X-SEL

IAI Corporation

PC Software
PC Software for X-SEL
XSEL2 Edition

IA-101-N
IA-101-X-MW-JS

Instruction Manual

First Edition

IAI Corporation

Please Read Before Use

Thank you for purchasing our product.

This instruction manual explains the handling methods, structure and maintenance of this product, providing the information you need in order to use the product safely.

Before using the product, be sure to read this manual and fully understand the contents explained herein to ensure safe use of the product.

Please downloaded the user's manual from our website.
You can download it free of charge. User registration is required for the first time downloading.
  URL : www.iai-robot.co.jp/data_dl/CAD_MANUAL/

When using the product, print out of the necessary portions of the relevant manual, or please display it on your computer, tablet terminal, etc. so that you can check it immediately.

After reading the instruction manual, keep it in a convenient place so that whoever is handling the product can refer to it quickly when necessary.

[Important]

- This instruction manual is an original document dedicated for this product.
- This product cannot be used in ways not shown in this instruction manual. IAI shall not be liable for any result whatsoever arising from the use of the product in any other way than what is noted in the manual.
- The information contained in this instruction manual is subject to change without notice for the purpose of product improvement.
- If any issues arise regarding the information contained in this instruction manual, contact our customer center or the nearest sales office.
- Use or reproduction of this instruction manual in full or in part without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the text are registered trademarks.

ME0483-1A

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Safety Guide

"Safety Guide" has been written to use the machine safely and so prevent personal injury or property damage beforehand. Make sure to read it before the operation of this product.

Safety Precautions for Our Products

The common safety precautions for the use of any of our robots in each operation.

No.	Operation Description	Description
1	Model Selection	• This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications. 1) Medical equipment used to maintain, control or otherwise affect human life or physical health. 2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility) 3) Important safety parts of machinery (Safety device, etc.) • Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product. • Do not use it in any of the following environments. 1) Location where there is any inflammable gas, inflammable object or explosive 2) Place with potential exposure to radiation 3) Location with the ambient temperature or relative humidity exceeding the specification range 4) Location where radiant heat is added from direct sunlight or other large heat source 5) Location where condensation occurs due to abrupt temperature changes 6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid) 7) Location exposed to significant amount of dust, salt or iron powder 8) Location subject to direct vibration or impact • For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.

No.	Operation Description	Description
2	Transportation	• When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. • When the work is carried out with 2 or more persons, make it clear who is to be the "leader" and who to be the "follower(s)" and communicate well with each other to ensure the safety of the workers. • When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. • Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the instruction manual for each model. • Do not step or sit on the package. • Do not put any heavy thing that can deform the package, on it. • When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. • When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit. • Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. • Do not get on the load that is hung on a crane. • Do not leave a load hung up with a crane. • Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	• The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. • Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.
4	Installation and Start	(1) Installation of Robot Main Body and Controller, etc. • Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake. • Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. • When using the product in any of the places specified below, provide a sufficient shield. 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	(2) Cable Wiring ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.
		(3) Grounding ● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. ● For the ground terminal (PE) on the AC power cable of the controller and the grounding plate in the control panel, make sure for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment standards and criteria). For detail, follow the description in [an instruction manual of each controller or controller built-in actuator]. ● Conduct functional grounding on the FG terminal for a controller supplying 24V DC or a controller built-in type actuator. In order to minimize influence to mechanical operation given by electromagnetic interference (noise) to an electrical device or insulation failure, conduct grounding on a terminal or a conductor that is electrically stable. The reference impedance should be Type D (Former Class 3, ground resistance 100Ω or less).

No.	Operation Description	Description
4	Installation and Start	(4) Safety Measures ● When the work is carried out with 2 or more persons, make it clear who is to be the "leader" and who to be the "follower(s)" and communicate well with each other to ensure the safety of the workers. ● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury. ● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. ● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. ● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. ● When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury. ● Take the measure so that the work part is not dropped in power failure or emergency stop. ● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. ● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	● When the work is carried out with 2 or more persons, make it clear who is to be the "leader" and who to be the "follower(s)" and communicate well with each other to ensure the safety of the workers. ● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign "Under Operation" at the position easy to see. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.

No.	Operation Description	Description
6	Trial Operation	• When the work is carried out with 2 or more persons, make it clear who is to be the "leader" and who to be the "follower(s)" and communicate well with each other to ensure the safety of the workers. • After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation. • When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation. • Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc. • Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.
7	Automatic Operation	• Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence. • Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication. • Make sure to operate automatic operation start from outside of the safety protection fence. • In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product. • When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.

No.	Operation Description	Description
8	Maintenance and Inspection	● When the work is carried out with 2 or more persons, make it clear who is to be the "leader" and who to be the "follower(s)" and communicate well with each other to ensure the safety of the workers. ● Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. ● When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign "Under Operation" at the position easy to see. ● For the grease for the guide or ball screw, use appropriate grease according to the instruction manual for each model. ● Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. ● The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation. ● Pay attention not to lose the removed cover or screws, and make sure to put the product back to the original condition after maintenance and inspection works. Use in incomplete condition may cause damage to the product or an injury. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.
9	Modification and Dismantle	● Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	● When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. ● When removing the actuator for disposal, pay attention to drop of components when detaching screws. ● Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.
11	Other	● Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device. ● See Overseas Specifications Compliance Manual to check whether complies if necessary. ● For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure the safety.

Alert Indication

The safety precautions are divided into "Danger", "Warning", "Caution" and "Notice" according to the warning level, as follows, and described in the instruction manual for each model.

Level	Degree of Danger and Damage	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	⚠ Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	⚠ Warning
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	⚠ Caution
Notice	This indicates lower possibility for the injury, but should be kept to use this product properly.	ⓘ Notice

Support Models

Model Name	Various data file extensions									Support Started Version
	Program (Individually)	Program (Batch)	Position (Individually)	Position (Batch)	Parameter	Symbol	Coordinate	Global data	Backup Data	
XSEL2-T	.x7pg	.x7pa	.x7pt	.x7pta	.x7pm	.x7sm	–	.x7gd	.x7bk	V15.00.00.00
XSEL2-TX	.s7pg	.s7pa	.s7pt	.s7pta	.s7pm	.s7sm	.s7cd	.s7gd	.s7bk	V15.00.00.00

* XSEL2-T/TX is capable to divide the construction axes into two groups at the maximum.

Positions can be edited in unit of axes groups.

The positions of individual axes groups should be stored with an extension .x7pt,.s7pt.

The positions of all axes groups consolidated position should be stored with an extension .x7pta,.s7pta.

Software License Agreement

Before opening the software package, please read this Software License Agreement (hereinafter referred to as "Agreement").

This Agreement is applied to the PC interface software for this product (hereinafter referred to as "this Software", and also includes updated versions.).

Regardless of the reason, opening the this Software package will be regarded as your acknowledgement of consenting to this Agreement. You may not use this software if you do not agree to the terms of this Agreement.

IAI Corporation (hereinafter referred to as "IAI") shall grant to the user (hereinafter referred to as "the User"), and the User shall accept, a non-transferable, non-exclusive right to use the Licensed Software supplied with this Agreement, based on the following terms and conditions.

Witnesseth

1. Term of the Agreement

This Agreement shall take effect the moment the User opens the Licensed Software and remain effective until the User submits a termination request to IAI in writing or the Agreement is otherwise terminated pursuant to the provision of Section 3.

2. Licensing

If the User owns an electronic medium, such as DVD-R, which is sold by IAI and which this Software is recorded to, or if user registration has been held to this Software, it should be allowed that the User uses this Software on multiple computers.

The user should not be allowed to have himself or a third party performs modification, reverse engineering, disassembly, decompile, translation or adaptation entirely or partially in this Software.

If the User violates anything in the agreement and causes any loss to IAI, the User is to compensate the loss caused to IAI.

3. Termination of the Agreement

In the event of breach by the User of any of the terms and conditions hereunder, or upon discovery of a material cause that makes continuation of this Agreement impossible, IAI may immediately terminate this Agreement without serving any prior notice to the User.

In this case, the User should delete or dispose everything of this Software (including software copies) and dedicated connection cables within ten days after the day when the Agreement is terminated.

4. Range of Guarantee

IAI does not guarantee that this Software works in normal condition in every operational environment.

IAI may change all the specifications related to this Software without serving any prior notice. Also, IAI should not take any responsibility to any loss or damage caused as a result of use of this Software.

The User or a third party agrees not to claim compensation for damage from IAI for any loss suffered by the User or a third party as a result of installing and using the Licensed Software.

Based on this Agreement, the upper limit of the responsibility that IAI may take should be the amount of money that the User has actually paid to purchase this Software.
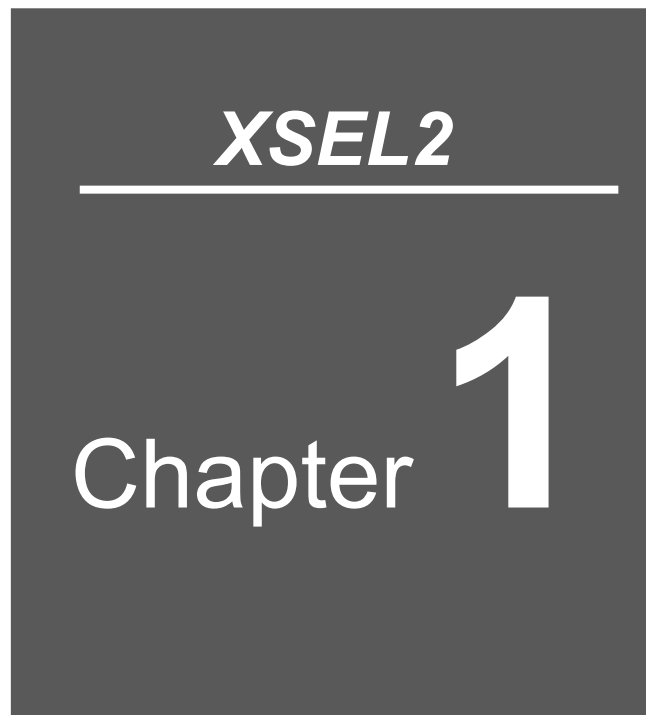
Caution in Handling

(1) This software is copyrighted by IAI Corporation (IAI).

(2) The software and the manual can only be used under the terms and conditions of the license agreement.

(3) IAI cannot assume responsibility for any damage or loss resulting from the use of this software or the manual.

(4) Please note that the version or edition number printed on the face of this manual does not correspond to the software version number.

(5) The content of this manual is subject to change without notice.

(6) The software runs with the Windows operation systems listed in the table below. Accordingly, it is a prerequisite to have a basic Windows operating environment to use this software.
(Note, however, that Windows is not included with the software.)

Port used	Type	Operable Windows
RS-232C	IA-101-X-MW-JS	Windows 10, Windows 11
USB	IA-101-N[Note 1]	Windows 10, Windows 11

Note 1 There is no cable enclosed. Please prepare yourself an USB cable to connect to the USB connector on XSEL2-T/TX Controllers.

XSEL2

Chapter 1

Before You Begin
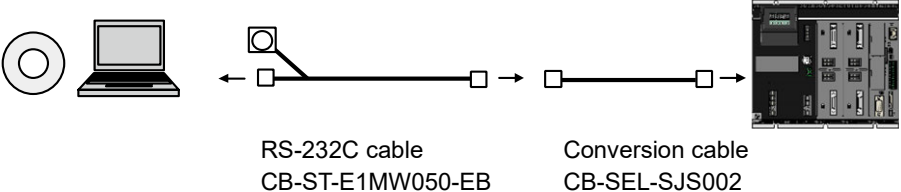
1.1　Components

Please check to make sure that the following items are included in your software package.

(1) Instruction manual	One
(2) DVD-ROM containing the software	One
(3) Permission of use contract (manual) for the software	One
(4) Connection cables	One set

　　Enclosed connection cables vary depending on the PC interface software type.

　　The types and connection cables are shown in the table below.

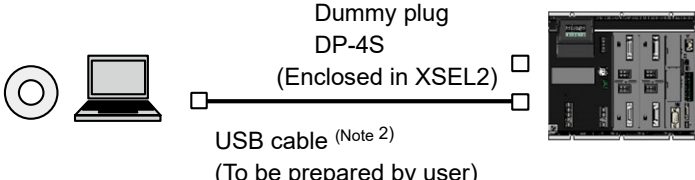| Type	External Connection Cable	
IA-101-X-MW-JS	RS-232C Cable (CB-ST-E1MW050-EB) Conversion cable (CB-SEL-SJS002)	1 cable 1 cable
Connection Configuration	Compatible controller XSEL2 RS-232C cable　　　Conversion cable CB-ST-E1MW050-EB　　CB-SEL-SJS002	

Type	External Connection Cable
IA-101-N	No USB cable enclosed (Note 1)
Connection Configuration	Dummy plug DP-4S (Enclosed in XSEL2)　Compatible controller XSEL2 USB cable (Note 2)　(To be prepared by user)

Note 1　There is no USB cable enclosed. Please prepare yourself a general-purposed USB cable.
Note 2　A general-purposed UBS cable (the connector on the controller side should be mini-B) can be used.
　　　　A recommended USB cable is U2C-MF50BK (manufactured by ELECOM).

1. Before You Begin

1A

1.2   System Requirements

The following operating environment is required to run this software.

Supported OS	Type	Operable OS
	IA-101-X-MW-JS IA-101-N (Note 1)	Windows 10, or Windows 11
Computer	PC compatible with supported OS (Windows)	
Keyboard	Keyboard compatible with a PC compatible with supported OS (Windows)	
Memory	Capacity of memory necessary to run a supported OS (Windows)	
Display	XGA and above	
Pointing device	Mouse or a compatible driver	
Storage medium drive	DVD-ROM drive	
Hard disk	Hard disk with at least 200 MB of available space (The software is installed on the hard disk.)	
Serial port RS-232C (EIA-S74 compliant)	Required for PC software of the following model number: Model number: IA-101-X-MW-JS	
USB port	Required for PC software of the following model number: Model number: IA-101-N (Note 1)	
Other	It is necessary to install the following. .NET Framework 4.8.1 or later	

Note 1 There is no cable enclosed. Please prepare yourself an USB cable to connect to the USB connector on XSEL2-T/TX Controllers.

1.3 Installing the Software

This software is run from the hard disk. This section explains how to install the software.

1.3.1 How to Install the PC Software

[1] Launching the tool for installation
  1) Insert the software DVD-ROM into the computer's optical drive.
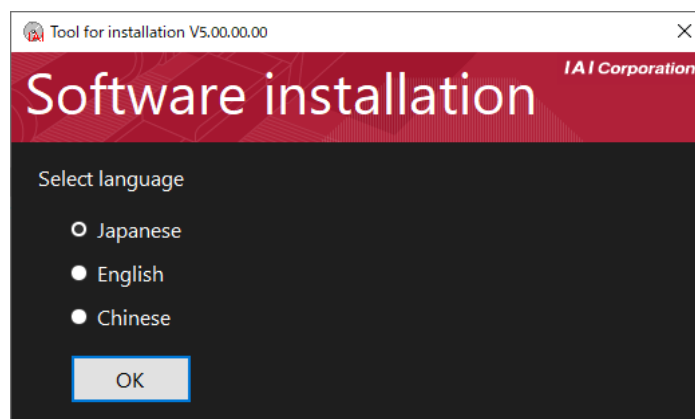 2) The tool for installation window (Fig. 1.1) will be displayed.

Fig. 1.1 Tool for installation window
(The window displayed may vary depending on the version, DVD data, etc.)

  * What to do if the tool for installation window (Fig. 1.1) is not displayed
    If the data installation selection window (Fig. 1.1) is not displayed even when the DVD-ROM is inserted, display the window according to the process below.
    a. Using Explorer, etc., display a list of the folders in the DVD-ROM.
       Figure 1.2 is displayed.
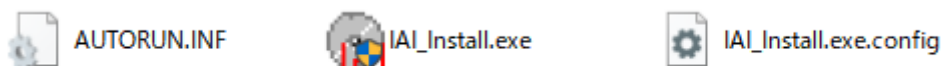
Fig. 1.2 List of Folders, etc., in the DVD-ROM

    b. Double-click to display the tool for installation window (Fig. 1.1).

1. Before You Begin

[2] Installation of the PC software for XSEL.

1) Select "English" on the tool for installation window (Fig. 1.3) and click OK .

Fig. 1.3 Tool for installation Window

2) When the tool for installation window (Fig. 1.4) is displayed, select "PC Interface software for XSEL."
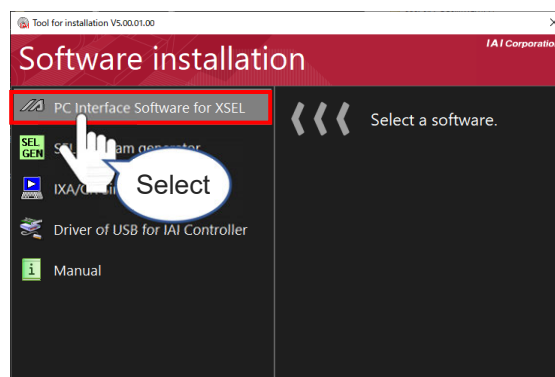
Fig. 1.4 Installation Window

3) Click Installarion .
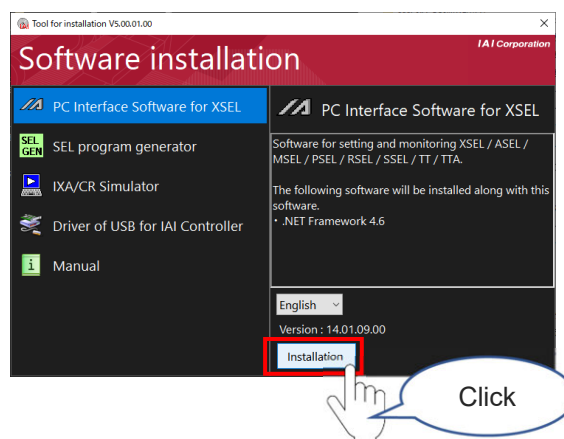
Fig.1.5 Installation Window

4) The standby window (Fig. 1.6) is displayed. Wait for the installation to launch.
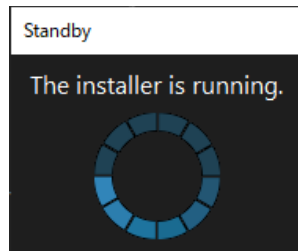
Fig.1.6 Standby Window

5) Installation preparation (Fig. 1.7) begins.
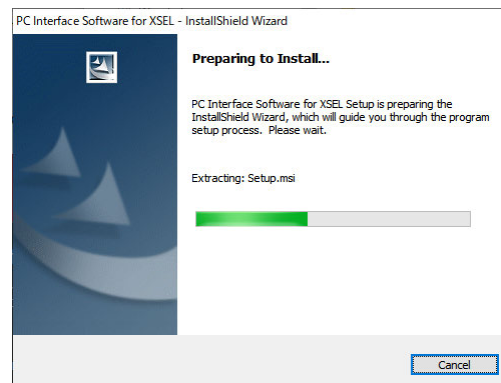
Fig. 1.7 Preparing to Install

6) InstallShield wizard window for XSEL PC software (Fig. 1.8) will be displayed.
   Click Next .
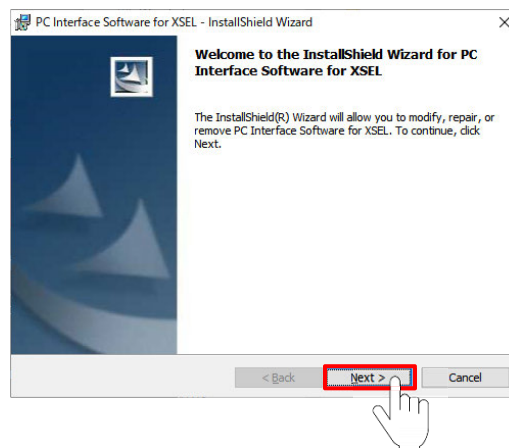
Fig. 1.8 InstallShield wizard window for XSEL PC software

1. Before You Begin

7) The user information registration window (Fig. 1.9) will be displayed. Enter user information and click Next .
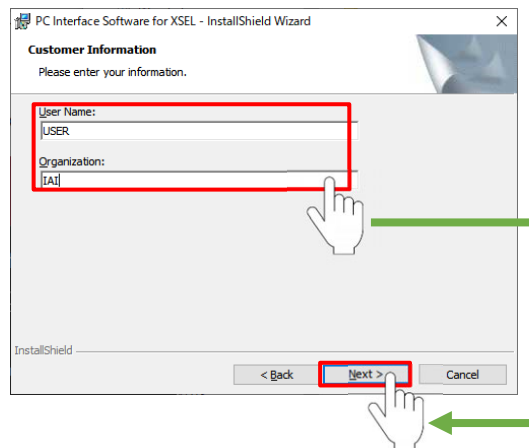
Fig. 1.9 User Information Registration Window

8) Designate the destination for installation of the XSEL PC software (Fig. 1.10). Normally, the window as displayed is fine.
After designation, click Next .
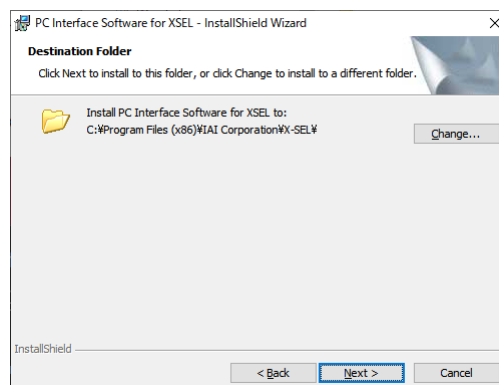
Fig. 1.10 Installation Destination Folder Designation Window

9) Click [Anyone who uses this computer (all users)].
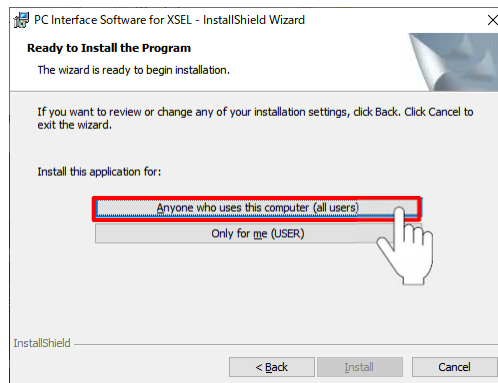
Fig. 1.11 Ready to Install Program Window

Installation begins. During installation, the window in Fig. 1.12 will be displayed.
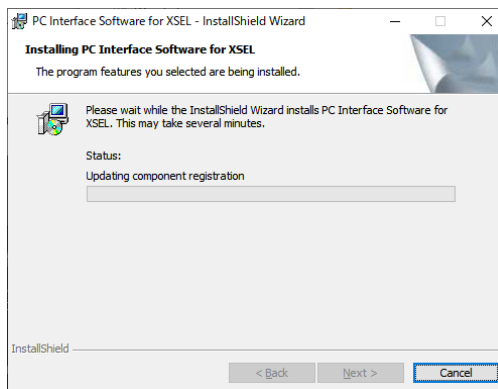
Fig. 1.12 Installing Program Window

10) When installation is complete, the window in Fig. 1.13 will be displayed.
    Uncheck "Launch the program" and click [Finish].
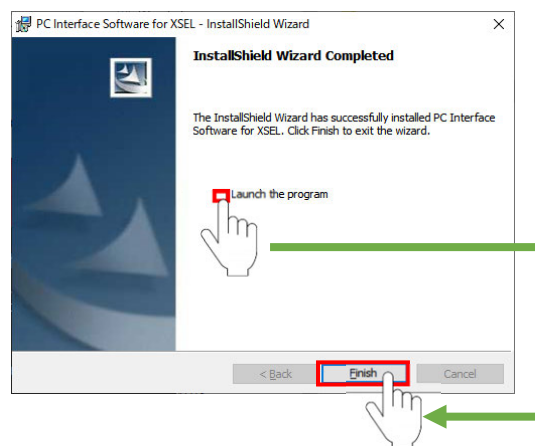
Fig. 1.13 Installation Complete

11) When program installation is complete, the start menu program (P) → IAI →XSEL PC software item will be displayed. Select this item to launch the software.

12) Eject the DVD-ROM.

13) After launching the program, click $\boxed{\text{Help}}$ in the menu to check whether the version is the same as the DVD-ROM version.
If the version has not been updated, uninstall the program and install from the DVD-ROM again.

1.3.2 How to Install Driver Software for USB Connection of XSEL2-T/TX

It is necessary to install the driver software when using USB by connecting to USB connector. Make sure to prepare the stop switch in your reach when having an actuator operated by USB connection so that you can stop the actuator in an emergency case.

1) Connect the PC to the controller using the USB cable. After connection being established, turn on the power to the controller if it is not on.

2) Installation process of the driver software automatically starts.

[Remarks]
Once the installation of the USB driver is complete, COM port gets automatically added.
The way to change the COM port, refer to [1.3.3 How to change the USB COM port]
(The name of the COM port is differ from the one on USB converter adapter)
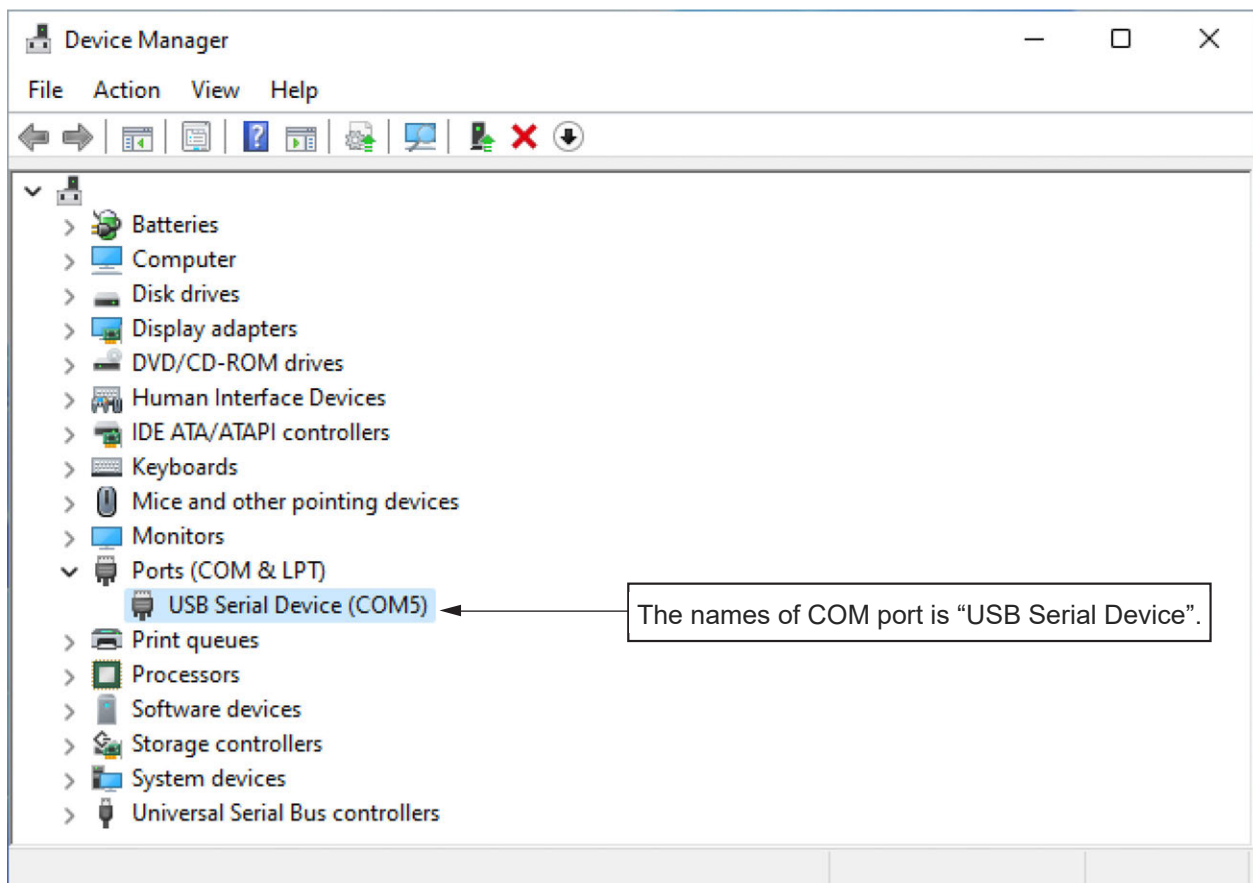
Fig. 1.14 Device Manager Window

1.3.3 How to change the USB COM port

The COM port set in the installation of USB conversion adapter driver software can be changed by the following procedures.

1) Click Windows Start, Setting, and Control Panel to open the Control Panel window.
   Double click System to open the Property window.
   Click and open Hardware above the System icon.
   Click and open Device Manager inside the Hardware folder.
   Double click and extend Port (COM and LPT) inside the Device Manager folder.
2) Double click IAI USB to UART Bridge Controller (COM?) .
   (Note) COM? is the COM port number before the port is changed.

IAI USB to UART Bridge Controller（COM?）
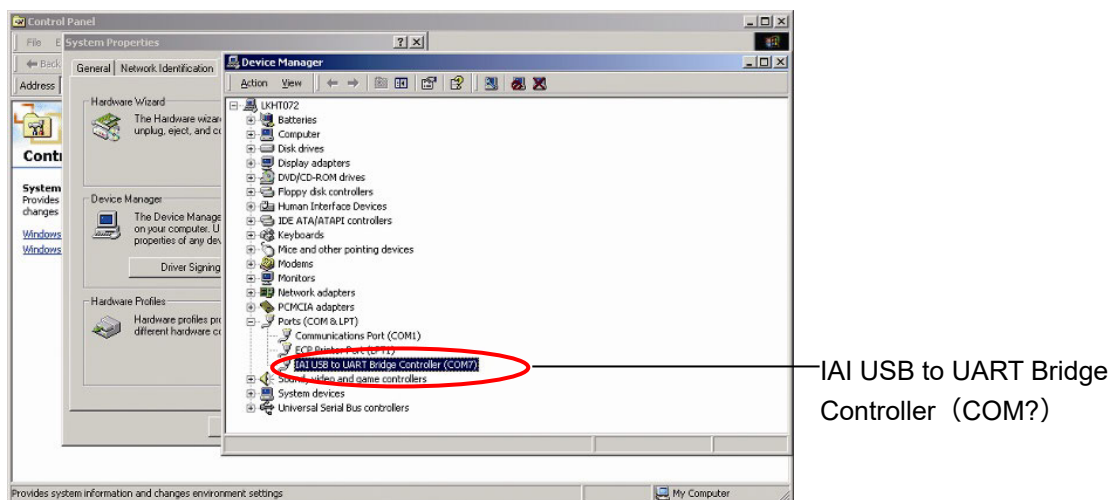
Fig. 1.15 Device Manager Window

3) Property window of "IAI USB to UART Bridge Controller (COM?)" will be displayed.
   Click Advanced on the Property window.
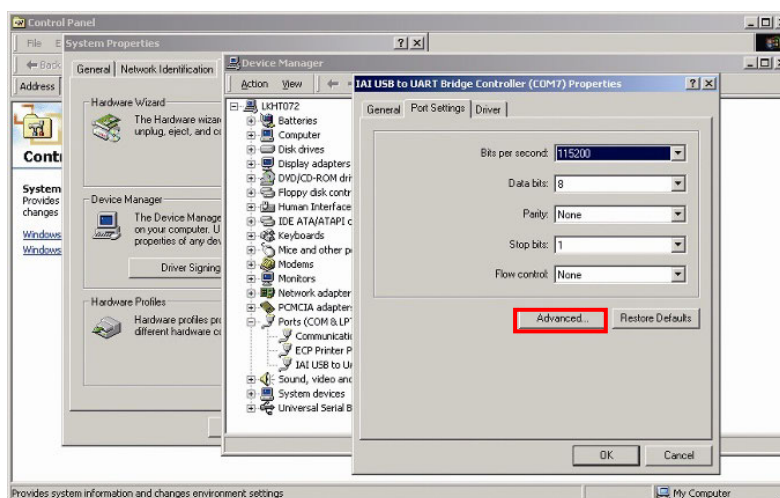
Fig. 1.16 Property Window

4) "COM? Port Option window" will be displayed.

Change the COM port number in the "COM Port Number" box to the number to be set.
Click OK .
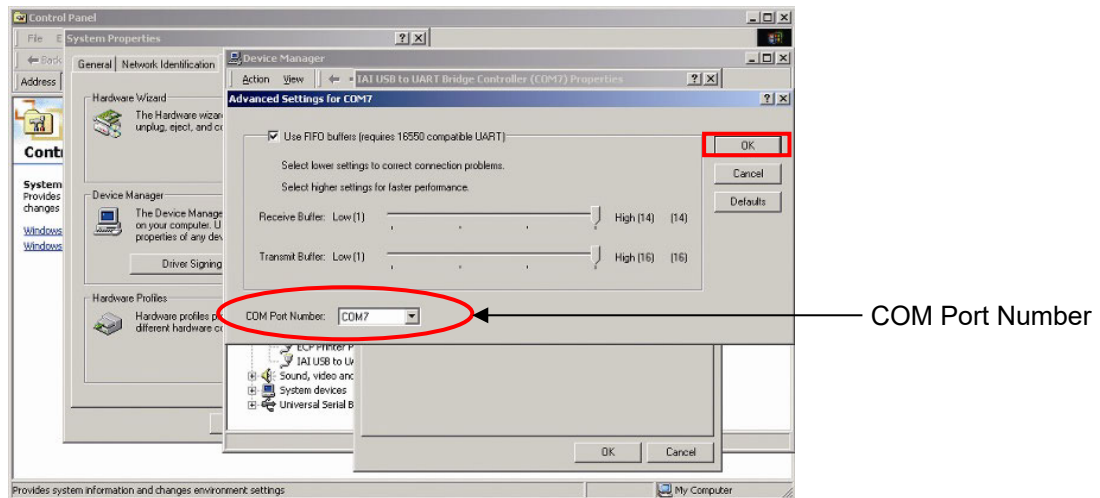
COM Port Number

Fig. 1.17 COM? Port Option Window

5) "COM? Port Option window" will be disappeared.
COM port number will be changed by clicking OK on the "Property window" (Fig. 1.16)

6) To confirm that the COM port number is changed, close the "Device Manager window" and
display it again.
After confirming the change, close all windows including the "Device Manager window".

1.4 Connection to Controller

1. Before You Begin

PLC

Touch Panel Teaching Pendant
Model: TB-02(D)-□
TB-03-□

Applicable Field Networks
EtherCAT
EtherNet/IP
DeviceNet
CC-Link
CC-Link IE Field
PROFIBUS-DP
PROFINET IO

24V DC Power supply for I/O
(To be prepared by user)

PC software

PIO Cable

Emergency
stop switch

Field Network Cables (To be prepared by user)

24V DC Power supply for brake release
(To be prepared by user)

Control Power
Single-Phase AC100 to 230V±10%

Motor Power Supply
3-Phase Type AC200 to 230V±10%/
Single-Phase type AC200 to 230V±10%/
Single-Phase 100V type AC100 to 115V±10%

Fig. 1.18 XSEL2 Controller

1.5   Starting the Software (Online Connection)

1) Turn off the power to the controller and PC, and connect the controller to the PC using the standard RS-232C cable or USB cable that comes with the software. Set the mode switch on the controller to the MANU side.

> ● When this software is started, the "safety velocity mode is enabled (enable the safety velocity limit)".
> In this mode, the maximum velocity is limited to 250mm/sec or below in programs started from the PC software. To operate programs according to their programmed velocity commands, the "safety velocity mode must be disabled (disable the safety velocity limit)".
> Refer to [3.3 Explanation of the Toolbar] for how to enable/disable the safety velocity mode.

2) Turn on the power to the controller and PC, and start Windows.

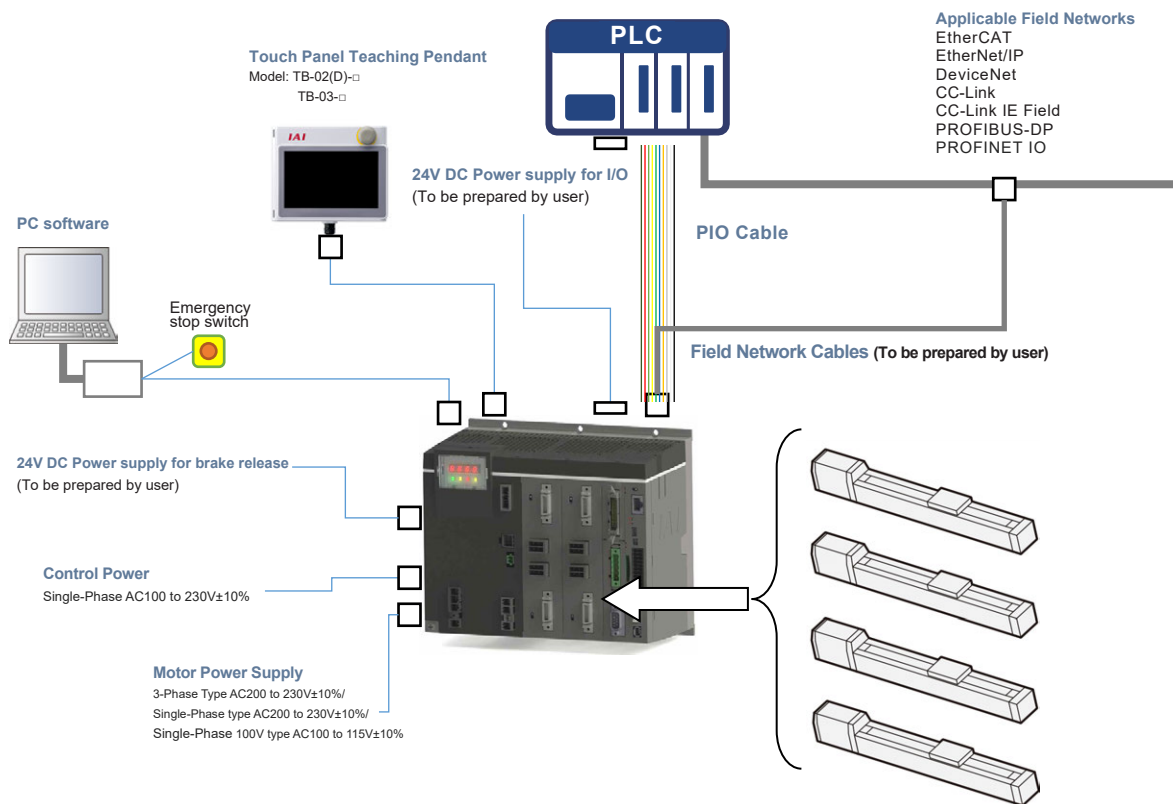3) Once you start up "XSEL PC Software" from the start menu of Windows, the controller select window (figure shown below) will show up.
   Select a controller that you would like to connect to the PC or to edit data, a window conform to the selected controller should come up.

   If you put a check mark on "Don't show this window again.", you will have an automatic connection to the controller with the communication setting you had last time (COM port number, baud rate, etc.) when you start it up next time.
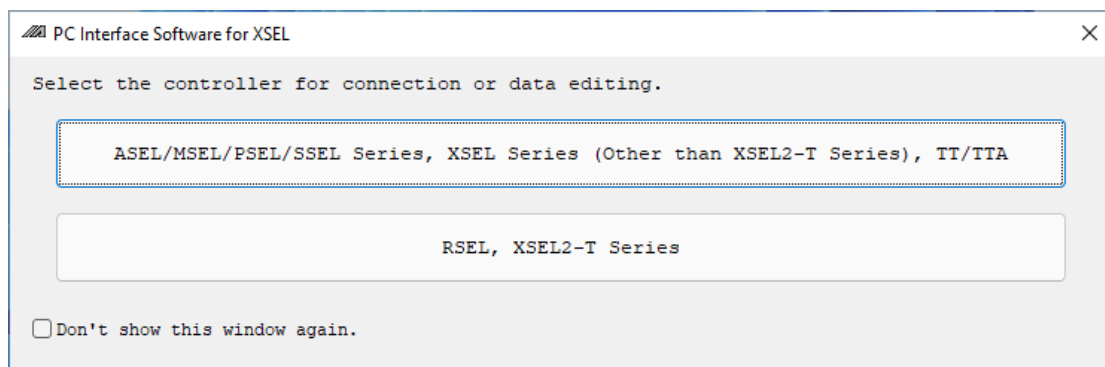
Fig. 1.19 Controller Select Window

If it is required to show this window again, remove the check mark on "When the PC Interface Software for XSEL is started up, the controller selection windows is skipped, and the controller is automatically connected with the current communication settings." in Environment Setup window for the XSEL PC software. Click OK .

* This environmental setting is equipped for both RSEL, XSEL2-T/TX and other than RSEL, XSEL2-T/TX.
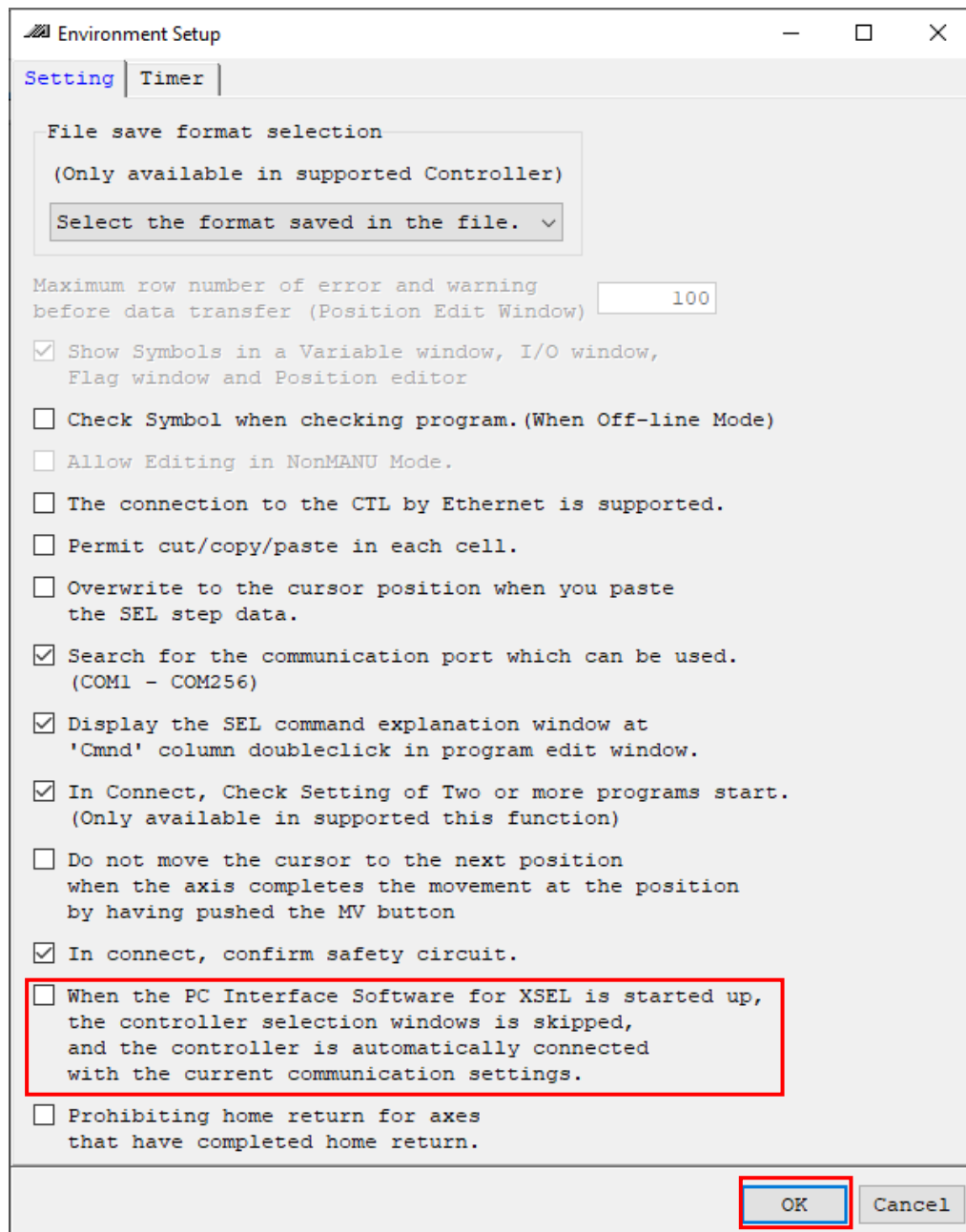
Fig. 1.20 Environment setup Window

4) The Connection Confirmation window (Fig. 1.21) will open.
   In the list boxes of "Port Name" and "Baud Rate (bps)", select the communication port [*1] to which the XSEL2-T/TX controller is connected and an applicable baud rate [*2], and then click OK.

Fig. 1.21 Connection Confirmation Window

*1 Only the communication ports that are available when the application is started can be selected.
*2 230,400bps Max.

5) After connection gets established, multiple program simultaneous startup permission/prohibition setting window (Fig. 1.22) opens. Set whether you prohibit or permit the simultaneous starting of multiple programs during the manual mode, and click OK.
   [Two or more programs start prohibition (MANU)]
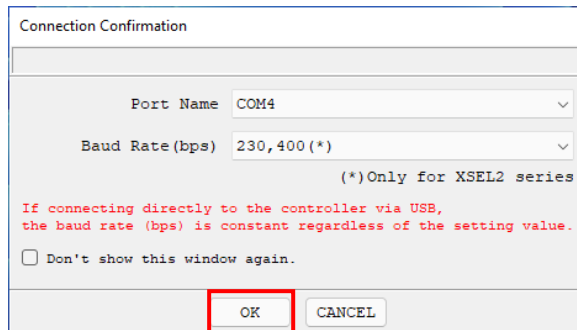   It prohibits the simultaneous starting of multiple programs during the manual mode.
   [Two or more programs start permission (MANU)]
   It permits the simultaneous starting of multiple programs during the manual mode.

Fig. 1.22 Multiple Program Simultaneous Startup Permission/Prohibition Setting Window

If "Don't Show this window from next time on" is checked, connection will be established with the settings at the last connection time without displaying the window in Fig. 1.22.
To remove this check, select the checkbox "In Connect, Check Setting of Two or more programs start" on the Environment Setup (Online) window (Fig. 13.2) or Environment Setup (Offline) window (Fig. 13.1). The window in Fig. 1.22 will be displayed at the next startup time to remove the check.
For the Environment Setup (Online) window and Environment Setup (Offline) window, refer to [13. Tool].

1. Before You Begin

1. Before You Begin

If you set "Two or more programs start prohibition (MANU)" when multiple programs have already started, the warning message will be displayed. To prohibit the simultaneous starting of multiple programs, click Yes to stop all the programs.
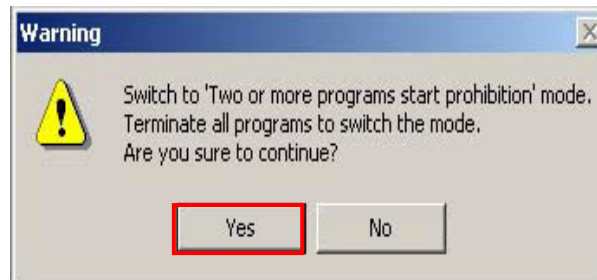
Fig. 1.23 Warning Message

6) A confirmation window for the safety circuit will be displayed.
Refer to [1.6 Operation System Command Restriction].

7) Once the controller connection is confirmed, the application will start in the online mode. If the controller cannot be recognized or CANCEL is clicked in this window, the application will start in the offline mode. (Even after the application has started in the offline mode, you can use the "Reconnect" function explained later to switch the application to the online mode.)

If "Don't Show this window from next time on" is selected, the software will automatically select the communication port and baud rate that were in use the last time the application was closed and check the controller connection based on these settings.

⚠ Caution

● The open status of the TP port (teaching connector) should be as shown below depending on whether or not the servo is in use.

\<MANU mode/Servo not in use\>

	Before the OPEN command	**After the OPEN command**
TP port connection	Connected to the PC software ⇨	Forcibly switched to SEL program connection. The program continues to run.

Error code 414 "SIO unopened error" will occur following the OPEN command.

\<MANU mode/Servo in use\>

	Before the OPEN command	**After the OPEN command**
TP port connection	Connected to the PC software ⇨	Connection to the PC software The program end.

Error code 414 "SIO unopened error" will occur following the OPEN command.

The channel number of the TP port is 0 ch'OPEN 0'

The "Caution" information provided in the above box applies to a condition where the controller is in the MANU mode and I/O parameter No. 90 is not set to "2" (IAI protocol).

1.6 Operation System Command Restriction

When connected with a controller, confirm the user if there is a stop switch to stop the actuator immediately at hand, and if there is no stop switch, the actuator operation gets controlled from the XSEL PC software. (V13.00.00.00 or later)

After display of multiple program simultaneous startup permission and prohibition setting windows, the safety circuit confirmation window will be displayed.
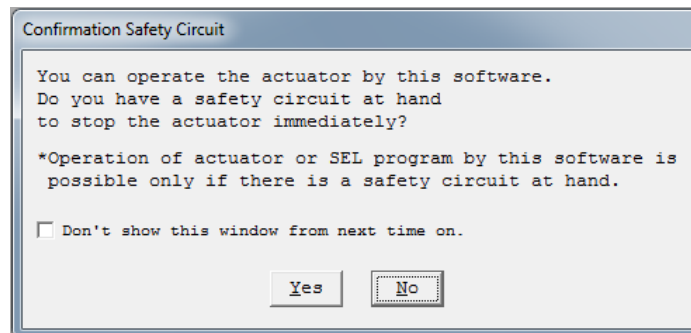
Fig. 1.24 Safety circuit confirmation window

Select if there is a stop switch to stop the actuator immediately at hand prepared.
Only when Yes is selected in the safety circuit confirmation window (there is a stop switch), such operations as actuator operation by the XSEL PC software and SEL program execution (operational system commands) become available.
When No is selected in the safety circuit confirmation window (there is no stop switch), such operations as actuator operation by the XSEL PC software and SEL program execution (operational system commands) become unavailable.

(Note) When the operation system commands are to be executed, 31A "Execution Condition Unsuccessful Error" or 32F "No Safety Circuit Execution Prohibited Error" is displayed.

The selected content will be shown in the main window.

Display of status permitted /
prohibited operational system commands
(The enable/disable of the safety circuit)
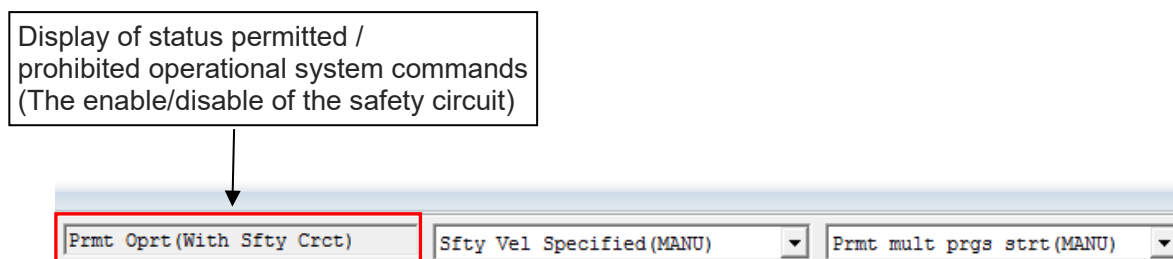
Fig. 1.25 Main window (Tool bar)

* Put a check mark on "Don't show this window from next time on." in the safety circuit confirmation window and the safety circuit confirmation window will not show up again when the controller is connected. (Operation will be made with the setting of the previous connection) If it is required to show the safety circuit confirmation window again, put a check mark on "In connect, confirm safety circuit." in Environment Setup window.

Fig. 1.26 Environment setup Window

1. Before You Begin

* When [Yes] was selected in the previous safety circuit confirmation window and a check mark was put on "Don't show this window from next time on.", a warning message shown in the figure below will be displayed when a controller is connected.
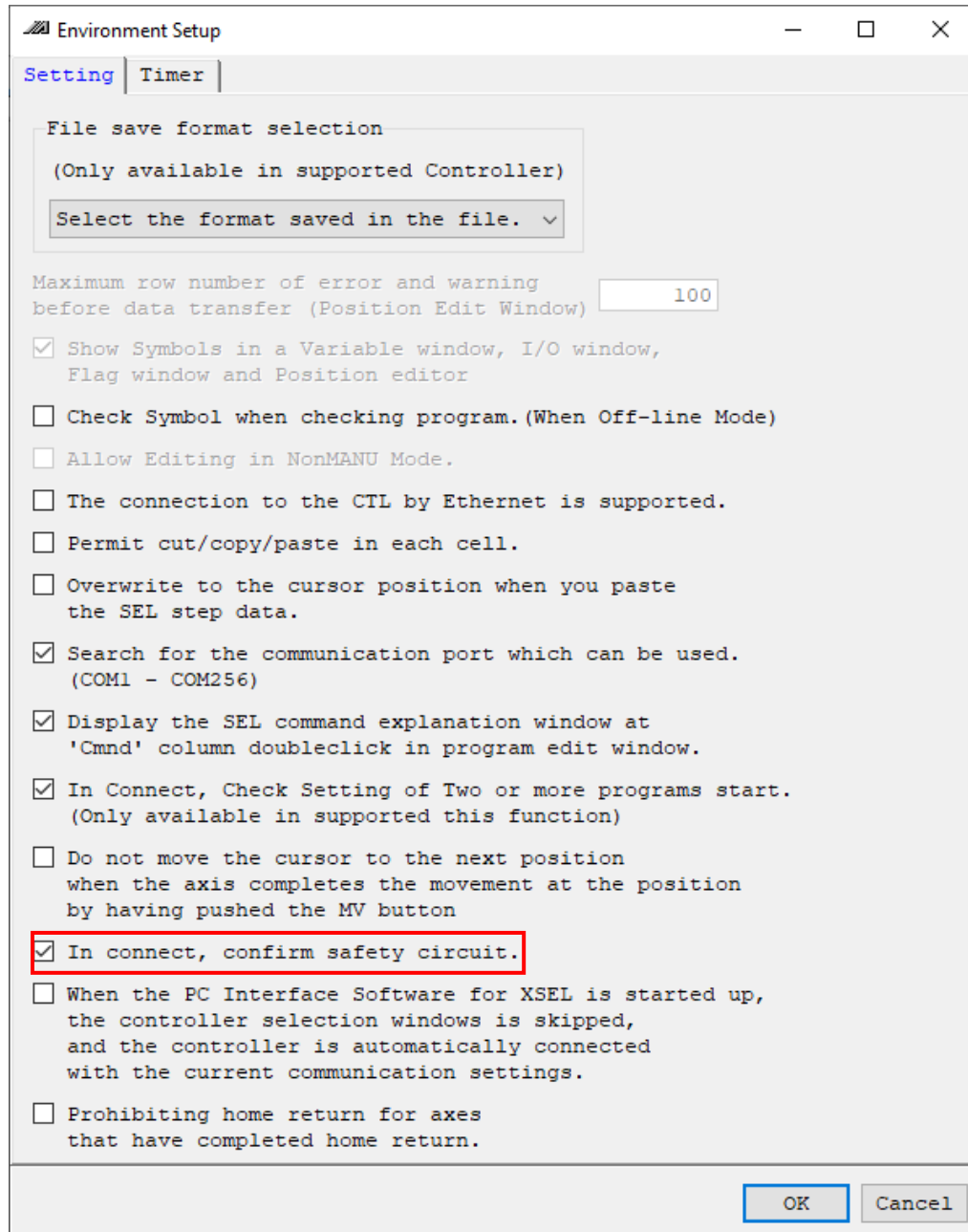
```
Warning

 Operation of actuator or SEL program by this software is permitted now.

 *If you don't have a safety circuit at hand to stop the actuator immediately
  for prevention of danger, check the "In connect, confirm safety cir
  in the "Environment Setup" window, reconnect with the controller
  and select "No" in the "Confirmation Safety Circuit".

                              [ Environment Setup ]        [ OK ]
```

Click this button and Environment Setup window opens.

Fig. 1.27 Warning Message (When Operational System Commands Permitted)

XSEL2

Chapter **2**
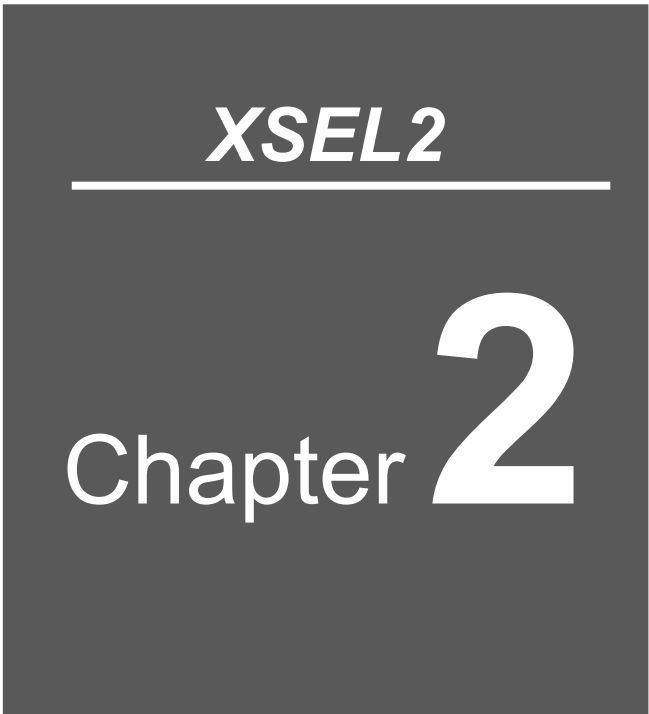
How to Save Data
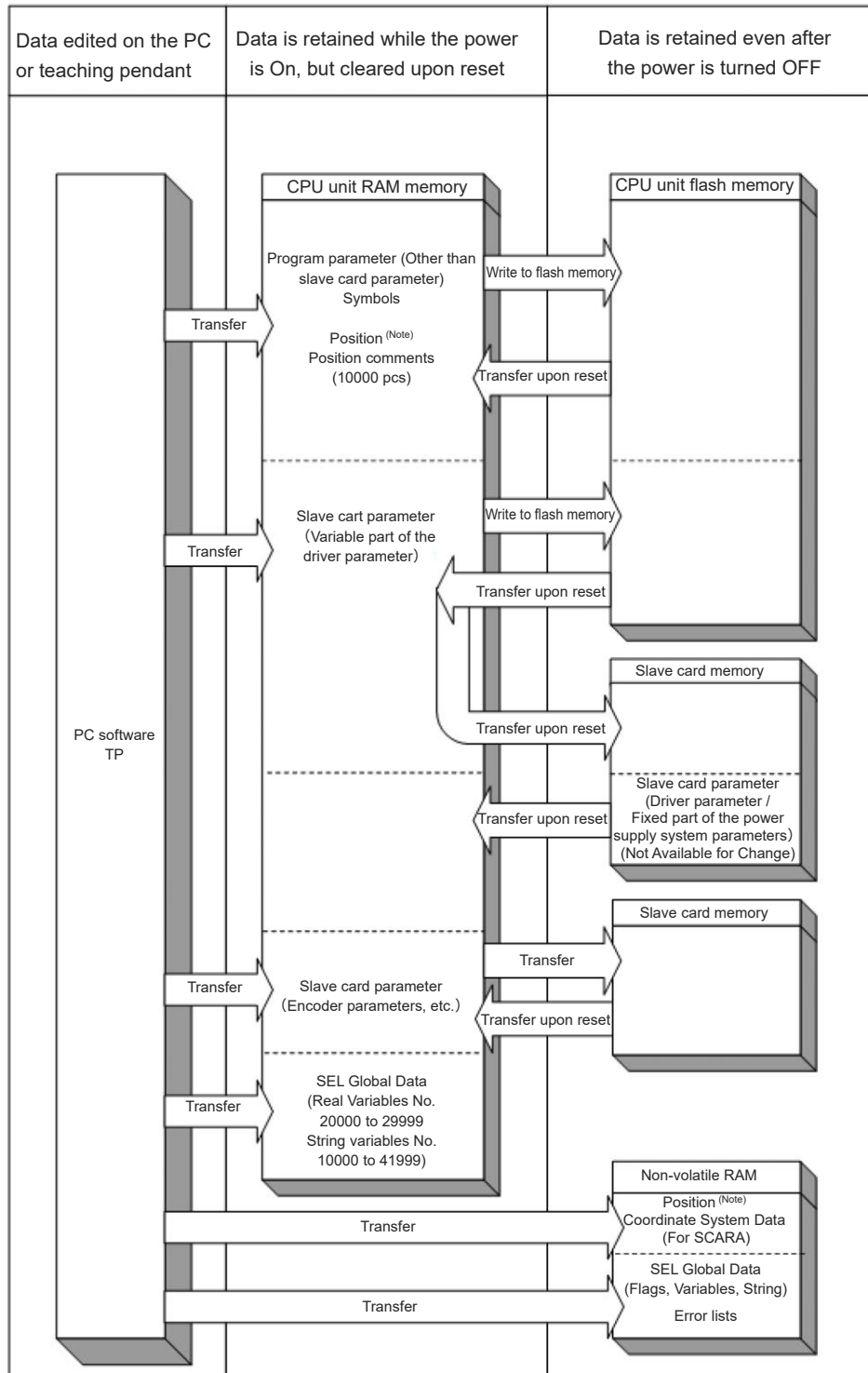
2.1 XSEL2

In the controller, there are storage domains in the non-volatile RAM (FRAM) and storage domains in the flash memory depending on the type of data to be stored.

Also note that transferring data from the PC software or teaching pendant to the controller will only write the data in the controller's memory, as illustrated below, and the data will be cleared once the controller power is turned off or the controller is reset.

To save important data, always write it in the flash memory.

Data edited on the PC or teaching pendant	Data is retained while the power is On, but cleared upon reset	Data is retained even after the power is turned OFF

CPU unit RAM memory

CPU unit flash memory

Program parameter (Other than slave card parameter)
Symbols

Position (Note)
Position comments
(10000 pcs)

Transfer

Write to flash memory

Transfer upon reset

Slave cart parameter
(Variable part of the driver parameter)

Transfer

Write to flash memory

Transfer upon reset

Slave card memory

Transfer upon reset

Slave card parameter
(Driver parameter /
Fixed part of the power supply system parameters)
(Not Available for Change)

Slave card memory

Slave card parameter
(Encoder parameters, etc.)

Transfer

Transfer

Transfer upon reset

Transfer upon reset

SEL Global Data
(Real Variables No.
20000 to 29999
String variables No.
10000 to 41999)

Transfer

PC software
TP

Non-volatile RAM

Position (Note)
Coordinate System Data
(For SCARA)

Transfer

SEL Global Data
(Flags, Variables, String)

Error lists

Transfer

Since programs, parameters and symbols are loaded from the flash memory upon restart, these data in the temporary memories will return to the conditions before editing unless written to the flash memory.

The controller always operates according to the data in main CPU memory (excluding parameters).

(Note) The position data from No. 1 to 5000 should be stored in the non-volatile RAM and the remaining should be stored in the flash memory.
When there are two axis groups, No. 1 to 2500 should be stored in the non-volatile RAM and the remaining should be stored in the flash memory.

2.2 Notes

Note on transferring data and writing it to the flash memory:

Never turn off the main power while data is still being transferred or written to the flash memory.

The data may be lost and the controller operation may be disabled.

Note on saving position data:

The domains to save the position data are the non-volatile RAM for the position data No.1 to 5000 and the flash memory for the remaining.

The position data comments are to be saved in the flash memory.

Therefore, if the power is turned OFF or the software is reset without writing into the flash ROM, the data and the position data comments saved in the flash memory should be erased and the data written to the flash ROM previously should get read in.

Write it to the flash ROM if you wish to retain the data.

2. How to Save Data

2. How to Save Data

XSEL2

Chapter 3
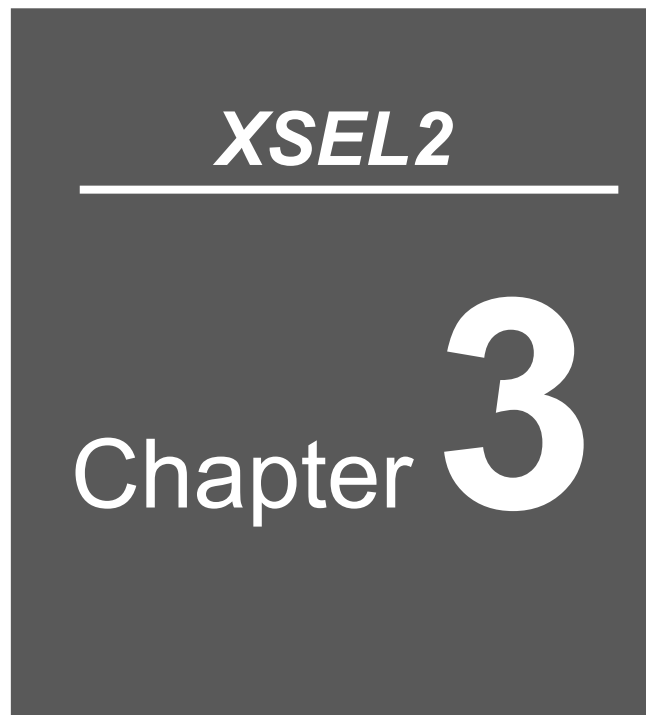
Menu Window

3.1   Explanation of the Menu

3.1.1   Online Window

[1] XSEL2-T/TX controller

When this software has been started, the main window in Fig. 3.1 will open showing the menu items with icons on the tool bar in the case of the XSEL2-T/TX controller.

The tree view appearing on the left side of the window can be displayed by clicking "View (V)" from the menu bar and then selecting "Tree View (T)". (Initial window: Main menu)
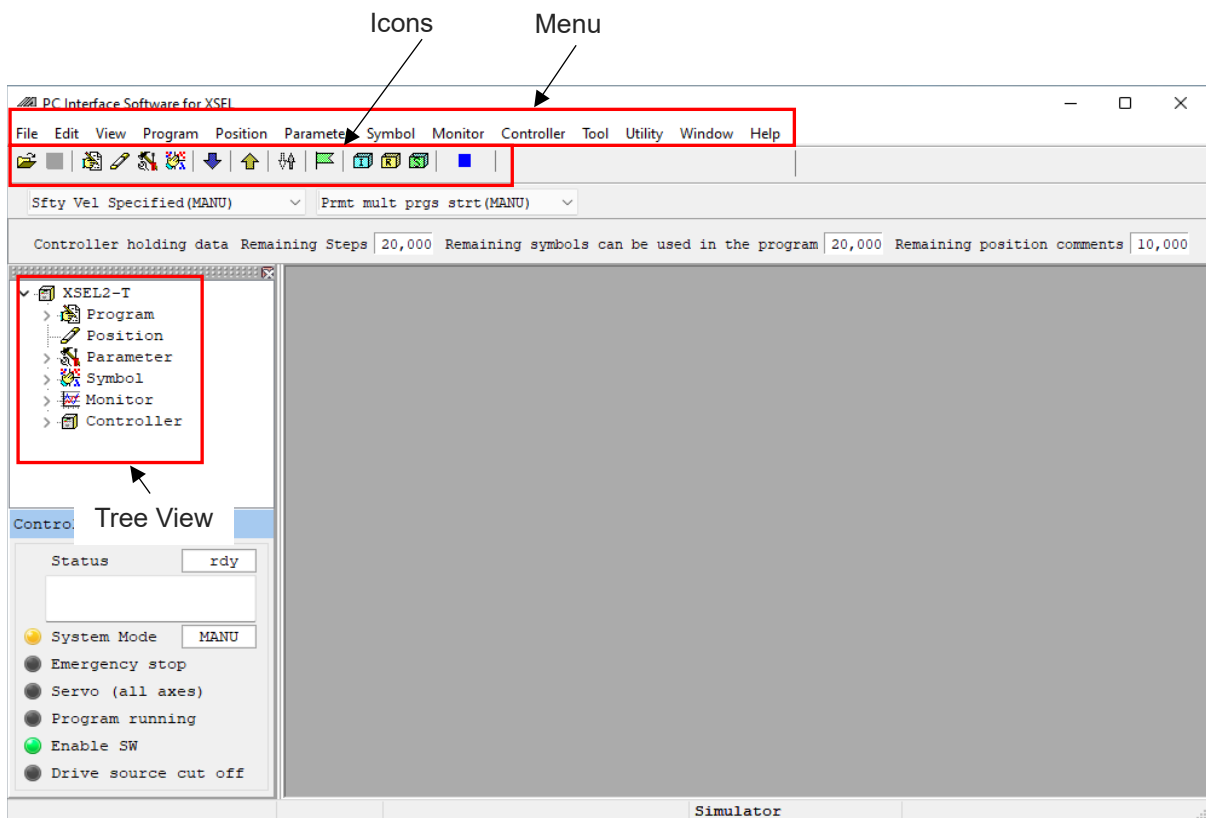

Fig. 3.1 Online Window (XSEL2-T/TX Controller)

3.2 Explanation of the Commands

[1] File (F)

(1) New (N)   Create new SEL data.

- Program (S)   Open the edit window for creating a new program.
- Position (O)   Open the edit window for creating new position data.
- Symbol (Y)   Open the edit window for creating new symbol data.
- Coordinate System (D)   Open the edit window for the new coordinate system definition data.
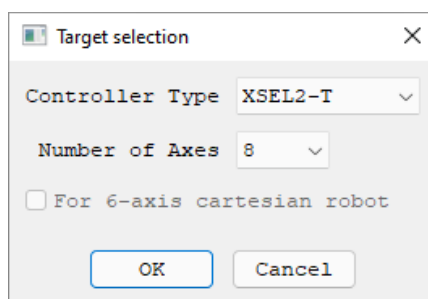

Fig. 3.2 Target Select Window

The Target Select Window (Figure 3.2) should open. Select controller type and axis quantity (necessary to select when creating position data only).

* The created data should be stored in the file format (Refer to List of Supported Models in the front page) in accordance with the target selected here.

(2) Open (O)   Load data currently saved in a file.

(3) Close (C)   Close the currently active window.

(4) Close All (L)   Close all the windows.

(5) Save (S)   Save the data in the active edit window by overwriting the corresponding file.

(6) Save as (A)   Save the data in the active edit window to a different file under a desired name.
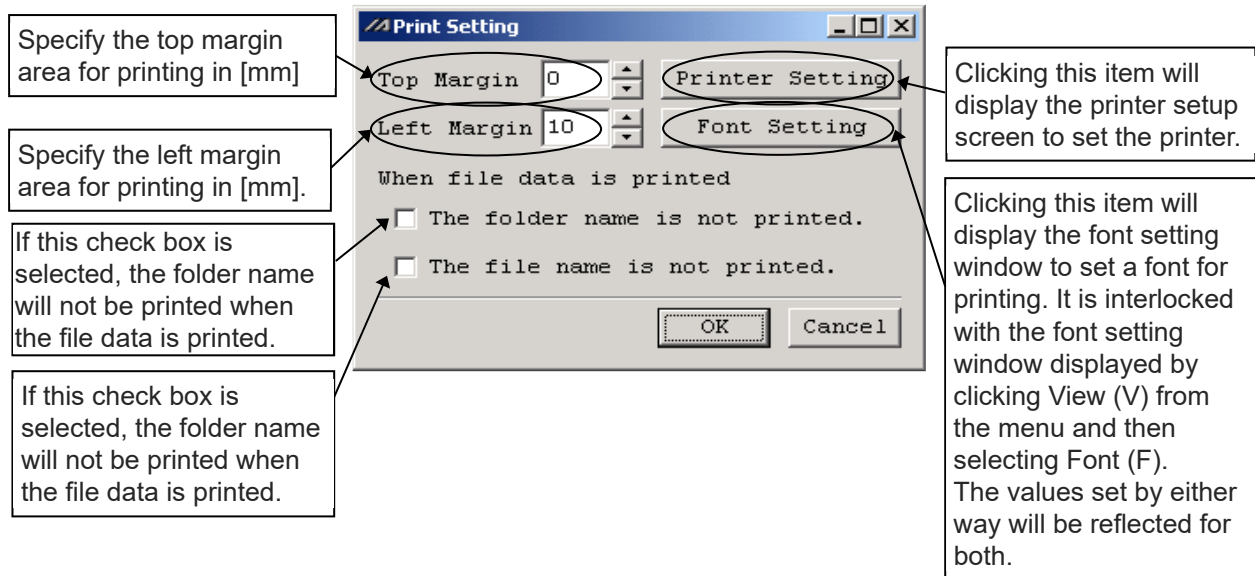
(7) Print Setup (P)   Set the print font and printer.

Specify the top margin area for printing in [mm]

Specify the left margin area for printing in [mm].

If this check box is selected, the folder name will not be printed when the file data is printed.

If this check box is selected, the folder name will not be printed when the file data is printed.

Clicking this item will display the printer setup screen to set the printer.

Clicking this item will display the font setting window to set a font for printing. It is interlocked with the font setting window displayed by clicking View (V) from the menu and then selecting Font (F). The values set by either way will be reflected for both.

Fig. 3.3 Print Setting Window

(Note) If you restart the controller, settings will return to the default values shown below.
- Upper margin: 0mm
- Left margin: 10mm
- Font: Font in PC Software Itself [(*)]
- Style: Standard
- Size: Font size in PC Software Itself

* The font and font size in the PC software can be set in "Display" → "Font" in the menu.

(8) Recent Files (D)   Display a list of files most recently loaded to the software, where you can select and load desired files.

(9) Exit (X)   Close the application.

[2] Edit (E)

This menu lets you perform auxiliary operations used in editing data.

(1) Undo (U)　　Up to the most recent 10 operations can be canceled.

However, they cannot be canceled when you perform any of the following operations:

● Transfer of data on the editing window such as the program edit window to the controller
● Saving of data on the editing window such as the program edit window in a file
● Closing of the editing window such as the program edit window

The following are the operations for which this function is enabled:

	Input	Line insertion	Line Deletion	Cut	Paste
Program Edit Window	○	○	○	○	○
Position Edit Window	○	-	-	○	○
Symbol Edit Window	○	-	-	○	○
Parameter Edit Window	○	-	-	-	-
Coordinate System Data Edit Window	○	-	-	-	-

When this operation is performed, and the warning window below will be displayed.

Clicking Yes will cancel the operation executed immediately before.
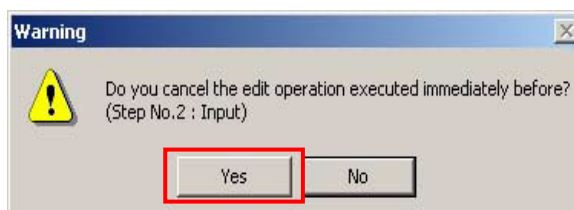
Fig. 3.4 Warning

(2) Cut (T)　　　Cut the data at the cursor line in the edit window.

(3) Copy (C)　　Copies the data at the cursor line in the edit window.

(4) Paste (P)　　Paste the copied or cut data to the cursor line in the edit window.

(5) Find (F)　　　Find a specified character string.

(6) Find Next Match (S)　　Find the character string specified in (5) again, starting from the cursor line position.

[3] View (V)

This menu lets you set options relating to window views. (Refer to [3.4 Tree View]).

(1) Tree view (T)　Show/hide the tree view that appears on the left side of the main window.

(2) Font (F)　　　Set the font of text shown in the windows.

[4] Program (S)

This menu lets you perform operations relating to programs. (Available only in the online mode.)
(Refer to [4. Program Edit Window]).

(1) Edit (E)   Load a selected program from the controller for editing.
                                Cycle time can be measured.
                                Refer to [4.5 Cycle Time Measurement]

(2) Copy/Move (C)   Copy/move (cut & paste) a program

(3) Clear (L)   Clear a program.

(4) Save File AS (S)   Save a selected program or all programs to a file under a desired
                                name.

(5) Stop All Operations (T)   End all programs and operations that are currently running/being
                                performed.

(6) SEL Program Assistant (A)   Start up SEL Programming Support Tool.

[5] Position (O)

This menu lets you operate position data. (Available only in the online mode.)
(Refer to [6. Position Data Edit Window]).

(1) Edit (E)   Load position data from the controller for editing.

(2) Copy/Move (C)   Copy/move (cut & paste) position data.

(3) Clear (L)   Clear position data.
                                * It is not available to select clear items when XSEL2-T/TX connected.

```
┌─────────────────────────────────────────────┐
│ ◢◣ Clear Position Data                    ×  │
├─────────────────────────────────────────────┤
│ When only axis group No. is entered,        │
│ all positions in the axis group             │
│ are manipulated.                            │
│                                             │
│            Axis group No. Top No.  Last No. │
│ Clear Scope     2        1,201  -  1,300    │
│                                             │
│                        Clear    Cancel      │
└─────────────────────────────────────────────┘
```
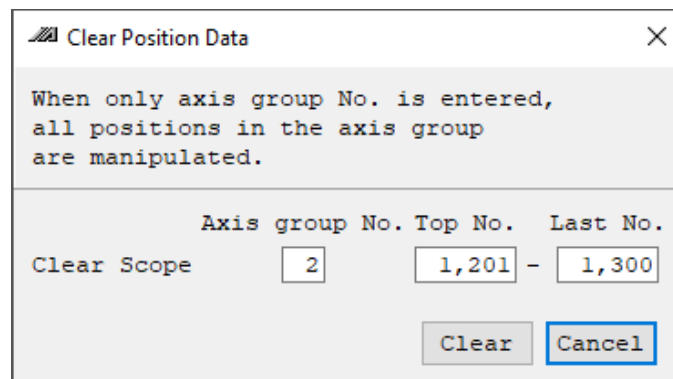
Fig. 3.5 Clear Position Data Window

(4) Save File AS (S)   Save position data.

3. Menu Window

[6] | Parameter (P) |

This menu lets you operate parameters. (Available only in the online mode.)

(Refer to [8. Parameter Edit Window]).

(1) | Edit (E) | Load position parameters from the controller for editing.

(2) | Easy Parameter Setup (S) | Parameter edit is to be conducted in the setting window of each feature for those features listed below.

- RS-232C
- IAI Protocol Multiple Channels
- Fieldbus (CC-Link, DeviceNet, PROFIBUS-DP, EtherCAT, PROFINET IO, CC-Link IE Field)
- Ethernet
- Vision System

(3) | I/O Output Setting (I) | The I/O output setting is a feature to perform this monitor setting easily. Also, it is available to establish the settings for the input feature select and the output feature select.

[7] | Symbol (Y) |

This menu lets you operate symbol data. (Available only in the online mode.)

(Refer to [9. Symbol Edit Window]).

(1) | Edit (E) | Load symbol data from the controller for editing.

(2) | Clear All (C) | Clear all symbol data.

[8] | Coordinate System (D) |

It should be displayed when XSEL2-TX is connected..

Edit the coordinate system definition data. (Available only in the online mode.)

(Refer to [10. Coordinate System Definition Data edit Window]).

(1) | Edit (E) | Load the coordinate system definition data from the controller and edit the data.

(2) | Clear (L) | Clear the coordinate system definition data.

