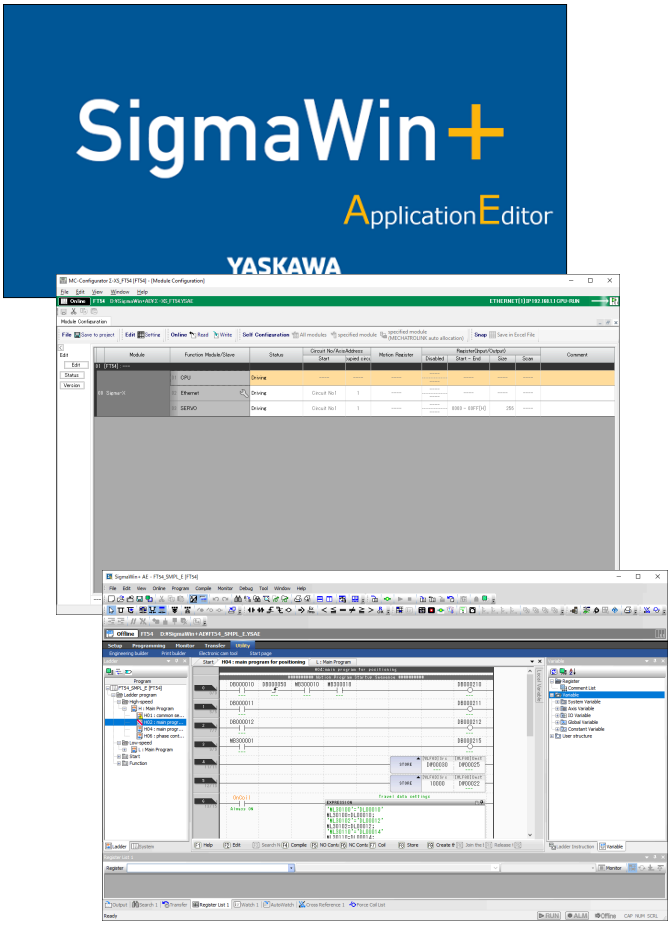
YASKAWA

AC Servo Drive Engineering Tool

SigmaWin+ Application Editor

Operation Manual



MANUAL NO. SIEP C710812 33B

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Preface and General Precautions

i.1 About this Manual

This manual provides detailed operating procedures for the SigmaWin+ Application Editor engineering tool for AC servo drives.

Read and understand this manual to ensure correct usage of the SigmaWin+ Application Editor.

i.2 Target Readers

This manual is intended for the following readers who are assumed to possess knowledge about the fundamentals of servo drives and electric/electronic circuits.

- Readers who wish to deepen their knowledge of SERVOPACK products
- Personnel in charge of selecting products for equipment
- Designers of applications for SERVOPACKs and servomotors in various types of equipment
- Personnel who maintain equipment
- Designers of FA systems

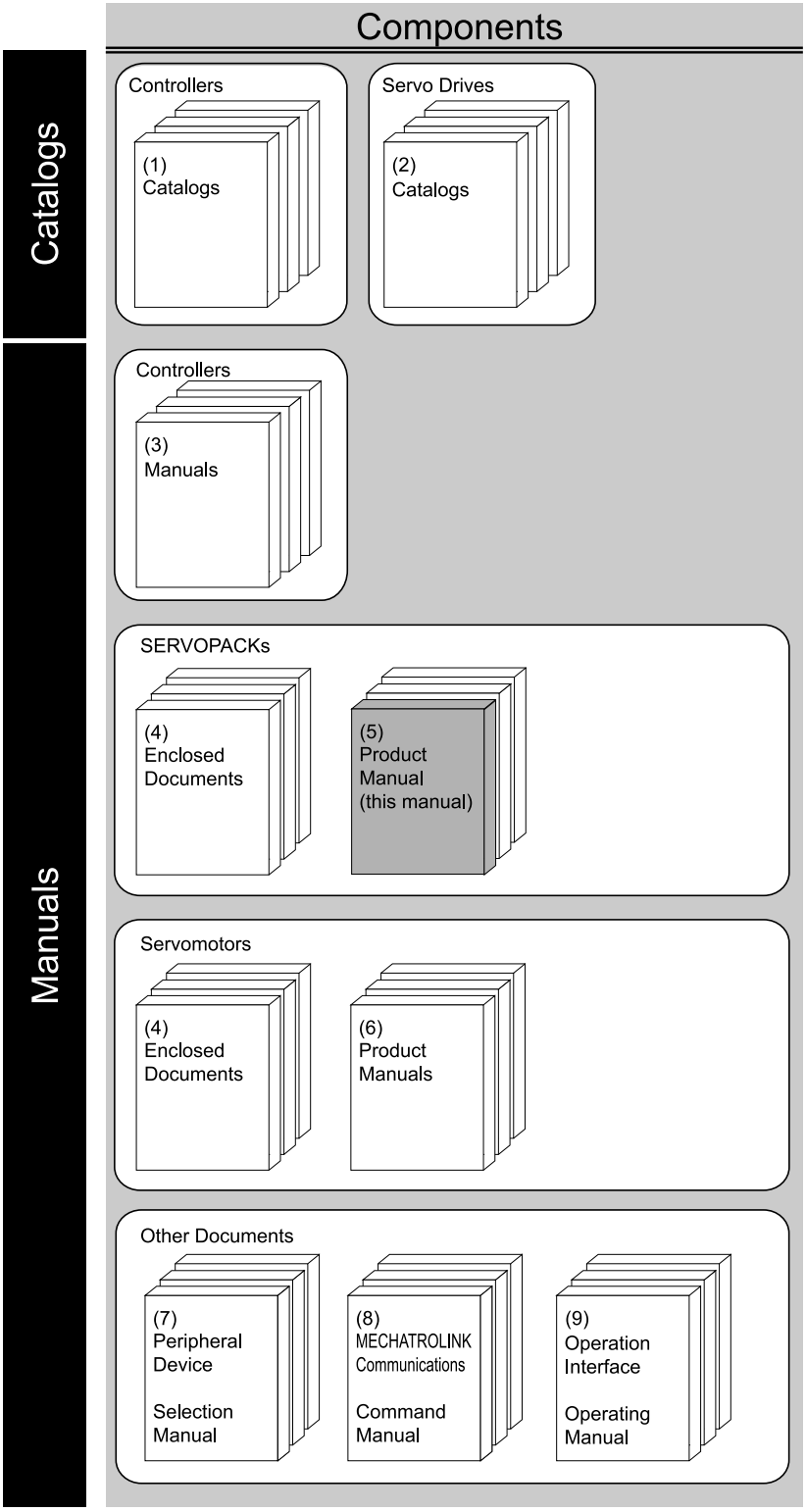
i.3 Outline of Manual

The contents of the chapters of this manual are described in the following table. Refer to these chapters as required.

Chapter	Title	Contents
1	Basic Information on the SigmaWin+ AE	Describes an outline of the SigmaWin+ AE, the tasks that must be performed to use the SigmaWin+ AE, and the window configuration.
2	Project Management	Describes basic operations and management methods for project files.
3	Designing the System	Describes the operations required to design the system in the SigmaWin+ AE.
4	Programming	Provides an overview of programming and describes basic operations related to programming.
5	Debugging	Describes the functions for debugging ladder programs.
6	Monitor	Describes the methods to monitor the status of the connected SERVOPACK and the status of registers.
7	Security	Describes the security functions available in the SigmaWin+ Application Editor for users, SERVOPACK, projects, and programs.
8	Convenient Functions	Describes convenient functions in the SigmaWin+ Application Editor, such as the environment settings, printing, and importing and exporting data.
9	Appendices	Describes error messages and the corrective action to perform when an error is displayed.

i.4 Related Documents

The relationships between the documents that are related to the Servo Drives are shown in the following figure. The numbers in the figure correspond to the numbers in the table on the following pages. Refer to these documents as required.



i.4.1 Related Documents

(1) Machine Controllers Catalogs

You can check for products related to YASKAWA machine controllers. Refer to these documents as required.

(2) Servo Drives Catalogs

Document Name	Document No.	Description
AC Servo Drive Σ-X Series	KAEP C710812 03	Provides detailed information on Σ-X-series AC servo drives, including features and specifications.
AC Servo Drive Large-Capacity Σ-X Series	KAEP C710812 35	Provides detailed information on large-capacity Σ-X-series AC servo drives, including features and specifications.

(3) Machine Controllers Manuals

The machine controller to use depends on the SERVOPACK that is used. Refer to the manual for the machine controller as required.

(4) Enclosed Documents

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW SERVOPACK Safety Precautions	TOMP C710812 00	Provides detailed information for the safe usage of Σ-X-series SERVOPACKs.
Σ-X-Series AC Servo Drive Σ-XT SERVOPACK Safety Precautions	TOMP C710812 16	
Σ-X-Series AC Servo Drive Large-Capacity Σ-XS SERVOPACK Safety Precautions	TOMP C710812 35	Provides detailed information for the safe usage of Σ-X-series large-capacity Σ-XS SERVOPACKs.
Σ-X-Series AC Servo Drive Advanced Safety Module Safety Precautions	TOMP C710812 25	Provides detailed information for the safe usage of the advanced safety module.
Σ-X-Series AC Servo Drive Advanced Safety Module Installation Guide	TOMP C710812 26	Provides detailed procedures for installing the advanced safety module in a SERVOPACK.
Σ-X-Series AC Servo Drive Σ-LINK II Sensor Hub INSTRUCTIONS	TOMP C710812 06	Provides detailed information for the safe usage of the Σ-LINK II sensor hub, as well as specifications, installation, and connection information.
Σ-X-Series AC Servo Drive Σ-LINK II Booster Unit Instructions	TOMP C710812 08	Provides detailed information for the safe usage of the Σ-LINK II booster unit, as well as specifications, installation, and connection information.
Σ-V-Series/Σ-V-Series for Large-Capacity Models/Σ-7-Series/Σ-X-Series Installation Guide Fully-closed Module	TOBP C720829 03	Provides detailed procedures for installing the fully-closed module in a SERVOPACK.

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Document Name	Document No.	Description
AC Servo Drive Rotary Servomotor Safety Precautions	TOBP C230260 00	Provides detailed information for the safe usage of rotary servomotors and direct drive servomotors.
Σ-X-Series Rotary Feedback Unit Safety Precautions	TOBP C770100 00	Provides detailed information for the safe usage of the rotary feedback unit.

(5) SERVOPACK Product Manuals

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 01	Provide detailed information on selecting Σ-X-series Σ-XS or Σ-XW SERVOPACKs; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 02	
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK Analog Voltage/Pulse Train References Product Manual	SIEP C710812 03	
Σ-X-Series AC Servo Drive Σ-XW SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 04	
Σ-X-Series AC Servo Drive Σ-XW SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 05	
Σ-X-Series AC Servo Drive Σ-XT SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 16	Provide detailed information on selecting Σ-X-series Σ-XT SERVOPACKs; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Σ-XT SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 17	

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Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Large-Capacity Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 35	Provide detailed information on selecting Σ-X-series large-capacity Σ-XS SERVOPACKs; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Large-Capacity Σ-XS SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 36	
Σ-X-Series AC Servo Drive Large-Capacity Σ-XS SERVOPACK with Analog Voltage/Pulse Train References Product Manual	SIEP C710812 37	
Σ-X-Series AC Servo Drive Advanced Safety Module with Safety over EtherCAT (FSoE) Communications References Product Manual	SIEP C710812 25	Provide detailed information on selecting the advanced safety module; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Advanced Safety Module Digital I/O Product Manual	SIEP C710812 26	
Σ-X-Series AC Servo Drive Σ-XW/Σ-XT SERVOPACK Hardware Option Specifications HWBB Function Product Manual	SIEP C710812 13	Provides information on servo drives equipped with the HWBB safety function (SGDXW-□□□□40□1000, SGDXW-□□□□A0□1000, SGDXT-□□□□40□1000, and SGDXT-□□□□A0□1000)). The differences in specifications from SERVOPACKs not equipped with the HWBB are given in this manual.
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW/Σ-XT SERVOPACK Hardware Option Specifications Dynamic Brake Product Manual	SIEP C710812 14	Provides information on Σ-X-series AC servo drives (SGDX□-□□□□□□□0020) with the dynamic brake option. The differences in specifications from SERVOPACKs without the dynamic brake option are given in this manual.
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW SERVOPACK with MECHATROLINK-4/III Communications References FT Specification for Gantry Applications Product Manual	SIEP C710812 19	Provide information on the gantry application function and torque/force assistance in the Σ-X-series Σ-XS/Σ-XW SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW SERVOPACK with EtherCAT Communications References FT Specification for Gantry Applications Product Manual	SIEP C710812 20	

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Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References FT Specification for Press and Injection Molding Application Product Manual	SIEP C710812 22	Provide information on the press and injection molding function in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with EtherCAT Communications References FT Specification for Press and Injection Molding Application Product Manual	SIEP C710812 23	
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option Product Manual	SIEP C710812 18	Provides information on the customized sensing data function in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option (with Custom Motion Function) Product Manual	SIEP C710812 21	Provides information on the customized sensing data function (with custom motion function) in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option (with Standalone Custom Motion Function) Product Manual	SIEP C710812 32	Provides information on the customized sensing data function (with standalone custom motion function) in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT/EX Specification for Indexing Application Product Manual	SIEP C710812 34	Provides information on the indexing application function in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References FT Specification for Semi-/Fully-Closed Loop Control Online Switching Function Option Product Manual	SIEP C710812 31	Provides information on the semi-/fully-closed loop control online switching function in the Σ-X-series Σ-XS SERVOPACK.

(6) Servomotor Product Manuals

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Rotary Servomotor Product Manual	SIEP C230210 00	Provides detailed information on selecting, installing, and connecting the Σ-X-series servomotors.
Σ-X-Series AC Servo Drive Large-Capacity Rotary Servomotor Product Manual	SIEP C230301 00	Provides detailed information on selecting, installing, and connecting the Σ-X-series large-capacity servomotors.

(7) Peripheral Device Selection Manual

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Peripheral Device Selection Manual	SIEP C710812 12	Provides the following information in detail for Σ-X-series servo systems. • Cables: Models, dimensions, wiring materials, connector models, and connection specifications • Peripheral devices: Models, specifications, diagrams, and selection (calculation) methods

(8) MECHATROLINK Communications Command Manuals

Document Name	Document No.	Description
Σ-7/Σ-X-Series AC Servo Drive MECHATROLINK-III Communications Standard Servo Profile Command Manual	SIEP S800001 31	Provides detailed information on the MECHATROLINK-III communications standard servo profile commands that are used for a Σ-7/Σ-X-series servo system.
Σ-7/Σ-X-Series AC Servo Drive MECHATROLINK-4 Communications Standard Servo Profile Command Manual	SIEP S800002 32	Provides detailed information on the MECHATROLINK-4 communications standard servo profile commands that are used for a Σ-7/Σ-X-series servo system.

(9) Operation Interface Operating Manuals

Document Name	Document No.	Description
System Integrated Engineering Tool MPE720 Ver.7 User's Manual	SIEP C880761 03	Describes in detail how to operate MPE720 version 7.
Σ-7/Σ-X-Series AC Servo Drive Digital Operator Operating Manual	SIEP S800001 33	Describes the operating procedures for a digital operator for a Σ-7/Σ-X-series servo system.
AC Servo Drive Engineering Tool SigmaWin+ Operation Manual	SIET S800001 34	Provides detailed operating procedures for the SigmaWin+ engineering tool for a Σ-7/Σ-X series servo system.
AC Servo Drive Engineering Tool SigmaWin+ Application Editor Operation Manual	SIEP C710812 33	Describes in detail how to operate SigmaWin+ Application Editor.

i.5 Using this Manual

i.5.1 Basic Terms Used in this Manual

The following basic terms are used in this manual.

Basic Terms	Meaning
SigmaWin+ AE	The SigmaWin+ Application Editor add-on engineering tool or a personal computer running the engineering tool.
SigmaWin+ Ver.7	The engineering tool for setting up and tuning servo drives or a computer in which the engineering tool is installed.
SERVOPACK	A Σ-X-series Σ-XS servo amplifier with standalone custom motion references.
controller	A general term for a YRM controller, MPX controller, or machine controller
engineering	Setting up, adjusting, and programming devices to create a system and maintaining and managing that system

i.5.2 Screenshots Used in This Manual

A portion of the screenshots used in this manual may vary from the windows in the actual software because the screenshots show previous versions of the software or versions of the software currently in development.

i.5.3 Trademarks

- Ethernet is a registered trademark of the Xerox Corporation.
- Microsoft, Windows, Windows NT, and Internet Explorer are trademarks and/or registered trademarks of Microsoft Corporation in the United States.
- Adobe Reader is a trademark or registered trademark of Adobe Systems Incorporated.
- Other product names and company names are the trademarks or registered trademarks of their respective companies. “TM” and the ® mark do not appear with product or company names in this manual.
- This product includes file archive software UNLHA(32).dll. The copyright of UNLHA(32).dll is owned by Micco.

i.5.4 Visual Aids

The following aids are used to indicate certain types of information for easier reference.


Important

Indicates precautions or restrictions that must be observed.

Also indicates alarm displays and other precautions that will not result in machine damage.


Term

Indicates definitions of difficult terms or terms that have not been previously explained in this manual.

Information Indicates supplemental information to deepen understanding or useful information.

i.6 Operating Precautions

- It is strictly prohibited to copy or use SigmaWin+ AE for any purpose other than to design and maintain applications for SERVOPACK.
- It is strictly prohibited to decompile, disassemble, or reverse engineer SigmaWin+ AE.
- You may not give, exchange, lend, or otherwise provide the SigmaWin+ AE , in part or whole, to any third party without the prior permission of the Yaskawa Electric Corporation.

i.7 Safety Precautions

i.7.1 Safety Information

To prevent personal injury and equipment damage in advance, the following signal words are used to indicate safety precautions in this document. The signal words are used to classify the hazards and the degree of damage or injury that may occur if a product is used incorrectly. Information marked as shown below is important for safety. Always read this information and heed the precautions that are provided.

⚠ DANGER

This signal word identifies a hazard that will cause serious injury or death if you do not prevent it.

⚠ WARNING

This signal word identifies a hazard that can cause death or serious injuries if you do not prevent it.

⚠ CAUTION

This signal word identifies a hazard that can cause moderate injuries if you do not prevent it.

NOTICE

This signal word identifies a property damage message that is not related to personal injury.

i.7.2 Safety Precautions That Must Always Be Observed

(1) General Precautions

⚠ DANGER

Make sure to observe all information related to safety contained in this manual.

If you fail to observe these warnings, there is a risk of equipment damage or product failure. There is also a risk of injury, fire, or electric shock that causes death or serious injury.

Yaskawa bears no responsibility to you or your customers for injuries and equipment damage that occur from failing to observe the warnings and precautions listed in this manual.

Keep this manual in a safe, convenient place so that it can be referred to whenever necessary. Make sure that it is delivered to the final user of the product.

Install and remove covers, cables, connectors, and optional devices when the power is turned OFF.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

⚠ WARNING

Use a power supply with specifications (number of phases, voltage, frequency, and AC/DC type) that are appropriate for the product. Always check the power supply specifications in the product manual for your SERVOPACK.

If you do not use the product with the correct power supply specifications, there is a risk of thermal damage, fire, or electric shock because of product overheating due to the application of high voltage or leakage current, and these may cause death or serious injury.

Make sure to connect the ground terminals on the SERVOPACK and servomotor to ground poles in the state shown below.

- **SERVOPACK with 200-VAC power supply input: 100 Ω max.**
- **SERVOPACK with 400-VAC power supply input: 10 Ω max.**

There is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

A SERVOPACK with 400-VAC power supply input can be used only in a power system with grounded neutral. Make sure to connect the SERVOPACK to a power supply with grounded neutral.

If the SERVOPACK is connected to a power supply without a grounded neutral, there is a risk of electric shock and product failure. A fire or electric shock may also occur resulting in death or serious injury.

Do not modify or alter the product in any manner that is not described in this manual.

If you modify or alter the product, there is a risk of fire or electric shock that causes death or serious injury.

Repairs for product damage caused by modifying or altering the product in a manner not described in this manual are outside the scope of the Yaskawa warranty. Yaskawa bears no responsibility for product alterations performed by you or your customers.

For a 24-VDC power supply, use a power supply device with double insulation or reinforced insulation.

There is a risk of injury, fire, or electric shock that causes death or serious injury when a short circuit or ground fault occurs due to insulation deterioration in the device.

Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables.

There is a risk of fire or electric shock due to cable failure or damage that causes death or serious injury.

The person who designs the system that uses the safety function must have a complete knowledge of the related safety standards and a complete understanding of the instructions in the product manual for your SERVOPACK.

If the safety design of the system is insufficient, there is a risk of equipment damage. There is also a risk of death or serious injury due to unexpected machine operation.

Do not place the product in locations where it is subject to water, corrosive gases, flammable gases, potentially explosive atmospheres, or near flammable materials.

There is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

Install external emergency stop circuits that can turn OFF the power and stop operation immediately in case an error occurs.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Always use a servomotor and SERVOPACK in one of the specified combinations.

There is a risk of product failure. There is also a risk of fire that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Do not touch a SERVOPACK or servomotor with wet hands.

There is a risk of product failure if the SERVOPACK and servomotor get wet. A fire or electric shock may also occur resulting in death or serious injury.

⚠ CAUTION

The SERVOPACK heat sinks, regenerative resistors, external dynamic brake resistors, servomotors, and other components can be very hot while power is ON or soon after the power is turned OFF. Implement safety measures, such as installing covers, so that hands and parts such as cables do not come into contact with hot components.

There is a risk of burns from touching hot components.

NOTICE

Do not attempt to use a SERVOPACK or servomotor that is damaged or that has missing parts.

There is a risk that the product may not function correctly.

In environments with unstable power supply, install the necessary protective devices (such as AC reactors) to ensure that the input power is supplied within the specified voltage range.

There is a risk of product failure.

Minimize the effects of electromagnetic interference by connecting a device, such as a noise filter.

There is a risk of equipment or product malfunction.

(2) Storage Precautions

⚠ WARNING

Do not place an excessive load on the product. Follow the labels on the shipping box regarding product loading.

There is a risk of the product falling and causing product damage or failure. There is also a risk of death or serious injury.

Do not install or store the product in any of the following locations.

- **Locations that are subject to direct sunlight**
- **Locations that are subject to surrounding air temperatures that exceed product specifications**
- **Locations that are subject to relative humidities that exceed product specifications**
- **Locations that are subject to condensation as the result of extreme changes in temperature**
- **Locations that are subject to corrosive or flammable gases**
- **Locations that are near flammable materials**
- **Locations that are subject to dust, salts, or iron powder**
- **Locations that are subject to water, oil, or chemicals**
- **Locations that are subject to vibration or shock that exceeds product specifications**
- **Locations that are subject to radiation**

If you store or install the product in any of the above locations, there is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

(3) Transportation Precautions

⚠ WARNING

Transport the product in a way that is suitable to the mass of the product.

There is a risk of the product falling and causing product damage or failure. There is also a risk of death or serious injury.

Do not use the lifting hardware on a SERVOPACK or servomotor to move the entire machine.

There is a risk of the product falling due to improper use of lifting hardware and causing product and equipment damage or failure. There is also a risk of death or serious injury.

Do not place an excessive load on the product. Follow the labels on the shipping box regarding product loading.

There is a risk of the product falling and causing product damage or failure. There is also a risk of death or serious injury.

Do not overtighten the lifting hardware on the SERVOPACK and servomotor.

If you use a tool to overtighten the lifting hardware, the product may be damaged. The product may also be damaged and fall causing death or serious injury.

⚠ CAUTION

When you handle a SERVOPACK or servomotor, be careful of sharp edges, such as the corners.

There is a risk of injury.

When you move the SERVOPACK, hold the main body directly and not the front cover or connectors.

If you move the SERVOPACK by holding the front cover or connectors, those parts may break off and cause product damage, product failure, or injury.

NOTICE

A SERVOPACK or servomotor is a precision device. Do not drop it or subject it to impact or excessive force.

There is a risk of product damage or failure.

Avoid applying mechanical shock or impact to connectors.

There is a risk of product damage or failure.

If disinfectants or insecticides must be used to treat packing materials such as wooden frames, plywood, or pallets, use a method other than fumigation.

For example, use heat sterilization (core temperature of 56°C or higher for 30 minutes or longer).

Treat the packing materials before the product is packaged instead of using a method that treats the entire packaged product.

If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine, can contribute to product failure by corroding the insides of capacitors.

(4) Installation Precautions

⚠ WARNING

Install the SERVOPACK and the servomotor using mounting that can support their mass. Check the masses of the SERVOPACK and the servomotor in the respective instruction manuals, and install the SERVOPACK and the servomotor by following the chapters related to installation in the respective product manuals.

In case of improper installation, there is a risk of the SERVOPACK and servomotor falling and causing damage or failure to equipment and the product. There is also a risk of death or serious injury.

Install SERVOPACKs, servomotors, regenerative resistors, and external dynamic brake resistors on nonflammable materials.

Installation directly onto or near flammable materials may result in fire that causes death or serious injury.

Provide the specified clearances between the SERVOPACK and the control panel and other devices. Refer to "Mounting Interval" in the product manual for your SERVOPACK for the specified clearances.

There is a risk of product failure if the SERVOPACK temperature and the temperature around the SERVOPACK locally exceed the surrounding air temperature range. There is also a risk of fire that causes death or serious injury.

Install the SERVOPACK in the specified orientation.

There is a risk of product failure if the SERVOPACK temperature and the temperature around the SERVOPACK locally exceed the surrounding air temperature range. There is also a risk of fire that causes death or serious injury.

Do not allow any foreign matter to enter the SERVOPACK or servomotor.

There is a risk of product failure. There is also a risk of fire that causes death or serious injury.

Do not install or store the product in any of the following locations.

- **Locations that are subject to direct sunlight**
- **Locations that are subject to surrounding air temperatures that exceed product specifications**
- **Locations that are subject to relative humidities that exceed product specifications**
- **Locations that are subject to condensation as the result of extreme changes in temperature**
- **Locations that are subject to corrosive or flammable gases**
- **Locations that are near flammable materials**
- **Locations that are subject to dust, salts, or iron powder**
- **Locations that are subject to water, oil, or chemicals**
- **Locations that are subject to vibration or shock that exceeds product specifications**
- **Locations that are subject to radiation**

If you store or install the product in any of the above locations, there is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

⚠ CAUTION

Do not step on or place a heavy object on the product.

There is a risk of product damage or failure because the product cannot withstand the load.

NOTICE

Use the product in an environment that is appropriate for the product specifications.

There is a risk of product damage or failure if you use the product in an environment that exceeds the product specifications.

A SERVOPACK or servomotor is a precision device. Do not drop it or subject it to impact or excessive force.

There is a risk of product damage or failure.

Always install a SERVOPACK in a control panel.

Do not allow any foreign matter to enter a SERVOPACK or a servomotor with a cooling fan and do not cover the outlet from the servomotor's cooling fan.

There is a risk of product failure.

(5) Wiring Precautions

⚠ DANGER

Do not change any wiring while power is being supplied.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Wait for at least 20 minutes (or 100 minutes when using DC power supply input) after turning OFF the power and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the main circuit terminals while the CHARGE indicator is lit because high voltage may still remain in the SERVOPACK even after turning OFF the power.

There is a risk of electric shock that causes death or serious injury.

⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

If work is performed by a worker who is not a qualified engineer, there is a risk of fire or electric shock that causes death or serious injury.

Check all wiring and power supplies carefully.

Incorrect wiring or incorrect voltage application to the output circuits may cause short-circuit failures. If this failure occurs, there is a risk of fire that causes death or serious injury. There is also a risk of equipment and product damage because the holding brake may fail to operate properly.

Always use the specified terminals to connect the SERVOPACK and peripheral devices. For the power supply in particular, confirm that the connections are made to the terminals shown below.

200-V power supply input SERVOPACK:

- **AC power supply: L1, L2, L3, L1C, L2C terminals on the SERVOPACK**
- **DC power supply: B1/⊕, ⊖2, L1C, L2C terminals on the SERVOPACK**

400-V power supply input SERVOPACK:

- **AC power supply: L1, L2, L3 terminals on the SERVOPACK**
- **DC power supply: B1/⊕, ⊖2 terminals on the SERVOPACK**
- **24-VDC control power supply: 24-V and 0-V terminals (same whether the main circuit power supply wiring is an AC power supply or a DC power supply)**

Refer to "Terminal Symbols and Terminal Names" in the product manual for your SERVOPACK for details on terminals.

If you ignore these precautions, there is a risk of equipment failure or product failure due to fire. There is also a risk of fire that causes death or serious injury.

⚠ WARNING

If you use a SERVOPACK with the dynamic brake hardware option, connect an external dynamic brake resistor that is suitable for the machine and equipment specifications to the specified terminals.

There is a risk of equipment damage due to unintended machine operation during an emergency stop. There is also a risk of injury or fire that causes death or serious injury.

Observe the precautions and instructions for wiring and trial operation precisely as described in "Wiring" and "Holding Brake" in the product manual for your SERVOPACK.

If a mistake is made in wiring or trial operation, there is a risk of product failure due to incorrect wiring or incorrect voltage application in the brake circuit. A fire or electric shock may also occur resulting in death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Check the wiring to be sure it has been performed correctly. Connectors and pin layouts may vary depending on the model. Always confirm the pin layout examples in the chapter related to pin layouts in the product manual for your model.

If the wiring is not performed correctly, there is a risk of product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Connect wires to main circuit terminals and motor connection terminals securely with the specified methods and tightening torque. Refer to "Wiring Servomotors" in the product manual for your SERVOPACK for the specified methods and tightening torque.

Insufficient tightening may cause wires and terminal blocks to generate heat due to poor contact, possibly resulting in product failure. There is also a risk of fire that causes death or serious injury.

Make sure the cables do not exceed the following lengths:

- **I/O signal cable: 3 m max.**
- **Servomotor main circuit cable: 50 m max.**
- **Encoder cable: 50 m max.**
- **Control power supply cable for 400-V power supply input SERVOPACK (+24 V and 0 V): 10 m max.**

If a cable is longer than the specified length, there is a risk of equipment damage due to product malfunction that causes death or serious injury. There is also a risk of electric shock due to a short circuit or ground fault that causes death or serious injury.

Observe the following precautions when wiring the SERVOPACK's main circuit terminals.

- **Turn ON the power to the SERVOPACK only after all wiring, including the main circuit terminals, has been completed.**
- **If a connector is used for the main circuit terminals, remove the main circuit connector from the SERVOPACK before you wire it.**
- **Insert only one wire per insertion hole in the main circuit terminals.**
- **When you insert a wire, make sure that the conductor wire (e.g., whiskers) does not come into contact with adjacent wires and cause a short-circuit.**

If the SERVOPACK power is turned ON with incorrect wiring, there is a risk of fire due to electric shock or product failure that causes death or serious injury.

Install molded-case circuit breakers and other safety measures to provide protection against short circuits in external wiring.

There is a risk of fire or electric shock due to product failure that causes death or serious injury.

Install a battery at either the host controller or on the encoder cable.

If you install batteries both at the host controller and on the encoder cable at the same time, you will create a loop circuit between the batteries, and this may result in a fire from product failure or damage that causes death or serious injury.

When connecting a battery, connect the polarity correctly.

There is a risk of encoder failure if the battery ruptures and a risk of fire that causes death or serious injury.

⚠ CAUTION

Use shielded twisted-pair cables or shielded multi-core twisted-pair cables for I/O signal cables and encoder cables.

There is a risk of injury from product malfunction.

NOTICE

Use the cables specified by Yaskawa. If you use any other cables, confirm the rated current and application environment of your model and use the wiring materials specified by Yaskawa or equivalent materials. Refer to the peripheral selection manual for your SERVOPACK for Yaskawa-specified cables and wiring materials.

Securely tighten connector screws and lock mechanisms.

Insufficient tightening may result in connectors falling off during operation.

Do not bundle power lines (e.g., the main circuit cable) and low-current lines (e.g., the I/O signal cables or encoder cables) together or run them through the same duct. If you do not place power lines and low-current lines in separate ducts, separate them by at least 30 cm.

There is a risk that the product may not function correctly due to the effects of noise on low-current lines.

Do not change the communications cable connections while the SigmaWin+ is running.

There is a risk of product failure or malfunction.

(6) Operation Precautions

⚠ WARNING

Before starting operation with a machine connected, configure the settings of the switches and parameters to match the machine. Always check the settings of the switches and parameters in this manual.

If operation is performed without configuring the settings, there is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Do not significantly change the settings of the parameters.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Install safety equipment (e.g., limit switches or stoppers) in an appropriate manner at the ends of the moving parts of the machine to prevent unexpected accidents.

If safety equipment is not installed in an appropriate manner, there is a risk of equipment damage and death or serious injury due to unexpected machine operation.

For trial operation, securely mount the servomotor and disconnect it from the machine.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Forced stops for overtravel is disabled when the Jog, Origin Search, or Easy FFT utility function is executed. Ensure that appropriate safety measures are in place around moving parts.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

When an alarm occurs, the servomotor will coast to a stop or stop with the dynamic brake according to the SERVOPACK option and settings. The coasting distance will change with the moment of inertia of the load and the external dynamic brake resistance. Check the coasting distance during trial operation and implement suitable safety measures on the machine.

Refer to this manual for the specifications of SERVOPACK options.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

⚠ WARNING

Do not enter the machine's range of motion during operation.

