HITACHI

Software Manual

Operation

Ladder Diagram System For Windows®

510VE

Software Manual

Operation

Ladder Diagram System For Windows®

S10VE

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SAFETY PRECAUTIONS

● Read this manual thoroughly and follow all the safety precautions and instructions contained herein before performing operations such as system configuration and program creation. The use of an incorrect procedure might cause system malfunction.

● Keep this manual in a place where it can be readily accessed as necessary.

● If you have any question concerning any part of this manual, contact your nearest Hitachi branch office or service engineer.

● Hitachi will not be responsible for any accident or damage resulting from an operation that is not described in this manual.

● Hitachi will not be responsible for any accident or damage resulting from modification of software provided by Hitachi.

● Hitachi will not be responsible for reliability of software not provided by Hitachi.

● Make file backup a routine task. Any failure on a file unit, power failure during file access, or incorrect operation might destroy some of the files you have stored. To prevent data destruction and loss, back up the files regularly.

● Provide protective circuits outside the system and make sure that the system design provides adequate safeguards to prevent personal injury, death or serious property damage. This is to ensure safe system operation even if the product should become faulty or malfunction, or if an employed program is defective.

● Configure an emergency stop circuit, interlock circuit, or similar circuit outside the programmable logic controller. If you do not observe this precaution, the programmable logic controller might malfunction and cause equipment damage or an accident.

● During operation, before changing a program or performing forced output, RUN, or STOP, thoroughly verify that it is safe to do so. The use of an incorrect procedure might cause equipment damage or an accident.

● Safety precautions in this manual are classified into four levels according to the severity of potential hazards: DANGER, WARNING, CAUTION, and Notice.
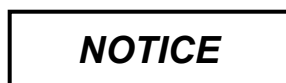
Definitions of the safety labels

⚠ **DANGER**	: Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ **WARNING**	: Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ **CAUTION**	: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	: Indicates a danger (resulting from incorrect use of the product) that can cause property damage or loss not related to personal injury if the safety precautions are not observed.

Failure to observe precautions marked with ⚠ CAUTION or *NOTICE* could also lead to a serious consequence depending on the situation in which the product is used. Therefore, you must observe all of those precautions without fail.

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

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

Minor or moderate injury:
    Is an injury that does not require either hospitalization for medical treatment or long-term follow-up care. Examples of minor or moderate injuries include burns and electric-shock injuries.

Property damage or loss not related to personal injury:
    Is damage other than personal injury. Examples of property damage or loss not related to personal injury are as follows: damage or loss of personal property, failure or damage of the main unit of the product, and loss of data.

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

NOTICE

● This product allows rewriting of programs and internal-register values while the PCs are running. However, you should be aware that careless rewriting might lead to serious consequences, such as breakdown of the equipment. If any such program or register needs to be rewritten, check the condition of the equipment first. Make sure that no problem will occur in the equipment as a result of rewriting any such program or register.

● When installing or uninstalling the ladder diagram system, use an Administrator account. Using the standard account might result in incorrect installation or uninstallation.

● Before installing the ladder diagram system, you need to exit all programs running on Windows®, including resident programs in the memory (such as virus check software). Failure to do so might result in an error during installation. In that case, uninstall the tool that is being installed, exit all programs running on Windows®, and then reinstall the tool. For the uninstallation procedure, see *2.2 Uninstalling the ladder diagram system*.

● Do not specify, as the installation destination of the ladder diagram system, any of the following folders protected by User Account Control:
  - Program file folder (for example, `C:¥Program Files`)
  - System root folder (for example, `C:¥Windows`)
  - System drive root folder (for example, `C:¥`)
  - Program data folder (for example, `C:¥ProgramData`)

● The ladder diagram system cannot be installed on a per-user basis. To install the ladder diagram system successfully, you must first log on to the system with an administrator account.
The ladder diagram system might not be installed properly in any of the following cases: 1) Administrator permissions are acquired by using User Account Control[#] from a standard account, 2) Logon is made with an administrator account that has been created from a standard account by using User Account Control.
In this case, log on with the administrator account that was first created on your computer, and then reinstall the ladder diagram system.
If you log on with a user account other than that used for installing the ladder diagram system, the installed program might not appear in the program menu. In this case, log off and log on again with the administrator account that was first created on your computer, uninstall the installed program, and then install the program again.
When you want to create a new account, log on with an administrator account without using User Account Control.

#: User Account Control is a Microsoft Windows feature that temporarily grants administrative rights to standard user accounts.

NOTICE
● If an S code file is sent by specifying destination addresses in the range from H004A 8000 to H004A A3FE, the ladder program's Ethernet communication instruction might no longer be activated by setting the ladder switch to RUN. If this happens, reset the PCs or perform a power-on reset. (See page 4-174)   ● After file transmission failed due to line disconnection or other reasons, if a file containing inconsistent ladder area has been successfully sent, the ladder program enters normal run mode without changing to temporary run mode. Running the ladder program in this state will cause malfunction. You need to resend the consistent due file. (See page 4-176)

Revision History

Revision No.	History (revision details)	Issue date	Remarks
C	First edition	March 2021	

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PREFACE

Thank you for purchasing Hitachi's LADDER DIAGRAM SYSTEM/S10VE.

> This ladder diagram system is a tool that runs on a personal computer and is used for creating and editing application program of ladder diagram.

This document describes how to operate the LADDER DIAGRAM SYSTEM/S10VE.

It covers the following versions of the ladder diagram system:

System name and version
LADDER DIAGRAM SYSTEM/S10VE 01-01-/A or later

For information about ladder programs (instructions), refer to the following manuals:

Related manuals

S10VE Software Manual Programming Ladder Diagram System for Windows® (manual number SEE-3-121)

S10VE Software Manual Operation HI-FLOW for Windows® (manual number SEE-3-132)

Trademarks

- Microsoft® and Windows® are registered trademarks of Microsoft Corporation in the United States and other countries.
- Ethernet is a registered trademark of Xerox Corp.
- SuperH is a registered trademark of Renesas Electronics Corporation.

Note about storage capacity calculations

- Memory capacities and requirements, file sizes and storage requirements must be calculated according to the formula 2^n. The following examples show the results of such calculations by 2^n (to the right of the equal signs).
  1 KB (kilobyte) = 1,024 bytes
  1 MB (megabyte) = 1,048,576 bytes
  1 GB (gigabyte) = 1,073,741,824 bytes
  1 TB (terabyte) = 1,099,511,627,776 bytes

- As for disk capacities, they must be calculated using the formula 10^n. Listed below are the results of calculating the above example capacities using 10^n in place of 2^n.
  1 KB (kilobyte) = 1,000 bytes
  1 MB (megabyte) = $1,000^2$ bytes
  1 GB (gigabyte) = $1,000^3$ bytes
  1 TB (terabyte) = $1,000^4$ bytes

Definitions of Terms

PCs: An abbreviation of <u>P</u>rogrammable <u>C</u>ontrollers.

This is a general term for PLC such as the S10VE, S10V, S10α, and S10mini series.

PLC: An abbreviation of <u>P</u>rogrammable <u>L</u>ogic <u>C</u>ontroller.

This is an industrial electronic device to exert sequence control with an incorporated program.

The S10VE, S10V, S10α, and S10mini series come under this PLC.

N coil: A ladder program converted into a form that can be run on PCs by pasting symbols on a sheet displayed on a personal computer.

Compile: The process of converting an application program of ladder diagram into a form (N coils) that can be run on PCs.

Sheet: A form to prepare an application program of ladder diagram. This form is controlled on a personal computer.

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CHAPTER 1 BEFORE USE

This manual is intended for users who are familiar with programming on Windows®-based personal computers.

1.1 Overview of LADDER DIAGRAM SYSTEM/S10VE

LADDER DIAGRAM SYSTEM/S10VE (hereinafter referred to as *the ladder diagram system*) is a tool for creating, editing, monitoring, and debugging ladder programs that run on an S10VE programmable controller, by using operations similar to those of common Windows®-based applications.

1.2 Supported hardware

The ladder diagram system supports only S10VE Series PCs.

1.3 Required hardware and software

The ladder diagram system requires the following hardware and software for its normal operation:

• Personal computer with a CPU (1 GHz or higher)

• Display device with a resolution of 1366 × 768 dots (FWXGA) or higher

• RAM (2 GB or more)

• Free hard disk capacity of 200 MB or more

• S10VE series CPU, power supply unit, and backboard

• Cables for connection between the personal computer and PCs (LAN cables)

• Remote I/O station, power supply unit, backboard, card, and cable as required

• Microsoft® Windows® 7 (64-bit) operating system, Microsoft® Windows® 10 (64-bit) operating system

• Microsoft Visual C++ 2010 redistributable package (x64)

• Microsoft .NET Framework 4

NOTICE

This product allows rewriting of programs and internal-register values while the PCs are running. However, you should be aware that careless rewriting might lead to serious consequences, such as breakdown of the equipment. If any such program or register needs to be rewritten, check the condition of the equipment first. Make sure that no problem will occur in the equipment as a result of rewriting any such program or register.

Users of this product must have adequate knowledge of the Windows® environment and user interface. This system conforms to the Windows® standard. This manual is prepared for users who are familiar with the basic Windows® operating procedures.

- If you use a personal computer that has a suspend feature, disable this feature as it might interfere with system execution and cause a malfunction.
- If there is inadequate free memory space available in RAM, an application error might occur. In the event of such an error, check the amount of free memory space and add more RAM if necessary.
- Use the Windows driver provided by the manufacturer. Using the Windows universal driver might result in slower operation.

CHAPTER 2 GETTING READY FOR USE

2.1 Installing the ladder diagram system

Before you start installation, check that your CD-ROM is the correct one. The ladder diagram system is compatible with Microsoft® Windows® 7 (64-bit) operating system and Microsoft® Windows® 10 (64-bit) operating system. If the ladder diagram system is installed in any other operating system, normal operation will not be guaranteed.

2.1.1 Notes on installation

Before you install the ladder diagram system, make sure that BASE SYSTEM/S10VE (software product model: S-7898-38) has been installed on the personal computer. If it has not been installed, install it first. (With no BASE SYSTEM/S10VE installed, the ladder diagram system cannot be installed.)

The following runtime program must have been installed for the ladder diagram system to operate correctly. If the runtime program has not been installed, install it in advance from the Microsoft Download Center:

• Microsoft Visual C++ 2010 redistributable package (x64)

- To operate the ladder diagram system, BASE SYSTEM/S10VE must be installed in advance. If this program is not installed, the ladder diagram system cannot be installed.
- If the ladder diagram system is started when the Microsoft Visual C++ 2010 redistributable package (x64) is not installed, the following error message appears during startup or operation: `The program can't start because MSVCR100.dll is missing from your computer. Try reinstalling the program to fix this problem.` Then, the ladder diagram system abends.

NOTICE

- When installing or uninstalling the ladder diagram system, use an Administrator account. Using the standard account might result in incorrect installation or uninstallation.
- Before installing the ladder diagram system, you need to exit all programs running on Windows®, including resident programs in the memory (such as virus check software). Failure to do so might result in an error during installation. In that case, uninstall the tool that is being installed, exit all programs running on Windows®, and then reinstall the tool. For the uninstallation procedure, see *2.2 Uninstalling the ladder diagram system*.
- Do not specify, as the installation destination of the ladder diagram system, any of the following folders protected by User Account Control:
  - Program file folder (for example, `C:\Program Files`)
  - System root folder (for example, `C:\Windows`)
  - System drive root folder (for example, `C:\`)
  - Program data folder (for example, `C:\ProgramData`)

2.1.2 Installation

This section describes how to install the ladder diagram system.

To install the ladder diagram system, log on with an administrator account.

(1) To install the ladder diagram system, double-click `SETUP.exe` in the CD (BASE SET/S10VE). In the SETUP window that appears (Figure 2-1), select `LADDER DIAGRAM SYSTEM/S10VE`, and then click the **Install** button.
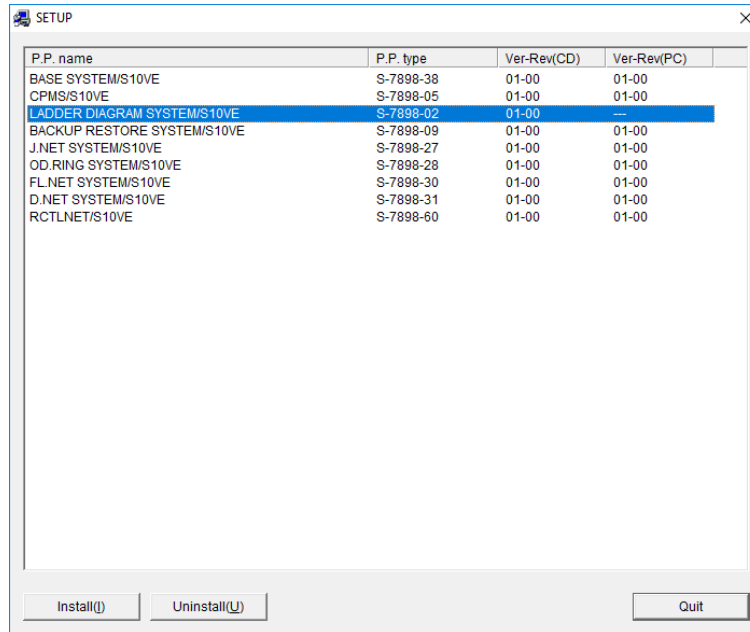
Figure 2-1 SETUP window

(2) A window showing `Welcome to the InstallShield Wizard for LADDER DIAGRAM SYSTEM/S10VE` appears. Click the **Next** button.
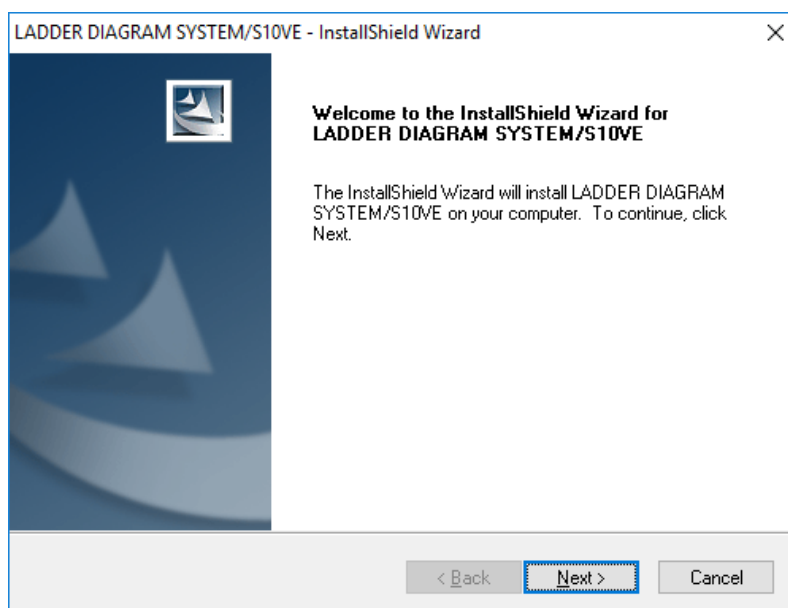
Figure 2-2 Window for selecting installation of LADDER DIAGRAM SYSTEM/S10VE

If you click the **Cancel** button, a message appears, asking whether you want to cancel setup. Click the **Yes** or **No** button.

Yes: Cancels installation of the ladder diagram system.

In the InstallShield Wizard Complete window, click the **Finish** button.

No: Restarts installation of the ladder diagram system.

(3) The Choose Destination Location window appears. If necessary, select an installation folder, and then click the Next button.

(4) The Setup Status window appears.

(5) When the installation is complete, the InstallShield Wizard Complete window appears. Click the Finish button.

<Notes on installation>

Starting `setup.exe` might cause the following dialog box to appear. Click the **Yes** button to run the setup program.

NOTICE

The ladder diagram system cannot be installed on a per-user basis. To install the ladder diagram system successfully, you must first log on to the system with an administrator account.

The ladder diagram system might not be installed properly in any of the following cases: 1) Administrator permissions are acquired by using User Account Control[#] from a standard account, 2) Logon is made with an administrator account that has been created from a standard account by using User Account Control.

In this case, log on with the administrator account that was first created on your computer, and then reinstall the ladder diagram system.

If you log on with a user account other than that used for installing the ladder diagram system, the installed program might not appear in the program menu. In this case, log off and log on again with the administrator account that was first created on your computer, uninstall the installed program, and then install the program again.

When you want to create a new account, log on with an administrator account without using User Account Control.

#: User Account Control is a Microsoft Windows feature that temporarily grants administrative rights to standard user accounts.

2.2 Uninstalling the ladder diagram system

This section describes how to uninstall the ladder diagram system.

To uninstall the ladder diagram system, log on with an administrator account.

(1) From the **Start** menu, open **Control Panel**. Click **Uninstall a program**, and then double-click `LADDER DIAGRAM SYSTEM/S10VE`.

The message `Do you want to completely remove the selected application and all of its features?` appears. Click the **Yes** button to start uninstallation.
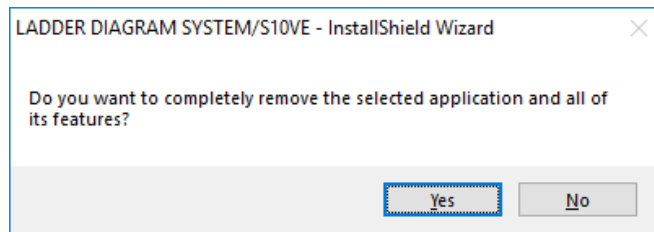
Figure 2-3 Window for selecting uninstallation of LADDER DIAGRAM SYSTEM/S10VE

Click the **Yes** button to start uninstallation.
Click the **No** button to cancel uninstallation.

(2) When uninstallation has been completed, `Uninstallation completed` appears. Click the **Finish** button.

2.3 Reinstalling the ladder diagram system

To reinstall the ladder diagram system, you must uninstall it, and then install it again. For details about the uninstallation procedure, see *2.2 Uninstalling the ladder diagram system*. For details about the installation procedure, see *2.1 Installing the ladder diagram system*.

> If a read-only file detection message appears when reinstalling the ladder diagram system, click the **Yes** button to perform overwrite operation.

2.4 Starting the system

Start the ladder diagram system from BASE SYSTEM/S10VE.

For details about how to do this, see *8.3.1 Starting tools* in the *S10VE User's Manual General Description* (manual number SEE-1-001).

The ladder diagram system is started (see Figure 2-4).
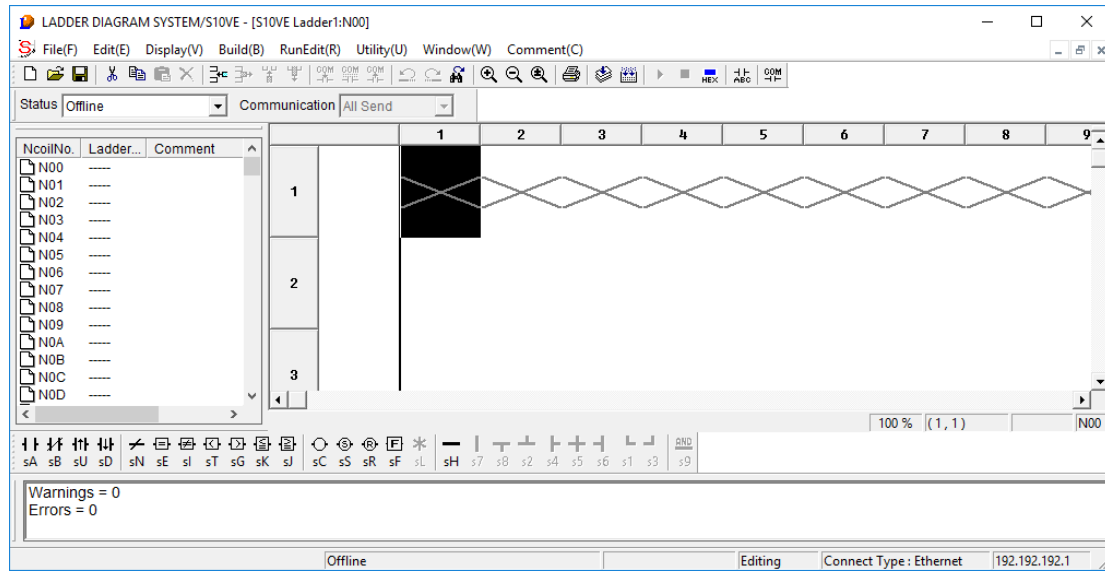
Figure 2-4 Window at startup of the ladder diagram system

2.5 Terminating the system

To terminate the ladder diagram system, from the **File** menu, click **Application termination** (see Figure 2-5).

After the system stops processing, its window closes, and then the Windows® screen reappears.
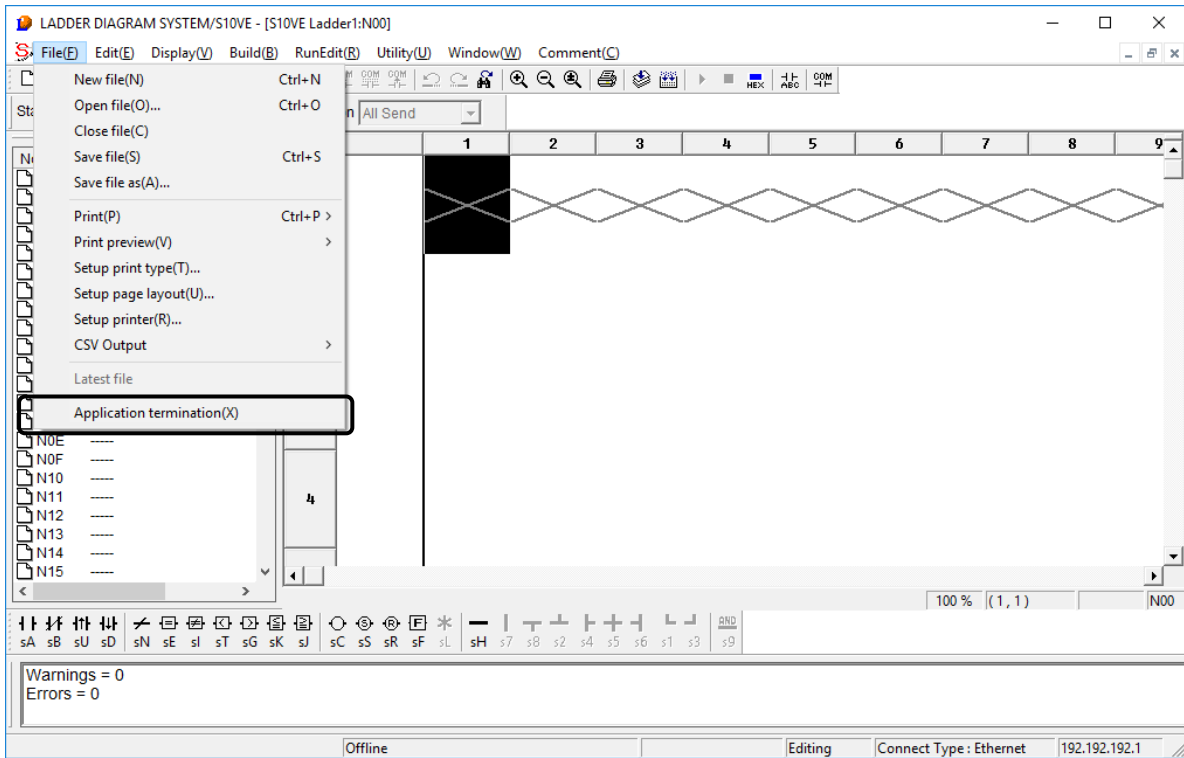
Figure 2-5 Terminating the ladder diagram system

CHAPTER 3 LADDER DIAGRAM SHEETS

The ladder diagram system processes application programs, called ladder programs, in the form of a series of ladder sheets on a personal computer.

3.1 Ladder sheets

Each ladder sheet is managed as a single N coil. A maximum of 256 N coils numbered N00 to NFF (hexadecimal) can be created. You can switch N coils by double-clicking the desired N coil number in the N coil list (the ladder sheet corresponding to the double-clicked N coil becomes active). You cannot edit multiple sheets at the same time. For NE0 to NFF coils, however, no ladder sheet can be opened if one step is defined as the area size in *4.7.9 Setting PCs edition information*.
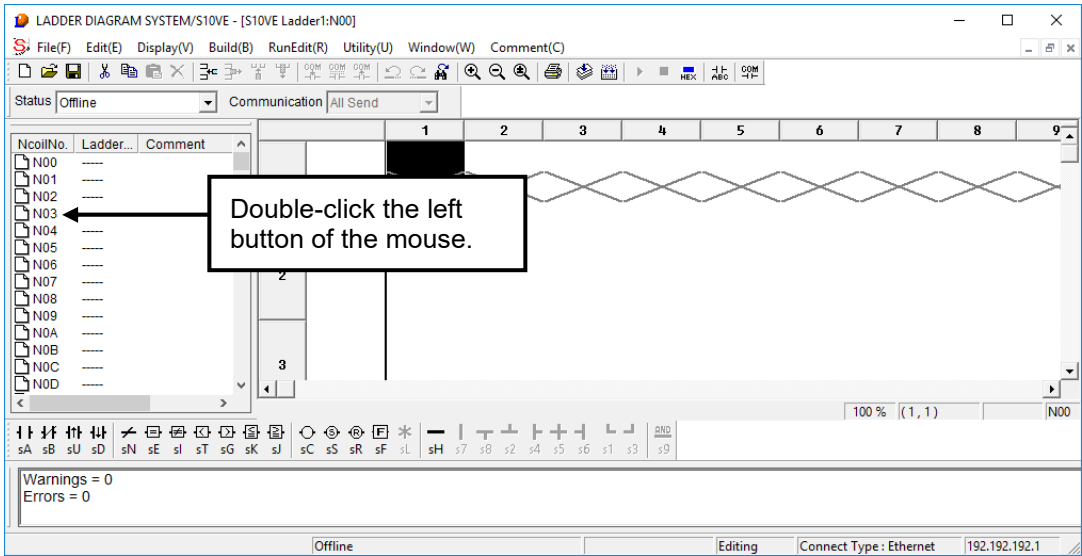
Figure 3-1 Example of a ladder sheet

A ladder program is created by pasting ladder symbols (selectable from the following ladder symbol bar) into a ladder sheet, which is simply called a sheet. For details, see *4.3 Ladder sheet editing functions*.
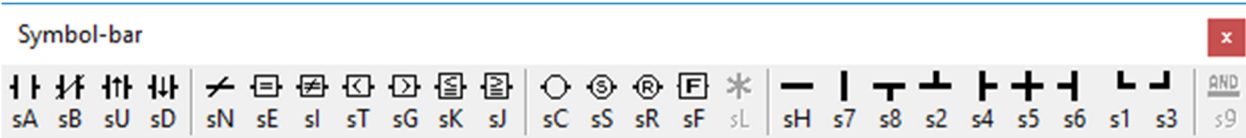
Figure 3-2 Ladder symbol bar

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CHAPTER 4 LADDER SHEET PROCESSING FUNCTIONALITY AND ITS USAGE

This chapter explains about ladder sheets and how to use them.

4.1 Configuration of the ladder diagram system's main window

Figure 4-1 shows the main window of the ladder diagram system. As shown in the figure, the main window consists of the following components: menu, tool bar, mode bar, ladder symbol bar, N coil window, ladder sheet, output window, status bar, and cross-reference window.
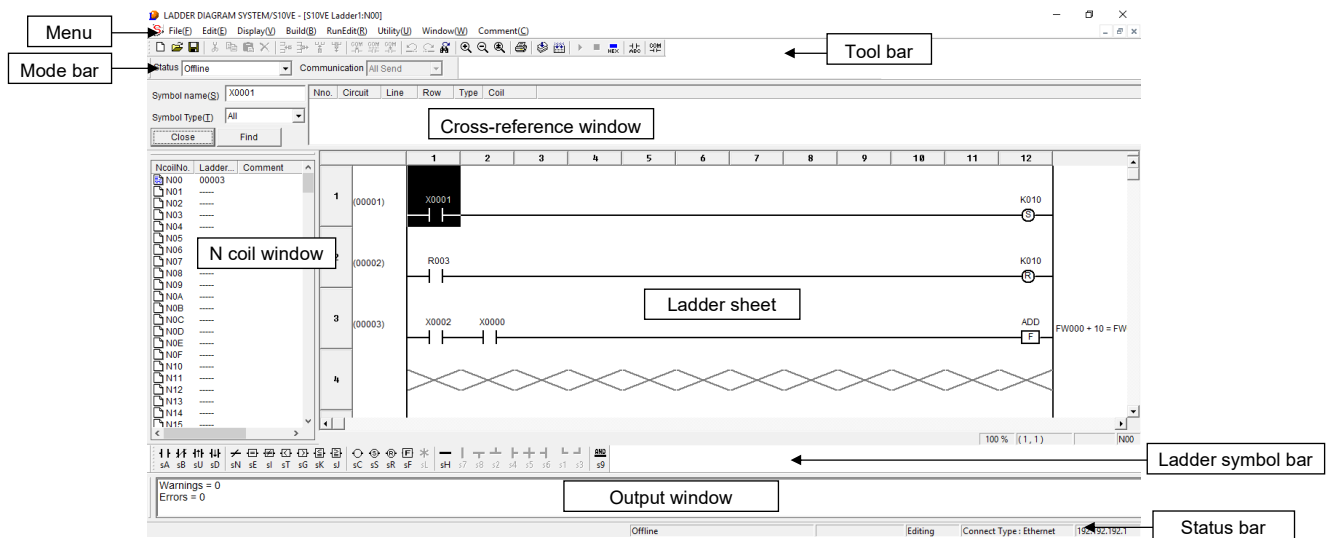
Figure 4-1 Configuration of the ladder diagram system's main window

4.1.1 Menu

The menu offers the following functions:
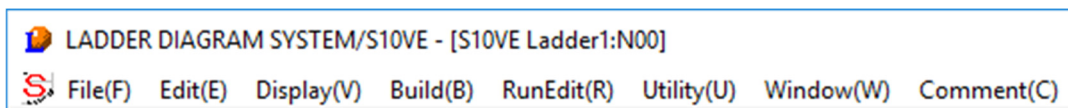
Figure 4-2 Main window menu

- **File**: A sub-menu of file processing functions such as saving, reading, and printing of ladder sheets
- **Edit**: A sub-menu of editing functions to edit displayed components of a ladder circuit
- **Display**: A sub-menu of functions relating to the display format of ladder circuits
- **Build**: A sub-menu of functions relating to the sending and receiving of ladder programs to and from the PCs
- **RunEdit**: A sub-menu of editing functions to edit a ladder circuit while it is running
- **Utility**: A sub-menu of a variety of utility functions
- **Window**: A sub-menu of functions relating to ladder sheet windows
- **Comment**: A sub-menu of PI/O comment-related functions

4.1.2 Tool bar

The tool bar offers the following functions:
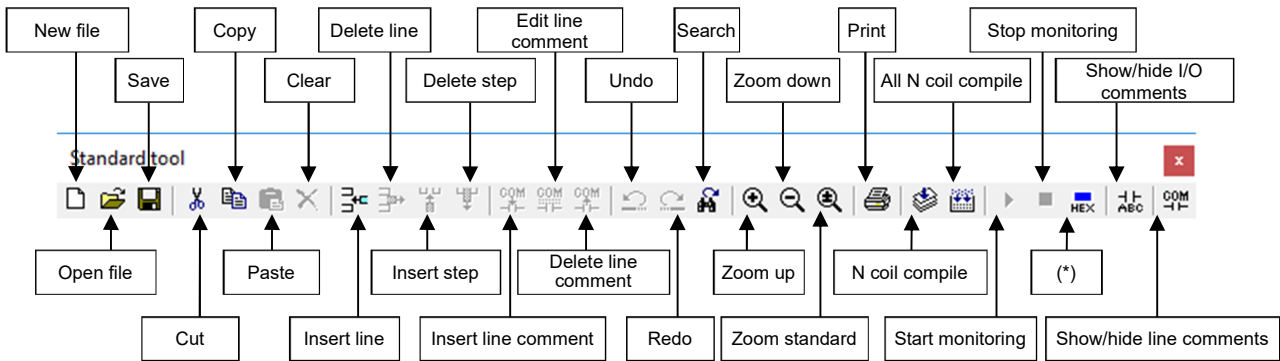
Figure 4-3 Tool bar

(*) Show monitor values in hexadecimal or decimal

- New file: Opens a new ladder sheet.
- Open file: Opens a selected ladder program.
- Save file: Saves the currently open ladder program file.
- Cut: Cuts the ladder symbol at the cursor in a ladder sheet.
- Copy: Copies the ladder symbol at the cursor in a ladder sheet.
- Paste: Pastes a copied or cut ladder symbol to the position at the cursor in a ladder sheet.
- Delete: Deletes the ladder symbol at the cursor in a ladder sheet.
- Insert line: Adds a new line before the one at the cursor in a ladder sheet.
- Delete line: Deletes the line at the cursor in a ladder sheet.
- Insert step: Adds a step (cell) to the left of the cursor in a ladder sheet. This occurs only when there is a free area in the ladder sheet.
- Delete step: Deletes the cell at the cursor in a ladder sheet and moves any cells which follow to the left in order to fill the empty space after the deletion. Note that, coils cannot be moved to the left.
- Insert line comment: Inserts a line comment into the currently open ladder program file.
- Edit line comment: Edits a selected line comment in the currently open ladder program file.
- Delete line comment: Deletes a selected line comment from the currently open ladder program file.
- Undo: Reverses the last operation performed. You cannot undo insertion, editing, or deletion of a line comment.
- Redo: Redoes the last operation performed. You cannot redo insertion, editing, or deletion of a line comment.
- Search: Searches for ladder symbols matching the value of a specified register.
- Zoom up: Increases the scale factor for displaying ladder sheets.

- Zoom down: Decreases the scale factor for displaying ladder sheets.
- Zoom standard: Sets the scale factor for displaying ladder sheets to the standard value (100%).
- Print: Displays the print type window.
- N coil compile: Compiles only the currently active N coil (ladder sheet).
- All N coil compile: Compiles all N coils in the N coil list displayed.
- Start monitoring: Starts monitoring ladder circuits. This option is selectable only when the ladder diagram system is running online.
- Stop monitoring: Starts monitoring ladder circuits. This option is selectable only when the ladder diagram system is running online.
- Show monitor values as hexadecimal values or decimal values:
  Switches between hexadecimal and decimal format the display of monitored values used during ladder circuit monitoring.
- Show/hide I/O comments: Displays or hides I/O comments.
- Show/hide line comments: Displays or hides line comments.

4.1.3 Mode bar

The mode bar offers the following functions:

Figure 4-4 Mode bar

- **Status**: Indicates or changes the communication status of the ladder diagram system.
  There are three types of communication status: **Offline**, **Online**, and **Only for online monitor**
- **Communication**: This option, which is only effective in online mode, provides two modes: **All Send** and **Run-Edit Send**. (Select **All Send** mode in the usual case.)

4.1.4 Ladder symbol bar

The ladder symbol bar contains ladder symbols, including connecting-line templates, which can be pasted into ladder sheets. For details, see *4.3 Ladder sheet editing functions*.
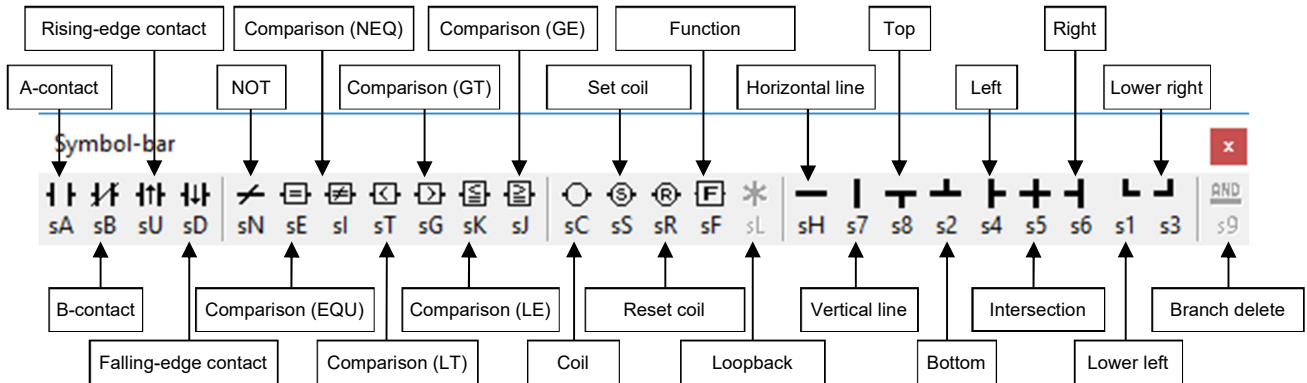
Figure 4-5 Ladder symbol bar

4.1.5 N coil window

The N coil window displays a list of N coils. This list contains N coil number icons (in the **NcoilNo.** column), ladder line counts, and comments.

If an N coil has no ladder program, its N coil number icon shares the background color. If an N coil's ladder program is not compiled yet, its icon is shown in red. If an N coil's ladder program has been compiled, its icon is shown in blue.

Ladder line counts are displayed in decimal format.

For an N coil comment, a maximum of 32 halfwidth characters can be displayed. If no comment is given to the N coil, the **Comment** column is blank.

If you double click an N coil number, the ladder sheet for the specified N coil number opens. Note, however, that the ladder sheet does not display under the following condition:

• In the window for Ladder Area Size Change, the area size is defined as one step.
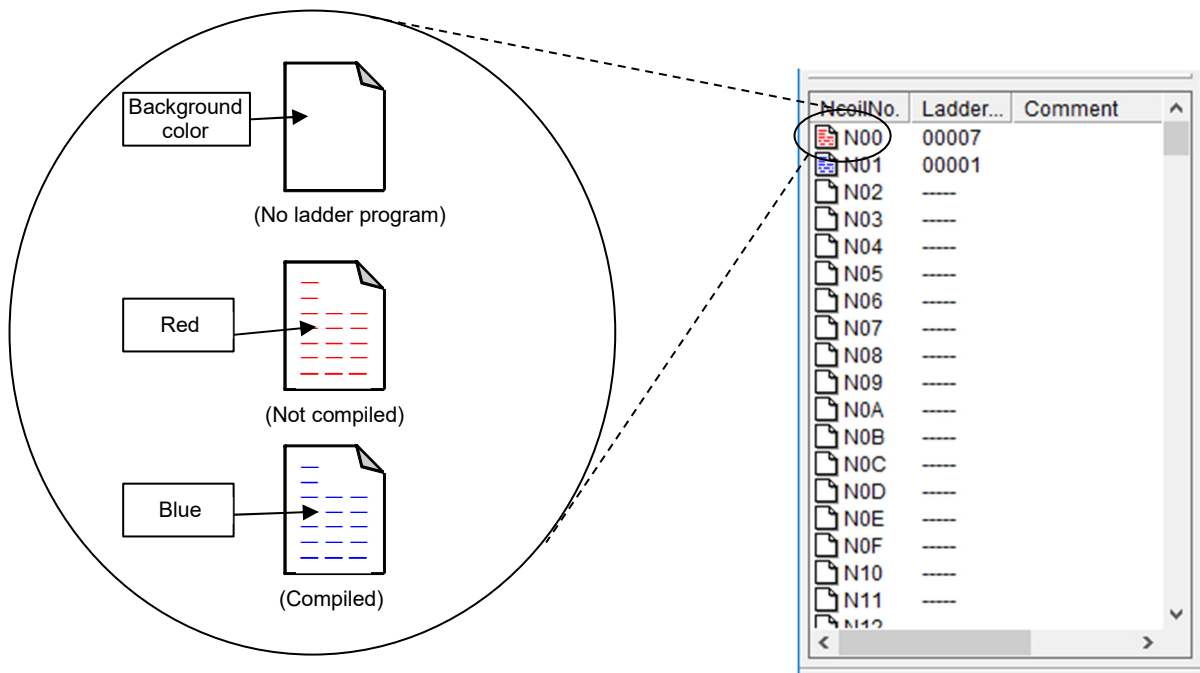
Figure 4-6 N coil window

4.1.6 Output window

The output window shows the following types of messages:

- Compilation result

- Number of instructions used when the ladder program file is read

- Replacement result at the time of batch name change

- Messages appearing while a ladder program is being sent or received

- Monitor counter indication by starting monitoring

- Processing message during run-time editing

- Conversion result

- Instruction file read result

4.1.7 Ladder sheet

Figure 4-7 shows a ladder sheet. A ladder program can be created by pasting symbols to cells of the ladder sheet.

The symbol directly connected to the left power rail of the ladder sheet (that is, pasted into the first column of the ladder sheet) is called an *input symbol*. The cell into which an input symbol is pasted is called an *input cell*. Similarly, the symbol directly connected to the right power rail of the ladder sheet (that is, pasted into the last column of the ladder sheet) is called an *output symbol*. The cell into which an output symbol is pasted is called an *output cell*. Symbols to be pasted into cells between the left and right power rails (between the input symbol and the output symbol) are called *intermediate symbols*, and cells into which intermediate symbols are pasted are called *intermediate cells*.

Create a ladder program from the input cell at the upper left of the ladder sheet.
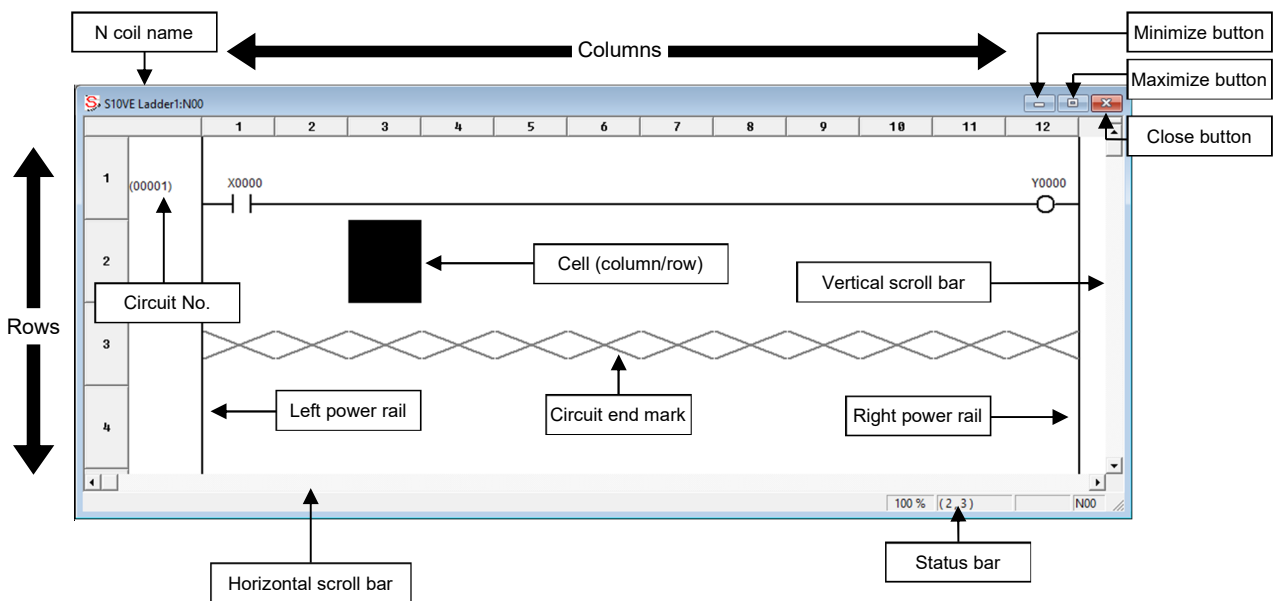
Figure 4-7 Ladder sheet

- Left power rail: A ladder program starts (block unit) from the left power rail.
- Right power rail: A ladder program ends (block unit) by connection to the right power rail.
- Circuit No.: Circuit numbers are automatically assigned in units of N coils in ascending order beginning with 1.
- N coil name: Indicates an N coil name (that is optionally set for each N coil) containing a maximum of 32 halfwidth characters or 16 fullwidth characters. You can set the N coil name by entering a comment in the N coil symbol information window (PI/O) when creating a ladder circuit. If no N coil comment is specified, the N coil name is *ladder-file-name*: N*XX* (*XX*: N coil number).

- Circuit end mark: Indicates the end of ladder programs. Ladder programs above this mark are enabled.
- Minimize button: Clicking this button minimizes the ladder sheet. (See Figure 4-8.)
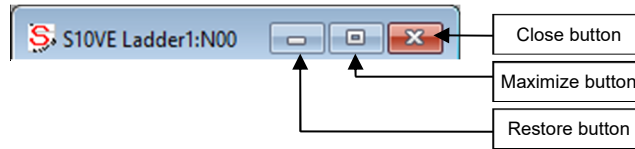
Figure 4-8 Ladder sheet (minimized)

- Maximize button: Clicking this button maximizes the ladder sheet.
- Restore button: Clicking this button restores the ladder sheet to the size that was manually set the last time.
- Close button: Clicking this button closes the ladder sheet. If any change has been made in the ladder sheet (such as modification of the ladder program), a dialog box appears asking you whether you want to save the change.
- Vertical scroll bar: Moving the vertical scroll bar upward or downward moves the ladder program respectively. The ladder program is movable by a maximum of 32,767 rows per ladder sheet.
- Horizontal scroll bar: Moving the horizontal scroll bar in the left or right direction moves the ladder program respectively.

4.1.8 Status bar

The following shows the configuration of the status bar.
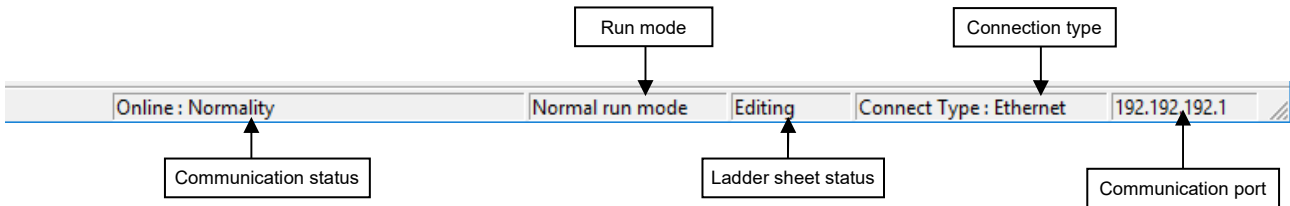
Figure 4-9 Status bar

- Communication status: Indicates the communication status. For details, see *4.5.2 Switching between online, offline, only for online monitor, and online waiting modes*.
- Run mode: Indicates the area where the S10VE ladder program is running:
  - **Normal run mode**: Indicated while the ladder program is running in the normal area.
  - **Temporary run mode**: Indicated while the ladder program is running in the save area after the ladder program failed to be sent. When this mode is indicated, resend the ladder program to recover to normal run mode.
    Note that, nothing is displayed if the communication status is offline.
- Ladder sheet status: **Editing** is displayed if any ladder sheet is open.
    No program is displayed if all the ladder sheets are closed.
- Connection type: Indicates the type of communication connection used between S10VE and a personal computer. Currently, only **Ethernet** is displayed.
- Communication port: Indicates the port used in communications between S10VE and a personal computer.
    Ethernet:
    The IP address of S10VE is displayed.
    You can set the communication port in the Connection Type window that is displayed by clicking **Change connection of PCs** from the **Utility** menu.

4.1.9 Cross-reference window

The cross-reference window enables you to retrieve cross-reference information. For details, see *4.3.4 Cross reference [ladder only]*.

4.2 Ladder sheet file processing functions

You can select a ladder sheet file processing function from the pull-down menu.
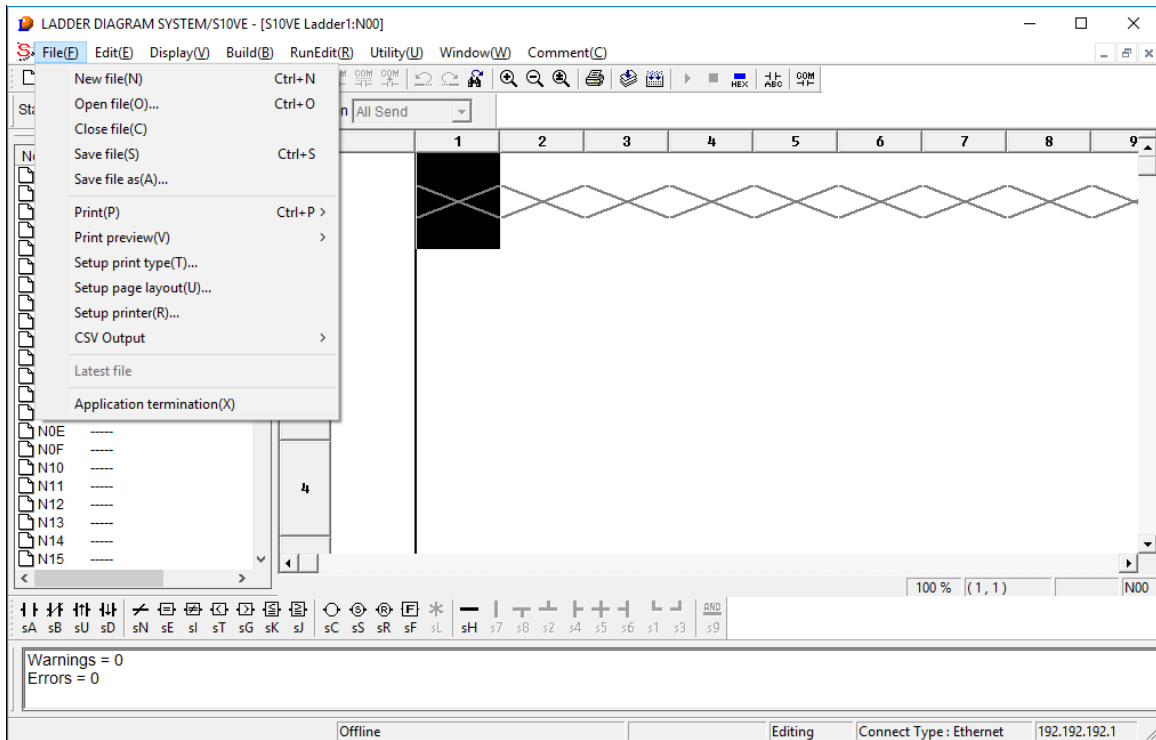
Figure 4-10 Clicking the [File] menu

The following table lists and describes the file processing functions provided in the **File** menu.

Table 4-1 [File] menu options (1/2)

No.	Level 1	Level 2	Level 3	Description
1	**File**	**New file**		Opens the ladder program creation window.
2		**Open file**		Reads a specified ladder program file.
3		**Close file**		Closes the currently active window (file).
4		**Save file**		Saves the contents (data) of the currently active window and allows you to continue editing.
5		**Save file as**		Saves the contents (data) of the currently active window with a specified name and allows you to continue editing.
6		**Print**	**Circuit**	Prints circuit diagrams.
7			**PCs edition**	Prints PCs edition information.
8			**LPET**	Prints LPETs.[#1]
9			**TUC**	Prints TUC (T, U, and C coils) set values.[#1]
10			**Device usage**	Prints devices used.[#1]
11			**Cross reference**	Prints cross-references used.[#1]
12			**Coil reference**	Prints coil references used.[#1]
13			**EXFET**	Prints a list of system extension functions.[#1]
14			**UFET**	Prints UFETs (user function edition tables).[#1]
15			**I/O comment**	Prints I/O comments.[#1]

#1: The PCs number stored in the internal memory is printed (see Appendix C).

Table 4-1 [File] menu options (2/2)

No.	Level 1	Level 2	Level 3	Description
16	**File** (continued from the previous page)	**Print** (continued from the previous page)	**Analog counters**	Prints analog counter assignment information.
17			**Ethernet communication setting**	Prints information about Ethernet communication settings.
18		**Print preview**	**Circuit**	Displays print images of circuit diagrams.
19			**PCs edition**	Displays print images of PCs edition information.
20			**LPET**	Displays print images of LPETs.[1]
21			**TUC**	Displays print images of TUC set values.[1]
22			**Device usage**	Displays print images of devices used.[1]
23			**Cross reference**	Displays print images of cross-references.[1]
24			**Coil reference**	Displays print images of coil references.[1]
25			**EXFET**	Displays print images of system extension functions.[1]
26			**UFET**	Displays print images of UFETs.[1]
27			**I/O comment**	Displays print images of I/O comments.[1]
28			**Analog counters**	Displays print images of analog counter assignment information.
29			**Ethernet communication setting**	Displays print images of Ethernet communication settings information.
30		**Setup print type**		Sets the details of a printout to be produced. This setting also applies to CSV output.
31		**Setup page layout**		Sets a page layout.
32		**Setup printer**		Sets up the printer.
33		**CSV Output**	**PCs edition**	Outputs PCs edition information to a file in CSV format.
34			**TUC**	Outputs TUC set values to a file in CSV format.[2]
35			**Cross reference**	Outputs cross-references to a file in CSV format.[2]
36			**Coil reference**	Outputs coil references to a file in CSV format.[2]
37			**I/O comment**	Outputs I/O comments to a file in CSV format.[2]
38			**Analog counters**	Outputs the analog counter assignment information to a file in CSV format.
39			**Ethernet communication setting**	Outputs the Ethernet communication settings information to a file in CSV format.
40		**Latest file**		Displays the specified file.
41		**Application termination**		Exits this application.

#1: The PCs number stored in the internal memory is displayed by the Print preview function (see Appendix C).
#2: The PCs number stored in the internal memory is output to a CVS file (see Appendix C).

4.2.1 Program file operations

(1) New file

This operation is used to create a ladder sheet with the default file name.

Default file name
Japanese: "S10VE ラダー△. wvel"
English (other than Japanese): "S10VELadder△. wvel"
(△: A number beginning with 1. This number is automatically updated at each new creation.)

When a new ladder sheet has been created, the message in Figure 4-11 appears.
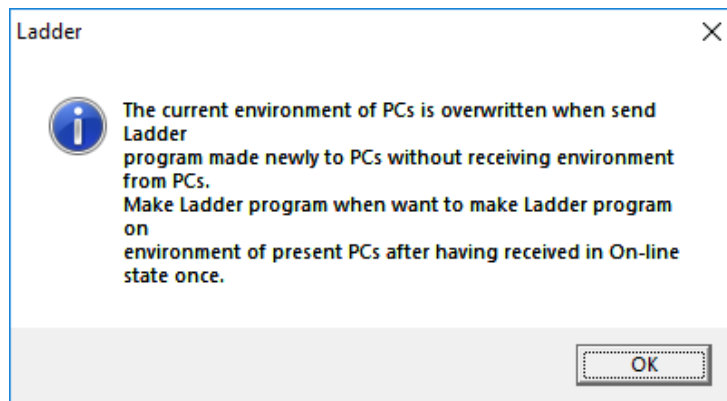
Figure 4-11 Message for new file creation

If you terminated the ladder diagram system by selecting **File**, **Close file**, and then the **Application termination** option, when you start the system again, operation is the same as when **New file** is selected. If you selected the **Application termination** option without selecting **File** and then **Close file**, the previously used file is opened when the ladder diagram system starts again.

When a new file is created, the ladder diagram is in the default state (no ladder program), the PCs edition window shows default values (see *4.7.9 Setting PCs edition information*), and other user setting items have not been set.

When the ladder diagram system is started from BASE SYSTEM/S10VE, the default PCs number is the PCs number of the open project in BASE SYSTEM/S10VE. When this system is started from the Windows **Start** menu, the default PCs number is the PCs number of the project that was previously used to start the ladder diagram system or the HI-FLOW system in BASE SYSTEM/S10VE.

When a file opens, information saved in that file is applied to the ladder diagram, PCs edition window, and other user setting items.

(2)　Open file

This operation is used to display the Open window (Figure 4-12) to read the selected file.
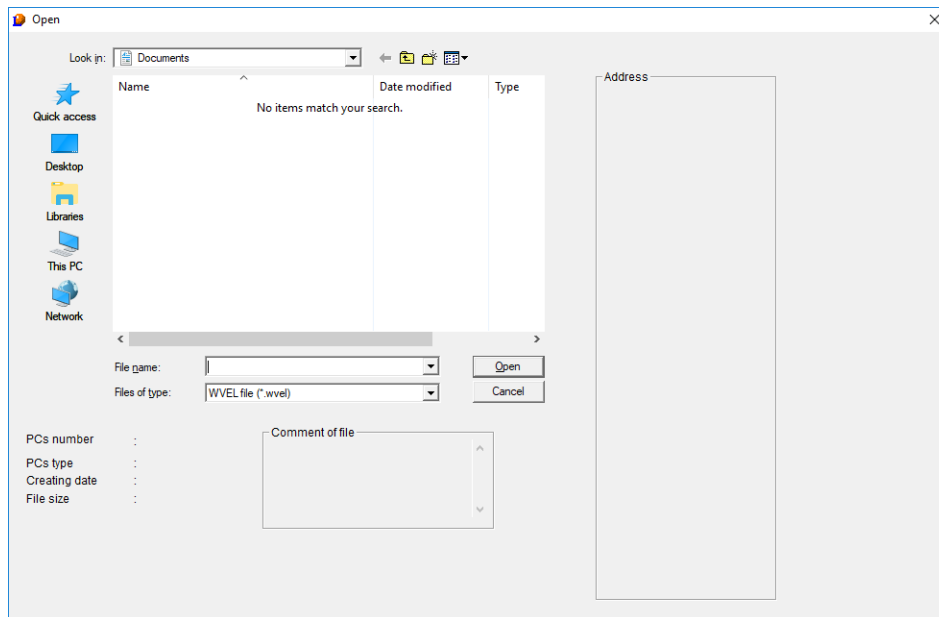
Figure 4-12　Open window

<Operation>

[1] From the **Files of type** list box, select the type of file to be read.

[2] In the **Look in** list box, from the file name list, select the file to be read.

[3] Click the **Open** button to read the specified file, and then close the Open window.

　　If you select `Instruction file (*.vcm)` in **Files of type** and then click the **Open** button with an S10V instruction file selected, the following message appears. The selected S10V instruction file cannot be opened.
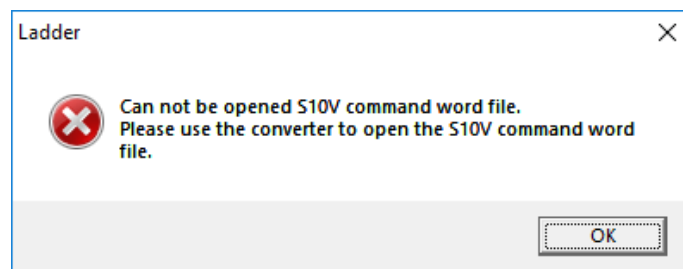
Figure 4-13　Error message indicating that the S10V instruction file cannot be opened

[4] Click the **Cancel** button to close the Open window without reading the file.

(3) Save file as

This operation is used to display the Save As window (Figure 4-14) to save the ladder program and the memory data of the real machine in the specified file. In the Save As window, the default value in the **PCs number** text box is the PCs number stored in the internal memory (see APPENDIX C).
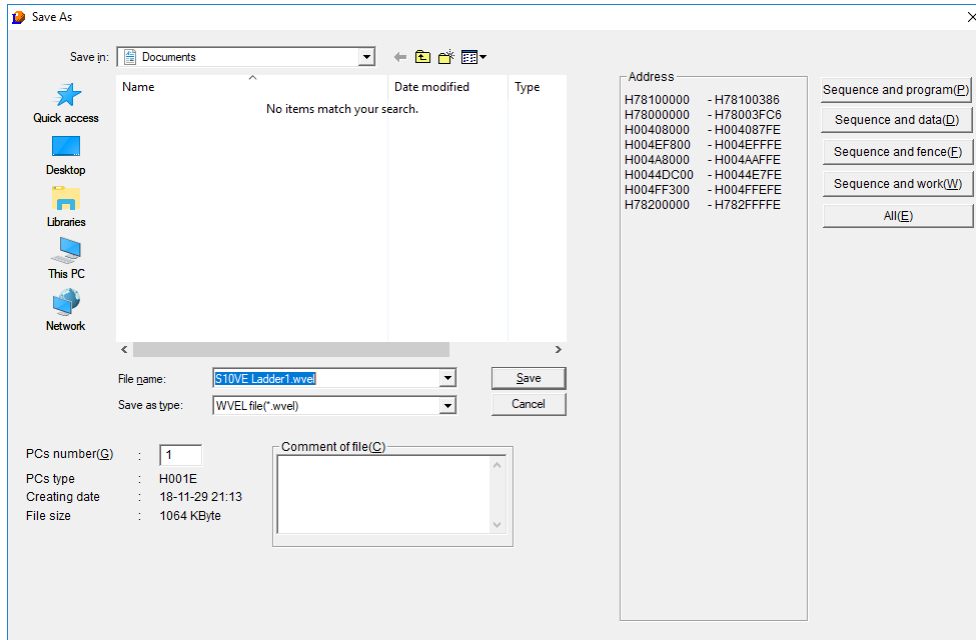
Figure 4-14 Save As window

<Operation>

[1] From the **Save as type** list box, select the type of file you want to save.

[2] Select the save address by using any of the buttons **Sequence and program** to **All**. If the file type is an instruction file (vcm or vcd), these buttons are hidden because only the ladder program is saved.

[3] Enter a PCs number and a file comment as needed.

[4] Click the **Save** button to save data in the specified file.

[5] Click the **Cancel** button to close the Save As window without saving data in the file.

(4) Save file

If the file to be saved is open, clicking **Save file** saves that file without opening another window for saving a file.

If a file to be saved is not open, clicking **Save file** opens the Save As window (Figure 4-14).

(5)   Confirmation of file save

If you select one of the following operations before the ladder sheet you have edited is saved in a file, the message shown in Figure 4-15 appears:

- **New file**

- **Open file** (after the **Open** button is clicked on the Open window)

- **Close file**

- **Application termination**
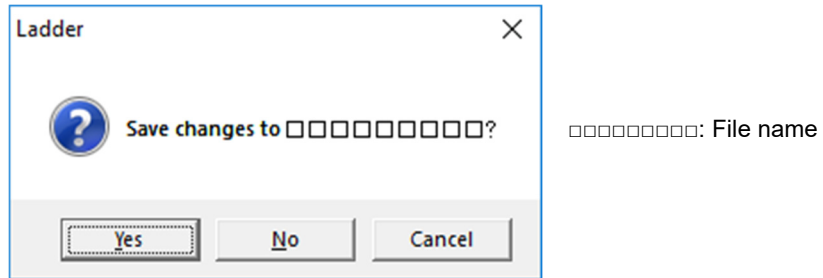
Figure 4-15 Confirmation of file save message

Yes (after compilation): Displays the Save As window (Figure 4-14).

(before compilation): Displays the message shown in Figure 4-16 without saving data in a file.

No: Performs the specified processing without saving the file.

Cancel: Does not save the file or perform the specified processing.
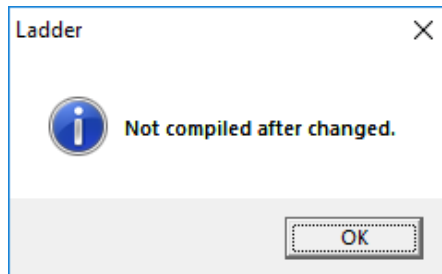
Figure 4-16 Non-compilation message

If you attempt to close the file in online mode while the system is running in temporary run mode, the following warning message appears.
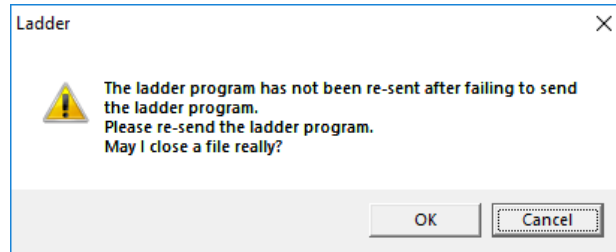
Figure 4-17 Warning message indicating that the ladder program is not resent

OK: Closes the ladder sheet.

Cancel: Continues online mode without closing the ladder sheet.

4.2.2 Printing ladder circuit diagrams

You can print ladder circuit diagrams.

To print a ladder circuit diagram, display the Print window (for circuit diagrams) (Figure 4-18), and then specify the printing range of the N coil specified on the Circuit tab in the Setup print type window (Figure 4-20).
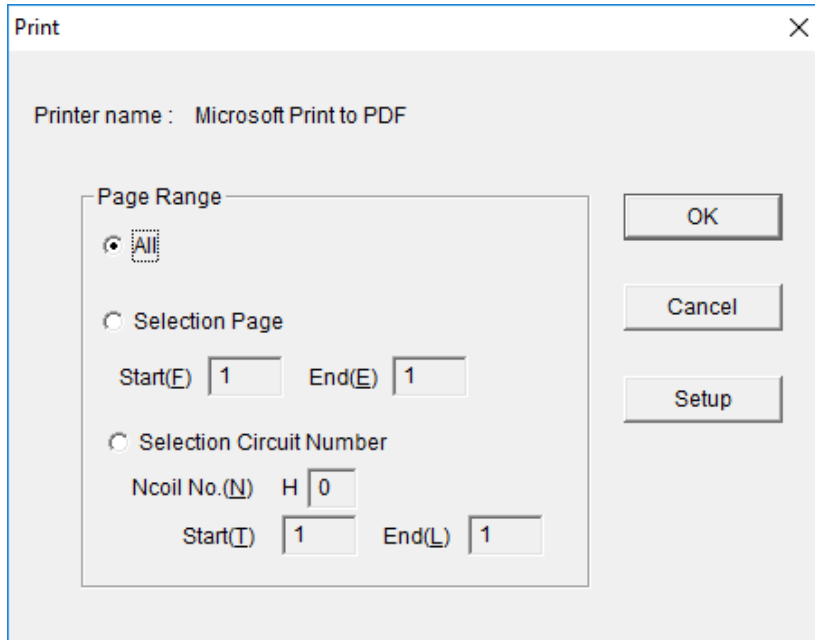
Figure 4-18 Print window (for circuit diagrams)

- **Page Range**

  All: Select this option to print all pages of the target N coil.

  Selection Page: Selecting this option enables the **Start(F)** and **End(E)** boxes for specifying print pages of the target N coil. If a page out of the printing range is specified, all pages are printed.

  Selection Circuit Number: Selecting this option enables the **Ncoil No.(N)**, **Start(T)**, and **End(L)** boxes. You can specify the circuit numbers in the specified N coil. If a circuit out of the printing range is specified, a blank page is printed.

- **Setup** button

  Displays the Printer settings window (standard window of Windows).

When an operation function using the index register is printed, a maximum of four syntax parameters are printed, but subsequent parameters are not printed.

(Example)

    Syntax: ADD LBW0000(LBW0010) + LBW0020(LBW0030) = LBW0040(LBW0050)

    Print result: ADD LBW0000(LBW0010) + LBW0020(LBW0030)

4.2.3 Printing a circuit diagram with cross-references

You can print a circuit diagram with cross-references. To do this, select the **Ladder Cross Reference** check box in the Setup print type window (displayed by clicking **Setup print type** in the **File** menu, as shown in Figure 4-19). Then, click **File**, **Print**, and then **Circuit**.