[9] Monitor (M)

This menu lets you monitor various statuses, global variables, port statuses, and so on.

(Available only in the online mode.) (Refer to [11. Monitor]).

(1)	Task Status (T)	Open the task status monitor window.
(2)	System Status (S)	Open the system status monitor window.
(3)	Axis Status (A)	Open the axis status monitor window.
(4)	Input port (I)	Open the input port monitor window.
(5)	Output port (O)	Open the output port monitor window.
(6)	Virtual Input/Output Port (N)	Open the virtual input and output port monitor window.
(7)	Global Flag (F)	Open the global flag monitor window.
(8)	Global Integer (L)	Open the global integer variable monitor window.
(9)	Global Real (R)	Open the global real variable monitor window.
(10)	Global String Variables (G)	Open the global string variable monitor window.
(11)	Local Data (B)	Local data (local integers variables, local real variables, local string real numbers and local flags) for each program number can be shown.
(12)	Detailed Error Information (E)	Open the detailed error information monitor window.

If you click "Monitor (M)" from the main menu and then selecting "Detailed Error Information (E)", the Error Number Select window will be displayed.

After setting the number of displayed errors, click OK .

The detailed error information window will be displayed.
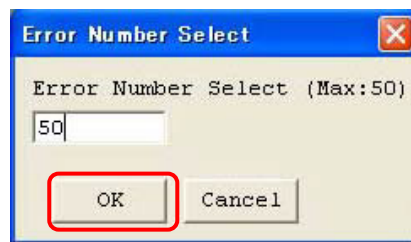
Fig. 3.6 Error Number Select Window

(13)	Maintenance Information (X)	Open the maintenance information monitoring window.
(14)	Servo Addition Datamonitor (V)	The data of the monitoring type that the controller supports should be displayed at once for each axis group.
(15)	Monitoring Data (M)	Open the monitoring data window.

[10] Controller (C)

This menu lets you perform operations relating to the controller, such as executing a software reset or resetting controller errors.

(1) Reconnect (C)　　　　　　　Reestablish communication with the controller. If the software is currently in the offline mode but is able to establish communication with the controller, selecting this menu item will switch the software to the online mode.

(2) Change Baud Rate (B)　　Change the baud rate used for communication between the controller and PC.

(3) Off-line work (Port Close) (O)

(4) Axes Setting (G)　　　　　The construction of the driver unit that is connected should be displayed.
Assignment of axes can be changed individually.

(5) SEL global data backup (G)

　　Save to File (S)　　　　　　Can save global flags, global integer variables, global real variables, and global strings.

　　Transfer to Controller (L)　Can transfer global flags, global integer variables, global real variables, and global strings to the controller.

(6) All Data Backup (X)

　● Save to File (S)　　　　　　Save all program, position, symbol, parameter, coordinate system definition data (only if available to edit) and global data in the controller.

The following confirmation window will be displayed if an ELECYLINDER axis is still connected after saving backup files. Select Yes to save all ELECYLINDER axes in a file named "Backup File Name + _Axis + Axis number."
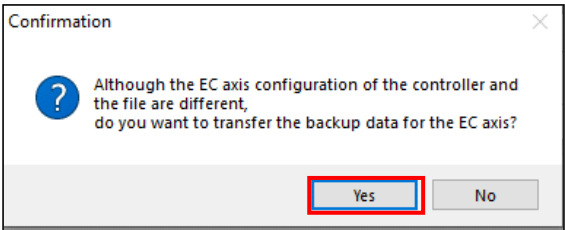
Fig. 3.7 Message to confirm saving all ELECYLINDER axes

The following window will be displayed next. Select Yes to save the error list to a separate file.
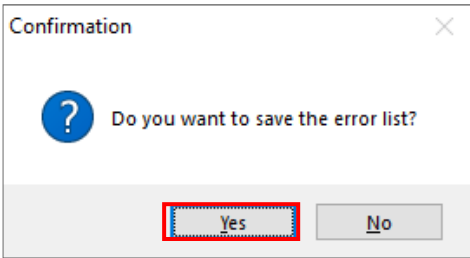
Fig. 3.8 Error List Save Confirmation Message

[10] Controller (C) (6) All Data Backup (X) (continued)

● Open File (O)   In the Transfer / Select Divided Data window, data transfer to a controller, file division for all data and referring to data can be conducted.

Fig. 3.9 Backup Window

[10] Controller (C) (6) All Data Backup (X) ● Open File (O) (continued)

Click on the Transfer to Controller , and the selected data should be transferred to the controller.

Click on the Divide File , and the selected data should be individually saved in files.

Drag & drop All Data Backup File to the window for the XSEL PC software and the backup window should open.

[Caution]

Data transfer to controller is not available in the following cases.

Table: Condition Backup Data Transfer Unavailable (XSEL2-T/TX)

Data type	Transfer unavailable conditions
Parameter	● The axes setting does not match between the file data and the controller. (Activated axes pattern and Number of activated axes groups)
Position	● The axes setting does not match between the file data and the controller. (Number of activated axes groups) The position cannot be transferred also when the maximum valid axis number on the controller is larger than the maximum valid axis number in the file data. * When the data is transferred with parameters at the same time, transfer to the controller is available even with the condition above.
EC	● There is no EC backup file ("Backup file name + _Axis + Axis number") available for transfer. ● MANU Mode and EC I/O command permitted at the same time ● ROBO Pump in operation

The following section explains about "Transfer to Controller" and "Divide File." and "View/Edit".

● Transfer to Controller   On the Data Transfer/Division Selection Window, click Transfer to Controller . The File Setup Window will appear. Select Backup All Saved Data (all data including programs, positions, etc.) and transfer to the controller. (If you are not selecting, click □ to select the data to be transferred. The selected data will be marked with ✓.)

(Note) When transferring parameters, they should not be transferred if the parameters written in the controller and the axis patterns do not match with each other.

● Divide Files   The backup data (all data including program and position) can be divided into program, position, parameter, symbol, coordinate system and global data. Click Divide Files on the Transfer/Divide data selection window. The program, position, parameter, symbol and global data are displayed in order on the File Save Window. Save them with a file name.

[10] Controller (C) (6) All Data Backup (X) (continued)

● Browse/Edit   The Edit window for the selected data should be displayed.

* Each data can be saved individually to a file in the displayed Edit
  window. However, it is not available to overwrite a backup file.
* The global data is for viewing only.
* The backup data for the EC axis should not be displayed.

[10] Controller (C) (continued)

(7) Write Flash ROM (W)   Clear the data areas in the flash ROM and then write the
                                           data saved in the controller's RAM to the flash ROM.

* There is a limit in the number of writing to the flash ROM (write limit: about 100,000 times).
  If you do not want to write all the data, select "Select the data range" and write to the flash
  ROM.
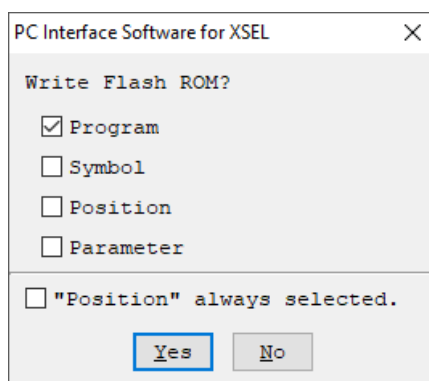
Fig. 3.10 Confirmation

(8) Initialize Memory (I)

- Position (O)   Clear all position data.
                        (Note)   If 60A "Position Data Error" occurs, use this command to
                                 initialize the position data.
                        (Note)   20B "Position Data Error" will occur if the software is reset or
                                 power is turned OFF after this operation without writing the
                                 position data to the flash ROM first when connection is
                                 established.

- Coordinate System Definition Data (C)
                        Clear all coordinate system definition data.
                        It should be displayed when XSEL2-TX is connected.
                        (Note) If 623 "Coordinate System Error" occurs, use this
                               command to initialize the coordinate system definition
                               data.

- Global Val./Flag (V)   Clear all global variables and flags to zero.

- Parameter of Shipping (S)   Can return parameters to the ones at the time of shipment.
                                This item is not displayed normally. It is a function which
                                will become available by inputting a password. Refer to [8.5
                                How to Initialize Parameter (at the time of shipment)].

- Memory for PLC (L)   The PLC data (user data, program, etc.) should be
                                initialized.

[10] Controller (C) (continued)

(9) Abs. Encoder Reset (A)   Reset the absolute data. It should be displayed when XSEL2-TX is connected.

(10) Abs. Encoder Reset(Scara)(&Q) (Q)   The absolute data of a SCARA axis should be reset. It should be displayed when XSEL2-TX is connected.

(11) Abs. Encoder Reset(Line)(&A) (A)   The absolute data of an Orthogonal axis should be reset. It should be displayed when XSEL2-TX is connected.

(12) Software Reset (R)   Execute software reset of the controller.

(13) Reset Error (E)   Reset errors present in the controller.

(14) Request Drive Power Recovery (P)   Issue a request drive power recovery to the controller.

(15) Request Release Pause (L)   Issue request release pause to the controller.

(16) Collision Detection Function Setting (D)   Enable / disable of SCARA Robot Collision Detection Feature should be set up. It should be displayed when XSEL2-TX is connected.
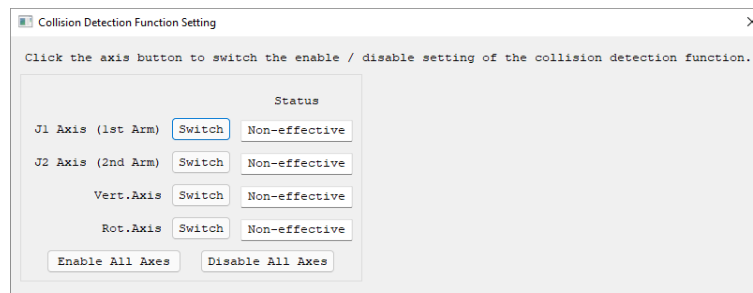
Fig. 3.11 Setup Collision Detection Feature

(17) Compliance Mode Release (M)   Compliance Mode (compliance control) of SCARA Robot should be released.

(18) Brake Operation (B)   Compulsory release / lock of a brake should be conducted.
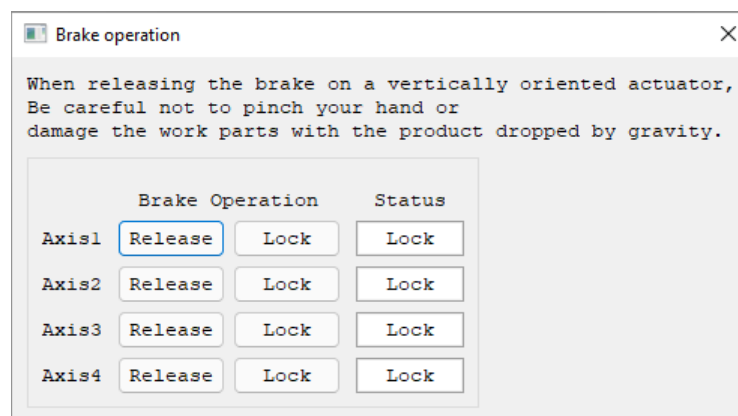
Fig. 3.12 Brake Operation

3. Menu Window

[10] Controller (C) (18) Brake Operation (B) (continued)

* The moving part being dropped may cause injury or damage on the actuator main body, workpiece or equipment. Pay special attention on it.
* Make sure to lock the brake without failure after a work is finished.
* When the Release Brake window is closed, or the servo is on, the brake compulsory release should automatically get disabled.

(19) Time Setting   Set the time.

(20) Version Information (V)   Show the various version information regarding the controller.

Select "Controller (C)" → "About Version (V)" in the menu. Version information is displayed for the controller, driver, encoder, EC axis, and I/O slot.
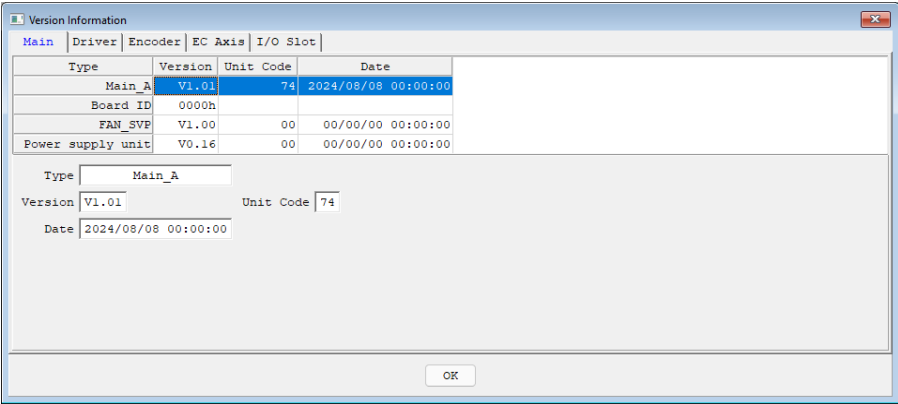
Fig.3.13 Controller-related version information
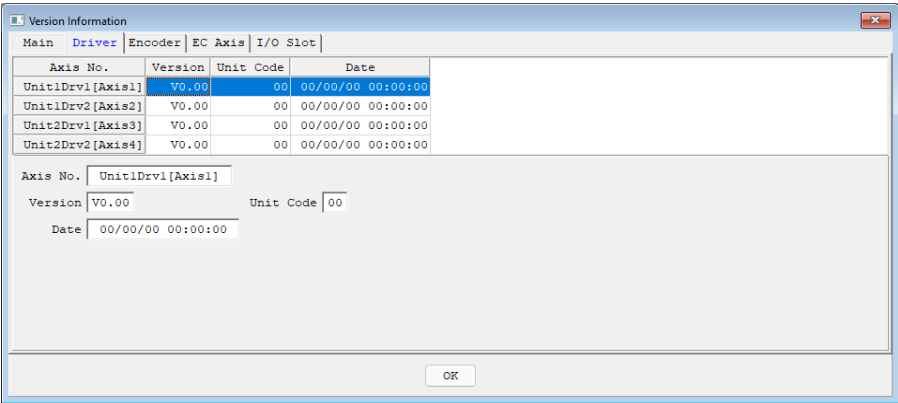
Fig. 3.14 Driver-related version information

[10] Controller (C) (20) Version Information (V) (continued)

Fig. 3.15 Encoder-related version information

Fig. 3.16 EC Axis-related version information

Fig. 3.17 I/O Slot-related version information

When the actuators support the actuator identification feature, it is available to edit the user memo.
(Rewrite the user memo by pressing Update .)

[11] Tool (T)

This menu lets you specify settings relating to this application.

(1) Environment Setup (S)　　　Set items that define how the application is run.

[12] Utilities (U)

(1) SEL Program Assistant (A)　Start up SEL Programming Support Tool.

[13] EC(E)

(1) Teaching Tool (T)　　　　　Start up the EC teaching tool.

[14] Window (W)

This menu lets you change how the windows are displayed.

(1) Cascade (C)　　　　　　　Cascade all open windows diagonally from top to bottom.

(2) Tile Vertically (V)　　　　　Arrange all open windows vertically without overlapping.

(3) Tile Horizontally (H)　　　　Arrange all open windows horizontally without overlapping.

(4) Minimize All (M)　　　　　　Minimize all open windows (reduce them to icons).

(5) Make to Window (N)　　　　Make all minimized windows (window icons) to windows.

(6) Arrange Icons (A)　　　　　Arrange minimized windows (window icons).

[15] Help (H)

(1) Tool Version Information (A)　　Show the version information of this software.

(2) Search for Error Countermeasures (T)　　Shows the error countermeasure search window.
Select "Help (H)" → "Search for Error Countermeasures (T)" in the menu. Following Search for Error Countermeasures window is displayed.
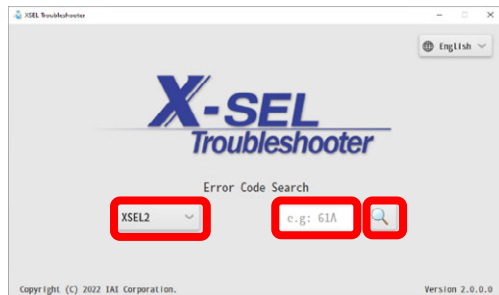
Select XSEL2 in Combo Box in the left of the window.
Input an error code in three digits of hexadecimal numbers to Text Box located in the right center of the window.

Click 🔍 on the right side of Text Box and the error countermeasure window for the input error code should be displayed.
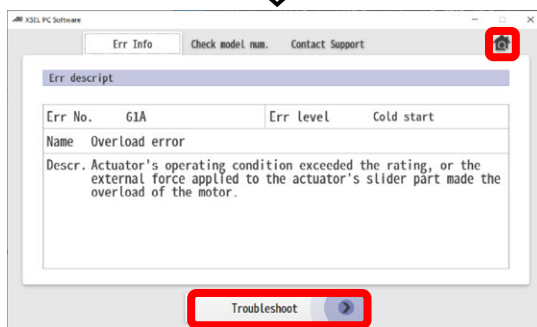
Click Troubleshoot and the error countermeasure window should be displayed. Follow the instruction in the window to remove the cause of the error. (Refer to [16. Error Countermeasures])

Click 🏠 and the screen goes back to the error countermeasure search window.

Fig. 3.18 Search for Error Countermeasures

3. Menu Window

3.3   Explanation of the Toolbar

This section explains the toolbar (Fig.3.19) shown at the top of the main window (below the menu bar).

Fig. 3.19 Toolbar

Sfty Vel Specified(MANU)

Prmt mult prgs strt(MANU)

EC I/O Command Prohibited
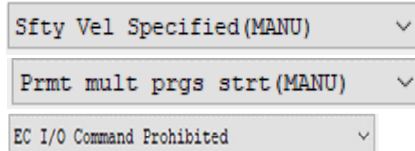
	Open File	Same as File (F) → Open (O)
	Save	Same as File (F) → Save (S)
	Edit Program	Same as Program (S) → Edit (E)
	Edit Position	Same as Position (O) → Edit (E)
	Edit Parameter	Same as Parameter (P) → Edit (E)
	Edit Symbol	Same as Symbol (Y) → Edit (E)
	Edit Coordinate System Definition Data	Same as Coordinate System (D) → Edit (E) It should be displayed when XSEL2-TX is connected.
	Monitor Input Port	Same as Monitor (M) → Input Port (I)
	Monitor Output Port	Same as Monitor (M) → Output Port (O)
	Monitor Virtual Input/Output Port	Same as Monitor (M) → Virtual Input/Output Port (N)
	Monitor Global Flag	Same as Monitor (M) → Global Flag (F)
	Monitor Global Integer Variable	Same as Monitor (M) → Global Integer (L)
	Monitor Global Real Variable	Same as Monitor (M) → Global Real (R)
	Monitor Global String Variable	Same as Monitor (M) → Global String Variables (G)
	End All Operations	Same as Program (S) → Stop All Operations (T)

3. Menu Window

Sfty Vel Specified(MANU) ⌄	Enable/disable the safety velocity limit when in the MANU (manual) mode. [Safety Vel Specified (MANU)] --- Enable the safety velocity limit (the maximum speed will be limited to 250 mm/s or below regardless of program or parameter settings). [Safety Vel Not Specified (MANU)] --- Disable the safety velocity limit.
Prmt mult prgs strt(MANU) ⌄	Permit/prohibit the simultaneous starting of multiple programs in the MANU (manual) mode. [Prhbt mult prgs strt (MANU)] Prohibit the simultaneous starting of multiple programs in the MANU mode. [Prmt mult prgs strt (MANU)] Permit the simultaneous starting of multiple programs in the MANU mode.
EC I/O Command Prohibited ⌄	Permit/prohibit sending I/O commands to ELECYLINDER axes. [EC I/O Command Prohibited(MANU)] Prohibit sending I/O commands to ELECYLINDER axes. Select this when performing tasks such as using the EC teaching tool to perform teaching. [EC I/O Command Permission (MANU)] Permit sending I/O commands to ELECYLINDER axes. Select this when controlling ELECYLINDER axes from the I/O port.

3. Menu Window

3.4   Tree View

You can display easily various data edit windows in the online mode by double-clicking the corresponding items displayed in the tree view (Fig. 3.12) that appears on the left side of the main window.

You can show or hide the tree view by clicking "View (V)" from the menu bar and then selecting "Tree View (T)".
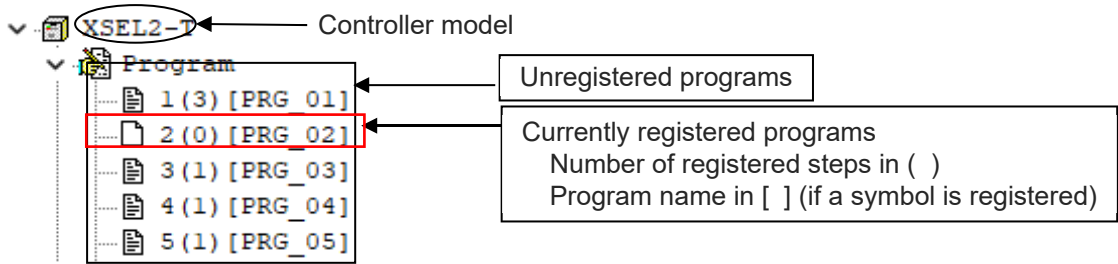
Fig. 3.20 Tree View (Controller model, Program)

In XSEL2-T/TX, the number of remaining steps should not be displayed in the tree view. (It should be displayed in the main window.)
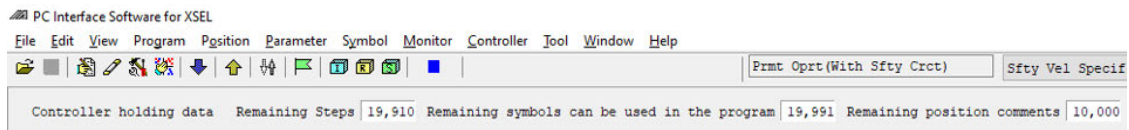
Fig. 3.21 The number of remaining steps
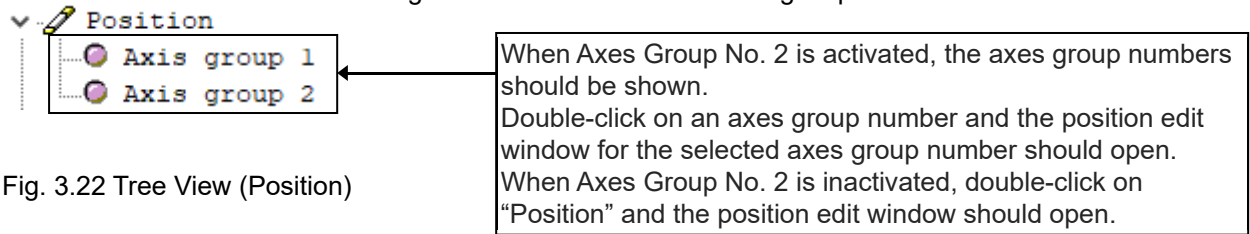
Fig. 3.22 Tree View (Position)

Fig. 3.23 Tree View (Parameter)

Symbol edit items
Double-click a desired symbol category to open the corresponding edit window.

Fig. 3.24 Tree View (Symbol)

Coordinate system edit items
Double-click a desired coordinate system category to open the corresponding edit window.
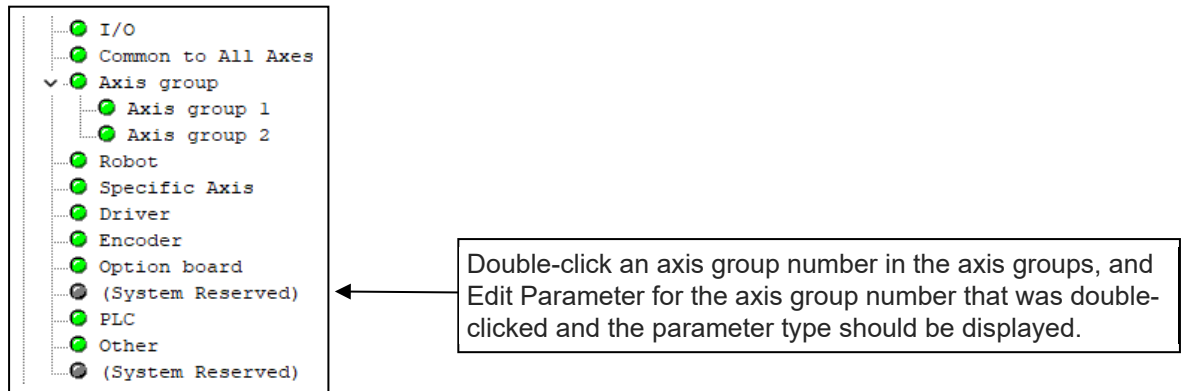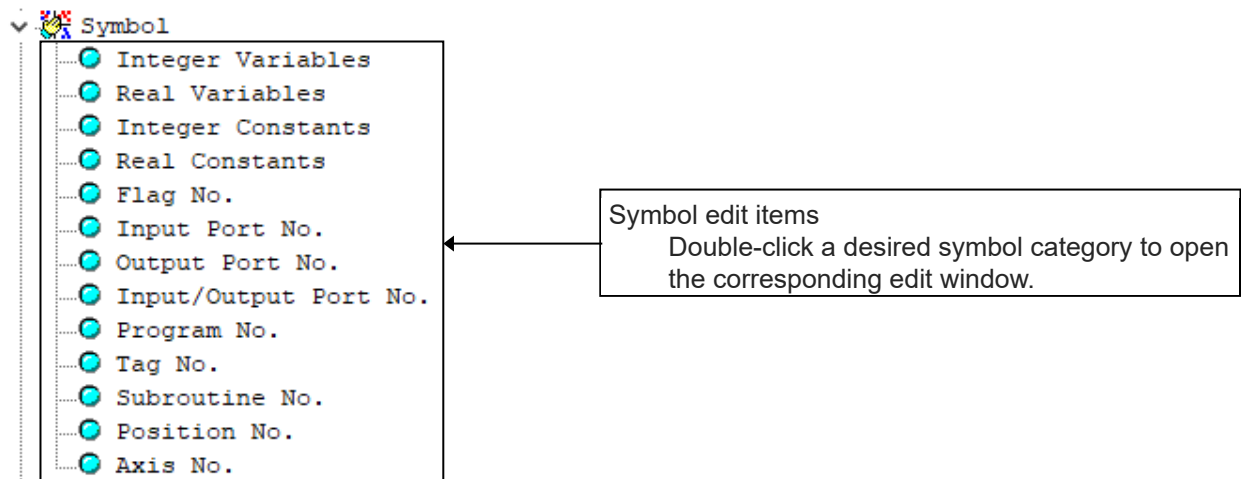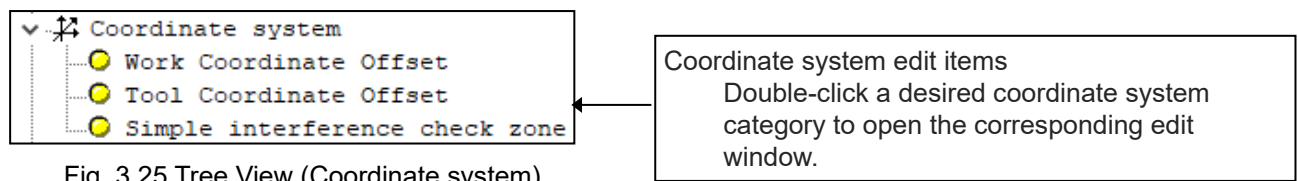
Fig. 3.25 Tree View (Coordinate system)

Monitors supported by the XSEL2-T/TX should be displayed.
Double-click on a monitor type, and the monitor window for the selected monitor type should open.
Also, the local variable monitoring type for each program number should be displayed below "Local Variable". (Only for program numbers valid step data is registered)
Double-click on the local variable monitoring type, and the local variable monitoring window for the selected program number should open.

Fig. 3.26 Tree View (Monitor)

Axes Setting
SEL Global Data Backup
    Save to File
    Transfer to Controller
All Data Backup
    Save to File
    Open File
Write Flash ROM
Initialize Memory
    Global Val./Flag
    Position
Abs. Encoder Reset
Software Reset
Error Reset
Request Drive Power Recovery
Request Release Pause
Collision Detection Function Setting
Compliance Mode Release
Brake operation
Time Setting
ROM Version Information
Control constant table management information

Axes Setting
SEL Global Data Backup
    Save to File
    Transfer to Controller
All Data Backup
    Save to File
    Open File
Write Flash ROM
Initialize Memory
    Global Val./Flag
    Position
    Coordinate System Definition Data
Abs. Encoder Reset (Scara)
Abs. Encoder Reset (Line)
Software Reset
Error Reset
Request Drive Power Recovery
Request Release Pause
Collision Detection Function Setting
Compliance Mode Release
Brake operation
Time Setting
ROM Version Information
Control constant table management information

The controller menu supported by the XSEL2-T/TX should be displayed.
(There are some items hidden in the menu.)
Double-click it and the same process as the selected controller menu should be executed.

Fig. 3.27 Tree View (Controller)

Other Operations

Drag an item other than the controller to the main window and drop it, and the window for the selected item should be displayed in the main menu. (The same process as when an item is double-clicked)

3.5 Controller Monitor

Together with display of the tree view, the controller monitoring window should be displayed and the condition of a controller should be shown.

MANU Mode + All Axes Servo-On   AUTO Mode + Emergency Stop   MANU Mode + Error Occurred
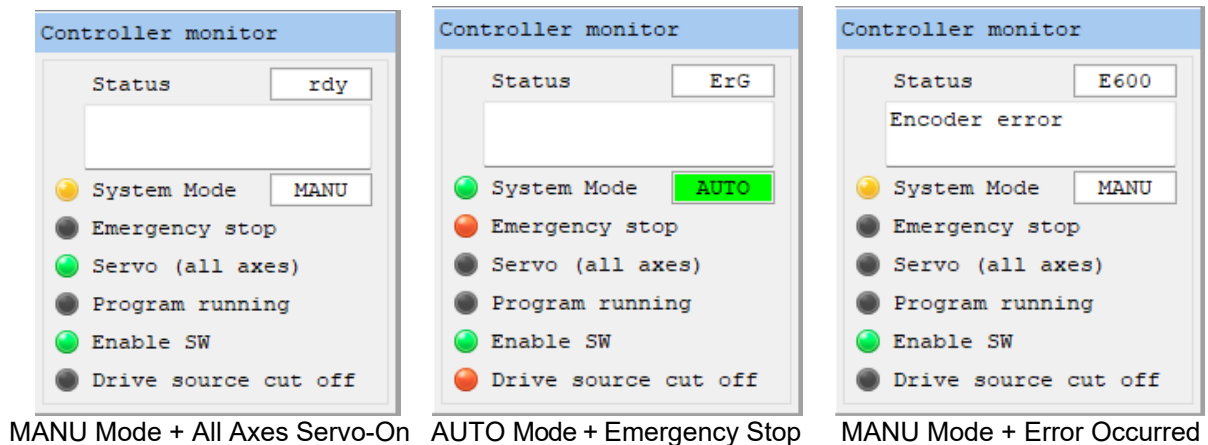
Fig. 3.28 Controller Monitor

Status:	The controller status state is displayed.
	Refer to [Table on next page] for contents of display.
System Mode:	The current operation mode is displayed.
	Yellow lamp should turn on in MANU Mode while green in AUTO Mode.
Emergency stop:	Status of Emergency stop is displayed.
	Red lamp should turn on in emergency stop.
Servo (all axes):	Green lamp should turn on when the servo in all the axes connected to a controller is on.
	Note: EC axes should not be included to servo-on status.
Program running:	Status of program execution is displayed.
	Green lamp should turn on while a program is being executed.
Enable SW:	Status of Enable SW is displayed.
	Green lamp should turn on when the enable switch is on.
Drive source cut off:	Status of Drive source cut off is displayed.
	Red lamp should turn on during the drive cutoff.

Gray lamp should turn on and all letters turn into gray when offline.

Table: 3.5 Status display list

Display	Priority*	Detail
Prd	2	In Data Flush ROM Write
ErG	3	In Emergency Stop (Update Mode excluded)
enb	4	When Enable Switch is off (Deadman Switch, Safety Gate) (Update Mode excluded)
EE**	5	Cold Start Level Error
Ed**	5	
E6**	5	
E5**	5	
EC**	5	Operation Cancelation Level Error
Eb**	5	
E4**	5	
-rS	6	Operation Paused (standby for resuming) (Update Mode excluded)
-ILC	7	Servo All Axes Interlock (Update Mode excluded)
EA**	8	Message Level Error
E9**	8	
E2**	8	
Ardy	9	Ready Status (AUTO mode)
rdy	9	Ready Status (MANU mode)

* Smaller number has higher priority

In simultaneous occurrence, one in high priority should be displayed.

When the status display is Priority 2 to 8, the content of error should be shown in the text box at the bottom of the status.

XSEL2

Chapter 4

Program Edit Window

4.1 Explanation of the Items Displayed in the Program Edit Window

[1]   Select "Program (S)" → "Edit (E)" from the menu.

[2]   When the program number selection window opens, select the program you want to edit, and then click Read .

Program name assigned in the symbol edit window
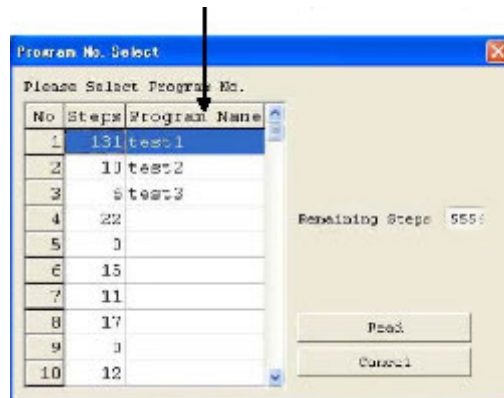
Fig. 4.1 Program Number Selection

* When Axes Group No. 2 is valid, "Axis Group Number Initial Value" should be displayed.

Axis Group Number Initial Values: Axis group number applicable for control at program start
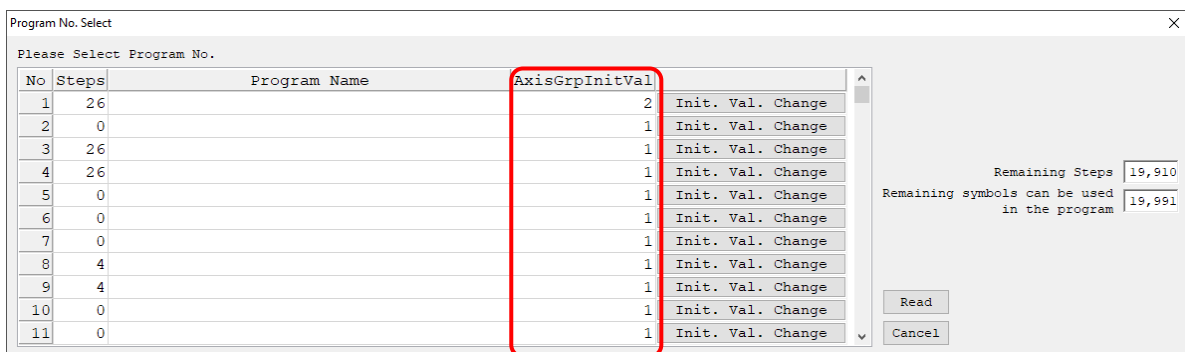
Fig. 4.2 Program Number Select Window

The axis group number initial value should be changed in the following process.

(1) Select "Program (S)" → "Edit (E)" in the menu. (Window shown above should appear)

(2) Click Init. Val. Change on the program number you would like to make a change to the axis group number initial value, and the window shown in the figure below should open.
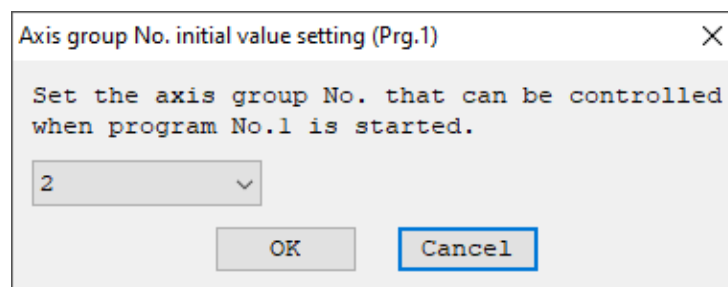
Fig. 4.3 Axis Group Initial Value Setting

4. Program Edit Window

(3) Select an axes group number initial value and click $\boxed{\text{OK}}$.

(4) Confirmation for flash ROM writing should be displayed. Select "Program" and click $\boxed{\text{Yes}}$.
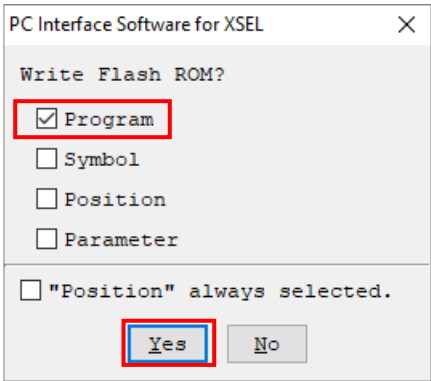
Fig. 4.4 Confirmation for Flash ROM Writing

(Note)   Without writing the program to the flash ROM, the axes group number initial value should go back to that before change after the power gets OFF or controller gets reset.

[3] The program edit window will open. This window has the following controls and fields.

No.   Step number.

B   Use this field to set a breakpoint. (Supported only in the online edit mode.)
                 Click the "B" field in the line you want to set a breakpoint for. Once a
                 breakpoint is set, "B" will be shown in the field.
                 A breakpoint will be cancelled by executing software reset.

T   Indicate the start point and end point for cycle time measurement.

E   Enter a desired extended condition.

N   Specify reversing "N" of the input condition.

Cnd *   Enter a desired input condition.

Cmnd SEL   Enter a desired SEL command.
                 Double-clicking this field or pressing the $\boxed{\text{F1}}$ key will open the SEL Command
                 Explanation window (Fig. 4.9).
                 This window provides an explanation of each SEL command. You can select
                 a desired command in this window and input it to the step data.

Operand 1 *   Enter desired operand 1.

Operand 2 *   Enter desired operand 2.

Pst *   Enter a desired output (operand 3).

Comment   Enter a comment, if necessary (32 half-width characters and 16 full-width
                 characters max.).
                 You can also double-click this field to modify a part of the comment currently
                 entered.

                 * Press $\boxed{\text{F11}}$ to find a specific symbol in the input condition/operand fields.

* Column T should be shown. Indicate the start point and end point for cycle time measurement.
  Refer to [4.5 Cycle Time Measurement]

Fig. 4.5 Program Edit

*1 It is available to set in Operand 1 and Operand 2 with binary and hexadecimal systems.
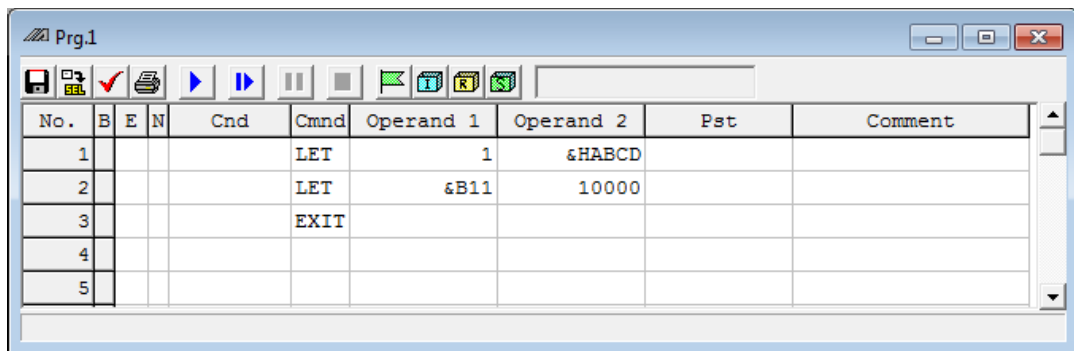
Fig.4.6 Setting with Binary and Hexadecimal Systems

[How to set up]
  When using the binary numbers, apply "&B" at the top of the value.
  When using the hexadecimal numbers, apply "&H" at the top of the value.
  Eight digits can be input at maximum for binary and hexadecimal numbers.
  * In the operand to input the axis pattern (the operand input values in binary system), do not
    apply "&B" at the top to input with the binary numbers.
  * Binary numbers are treated as an unsigned integer.
    (e.g. &B11111111 = 255)
  * Hexadecimal numbers treated as a signed integer.
    (e.g. &HFFFFFFFF = -1)

[Restrictions]
  ● Binary and hexadecimal systems cannot be used for the operand indirect indication in the
    program.
  ● There will be no change to the input range of each operant even if binary or hexadecimal
    system is used.

*2 Press [Enter] key in the condition that the cursor is placed on the comment in the final line,
    and 100 lines of blank step data will be added.

If even one line is changed, all step numbers will be displayed in red. Right-clicking a desired input item in each line will display a pop-up menu (Fig. 4.7). The items in the pop-up menu are explained below.

Cut (T)	Same as clicking "Edit (E)" → "Cut (T)" from the menu.
Copy (C)	Same as clicking "Edit (E)" → "Copy (C)" from the menu.
Paste (P)	Copy the entire cursor line.
	Same as clicking "Edit (E)" → "Paste (P)" from the menu.
	The step data copied or cut should be inserted to the line where the cursor is placed.
Insert Line (I)	Insert line at the cursor line. You can also insert multiple lines.
Delete Selected Lines (D)	Delete the lines in the selected range.
Set Comment (S)	Set the entire cursor line as a comment (invalid step). If a valid step has been set as a comment by mistake, you can select Release Comment explained below to return the line to a valid step.
	Executing Release Comment on a line containing character strings will clear all character strings in the line.
Release Comment (R)	Return the selected comment line to a step.
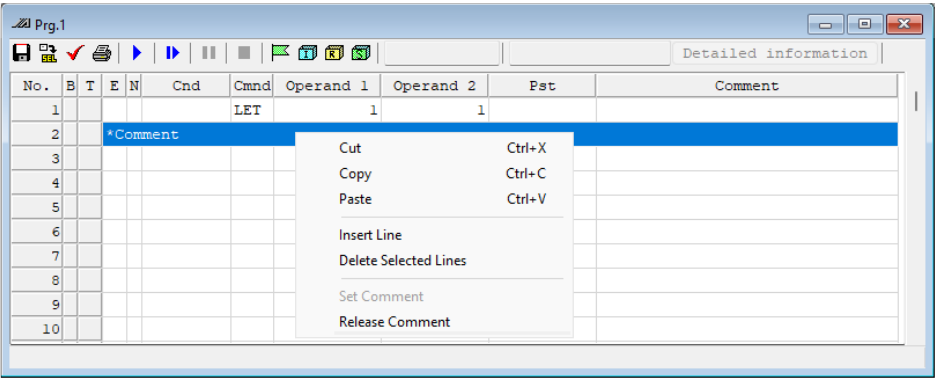
Fig. 4.7 Pop-up Menu

In the program edit window, selecting "Edit (E)" from the menu and then "Undo (U)" can cancel up to the most recent 10 operations.

Alternatively, pressing the Ctrl + Z key simultaneously can cancel the operations.

However, the cancel function will become disabled when any of the following operations is performed:

● Transfer of data on the edit window to the controller

● Saving data on the edit window to a file

● Closing of the edit window

When this operation is performed, the warning window in Fig. 4.8 will be displayed.

Clicking Yes will cancel the operation executed immediately before.
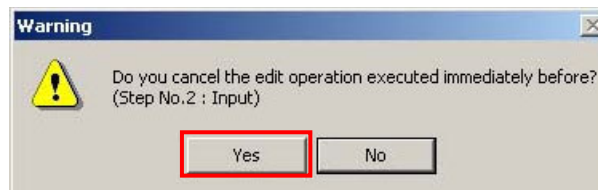
Fig. 4.8 Warning

Double-clicking the Cmnd field or pressing the F1 key will open the SEL Command Explanation window. Use this window as a reference when editing data.
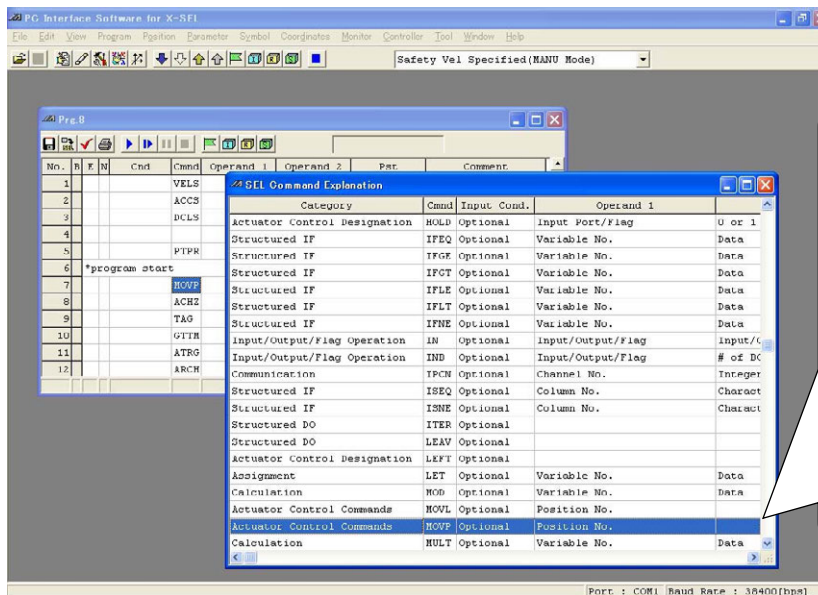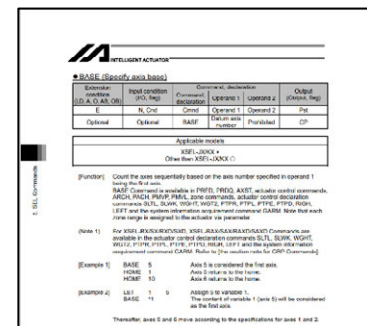
Fig. 4.9 SEL Command Explanation

Pressing the F2 key can change data in the cell partially.
(Example: "MOVP" → "MOVL")

Right-clicking on the SEL Command Explanation window will open a pop-up menu containing the following items.

Input   Input the command in the cursor line to the step data (into the cursor line in the program edit window).
It should made the same behavior when double-click on the selected line in the SEL Command Explanation window.

Font   Font settings for SEL Command Explanation

Sort   ● Alphabetical order

           ● Display should be shown in the command type order.

Help   The SEL programing manual of the selected command should show up.
Pressing the F1 key in the selected line in the SEL Command Explanation window should behave in the same way.

Fig. 4.10 Pop-up Menu

[4] This window has the various buttons shown below.

(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l)   (m)
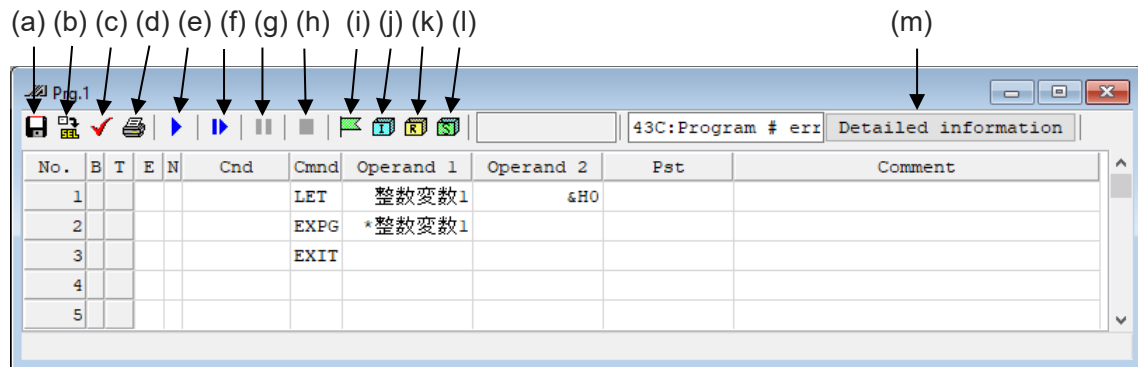
Fig. 4.11 Buttons

(a) <u>Save to File</u>
Click this button to save the program in a file with a name.

⚠ **Caution**
● In "Program File Format 1" of the X-SEL-P/Q, PX/QX (with gateway function), controllers that are compatible with increased memory, steps No. 6001 and thereafter and programs No. 65 and thereafter cannot be saved. SSEL In a controller, Step No. 2001 and later and Program No. 65 and later cannot be stored to "Program File Format 1" in the normal format. Store them to "Program File Format 2" in the extension format.

(b) <u>Transfer to Controller</u>
Clicking this button will prompt the software to check the program data for syntax errors and transfer the program data to the controller if no errors have been found.

(c) <u>Check Program</u>
Clicking this button will display information regarding syntax errors found in the program you have created, as well as operands used in the program.

(d) <u>Print</u>
Clicking this button will print the program.

(e) <u>Run</u>
Clicking this button will run the program. If the program has not yet been saved after editing, you must <u>transfer the program</u> to the controller beforehand.

⚠ **Caution**
● Since the controller's processing speed is faster than the PC's communication speed, the cursor position in the program edit window may not always correspond to the actual movement of the actuator.

(f) <u>Run 1 Step</u>
The program will run one step every time this button is clicked.

(g) <u>Pause</u>
Clicking this button will pause the program currently running.

(h) <u>End</u>
Clicking this button will end the program currently running.

(i) <u>Show Local Flag</u>
Clicking this button will show the local flag window for the program currently running.

(j) <u>Show Local Integer Variable</u>
Clicking this button will show the local integer variable window for the program currently running.

(k) <u>Show Local Real Variable</u>
Clicking this button will show the local real variable window for the program currently running.

(l) <u>Show Local String Variable</u>
Clicking this button will show the local string variable window for the program currently running.

(m) <u>Program Error Information</u>
It shows program errors.
Click on the Detail Information button and the details of the program errors should be displayed.
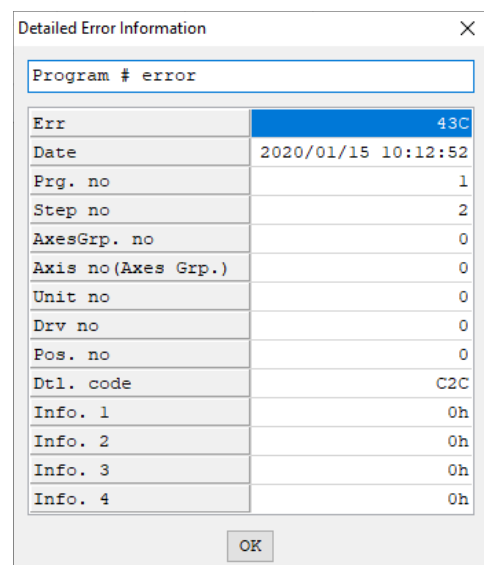
Fig. 4.12 Program Error Detail Information

4. Program Edit Window

[5] Checking the program

The software will check the program you have created, for SEL syntax errors.

(1) Click ⌐Check Program button⌐ in the program edit window.

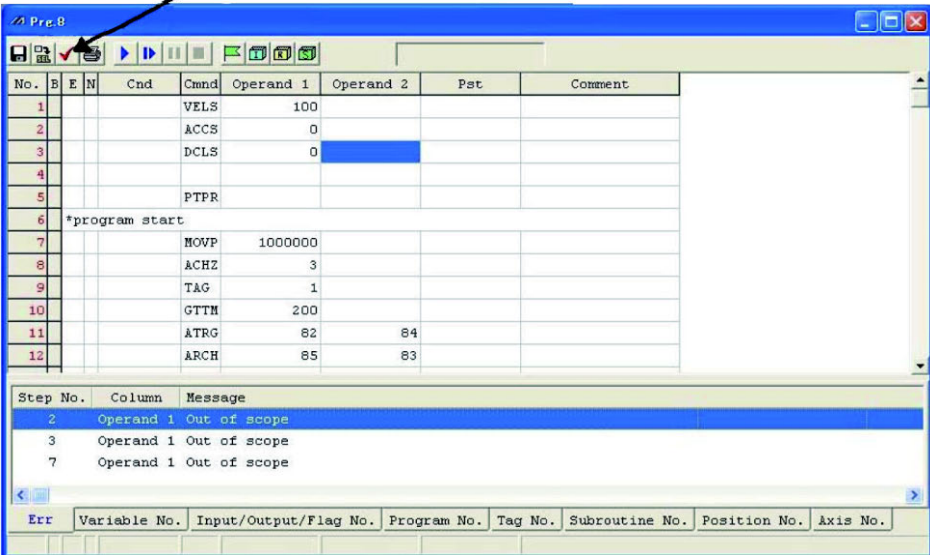(2) If any error is found, the error list will be displayed.

Check Program button

Fig. 4.13 Error List

The error list has the Step No., Operand and Message fields. Double-clicking an error line will move the cursor to the location of the corresponding error.

(3) Information regarding the operands (Cnd, Operand 1, Operand 2 and Pst) in the program you are editing is displayed.
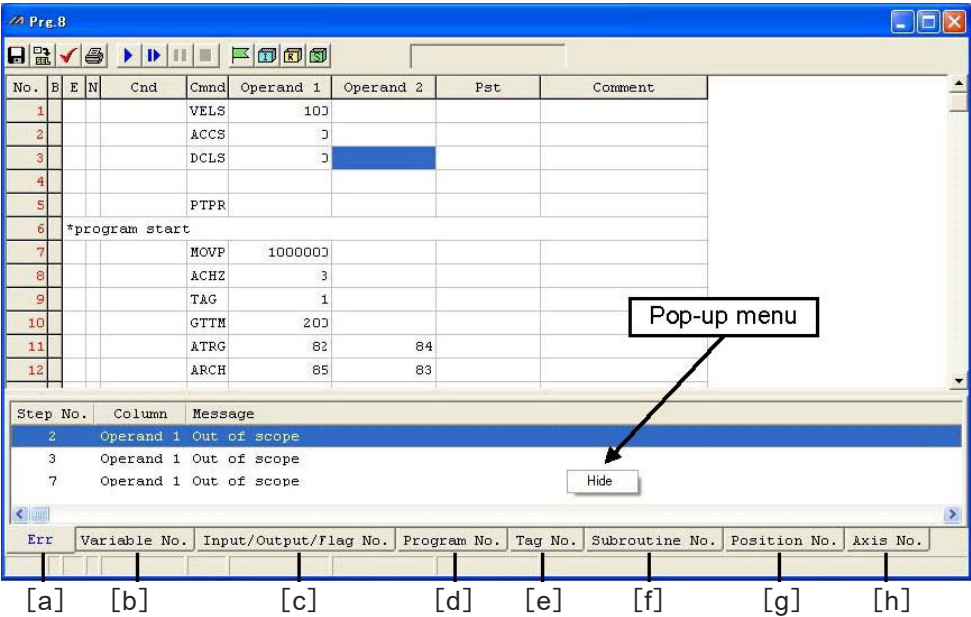
Fig. 4.14 Operand Information

[a]   Syntax Error

“Message” (Error content)

[b]   Variable No. Use Condition

“Variable No.”

“Category” (Integer/real number determination)

“Scope” (Global/local determination)

*   If the applicable variable number is specified indirectly, the Category and Scope fields will show “(Unknown)”.

[c]   Input/Output/Flag No. Use Condition

“Port/Flag No.”

“Category” (Input Port No./ Output Port No./ Flag No. determination)

“Scope” (Global/local determination)

*   If the applicable port/flag number is specified indirectly, the Category and Scope fields will show “(Unknown)”.

[d]   Program No. Use Condition

“Program No.”

[e]   Tag No. Use Condition

“Tag No.” (Tag number in use)

“Declaration/Jump”

[f]   Subroutine No. Use Condition

“Subroutine No.”

“Declaration/Call”

[g]   Position No. Use Condition

“Position No.”

[h]   Axis No. Use Condition

“Axis No.”

*   If a symbol is used in any of the numbers in [b] through [h], the corresponding definition value will be displayed in the margin.

The above information is displayed in an itemized list at the bottom of the program edit window. You can double-click a desired item to move the cursor to the corresponding program.
You can also right-click the list to display a pop-up menu and hide the list or sort the records.

4. Program Edit Window

4.2 Saving a Program, Transferring and Closing the Edit Window

4.2.1 Saving a Program Online, Transferring and Closing the Edit Window

[1] Saving to a file the program data you are editing

Click Save AS in the program edit window.

This is the same as clicking "File (F)" → "Save As (A)".

A window to input a file comment should appear at file saving.

Input a file comment and click OK.

If you click Cancel, the file can be saved but the file comment will not be saved.
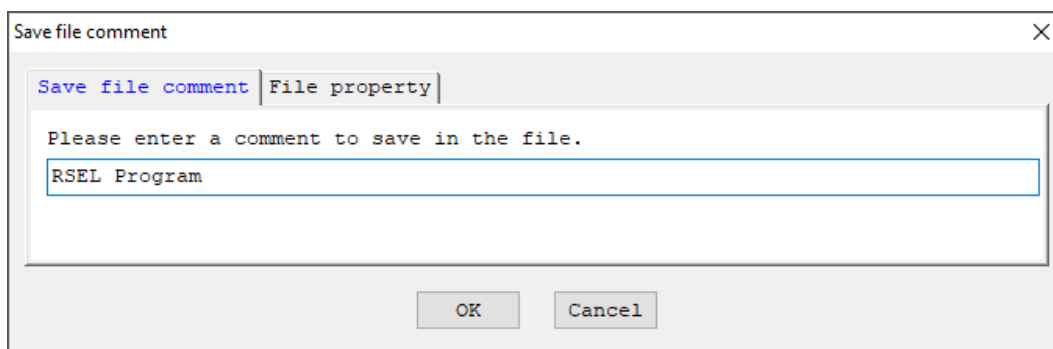
Fig. 4.15 File Comment Save Window

* The file comment you had can be confirmed by clicking the file property button (🛈) in each edit window.

[2] Transferring to the controller the program data you are editing.

You can save the program data you are editing to the controller's memory.

Click Transfer to Controller in the program edit window.

This button is selectable only in the online edit mode.

⚠️ **Caution**

- If the program contains any error, the error will be displayed and the program will not be transferred to the controller.

[3] Writing to the flash ROM

Once the program has been transferred to the controller, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
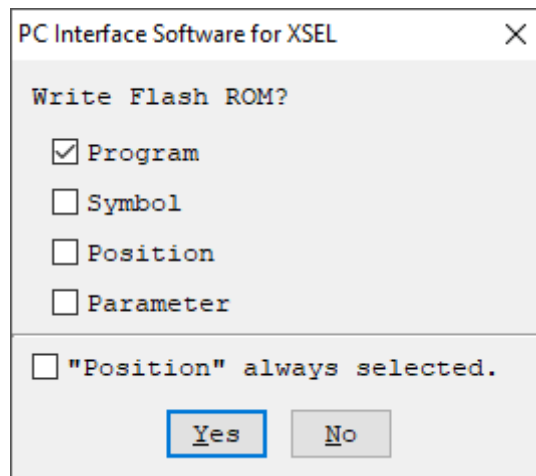
Fig. 4.16 Confirmation

Click and select a desired item (Program, etc.) to write to the flash ROM.

Click [Yes] → The memory data will be written to the flash ROM.

Click [No] → The memory data will not be written to the flash ROM. If No (N) is selected, the controller will clear all data in its memory after a reset (i.e., after the controller power is reconnected or a software reset is executed), and then load the data from the flash ROM. (The controller will operate in accordance with the transferred data until a reset is executed.)

* The number of writing to the flash ROM is limited. (can write approx. 100,000 times)
  If you don't want to write all the data to the flash ROM, select "Write selected data region".

[4] Closing the program edit window

Attempting to close the program edit window will display the following confirmation dialog box with the message, "Data will be transmitted to the controller, Are you sure to continue?"

Fig. 4.17 Confirmation

Yes	The edited data will be transferred to the controller → [3] Writing to the flash ROM
No	The software will close the program edit window without saving the edited data.
Cancel	The software will cancel the operation and return to the program edit window.

4.2.2 Transferring a Program Created Offline

A program created offline can be transferred to a controller by following the steps below.

(1) Select "File" → "Open" from the menu.
In the window of "Open File", select a program created offline and open it.

(2) If a controller is connected, Controller Transfer button ▣ gets activated once the program is opened.
Press Controller Transfer button ▣ , the program gets transferred to the controller.
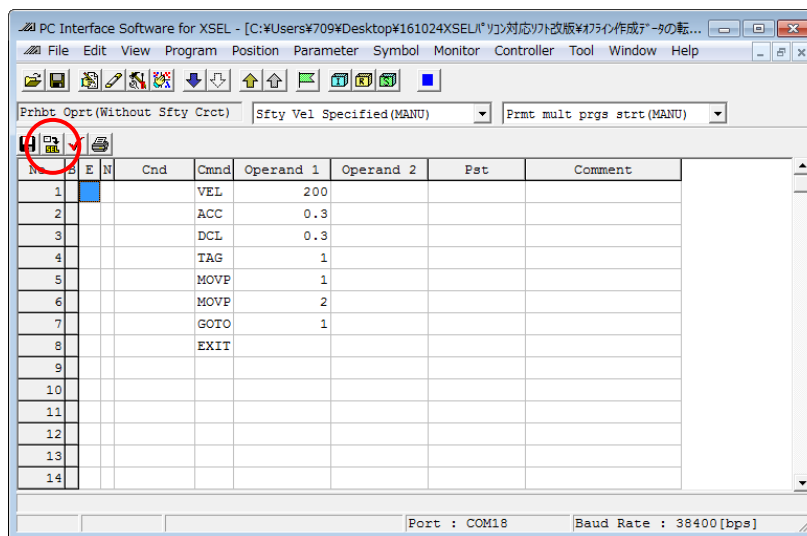
Fig. 4.18 Program Edit Window

(3) A confirmation window asking if it is okay to transfer the data to the controller will appear.
Press Yes .
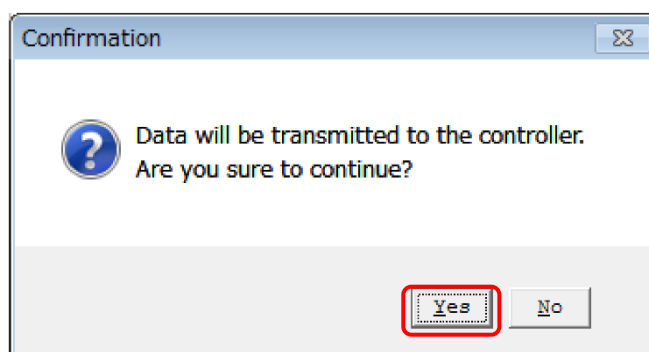
Fig. 4.19 Confirmation Window

4. Program Edit Window

(4) Next, a window to select the program number for transfer destination will be shown.
Click on a program number line for transfer destination to select a transfer destination.
Press ⎡Write⎤.

Program No. Select				
Please Select Program No.				
No	Steps	Program Name	AxisGrpInitVal	
1	1		1	
2	0		1	
3	26		1	
4	26		1	
5	0		1	
6	0		1	
7	26		2	
8	4		1	
9	4		1	
10	0		1	
11	0		1	

Remaining Steps 19,908
Remaining symbols can be used in the program 19,991

Write

Cancel
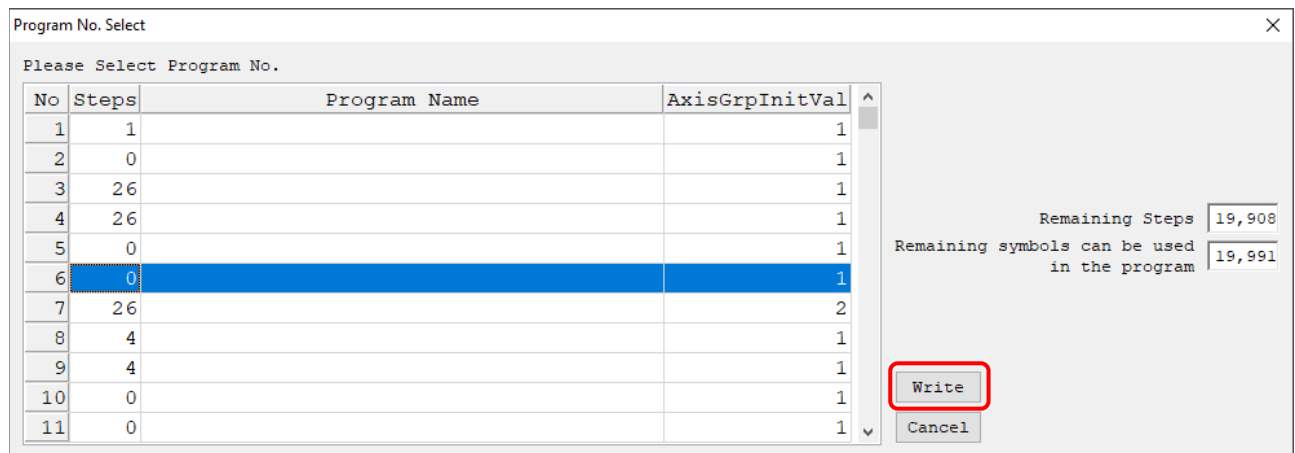
Fig. 4.20 Program No. Select

(5) A confirmation window stating "Write Flash ROM" will appear.
Press ⎡Yes⎤.

PC Interface Software for XSEL

Write Flash ROM?

○ Write all data areas.

● Write the selection data area.

☑ Program

☐ Symbol

☐ Position

☐ Parameter

☐ User data-hold memory

☐ "Position" always selected.

Yes   No
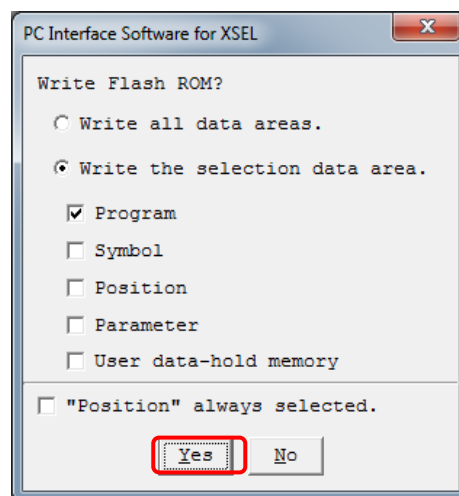
Fig. 4.21 Confirmation Window

(6) The program will be transferred to the controller.
Also, flash ROM writing will be conducted, and the display below flashes during writing.
The display will disappear once writing is complete.

PC Interface Software f...
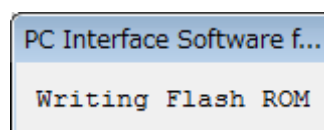
Writing Flash ROM

Fig. 4.22 Writing Flash ROM Window

4.3   Saving All Programs to a File

[1] Saving all programs

You can save programs from No. 1 to 512 in the controller as a single file.

(1) Click "Program" → "Save to File" from the menu.

(2) In the program number selection window, click Save All . Then specify a desired file name and folder.
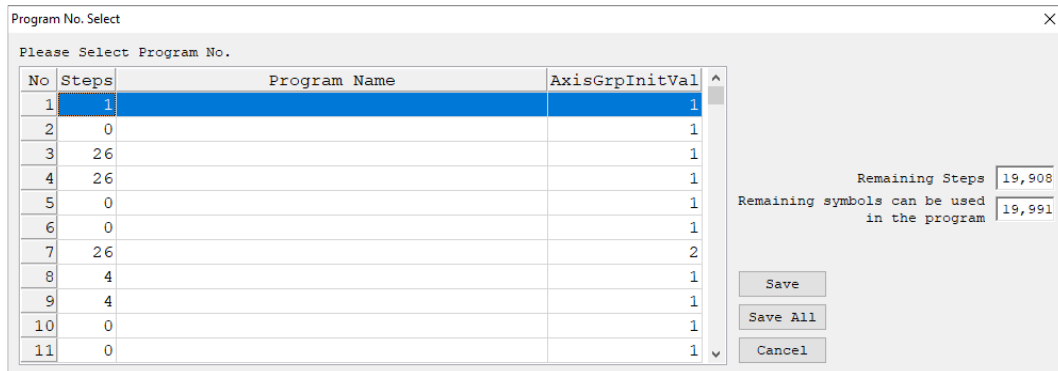
Fig. 4.23 Program Save

[2] Opening the all programs file

(1) Click "File" → "Open" from the menu.

(2) In the file open window, select the file you want to open and then click Open .

(3) The program No. selection window will be displayed. Select a desired program No. to read and click Read .

If you want to transfer all programs to the controller, select Load All Program . If you want to select programs in the all programs file and transfer them individually, select desired program numbers and then click Load a Program to transfer the corresponding programs to the controller.
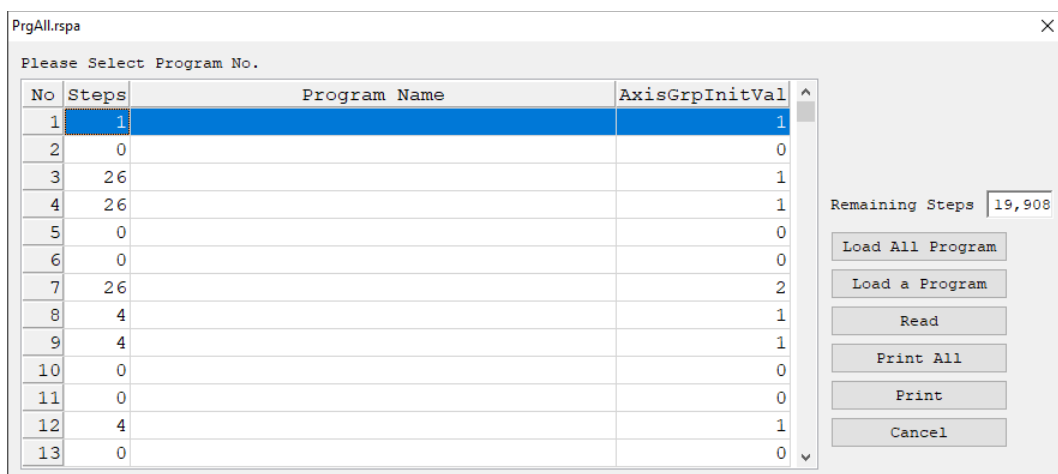
Fig. 4.24 Program Transfer (Online)

Print All : Print all programs (excluding the program with "0" steps).

Print : Print only the program selected from the list at the left of the button.

[3] Important note on transferring an all programs file to the controller

(1) Transferring all program files to a controller at once will clear all existing programs No. 1 to 512.

If necessary, back up all current programs before the transfer.

(2) If the all programs file includes any program that contains symbols and the symbols are not defined in the controller's memory, an error will occur when the applicable program is transferred to the controller. If an error occurs, none of the programs will be transferred to the controller. Therefore, if the applicable symbol data is saved to a file, transfer the symbol definition file first. If there is no symbol definition file, define the applicable symbols in the symbol edit window and then transfer the definitions to the controller, before transferring the all programs file again.

(3) If the all programs file contains any error, the error window will be displayed and none of the programs will be transferred to the controller. In this case, double-click the error shown in the error window to open the program file that contains the applicable error. Correct the error, and then save the file by overwriting. If multiple errors exist, correct all errors. When all errors have been corrected, transfer the programs to the controller again. The procedure in (3) provides an important recovery method for program files containing errors.

[4] Saving the all programs file

(1) If the program files read from the all programs file are saved as the all programs file, click Save .

(2) If the program files are saved individually, click Save as .

4.4 Running the Program

You can run the program in the program edit window. To run the program you are editing, <u>transfer it to the controller</u> first.

⚠ **Caution**

● Once <u>transferred to the controller</u>, the program can be run without being written to the flash ROM first. If the program is not written to the flash ROM, however, it will be lost once the controller power is reconnected or a software reset is executed.

---

[e] Run: Clicking this button will run the program.

[f] Run 1 Step: The program will run one step every time this button is clicked.

[g] Pause: Clicking this button will pause the program currently running.
Clicking Run or Run 1 Step will resume the program.

[h] End: Clicking this button will end the program currently running.

<u>Breakpoint</u>: You can pause the program in a desired step. "B" will appear/disappear every time the field is clicked.
(Note) A breakpoint will be cleared once the controller power is reconnected or a software reset is executed.

[e] [f] [g] [h]
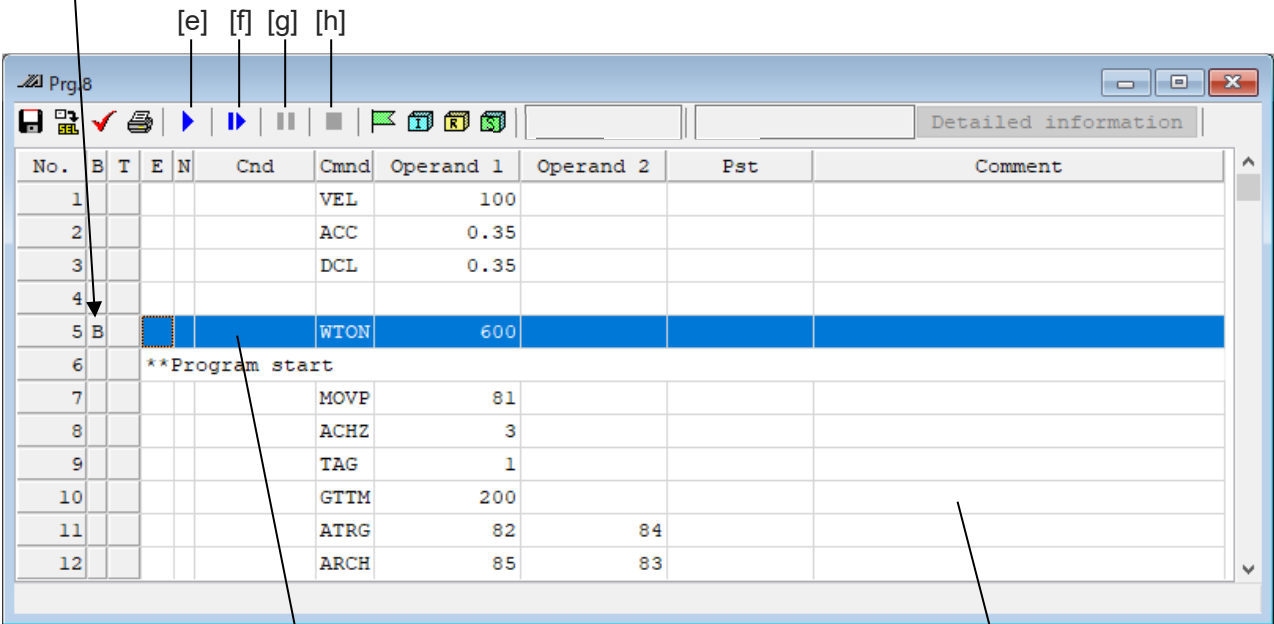
Fig. 4.25 Running the Program

Cursor colors
  Green: The program is paused (by step operation, by a breakpoint, by the pause button, by the SSPG command, etc.)
  Red: The program is waiting (in response to the TIMW, WTxx, WZxx, WRIT or READ command and waiting for a servo command to be completed, etc.)
  Blue: Any condition other than those represented by a green or red cursor.

Background colors
  Gray: The program is running.
  White: The program is not running.

4.5　Cycle Time Measurement

By setting up the measurement start point and end point in the program, the cycle time during program operation can be measured.

4.5.1　How to Measure Cycle Time

Select "Program (S)" → "Edit (E)" and Program Number Select window appears.
Select a program to operate and click Read .
Program Edit window appears.
Column T (marked in red box), which is for the setup of measurement start point and end point for cycle time measurement, should be shown in Program Edit window.
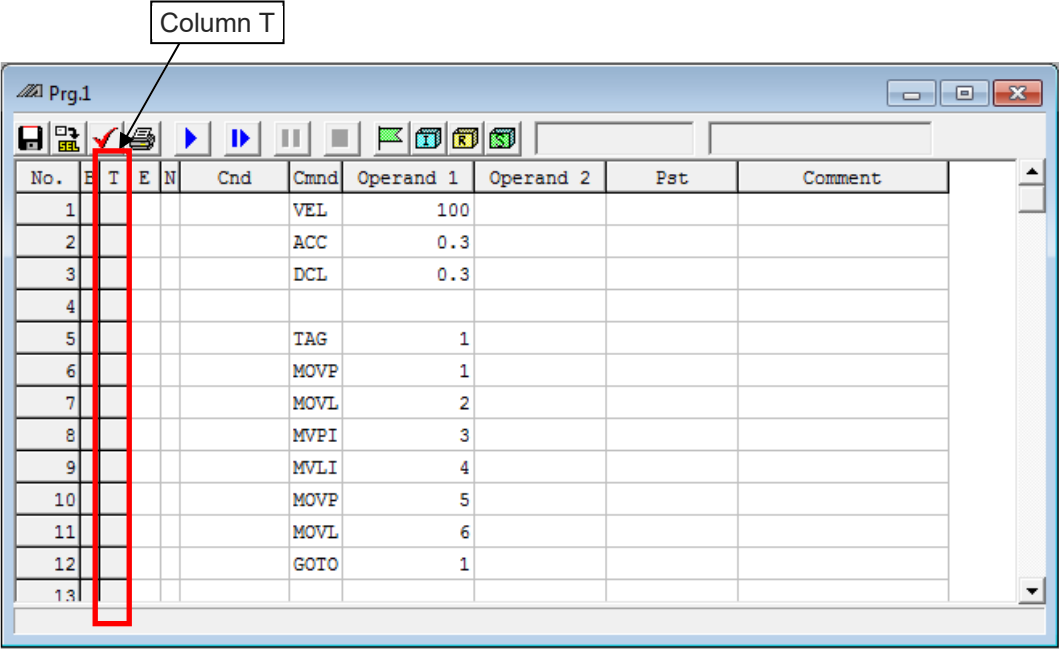
Fig. 4.26 Program Edit window

There are three types of setting in the setup in Column T.
- S:　Cycle Time Measurement Start Point
- E:　Cycle Time Measurement End Point
- SE:　Measurement Point for Cycle Time Measurement for One Step Only

[1] Setting of Cycle Time Measurement Area Section

(Note) The section of area to be set up should be just one section. Two or more sections cannot be established.

(Note) When establishing the input / extension status setting, set "S" and "E" in the command (Cmnd column) description step.

If the setting is established in the steps of only input / extension stays, it will not be subject to measurement.

(1) Measurement Start Point and End Point Setup

1) Right-click on Column T (blank cell) of the start step of the area section that you would like to measure.