There is a risk of death or serious injury from entrapment or the machine making contact with your body due to unexpected equipment or system operation.

Do not touch the moving parts of the servomotor or machine during operation.

There is a risk of death or serious injury from entrapment or the machine making contact with your body due to unexpected equipment or system operation.

Perform the correct operation with the servomotor connected to the machine.

There is a risk of equipment damage or product damage. There is also a risk of fire that causes death or serious injury.

Design the system to ensure safety even when problems, such as broken signal lines, occur. For example, the P-OT (Forward Drive Prohibit Input) and N-OT (Reverse Drive Prohibit Input) signals are set in the default settings to operate on the safe side if a signal line breaks. Do not change the polarity of this type of signal. Refer to "Overtravel Function and Settings" in this manual for the P-OT and N-OT signals.

If there is poor contact or a cable break occurs when safety is neglected or the signal polarities are changed, there is a risk of equipment damage because the SERVOPACK will not stop when the P-OT and N-OT signals are input. There is also a risk of death or serious injury due to unexpected machine operation.

When overtravel occurs, the power to the motor is turned OFF and the brake is released. If you use the servomotor to drive a vertical load, set the servomotor to enter a zero-clamped state after the servomotor stops. Also, install safety devices (such as an external brake or counterweight) to prevent the moving parts of the machine from falling.

There is a risk of equipment damage and death or serious injury due to the moving parts of the machine falling.

Use the dynamic brake only for emergency stop applications.

If used for any other applications, there is a risk of rapid deterioration of internal components in the SERVOPACK as well as equipment or product damage. There is also a risk of fire that causes death or serious injury.

In the following situations, use the SigmaWin+ to back up the settings of the SERVOPACK parameters, and then apply the backed up parameter settings after the SERVOPACK is replaced.

- **Before replacement or shipment when shipping a SERVOPACK to Yaskawa for SERVOPACK or part replacement**
- **After you complete tuning and trial operation of the machine and facilities**

Refer to the SigmaWin+ Operation Manual for saving parameter settings to a file and applying saved parameter settings.

If you fail to perform these operations, the SERVOPACK may not operate normally after replacement or after trial operation, and there is a risk of equipment damage. There is also a risk of death or serious injury due to unexpected machine operation.

NOTICE

Always turn OFF the servo before you turn OFF the power. If you turn OFF the main circuit power or control power during operation before you turn OFF the servo, the servomotor stopping method will be executed as follows regardless of the stopping method set in the parameter.

- **If you turn OFF the main circuit power during operation without turning OFF the servo, the servomotor will stop abruptly with the dynamic brake.**
- **If you turn OFF the control power without turning OFF the servo, the stopping method that is used by the servomotor depends on the model of the SERVOPACK. For details, refer to the manual for your SERVOPACK.**
- **If you use a SERVOPACK with the dynamic brake hardware option, the servomotor stopping methods will be different from the stopping methods used without the option or with other hardware options. For details, refer to the manual for your SERVOPACK.**

Depending on the usage conditions of the servomotor, there is a risk of equipment damage.

When you adjust the gain during system commissioning, use a measuring instrument to monitor the torque waveform and speed waveform and confirm that there is no vibration.

If a high gain causes vibration, the servomotor will be damaged quickly.

Do not frequently turn the power ON and OFF. After you have started actual operation, allow at least one hour between turning the power ON and OFF (for reference only). Do not use the product in applications that require the power to be turned ON and OFF frequently.

Frequently turning the power ON and OFF may rapidly deteriorate internal components in the SERVOPACK or cause the product to fail.

An alarm or warning may occur if communications are performed with the host controller while the SigmaWin+ or digital operator is operating.

If an alarm or warning occurs, it may interrupt the current process and stop the system.

Exit the SigmaWin+ before you turn the power to the SERVOPACK and controller ON or OFF.

There is a risk of product failure or malfunction.

(7) Maintenance and Inspection Precautions

⚠ DANGER

Do not change any wiring while power is being supplied.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Wait for at least 20 minutes (or 100 minutes when using DC power supply input) after turning OFF the power and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the main circuit terminals while the CHARGE indicator is lit because high voltage may still remain in the SERVOPACK even after turning OFF the power.

There is a risk of electric shock that causes death or serious injury.

⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

If work is performed by a worker who is not a qualified engineer, there is a risk of fire or electric shock that causes death or serious injury.

When shipping a SERVOPACK to Yaskawa for SERVOPACK or part replacement, use the SigmaWin+ to back up the settings of the SERVOPACK parameters. Apply the backed up parameter settings before using the replaced SERVOPACK. Refer to the SigmaWin+ Operation Manual for saving parameter settings to a file and applying saved parameter settings.

The parameters of any SERVOPACKs that are sent to Yaskawa for part replacement are reset to the factory settings before they are returned to you. If you fail to perform these operations, there is a risk of equipment damage and death or serious injury due to unexpected machine operation.

NOTICE

Discharge all static electricity from your body before you operate any of the buttons or switches inside the front cover of the SERVOPACK.

There is a risk of equipment damage or product failure.

(8) Troubleshooting Precautions

⚠ DANGER

If the safety device (molded-case circuit breaker or fuse) installed in the power line operates, repair or replace the SERVOPACK, check the wiring, and remove the factor that caused the safety device to operate. After you confirm that the factor was removed, supply power to the SERVOPACK.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

⚠ WARNING

The product may suddenly start to operate when the power supply is recovered after a momentary power interruption. Design the machine to ensure human safety when operation restarts.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

When an alarm occurs, remove the cause of the alarm and ensure safety. Then reset the alarm or turn the power OFF and ON again to restart operation.

There is a risk of equipment damage or product failure. There is also a risk of injury, fire, or electric shock that causes death or serious injury.

If the Servo ON signal is input to the SERVOPACK and an alarm is reset, the servomotor may suddenly restart operation. Make sure to confirm that the servo is OFF and ensure safety before you reset an alarm.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Always insert a magnetic contactor in the line between the main circuit power supply and the main circuit terminals on the SERVOPACK so that the power can be turned OFF at the main circuit power supply.

There is a risk of fire due to internal component failure in the SERVOPACK that causes death or serious injury.

⚠ WARNING

If an alarm occurs, turn OFF the main circuit power supply.

There is a risk of fire and death or serious injury due to a regenerative resistor overheating as the result of regenerative transistor failure.

Install a ground fault detector against overloads and short-circuiting or install a molded-case circuit breaker combined with a ground fault detector.

If a ground fault occurs, there is a risk of injury, fire, or electric shock due to SERVOPACK failure that causes death or serious injury.

The holding brake alone on a servomotor will not ensure safety if there is the possibility that an external force (including gravity) may move the current position and create a hazardous situation when power is interrupted or an error occurs. To ensure safety, make sure to install an external braking mechanism.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

(9) Disposal Precautions

- Correctly discard the product as stipulated by regional, local, and municipal laws and regulations. Be sure to include these contents in all labelling and warning notifications on the final product as necessary.

(10) General Precautions

- Figures provided in this manual are typical examples or conceptual representations. There may be differences between them and actual wiring, circuits, and products.
- The products shown in illustrations in this manual are sometimes shown with their covers or protective guards removed to illustrate detail. Always replace all covers and protective guards before you use the product.
- If you need a new copy of this manual because it has been lost or damaged, contact your nearest Yaskawa representative or one of the offices listed on the back of this manual.
- This manual is subject to change without notice for product improvements, specifications changes, and improvements to the manual itself. We will update the manual number of the manual and issue revisions when changes are made.
- Any and all quality guarantees provided by Yaskawa are null and void if the customer modifies the product in any way. Yaskawa disavows any responsibility for damages or losses that are caused by modified products.

i.8 Warranty

i.8.1 Details of Warranty

(1) Warranty Period

The warranty period for a product that was purchased (hereinafter called the “delivered product”) is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

(2) Warranty Scope

Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the above warranty period. This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.

This warranty does not cover failures that result from any of the following causes.

- Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
- Causes not attributable to the delivered product itself
- Modifications or repairs not performed by Yaskawa
- Use of the delivered product in a manner in which it was not originally intended
- Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
- Events for which Yaskawa is not responsible, such as natural or human-made disasters

i.8.2 Limitations of Liability

- Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
- Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
- The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
- Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

i.8.3 Suitability for Use

- It is the customer’s responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.
- The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
- Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
  - Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals

  - Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
  - Systems, machines, and equipment that may present a risk to life or property
  - Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
  - Other systems that require a similar high degree of safety
- Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.
- The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
- Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

i.8.4 Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

1

Basic Information on SigmaWin+ AE

This chapter describes an outline of the SigmaWin+ AE, the tasks that must be performed to use the SigmaWin+ AE, and the window configuration.

1.1 Before Using the SigmaWin+ AE

This section describes an outline of the SigmaWin+ AE and the tasks that must be performed to use the SigmaWin+ AE.

1.1.1 What Is the SigmaWin+ AE?

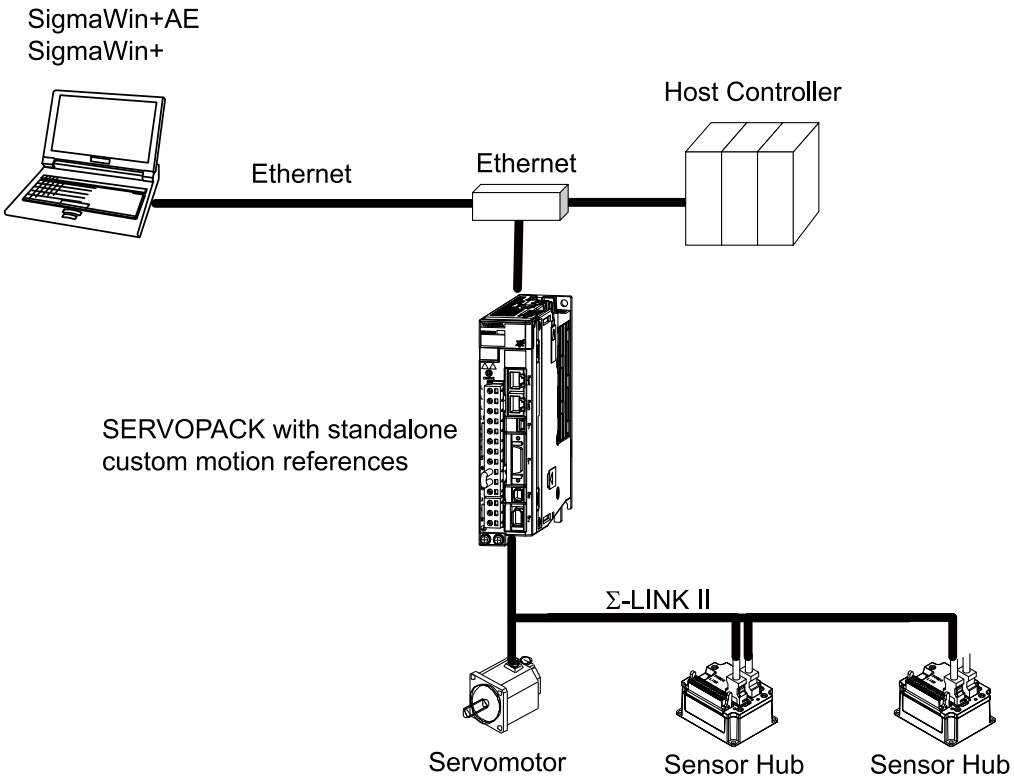
The SigmaWin+ AE engineering tool for configuring user applications and editing ladder programs.

The SigmaWin+ AE is an add-on engineering tool for the SigmaWin+ version 7. This means you first need to install version 7.52 or later of the SigmaWin+ Ver.7 and then add the special model information file.

The SigmaWin+ AE is installed in a PC and the PC can be connected to a SERVOPACK to operate the SERVOPACK from the PC interface.

1.1.2 System Configuration Example

The following figure shows a system configuration example where the SigmaWin+ AE is connected to the SERVOPACK.



1.1.3 Applicable SERVOPACK Models

The SigmaWin+ AE supports the following SERVOPACKs:

- Σ-X-Series Σ-XS SERVOPACK with FT specification customized sensing data function option (with standalone custom motion function)

Information You can also check this information in the [Environment Setting] window in the SigmaWin+ AE. Refer to the following section for details.

☞ *8.1.3 [System] - [Controller Type] on page 326*

1.1.4 Operating Environment

The operating environment of the SigmaWin+ AE is given below.

CPU Clock	1 GHz or more (recommended) *1
Memory Capacity	1 GB or more (recommended) *2
Available Hard Disk Space	1.2 GB or more *3
Monitor	1280 × 800 resolution or higher (recommended)
CD Drive	One (Used only for software installation)
Communications Port	Ethernet, USB
Supported Languages	English, Japanese, Simplified Chinese
Supported Operating Systems	Supports 32-bit OS and 64-bit OS. Windows11, Windows10
Software Environment	Microsoft .NET Framework 4.6.2
Browser (to Display Help)	Internet Explorer 9 or later
Other	Adobe Reader Ver. 6.00 or later

*1 This software can also run on compatible CPUs manufactured by companies other than Intel.
*2 Installing more memory than the minimum requirements is recommend because the memory will be insufficient and performance will decrease when multiple applications are run at the same time.
*3 This value includes the standard workspace after installation.

1.1.5 Installing the SigmaWin+ AE on a PC

Use the following procedure to install the SigmaWin+ AE on a PC.

1. **Ready the model information data set.**
2. **Extract the contents of the ZIP file with the model information data set.**
3. **Add the model information file (DB) inside the extracted folder to the SigmaWin+ Ver.7.**

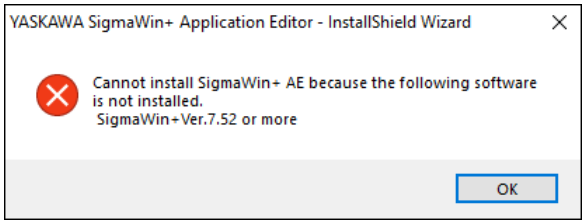
   Refer to the following manual for how to add the model information file.

   AC Servo Drive Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)
4. **Execute the [Setup.exe] file in the extracted folder.**

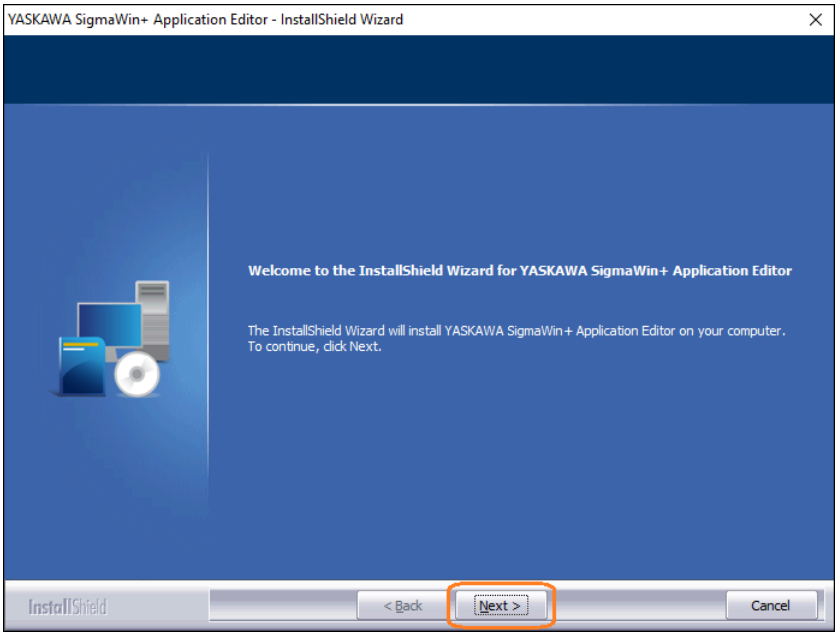
Important

If you did not install the SigmaWin+ version 7.52 or later on the personal computer in advance, the following message dialog box will be displayed. In this case, install the SigmaWin+ Ver.7 for the following conditions, and then perform step 4 again.

- When the SigmaWin+ Ver.7 is not installed on the personal computer:
  Use the installer for the SigmaWin version 7.52 or later and install it on the personal computer.
- When an older version of the SigmaWin+ Ver.7 is installed on the personal computer:
  Uninstall the currently installed SigmaWin+ Ver.7 from the personal computer, and then use the installer for the SigmaWin version 7.52 or later and reinstall it.

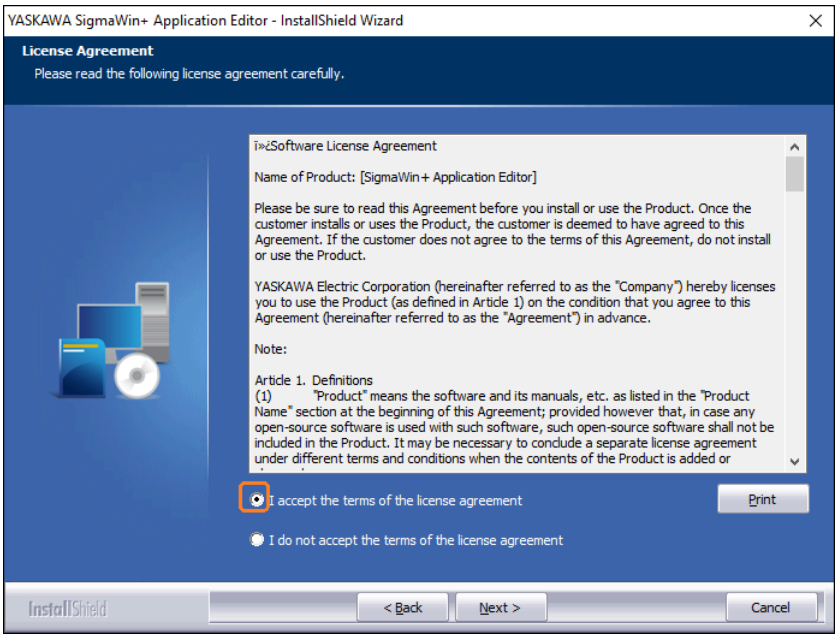


5. **Click the [Next] button.**

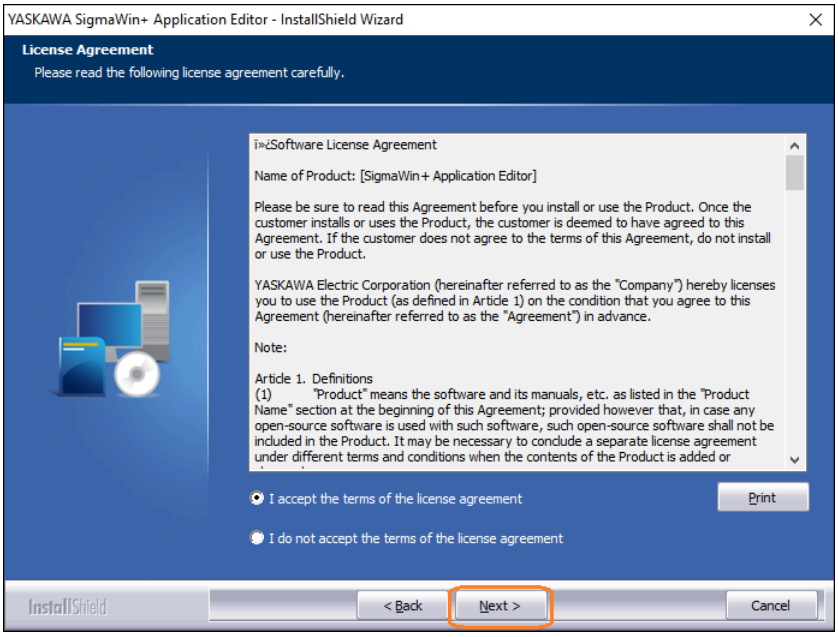


The License Agreement will be displayed.

6. **Read the agreement, and then click [I accept the terms of the license agreement].**

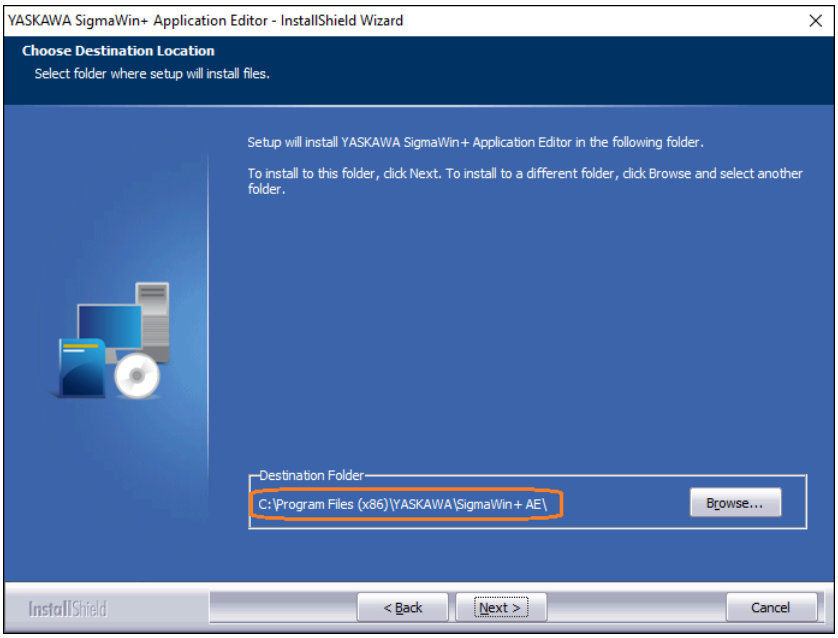


7. **Click the [Next] button.**

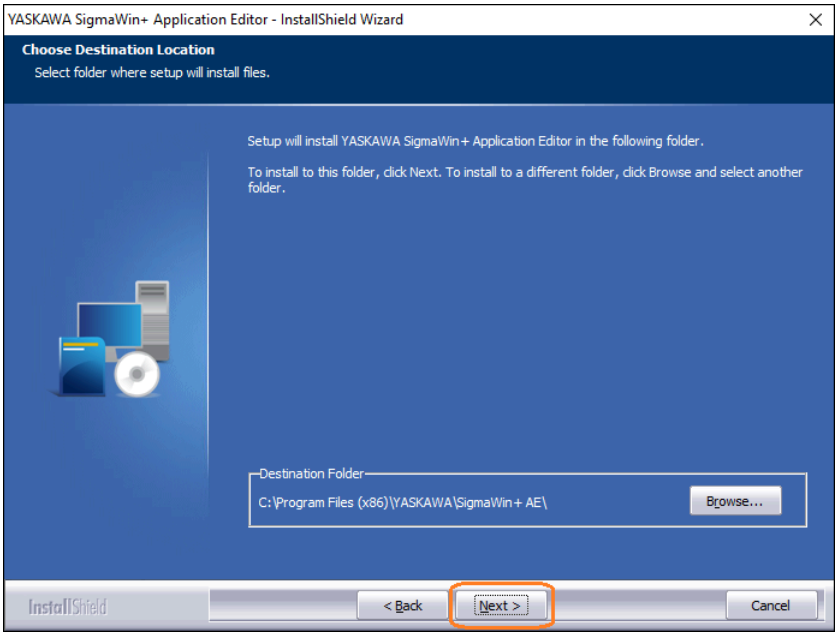


8. **Select the destination folder.**

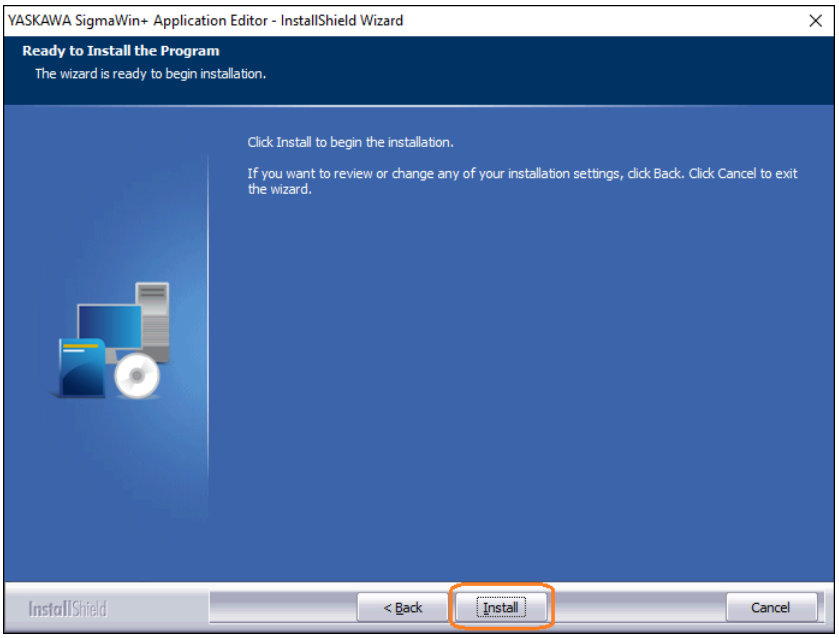
- To install to the folder shown under [Destination Folder]: Proceed to step 9.
- To change the destination folder: Click the [Browse] button and select the desired destination by following the guidance displayed in the window.



9. **Click the [Next] button.**

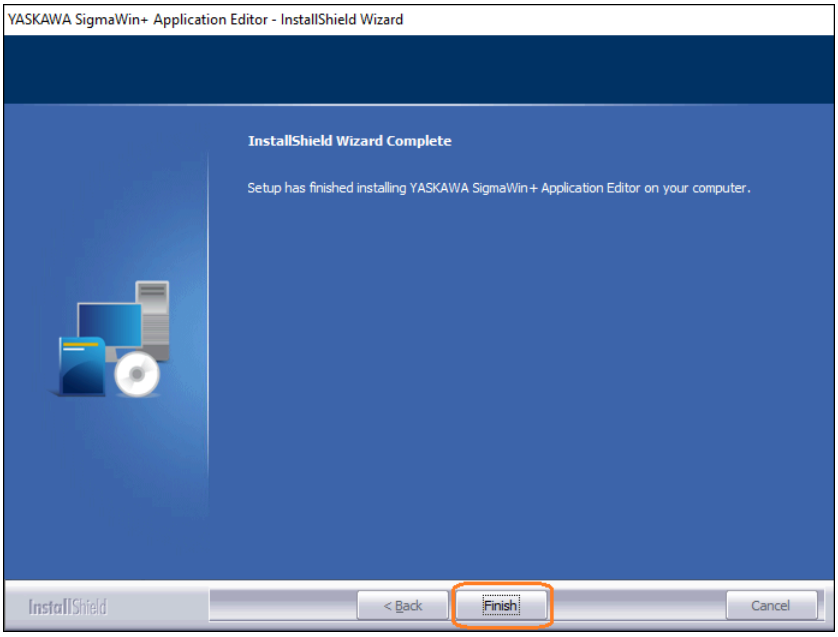


10. **Click the [Install] button.**



The installation will begin.

11. **Click the [Finish] button.**



This concludes the installation of SigmaWin+ AE on the PC.

1.1.6 Connecting the SigmaWin+ AE to a SERVOPACK

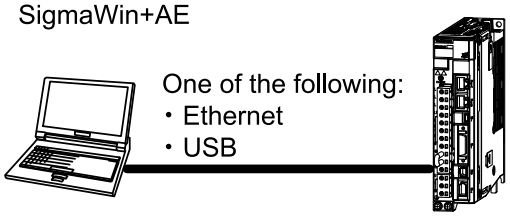
This section describes how to connect the PC on which the SigmaWin+ AE is installed to a SERVOPACK.

(1) Connecting Cables

A conceptual illustration of a connection and the cable specifications are shown below.

Information Refer to the manual for the SERVOPACK for the connections between the SERVOPACK and power supply.

Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option (with Standalone Custom Motion Function) Product Manual (Manual No.: SIEP C710812 32)

Conceptual Illustration of Connection	Cable Specifications
	Ethernet Use a commercially available cable that meets the following conditions: • Ethernet specification: 100Base-TX • Category 5 or higher • Twisted-pair cable with RJ-45 connectors USB Use the Yaskawa-specified USB cable.

(2) Connection Status

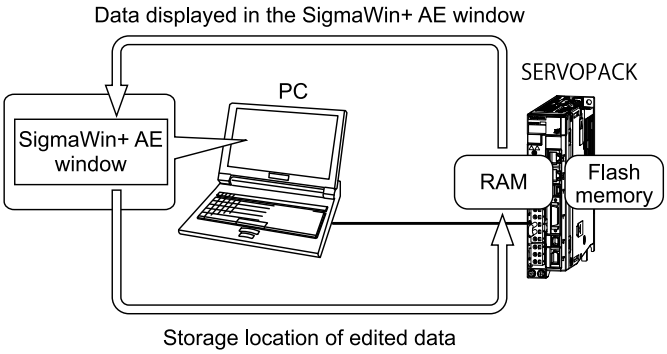
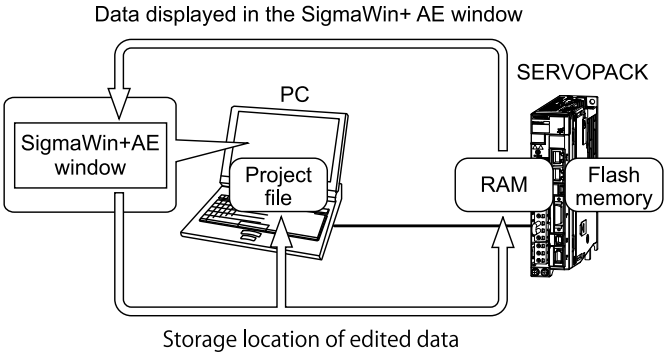
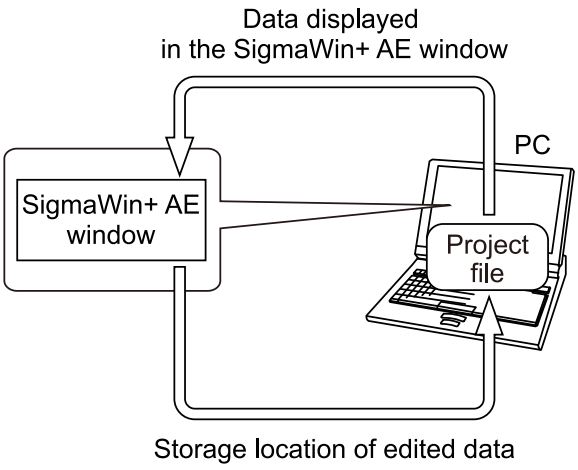
The connection status between the SigmaWin+ AE and SERVOPACK can be classified as shown below.

Information Refer to the following section for details on the project file.

2.1 What Is a Project File? on page 80

Connection Status		Description
Online	Direct Connection	The status where a connection is made to the SERVOPACK in the SigmaWin+ AE without opening a project file. You can monitor and edit information in the SERVOPACK using the SigmaWin+ AE. However, you cannot copy a drawing when using a direct connection. To copy a drawing, establish a project link connection.
	Project Link Connection	The status where a project file is opened in the SigmaWin+ AE and then a connection is made to the SERVOPACK. A project link connection is made to the SERVOPACK in the following cases: • To set up the actual machine using a project file that was previously created because the previous and current machine configurations are the same. • To connect to the actual machine and continue setup using a project that was previously created when the setup process was not completed.
Offline		The status where the SigmaWin+ AE is not connected to the SERVOPACK. You can open a project file and configure the settings for that data. You can manipulate the data in the project file without the actual machine (e.g., SERVOPACK), but the functions available to you are limited.

The data that is displayed in the SigmaWin+ AE window and the storage location for edited data depend on the connection status and the project file status. The following table provides illustrations of this. This table describes saving only, but deletion is the same.

Connection Status	Project File Status	Data Displayed in the SigmaWin+ AE Window	Storage Location of Edited Data	Illustration
Online: Direct Connection	Not open	SERVOPACK RAM	SERVOPACK RAM	
Online: Project Link Connection	Open	SERVOPACK RAM	In the open project file and the SERVOPACK RAM	 **Note:** Only changes are stored in the project file. When using a project link connection, make sure the contents of the project file and the SERVOPACK RAM are the same before you start. Refer to the following section for details. ☞ *2.4.1 Compare with Controller on page 95*
Offline	Open	Open project file	Open project file	

Information **Differences between the SERVOPACK RAM and Flash Memory**

- RAM: Data is lost when the power to the SERVOPACK is turned OFF.
- Flash memory: Data is retained even when the power to the SERVOPACK is turned OFF.

We recommend saving the data to the flash memory.

(3) Engineering Range

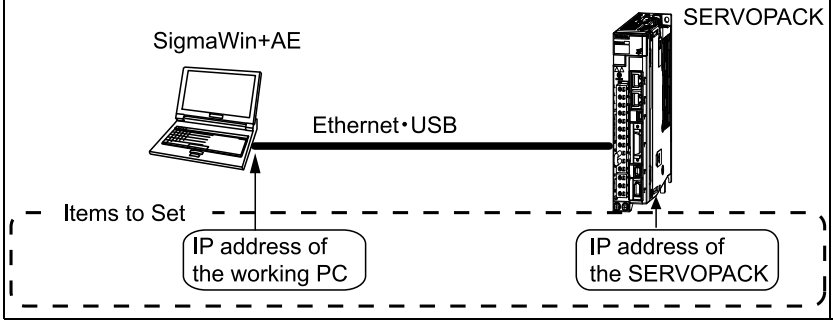
This product can be used to engineer a single-axis system as shown below.

Engineering is supported only for SERVOPACKs used in single-axis systems.

1.1.7 Setting Up Communications

This section describes the communications settings for the PC on which the SigmaWin+ AE is installed and the SERVOPACK.

