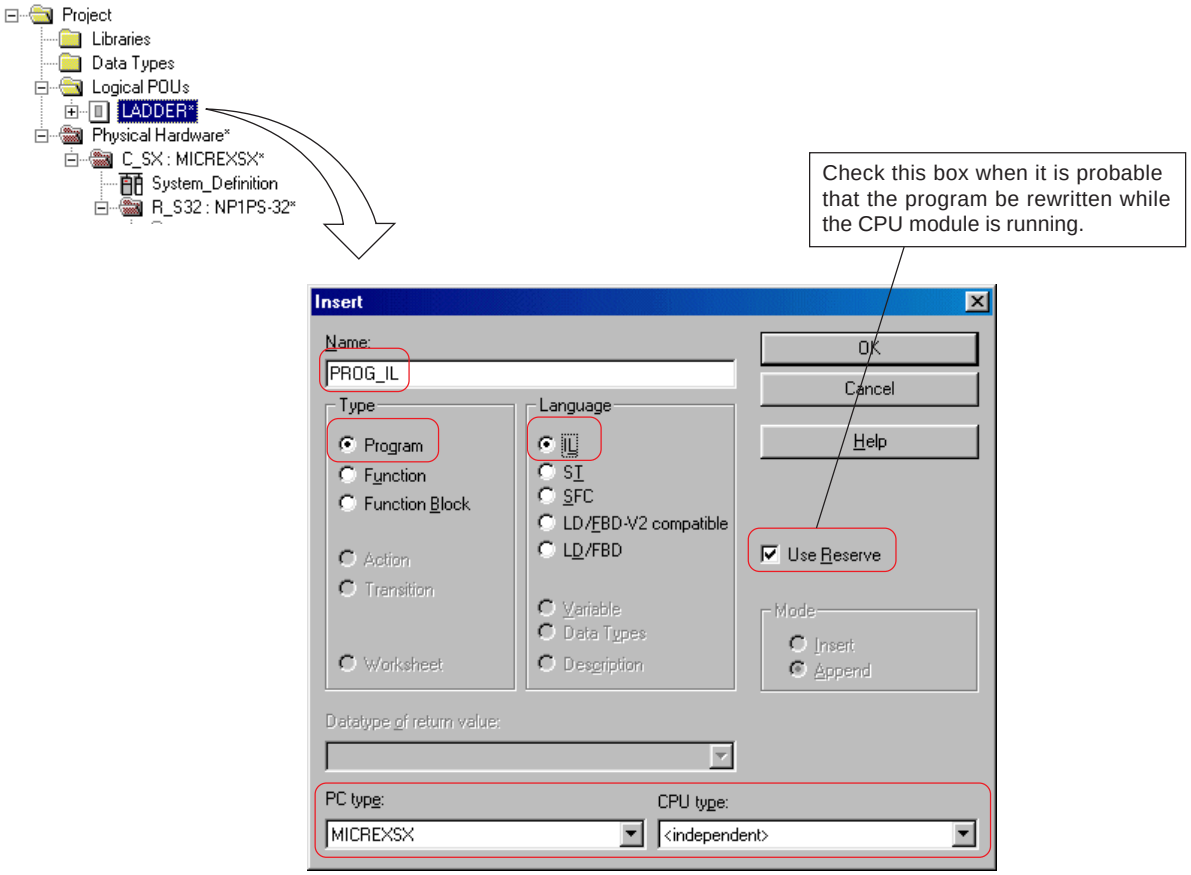
Section 6 Editing Codes in ST Language or IL Language

6-3 IL Language

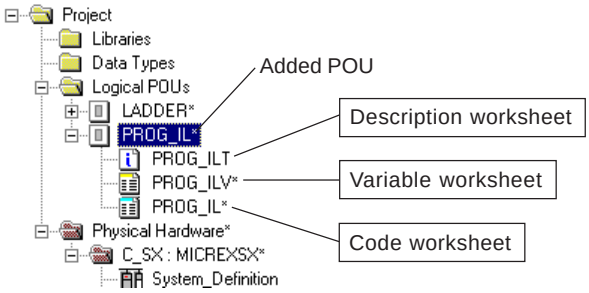
6-3-2 Describing an IL code

(1) Inserting a POU

◆ A POU that is to be created in IL language is inserted in the [Logical POUs] folder in the project tree. In this example, a POU that is to be created in IL language is inserted after the POU “LADDER”.
Select “LADDER” and click the [Add Program] button or press the <Insert> key. Then the [Insert] dialog box will be displayed.



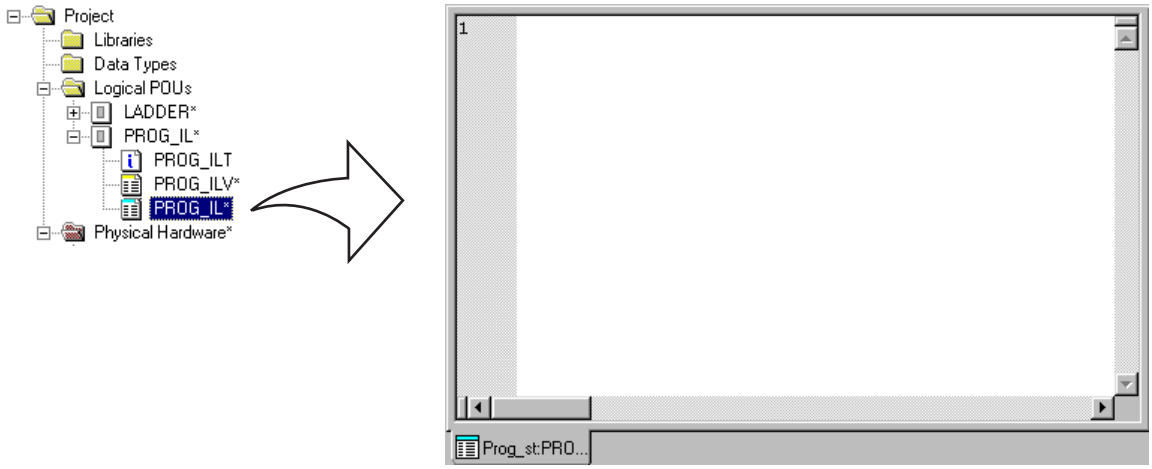
◆ On the [Insert] dialog box, enter a desired POU name (maximum 24 characters) in the [Name] text box, and select “Program” for [Type] and “IL” for [Language]. Select “MICREXSX” for [PLC type:] and “Current CPU type” for [CPU type:], respectively. After all these items are set, click the [OK] button, and the POU “PROG_IL” will be added to the project tree.



Section 6 Editing Codes in ST Language or IL Language

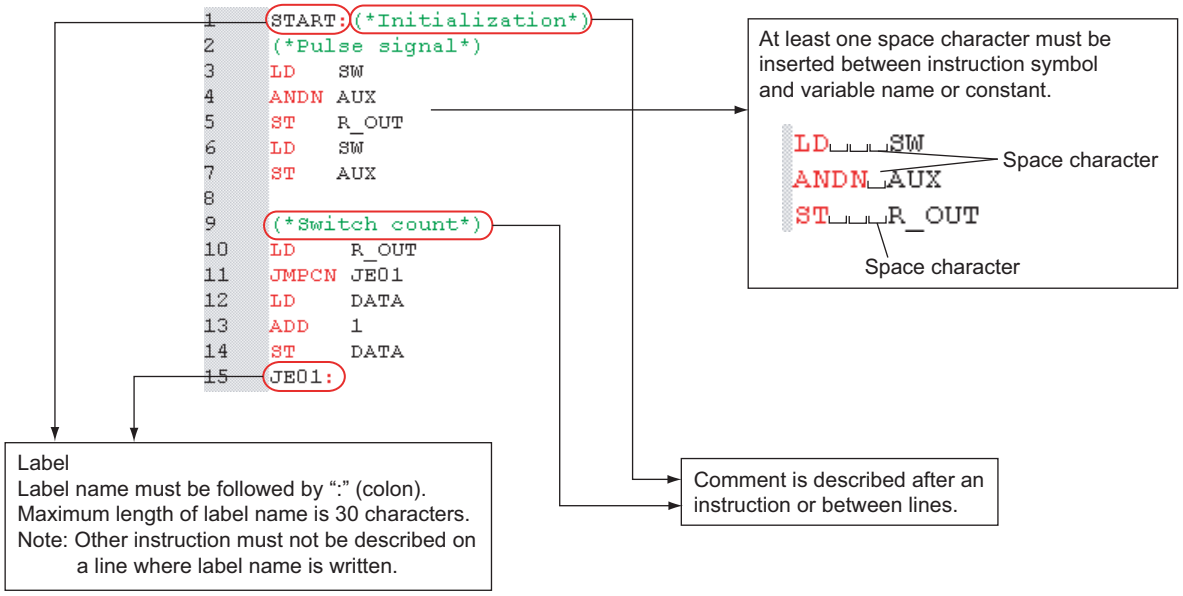
6-3 IL Language

◆ Double-click the code worksheet icon for the POU “PROG_IL”, and the code worksheet will be displayed.



(2) Basic description of codes

IL language program is made by describing one instruction on one line, which basically consists of instruction symbol, variable name, and comment, as shown in the figure below:



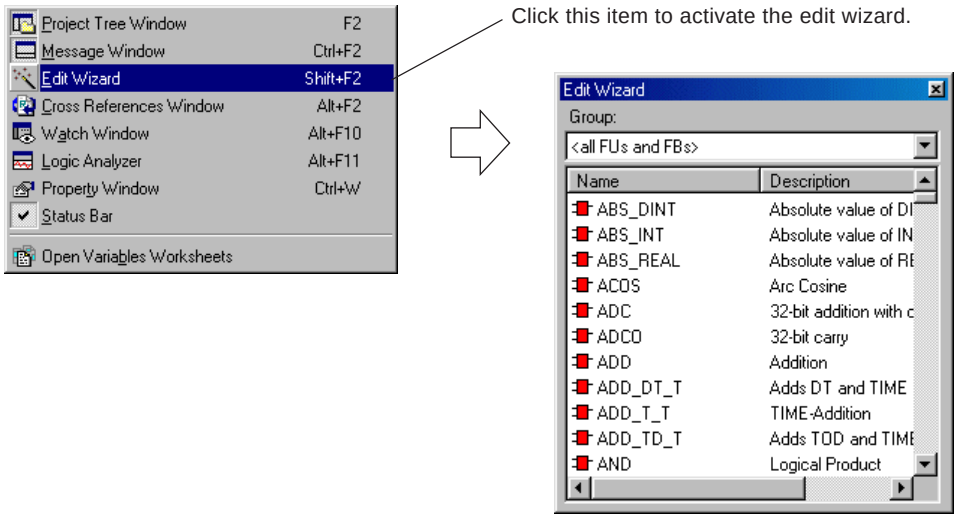
Section 6 Editing Codes in ST Language or IL Language

6-3 IL Language

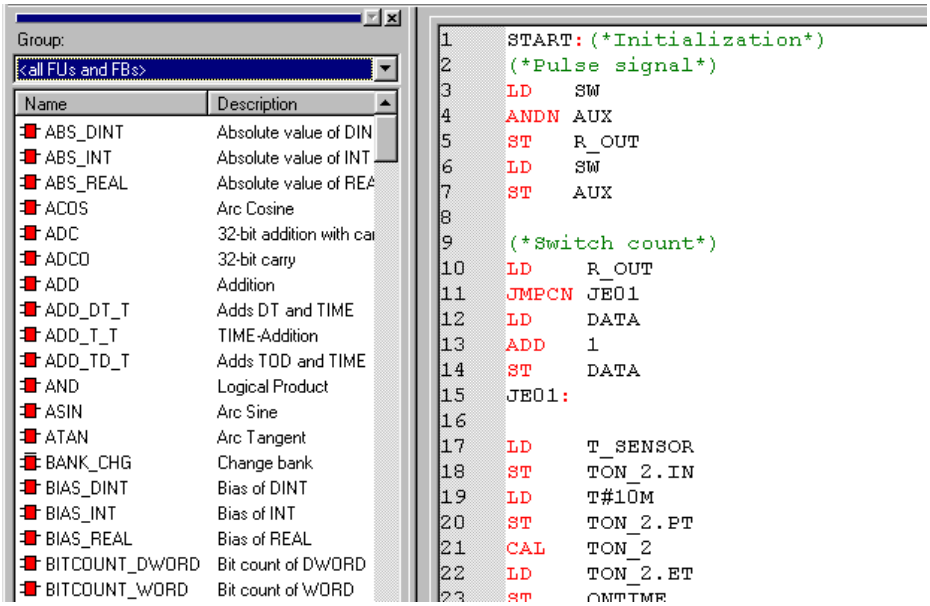
(3) Describing a code using the edit wizard

When programming in IL language, the program is coded in the format described in (2). To facilitate and simplify editing, and to prevent programming errors, D300win prepares the edit wizard.

◆ When no edit wizard is displayed on the D300win screen, fist you must display the edit wizard. Click the [Edit Wizard] command in the [View] menu, and the [Edit Wizard] window will be displayed.



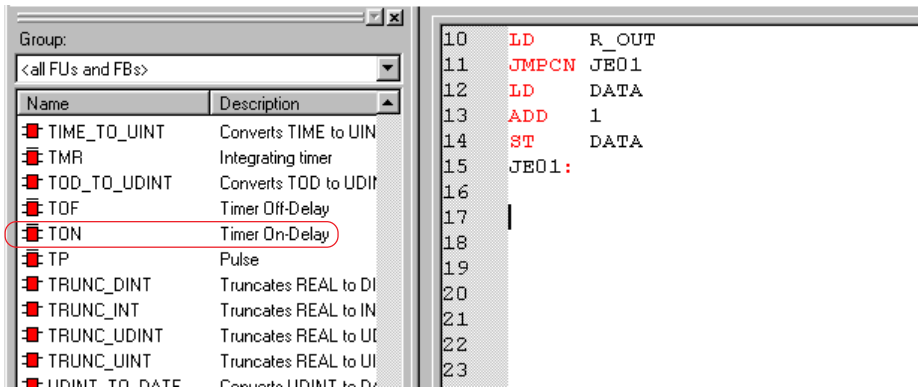
◆ While the [Edit Wizard] window can be used as an independent window, it can also be attached on the D300win screen, like code worksheet.

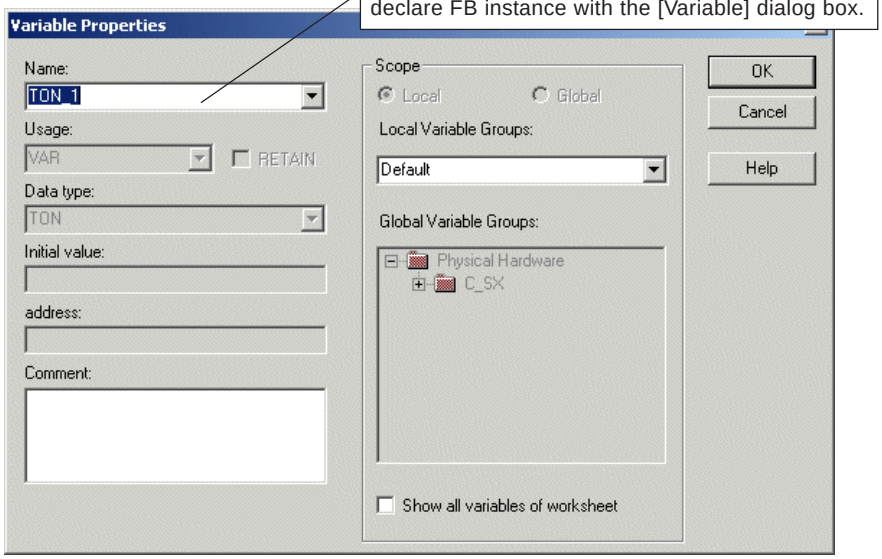


Section 6 Editing Codes in ST Language or IL Language

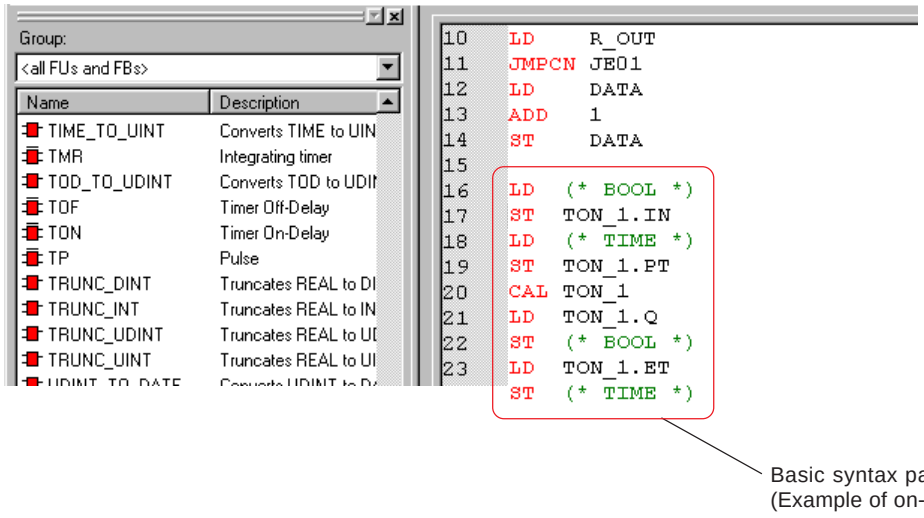
6-3 IL Language

◆ Place the cursor at a location at which you want to describe a code, and double-click the keyword or instruction that you want to use. Then the basic syntax of the selected keyword or instruction will be described on the code worksheet. You can make a program by rewriting the part enclosed by “(*” and “*)”.





Clicking the [OK] button creates the basic syntax on the code worksheet.



Basic syntax pasted
(Example of on-delay timer)

Section 7 Editing a Code with SFC Elements

7-1 SFC Elements Overview 7-1

7-2 Editing SFC Elements 7-2

7-2-1 Inserting a POU 7-2
7-2-2 Creating an SFC network 7-3
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7-2-4 Setting/changing an action 7-17
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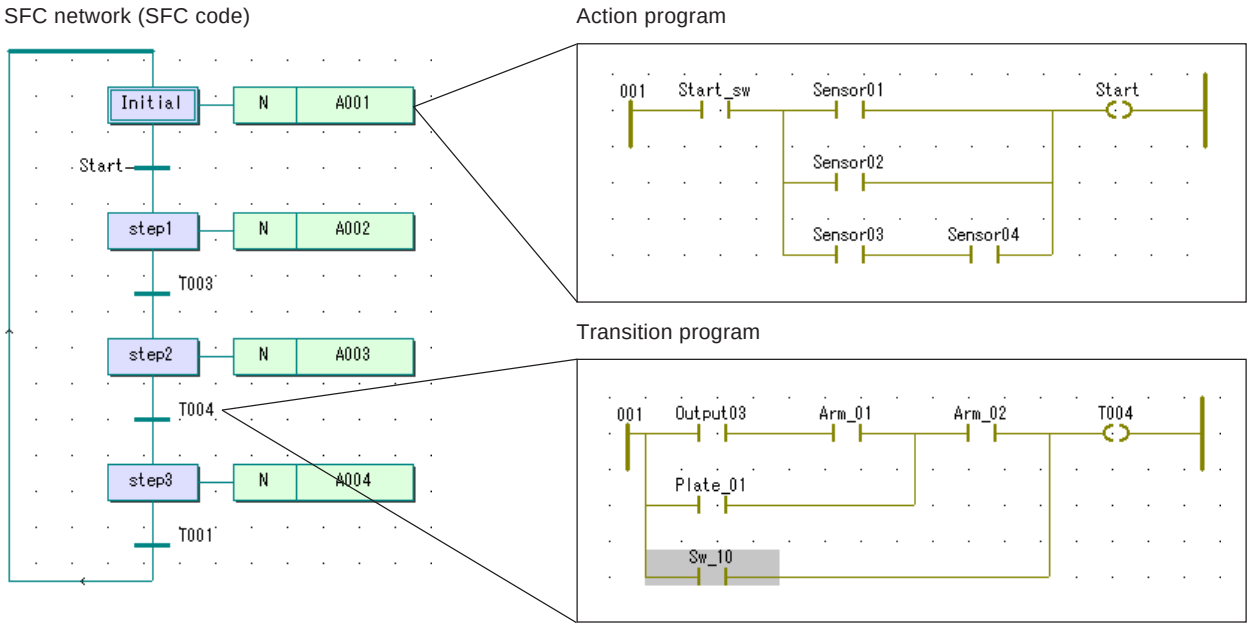
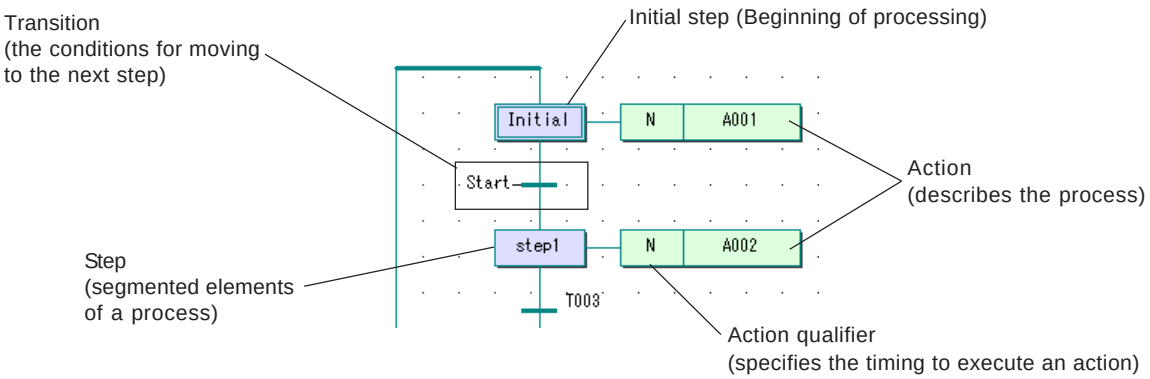
Section 7 Editing Codes with SFC Elements

7-1 SFC Elements Overview

SFC is a programming method that expresses the motion of a plant or a machine by a flow chart. An SFC network consists mainly of “Step” that shows one process of a program motion, “Action” in which the program executed in said process is stored, and “Transition” that shows the conditions for shifting from one process to the next process.
One SFC network is structured basically as a closed loop, and requires one initial step. Simultaneous sequence divergence or divergence of sequence selection can be inserted in an SFC network. Comment can be inserted at arbitrary location, like with the LD/FBD editor.
An example of simple SFC network is shown below:



<SFC network element>



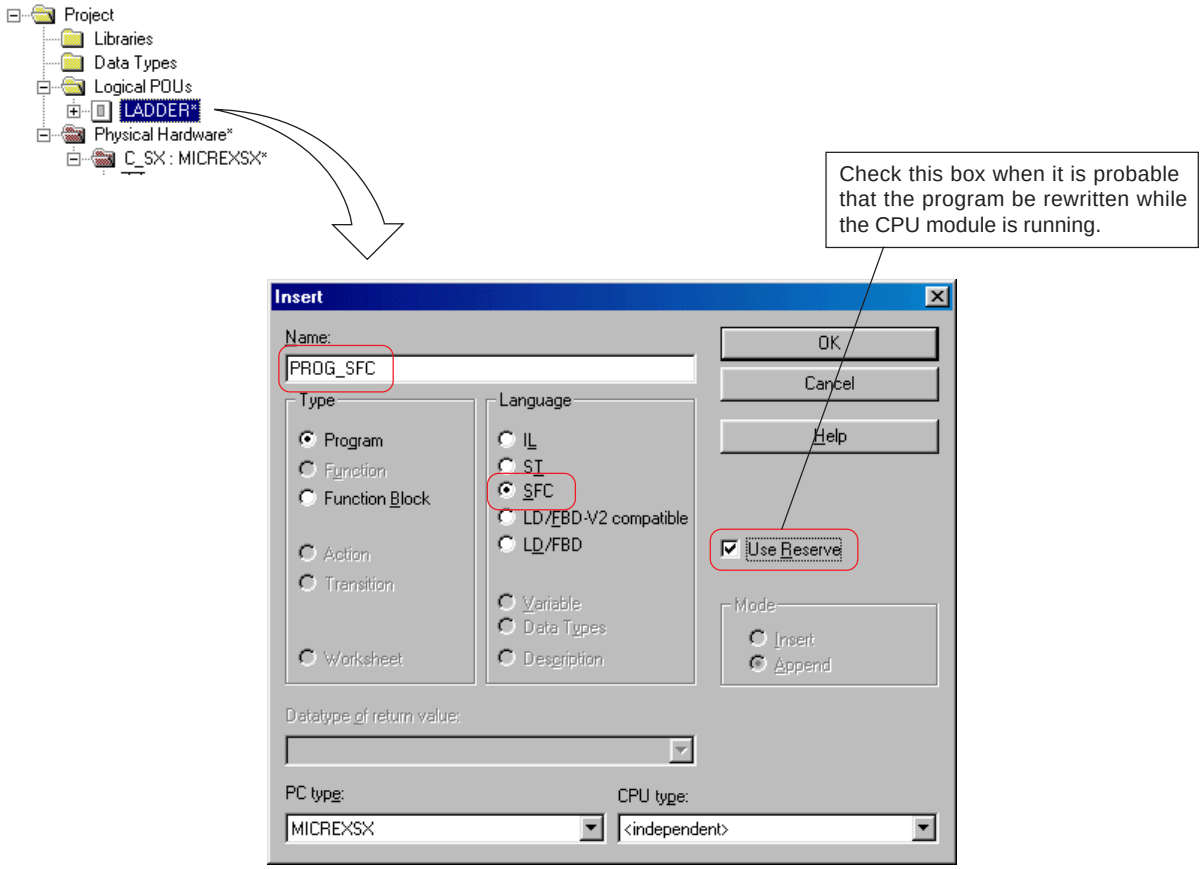
Each action or transition must be assigned a BOOL-type variable or be programmed in IL, ST, LD or FBD language.

Section 7 Editing Codes with SFC Elements

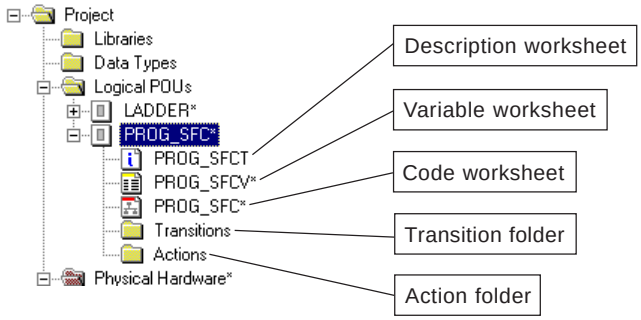
7-2 Editing SFC Elements

7-2-1 Inserting a POU

◆ A POU that is to be created using SFC elements is inserted in the [Logical POUs] folder in the project tree. In this example, a POU is inserted (added) below the POU “LADDER”. Select “LADDER” and click the [Add Program] button or press the <Insert> key. Then the [Insert] dialog box will be displayed.



◆ On the [Insert] dialog box, enter a desired POU name. (maximum 24 characters) in the [Name] text box, and select “Program” for [Type] and “SFC” for [Language]. Select “MICREXSX” for [PLC type:] and “Current CPU type” for [CPU type:], respectively. After all these items are set, click the [OK] button, and the POU “PROG_SFC” will be added to the project tree. When SFC elements are used as programming language, a POU consists of description worksheet, variable worksheet, and code worksheet as well as transition folder and action folder.



Note: Only one SFC network can be created on one code worksheet.

Transition folder

This is a folder for the worksheet for transition program. All the transition program worksheets that are used on the SFC code worksheet are stored in this folder.

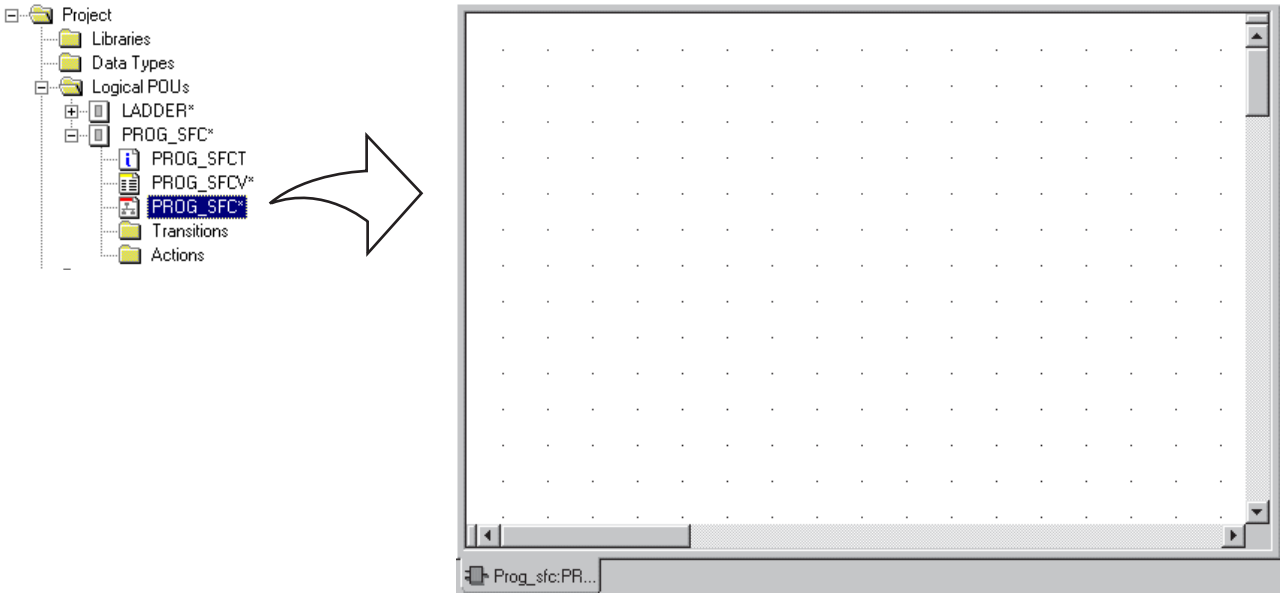
Action folder

This is a folder for the worksheet for action program. All the action program worksheets that are used on the SFC code worksheet are stored in this folder.

Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

◆ Double-click the code worksheet icon for the POU “PROG_SFC”, and the code worksheet will be displayed.

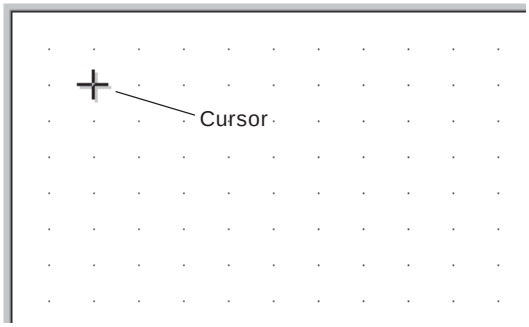


7-2-2 Creating an SFC network

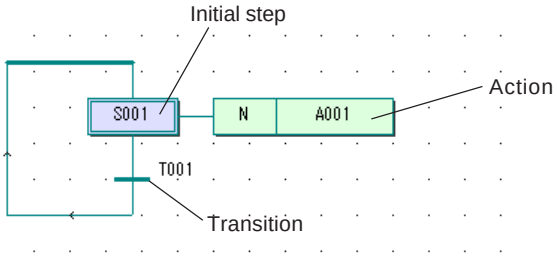
(1) Inserting a new SFC network

To edit an SFC network, first you must inset a basic network (a network having one step and one transition) on the worksheet.

◆ Click an arbitrary point on the code worksheet to place the pointer there.



◆ Click the [Create step transition sequence] button, and an SFC network having one step (initial step) and one transition will be inserted there. One action is connected to the step.



* Step name, action name and transition name can be changed. For more information, see “7-2-3 Setting/changing a step”, “7-2-4 Setting/changing an action”, and “7-2-5 Setting/changing a transition”.

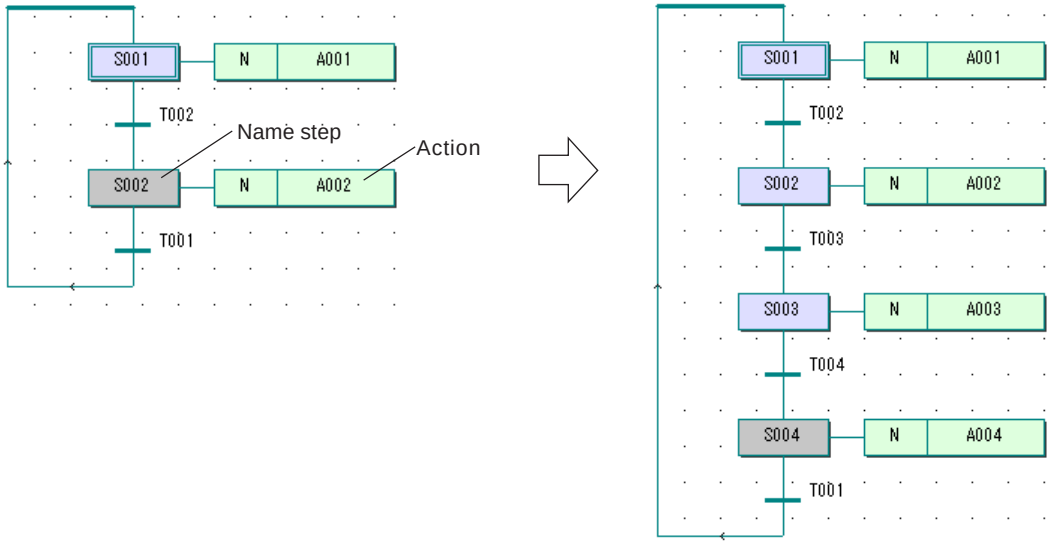
Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

(2) Adding a step and a transition

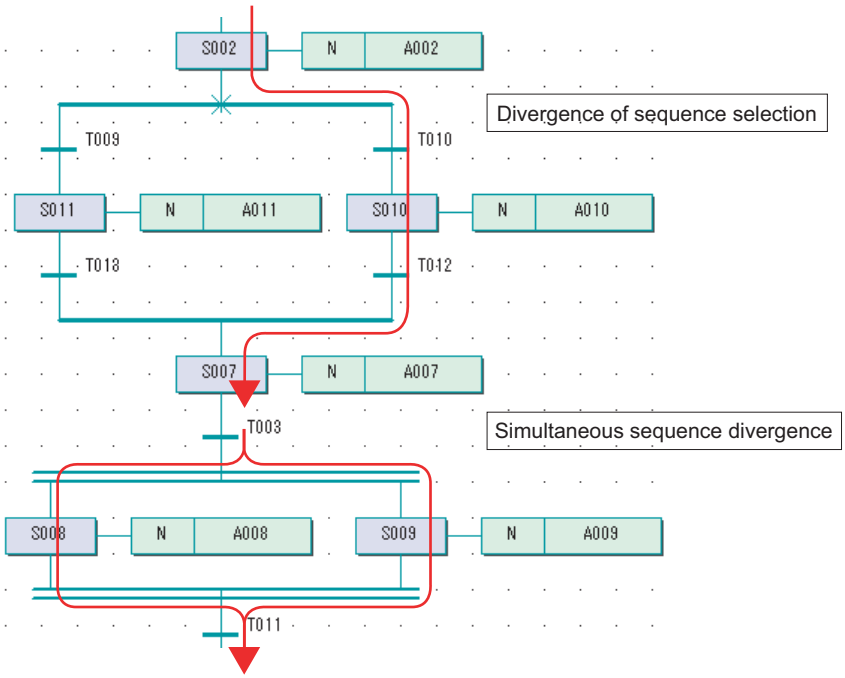
To add a step and a transition to an SFC network, do as follows:

◆ In the condition that step “S001” is selected, click the [Create step transition sequence] button. A normal step will be added and inserted below step “S001”. To add more steps, repeat this procedure.



(3) Inserting a branch

There are two types of branch for SFC network: divergence of sequence selection and simultaneous sequence divergence. Divergence of sequence selection selects one of the steps that exist below it and executes the selected step. Divergence of sequence selection is expressed by a bold horizontal line.
Simultaneous sequence divergence executes parallel all the steps that exist below it, by processing the corresponding programs at a time. Simultaneous sequence divergence is expressed by a bold horizontal double-line.



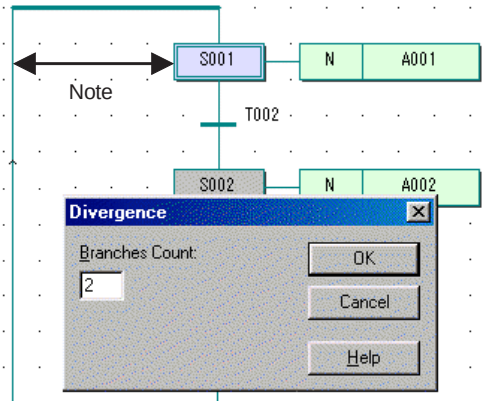
Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

1) Inserting a divergence of sequence selection

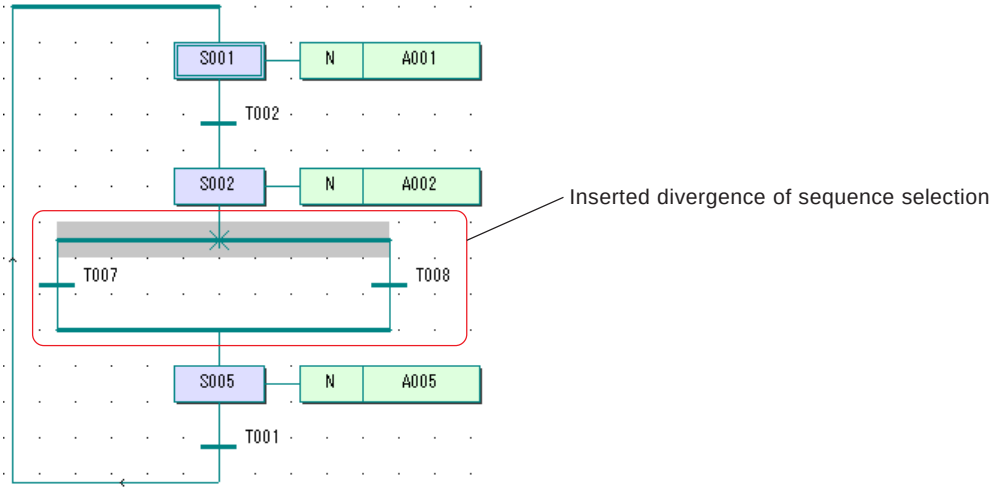
To insert a network for divergence of sequence selection at step “S002”, do as follows:

◆ Select step “S002” and click the [Insert Simultaneous/Alternative Divergence] button. Then the [Divergence] dialog box will be displayed.

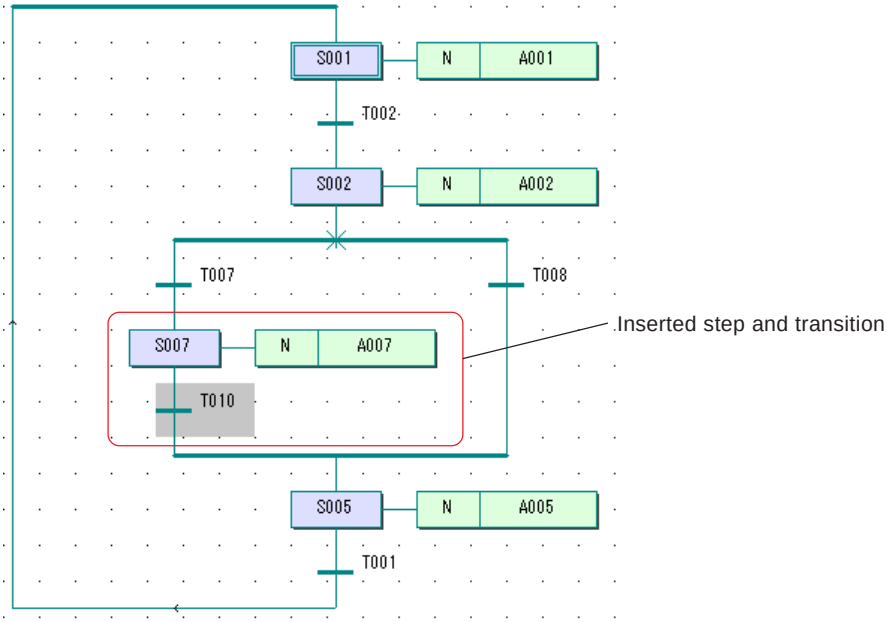


Note: When inserting a divergence of sequence selection, keep enough space between the objects so that they won’t overlap on each other.

◆ Enter “2” in the [Branches Count] text box, and click the [OK] button. A divergence of sequence selection will be added.



◆ Insert a step in the inserted divergence of sequence selection
Select the transition (in this example, transition “T007”) at the location where you want to inset a step, and click the [Create step transition sequence] button. A step and a transition will be inserted.



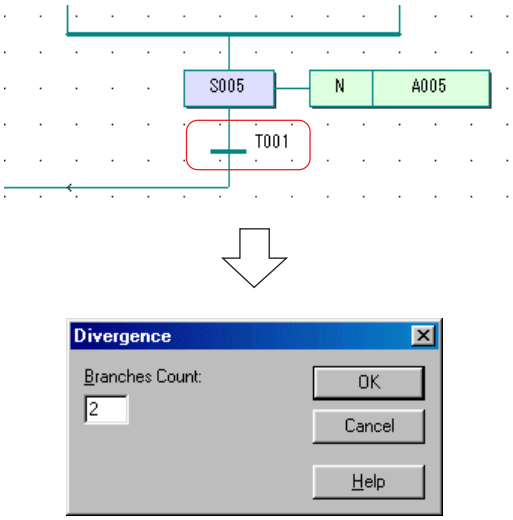
Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

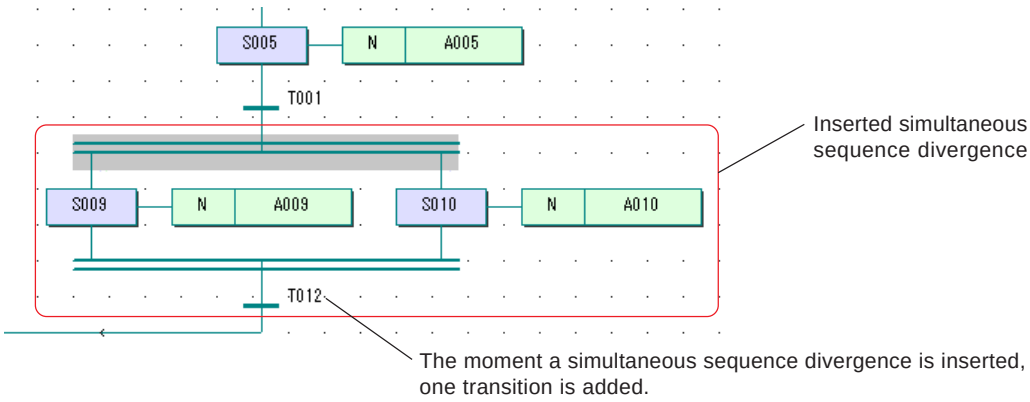
2) Inserting a simultaneous sequence divergence

To insert a network for simultaneous sequence divergence at step “S005”, do as follows:

◆ Select the transition that exists below step “S005” and click the [Insert Simultaneous/Alternative Divergence] button. Then the [Divergence] dialog box will be displayed.



◆ Enter “2” in the [Branches Count] text box, and click the [OK] button. A simultaneous sequence divergence will be added.



Section 7 Editing Codes with SFC Elements

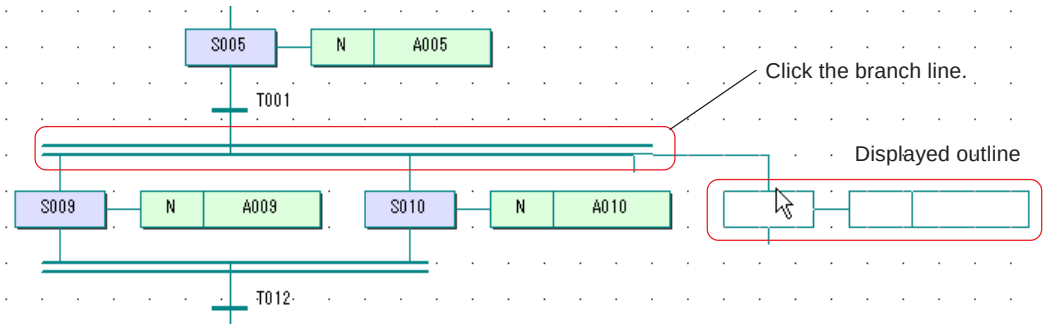
7-2 Editing SFC Elements

(4) Adding a branch network

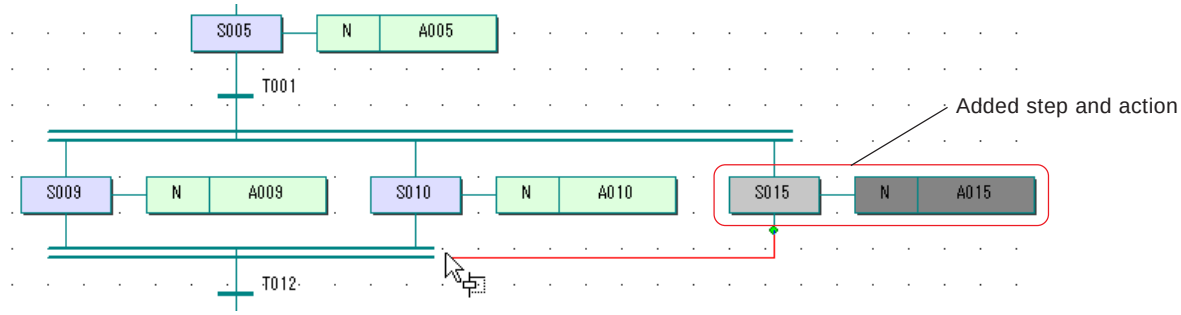
The method for inserting a divergence of sequence selection or a simultaneous sequence divergence is explained above. This paragraph explains the method for increasing the number of branches of an existing divergence.

◆ Click the [Insert SFC branch] button, and then click the branch line.

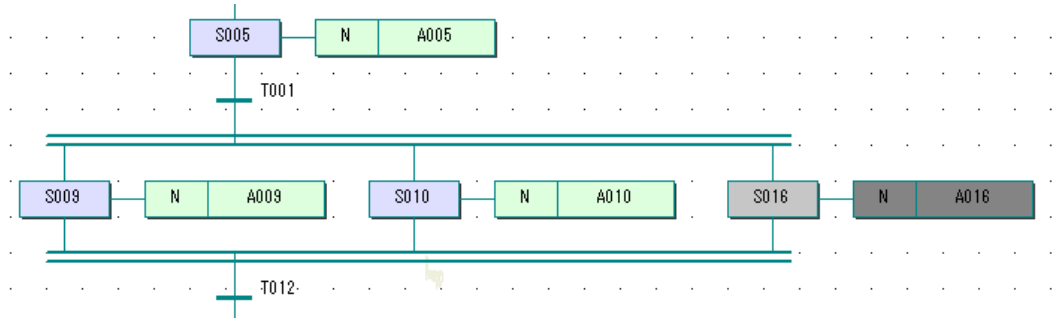
The step and action that are to be added as a branch are displayed as an outline.



◆ Click a point at a location where no overlap will occur with any of the existing objects, and the step and action will be added.



◆ Move the cursor to a point on which branch lines should converge, and click the point.



Section 7 Editing Codes with SFC Elements

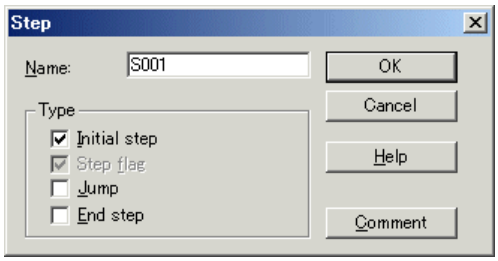
7-2 Editing SFC Elements

7-2-3 Setting/changing a step

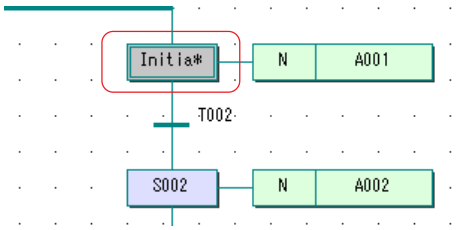
(1) Changing step name

When an SFC network is created, it is inserted on the SFC code worksheet with step name “S***” already added. Step name is set within 24 characters. However, the name must not begin with a numeric character, nor the characters reserved for D300win system may be used in the name.

◆ In this example, the initial step “S001” is changed to “Initial_Step”. Double-click “S001”, and the [Step] dialog box will be displayed.



◆ Rewrite “S001” to “Initial_Step” in the [Name:] text box, and click the [OK] button.



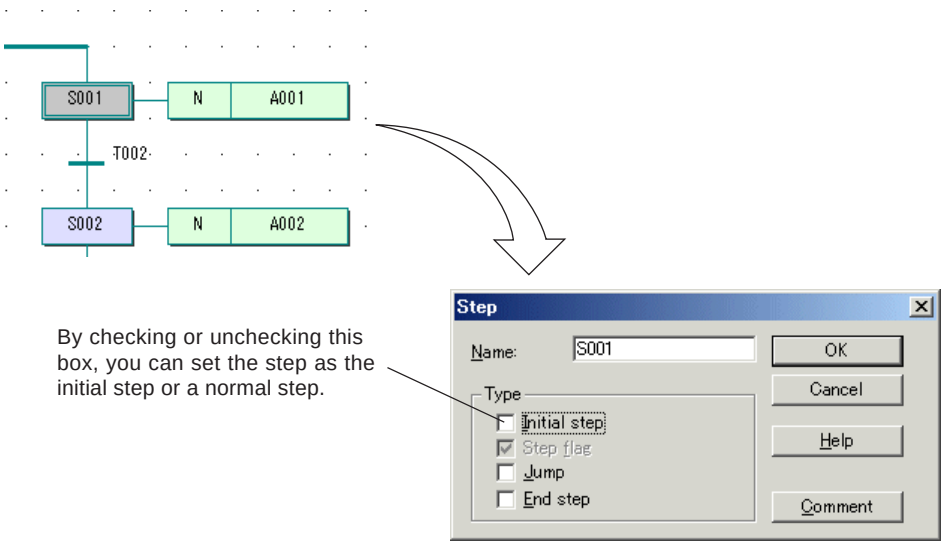
When a name is followed by “*”, it means that the name continues further. To display the remaining part of the name, uncheck the [Fixed SFC Objects Width] command in the [Layout] menu. Then move rightward the action block that is connected to the step, and the whole name will be displayed.

(2) Changing the initial step to a normal step, or vice versa

In this example, the initial step “S001” is changed to a normal step, and normal step “S002” is changed to the initial step.

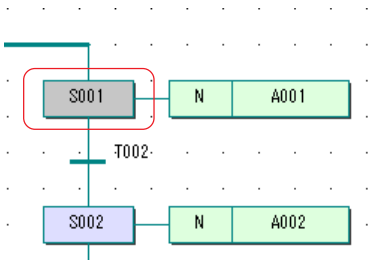
1) Changing the initial step to a normal step

◆ Double-click the initial step “S001” to display the [Step] dialog box.



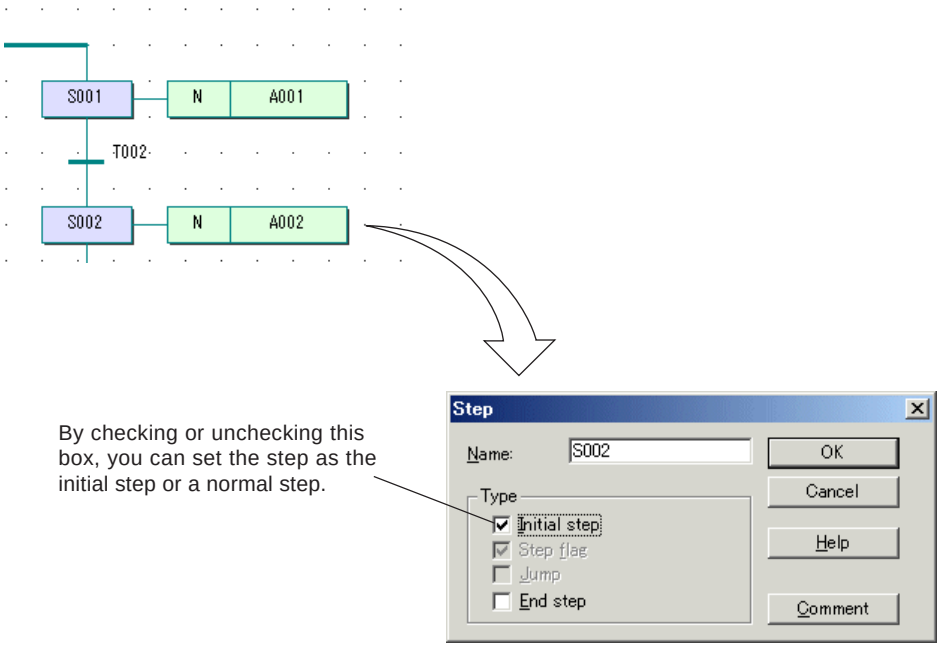
7-2 Editing SFC Elements

◆ Uncheck the [Initial step] box, and click the [OK] button.

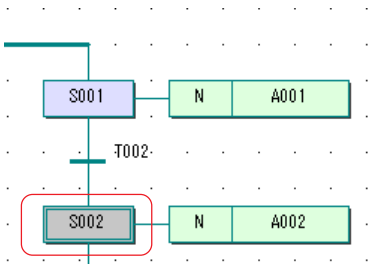


2) Changing a normal step to the initial step

◆ Double-click the normal step “S002” to display the [Step] dialog box.



◆ Check the [Initial step] box, and click the [OK] button.

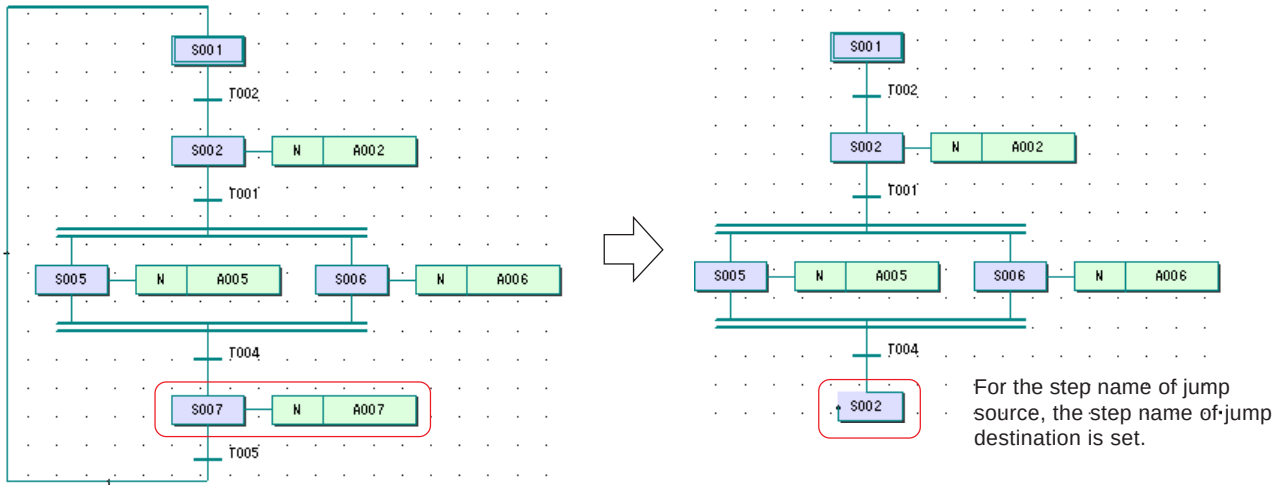


Section 7 Editing Codes with SFC Elements

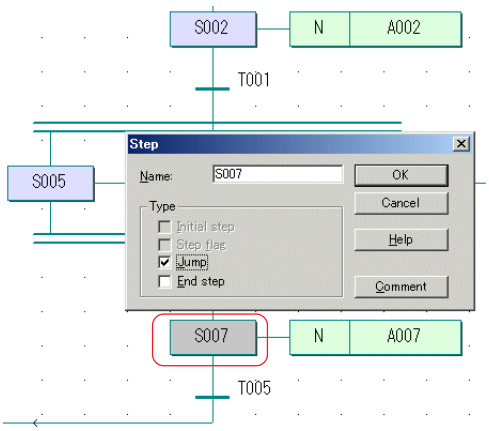
7-2 Editing SFC Elements

(3) Changing to a jump step

In this example, normal step “S007” is changed to a jump step and then set such that we will jump to step “S002”.

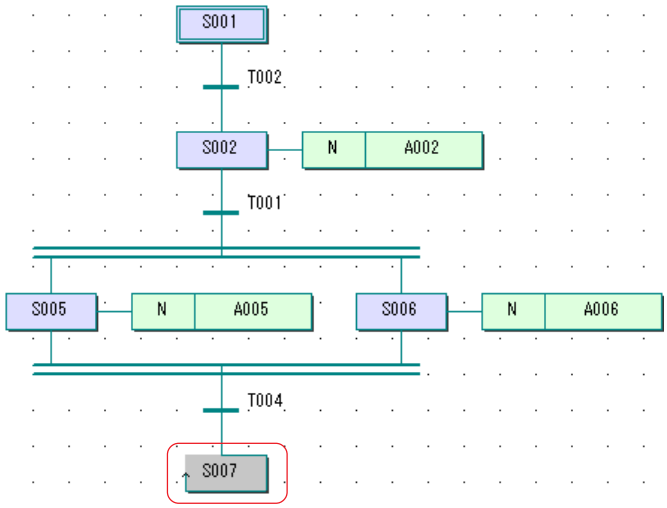


◆ Double-click normal step “S007”, and the [Step] dialog box will be displayed. On this dialog box, check the [Jump] box and click the [OK] button. The [Jump/End step insert control] dialog box will be displayed.

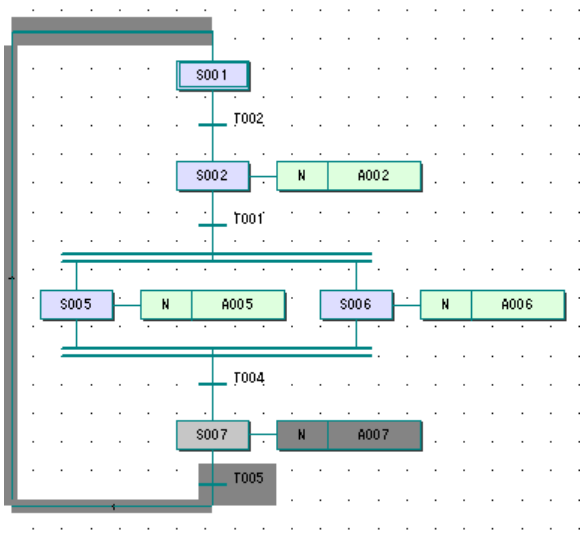


7-2 Editing SFC Elements

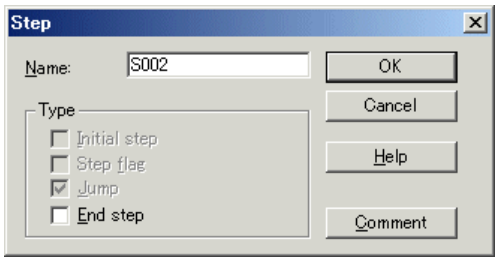
◆ Click the [Change] button, and step “S007” will change to a jump step, as shown in the figure below:

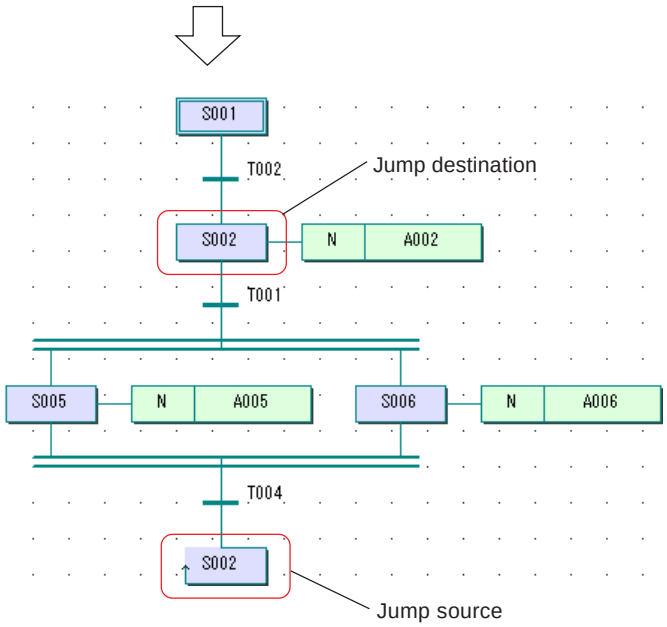


When the [Show marked objects for delete] box is checked and the [OK] button is clicked, the part to be deleted is highlighted, as shown below.



◆ The name of jump step must be the step name of jump destination. Double-click “S007”, and enter a desired step name (“S002” in this example) in the [Name:] text box on the displayed [Step] dialog box, and click the [OK] button.



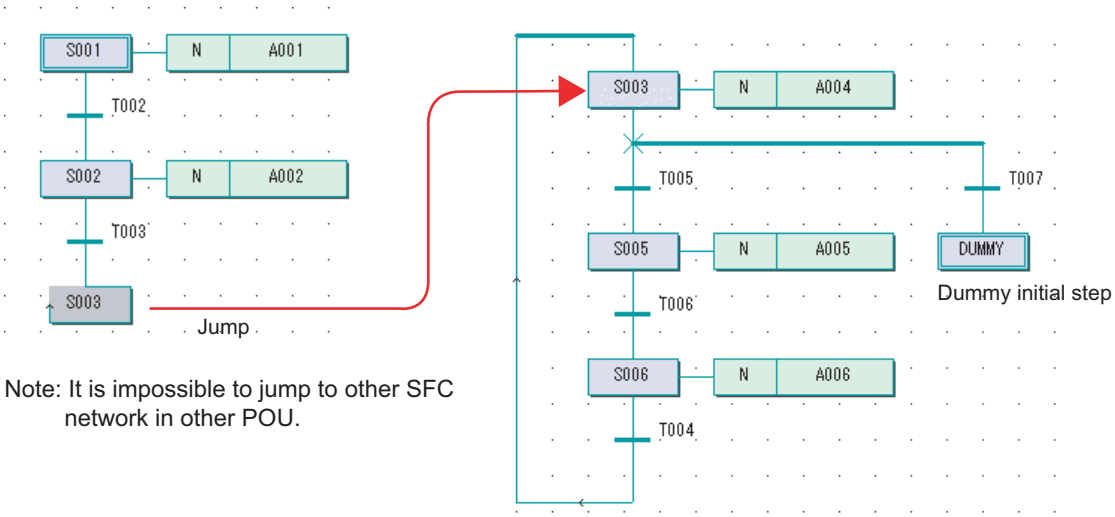


Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

<Method for jumping to other SFC network>

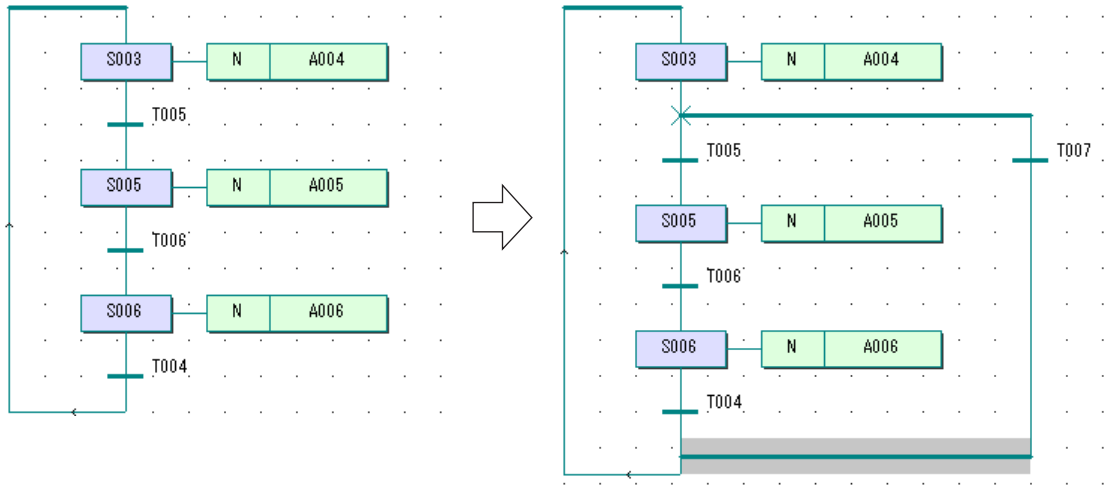
Using a jump step, you can jump to an SFC network on other code worksheet in a same POU. For this, a step having the same name as the step of jump source is created in the SFC network as jump source. Each SFC network must have one initial step. Even when no initial step is necessary on the jump destination worksheet, be sure to create a dummy initial step.



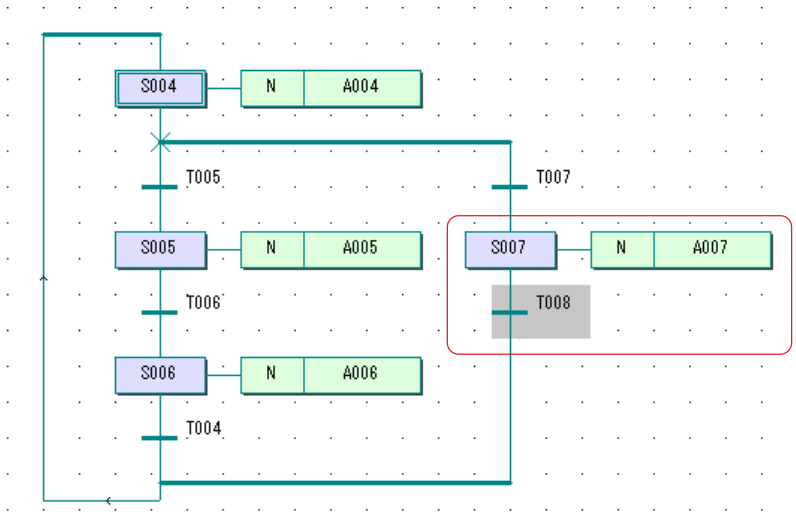
Note: It is impossible to jump to other SFC network in other POU.

Create a dummy initial step, as shown in above figure.

◆ Click the [Insert SFC branch] button to create a divergence of sequence selection.



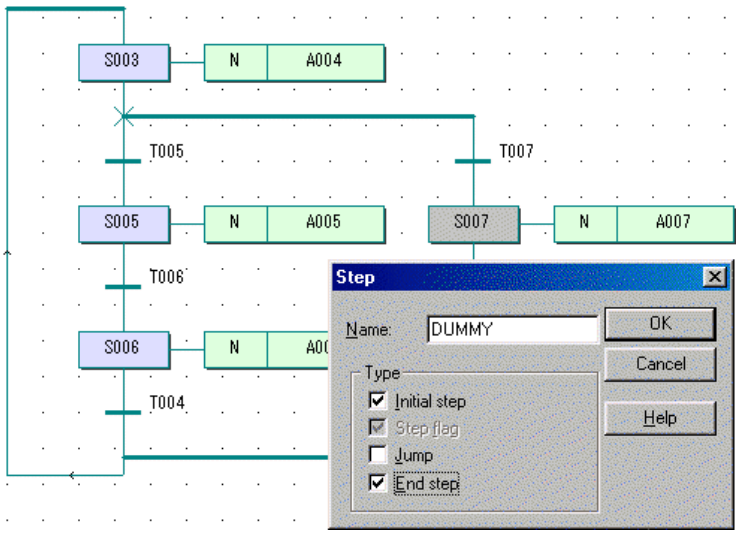
◆ Select transition “T007” and click the [Create step transition sequence] button. A step, an action and a transition will be inserted, as shown in the figure below.



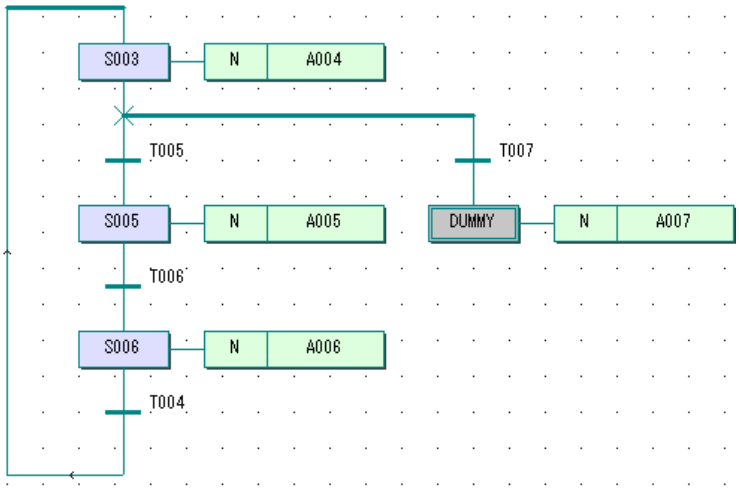
Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

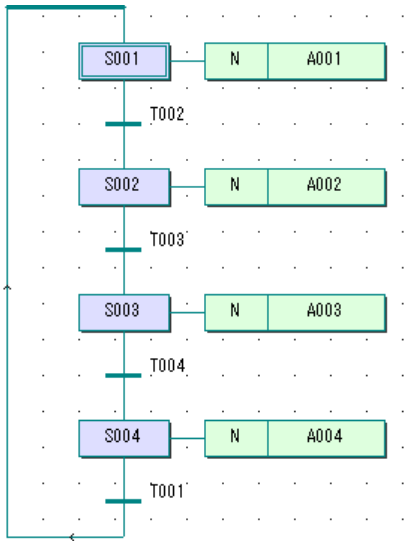
◆ Double-click step “S007” that is to become a dummy initial step to display the [Step] dialog box. On this dialog box, check the [Initial step] box as well as the [End step] box, enter a desired step name (“DUMMY” in this example) in the [Name:] text box, and click the [OK] button.



◆ The transition and the convergence line for the divergence of sequence selection that exist below the “DUMMY” step will be deleted, as shown in the figure below.



◆ Delete the action that is connected to the “DUMMY” step.



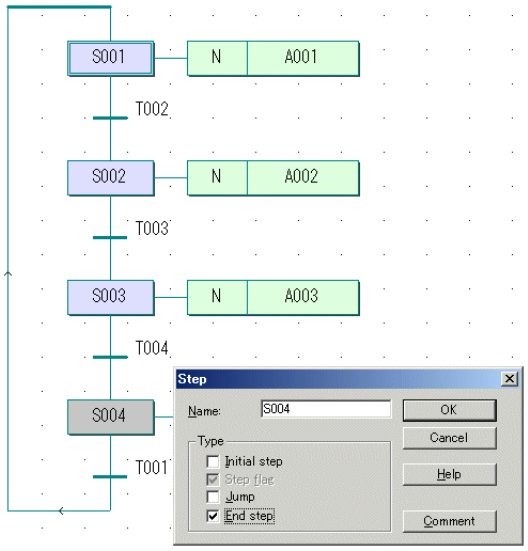
Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

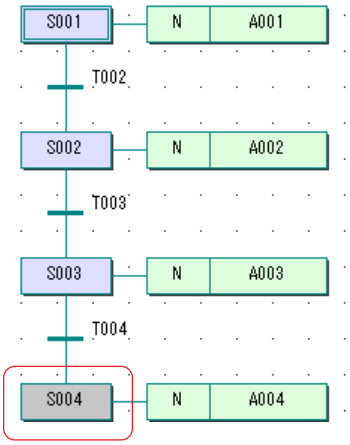
(4) Changing to an end step

The method to change normal step “S004” of the SFC network as shown below to an end step is explained below:

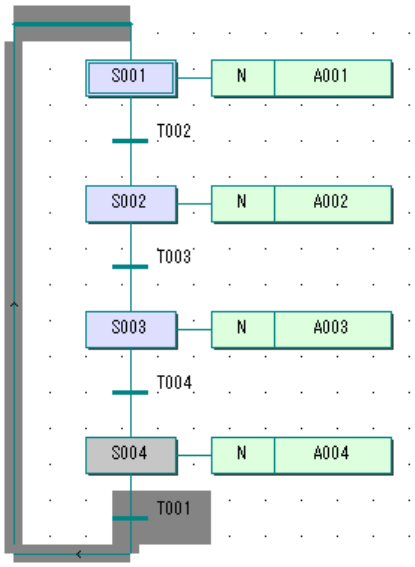
◆ Double-click step “S004” to display the [Step] dialog box. On this dialog box, check the [End step] box, and click the [OK] button.



◆ The [Jump/End step insert control] dialog box is displayed. Click the [Change] button on this dialog box, and “S004” will change to an end step.



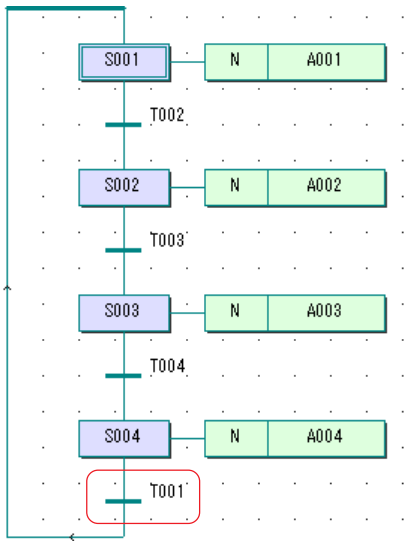
When the [Show marked objects for delete] box is checked and the [OK] button is clicked, the part to be deleted is highlighted, as shown below.



7-2 Editing SFC Elements

[Precautions for creating an SFC network using an end step]

When creating a network as shown in the previous figure, if process proceeds to the end step, the processing of program is stopped.
To restart the network, the PLC system needs to be restarted.
As a measure to re-execute the processing of the program without restarting the PLC system, the network may be devised to be as shown below so that control can be performed by the transition that is added after the final step (in this example, transition “T001” that is added after step “S004”.)

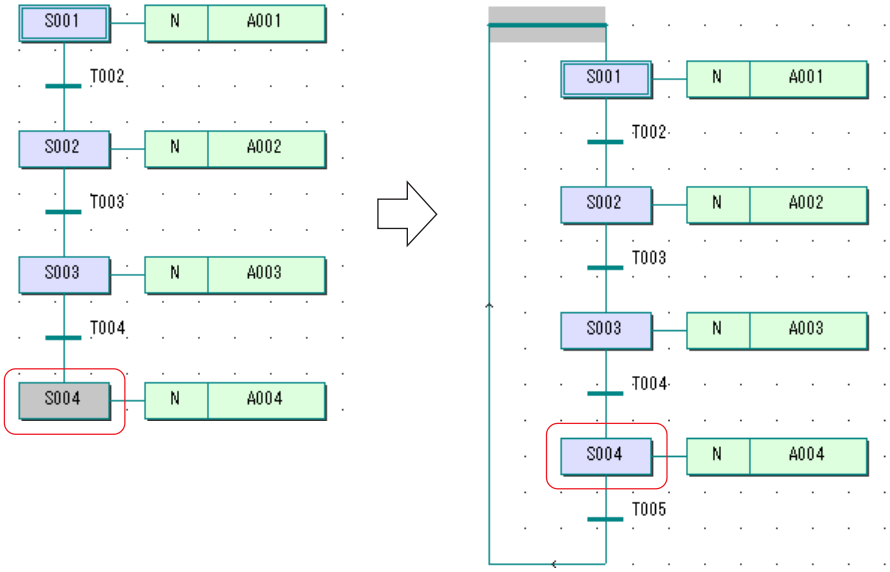


Section 7 Editing Codes with SFC Elements

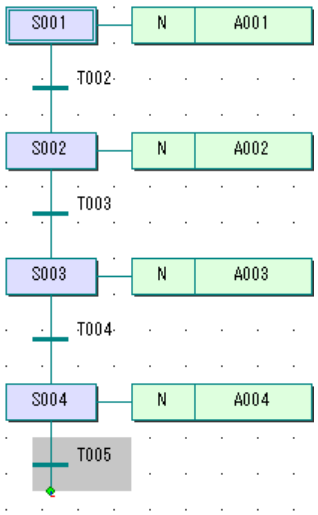
7-2 Editing SFC Elements

(5) Changing a jump or end step to a normal step

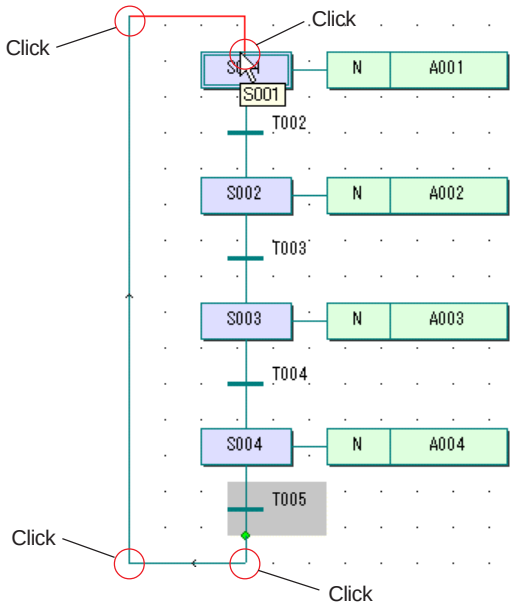
The method to change a jump or end step to a normal step is explained below.



◆ Click the [Insert SFC branch] button, and click end step “S004”. A transition will be inserted after “S004”.



◆ Move the mouse cursor to draw a line as shown in the figure below:



Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

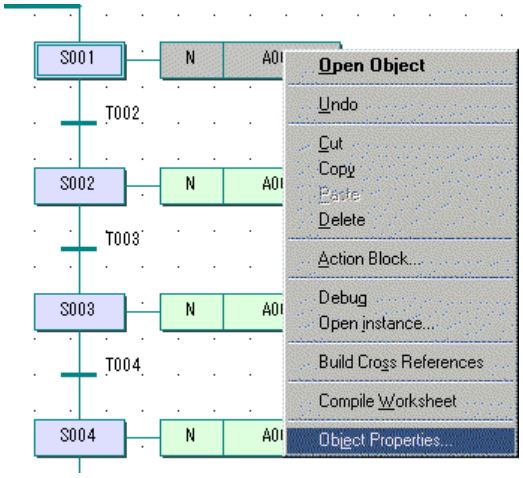
7-2-4 Setting/changing an action

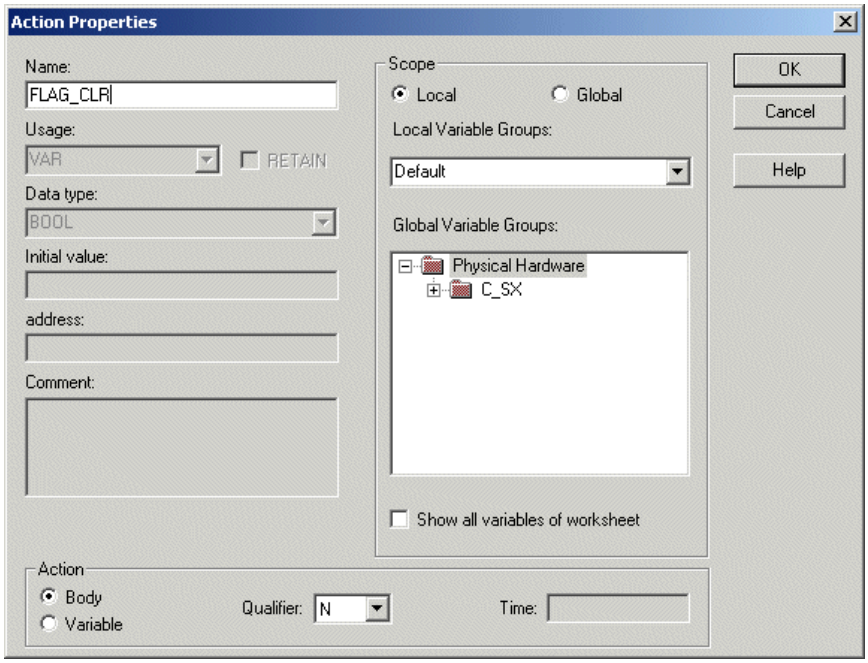
(1) Changing the name of an action

<About action name>

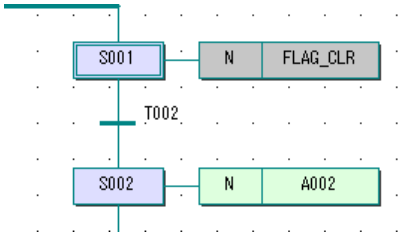
Action name is set within 24 characters. However, the name must not begin with a numeric character, nor the characters reserved for D300win system may be used in the name.

◆ In this example, action “A001” of an SFC network as shown below is changed to “FLAG_CLR”.
Right-click action “A001”, and left-click the [Object Properties...] command in the displayed shortcut menu. Then the [Acton Properties] dialog box will be displayed.





◆ Rewrite “A001” to “FLAG_CLR” in the [Name:] text box, and click the [OK] button.

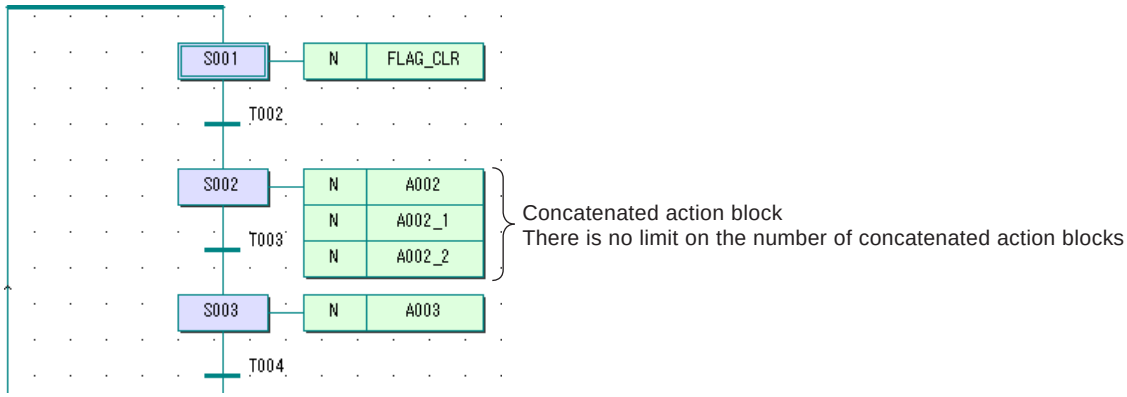


When a name is followed by “*”, it means that the name continues further. To display the remaining part of the name, uncheck the [Fixed SFC Objects Width] command in the [Layout] menu. Then move rightward the action block that is connected to the step, and the whole name will be displayed.

7-2 Editing SFC Elements

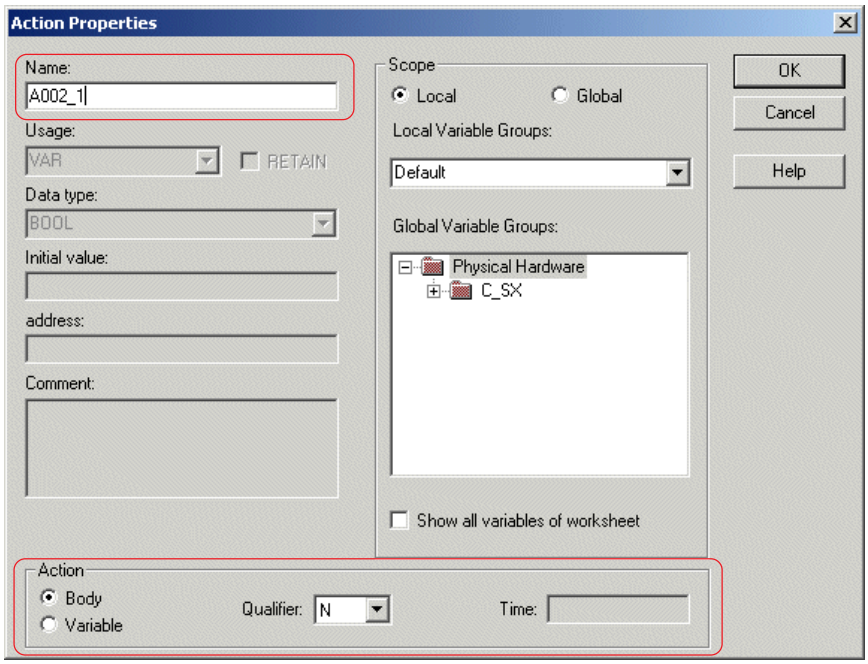
(2) Inserting an action block

You can add a new action block to an existing action clock to create a concatenated action block.
(A concatenated action block is multiple action blocks that are assigned to a single step.)

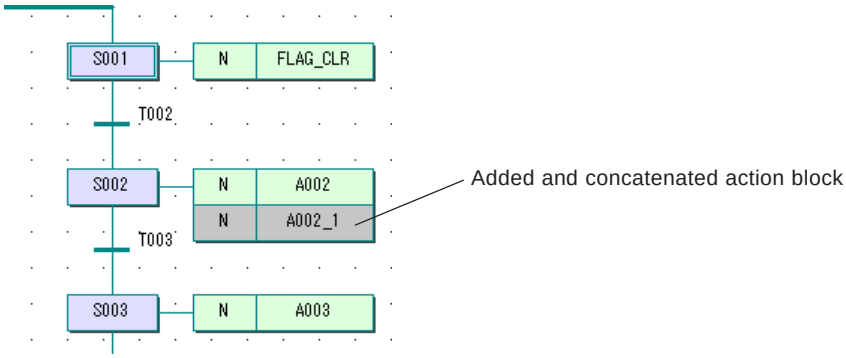


1) Inserting a concatenated action block

◆ Select action block “A002” to which you want to insert an action block, and click the [Create action] button or click the [Action Block...] command in the right-click menu. Then the [Action Properties] dialog box will be displayed.



◆ After setting action name, definition and qualifier, click the [OK] button. An action will be concatenated below “A002”.

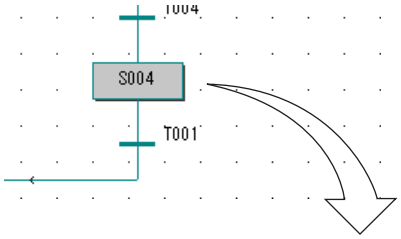


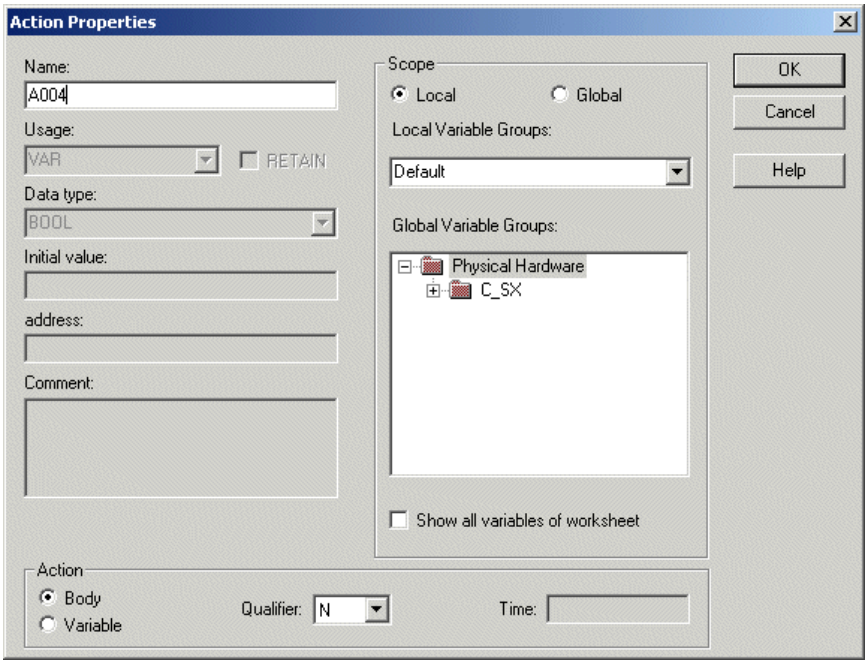
Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

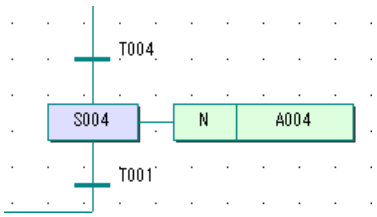
2) Inserting an action into a step where no action exists

◆ Select step “S004”, and click the [Create action] button or click the [Action Block...] command in the right-click shortcut menu. The [Action Properties] dialog box will be displayed.





◆ After setting action name, definition and qualifier, click the [OK] button. An action will be concatenated below “A002”.



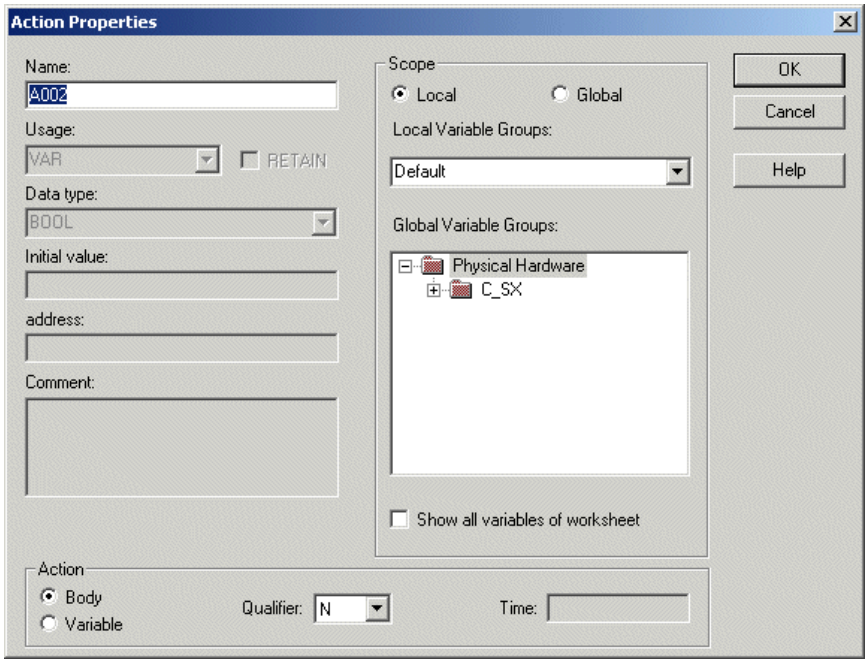
Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

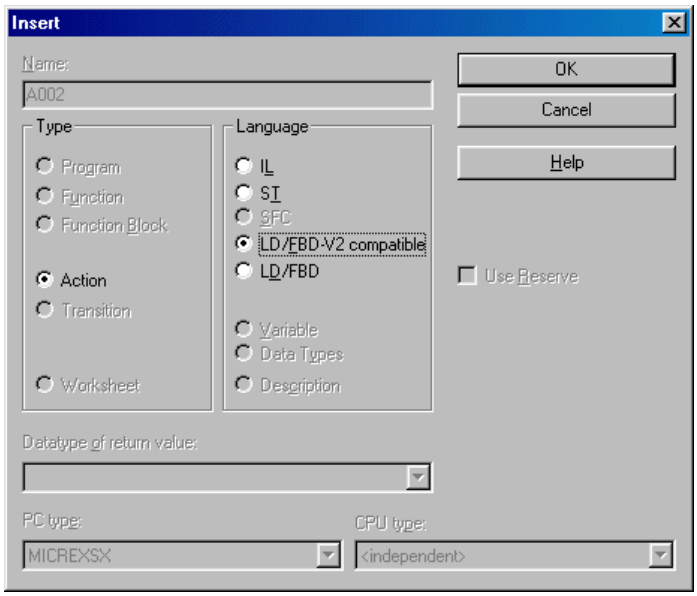
(3) Making an action program

To make an action program, “Body” is selected for [Code] to prepare an action code worksheet. Then you can code the program on the worksheet. Action program is made using IL, ST, or LD/FBD language.

◆ Right-click action “A002”, and left-click the [Object Properties...] command in the displayed shortcut menu. Then the [Action Properties] dialog box will be displayed. On this dialog box, turn on the optional [Body] button in the [Code] box, and click the [OK] button.

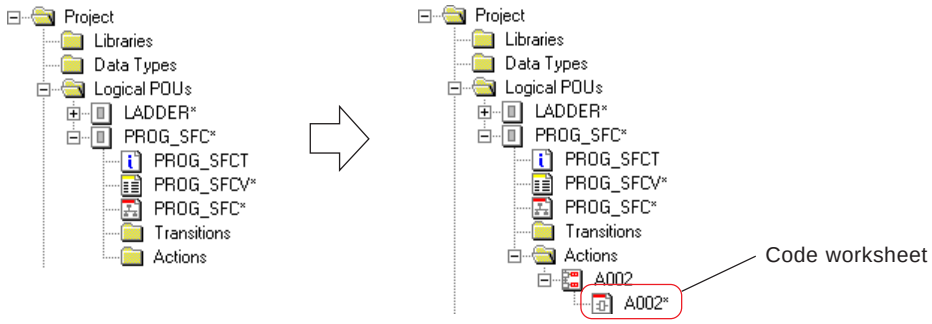


◆ Double-click action “A002” for which you want to make an action program, and the [Insert] dialog box will be displayed.

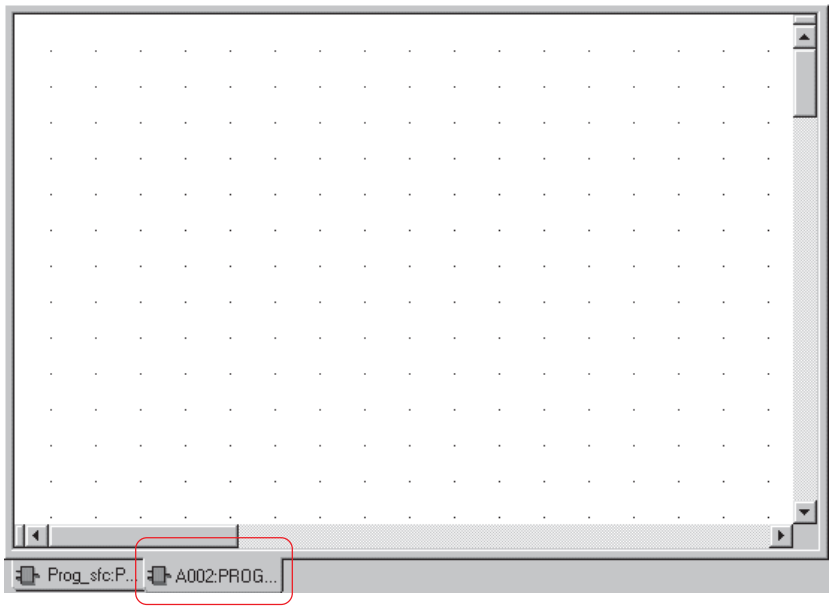


7-2 Editing SFC Elements

◆ On this dialog box, select a programming language and click the [OK] button. A code worksheet for action “A002” will be created.



◆ Double-click the code worksheet icon to open the code worksheet, on which you can make an action program.



* Like POU code worksheet, action code worksheet can be added and inserted.

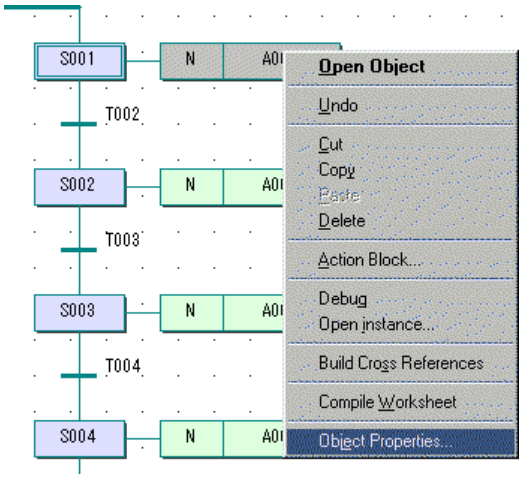
Section 7 Editing Codes with SFC Elements

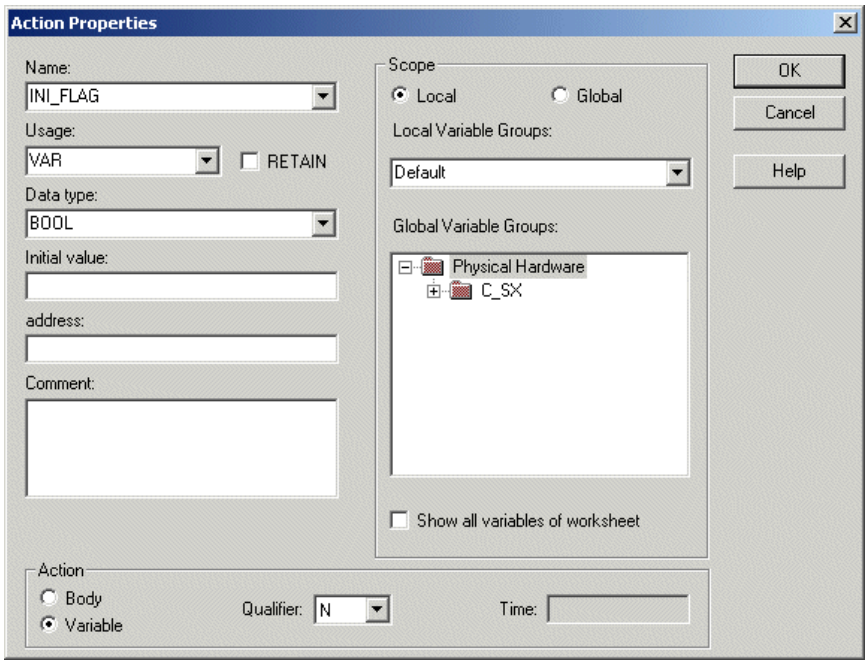
7-2 Editing SFC Elements

(4) Method to define an action as a variable

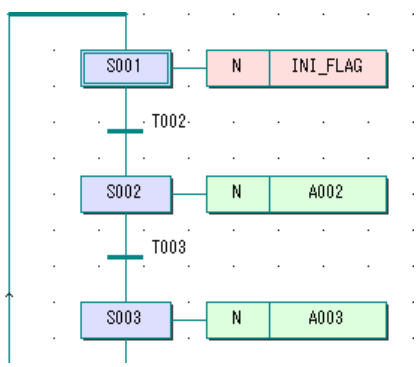
An SFC action can be defined to be a variable (only BOOL-type). The action that is defined as a variable turns ON and OFF according to the operation of the qualifier that is set for it, when the step is activated.

◆ Right-click action “A001” that you want to define as a variable, and left-click the [Object Properties...] command in the displayed shortcut menu. Then the [Action Properties] dialog box will be displayed.





◆ Select “Variable” for [Action], and set action variable name, scope (local or global variable) and qualifier. After setting these items, click the [OK] button. The action will change to be a variable.

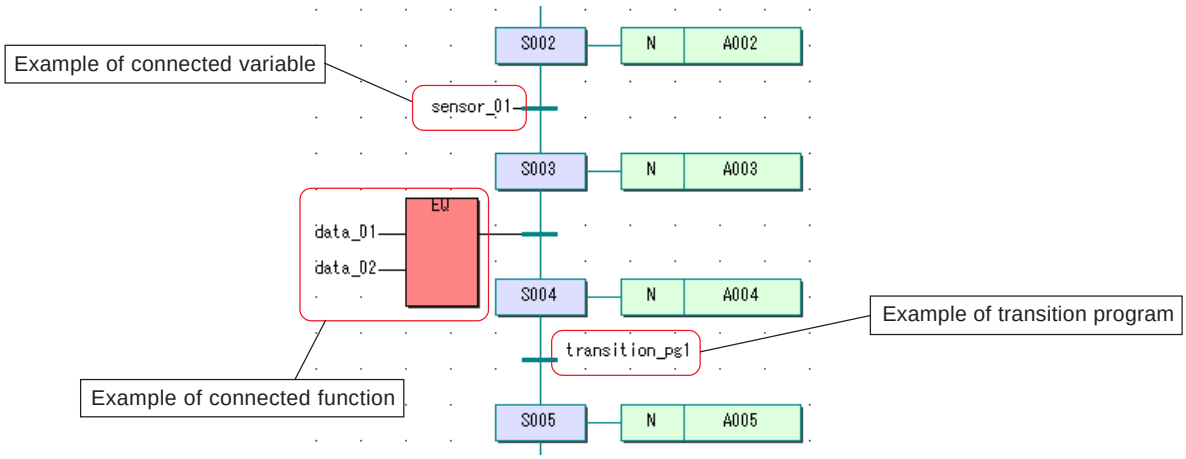


Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

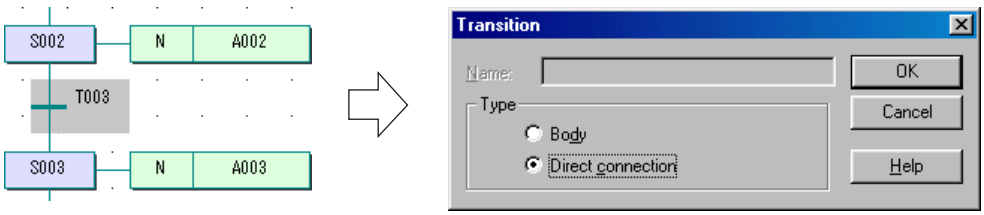
7-2-5 Setting/changing a transition

A transition shows the conditions for moving from one step to other. When a step is inserted, a transition is automatically arranged at a necessary location. And when a step is deleted, the operation is automatically performed that is necessary to delete the transition. Thus transitions are inserted and deleted while you are not aware of it.
As shown in the figure below, transition can connect not only the body (program) but also BOOL-type variable or the function or FB the variable processing of which results in BOOL-type data.

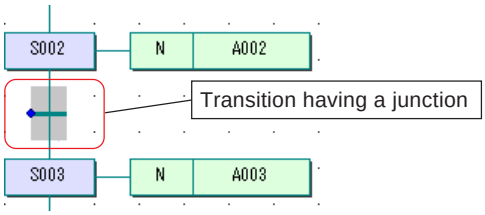


(1) Method for connecting a variable to a transition

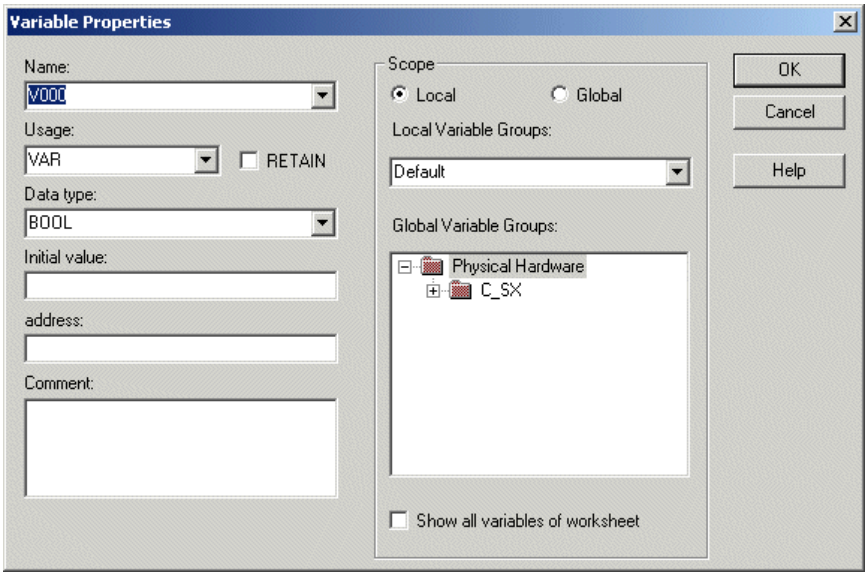
◆ In this example, BOOL-type variable “sensor_01” is connected to transition “T003”. Right-click transition “T003”, and left-click the [Object Properties...] command in the displayed shortcut menu. Then the [Transition] dialog box will be displayed.



◆ Select “Direct connection” for [Type], and click the [OK] button. The transition will be deleted, and instead a transition having a junction will be displayed.

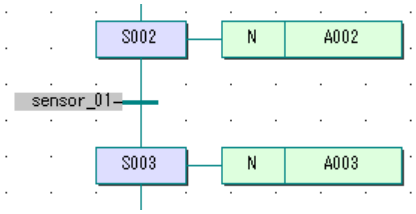


◆ In the condition that the transition is selected, click the [Variable...] button, and the [Variable Properties] dialog box will be displayed. On this dialog box, specify (or create) a variable, and click the [OK] button.



7-2 Editing SFC Elements

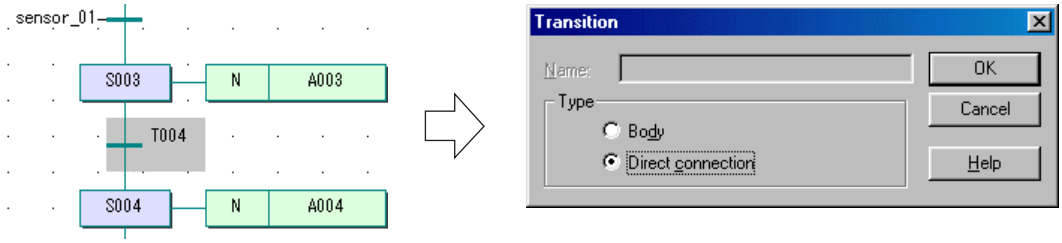
◆ The variable is connected to a transition, as shown in the figure below.



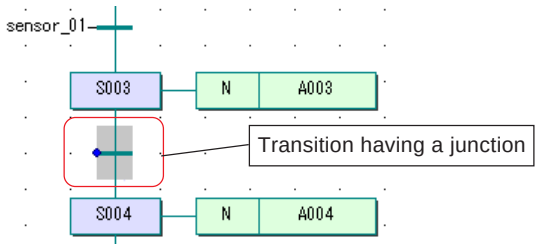
Note: Of variables, only BOOL-type can be connected to a transition.

(2) Method for connecting an LD/FBD object to a transition

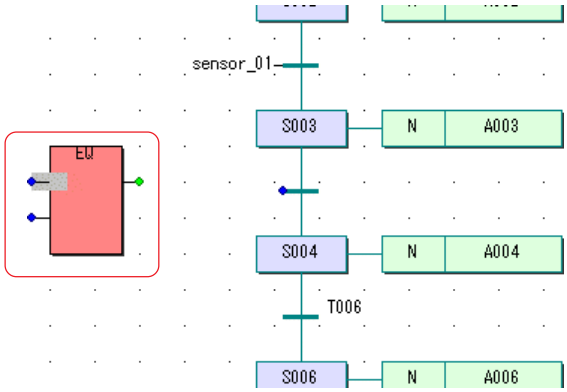
◆ In this example, function (Comparison Fct) “EQ” is connected to transition “T004”. Right-click transition “T004”, and left-click the [Object Properties...] command in the displayed shortcut menu. Then the [Transition] dialog box will be displayed.



◆ Select “Direct connection” for [Type], and click the [OK] button. The transition will be deleted, and instead a transition having a junction will be displayed.



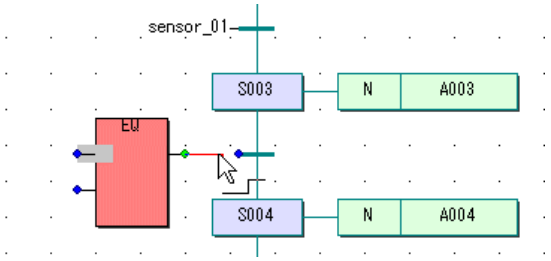
◆ With the edit wizard, paste the function that you want to connect to the transition onto the code worksheet.