S: Measurement start point will be displayed.
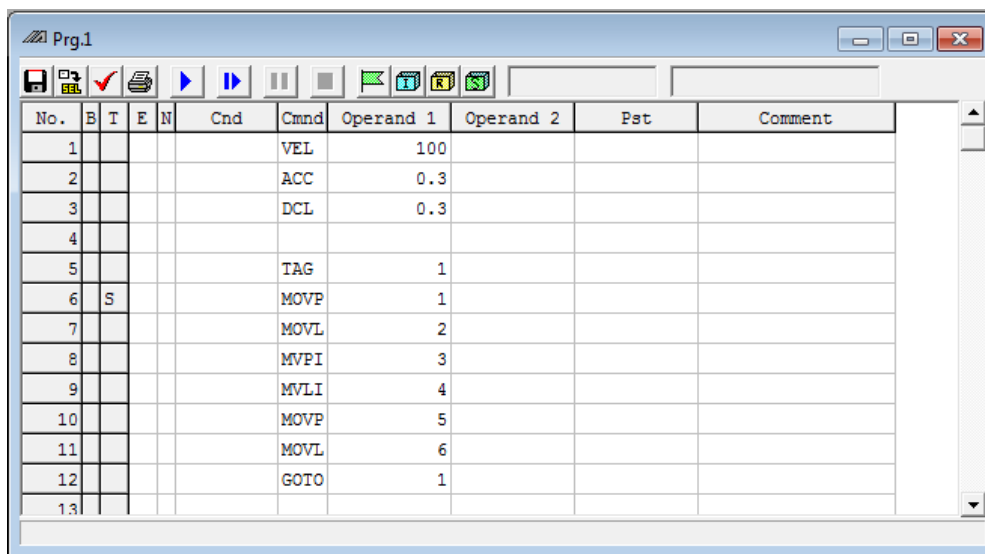
Fig. 4.27 Measurement start point Setup

2) Secondly, right-click on Column T (blank cell) of the end step of the area section that you would like to measure.

E: Measurement end point will be displayed.
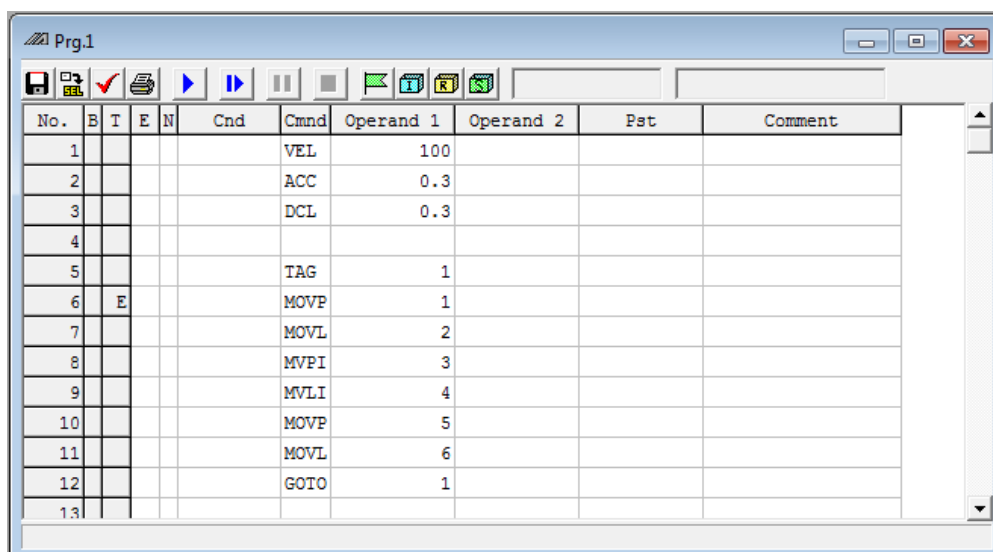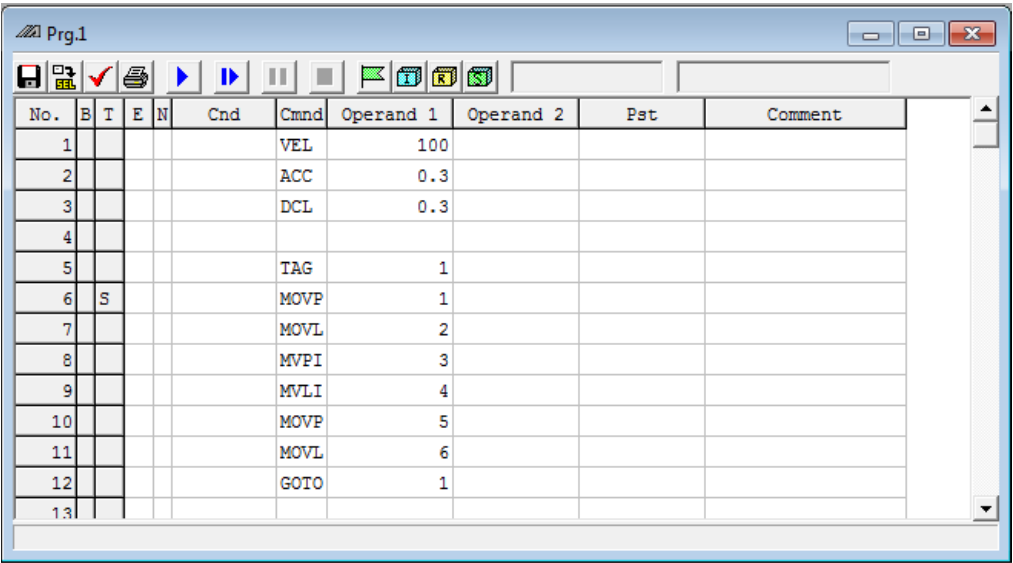
Fig. 4.28 Measurement end point Setup

4. Program Edit Window

(2) Measurement One Step Setup
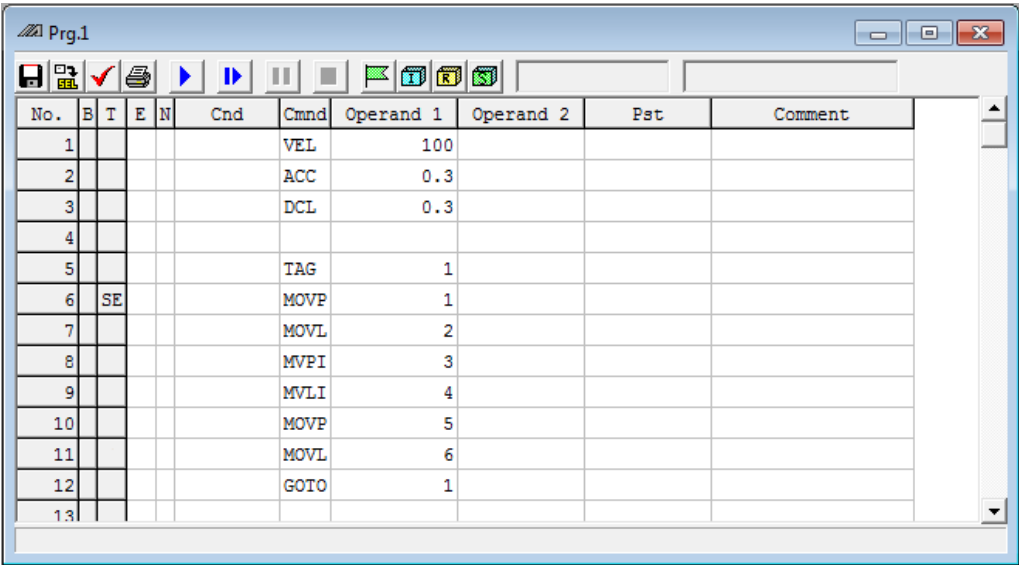
    1) Right-click on Column T (blank cell) of the step that you would like to measure.

        S: Measurement start point will be displayed.

Fig. 4.29 Measurement start point Setup

    2) Secondly, right-click on the point that "S" is being displayed.

        SE: The measurement point will be displayed.

Fig. 4.30 The measurement point Setup

Follow the steps below when it is required to set up again or cancel the items that you have already set up.

- When "S" and "E" are displayed right-click on the cell of "S", and "S" will be erased.

  If "E" is displayed, it means that the measurement area section setting is not activated.

  Right-click on a blank cell, and "S" will be shown and the measurement area section setting gets activated.

- Right-click on the cell of "E", and "E" will be erased.

  If "S" is displayed, it means that the measurement area section setting is not activated.

  Right-click on a blank cell, and "E" will be shown and the measurement area section setting gets activated.

- Right-click on the cell of "SE", and "E" will be erased.

  Click it again, and "E" will be erased.

4. Program Edit Window

[2] Displaying Cycle Time Measurement Result

Once a program gets operated, cycle time will be measured and the result will be displayed at the position marked in red.

Once the program starts executed and the step with "S" being shown gets executed, measurement will start and display shows -----.---s.

Once the step with "E" being shown is completed, the measurement will finish and the cycle time measurement result will be displayed.

The time to be shown should be from 0.000sec to 86399.999sec (one day).

Once the first measurement is completed and the step with "S" being shown has been executed, measurement will start again and -----.---s will be displayed.

If a change is made to the cycle time measurement area section after measurement is finished, the display will turn to blank.
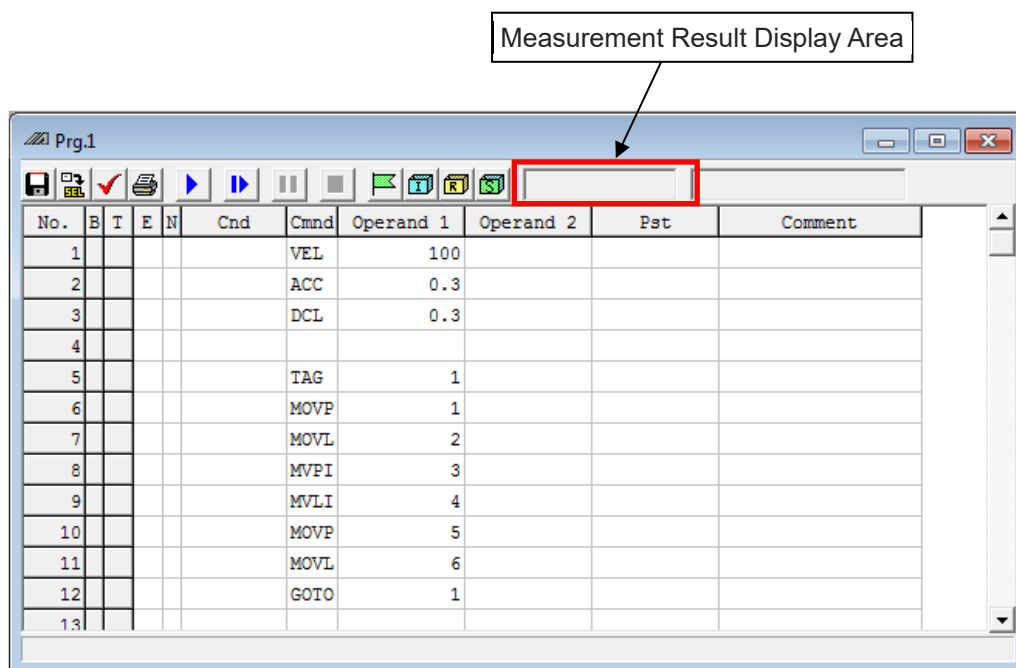
Fig. 4.31 Measurement Result Display

● Blank Displayed: Status of Cycle Time Measurement Not Executed
● -----.--- Displayed: Status of Cycle Time Measurement Under Execution
● Time Displayed: Status of Cycle Time Measurement Completed

[Note]

● Measurement keeps executed unless the execution of the step with "E" displayed in Column T is completed.

● In case setting is established in an area section that is looped in short period of time, it could seem as if -----.---s is kept displayed because measurement will start straight after the previous measurement is finished.

● In case of a program being stopped by breakpoint / pause, the stop duration should be included to the cycle time.

● In case the steps with "S" and "E" displayed are set to the input / extension condition, cycle time will be measured when input / extension condition has been succeeded.

● In case the step with "S" displayed is set to the breakpoint, measurement will start once the program is executed.

● The maximum time to be display should be 86399.999sec (one day). Also, when the cycle time exceeds 4294967.295sec, the cycle time measurement result will not be displayed correctly.

4. Program Edit Window

XSEL2

Chapter 5

Copying/Moving/ Clearing a Program

5.1   Program Copy/Move Window

The steps to copy or move a program to other program number are explained below.

(1) Select "Program (S)" → "Copy/Move (C)" from the menu.

(2) The "program Copy/Move" window will be displayed.
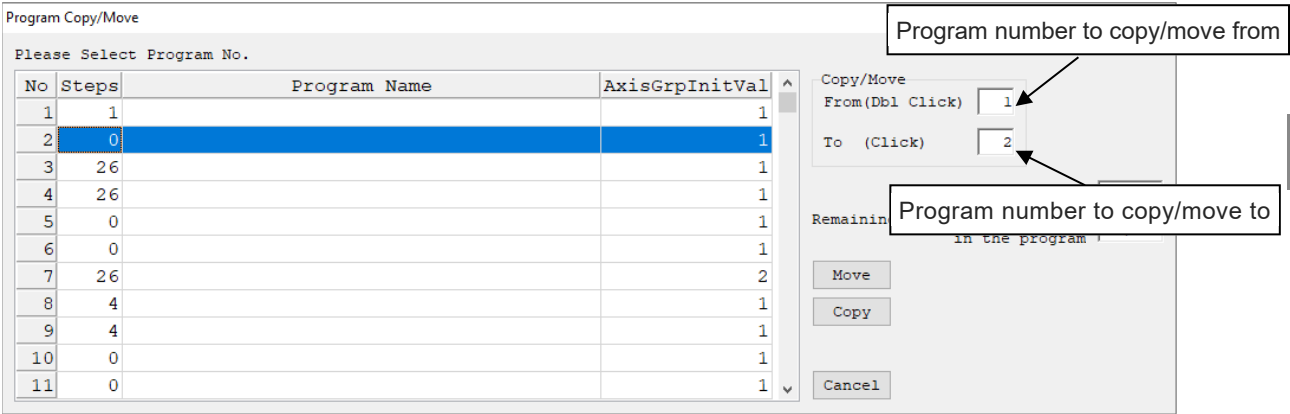
Fig. 5.1 Program Copy/Move

Double-click the source program you want to copy or move.

Click the destination program you want to copy or move the source program to.

To copy the program, click Copy . To move the program, click Move .

Both operations are done in the memory.

Clicking Cancel will cancel the selected operation.

* It is available to copy, move and delete the local symbols in the applicable programs when conducting copy, move or delete of programs.

The following message should be displayed when conducting copy, move or delete of programs.

Click Yes and copy, move or delete of the local symbols in the applicable programs should be executed.
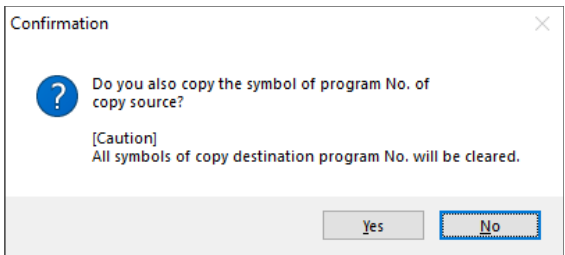
Fig. 5.2 Confirmation Message (copy)
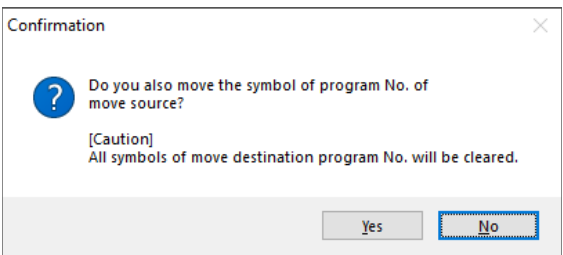
Fig. 5.2 Confirmation Message (move)
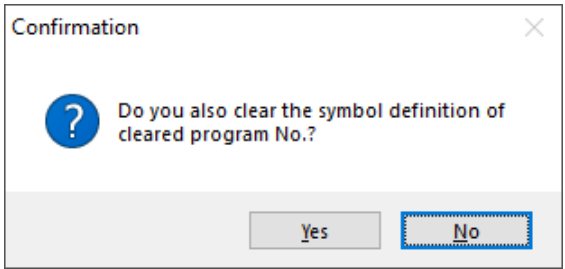
Fig. 5.2 Confirmation Message (clear)

(Note) When copy or move of the local symbols are conducted, all the local symbols saved in the program number of destination should all be cleared.

5. Copying/Moving/Clearing a Program

(3) Writing to the flash ROM

When the copy or move is completed, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
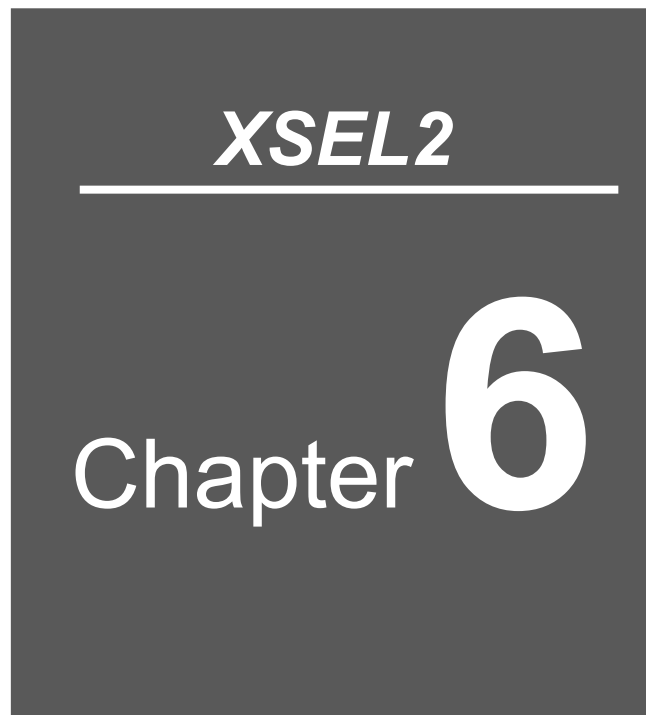
```
┌─────────────────────────────────────────┐
│ PC Interface Software for XSEL      [X]  │
├─────────────────────────────────────────┤
│  Write Flash ROM?                        │
│                                          │
│   ○ Write all data areas.                │
│                                          │
│   ● Write the selection data area.       │
│                                          │
│      ☑ Program                           │
│                                          │
│      ☐ Symbol                            │
│                                          │
│      ☐ Position                          │
│                                          │
│      ☐ Parameter                         │
│                                          │
│      ☐ User data-hold memory             │
│                                          │
│   ☐ "Position" always selected.          │
│                                          │
│           [ Yes ]    [ No ]              │
└─────────────────────────────────────────┘
```
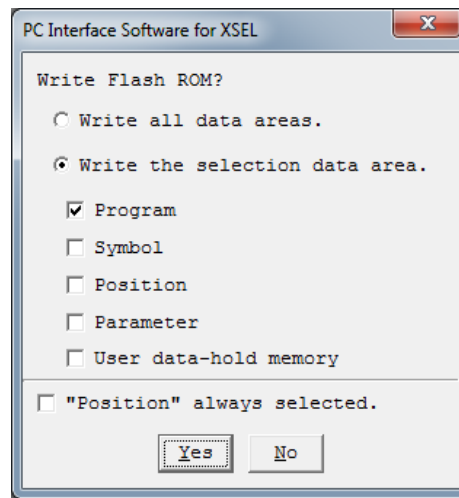
Fig. 5.3 Confirmation

Click and select a desired item (Program, etc.) to write to the flash ROM.

- Click Yes → The memory data will be written to the flash ROM.
- Click No → The memory data will not be written to the flash ROM.
Once the controller is reset (the controller power is reconnected or a software reset is executed), the original program arrangement before the copy or move will be restored.

* The number of writing to the flash ROM is limited (approx. 100,000 times).
If you do not want to write all the data to the flash ROM, select "Write the selection data area."

5.2 Program Clear Window

The steps to clear a program are explained below.

(1) Select "Program (S)" → "Clear (L)" from the menu.

(2) The program clear window will be displayed.
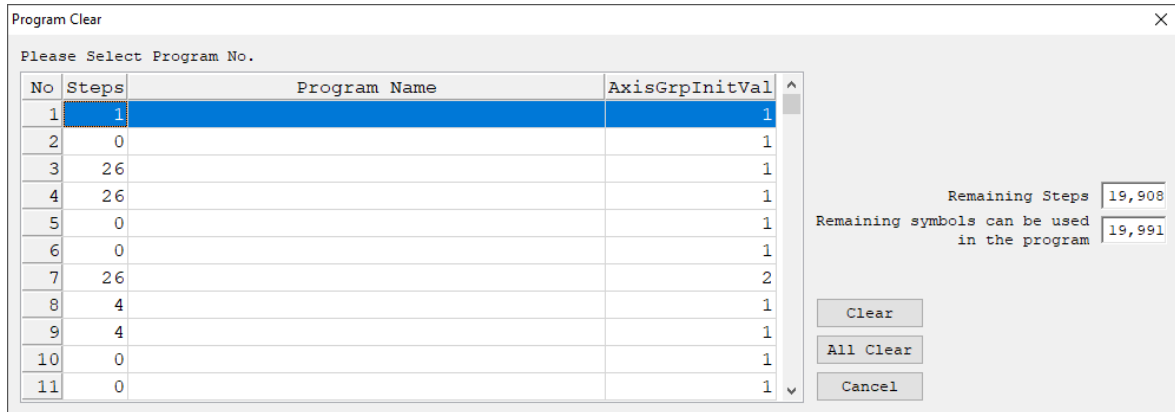
Fig. 5.4 Program Clear

Click the program you want to clear.

You can select multiple programs by dragging the mouse or pressing the $\boxed{\text{Ctrl}}$ + $\boxed{\uparrow}$ $\boxed{\downarrow}$ key simultaneously.

Next, click $\boxed{\text{Clear}}$.

(This operation is done in the memory.)

Clicking $\boxed{\text{Cancel}}$ will cancel the operation.

When clearing all programs in the controller, click $\boxed{\text{All Clear}}$.

5. Copying/Moving/Clearing a Program

(3) Writing to the flash ROM

When the clear is completed, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
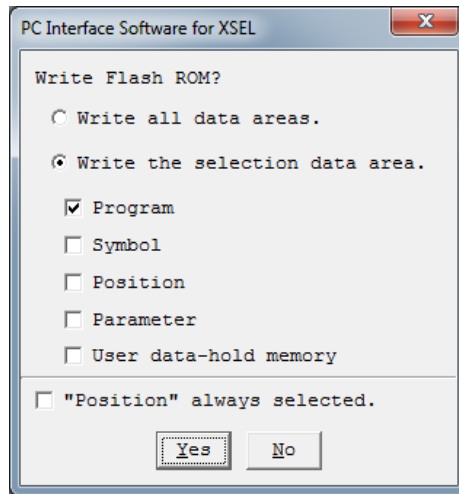
Fig. 5.5 Confirmation

Click and select a desired item (Program, etc.) to write to the flash ROM.

● Click Yes → The memory data will be written to the flash ROM.

● Click No → The memory data will not be written to the flash ROM.

Once the controller is reset (the controller power is reconnected or a software reset is executed), the cleared program will be restored.

XSEL2

Chapter 6

Position Data Edit Window

6.1 Explanation of the Items Displayed in the Position Data Edit Window

(1) Select "Position (O)" → "Edit (E)" from the menu.

(2) The position data edit window will be displayed. This window has the following controls and fields.

The Position edit range window should appear.

Set the number of the position data to be displayed in the position edit window in the section of 2.

The section of 1 should be displayed when the axes group numbers are divided into two groups.

The position data is to be edited in the unit of axes group.

Select Axes Group No. 1 and No. 2 targeted for edit. (Multiple select available)

Click Edit .
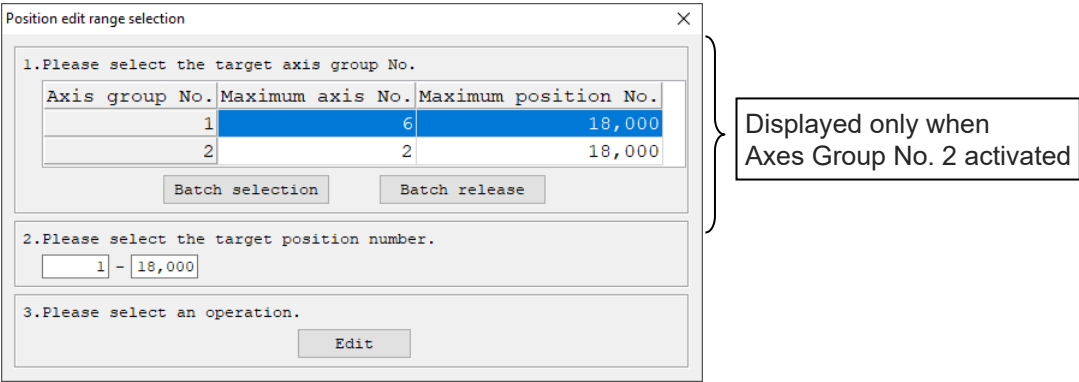
Fig. 6.1 Position edit range selection

1) <u>Position data</u> 2) <u>Common buttons</u> 3) <u>Axis-specific buttons</u> 4) <u>Setting functions</u>
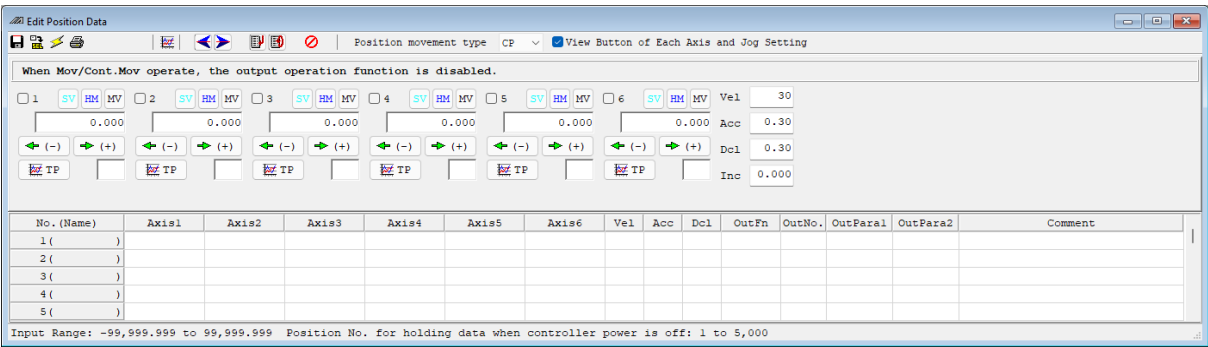
Fig.6.2 Position Data Edit (XSEL2-T)

(Note) Position of synchronized slave axis is not available for edit.

1) Position data

Fig. 6.3 Position Data (XSEL2-T)

1) Position data 2) Common buttons 3) Axis-specific buttons 4) Setting functions 5) Move Setting

6) Switching over Axis Identification Button / Setup Feature / Select Movement Displays
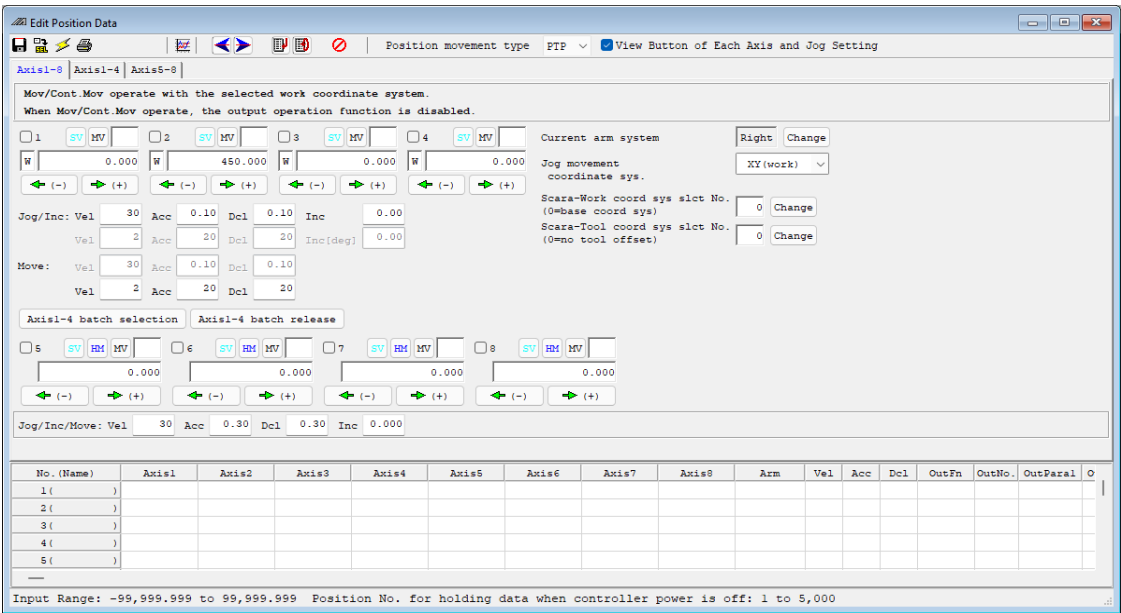
Fig. 6.4 Position Data Edit (XSEL2-TX)

1) Position data

Fig. 6.5 Position data (XSEL2-TX)

No. (Name)

The position number and corresponding symbol are displayed.

You can press the F11 key to open the symbol edit window where you can edit the symbol assigned to the applicable position number. Pressing the F11 key on the symbol edit window will return the input focus to the applicable position data in the edit window.

* You can press the F11 key to return the input focus from the symbol edit window to the position data edit window only when the position data edit window is currently open.

* To show or hide symbols, do so in the Environment Setup window accessible from Tool. (For the switching method, refer to [13. Tool])

Axis1 to 8

Specify each desired position for Axis 1 to Axis 8.

For XSEL2-TX, Axis1 to Axis4 should be indication of a SCARA axis position. Those after Axis5 should be indication of an added axis position.

Arm (It should be displayed for XSEL2-TX)

The target arm system of a SCARA axis should be indicated in Left or Right.

(Note)   The target arm system indication set in this item should be effective in the following operations.

・Move with "Move" button ( ) or "Continuous Move" button ( ) in the Edit Position window (When there is no target arm system set in the position data, operation should be made as "Current Arm System (permit move of opposite arm system when not available)".)

・Servo Operation SEL Command Using Position Data

(Note)   When edit, indication is available by inputting the top letter of the indication format.

[Example] ●Enter "L" → Left

●Enter "R" → Right

Vel

Specify a desired speed.

Available range is from 1 to 9999.

However, for XSEL2-T, All Axes Common Parameter No. 21 "Operation Velocity Max. for Input Check" should be the maximum value in the set value when All Axes Common Parameter No. 20 "Max. Operation Velocity Check Timing" is set to "0".

Acc

Specify a desired acceleration.

Available range is from 0.01 to 9.99.

However, for XSEL2-T, All Axes Common Parameter No. 22 "Acceleration Max." should be the maximum value in the set value when All Axes Common Parameter No. 18 "Max. Operation Acceleration/Deceleration Check Timing" is set to "0".

6. Position Data Edit Window

Dcl

Specify a desired deceleration.

Available range is from 0.01 to 9.99.

However, for XSEL2-T, All Axes Common Parameter No. 23 "Deceleration Max." should be the maximum value in the set value when All Axes Common Parameter No. 18 "Max. Operation Acceleration/Deceleration Check Timing" is set to "0".

Comment

Enter comment, if necessary (using up to 32 single-byte characters/16 double-byte characters).

In the position edit window, clicking "Edit (E)" → "Undo (U)" from the menu can cancel the most recent 10 operations.

Alternatively, pressing $\boxed{\text{Ctrl}}$ + $\boxed{\text{Z}}$ key simultaneously can cancel the operations.

However, the cancel function will become disabled when any of the following operations is performed:

● Transfer of data on the edit window to the controller

● Saving data on the edit window to a file

● Closing of the edit window

When this operation is performed, the warning window in Fig. 6.6 will be displayed.

Clicking $\boxed{\text{Yes}}$ will cancel the operation executed immediately before.
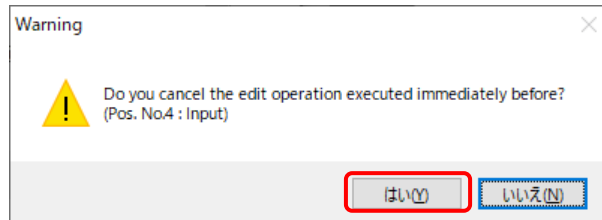
Fig. 6.6 Warning

2) Common buttons
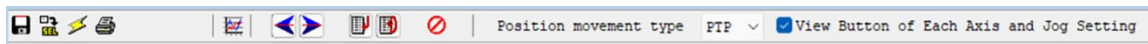
Fig. 6.7 Common Buttons

Save to File

Clicking this button will open a dialog box where you can save the position data to a file under a desired name.

Transfer to Controller

Clicking this button will transfer the position data to the controller.

Refresh Position Data

After a program that rewrites position data has been run, click this button to refresh the position data display.

Print

Clicking this button will print the position data.

Capture Current Position

Clicking this button will capture the current position into the position number corresponding to the cursor [↵] position for all axes indicated by. (The captured position is not yet transferred to the controller.)

For XSEL2-TX, the window in Figure 6.8 should be displayed. Select an axis and arm system to read in the current position and current arm system, and click OK .
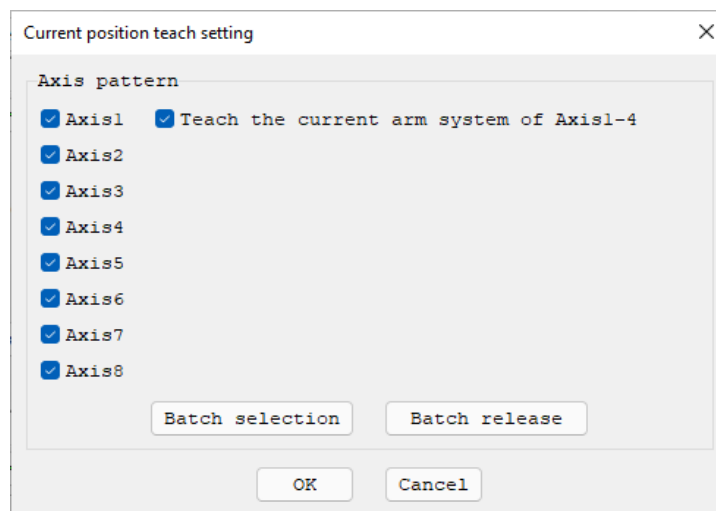
Fig. 6.8 Current Position Load Setting Window

Jog –

The axes specified as the ones to be operated by the common buttons and whose servo is ON will jog backward while this button is pressed. However, indication of a SCARA axis and orthogonal axis at the same time cannot be performed.

Jog +

The axes specified as the ones to be operated by the common buttons and whose servo is ON will jog forward while this button is pressed. However, indication of a SCARA axis and orthogonal axis at the same time cannot be performed.

Move

Clicking this button will move all axes indicated by [↵] to the position of the position number corresponding to the cursor position.

* If there is changed position data, transfer the data to the controller first.

Move Continuously

Clicking this button will move all axes indicated by [↵] to the position of the position corresponding to the cursor position. Thereafter, each axis will continue to move to the position set by the data in next position number.

* If there is changed position data, transfer the data to the controller first.

Stop All Axes

Clicking this button will stop all axes currently moving.

Position Move Type

A move type (PTP move or CP move) can be selected for when a position move is executed. (Display in V15.00.00.00 and later)

☑ View Button of Each Axis and Jog Setting

If a checkmark is placed in the checkbox of this button, the axis-specific button/setting window (Fig. 6.2) will be displayed. If the checkmark is not placed, the position data will only be displayed.

Fig. 6.9 Window of Position Data Only

(3) Axis-specific buttons (Orthogonal axis)

Axis number

The axis you want to move
using the common buttons →

Current position of the selected axis
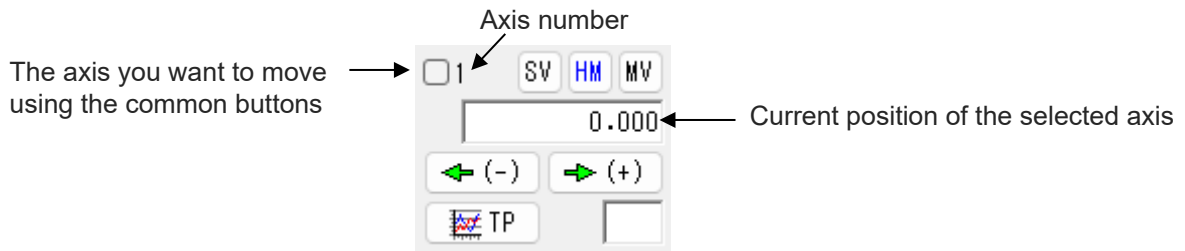
Fig. 6.10 Axis-specific Button (XSEL2-T)

Axis number

Select the axis to be operated
with the common buttons. →

Error code

Current position of
the selected axis
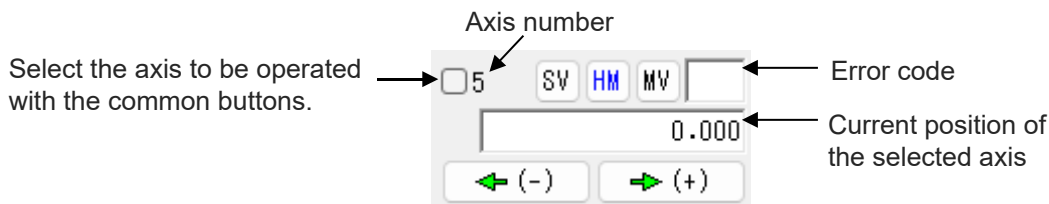
Fig. 6.11 Axis-specific Button (XSEL2-TX)

SV Clicking this button will turn the servo of the selected axis OFF if it is currently ON, or turn the axis servo ON if it is currently OFF.
(The button is text shown in light blue when the servo is ON.)

HM Clicking this button will perform homing if the servo of the selected axis is ON.
(The button is text shown in blue after home return.)
(Note) Axes from Axis 1 to Axis 4 of the XSEL2-TX should not be displayed.

MV Clicking this button will move the selected axis to the position specified by the data in the position number corresponding to the cursor position, if the axis servo is ON.
(The button text remains yellow while the axis is moving.)

(+) The selected axis will jog forward while this button is clicked, if the axis servo is ON.
If a value (0.001 to 1) is entered in the Inc. field in the setting function group, the axis will perform inching. In this case, one click will move the axis by one inching distance.

(−) The selected axis will jog backward while this button is clicked, if the axis servo is ON.
If a value (0.001 to 1) is entered in the Inc. field in the setting function group, the axis will perform inching. In this case, one click will move the axis by one inching distance.

TP Clicking this button will capture the current position of the selected axis into the position number corresponding to the cursor position.
(It is not transferred to the controller.)
(Note) In the case of the XSEL2-TX, there is no "TP" button.
To load the current position, click the current position load button ( ) among the common buttons in (2) and (3).

6. Position Data Edit Window

(3) Axis-specific buttons (SCARA axis)
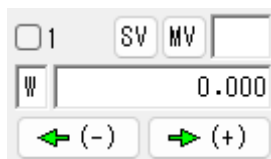
fig. 6.12 Axis-specific Button (SCARA axis)

SV Clicking a button of any SCARA axis can turn the servo on/off for all the SCARA axes. (The letters on the buttons should turn into light blue when the servo gets turned on.)
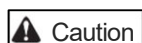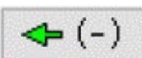
⚠ Caution Click this button, and the servo on all the SCARA axes should turn on when the servo on the axes are off, and the servo on all the SCARA axes should turn off when the servo is on.

MV Clicking this button will move the selected axis to the position specified by the data in the position number corresponding to the cursor position, if the axis servo is ON. (The button text remains yellow while the axis is moving.)

➡ (+) The selected axis will jog forward while this button is clicked, if the axis servo is ON. If a value (0.001 to 1) is entered in the Inc. field in the setting function group, the axis will perform inching. In this case, one click will move the axis by one inching distance.

⬅ (-) The selected axis will jog backward while this button is clicked, if the axis servo is ON. If a value (0.001 to 1) is entered in the Inc. field in the setting function group, the axis will perform inching. In this case, one click will move the axis by one inching distance.

(4) Setting functions (Orthogonal axis)

Vel[mm/sec]	30
Acc[G]	0.30
Dcl[G]	0.30
Inc[mm]	0.000

Fig. 6.13
Settings of Velocity,
Acceleration,
Deceleration and
Inching Distance
(XSEL2-T)

Set the velocity (Vel), acceleration (Acc), deceleration (Dcl) and inching distance (Inc.) to be used when the actuator is operated using the various buttons. If a value is entered in any of the Vel, Acc and Dcl fields in the position data area, the value in the applicable position data field will be given priority for movement to the corresponding position number.

The maximum settings for Vel (Velocity), Acc (Acceleration) and Dcl (Deceleration) are as stated below:

- Velocity: 250mm/sec
- Acceleration: All Axes Common Parameter No.22
- Deceleration: All Axes Common Parameter No.23

Jog/Inc/Move: Vel[mm/sec] 30 Acc[G] 0.30 Dcl[G] 0.30 Inc[mm] 0.00

Fig. 6.14 Setting functions（Axis 5 to Axis 8 of the XSEL2-TX）
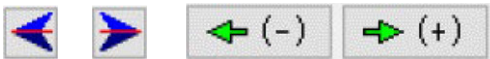
Fig. 6.15 Jog Buttons

These jog buttons can also be used to jog those axes that have not yet completed homing. However, coordinate values have no meaning for these axes, so pay due attention to avoid contact with the stroke end. If a value (0.001 to 1) is entered in the Inc. field in the setting function group, the jog buttons will function as inching buttons.

Continue to click an inching button will change the operation to jogging. Specifically, the axis will start jogging approx. 1.6 second after the inching button is clicked. If the button is held continuously, the jogging velocity will change approx. every second thereafter in the order of $1 \rightarrow 10 \rightarrow 30 \rightarrow 50 \rightarrow 100$ [mm/s].

⚠ Caution

- Operating any selectable jog button for an operating axis will jog the axis, and the axis will stop once the button is released. (If the next operation command is input, the axis will perform the specified operation.)

---

(4) Setting functions (SCARA axis)

Fig. 6.16 Settings of Velocity, Acceleration, Deceleration and Inching Distance (XSEL2-TX)

Set the velocity (Vel), acceleration (Acc), deceleration (Dcl) and inching distance (Inc.) to be used when the actuator is operated using the various buttons. Set it up for both the jog/inching (Jog/Inc) and the position indication move (Move).
There are two types of set units for Vel, Acc, Dcl and Inc.

For Jog/Inching（Jog/Inc）

Vel [mm/sec] , Acc [G], Dcl [G], Inc [mm]
It should be enabled when the jog move coordinate system is set to the XY (workpiece) coordinate system or XY (tool) coordinate system.
Vel [%], Acc [%], Dcl [%], Inc [deg]
It should be enabled when the jog move coordinate system is set to each axis system.

For Position indication move（Move）

Vel [mm/sec], Acc [G], Dcl [G]
It should be enabled when the position move type is set to CP.
Vel [%], Acc [%], Dcl [%]
It should be enabled when the position move type is set to PTP.

The maximum set value of Vel [mm/sec], Acc [G] and Dcl [G] should be as follows. (In common for jog/inching and position indication move)
● Velocity: 250mm/sec
● Acceleration: Robot Parameter No.22
● Deceleration: Robot Parameter No.23

The maximum set value of Vel [%], Acc [%] and Dcl [%] should be as follows. (In common for jog/inching and position indication move)
● Velocity: Robot parameter No.35
● Acceleration:100%
● Deceleration:100%

(5) Movement Selection

Establish the setting for [Current Arm System], [Jog Movement Coordinate System], [SCARA Work Coordinate System Select No.] and [SCARA Tool Coordinate System Select No.] in each button.

Fig. 6.17 Selection of Current Arm system and Each Coordinate System

Current arm system

Arm system can be changed by clicking Change .

Fig. 6.18 Current Arm system

⚠ Caution

● When a change of the arm system is made to an axis in stop, the arm may operate.

Jog movement coordinate sys.

The coordinate system can be changed by clicking ▼

XY (work) coordinate system (Can be offset using Work Coordinate System Selection No.)

XY (tool) coordinate system

Each axis coordinate system

Fig. 6.19 Jog movement coordinate sys.

SCARA-Work coord sys slct No.

A desired work coordinate system No. can be selected by clicking Change .

Fig. 6.20 SCARA Work coord sys slct No.

SCARA-Tool coord sys slct No.

A desired tool coordinate system No. can be selected by clicking Change .

Fig. 6.21 SCARA Tool coord sys slct No.

6. Position Data Edit Window

(6) Axis-specific button/setting function/movement selection display axis switching
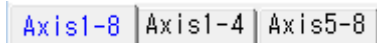
Fig. 6.22 Axis-specific Button/Setting Function/Movement Selection Display Axis Switching

Switch the axes displayed in the axis-specific button, setting function and movement selection areas.

Axis1-8: Display the axis-specific buttons, setting functions and movement selections of all effective axes.

Axis1-4: It should display the axis-specific buttons, setting functions and movement selections only for the SCARA axis (Axis 1 to 4).

(This item is displayed only when the SCARA axis (Axis 1 to 4) is an activated axis.)

Axis5-8: It should display the axis-specific buttons, setting functions and movement selections only for the Orthogonal axis (Axis 5 to 8).

(This item is displayed only when Axis 5 or later is an activated axis in the XSEL2-TX.)

(7) Position output operation data

Fig. 6.23 Position Output Operation Data

OutFn

Set the output function code.

There are two ways to establish setting. Without setting, the output operation will be invalid.

1) Bring the cursor to the setting position and click to show the output function code list. Select in the list from ON, OFF, etc.

2) Input a number from 1 to 6 that is applicable as an output function from the table below. As shown below, the display will be ON if "1" is selected for example.

Output Function Code	Numerical Setting	Display
Turns ON after movement	1	ON
Turns OFF after movement	2	OFF
Turns ON after passed specified distance	3	OND
Turns OFF after passed specified distance	4	OFFD
Turns ON after passed specified ratio	5	ONR
Turns OFF after passed specified ratio	6	OFFR

[Output Function Code]

● Turns ON/OFF after movement:

It turns ON/OFF the specified output ports and flags after moved to the applicable position.

● Turns ON/OFF after passed specified distance:

It turns ON/OFF the output ports and flags at the position where proceeded from the movement start position for the distance specified in Function Parameter 1 during movement to the applicable position.

● Turns ON/OFF after passed specified ratio:

It turns ON/OFF the output ports and flags at the position where proceeded from the movement start position for the ratio specified in Function Parameter 1 to the whole movement mount during movement to the applicable position.

OutNo.

Set the output ports and flags applicable for operation.

OutPara1

Set the parameters defined for each output function.

OutPara2

One-shot pulse will be output if output pulse timer time is set.

Settings for Each Output Function

Output Function Code Name	Function Parameter 1	Function Parameter 2
Turns ON after movement	Output Delay Timer Time (0.000 to 999.999 second)	Output Pulse Timer Time (0.000 to 999.999 second)
Turns OFF after movement		
Turns ON after passed specified distance	Output Operation Specified Distance (0.000 to 9999.999mm)	Output Pulse Timer Time (0.000 to 999.999 second)
Turns OFF after passed specified distance		
Turns ON after passed specified ratio	Output Operation Specified Ratio (0.000 to 100.000%)	Output Pulse Timer Time (0.000 to 999.999 second)
Turns OFF after passed specified ratio		

⊙ Display of Output Port

Output port can be displayed on position edit window.

To show the display, it is necessary to establish the following parameter settings.

I/O Parameter	Name	Setting Details
No.74	Number of Use of PC/TP User Output Ports (such as hand)	Set the number of output ports to be displayed on the position edit window.
No.75	PC/TP User Output Port Start Number (such as hand)	Set the output port start number. With this number as the start number, ports are displayed in a row for the number set in No. 74. (Note) The display will not be shown if a number out of the output ports is set. An error will also not be shown.

(Note) Virtual output port number can be set in No. 75 to show on the display.
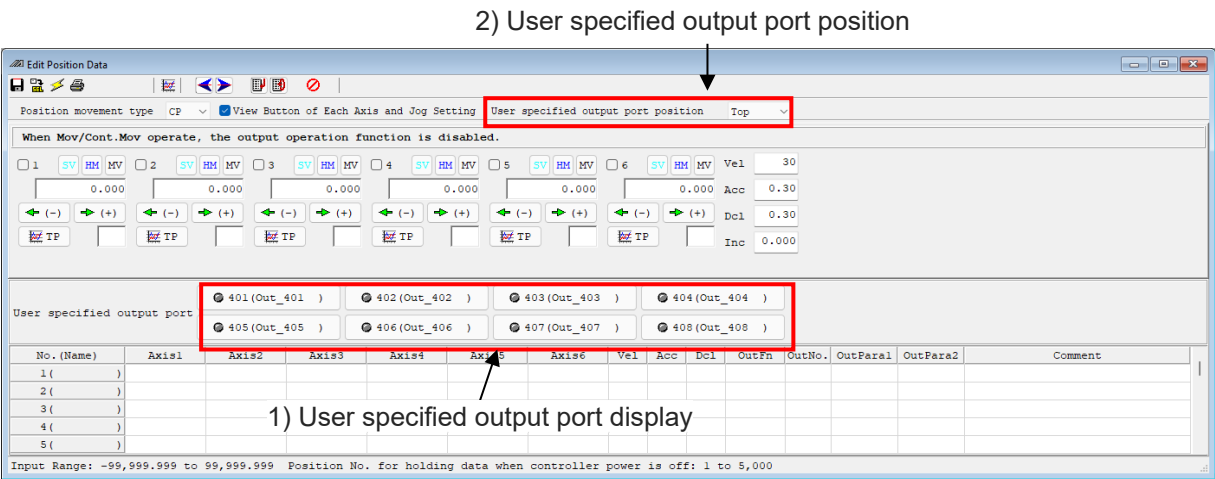
Fig. 6.24 User Specified Output Port Display

1) User Indicated Output Port Display

It shows the user indicated output port. It displays on the position edit window the same condition as 1 (ON) and 0 (OFF) displayed on the monitor output port window.

It is on when the light is ON, and OFF when the light is off.

When a check mark is put to the following in the configuration of the tool, not only the output ports such as 300, but also the symbols defined in the symbol edit window will be displayed.

● Display symbol names to variable monitor, I/O port monitor, flag monitor and position edit window.

Refer to [9. Symbol Edit and 13. Tools].

2) User Specified Output Port Position

You can choose where around the position data you would like to display the user indicated output port.

Selection can be made from "Top", "Bottom", "Left" and "Right".

Also, by selecting "None", display can be disappeared.

6. Position Data Edit Window

6.2 Saving Position Data, Transferring and Closing the Edit Window

6.2.1 Saving a Position Online, Transferring and Closing the Edit Window

[1] Saving to a file the position data you are editing

Click Save to File in the position edit window.

This is the same as clicking "File (S)"→ " Save As (A)"

After clicking Save to File , File Save Select window will be displayed.

When Axes Group No. 2 is activated, the position data in Axes Group No. 1 and 2 can be saved in one file.

When Axes Group No. 2 is activated, select "Position (O)" → "Save to File (S)" in the menu and the window shown below should appear.

Position data save			✕
1.Please select a position saving range.			
Axis group No.	Maximum axis No.	Maximum position No.	
1	6	18,000	
2	2	18,000	
Save position data of all axis groups			
Save position data of specified axis group			
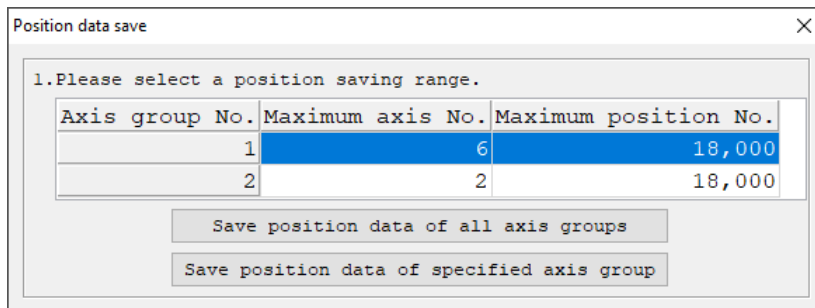
Fig. 6.25 Position data save

"Save position data of all axis groups"

The position data in Axes Group No. 1 and 2 should be saved in one file at once.

"Save position data of specified axis group"

An individual position data file of the axes group number selected in 1. should be saved.

6. Position Data Edit Window

If you open the consolidated saved file, the window shown below should come out.

Fig. 6.26 Batch selection

| Transfer to Controller |

The position data of the axes group number selected in 1. should be transferred to the controller.

The transfer position range is to be set in Window 1..

| Read |

The axes group number selected in 1. can be read in and the position edit window (offline edit) can be displayed.

| Print |
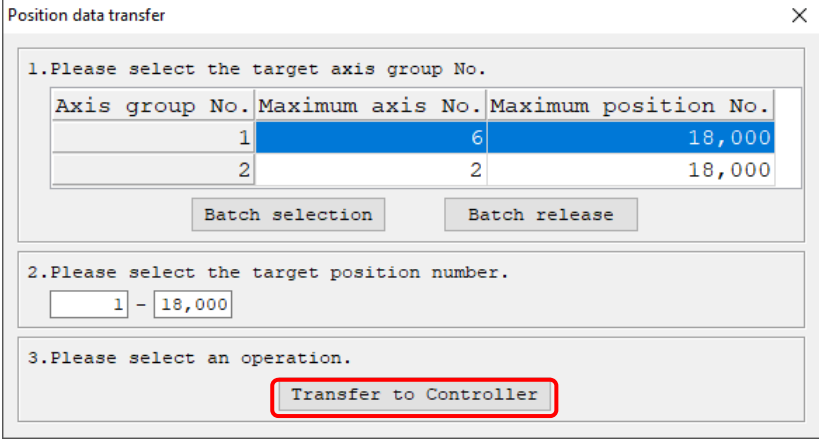
The axes group number selected in 1. can be printed out.

* Multiple axes group numbers can be selected.

Click | Select All | and all the axes groups displayed in the window can be selected.

Click | Release All | and the select of all the axes groups displayed in the window can be released.

Click Transfer to Controller in the position edit window (offline edit), and the window shown below should come up.

Fig. 6.27 Position data transfer

Set the axes group number to transfer the data to in 1. and set the position number range to transfer in 2., and click Transfer to Controller .

[2] Transferring to the controller the position data you are editing

Click │Transfer to Controller│ in the position edit window.

The position data you are editing will be saved to the controller's memory.

This button is selectable only in the online edit mode.

⊙ Error/warning display before data transfer

When transferring position data to the controller, the position data to be transferred is checked for problems and if any of the data cannot be transferred (due to excessive speed, acceleration, deceleration, etc.), applicable errors/warnings are displayed in a list.
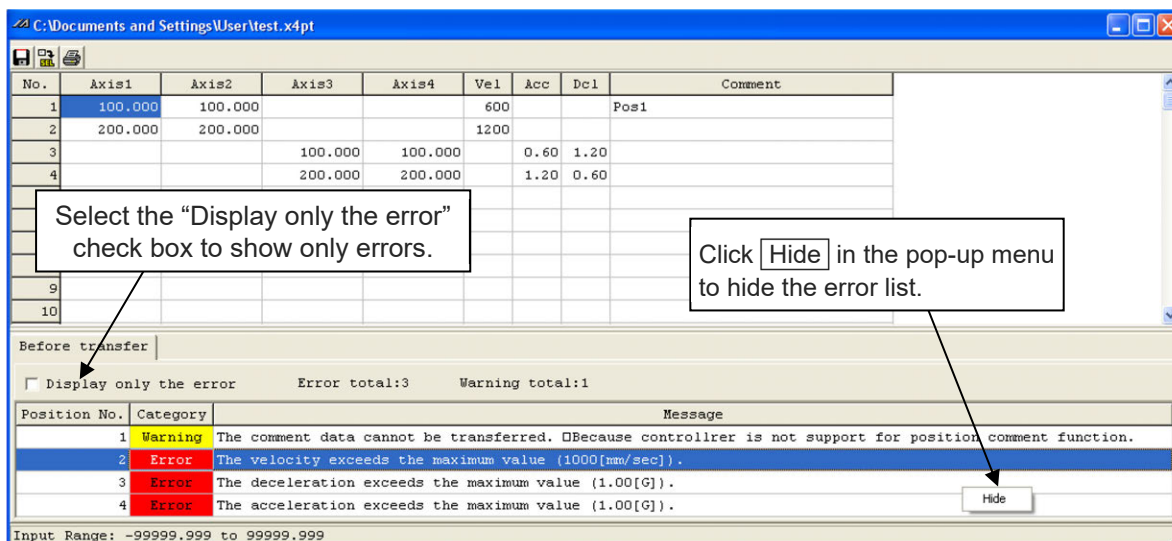
Fig. 6.28 Position Data Error List

If an error is found in the position data to be transferred, the position data will not be transferred.

If the position data to be transferred only generates a warning, the warning window appears.

Fig. 6.29 Warning Window

Click │Yes│ to transfer the position data.

Click │No│ to cancel the transfer of position data.

(Note) The maximum number of errors/warnings displayed in the position data error list is set on the Environment Setup window. Refer to [13. Tool Environment Setup Window].

[3] Writing to the flash ROM

Once the position has been transferred to the controller, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
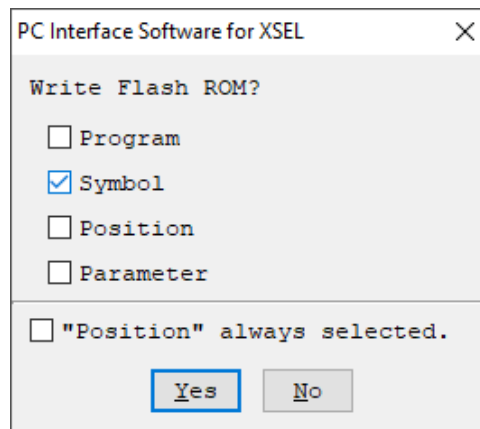
Fig. 6.30 Confirmation

Click and select a desired item (Position, etc.) to write to the flash ROM.

Click $\boxed{\text{Yes}}$ → The memory data will be written to the flash ROM.

Click $\boxed{\text{No}}$ → The memory data will not be written to the flash ROM.

Comment data for Position No. 10001 and later also can be transferred.

However, the number of the position comments available to save is 10000 for the total of all the axes groups.

The number of position comments available to transfer can be confirmed in the main window.
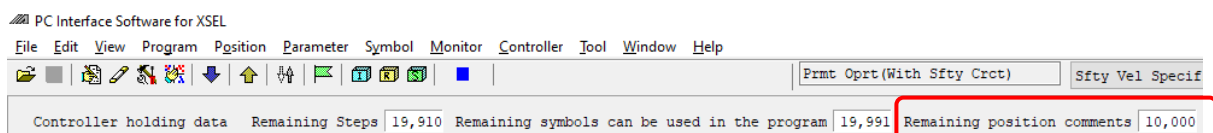
Fig. 6.31 Display for Number of Remaining Position Comments

6. Position Data Edit Window

[4] Closing the position data edit window

Attempting to close the program edit window will display the following confirmation dialog box with the message, "Data will be transmitted to the controller, Are you sure to continue?"

Fig. 6.32 Confirmation

Yes	The edited data will be transferred to the controller → (3) Writing to the flash ROM.
No	The software will close the point edit window without saving the edited data.
Cancel	The software will cancel the operation and return to the position edit window.

6. Position Data Edit Window

6.2.2　Transferring a Position Created Offline

A position created offline can be transferred to a controller by following the steps below.

(1)　Select "File (F)"→ "Open (O)" from the menu.
　　　In the window of "Open File", select a position created offline and open it.

(2)　If a controller is connected, Controller Transfer button ⊞ gets activated once the position is opened.
　　　Press Controller Transfer button ⊞ , the position gets transferred to the controller.

No.	Axis1	Axis2	Vel	Acc	Dcl	OutFn	OutNo.	OutPara1	OutPara2	Comment
1	10.000	50.000								
2	100.000	150.000								
3										
4										
5										
6										
7										
8										
9										
10										

Input Range: -99,999.999 to 99,999.999
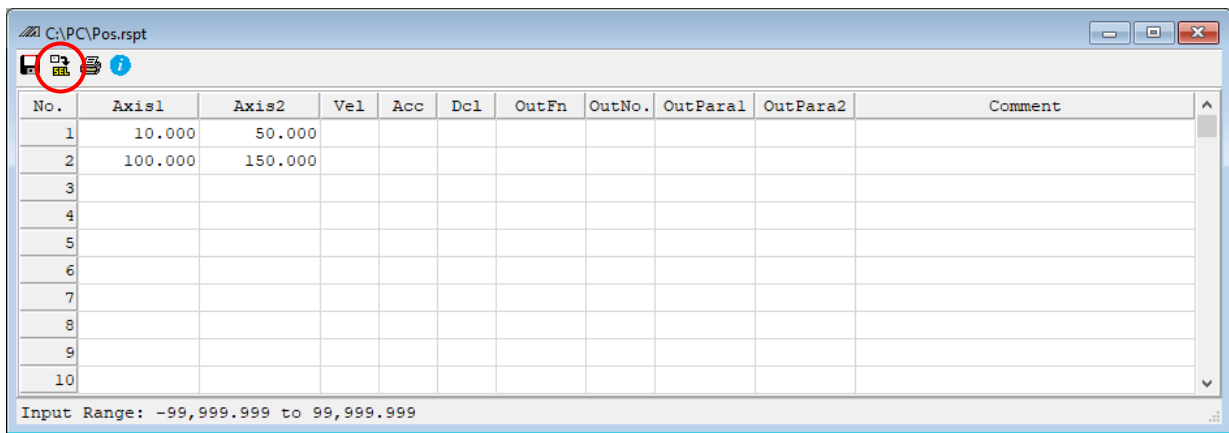
Fig. 6.33 Position Edit Window

(3)　A confirmation window asking if it is okay to transfer the data to the controller will appear.
　　　Press Yes .

Confirmation

Data will be transmitted to the controller.
Are you sure to continue?

Yes　　No
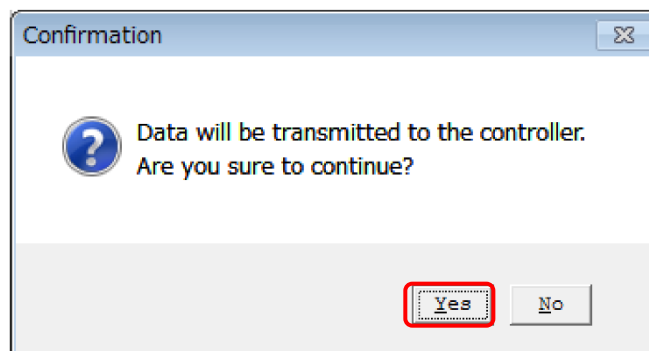
Fig. 6.34 Confirmation Window

6. Position Data Edit Window

(4) Next, a window to select the position number for destination will be shown.
Select the axes group number and also numbers to indicate transfer from what number to what number of the positions to be performed.
Press OK .
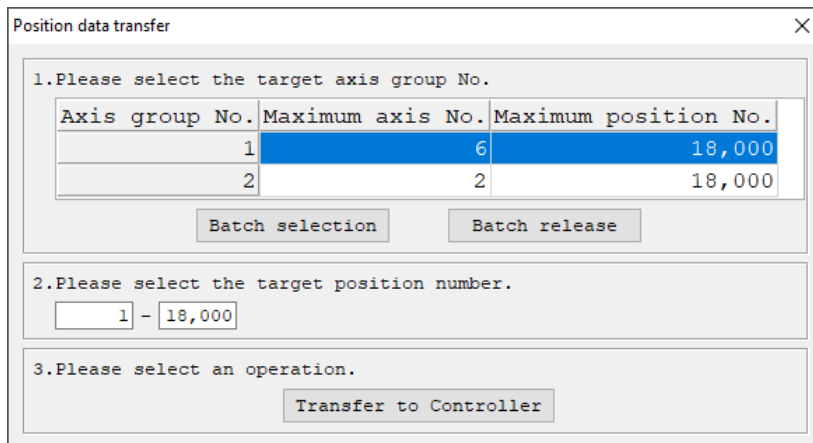
Fig. 6.35 Position No. Select

(5) A confirmation window stating "Write Flash ROM?" will appear.
Press Yes .
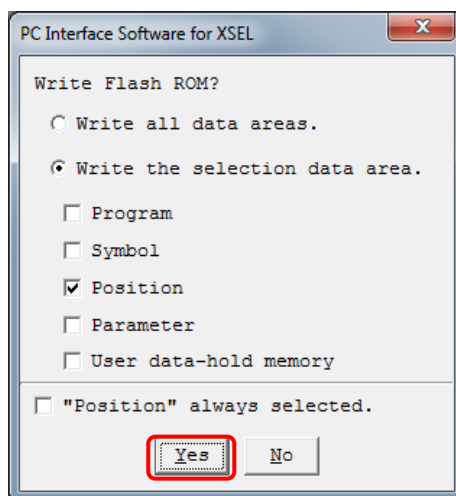
Fig. 6.36 Confirmation Window

(6) The position will be transferred to the controller.
Also, flash ROM writing will be conducted, and the display below flashes during writing.
The display will disappear once writing is complete.
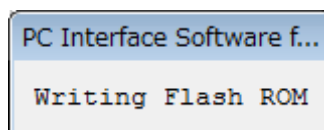
Fig. 6.37 Writing Flash ROM Window

XSEL2

Chapter 7
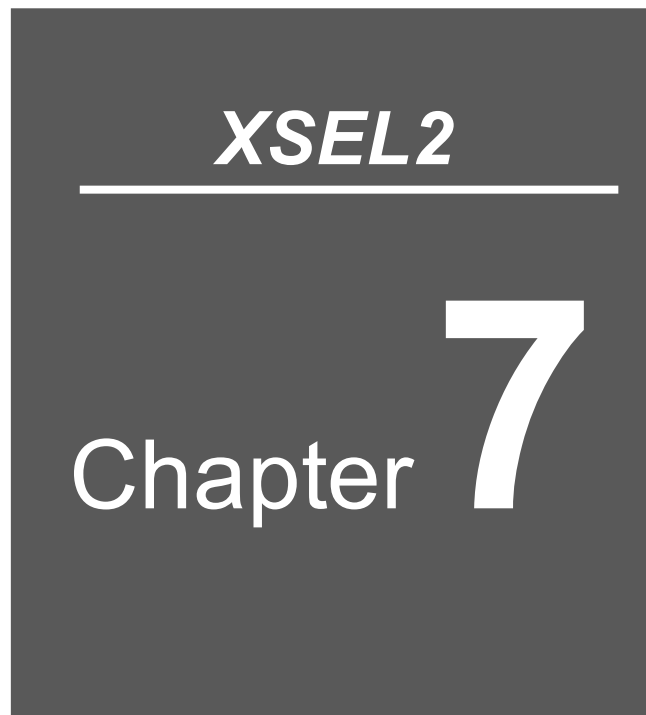
Copying/Moving/Clearing Position Data

7.1 Copying/Moving Position Data Window

(1) Select "Position (O)" → "Copy/Move (C)" from the menu.

(2) The position data copy/move window will be displayed.

Specify the Top No. and the last No. of the Copy/Move source, and specify the Top No. of the Copy/Move destination.

Copying position data: Click Copy .

The positions specified in Source to Copy/Move will be copied to the positions specified in Destination to Copy/Move.

Moving position data: Click Move .

The positions specified in Source to Copy/Move will move to the positions specified in Destination to Copy/Move.
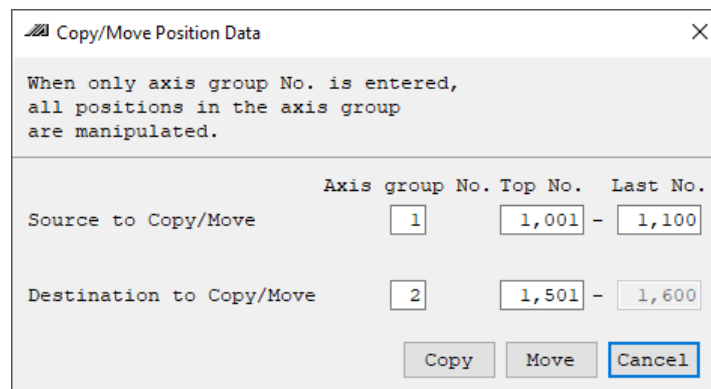
Fig. 7.1 Position Data Copy/Move

* Clicking Cancel will cancel the selected operation.

(3) Writing to the flash ROM

When the copy or move is completed, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
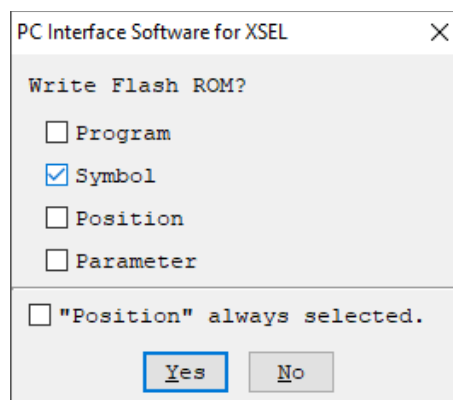
Fig. 7.2 Confirmation

Click and select a desired item (Position, etc.) to write to the flash ROM.

Click Yes → The memory data will be written to the flash ROM.

Click No → The memory data will not be written to the flash ROM.

7. Copying/Moving/Clearing Position Data

7.2 Clearing Position Data

(1) Select "Position (O)" → "Clear (L)" from the menu.

(2) The position data clear window will be displayed.
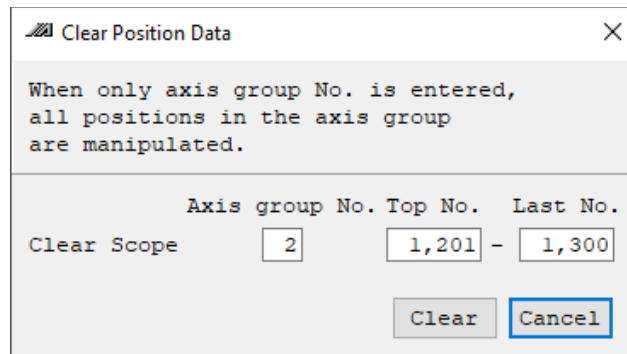
Fig. 7.3 Clear Position Data

Input the first number and the last number of the position data to be deleted.

Then, click Clear .

Clicking Cancel will cancel the operation.

(3) Writing to the flash ROM

When the clear is completed, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
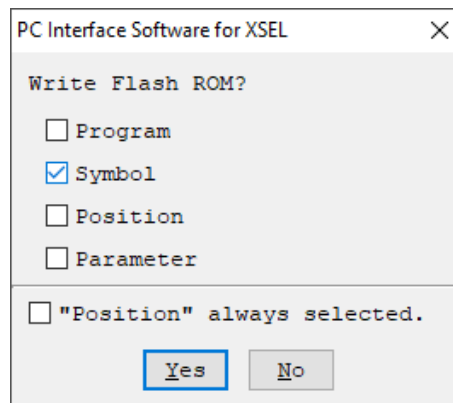
Fig. 7.4 Confirmation

Click and select a desired item (Position, etc.) to write to the flash ROM.

Click Yes → The memory data will be written to the flash ROM.
Click No → The memory data will not be written to the flash ROM.

XSEL2

Chapter **8**
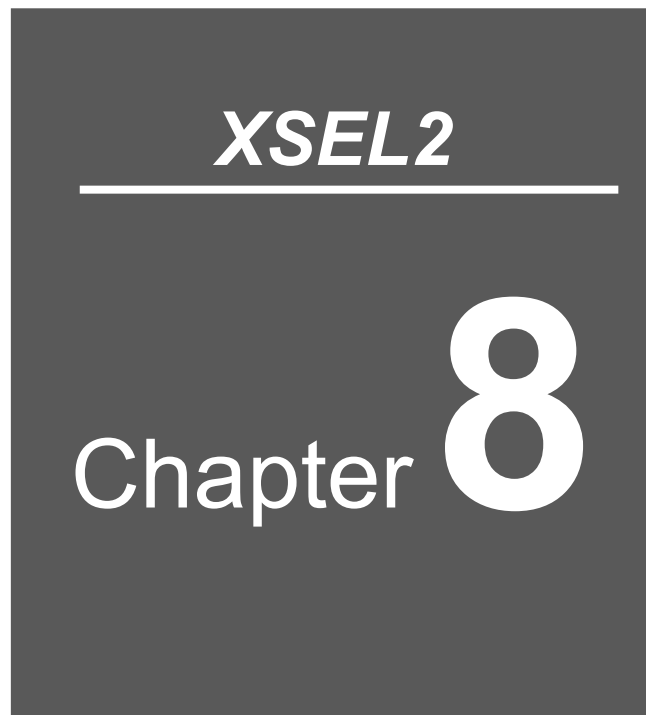
Parameter Edit Window

8.1 Explanation of the Parameter Edit Window

(1)   Select "Parameter (P)" → "Edit (E)" from the menu.

(2)   The parameter edit window will be displayed.

You can select a desired parameter and change the value.

Values that are grayed out are read-only and cannot be changed.

　　　Save to File

Clicking this button will open a dialog box where you can save the parameter data to a file under a desired name.

　　　Transfer to Controller

Clicking this button will transfer the parameter data to the controller.

　　　Print

Clicking this button will print the parameter data.

Easy Parameter Setup

Clicking this button and you can conduct Easy Parameter Setup.
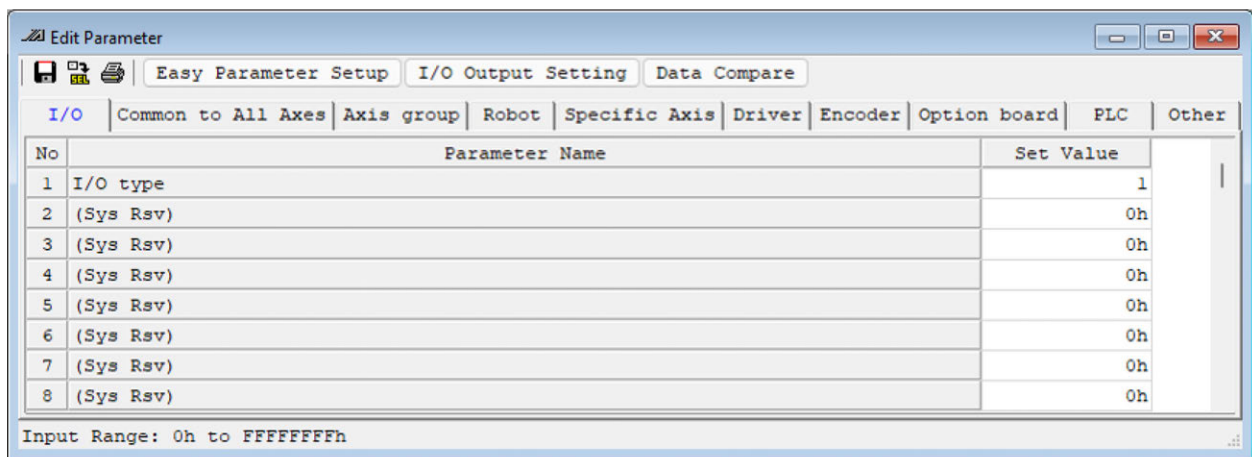
Fig. 8.1 Parameter Edit

* The above window shows axis group parameters. You can display other parameters by clicking each items.

<div style="writing-mode: vertical">8. Parameter Edit Window</div>

In the parameter edit window, clicking "Edit (E)" → "Undo (U)" from the menu can cancel up to the most recent 10 input operations.

Alternatively, pressing $\boxed{\text{Ctrl}}$ + $\boxed{\text{Z}}$ key simultaneously can cancel the operations.

However, the cancel function will become disabled when any of the following operations is performed:

● Transfer of data on the edit window to the controller

● Saving data on the edit window to a file

● Closing of the edit window

When this operation is performed, the warning window in Fig. 8.2 will be displayed.

Clicking $\boxed{\text{Yes}}$ will cancel the operation executed immediately before.
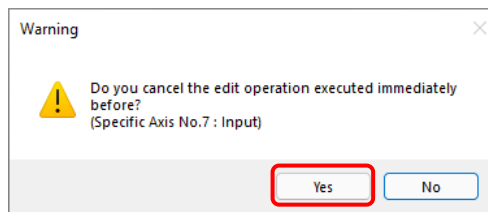
Fig. 8.2 Warning

8.2   Saving Parameter Data and Closing the Edit Window

(1)   Saving to a file the parameter data you are editing
Click $\boxed{\text{Save As}}$ in the parameter edit window.
This is the same as "Clicking File (F)" → "Save As (A)".

(2)   Transferring to the controller the parameter data you are editing
You can save the parameter data you are editing to the controller's memory.
Click $\boxed{\text{Transfer to Controller}}$ in the parameter edit window.

(3)   Writing to the flash ROM
Once the parameter has been transferred to the controller, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.

PC Interface Software for XSEL   ✕

Write Flash ROM?
   ☐ Program
   ☑ Symbol
   ☐ Position
   ☐ Parameter
☐ "Position" always selected.
      Yes   No
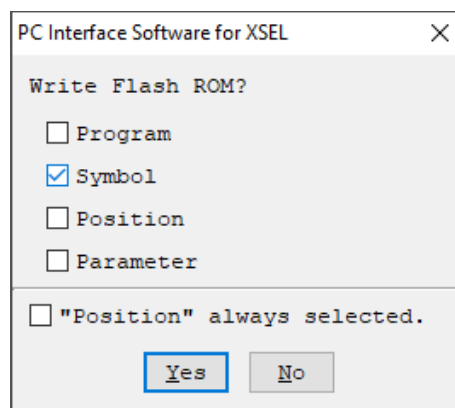
Fig. 8.3 Confirmation

Click and select a desired item (Parameter, etc.) to write to the flash ROM.

Click $\boxed{\text{Yes}}$ →   The memory data will be written to the flash ROM.

Click $\boxed{\text{No}}$ →   The memory data will not be written to the flash ROM.
If No is selected, the controller will clear all data in its memory after a reset (i.e., after the controller power is reconnected or a software reset is executed), and then load the data from the flash ROM.

8. Parameter Edit Window

(4)   Restarting the controller (software reset)

After the data has been written to the flash ROM, the following confirmation dialog box with the message, "Restart the controller?" will be displayed.

| Yes | The new parameters will become effective. |

| No | The new parameters will not become effective. |

The parameters will become effective after the controller is restarted (software reset) or the controller power is reconnected.

Fig. 8.4 Confirmation

(5)   Closing the parameter edit window

Attempting to close the parameter edit window will display the following confirmation dialog box with the message, "Save edited data in the Controller?"

Fig. 8.5 Confirmation

| Yes | The edited data will be transferred to the controller → (3) Writing to the flash ROM. |

| No | The software will close the parameter edit window without saving the edited data. |

| Cancel | The software will not close and go back to the parameter edit window. |

● The user of the PC software is recommended to back up the parameters when the controller is delivered and also when the system into which the controller has been assembled is started.

*   There are many customizable parameters. It is recommended that you back up the parameters frequently just like you do the programs.

8.3 Transferring a Parameter File

Pay attention to parameter categories when transferring parameter data files to the controller.
The controller is shipped with its axis-related parameters set, for each axis number, to values appropriate for the type of the robot connected.
The axis-specific related parameters are Each axis / Driver / Encoder.
Exercise caution when using an existing file containing customized parameters.