The following table gives visual examples of the communications settings and page references.

Illustration	Reference
	☞ *(a) Ethernet Communications (Assigning IP Addresses Manually) on page 46* ☞ *(c) USB Communications on page 51*

Use the following procedure.

(1) Communications Methods

The following two communications methods are available for the connection between the personal computer on which the SigmaWin+ AE is installed and the SERVOPACK.

- Ethernet communications
- USB communications

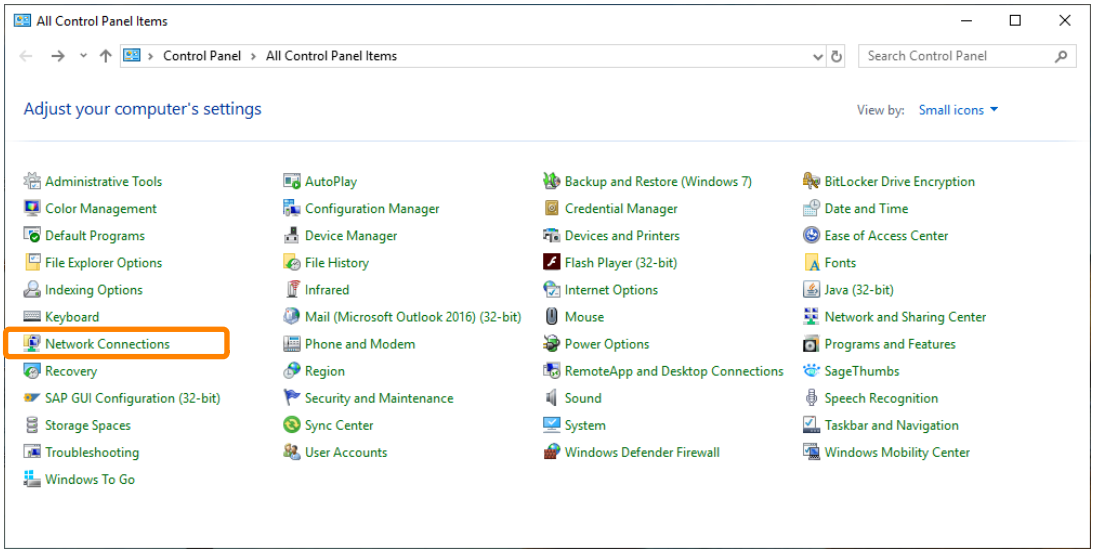
IP addresses can also be assigned automatically or manually for Ethernet communications.

(a) Ethernet Communications (Assigning IP Addresses Manually)

Use the following procedure to establish a normal connection from the PC on which the SigmaWin+ AE is installed to a SERVOPACK by Ethernet communications (assigning IP addresses manually).

1. **Open Control Panel from the Windows Start Menu.**

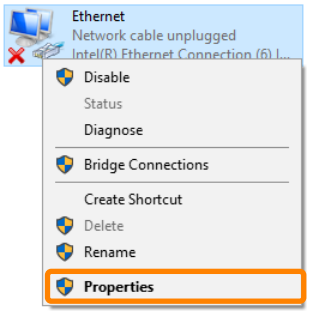
2. **Click [Network Connections].**



The [Network Connections] window will be displayed.

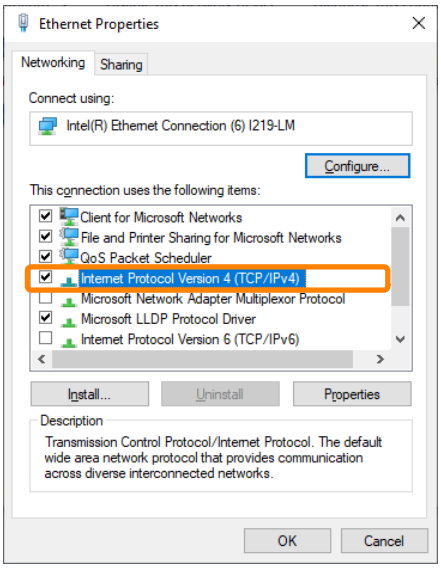
3. **Right-click [Local Area Connection] or [Ethernet] and select [Properties].**

Information The text displayed for the options will depend on your personal computer.



The [Ethernet Properties] window will be displayed.

4. **Double-click [Internet Protocol Version 4 (TCP/IPv4)].**

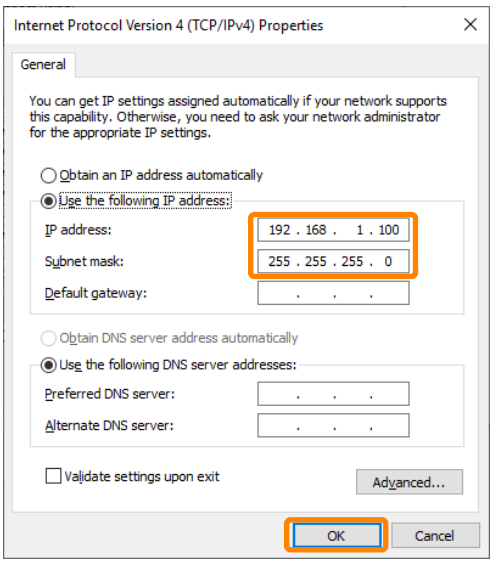


The [Internet Protocol Version 4 (TCP/IPv4) Properties] window will be displayed.

5. **In the [Use the following IP address] area, set the following items, and then click the [OK] button.**

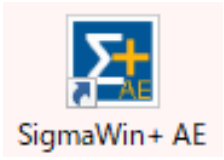
- IP address = 192.168.1.□□□
- Subnet mask = 255.255.255.0

Information
- Do not use the same IP address as the IP address of any other device.
- It is not necessary to change or specify the default gateway.

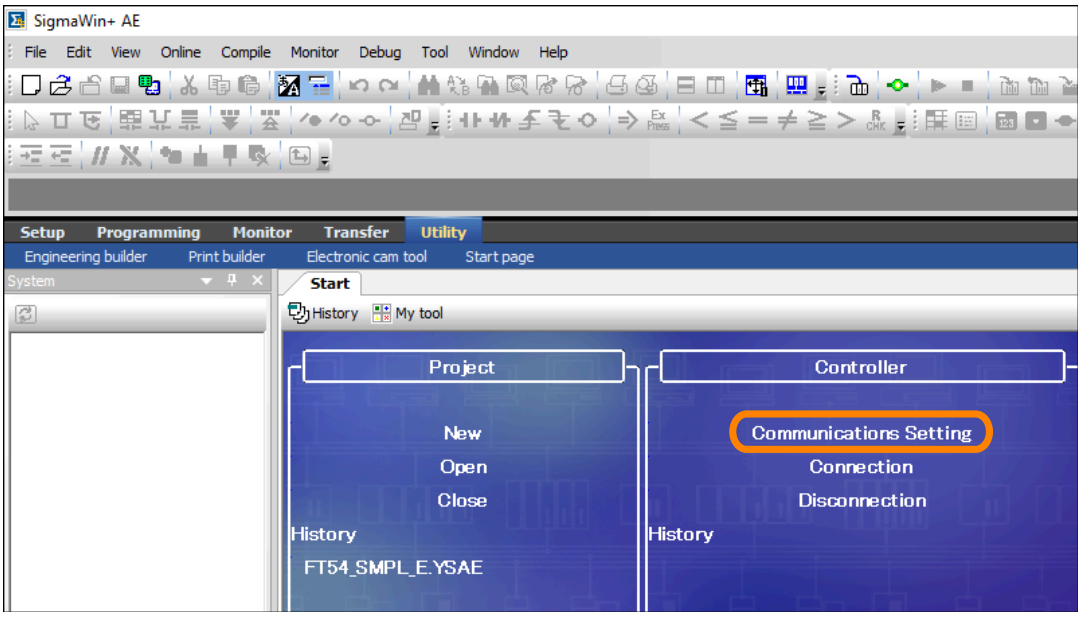


This completes the IP address settings and closes the [Internet Protocol Version 4 (TCP/IPv4) Properties] window.

6. **Start up SigmaWin+ AE.**



7. **Click [Communications Setting].**

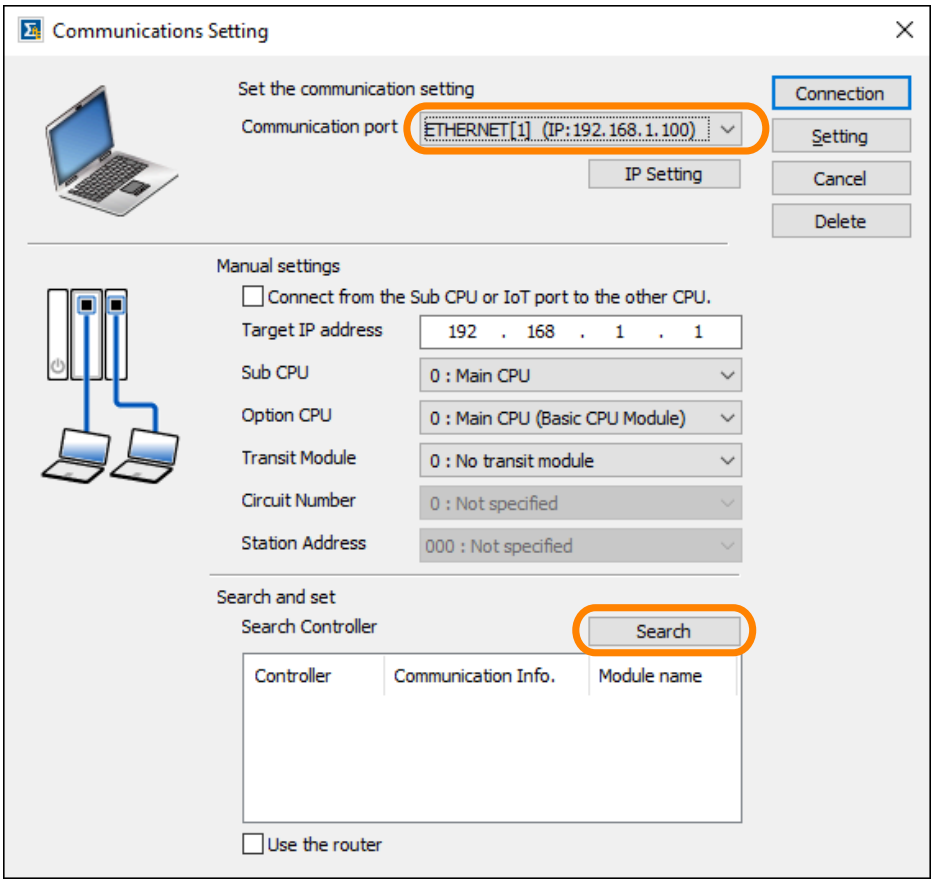


The [Communications Setting] window will be displayed.

8. **Select the IP address that was set in step 5 from the [Communication port] box, and then click the [Search] button.**

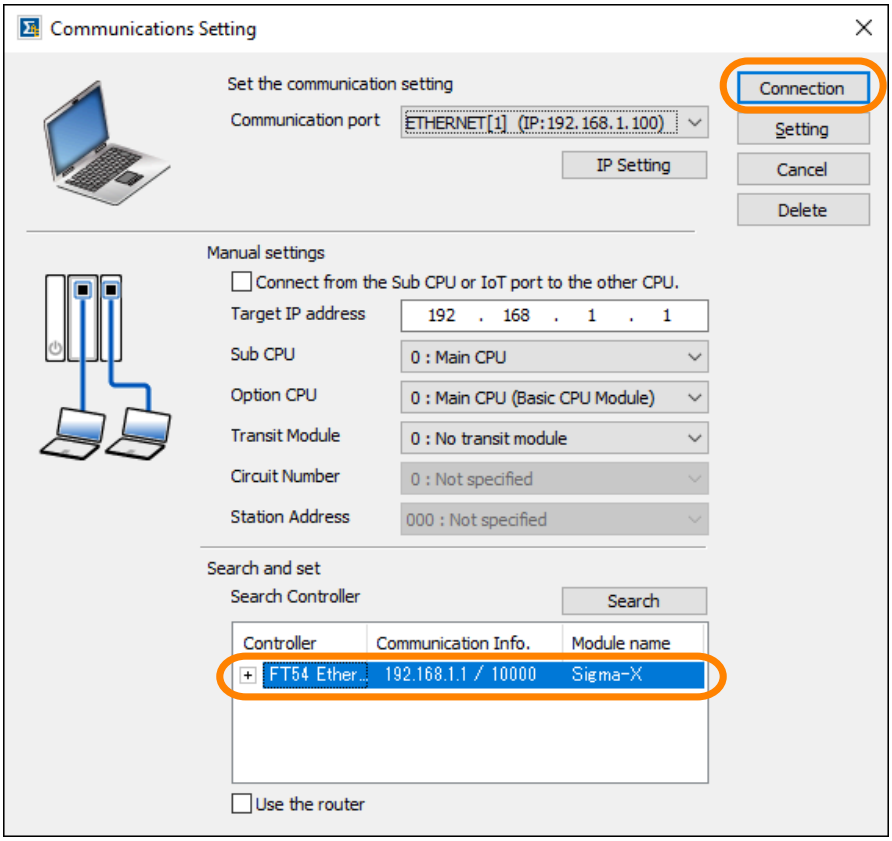
Information This section describes the typical procedure. You can also make the connection with other operations. Refer to the following section for details.

☞ *(b) Details on the [Communications Setting] Dialog Box on page 50*

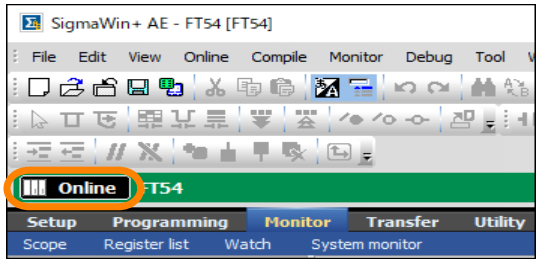


The search results will be displayed in the [Search Controller] area.

9. **Select the SERVOPACK that is directly connected to the the SigmaWin+ AE from the [Search Controller] area, and click the [Connection] button.**



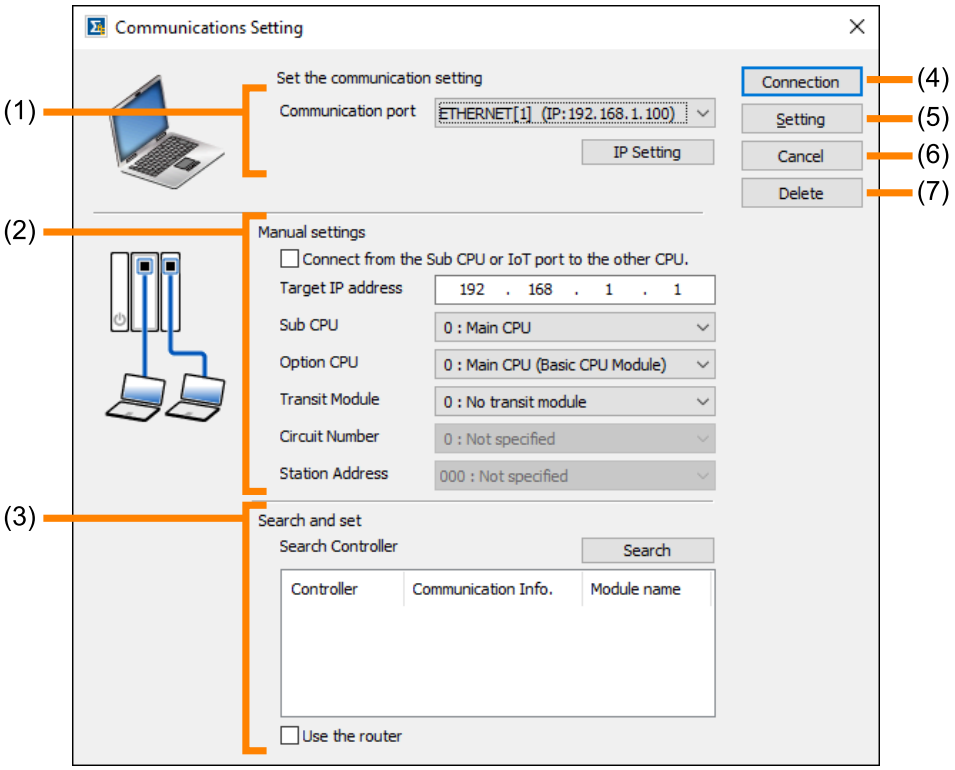
10. **Confirm that [Online] appears to the upper left of the launcher.**



This concludes the settings.

(b) Details on the [Communications Setting] Dialog Box

This section describes the details on the [Communications Setting] dialog box that is displayed when the personal computer on which the SigmaWin+ AE was installed (referred to here as "the SigmaWin+ AE") is connected to the SERVOPACK over Ethernet communications.



No.	Item	Description
(1)	[Communications port]	Set or select the IP address of the Ethernet connector for the SigmaWin+ AE. Click [Communication port] and you can select an option from the displayed list. You cannot use the [IP Setting] button.
	[IP Setting] Button	
(2)	[Manual settings]	Set the information on the destination SERVOPACK in either [Manual settings] or [Search and set].
	[Connect from the Sub CPU or IoT port to the other CPU.]	This item is not used in this product.
	[Target IP address]	Set the IP address of the SERVOPACK connected to the SigmaWin+ AE (or the Ethernet connector of the SERVOPACK. Refer to the manual for SERVOPACK for the default setting of the IP address. 📖 Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option (with Standalone Custom Motion Function) Product Manual (Manual No.: SIEP C710812 32)
	[Sub CPU]	This item is not used in this product.
	[Option CPU]	This item is not used in this product.
	[Transit Module]	This item is not used in this product.
	[Circuit Number]	
	[Station Address]	
(3)	[Search and set]	Set the information on the destination SERVOPACK in either [Manual settings] or [Search and set].
	[Search] Button	Click this button to display the SERVOPACK connected to the connector with the IP address set in (1) [Communication port] on this window. When there are multiple SERVOPACKs that can be connected, select the model to connect to.
	[Use the router]	This item is not normally used.
(4)	[Connection] Button	Click this button to start the connection between the SigmaWin+ AE and the SERVOPACK according to the settings in (1) [Communication port] and (2) [Manual settings] or (7) [Search and set] on this window.
(5)	[Setting] Button	Click this button to save the set values.
(6)	[Cancel] Button	Click this button to discard the set values and close the [Communications Setting] dialog box.
(7)	[Delete] Button	Click this button to discard the set values.

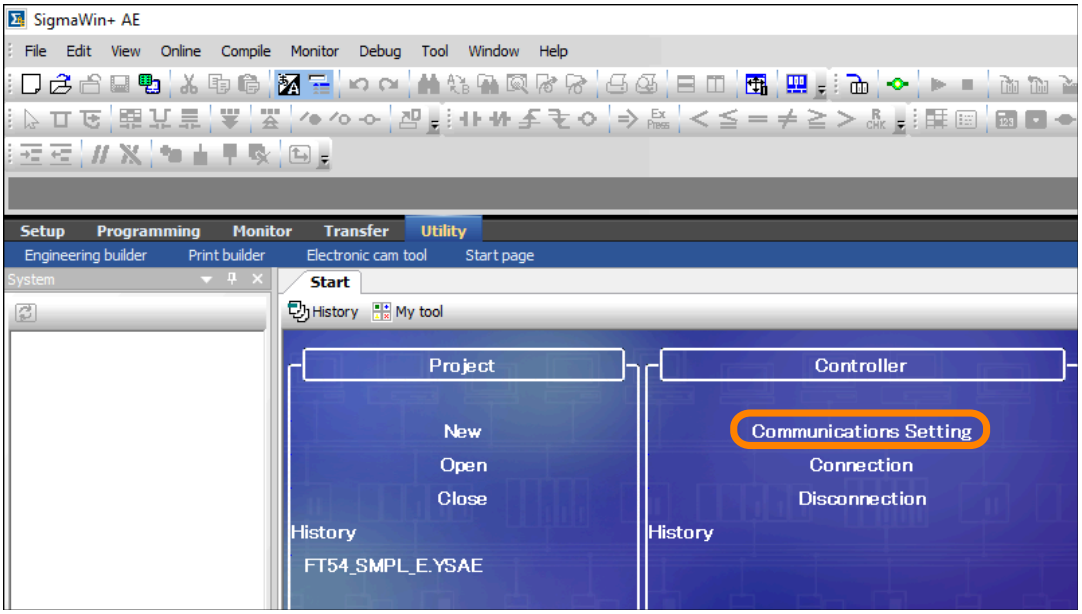
(c) USB Communications

Use the following procedure to establish a normal connection from the PC on which the SigmaWin+ AE is installed to a SERVOPACK by USB communications.


Important

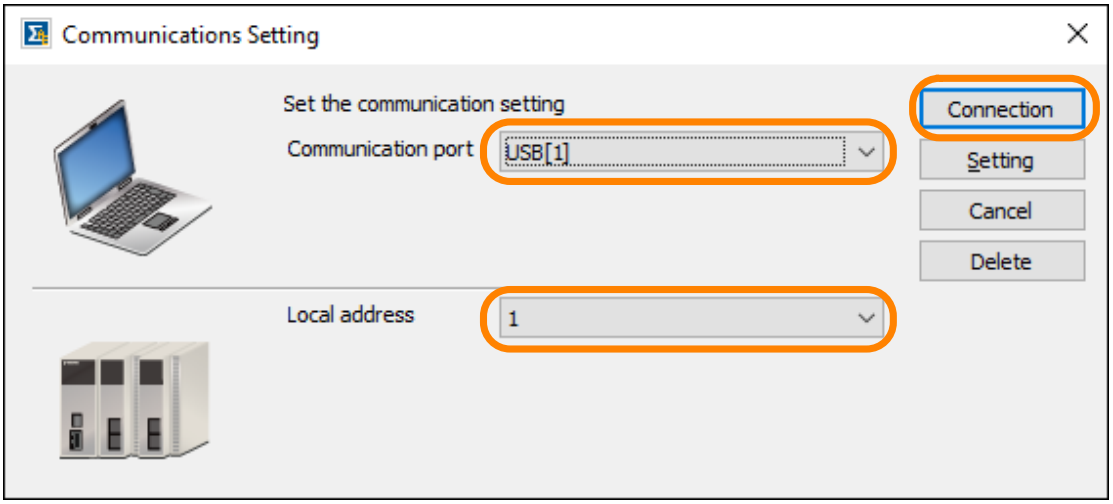
Use this procedure only when the PC and SERVOPACK are connected using the USB connector on the SERVOPACK.

1. **Start up SigmaWin+ AE, and click [Communications Setting].**

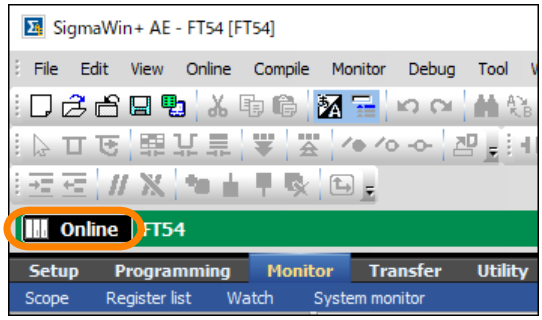


The [Communications Setting] window will be displayed.

2. **On the [Communications Setting] window, set the communications port to [USB], set [Local address] to the SERVOPACK's station address, and then click [Connection].**



3. **Confirm that [Online] appears to the upper left of the launcher.**

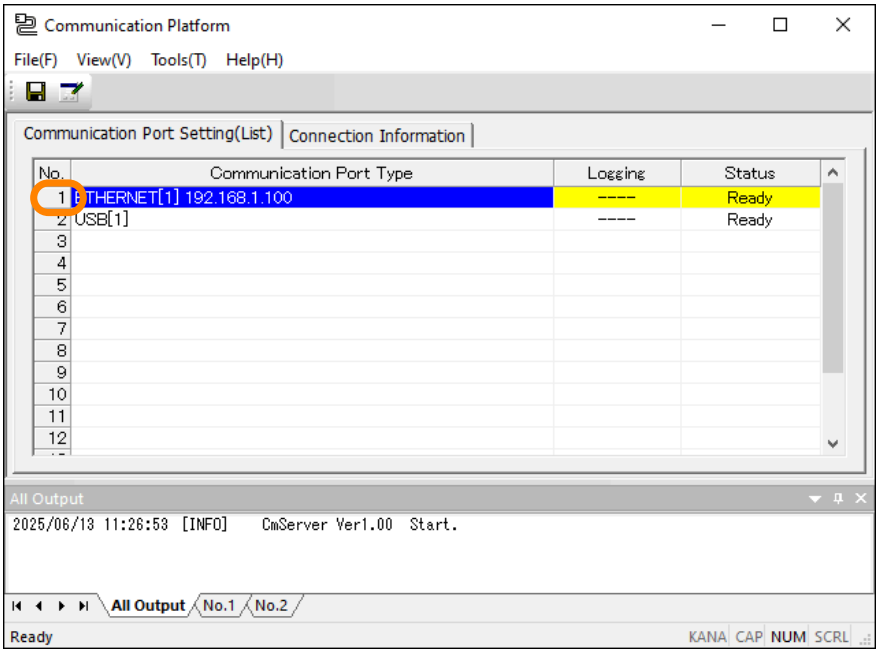


This concludes the settings.

(2) Setting an Upper Limit to the Communications Size

You can set an upper limit to the communications size when you use a USB or Ethernet communications port. Use the following procedure.

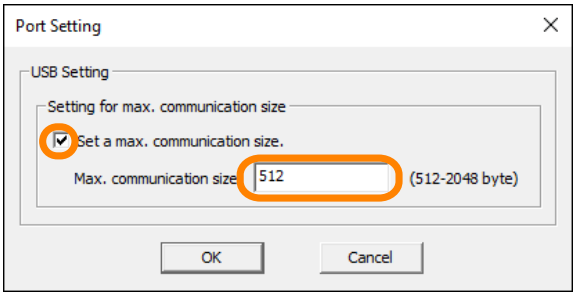
1. **Double-click the number of the communications port for which to set an upper limit to the communications size.**



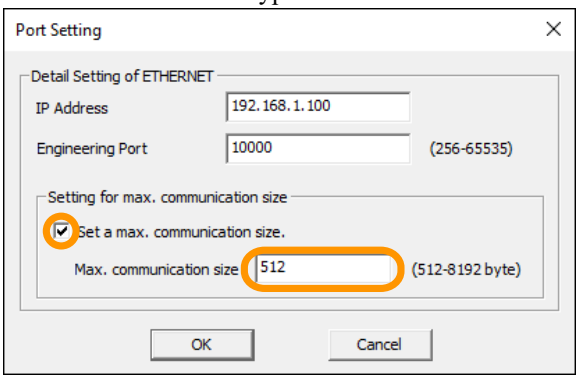
The [Port Setting] window will be displayed.

2. **Select the [Set a max. communication size] and enter the upper limit.**

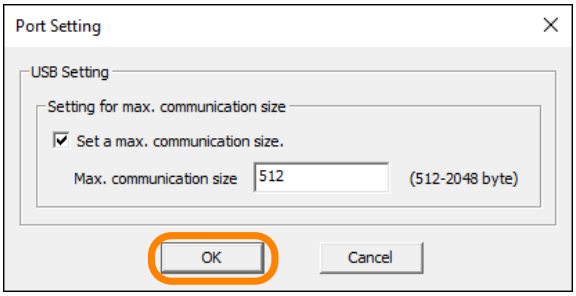
- Communications Port Type: USB



- Communications Port Type: Ethernet



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

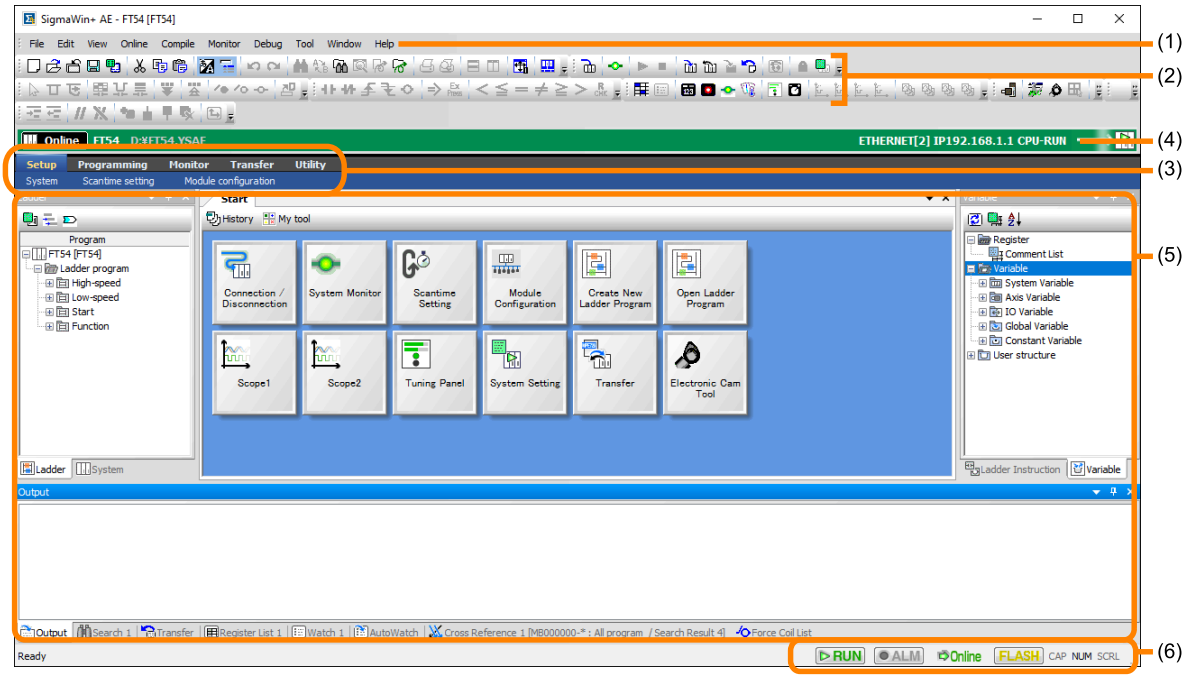


The maximum communications size setting will be enabled.

This concludes the procedure.

1.2 Main Window Configuration

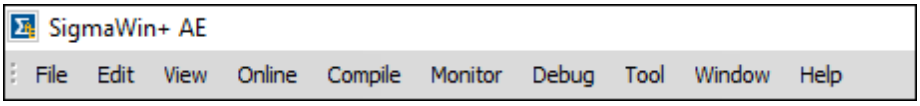
This section describes the names, functions, and view settings for the parts of the Main window in the SigmaWin + AE.



No.	Name	Reference
(1)	Menu bar	☞ *1.2.1 Menu Bar on page 55*
(2)	Toolbar	☞ *1.2.2 Toolbar on page 59*
(3)	Launcher	☞ *1.2.3 Launcher on page 64*
(4)	Caption bar	☞ *1.2.4 Caption Bar on page 65*
(5)	Window	☞ *1.2.5 Window on page 66*
(6)	Status bar	☞ *1.2.6 Status Bar on page 77*

1.2.1 Menu Bar

The menu bar displays the functions necessary for controlling the SigmaWin+ AE as a menu.
This section gives details on the menu bar.



(1) [File] Menu

Item	Description
New Project	Creates a project file.
Open Project	Selects and opens a project file.
Close Project	Closes the currently open project file.
Save Project	Saves by overwriting the currently open project file.
Save as a New Project	Saves the currently open project file as a separate file.

Continued on next page.

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Item	Description
Convert Project	Cannot be used.
Update Project	Updates module configuration definition information and ladder instruction information in the project file.
New Solution	Cannot be used.
Open Solution	Cannot be used.
Open Solution and Add Current Project	Cannot be used.
Close	Closes the currently open program.
Environment Setting	Displays the [Environment Setting] window.
Import	Imports files.
Export	Exports files.
Print Preview	Displays a printing preview.
Print	Displays the [Print] window.
Page Setup	Displays the [Page Setup] window.
□□.YSAE	Displays the names of the last five project files that were opened. Click a file name to open that project file.
Exit	Exits the SigmaWin+ AE

(2) [Edit] Menu

Item	Description
Undo	Reverses the effect of the last operation.
Redo	Performs the last operation that was reversed using [Undo].
Cut	Cuts the contents in the selected range.
Copy	Copies the contents in the selected range.
Paste	Inserts the contents that has been cut or copied.
Delete	Deletes the contents in the selected range.
Automatic Switch to IME	When this menu is selected, the input from the keyboard is automatically switched between Japanese and English according to the input box.
Display the Autocomplete list for variables and registers	Toggles between enabling and disabling the Autocomplete.
Select All	Selects the entire range in the currently displayed view.
Search	Displays the [Search] window, which allows you to search for registers and other items.
Replace	Displays the [Replace] window, which allows you to replace registers and other items.
Search in Project	Displays the [Search in project] window, which allows you to search for registers and other items in a specified project.
Replace in Project	Displays the [Replace in the project] window, which allows you to replace registers and other items in a specified project.

(3) [View] Menu

Item	Description
Navigation	Cannot be used.
System	Toggle between displaying and hiding the selected windows.
Ladder	
Ladder Instruction	
Variable	
Cross Reference	
Check for Multiple Coils	
Register List	
Watch	
Other Windows	
AutoWatch	
Search for Programs Used in Each Axis	
Toolbars	Toggles between displaying and hiding the selected toolbars.
Launcher	Toggles between displaying and hiding the launcher.
Status Bar	Toggles between displaying and hiding the status bar.
Zoom	Changes the display magnification.
Refresh	Updates the [Ladder] window and [Variable] window with the latest information.