You can also display the print image of the circuit diagram with cross-references by clicking **File**, **Print preview**, and then **Circuit**.
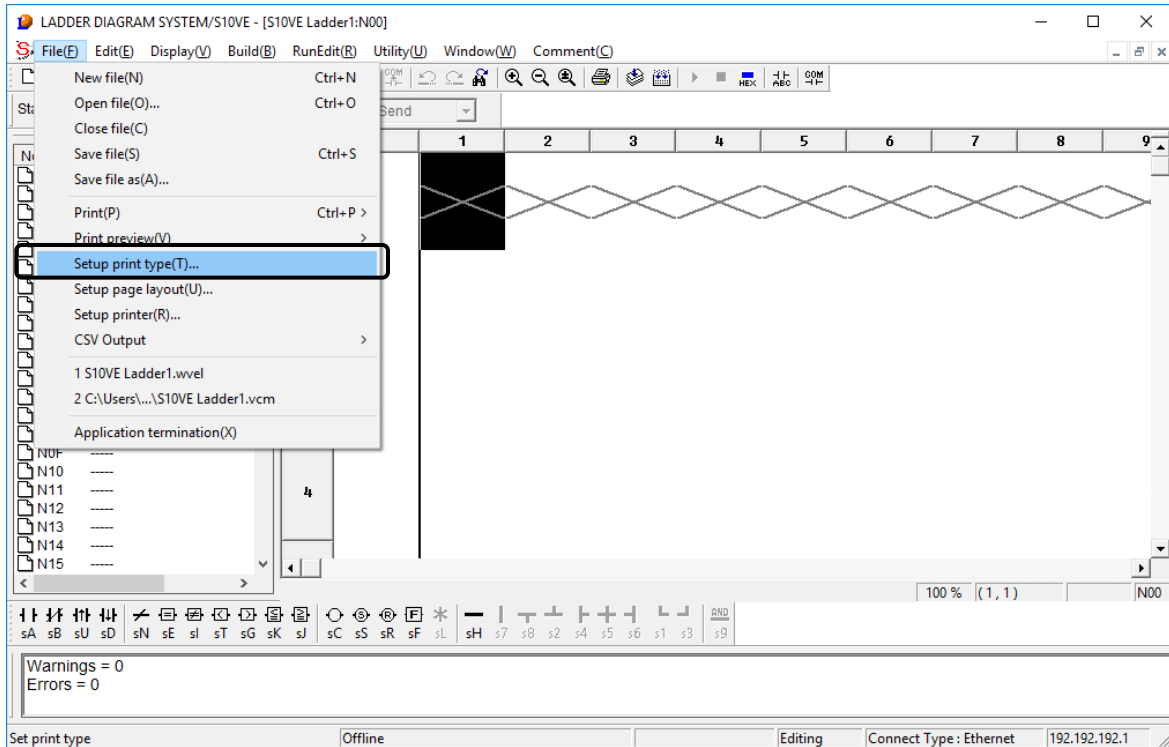
Figure 4-19 Clicking [Setup print type] from the [File] menu

(1) Setting print details when printing a circuit diagram with cross-references
To specify output of a circuit diagram with cross-references and the print format, use the **Circuit** tab in the Setup print type window. On this tab, selecting the **Ladder Cross Reference** check box allows the system to print a circuit diagram with cross-references. (This print setting is applicable to the N coils selected in the N coil list of the window.)
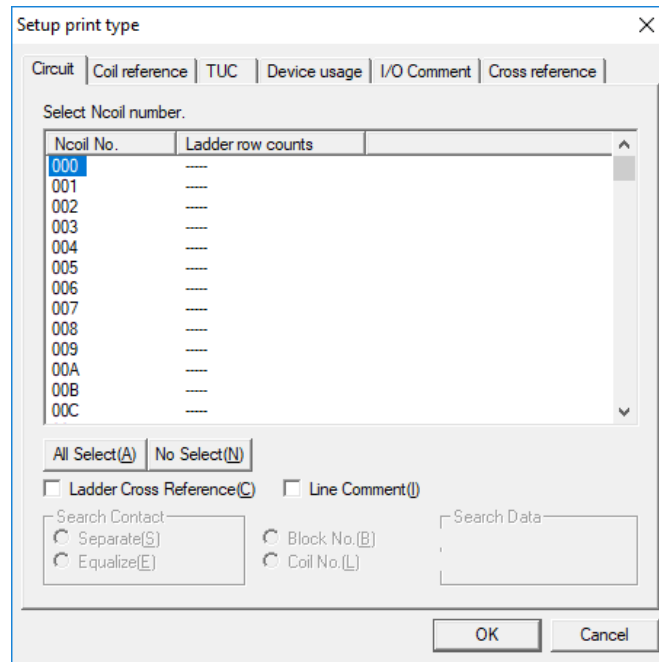
Figure 4-20 Setup print type window

- **All Select** button

  Selects all N coils in the N coil list which have a ladder sheet created (that is, any N coils for which a value is indicated in the **Ladder row counts** column). If you wish to print only some of the N coils, click the desired N coils instead of using this button.

- **No Select** button

  Clears the selection of all N coils in the N coil list.

- **Ladder Cross Reference** check box

  Select this check box to print a circuit diagram with cross-references. You can also specify the format in which to print searched contacts and searched data.

- **Search Contact** group box

  This group box allows you to specify the format in which to print search contacts with cross-references. You can specify **Separate** (default) or **Equalize**.

- **Search Data** group box

  This group box allows you to specify the type of search data to be printed. You can specify **Block No.** (default) or **Coil No.**.

- **Line Comment** check box

  Select this check box to print the selected N coils (and inserted line comments, if any).

(2) Printing a circuit diagram with cross-references

In the Setup print type window shown in (1), make sure that the **Ladder Cross Reference** check box is selected. Then, from the **File** menu, click **Print**, and then **Circuit**. The circuit diagram with cross-references is output to the printer. (See Figure 4-21.)
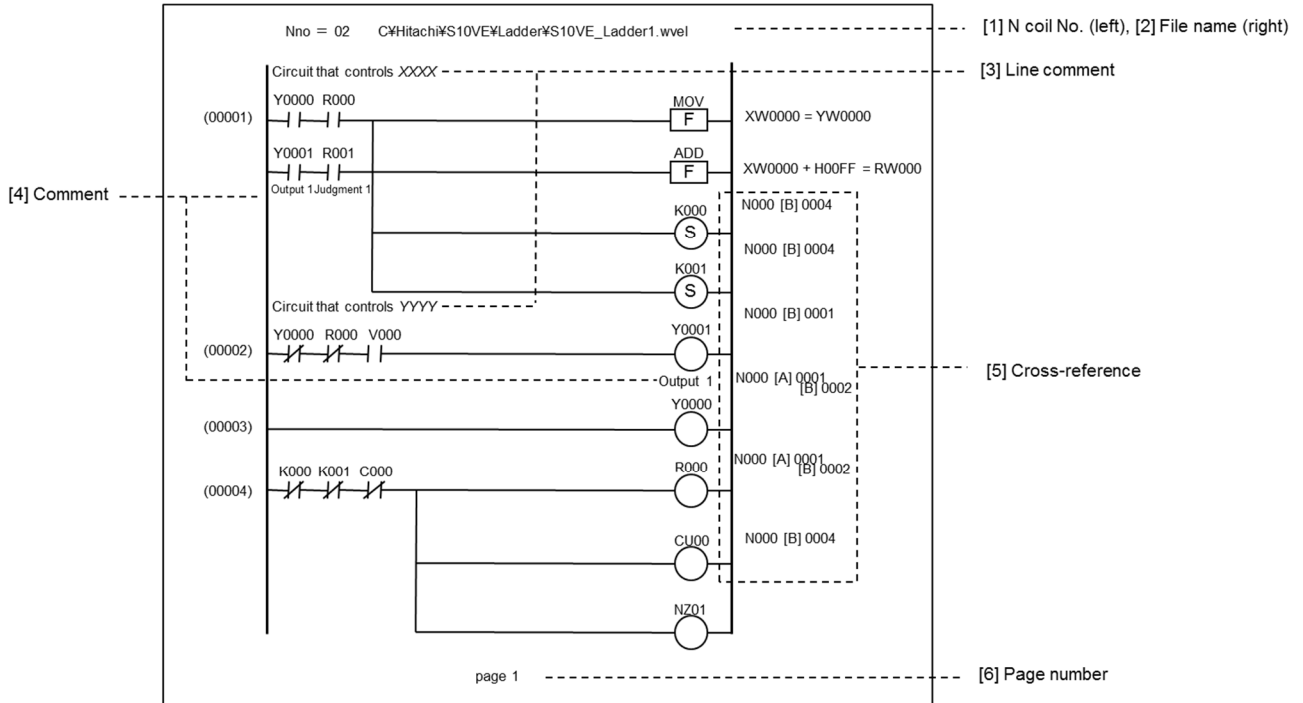
Figure 4-21 Circuit diagram print format

Table 4-2 Circuit diagram print items

No.	Item	Description	Remarks
[1]	N coil number	N coil number to be printed	
[2]	File name	File name to be printed	
[3]	Line comment	If the **Line Comment** check box on the Circuit tab in the Setup print type window is selected, a line comment is output.	
[4]	Comment	If **Comment display** and then **Display** is selected in the **Comment** menu, a comment is output.	
[5]	Cross-reference	Cross-references are output when the **Ladder Cross Reference** check box on the Circuit tab in the Setup print type window is selected. Output data varies depending on the options selected under **Search Contact** and **Search Data**.	
[6]	Page number	Print page number	

Note 1: Cross-references to be printed

The cross-references corresponding to the coils used in the ladder program are printed in a circuit diagram. These coils are any of the following.

<Coils subject to cross-reference printing>

Symbol	To be printed?
—(R)— : Keep relay reset coil	Yes
—(S)— : Keep relay set coil	Yes
—( )— : Output coil#	Yes
—[F]— : Function	No

#: The applicable output coils are as follows:
Y: External output
R: Internal register
M: Extension internal register
T: On-delay timer
U: One-shot timer
C: Up-down counter
G: Global-link register
N: Nesting coil
P: Process register
E: Event register
Z: Z register
LB: Work register
LR: Ladder converter-dedicated work register

Note 2: Items printed as cross-references

The following table lists the items printed as cross-references in a circuit diagram.

Table 4-3 Items printed as cross references

No.	Item	Print format	Remarks
1	Nesting number of a nesting where the register for a coil is used	N***	***: 3-digit hexadecimal number
2	Type of symbol where the register for a coil is used	[A]: A-contact [B]: B-contact [C]: Coil	Operation functions are not applicable.#
3	Block number of a block where the register for a coil is used	****	****: 4-digit decimal number
4	Output coil name in a block where the register for a coil is used	Output coil name (The coil and the register used with that coil are printed in the following format.) Example: —( )— R050	Operation functions are not applicable.

#: [C] (coil) is displayed in cases where any two nestings (N coils) use the same coil. This duplicate use of a coil is allowed in any two nestings.

Note 3: Cross-reference print formats
When printing a cross-reference, you can specify any of the following print formats in the Setup print type window shown in Figure 4-20.

(1) Print formats for search contacts
- A print format can be specified for search contacts to be printed with cross-references.
- You can specify **Separate** or **Equalize**.

Separate format:

```
┌─────────────────────────────────┐
│                                 │
│        Y0100 │ N000[A]0002       │
│         ─○─  │      [B]0010      │
│              │                   │
│              │                   │
└─────────────────────────────────┘
```
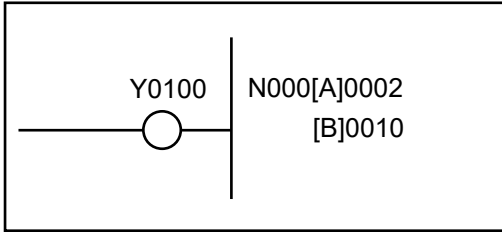
The contacts for Y0100 are classified (either as A-contacts or B-contacts) and printed.

Equalize format:

```
┌─────────────────────────────────┐
│                                 │
│        Y0100 │ N000 : 0002 0010  │
│         ─○─  │                   │
│              │                   │
│              │                   │
└─────────────────────────────────┘
```
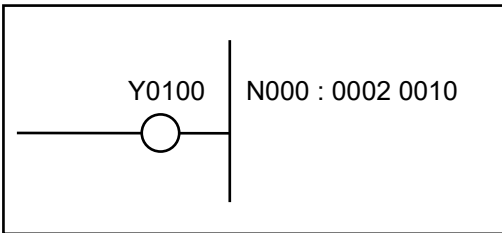
The contacts for Y0100 are printed without any classification.

(2) Print formats for search data
- A print format can be specified for search data to be printed with cross-references.
- You can specify **Block No.** or **Coil No.**.

Block No. format

```
┌─────────────────────────────────┐
│                                 │
│        Y0100 │ N000[A]0002       │
│         ─○─  │      [B]0010      │
│              │                   │
│              │                   │
└─────────────────────────────────┘
```
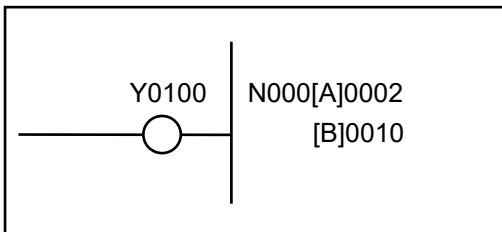
Block numbers of blocks that contain Y0100 contacts are printed.

Coil No. format

```
┌─────────────────────────────────┐
│                                 │
│      Y0100 │ N000[A] ─○─ R043    │
│       ─○─  │    [B] ─○─ Y020C    │
│            │                     │
│            │                     │
└─────────────────────────────────┘
```
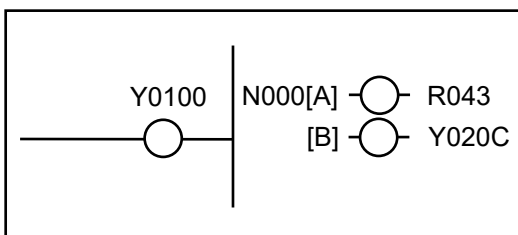
All output coil names in the blocks that contain Y0100 contacts are printed.

4.3 Ladder sheet editing functions

The ladder sheet editing functions are contained in the ladder symbol bar and **Edit** pull-down menu. The basic procedure for using ladder sheet editing functions is as follows:

(1) Select a ladder symbol template (for example, an A-contact), specify the position to which you wish to paste it, and then paste the symbol.

(2) Set parameters for the pasted symbol.

(3) Repeat steps (1) and (2), or edit the ladder sheet by specifying an individual line or a range of lines.
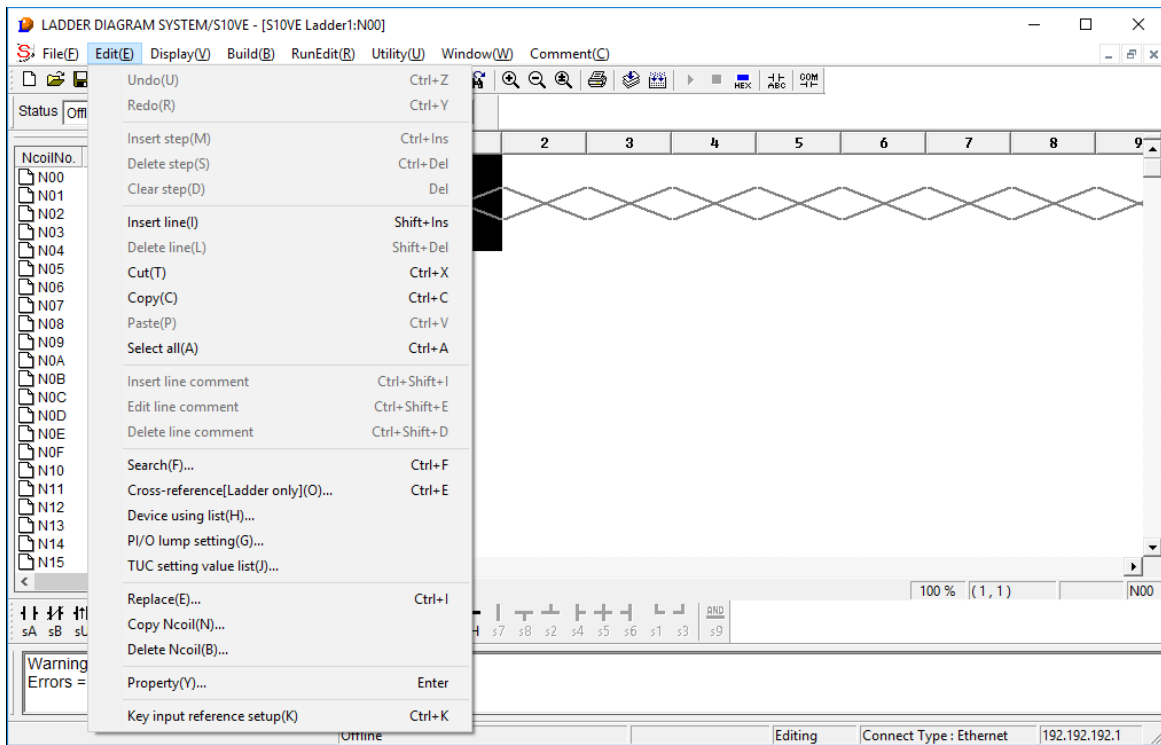
Figure 4-22 Clicking the [Edit] menu

The following table lists and describes the editing functions provided in the **Edit** menu.

Table 4-4 [Edit] menu options

No.	Level 1	Level 2	Level 3	Description
1	**Edit**	**Undo**		Undoes the last operation performed.
2		**Redo**		Repeats the last operation performed.
3		**Insert step**		Adds an empty step to a specified position.
4		**Delete step**		Deletes a specified step, and then moves the steps which follow to the left to fill the empty space.
5		**Clear step**		Clears the contents of a specified step.
6		**Insert line**		Adds a new line before a specified line position.
7		**Delete line**		Deletes a specified line.
8		**Cut**		Removes a selected range and copies it to the clipboard.
9		**Copy**		Copies a selected range to the clipboard.
10		**Paste**		Pastes the contents of the clipboard to a specified position.
11		**Select all**		Selects all circuits displayed on the screen.
12		**Insert line comment**		Inserts a new line comment.
13		**Edit line comment**		Edits a selected line comment.
14		**Delete line comment**		Deletes a selected line comment.
15		**Search**		Searches the open N coil for a specified symbol.
16		**Cross-reference [Ladder only]**		Searches a ladder program to find specified symbols.
17		**Device using list**		Displays whether selected devices are currently in use.
18		**PI/O lump setting**		Changes all the registers assigned to symbols at a time.
19		**TUC setting value list**		Displays a list of set values of TUC registers, which can then be edited.
20		**Replace**		Replaces a specified character string with a new one in all the N coils.
21		**Copy Ncoil**		Copies a specified N coil.
22		**Delete Ncoil**		Deletes a specified N coil.
23		**Property**		Sets properties.
24		**Key input reference setup**		Displays the symbol search window by key input.

The following shows the ladder symbol bar that contains the symbols that can be used in editing.
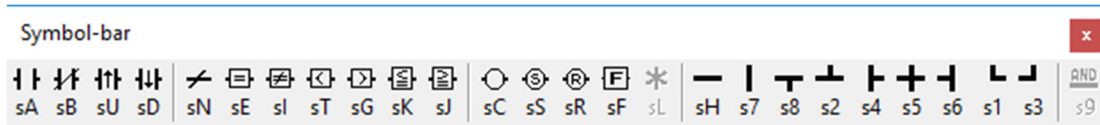
Figure 4-23 Ladder symbol bar

The names of the symbol templates running from left to right in the ladder symbol bar are as follows:

• A-contact

• B-contact

• Rising-edge contact

• Falling-edge contact

• NOT

• Comparison (EQU)

• Comparison (NEQ)

• Comparison (LT)

• Comparison (GT)

• Comparison (LE)

• Comparison (GE)

• Coil

• Set coil

• Reset coil

• Function

• Loopback

All other symbols are branch symbols.

The following shows the format of a shortcut key.

Example: s A   ··· Shift + A
          | └── Key
          └────── Abbreviation of *Shift key*
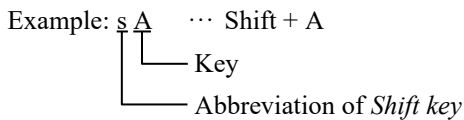
For details about how to change shortcut keys, see *4.7.1 Keyboard*.

4.3.1 Pasting ladder symbols into the sheet

Ladder symbols can be pasted into the sheet by more than one method. You can select the method you prefer.

(1) Pasting to the symbol cursor position by using the mouse

Clicking a symbol on the symbol bar pastes the selected symbol to the position of the symbol cursor in the sheet.
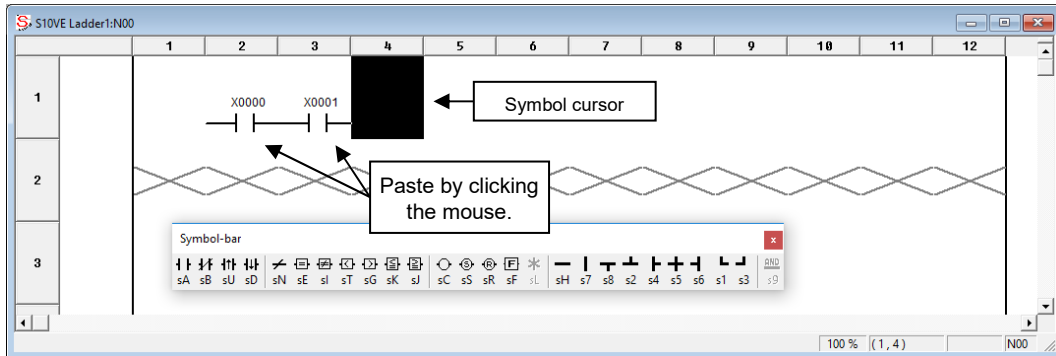
Figure 4-24 Pasting a ladder symbol

(2) Operating keys on the keyboard

Performing a specified key operation pastes its associated symbol to the position of the symbol cursor in the sheet. You can move the symbol cursor by using the [←], [→], [↑], and [↓] keys on the keyboard. Each defined key operation can be customized as desired (by clicking **Keyboard** from the **Utility** menu).
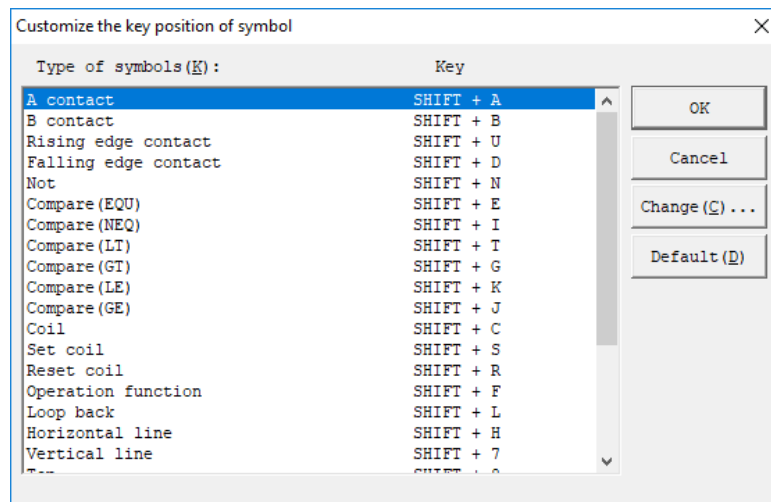
Figure 4-25 Customize the key position of symbol window

(3) Input boxes displayed

When a symbol is pasted into the sheet, a parameter input box automatically opens. To open the parameter box for an existing symbol, double-click the symbol or move the symbol cursor to the symbol, and then press the **Enter** key.

Parameter input box for contacts:
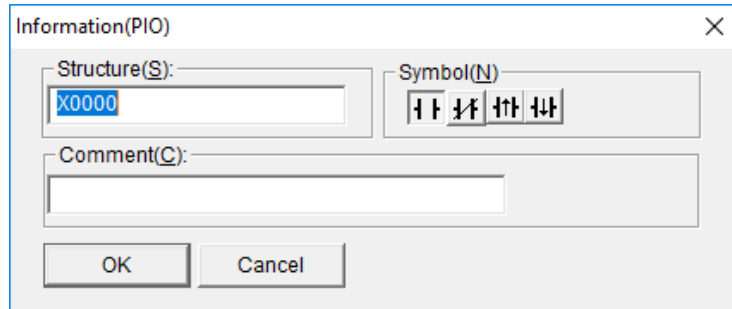
Figure 4-26 Information(PIO) window

In this input box, you can enter the syntactical structure of a contact and a comment.

In the **Symbol** area, you can change the type of contact to A-contact, B-contact, or edge (↑ or ↓) contact.

Parameter input box for operation functions:
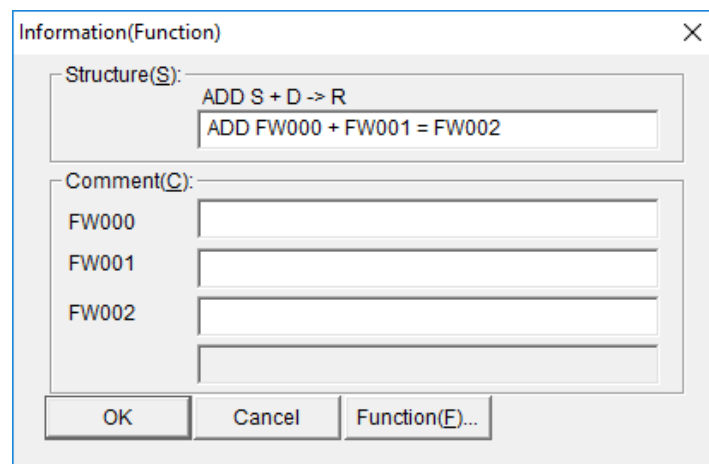
Figure 4-27 Information(Function) window

In this input box, you can enter the syntactical structure of an operation function and comments for the parameters.

You can enter the syntactical structure according to the format that is displayed when the function name is entered. (Use either = or -> for the assignment symbol, and delimit symbols by a space character.)

<Selecting operation functions>

In the Information(Function) window, clicking the **Function** button opens the Function list window. The operation function selected in this list is applied to the **Structure** box in the Information(Function) window.
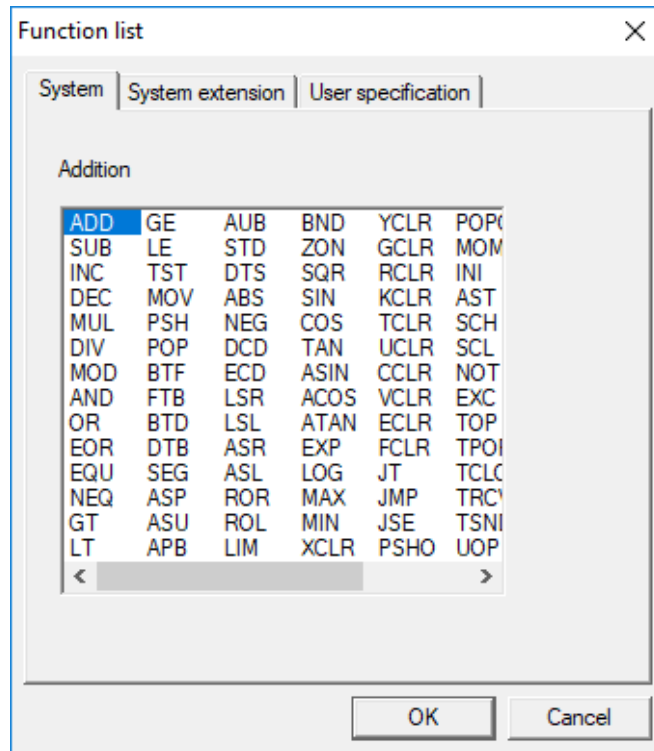
Figure 4-28 Function list window

Parameter input box for comparisons:
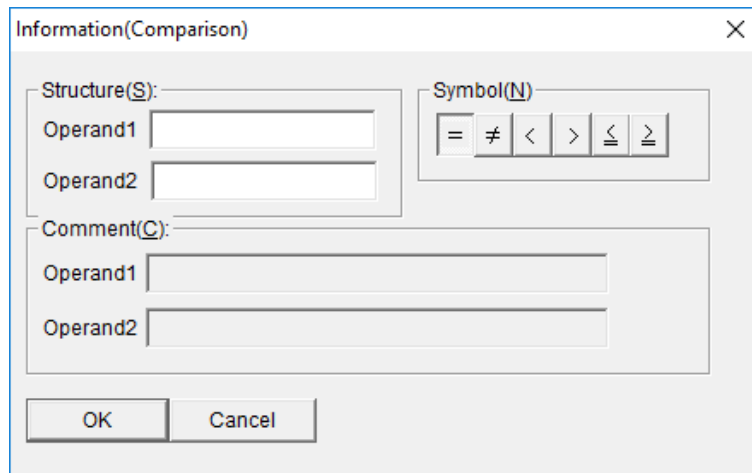
Figure 4-29 Information(Comparison) window

In this input box, you can enter the syntactical structure of a comparison and comments for the parameters. However, no comment for comparisons is shown on the ladder sheet.

In the **Symbol** area, you can change the type of comparison operator to EQU (equal to), NEQ (not equal to), GT (greater than), LT (less than), GE (greater than or equal to), or LE (less than or equal to).

(4) Index specification

You can index any register that is used for a parameter for an A-contact, B-contact, edge contact, coil, comparison, or a system function. This indexing can be accomplished by using one of the following formats:

● Base register (index register) format
This indexing format can be used in conjunction with the following 10 types of ladder symbols: A-contact, B-contact, rising-edge contact, falling-edge contact, normal coil, set coil, reset coil, comparison, and system function. A normal coil cannot be used with an indexed register if the register symbol of the base register is T, U, C, N, or P.

Example: If you wish to use X0000 for an A-contact as the base register and RW000 as its index register, specify the indexed register as shown in the following figure. If the content of RW000 is 3, this specification has the same effect as specifying the X0003 register for the A-contact.
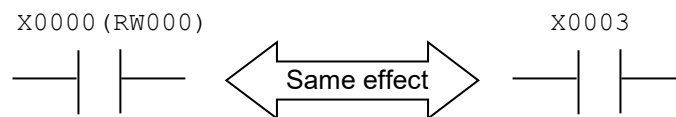
Notes:

- Only a word register can be specified as an index register. No other type can be used.
- There is no limitation on the type of register symbol that can be specified as an index register.
- The content of an index register must be within the range from -32768 to 32767.
- A register whose symbol is BW cannot be indexed.
- There is no limitation on the type of a base register.

● Reference (indirect register) format

This format can be used only with system functions. According to the reference format, the content of the indirect register is accessed as reference addresses. You can specify W, L, or F according to the reference format.

• For word-type references: W (indirect register)

• For long-word-type references: L (indirect register)

• For single-precision floating-point type references: F (indirect register)

Example: The following figure shows an example of when the INC parameter is specified by this method. The parameter uses RL000 as an indirect register and references it by word type. If the content of RL000 points to the address of XW0000, it has the same meaning as specifying XW0000 directly as the INC parameter.
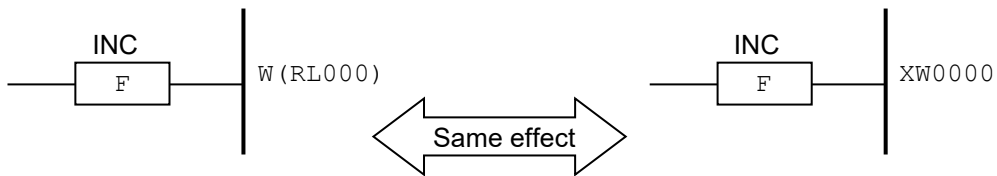
Notes:

- You can specify only long word registers as an indirect register. No other type can be used.
- There is no limitation on the type of register symbol that can be specified for an indirect register.
- Addresses in the range from 0x00000000 to 0xFFFFFFFE can be specified for an indirect register.
- A register whose symbol is BL cannot be indexed (with an indirect register).

(5)   Entering line labels

Set labels to be used as arguments of jump instructions (JT and JMP) of the system function in the specified line of the ladder sheet.

You can enter a label in the Input label window that is displayed by right-clicking a line number on the ladder sheet. Label input is enabled for lines where a circuit number is displayed.

You can also set labels on lines where no circuit number is displayed. However, such settings are deleted during compilation.

A maximum of 256 labels are available for all N coils. You cannot batch-delete all labels or search labels.
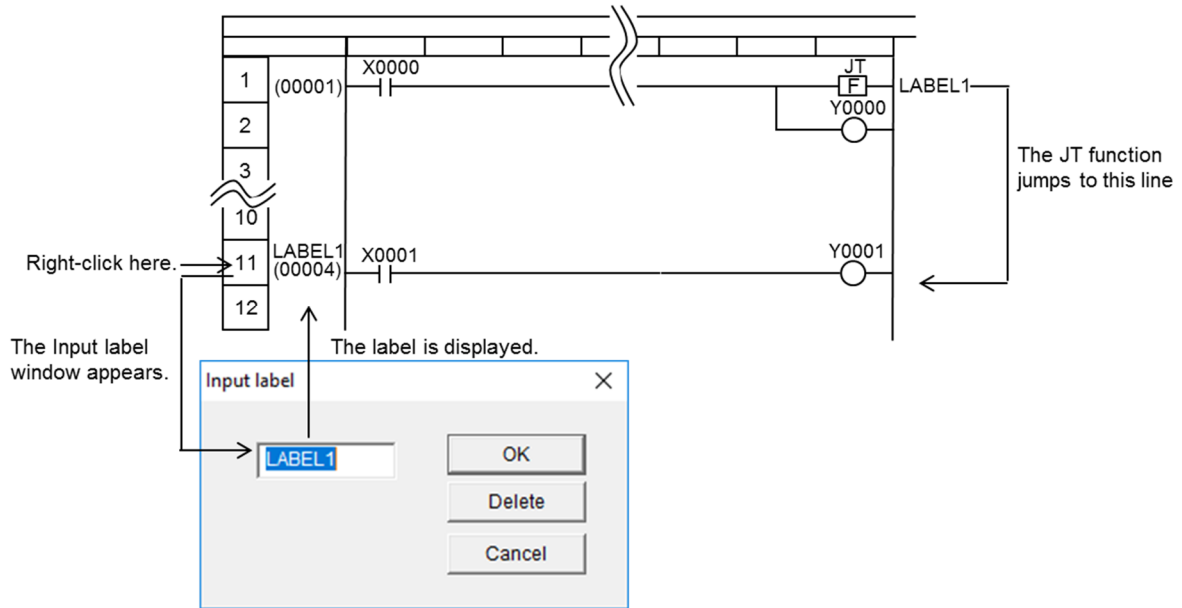
Label input box: You can enter a maximum of 8 halfwidth alphanumeric characters and underscores (_).
(Only uppercase alphabet characters are allowed.)

4.3.2 Line comment support

(1) Overview

The line comment support allows you to enter comments into individual lines in a ladder circuit diagram. You can enter a comment of no more than 80 halfwidth alphanumeric characters or 40 fullwidth characters into a single line, and can insert a maximum of 1000 comment lines into a single ladder program. Each entered comment is displayed at the top of the circuit.

(2) Operation procedure

[1] During editing of an N coil, you cannot edit line comments. In this case, you have to compile the ladder program on which you are editing, and then proceed to the next step. Also, you cannot edit line comments during monitoring of ladder circuits. In this case, stop the monitoring, and then proceed to the next step.

[2] Move the cursor to the circuit into which you want to insert a comment. Then, from the **Edit** menu, click **Insert line comment**. In the Insert line comment dialog box that appears, enter a comment into the text box.
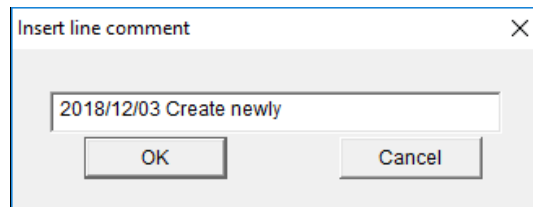
Figure 4-30 Insert line comment dialog box

[3] Click the **OK** button. The comment you entered appears on the top of the circuit.
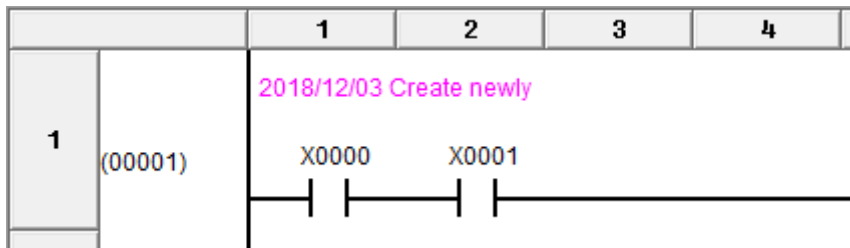
Note: If you have clicked **Display line comment** from the **Comment** menu and selected the **No display** check box, comments entered in this step will not appear on-screen.

[4] If you want to change a line comment, you can use the line-comment edit function. To do this, move the cursor to the circuit for which you want to edit the comment, and then from the **Edit** menu, click **Edit line comment**. In the Edit line comment dialog box that appears, edit the comment.
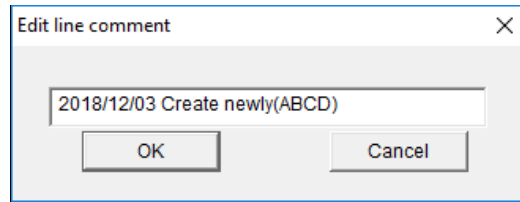
Figure 4-31 Edit line comment dialog box

[5] Click the **OK** button. The editing result appears at the top of the circuit.
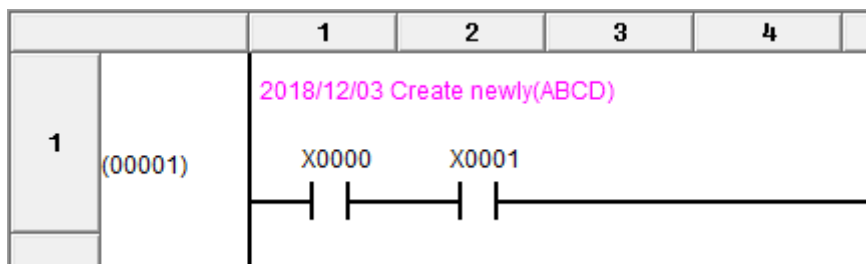
[6] If you want to delete a line comment, you can use the line-comment deletion function. To do this, move the cursor to the circuit from which you want to delete the comment, and then from the **Edit** menu, click **Delete line comment**. The deletion confirmation dialog box appears. Click the **OK** button to delete the comment.
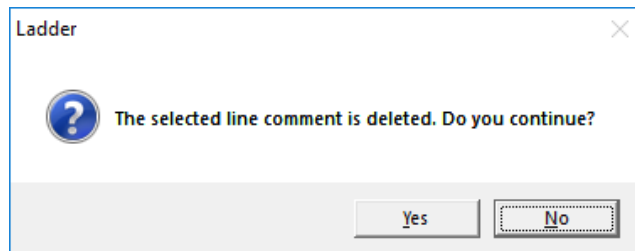
Figure 4-32 Deletion confirmation dialog box

[7] You can hide a displayed line comment by reducing the circuit display area. To do this, from the **Comment** menu, click **Comment display** and then **Nothing**. To show a hidden line comment (by increasing the circuit display area), from the **Comment** menu, click **Comment display** and then **Display**.

(3) Notes
- Circuit edit operations and copy, paste, undo, and redo operations cannot be used to handle line comments. For example, any attempt to copy and paste a line comment will fail.
- Copying an N coil does not copy any line comments that have been inserted in it.
- If you insert or delete a line in a circuit, the displayed line comment is not immediately changed. The line comment will be moved or deleted in accordance with insertion or deletion of the line during later compilation of that circuit.

4.3.3 Searching for ladder symbols

   (1)   Overview of symbol search

The ladder symbol search function searches the currently active ladder sheet to find the ladder symbol specified in the **String for search** and **Target for search** boxes in the Search character string window (see Figure 4-33). For details about the target for search, see *(5) Target for search*.
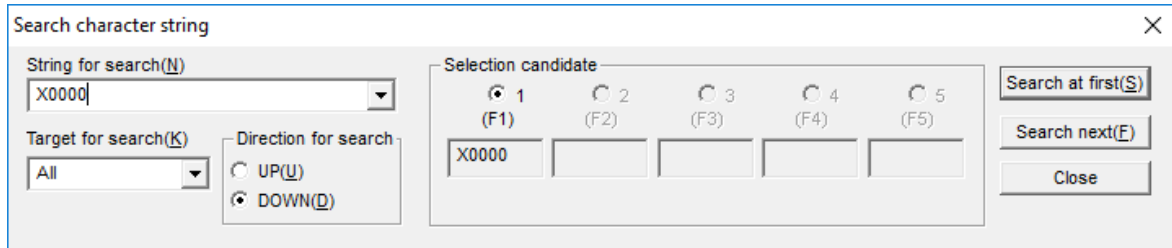
Figure 4-33 Search character string window

When a matching ladder symbol is found, the cursor moves to the position of that ladder symbol on the ladder sheet.

When the active ladder sheet is searched to the end, the message dialog box shown in Figure 4-34 appears.
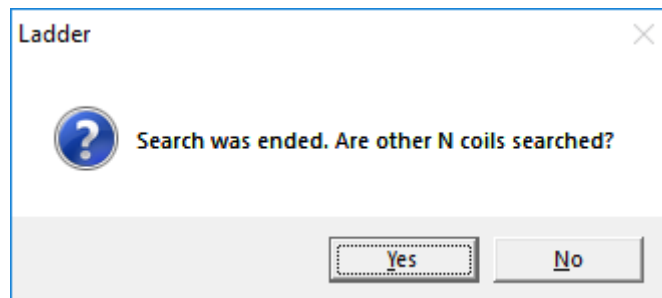
Figure 4-34 Dialog box asking whether to search other N coils

Clicking the **Yes** button starts searching for the next N coil. When a matching string is found, the ladder sheet is switched automatically and the cursor moves to the position of the string found. After all N coils (256 coils) are searched, a message dialog box appears to show the search result (see Figure 4-35 and Figure 4-36).

Clicking the **No** button ends the search and displays a message dialog box to show the search result (see Figure 4-35 and Figure 4-36).
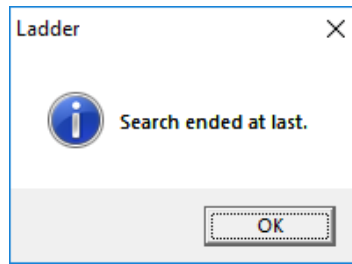
Figure 4-35 Message dialog box displayed after fully searching the ladder sheet
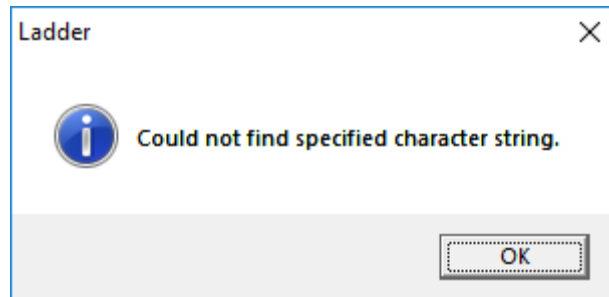
Figure 4-36 Search result message dialog box displayed when a matching ladder symbol is not found

Clicking the **Close** or X button closes the Search character string window.

(2) How to call the Search character string window

You can call the Search character string window in any of the following five ways:

- Calling from a menu in the main window
  From the **Edit** menu in the main window, click **Search**.

- Calling from the tool bar in the main window
  On the tool bar in the main window, click **Search**.

- Calling from a popup menu
  Move the mouse pointer to the desired place in the ladder sheet, and then right-click the mouse to open the popup menu. From the popup menu, click **Search**.

- Calling by standard key input
  If the **Key input reference setup** option in the **Edit** menu is enabled (with a check mark displayed) as shown in Figure 4-37, you can call the Search character string window by using standard key input. With this option enabled, press a standard key (alphanumeric key only) while the cursor is blinking on the ladder sheet. Then, the character corresponding to the pressed key appears in the **String for search** box in the Search character string window.
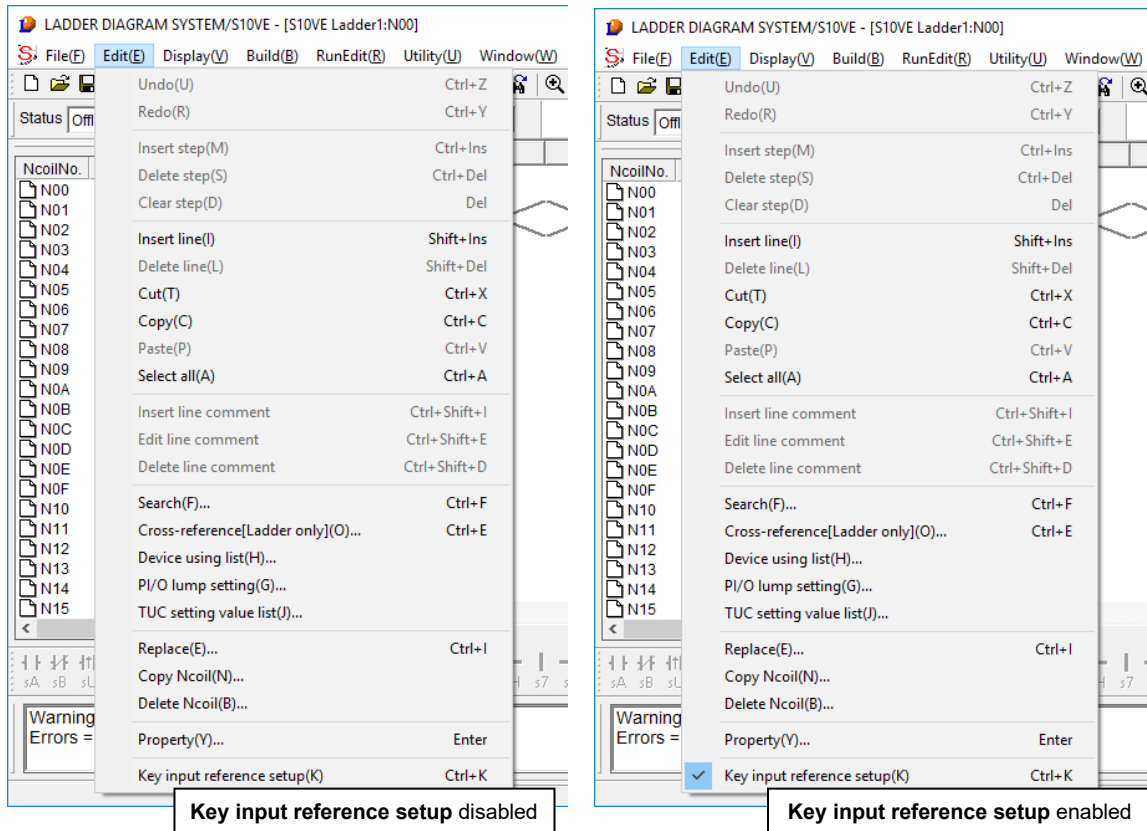
Figure 4-37 Key input reference setup

- Calling by shortcut key operation
  Press the **Ctrl** + **F** keys as a shortcut.

(3)   Default display for string search

When calling the Search character string window, if one of the following ladder symbols appears at the current cursor position on the ladder sheet, the register name for the ladder symbol appears in the **String for search** box. (If a register with an index register is specified for the register name, the register name with an index register name is displayed.)

- A-contact

- B-contact

- Rising-edge contact

- Falling-edge contact

- Normal coil

- Set coil

- Reset coil

For a ladder symbol indicating an operation function, the operation function name appears in the **String for search** box in the Search character string window. For a ladder symbol indicating comparison (EQU, NEQ, LT, GT, LE, or GE), the first parameter of the comparison symbol (along with an index register name if it has an index register) appears in this box.

For a ladder symbol indicating a connection line, NOT, or loopback, blanks appear in the **String for search** box in the Search character string window.

(4)   Selecting the string for search

In the **String for search** box, you can directly enter a string or select a previously-used string (see Figure 4-38). The last ten recently used strings are stored automatically. Specifying a new string as the eleventh string deletes the oldest string among those stored in memory.
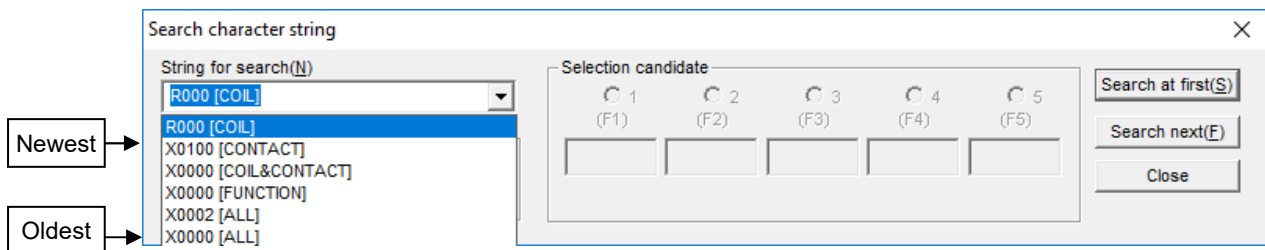
Figure 4-38 Selecting the string for search

(5)   Target for search

The string specified in the **String for search** box is searched for under the condition selected in the **Target for search** box. (For example, when **Coil** is selected as the target for search, only the coils (normal, set, and reset coils) are searched to find the string specified in the **String for search** box.) You can select a target for search from six options: **Coil**, **Contact**, **Coil & Contact**, **Function**, **Comparison**, and **All**. At system startup, the default setting is **All**. When the Search character string window subsequently appears, the target for search specified for the preceding search operation is displayed by default.

Coil: Searches normal, set, and reset coils to find a matching string (register name).

Contact: Searches A-contacts, B-contacts, rising-edge contacts, and falling-edge contacts to find a matching string (register name).

Coil & Contact: Searches coils and contacts to find a matching string (register name).

Function: Searches operation functions to find a matching string (operation function name and a register name).

Comparison: Searches comparison symbols (EQU, NEQ, LT, GT, LE, and GE) to find a matching string (register name and constant).

All: Searches all of the preceding coils, contacts, operation functions, and comparison symbols to find a matching string.

(6)   Direction for search

You can select **DOWN** and **UP** for the search direction (see Figure 4-39).

The default setting is **DOWN** (**DOWN** radio button selected in the **Direction for search** group box).
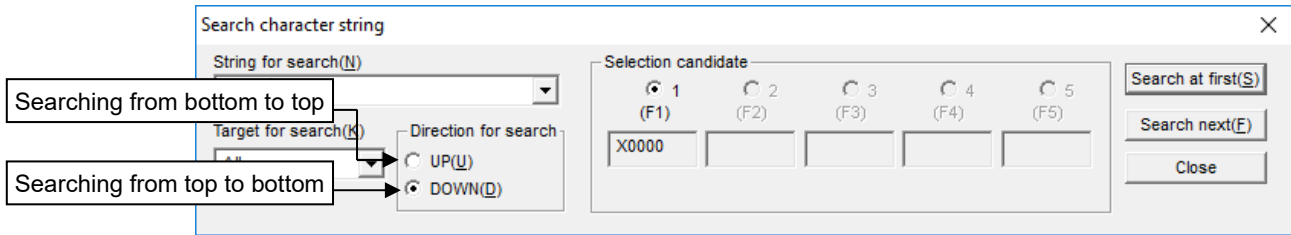
Figure 4-39 Search direction

UP: Searches symbols in descending order of ladder circuit numbers. On the same line, symbols are searched from right to left.

Clicking the **Search at first** button starts searching in the upward direction from the last line in the ladder circuit.

Clicking the **Search next** button starts searching in the upward direction from the current cursor position in the ladder circuit.

DOWN: Searches symbols in ascending order of ladder circuit numbers. On the same line, symbols are searched from left to right.

Clicking the **Search at first** button starts searching in the downward direction from the first line in the ladder circuit.

Clicking the **Search next** button starts searching in the downward direction from the current cursor position in the ladder circuit.

(7)   Selection candidate

In the Search character string window, register names and operation function names are displayed in the candidate boxes (candidate 1 to candidate 5) in the **Selection candidate** group box. In the Search character string dialog box that appears, the names shown in the candidate boxes depend on the ladder symbol where the cursor is positioned (see Table 4-5). These names do not change automatically according to the ladder symbol at the cursor position during search. Figure 4-40 shows an example of displaying candidate names in the candidate boxes in the **Selection candidate** group box when the ladder symbol at the current cursor position is operation function *ADD FW000 + FW001 → FW002*.
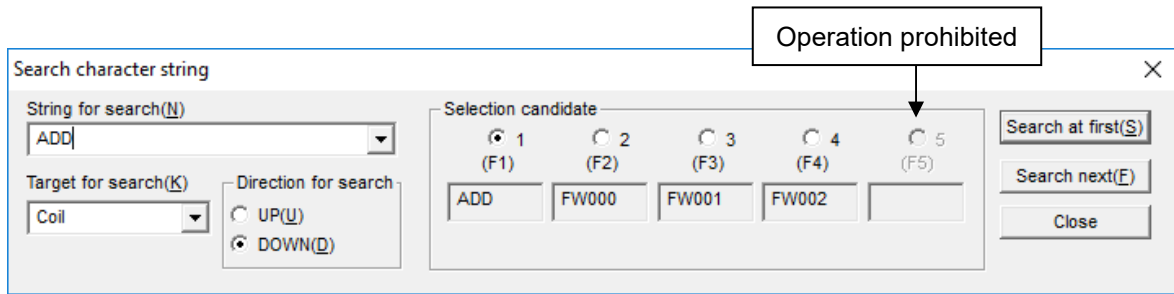
Figure 4-40 Example of name display in candidate boxes under [Selection candidate]

You can select a candidate box by clicking the radio button (hereinafter called a *candidate box selection button*) above the candidate box. When you click a candidate box selection button, the name shown in the corresponding candidate box also appears in the **String for search** box. The candidate box selection button of a non-selectable candidate box is non-functional.

You cannot enter data in candidate boxes, which are read-only.

Table 4-5 Candidate data for ladder symbol at current cursor position

Ladder symbol	Candidate 1	Candidate 2	Candidate 3	Candidate 4	Candidate 5
Contact[#1]	Register name[#4]	--	--	--	--
Coil[#2]	Register name[#4]	--	--	--	--
Comparison symbol	Register name[#4]	Register name[#4] or constant	--	--	--
Function	Operation function name	Register name[#5]	Register name[#5]	Register name[#5]	Register name[#5]
Others[#3]	Previously searched string	--	--	--	--

#1: A contact indicates an A-contact, B-contact, rising-edge contact, or falling-edge contact.
#2: A coil indicates a normal coil, set coil, or reset coil.
#3: Others indicate a connection line (horizontal line, vertical line, top, bottom, left, intersection, right, or lower left), no symbol, or circuit end mark.
#4: If the register has an index register, a register name with an index register name is displayed.
#5: If the register has an index register, a register name with an index register name is displayed. If the operation function indicates a constant, the constant is displayed. Because the number of parameters varies depending on the operation function, candidate boxes for which no parameters are specified are left blank and cannot be selected. When displayed, parameters are left-justified on the line of candidate boxes.

(8) Fuzzy searching

If a question mark (?) is specified as a wildcard character in the string in the **String for search** box, the wildcard character substitutes for a character of the string. You can specify one or more wildcard characters in the **String for search** box. This system does not support the wildcard character *, which indicates multiple characters. (For example, to search for all register names that include X, you only have to specify X (not X*) to search for X0000 to XFFFF.)

The following shows an example of fuzzy search using wildcard character ?.

If the string specified in the **String for search** box only consists of ?, standard search will be performed instead of fuzzy searching. (The string of question marks (?) will be searched for.)

Example: Searching the ladder circuit to find contacts X0010, X0020, X0030, X0040, X0050, X0060, X0070, X0080, X0090, X00A0, X00B0, X00C0, X00D0, X00E0, and X00F0 (see Figure 4-41)
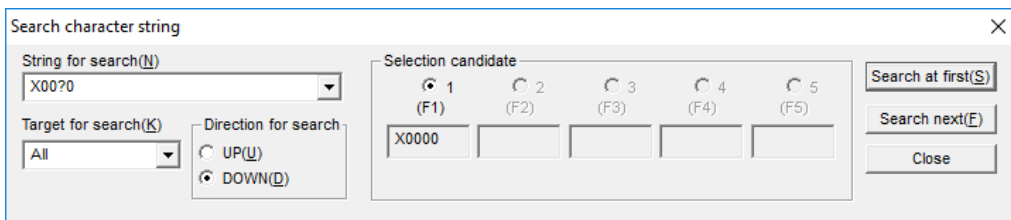
Figure 4-41 Example of fuzzy searching
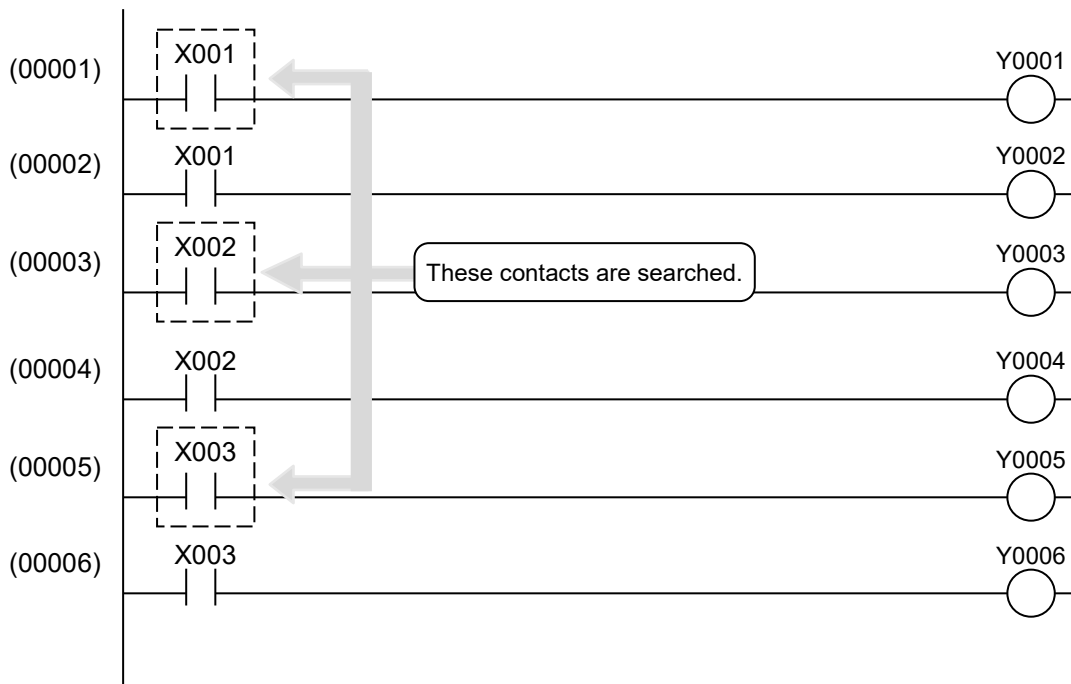
4.3.4 Cross reference [ladder only]

(1) Overview of cross referencing

The cross-reference function searches all N coils (256 N coils) to find the symbols that use a specified symbol name, and then displays the search result in a list (see *Display information*). You can also select desired information in the search result list (see step [2] in *(5) Operation procedure*), and move the cursor to the relevant symbol on the ladder sheet corresponding to the selected information.

Only when the symbol found by search is an A-contact or B-contact, the output coil of the relevant circuit is also displayed.
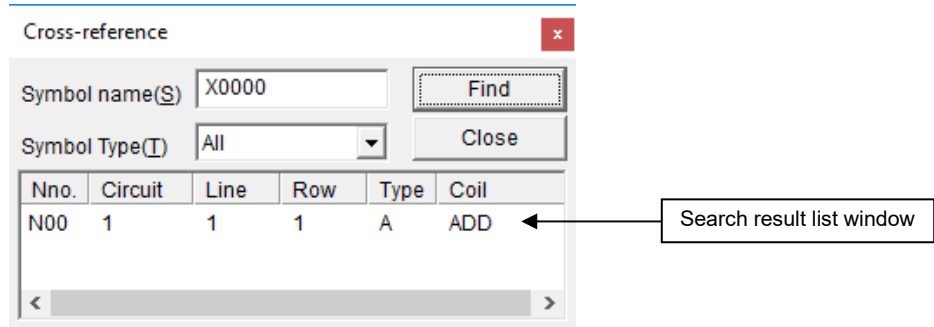
Figure 4-42 Cross-reference window

[Display information]

Nno: N coil number of the symbol found

Circuit: Circuit number in the N coil of the symbol found

Line: Line number in the N coil of the symbol found

Row: Row number in the N coil of the symbol found

Type: Type of symbol found (see Table 4-6)

Coil: Output coil of the circuit found by searching with a contact specified.

Table 4-6 List of types

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

(2)   How to call the Cross-reference window

You can call the Cross-reference window in any of the following three ways:

● Calling from a menu in the main window
From the **Edit** menu, click **Cross-reference[Ladder only]**. The Cross-reference window appears (see Figure 4-42).

● Calling from a popup menu
Move the mouse pointer to a desired place in the ladder sheet, and then right-click the mouse to open the popup menu. From the popup menu, click **Cross-reference[Ladder only]**. The Cross-reference window appears (see Figure 4-42).

● Calling by shortcut key operation
Press the **Ctrl** + **E** keys as a shortcut. The Cross-reference window appears (see Figure 4-42).

(3) Default of symbol name

When calling the Cross-reference window, if one of the following ladder symbols appears at the current cursor position on the ladder sheet, the register name for the ladder symbol appears in the **Symbol name** box. (Even if a register with an index register is specified for the register name, the index register name is not displayed.)

- A-contact

- B-contact

- Rising-edge contact

- Falling-edge contact

- Normal coil

- Set coil

- Reset coil

For a ladder symbol indicating an operation function, the operation function name appears in the **Symbol name** box in the Cross-reference window. For a ladder symbol indicating comparison (EQU, NEQ, LT, GT, LE, or GE), the first parameter of the comparison symbol appears in this box (without an index register name even if it has an index register).

A ladder symbol indicating a ruled line, NOT, or loopback, appears as a blank in the **Symbol name** box in the Cross-reference window.

(4) Symbol type

The string specified in the **Symbol name** box is searched for under the condition selected in the **Symbol Type** box. (For example, when **Coil** is selected as the symbol type, only the coils (normal, set, and reset coils) are searched to find the string specified in the **Symbol name** box.

You can select the symbol type from among the following seven types. The default setting is **All**.

Symbol type	Description
Contact	Searches the register names of A- and B-contacts in all N coils to find the register name that matches the register name specified in the **Symbol name** box. When a matching register name is found, the N coil number, circuit number, line number, row number, type, and output coil information (such as normal coil, set coil, reset coil, or operation function name) corresponding to the symbol found are displayed.
Edge	Searches the register names of rising-edge and falling-edge contacts in all N coils to find the register name that matches the register name specified in the **Symbol name** box. When a matching register name is found, the N coil number, circuit number, line number, row number, and type corresponding to the symbol found are displayed (without output coil information).
Coil	Searches the register names of normal, set, and reset coils in all N coils to find the register name that matches the register name specified in the **Symbol name** box. When a matching register name is found, the N coil number, circuit number, line number, row number, and type corresponding to the symbol found are displayed (without output coil information).
Label	Searches the labels in all N coils to find the label that matches the label name specified in the **Symbol name** box. When a matching label is found, the N coil number, circuit number, line number, row number, type, and output coil corresponding to the label found are displayed.
Function	Searches the operation function names or register names of operation function parameters in all N coils to find the register name that matches the register name specified in the **Symbol name** box. When a matching register name is found, the N coil number, circuit number, line number, row number, and type corresponding to the symbol found are displayed (without output coil information).
Index/Comp	Searches the index register names and register names of comparison symbol parameters in all N coils to find a register name that matches the register name specified in the **Symbol name** box. When a matching register name is found, the N coil number, circuit number, line number, row number, and type corresponding to the symbol found are displayed (without output coil information).
All	Searches the register names (including index register names) and operation function names in all N coils to find a name that matches the character string specified in the **Symbol name** box. When a matching string is found, the N coil number, circuit number, line number, row number, type, and output coil corresponding to the symbol found are displayed. (Note that, output coil information is also displayed only when the matching symbol is an A-contact or B-contact.)

(5) Operation procedure

[1] Performing cross-reference operation

Enter a symbol name (you can omit the entry when using the default symbol name), select a symbol type in the **Symbol Type** box, and then click the **Find** button. Cross reference starts. When a string that matches the specified symbol name is found, the relevant cross-reference information appears in the search result list in the Cross-reference window (see *(4) Symbol type*). If no matching symbol is found, the following message dialog box appears.
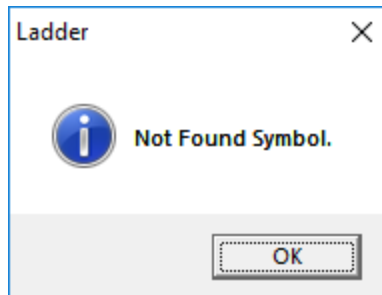
Figure 4-43 Message dialog box displayed when a matching symbol is not found

[2] Moving the cursor to a symbol found

In the Cross-reference window, double-click the desired cross-reference information in the search result list. The cursor moves to the corresponding symbol on the ladder sheet.

[3] Closing the Cross-reference window

In the Cross-reference window, click the **Close** or X button to close the window.

- The cross-referencing function is not available when you are editing a program. Before using this function, you must compile the program.
- If two or more of the same-type of symbols using the same register are included in a line, only the leftmost symbol is searched for.

4.3.5 Displaying a list of currently-used devices

(1) Overview of the device usage list

You can search for devices (registers) used in the ladder programs, and then display a list of usage information for those devices. Note that, searching for devices (registers) used in HI-FLOW programs is not supported.

(2) How to call the Device usage list window

From the **Edit** menu, click the **Device using list**. The Device usage list window appears.

(3) Device usage list window
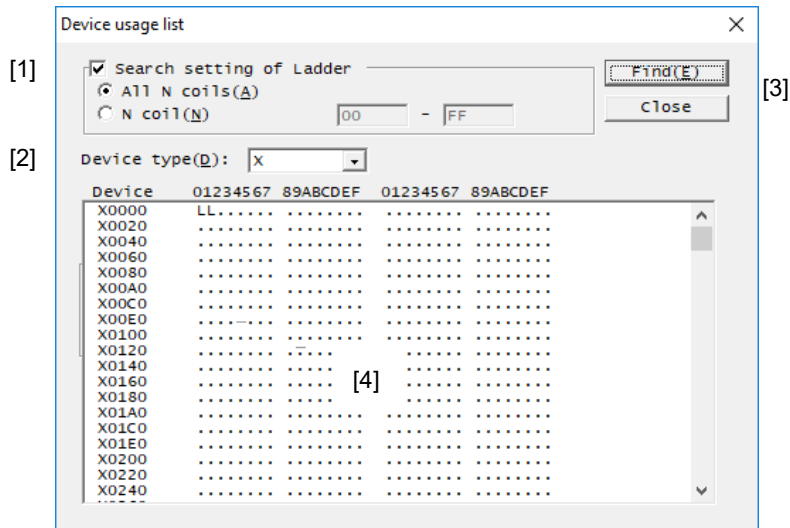
Figure 4-44 Device usage list window

[1] The **Search setting of Ladder** check box

If you want to find the devices used in a specified set of ladder programs, select this check box, and then specify the following:

All N coils: Select this radio button to search all the N coils. This option is selected by default.

N coil: Select this radio button to specify an N coil or a range of N coils (whose coil numbers are in the range from 0 to FF hexadecimal) to be searched. In the same specified range, the coil number of the first N coil must be smaller than or equal to that of the last N coil.

[2] **Device type** list box

From the pull-down list, select the type of devices you want to view in a list form. Table 4-7 lists the types of devices that you can specify for search in the ladder programs.

Table 4-7 Device type list

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

[3] **Find** button:

Starts a search for the employed devices.

[4] Device usage list pane:

Displays a list of device usage information found by a search.

The use of each device is indicated as follows:

Used in the ladder program: `L`

Unused: `.` (period)

The number of device usage search results depends on the data size of the device type and the register size specified for an argument, as shown in Table 4-8.

Table 4-8 Number of device usage search results

Data size for each device type	Number of searches for the register size specified for an argument#			
	Bit type	Word type	Long type	Float type
Bit type (X, J, Y, Q, T, U, C, R, M, K, G, A, V, N, P, E, Z, S, LB, LR, LV)	1	16	32	--
Word type (FW, DW, LWW, LXW)	--	1	2	--
Long type (B, LLL, LML)	--	--	1	--
Float type (LF, LG)	--	--	--	1

\#: For the operation functions shown in Table 4-9, the number of searches is obtained by multiplying the number of searches in this table by device usage size (the size of the area used by the device). (However, for an indexed register, the device usage size always set to 1.)

Table 4-9 Device usage size

Function type	Parameter type of the second argument	Device usage size#		
		First argument	Second argument	Third argument
MOM	Numeric value	Second argument value	0	Second argument value
	Register		1	
INI	Numeric value	1	0	Second argument value
	Register		1	
SEG	--	1	2	--
ASP	--	1	2	--
ASU	--	1	4	--
APB	--	2	1	--
AUB	--	4	1	--

\#: If the device usage size is 2 or greater, a usage area extending over multiple devices can be specified. For example, if the usage size of XWFFF0 is 2, XWFFF0 and YW0000 can be specified as the usage area. In this case, the latter device (YW0000) will not be detected as a used device.

For devices whose usage size and location depend on the specified register settings, only the registers specified by the argument are displayed as used devices in the search results. Note that, operation functions shown in Table 4-10 might also use areas that are not displayed in the search results.