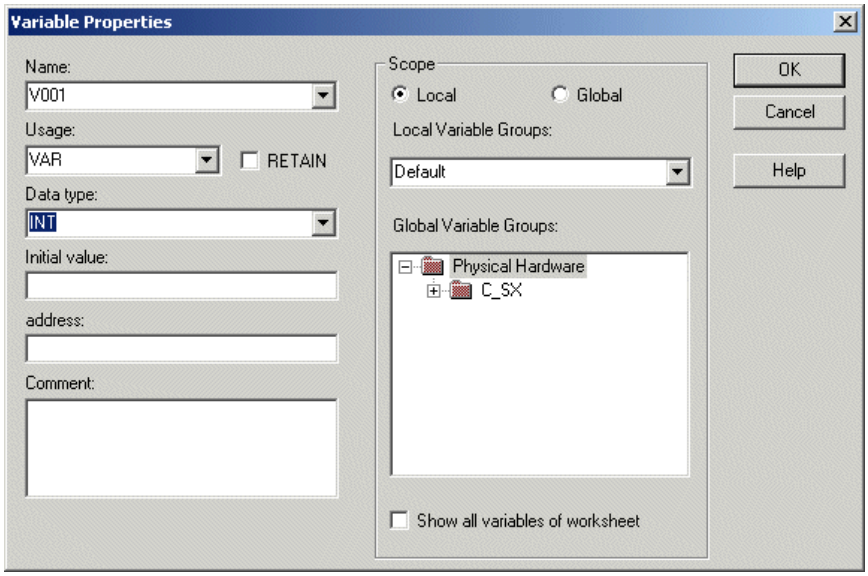
Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

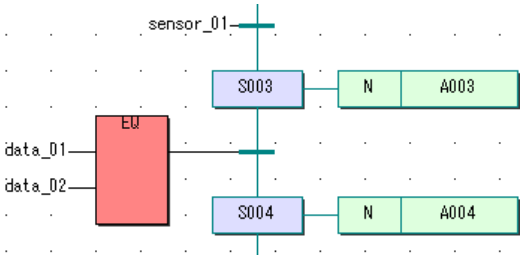
◆ Connect between the function and the transition. For this, click the [Connect objects] button, and the editor will come in Object Connection mode. Click the junction of the output terminal of the function, drag the mouse, and click the junction of the transition. Then the object will be connected.



◆ Connect a variable to the input terminal of the function. For this, in the condition that the terminal is selected, click the [Variable...] button to display the [Variable Properties] dialog box. On this dialog box, specify (or create) a variable, and click the [OK] button.



◆ In the same way, connect a variable to all the input terminals.



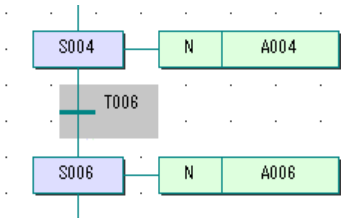
Section 7 Editing Codes with SFC Elements

7-2 Editing SFC Elements

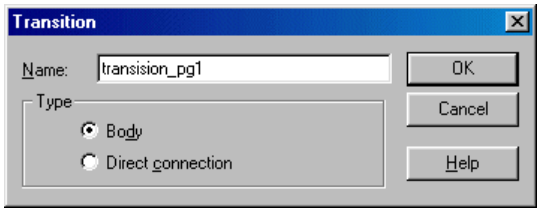
(3) Making a transition program

To make a transition program, “Body” is selected for [Code] to prepare a transition code worksheet. Then you can code the program on the worksheet. Transition program is made using IL, ST, or LD/FBD language.

◆ Right-click transition “T006” for which you want to make a transition program, and left-click the [Object Properties...] command in the displayed shortcut menu. Then the [Transition] dialog box will be displayed.

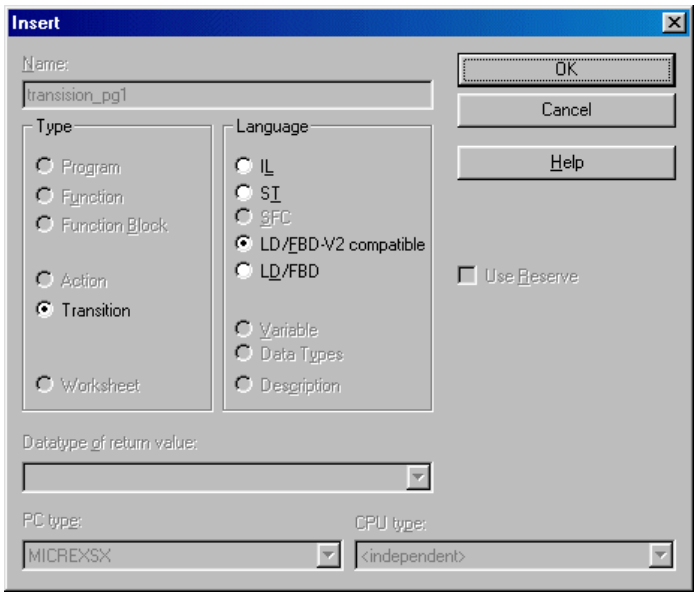


◆ On this dialog box, turn on the optional [Body] button for [Type], and click the [OK] button.

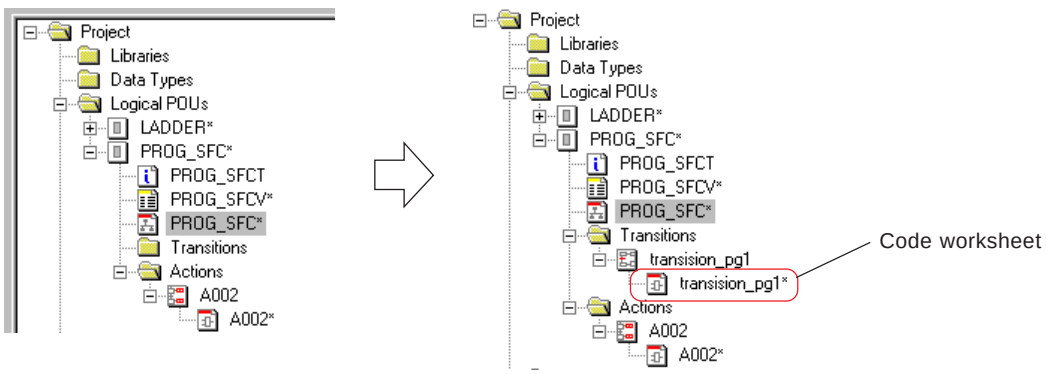


Transition name is set within 24 characters. The name must not begin with a numeric character, nor the characters reserved for D300win system may be used in the name.

◆ The name of the transition becomes “transition_pg1”. Double-click this transition, i.e. “transition_pg1”, and the [Insert] dialog box will be displayed.



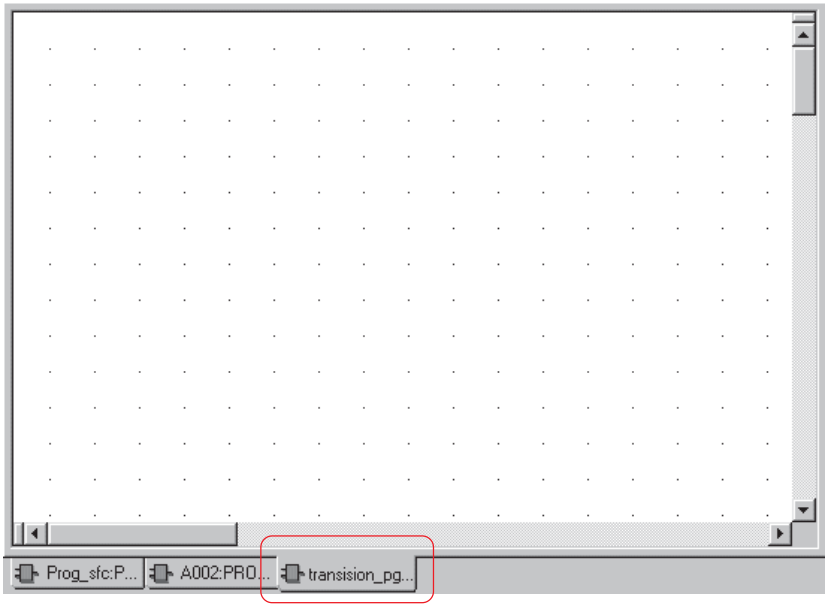
◆ On this dialog box, select a programming language and click the [OK] button. A code worksheet for transition “transition_pg1” will be created.



Section 7 Editing Codes with SFC Elements

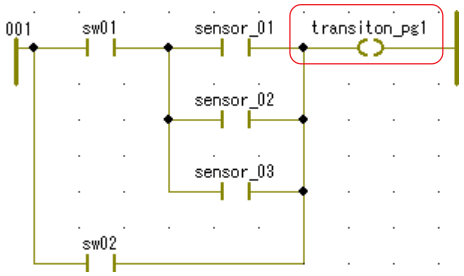
7-2 Editing SFC Elements

◆ Double-click the code worksheet icon to open the code worksheet, on which you can make a transition program.



* Like POU code worksheet, transition code worksheet can be added and inserted.

Note: For the transitions, a program is made that turns ON and OFF transition “transition_pg1” as a coil. It is unnecessary to declare “transition_pg1” as a variable.



Section 8 Variables Declaration

8-1 How to Declare Variables 8-1

8-2 Variables Declaration While Editing Codes 8-2

8-2-1 Variables declaration when the LD/FBD-V2 compatible mode editor is used 8-2

(1) Variable declaration for contact/coil 8-2

(2) Scope setting 8-4

(3) Variables declaration for function or FB 8-5

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(3) Variables declaration for function or FB 8-9

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8-4 Declaration of Derived Data Types 8-34

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(1) Inserting the data type worksheet 8-34

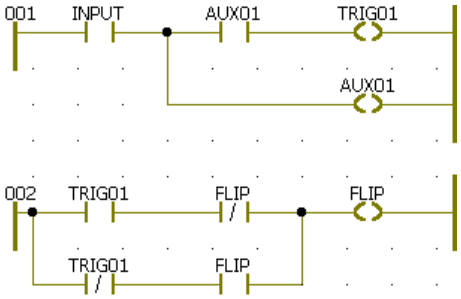
(2) Declaration of data types 8-35

(3) The method to declare data type using the Edit Wizard 8-35

Section 8 Variables Declaration

With MICREX-SX series, “variables” are assigned to program code bodies, and real addresses in the PLC internal memory are assigned to the variables that are assigned to individual command codes, which is done manually by user or automatically by the D300win system during compilation, to implement an application program.
The use of variables makes it possible to separate hardware and software and create application programs that have highly reusable software configuration.

<Example of program code body>



<Example of variables declaration for the code body shown above>

Variable	Data type	Usage	Address	Comment
Default				
INPUT	BOOL	VAR	%IX1.0.0	
FLIP	BOOL	VAR	%QX2.0.0	
AUX01	BOOL	VAR		
TRIG01	BOOL	VAR		

* V3 and later versions of D300win have the variables worksheet editor of tabular format.

8-1 How to Declare Variables

There are two methods for variables declaration, as described below:

To declare variables while a code body worksheet is being edited

This method is used to declare variables when variables that are not yet declared are inserted in the code body worksheet. Variables are declared from the [Variable] dialog box when IL or ST language is used or from the [Contact/Coil Properties] dialog box or the [Variable Properties] dialog box when LD or FBD language or SFC element is used.

To directly declare variables using the variables worksheet

This method is used to declare variables by inserting new variables directly in the variables worksheet.
The variables that are declared on a variables worksheet are inserted in the code body worksheet using the [Variable] dialog box or the [Variable Properties] dialog box.

Section 8 Variables Declaration

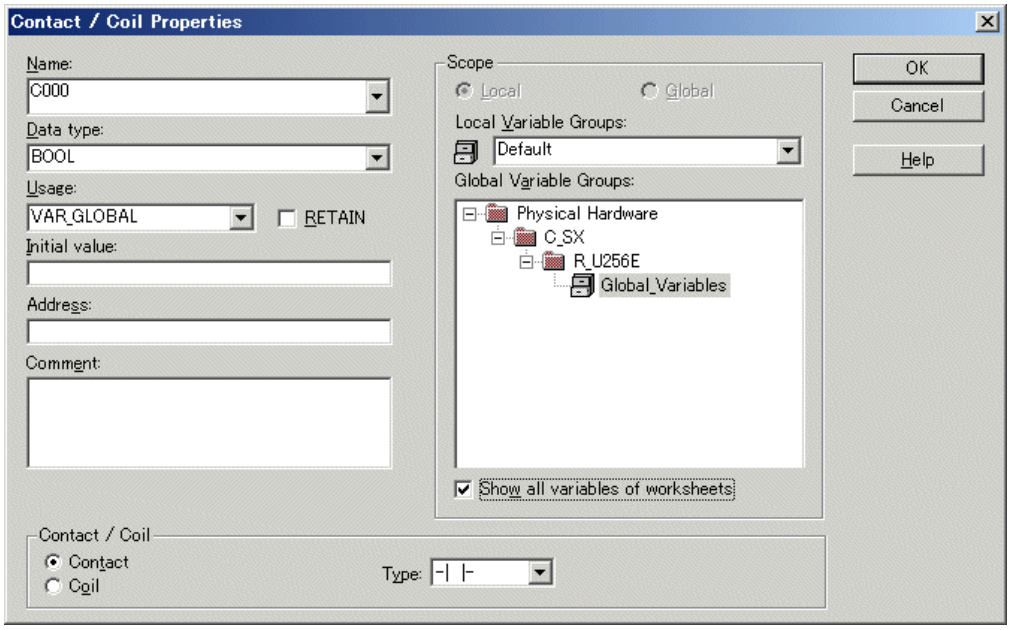
8-2 Variables Declaration While Editing Codes

In this paragraph, a variable that is not yet declared on the variables worksheet is declared using the dialog box while the code body worksheet is being edited. In this case, the variables worksheet is automatically updated.

8-2-1 Variables declaration when the LD/FBD-V2 compatible mode editor is used

(1) Variable declaration for contact / coil

◆ Double-click the contact for which a variable is to be declared, or right-click “C000” and left-click the [Object Properties...] command in the shortcut menu. The [Contact/Coil Properties] dialog box is displayed.



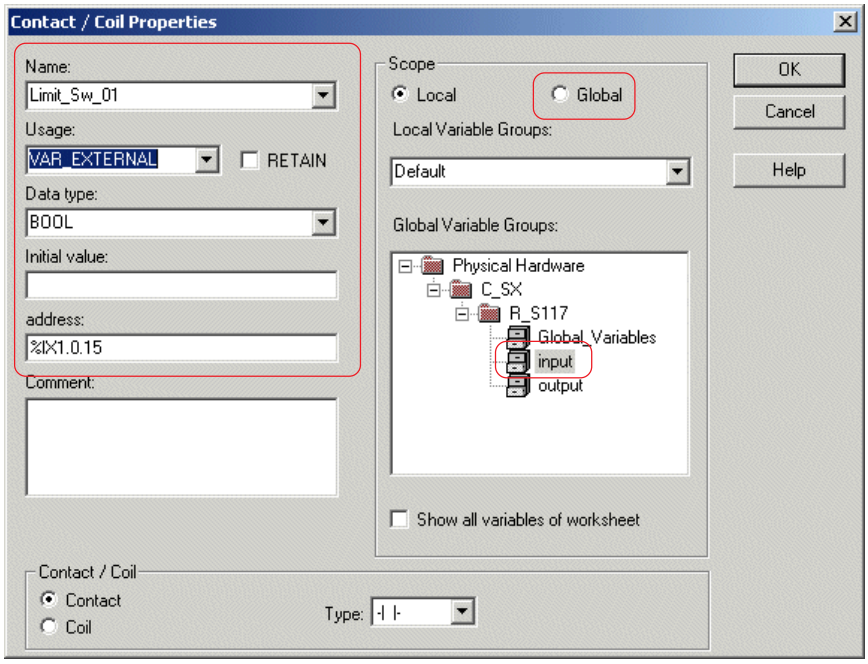
<Setting items on the dialog box above>

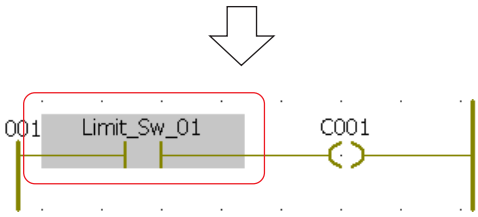
Item	Description
Name	Enter a variable name or select a variable name from the variable groups already defined. (maximum 30 characters)
Usage	Specifies usage. For details, see "8-3-1 Overview of the variables editor".
RETAIN	Check this box when the address of the variable is to be assigned to the retain memory.
Data type	Specifies data type.
Initial value	Specifies the initial value of the variable.
Address	Specifies CPU internal memory within AT range. If no address is specified here, D300win automatically assigns the variable to the CPU internal memory during compilation.
Comment	Enter your comment about the variable.
Scope	Specifies where to store the variable. For details, see "8-2-1 (2) Scope setting".
Contact/coil	Set property of a contact or a coil. Contact: NO contact/NC contact Coil: normal/reverse/set/reset
Show all variables of worksheet	If this box is ON, all local variables of current local worksheet, and all global variables of current selected global group is shown on "Name" box. In this case, VAR_EXTERNAL is not shown on "Usage" box, and VAR_GLOBAL is shown. In addition, Local and Global of "Scope" button is invalid.

Section 8 Variables Declaration

8-2 Variables Declaration While Editing Codes

◆ After setting all necessary items, click the [OK] button. The variable is assigned to the object and declared on the variables worksheet.





<Example of variables worksheet>

	Variable	Data type	Usage	Comment	Address	Init	RETAIN
	output						
	LMP_01	BOOL	VAR_GLOBAL		%QX2.0.0		☐
	LMP_02	BOOL	VAR_GLOBAL		%QX2.0.1		☐
	LMP_03	BOOL	VAR_GLOBAL		%QX2.0.2		☐
	input						
	SW_01	BOOL	VAR_GLOBAL		%IX1.0.0		☐
	SW_02	BOOL	VAR_GLOBAL		%IX1.0.1		☐
	Limit_Sw_01	BOOL	VAR_GLOBAL		%IX1.0.15		☐
	Global_Variables						
	sensor01	BOOL	VAR_GLOBAL		%IX1.0.0		☐
	sensor02	BOOL	VAR_GLOBAL		%IX1.0.1		☐
	sensor03	BOOL	VAR_GLOBAL		%IX1.0.2		☐
	sensor04	BOOL	VAR_GLOBAL		%IX1.0.3		☐

	Variable	Data type	Usage	Comment	Address	Init	RETAIN
	data_01						
	DATA_01	DINT	VAR				☐
	Limit_Sw_01	BOOL	VAR_EXT...				☐
	data_02						
	I_data_00	INT	VAR				☑
	I_data_01	INT	VAR				☑
	I_data_02	INT	VAR				☑
	I_data_03	INT	VAR				☑
	I_data_04	INT	VAR				☑

In this example, because global variable group “input” is selected, the variable is registered as shown above.

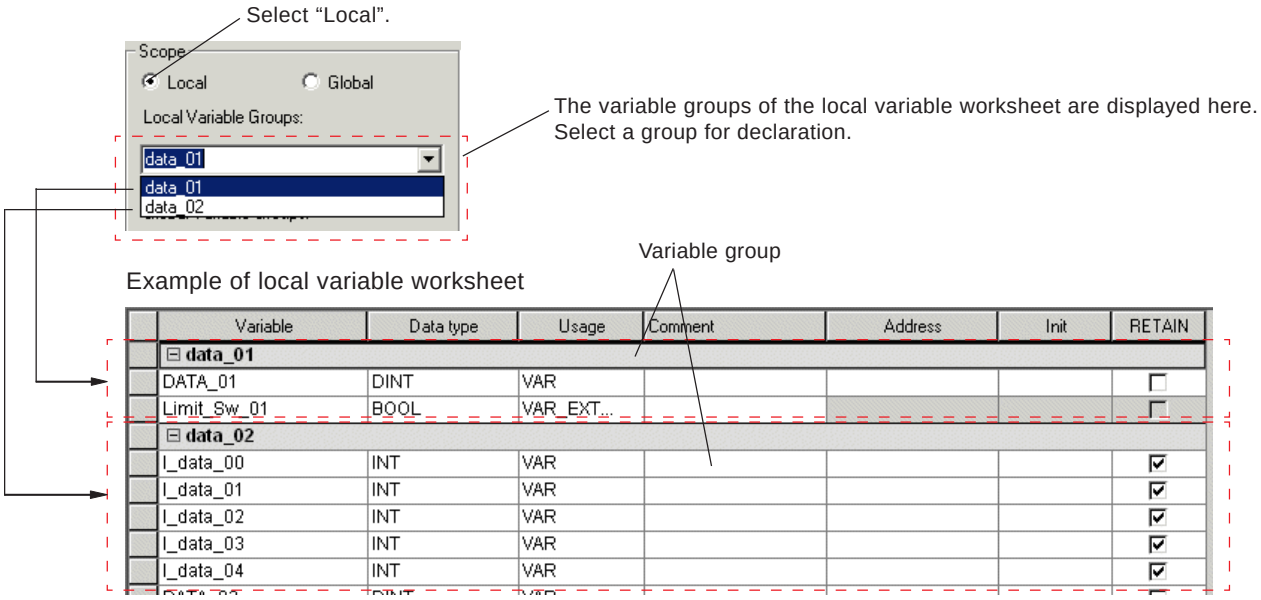
Section 8 Variables Declaration

8-2 Variables Declaration While Editing Codes

(2) Scope setting

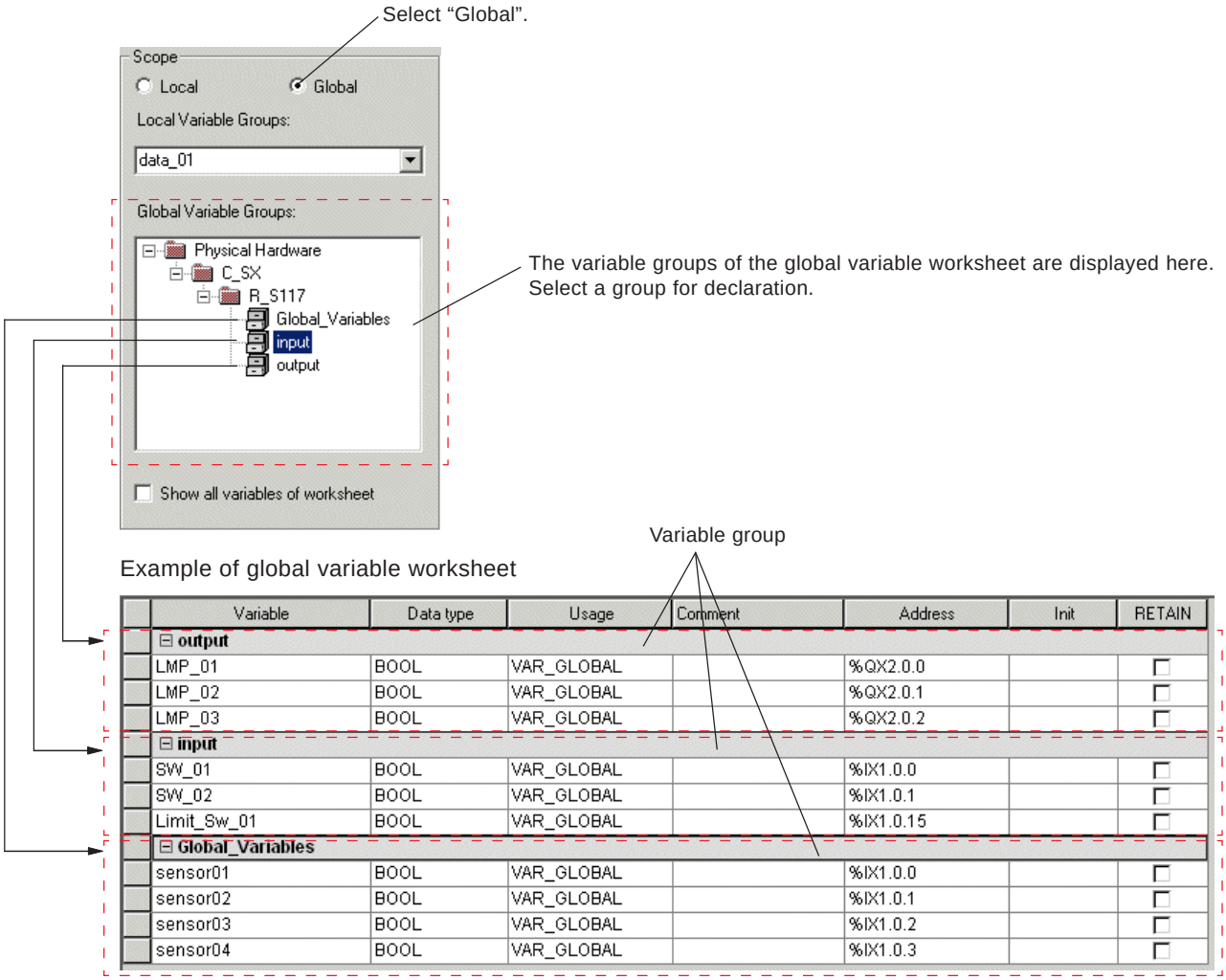
Specifies the position where the variable to be defined should be stored.

1) Local variables



Variable	Data type	Usage	Comment	Address	Init	RETAIN
data_01						
DATA_01	DINT	VAR				☐
Limit_Sw_01	BOOL	VAR_EXT...				☐
data_02						
I_data_00	INT	VAR				☑
I_data_01	INT	VAR				☑
I_data_02	INT	VAR				☑
I_data_03	INT	VAR				☑
I_data_04	INT	VAR				☑

2) Global variables



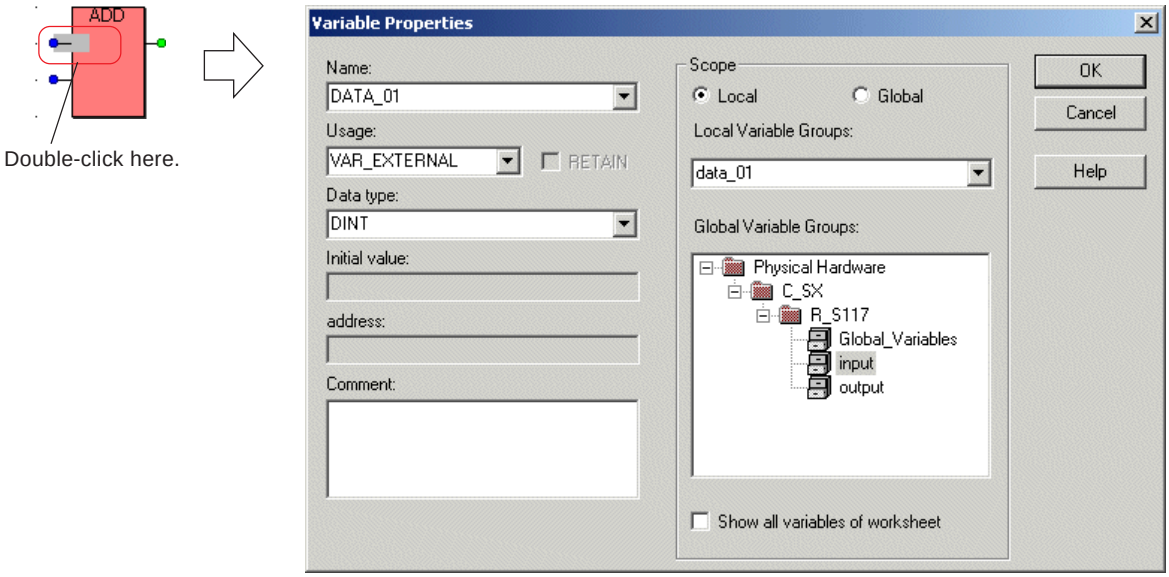
Variable	Data type	Usage	Comment	Address	Init	RETAIN
output						
LMP_01	BOOL	VAR_GLOBAL		%QX2.0.0		☐
LMP_02	BOOL	VAR_GLOBAL		%QX2.0.1		☐
LMP_03	BOOL	VAR_GLOBAL		%QX2.0.2		☐
input						
SW_01	BOOL	VAR_GLOBAL		%IX1.0.0		☐
SW_02	BOOL	VAR_GLOBAL		%IX1.0.1		☐
Limit_Sw_01	BOOL	VAR_GLOBAL		%IX1.0.15		☐
Global_Variables						
sensor01	BOOL	VAR_GLOBAL		%IX1.0.0		☐
sensor02	BOOL	VAR_GLOBAL		%IX1.0.1		☐
sensor03	BOOL	VAR_GLOBAL		%IX1.0.2		☐
sensor04	BOOL	VAR_GLOBAL		%IX1.0.3		☐

Section 8 Variables Declaration

8-2 Variables Declaration While Editing Codes

(3) Variables declaration for function or FB

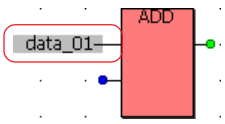
◆ Double-click a terminal of the function or FB to which you want to connect a variable, or right-click the terminal and left-click the [Variables...] command in the shortcut menu. The [Variable Properties] dialog box is displayed.



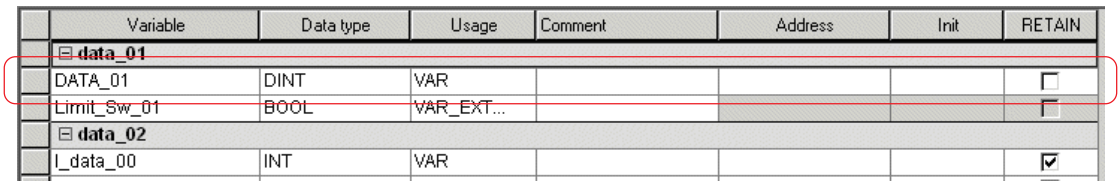
<Setting items on the dialog box above>

Item	Description
Name	Enter a variable name or select a variable name from the variable groups already defined. (maximum 30 characters)
Usage	Specifies usage. For details, see "8-3-1 Overview of the variables editor".
RETAIN	Check this box when the address of the variable is to be assigned to the retain memory.
Data type	Specifies data type.
Initial value	Specifies the initial value of the variable.
Address	Specifies CPU internal memory within AT range. If no address is specified here, D300win automatically assigns the variable to the CPU internal memory during compilation.
Comment	Enter your comment about the variable.
Scope	Specifies where to store the variable. For details, see "8-2-1 (2) Scope setting".
Show all variables of worksheet	If this box is ON, all local variables of current local worksheet, and all global variables of current selected global group is shown on "Name" box. In this case, VAR_EXTERNAL is not shown on "Usage" box, and VAR_GLOBAL is shown. In addition, Local and Global of "Scope" button is invalid.

◆ After setting all necessary items, click the [OK] button. The variable is assigned to the object and declared on the variables worksheet.



<Variables worksheet>



Variable	Data type	Usage	Comment	Address	Init	RETAIN
⊟ data_01						
DATA_01	DINT	VAR				☐
Limit_Sw_01	BOOL	VAR_EXT...				☐
⊟ data_02						
I_data_00	INT	VAR				☑

Section 8 Variables Declaration

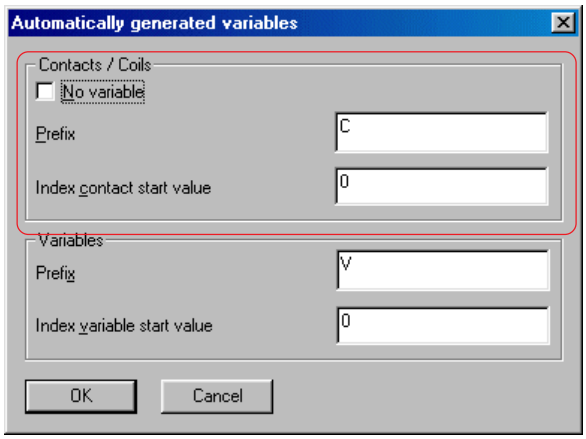
8-2 Variables Declaration While Editing Codes

8-2-2 Variables declaration when the LD/FBD editor is used

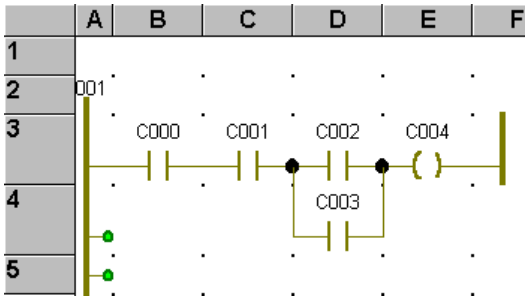
(1) Automatic generation of contact/coil variables

The LD/FBD editor has the function that automatically generates variables when an object is pasted on a code worksheet. Each time an object is pasted, the automatic assignment function declares variables while incrementing the numbers included in their prefixes.

◆ Select [Objects] on the menu bar, and then click the [Automatically generated variables...] command in the [Objects] menu. The [Automatically generated variables] dialog box is displayed. When a contact or a coil is inserted in the code worksheet, variables are declared to be the prefix that is set here and added by number. For the setting as shown in the figure below, variables are declared from “C000” in order.



◆ A contact or a coil is inserted onto the code worksheet or the LD/FBD editor.
How to operate the LD/FBD editor is described in the “User’s Manual <D300win V3 LD/FBD Editor Operations>” (FEH257-1).



◆ When an LD network as shown above is created, variables are automatically generated on the variables worksheet, as shown below.

Variable	Data type	Usage	Comment
Default			
C000	BOOL	VAR	
C001	BOOL	VAR	
C002	BOOL	VAR	
C003	BOOL	VAR	
C004	BOOL	VAR	

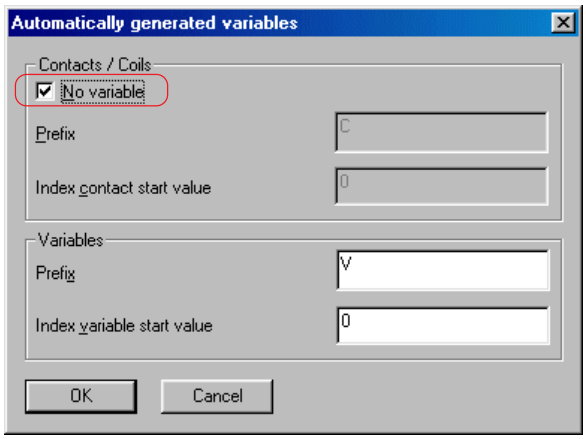
* No address is assigned when variables are generated automatically. Concrete address assignment or correction is made on the variables worksheet.

Section 8 Variables Declaration

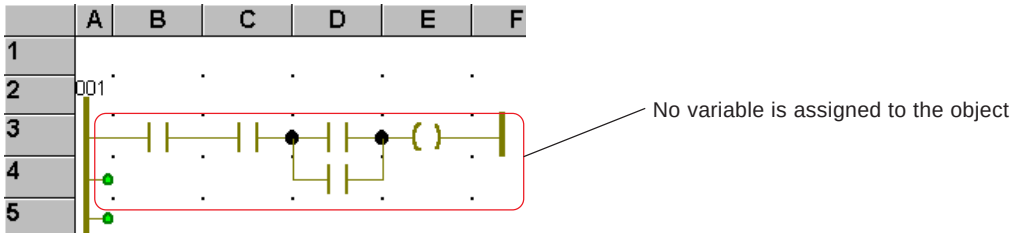
8-2 Variables Declaration While Editing Codes

(2) Variables declaration for contact or coil when the automatic variables generation function is not used

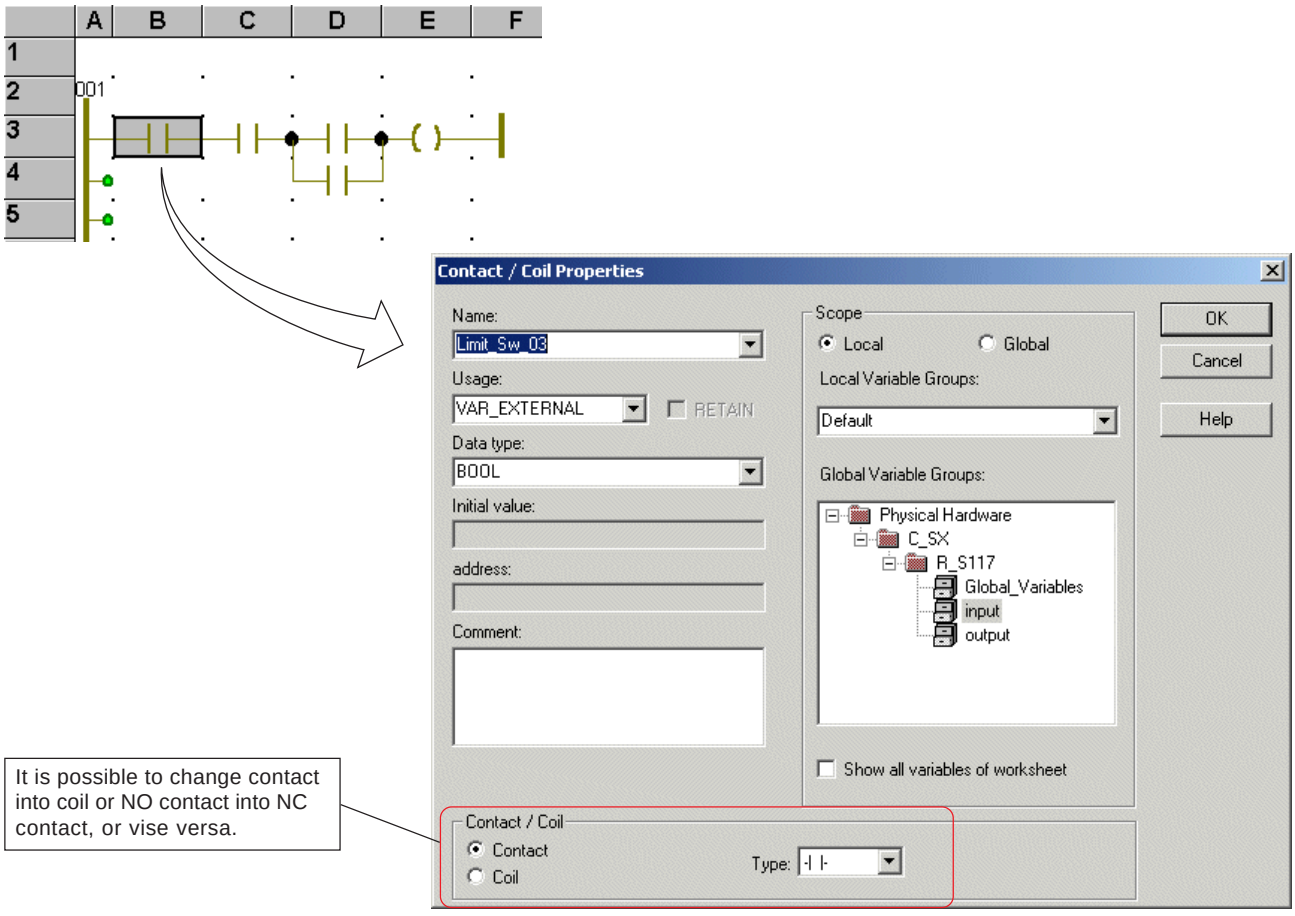
◆ Select [Objects] on the menu bar, and then click the [Automatically generated variables...] command in the [Objects] menu. The [Automatically generated variables] dialog box is displayed. On this dialog box, check the [No variable] box and click the [OK] button.



◆ A contact or a coil is inserted onto the code worksheet or the LD/FBD editor.
How to operate the LD/FBD editor is described in the “User’s Manual <D300win V3 LD/FBD Editor Operations>” (FEH257-1).



◆ Double-click the object to which you want to assign variables, or right-click the object and left-click the [Object Properties...] command in the shortcut menu. The [Contact/Coil Properties] dialog box is displayed.



Section 8 Variables Declaration

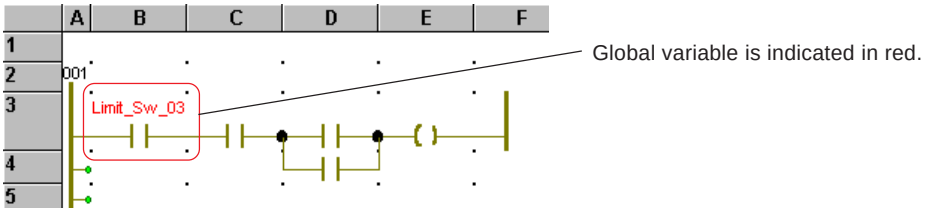
8-2 Variables Declaration While Editing Codes

<Setting items>

Item	Description
Name	Enter a variable name or select a variable name from the variable groups already defined. (maximum 30 characters)
Usage	Specifies usage. For details, see "8-3-1 Overview of the variables editor".
RETAIN	Check this box when the address of the variable is to be assigned to the retain memory.
Data type	Specifies data type.
Initial value	Specifies the initial value of the variable.
Address	Specifies CPU internal memory within AT range. If no address is specified here, D300win automatically assigns the variable to the CPU internal memory during compilation.
Comment	Enter your comment about the variable.
Scope	Specifies where to store the variable. For details, see "8-2-1 (2) Scope setting".
Contact/coil	Set property of a contact or a coil. Contact: NO contact/NC contact Coil: normal/reverse/set/reset
Show all variables of worksheet	If this box is ON, all local variables of current local worksheet, and all global variables of current selected global group is shown on "Name" box. In this case, VAR_EXTERNAL is not shown on "Usage" box, and VAR_GLOBAL is shown. In addition, Local and Global of "Scope" button is invalid.

◆ Then, it is specified where to store the declared variable. Click the [Local scope] tab when local variable is specified or the [Global scope] when global variable is specified. Currently existing variables worksheets and variable groups in them are displayed. Specify, by clicking, a variable group in which you want to store the declared variable.

◆ After setting all necessary items, click the [OK] button. The variable is assigned to the object and declared on the variables worksheet.



<Global variables worksheet>

	Variable	Data type	Usage	Comment
	Global_Variables			
	Limit_Sw_03	BOOL	VAR_GLOBAL	

<Local variables worksheet>

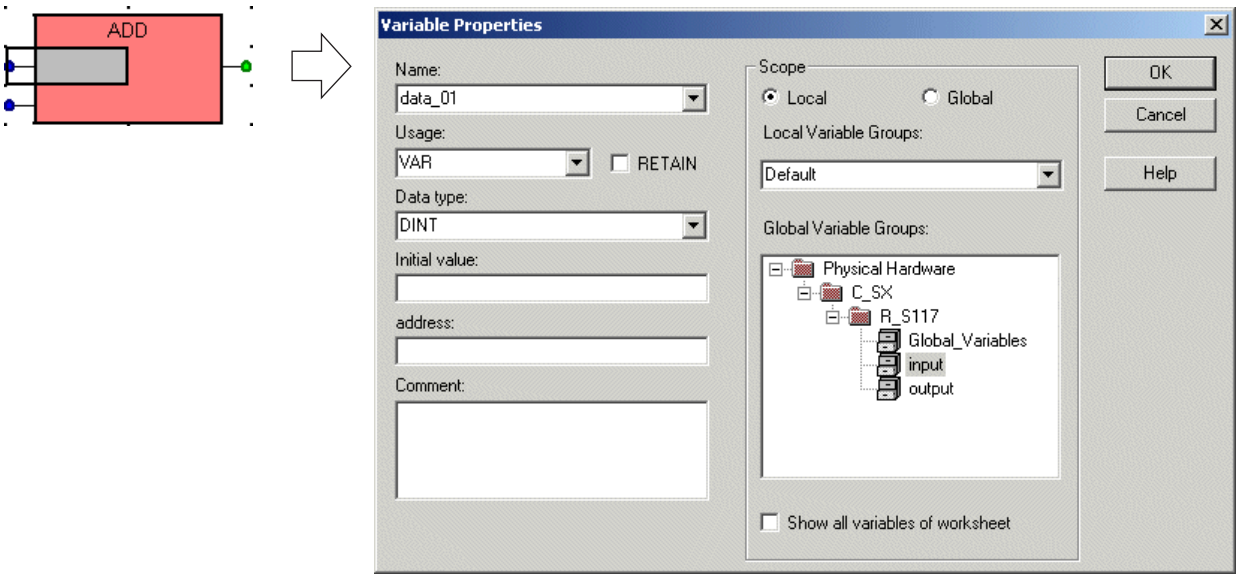
	Variable	Data type	Usage	Comment
	Default			
	Limit_Sw_03	BOOL	VAR_EXTER...	

Section 8 Variables Declaration

8-2 Variables Declaration While Editing Codes

(3) Variables declaration for function or FB

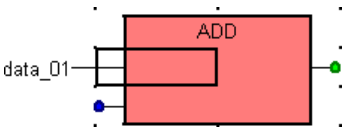
◆ Double-click a terminal of the function or FB to which you want to connect a variable, or right-click the terminal and left-click the [Variables...] command in the shortcut menu. The [Variable Properties] dialog box is displayed.



<Setting items on the dialog box above>

Item	Description
Name	Enter a variable name or select a variable name from the variable groups already defined. (maximum 30 characters)
Usage	Specifies usage. For details, see "8-3-1 Overview of the variables editor".
RETAIN	Check this box when the address of the variable is to be assigned to the retain memory.
Data type	Specifies data type.
Initial value	Specifies the initial value of the variable.
Address	Specifies CPU internal memory within AT range. If no address is specified here, D300win automatically assigns the variable to the CPU internal memory during compilation.
Comment	Enter your comment about the variable.
Scope	Specifies where to store the variable. For details, see "8-2-1 (2) Scope setting".
Show all variables of worksheet	If this box is ON, all local variables of current local worksheet, and all global variables of current selected global group is shown on "Name" box. In this case, VAR_EXTERNAL is not shown on "Usage" box, and VAR_GLOBAL is shown. In addition, Local and Global of "Scope" button is invalid.

◆ After setting all necessary items, click the [OK] button. The variable is assigned to the object and declared on the variables worksheet.



<Variables worksheet>

	Variable	Data type	Usage	Comment
	Default			
	Limit_Sw_03	BOOL	VAR_EXTER...	
	data_01	INT	VAR	

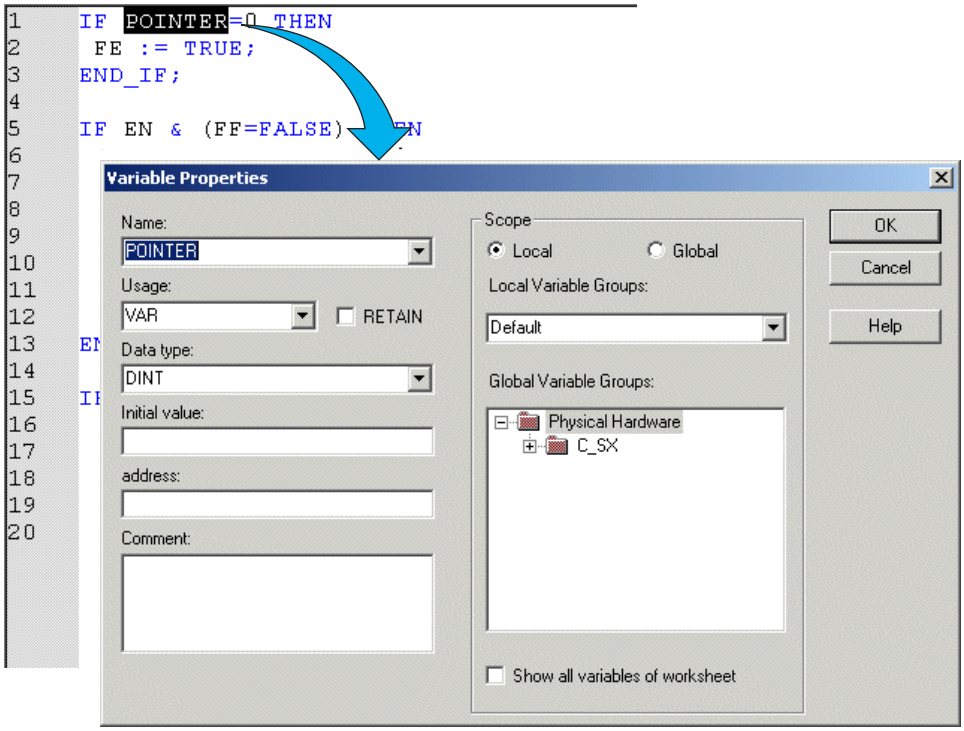
Section 8 Variables Declaration

8-2 Variables Declaration While Editing Codes

8-2-3 Variables declaration when the IL/ST language editor is used

For IL language and ST language, both of which are text language, the method for declaring variables on the code worksheet is the same. In this paragraph, explanation is given, taking ST language for example.

◆ Select (click or double-click) a variable that is to be declared and click the [Variables] button, or right-click the variable and left-click the [Variable...] command in the shortcut menu. The [Variables] dialog box is displayed.

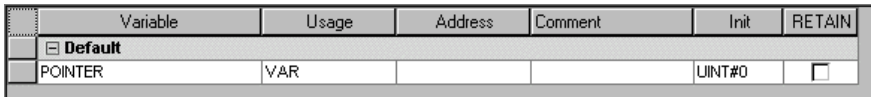


<Setting items on the dialog box above>

Item	Description
Name	Enter a variable name or select a variable name from the variable groups already defined. (maximum 30 characters)
Usage	Specifies usage. For details, see "8-3-1 Overview of the variables editor".
RETAIN	Check this box when the address of the variable is to be assigned to the retain memory.
Data type	Specifies data type.
Initial value	Specifies the initial value of the variable.
Address	Specifies CPU internal memory within AT range. If no address is specified here, D300win automatically assigns the variable to the CPU internal memory during compilation.
Comment	Enter your comment about the variable.
Scope	Specifies where to store the variable. For details, see "8-2-1 (2) Scope setting".
Show all variables of worksheet	If this box is ON, all local variables of current local worksheet, and all global variables of current selected global group is shown on "Name" box. In this case, VAR_EXTERNAL is not shown on "Usage" box, and VAR_GLOBAL is shown. In addition, Local and Global of "Scope" button is invalid.

◆ After setting all necessary items, click the [OK] button. The variable is declared on the variables worksheet.

<Variables worksheet>

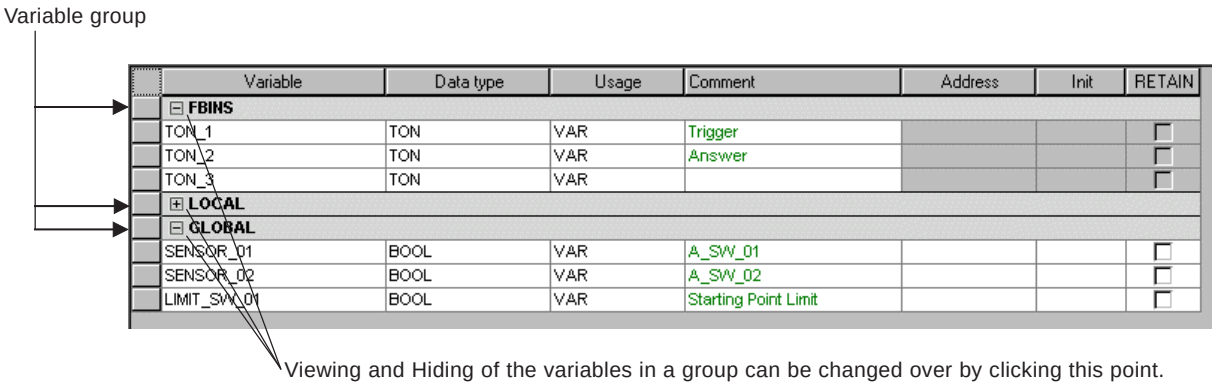


Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

8-3-1 Overview of the variables editor

With D300winV3, the variables worksheet editor edits in the following tabular format.



<Setting items>

Item	Description
Variable	Variable name is entered in this field. When FB instance is to be declared, FB instance name is entered.
Data type	The data type of variable is specified. FB name is specified when FB instance is to be declared.
Usage	The type of variable is specified. For variable types, VAR (local variable), VAR_EXTERNAL (external variable: declared when global variable is used in a POU), VAR_GLOBAL (global variable), VAR_INPUT (input variable), VAR_OUTPUT (output variable) and VAR_IN_OUT (I/O variable) are available.
Comment	Enter your comment about the variable.
Address	CPU internal memory is assigned to variables. If no address is specified here, D300win automatically assigns the CPU internal memory (standard memory or retain memory) to the variables during compilation.
Initial value	Specifies the initial values of assigned memories when the CPU is started.
RETAIN	When no address is set in the "Address" field, D300win automatically assigns the CPU internal memory. However, when this box is checked, the variables are assigned to the retain memory area.

Note: None of “Address”, “Initial value” and “RETAIN” is used for the declaration of FB instances.

Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

8-3-2 Variables declaration by the variables editor

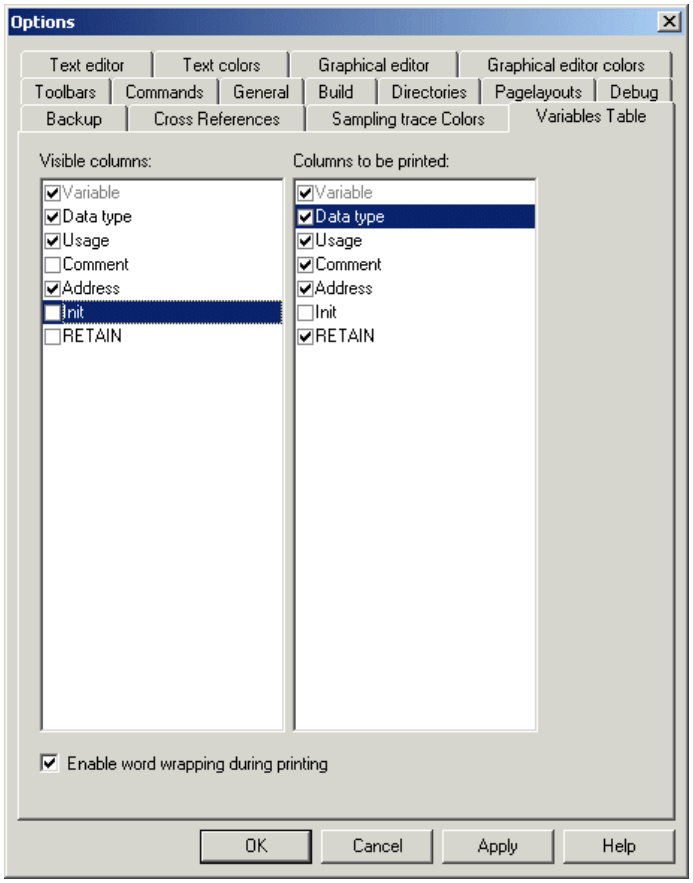
(1) Customizing the variables editor

◆ Double-click a variables worksheet in the project tree, or right-click it and left-click the [Open Variables Worksheets] command in the shortcut menu. The target variables worksheet is opened.

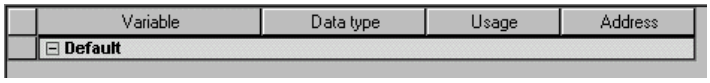
For default setting, “Variable”, “Data type”, “Usage”, “Address”, “Comment”, “Init” and “RETAIN” columns are displayed.

1) Viewing or hiding the columns

◆ Left-click the [Options...] command from the [Extras] on the menu bar to display the [Options] dialog box. On this dialog box, left-click the [Variables Table] tab to display the [Variables Table] tab window.
From this tab window, you can specify viewing or hiding of individual column of the variables worksheet by checking (view) or unchecking (hide) the box for individual column name.



◆ Uncheck the boxes for the column that you want to hide, and click the [OK] button. Then, only your desired columns are displayed, as shown in the figure below.



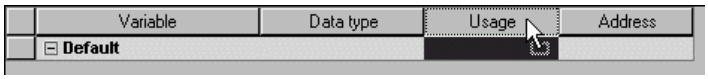
Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

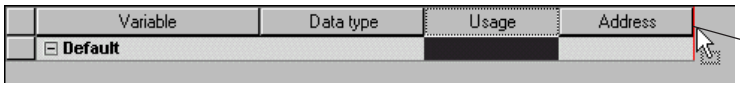
2) Changing in which order to display the columns

You can change in which order to display the columns. However, the first column cannot be changed (fixed to “Variable”).

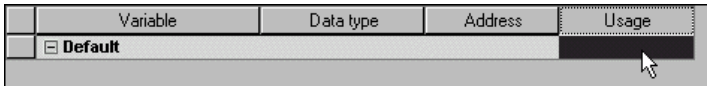
◆ In this example, the “Usage” column is moved behind the “Address” column.
Click “Usage”, and the cursor will change to .



◆ With the mouse left-side button kept clicked, drag the cursor to a point just behind the “Address” field.



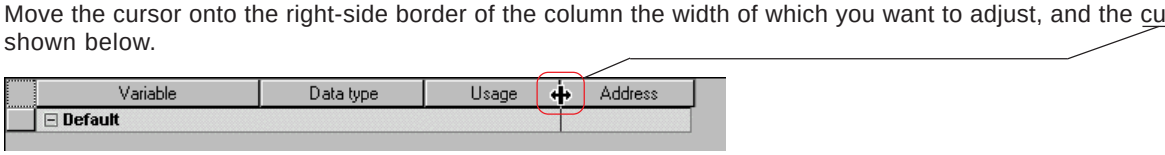
◆ Take your finger off the mouse, and the column will be moved there.



3) Adjusting the column width

Column width can be adjusted as needed.

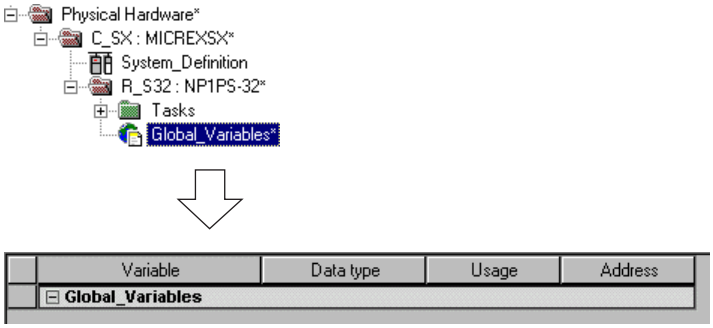
◆ Move the cursor onto the right-side border of the column the width of which you want to adjust, and the cursor will change as shown below.



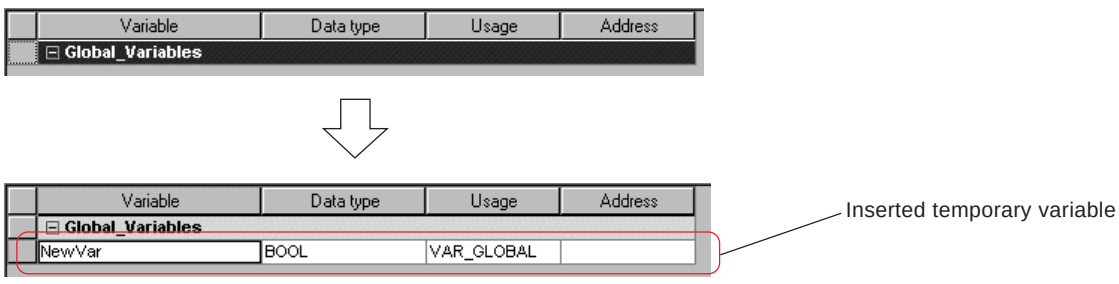
(2) Inserting a new variable

You can declare a new variable on the variable worksheet.

◆ Double-click the target variable worksheet, or right-click it and left-click the [Open Worksheet] command in the shortcut menu. The variables worksheet is displayed.



◆ Only one variable group is prepared as default. For global variable worksheets, this group is named “Global_Variables”. In this example, a variable is inserted in the “Global_Variables” group. Select the group name line, and press <Ctrl> + <Shift> + <I> keys, or right-click the group name and left-click the [Insert variable] command in the shortcut menu. A line of temporary variable, which is named “NewVar”, is inserted.



Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

◆ Enter or set necessary items, such as variable name and data type.

Variable	Data type	Usage	Address
⊟ **Global_Variables**			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0

◆ Then we insert a variable below “Limit_sw_01”. Select the group name line, and press <Ctrl> + <Shift> + <I> keys, or right-click the group name and left-click the [Insert variable] command in the shortcut menu. A line of temporary variable, which is named “NewVar”, is inserted.

Variable	Data type	Usage	Address
⊟ **Global_Variables**			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0

Variable	Data type	Usage	Address
⊟ **Global_Variables**			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
NewVar	BOOL	VAR_GLOBAL	

Note: To insert a variable above “Limit_sw_01”, select the variable “Limit_sw_01” and press <Ctrl> + <Shift> + <I> keys, or right-click the variable and left-click the [Insert variable] command in the shortcut menu.

Variable	Data type	Usage	Address
⊟ **Global_Variables**			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0

Variable	Data type	Usage	Address
⊟ **Global_Variables**			
NewVar	BOOL	VAR_GLOBAL	
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0

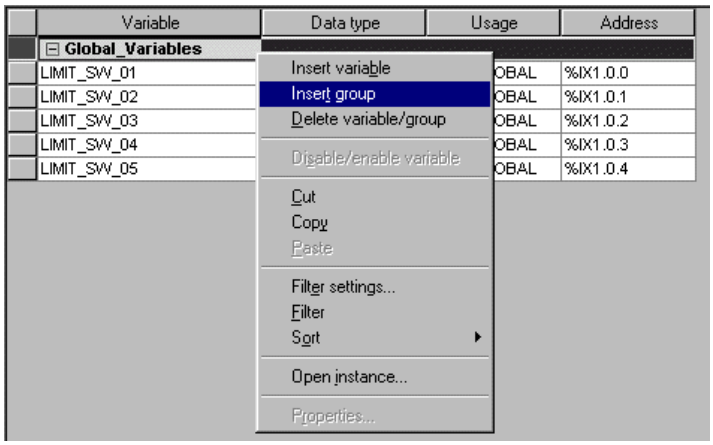
Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

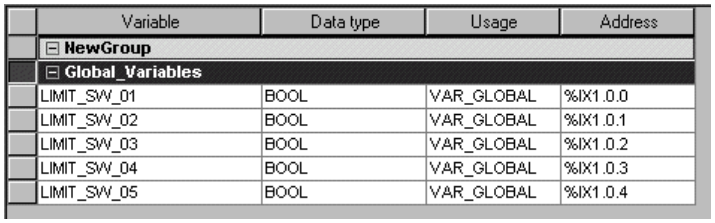
(3) Inserting a variable group

You can insert a new variable group in the variables worksheet.

◆ Right-click an existing variable group name line and left-click the [Insert group] command in the shortcut menu.

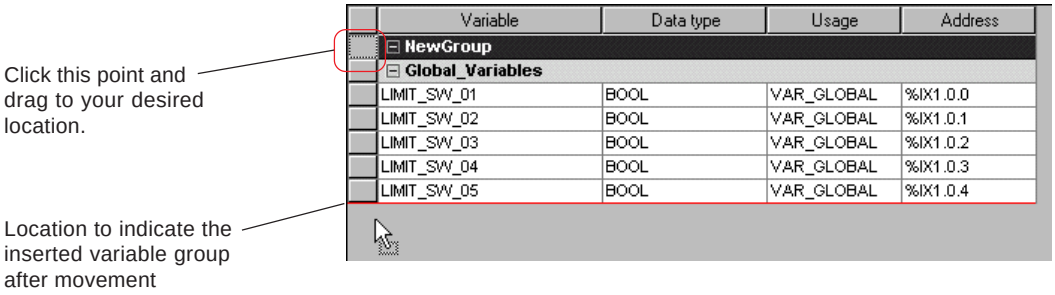


◆ A new variable group (the default group name is “NewGroup”) is inserted above the existing variable group.

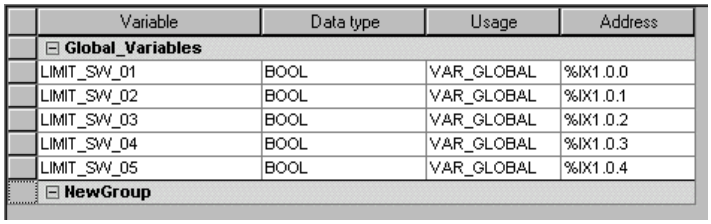


Variable	Data type	Usage	Address
NewGroup			
Global_Variables			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
LIMIT_SW_05	BOOL	VAR_GLOBAL	%IX1.0.4

◆ The inserted variable group can freely be moved to your desired location. For this, click the variable group and, with the mouse left-side button kept clicked, drag to your desired location. It is indicated by red line at which location the inserted variable group will be indicated after movement.



◆ At your desired location, take you finger off the mouse left-side button, and the newly inserted variable group will be moved there.



Variable	Data type	Usage	Address
Global_Variables			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
LIMIT_SW_05	BOOL	VAR_GLOBAL	%IX1.0.4
NewGroup			

* When a variable group that includes declared variables is moved, the variables included in that group are moved at the same time.

8-3 Variables Declaration by the Variables Editor

◆ Click the default group name to rename the variable group.

Variable	Data type	Usage	Address
Global_Variables			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
LIMIT_SW_05	BOOL	VAR_GLOBAL	%IX1.0.4
Global_data			

(4) Deleting a variable or a variable group

1) Deleting a variable

◆ Select the line of the variable that you want to delete, and press <Shift> + <Delete> keys, or right-click the line to be deleted and left-click the [Delete variable/group] command in the shortcut menu. The selected variable line is deleted.

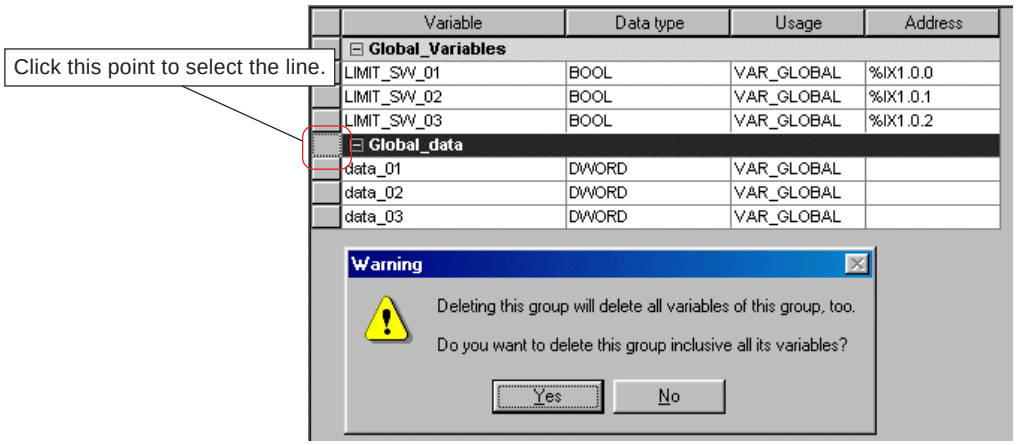
Click this point to select the line.

Variable	Data type	Usage	Address
Global_Variables			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
Global_data			
data_01	DWORD	VAR_GLOBAL	
data_02	DWORD	VAR_GLOBAL	
data_03	DWORD	VAR_GLOBAL	

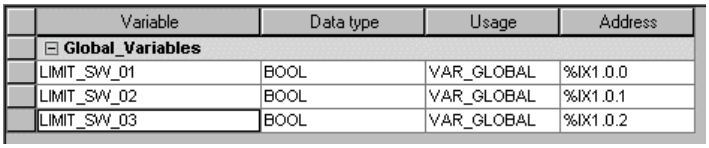
Variable	Data type	Usage	Address
Global_Variables			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
Global_data			
data_01	DWORD	VAR_GLOBAL	
data_02	DWORD	VAR_GLOBAL	
data_03	DWORD	VAR_GLOBAL	

2) Deleting a variable group

◆ Select the top line of the variable group that you want to delete, and press <Shift> + <Delete> keys, or right-click the line to be deleted and left-click the [Delete variable/group] command in the shortcut menu. The warning dialog box as shown below is displayed. When the [Yes] button is clicked, the variable group is deleted.



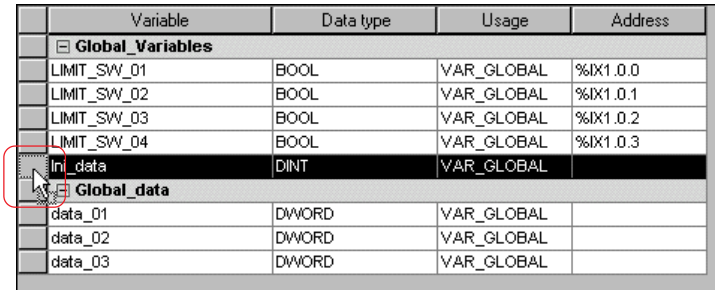
Note: As described on the warning dialog box, if a variable group is deleted, the declared variables that are included in that group will be all deleted.



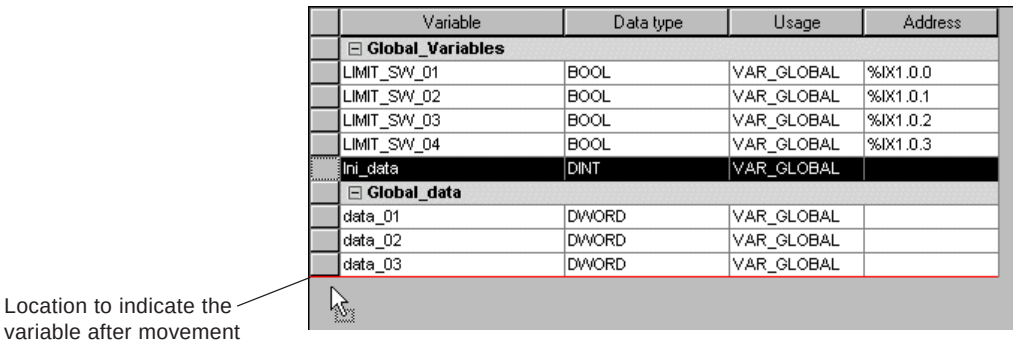
(5) Moving a variable or a variable group

1) Moving a variable

◆ Click the left end column of the variable line that you want to move (select the variable line to be moved), and keep the mouse left-side button clicked. The cursor changes to .



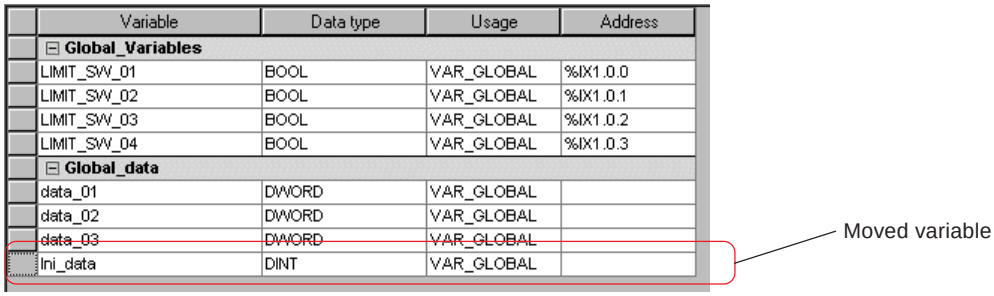
◆ With the mouse left-side button kept clicked, drag the mouse to a location to which you want to move the variable. It is indicated by red line at which location the variable will be indicated after movement.



Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

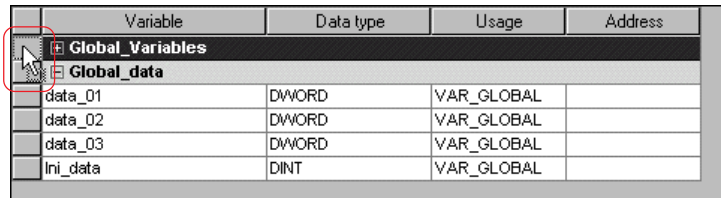
◆ At your desired location, keep your finger off the mouse left-side button, and the variable will be moved there.



Variable	Data type	Usage	Address
Global_Variables			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
Global_data			
data_01	DWORD	VAR_GLOBAL	
data_02	DWORD	VAR_GLOBAL	
data_03	DWORD	VAR_GLOBAL	
Ini_data	DINT	VAR_GLOBAL	

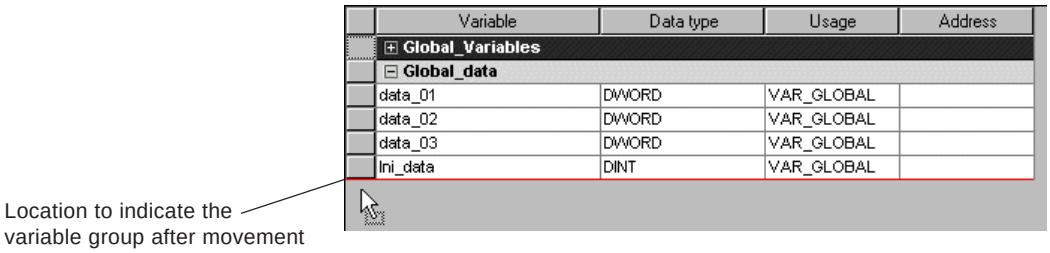
2) Moving a variable group

◆ Click the left end column of the variable group that you want to move, and keep the mouse left-side button clicked. The cursor changes to .



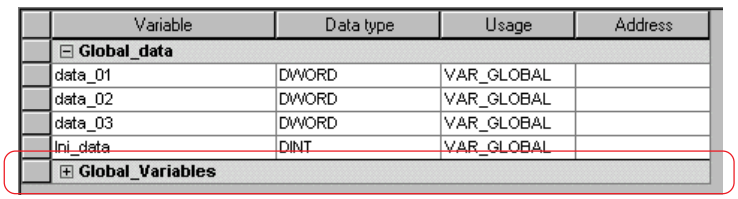
Variable	Data type	Usage	Address
Global_Variables			
Global_data			
data_01	DWORD	VAR_GLOBAL	
data_02	DWORD	VAR_GLOBAL	
data_03	DWORD	VAR_GLOBAL	
Ini_data	DINT	VAR_GLOBAL	

◆ With the mouse left-side button kept clicked, drag the mouse to a location to which you want to move the variable group. It is indicated by red line at which location the variable group will be indicated after movement.



Variable	Data type	Usage	Address
Global_Variables			
Global_data			
data_01	DWORD	VAR_GLOBAL	
data_02	DWORD	VAR_GLOBAL	
data_03	DWORD	VAR_GLOBAL	
Ini_data	DINT	VAR_GLOBAL	

◆ At your desired location, keep your finger off the mouse left-side button, and the variable group will be moved there.



Variable	Data type	Usage	Address
Global_data			
data_01	DWORD	VAR_GLOBAL	
data_02	DWORD	VAR_GLOBAL	
data_03	DWORD	VAR_GLOBAL	
Ini_data	DINT	VAR_GLOBAL	
Global_Variables			

Section 8 Variables Declaration

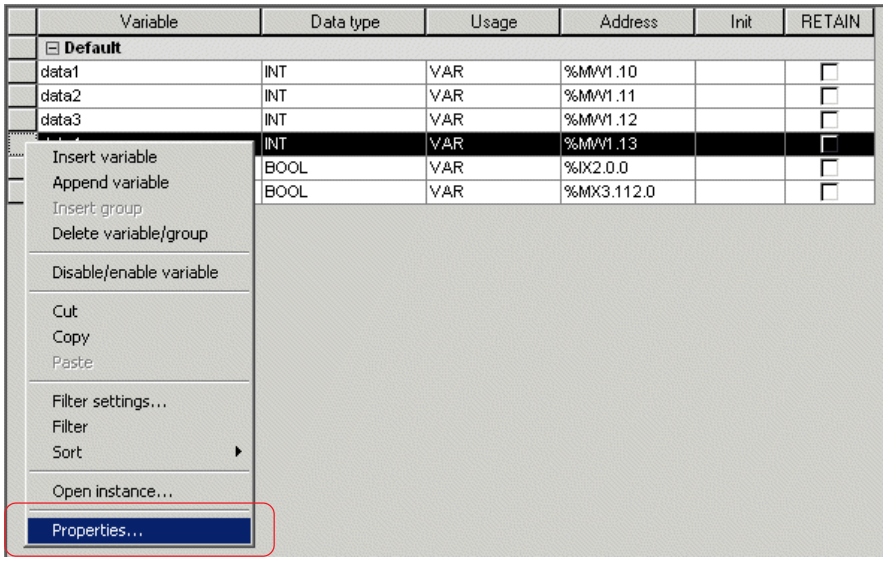
8-3 Variables Declaration by the Variables Editor

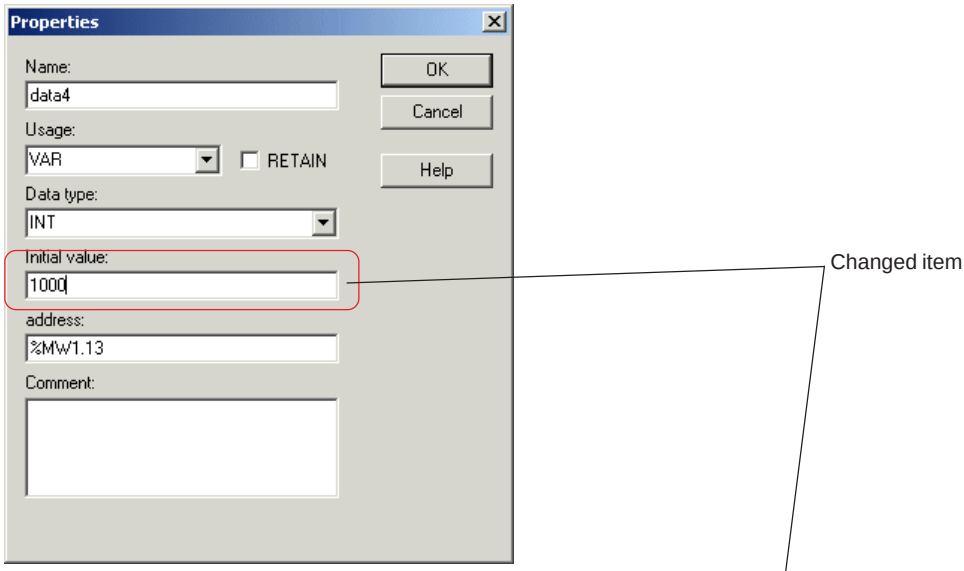
(6) Variables declaration on the variable properties dialog

You can open the “Properties” dialog box on the variables worksheet and display or change the variables on it. (V3.2.0.0 or later)

1) Displaying and changing a variable

◆ Open the variables worksheet and right-click the variable that you want to display and change. The menu is displayed. Execute [Properties...] command in it to display the [Properties] dialog box.





◆ On the [Properties] dialog box, change the contents of the variable and then click the [OK] button. The change will be reflected on the worksheet.

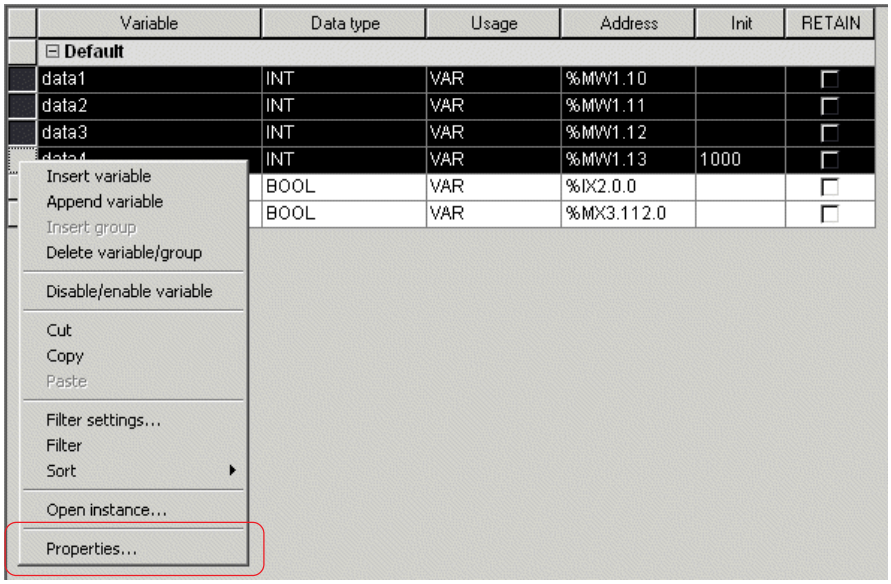
	Variable	Data type	Usage	Address	Init	RETAIN
	Default					
	data1	INT	VAR	%MW1.10		
	data2	INT	VAR	%MW1.11		
	data3	INT	VAR	%MW1.12		
	data4	INT	VAR	%MW1.13	1000	
	SW	BOOL	VAR	%IX2.0.0		
	SEND	BOOL	VAR	%MX3.112.0		

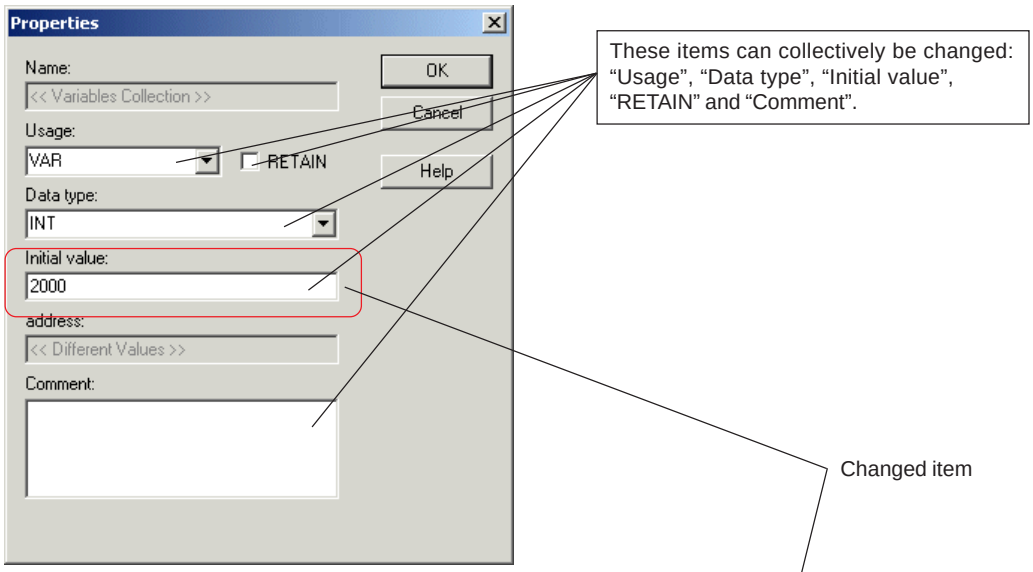
Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

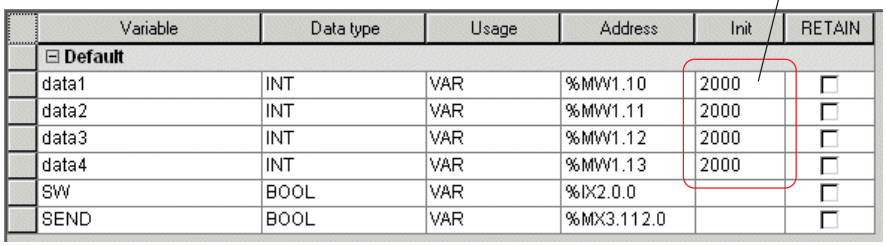
2) Package setting of contents of the variables

◆ As shown below, select multiple variables and right-click on them. The menu is displayed. Execute [Properties...] command in it to display the [Properties] dialog box.





◆ On the [Properties] dialog box, change the contents of the variables and then click the [OK] button. The change will be reflected on the worksheet.



Variable	Data type	Usage	Address	Init	RETAIN
Default					
data1	INT	VAR	%MW1.10	2000	
data2	INT	VAR	%MW1.11	2000	
data3	INT	VAR	%MW1.12	2000	
data4	INT	VAR	%MW1.13	2000	
SW	BOOL	VAR	%IX2.0.0		
SEND	BOOL	VAR	%MX3.112.0		

Section 8 Variables Declaration

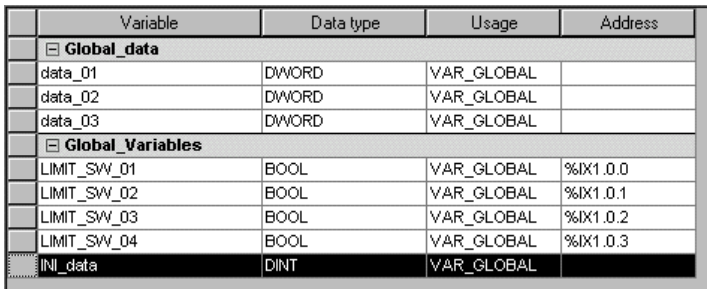
8-3 Variables Declaration by the Variables Editor

8-3-3 Other functions

(1) Disabling declared variables

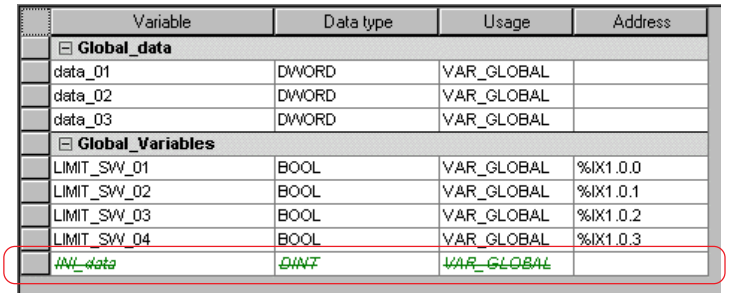
It is possible to disable an already declared variable. During complication, disabled variables are treated the same as comments.

◆ Right-click the left end of the variable line that you want to disable, and left-click the [Disable/enable variable] command in the shortcut menu.



Variable	Data type	Usage	Address
Global_data			
data_01	DWORD	VAR_GLOBAL	
data_02	DWORD	VAR_GLOBAL	
data_03	DWORD	VAR_GLOBAL	
Global_Variables			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
INI_data	DINT	VAR_GLOBAL	

◆ A cancel line is drawn on the disabled variable, as shown in the figure below.



Variable	Data type	Usage	Address
Global_data			
data_01	DWORD	VAR_GLOBAL	
data_02	DWORD	VAR_GLOBAL	
data_03	DWORD	VAR_GLOBAL	
Global_Variables			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
~~INI_data~~	~~DINT~~	~~VAR_GLOBAL~~	

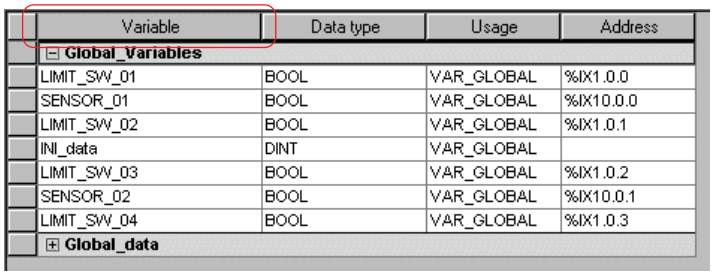
* When a disabled variable is selected and the [Disable/enable variable] command is left-clicked, the variable is enabled again.

(2) Sorting variables

It is possible to sort variables on the variables worksheet in the ascending or descending order of variable name or data type. There are two methods for sorting variables: one to double-click the column name that becomes sort key and the other to right-click the variables worksheet and left-click the command in the shortcut sort menu.

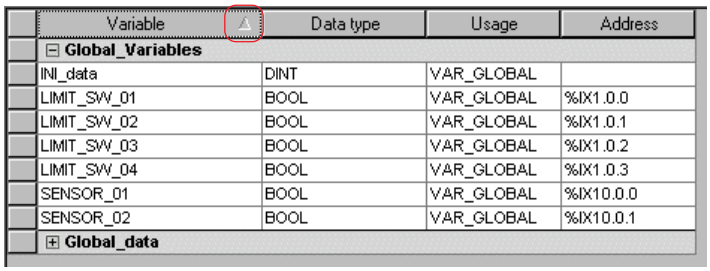
1) The method to sort by double-clicking the column name

◆ Double-click the column name that becomes sort key. In this example, variable name becomes sort key.



Variable	Data type	Usage	Address
Global_Variables			
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
SENSOR_01	BOOL	VAR_GLOBAL	%IX10.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
INI_data	DINT	VAR_GLOBAL	
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
SENSOR_02	BOOL	VAR_GLOBAL	%IX10.0.1
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
Global_data			

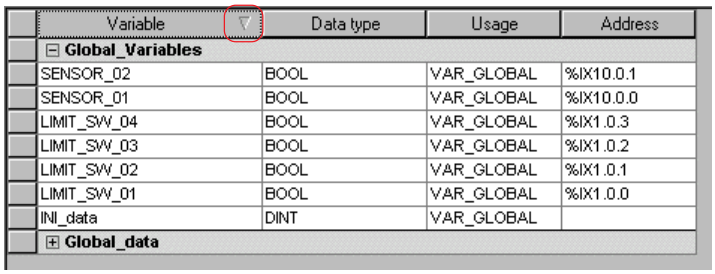
◆ Double-click the column name “Variable”, and the variables will be sorted first in ascending order. △ is indicated beside the column name.



Variable △	Data type	Usage	Address
Global_Variables			
INI_data	DINT	VAR_GLOBAL	
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
SENSOR_01	BOOL	VAR_GLOBAL	%IX10.0.0
SENSOR_02	BOOL	VAR_GLOBAL	%IX10.0.1
Global_data			

8-3 Variables Declaration by the Variables Editor

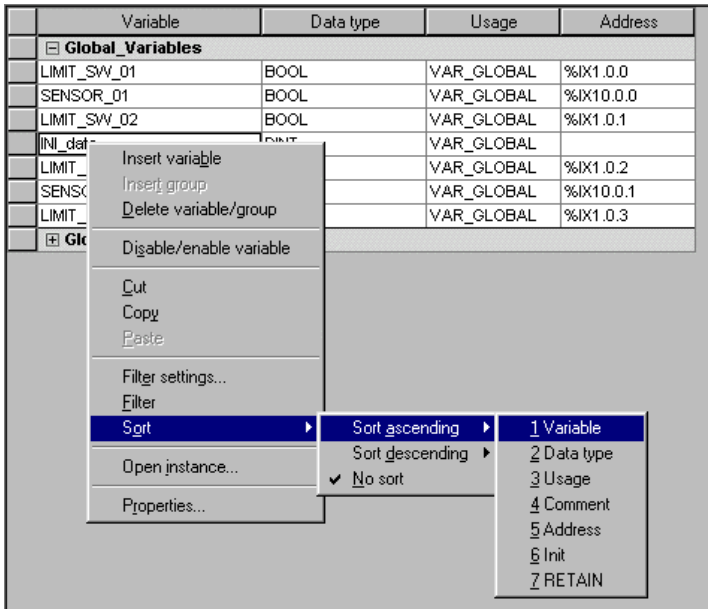
◆ Double-click again the column name “Variable”, and the variables will be re-sorted in descending order. This time, s is indicated besides the column name. Each time the column name is double-clicked, the variables are sorted alternately in ascending or descending order.



Variable	Data type	Usage	Address
Global_Variables			
SENSOR_02	BOOL	VAR_GLOBAL	%IX10.0.1
SENSOR_01	BOOL	VAR_GLOBAL	%IX10.0.0
LIMIT_SW_04	BOOL	VAR_GLOBAL	%IX1.0.3
LIMIT_SW_03	BOOL	VAR_GLOBAL	%IX1.0.2
LIMIT_SW_02	BOOL	VAR_GLOBAL	%IX1.0.1
LIMIT_SW_01	BOOL	VAR_GLOBAL	%IX1.0.0
INI_data	DINT	VAR_GLOBAL	
Global_data			

2) The method to sort with the right-click shortcut menu

◆ Right-click the variables worksheet to display the shortcut menu, click the [Sort] command in the menu, then select [Sort ascending] or [Sort descending], and finally click the column name that becomes sort key.



◆ The variables are sorted and displayed in ascending or descending order.

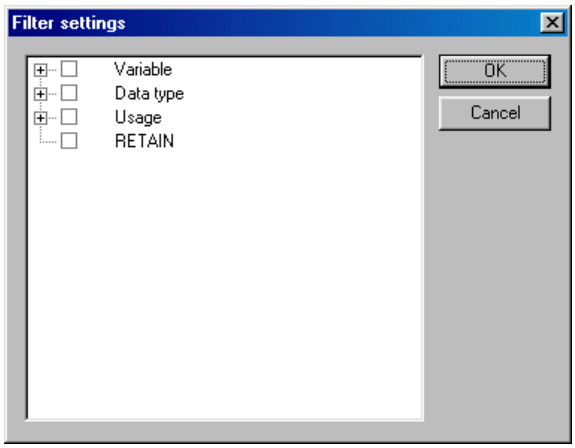
Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

(3) Filtering the display of variables

It is possible to set display conditions for the variables existing on the variables worksheet and thus to display only those that meet the set conditions. Filter can be set for “Variable”, “Data type”, “Usage” and “RETAIN” columns.

◆ Right-click the variables worksheet and left-click the [Filter settings...] command in the shortcut menu. The [Filter settings] dialog box is displayed.

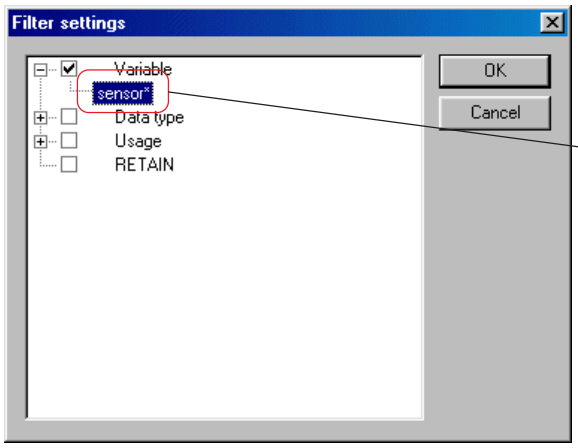


Note: The columns for which “hide” is set are not displayed in the [Filter settings] dialog box.

◆ Filter is set when the box for the corresponding column name is checked.
To select all available entries in one group, you have only to check the box for your desired group. When you want to select entries individually in one group, open that group and check the boxes for your desired items.

1) To display specific variable names

◆ Open the variable group and click a point as shown in the figure below, or move the cursor there with arrow keys and press the <F2> key.
Enter characters for which filter is to be set. Wild card “*” can be used for this purpose.



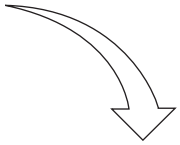
In this example as shown in the figure at left, all the variable names that begin with “sensor” become the target to display.

Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

◆ Right-click the variables worksheet, and left-click the [Filter] command in the shortcut menu. Only the variables that meet the filtering conditions are displayed.

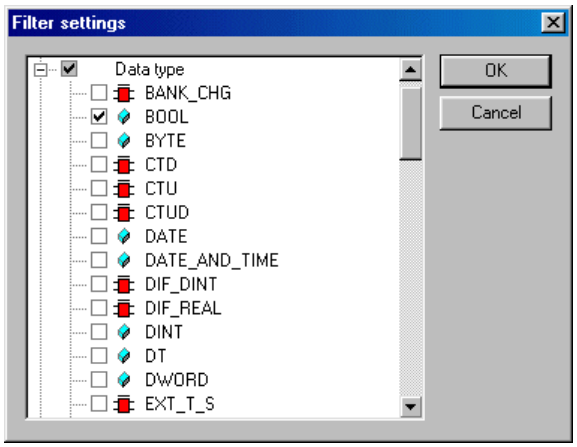
Variable	Data type	Usage	Comment
⊞ FBINS			
⊟ LOCAL			
input	BOOL	VAR	
t_data	TIME	VAR	
t_out	BOOL	VAR	
ini_data01	DINT	VAR_EXTERNAL	
ini_data02	DINT	VAR_EXTERNAL	
Limit_sw_01	BOOL	VAR_EXTERNAL	
Limit_sw_02	BOOL	VAR_EXTERNAL	
sensor_01	BOOL	VAR_EXTERNAL	
sensor_02	BOOL	VAR_EXTERNAL	
sensor_03	BOOL	VAR_EXTERNAL	



Variable	Data type	Usage	Comment
⊞ FBINS			
⊟ LOCAL			
sensor_01	BOOL	VAR_EXTERNAL	
sensor_02	BOOL	VAR_EXTERNAL	
sensor_03	BOOL	VAR_EXTERNAL	

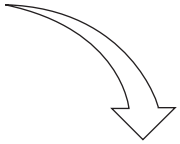
2) To display variables and FB instances by specifying data type and FB names

◆ When the “Data type” group is opened, the data types and FB names for which filter can be set are displayed. Check the boxes for the items that are to be displayed.



◆ Right-click the variables worksheet, and left-click the [Filter] command in the shortcut menu. Only the variables and FB instances whose boxes are checked are displayed.

Variable	Data type	Usage	Comment
⊞ FBINS			
⊟ LOCAL			
input	BOOL	VAR	
t_data	TIME	VAR	
t_out	BOOL	VAR	
ini_data01	DINT	VAR_EXTERNAL	
ini_data02	DINT	VAR_EXTERNAL	
Limit_sw_01	BOOL	VAR_EXTERNAL	
Limit_sw_02	BOOL	VAR_EXTERNAL	
sensor_01	BOOL	VAR_EXTERNAL	
sensor_02	BOOL	VAR_EXTERNAL	
sensor_03	BOOL	VAR_EXTERNAL	



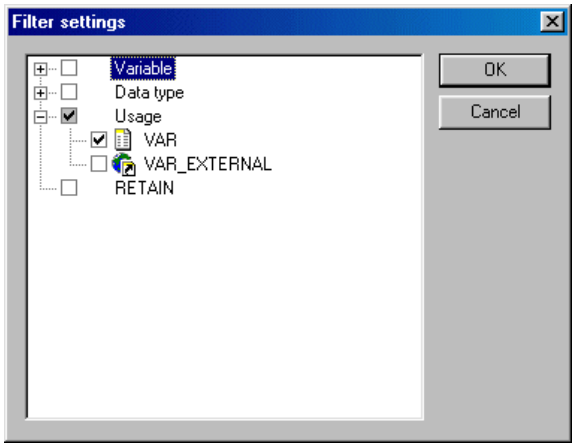
Variable	Data type	Usage	Comment
⊞ FBINS			
⊟ LOCAL			
input	BOOL	VAR	
t_out	BOOL	VAR	
Limit_sw_01	BOOL	VAR_EXTERNAL	
Limit_sw_02	BOOL	VAR_EXTERNAL	
sensor_01	BOOL	VAR_EXTERNAL	
sensor_02	BOOL	VAR_EXTERNAL	
sensor_03	BOOL	VAR_EXTERNAL	

Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

3) To display variables by specifying “Usage”

◆ When the “Usage” group is opened, the usages of variables that can be set on the worksheet are displayed. Check the boxes for the items to be displayed.



◆ Right-click the variables worksheet, and left-click the [Filter] command in the shortcut menu. Only the variables of the usages whose boxes are checked are displayed.

Variable	Data type	Usage	Comment
⊞ **FBINS**			
⊟ **LOCAL**			
input	BOOL	VAR	
t_data	TIME	VAR	
t_out	BOOL	VAR	
ini_data01	DINT	VAR_EXTERNAL	
ini_data02	DINT	VAR_EXTERNAL	
Limit_sw_01	BOOL	VAR_EXTERNAL	
Limit_sw_02	BOOL	VAR_EXTERNAL	
sensor_01	BOOL	VAR_EXTERNAL	
sensor_02	BOOL	VAR_EXTERNAL	
sensor_03	BOOL	VAR_EXTERNAL	

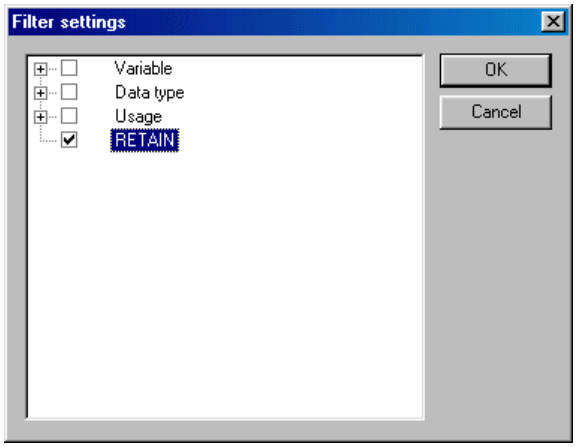
Variable	Data type	Usage	Comment
⊞ **FBINS**			
⊟ **LOCAL**			
input	BOOL	VAR	
t_data	TIME	VAR	
t_out	BOOL	VAR	

Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

4) To display the variables for which RETAIN is set

◆ Check the [RETAIN] box.



◆ Right-click the variables worksheet, and left-click the [Filter] command in the shortcut menu. Only the variables for which RETAIN is set are displayed.

Variable	Data type	Usage	Address	RETAIN
⊞ FBINS				
⊟ LOCAL				
aux01	BOOL	VAR		☑
aux02	BOOL	VAR		☑
input	BOOL	VAR		☐
t_data	TIME	VAR		☐
t_out	BOOL	VAR		☐
ini_data01	DINT	VAR_EXTERNAL		☐
ini_data02	DINT	VAR_EXTERNAL		☐
Limit_sw_01	BOOL	VAR_EXTERNAL		☐
Limit_sw_02	BOOL	VAR_EXTERNAL		☐
sensor_01	BOOL	VAR_EXTERNAL		☐
sensor_02	BOOL	VAR_EXTERNAL		☐
sensor_03	BOOL	VAR_EXTERNAL		☐

Variable	Data type	Usage	Address	RETAIN
⊞ FBINS				
⊟ LOCAL				
aux01	BOOL	VAR		☑
aux02	BOOL	VAR		☑

Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

(4) Editing variables using Excel (V3.2.1.0 or later)

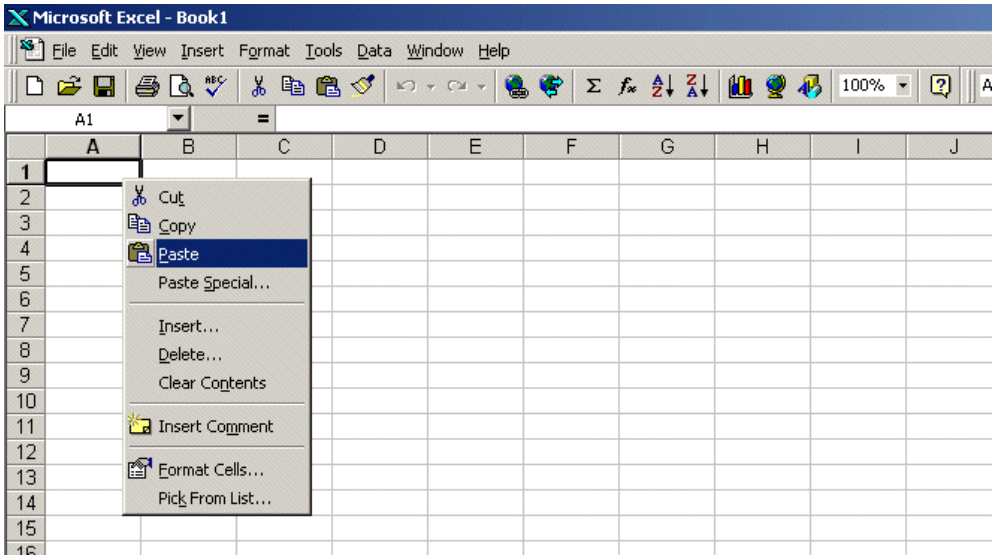
Variables declaration can be directly copied and pasted from the variables worksheet to an Excel worksheet or from an Excel worksheet to the variables worksheet.

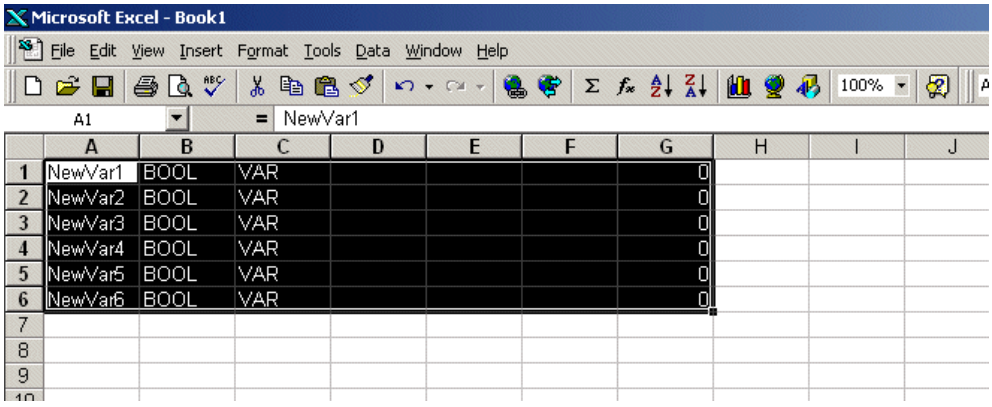
1) Copying and pasting from the variables worksheet to an Excel workwheet

◆ Select a range that you want to copy in the variables worksheet and copy it by executing the [Copy] command in the right-click menu or by pressing the <Ctrl> + <C> keys.

	Variable	Data type	Usage	Comment	Address	Init	RETAIN
	⊟ Default						
	NewVar1	BOOL	VAR				☐
	NewVar2	BOOL	VAR				☐
	NewVar3	BOOL	VAR				☐
	NewVar4	BOOL	VAR				☐
	NewVar5	BOOL	VAR				☐
	NewVar6	BOOL	VAR				☐
	NewVar7	BOOL	VAR				☐
	NewVar8	BOOL	VAR				☐
	NewVar9	BOOL	VAR				☐
	NewVar10	BOOL	VAR				☐

◆ Open an Excel worksheet, right-click the top cell (upper left corner) of the target area, and execute the [Paste] command. The contents of the variables worksheet are copied to the Excel worksheet.



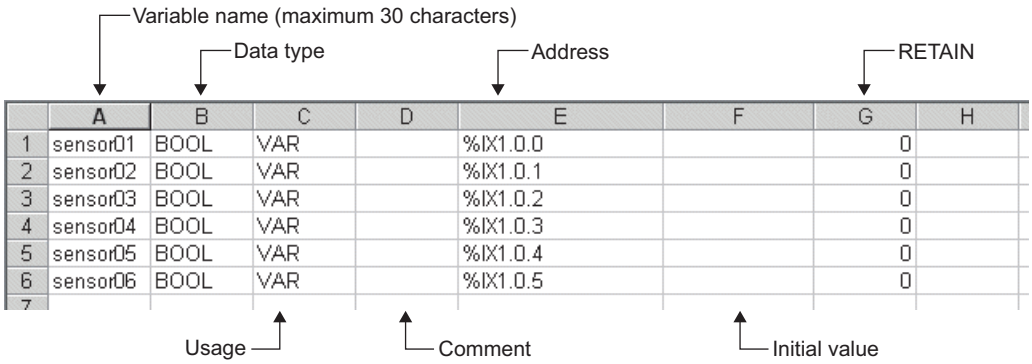


Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

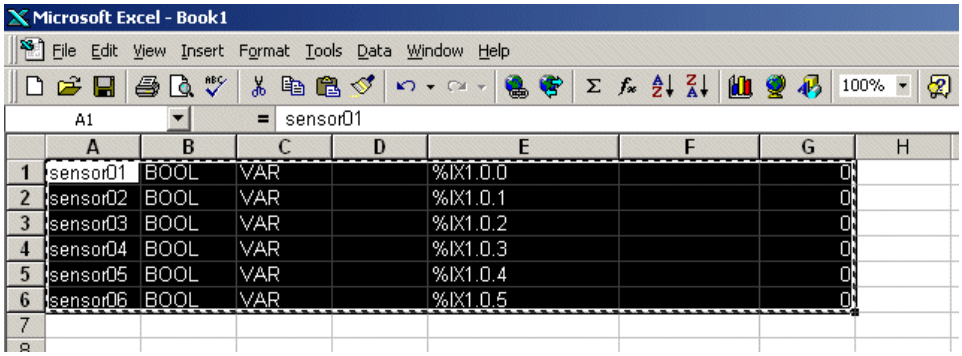
2) Copying and pasting from an Excel worksheet to the variables worksheet

◆ Create variables declaration on an excel worksheet. The order of the lines must be matched to that of the variables worksheet of D300win, as shown below.