(4) [Online] Menu

Item	Description
Connection	Establishes a logical connection between the PC on which the SigmaWin+ AE is installed and a SERVOPACK. This is displayed only in offline mode.
Disconnection	Disconnects the PC on which the SigmaWin+ AE is installed and a SERVOPACK. This is displayed only in online mode.
1 □□	Displays up to five connection names (logical port number + port type) that have been used for connections. Click this item to establish the connection with those settings.
Communications Setting	Sets up communications between the PC on which the SigmaWin+ AE is installed and a SERVOPACK.
CPU Switching	Fixed to "CPU0".
CPU RUN	Starts the CPU of the connected SERVOPACK.
CPU STOP	Stops the CPU of the connected SERVOPACK.
Reset CPU Memory	Clears CPU memory.
Write to Controller	Writes the contents of the project file into the SERVOPACK.
Read from Controller	Writes the data from the SERVOPACK into the project file.
Save to Flash	Saves the SERVOPACK RAM contents to the flash memory of the SERVOPACK.
Transfer	Transfers data, such as programs and registers.
Test Run	Cannot be used.
Online Security Setting	Sets the online security settings.
Controller Information	Displays information about the connected SERVOPACK.

(5) [Compile] Menu

Item	Description
Compile	Compiles the currently displayed program.
Compiles All Programs	Compiles all programs.
Compile Program Being Edited	Compiles the program being edited or that has not been compiled.

(6) [Monitor] Menu

Item	Description
System Monitor	Displays the System Monitor.
Tuning Panel	Used to monitor, edit, and adjust the current value of variables from the panel.
Trace	Analyzes tracing data in the form of a trend graph or XY graph.

(7) [Debug] Menu

Item	Description
Cross Reference	Performs a search on variables or registers currently used in the program.
Check for Multiple Coils	Searches all ladder programs for different coils that use the same register.
Force Coil List	Searches ladder programs for coils that are forced ON or OFF.
Display Register Map	Displays the values of registers (register map) at consecutive addresses.
Add to Watch	Adds the selected register to the [Watch] window.
Add to Scope	Adds the selected register to the trace window.

(8) [Tool] Menu

Item	Description
Engineering builder	Displays the engineering builder.
Electronic cam tool	Starts the Electronic Cam Tool to create cam tool data.
Print builder	Displays the print builder.

(9) [Window] Menu

Item	Description
Close All	Closes all tab pages except the [Start] tab page when more than one tab page is open in the center window.
Window layout	Saves and restores the window layout.
Horizontal view	Splits the tab page displayed in the center window vertically.
Vertical view	Splits the tab page displayed in the center window horizontally.
Move to the previous tab	Moves the selected tab page to the other window when the center window is split vertically or horizontally.
Move to the next tab	
1 Start	Displays the name of the tab page that is currently displayed in the center window.
2 □□	
Window	Brings the specified tab page to the front or closes it when more than one tab page is open.

(10) [Help] Menu

Item	Description
Contents	Displays the table of contents for the help file.
About App	Displays the version of the SigmaWin+ AE.

1.2.2 Toolbar

The toolbar displays functions related to project files and programming as buttons.
This section gives details on the tool and tells how to toggle whether the toolbar is displayed or hidden.

(1) [Standard] Toolbar

Button	Description
	Creates a project file.
	Selects and opens a project file.
	Closes the currently open project file.
	Saves by overwriting the currently open project file.
	Displays the [Environment Setting] window.
	Cuts the contents in the selected range.
	Copies the contents in the selected range.
	Inserts the contents that has been cut or copied.
	When this menu is selected, the input from the keyboard is automatically switched between Japanese and English according to the input box.
	Toggles between enabling and disabling the Autocomplete.
	Reverses the effect of the last operation.
	Performs the last operation that was reversed using [Undo].
	Displays the [Search] window, which allows you to search for registers and other items.
	Displays the [Replace] window, which allows you to replace registers and other items.
	Displays the [Search in project] window, which allows you to search for registers and other items in a specified project.
	Changes the display magnification.

Continued on next page.

Continued from previous page.

Button	Description
	Compiles the currently displayed program.
	Compiles all programs.
	Displays the [Print] window.
	Displays a printing preview.
	Splits the tab page displayed in the center window vertically.
	Splits the tab page displayed in the center window horizontally.
	Restores the window layout to the layout that was saved as layout 1.
	Displays the version of the SigmaWin+ AE.

(2) [Online] Toolbar

Button	Description
	Establishes and disconnects a logical connection between the PC on which the SigmaWin+ AE is installed and a SERVOPACK.
	Sets up communications between the PC on which the SigmaWin+ AE is installed and a SERVOPACK.
	Starts the CPU of the connected SERVOPACK.
	Stops the CPU of the connected SERVOPACK.
	Writes the contents of the project file into the SERVOPACK.
	Writes the data from the SERVOPACK into the project file.
	Saves the SERVOPACK RAM contents to the flash memory of the SERVOPACK.
	Transfers data, such as programs and registers.
	Cannot be used.
	Sets the online security settings.
	Displays information about the SERVOPACK.

(3) [Ladder Editor] Toolbar

This tool bar is used when working in the Edit Ladder Program Window.

Button	Description
	Normal Edit Mode
	Branch Creation Mode
	Branch Edition Mode
	Toggles between displaying and hiding register addresses.
	Toggles between displaying and hiding register variables.
	Toggles between displaying and hiding register comments.
	Turns ON batch scoping.
	Turns OFF batch scoping.
	Forces ON the coils in the selected register.
	Forces OFF the coils in the selected register.
	Clears a selected register that has been forced ON or forced OFF.
	Lists program locations that have called the current position.

(4) [Ladder Instruction] Toolbar

This tool bar is used when working in the Edit Ladder Program Window.

Button	Description
	Inputs an NO contact.
	Inputs an NC contact.
	Inputs a rising-edge pulse.
	Inputs a falling-edge pulse.
	Inputs a coil.
	Inputs a Store (=>) instruction.
	Inputs an Expression instruction.
	Inputs a Less Than (<) instruction.

Continued on next page.

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Button	Description
	Inputs a Less Than or Equal (<=) instruction.
	Inputs an Equal (==) instruction.
	Inputs a Not Equal (!=) instruction.
	Inputs a Greater Than or Equal (>=) instruction.
	Inputs a Greater Than (>) instruction.
	Checks that the input data is within the upper and lower limits.

(5) [Monitor] Toolbar

Button	Description
	Displays the values of registers (register map) at consecutive addresses.
	Adds the selected register to the [Watch] window.
	Cannot be used.
	Cannot be used.
	Displays the System Monitor.
	Cannot be used.
	Used to monitor, edit, and adjust the current value of variables from the panel.
	Cannot be used.
	Analyzes the data obtained by Trace 1 to 4 in the form of a trend graph or XY graph.
	Cannot be used.

(6) [Debug] Toolbar

Button	Description
	Performs a search on variables or registers currently used in the program.
	Searches all ladder programs for different coils that use the same register.

(7) [Tool] Toolbar

Button	Description
	Cannot be used.
	The [Engineering Builder] window will be displayed
	Displays the [Electronic Cam Tool] window.
	Cannot be used.
	Cannot be used.
	Displays the Print Manager.

(8) Toggling between Display and Hide

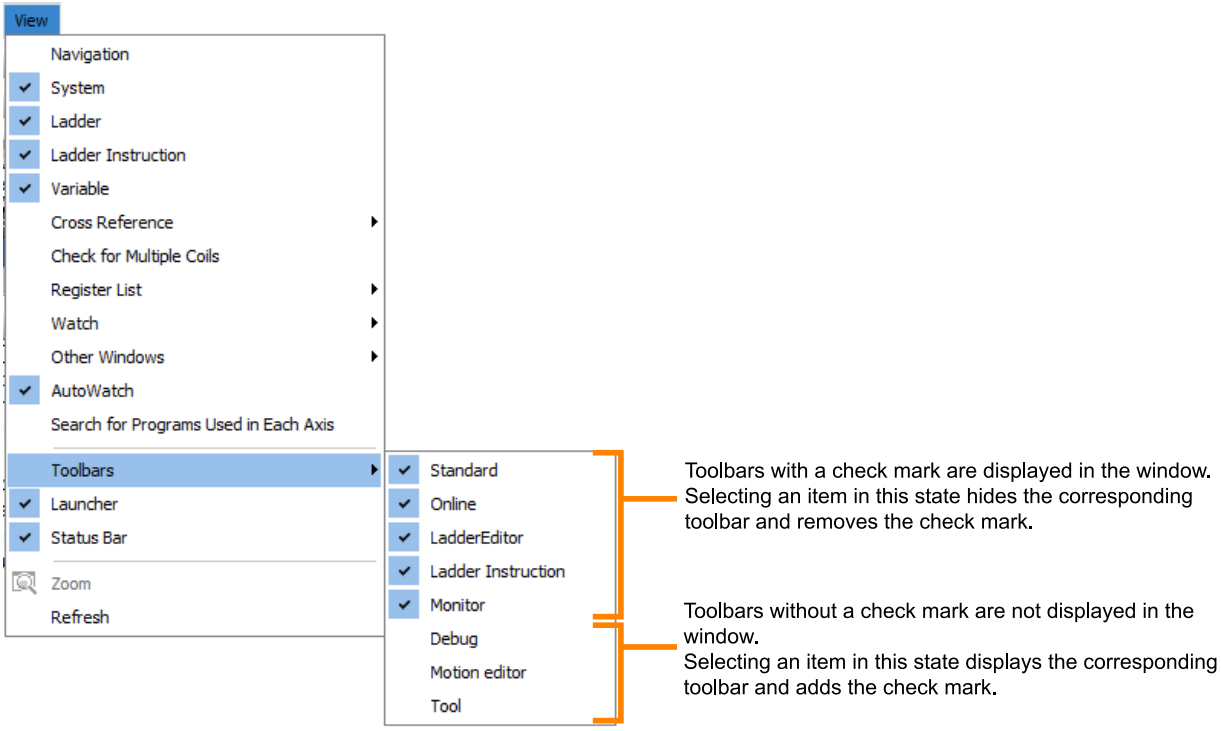
You can display or hide in the following two ways for toolbars:

- Displaying and Hiding Entire Toolbars
- Displaying and hiding individual buttons on each toolbar

The procedures are given below.

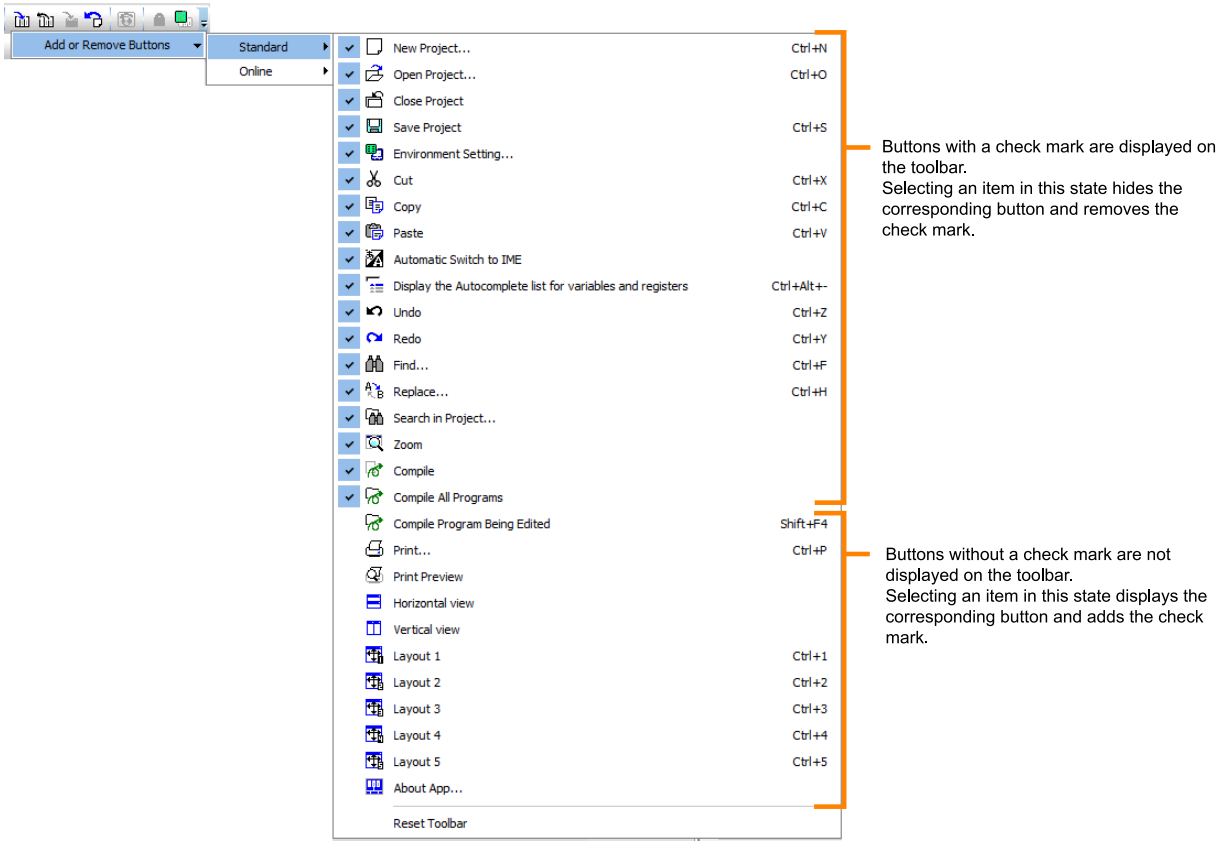
(a) Displaying and Hiding Entire Toolbars

Toggle between displaying and hiding the toolbars with [Toolbars] on the [View] menu.



(b) Displaying and Hiding Individual Buttons on Each Toolbar

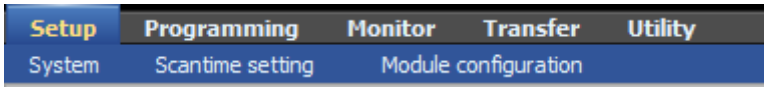
Toggle between displaying and hiding the buttons on the toolbar with [] - [Add or Remove Buttons] - [(Name of the button)].



1.2.3 Launcher

The launcher displays frequently used functions in the SigmaWin+ AE.

This section gives details on the launcher and tells how to toggle whether the launcher is displayed or hidden.



Item		Description
Setup	System	Displays the [System] window.
	Scantime setting	Displays the [Environment Setting] window and navigates to [Setup] - [Scan Time Setting].
	Module configuration	Displays the [Module Configuration] window.
Programming	Ladder program	Displays the [Ladder] window.
	Variable	Displays the [Variable] window.
Monitor	Scope	Displays the [Trace Type] window.
	Register list	Displays the [Register List] window.
	Watch	Displays the [Watch] window.
	System monitor	Displays the [System Monitor] window.
Transfer	Write into controller	Displays the [Transfer Program - Write to Controller] window.
	Read from controller	Displays the [Transfer Program - Read from Controller] window.
	Save to flash	Displays the [Transfer Program - Save to Flash] window.
	Transfer	Displays the [Transfer] window.

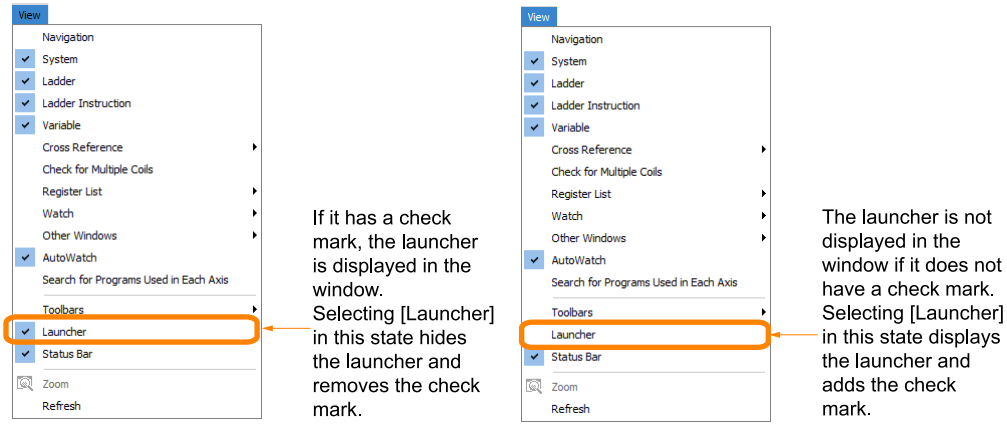
Continued on next page.

Continued from previous page.

Item		Description
Utility	Engineering builder	Displays the [Engineering Builder] window.
	Print builder	Displays the print builder.
	Electronic cam tool	Displays the [Electronic Cam Tool] window.
	Start page	Displays the [Start] tab page.

(1) Toggling between Display and Hide

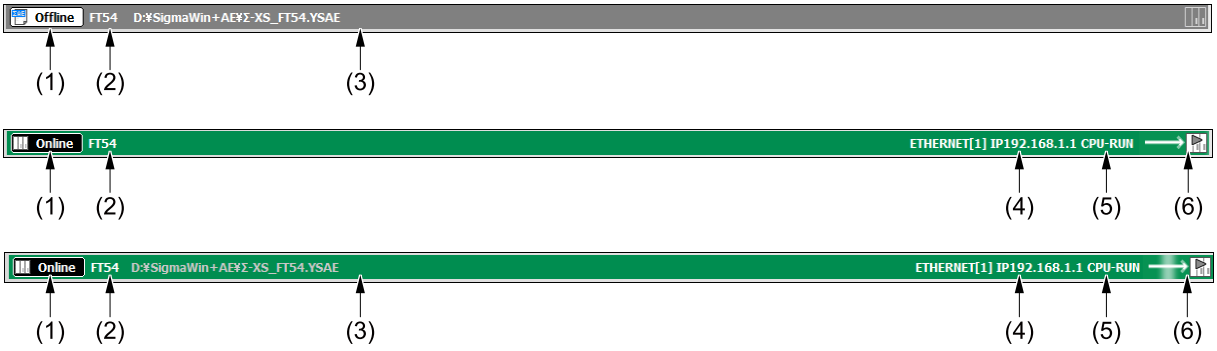
Toggle between displaying and hiding the launcher with [Launcher] on the [View] menu.



1.2.4 Caption Bar

The caption bar displays information that includes the status of the SERVOPACK, its type, and the name of the project file.

This section gives details on the caption bar.



No.	Display	Description
(1)	Online	The SigmaWin+ AE is correctly connected to the SERVOPACK.
	Offline	The SigmaWin+ AE is not connected to the SERVOPACK.
(2)	SERVOPACK model	When offline: Displays the model of the SERVOPACK that was set when the current project file was created. When online: Displays the model of the connected SERVOPACK.
(3)	Storage location and name of project file	Displays the storage location and file name of the currently open project file. This information is displayed only when a project file is open (i.e., only when offline or when a project link connection is active).
(4)	Ethernet	Displays the communications methods between the SigmaWin+ AE and the SERVOPACK. This is displayed only in online mode.
	USB	

Continued on next page.

Continued from previous page.

No.	Display	Description
(5)	IP address of SERVOPACK	Displays the IP address of the SERVOPACK that is connected to the SigmaWin+ AE. This is displayed only in online mode.
(6)	CPU Status	The operating status of the CPU is displayed. This is displayed only in online mode.

1.2.5 Window

SigmaWin+ AE has the types of windows described below.

This section describes the details of the [History] window and [My Tool] window, as well as how to display or hide each window.

Check the references in the following table for details on the other windows.

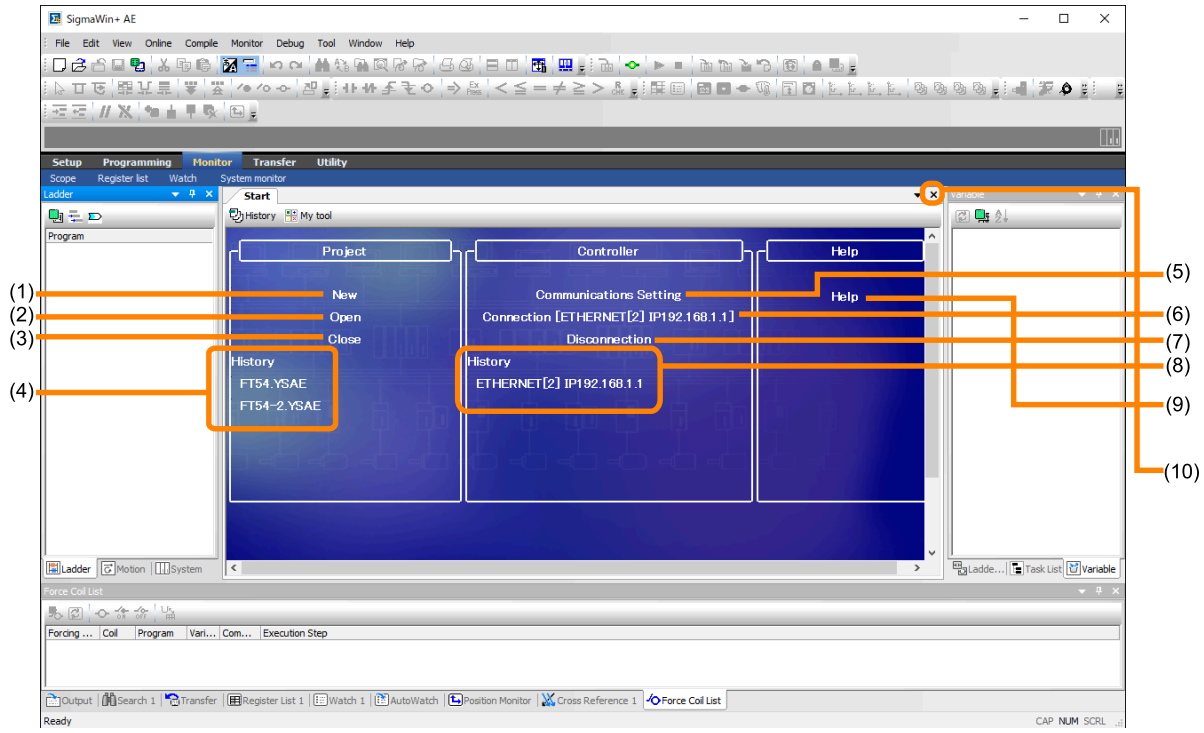
Window	Reference
History	☞ *(1) [History] Window on page 66*
My Tool	☞ *(2) [My Tool] Window on page 68*
Ladder Program	☞ *(2) Edit Ladder Program Window on page 127*
Trace	☞ *6.2.3 [Real-Time Trace] Tab Page on page 246* ☞ *6.2.5 [Trace Manager] Tab Page on page 258* ☞ *6.2.7 [XY Trace] Tab Page on page 275*
Comment List	☞ *(2) [Comment List] Tab Page on page 184*
System	–
Ladder	☞ *(1) [Ladder] Window on page 125*
Ladder Instruction	☞ *(4) [Ladder Instruction] Window on page 127*
Variable	☞ *(3) [Variable] Window on page 127*
Cross Reference	☞ *5.8 Cross Reference on page 230*
Check for Multiple Coils	☞ *5.9 Check for Multiple Coils on page 233*
Register List	☞ *5.1.1 [Register List] Window on page 207*
Watch	☞ *5.2 Watch on page 210*
Outputs	–
Search	–
Transfer	–
Force Coil List	☞ *5.5.1 Operations on the [Force Coil List] Window on page 221*
AutoWatch	☞ *(2) Displaying Data with the [AutoWatch] Window on page 211*

(1) [History] Window

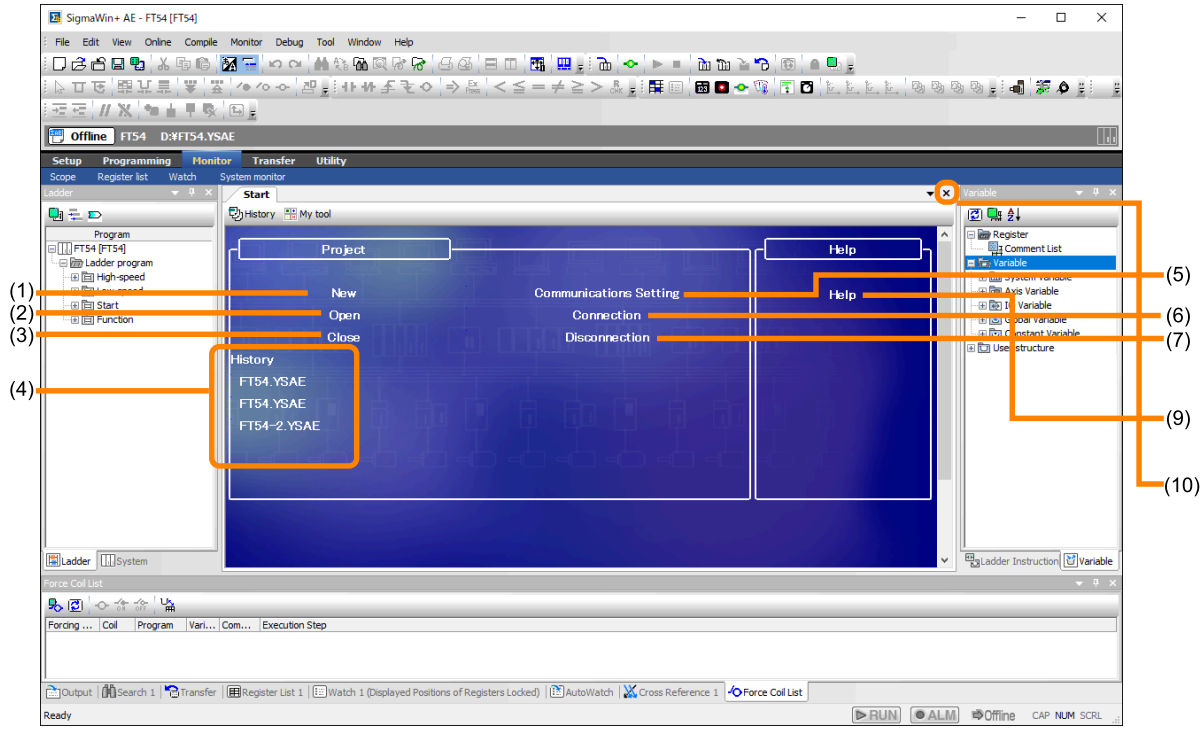
Start the SigmaWin+ AE or click [History] on the [Start] tab to display the [History] window.

The appearance of the [History] window depends on whether a project file is open.

- When a Project File Is Not Opened



- When a Project File Is Open



No.	Item	Description
(1)	New *1	Displays the [Create New Project] window, which allows you to create a project file. Refer to the following section for details. ☞ *2.2.1 Creating a Project File on page 81*
(2)	Open *1	Displays the [Open Project] window, which allows you to select and open a created project file.
(3)	Close *1	Automatically saves and closes the project file. [Close] is displayed only when there is an active project link connection. Refer to the following section for details on using a project link connection. ☞ *(2) Connection Status on page 43*

Continued on next page.

Continued from previous page.

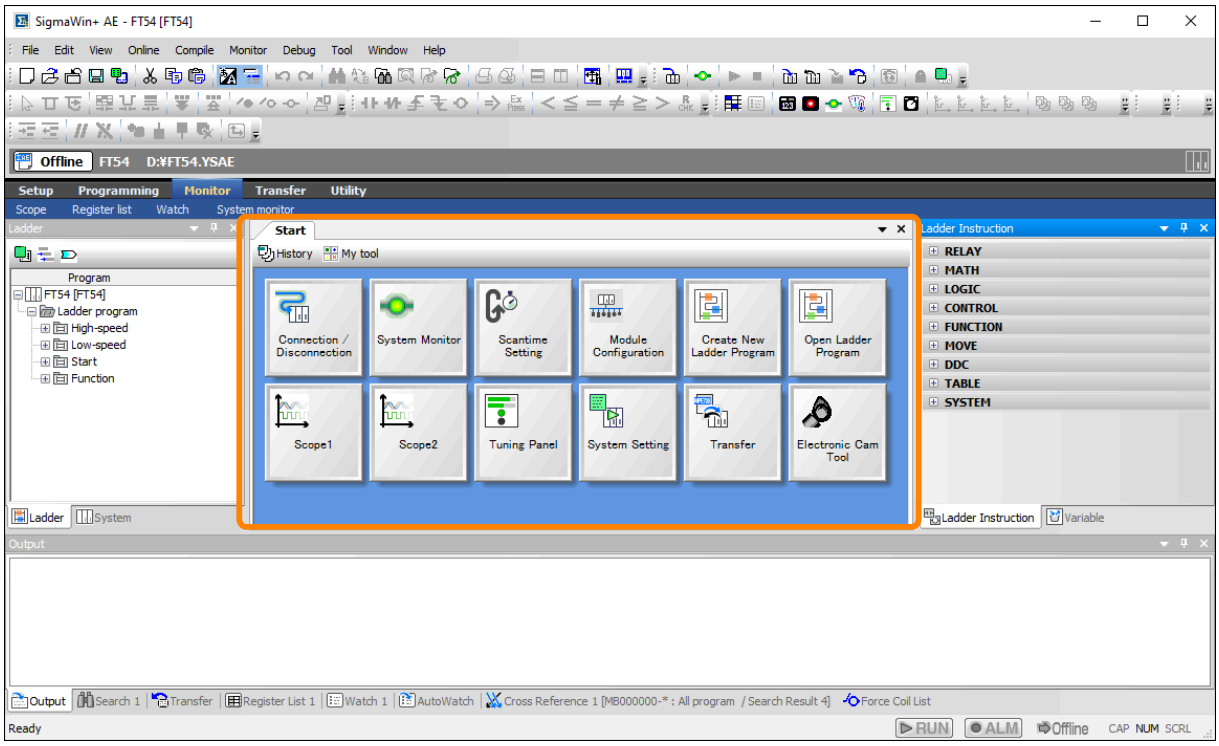
No.	Item	Description
(4)	History (file name) *1	Displays the names of the five project files that were most recently created or edited using the SigmaWin+ AE in order beginning with the most recent. If you click a file name, the project file will be opened. Move the cursor over a file name to display a balloon that allows you to confirm the location of the file, the date the file was created, and the date it was changed.
(5)	Communications Setting	Displays the [Communications Setting] window, which allows you to set the communications port and connect with the SERVOPACK. Refer to the following section for details. ☞ *1.1.7 Setting Up Communications on page 46*
(6)	Connection	Enables a connection to the SERVOPACK using the communications port that is currently set.
(7)	Disconnection	Closes the connection with the SERVOPACK.
(8)	History (connection name)	Displays up to five connection names (logical port number + port type) that have been used for connections. Click a connection name to change the SERVOPACK to which the connection is to be made.
(9)	Help	Starts Acrobat Reader and displays the [Help Selection] window. Select a PDF file and click the [OK] button to display help for the SigmaWin+ AE.
(10)	Close button	Moves the [History] window to the back. This button does not exit the SigmaWin+ AE. To exit the SigmaWin+ AE, either click the close button in the Main Window, or select [Exit] from the [File] menu.

*1 This command closes the current connection, if one exists, with the SERVOPACK.

(2) [My Tool] Window

Open a project file or click [My tool] on the [Start] tab to display the [My Tool] window.

The [My Tool] window is also displayed automatically when a connection is made to a SERVOPACK.



This section describes the names and functions of the buttons that are displayed on the [My tool] window.

Button Name	Function
System Monitor	Displays the System Monitor.
System Setting	Displays the system settings.
Scantime Setting	Sets the high-speed and low-speed scan time.

Continued on next page.

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Button Name	Function
Scope 1	Analyzes the data obtained by Scope 1 in the form of a trend graph or XY graph.
Scope 2	Analyzes the data obtained by Scope 2 in the form of a trend graph or XY graph.
Module Configuration	Opens the Module Configuration window.
Create New Ladder Program	Creates a ladder program. Allows you to create H, L, and A drawings and functions.
Open Ladder Program	Displays a ladder program that was selected from a list.
Connection/Disconnection	Connects or disconnects the SERVOPACK.
Tuning Panel	Used to monitor, edit, and adjust the current value of variables from the panel.
Transfer	Displays the [Transfer] window and executes transfer operations such as writing, reading, and comparing.
Electronic Cam Tool	Starts the Electronic Cam Tool to create cam tool data.

(3) Changing the Window Layout

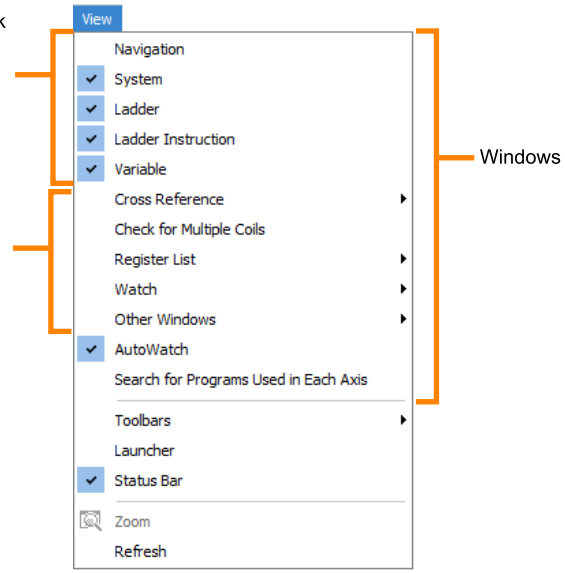
This section describes how to change the window layout.