Table 4-10 List of operation functions that use areas other than those in search results of device usage

Operation function	Used area
Operation functions that use the base register (index register) format as an argument	An area used for moving from the base register according to the value of the index register
Operation functions that use the reference (indirect register) format or B register as an argument	An area used for referencing the address to be displayed as the register value
MOM (when a register is specified in the second argument)	The range used by the first and third arguments changes based on the register value (second argument) that determines the size of the area used by the device.
INI (when a register is specified in the second argument)	The range used by the third argument changes based on the register value (second argument) that determines the size of the area used by the device.
PSH and POP	14 bytes for the FIFO table and the size used for setting the FIFO table are used.
PSHO and POPO	12 bytes for the FIFO table and the size used for setting the FIFO table are used.
PBL0, PBL1, PBL2, and PBL3	Depending on the command used, the first argument uses 4 to 12 bytes, and the second argument uses 12 to 268 bytes.
Clear functions (XCLR, YCLR, GCLR, RCLR, KCLR, TCLR, UCLR, CCLR, VCLR, ECLR, and FCLR)	All areas of the specified PI/O. They are not detected as used devices.

These functions are not available when you are editing a program. Before using these functions, you must compile the program.

4.3.6 PI/O lump setting

This function can simultaneously change registers assigned to symbols in programs.

<Operation>

[1] Select the range of program you want to change by using the mouse.
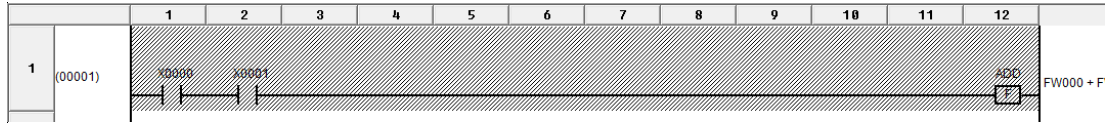
Figure 4-45 Selecting the range of program you want to change

[2] From the menu, select **Edit**, and then **PI/O lump setting**. The PIO lump setting dialog box appears.
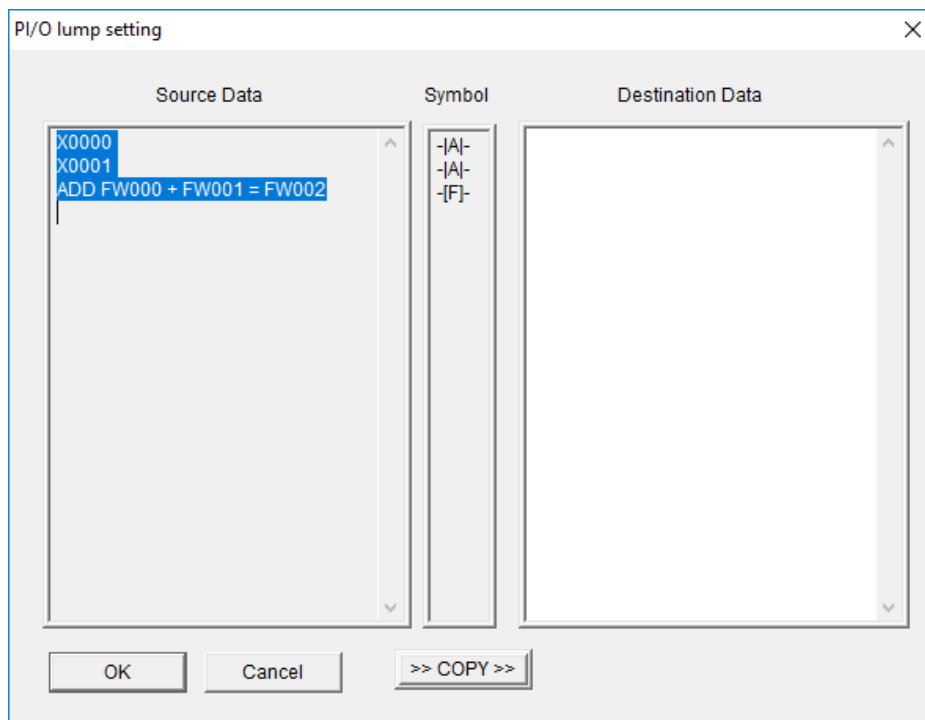
Figure 4-46 PIO lump setting dialog box

[3] This dialog box contains a list of register names and operation function types within the selection range.

[4] Click the **>>COPY>>** button. Information in the **Source Data** field is copied to the **Destination Data** field.

[5] In the **Destination Data** field, change the register names and operation function types as desired.

[6] Click the **OK** button.

● Only lines can be used to select a range.

● PI/O lump setting is not available during monitoring.

● A coil register cannot be converted to a register that is being used by another coil. If such conversion is attempted, a coil multi-output error occurs. To exchange registers between coils, convert them to other registers, and then convert them again after the exchange.

(Example) The following example shows how to exchange Y0000 and Y0001.
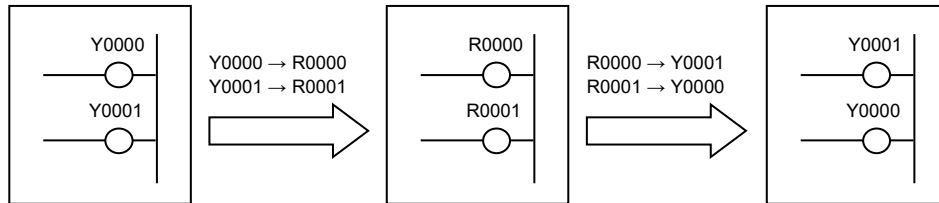
4.3.7 Listing and editing TUC set values

The **TUC setting value list** option shows a list of set values of TUC registers which can be edited. The term *TUC* here is a combination of three distinctive PI/O registers: *T* refers to ON-delay timers, *U* refers to one-shot timers, and *C* refers to up-down counters. For details about these three types of PI/O registers, refer to the *S10VE Software Manual Programming Ladder Diagram System for Windows®* (manual number SEE-3-121). To print the set values of desired TUC registers, from the pull-down menu on the ladder diagram sheet, select **File**, **Print**, and then **TUC**. You cannot print data from the TUC setting value list window.

<Operation>

(1) Displaying the TUC setting value list window

   [1] From the pull-down menu on the ladder diagram sheet, select **Edit**, and then **TUC setting value list**. Alternatively, move the mouse pointer into the displayed ladder sheet, and then right-click the mouse. From the displayed popup menu, click **TUC setting value list**.

   [2] The TUC setting value list window appears (see Figure 4-47).
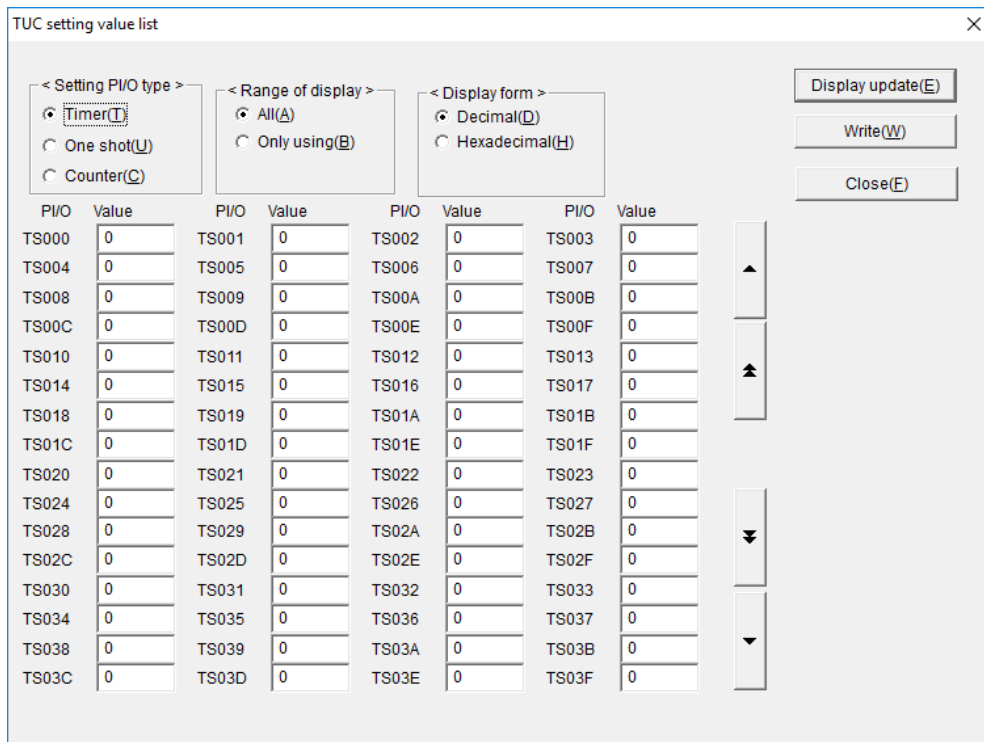
Figure 4-47 TUC setting value list window

   [3] In the TUC setting value list window, from the **Setting PI/O type** group box, select the PI/O register type for which you want to display a list of set values.
   Timer: The set values of ON-delay timers in the range from TS000 to TS7FF (2048 cases)
   One shot: The set values of one-shot timers in the range from US000 to US0FF (256 cases)
   Counter: The set values of up-down counters in the range from CS000 to CS0FF (256 cases)
   The default option is **Timer**.

[4] From the **Range of display** group box, select one of the following ranges of display:

All: Displays the set values of all PI/O registers whose type is selected from the **Setting PI/O type** group box.

Only using: Displays the set values of the PI/O registers whose type is selected from the **Setting PI/O type** group box and whose set value is larger than zero (0).

The default option is **All**.

[5] From the **Display form** group box, select one of the following display formats:

Decimal: Displays the set values in decimal format. If this option is selected, enter a new value in decimal format when you are editing a displayed TUC set value.

Hexadecimal: Displays the set values in hexadecimal format. If this option is selected, enter a new value in hexadecimal format when you are editing a displayed TUC set value.

The default option is **Decimal**.

[6] Click the **Display update** button. The PI/O set values are read again from the PCs, and then displayed according to the selections in steps [3] to [5] (see Figure 4-48).
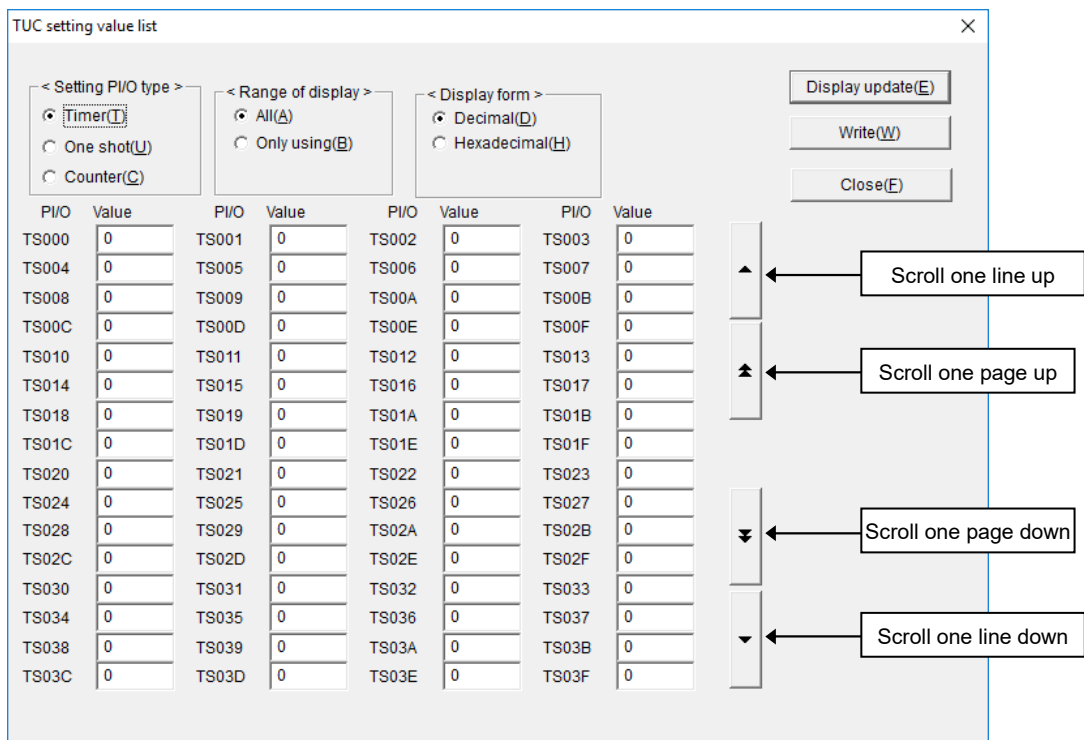
Figure 4-48 TUC setting value list window with set values displayed

If you cannot view all the displayed set values at a time in the dialog box, click any of the scroll buttons to view the hidden set values. Scrolling is possible only within the range determined from your selections from both the **Setting PI/O type** and **Range of display** group boxes. The scroll buttons function as described below.

Scroll one line up: Scrolls line-by-line[1] in the upward direction[2].

Scroll one page up: Scrolls page-by-page[3] in the upward direction[2].

Scroll one line down: Scrolls line-by-line[1] in the downward direction[4].

Scroll one page down: Scrolls page-by-page[3] in the downward direction[4].

#1: Four cases are scrolled at a time.

#2: This is the direction toward the smallest register number.

#3: A total of 64 cases are scrolled at a time.

#4: This is the direction toward the largest register number.

(2) Changing TUC set values
[1] In the **Value** column, enter a new value in a desired input box. In the **Display form** group box, select the **Decimal** radio button to enter values in decimal format, or select the **Hexadecimal** radio button to enter values in hexadecimal format.
[2] Press the **Tab** or **Enter** key. The system checks whether the entered value (in the focus position) is within the allowable range. If so, the entered value is written to the destination as a new value of the PI/O register.
Note that, you cannot use any means other than the **Tab** and **Enter** keys (for example, the mouse or a shortcut key) to rewrite the set value in the focus position.

Table 4-11 Allowable ranges of TUC set values

Display format	Allowable range
Decimal	0 to 65535
Hexadecimal	0 to FFFF

The destination to which the entered value is written varies depending on the status of data communication:
<Status of data communication>
Online: The entered value is written to the corresponding PI/O set-value storage location in the CPU module's PI/O-RAM.
Offline: The entered value is written to the corresponding PI/O set-value storage location in the PCs' internal memory.
If the entered value is out of range, the error message shown in Figure 4-49 appears.
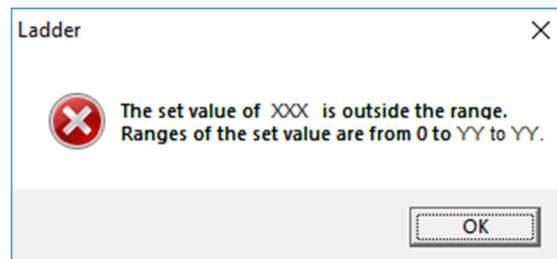
XXX: The register name of the PI/O register whose entered value is out of range
YY to YY: The allowable range of the set value (See Table 4-11.)

Figure 4-49 Error message for out-of-range value

You can click the **Write** button to rewrite all entered values to the destination at the same time. If the status of data communication is online and the CPU's LADDER switch is set to RUN, the message dialog box shown in Figure 4-50 appears, indicating that the PCs are currently in the RUN state.
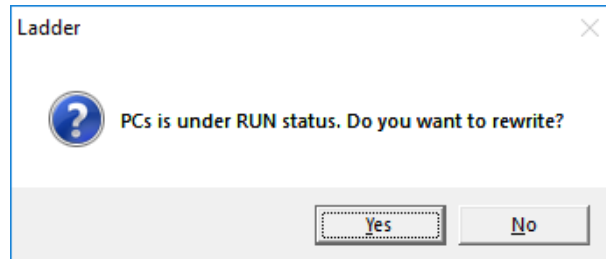
Figure 4-50 Message dialog box indicating that PCs are in the RUN state

In this dialog box, click the **Yes** or **No** button.
Yes: Rewrites all the entered values to the destination.
No: Does not rewrite entered values.

In *Only for online monitor* mode, you cannot edit or write TUC set values from the TUC setting value list window.

● During writing of a TUC set value, if data communication fails (due to a line disconnection, for example), a line error message appears. Revise the connection with S10VE, and then click the **Retry** button. If you click the **Cancel** button, writing of the TUC set value is canceled. At this time, temporary run mode is set. Revise the line status, and then try to write the TUC set value again. If you click the **Close** button in the TUC setting value list window without rewriting the set value, the following warning message appears.
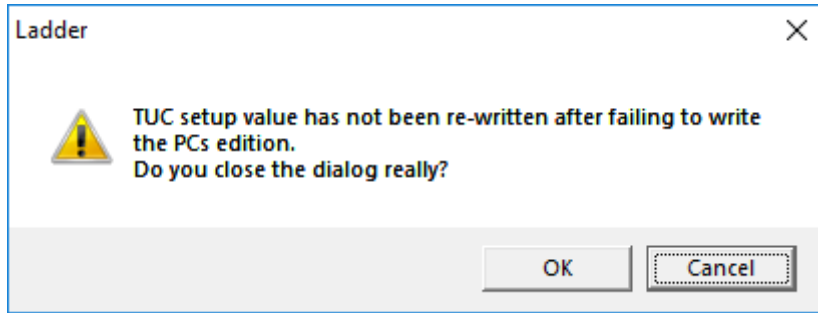
Figure 4-51 Warning message about closing the dialog box without rewriting

Click the **OK** button to close the TUC setting value list window in temporary run mode. When you redisplay the main window, S10VE remains in temporary run mode.
Click the **Cancel** button to redisplay the TUC setting value list window.

If you open the TUC setting value list window when S10VE is in temporary run mode, the following error message appears. In this case, send the ladder program in online mode to recover the temporary run mode to normal run mode.
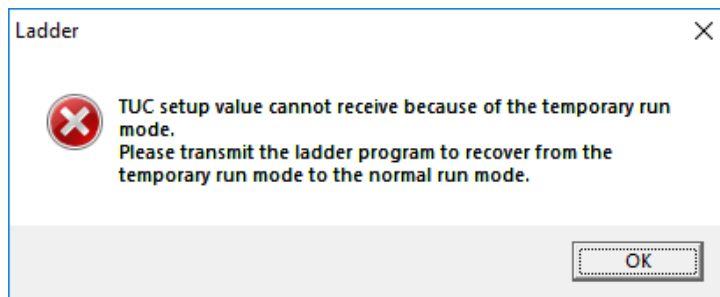
Figure 4-52 Error message indicating reception in temporary run mode (TUC set value)

4.3.8 Name replacement

(1) Overview of the name replacement function

This function searches the target N coils to find symbols of the specified relay type (coil, contact, or operation function) that use the name specified in the **Source** box. Then, it replaces as many names of symbols as the number specified for **Number** (H1 to H1000) with the new name specified in the **Destination** box.

You can also move comments at the time of replacing names.
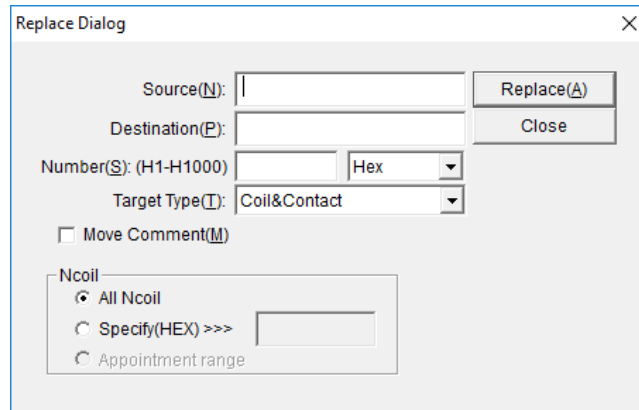
Figure 4-53 Replace Dialog window

In the **Source**, **Destination**, and **Number** boxes, enter values. In the **Target Type** list box, select a target type, and then click the **Replace** button. The message dialog box shown in Figure 4-54 appears.
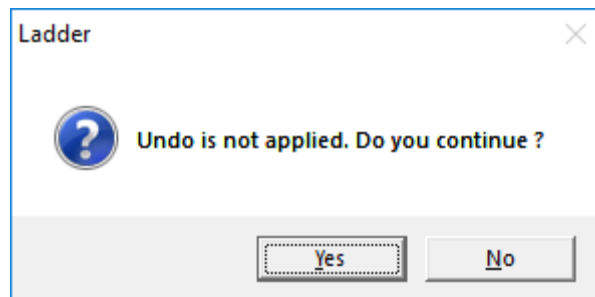
Figure 4-54 Message dialog box asking whether you want to perform name replacement

Click the **Yes** button to start name replacement in the target N coils. When name replacement ends, a message dialog box indicating the search result appears (see Figure 4-55).
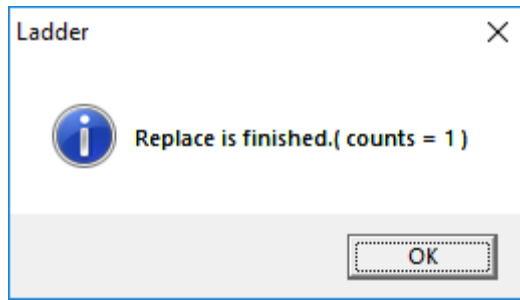
Figure 4-55 Message dialog box to indicate the normal end of name replacement

If you select the **Move Comment** check box and then click the **Replace** button, the message dialog box shown in Figure 4-54 appears. Clicking the **Yes** button displays a dialog box for confirming the move of the comment (see Figure 4-56).
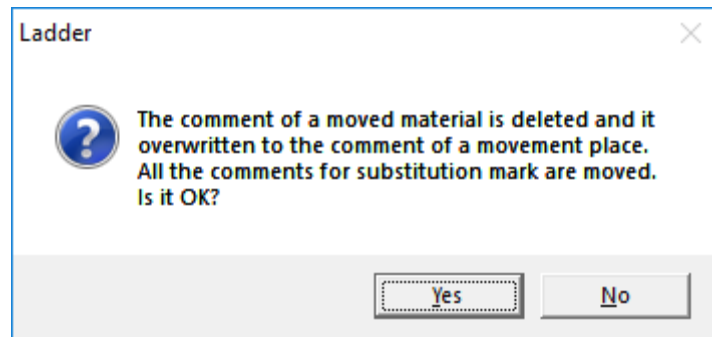
Figure 4-56 Message dialog box for confirming the move of a comment

Click the **OK** button to start name replacement (and moving of a comment) in the target N coils. When name replacement ends, a message dialog box indicating the search result appears (see Figure 4-55).

(2)   How to call the Replace Dialog window

You can call the Replace Dialog window in any of the following two ways:

● Calling from a menu in the main window
  From the **Edit** menu in the main window, click **Replace**. The Replace Dialog window appears (see Figure 4-53).

● Calling by shortcut key operation
  Press the **Ctrl** + **I** keys as a shortcut. The Replace Dialog window appears (see Figure 4-53).

(3) Entering the number of points (hexadecimal or decimal number)

Select hexadecimal (**Hex**) or decimal (**Decimal**) to specify the type of the number of points to be entered.

Then, in the **Number** box, enter the number of points.

Decimal: Enter a decimal number of points in the range from 1 to 4096.

Hex: Enter a hexadecimal number of points in the range from 1 to 1000.
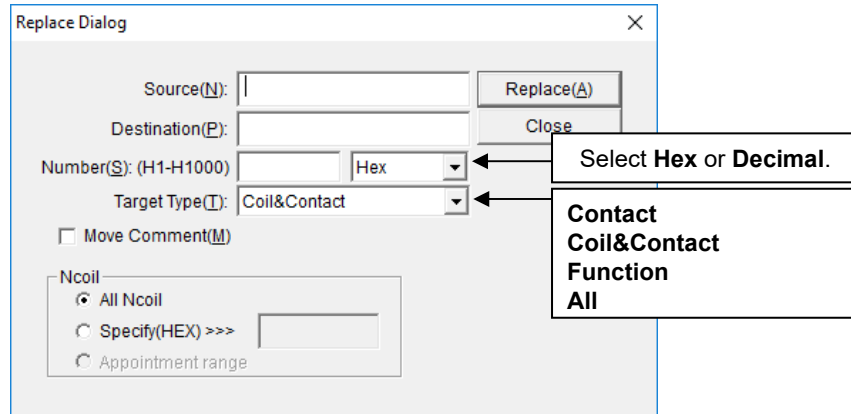
Figure 4-57 Replace Dialog window

Note that, if a number outside the valid range is entered, clicking the **Replace** button displays the error message dialog box shown in Figure 4-58.
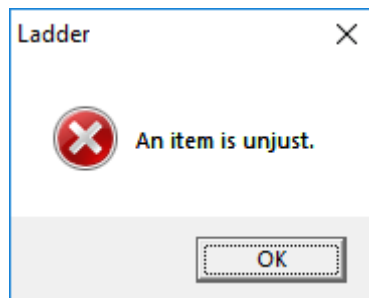
Figure 4-58 Error message dialog box indicating an invalid number of points

(4)   Selecting a relay type

In the **Target Type** box, select the relay type as the target for name replacement.

Contact: Specifies only the coil as the target type.

Coil&Contact: Specifies the contact and coil as target types.

Function: Specifies only the operation function as the target type.

All: Specifies all relay types (contact, coil, and operation function) as target types.

Note: If the relay type is **Coil&Contact** or **All**, make sure that new and old register names of the same relay type are specified. If register names of different relay types are specified, name replacement will change registers that cannot be specified for **Coil&Contact**.

Such changes cause an error during compilation.

(5)   Moving the comment

When the **Move Comment** check box is selected, the comment on the old name (**Source**) is moved to the comment on the new name (**Destination**) when name replacement terminates normally.

(6)   Specifying target N coils

In the **Ncoil** group box, specify N coils as the targets of name replacement.

All Ncoil: Specifies all N coils as targets.

Specify(HEX): Specifies an N coil number (a hexadecimal number from 0 to FF) as the target.

- Name replacement does not work on comparison instructions and index registers irrespective of the relay type you specify. If you want to apply name replacement to comparison instructions and index registers, search for a specified string and replace every instance of the matching string in the symbol without any omission. (For details about how to search for ladder symbols, see *4.3.3 Searching for ladder symbols*.)
- When you apply name replacement to symbols in a ladder program that use both word-type and long-word-type (long-type hereafter), you must always convert symbols that identify long-type data before converting word-type data. If the conversion order is reversed, the names that identify long-type data will be automatically changed to the names that identify word-type data.
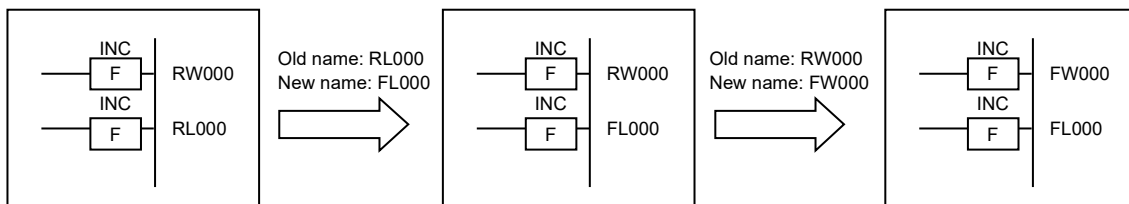
(7) Changeable registers

The following tables list registers whose names can be changed at the same time.

The index part (*YYYY* in the *XXXX*(*YYYY*) format) of the index register and indirect registers (W(*YYYY*), L(*YYYY*), and F(*YYYY*)) are not conversion targets.

Table 4-12 Registers whose names can be changed at the same time (bit)

		Old name (before conversion)																				
		X	J	Y	Q	G	R	M	K	T	U	C	N	P	V	E	Z	S	A	LB	LR	LV
New name (after conversion)	X	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	Y	--	--	Y	--	--
	J	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	Y	--	--	Y	--	--
	Y	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	Y	--	--	Y	--	--
	Q	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	Y	--	--	Y	--	--
	G	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	Y	--	--	Y	--	--
	R	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	Y	--	--	Y	--	--
	M	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	Y	--	--	Y	--	--
	K	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	Y	--	--	Y	--	--
	T	--	--	--	--	--	--	--	--	Y	--	--	--	--	--	--	--	--	--	--	--	--
	U	--	--	--	--	--	--	--	--	--	Y	--	--	--	--	--	--	--	--	--	--	--
	C	--	--	--	--	--	--	--	--	--	--	Y	--	--	--	--	--	--	--	--	--	--
	N	--	--	--	--	--	--	--	--	--	--	--	Y	--	--	--	--	--	--	--	--	--
	P	--	--	--	--	--	--	--	--	--	--	--	--	Y	--	--	--	--	--	--	--	--
	V	--	--	--	--	--	--	--	--	--	--	--	--	--	Y	--	--	--	--	--	--	--
	E	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	--	--	--	Y	--	--
	Z	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	Y	--	--
	S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Y	--	--	--	--
	A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	LB	Y	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	Y	Y	--	--	Y	--	--
	LR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	LV	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 4-13 Registers whose names can be changed at the same time (word)

		Old name (before conversion)																								
		XW	JW	YW	QW	GW	RW	MW	KW	TW	UW	CW	NW	PW	VW	EW	ZW	SW	AW	DW	FW	LBW	LRW	LVR	LWW	LXW
New name (after conversion)	XW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	JW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	YW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	QW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	GW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	RW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	MW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	KW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	UW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	CW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	NW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	VW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	ZW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	AW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	DW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	FW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	LBW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	LRW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	LVW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	LWW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y
	LXW	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	Y	--	--	Y	Y

Table 4-14 Registers whose names can be changed at the same time (long word)

New name (after conversion) \ Old name (before conversion)	XL	JL	YL	QL	GL	RL	ML	KL	TL	UL	CL	NL	PL	VL	EL	ZL	SL	AL	DL	FL	BD	LBL	LRL	LVL	LWL	LXL	LLL	LML
XL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
JL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
YL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
QL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
GL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
RL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
ML	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
KL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
ZL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
FL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
BD	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LBL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
LRL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LVL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LWL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
LXL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
LLL	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y
LML	Y	Y	Y	Y	Y	Y	Y	--	--	--	--	--	--	--	Y	--	--	--	Y	Y	--	Y	--	--	Y	Y	Y	Y

Table 4-15 Registers whose names can be changed at the same time (float type)

		Old name (before conversion)	
		LF	LG
New name (after conversion)	LF	Y	Y
	LG	Y	Y

4.3.9 Copy Ncoil

This function copies all circuits of a specified N coil to another specified N coil.

Enter the copy source and destination N coil numbers, and then click the **Copy** button. You can also copy an N coil by dragging and dropping it in the N coil window.

<Operation>

[1] From the pull-down menu on the ladder diagram sheet, select **Edit**, and then **Copy Ncoil**. The Ncoil Copy window appears.
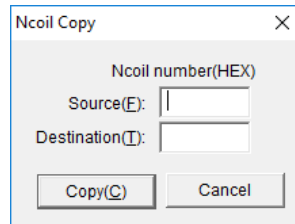
Figure 4-59 Ncoil Copy window

[2] Enter the copy source and destination N coil numbers, and then click the **Copy** button. A copy confirmation message appears.
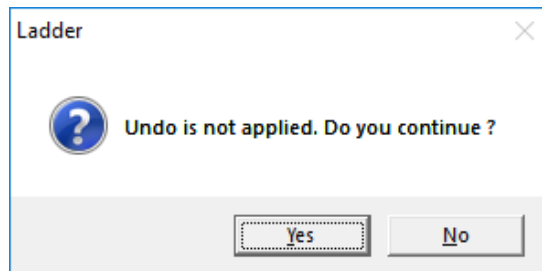
Figure 4-60 Copy confirmation message

[3] Click the **Yes** button to start N coil copy.

If copy to the same N coil is attempted, a message confirming whether to output multiple output coils appears.
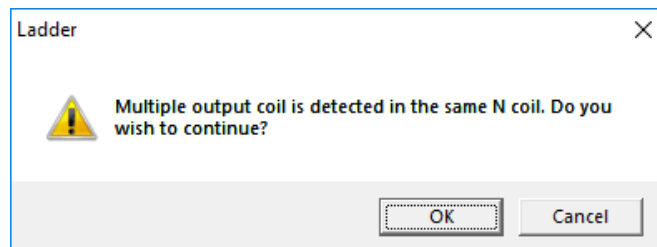
Figure 4-61 Multiple-output coil confirmation message

[4] Click the **OK** button to start N coil copy.

At this time, multiple output coils are generated. Correct the output.

<Notes on operation>
- Note that, if this processing is performed, the previous state cannot be restored.
- If circuits have already been created at the copy destination, the circuits in the copied N coil are added after the existing circuits.
- Before performing this processing, you must compile the program and make sure that the operation can be started in an error-free state.
- If the copy destination N coil number is NE0 to NFF and the area size of the specified N coil is 1 in the PCs edition window, an error message appears, indicating that the N coil cannot be copied. In that case, change the copy destination N coil number. Alternatively, change the area size to a value other than 1 in the PCs edition window.
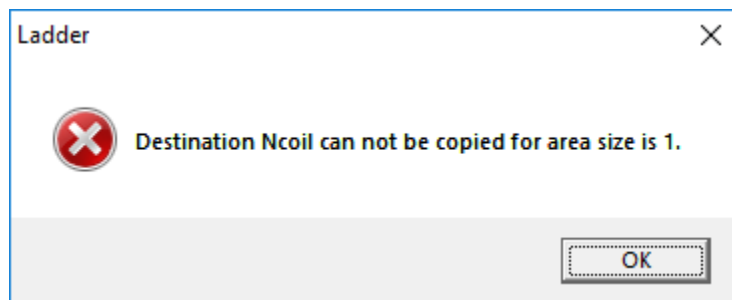
Figure 4-62 Error message indicating that the N coil cannot be copied

4.3.10 Delete Ncoil

This function deletes all circuits of the specified N coil at a time.

<Operation>

[1] From the pull-down menu on the ladder diagram sheet, select **Edit**, and then **Delete Ncoil**.
The Ncoil Delete window appears.
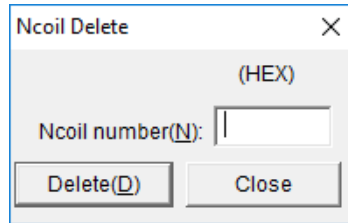
Figure 4-63 Ncoil Delete window

[2] Enter the number of the N coil to be deleted, and then click the **Delete** button. A deletion confirmation message appears.
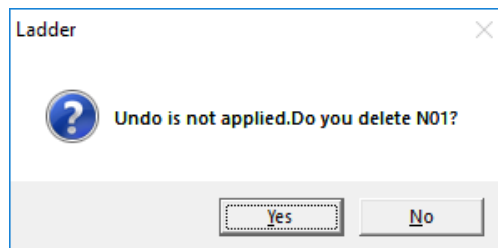
Figure 4-64 Deletion confirmation message

[3] Click the **Yes** button to delete the N coil.

<Note on operation>

● Note that, if deletion is performed, the previous state cannot be restored. Back up necessary data in advance.

4.4 Ladder sheet display functions

The ladder sheet display functions are contained in the standard tool bar and pull-down menu.
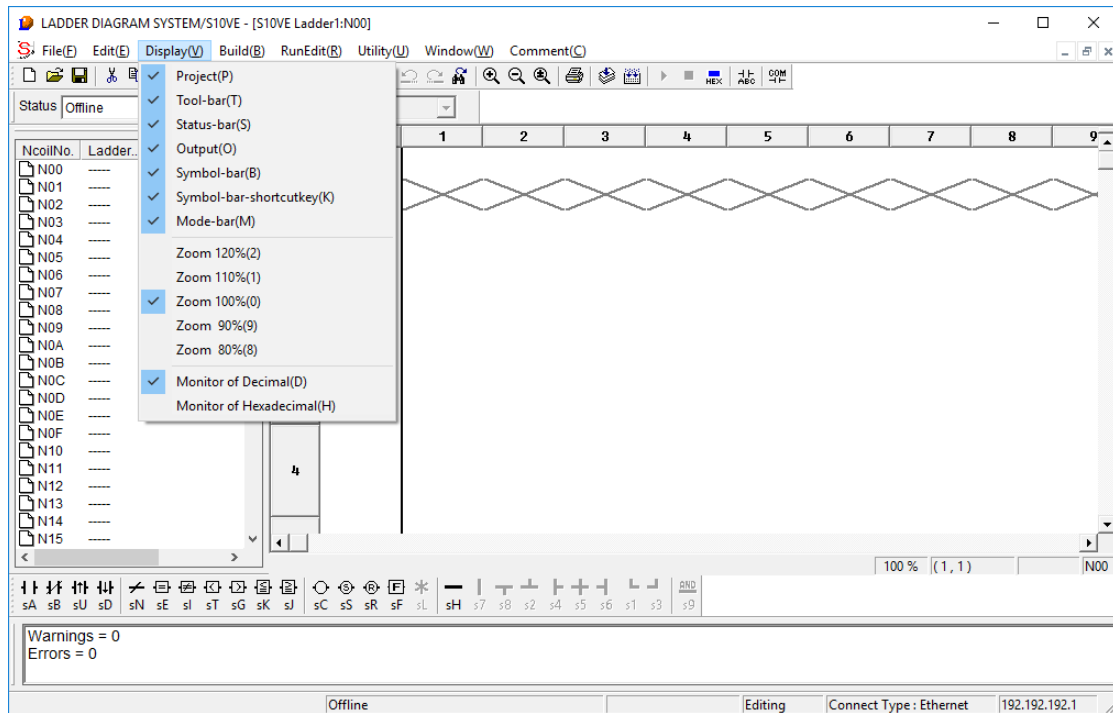
Figure 4-65 Clicking the [Display] menu

The following table lists and describes the display functions provided in the **Display** menu.

Table 4-16 [Display] menu options

No.	Level 1	Level 2	Level 3	Description
1	**Display**	**Project**		Shows or hides the N coil list.
2		**Tool-bar**		Shows or hides the tool bar.
3		**Status-bar**		Shows or hides the status bar.
4		**Output**		Displays the area used for presenting the result of compilations.
5		**Symbol-bar**		Shows or hides the symbol bar.
6		**Symbol-bar-shortcutkey**		Shows or hides the shortcut keys on the symbol bar.
7		**Mode-bar**		Shows or hides the mode bar.
8		**Zoom 120%**		Sets the scale factor of the displayed ladder sheet to 120%.
9		**Zoom 110%**		Sets the scale factor of the displayed ladder sheet to 110%.
10		**Zoom 100%**		Sets the scale factor of the displayed ladder sheet to 100%.
11		**Zoom 90%**		Sets the scale factor of the displayed ladder sheet to 90%.
12		**Zoom 80%**		Sets the scale factor of the displayed ladder sheet to 80%.
13		**Monitor of Decimal**		Displays monitoring-time monitored values in decimal format.
14		**Monitor of Hexadecimal**		Displays monitoring-time monitored values in hexadecimal format.

4.5 Ladder sheet build functions

The ladder sheet build functions are provided in the **Build** pull-down menu.
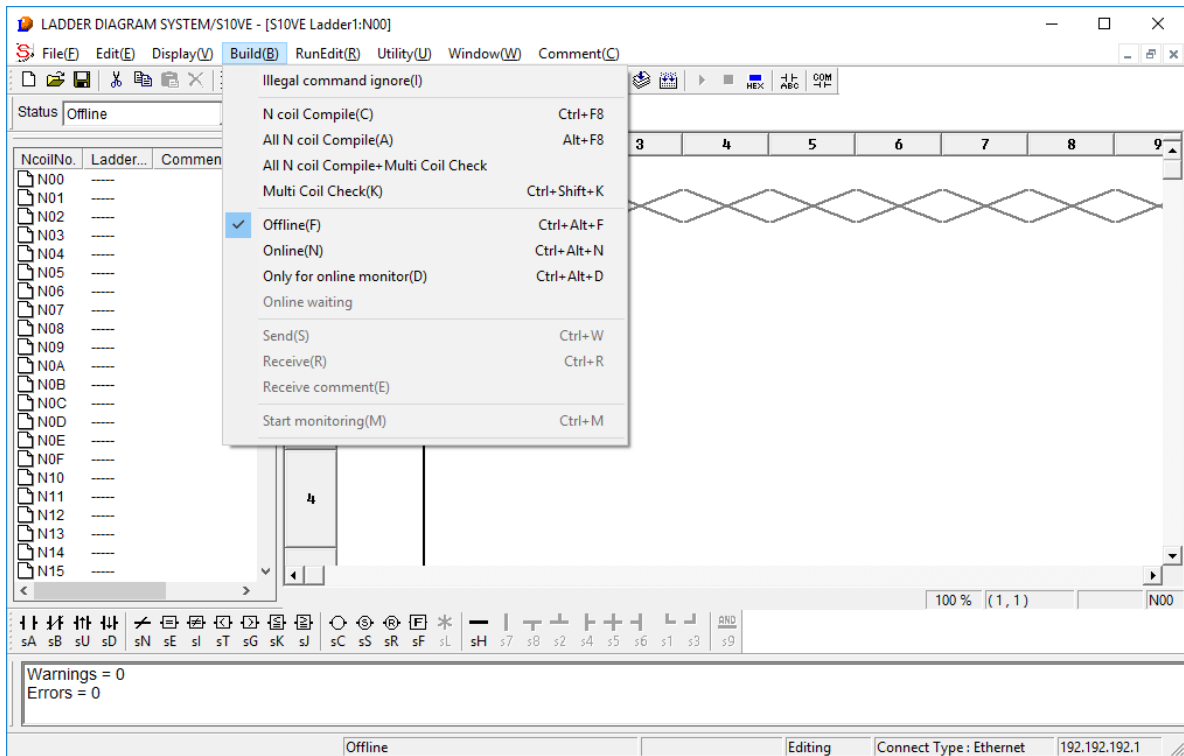
Figure 4-66 Clicking the [Build] menu

The following table lists and describes the build functions provided in the **Build** menu.

Table 4-17 [Build] menu options (1/2)

No.	Level 1	Level 2	Level 3	Description
1	**Build**	**Illegal command ignore**		Compiles ladder programs, ignoring any invalid instruction codes.
2		**N coil Compile**		Compiles only the current open N coil.
3		**All N coil Compile**		Compiles all the existing N coils.
4		**All N coil Compile+Multi Coil Check**		Compiles all N coils, and then checks them for any multiple shared coils.
5		**Multi Coil Check**		Checks all given N coils for any multiple shared coils.

Table 4-17 [Build] menu options (2/2)

No.	Level 1	Level 2	Level 3	Description
6	**Build**	**Offline**		Switches the operation mode to offline.
7		**Online**		Switches the operation mode to online.
8		**Only for online monitor**		Sets the operation mode to *only for online monitor* mode.
9		**Online waiting**		Sets the operation mode to online waiting mode.
10		**Send**		Sends processes to the PCs.
11		**Receive**		Receives processes from the PCs.
12		**Receive comment**		Receives comment files from the PCs.
13		**Start monitoring** or **Stop monitoring**		Starts or stops monitoring.

4.5.1 Compiling ladder programs

(1) About compilation

Compiling a ladder program (a collection of ladder symbols pasted into ladder sheets) produces a sequence of ladder instructions that can be run on the S10VE. You can compile existing N coils one by one or all at one time.

- Compiling N coils one by one
  From the **Build** menu or tool bar, click **N coil Compile**. This compiles only the currently active ladder sheet.

- Compiling all N coils at one time
  From the **Build** menu or tool bar, click **All N coil Compile**. This compiles the ladder program file you are editing (that is, all ladder sheets in the range from N00 to NFF) at one time.

The results of compilations are displayed in the output window. If a compilation does not terminate normally or if any N coil is not yet compiled, the ladder program cannot be sent to the S10VE.

If 0 is reported as the number of errors, this indicates that the compilation has terminated normally.

Figure 4-67 Message displayed in the output window when the compilation terminated normally
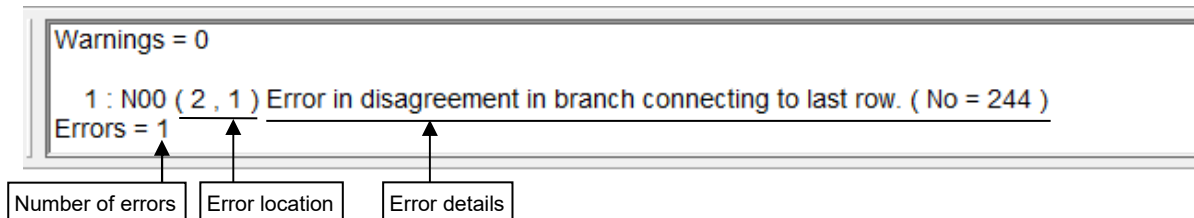
Figure 4-68 Message displayed in the output window when the compilation terminated abnormally

When you double-click on the message body in the output window, the mouse cursor will move to the location of the detected error (error line).
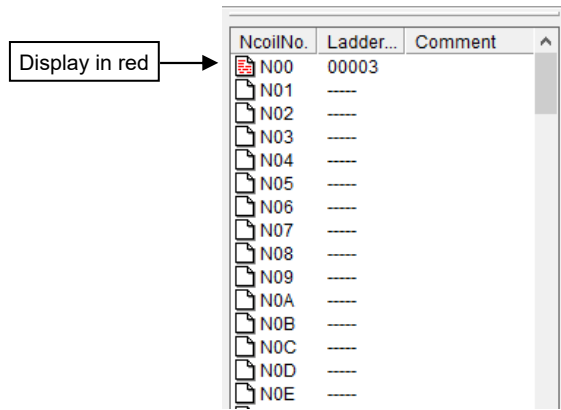
Figure 4-69 N coil not yet compiled

When an N coil is compiled successfully, the N coil icon turns from red to blue.

In the case of the **All N coil Compile** option, a multi coil check among N coils is not performed. If you want to perform this check, click **Multi Coil Check** or **All N coil Compile+Multi Coil Check** as follows.

● [Multi Coil Check]
  To check whether duplicated registers are specified for coils, select **Build**, and then **Multi Coil Check**.
  The check result is displayed in the output window.

Figure 4-70 Output window messages at the end of multi coil check

● [All N coil Compile+Multi Coil Check]
  From the **Build** menu, select **All N coil Compile+Multi Coil Check**. Multi coil check starts after all the N coils have been compiled.

● Ladder diagrams are compiled for each circuit. When two or more compilation errors occur in a circuit, the output window displays only the compilation error that was detected first.
● If the number of instructions exceeds the ladder area size, the message `The number of instructions exceeded the maximum` appears in the output window. In this case, all N coils are placed in an uncompiled state and all icons in the N coil window turn from blue to red.

4.5.2 Switching between online, offline, only for online monitor, and online waiting modes

The ladder diagram system operates in one of the following modes: *Online*, *offline*, *only for online monitor*, and *online waiting*. When started, the ladder diagram system always enters offline mode. You can change offline mode to any mode other than online waiting mode by using the **Build** pull-down menu or the mode bar. For details about online waiting mode, see *(2) Online mode*.

In addition to the **Build** pull-down menu and mode bar, the Mode selection by online dialog box (Figure 4-75) can also be used to select *only for online monitor* mode. For details, see *(2) Online mode*.

Note that the operation mode you select determines what you can process and the functions available for processing.

The selected mode and the current communication status are displayed on the status bar (see Figure 4-9).

The communication status is displayed on the status bar as follows:

- **Offline**: Indicates offline mode.
- **Online : Normality**: Indicates that the system is in online mode and the communication status is normal.
- **Online : Connection is retried**: Indicates that the system is in online mode and the connection is being retried.
- **Online : Abnormality**: Indicates that the system is in online mode and the communication status is abnormal (communication is disabled).
- **Only for online monitor : Normality**: Indicates that the system is in *only for online monitor* mode and the communication status is normal.
- **Only for online monitor : Connection is retried**: Indicates that the system is in *only for online monitor* mode and the connection is being retried.
- **Only for online monitor : Abnormality**: Indicates that the system is in *only for online monitor* mode and the communication status is abnormal (communication is disabled).
- **Online waiting : Normality**: Indicates that the system is waiting for transition to online mode and the communication status is normal.
- **Online waiting : Connection is retried**: Indicates that the system is waiting for transition to online mode and the connection is being retried.
- **Online waiting : Abnormality**: Indicates that the system is waiting for transition to online mode and the communication status is abnormal (communication is disabled).
- **Rewrite under RUN status**: Indicates that the system is in run-time editing mode. For details about this mode, see *4.6 Ladder sheet run-time editing function*.

(1) Offline mode

In offline mode, you can edit the contents of memory or files on the personal computer.

You cannot use the following options of the **Build** menu in this mode:

● **Send**: Sends ladder programs edited on the personal computer to the PCs' memory.

● **Receive**: Receives ladder programs from the PCs' memory and stores them on the personal computer's hard disk.

● **Receive comment**: Receives I/O comment information from the PCs' memory and stores it on the personal computer's hard disk.

● **Start monitoring**: Monitors the operating status of ladder programs residing in the PCs' memory.

<Note>

If the ladder diagram system transitions to offline mode in temporary run mode, a warning message appears, indicating that the ladder program has not been resent. In this case, click the **Cancel** button and then send the ladder program before the transition to offline mode. If you click the **OK** button, the ladder diagram system switches to offline mode, but the PCs remain in temporary run mode. We recommend that you resend the ladder program for recovery to normal run mode without switching the system to offline mode.
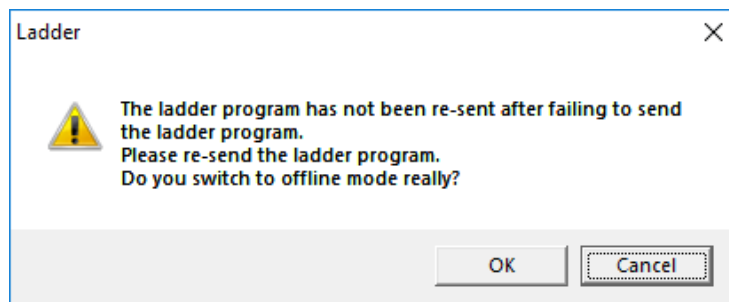
Figure 4-71 Warning message indicating that the ladder program has not been resent (offline)

(2) Online mode

In online mode, you can edit the contents of memory or files on the personal computer that match the contents of the PCs' memory. To use online functions, you need to send and receive data for matching with contents of the PCs' memory. In online mode, if a line error occurs (such as disconnection of a cable between the personal computer and the PCs, or a power outage of the PCs' power supply), the following error message appears. In this case, remove the cause of the error.
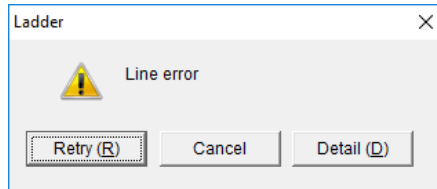
Figure 4-72 Line error message dialog box

<Note>

If a transition to offline mode has occurred in temporary run mode, the following warning message (indicating that the ladder program has not been resent) appears at the next transition to online mode. In this case, send the ladder program before using the online function. If the previous ladder program does not exist, the ladder program before the last transmission is received. In this case, resend the received ladder program as is.
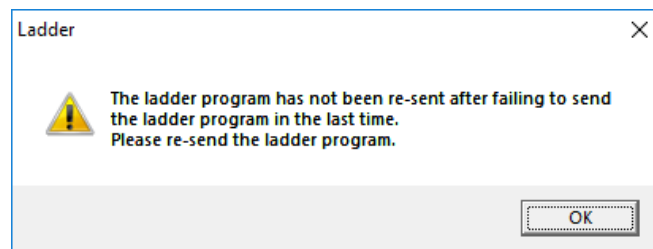
**Figure 4-73 Warning message indicating that the ladder program has not been resent
(online)**

<Exclusive use of PCs in online mode>

When the operation mode is switched from offline to online, the ladder diagram system exclusively uses the PCs thereafter. This feature prevents more than one ladder diagram system in the network from accessing the same group of PCs simultaneously. This exclusive use of PCs is ended when the operation mode is switched from online to offline.

If you specify online mode for the group of PCs being exclusively used by a ladder diagram system running on another personal computer, the following event might occur depending on the communication type used.

In addition, the message dialog box in Figure 4-74 or the Mode selection by online dialog box in Figure 4-75 indicates a personal computer that is exclusively using PCs. If the ladder diagram system on that personal computer is not in online mode (or the system has not yet started), the ladder diagram system might have terminated without ending the exclusive use of PCs[#]. To end the exclusive use, from the **Utility** menu, click **Free occupancy**. In the following dialog box that appears, click the **OK** button. Clicking the **No** button continues the exclusive use of PCs.
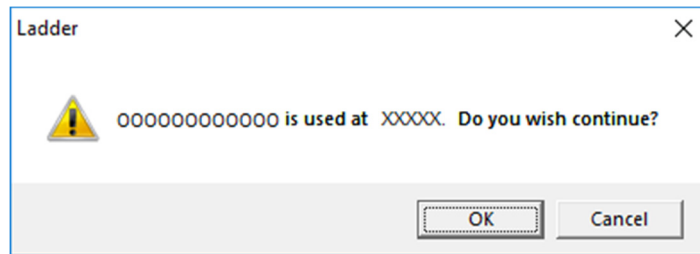
Figure 4-74 Message dialog box indicating that PCs are currently being used exclusively

#: Exclusive use of PCs is not ended in either of the following cases:
- The ladder diagram system running in online mode does not terminate normally because power to the personal computer is turned off (due to a power failure, for example).
- The ladder diagram system running in online mode is ended after power to the PCs is turned off.

The Mode selection by online dialog box appears.

oo...oo: ID name of the personal computer using PCs exclusively (in online mode)
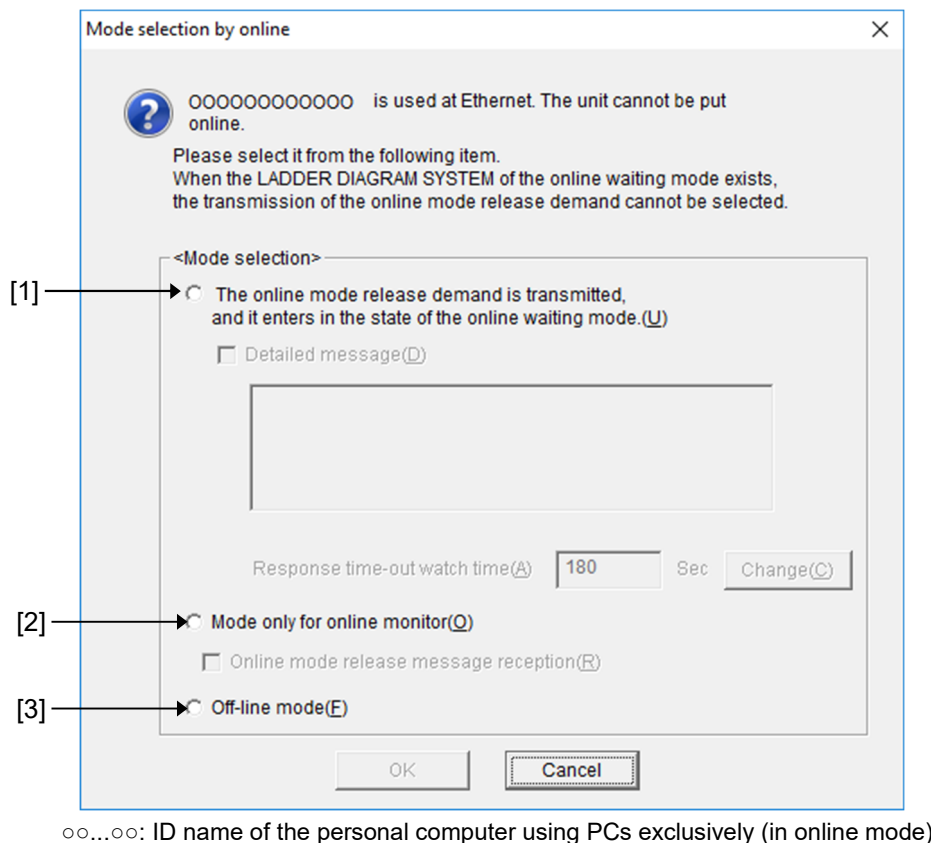
Figure 4-75 Mode selection by online dialog box

Select one of the options [1], [2], and [3], and then click the **OK** button. (The **OK** button is inactive until any one of these options is selected.) If you select option [1] and select the **Detailed message** check box, you can enter any message and send it to the ladder diagram system currently running in online mode. (The message is sent by clicking the **OK** button.)

Option [1]: Sends an online-mode release request and places the ladder diagram system in online waiting mode. When online mode is released (cleared), the communication status of the ladder diagram system on the personal computer which has sent the online-mode release request changes from online waiting mode to online mode. If a ladder diagram system on another personal computer is already in online waiting mode, you cannot select the radio button **The online mode release demand is transmitted, and.....**.

For details about how to use the online-mode release request, see *(3) How to use the online-mode release request*.

Option [2]: Forces the ladder diagram system to enter *only for online monitor* mode. If you select the **Online mode release message reception** check box, when the online mode is released, a message dialog box shown in Figure 4-85 appears, indicating release of online mode.

For details, see *(4) Only for online monitor mode*.

Option [3]: Forces the ladder diagram system to enter offline mode.

(3)   How to use the online-mode release request

The following illustrates how to use the online-mode release request.
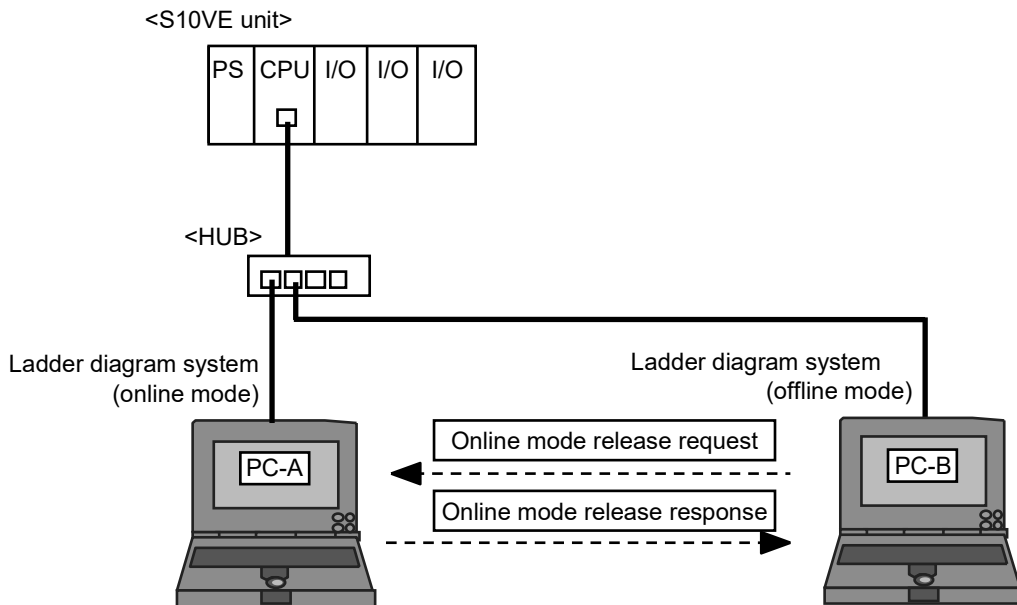
Figure 4-76 Sending and receiving an online-mode release message

[1] If you try to change the communication status of the ladder diagram system on PC-B from offline mode to online mode, the Mode selection by online dialog box (Figure 4-75) appears because the ladder diagram system on PC-A is already running in online mode.

[2] On PC-B, in the Mode selection by online dialog box, select the radio button **The online mode release demand is transmitted, and....** in the **Mode selection** group box. If necessary, select the **Detailed message** check box, and then enter a message. In the **Response time-out watch time** box, you need to specify how long to wait for a response from the ladder diagram system currently running in online mode. The specifiable range is from 30 to 600 (seconds). The default value is 180 (seconds). If no response is received from that ladder diagram system within the specified time period, the response-watch timeout message dialog box appears.

For details about detailed messages and the response-watch timeout message dialog box, see the description under *Online-mode release request message sender*.

Click the **OK** button. The communication status of the ladder diagram system running on PC-B changes to online waiting mode, and the system waits for PC-A to respond to the online-mode release request.

<Note>

Clicking the **OK** button in the Mode selection by online dialog box performs monitoring for 10 seconds. If no response is received from the ladder diagram system in online mode within the monitoring time, the message dialog box shown in Figure 4-77 appears.
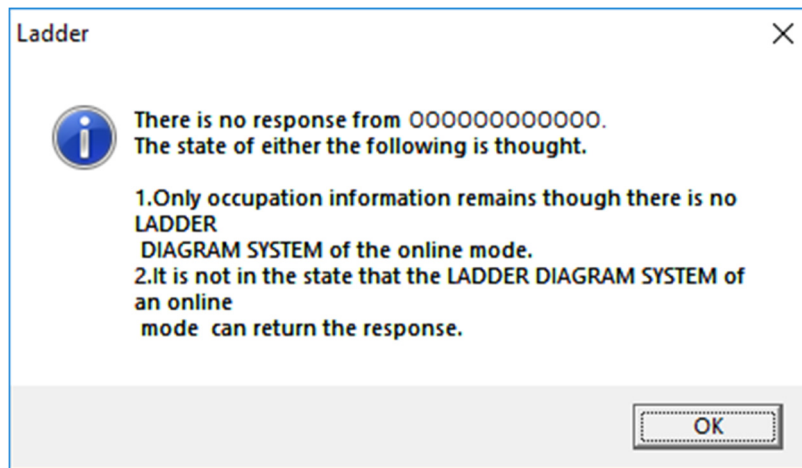
○○...○○: ID name of the personal computer using PCs exclusively (in online mode)

Figure 4-77 "No response" message dialog box

The following describes possible causes of the *No response* error. However, the personal computer user who has issued the online-mode release request cannot identify the cause of the error.

● The communication status of the ladder diagram system changes from online mode to another mode before the online-mode release request is sent (or before the **OK** button is clicked in the Mode selection by online dialog box).

● The ladder diagram system running in online mode is terminated without ending exclusive use of PCs.
(For details, see the description under *(2) Online mode* in this subsection.)

● The communication link between the personal computer running the ladder diagram system in online mode and the PCs is broken (due to disconnection of a cable, for example). In this case, click the **OK** button in the *no response* message dialog box (Figure 4-77), and then contact the user of the ladder diagram system running in online mode. (The procedure ends at this point.)

[3] The `Online mode release demand` message dialog box (Figure 4-82) appears on the screen of PC-A. In the **Reply item** group box, select the radio button **The online mode is made clear at once.**, and then click the **OK** button.

[4] On the screen of PC-B, the message dialog box shown in Figure 4-79 appears, indicating that a response was received. Click the **OK** button, and then wait for PC-A to enter offline mode.

[5] On PC-A, change the communication status of the ladder diagram system from online to offline.

[6] The communication status of the ladder diagram system running on PC-B automatically changes from online waiting to online, and then the following message dialog box appears. Click the **OK** button.
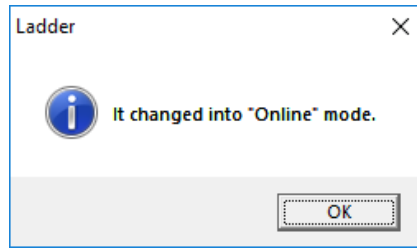
Figure 4-78 Message dialog box indicating that online mode was entered

Online-mode release request message sender:

A personal computer can send an online-mode release request message to a ladder diagram system running in online mode on another personal computer.

When the **Detailed message** check box is selected, you can enter any message. Make sure that the message length is no more than 128 bytes (a halfwidth character is counted as one byte, and a fullwidth character is counted as two bytes). A detailed message is optional. If you do not need it, clear the check box.

When a response is received from the ladder diagram system running in online mode, the following message dialog box appears. Confirm the message, and then click the **OK** button.

```
┌─────────────────────────────────────────┐
│ Ladder                               ✕   │
│                                          │
│      ⓘ    There was a response from      │
│           OOOOOOOOOOOO.                  │
│           XXXXXXXXXXXXXXXXXXXXXXX        │
│                                          │
│           < Detailed message >           │
│           YYYYYYYYYYYYYYYYYYYYYYY        │
│                                          │
│                          ┌─────────┐     │
│                          │   OK    │     │
│                          └─────────┘     │
└─────────────────────────────────────────┘
```
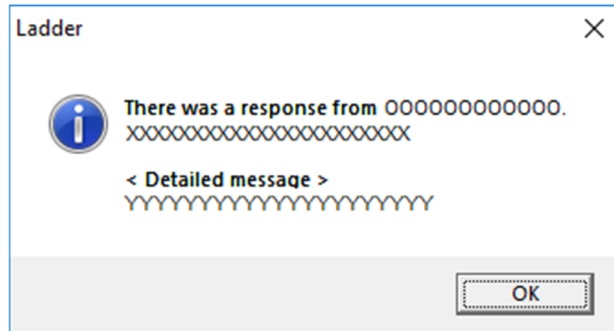
oo...oo: ID name of the personal computer using PCs exclusively (in online mode)
XX...XX: Response message from the same personal computer
YY...YY: Detailed message from the same personal computer

Figure 4-79 Message dialog box indicating that a response is received

When a ladder diagram system currently running in online mode is released from online mode, another ladder diagram system in online waiting mode automatically changes to online mode.

If no response is received from the other ladder diagram system within the response timeout watch time specified in the Mode selection by online dialog box, the following message dialog box appears (indicating a response watch timeout).
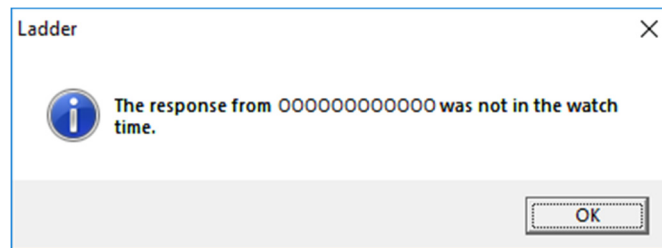
○○...○○: ID name of the personal computer using PCs exclusively (in online mode)

Figure 4-80 Response watch timeout message dialog box

In this dialog box, click the **OK** button. A message dialog box appears, asking you whether you want to switch the operation mode to *only for online monitor* mode.
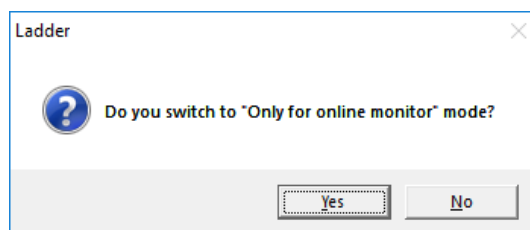
Figure 4-81 Confirmation message dialog box for switching to "only for online monitor" mode

In this dialog box, click the **Yes** or **No** button.
Yes: Switches the operation mode to *only for online monitor* mode.
No: Switches the operation mode to offline mode.

Online-mode release request message receiver:

When receiving an online-mode release request message, the ladder diagram system running in online mode displays the Online mode release demand message dialog box.
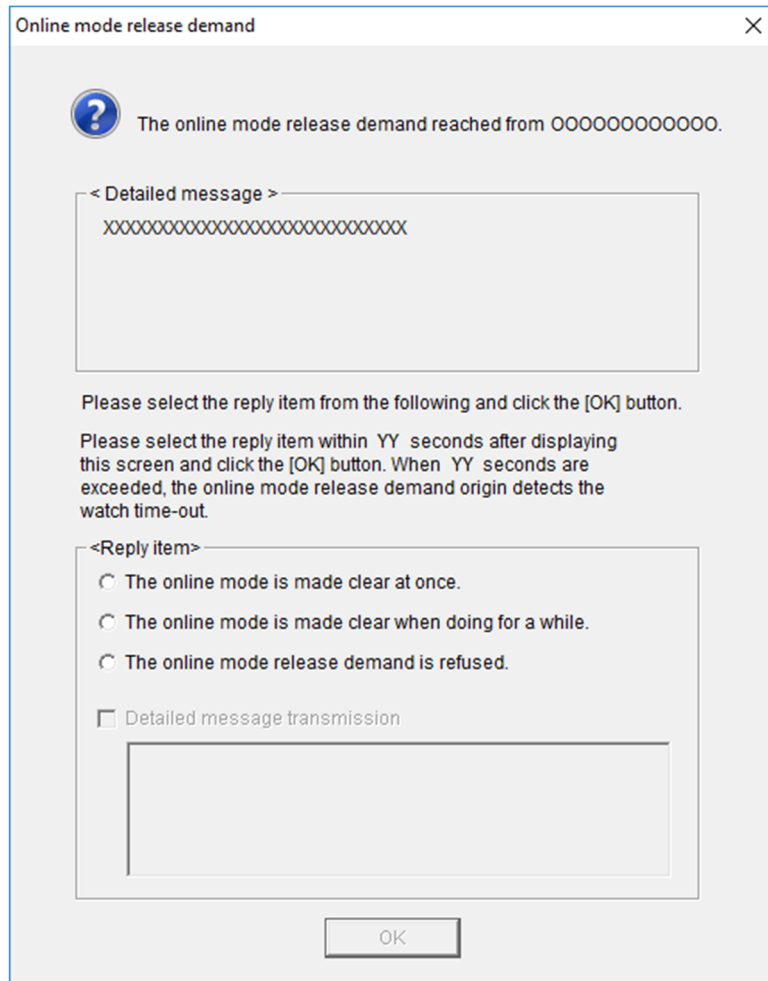
○○...○○: The ID name of a personal computer (sender) that issued an online-mode release request
XX...*XX*: Detailed message from that personal computer
YY: The period of time (seconds) that can elapse before a timeout is generated in that personal computer

Figure 4-82 "Online mode release demand" message dialog box

In the **Reply item** group box, select any option and then click the **OK** button. A reply message is sent to the personal computer (sender) that sent the online-mode release request message. Before receiving the reply message, the sender might have terminated the ladder diagram system or changed the operation mode to offline mode or *only for online monitor* mode. In such cases, a message dialog box indicating cancellation of the online-mode release request appears.
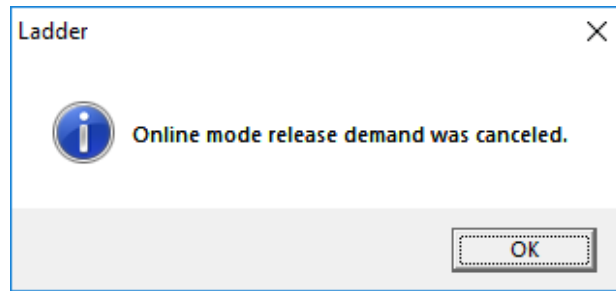
Figure 4-83 Message dialog box indicating cancellation of the online-mode release request

In this dialog box, click the **OK** button.