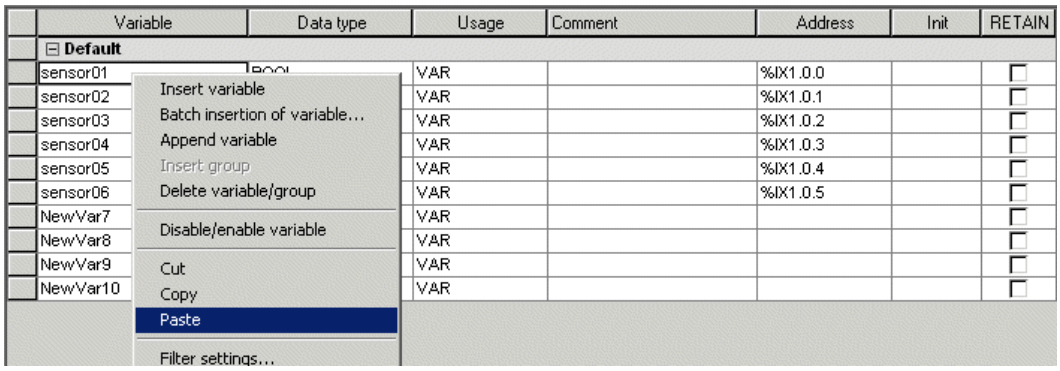
	A	B	C	D	E	F	G	H
1	sensor01	BOOL	VAR		%IX1.0.0		0	
2	sensor02	BOOL	VAR		%IX1.0.1		0	
3	sensor03	BOOL	VAR		%IX1.0.2		0	
4	sensor04	BOOL	VAR		%IX1.0.3		0	
5	sensor05	BOOL	VAR		%IX1.0.4		0	
6	sensor06	BOOL	VAR		%IX1.0.5		0	
7								

◆ Select an range that you want to copy to the variables worksheet and copy it by executing the [Copy] command in the right-click menu or by pressing the <Ctrl> + <C> keys.



	A	B	C	D	E	F	G	H
1	sensor01	BOOL	VAR		%IX1.0.0		0	
2	sensor02	BOOL	VAR		%IX1.0.1		0	
3	sensor03	BOOL	VAR		%IX1.0.2		0	
4	sensor04	BOOL	VAR		%IX1.0.3		0	
5	sensor05	BOOL	VAR		%IX1.0.4		0	
6	sensor06	BOOL	VAR		%IX1.0.5		0	
7								

◆ Open the variables worksheet, right-click the top cell (upper left corner) of the target area, and execute the [Paste] command. The contents of the Excel worksheet are copied to the variables worksheet.



Variable	Data type	Usage	Comment	Address	Init	RETAIN
Default						
sensor01		VAR		%IX1.0.0		
sensor02		VAR		%IX1.0.1		
sensor03		VAR		%IX1.0.2		
sensor04		VAR		%IX1.0.3		
sensor05		VAR		%IX1.0.4		
sensor06		VAR		%IX1.0.5		
NewVar7		VAR				
NewVar8		VAR				
NewVar9		VAR				
NewVar10		VAR				

Variable	Data type	Usage	Comment	Address	Init	RETAIN
Default						
sensor01	BOOL	VAR		%IX1.0.0		
sensor02	BOOL	VAR		%IX1.0.1		
sensor03	BOOL	VAR		%IX1.0.2		
sensor04	BOOL	VAR		%IX1.0.3		
sensor05	BOOL	VAR		%IX1.0.4		
sensor06	BOOL	VAR		%IX1.0.5		
NewVar7	BOOL	VAR				
NewVar8	BOOL	VAR				
NewVar9	BOOL	VAR				
NewVar10	BOOL	VAR				

Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

<Rules for transferring data>

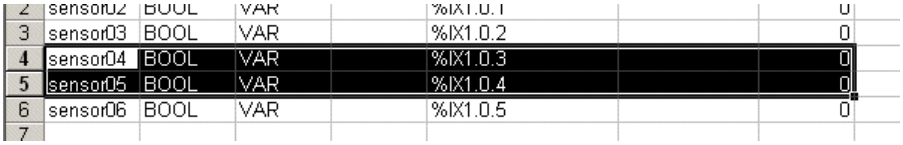
There are some rules for inserting cell data of Excel to the variables worksheet, as described below.

- When psating values from an Excel worksheet to the [RETAIN] cell of the variables worksheet, set the cells of Excel as shown below.

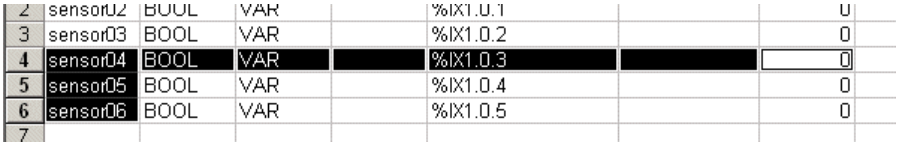
Pasting to the retain memory (When the check box is set to ON.)	Value other than 0
Not pasting to the retain memory (When the check box is set to OFF.)	0 or blank cell

- If text data containing more than 30 characters is pasted to the [Variable names] or [Data type] cell, characters exceeding 30 characters are cut.
- If any grammatically incorrect key word is used in the [Usage] cell, default usage (VAR or VAR_GLOBAL) is inserted.
- On the variables worksheet, multiple cells can be contiguously selected. Select cells contiguously and rectangularly.

<Example of proper selection of cells>



<Example of improper selection of cells>



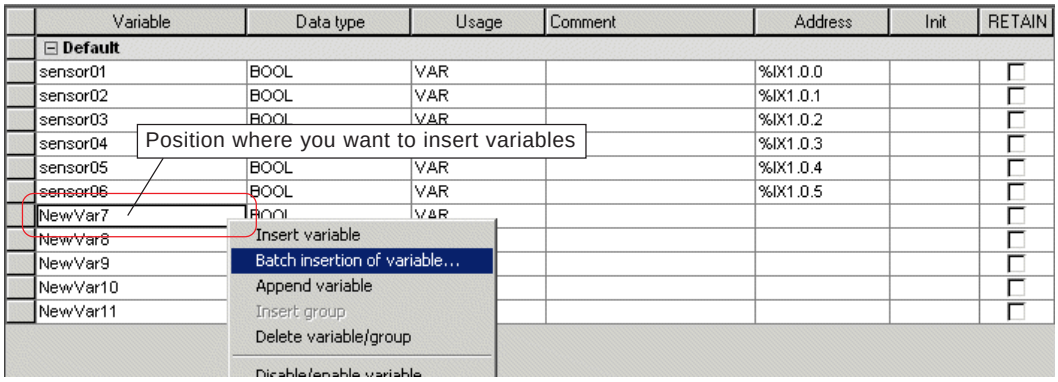
Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

(5) Batch insertion of variables (V3.2.1.0 or later)

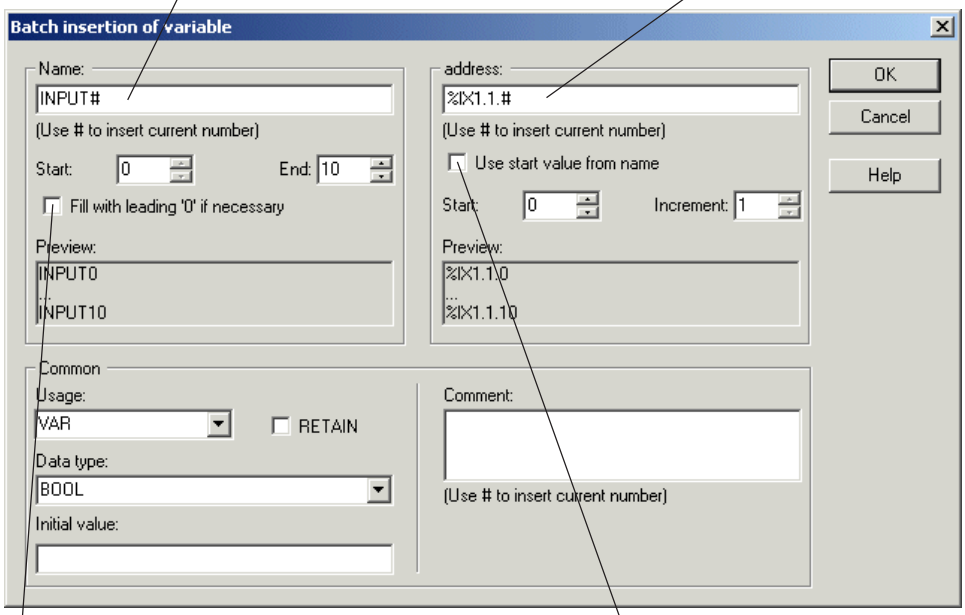
Variables that have the same attributes can be collectively inserted.

◆ Select the position where variables are inserted in the variables worksheet and execute the [Batch insertion of variable...] command. The [Batch insertion of variable] dialog is displayed.



Enter a variable name. If you enter variable name + a # sigin, # part is replaced with a serial number when inserted. The start position and end position can be specified.

Enter an address. If you enter a # sign in the address, # part is incremented when inserted. The start number and increment can be specified.



If more than ten variables are to be inserted at a time, zeros are put in front of the numbers of the variables.

If this check box is set to on, the start number specified in the [Name] group box is used for the start number of the address. In this case, the start number in the [Address] group box cannot be set.

* As common setting items of variables inserted collectively, it is possible to set the usage, initial value, RETAIN (ON or OFF) and comment.

Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

◆ After setting all necessary items, click the [OK] button. Variables are inserted according to the setting.

	Variable	Data type	Usage	Comment	Address	Init	RETAIN
	⊟ **Default**						
	sensor01	BOOL	VAR		%IX1.0.0		
	sensor02	BOOL	VAR		%IX1.0.1		
	sensor03	BOOL	VAR		%IX1.0.2		
	sensor04	BOOL	VAR		%IX1.0.3		
	sensor05	BOOL	VAR		%IX1.0.4		
	sensor06	BOOL	VAR		%IX1.0.5		
	INPUT0	BOOL	VAR		%IX1.1.0		
	INPUT1	BOOL	VAR		%IX1.1.1		
	INPUT2	BOOL	VAR		%IX1.1.2		
	INPUT3	BOOL	VAR		%IX1.1.3		
	INPUT4	BOOL	VAR		%IX1.1.4		
	INPUT5	BOOL	VAR		%IX1.1.5		
	INPUT6	BOOL	VAR		%IX1.1.6		
	INPUT7	BOOL	VAR		%IX1.1.7		
	INPUT8	BOOL	VAR		%IX1.1.8		
	INPUT9	BOOL	VAR		%IX1.1.9		
	INPUT10	BOOL	VAR		%IX1.1.10		
	NewVar7	BOOL	VAR				
	NewVar8	BOOL	VAR				
	NewVar9	BOOL	VAR				
	NewVar10	BOOL	VAR				
	NewVar11	BOOL	VAR				

Inserted variables

Section 8 Variables Declaration

8-3 Variables Declaration by the Variables Editor

(6) Edit function of variables worksheet (V3.2.1.0 or later)

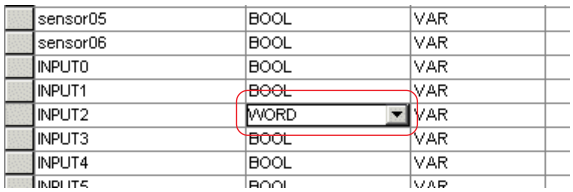
In V3.2.1.0 or later versions, the following functions have been added to the edit function of cells of the variables worksheet.

- Copying contents of a single cell to multiple cells
- Reflecting edit contents of a single cell in the other selected cells
- Editing cells by using the <F2> key

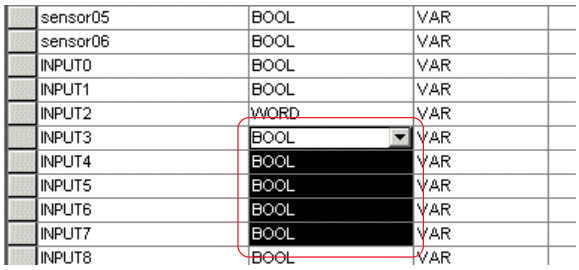
1) Copying contents of a single cell to multiple cells

Contents of an arbitrary cell can be collectively copied to multiple cells.

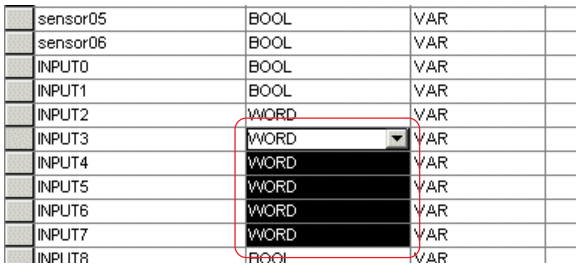
◆ Select a cell to be copied and press the <Ctrl> + <C> keys to copy it.



◆ Select cells to which the selected contents are pasted.

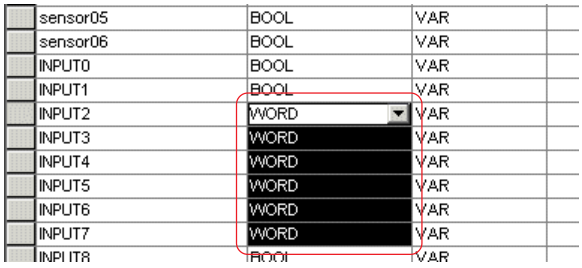


◆ Execute paste by pressing the <Ctrl> + <V> keys. The same contents are pasted to all the selected cells, as shown below.



2) Reflecting edit contents of a single cell in the other selected cells

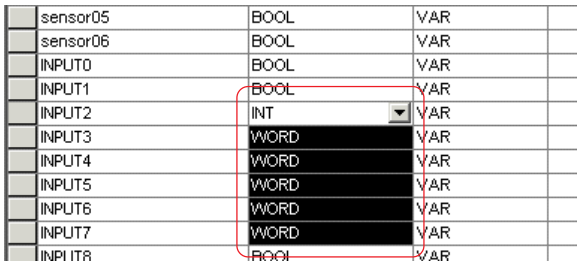
◆ Select cells to be collectively edited.



Section 8 Variables Declaration

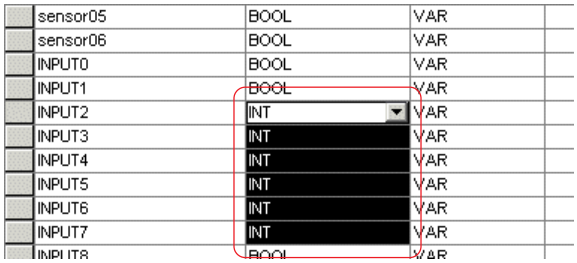
8-3 Variables Declaration by the Variables Editor

◆ Edit the focused cell.



	sensor05	BOOL	VAR
	sensor06	BOOL	VAR
	INPUT0	BOOL	VAR
	INPUT1	BOOL	VAR
	INPUT2	INT	VAR
	INPUT3	WORD	VAR
	INPUT4	WORD	VAR
	INPUT5	WORD	VAR
	INPUT6	WORD	VAR
	INPUT7	WORD	VAR
	INPUT8	BOOL	VAR

◆ After editing the cell, press the <Ctrl> + <Enter> keys. The edit contents are reflected in all the selected cells.



	sensor05	BOOL	VAR
	sensor06	BOOL	VAR
	INPUT0	BOOL	VAR
	INPUT1	BOOL	VAR
	INPUT2	INT	VAR
	INPUT3	INT	VAR
	INPUT4	INT	VAR
	INPUT5	INT	VAR
	INPUT6	INT	VAR
	INPUT7	INT	VAR
	INPUT8	BOOL	VAR

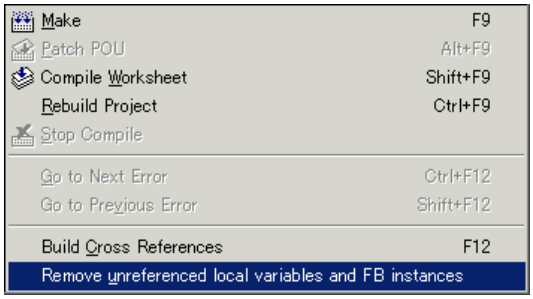
3) Editing cells by using the <F2> key

Pressing the <F2> key place the cell where the cursor is placed in edit mode.

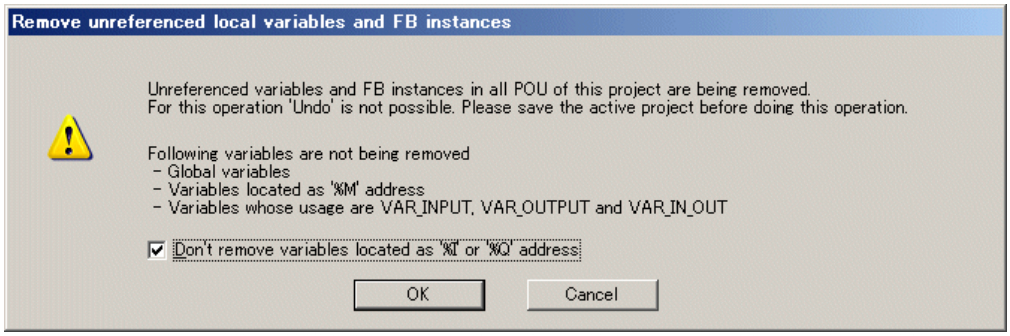
(7) Remove unreferenced local variables and FB instances function

This function is used to delete local variables and FB instances from variable worksheet that is not used in the project.

◆ Click the [Remove unreferenced local variables and FB instances] command in the [Build] menu, and below dialog box will be displayed. On this dialog box, click [OK] button to delete unused local variables and FB instances from variable worksheet.



<Undeleted variables>
Global variable
Variable assigned for internal memory (%M)
Function, variable for FB
When “Don’t remove variables located as ‘%I’ or ’%Q’ address” box is on, variable assigned for %I or %Q memory.



Section 8 Variables Declaration

8-4 Declaration of Derived Data Types

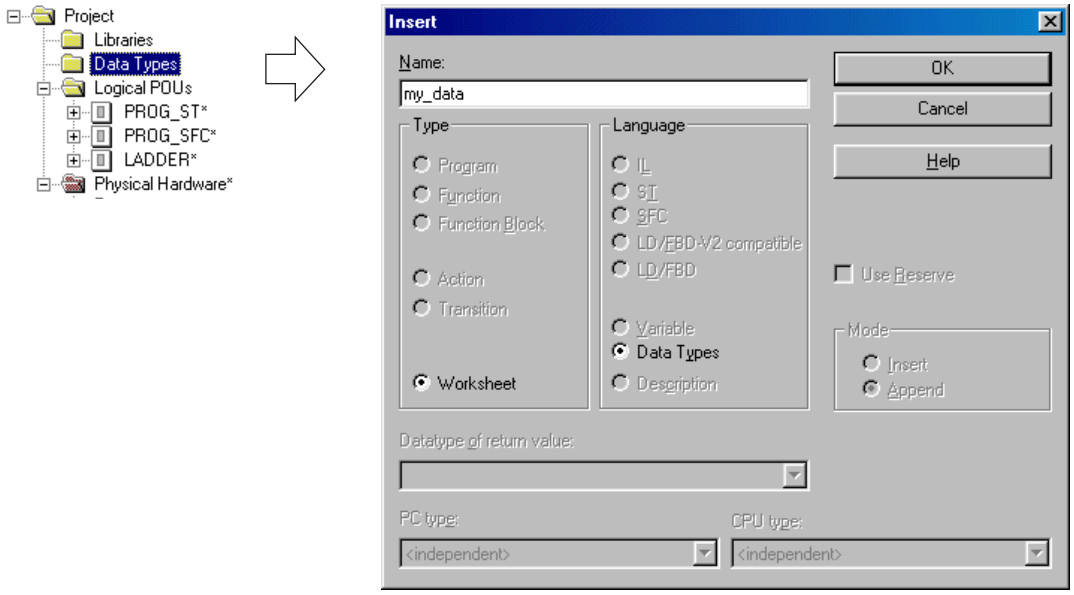
Derived data types are defined by user or PLC manufacturer. For this, a worksheet is inserted in the “Data types” folder of the project tree, and derived data types are defined on the worksheet.
MICREX-SX series can set the following derived data types.

- **Array data type**
  One-dimensional array, two-dimensional array (an array of arrays)
- **Structural data type**
  Structure, array of structures, structure of array, structure of structure

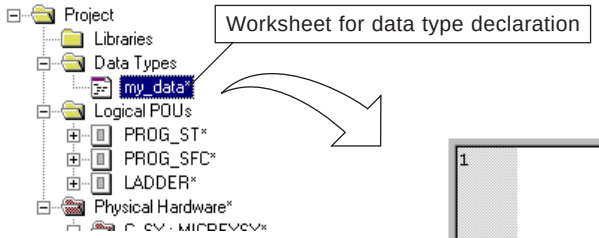
8-4-1 Definition of derived data types

(1) Inserting the data type worksheet

◆ Select the “Date types” folder in the project tree, and press the <Insert> key or click the [Add Object] button. The [Insert] dialog box is displayed.



◆ Enter your desired worksheet name (maximum 24 characters), and click the [OK] button. The worksheet for data type declaration is inserted.



◆ Double-click the icon for the data type worksheet, and the worksheet will be displayed.

Section 8 Variables Declaration

8-4 Declaration of Derived Data Types

(2) Declaration of data types

The data type worksheet can be operated in the same manner as ordinary text editors.
uClick a point on the worksheet, and the cursor will blink. Enter a text from the keyboard to declare data type.

<Sample declaration of array data type>

In the following example, an array data type is declared that consists of 10 elements (element 1 to element 10) of word type data.

```
1    TYPE
2        WORD_1_10 :ARRAY[1..10]OF WORD;
3    END_TYPE
```

<Sample declaration of structural data type>

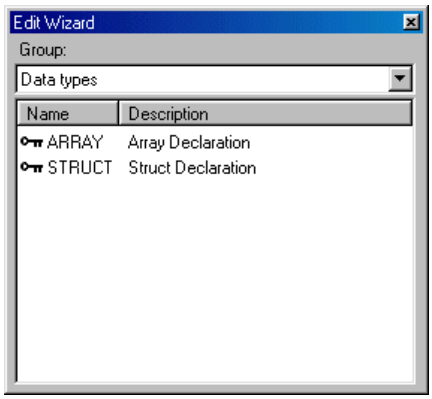
In the following example, a structural data type is declared that consists of BOOL type, INT type, WORD type and UINT type.

```
1    TYPE
2        ANA :
3        STRUCT
4            ERR      :BOOL;
5            ERR_STA  :INT;
6            DONE     :BOOL;
7            S_PARA   :WORD;
8            STA_NO   :UINT;
9        END_STRUCT;
10   END_TYPE
```

(3) The method to declare data type using the Edit Wizard

It is possible to declare data type with the Edit Wizard.

◆ When the cursor is located on the worksheet for data type declaration, keywords for data type declaration are displayed in the [Edit Wizard] window. If no edit wizard is displayed, press <Shift> + <F2> keys, or select [Display] on the menu bar and then click the [Edit Wizard] command in the [Display] menu. The [Edit Wizard] window is displayed.



◆ Double-click the keyword for the data type that you want to declare. The declarative statement as shown below is displayed. Rewrite the comment to complete the declarative statement.

<For array data type>

```
1    TYPE
2        (*Typename*) : ARRAY[(*From..To*)] OF (*DATATYPE*);
3    END_TYPE
4
```

<For structural data type>

```
1    TYPE
2        (*Typename*)     :
3        STRUCT
4            (*Element 1 Name*)  :   (*DATATYPE*);
5            (*Element 2 Name*)  :   (*DATATYPE*);
6            (*Element 3 Name*)  :   (*DATATYPE*);
7            (*      .           :       .     *);
8            (*      .           :       .     *);
9            (*Element n Name*)  :   (*DATATYPE*);
10       END_STRUCT;
11   END_TYPE
12
```

Section 9 User Functions / FBs

9-1 Creating a User Function/FB 9-1

9-1-1 Creating a user function 9-1

(1) Inserting a POU for user function 9-1

(2) Creating internal code for the function 9-2

(3) Creating a variables worksheet 9-3

(4) Pasting on the program code worksheet 9-3

(5) Creating help for the created function 9-4

9-1-2 Creating a user FB 9-5

(1) Inserting a POU for user FB 9-5

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(3) Creating a variables worksheet 9-7

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9-2 Using the Created User Function/FB 9-10

9-2-1 Saving the project 9-10

9-2-2 Library function 9-10

(1) Registration to library 9-10

(2) Pasting on the program code worksheet 9-11

9-3 User Function/FB with Pictures 9-12

9-3-1 Creating pictures using D300win picture creation function 9-12

9-3-2 Creating pictures using graphic editor available on the market 9-14

Section 9 User Functions / FBs

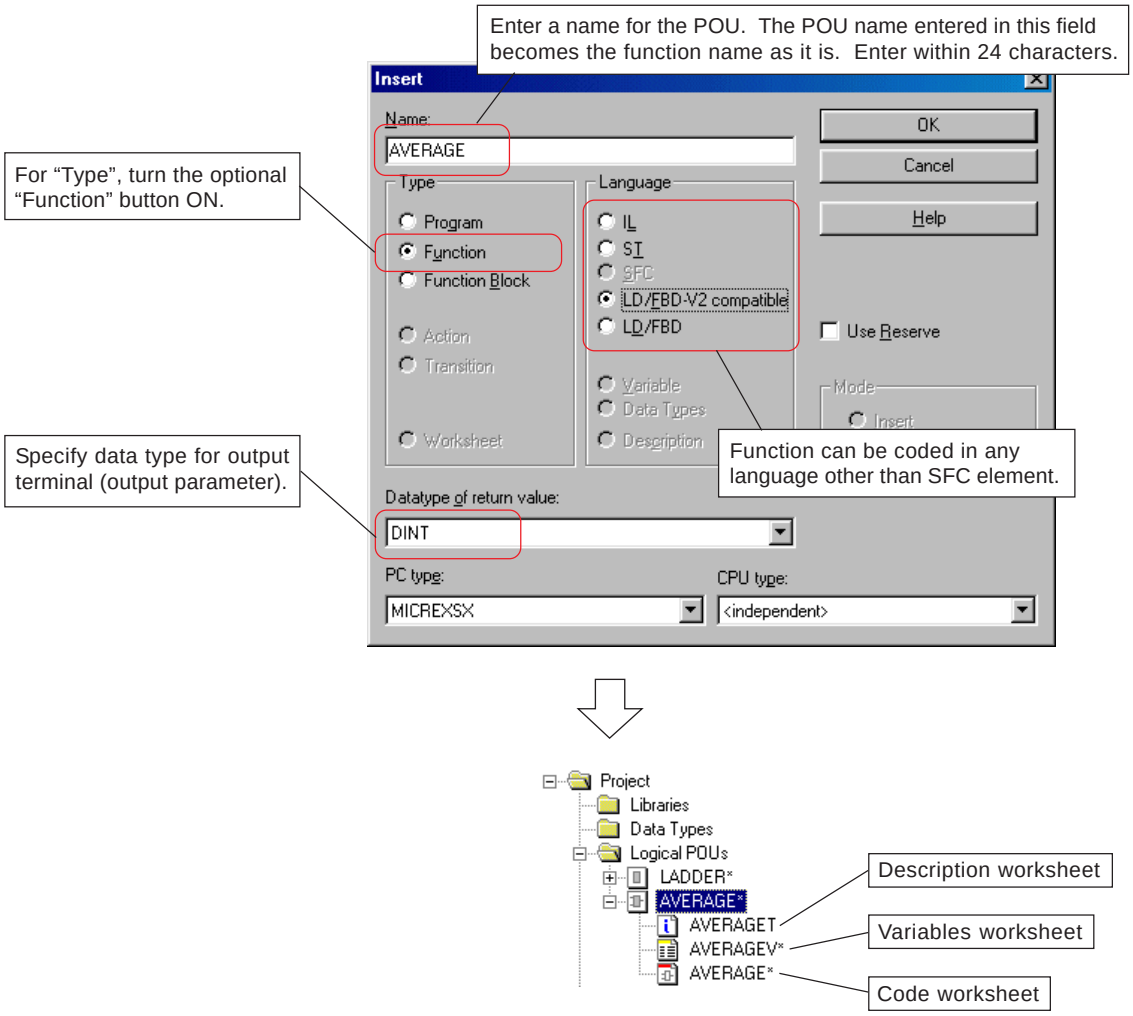
The standard functions (FCTs) and function blocks (FBs) that are defined in IEC 61131-3 as well as the functions and FBs that are proposed and provided by Fuji Electric are available for D300win.
In addition to these, users can create unique functions and FBs according to the specification of their machine or system.
How to create and use user-defined functions and FBs is explained below.

9-1 Creating a User Function/FB

9-1-1 Creating a user function

(1) Inserting a POU for user function

◆ With an existing POU selected, click the [Add function] button or press the <Insert> key. The [Insert] dialog box is displayed.
◆ After setting all necessary items, click the [OK] button. A function POU is added to the “Logical POUs” folder in the project tree.



One-Point Advice

- Function name should be determined such that the user can imagine how the function works from the name. Such naming will facilitate the selection of a function from the edit wizard.
- Maximum 24 characters can be used for a function name. However, when such a long name is used, the function that is pasted on a program code worksheet of the graphic editor may become too oblong. It is recommended to limit the number of characters to a certain extent when naming functions.

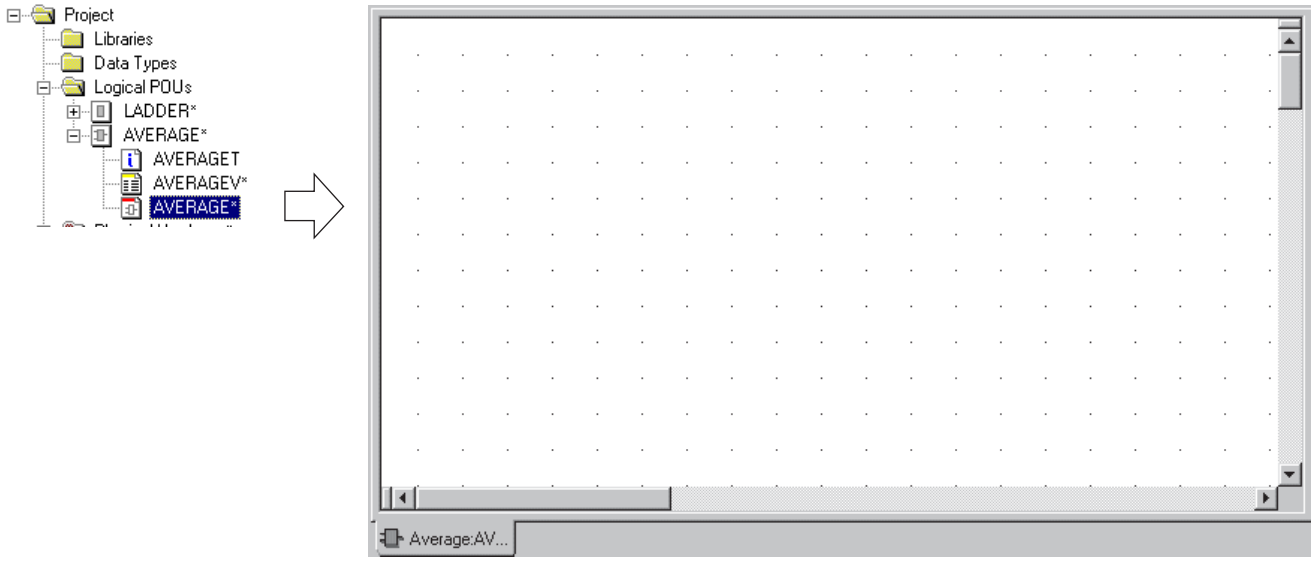
Section 9 User Functions / FBs

9-1 Creating a User Function/FB

(2) Creating internal code for the function

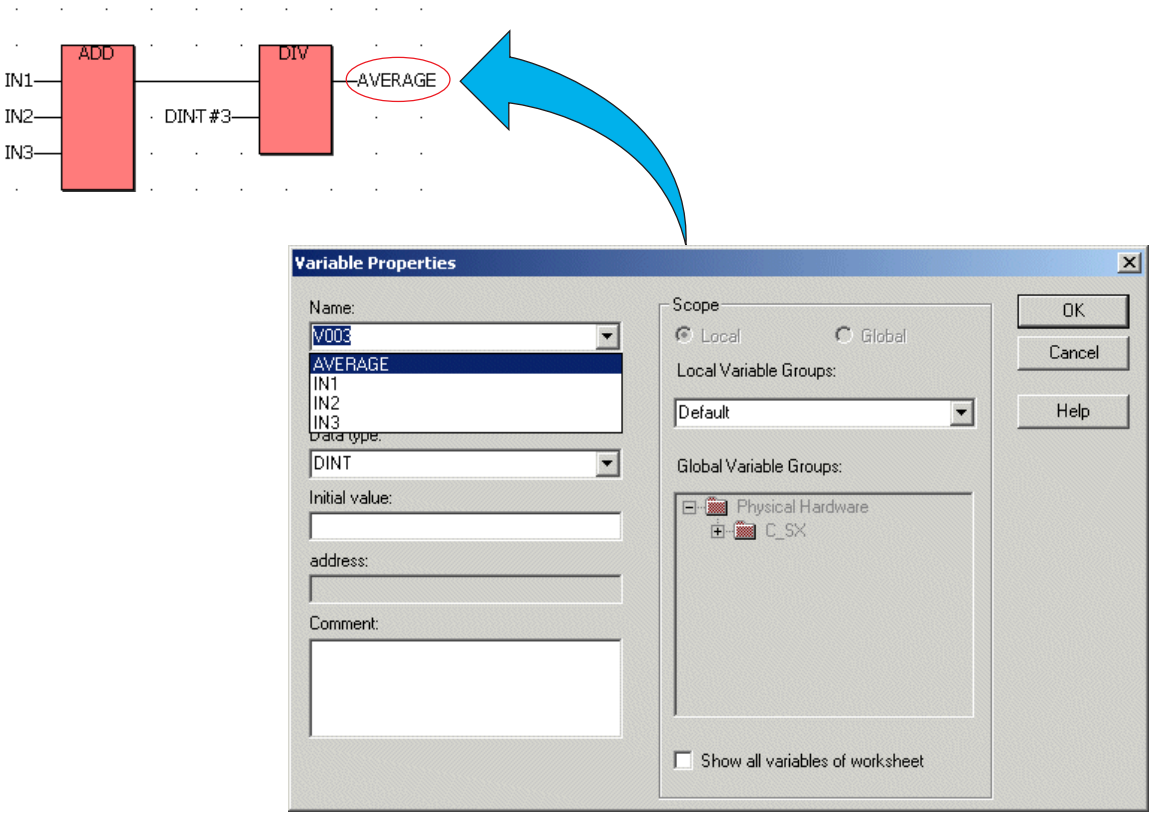
A code worksheet is created for the function. The operation for creating function codes is the same as that for ordinary programming.

◆ Double-click the code worksheet for function POU “AVERAGE”, and the code worksheet will be displayed.



◆ Create an internal code for the function as shown in the figure below.

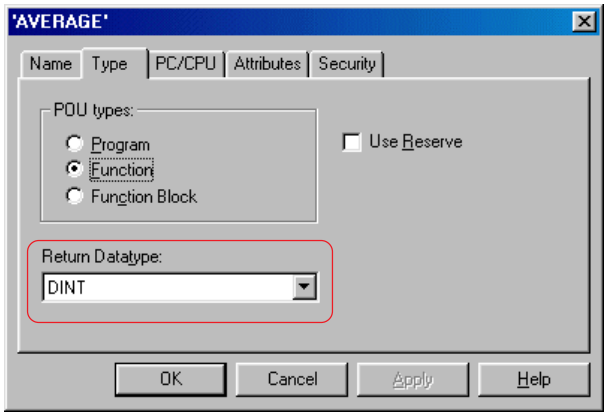
A function name, which is set from the [Insert] dialog box, is set for the output terminal of the function.
Though inexistent in the variables worksheet, it is also possible to select a name from the [Variable Properties] dialog box and connect it to the terminal.



Section 9 User Functions / FBs

9-1 Creating a User Function/FB

◆ The data type for output terminal “AVERAGE” is that specified by “Data type of return value” in the [Insert] dialog box. This data type can be confirmed on the [Type] tab window for property “AVERAGE” of the POU. Data type can be changed.



(3) Creating a variables worksheet

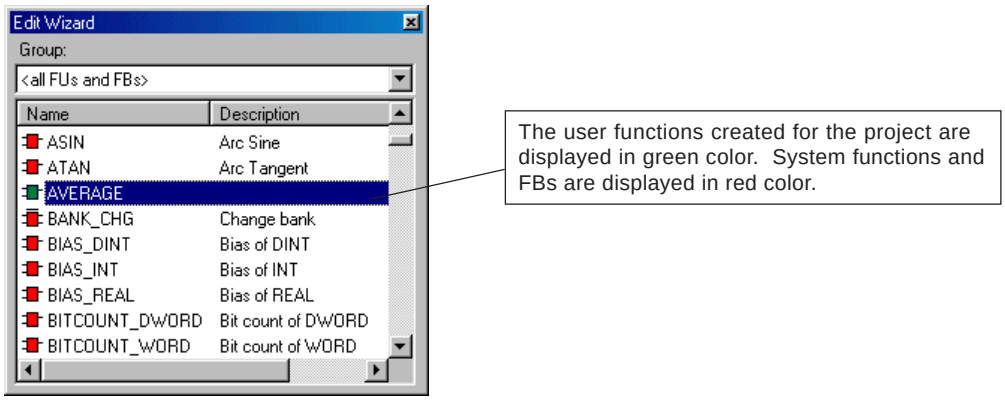
A variables worksheet is created for the created code. Here, input terminals are specified for the function. The variables worksheet for the code created in (2) becomes as follows:

	Variable	Data type	Usage	Comment
	Default			
	IN1	DINT	VAR_INPUT	
	IN2	DINT	VAR_INPUT	
	IN3	DINT	VAR_INPUT	

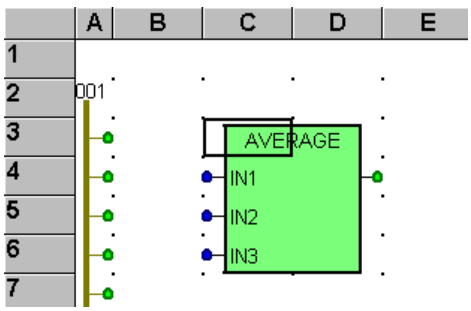
“VAR_INPUT” is declared as the “Usage” of the input terminals of the function.

(4) Pasting on the program code worksheet

◆ After above operations (1) to (3) are completed, the project is compiled. When the compilation is completed successfully, the created function is displayed in the edit wizard.



◆ Place the cursor on the code worksheet for the POU that uses the created function, and double-click the created user function on the edit wizard. The function is pasted on the code worksheet.



Section 9 User Functions / FBs

9-1 Creating a User Function/FB

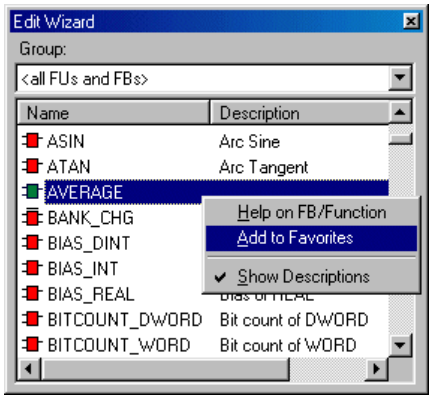
(5) Creating help for the created function

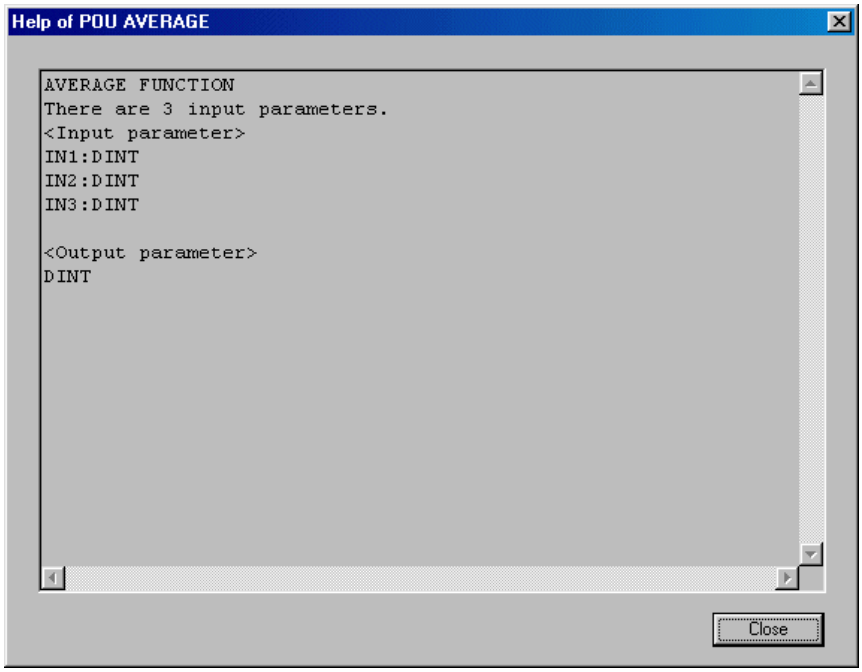
If explanatory statements of the operation, using method and other information of created functions are input to the description worksheet for the function POU, it is possible to see the explanation when the function is used in a program.

◆ Open a description worksheet and enter explanatory statements for the function.

```
1     AVERAGE FUNCTION
2     There are 3 input parameters.
3     <Input parameter>
4     IN1:DINT
5     IN2:DINT
6     IN3:DINT
7
8     <Output parameter>
9     DINT
```

◆ After the project is compiled, right-click a created function on the edit wizard, and left-click the [Help on FB/Function] command in the short-cut menu. Help on the function is displayed.





Section 9 User Functions / FBs

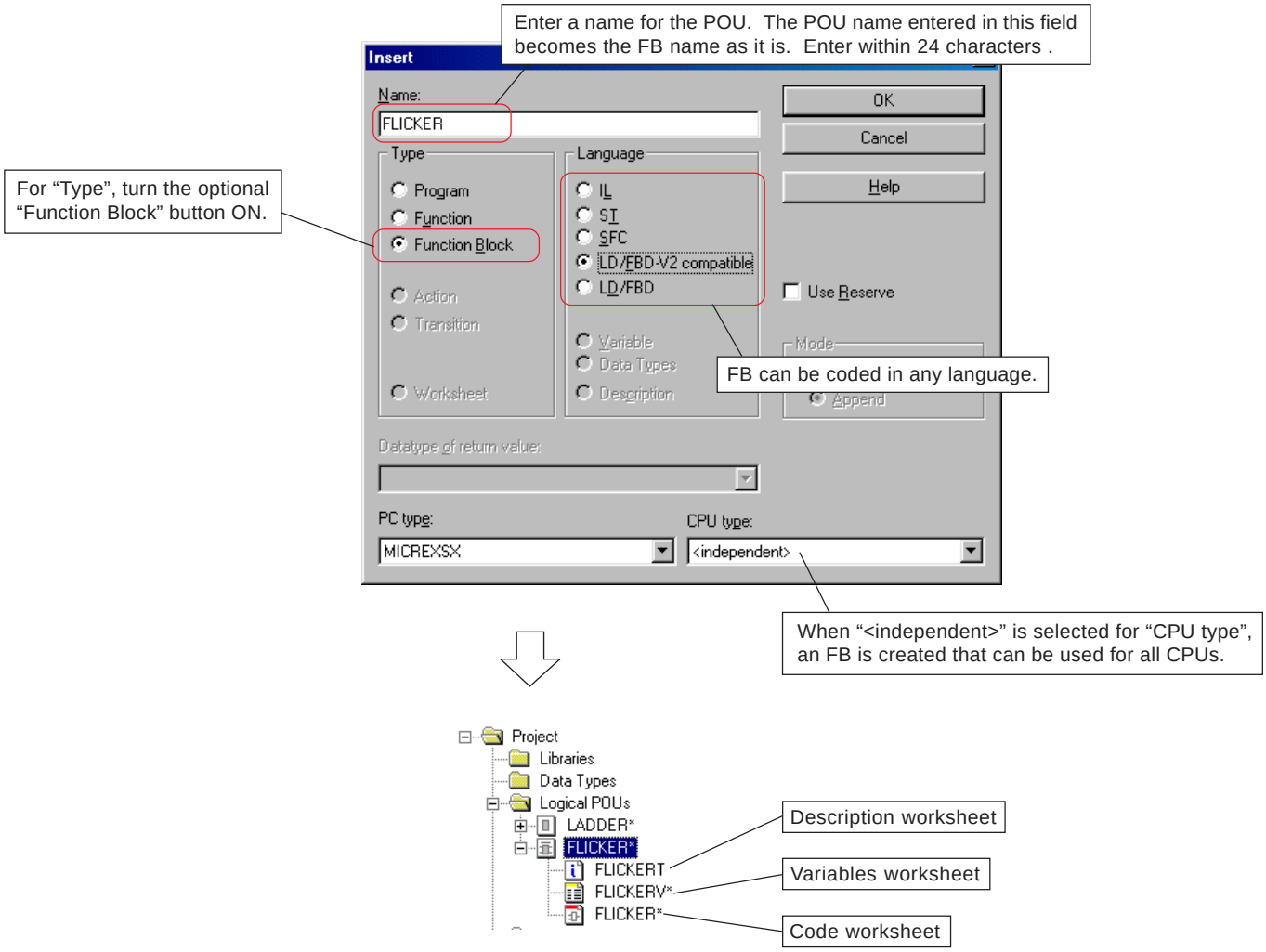
9-1 Creating a User Function/FB

9-1-2 Creating a user FB

(1) Inserting a POU for user FB

◆ With an existing POU selected, click the [Add Function Block] button or press the <Insert> key. The [Insert] dialog box is displayed.

◆ After setting all necessary items, click the [OK] button. An FB POU is added to the "Logical POUs" folder in the project tree.



One-Point Advice

- FB name should be determined such that the user can imagine how the FB works from the name. Such naming will facilitate the selection of a FB from the edit wizard.
- Maximum 24 characters can be used for an FB name. However, when such a long name is used, the FB that is pasted on a program code worksheet of the graphic editor may become too oblong. It is recommended to limit the number of characters to a certain extent when naming FBs.

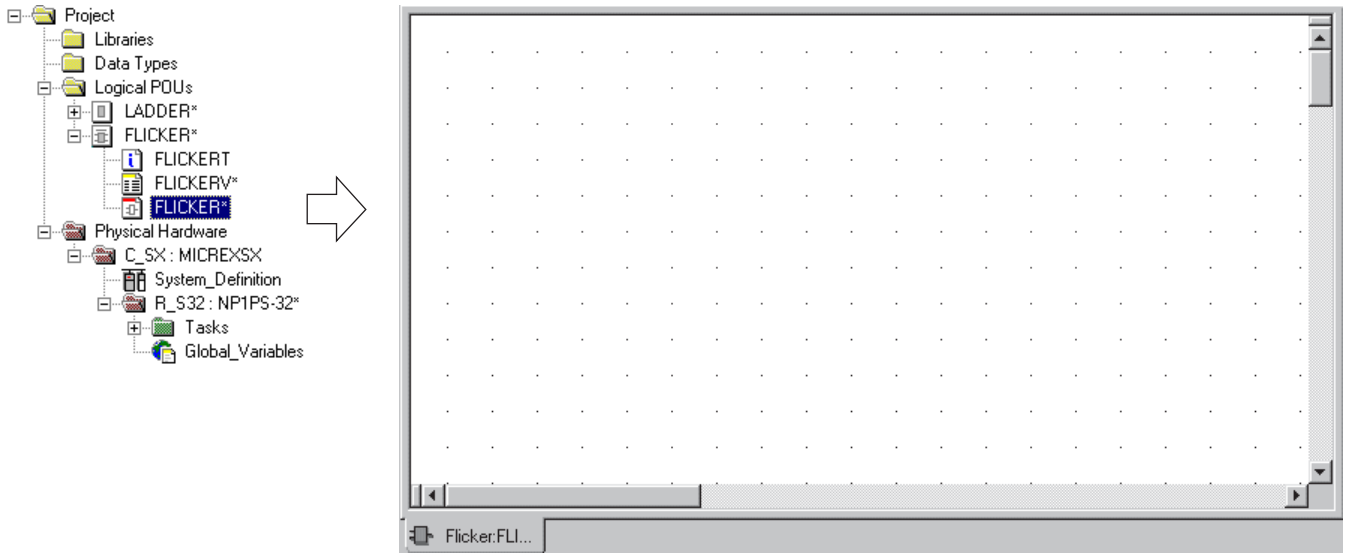
Section 9 User Functions / FBs

9-1 Creating a User Function/FB

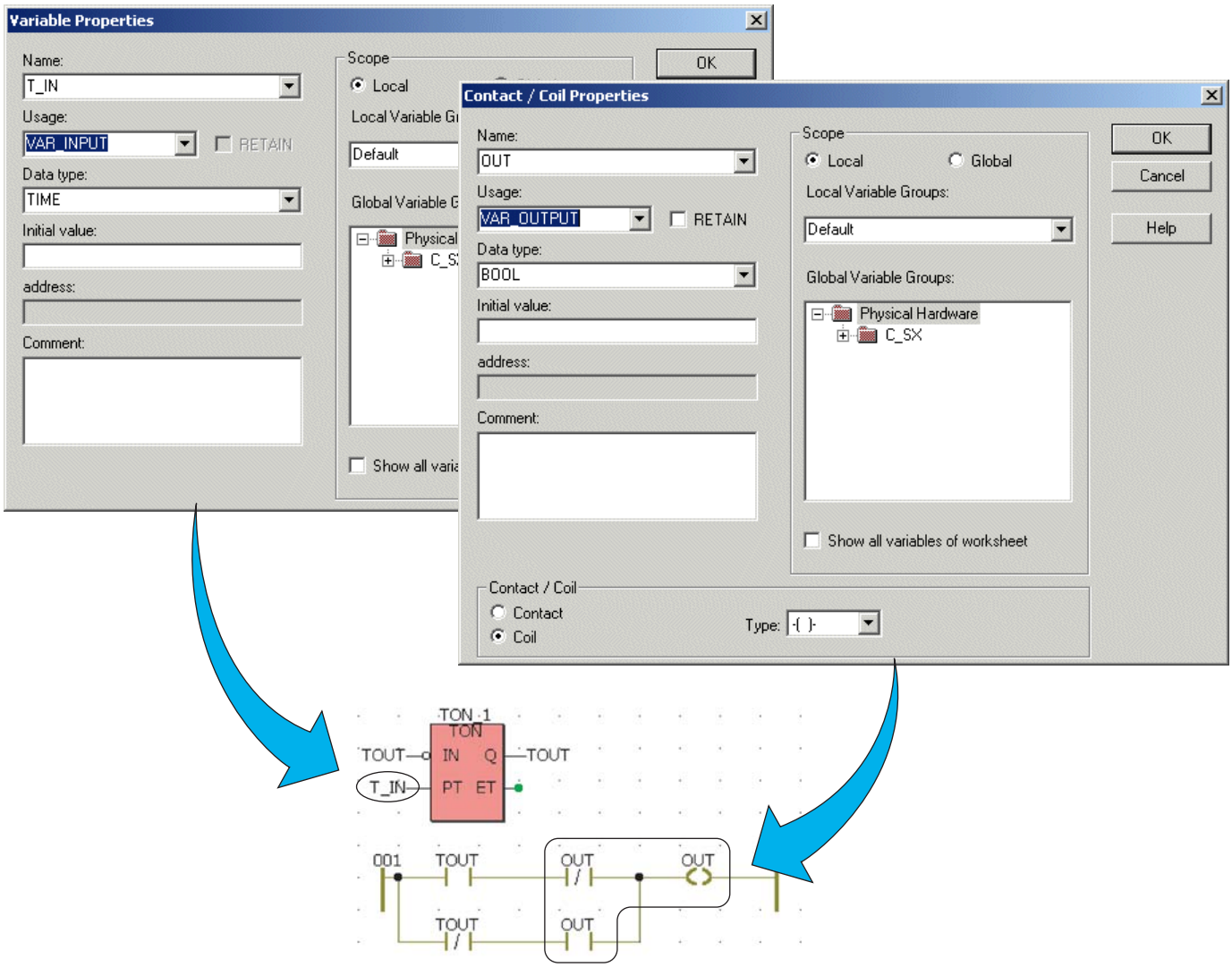
(2) Creating internal code for the FB

A code worksheet is created for the FB. The operation for creating FB codes is the same as that for ordinary programming. In this example, an FB that outputs flicker signal, the flickering intervals of which can be set externally, is created.

◆ Double-click the code worksheet for the POU “FLICKER”, and the code worksheet will be displayed.

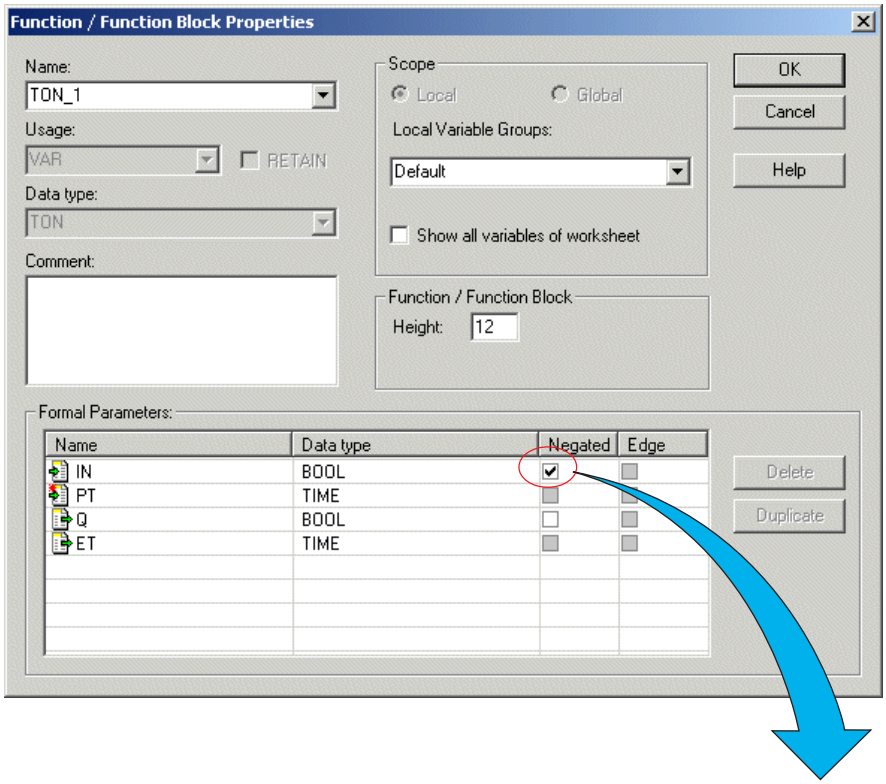


◆ Create internal codes for the FB as shown in the figure below.
“VAR_INPUT” is declared as the “Usage” of the input terminal of the FB while “VAR_OUTPUT” is declared as the “Usage” of the output terminal of the FB.

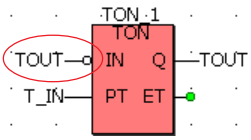


Section 9 User Functions / FBs

9-1 Creating a User Function/FB



The logic of BOOL type terminal can be inverted (negated).



(3) Creating a variables worksheet

A variables worksheet is created for the created code. The variables worksheet for the codes created in (2) becomes as follows:

	Variable	Data type	Usage	Comment
	Default			
	TON_1	TON	VAR	
	TOUT	BOOL	VAR	
	T_IN	TIME	VAR_INPUT	
	OUT	BOOL	VAR_OUT...	

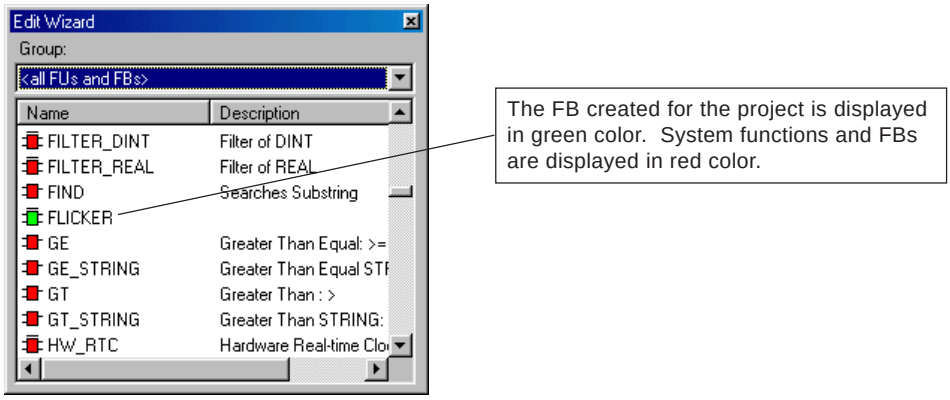
"VAR_INPUT" is declared as the "Usage" of the input terminals of the FB while "VAR_OUTPUT" is declared as the "Usage" of the output terminals of the FB.

Section 9 User Functions / FBs

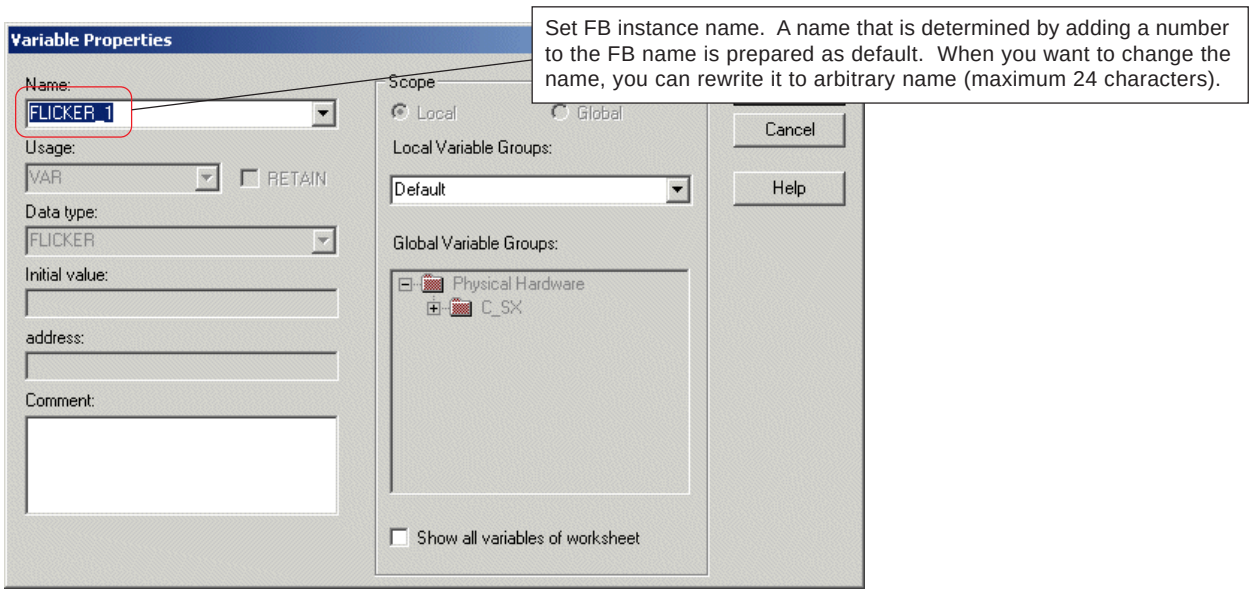
9-1 Creating a User Function/FB

(4) Pasting on the program code worksheet

◆ After above operations (1) to (3) are completed, the project is compiled. When the compilation is completed successfully, the created FB is displayed in the edit wizard.



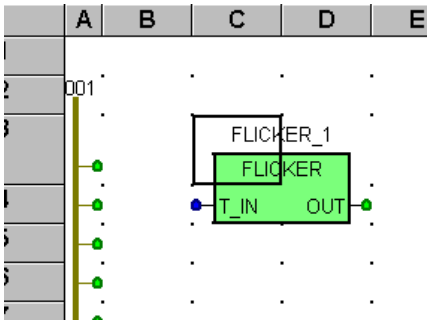
◆ Place the cursor on the code worksheet for the POU that uses the created FB, and double-click the created user FB on the edit wizard. The [Variable Properties] dialog box is displayed. This dialog box is displayed for the purpose of declaring instances for the FB that is to be used.
After setting the name and comment, click the [OK] button.



Section 9 User Functions / FBs

9-1 Creating a User Function/FB

◆ After inputting a comment as needed, click the [OK] button. The created FB is pasted on the code worksheet, as shown in the figure below.



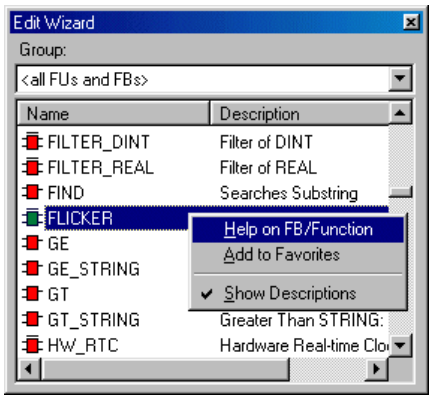
(5) Creating help for the created FB

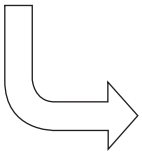
If explanatory statements of the operation, using method and other information of created FBs are input to the description worksheet for the FB POU, it is possible to see the explanation when the FB is used in a program.

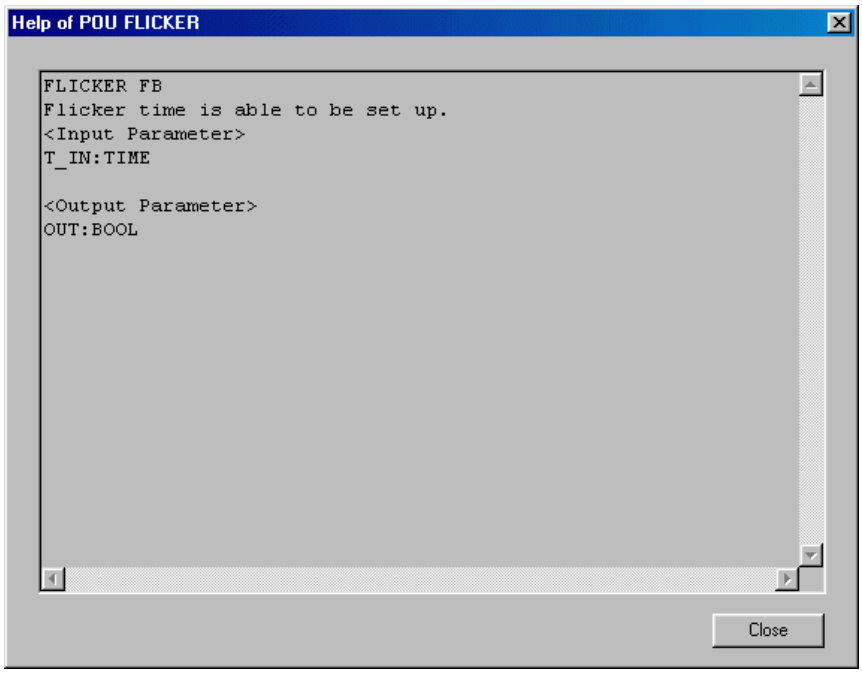
◆ Open a description worksheet and enter explanatory statements for the FB.

```
1    FLICKER FB
2    Flicker time is able to be set up.
3    <Input Parameter>
4    T_IN:TIME
5
6    <Output Parameter>
7    OUT:BOOL
```

◆ After the project is compiled, right-click an created FB on the edit wizard, and left-click the [Help on FB/Function] command in the short-cut menu. Help on the FB is displayed.







Section 9 User Functions / FBs

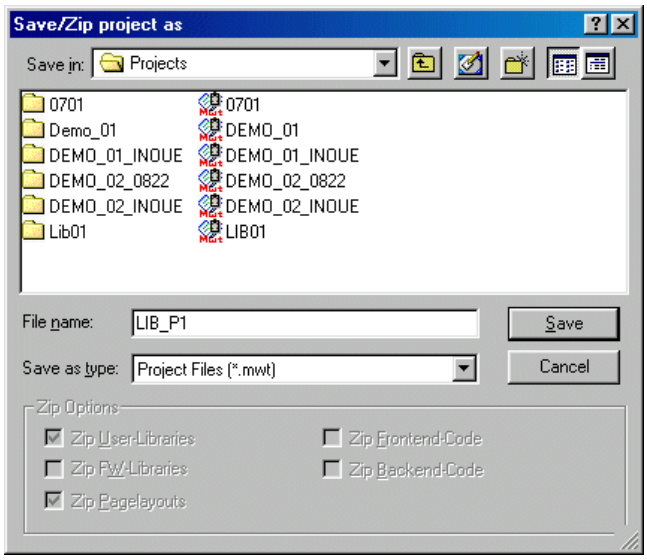
9-2 Using the Created User Function/FB

When you want to use a user function/FB in a project other than that for which the user function or FB was created, it is necessary to register the project for which the user function or FB was created to a library.

9-2-1 Saving the project

The project for which the user function or FB was created is saved.

◆ Left-click the [Save Project As / Zip Project As...] command in the [File] menu. The [Save/Zip project as] dialog box is displayed.

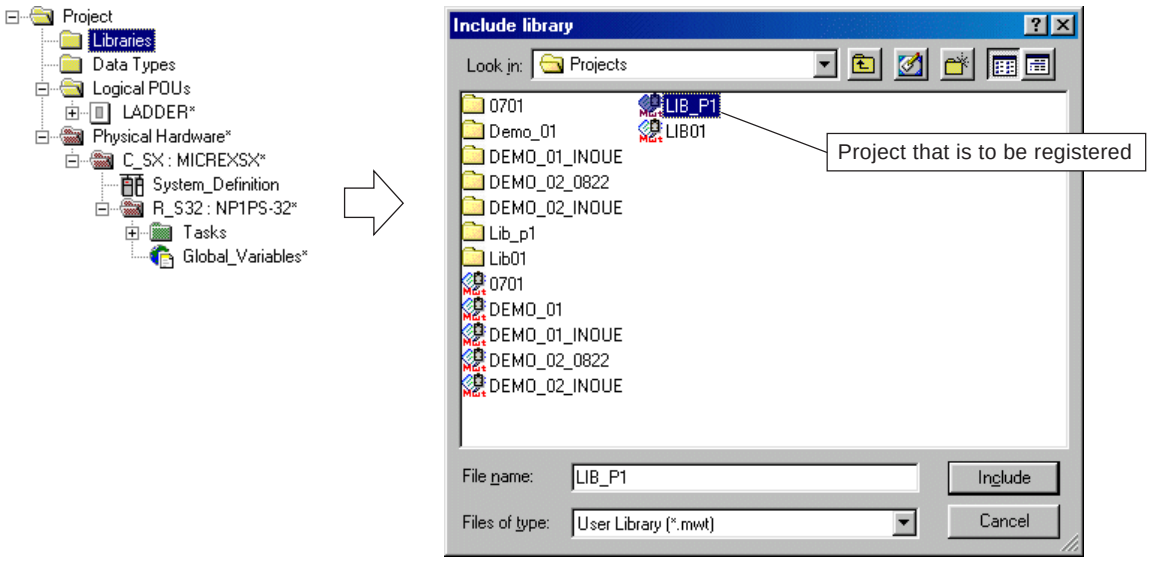


◆ After specifying “Save in” (where to save the FB) and entering “File name”, click the [OK] button. The project is saved.

9-2-2 Library function

(1) Registration to library

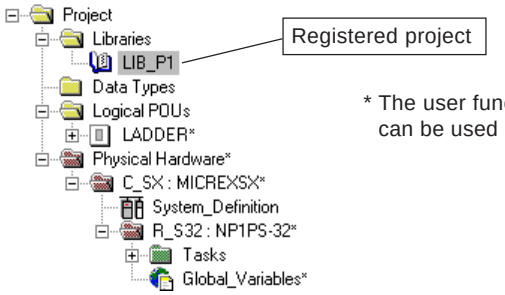
◆ After selecting the “Libraries” folder in the project tree, click the [Add Object] button or press the <Insert> key. The [Include library] dialog box is displayed.
Default for “Look in” is “Libraries”. Specify a folder that is to be registered to the library, and select a project that is to be registered.



Section 9 User Functions / FBs

9-2 Using the Created User Function/FB

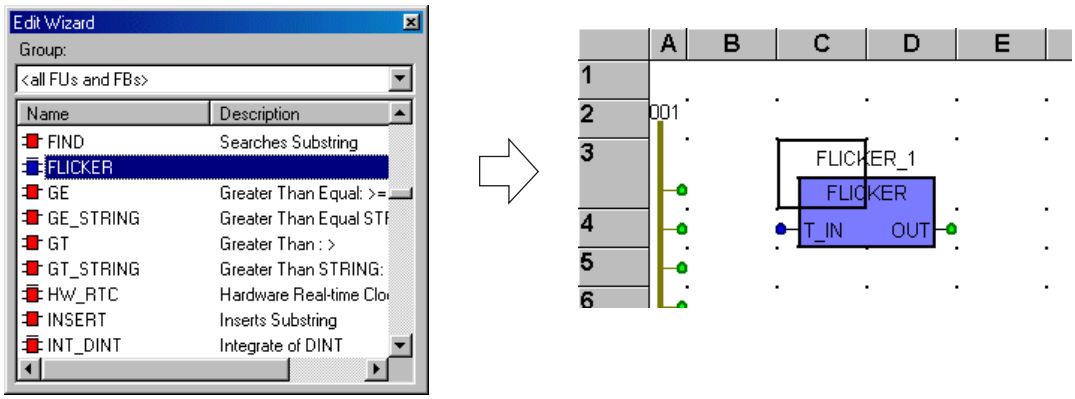
◆ After selecting a project that is to be registered to the library, click the [OK] button. The project is registered to the “Libraries” folder in the project tree.



* The user functions and FBs that are created in the registered project can be used in other POUs in the project tree.

(2) Pasting on the program code worksheet

◆ Place the cursor on the code worksheet for the POU that uses the created user function or FB, and select the user function or FB that you want to use from the edit wizard. The user function or FB is pasted on the code worksheet.

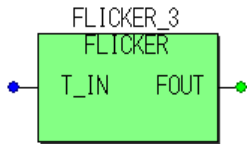


Section 9 User Functions / FBs

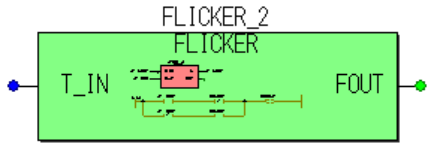
9-3 User Function/FB with Pictures

In order to make the created user function/FB easier to understand, pictures can be inserted in the user function/FB frame. Pictures to be added to user functions or FBs can be created in two ways: one is to recognize a program in the POU as a picture by using the D300win picture creation function and another is to create a picture using a graphic editor available on the market.

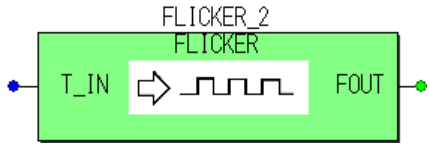
<Sample user function/FB without pictures>



<Sample user function/FB with pictures created by programs in POU>

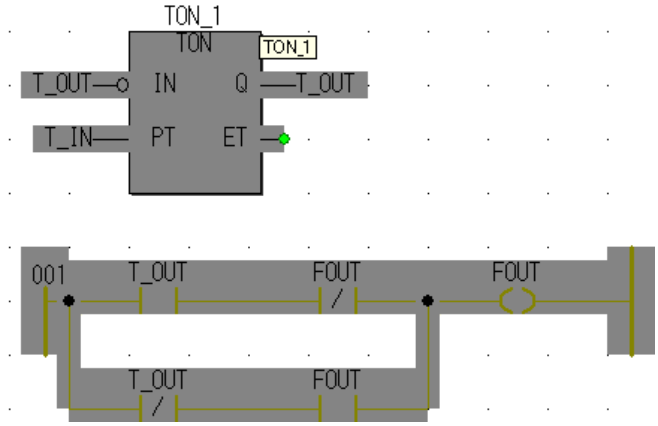


<Sample user function/FB with pictures created by graphic editor available on the market>



9-3-1 Creating pictures using D300win picture creation function

◆ Open the code body worksheet for the user function/FB to be added pictures and select the parts to be used as pictures.

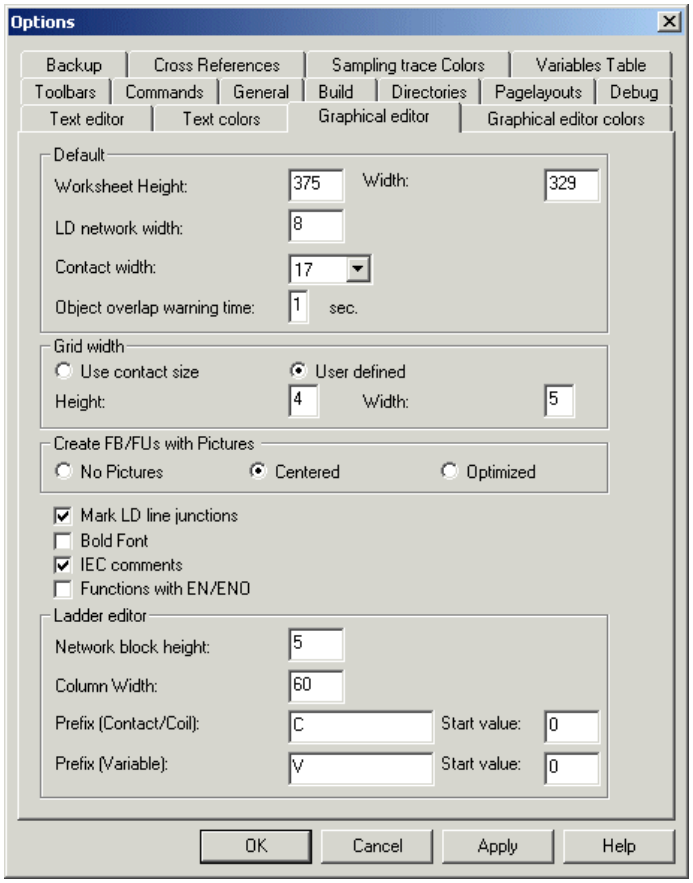


◆ Select [Make picture] from [Edit]. D300win creates file “picture.emf” from the selected graphic (circuit) and saves it in the related POU subdirectory.

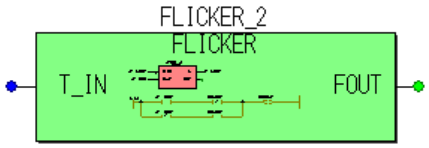
Section 9 User Functions / FBs

9-3 User Function/FB with Pictures

◆ Click the [Graphical editor] tab on the [Options] dialog and check the [Centered] or [Optimized] option button ON for “Create FB/FUs with Pictures”.



◆ When the created user function/FB is pasted on the LD/FBD-V2 compatible editor, the user function/FB with pictures is displayed as shown below.

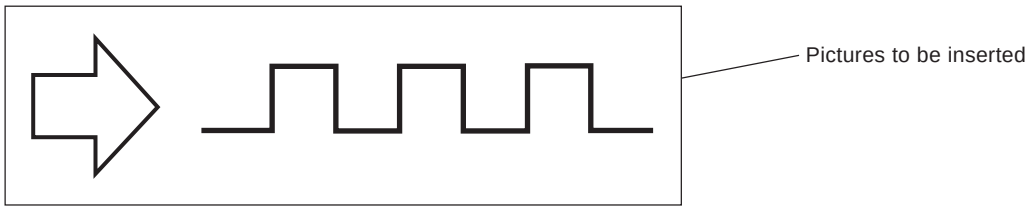


Section 9 User Functions / FBs

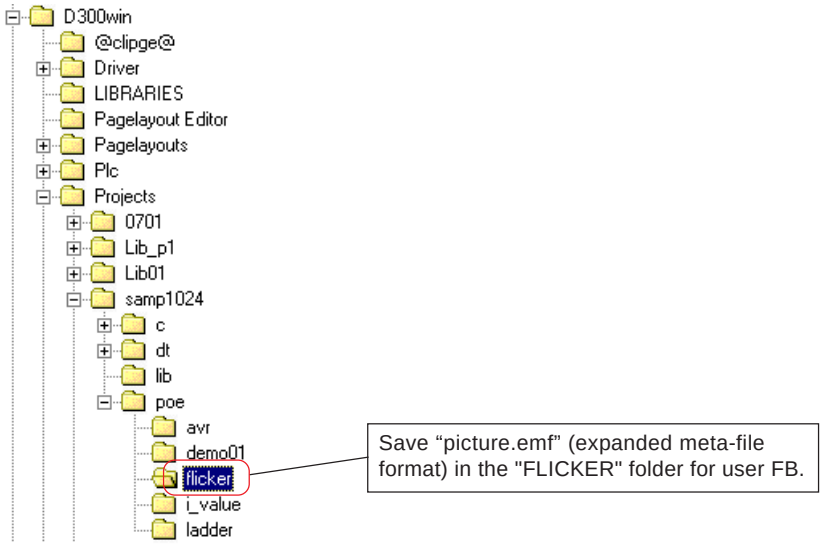
9-3 User Function/FB with Pictures

9-3-2 Creating pictures using graphic editor available on the market

◆ Using a graphic editor available on the market, create pictures to be added to user functions or FBs.

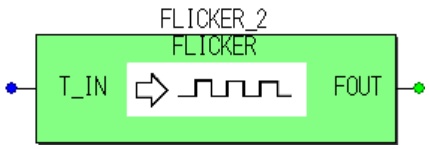


◆ Save the created pictures under file name “picture.emf” and then save this file in the related POU subdirectory using Explorer.



◆ Click the [Graphical editor] tab on the [Options] dialog and check the [Centered] or [Optimized] option button ON for “Create FB/FUs with Pictures”.

◆ When the created user function/FB is pasted on the LD/FBD-V2 compatible editor, the user function/FB with pictures is displayed as shown below.



Section 10 Compiling/Loading

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Section 10 Compiling/Loading

10-1 Compiling Projects

A created project must be compiled before it is actually downloaded to SX_CPU. Compiling means converting the worksheet contents to SX_CPU machine code. D300win allows compiling whole or a part of a project.

10-1-1 D300win compiling functions

D300win provides four compiling functions: Make, Compile Worksheet, Patch POU, and Rebuild Project. They should be selected according to the purpose.

1) Make

This is standard mode for compiling an edited project. In this mode, all uncompiled worksheets (those with an asterisk) in the project tree to create machine code.
When the existing project is partially modified, this mode is also used to compile only the modified part.

2) Compile Worksheet

After editing a worksheet, this mode is used to check the syntax. In this mode, syntax errors, if any, in the worksheet being edited are detected and no machine code is created.

Note: When a worksheet is closed or saved, the system automatically compiles the worksheet and the variable worksheet. After the related worksheets are saved by automatic compilation, the user function or user FB can be used with the edit wizard.

3) Patch POU

This is a function for rewriting program during CPU running. It is used for modifying project code worksheets during SX_CPU running. For details of Patch POU, see Section 10-2-2 “Patch POU (Rewriting POU During Project Running).”

4) Rebuild Project

This function compiles all worksheets of the project and creates machine code. After modifying a project registered in the library, Rebuild Project is necessary even when the project itself has not been modified.

Section 10 Compiling/Loading

10-1 Compiling Projects

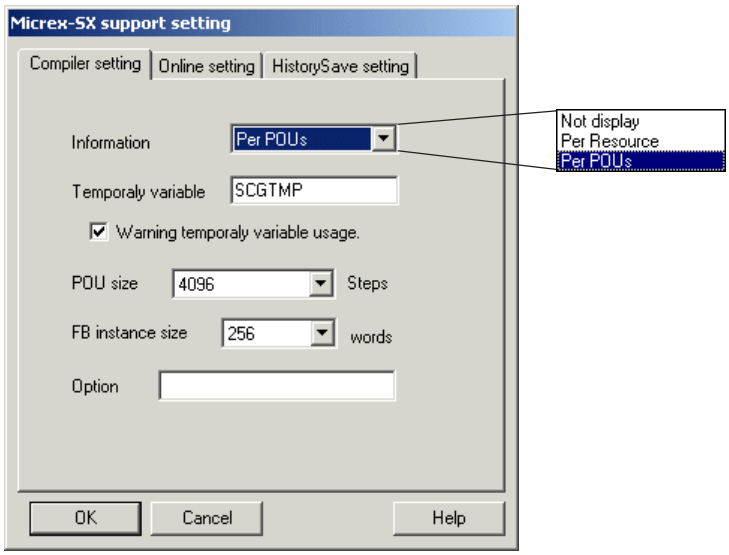
10-1-2 Compiling projects

This section describes how to compile a created project.

(1) Set items for compilation

Though compilation can be done in default settings, the items given below can be set.

◆ Click [Extras] g [SX support setting] to display the [SX support setting] dialog. After setting necessary items from this dialog, click the [OK] button. The set contents are reflected for compilation operations carried out after this setting.



<Set items>

1) Information

Select the type of information of the compilation results displayed on the message window after compilation. After normal completion of compilation, the number of program steps and memory size used are displayed.

Display item	Description
Not display	Displays no compilation results.
Per Resource	Displays the total number of program steps and total memory size used for each resource.
Per POUs	In addition to the total number of program steps and total memory size used for each resource, displays the number of program steps and memory size used for each POU.

2) Temporary variable prefix

The compiler may use a temporary area for code creation. The project uploaded from the CPU module to D300win creates program using this temporary area as the system temporary variables. Recompiling the created program increases variables used for the original program, resulting in more memory used. To avoid this, a prefix of the variable name can be set for identifying this temporary variable. The variable with a prefix is allocated to the temporary area, not to retained, non-retained, or FB instance memory.

* Characters available in system temporary variable names are alphanumeric characters, and underscore (_). The first character must not be a numeric character and two or more underscores cannot be used successively (__). A system temporary variable name must not be a blank.
  If [Make] has been used instead of [Rebuild Project] after modification, POUs without created code may remain. In this case, the message shown below appears.
  Message: “Code generation setting changed.! You have to rebuild project.!”

Section 10 Compiling/Loading

10-1 Compiling Projects

3) Warning temporary variable usage

Set whether or not to display a variable with a system temporary variable name as warning.
If the user uses a system temporary name carelessly, this variable becomes a local variable for POU and is not retained for program scan. The compiler displays a warning to avoid this. If uploaded program is compiled, a huge number of variables of this kind will be created and the warning itself may become unrecognizable among these variables. When setting a filter to inhibit warning display, check this check box ON.

4) POU size

Set the limit of the number of program steps that can be created in one POU. The number of program steps available depends on the CPU module type. For more information, see the “User’s Manual <Instruction>” (FEH200).
If the number of program steps of a created program exceeds the limit, a compilation error will occur.

5) FB instance size

Set the limit of the instance size of user FBs. The instance size available depends on the CPU module type. For more information, see the “User’s Manual <Instruction>” (FEH200).
If the instance size of a created user FB exceeds the limit, a compilation error will occur.

(2) Executing compilation

◆ Select as [Build] g [Make] or [Rebuild Project].
During compilation, compilation status is displayed on the message window. The compilation status includes the compilation results, number of errors, and number of warnings.

<Sample display of compilation results>

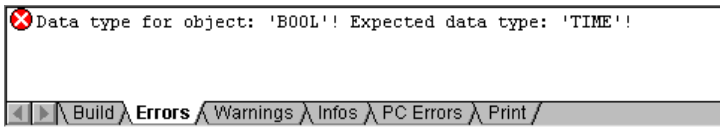
```
--------- Compiling variables --------
snd_dataV
LADDERV
Global_Variables
--------- Compiling graphics --------
snd_data
--------- Compiling ladder ---------
LADDER
1 Error(s), 0 Warning(s)
```

Build | Errors | Warnings | Infos | PC Errors

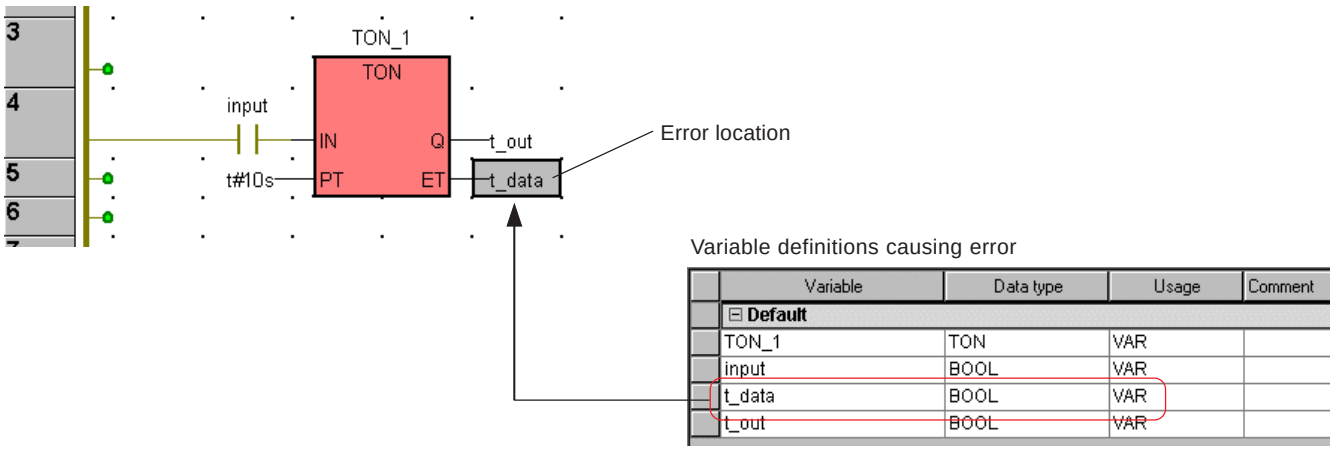
(3) Compilation errors

If the project created by compilation contains an error, compilation stops immediately upon detection of the error.

◆ When an error has been detected by compilation, the error contents can be displayed by clicking the [Errors] tab on the message window.



◆ Double-clicking the error item displays the error location in the main window.



◆ While the error item is being selected, pressing the <Shift> + <F1> keys displays the help topic about the error cause and reactions.

Section 10 Compiling/Loading

10-1 Compiling Projects

(4) Warnings

When a problem is assumed to possibly occur during application execution, though it does not affect program execution, it is displayed as a “Warning”.
When there are only warnings, but errors, compilation completes and machine code is created.

◆ After compilation has completed, clicking the [Warnings] tab in the message window displays the contents of the warnings.

◆ While the warning item is being selected, pressing the <Shift> + <F1> keys displays the help topic about the error warning and reactions.

Section 10 Compiling/Loading

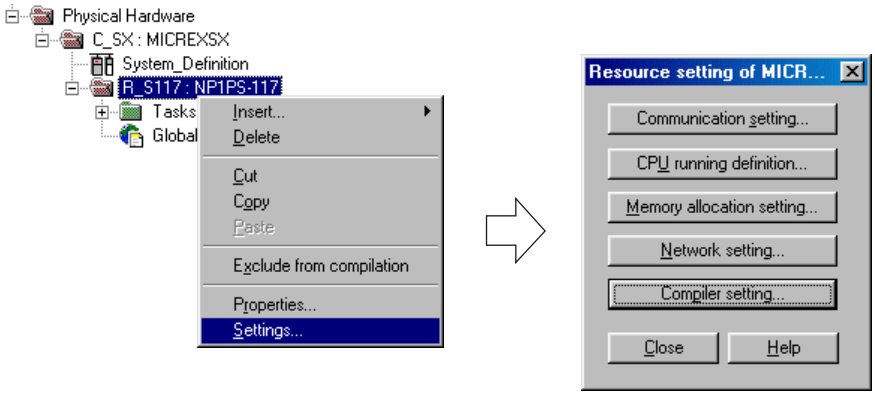
10-1 Compiling Projects

10-1-3 Setting compiler for reverse compilation

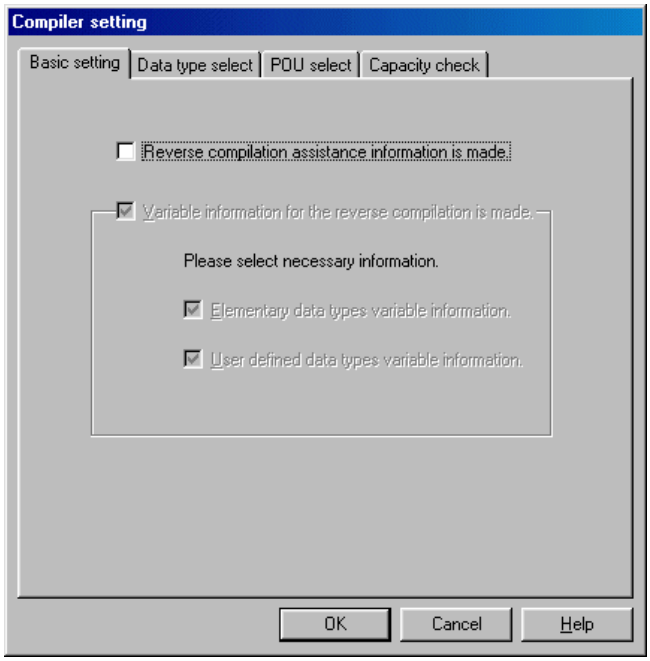
These settings are necessary for uploading and reverse compilation of the project.

* Settings of these items are not necessary when not executing upload -> reverse compilation.

◆ Right-click the resource icon and click [Settings...] to display the [Resource setting of MICREX-SX] dialog.



◆ Clicking the [Compiler setting...] button displays the [Compiler setting] dialog.



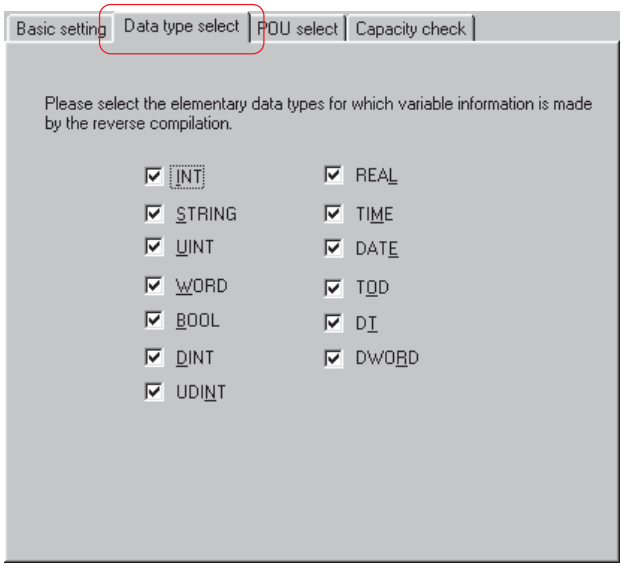
<Set items>

Item	Description
Reverse compilation assistance information is made.	When this check box is checked ON, supplementary information necessary for reverse compilation is created during compilation. If no supplementary information exists, reverse compilation is disabled.
Variable information for the reverse compilation is made.	When this check box is checked ON, information necessary for recovering the original variable name during reverse-compilation is compiled in the format (Zip data format) that can be saved in CPU.
Elementary data type variable information.	When this check box is checked ON, variable information of basic data type is created. The details are selected from [Data type select].
User defined data type variable information.	When this check box is checked ON, variable information of the array/structure data type is created.

Section 10 Compiling/Loading

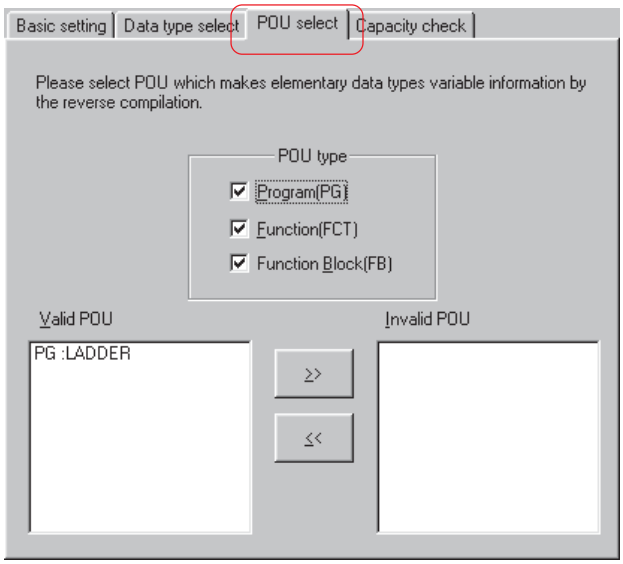
10-1 Compiling Projects

◆ Clicking the [Data type select] tab from the [Compiler setting] dialog displays the screen for selecting the basic data type for which the reverse-compilation information is to be created.



◆ When the check box of a data type is checked ON, the variables of the related basic data type are registered in the variable information necessary for reverse-compilation.

◆ Clicking the [POU select] tab from the [Compiler setting] dialog displays the screen for selecting the basic data type for which the reverse-compilation information is to be created.



<Set items>

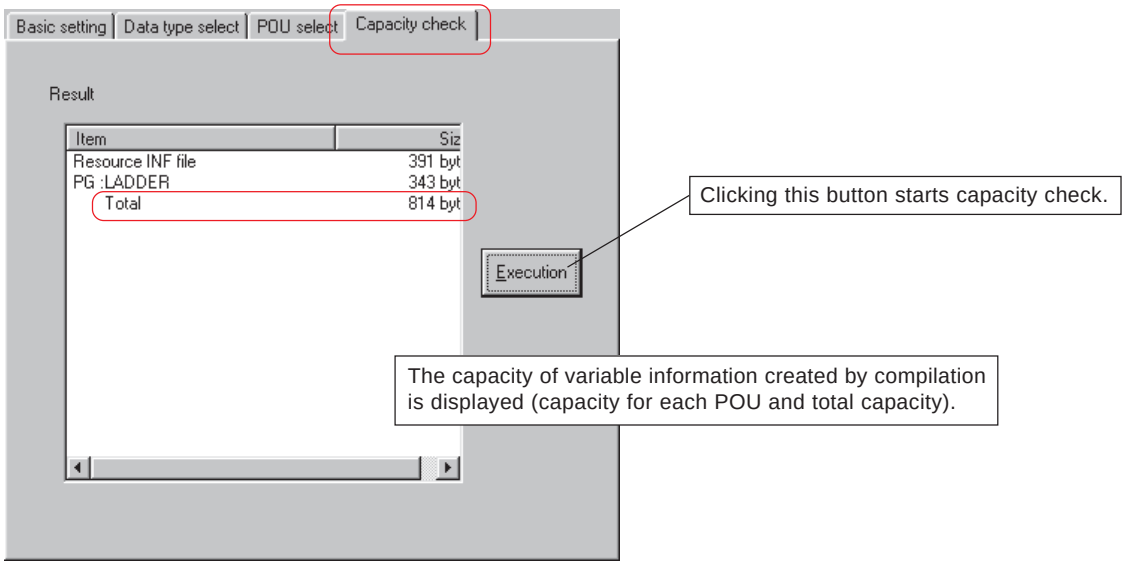
Item	Description
POU type	Check the check box ON to specify the POU type for which variable information of the basic data type is to be created.
Valid POU	Register the POUs whose basic data type variable information should be created. By default, all POUs set by [POU type] are registered.
Invalid POU	Register the POUs whose basic data type variable information may not be created. Select unnecessary POUs from the POU field and click the [>>] button.

Section 10 Compiling/Loading

10-1 Compiling Projects

◆ Clicking the [Capacity check] tab from the [Compiler setting] dialog displays the capacity check screen. Check the compressed file capacity based on the created variable information and make sure that it can be stored in the controller.
(Compressed file capacity stored in the high performance CPU: 128K bytes)
(Compressed file capacity stored in the standard CPU: 64K bytes)

Note: Check the capacity after compilation has completed.



Note: Check that the total capacity of the variable information is 128K bytes or less (for the high performance CPU).
Check that the total capacity of the variable information is 64K bytes or less (for the standard CPU).

Section 10 Compiling/Loading

10-2 Downloading

Download the operation project and ZIP file (variable information) from D300win to the CPU module.

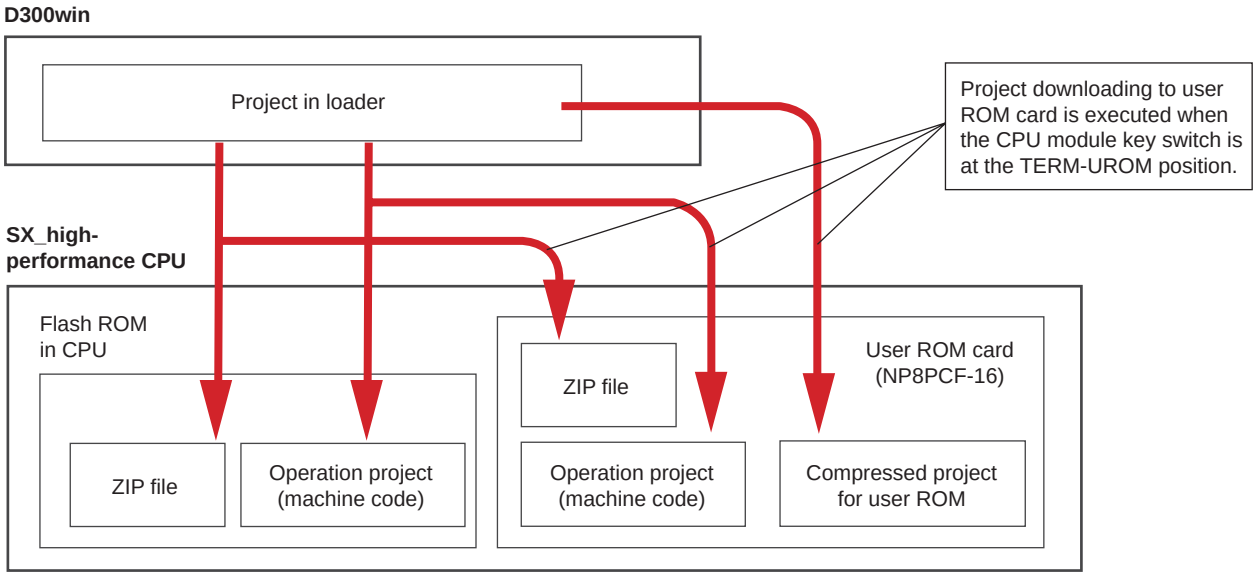
10-2-1 Downloading from D300win to CPU module

Download the project in D300win to the project storage area in the CPU memory.

(1) Outline of download function

<For high-performance CPU>

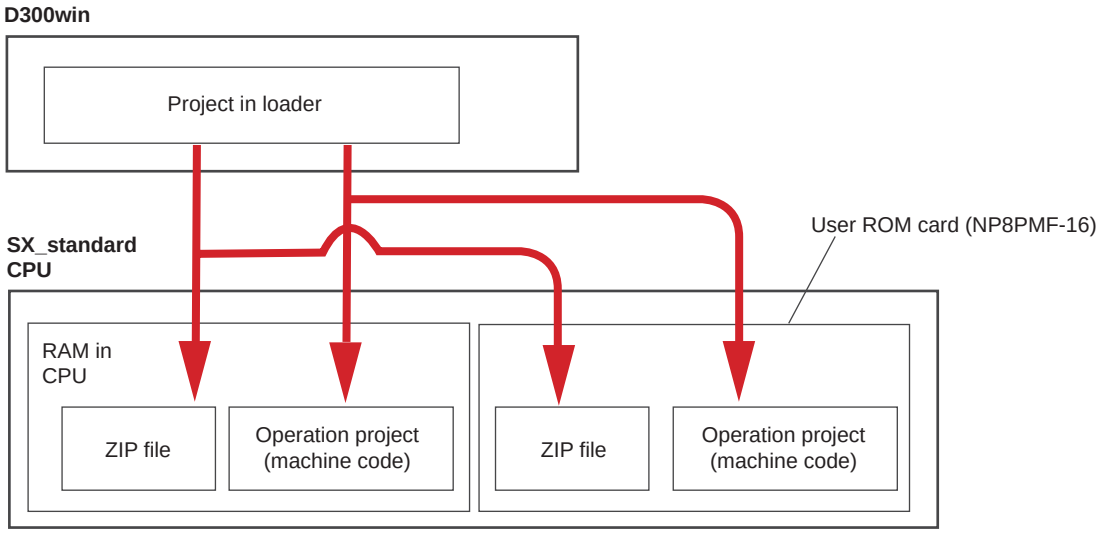
For high-performance CPU, the operation project (program and system definitions) and ZIP file are transferred to flash ROM in the CPU. When a user ROM card is mounted for a model that can use user ROM, the compressed project file and operation project (program and system definitions) can be transferred to the user ROM card. When a user ROM card and necessary adapter are used, the operation and compressed projects can be directly transferred from the PLC card slot of the personal computer. For details, see Section 13-4 “Memory Card Utility.”



* User ROM cards are optional.

<For standard CPU>

For standard CPU, the operation project (program and system definitions) and ZIP file are transferred to RAM in the CPU. When a user ROM is mounted, they are simultaneously transferred also to the user ROM card.



* User ROM cards are optional.

Section 10 Compiling/Loading

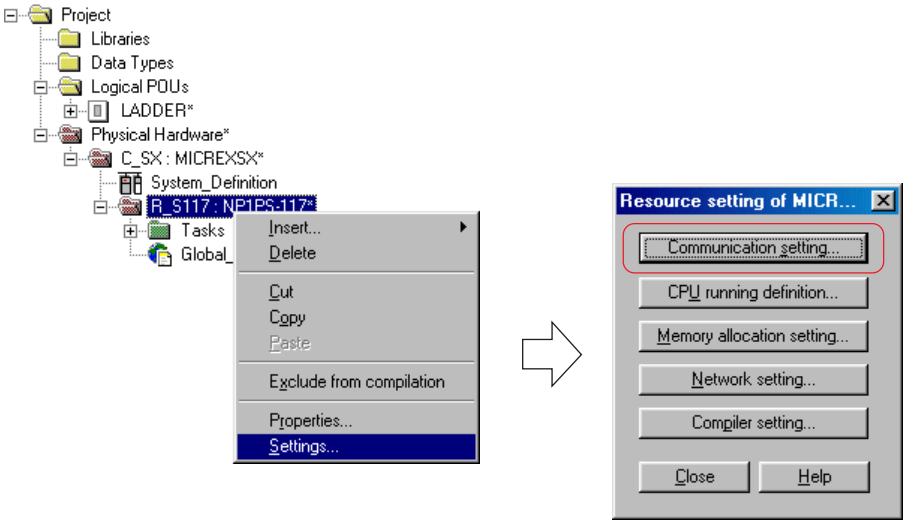
10-2 Downloading

(2) Preparing connection to CPU

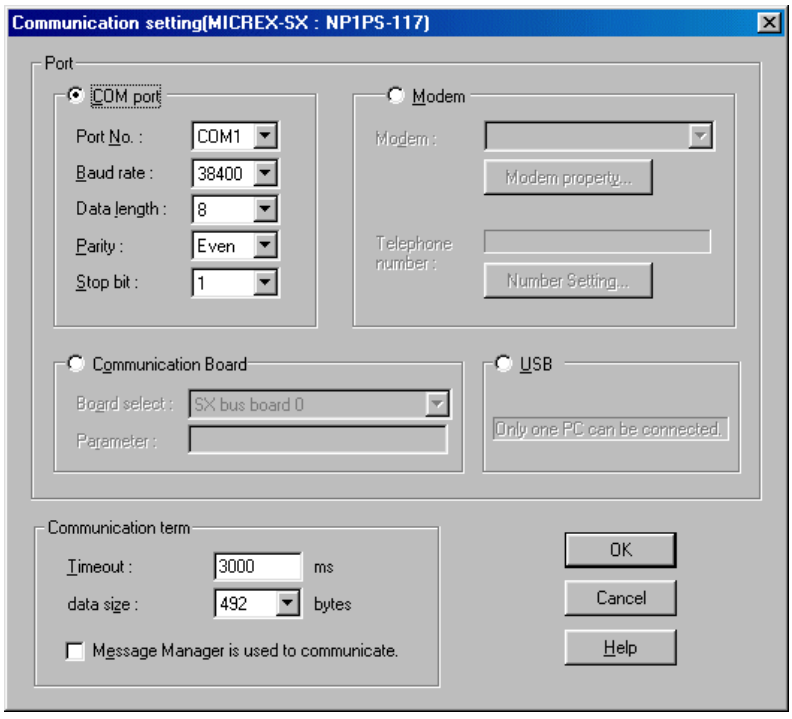
◆ Connect the loader cable to the RS-232C port of the personal computer and connect the connector on the loader side to the "LOADER" connector of the CPU module.

* For the model enabled for high-performance CPU user ROM, communications through USB cable are also available.

◆ Next, set D300win communications. They can be set for each resource (CPU module).
By default, the RS-232C port (COM port) is used for communications.
Right-click the resource and click [Settings...] to display the [Resource setting of MICREX-SX] dialog.



◆ Clicking [Communication setting...] displays the [Communication setting (MICREX-SX:NP1PS-117)] dialog used for selecting communication measures.



◆ After setting the communication measures, click the [OK] button to complete the setting operation.

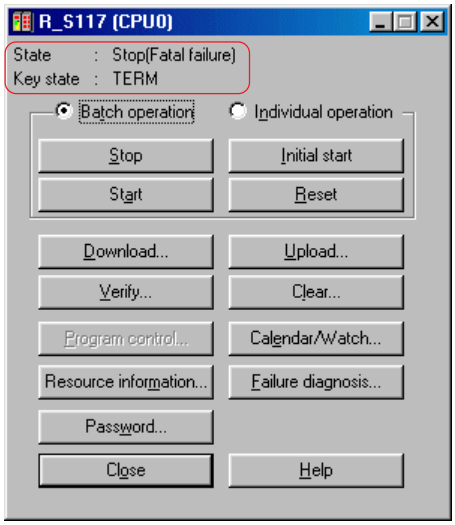
Section 10 Compiling/Loading

10-2 Downloading

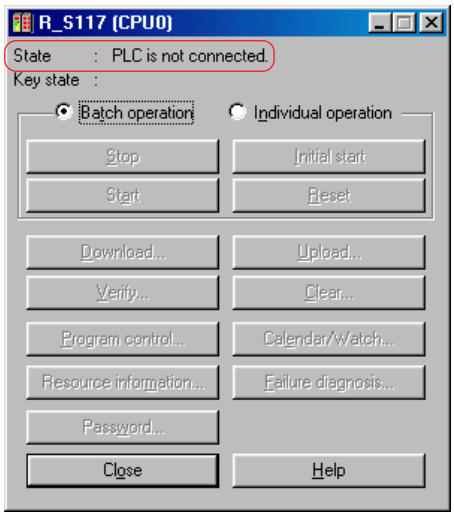
(3) Downloading

When compilation of a project has completed, download it to the CPU.