(a) Toggling between Display and Hide

Toggle between displaying and hiding the selected windows on the [View] menu.

Windows that have a check mark are displayed.
Selecting an item in this state hides the corresponding window and removes the check mark.

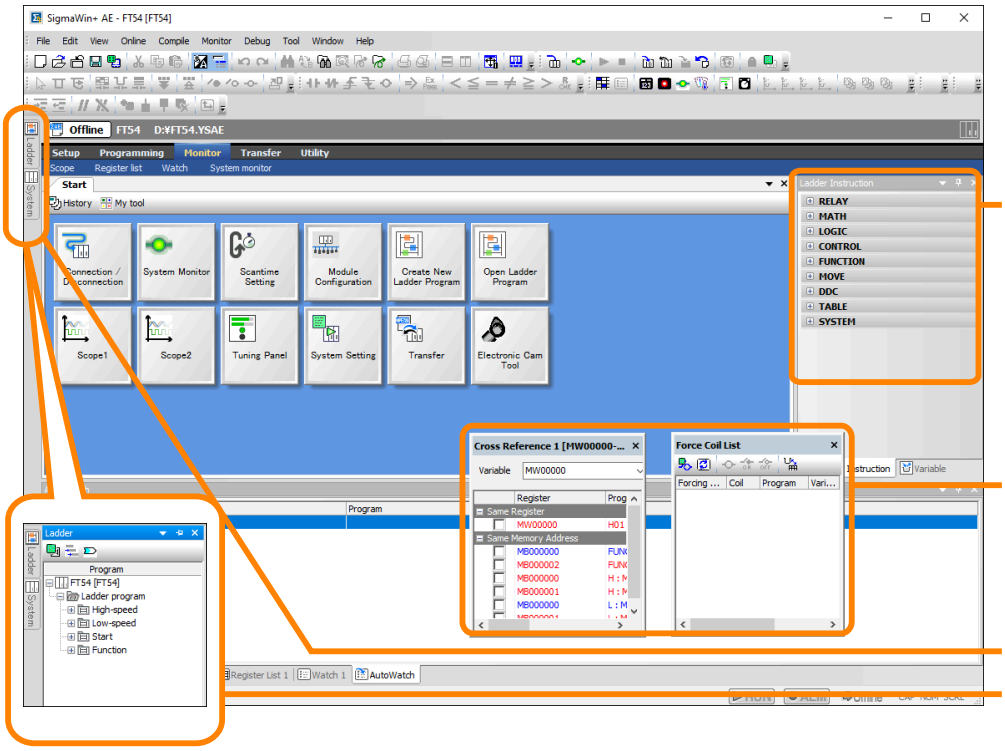
Windows without a check mark are not displayed.
Selecting an item in this state displays the corresponding window and adds the check mark.



(b) Changing the Window Display Type

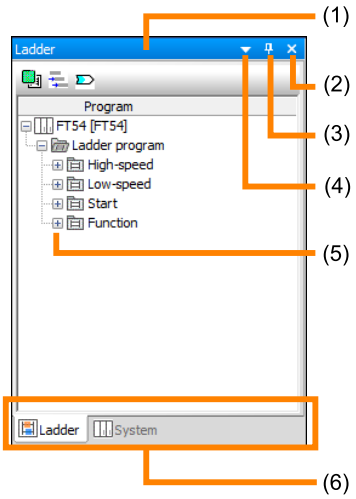
There are three display types for windows, as described below.

No.	Display Type	Description
(1)	Docked Window	This is the default display type. Multiple windows are displayed on top of each other as tab pages. The top tab page can be changed by clicking a tab.
(2)	Floating Window	Floating windows are displayed separate from the Main window. A floating window can be freely moved by dragging the title bar. Information Normally, the Main window cannot be changed to a floating window. Only the [Comment List] tab page displayed in the Main window can be changed to a floating window. Drag the tab part to move the floating window.
(3)	Auto Hide Window	The window slides out from the side when the relevant tab is clicked, and closes when any location outside of the window is clicked.

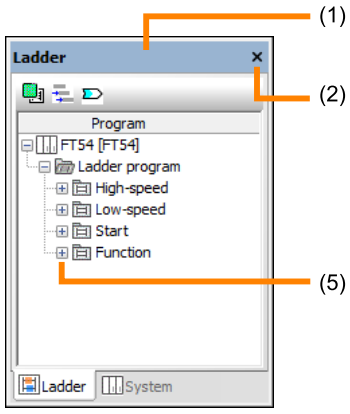


This section provides the names and descriptions of the components of a window.

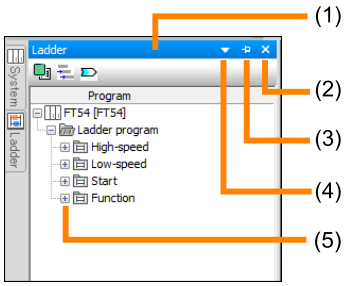
<Docked Window>



<Floating Window>

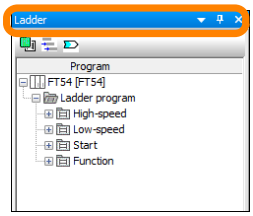
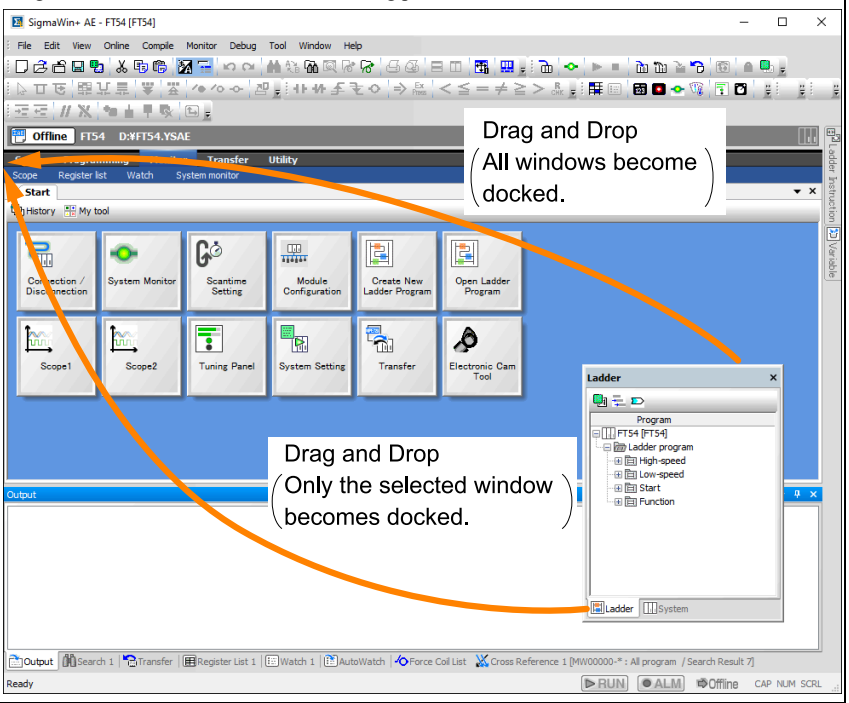
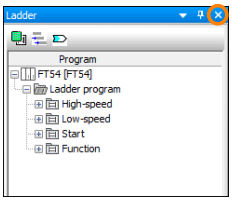


<Auto Hide Window>



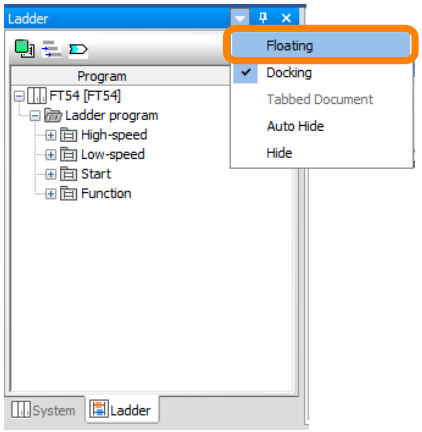
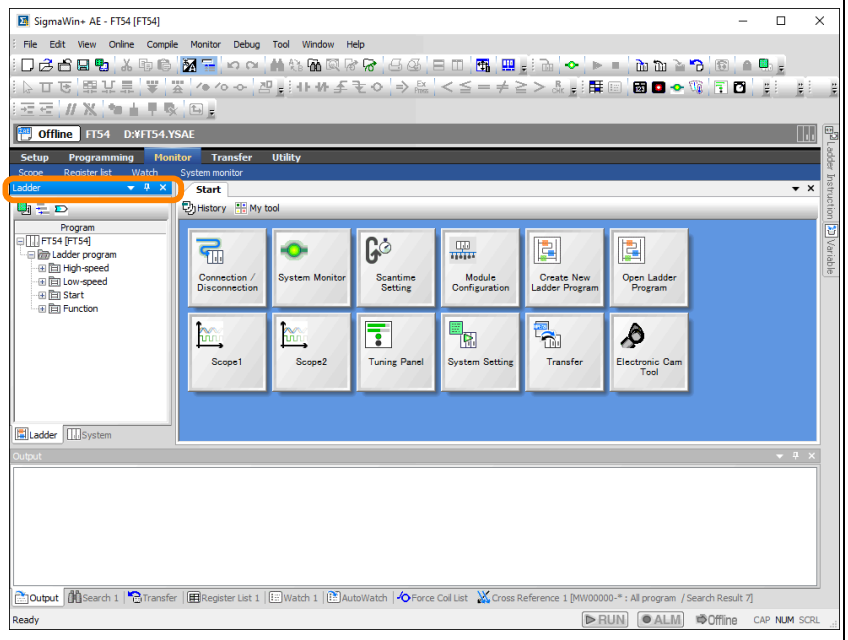
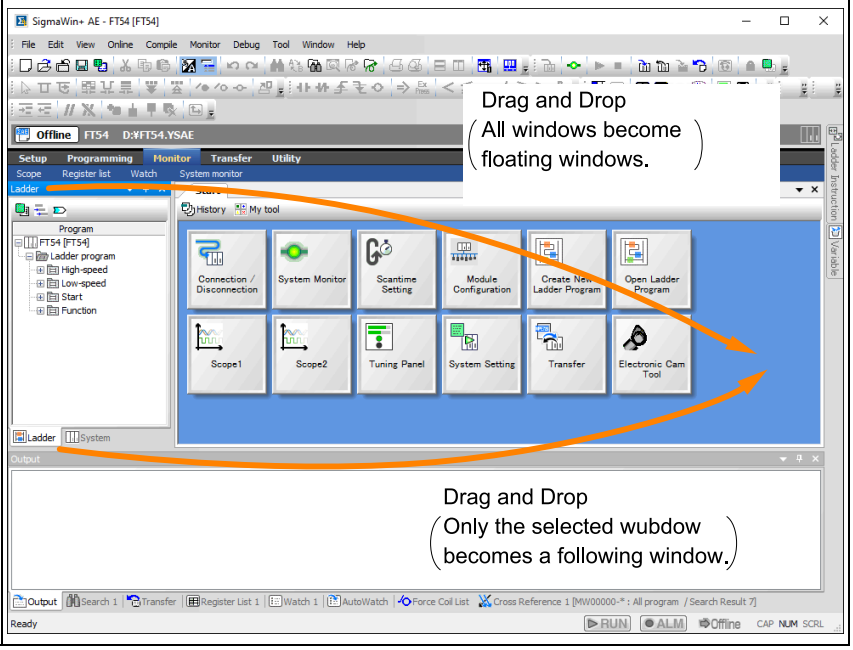
No.	Name	Description
(1)	Title bar	Displays the title of the currently selected (activated) window.
(2)	Close button	Hides the currently selected window. To display the window again, select the window name from the [View] menu.
(3)	[ ] button	Toggles the display type of the window between Auto Hide and Docked.
(4)	[▼] button	Displays a menu for selecting the display type of the window.
(5)	[+] button	Appears when the window contains a tree hierarchy or categorized list. Expands the display to show the lower levels of the hierarchy or a list of items included in the category. Click the collapse button ([-]) to return the expanded list to its original state.
(6)	Tab	Changes the window that is displayed. The order of the tabs can be changed by dragging one tab over another tab. The window display type can be changed from docked to floating by dragging the tab for that window to a position outside of the currently displayed window.

Use the following methods to change the window display type.

<table>
<tr><th>Before Change</th><th>After Change</th><th>Operating Procedure</th></tr>
<tr><td rowspan="3">Floating Window</td><td rowspan="2">Docked Window</td><td>Double-click the title bar.
 
</td></tr>
<tr><td>Drag the tab or title bar to the desired docking position in the Main Window.
 
</td></tr>
<tr><td>Auto Hide Window</td><td>Change the window to a docked window first.
A floating window cannot be directly changed to an auto hide window.</td></tr>
<tr><td>Hide</td><td>Click the close button.
 
</td></tr>
</table>

Continued on next page.

Continued from previous page.

Before Change	After Change	Operating Procedure
Docked Window	Floating Window	Click the menu button [▼] on the title bar and select [Floating]. 
		Double-click the title bar. 
		Drag the tab or title bar to the desired position. 

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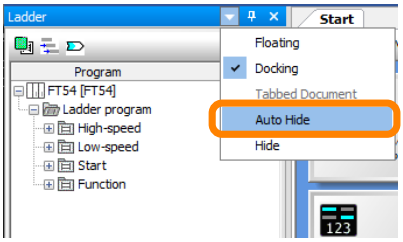
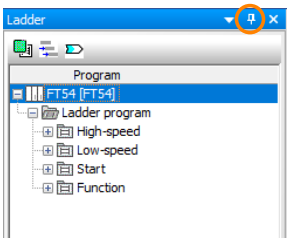
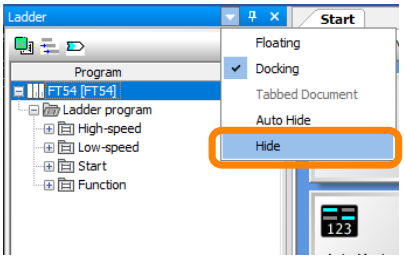
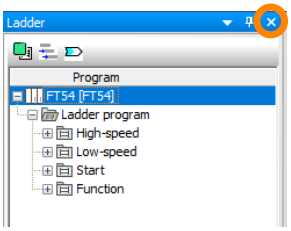
<table>
<tr><th>Before Change</th><th>After Change</th><th>Operating Procedure</th></tr>
<tr><td rowspan="4">Docked Window</td><td rowspan="2">Auto Hide Window</td><td>Click the menu button [▼] on the title bar and select [Auto Hide].
 

If multiple windows are displayed on top of each other, all of the windows become auto hide windows.</td></tr>
<tr><td>Click [].
 

If multiple windows are displayed on top of each other, all of the windows become auto hide windows.</td></tr>
<tr><td rowspan="2">Hide</td><td>Click the menu button [▼] on the title bar and select [Hide].
 
</td></tr>
<tr><td>Click the close button.
 
</td></tr>
</table>

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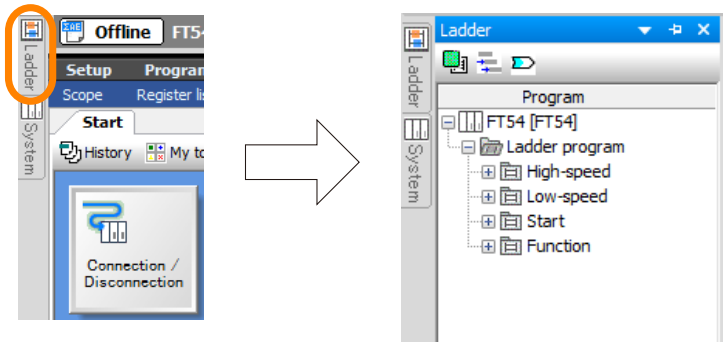
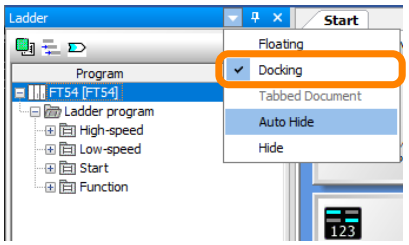
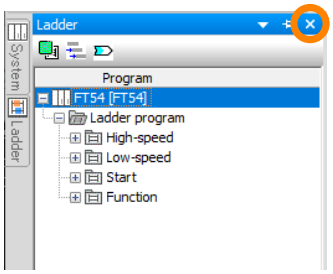
<table>
<tr><th>Before Change</th><th>After Change</th><th>Operating Procedure</th></tr>
<tr><td rowspan="4">Auto Hide Window</td><td colspan="2">Before performing the following procedure, display the window by clicking on its tab.
 
</td></tr>
<tr><td>Floating Window</td><td>Change the window to a docked window first.
An auto hide window cannot be directly changed to floating window.</td></tr>
<tr><td>Docked Window</td><td>Click the menu button [▼] on the title bar and select [Docking].
 

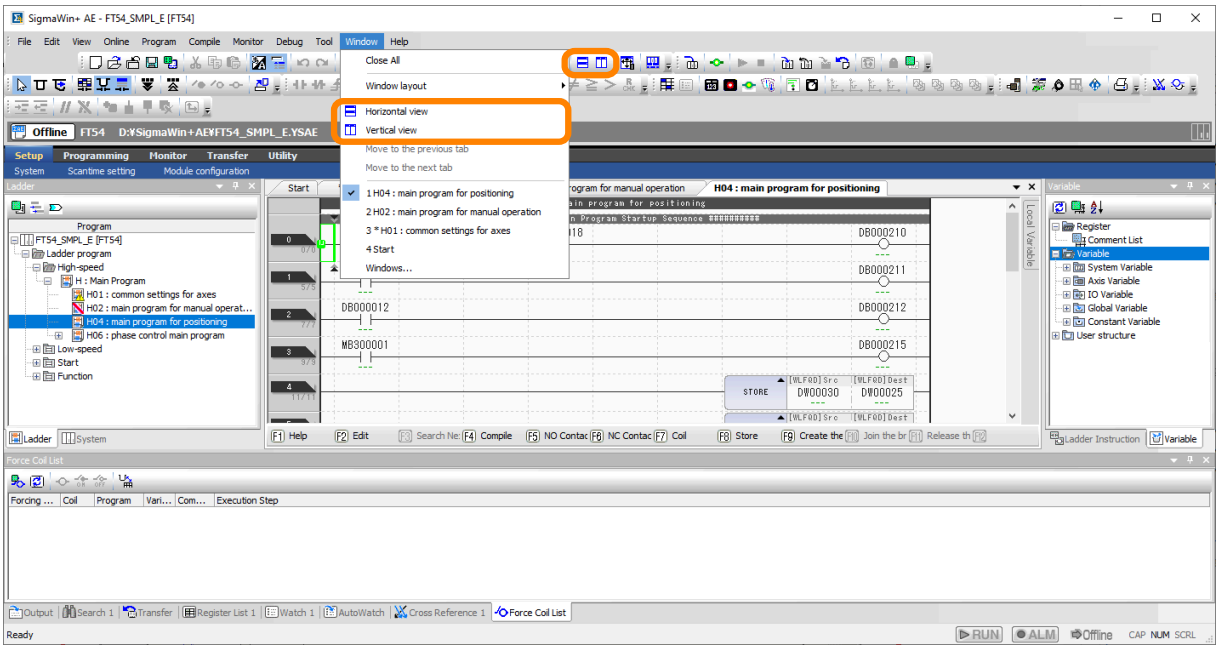
If multiple windows are displayed on top of each other, all of the windows become docked windows.</td></tr>
<tr><td>Hide</td><td>Click the close button.
 
</td></tr>
</table>

(c) Splitting the Window

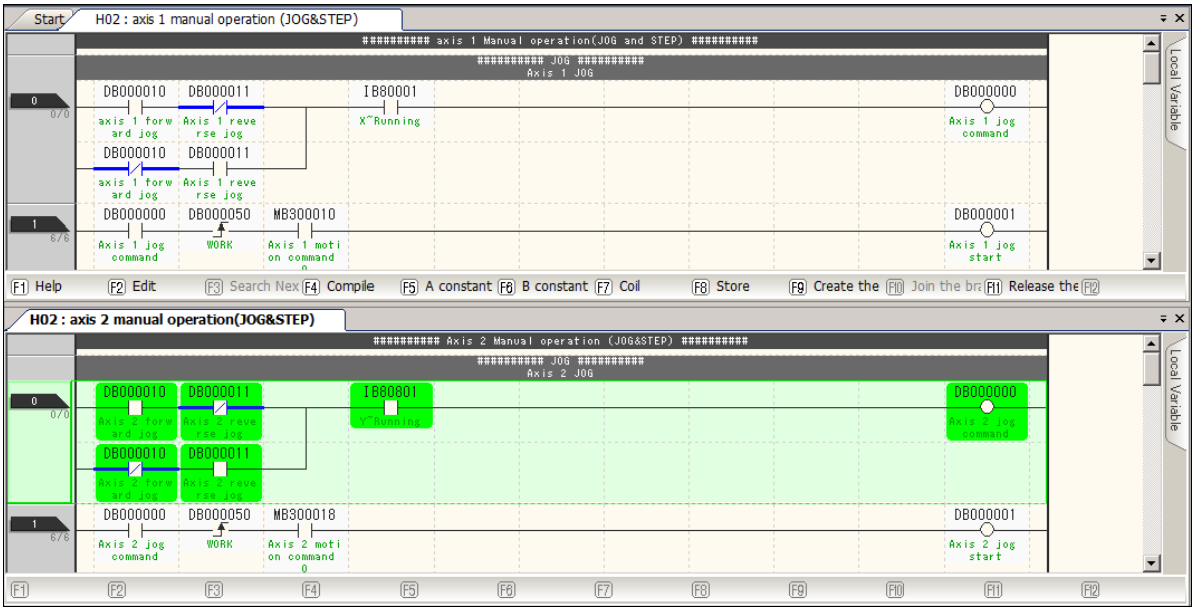
When two or more tab pages are open in the center window, select [Horizontal view] or [Vertical view] on the [Window] menu to display the tab pages in the corresponding manner.

This is convenient for displaying and editing more than one program.

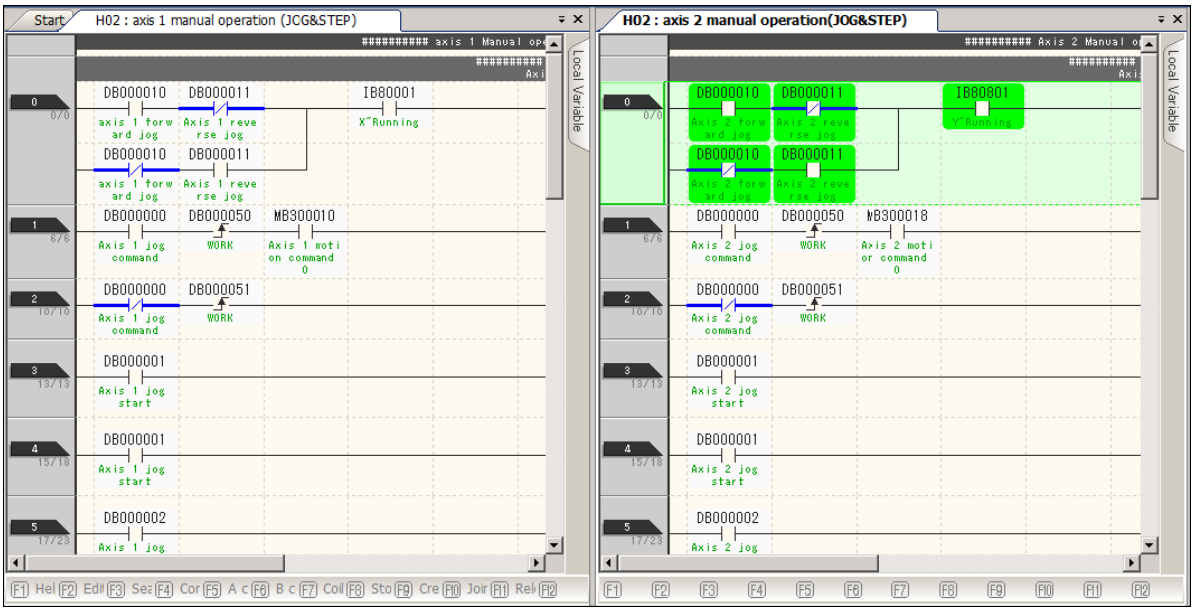
Information Or, click the corresponding button on the toolbar.



- When [Horizontal view] Is Selected



- When [Vertical view] Is Selected



(d) Registering Window Layouts

You can register up to five of the following window layouts.

- Display position and size of each window
- Customized toolbars and menus
- Customized shortcut keys

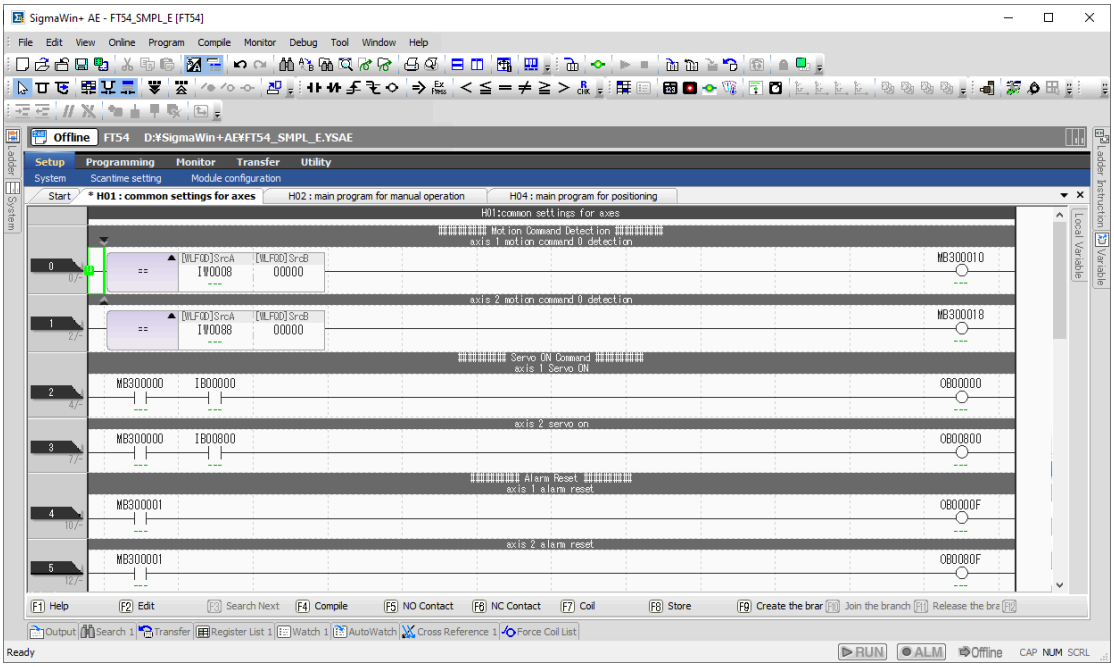
You can select from the previously registered layouts when programming, debugging, or performing maintenance to switch to the easiest window layout to use.

◆ Registering Window Layouts in Advance

1. **Arrange the windows into layout to register.**

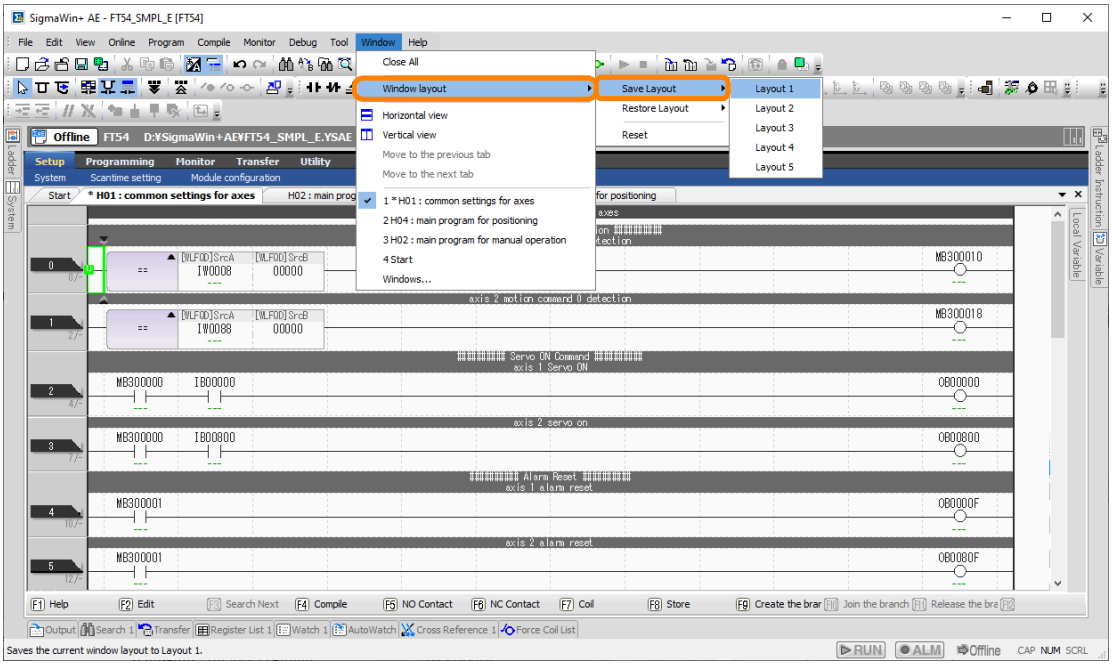
<Example>

Window Layout for Programming with All Other Windows Hidden



2. **Select [Window layout] - [Save Layout] from the [Window] menu and select the desired layout number.**

Information To register other window layouts, select a different layout number.



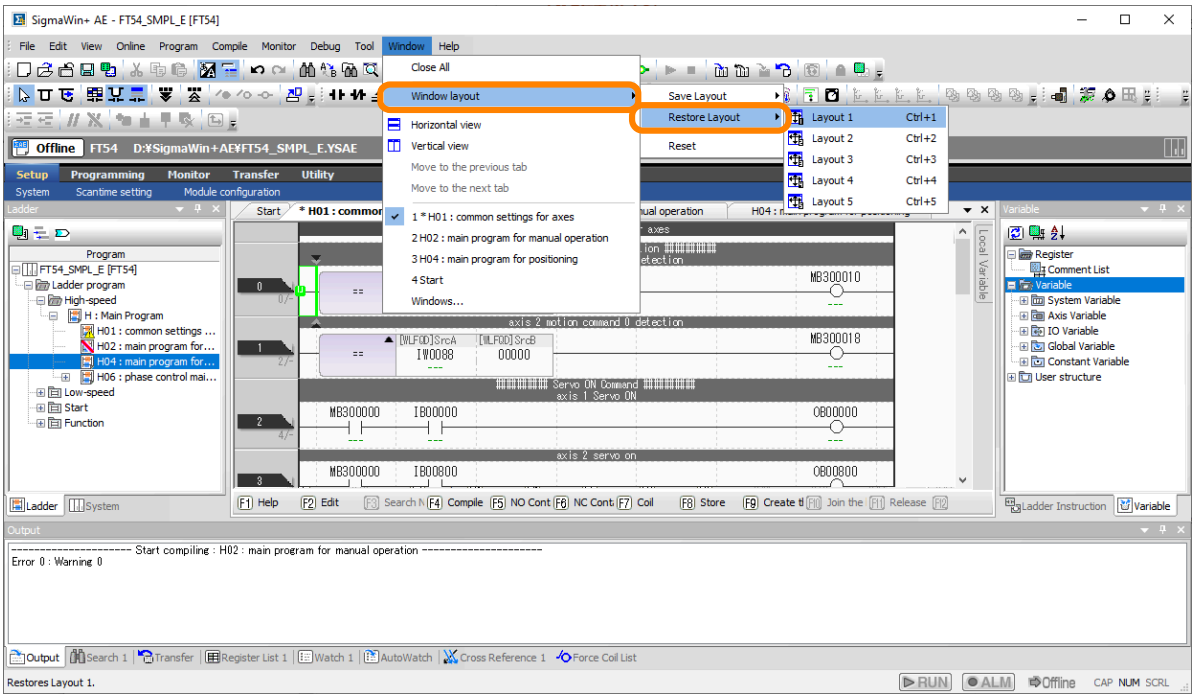
A message dialog box will be displayed, and the window layout will be registered.

This concludes the procedure.

◆ Changing to a Registered Window Layout

Use one of the following methods to change to one of the registered window layouts.

- Select [Window layout] - [Restore Layout] from the [Window] menu and select the desired layout number.

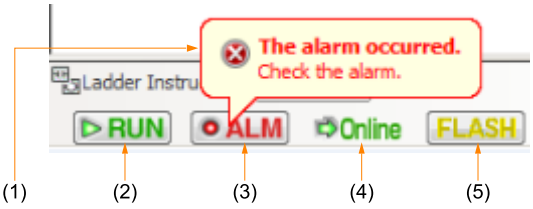


- Hold down the **Ctrl** key and press the number key (**1** to **5** keys) for the layout number to use.

1.2.6 Status Bar

The status bar displays the status of the SERVOPACK.

This section gives details on the status bar.