<How to send a detailed message>
[1] In the **Reply item** group box, select the **Detailed message transmission** check box. The detailed message form becomes available for input.
[2] In the form, enter detailed message text. Make sure that the message length is no more than 128 bytes (a halfwidth character is counted as one byte, and a fullwidth character is counted as two bytes).
[3] Click the **OK** button.

(4)   Only for online monitor mode

<Functional limitations>

Compared with online mode, *only for online monitor* mode does not support the following:

- Transmission of ladder programs
- Change of ladder program size
- Change of the analog counter
- Writing to the PCs' memory by using the MCS window or TUC setting value list window
- Data transmission
- Run-time editing
- Forced release of exclusive use

<Changing the ladder program during monitoring>

If a ladder circuit being monitored in *only for online monitor* mode is changed, the following message dialog box appears.
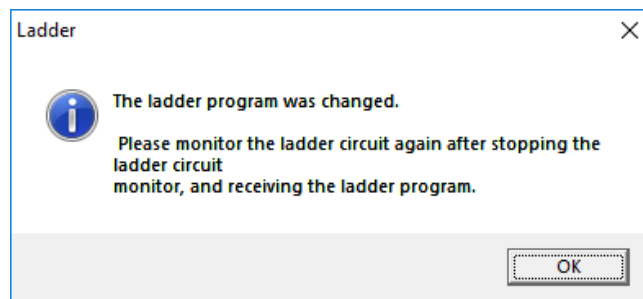
Figure 4-84 Message dialog box indicating that the ladder program was changed

Click the **OK** button, and then stop the ladder circuit monitoring according to the message. Then, receive the ladder program, and then start ladder circuit monitoring again. Unless you receive the ladder program, ladder circuit monitoring is not performed normally.

<Notification of online mode release>

In *only for online monitor* mode, you can receive a notification by the message (Figure 4-85) whenever the ladder diagram system running in online mode is released from online mode. To use this service, you have to select the **Online mode release message reception** check box in the Mode selection by online dialog box (Figure 4-75) and change the operation mode to *only for online monitor*. If you directly select **Only for online monitor** directly from the **Build** menu or mode bar, you cannot receive such notifications.
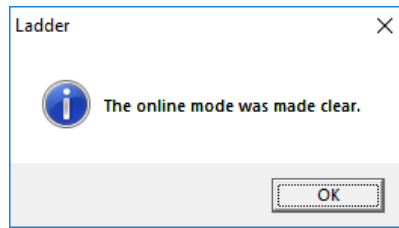
Figure 4-85 Message dialog box indicating that online mode was released

<Maximum number of personal computers connectable>
   When connecting a tool to the CPU module by using a hub, up to four personal computers can be connected.

<Note>
   If the ladder diagram system transitions to *only for online monitor* mode in temporary run mode, a warning message appears, indicating that the ladder program has not been resent. In this case, click the **Cancel** button and then send the ladder program. If you click the **OK** button, the ladder diagram system switches to *only for online monitor* mode, but the PCs remain in temporary run mode. We recommend that you resend the ladder program for recovery to normal run mode without switching the system to *only for online monitor* mode.
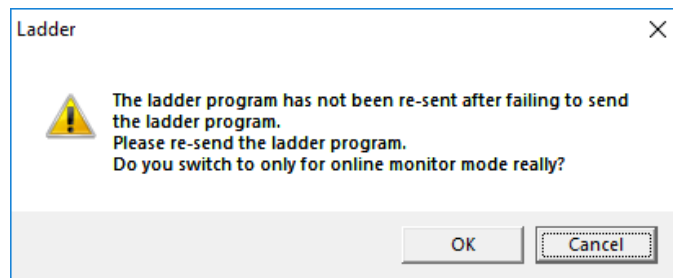
**Figure 4-86 Warning message indicating that the ladder program has not been resent
(only for online monitor mode)**

(5)   Handling of simultaneously issued online-mode release requests
   In normal operation, it is impossible to issue an online-mode release request if one such request is already issued from another personal computer in the network but has not yet been satisfied completely. If two or more personal computers simultaneously issue online-mode release requests to the same CPU, a *no response* message dialog box might appear because a response cannot be received from a personal computer running in online mode. To solve this problem, in the Mode selection by online dialog box, select the radio button **The online mode release demand is transmitted, and....**, and then click the **OK** button. (Note that, this radio button is inactive if any other personal computer is running a ladder diagram system in online waiting mode.)

4.5.3 Sending and receiving ladder programs

The function to send and receive ladder programs is available only in online mode (it is not available in offline mode). After all N coils of a ladder program are sent or received, the background color of the ladder sheet is the color specified in **Sheet after send or receive** of the Setup environment window. Make sure the system is in online mode before using this function.

(1) Sending ladder programs edited on a personal computer to the S10VE

After you have edited and compiled ladder programs successfully, you can send them to the S10VE.

Note 1: Ladder programs cannot be sent separately for each N coil. However, you can select whether to send all N coils in a batch (by selecting the **Send NE0-NFF coil** check box) or send N00 to NDF coils (by clearing this check box).

If you clear the **Send NE0-NFF coil** check box and send ladder programs, the background color of the ladder sheet for the NE0-NFF coil is the color specified in **Sheet in edit** of the Setup environment window. After the sending of coils, the background color of the ladder sheet for the N00-NDF coil is the color specified in **Sheet after send or receive** of the Setup environment window.

Note 2: The ladder program is written to both the sequence memory and flash memory. When the power to the CPU unit is turned off, the contents of the sequence memory are cleared and the ladder program that was saved at the power-on time is transferred from the flash memory to the sequence memory.

Note 3: Too long file names cannot be fit in the window used to send, save, or compare files or to view file header information. In this case, set the focus on the file name, and then press the right-arrow key on the keyboard to scroll display information.

<Operation>

[1] From the Build menu, click Send.

[2] The Sending setup window appears.
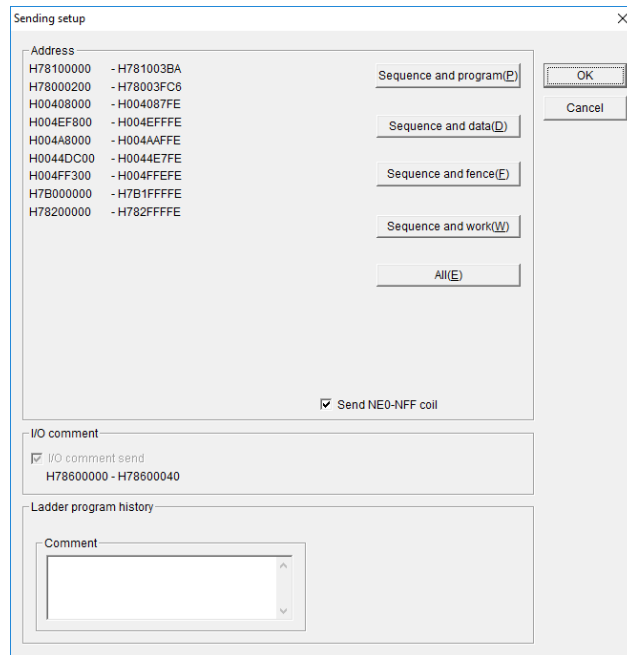
Figure 4-87 Sending setup window

[3] In the Sending setup window, click the selection button for the desired destination area (see Table 4-18), and then click the **OK** button. The default area is **Sequence and program**.
Clicking the **Cancel** button closes this window without sending the ladder program.

Table 4-18 Destination and source areas

Button	Ladder area[#1]	Analog counter information	TUC set value	Registers				
				DW, LW	FW, BD	LB, LL, LF, LM, LG, LX	Work[#2]
Sequence and program	Y	Y	Y	--	--	--	--
Sequence and data	Y	Y	Y	Y	--	--	--
Sequence and fence	Y	Y	Y	Y	--	--	--
Sequence and work	Y	Y	Y	Y	Y	Y	--
All	Y	Y	Y	Y	Y	Y	Y

Y: To be sent and received

--: Not to be sent and received

#1: The ladder area is used to hold ladder programs plus the following information:
- User function information (registration tables and program bodies)
  (Limited to cases where a user function area size is specified in the PCs edition window)
- I/O comment information
- Sequence management table (SQET)
- PCs edition information (set or changed in the PCs edition window)
- Ladder program history information
- Ladder program label information

#2: Indicates register X, J, Y, Q, G, R, M, K, T, U, C, N, P, V, E, Z, or S.

Here, T, U, and C indicate contacts.

If you click the **Sequence and program** or **Sequence and data** button, the part of the ladder program up to the EOP (end of ladder program) will be sent. If you click any other button, all the areas in the ladder program set in the PCs edition window will be sent.

If necessary, enter a ladder program history comment by using a maximum of 128 halfwidth characters (or 64 fullwidth characters).

[4] The Confirmed send circuit window appears.
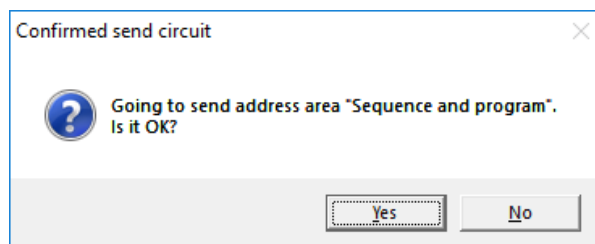
Figure 4-88 Confirmed send circuit window

Clicking the **Yes** button closes the Confirmed send circuit and Sending setup windows, and starts sending the ladder program.

Clicking the **No** button closes the Confirmed send circuit window without sending the ladder program (return to step [3]).

[5] After the **Yes** button is clicked in the Confirmed send circuit window, ladder program area definitions of PCs are compared. If the NE0 to NFF definitions are different, the following warning message appears to indicate mismatched ladder area size. Click the **OK** button to continue transmission.

Clicking the **Cancel** button closes this dialog box without sending the ladder program (return to step [3]).
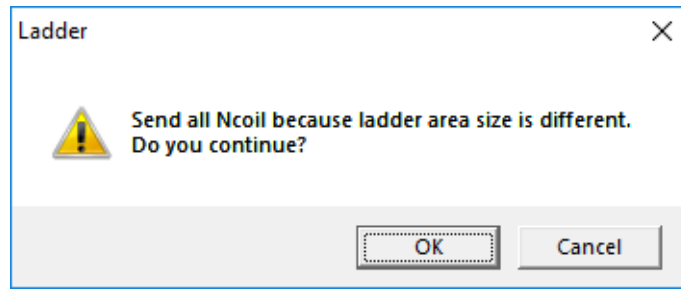
Figure 4-89 Warning message about mismatched ladder area size

[6] If any of the following items in the PCs edition information in the PCs edition window (Figure 4-144) differs from the information of PCs, a PCs reset warning message appears.
- **Sequence cycle time**
- **Watch dog timer**
- **Setup PI/O** (**PI/O**, **Partition**, **Out module hold**, and **Slot points**)
- **Setup RI/O** (**PI/O mode**, **Optical adapter connection**, and **Remote I/O points**)
- **Ladder RUN delay count** and **Invalid ladder RUN**
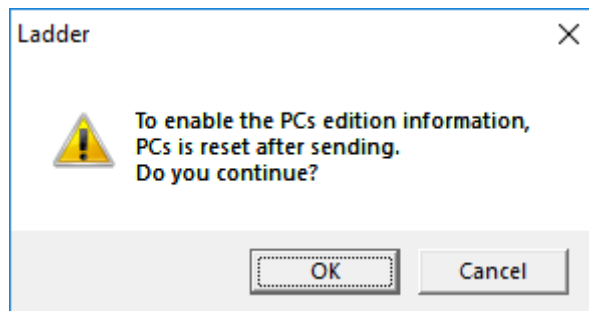
Figure 4-90 PCs reset warning message

Clicking the **OK** button closes the PCs reset warning message and starts sending the ladder program.
Clicking the **Cancel** button closes this dialog box without sending the ladder program (return to step [3]).

[7] When this warning message is not displayed, if any of the following items in the Ethernet Communication Setting List window (Figure 4-232) differs from information of PCs, or if parameter information is added or deleted, a warning message appears. (See Warning message about resetting PCs after sending Ethernet communication setting information.)
- **Module name** (ET1/ET2 or CH1/CH2)
- **Communication mode** (TCP/UDP)
- **Self-port No.**
- **Other port No.**
- **Other IP address**
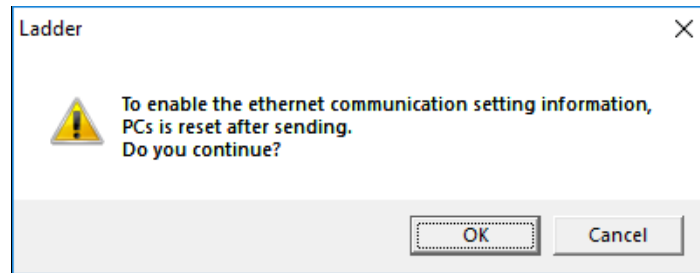
Figure 4-91 Warning message about resetting PCs after sending Ethernet communication setting information

Clicking the **OK** button closes this message and starts sending the ladder program.
Clicking the **Cancel** button closes this message without sending the ladder program (return to step [3]).

[8] If the PCs number of the ladder file is neither 9999 nor the PCs number of the PCs, the confirmation message indicating PCs number mismatch appears, as shown in Figure 4-92.
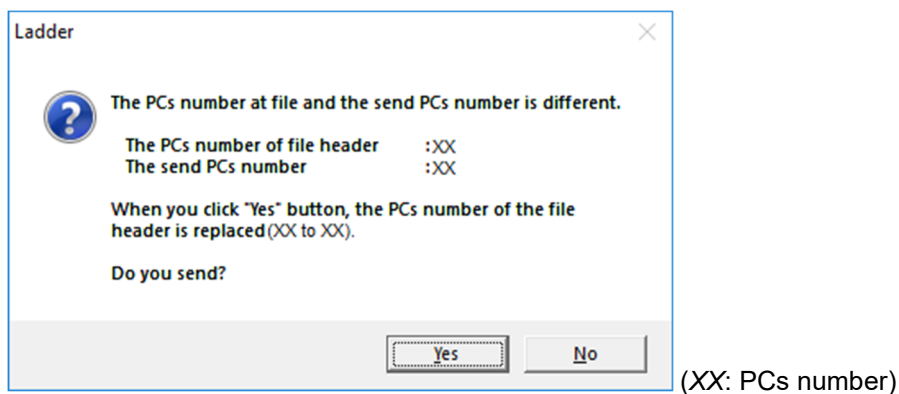
(*XX*: PCs number)

Figure 4-92 Confirmation message indicating PCs number mismatch

Clicking the **Yes** button closes this message and starts sending the ladder program. At this time, the PCs number of the ladder file changes to the PCs number of the S10VE.
Clicking the **No** button closes this message without sending the ladder program (return to step [3]).

[9] If the PCs are in the ladder RUN status, the warning message shown in Figure 4-93 appears.
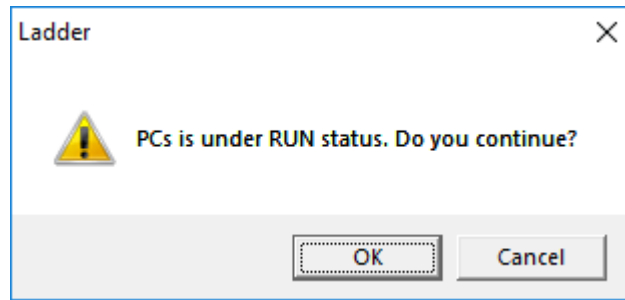
Figure 4-93 Warning message indicating that PCs are in the RUN status

Clicking the **OK** button closes this message and starts sending the ladder program.
Clicking the **Cancel** button closes this message without sending the ladder program (the Sending setup window is closed).

[10] The Now sending window shown in Figure 4-94 remains displayed during transmission of the ladder program.
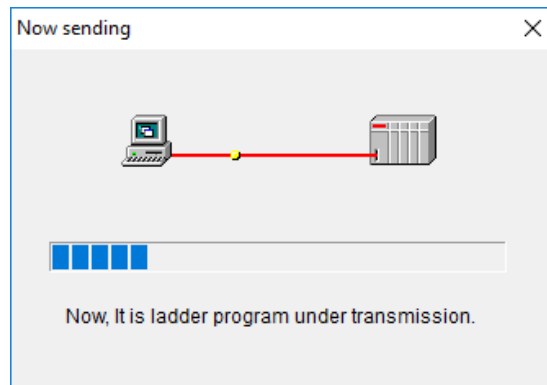
Figure 4-94 Now sending window

[11] If communication fails due to line disconnection or other reasons during transmission of the ladder program, a line error message appears. Revise the connection with the S10VE, and then click the **Retry** button. If you click the **Cancel** button, a message indicating a failure to send the ladder program appears and transmission is aborted. Furthermore, when you redisplay the main window, the run mode changes to temporary run mode.
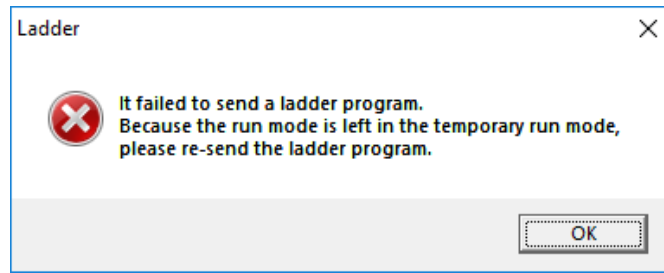
Figure 4-95 Message indicating a failure to send the ladder program

In temporary run mode where transmission is aborted due to a line error, completion of transmission cannot be reported to the PCs, and the PCs remain in the ladder program sending state. (Ladder operation continues in the temporary save area during transmission of the ladder program.) You need to resend the ladder program to complete the ladder program transmission.

[12] After the ladder program is sent, if an inconsistency (SUM check error) is found in the ladder program, a Ladder Area Sum Mismatch message appears and the transmission is aborted.
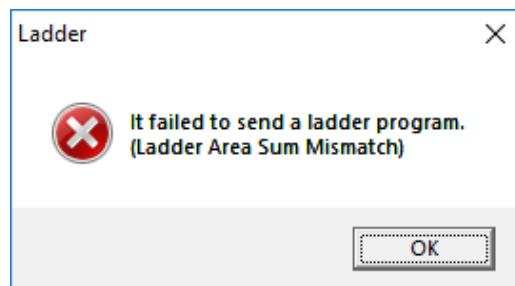
Figure 4-96 Ladder Area Sum Mismatch message

[13] After transmission of the ladder program, if an attempt to write the ladder program to flash memory fails due to line disconnection or other reasons, a line error message appears. Revise the connection with the S10VE, and then click the **Retry** button. If you click the **Cancel** button, a flash-memory rewrite failure message and a message indicating a failure to send the ladder program appear, and the transmission is aborted. Furthermore, when you redisplay the main window, the run mode changes to temporary run mode.
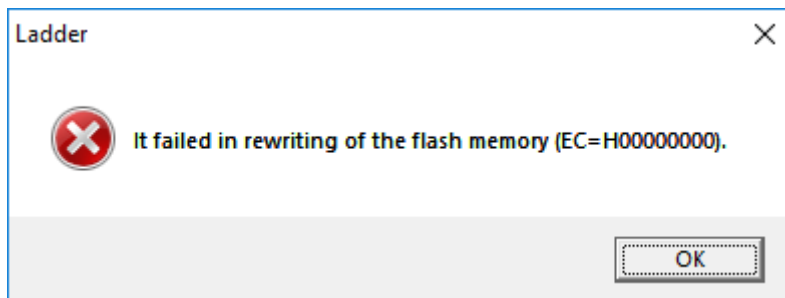
Figure 4-97 Flash-memory rewrite failure message

[14] When the transmission of the ladder program is complete, the Now sending window is closed.

<Ladder program history>

Ladder program history comments entered in the Sending setup window are registered in the PCs memory in the ladder program transmission state. In addition, the transmission date and time is automatically registered in the PCs memory in the ladder program transmission state. Because the clock time of the PCs is used as the transmission date and time, set the correct time for the PCs.

Note: You cannot send only a ladder program history.

<Sending I/O comments>

I/O comments can be sent when all the following conditions are satisfied. Unless all the conditions are satisfied, the **I/O comment send** check box in the **I/O comment** group box cannot be selected.

● Comment display is enabled in the ladder sheet.
● An I/O comment area is allocated in memory of the S10VE (by using the PCs edition window).
● The specified size of the I/O comment area is smaller than the size used for I/O comments.

Note 1: When the size of the I/O comment area is smaller than the size used for I/O comments, the following message appears when the window is activated. Click the **OK** button to continue processing.
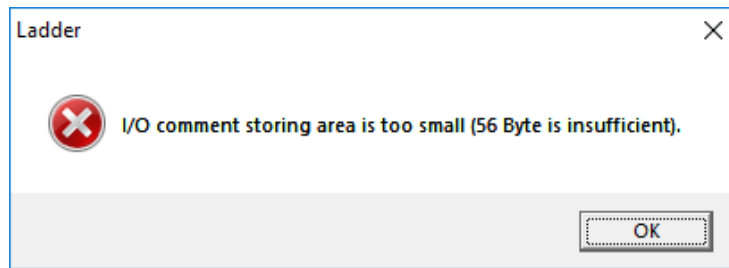
Figure 4-98 Insufficient I/O comment area message

When the size of the I/O comment area of the ladder program you are editing is larger than that of the machine, the following message appears when the window is activated. Click the **OK** button to continue processing.
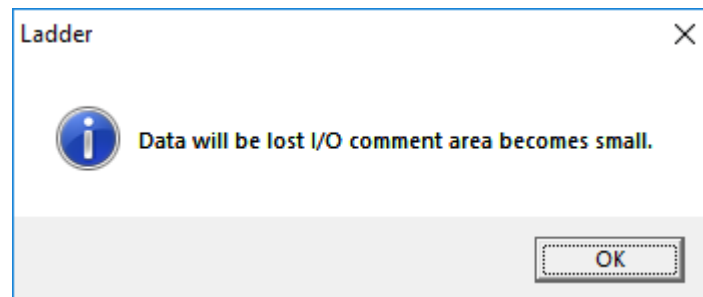
Figure 4-99 Message indicating that data will be lost due to insufficient I/O comment area

Note 2: If the size used for I/O comments differs between the ladder program to be sent and the machine, the **I/O comment send** check box cannot be cleared.

(2) Receiving ladder programs

You can receive ladder programs from the S10VE's memory and store them on the disk of the personal computer.

<Operation>

[1] From the **Build** menu, click **Receive**.

[2] The Receiving setup window appears.
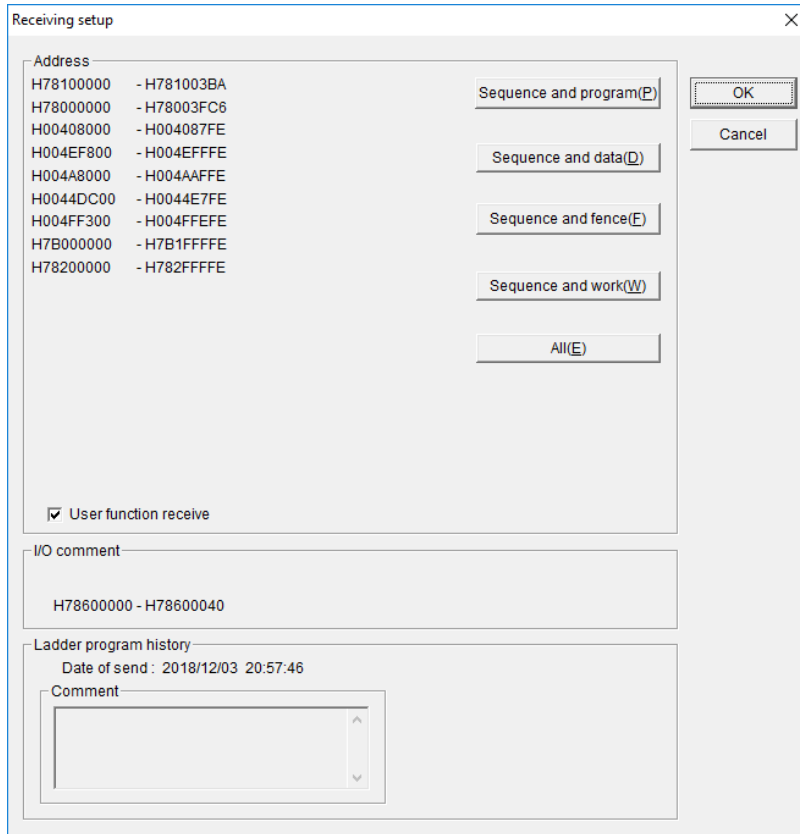
Figure 4-100 Receiving setup window

The ladder program history information is also displayed (the transmission date and time displayed is the one at which a ladder program was sent the last time).

[3] In the Receiving setup window, select the area whose content you wish to receive (see (1)), and then click the **OK** button. The default area is **Sequence and program**.
Clicking the **Cancel** button closes the Receiving setup window without receiving the ladder program.

[4] If the PCs number of the ladder file is 9999, the message indicating PCs number mismatch appears, as shown in Figure 4-101.
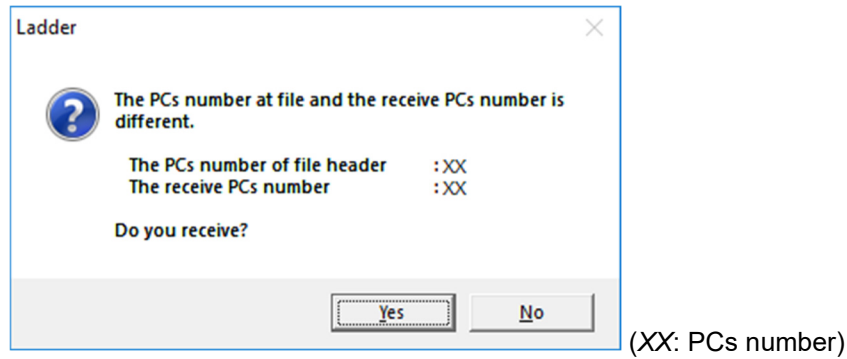
(*XX*: PCs number)

Figure 4-101 Message indicating PCs number mismatch (PCs No. 9999)

Clicking the **Yes** button closes this message and starts receiving the ladder program. Clicking the **No** button closes this message without receiving the ladder program (return to step [3]).

[5] If the PCs number of the ladder file differs from that of the S10VE, the message shown in Figure 4-102 appears.
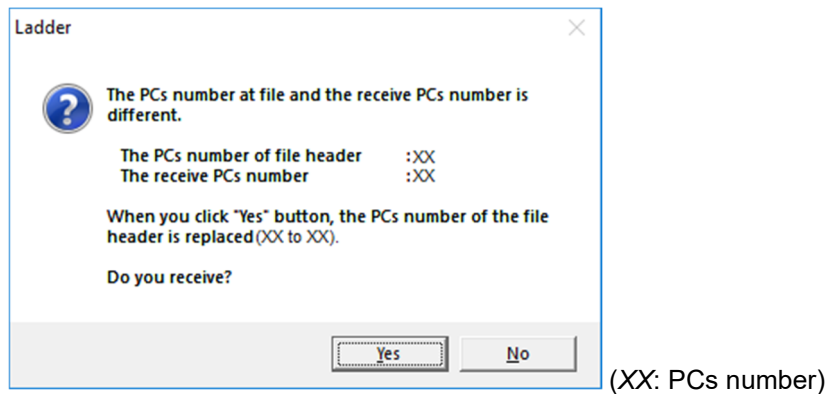
(*XX*: PCs number)

Figure 4-102 Message indicating PCs number mismatch (other than PCs No. 9999)

Clicking the **Yes** button closes this message and starts receiving the ladder program. At this time, the PCs number of the ladder file changes to the PCs number of the S10VE.
Clicking the **No** button closes this message without receiving the ladder program (return to step [3]).

[6] The Confirmed receive circuit window (Figure 4-103) appears.
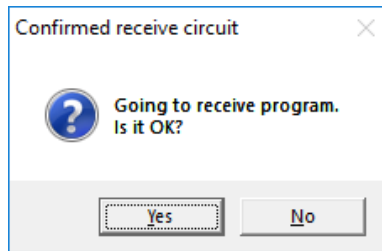
Figure 4-103 Confirmed receive circuit window

Clicking the **Yes** button closes the Confirmed receive circuit window and Receiving setup window, and starts receiving the ladder program.
Clicking the **No** button closes the Confirmed receive circuit window without receiving the ladder program (return to step [3]).

[7] The Now receiving window (Figure 4-104) is displayed while the reception of the ladder program is in progress.
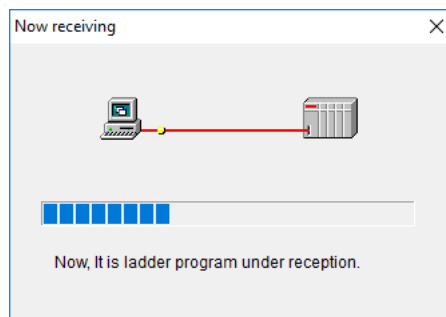
Figure 4-104 Now receiving window

[8] When the reception of the ladder program is completed, the Now receiving window is closed.

If the S10VE is running in temporary run mode and *only for online monitor* mode, the following error message appears. Send the ladder program in online mode to recover temporary run mode to normal run mode.
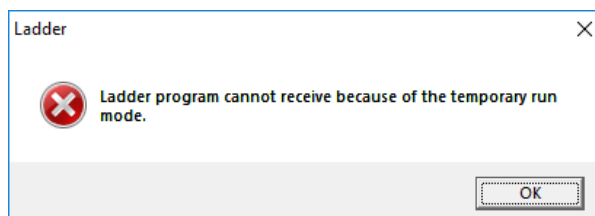
Figure 4-105 Error message for reception in temporary rum mode

4.5.4 Monitoring ladder circuits

You can monitor the status of ladder programs running in the S10VE's memory. The following lists the types of ladder symbols you can monitor. No other types can be monitored.

This ladder circuit monitoring function also supports input/output settings for ladder symbols.

- A-contact: The color of this symbol changes to red when the contact turns on (= 1).
- B-contact: The color of this symbol changes to red when the contact turns off (= 0).
- Rising-edge contact: The color of this symbol changes to red when the contact turns on (= 1).
- Falling-edge contact: The color of this symbol changes to red when the contact turns on (= 1).
- Normal coil: The color of this symbol changes to red when the coil turns on (= 1).
  For timers, counters, and one-shots, their current count values are also displayed.
- Set coil: The color of this symbol changes to red when the set coil turns on (= 1).
- Reset coil: The color of this symbol changes to red when the reset coil turns on (= 1).
- Function: The result of an operation function is displayed in decimal or hexadecimal.

You can change the display color of symbols in the Setup environment window.

<Operation>

[1] From the **Build** menu, click **Start monitoring** (the **Start monitoring** option in the **Build** menu changes to **Stop monitoring**). Alternatively, on the tool bar, click **Start monitoring**.

If the operation of the **Send** or **Receive** option in the **Build** menu has not been performed, the warning message shown in Figure 4-106 appears when the monitoring starts.

If NE0 to NFF coils have not been sent when the ladder is sent, the warning message shown in Figure 4-106 does not appear.
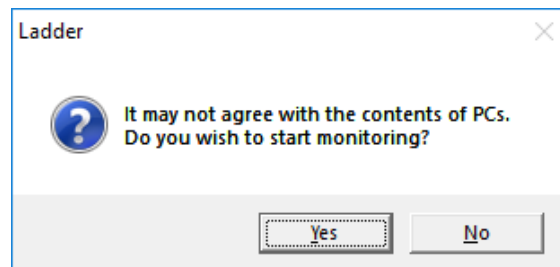
Figure 4-106 Warning message about starting monitoring

Click **Yes** to start monitoring or click **No** if you do not want to start monitoring.

[2] The ladder sheet enters a monitoring state (the background color selected in the Setup environment window is set).
   If NE0 to NFF coils have not been sent, the background color of the ladder sheet is as follows:
   - N00-NDF: Display color for the monitoring state
   - NE0-NFF: Display color for the editing state

[3] If you want to stop monitoring, click **Build**, and then **Stop monitoring** (the **Stop monitoring** option in the **Build** menu changes to **Start monitoring**). Alternatively, on the tool bar, click **Stop monitoring**.

<Switching between display formats>

   You can use the **Display** menu or tool bar to set decimal or hexadecimal for the display format for the result of operation functions. In the **Display** menu, the check box for the currently used display format (**Monitor of decimal** or **Monitor of Hexadecimal**) is selected. In the case of the tool bar, the button for the new display format is displayed. (That is, if the decimal format is used, the tool bar contains the hexadecimal button. If the hexadecimal format is used, the tool bar contains the decimal button.)
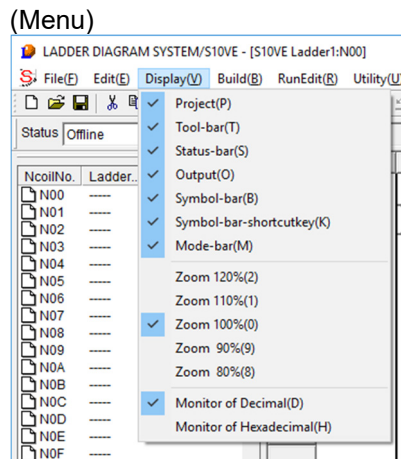
(Menu)

Figure 4-107 Switching the monitoring display format by using the Display menu

(Tool bar)

Monitored values are displayed in hexadecimal.

Figure 4-108 Switching the monitoring display format by using the tool bar

   The default display format is decimal.

The following shows examples of monitoring an operation function.
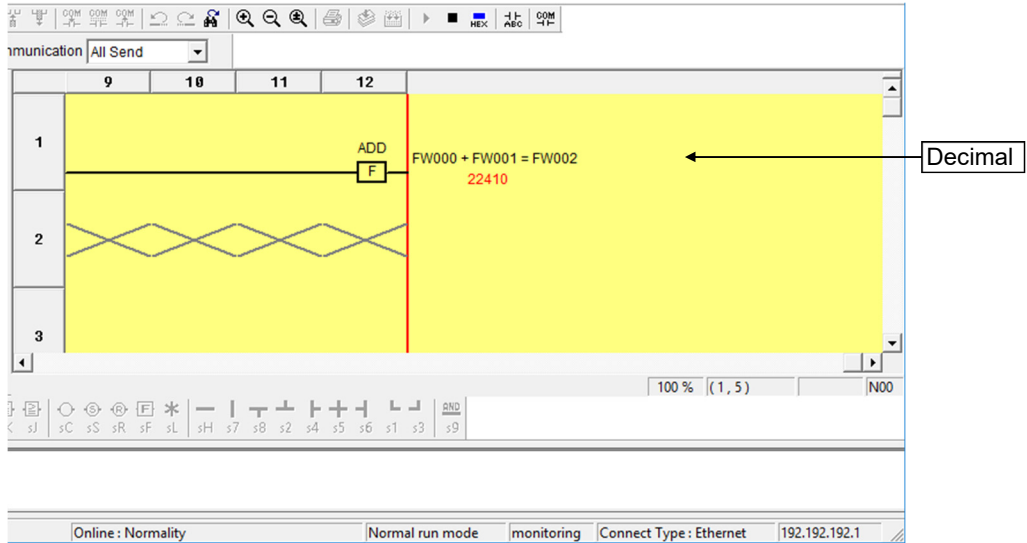
Figure 4-109 Monitoring of a ladder circuit using decimal format
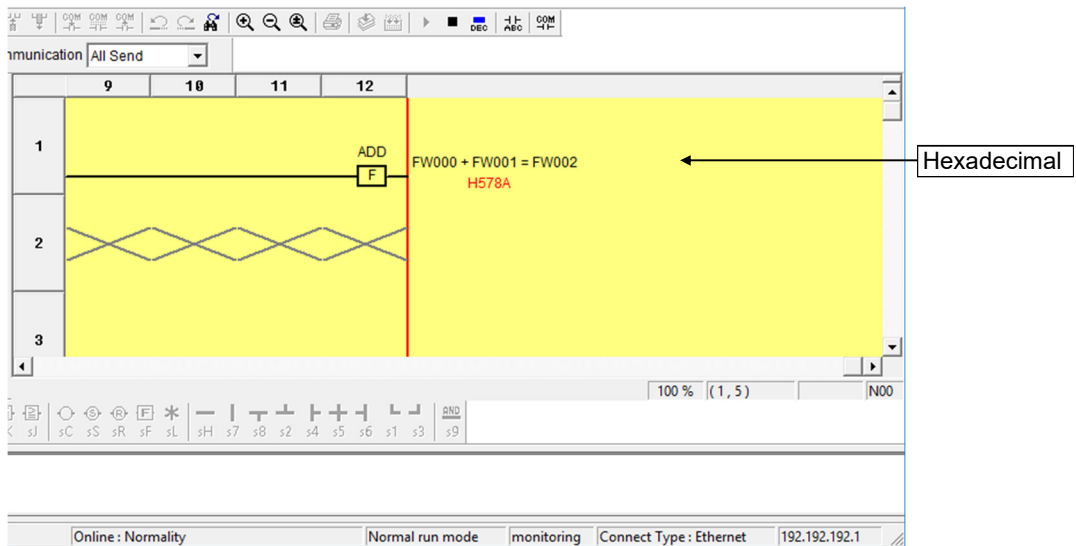
Figure 4-110 Monitoring of a ladder circuit using hexadecimal format

<Input/output settings>

If a ladder sheet is being monitored, you can provide input/output settings for ladder symbols, except for comparison symbols and other symbols using index registers.

The following provides a detailed example of how to specify the input/output settings.

(1) Move the mouse cursor to a ladder symbol for which you wish to specify the input/output settings, and then double-click the symbol. (In the following example, move the mouse cursor to the A-contact X0000, and then double-click.)
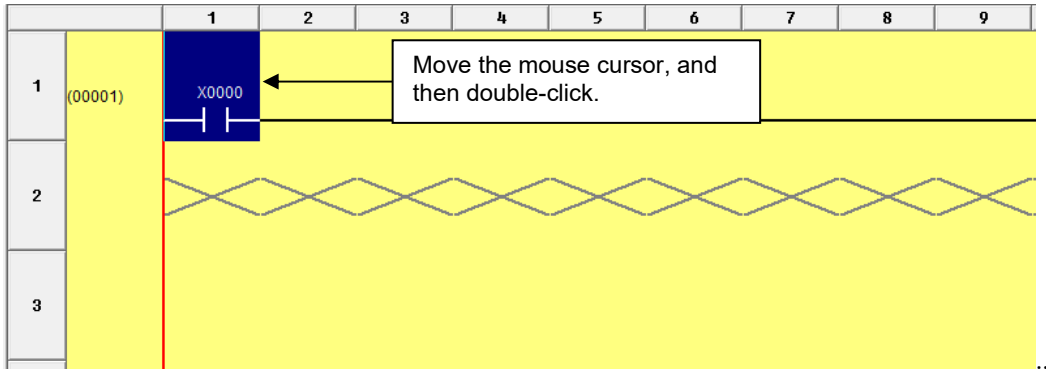
Figure 4-111 Selecting a ladder symbol

(2) The IO Set window (Figure 4-112) appears.
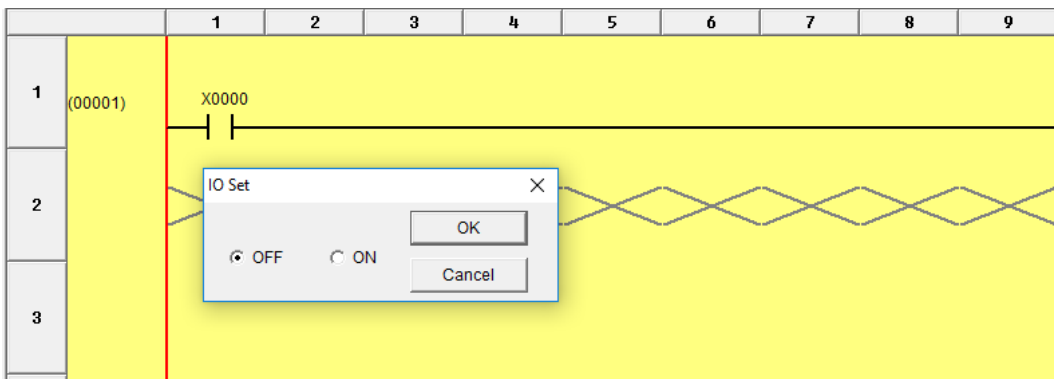
Figure 4-112 IO Set window

(3) In the IO Set window, select the **ON** radio button, and then click the **OK** button to close the IO Set window and turn on the contact (see Figure 4-113).
Clicking the **Cancel** button closes the IO Set window without changing the status of the contact.
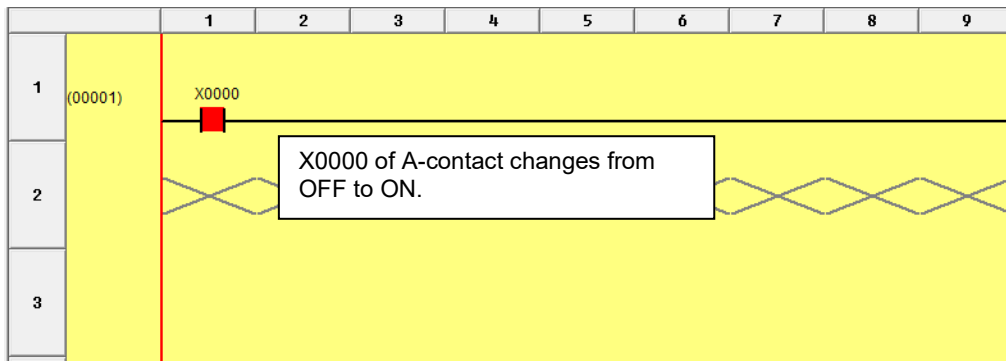
Figure 4-113 Changing the color of the symbol under monitoring

4.6 Ladder sheet run-time editing function

The ladder sheet run-time editing functions are contained in the **RunEdit** pull-down menu.
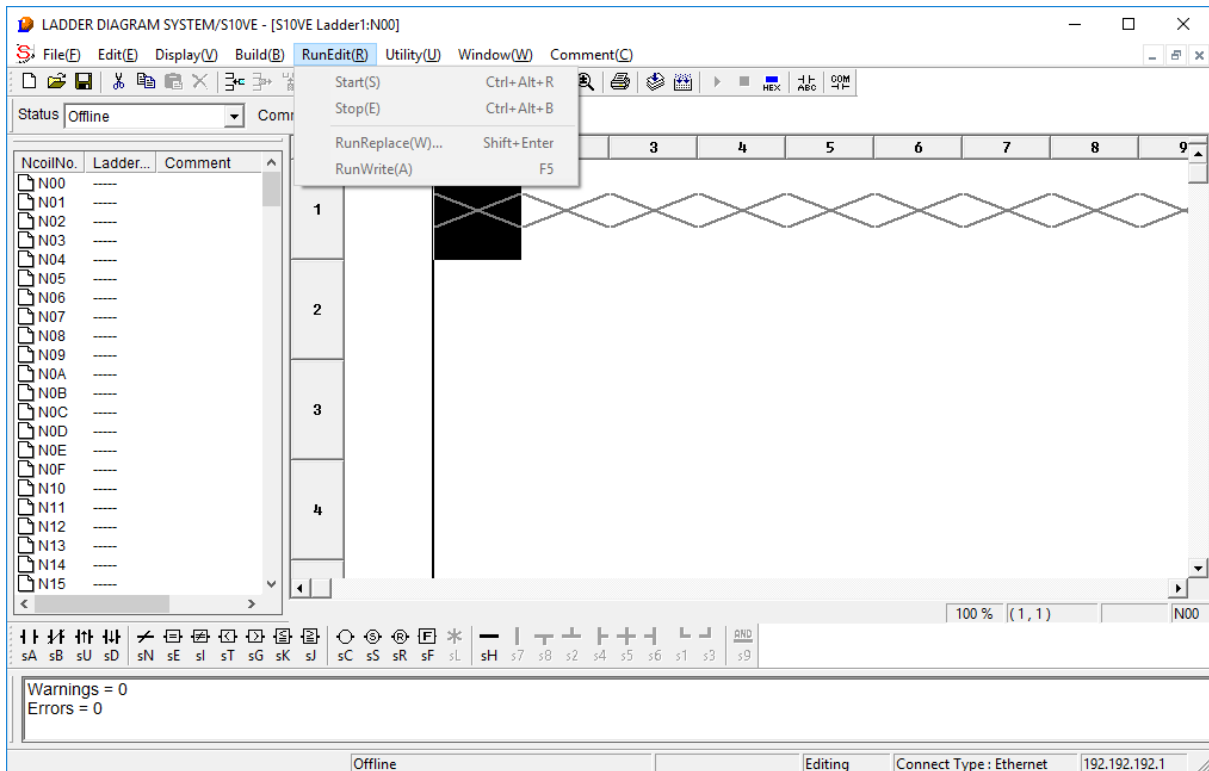
Figure 4-114 Clicking the [RunEdit] menu

The following table lists and describes the run-time editing functions provided in the **RunEdit** menu.

Table 4-19 [RunEdit] menu options

No.	Level 1	Level 2	Level 3	Description
1	**RunEdit**	**Start**		Enters the run-time editing mode.
2		**Stop**		Exits the run-time editing mode.
3		**RunReplace**		Starts the run-time rewriting process.
4		**RunWrite**		Performs the run-time writing process.

Suppose that transmission has started with the **Send NE0-NFF coil** check box cleared in the Sending setup window displayed by selecting **Send** from the **Build** menu. If you attempt to start RunReplace mode, a message appears indicating that rewriting of NE0 to NFF coils is not possible.

However, this message does not appear if 1 step is defined for the area size of NE0 to NFF coils in *4.7.9 Setting PCs edition information*.
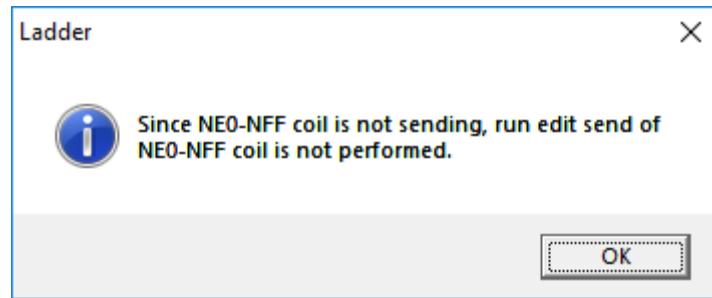
Figure 4-115 Message indicating that rewriting of NE0 to NFF coil is not possible

When the RunReplace mode is started in temporary run mode, the following message (indicating that the ladder program has not been resent) appears, and the RunReplace mode does not become active.
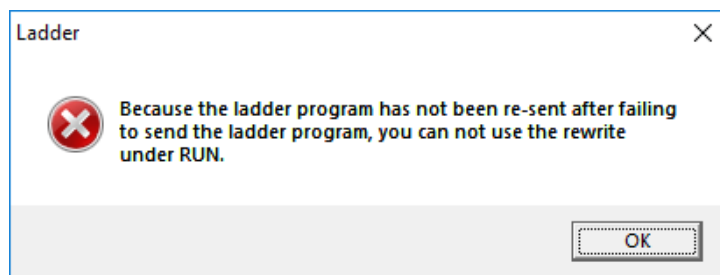
Figure 4-116 Error message indicating that the ladder program has not been resent

The following describes the **RunReplace** and **RunWrite** options of the **RunEdit** menu.

RunReplace: Changes existing symbols (contacts and coils) without stopping the PCs. This option does not support changing of branch instructions and deletion and addition of circuits. If you wish to perform such operations, use the **RunWrite** option.

To change an existing symbol, move the cursor to that symbol, and then click **RunReplace**. The Information(PIO) window appears which allows you to change an existing symbol. Specify the type of new symbol by clicking the symbol button, and then click the **OK** button. The new symbol data will be sent to the PCs.

If NE0 to NFF coils have not been sent by selecting **Build**, and then **Send**, menu operations are disabled if the NE0 to NFF coil sheet is active.
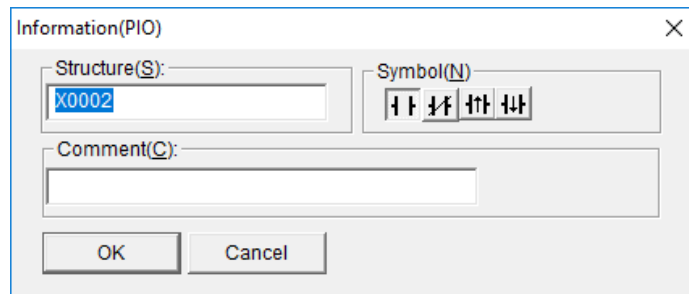
Figure 4-117 Information(PIO) window

RunWrite: Changes branch instructions in an existing circuit, or deletes or add circuits. After altering the circuit, click **RunWrite** from the **RunEdit** menu. The new data will be sent to the PCs (without stopping the PCs).

Before sending information to the PCs, you can select whether to rewrite all N coils (N00 to NFF) or cancel transmission to the PCs depending on the definition of NE0 to NFF coils and whether the coils are edited.

If the area definition of NE0 to NFF coils differs between the PCs and the personal computer, a warning message appears, asking whether you want to continue the RunReplace operation.
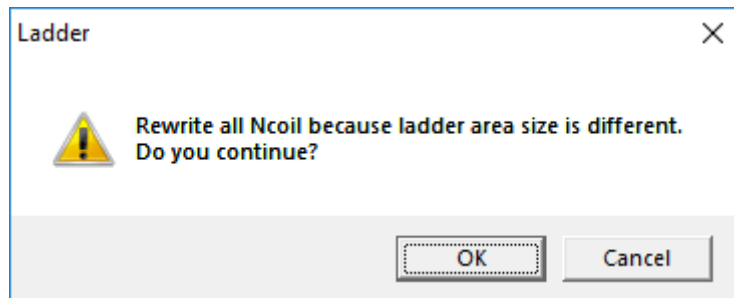
Figure 4-118 Warning message against continuation of RunReplace operation

Clicking the **OK** button rewrites all N coils (N00 to NFF).
Clicking the **Cancel** button does not send data to the PCs.

If the area definition of NE0 to NFF coils is the same between the PCs and the personal computer and those coils are edited, a warning message appears, asking whether you want to rewrite all N coils.
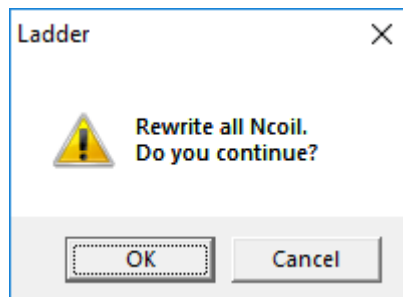
Figure 4-119 Warning message against rewriting of all N coils

Clicking the **OK** button rewrites all N coils (N00 to NFF).
Clicking the **Cancel** button does not send data to the PCs.

The RunReplace function does not rewrite I/O comments.

If the ladder program has not been modified, the following message appears in the output window and the RunWrite function ends successfully.

```
Rewrite succeeded under RUN status.
Since it is the same data as that in PCs, the transmission processing is not performed.( No = 10 )
All instructions count 278 / 524288
Rewrite succeeded under RUN status.
```
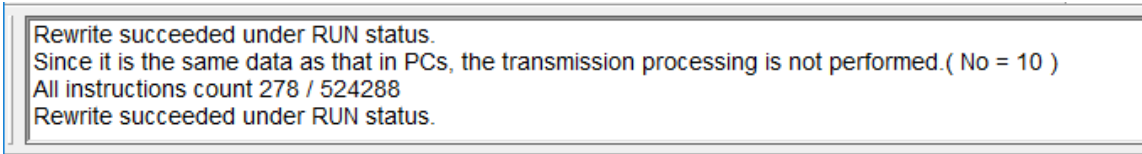
Figure 4-120 Message indicating that transmission is not performed due to data match

When transmission to the PCs starts, the Now sending window appears.
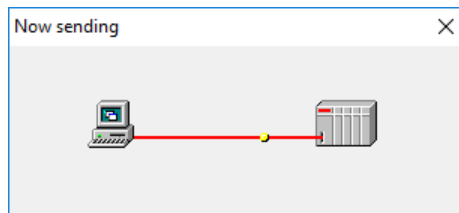
Figure 4-121 Now sending window

If communication fails due to line disconnection or other reasons during transmission of the ladder program, a line error message appears.
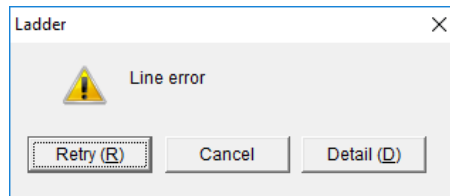
Figure 4-122 Line error message

Revise the connection with the S10VE, and then click the **Retry** button to retry transmission to the PCs. If you click the **Cancel** button, a message indicating a failure in sending the ladder program appears, and transmission to the PCs is aborted. When you redisplay the main window, the run mode has changed to temporary run mode. Furthermore, the RunReplace mode is reset.
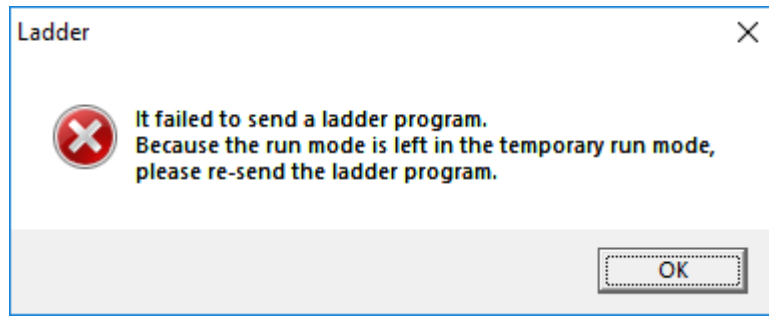
Figure 4-123 Message indicating a failure in sending a ladder program

After the ladder program is sent, if an inconsistency (SUM check error) is found in the ladder program, the message `Ladder Area Sum Mismatch` appears and transmission to the PCs is aborted. Furthermore, the RunReplace mode is reset.
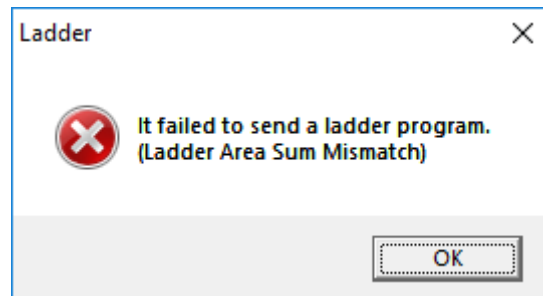
Figure 4-124 [Ladder Area Sum Mismatch] message

After the ladder program is sent, if an attempt to write the ladder program to flash memory fails due to, for example, line disconnection, a line error message appears. Revise the connection with the S10VE, and then click the **Retry** button. If you click the **Cancel** button, a message indicating a failure in rewriting flash memory and a message indicating a failure in sending the ladder program appear, and the transmission is aborted. Furthermore, when you redisplay the main window, the run mode has changed to temporary run mode and the RunReplace mode is reset.
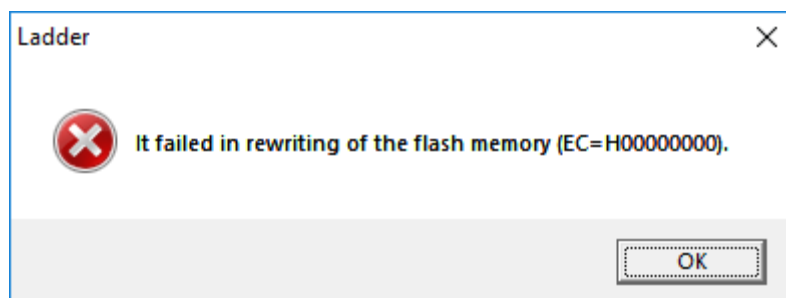
Figure 4-125 Flash-memory rewrite failure message

When the transmission of the ladder program is complete, the Now sending window is closed.

4.7 Ladder sheet utility functions

The ladder sheet utility functions are contained in the **Utility** pull-down menu.
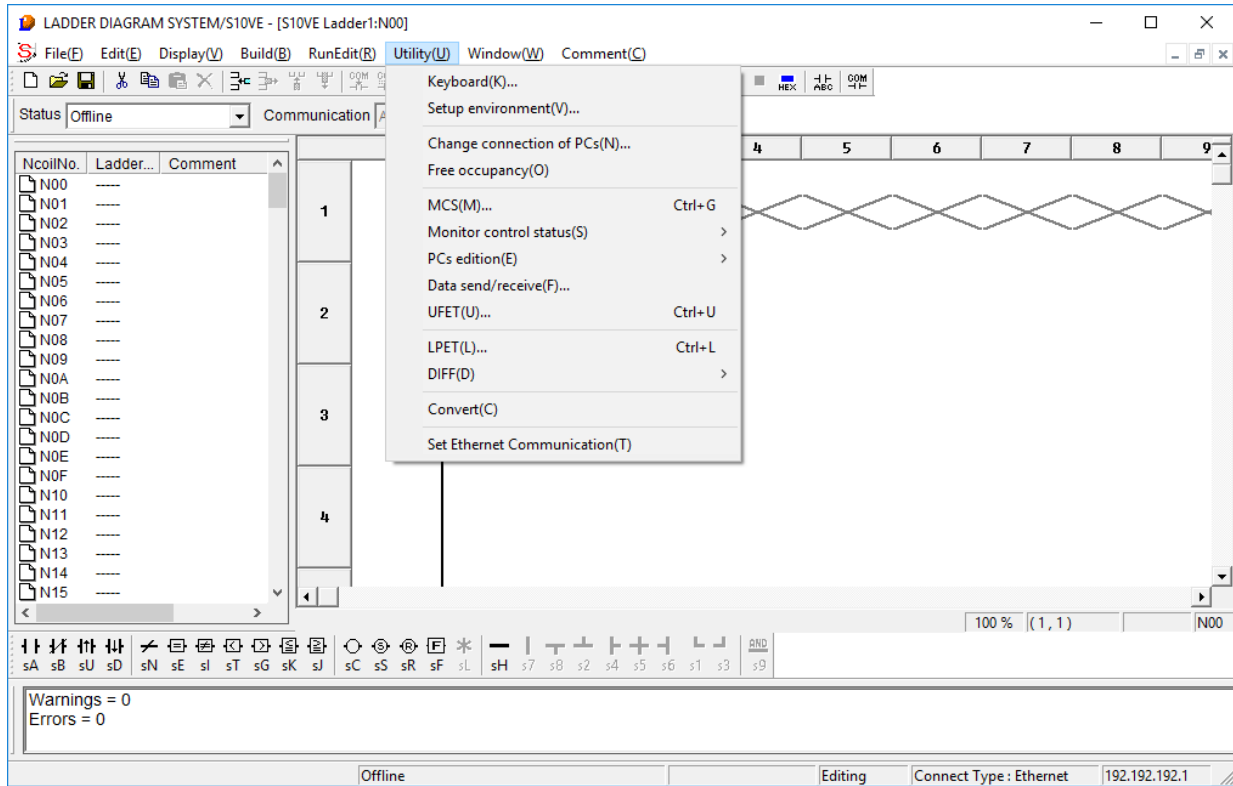
Figure 4-126 Clicking the [Utility] menu

The following table lists and describes the utility functions provided in the **Utility** menu.

Table 4-20 [Utility] menu options

No.	Level 1	Level 2	Level 3	Description
1	**Utility**	**Keyboard**		Sets shortcuts to symbol key inputs.
2		**Setup environment**		Sets display colors for operation states.
3		**Change connection of PCs**		Sets types of communication with the PCs.
4		**Free occupancy**		Forcibly terminates the current exclusive use of the PCs.
5		**MCS**		Reads from or writes to the PCs' memory.
6		**Monitor control status**	**Time chart monitor**	Displays a time chart monitor.
7			**Matrix monitor**	Displays a matrix monitor.
8			**Register monitor**	Displays a register monitor.
9			**Sequence cycle monitor**	Displays a sequence cycle monitor.
10		**PCs edition**	**PCs edition**	Sets operating conditions and environments for operation in the PCs.
11			**Analog counter**	Registers or deletes control data for analog and pulse counters.
12		**Data send/receive**		Sends, receives, and compares data between a file and S10VE or internal memory.
13		**UFET**		Registers or deletes UFET.
14		**LPET**		Displays contents of LPETs.
15		**DIFF**	**Circuit**	Compares ladder diagrams.
16			**Data**	Compares memory data.
17		**Convert**		Converts the S10V ladder program to a program for use by the S10VE.
18		**Set Ethernet Communication**		Displays the Ethernet Communication Setting List window to show the list of parameter information in Ethernet communication system functions.

4.7.1 Keyboard

This option displays the Customize the key position of symbol window in which you can set shortcut keys for symbol key input.
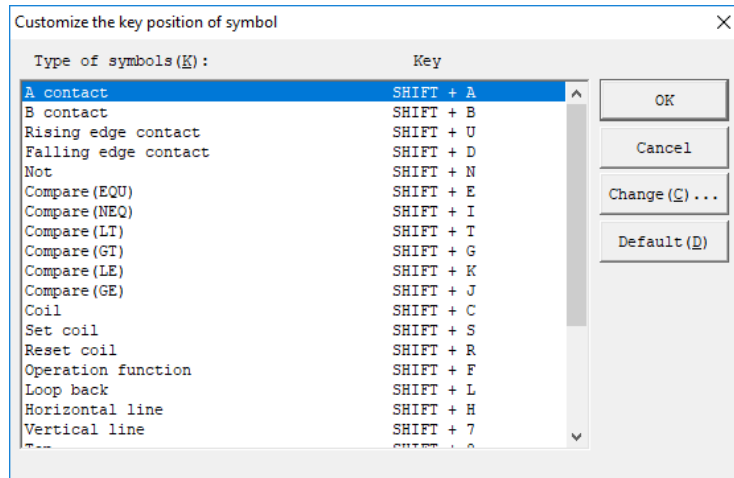
Figure 4-127 Customize the key position of symbol window

Click the **Change** button to open the Setup key window. In this window, change the allocation of shortcut keys. Clicking the **OK** button applies the settings and changes the indication of shortcut keys on the symbol bar.

<Setting shortcut keys>

Set the cursor at the **Key code** box, and then press the key to be a shortcut key.
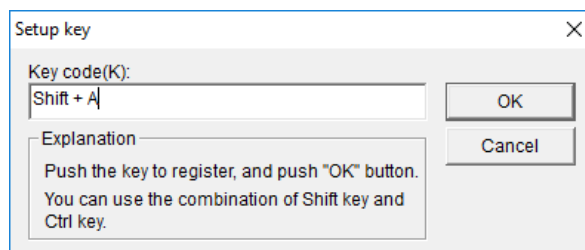
Figure 4-128 Setup key window

Clicking the OK button applies the allocation of shortcut keys to the Customize the key position of symbol window.

The following lists abbreviations displayed on the symbol bar and shortcut key types that can be set.

No abbreviation: Alphanumeric characters and function keys

s: Shift + alphanumeric characters and function keys

c: Ctrl + alphanumeric characters and function keys

cs: Ctrl + Shift + alphanumeric characters and function keys

n: Ten-key numbers

cn: Ctrl + ten-key numbers

4.7.2 Setup environment

The Setup environment window appears by default when the Environment window is displayed or when the **View** tab is clicked in the Environment window. The Setup environment window allows you to set and change the display colors that indicate system operating status as follows:

- **Sheet in edit**: Background color indicating that displayed data might be different from PCs memory data
- **Sheet after send or receive**: Background color indicating that displayed data matches PCs memory data
- **Sheet in monitor**: Background color indicating that monitoring is in progress
- **Sheet in monitor ON**: Color of the ladder symbol in ON state during monitoring and common line
- **Comment**: Color of displayed comment
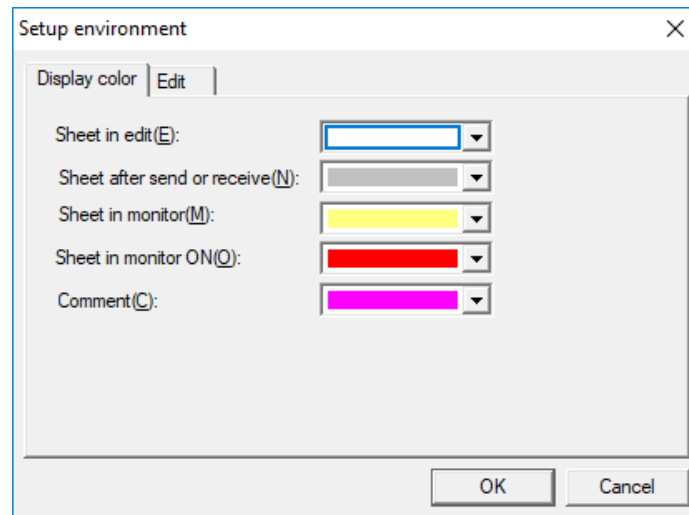
Figure 4-129 Setup environment (Display Color) window

<Setup environment window (**Edit** tab)>

The following window is displayed by default when the Environment window is displayed or when the **Edit** tab is clicked in the Environment window. This window allows you to set display colors of ladder sheets and other colors.
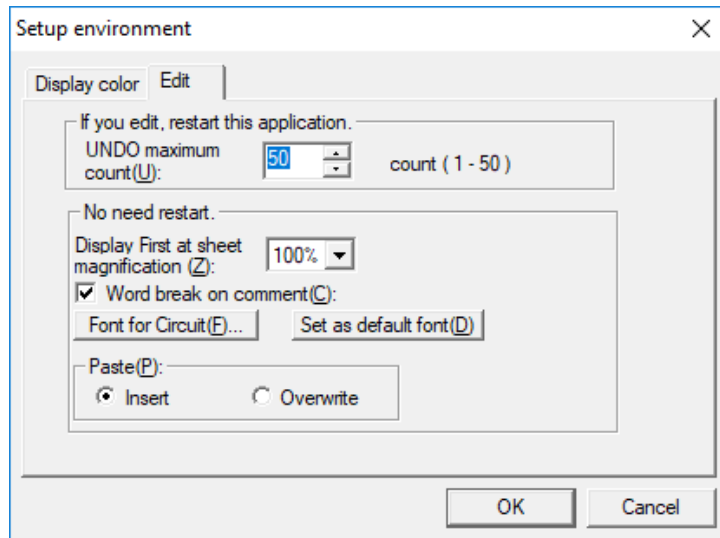
Figure 4-130 Setup environment (Edit) window

[If you edit, restart this application.]

This setting takes effect after the ladder diagram system restarts. Edit this setting and then restart the ladder program.

- **UNDO maximum count**: Enter the memory count (1 to 50) when using the Undo function during editing.

[No need restart.]

The following settings take effect immediately after this window closes:

- **Display First at sheet magnification**: From the pull-down menu, select the display magnification of the circuit diagram at system startup.
- **Word break on comment**: Specify whether to use word break for comment display.
- Font of circuit diagram: Set the display font of register names in circuit diagrams and comments.

  This system is developed based on the following fonts.