⚠ **Caution**

● If parameter data is lost during parameter writing to the flash ROM due to main power OFF or any other factor, all parameters will be rewritten to initial values.

8.3.1 Selecting Categories of Parameters to Be Transferred

(1) Select "File" → "Open" from the menu or click Open File and select the parameter file you want to transfer to the controller. Load the file into the PC software and open the parameter edit window.

(2) Click Transfer to Controller in the parameter edit window.

(3) The Select Parameter Category window (Fig. 8.6) will be displayed.
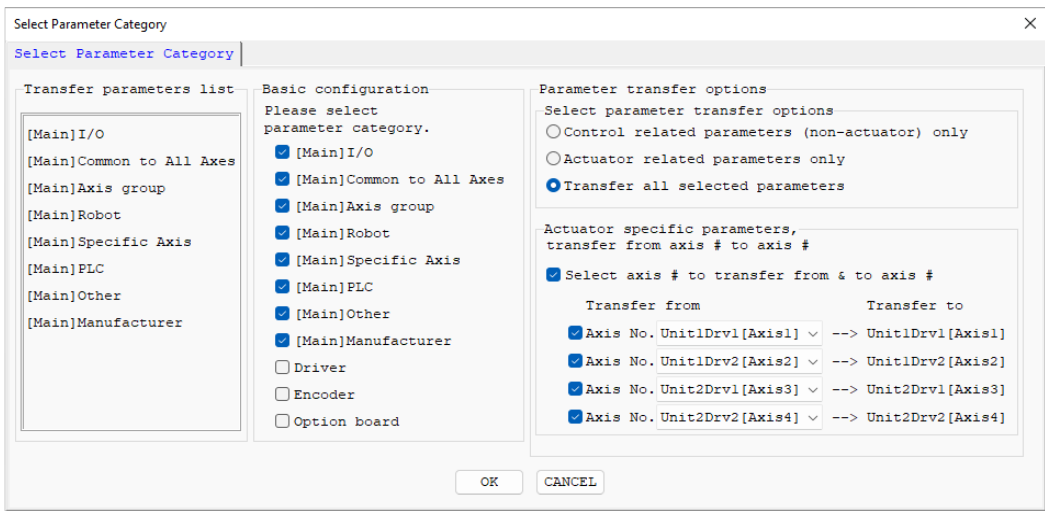
Fig. 8.6 Select Parameter Category window (XSEL2-T)

8. Parameter Edit Window
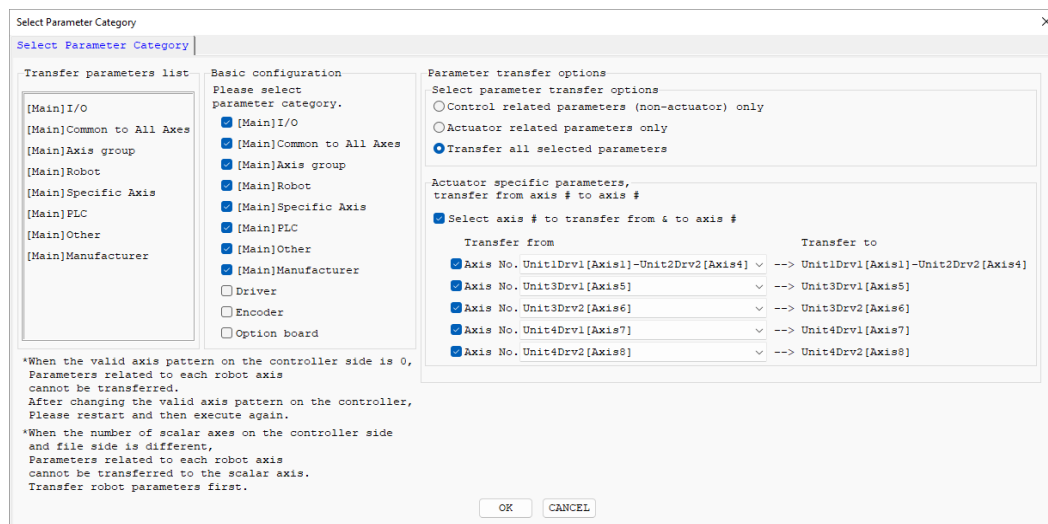
Fig. 8.7 Select Parameter Category window (XSEL2-TX)

1) Transferred Parameter List

By selecting (2) to (4) below, the parameters to be transferred to a controller should be displayed.

Make sure that you confirm the parameter type to be transferred before pressing OK .

2) Basic configuration

Click the checkbox corresponding to each category of parameters you want to transfer (the clicked checkbox will be selected).

Only the parameters of the selected category or categories will be transferred to the controller.

3) Parameter transfer options - Selecting parameter transfer options

Selection whether to transfer parameters related to each axis of a robot only, or to transfer parameters other than those related to each axis of a robot only, to transfer all the selected parameters in the parameters selected in Basic configration should be made.

Parameters would not be transferred in the following cases, and a warning message stating "Parameters cannot be transferred." should be shown.

- When "Actuator related parameters only" is selected in
  Parameter transfer options - Selecting parameter transfer options
  is selected while nothing is selected in the parameters related to each axis of robot (axis type, driver, encoder) in Basic configration .

- When "Control related parameters (non-actuator) only" is selected in
  Parameter transfer options - Selecting parameter transfer options
  is selected while nothing is selected in the parameters not related to each axis of robot in
  Basic Setup .

4) ☐ Detail Setup ☐ - ☐ Actuator specific parameter, transfer from axis # to axis # ☐

Parameters related to each axis for a file at the origin of transfer can be indicated and transferred individually for each axis number to the destination controller.

Put a checkmark in [☐ Indicate Origin / Destination of Transfer].

Put a checkmark in the checkbox at the destination axis number to indicate the destination axis number.

It should be in order of the driver slots on the controller side from the top. A checkmark should not be put to a checkbox of an axis number of the controller that should not receive transfer.

Indicate the axis number at the origin of transfer for the parameter related to each axis of the file to the box for the axis number at origin of transfer.

Shown in the figure below is an example of indication to transfer;

Axis2 data in file to Axis1 in controller,

Axis1 data in file to Axis2 in controller, and

Axis3 data in file to Axis4 in controller

(Not to be transferred to Axis3 in controller)

Fig. 8.8 Actuator specific parameter, transfer from axis # to axis #

(Note) Do not put a checkmark to "☐ Indicate Origin / Destination of Transfer" when transferring parameters related to each axis for all the axes without making any change to the axis number (All axes as are) or when parameters related to each axis are not to be transferred. A checkmark should not be put in usual case.

Also, the electric circuit in a controller should differ depending on the connected robots for each axis. Making a change to configuration of axes only with parameter changes could cause a failure or error.

(Note) For the XSEL2-TX controller, axes from Axis1 to Axis4 (or Axis3) applicable for SCARA should be indicated simultaneously. They cannot be indicated individually. Also, an axis number cannot be selected.

For the origin of transfer for the axes from Axis5 to Axis8 applicable for the cartesian axes in XSEL2-TX, from Axis5 to Axis8 should be available for selection.

(Note) If the number of axes on the controller side and the file side differ to each other when IXA SCARA Robot (3-axis specification or 4-axis specification) is used, parameters related to each axis should not be able to be transferred.

(4) Write the parameters to the controller according to steps 8.2 3) to 5).

8.4   Easy Parameter Setup

(1)   Click ⬚Easy Parameter Setup⬚ in Edit Parameter window.
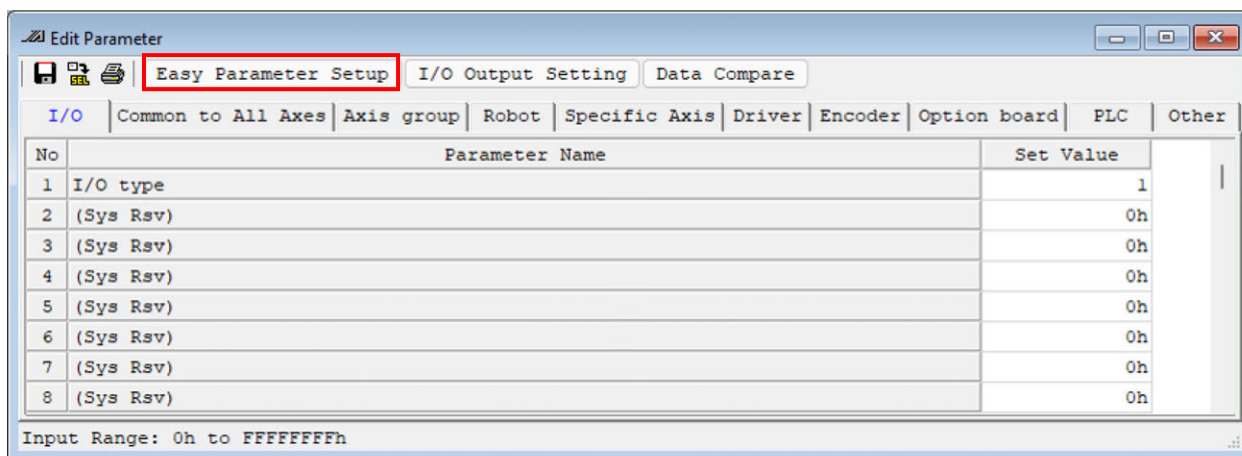Or, select "Parameter" → "Easy Parameter Setup" from the menu.
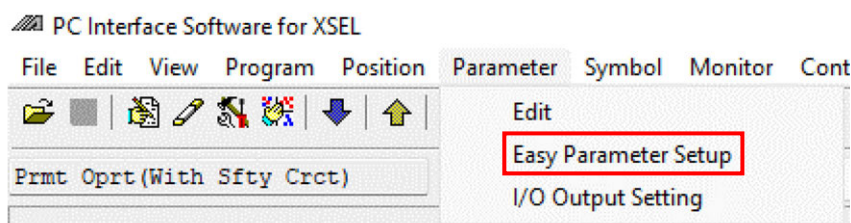
Fig. 8.9 Edit Parameter Window

Fig. 8.10 Menu Command

(2)   The top menu of Easy Parameter Setup appears.
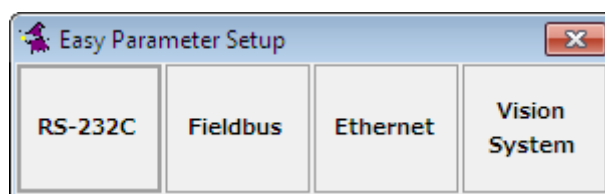Click on a button for a function of which you would like to set up or change the parameter.

Fig. 8.11 Easy Parameter Setup Top Menu

(Note) ⬚Fieldbus⬚ may be replaced with a network name that is equipped to a controller.

(3)   For example, if you click RS-232C, the setup window for RS-232C will appear.
       Set up or change the parameters.
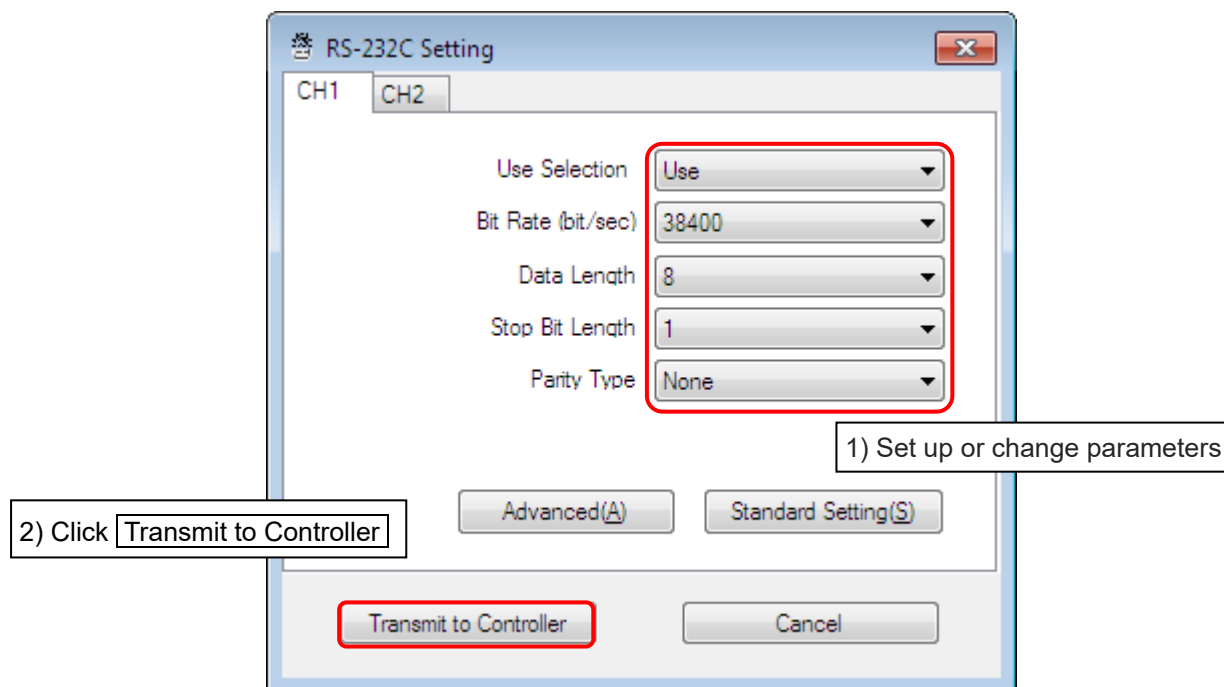
Fig. 8.12 Example for Setup Window (RS-232C)

(4)   After setting up or changing the parameters, click Transmit to Controller and the setup
       change data gets transmitted to the controller and the setup window closes.
       Once the setup window is finished, close the top menu of Easy Parameter Setup window, and
       the confirmation for flash ROM writing of parameters will be displayed. Once the flash ROM
       writing is complete, the controller will get rebooted.
       (Note) Transmit to Controller is displayed when Easy Parameter Setup is clicked during
              online edit (controller edit) of parameters, or "Parameter" → "Easy Parameter Setting" is
              selected in the menu.
       (Note) If editing the parameters saved in the PC offline and clicking Easy Parameter Setup ,
              Transmit to Controller in the setup window changes to
              Reflect to Edit Parameter Window .
              Click Reflect to Edit Parameter Window , and the settings and changes conducted in
              Easy Parameter Setup will be reflected (changed) to the setting values in the Edit
              Parameter window. (But, controller transmission will not be executed.)
              As parameters will not be transmitted to the controller, close the top menu of Easy
              Parameter Setup window, go to Edit Parameter window to save the parameter file and
              transmit the data to the controller.
       (Note) If there is data in edit (data in red writing) in Edit Parameter window during online edit
              (controller data edit) of parameters, Easy Parameter Setup function cannot be used.
              If you click Easy Parameter Setup , a message will appear saying "There is data not
              written to the controller. Write to the controller first, or close the edit window".

8.4.1　Explanation of Easy Parameter Setup

Parameter edit is to be conducted in the setting screen of each function for those functions listed below.

The settings in each window should differ depending on the controller type and hardware construction.

Place the mouse cursor on the settings in each window, and the help for each item should be displayed.

● RS-232C

Setup for communication with external devices using RS-232C communication can be conducted. Select the communication settings for use / not to use of communication functions, communication speed and so on.

Click Standard Setting(S) , and the settings in each item should be changed to the standard ones.
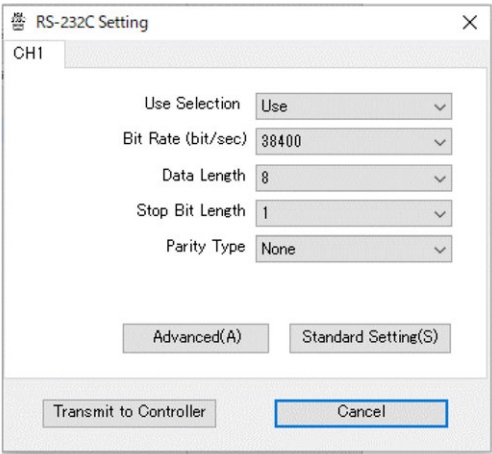
Fig. 8.13 RS-232C Setting

Set up the how to use COM Port (CH1) in the Communication Mode Setting (CH1) tab.
Click Standard Setting(S) , and the settings in each item should be changed to the standard ones.
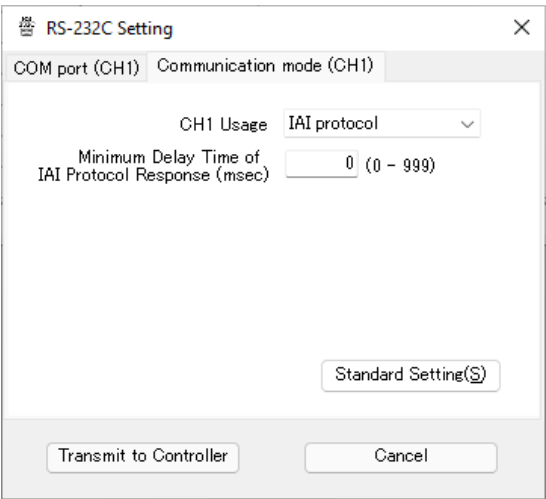
Fig. 8.14 Communication Mode Setting

● IAI Protocol Multiple Channels

IAI Protocol Multiple Channel Function should be set up.
Click Standard Setting(S) , and the settings in each item should be changed to the standard ones.
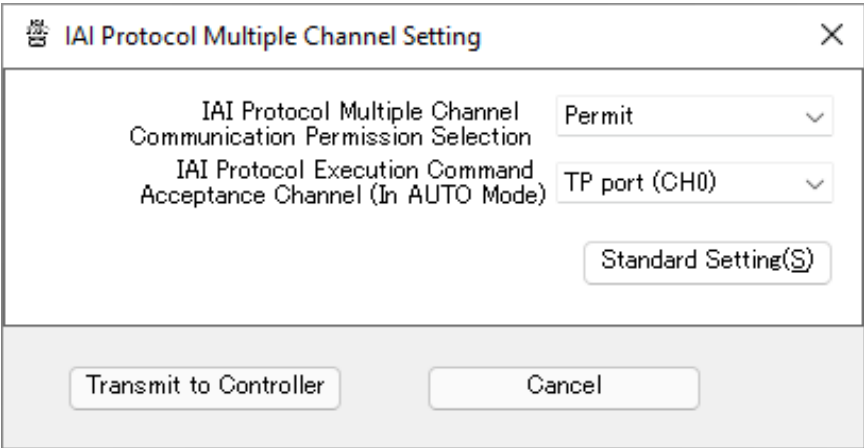
Fig. 8.15 IAI Protocol Multiple Channel setting

● Fieldbus (CC-Link, DeviceNet, PROFIBUS-DP, EtherCAT, PROFINET IO, CC-Link IE Field)
Setup of Fieldbus communication and I/O assignment can be conducted.
Basic settings for communication should be established in Communication Tab. Settings should differ depending on the fieldbus type.

Click Standard Setting(S) , and the settings in each item should be changed to the standard ones.
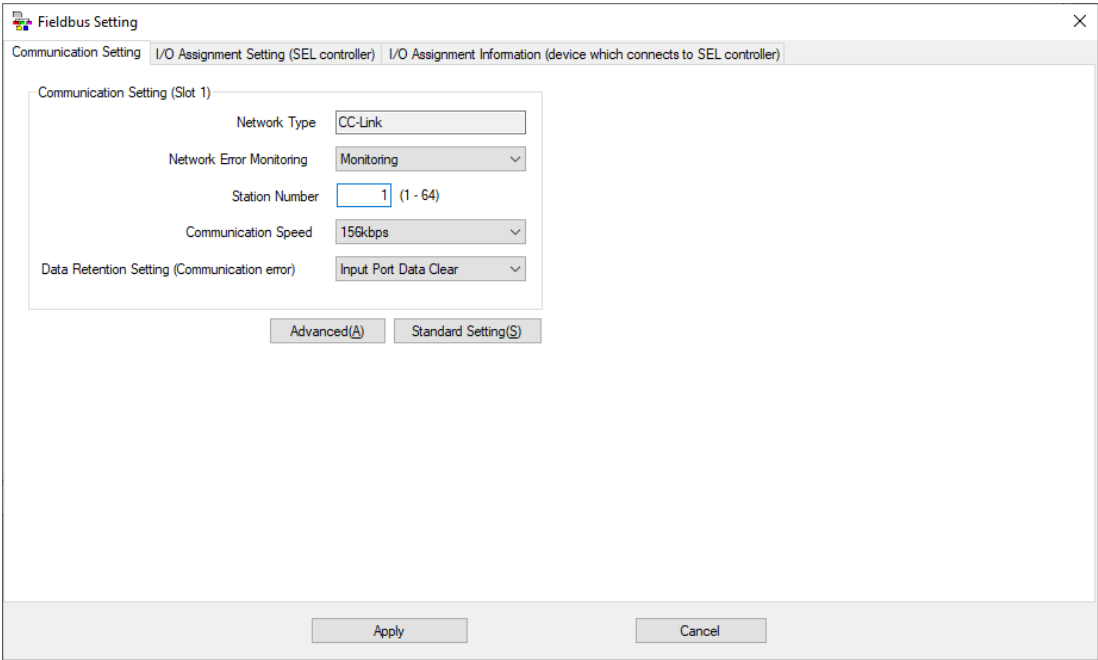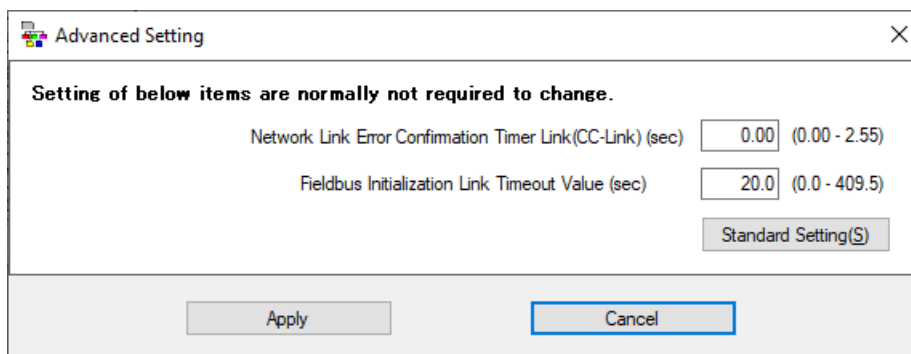
Fig. 8.16 Communication Setting

8. Parameter Edit Window

Click Advanced Setting , and the detailed setting window for such as the timeout duration should open.
(There should be no need of setting change in normal use.)
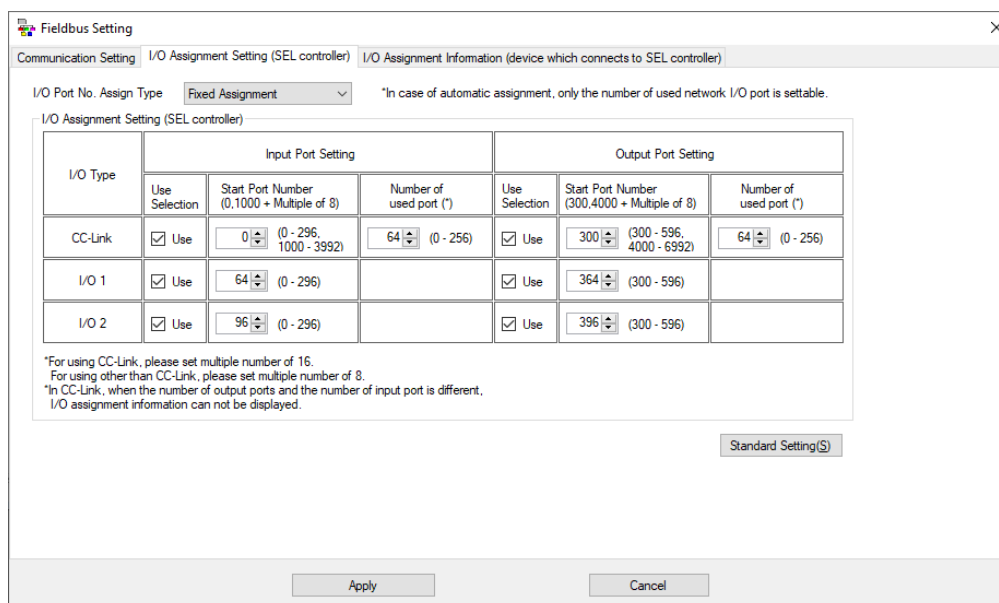
Fig. 8.17 Advanced Setting

Set I/O start port number and the number of ports to be used in SEL Controller in I/O Assignment Setting (SEL Controller) Tab.
Click Standard Setting(S) , and the settings in each item should be changed to the standard ones.
* There is a setting for the number of remote register words only in CC-Link IE Field setting.

Fig. 8.18 I/O Assignment Setting (SEL controller)

Display the I/O assignment information for the device SEL Controller is connected to (such as PLC) and SEL Controller in I/O Assignment Setting (SEL controller connected device) Tab.

Input the I/O assignment top address of PLC to "Top Address", and such information as the range of the fieldbus I/O assigned to the device SEL Controller is connected to (such as PLC) can be confirmed.

Fig. 8.19 I/O Assignment Information (For CC-Link)

Fig. 8.20 I/O Assignment Information (For DeviceNet and Others)

Fig. 8.21 I/O Assignment Information (For CC-Link IE Filed)

● Ethernet

Setup of I/O communication, IAI protocol B/TCP communication and program message communication by Ethernet can be conducted.
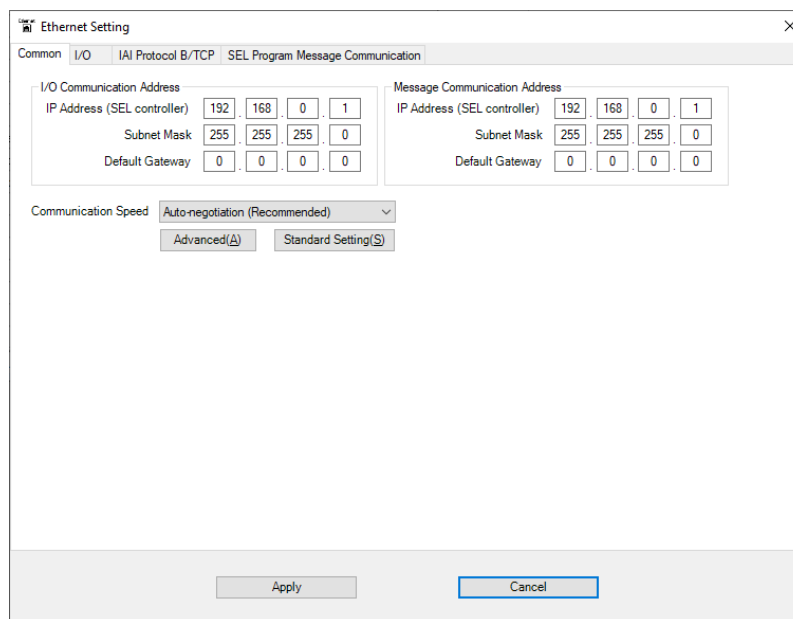
Fig. 8.22 Ethernet Setting (Common)

Setting of IP address on SEL Controller side and communication speed should be established in Common Tab.

In XSEL2-T/TX, it is necessary to set the IP addresses individually for I/O communication and for message communication.

(Setting of address only for message communication is available when there is no EtherNet/IP module connected.)

Click Standard Setting(S) , and the settings in each item should be changed to the standard ones.

Click Advanced Setting , and the detailed setting window for such as the timeout duration should open.

(There should be no need of setting change in normal use.)
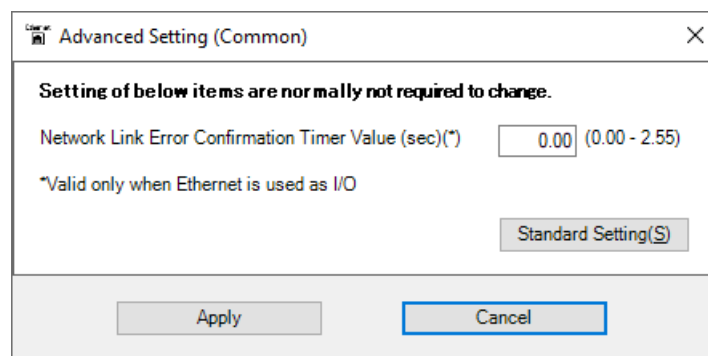
Fig. 8.23 Advanced Setting (Common)
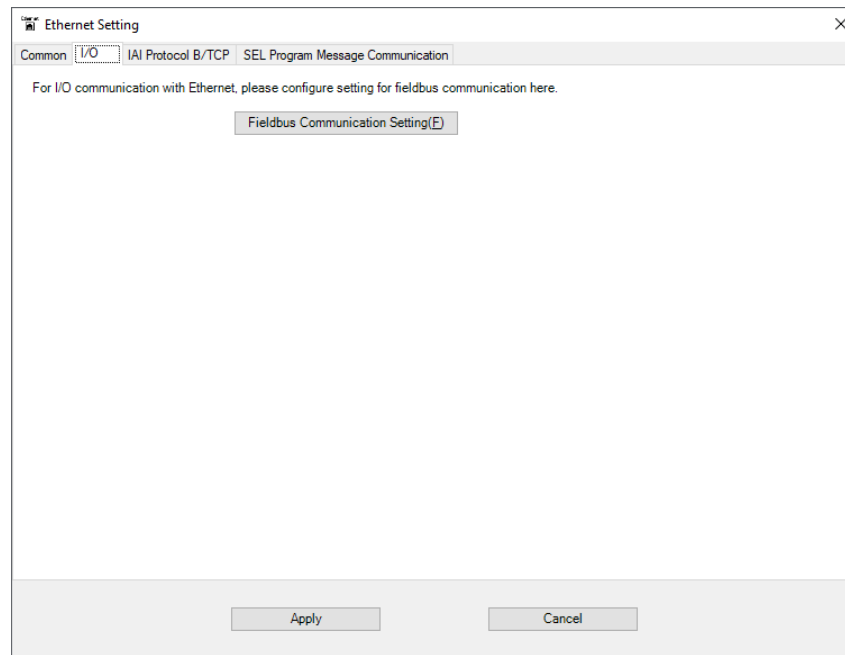
Fig. 8.24 Ethernet Setting (I/O)

When it is required to establish settings for I/O communication for EtherNet/IP, click ┃Fieldbus Communication Setting┃ in I/O Setting Tab, and the fieldbus communication setting window can be displayed in a separate window.

8. Parameter Edit Window

Fig. 8.25 Ethernet Setting (IAI Protocol B/TCP)

Setup for having the message communication with IAI protocol B/TCP can be done in "IAI Protocol B/TCP" Tab.

Click Set Same as AUTO Mode , and the setting in MANU Mode can be set to the same as those in AUTO Mode.

Click Set Same as MANU Mode , and the setting in AUTO Mode can be set to the same as those in MANU Mode.

Click Standard Setting(S) , and the settings in each item should be changed to the standard ones.

Click Advanced(A) , and the detailed setting window for such as the retry pitch should open. (There should be no need of setting change in normal use.)

Fig. 8.26 Advanced Setting (IAI Protocol B/TCP)
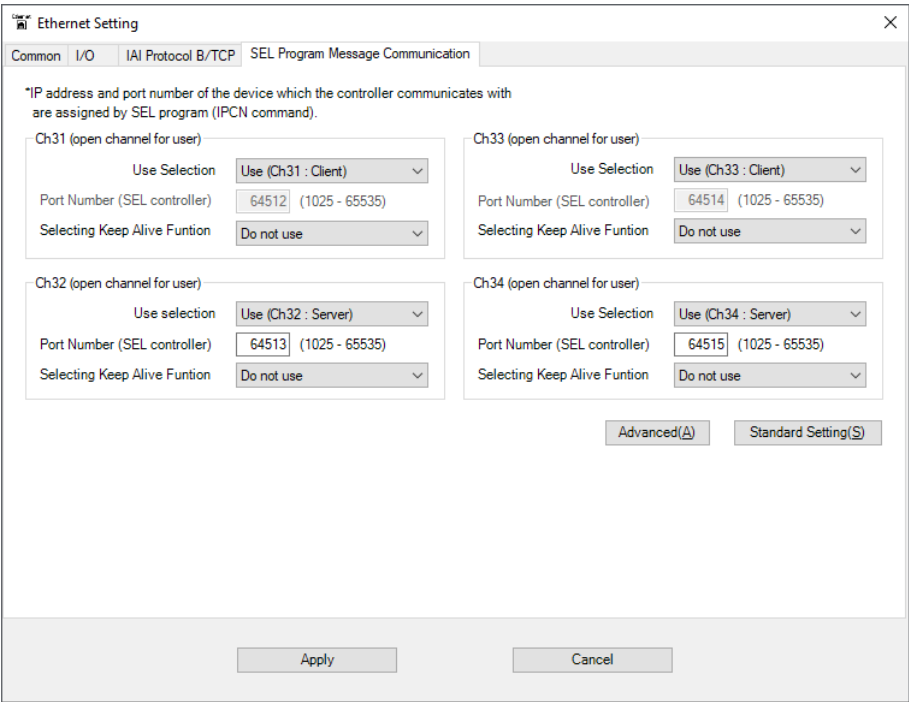
Fig. 8.27 Ethernet Setting (SEL Program Message Communication)

Setup for having the message communication in SEL program can be done in "SEL Program Message Communication" Tab.

Click Standard Setting(S) , and the settings in each item should be changed to the standard ones.

Click Advanced(A) , and the detailed setting window for such as the timeout duration should open.

(There should be no need of setting change in normal use.)
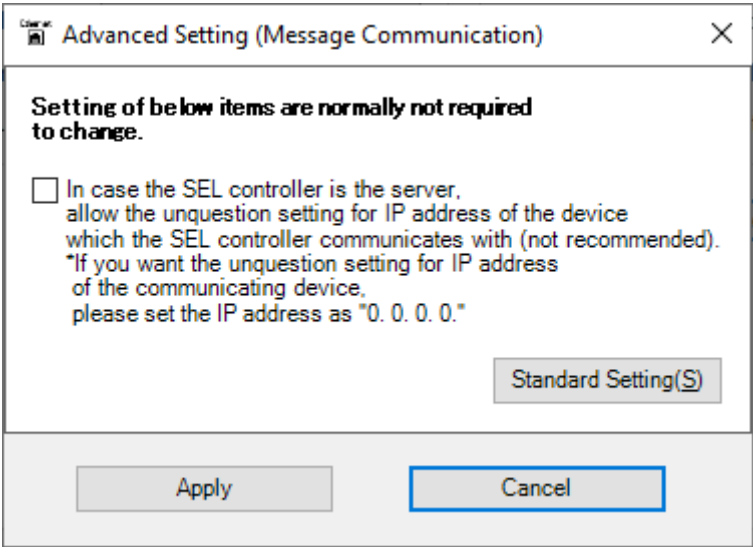
Fig. 8.28 Advanced Setting (SEL Program Message Communication)

● Vision System

Setup of Vision System I/F function can be conducted.

Fig. 8.29 Vision System Setting

Setup for selection of Vision System I/F functions and selection of vision system manufacturer can be done in "Basic Setting".

Setup for communication setting for the controller and vision system can be done in "Communication Setting".

Select either to use RS-232C or Ethernet in "Select Communication Device". (Select communication channel here)

Click Ethernet Message Communication Setting and the Ethernet communication setting window can be displayed in a separate window.

Click RS-232C Communication Setting and the RS-232C setting window can be displayed in a separate window.

Setup for capturing command physical output port and vision system coordinate axis number can be done in "Vision System Setting".

* For XSEL2-T/TX, indicate an axis number in Axes Group No. 1. An axis in Axes Group No. 2 cannot be set as the vision system coordinate axis.

Click Standard Setting(S) , and the settings in each item should be changed to the standard ones.

Click Advanced(A) , and the detailed setting window for such as the timeout duration should open.

(There should be no need of setting change in normal use.)
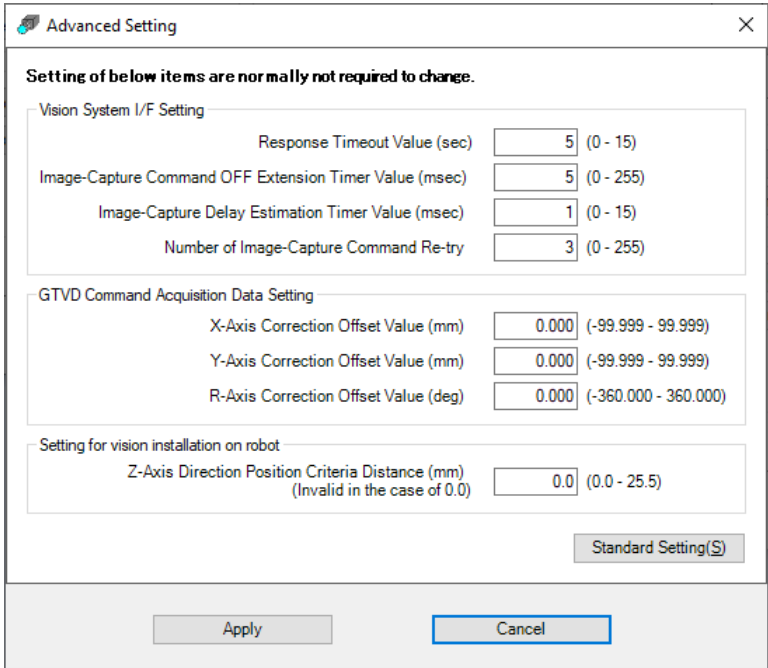
Fig. 8.30 Advanced Setting

8.5 How to Initialize Parameter (at the time of shipment)

(1) Right-click a blank space in the tool bar (refer to [Fig. 8.31]) while pressing ⌈Ctrl⌋ key. The Input Password will be displayed as shown in the Fig. 8.32.
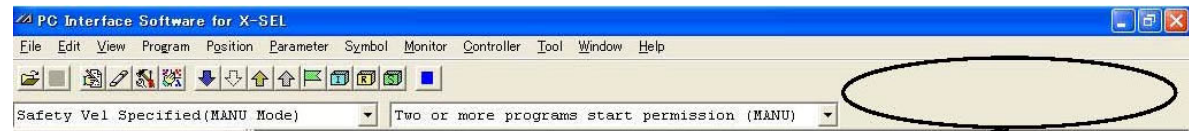
Fig. 8.31 Menu Bar

Right-click a blank space in the tool bar while pressing ⌈Ctrl⌋.

Fig. 8.32 Input Password Window

(2) Enter a password (5119) in the displayed Input Password screen. The "Parameter of Shipping" menu will be displayed in the Initialize Memory menu (Fig. 8.33).

* The password will be valid until the end of application once it has been entered.
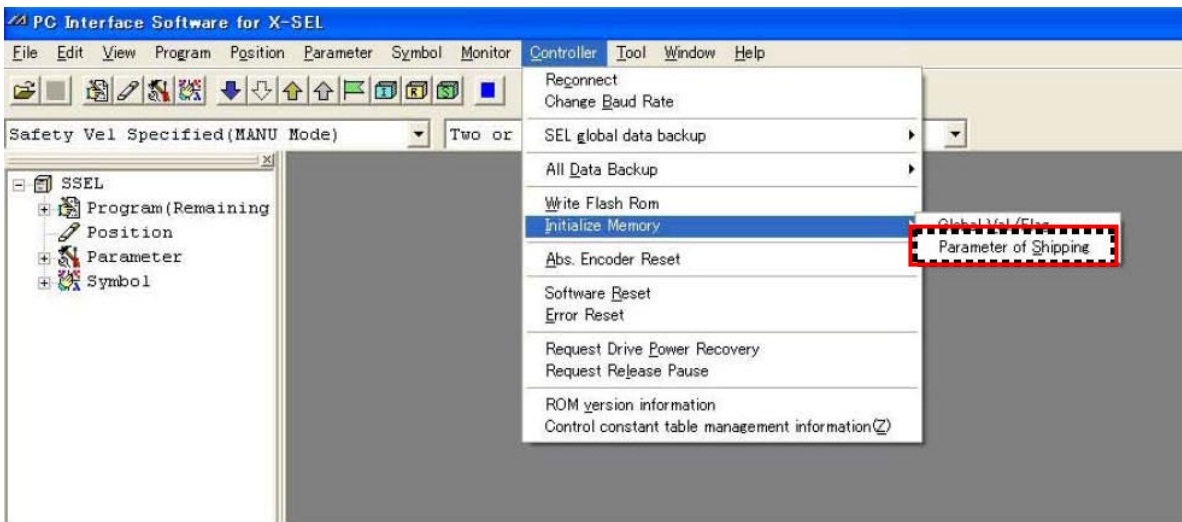
Fig. 8.33 Menu Bar (Parameter of Shipping [Shipment Values])

(3)   Selecting the displayed menu "Parameter of Shipping" displayed in (2) will display a dialog in
       Fig. 8.34.
       If you have no problem, click Yes .
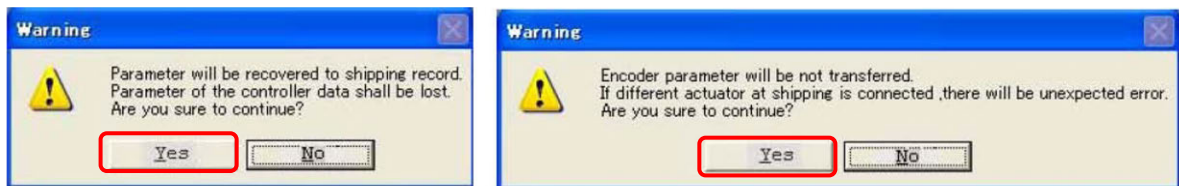
Fig. 8.34 Warning Dialog

(4)   After completion of rewriting, write the parameters to the flash ROM.

⚠ **Caution**
   ● Encoder parameters are not initialized. Because of this an unexpected error may be
     detected when the actuator different from the one at the time of shipment is connected.

---

8. Parameter Edit Window

8.6 Parameter Comparison

Comparison of the parameter files below can be performed.

- Saved parameter files

- Parameters in the controller and saved parameters

[Comparable Parameter Files]

Parameters in the same controller (same extension) and also a file in the same effective axis pattern and hardware configuration

8.6.1 How to Compare Parameters

Choose either to open parameter files by selecting "File (F)" → "Open (O)" or to select "Parameter (P)" → "Edit (E)" to open the parameter edit window.
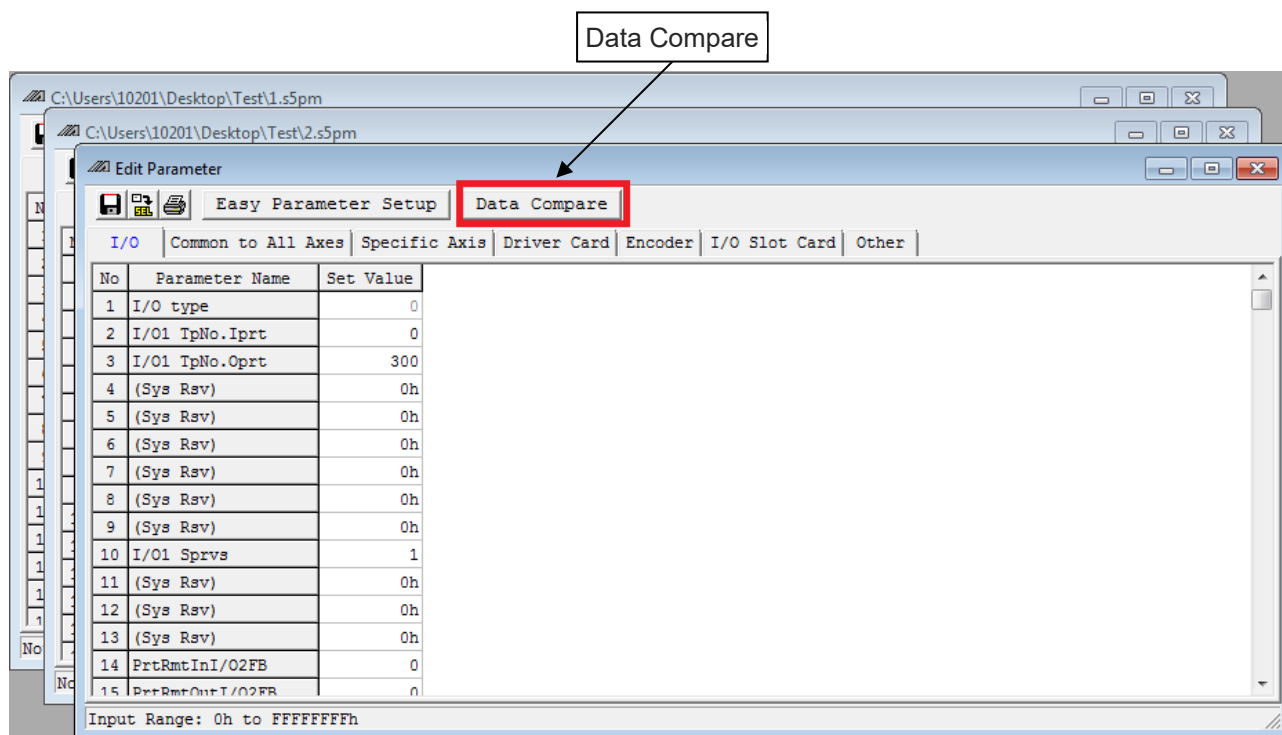
Fig. 8.35 Edit Parameter Window

Click Data Compare .

Parameter files which are open should be subject to comparison.

A dialog will open if there are data exist available for parameter comparison.
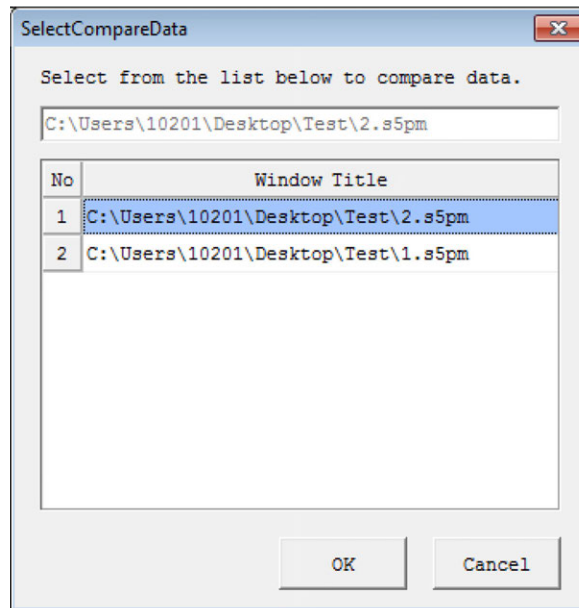
Fig. 8.36 Select Dialog Window

When there is no data available for parameter comparison existed, the message in Fig 8.37 should appear.
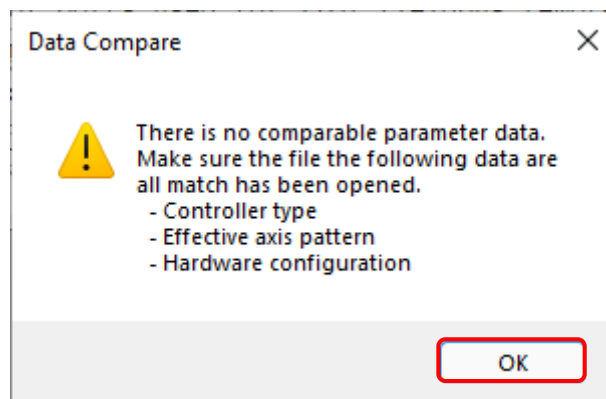
Fig. 8.37 Message

Select parameter data to be compared in the select dialog and click OK .

Parameter comparison will start.

8. Parameter Edit Window

After the parameter comparison is finished, the form gets changed and numbers in difference are displayed and parameters in difference turns to yellow.
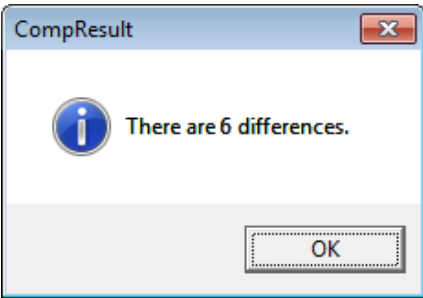
Fig. 8.38 CompResult
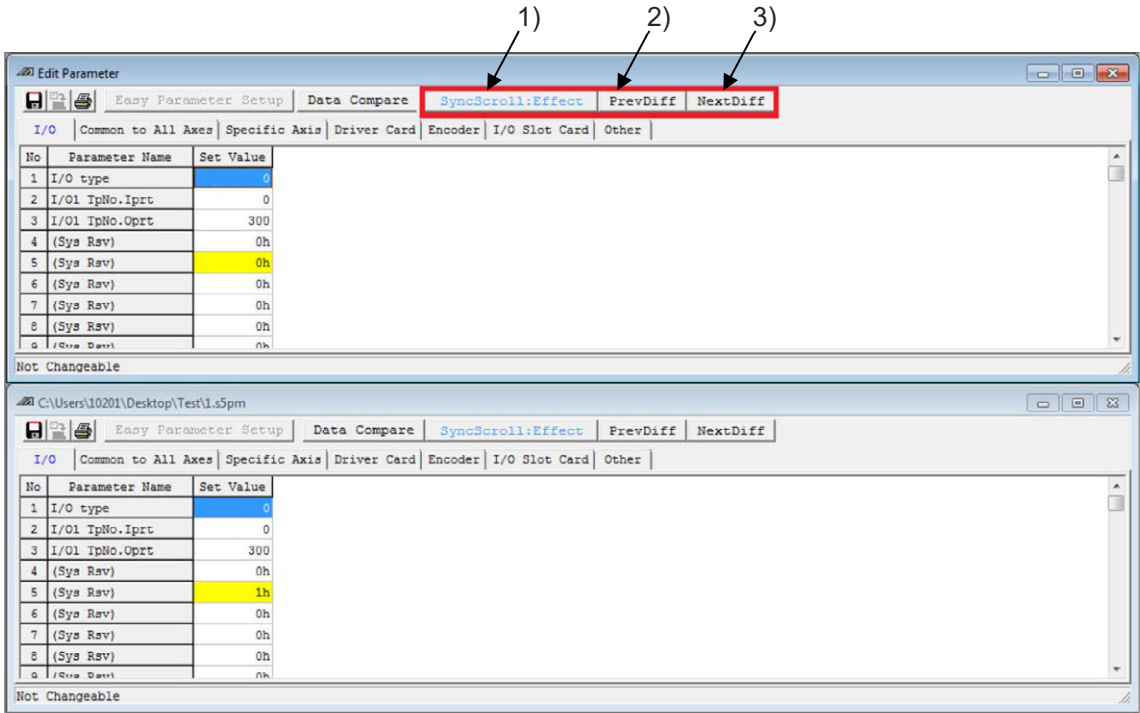
Fig. 8.39 Edit Window after Comparison Result

1) SyncScroll: Effect : When it is displayed in blue, the scroll of the grid gets synchronized to the move.
The form that the button is not pressed also moves.
Tab movement also synchronizes.

SyncScroll: Invalid : When it is displayed in black, each form scrolls and tab moves individually.

2) PrevDiff : Moves to the nearest previous difference from the cell position of which PrevDiff button was pressed.

3) NextDiff : Moves to the nearest previous difference from the cell position of which NextDiff button was pressed.

8.7　I/O Output Setting

There is a function to output various monitor data such as the current position to the output port domains in XSEL2-T/TX.

The I/O output setting is a function to perform this monitor setting easily.

Also, it is available to establish the settings for the input function select and the output function select.

There are two ways to start up the I/O output setting function.

(1)　Click ⌈I/O Output Setting⌋ in the parameter edit window to start up the I/O output setting function.
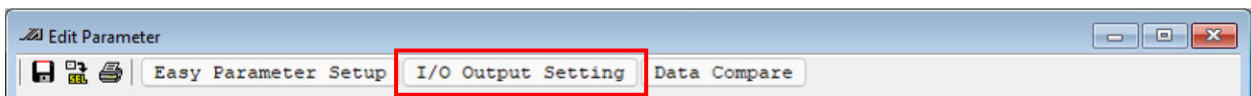
Fig. 8.40 I/O Output Setting

(2)　Select "Parameter (P)" → "I/O Output Setting (I)" in the menu to start up the I/O output setting function.
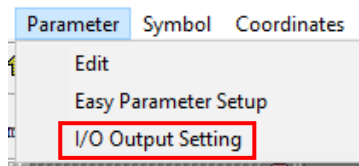
Fig. 8.41 I/O Output Setting

<Explanation of I/O Output Setting Function>

The I/O output setting function shows the following window based on the parameter values in the parameter edit window.
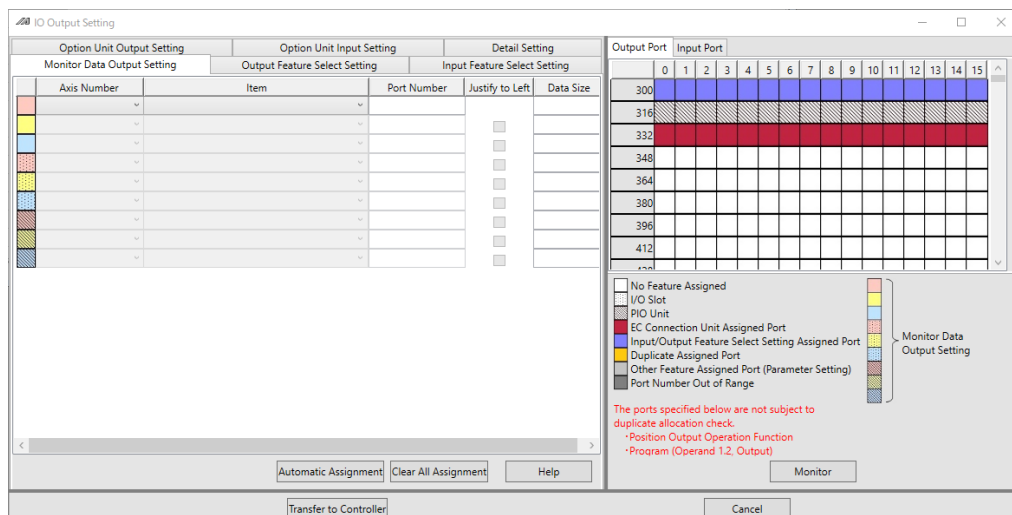
Fig. 8.42 I/O Output Setting (Monitor Data Output Setting)

In the left window, shows the menu for each setting. The monitor data output setting window should be displayed after startup.

In the right window, shows the status of port assignments. The output port assignment status should be displayed after startup.

8.7.1 Monitor Data Output Setting

After starting up the I/O output setting function, the monitor data output setting window should be displayed in the left window.

In the monitor data output setting window, operations stated below should be available.

Operation	Things Available to Do
Select "Output Function Select Setting" tab in the left window.	The left window can be switched to the output function select setting window.
Select "Input Function Select Setting" tab in the left window.	The left window can be switched to the input function select setting window.
Select "Axis Number" combo box in the list in the left window.	A list of axes available in the monitor data output setting can be displayed. Refer to [8.7.1 [1]]
Select "Item" combo box in the list in the left window.	A list of items in the monitor data output setting can be displayed. Refer to [8.7.1 [1]]
Select "Top Output Port Number" text box in the list in the left window.	A port number can be input. Refer to [8.7.1 [1]]
Select "Allocate" check box in the list in the left window.	Allocate function for output port assignment can be turned ON/OFF.
Select "Input Port" tab in the right window.	The right window can be switched to the input port assignment status window.
Select "Automatic Assignment" button in the left window.	Automatic assignment of the monitor data output setting can be performed. Refer to [8.7.1 [3]]
Select "Clear All Assignment" button in the left window.	The monitor data output setting can be all cleared.
Select "Help" button in the left window.	Helps for operation in the monitor data output setting can be displayed.
Select "Monitor" button in the right window.	The monitor window should be displayed. Refer to [8.7.5]
Select "Transfer to Controller" button on the bottom of the window.	The setting data can be transferred to the controller. Refer to [8.7.4]
Select "Cancel" button on the bottom of the window.	I/O output setting function window closes.

[1] How to Establish Monitor Data Output Setting

Established the settings in "Axis Number", "Item" and "Top Output Port Number" to conduct the monitor data output setting.

"Axis Number" setting is to be done in a combo box.

In the combo box list, axis numbers (axes group numbers) available for setting should be displayed.

Select an axis for monitoring from the list.

Item to be Displayed	Explanation of Item
Axis Number (Axes Group Number)	When axes from Axis No. 1 to Axis No. 4 are available in Axes Group 1, the combo box list should show as it is shown below. 1 (Axes Group No. 1) 2 (Axes Group No. 1) 3 (Axes Group No. 1) 4 (Axes Group No. 1) When Axes Group No. 2 and later are invalid, there should be no display of the axis group number.

"Item" setting is to be done in a combo box.

A list of the items for the monitor data output setting should be displayed in the combo box list.

Select an item for monitoring from the list.

Item to be Displayed	Explanation of Item
Current Position [mm] (2W)	The current position should be displayed in the monitor in unit of [mm]. The current position in the range of -2,147,483,648 to 2,147,483,647mm (for two words) should be displayed in the monitor.
Current Position 0.01mm (2W)	The current position should be displayed in the monitor in unit of 0.01mm. The current position in the range of -21,474,836.48 to 21,474,836.47mm (for two words) should be displayed in the monitor.
Current Position 0.001mm (2W)	The current position should be displayed in the monitor in unit of 0.001mm. The current position in the range of -2,147,483.648 to 2,147,483.647mm (for two words) should be displayed in the monitor.
Current Position [mm] (1W)	The current position should be displayed in the monitor in unit of [mm]. The current position in the range of -32,768 to 32,767mm (for one word) should be displayed in the monitor.
Current Position 0.01mm (1W)	The current position should be displayed in the monitor in unit of 0.01mm. The current position in the range of -327.68 to 327.67mm (for one word) should be displayed in the monitor.
Current Velocity [mm/s] (1W)	Current velocity should be displayed in the monitor in the unit of [mm/s]. The current velocity in the range of 0 to 65,535mm/s (for one word) should be displayed in the monitor.

8. Parameter Edit Window

Item to be Displayed	Explanation of Item
Current Velocity 0.1mm/s (1W)	Current velocity should be displayed in the monitor in the unit of 0.1mm/s. The current velocity in the range of 0 to 6,553.5mm/s (for one word) should be displayed in the monitor.
Alarm Code (1W)	The alarm code (from 0000h to FFFFh) should be displayed in the monitor.
Axis Operation Status (1W)	Axis Operation Status (from 0000h to FFFFh) should be displayed in the monitor. The configuration for axis operation status is the same as for the ECMD 5 command. Refer to [SEL Language Programming Manual (ME0224)] for details.
Motor Command Current Rated Ratio [%] (1W)	The motor command current should be displayed in the monitor in the unit of rated ratio [%]. The motor command current in the range of -3,276.8 to 3,276.7% (for one word) should be displayed in the monitor.
Motor Command Current Rated Ratio 0.1% (1W)	The motor command current should be displayed in the monitor in the unit of rated ratio 0.1%. The motor command current in the range of -3,276.8 to 3,276.7% (for one word) should be displayed in the monitor.
Motor Command Current [mA] (2W)	The motor command current should be displayed in the monitor in the unit of [mA]. The motor command current in the range of -2,147,483.648 to 2,147,483.647mA (for two words) should be displayed in the monitor.
Motor Command Current [mA] (1W)	The motor command current should be displayed in the monitor in the unit of [mA]. The motor command current in the range of -32,768 to 32,767mA (for one word) should be displayed in the monitor.
Position Deviation [Pulse] (2W)	The position deviation in the range of -2,147,483.648 to 2,147,483.647pulse (for two words) should be displayed in the monitor.
Position Deviation [Pulse] (1W)	The position deviation in the range of -32,768 to 32,767 [pulse] (for one word) should be displayed in the monitor.
Overload Level 0.1% (1W)	The overload level should be displayed in the monitor in the unit of 0.1%. The overload level in the range of 0 to 6,553.5% (for one word) should be displayed in the monitor.
Motor Feedback Current Rated Ratio [%] (1W)	The motor feedback current should be displayed in the monitor in the unit of rated ratio [%]. The motor feedback current in the range of -32,768 to 32,767% (for one word) should be displayed in the monitor.
Motor Feedback Current Rated Ratio 0.1% (1W)	The motor feedback current should be displayed in the monitor in the unit of rated ratio 0.1%. The motor feedback current in the range of -3,276.8 to 3,276.7% (for one word) should be displayed in the monitor.
Motor Feedback Current [mA] (2W)	The motor feedback current should be displayed in the monitor in the unit of [mA]. The motor feedback current in the range of -2,147,483.648 to 2,147,483.647mA (for two words) should be displayed in the monitor.
Motor Feedback Current [mA] (1W)	The motor feedback current should be displayed in the monitor in the unit of [mA]. The motor feedback current in the range of -32,768 to 32,767mA (for one word) should be displayed in the monitor.

8. Parameter Edit Window

Item to be Displayed	Explanation of Item
Maintenance Bit (EC Status) (1W)	Display ELECYCLINDER ALML bits in the monitor in axis number order.

In case of selecting a monitor item for the power supply unit, the axis number setting should become "in common".

● The power supply unit output size will be the number of power supply units connected (Other Parameter No. 61) × 1W

● The data configuration for each power supply unit is as follows.

bit15:　　Power supply unit connection status (ON once communication is established)

bit9:　　Reduced FAN revolution speed error (ON once revolution speed reduced 30%)

bit8:　　Reduced FAN revolution speed error (ON once revolution speed reduced 50%)

bit0 to 7: Selection data

Input a port number with 3 to 4 digits in "Top Output Port Number" to set it up.

Content of Input	Explanation for Value to Input
Value with 3 to 4 Digits	Input a value with 3 to 4 digits of decimal number. Input a value in the range of either the physical output port (300 to 599) or the extension output port (4000 to 6999).

It is available to set nine at the maximum in the monitor data output setting.
The settings from 1 to 9 should be displayed in the colors shown below in the port assignment status of the output in the window on the right.
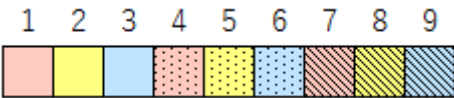
Fig. 8.43 Colors

Set "Axis Number", "Item", "Top Output Port Number", and the monitor data output setting should be displayed in the port assignment status in the window on the right.

Example: When setting 1 (Axes Group No. 1), Current Position [mm] (2W) and Port No. 300 in the first monitor data output setting.
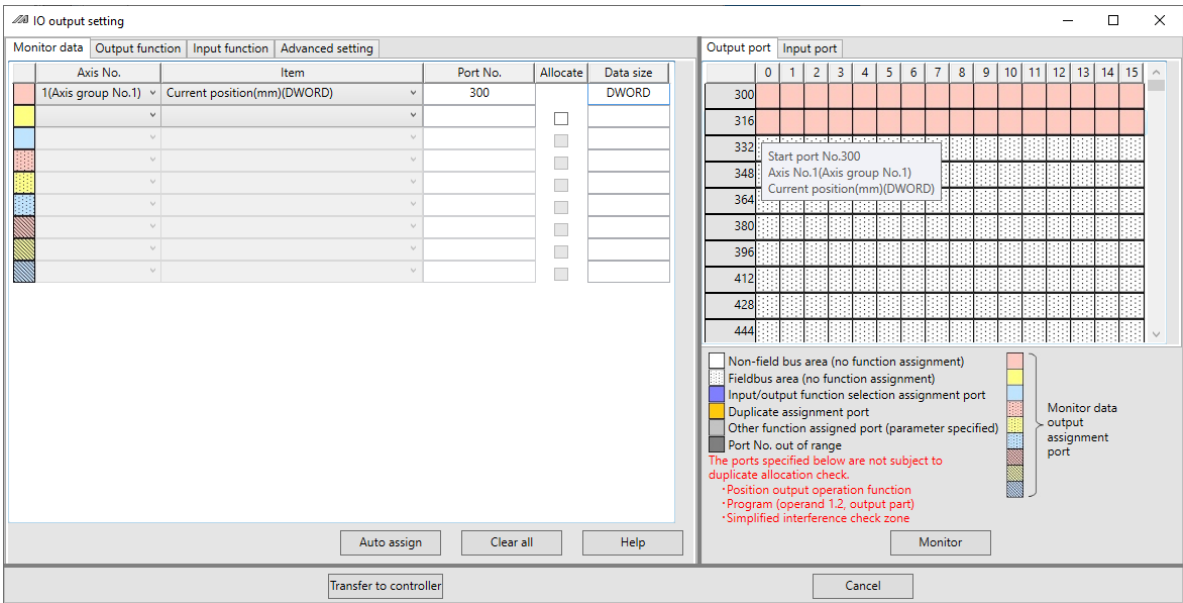
Fig. 8.44 Monitor Data Output Setting (Example)

Clue: Place the mouse cursor on the monitor data output setting in the window on the right, and a help display shows up to display the contents of setting.

[2] How to Allocate Output Ports

Check in the Allocate check box, and port numbers in a row after the those for the one step previous in the monitor item can be allocated automatically.

Example: 1 (Axes Group No. 1), Current Position [mm] (2W) and Port No. 300 are set in the first monitor data output setting. When 1 (Axes Group No. 2) and Alarm Code (1W) are set in the second monitor data output setting, and Allocate gets turned on.
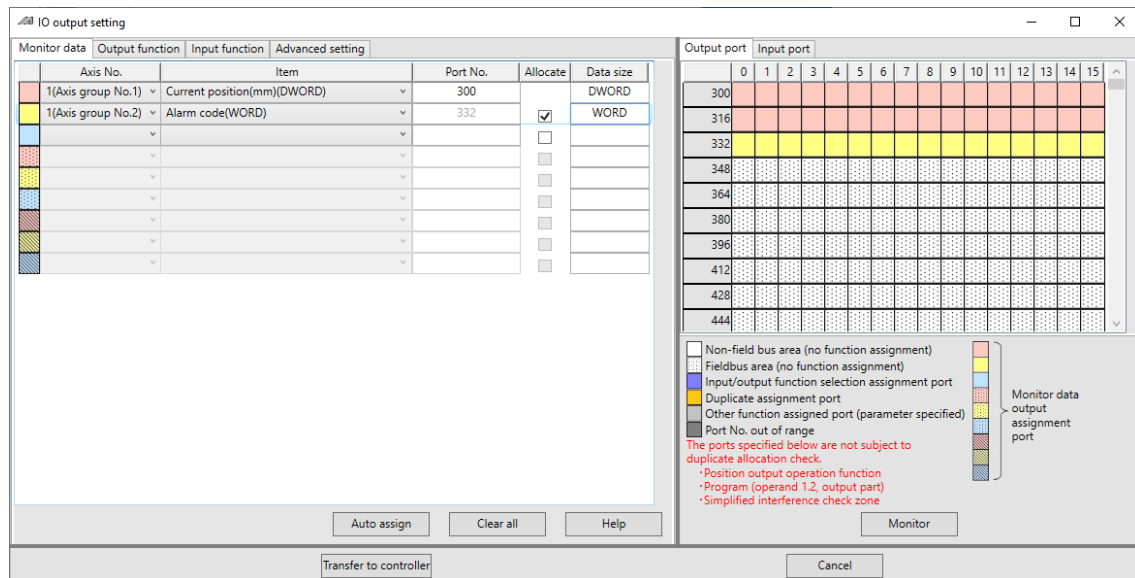
Fig. 8.45 How to Allocate Output Ports

With Allocate ON, output port numbers (332 to 347) which are in row after the port numbers (300 to 331) set to the first setting item can be allocated to the second setting item automatically. When the port numbers are set automatically with Allocate ON, the top output port number turns to grey and gets banned to input.

When you require to turn Allocate OFF, remove the check mark in the check box.

Even if Allocate gets turned OFF, the port numbers should remain without being cleared.

Allocate setting should be kept activated while the check box is ON.

If the port number for the first setting item in the example above is changed from 300 to 4000, the port number for the second setting item should automatically be updated to 4032.

[3] How to Automatic Assignment

Select the "Automatic Assignment" button, and the automatic assignment of the monitor data output setting should be conducted.

The setting items for automatic assignment may differ depending on the number of effective axes.

Relation between Monitoring Items for Automatic Assignment and Effective Axes

Monitoring Items for Automatic Assignment	Number of Effective Axes				
	1	2	3	4	5 or more
Current Position 0.001mm (2W)	○	○	○	○	○
Current Velocity 0.1mm/s (1W)	○	○	○	○	×
Alarm Code (1W)	○	○	○	×	×
Axis Operation Status (1W)	○	○	×	×	×
Motor Command Current [mA] (2W)	○	×	×	×	×

When there is one effective axis, five monitoring items, Current Position 0.001mm (2W), Current Velocity 0.1mm/s (1W), Alarm Code (1W), Axis Operation Status (1W) and Motor Command Current [mA] (2W), should be assigned automatically to the axis.

When there are two effective axes, four monitoring items, Current Position 0.001mm (2W), Current Velocity 0.1mm/s (1W), Alarm Code (1W) and Axis Operation Status (1W), should be assigned automatically to each axis.

When there are three effective axes, three monitoring items, Current Position 0.001mm (2W), Current Velocity 0.1mm/s (1W) and Alarm Code (1W), should be assigned automatically to each axis.

When there are four effective axes, two monitoring items, Current Position 0.001mm (2W) and Current Velocity 0.1mm/s (1W), should be assigned automatically to each axis.

When there are five or more effective axes, the monitoring item of Current Position 0.001mm (2W) should be assigned automatically to each axis.

8.7.2   Output Function Select Setting
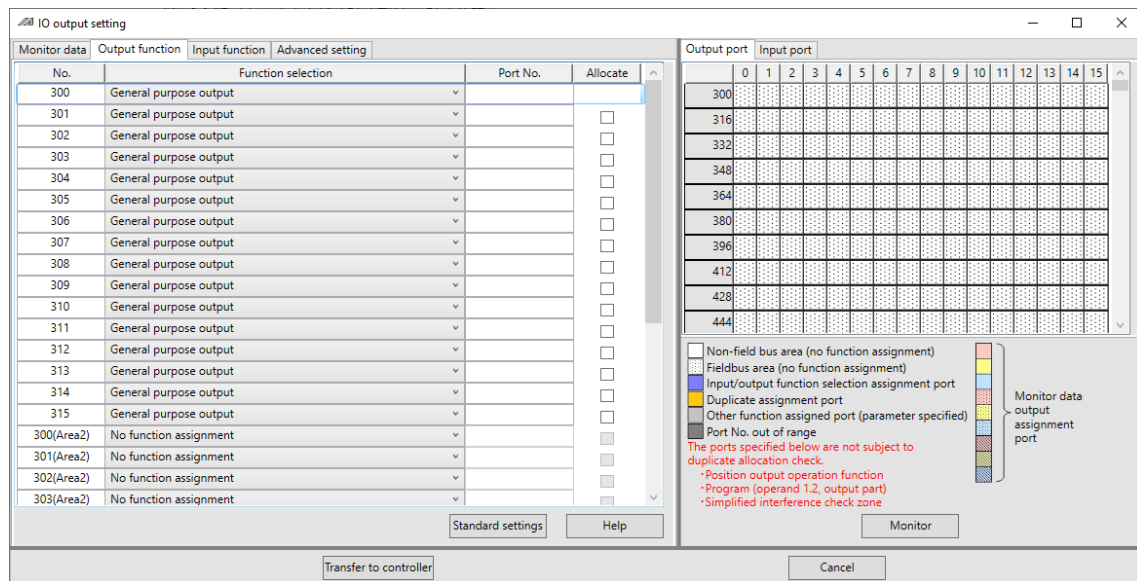
Fig. 8.46 Output Function Select Setting

In the output function select setting window, the following operations can be performed.

Operation	Things Available to Do
Select "Monitor data" in left window.	The left window can be switched to the monitoring data output setting window.
Select "Input function" tab in the left window.	The left window can be switched to the input function select setting window.
Select "Function selection" combo box in the list in the left window.	A list of items available for setting in each output function should be displayed. Refer to [8.7.2 [1]]
Select "Port No." text box in the list in the left window.	A port number can be input. Refer to [8.7.2 [1]]
Select "Allocate" check box in the list in the left window.	Allocate function for output port assignment can be turned ON/OFF.
Select "Input port" tab in the right window.	The right window can be switched to the input port assignment status window.
Select "Standard Settings" button in the left window.	The standard setting should be set to the output function select setting. Refer to [8.7.2 [3]]
Select "Help" button in the left window.	Helps for operation in the output function select setting can be displayed.
Select "Monitor" button in the right window.	The monitor window should be displayed. Refer to [8.7.5]
Select "Transfer to controller" button on the bottom of the window.	The setting data can be transferred to the controller. Refer to [8.7.4]
Select "Cancel" button on the bottom of the window.	I/O output setting function window closes.

8. Parameter Edit Window

[1] How to Output Function Select Setting

Establish the settings in "Function Select" and "Output Port Number" to perform the output function select setting.

The setting for "Function Select" is to be conducted in the combo box.
Items for each output function number should be displayed in the list of the combo box.
Select an item to set from the list.

Items in List for Output Function No. 300	Items in List for Output Function No. 300 (Area 2)
General Output	No Function Assigned
Error output higher than operation cancellation level (ON)	
Error output higher than operation cancellation level (OFF)	
Error output higher than operation cancellation level + emergency stop output (ON)	
Error output higher than operation cancellation level + emergency stop output (OFF)	
Error output higher than cold start level (ON)	
Error output higher than cold start level (OFF)	
Error output in maintenance information alert function related message level (ON)	
Error output in maintenance information alert function related message level (OFF)	

Items in List for Output Function No. 301	Items in List for Output Function No. 301 (Area 2)
General Output	No Function Assigned
READY Output (PIO trigger program available for operation)	
READY Output (PIO trigger program available for operation and error higher than operation cancellation level not occurred)	
READY Output (PIO trigger program available for operation and error higher than cold start level not occurred)	

Items in List for Output Function No. 302	Items in List for Output Function No. 302 (Area 2)
General Output	No Function Assigned
Emergency Stop Output (ON)	
Emergency Stop Output (OFF)	

Items in List for Output Function No. 303	Items in List for Output Function No. 303 (Area 2)
General Output	No Function Assigned
AUTO Mode Output	
Output During Automatic Operation (Other Parameter No. 12)	

Items in List for Output Function No. 304	Items in List for Output Function No. 304 (Area 2)
General Output	No Function Assigned
Output When All Effective Axes at Home Position (= 0)	
Output When All Effective Axes Home-Return Complete Status (Coordinates Firm)	
Output When All Effective Axes at Home Position Preset Coordinates	

Items in List for Output Function No. 305	Items in List for Output Function No. 305 (Area 2)
General Output	No Function Assigned
1st Axis In-Position Output (OFF when pressing missed)	
1st Axis Servo-on Output (System Monitoring Task Output)	

Items in List for Output Function No. 306	Items in List for Output Function No. 306 (Area 2)
General Output	No Function Assigned
2nd Axis In-Position Output (OFF when pressing missed)	
2nd Axis Servo-on Output (System Monitoring Task Output)	

Items in List for Output Function No. 307	Items in List for Output Function No. 307 (Area 2)
General Output	No Function Assigned
3rd Axis In-Position Output (OFF when pressing missed)	
3rd Axis Servo-on Output (System Monitoring Task Output)	

Items in List for Output Function No. 308	Items in List for Output Function No. 308 (Area 2)
General Output	No Function Assigned
4th Axis In-Position Output (OFF when pressing missed)	
4th Axis Servo-on Output (System Monitoring Task Output)	

Items in List for Output Function No. 309	Items in List for Output Function No. 309 (Area 2)
General Output	No Function Assigned
5th Axis In-Position Output (OFF when pressing missed)	
5th Axis Servo-on Output (System Monitoring Task Output)	

Items in List for Output Function No. 310	Items in List for Output Function No. 310 (Area 2)
General Output	No Function Assigned
6th Axis In-Position Output (OFF when pressing missed)	
6th Axis Servo-on Output (System Monitoring Task Output)	

Items in List for Output Function No. 311	Items in List for Output Function No. 311 (Area 2)
General Output	No Function Assigned
7th Axis In-Position Output (OFF when pressing missed)	
7th Axis Servo-on Output (System Monitoring Task Output)	

Items in List for Output Function No. 312	Items in List for Output Function No. 312 (Area 2)
General Output	No Function Assigned
8th Axis In-Position Output (OFF when pressing missed)	
8th Axis Servo-on Output (System Monitoring Task Output)	

8. Parameter Edit Window

Items in List for Output Function No. 313	Items in List for Output Function No. 313 (Area 2)
General Output	No Function Assigned

Items in List for Output Function No. 314	Items in List for Output Function No. 314 (Area 2)
General Output	No Function Assigned

Items in List for Output Function No. 315	Items in List for Output Function No. 315 (Area 2)
General Output	No Function Assigned

Input the port number in 3 to 4 digits in "Output Port Number" for setting.

Content of Input	Explanation for Value to Input
Value with 3 to 4 Digits	Input a value with 3 to 4 digits Input a value in the range of either the physical output port (300 to 599) or the extension output port (4000 to 6999).

The output function select setting should be shown in the following color.

Establish the settings in "Function Select" and "Output Port Number", and the output function select setting should be displayed in the port assignment status for the output port in the right window.

Example: When Error output higher than operation cancellation level (ON) and Port No. 316 are set in Output Function No. 300.
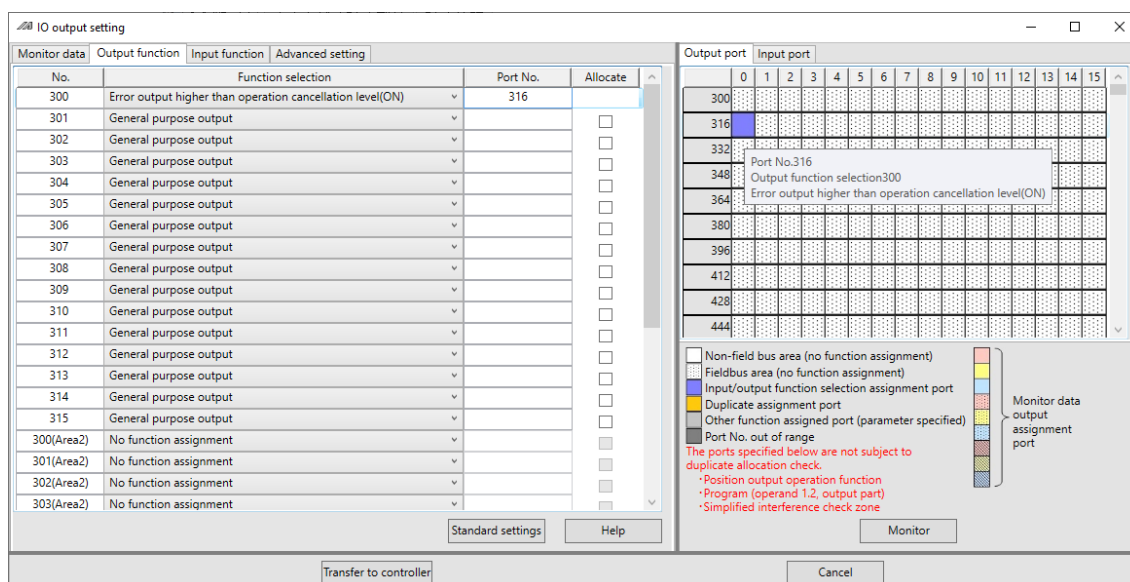

Fig. 8.47 Output function select setting (Example)

[2] How to Allocate to Output Ports

Check in the Allocate check box, and port numbers in a row after the those for the one step previous in the output function select setting item can be allocated automatically.