No.	Display	Description	Remarks
(1)	Balloon help	When an alarm occurs, an alarm balloon will be displayed.	–
(2)	RUN	Lits while the CPU of the SERVOPACK is running. The button is grayed out while the CPU is stopped.	Clicking the [RUN] button starts the System Monitor.
(3)	ALM	Lits while there is an alarm in the SERVOPACK. The button is grayed out when there is no alarm.	Clicking the [ALM] button starts the System Monitor.
(4)	Online	Displayed while the SigmaWin+ AE is correctly connected to the SERVOPACK.	–
	Offline	Displayed while the SigmaWin+ AE is not connected to the SERVOPACK.	
(5)	FLASH	Lits when the SERVOPACK RAM and flash memory do not match. The button is grayed out when they match.	Clicking the [FLASH] button displays the [Save to Flash] window.

2

Project Management

This chapter describes basic operations and management methods for project files.

2.1 What Is a Project File?

With the SigmaWin+ AE, you can save and manage the application data necessary for the SERVOPACK as a single file. This file is called the project file.

The project file includes the following application data.

System Configuration	• System definitions • Scan time definitions • Module configuration definitions • Register Map • Data tracing information
Programming	• Ladder programs (high-speed, low-speed, start, and function programs) • Table data • Variables (axis, I/O, global, constant, and user-defined structure variables) • Comments (I/O, global, and constant comments)
Register	• M (data registers) • D (internal registers) • C (constant registers) • S (system registers) • I (input registers) • O (output registers) • G (data registers)

Use the project file in the follow types of applications.

- To configure the system configuration settings and write programs in a project file on the PC, and then write that data to a SERVOPACK.
- To write SERVOPACK data to a project file.

Refer to the following section for details on reading and writing data.

☞ *2.3 Transfer on page 84*


Important

To prevent data loss in case of a equipment failure, always store a backup copy of the project file. We recommend that you save a copy of the project file before you make any modifications to it (changing the module configuration definitions, the ladder programs, etc.).

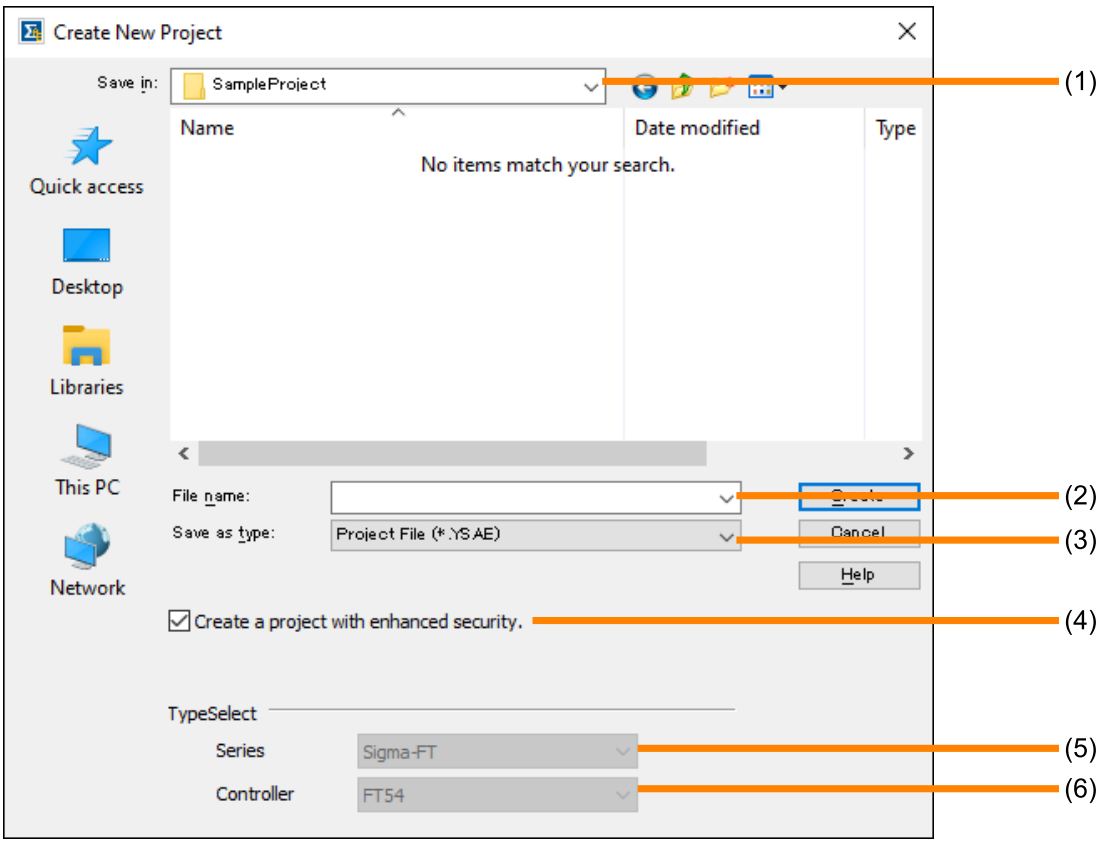
2.2 Project File Operations

This section describes basic operations for project files.

2.2.1 Creating a Project File

Select [New Project] form the [File] menu to create the project file.

Information You can create a project file only when the SigmaWin+ AE is offline. If the SigmaWin+ AE is online, click the [Connection/Disconnection] button on the [My Tool] window to set the SigmaWin+ AE to offline.



No.	Item	Description
(1)	Save in	Select the folder in which to save the project file.
(2)	File name	Enter the name of the project file. **Note:** The file name cannot contain any of the following characters: / \ : * ? " < > |
(3)	Save as type	Select the file extension for the project file. The extension that can be selected for the project file is YSAE. • YSAE: This extension is supported by FT54.
(4)	Create a project with enhanced security.	This check box is selected by default. Clear this check box as required.
(5)	Series	Fixed value: Sigma-FT
(6)	Controller	Fixed value: FT54

2.2.2 Opening an Existing Project File

Select [Open Project] form the [File] menu to open a project file.

Information Only one project file can be opened in a single window with SigmaWin+ AE. The same project file cannot be opened in more than one window with SigmaWin+ AE. If you try to open a project file that is already open, the window that contains the open project file will move to the front.

2.2.3 Overwriting Project Files

Select [Save Project] form the [File] menu to overwrite a project file.

2.2.4 Saving a New Project File

Select [Save as a New Project] form the [File] menu to save a project with a new name.

2.2.5 Closing a Project File

Select [Close Project] form the [File] menu to close the project file.

2.2.6 Opening a Backed Up Project File

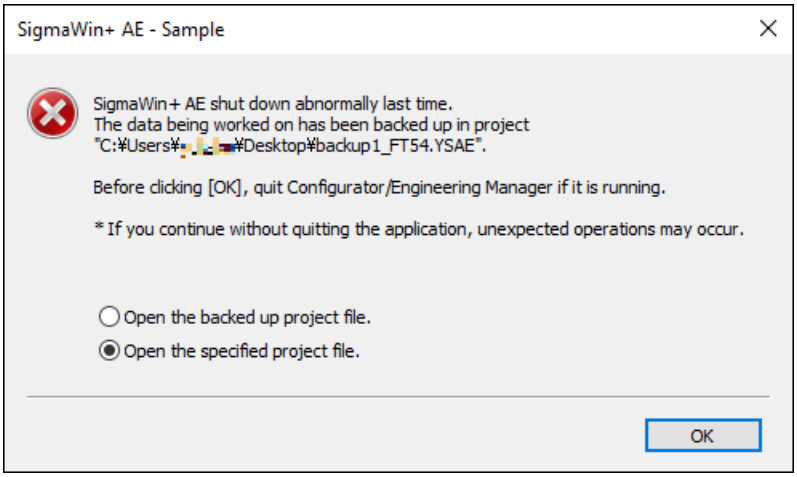
Important This function provides no guarantees that the content you were editing can be successfully restored.

If you open and edit a project file while offline and the SigmaWin+ AE shuts down abnormally, a backup file will be created on the desktop of the PC. You can restore the contents of the project file you were editing by opening this backup file.

When the SigmaWin+ AE shuts down abnormally, use the following procedure to open the backed up project file.

1. **After the SigmaWin+ AE shuts down abnormally, restart the SigmaWin+ AE and open the project file you were editing.**

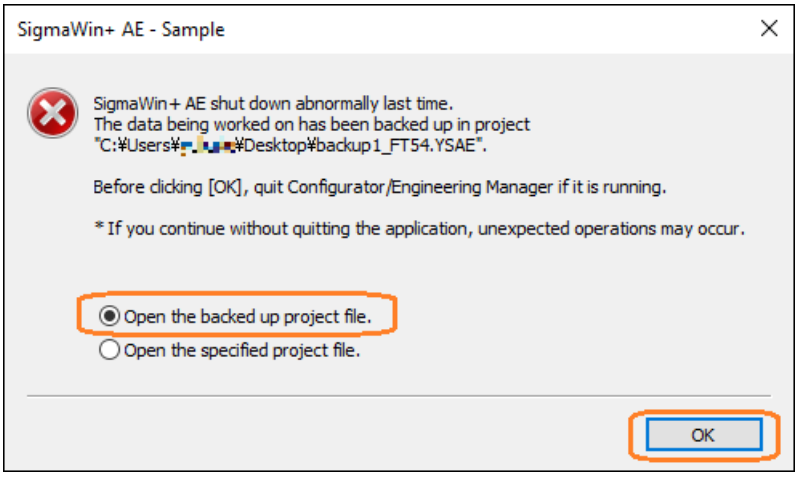
   A backup file will have been saved to the desktop, and a message dialog box will be displayed.



Information The name of the backup file that is created on the desktop begins with "backup0_".
If you open the backup file and the SigmaWin+ AE shuts down abnormally again, the number in the backup file name will be incremented.

2. **Quit Configuratior/EngineeringManager if it is running.**

3. **Select "Open the backed up project file", and then click the [OK] button.**



The backup file that was saved to the desktop will be opened.

We recommend you save the opened backup file again as the real project file.

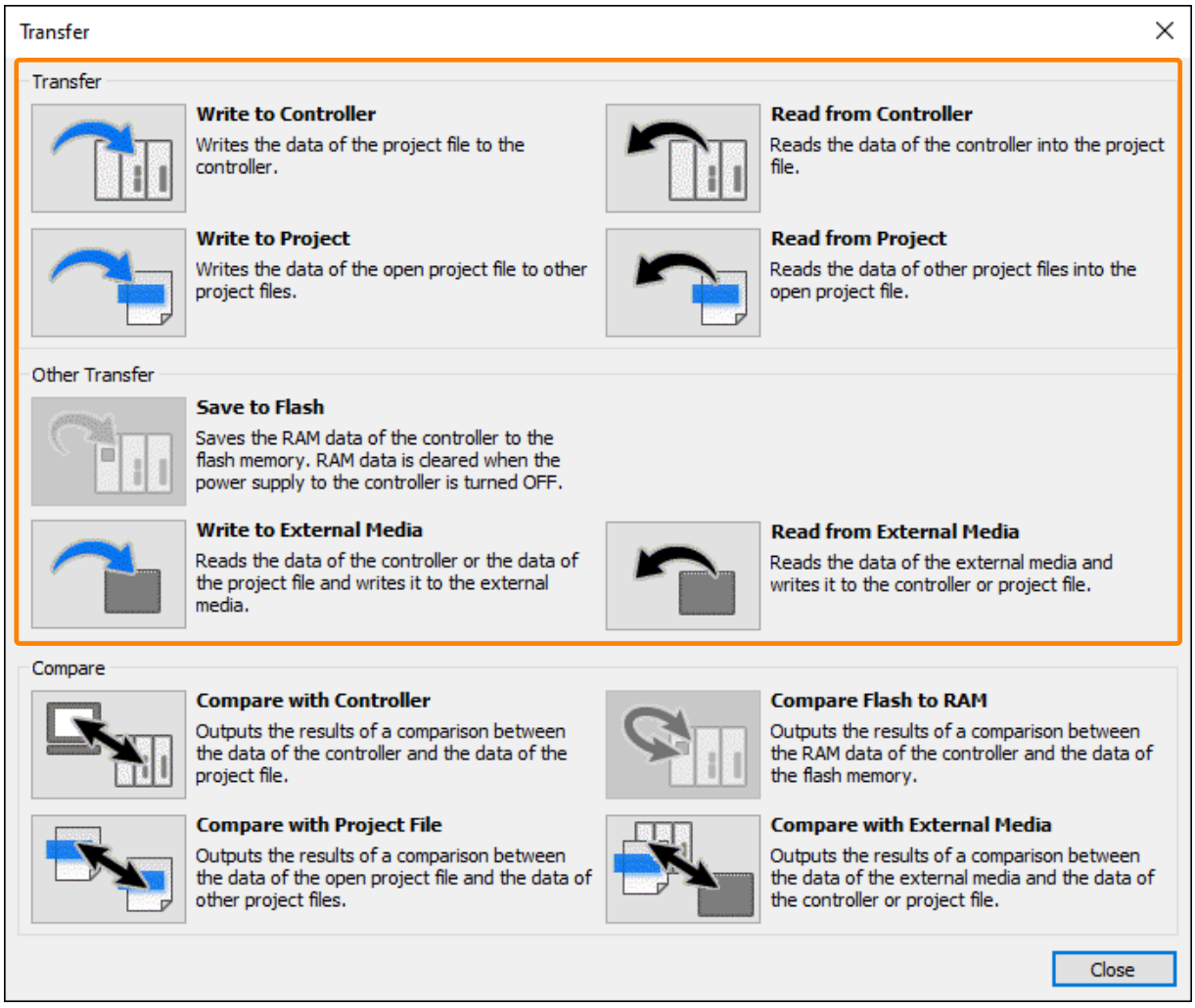
This concludes the procedure.

2.3 Transfer

A transfer refers to reading and writing data between project files, SERVOPACK, and external media, and it also refers to saving the SERVOPACK RAM data to flash memory.

Click the [Transfer] button in the [My Tool] window to display the [Transfer] window.

The following table lists the types of transfers.

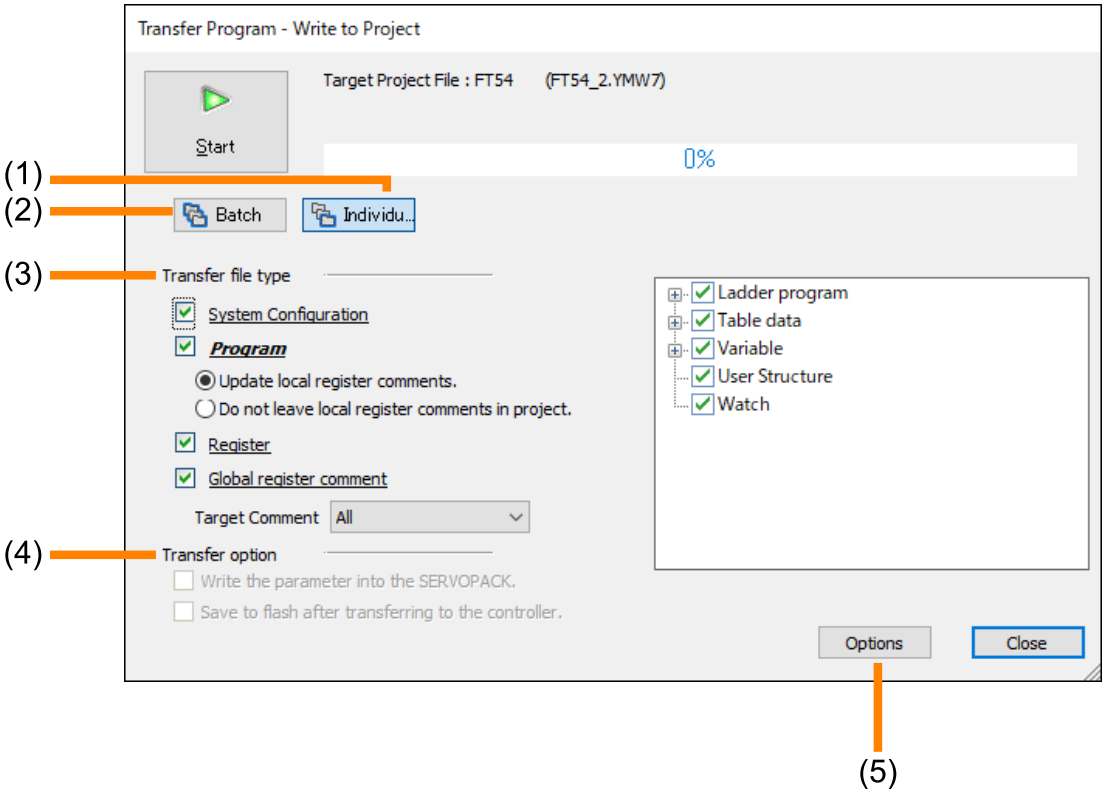


Type of Transfer	Transfer Source and Transfer Destination	Project File Status	Connection Status of SigmaWin+ AE
Write to Controller	Project File → SERVOPACK	–	Online
Read from Controller	SERVOPACK → Project File		
Write to Project	Open project file → Other project file	Open	Offline
Read from Project	Other project file → Open project file		
Save to Flash	SERVOPACK RAM → Flash memory	–	Online
Write to External Media	Project file → External media	Open	–
	SERVOPACK RAM → External media	Closed	Online
Read from External Media	External media → Project file	Open	–
	External media → SERVOPACK RAM	Closed	Online

2.3.1 [Transfer Program] Window

Click a button related to reading or writing in the [Transfer] window to display the [Transfer Program] window.

You can select the files to transfer and set the options. The settings that are displayed will depend on the type of transfer.



No.	Item	Description
(1)	[Individual] Button	Displays the details on the data selected in [Transfer file type] in the area to the right. The data selected in this area will be transfered. The [Individual] button has been selected in the above screenshot.
(2)	[Batch] Button	Transfers all data selected in [Transfer file type].
(3)	Transfer file type	Select the data to transfer.
		<When Transferring a Program> Select one of the following radio buttons: • Update local register comments: The program and local register comments will be transferred. • Do not leave local register comments in project/Do not leave local register comments in controller: Only the program will be transferred. As local register comments will not be transferred, local register comments will not be displayed in the program at the transfer destination.
		<When Transferring Global Register Comments> Select the target comments from [All], [Standard Comment], [Extended Comment 1], [Extended Comment 2], or [Extended Comment 3].
(4)	Transfer option	The following options can be selected. • Save to flash after transferring to the controller: Saves the transferred data to the flash memory in the SERVOPACK.
(5)	[Option] Button	Displays the [Environment Setting] window. You can change the settings related to transfers on this window.

2.3.2 Write to Controller

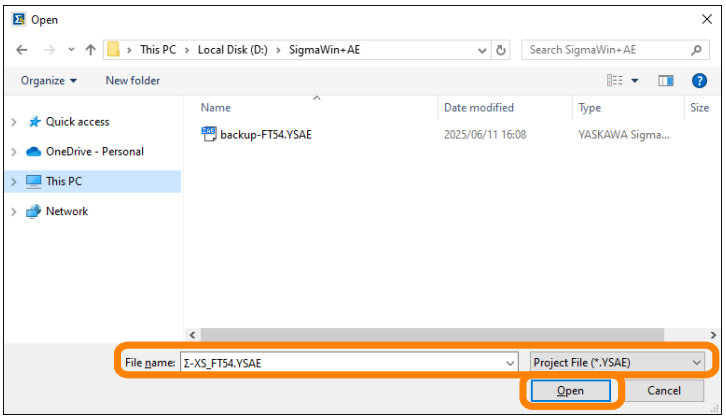
Use the following procedure to write the project file data to the SERVOPACK.

1. **Click the [Write to Controller] button in the [Transfer] window.**

   The [Open] window will be displayed.

2. **Select the project file at the transfer source, then click the [Open] button.**

   Information This window will not be displayed if the project file is already open. The project file that is open serves as the transfer source.

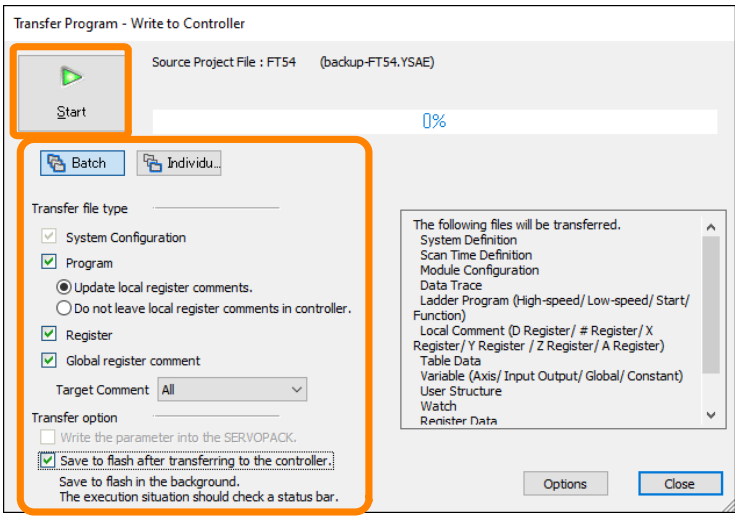


The [Transfer Program] window will be displayed.

3. **Specify the transfer settings, and click the [Start] button.**

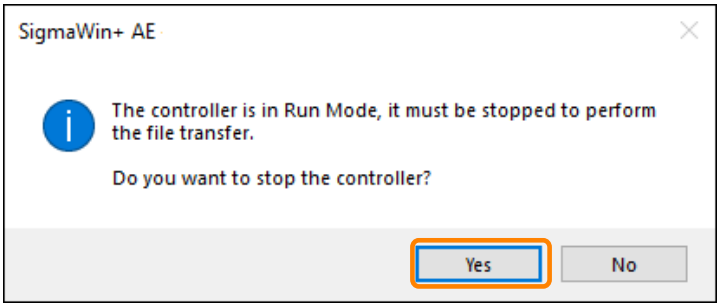
Refer to the following section for details on the settings.

☞ *2.3.1 [Transfer Program] Window on page 84*



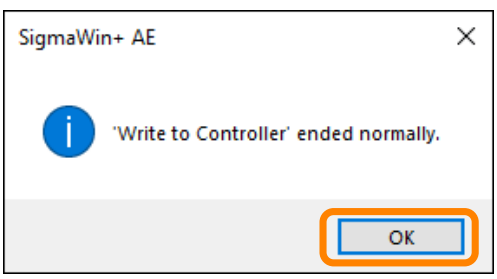
A message dialog box will be displayed.

4. **Read the message, and then click the [Yes] button.**

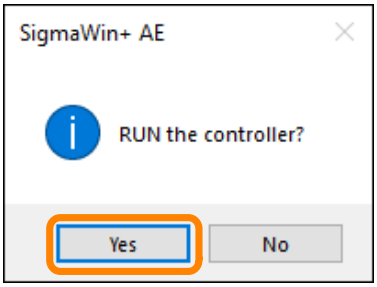


The transfer will start. When data transfer is completed, a message dialog box will be displayed.

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



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



This concludes the procedure.

2.3.3 Read from Controller

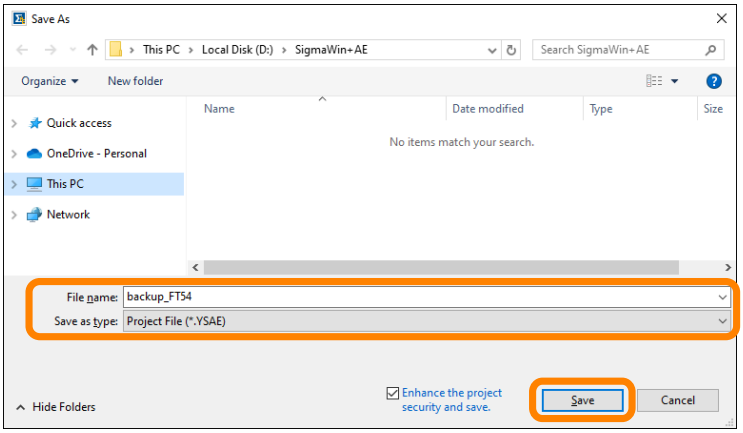
Use the following procedure to read the data from the SERVOPACK to a project file.

1. **Click the [Read from Controller] button in the [Transfer] window.**

   The [Save As] window will be displayed.

2. **Select the project file at the transfer destination (or create a new project file), then click the [Save] button.**

   Information This window will not be displayed if the project file is already open. The project file that is open serves as the transfer destination.

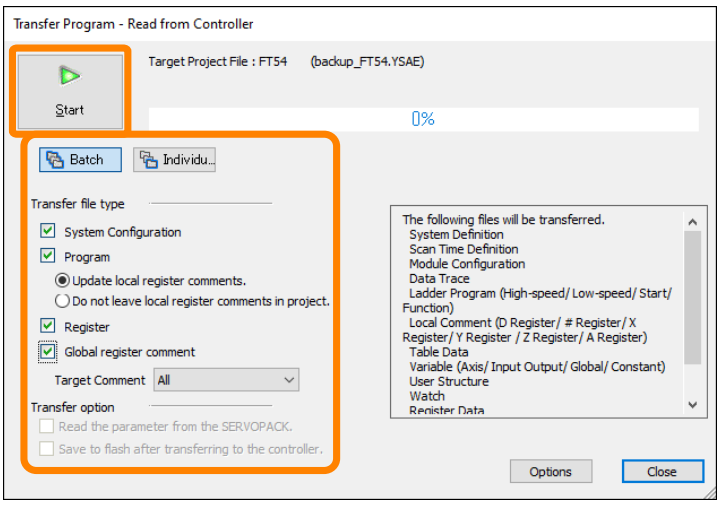


   The [Transfer Program] window will be displayed.

3. **Specify the transfer settings, and click the [Start] button.**

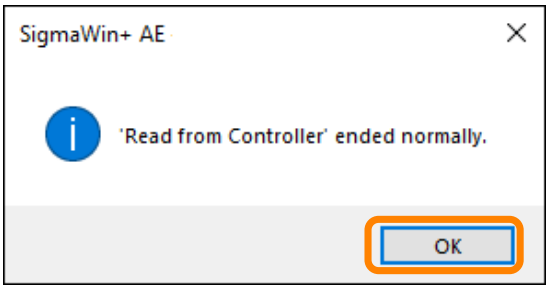
   Refer to the following section for details on the settings.

   ☞ *2.3.1 [Transfer Program] Window on page 84*



The transfer will start. When data transfer is completed, a message dialog box will be displayed.

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



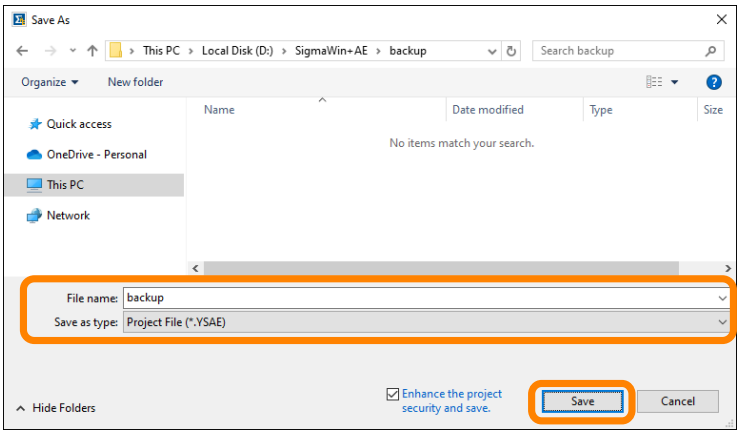
This concludes the procedure.

2.3.4 Write to Project

Use the following procedure to write the data in the open project file to another project file.

1. **Open the project file.**
2. **Click the [Write to Project] button in the [Transfer] window.**

   The [Save As] window will be displayed.
3. **Select the project file at the transfer destination (or create a new project file), then click the [Save] button.**

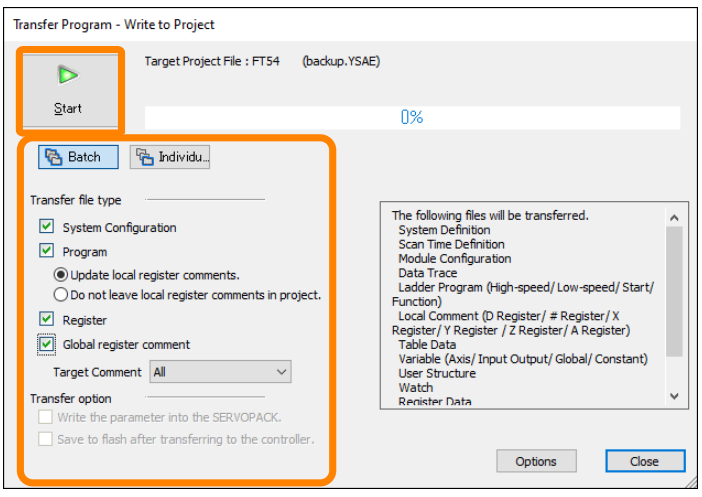


The [Transfer Program] window will be displayed.

4. **Specify the transfer settings, and click the [Start] button.**

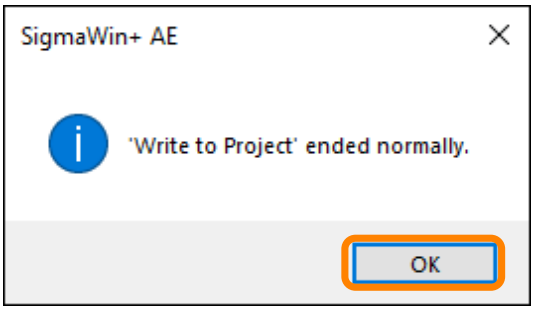
   Refer to the following section for details on the settings.

   ☞ *2.3.1 [Transfer Program] Window on page 84*



A message dialog box will be displayed.

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



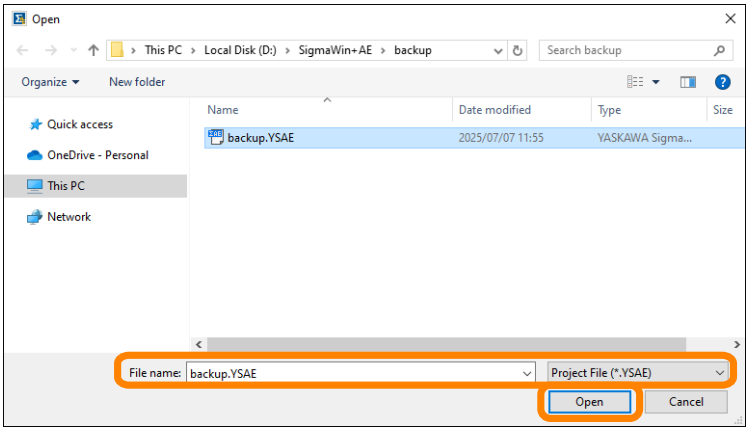
This concludes the procedure.

2.3.5 Read from Project

Use the following procedure to read the data in another project file to the open project file.

1. **Open the project file.**
2. **Click the [Read from Project] button in the [Transfer] window.**

   The [Open] window will be displayed.
3. **Select the project file at the transfer source, then click the [Open] button.**

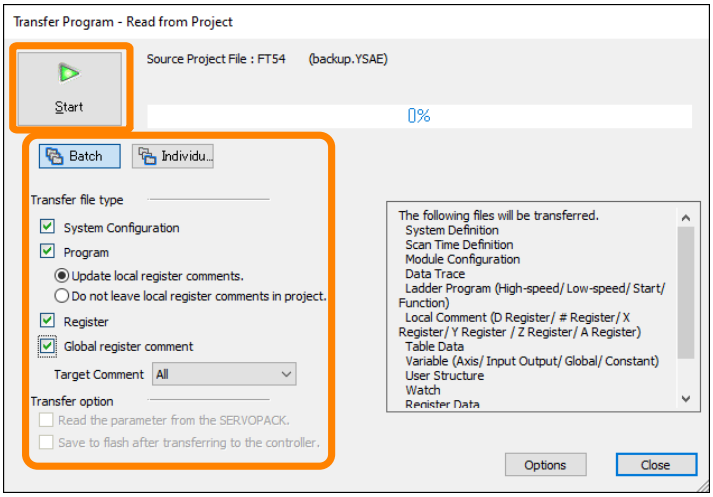


The [Transfer Program] window will be displayed.

4. **Specify the transfer settings, and click the [Start] button.**

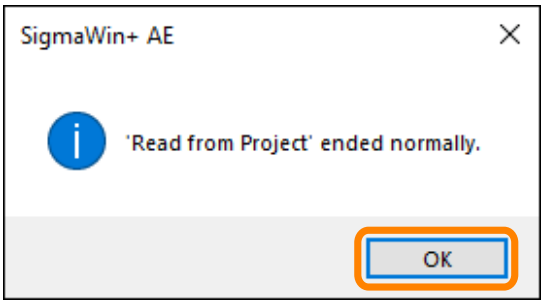
   Refer to the following section for details on the settings.

   ☞ *2.3.1 [Transfer Program] Window on page 84*



A message dialog box will be displayed.

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



This concludes the procedure.

2.3.6 Save to Flash

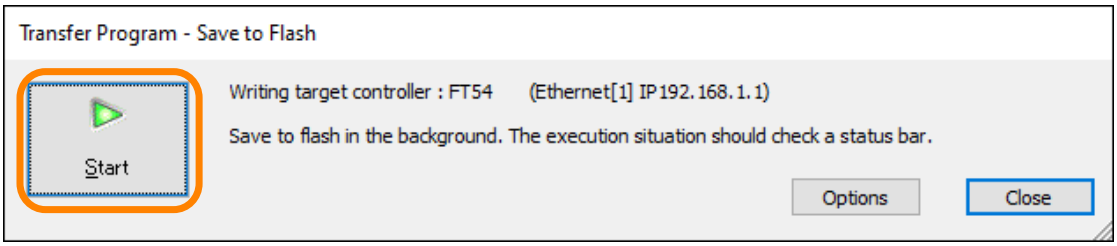
Save to flash refers to saving the data in the SERVOPACK's RAM to the SERVOPACK's flash memory.
Use the following procedure to save data to flash memory.