  Japanese version:

    Circuit display: MS Gothic, Regular, 9 point

    Print characters: MS Gothic, Regular, 10 point

  English version:

    Circuit display: Arial, Regular, 9 point

    Print characters: Courier New, Regular, 10 point

The following describes the relationship between word break and specified fonts.

- Comment display area
- Without word break: 16-character display: 8 halfwidth characters of the default font can be displayed up to 2 lines.

  32-character display: 12 halfwidth characters of the default font can be displayed up to 3 lines.

- With word break: All characters that can be displayed in the display area calculated with the default character are displayed.

  Therefore, the number of displayable characters is variable.

- If words in a comment do not fall within a line
- Without word break: A word can be displayed in two lines.
- With word break: The relevant word is displayed at the beginning of the next line.
- In case a font that cannot be displayed in a single-line display area is specified
- Without word break: Undisplayable part is ignored (hidden).
- With word break: Overflowing part is moved to the next line and is displayed.

  Small fonts are left justified and displayed.

Word break specification is valid only for comments and is not applied to register names. Therefore, if a specified font does not fall within the display area, characters might be missing.

[Paste]

Specify the mode to be used for the paste operation when editing a program. The default mode is **Insert**.

You can change the mode setting in this dialog box or by pressing the **Insert** key.

This setting takes effect immediately after being set.

The overwrite mode set here will be displayed on the status bar of the N coil window.

4.7.3 Forcibly terminating the exclusive use of PCs

If a connection with the PCs being exclusively used by your ladder diagram system is terminated abruptly, the exclusive use might continue. In such a case, none of the PCs can establish a connection with any other personal computer. To solve this problem, you can use a function for forcibly terminating the exclusive use of the PCs.

- This forcible termination function can also be applied to the PCs being exclusively used by another user. In this case, the user of the PCs will not be informed that the exclusive use of the PCs is terminated. In this situation, multiple accesses might be made to the same PCs depending on network and PCs operations. To prevent this problem, before using the forcible termination function, make sure that no other users are using the PCs by checking warning messages.
- When the ladder diagram system is running online with the PCs, you might change **PCs edition** settings (by selecting **Utility**, and then **PCs edition**) or **Analog counter** settings. After that, if you send a ladder program created in offline mode, the new settings are overwritten with the settings that were specified during offline operation. This is because the PCs edition settings are contained in the ladder program. When such overwriting occurs, you have to specify the settings again in online mode.

4.7.4 MCS

The MCS window allows you to read or write data by specifying addresses or PI/O symbols. As shown in the following table, the source of reading, the destination of writing, and the range of accessible addresses vary depending on the status of data communication.

Communication status	Source of reading or destination of writing	Range of accessible addresses	Remarks
Online Only for online monitor	PCs memory	/0000 0000 to /7FFF FFFE	From the beginning to the end of S10 space
Offline	Personal computer's internal memory	/0010 0000 to /007F FFFE /7800 0000 to /7BFF FFFE	EQ-RAM to PIORAM(BIT) From the beginning to the end of LADDER space

<Operation>

(1) Displaying memory contents

[1] From the **Utility** menu of the ladder diagram sheet, click **MCS**.

[2] The MCS window appears as shown in Figure 4-131.
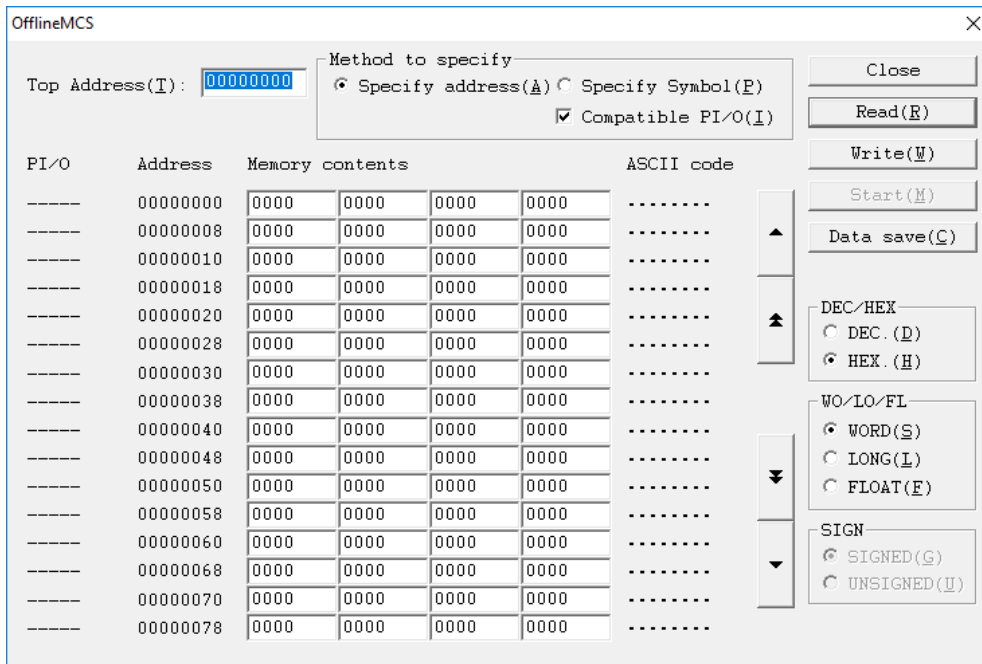
Figure 4-131 MCS window

[3] Select one of the following options as the method of specifying the beginning of a memory area to be accessed.

Specify address: Specify the beginning of a memory area by using an address.

Specify Symbol: Specify the beginning of a memory area by using a PI/O symbol (register name). The default is **Specify address**.

■ Compatible PI/O check box

Select this check box to specify S10mini compatible addresses, or clear this check box to specify S10V/S10VE extension addresses.

For registers, PI/O names are displayed with both S10mini compatible addresses and S10V/S10VE extension addresses irrespective of whether the **Compatible PI/O** check box is selected. Example: Register J000 is displayed with addresses 0x202000 and 0xA2000.

[4] In the **Top Address** text box, enter the desired address or PI/O register name, and then click the **Read** button. Then, the data for 64 consecutive words are read from the memory, starting from the specified address or PI/O register, and displayed in the dialog box. You can also change the beginning of data by clicking the scroll button.

You can change the display format of the displayed content values by selecting one of the following radio buttons.

■ **DEC/HEX** group box

DEC.:   Displays the requested data contents in decimal format.

HEX.:   Displays the requested data contents in hexadecimal format (selected by default).

This group box is enabled only when either **WORD** or **LONG** is selected in the **WO/LO/FL** group box.

■ **WO/LO/FL** group box

WORD: Displays the requested data contents in units of words (two bytes long each) (selected by default).

LONG: Displays the requested data contents in units of long words (four bytes long each).

FLOAT: Displays the requested data contents in single-precision floating-point format

■ **SIGN** group box

SIGNED: Displays the requested data contents in signed number format (selected by default).

UNSIGNED: Displays the requested data contents in unsigned number format.

This group box is enabled only when both of the following conditions are met: **WORD** or **LONG** is selected in the **WO/LO/FL** group box, and **DEC.** is selected in the **DEC/HEX** group box.

(2) Editing memory contents

[1] In the **Top Address** box, enter the desired starting address or PI/O register whose memory content you want to change, and then click the **Read** button.

[2] Select the data format used to change the memory contents.

■ **DEC/HEX** group box
DEC.:   Changes the contents to specified values in decimal format.
HEX.:   Changes the contents to specified values in hexadecimal format.
This group box is enabled only when **WORD** or **LONG** is selected in the **WO/LO/FL** group box.

■ **WO/LO/FL** group box
WORD: Changes the contents to specified values in units of words (two bytes long each) (selected by default).
LONG: Changes the contents to specified values in units of long words (four bytes long **each**).
FLOAT: Changes the contents to specified values in single-precision floating-point format.

■ **SIGN** group box
SIGNED: Changes the contents to specified values in signed number format.
UNSIGNED: Changes the contents to specified values in unsigned number format.
This group box is enabled only when both of the following conditions are met: **WORD** or **LONG** is selected in the **WO/LO/FL** group box, and **DEC.** is selected in the **DEC/HEX** group box.

[3] Under **Memory contents**, click the desired input box whose content you want to change, enter a new value in the input box (focus position), and then press the **Tab** or **Enter** key. The contents of memory indicated by the focus position are rewritten with the entered values.
Note that, if you use any means other than the **Tab** and **Enter** keys (for example, the mouse or a shortcut key), memory contents in the focus position cannot be rewritten.
Clicking the **Write** button rewrites all of the displayed memory contents (a total of 128 bytes).
However, if the data communication status is online and the CPU module's LADDER switch is set to RUN (RUN LED is lit), clicking **Write** causes the following message dialog box to appear.
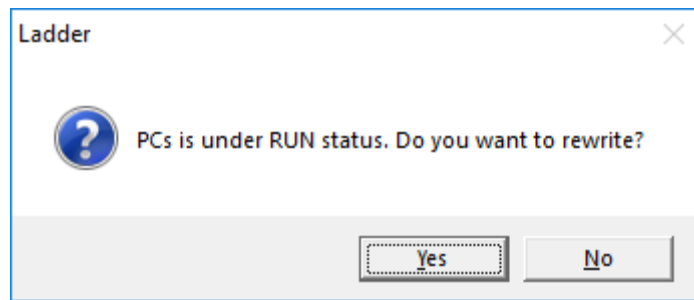
Figure 4-132 Message indicating that PCs are in the RUN state

In this message dialog box, click the **Yes** or **No** button.

Yes: Rewrites all the displayed memory contents with the entered values.

No: Does not rewrite values.

- In *only for online monitor* mode, you can neither edit nor rewrite the displayed memory contents by using the MCS window.
- If TUC set values are rewritten with new values in online mode, the result will also be applied to the backup area of TUC set values. For details about TUC set values, see *4.3.7 Listing and editing TUC set values*.

---

(3)   Displaying memory contents for monitoring purposes

This function is not available when the status of data communication is offline (the **Start** button is grayed out).

The monitoring interval is about 50 ms.

[1] In the **Top Address** box, enter the desired starting address or PI/O register whose memory content you want to monitor, and then click the **Start** button. When monitoring starts, the **Start** button changes to the **Stop** button. During the monitoring, the displayed memory content changes dynamically.

[2] To stop the monitoring, click the **Stop** button. When the monitoring stops, the **Stop** button changes to the **Start** button.

(4)   Saving the displayed memory contents

You can save the displayed memory contents to a file in text format.

[1] In the **Top Address** box, enter the desired starting address or PI/O register whose memory content you want to save, and then click the **Read** button. (Skip this step if the desired memory contents are already displayed.)

[2] Click the **Data save** button. The Save As window appears as shown in Figure 4-133.
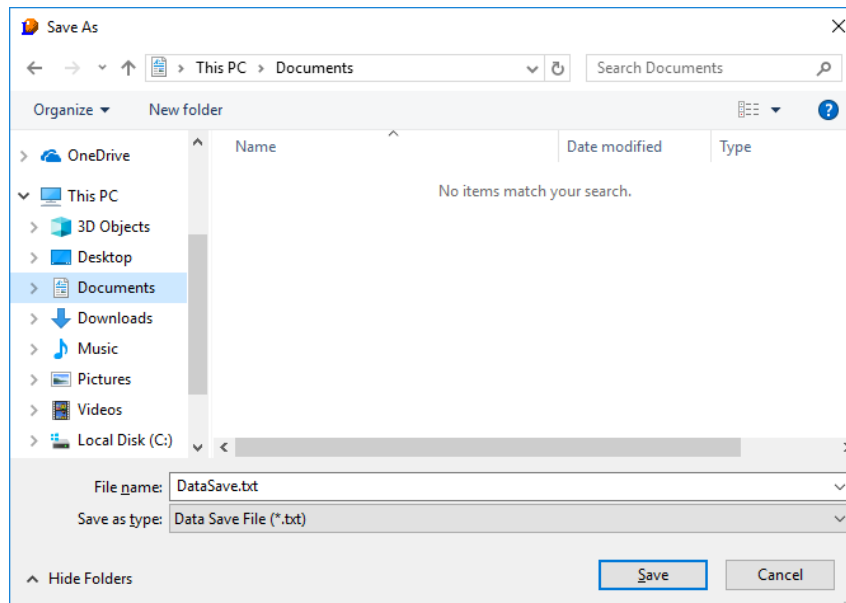
Figure 4-133 Save As window

[3] In the Save As window, enter a file name, which is `DataSave.txt` by default. If you want to use the default file name, skip this step.

[4] In the Save As window, click the **Save** button. The displayed memory contents will be saved to the specified file in text format as shown in Figure 4-134.

If you do not want to save the memory contents, click the **Cancel** button.

```
HEX, WORD, UNSIGNED
PI/O       address     Memory contents              ascii
XW0000     00441000    1234   5678   9ABC   0000    .4Vx....
XW0040     00441008    0000   0000   0000   0000    ........
XW0080     00441010    0000   0000   0000   0000    ........



XW0340     00441068    0000   0000   0000   0000    ........
XW0380     00441070    0000   0000   0000   0000    ........
XW03C0     00441078    0000   0000   0000   0000    ........
```

Figure 4-134 Example of memory contents saved when XW0000 is specified as the starting address

4.7.5 Time chart monitor

The time chart monitor function displays the ON and OFF states of PI/O registers with a time chart.

When this function is activated, the special menu window and the tool bar for time charts are displayed.

You can set monitor items and start and stop monitoring from this menu.

Table 4-21 [Time Chart Monitor] menu items

No.	Level 1	Level 2	Level 3	Description
1	**File**	**Open**		Displays the Open window to load the existing time chart monitor file (`*.tim`), and then displays it in the Time chart monitor window.
2		**Save**		Saves the current time chart monitor data in the previous file.
3		**Save As**		Displays the Save As window to save the current time chart monitor data in the time chart monitor file (`*.tim`).
4		**Close**		Terminates the time chart monitor.
5	**Display**	**Tool bar**		Specifies whether to show or hide the tool bar (consisting of monitor start, stop, monitor setting, and clear icons).
6		**Status bar**		Specifies whether to show or hide the status bar (containing the execution state, PCs state, and sampling time).
7	**Monitor**	**Start**		Starts monitoring.
8		**Stop**		Stops monitoring.
9		**Clear**		Clears the time chart monitor window.
10		**Monitor setting**		Displays the Setup window to set monitoring targets and sampling time.

<Operation (online)>

[1] Select **Utility**, **Monitor control status**, and then **Time chart monitor**.
   The Time chart monitor window appears.
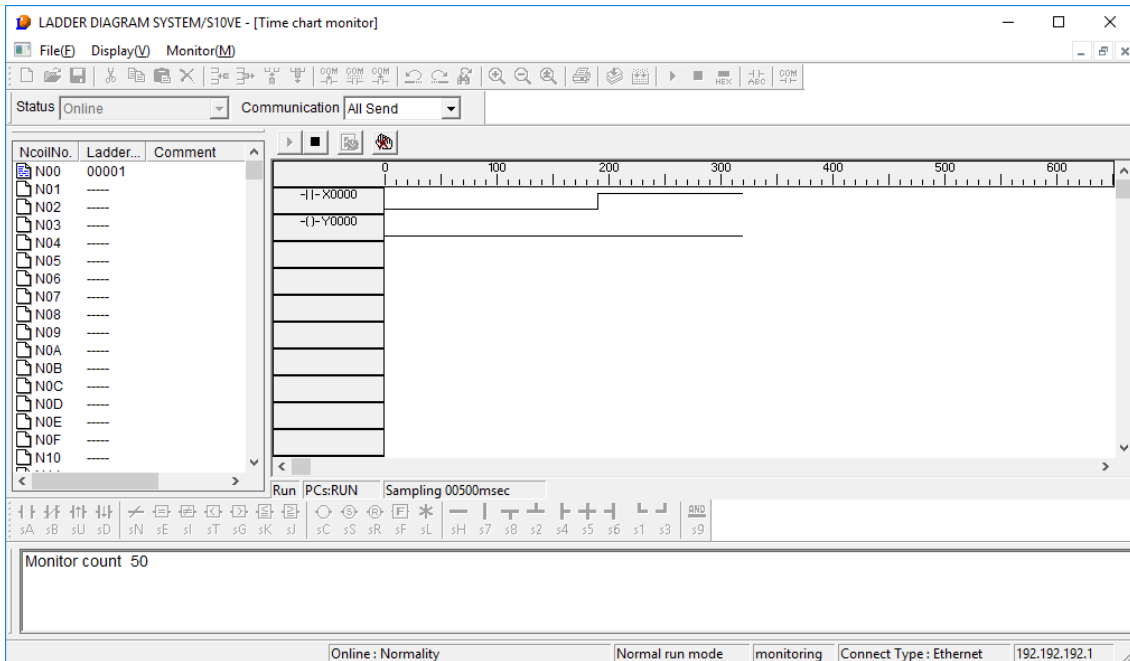
Figure 4-135 Time chart monitor window

[2] Select **Monitor**, and then **Monitor setting**. The Setup window appears.
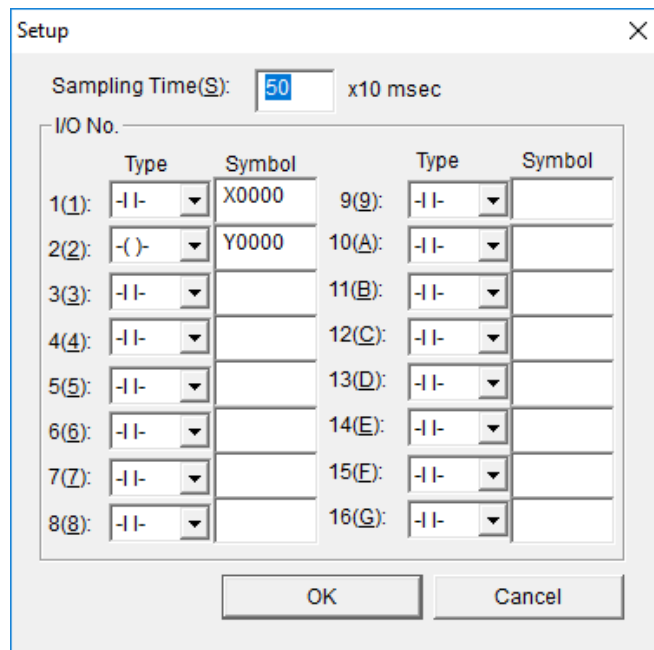
Figure 4-136 Setup window

Set the items to be monitored, and then click the **OK** button.

For **Sampling Time**, set 100 or larger. If you set a value less than 100, the actual monitoring operates at 100-ms intervals or longer.

[3] Select **Monitor**, and then **Start** to start monitoring.

To stop monitoring, select **Monitor**, and then **Stop**.

[4] To monitor an existing file, select **File**, and then **Open**. In the Open window that appears, specify the file to be displayed, and then click the **Open** button.
- Folder (directory) that contains the file
- File (`*.tim`) to be read

[5] To save the monitoring target currently displayed, select **File**, and then **Save**. If the monitoring target has not been saved, a message appears asking you whether you want to save the time chart monitor data. To save it, click the **Yes** button.

<Operation (offline)>

Select **Utility**, **Monitor control status**, and then **Time chart monitor**. You can only display and save the time chart file in offline mode.

In the Open window that appears, specify the file to be displayed, and then click the **Open** button.

• Folder (directory) that contains the file

• File (`*.tim`) to be read

- The monitoring cycle might not be accurate due to influence by the hardware and software of your personal computer. (Treat the monitoring cycle as a reference value.)
- Time chart monitoring automatically stops while the PCs is in the STOP state and automatically restarts when the PCs enters the RUN state.
- The time chart monitor function can monitor a maximum of 16 points.
- Note that an error occurs if an invalid symbol is set.
- The time chart monitor function can start concurrently with the circuit monitor function.
- Values of the machine can be monitored in online or *only for online monitor* mode.
- File processing functions are available only while monitoring is stopped.
- The extension of a time chart monitor file is always `****.tim`.
- When you open an existing time chart monitor file, all monitoring results are displayed beginning from 0.

4.7.6 Matrix monitor

The matrix monitor function displays and monitors a list of ON and OFF states of PI/O registers.

<Operation>

(1) Monitoring operation

[1] Select **Utility**, **Monitor control status**, and then **Matrix monitor**.
The Matrix Monitor window appears.
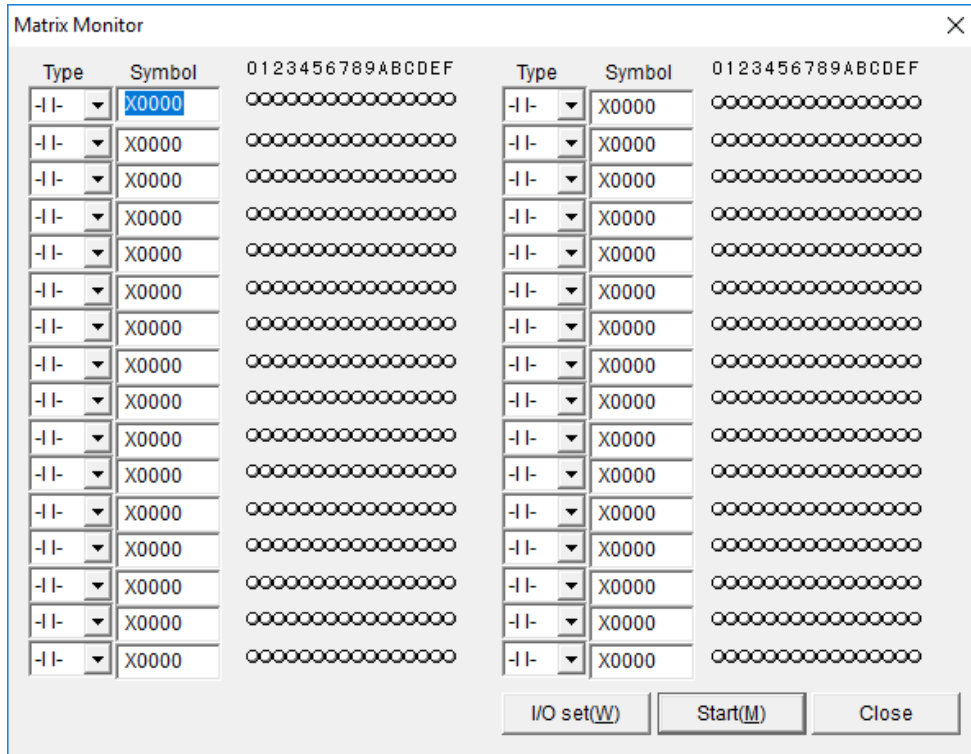
Figure 4-137 Matrix Monitor window

[2] Specify the type and register name.

[3] Click the **Start** button.
The ON state of the specified register is shown in red, and OFF state is shown in white.
To stop monitoring, click the **Stop** button.

(2)   Input/output setting

[1] Move the cursor to the register name you want to set.

[2] Click the **I/O set** button.

[3] The IO Set window (Figure 4-138) appears. Click the bit buttons (0 to F) you want to set.
You can move the cursor over the bit buttons (0 to F) by pressing the **Tab** key. You can also switch between the ON and OFF states by pressing the **Space** key.

```
IO Set                                        ×
 ┌ Bit write ─────────────────────
 │ PIO name :   X0000
 │  0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
 │
 │              ┌──────────┐
 │              │  Close   │
 │              └──────────┘
```
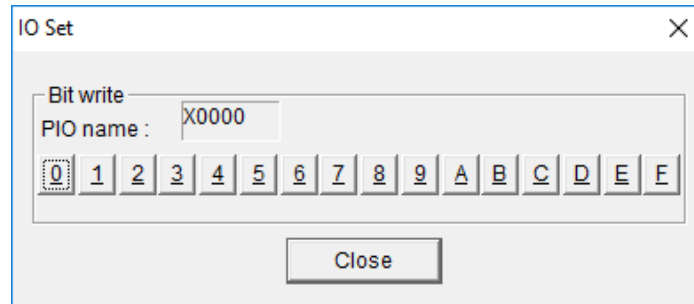
Figure 4-138 IO Set window

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

- If the lowest bit of a register name is 1 to F, it is automatically corrected to 0.
  Example: If X0FFF is specified, it is corrected to X0FF0.
- You cannot specify the word, longword, or float type.
- The matrix monitor function can start concurrently with the circuit monitor function.
- This function is available only in online mode.

4.7.7 Register monitor

The register monitor function displays and monitors a list of ON and OFF states of PI/O registers.

<Operation>

(1) Monitoring operation
   [1] Select **Utility**, **Monitor control status**, and then **Register monitor**.
        The Register monitor window opens.
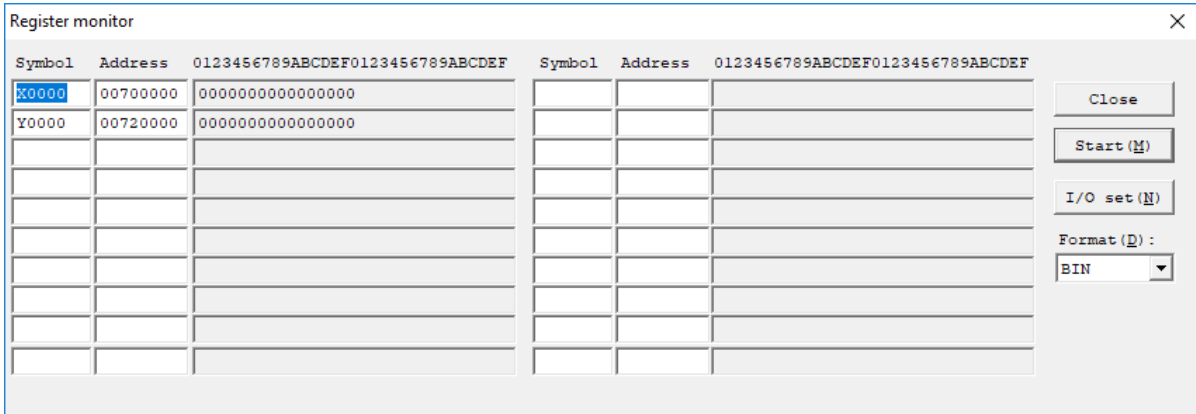
Figure 4-139 Register monitor window

   [2] Specify the symbol you want to monitor in the PI/O item.

   [3] Click the **Start** button.
        The ON state and OFF state of the specified PI/O registers are shown as 0 and 1, respectively.
        To stop monitoring, click the **Stop** button.

   [4] To modify the value of the specified symbol, click the **I/O set** button. The numeric value box is made available and the **I/O set** button changes to the **Write** button. After a numeric value has been modified, click the **Write** button to write the value. After a value has been written, the numeric value box changes to a read-only box and the **Write** button reverts to the **I/O set** button.
        When the **Write** button is clicked while the PCs are in the RUN state, the following warning message appears.
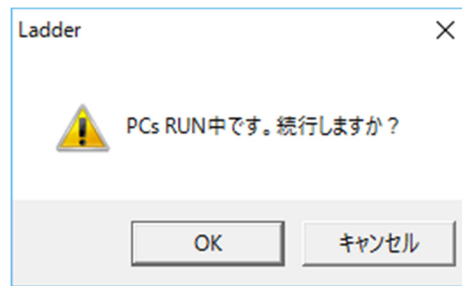
Figure 4-140 Warning message indicating that PCs are in the RUN state

Clicking the **OK** button writes numeric values.
If you click the **Cancel** button, no value is written and the numeric value box changes to a read-only box and the **Write** button reverts to the **I/O set** button. At this time, the value modified in the numeric value box reverts to the previous value.

- If you want to display PI/O in units of 16 points, specify word.
  Example: For X0000 to X000F, specify XW0000.
- You can change the data display format to binary, decimal, or hexadecimal.
- The register monitor function can start concurrently with the circuit monitor or time chart monitor function.
- The register monitor function can monitor addresses to which no PI/O is allocated. This makes it possible to specify a longword-type register over the PI/O boundary. (Example: XLFFF0, which contains specification of XWFFF0 and YW0000)

4.7.8 Monitoring the sequence cycle of ladder programs

The sequence cycle of a ladder program can be monitored by using the sequence cycle monitoring function. This monitoring function allows you to specify log collection intervals and the number of times of log collection. According to these specifications, the function collects sequence cycle times for the ladder program and displays them in a graph. The function also allows you to save the collected cycle times in a file on the personal computer.

<Operation procedure>

[1] From the **Utility** menu, click **Monitor control status**, and then **Sequence cycle monitor**.

[2] The Sequence cycle monitor window (Figure 4-141) appears.
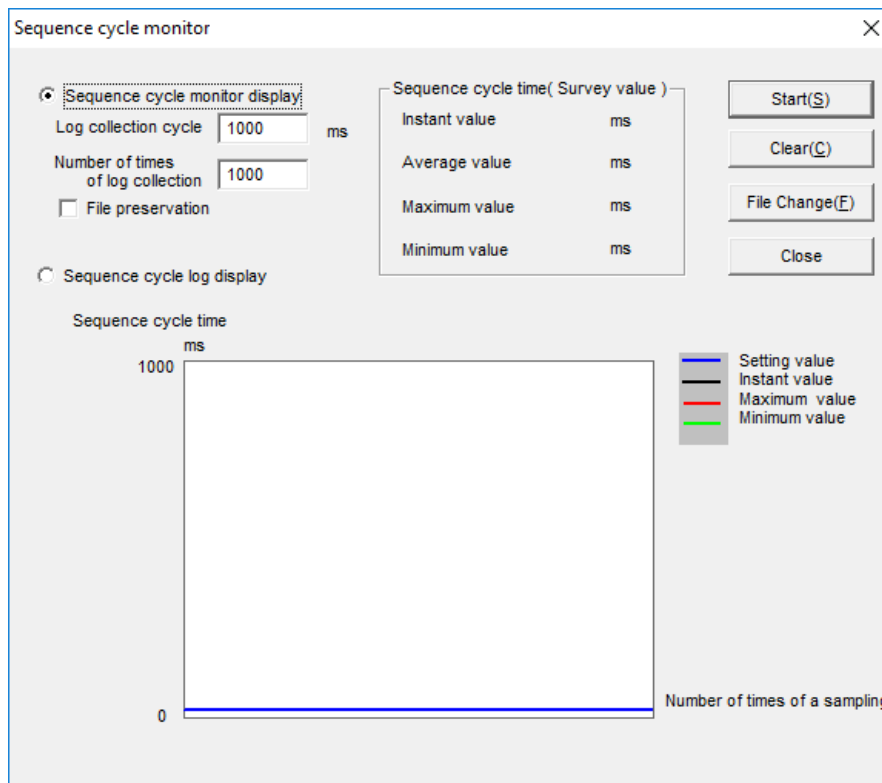
Figure 4-141 Sequence cycle monitor window

[3] Enter the log collection cycle in the range from 100 to 30000 (milliseconds) and the number of times of log collection in the range from 0 to 30000. The defaults of both items are 1000. If 0 is entered as the number of times of log collection, the monitoring function does not perform cycle time collection.
To save the collected cycle times in a file, select the **File preservation** check box before you start collecting cycle times. (If you select the check box after completion of a cycle time collection, no collected cycle times will be saved in a file.)

If a file name for saving the collected cycle times has not been specified, the Open dialog box (Figure 4-142) appears. Enter a file name.
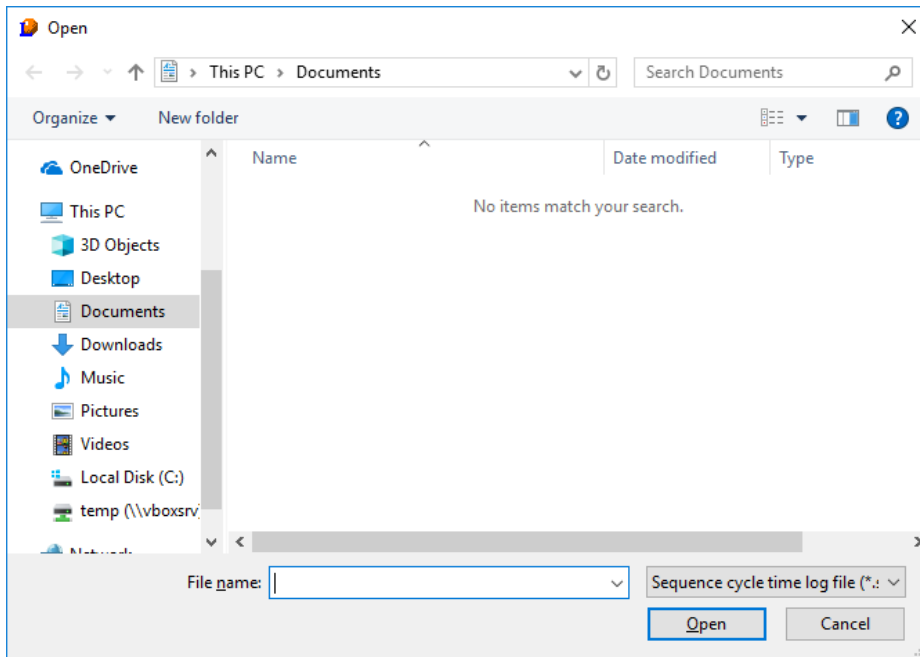
Figure 4-142 Open dialog box

If no file name is specified, the collected cycle times will not be saved.

[4] Click the **Start** button. Cycle time collection starts and the **Start** button changes to the **Stop** button. If you wish to discontinue the cycle time collection in process, click the **Stop** button (the cycle times collected by this time will not be saved even if the **File preservation** check box has been checked).

[5] When the collection is completed, the following message dialog box appears.
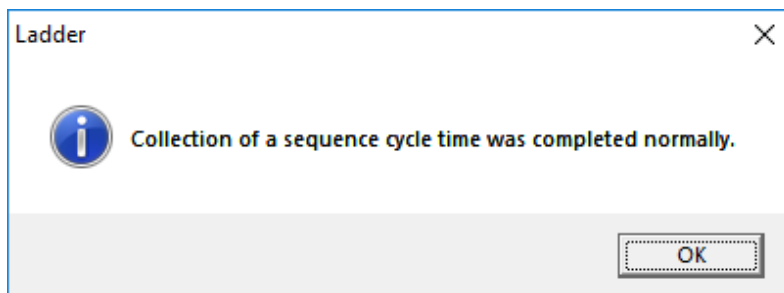
Figure 4-143 Message indicating successful termination of sequence cycle time collection

<Changing the file name to be saved>
  If you wish to change the name of the file where the collected cycle times are to be saved, you must do so before collection starts. To change the file name, click the **File Change** button, and then enter the new file name in the Open dialog box that appears.

<Displaying the sequence cycle times saved in a file>
  To display the sequence cycle times saved in a file, click the **Sequence cycle log display** radio button in the Sequence cycle monitor window. In the Open dialog box that appears, select the file in which the collected cycle times have been saved. Then, the data in the selected file appears in the Sequence cycle monitor window.

<Clearing the graph being displayed>
  To clear the sequence cycle time graph currently displayed, click the **Clear** button. However, this does not clear the set values for the graph and the values (**Instant value**, **Average value**, **Maximum value**, and **Minimum value**) in the **Sequence cycle time** group box.

- In the Sequence cycle monitor window, the **Sequence cycle time** group box contains the average, maximum, and minimum values collected since the ladder program started running, not the values collected after collection of sequence cycle times has started.
- No sequence cycle times can be collected when the ladder diagram system is running in offline mode (however, the collected cycle times saved in a file can be displayed in offline mode). If you wish to start collecting sequence cycle times, you need to place the system in online mode.

4.7.9 Setting PCs edition information

You can set or change PCs edition information in the PCs edition window. To create a new ladder program, first display the PCs edition window in offline mode. Then, in the **Area size** group box, specify the sizes in the **Ladder program**, **I/O comment**, and **User function** boxes. If you do not need to register I/O comments or user functions, you can use the default values.

Figure 4-144 PCs edition window

<Operation>

[1] From the **Utility** menu, click **PCs edition**, and then **PCs edition**.

[2] The PCs edition window appears.
   If this window is displayed in offline mode, the values displayed for individual items are the defaults.
   If the window is displayed in online mode, the values displayed for individual items appear as the PCs edition information set in the S10VE.

[3] Set individual items in the window, and then click the **OK** button. The set values are registered immediately. However, if the ladder diagram system is running in offline mode, these values are not registered to the S10VE until the ladder program is sent.

<Items>

Ladder System Area
Indicates the size of the space (in steps) used in the ladder program storage area and the size of free space (in steps) in that area.

PCs
Indicates the version number (Ver) and revision number (Rev) of the operating system (OS) running on the CPU module. These numbers are valid only in online mode.

PCs-No.
Indicates the decimal PCs number set in the S10VE.
In offline mode, the PCs number of the project used in BASE SYSTEM/S10VE is displayed. When the ladder diagram system is started from BASE SYSTEM/S10VE, the displayed value is the PCs number of the open project in BASE SYSTEM/S10VE. When this system is started from the Windows **Start** menu, the displayed value is the PCs number of the project that was previously used to start the ladder diagram system or the HI-FLOW system in BASE SYSTEM/S10VE.
For details about the handling of PCs numbers in the ladder diagram system, see *Appendix C. PCs Numbers in the Ladder Diagram System*.

Sequence cycle time
Specify, in milliseconds, the run time of the ladder program. You can specify a value in the range from 1 to 999.
The default is 30.

Watch dog timer
Specify, in milliseconds, the monitoring duration until one sequence cycle of the ladder program is completed. If the ladder program does not end within the specified duration, a CPU DOWN error will result. You can specify a value in the range from 50 to 10000.
The default is 2000.

10 ms timer
Specify whether to use the 16 points T000 to T00F (registers) as 10-ms on-delay timers.

Used: The 16 points T000 to T00F will operate as 10-ms on-delay timers.
            The points T010 to T7FF will operate as 100-ms on-delay timers.
No used: The points T000 to T7FF will operate as 100-ms on-delay timers.

Note: The above information applies when the timer setting in the **Change number** group box is 2048 (maximum).

Mode of operation at the time of Ncoil master

Specify operation mode of the master control that turns off coils in use when the N coil turns off.

Usual: When the N coil turns off, all coils used in that N coil (except for the set and reset coils) are turned off.

0 out: When the N coil turns off, all coils used in the N coil are turned off.

Ladder RUN delay count

If you want transition to the ladder RUN mode to occur after the remote I/O starts operating at startup of the S10VE, specify the number of sequence cycles to be completed before the transition. To inhibit transition to the ladder RUN mode when the remote I/O starts operating, select the **Invalid ladder RUN** check box.

You can specify a value in the range from 0 to 2000. The default is 0 (no delay).

Change number (Timer)

Specify the number of T registers (points) that the OS will process as timers. You can specify a value in the range from 0 to 2048.

The default is 512.

Example: If this item is set to 16:

       The points T000 to T00F will operate as on-delay timers.

       The points T010 to T7FF will not operate as on-delay timers.

Example: If this item is set to 0:

       None of the T registers will operate as timers.

Note: These points are processed in units of 16 points. Thus, if you set the number of points in the range from 1 to 15, the 16 points (T000 to T00F) will operate as timers. If you set 17, the 32 points (T000 to T01F) will operate as timers.

Change number (One shot)

Specify the number of U registers (points) that the OS will process as one-shots. You can specify a value in the range from 0 to 256. The default is 256.

Example: If this item is set to 16:

       The points U000 to U00F will operate as one-shots.

       The points U010 to U0FF will not operate as one-shots.

Example: If this item is set to 0:

       None of the U registers will operate as one-shots.

Note: These points are processed in units of 16 points. Thus, if you set the number of points in the range from 1 to 15, the 16 points (U000 to U00F) will operate as one-shots. If you set 17, the 32 points (U000 to U01F) will operate as one-shots.

Setup PI/O (PI/O)

Specify whether to mount one or more I/O modules in the CPU unit.

The default is **No used**.

Used: One or more I/O modules will be mounted in the CPU unit. Station number 0 is assigned to the CPU unit, and I/O numbers starting with 000 are assigned to slot 0 and subsequent slots. Do not assign 0 as a station number of the I/O unit (station).

No used: No I/O modules will be mounted in the CPU unit.

Setup PI/O (Partition)

The default setting is **FREE**, which is used for usual operation.

FREE: No I/O limitations are placed on all I/O slots in the CPU mount base or I/O mount base. Each slot is assigned two I/O numbers dedicated to input or output (X$\Delta\Delta\Delta$ and Y$\Delta\Delta\Delta$). This allows specification of the I/O number matching an I/O module to be mounted.

FIX: The left half of the I/O slots in the CPU mount base or I/O mount base is dedicated to input modules, and the right half of the slots are dedicated to output modules. For I/O numbers, X$\Delta\Delta\Delta$ is assigned to each input slot, and Y$\Delta\Delta\Delta$ is assigned to each output slot.

Here, $\Delta\Delta\Delta$ indicates an I/O number.

Setup PI/O (Out module hold)

Specify whether the output of the DO (digital output) modules mounted in each unit should be reset or held in the event of an error such as breakage of the RI/O circuit.

The default is **RESET**.

RESET: Turns off the output of the individual DO modules.

HOLD: Holds the output values from the individual DO modules that existed immediately before an error occurred.

Note: This output hold setting is effective only for DO modules. This setting does is not effective for AO (analog output) modules, which always operate in respect of the **HOLD** setting.

Setup PI/O (Slot points)

Set the I/O point count for each I/O module to be mounted. If modules with different I/O point counts are mounted in the same unit, set this item to the largest I/O point among those modules. For example, if 16-point modules and 32-point modules are mounted in the same unit, set 32 for this item. In this case, I/O numbers for 32 points are assigned to each module, and each 16-point module uses only the first 16 I/O numbers corresponding to its 16 points and the remaining 16 I/O numbers are regarded as unused. In contrast, if this item is set to 16, each 32-point module will have only its first 16 points assigned to I/O numbers.

You can specify the I/O slot point count as 16, 32, 64, or 128. The default is 16.

Area size (Change ladder area size button)

Displays the Ladder Area Size Change window for setting the size of the ladder program storage area in units of steps. This window allows you to define the number of steps to be used by each N coil.

Default of N00 to NDF: 262144 steps

Default of NE0 to NFF: 8192 steps
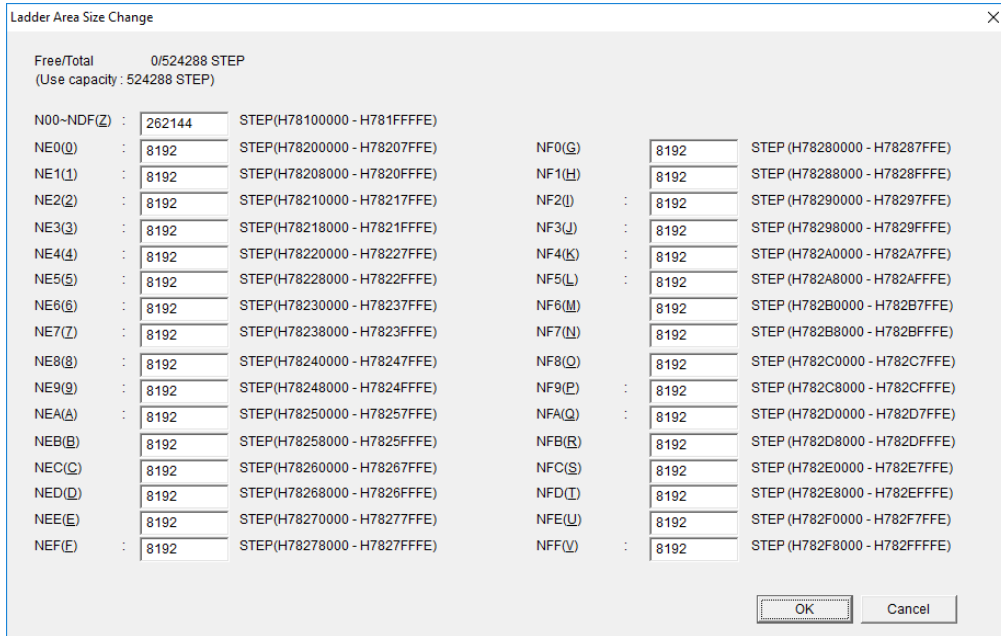
Figure 4-145 Ladder Area Size Change window

Area size (I/O comment)

Specify the size (in bytes) of the area for storing I/O comments. You can specify an even number of bytes. The default is 0.

Area size (Actually used by I/O comments)

Indicates the size (in bytes) of the space actually used for storing I/O comments (in the I/O comment storage area).

Area size (User function)

Specify the size (in bytes) of the area for storing the user function program body. You can specify an even number of bytes.

The default is 0.

Area size (Range of addresses of the user function registration area)
Indicates the starting and ending addresses of the storage space into which the user function program body can be stored.

Setup RI/O (**PI/O mode**)
Specify whether to synchronize RI/O processing with ladder processing.
The default is **Async**.

Async: Updates PI/O-RAM irrespective of operation of the ladder program.
Sync: Updates PI/O-RAM upon completion of one sequence cycle of the ladder program.

Setup RI/O (**Optical adapter connection**)
Specify whether to use an optical adapter.
Using an optical adapter will require you to increase the timeout detection time due to the transmission delay inherent in such adapters. To change the timeout detection time, select **Connect**. If you select **No-connect** when the optical adapter is connected, the timeout detection time will not be changed, which might cause a timeout. You must select **Connect** when an optical adapter is used. The default is **No-connect**.

Setup RI/O (**Remote I/O points**)
Specify a RI/O point count. You can select a value from among 64, 128, 256, 512, 1024, 1536 and 2048 (points).
The default is 2048.
Table 4-22 shows the relationships between specifiable RI/O point counts and I/O numbers that are exclusively used.

Table 4-22 Specifiable RI/O point counts and their related I/O numbers that are exclusively used

RI/O point count	Range of I/O numbers exclusively used	
	Input	Output
64	X0000 to X003F	Y0000 to Y003F
128	X0000 to X007F	Y0000 to Y007F
256	X0000 to X00FF	Y0000 to Y00FF
512	X0000 to X01FF	Y0000 to Y01FF
1024	X0000 to X03FF	Y0000 to Y03FF
1536	X0000 to X05FF	Y0000 to Y05FF
2048	X0000 to X07FF	Y0000 to Y07FF

<Notes>

● If you modify the existing PCs edition information in online mode, receive a ladder program from the S10VE before altering the ladder program at hand. If you send the altered (and complied) ladder program to the S10VE without receiving the ladder program, the PCs edition information after the online modification is invalidated. That is, the new PCs edition information is replaced by the old PCs edition information before the online modification. For details about how to send and receive ladder programs, see *4.5.3 Sending and receiving ladder programs*.

● Note that if you change the area size specified for **I/O comment** to be smaller than the size actually used by I/O comments, the I/O comments stored in the storage area will be cleared. (The I/O comments will remain intact during the period that the new area size is larger than or equal to the size actually used by I/O comments.)

● If any of the following items is changed in online mode, the PCs must be reset.

　　<Items requiring PCs reset or power-on reset when changing settings>

　　• **Sequence cycle time**

　　• **Watch dog timer**

　　• **Setup PI/O** (**PI/O**, **Partition**, **Out module hold**, and **Slot points**)

　　• **Setup RI/O** (**PI/O mode**, **Optical adapter connection**, and **Remote I/O points**)

　　• **Ladder RUN delay count** and **Invalid ladder RUN**

If any of these items is changed, clicking the **OK** button in the PCs edition window causes the following warning message to appear.
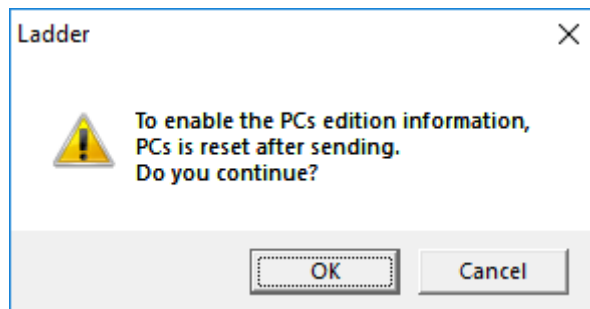
Figure 4-146 PCs reset warning message

Clicking the **OK** button closes this message and sends PCs edition information.
Clicking the **Cancel** button closes this message without sending PCs edition information.

● If the area size specified for **I/O comment** is smaller than the size actually used by I/O comments, an attempt to compile the ladder circuit causes the following error message to appear.
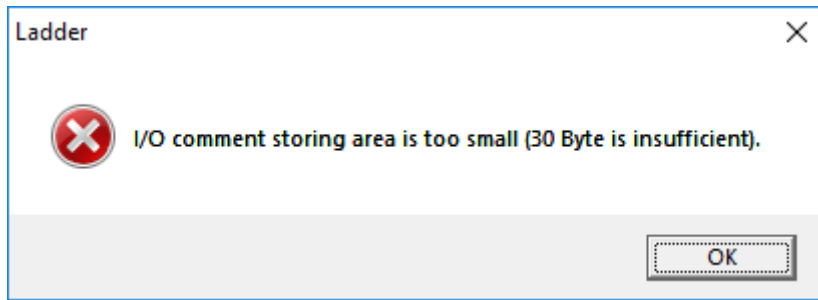
( ): Actual deficient size

Figure 4-147 Error message indicating an insufficient I/O comment storing area

After that, if any of the following options are selected from the menu, the operation is not performed and an error message indicating an invalid I/O comment size appears:

- **File**, and then **Save file as**
- **File**, and then **Save file**
- **Build**, and then **Send**
- **Utility**, and then **Data send/receive** (offline)
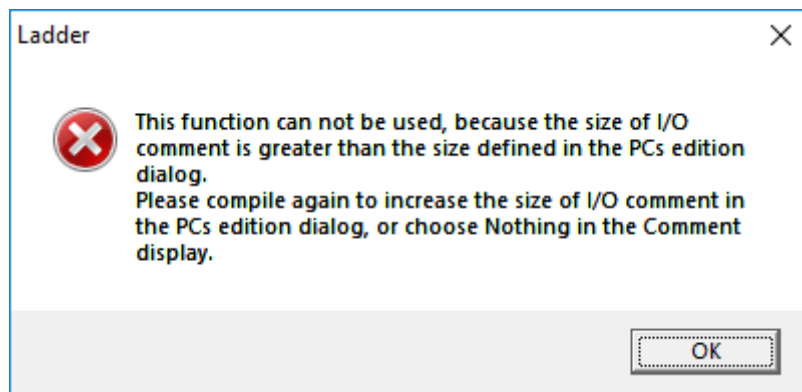
Figure 4-148 Error message indicating an invalid I/O comment size

If you need to store I/O comments in the I/O comment area, increase the area size in **I/O comment**, and then recompile the ladder circuit.
If you do not need to store I/O comments, hide I/O comments.

- If data communication fails due to, for example, line disconnection while PCs edition information is being written, a line error message appears. Revise the connection with the S10VE, and then click the **Retry** button. If you click the **Cancel** button, writing of the PCs edition information is aborted. At this time, the run mode has changed to temporary run mode. Revise the line status, and then try rewriting the PCs edition information. If you click the **Cancel** button in the PCs edition window without rewriting this information, the following warning message appears.
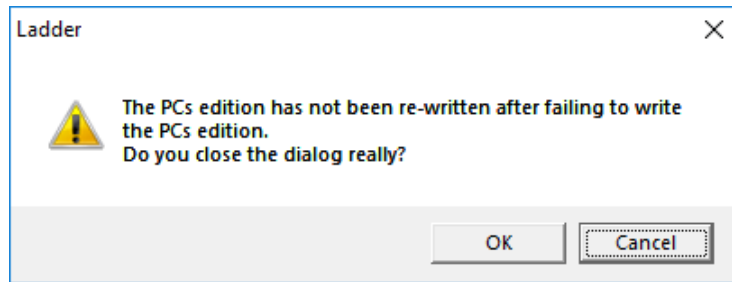
Figure 4-149 Warning message against closing of the window without rewriting

Clicking the **OK** button closes the PCs edition window without writing PCs edition information. When you redisplay the main window, the temporary run mode is retained.
Clicking the **Cancel** button redisplays the PCs edition window.

If the S10VE is running in temporary run mode and *only for online monitor* mode, the following error message appears. In this case, send the ladder program in online mode to recover the temporary run mode to normal run mode.
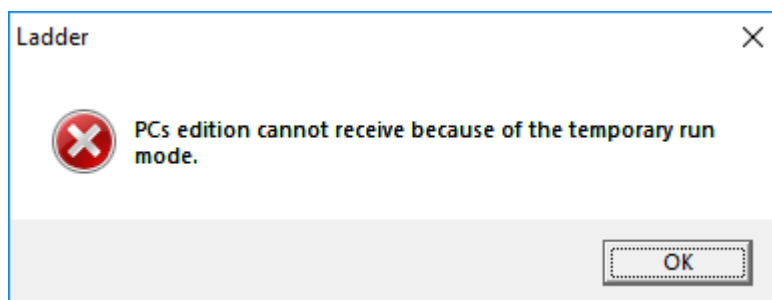
Figure 4-150 Error message indicating reception in temporary run mode (PCs edition information)

4.7.10 Setting analog and pulse counter modules

Ladder programs can use a 4-channel or 8-channel analog input module, a 4-channel analog output module, and a pulse counter module. To use these modules, you must first register the installation address for each module in the data area[#1] by using the analog counter function of the ladder diagram system. The *data area* here refers to a PI/O register area in the range from EW400 to EWFF0. For details, see *(1) Registering installation addresses in the data area*. The ladder program exchanges data with the analog input/output modules and pulse counter module via the data area. For details about the format of the data area, refer to the manual of each I/O module[#2]. The following shows the relationships between the data area and the analog input/output modules and between the data area and the pulse counter module.

Analog input module

The analog input module converts analog input signals (current or voltage) taken from the external source into digital data by A/D conversion. The converted digital data is then transferred by the CPU to the data area, where it is stored in the location allocated for each channel.

The ladder program can then obtain the data from the analog input module in digital form by accessing the data area.

Analog output module

The ladder program writes digital data to the allocated location in the data area. Then, the CPU transfers the data to the analog output module, which, in turn, converts the data to analog output format and then outputs the resulting current or voltage signal to the external destination.

<CPU module>
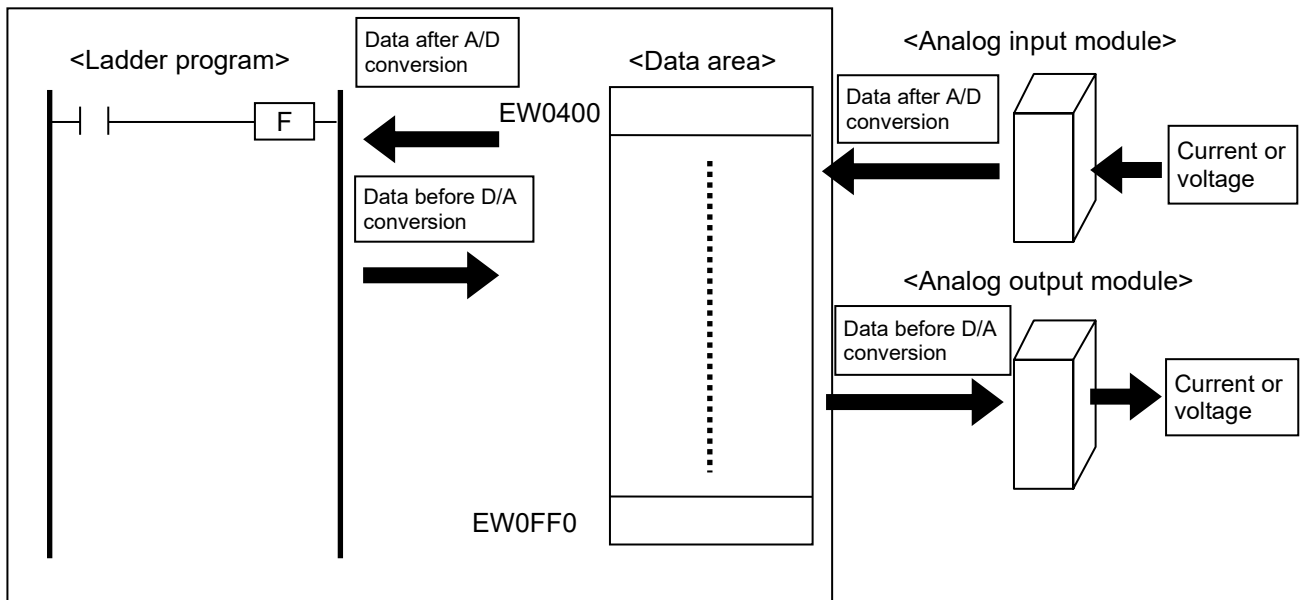
Pulse counter module

The pulse counter module takes pulses from the external source. Then, the CPU transfers the resulting data (read-data and status code) from the pulse counter module to the allocated location in the data area.

The ladder program can control the pulse counter module by writing write-data and control code to the allocated location in the data area for further transfer by the CPU to that pulse counter module.

For details about the data area format for the pulse counter module, refer to the manual on the pulse counter module.[#2]

<CPU module>

<Ladder program>	

<Data area>

EW0400

EW0FF0

<Pulse counter module>

Read-data
Status code

Write-data
Control code

Read-data,
status code

Write-data,
control code

Pulse

Comparison
output
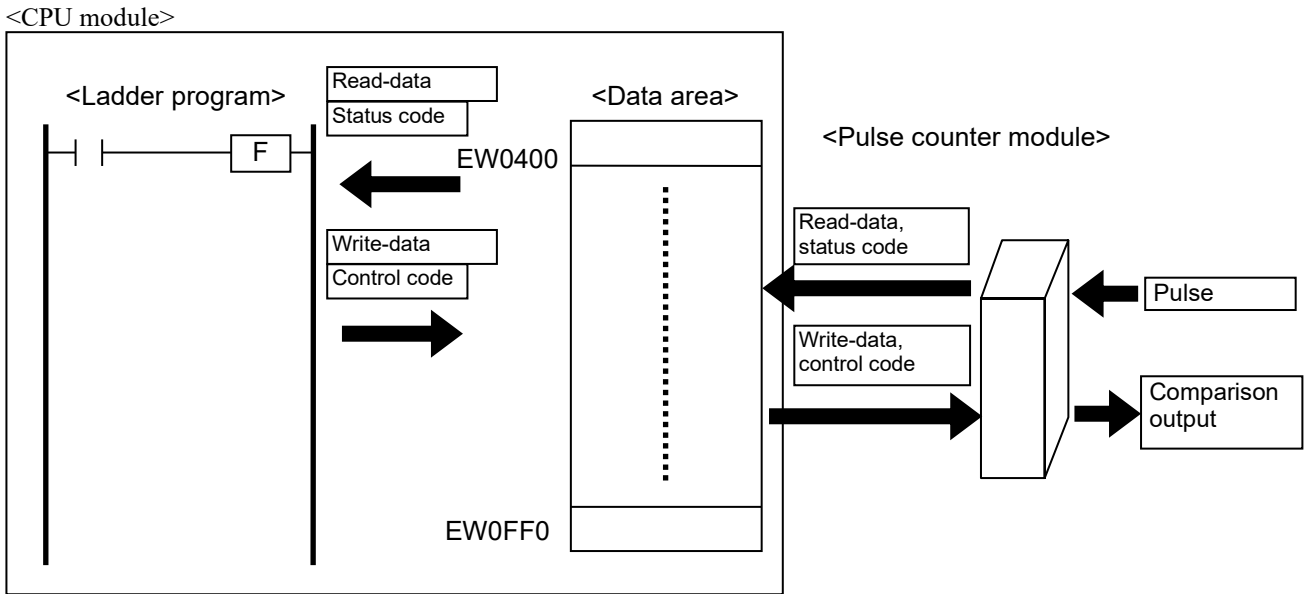
#1: Depending on the set mode, installation addresses for the following analog input/output modules might not need to be registered in the data area. For details about mode settings, refer to the *S10mini HARDWARE MANUAL I/O MODULES* (manual number SME-1-114).

No.	Module model	Set mode	Installation address registration in data area
1	LQA000	MODE1	Not required
		MODE2	Required
2	LQA100	MODE1	Not required
		MODE2	Required
3	LQA200	MODE1	Not required
		MODE2	Required
4	LQA500	MODE1	Not required
		MODE2	Required
5	LQA600	MODE1	Not required
		MODE2	Required
6	LQA610	MODE1	Not required
		MODE2	Required
7	LQA050	MODE1	Not required
		MODE2	Required
		MODE3	Not required
		MODE4	Required
8	LQA150	MODE1	Not required
		MODE2	Required
		MODE3	Not required
		MODE4	Required

#2: The following table shows available I/O module models and their corresponding manual numbers.

Module model	Manual number
LQA000/050/100/150/200/310/500/600/610/810	SME-1-114
LQC000	SME-1-114
LWA400/401/402/403/404/421/422/423/430/435/450/460	SME-1-126
LWC400/401/402	SME-1-126
PAN300B/301B/309/320B/329	SME-1-124
PAF300/301/309/320/329	SAJ-2-201
PTF300/320	SAJ-2-201

#3:   he following table shows the correspondence between module names and module models.

No.	Module name	Applicable module models	
		HSC-1000	HSC-2100
1	4ch AI(12bit)	LQA000/100/200/201	LWA400/401/402/403/404/421/422/423/430
2	4ch AI(14bit)	--	LWA435
3	4ch AO(12bit)	LQA500/600/610	LWA450/460
4	PCT(MODE2)	LQC000	LWC401/402
5	PCT(MODE1)	LQC000	LWC400
6	8ch AI(12bit)(MODE2)	LQA050/055/150/155	LWA500/501
7	8ch AI(12bit)(MODE4) (ch0-ch3)	LQA050/055/150/155	--
8	8ch AI(12bit)(MODE4) (ch4-ch7)	LQA050/055/150/155	--

(1) Registering installation addresses in the data area

You can register installation addresses of I/O modules in online mode or offline mode. For details about each mode, see *4.5.2 Switching between online, offline, only for online monitor, and online waiting modes*.

(a) Setting in the offline state

[1] From the **Utility** menu, click **PCs edition**¸ and then **Analog counter**.

Figure 4-151 Selecting [Analog counter]

[2] The Analog counter window appears. If any module has already been allocated in the offline state, the name, type, and address of the module are displayed.

Figure 4-152 Analog counter window

[3] In the Analog counter window, select the registration number of the allocation data area, and then click the **Setup** button.
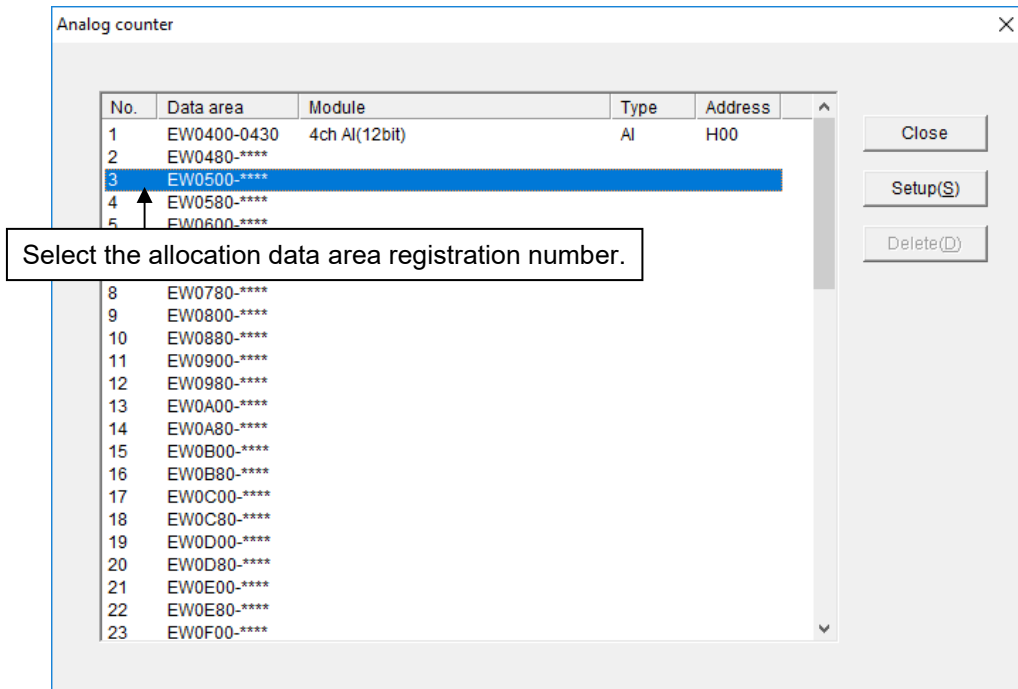
Figure 4-153 Analog counter window (selecting the allocation data area)

[4] The Setup window appears. In the **Module name** list box, select the module name to be allocated. If you select an 8-channel analog input module, the allocation data range changes from 4-channel to 8-channel. The default of the allocation data area displays 4-channel.
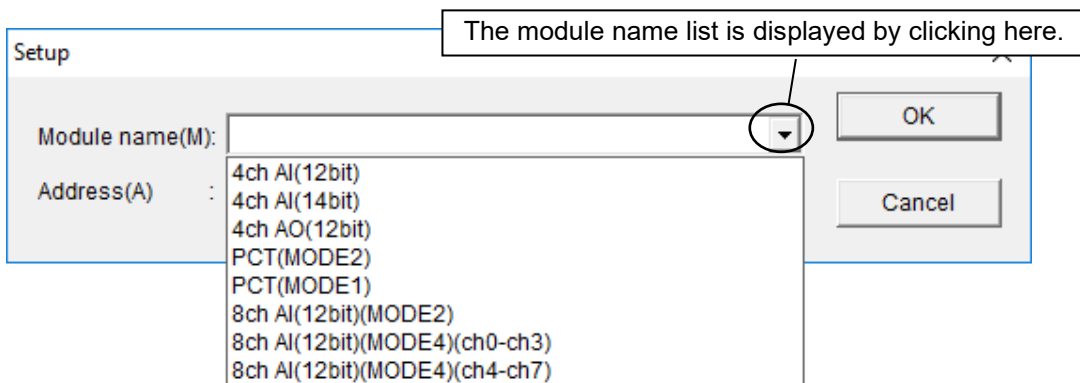
Figure 4-154 Setup window (displaying the module name list)

Unlike other I/O modules, 8-channel AI modules of models LQA050 or LQA150 has a different module name to be selected by users, depending on the selected mode (MODE2 or MODE4). For details, see *(d) 8-channel analog input module*.

After selecting the module name, set the address. For details about address settings, see *(c) Address setting*.
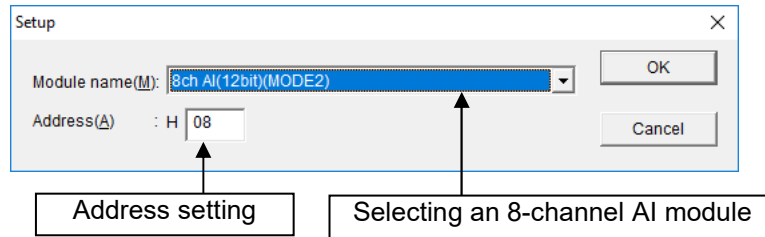
Figure 4-155 Setup window (selecting an 8-channel AI module)

[5] Click the **OK** button to apply the data you specified in the Setup window to the Analog counter window. (The data will be displayed on the line of the registration number selected in step [3].)
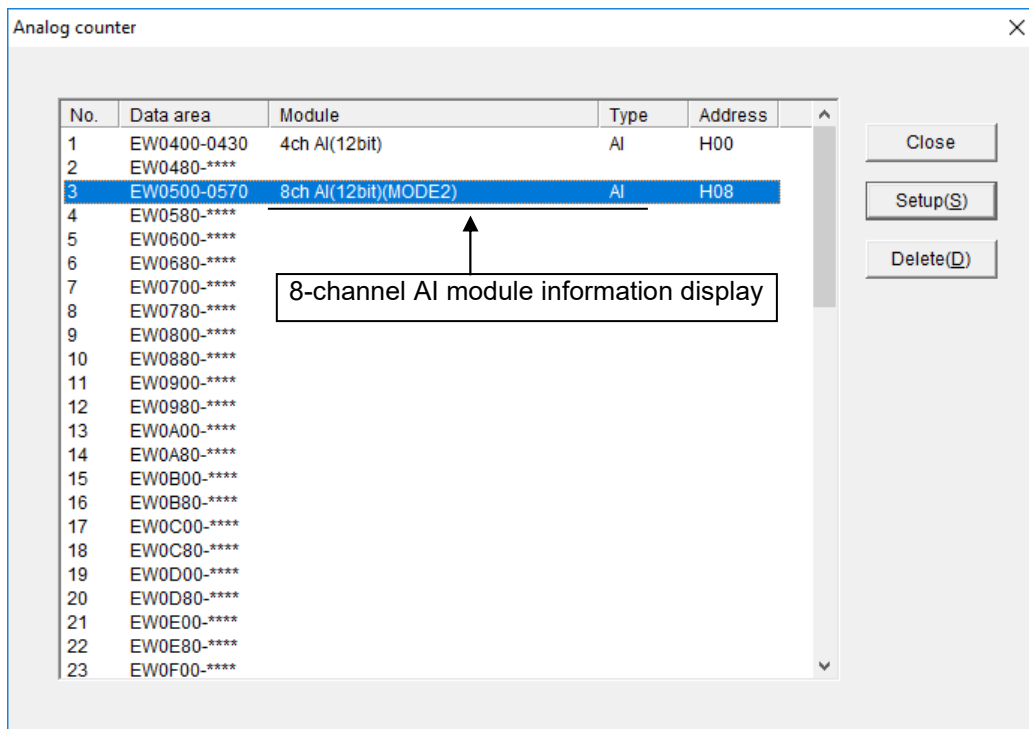
Figure 4-156 Analog counter window (displaying 8-channel AI module information)

This is the end of module registration under the offline state. If you want to allocate another module, repeat steps from [3] to [5].