Example: When Error output higher than operation cancellation level (ON) and Port No. 316 are set in Output Function No. 300.
And READY output (PIO trigger program available for operation) is set to Output Function No. 301 and Allocate is turned ON.
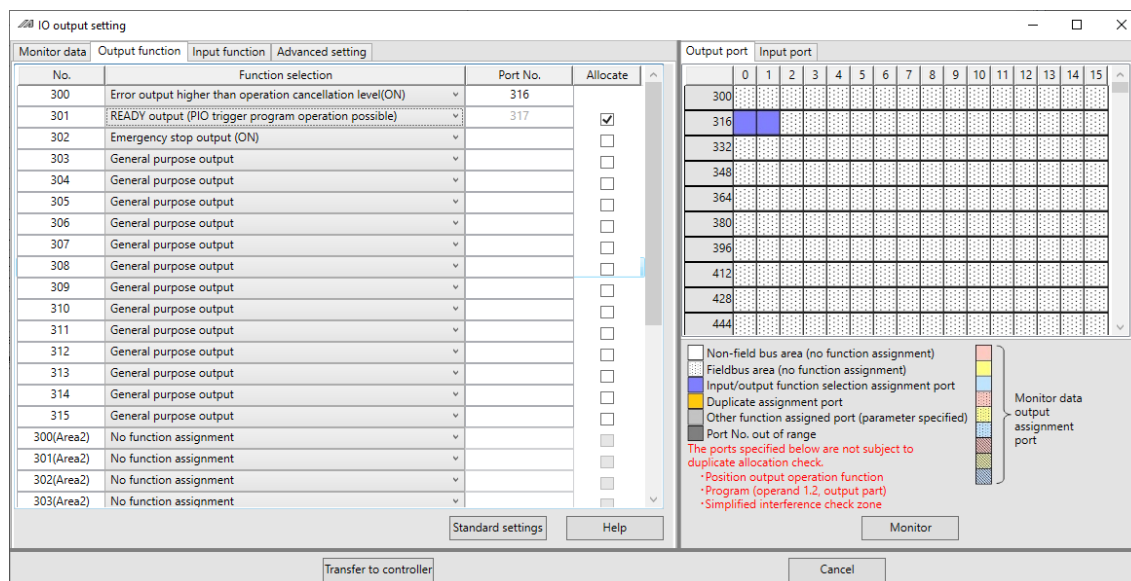
Fig. 8.48 How to Allocate to Output Ports

Once Allocate at Output Function No. 301 is turned ON, the port number (317) in a row to the output port number (316) set in Output Function No. 300 should be automatically set.
When the port numbers are set automatically with Allocate ON, the output port numbers turn to grey and get banned to input.
When you require to turn Allocate OFF, remove the check mark in the check box.
Even if Allocate gets turned OFF, the port numbers should remain without being cleared.
Allocate setting should be kept activated while the check box is ON.
If the port number for the setting item in Output Function No. 300 is changed from 316 to 4000, the port number for Output Function No. 301 should automatically be updated to 4001.

8. Parameter Edit Window

[3] How to Change to Standard Setting

Select "Standard settings" button, and the standard setting should be allocated to the output function select setting.

Contents of Standard Setting in Output Function Select Setting

| Output Function Select Setting	Items	Output Port Number
Output Function No. 300	Error output higher than operation cancellation level (OFF)	300
Output Function No. 301	READY Output (PIO trigger program available for operation and error higher than cold start level not occurred)	301
Output Function No. 302	Emergency stop output (OFF)	302
Output Function No. 303	General Output	303
Output Function No. 304	General Output	304
Output Function No. 305	General Output	305
Output Function No. 306	General Output	306
Output Function No. 307	General Output	307
Output Function No. 308	General Output	308
Output Function No. 309	General Output	309
Output Function No. 310	General Output	310
Output Function No. 311	General Output	311
Output Function No. 312	General Output	312
Output Function No. 313	General Output	313
Output Function No. 314	General Output	314
Output Function No. 315	General Output	315
Output Function No. 300 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 301 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 302 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 303 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 304 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 305 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 306 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 307 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 308 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 309 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 310 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 311 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 312 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 313 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 314 (Area 2)	No Function Assigned	Not Allocated
Output Function No. 315 (Area 2)	No Function Assigned	Not Allocated

8.7.3 Input Function Select Setting
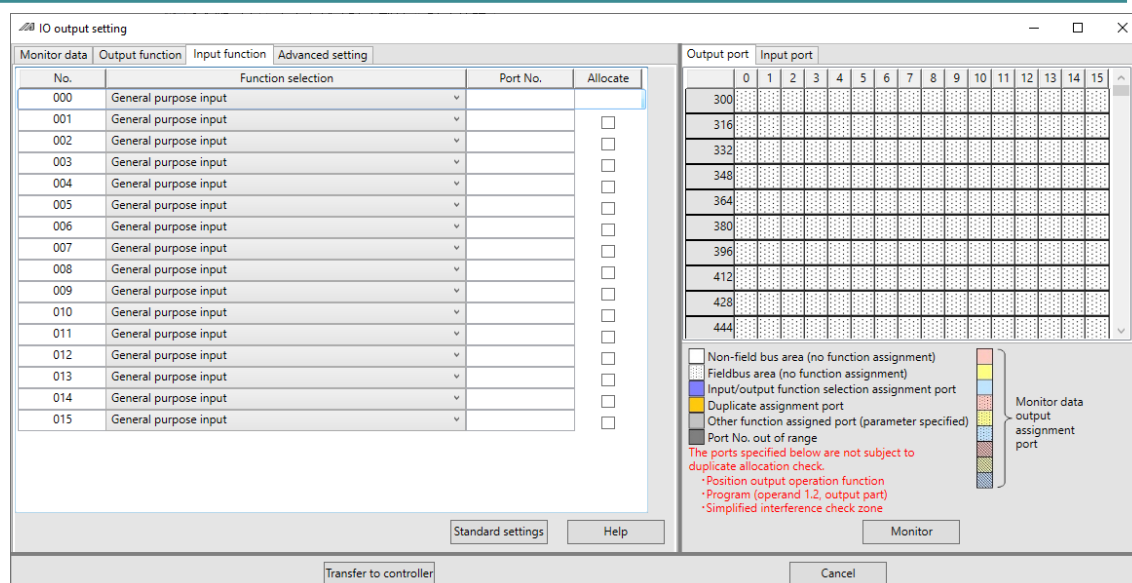
Fig. 8.49 Input Function Select Setting

In the input function select setting window, the following operations can be performed.

Operation	Things Available to Do
Select "Monitor data" tab in left window.	The left window can be switched to the monitoring data output setting window.
Select "Output Function Select Setting" tab in the left window.	The left window can be switched to the output function select setting window.
Select "Function selection" combo box in the list in the left window.	A list of items available for setting in each input function should be displayed. Refer to [8.7.3 [1]]
Select "Port No." text box in the list in the left window.	A port number can be input. Refer to [8.7.3 [1]]
Select "Allocate" check box in the list in the left window.	Allocate function for input port assignment can be turned ON/OFF.
Select "Input port" tab in the right window.	In the input function selection setting, the right side of the screen can be switched from the input port display (default) to the output port display.
Select "Standard settings" button in the left window.	The standard setting should be set to the input function select setting. Refer to [8.7.3 [3]]
Select "Help" button in the left window.	Helps for operation in the input function select setting can be displayed.
Select "Monitor" button in the right window.	The monitor window should be displayed. Refer to [8.7.5]
Select "Transfer to Controller" button on the bottom of the window.	The setting data can be transferred to the controller. Refer to [8.7.4]
Select "Cancel" button on the bottom of the window.	I/O output setting function window closes.

8. Parameter Edit Window

[1] How to Input Function Select Setting

Establish the settings in "Function selection" and "Port No." to conduct the function select setting.

The setting for "Function selection" is to be conducted in the combo box.

Items for each input function number should be displayed in the list of the combo box.

Select an item to set from the list.

List Items of Input Function No. 000
General Input
Program Start Signal (ON-edge) (Indication Program Number for Input Port Numbers from No. 007 to 014BCD)
Program Start Signal (ON-edge) (Binary Indication Program Number for Input Port Numbers from No. 007 to 014)
Program Start Signal (ON-edge) (Indication Program Number for Input Port Numbers from No. 008 to 014BCD)
Program Start Signal (ON-edge) (Binary Indication Program Number for Input Port Numbers from No. 008 to 014)

List Items of Input Function No. 001
General Input
Soft Reset Signal (ON for 1sec)

List Items of Input Function No. 002
General Input
Servo-ON

List Items of Input Function No. 003
General Input
General Input (Automatic start program startup with power-ON reset / soft reset in AUTO Mode)
Automatic Start Program Startup Signal (ON-edge: Start, OFF-edge: All operations and programs stopped (excluding I/O process program at operation and program stop))

List Items of Input Function No. 004
General Input
All Servo Axes Soft Interlock (OFF level) (Effective in commands other than Servo-OFF Command) (Operations withheld at interlock during automatic operation, Operations stopped at interlock during non-automatic operation)

List Items of Input Function No. 005
General Input
Operation Resume Signal (ON-edge)

List Items of Input Function No. 006
General Input
Operation Pause Signal (OFF level)

List Items of Input Function No. 007
General Input
Program Start Indicating Program Number (Lowest bit)

List Items of Input Function Numbers from No. 008 to No. 012
General Input
Program Start Indicating Program Number

List Items of Input Function No. 013
General Input
Program Start Indicating Program Number
Error Reset (ON-edge)

List Items of Input Function No. 014
General Input
Drive Cutoff Release Input (ON-edge) (Effective after cause removed)
Program Start Indicating Program Number

List Items of Input Function No. 015
General Input
All Activated Axes Home-Return (ON-edge)
All Incremental Activated Axes Home-Return (ON-edge)

Input the port number in 1 to 4 digits in "Port No." for setting.

Content of Input	Explanation for Value to Input
Value with 1 to 4 Digits	Input a value with 1 to 4 digits Input a value in the range of either the physical input port (0 to 299) or the extension input port (1000 to 3999).

The input function select setting should be shown in the following color.

Set "Function selection" and "Port No.", and the input function select setting should be displayed in the port assignment status in the window on the right.

Example: When Program Start Signal (ON-edge) (Input Port No. 007 to 014 BCD Indication Program Number) and Port No. 16 are set in Input Function No. 000.
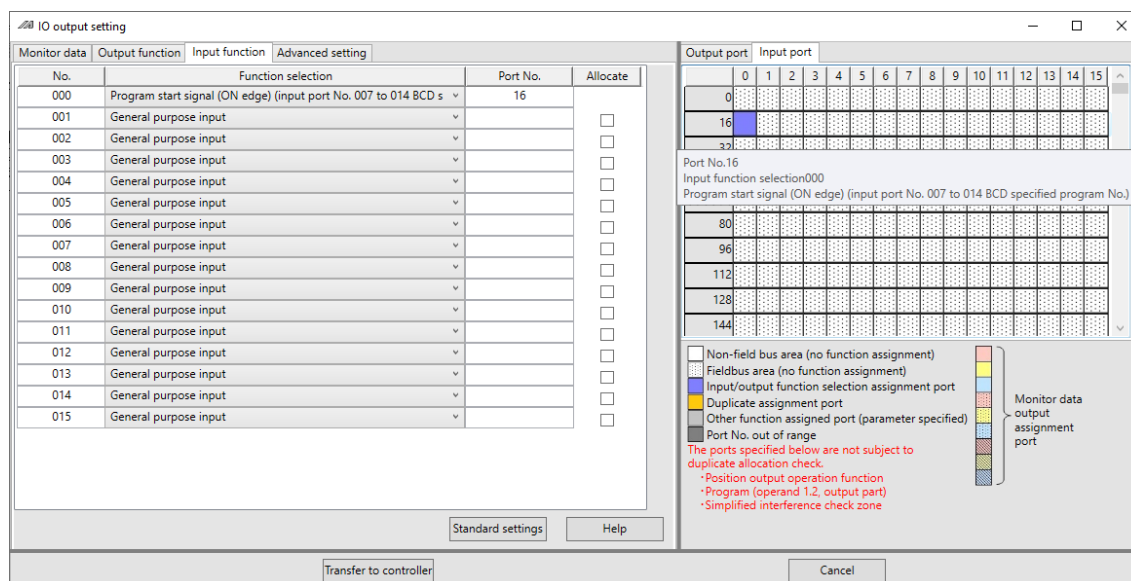

Fig. 8.50 Input function select setting (Example)

[2] How to Allocate Input Port

Check in the Allocate check box, and port numbers in a row after those for the one step previous in the input function select setting can be allocated automatically.

Example: Program Start Signal (ON-edge) (Input Port No. 007 to 014 BCD Indication Program Number) and Port No. 16 are set in Input Function No. 000. And Soft Reset Signal (ON for 1sec) is set to Input Function No. 001 and Allocate gets turned ON.
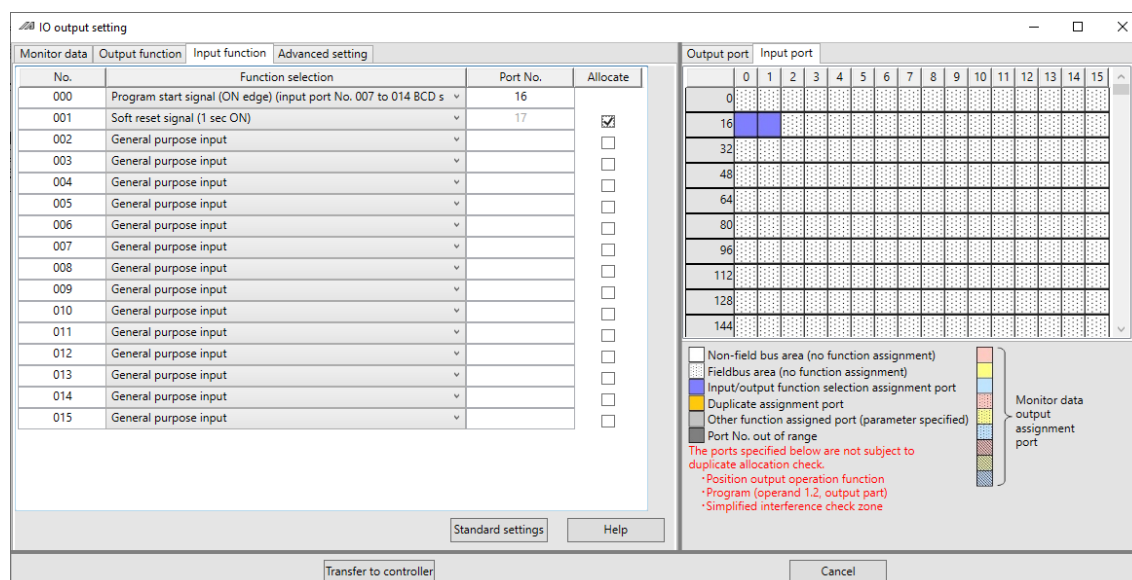

Fig. 8.51 How to Allocate Input Port

Once Allocate at Input Function No. 001 is turned ON, the consecutive port number (17) in a row to the input port number (16) set in Input Function No. 000 should be automatically set.

When the port numbers are set automatically with Allocate on, the input port numbers turn to grey and get banned to input.

When you require to turn Allocate OFF, remove the check mark in the check box.

Even if Allocate gets turned OFF, the port numbers should remain without being cleared.

Allocate setting should be kept activated while the check box is ON.

If the port number for the setting item in Input Function No. 000 is changed from 16 to 1000, the port number for Input Function No. 001 should automatically be updated to 1001.

[3] How to Change to Standard Setting

Select "Standard settings" button, and the standard setting should be allocated to the input function select setting.

Contents of Standard Setting in Input Function Select Setting

Input Function Select Setting	Items	Input Port Number
Input Function No. 000	Program Start Signal (ON-edge) (Indication Program Number for Input Port Numbers from No. 007 to 014BCD)	000
Input Function No. 001	General Output	001
Input Function No. 002	General Output	002
Input Function No. 003	General Input (Automatic start program startup with power-ON reset / soft reset in AUTO Mode)	003
Input Function No. 004	General Output	004
Input Function No. 005	General Output	005
Input Function No. 006	General Output	006
Input Function No. 007	Program Start Indicating Program Number (Lowest bit)	007
Input Function No. 008	Program Start Indicating Program Number	008
Input Function No. 009	Program Start Indicating Program Number	009
Input Function No. 010	Program Start Indicating Program Number	010
Input Function No. 011	Program Start Indicating Program Number	011
Input Function No. 012	Program Start Indicating Program Number	012
Input Function No. 013	Program Start Indicating Program Number	013
Input Function No. 014	General Output	014
Input Function No. 015	General Output	015

8.7.4 EC connection input setting / EC connection output setting

In the EC Connection Input Setting window and the EC Connection Output Setting window, display / setting of the domains that the fieldbus domains and PIO unit domains are assigned, and the ports that the EC connection and the input / output function select are assigned can be conducted.
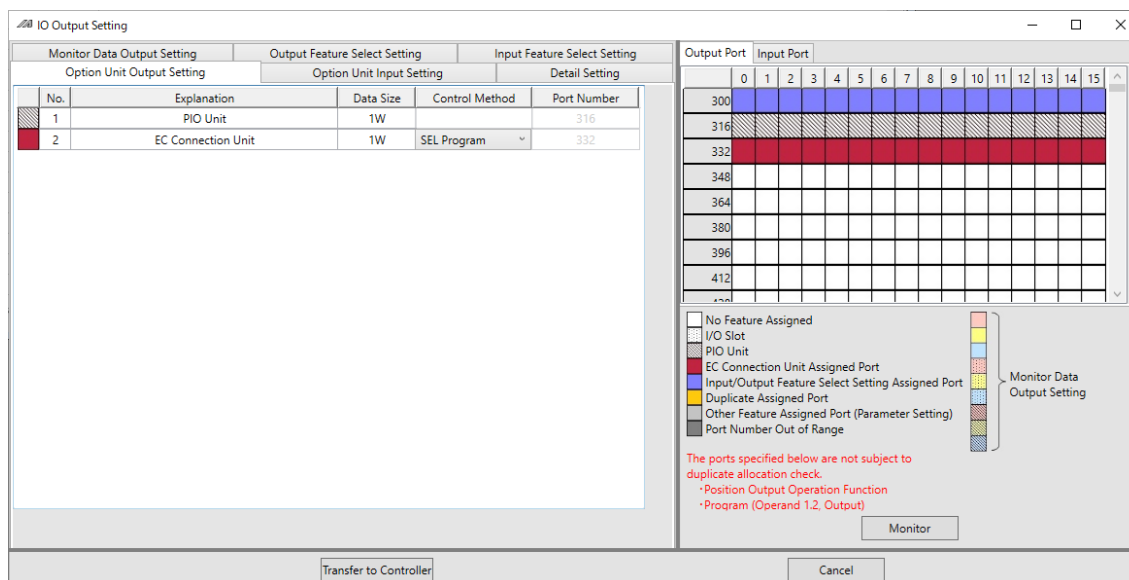

Fig. 8.52 EC connection input setting / EC connection output setting

Input ports and output ports are displayed as follows.

Display	Description
	Unassigned area
	Domain with fieldbus assigned
	Domain with PIO unit and IA net assigned
	Domain with EC connection port assigned
	When EC connection port assigned to fieldbus domain
	When EC connection port assigned to PIO unit and IA net domain

Display	Description
	Area with an assigned input/output function selection port
	When ports for input/output function select assigned to fieldbus domain
	When ports for input/output function select assigned to PIO unit and IA net domain
	Duplicate assigned port
	Port with another function already assigned

The followings can be selected in "Control System" on the left of the window.

SEL program: Select this if a SEL program will be used to perform EC axis control and monitor its status.

Host device: Select this if a host device will be used to perform EC axis control and monitor its status. Assign the leading input port number or leading output port number to an I/O slot or PIO unit area.

Built-in PLC: It should be selected when performing control of an EC axis from the occupied input and output ports in the software PLC.

8. Parameter Edit Window
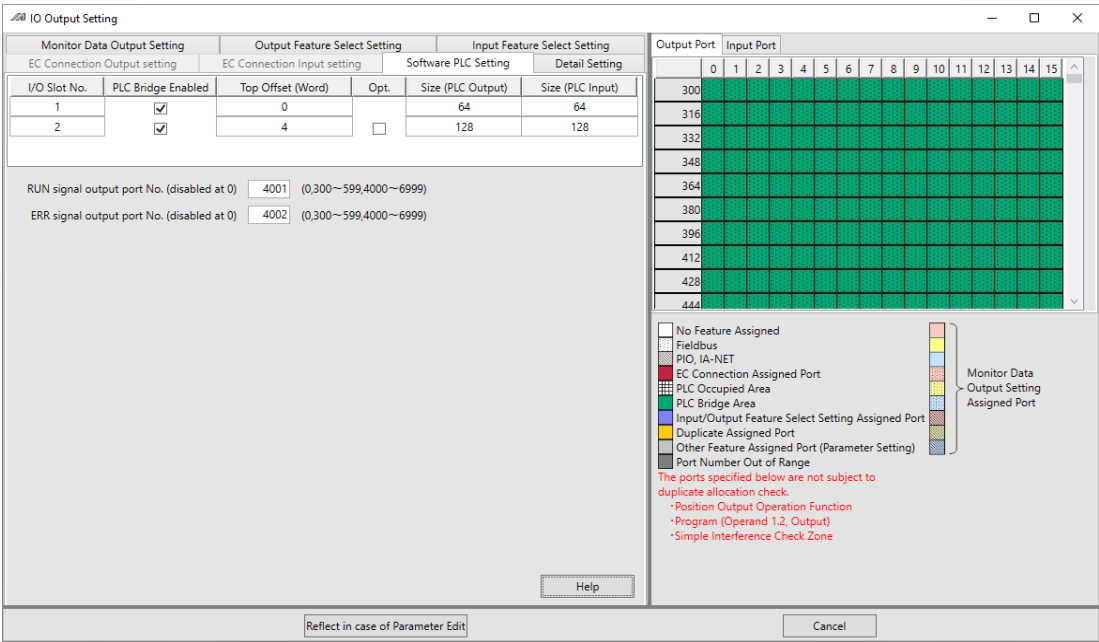
8.7.5　Software PLC setting

Fig. 8.53 Software PLC setting

The software PLC should be set up.

Setup of the signal output port numbers and setup / display of assigned ports in the PLC bridge domain should be conducted.

Set up "Enable PLC Bridge" and "Top Offset (Word)" and the port assignment status of the PLC bridge domain should be displayed with ▮ in the output port.

[Enable PLC Bridge]

　Put a checkmark, and the PLC bridge domain should get enabled.

[Top Offset (Word)]

　The top address in the bridge domain on the side of PLC should be indicated with offset (in word unit).

　(Effective Range: 0 to 63)

Fig. 8.54 Top Offset (Word)

[Allocate]

Put a checkmark, and the offset values consecutive to the "Top offset (word)" set in the previous I/O slot number should be set up automatically.

[RUN Signal Output Port No.]

[ERR Signal Output Port No.]

The port numbers to output RUN Signal and ERR Signal in the software PLC should be set up.

A decimal number in 3 to 4 digits should be input directly.

A value in the range of the physical output ports (300 to 599) or extension output ports (4000 to 6999) should be input.

8. Parameter Edit Window

8.7.6 How to Data Transfer

Transfer the setting data to the controller with ⌐Transfer to Controller¬ after the monitoring data output setting, output function select setting and input function select setting are conducted.
The transfer to the setting data should get cancelled when there is an error in the setting and the content of the error should show up.

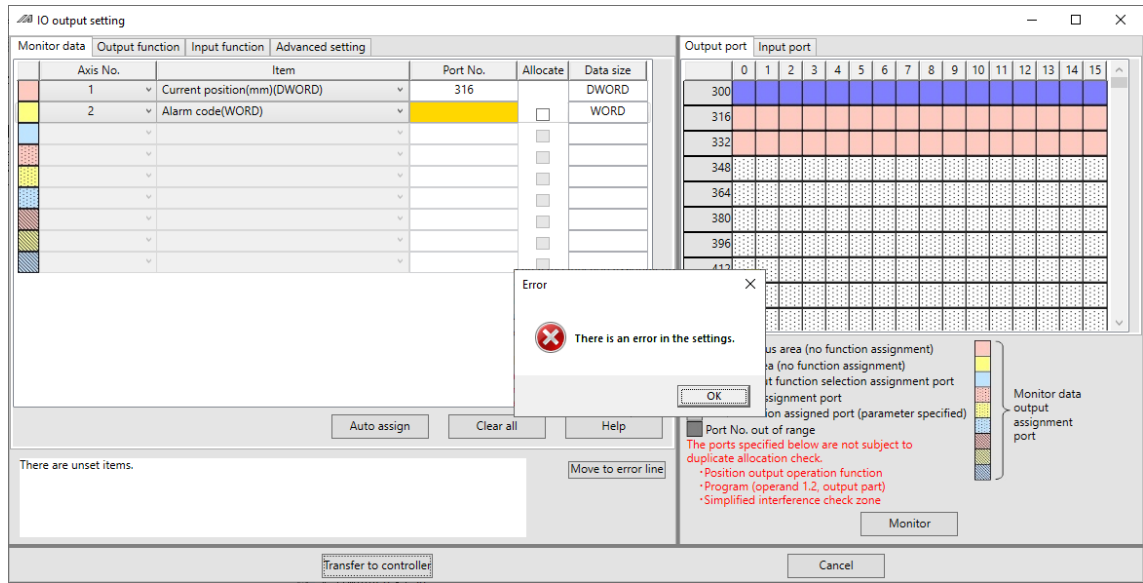Example: When Top Output Port Number is not set in the monitoring data output setting

Fig. 8.55 How to Data Transfer

An error dialog should be displayed.
The content of an error occurred should be displayed on the lower left of the window.
The port number in the line that the error occurred should be shown in the following color.

Close the error dialog and select "Move to Where Applicable", and the cursor should move to the line that the error has occurred.
Select "Move to Where Applicable" again, and the cursor should move to the line that the next error has occurred.

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8. Parameter Edit Window

Once the cursor moves to the line that the error has occurred, correct the setting where there is an error.

Error	Correction
There is an item that is not set.	Establish the setting in the item with no setting done.
There is a port that the assignments are duplicated.	Set the port numbers that should not duplicate.
There is a port that the monitoring items are duplicated.	Change the duplicated settings or delete them.
There is a port out of the setting range.	Set the port numbers that are in the effective range.
There is a port used that should not be used.	Set the port numbers that do not duplicate with the ports that have other functions already assigned.
The monitoring data output is set to a port not for the fieldbus.	Set the fieldbus domain to the port number in the monitoring data output setting.
The setting of the program numbers is not in a row.	Set the program numbers with care not to have them discontinued in the input function select setting.
Indicate (Top port number in port domain + Multiple of 8) for the top port number.	The top port number for the EC output setting / EC input setting in (Top port number in port domain + multiple of 8) should be set.
The PLC bridge domain has exceeded the PLC occupied domain.	The top offset (word) in the software PLC setting should be set.

8. Parameter Edit Window

Once all the errors are corrected, try to transfer the data again to the controller by
Transfer to Controller .
If the setting is correct, the error display should go away and the setting data should be transferred
to the controller.

Clue: Even if "There are some ports that the monitoring item is duplicated." error is occurred,
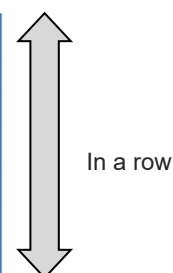the set data can be transferred to a controller.
Once you select Transfer to Controller , there should appear a confirmation dialog.
Select OK in the confirmation dialog when the setting data is to be transferred.

Clue: For "Program Start Indication Program Number" in the input function select setting, do
not input any "general input" in between. Also, it is necessary to set values in a row in
ascending order for the input port numbers in "Program Start Indication Program
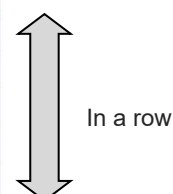Number".

Example for Appropriate Setting

Input Function No. 007 Program Start Indicating Program No. Input Port No. 000	
Input Function No. 008 Program Start Indicating Program No. Input Port No. 001	
Input Function No. 009 Program Start Indicating Program No. Input Port No. 002	
Input Function No. 010 Program Start Indicating Program No. Input Port No. 003	In a row
Input Function No. 011 Program Start Indicating Program No. Input Port No. 004	
Input Function No. 012 Program Start Indicating Program No. Input Port No. 005	
Input Function No. 013 Program Start Indicating Program No. Input Port No. 006	

Input Function No. 007 Program Start Indicating Program No. Input Port No. 000	
Input Function No. 008 Program Start Indicating Program No. Input Port No. 001	
Input Function No. 009 Program Start Indicating Program No. Input Port No. 002	In a row
Input Function No. 010 Program Start Indicating Program No. Input Port No. 003	
Input Function No. 011 Program Start Indicating Program No. Input Port No. 004	
Input Function No. 012 General Input Input Port No. 016	
Input Function No. 013 General Input Input Port No. 017	
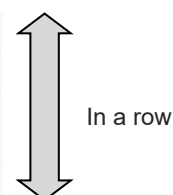
Input Function No. 007 General Input Input Port No. 016	
Input Function No. 008 General Input Input Port No. 017	
Input Function No. 009 Program Start Indicating Program No. Input Port No. 002	
Input Function No. 010 Program Start Indicating Program No. Input Port No. 003	
Input Function No. 011 Program Start Indicating Program No. Input Port No. 004	In a row
Input Function No. 012 Program Start Indicating Program No. Input Port No. 005	
Input Function No. 013 Program Start Indicating Program No. Input Port No. 006	

8. Parameter Edit Window

Example for Wrong Setting

Input Function No. 007 Program Start Indicating Program No. Input Port No.
Input Function No. 008 Program Start Indicating Program No. Input Port No.
Input Function No. 009 General Input Input Port No. 016
Input Function No. 010 General Input Input Port No. 017
Input Function No. 011 General Input Input Port No. 018
Input Function No. 012 Program Start Indicating Program No. Input Port No.
Input Function No. 013 Program Start Indicating Program No. Input Port No.

"General input" settings are involved between
"program start indicating program numbers"
and "program start indicating program numbers"

Input Function No. 007 Program Start Indicating Program No. Input Port No.
Input Function No. 008 Program Start Indicating Program No. Input Port No.
Input Function No. 009 Program Start Indicating Program No. Input Port No.
Input Function No. 010 Program Start Indicating Program No. Input Port No.
Input Function No. 011 Program Start Indicating Program No. Input Port No.
Input Function No. 012 Program Start Indicating Program No. Input Port No.
Input Function No. 013 Program Start Indicating Program No. Input Port No.

Setting of input port numbers is not in a row

Clue: When the I/O output setting function is started up offline, Transfer to Controller should be turned into Reflect to Parameter Edit Window .

When also the parameters are to be reflected to the parameter edit window with Reflect to Parameter Edit Window , if there is an error in the setting, the error should be displayed and reflecting of the setting data to the parameter edit window should be cancelled.

Clue: The ports that have other functions already assigned are the ports that the parameters below are used. Check separately for the functions and settings for each parameter.

Details of Ports Other Functions Already Assigned

Parameter Type / Number	Function Name
I/O Parameter No.28	I/O Ready Output Port Number
I/O Parameter No.74	Number of TP User Output Port Use (hand, etc.)
I/O Parameter No.75	TP User Output Port Start Number(hand, etc.)
I/O Parameter No.76	AUTO Mode Output Port Number
I/O Parameter No.79	Remote Mode Control Input Port Number
I/O Parameter No.356	Vision System I/F1 Initial Complete Status Physical Input Port Number
I/O Parameter No.357	Vision System I/F1 Capturing Command Physical Output Port Number
Each Axis Parameter No.88	Zone 1 Output Number
Each Axis Parameter No.91	Zone 2 Output Number
Each Axis Parameter No.94	Zone 3 Output Number
Each Axis Parameter No.97	Zone 4 Output Number
Each Axis Parameter No.114	OLWNO Driver Overload Warning Output Number
Each Axis Parameter No.231	Output Number with Servo On
Each Axis Parameter No.232	In-Position Output Number

8. Parameter Edit Window

8.7.7　How to Controller Data Monitoring

After transferring the setting data to the controller, select ⎡Monitor⎤ to open the output port monitoring window.

In the output port monitor window, the values in the output port indicated in the monitoring data output setting can be monitored.

Example:　When setting "1" (Axes Group No. 1), Current Position [mm] (2W) and Port No. 316 in the first monitoring data output setting. And setting "1" (Axes Group No. 2), Alarm Code (1W) and Port No. 348 in the second monitor data output setting.

First No.	Monitor item	Axis No.	Data size	Select monitor radix	State
316	Current position(mm)(DWORD)	1(Axis group No.1)	DWORD	32-bit order(0, 31)	0000 0000 0000 0000 0000 0000 0000 0000
348	Alarm code(WORD)	1(Axis group No.2)	WORD	16-bit order(0, 15)	0000 0000 0000 0000
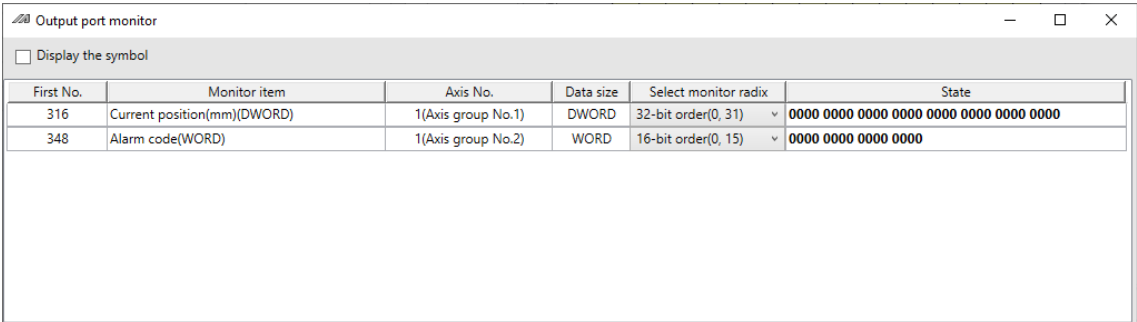
Fig. 8.56 How to Controller Data Monitoring

From Top No. to Size, the contents set in the monitoring data output setting should be displayed. The how to display the output port numbers can be selected in Monitor Radix.

Monitor Radix	Status Display
Bit Order 0 to 31 / Bit Order 0 to 15	Data is to be shown in binary numbers with the left LSB. (LSB: Lowest bit)
Bit Order 31 to 0 / Bit Order 15 to 0	Data is to be shown in binary numbers with the left MSB. (MSB: Highest bit)
10 (unsigned)	Data is to be shown in unsigned decimal numbers.
10 (singed)	Data is to be shown in singed decimal numbers.
16	Data is to be shown in hexadecimal numbers.

8.7.8 How to Monitoring Data Swap Setting
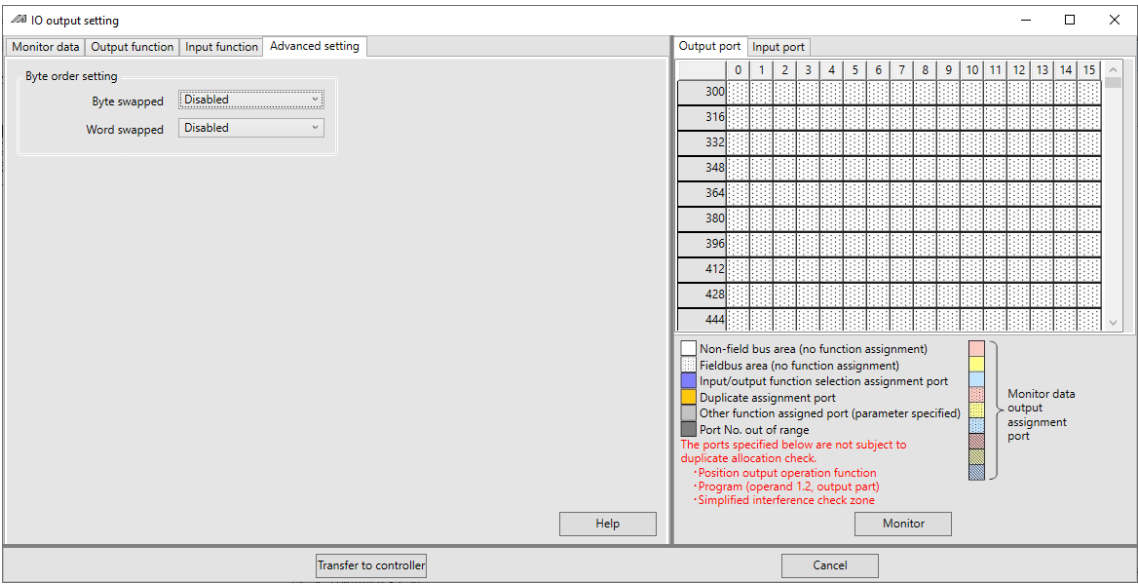
Fig. 8.57 How to Monitoring Data Swap Setting

In the Advanced setting window, the endian for monitoring data read from the controller can be set.

Setting	Detail
Byte Swap	Select either to enabled or disabled. When selected to enabled, swapping should be conducted in the byte unit.
Word Swap	Select either to enabled or disabled. When selected to enabled, swapping should be conducted in the word unit.

Clue: In the swap setting, the data shown in the monitoring window can be set in four ways as shown below.

8. Parameter Edit Window

Data Indicated in Monitoring Item (Big Endian)

bit31   bit0

| 01 | 23 | 45 | 67 |

Byte Swap = Disabled
Word Swap = Disabled

bit31   bit0

| 01 | 23 | 45 | 67 |
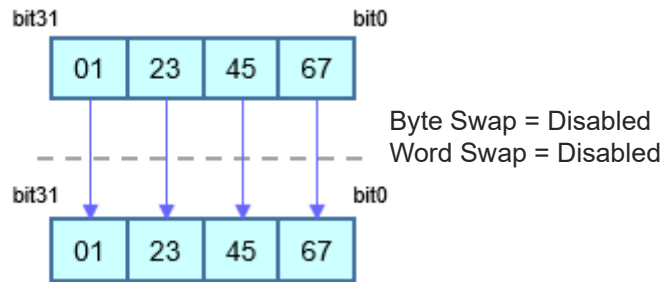
Data Displayed in Monitoring Window (Big Endian)

Data Indicated in Monitoring Item (Big Endian)

bit31   bit0

| 01 | 23 | 45 | 67 |

Byte Swap = Enabled
Word Swap = Disabled

bit31   bit0

| 23 | 01 | 67 | 45 |
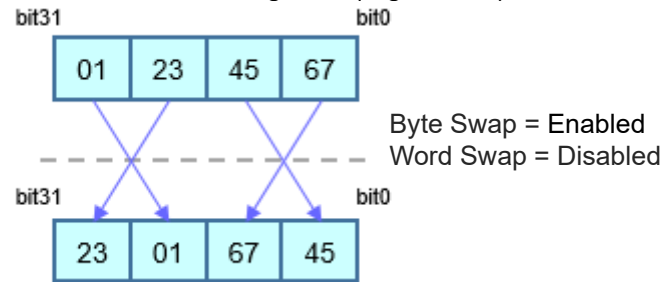
Data Displayed in Monitoring Window (PDP Endian)

Data Indicated in Monitoring Item (Big Endian)

bit31   bit0

| 01 | 23 | 45 | 67 |

Byte Swap = Disabled
Word Swap = Enabled

bit31   bit0

| 45 | 67 | 01 | 23 |
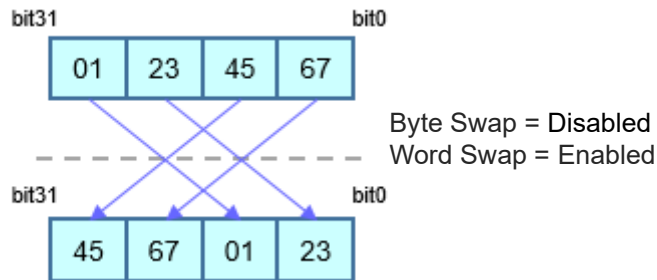
Data Displayed in Monitoring Window

Data Indicated in Monitoring Item (Big Endian)

bit31   bit0

| 01 | 23 | 45 | 67 |

Byte Swap = Enabled
Word Swap = Enabled

bit31   bit0

| 67 | 45 | 23 | 01 |
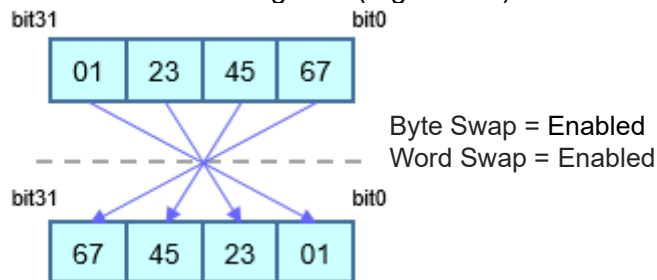
Data Displayed in Monitoring Window (Little Endian)

8. Parameter Edit Window

XSEL2

Chapter 9

Symbol Edit Window

9.1 About Symbols

Variable numbers, flag numbers and other values can be treated as symbols.

(1) Support range

The range that supports symbolization is as follows.

Variable number, flag number, tag number, subroutine number, program number, position number, input port number, output port number, input/output port number, axis number, constant

(2) Symbol description rules

1) First character: A single-byte alphabet, single-byte underscore, single-byte character (half-width kana) in ASCII Code 0x80 or later or two-byte character (excluding full-width space)

2) Second and subsequent characters: Any single-byte character or two-byte character (excluding full-width space) in ASCII Code 0x21 or later.

3) Maximum number of characters: 40 single-byte characters (20 two-byte characters).

4) Definition of the same symbol for two or more values within a given function is prohibited. (The same symbol can be defined for two or more local values that are each used in a different program.)

5) Definition of the same symbol for two or more flag numbers, input port number, output port number and/or input/output port number is prohibited.
(The same symbol can be defined for two or more local flags/ports that are each used in a different program.)

6) Definition of the same symbol for two or more integer variable numbers and/or real variable numbers is prohibited.
(The same symbol can be defined for two or more local variables that are each used in a different program.)

7) Definition of the same symbol for two or more integer constants and/or real constants is prohibited.

(3) Number of symbol definitions: Up to 2,000

(4) Number of symbol uses allowed in commands: Up to 20,000

* Defining the input condition, operands 1 and 2 and output in a step all using symbols is equivalent to four symbol uses in one step.

9.2   Explanation of the Symbol Edit Window

(1)   Select "Symbol (Y)" → "Edit (E)" from the menu.

(2)   The symbol edit window will be displayed.

💾 Save to File

Clicking this button where you can save the symbol data to a file under a desired name.

⚠️ **Caution**

● X-SEL-P/Q applicable for increased memory capacity, PX/QX (equipped with the gateway function) and SSEL controllers are not capable of saving the symbols in Program No. 65 and after and Position No. 4001 and after in "Symbol File Format 1" in the normal format.
Save them in "Position File Format 2" in the extension format.

🔲 Transfer to Controller

Clicking this button will transfer the symbol data to the controller.

🖨 Print

Clicking this button will print the symbol data.

Select the scope as Global or Local.   If Local is selected, specify a desired program number.
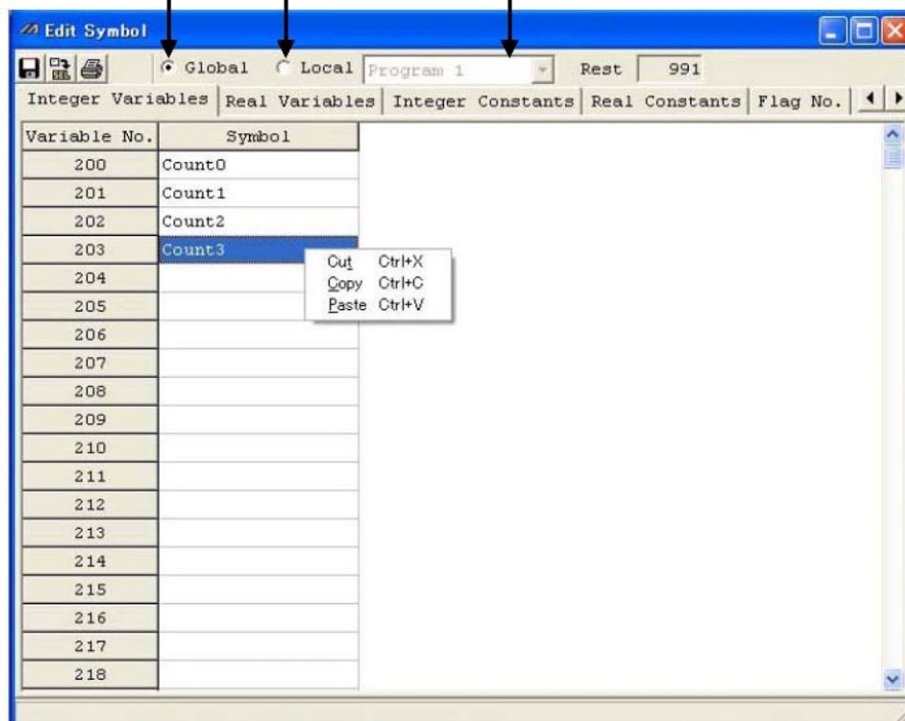
Fig. 9.1 Symbol Edit

* The above symbol edit window is for integer variables. You can display other symbol edit window by clicking each category tab.

(3)   Right-click in the symbol edit window will display the pop-up menu which has the options of
       "Cut (T)", "Copy (C)" and "Paste (P)".
       The "Cut (T)" or "Copy (C)" data can be "Paste (P)" only in the symbol edit window. (The data
       cannot be pasted in the other windows such as the program edit window and position data edit
       window.)

(4)   A symbol character string can be drag & drop between the symbol edit window and program
       edit window.
       By dragging a symbol character string on the symbol edit window while pressing Ctrl key and
       then dropping it into any cell of "Cnd", "Operand 1", "Operand 2" and "Pst", the symbol
       character string can be copied.
       The reverse operation (drag & drop operation from the program edit window to the symbol edit
       window) is also available.
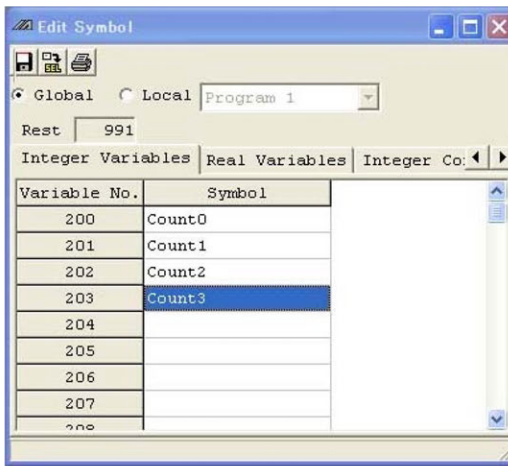
Fig. 9.2 Symbol Edit Window   Fig. 9.3 Program Edit Window
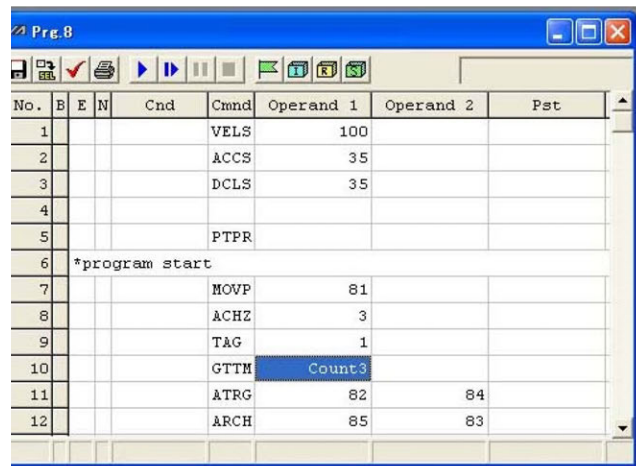
In the symbol edit window, clicking "Edit (E)" → "Undo (U)" from the menu can cancel up to the
most recent 10 input operations.
Alternatively, pressing Ctrl + Z key simultaneously can cancel the operations.
However, the cancel function will become disabled when any of the following operations is
performed:
● Transfer of data on the edit window to the controller
● Saving data on the edit window to a file
● Closing of the edit window

When this operation is performed, the warning window in Fig. 9.4 will be displayed.
Clicking Yes will cancel the operation executed immediately before.
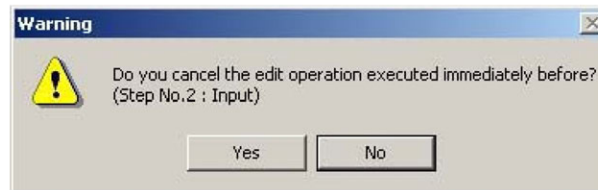
Fig. 9.4 Warning

* Setting in binary and hexadecimal numbers is available in the definition value for the integral constants.
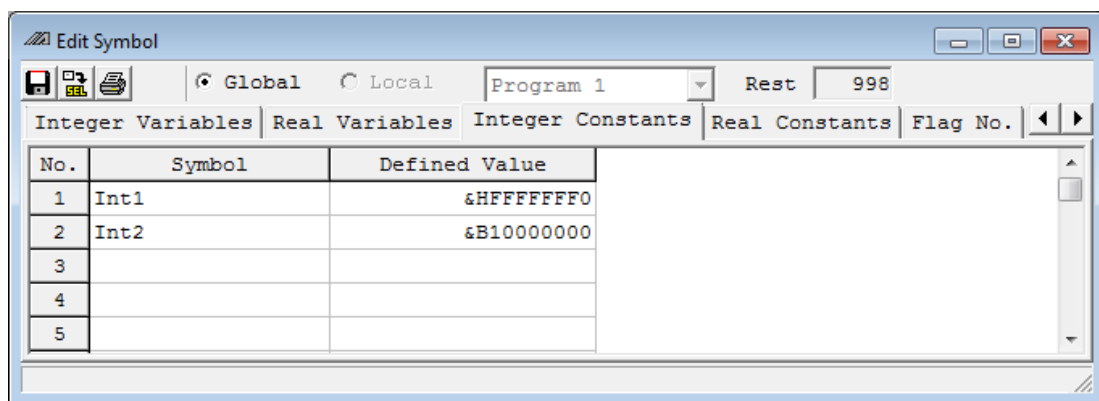
Fig. 9.5 Setting with Binary and Hexadecimal Systems

[How to set up]

When using the binary numbers, apply "&B" at the top of the value.

When using the hexadecimal numbers, apply "&H" at the top of the value.

Eight digits can be input at maximum for binary and hexadecimal numbers.

* In the operand to input the axis pattern (the operand input values in binary system), do not apply "&B" at the top to input with the binary numbers.

* Binary numbers are treated as unsigned integer.
(Example: &B11111111 = 255)

* Hexadecimal numbers treated as signed integer.
(Example: &HFFFFFFFF = -1)

(5)   The remaining number of symbols in the command available for use can be checked in the main window and program number select window.
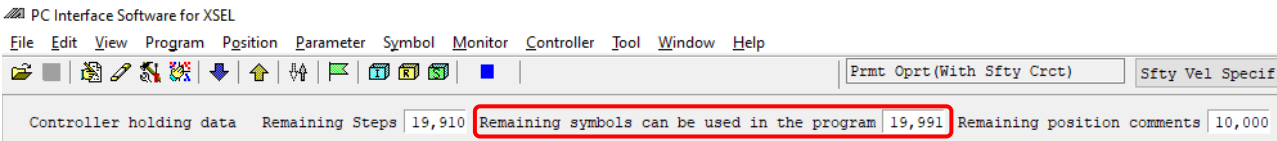
Fig. 9.6 Display of Remaining Number of Symbols in Command Available for Use (Main Window)
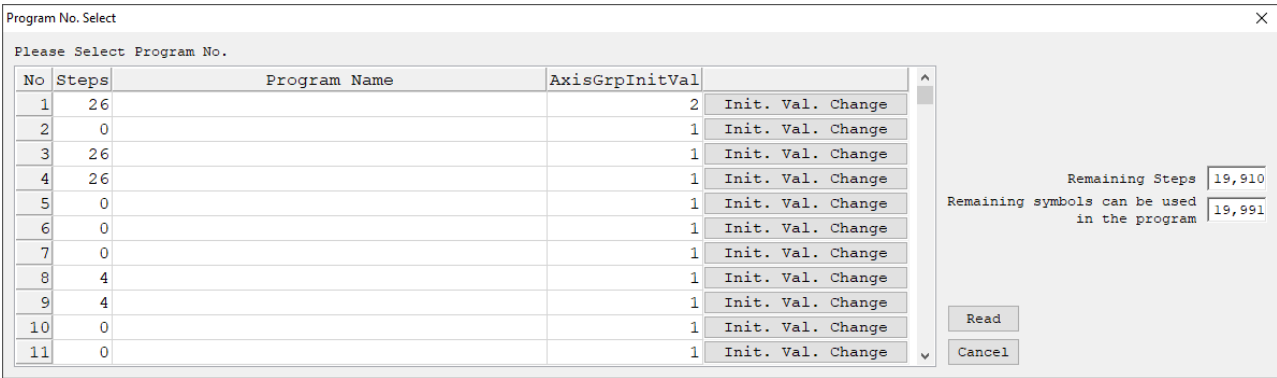
Fig. 9.7 Display of Remaining Number of Symbols in Command Available for Use
(Program Number Select Window)

9. Symbol Edit Window

9.3　Saving Symbol Data and Closing the Edit Window

(1)　Saving to a file the symbol data you are editing

Click Save to File in the symbol edit window.

This is the same as clicking "File (F)" → "Save As (A)".

After clicking Save to File , "File save format selection window" will be displayed.

⚠ **Caution**

● If you click "Always save with Format 2", files will be always saved with Format 2. And this window won't be displayed after that. It can be displayed again by setting in the Environment Setup window [13. Tool].
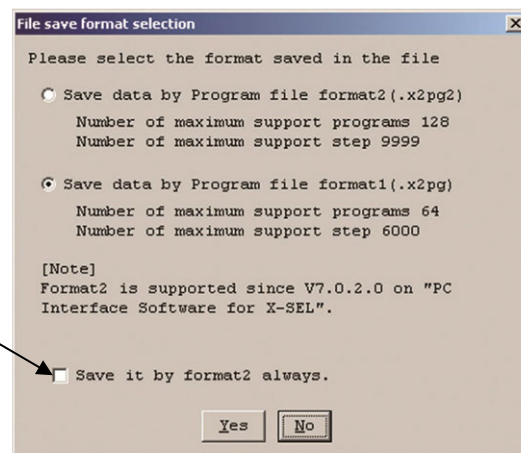
Fig. 9.8 File save format selection window

(2)　Transferring to the controller the symbol data you are editing

You can save the symbol data you are editing to the controller's memory.

Click Transfer to Controller in the symbol edit window.

It is available to use only when it is connected to a controller.

(3)　Writing to the flash ROM

Once the symbol has been transferred to the controller, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
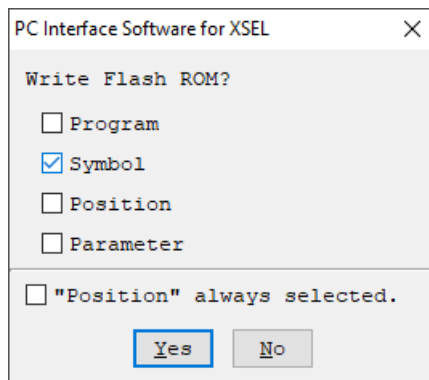
Fig. 9.9 Confirmation

9. Symbol Edit Window

Click and select a desired item (Symbols, etc.) to write to the flash ROM.

Click $\boxed{\text{Yes}}$ → The memory data will be written to the flash ROM.

Click $\boxed{\text{No}}$ → The memory data will not be written to the flash ROM.

If No is selected, the controller will clear all data in its memory after a reset (i.e., after the controller power is reconnected or a software reset is executed), and then load the data from the flash ROM. (The controller will operate in accordance with the transferred data until a reset is executed.)

* The number of writing to the flash ROM is limited (approx. 100,000 times). If you do not write all the data, select "Write Selected Data Region" and write to the flash ROM.

(4) Closing the symbol edit window

Attempting to close the symbol edit window will display the following confirmation dialog box with the message, "Save edited data in the Controller?"

Fig. 9.10 Confirmation

$\boxed{\text{Yes}}$ The edited data will be transferred to the controller.

$\boxed{\text{No}}$ The software will close the symbol edit window without saving the edited data.

$\boxed{\text{Cancel}}$ The software will cancel the operation and return to the symbol edit window.

(Note) If a symbol in use in SEL program gets deleted or changed, 44C "Symbol Searching Error" could occur when the SEL program is executed.

In such a case, have the SEL program that refers the deleted or changed symbol transferred again to the controller.

* In case the error would not be cleared, it may be necessary to edit the SEL program again.

9. Symbol Edit Window

* Symbol edit is available also in the following windows.

1) Conduct the following operations, and the symbol input dialog should appear.

Window Name	Editable Symbols	How to Show
Position Edit Window (Offline Edit)	Position Number	Right-click on the position data while in symbol display → select "Symbol Edit (&E)" in the right-click menu
Program Number Select Window (Edit, Copy/Move, Clear)	Program Number	Right-click on the program information → select "Symbol Edit (&E)" in the right-click menu
Tree View	Program Number	Right-click on the program number → select "Program name Edit (&E)" in the right-click menu
Input Port Monitor	Input Port	Right-click on the monitor while in symbol display → select "Symbol Edit (&E)" in the right-click menu
Output Port Monitor	Output Port	Right-click on the monitor while in symbol display → select "Symbol Edit (&E)" in the right-click menu
Input and Output Port Monitor	Input and Output Port	Right-click on the monitor while in symbol display → select "Symbol Edit (&E)" in the right-click menu
Integer Variables Monitor	Integer Variables	Right-click on the monitor → select "Symbol Edit (&E)" in the right-click menu
Real Variables Monitor	Real Variables	Right-click on the monitor → select "Symbol Edit (&E)" in the right-click menu
Flag Monitor	Flag	Right-click on the monitor while in symbol display → select "Symbol Edit (&E)" in the right-click menu

2) Input a symbol name and click OK.

The symbol that was input should be transferred to the controller.
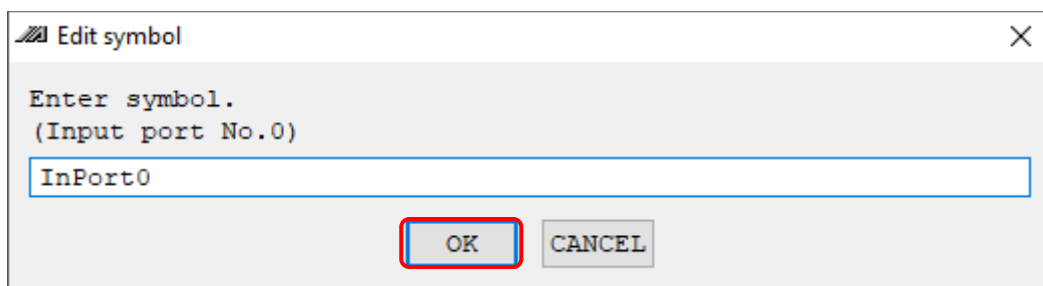
Fig. 9.11 Symbol Name Input

3) Flash ROM writing window opens.

Put a check mark at Symbol and click $\boxed{\text{Yes}}$.

It should be reflected also to the symbol edit window.
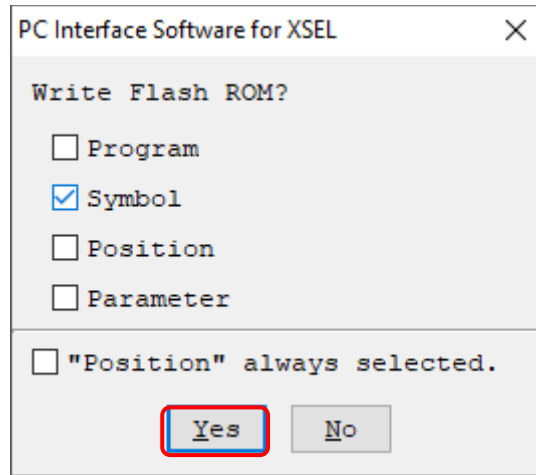
Fig. 9.12 Flash ROM Writing Window

(Note) If you click $\boxed{\text{No}}$ to cancel writing, the symbol setting should get back to that before change after the power is turned off or controller reset is performed.

9. Symbol Edit Window

XSEL2

Chapter **10**
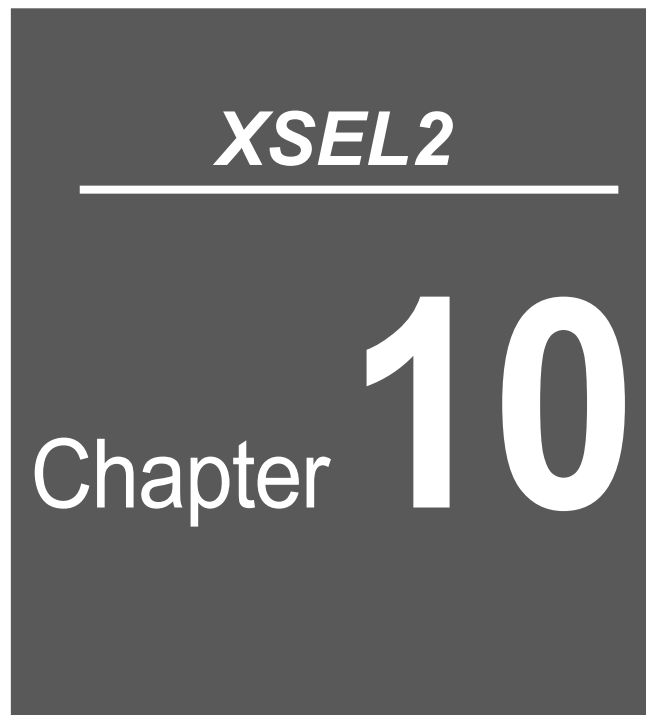
Coordinate System Definition Data Edit Window

10.1 Explanation of Coordinate System Definition Data Edit Window

Edit of the coordinate system definition data can be performed for the XSEL2-TX.
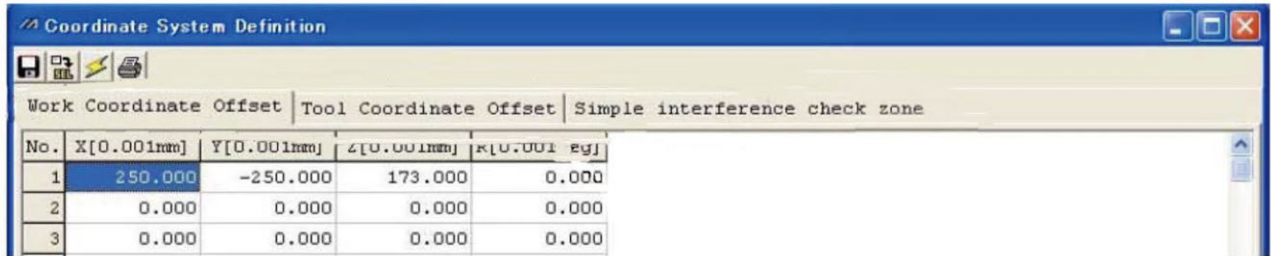
Fig. 10.1 Coordinate System Definition Data Edit Window

(1) Select "Coordinate System (D)" → "Edit (E)" from the menu.

In the coordinate system definition data edit window, clicking "Edit (E)" → "Undo (U)" from the menu can cancel up to the most recent 10 input operations.

Alternatively, pressing the Ctrl + Z key simultaneously can cancel the operations.

However, the cancel function will become disabled when any of the following operations is performed:

● Transfer of data on the edit window to the controller

● Saving data on the edit window to a file

● Closing of the edit window

When this operation is performed, the warning window in Fig. 10.2 will be displayed.

Clicking Yes will cancel the operation executed immediately before.

Fig. 10.2 Warning

10. Coordinate System Definition Data Edit Window
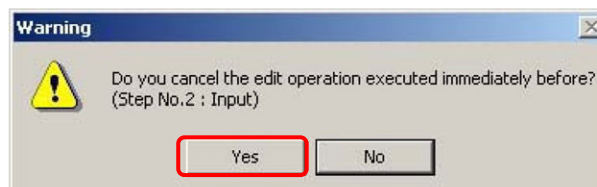
10.2 Work Coordinate System

The work coordinate system (X, Y, Z and R) should be defined by the offset against the base coordinate system. If the offset is all "0", it is the same as the base coordinate system.
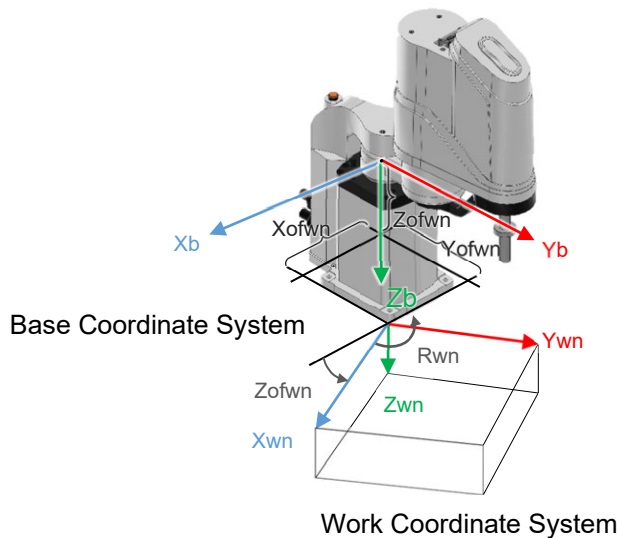
Xofwn: X Work Coordinate System Offset
Yofwn: Y Work Coordinate System Offset
Zofwn: Z Work Coordinate System Offset
Rofwn: R Work Coordinate System Offset

Xwn: Work Coordinate System X-axis
Ywn: Work Coordinate System Y-axis
Zwn: Work Coordinate System Z-axis
Rwn: Work Coordinate System R-axis

(n is the work coordinate system No.)

Fig. 10.3 Work Coordinate System

The edit window should be as shown below.
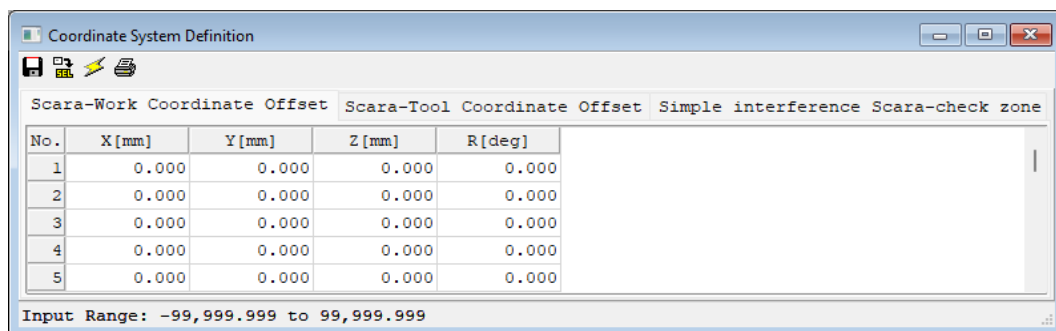
Fig. 10.4 Work Coordinate System Offset Setting Window

The content of each edit item is as stated below.

<SCARA Work Coordinate System Offset>

No.	Work coordinate system number should be shown.
X [mm]	Input the offset value of the X-axis to the base coordinate.
Y [mm]	Input the offset value of the Y-axis to the base coordinate.
Z [mm]	Input the offset value of the Z-axis to the base coordinate.
R [deg]	Input the offset value of the R-axis to the base coordinate.

10. Coordinate System Definition Data Edit Window

10.3 Tool Coordinate System

It is the 3-dimensional cartesian coordinates + rotary axis coordinates in 128 kinds defined with the dimensions (offset) of a tool (such as hand) attached on the tool attachment surface.
However, Tool Coordinate System No. 0 should be reserved as Offset 0 in the tool coordinate system by the system.
Select a defined tool coordinate system number, and the tool tip, not the center of the tool attachment surface, should be used as the reached point at positioning.
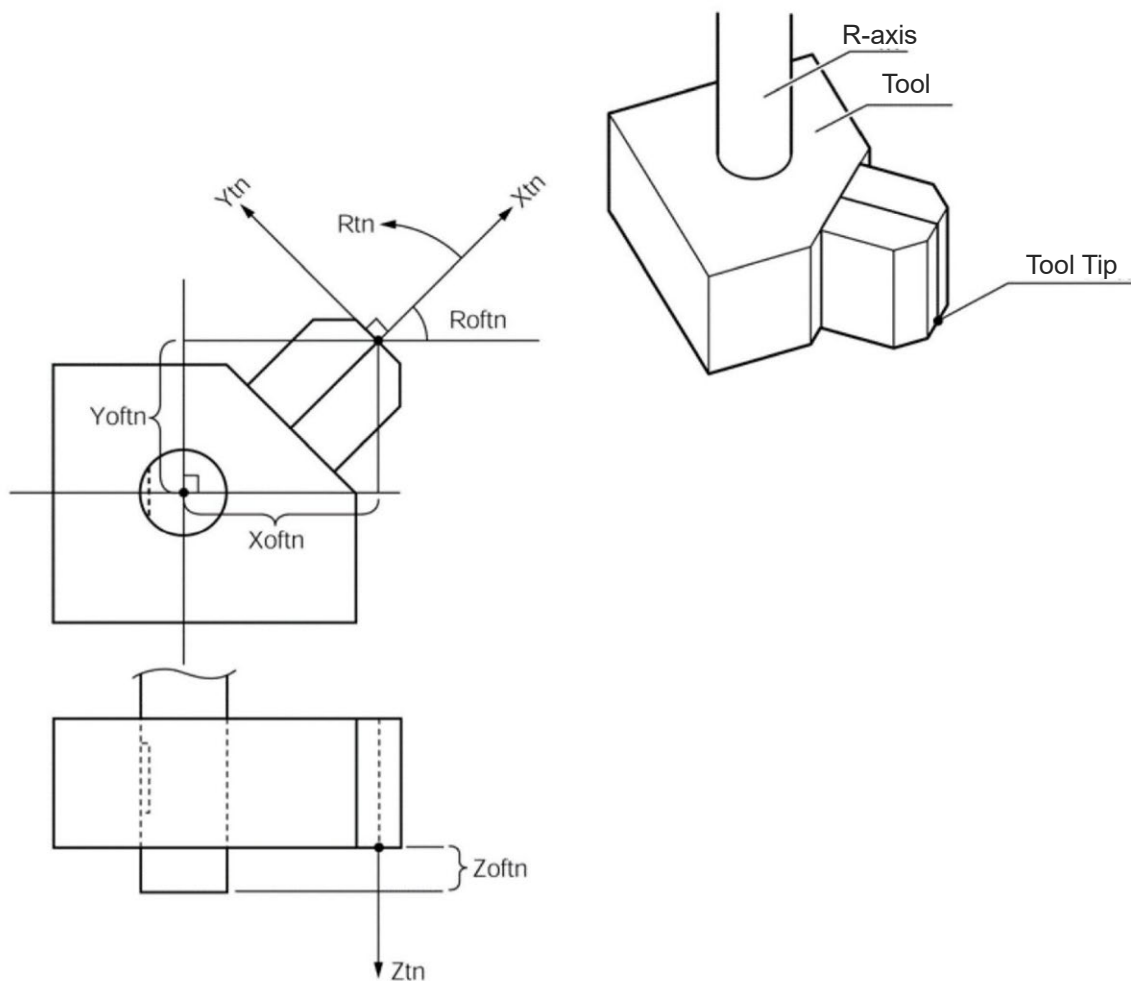
Fig. 10.5 Tool Coordinate System

10. Coordinate System Definition Data Edit Window

The edit window should be as shown below.

Fig. 10.6 Tool Coordinate System Offset Setting Window

The content of each edit item is as stated below.

<SCARA Tool Coordinate System Offset>

No.	Tool coordinate system number should be shown.
X [mm]	Input the offset value of the X-axis
Y [mm]	Input the offset value of the Y-axis
Z [mm]	Input the offset value of the Z-axis
R [deg]	Input the offset value of the R-axis

10. Coordinate System Definition Data Edit Window

10.4 Simple Interference Check Zone

The simple interference check zone is the area to be set in order to have an interference check between a robot and peripheral devices.

Interference in a simple interference check zone at the center position on the tool attachment surface for Tool Coordinate No. 0 (= tool coordinate system offset 0) and the tip position on a tool for the tool coordinate system No. 1 to 127 (=tool coordinate system offset valid) can be detected.

Interference in a simple interference check zone at the center position on the tool attachment surface (when Tool Coordinate No. 0 is selected) and the tip position on a tool (when Tool coordinate system No. 1 to 127 is selected) should be detected. Any interference at an area other than the outer circumference of the R-axis or the tip position of a tool should not be detected.

The edit window should be as shown below.

Fig. 10.7 Simple Interference Check Zone Definition Coordinate Setting Window

The content of each edit item is as stated below.

<Simple Interference Check Zone Coordinate Definition>

Zone No.	Zone No. should be displayed.
Coordinate No.	Coordinate No. should be displayed. There are Coordinate 1 and Coordinate 2.
X [mm]	Input the interference area data of the X-axis.
Y [mm]	Input the interference area data of the Y-axis.
Z [mm]	Input the interference area data of the Z-axis.
R [deg]	Input the interference area data of the R-axis.

Physical/Extension Output Port Number/Global Flag Number:

Input the output port / flag number when getting into the check zone.

Error Type   Select the error type.

   0 = Error not to be processed

   1 = Error output in message level

   2 = Error output in operation cancel level

10. Coordinate System Definition Data Edit Window

- X, Y, Z

  Set the values for the space diagonal points on a rectangular parallelepiped on the base coordinates to Coordinate 1 and Coordinate 2.
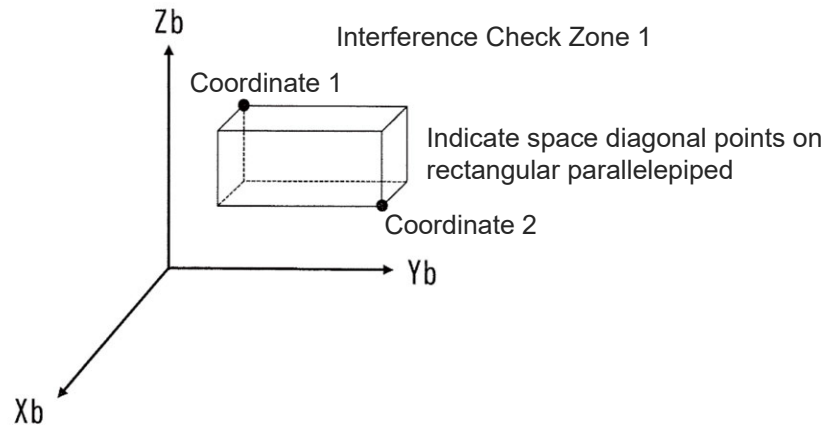
Fig. 10.8 Simple Interference Check Zone Coordinate

- Output Port / Global Flag Numbers

  Set the values for 300 to 500 / 4000 to 6999 / 600 to 899.

  If there are values set, ON while the tool tip is entering the zone.

- Error Type

  Establish the setting from:

  0 = No error process while in the zone

  1 = Message level error while in the zone

  2 = Operation cancel level error while in the zone

● Caution
  ● If the operation cancel level error while in the zone is selected, the robot will decelerate and stop after the tool tip gets into the simple interference check zone, thus the position where the robot actually stops should be in the zone. It is recommended to have the zone range set relatively large considering the size of the tool and the distance to decelerate and stop.
  ● The simple interference check zone gets valid after the absolute coordinates are confirmed. Note that the interference check will not be held when the absolute coordinates are not confirmed.
  ● The frequency of invasion monitor is 5ms.
    There may be a case that the invasion cannot be detected if the tool tip stays in the zone for 5ms or more.
    It is recommended to have the zone range set relatively large considering the size of the tool and the duration not detected. There may be a case that it takes 5ms before the change to the simple interference check zone setting gets reflected. It is recommended to have the robot stopped while in the simple interference check zone setting change.
  ● The tool tip that the invasion monitor is to be conducted should be determined by the tool coordinate system definition data and currently selected tool coordinate system number. It is mandatory to have the tool coordinate system definition data and currently selected tool coordinate system number set properly.

10. Coordinate System Definition Data Edit Window

10.5 Coordinate System Definition Data Clear Window

The procedure to delete coordinate system definition data is explained below:

(1)   Select "Coordinate System (D)" → "Clear (L)" from the menu.

(2)   The coordinate system definition data clear window will be displayed.

Click in the applicable checkbox to select the type of data you wish to delete.
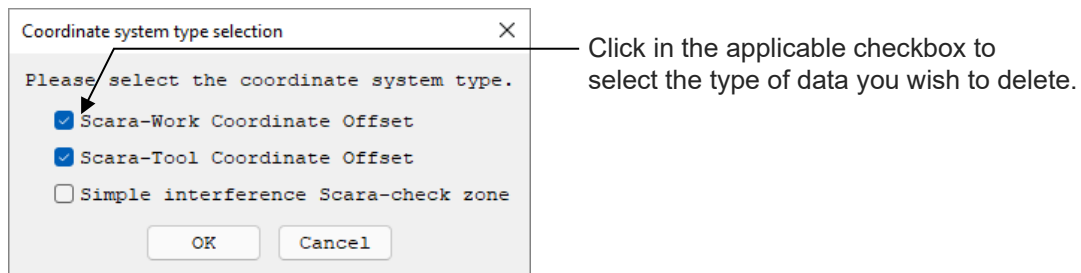
Fig. 10.9 Coordinate System Definition Data Clear

Select the type of coordinate system data you wish to delete.
Next, click OK .
A warning message will be displayed to confirm if you really want to delete the data.
Click OK .
The data will be transferred to the controller.
Clicking Cancel will cancel the operation.
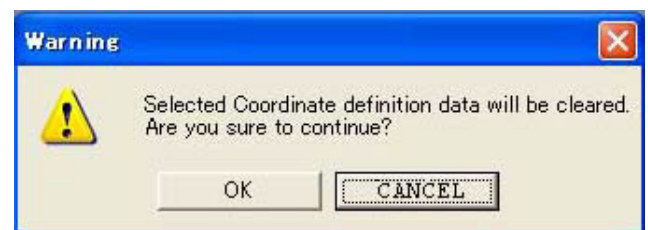
Fig. 10.10 Warning

10.6 Printing of Coordinate System Definition Data

The procedure to print coordinate system definition data is explained below.