Important
- If you turn the power OFF and ON again without saving data to the flash memory, any changes to the program or definition data will be lost.
- In the [Environment Setting] window, you can also set to automatically save data to flash memory when the connection to the SERVOPACK is disconnected. Refer to the following section for details.
☞ *8.1.24 [Transfer] - [Transfer] on page 338*

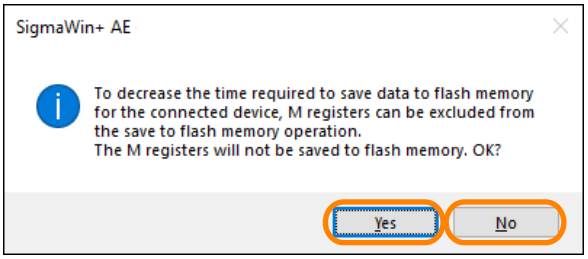
1. **Click the [Save to Flash] button in the [Transfer] window.**

The [Transfer Program - Save to Flash] window will be displayed.

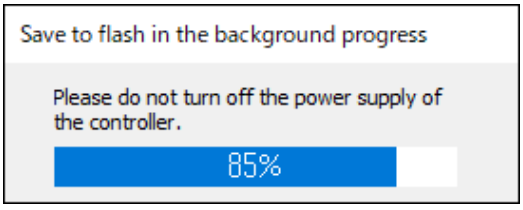
2. **Click the [Start] button.**



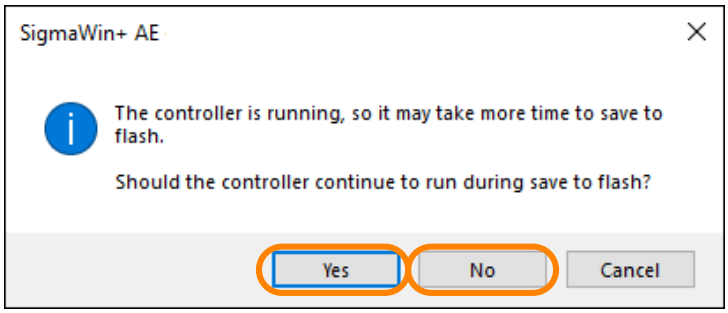
3. **Read the message, and click the [Yes] button or the [No] button.**



Save to flash will start, and the following window will be displayed.

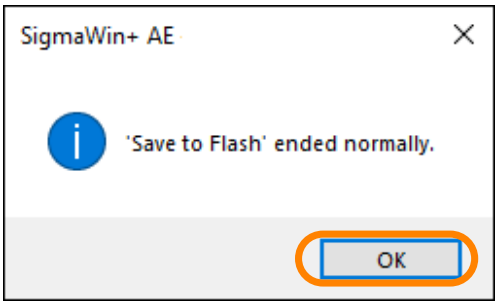


Information If the SERVOPACK is in RUN mode, the following message will be displayed. The data transfer to the SERVOPACK starts when you click the [Yes] button or the [No] button.



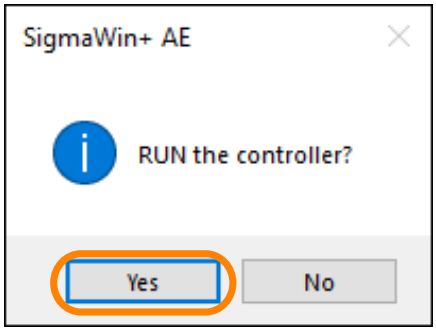
When save to flash is completed, a message dialog box will be displayed.

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



A message dialog box will close.

Information If you clicked the [No] button in step 3, the following message will be displayed. Click the [Yes] button to put the SERVOPACK in the RUN status.



This concludes the procedure.

Important
Do not turn OFF the power to the SERVOPACK until saving data to flash memory has been completed.
If you turn OFF the power to the SERVOPACK while data is being saved to flash memory, the data will be lost.
If you then restore power to the SERVOPACK, the SERVOPACK will start in the factory default condition.

2.3.7 Write to External Media

You can transfer data to external media (e.g., CF cards and SD cards).

<Example>

When data is transferred to a SERVOPACK via a display or other device that supports CF cards, use of a CF card frees the operator from the trouble of connecting the SigmaWin+ AE to the SERVOPACK.

When a CF Card Is Used	When a CF Card Is Not Used
1. Write the data in SERVOPACK to CF card. 2. Insert the CF card into the display or other device connected to the SERVOPACK and transfer the data.	1. Write the data in the SERVOPACK to a project file. 2. Switch the PC connection to the SERVOPACK which you want to transfer the project file to. 3. Write the project file to the SERVOPACK.

Important

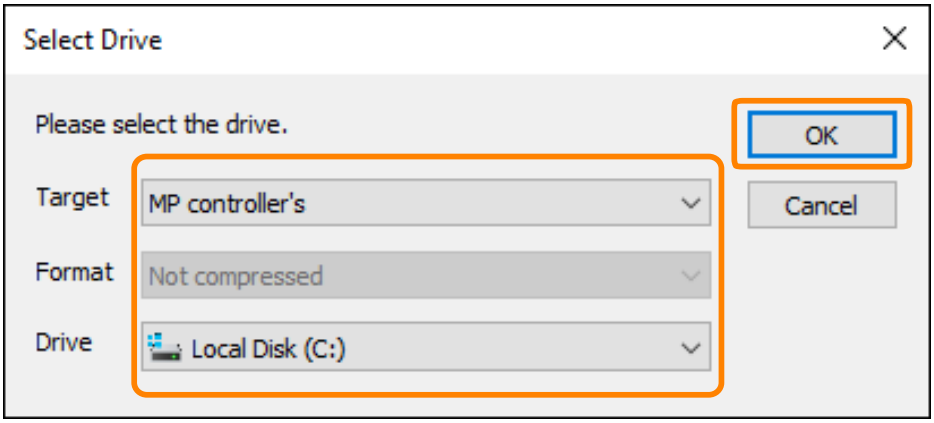
When the [Apply File Reading Restriction] check box is selected in the security settings on the SigmaWin+ AE, data transfer from RAM in SERVOPACK to external media is not possible. To transfer data, change the security settings in [Online Security Setting] under the [Online] menu.

Use the following procedure to write the data in the SERVOPACK or a project file to external media.

1. **Click the [Write to External Media] button in the [Transfer] window.**

   The [Select Drive] window will be displayed.

2. **Set the following items, and then click the [OK] button.**



Important

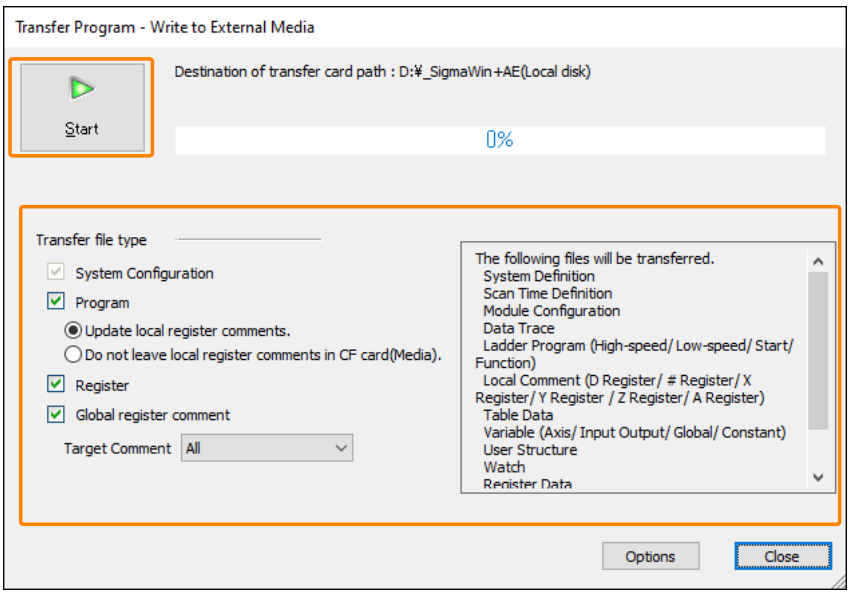
When [User memory (folder specification)] is selected at [Target], and [Compressed □□] is selected at [Format], the transfer file type can be set individually in the [Transfer Program] window that is displayed next.

   The [Transfer Program] window will be displayed.

3. **Specify the transfer settings, and click the [Start] button.**

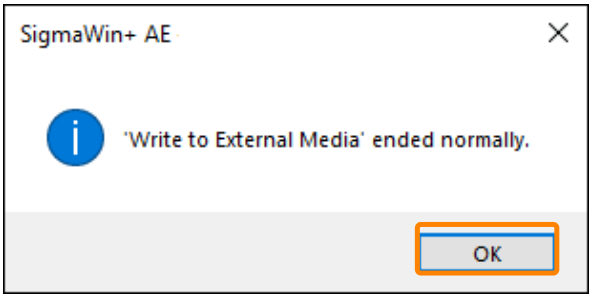
   Refer to the following section for details on the transfer file type settings.

☞ *2.3.1 [Transfer Program] Window on page 84*



   The transfer will start. When data transfer is completed, a message dialog box will be displayed.

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



This concludes the procedure.

2.3.8 Read from External Media

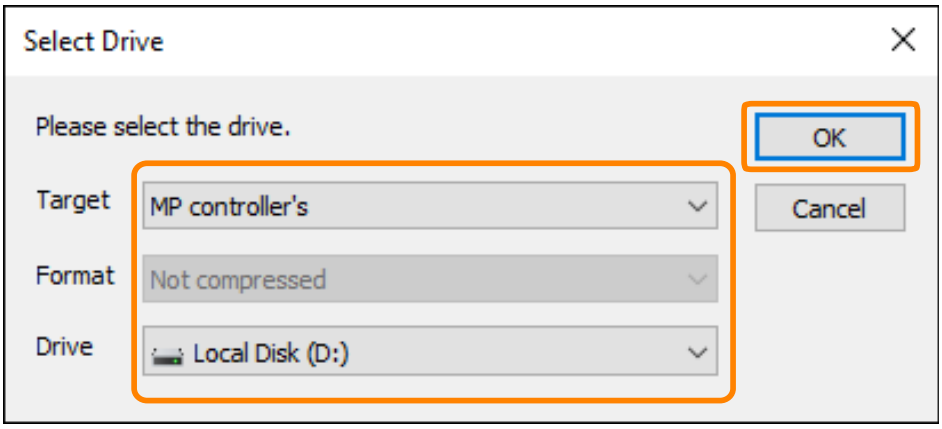
Data is read from external media, for example, to check content written to a CF card or SD card or to write data to the SERVOPACK during maintenance.

Use the following procedure to read the data on external media to the SERVOPACK or a project file.

1. **Click the [Read from External Media] button in the [Transfer] window.**

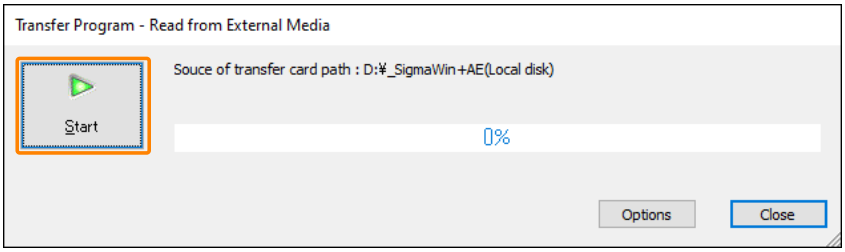
   The [Select Drive] window will be displayed.

2. **Specify the transfer settings, and click the [OK] button.**



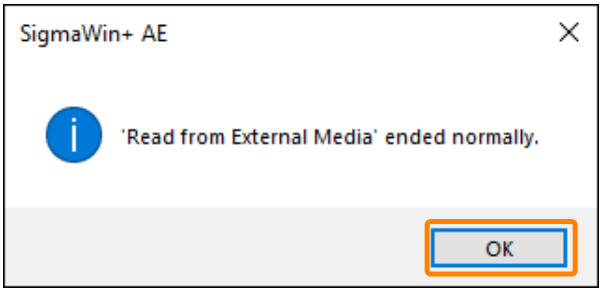
   The [Transfer Program] window will be displayed.

3. **Click the [Start] button.**



   The transfer will start. When data transfer is completed, a message dialog box will be displayed.

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



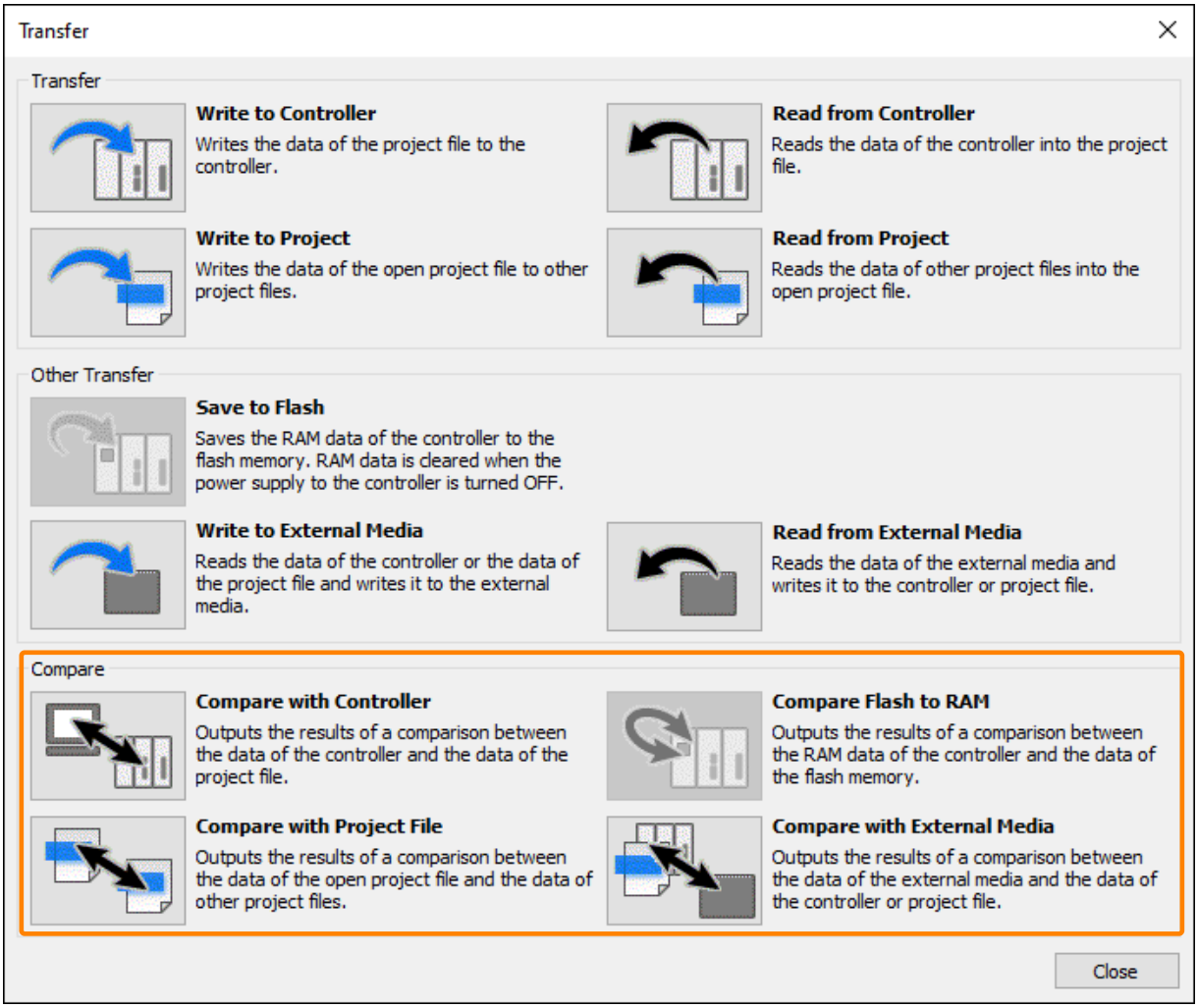
This concludes the procedure.

2.4 Compare

You can compare data between project files, SERVOPACK, and external media.

Click the [Transfer] button in the [My Tool] window to display the [Transfer] window.

The following table lists the types of comparisons.



Type of Comparison	Data to Compare	Project File Status	SigmaWin+ AE Connection Status
Compare with Controller	SERVOPACK ⇔ Project file	Open	Online
Compare Flash to RAM	SERVOPACK RAM ⇔ SERVOPACK flash memory	–	
Compare with Project File	Open project file ⇔ Other project file	Open	Offline
Compare with External Media	External media ⇔ SERVOPACK or project file	–	–

2.4.1 Compare with Controller

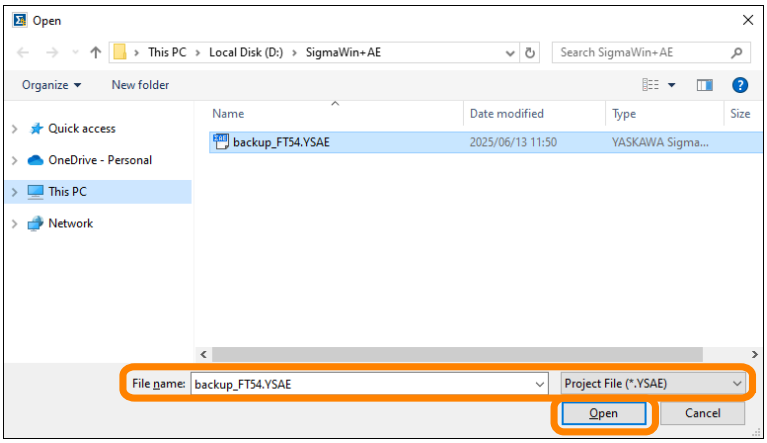
Use the following procedure to compare the data in the SERVOPACK and in a project file.

1. **Click the [Compare with Controller] button in the [Transfer] window.**

   The [Open] window will be displayed.

2. **Select the project file at the comparison source, then click the [Open] button.**

   Information This window will not be displayed if the project file is already open. The project file that is open serves as the comparison source.

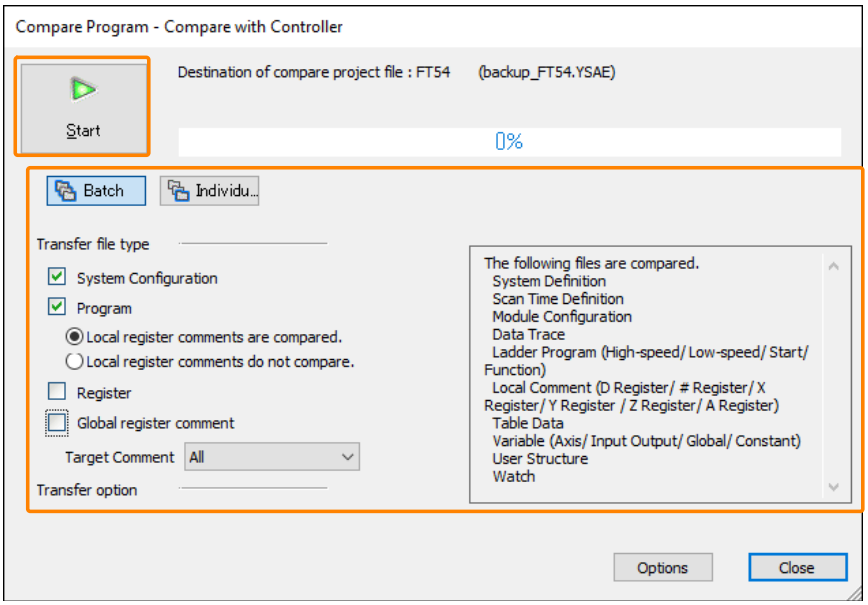


The [Compare Program] window will be displayed.

3. **Select the data to compare, and then click the [Start] button.**

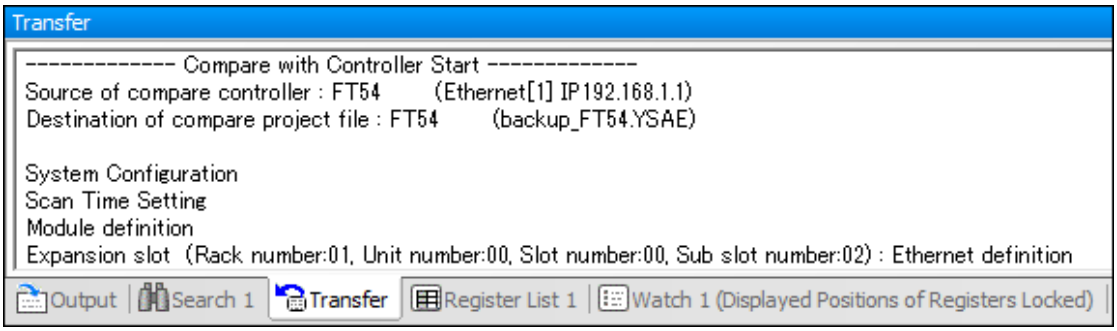
Refer to the following section for details on the settings.

☞ *2.3.1 [Transfer Program] Window on page 84*



The comparison will start.

When the comparison has been completed, a message dialog box will be displayed, and a log of the comparison operation will be displayed in the [Transfer] window.



This concludes the procedure.

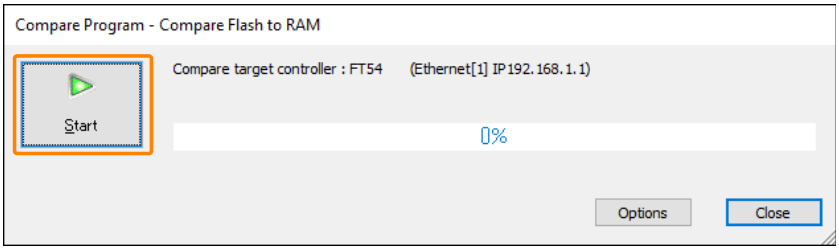
2.4.2 Compare Flash to RAM

Use the following procedure to compare the data in the SERVOPACK's RAM and flash memory.

1. **Click the [Compare Flash to RAM] button in the [Transfer] window.**

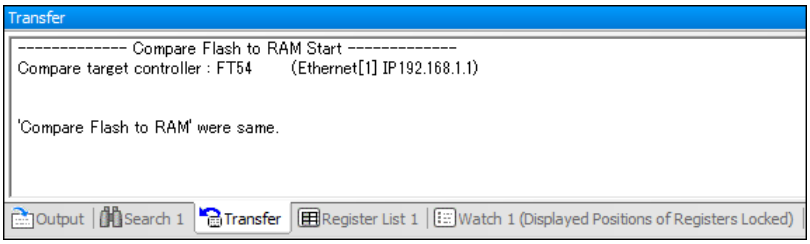
   The [Compare Program] window will be displayed.

2. **Click the [Start] button.**



   The comparison will start.

   When the comparison has been completed, a message dialog box will be displayed, and a log of the comparison operation will be displayed in the [Transfer] window.



This concludes the procedure.

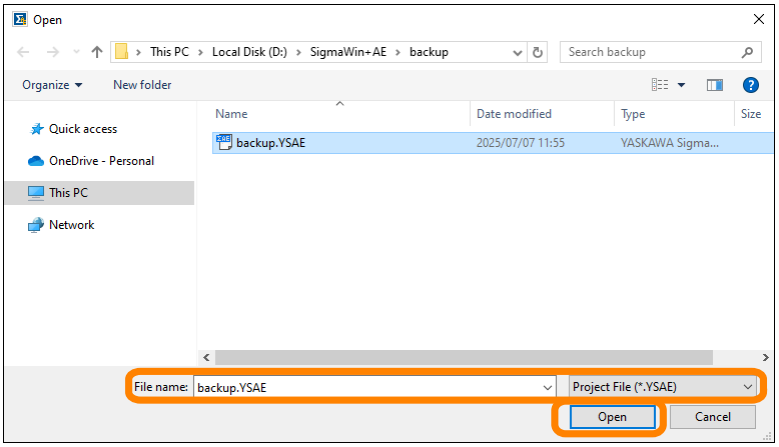
2.4.3 Compare with Project File

Use the following procedure to compare the data in the open project file and in another project file.

1. **Open the project file.**
2. **Click the [Compare with Project File] button in the [Transfer] window.**

   The [Open] window will be displayed.

3. **Select the project file at the comparison source, then click the [Open] button.**

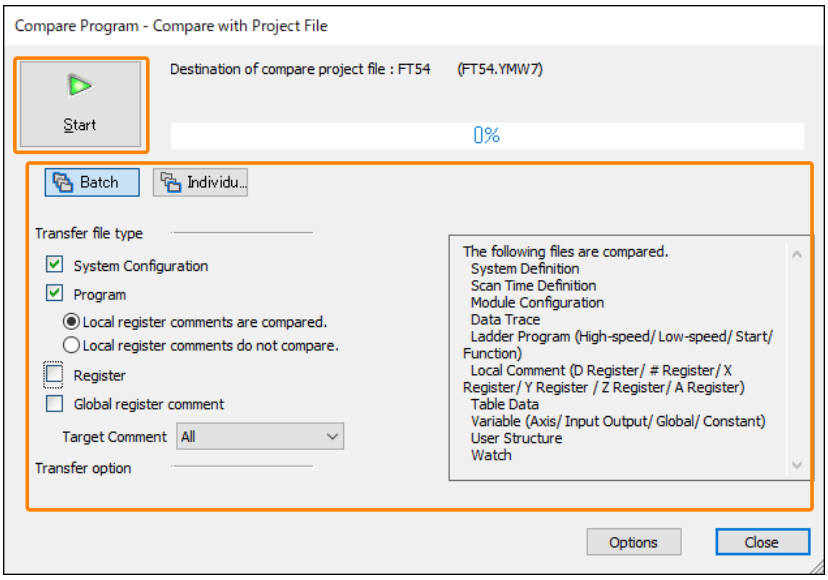


   The [Transfer Program] window will be displayed.

4. **Specify the transfer settings, and click the [Start] button.**

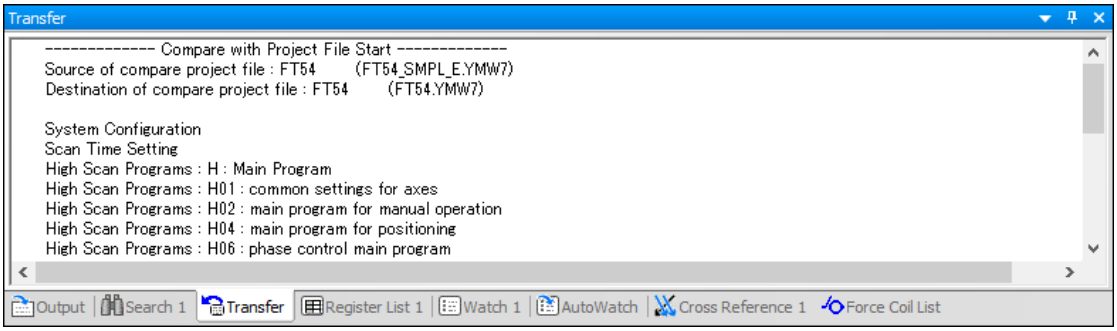
   Refer to the following section for details on the settings.

   ☞ *2.3.1 [Transfer Program] Window on page 84*



The comparison will start.

When the comparison has been completed, a message dialog box will be displayed, and a log of the comparison operation will be displayed in the [Transfer] window.



This concludes the procedure.

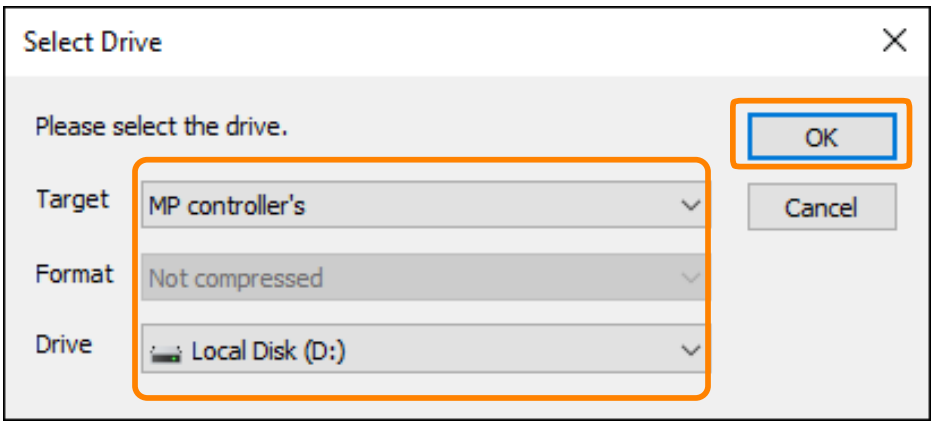
2.4.4 Compare with External Media

Use the following procedure to compare the data on external media and in the SERVOPACK or a project file.

1. **Click the [Compare with External Media] button in the [Transfer] window.**

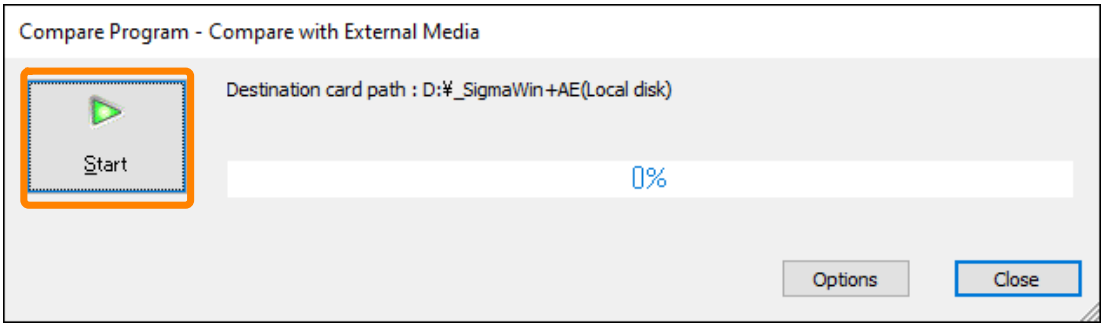
   The [Select Drive] window will be displayed.

2. **Set the following items, and then click the [OK] button.**



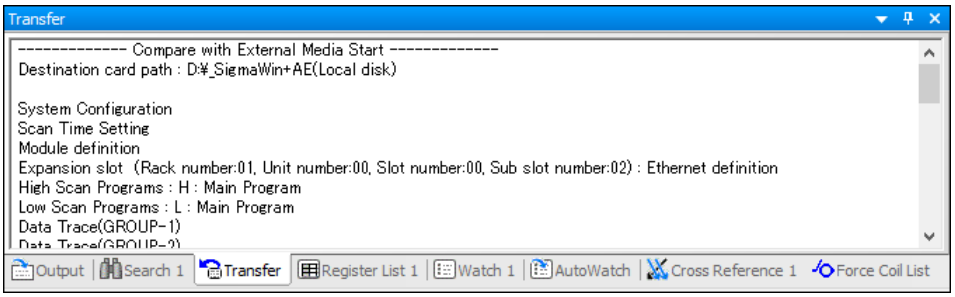
The [Compare Program] window will be displayed.

3. **Click the [Start] button.**



The comparison will start.

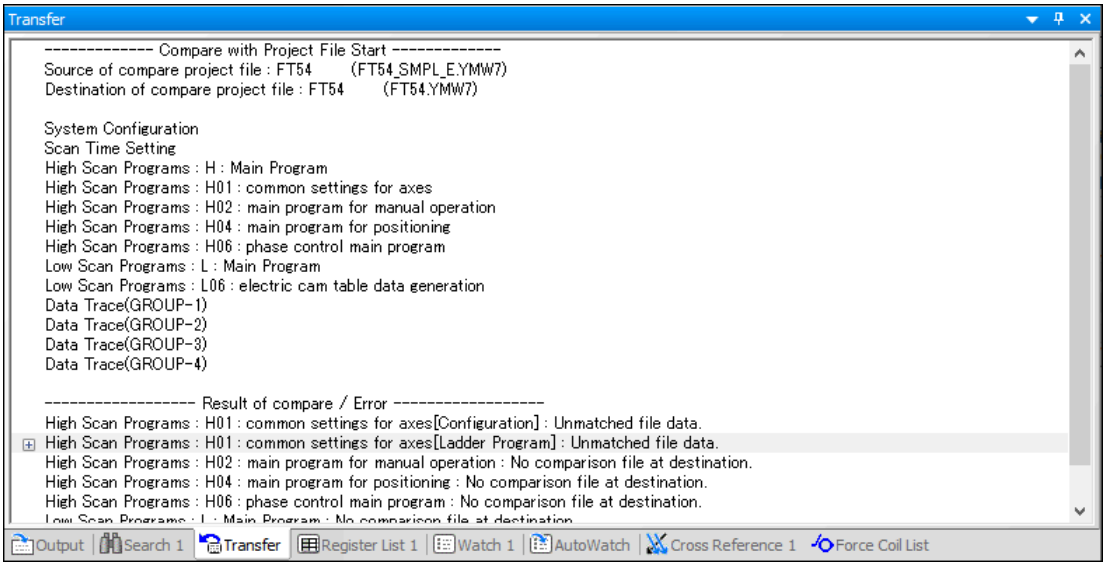
When the comparison has been completed, a message dialog box will be displayed, and a log of the comparison operation will be displayed in the [Transfer] window.