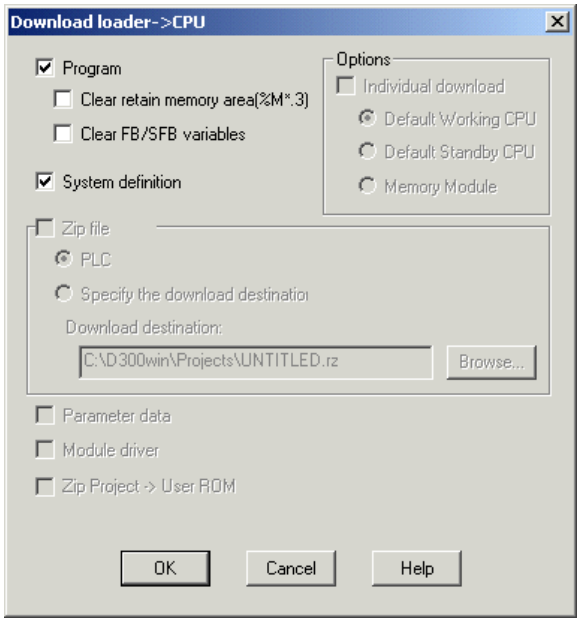
◆ Clicking the [project control dialog] button displays the [Control] dialog that displays the SX_CPU status.



Note: If the loader cable is not connected or the SX system is not powered, communications between D300win and CPU are not established and the status becomes “PLC is not connected.”



◆ Before downloading the project, the SX_CPU operation should be stopped. If the CPU is in operation, click the [Stop] button to stop the operation. Clicking the [Download...] button displays the [Download loader → CPU] dialog. On this dialog, check the check box ON for the file to be downloaded and click the [OK] button.



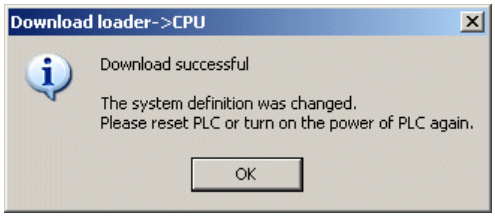
Section 10 Compiling/Loading

10-2 Downloading

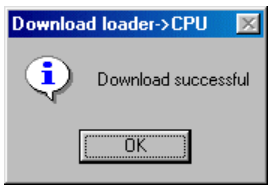
<Description of download dialog fields>

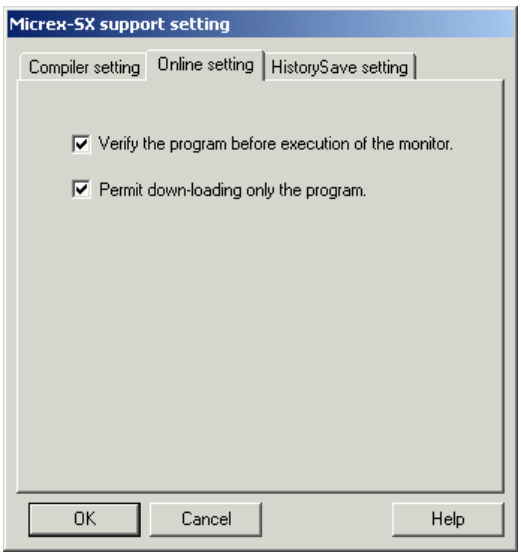
Item	Description
Program	Downloads the POU allocated to the resource to the destination CPU.
Clear retain memory area (%M*.3)	For program downloading, clears the contents of the retained memory in the download destination CPU.
Clear FB/SFB variables	For program downloading, clears the contents of the retained variables in the FB and SFB instance areas in the connected CPU.
System definition	Downloads the system definition contents to the connected CPU. For a multi-CPU system connecting more than one CPU in the configuration or redundant system, the system definition contents are downloaded to all CPUs in the configuration by one operation.
ZIP file	Downloads the reverse-compilation information to the connected CPU.
Parameter data	Downloads parameter data such as positioning FB to the connected CPU.
Module driver	Downloads driver files to the Ethernet and other modules requiring them through the CPU module. This item is enabled only when modules that require driver files downloaded are registered in the system definitions library.
Zip Project → User ROM	Zips the currently open project and downloads it to the user ROM card mounted in high-performance CPU. This item is enabled only when the user ROM card is mounted in the high-performance CPU module enabled for user ROM and the key switch is at the UROM-TERM position.
Individual download	This item is enabled only when the connected CPU is a redundant system. Usually, for a redundant system, downloading occurs to both the default operation and default standby CPUs. However, the download destination CPU can be selected from the default operation CPU, default standby CPU, or memory module (NP1F-MM1).

◆ Downloading starts. The download status is displayed on the task bar at the bottom of the D300win screen. When downloading has completed, a normal completion message appears.



Note: When the “Permit downloading only the program” box on the [Online setting] screen on the [Micrex-SX support setting] dialog box is checked, only the program can be downloaded. In this case, when downloading has completed, the following message appears.





◆ After downloading a new project (program and system definitions) or modifying the system definition contents, click the [Reset] button on the [Control] dialog or reset the system power.

Section 10 Compiling/Loading

10-2 Downloading

10-2-2 Patch POU (rewriting program during CPU running)

Patch POU allows to modify a part of the program without stopping the CPU operation.

(1) Allowable modification range for Patch POU

Language	Modification contents
All languages	Adding a new local or new global variable to the code worksheet. The reserved area must be registered.
	Deleting variables from the code worksheet.
	Adding a new function. When adding a user function, it must have been registered in the project.
	Inserting a new function block. When inserting a user function block, it must have been registered in the project.
	Deleting function or function block from the code worksheet.
	Inserting a blank line or comment or moving circuits.
SFC element	Changing time setting for time-related action qualifier.
	Changing action block variable name.

(2) Patch POU restrictions

Patch POU is under the restrictions given below.

1) For high-performance CPU, Patch POU is disabled unless the program memory empty area is 8K or more steps.
2) Patch POU is disabled in the cases given below.
   - Changing variable worksheet
   - Adding or changing character string constant
   - Changing variable property
   - Adding or changing function or function block terminals
   - Deleting POUs or deleting projects registered in library
   - Changing physical hardware

(3) Precautions for Patch POU

1) Be sure to collate the project being monitored by D300win with the project currently in operation and check that collation results in match. After downloading a project to the CPU module, if Patch POU is performed despite a mismatch, the system will not operate as intended, which may cause accidents or troubles.
2) Do not execute the “Make” or “Rebuild Object” command.
   * After compiling and downloading a project once, if the “make” or “rebuild object” is executed for the currently open project, the memory allocation of variables with no AT range specified (variables that have not been allocated addresses on the worksheet) may become different the project in the CPU.
3) For a high-performance CPU, 8K steps of free space in the program memory of the CPU is required for Patch POU.
4) Patch POU must be performed on a one-by-one basis.
5) When variables, functions, and/or function blocks are to be added for circuit modification by Patch POU, memory area that has been reserved is used.
   The variables added by “Patch POU” are allocated to the “reserved area”.
   Note: If a FB is added, two words of the standard memory is used other than the FB instance area.

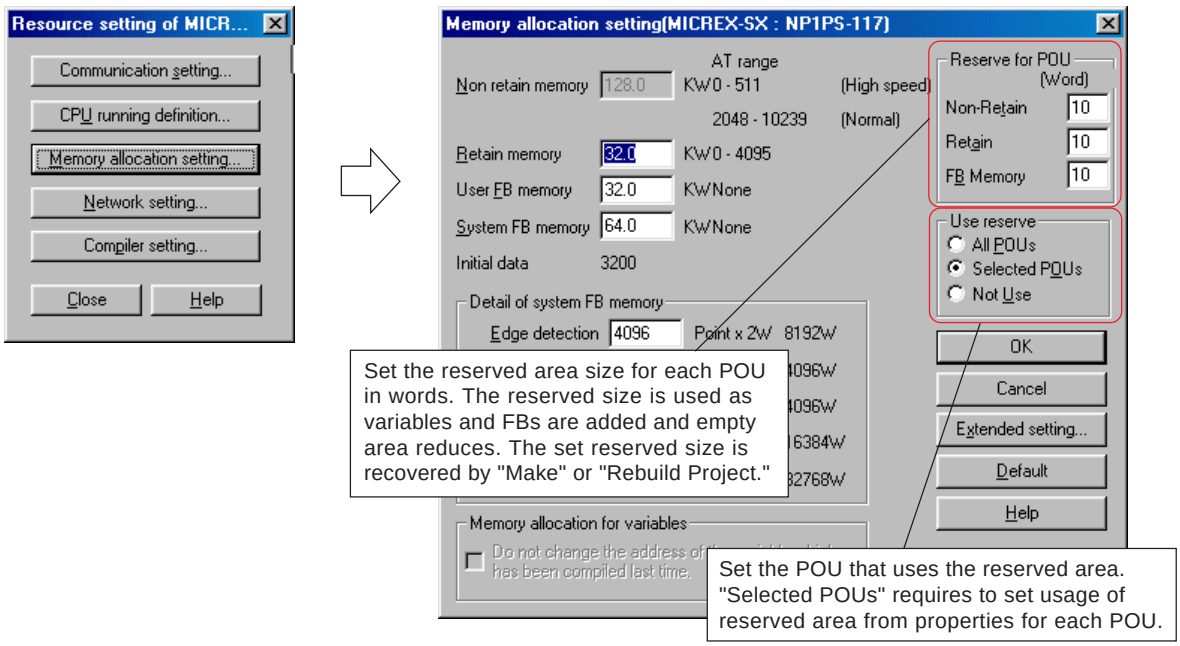
Section 10 Compiling/Loading

10-2 Downloading

(3) Setting reserved areas

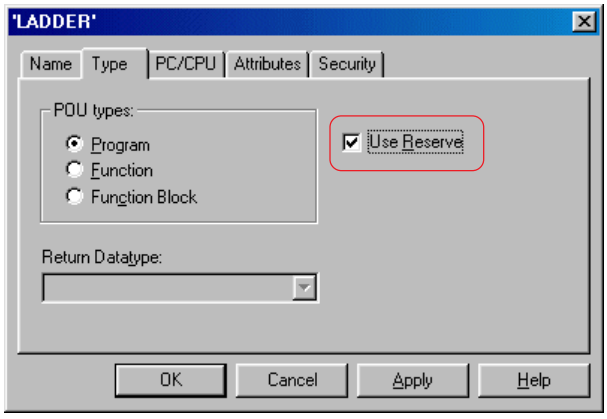
When variables, functions, and/or function blocks are to be added for circuit modification by Patch POU, memory area that has been reserved is used. For this purpose, the reserved area should be set from the [CPU memory size definition] dialog for resource setting.

◆ Right-click the resource icon in the project tree and execute the [Setting...] command to display the [Resource setting of MICREX-SX] dialog. From this dialog, clicking the [Memory allocation setting...] button displays the [Memory allocation setting] dialog.



◆ Set the area size to be reserved for each POU, set the POU that uses the reserved area, and then click the [OK] button.

◆ When "Selected POUs" has been set from the [Memory allocation setting] dialog, check ON the "Use Reserve" check box on the property dialog for the POU to be modified and click the [OK] button.

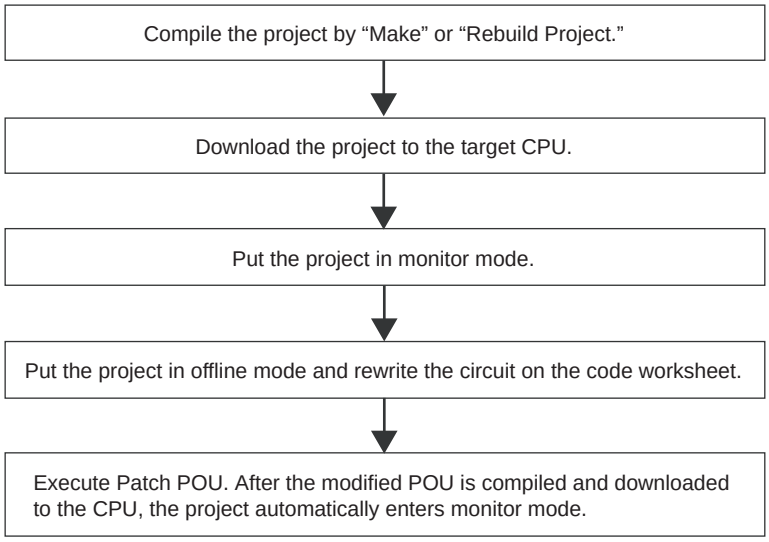


Section 10 Compiling/Loading

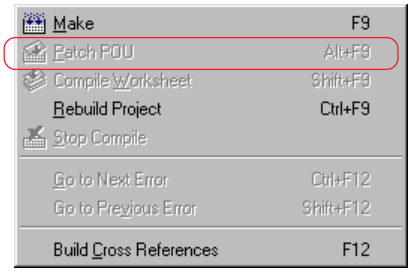
10-2 Downloading

(5) Patch POU procedure

The steps for Patch POU (rewriting program during CPU running) are given below.

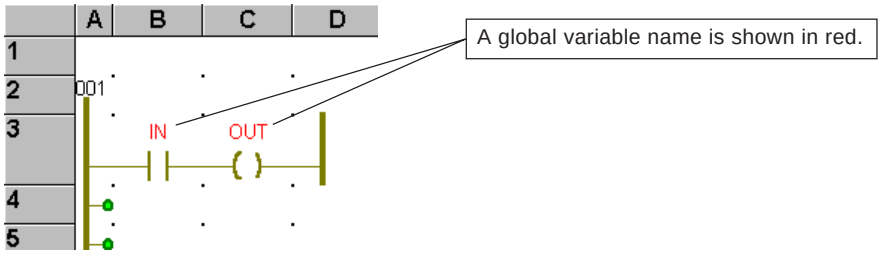


Note: If the above steps have not been followed, the [Patch POU] command is not enabled.

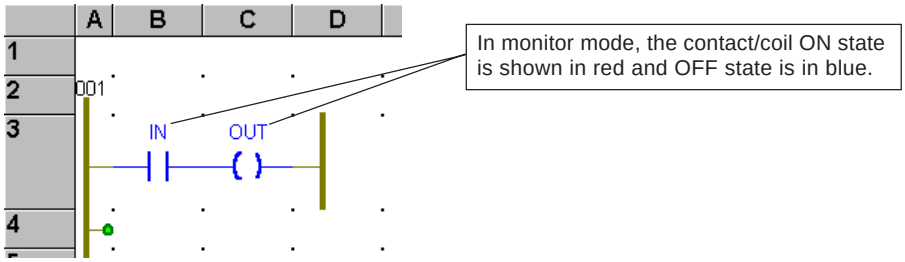


<Operation procedure example>

◆ During CPU operation, add contact “L_SW” to the circuit shown below.



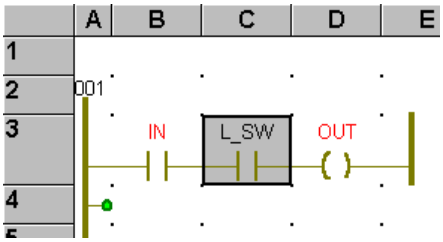
◆ First, monitor the circuit to be modified in monitor mode.



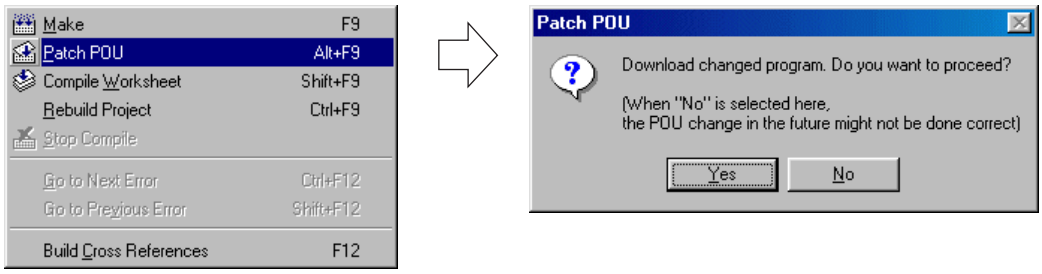
Section 10 Compiling/Loading

10-2 Downloading

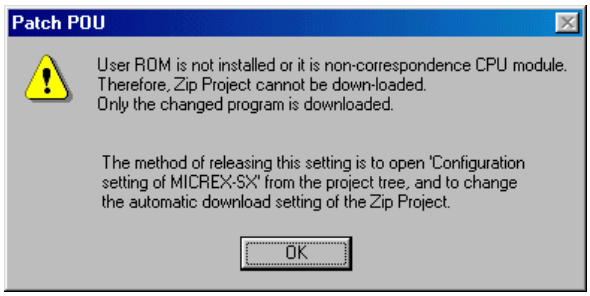
◆ Click the [monitor ON/OFF] button to put the project in offline mode and modify the circuit. In this example, add contact "L_SW".



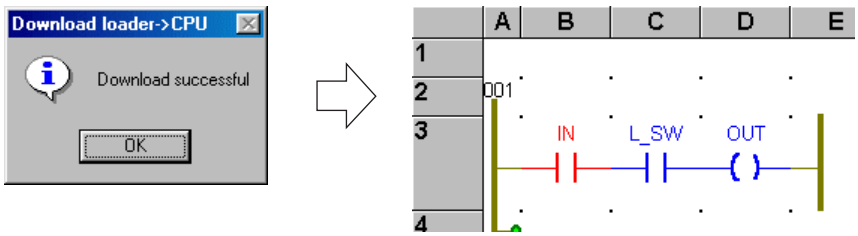
◆ Selecting [Build] g [Patch POU] starts compilation. When compilation has normally completed, a download confirmation message appears. Clicking the [Yes] button starts program downloading to the CPU.



Note: If the configuration has been set to download a compressed project by Patch POU for high-performance CPU module inapplicable to user ROM or for high-performance CPU module with no user ROM mounted, the dialog shown below appears. From this dialog, clicking the [OK] button downloads only the operation project, but the compressed project.



◆ When downloading has completed normally, the dialog shown below appears. Clicking the [OK] button automatically puts the project in monitor mode.



Section 10 Compiling/Loading

10-3 Uploading

The upload function transfers the operation and compressed projects and ZIP file (variable information) in the CPU module to the project on D300win.

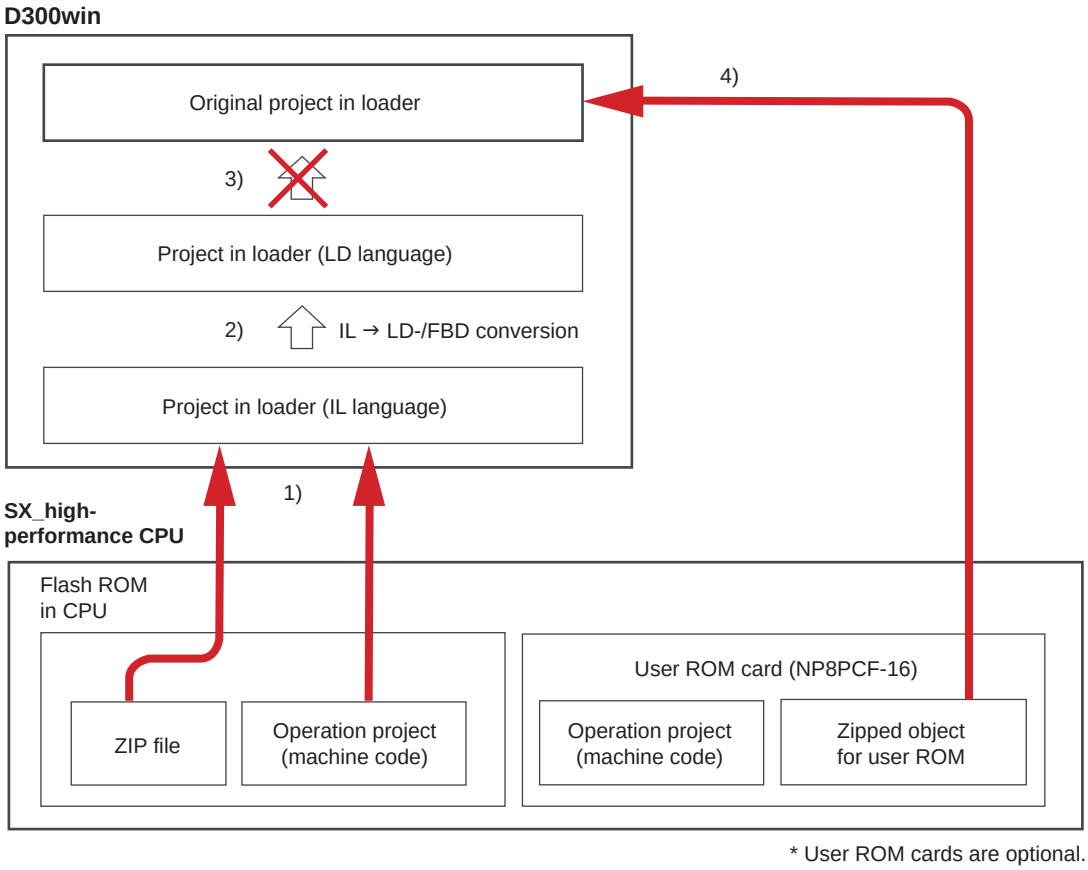
10-3-1 Uploading from CPU module to D300win

(1) Outline of uploading function

<For high-performance CPU>

1) For high-performance CPU, the operation project (program and system definitions) and ZIP file are transferred from flash ROM in CPU and reverse-compiled to IL language.
2) The POU in IL language can be converted to LD/FBD language through compilation.
3) However, even if the original project has been created with the LD/FBD editor, it cannot be fully recovered to the original project.
4) If a user ROM card is mounted for a model applicable to a user ROM, the project can be fully recovered to the original project by transferring the zipped project file to D300win.

* When a user ROM card and necessary adapter are used, the operation and compressed projects can be directly transferred from the PLC card slot of the personal computer. For details, see Section 13-4 “Memory Card Utility.”



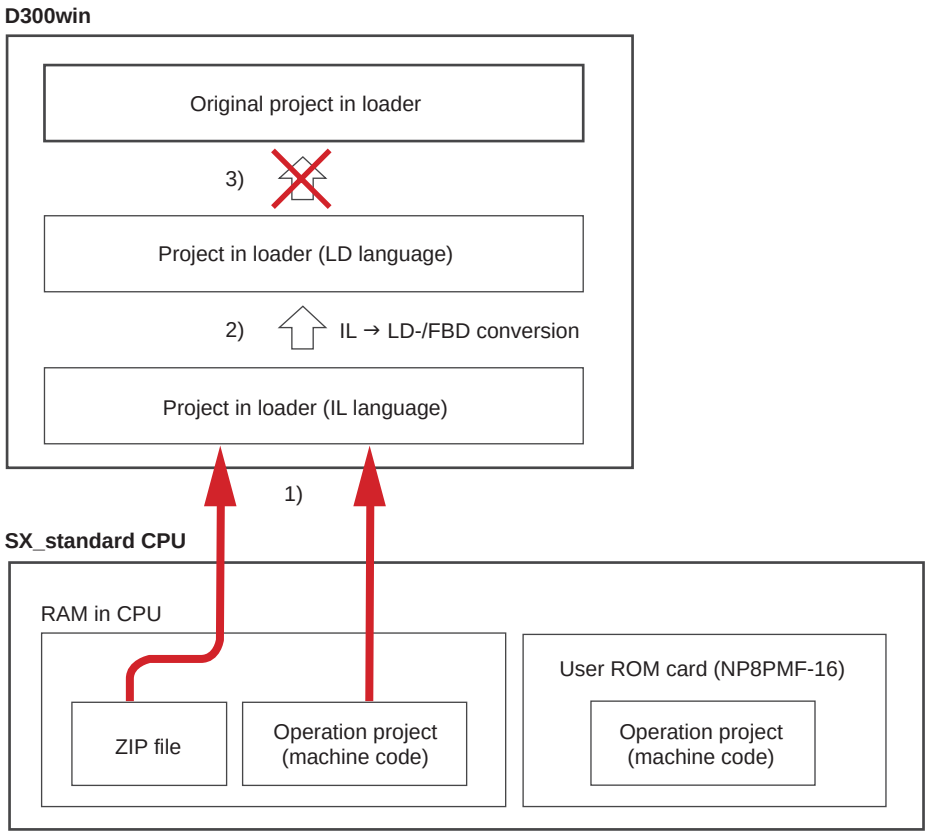
* User ROM cards are optional.

Section 10 Compiling/Loading

10-3 Uploading

<For standard CPU>

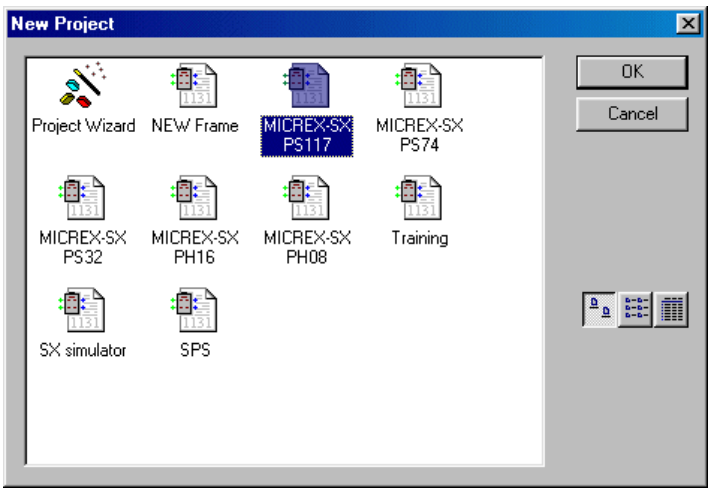
1) For standard CPU, the operation project (program and system definitions) and ZIP file are transferred from RAM in CPU and reverse-compiled to IL language.
2) The POU in IL language can be converted to LD/FBD language through compilation.
3) However, even if the original project has been created with the LD/FBD editor, it cannot be fully recovered to the original project.



* User ROM cards are optional.

(2) Uploading operation project and ZIP file

◆ First, prepare a new project of the same type as the upload CPU. Select [File] g [New project...] to display the [New project] dialog.

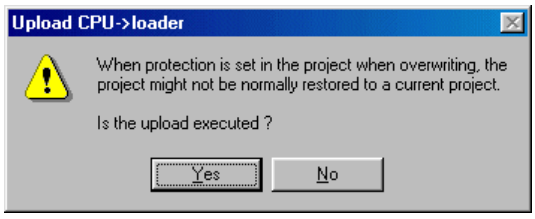


◆ Select the template of the same type as the upload CPU and click the [OK] button to display a new project tree.

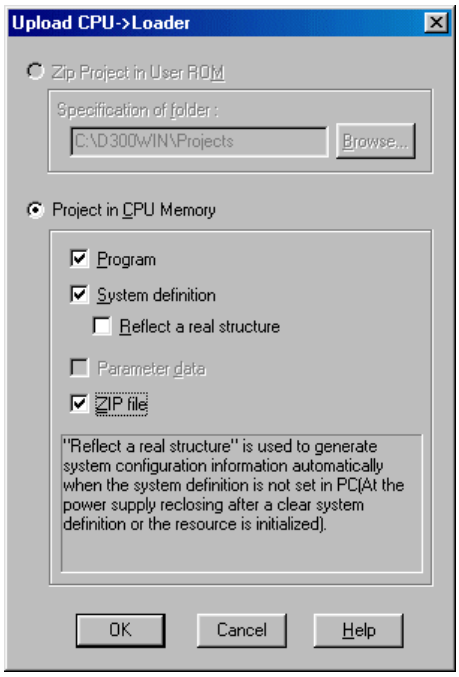
Section 10 Compiling/Loading

10-3 Uploading

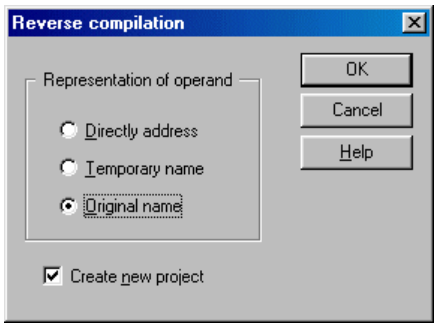
◆ Display the [Control] dialog and click the [Upload] button to display the confirmation dialog shown below. Clicking the [Yes] button displays the [Upload CPU → loader] dialog.



◆ On this dialog, check the data to be uploaded and click the [OK] button.



◆ Uploading starts. The [Control] dialog shows “Uploading...”
◆ When uploading has completed, the [Reverse compilation] dialog appears. Select the “Representation of operand” and click the [OK] button to start reverse compilation.

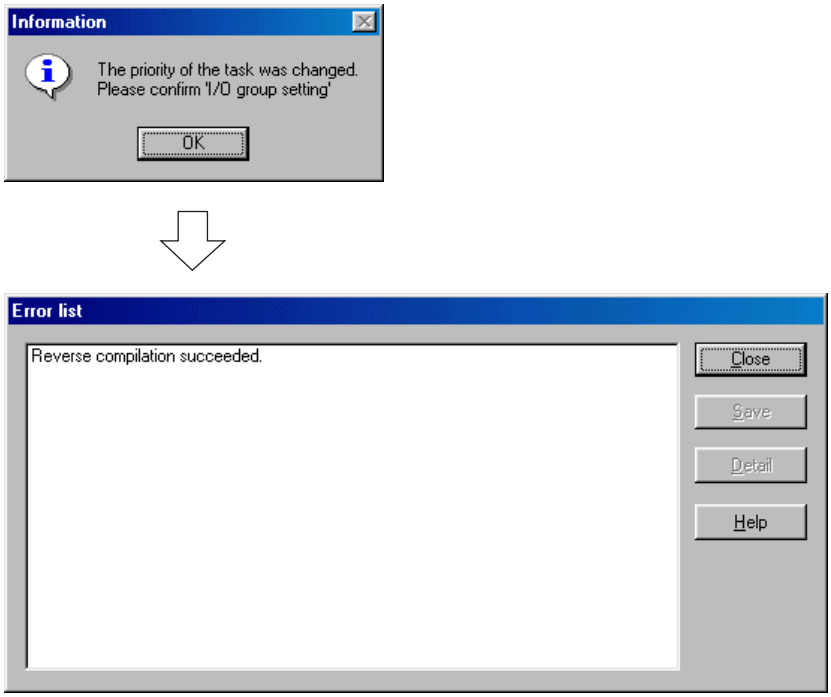


Item	Description
Directly address	Represents the variable used for the project by direct addressing. The POU name, etc. are converted under the predetermined rules. For details, see the D300win Help.
Temporary name	Represents the variable used for the project with a temporary name (such as C000 or V000). The POU name, etc. are converted under the predetermined rules. For details, see the D300win Help.
Original name	Represents the variable with the variable name created by the original object. This can be selected only when "ZIP file" has been downloaded to the CPU.
Create new project	When this check box is ON, a new project is created for restoration.

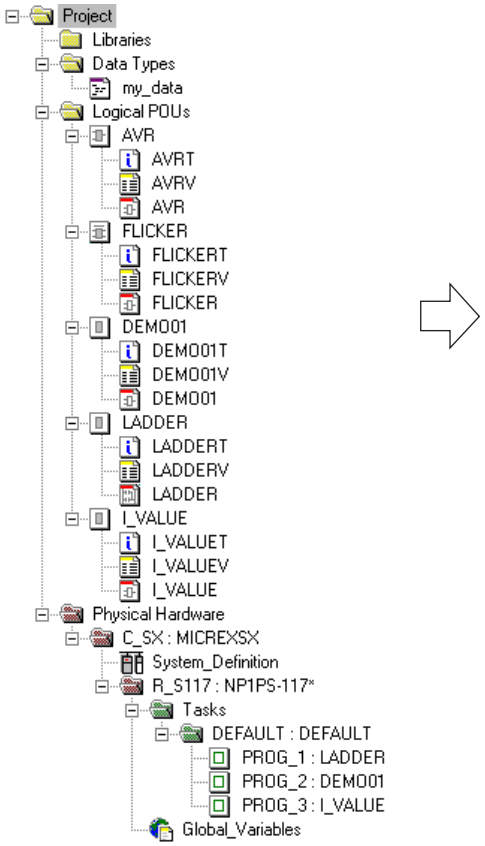
Section 10 Compiling/Loading

10-3 Uploading

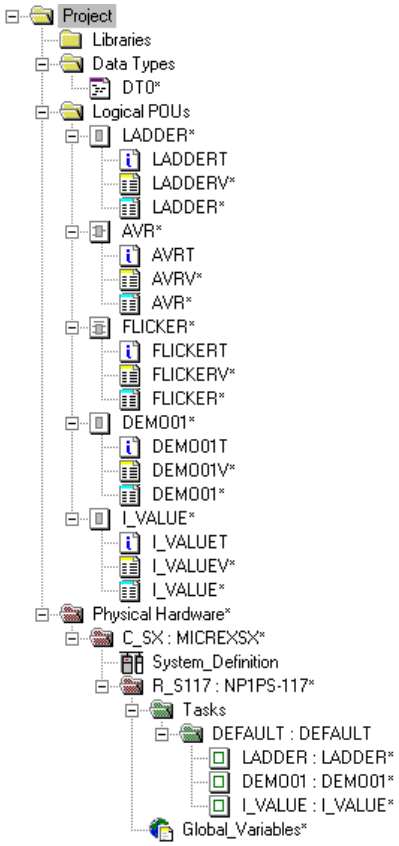
◆ When reverse compilation has completed, the [Information] dialog appears. Clicking the [OK] button displays the [Error list] dialog.



<Original object tree>



<Project tree after uploading>



10-3 Uploading

(3) Upload restrictions

The upload function is subject to the restrictions given below.

1) All program codes are restored in IL language.
2) Variables in a program POU are restored with direct address expression or variables with AT specification.
3) Comments are not restored.
4) Data in description sheets is not restored.
5) Jump labels are not restored to original names.
6) The worksheet name is not restored to the original name.
7) Variables unused in the code worksheet are not restored.
   However, if initial values have been set, the variables are restored under the rules given below.
   - When [Directly address] or [Temporary name] has been selected
     The variables are restored as the BOOL, WORD, or DWORD data type in the global variable worksheet.
   - When [Original name] has been selected
     The variables are restored as the original data type in the local variable worksheet for the original POU.
8) If delivered data type (array/structure) is used, select [Original name] for reverse-compilation. When [Directly address] or [Temporary name] is selected, restoration to the original array/structure will not be carried out. Note that, in this case, compilation errors may occur in the reverse-compiled project.
9) Reverse-compilation with [Directly address] or [Temporary name] selected is subject to the restrictions given below.
   - Variable, data type, and POU names are restored as temporary names.
   - STRING-type constants are restored as STRING-type variables with initial values specified.
   - Global variables are restored as local variables in the referenced POU.
10) POUs with names given below are not restored. In this case, change the POU names or select [Temporary name] for reverse compilation.
    - Same name as system reserved words (such as LD and ST)
    - Name ending with an underscore (such as ABC_)
11) When uploading from more than one configuration to one project, select [Original name] for reverse compilation.
12) When the VAR_IN_OUT variable is used or a variable is connected to the VAR_IN_OUT terminal, select [Original name] for reverse compilation.
    When [Directly address] or [Temporary name] is specified, restoration to the original array/structure will not be carried out. Note that, in this case, compilation errors may occur in the reverse-compiled project.

Section 10 Compiling/Loading

10-3 Uploading

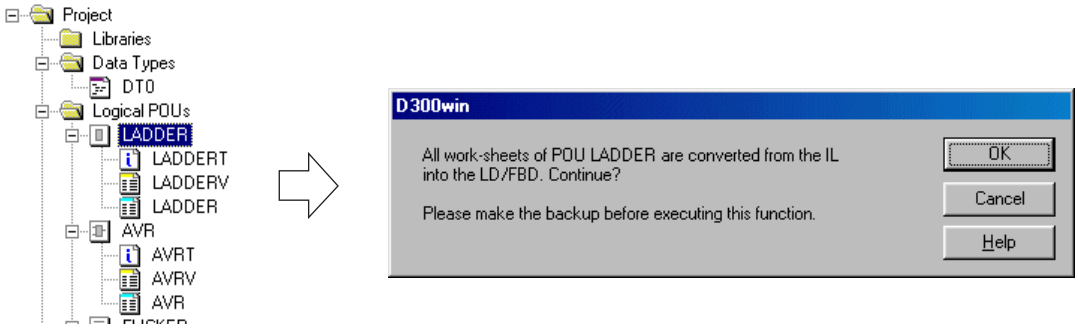
10-3-2 IL ➔ LD/FBD conversion

An uploaded project is made of code in IL language. The IL language code can be converted to LD/FBD graphic language.

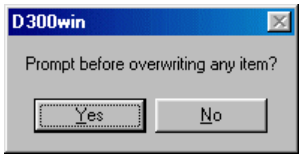
Note: Conversion to ST or SFC language is not possible.

◆ First, compile the uploaded and reverse-compiled project.
Select as [Build] g [Make] or [Built] g [Rebuild Project].

◆ When compilation has normally completed, select the POU to be converted and execute [Extras] g [IL g LD/FBD conversion] command. The confirmation dialog shown below appears.



◆ Clicking the [Yes] button displays a message asking how to handle the existing project. Click [Yes] or [No].

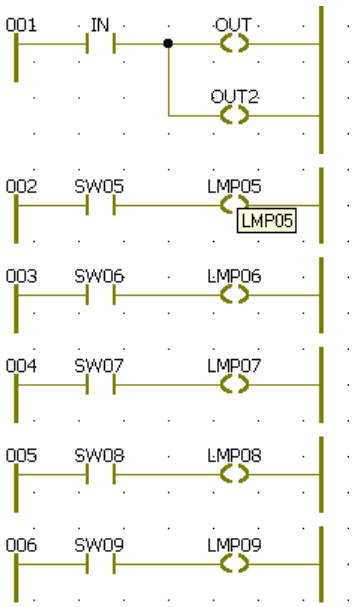


◆ When compilation has completed, the [Error list] dialog appears.

<Before conversion>

```
1     LD    IN
2     ST    OUT
3     ST    OUT2
4     LD    SW05
5     ST    LMP05
6     LD    SW06
7     ST    LMP06
8     LD    SW07
9     ST    LMP07
10    LD    SW08
11    ST    LMP08
12    LD    SW09
13    ST    LMP09
14    LD    SENSOR01
15    OR    SENSOR02
16    OR    SENSOR03
17    ST    S_FLAG
18
```

<After conversion>



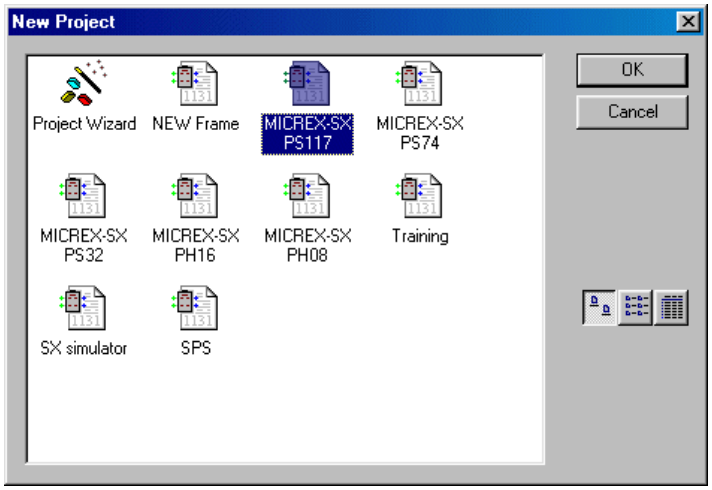
Section 10 Compiling/Loading

10-3 Uploading

10-3-3 Uploading from user ROM card

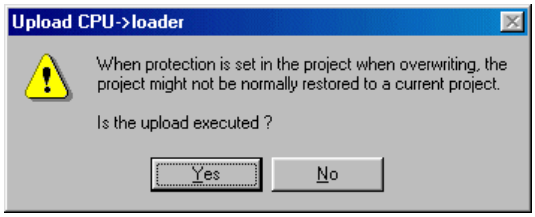
The compressed project in the user ROM card mounted in the CPU module can be returned to the original project by uploading.

◆ First, prepare a new project of the same type as the uploading CPU. Select [File] g [New project...] to display the [New project] dialog.

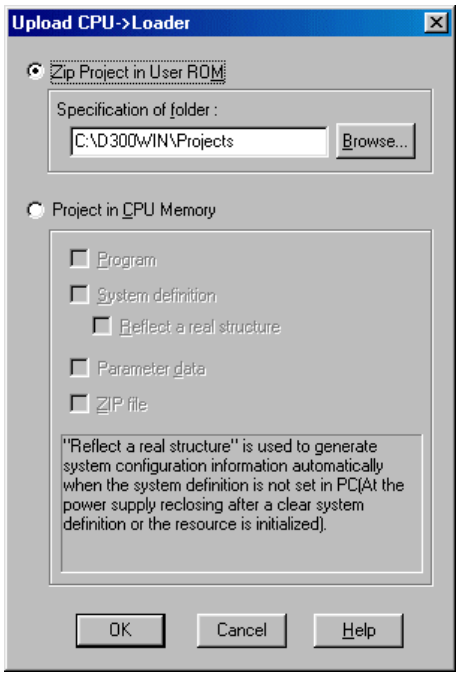


◆ Select the template of the same type as the uploading CPU and click the [OK] button to display a new project tree.

◆ Display the [Control] dialog and click the [Upload] button to display the confirmation dialog shown below. Clicking the [Yes] button displays the [Upload CPU → loader] dialog.



◆ On this dialog, check ON the [Zip Project in User ROM] button, specify the upload destination folder, and click the [OK] button. Uploading starts.



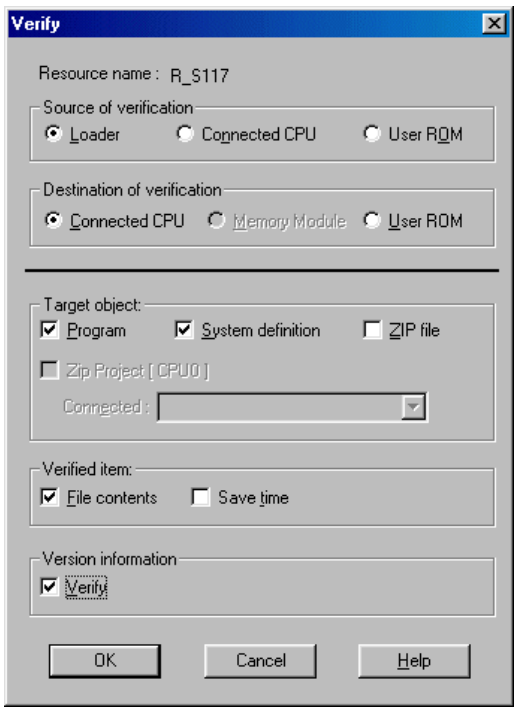
When uploading has completed, the dialog shown below appears.

Section 10 Compiling/Loading

10-4 Verification

Collate the contents of the project in D300win with those of the connected CPU or user ROM set in CPU.

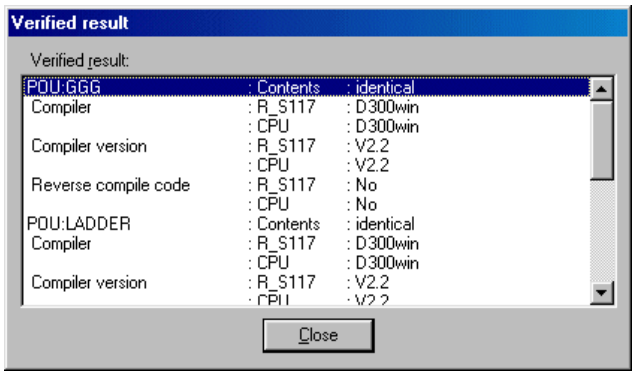
◆ Click the [Verify...] button on the [Control dialog] to display the [Verify] dialog.



◆ Specify “Source of verification”, “Destination of verification”, “Target object” and “Verified item” and click the [OK] button to start collation.

Note: If the source is loader (D300win), open the target project before starting collation.

◆ When collation has completed, the collation results are displayed.



Identical : Match
No : Mismatch

Section 10 Compiling/Loading

10-4 Verification

Notes:

1) About collation of save time
   The save time for each project file is updated by the procedures listed below. (The save time is updated even when the contents remain unchanged.)

Target data	Update timing
Program	Execution of [Make] or [Rebuild project] (Unless this operation is carried out, the save time is not updated by rewriting the worksheet contents.)
System definition	Closing system definition
ZIP file	Executing downloading

   If operation above is carried out after downloading a project, mismatch occurs for the save time of each file. (A ZIP file is created at the time of downloading and causes no mismatches.)
   When a project is copied or unzipped, save time mismatch occurs for all project files.

2) About collation of compressed project
   A zipped project is created at the time of downloading and the size and save time of each file in the current project are recorded. Collation is carried out based on these records. Therefore, if the project file contents are modified after downloading the zipped project, mismatch occurs for the contents and save time. If only the save time is updated, mismatch occurs for the save time.
   For a zipped project, the entire project is zipped and no discrepancies can be detected in the contents of individual files. That is, collation results in match if the size matches (even if the contents do not match).
   When collation of file contents is necessary, upload the zipped object and collate the project with individual files.

3) After modifying and compiling the instance structure in a task, collation will result in mismatch.

4) For D300win of the new version, the internal (machine) code of the program to be transferred to PLC has been partially modified. Therefore, the compiled results for the same source program (project) will be different between the new and old versions.
   That means, collating a program downloaded to PLC with D300win of an old version with the related program compiled with D300win of the new version may result in mismatch.

Section 11 Monitor/Control Functions

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Section 11 Monitor/Control Functions

This section describes D300win monitor functions and debug functions necessary for checking application program operations. D300win provides the monitor and debug functions given below.

11-1 Overview of D300win Monitor/Control Functions

1) Resource (CPU) information display function

Displays the information in the CPU module, such as the tact time, task execution time, CPU version.

2) Monitoring function

- Monitors the POU code, local variable, and global variable worksheets.
- Simultaneously monitors multiple CPUs.
- Switches data display (binary, decimal, or hexadecimal)

3) Data change functions

- Forcible set/reset function: Forcibly setting bit data ON/OFF in the I/O memory.
- Overwriting function: Setting arbitrary data in variables (internal memory) monitored.

4) Initialization function

Individually clears program, data, and system definitions. In addition, there is “Resource initialization” function that clears all data in the CPU module.

5) Step execution function

Executes a program in the CPU module in instruction steps.

6) Monitor condition stop function

Stops the D300win monitor screen under the specified conditions.

7) Breakpoint function

Stops CPU module processing under the specified conditions.

8) Program temporary deletion function

Temporarily deletes the specified program from the task management and stops it. The stopped program can be registered again in the task.

9) Calendar time display/set function

Displays or sets the date (year, month, day) and time (hour, minute, second) for the calendar/timer in the CPU module.

10) Start/stop/reset function

Starts, stops, initial-starts, or resets the CPUs in the configuration. “Batch operation” or “Individual operation” can be selected. In the former mode, all CPUs in the configuration are controlled simultaneously.

11) Redundant control function

Allows switching between operation/standby and selecting the CPU to which D300win is connected in a redundant system.

12) Failure diagnosis function

Diagnoses the status of the PLC system. If an error occurs in the system, information such as error description, location and remedies can be obtained.

13) Password function

Allows access restrictions on projects or online operations.

Section 11 Monitor/Control Functions

11-2 PLC Operation and Monitoring Procedures

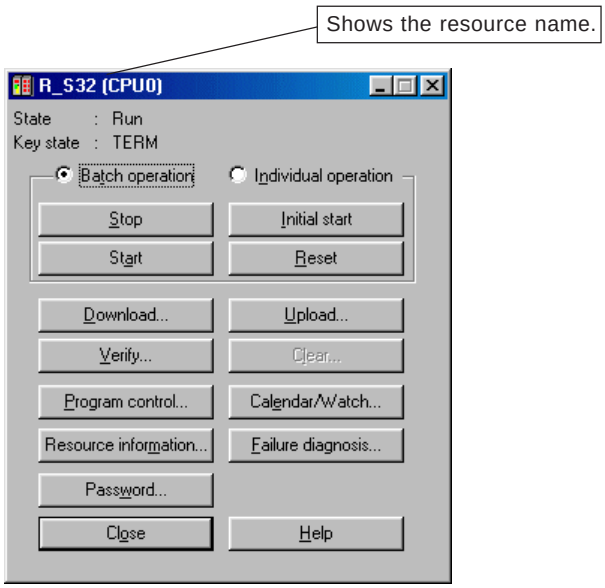
11-2-1 PLC operations

The main functions for operating the CPU module are available from the [Control] dialog.

(1) Displaying [Control] dialog (Normal)

While D300win and CPU module are connected online, display the [Control] dialog in the procedure given below.

◆ Clicking the [Project control dialog] button displays the [Control] dialog.



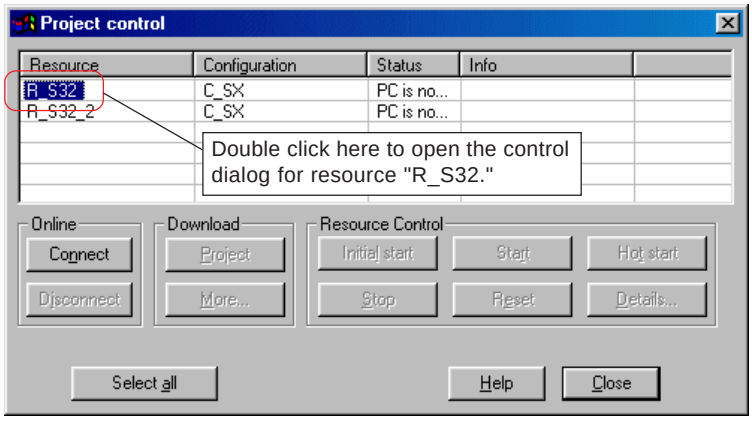
<Display and buttons in dialog>

Item	Description
State	Shows the PLC state.
Key state	Shows the PLC key switch locations.
Batch operation/ Individual operation	Selecting "Individual operation" specifies operation only for the selected resource. Selecting "Bach operation" specifies operation for all resources in the configuration including the selected resource.
[Stop]	Stops the PLC.
[Start]	Starts the PLC. The retained variables are not cleared (note).
[Initial start]	Clears the retained variables in the PLC and starts the PLC.
[Reset]	Resets the PLC. Reset is necessary after downloading new system definitions. Note: If CPU0 is disconnected with a redundant system and multi-CPU system, the PLC cannot be reset.
[Download...]	Transfers a project from D300win to PLC.
[Upload...]	Transfers a project from PLC to D300win.
[Verify...]	Collates the project and data in D300win with those in the PLC (CPU module).
[Clear...]	Clears the selected data in the CPU module.
[Program control...]	When one resource contains multiple tasks, validates or invalidates them.
[Calendar/Watch...]	Displays or changes the calendar/watch in the CPU.
[Resource information...]	Shows the version, number of program steps, task execution time, etc. of the connected CPU module.
[Failure diagnosis...]	Checks the PLC system current status and diagnoses faulty system. It is possible to automatically execute failure analysis when an error occurs in the PLC system. For more information, refer to "11-6 Failure Diagnosis."
[Password...]	Sets a password for the PLC system.
[Redundancy control...]	For a redundant system, selects operation/standby and connected CPUs.

Section 11 Monitor/Control Functions

11-2 PLC Operation and Monitoring Procedures

* For a multi-CPU system configuration, the [Project control] dialog box first appears. On this dialog, double click the resource to be opened or click the [Connect] g [Details...] button to display the [Control] dialog for the selected resource.



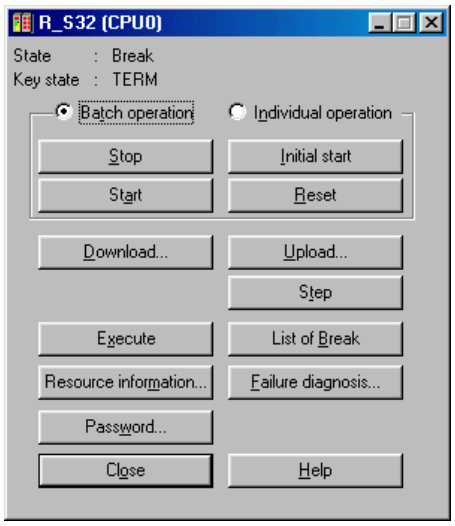
* Project download and/or CPU start/stop are also available from the above dialog. For details, see Help for the product.

(2) Displaying [Control] dialog (Test function)

When executing the test function, the displayed dialog is partially different from the ordinary [Control] dialog.

- For “Breakpoint function” execution, see Section 11-3-2.
- For “Step function” execution, see Section 11-3-3.
- For “Condition monitor function” execution, see Section 11-3-4.

◆ Clicking the [Project control dialog] button displays the [Control] dialog.



<Display and buttons in dialog (differences from ordinary dialog)>

Item	Description
[Step]	After the CPU operation has stopped at a breakpoint, clicking this button starts the operation, executing one instruction at a time.
[Execute]	After the CPU operation has stopped at a breakpoint, clicking this button restarts the operation from the current position.
[List of Break]	Shows a list of set breakpoints.

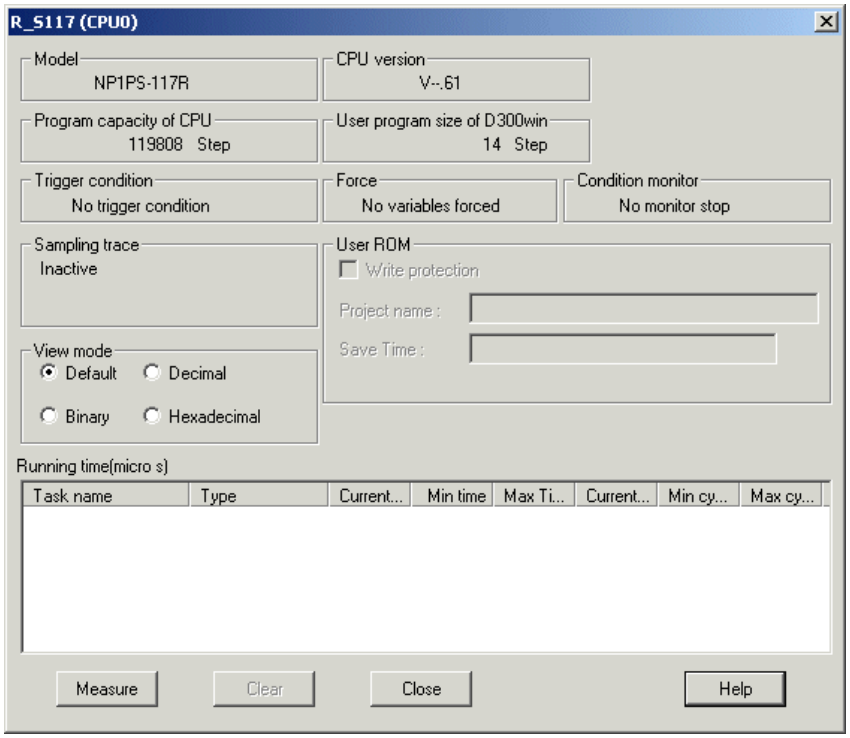
Section 11 Monitor/Control Functions

11-2 PLC Operation and Monitoring Procedures

11-2-2 Resource information

Display the states of the connected CPU module.

◆ Clicking the [Resource information...] button in the [Control] dialog displays the resource information of the selected resource (CPU module).



◆ Clicking the [Measure] button displays the task execution time and tact execution cycle.
◆ Clicking the [Clear] button refreshes the monitored task time.

<Display items>

Display item	Description
Model	Shows the CPU module type.
CPU version	Shows the CPU module software version.
Program capacity of CPU	Shows the maximum program capacity that can be stored in the CPU module.
User Program size of D300win	Shows the user program size in offline mode compiled with D300win.
Trigger condition	Shows the set trigger conditions. When trigger conditions have been set, the all reset check box appears, allowing to reset all conditions. All reset is carried out when this dialog is closed.
Force	Shows the set forcible ON/OFF conditions. When forcible ON/OFF has been set, the all reset check box appears, allowing to reset all settings. All reset is carried out when this dialog is closed.
Condition monitor	Shows the monitor condition stop state. When this is checked and the operation stops, monitor stop is reset and monitor refreshing starts. (Monitor stop is reset also by monitor screen change such as scroll.)
Sampling trace	Shows the following five statuses depending on the execution status of sampling trace of the CPU module: "Not provided" "Inactive" "Trigger approval waiting" "Data is sampled" "Sampling completion" Except for "Not provided" and "Inactive", the "Sampling trace reset" checkbox appears.
View mode	Specifies the view mode for numeric values. By default, the view mode is based on the variable data type.
User ROM - Write protection	Shows the write protection attribute settings for the user ROM mounted on the CPU module. Check this check box ON to inhibit writing to user ROM.
User ROM - Project name	Shows the name of the zipped project stored in the user ROM.

11-2 PLC Operation and Monitoring Procedures

User ROM - Save Time:	Shows the same time of the zipped project stored in the user ROM.
Task name	Shows the name of the task being executed.
Task type	Shows the type of the task being executed.
Task execution time (ms)	Checking the [Measure] button shows the current time, minimum time, and maximum time of the task.
Task time (ms)	Checking the [Measure] button shows the current cycle, minimum cycle, and maximum cycle of the tact.
[Measure] button	Starts mesurment of the task or tact time and starts monitor display.
[Clear] button	Clears the minimum and maximum values of all tasks

Section 11 Monitor/Control Functions

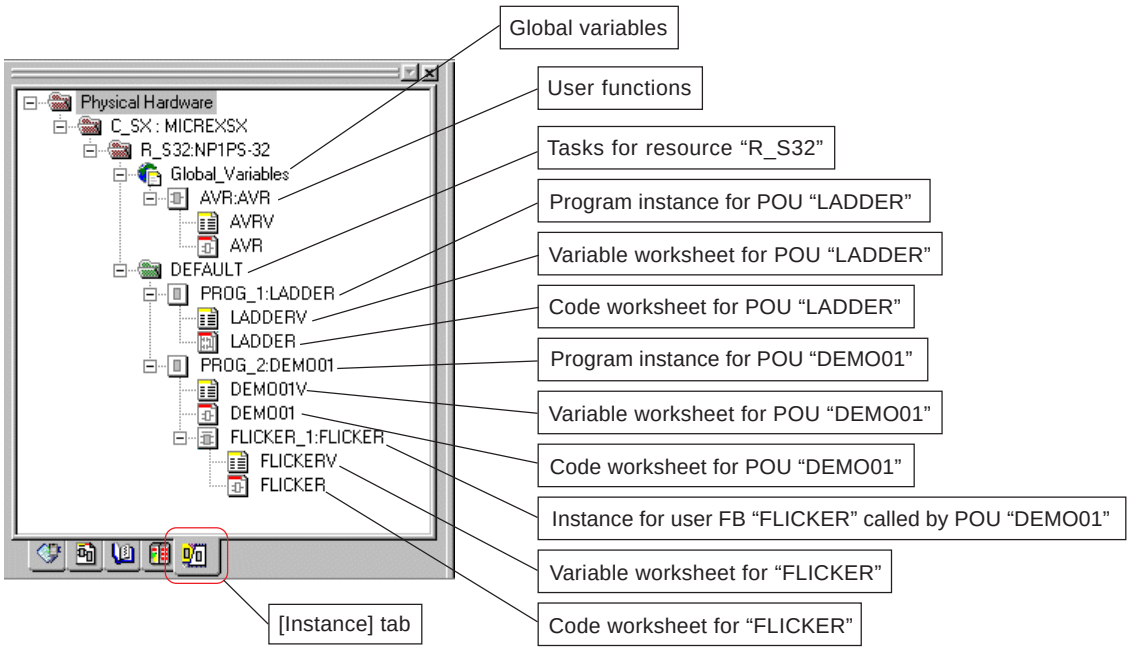
11-2 PLC Operation and Monitoring Procedures

11-2-3 Program/variable monitor basic operations

Programs and variables can be displayed online by opening the program worksheet in the “Program configuration” and place it online. Basically, an instance tree is used for this purpose. An instance tree shows programs assigned to all functions, function blocks, and tasks in the resource. This tree structure is created during resource compilation. Therefore, editing an instance tree is not possible.

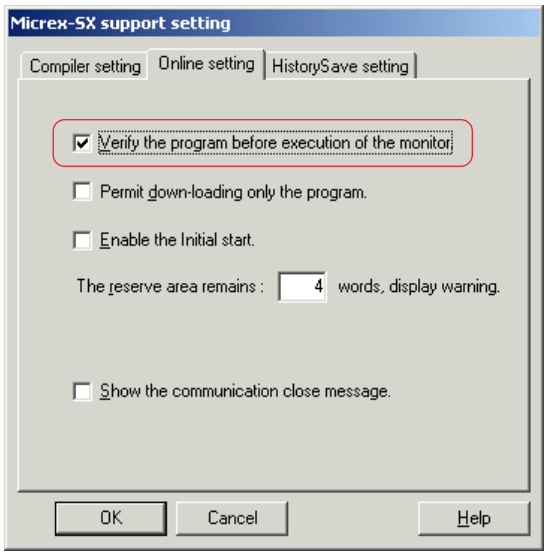
(1) Monitor basic operations

◆ Clicking the [Instance] tab in the bottom of the project tree window displays the [Instance tree] window.



◆ Double clicking the icon of the sheet to be monitored opens the selected worksheet.
Click the [Debug ON/OFF] button to start monitoring.

Note 1: V3.1.0.0 or later version of D300win automatically verifies the program before monitoring is started. Monitoring dosn’t start if an error is found by this verification.



* The setting of whether or not to verify the program before monitoring is started can be changed over in the following manner:

◆ When [MICREX-SX support setting] command in the [Extras] menu is executed, the [SX support setting] dialog box is displayed. You can change over the setting by checking or unchecking the [Verify the program before execution of the monitor] in this dialog box.

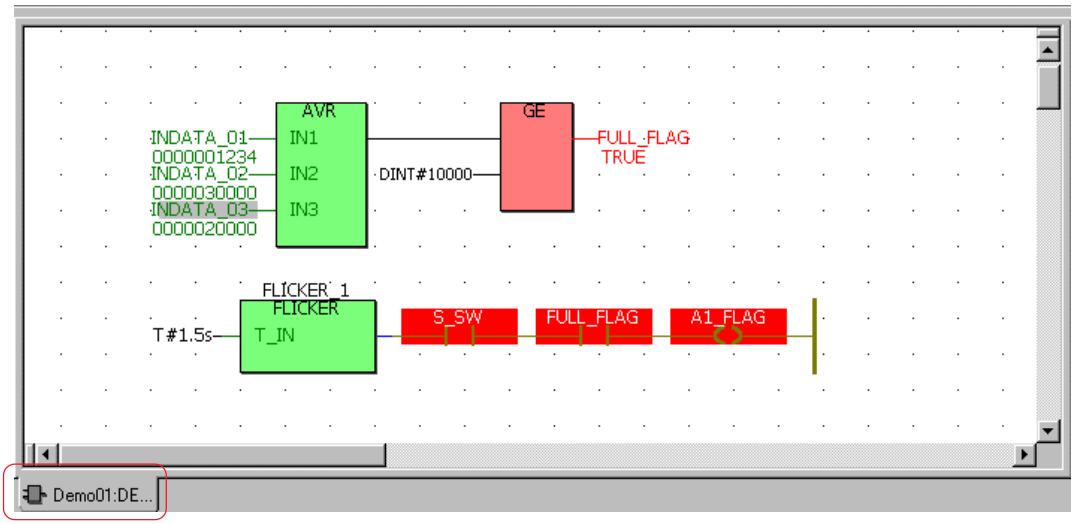
◆ Click the [OK] button. After this, the setting is reflected on the operation of the D300win.

Note 2: Because user functions use temporary area, the circuit or variable sheets in user functions cannot be monitored.

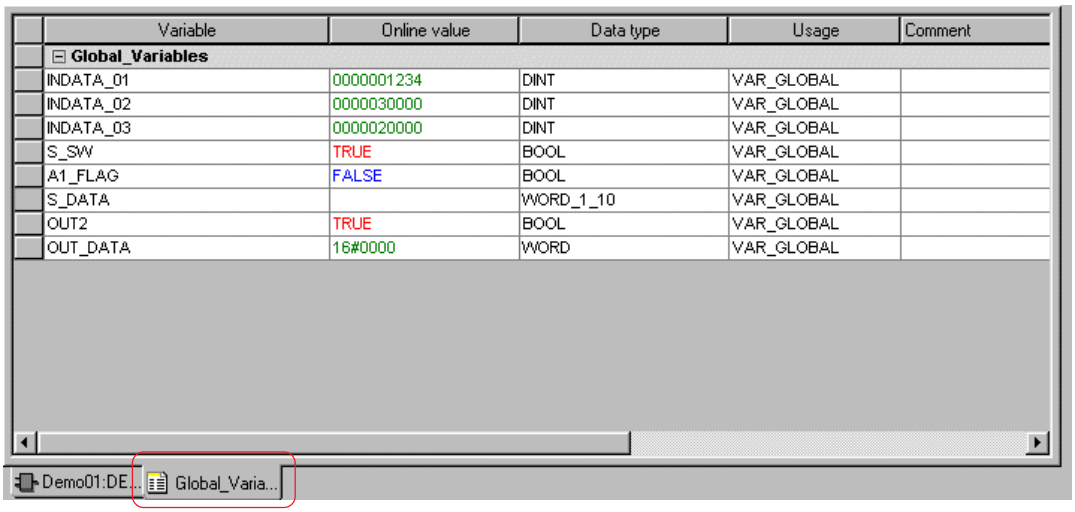
Section 11 Monitor/Control Functions

11-2 PLC Operation and Monitoring Procedures

<Code worksheet monitoring example>



<Global variable worksheet monitoring example>



Variable	Online value	Data type	Usage	Comment
Global_Variables				
INDATA_01	0000001234	DINT	VAR_GLOBAL	
INDATA_02	0000030000	DINT	VAR_GLOBAL	
INDATA_03	0000020000	DINT	VAR_GLOBAL	
S_SW	TRUE	BOOL	VAR_GLOBAL	
A1_FLAG	FALSE	BOOL	VAR_GLOBAL	
S_DATA		WORD_1_10	VAR_GLOBAL	
OUT2	TRUE	BOOL	VAR_GLOBAL	
OUT_DATA	16#0000	WORD	VAR_GLOBAL	

(2) About monitor display colors

The default display colors for program monitoring are described below.

- Objects with Boolean variable values specified are displayed in red or blue.
  Red: State of 1 (TRUE)
  Blue: State of 0 (FALSE)
- Objects with variable values (other than Boolean data) are displayed in green.

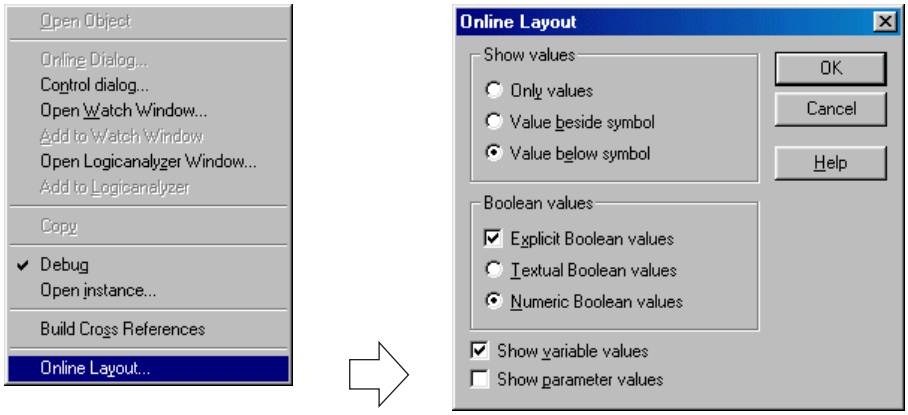
Note: If the online values are overlapped with the objects connected to the input or output terminals of functions or function blocks, shift the terminal position or the position of an object connected to the terminal when creating the circuit.
The display colors can be changed from the [Options] dialog. See Section 13-*-*.

11-2 PLC Operation and Monitoring Procedures

(3) Changing display procedure for monitoring code worksheet

For a code worksheet described in graphic language, the variable display procedure can be changed. The Boolean variable TRUE/FALSE states, variable value display locations, etc. can be changed.

◆ Right click any position on the graphic worksheet and execute the [Online Layout...] command from the short-cut menu to display the [Online Layout] dialog.



<Display items>

Item	Description
Only values	Shows only variable values, but variable names.
Value beside symbol	Shows a value to the side of the variable name.
Value below symbol	Shows a value below the variable name.
Explicit Boolean values	Shows Boolean variable values other than contacts or coils.
Textual Boolean values	Shows the words "TRUE" and "FALSE"
Numeric Boolean values	Shows the numbers "1" and "0".
Show variable values	Shows values of all variables other than contacts or coils.
Show parameter values	Shows function/FB terminal (temporary parameter) values.

(4) Changing display mode (binary, decimal, hexadecimal)

The display mode change function is used to select the numeric value display mode (binary, decimal, or hexadecimal) when monitoring the programs and variables. (The basic display mode for variable values is determined by the variable data type.)

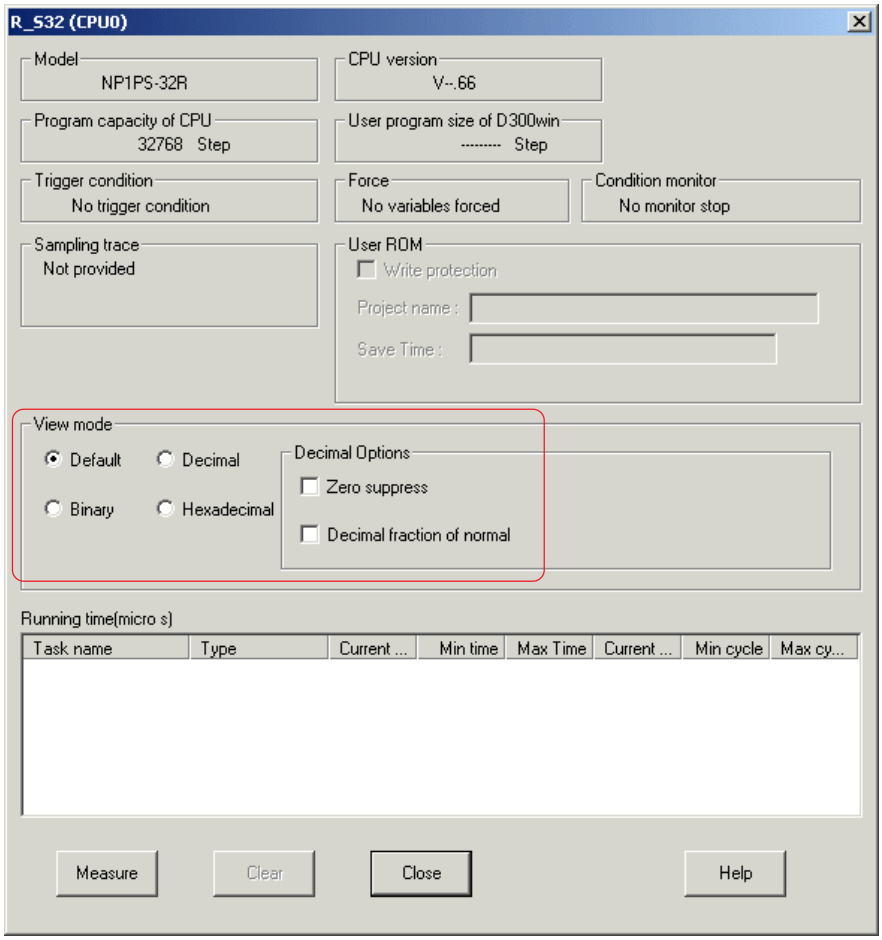
<Display in default mode>

In the example given below, the variable data type is DINT and the values are displayed in decimal.

Variable	Online value	Data type	
Global_Variables			
INDATA_01	0000001234	DINT	VA
INDATA_02	0000030000	DINT	VA
INDATA_03	0000020000	DINT	VA
S_SW	TRUE	BOOL	VA
A1_FLAG	FALSE	BOOL	VA

11-2 PLC Operation and Monitoring Procedures

◆ Use the [Resource information] dialog for selecting the display mode. Clicking the [Resource information ...] button in the [Control] dialog displays the [Resource information] dialog.



◆ From [View mode] in this dialog, select the display mode. For example, when displaying in hexadecimal, click the [Hexadecimal] option button and then the [Close] button.

<Display example in hexadecimal mode>

	Variable	Online value	Data type	
	⊟ **Global_Variables**			
	INDATA_01	16#000004D2	DINT	VA
	INDATA_02	16#00007530	DINT	VA
	INDATA_03	16#00004E20	DINT	VA
	S_SW	TRUE	BOOL	VA
	A1_FLAG	TRUE	BOOL	VA

<Display example in binary mode>

	Variable	Online value	Data type	
	⊟ **Global_Variables**			
	INDATA_01	2#00000000000000...	DINT	VA
	INDATA_02	2#00000000000000...	DINT	VA
	INDATA_03	2#00000000000000...	DINT	VA
	S_SW	TRUE	BOOL	VA
	A1_FLAG	TRUE	BOOL	VA

Section 11 Monitor/Control Functions

11-2 PLC Operation and Monitoring Procedures

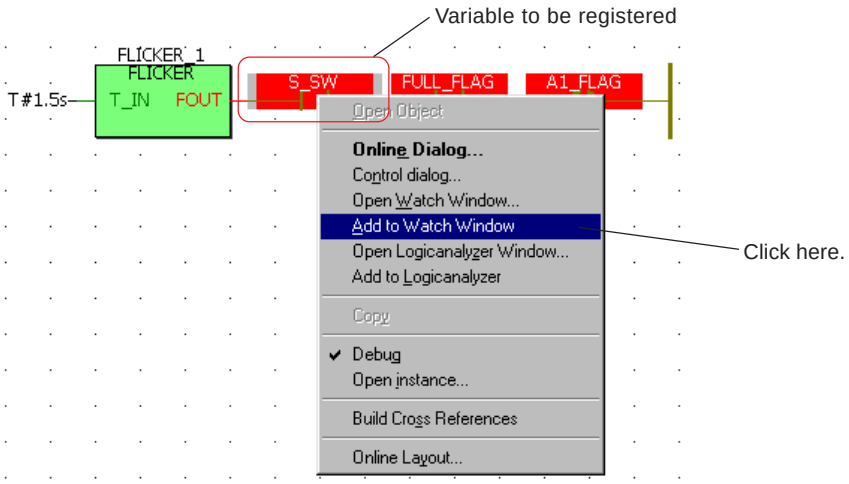
11-2-4 Watch window

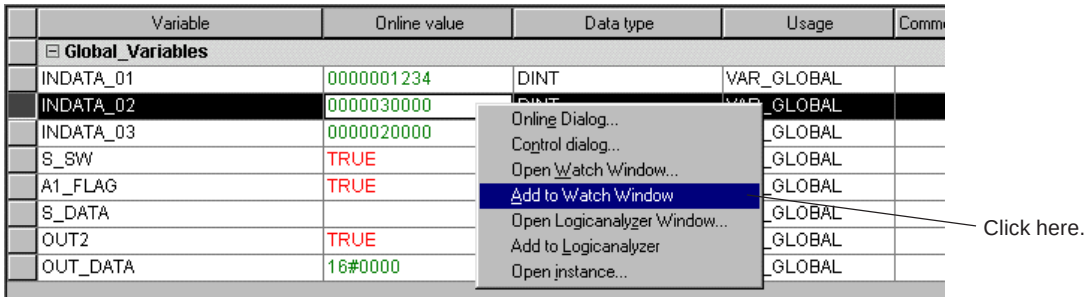
The watch window function allows to collect variables from different worksheets onto one window and to debug these variables at a time. User-defined data elements such as arrays or structures are monitored using this function.

(1) Registering variables in watch list

◆ Place the worksheet in online monitor mode.

◆ Display the code or variable worksheet that contain variables to be registered in the watch window. Then, right click the variable to be registered and click [Add to Watch Window].

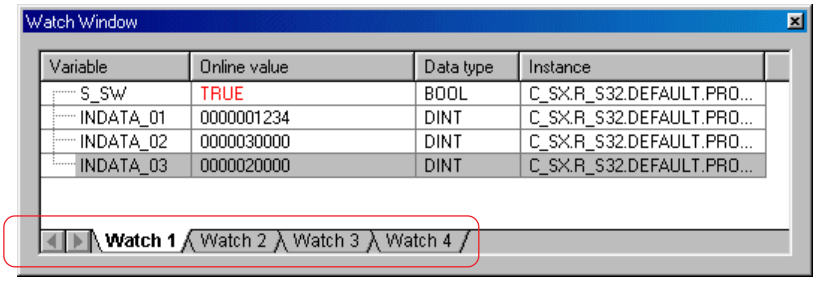




Note: The watch window function provides four sheets, each sheet registering a maximum of 99 variables.

(2) Displaying watch window

◆ Click the [Watch Window] button, or right click any point on the monitor screen and click the [Open Watch Window...] to display the watch window.



◆ Click one of tabs on the watch window to select the display.

* While a watch list sheet is being selected (being displayed on the front window), executing [Add to Watch Window] registers the variable to the selected sheet.

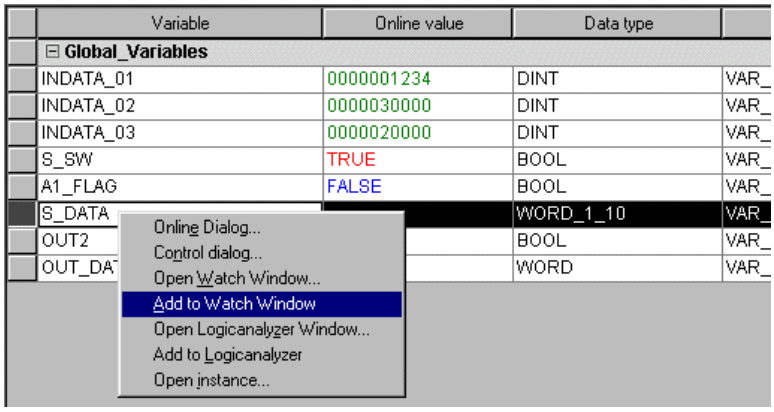
Section 11 Monitor/Control Functions

11-2 PLC Operation and Monitoring Procedures

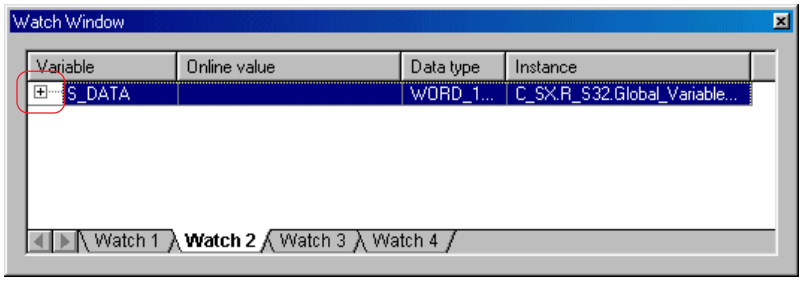
(3) Monitoring derived data

When monitoring variables of array or structure data type, they must be monitored from the watch window. These variables cannot be directly monitored from variable or code worksheet.

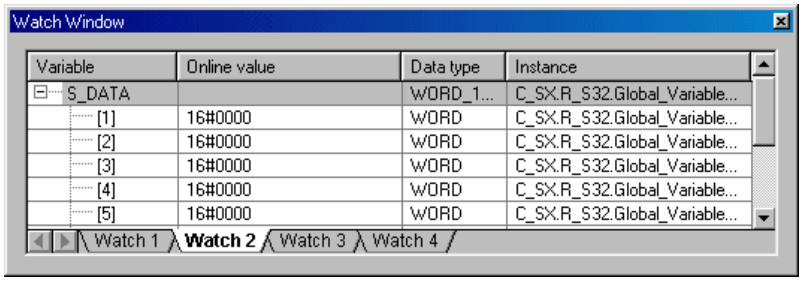
◆ Open the worksheet where the derived data variable to be registered to the watch window has been declared, right click the variable to be registered to the watch window, and then click [Add to Watch Window].



◆ Click the [Watch Window] button, or right click any point on the monitor screen and click the [Open Watch Window...] button. The watch window appears, showing the registered variable of the derived data type.



◆ Click the plus sign preceding "S_DATA" displayed on the watch window. The array is expanded, allowing to monitor the elements.



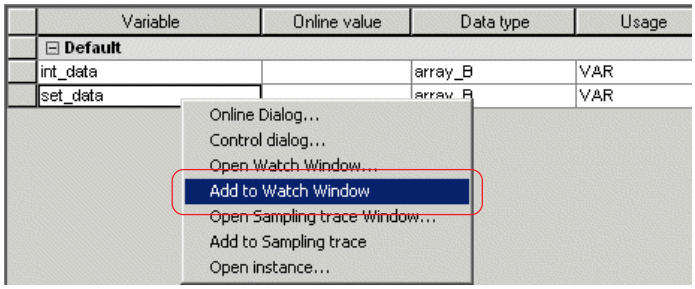
Section 11 Monitor/Control Functions

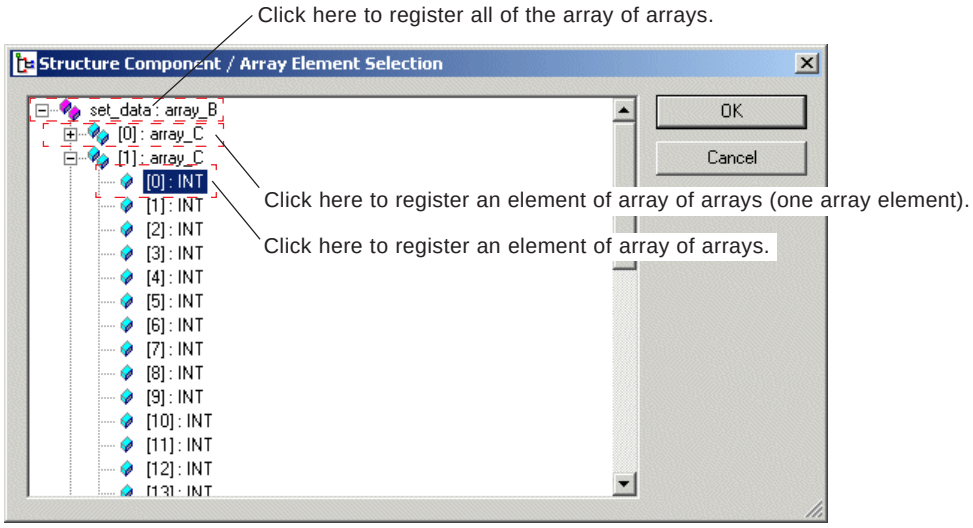
11-2 PLC Operation and Monitoring Procedures

(4) Registering array/structure variables in watch list in units of elements

Derived data type variables can be registered in units of elements. (With V3.4.0.0 or later version of SX-Programmer Expert)

◆ Right-click a multielement variable to be registered in the watch window and click the [Add to Watch Window] command. The [Structure Component / Array Element Selection] dialog box appears.





◆ Select the array variable or an element of the array variable to be registered and click the [OK] button. The variable is registered in the watch window.

Section 11 Monitor/Control Functions

11-3 Online Tests

11-3-1 Forcible ON/OFF and overwriting

D300win provides functions for forcibly setting I/O memory ON/OFF and overwriting the internal/output memory. These data change functions can be executed in the same procedure for the code worksheet, variable worksheet, or watch window being monitored online.

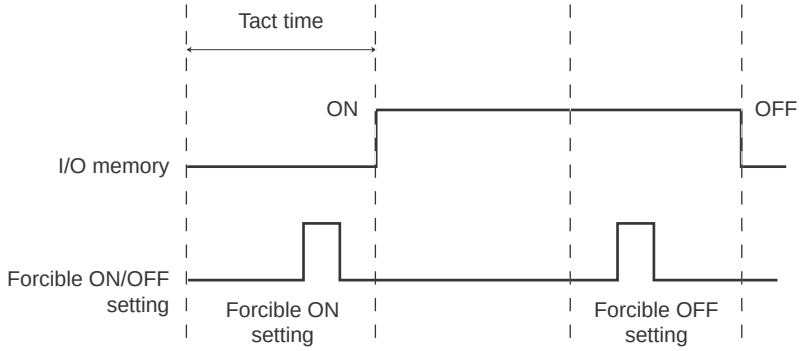
Data memory on program		Forcible ON/OFF	Overwrite
I/O memory	Actually existent input	O	-
	Actually existent output	O	O
Internal memory		-	O

Note 1: While the PLC is operating, take care when forcibly setting ON/OFF or overwriting variables. These variable operations mean executing the PLC program under the forcibly set ON/OFF or overwritten variable values.
Note 2: Forcible ON/OFF setting is only enabled for actually existent input/output. It is disabled for input/output indicated as “not equipment” in the system configuration definitions.

(1) PLC operation for forcible ON/OFF and overwriting

1) Operation timing for I/O memory forcible ON/OFF setting

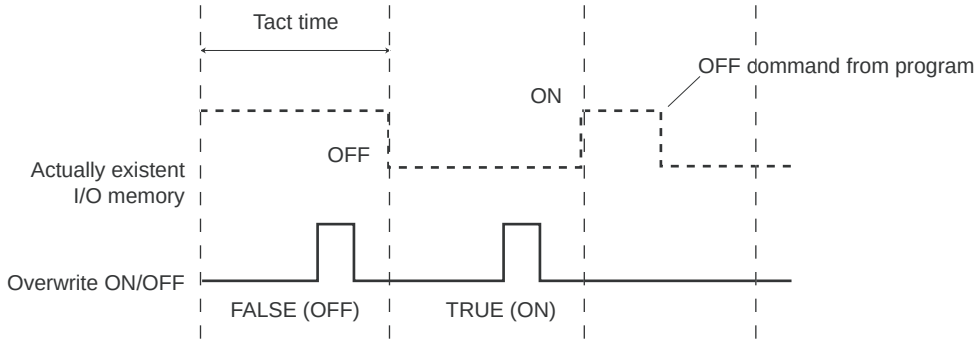
The forcible ON/OFF setting command from D300win is sent to the CPU in synchronization with the tact time. Thus, the forcible ON/OFF setting timings are as shown below.



* Memory with forcible ON/OFF setting specified is not affected by ON/OFF commands from program or ON/OFF signals from the input module. This memory holds the forcible ON/OFF state until it is reset.
When resetting forcible ON/OFF setting, click the [Forced reset] button on the [Online debug] dialog for individual reset or check the [Forced reset] check box ON in the [Resource information] dialog for batch reset.

2) Overwriting timing for internal/output memory

An overwrite command from D300win is also sent to the CPU in synchronization with the tact time. Thus, the overwriting timings are as shown below.



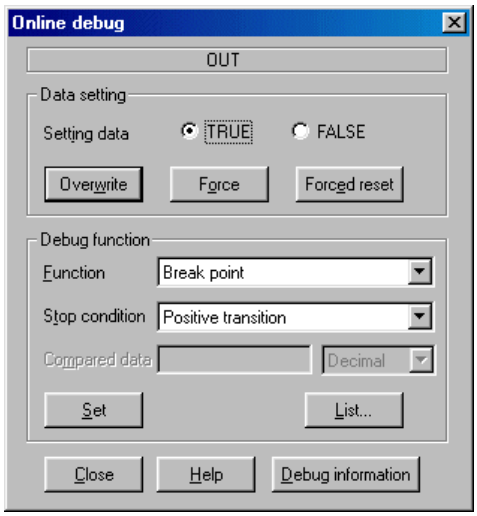
* Memory set by an overwrite command is refreshed by program.

Section 11 Monitor/Control Functions

11-3 Online Tests

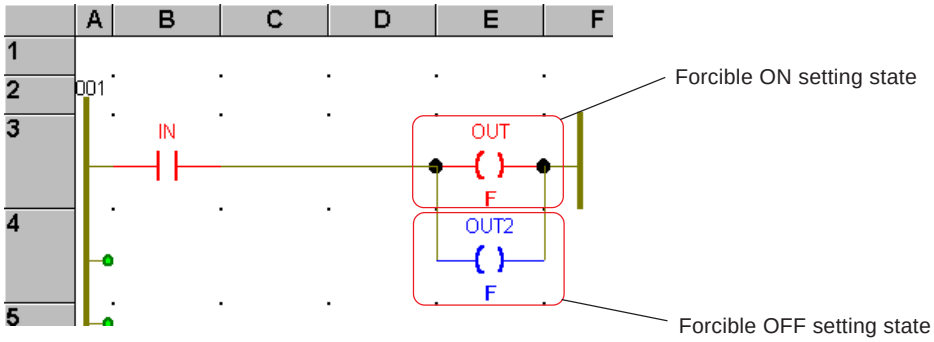
(2) Forcible ON/OFF (overwrite) setting for Boolean variable

◆ Double clicking the Boolean variable (I/O memory) to be forcibly set ON/OFF in online monitor mode displays the [Online debug] dialog.

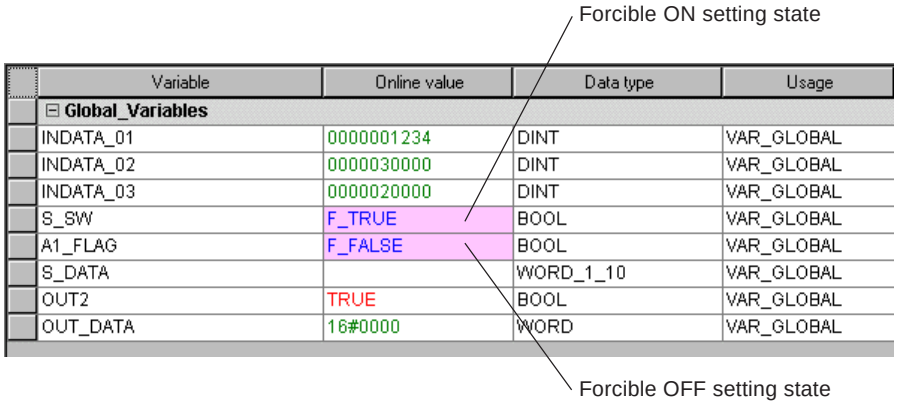


◆ Click the [TRUE] or [FALSE] option button and click the [Force] button to place the I/O variable in forcible setting state. (Click the [Overwrite] button when overwriting.) For a graphic worksheet, “F” is added below the symbol. For a text worksheet, “F_” is added to the online value.

<Code worksheet example>



<Variable worksheet example>



Section 11 Monitor/Control Functions

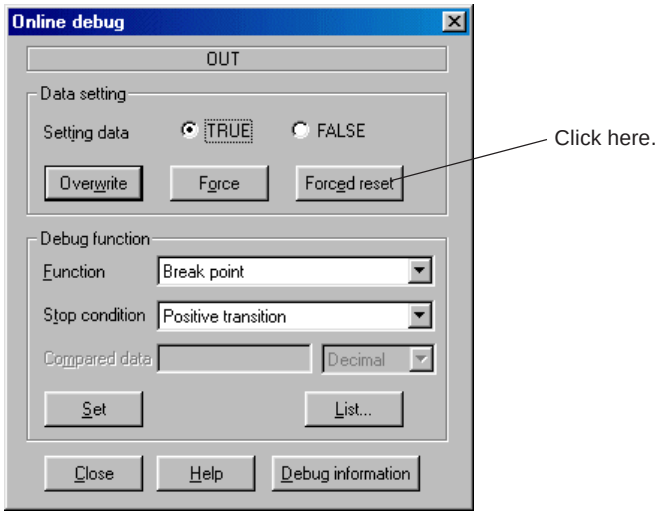
11-3 Online Tests

(3) Resetting forcible ON/OFF settings

Forcible ON/OFF setting is reset individually or in batch.

1) Individual reset

◆ Double clicking the variable forcibly set ON/OFF displays the [Online debug] dialog.

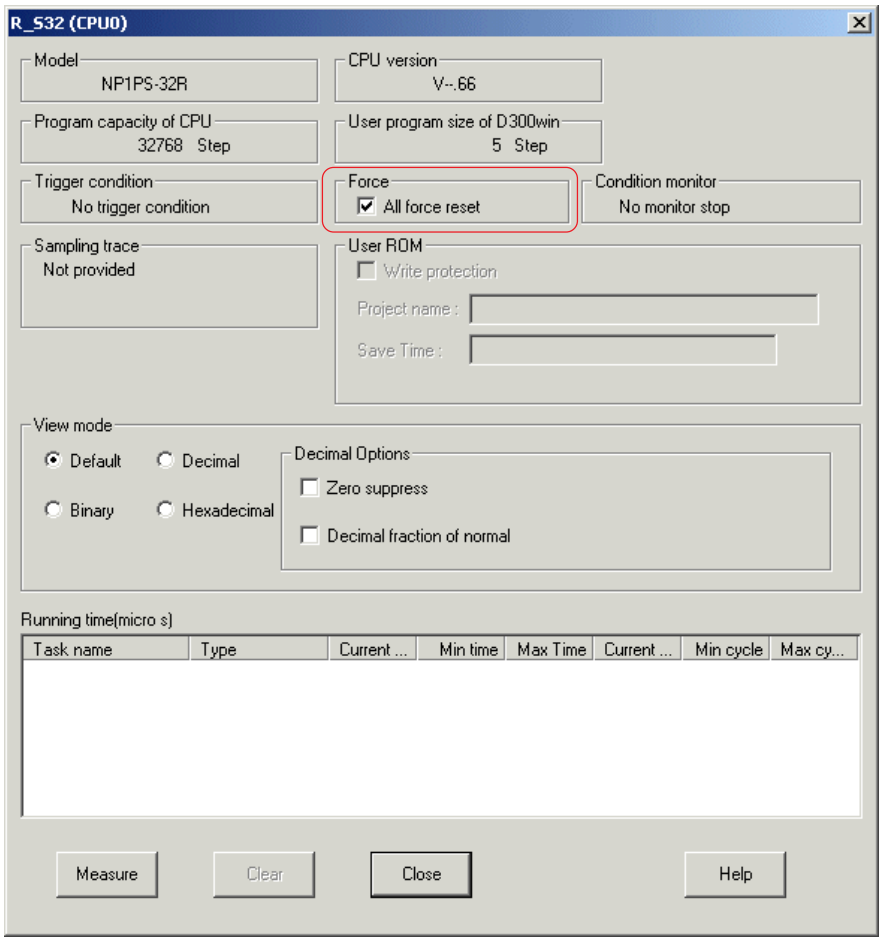


◆ Clicking the [Forced reset] button in the dialog resets forcible ON/OFF setting mode.

2) Batch reset

◆ Double clicking any one of the objects forcibly set ON/OFF displays the [Online debug] dialog.

◆ Clicking the [Debug information] button in the dialog displays the [Debugging information] dialog. Check the [All force reset] check box ON in the dialog and click the [Close] button to forcibly reset all variables forcibly set ON/OFF.



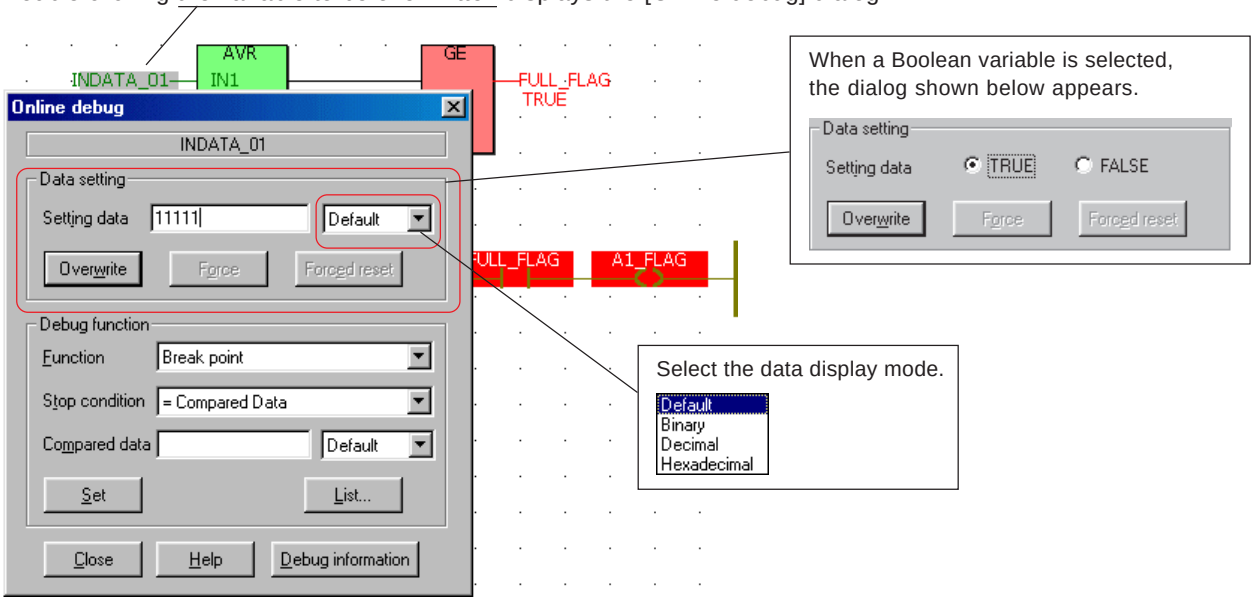
* "All force reset" functions for one resource (CPU).
* "All force reset" is also available from the [Resource information] dialog.

Section 11 Monitor/Control Functions

11-3 Online Tests

(4) Overwriting variable values

◆ Double clicking the variable to be overwritten displays the [Online debug] dialog.



◆ Select the display mode for the set data from the [Setting data] box and enter the setting data from the [Setting data] text box.
◆ Clicking the [Overwrite] button overwrites the data.

Note: When the PLC is reset or restarted after overwriting data on a variable that has an initial value set, this variable returns to the initial value.

Section 11 Monitor/Control Functions

11-3 Online Tests

11-3-2 Breakpoint function

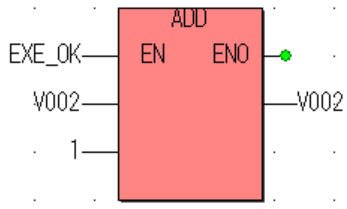
The breakpoint function allows to detect a change of the user-specified variable during user program processing (operation) in the CPU module and immediately stop program processing (stop the operation of the target CPU module).

Note: During system operation, take sufficient care when using the breakpoint function. This function stops the program at the position set as a breakpoint.

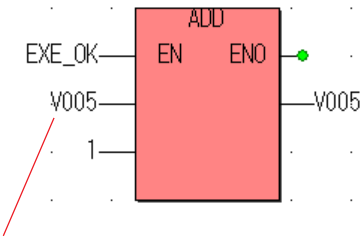
(1) Functions of breakpoint

Function		Specification	SPH300 /200	SPH2000 /3000
Multi-point breakpoint		Up to 32 points of breakpoints can be set for one project.	X	O
Logical concatenation of break stop conditions		For one variable, up to 4 points of break stop conditions by a specified value of data can be concatenated with AND or OR. e.g.) DATA=1000 OR variable>=2000 AND variable<3000 ⇨When the variable "DATA" is 1000 or 2000<=DATA<3000, the program is stopped.	X	O
Break stop condition	Step match (REACHED)	After an instruction set as the breakpoint is executed	O	O
	BOOL data match (=1, =0)	=1: When the specified BOOL variable is turned ON =0: When the specified BOOL variable is turned OFF	O	O
	Rising/falling edge of BOOL data	Rising edge: When the specified BOOL variable is changed from OFF to ON. Falling edge: When the specified BOOL variable is changed from ON to OFF.	O	O
	Data comparison match	When the specified data satisfies the specified conditions. Comparison conditions (=, ≠, <, >, <=, >=)	O	O
	Reading/ writing to data (READ/WRITE)	After reading to the specified data After writing to the specified data	O	X

Note1) Approval timing differs depending on CPU



SPH200/300
Approves when V005 changed from 4 to 5, even if ADD is not executed.



SPH2000/3000
Approval judgement is performed before execute instruction.
Therefore, not approved when V005 changed from 4 to 5 by ADD execution, and next scan, when ADD is executed, approved.

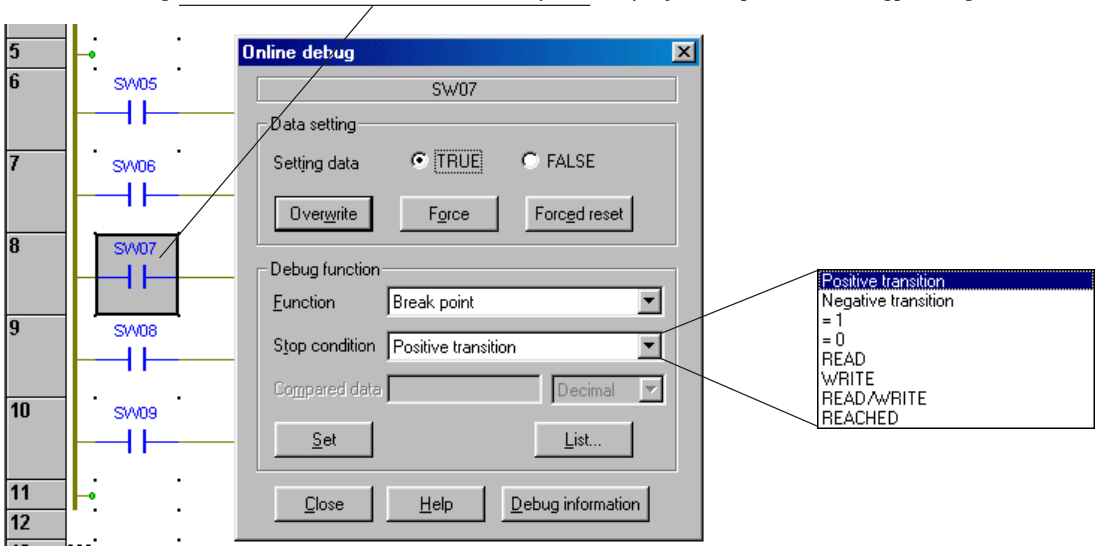
Set Approval condition as “V005 = 5” at here.

Section 11 Monitor/Control Functions

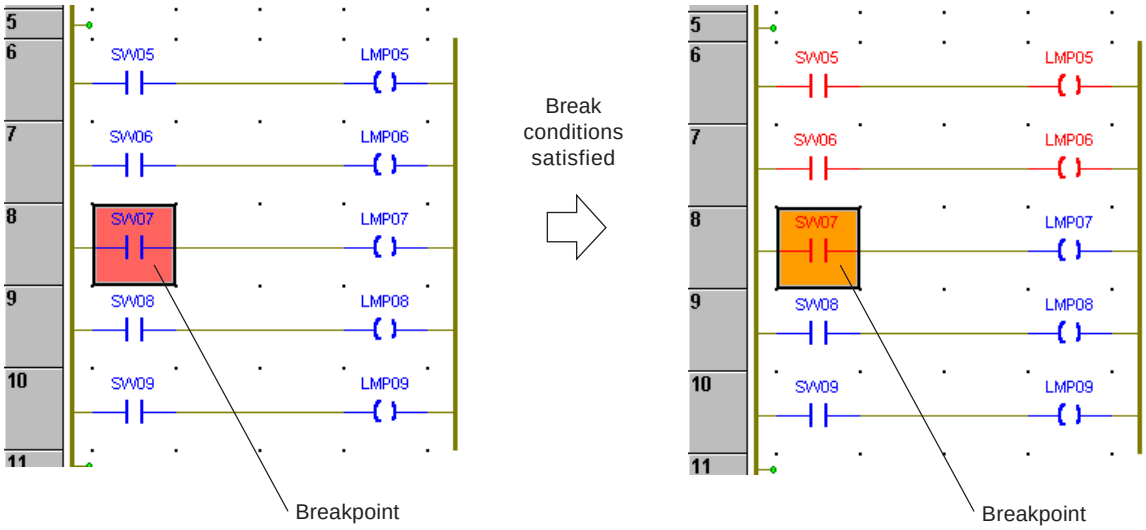
11-3 Online Tests

(2) Setting breakpoint

◆ Display the worksheet where a breakpoint to be set and place it in monitor mode.
Double clicking the variable to be set as a breakpoint displays the [Online debug] dialog.



◆ Select the stop condition and click the [Set] button to set a breakpoint.
A breakpoint appears in red. When the break conditions are satisfied and the program has stopped, the breakpoint appears in yellow.



Note1: For an FB in the POU assigned to a fixed-cycle task (FIXED_CYCLE), the value is output when this task is started and the FB is called and executed. For example, when the fixed-cycle task is set to “10ms,” the POU assigned to the task is executed with an interval of 10ms. If a timer FB is used in the program, the timer current value is also updated at every 10ms. Therefore, if a breakpoint (stop condition:=, comparison data: 5 ms) is set for the timer current value, the PLC does not stop. (When “=” is specified in the stop condition, set a value that is a multiple of fixed-cycle task “10ms”, “>:” (greater than), or “<=” (equal to or greater than) as the stop condition.)
Note2: In case of SPH3000, when PLC is password protected, breakpoint cannot be set.
Note3: If breakpoint is set to the POU which is set as compile optimizing, this POU works in normal mode when debug mode. If debug mode is finished, automatically operates in optimized mode.

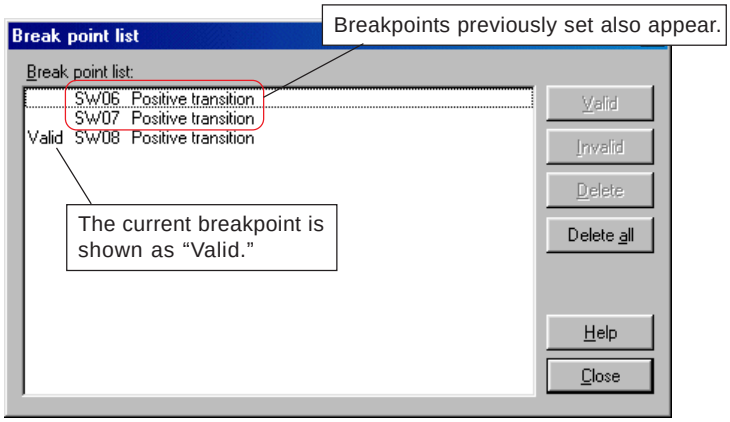
Section 11 Monitor/Control Functions

11-3 Online Tests

(3) List of breakpoints

The contents of a set breakpoint are saved in the “Break point list” of the project (held until they are deleted). The breakpoint function can also be used by selecting breakpoint items from this list.

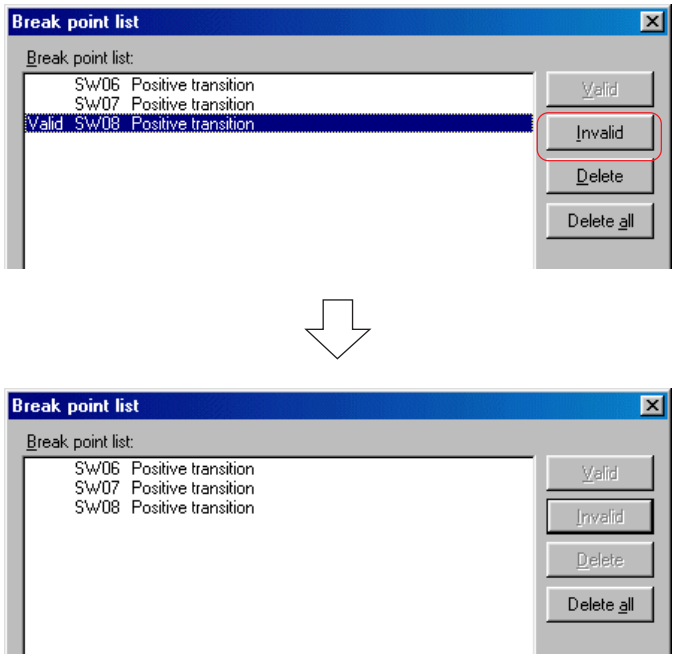
◆ Click the [List...] button in the [Online debug] dialog or click the [List of Break...] in the [Control] dialog to display the [Break point list] dialog.