In the Setup window, clicking the **Cancel** button discards the data specified in the Setup window without applying the data to the Analog counter window.

[6] In the Analog counter window, click the **Close** button to close this window.

[7] From the **Build** menu, click **Online** to change the communication status to online.
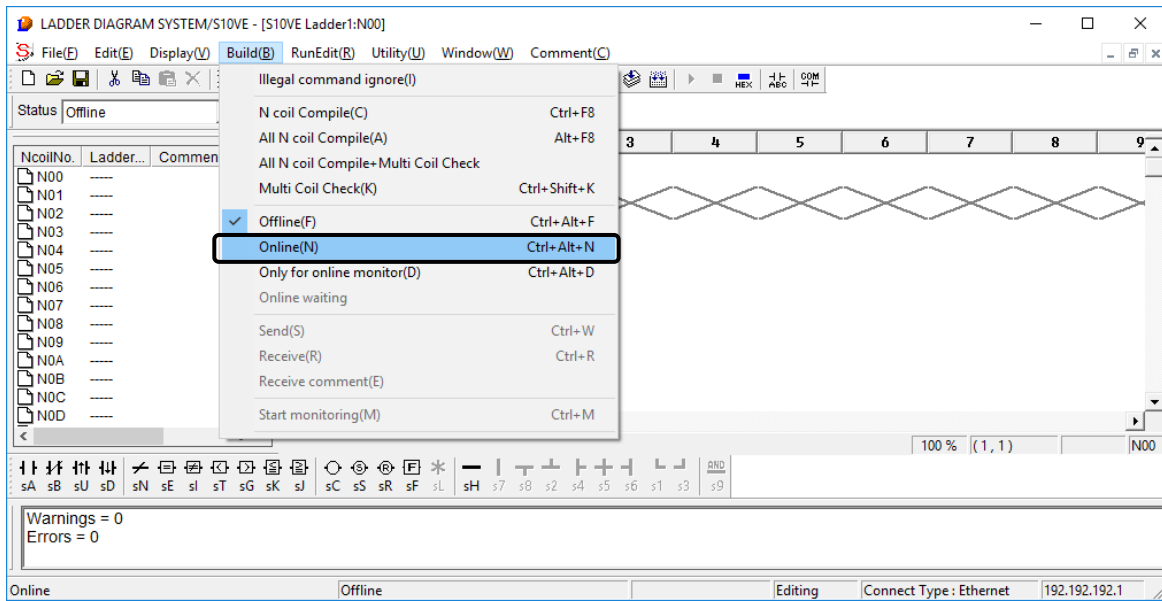
Figure 4-157 Switching to online

[8] After the communication status changed to online, from the **Build** menu, click **Send**. The Sending setup window appears.
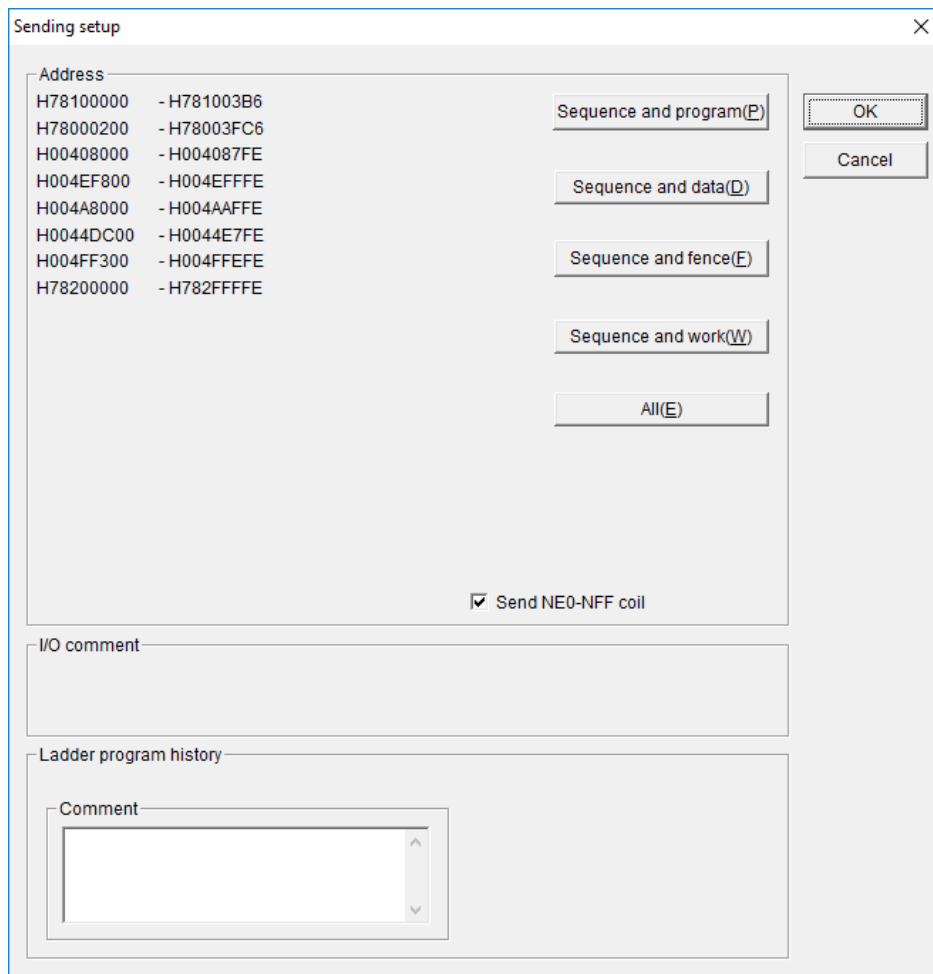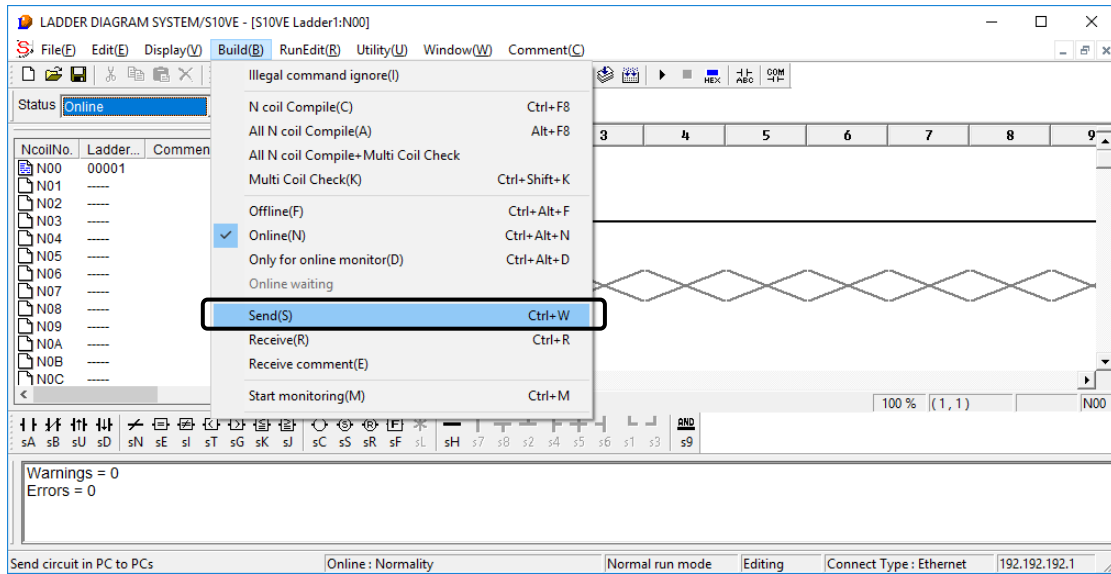
Figure 4-158 Displaying the Sending setup window

[9] Click the **OK** button. The configuration information specified in the Analog counter window is sent together with the ladder program to the PCs.

This is the end of module setting in the offline state.

(b) Setting in the online state

[1] From the **Build** menu, click **Online** (see Figure 4-157). Skip this step if the system has already been in online state.

[2] Perform steps [1] to [4] described in *(a) Setting in the offline state.*

[3] In the Setup window, click the **OK** button. The data specified in the Setup window is displayed in the Analog counter window and also is registered in the PCs. If you want to allocate another module, repeat steps [2] and [3].
In the Setup window, clicking the **Cancel** button does not register data specified in step [2].

This is the end of module setting in the online state.

(c) Address setting

The address specified in the Setup window is the external input/output (X, Y) address corresponding to each I/O slot. (See the following figures.)

Setting conditions
    Station number: 000 (variable)
    Partition setting: FREE
    I/O slot point: 16 points
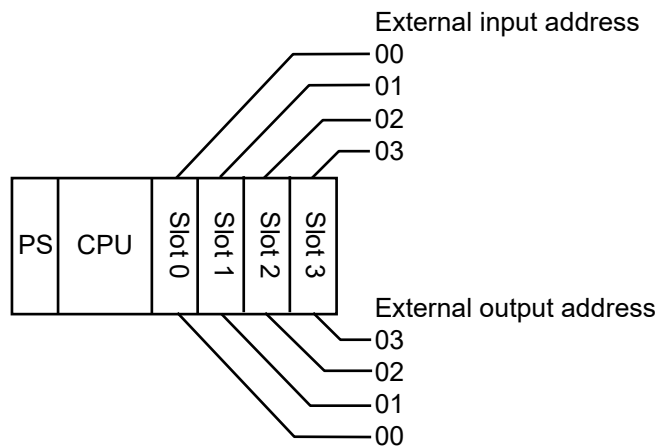
Figure 4-159 4-slot CPU mount base (FREE setting)

Setting conditions
    Station number: 000 (fixed)
    Partition setting: FIX
    I/O slot point: 16 points
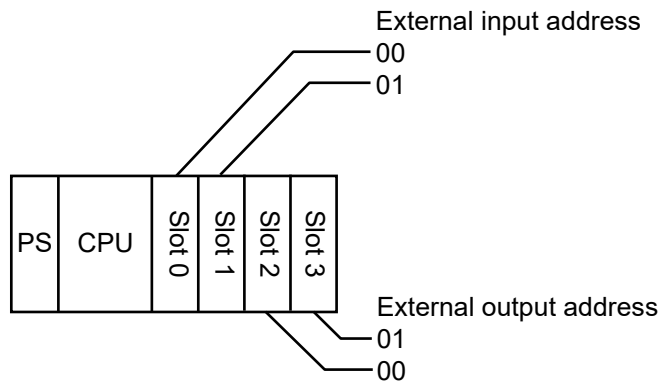
Figure 4-160 4-slot CPU mount base (FIX setting)

Setting conditions
Station number: 040 (variable)
Partition setting: FREE
I/O slot point: 16 points

External input address
40
41
42
43

PS RI/O Slot 0 Slot 1 Slot 2 Slot 3

External output address
43
42
41
40
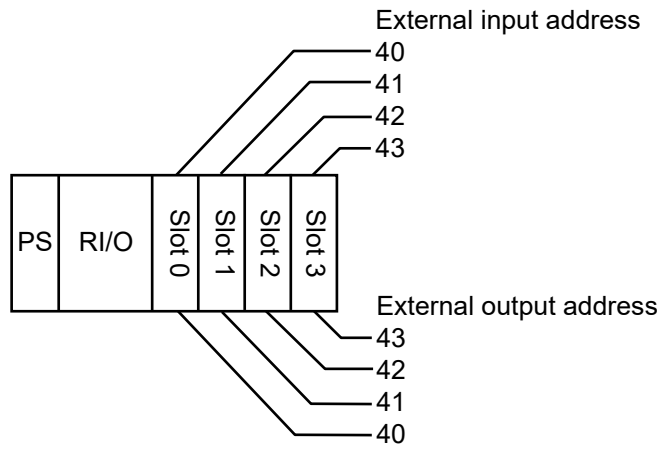
Figure 4-161 4-slot I/O mount base (FREE setting)

Setting conditions
Station number: 040 (fixed)
Partition setting: FIX
I/O slot point: 16 points

External input address
40
41

PS RI/O Slot 0 Slot 1 Slot 2 Slot 3

External output address
41
40
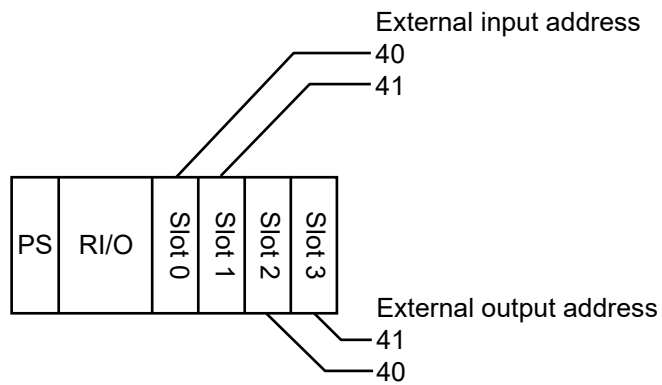
Figure 4-162 4-slot I/O mount base (FIX setting)

External input/output addresses are not fixed to an I/O slot. Instead, these addresses vary depending on the RI/O station number, I/O point setting, and partition setting (FREE/FIX). For details, refer to the *S10VE User's Manual General Description* (manual number SEE-1-001).

(d) 8-channel analog input module

To use an 8-channel analog input module with MODE2 or MODE4 setting, you need to register this module in the Analog counter window of the ladder diagram system.

When MODE2 or MODE4 is set, select the following module in the Analog counter window, and then click the **OK** button.

● When MODE2 is set
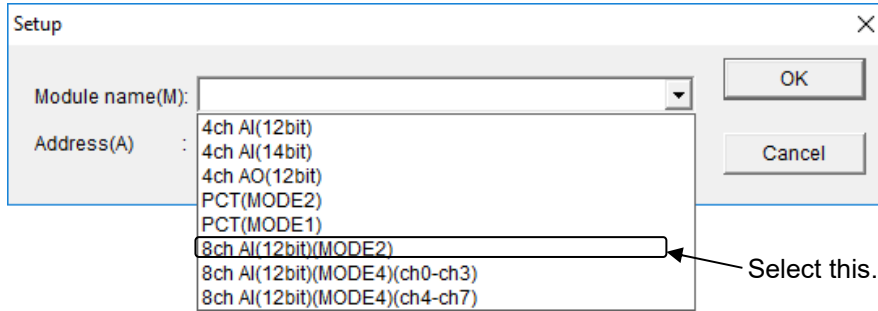
Figure 4-163 When using 8ch AI with MODE2

● When MODE4 is set and channels 0 to 3 are used
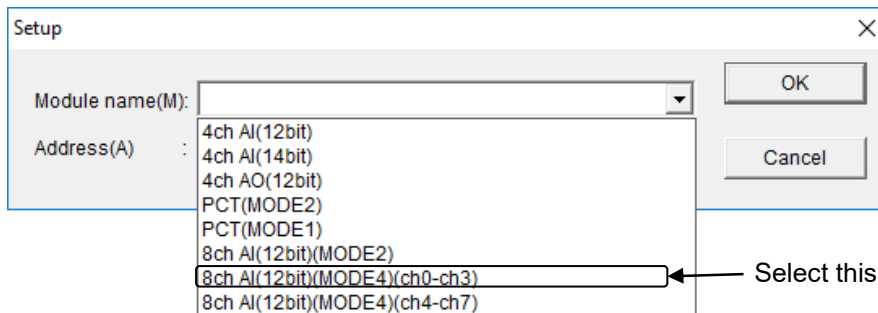
Figure 4-164 When using 8ch AI with MODE4 (only channels 0 to 3 are used)

Note: You cannot specify a setting that only uses channels 4 to 7 without using channels 0 to 3.

● When MODE4 is set and channels 0 to 7 are used
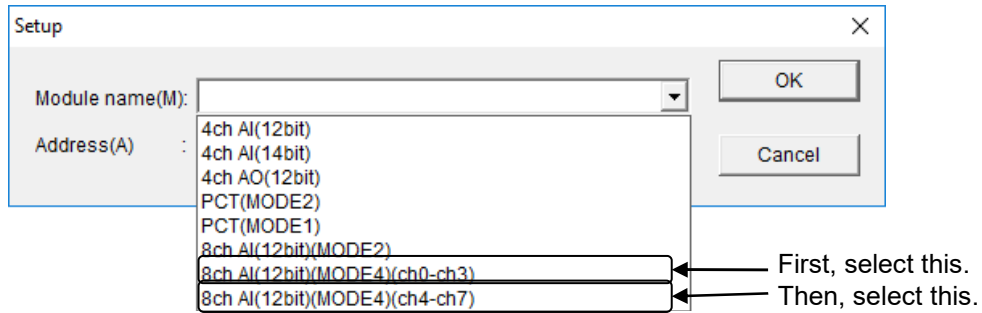
Figure 4-165 When using 8ch AI with MODE4 (all channels 0 to 7 are used)

First, from the module name list, select `8ch AI(12bit)(MODE4)(ch0-ch3)`, and then click the **OK** button. Then, from the module name list, select `8ch AI(12bit)(MODE4)(ch4-ch7)`, and then click the **OK** button. Make sure that the position specified for `8ch AI(12bit)(MODE4)(ch4-ch7)` is immediately after the registration number of `8ch AI(12bit)(MODE4)(ch0-ch3)`.

If, as shown in Figure 4-166, `8ch AI(12bit)(MODE4)(ch0-ch3)` is registered at No. 2, but registration of `8ch AI(12bit)(MODE4)(ch4-ch7)` is attempted in No. 4 instead of No. 3, the following error message dialog box appears.
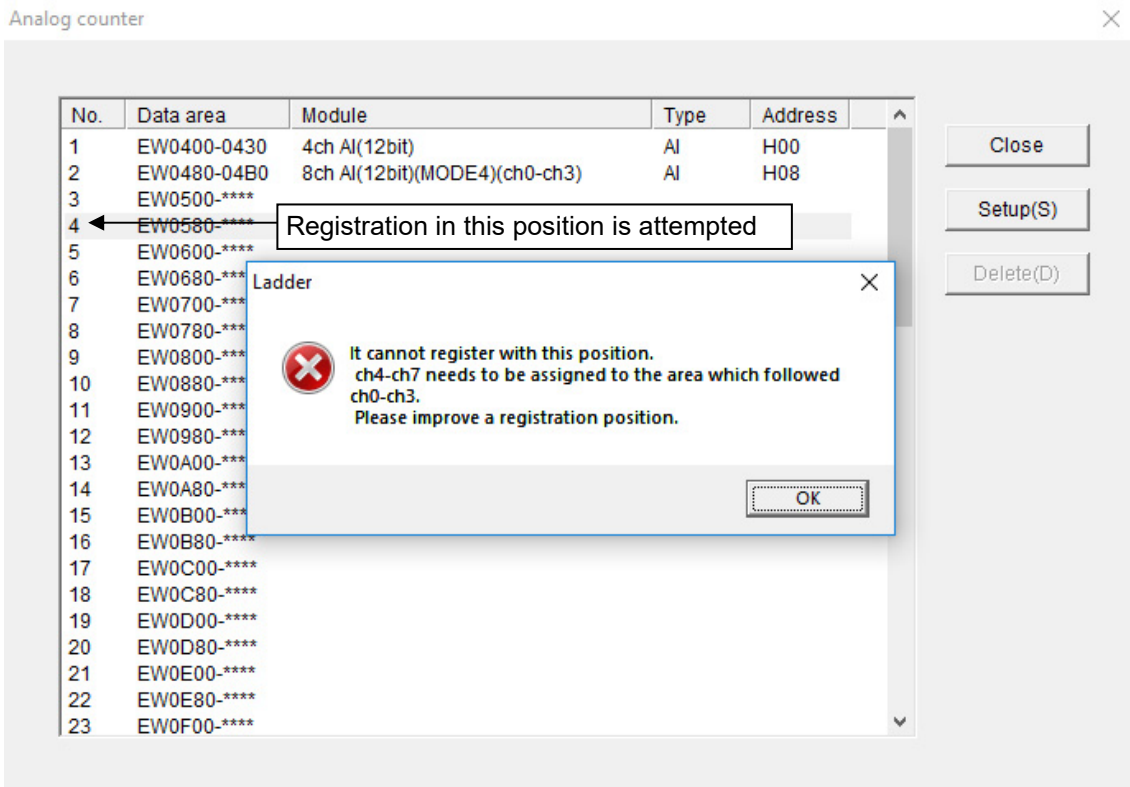
Figure 4-166 When MODE4 (ch4-ch7) for 8ch AI is set to an incorrect position

In case of setting MODE1 or MODE3, you do not need to register a module in the Analog counter window. (Do not use it.) For details about mode settings, see the *S10mini HARDWARE MANUAL I/O MODULES* (manual number SME-1-114).

(2) Deleting the analog counter
   (a) Deleting in the offline state
     [1] From the **Utility** menu, click **PCs edition**, and then **Analog counter** (see Figure 4-151).
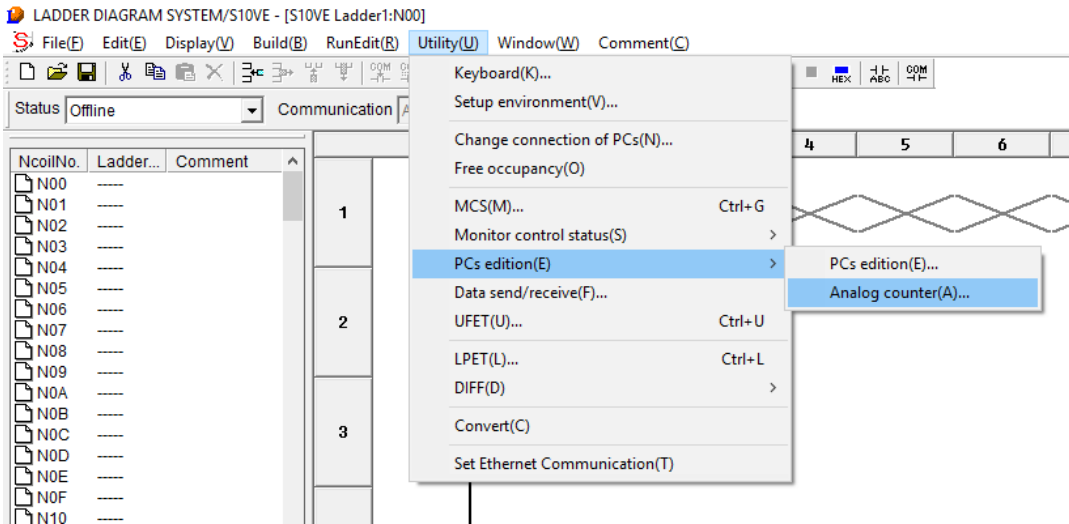   [2] The Analog counter window appears. If any module has already been allocated in the offline state, the name, type, and address of the module are displayed.
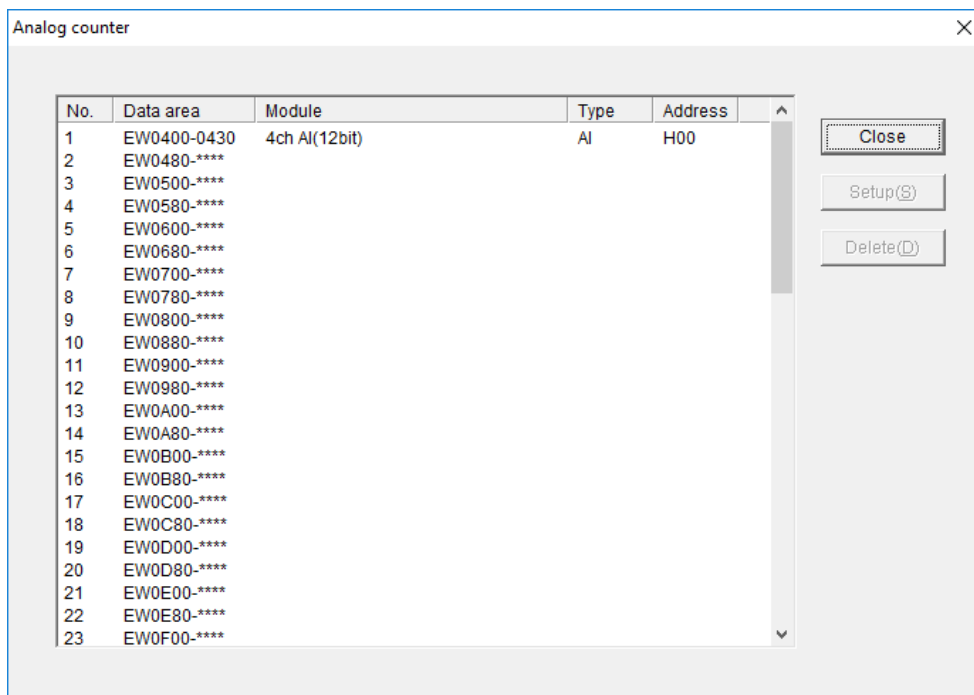   [3] Select the registration number of module to be deleted, and click the **Delete** button.
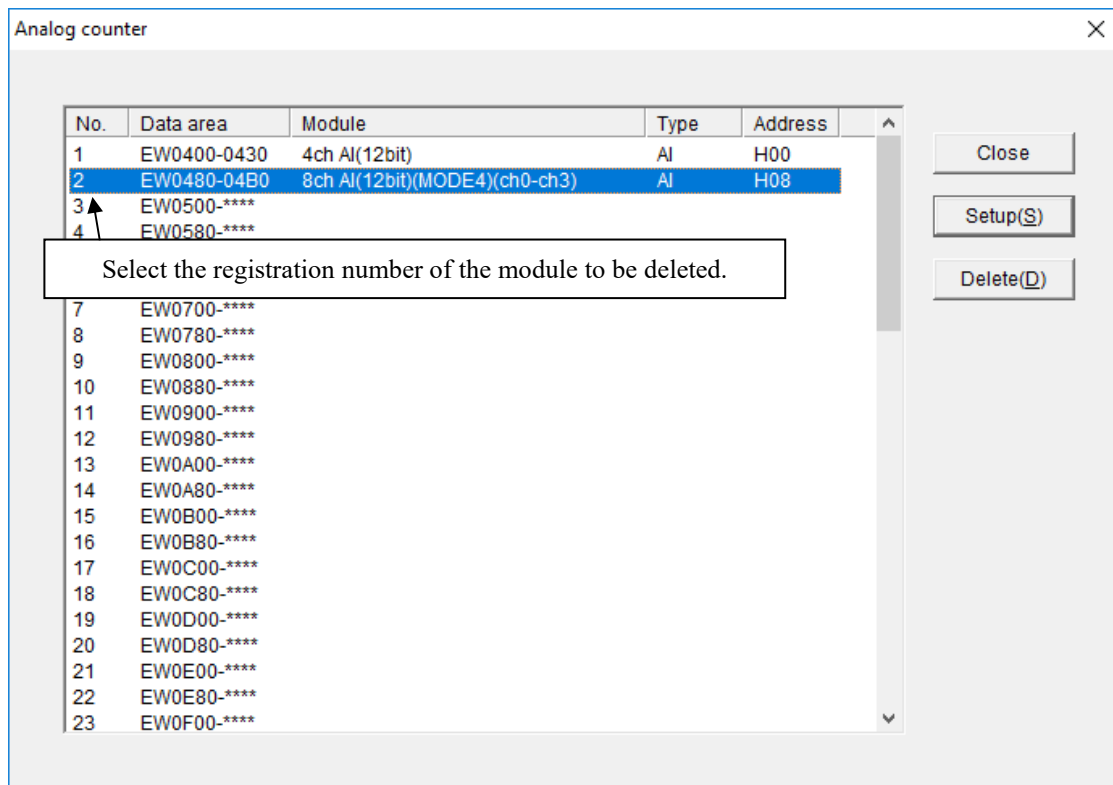
Figure 4-167 Analog counter window (deleting allocation data)

[4] The following message dialog box appears.
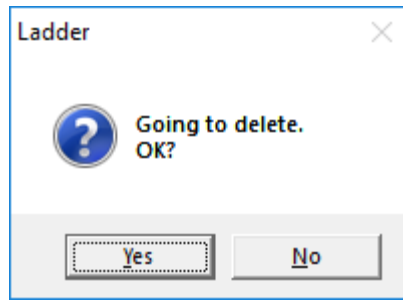
Figure 4-168 Confirmation message for deleting allocation data

Clicking the **Yes** button deletes the module setting selected in step [3] from the Analog counter window (deleting in the offline state).
Clicking the **No** button does not delete the module setting.

[5] Click the **Close** button in the Analog counter window to close this window.

[6] From the **Build** menu, click **Online** to change the communication status to online (see Figure 4-157).

[7] After changing the communication status to online, from the **Build** menu, click **Send**. The Sending setup window appears (see Figure 4-158).

[8] Click the **OK** button. The configuration information deleted from the Analog counter window is sent together with the ladder program to the PCs.

This is the end of module deletion in the offline state.

(b)   Deleting in the online state

[1] From the **Build** menu, click **Online**. This step is not necessary if the system has already been in online state.

[2] The Analog counter window appears. If any module has already been allocated in the offline state, the name, type, and address of the module are displayed.

[3] Select the registration number of module to be deleted, and click the **Delete** button.

[4] The message dialog box indicating `Going to delete. OK?` appears.

Clicking the **Yes** button deletes the module setting selected in step [3] from the both the Analog counter window and the PCs.
Clicking the **No** button does not delete the module setting.

This is the end of module deletion in the offline state.

<Note>

If data communication fails due to, for example, line disconnection while PCs edition information is being written, a line error message appears. Revise the connection with the S10VE, and then click the **Retry** button. If you click the **Cancel** button, writing of the PCs edition information is aborted. At this time, the run mode has changed to temporary run mode. Revise the line status, and then try to write the PCs edition information again. If you click the **Close** button in the Analog counter window without rewriting this information, the following warning message appears.
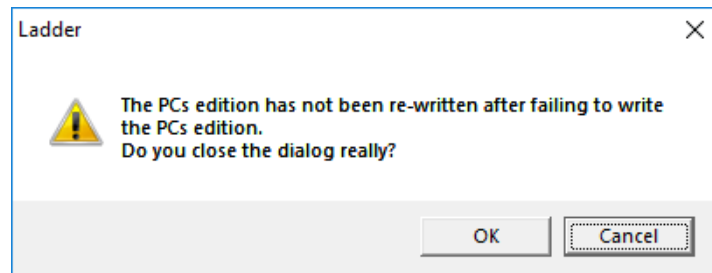
Figure 4-169 Warning message against closing of the window without rewriting

Clicking the **OK** button closes the Analog counter window without writing PCs edition information. When you redisplay the main window, the temporary run mode is retained.

Clicking the **Cancel** button redisplays the Analog counter window.

If the S10VE is running in temporary run mode and *only for online monitor* mode, the following error message appears. In this case, send the ladder program in online mode to recover the temporary run mode to normal run mode.
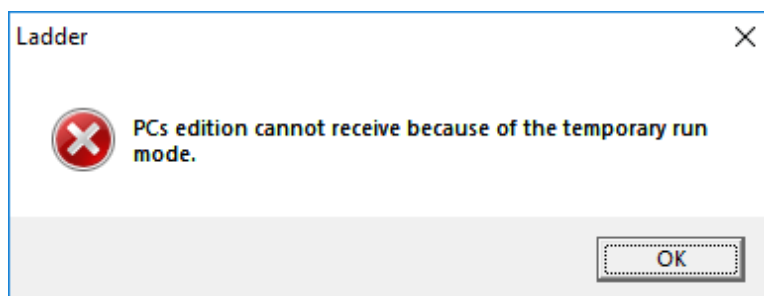
Figure 4-170 Error message indicating reception in temporary run mode (PCs edition information)

4.7.11 Send/receive data

This function sends, receives, and compares ladder files.

The data access destination varies with communication mode (online or offline mode).

Online mode: PCs

Only for online monitor mode: PCs (however, transmission is disabled)

Offline mode: Internal memory of the ladder diagram system

From the **Utility** menu, selecting **Data send/receive** displays the Data send/receive window.
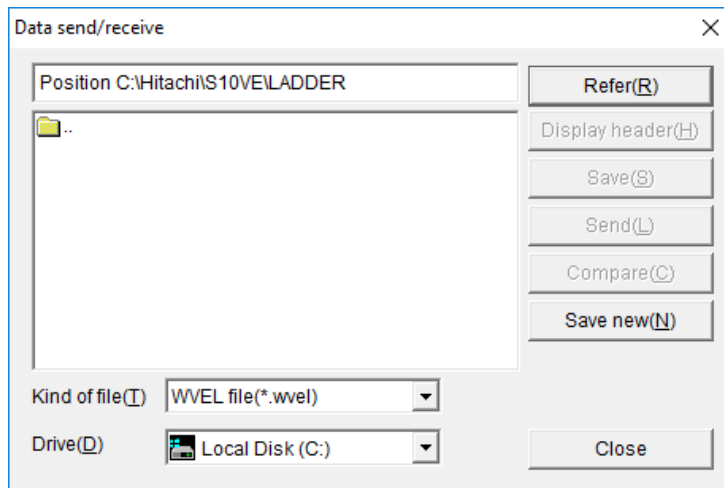
Figure 4-171 Data send/receive window

<Note on operation>

For the monitor function and run-time editing function, the availability of the ladder diagram system's main window and the **Send** button in the Data send/receive window depends on the communication mode shown in the following table.

Table 4-23 Operations when the monitor function and run-time editing function are used

	Communication mode		
	Offline	Online	Only for online monitor
Circuit monitoring[#2]	--	D	D
Time chart monitor display[#2]	Y	D	D
Sequence cycle monitor display[#2]	N	N	N
Matrix monitor display[#2]	--	D	D
Register monitor display[#2]	N	D	D
When **RunReplace** is selected for the transmission/reception method[#1]	--	D	--

--: Not applicable
Y: The ladder diagram system's main window is operable and the **Send** button in Data send/receive window is enabled.
D: The ladder diagram system's main window is operable, but the **Send** button in Data send/receive window is disabled.
N: The ladder diagram system's main window is not operable.
#1: If a monitor window opens during RunReplace mode, the monitor conditions become effective.
#2: If multiple conditions exist, operations are performed with conditions in the priority order of N (highest), D, and Y.

(1) Viewing the folder
In the Data send/receive window, click the **Refer** button. The Browse for Folder window appears.
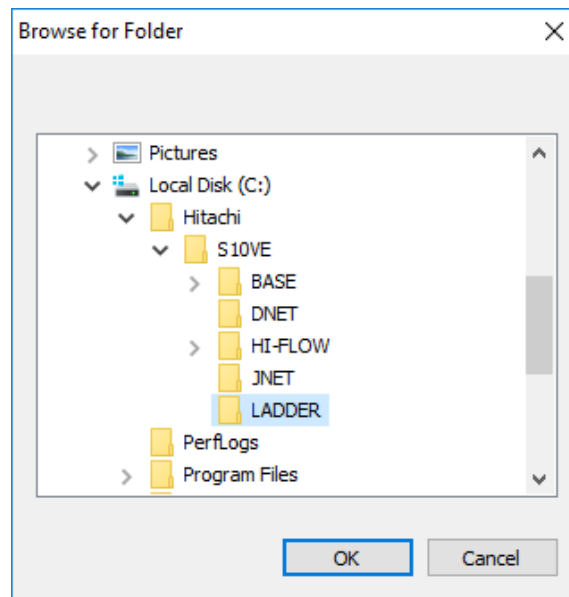
Figure 4-172 Browse for Folder window

Select the folder you want to change, and then click the **OK** button. The folder directly below the selected folder appears in the Data send/receive window.

(2) Displaying header information
In the Data send/receive window, clicking the **Display header** button displays the following window showing the header information of the file selected in the Data send/receive window.


```
File header information                                          ×

                                          ┌Address─────────────────┐
   File name       :  FileName.wvel        H78100000 - H78100386
   PCs number      :  0001                 H78000000 - H78003FC6
   PCs type        :  H001E                H00408000 - H004087FE
   Creating date   :  18-12-02             H004EF800 - H004EFFFE
   File size       :  1064                 H004A8000 - H004AAFFE
                                           H0044DC00 - H0044E7FE
   ┌Comment──────────────────────┐         H004FF300 - H004FFEFE
   │                             │         H78200000 - H782FFFFE
   │                             │
   │                             │
   │                             │
   └─────────────────────────────┘

                                          ┌──────Confirm──────┐
                                          └───────────────────┘
```

Figure 4-173 File header information window

If the file name is too long to display the full name, set the focus on the file name, and then press the right-arrow key on the keyboard to scroll the information.

(3) Saving the file
In the Data send/receive window, clicking the **Save** button displays the Save window.
This window shows the header information of the file selected in the Data send/receive window, and allows you to save data of the area indicated by addresses in the file.

<Operation>

[1] In the Data send/receive window, select the file to be saved, and then click the **Save** button.

[2] The Save window (Figure 4-174) appears.

```
Save                                                    ×

 Overwrite to existing
                                       ┌Address─────────────┐
  File name        :  FileName.wvel    │  H78100000 - H78100386 │
  PCs number       :  0001             │  H78000000 - H78003FC6 │
  PCs type         :  H001E            │  H00408000 - H004087FE │
  Creating date    :  18-12-02         │  H004EF800 - H004EFFFE │
  File size        :  1064             │  H004A8000 - H004AAFFE │
                                       │  H0044DC00 - H0044E7FE │
                                       │  H004FF300 - H004FFEFE │
                                       │  H78200000 - H782FFFFE │
                                       │                        │
                                       │                        │
                                       │                        │
                                       │                        │
 ┌Comment─────────────┐                │                        │
 │                    │                │                        │
 │                    │                │                        │
 │                    │                │                        │
 │                    │                │                        │
 │                    │                └────────────────────────┘
 └────────────────────┘          ┌──────┐    ┌──────┐
                                  │  OK  │    │Cancel│
                                  └──────┘    └──────┘
```
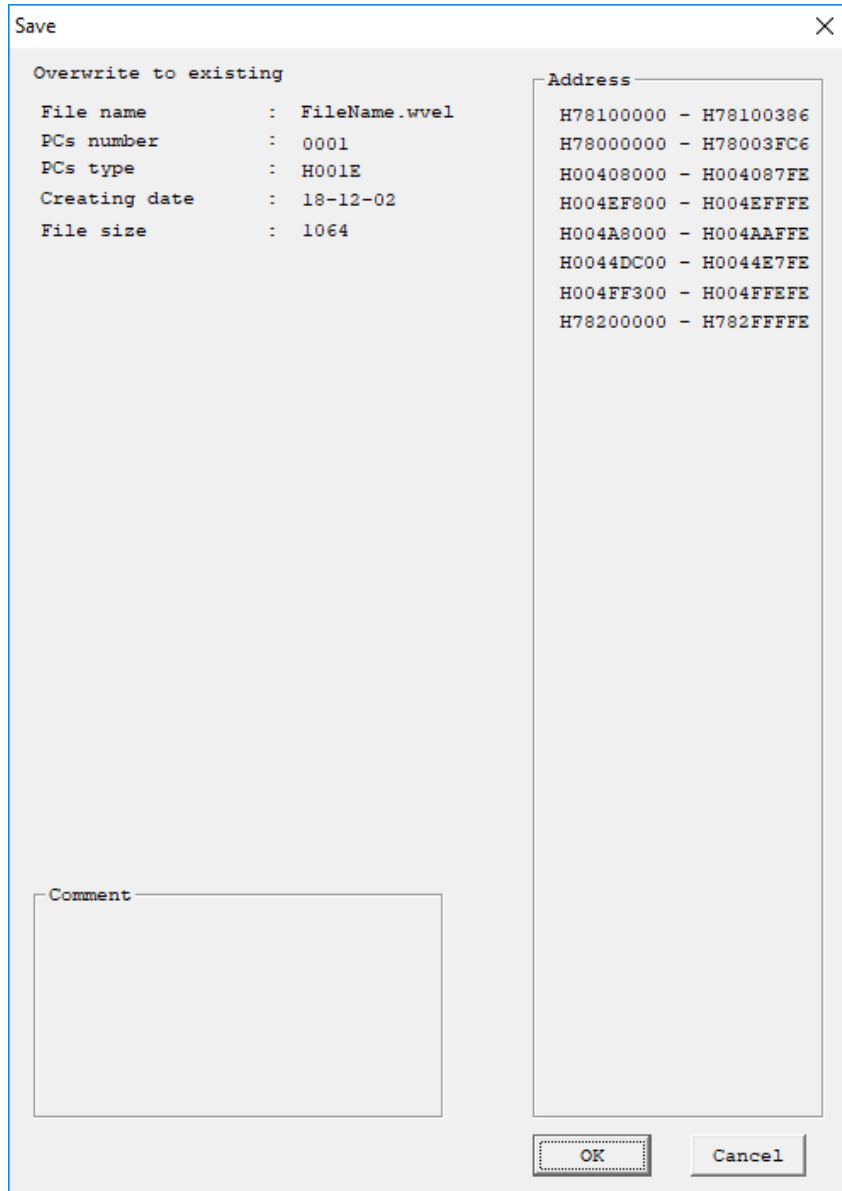
Figure 4-174 Save window

[3] To close the Save window without saving data, click the **Cancel** button.

[4] To save the file, click the **OK** button. The Receive file window appears and saving starts.
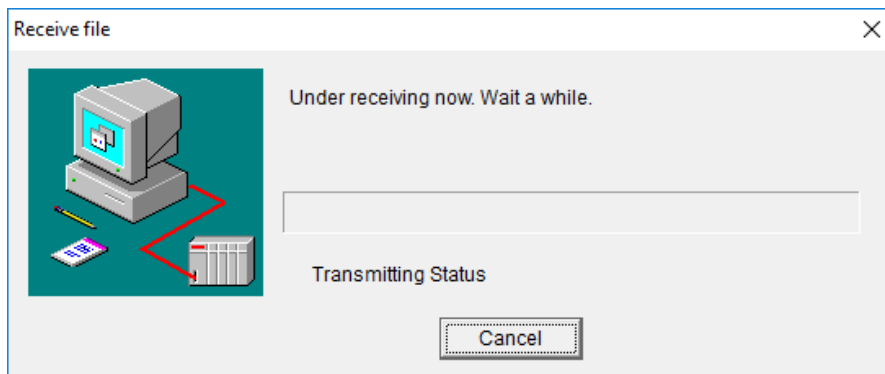
Figure 4-175 Receive file window

[5] After the **OK** button is clicked in the Save window, if the PCs number of the file being saved is different from the receive-source PCs number, the following message appears.
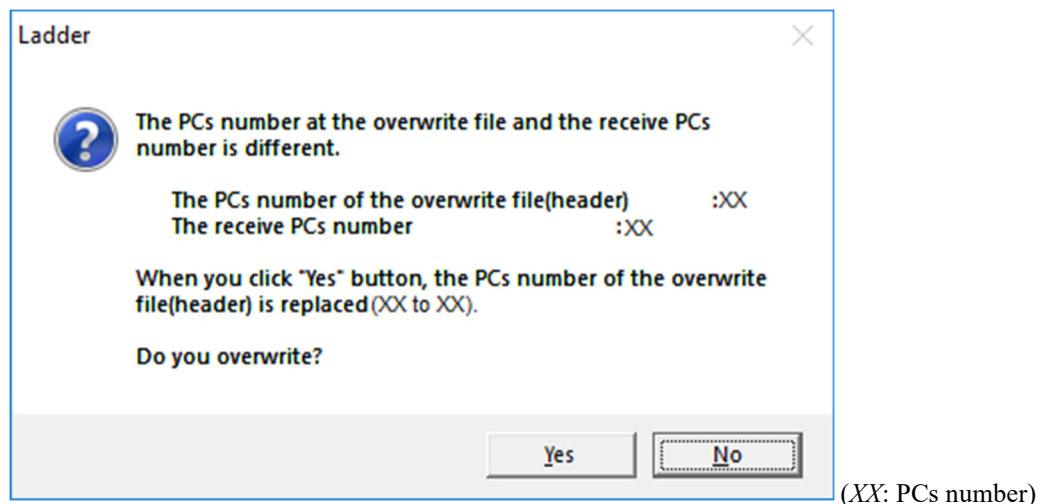
(*XX*: PCs number)

Figure 4-176 Message indicating PCs number mismatch

Clicking the Yes button closes this dialog box and displays the Receive file window. At this time, the PCs number of the file being saved changes to the receive-source PCs number.
Clicking the **No** button redisplays the Save window.

[6] After the **OK** button is clicked in the Save window, if the size of the ladder program, user function, or I/O comment differs between the file to be saved and the receive source, the following message appears.

○○○○○○○○○○: Ladder program, user function, or I/O comment
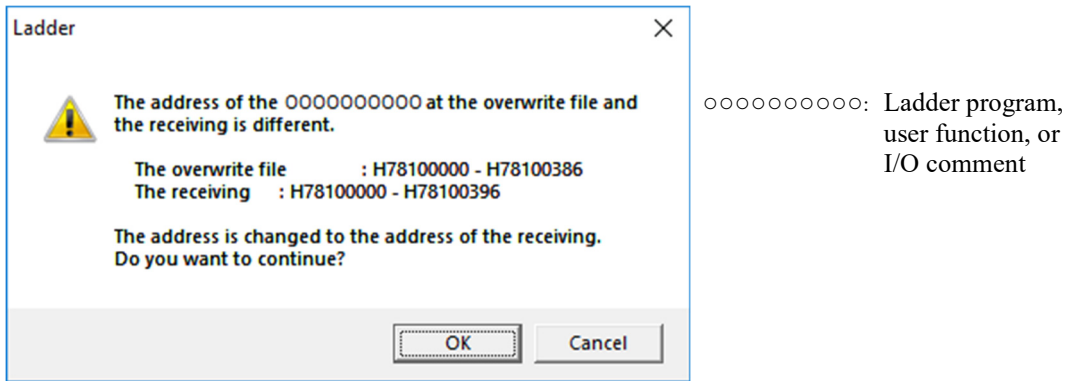
Figure 4-177 Message indicating address mismatch

Clicking the **OK** button closes this dialog box and displays the Receive file window.
Clicking the **Cancel** button redisplays the Save window.

[7] When the file is received, the message `Receiving terminated` appears. Click the **OK** button to redisplay the Data send/receive window.
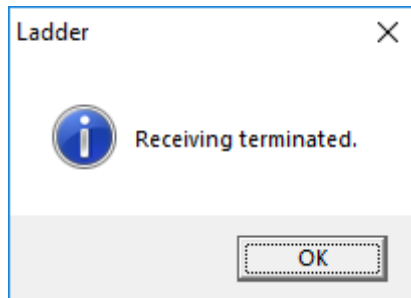
Figure 4-178 [Receiving terminated] message

[8] To cancel the ongoing reception, click the **Cancel** button in the Receive file window. The message `Stopped` appears. Click the **OK** button to redisplay the Data send/receive window.
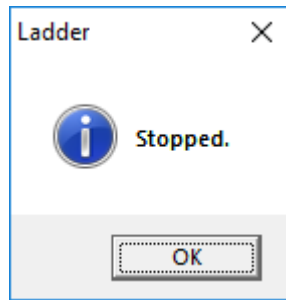
Figure 4-179 [Stopped] message

<Note>

If data is received in *only for online monitor* mode while the system is running in temporary run mode, the following error message appears and data reception is disabled. In this case, resend the ladder program in online mode to recover the temporary run mode to normal run mode.
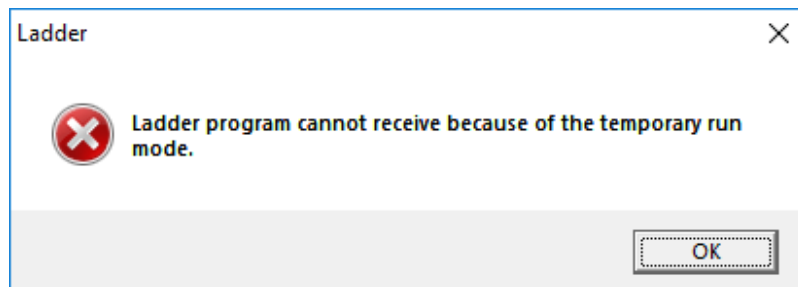
Figure 4-180 Error message indicating reception in temporary run mode (ladder program)

(4) Sending the file
In the Data send/receive window, clicking the **Send** button displays the Send file window.
This window shows the header information of the file selected in the Data send/receive window, and allows you to send the contents of the file to the specified area.

<Operation>
[1] In the Data send/receive window, select the file to be sent, and then click the Send button.
[2] The Send file window (Figure 4-181) appears.

```
Send file                                                                            ×

  Going to send file below.              ┌Current address──────────┐  ┌New address──────────┐
  File name        : FileName.wvel         H78100000 - H781FFFFE      [78100000] - H781FFFFE
  PCs number       : 0001                  H78000000 - H78003FC6      [78000000] - H78003FC6
  PCs type         : H001E                 H00408000 - H004087FE      [00408000] - H004087FE
  Creating date    : 18-12-04              H004EF800 - H004EFFFE      [004EF800] - H004EFFFE
  File size        : 2445 KByte            H00400200 - H004003FE      [00400200] - H004003FE
                                           H00400800 - H00400DFE      [00400800] - H00400DFE
  ┌I/O comment────────────────────┐        H00401000 - H00401BFE      [00401000] - H00401BFE
  │                                │        H00401E00 - H00401E7E      [00401E00] - H00401E7E
  │   □ I/O comment send           │        H00402000 - H00403FFE      [00402000] - H00403FFE
  │                                │        H00441000 - H0044AFFE      [00441000] - H0044AFFE
  │                                │        H00412000 - H00413FFE      [00412000] - H00413FFE
  └────────────────────────────────┘        H00430000 - H0043FFFE      [00430000] - H0043FFFE
                                           H00450000 - H00471FFE      [00450000] - H00471FFE
  ┌Log of Ladder program──────────┐        H00490000 - H004A7FFE      [00490000] - H004A7FFE
    Date of send  2018-12- 4 17:25:30      H004A8000 - H004AAFFE      [004A8000] - H004AAFFE
   ┌Comment──────────────────────┐         H0044DC00 - H0044E7FE      [0044DC00] - H0044E7FE
   │                              │         H004FF300 - H004FFEFE      [004FF300] - H004FFEFE
   │                              │
   │                              │
   │                              │
   │                              │
   │                              │
   └──────────────────────────────┘

  ┌NE0-NFF coil───────────────────┐
  │   ☑ Send NE0-NFF coil          │
  │                                │
  │     H78200000 - H782FFFFE       │
  └────────────────────────────────┘

                                              [    OK    ]     [  Cancel  ]
```
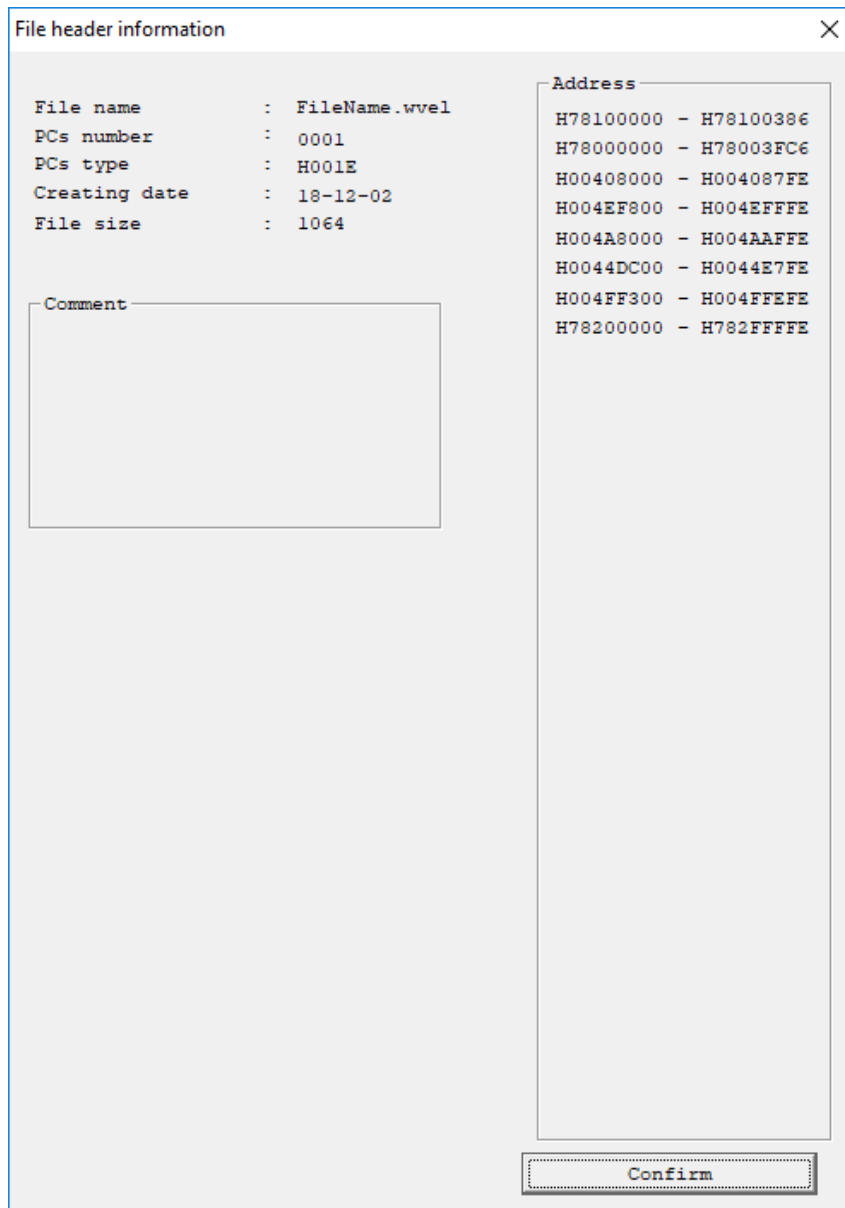
Figure 4-181 Send file window

[3] To close the Send file window without sending the file, click the **Cancel** button.

[4] To send the file, click the **OK** button. The following Send file window appears and transmission starts.
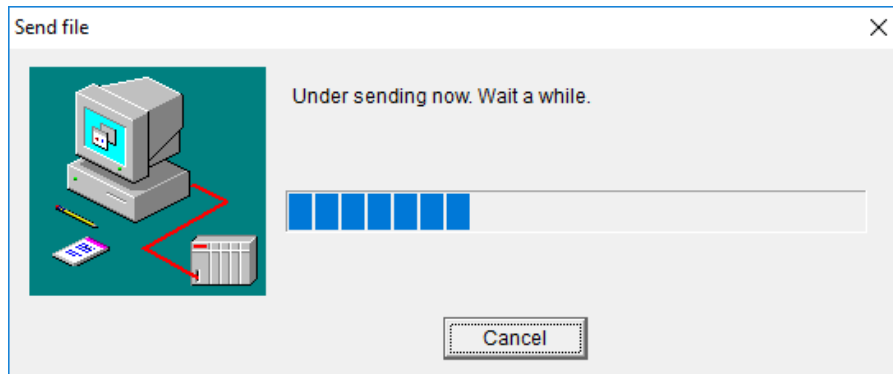
Figure 4-182 Window showing a send file message

[5] After the **OK** button is clicked in the Send file window (Figure 4-181), if the PCs number of the file is different from the PCs number of the destination in offline mode, the following message appears.
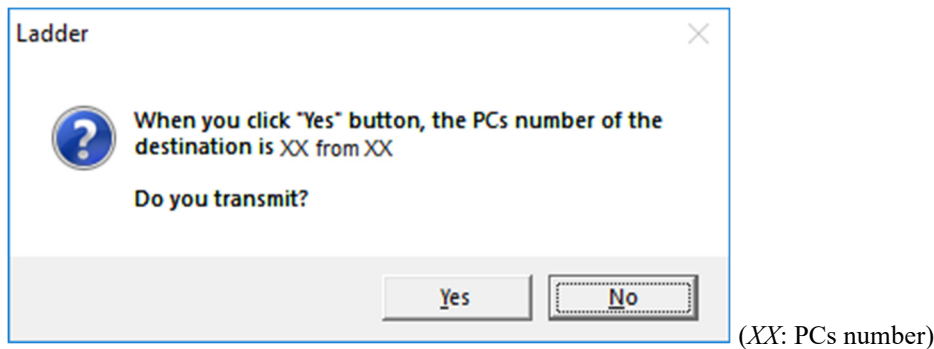
(*XX*: PCs number)

Figure 4-183 Message indicating that the PCs number will be changed

Clicking the **Yes** button closes this dialog box and continues transmission.
At this time, if the PCs number of the open file in the destination ladder diagram system is not 9999, the PCs number of that open file changes to the PCs number of the sent file.
Clicking the **No** button terminates transmission and redisplays the Data send/receive window.

[6] After the **OK** button is clicked in the Send file window (Figure 4-181), the ladder program area definition is compared between the file and the destination. If the NE0 to NFF definitions are different, the following warning message appears to indicate a ladder area size mismatch. Click the **OK** button to continue transmission. Clicking the **Cancel** button terminates the transmission and redisplays the Send file window (Figure 4-181).
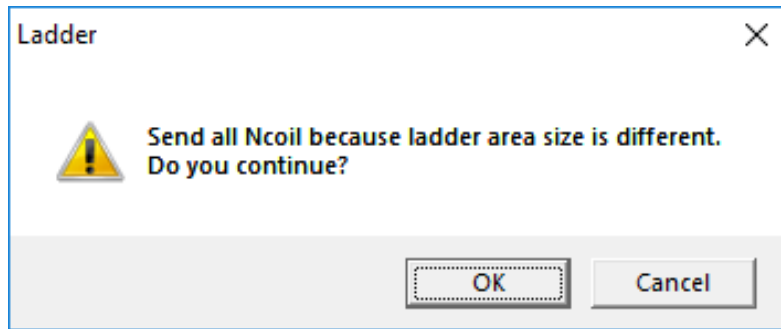
Figure 4-184 Warning message for ladder area size mismatch

[7] In online mode, if any of the following items in PCs edition information in the PCs edition window (Figure 4-144) for the file being sent differs from the information of PCs, a PCs reset warning message appears.

- **Sequence cycle time**
- **Watch dog timer**
- **Setup PI/O** (**PI/O**, **Partition**, **Out module hold**, and **Slot points**)
- **Setup RI/O** (**PI/O mode**, **Optical adapter connection**, and **Remote I/O points**)
- **Ladder RUN delay count** and **Invalid ladder RUN**
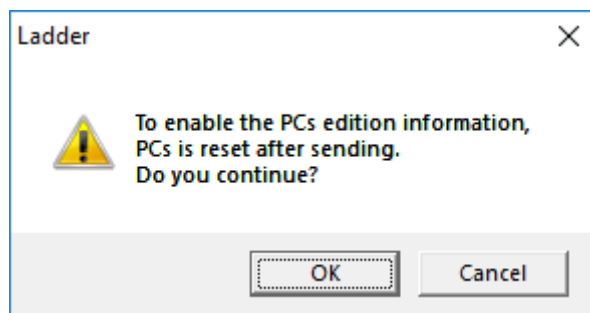
Figure 4-185 PCs reset warning message

Clicking the **OK** button closes this warning message and continues transmission.
Clicking the **Cancel** button terminates transmission and redisplays the Data send/receive window.

[8] In online mode, if the HI-FLOW area (H7C00 0000 to H7C7F FFFE) is included in the transmission area without a PCs reset warning message, the warning message `To enable the HI-FLOW, PCs is reset after sending` appears.
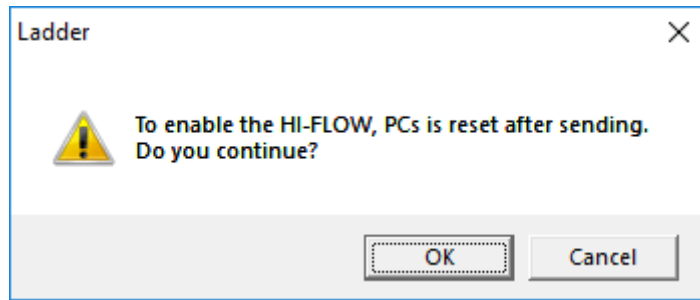
Figure 4-186 [To enable the HI-FLOW, PCs is reset after sending] warning message

Clicking the **OK** button closes the warning message and continues transmission.
Clicking the **Cancel** button terminates transmission and redisplays the Data send/receive window.

[9] When the PCs reset warning message is not displayed in online mode, it is likely that an item shown in the Ethernet Communication Setting List window (Figure 4-232) differs from information of PCs, or parameter information is added or deleted. In this case, the following warning message appears. However, this warning message does not appear if the selected file is an S code file or a WVEL file that was saved without clicking the save range button.

- **Module name** (ET1/ET2 or CH1/CH2)
- **Communication mode** (TCP/UDP)
- **Self-port No.**
- **Other port No.**
- **Other IP address**
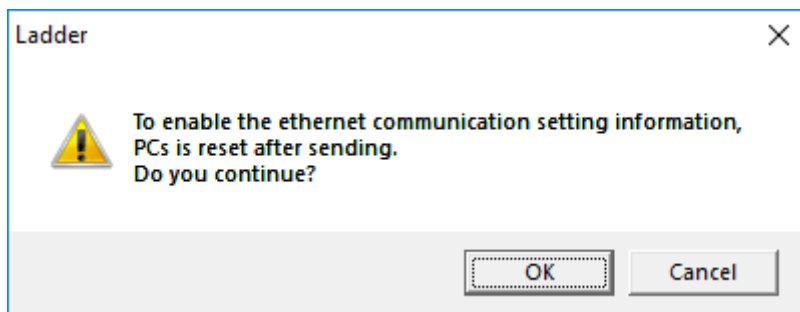
Figure 4-187 Warning message about resetting PCs after sending Ethernet communication setting information

Clicking the **OK** button closes this message and continues transmission.
Clicking the **Cancel** button terminates transmission and redisplays the Data send/receive window.

Notice
If an S code file is sent by specifying destination addresses in the range from H004A 8000 to H004A A3FE, the ladder program's Ethernet communication instruction might no longer be activated by setting the ladder switch to RUN. If this happens, reset the PCs or perform a power-on reset.

[10] When transmission is completed, the message `Sending terminated` appears. Clicking the **OK** button redisplays the Data send/receive window.
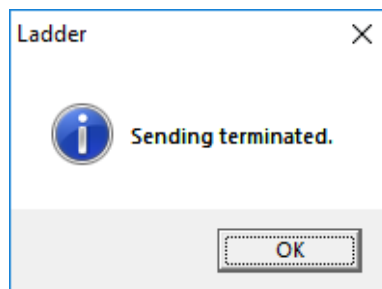
Figure 4-188 [Sending terminated] message

[11] To cancel the ongoing transmission, click the **Cancel** button in the Send file window. The message `Stopped` appears. Clicking the **OK** button redisplays the Data send/receive window.
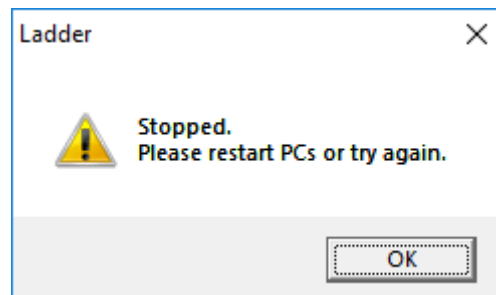
Figure 4-189 [Stopped] message

If transmission is cancelled, the PCs ladder program and other data that are being sent are suspended. Therefore, you must perform a power-on reset after cancellation to restore the state before transmission, or resend the suspended data. Note that the state before transmission is not restored by resetting the PCs.

[12] If data communication fails due to, for example, line disconnection while the ladder program is being sent, a line error message appears. Revise the connection with the S10VE, and then click the **Retry** button. If you click the **Cancel** button when the area to be sent contains a ladder area, a message indicating a failure in sending the ladder program appears, and transmission is aborted. Furthermore, when you close the Data send/receive window and redisplay the main window, the displayed run mode has changed to temporary run mode.
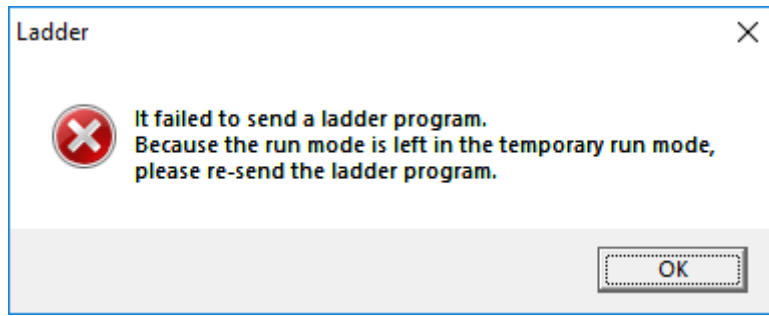
Figure 4-190 Message indicating a failure in sending the ladder program

Table 4-24 Ladder areas

No.	Area name	Address range
1	Ladder sequence area	H7800 0000 to H787F FFFE
2	User function area	H7B00 0000 to H7B1F FFFE

[13] After the ladder program is sent, if an inconsistency (SUM check error) is found in the ladder program, the message `Ladder Area Sum Mismatch` appears and transmission is aborted.
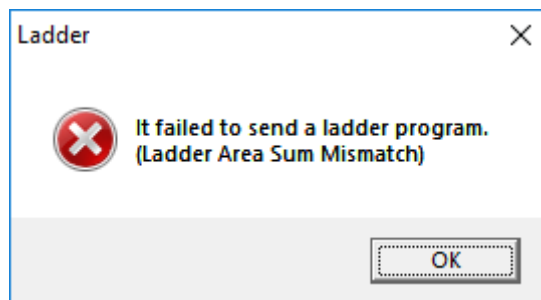
Figure 4-191 [Ladder Area Sum Mismatch] message

[14] After the ladder program is sent, if an attempt to write the ladder program to flash memory fails due to, for example, line disconnection, a line error message appears. Revise the connection with the S10VE, and then click the **Retry** button. If you click the **Cancel** button, a message indicating a failure in rewriting flash memory and a message indicating a failure in sending the ladder program appear, and transmission is aborted. Furthermore, when you close the Data send/receive window and redisplay the main window, the displayed run mode has changed to temporary run mode.
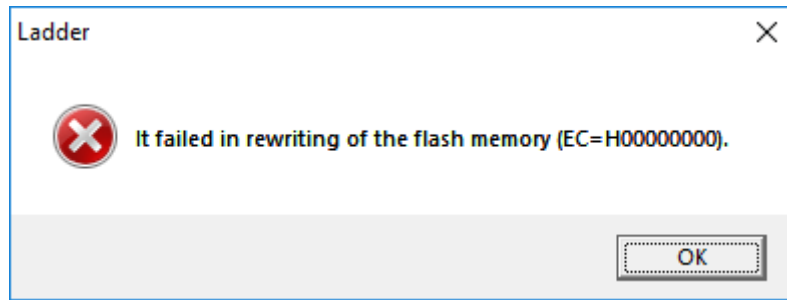
Figure 4-192 Flash-memory rewrite failure message

[15] Transmission is not possible while the PCs are in RUN state in online mode. The message `PCs is under RUN status` appears and transmission is aborted. Clicking the **OK** button redisplays the Data send/receive window.
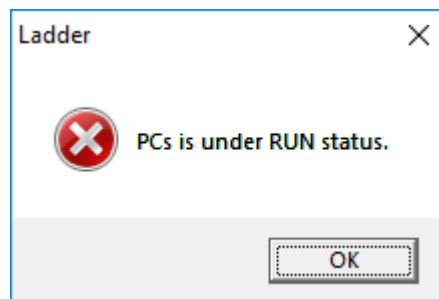
Figure 4-193 Message indicating that PCs are in the RUN state

Notice
After file transmission failed due to line disconnection or other reasons, if a file containing inconsistent ladder area has been successfully sent, the ladder program enters normal run mode without changing to temporary run mode. Running the ladder program in this state will cause malfunction. You need to resend the consistent due file.