(1)   Click 🖨 in the menu in the coordinate system data definition edit window.

(2)   Select whether to print all types or the coordinate system data being displayed.
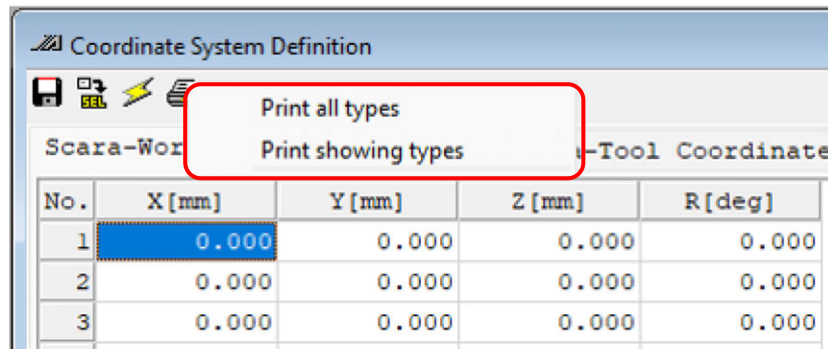
Fig. 10.11 Print Type Selection

(3)   The coordinate system definition data will be printed in accordance with the selected content.

10. Coordinate System Definition Data Edit Window

10. Coordinate System Definition Data Edit Window

XSEL2

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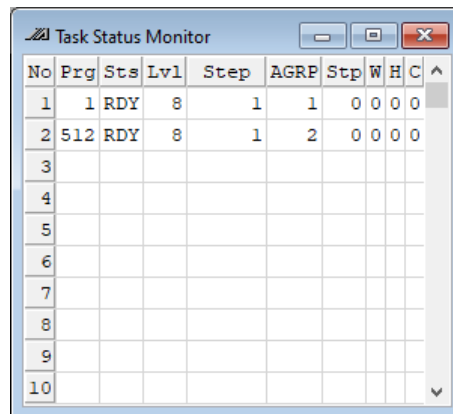
Monitor

11.1 Various status

You can check the current statuses of various items from the "Monitor" menu.

(1) Task status monitor window
This window shows the statuses of running programs.

Fig. 11.1 Task Status

No.: Task No.

Prg: Program No.

Sts: Task status

- RUN (Run): Being executed
- RDY (Ready):The task is ready to be performed.
- WAT (Wait): The task is suspended.
- WAS (Wait Suspend): Double suspension
- SUS (Suspend): Compulsory suspension

Lv1: Task level

Step: Program executed step number

AGRP: Axes group number indication current value

Stp: While in execution stop command (0 or 1)

W: Waiting (in response to the TIMW, WTxx, WZxx, WRIT or READ command, waiting for a servo command to be completed, etc.) (0 or 1)

H: HOLD input (0 or 1)

C: CANC input (0 or 1)

11. Monitor

(2)　System status monitor window

The current operation mode is displayed. ("MANUAL", "AUTO")

Of the errors currently occurring, the most serious level system error number is displayed.

Of the errors currently occurring, the latest system error number is displayed.

Various statuses are displayed.
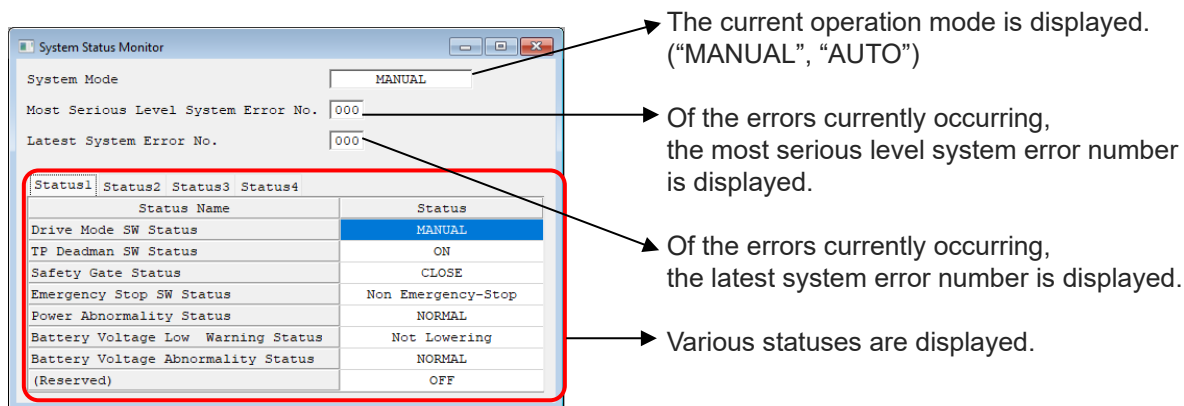
Fig. 11.2 System Status

(3)　Axis status monitor window

This window shows the status of each axis.
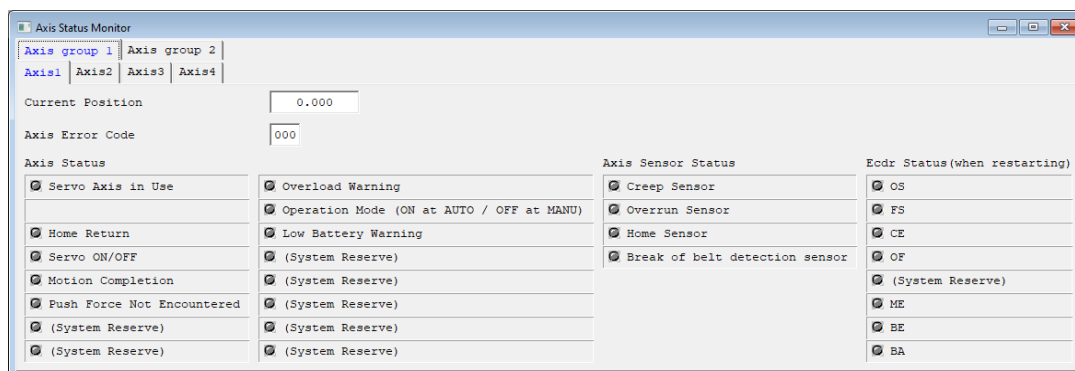
Fig. 11.3 Axis status (XSEL2-T)
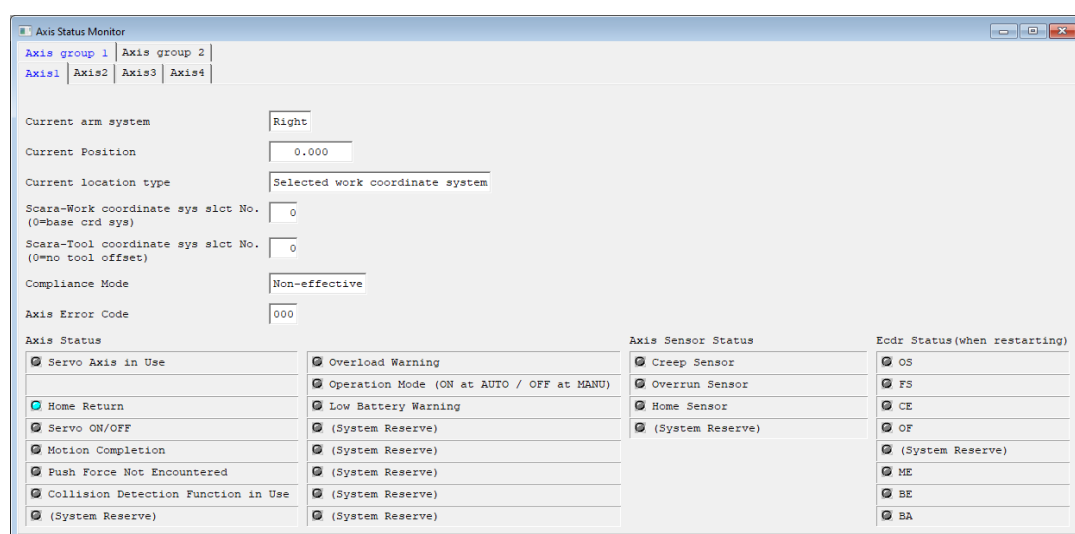
Fig. 11.4 Axis status (XSEL2-TX)

11. Monitor

(4)   Input port, virtual input port, output port and virtual output port windows

These windows show the ON/OFF status of each input/output. 1: ON, 0: OFF

* The physical ports and extension ports can be monitored in one window.
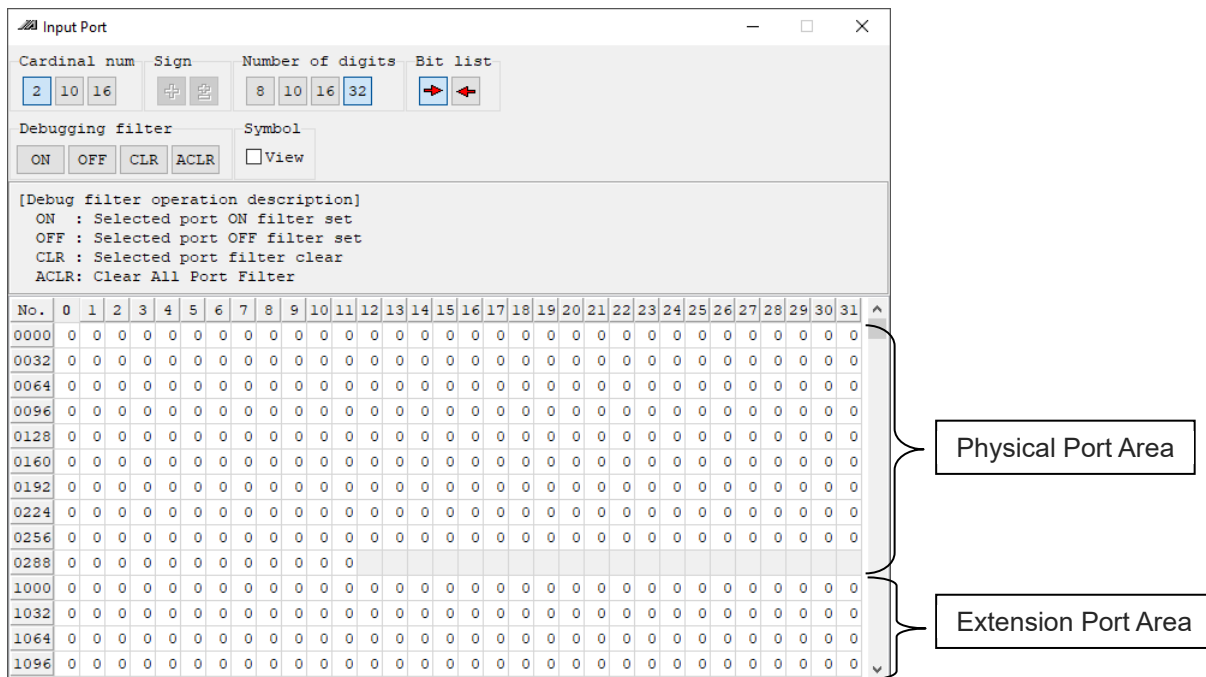
Fig. 11.5 Input Port
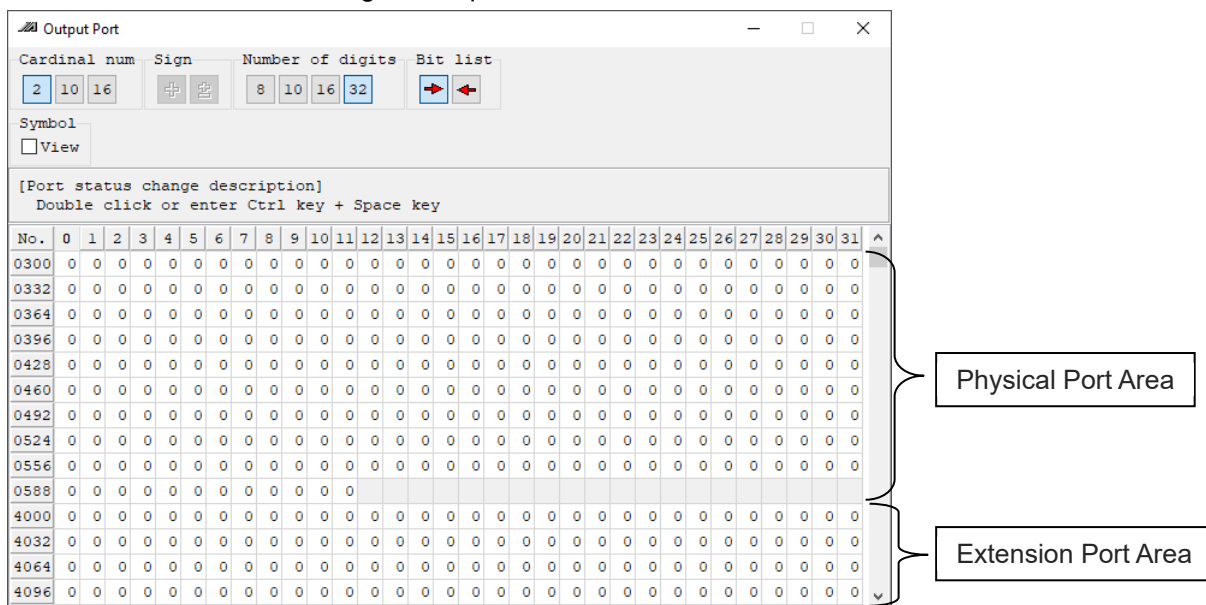
Fig. 11.6 Output port

The 1/0 (ON/OFF) of output ports and virtual output ports can be switched by double-clicking the applicable port or pressing Ctrl + space key simultaneously.

The virtual input/output port No. 7000 to 7599 are shown all together.

Refer to [SEL Language Programming Manual] for the assignment of the virtual input/output ports.

The display on the left will be shown when a tick mark is put in the "Symbol" box, and the display on the right will be shown when a tick mark is removed.
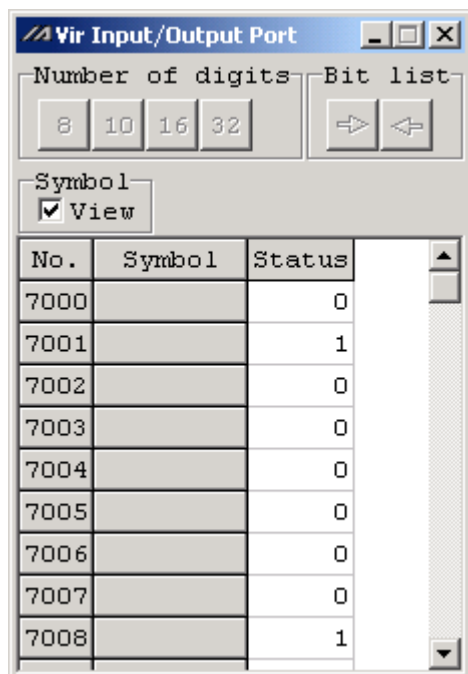
Fig. 11.7 Virtual Input/Output Port
(with Symbol display)
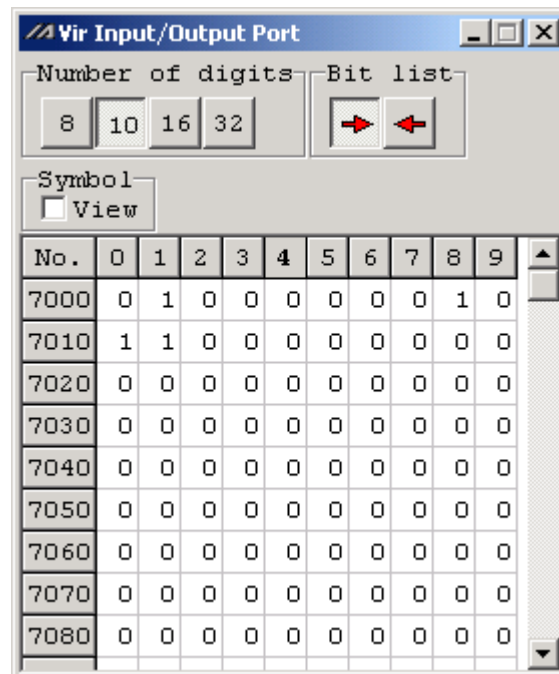
Fig. 11.8 Virtual Input/Output Port
(No Symbol display)

(Note)   488 "Virtual Input/Output Port Operation Error" will occur if the ON/OFF of the input ports in Virtual Input/Output Port No. 7000 to 7599 are switched over.

In the input port window, you can set an input port debug filter.

"Input port debug filter" is a function that causes the controller to recognize a given physical input port as ON or OFF regardless of the actual input status of the physical input port.

To set a debug filter, use the following four buttons provided on the Debug filter setting panel in the input port window (available in the MANUAL mode).

1) ON

Clicking this button will set an ON filter for the input port corresponding to the cursor position.
The controller will always recognize the specified port as ON.

2) OFF

Clicking this button will set an OFF filter for the input port corresponding to the cursor position.
The controller will always recognize the specified port as OFF.

3) CLR

Clicking this button will clear the debug filter currently set for the input port corresponding to the cursor position.

4) ACLR

Clicking this button will clear the debug filters currently set for all physical input ports.

* While a debug filter is set, the status of the port ("0" or "1") for which the ON or OFF filter is set will be shown in red (all ports for which a debug filter is not set will be shown in black).

Buttons on the Debug filter setting panel (from left):
[1] ON (Set an ON filter)
[2] OFF (Set an OFF filter)
[3] CLR (Clear a filter)
[4] ACLR (Clear all filters)

An OFF filter has been set for this port.

An ON filter has been set for this port.

Port number selection cursor
(Port No. 53 is selected in this example.)
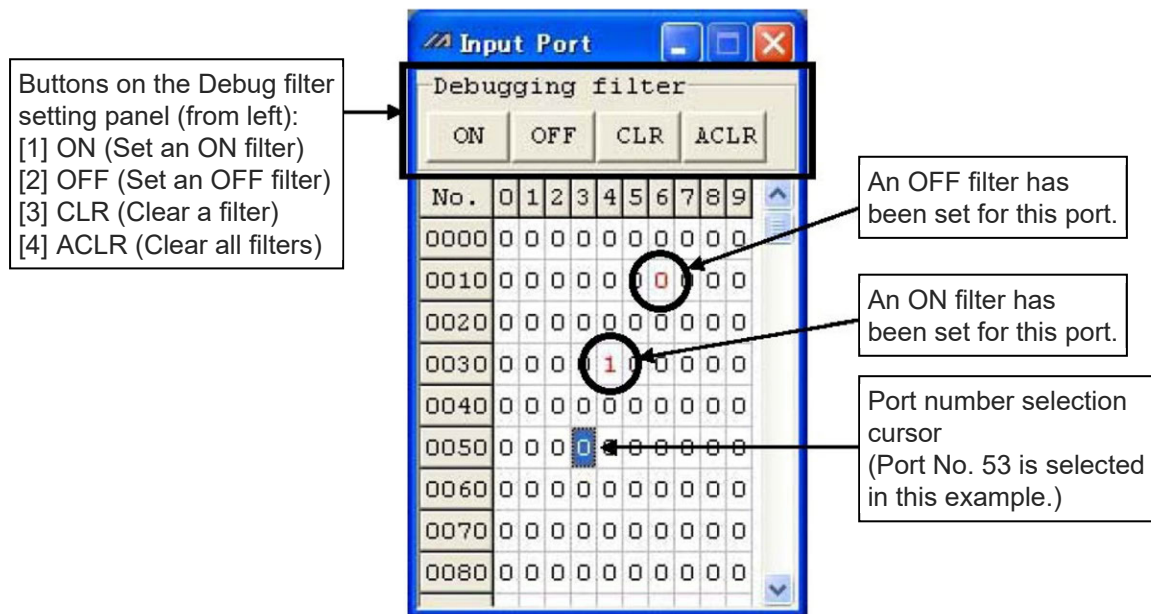
Fig. 11.9 Input Port Window

Clicking CLR or ACLR will display the warning message shown in Fig. 11.10.
Select Yes (clear the filter(s)) or No (cancel the clear) after carefully reading the content of the message.
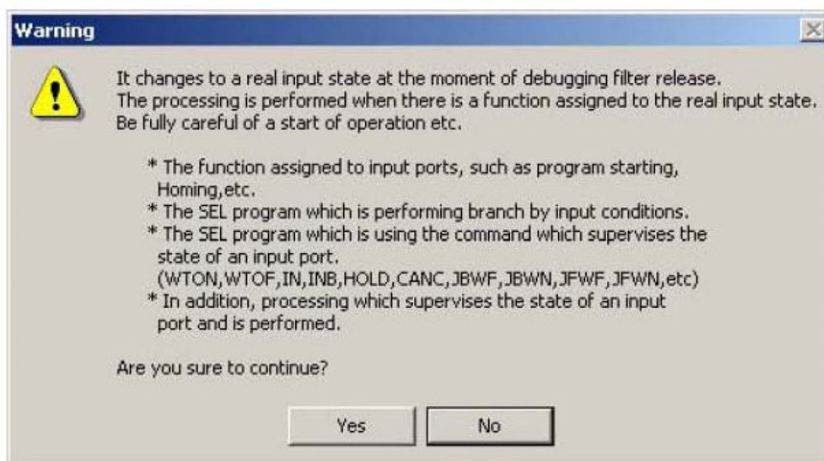
Fig. 11.10 Warning Message

> ⚠ **Caution**
>
> ● The status (ON/OFF) of each input port as recognized by the controller changes the moment the debug filter is cleared or controller operation mode (MANUAL or AUTO) is changed.

(1) Upon clearing a filter

Filter type \ Actual input status	ON	OFF
ON	———	ON → OFF
OFF	OFF → ON	———

(2) Upon switching the controller mode from MANUAL to AUTO

Filter type \ Actual input status	ON	OFF
ON	———	ON → OFF
OFF	OFF → ON	———

(3) Upon switching the controller mode from MANUAL to AUTO and then back to MANUAL

Filter type \ Actual input status	ON	OFF
ON	———	OFF → ON
OFF	ON → OFF	———

* Changing the controller mode (MANUAL or AUTO) will not clear debug filters. Accordingly, changing the controller mode back to MANUAL from AUTO will make effective again the debug filters that were set in the previous MANUAL mode.

If any function is assigned to an input port, the applicable process will be executed. Exercise caution against start of the following operations and others.
● Functions assigned to input ports, such as program start and homing of all valid axes
● SEL programs that use branching based on input condition
● SEL programs that include commands for monitoring input port statuses (WTON, WTOF, IN, INB, HOLD, CANC, JBWF, JBWN, JFWE, JFWN, etc.)
● Other processes executed according to the input port statuses as monitored (recognized) by the controller

(5) Global flag, global integer variable, global real variable and global string windows
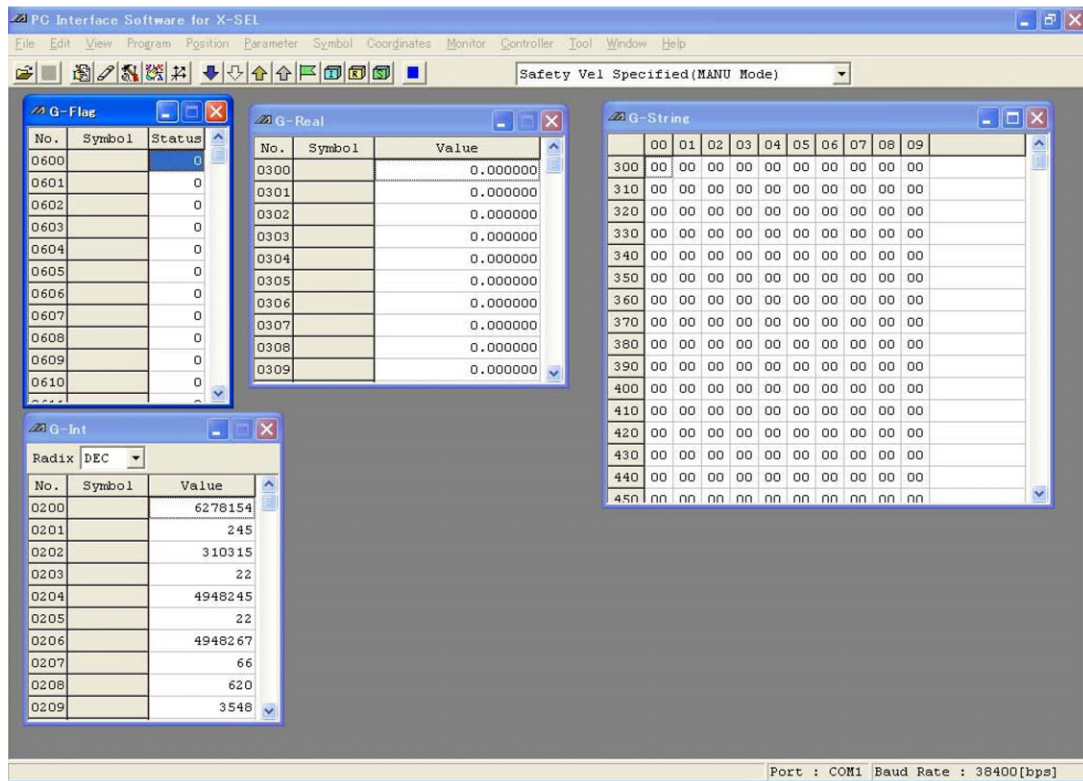
Fig. 11.11 Global

You can change the values in global variables or assign values to global variables.
You can also change the characters in global strings or assign characters to global strings.
The 1/0 (ON/OFF) of global flags can be switched by double-clicking the applicable global flag or pressing the Ctrl + space key simultaneously.

In the integer variable monitor, select Decimal or Hexadecimal for the data radix.
(Select it from the combo box at the top of the window.)
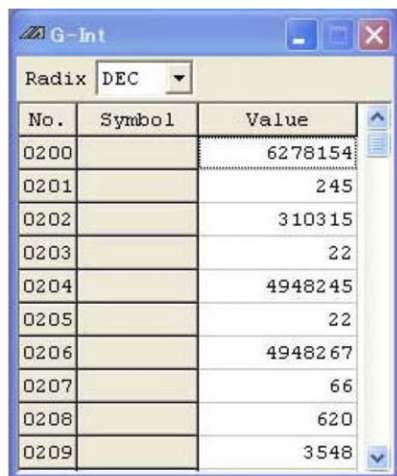
Fig. 11.12 Decimal Notation
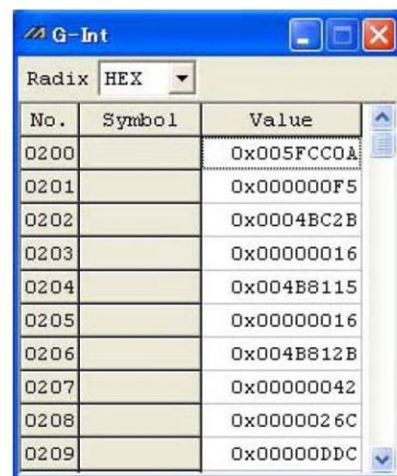
Fig. 11.13 Hexadecimal Notation

Select "Move to specified variable (flag) No." in the right-click menu in each variable monitoring window or press $\boxed{\text{Ctrl+G}}$ keys, and the variable (flag) number shown at the top of the window should change.
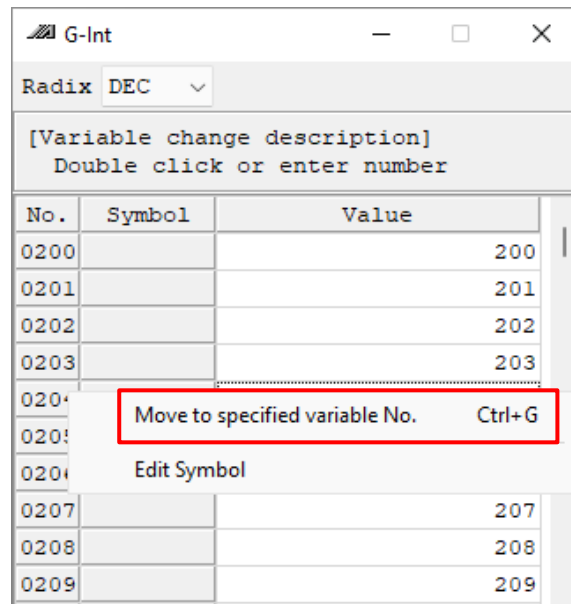
Fig. 11.14 G-Int

The window to input the top variable (flag) number should be displayed.
Input the top variable (flag) number and click $\boxed{\text{Move}}$, and cursor should move to the input variable (flag) number.
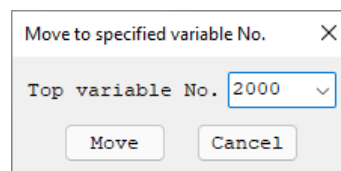
Fig. 11.15 Move to specified variable No.

Activate "Displayed only in character strings" in the String Variable window, and the number of characters to be shown in one line should increase to 100 characters, however, the variables in each column number should be hidden.
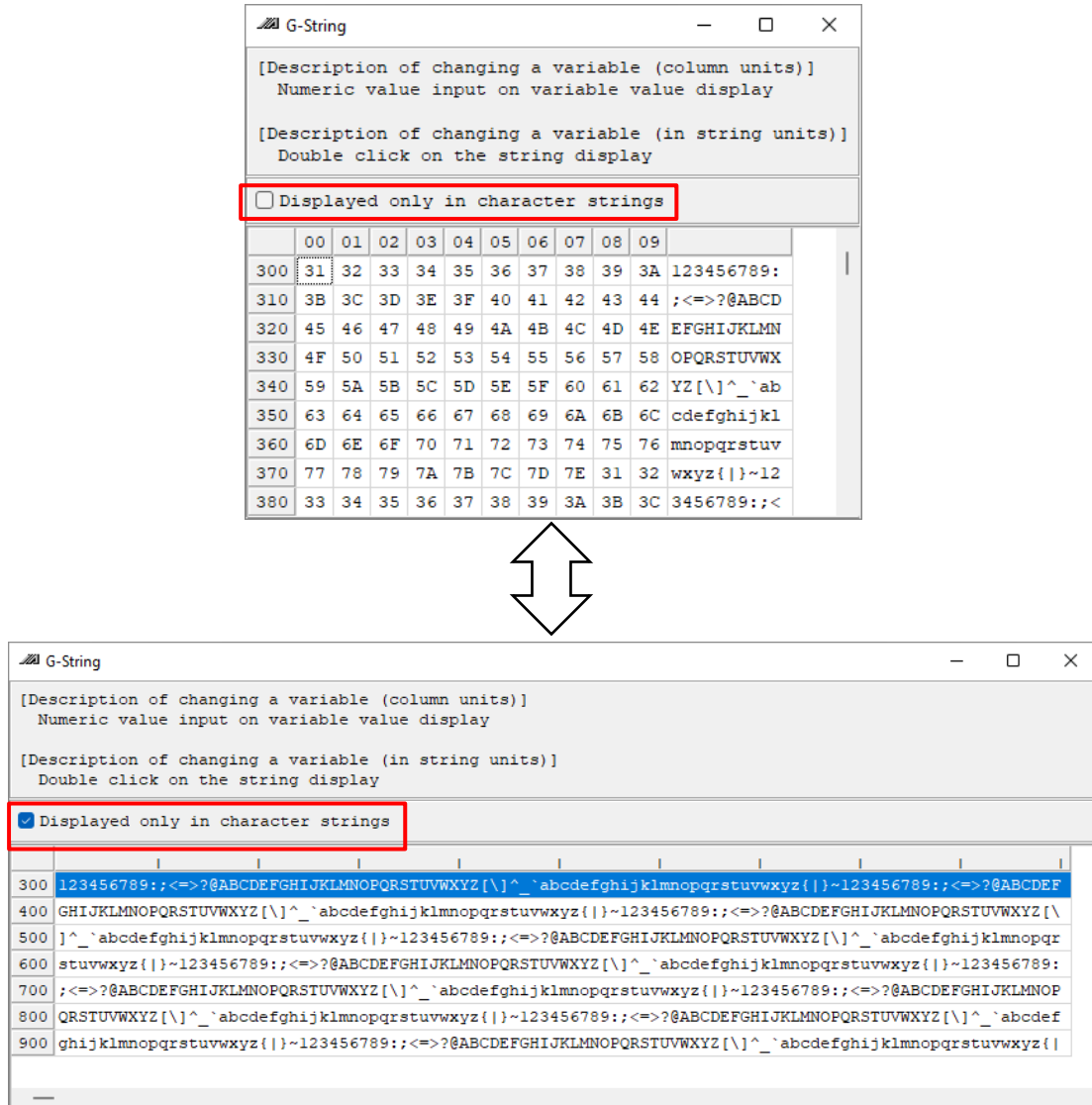
Fig. 11.16 String Variable Window

(6) Local Data

Select "Monitor (M)" → "Local Data (B)" in the main menu and the Show Local Data window opens.

The Program No. selected in the Show Local Data window and the local data in the Category of Local Data are displayed.
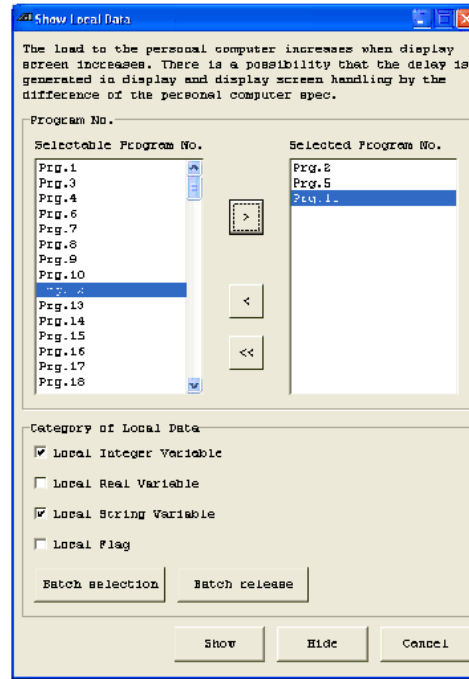
Fig. 11.17 Show Local Data Window

Select the Program No. to the local data and the Category of Local Data by following the steps below to show the local data.

1) Selection of Program No.
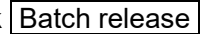
Select a Program No. from the Selectable Program No. and click on it. The background color of the Selectable Program No. turns into blue. Click $\boxed{>}$. The data will be displayed in the Selectable Program No..

2) Selection of Category of Local Data

Click in the box □ for the item to be displayed from the Category of Local Data. A tick mark ✓ will be shown in the selected box.

(Click again to remove the tick mark ✓ and cancel the selection.)

Click $\boxed{\text{Batch selection}}$ to select all the selectable items at once.

(Click $\boxed{\text{Batch release}}$ to make all the selected ones cancelled.)

3) Click $\boxed{\text{Show}}$ and the local data display window will be shown.

(Click $\boxed{\text{Hide}}$ and the display window will be hidden.)

All are shown at once at the first time one on top of another.
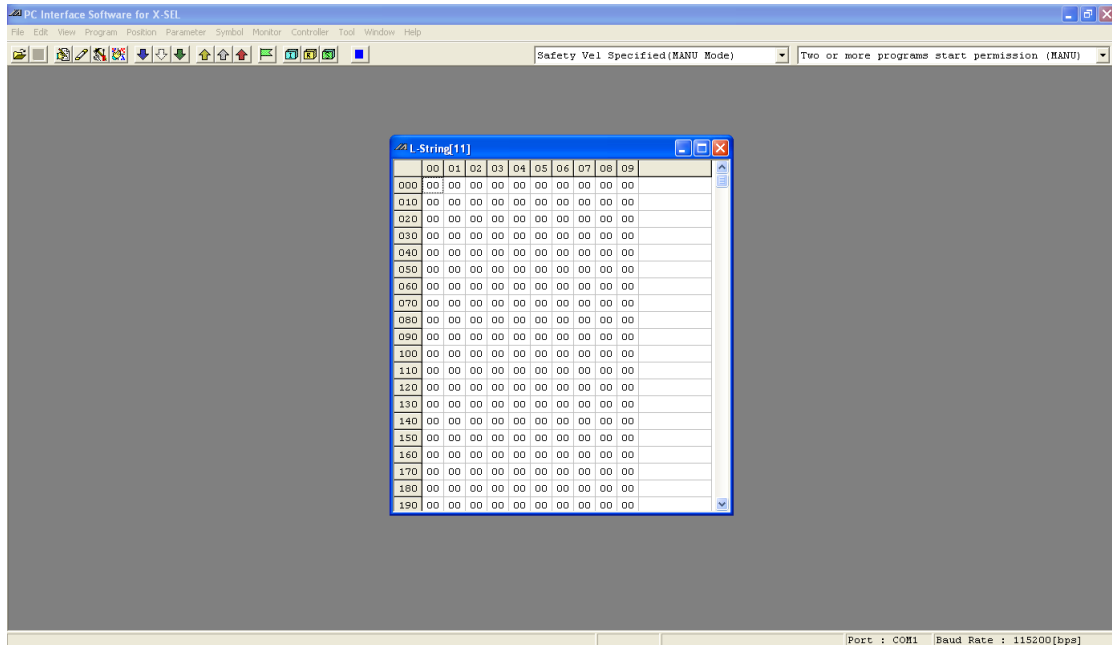
Fig. 11.18 Local Data Display Window (display at first time)

Drag one by one from the top to bottom and show all in the window.

Numbers in the brackets [ ] show the program numbers.
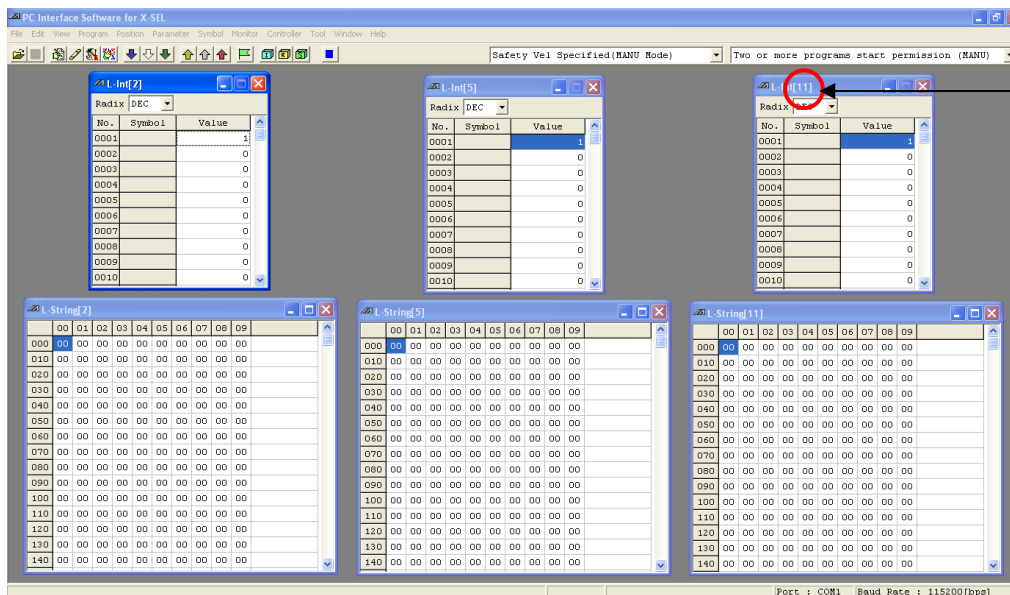
Fig. 11.19 Local Data Display Window

(7) Detailed error information

Select "Monitor (M)" → "Detailed Error Information (E)" in the main menu and the Error Number Select window opens.

Clicking OK after setting the Error Number Select will display the Detailed Error Information window.
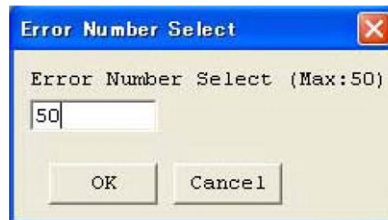
Fig. 11.20 Error Number Select Window

Fig. 11.21 Detailed Error Information

(Note) If date & time data is lost, the following error occurs. In this case, the date & time data becomes 2000/01/01 00:00:00.
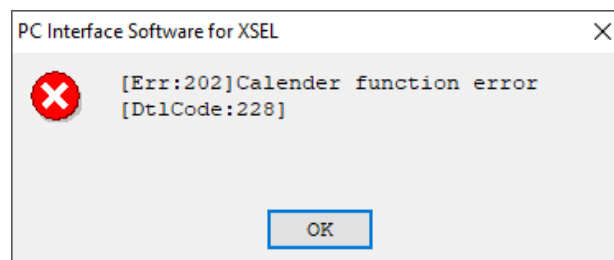

Fig. 11.22 Error Display

(Note)   Refer to [12.6 Setting Time] for how to set the internal clock of the controller.

(Note)   When bits 0 to 3 of Other parameter No. 47, "Other setting bit pattern 2" are set to 2
(Do not use the calendar function (use the elapsed time after the reset)), the error
occurrence time display becomes "After Reset (elapsed time after the reset)".
(The factory default for bits 0 to 3 of Other parameter No. 47, "Other setting bit pattern
2" is 1 (Use the calendar function).)

*   When trouble occurs, you may be requested to send the error list saved in a file to resolve
the problem at an early stage. The error list file cannot be opened by this PC software.

11. Monitor

(8) Maintenance information screen

The total movement count of actuator, and total mileage, are displayed.

Also, the pairing I.D. of the battery-less absolute encoder can be cleared in this window.

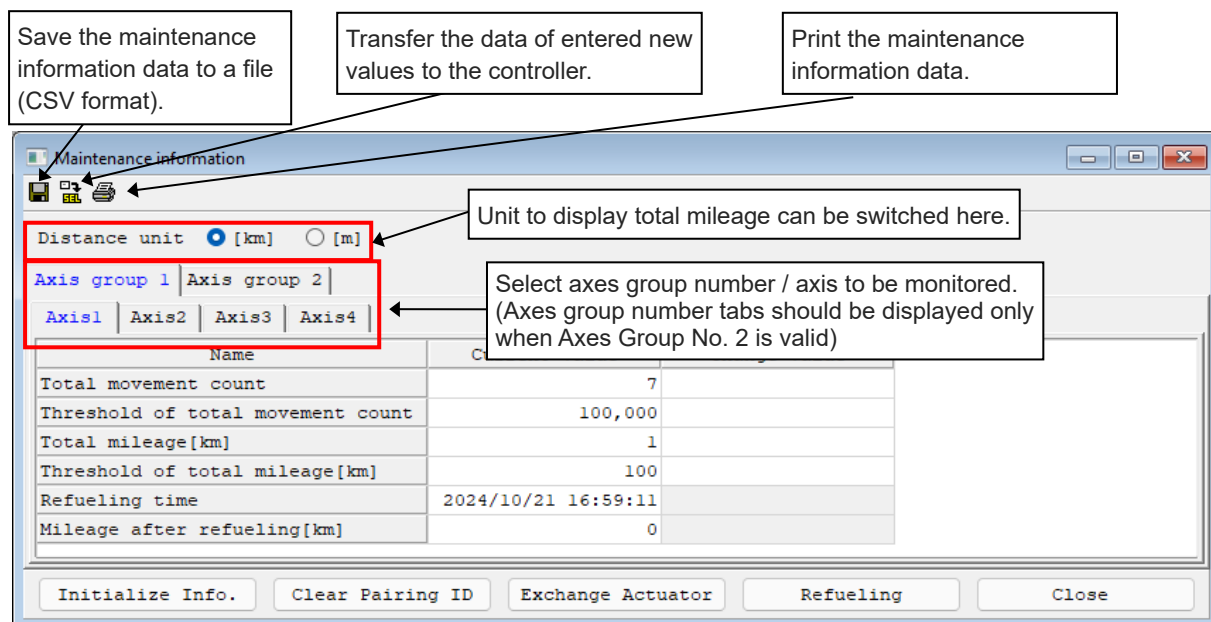Refer to [How to Clear Paring ID] in this section.

Fig. 11.23 Maintenance Information

There is no change to the tool button specifications.

[Monitored Items when XSEL2-T/TX Connected]

Total movement count:	It shows the sum of the number of actuator movement count.
Threshold of total movement count:	It shows the setting value of the total movement count.
Total mileage:	It shows the sum of the actuator mileage.
Threshold of total mileage:	It shows the setting value of the threshold of total mileage.
Refueling time:	In this, displays the date and time when grease was supplied.
Mileage after refueling:	The sum-up of the mileage of an actuator after grease was supplied should be displayed.

"Refueling time" and "Mileage after refueling" should be displayed only when an actuator supports the actuator identifying function.

[Caution in Distance unit]

When the distance unit is in [km], the display of the total mileage should be rounded down.

(Example: When the actual total mileage is 3,600m, The display in the widow should show 3km)
Also, when the distance unit is in [km], the threshold of total mileage in the maintenance information window should be in km unit.)

(Example: When the threshold of total mileage before change is 3,500m, and if the threshold of total mileage in the maintenance information window (distance unit: [km]) is set to 3km, the threshold of total mileage after change should become 3,000m)

[Functions of Buttons Displayed when XSEL2-T/TX Connected]

Information Initialization: The maintenance information data should be initialized.
(Displayed only when there is an error in maintenance information data)

Pairing ID Clear: The pairing ID to the battery-less absolute encoder should be cleared.
(Valid only when password 5119 is valid and battery-less absolute encoder is mounted)

Actuator Replacement: The Total movement count and total mileage should be reset.
(Valid only when password 5119 is valid)

Refueling: The mileage after refueling should be reset and the refueling time should be updated.
(Valid only when "Mileage after refueling" and "Refueling time" are displayed)

By setting the values for the total movement count and Tatal mileage, you can notify an external device, by means of a message level error or output signal that each setting value has been exceeded. (Alert function)

[How to establish setting values in alert function]

Method 1: Change Each Axis Parameter No. 221 "Threshold of total movement count", Each Axis Parameter No.222 "Threshold of total mileage" in the parameter edit window.

Method 2: Perform one of the following operations in the desired "New value" cell and enter a new setting value:

- Double-click the cell.
- Press the Ctrl + Space keys.
- Press a number key.

When the new setting value has been entered, click to transfer the new setting value to the controller.

When the transfer to the controller is complete, the confirmation message, "Write Flash ROM?" appears.
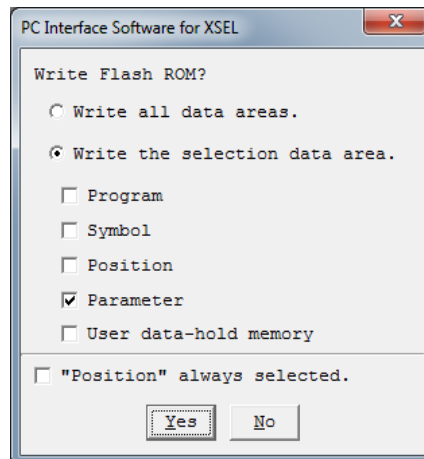

Fig. 11.24 Confirmation

Click to select the items (parameters, etc.) you want to write to the flash ROM.

| Yes | Write the memory data to the flash ROM. |

| No | Do not write the memory data to the flash ROM. |

When a reset is performed (by turning off the power and then turning it back on, or resetting the software), the memory data will be destroyed and data will be loaded from the flash ROM. (The controller will use the transferred memory data until the reset takes effect.)

(Note) If a reset is performed (by turning off the power and then turning it back on, or resetting the software) without writing the parameters to the flash ROM first, the threshold under the alert function will not be changed and the value set before the change will be restored.

(Note) The number of writing to the flash ROM is limited. (can write approx. 100,000 times) If you don't want to write all the data to the flash ROM, select "Write selected data region".

When the flash ROM has been written, the confirmation message, "Restart the controller?" appears.

Fig. 11.25 Confirmation

| Yes | Restart the controller (reset the software). |
| No | Do not restart the controller (reset the software). |

[How to Clear Pairing ID]

1) Right-click a blank space in the tool bar while pressing $\boxed{\text{Ctrl}}$. The Input Password will be displayed.
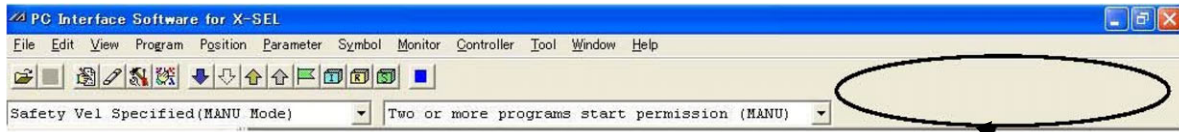

Fig. 11.26 Menu Bar

Right-click a blank space in the tool bar while pressing $\boxed{\text{Ctrl}}$.

Fig. 11.27 Input Password Window

(2) Enter a password (5119) in the displayed Input Password screen. "Clear Pairing ID" will show up in the bottom of Maintenance Information screen.

Click $\boxed{\text{Clear Pairing ID}}$, and the pairing ID for the battery-less absolute encoder will be cleared.
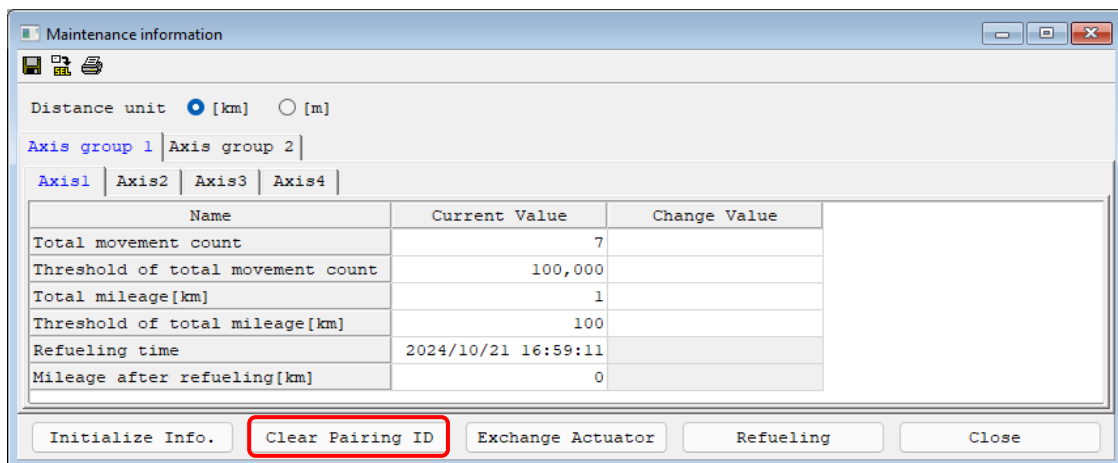
Fig. 11.28 Maintenance Information

Or, "Clear Pairing ID" will show up to the menu in "Controller" in Menu.

Select "Pairing ID Clear" and the pairing ID clear window for the battery-less absolute encoder should appear.

11. Monitor

(9) Monitoring data

The servo monitoring window in XSEL2-T/TX applies the system to indicate the monitoring target axes and data types in the channel (CH).
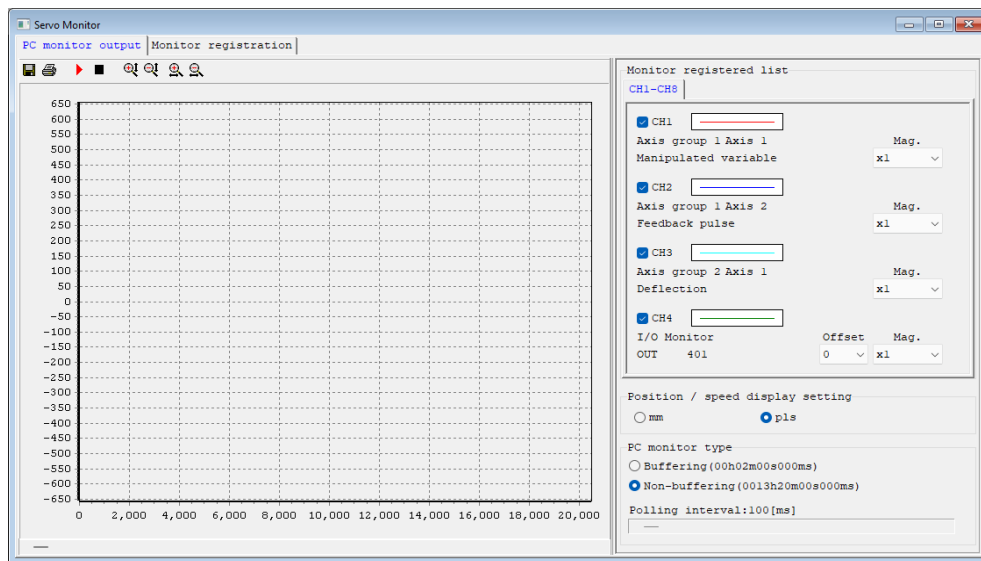

Fig. 11.29 Servo Monitoring Window (when XSEL2-T/TX connected)

<Procedure for Monitoring>

1) Select "Monitor Registration" tab in the servo monitoring window.
2) Set the monitoring items for each channel.
   Select [CH1-CH16] tab when establishing setting for CH1 to CH16.
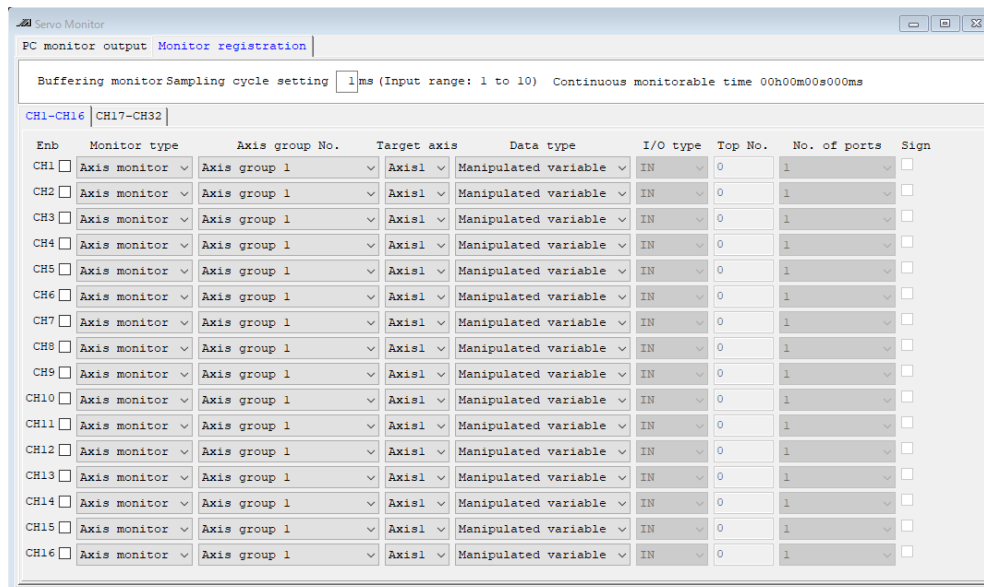   Select [CH17-CH32] tab when establishing setting for CH17 to CH32.

Fig. 11.30 Monitor Registration Window

[Validity]

Put a check mark on the channels to monitor.

[Monitoring Type]

Select "Axis Monitor" when the axis data is to be monitored.

Select "I/O Monitor" when the I/O data is to be monitored.

Select "Power Monitor" when the power supply data is to be monitored.

(Only when XSEL2-T/TX Connected)

[Axis Group Number]

Select axis group numbers of axes to monitor.

* Valid only when "Axis Monitor" selected in "Monitoring Type"

* Not displayed when Axis Group No. 2 is invalid

[Target Axis]

Select an axis number of an axis to be monitored.

* Valid only when "Axis Monitor" selected in "Monitoring Type"

[Data Type]

Select axis data to be monitored.

* Valid only when "Axis Monitor" and "Power supply monitor" selected in "Monitoring Type"

In XSEL2-T/TX, the following axis data can be monitored when "Axis Monitor" is selected in "Monitoring Type".

11. Monitor

Table: List of Axis Monitoring Data Type

Data Type	Data Contents	Servo Monitoring Window Output Unit (When Output Magnification × 1)
Manipulated Variable	Original command pulse count or original command distance per sampling time	PLS/ST or mm/ST
Feedback Pulse	Feedback pulse count per sampling time	PLS/ST or mm/ST
Position Deviation	Position Deviation	PLS or mm
Current Command	Motor current command value	Rated ratio (100% = 4,096) [*]
Feedback Current	Motor feedback current [Note] Monitoring is not available on an axis connected to the driver unit RCON-PC/PCF. (Monitoring value should always be 0)	Rated ratio (100% = 4,096) [*]
Current Position	Current position for each axis	PLS or mm
Command Position	Command position for each axis	PLS or mm

* Displayed with rated ratio 100% = 4,096 as standard.

Rated Ratio [%] = Displayed Value / 4,096 × 100

The following data can be monitored when "Power Supply Monitor" is selected in "Monitoring Type".
(Only when XSEL2-T/TX Connected)

Table: List of Power supply Monitoring Data Type

Data Type	Data Contents	Servo Monitoring Window Output Unit (When Output Magnification × 1)
DC Bus Voltage	DC Bus Voltage in Power Supply Board	V
Regenerative Resistor Peripheral Temperature	Regenerative Resistor Peripheral Temperature	℃
Regenerative Resistor Power	Load Ratio of Regenerative Resistor	%

[I/O Type]

Select the I/O data type to be monitored.

IN:　　Input Port

OUT:　　Output Port

IN/OUT:　Virtual Input and Output Port

FLG:　　Global Flag (Local flag not available to monitor)

* Valid only when "I/O Monitor" selected in "Monitoring Type"

[Top No.]

Enter the leading number of the port/flag for the I/O data to monitor.

* Valid only when "I/O Monitor" selected in "Monitoring Type"

[No. of I/O points]

Select the number of I/O points to monitor at the same time (1, 8, 16, or 32). The selected number of points will be monitored as a single unit of data (the leading number will be the lowest bit).

* Valid only when "I/O Monitor" selected in "Monitoring Type"

[Sign]

Select this to handle monitored data as signed.

* Valid only when "I/O Monitor" selected in "Monitoring Type" and a value other than "1" selected in "No. of I/O points"

3) Establish the setting for the sampling period (1 to 10ms) when it is required to have the buffering monitor.

```
Buffering monitor Sampling cycle setting  1 ms (Input range: 1 to 10)  Continuous monitorable time 00h01m36s000ms
```

The continuous monitoring time may vary depending on the setting for the sampling period and number of channels to be monitored at the same time. (More the number of simultaneously monitored channels are, the shorter the monitoring time gets.)

4) Select "PC Monitoring Type" in the servo monitoring window.

5) The channels registered in 2) should be displayed in "Monitor registered list". Establish the setting for the graph output here.

11. Monitor

* Eight channels should be shown in "Monitor registered list". Select a channel to be set in "CH1-CH8", "CH9-CH16", "CH17-CH24" or "CH25-CH32" tab.
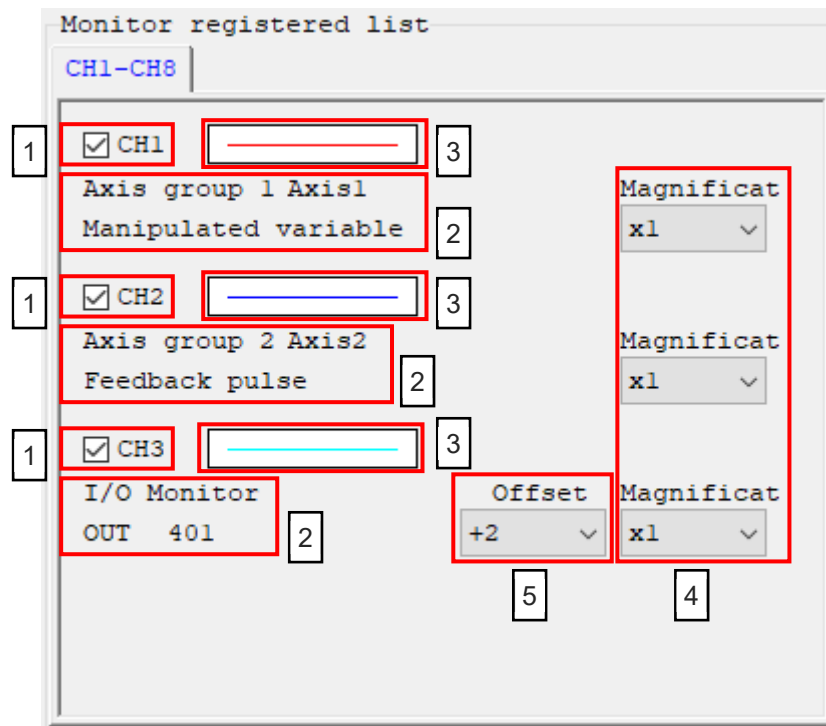

Fig. 11.31 Monitor registered list

1 is provided to put a check mark on the channels to be plotted in the graph.

2 displays the monitoring types and axis numbers registered in "Monitor Registration".

3 shows a type of line plotted in the graph.

4 is provided to set up the output magnification when the graph is plotted.

5 is to be set the offset when the I/O data is displayed.

6) ▶ is to be clicked to start monitoring.

<Other Operations>

[Tool Buttons]

The function of each button is the same as those for the servo monitor in the XSEL PC software.

[Position / speed display setting]

Position / speed display setting
○ mm   ● pls
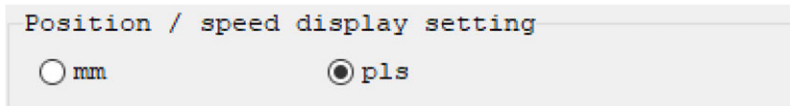
Select the unit for display of position / speed data (mm system or PLS system).

[PC Monitoring Setting]

PC monitor type
○ Buffering(00h01m36s000ms)
● Non-buffering(0013h20m00s000ms)

Polling interval:100[ms]
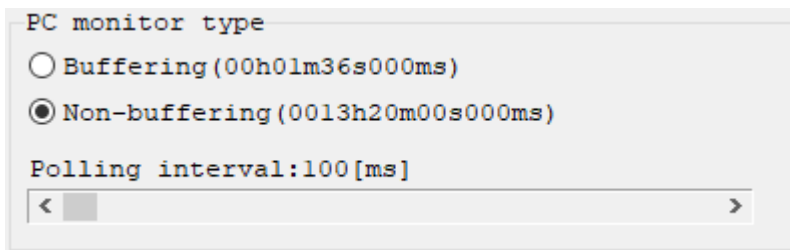
Buffering: Using data that buffers on the controller side, a graph should be shown.
Non-buffering: Reading out the Data at each point of every interval set in "Polling Interval", a graph should be shown.

* There is no "Synthesis Rate" or "Movement Average Period" setting in the servo monitoring window for XSEL2-T/TX

(10) Servo Added Data Monitor

All the servo added data that the controller supports can be monitored in one window at once.

Servo addition Datamonitor

Axis group 1	Axis group 2					
Monitor Type	Axis1	Axis2	Axis3	Axis4	Axis5	Axis6
Overload level[%]	0.0	0.0	0.0	0.0	0.0	0.0
Motor command current[%(Rated ratio)]	0.0	0.0	0.0	0.0	0.0	0.0

Fig. 11.32 Servo addition Data monitor

11. Monitor

11. Monitor

XSEL2

Chapter 12

Supplemental on Operation Menu

12.1 Software Reset

Selecting this menu item will restart the controller.

Caution is required because data that is not yet written to the flash ROM will be lost after this operation.

Click "Controller (C)" → "Software Reset (R)" from the menu.

12. Supplemental on Operation Menu

12.2 Reset Error

Selecting this menu item will reset message level errors and operation-cancellation level errors.

Even after selecting Reset Error, those errors whose cause has not been removed will occur again.

Click "Controller (C)" → "Reset Error (E)" from the menu.

12. Supplemental on Operation Menu

12.3 Axis Setting

Select "Controller (C)" → "Axis Setting (G)" from the menu.

[1] Simple Setting

The logical axes should be assigned in the order of the actually mounted physical axes in the driver unit.

If there is no need of change, press Yes .

If it is required to assign the logical axes individually, press No .
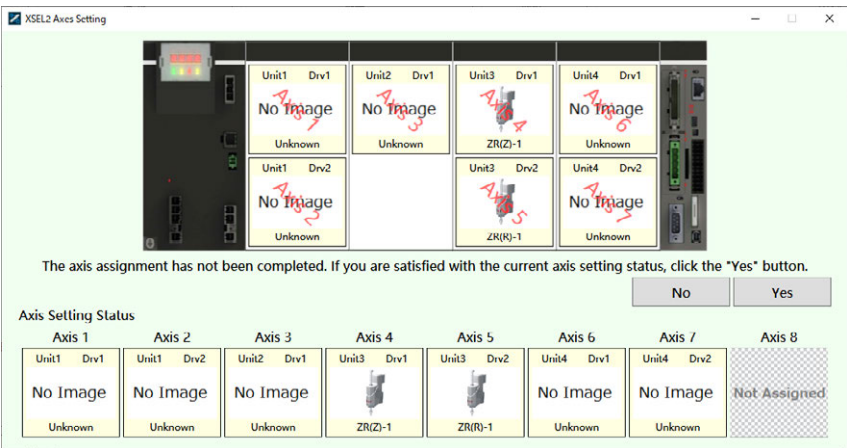
Fig. 12.1 Startup Window

When "Yes" Pressed

The following message should appear. Press Yes if okay.
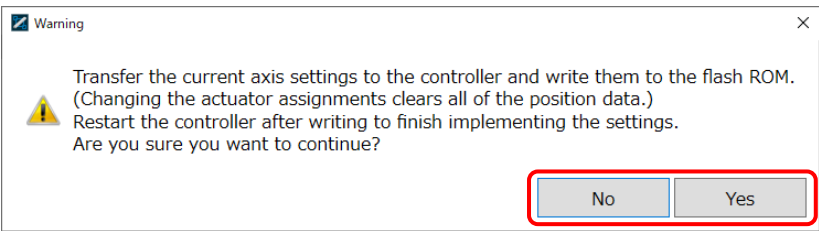
Fig. 12.2 Confirmation Window for Writing to Controller

⚠ **Caution**

● When the writing to the flash ROM is conducted, initialization of the position data should be conducted at the same time.

12. Supplemental on Operation Menu

When "No" Pressed

The screen switches to the window shown in Fig. 12.3.

Drag the actuator figure (hereinafter described as axis figure) located in the physical axis area on the top of the window, drop it in the logical axis area, and the assignment of the axes can be performed.

In order to cancel the axis figure assigned in the logical axis area;
- Drag the axis figure and drop it in the physical axis area
- Select the axis figure and right-click → "Clear selected changes" or press Delete key

In case of cancel all at once;
- In the logical axis area, right-click → "Clear all changes"
- In the logical axis are, press Ctrl + A to select all and then press Delete key to canceled.
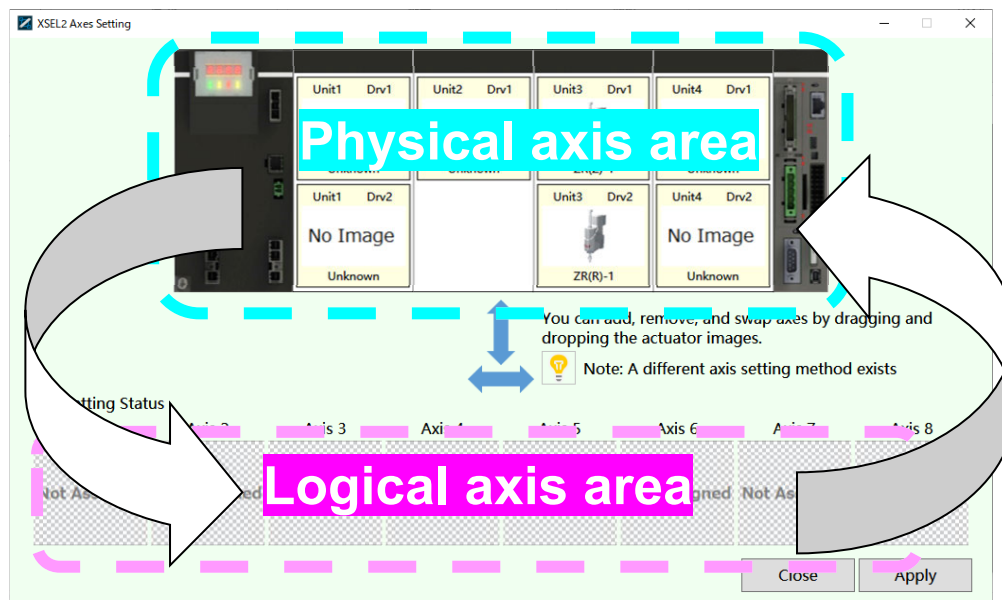
Fig. 12.3 Axis Setting Rearrangement Window

Once the assignment is finished, press Confirm and the window shown in Fig. 12.2 should show up.

Press Close and the setting should be finished.

[2] Explanation of Areas

⊙ Physical Axis Area

In the physical area, there should be already installed axis figures displayed.
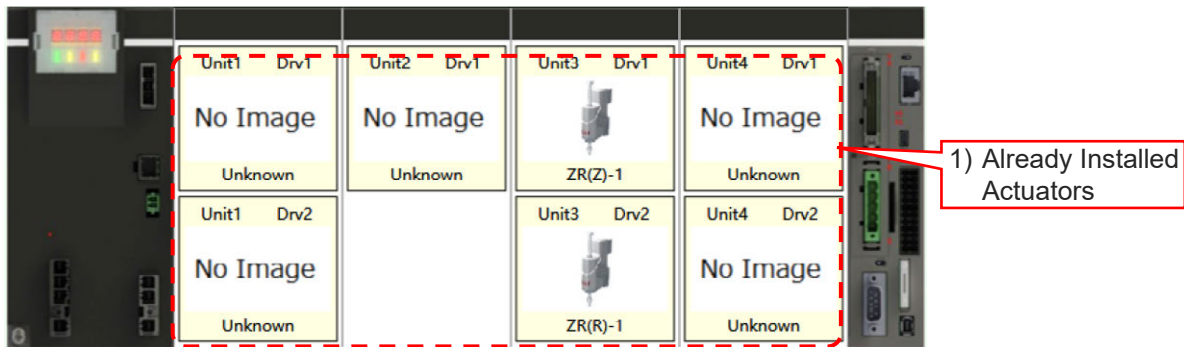
Fig. 12.4 Physical Area Image

1) Already Installed Axis Figures

In the Axis figure of the already installed, there should be following information displayed.
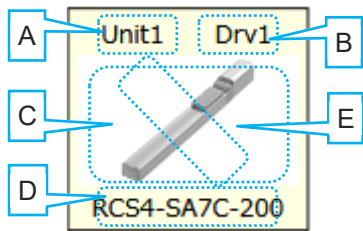

Fig. 12.5 Already Installed Axis Figures

A	Driver Unit Number (Unit 1 to Unit 4)
B	Physical Axis Number in Driver Unit (Drv 1 to Drv 2)
C	Actuator Figure (A picture showing "No Image" should be shown when there is no figure)
D	Actuator Name (Unknown should be shown when no name acquired)
E	Axis Number Assigned to Axis Setting Status (Axis 1 to Axis 8) (It should be displayed with translucent letter only when assignment is allocated)

12. Supplemental on Operation Menu

◉ Logical Axis Area

In the logical axis area, the axis figures that was assigned should be displayed.

There should always be eight axis slots (Axis 1 to Axis 8), and in the slot with no axis assigned should show "Not Assigned".
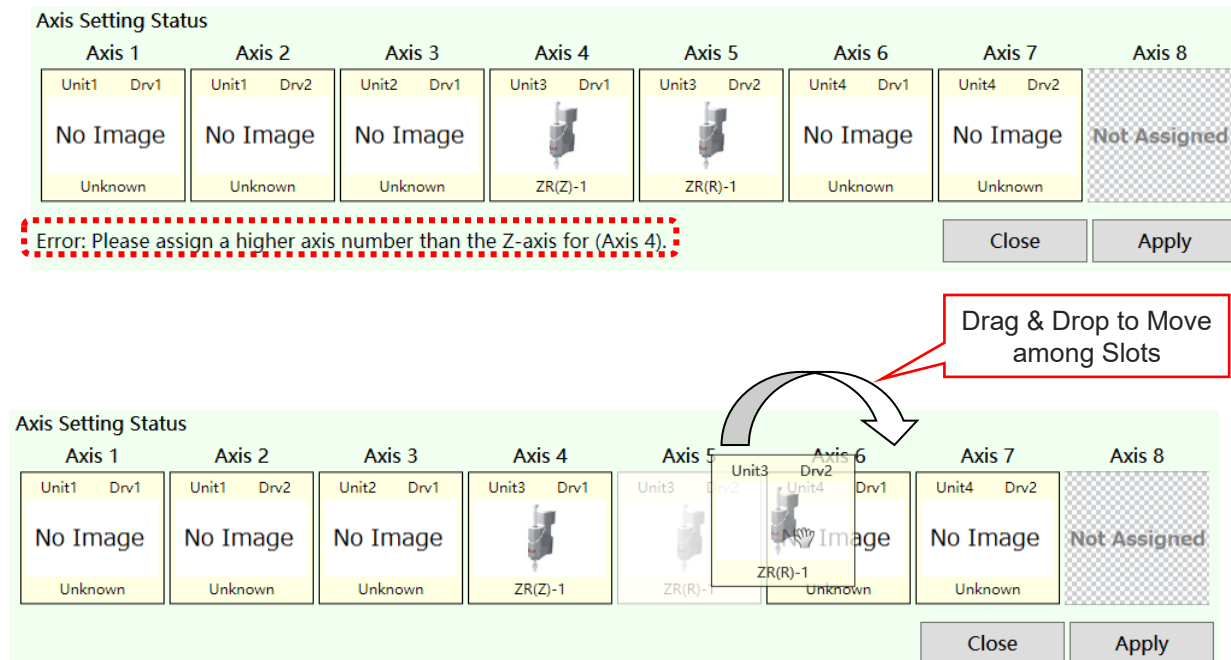
Fig. 12.6 Axis Setting Status

In the logical axis area, it is available to move the axis figures.

However, because there is a limit in the order of logical axes for the special functional axes, there may be a limit in the move of the axes. Pay special attention.

(Example)

The message shown in the frame with red dotted lines in Fig. 12.6 is an error message when it happened to assign the axis figure of Axis 5 to Axis 3.

◉ Special Mechanism Axes

The special mechanism axis is a general term of axes that special mechanism are allocated as the function of the actuator.

There are three types as shown below for the special mechanism axes.

1) SCARA Robot
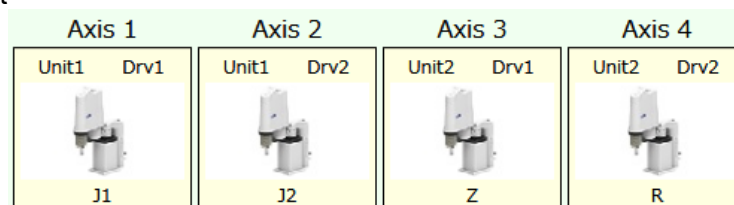
Fig. 12.7 SCARA Robot

In case of connecting the SCARA robot, there should be some limitations as shown below:
- The logical axis numbers should be fixed
- It is not available to assign axes and cancel the axes assignment (move between physical axis area and logical axis area).
- The actuator names should be J1, J2, Z and R.
  For the 3-axis SCARA, the actuator name for the 4th axis should be "---".
- The actuator figure should be the figure of the SCARA robot.

2) Multiple Slider Axes
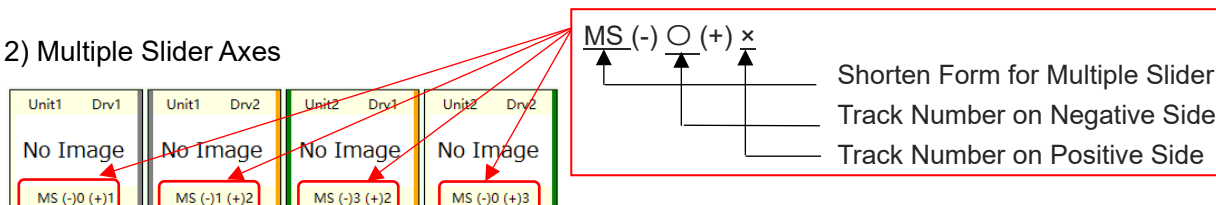
Fig. 12.8 Multiple Slider Axes

For the multiple slider axes, the setting can be established over axis groups like normal axes.

3) ZR Units
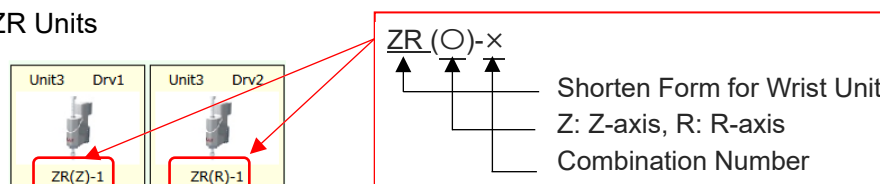
Fig. 12.9 ZR Units

Regarding the ZR units, drag & drop in physical axis area ⇔ logical axis area of an axis, and the paired axis should also come together. Also, in the logical axis area, it is necessary to have the Z-axis assigned to a logical axis number lower than that for the R-axis.

12. Supplemental on Operation Menu
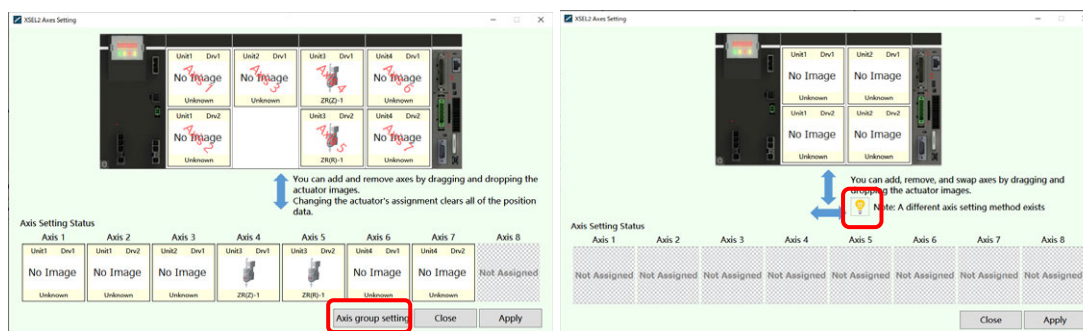
◉ Axes Group Setting

Fig. 12.10 Axes Group Setting

In the axes group setting, multiple axes should be managed in the unit of "Axes Group", and individual position data can be allocated to each group. With this feature, it is available to move the axes with the same position data when there are two axes with the same structure. Also, the position data for combination axes and added axes can be held separately, thus it gets easier to manage them. If there are two groups with a combination of three axes, it used to input using Axis 1 to Axis 6 for the position data. Grouping enables to have two position data for three axes. In the SEL program, declare the group to be used and indicate the position data to be used. Click Axis group setting in Fig. 12.10 above and two groups should appear in the logical axis area as shown in Fig. 12.11, and it becomes available to assign the axis figure to each.