◆ The [Break point list] dialog allows to reset, change, or delete breakpoints.

1) Resetting a breakpoint

◆ Select a valid breakpoint and click the [Invalid] button to reset the breakpoint.



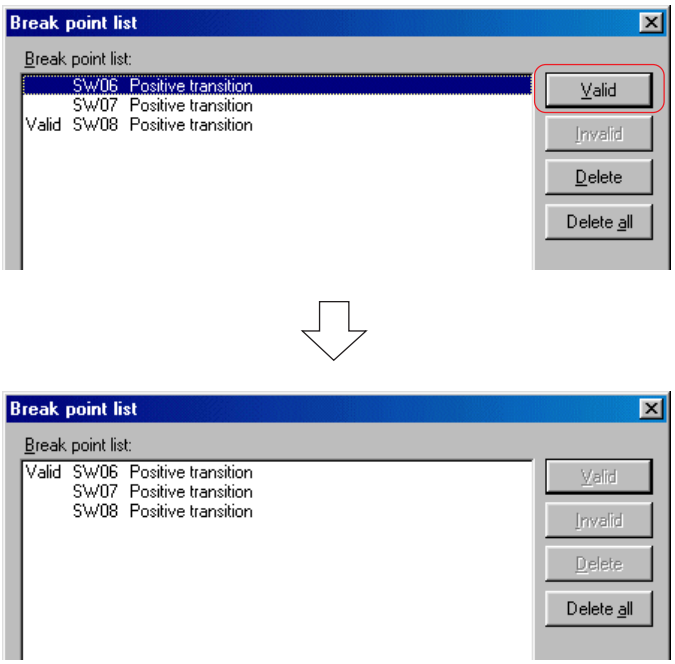
Section 11 Monitor/Control Functions

11-3 Online Tests

2) Changing a breakpoint

The current breakpoint can be changed to a variable in the list.

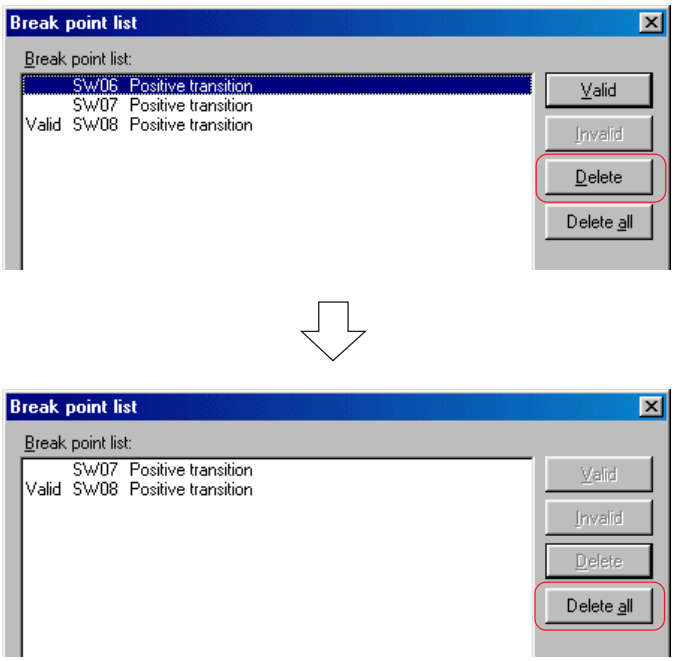
◆ Select the variable to be changed to a breakpoint from the list and click the [Valid] button to change the breakpoint.



3) Deleting a breakpoint

The previously set or current breakpoint can be deleted.

◆ From the list, select the variable to be deleted and click the [Delete] button. The selected variable is deleted.



* Clicking the [Delete all] button deletes all variables in the list.

Section 11 Monitor/Control Functions

11-3 Online Tests

(4) Resetting breakpoint

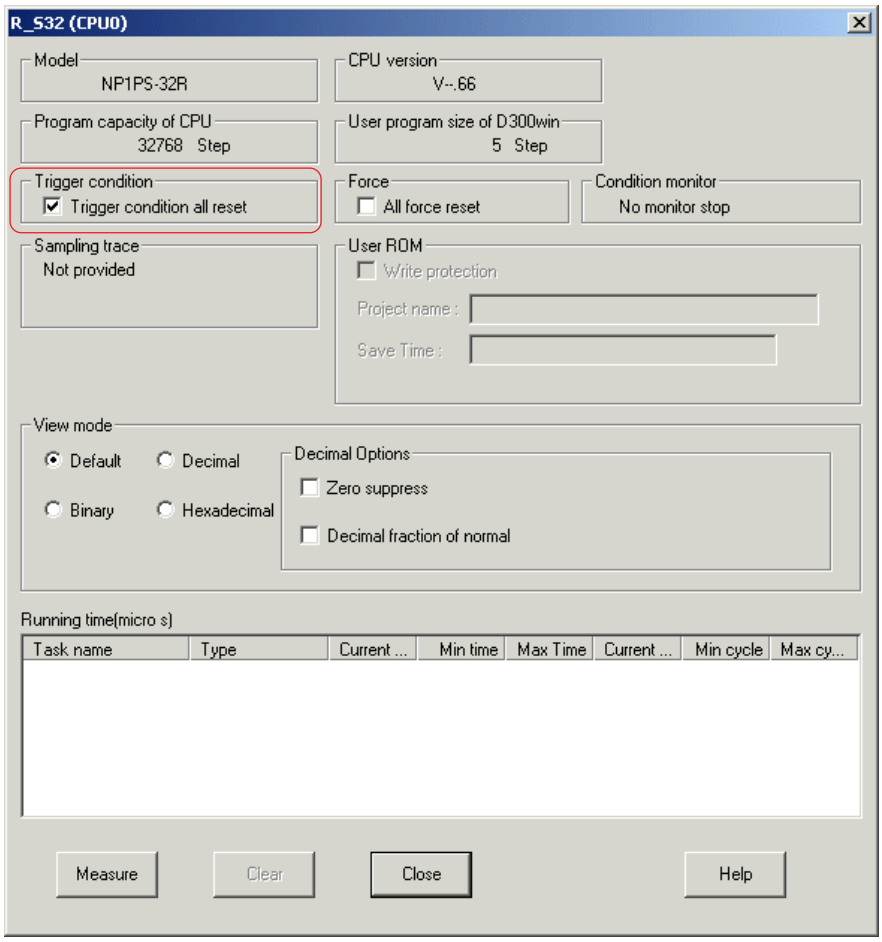
The procedure for resetting a breakpoint differs depending on whether the breakpoint has been executed or not.

1) Resetting breakpoint before its execution

The set breakpoint can be reset by using the [Break point list] dialog as described before or by using the [Resource information] dialog. This section describes the latter procedure.

Using [Online debug] dialog

◆ Right click on any variable on the worksheet being monitored and execute [Online Dialog...] to display the [Online debug] dialog.
◆ Clicking the [Debug information...] button in the dialog displays the [Debugging information] dialog.



◆ Check the [Trigger condition all reset] check box ON in the dialog and click the [Close] button to reset the breakpoint.

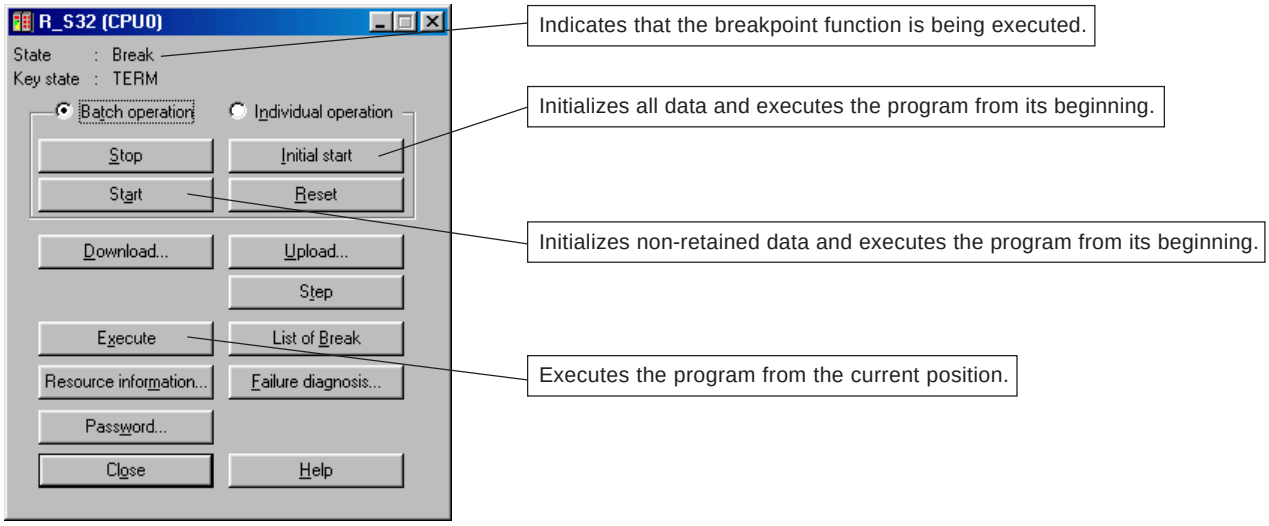
Section 11 Monitor/Control Functions

11-3 Online Tests

2) Resetting breakpoint after its execution

After a breakpoint has been executed, the PLC (CPU module) is in stop state. Moreover, the program is being stopped at the position set as the breakpoint. Depending on the PLC operation, the program may have to be restarted from the position of the breakpoint or started from the beginning.

◆ Click the [Start], [Execute], or [Initial start] button.

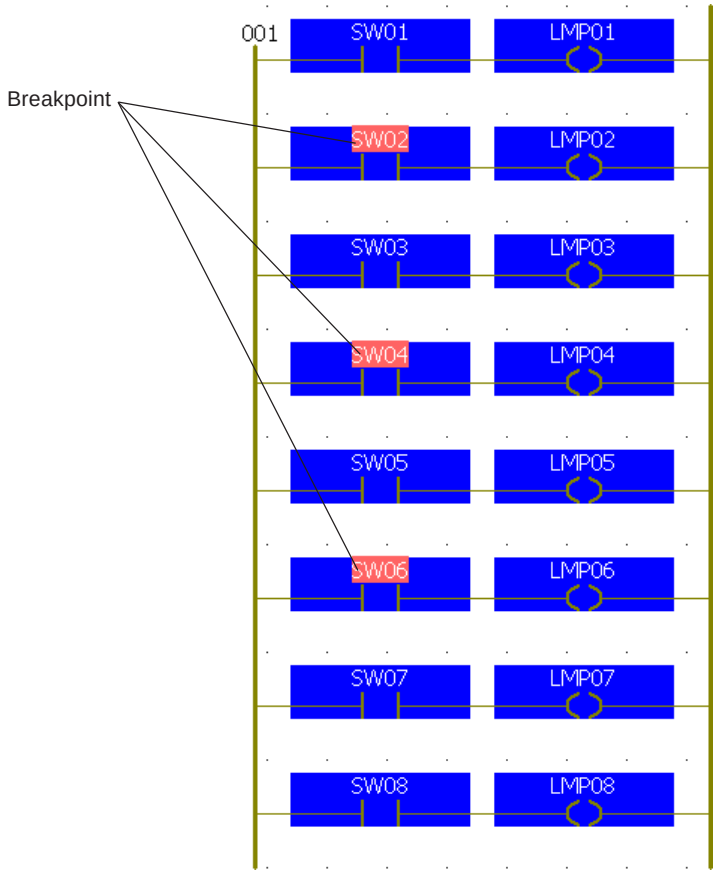


Section 11 Monitor/Control Functions

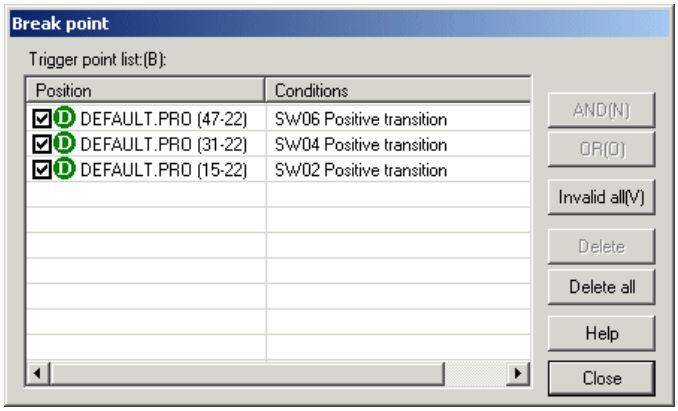
11-3 Online Tests

(5) Multi-point breakpoint (for SPH2000/3000)

Following the procedure described in (2), set a breakpoint. Up to 32 points can be set using the same procedure. Breakpoints are set as shown in the figure below.



* In the case of the example above, the “Breakpoint” dialog (List fo breakpoints) is displayed as shown below.
It is possible to set the checkboxes on this dialog to ON or OFF.



Section 11 Monitor/Control Functions

11-3 Online Tests

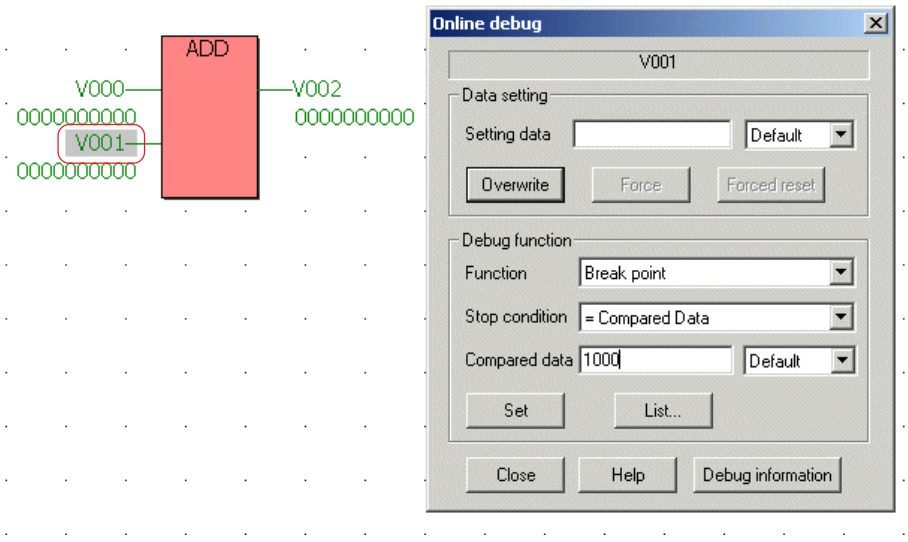
(6) Logical concatination of breakpoints (for SPH2000/3000)

With SPH2000/3000, up to 4 points of break stop conditions by a specified value of data can be concatenated with AND or OR for one variable.

<Concatenation setting example>

The procedure for setting break conditions to stop the program when the variable “V001” is 1000 or 2000<=DATA<3000.

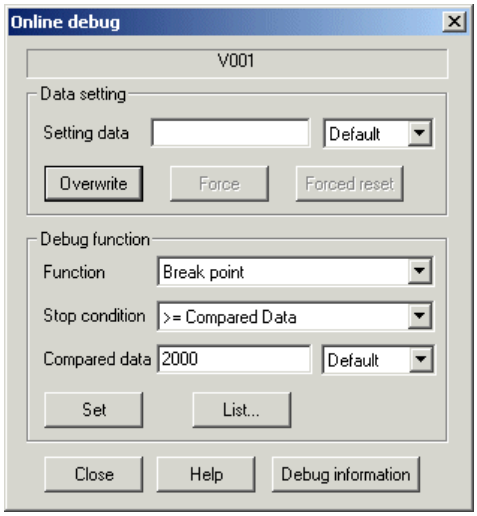
◆ Double-click the variable to be set as a breakpoint while monitoring the program. The “Online debug” dialog is displayed.



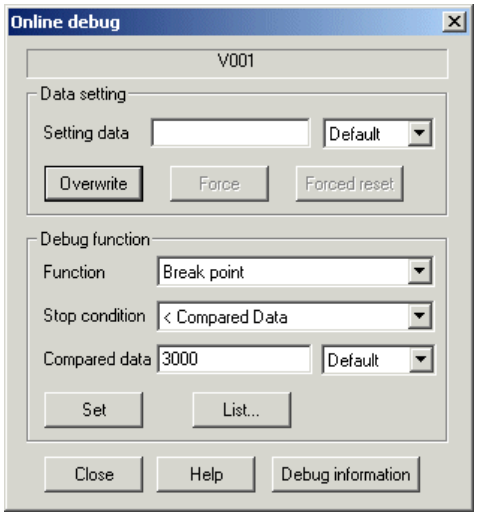
◆ Select “= Compared Data” for the stop condition, set the compared data at “1000”, and then click the “Set” button.
The confirmation dialog for breakpoint setting is displayed. Clicking the “Yes” button sets the breakpoint and condition.

◆ Using the same procedure, set the following two break conditions:

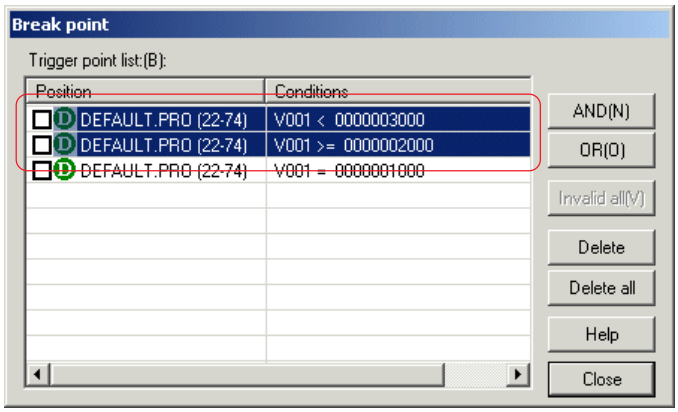
Stop condition: “<= Compared Data”
Compared data: “2000”

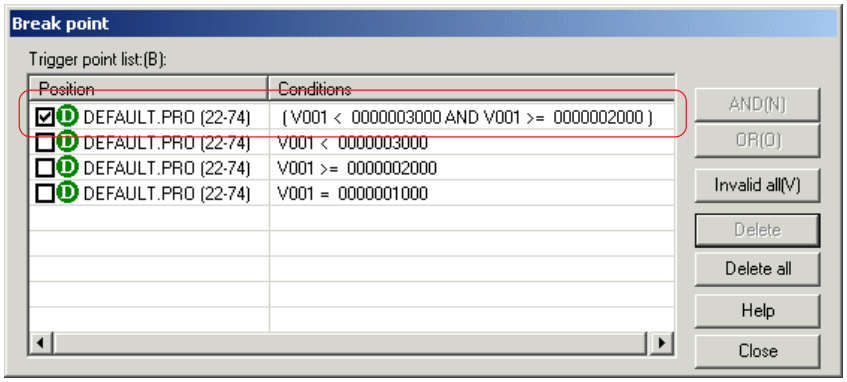


Stop condition: “> Compared Data”
Compared data: “3000”

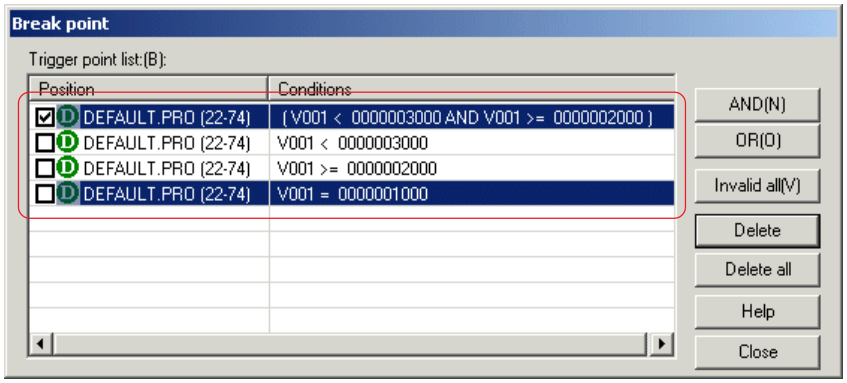


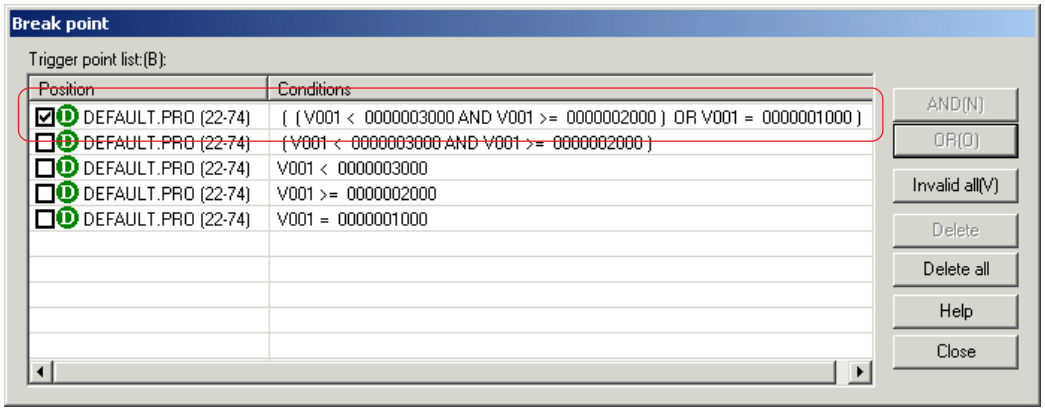
◆ Next, concatenate the break conditions on the “Break point” dialog.
For setting 2000<=V001<3000, select two conditions as shown below and click the “AND” button. The concatenated conditions are added.





◆ Also, for setting the state in which V001=1000 or 2000<=V001<3000 as break conditions, set the two conditions as shown below and click the “OR” button.





Section 11 Monitor/Control Functions

11-3 Online Tests

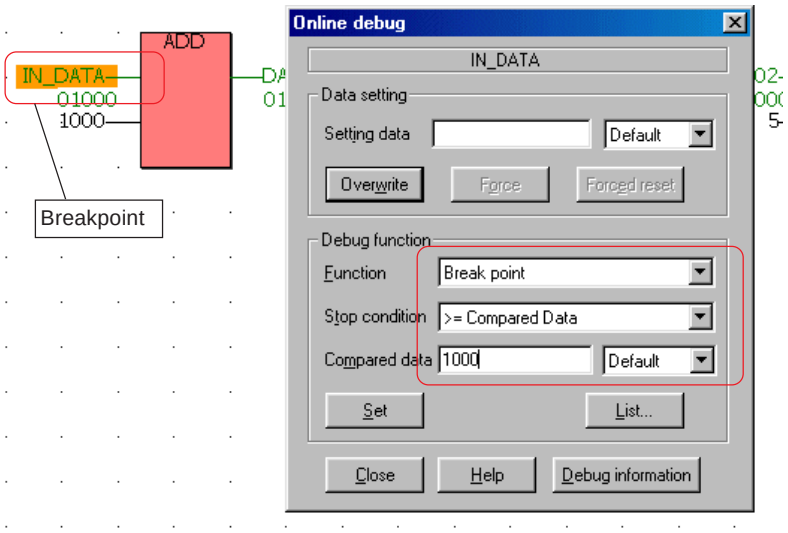
11-3-3 Step execution

The step execution function allows to execute the user program in the CPU module in steps of instructions. The procedure for step execution is described below.

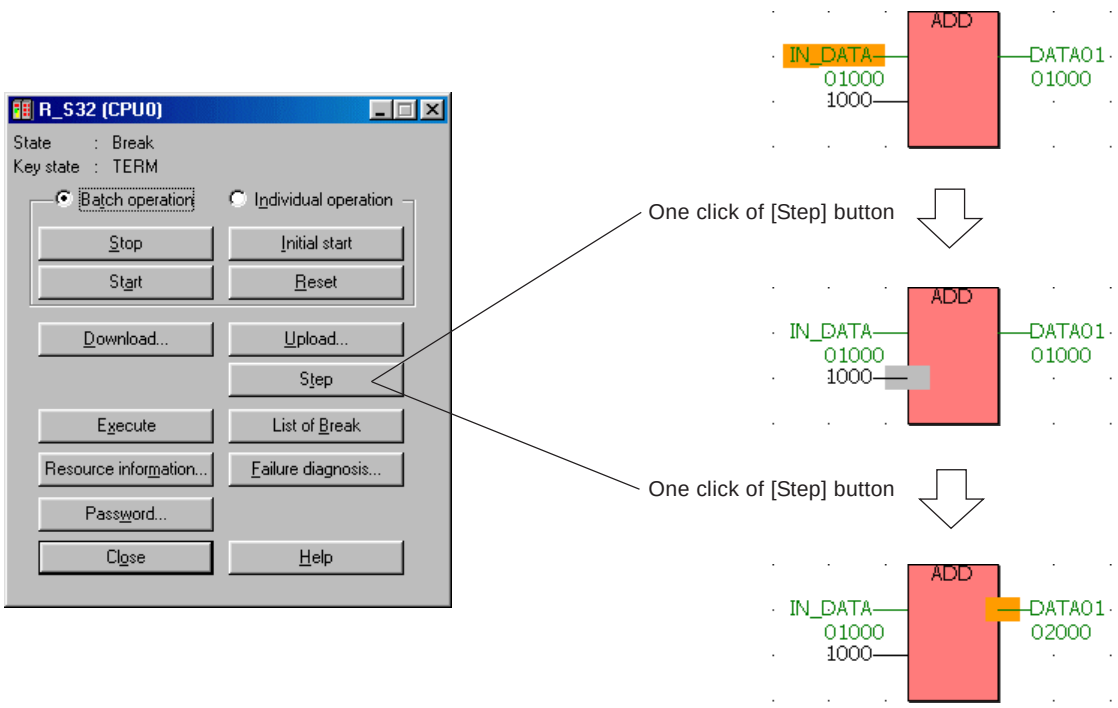
1) Using the breakpoint function, stop the program under the set conditions.
2) Each clicking of the [Step] button in the [Control] dialog executes one instruction.

Note: Step execution does not refresh the I/O memory.

◆ Set a breakpoint. In this example, stop the program when the value of variable “IN_DATA” is equal to or greater than 100. Set the conditions and click the [Set] button.



◆ When the IN_DATA value becomes 100 or more, the stop conditions are satisfied and the CPU stops at the IN_DATA position.
◆ Clicking the [Step] button in the [Control] dialog starts step execution.



◆ In the same way as breakpoint resetting, step execution is reset by clicking the [Start], [Execute], or [Initial start] button.

Section 11 Monitor/Control Functions

11-3 Online Tests

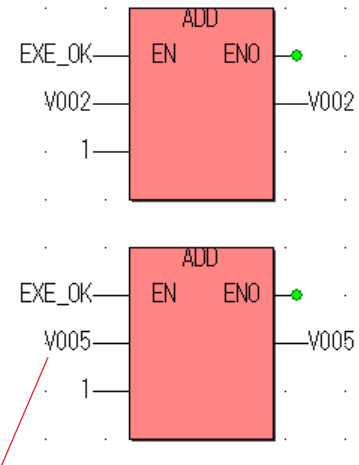
11-3-4 Condition monitor

The condition monitor function allows to stop the monitor screen during online monitoring by detecting the rising or falling of an arbitrary Boolean variable such as a contact or coil. At this time, the monitor screen stops, but the CPU runs continuously.

(1) Available monitoring stop conditions

Function		Specification	SPH300 /200	SPH2000 /3000
Multi-point condition monitoring stop		Up to 32 points of condition monitoring stop points can be set for one project.	X	O
Logical concatenation of monitoring stop conditions		For one variable, up to 4 points of monitoring stop conditions by a specified value of data can be concatenated with AND or OR. e.g.) DATA=1000 OR variable>=2000 AND variable<3000 ⇨When the variable "DATA" is 1000 or 2000<=DATA<3000, the monitoring is stopped.	X	O
Monitoring stop condition	Step match (REACHED)	After an instruction set as the breakpoint is executed	X	O *1
	BOOL data match (=1, =0)	=1: When the specified BOOL variable is turned ON =0: When the specified BOOL variable is turned OFF	X	O
	Rising/falling edge of BOOL data	Rising edge: When the specified BOOL variable is changed from OFF to ON. Falling edge: When the specified BOOL variable is changed from ON to OFF.	O	O
	Data comparison match	When the specified data satisfies the specified conditions. Comparison conditions (=, ≠, <, >, <=, >=)	X	O

*1) If compile optimizing mode is used in SPH3000, monitor stops when condition stop is set.
*2) Approval timing differs depending on CPU



Set Approval condition as “V005 = 5” at here.

SPH200/300
Approves when V005 changed from 4 to 5, even if ADD is not executed.

SPH2000/3000 : Normal mode
Approval judgement is performed before execute instruction.
Therefore, not approved when V005 changed from 4 to 5 by ADD execution, and next scan, when ADD is executed, approved.

SPH3000 : Compile optimizing mode
Approval judgement is performed at scan end.
Therefore, not approved when V005 changed from 4 to 5 by ADD execution, and at the scan end, approved.

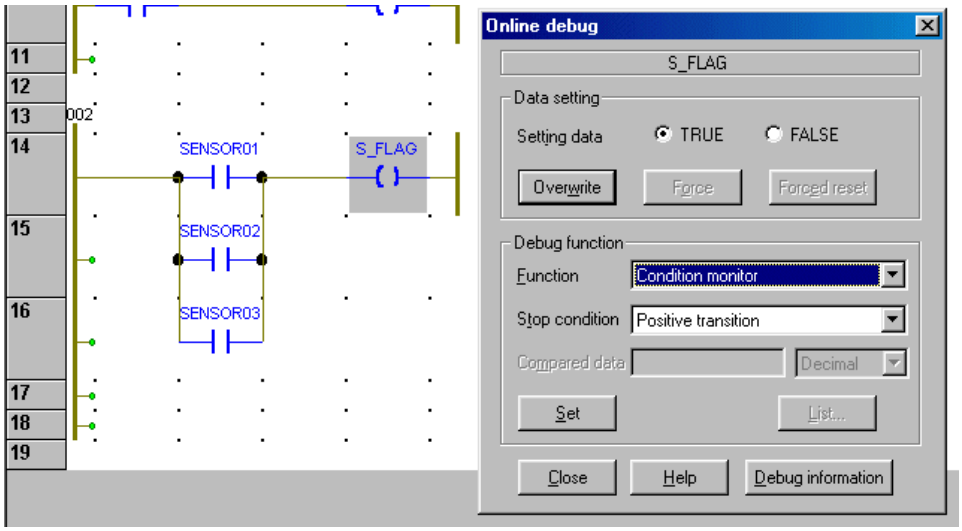
Section 11 Monitor/Control Functions

11-3 Online Tests

(2) Setting stop conditions

1) SPH300/SPH200

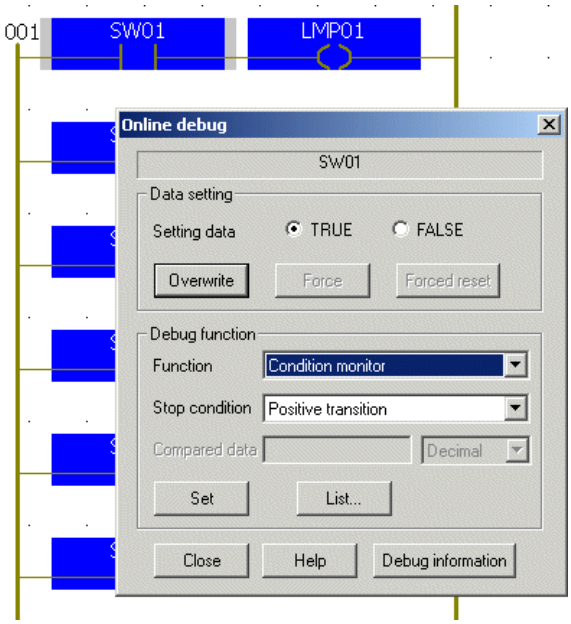
◆ Display the worksheet (code worksheet, variable worksheet, or watch window) and place it in the online monitor mode.
◆ Double clicking the Boolean variable to be condition-monitored displays the [Online debug] dialog. Select “Condition monitor” from the [Function] list box, select “Positive transition” or “Negative transition” from the [Stop condition] list box, and click the [Set] button.



◆ During condition monitoring, the status bar shows “Condition monitoring.” When the stop conditions are satisfied and the monitor has stopped, the status bar shows “Condition monitoring stopped.”
◆ The condition monitor is reset by the following four methods: moving the scroll bar of the editor, setting the monitor ON/OFF, executing the [Trigger condition all reset] on the “Resource information” dialog or stopping and staring the CPU again.

2) SPH2000/3000

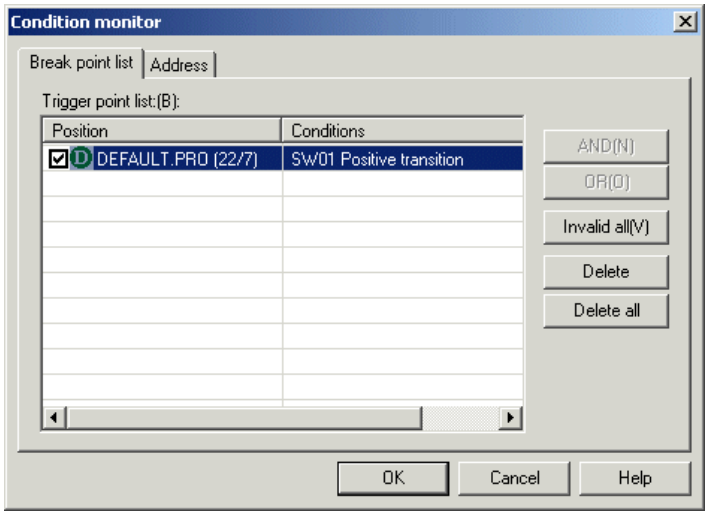
◆ Display the worksheet (code worksheet, variable worksheet, or watch window) and place it in the online monitor mode.
◆ Double clicking the variable to be condition-monitored displays the [Online debug] dialog. Select “Condition monitor” from the [Function] list box, select “Positive transition” or “Negative transition” from the [Stop condition] list box, and click the [Set] button.



Section 11 Monitor/Control Functions

11-3 Online Tests

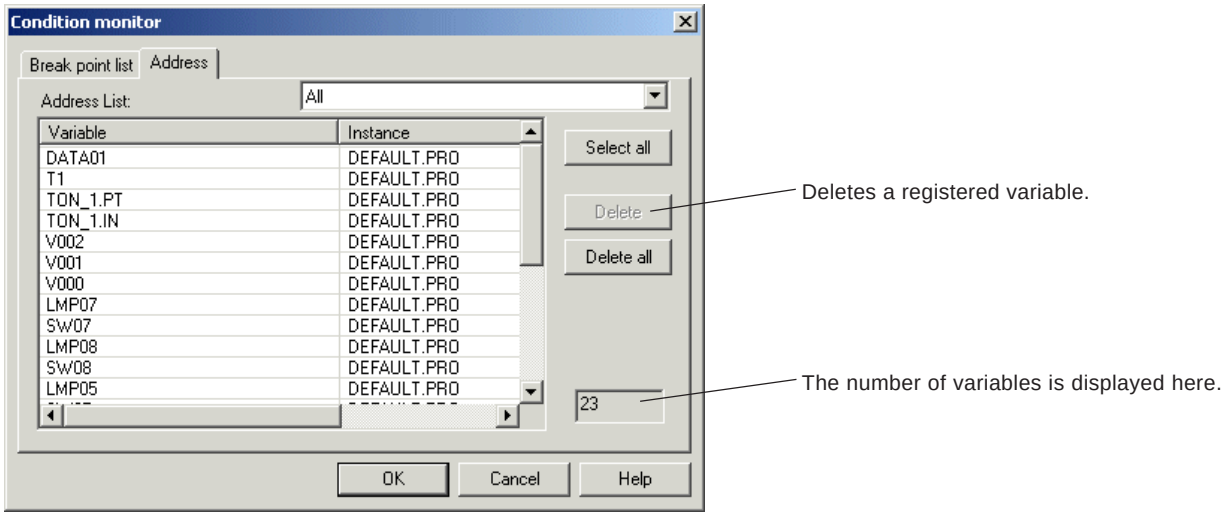
◆ Select “Condition monitor” from the [Function] list box on the [Online debug] dialog, and click the “List” button. The [Condition monitor] dialog box appears and the registered stop conditions are displayed.



* With SPH2000/3000, two or more stop conditions of the condition monitor can be set. (max. 32 points).
When multiple variables are aet as stop conditions of condition monitor, use the same procedure explained above.

* On the “Trigger point list”, set stop conditions can be enabled or disabled, and logical concatenation of the conditions to the same variable can be performed. (max. 4 points). For the setting procedure, refer to “11-3-2 (6)”.

◆ Click the [Address] tab on the [Condition monitor] dialog to display the [Address list]. On the address list, variables that had been displayed when the stop condition was registered have been automatically registered.



* Up to 512 points of variables can be registered. However, note that for STRING type variables, one variable uses 33 points.

◆ Click the [OK] button to register the variable to be condition-monitored.
◆ During condition monitoring, the status bar shows “Condition monitoring.” When the stop conditions are satisfied and the monitor has stopped, the status bar shows “Condition monitoring stopped.”
◆ The condition monitor is reset by the following four methods: moving the scroll bar of the editor, setting the monitor ON/OFF, executing the [Trigger condition all reset] on the “Resource information” dialog or stopping and staring the CPU again.

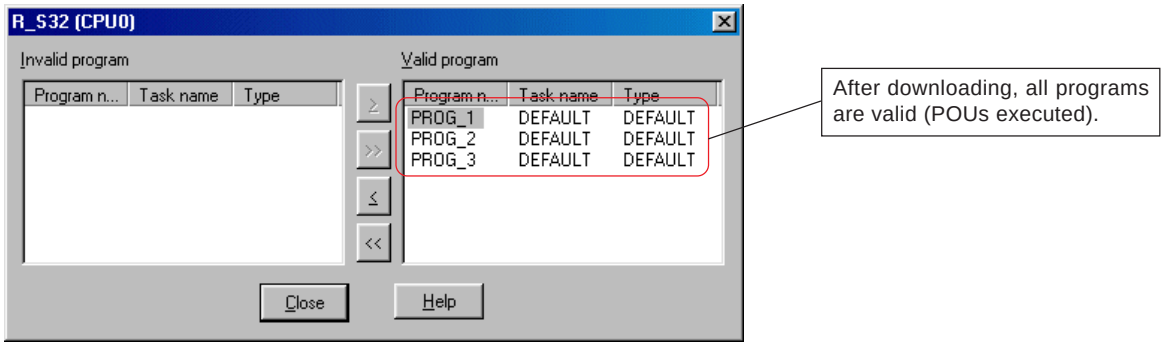
Section 11 Monitor/Control Functions

11-3 Online Tests

11-3-5 Program control

When multiple POUs are assigned to one resource (CPU module), the program control function allows to select one or more POUs to be executed. Debugging operation can be executed in the unit of POUs by using this function.
Note: The program control function cannot be used during execution of another test function (breakpoint, step execution, or condition monitor). However, other test functions can be used after execution of the program control function has completed.

- ◆ Clicking the [Project control dialog] button in the offline state displays the [Control] dialog.
- ◆ Clicking the [Program Control...] button in the [Control] dialog displays the "For program control" dialog that shows the states of POUs assigned to the resource.



- ◆ Select POUs other than the POU to be debugged and click the [<] button. The selected POUs move to the [Invalid program] box.

Note: Resetting the CPU module power (OFF → ON) cancels the invalid state of the programs moved to the [Invalid program] box and moves them to the [Valid program] box, operating all POUs assigned to the resource.

Section 11 Monitor/Control Functions

11-4 Calendar Function

The MICREX-SX Series provides a calendar function with a clock in each CPU module.
The calendar value can be monitored and/or set from D300win and also from application programs.

(1) Calendar range

The available calendar range is 00:00:00 in 1970-1-1 to 23:59:59 in 2069-12-31.

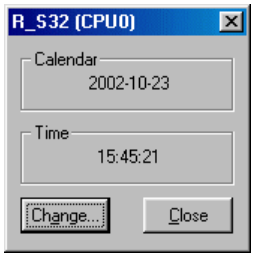
(2) Calendar accuracy

The calendar (clock) in the CPU has accuracy 27 seconds/month (under ambient temperature 25°C).

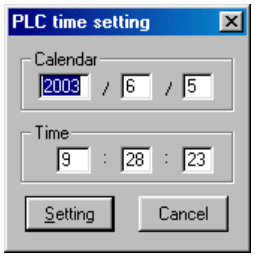
Note: The calendar accuracy varies depending on the environmental conditions such as the ambient temperature. For a system requiring high accuracy for the calendar, consider about the inspection (clock value modification) cycle based on actual measurement.

(3) Monitoring and setting from D300win

◆ Clicking the [Calendar/Watch...] button in the [Control] dialog displays the current date and time.



◆ Clicking the [Change...] button displays the [PLC time setting] dialog. From this dialog, the set values can be changed. After changing the values, click the [Setting] button.



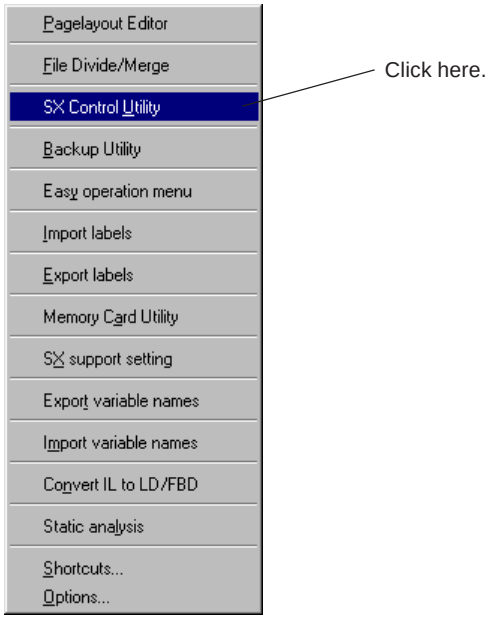
Section 11 Monitor/Control Functions

11-5 SX Control Utility

The SX control utility allows MICREX-SX system I/O and internal memory monitoring, data change, and data backup without starting D300win. This utility can also be used for I/O check in a system where no project is downloaded to the CPU module.

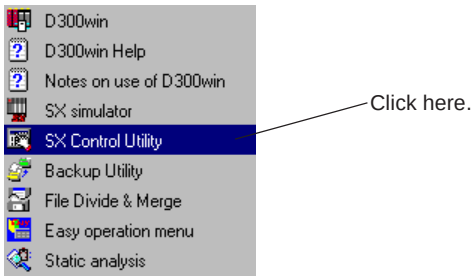
11-5-1 Starting SX control utility

◆ Connect D300win and MICREX-SX system
◆ Click [Extras] → [SX Control Utility] to start the SX control utility.



* The SX control utility can be started even if D300win is not started.

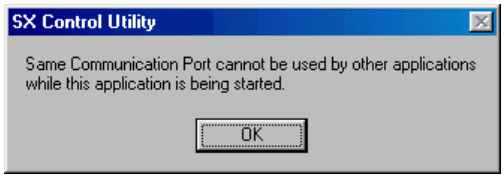
◆ The SX control utility can also be started by clicking [Start] → [Program] → [D300win] and then clicking [SX Control Utility] from the D300win program loop.



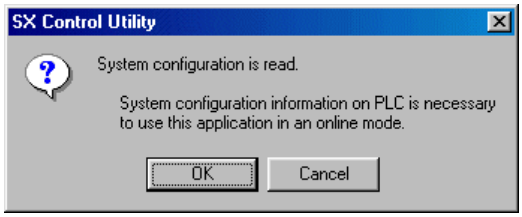
Section 11 Monitor/Control Functions

11-5 SX Control Utility

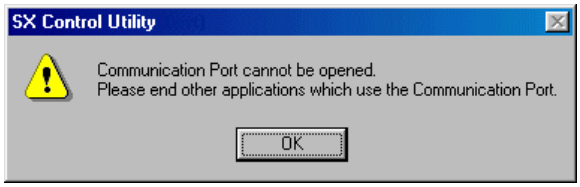
◆ When the SX control utility is started, the message shown below appears.



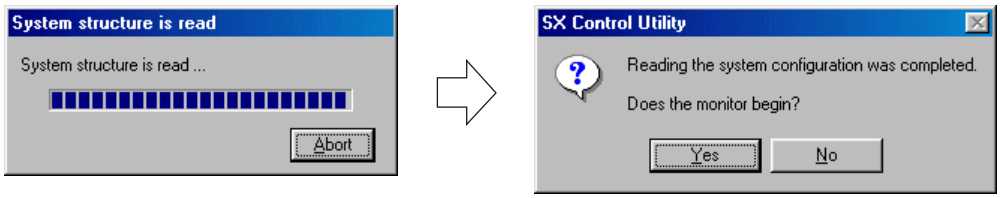
◆ Clicking the [OK] button displays the screen for confirming to read the system configuration.



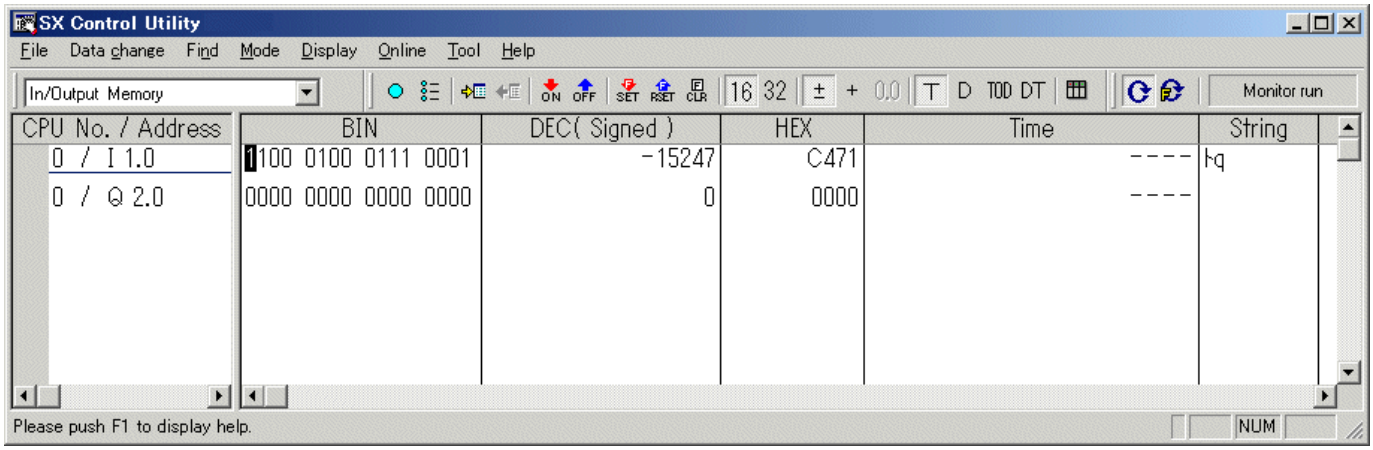
Note: When another application program is already using the communication port (for example, D300win is in online monitoring), the message shown below appears.



◆ Clicking the [OK] button reads the system configuration from the connected CPU module.



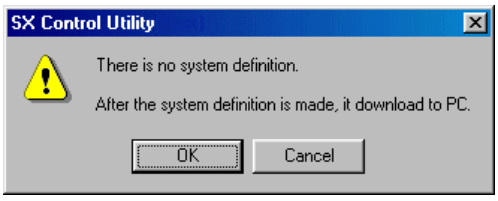
◆ Clicking the [Yes] button displays the screen in the monitor started state.
Clicking the [No] button displays the screen in the monitor stopped state.



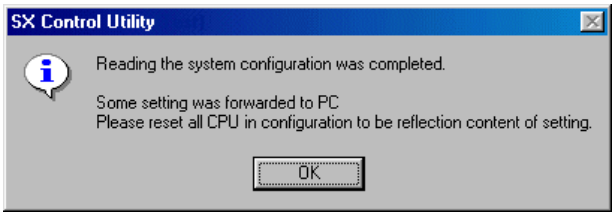
Section 11 Monitor/Control Functions

11-5 SX Control Utility

Note 1: For a CPU module with no system definitions registered, the message shown below appears. The SX control utility recognizes the I/O modules of the connected system, creates system definitions, and download them.



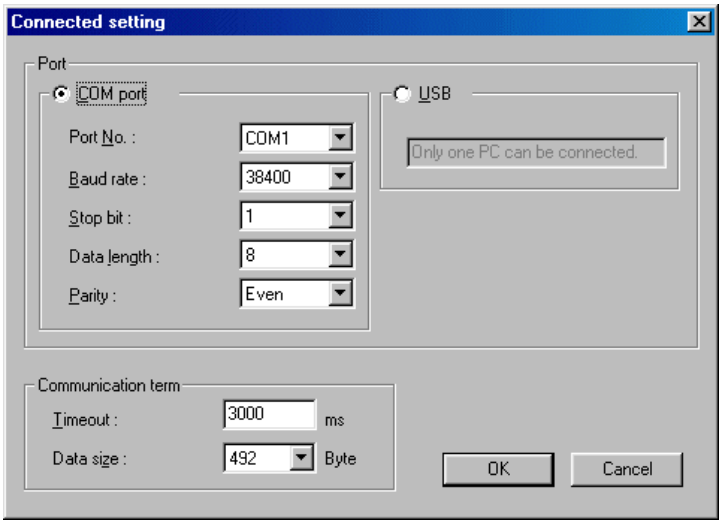
◆ Clicking the [OK] button creates and downloads the system definitions to the CPU and displays the message shown below.



◆ Click the [OK] button, reset the CPU, and then use the SX control utility.

Note 2: If the communications with the CPU are established when starting the SX control utility, the message shown below appears. In this case, check the connections with the CPU and communication settings for the SX control utility.

◆ Clicking [Online] g [Communication setting...] in the monitor stopped state displays the [Connection setting] dialog. From this dialog, set the COM port in accordance with the personal computer port: Baud rate 38400, Stop bit 1, Data length 8, and Parity (Even) fixed.

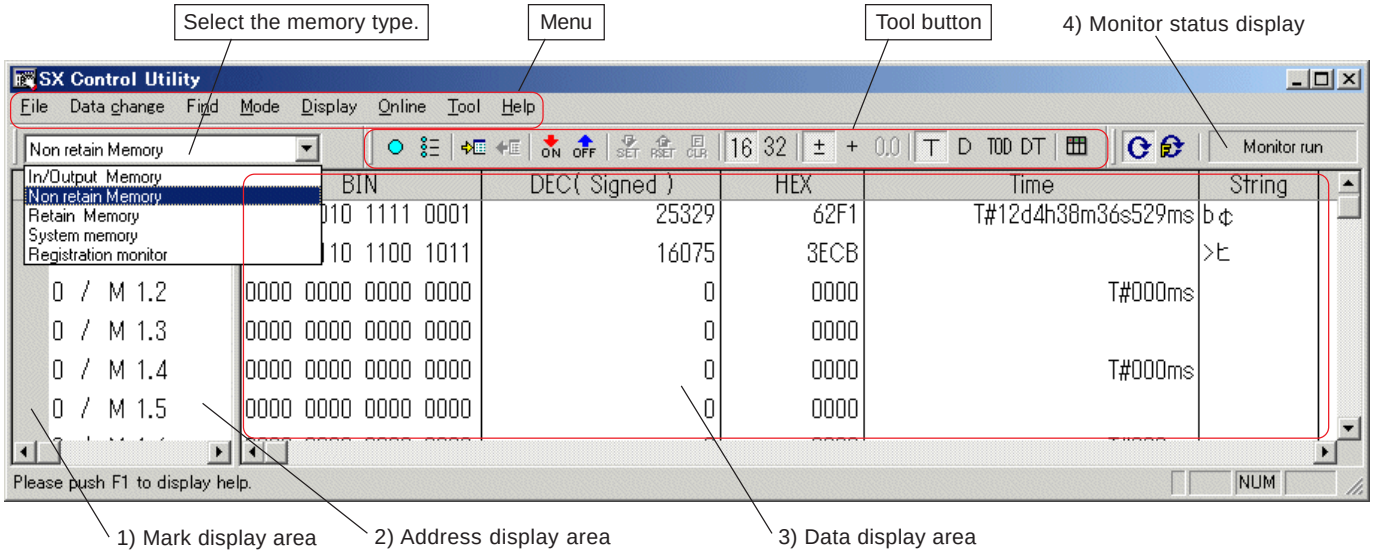


◆ Set the items and click the [OK] button.

Section 11 Monitor/Control Functions

11-5 SX Control Utility

11-5-2 SX control utility window



1) Mark display area

- Displays the mark settings.
  When a mark is set for an address, this area shows a marker (I in light blue).
- Displays the reference input specification for output address.
  When an output area has been defined as the reference input in I/O group setting of the system definitions, “R” is added to the address.

2) Address display area

Displays the addresses in the CPU memory in the order of CPU numbers and addresses.

3) Data display area

- Binary display area
  Displays binary data of the memory related to “Address display area.”
  <Detailed display of I/O group definition>
  This area also displays detailed information of I/O group settings. I/O groups have been set for the bits displayed in the ordinary character display color (black) and no I/O groups have been set for the bits displayed in gray.
- Forcible set status display (valid only when forcible ON/OFF display is set)
  its set for forcible ON/OFF are displayed with an underscore.
- Decimal display area
  Displays decimal data of the I/O module related to “Address display area.”
  (The data type can be selected from signed integer, unsigned integer, or real number.)
- Hexadecimal display area
  Displays hexadecimal data of the I/O module related to “Address display area.”
- Time display area (supported from V 3.1 or later versions)
  The data that corresponds to the data in the address display area is displayed in time format (selectable from “TIME”, “DATE”, “TOD” and “TD”).
- String display area (supported from V 3.1 or later versions)
  The data that corresponds to the data in the address display area is displayed in the form of character string (STRING type).

4) Monitor status display

Displays the monitor status (stopped or running).

Section 11 Monitor/Control Functions

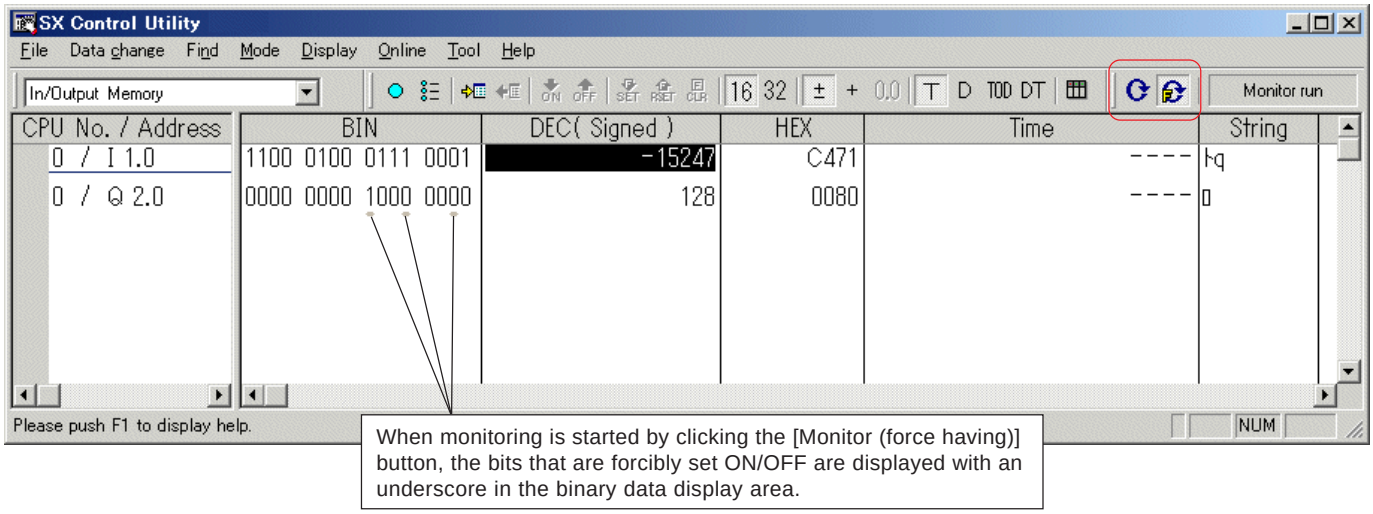
11-5 SX Control Utility

11-5-3 SX control utility operations

(1) Setting monitor ON/OFF

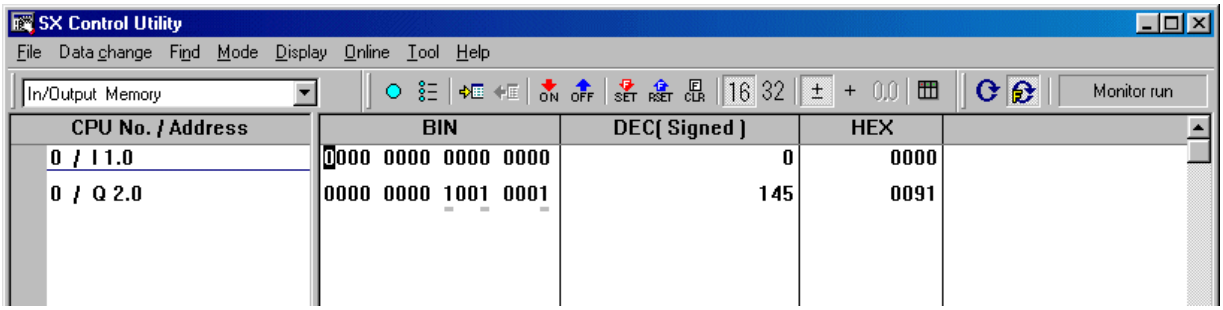
Start or stop the monitor.

◆ Monitor can be switched ON/OFF by clicking the [Monitor] button or [Monitor (force having)] button.



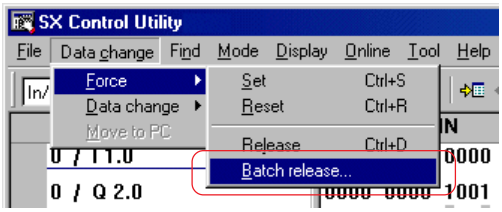
(2) Setting bit data

Overwrite data or forcibly set/reset (force ON/OFF) for the bit data in the binary data display area. Force ON/OFF is valid only for actually existent I/O memory.



◆ Select the bit to be set data and click one of buttons [Bits ON], [Bits OFF], [Force set], and [Force reset].

◆ For releasing the forcibly set/reset I/O, select the forcibly set bit and click the [Force release] button. For releasing multiple I/Os set/reset forcibly, click [Data change] g [Force] and then [Batch release].



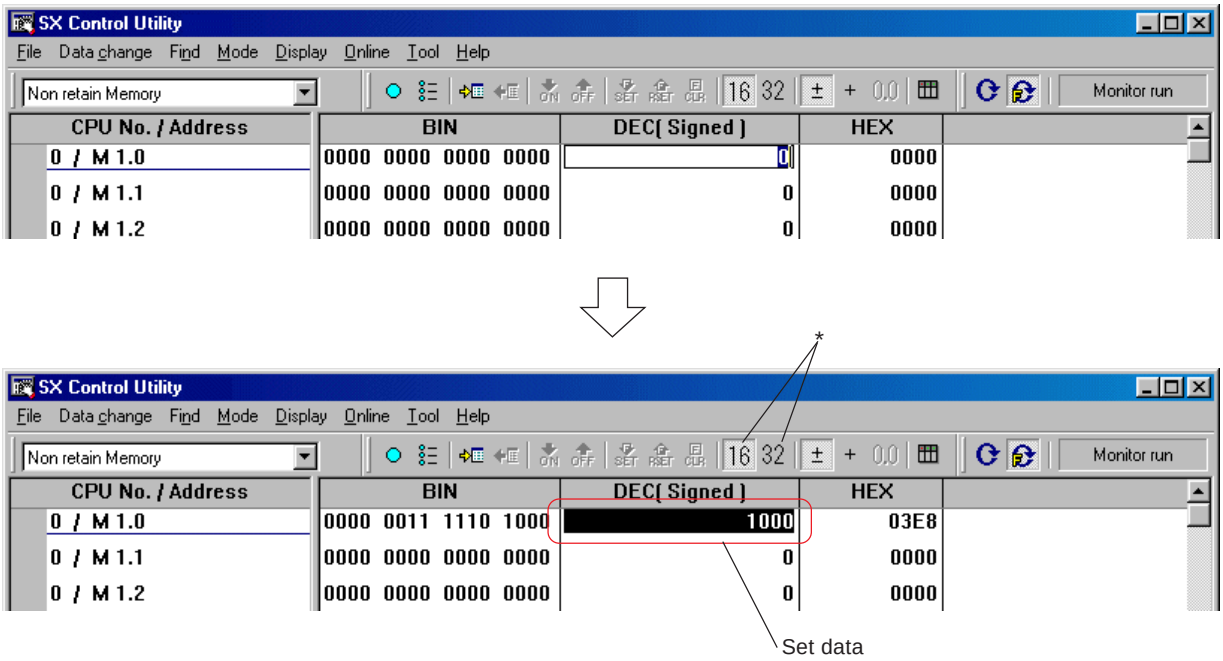
Section 11 Monitor/Control Functions

11-5 SX Control Utility

(3) Setting word data (16- or 32-bit data)

Overwrite data on the word data in the decimal or hexadecimal display area on the SX control utility window.

◆ Click the decimal or hexadecimal display area of the memory to be overwritten, set decimal or hexadecimal data in accordance with the display area, and press the <Enter> key.



* Double-word data can also be set by switching word/double-word display by the 16 [16-bits display] and 32 [32-bits display] buttons.

Section 11 Monitor/Control Functions

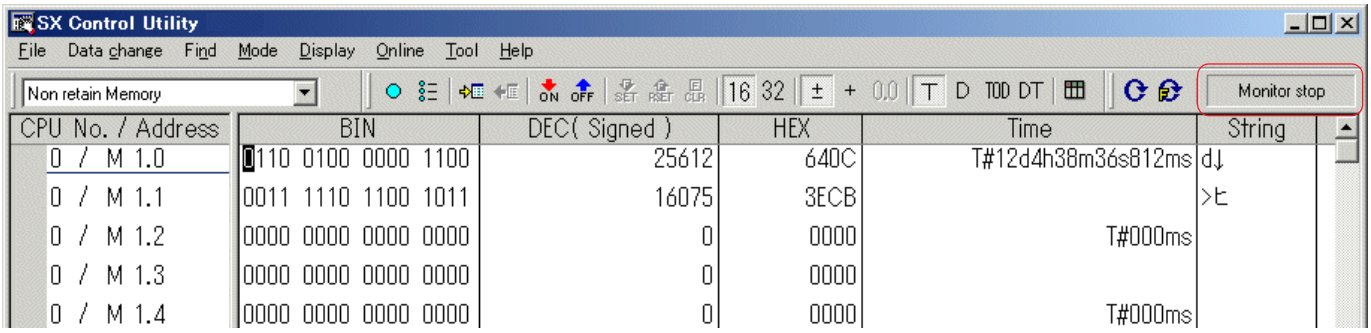
11-5 SX Control Utility

(4) Batch data change

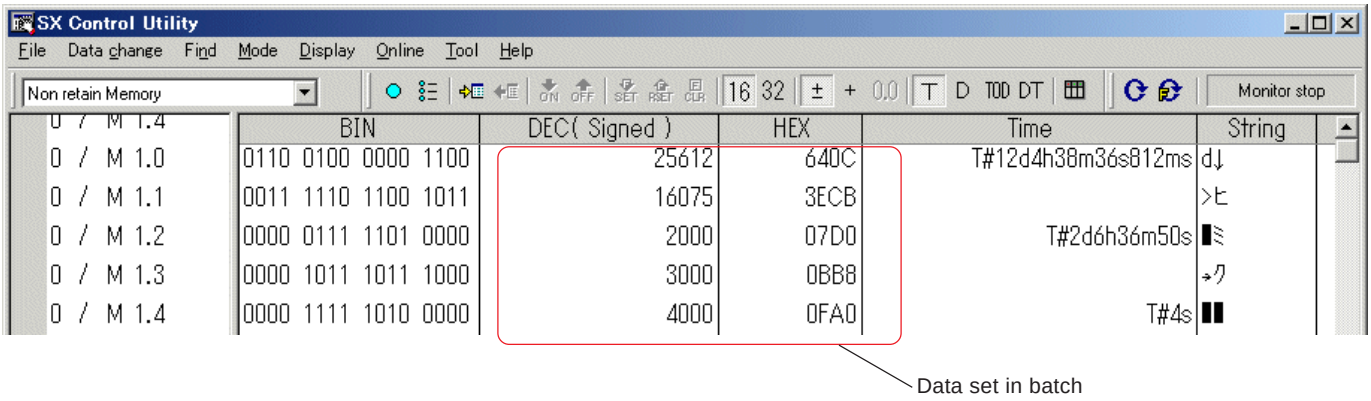
Change the data in multiple memories at once.

Note: Because batch data change sets data in batch offline and then transfers the data to CPU, the CPU must be in the stop state.

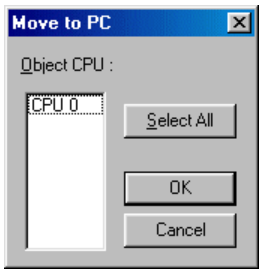
◆ Place the SX control utility in the monitor stopped state.



◆ Set data.

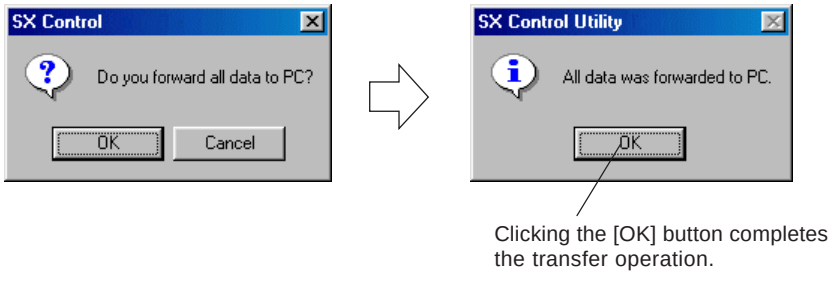


◆ Transfer the set data to the CPU. Executing [Data change] → [Move to PLC...] displays the [Move to PLC] dialog.



* For multiple-CPU configuration, select the CPU the data is to be transferred to.

◆ Select the data transfer destination CPU and click the [OK] button to display the confirmation dialog shown below. Clicking the [OK] button transfers the data to the CPU.



Section 11 Monitor/Control Functions

11-5 SX Control Utility

11-5-4 CPU memory backup

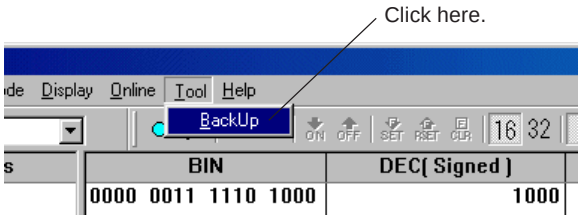
The SX control utility can store backup data files (*.bup) for program memory, data memory, system definitions, etc. from the CPU into the personal computer.

Note: Backup files for programs and system definitions cannot be opened with D300win. Data stored in files are in SX-specific machine code.

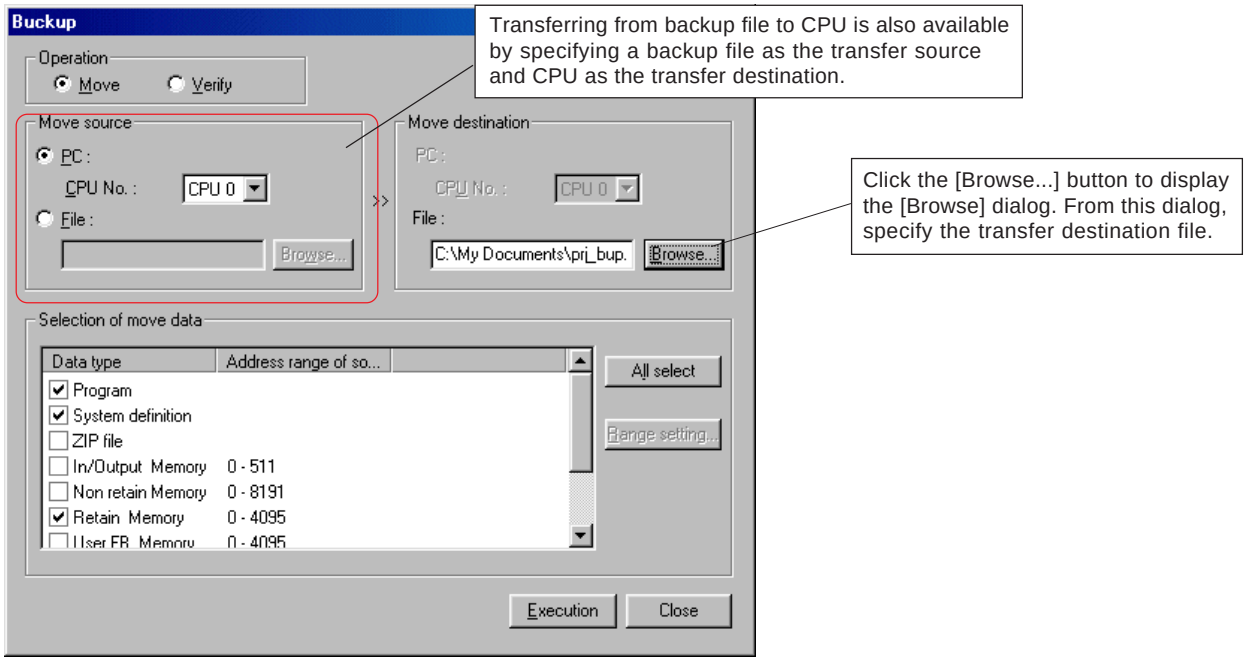
(1) Data backup

Transfer the data in the CPU module to the personal computer.

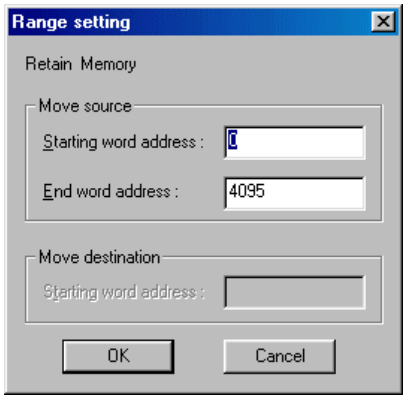
◆ Place the monitoring stopped state and execute [Tool] g [BackUp] to display the [Backup] dialog.



◆ Set the transfer source CPU and the transfer destination file and then select the backup data type from the list box.



◆ The backup range in the data memory area can be specified. Click the [Range setting...] button to display the [Range setting] dialog. From this dialog, specify the range and click the [OK] button.

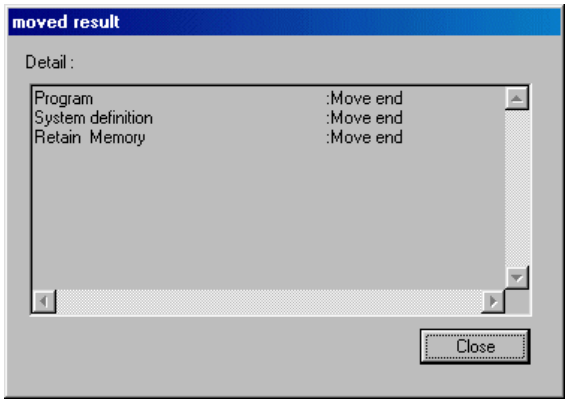


Section 11 Monitor/Control Functions

11-5 SX Control Utility

◆ Select the transfer source, transfer destination, and backup data and then click the [Execution] button to display the confirmation dialog shown below. Clicking the [OK] button starts data transfer.

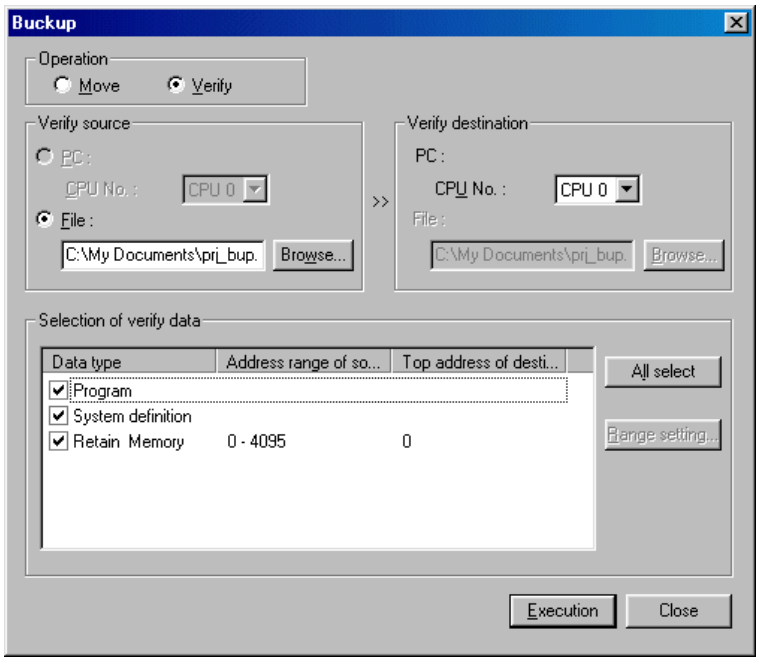
◆ When data transfer has completed, the dialog appears, showing the transfer results.



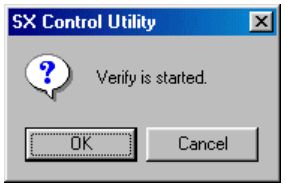
(2) Data verify

Verify the contents of the memory in the CPU with those of the backup file.

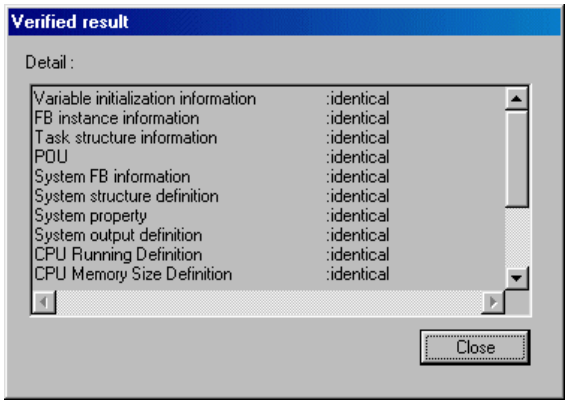
◆ Set the [Verify] button ON in the [Backup] dialog, select the verify source file, verify destination CPU, and verified data type and then click the [Execution] button.



◆ The confirmation dialog shown below appears. Clicking the [OK] button starts verify.



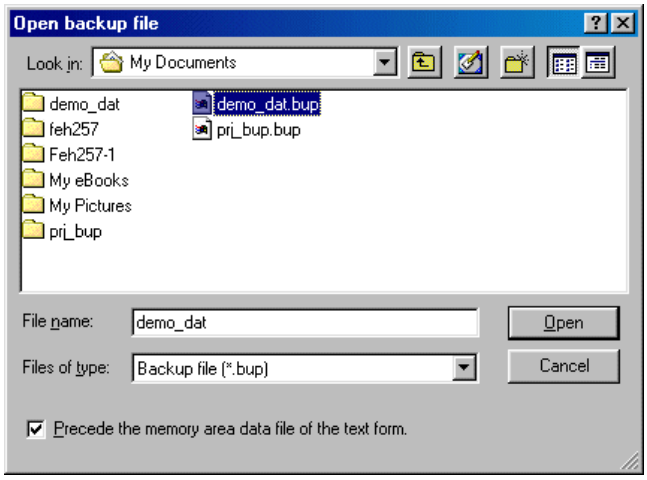
◆ When verify has completed, the dialog appears showing the verified results.



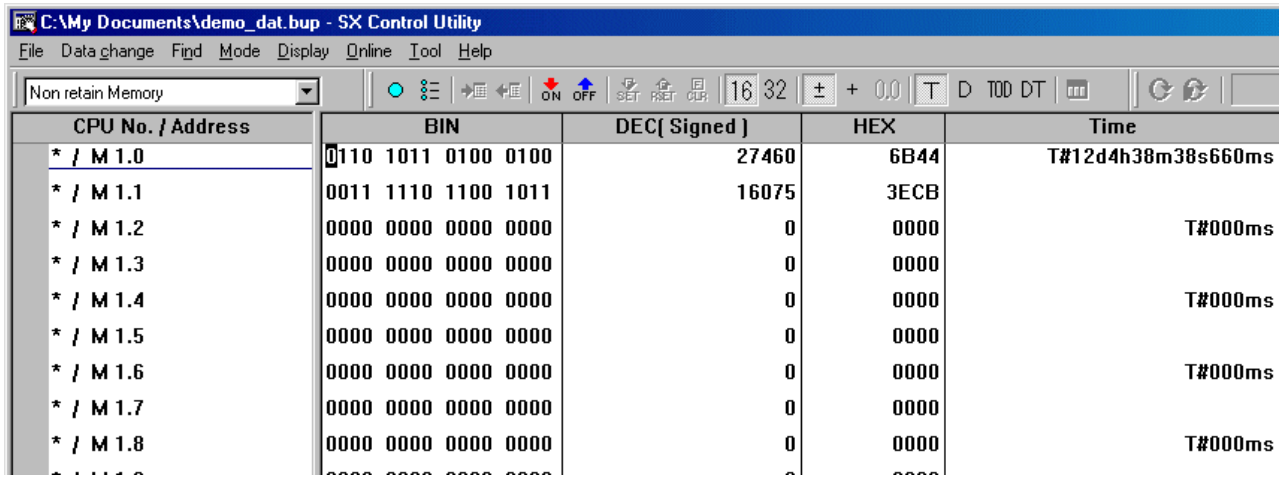
(3) Backup text file input/output function (adapted to V3.1 or later versions)

It is possible to save backup data as text files and display or edit the saved data with commercially available text editor or spreadsheet program.

◆ First, backup files that have been created with [BackUp] command in the [Tool] menu are read out.
Execute [Open backup file...] command in the [File] menu. The [Open backup file] dialog box is displayed.



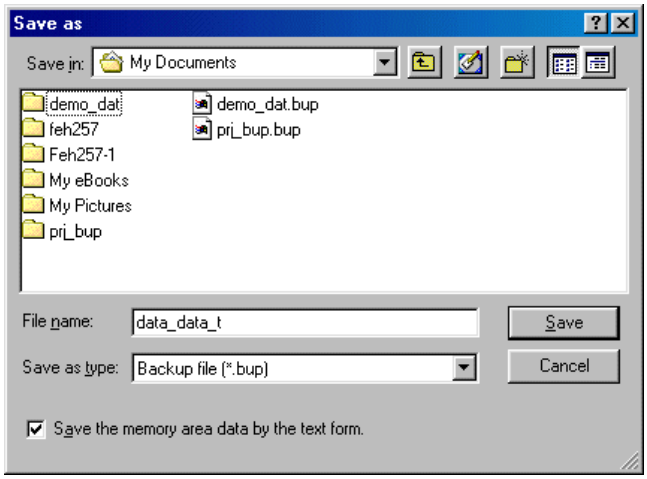
◆ Click the [Open] button on this dialog box. The selected backup file is opened.



Section 11 Monitor/Control Functions

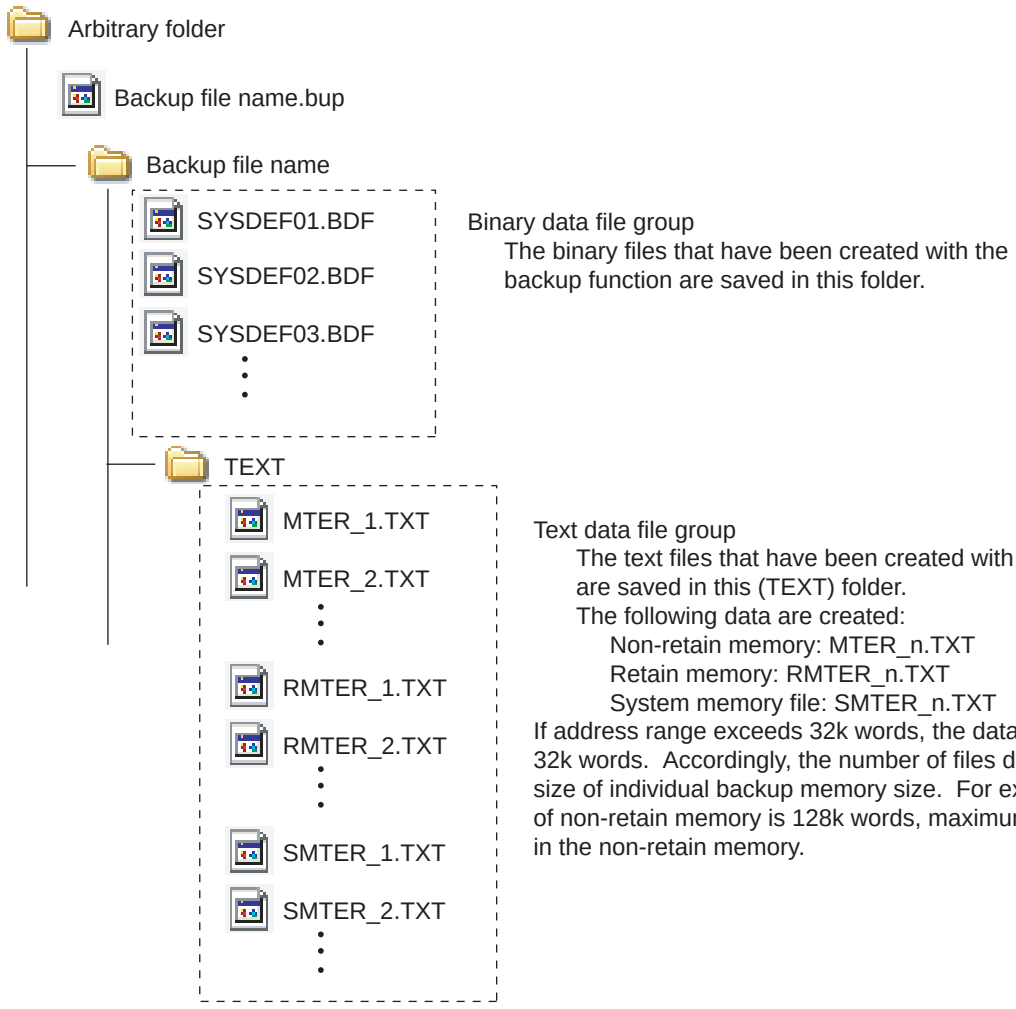
11-5 SX Control Utility

◆ Then execute [Save as...] command in the [File] menu. The following dialog box is displayed. Check the [Save the memory area data by the text form] box, enter a desired file name for the file to be saved, and click the [Save] button. The backup data is saved in the file, in the “tab delimited text” format.



<Saved file name and folder>

By above explained operations, a folder and a file are created in the following structure.



Binary data file group
The binary files that have been created with the backup function are saved in this folder.

Text data file group
The text files that have been created with the backup function are saved in this (TEXT) folder.
The following data are created:
Non-retain memory: MTER_n.TXT
Retain memory: RMTER_n.TXT
System memory file: SMTER_n.TXT

If address range exceeds 32k words, the data is divided in units of 32k words. Accordingly, the number of files differs depending on the size of individual backup memory size. For example, when the size of non-retain memory is 128k words, maximum 4 files can be saved in the non-retain memory.

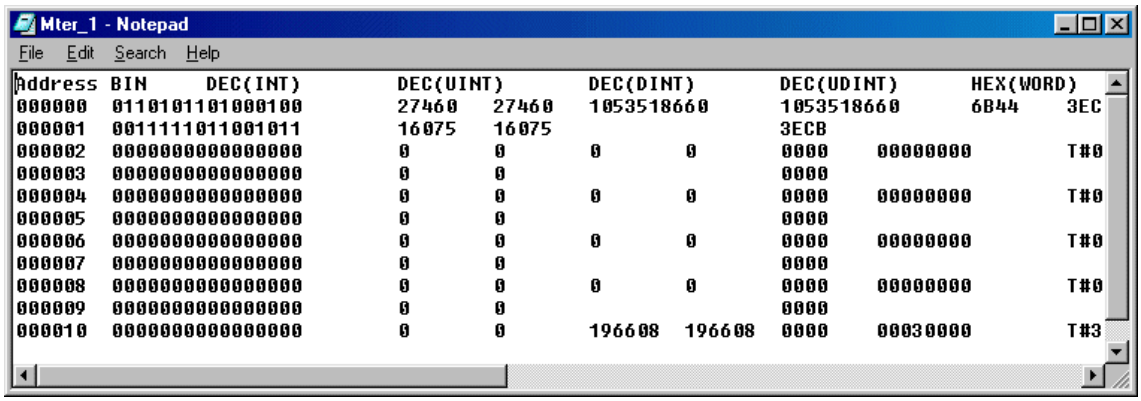
Section 11 Monitor/Control Functions

11-5 SX Control Utility

<Format of created text file>

Created text file is delimited by tab to have the following format.

* The figure shown below is an example when a file is opened with a text editor.



Section 11 Monitor/Control Functions

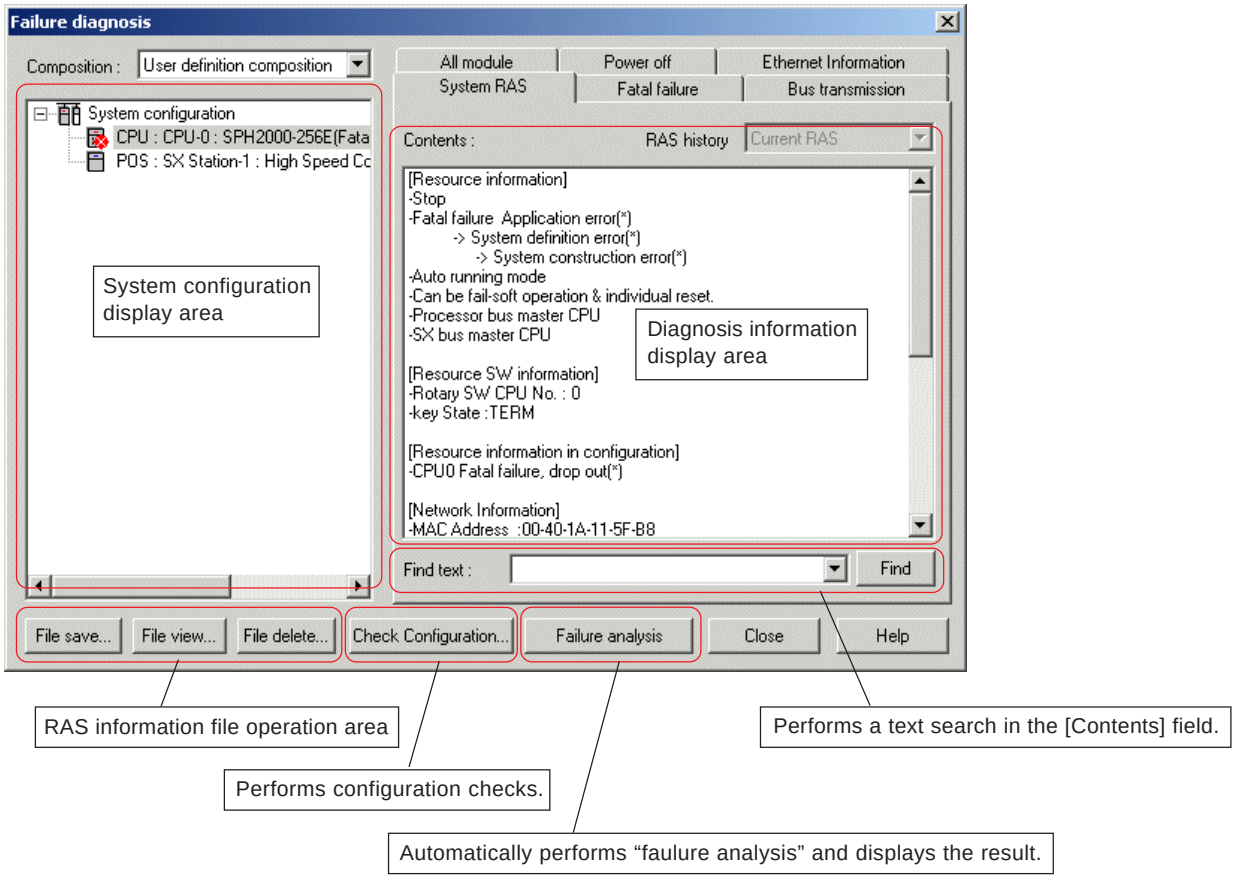
11-6 Failure Diagnosis

11-6-1 Diagnosis information display

Failure Diagnosis checks the MICREX-SX system operation states and, when a system error has occurred, it detects faulty locations and error causes. Failure Diagnosis provides the functions listed below.

Function	Description
System RAS display	Displays information about the system memory in the CPU module.
Module detailed RAS display	Displays the detailed RAS for individual modules in the configuration.
RAS history display	When the detailed RAS contains history information, displays the past information for three generations.
RAS information file save/display	Saves the RAS information in the file or displays the RAS information read from the file.

◆ Click the [Failure diagnosis...] button on the [Control] dialog to display the [Failure Diagnosis] dialog. The RAS information is displayed in the system configuration and diagnosis information display areas.

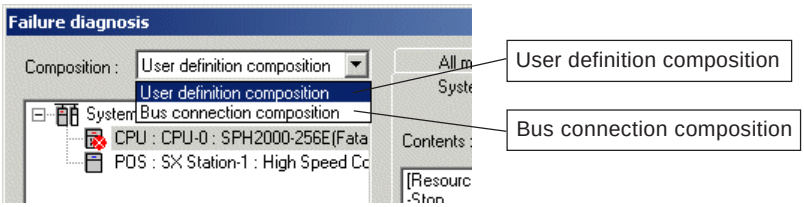


Section 11 Monitor/Control Functions

11-6 Failure Diagnosis

(1) System configuration display area

The system configuration display area has two display modes that can be switched from the [Selection] combo box.



1) User definition composition

Uploads the system configuration definitions from the CPU module and displays them in a tree form.

2) SX bus connection composition

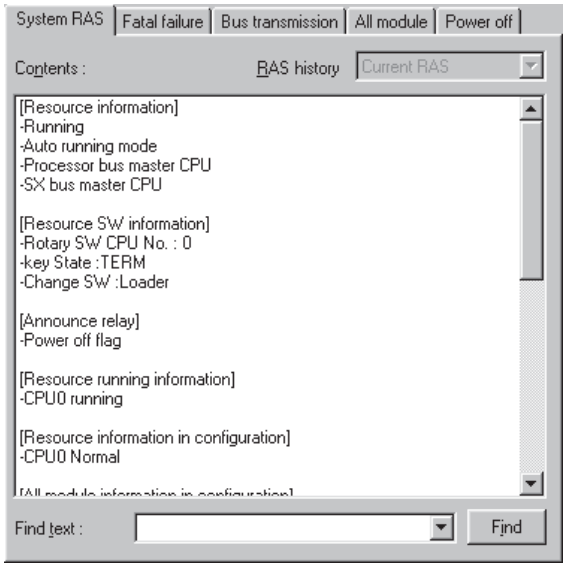
From the detailed RAS information in the CPU module, reads the configuration of the modules connected actually to the SX bus and displays it in a tree form. Only configuration of the modules directly connected to the SX bus are displayed in the order of SX bus station numbers.

(2) Diagnosis information display area

The displayed contents are classified by tabs, which are different by modules selected from the system configuration display area. For details of the diagnosis information, refer to the manual for the related module.

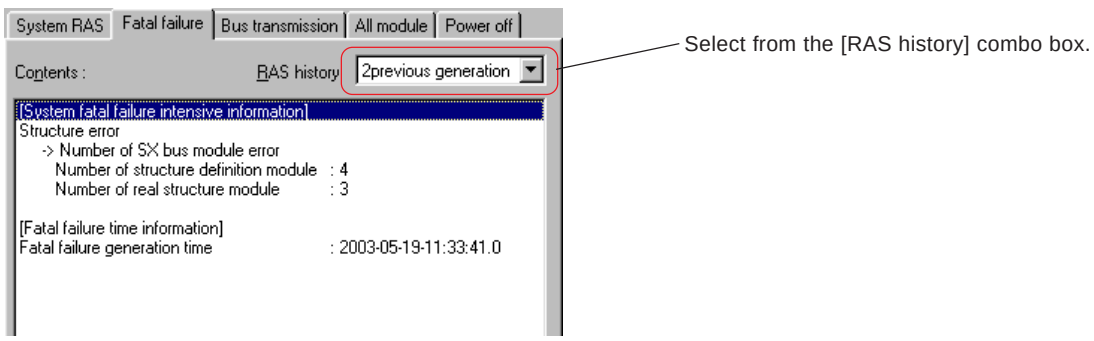
1) System RAS

When a module containing system RAS information has been selected from the system configuration display area, shows the system RAS information.
When a CPU module is selected, system RAS information like the one shown below appears. For a CPU module, the system memory contents are shown as messages.



2) Fatal Failure

When a CPU module has been selected from the system configuration display area, heavy breakdown information of “Current RAS”, “1 previous generation”, “2 previous generation”, and “3 previous generation” appears.

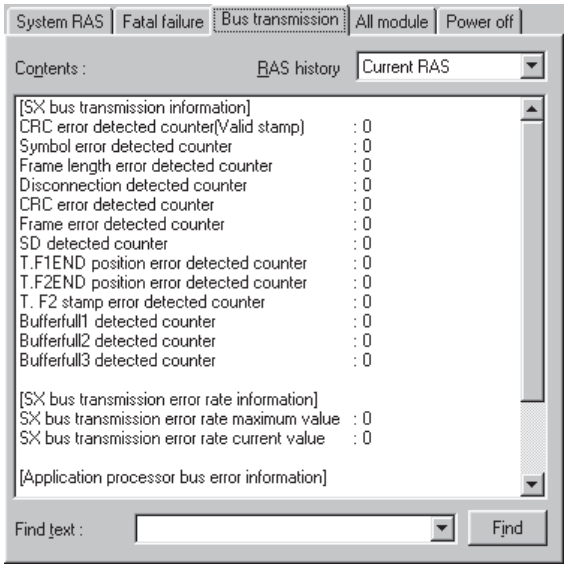


Section 11 Monitor/Control Functions

11-6 Failure Diagnosis

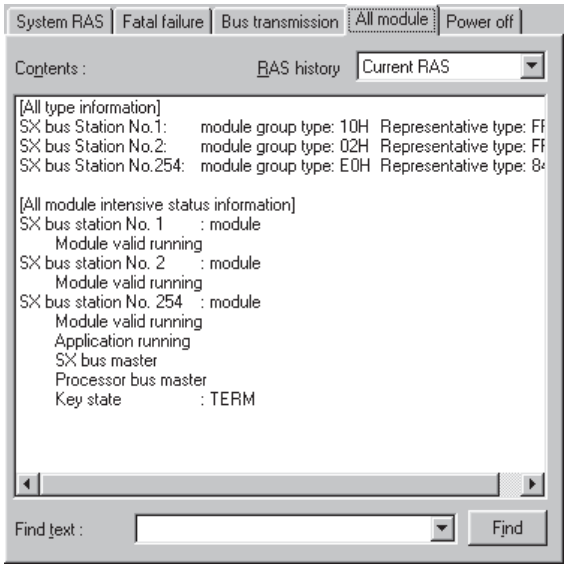
3) Bus transmission

When a CPU or communication module has been selected from the system configuration display area, the SX bus transmission states appear.



4) All module

When a CPU module has been selected from the system configuration display area, information for all modules on the SX bus appears (type information and intensive status information). Information is displayed for individual history levels: “Current RAS”, “1 previous generation”, “2 previous generation”, and “3 previous generation.”

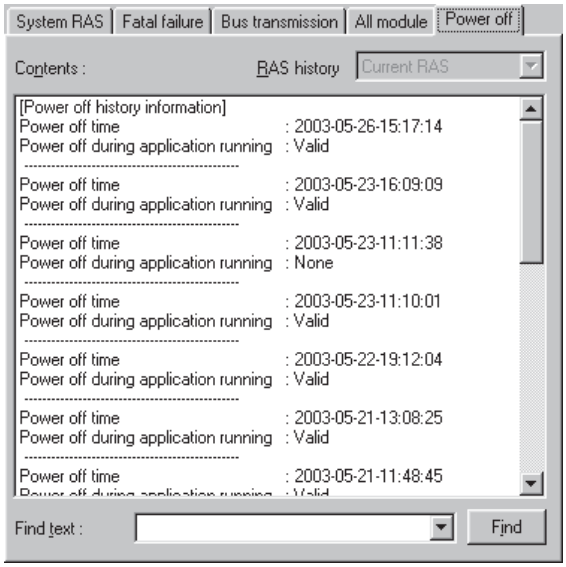


Section 11 Monitor/Control Functions

11-6 Failure Diagnosis

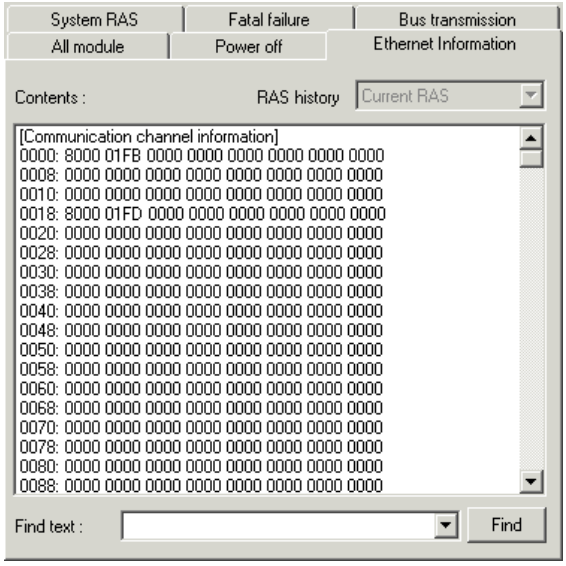
5) Power off

When a CPU module has been selected from the system configuration display area, the CPU module power OFF information appears.



6) Ethernet information

When Ethernet is built in the CPU module, Ethernet information appears.



* For information about how to read the display, refer to “SPH2000 Ethernet communications (FEH193).”

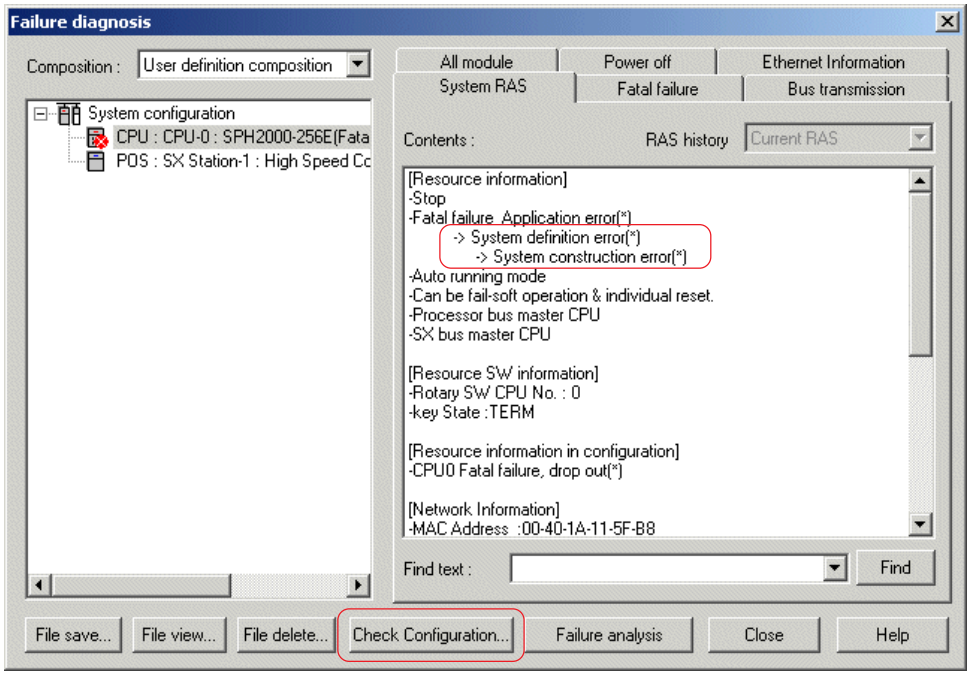
Section 11 Monitor/Control Functions

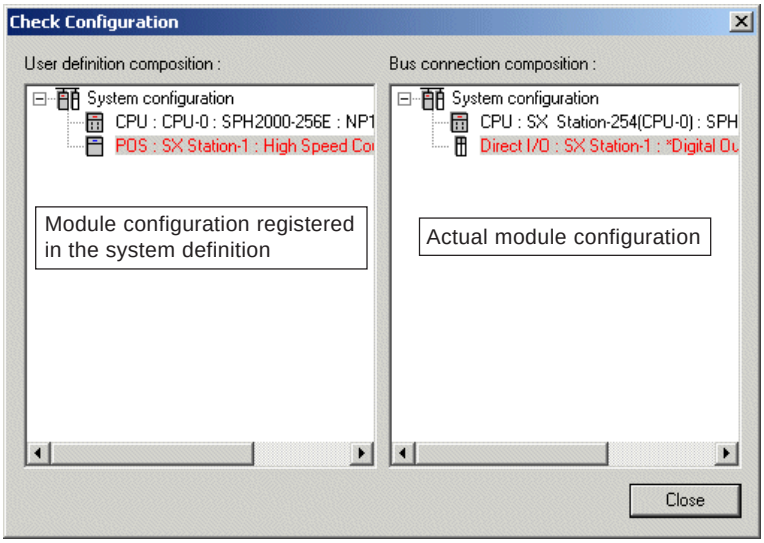
11-6 Failure Diagnosis

(3) Configuration check function

If the system configuration registered in the system definition does not agree with the actual configuration, a fatal fault occurs in the system, which cannot start to run. In this case, a “System configuration error” message is displayed on the system RAS. To operate the SX system normally, it is necessary to match the system definition with the actual configuration.

◆ Click the [Check Configuration] button on the [Failure diagnosis] dialog box. The [Check Configuration] dialog is displayed.
◆ On the dialog box, the contents of the module registration in the system definition and the actual configuration are displayed. If there is a mismatch between them, the mismatch spot is displayed in red.





* The above example shows that a module that has not been registered in the system definition exists in the actual configuration. If a module that has been registered in the configuration does not exist in the actual configuration, the concered module in the “User definition composition” area is displayed in red.

Section 11 Monitor/Control Functions

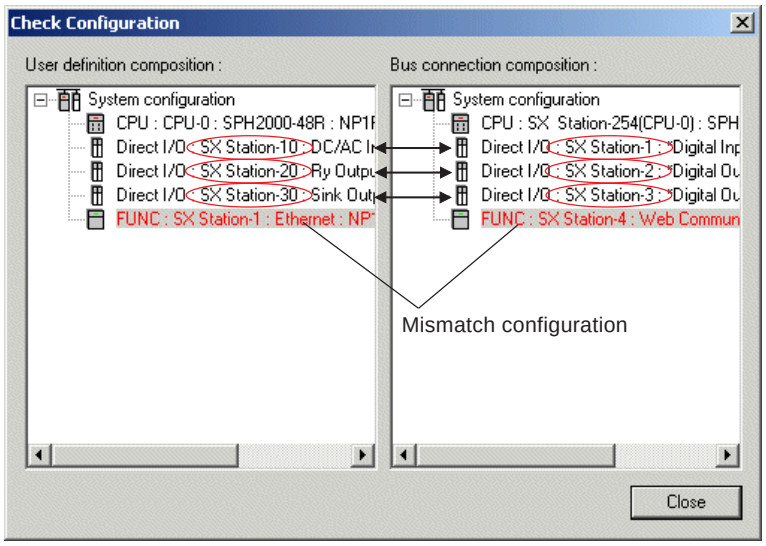
11-6 Failure Diagnosis

<Differences of SX bus station numbers between user definition composition and bus connection composition>

If the SPH system is reset when a system configuration error occurs due to a configuration definition mistake or module failure, etc., numbers beginning with 1 are assigned to the SX bus stations in their connected order on “bus connection composition” box.
Note that if the CPU or power supply is reset due to a system configuration error after arbitrary SX bus station numbers are set as shown in the figure below, the SX bus station numbers of “user definition composition” do not match those of “bus connection composition”.

In the example below, different SX bus station numbers are displayed as follows:

DC/AC input 16 points	User definition composition: 10	↔	Bus connection composition: 1
Relay output 16 points	User definition composition: 20	↔	Bus connection composition: 2
Sink-type output 16 points	User definition composition: 30	↔	Bus connection composition: 3
Ethernet module	User definition composition: 1	↔	Bus connection composition: 4



<Measures>

1) To match “user definition composition” with “bus connection composition”, it is recommended to assign SX bus station numbers in their connected order.
2) Even if an error occurs in the system during operation, “user definition composition” matches “bus connection composition” until the system is reset. Perform failure diagnosis before resetting the system, .

Section 11 Monitor/Control Functions

11-6 Failure Diagnosis

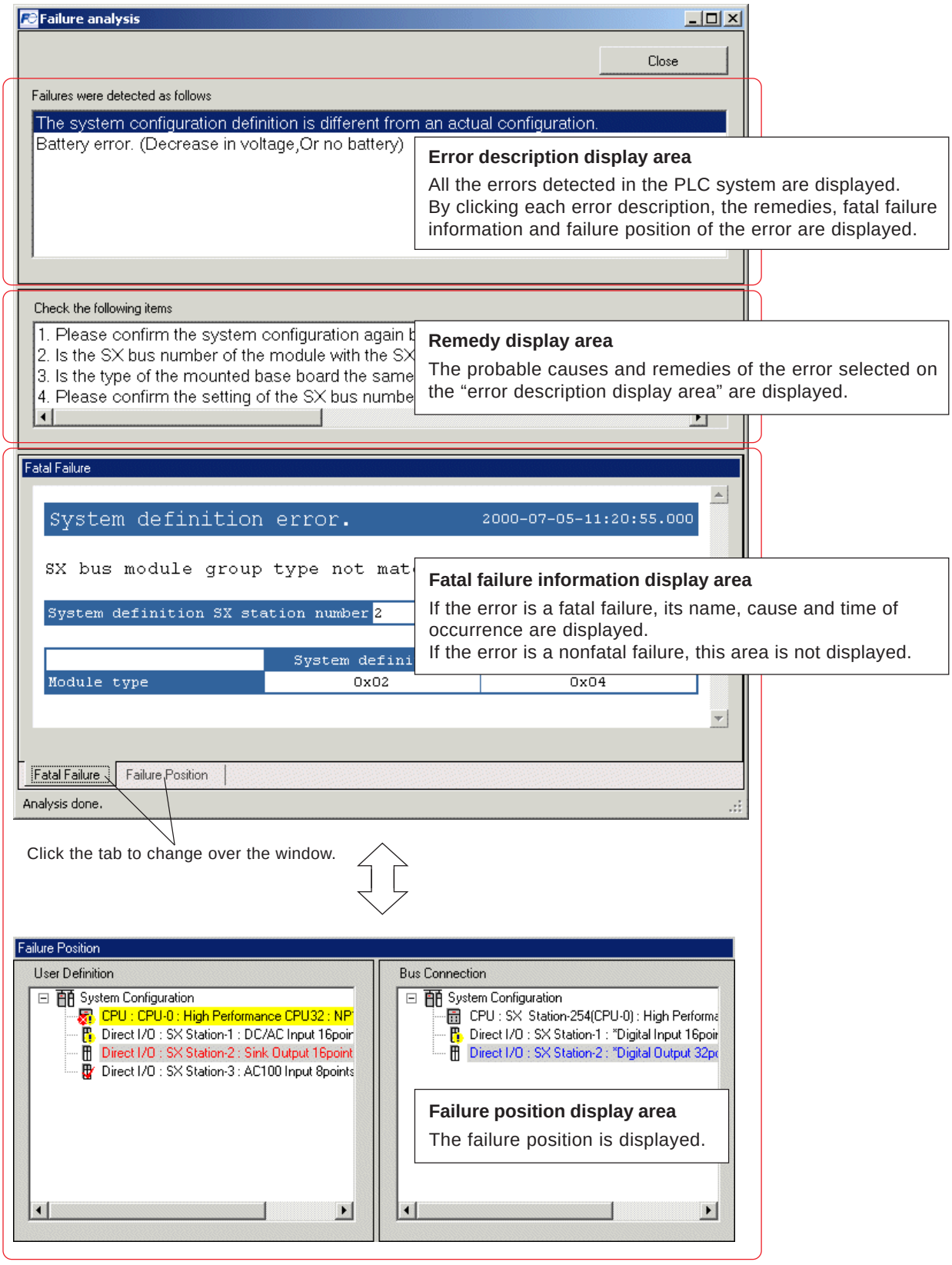
11-6-2 Failure analysis function

(1) Overview

This function automatically analyzes the status of the PLC system from the system memory and RAS information in the CPU and displays the error description, cause, remedies and location.