(5) File comparison

In the Data send/receive window, clicking the **Compare** button displays the Compare file window.
This window shows the header information of the file selected in the Data send/receive window, and allows you to compare the file information with the memory data in the specified area.

<Operation>

[1] In the Data send/receive window, select the file to be compared, and then click the **Compare** button.

[2] The Compare file window (Figure 4-194) appears.

Compare file				✕

Going to compare file below.

		Current address	New address
File name	: FileName.wvel	H78100000 – H781FFFFE	78100000 – H781FFFFE
PCs number	: 0001	H78000000 – H78003FC6	78000000 – H78003FC6
PCs type	: H001E	H00408000 – H004087FE	00408000 – H004087FE
Creating date	: 18-12-04	H004EF800 – H004EFFFE	004EF800 – H004EFFFE
File size	: 2445 KByte	H00400200 – H004003FE	00400200 – H004003FE
		H00400800 – H00400DFE	00400800 – H00400DFE

I/O comment

☐ I/O comment send

Current address	New address
H00401000 – H00401BFE	00401000 – H00401BFE
H00401E00 – H00401E7E	00401E00 – H00401E7E
H00402000 – H00403FFE	00402000 – H00403FFE
H00441000 – H0044AFFE	00441000 – H0044AFFE
H00412000 – H00413FFE	00412000 – H00413FFE
H00430000 – H0043FFFE	00430000 – H0043FFFE

Log of Ladder program

Date of send   0- 0- 0   0: 0: 0

Comment

Current address	New address
H00450000 – H00471FFE	00450000 – H00471FFE
H00490000 – H004A7FFE	00490000 – H004A7FFE
H004A8000 – H004AAFFE	004A8000 – H004AAFFE
H0044DC00 – H0044E7FE	0044DC00 – H0044E7FE
H004FF300 – H004FFEFE	004FF300 – H004FFEFE

NE0-NFF coil

☑ Compare NE0-NFF coil

H78200000 – H782FFFFE

OK   Cancel

Figure 4-194 Compare file window

[3] To close the Compare file window without performing comparison, click the **Cancel** button.

[4] To perform comparison, click the **OK** button. The following Compare file window appears and comparison starts.
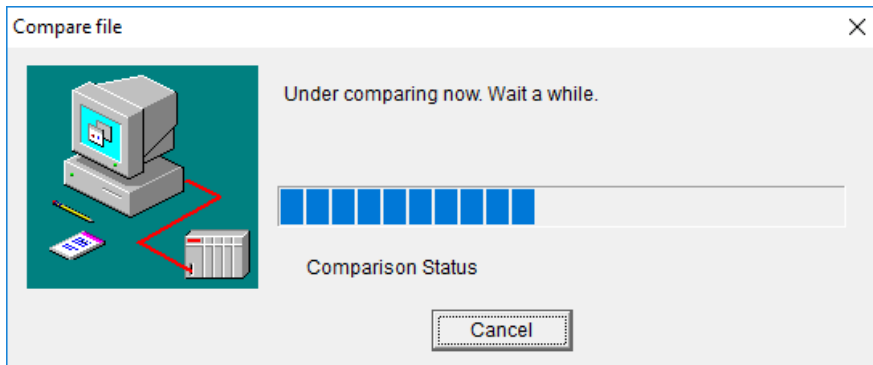
Figure 4-195 Compare file window

[5] If no difference is found between memory contents and file data at completion of comparison, the message `Compare terminated with no disagreement` appears. Clicking the **OK** button redisplays the Data send/receive window.
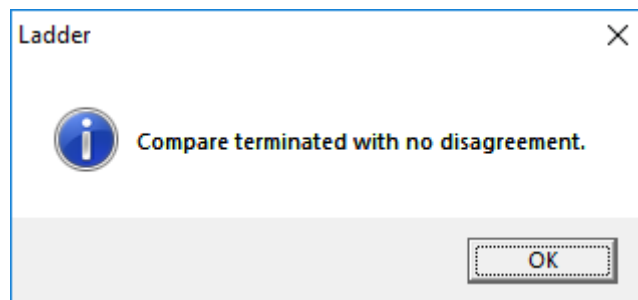
Figure 4-196 [Compare terminated with no disagreement] message

[6] If a difference is found between memory contents and file data, the Memory contents window appears. You can select the **PCs** or **System file** radio button to show the relevant memory data.
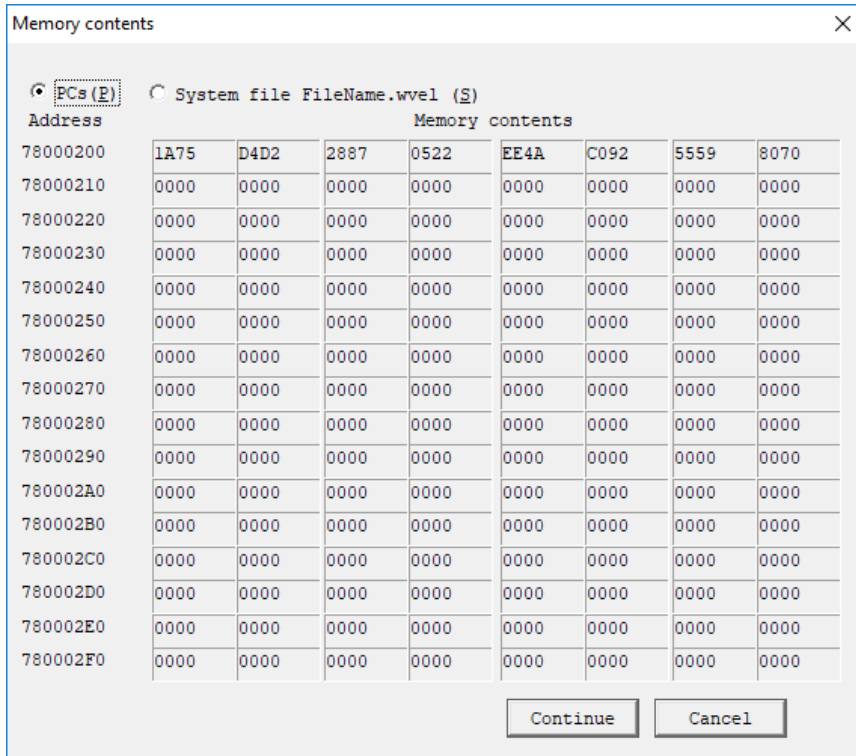
Figure 4-197 Memory contents window

[7] To continue comparison, click the **Continue** button. After that, if comparison is completed with no difference found between memory contents and file data, a message `Compare terminated with disagreement` appears. Clicking the **OK** button redisplays the Data send/receive window.
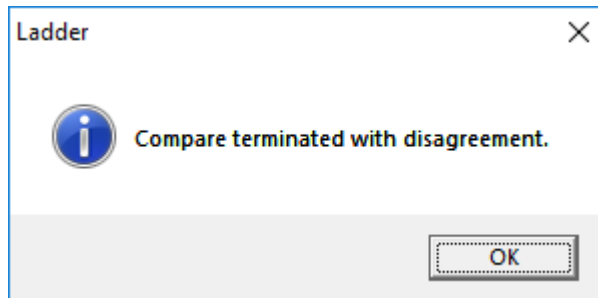
Figure 4-198 [Compare terminated with disagreement] message

[8] To cancel comparison, click the **Cancel** button. The message `Stopped comparison` appears. Clicking the **OK** button redisplays the Data send/receive window.
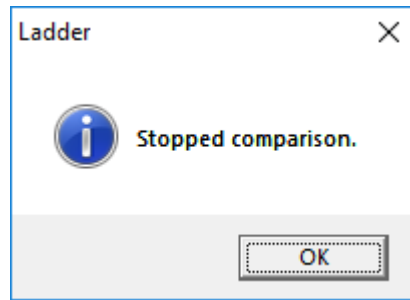
Figure 4-199 [Stopped comparison] message

[9] To cancel ongoing comparison, click the **Cancel** button in the Compare file window. A `Stopped comparison` message (Figure 4-199) appears. Clicking the **OK** button redisplays the Data send/receive window.

(6)   Saving a new file
In the Data send/receive window, clicking the **Save new** button displays the Save new window.
In this window, you can enter a file name and specify the save address to save data in the specified file.

<Operation>

[1] In the Data send/receive window, specify the folder to save the file, and then click the **Save new** button.

[2] The Save new window (Figure 4-200) appears.
The default value set in **PCs number** is as follows: In offline mode, when the ladder diagram system is started from BASE SYSTEM/S10VE, the default value is the PCs number of the open project in BASE SYSTEM/S10VE. When this system is started from the Windows **Start** menu, the default value is the PCs number of the project that was previously used to start the ladder diagram system or the HI-FLOW system in BASE SYSTEM/S10VE. In online mode, the PCs number of the S10VE is set by default. If necessary, change the PCs number.
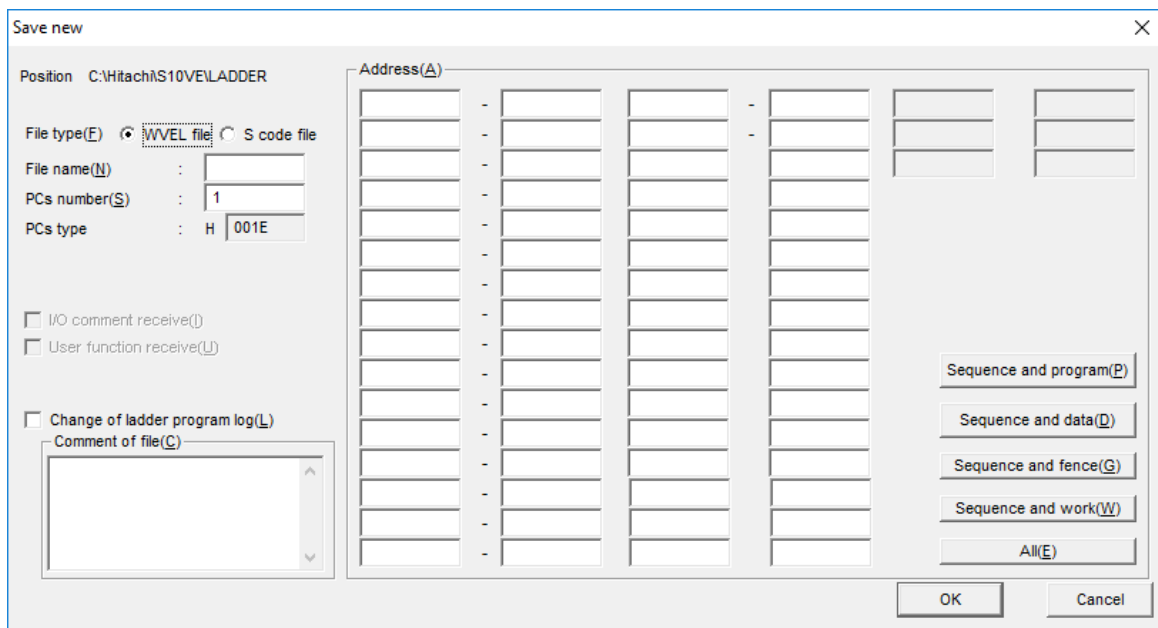
Figure 4-200 Save new window

[3] To close the Save new window without saving the file, click the **Cancel** button.

[4] To save the file, select an option for **File type**, and then enter information in the **File name** and **Address** text boxes. Clicking any of the buttons **Sequence and program** to **All** sets the address of the relevant area.
Set other necessary items, and then click the **OK** button. The Receive file window (Figure 4-175) appears, and then saving starts.
If the specified file already exists, a warning message appears before saving starts, asking you whether you want to overwrite the existing file.
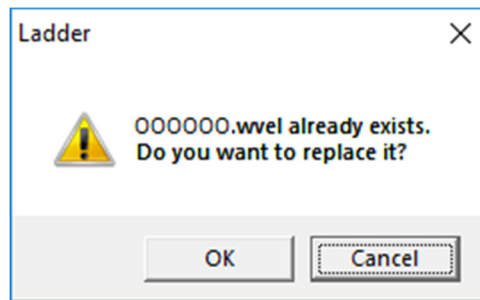
Figure 4-201 Overwrite warning message

Clicking the OK button starts saving. Clicking the Cancel button redisplays the Save new window.
In addition, the ladder diagram system is prohibited to set the PCs number of the S10VE. Therefore, if the specified address contains the PCs number area (H004E7010), the following error message appears.
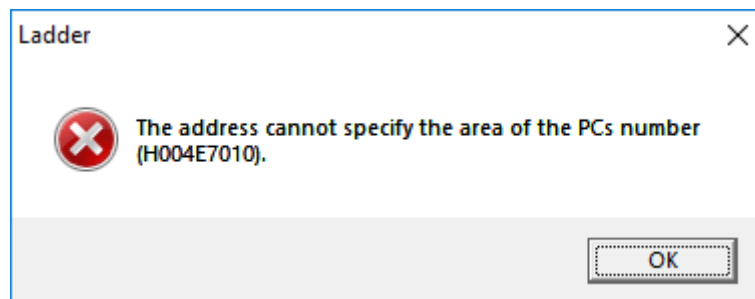
Figure 4-202 Error message about PCs number address specification

Clicking the OK button redisplays the Save new window.

[5] When receiving is terminated, the message `Receiving terminated` (Figure 4-178) appears. Clicking the **OK** button redisplays the Data send/receive window.

[6] To cancel the ongoing reception, click the **Cancel** button in the Receive file window. The message `Stopped` (Figure 4-179) appears. Clicking the **OK** button redisplays the Data send/receive window.

<Note>

If data is received in *only for online monitor* mode while the system is running in temporary run mode, the following error message appears and data reception is disabled. In this case, resend the ladder program in online mode to recover the temporary run mode to normal run mode.
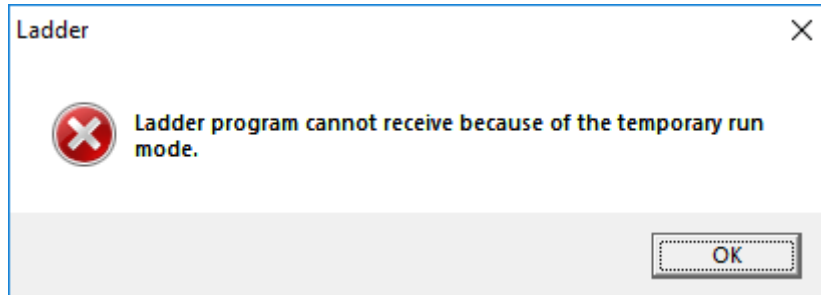
Figure 4-203 Error message indicating reception in temporary run mode (ladder program)

4.7.12 Registering user functions

(1) Procedure

The following shows the procedure for registering user functions.

```
                          ▽

          ┌─────────────────────────────────────┐
          │   Create a user function program.   │
          └─────────────────────────────────────┘

          ┌─────────────────────────────────────┐
          │ Compile the created user function   │
          │             program.                │
          └─────────────────────────────────────┘

          ┌─────────────────────────────────────┐
          │ Allocate a user function loading area.#│
          └─────────────────────────────────────┘

          ┌─────────────────────────────────────┐
          │ Register the compiled user function │
          │             program.                │
          └─────────────────────────────────────┘

                          △
```
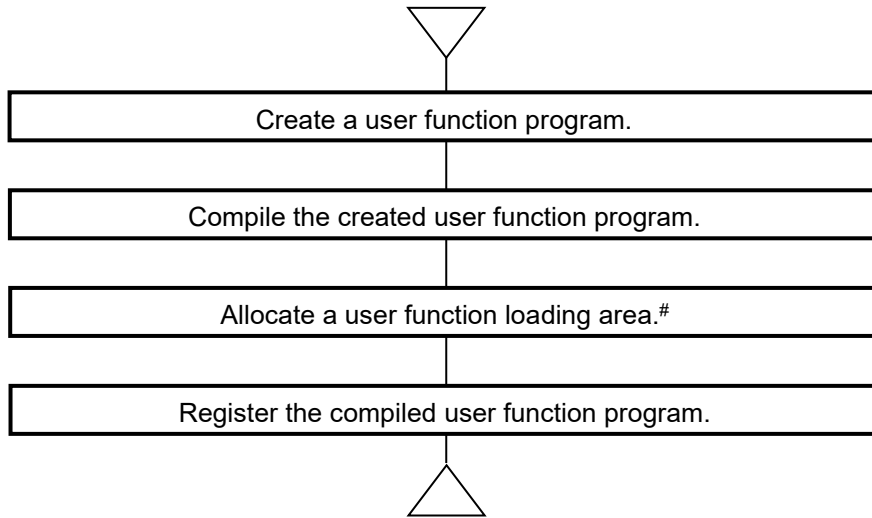
#: Skip this step if a user function loading area is already allocated.

(2) Creating user function programs

Create user function programs in C.

Observe the following rules when creating a user function program:

- Parameters specified for the user function of the ladder program can be acquired as arguments of the user function program.
- You can specify one to four parameters for a user function.
- A parameter consists of one or two steps. Because one step must be a long size, the user function program must acquire parameters with the long-type pointer.
- When extracting parameters, mask the necessary part of parameters according to Table *4-25 Operation Function Parameters*.
- To access the PI/O-RAM, use system bus addresses, which can be referenced by MCS.

The following shows an example of coding a user function program.

Source name: `testFunc.c`

Number of parameters: 4

- Parameter 1: Longword-type numeric value
- Parameter 2: Longword-type register
- Parameter 3: Float-type numeric value
- Parameter 4: Word-type index specification

```
void  testFunc( long *para  )
 {
     long paraImm;                                       /* Parameter 1 (Longword-type numeric
                                                             value) */

     long* paraReg;                                      /* Parameter 2 (Longword-type register) */
     long paraFlt;                                       /* Float-type numeric value fetch work */
     float flImm;                                        /* Parameter 3 (Float-type numeric value) */
     short* paraBaseReg;                                 /* Parameter 4 (Base register) */
     short* paraIndexReg;                                /* Parameter 4 (Index register)*/


     /* Parameter 1 fetch processing (longword-type numeric value) ----------------------------------- */
     paraImm = ( *para & 0x0000ffff ) << 16 ;            /* Fetch upper word */
     para++ ;                                            /* Move to next step  */
     paraImm |= ( *para & 0x0000ffff ) ;                 /* Fetch lower word */
     para++ ;                                            /* Move to next parameter */


     /* Parameter 2 fetch processing (longword-type register) ------------------------------------------ */
     paraReg = ( long* )( *para & 0x007fffff );          /* Fetch system bus address */
     para++ ;                                            /* Move to next parameter */


     /* Parameter 3 fetch processing (float-type numeric value) ---------------------------------------- */
     paraFlt = ( *para & 0x0000ffff ) << 16 ;            /* Fetch upper word */
     para++ ;                                            /* Move to next step */
     paraFlt |= ( *para & 0x0000ffff ) ;                 /* Fetch lower word */
     para++ ;                                            /* Move to next parameter */
     memcpy(&flImm , &paraFlt ,sizeof(float));           /* Copy value to a float-type variable to use
                                                             the acquired value as float-type numeric
                                                             value */


     /* Parameter 4 fetch processing (word-type index specification) ----------------------------------- */
     paraBaseReg = ( short* )( *para & 0x007fffff );     /* Fetch system bus address of base
                                                             register */

     para++ ;                                            /* Move to next step */
     paraIndexReg = ( short* )( *para & 0x007fffff );    /* Fetch system bus address of index
                                                             register */
```

```
    /* User-specific processing  ----------------------------------------------------------------------*/
    if( flImm < 1.0 ) {                              /* Judge float-type numeric value */
        return;                                      /* Terminate processing */
    }
    *paraReg = paraImm;                              /* Assign longword-type numeric value to
                                                        longword-type register */
    paraBaseReg[*paraIndexReg] = 0x1234;             /* Assign to word-type index register */


    return;                                          /* Terminate processing */
}
```

Table 4-25 Operation Function Parameters

No.	Classification	Number of steps	31	30	29	28	27-24	23	Data / Address field	Remarks
1	Word immediate data (hexadecimal)	1	1	0	0	0	0x8	0	[19-16] Unused; [15-0] Word data	
2	Word immediate data (decimal)	1	1	0	0	0	0x8	1	[19-16] Unused; [15-0] Word data	
3	Longword immediate data (hexadecimal)	2	1	0	0	0	0x7 / 0x7	0 / 2	Unused; Upper-word data / Lower-word data	
4	Longword immediate data (decimal)	2	1	0	0	0	0x7 / 0x7	1 / 3	Unused; Upper-word data / Lower-word data	
5	Floating immediate data	2	1	0	0	0	0x6 / 0x6	4 / 6	Unused; Upper-word data / Lower-word data	
6	Word address direct	1	1	0	0	0	0xF	0	System bus address (0x000000 to 0x7FFFFF)	
7	Word address indirect	1	1	0	0	0	0xE	0	System bus address (0x000000 to 0x7FFFFF)	BW specified
8	Longword address direct	1	1	0	0	0	0xD	0	System bus address (0x000000 to 0x7FFFFF)	
9	Longword address indirect	1	1	0	0	0	0xC	0	System bus address (0x000000 to 0x7FFFFF)	BL specified
10	Floating address direct	1	1	0	0	0	0xB	0	System bus address (0x000000 to 0x7FFFFF)	
11	Word address index specification xxxx(yyyy)	2	1	0	0	0	0xF / 0xC	1 / 1	System bus address (0x000000 to 0x7FFFFF)	xxxx / yyyy
12	Longword address index specification xxxx(yyyy)	2	1	0	0	0	0xE / 0xC	1 / 1	System bus address (0x000000 to 0x7FFFFF)	xxxx / yyyy
13	Floating address index specification xxxx(yyyy)	2	1	0	0	0	0xD / 0xC	1 / 1	System bus address (0x000000 to 0x7FFFFF)	xxxx / yyyy
14	Index specification W(xxxx)	1	1	0	0	0	0xB	1	System bus address (0x000000 to 0x7FFFFF)	
15	Index specification L(xxxx)	1	1	0	0	0	0xA	1	System bus address (0x000000 to 0x7FFFFF)	
16	Index specification F(xxxx)	1	1	0	0	0	0x9	1	System bus address (0x000000 to 0x7FFFFF)	

☐ : Used by users

(3) Compiling user function programs

Compiling a user function program requires the SuperH RISC engineC/C++ compiler V9.04. By using this compiler, you can compile the coded user function, convert the generated object into S code file format, and output the result. The following shows a simple compilation procedure based on command lines.

```
C:¥> shc testFunc.c                                          Compilation

C:¥> optlnk -start=P/7B000000  testFunc.obj  -fo=stype  -lib=libsh4nbmzz.lib   Conversion into
                                                             S code file
                                     Object file name        format
                                Starting address of the loading destination area#

C:¥> dir
    TestFunc.mot
```

For details about how to use the compiler, refer to the manual for SuperH RISC engineC/C++ Compiler V9.04.

#: For the starting address of the loading destination area, specify the starting address calculated in *(6) Finding the address range of the user function loading area*.

(4) Allocating a user function loading area

Before you register the created user function, you must allocate a user function loading area according to *4.7.9 Setting PCs edition information*. If a user function loading area has not been allocated, an attempt to display the User operation function registration window causes the following error message dialog box to appear.
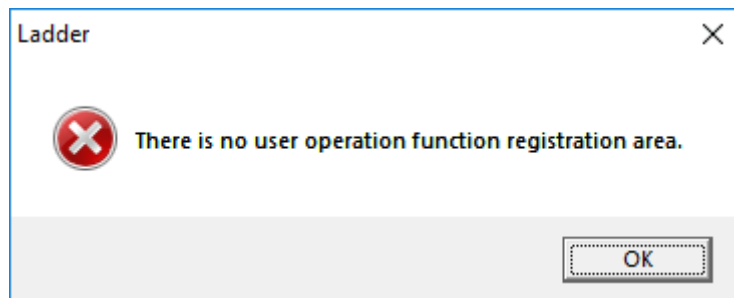
Figure 4-204 Error message when no user function loading area is allocated

(5) Registering user functions

Register the user function in the User function setup window (Figure 4-205).

Figure 4-205 User function setup window

You can register a maximum of 128 user functions (provided that you have allocated the area for 128 user functions in the PCs edition window). Every operation function (system function, system extension function, or user function) must be assigned a unique name. Functions having the same name cannot be registered. For the user function name, you can use uppercase letters, numbers, and underscores (_). Note, however, that this name cannot start with a number.

For **Number of parameters**, set a value in the range from 1 to 4.

In the **Parameter setting** field, set the data type (WORD, LONG or FLOAT) and data kind (value or register) according to values to be acquired.

The **Parameter setting** field shows parameters (**Parameter 1** to **Parameter 4**) only for the specified number of parameters.

The user function program is registered in the user function program area of the CPU module.

<Registration procedure>

[1] From the **Utility** menu, click **UFET**.

[2] The User operation function registration window (Figure 4-206) appears.

Figure 4-206 User operation function registration window

[3] Select the number, and then click the **Setup** button. If the ladder diagram system is running in online mode, this button is disabled (user functions can be registered only in offline mode).

[4] The User function setup window appears. To register a new user function, specify the user function program name, path to the user function program, number of parameters, and data type and data kind of parameters. When the user function program is specified, the transmission address is automatically displayed. If the user function has already been registered and you only want to modify registered information, modify the information without specifying the user function program.
Click the **Setup** button to register the user function.
When registration of the user function terminates normally, the User function setup window is closed. If the registration terminates abnormally, an error message dialog box appears.

<Possible causes of registration failures>

The following table lists the error messages that appear in the event of registration failures, and describes corrective actions to be taken.

Error message	Action
`An operation function name overlaps.`	Assign a unique name to the user function.
`Operation function registration address range excess.`	Revise the addresses of the loading area. The area allocated in the PCs edition window is not large enough.
`An operation function address overlaps.`	Change the loading area addresses so that they do not duplicate with loading area addresses of any other existing user function.
`Please enter an integer between 1 and 4.`	Revise the number of parameters. The specified value is outside the allowed range.

(6) Finding the address range of the user function loading area

The following describes how to find the starting and ending addresses of a user function loading area. Make sure that the user function to be registered fits in this address range. If it does not, use the PCs edition window to increase the size of the user function.

< Starting address of user function loading area>

0x7B000000

<Ending address of user function loading area>

Starting address of user function loading area + user function area size - 2

Example: When the user function area size is 3000 bytes

Starting address: 0x7B000000

Ending address: 0x7B000000 + 3000 - 2

= 0x7B000BB6.

Address range of the user function loading area:

0x7B000000 to 0x7B000BB6

(7)   Deleting registered user functions

To delete registered user functions, use the following procedure.

Note, however, that deleting a registered user function only removes its name and other items from the user function registration table (the user function program itself is not deleted).

<Deletion procedure>

[1] From the **Utility** menu, click **UFET**.

[2] The User operation function registration window (Figure 4-207) appears.
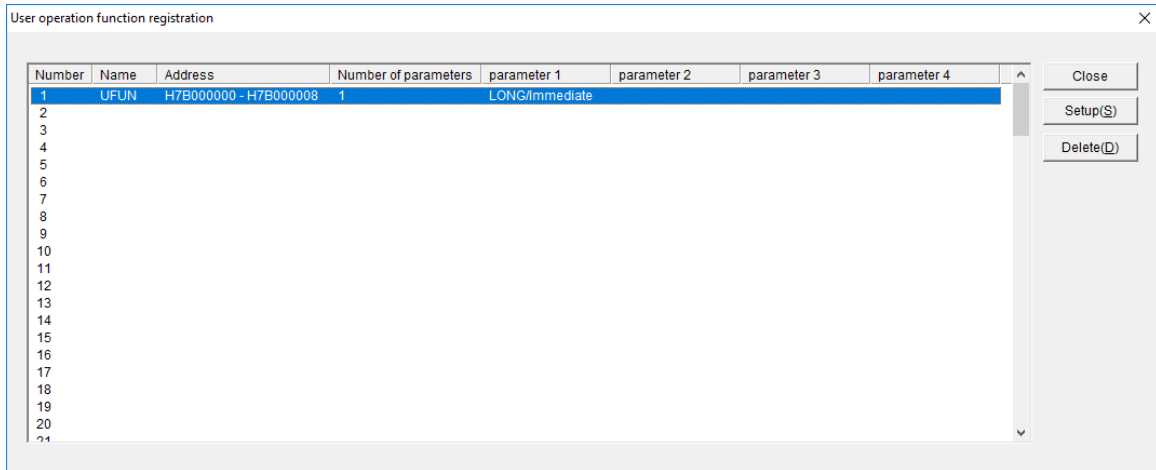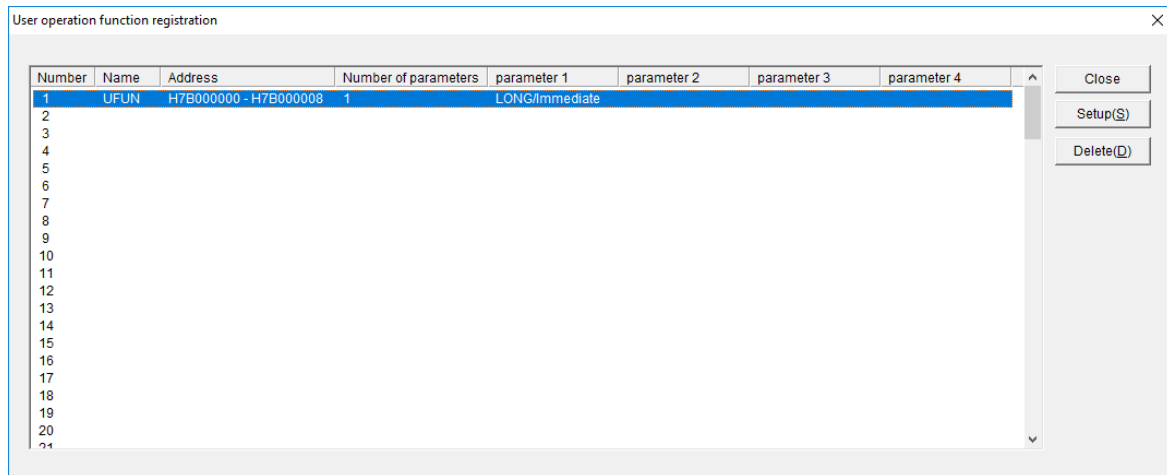

Figure 4-207 Deleting a user function

[3] Select the user function number you wish to delete, and then click the **Delete** button. If the ladder diagram system is running in online mode, this button is disabled (user functions can be deleted only in offline mode).

4.7.13 LPET

This function displays the capacity of ladder programs created for each N coil.

<Operation>

[1] Select **Utility**, and then **LPET**.
    The LPET window opens.

```
LPET                                          ×

    N c... | ADDR       | USED   |        ∧
    000    | H78100000  | 0013
    001    | H7810003C  | ----
    002    | H78100040  | ----
    003    | H78100044  | ----
    004    | H78100048  | ----
    005    | H7810004C  | ----
    006    | H78100050  | ----
    007    | H78100054  | ----
    008    | H78100058  | ----
    009    | H7810005C  | ----
    00A    | H78100060  | ----
    00B    | H78100064  | ----
    00C    | H78100068  | ----
    00D    | H7810006C  | ----
    00E    | H78100070  | ----
    00F    | H78100074  | ----    ∨

  Display by double-clicking
  on corresponding line              Close
```
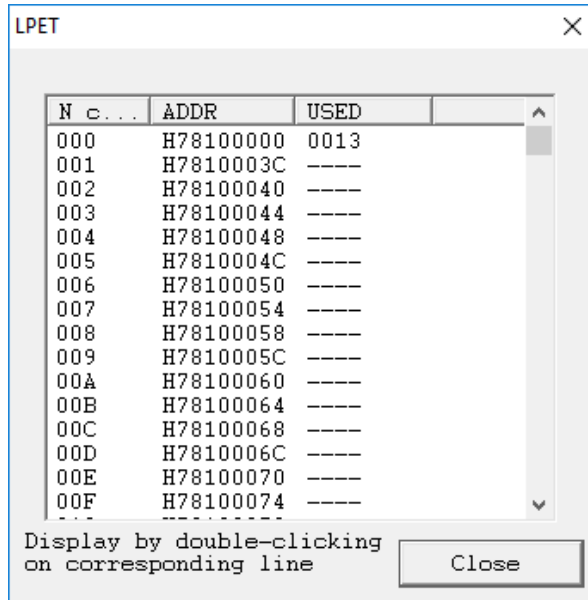
Figure 4-208 LPET window

[2] In the LPET window, you can check the capacity of the desired N coil by using the scroll bar.

[3] Double-clicking the line of an N coil number displays the ladder sheet of that N coil. However, ladder sheets of NE0 to NFF coils are not displayed under the following condition:
   • In the window for Ladder Area Size Change, the area size is defined as one step.

● The number of steps does not include the end instruction (SEND) of each N coil.
● When the program has been modified, you must perform All N coil compile before displaying the program. If not compiled, the program cannot start.
● An instruction contains four bytes per step.
● This function is available in both offline and online modes. Information of the PCs is not displayed, but information on the currently edited circuit is displayed.

4.7.14 Comparing ladder diagrams

The ladder diagram system provides a function that compares two ladder diagrams and displays any differences between them. For example, when changes have been made to a ladder diagram, this function allows the user to confirm the locations of differences from the previous ladder diagram. Make sure that the ladder sheet to be compared is displayed because this function compares the ladder diagram in the displayed ladder sheet with the corresponding ladder instruction file stored. For details about how to display a ladder sheet, see *4.2 Ladder sheet file processing functions*.

Hereafter, the ladder sheet currently displayed on screen is referred to as *on-screen chart*, and the ladder instruction file used as the DIFF target is referred to as *on-disk chart*.

(1)   Operation procedure

(a) Selecting a DIFF target file (on-disk chart)From the **Utility** menu, click **DIFF**, and then **Circuit**. The Circuit DIFF Setting window appears. In the **File Name** text box, enter the file name of an on-disk chart. Then, clicking the **DIFF** button displays the Nesting DIFF list window. Clicking the **Cancel** button closes the window.
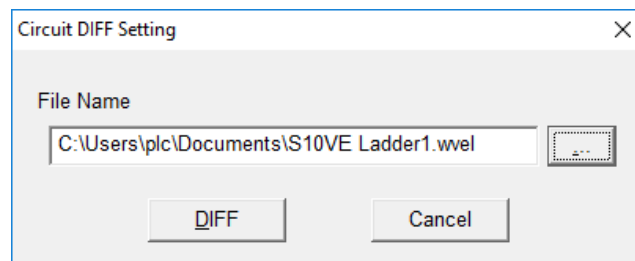
Figure 4-209 Circuit DIFF Setting window

Clicking the **...** button near the right edge of the Circuit DIFF Setting window displays the Open window.
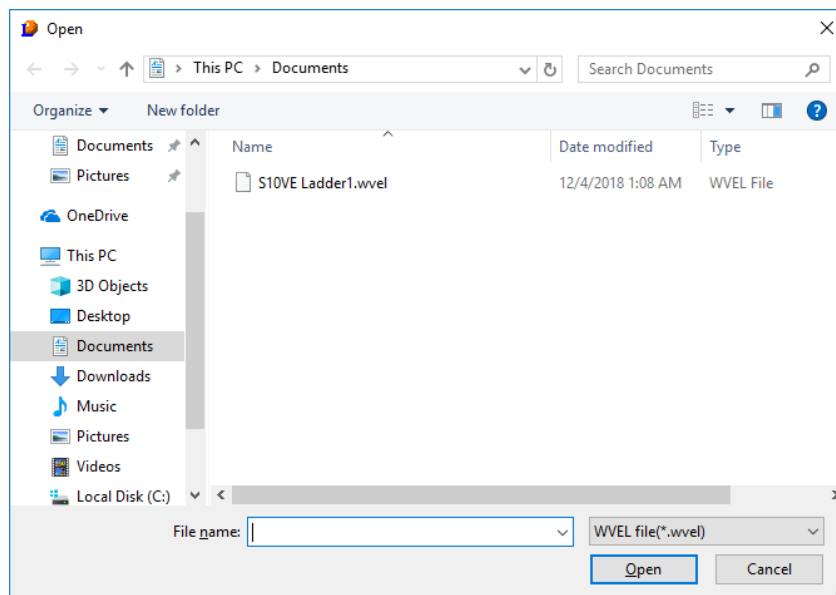
Figure 4-210 Open window

Select a DIFF target file, and then click the **Open** button. The selected file name appears in the **File Name** text box in the Circuit DIFF Setting window.

(b) Nesting DIFF list window

In the Circuit DIFF Setting window, clicking the **DIFF** button closes the Circuit DIFF Setting window and then displays the Nesting DIFF list window, which shows whether differences are detected for each nesting.
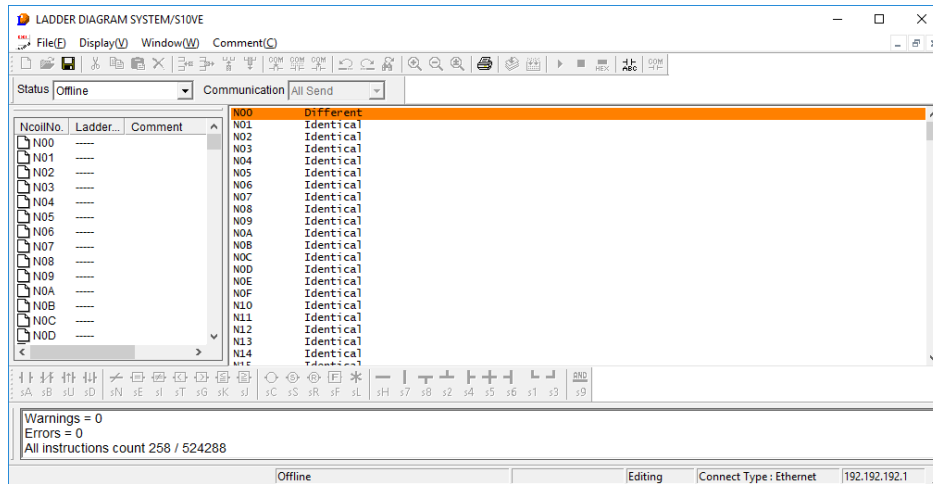
Figure 4-211 Nesting DIFF list window

● Window title

Shows the names of the on-screen and on-disk chart files compared, and the number of nestings in which differences were detected.

● Results of comparison

Shows the results of comparison for each nesting.

No.	Result of comparison	Displayed string	Display color
1	No differences detected or no circuit data is found	`Identical`	White
2	Differences detected	`Different`	Red

To close the Nesting DIFF list window, click the X button on the upper right corner of the window. You can save the results of comparison (nesting differences) in a file in text format by performing the following steps:

[1] Make sure that the Nesting DIFF list window is displayed. From the **File** menu, click **Save file** or **Save file as**, or press the **Ctrl** + **S** keys.

[2] The Save As window appears.

[3] In the Save As window, enter the file name, and then save the file.

(c) Circuit DIFF window

In the Nesting DIFF list window, double-clicking a nesting marked as `Different` displays the Circuit DIFF window, which shows circuits shaded in different colors to indicate whether differences were detected.

Note that the display size of circuit data is fixed to 100% (zooming factor).
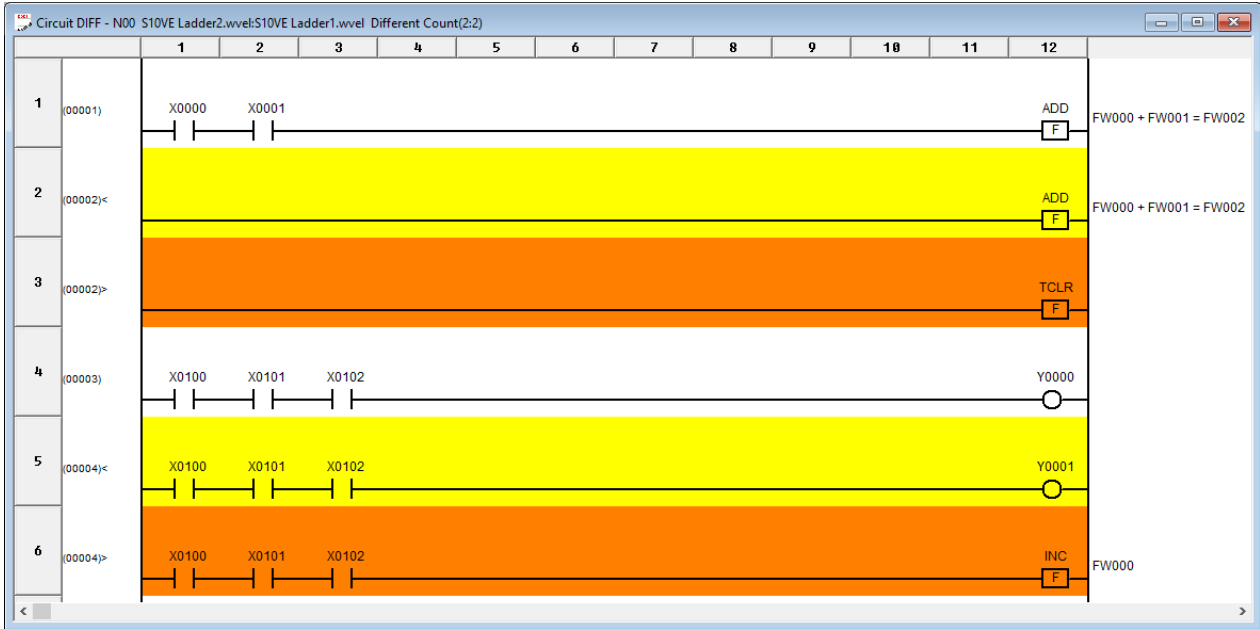
Figure 4-212 Circuit DIFF window

● Window title

Shows the selected nesting number, the names of on-screen and on-disk chart files, and the number of different circuits for each file (indicated in the *on-screen-chart*:*DIFF-target* format).

● Results of comparison

The results of comparison are shaded in different colors. The column near the left edge of the Circuit DIFF window shows the circuit numbers of the compared circuits and the symbols indicating the result of comparison.

No.	Result of comparison	Display color	Circuit number	Symbol
1	Identical lines	White	On-disk	None
2	Non-identical line (on-screen circuit)	Yellow	On-screen	<
3	Non-identical line (on-disk circuit)	Red	On-disk	>
4	Deleted line[#1]	Yellow	On-screen	<D
5	Added line[#2]	Red	On-disk	>A

#1: A circuit existing in the on-screen chart but missing in the on-disk chart is displayed as a deleted line.

#2: A circuit existing in the on-disk chart but missing in the on-screen chart is displayed as an added line.

To close the Circuit DIFF window, click the X button on the upper right corner of the window. In the Nesting DIFF list window, double-clicking another nesting displays the Circuit DIFF window for that nesting and closes the currently displayed Circuit DIFF window.

(2) Displaying only differences

The results of comparing ladder circuits are displayed in two different modes: Only-differences display mode and All-inclusive display mode. To switch between these modes, click the **Display** menu, and then click **Display only differences** when the Circuit DIFF window is displayed. The currently used mode is indicated by whether a check mark appears beside the **Display only differences** option in the pull-down menu.

The default display mode of the Circuit DIFF window is **Display only differences**.

(a) Only-differences display mode (check mark present)
Only circuits containing differences (that is, circuits other than identical circuits) are displayed.
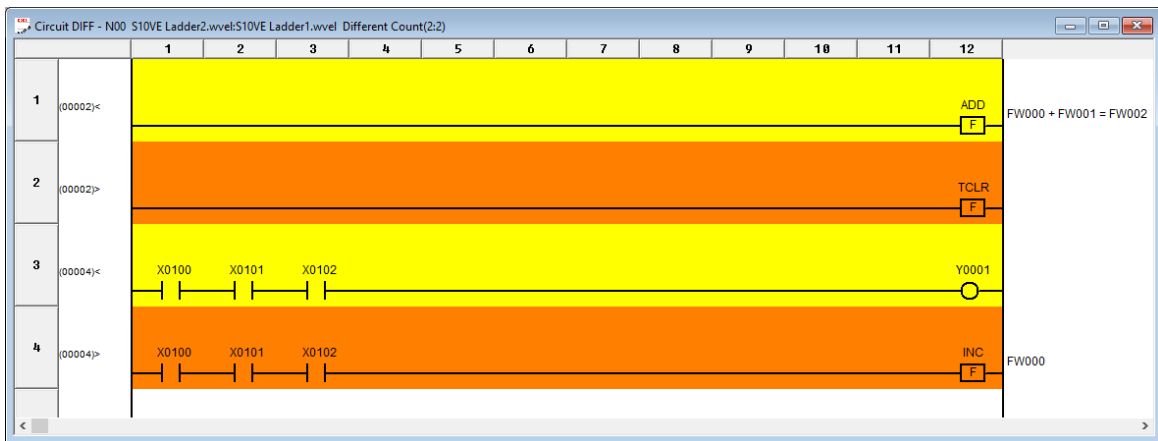
Figure 4-213 Window in Only-differences display mode

(b) All-inclusive display mode (check mark absent)
All the comparison results are displayed.
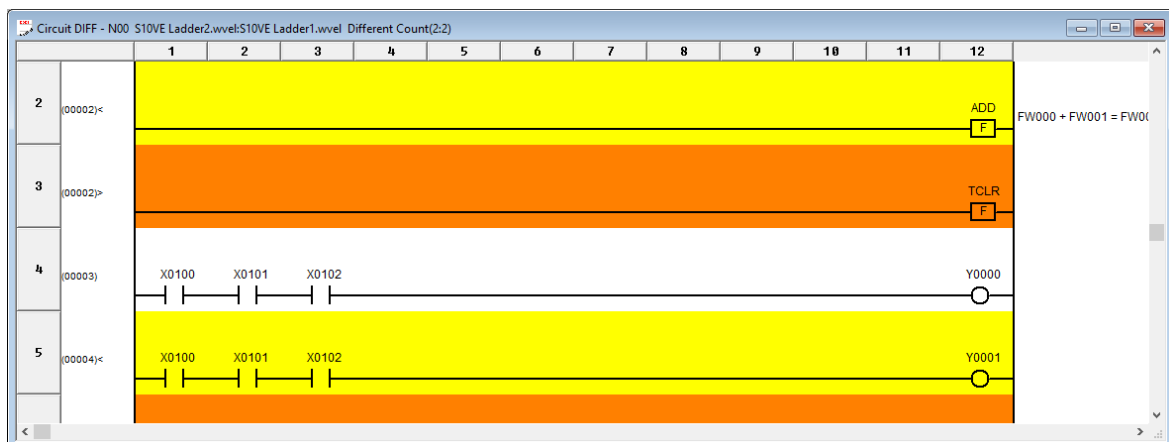
Figure 4-214 Window in All-inclusive display mode

(3) I/O comments

You can read comment files and then display I/O comments along with the results of comparison. To do this, select the comment file of the on-screen chart and that of the on-disk chart, and then click **Comment**, **Comment display**, and then **Display**. Alternatively, you can click the show/hide I/O comments button on the tool bar.

The display size of comments is fixed at ordinary size (16 characters long).

(a) Selecting comment files

From the **Comment** menu, click **Open file**. The Comment File Setting window appears. In this window, select comment files of the on-screen chart and on-disk chart.
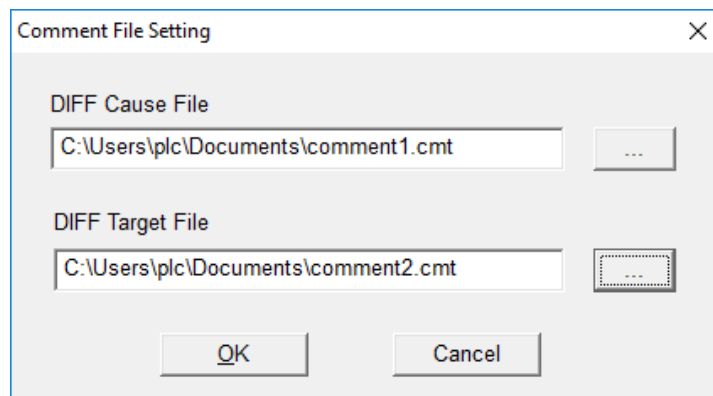
Figure 4-215 Comment File Setting window

Click the **...** button on the right of each input box. In the Open window that appears, select the desired file. Clicking the **Cancel** button aborts selection of comment files and then closes the window.

(b) Displaying I/O comments

To display I/O comments, from the **Comment** menu, click **Comment display**, and then **Display**. Alternatively, click the show/hide I/O comments button on the tool bar. If you want to hide I/O comments, from the **Comment** menu, click **Comment display**, and then **Nothing**, or click the show/hide I/O comments button on the tool bar.
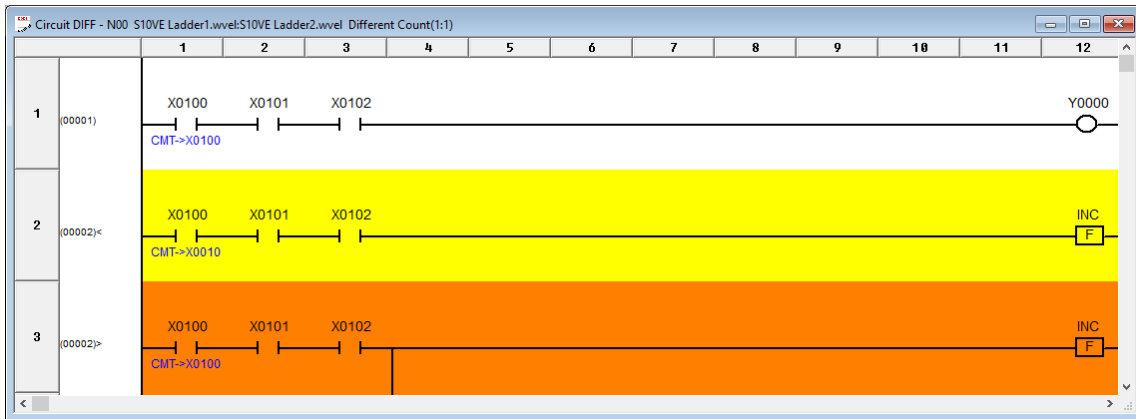
Figure 4-216 Comment display window

(4) Printing

To print out the results of comparison, click the **File** menu and then **Print**. You can also view the print image on screen by clicking the **File** menu and then **Print preview**. Note that you can print out the results of comparison only when the Nesting DIFF list window or Circuit DIFF window is active.

(5) Notes on operation

- The ladder diagram comparison function is not available while you are editing a ladder sheet. To use this function, you must compile the ladder sheet first.

- Comparing user functions only compares the operation function names and parameters. Therefore, any changes in the registered addresses and program bodies are not shown in the results of comparison.

- I/O comments are supported for display only, and they cannot be compared. Therefore, any differences between I/O comments are not applied to the results of comparison. Line comments are not supported.

- The jump functions (JT, JMP, and JSE) might be shown as containing differences between their on-screen and on-disk versions even if the two versions are identical in their displayed circuits.

4.7.15 Comparing memory data

The ladder diagram system provides a function that compares the contents of registers and displays any differences between them. For example, when changes have been made to register settings, this function allows the user to confirm details about the changes. Because this function compares the currently displayed ladder sheet with the corresponding ladder instruction file stored, the ladder sheet to be compared must be displayed on screen.

Hereafter, the ladder sheet currently displayed on screen is referred to as *on-screen chart*, and the ladder instruction file used as the DIFF target is referred to as *on-disk chart*.

Data comparison is applicable to registers in which set values and other similar data are stored, and is not applicable to work registers whose contents are cleared by turning off power. The following table shows the registers whose contents can be compared.

No.	Register name	Memory area name
1	K	Keep-relay
2	FW	Work register
3	DW	Data register
4	LML	Long-word work register
5	LG	Floating-point work register
6	LXW	Word work register
7	TS	T set value
8	US	U set value
9	CS	C set value
10	---	TUC set value[#]
11	ANC	Analog pulse counter

#: The T, U, and C set values are displayed at the same time in the result of a comparison.

Note: Some of the contents of registers compared might not be saved in the file depending on the file save format. For details about the relationships between save formats and types of data, see *(4) Notes on operation.*

(1)   Operation procedure

(a)   Selecting a DIFF target file (on-disk chart)
From the **Utility** menu, click **DIFF**, and then **Data**. The Data DIFF Setting window appears. In the **File Name** text box, enter the file name of an on-disk chart. Then, clicking the **DIFF** button displays the Data DIFF List window. Clicking the **Cancel** button closes the window.
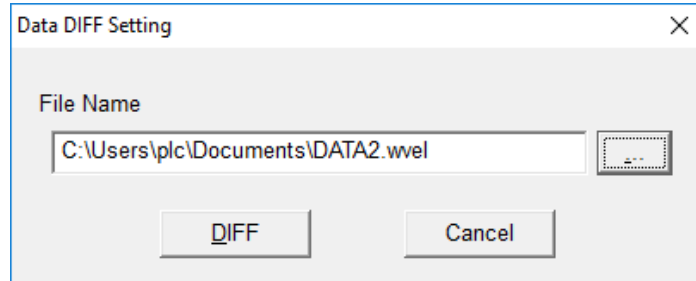
Figure 4-217 Data DIFF Setting window

Clicking the **...** button near the right edge of the Data DIFF Setting window displays the Open window.
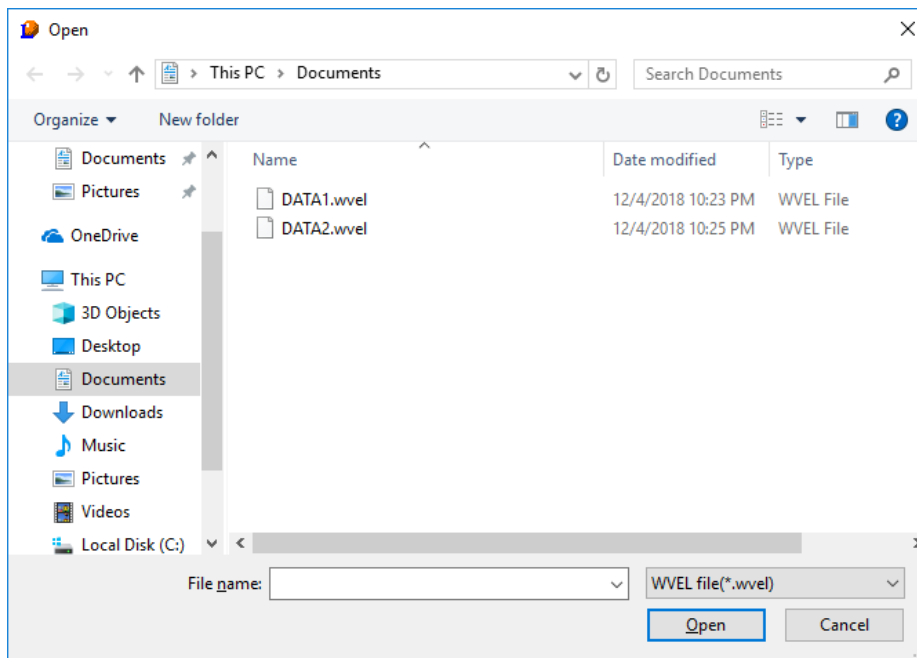
Figure 4-218 Open window

Select a DIFF target file, and then click the **Open** button. The selected file name appears in the **File Name** text box in the Data DIFF Setting window.

(b) Data DIFF List window

In the Data DIFF Setting window, clicking the **DIFF** button closes the Data DIFF Setting window and then displays the Data DIFF List window, which shows whether differences are detected for each memory area (DIFF target).
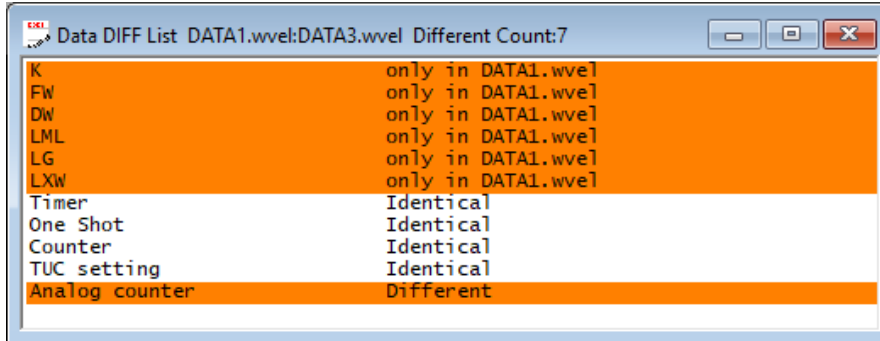
Figure 4-219 Data DIFF List window

● Window title

Shows the names of the on-screen and on-disk chart files compared, and the number of memory areas in which differences were detected.

● Results of comparison

Shows the result of the comparison for each memory area by providing the following information:

No.	Result of comparison	Displayed string	Display color	Remarks
1	No differences detected	Identical	White	
2	Differences detected	Different	Red	
3	Data found only in the on-screen chart	Only in[#1]	Red	[#2]
4	Data found only in the on-disk chart	Only in[#1]	Red	[#2]
5	No comparison data found	No data	White	[#2]

#1: If data is found only in the on-screen or on-disk chart, Only in is followed by the file name.

#2: This is a case where a given data piece is not saved in the on-screen or on-disk chart. For details about the relationships between save formats and types of data, see *(4) Notes on operation*.

To close the Data DIFF List window, click the X button on the upper right corner of that window.

(c) Data DIFF window

In the Data DIFF List window, double-clicking an area displays the Data DIFF window, which shows data items shaded in different colors to indicate whether differences were detected.

Figure 4-220 Data DIFF window

● Window title

Shows the area name of the selected memory area, the file names of the on-screen and on-disk chart files compared, and the number of non-matching data pieces in the two chart files.

● Column titles

Each column title identifies the type of information in the displayed result of the comparison. The column headers for the on-screen and on-disk charts show the corresponding file names. If a file name to be displayed is too long, its trailing part might be cut off.

● Results of comparison

The results of comparison is shown shaded in different colors. The data pieces that are found different are shown in red with an asterisk (*) added to the right of their displayed address. For those registers in which no comparison data piece is found, a string of four asterisks (****) is displayed in the data column.

To close the Data DIFF window, click the X button on the upper right corner of that window. In the Data DIFF List window, double-clicking another area closes the currently displayed Data DIFF window, and then displays the Data DIFF window for the area you selected.

<Comparison result displays>

The results of comparison are displayed according to the type of data contained in each memory area.

● Bit-type data (K)

● Word-type data (FW, DW, LXW, TS, US, CS, or ANC)

● Long-type data (LML)

● Float-type data (LG)

(2) Display modes

The results of comparing data are displayed in two different modes: Only-differences display mode and All-inclusive display mode. To switch between these modes, click the **Display** menu, and then click **Display only differences** when the Data DIFF window is displayed. The currently used mode is indicated by whether a check mark appears beside the **Display only differences** option in the pull-down menu.

The default display mode of the Data DIFF window is **Display only differences**.

(a) Only-differences display mode (check mark present)

Only circuits containing differences (that is, circuits other than identical circuits) are displayed.

Figure 4-221 Window in Only-differences display mode

(b) All-inclusive display mode (check mark absent)

All the comparison results are displayed.

Figure 4-222 Window in All-inclusive display mode

(3)   Printing

To print out the results of comparison, click the **File** menu and then **Print**. You can also view the print image on screen by clicking the **File** menu and then **Print preview**. Note that you can print out the results of comparison only when the Data DIFF List window or Data DIFF window is active.

(4)   Notes on operation

- The ladder diagram comparison function is not available while you are editing a ladder sheet. To use this function, you must compile the ladder sheet.
- The types of data that can be saved in a ladder instruction file vary depending on the save format. The following table shows the relationships between save formats and types of data saved.

No.	Save format	K	FW	DW	LML	LG	LXW	TS	US	CS	ANC
1	Sequence	--	--	--	--	--	--	Y	Y	Y	Y
2	Sequence + data	--	--	Y	--	--	--	Y	Y	Y	Y
3	Sequence + fence	--	--	Y	--	--	--	Y	Y	Y	Y
4	Sequence + work	--	Y	Y	Y	Y	Y	Y	Y	Y	Y
5	All areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Y: Data saved for this combination

--: No data saved for this combination

4.7.16 Conversion

The conversion function reads the vcm-format instruction file created by the S10V (called *S10V instruction file* hereafter) and converts the file to a ladder circuit for the S10VE. The following three items are converted by the read instruction file. Only TUC set values used in the ladder circuit are converted. Because unused TUC set values are initialized to 0, if you need such TUC set values, manually enter them in the MCS window after conversion.

- Ladder circuit
- Analog counter setting information
- Ethernet communication setting information

Because PCs edition information and user function registration information in the S10V instruction file are not converted, they must be set by the user. Furthermore, user functions must also be registered after the user function program is recompiled.

For details, see *4.7.12 Registering user functions*.

To use PI/O comments, read the PI/O comment file of the S10V and use PI/O comments as described in *4.9 Ladder sheet comment functions*.

<Operation procedure>

(1) From the **File** menu, click **Open file**.
    The Open window appears.
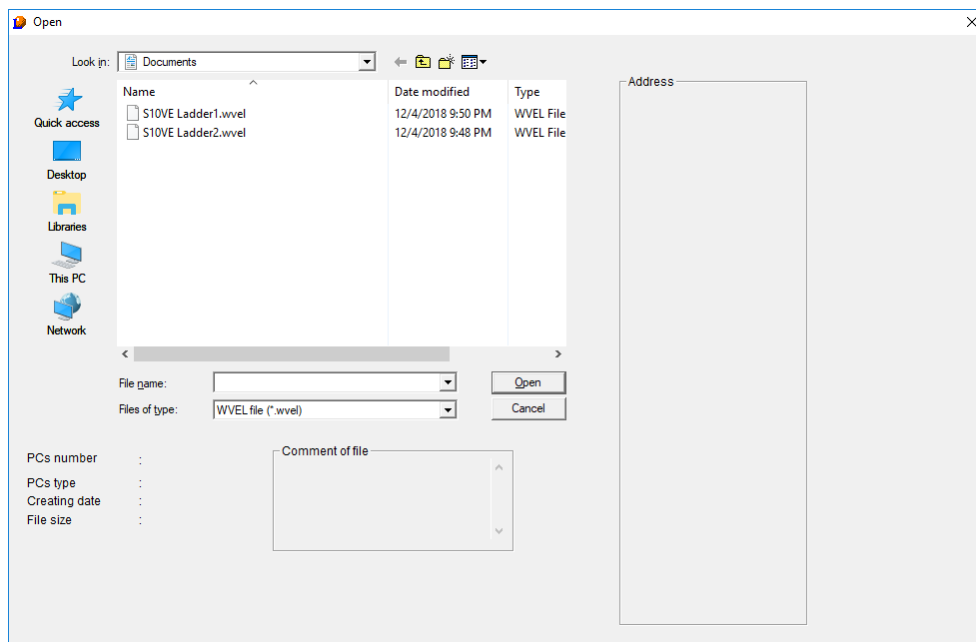
Figure 4-223 Open window

(2) Select the wvel file that includes no ladder circuit as a base to merge the ladder circuit to be converted by operations in step (4) and later, and then click the **Open** button. The Open window closes and the ladder diagram system without a ladder circuit is displayed on the ladder sheet as shown in Figure 4-224.
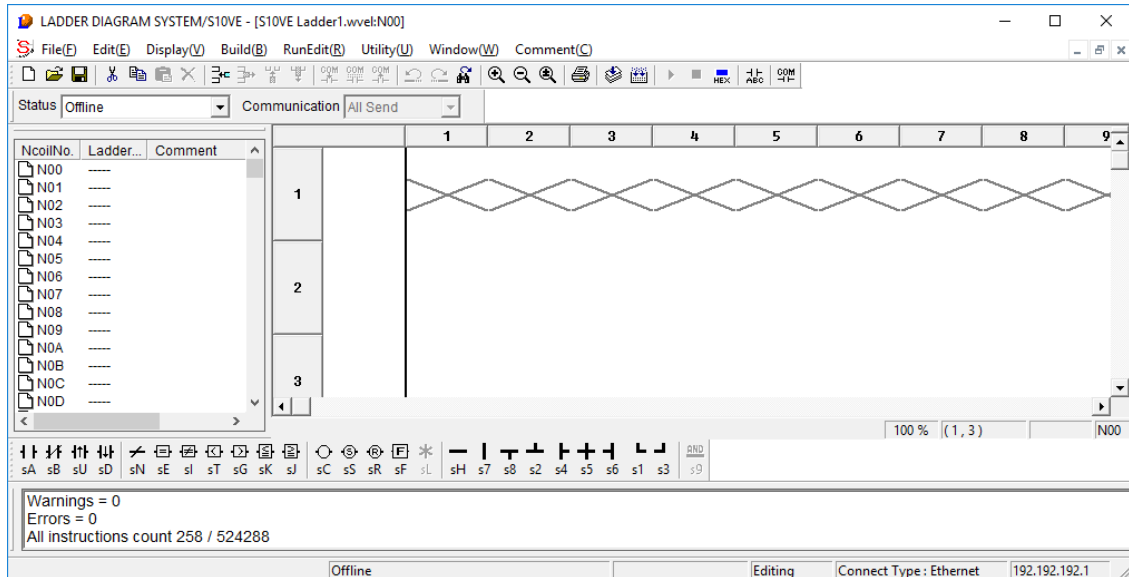
Figure 4-224 Display without a ladder circuit

(3) If coils NE0 to NFF are used for the file to be converted, open the file by using a text editor, and then check the number of steps to be used based on the LPET information for NE0 to NFF. (Check the line showing LPET*XXX YYYY*, where *XXX* indicates the N coil number such as 0E0, and *YYYY* indicates the number of steps.) Compare the number of steps with the number of steps defined in the Ladder Area Size Change window for PCs edition information. Then, change the definition of the ladder area size to be approximately twice the number of steps to be used in the S10V. For details, see *4.7.9 Setting PCs edition information*.

If an error message indicating that the maximum number of instructions is exceeded appears for the ladder sheet for NE0 to NFF in step (6), start over from this step. In this case, you also need to increase the number of steps to be used for the ladder area size.

(4) From the **Utility** menu, click **Convert**.
The Open window appears (Figure 4-225).
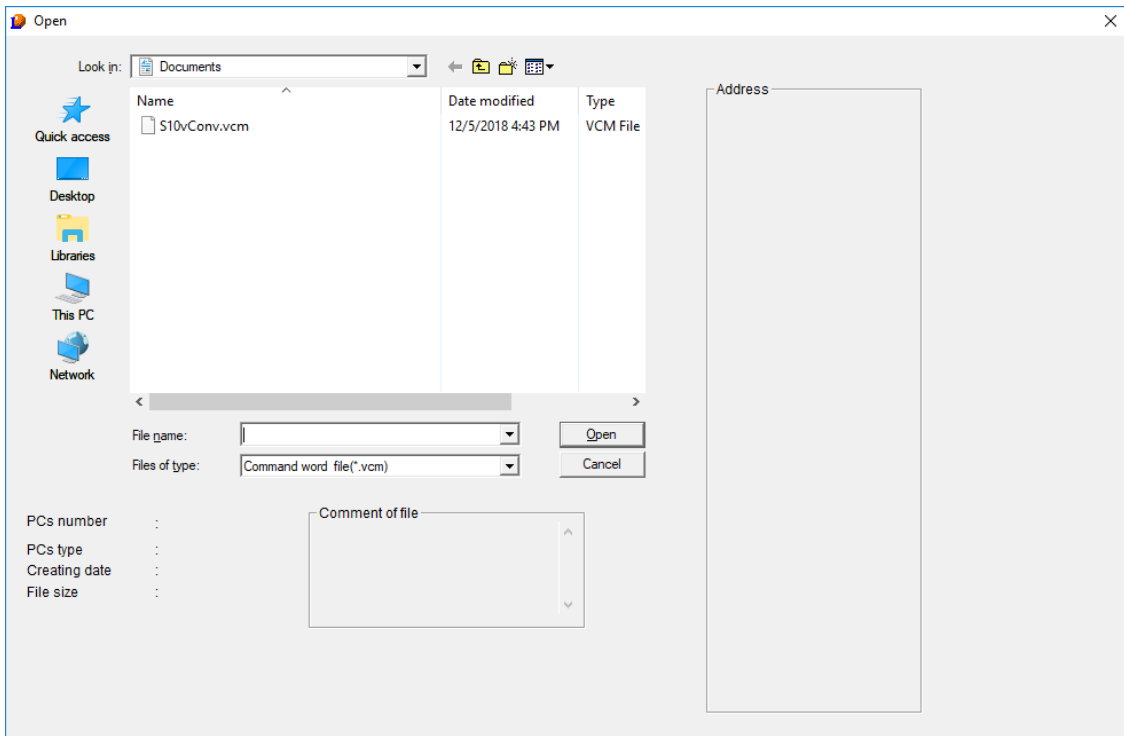
Figure 4-225 Open window

However, if the open file shown in step (2) has been edited and compiled but has not been saved, a message for confirming whether to save changes appears before the Open window appears (Figure 4-226). In this message, *XXXXXXXX* indicates the file name.
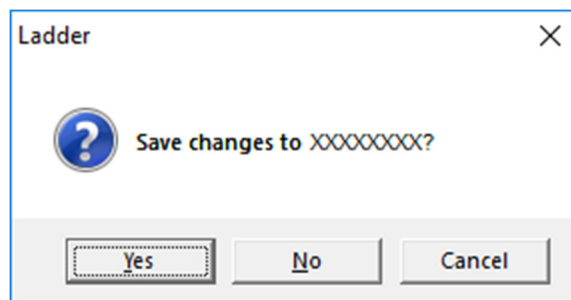
Figure 4-226 Confirmation message for saving changes

In this message dialog box, click the **Yes**, **No**, or **Cancel** button.