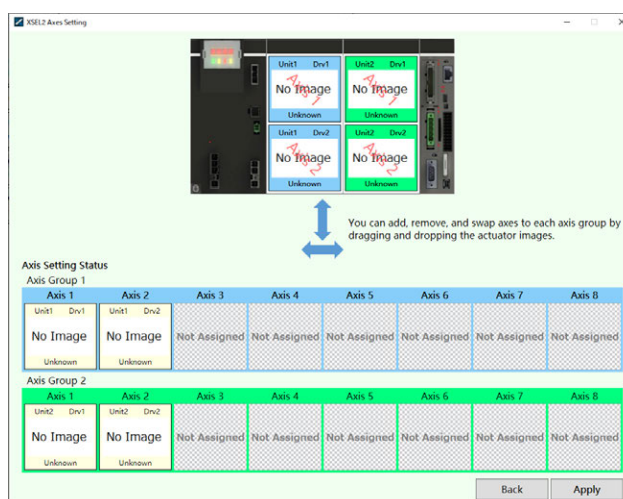*   The same axes group show the same background color in the axis figure in the physical axis area.

Fig. 12.11 Condition of 3 Axes Assigned in Axes Group 1 and 2

12.4 SEL Programming Support Tool

The SEL program support tool is a teaching application for the program controller.

The SEL program support tool is available for the following operations.

1. Jog / Inching Operation
2. To Create / Edit Position Data and Coordinate System Definition Data
3. To Create / Trial Run Programs in Flow Chart Format
4. To read in DXF Data and Convert into Position Data / Program

Refer to [SEL Programming Support Tool Instruction Manual (ME0396)] provided separately for detail.

12. Supplemental on Operation Menu

12.5 Request Drive Power Recovery and Request Release Pause

(1) Request Drive Power Recovery

　1) Case where a request drive power recovery

　　A request drive power recovery is required only in the following case:

　　● When you set I/O parameter No.44 to "1", device-source cut-off occurs. → Recovery after the main cause of cut-off is solved.

　2) How to issue a request drive power recovery

　　A request drive power recovery can be issued using one of the following methods:

　　● Set I/O parameter No.44 to "1" (input selection function 014 = Drive-source cut-off reset input), and then input the ON edge on input port No. 14

　　● From the software menu, execute "Controller (C)" → "Request Drive Power Recovery (P)".

(2) Request Release Pause

　1) Case where a request release pause is required

　　A request release pause is required in any of the following cases:

　　● When you set other parameter No.10 to "2", (emergency stop recovery according to type = continuous operation recovery (during automatic operation only)), emergency stop during automatic operation → recovery after emergency stop release (operation pause release).

　　● When you set other parameter No.11 to "2", (recovery type when safety gate OPEN = continuous operation recovery (during automatic operation only)), safety gate OPEN during automatic operation → recovery after safety gate CLOSE (operation pause release).

　　● When you set I/O parameter No.36 to "1", (input selection function 006 = pausing operation signal), OFF level input on input port No.6 at automatic operation (pausing operation) → recovery after ON level input on input port No.6 (operation pause release).

　2) How to issue a request release pause

　　A request release pause can be issued using one of the following methods:

　　● Set I/O parameter No.35 to "1" (input selection function 005 = operation-pause reset signal), and then input the ON edge on input port No.5.

　　● From the PC software menu, execute "Controller (C)" → "Operation Pause Reset Request (L)".

⚠ Caution

　● If the case in (1) of 1) and any of the cases in (2) of 2) are present at the same time, a request drive power recovery must be issued first, followed by a request release pause.

12.6 Setting Time

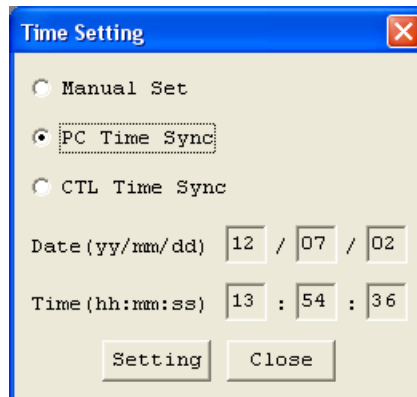Select "Controller (C)" → "Time Setting (T)" from the PC Software Menu to display the Set Time window.

Fig. 12.12 Time Setting Window

Manual entry:	Directly enter the time (date & time) you want to set to the controller.
Show PC time:	The time (date & time) set in the PC you are currently using is shown.
Show controller time:	The time (date & time) currently set in the controller is shown.
"Setting" button:	Set the time (date & time) shown on the screen to the controller.

12. Supplemental on Operation Menu

12.7 SEL Global Data Backup

[1] Saving to a file

Global flags, global integer variables, global real variables and global strings can be saved.

Click "Controller (C) → "SEL global data backup (G)" → "Save File AS (S)" from the menu.

The SEL global data backup window (Save File AS) will be displayed.

Clicking ⊞ will save the global data.
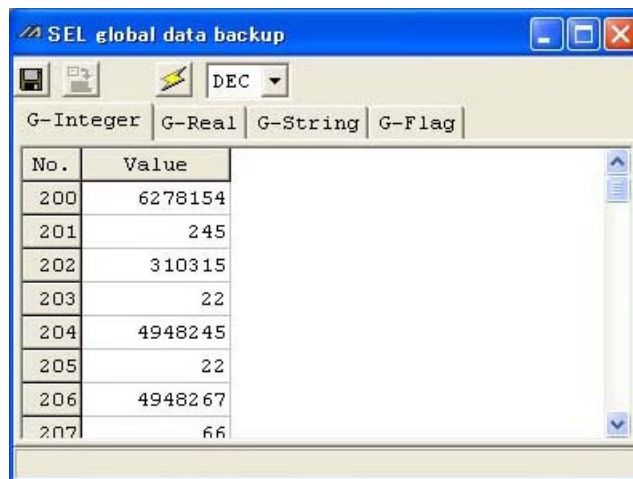
Fig. 12.13 SEL Global Data Backup Window (Save File AS)

[2] Transmitting to the controller

Global flags, global integer variables, global real variables and global strings can be transmitted to the controller.

Click "Controller (C) → "SEL global data backup (G)" → "Transmit to Controller (L)" from the menu.

The SEL global data backup screen (Transmit to Controller) will be displayed.

If an error occurs, focus will move to the "Detailed Error Information" tag to display the error description.
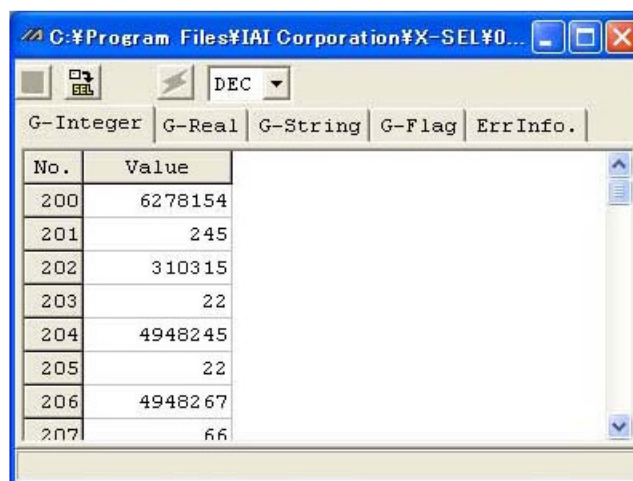
Fig. 12.14 SEL Global Data Backup Window (Transmit to Controller)

12. Supplemental on Operation Menu

Clicking ⊞ will display the SEL global transfer data type select screen.

Select a desired transfer data type and click $\boxed{\text{OK}}$. The data will be transmitted to the controller.
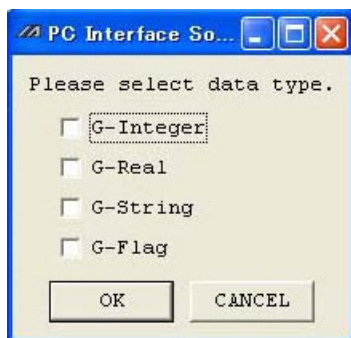
Fig. 12.15 SEL Global Transfer Data Type Select Window

12. Supplemental on Operation Menu

12.8 Excel File Save and Readout

The position data can be saved and read out in the Excel file formats.

However, it can only be available on a PC that Microsoft Office Excel has already been installed.

12.8.1 Excel File Save

Click $\boxed{\text{Save to File}}$ in the position edit window.

This is the same as clicking "File (F)"→ "Save to File (A)".

Next, the file save dialog will show up.

Select "Excel 97-2003 Workbook (*.xls)", put a file name and conduct saving.

Excel will open and the file will be saved to the sheet on the leftmost.
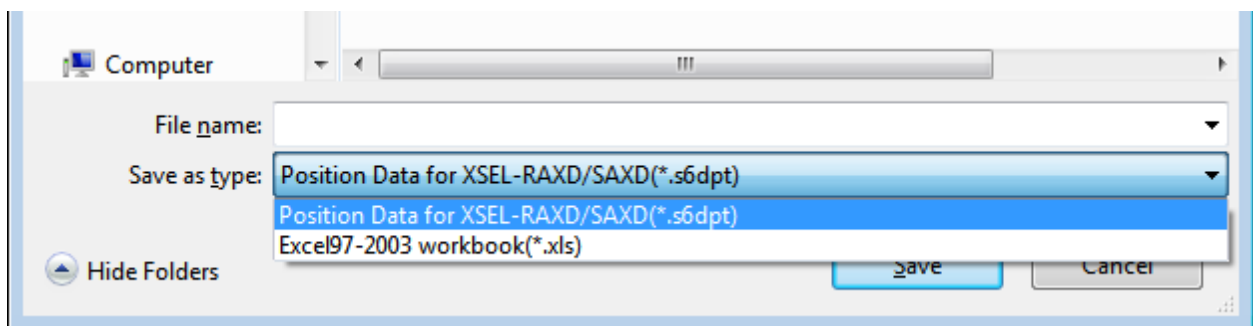
Fig. 12.16 File Save Dialog

[File Format]

The file format available to save file is only "Excel 97-2003 Workbook (*.xls)".

(Note) Files cannot be saved or read out in other formats such as "Excel Workbook (.xlsx)".

[Position Data Format]

The format should be as shown in the table below when the position data is saved in the Excel format.

Table Position Data Title Line (Excel Format)

No.	Axis (1-8)	Arm	Vel	Acc	Dcl	(OutFn)	(OutNo.)	(OutPara1)	(OutPara2)	(Comment)
Position No..	Each axis position data	Arm system	Velocity	Acceleration	Deceleration	Output function code	Output ports and flags	Function Parameter 1	Function Parameter 2	Position comment

*1 These should be displayed when the output operation function is valid

*2 It should be displayed only on the models with the position comment function valid.

◎ Explanation of Each Column Data

No. Column	…Position No.. Data with only integer digits.
Axis Column	…Position data. Data with down to three decimal digits.
Arm Column	…Arm system data. Data of "Right" or "Left".
Vel Column	…Velocity data. Data with only integer digits.
Acc Column	…Acceleration data. Data with down to two decimal digits.
Dcl Column	…Deceleration data. Data with down to two decimal digits.
OutFn Column	…Output Function code. Data of any from "ON", "OFF", "OND", "OFFD", "ONR" or "OFFR".
OutNo. Column	…Output ports and flags. Data with only integer digits.
Outpara1 Column	…Function Parameter 1. Data with down to three decimal digits.
Outpara2 Column	…Function Parameter 2. Data with down to three decimal digits.
Comment Column	…Position comment data.

12. Supplemental on Operation Menu

12.8.2 Excel File Readout

Click Open File in the toolbar.

This is the same as clicking "File (F)"→ "Open (O)".

Open File dialog will appear.

Select either "Excel 97-2003 Workbook (*.xls)" or "All Files (*.*)" and all the ".xls" files should appear.
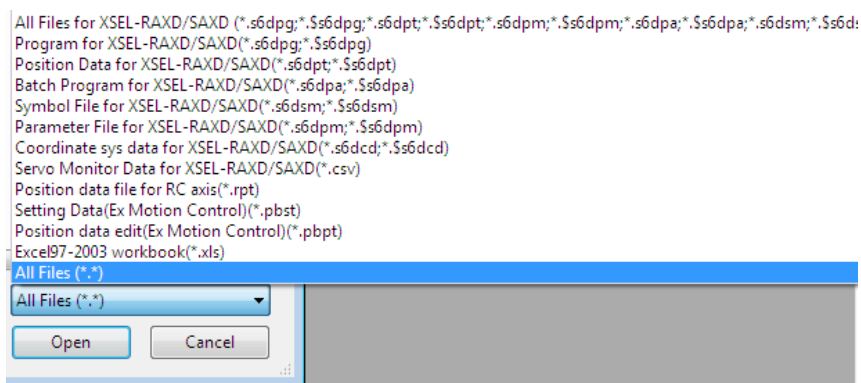
Fig. 12.17 Open File Dialog

The controller selection window will show up once a "Excel 97-2003 Workbook (.xls)" file with the correct position data file format is selected. Select a controller to be used, press OK , and Microsoft Office Excel opens and the file will start to be read out. File error will be displayed if the file format is incorrect.
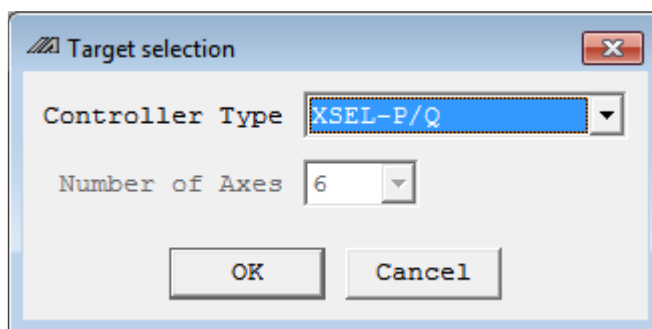
Fig. 12.18 Target Selection
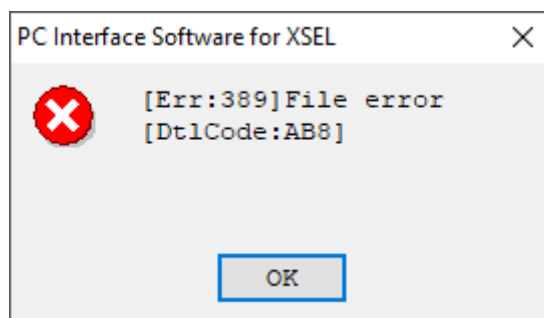
Fig. 12.19 File Error

12.8.3 Excel File Create and Edit

When creating and editing the position data in Microsoft Office Excel and reading out in the XSEL PC software, input the title line in the first line of the first Excel sheet, and input the position data from the second line.

Or, by creating a new file and save it with a name in the XSEL PC software, an Excel file with title line and number column are already input can be generated. With using this file, create and edit the position data on the Excel sheet.

Refer to [12.8.1 Position Data Format] for the title line.

12. Supplemental on Operation Menu

12.8.4 Caution

(1) Do not attempt to input any information except for those described in the position data format to the title line and position number column. Doing so will disturbs reading the data correctly.

In the area hatched in the figure below can be used for free input.

(Note) Once the file gets overwritten in the XSEL PC software, the data input in the hatched area will all be deleted.

Fig. 12.20 Position Data Input Area

(2) If there is a restriction on the edit or readout of the Excel file, it will cause a file readout error.

(3) If you work on Microsoft Office Excel while the file is being saved or read out, file save or readout could fail.
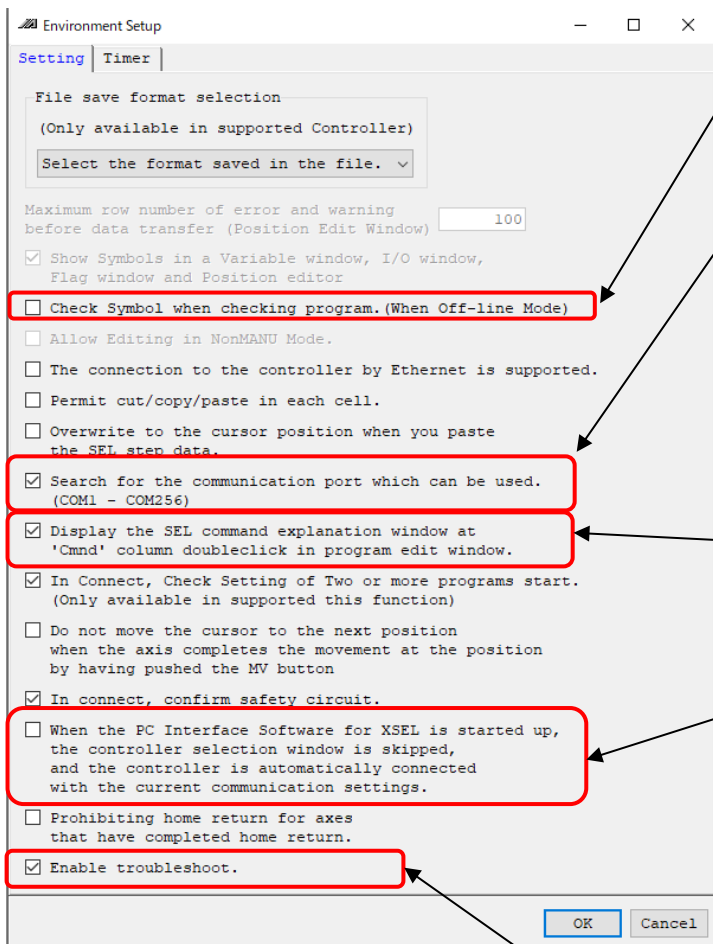
XSEL2

Chapter 13

Tool

13.1 Setting

Specify whether or not to check symbols during the program error check.

If this checkbox is not selected, symbol errors will not be checked.

If this checkbox is not selected, the communication port which can be used will not be checked.
However, selectable communication ports are extended to COM1 to COM256 in the communication check window.
If the selected communication port cannot be used, the "EC5: communication port open error" will occur.

If this checkbox is not selected, partial correction will be possible when the 'Cmnd' column is double-clicked.

For the next startup of the XSEL PC software and later, the controller select window should be skipped and the controller connected in the last operation should be connected with the same communication settings (COM port number, baud rate, etc.).
The specifications of the PC software (RSEL, XSEL2-T/TX and other than RSEL, XSEL2-T/TX) should be automatically switched over in response to the connected controller type.

Remove the check mark and the error countermeasure window (refer to [16. Error Countermeasures]) should not be displayed and a notification should be received in the error dialog (Figure 13.3) showing an error has occurred.
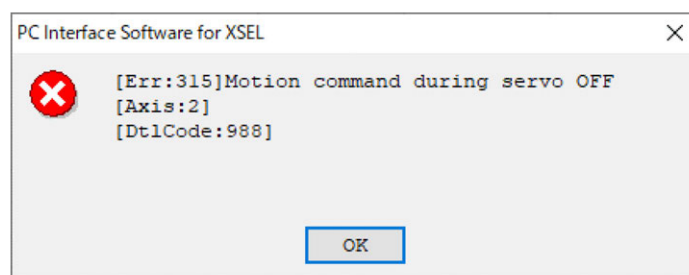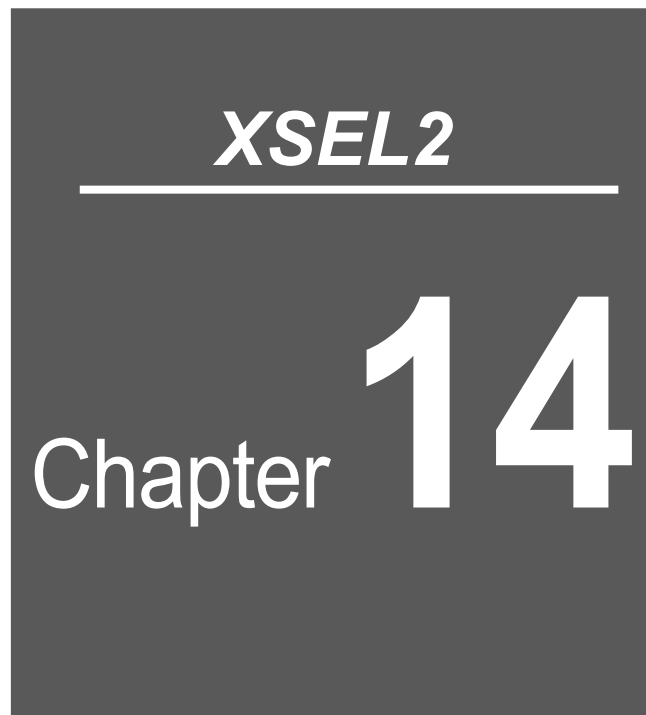
Fig. 13.1 Setting (Offline)

13. Tool

Fig. 13.2 Setting (Online)
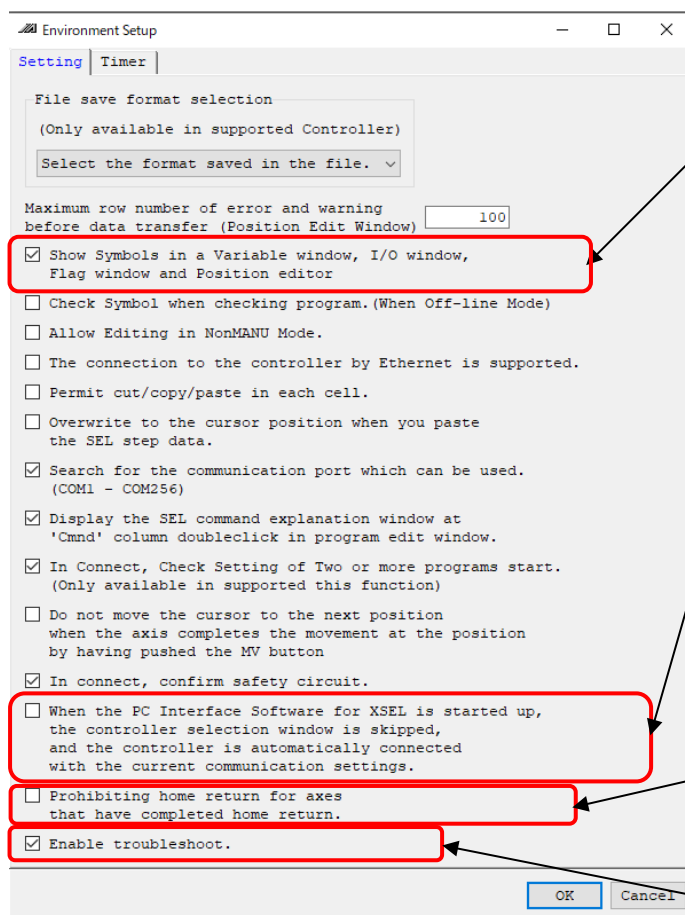
If this checkbox is selected, symbols will be shown in the variable window, I/O window, flag monitor window and position data edit window.

For the next startup of the XSEL PC software and later, the controller select window should be skipped and the controller connected in the last operation should be connected with the same communication settings (COM port number, baud rate, etc.).
The specifications of the PC software (RSEL, XSEL2-T/TX and other than RSEL, XSEL2-T/TX) should be automatically switched over in response to the connected controller type.

Put a check mark, and the home-return operation of the axis with the home-return operation completed becomes unable in the position edit window.

Remove the check mark and the error countermeasure window (refer to [16. Error Countermeasures]) should not be displayed and a notification should be received in the error dialog (Figure 13.3) showing an error has occurred.

Fig. 13.3 Error dialog

XSEL2

Chapter 14

IXA (SCARA Robot) Simulator

14.1 Overview

IXA Simulator is a function that enables operation of a IXA SCARA Robot simulated in PC.
SEL programs and position data can be created in the XSEL PC software, and by executing a program in the Edit Program window, operation can be checked in PC.

⚠ **Caution**
- Even though operation can be performed in simulation, there may be a case that the overload error can occur and not able to operate in the actual robot operation.
- If there is an input signal awaiting in a program, it will not go on to the next step until this program gets executed. If there is an input signal awaiting, use the debug filtering function in the input port monitor window.

14. IXA (SCARA Robot) Simulator

14.2 Preparation

Here, explains preparation to use IXA Simulator.

14.2.1 System Requirements

Required System / Recommended System Requirements

Item	Specifications
OS	Windows 10/11
CPU	Intel Core i Series or Intel Core 2 Quad or higher
Memory	2G byte or more
Hard Disk Space	Space of 1G byte or more required (This software is to be installed to the hard disk drive to use)
Graphic	1280 × 1024 dots or more Operating environment of DirectX 9.0c is required Graphic memory of 64MB or more required
Others	.Net Framework 4.8.1 or more required

Caution

● The software cannot be installed to a PC with Virfit provided by Computer Engineering & Consulting Ltd. already installed.

14. IXA (SCARA Robot) Simulator

14.2.2 How to Install

It is mandatory that X-SEL PC Software V15.00.00.00 or later is installed in order to operate the IXA simulator.

1) Insert the DVD-ROM containing this software into your DVD-ROM drive.
2) The installed data selection screen will be displayed.
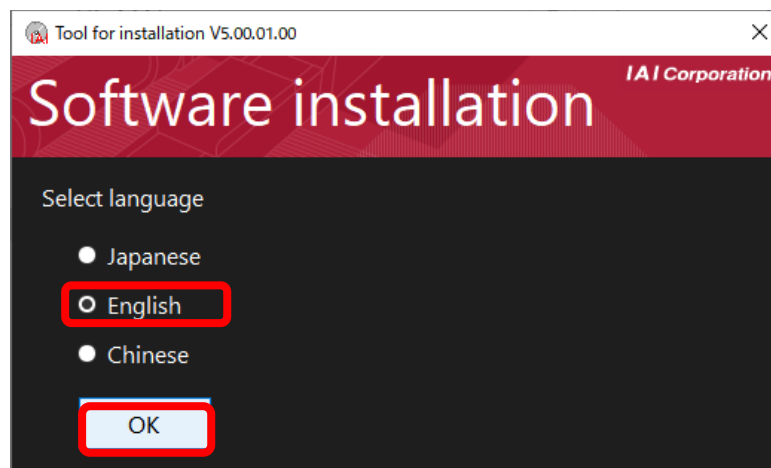   Select English and click OK .

Fig. 14.1 Select language Window

3) Select IXA/CR Simulator and click Installation .

Fig. 14.2 Software installation Window
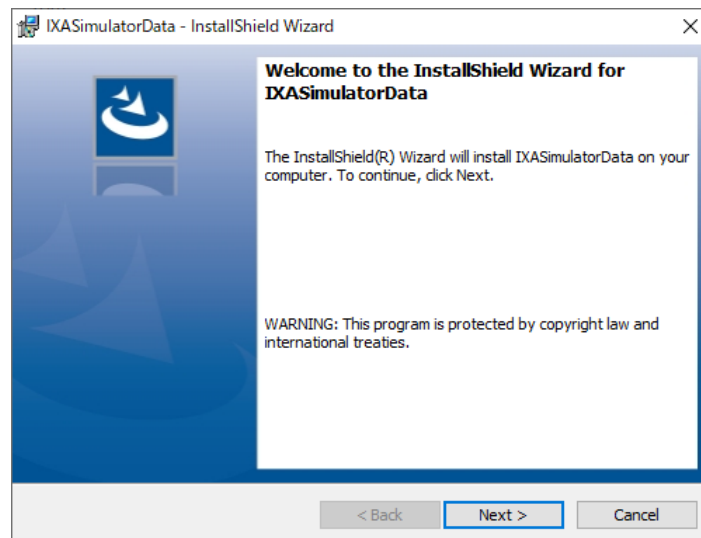
4) The screen will change to the installation window.

Fig. 14.3 Installation Window

5) Click Next > . The data necessary for simulation gets installed.

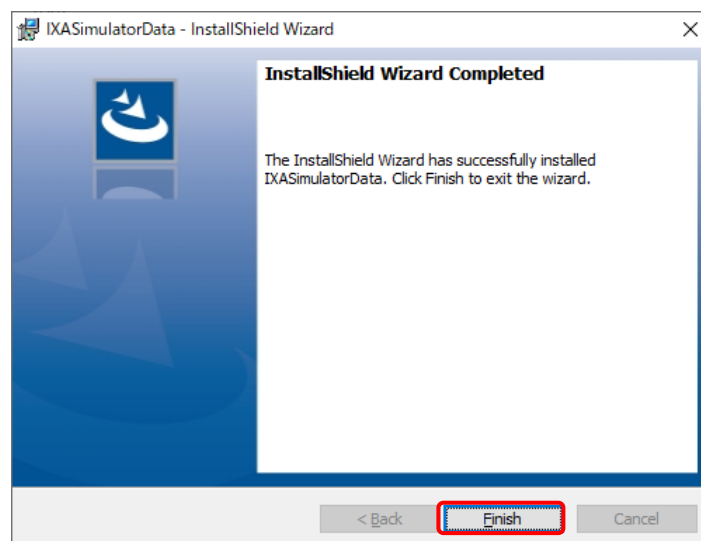Following window appears when the installation of simulation data is complete.

Fig. 14.4 Installation Window

6) Click Finish .

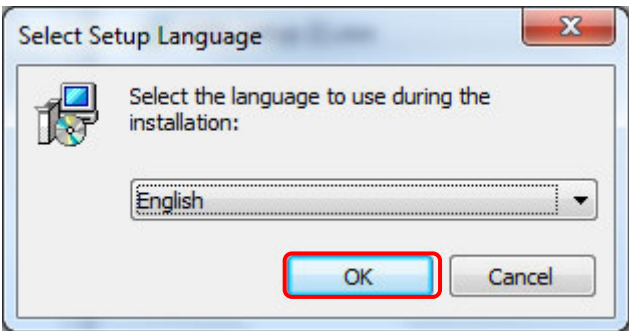7) Installation of 3D Drawing Software (Virfit) starts.

⚠ Caution

● If this software is installed to a PC with Virfit provided by Computer Engineering & Consulting Ltd. already installed, it will be overwritten by the one dedicated for IXA simulation. Cancel the process and install the software to another PC.

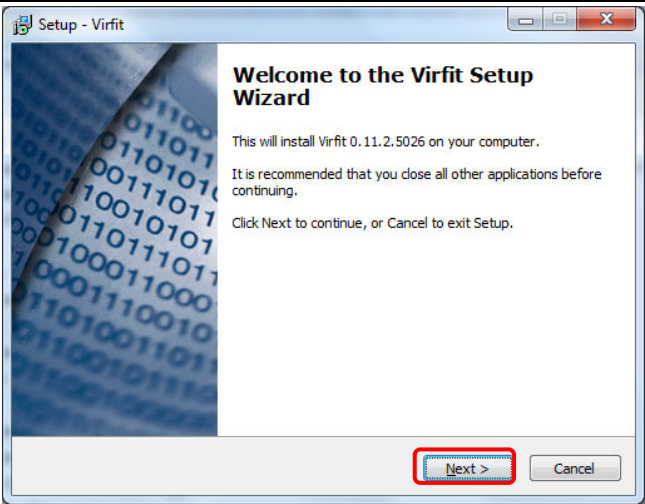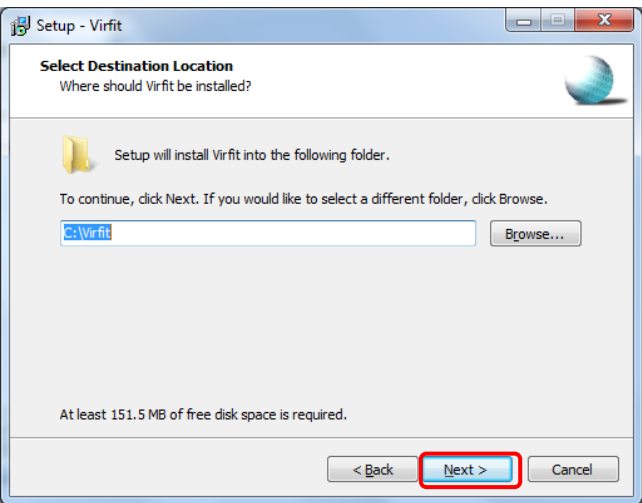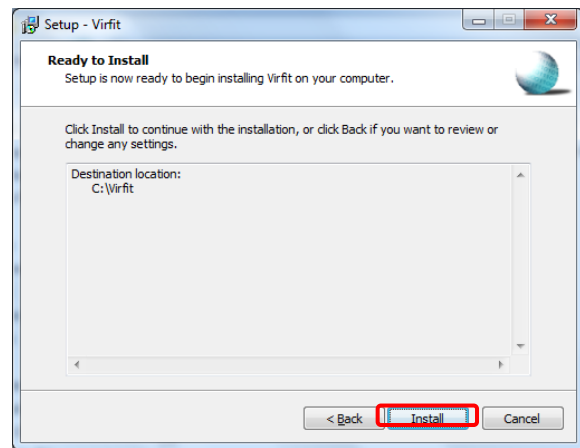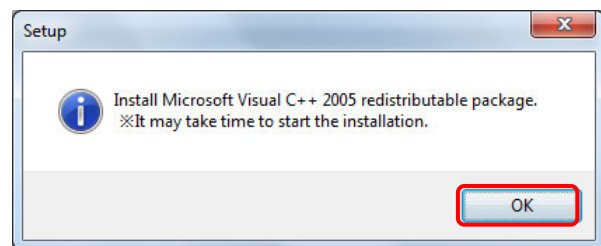|	
1. Select English as the language to be displayed in Virfit. Click OK. * It is the display only in recovery installation.	
2. The setup start window for installation appears. Click Next >.	
3. A window to indicate the destination location to install the software shows up. Click Next > with the default setting unless necessary to change.	

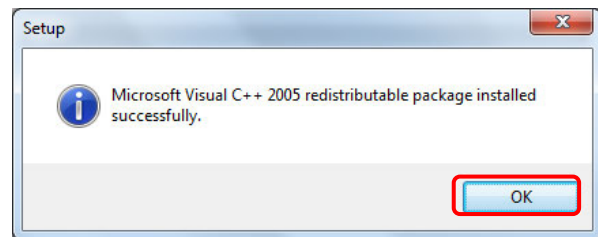|	
4. Ready to Install window comes up. Confirm there is no problem in the display and click Install.	
5. Install Visual C++ 2005 Redistributable Package. Click OK. * It may take time to start the installation.	
6. A message appears when the installation of Visual C++ 2005 Redistributable Package is complete. Click OK.	
7. Install Visual C++ 2008 Redistributable Package. Click OK.	
8. A setup window for Visual C++ 2008 Redistributable shows up. Click Next >. Move on to Step 9.	

14. IXA (SCARA Robot) Simulator

8-1. For a PC with Visual C++ 2008 Redistributable Package already installed, a window shown on the right appears.

Click Cancel.

8-2. Setup should be cancelled and a window shown on the right appears.

Click Finish.
Move on to Step 11.

9. License Terms for Visual C++ 2008 Redistributable software gets displayed.

Check to the acceptance and click Install.

14. IXA (SCARA Robot) Simulator

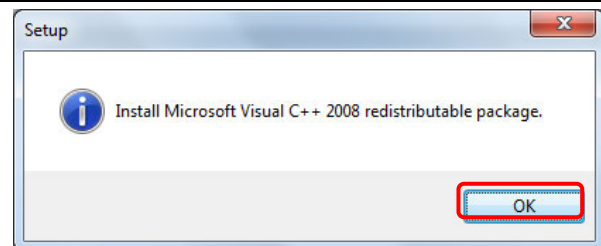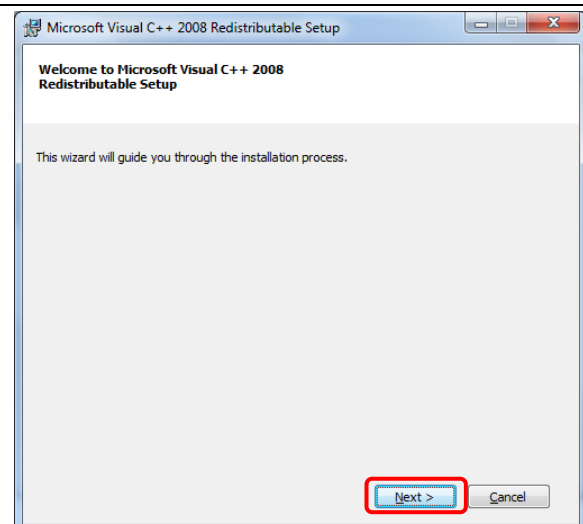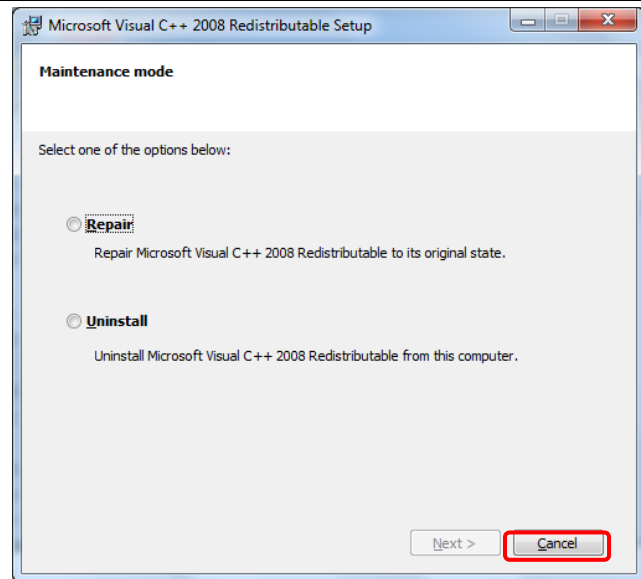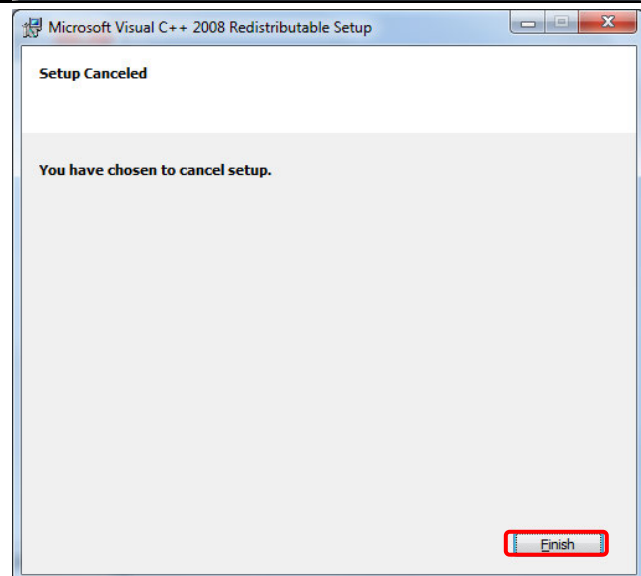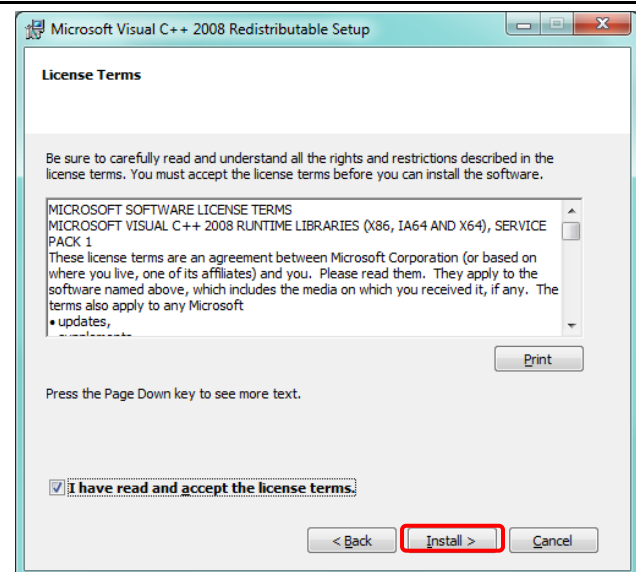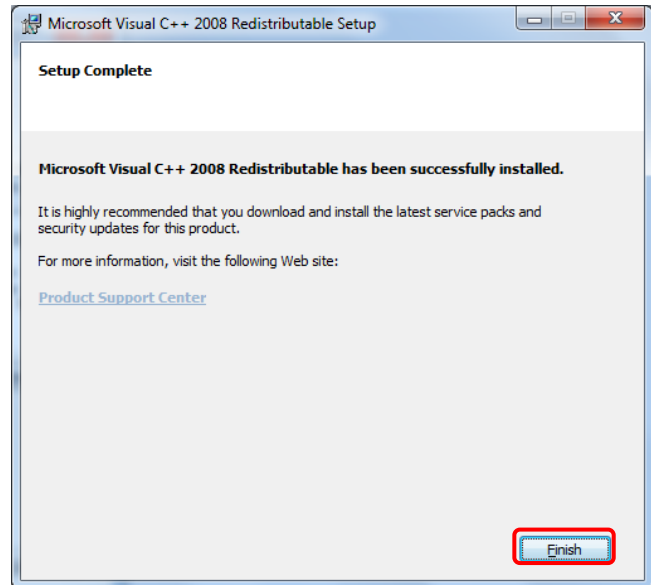|	
10. A setup complete window for Visual C++ 2008 Redistributable appears. Click Finish .	
11. A message appears when the installation of Visual C++ 2008 Redistributable Package is complete. Click OK .	
12. Install Visual C++ 2010 Redistributable Package. Click OK . * For a PC with Visual C++ 2010 Redistributable Package already installed, this window will not appear and the process moves on to Step 16.	
13. License Terms for Visual C++ 2010 Redistributable software gets displayed. Check to the acceptance and click Install . * It may not be displayed in some environments of use.	
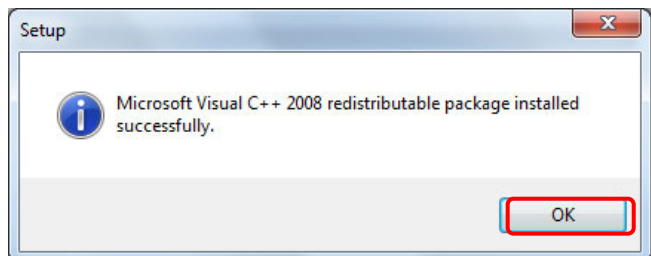
14. IXA (SCARA Robot) Simulator
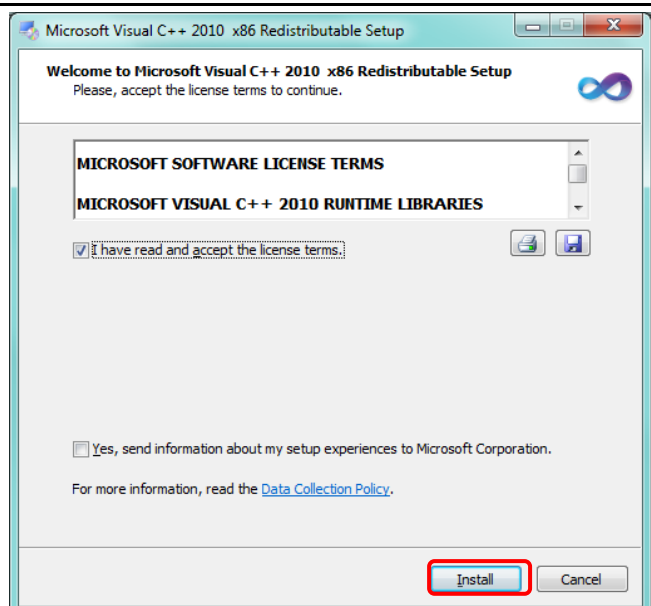
14. A setup complete window for Visual C++ 2010 Redistributable appears.

Click Finish .
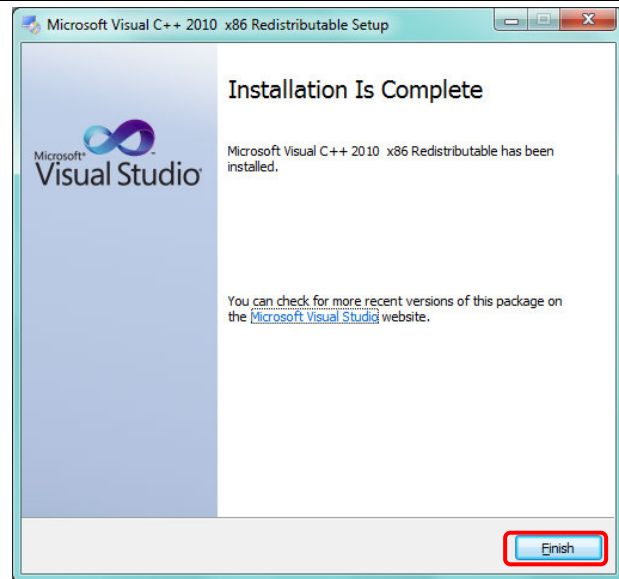
15. A message appears when the installation of Visual C++ 2010 Redistributable Package is complete.
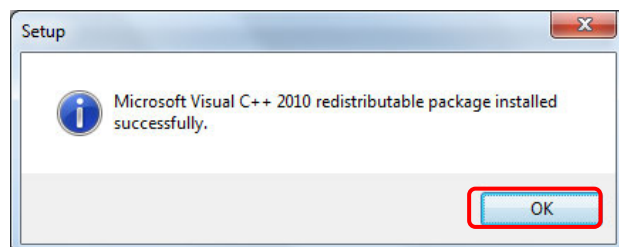
Click OK .
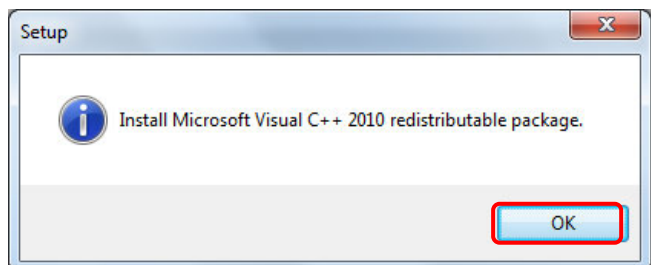
16. Install DirectX Runtime.

Click OK .

* For a PC with DirectX already installed, this window will not appear and the process moves on to Step 22.
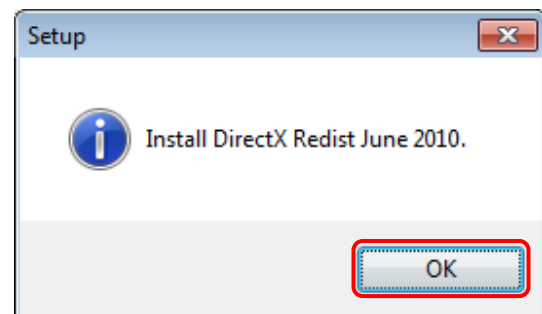
17. The software license agreement shows up.

Click Yes .

14. IXA (SCARA Robot) Simulator
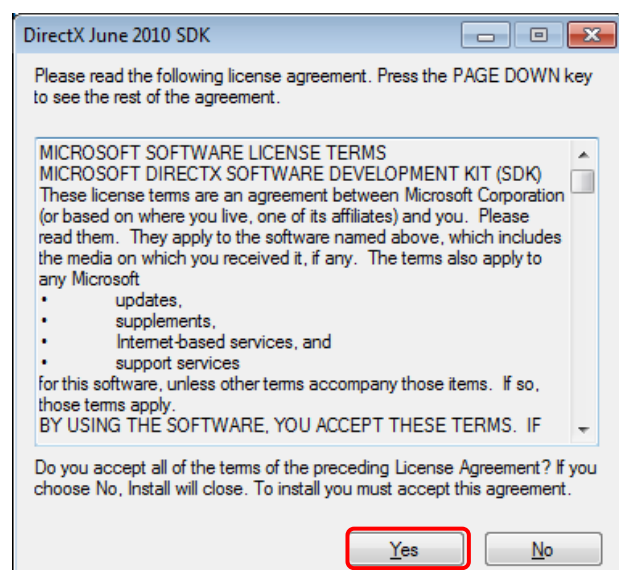
18. A setup window for DirectX shows up.

    Check on "accept the agreement" and click Next > .
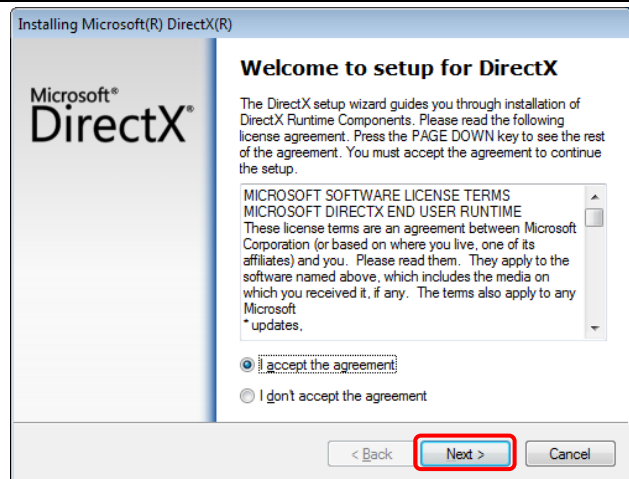
19. A installation confirmation window comes up.

    Click Next > .
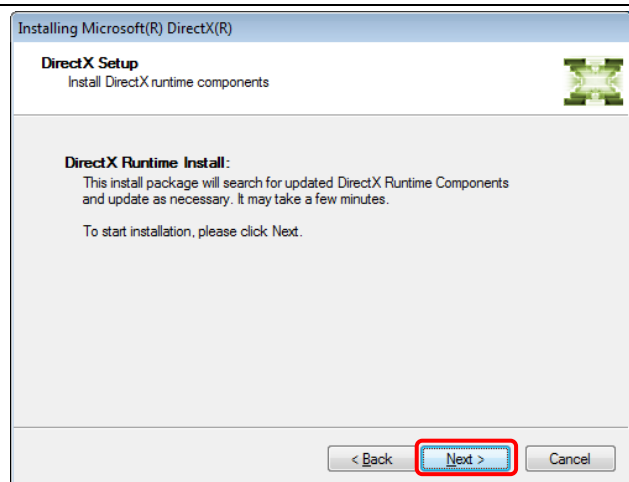
20. A DirectX installation complete window appears.

    Click Finish .
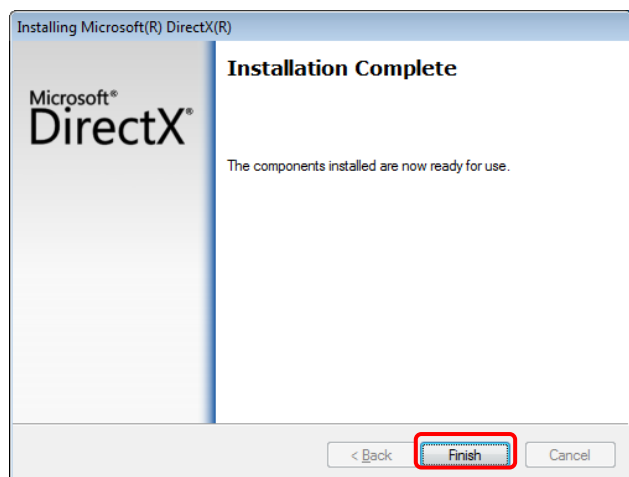
21. A message appears when the installation of DirectX Runtime is complete.

    Click OK .

14. IXA (SCARA Robot) Simulator
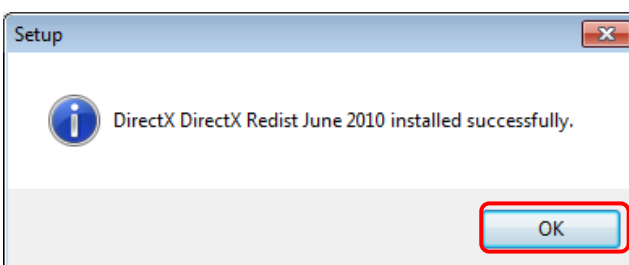
22. Install HASP HL Device Driver.

    Click OK.
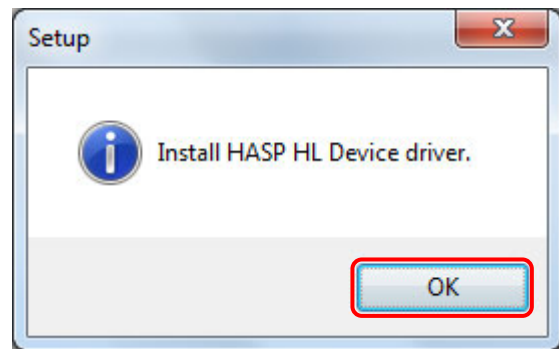
23. A setup window for Sentinel Runtime shows up.

    Click Next >.
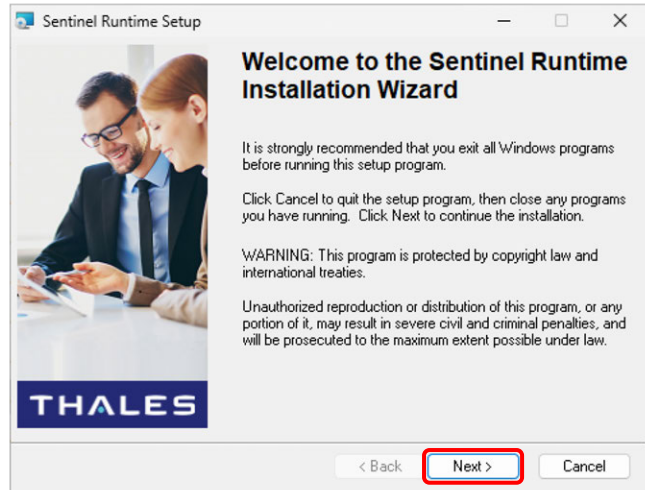
24. A license agreement window shows up.

    Check on "I accept the license agreement" and click Next >.
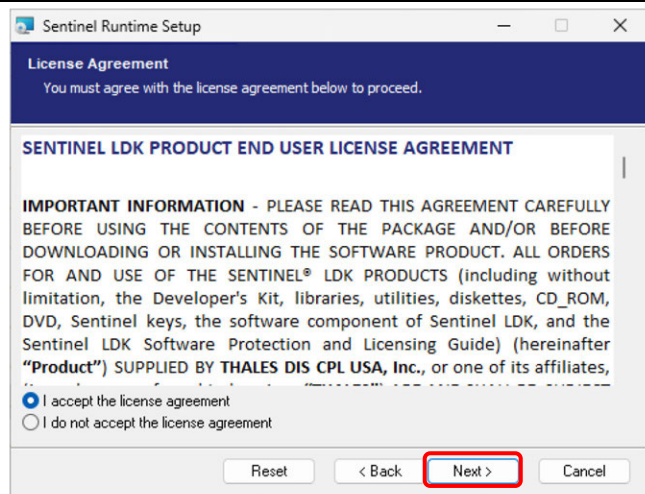
25. Ready to Install window comes up. Click Next > .	
26. A Sentinel Runtime installation complete window appears. Click Finish .	
27. A message appears when the installation of HASP HL Device Driver is complete. Click OK .	
28. The NET Framework 4.8.1. installation message appears. Click OK .	
29. A NET Framework 4.8.1. installation complete window appears. Click OK .	
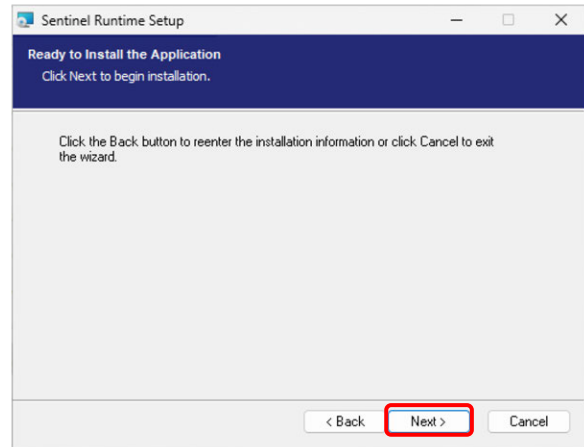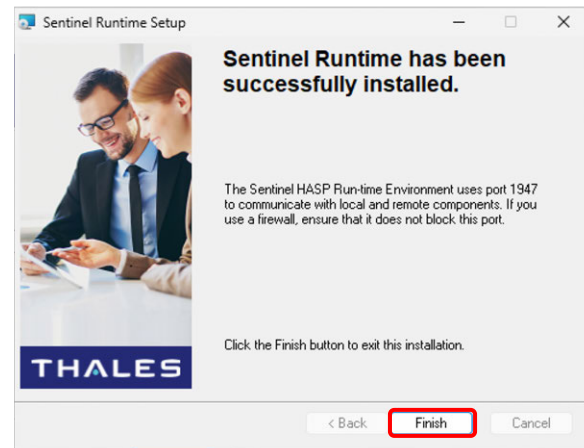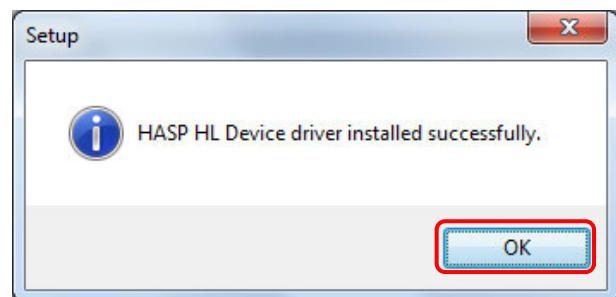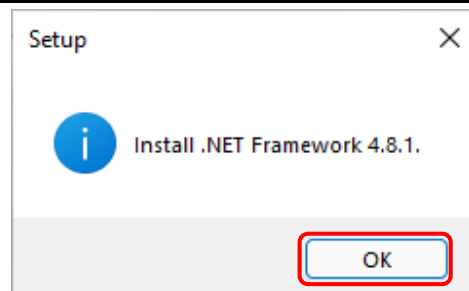
14. IXA (SCARA Robot) Simulator
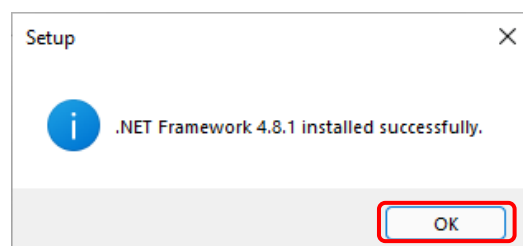
30. Installation of Virfit starts.

    Wait for a while.
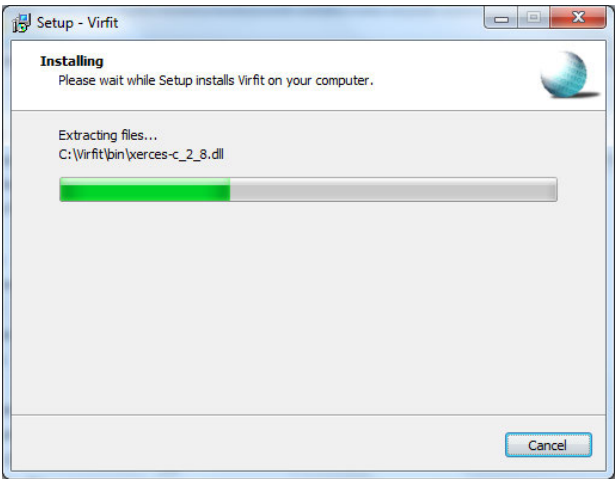
31. A setup complete window for Virfit appears.

    Click Finish to complete the installation.

14. IXA (SCARA Robot) Simulator

14.3 How to Start up

14.3.1 Startup

Once you start up "XSEL PC Software" from the start menu of Windows, the controller select window (figure below) will show up. Click RSEL,XSEL2-T series .
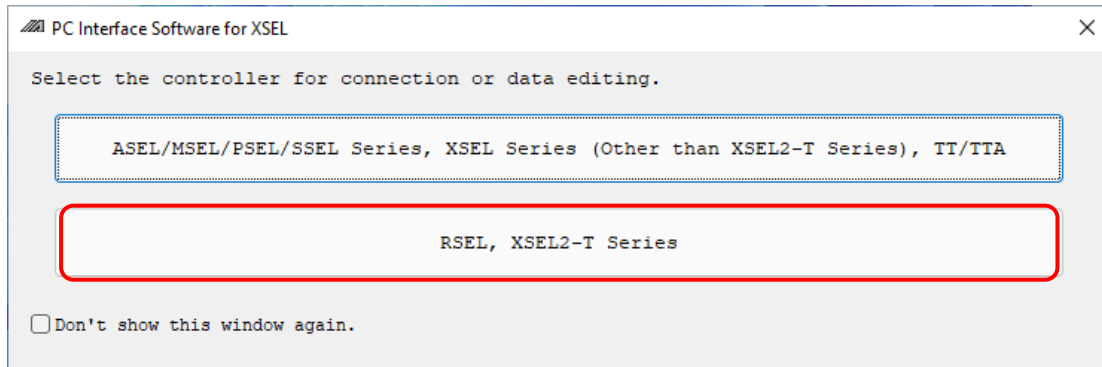
Fig. 14.4 Controller Select Window

Select "Simulator (IXA)" [*1] from the list in "Port Name" and click OK .

* 1   PC software can be launched in several windows on one PC, however it should be only one window on one PC that can be connected to the simulator.
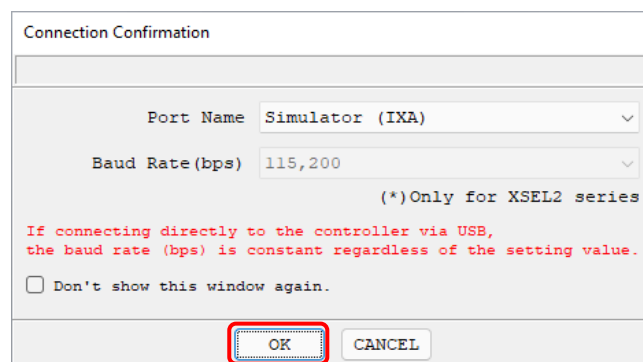
Fig. 14.5 Connection Confirmation Window

After clicking OK , a robot select window comes up.

Select a robot that you would like to simulate from the list of "Type" and "Model Code", and click
OK .
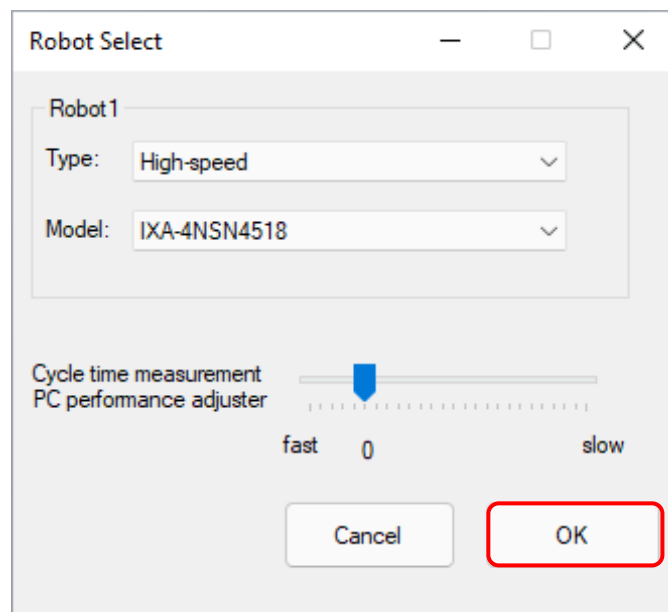
Fig. 14.6 Robot Select Window

The parameters should be initialized when a robot model different from the one selected previously
is selected.
Refer to [14.5.1 Flash ROM Writing Operation]
In case requires to change the robot model, end the simulation once and reboot.

14. IXA (SCARA Robot) Simulator

14.3.2 Cycle Time Measurement PC Performance Adjustment

Cycle time measurement is measurement available also when connected to the simulator, but the measurement results will vary due to the performance and load on the PC to be used, and will not perfectly match with the time measured on the actual controller. Utilize this as a reference for cycle time consideration. If the difference between the actual controller and the simulator is expectable in advance, the result on the PC (simulator) can be adjusted slower or faster on the slider bar. (10% of increase/decrease by one gradation)
Refer to [4.5 Cycle Time Measurement]

[1] Conditions at Cycle Time Measurement
Note that there are some limitations as follows in the cycle time measurement in the simulator.

⚠ **Caution**

● Do not attempt to use a program with conditional change of input signals.
A program that waits for a signal from outside should be commented out at that part or extract only the part to be measured to conduct the cycle time measurement. In case of considering the cycle time of such a program, add the waiting time into the consideration on top of the measurement result.

● Do not attempt to use a program that runs in an infinity loop.
In case of a program in loop and the time between the end and start in the range of measurement is short, the measurement result display time gets short and always displays under measurement.

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14. IXA (SCARA Robot) Simulator

[2] Cause of Cycle Time Measurement Variance in Simulator

    (1)   Variance due to CPU Process Speed and Memory Access Difference

There is a tendency in general that a PC has a CPU with better performance and the process is faster (cycle time measurement result shorter) except for the robot operation system commands (arithmetic operation, brunch instruction, etc.). Also in commands to operate the global data, the way of memory access is different from the controller making the cycle time measurement result shorter in a PC (simulator).

    (2)   Using Commands Dependent to Condition of Robot Main Unit

In the cycle time measurement in a simulator, there is no connection to a robot unit or external device. This makes the simulator unable to measure the cycle time properly in such commands as those to monitor external force against the robot or those to communicate with external devises.

Described below are the applicable commands.

No.	Feature	Command	Explanation
1	Pressing	PUSH	As there is nothing to push against, always finishes with miss-pressing.
2	Communication	OPEN/CLOS/READ/ WRIT/TMRW	Moves on to the next step without conducting communication process. It makes the cycle time shorter than the actual controller.
3	Vision System I/F	SLVS/GTVD	Go to the next step without having the vision system I/F process conducted. It makes the cycle time shorter than the actual controller.

14. IXA (SCARA Robot) Simulator

14.3.3 Warning at First Startup

There may be a case that a warning window as shown below appears at the first startup of the simulator. When this window appears, confirm that there is a check mark in a check box corresponding to your environment of use and click $\boxed{\text{Allow access}}$. It is necessary in order to operate of 3D view.
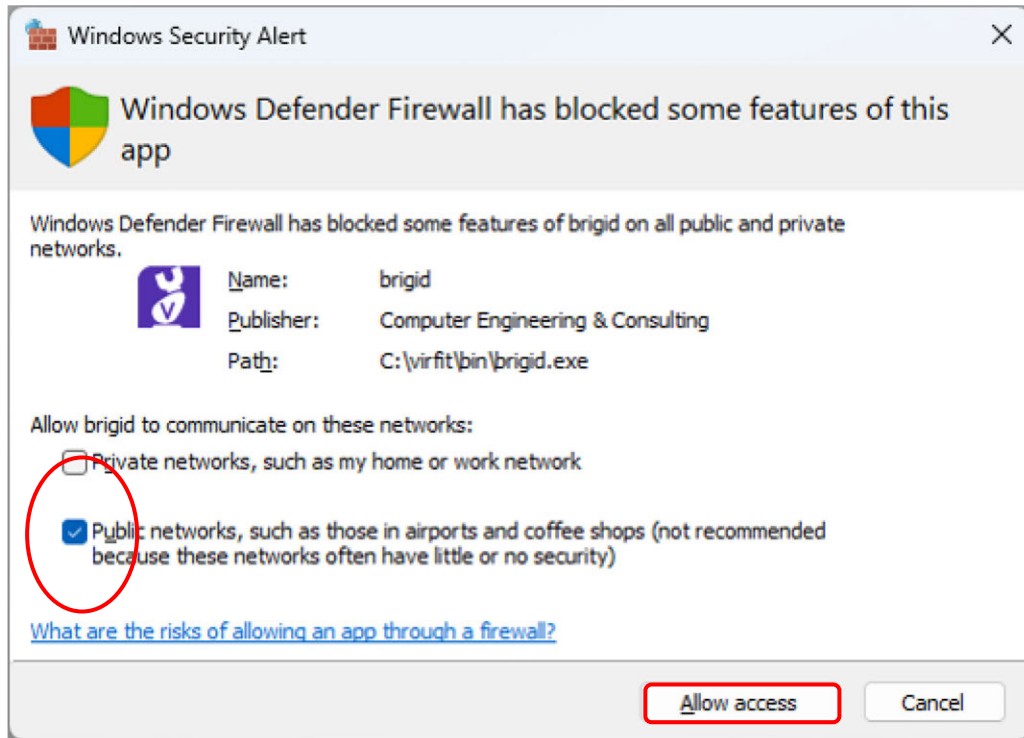
Fig. 14.7 Example of Warning Window at First Startup of Simulator

14.3.4 Start of Simulation

Either read out a SEL program or position data to be simulated from a file (File - Open in the menu bar) or create a new (File - Create New in the menu bar) and transfer to the simulator. Refer to [3.2 Explanation of the Commands (1)], [4. Program Edit Window] and [6. Position Data Edit Window] for detail of how to edit and transfer a SEL program or position data.
After data transfer, refer to [4.4 Running the Program] in order to execute a program.

Caution

● As it will be launched with "Safety VEL Specified" at the PC software startup, switch it to "Safety VEL Not Specified" if necessary. Refer to [3.3 Explanation of the Toolbar]

14.3.5 Stop of Simulation

Refer to [4.4 Running the Program] in order to stop the program.

14. IXA (SCARA Robot) Simulator

14.3.6 Termination of Simulation

Either finish the PC software or execute Off-line work (Exit Simulator) in the controller menu. If it is required to perform simulation again from offline condition, reconnect and execute it in the process of startup in [14.3.1] (Reconnection menu gets active offline.)
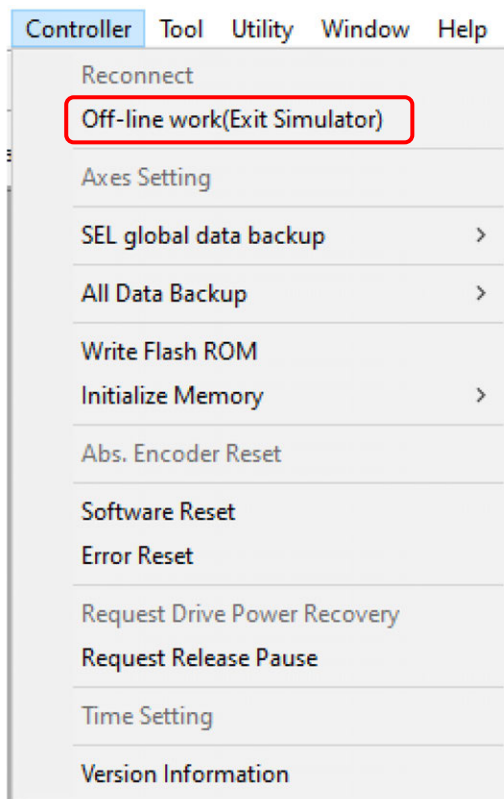
Fig. 14.8 Controller Menu

14. IXA (SCARA Robot) Simulator

14.4 Basic operation in 3D View Window
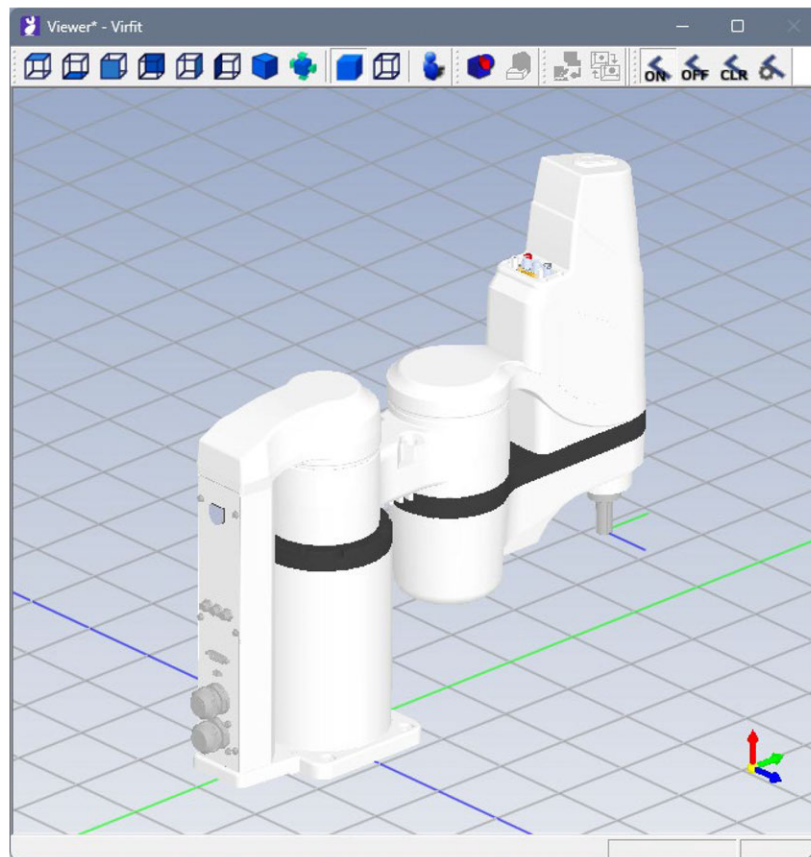
Fig. 14.9 3D View Window

14.4.1 View Operation (Normal Mode)

[1] View Operation Using a Wheel Mouse (3-button Mouse)

Action	How to Operate
Rotation	Press and hold the wheel button (middle button) and press the left button to drag.
Panning	Press and hold the wheel button (middle button) and drag it.
Zooming	When using a wheel mouse, turn the wheel to zoom in and out. When using a 3-button mouse, press and hold the middle button, click the left button once and then drag.
Changing Rotation Center	Click the wheel button (middle button) at a point to make the center.

[2] View Operation Using Keys and Mouse

Action	How to Operate
Rotation	Press and hold Alt Key and press the left button and drag.
Panning	Press and hold Ctrl Key and press the left button and drag.
Zooming	Press and hold Ctrl + Alt Keys and press the left button and drag.
Changing Rotation Center	Press and hold Ctrl + Alt Keys and click the left button.

14. IXA (SCARA Robot) Simulator

[3] Normal Camera Work from Tool Bar
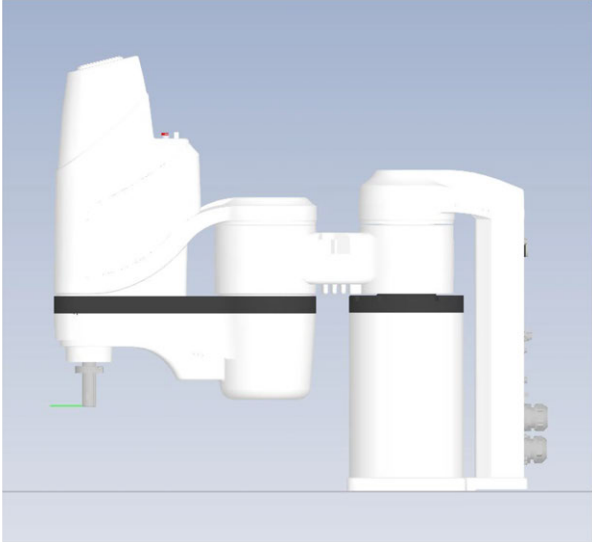
	Click Front View Icon in the tool bar. The view confronts the ZX plane. 	
	Click Right View Icon in the tool bar. The view confronts the ZY plane. 	

14. IXA (SCARA Robot) Simulator
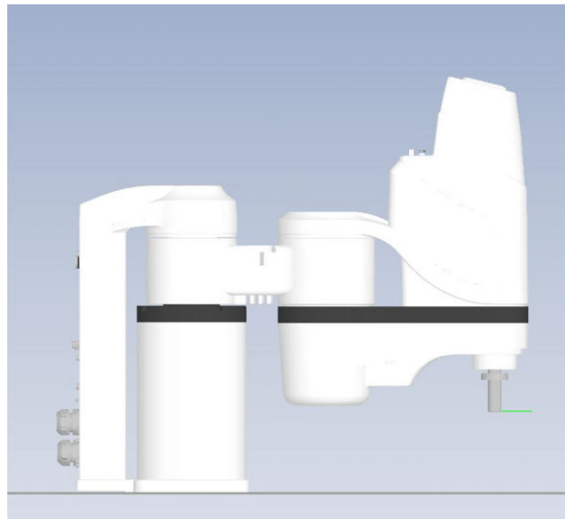
	Click Left View Icon in the tool bar. The view confronts the ZY plane (backside).
	Click Rear View Icon in the tool bar. The view confronts the ZX plane (backside).

14. IXA (SCARA Robot) Simulator
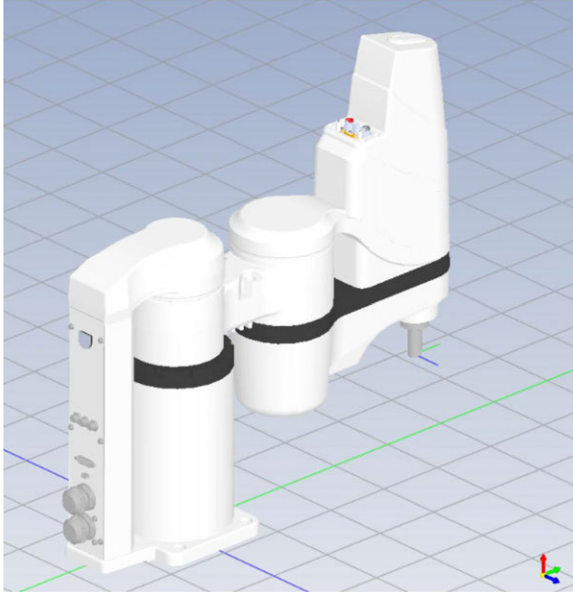
	Click Top View Icon in the tool bar. The view confronts the YX plane.
	Click Bottom View Icon in the tool bar. The view confronts the YX plane (backside).
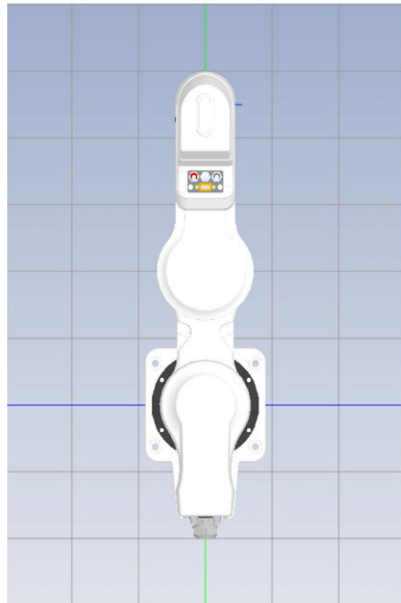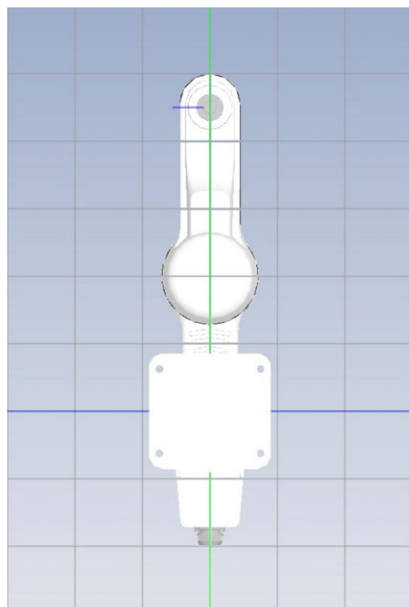
	Click Isometric View Icon in the tool bar. The view comes slanted (isometric view).
	Click Zoom to Fit Icon in the tool bar. The view shows the whole element without changing the view angle.