Note: This function can be used only with SPH 300 series of CPUs. (except for SPH300EX and 117H).

<Example of displaying failure analysis result>



Section 11 Monitor/Control Functions

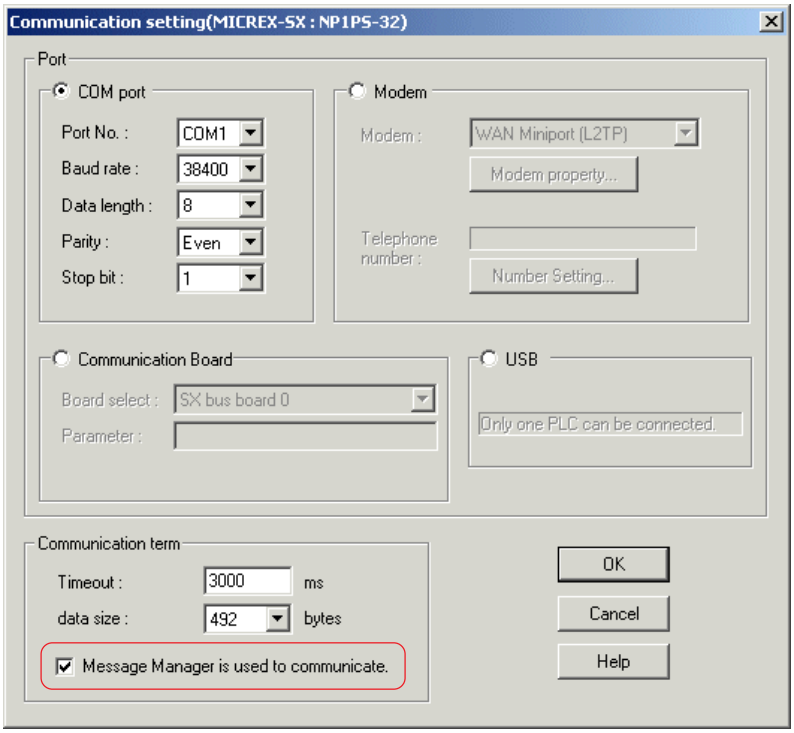
11-6 Failure Diagnosis

(2) Personal computer environment necessary for the failure analysis function

The following software is necessary to use the failure analysis function.

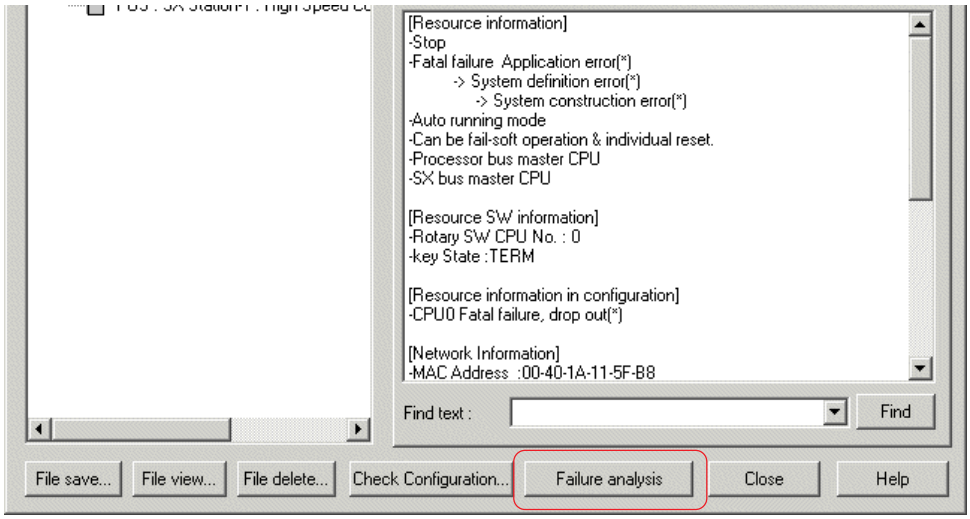
Item	Specifications
Operating system	Windows 2000 SP3 or later Japanese or English Edition
	Windows XP SP2 or later Japanese or English Edition
	Windows Vista Japanese or English Edition * Loader version V3.5.0.0. or later
Other software	.NET Framework 2.0 Microsoft Internet Explorer 6.0 SP1 Microsoft Data Access Components (MDCA) 2.8

Note 1: The failure analysis function is not available under Windows NT.
Note 2: When using the failure analysis function, check the [Message Manager is used to communicate.] check box ON.



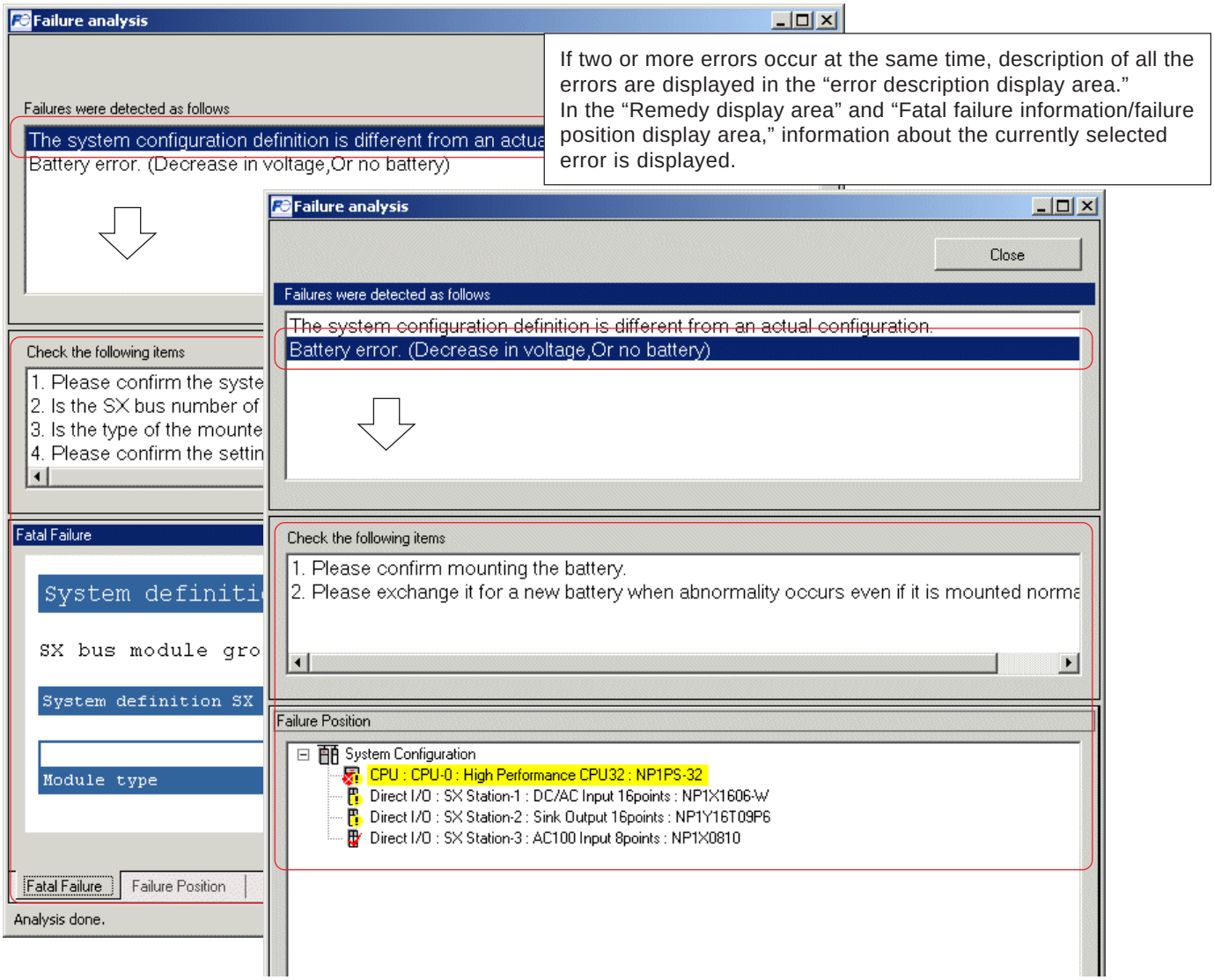
(3) Display specifications of the failure analysis screen

◆ Click the [Failure analysis] button to perform failure analysis and display the result.



Section 11 Monitor/Control Functions

11-6 Failure Diagnosis



If two or more errors occur at the same time, description of all the errors are displayed in the “error description display area.”
In the “Remedy display area” and “Fatal failure information/failure position display area,” information about the currently selected error is displayed.

Note 1: If two or more fatal failures occur, only the description of the first detected error is displayed on the “fatal failure” tab window.

<Display specifications of the failure analysis screen>

1) Icon

Icon	Description
	Fatal failure has occurred.
	Nonfatal failure has occurred.
	Both fatal and nonfatal failures have occurred.
	Set as "no equipment" in the system definition.

2) Display color

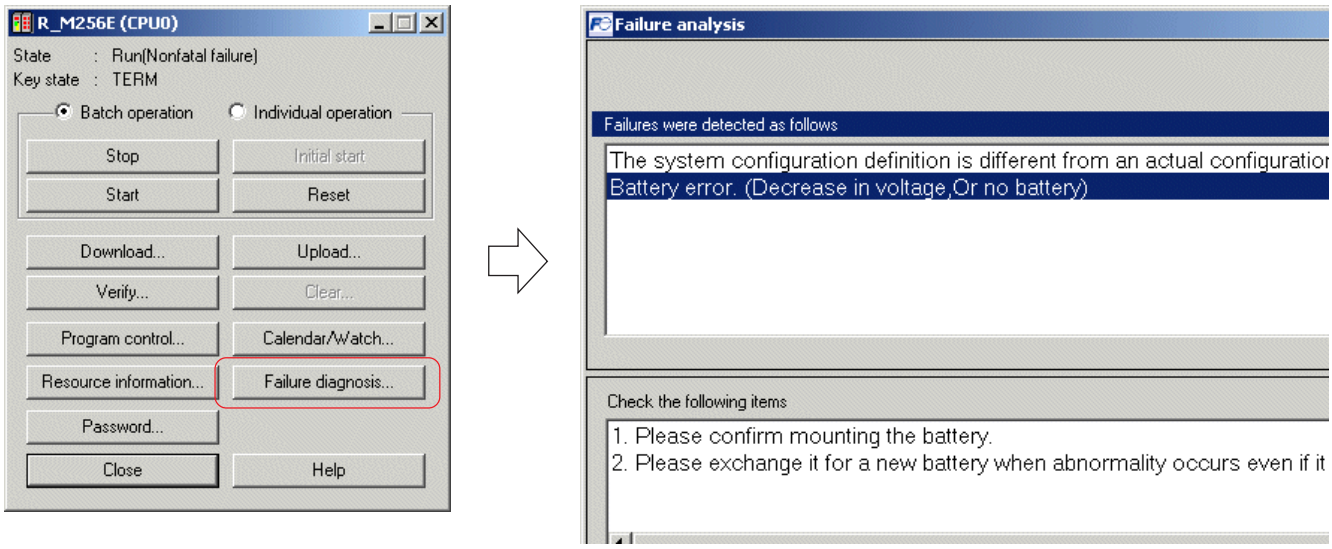
Display color and example	Description
Backgorund color: yellow, Text color: black CPU : CPU-0 : High Performance CPU32 : NP1PS-32	This module is disconnected. (or fatal failure has occured.)
Backgorund color: gray, Text color: red Direct I/O : SX Station-2 : Sink Output 16points : NP1Y16T09P6	This module is registered in the system definition, however, does not exist in the actual configuration.
Backgorund color: gray, Text color: blue Direct I/O : SX Station-2 : *Digital Output 32points	This module exists in the actual configuration, however, is not registered in the system definition.

Section 11 Monitor/Control Functions

11-6 Failure Diagnosis

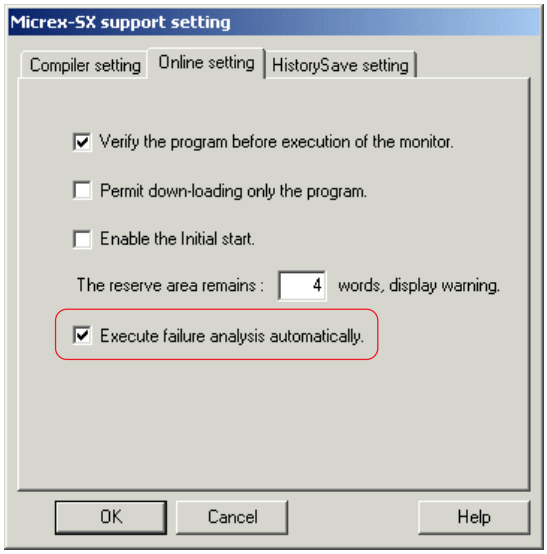
(4) Automatic execution of failure analysis

If an error occurs in the system, failure analysis can be automatically executed by simply clicking the [Failure diagnosis] button on the [Control] dialog box.



<Setting procedures>

◆ Execute the [SX support setting] command in the [Extras] menu. The [Micrex-SX support setting] dialog box appears. On this dialog box, click the [Online setting] tab to display the following window. After checking the [Execute failure analysis automatically.] check box ON, click the [OK] button.



Section 11 Monitor/Control Functions

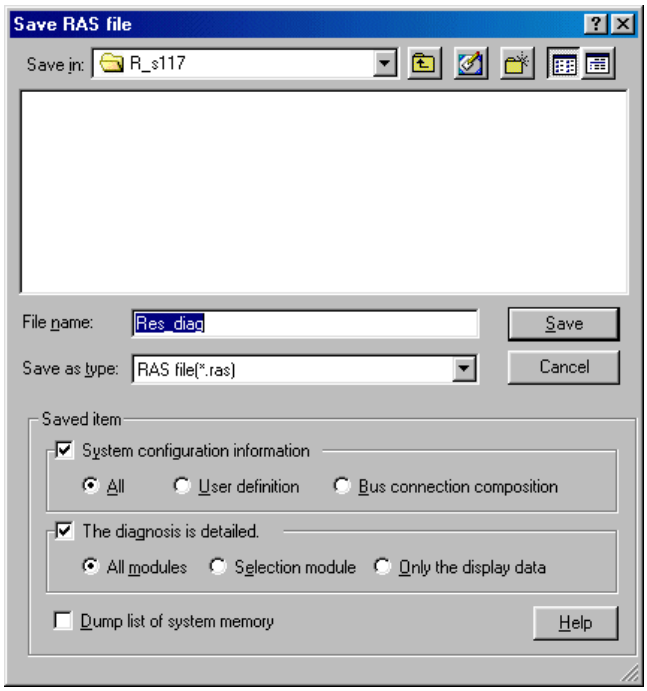
11-6 Failure Diagnosis

11-6-3 Saving RAS information in file

All information displayed on the [Failure diagnosis] dialog can be saved as an RAS file (with extension .ras).

(1) Saving RAS information in file

◆ Click the [File save...] button on the [Failure diagnosis] dialog to display the [Save RAS file] dialog.



◆ Set the saving location, file name, and save items and click the [Save] button to save the RAS information currently displayed to the file.

<Save items>

Item	Description
System configuration information	Select "User definition", "Bus connection composition", or "All". Selecting "All" causes both of "User definition" and "SX bus connection composition" to be saved.
The diagnosis is detailed.	"All modules": Saves information for all modules in the configuration. "Selection module": Saves only information for the modules selected from the system configuration information. "Only the display data": Saves only information for the tab being displayed in the diagnosis information display area.
Dump list of system memory	Saves the CPU module system memory data as hexadecimal text data.

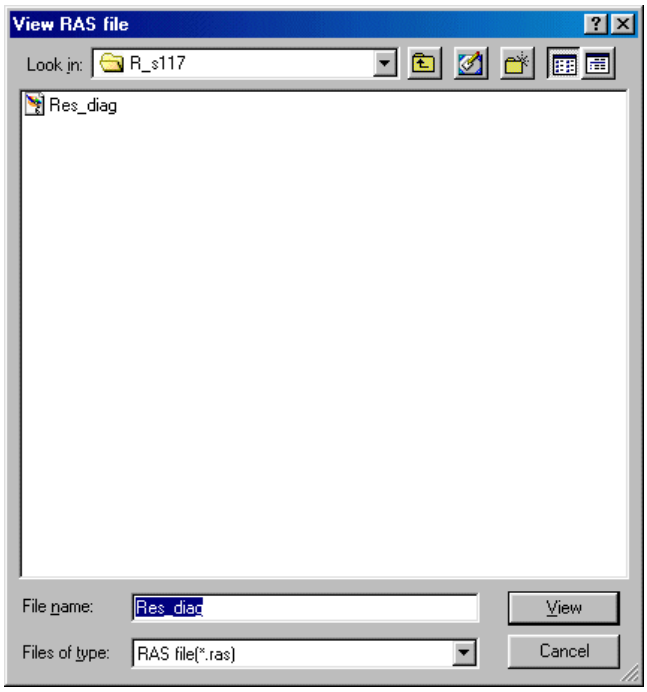
Section 11 Monitor/Control Functions

11-6 Failure Diagnosis

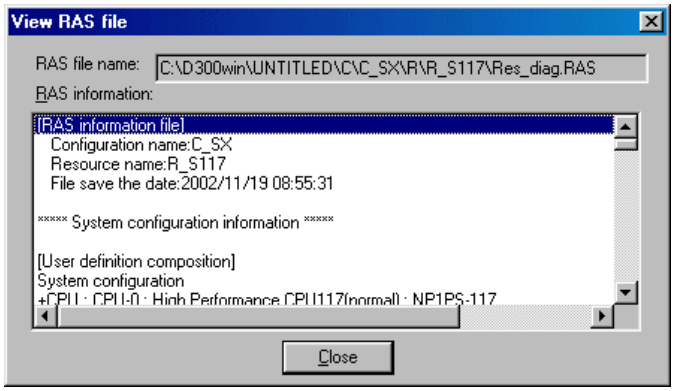
(2) Displaying RAS information file

Display the RAS information file contents on the disk.

◆ Click the [File view...] button on the [Failure diagnosis] dialog to display the [View RAS file] dialog.



◆ Select the RAS file to be displayed and click the [View] button to display the RAS information.



(3) Deleting RAS information file

◆ Click the [File delete...] button on the [Failure diagnosis] dialog to display the [Delete RAS file] dialog.

◆ Select the RAS file to be deleted and click the [Delete] button to delete the file.

Section 11 Monitor/Control Functions

11-7 Sampling Trace

11-7-1 Specifications for sampling trace

Sampling trace that is added to V3.1.1.0 or later versions is the high-accuracy data sampling function that D300win reads to display the data sampled by the CPU module.

(1) Sampling trace adapted CPU

Because data sampling is performed by a CPU module, it is necessary that the CPU module is adapted to the sampling trace function. For the CPU modules that are not adapted to the sampling trace function, simplified sampling trace is performed, in which D300win itself samples data.

CPU type	Software version	Sampling trace function	Simplified sampling trace function
NP1PS-32	-	X	△ See note 1.
NP1PS-32R	-	X	△ See note 1.
NP1PS-74	-	X	△ See note 1.
NP1PS-74R	V60 or older	X	△ See note 1.
	V61 or newer	O	X
NP1PS-74D	All versions	O	X
NP1PS-117	V60 or older	X	△ See note 1.
	V61 or newer	O	X
NP1PS-117R	V60 or older	X	△ See note 1.
	V61 or newer	O	X
NP1PS-245R	V64 or newer	O	X
NP1PM-48R NP1PM-48E NP1PM-256E NP1PM-256H	All versions	O	X
NP1PU-048E NP1PU-256E	All versions	O	X
NP1PH-08	-	X	△ See note 1.
NP1PH-16	-	X	△ See note 1.
SPB (SX-mode)	-	X	△ See note 1.
Simulator	-	X	O See note 2.

Note 1: For the models that are not adapted to sampling trace, sampling cycle depends on the message processing of CPU and the processing of personal computer because data sampling is performed by D300win. As a result, sampling cycle becomes approximately 500ms or more.

Note 2: For the simulator function of D300win, sampling cycle is synchronized with tasks of the simulator (a multiplication of 20ms).

Section 11 Monitor/Control Functions

11-7 Sampling Trace

(2) Sampling function

1) Available data type

BOOL, WORD, DWORD, INT, DINT, UINT, UDINT and REAL type variables can be registered as sampling variables.

* With the version V3.2.0.0, it has become possible to register variables of a arrayed data type and a structured data type.

2) Number of sampling points

From the variables that are registered as sampling trace variables, maximum 10 points per resource can be selected as the target to trace. There is no limit on the number of variables registered for sampling trace.

3) Sampling cycle

The interval of sampling is specified. Either “at each scanning” or “fixed cycle” can be specified.
At each scanning: Collects data at the scan end of default task.
Fixed cycle: A value that is an integral multiple of tact time can be set in the range from 1 to 32000ms, in 0.5-ms steps.
For example, when tact time is 3ms, 3ms, 6ms, ..., 31998ms can be set.

4) Sampling frequency

Sampling frequencies before and after trigger condition is met need to be input. The maximum value of sampling frequency is 16383 for the total number of sampling points. Set this item so that the following relational expression can be satisfied.

Sampling frequency x Number of sampling points <= 16383 times
Sampling frequency = Frequency before trigger consists + Trigger point (one time) + Frequency after trigger consists

5) Trigger condition

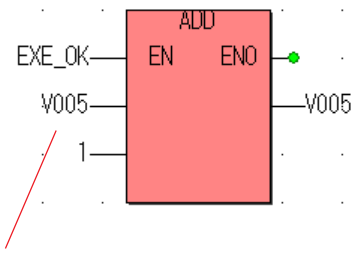
For the trigger condition to start sampling trace, the following timing can be set:

<Not set the trigger>
Starts data sampling, regarding the timing when the [Recording start] command is executed as the timing when trigger condition is met. With this setting, no data is sampled at trigger point. No data is sampled, either, before trigger condition is met.

<Trigger condition>

Function		Specification	SPH300 /200	SPH2000 /3000
Multi-point trigger condition		Up to 32 points of sampling conditions can be set for one project.	X	O
Logical concatenation of trigger conditions		For one device, up to 4 points of sampling start conditions by a specified value of data can be concatenated with AND or OR.	X	O
Trigger condition	BOOL data match (=1, =0)	=1: When the specified BOOL variable is turned ON =0: When the specified BOOL variable is turned OFF	O	O
	Rising/falling edge of BOOL data	Rising edge: When the specified BOOL variable is changed from OFF to ON. Falling edge: When the specified BOOL variable is changed from ON to OFF.	O	O
	Data comparison match	When the specified data satisfies the specified conditions. Comparison conditions (=, ≠, <, >, <=, >=)	O	O
	READ/WRITE	When reading or writing of data to the specified device is performed.	O	X

Note1) Approval timing differs depending on CPU



Set Approval condition as “V005 = 5” at here.

SPH200/300
Approves when V005 changed from 4 to 5, even if ADD is not executed.

SPH2000/3000 : Normal mode
Approval judgement is performed before execute instruction.
Therefore, not approved when V005 changed from 4 to 5 by ADD execution, and next scan, when ADD is executed, approved.

SPH3000 : Compile optimizing mode
Approval judgement is performed at scan end.
Therefore, not approved when V005 changed from 4 to 5 by ADD execution, and at the scan end, approved.

Section 11 Monitor/Control Functions

11-7 Sampling Trace

11-7-2 Operation procedure for sampling trace

The basic procedure for sampling trace is shown below:

Register sampling variables.
Target variables for data collection are registered.

⇩

Set trigger condition / sampling condition.
Trigger condition: The timing to start data collection is set.
Sampling condition: Sampling cycle and sampling frequency are set.

⇩

Start sampling.

⇩

Display sampled data.

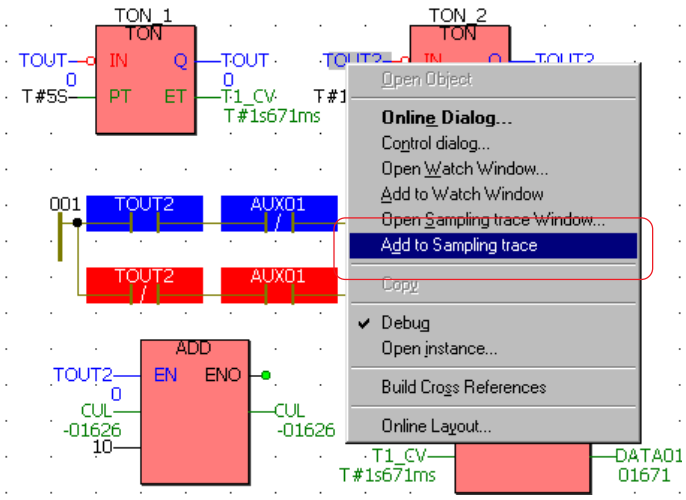
⇩

Save sampled data.
It is possible to save sampled data in CSV file format while the sampling trace window is displayed.

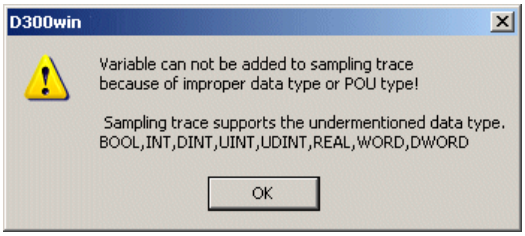
(1) Registration of sampling variables

Target variables of sampling are registered.

◆ Target variables of sampling are registered in monitor mode. On the monitor window, right-click the variables that you want to register, and execute the [Add to Sampling trace] command in the pop-up menu.



Note 1: If a variable of the data type that cannot be used for sampling trace, the following dialog box is displayed.

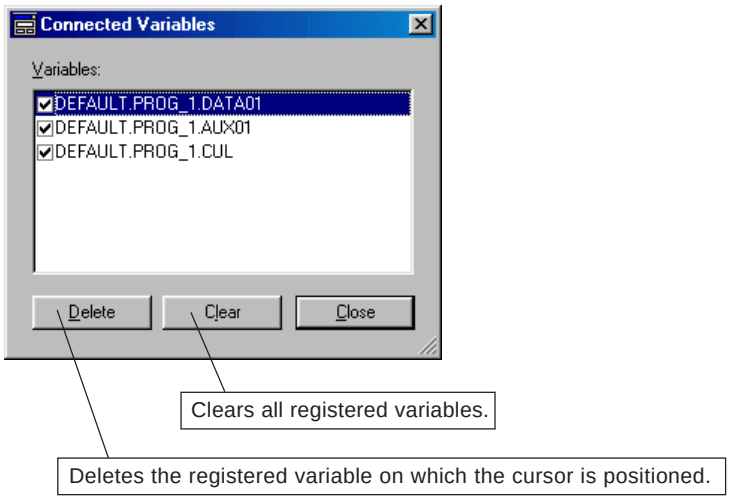


Note 2: Though there is no limit on the number of registered variables, the number of variables that are actually sampled is limit to 10 for one resource. When more than 10 variables are registered, select maximum 10 target variables of sampling, using the following procedure:

Section 11 Monitor/Control Functions

11-7 Sampling Trace

◆ When the [Connected Variables] command in the [Sampling trace] pull-down menu under [Online] is executed, the [Connected Variables] dialog box is displayed. Check the boxes for target variables.



* If a variable is newly registered when 10 variables are already registered on this dialog box, the newly registered variable cannot become the target of sampling. When you want to make it the target of sampling, it is necessary to change the selection on this dialog box.

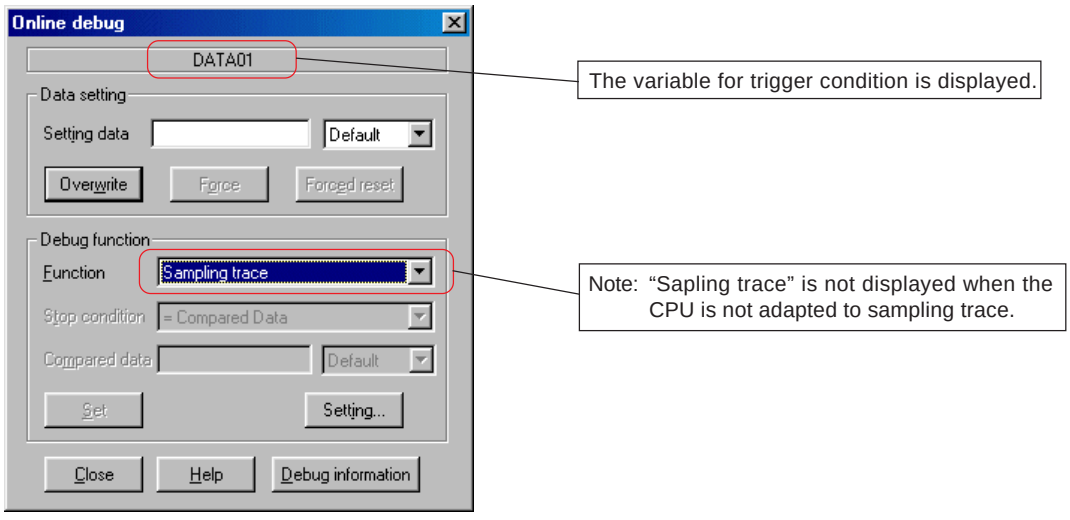
(2) Setting trigger condition and sampling condition

The timing to start sampling trace (trigger condition), sampling cycle and sampling frequency are set. Their setting is commonly applied to all the target variables of sampling.

<SPH300>

◆ On the monitor screen of the code worksheet, double-click the variable for trigger condition. The [Online debug] dialog box is displayed.

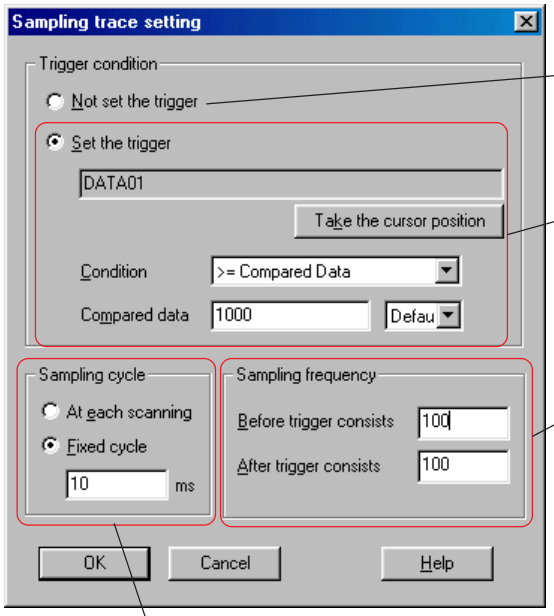
Note: Even when no trigger condition is set, select a variable to display the [Online debug] dialog box.



Section 11 Monitor/Control Functions

11-7 Sampling Trace

◆ Select “Sampling trace” from the [Function] list box, and click the [Setting...] button. The [Sampling trace setting] dialog box is displayed. After setting all necessary items, click the [OK] button.



If “Not set the trigger” is selected, sampling is started when the “Recording start” command is executed.

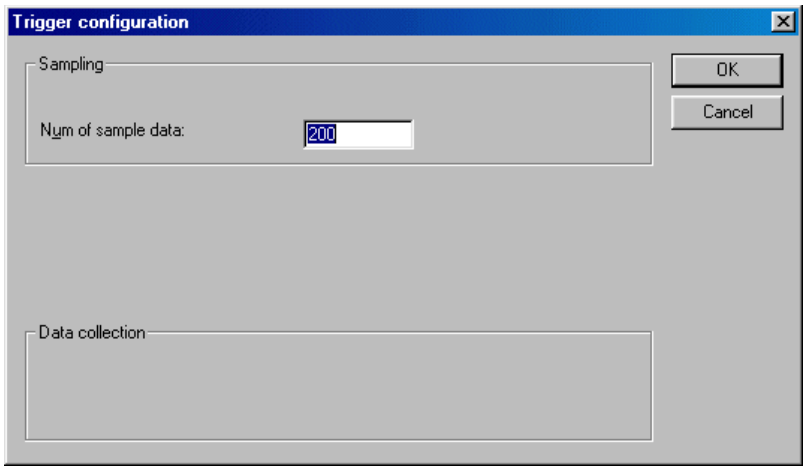
When “Set the trigger” is selected, the “Take the cursor position” button is enabled. When this button is clicked, the selected variable becomes the trigger condition variable. Set the conditions.

Set the sampling frequencies before and after trigger condition is met. If “Not set the trigger” is selected, the setting of “trigger frequency before trigger consists” does not take effect.
The set values of sampling frequency are commonly applied to all the target variables of sampling.

Set a value for sampling cycle.

Then sampling frequency is set.

◆ When the [Trigger configuration] command in the [Sampling trace] pull-down menu under [Online] is executed, the [Trigger configuration] dialog box is displayed.



◆ After setting a value for “Num of sample data” (the number of sample data to be displayed), click the [OK] button.

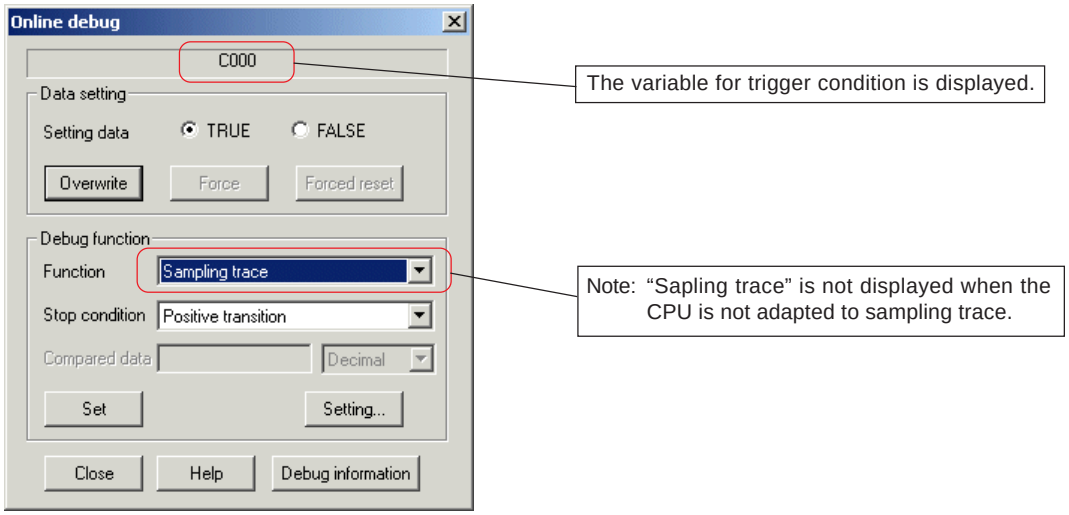
Section 11 Monitor/Control Functions

11-7 Sampling Trace

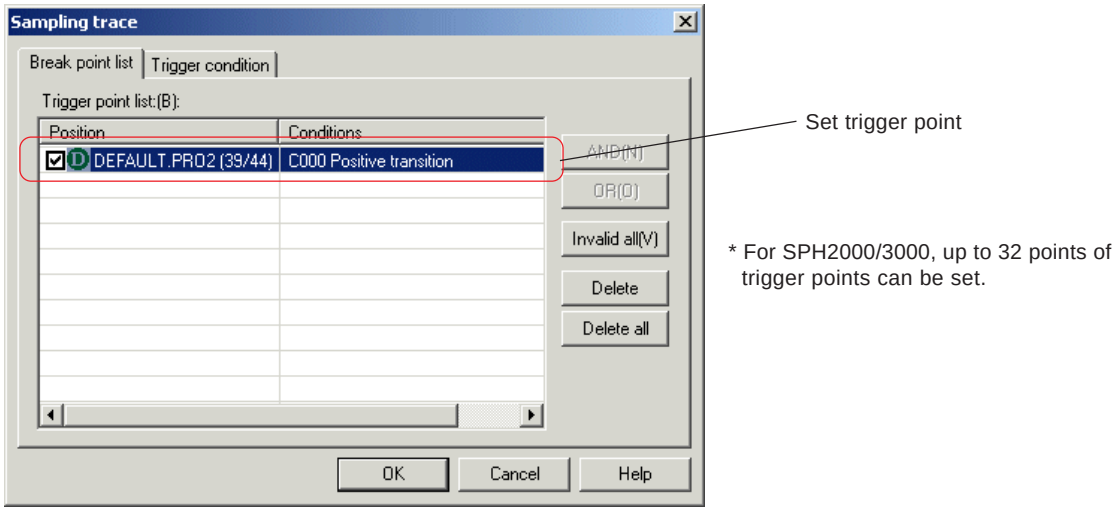
<SPH2000/3000>

◆ On the monitor screen of the code worksheet, double-click the variable for trigger condition. The [Online debug] dialog box is displayed.

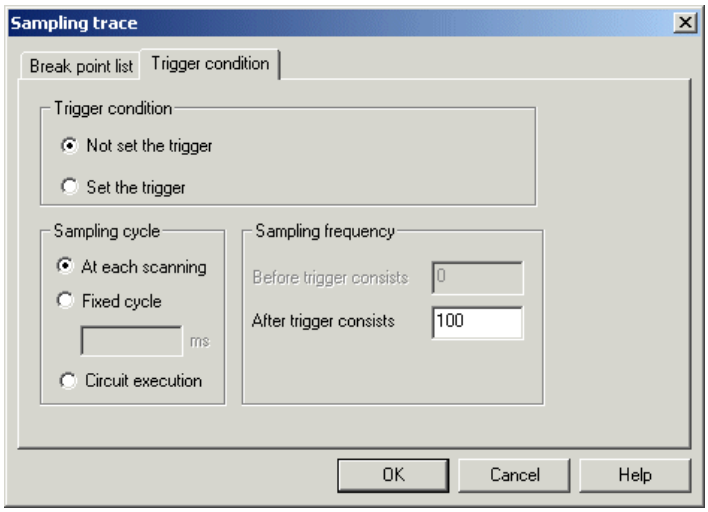
Note: Even when no trigger condition is set, select a variable to display the [Online debug] dialog box.



◆ Select "Sampling trace" from the [Function] list box, set a trigger condition, and then click the [Set] button to display the confirmation dialog. Click the [Yes] button on it. The [Sampling trace] dialog appears and the set trigger point is displayed.



◆ Clink the [Trigger condition] tab on the [Sampling trace] dialog. After setting the [Trigger condition], [Sampling cycle], and [Sampling frequency], click the [OK] button.



Section 11 Monitor/Control Functions

11-7 Sampling Trace

(3) Sampling start

Sampling is started in the set condition.

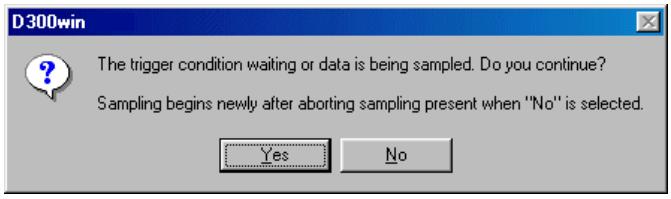
◆ Execute the [Recording start] command in the [Sampling trace] pull-down menu under [Online]. The operation after sampling is started depends on the condition of the CPU.

<When sampling is not yet executed>

When there is no sampled data in the CPU internal memory, sampling is started in the set sampling conditions.

<When the CPU is waiting for trigger condition being met or executing data sampling>

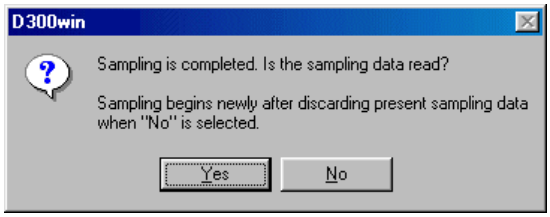
If the [Recording start] command is executed while the CPU is waiting for trigger condition being met or executing data sampling, the following message is displayed.



Yes: Keeps the current condition of waiting for trigger condition being met or executing data sapling.
No: Canceling the currently executed sampling operation, sampling is newly started in the sampling conditions set in the loader.

<When sampling is completed>

When sampling is completed and sampled data exists in the CPU internal memory, the following message is displayed.



Yes: The sampled data is read from the CPU internal memory to be displayed on the [Sampling trace] window.
No: Canceling the currently executed sampling operation, sampling is newly started in the sampling conditions set in the loader. Previously sampled data is all discarded.

Section 11 Monitor/Control Functions

11-7 Sampling Trace

<The function to check the consistency of individual setting before sampling is started>

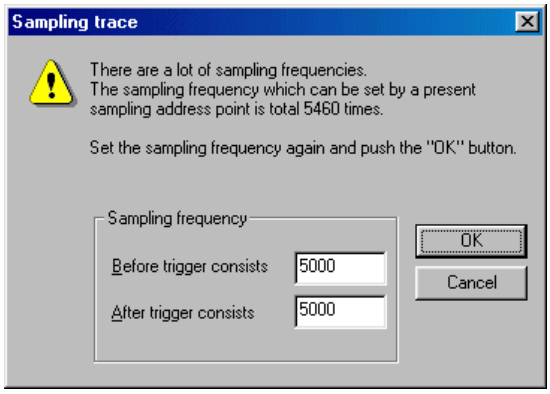
Before sampling is started, D300win checks consistency in the following manner:

1) Consistency of sampling frequency and the number of sampling address points

D300win checks whether or not sampling frequency and the number of sampling address points fall within the range allowed for the CPU module. The allowable range for CPU module is calculated from the following expression:

Sampling frequency (frequency before trigger consists + frequency after trigger consists +1) x Number of sampling points <= 16383 times

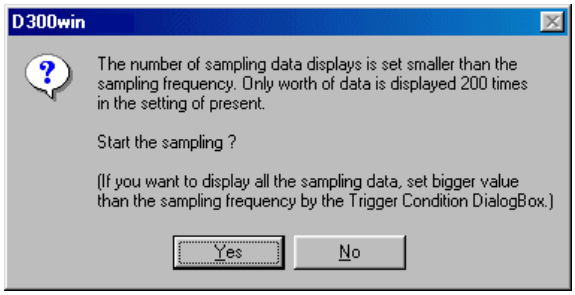
When this relational expression cannot be satisfied, the following message is displayed:



Sampling is started when the [OK] button is clicked after correct values are input. When the [Cancel] button is clicked, operation is ended without starting sampling.

2) Consistency of the setting of “Sampling frequency” and the setting of “Num of sample data”

If the setting of “Num of sample data” is smaller than that of “Sampling frequency”, the following dialog box is displayed when sampling is started.

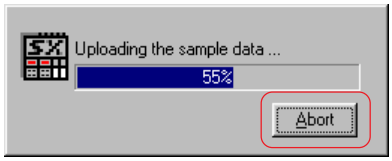


Yes: Sampled data is read, giving priority to the setting of “Num of sample data”. For example, even when sampling frequency is set to 1000 times, the data for only 100 times of sampling operation is read if “Num of sample data” is set to 100 times.

No: The dialog box is closed without starting sampling. Set appropriate value from the [Trigger configuration] dialog box.

<Forcible end of sampling>

When you want to forcibly end sampling, click the [Recording end] button; when sampled data is being read, click the [Abort] button.



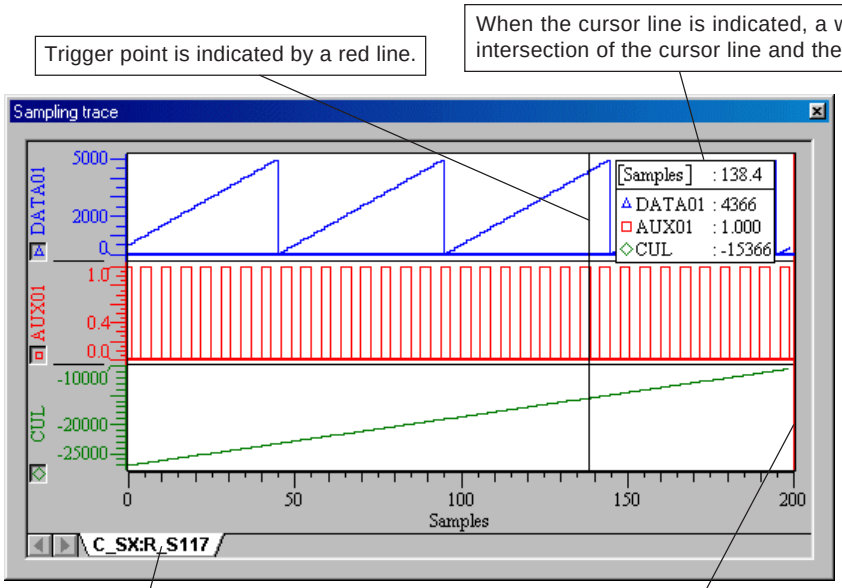
Section 11 Monitor/Control Functions

11-7 Sampling Trace

(4) Displaying the sampled data

Sampled data is displayed on the [Sampling trace] window.

◆ When the [Sampling trace] command in the [Display] menu is executed, the [Sampling trace] window is displayed, in which the axis of abscissa is sampling frequency and the axis of ordinates is data value. The scale of the axis of ordinates is adjusted properly according to the data type of variable.



<Adjustment on the [Sampling trace] window>

1) Magnification / reduction along the axis of abscissa / ordinate

The display can be magnified or reduced by changing the scale of the axis of abscissa or ordinates.
Press the left- or right-side mouse button on the axis of abscissa or ordinates along which you wan to magnify or reduce the image, and then drag the mouse.

- When the axis of abscissa is dragged with the left-side mouse button pressed, the part on the left of the trigger point is magnified or reduced.
- When the axis of abscissa is dragged with the right-side mouse button pressed, the part on the right of the trigger point is magnified or reduced.
- When the axis of ordinates is dragged with the left-side mouse button pressed, negative data is magnified or reduced.
- When the axis of ordinates is dragged with the right-side mouse button pressed, positive data is magnified or reduced.

2) Movement of view range on the axis of abscissa or ordinates

On the axis of abscissa or ordinates on which you want to move view range, press both the right- and left-side mouse buttons and drag the mouse.

3) Setting the color of graph

On the [Sampling trace] window, maximum 10 sampling variables can be displayed at the same time. To make individual graph distinguishable, color can be set for individual graph. Default setting assigns different colors to 10 variables. This setting can be changed from the [Sampling trace color] window in the [Option] dialog box, which is displayed when the [Options...] command in the [Extras] menu is executed.

4) Setting the initial value of window width

Width of the initial windows for displaying sampled data can be set. When the [Window width] command in the [Sampling trace] pull-down menu under [Online] is executed, the [Data window] dialog box is displayed.

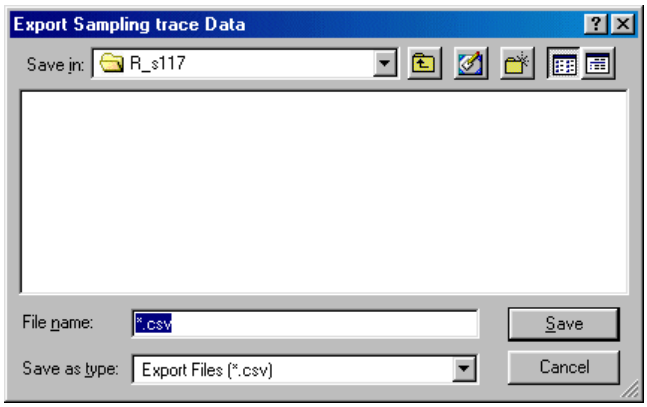
Section 11 Monitor/Control Functions

11-7 Sampling Trace

(5) Saving the sampled data

The sampled data that is displayed on the [Sampling trace] window can be saved in a file of CSV format. The saved sampling data can be used by spreadsheet software, such as Microsoft Excel.

◆ When the [Export Data] command in the [Sampling trace] pull-down menu under [Online] is executed, the following dialog box is displayed.

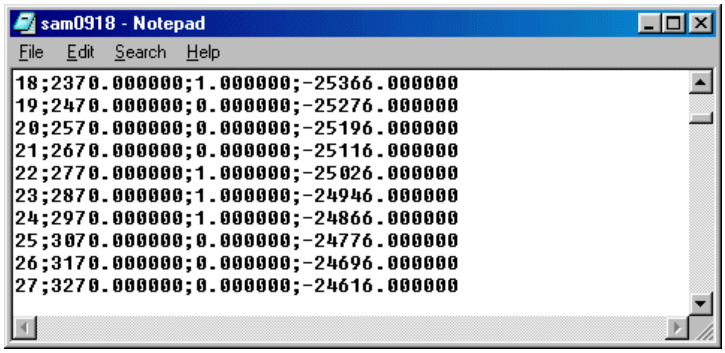


◆ When the [Save] button is clicked after destination folder and file name are entered, the data is saved in the following format.

<Format of saved data>

<1st line> Samples; (variable 1); (variable 2); (variable 3); ...
<2nd line> Data No.; the value of variable 1; the value of variable 2; the value of variable 3; ...

<Example of output file>



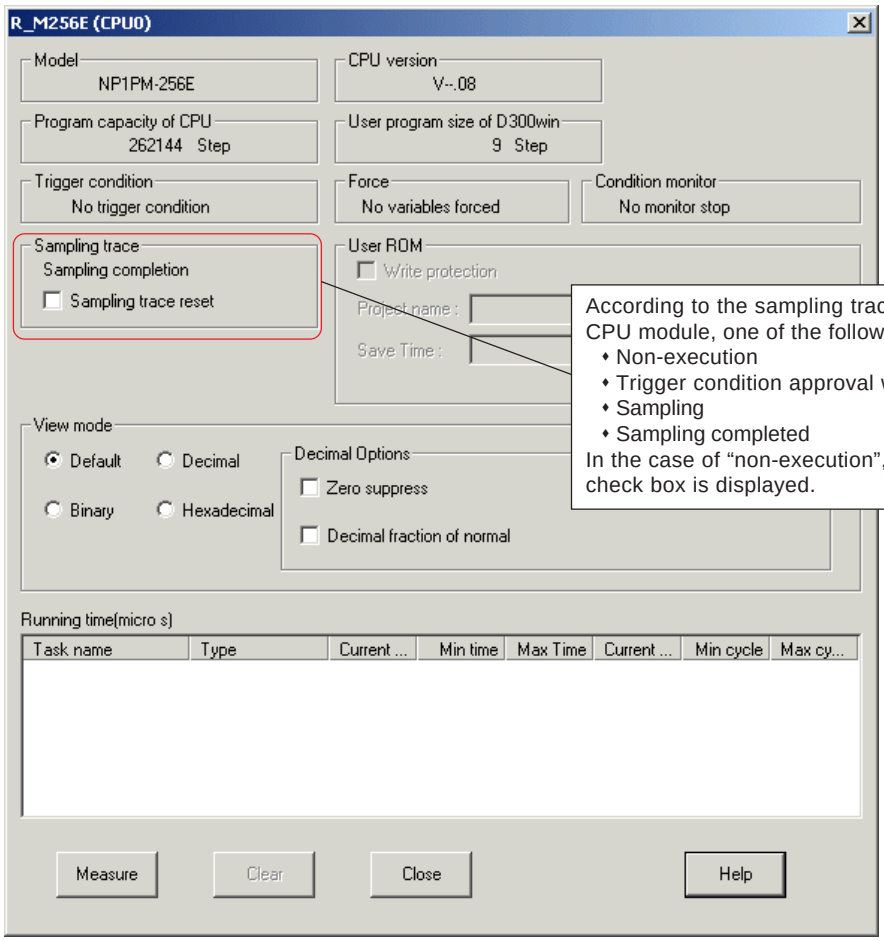
Section 11 Monitor/Control Functions

11-7 Sampling Trace

(6) Sampling trace status display and cancel

It is possible to cancel sampling trace and delete the sampled data that is recorded in the CPU module.

◆ When the [Resource information...] button is clicked on the [Online] dialog box, the following window is displayed.



According to the sampling trace execution status of the CPU module, one of the following 4 statuses is displayed:

- Non-execution
- Trigger condition approval waiting
- Sampling
- Sampling completed

In the case of “non-execution”, the [Sampling trace reset] check box is displayed.

◆ To cancel sampling in the case of sampling completed, trigger condition approval waiting, or sampling, check the [Sampling trace reset] box and then click the [Close] button.

<Other conditions for cancel>

The following operations automatically cancel sampling trace. When sampling trace is automatically canceled, the sampled data stored in the CPU module are all deleted.

1) Download or clear of program, system definition or ZIP file

Sampling trace is automatically canceled if the basic structure of a project tree is changed, except when POU is changed, where sampling trace is not canceled because the address assignment of sampling target variables to which no AT is specified does not change.

2) Initialization of resource

When a resource is initialized, all the internal data of the CPU is deleted, including the data related to sampling trace.

3) Execution of other debugging function (the function with trigger condition)

Because only one trigger condition can be registered to CPU, if trigger condition is set for other debugging function, the trigger condition for sampling trace is deleted, and sampling trace is canceled.

Section 11 Monitor/Control Functions

11-7 Sampling Trace

(7) Other functions

1) Display All Data

This function resets the graphs of sampling data that are displayed on the [Sampling trace] window to their initial condition. This function is convenient when you want to reset the display to its initial condition by a single operation after you have moved view range or the axis of abscissa or ordinates. For this, the [Display All Data] command in the [Sampling trace] pull-down menu under [Online] is executed (otherwise, the button on the tool bar is pressed).

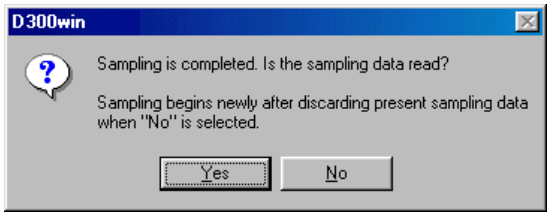
2) Clear Data

This function clears all the graphs of sampled data that are displayed on the [Sampling trace] window. For this, the [Clear Data] command in the [Sampling trace] pull-down menu under [Online] is executed.

3) Restoration of recorded data onto the [Sampling trace] window

Once cleared, graphs cannot be restored to the original condition. However, when the sampled data is still remained in the CPU module, the data can be read again using the following procedure:

◆ When the [Recording start] command in the [Sampling trace] pull-down menu under [Online] is executed, the following message is displayed.,



Note: If this message is not displayed, the sampled data is no longer remained in the CPU and therefore cannot be read again.

◆ When the [Yes] button is clicked, the sampled data is read from the CPU to be displayed on the [Sampling trace] window.

Section 11 Monitor/Control Functions

11-7 Sampling Trace

11-7-3 Simplified sampling trace

For the CPU modules that are not adapted to the sampling trace function, D300win serves as the simplified sampling trace function to sample data. Simplified sampling trace is performed also for simulator because the simulator in the personal computer samples data.

<Operating procedure>

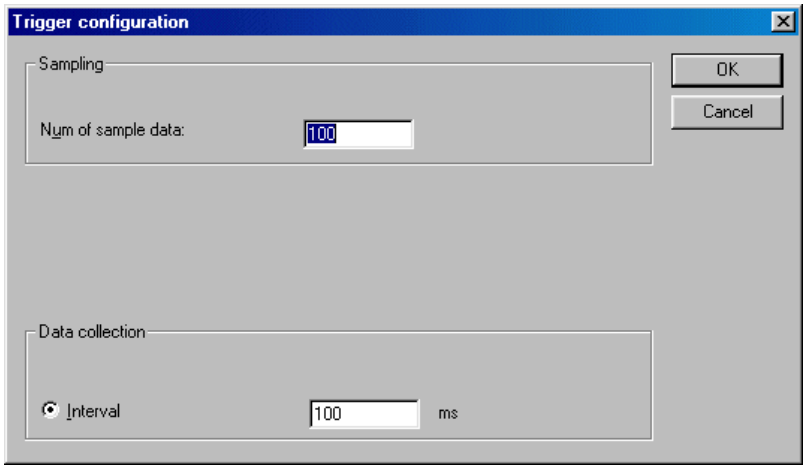
The operations to register, display and cancel sampling variables are the same as those of the sampling trace function, but the operations to set trigger condition and sampling condition are different between them.

Note: For simulator, there is no function to cancel sampling trace. Sampling trace is canceled when project is changed or when simulator is ended.

(1) For CPUs that are not adapted to sampling trace

There is no operation to set trigger condition. D300win starts sampling when the [Recording start] command is executed. Sampling condition is set from the [Trigger configuration] dialog box.

◆ When the [Trigger configuration] command in the [Sampling trace] pull-down menu under [Online] is clicked, the [Trigger configuration] dialog box is displayed.



◆ On this dialog box, only “Num of sample data” and “Data collection / Interval” (sampling cycle) are set.

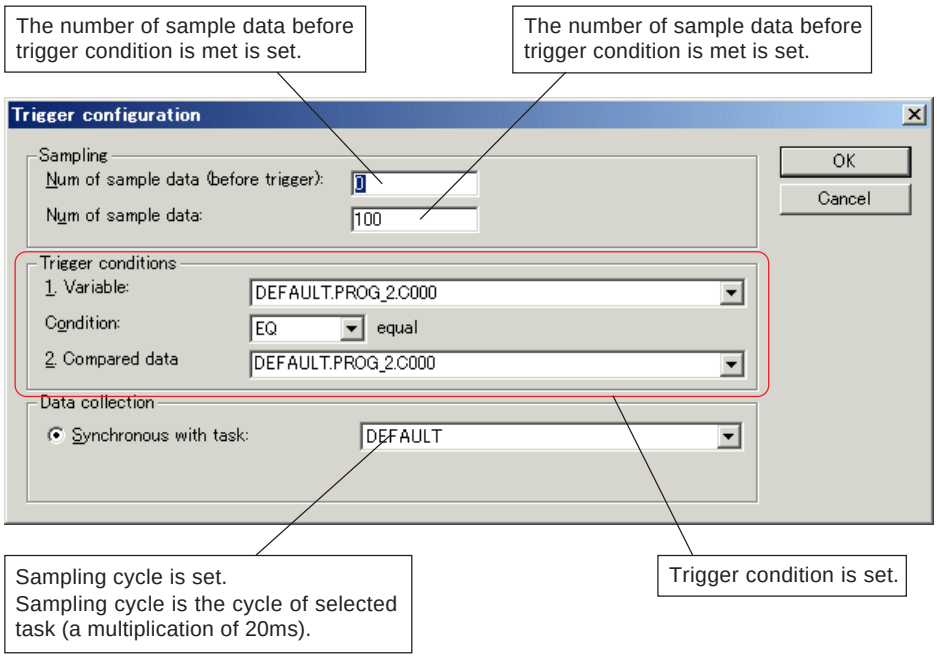
Note: Because data sampling is performed by D300win, sampling cycle depends on the message processing of CPU and the processing of the personal computer. As a result, sampling cycle becomes approximately 500ms or more. The sampling operation with the values set from this dialog box cannot be guaranteed.

Section 11 Monitor/Control Functions

11-7 Sampling Trace

(2) For simulator

◆ When the [Trigger configuration] command in the [Sampling trace] pull-down menu under [Online] is clicked, the [Trigger configuration] dialog box is displayed.



Section 12 Page Layout and Printing

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Section 12 Page Layout and Printing

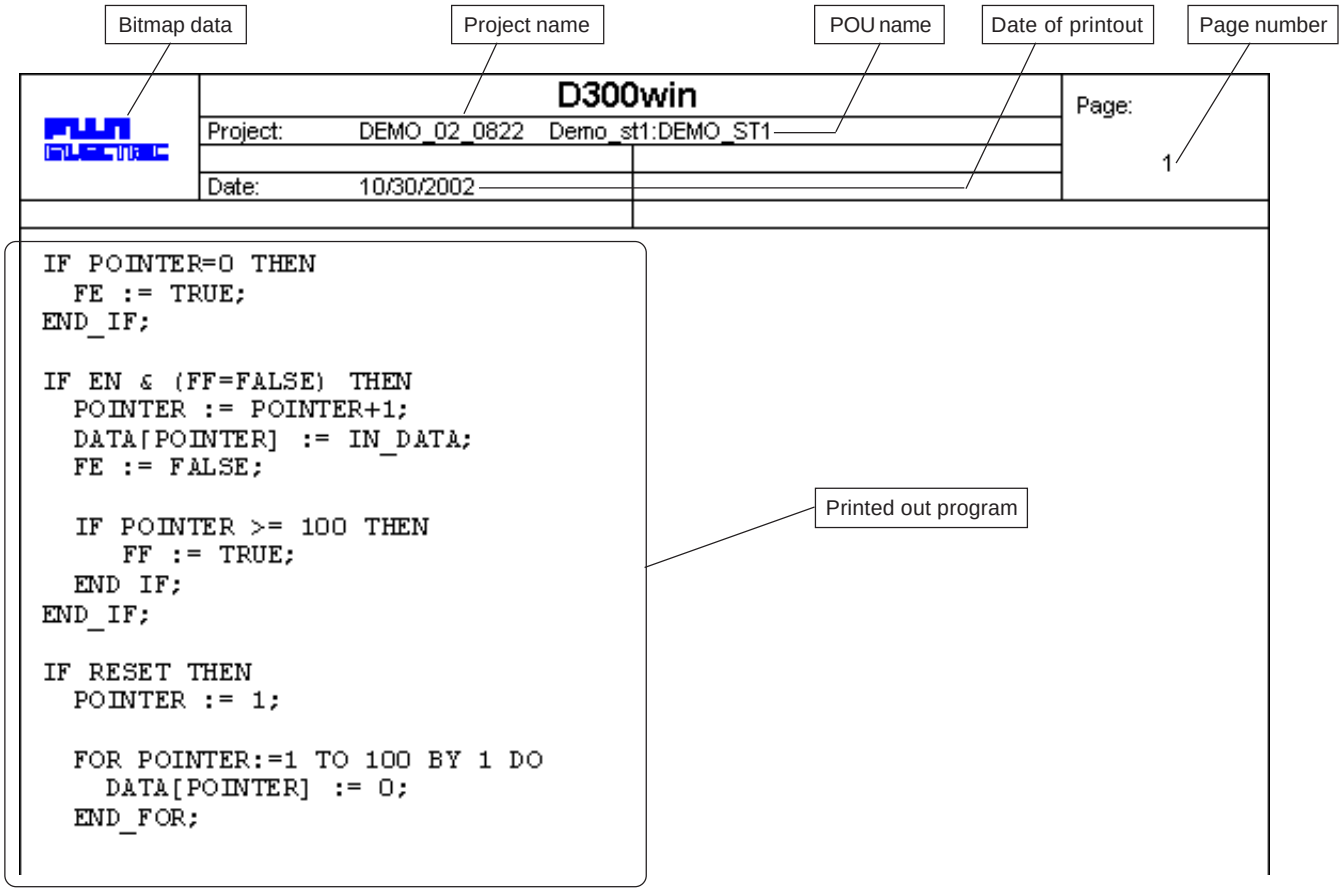
12-1 Page Layout

12-1-1 Functions of the page layout editor

The page layout editor is used to design forms for printing out the content of projects or worksheets or other data. With the page layout editor, you can insert or set the following objects:

Function and object		Description
Print form setting		Sets the size (A4 or A3) and orientation (Portrait or Landscape) of print form.
Print data output area (source area) setting		Sets the print area in a form as well as the magnification of zoom for print data (code worksheets, variable worksheets, project trees, etc.)
Insertion of graphics (bitmap data)		BMP type graphic data can be inserted in a print form.
Insertion of line graphics		Rectangles and straight lines can be plotted on a print form.
Insertion of characters		Arbitrary characters can be inserted.
Insertion of environment texts	#DATE#	Position folder can be inserted for printing the date.
	#TIME#	Position folder can be inserted for printing the time.
	#PAGE#	Position folder can be inserted for printing the page numbers.
	#PROJECT#	Position folder can be inserted for printing the project name.
	#POU#	Position folder can be inserted for the POU names that are printed.
	#SORCE#	Position folder can be inserted for printing path names, such as those to worksheet files.

<Example of printed out form>



Section 12 Page Layout and Printing

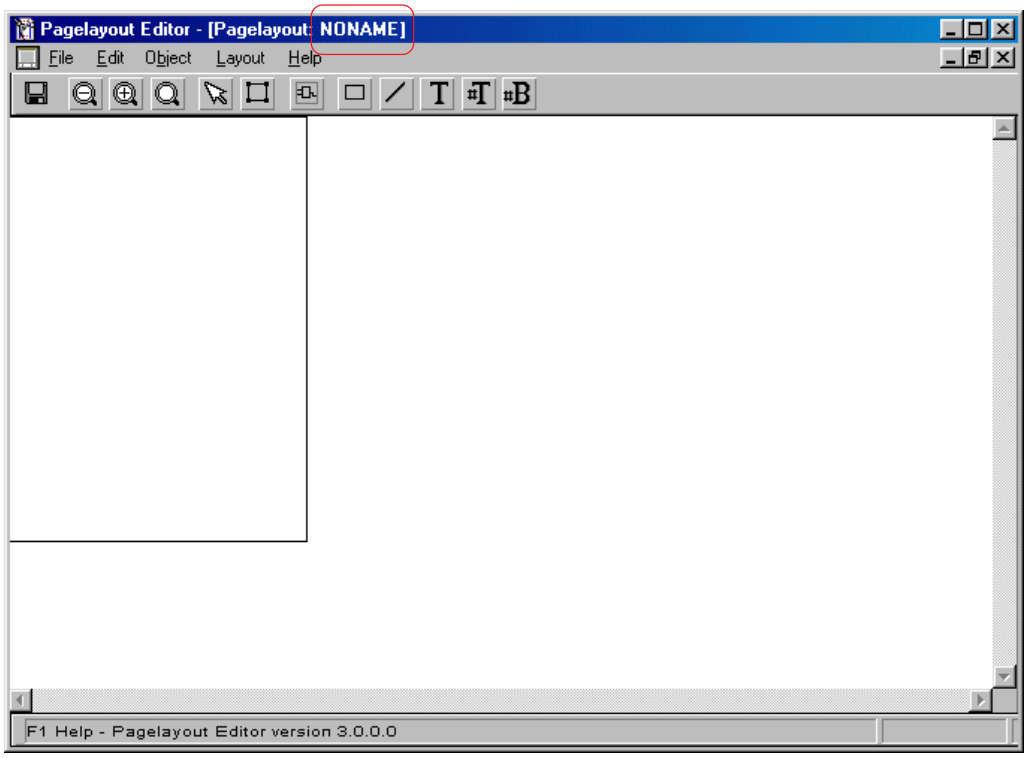
12-1 Page Layout

12-1-2 Editing a page layout

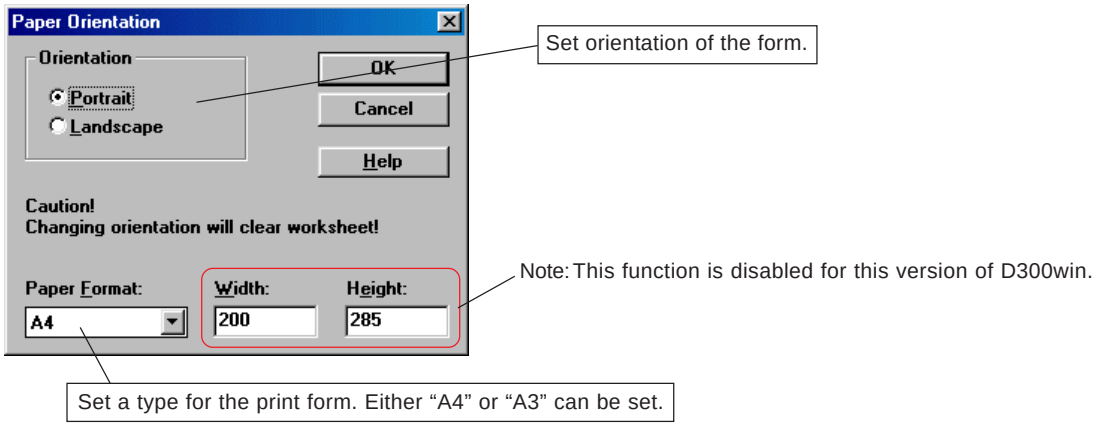
In this paragraph, the procedure for creating a page layout is explained, taking the sample printed out form shown on the preceding page for example.

(1) Setting the form orientation

◆ Execute the [Pagelayout Editor] command in the [Extras] menu. The page layout editor is activated, and the page layout “NO NAME” is displayed, in which nothing is set yet.



◆ First of all, type (size) is set for the form for which page layout is to be set. Execute the [Paper Orientation...] command in the [Layout] menu. The [Paper Orientation] dialog box is displayed.



◆ After setting “Paper Format:” and “Orientation”, click the [OK] button.

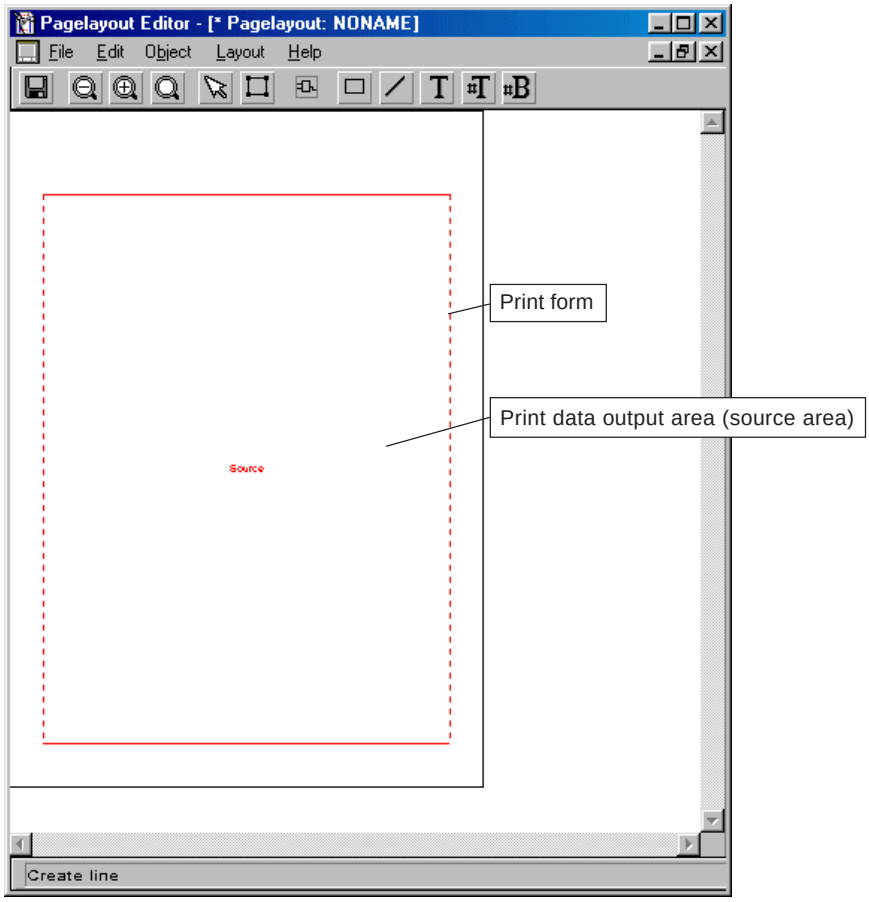
Section 12 Page Layout and Printing

12-1 Page Layout

(2) Setting the print data output area (source area)

It can be set in which area on the form to print the data, such as code worksheet.

◆ Click the [Create source area] button in order to set a print area within the range of the form.
Click a point for the upper left corner (starting point) of the print area and then drag the mouse to an arbitrary point to determine the print area as you desire. A red rectangle for the print data output area (source area) is displayed, as shown in the figure below.

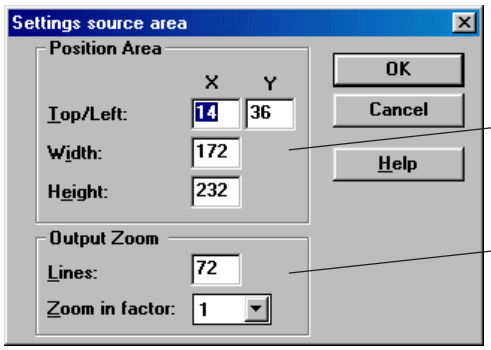


* The size of “print data output area” (source area) corresponds to the size of a page that is indicated by boundaries on the worksheet.

Section 12 Page Layout and Printing

12-1 Page Layout

◆ The properties of the print data output area (source area) are set. For this, after selecting the print data output area (source area) by clicking it, right-click an arbitrary point in it and execute the [Object Properties...] command in the shortcut menu. The [Settings source area] dialog box is displayed.



The position of the print data output area (source area) is displayed. You can change the position and/or size of the print data output area (source area) from this dialog box.

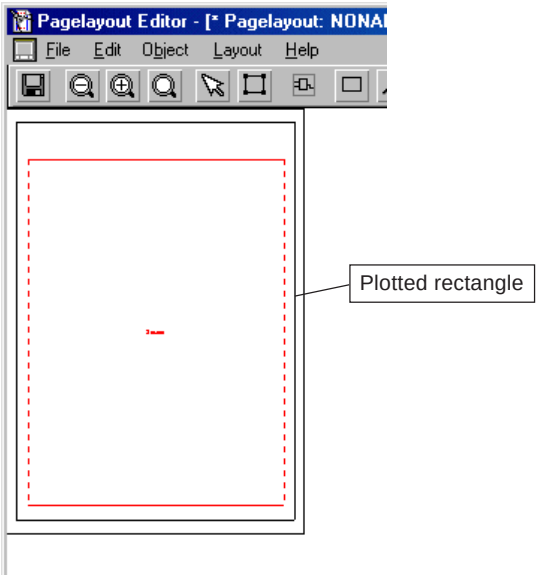
Magnification is set for printing the object in the print data output area (source area).
“Lines:” is the setting item for text worksheet, which determines the number of lines to be printed in the print data output area (source area).
“Zoom in factor:” sets magnification for graphic worksheet. For example, when this item is set to "2", the object is printed, magnified twice. (As a result, the volume of program that can be printed in one form is reduced.)

◆ After setting “Output Zoom”, click the [OK] button.

(3) Plotting a rectangle

It is possible to plot a rectangle on the page layout (print form).

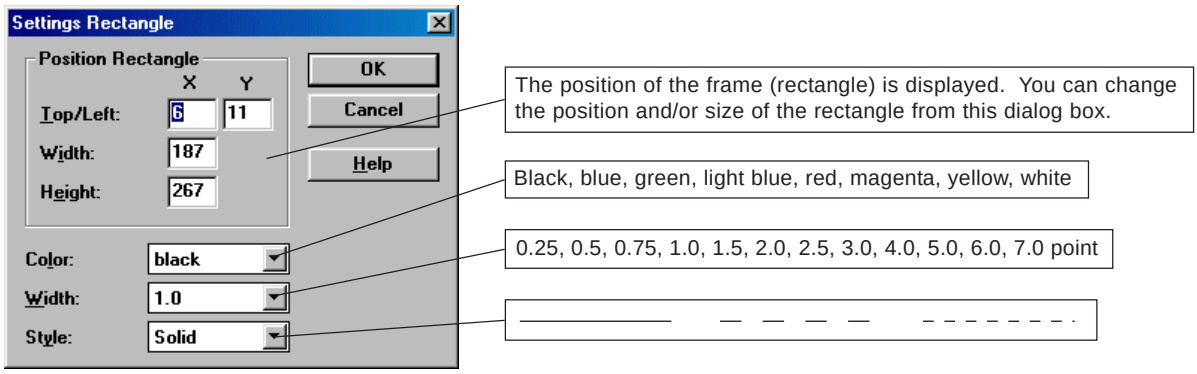
◆ Click the [Create rectangle] button in order to plot a rectangle within the range of the form.
Click a point for the upper left corner (starting point) of the rectangle and drag the mouse to an arbitrary point to plot a rectangle.



Section 12 Page Layout and Printing

12-1 Page Layout

◆ Then, the properties of the platted rectangle are set. For this, after selecting the plotted rectangle by clicking it, right-click an arbitrary point in it and execute the [Object Properties...] command in the shortcut menu. The [Settings Rectangle] dialog box is displayed.

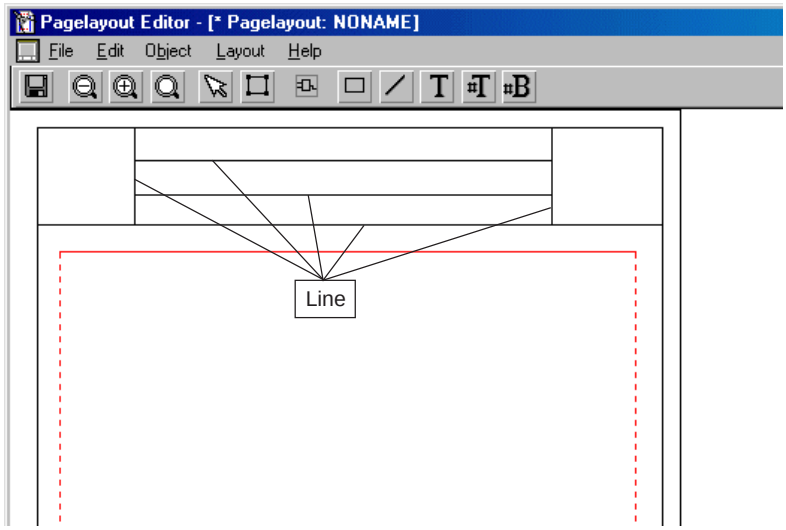


◆ After setting all necessary items, click the [OK] button.

(4) Plotting lines

You can plot lines on the page layout (print form).

◆ Click the [Create line] button in order to plot arbitrary lines within the range of the form.
Click a point for the starting point of the line and drag the mouse to an arbitrary point to plot a line.



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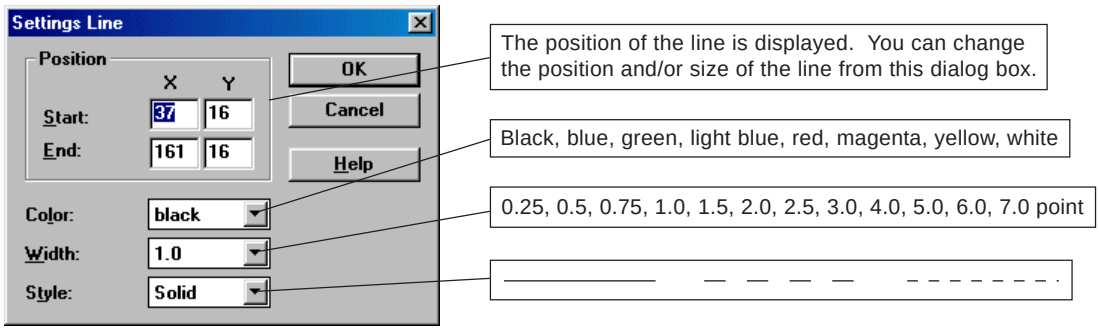
12-1 Page Layout

◆ Then, the properties of the platted line are set. For this, after selecting the plotted line by clicking it, right-click an arbitrary point on it and execute the [Object Properties...] command in the shortcut menu. The [Settings Line] dialog box is displayed.

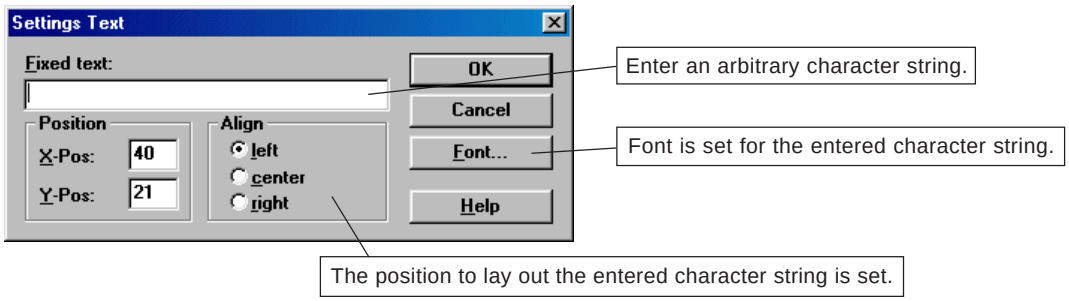


◆ After setting all necessary items, click the [OK] button.

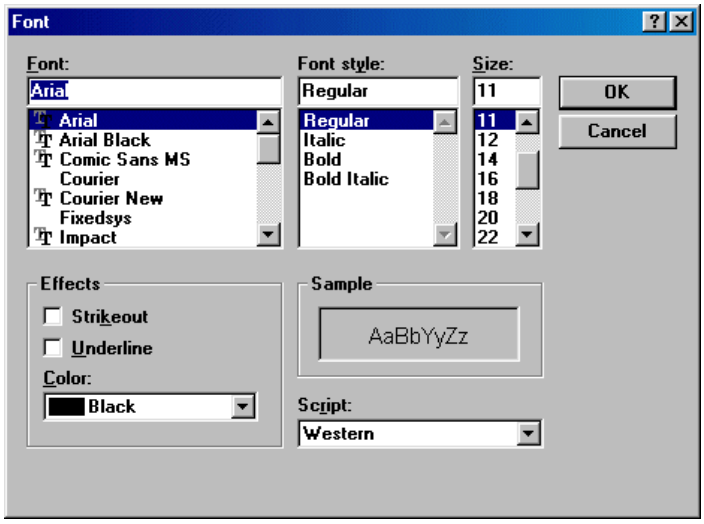
(5) Inserting text

You can insert arbitrary text on the page layout (print form).

◆ Click the T [Create text] button, and character "T" will be added to the cursor. Click a point at which you want to insert a text. The [Settings Text] dialog box is displayed.



◆ Click the [Font...] button. The [Font] dialog box is displayed. Font, font style, size, etc. can be set from this dialog box. After setting all necessary items, click the [OK] button.



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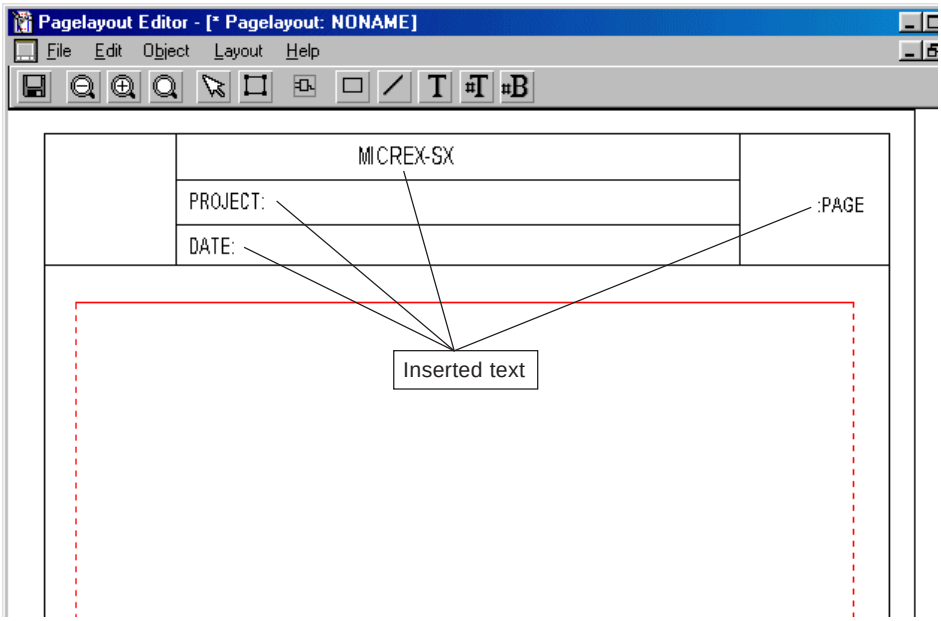
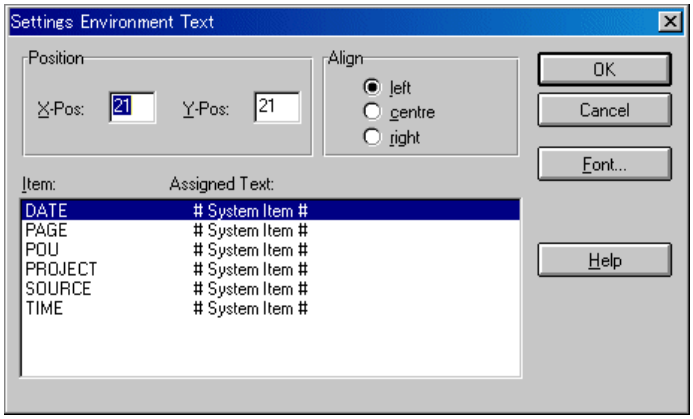
12-1 Page Layout



(6) Inserting environment text

By inserting environment text in the page layout, it becomes possible to automatically read and print the data of the D300win system or personal computer, such as the date of printout, page number and project name.

◆ Click the [#T] [Create environment item] button, and character “T” will be added to the cursor. Click a point at which you want to insert a text. The [Settings Environment Text] dialog box is displayed.



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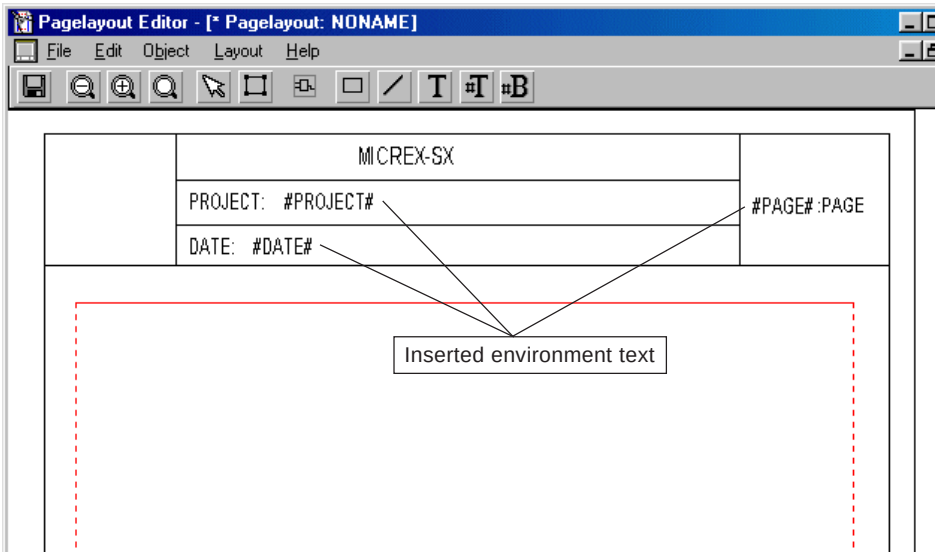
12-1 Page Layout

◆ On the [Settings Environment Text] dialog box, select an environment text that you want to insert, and click the [OK] button. The selected environment text is inserted on the form. The same as with ordinary text, it is possible to set font for environment text.



<Type of environment text>

- **#DATE#**

  Position folder for printing the date of printout. The format for printing the date corresponds to the setting of “Area” on the Windows control panel.

- **#PAGE#**

  Position folder for printing page numbers.

- **#POU#**

  System item “POU” is the position folder for printing the POU name. It is possible to display and check the content of this position folder with the Print Preview function.

- **#PROJECT#**

  Position folder for printing the project name. It is possible to display and check the content of this position folder with the Print Preview function.

- **#SOURCE#**

  Position folder for printing paths, such as those to worksheet files. It is possible to display and check the content of the position folder with the Print Preview function.

- **#TIME#**

  Position folder for printing the time at which printing is started. It is possible to display and check the content of the position folder with the Print Preview function. This printout time corresponds to the setting of “Area” on the Windows control panel.

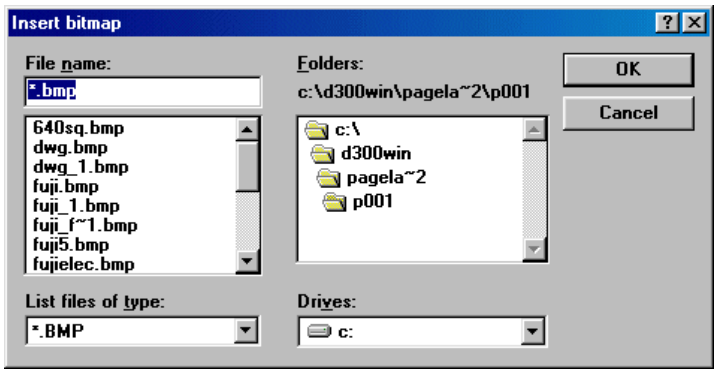
Section 12 Page Layout and Printing

12-1 Page Layout

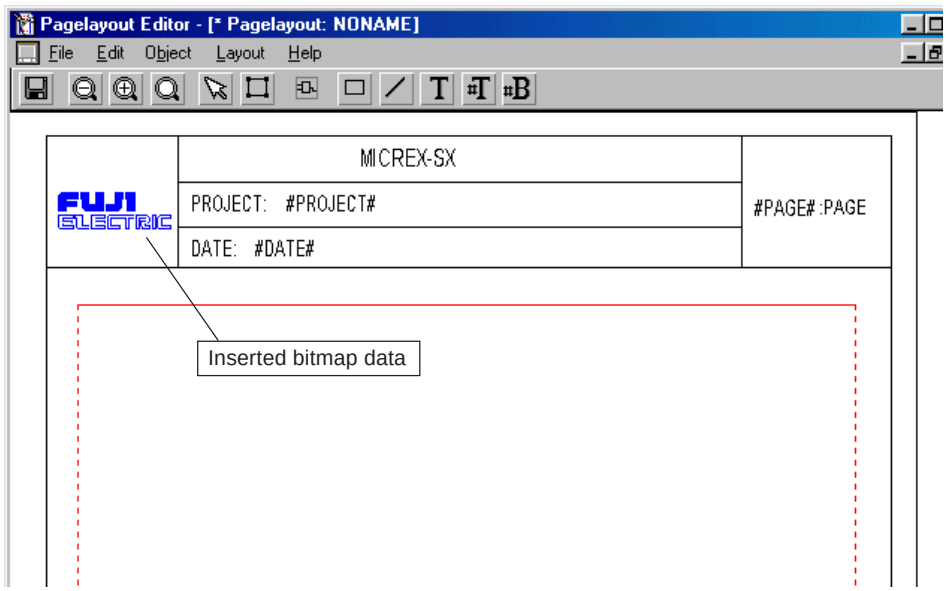
(7) Inserting a bitmap

Bitmap type graphics can be inserted in the page layout.

◆ Click the [Insert bitmap] button in order to plot a rectangle and thus specify the range for pasting the bitmap data. Click a point for the upper left corner (starting point) of the rectangle, and drag the mouse to an arbitrary point to set the range for pasting the bitmap. When the range is specified, the [Insert bitmap] dialog box is displayed.

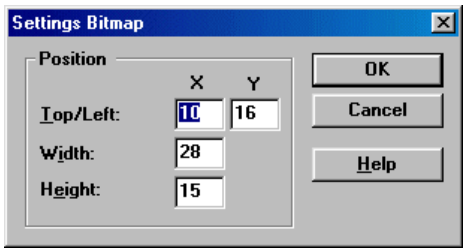


◆ Select a bitmap you want to paste, and click the [OK] button. The selected bitmap is inserted in the page layout.



Note 1: Available size of bitmap data is maximum 59k bytes.
Note 2: The maximum length of the folder name for saving the bitmap is 8 alphanumeric characters.

◆ After selecting, by clicking it, the bitmap data you want to insert, right click it and then click the [Object Properties...] command in the shortcut menu. The [Settings Bitmap] dialog box is displayed. You can change the position and/or size of the insertion range from this dialog box.



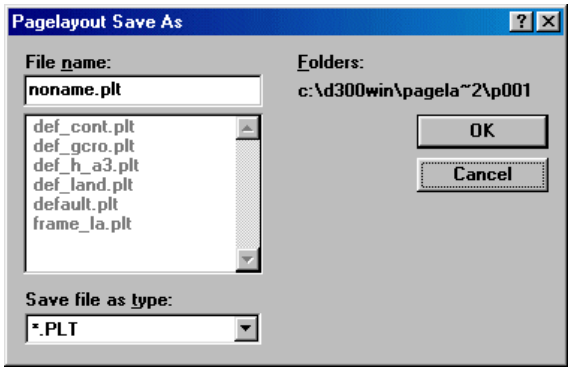
Section 12 Page Layout and Printing

12-1 Page Layout

12-1-3 Saving a page layout

In this paragraph, you give a name to the created page layout and then save it.

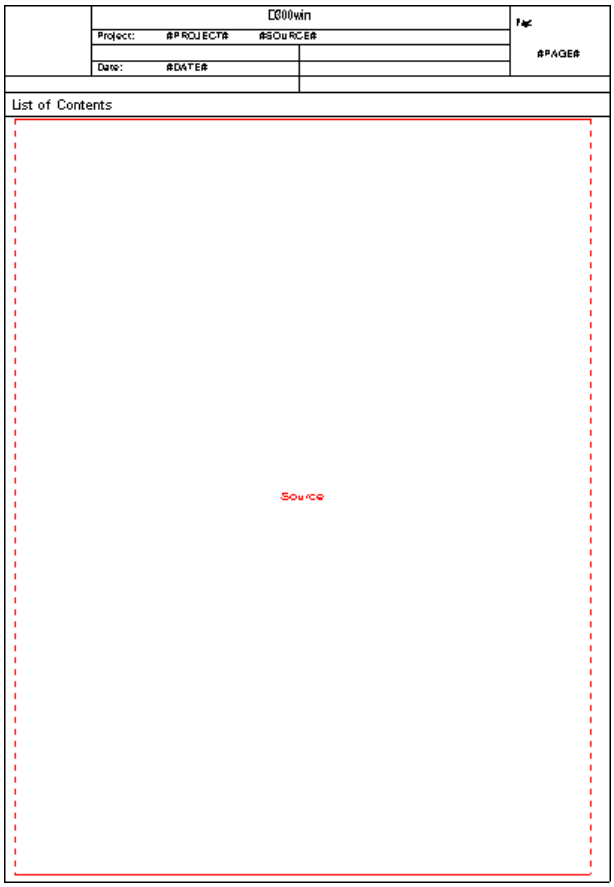
◆ Click [File] in the menu bar of the page layout editor, and then click the [Save as...] command in the [File] menu. The [Pagelayout Save As] dialog box is displayed.



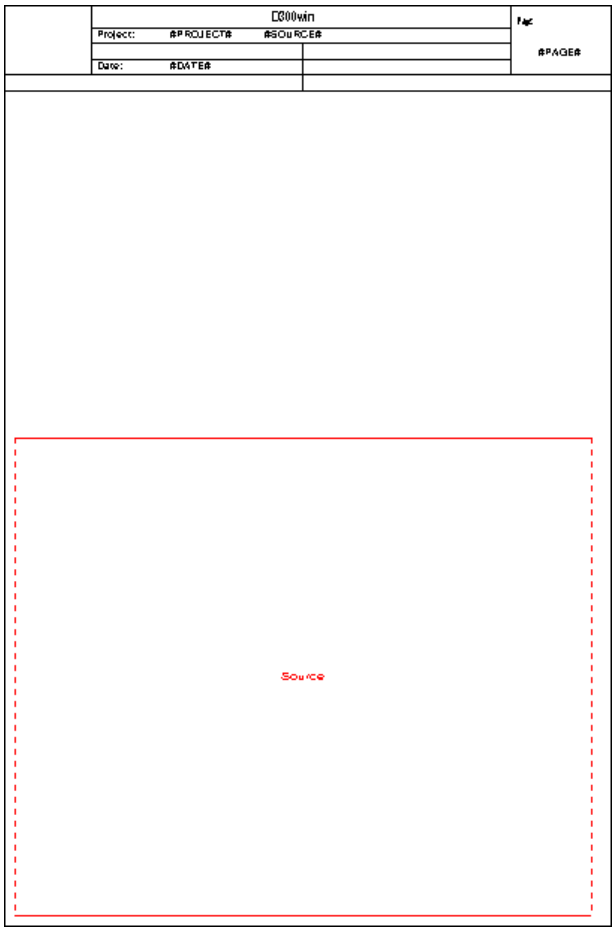
◆ Enter a name for the created page layout, and click the [OK] button.

12-1-4 Page layouts prepared for D300win

File name: default.plt, Form size: A4 portrait



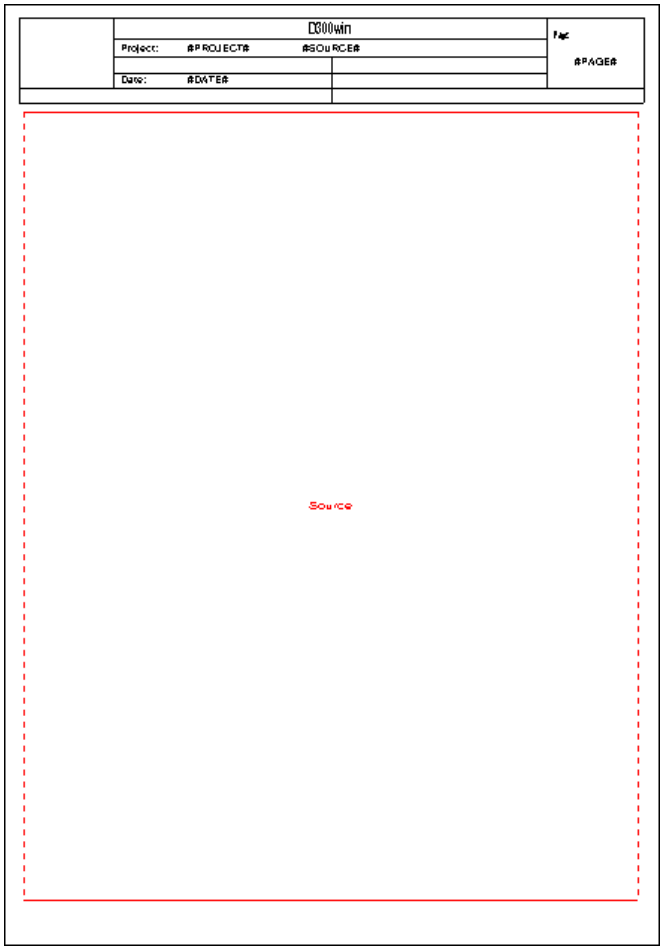
File name: def_gcro.plt, Form size: A4 portrait



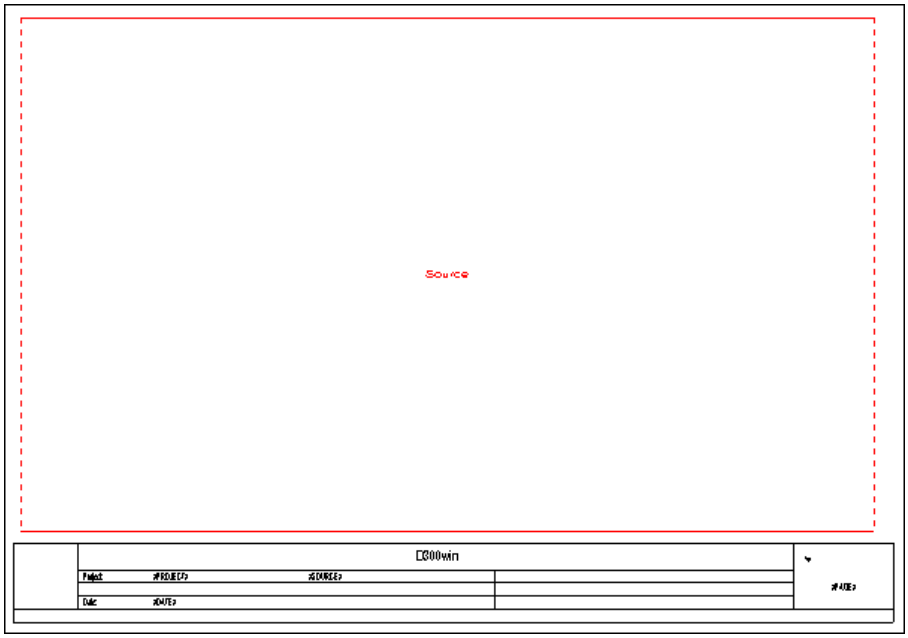
Section 12 Page Layout and Printing

12-1 Page Layout

File name: def_h_a3.plt, Form size: A3 portrait



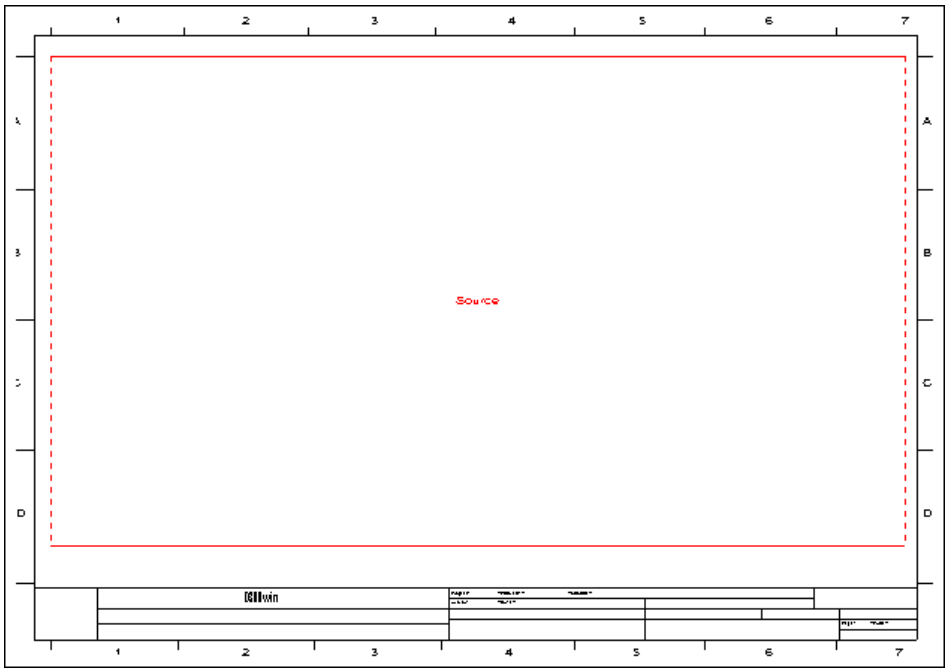
File name: def_land.plt, Form size: A4 landscape



Section 12 Page Layout and Printing

12-1 Page Layout

File name: frame_la.plt, Form size: A4 landscape



Section 12 Page Layout and Printing

12-2 Printing

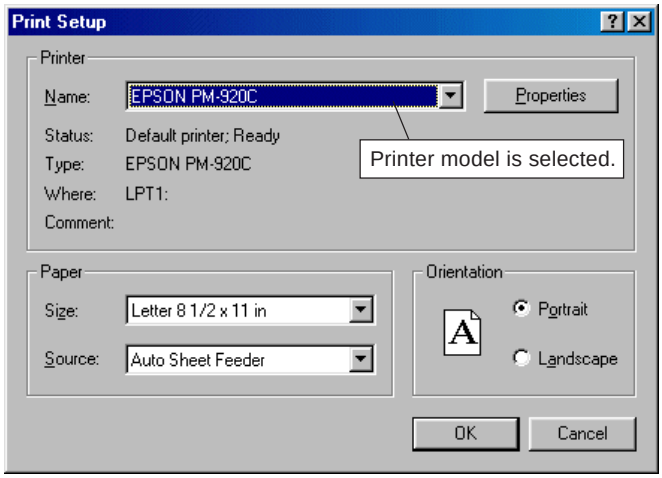
D300win print functions are as follows:

- Print preview
- Printing individual worksheets
- Printing an entire project
- Printing part of a project
- Printing a cross-reference table

12-2-1 Printer settings

In this paragraph, you select a printer to use.

◆ Click the [Print Setup...] command in the [File] menu of D300win. The [Print Setup] dialog box is displayed.



◆ From the “Name:” list box, select a printer you want to use. Set “Paper”, “Orientation”, “Properties”, etc. as needed, and click the [OK] button.

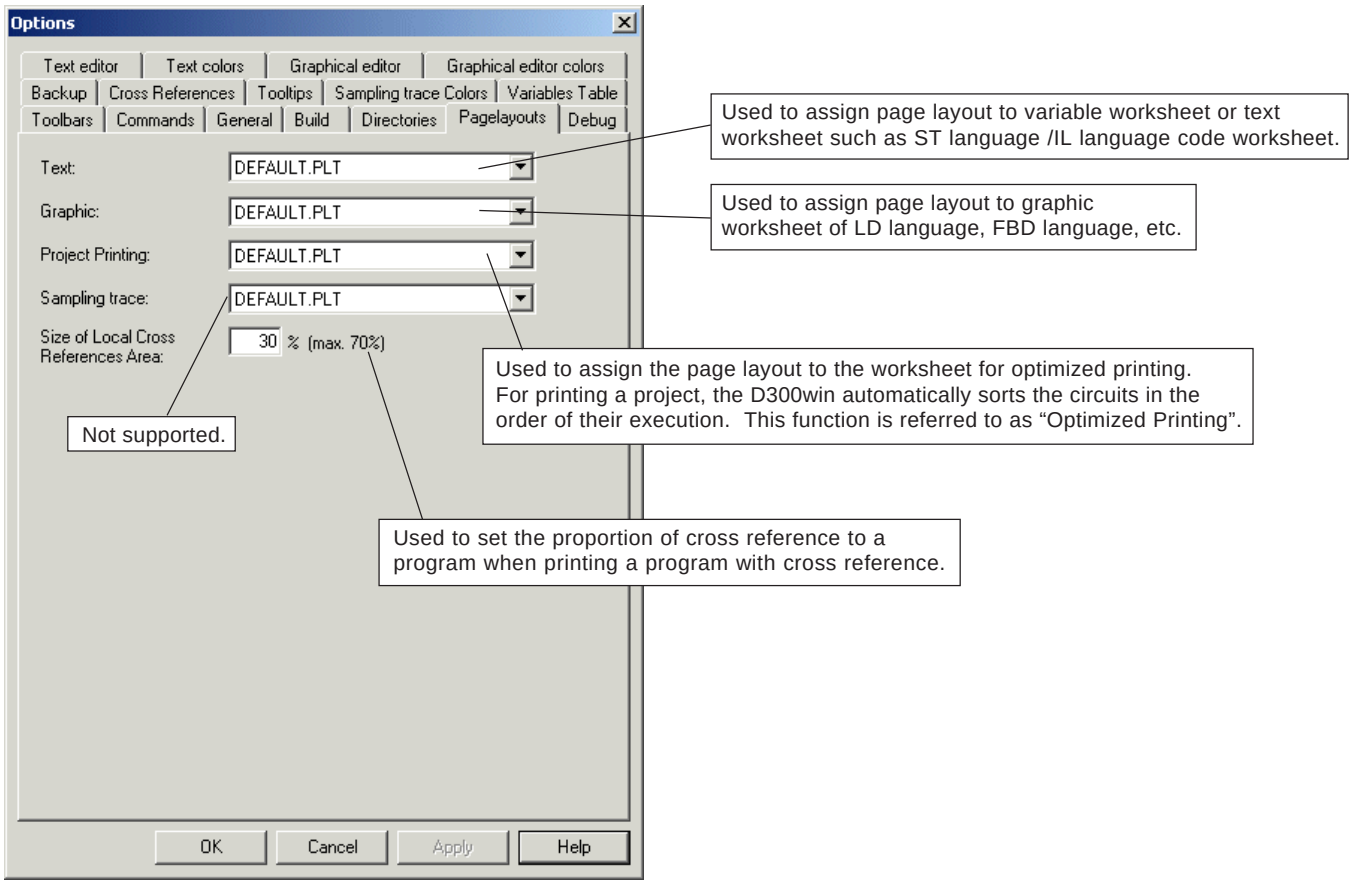
Section 12 Page Layout and Printing

12-2 Printing

12-2-2 Assigning page layouts

In order to perform printout, page layouts are assigned to the worksheets, from those prepared.