Yes:

Displays the Save As window (Figure 4-227).

No:

Does not save changes in the open ladder program, and does not close the open ladder program, but continues conversion processing.

Cancel:

Discontinues the conversion processing without closing the open ladder program.
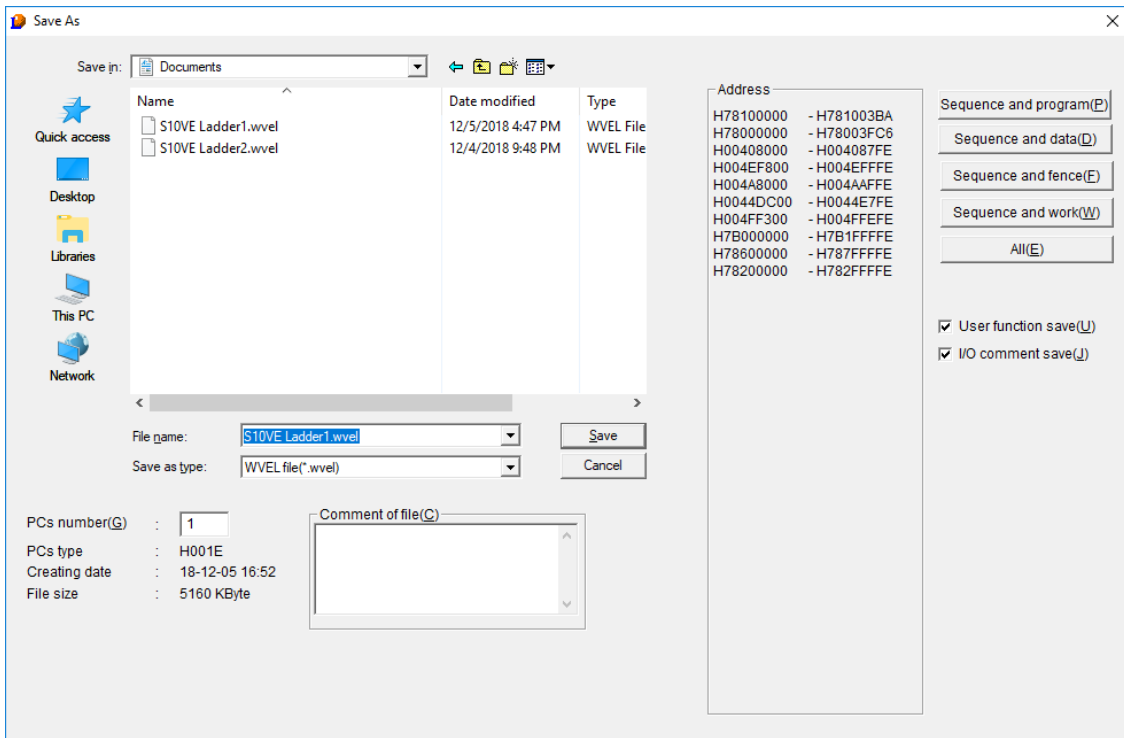
Figure 4-227 Save As window

In the Save As window, click the **Save** or **Cancel** button.

Save:

If an existing file name is specified in **File name**, a save confirmation message appears (Figure 4-228). If a new file name is specified, conversion processing continues without showing this message.

Cancel:

Closes the Save As window without closing the currently open ladder program.

Conversion processing is discontinued.
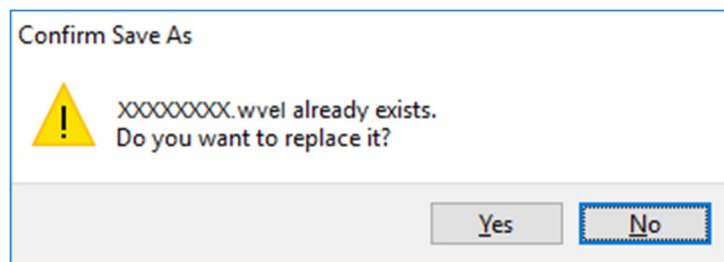
Figure 4-228 Save confirmation message

In this message dialog box, click the **Yes** or **No** button.

Yes:

Closes the Save As window, saves changes in the open ladder program, and continues the conversion processing.

No:

Does not close the Save As window.

(5) Select the S10V instruction file used for conversion to a ladder circuit for the S10VE, and then click the **Open** button. The Open window closes and the converted ladder circuit is shown on the ladder sheet. The conversion result is shown in the output window.
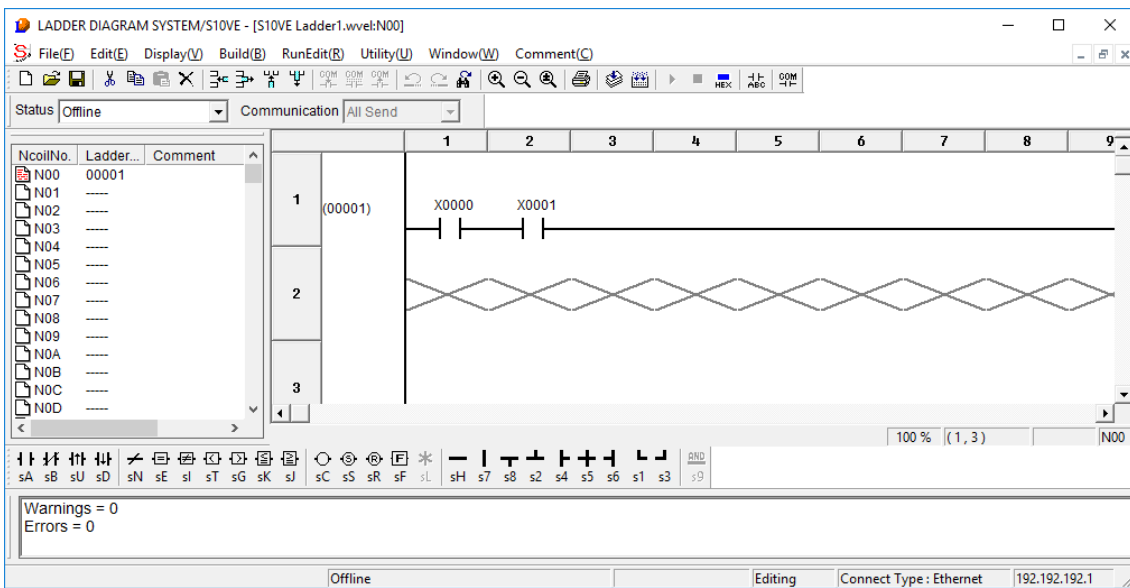
Figure 4-229 Example of a ladder circuit shown on the ladder sheet

If the file selected in the Open window is not an S10V instruction file, an error message indicating that the file is not a conversion target appears. At this time, the Open window is not closed.
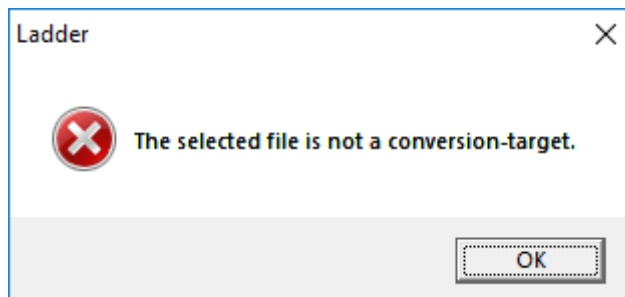
Figure 4-230 Error message indicating that the file is not a conversion target

If the conversion resulted in an error, a save confirmation message for conversion error appears.
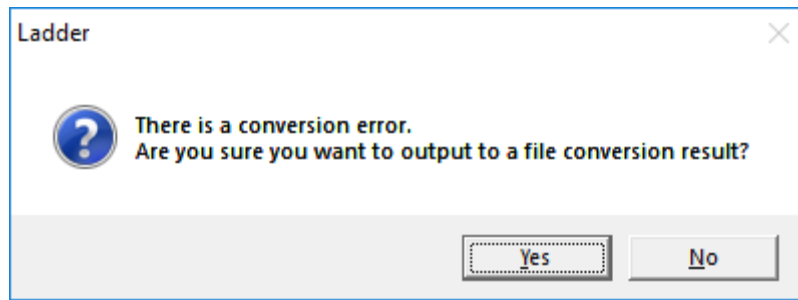
Figure 4-231 Save confirmation message for conversion error

Yes: Displays the Save As window (default selection).
No: Does not display the Save As window.
In the Save As window, in the **File name** input box, enter the file name, and then click the **Save** button.
The message shown on the output window is output to a file, and then the file opens automatically.

(6)   From the **Build** menu, click **All N coil Compile**.
The converted ladder circuit is compiled. If the compilation results in an error, remove the cause of the error, and then re-click **All N coil Compile**.
For details about compilation, see *4.5.1 Compiling ladder programs*.

<Actions to be taken in the case of a conversion error>
- If the ladder circuit includes an error, double-clicking the error message shown in the output window jumps to the relevant error on the ladder sheet. Remove the cause of the error, and then perform compilation.
- If an error occurs in the analog counter setting information or Ethernet communication setting information, double-clicking the error message does not display the setup window. Remove the error information in the ladder circuit, and then correct the analog counter setting information or the Ethernet communication setting information.

<Notes on using the converter>

● Analog counter module names differ between the S10VE and S10V. When the converter is run, module names are converted to those for the S10VE. For correspondence of module names to be converted, see *4.7.10 Setting analog and pulse counter modules.*
Input/output addresses are changed to those for the S10VE. No other analog counter setting information is changed.

● If an attempt to read `LQA050/150(MODE4)(ch0-ch3)` failed during conversion of the setting where `LQA050/150(MODE4)(ch0-ch3)` and `LQA050/150(MODE4)(ch4-ch7)` are consecutively allocated in the Analog counter window, the following message appears in the output window:
`Failed to read analog/counter No.`*XX* `"LQA050/150(MODE4)(ch0-ch3)(AI)."` `On the Analog/counter window, make re-setting so that ch0 to ch3 and ch4 to ch7 are consecutively set.`
In this message, *XX* indicates the number at which reading failed.
After compilation has been successfully completed, open the Analog counter window and reregister the analog counter setting that failed to be read.

● Module name `CMU` of management number 1 to 16 in the Ethernet communication setting is converted to `CPU(ET1).`
The following message that indicates successful conversion appears in the output window:
`Module name "CMU" of management number` *XX* `was converted to "CPU(ET1)".`
In this message, *XX* indicates the management number used for module name conversion.
No other Ethernet communication setting information is changed.

● Module name `ET.NET(MAIN)` of management number 17 to 32 in the Ethernet communication setting is converted to `ET.NET(MAIN)(CH1).`
The following message that indicates successful conversion appears in the output window:
`Module name "ET.NET(MAIN)" of management number` *XX* `was converted to "ET.NET(MAIN)(CH1)".`
In this message, *XX* indicates the management number used for module name conversion.
No other Ethernet communication setting information is changed.

● Module name `ET.NET(SUB)` of management number 33 to 48 in the Ethernet communication setting is converted to `ET.NET(SUB)(CH1).`
The following message that indicates successful conversion appears in the output window:
`Module name "ET.NET(SUB)" of management number` *XX* `was converted to "ET.NET(SUB)(CH1)".`
In this message, *XX* indicates the management number used for module name conversion.
No other Ethernet communication setting information is changed.

● When there is a setting for management number 49 or later in the Ethernet communication setting, the following warning message appears, showing that an unsupported module is defined:
`Management number of an unsupported module is defined in the Ethernet communication information. Review the Ethernet communication setting and arguments of the Ethernet communication instruction arithmetic function.`
Revise the Ethernet communication setting. For details about setting Ethernet communication, see *4.7.17 Setting Ethernet communication (parameter information setting).*

● Characters that can be used for user function names are restricted to uppercase letters, numbers (other than as the first character of a function name), and underscores (_). Correct any user function name that contains characters that cannot be used for the S10V.

4.7.17 Setting Ethernet communication (parameter information setting)

(1) Ethernet Communication Setting List window

This window provides functions to display and edit the list of parameter information in the Ethernet communication system extension functions. The **Management No.** column displays fixed numbers from 1 to 80 corresponding to the usable socket. The **Module name** column displays the fixed name of the communication module available for each management number. For items that are not set, an asterisk (`*`) is displayed.

You can edit only management numbers 1 to 48 for module names `CPU`, `ET.NET(MAIN)`, and `ET.NET(SUB)`. Because the S10VE does not support management numbers beginning with 49, they can be deleted and copied in the window used to display data converted from the S10V.

<Operation>

[1] From the **Utility** menu, click **Set Ethernet Communication**.

[2] The Ethernet Communication Setting List window is displayed (Figure 4-232).
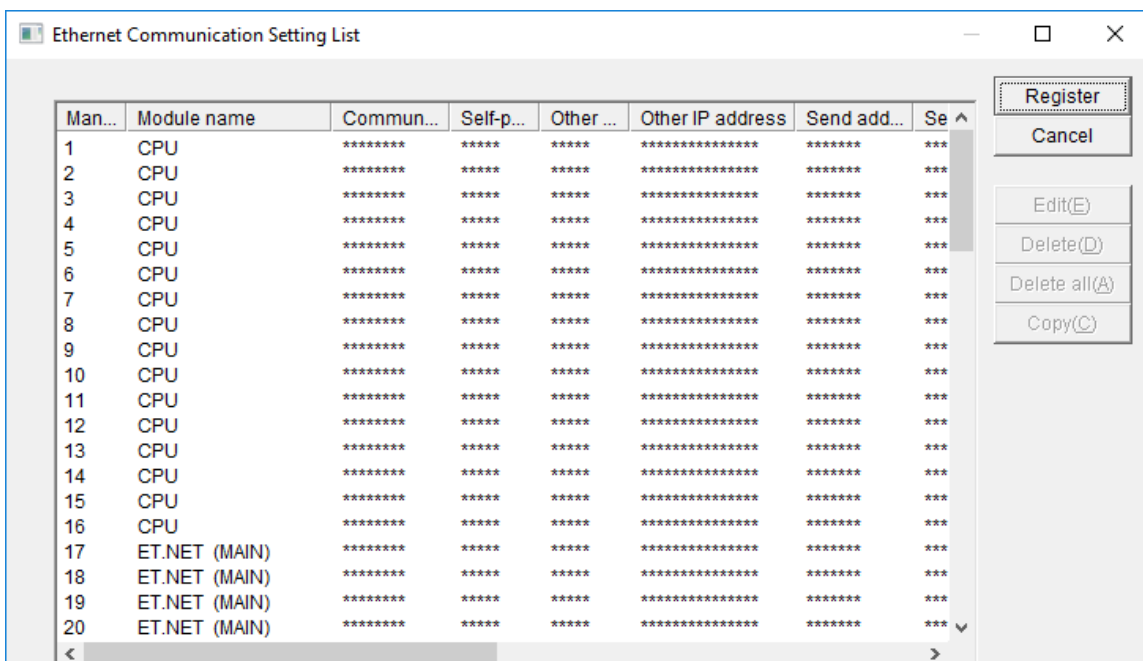
Figure 4-232 Ethernet Communication Setting List window

[3] To save the parameter information of the Ethernet communication settings into PCs and then close the Ethernet Communication Setting List window, click the **Register** button. (When the ladder diagram system is running in offline mode, the parameter information is saved into the internal memory of the ladder diagram system.)

If any of the following items differs from information of PCs in online mode, or if parameter information is added or deleted, a warning message about resetting PCs after registration of Ethernet communication setting information appears.
- **Module name** (ET1/ET2 or CH1/CH2)
- **Communication mode** (TCP/UDP)
- **Self-port No.**
- **Other port No.**
- **Other IP address**
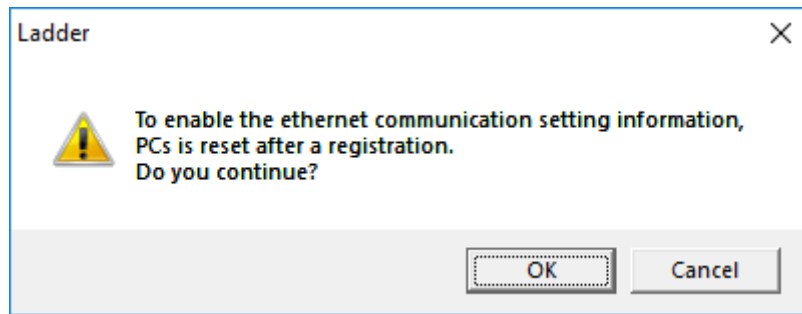
Figure 4-233 Warning message about resetting PCs after registration of Ethernet communication setting information

Clicking the **OK** button closes this message and saves all the edited Ethernet communication settings in the save target PCs.
Clicking the **Cancel** button closes this message and redisplays the Ethernet Communication Setting List window. Edited Ethernet communication settings are not saved in the save target PCs.

[4] To terminate the Ethernet Communication Setting List window without saving the parameter information of the Ethernet communication settings in PCs, click the **Cancel** button.

[5] Select a line of the parameter information of the Ethernet communication setting to be edited, and then click the **Edit** button. The Set Ethernet Communication window (Figure 4-234) appears. The **Edit** button is inactive if no line is selected. You can also display this window by double-clicking a line of the parameter information of the Ethernet communication setting.

[6] To delete an entry of parameter information of the Ethernet communication setting, select the line of the parameter information you want to delete, and then click the **Delete** button.

[7] To delete all parameter information of the Ethernet communication setting, click the **Delete all** button. This button is inactive if no parameter information has been set.

[8] To copy the set parameter information, select the copy source line, and then click the **Copy** button. The Copy Ethernet Communication Setting Information window appears.

<Note>
● Clicking the **Delete** or **Delete all** button only disables the display of parameter information of the Ethernet communication setting on the selected line. The deletion is actually applied to the PCs or internal memory when you click the **Register** button.

(2) Set Ethernet Communication window

In the Ethernet Communication Setting List window, clicking the **Edit** button or double-clicking a management number in the Ethernet communication setting list box displays the following window. This window allows you to set the Ethernet communication parameter information for the specified management number (see Figure 4-234).

Figure 4-234 Set Ethernet Communication window

<Operation>

[1] Set each item, and then click the **OK** button. The displayed values are applied to the Ethernet Communication Setting List window (Figure 4-232).

[2] Clicking the **Cancel** button closes the Set Ethernet Communication window without applying the displayed values.

<Items>

Management No.:

Displays the management number specified in the Ethernet Communication Setting List window (Figure 4-232).

Module name:

Displays the module for communication specified in the Ethernet Communication Setting List window (Figure 4-232).

The fixed module name is displayed according to the management number as shown below.

If the module name is CPU, select ET1 or ET2 as the communication port used for the CPU.

If the module name is ET.NET (main), select CH1 or CH2 as the communication port used for the ET.NET (main).

If the module name is ET.NET (sub), select CH1 or CH2 as the communication port used for the ET.NET (sub).

Management number	Module name
1 to 16	CPU
17 to 32	ET.NET (main)
33 to 48	ET.NET (sub)
49 to 80	Reserved by the system

Communication mode:

From the combo box, select TCP or UDP.

The default is TCP. The selected item corresponds to the open instruction of Ethernet communication.

Self-port No.:

Specify a decimal port number used for communication. (The specification range is from 1 to 65535.)

The default is blank. (The recommend values are from 10000 to 59999. 60000 and greater numbers are reserved for the system.)

Other port No.:

Specify a decimal port number of the remote host. (The specification range is from 1 to 65535.)

The default is blank. (The recommend values are from 10000 to 59999. 60000 and greater numbers are reserved for the system.)

Other IP address:

Specify the IP address of the remote host. To broadcast data by UDP transmission, specify the node address as 255, such as in 255.255.255.255. The default is blank.

Send address:

Specify the starting address of data to be sent by using PI/O word format (or long and float formats for long registers and float-only registers). You cannot specify a bit-type register, an area not allocated for PI/O, or an area extending over two or more registers. The default is blank.

The end address of the send data is calculated and displayed based on the send address and send size.

Send size:

Specify the send size for data as a hexadecimal number. The default is blank.

For each communication type, you can specify either of the following sizes in units of bytes:

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

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

Receive address:

Specify the starting address of the area for storing received data by using PI/O word format (or long and float formats for long registers and float-only registers). You cannot specify a bit-type register, an area not allocated for PI/O, or an area extending over two or more registers.

The default is blank. The end address of the received data is calculated and displayed based on the receive address and receive size.

Receive size:

Specify the receive size for data as a hexadecimal number. The default is blank.

For each communication type, you can specify either of the following sizes in units of bytes:

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

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

Receive timeout:

Set a wait time for received data to arrive if data cannot be received when a reception instruction is issued.

You can specify a value in the range from 0 to 100 (0 to 10 seconds) in units of 100 ms (0 means no timeout).

The default is 10 (1 second). If a timeout time is specified and a reception timeout occurs in a reception instruction, the reception instruction will cause an error with no reception data (EWOULDBLOCK).

Execution flag:

Specify with a bit-type register an area that indicates whether an Ethernet communication instruction is being processed. The default is blank.

Details result code:

Specify with a long-type register an area for storing a detailed result code for the execution result of an Ethernet communication instruction. The default is blank.

Socket disconnection mode:

This item can be specified only when the communication mode is `TCP`. For **Socket disconnection mode**, you can select **Waiting for non-sent data sending** or **Non-sent data destruction**. The default is **Waiting for non-sent data sending**. The following describes the meaning of each option.

Waiting for non-sent data sending:	If sending of data is incomplete, the system waits until the data flows. Any received data that has not been read is discarded.
Non-sent data destruction:	If sending of data is incomplete, the system disconnects the channel and releases the socket without waiting for the data to flow. In that case, an RST is sent to the TCP of the remote host. Because the disconnection differs from the usual disconnection method, check the system behavior (the method of reporting an RST reception to the UP) when the remote host receives an RST. Any received data that has not been read is discarded.

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

Table 4-26 Setting registers (1/2)

No.	Item	Symbol	Send address	Receive address	Running flag	Detailed result code
1	External input	X	Yes	Yes	Yes	Yes
2	External output	Y	Yes	Yes	Yes	Yes
3	Internal register	R	Yes	Yes	Yes	Yes
4	Keep-relay	K	Yes	Yes	Yes	Yes
5	On delay timer	T	Yes	Yes	Yes	Yes
6	One-shot timer	U	Yes	Yes	Yes	Yes
7	Up/down counter	C	Yes	Yes	Yes	Yes
8	Global link register	G	Yes	Yes	Yes	Yes
9	Nesting coil	N	Yes	Yes	Yes	Yes
10	Process register	P	Yes	Yes	Yes	Yes
11	Event register	E	Yes	Yes	Yes	Yes
12	Edge contact	V	Yes	Yes	Yes	Yes
13	System register	S	Yes	Yes	Yes	Yes

Yes: Can be specified

Table 4-26 Setting registers (2/2)

No.	Item	Symbol	Send address	Receive address	Running flag	Detailed result code
14	Data register	DW	Yes	Yes	--	Yes
15	Work register	FW	Yes	Yes	--	Yes
16	Internal register	M	Yes	Yes	Yes	Yes
17	Internal register (Longword)	BD	--	--	--	--
18	For high speed RI/O input	I	Yes	Yes	--	Yes
19	For high speed RI/O output	O	Yes	Yes	--	Yes
20	Register for sharing data between HI-FLOW and ladder programs	J	Yes	Yes	Yes	Yes
21		Q	Yes	Yes	Yes	Yes
22	Work register	LB	Yes	Yes	Yes	Yes
23	Work register for word only	LW	Yes	Yes	--	Yes
24	Work register for longword only	LL	Yes	Yes	--	Yes
25	Work register for single-precision floating point only	LF	Yes	Yes	--	Yes
26	Work register for word only (Power failure retention)	LX	Yes	Yes	--	Yes
27	Work register for longword only (Power failure retention)	LM	Yes	Yes	--	Yes
28	Work register for single-precision floating point only (Power failure retention)	LG	Yes	Yes	--	Yes
29	Work register for ladder converter only	LR	Yes	Yes	Yes	Yes
30	Work register for ladder converter only (Edge contact)	LV	Yes	Yes	Yes	Yes

Yes: Can be specified

--:　Cannot be specified

> Do not specify the Z register in the Ethernet communication setting (although the specification is possible).

(3) Copy Ethernet Communication Setting Information window
In the Ethernet Communication Setting List window, clicking the **Copy** button displays the following window.
This window allows you to set parameter information of the Ethernet communication setting for the specified management number.
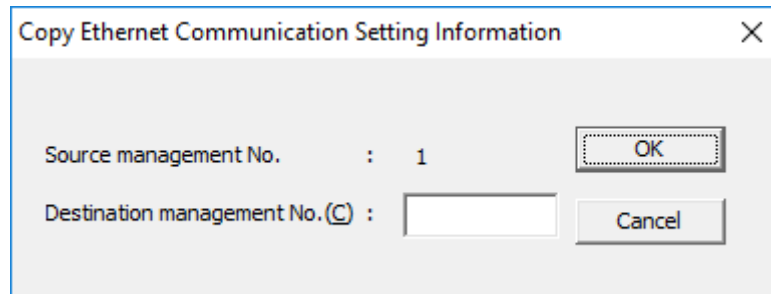
Figure 4-235 Copy Ethernet Communication Setting Information window

4.8 Ladder sheet window functions

The ladder sheet window functions are contained in the **Window** pull-down menu.
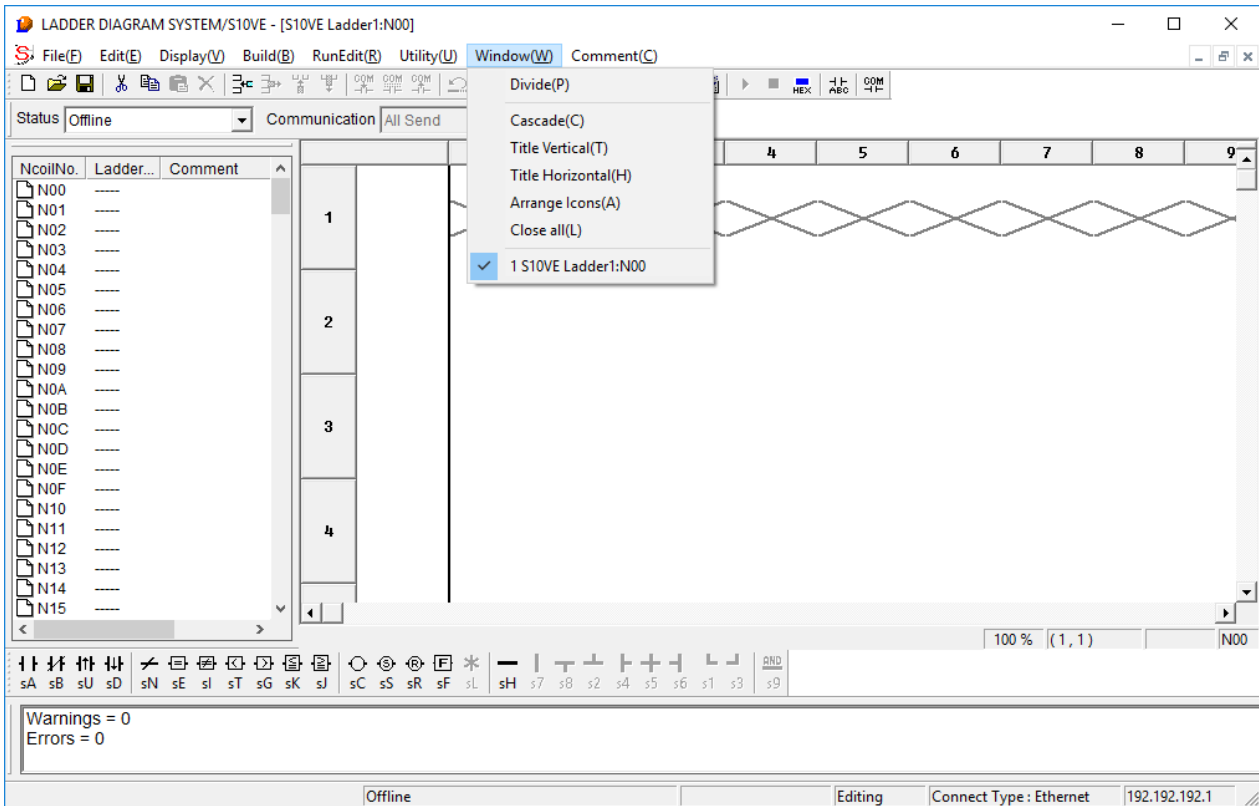
Figure 4-236 Selecting the [Window] menu

The following table lists and describes the window functions provided in the **Window** menu.

Table 4-27 [Window] menu options

No.	Level 1	Level 2	Level 3	Description
1	**Window**	**Divide**		Splits a window into smaller windows.
2		**Cascade**		Cascades multiple N coil windows.
3		**Tile Vertical**		Tiles multiple N coil windows vertically.
4		**Tile Horizontal**		Tiles multiple N coil windows horizontally.
5		**Arrange Icons**		Arranges a set of icons.
6		**Close all**		Closes all currently open N coil windows.
7		**Window lists 1,2,3,4,...**		Displays a list of all currently open windows.

The **Window lists 1,2,3,4,..** option displays a list of all currently open windows in order of foremost to backmost on the screen.

4.9 Ladder sheet comment functions

The ladder sheet comment functions are contained in the **Comment** pull-down menu.
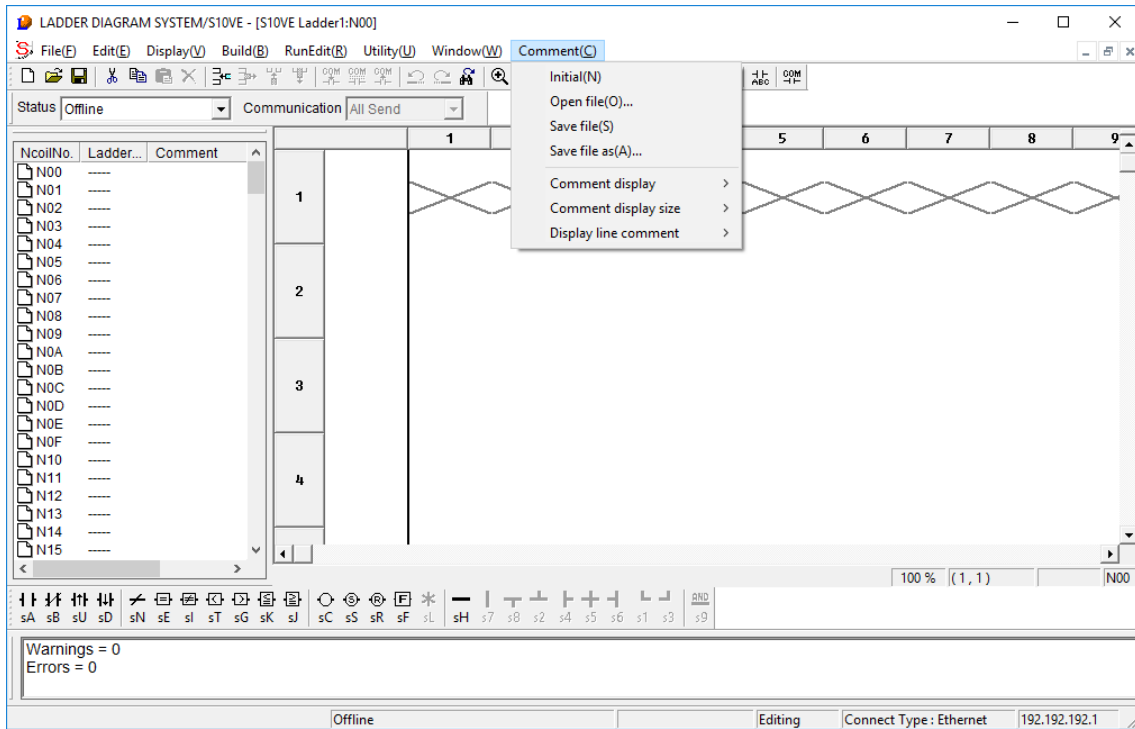
Figure 4-237 Selecting the [Comment] menu

The following table lists and describes the comment functions provided in the **Comment** menu.

Table 4-28 [Comment] menu options

No.	Level 1	Level 2	Level 3	Description
1	**Comment**	**Initial**		Initializes comment information.
2		**Open file**		Opens existing comment files.
3		**Save file**		Saves the comment file you are working on.
4		**Save file as**		Saves the comment file you are working on with a specified file name.
5		**Comment display**	**Nothing**	Hides the comments.
6			**Display**	Displays the comments.
7		**Comment display size**	**Usually (16 characters)**	Switches the comment display size to standard size (16 characters).
8			**Usually (32 characters)**	Switches the comment display size to standard size (32 characters).
9			**Smallness (32 characters)**	Switches the comment display size to small size (32 characters).
10		**Display line comment**	**No display**	Hides line comments.
11			**Display**	Displays line comments.

(1)   [Initial]

The **Initial** option initializes (clears) all comment information assigned to each register in the currently open ladder program file.

(2)   [Open file]

The **Open file** option reads already edited comment files (with extension `.cmt`) and automatically assigns comments to the registers in the currently open ladder program file.

You can use a commercially available general-purpose text editor to edit a comment file, which is a text-format file.

A comment is described on one line. A register name and a comment must be separated by two halfwidth spaces. In the comment file, a comment line beginning with a hash mark (#) is ignored. The following shows the comment file format.

[Comment file format]

○○○○␣␣ □□□□□□□□□□□□□□

○○○○	:	Register name
␣␣	:	Two halfwidth spaces
□□...□	:	Comment assigned to a specified register. Table 4-33 lists the maximum number of comment characters. If the number of characters in a comment exceeds the maximum, a message (Figure 4-238) appears in the output window during a comment file read. In this case, the part of the string exceeding the maximum number of characters is not read.

Example: This example shows how to assign a comment on starting A motor to register X0000.

X0000 A Motor Start

Table 4-29 Maximum number of comment characters

	Halfwidth characters	Fullwidth characters	Mixed halfwidth and fullwidth characters
Maximum number of characters	32	16	32#

#: Each fullwidth character must be counted as two halfwidth characters.

```
  1 :  Comment file, in 1 line, Comment character count is out of range. ( No = 331 )
Errors = 1
```
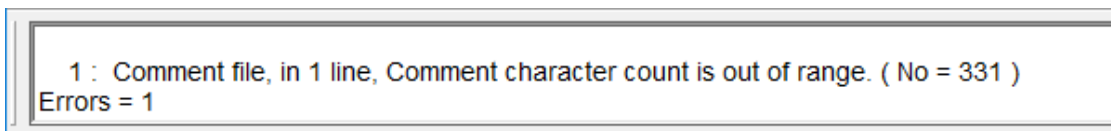
Figure 4-238 Message displayed in the output window when the maximum number of comment characters is exceeded

<Notes>

- Enter a register name from the first column. A register name entered beginning in the second column will not be read correctly.

- Separate the register name and comment by two halfwidth spaces.

(3)   [Save file]

The **Save file** option saves the currently open comment file by overwriting the original comment file. After changing the comment on a register described in the ladder program file you are editing, you can use this option to apply the change in the corresponding comment file.

(4)   [Save file as]

The **Save file as** option is used to save the comment assigned to a register in a ladder program as a new comment file.

(5)   Showing and hiding comments
      You can switch comment display mode to show or hide comments by using the menu or tool bar.

(a)   Displaying comments

<Operation>
● Operation using the menu
   [1] From the Comment menu, click Comment display, and then Display.
   [2] The comments assigned to the registers in the ladder sheet circuit diagram are displayed (see Figure 4-239).

Figure 4-239 Displaying comments in the ladder circuit

● Operation using the tool bar
   [1] On the tool bar, click the show I/O comments icon (see Figure 4-240).
   [2] The comments assigned to the registers in the ladder sheet circuit diagram are displayed (see Figure 4-239).
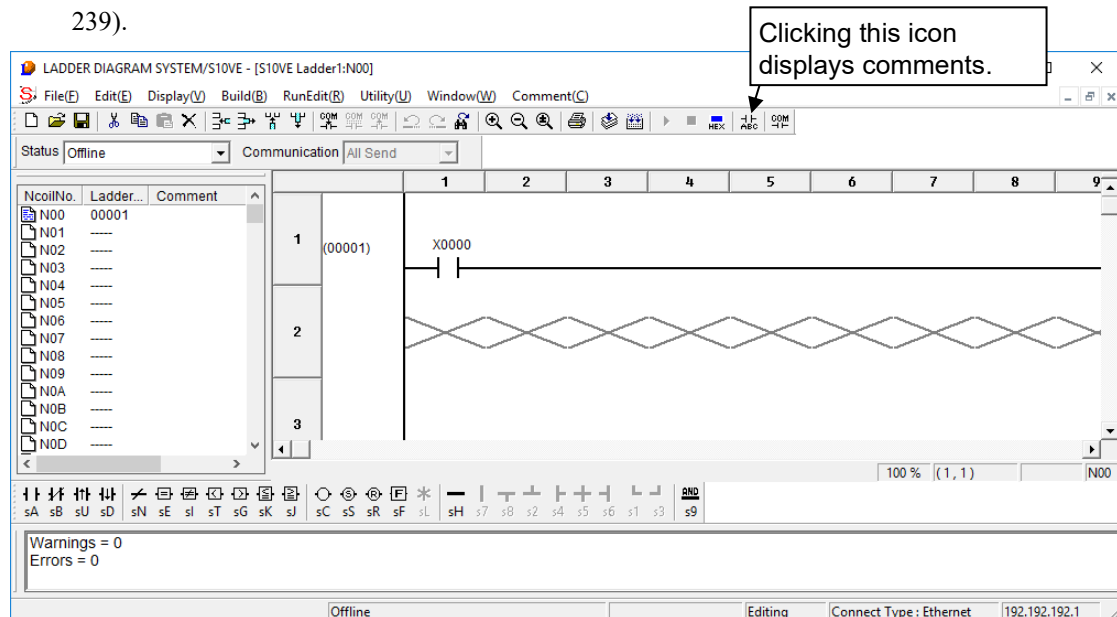
Figure 4-240 Displaying comments by using the tool bar

<Note>

- No comment of a comparison instruction operand is displayed.

(b) Hiding comments

<Operation>

● Operation using the menu

[1] From the **Comment** menu, click **Comment display**, and then **Nothing**.

[2] The comments assigned to the registers in the ladder sheet circuit diagram are hidden (see Figure 4-241).
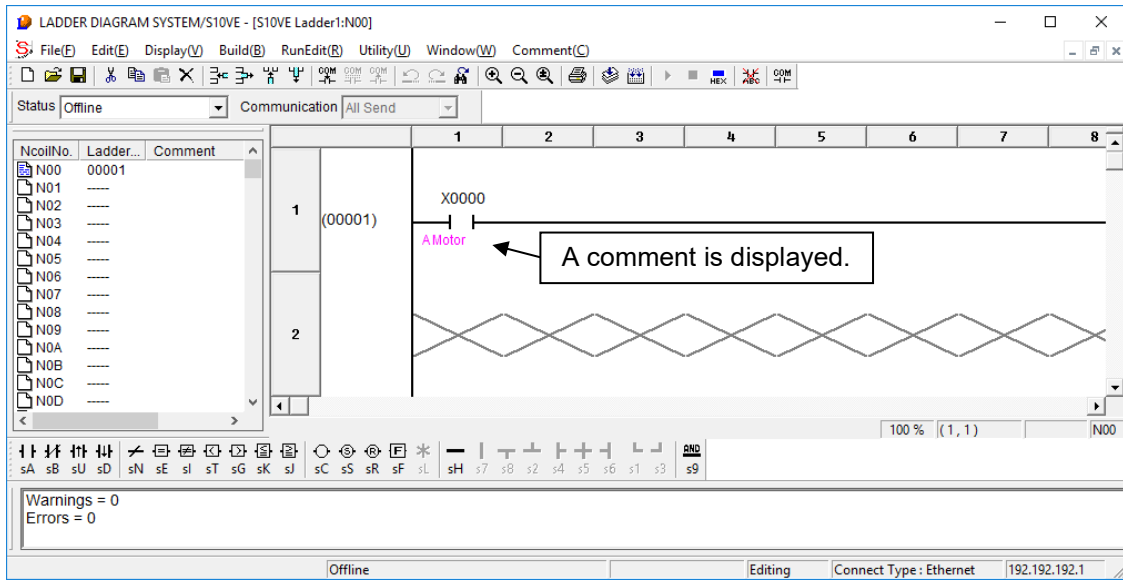
Figure 4-241 Hiding comments from the ladder circuit
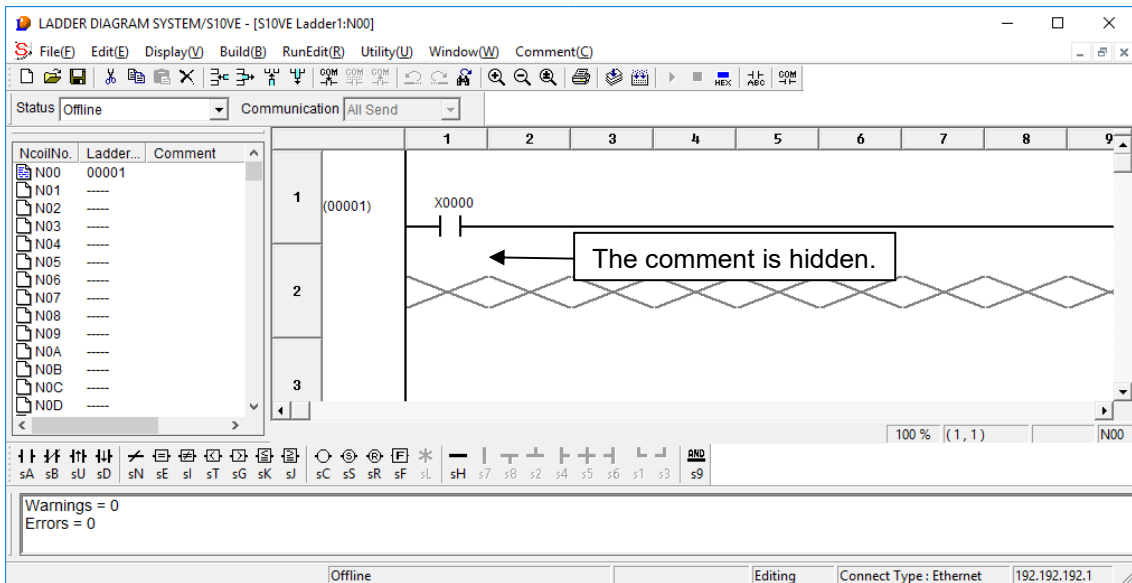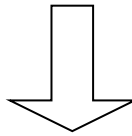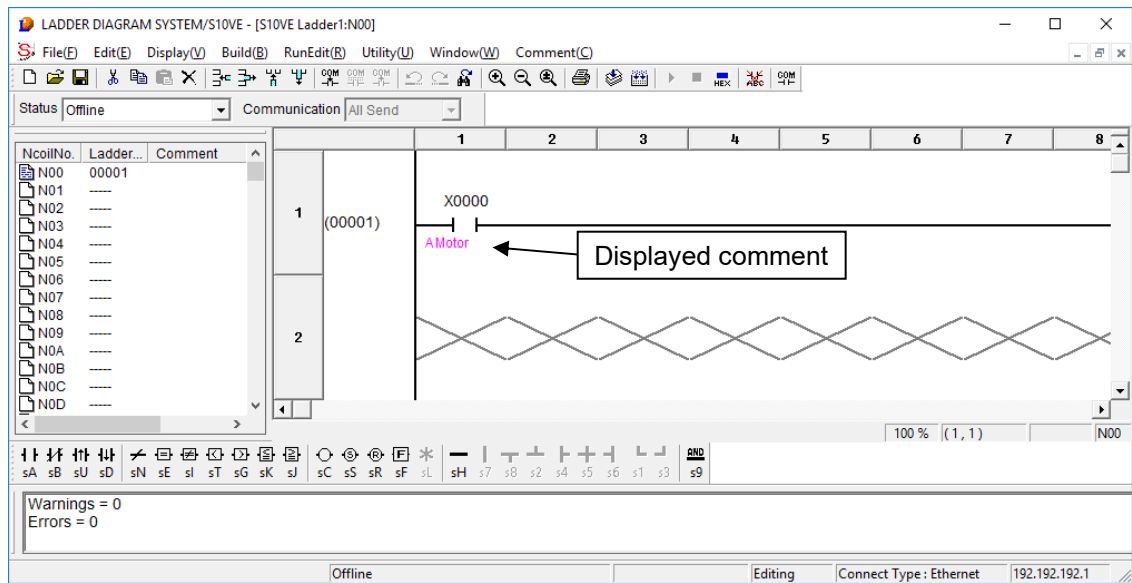
● Operation using the tool bar

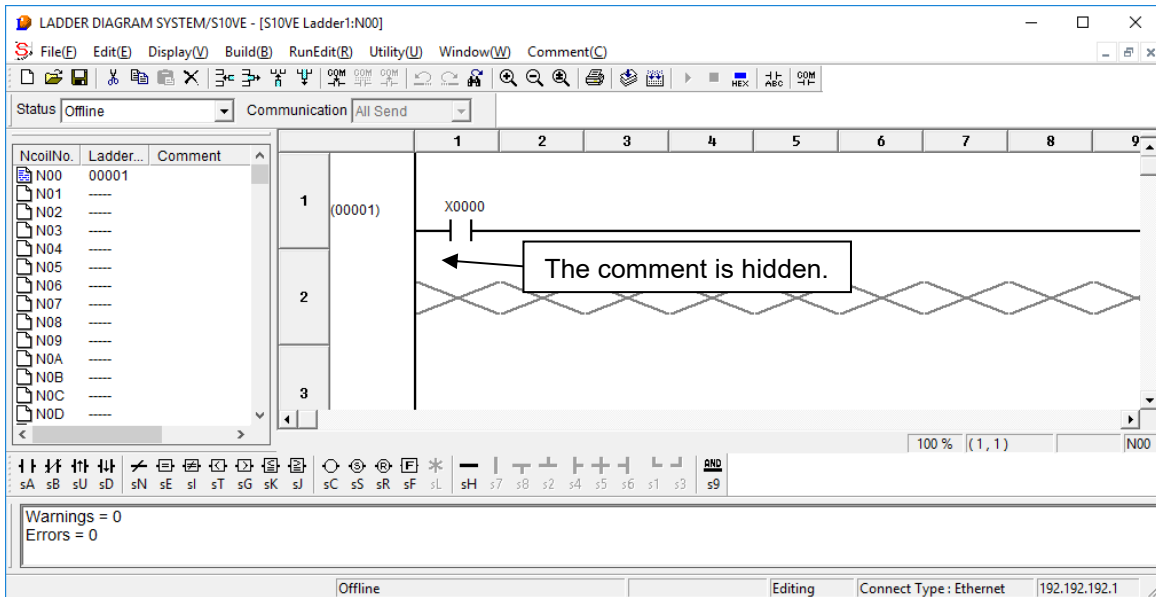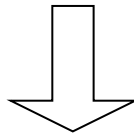[1] On the tool bar, click the hide I/O comments icon (see Figure 4-242).
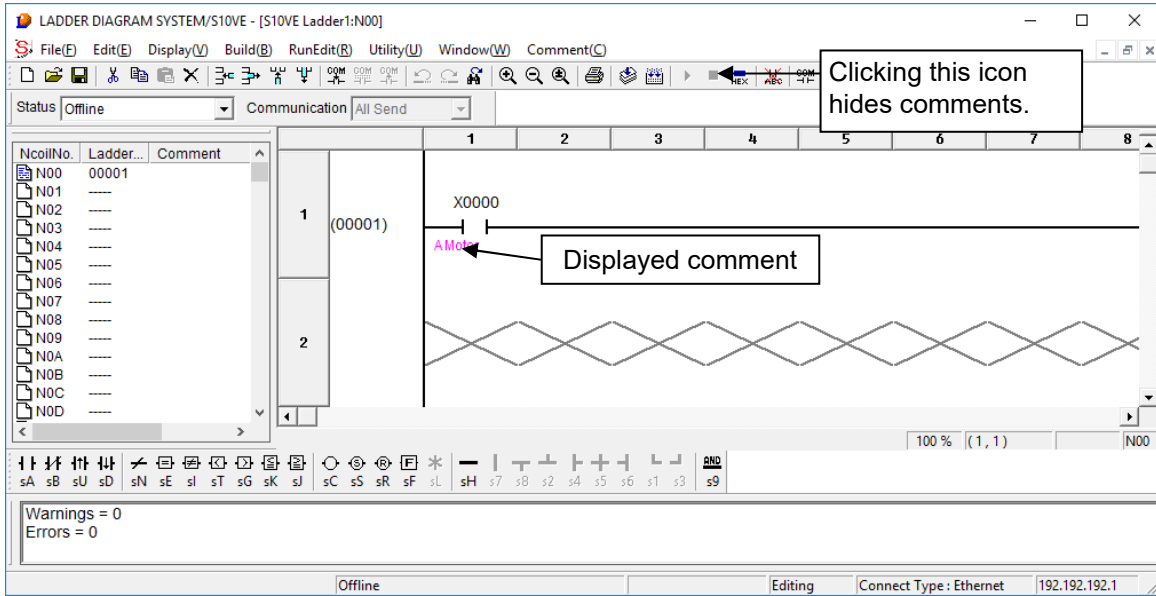
Figure 4-242 Hiding comments in the ladder circuit by using the tool bar

(6) Changing the comment display size

You can change the size of characters in displayed comments. You can select from among three character sizes, **Usually (16 characters)**, **Usually (32 characters)**, and **Smallness (32 characters)** from the menu in the main window (see Figure 4-243). The default is **Usually (16 characters)**.
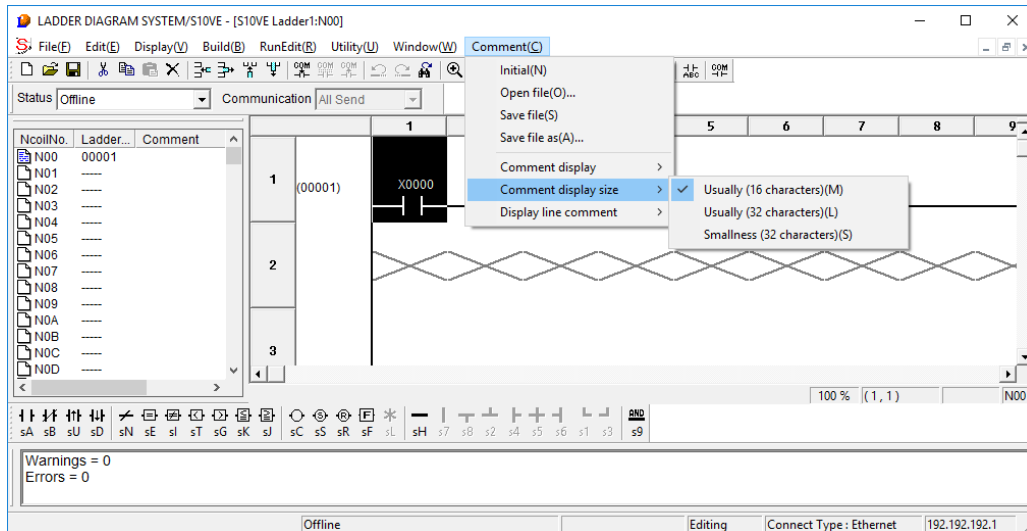
Figure 4-243 Changing the comment character size

Usually (16 characters):   Displays characters in the font size specified in the Setup environment window of the utility function.

Without word break specified, a maximum of 8 characters (halfwidth) by 2 lines can be displayed. (However, the maximum comment length is 16 halfwidth characters.)

The cell size is smaller than that of the character size **Usually (32 characters)**.

Usually (32 characters):   Displays characters in the font size specified in the Setup environment window of the utility function.

Without word break specified, a maximum of 8 characters (halfwidth) by 4 lines can be displayed.

The cell size is larger than that of the character size **Smallness (32 characters)** and **Usually (16 characters)**.

Smallness (32 characters):   Displays characters of a size about 70% of the font size specified in the Setup environment window of the utility function.

Without word break specified, a maximum of 11 characters (halfwidth) by 3 lines can be displayed. (However, the maximum comment length is 32 halfwidth characters.)

The cell size is smaller than that of the character size **Usually (32 characters)**.

Note 1: If word break is specified, the number of displayable characters is variable because all characters that can be displayed in the display area calculated with the default font are displayed.

Note 2: No comments can be entered for IW (I/O input register for future use) and OW (I/O output register for future use).

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APPENDIX A SYSTEM FUNCTIONS

This appendix lists all available system functions. For details about these functions, refer to the *S10VE Software Manual Programming Ladder Diagram System for Windows®* (manual number SEE-3-121).

Table A-1 System Functions (1/5)

Classification	Function	Input format	Description
Arithmetic instructions	ADD	ADD $S + D \rightarrow R$	Adds the values of S and D together and assigns the result to R.
	SUB	SUB $S - D \rightarrow R$	Subtracts the value of D from S and assigns the result to R.
	INC	INC S	Adds one to the value of S and assigns the result to S.
	DEC	DEC S	Subtracts one from the value of S and assigns the result to S.
	MUL	MUL $S \times D \rightarrow R$	Multiplies the values of S and D together and assigns the result to R.
	DIV	DIV $S / D \rightarrow R$	Divides the value of S by that of D and assigns the quotient to R.
	MOD	MOD $S \% D \rightarrow R$	Divides the value of S by that of D and assigns the remainder to R.
	SCL	SCL $S : D1 : D2 \rightarrow R$	Multiplies the values of S and D1 together, divides the result by D2, and assigns the quotient to R.
Logical instructions	AND	AND $S : D \rightarrow R$	ANDs the values of S and D together and assigns the result to R.
	OR	OR $S : D \rightarrow R$	ORs the values of S and D together and assigns the result to R.
	EOR	EOR $S : D \rightarrow R$	EORs the values of S and D together and assigns the result to R.
	NOT	NOT $S \rightarrow R$	Logically negates the value of S and assigns the result to R.
Comparison instructions	EQU	EQU $S : D \rightarrow R$	If the value of S is equal to that of D, assigns the value 1 to R. If not, assigns the value 0 to R.
	NEQ	NEQ $S : D \rightarrow R$	If the value of S is not equal to that of D, assigns the value 1 to R. If they are equal, assigns the value 0 to R.
	GT	GT $S : D \rightarrow R$	If $S > D$, assigns the value 1 to R. If $S \leq D$, assigns the value 0 to R.
	LT	LT $S : D \rightarrow R$	If $S < D$, assigns the value 1 to R. If $S \geq D$, assigns the value 0 to R.
	GE	GE $S : D \rightarrow R$	If $S \geq D$, assigns the value 1 to R. If $S < D$, assigns the value 0 to R.
	LE	LE $S : D \rightarrow R$	If $S \leq D$, assigns the value 1 to R. If $S > D$, assigns the value 0 to R.
	TST	TST S	Tests S to determine which one of the three conditions P (positive), N (negative), or Z (zero) it meets and sets its associated flag (P, N, or Z).

The symbols *S* (source) and *D* (destination) denote a register or a constant. Some functions do not allow specification of constants. The symbol *R* (result) denotes a register.

Table A-1 System Functions (2/5)

Classification	Function	Input format	Description
Transfer instructions	MOV	MOV S → R	Moves the value of S to R.
	MOM	MOM S : N → R	Moves as many values as N steps to R, starting from S.
	INI	INI S : N → R	Initializes as many locations as N steps with the value of S, starting from R.
	EXC	EXC S : D	Exchanges the values of S and D.
	PSH	PSH S → D	Pushes the value of S to FIFO table D.
	POP	POP S → D	Pops a value out of FIFO table S and assigns the value to D.
	AST	AST S → R	Assigns the address of S to R.
	SCH	SCH S : D : N → R	Searches a sequence of as many locations as N steps for the value of S, starting from address D, and stores the result in R.
	PSHO	PSHO S → D	Pushes the value of S to FIFO table D. [Dedicated to S10/2α and S10mini-compatible FIFO]
	POPO	POPO S → D	Pops data from FIFO table S and inserts it into D. [Dedicated to S10/2α and S10mini-compatible FIFO]
Conversion instructions	BTF	BTF S → R	Converts the value of S in binary to floating-point format and assigns the result to R.
	FTB	FTB S → R	Converts the value of S in floating-point format to binary and assigns the result to R.
	BTD	BTD S → R	Converts the value of S in binary to BCD format and assigns the result to R.
	DTB	DTB S → R	Converts the value of S in BCD format to binary and assigns the result to R.
	SEG	SEG S → R	Converts the value of S in binary to 7-segment format and assigns the result to R.
	ASP	ASP S → R	Converts the value of S in binary to ASCII format and assigns the result to R in pack mode.
	ASU	ASU S → R	Converts the value of S in binary to ASCII format and assigns the result to R in unpack mode.
	APB	APB S → R	Converts the value of S in packed ASCII format to binary and assigns the result to R.
	AUB	AUB S → R	Converts the value of S in unpacked ASCII format to binary and assigns the result to R.

The symbols *S* (source) and *D* (destination) denote a register or a constant. Some functions do not allow specification of constants. The symbol *R* (result) denotes a register.

Table A-1 System Functions (3/5)

Classification	Function	Input format	Description
Conversion instructions	STD	STD S → R	Converts the word-value of S to long-word format and assigns the result to R.
	DTS	DTS S → R	Converts the long-word value of S to word format and assigns the result to R.
	ABS	ABS S → R	Finds an absolute value from the value of S and assigns the result to R.
	NEG	NEG S → R	Makes the value of S negative and assigns the result to R.
	DCD	DCD S → R	Decodes the value of S and assigns the result to R.
	ECD	ECD S → R	Encodes the value of S and assigns the result to R.
Shift instructions	LSR	LSR S : N → R	Logically shifts the content of S by N bits to the right and assigns the result to R.
	LSL	LSL S : N → R	Logically shifts the content of S by N bits to the left and assigns the result to R.
	ASR	ASR S : N → R	Arithmetically shifts the content of S by N bits to the right and assigns the result to R.
	ASL	ASL S : N → R	Arithmetically shifts the content of S by N bits to the left and assigns the result to R.
Rotation instructions	ROR	ROR S : N → R	Rotates the content of S by N bits to the right and assigns the result to R.
	ROL	ROL S : N → R	Rotates the content of S by N bits to the left and assigns the result to R.
Function processing instructions	LIM	LIM S : D1 : D2 → R	Compares the value of S with boundary values D1 (upper) and D2 (lower) and assigns the result (D1 [if D1] < S, D2 [if D2 > S], or S [if D2 ≤ S ≤ D1]) to R.
	BND	BND S : D1 : D2 → R	Compares the value of S with boundary values D1 and D2 and, if the value is within the limits, assigns the value 0 to R.
	ZON	ZON S : D1 : D2 → R	Adds bias value D1 (if S > 0) or D2 (if S < 0) to the value of S and assigns the result to R.
	SQR	SQR S → R	Finds a square root for the value of S and assigns the result to R.
	SIN	SIN S → R	Converts the value (angle) of S to a sine value and assigns the result to R.

The symbols *S* (source) and *D* (destination) denote a register or a constant. Some functions do not allow specification of constants. The symbol *R* (result) denotes a register.

Table A-1 System Functions (4/5)

Classification	Function	Input format	Description
Function processing instructions	COS	COS S → R	Converts the value (angle data) of S to a cosine value and assigns the result to R.
	TAN	TAN S → R	Converts the value (angle data) of S to a tangent value and assigns the result to R.
	ASIN	ASIN S → R	Converts the value (angle data) of S to an arcsine value and assigns the result to R.
	ACOS	ACOS S → R	Converts the value (angle data) of S to an arccosine value and assigns the result to R.
	ATAN	ATAN S → R	Converts the value (angle data) of S to an arc tangent value and assigns the result to R.
	EXP	EXP S → R	Calculates the exponent for the value specified for S and assigns the result to R.
	LOG	LOG S → R	Calculates the logarithm where the natural logarithm of the value specified for S is the base, and then assigns the result to R.
	MAX	MAX S : D → R	Compares the value of S with the value of D, and then assigns the larger value to R.
	MIN	MIN S : D → R	Compares the value of S with the value of D, and then assigns the smaller value to R.
Special instructions	XCLR	XCLR	Clears the X register area.
	YCLR	YCLR	Clears the Y register area.
	GCLR	GCLR	Clears the G register area.
	RCLR	RCLR	Clears the R register area.
	KCLR	KCLR	Clears the K register area.
	TCLR	TCLR	Clears the T register area.
	UCLR	UCLR	Clears the U register area.
	CCLR	CCLR	Clears the C register area.
	VCLR	VCLR	Clears the V register area.
	ECLR	ECLR	Clears the E register area.
	FCLR	FCLR	Clears operation result flags.
Jump instructions	JT	JT *label-name*	If a given condition is true, jumps to a specified label.
	JMP	JMP *label-name*	Unconditionally jumps to a specified label.
	JSE	JSE	If a given condition is true, jumps to the end of the sequence.

The symbols *S* (source) and *D* (destination) denote a register or a constant. Some functions do not allow specification of constants. The symbol *R* (result) denotes a register.

Table A-1 System Functions (5/5)

Classification	Function	Input format	Description
Ethernet Communication instructions[#]	TOP	TOP S (N)	Opens the TCP connection (client).
	TPOP	TPOP S (N)	Opens the TCP connection (server).
	TCLO	TCLO S (N)	Closes the TCP connection.
	TRCV	TRCV S (N)	Receives TCP.
	TSND	TSND S (N)	Transmits TCP.
	UOP	UOP S (N)	Opens UDP.
	UCLO	UCLO S (N)	Closes UDP.
	URCV	URCV S (N)	Receives UDP.
	USND	USND S (N)	Transmits UDP.

#: Both word-type registers (S) and immediate values (N) are available as parameters.

For details about Ethernet communication instructions, refer to the *S10VE Software Manual Programming Ladder Diagram System for Windows®* (manual number SEE-3-121).

For details about Ethernet communication instructions, refer to *2.7 Ethernet communication instructions* in the *S10VE Software Manual Programming Ladder Diagram System for Windows®* (manual number SEE-3-121).

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APPENDIX B SYSTEM EXTENSION FUNCTIONS

Table B-1 shows a list of system extension functions. For details on the system extension functions, see the documentation for the option modules and tools. Note that index specifications and indirect registers cannot be used for the parameters of the system extension functions.

Table B-1 System extension functions

Option module/tool	Function	Input format	Function summary
NXTOOLS	SAT	SAT S	Function for NXACP initials
	ACP	ACP S	Function for NXACP transmission
	SATO	SATO S	Function for NXACP initials (converted from S10mini)
	ACPO	ACPO S	Function for NXACP transmission (converted from S10mini)

S (source) indicates a register.

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APPENDIX C PCS NUMBERS IN THE LADDER DIAGRAM SYSTEM

PCs numbers are managed by a project of BASE SYSTEM/S10VE and set in PCs by downloading CPMS data. The PCs number cannot be set or changed by using the ladder diagram system.

If an operation shown in *Flow of PCs number* is performed, the ladder diagram system imports the PCs number and stores it in the internal memory. The PCs number to be imported varies depending on the operation:

- Creating a new ladder file: PCs number of the project of BASE SYSTEM/S10VE
- Opening an existing ladder file: PCs number in the header information of the open ladder file
- Send (offline) of the data transmit/receive function: PCs number in the header information of the sent ladder file
- Send/receive of the build function: PCs number of the communication destination PCs (this is to match the PCs number of the PCs)

Flow of PCs number
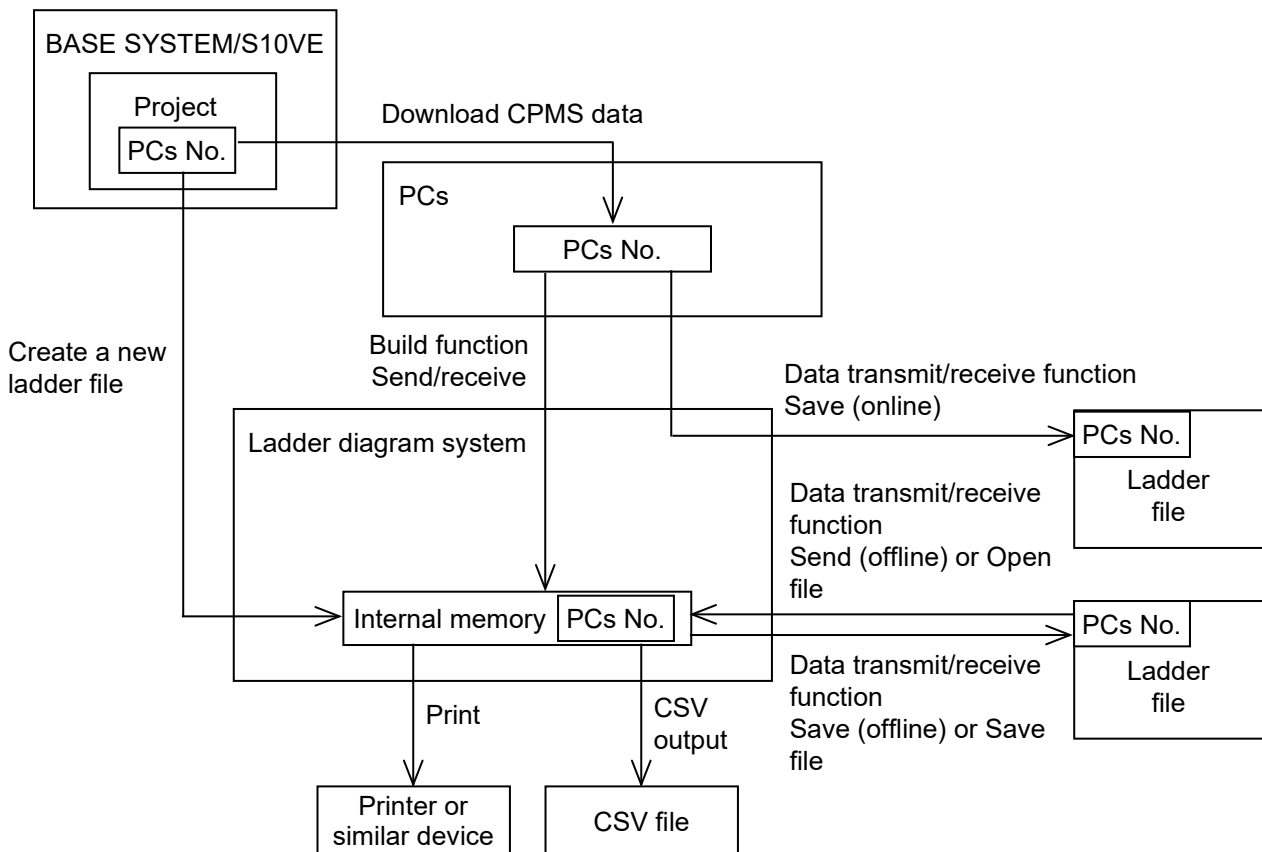
The PCs number stored in the internal memory is used to save a ladder file, print data, or output data to a CSV file. When saving a ladder file, the user can change the PCs number saved in the header information of the ladder file. When a file is saved, the PCs number stored in the internal memory is displayed by default. As an exception, the default PCs number is 9999 if the PCs number of the open ladder file is 9999 (a wildcard).

If the PCs number of the ladder file is not a wildcard, the system checks whether the PCs number matches that of PCs during send/receive processing (build function) or send/save processing (online data transmit/receive function). During send/save processing (offline data transmit/receive function), the system checks whether the PCs number of the open ladder file matches that of the ladder file selected by the offline data transmit/receive function. For details, see the descriptions of functions in CHAPTER 4.