14. IXA (SCARA Robot) Simulator

14.4.2 View Operation (Walkthrough Mode)

[1] Switching to Walkthrough Mode

Click "Walkthrough Icon" 👤 .

During Walkthrough Mode, the icon is kept pressed.

Click on the icon while it is pressed, it gets back to the normal mode.
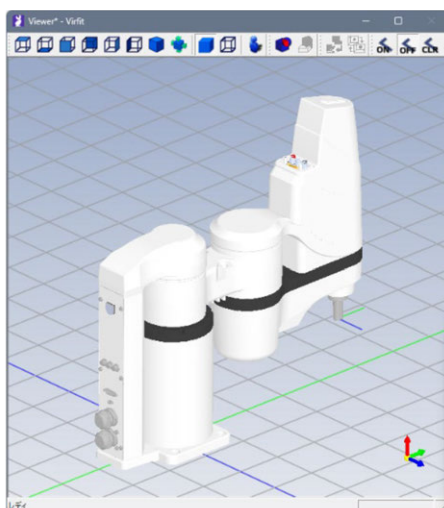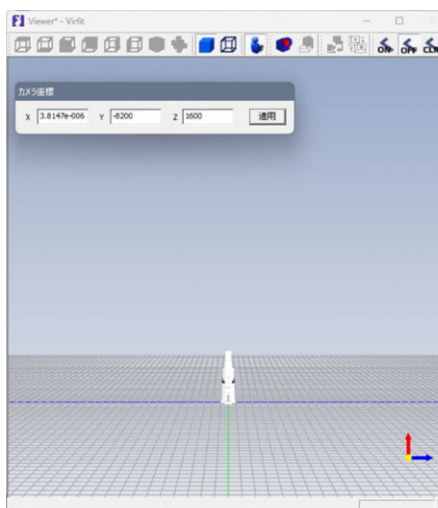
| Normal Mode | Walkthrough Mode |

[2] View Operation Using a Wheel Mouse (3-button Mouse)

Action	How to Operate
Panning (XY plane)	Press the left button and drag it. For a wheel mouse, turn the wheel to move back and forth.
Vertical Move (Z direction)	Press and hold the wheel button (middle button) and drag it.
Camera Rotation	Press the right button and drag it.

[3] View Operation in Camera Coordinate Window

Input numbers in camera coordinate window and click Apply .
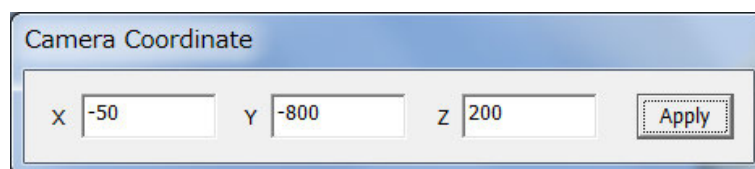
Fig. 14.10 Camera Coordinate Window

The view moves to the point of coordinates that was input.

⚠ Caution
● Moving the mouse pointer in the view area during number input should cancel the input.

14.4.3 Locus drawing

The locus of the vertical axis tip can be displayed. If the SCARA tool coordinate system offset in the coordinate system definition data is set up, the amount of offset is considered in the display.

[1] Turning on Locus drawing

Click Locus Display Activated Icon ON .

The locus of the tip of the vertical axis gets plotted in response to the robot animation.

The locus display shows a certain amount of movement and disappears from the older.
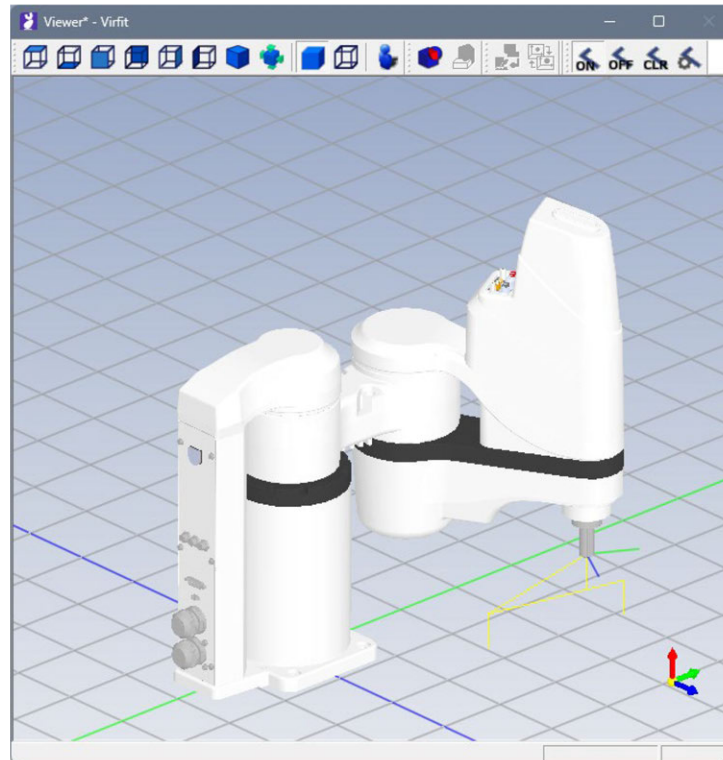
Fig. 14.11 During Locus drawing

⚠ **Caution**

● The pitch of robot locus plotting may get longer in such conditions as described below:

　● Robot movement speed high

　● View changed

　● PC performance is low

　● Another application in operation

　etc.

14. IXA (SCARA Robot) Simulator

Click Locus Display Inactivated Icon ![icon] .

Locus drawing stops.

Click Locus Display Clear Icon ![icon] .

The displayed locus are cleared up.

Click Locus Display Setup Icon ![icon] .

Color and line width of locus and show/hide of robot is to be set up.
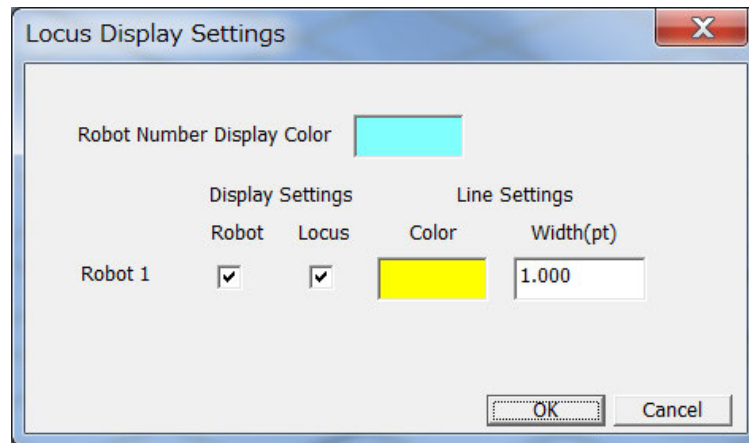
Fig 14.12 Locus Display Settings

* Robot Number Display Color: Color of "Robot 1" displayed on the 3D view robot in the locus display setup window

To change color, click on the colored portion and a color setting window pops up. Select a desired color and click OK .
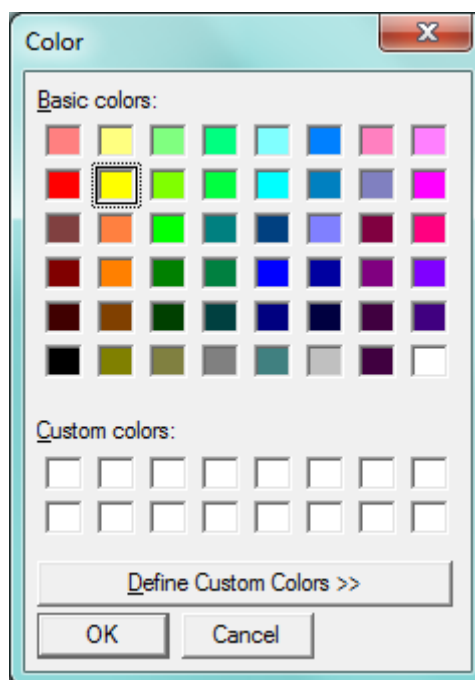
Fig. 14.13 Color

Line width can be changed in the range from 0.1 to 10.0.

14.4.4 Other Displays

[1] Lettering Mode

Display format of an object can be changed.

♦ Solid

Click Solid Display Icon .

During the solid display, the icon is kept pressed.
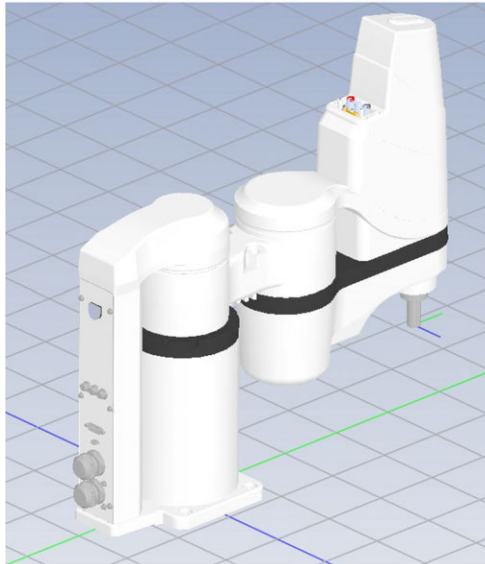
Fig. 14.14 Solid Display

♦ Wireframe

Click Wireframe Display Icon .

During the wireframe display, the icon is kept pressed.
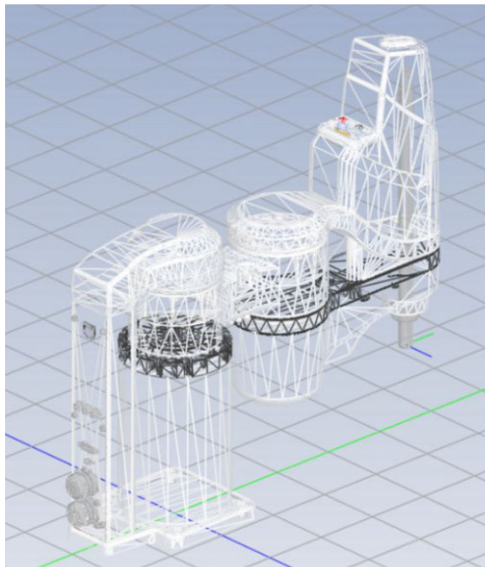
Fig. 14.15 Wireframe Display

14. IXA (SCARA Robot) Simulator

14.5 Operation on PC Software

The functions described in Chapters from 4 to 13 are available to use while the simulator is connected. However, in Chapter 12, [12.3 Axis Setting], [12.5 Request Drive Power Recovery] and [12.6 Setting Time] cannot be used.

14.5.1 Flash ROM Writing Operation

Conducting flash ROM writing operation in the PC software should make each type of data (program data, position data, symbols, coordinate system definition data and parameters) recorded in the hard disk in the PC. The recorded data is available for simulation in the next startup. However, when the robot model is changed in the robot select window at the startup, each type of data (program data, position data, symbols, coordinate system definition data and parameters) will get initialized.

14.5.2 Operation of Software Reset

Conducting an operation of software reset in the PC software should bring the robot current position data back to the initial position.

14.6 SEL Commands not Applicable for Simulation

Shown below are those with different behaviors between controller and simulator in SEL Commands.

No.	Feature	Command	Explanation
1	Pressing	PUSH	As there is nothing to push against, always finishes with miss-pressing.
2	Communication	OPEN/CLOS/READ/ WRIT/TMRW	Moves on to the next step without conducting communication process. The output part should be set, but return codes or received messages should not be set. In case of debugging READ Command, set the received message in advance to executing READ Command.
3	Expansion Command	ECMD 1/ECMD 10	The value read out always comes "0".
4	Task Level Change	CHPR	This software runs on Windows and strict level change operation cannot be performed.
5	Vision System I/F	SLVS/GTVD	Go to the next step without having the vision system I/F process conducted. Even though the output part should get set, other data should not be set.

14. IXA (SCARA Robot) Simulator

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XSEL2

Chapter 15

EC teaching tool

15.1 Overview

The EC teaching tool is used to perform teaching for an ELECYLINDER axis connected to an XSEL2-T/TX.

15. EC teaching tool

15.2　How to Startup

Select "EC (E)" → "Teaching tool (T)" from the main menu of the XSEL PC software.

The following connected axis check window is displayed during startup. "Connected" will be displayed for any axes confirmed to be connected, while others will be blank.

(Only axes recognized by the XSEL2-T/TX will be checked.)

Check for connected axes	
Axis No.	Status
3	Connected
4	(Checking)

Fig. 15.1 Check for connected axes

Once the connected axes have been confirmed, the main window will be displayed.
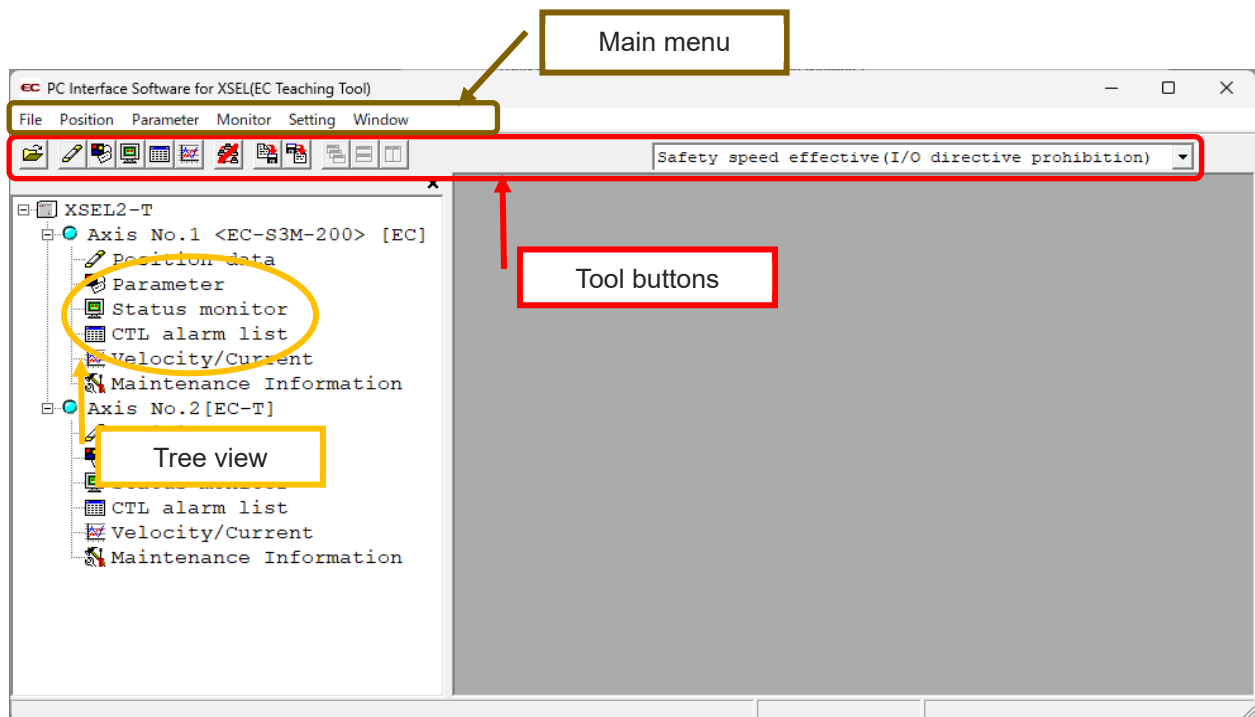
図 15.2 Main window of PC software for XSEL

15.3 Main menu

15.3.1 Operation using the main menu

(1) File

1) "Open"

Reads position data or parameters from a file.

2) "Close"

Closes the file.

3) "Load to CTL" → "Position"

Writes position data from the file to the controller.

4) "Load to CTL" → "Parameter"

Writes parameters from the file to the controller.

5) "Backup" → "Save all data"

Saves all position data and parameters from the controller to a file.

6) "Backup" → "Load all data"

Transfers all position data and parameters from a file to the controller.

7) "Backup" → "Print Backup Data"

Prints backup data.

8) "Backup" → "Edit parameter"

Allows parameters from a backup file to be edited on the parameter editing window.

9) "Backup" → "Edit position data"

Allows position data from a backup file to be edited on the position editing window.

10) "Backup" → "Back up multi axes"

Saves position data and parameters for axes selected from multiple connected axes to individual backup files.

11) "Backup" → "Restore multi axes"

Transfers position data and parameters from a file to the selected folder.

12) "Recent Files"

Displays a list of recently loaded files. A file can be selected and read from this list.

13) "Exit"

Exits the application.
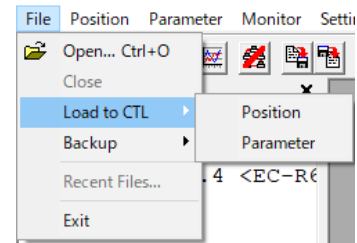
Fig. 15.3 Load to CTL

Fig. 15.4 Backup

15. EC teaching tool
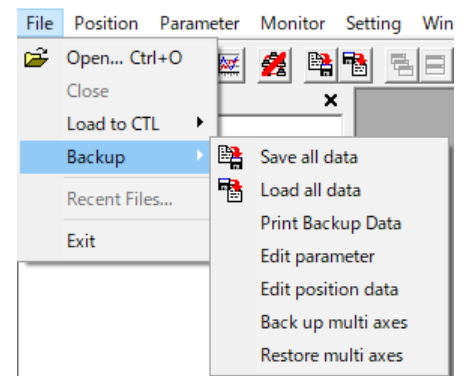
(2) Position

1) "Edit/Teaching"

Reads position data from the controller in order to edit data or perform teaching.

2) "Load to CTL"

Transfers (writes) edited position data to the controller.

3) "Print"

Prints position data being edited.
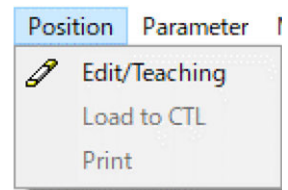
Fig. 15.5 Position tab

(3) Parameter

1) "Edit"

Reads parameters from the controller for editing.

2) "Load to CTL"

Transfers (writes) edited parameters to the controller.

3) "Print"

Prints parameters being edited.
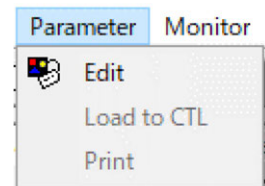
Fig. 15.6 Parameter tab

(4) Monitor

1) "Status"

Allows the status of each axis (axis status, internal flags, input/output ports) to be viewed.
Refer to [Status monitor window].

2) "CTL alarm list"

Displays the controller alarm list window.
Refer to [Controller alarm list window].

3) "Velocity/Current"

Displays the velocity/current monitor window.
Refer to [Velocity/current monitor window].

4) "Maintenance info"

Displays the maintenance information window.
Refer to [Maintenance information window].
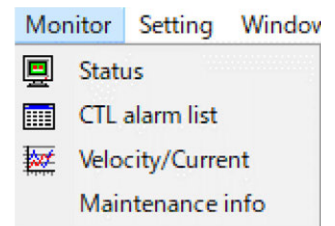
Fig. 15.7 Monitor tab

15. EC teaching tool

(5) Setting

1) "Application"

Allows application settings to be configured.

Refer to [Application setting window].

2) "Controller" → "Disconnect"

Disconnects connected axes and closes the
application.
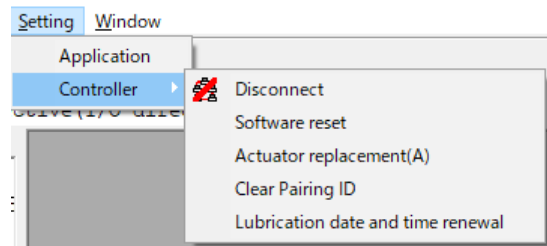
Fig. 15.8 Setting tab

"Controller" → "Software reset"

Resets (restarts) the software.

"Controller" → "Actuator replacement"

Resets maintenance information total moving count, total moving distance to "0".

"Controller" → "Clear Pairing ID"

Clears the pairing ID of a controller compatible with a battery-less absolute controller.

Enter 5119 as the password and then click OK .

(Note)   If an actuator motor is replaced, be sure to perform home return without clearing
the pairing ID.
The home position will not be set if home return is not performed.

"Controller" → "Lubrication date and time renewal"

Sets the current time as the "lubrication time" displayed on the maintenance information
window, and resets the total moving distance after lubrication to "0".

(Note)   This is available only if the actuator recognition function is supported.

15. EC teaching tool

(6) Window

   1) "Cascade"

     Displays windows cascaded.

   2) "Horizontal"

     Displays windows arranged horizontally.

   3) "Vertical"

     Displays windows arranged vertically.

   4) "Arrange icons"

     Arranges windows displayed as icons (minimized).

   5) "Minimizing"

     Switches all windows to icons (minimized).

Fig. 15.9 Window tab

   6) "Normalizing"

     Reverts all windows switched to icons (minimized) as windows.

   7) "Close all"

     Closes all open windows.

   8) "Font size" → "Largest"/"Larger"/"Medium"/"Smaller"/"Smallest"

     Allows the font size on each window to be changed.

   9) "Tree View"

     Shows/hides the tree view.

15. EC teaching tool
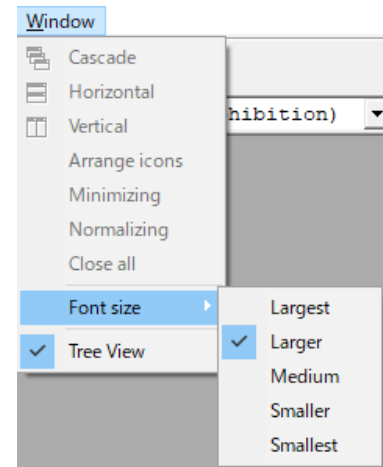
15.3.2 Operation using the tool buttons

1) 2) 3) 4) 5) 6) 7)   8) 9) 10) 11) 12)   13)
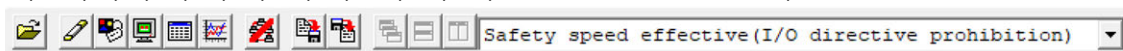
1) Open file

   This is the same as selecting "File" → "Open".

2) Edit/teach position data

   This is the same as selecting "Position" → "Edit/Teaching".

3) Edit parameters

   This is the same as selecting "Parameter" → "Edit".

4) Status monitor

   This is the same as selecting "Monitor" → "Status".

5) Controller alarm list

   This is the same as selecting "Monitor" → "CTL alarm list".

6) Speed/current

   This is the same as selecting "Monitor" → "Speed/Current".

7) Disconnect

   This is the same as selecting "Setting" → "Controller" → "Disconnect".

8) Save all data

   This is the same as selecting "File" → "Backup" → "Save all data".

9) Transfer all data

   This is the same as selecting "File" → "Backup" → "Load all data".

* Items that are dimmed cannot be selected.

10) Display windows cascaded

   This is the same as selecting "Window" → "Cascade".

11) Display windows arranged vertically

   This is the same as selecting "Window" → "Vertical".

12) Display windows arranged horizontally

   This is the same as selecting "Window" → "Horizontal".

13) Enables or disables the safety speed.

   * This is enabled when the controller switch is set to manual (MANU).
   * This selection will be enabled if "EC I/O directive prohibition" is specified in the XSEL PC software.
   ● Safety speed effective (I/O directive prohibition)
     The maximum speed will be the speed set in the parameters, regardless of the position data speed specification.
   ● Safety speed ineffective (I/O directive prohibition)

15. EC teaching tool

15.3.3 Tree view

Select "Window" → "Tree View" from the main menu.
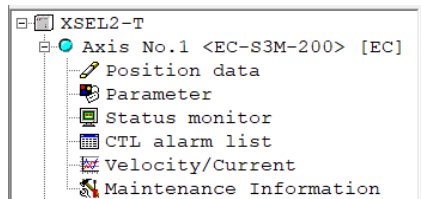
Fig. 15.10 Tree view

1) Axis No.1 <EC-S3M-200>

The axis numbers and axis names are displayed.
A light blue icon will be displayed if the connection is normal, while a red icon will be displayed if there is an error.

* Items displayed on the application setting window can be modified.

2) Position data

Double-click this to open the simple data setting window.
(Note) The simple data setting window and parameter editing window cannot be opened at the same time.

3) Parameter

Double-click this to open the parameter editing window.

4) Status monitor

Double-click this to open the status monitor window.

5) CTL alarm list

Double-click this to open the controller alarm list window.

6) Velocity/Current

Double-click this to open the velocity/current monitor window.

7) Maintenance Information

Double-click this to open the maintenance information window.

15. EC teaching tool

15.3.4 Axis selection

To perform an operation such as position editing, select the corresponding axis number on the select axis window.

Axis numbers that can be selected are displayed in the "Connected axes" box.

Move the cursor and click $\boxed{>}$ to select a viable axis, and then click $\boxed{\text{OK}}$.

To select all axes, click $\boxed{>>}$ and then click $\boxed{\text{OK}}$.
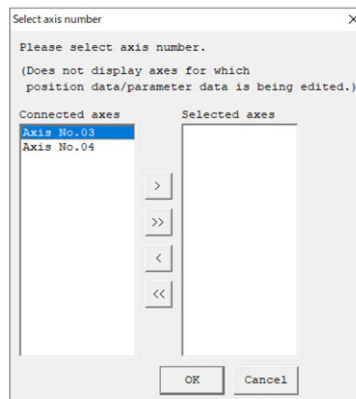
Fig. 15.11 Axis selection

⚠️ **Caution**

● Numbers for axes that are already open on the "Parameter editing window" or "Simple data setting window" will not be displayed. To select such an axis, first close the applicable window.

---

15. EC teaching tool

15.4 Simple data setting window

Either select "Position" → "Edit/Teaching" from the main menu, or double-click Position data in the tree view to display the simple data setting window.

Fig. 15.12 Simple data setting window

⚠ **Caution**
● If the simple data setting window is open for an axis, the parameter editing window for the same axis cannot be opened.

The simple data setting window is used to configure operating conditions (velocity, acceleration, deceleration, push force) and position settings (forward end, backward end, pushing start point) display the current position, cycle time, settings log and perform manual operation.

Operating condition data and position setting data configured here will be valid after being transferred to the controller.
This can be transferred using either of the following operations.
● Click Transfer on the bottom right corner of the window.
● Click the ⬚ icon (transfer to controller button) in the tool buttons area.

Manual operation will be performed after transferring data to the controller.

15.4.1 Tool buttons
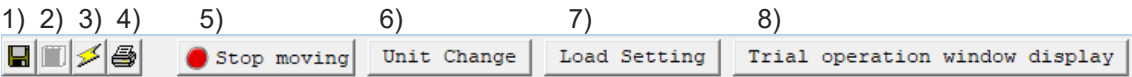
1) Save as

Saves the displayed data to a file.

2) Transfer to controller

Transfers (writes) data to the controller.

3) Refresh

Refreshes the data display after rereading all data on the window from the controller.

4) Print

Prints data.

Clicking this opens the print setting window, which allows the top/left margins and row spacing [mm] to be set, along with the print orientation.

Click Print to print.
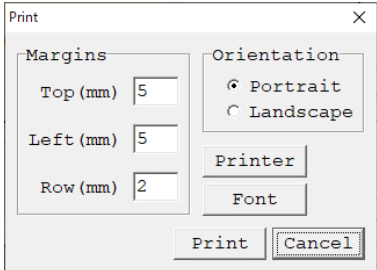
5) Stop moving

Click this to forcibly stop axis movement.

Fig. 15.13 Print window

6) Unit change

Switches the units shown for setting items and display items as follows.

Velocity: [%] ⇔ [mm/s]

Acceleration/deceleration: [%] ⇔ [G]

Push: [%] ⇔ [N] (reference value)

7) Load setting

Displays the load setting window.

Enter the installation position and the forward/return transported load to calculate the optimal velocity and acceleration/deceleration values.
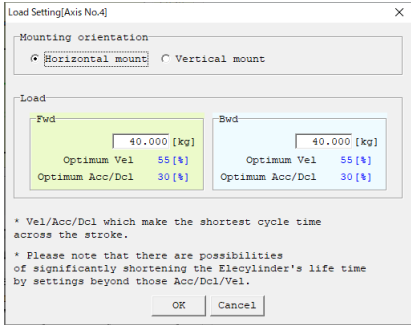
Fig. 15.14 Load setting

8) Trial operation window display

Displays the trial operation window.
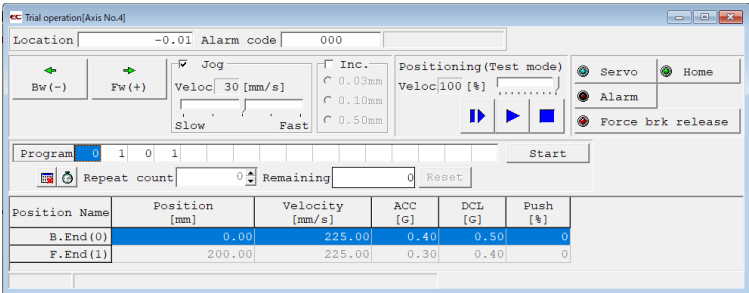
Fig. 15.15 Trial operation window

15. EC teaching tool

15.4.2 Operating condition settings, position settings

[Positioning operation]
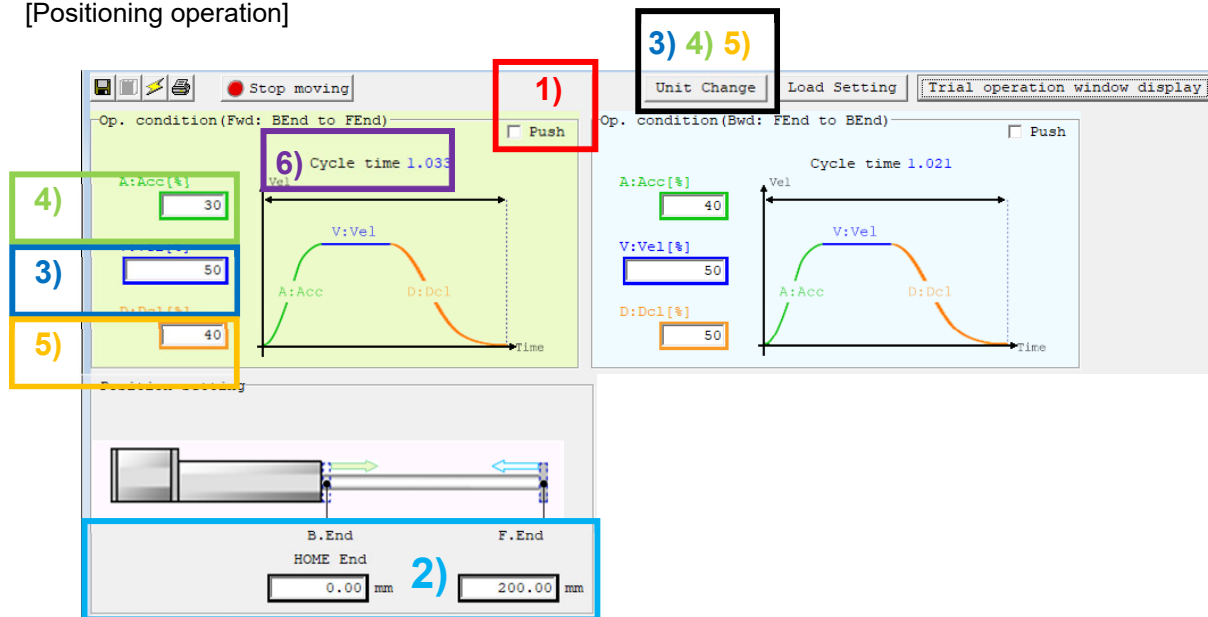
Fig. 15.16 Positioning operation

1) Push checkbox: If the push checkbox is not selected (□), a positioning operation will be
                        performed.

2) Position setting [mm]: Enter the backward end and forward end values.
                        Enter the position from home as a positioning coordinate value.
                        The unit used is [mm], and the value can be entered up to two positions
                        after the decimal point.
                        The unit used for EC rotary type actuators [degrees/s], and the value can
                        be entered up to two positions after the decimal point.

3) Velocity [%] or [mm/s]: Set the positioning operation velocity.
                        This can be set as a number from 1% to 100%.
                        The unit can be switched to [mm/s] by pressing Unit Change .
                        When set to [mm/s], the value can be entered up to two positions after the
                        decimal point.
                        The unit used for EC rotary type actuators [degrees/s], and the value can
                        be entered up to two positions after the decimal point.
                        (Note) Use the following equation to calculate the minimum velocity.
                            Minimum velocity [mm/s] = Lead length [mm] ÷ 800 ÷ 0.001 [s]

4) Acceleration [%] or [G]: Set the acceleration when movement starts.
                        This can be set as a number from 1% to 100%.
                        The unit can be switched to [G] by pressing the Unit Change .
                        When set to [G], the value can be entered up to two positions after the
                        decimal point.

5) Deceleration [%] or [G]: Set the deceleration when movement stops.

This can be set as a number from 1% to 100%.

The unit can be switched to [G] by pressing the Unit Change .

When set to [G], the value can be entered up to two positions after the decimal point.

6) Cycle time [s]: The displayed cycle time is calculated from the set velocity, acceleration, and deceleration.

15. EC teaching tool
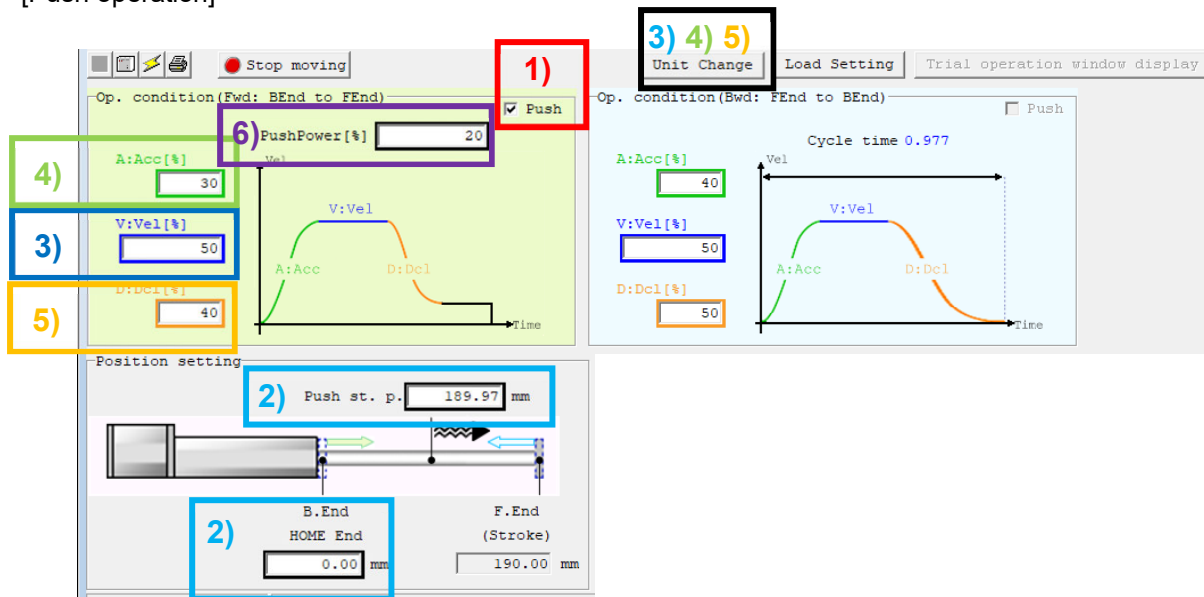
[Push operation]

Fig. 15.17 Push operation

1) Push checkbox: If the push checkbox is selected (☑), a push operation will be performed.

2) Position setting [mm]: Set the movement start position (forward end or backward end) and pushing start position.
Enter the position from home as a positioning coordinate value.
The unit used is [mm], and the value can be entered up to two positions after the decimal point.
The unit used for EC rotary type actuators [degrees/s], and the value can be entered up to two positions after the decimal point.

3) Velocity [%] or [mm/s]: Set the velocity up to the movement start position (forward end or backward end) and pushing start position.
This can be set as a number from 1% to 100%.
The unit can be switched to [mm/s] by pressing the Unit Change .
When set to [mm/s], the value can be entered up to two positions after the decimal point.
The unit used for EC rotary type actuators [degrees/s], and the value can be entered up to two positions after the decimal point.
(Note) Use the following equation to calculate the minimum velocity.
Minimum velocity [mm/s] = Lead length [mm] ÷ 800 ÷ 0.001 [s]

4) Acceleration [%] or [G]: Set the acceleration when movement starts.
This can be set as a number from 1% to 100%.
The unit can be switched to [G] by pressing the Unit Change .
When set to [G], the value can be entered up to two positions after the decimal point.

15. EC teaching tool

5) Deceleration [%] or [G]: Set the deceleration up to the pushing start position.
This can be set as a number from 1% to 100%.
The unit can be switched to [G] by pressing the Unit Change .
When set to [G], the value can be entered up to two positions after the decimal point.

6) Push [%] or [N]: Set the push torque (current limit value) as a [%] or [N] value.
The push velocity will be 20 mm/s.
This will be 20 degrees/s for EC rotary type actuators.
If the set velocity is 20 mm/s or less (20 degrees/s or less for EC rotary type actuators), pushing will be performed at the set velocity.
The unit can be switched to [N] (reference value) by pressing the Unit Change .

15-15

15. EC teaching tool

15.4.3 Manual operation
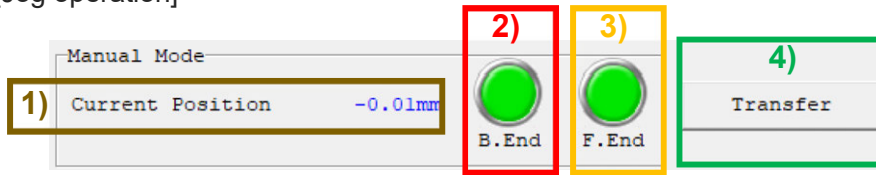
[Jog operation]

Fig. 15.18 Manual operation (Jog operation)

1) Current Position [mm]: Displays the current position.

2) B.End :   Moves toward the backward end as long as the button is pressed. Movement stops when the button is released or the backward end LS signal switches ON.

3) F.End :   Moves toward the forward end as long as the button is pressed. Movement stops when the button is released or the forward end LS signal switches ON.

(Note) Backward end and Forward end can only be used when they are green. If they are not green, it means that the setting values have not yet been transferred. They will need to be transferred to the controller first.

4) Transfer :   Transfers data that has been set changed to the controller.
                     * This will be dimmed when a jog operation can be performed.

15. EC teaching tool

15.4.4 Transfer log

Transfer log		Acc [%]	Vel [%]	Dcl [%]	Cycle time [s]
Fwd	Current Setting	30	50	40	1.033
	Previous Setting	30	50	40	1.033
Bwd	Current Setting	40	50	50	1.021
	Previous Setting	40	50	50	1.021

Fig. 15.19 Transfer log

When data is transferred to a controller and the forward movement or backward movement operating conditions (velocity, acceleration/deceleration, push) have been set changed, the previous setting values are displayed in the Previous Setting area, while the new setting values are shown in the Current Setting area. The cycle time calculated from these setting values is also displayed.

If a push operation was selected as an operating condition, the previous setting values and current setting values will not be displayed.

Reference

● The acceleration/deceleration unit of [G] is described below.

$1G = 9,800mm/s^2$: Acceleration possible up to 9,800mm/s per second.

For 0.3G, the acceleration per second is $9,800mm/s^2$ x 0.3 = $2,940mm/s^2$.
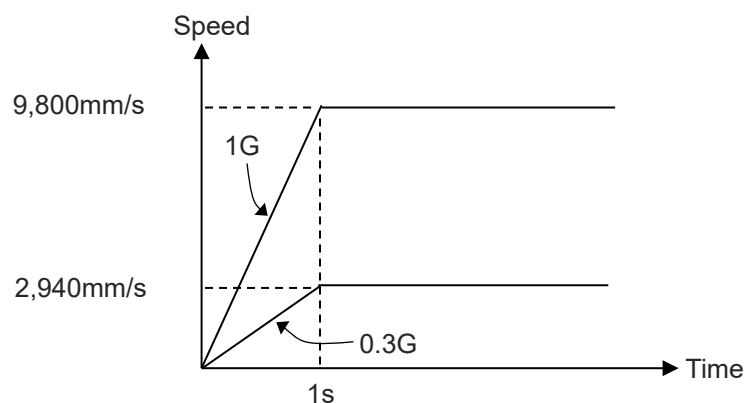
Fig. 15.20 The acceleration/deceleration unit of [G]

⚠ Caution

● Reduce acceleration/deceleration if any shock or vibration is generated in the actuator or workpiece.

Continuing use in such a situation could drastically reduce operation life.

15. EC teaching tool

15.4.5 Automatic Servo OFF Function

[1] Overview

Automatic Servo OFF Function of ELECYLINDER can be set up.

With automatic servo OFF function, the servo turns OFF automatically after a certain period of time once (delay time) positioning is completed.

Conduct the next movement command input and the servo should turn on automatically and the positioning operation should be executed.

Since holding current does not flow during the stop, power consumption can be reduced.

[Push operation]

When it is necessary to have the push operation performed, do not set up Automatic Servo OFF Function.

Once ST Signal turns off after the pressing completed, Automatic Servo OFF Function should be activated and the servo gets turned off.

EC auto servo OFF supported version: V14.02.03.00 or later

15. EC teaching tool

[2] Setting

Below explains how to set it up.

1. Click Automatic servo off Setting on the simple data setting window.

- The simple data setting window should be displayed.
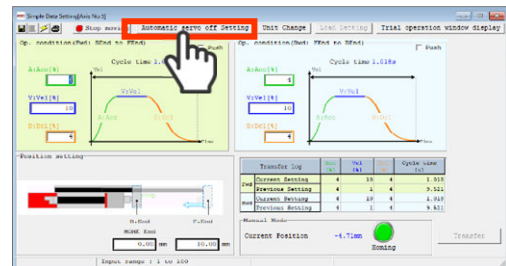
Fig. 15.21 Simple Data Setting window

2. Set the duration from the time after positioning complete until Automatic servo OFF, the Automatic servo off setting window.
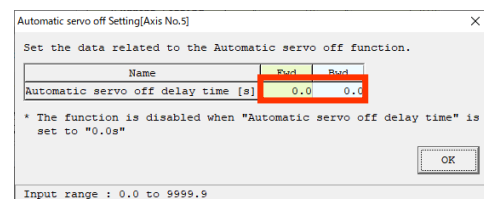
Fig. 15.22 Automatic servo off Setting window

- Input for both the way forth (forward) and the way back (backward).
- The Automatic servo off delay time can be set in unit of 0.1 second.

3. Input the Automatic servo off delay time, and click OK.

- Set it to "0.0" and this function will inactivated. (The servo will not turn off.)
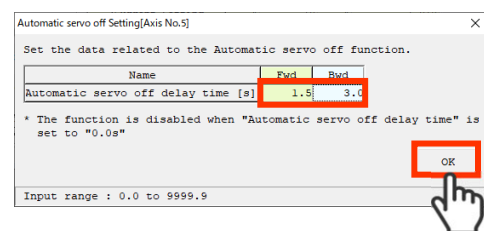
Fig. 15.23 Input the Automatic servo off delay time

15. EC teaching tool

4. After returning to the Easy Data Setup window, click $\boxed{\text{Transfer}}$ and proceed with the settings according to each dialog box.
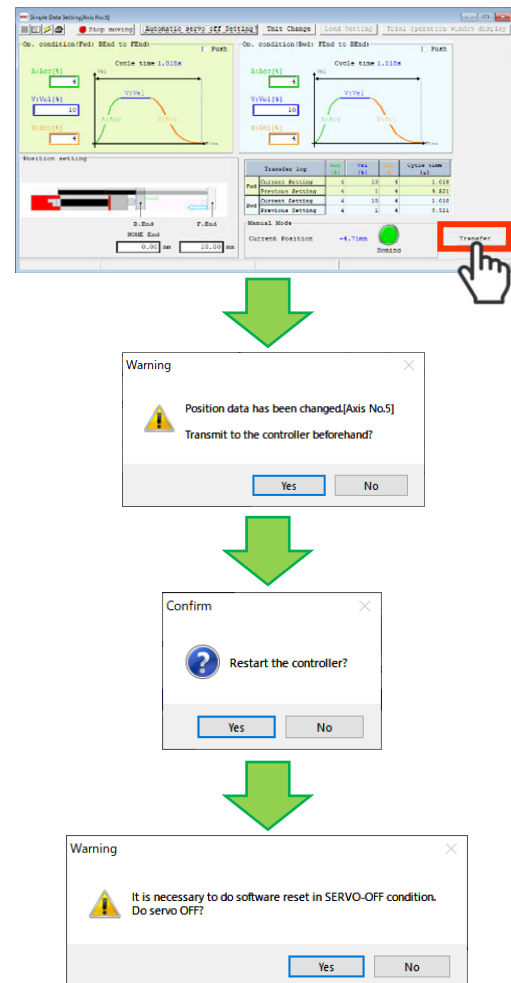
Fig. 15.24 Transfer

⚠ **Caution**

- Changing parameters only should not enable the changes made.
- Conduct reboot of the power or software reset after a change is made.
  After ELECYLINDER is started up, the parameter changes should become enable.
- Do not attempt to turn the power off during the setting transfer.
  Doing so may damage the controller.
- Do not use Automatic servo OFF function with push operation. When the push operation is conducted, it should be effective only when the pressing is missed.
  (Operation complete without touching subject = same condition as completion when positioning)
- There is no holding torque during Automatic servo off. The actuator will move if external force is applied. Please be careful about interference and safety when setting up.
- Automatic servo off functions only when the controller is in AUTO mode.

---

15. EC teaching tool

15.5 Parameter editing window

This window is used to edit parameter data read from a controller or file.

* Displayed content will vary depending on the model.
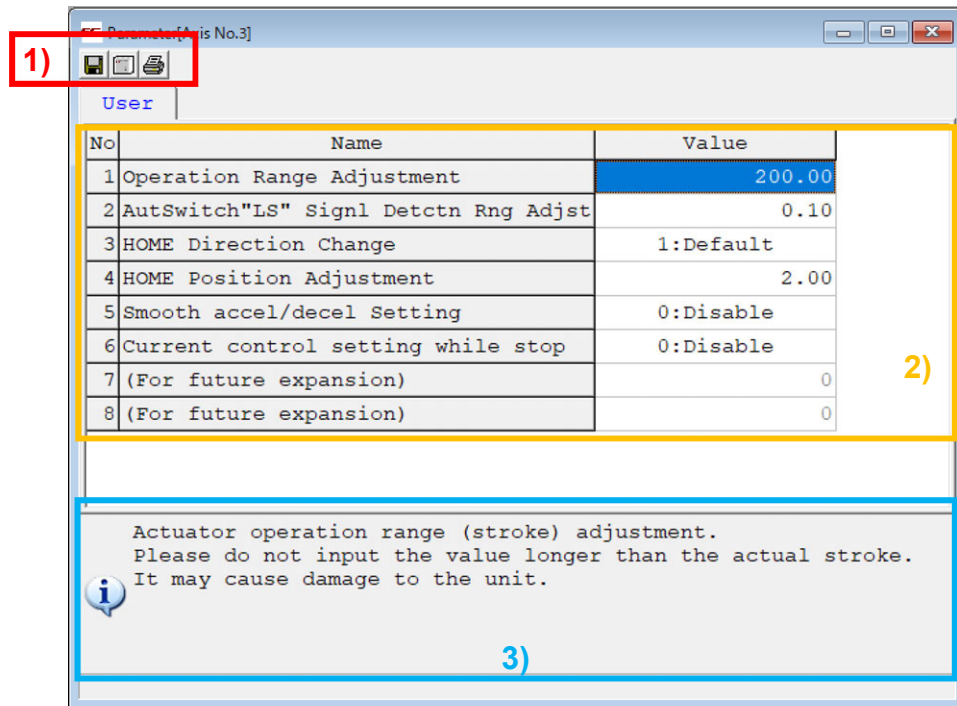
Fig. 15.25 Parameter editing window

⚠️ **Caution**

● If the parameter editing window is open for an axis, the simple data setting window for the same axis cannot be opened.

---

1) Tool buttons

💾 [Save as]
Saves parameter data to a file.

🗔 [Transfer to controller]
Transfers parameter data to the controller.
Once parameters have been transferred, a window confirming whether to restart the controller (software reset) will be displayed.

🖨 [Print]
Prints parameter data.

2) Editing area

Used to edit parameters.

For items that allow a value to be selected, clicking to the right of the item will display a list of options in a pull-down menu. Click the option you wish to set.

After editing, closing without transferring data to the controller will cause any changes to be reverted.

3) Explanation area

An explanation of the selected item is displayed here.

15. EC teaching tool

15.6 Monitor Window

These windows are used to monitor various statuses, the controller error list, and velocity/current waveforms.

15.6.1 Status monitor window

Either select "Monitor" → "Status" from the main menu, or double-click Status monitor in the tree view to display the status window.
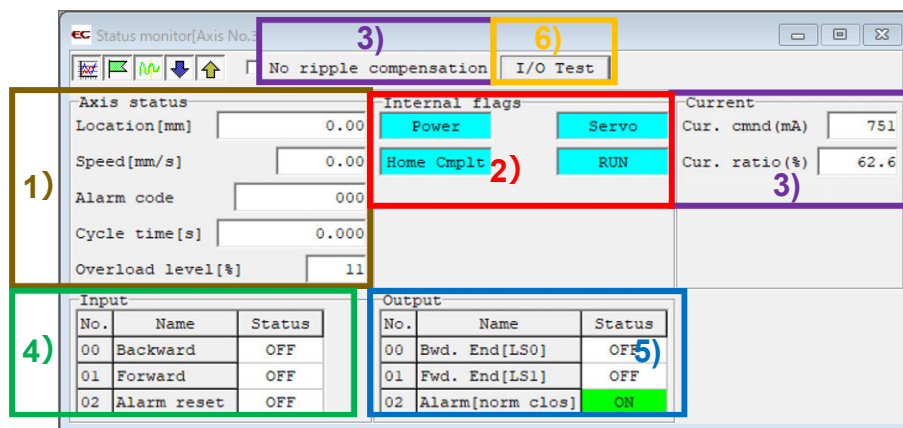
Fig. 15.26 Status monitor window

1) Axis status

Displays the Location [mm], Speed (while moving) [mm/s], Alarm code, Cycle time [s], and Overload level [%].

2) Internal flags

Power:	ON/OFF status of controller main power supply
Servo:	Servo command status
Home cmplt:	Home return complete flag (ON/OFF)
RUN:	Actual servo status

3) Current

Displays the current command value [mA] and rated current ratio [%].

Ripple compensation (□): Displays the command value of the motor ripple compensation amount.

This may be a larger value than the execution current in some models.

No ripple compensation (☑): Displays the command value with the motor ripple compensation amount subtracted.

The value will be close to the motor execution current.

15. EC teaching tool

4) Displays the ON/OFF status of the input data PIO input ports.

5) Output data
   Displays the ON/OFF status of the PIO output ports.

6) I/O Test
   Click I/O Test to display the Do output window.
   Click the port to output. Selecting the checkbox (☑) will force
   the signal ON.

Fig. 15.27 I/O Test

15. EC teaching tool
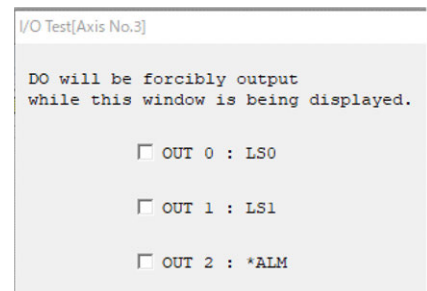
15.6.2 Controller alarm list

Either select "Monitor" → "CTL alarm list" from the main menu, or double-click CTL alarm list in the tree view to display the controller alarm list.

Data type	Group	Group name	Code	Message	Axis	Detail	Time
detected last	Other	-	FFF	PowerUP No Error	----	----	--:--:--
History 1	Other	Inquiry	0A2	Position data error when executing	1010	0001	0:23:33
History 2	Other	Inquiry	0A2	Position data error when executing	1010	0001	0:16:52
History 3	Other	-	FFF	PowerUP No Error	----	----	--:--:--
History 4	Other	Inquiry	080	Motion command while in SERVO-OFF condition	----	----	0:06:06
History 5	Other	Inquiry	080	Motion command while in SERVO-OFF condition	----	----	0:05:43
History 6	A	Overload alarm	0C1	Servo error	----	----	0:02:48
History 7	A	Overload alarm	0C1	Servo error	----	----	0:01:54
History 8	Other	-	FFF	PowerUP No Error	----	----	--:--:--
History 9	A	Overload alarm	0C1	Servo error	----	----	0:02:06
History 10	A	Overload alarm	0C1	Servo error	----	----	0:01:25
History 11	Other	-	FFF	PowerUP No Error	----	----	--:--:--
History 12	Other	Inquiry	0A2	Position data error when executing	1010	0001	0:34:24
History 13	Other	Inquiry	0A2	Position data error when executing	1010	0001	0:31:02
History 14	Other	-	FFF	PowerUP No Error	----	----	--:--:--

Fig. 15.28 Controller alarm list

1) Tool bar

Save as
Saves the alarm list as a file (CSV format).
* Files saved in this manner cannot be read by this application.

Print
Prints the alarm list.

Refresh
Reacquires the alarm list from the controller and refreshes the display.

Clear alarm list.
The alarm list is not cleared even if the power is turned OFF.
The clear alarm list button can be used to clear the alarm list.
Click Clear alarm list . A warning is displayed.
Click Yes to clear the alarm list.

2) Alarm list display

Displays the most recently detected warning code, the last 31 alarm codes and addresses with execution data errors (for manufacturer use), detail codes, and occurrence times.

(Note) The power ON log (no error) indicates that the controller power was turned ON.
It is not an error.
The occurrence time is indicated as the amount of time since the power ON log (no error) was generated.

15. EC teaching tool

15.6.3 Velocity/current monitor window

Either select "Monitor" → "Velocity/Current" from the main menu, or double-click Velocity/Current in the tree view to display the velocity/current monitor window.
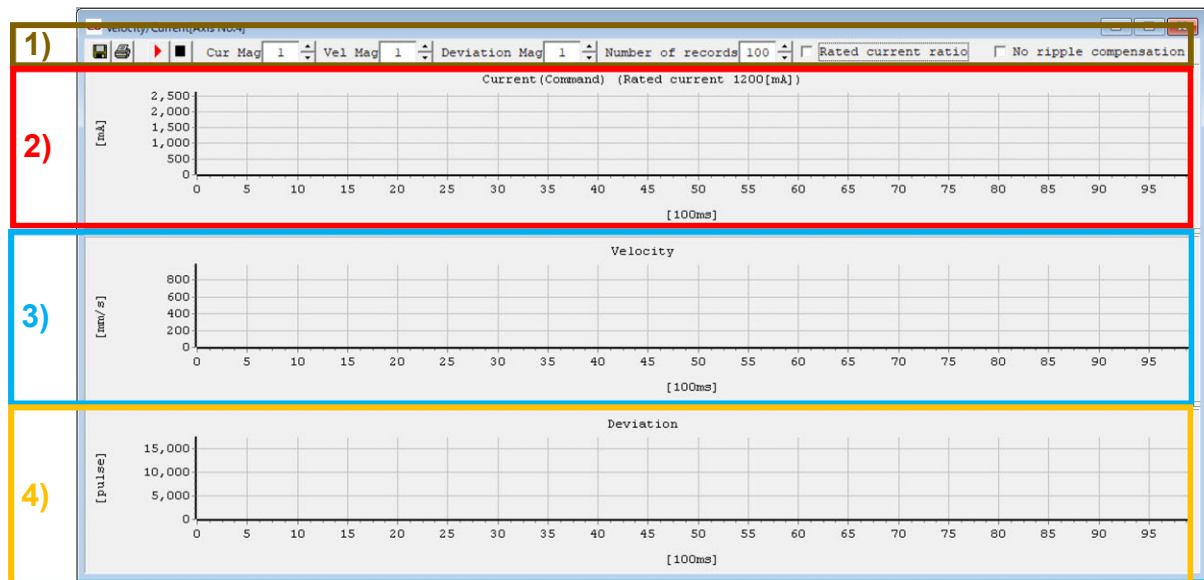
Fig. 15.29 Velocity/current monitor window

1) Tool

    🖫   Save as
        Saves the displayed current, velocity, and deviation data as a file (CSV format).
        * Only the data displayed in the data display area will be saved.
        * Files saved in this manner cannot be read by this application.

    🖨   Print
        Prints the displayed current, velocity, and deviation data.

    ▶   Start monitoring
        Starts monitoring.

    ■   Stop monitoring
        Stops monitoring.

"Cur Mag, Vel Mag, Deviation Mag" changed.
   Changes the vertical axis magnification in the current, velocity, and deviation data display areas.

Number of records

Changes the number of horizontal axis records in the current, velocity, and deviation data display areas.

Rated current ratio checkbox

Changes the type of data displayed in the current data display area.

Unselected (□):	Current value (command value) [mA]
Selected (☑):	Rated current ratio displayed [%]

No ripple compensation checkbox

If the current data display graph is set to display the current value (command value), this will switch to displaying the current.

Unselected (□): Displayed with ripple compensation

Displays the command value of the motor ripple compensation amount.

This may be a larger value than the execution current in some models.

Selected (☑): Displayed without ripple compensation

Displays the command value with the motor ripple compensation amount subtracted.

The value will be close to the motor execution current.

* Default values can be set on the application setting window.

2) Current data display area

● Current value (command value) displayed (rated current ratio checkbox unselected (□))
The current value (command value) [mA] is shown on the vertical axis, and the time since monitoring began 100ms is shown on the horizontal axis.

● Rated current ratio displayed (rated current ratio checkbox selected (☑))
The rated current ratio [%] is shown on the vertical axis, and the time since monitoring began 100ms is shown on the horizontal axis.

3) Velocity data display area

The velocity [mm/s] is shown on the vertical axis, and the time since monitoring began 100ms is shown on the horizontal axis.

4) Deviation data display area

Deviation is the difference between the actual command pulse and the feedback pulse (actual position).

The deviation [pulse] is shown on the vertical axis, and the time since monitoring began 100ms is shown on the horizontal axis.

* Current data and velocity data are obtained from the controller on an approximately 100ms cycle.
(The cycle at which data is obtained will vary depending on the number of connected axes.)
Any fluctuations in current and velocity that occur during this cycle cannot be monitored accurately.

* Monitoring will automatically stop if the horizontal axis reaches 65535.

15. EC teaching tool

15.6.4 Maintenance information window

Either select "Monitor" → "Maintenance info" from the main menu, or double-click
Maintenance Information in the tree view to display the maintenance information window.

Switch between
displaying [km] or [m]

Maintenance information
update data
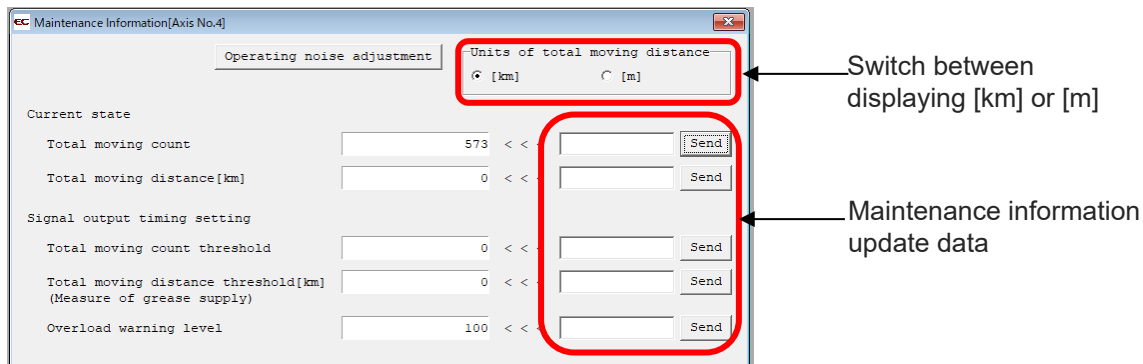
Fig. 15.30 Maintenance information window

(1) Current state

Displays the total moving count and total moving distance of the actuator.

● Total moving count: Displays the total moving count of the actuator.

● Total moving distance: Displays the total moving distance of the actuator.

The unit displayed for total moving distance can be switched between [km] and [m].

* This will be the back and forth count (back and forth operation between 0 degrees and 180 degrees) for EC rotary actuators

[Changing the total moving count and total moving distance]

The total moving count and total moving distance can be changed by entering a value for the maintenance information update data to the right and clicking Send. (You will need to enter the password.)

(2) Signal output timing setting

Displays the thresholds (target values) for total moving count and total moving distance.
If the total moving count or total moving distance is set to a value other than "0", a message level alarm (maintenance warning 1, maintenance warning 2) will be displayed when that value is exceeded.

15. EC teaching tool

[Changing the total moving count threshold and total moving distance threshold]

The total moving count threshold and total moving distance threshold can be changed by entering a value for the maintenance information update data to the right and clicking $\boxed{\text{Send}}$.

Overload warning level

When the motor estimated rise temperature at which an overload alarm occurs is 100% and the ratio set on this window exceeds the motor temperature, the green LED blinks to indicate an overload warning and the maintenance warning 3 window is displayed.

[Changing the overload warning level]

The overload warning level can be changed by entering a value for the maintenance information update data to the right and clicking $\boxed{\text{Send}}$.

No judgment will be made if this set to "100."

(3) Operating noise adjustment

Click $\boxed{\text{Operating noise adjustment}}$ to display the operating noise adjustment window.

The operating noise adjustment window allows the level to be set from 0 to 14 (1 to 9 for Ultra Mini ELECYLINDER).

If an abnormal sound is generated especially if a high tone abnormal sound is generated when stopped or operating at low velocity (50mm/s or less), increase the level and click $\boxed{\text{Setting}}$.

Doing so may prevent the abnormal sound from occurring.

However, setting the level too high could cause vibration.

(This should be adjusted by changing it one level at a time.)
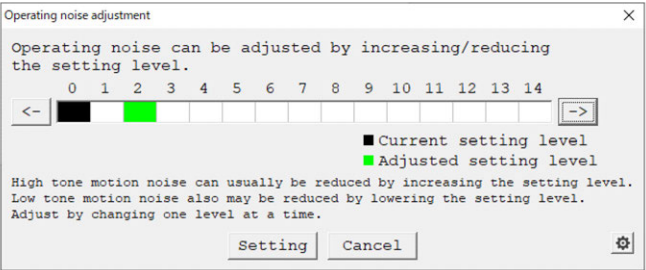
Fig. 15.31 Operating noise adjustment Window (Excluding Ultra Mini ELECYLINDER)
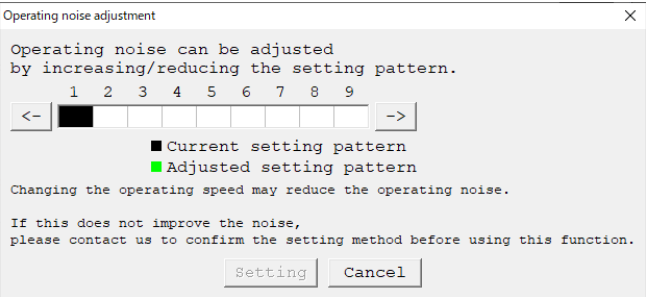
Fig. 15.32 Operating noise adjustment Window (Ultra Mini ELECYLINDER)

15. EC teaching tool

15.7 Setting of application window

Select "Setting" → "Application" from the main menu.
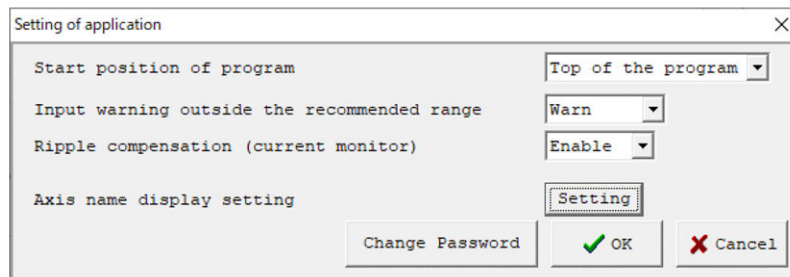
Fig. 15.33 Setting of application window

(1) Start position of program
Click ▾ to select whether to start the simple program from the cursor position or from the top of the program.

(2) Input warning outside the recommended range
Click ▾ to switch between showing and hiding the warning output when the input value being outside the recommended range could cause abnormal noise or vibration, when entering parameters or position data.

(3) Ripple compensation (current monitor)
This allows the default ripple compensation status to be set for the status window and velocity/current monitor.

Setting	Default ripple compensation on the status screen and velocity/current monitor screen	
Enabled	Ripple compensation	Unselected (□)
Disabled	No ripple compensation	Selected (☑)

(4) OK and cancel buttons
If any of the settings from (1) to (3) were changed, clicking ✔ OK will save the changes as the default values for these items when the system is next started.
To cancel making changes, click ✗ Cancel .

15. EC teaching tool

(5) Axis name display setting

   Click   Setting   to display the axis display window.

   The names of axes displayed in the tree view, etc. can be set here.

Fig. 15.34 Axis display window

1) Tree View with axis numbers: Select how each axis on the tree view in the main menu is displayed. Select from axis number, axis name, or axis number with axis name.

2) Tree view with model names: Select whether to show or hide the controller name.

3) Tree view with elapsed time: Select whether to show or hide the elapsed time from when the controller started.

4) Show Screen title axis: Select what to display in addition to the screen title when screens such as the parameter editing screen and simple data setting screen are displayed. Select from axis number, axis name, or axis number with axis name.

5) Save file name initial display: Select the file name that is displayed initially when saving parameters or position data as a file. Select from axis number, axis name, or axis number with axis name.

[Setting/editing axis names]

   To set or edit an axis name, right-click the applicable axis name in the tree view on the main screen to display a pop-up menu, and then open the axis name setting screen from the menu.
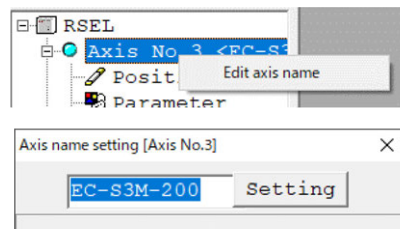
Fig. 15.35 Axis name setting window

   An axis name may consist of up to 12 half-width characters (6 full-width characters).

(6) Change password

A password can be set for opening the parameter editing screen and simple data setting screen. Follow the instructions below to change the password.

1) Click Change Password to open the Select Password screen.

2) To set a password for the parameter editing screen, select System Password.
To set a password for the simple data setting screen, select Position edit Password.

3) The password editing screen will be displayed.
Enter the current password ("0000" by default) and new password, and then click OK.

Fig. 15.36 Change password

15. EC teaching tool

XSEL2

Chapter 16

Error Countermeasures

16.1 Display when Error Occurred

When an error has occurred, an error countermeasure window should open in the default setting.

* If it is required not to display an error countermeasure when an error has occurred, this feature can be deactivated in the menu "Tool" → "Environment Setting".

Click Troubleshoot in the error countermeasure window, and the error countermeasure window should be displayed. Follow the instruction in the window to remove the cause of the error.
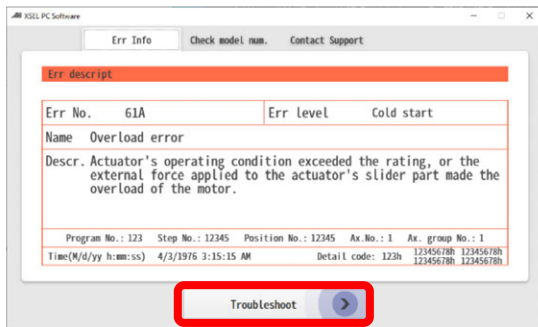
Fig. 16. 1 Error countermeasure window

Click Troubleshoot .

When there are several causes, the window as shown in the figure on the left should be shown. Select the applicable cause from these causes and click count.m .

* This window should not appear when there is no several causes.
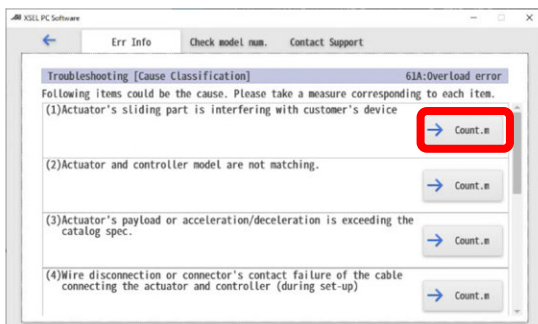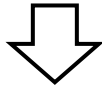
Fig. 16. 2 Err Info (Cause Classification)

As a countermeasure should be shown, follow the instruction in the window to remove the cause of the error.
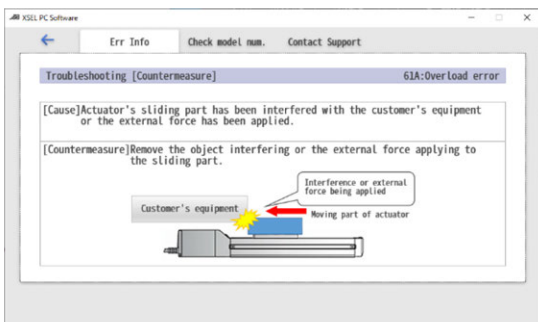
Fig. 16. 3 Err Info (Countermeasure)

16. Error Countermeasures

16. Error Countermeasures

XSEL2

Chapter 17

Appendix

17.1 Error Level Control

The PC alarm levels are as shown below depending on the content of the error.

● Message Level: Error code No. 300 to 3FF

● Cold Start Level: Error code No. 700 to 7FF

17. Appendix

17.2 X-SEL PC Software Error Table

(Errors specific to the PC Software are listed below. See the [XSEL2-TS/TL Controller Operation Manual] for controller errors.)

Error code	Error name	Special note
304	Undefined symbol usage for operand error	An undefined symbol is used in Operand 1, 2 and output part (Operand 3) in a SEL command.
306	Running program editing error	An edit operation such as write, copy, move or clear was conducted to a program in process. Finish the process of the program applicable for edit and try again.
307	Symbol error	1) A character not permitted is used at the top of a symbol. 2) An inappropriate character is included in a character string for a symbol. 3) The same symbol is defined duplicated. 4) The input exceeds the available number for symbol definition. Delete other symbols in advance to secure open area and try again. 5) Edit of a symbol in a data number that a controller does not support or transferring to a controller is not available.
308	Input condition undefined symbol usage error	An undefined symbol is used in the input condition of a SEL command.
30D	Data edit error during non-manual mode	Data edit operation (write, copy, move, clear, etc.) was attempted in a non-manual mode.
30E	Input data error	There is an error in the input data. Check the input data.
30F	Input value too small	A value that is below the range available for input was input.
310	Input value too large	A value that is above the range available for input was input.
311	Protected data error	1) An operation should not be attempted to read out, copy or move to data prohibited to read out. 2) An operation should not be attempted to write in, copy, move or clear to data prohibited to write in. 3) An inappropriate value is set in a protection setting parameter (Other Parameter No. 55, 56 or Axes Group Parameters from No. 11 to 15).
313	Password error	There is an error in the input password. Input the correct password.
314	Homing incomplete error (TP/PC)	1) Movement or continuous movement operation was attempted to an axis with the home-return operation incomplete. Finish the home-return operation in advance. 2) Teaching (reading in current position) operation was attempted to an axis with the home-return operation incomplete. Finish the home-return operation in advance.

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Error code	Error name	Special note
315	Motion command during servo OFF	A movement command was executed to an axis with the servo off. Have the servo turned on in advance.
31A	Absolute Reset execution condition unsatisfied error	The conditions to execute an Absolute Reset is not yet established. (When prompt to execute AUTO Mode, etc.)
31B	# of break point setting excess error	The number of breakpoint setting has exceeded the available number for setting. Cancel other breakpoints in advance and try again.
326	Unsupported function error	It is an unsupported function.
329	Insufficient blank steps error	There is no enough number of open steps in a controller.
32E	Servo-on Encoder Error Reset Prohibited Error	The encoder reset should be conducted while the servo is off.
32F	Execution Prohibited with No Safety Circuit Error	The condition to execute the function is not satisfied. (When prompt to execute actuator operation or SEL program with operation system command prohibited, etc.)
380	Can not change data being edited on-line	Data change operation was conducted while the online edit window is open. Close the edit window in advance.
381	Can not initialize memory being edited on-line	Memory initialization was conducted while the online edit windows for the program, symbol and position data are open. Close the online edit windows in advance.
382	Acceleration/deceleration specification error	A number indicated in the acceleration or deceleration for jog, movement or continuous movement is out of the range, or an inappropriate value is input. Check the values indicated in the acceleration and deceleration.
383	The number of file read/write data over	1) The number of data saved in a file (number of steps, number of positions, etc.) exceeds the allowable. 2) The number of data to be written in a file (number of steps, number of positions, etc.) exceeds the allowable.
384	Invalid baud rate specified	An inappropriate baud rate was indicated. (At connection check, baud rate change, etc.)
385	Can not transmit the data file while sending data	It is not available to transfer data read in from a file to a controller during the sending and receiving (read-out and write-in) of the data.
386	Invalid Ethernet port number	There is an error in the Ethernet port number indication.
388	Decimal point/digit separator string error (PC)	The character string of the decimal point is set to something other than [.] or the character string to divide numbers is set to something other than [,].
389	File error	1) The format of a file could differ or abnormal data could be included. 2) The file cannot be open. Check if the file is used in another application. 3) The indicted file cannot be found. Check the file name.
38A	Data editing prohibition error (manual operation type)	Data edit operation, memory initializing operation, flash ROM writing operation or error list clear operation was conducted during an operation mode. Check the manual operation type (in Other Parameter No. 21 and manual operation type in PC software that is currently selected).

17. Appendix

Error code	Error name	Special note
38B	Can not write data while Flash ROM being written	Data writing operation was conducted during the flash ROM writing process. It is not available to have a data edit operation during the flash ROM writing.
38C	Speed specification error	A number indicated in the velocity for jog, movement or continuous movement exceeds the range, or an inappropriate value is indicated. Check the values indicated in the velocity.
38D	Can not transmit data when not connected	Data cannot be sent or received as the communication to a controller is cut off. Start up the application in the online mode and try again.
390	File type error	There is an error in the file type. Check the file type (extension).
391	No data inputted	There is no data input in items with data input mandatory. Input data.
392	The input date or time is invalided	There is an inappropriate data input in the date and time.
393	Too long distance for Inching	The inching distance indication exceeds the range. Check the inching distance indication.
394	Can not close a window while sending data	It is not available to close the edit window during sending or receiving data. Finish the data transfer before closing the window.
700	Communication error	1) There is an error in the received message. In case that the error is not solved even after connecting again, contact a manufacturer. 2) It is a communication error. Check on the cable connection, short-circuit, noise and so on. 3) There is a concern that the communication is not completed to establish. Check the physical connection to a controller and try to "reconnect". 4) A controller not supported is connected.
780	Com port open error	The communication port cannot be open. Check that the communication port is ready to be used.
781	Sum check error (PC)	It is a communication error. Check on the cable connection, short-circuit, noise and so on.
782	Communication error (PC) (OS)	A communication error has occurred. Try to "reconnect".
783	Ethernet (receive) time out error (PC)	
784	Connection disconnection error (PC)	
785	Socket error (PC)	
786	Service port number in use (PC)	
787	Mismatch I/F register address	There is an error in the received message. In case that the error is not solved even after connecting again, contact a manufacturer.

17. Appendix

17.3 EC teaching tool error table

Error code	Error name	Content
103	File writing error	Indicates that a data file (position data file, parameter file, complete data backup file, etc.) could not be written.
104	Input value too small error	The value that was entered is below the setting range. Refer to the actuator specifications and parameter list, and enter an appropriate value.
105	Input value too large error	The value that was entered is above the setting range. Refer to the actuator specifications and parameter list, and enter an appropriate value.
10B	File opening error (reading)	Indicates that the specified file could not be opened. This could be caused by the following. • The specified file does not exist. • The file has been opened and is being used by another application.
10C	File opening error (writing)	Indicates that an attempt was made to save to a file, but that the file could not be opened. This could be caused by the following. • The file has been opened and is being used by another application.
10D	File reading error	Indicates that a file could not be read. This could be caused by the following. • Unable to reserve memory required to read the file.
10E	File format error	Indicates that an attempt was made to transfer a parameter file or complete data backup file to a model different from the file source.
111	File data error	Indicates that a file could not be read. This could be caused by the following. • The specified file contains invalid data.
122	Input data error	Indicates that inappropriate data was entered. This could be caused by the following. • A value exceeding the operation range adjustment value was set.
123	Data version mismatch error	Indicates that an attempt was made to transfer saved data using an incompatible version of controller. Check the versions of the source and destination controllers.
124	I/O directive permission, data editing prohibition	Indicates that a position data or parameter write operation was performed to the controller when in "AUTO" mode or in the "EC I/O directive permission" state. This could be caused by the following. • The mode switch on the controller is set to "AUTO." • The XSEL PC software is set to "EC I/O directive permission".
125	I/O directive permission, axis operation prohibition	Indicates that an axis operation (jog, axis operation, home return, continuous movement, etc.) was performed in "AUTO" mode or in the "EC I/O directive permission" state. This could be caused by the following. • The mode switch on the controller is set to "AUTO." • The XSEL PC software is set to "EC I/O directive permission".

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Error code	Error name	Content
300	Communication port opening error	Indicates that the communication port could not be opened. This could be caused by the following. ・Unable to communicate with the EC axis recognized when the XSEL PC software was started.
301	Reception timeout error	Indicates that a reception timeout occurred during communication between this application and the connected controller. (*)
302	Reception buffer overflow	Indicates that a reception buffer overflow occurred when receiving a response statement from the controller. (*)
305	Communication error	Indicates that some other type of communication error occurred when receiving a response statement from the controller. (*)
306	Checksum error	Indicates that a checksum error occurred when receiving a response statement from the controller. (*)
307	CRC error	Indicates that a CRC error occurred when receiving a response statement from the controller. (*)
308	Response statement error	Indicates that error data is included in the response statement from the controller. (*)
310	Unsupported model connection error	Indicates that a connection with an unsupported model was detected. Check the version of this application and its supported models.

* The cause of this error and possible solutions are listed below.

Contact IAI if you are unable to resolve an error.

Cause	Possible solution
Communication error due to a connection defect between the PC and controller	Confirm that the connectors on the cable connecting the PC and controller are firmly inserted.
Communication error due to noise (corrupt data, etc.)	Review wiring and device placement to ensure that noise has no effect.
Controller power cutoff	Confirm that the controller power is ON.

17. Appendix

Revision History

Revision date	Revised content
2024.09	First Edition

Revision History

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Quality and Innovation

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