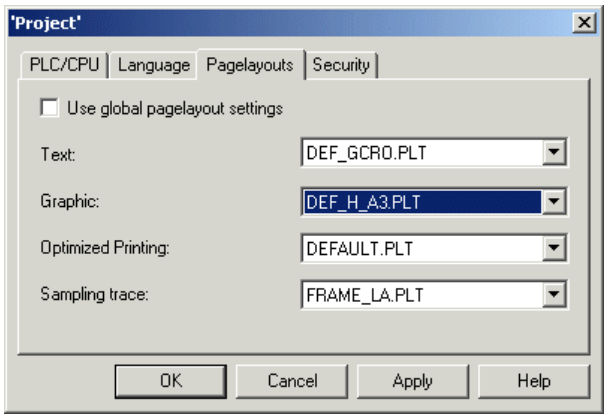
◆ Click the [Options...] command in the [Extras] menu, and the [Options] dialog box will be displayed. On this dialog box, click the [Pagelayouts] tab. The [Pagelayouts] tab window for assigning page layouts is displayed.



◆ After assigning page layout to individual worksheet as needed, click the [OK] button.

* With the version V3.2.0.0, it has become possible to save the page layout assignment settings for every project. The saved data also reflects on the zipped project.

◆ Right-click the “project” icon in the project tree and then execute the [Properties...] command. The [Project] dialog box is displayed. Click the [Pagelayouts] tab to display the following screen. When you check the “Use global pagelayouts settings” box, it becomes possible to set the page layout assignment for every project.



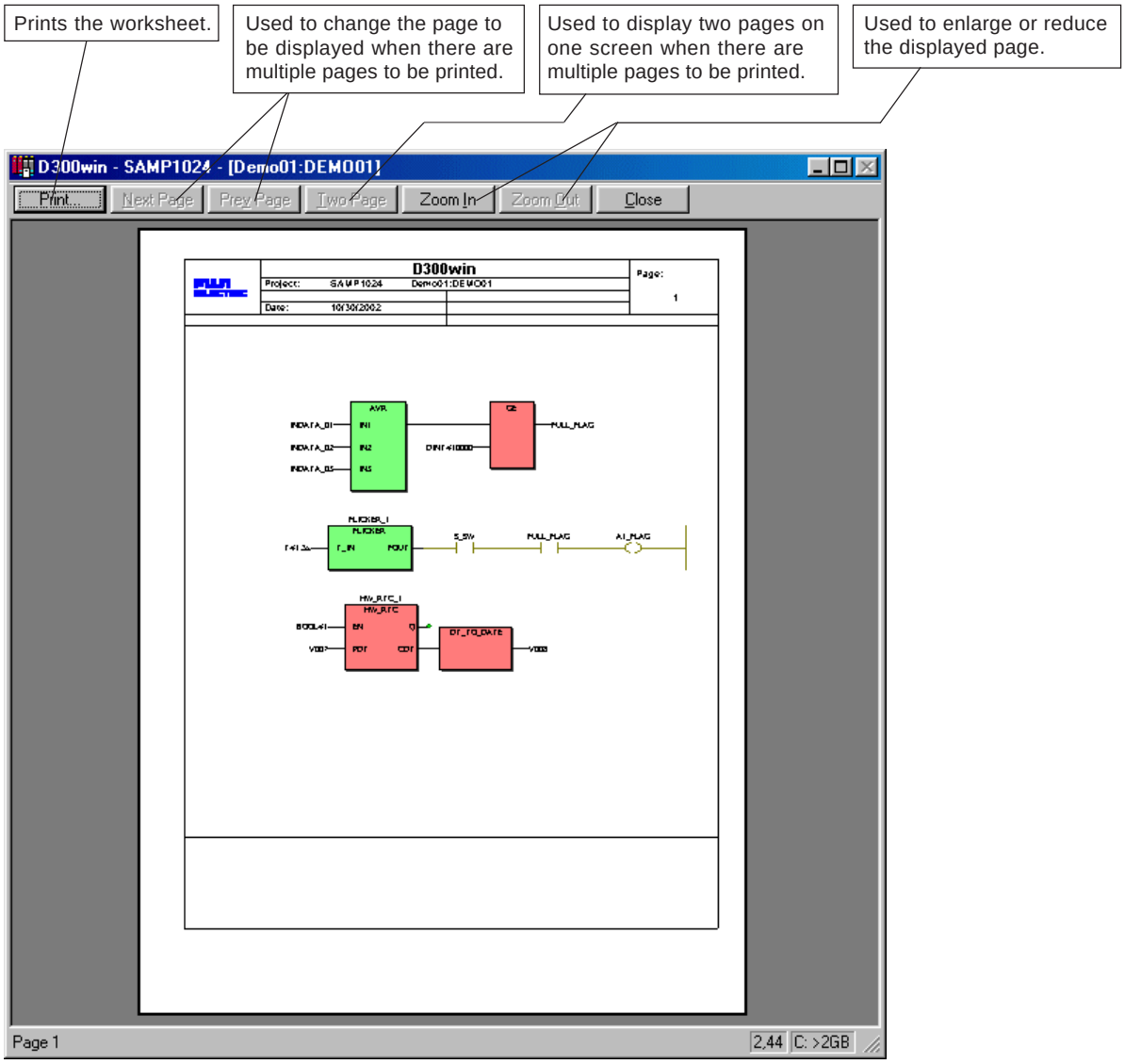
Section 12 Page Layout and Printing

12-2 Printing

12-2-3 Print preview

When page layout is selected for individual worksheet for printing, you can use the print preview function.

- ◆ Select an arbitrary worksheet and make it active.
- ◆ Click the [Print Preview] command in the [File] menu. The print preview of the selected worksheet is displayed.



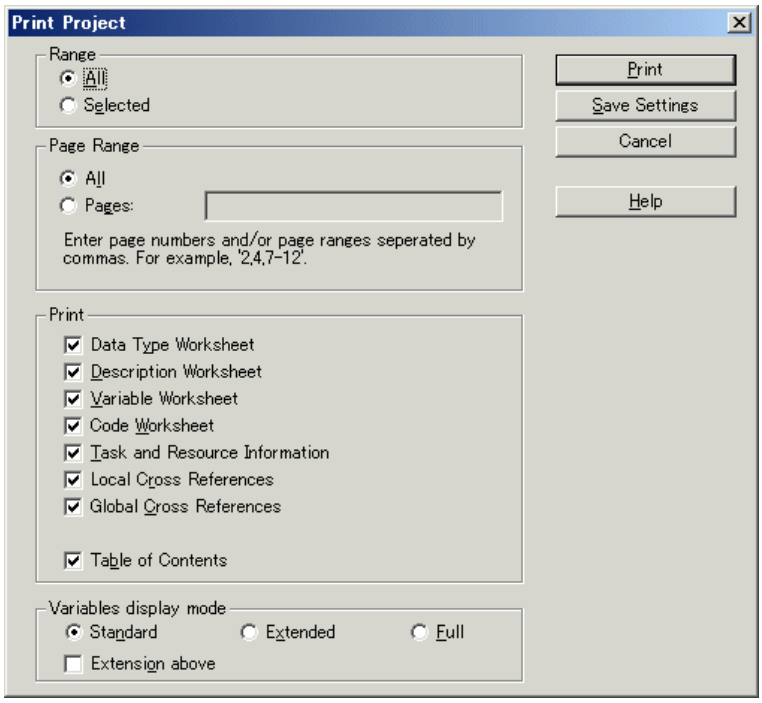
Section 12 Page Layout and Printing

12-2 Printing

12-2-4 Printing a project

Print the created project wholly or partly.

◆ Execute the [Print Project...] command in the [File] menu to display the [Print Project] dialog.



<Setting item>

Setting item	Description
Range	Specifies the range of print. All: The whole project is printed. Sheets or pages that you want to print can be selected in the "Page Range" and "Print" boxes. Selected: Only the project tree nodes that are selected before displaying this dialog are printed. Sheets or pages that you want to print can be selected in the "Page Range" and "Print" boxes. However, in the "Print" box, only "Local Cross Reference" and "Global Cross Reference" can be selected.
Page Range	Specifies pages to be printed. , (Comma): Page(s) to be prined can be specified on a page-by-page basis. (ex.) 1, 5, 8 ..... The page 1, page 5 and page 8 are printed. - (Hyphen): A range of pages to be printed can be specified. (ex.) 10-20.....Pages between page 10 and page 20 are printed.
Print	Specifies which parts of the project to print. If the [Table of Contents] checkbox is set to on, the table of printing contents is printed as the Contents on the last page.
Variable display mode	The LD/FBD worksheet allows to specify the print modes for variables. The following modes are available: "Standard", "Extended", "Full" and "Extension above". In Standard mode, only the variable name is printed. In Extended mode, the variable name and, if available, the direct address is printed. For input and output formal parameters, the data types are printed. In addition, activating/deactivating the entry 'Extension above' allows to specify whether the direct address information is printed above or below the variable name. In Full mode, the variable name and, if available, the direct address and variable comment is printed. For input and output formal parameters the data types are printed. This setting is effective only to the LD/FBD worksheet.

◆ After setting all necessary items, click the [Print] button.

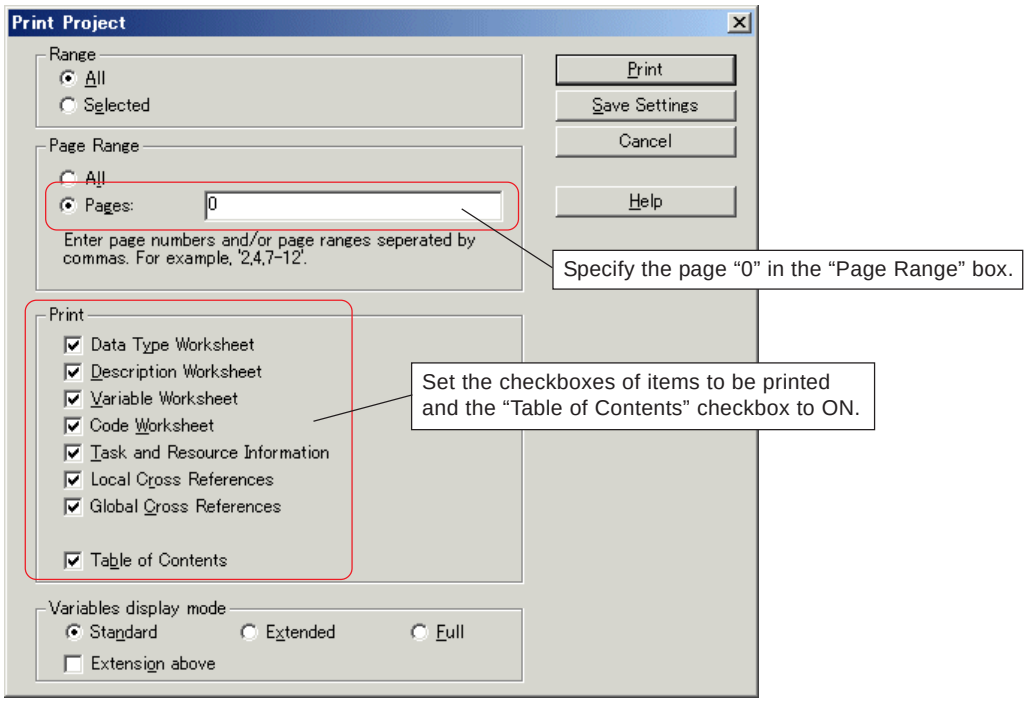
Section 12 Page Layout and Printing

12-2 Printing

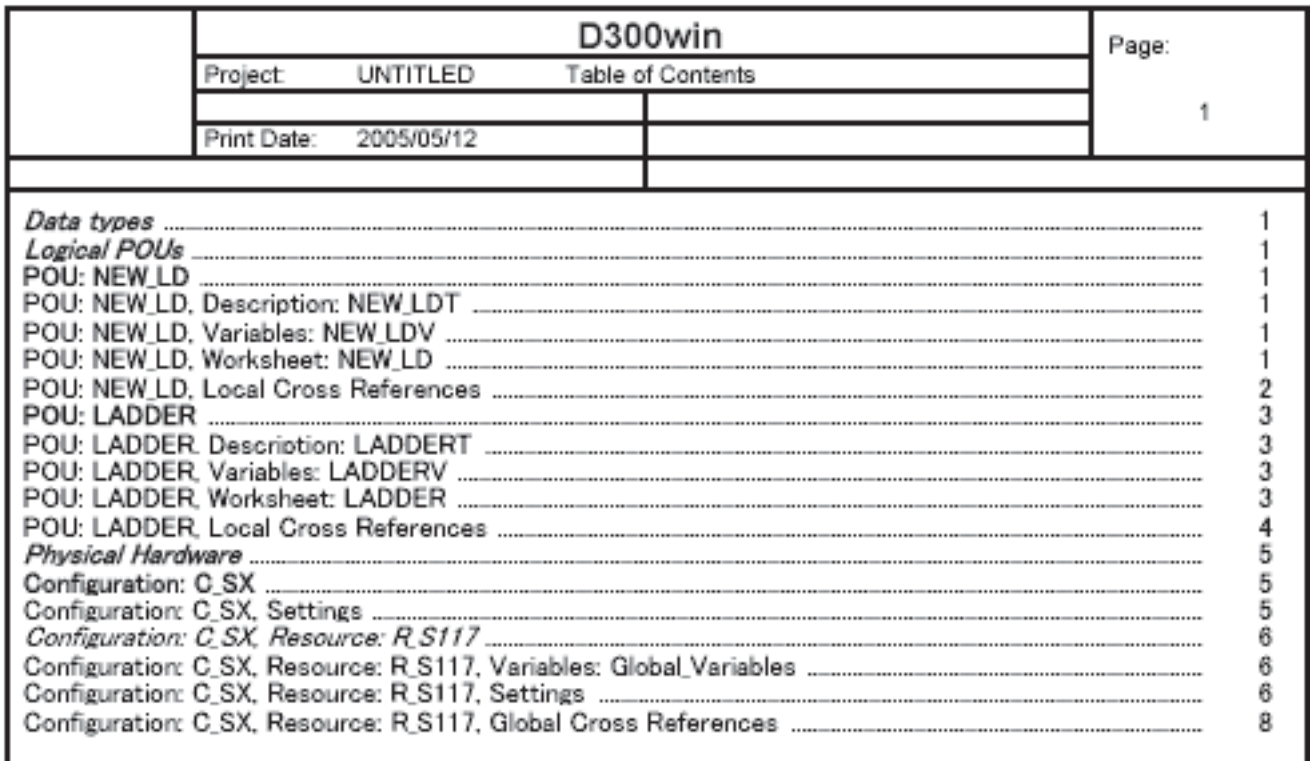
<Printing Table of Contents and specified page>

When printing a project, print the “Table of Contents” and then according to the information, necessary pages can be printed.

◆ Open the [Print Project] dialog box and make settings as shown below.



◆ After setting all necessary items, click the [Print] button. Only the table of contents is printed.



D300win

Project: UNTITLED Table of Contents

Print Date: 2005/05/12

Page: 1

Data types 1
Logical POUs 1
POU: NEW_LD 1
POU: NEW_LD, Description: NEW_LDT 1
POU: NEW_LD, Variables: NEW_LDV 1
POU: NEW_LD, Worksheet: NEW_LD 1
POU: NEW_LD, Local Cross References 2
POU: LADDER 3
POU: LADDER, Description: LADDERT 3
POU: LADDER, Variables: LADDERV 3
POU: LADDER, Worksheet: LADDER 3
POU: LADDER, Local Cross References 4
Physical Hardware 5
Configuration: C_SX 5
Configuration: C_SX, Settings 5
Configuration: C_SX, Resource: R_S117 6
Configuration: C_SX, Resource: R_S117, Variables: Global_Variables 6
Configuration: C_SX, Resource: R_S117, Settings 6
Configuration: C_SX, Resource: R_S117, Global Cross References 8

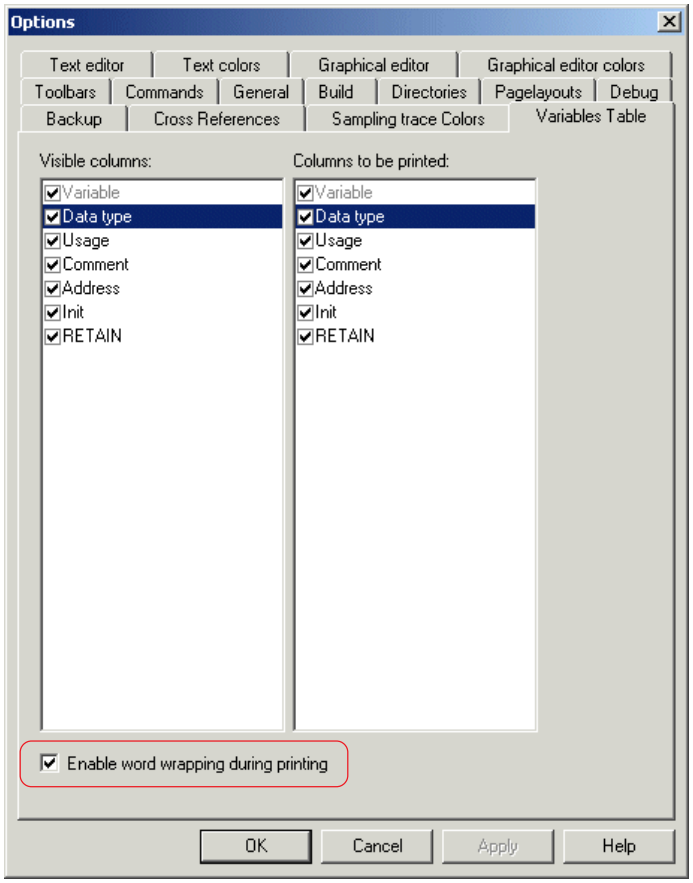
Section 12 Page Layout and Printing

12-2 Printing

12-2-5 Word wrapping during printing a variables worksheet

Specify whether or not to enable the word wrapping during printing a variables worksheet, .

◆ Execute the [Options] command in the [Extras] menu. The [Options] dialog is displayed. Click the [Variables Table] tab to display the following window.

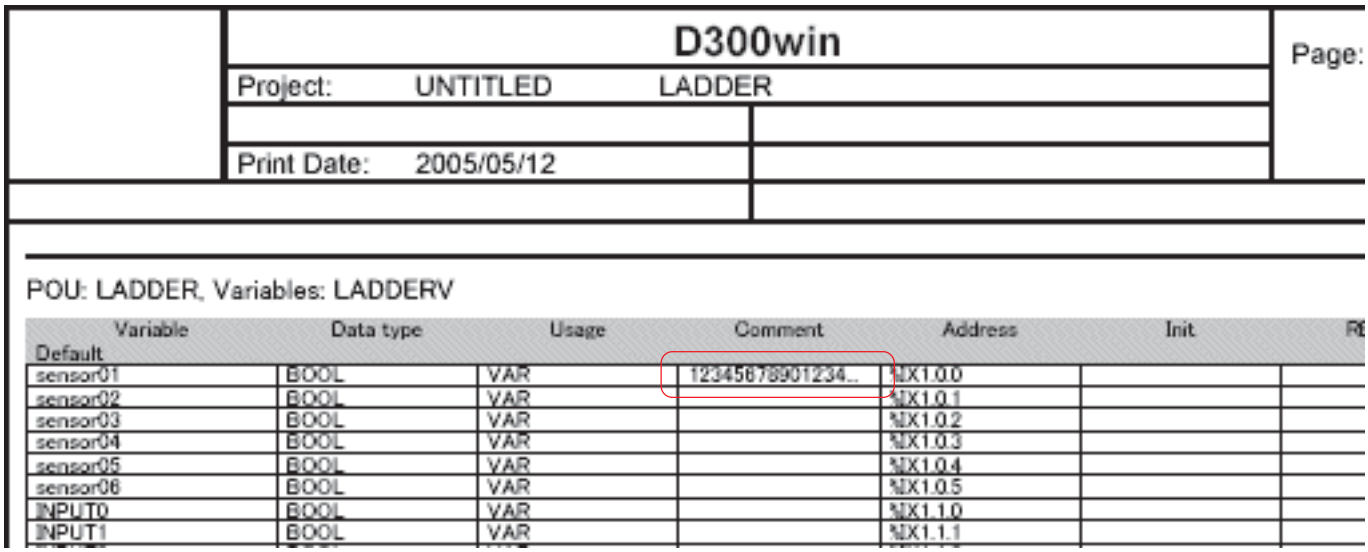


◆ If you want to perform word wrap during printing a variables worksheet, set the [Enable word wrapping during printing] checkbox to ON.

Section 12 Page Layout and Printing

12-2 Printing

<Example of printing when word wrapping is enabled>



D300win

Page:

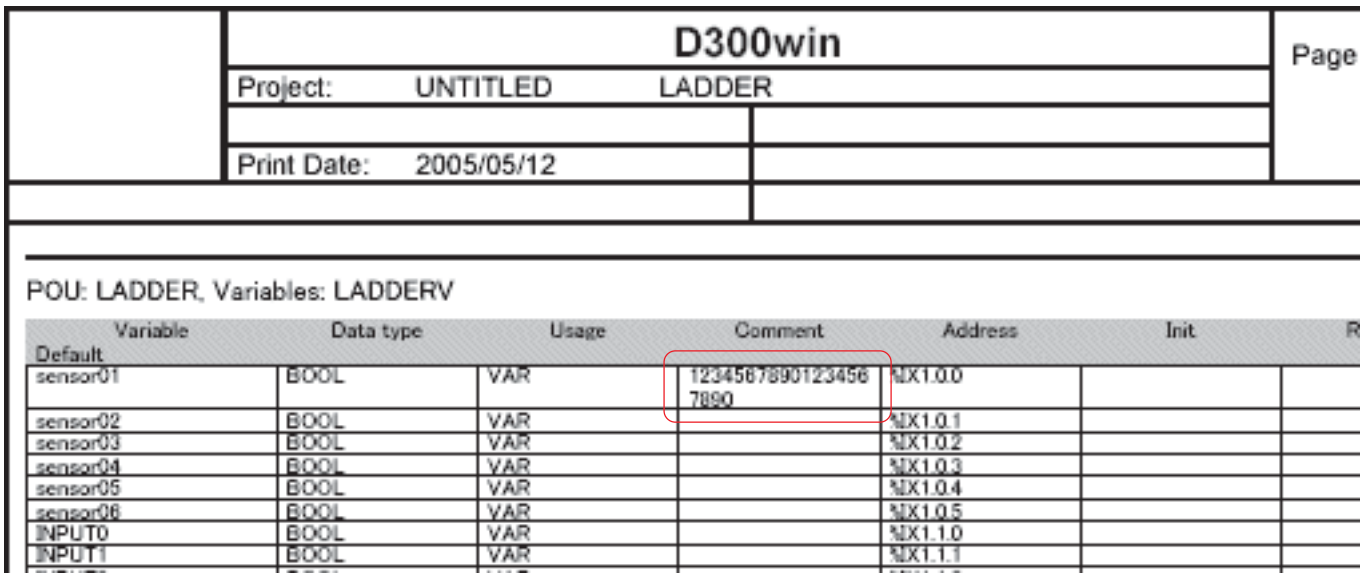
Project: UNTITLED LADDER

Print Date: 2005/05/12

POU: LADDER, Variables: LADDERV

Variable	Data type	Usage	Comment	Address	Init	Default
sensor01	BOOL	VAR	12345678901234..	%IX1.0.0		
sensor02	BOOL	VAR		%IX1.0.1		
sensor03	BOOL	VAR		%IX1.0.2		
sensor04	BOOL	VAR		%IX1.0.3		
sensor05	BOOL	VAR		%IX1.0.4		
sensor06	BOOL	VAR		%IX1.0.5		
INPUT0	BOOL	VAR		%IX1.1.0		
INPUT1	BOOL	VAR		%IX1.1.1		

<Example of printing when word wrapping is disabled>



D300win

Page

Project: UNTITLED LADDER

Print Date: 2005/05/12

POU: LADDER, Variables: LADDERV

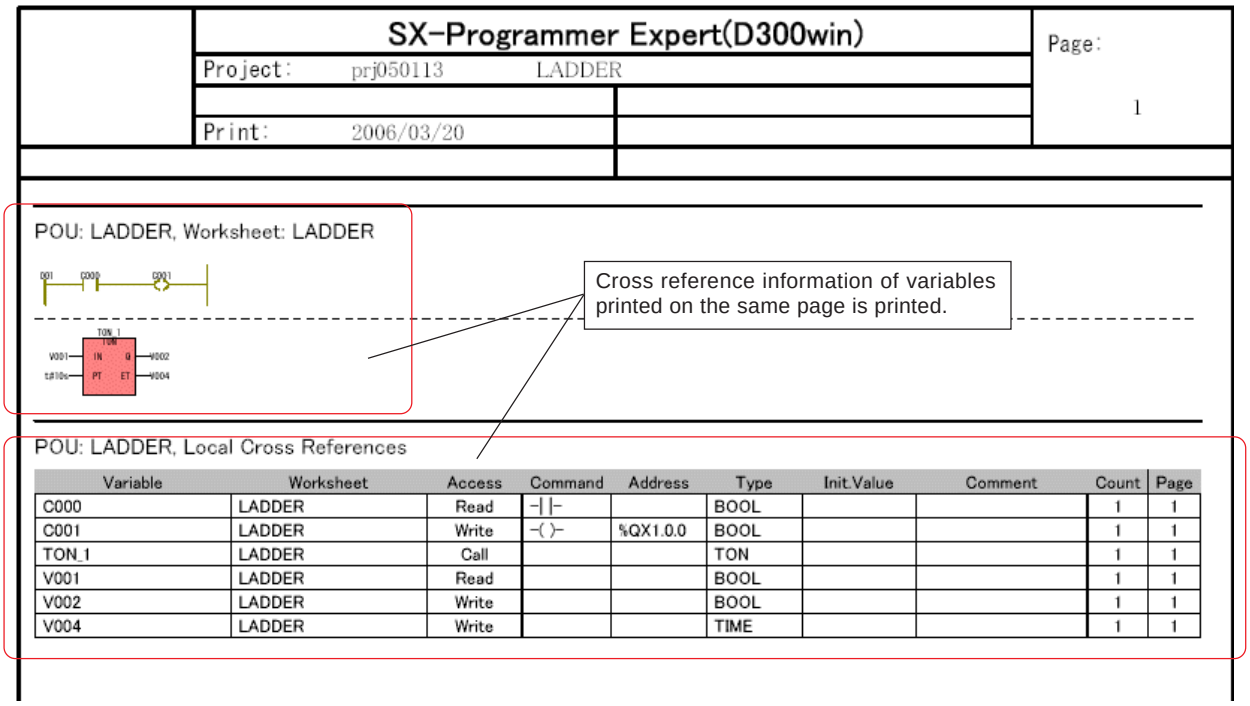
Variable	Data type	Usage	Comment	Address	Init	Default
sensor01	BOOL	VAR	12345678901234567890	%IX1.0.0		
sensor02	BOOL	VAR		%IX1.0.1		
sensor03	BOOL	VAR		%IX1.0.2		
sensor04	BOOL	VAR		%IX1.0.3		
sensor05	BOOL	VAR		%IX1.0.4		
sensor06	BOOL	VAR		%IX1.0.5		
INPUT0	BOOL	VAR		%IX1.1.0		
INPUT1	BOOL	VAR		%IX1.1.1		

Section 12 Page Layout and Printing

12-2 Printing

12-2-6 Printing a program with cross reference (V3.3.3.0 or later)

When printing a project, cross reference information is printed on the same page as the program.

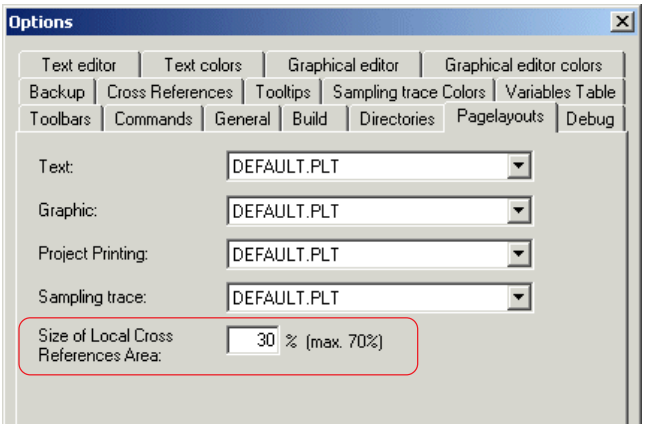


Variable	Worksheet	Access	Command	Address	Type	Init.Value	Comment	Count	Page
C000	LADDER	Read	-||-		BOOL			1	1
C001	LADDER	Write	-( )-	%QX1.0.0	BOOL			1	1
TON_1	LADDER	Call			TON			1	1
V001	LADDER	Read			BOOL			1	1
V002	LADDER	Write			BOOL			1	1
V004	LADDER	Write			TIME			1	1

<Setting size of printout>

Set the size of printout of cross reference on the print data output area.

◆ Execute the [Options...] command in the [Extras] menu to display the [Options] dialog box. Click the [Pagelayouts] tab. The following window will be displayed.



◆ Set the size of printout of cross reference on the print data output area in the range of 0 to 70%. When the size is set to 0%, cross reference information is printed on the next page of the one where the program is printed. If cross reference information is too large to print on one page, the overflowing information is continued on the next page.

Section 13 Auxiliary Functions

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(3) POU protection 13-7
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Section 13 Auxiliary Functions

13-1 Static Analysis

Static Analysis is an external tool that allows to analyze the items for an application program that cannot be checked during compilation. The unit of analysis is “project.” That means, all configurations and resources contained in the project are subject to analysis.

13-1-1 Analysis items

The Static Analysis function can check the items listed below.

<List of Analysis items>

Analysis item	Description
Multiple write check	Detects multiple writing for a variable or direct address. When "Multiple write check" for the [Check by each size prefix] group is set ON from the [Change for analysis items] dialog, multiple writing is not detected even if word writing at a certain address and bit writing in the same word have been both carried out.
Read only	Detects a read-only variable (no writing) or the direct address (other than I/O). When "Read only" is set ON for the [Check by each size prefix] group, word and bit accesses to the same address do not interfere with each other.
Write only	Detects a write-only variable (no reading) or the direct address (other than I/O). When "Write only" is set ON for the [Check by each size prefix] group, word and bit accesses to the same address do not interfere with each other.
Alias variables	Detects multiple variables with AT specifications at the same address. When "Alias variables" is set ON for the [Check by each size prefix] group, alias declaration for the same address is not detected even if word- and bit-unit AT specifications are overlapped.

<Analysis Options>

The [Change for analysis items] dialog allows to select the options listed below.

Option item	Description
IQ address	Checking this item causes to detect multiple writing to the input memory (%I) or output memory (%Q).
Non-retain memory address	Checking this item causes to detect multiple writing to the variable with AT specification in non-retained (standard) memory and to the direct address specification in non-retained (standard) memory.
Retain memory address	Checking this item causes to detect multiple writing to the variable with AT specification in retained memory and to the direct address specification in retained memory.
Address with CPU No.	Checking this item causes to detect multiple writing to the address with CPU number added (see note).
Variables	Checking this item causes to detect multiple writing to local and global variables. This does not apply to SFC automatic creation variables when SFC language is used.
Reset instruction is not treated as writing.	Checking this item causes a reset instruction not to be treated for writing.

Note: When accessing data between multi-CPU systems or addressing memory such as P/PE link, specify the module CPU number succeeding the memory prefix (such as %MW or %MX).

Section 13 Auxiliary Functions

13-1 Static Analysis

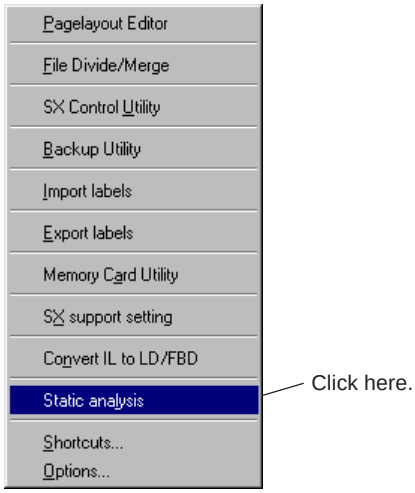
13-1-2 Static analysis procedure

Static analysis is carried out for a project whose compilation has normally completed. The Static Analysis function is provided as one of D300win external tools.

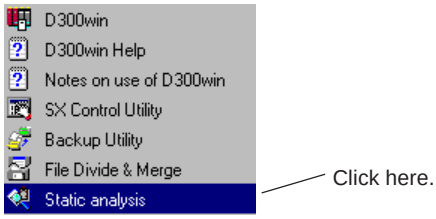
(1) Basic operation

◆ Start Static Analysis in one of two ways:

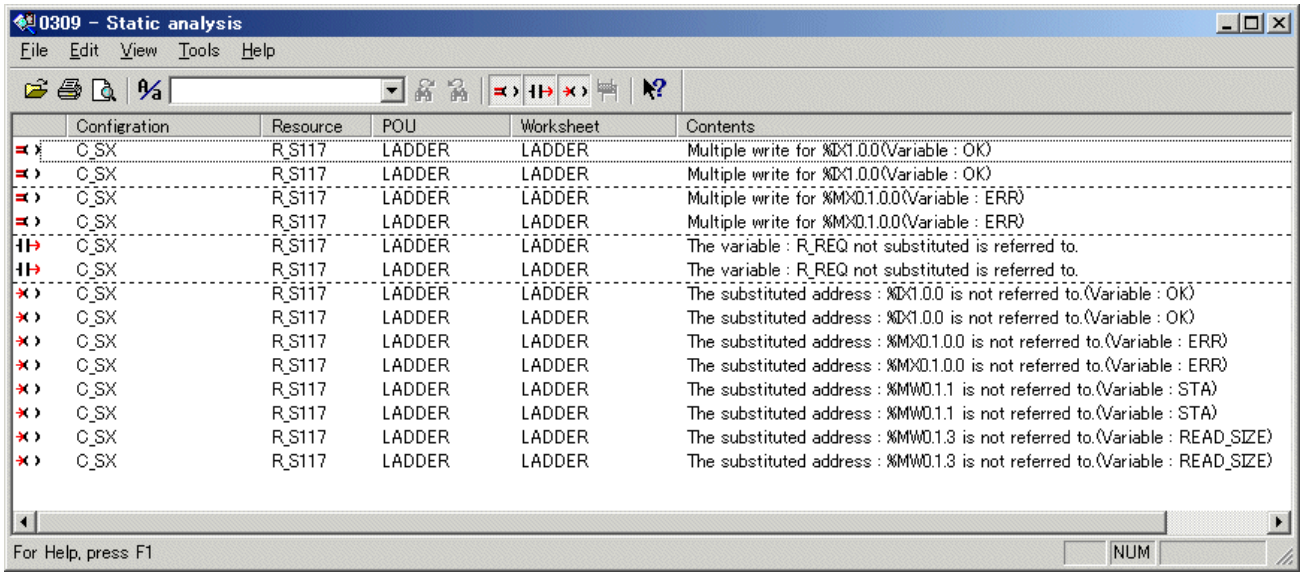
<Starting procedure 1>
From the D300win [Extras] menu, click [Static analysis].



<Starting procedure 2>
Click the Windows [Start] button. Click [D300win] from the [Programs] menu displayed and click "Static Analysis" from the D300win program group.



The Static Analysis screen appears.

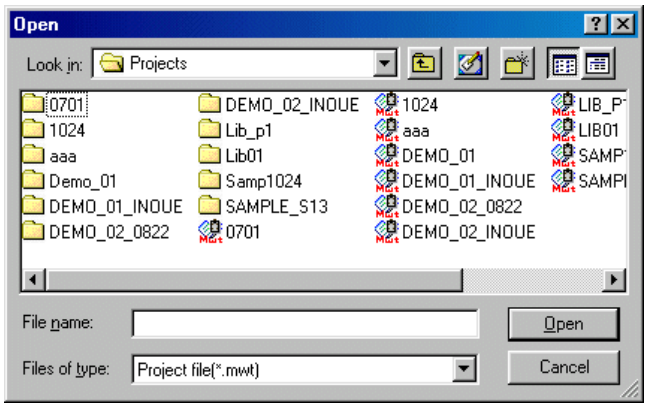


Note: When "Static Analysis" is started from the D300win expansion menu, Static Analysis is carried out for the project currently being open.

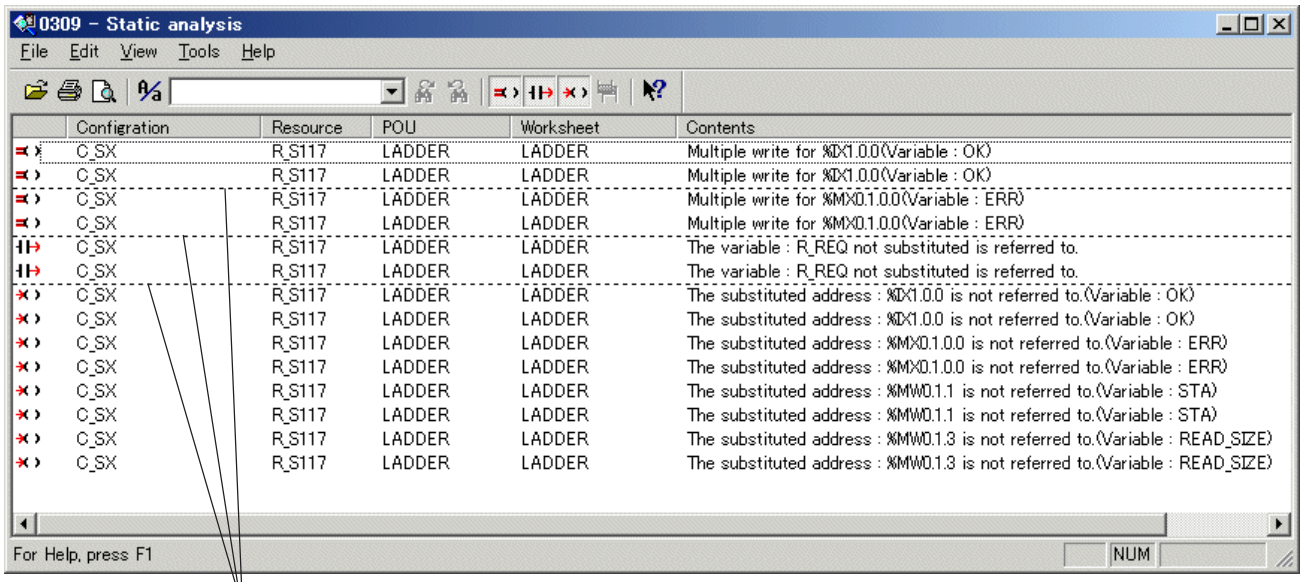
Section 13 Auxiliary Functions

13-1 Static Analysis

◆ Then, open the project to be analyzed by Static Analysis.
From the [File] menu for the [Static Analysis] dialog, click [Open...] to display the [Open] dialog.



◆ Select the project and click the [Open] button to start Static Analysis. When the analysis has completed, the analysis results appear.

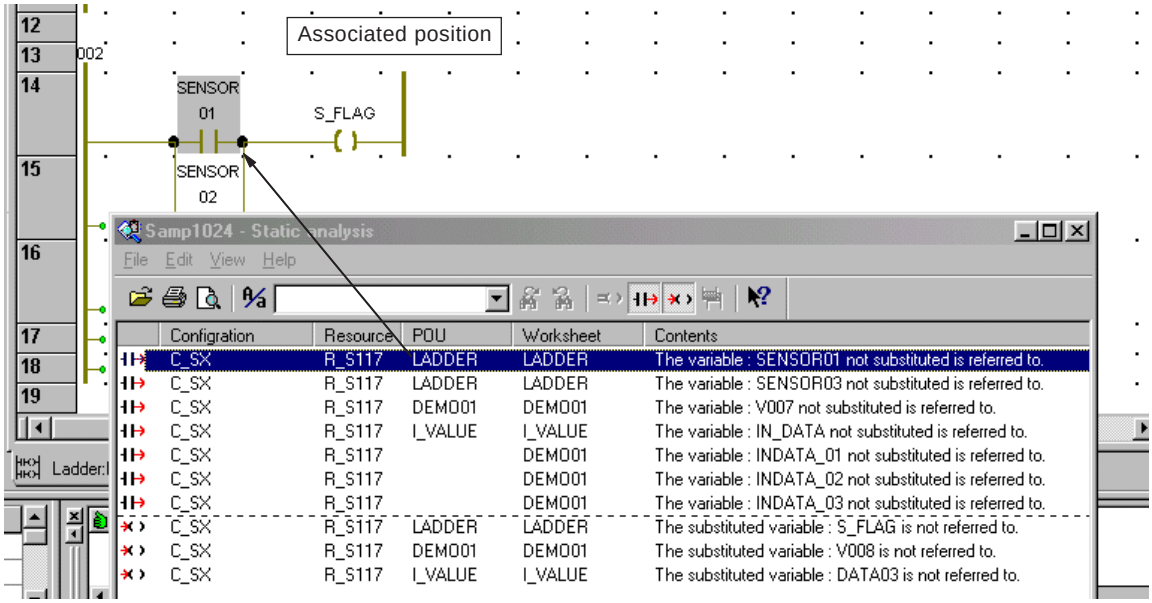


In the analysis results, “multiple writing” and “Alias variables” group are separated from analysis items by a dotted line.

Section 13 Auxiliary Functions

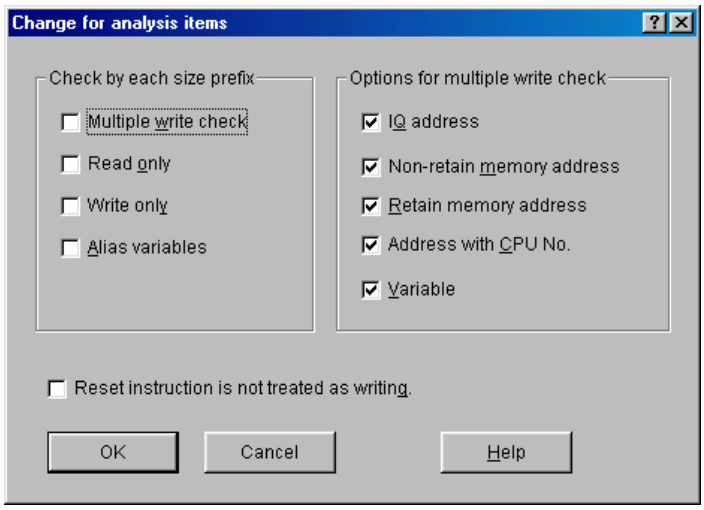
13-1 Static Analysis

◆ After starting D300win, double click on a line in the analysis results or select a line in the analysis results and press the <Enter> key to jump to the associated position in the project.



(2) Changing analysis item

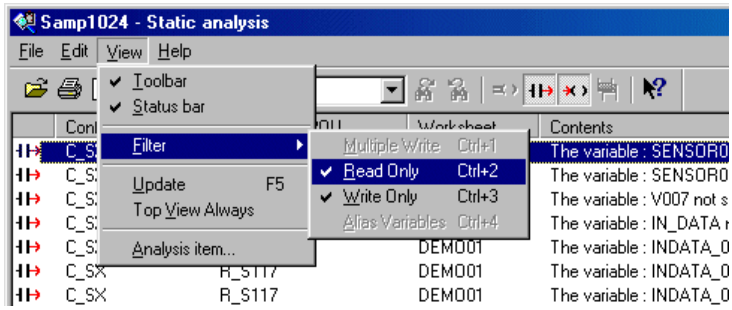
◆ Selecting [View] g [Analysis items...] displays the [Change for analysis items] dialog. Set the analysis items and click the [OK] button.



(3) Changing display items

When there are many items in the analysis results, displayed items can be reduced by selecting the type.

◆ From the [View] menu. selecting [Filter] displays the display filter as shown below. Only the checked items are displayed. Items not related to the analysis results cannot be checked.



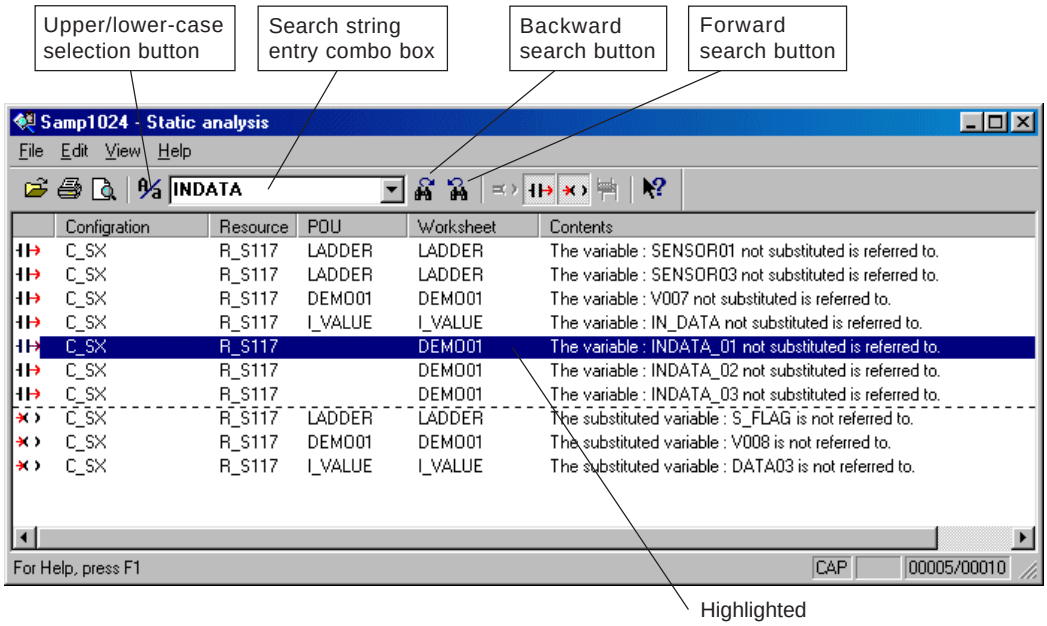
Section 13 Auxiliary Functions

13-1 Static Analysis

(4) Search function

This function allows to search a character string from the analysis results.

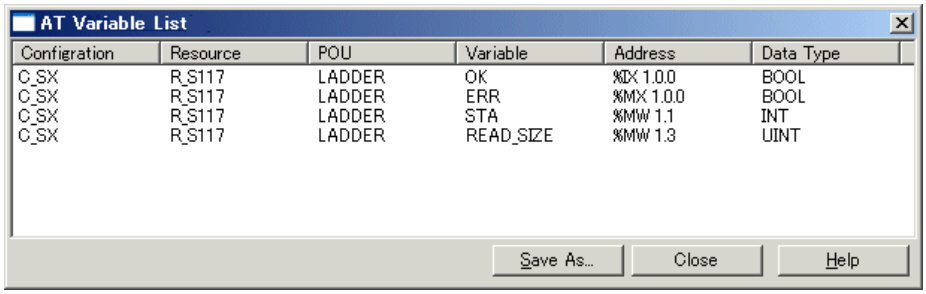
◆ Click the search string entry combo box or press the <Ctrl> + <F> keys to enable string entry. After entering a character string, clicking the backward or forward search button highlights the searched character strings.



(5) AT variable list

Configuration names, resource names, POU names, variable names, addresses, and data types of variables assigned an address on the variables worksheet are displayed.

◆ Execute the [AT Variable List...] command in the [Tools] menu to display the [AT Variable List] dialog.



<Precautions for using Static Analysis>

1) For other element variables (variables with user-defined structure/array data type), only “Alias variables” are checked and none of “Multiple write check”, “Read only” and “Write only” are checked.
2) Static Analysis is carried out only for compiled objects.
   Projects with compilation errors cannot be analyzed.
3) For functional block control statements (such as FOR statement) in ST language, multiple write instructions may be created as the results of compilation. Therefore, multiple writing may be displayed in the analysis results.
4) For SFC language, action variables may be displayed as multiple writing in the analysis results.

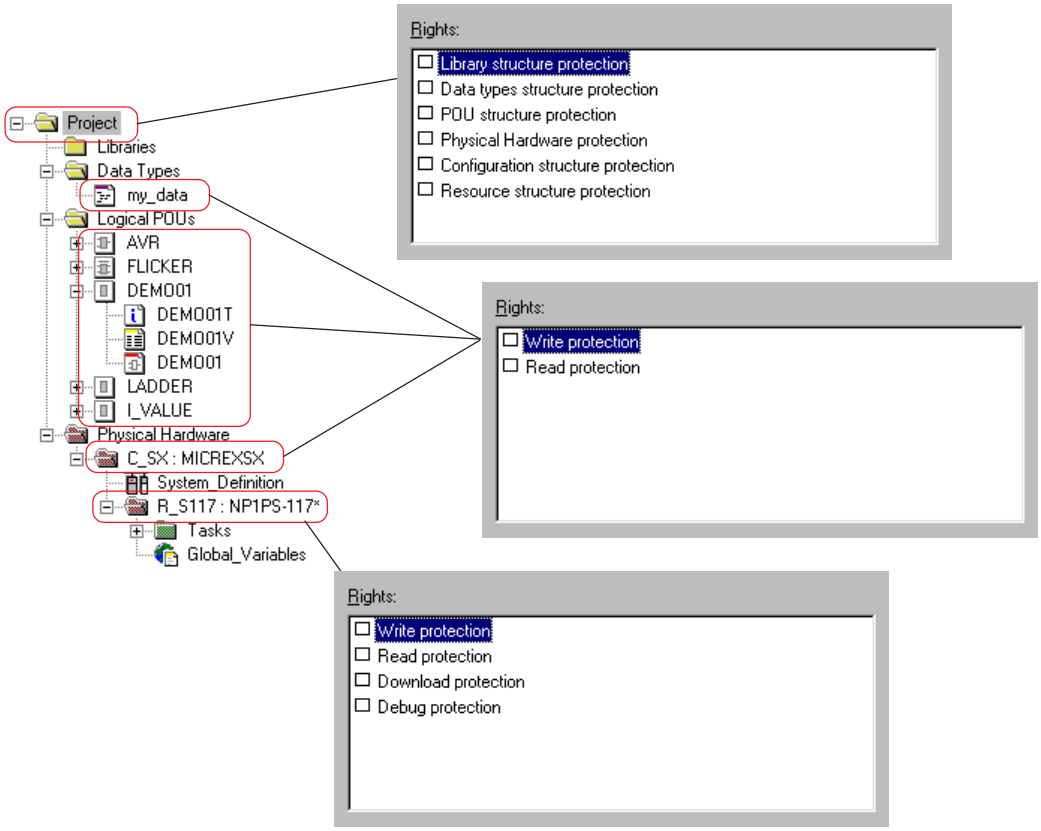
Section 13 Auxiliary Functions

13-2 Security Function

The D300win security function protects the project using a password. By setting a password, this function restricts accesses to whole or part (POUs or POU worksheets) of the project.

13-2-1 Security types

The D300win security function protects data of the types shown below.



(1) Project protection

Available protection items at the project icon position in the project tree are listed below.

Item	Operation under security protection
Library structure protection	Inhibits inserting or deleting library projects.
Data type structure protection	Inhibits inserting or deleting data-type worksheets though permits modifying (editing) existing worksheets.
POU structure protection	Inhibits inserting or deleting POUs or worksheets under POUs though permits modifying POU properties or worksheets.
Physical Hardware protection	Inhibits inserting or deleting configurations or resources or tasks under them.
Configuration structure protection	Inhibits inserting or deleting configurations.
Resource structure protection	Inhibits inserting or deleting tasks in resources.

Section 13 Auxiliary Functions

13-2 Security Function

(2) Data-type worksheet protection

Item	Operation under security protection
Write protection	Inhibits modifying (editing) data-type worksheets though permits referencing. In addition, this item inhibits modifying settings from the [Properties] dialog for data-type worksheets though permits referencing them.
Read protection	Inhibits displaying data-type worksheets and opening the [Properties] dialog for data-type worksheets.

(3) POU protection

Item	Operation under security protection
Write protection	Inhibits modifying (editing) description, variable, and code worksheets in POUs though permits referencing them. In addition, this item inhibits modifying the settings in the POU [Properties] dialog though referencing the dialog.
Read protection	Inhibits displaying description, variable, and code worksheets in POUs. In addition, this item inhibits opening the [Properties] dialog for POUs.

(4) Configuration protection

Item	Operation under security protection
Write protection	1) Inhibits modifying the settings from the configuration setting dialog. 2) Inhibits deleting the structures from configurations. 3) Inhibits modifying the settings in system definitions. 4) Inhibits modifying settings from the [Properties] dialog. 5) Write protection is also set for resources in the configuration.
Read protection	1) Inhibits displaying the configuration setting dialog and system definitions. 2) Inhibits deleting structures from the configuration. 3) Inhibits copying configuration structures. 4) Inhibits displaying the [Properties] dialog. 5) Read protection is also set for resources in the configuration.

(5) Resource protection

Item	Operation under security protection
Write protection	1) Inhibits modifying the settings from the resource setting dialog. 2) Inhibits modifying the settings from the task setting dialog. 3) Inhibits modifying (editing) global variable worksheets though permits referencing them. 4) Inhibits modifying the settings from the [Properties] dialog. 5) Inhibits modifying the settings from the configuration setting dialog or system definitions for the associated configuration.
Read protection	1) Inhibits displaying the resource setting and task setting dialogs. 2) Inhibits displaying the [Properties] dialog. 3) Inhibits displaying global variable worksheets. 4) Inhibits displaying the associated configuration setting dialog and system definitions.
Download protection	Inhibits downloading to the target CPU.
Debug protection	1) Inhibits using the control dialog functions (stop, initial start, start, reset, download, upload, verify, clear, password and redundant control) 2) Inhibits modifying the settings for program control functions (SPH only). 3) Inhibits modifying the settings from the resource information dialog (SPH). 4) Inhibits modifying the contents of the calendar/watch. 5) Inhibits displaying the online debug dialog.

Section 13 Auxiliary Functions

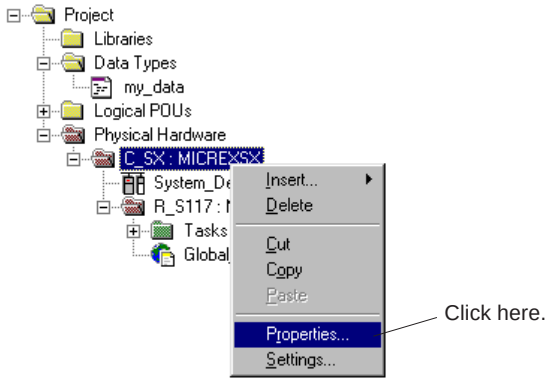
13-2 Security Function

13-2-2 Setting/releasing security

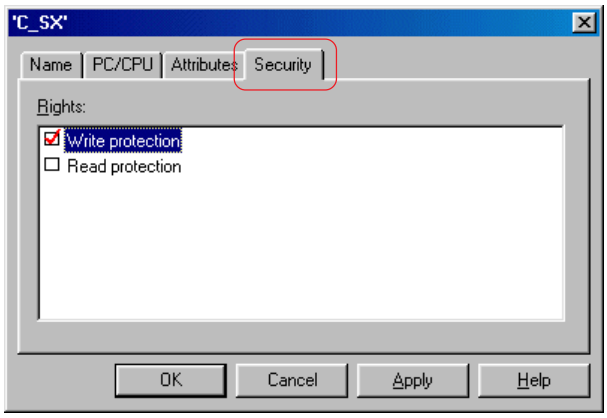
(1) Setting security

This paragraph describes how to set security for the configuration using an example.

◆ Right-click the Configuration icon from the project tree and execute the [Properties...].

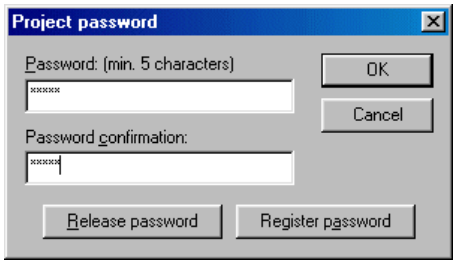


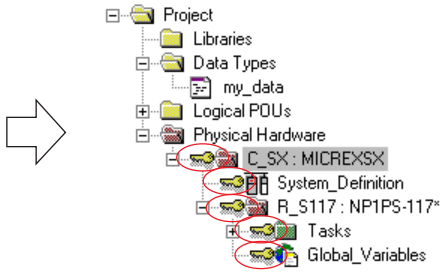
◆ The configuration properties dialog appears. From this dialog, click the [Security] tab to display the security screen.



◆ Check the check boxes ON for the items to be protected and click the [OK] button.

◆ Next, select [File] g [Project password...] to display the [Project password] dialog. From this dialog, enter any password consisting of five or more 1-byte alphanumeric characters from [Password], enter the same password from [Password confirmation] for confirmation, and then click the [Register password] button to set the security.





* An security-protected object is indicated with a key mark.

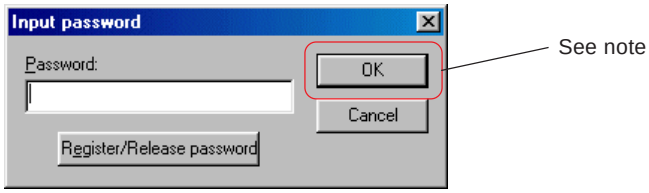
Note: When the [OK] button is clicked instead of the [Register password] button, the security function does not start immediately. It starts when the project is opened next time.

Section 13 Auxiliary Functions

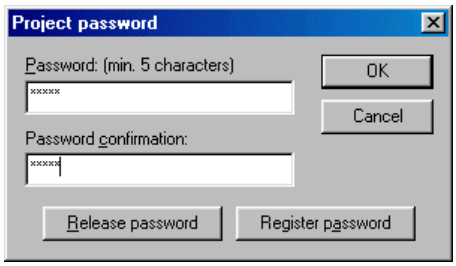
13-2 Security Function

(2) Releasing security

◆ Select [File] → [Project password] to display the [Input password] dialog.



◆ Enter the registered password and click the [Register/Release password] button to display the [Project password] dialog. From this dialog, re-enter the registered password and click the [Release password] button to release the security password.



Note: When the [OK] button is clicked instead of the [Register/Release password] button, the project security function stops immediately, but it restarts functioning when the project is opened next time.

Section 13 Auxiliary Functions

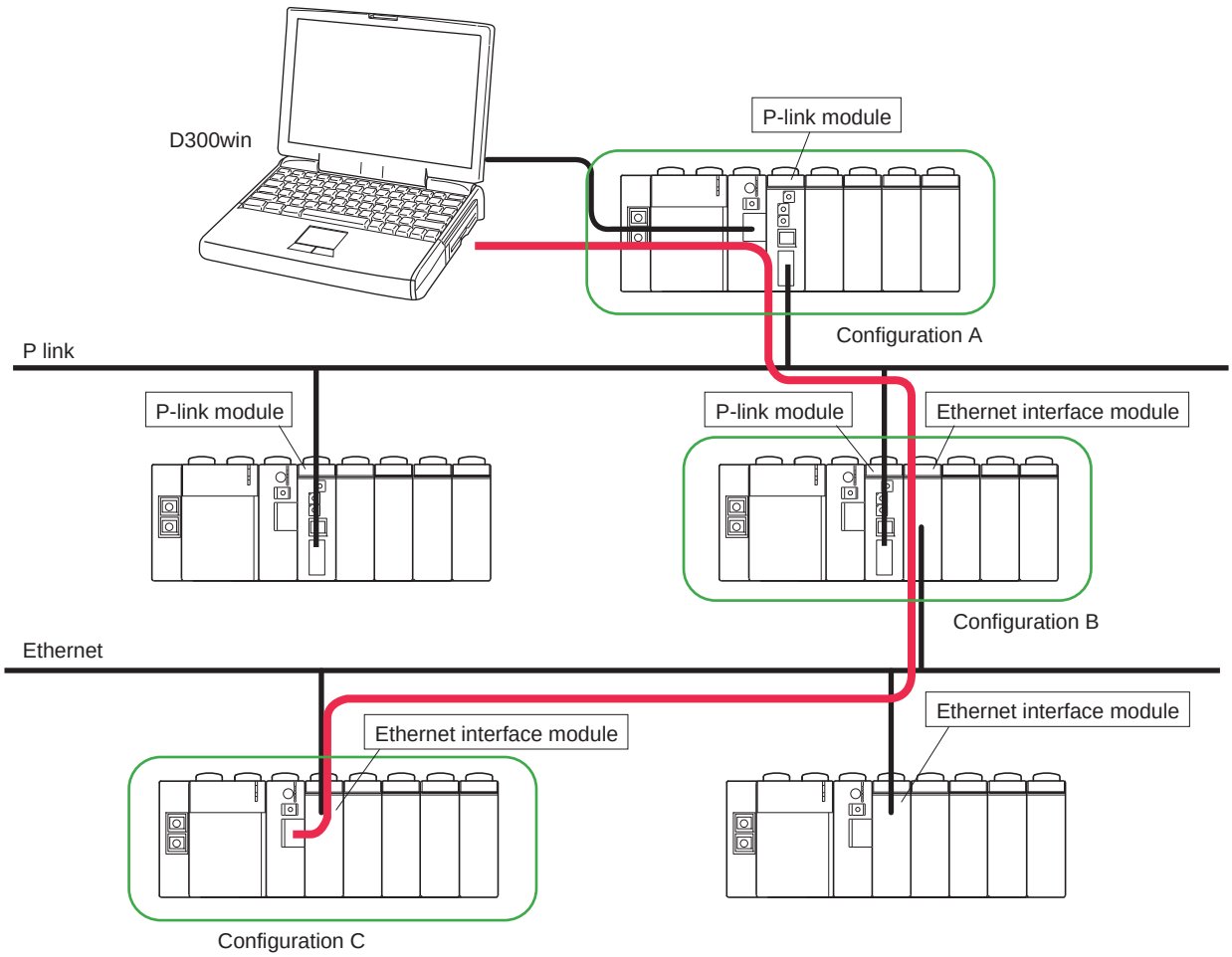
13-3 Loader Network

13-3-1 Overview of loader network function

From D300win connected to another CPU on the network, you can access to a CPU in another configuration. A maximum of two networks, each comprising up to three layers, can be configured (for simultaneous operations).

(1) Loader network configuration example

An example of a 2-layer loader network consisting of P links and Ethernet is shown below. In this example, the CPU in configuration C is accessed through configuration B from D300win connected to the CPU module in configuration A.



(2) Applicable versions

The loader network is available to the CPU and communication modules of the versions listed below.

Module	Version
High-performance CPU module	Software version V38 or up
Standard CPU module	Software version V37 or up
P-link module	Software version V33 or up
PE-link module	Software version V33 or up
FL-NET module (V1)	Software version V30 or up
FL-NET module (V2)	All versions applicable
PC card interface	Software version V31 or up
Ethernet interface	All versions applicable
General-purpose interface (RS1/RS4)	Software version V31 or up

Section 13 Auxiliary Functions

13-3 Loader Network

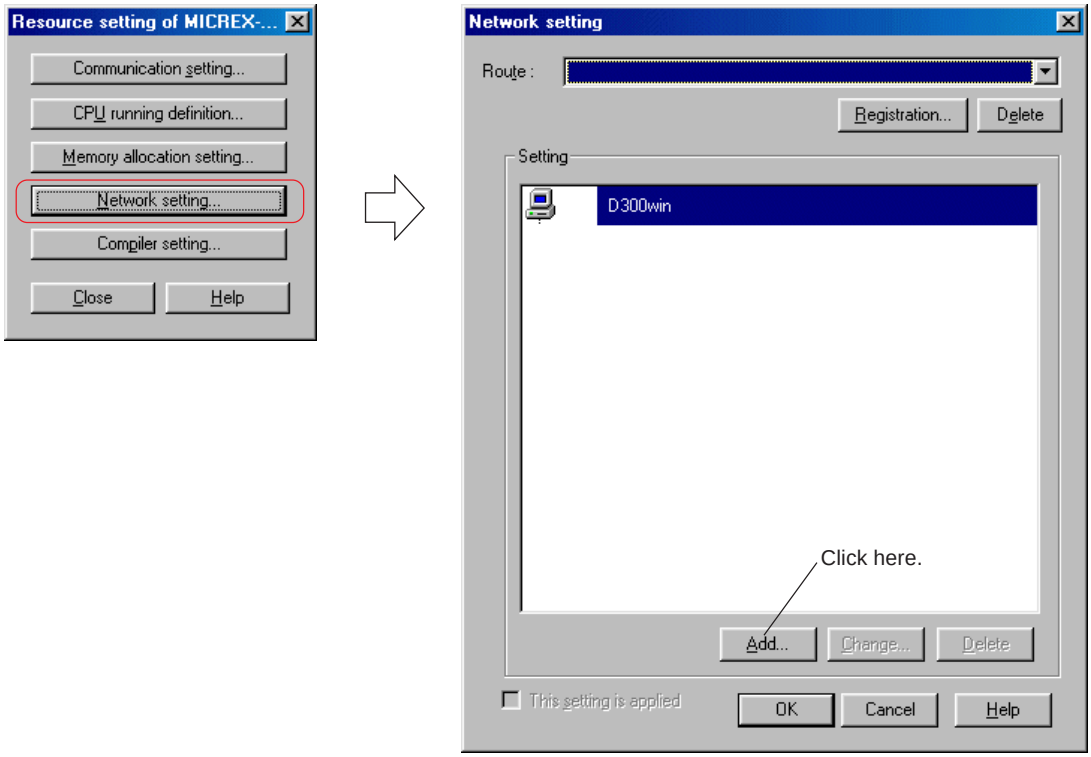
13-3-2 Setting procedures

(1) Network setting

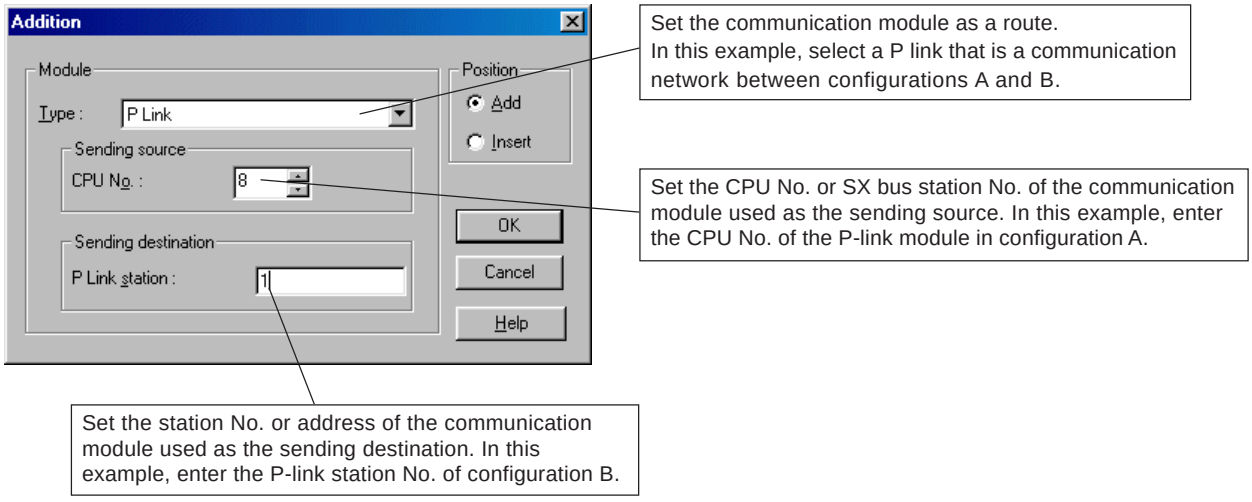
When accessing the CPU in **configuration C** through **configuration B** from D300win connected to the CPU module in **configuration A** as in the example above, sequentially set the route as (P-link module of configuration A) → (Ethernet interface module of configuration B) → (Ethernet interface module of configuration C).

Settings are necessary for the projects in configuration C but for those in configurations A and B.

◆ Right-click the resource icon (for the CPU module that communicates with D300win) from the project tree of configuration C and select [Setting...] to display the [Resource setting] dialog. From this dialog, clicking the [Network setting...] button displays the [Network setting] dialog.



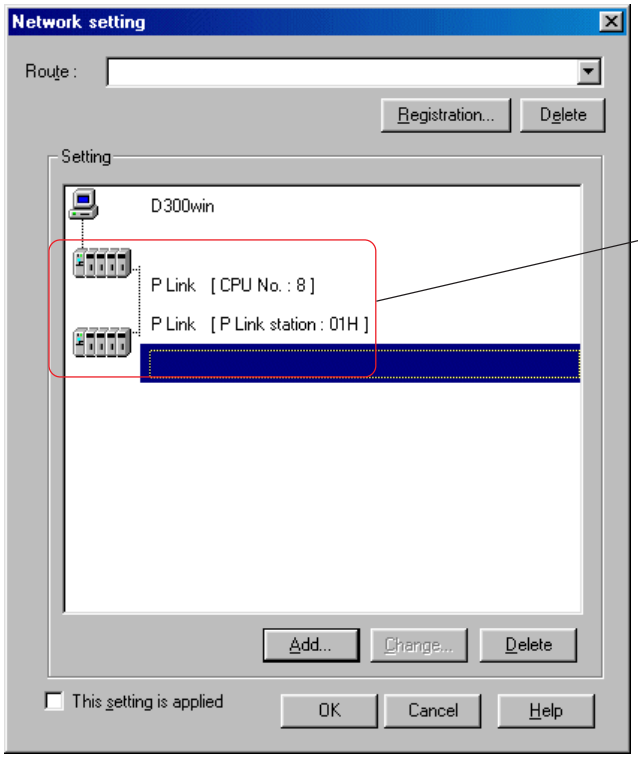
◆ From the [Network setting] dialog, click the [Add...] button to display the [Addition] dialog. First, set a P-link module as a route between configurations A and B.



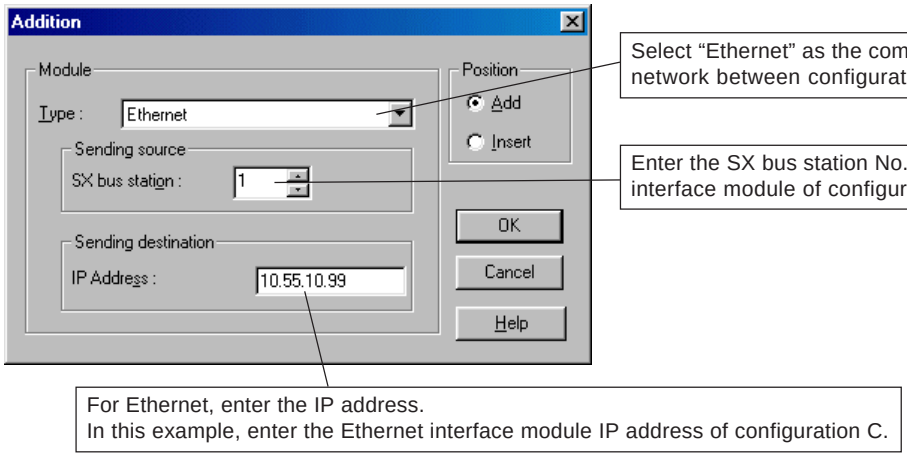
Section 13 Auxiliary Functions

13-3 Loader Network

◆ After setting the necessary items, clicking the [OK] button displays the set modules as the route.



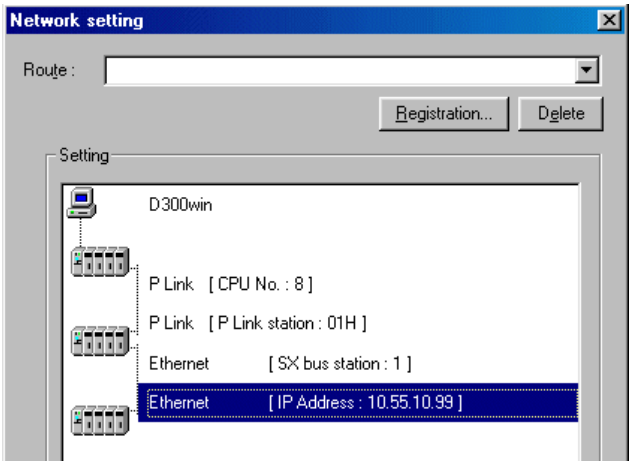
◆ In the same way, add an Ethernet interface module between configurations B and C. Clicking the [Add...] button from the [Network setting] dialog displays the [Addition] dialog.



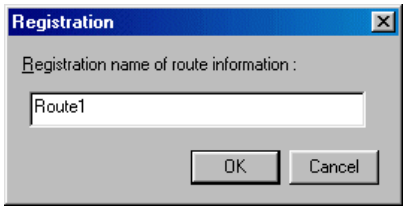
Section 13 Auxiliary Functions

13-3 Loader Network

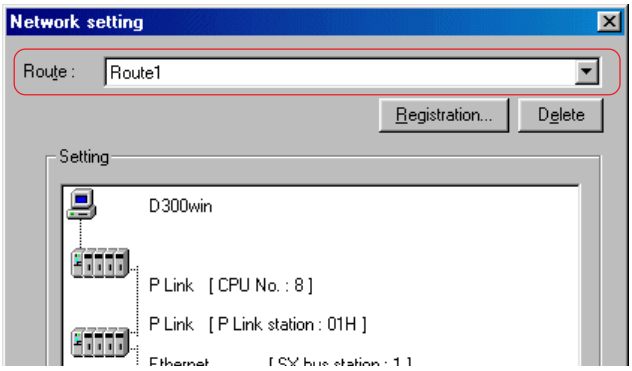
◆ After setting the necessary items, clicking the [OK] button displays the set modules as the route.



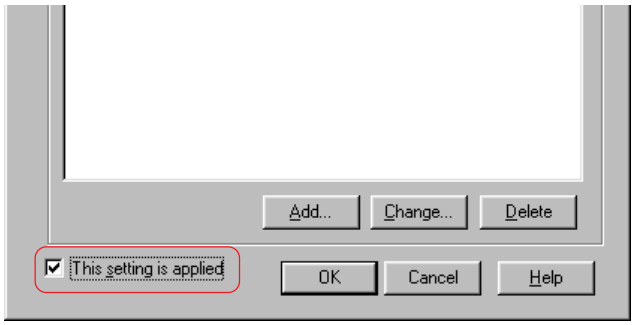
◆ Assign a name to the set route. Clicking the [Registration...] button from the [Network setting] dialog displays the [Registration] dialog. From this dialog, enter any route name and click the [OK] button.



◆ The set route is registered. It appears in the route combo box.



◆ Check the “This setting is applied” check box ON and click the [OK] button.

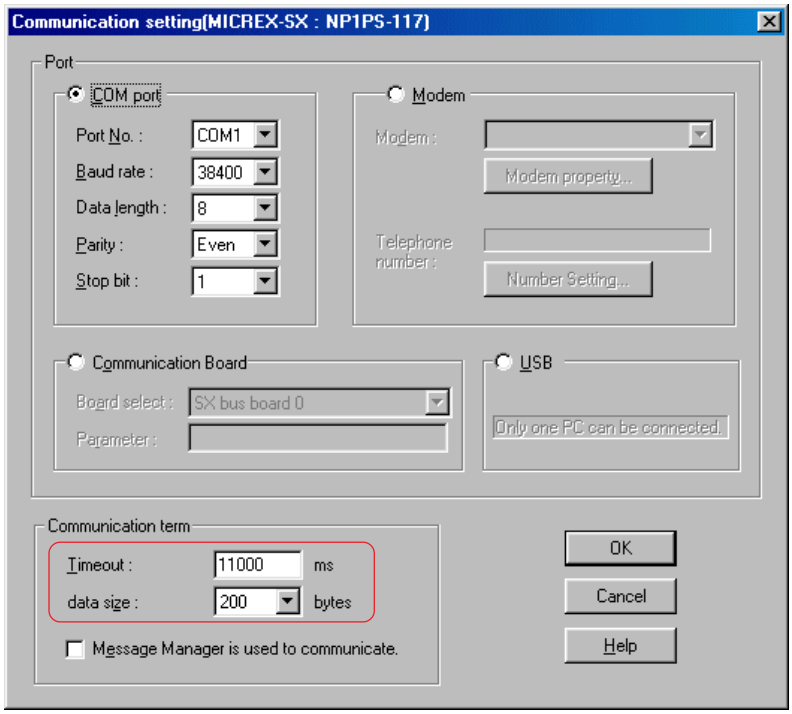


Note: If an error occurs during loader network operation
If the CPU or communication module power is reset or cables are removed from the communication route during loader network operation, D300win may enter unconnected state. In such a case, check that the communication route is normal, wait approximately 2 minutes, and retry the operation.

Section 13 Auxiliary Functions

13-3 Loader Network

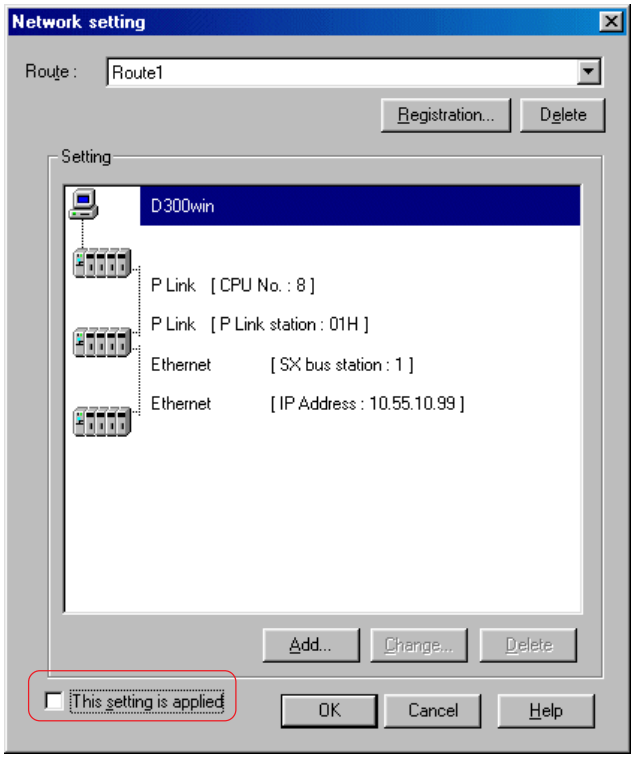
◆ Set “timeout” to 11000ms (11 seconds) or more for “Communication term” from the [Communication setting] dialog. In addition, set "data size" to 200 bytes when a P or PE link is used for the route. After setting these items, click the [OK] button.



◆ Now, setting the loader network route has completed. Opening the [Control] dialog for configuration C enables accessing to the CPU in configuration C from D300win connected to configuration A.

(2) Releasing network

◆ Open the [Network setting] dialog, check the [This setting is applied] check box OFF, and click the [OK] button to release the loader network.



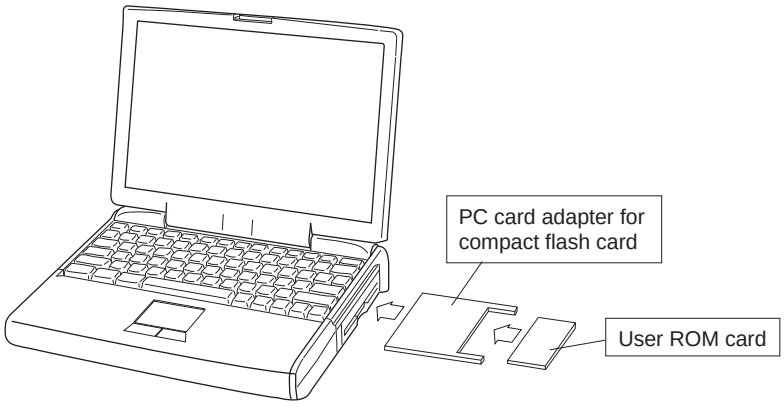
Section 13 Auxiliary Functions

13-4 Memory Card Utility

The memory card utility allows writing or reading programs to/from the memory card mounted in the personal computer PC card slot.

13-4-1 Overview of memory card utility

The memory card utility is a function for the SRAM or user ROM card mounted in the personal computer.



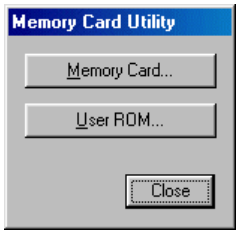
Memory card type (note)	Function
SRAM card	Writes compiled operation project (machine code) in the SRAM card mounted in the personal computer PC card slot.
User ROM (compact flash card)	For the user ROM card mounted in the personal computer PC slot, carries out maintenance operations such as project download, upload, verification, initialization, etc.

Note: SRAM card is used in the memory card interface module (NP1F-MM1). For the operation procedure, refer to the “User's Manual - Memory Card Interface Module (FEH227).” User ROM is a function for the user ROM card (compact flash card) used for high-performance CPU applicable to user ROM (NP1PS-***R).

13-4-2 Downloading to user ROM

Download the project in D300win to the user ROM mounted in the personal computer. Data that can be downloaded is programs, system definitions, ZIP files, or ZIP projects.

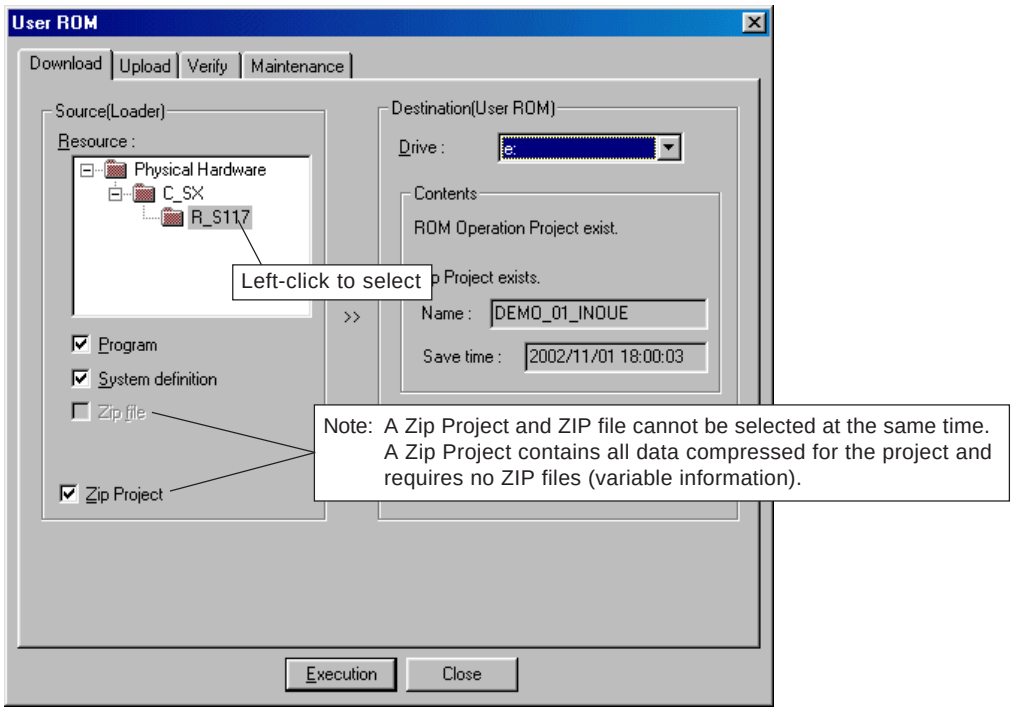
◆ Select [Extras] → [Memory Card Utility] to display the [Memory Card Utility] dialog.



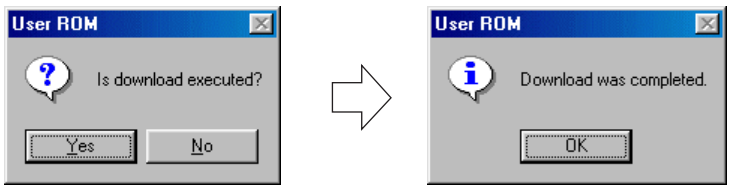
Section 13 Auxiliary Functions

13-4 Memory Card Utility

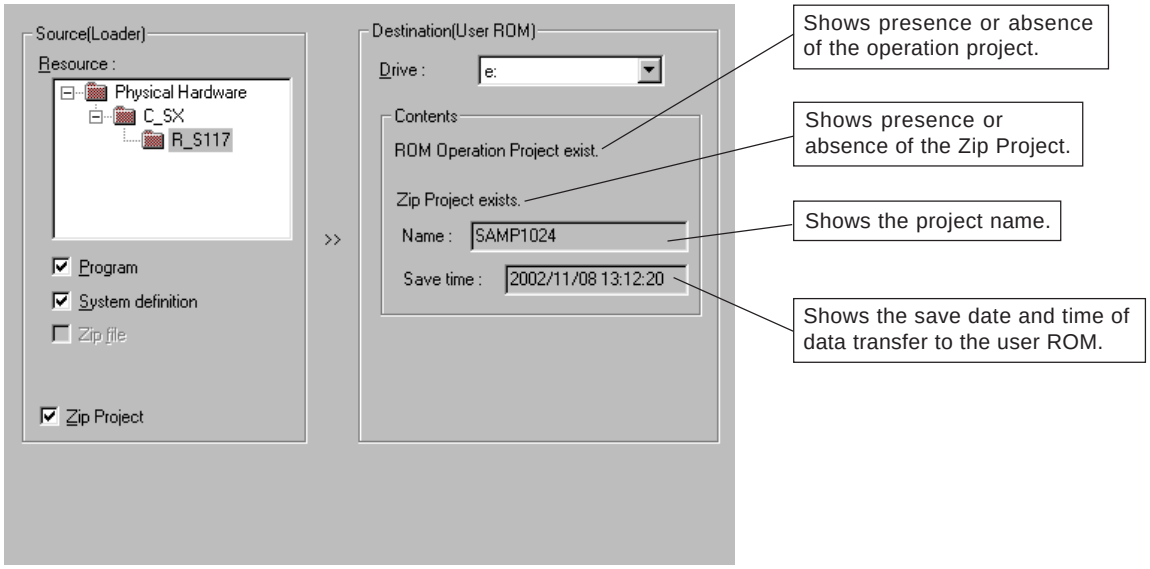
◆ Clicking the [User ROM...] button displays the [User ROM] dialog. From this dialog, select the source resource and check the check box ON for the data to be transferred.



◆ Select the destination (user ROM) drive and click the [Execution] button to display the confirmation dialog shown below. From this dialog, clicking the [Yes] button starts data transfer. When data transfer has completed, a completion message appears.



◆ The transferred “Contents” are displayed for the destination.



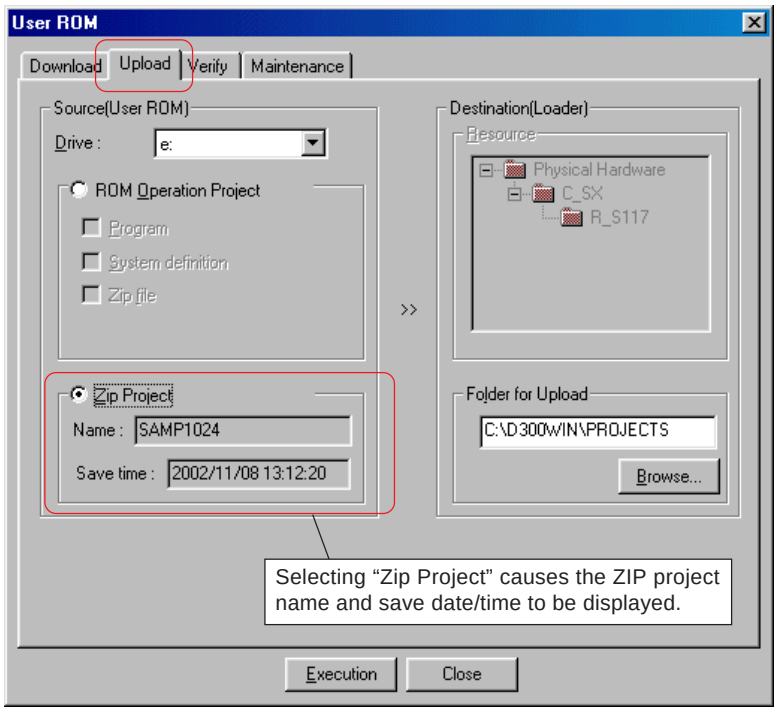
Section 13 Auxiliary Functions

13-4 Memory Card Utility

13-4-3 Uploading from user ROM

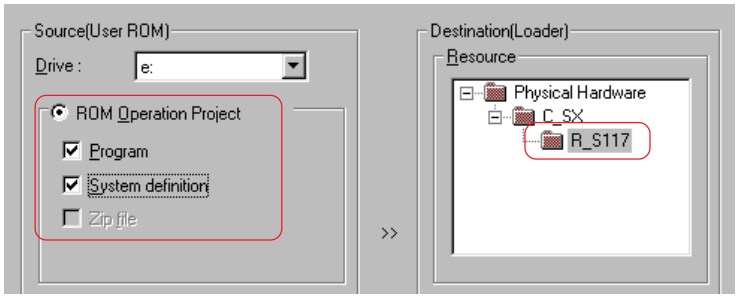
Upload data from the user ROM mounted in the personal computer to D300win. Data that can be uploaded is programs, system definitions, ZIP files, or ZIP projects.

◆ From the [User ROM] dialog, click the [Upload] tab to display the upload screen. From this screen, select the source (user ROM) drive and then select [ROM Operation Project] or [Zip Project].

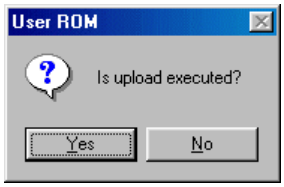


<When ROM operation project is selected>

Select the data to be uploaded and the upload destination resource.



◆ Set the transfer source and the destination folder and click the [Execution] button to display the confirmation dialog shown below. Clicking the [Yes] button starts data transfer.

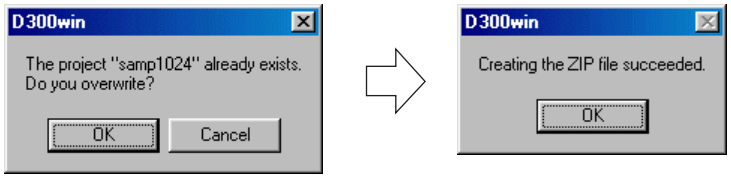


Note: Uploading is disabled when the project displayed contains no configurations or resources. Before starting upload, open a new project using the template for the resource (CPU) of the project to be read out from the [New project] dialog.

Section 13 Auxiliary Functions

13-4 Memory Card Utility

◆ If a project with the same name exists in the project destination folder, the confirmation dialog shown below appears. Clicking the [OK] button overwrites the project. Now, uploading has completed.

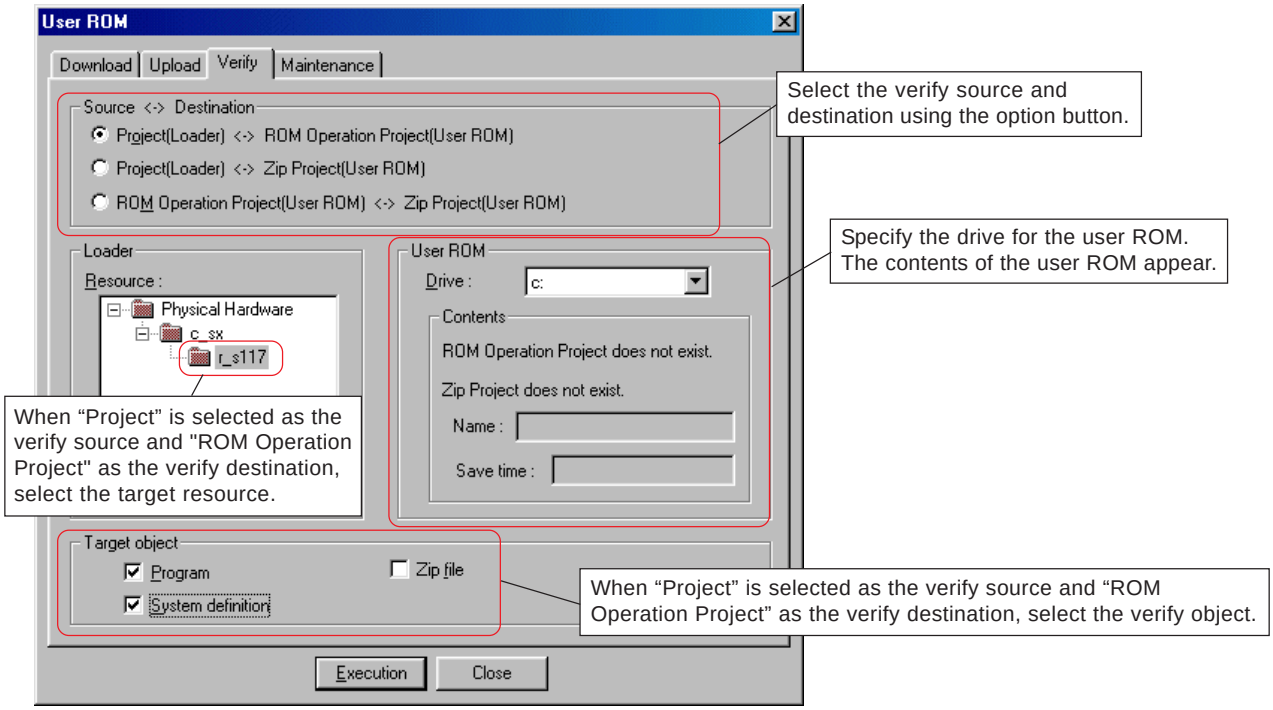


* Clicking the [Cancel] button stops uploading.

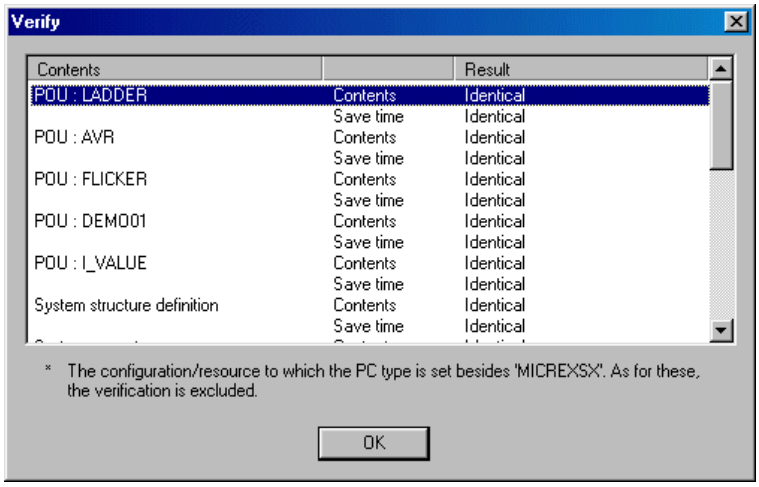
13-4-4 Verify

Verify the contents of the user ROM mounted in the personal computer with those of the project in D300win.

◆ From the [User ROM] dialog, clicking the [Verify] tab displays the verify screen.



◆ After setting the verify items, clicking the [OK] button starts verification and displays the [Verify] dialog showing the verification results.



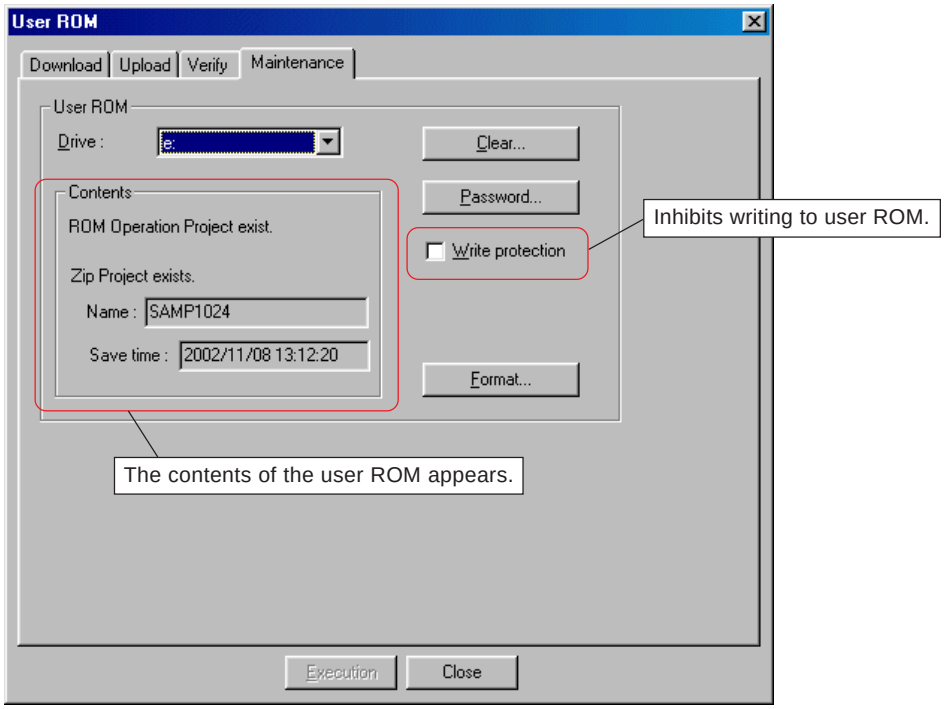
Section 13 Auxiliary Functions

13-4 Memory Card Utility

13-4-5 Maintenance

Clear or format the contents saved in the user ROM mounted in the personal computer or protect them using a password.

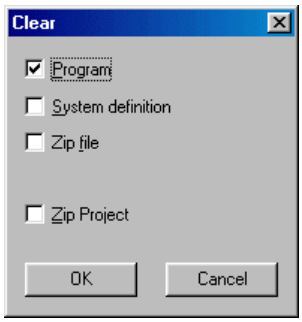
◆ From the [User ROM] dialog, clicking the [Maintenance] tab displays the maintenance screen.



(1) Clearing user ROM

Deletes the data (programs (operation projects), system definitions, Zip Files, or Zip Projects) saved in the user ROM.

◆ From the [Maintenance] screen, clicking the [Clear...] button displays the [Clear] dialog.



◆ Check the check box ON for the data to be cleared and click the [OK] button.

Section 13 Auxiliary Functions

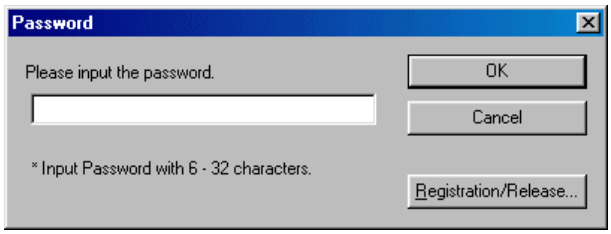
13-4 Memory Card Utility

(2) Password

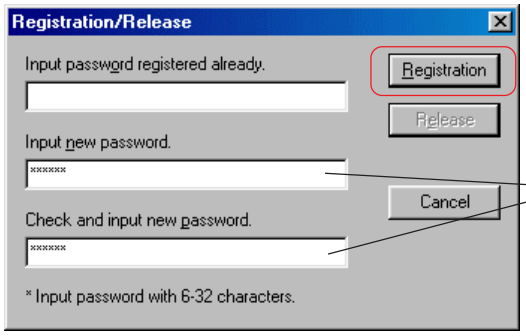
Register a password for the user ROM to inhibit download, upload, verify, write, and clear operations.

1) Registering password

From the maintenance screen, clicking the [Password...] button displays the [Password] dialog.



◆ From the [Password] dialog, clicking the [Registration/Release...] button displays the [Registration/Release] dialog. Enter a password consisting of 6 to 32 alphanumeric characters from this dialog.



Enter the same password from these two places.

Note: Upper- and lower-case characters are recognized in passwords.

◆ When the correct password has been entered, the [Registration] button is enabled. Clicking the [Registration] button displays the screen shown below.

◆ Once the [User ROM] dialog is closed and then opened, entering the password is required to carry out operations for the password-protected user ROM. Attempting to carry out operations without entering the password causes the dialog shown below to appear.

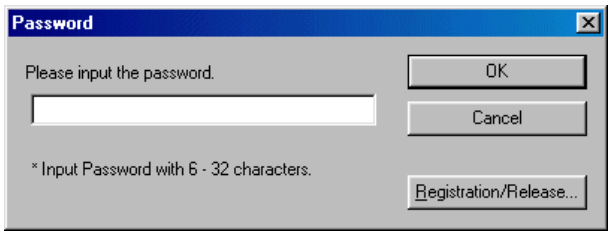
Section 13 Auxiliary Functions

13-4 Memory Card Utility

2) Entering password

Password entry is required to carry out password-protected operations.

◆ From the maintenance screen, clicking the [Password...] button displays the [Password] dialog.

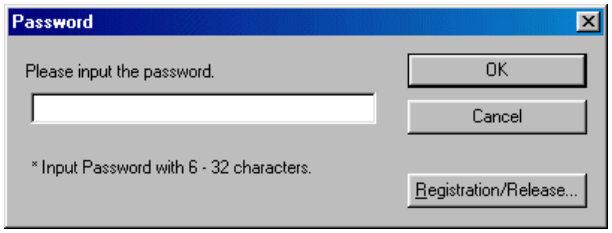


◆ Enter the password and click the [OK] button to enable password-protected operations. Note that once the [User ROM] dialog is closed, password re-entry is required to continue.

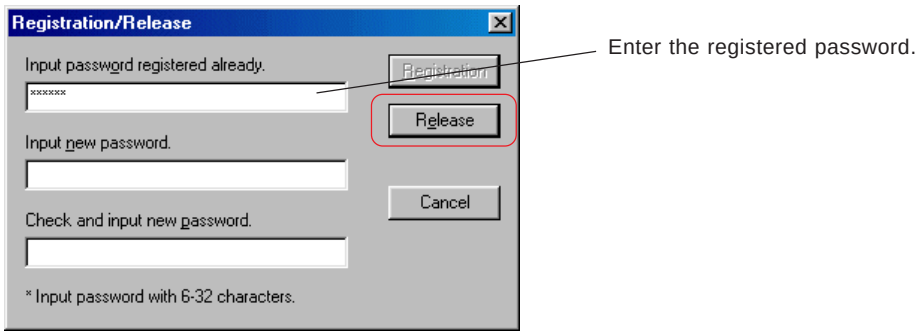
3) Releasing password

Release the registered password.

◆ From the maintenance screen, click the [Password...] button to display the [Password] dialog.



◆ From the [Password] dialog, clicking the [Registration/Release...] button displays the [Registration/Release] dialog. Enter the registered password from this dialog.
When the registered password has been correctly entered, the [Release] button is enabled.



◆ Clicking the [Release] button displays the screen shown below.

Section 13 Auxiliary Functions

13-4 Memory Card Utility

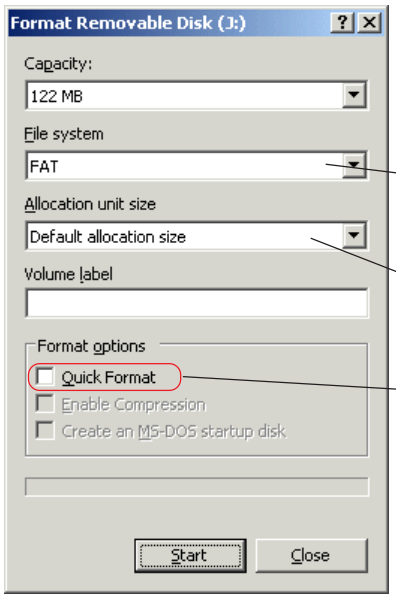
(3) Formatting

By DOS formatting or initialization, folders and files are created in the user ROM (compact flash card) so that it can be used for SX series.

◆ From the maintenance screen, clicking the [Format...] button displays the confirmation dialog shown below.

Note) User ROM formatted by WindowsXp/Vista cannot be used with SPH300 CPU version V58 or before. In this case, format using Windows2000.

◆ Make sure that the drive mounts the user ROM and click the [OK] button. The [Format] dialog appears.

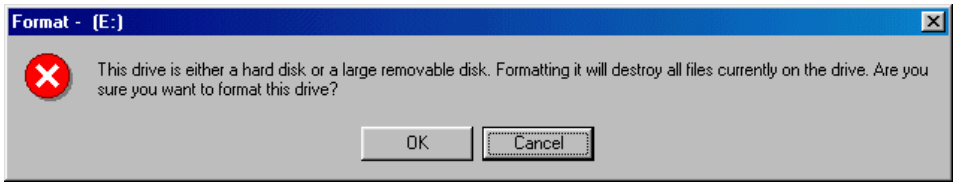


* Depends on User ROM size, select following file system.
2GB or less : FAT
4GB or more : FAT32

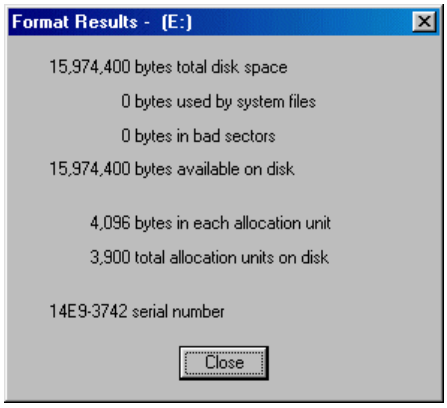
* Select “Default allocation size”

Check the “Quick” format check box OFF.

◆ Clicking the [Start] button displays the confirmation dialog shown below. Click the [OK] button to start formatting.



When formatting has completed, the dialog shown below appears.



Section 13 Auxiliary Functions

13-5 Comparing Projects

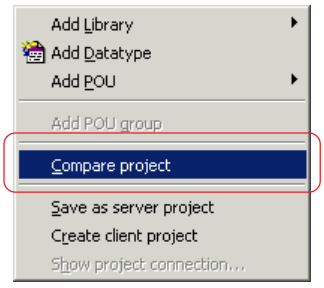
Two projects are compared and the differences are shown on the window.
This function compares the following items and detects differences.

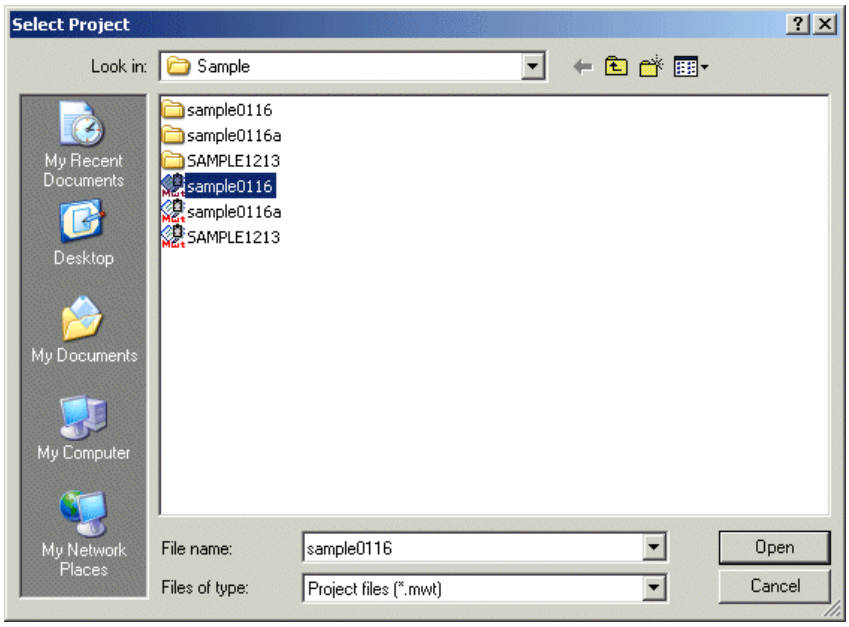
- Code worksheets, variable worksheets, and data type worksheets
- Structure of project tree (library, program configuration, and Physical Hardware)
- Properties of tasks

* Projects created with SX-Programmer Expert (D300win) can be compared.
  It is not possible to make a comparison with a project created with D300winV2.

13-5-1 Comparing procedure

◆ Open either of the projects to be compared and compile it.
A comparison cannot be made unless compilation is normally completed.
Then, execute the [Compare project] command in the [Project] menu. The [Select Project] dialog box appears.



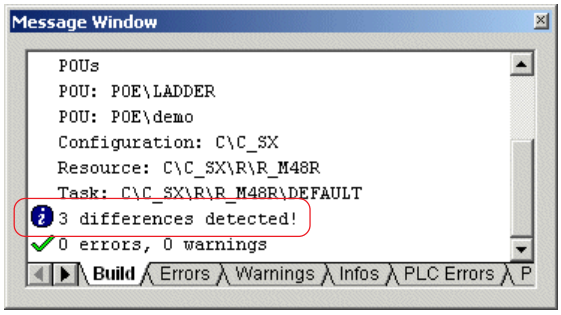


◆ Select a project to be compared on the [Select Project] dialog box and click the [Open] button. A comparison of the projects is executed.

Section 13 Auxiliary Functions

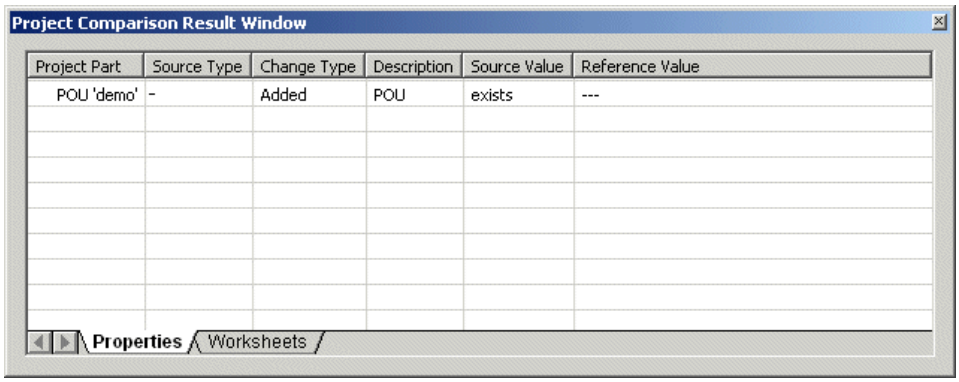
13-5 Comparing Projects

◆ When a comparison of the projects is completed, the result is shown on the message window.

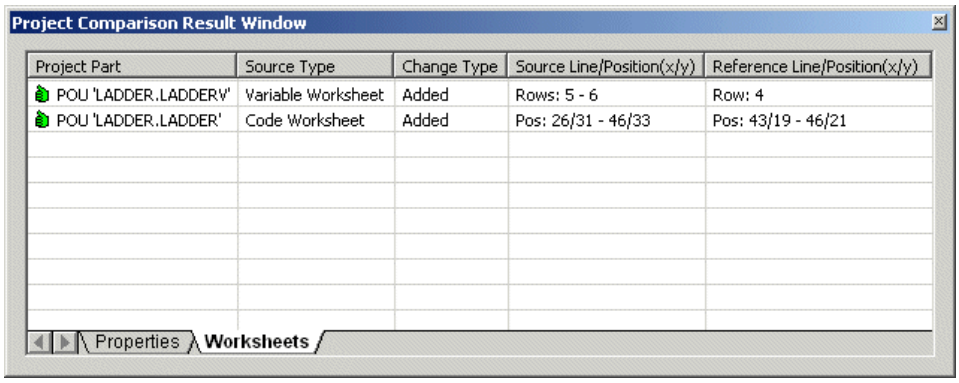


◆ If differences are detected as shown above, execute the [Project Comparison Result Window] command in the [View] menu to display the [Project Comparison Result Window].
The [Project Comparison Result Window] consists of the [Properties] and [Worksheets] tab windows, where differences are shown.

<Properties tab window>



<Worksheets tab window>



Section 13 Auxiliary Functions

13-5 Comparing Projects

13-5-2 Interpreting comparison results

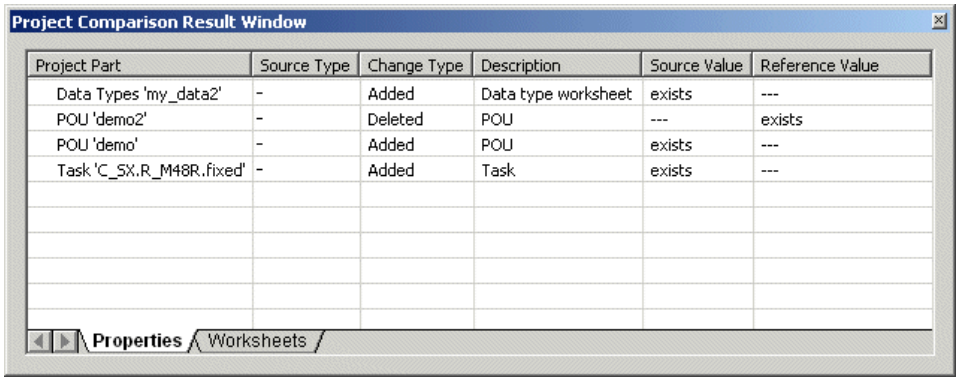
(1) Properties tab window

On the properties tab window, differences in project tree are shown.
The differences to be detected are as follows:

Project part	Compared item	Source type	Change type	Description
Library	Library added or deleted	-	Added, Deleted	Library
	Difference in library path	Property	Changed	Library
Data type	Data type worksheet added or deleted	-	Added, Deleted	Data type worksheet
POU	POU added or deleted	-	Added, Deleted	POU
	Code worksheet added or deleted	-	Added, Deleted	Code
	Difference in variable worksheet name	-	Added, Deleted	Variable
	Difference in program language of POU	Property	Changed	Language
	Difference in program type (PG/FB/FCT) of POU	Property	Changed	Type. POU type
	Difference in PLC/CPU type of POU	Property	Changed	PLC/CPU. Processor type
Configuration	Configuration added or deleted	-	Added, Deleted	Configuration
Resourace	Resource added or deleted	-	Added, Deleted	Resource
	Difference in CPU type of resource	Property	Changed	PLC/CPU. Processor type
Task	Task added or deleted	-	Added, Deleted	Task
	Difference in task type of task (DEFAULT/EVENT/FIXED_CYCLE)	Property	Changed	Type. Task type
Program instance	Program instance added or deleted	-	Added, Deleted	Program instance
	Difference in program type of program instance	Property	Changed	Type. Program instance type
Global variable	Difference in global variable worksheet name	-	Added, Deleted	Variable

Note: Changes in or additions to the system definition are not detected.

<Example of comparison result display>



- Project Part
  Locations in the project tree where a difference is detected are indicated by the type and name.
- Source Type
  The source type includes properties; differences in property settings are detected.
- Change Type
  The change type includes the following: “changed”, “added” and “deleted”.
  Note: If an element name is changed, both “deleted” and “added” are indicated.
- Description
  Element types are indicated.
- Source Value/Reference Value
  Assuming that the project currently opened is “source” and the one specified on the [Select Project] dialog box is “reference”, which of the projects contains the element is indicated.

Section 13 Auxiliary Functions

13-5 Comparing Projects

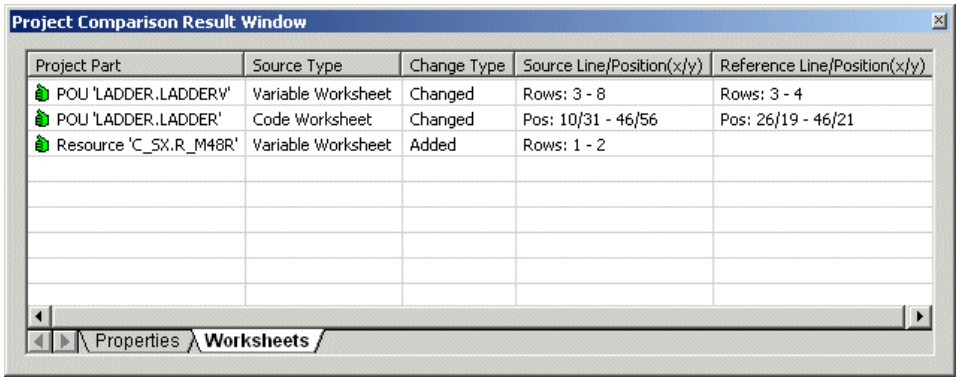
(2) Wotksheets tab window

On the worksheets tab window, changes in each code worksheet are shown.
The differences to be detected are as follows:

Project part	Compared item	Source type	Change type	Description
Data type	Difference in contents of data type worksheet (Note)	Code worksheet	Added, Deleted, Changed	Line
POU	Difference in contents of local variable worksheet (Note)	Variable worksheet	Added, Deleted Changed	Line
	Difference in contents of code worksheet (Note)	Code worksheet	Added, Deleted, Changed	Graphic language: xy position, Text language: Line
Resource	Difference in contents of global variable worksheet (Note)	Variable worksheet	Added, Deleted, Changed	Line

Note: Differences which do not affect compilation results (comment, symbol size, layout, etc.) are not detected.

<Example of comparison result display>



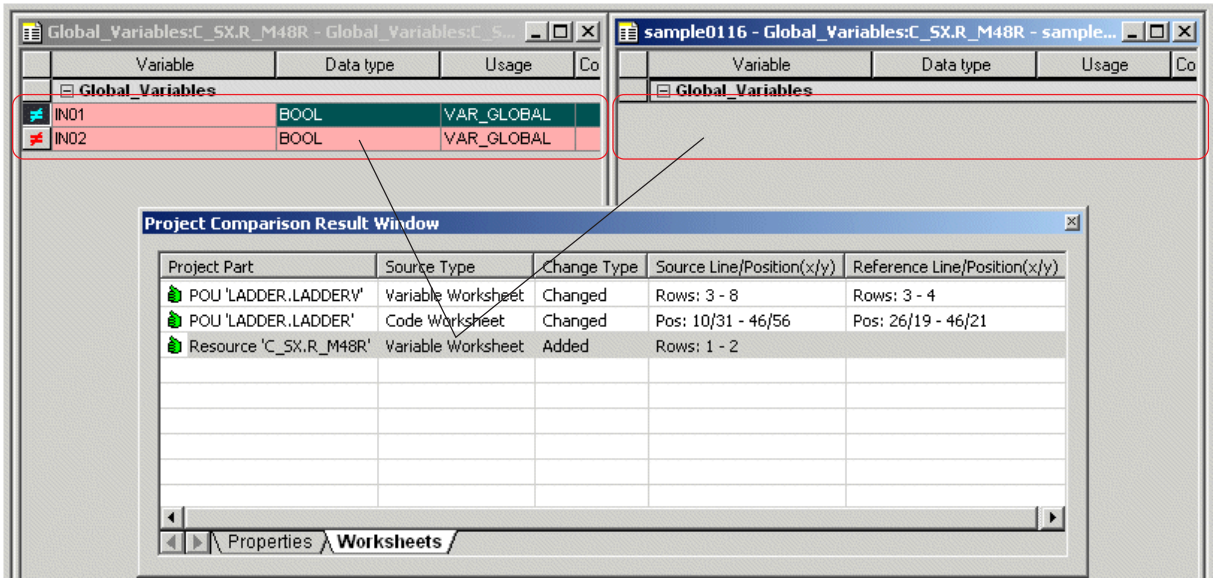
- Project Part
  Worksheet names where a difference is detected are indicated.
- Source Type
  The source type includes the following: “code worksheet” and “variable worksheet.”
  The worksheet for declaration of data types is classified under the code worksheet.
- Change Type
  The change type includes the following: “changed”, “added” and “deleted”.
  Note: If an element name is changed, both “deleted” and “added” are indicated.
- Source Line/Position(x/y)
  Assuming that the project currently opened is “source”, locations of detected elements are indicated by the line (for text worksheet) or x/y coordinate (for graphic worksheet).
- Reference Line/Position(x/y)
  Assuming that the project specified with a file is “reference”, locations of detected elements are indicated by the line (for text worksheet) or x/y coordinate (for graphic worksheet).

Section 13 Auxiliary Functions

13-5 Comparing Projects

<Difference displaying function>

Double-click a point of difference indicated on the worksheets tab window to display the location of the difference on both source and reference worksheets. You can check the difference.



Section 13 Auxiliary Functions

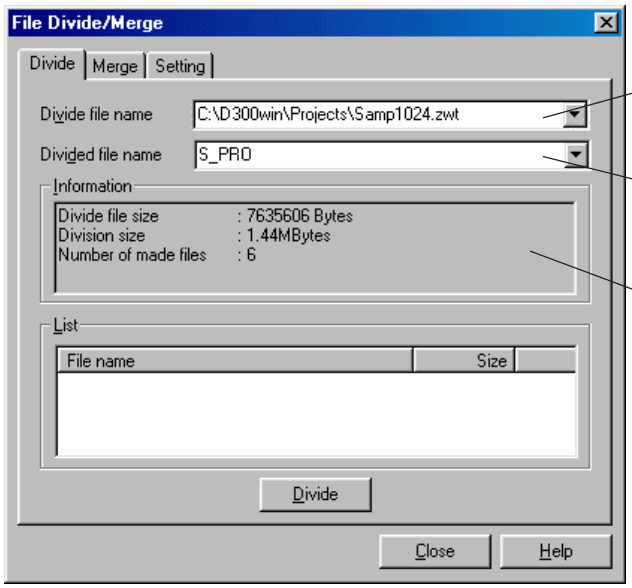
13-6 Other Functions

13-6-1 Dividing/merging files

A ZIP project to be saved to floppy disk or sent/received by E-mail can be divided into files of the specified size and divided files can be merged to a ZIP project file.

(1) Dividing a file

◆ Select [Extras] g [File Divide/Merge] to display the [File Divide/Merge] dialog.

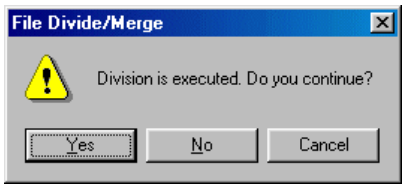


Specify the source file with the path. Selecting "Others" from the list allows referencing the files in the personal computer.

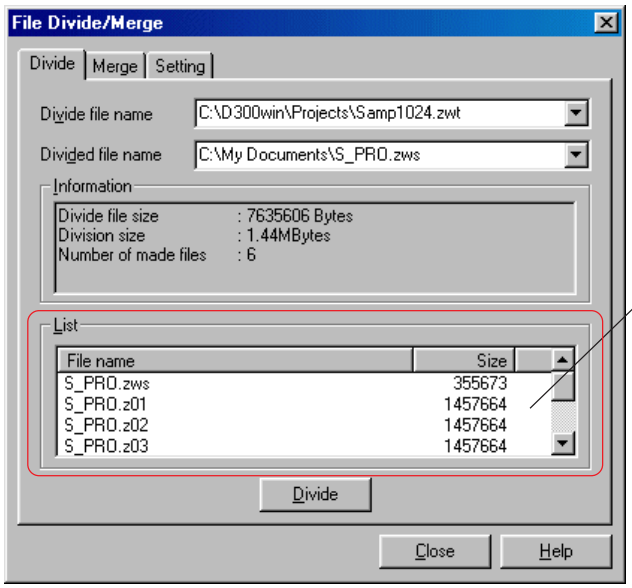
Enter the name of the divided file. Selecting "Others" from the list allows referencing the files in the personal computer.

Shows the division information.
The information is the source file size, divided file size, and number of files created by division.

◆ Specify "Divide file" and "Divided file" and click the [Divide] button to display the confirmation dialog shown below.



◆ Clicking the [Yes] button starts file division, showing the results in "List."



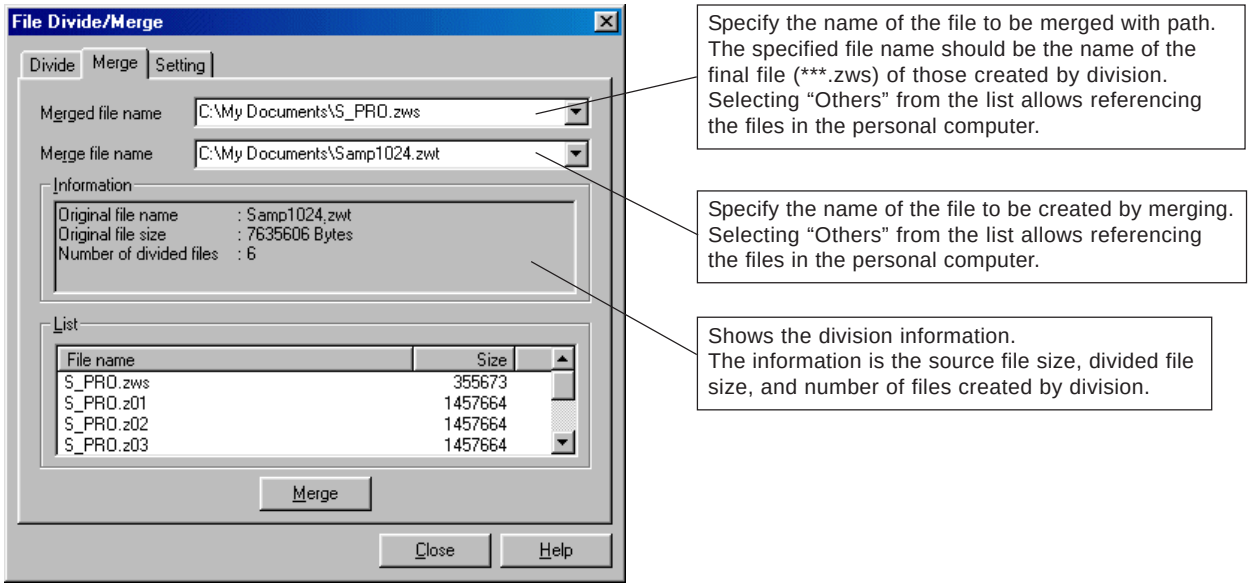
The files created by file division are assigned the divided file name specified plus .z01, divided file name specified plus .z02, ..., divided file name specified plus .zws (the file name extension of the final file is .zws).

Section 13 Auxiliary Functions

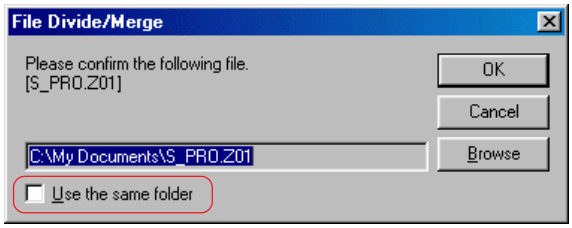
13-6 Other Functions

(2) Merging files

◆ From the [File Divide/Merge] dialog, clicking the [Merge] tab displays the merge screen. Specify a file name with extension .zws from “Merged file name.”



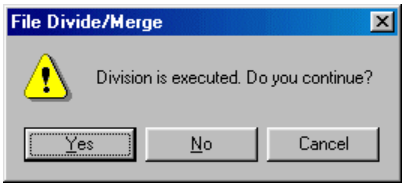
◆ Clicking the [Merge] button displays the dialog shown below allowing to specify the next file name. From this dialog, specify the next file name and click the [OK] button.



* Check this check box ON when the files to be merged are in the same folder.

◆ When merging files has been prepared by the operations above, the files are merged.

Note: If an existing file name has been specified for the file to be created by merging, the overwrite confirmation dialog shown below appears. Clicking the [Yes] button merges the files, overwriting to the existing file.



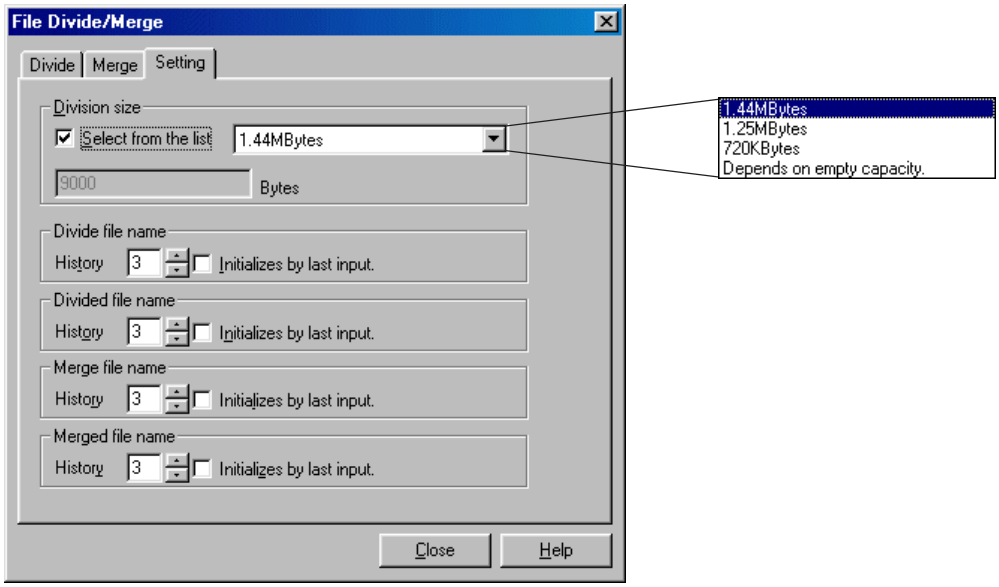
Section 13 Auxiliary Functions

13-6 Other Functions

(3) Setting for file divide/merge

When dividing or merging files, set the division size, history number, etc.

◆ From the [File Divide/Merge] dialog, clicking the [Setting] tab displays the setting screen.



◆ Click the list button and specify the division size or check the [Select from the list] check box ON to allow to set an arbitrary division size in bytes.

Section 13 Auxiliary Functions

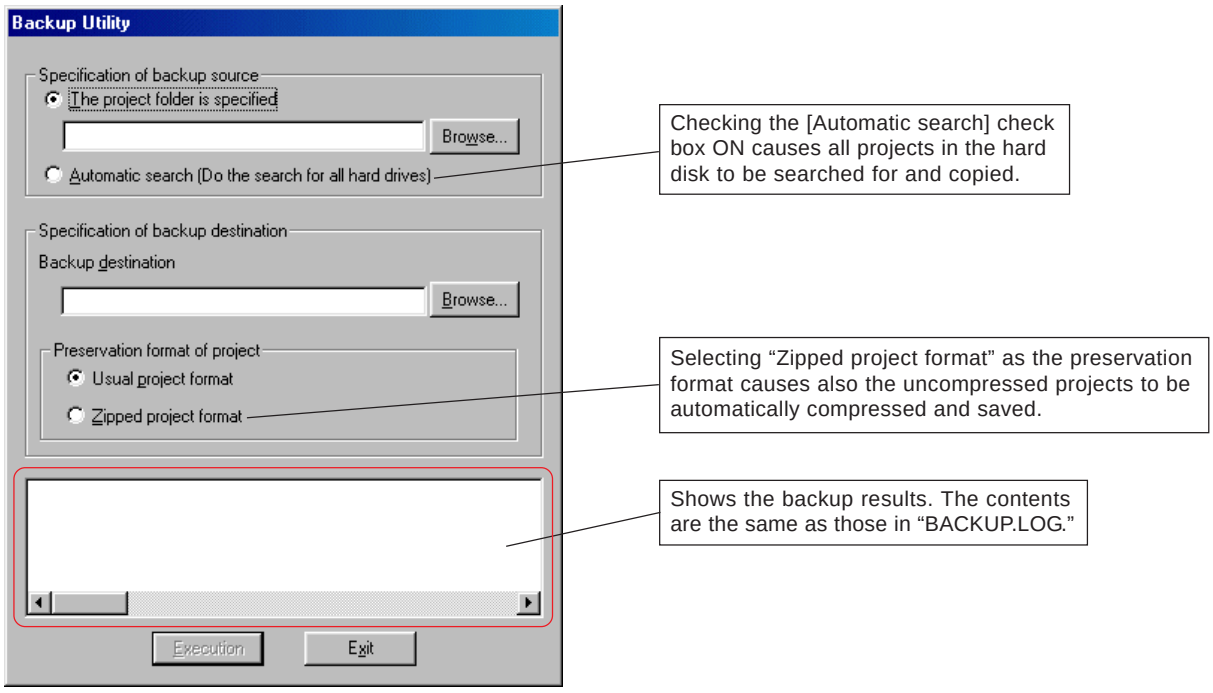
13-6 Other Functions

13-6-2 Backup utility

Make backup copy of the project created by D300win in the personal computer to the specified folder.

◆ Select [Extras] g [Backup Utility] to display the [Backup Utility] dialog.

◆ Select the backup source folder, backup destination folder, and preservation format (usual project or ZIP project) and then click the [Execution] button to start backup.



◆ When backup has completed, a folder with name “C”* is created in the specified folder and the backup data is saved in this folder. In addition, text file “BACKUP.LOG” is created showing the backup results.

* “C” is created when [Automatic search] is specified as the backup source and the “specified folder path name” is created when “The project folder is specified” is specified.
Example: When “D: work” has been specified, folder “D\work” is created and the file is saved in this folder.

Section 13 Auxiliary Functions

13-6 Other Functions

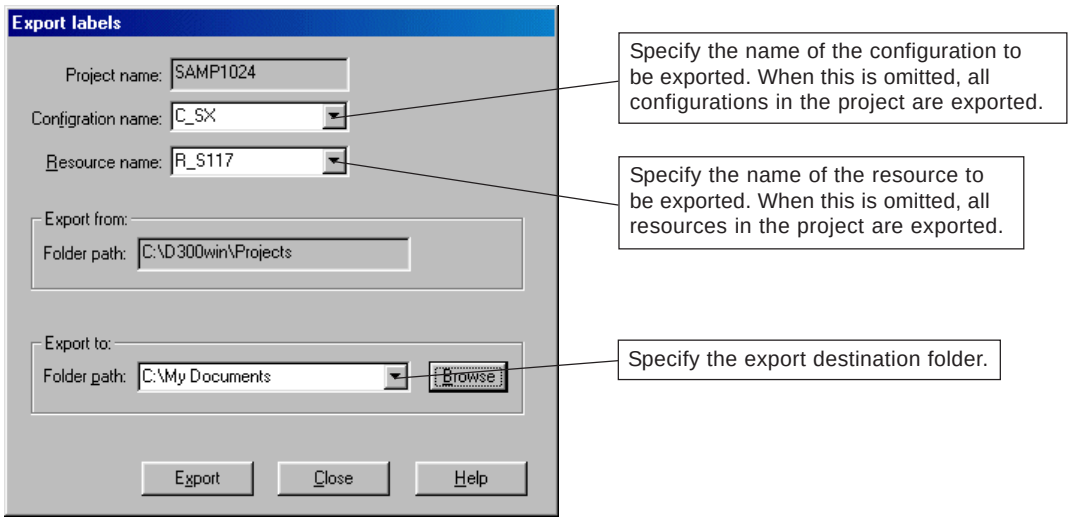
13-6-3 Exporting/importing variable names

From the project on D300win currently open, variable name definition information (including user-defined data type information and variable name assignment address information) can be exported to another path. The exported variable name definition information can be referenced or edited by POD editor, etc. By importing variable names, the edited variable name definition information can be reflected to the project on D300win.

Note: If variable name definition information already exists on the export destination, the exported information is overwritten.

(1) Exporting variables

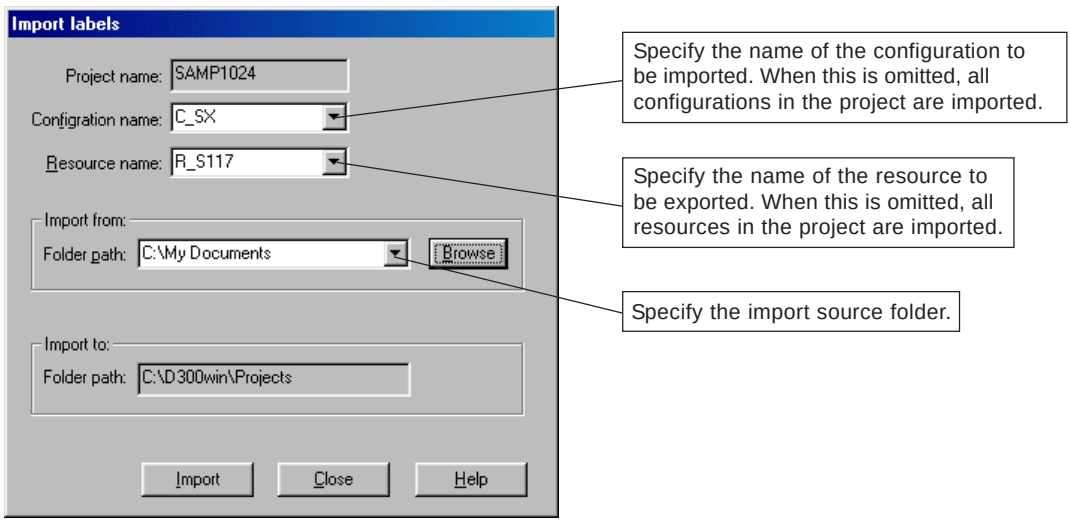
◆ Select [Extras] → [Export labels] to display the [Export labels] dialog.



◆ After specifying the configuration, resource, export destination folder, click the [Export] button. An export file is a file that has a project name and expansion .ini.

(2) Importing variables

◆ Select [Extras] → [Import labels] to display the [Import labels] dialog.

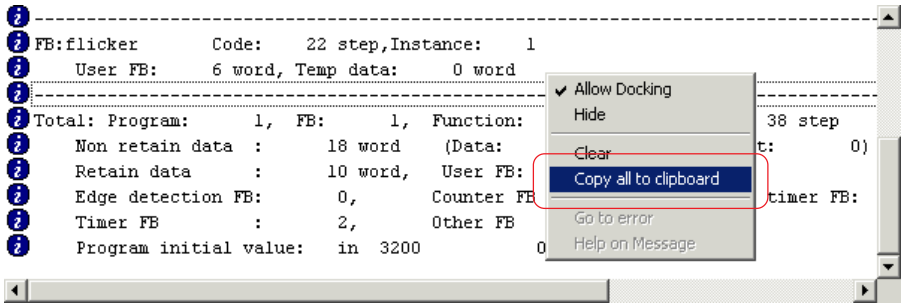


Section 13 Auxiliary Functions

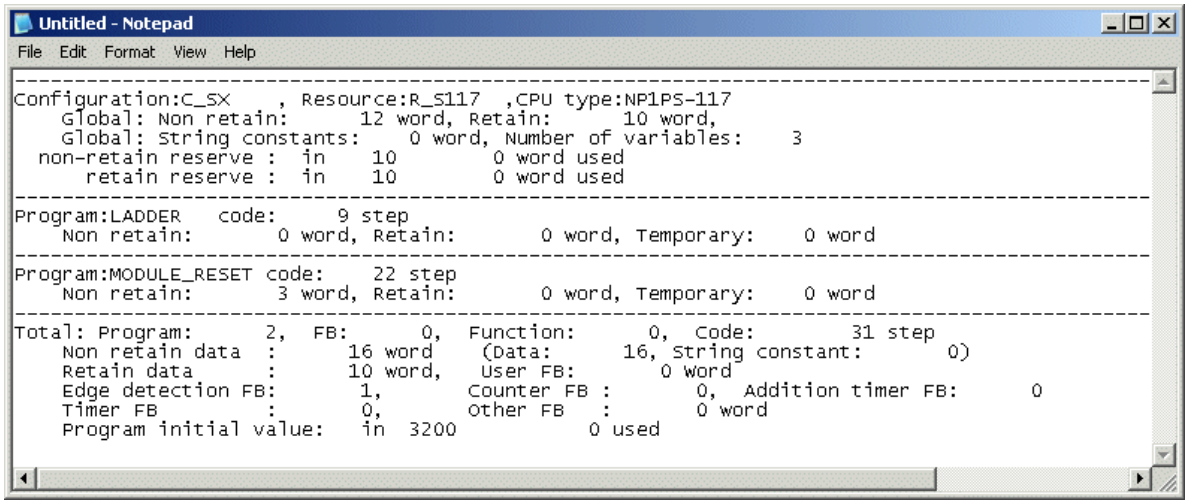
13-6 Other Functions

13-6-4 Saving a message window

Contents of a message window, such as information created when a project is compiled and information about a result of printing can be copied into a clipboard as text data.
The text data copied in the clipboard can be pasted onto a commercially available text editor or word processing software and edited with it.



- ◆ Display a tab window that you want to copy, and right-click on it to display the menu. When you execute the [Copy all to clipboard] command here, all information on the window is copied into the clipboard as text data.
- ◆ Start up an arbitrary text editor, etc. and then paste the text data copied in the clipborad.
  The following is an example of pasting text data copied in the clipboard onto the “Notepad” in Windows.



<Information that is displayed on tab windows>

Tab	Displayed information
Build	The progress of compilation is displayed.
Error	If an error occurs during compilation, the error description is displayed
Warning	If an warning is detected during compilation, the warning description is displayed.
Information	After compilation is completed, the number of steps of the project, the number of steps of each POU, the use of the memory, etc. are displayed.
PLC error	This is an error that occurs when the simulator is being used. If an error occurs in communications between the simulator and D300win, the description is diplayed.
Print	After the print command is executed, the progress of printing is displayed.

Section 13 Auxiliary Functions

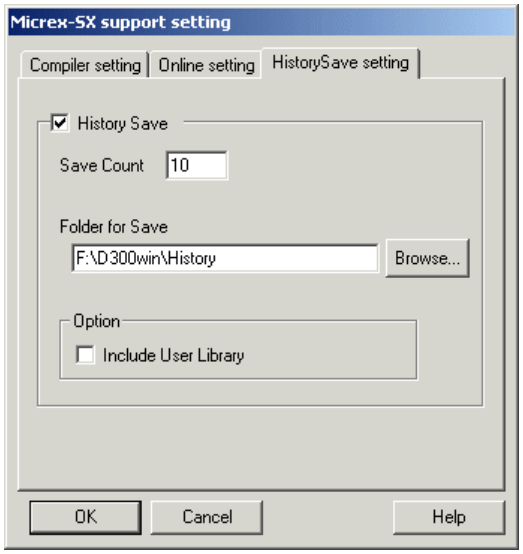
13-6 Other Functions

13-6-5 History saving function

When downloading or Patch POU is completed, the project will be zipped and saved in the specified folder. The saved project can be opened with D300win as is the case with other ordinary zipped projects.
The history file name becomes [project name + "_" + YYYYMMDDHHMMSS (year, month, day, hour, minute, second) + ".ZWT"].

* At default setting, histories are not saved.
* If downloading results in failure due to a communication error, etc., the project is not saved.

◆ Execute the [Micrex-SX support setting] command in the [Extras] menu. The [Micrex-SX support setting] dialog box appears. On the [History save setting] tab window, make the history saving settings.



◆ After setting all necessary items, click the [OK] button.

<Setting items>

Setting item	Function
[History Save] box	If this box is checked, the zipped project file is saved in the specified folder every time a project is downloaded to the CPU or Patch CPU is performed.
Save Count	Specifies the number of projects that can be saved in the range of 1 to 32767. If the number of saved projects reaches the specified number, the oldest history will be deleted. * Default: 10
Folder for save	Specifies the folder where the zipped project should be saved.
[Include User Library] box	If this box is checked, a user library registered in a project is included in the project to be saved. * Default: not checked

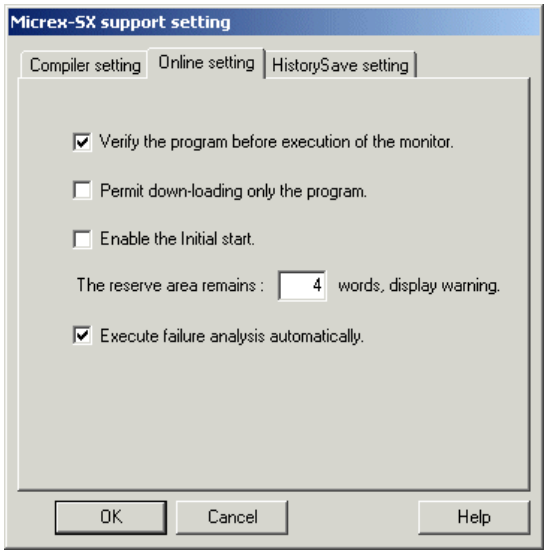
Section 13 Auxiliary Functions

13-6 Other Functions

13-6-6 Online setting function

Set the operations of D300win concerning online operations.

◆ Execute the [SX support setting] command in the [Extras] menu. The [Micrex-SX support setting] dialog box appears. On the [Online setting] tab window, set the operations of D300win concerning online operations.



<Setting items>

Setting item	Description
Verify the program before execution of the monitor.	When the monitor starts, do the checking whether the program of D300win is corresponding to the program of PLC when you monitor the code worksheet and the variables worksheet. Default is ON (enables verification of the program before execution of the monitor).
Permit down-loading only the program.	A program alone cannot usually be selected by the down-loading dialog because there is a dependent relationship between the program and the system definition. Turn on this checkbox when you down-load only the program. Default is OFF (disables down-loading only the program). Note: PLC might malfunction if the program has not been adjusted to the setting of the system definition. Do care enough when this setting is used.
Enable the Initial start.	Initial start button in the control dialog changes actively if this checkbox is turned on. And, it comes to be able to use initial start. Default is OFF (disables the Initial start). Note: Even if the checkbox is turned off, Initial start button of the project control dialog does not become an invalid display. In the project control dialog, when Initial start button is pushed, the error message is displayed.
Reserve area warning setting	When new variables are added during Patch POU (rewrting a program during CPU running), the reserve area is used. If the reserve area becomes lower than the number of words set here, a warning appears on the message window.
Execute failure analysis automatically.	When this check box is checked ON, failure analysis can be automatically executed by simply clicking the [Failure diagnosis] button on the [Control] dialog box if an error occurs in the SX system. Default is OFF (failure analysis is not executed automatically).

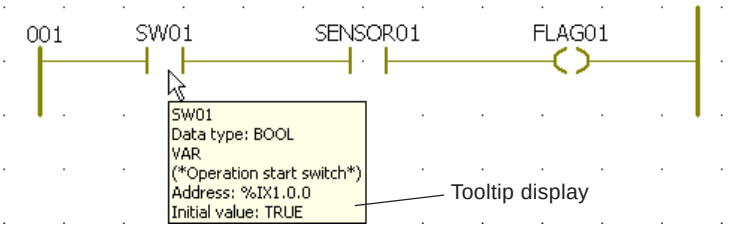
◆ After setting all necessary items, click the [OK] button.

Section 13 Auxiliary Functions

13-6 Other Functions

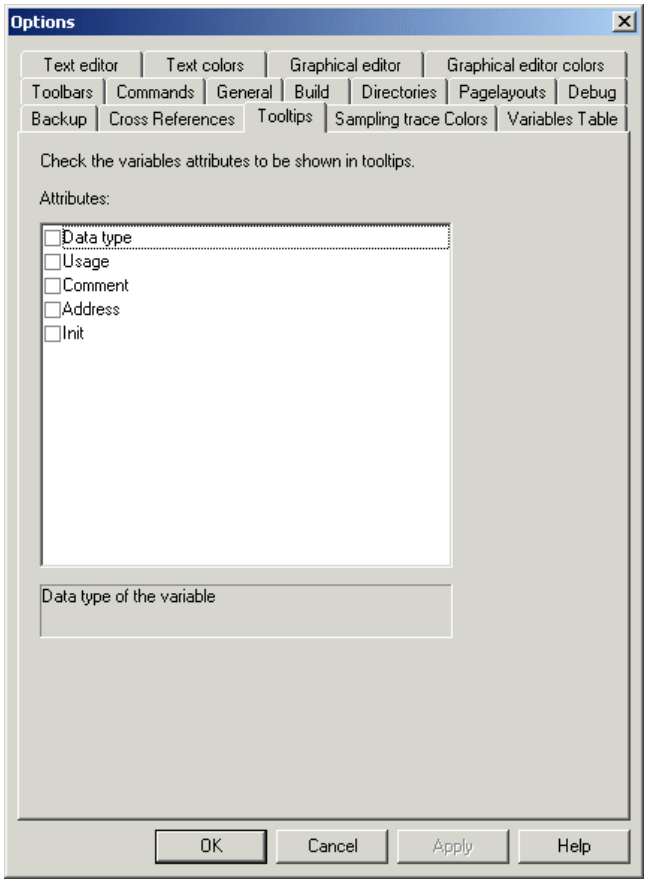
13-6-7 Variable information tooltip display function

When the cursor is put on a variable on a code worksheet, the data type, usage, comment, address, and initial value of the variable are displayed. The displayed items can be selected with the [Options...] command in the [Extras] menu.



<Setting displayed items>

◆ Execute the [Options...] command in the [Extras] menu to display the [Options] dialog box. Click the [Tooltips] tab. The following window will be displayed.



◆ Select items to be displayed and then click the [OK] button.

Note: The setting takes effect when a code worksheet is opened.

Appendix 1 Expansion Function Blocks

Appendix 1-1 List of Standard Expansion FBs App.1-1
Appendix 1-2 List of Optional Expansion FBs (Underdevelopment) App.1-2

Appendix 1 Expansion Function Blocks

The expansion function blocks (FBs) are the MICREX-SX original function blocks provided by Fuji Electric. Expansion FBs are classified into standard expansion FBs bundled with D300win and optional expansion FBs.

Appendix 1-1 List of Standard Expansion FBs

Project name (note)	FB name	Purpose	Related manual	Object module type
_Adsnet	_Adsnet	ADS-net module FB	ADS-net module (FEH248)	NP1L-AD1
_C_com	_C_com	Common FB for communication FB	General-purpose communication module (FEH225)	NP1L-RS1 NP1L-RS2 NP1L-RS3 NP1L-RS4
_C_free	_C_free	General-purpose non-procedure communication FB		
_Cfr252	_Cfr252			
_Cfr252	_Cfr128			
_Cfr128	_Cfr64			
_Cfr128	_Cfr32			
_Cfr64	_Cfrpr			
_Cfr64	_Cfrp2			
_Cfr32	_C_modm	MODBUS procedure FB (master function)	Standard expansion FB for general-purpose communication (FEH255)	
_Cfr32	_CfdFRN	Fuji Electric general-purpose inverter FB		
_CfdFVR	_CfdFVR			
_Cfvrpr	_Cfvrpr			
_CfdPYX	_CfdPYX	Fuji Electric temperature controller FB		
_CfdPK	_CfdPK	Fuji Electric bar code reader FB		
_MHCNT	_MHCNTR	High-speed counter FB (high-function version)	High-speed counter module (FEH210)	NP1F-HC2
	_MHCNTH	High-speed counter FB		
	_MHCNTM	Multi-channel high-speed counter FB		NP1F-HC8
	_MHCNTD	High-speed input module counter FB	Digital high-speed input module (FEH211)	NP1X3209-A
_MSPOSC	_MSMOV	High-speed output module simple positioning FB	Digital high-speed output module (FEH212)	NP1Y32T09PA
	_MSMVDAT	High-speed output module data setting FB		
_LEDUAL	_LEDUAL	LE-net loop2 redundant FB		NP1L-LL2
_FileCsvInnterface	_F_WRITE_CSV_DINT	Write CSV file FB	Instructions (FEH200)	SPH2000
	_F_READ_CSV_DINT	Read CSV file FB		
	_F_APPEND_CSV_DINT	CSV file data append FB		
	_F_APPEND	File data append FB		
	_F_DELETE	File deletion FB		
	_F_OFFSET_READ	Reading of a file with an offset		
	_F_GET_DRV_SIZE	Reading of the remaining capacity		
	_E_F_WRITE_DINT	Equalization of stored data	SPH2000 Redundant Functions (FEH184)	SPH2000

Note: The function blocks are provided in the project format. They can be made available by registering the projects in the library.

Appendix 1 Expansion Function Blocks

Appendix 1-2 List of Optional Expansion FBs

Package name	Type	Contents	Related manual
Positioning FB	Underdevelopment	Positioning FBs and supporting utilities	FEH219, FEH219-1, FEH219-2, FH219-3, FEH219-4
Electric cam FB	Underdevelopment	Electric cam FBs	FEH222, FEH222-1
Fault analysis FB	Underdevelopment	Fault analysis FBs and supporting utilities	FEH205
PID FB	Underdevelopment	Temperature controller PIDFBs and supporting utilities	FEH241
FA device general-purpose communication FB	Underdevelopment	FA device FBs and supporting utilities	FEH240

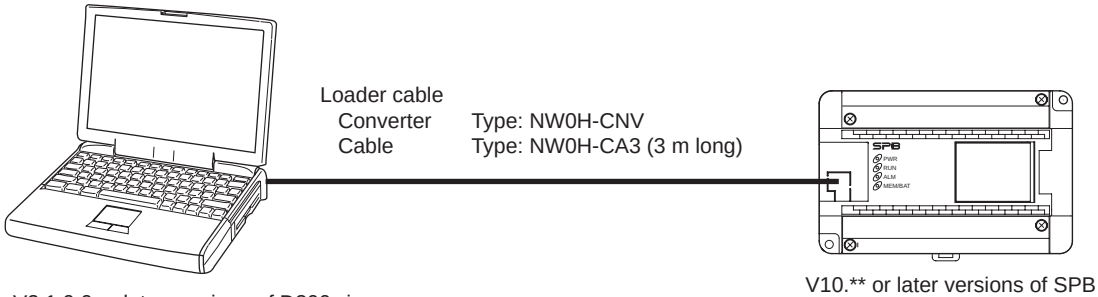
* For more information about installing method and operations of each expansion FB, refer to each manual.
* We provide “Expansion FB Packeage Set NP4N-FSETV3” that includes five types of expansion FBs listed above.

Appendix 2 System Software Utility

Appendix 2 System Software Utility

This utility is used to change the mode of supported programming language to “SX-mode” that conforms to IEC 61131-3, an international standard, or to update the SPB firmware.
(SPB is set to “N-mode” at shipment.)

<Necessary system configuration>

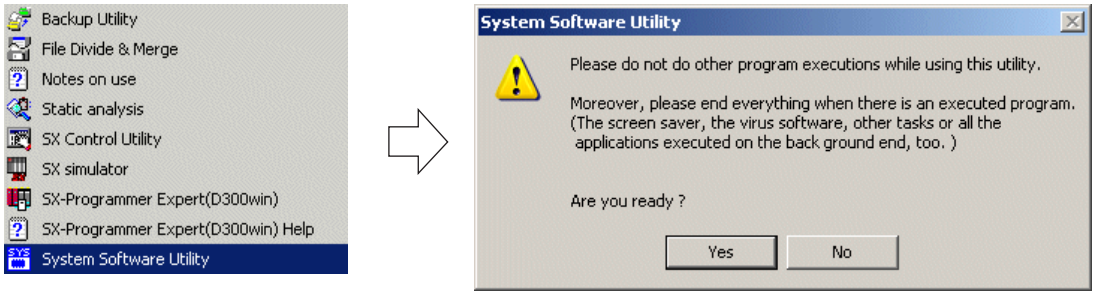


*For loader cable, either NN-CNV1 or NN-CNV3 can be used.

<Operating procedure>

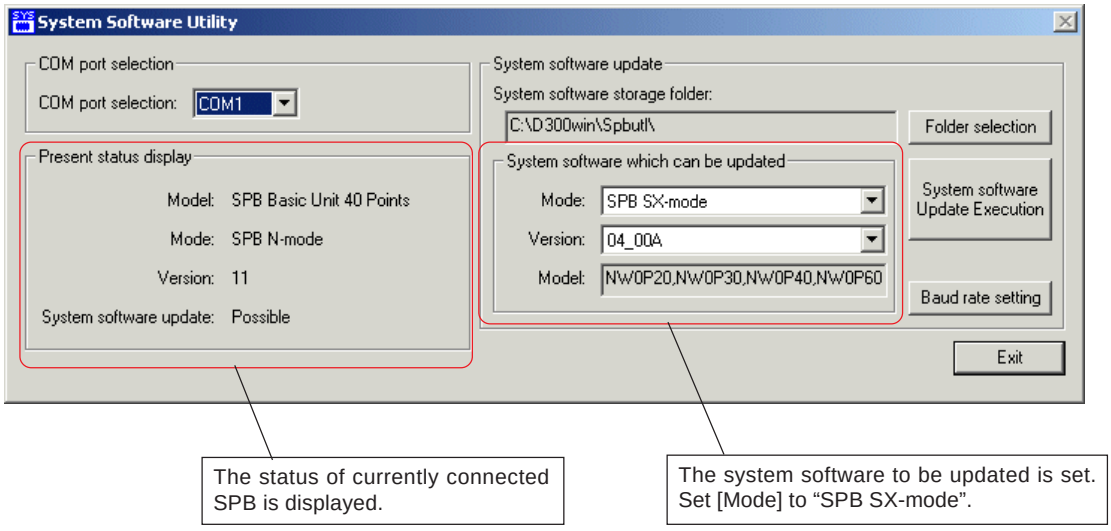
From the D300win program group, execute [System Software Utility].

(Note)



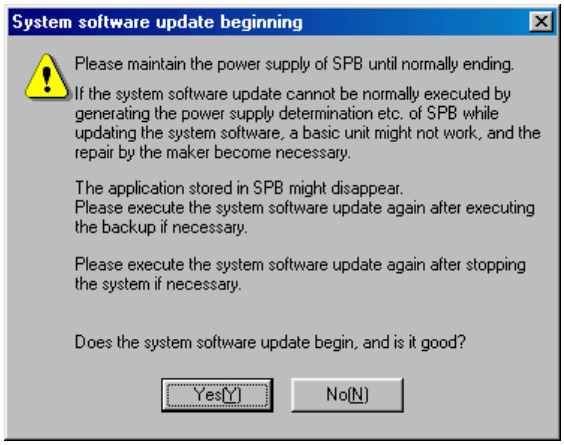
Note: Be sure to end other application programs before this utility is executed.

◆ When the [OK] button is clicked after other application programs are ended, the currently connected SPB is checked. After the checking, the following dialog box is displayed. (This checking takes approximately maximum 18 seconds.)

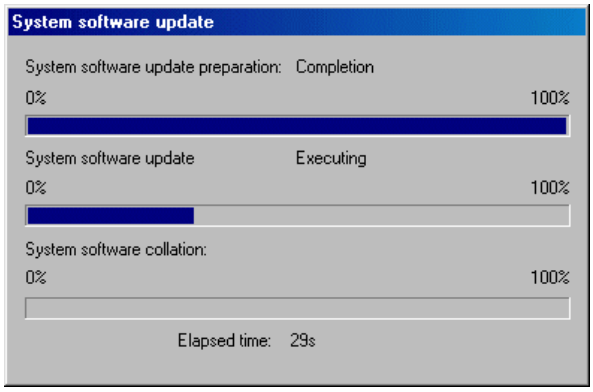


Appendix 2 System Software Utility

◆ When the [System software Update Execution] button is clicked, the following confirmation dialog box is displayed.
When application programs exist in the SPB, make their backup copy as needed.



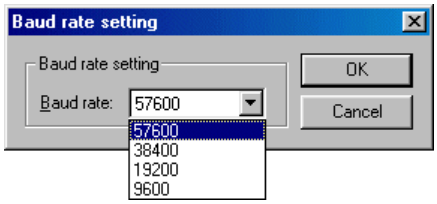
◆ When the [Yes [Y]] button is clicked, the system software begins to be updated.



Note: Be careful not to turn off the power switch of the system or disconnect the power cable while system software is being updated.

◆ When system updating is completed successfully, the following dialog box is displayed.
Click the [OK] button to finish the operation.

* If system updating does not finish successfully, change the setting of baud rate and re-execute update.



Appendix 3 3-level Access Restriction Function

Appendix 3-1 Overview App.3-1

Appendix 3-2 Specifications of 3-level Access Restriction Function App.3-1

Appendix 3-2-1 Target CPU App.3-1
Appendix 3-2-2 Operating range for each access level App.3-2
(1) D300win App.3-2
(2) SX control utility App.3-3
Appendix 3-2-3 Functions to manage password App.3-4

Appendix 3-3 How to Use Password App.3-5

Appendix 3-3-1 Registering password (when no password has been registered) App.3-5
Appendix 3-3-2 Password authentication App.3-8
Appendix 3-3-3 Changing password App.3-9
Appendix 3-3-4 Clearing password App.3-11
Appendix 3-3-5 Changing access restriction setting App.3-12

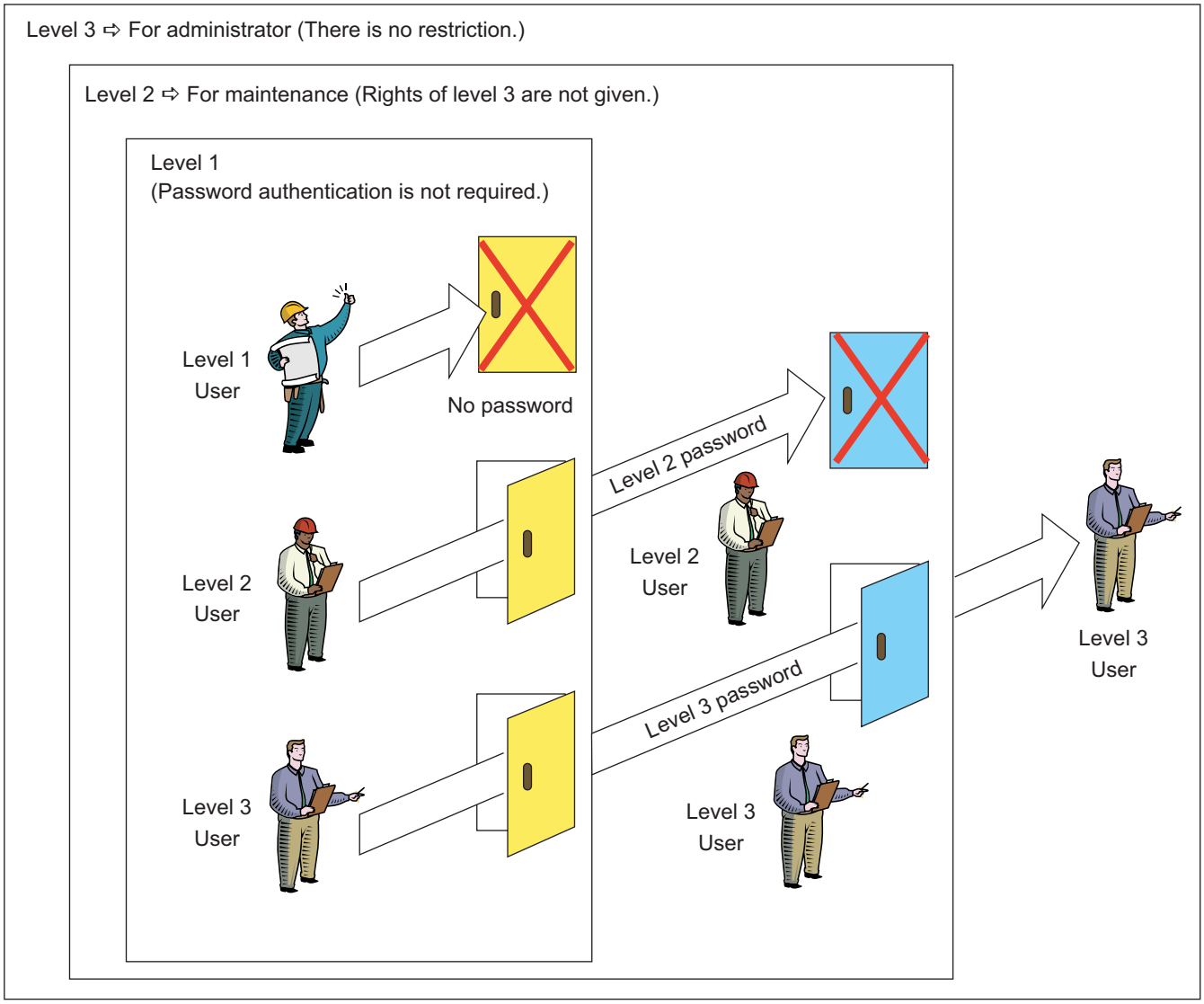
Appendix 3-4 Notes on Use App.3-16

Appendix 3　3-level Access Restriction Function

Appendix 3-1　Overview

The “3-level access restriction function”, which restricts online operations to the PLC, has been supported with D300win V3.3.2.0.
With this function, operations to the PLC can be restricted at 3 different levels by setting passwords for access authentication.
When the 3-level access restriction function is not used, it is possible to restrict access using the password function of versions earlier than V3.3.2.0.

* In addition, the function which allows users to set the range of access restriction is added to V3.3.3.0.



<Differences between existing security function and this function>

The D300win loader has already supported the project security function (password of project), which aims to maintain confidentiality and avoid falsification of projects. It contains online access restriction function, however, it only protects projects on the loader; the PLC itself cannot be protected.
In addition, only one password can be set, therefore, it is not possible to set multiple access levels.

Appendix 3 3-level Access Restriction Function

Appendix 3-2 Specifications of 3-level Access Restriction Function

Appendix 3-2-1 Target CPU and loader version

Version	Access restriction function (user-changeable)	Access restriction function	Traget CPU
Earlier than V3.3.2.0	Not provided	Not provided	-
V3.3.2.0	Provided	Not provided	SPH300
V3.3.3.0 or later	Provided	Provided	SPH300, SPB, Board Controller

Appendix 3-2-2 Operating range for each access level

Available operations of D300win loader for each level (default) are shown below.
Note: For access restrictions that are not on the list below, use the conventional project security function.

Function class	Function	Level 3	Level 2	Level 1	Earlier than V3.3.2.0
PLC control	Initial start / start / stop / reset	O	O	X	O
Download	Program	O	O	X	X
	System definition	O	X	X	X
	ZIP file	O	O	X	X
	Parameter data	O	O	X	O
	Module driver	O	X	X	O
	Compressed project	O	O	X	X
Upload	Program	O	O	X	X
	System definition	O	O	X	X
	ZIP file	O	O	X	X
	Compressed project	O	O	X	X
Verify		O	O	O	X
Clear	Program / system definition / ZIP	O	X	X	X
	Data / initialization of resource	O	O	X	O
Program control		O	O	X	X
Calendar/time display		O	O	O	O
Calendar/time setting		O	O	X	O
Resource information display	Measurement of task execution time / user ROM - write protection	O	O	X	O
	View	O	O	O	O
Failure diagnosis		O	O	O	O
Redundancy control	Selecting connected CPU	O	O	O	O
	Switch between operation and standby CPUs	O	O	X	O
Memory transfer		O	O	X	X
POU change		O	O	X	X
Debug	Sampling trace	O	O	X	O
	Breakpoint	O	O	X	O
	Step execution	O	O	X	O
	Condition monitor	O	O	X	O
	Forcible setting/Data change	O	O	X	O
Monitor		O	O	O	O

Appendix 3 3-level Access Restriction Function

Appendix 3-2 Specifications of 3-level Access Restriction Function

SX control utility	Backup (read)	O	O	X	X
	Backup (write)	O	X	X	X
	Backup (verify)	O	O	O	X
	Move to PLC	O	X	X	O
Password registration/change	Level 3 password registration/unnecessary	O	X	X	X
	Level 2 password registration/change	O	O	X	X
Password clear		O	X	X	X
Access restriction setting		O	X	X	X

* For the shaded items on the list above, it is not possible to change access restriction setting.

Appendix 3 3-level Access Restriction Function

Appendix 3-2 Specifications of 3-level Access Restriction Function

Appendix 3-2-3 Functions to manage password

Operations required to manage the password (“Registration”, “Authentication”, “Change” and “Clear”) and the authority to perform them are as follows:

Function	Access level	Authority
1) Registration The password is registered for the PLC.	Level 3 user or No password registered	Allowed to register passwords for level 3 and level 2.
	Level 2 user	Allowed to register only a password for level 2.
	Level 1 user	Not allowed.
2) Authentication (logon) Logon operation to allow operations to the PLC.	Level 3 user	By performing password authentication for each level, operations for each level are allowed. * If passowred authentication is not performed, access level 1 is provided.
	Level 2 user	
	Level 1 user	
3) Change The registered password is changed.	Level 3 user	Allowed to change passwords for level 3 and level 2.
	Level 2 user	Allowed to change a password for level 2.
	Level 1 user	Not allowed.
4) Clear All registered passwords are cleared.	Level 3 user	Allowed to clear passwords for level 3 and level 2.
	Level 2 user	Not allowed.
	Level 1 user	Not allowed.
5) Restriction setting Operations for each level can be individually enabled/disabled.	Level 3 user	Allowed to change access restriction.
	Level 2 user	Not allowed.
	Level 1 user	Not allowed.

*** Effective duration of password authentication**

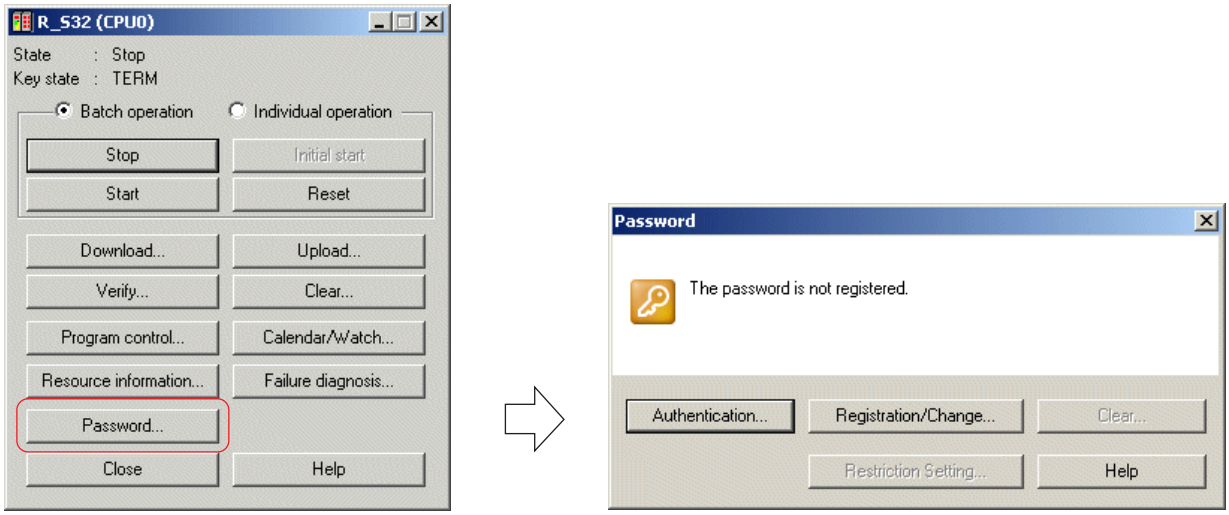
Once password authentication is completed, it is effective until the project is closed.
Even if the state of the PLC is changed between online and offline, the password authentication does not reset and you can continue the operation.

Appendix 3 3-level Access Restriction Function

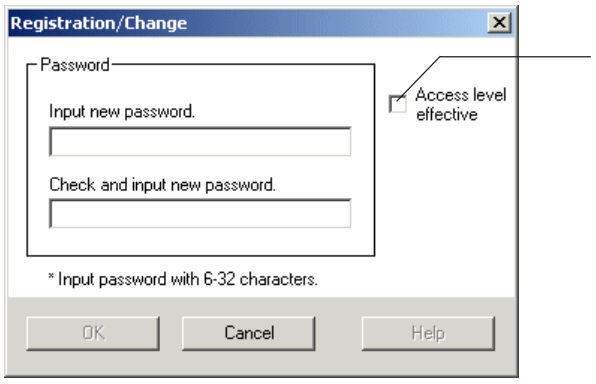
Appendix 3-3 How to Use Password

Appendix 3-3-1 Registering password (when no password has been registered)

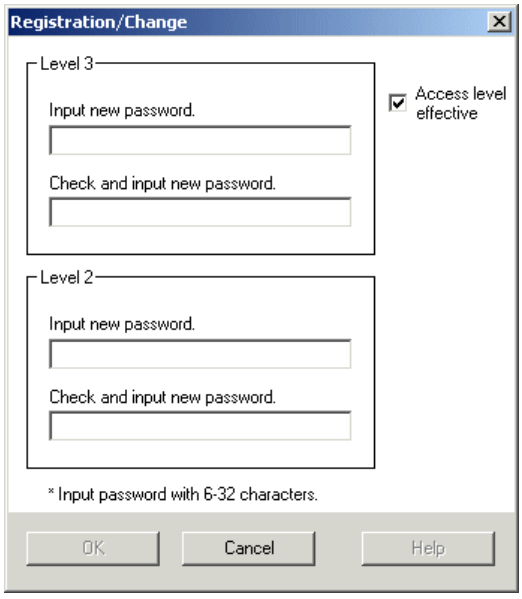
◆ Before registering passwords, open the project of the PLC or a new project of the same type as the PLC.
◆ Click the [Password...] button on the [Control] dialog to display the [Password] dialog. **If the PLC is running, stop it.**



◆ Click the [Registration/Change...] button to display the [Registration/Change] dialog.



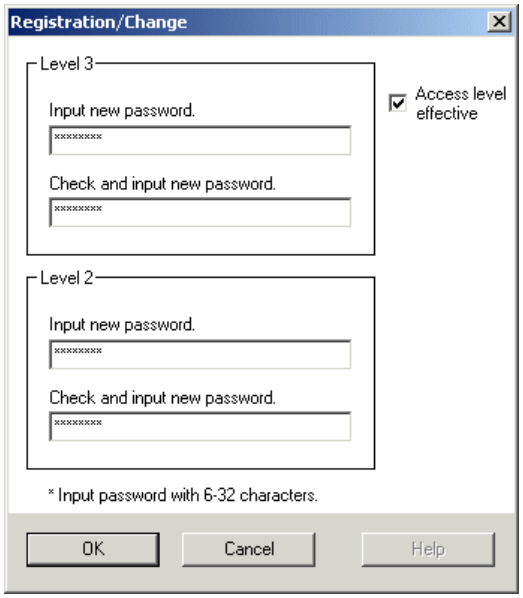
* If the [Access level effective] checkbox is set to ON, the screen changes into the password entry screen for level 2 and 3.
If a password is set without setting this checkbox to ON, access restriction of the password function of versions earlier than V3.3.2.0 is imposed.

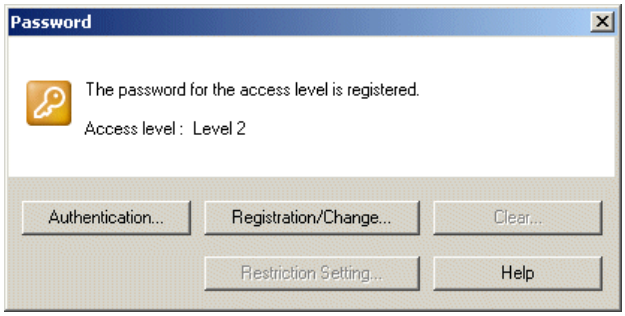


Appendix 3　3-level Access Restriction Function

Appendix 3-3　How to Use Password

◆ After setting passwords for level 2 and 3, click the [OK] button. The passwords are registered in the PLC and control returns to the [Password] dialog.



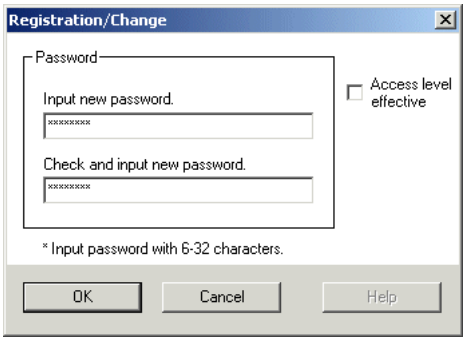
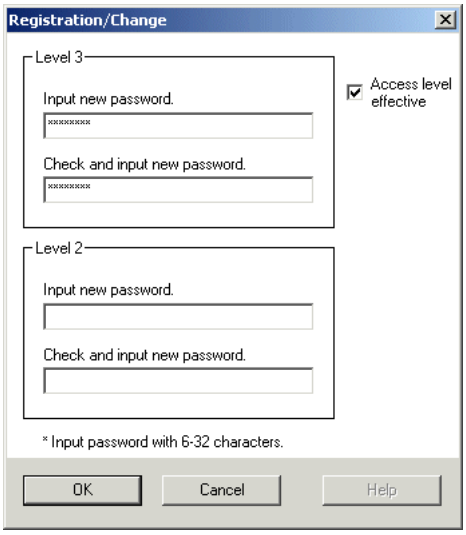
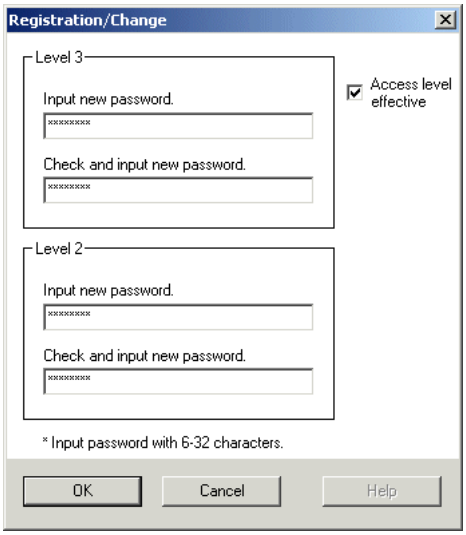


* It is possible to register only the password for level 3.
  However, it is not possible to register only the password for level 2.

Appendix 3 3-level Access Restriction Function

Appendix 3-3 How to Use Password

<Password registration patterns and access level>

No.	Password registration pattern	Authentication and access level after authentication
1	The password is not registered.	No restriction (Level 3)
2	The password is registerd. (Access level is not effective.) 	Authentication is performed with the registered password. → No restriction (Level 3) Password authentication is not performed. → Access rights when no password is entered in the password function of D300win versions earlier than V3.3.2.0.
3	Only the password for level 3 is registered. (Access lavel is effective.) 	Authentication is performed with the registered password for level 3. → No restriction (Level 3) Password authentication is not performed. → Level 2 access right
4	Passwords for level 3 and level 2 are registered. (Access level is effective.) 	Authentication is performed with the registered password for level 3. → No restriction (Level 3) Authentication is performed with the registered password for level 2. → Level 2 access right Password authentication is not performed. → Level 1 access right

Note: If the same password is set for level 2 and level 3, access is allowed at level 2 after authentication. If you want to access at level 3, set different passwords for level 2 and level 3.

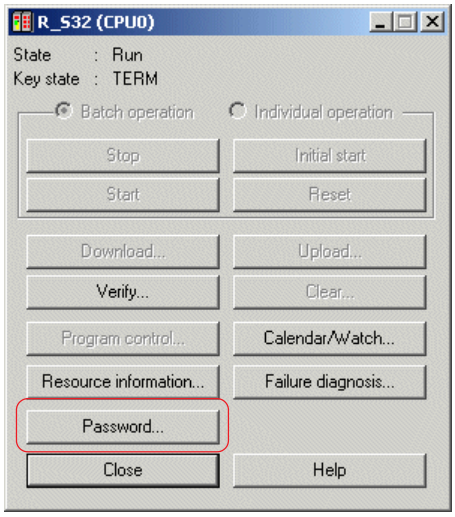
Appendix 3 3-level Access Restriction Function

Appendix 3-3 How to Use Password

Appendix 3-3-2 Password authentication

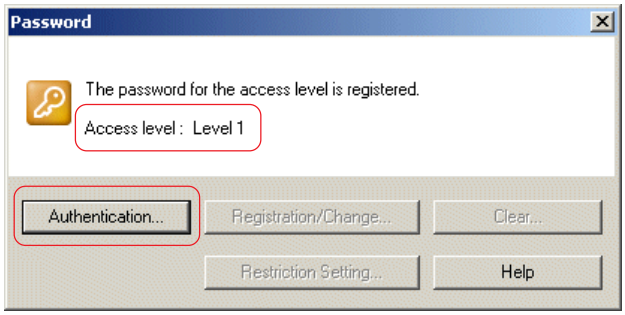
When connecting to the CPU for which passwords for level 2 and 3 are set, use the following procedure to perform password authentication.

◆ Click the [Password...] button on the [Control] dialog to display the [Password] dialog.



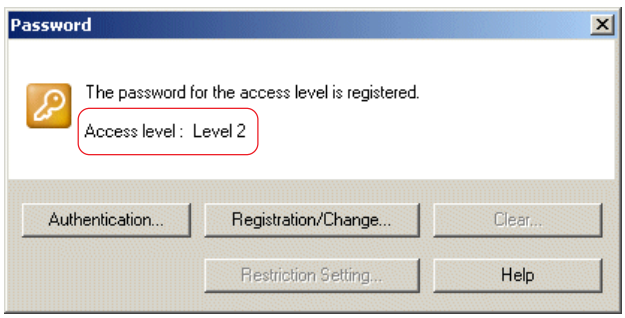
* [Control] dialog of access level 1

◆ Click the [Password...] button to display the [Password] dialog. The current access level is indicated.

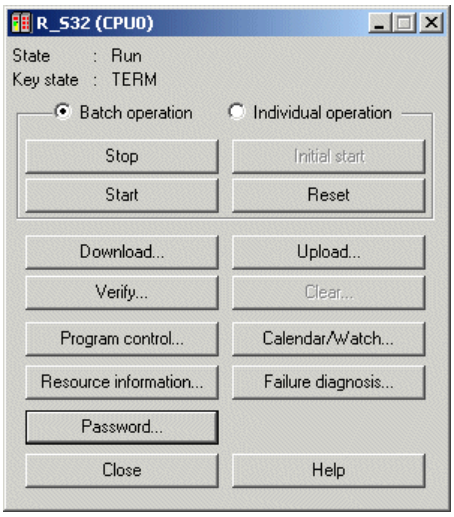


* Indicates “Level 1 “ when password authentication has not been completed (initial state)

◆ Click the [Authentication...] button to display the [Authentication] dialog.
Enter the registered password and click the [OK] button. The authenticated access level is indicated as shown below. (In this example, the password for level 2 was entered.)



* [Control] dialog of access level 2



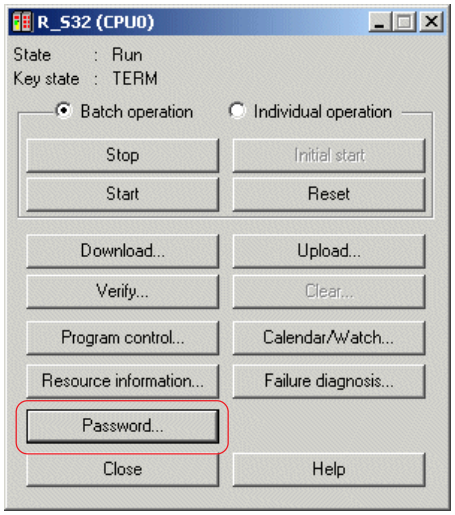
Appendix 3　3-level Access Restriction Function

Appendix 3-3　How to Use Password

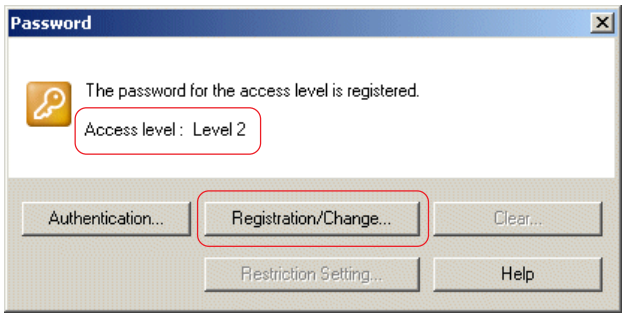
Appendix 3-3-3　Changing password

Change the currently registered password.

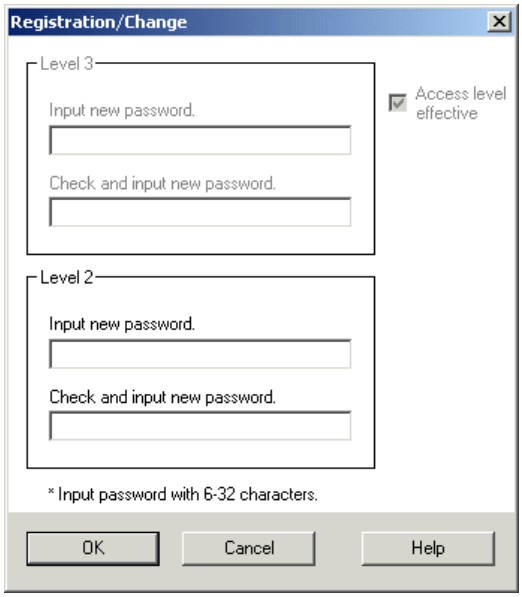
◆ Click the [Password...] button on the [Control] dialog to display the [Password] dialog.



◆ Click the [Password...] button to display the [Password] dialog. The current access level is indicated.



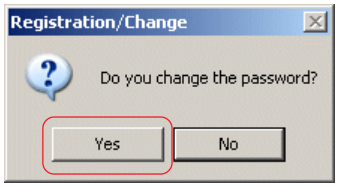
◆ Click the [Registration/Change...] button to display the [Registration/Change] dialog. As shown below, a user with access level 2 cannot change the password for level 3.



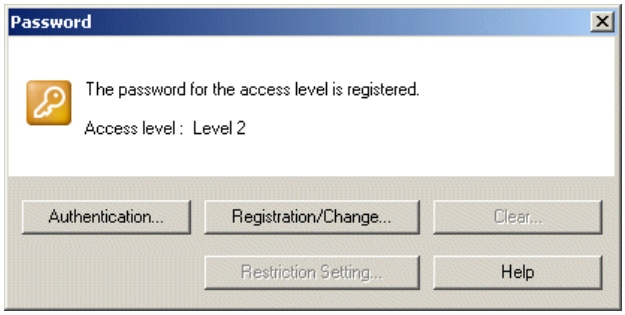
Appendix 3　3-level Access Restriction Function

Appendix 3-3　How to Use Password

◆ Change the password for access level 2 and click the [OK] button. The following dialog appears. Clicking the [Yes] button returns control to the [Password] dialog. The current access level is not changed.



Note: While the PLC is running, it is not possible to change the password.



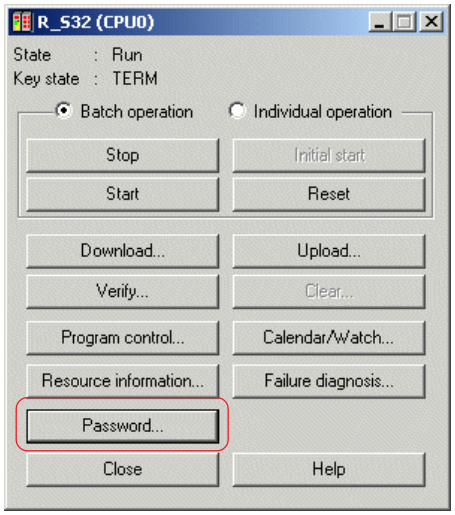
Appendix 3　3-level Access Restriction Function

Appendix 3-3　How to Use Password

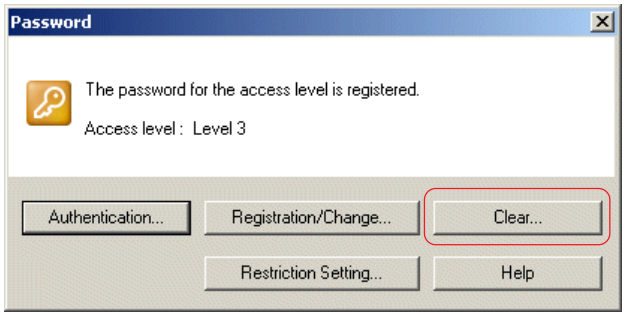
Appendix 3-3-4　Clearing password

Clear the currently registered passwords. Only users with access level 3 can clear passwords.

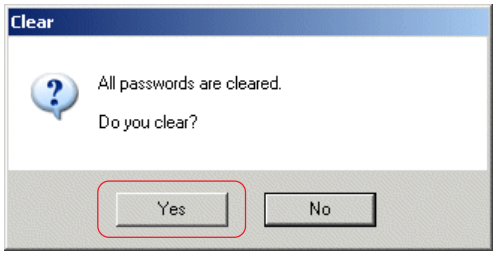
◆ Click the [Password...] button on the [Control] dialog to display the [Password] dialog.

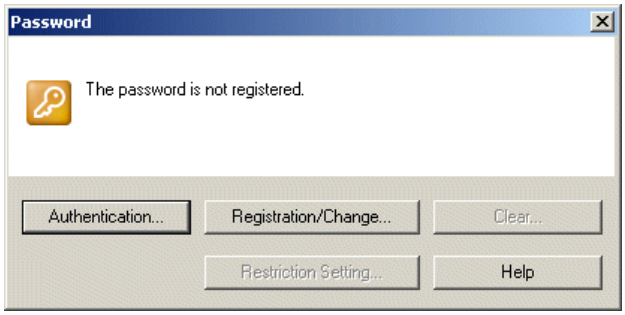


◆ Click the [Password...] button to display the [Password] dialog. The current access level is indicated.



◆ Click the [Clear...] button to display the [Clear] dialog. Clicking the [Yes] button clears all passwords.





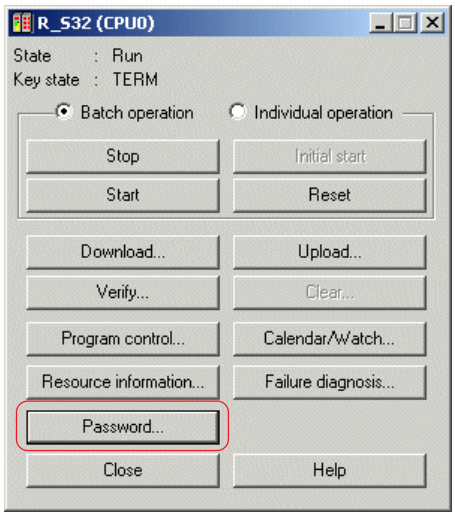
Appendix 3　3-level Access Restriction Function

Appendix 3-3　How to Use Password

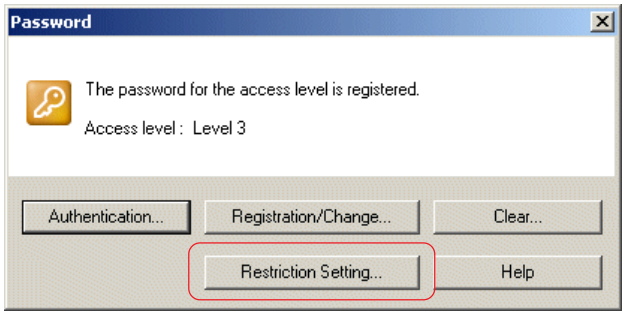
Appendix 3-3-5　Changing access restriction setting

Change the currently set restrictions on online operations individually. Only users with access level 3 can use this function.

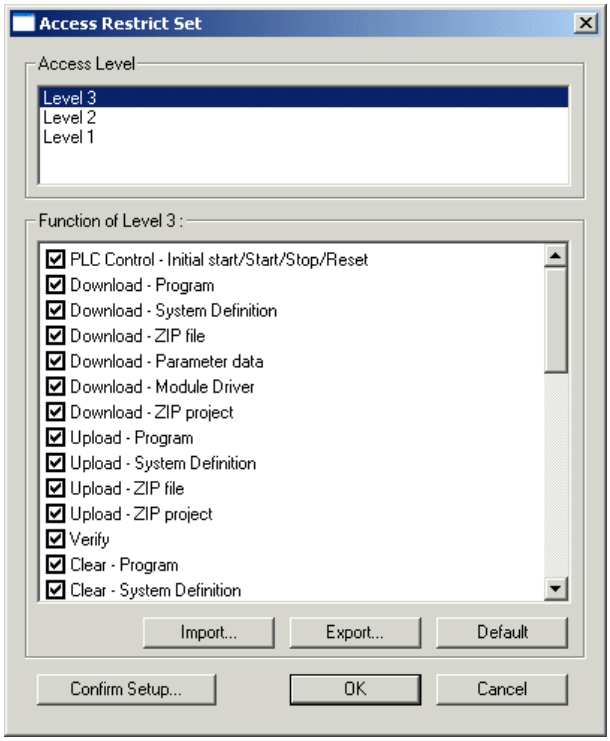
◆ Click the [Password...] button on the [Control] dialog to display the [Password] dialog.



◆ Click the [Password...] button to display the [Password] dialog. The current access level is indicated.



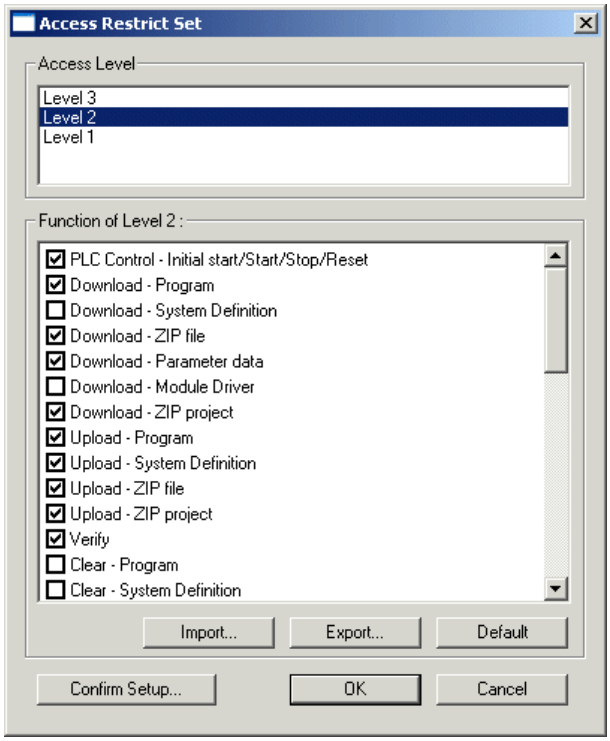
◆ Click the [Restriction Setting...] button to display the [Access Restrict Set] dialog.



Appendix 3　3-level Access Restriction Function

Appendix 3-3　How to Use Password

◆ Select the access level to be changed, and then set the checkboxes for each function to ON or OFF to enable or disable the function.

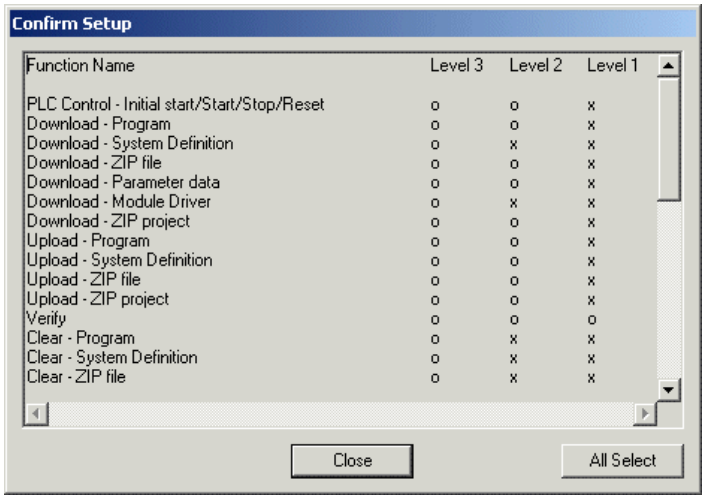


* If you set the checkbox to ON, the function becomes accessible.

◆ After determining the setting, click the [OK] button to complete it.

<Checking set items>

◆ When you click the [Confirm Setup] button on the [Access Restrict Set] dialog, the following dialog appears. You can check the current setting status.



Appendix 3　3-level Access Restriction Function

Appendix 3-3　How to Use Password

<Initializing set items>

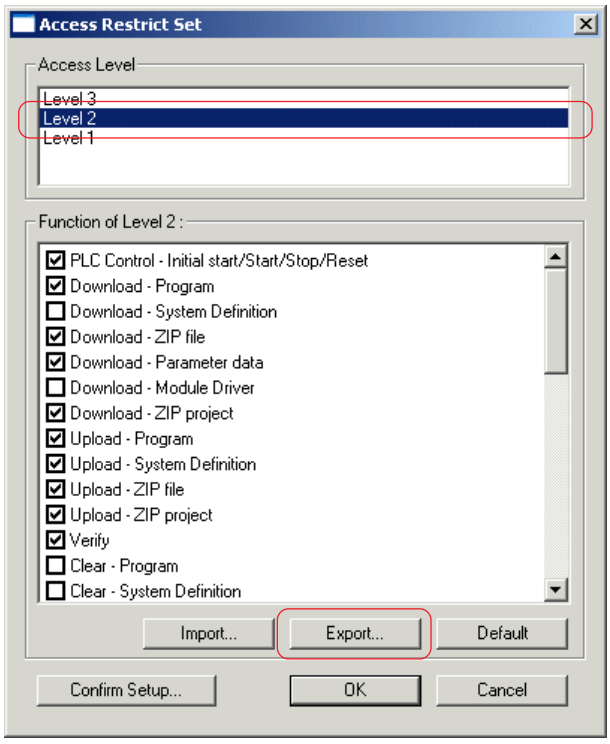
◆ When you click the [Default] button on the [Access Restrict Set] dialog, the following dialog appears. Click the [OK] button to reset the access restriction settings.

* For the default setting of access restriction, refer to the table in “Appendix 3-2-2 Operating range for each access level”.

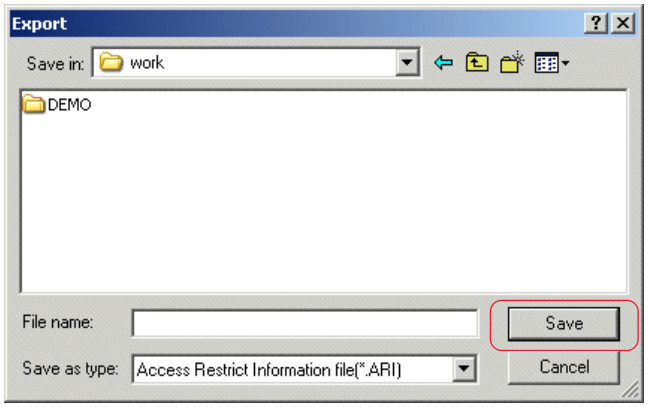
<Exporting settings>

The settings of the selected access level can be saved under an arbitrary filename. (The extension is “.ARI”.)
By importing the saved file, it can be used as a kind of template.

◆ In the [Access Level] list box on the [Access Restrict Set] dialog, select the access level whose settings are to be saved in a file and then click the [Export] button. The [Export] dialog is displayed.



◆ Enter a filename and click the [Save] button.



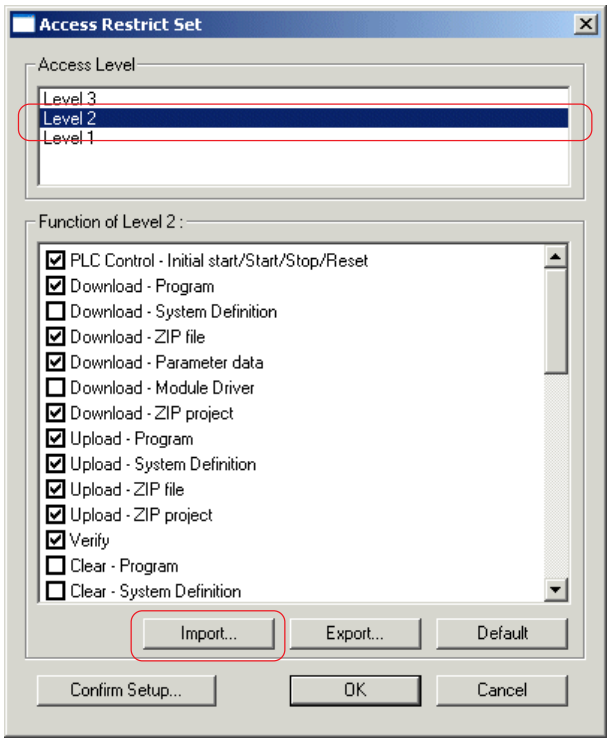
Appendix 3　3-level Access Restriction Function

Appendix 3-3　How to Use Password

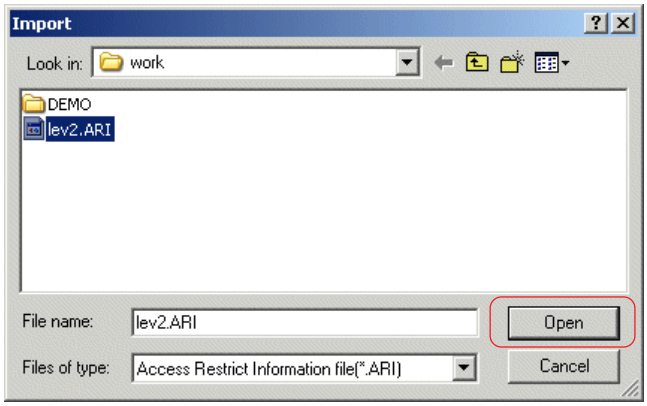
<Importing settings>

Import information of access restriction settings saved by the export function.

◆ In the [Access Level] list box on the [Access Restrict Set] dialog, select the access level to which settings are imported and then click the [Import] button. The [Import] dialog is displayed.



◆ Select a filename to be imported and click the [Open] button.



Appendix 3 3-level Access Restriction Function

Appendix 3-4 Notes on Use

(1) When you forget password

If you forget the password, it becomes impossible to access at level 2 and level 3.

(2) Position of the key switch

Set the key switch to the “TERM” position. If the switch is at the “RUN” or “STOP” position, it is not possible to register the password.

(3) State of PLC

When the PLC is in the following states, it is not possible to set the password for access level 2 or 3.

- When the program and system definition have not been downloaded
- When the breakpoint function is used
- When the condition monitor function is used
- When the sampling trace function is used
- When a user ROM card is write-protected
- When in a N-to-1 redundant system
- When 511 or more user functions are used in a program of the PLC (for SPH300)
  * SPB: 15 or more, Board Controller: 511 or more

(4) Consumption of program memory

When registering passwords for access level 3 and level 2, 33 steps of program memory is consumed. If there is not 33 steps or more available space in the program memory, it is not possible to set the password.
In addition, when a program with maximum steps is downloaded to the PLC in which a password with the access level is registered, the 3-level access restriction function becomes disabled and access restriction of the password function of versions earlier than V3.3.2.0. is imposed.

(5) Downloading a program

When a password of 3-level access restriction function is set for the PLC, it is not possible to download a project with 511 or more user functions (for SPH300).
* SPB: 15 or more, Board Controller: 511 or more

(6) Access restriction to a project file

To restrict access to a project file, use the security function of the project.
For more information, see “Section 13-2 Security Function”.

(7) Setting password for a memory card utility

It is not possible to set a password of 3-level access restriction function for a user ROM card utility. To set a password for a user ROM, mount it in the PLC, set the key switch to the “UROM-TERM” position, and then set a password for the PLC.

(8) Setting password in a multi-CPU system

In a multi-CPU system, set a password for each CPU. When you want to register the same password for all the CPUs, set it for each CPU.

(9) Combinations of password of PLC and loader

	V3.3.2.0 or later	Earlier than V3.3.2.0
Password of 3-level access restriction function of V3.3.2.0 or later	3-level access restriction is enabled.	Access restriction by password function of versions earlier than V3.3.2.0 (see note.)
Conventional password registered with a loader earlier than V3.3.2.0	Access restriction by password function of versions earlier than V3.3.2.0	Access restriction by password function of versions earlier than V3.3.2.0

Note 1: It is not possible to upload a project.
Note 2: If you connect V3.3.3.0 or later version of the loader to the PLC for which the password of 3-level access restriction function has been set with V3.3.2.0 of the loader and change the password or perform access restrction settings, it becomes impossible to use the password of 3-level access restriction function when you access the PLC with V3.3.2.0 of the loader.

Appendix 4 Compile optimizing (For SPH3000)

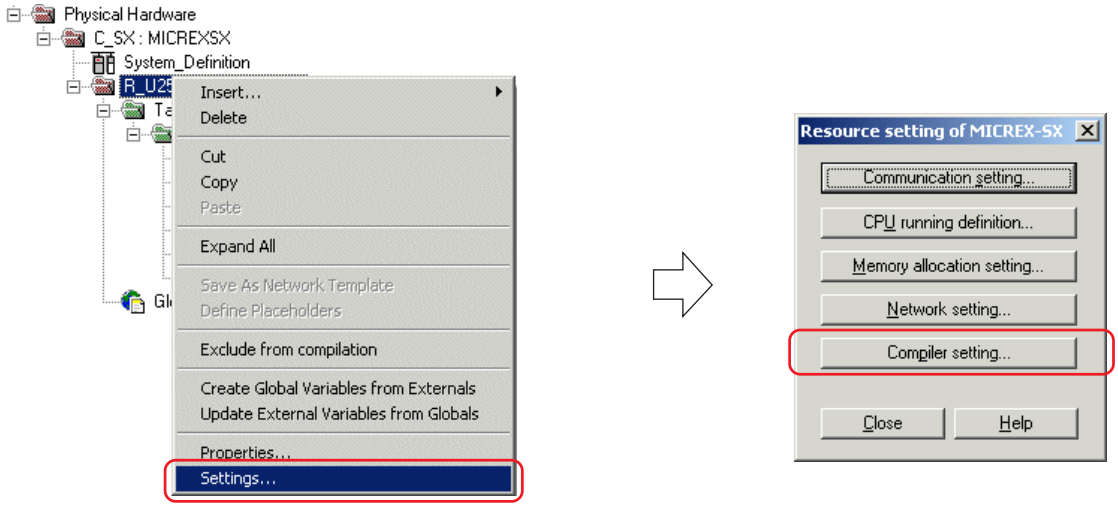
Appendix 4-1 Setting procedures App.4-1
Appendix 4-2 Create circuit in compile optimizing mode App.4-3

Appendix 4　Compile optimizing (For SPH3000)

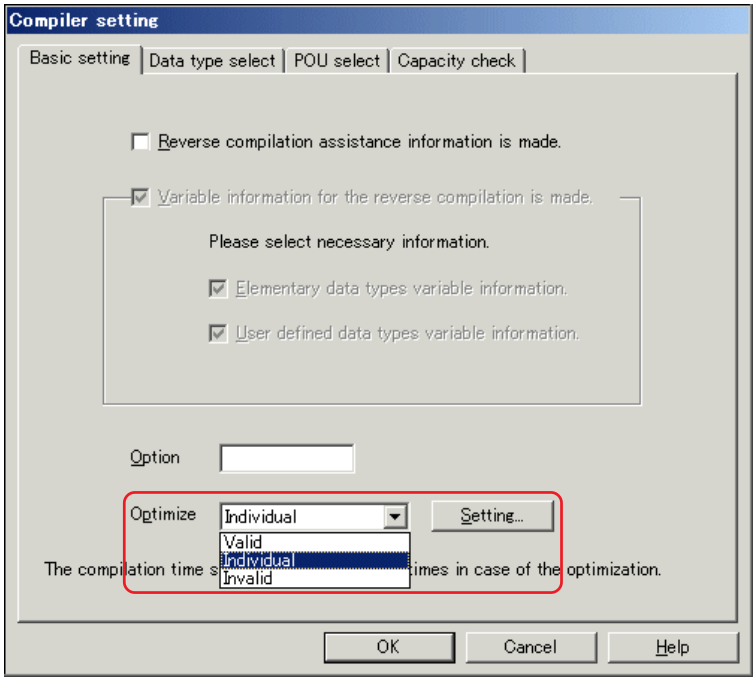
SPH3000 have two kinds of POU execution area (High speed, Default). User can set which area to assign for each POU.

Appendix 4-1　Setting procedures

◆ Right-click the resource icon from the project tree and select [Setting...] to display the [Resource setting] dialog.



◆ Clicking the [Compiler setting...] button displays the [Compiler setting] dialog.

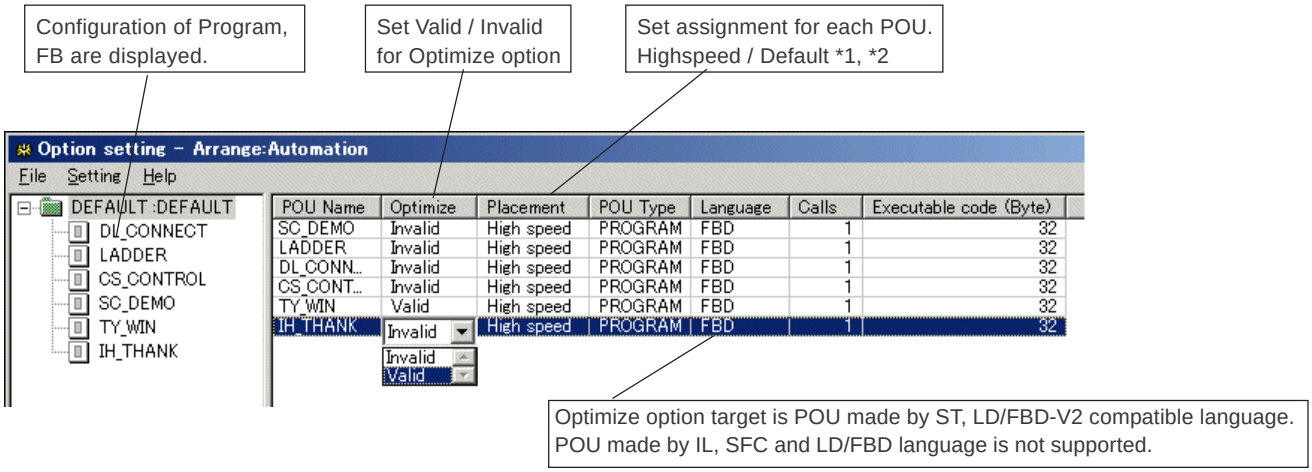


◆ IF select “Individual” at Optimize option, it is possible to use Optimize setting for each POU.
(Default setting is Invalid, and all POUs are automatically set to invalid.)

* If you change optimizing option from Invalid to Valid, compiling process time takes 3 to 10 times slower than before. Caution message also appear on Loader screen.

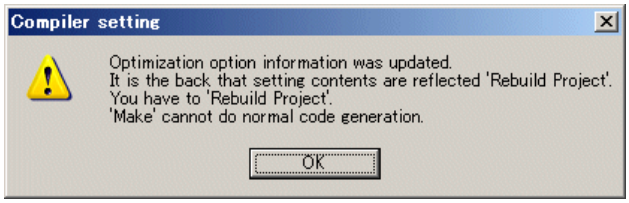
Appendix 4　Compile optimizing (For SPH3000)

◆ Clicking the [Setting] button displays the [Option setting] dialog.



*1 To change this area, uncheck “The placement of all POU are automatic setting” from [Setting] menu. Default setting is “Automatic setting”.
*2 Automatic assignment to “High speed” area is performed within memory size range. If memory size is not enough, POUs are assigned to “Default” area. When perform “Patch POU” also same.

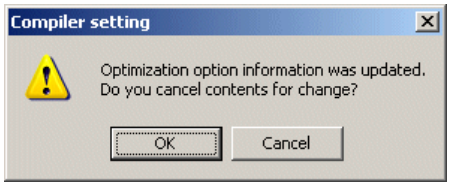
◆ On above dialog, it is possible to set Optimize (Valid/Invalid), Placement (High speed/Default) for each POUs.
After setting, execute [File] – [Exit] command, and return to “Compiler setting” dialog. If you click [OK] button, below dialog box is displayed.



* If you change compiler setting, please execute “Rebuild project”.

Clicking the [OK] button to finish setting.

◆ If you click [Cancel] button, following dialog box is displayed.



Clicking the [OK] button to discard changing and finish setting.

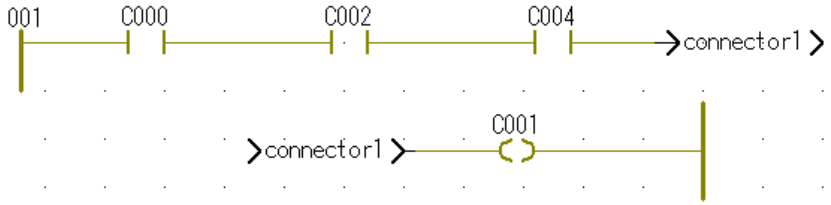
Appendix 4　Compile optimizing (For SPH3000)

Appendix 4-2　Create circuit in compile optimizing mode

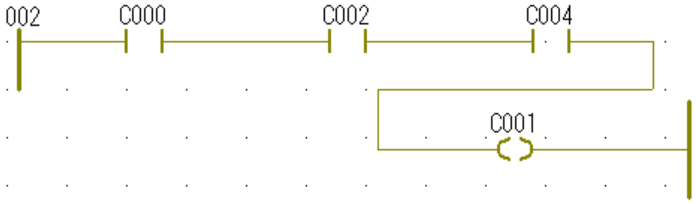
When compile optimizing mode, below circuit makes compilig error.
Change circuit as shown below <Counter measure circuit>
* Or it can be avoided by invalid optimizing option.

(1) Circuit conection using connector

<Compile error circuit>

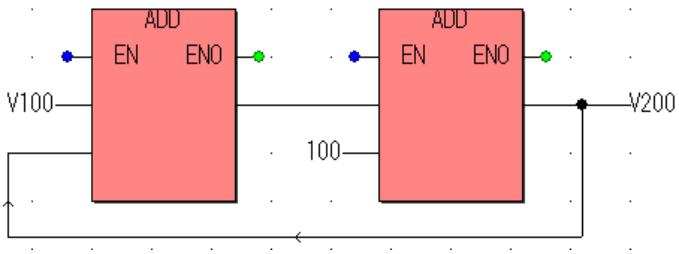


<Counter measure circuit>
Do not use connector. Connect using line.

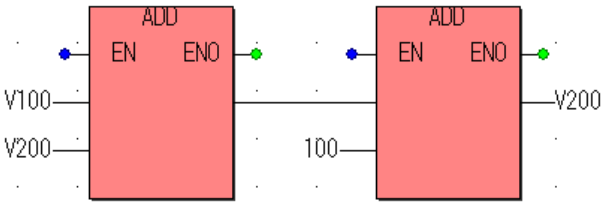


(2) Feedback circuit

<Compile error circuit>



<Counter measure circuit>
Do not feedback using line. Feedback using variable.



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