This concludes the procedure.

2.4.5 Program Comparison Results

If you double-click the comparison results for a ladder program in the output log of the [Transfer] window, you can display the comparison source and destination programs side by side.



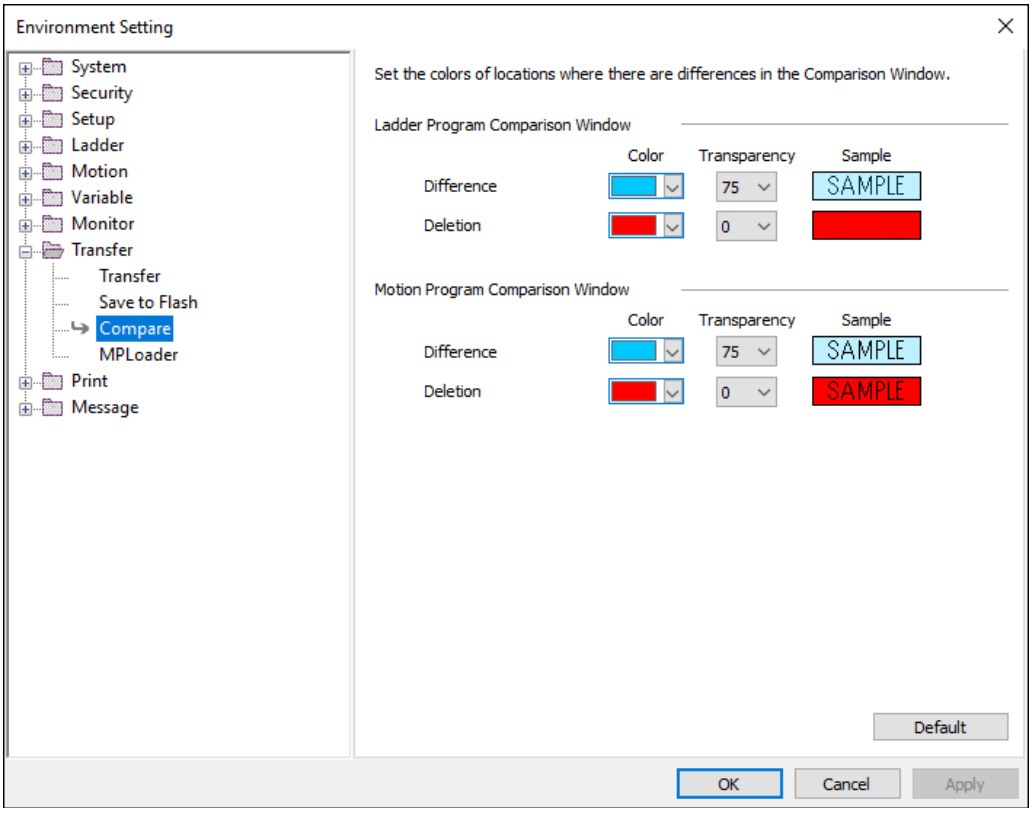
- Light blue: Added or changed locations
- Red: Deleted locations

Important

If there are multiple differences even though the program was changed in only one location:
The ladder programs are compared based on the executable code (the data that can be executed after the program is compiled). Since a specific instruction can be replaced with multiple lines of executable code (instruction numbers), this may be judged as differences in the comparison. This is not a problem in operation.

Information

- You can toggle between whether or not to simultaneously scroll the comparison source and destination programs by the **F9** key.
- You can toggle between the maximized and original size of the comparison results display by the **F5** key.
- You can align the corresponding lines on the comparison source and destination by the **F11** key. Move the cursor to the desired line in the program at either the comparison source or destination, and press the **F11** key. The corresponding line of the program on the other side will be displayed.
- The comparison source program can be corrected in this pane. The comparison destination program cannot be corrected.
- The display color of differences in the comparison window can be changed by [Transfer] – [Compare] in the [Environment Setting] window.



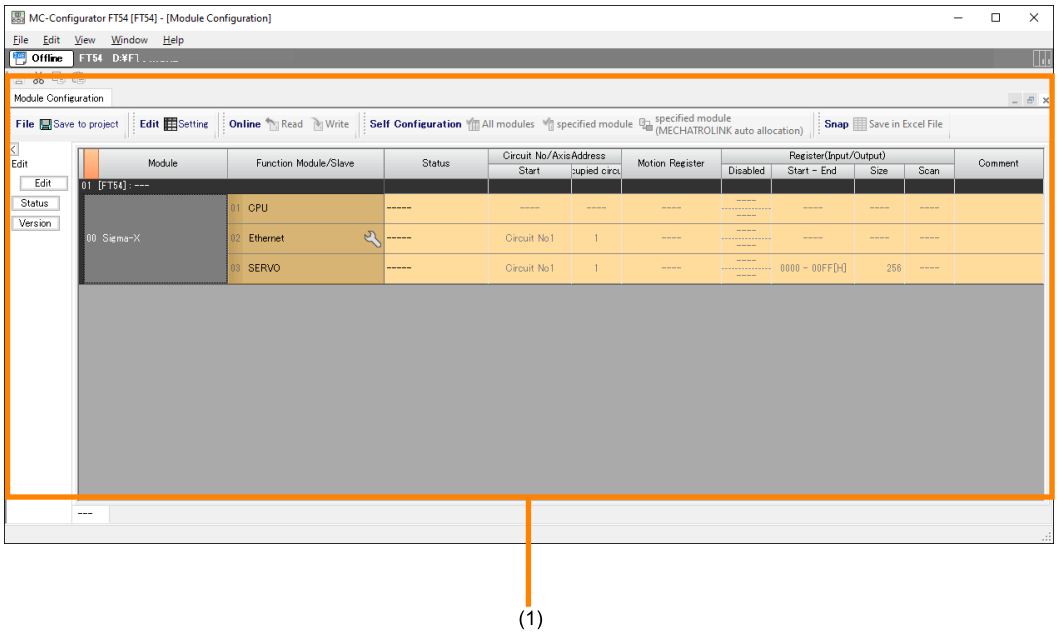
3

Designing the System

This chapter describes the operations required to design the system in the SigmaWin+ AE.

3.1 [MC-Configurator] Window

Click the [Module Configuration] button in the [My Tool] window to display the [MC-Configurator] window.
You can configure device detailed settings on the [MC-Configurator] window.



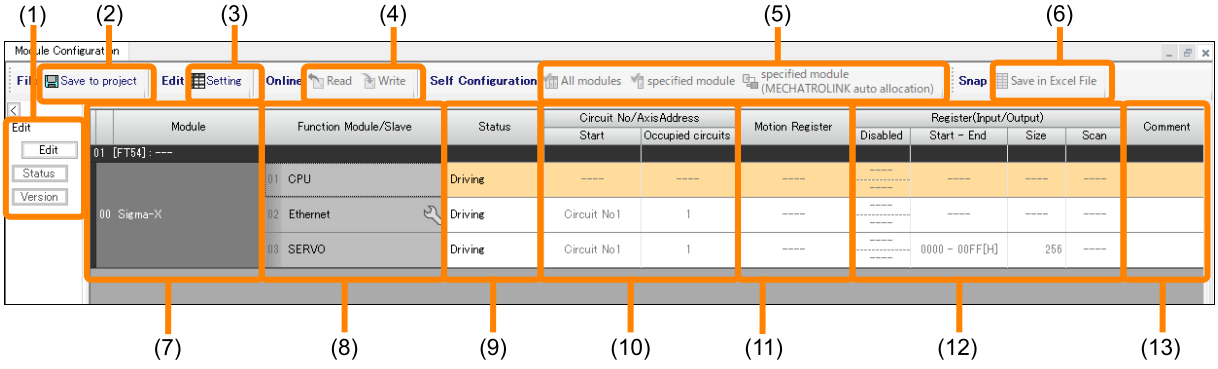
No.	Name	Reference
(1)	Edit Area	☞ *3.1.1 Edit Area on page 102*

3.1.1 Edit Area

This section describes the items displayed in the edit area.

(1) Module Configuration

When you open the [MC-Configurator] window, the Module Configuration Window will be displayed. If the window is not displayed, double-click [Module Configuration] in the [Work Space] window.



No.	Item	Description
(1)	Page Selection Buttons	Switches between the [Edit] page, [Status] page, and [Version] page. The [Edit] page is displayed in the example given above. The [Status] page shows the operating status of device. The [Version] page shows the hardware version and software version of device, as well as the model numbers of SERVOPACKs and servomotors (online mode only).
(2)	Save to project	Saves the edited content to a project file.

Continued on next page.

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No.	Item		Description
(3)	Setting		Configures the selected function module.
(4)	Online	Read	Reads data from the SERVOPACK.
		Write	Writes data to the SERVOPACK.
(5)	Self Configuration	All modules	Cannot be used.
		Specified module	
(6)	Snap	Save in Excel File	Cannot be used.
(7)	Module		Fixed value: Sigma-X
(8)	Function Module/Slave		The functions that are built into SERVOPACK are displayed. Click the [] button on the Ethernet to display the Detail Definition Window. Refer to the following section for details. ☞ *(a) Detail Definition Window on page 103*
(9)	Status		The SERVOPACK status is displayed.
(10)	Circuit No./Axis Address	Start	The circuit number of SERVOPACK is displayed.
		Occupied circuits	The number of circuits that can be used by the SERVOPACK is displayed.
(11)	Motion Register		Cannot be used.
(12)	Register (Input/ Output)	Disabled	Cannot be used.
		Start - End	The fixed range of allocated I/O registers.
		Size	The fixed size of the allocated I/O area is displayed in words.
		Scan	Cannot be used.
(13)	Comment		You can set comments. <Setting Conditions> • 16 characters maximum.

(a) Detail Definition Window

◆ Displaying the Detail Definition Window

Click the Ethernet [] button to display the Detail Definition Window.

Refer to the following section for details on the Ethernet Detail Definition Window.

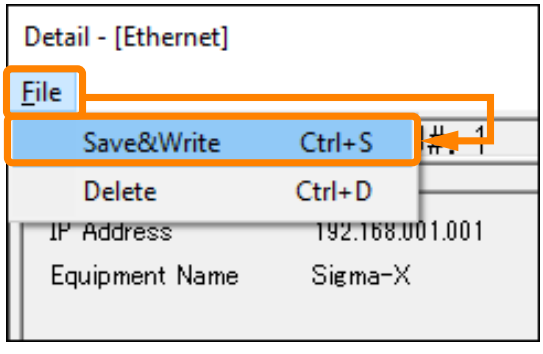
☞ *3.2 Details of Ethernet Detail Definition Window on page 106*

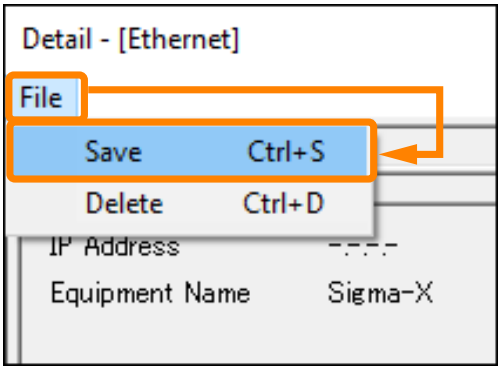
◆ Saving the Detail Definition Data

Use the following procedure to save the detail definition data that was configured or changed.

1. **Click [File] - [Save&Write] or [Save] from the main menu on the Detail Definition window.**

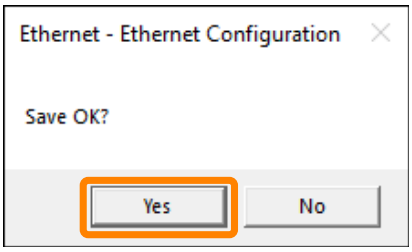
Information [Save&Write] is displayed in online mode and [Save] is displayed in offline mode.





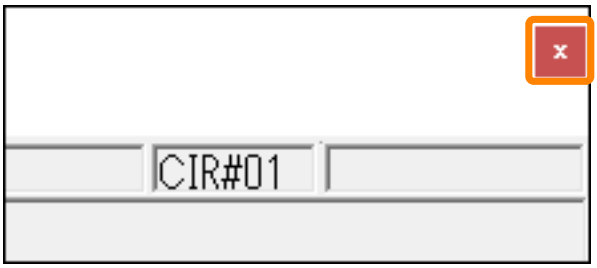
A confirmation message window will be displayed.

2. **Read the message, and then click the [Yes] button.**

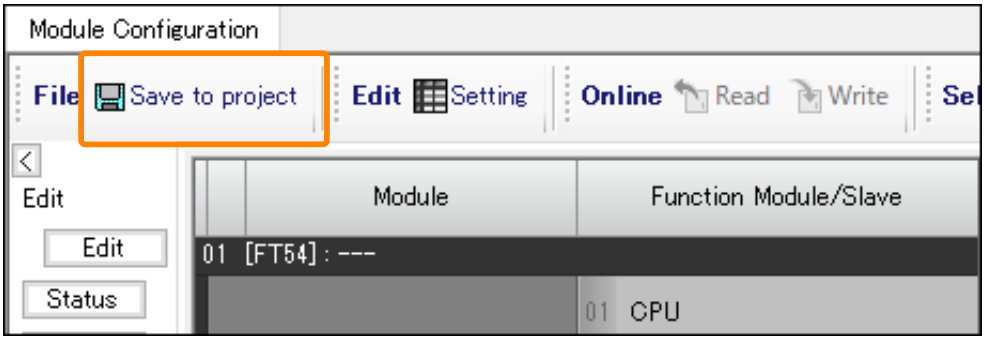


The settings on the Detail Definition window will be saved.

3. **Click the [×] button at the top-right of the Detail Definition window.**



4. **Click [Save to project] in offline mode only.**



5. **Save the data to flash memory only in online mode.**

Refer to the following section for details on the procedure.

☞ *2.3.6 Save to Flash on page 90*

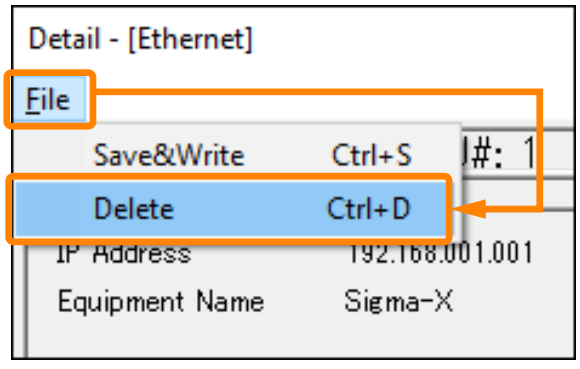
6. **Turn the SERVOPACK power OFF and ON again only in online mode.**

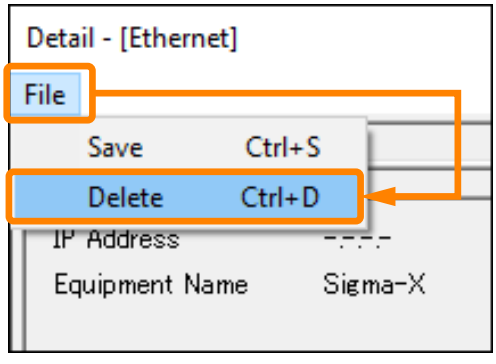
This concludes the procedure.

◆ Deleting the Detail Definition Data

Use the following procedure to delete all detail definition data.

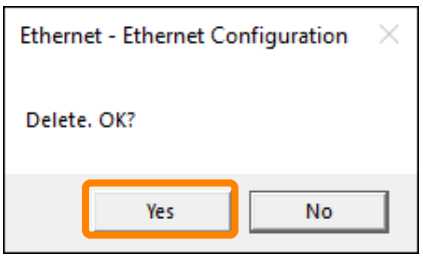
1. **Click [File] - [Delete] from the main menu on the Detail Definition window.**





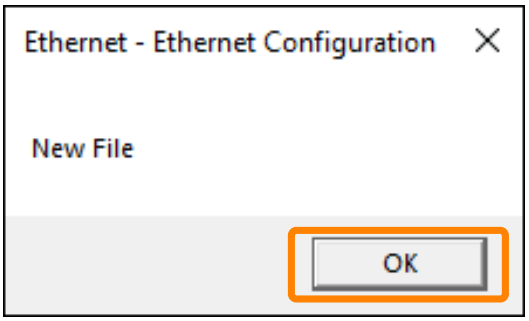
A confirmation message window will be displayed.

2. **Click the [Yes] button.**

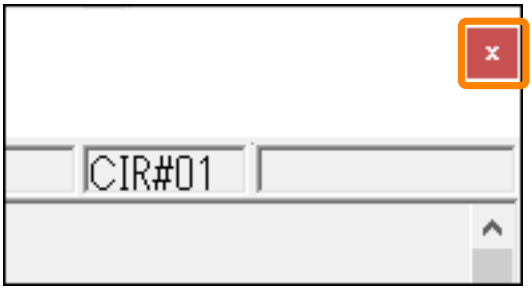


The settings on the Detail Definition window will be deleted.

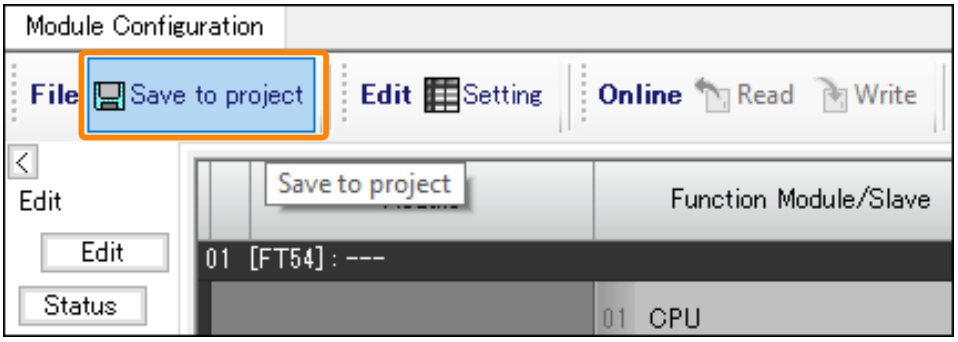
3. **Click the [OK] button.**



4. **Click the [×] button at the top-right of the Detail Definition window.**



5. **Click [Save to project] in offline mode only.**



6. **Save the data to flash memory only in online mode.**

Refer to the following section for details on the procedure.

☞ *2.3.6 Save to Flash on page 90*

7. **Turn the SERVOPACK power OFF and ON again only in online mode.**

This concludes the procedure.

3.2 Details of Ethernet Detail Definition Window

The Ethernet Detail Definition Window has three tab pages, the [Transmission Parameter], the [Connection Parameter] and the [Status] tab pages. Each tab page can be displayed by selecting the corresponding tab.

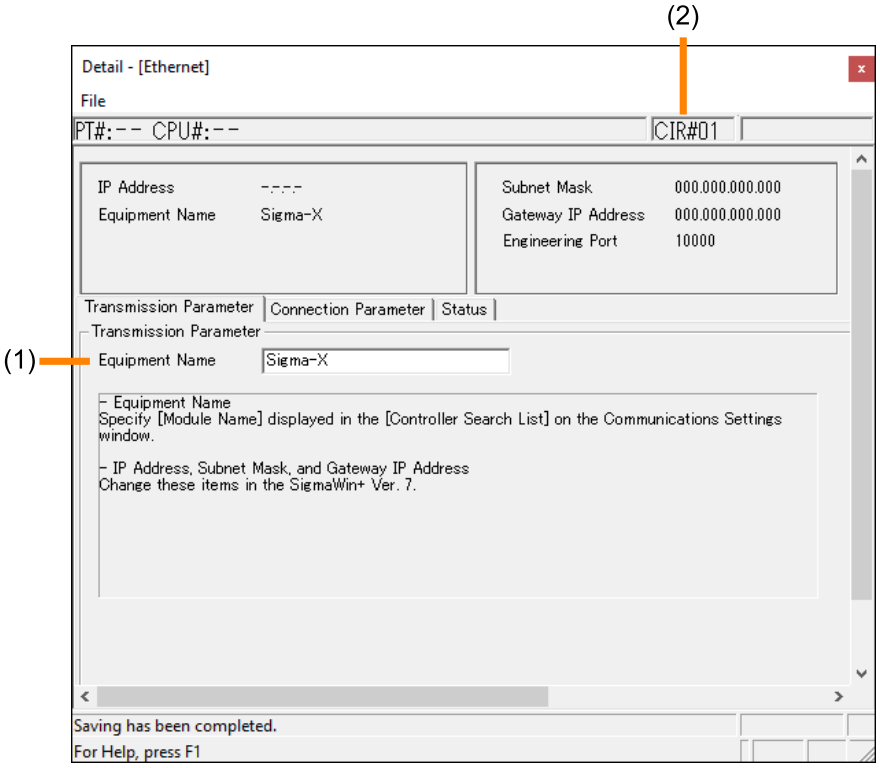
This section shows the items on each tab page. The following section gives a specific example of configuring Ethernet communications for this product and a touch panel.

☞ *3.3 Communications with a Touch Panel on page 113*

3.2.1 Transmission Parameter Tab Page

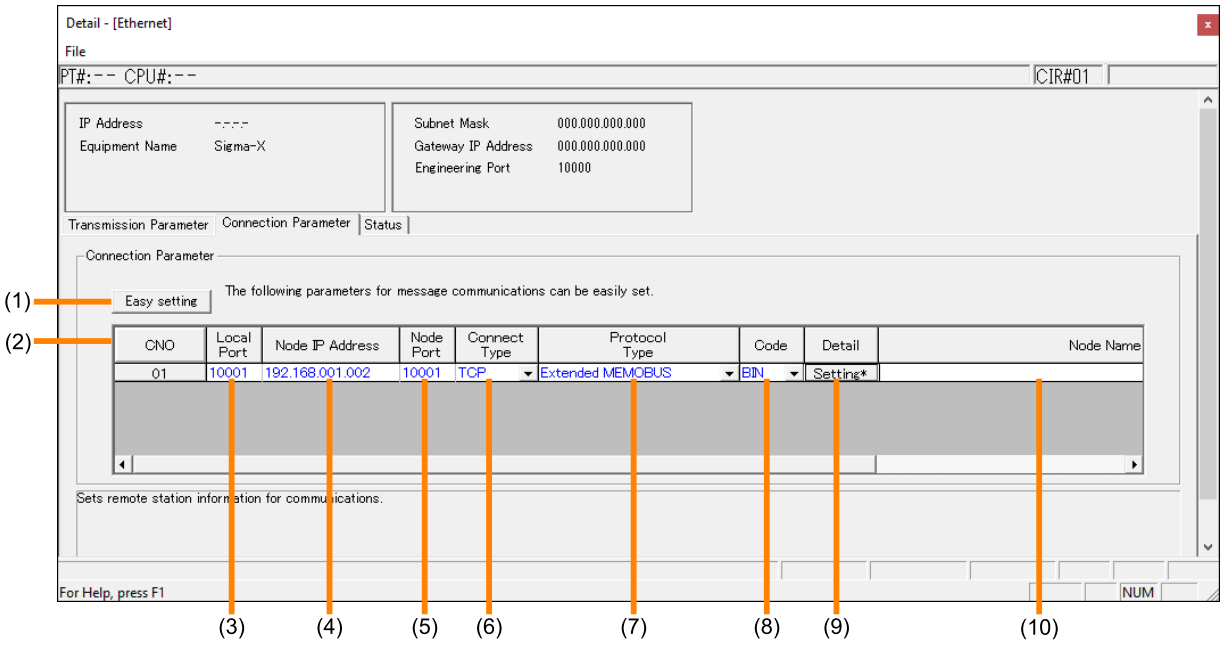
Details for item displayed on the Transmission Parameter Tab Page are shown below.

Ensure you save to flash memory after making any changes to the transmission parameter settings. After saving to flash memory, the changed transmission parameters will be written to memory.



No.	Name	Meaning
(1)	Equipment Name	Enter the equipment name. Enter the name with a maximum length of 16 characters. Single-byte and double-byte characters can be mixed.
(2)	Circuit Number	Gives the Ethernet port circuit number.

3.2.2 Connection Parameter Tab Page



No.	Name	Description
(1)	Easy setting	Sets parameters for message communications.
(2)	CNO	Gives the connection number.
(3)	Local Port	Sets the local port number.
(4)	Node Port IP Adress	Sets the remote station IP address.
(5)	Node Port	Sets the remote station port number.
(6)	Connection Type	Sets the transport layer protocol.
(7)	Protocol Type	Sets the application layer protocol.
(8)	Code	Sets the code type.
(9)	Detail	Sets the local station for automatic reception.
(10)	Node Name	Enter a connection comment.

(1) Connection Parameter Tab Page Details

Details for each item displayed on the Connection Parameter Tab Page are explained.

(a) CNO

The connection number is 01 only.

Remote stations are differentiated by the connection number in Ethernet communications.

This connection number corresponds to the Param10 “Connection Number” of the MSG-SNDE functions and MSG-RCVE functions.

(b) Local Port

Enter a local station port number (256 to 65535) for each connection.

Enter numbers that differ from those used for port numbers, engineering port numbers and diagnosis port numbers used on other connections.

If the SERVOPACK is the slave, do not use automatic assignment for the port number. Ethernet communications will not know what port to use when communicating with the master station.

Additionally, “9998”, “10000”, and whichever port number was set for the engineering port cannot be used for UDP.

If using the EtherNet/IP port for Ethernet communications, 2222 and 44818 cannot be used for UDP and 44818 cannot be used for TCP.

(c) Node Port IP Adress

Enter a remote station IP address number for each connection.

The data entry range that is allowed for the remote station IP address depends on the field.

- Field No. 1: 0 to 255 (Excluding 127)
- Field No. 2: 0 to 255
- Field No. 3: 0 to 255
- Field No. 4: 1 to 254

However, if using unpassive open mode, enter “0” for fields No. 1 to No. 4.

(d) Node Port

Enter a remote station port number (0 or 256 to 65535) for the connection.

Do not use an IP address and remote port combination that is already in use for another connection.

(e) Connect Type

Select a transport layer protocol.

TCP: Communicates using TCP (Transmission Control Protocol).

UDP: Communicates using UDP (User Datagram Protocol).


Important

If an error occurs during message communications with the UDP (connectionless) protocol, the following may occur.

The Ethernet connector's LINK/ACT LED indicator will light up or blink. Communication data will be lost and communications will be terminated.

In this case, implement the following measures.

- Use a twisted-pair cable with RJ-45 connectors, straight cable or a cross cable that is 100Base-TX and Category 5 or higher.
- Separate the Ethernet cables from the power cables.

If you have implemented these measures but the problem still persists, implement the following measures.

- Change to the TCP (connection) protocol.
- If using the UDP protocol, create a program to timeout and re-execute the send command if processing has not been completed in a certain amount of time after sending a command.

(f) Protocol Type

Select the application layer protocol for each connection in line with the protocol supporting the remote station.

The following table lists the protocol types.

Protocol	Outline
MEMOBUS	The Yaskawa standard MEMOBUS protocol
Extended MEMOBUS	A protocol to extend the functionality of the MEMOBUS protocol.
MODBUS / TCP	The industrial Ethernet protocol suggested by Modicon
No-protocol communications	General-purpose message communications

(g) Code

Select a transfer data code type that matches with the code type set in the remote station for each connection.

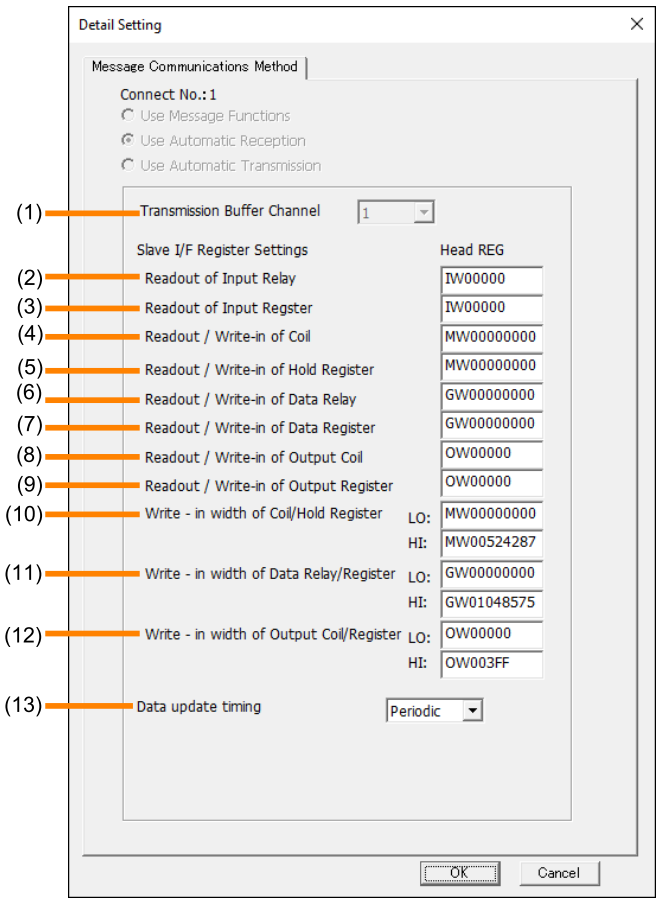
- RTU: Specifies RTU mode if MEMOBUS protocol is used
- ASCII: Specifies ASCII mode
- BIN: Specifies binary mode

However, there is restriction on selectable codes in the following way based on the data of the [Protocol Type] box.

Protocol Type	Code		
	RTU	ASCII	BIN
MEMOBUS	Supported	Supported	-
Extended MEMOBUS	-	Supported	Supported
MODBUS / TCP	-	-	Supported
No-protocolcommunications	-	Supported	Supported

(h) Detail

Set up automatic reception using the Detail Setting window.



No.	Item	Range	Description	Default Value
(1)	Transmission Buffer Channel	1	Fixed value: 1	1
(2)	Readout of Input Relay	IW00000 to IW1FFFFF	Sets the first register of the input relay used in automatic reception.	IW00000
(3)	Readout of Input Register	IW00000 to IW1FFFFF	Sets the first register of the input register used in automatic reception.	IW00000
(4)	Readout / Write-in of Coil	MW00000 to MW1048576	Sets the first register of the read/write coil used in automatic reception.	MW00000000
(5)	Readout / Write-in of Hold Register	MW00000 to MW1048576	Sets the first register of the read/write holding register used in automatic reception.	MW00000000
(6)	Readout / Write-in of Data Relay	GW00000 to GW67108863	Sets the first register of the read/write data relay used in automatic reception.	GW00000000

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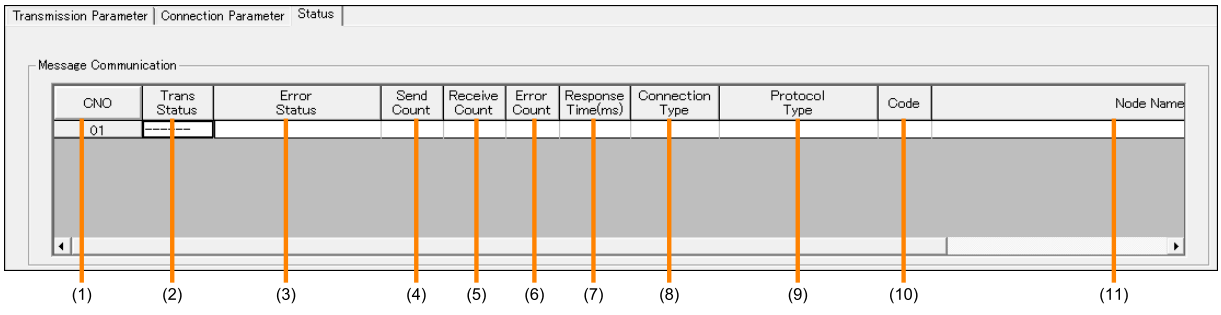
No.	Item	Range	Description	Default Value
(7)	Readout / Write-in of Data Register	GW00000 to GW67108863	Sets the first register of the read/write data register used in automatic reception.	GW00000000
(8)	Readout / Write-in of Output Coil	OW00000 to OW1FFFFF	Sets the first register of the read/write output register used in automatic reception.	OW00000
(9)	Readout / Write-in of Output Register	OW00000 to OW1FFFFF	Sets the first register of the read/write output register used in automatic reception.	OW00000
(10)	Write - in width of Coil/Hold Register (LO)	MW00000 to MW1048576	Sets the writing range (LO) used in automatic reception for holding register coil.	MW00000000
	Write - in width of Coil/Hold Rgister (HI)	MW00000 to MW1048576	Sets the writing range (HI) used in automatic reception for holding register coil.	MW00524287
(11)	Write - in width of Data Relay/ Register (LO)	GW00000 to GW67108863	Sets the writing range (LO) used in automatic reception for data register data relays.	GW00000000
	Write - in width of Data Relay/ Register (HI)	GW00000 to GW67108863	Sets the writing range (HI) used in automatic reception for data register data relays.	GW01048575
(12)	Write - in width of Output Coil/ Register (LO)	OW00000 to OW1FFFFF	Sets the output register (output coil) writing range (LO) used in automatic reception.	OW00000
	Write - in width of Output Coil/ Register (HI)	OW00000 to OW1FFFFF	Sets the output register (output coil) writing range (HI) used in automatic reception.	OW003FF
(13)	Data update timing	-	Sets the data update method to either Periodic, L scan or H scan.	Periodic

(i) Remote Station Name

Enter a connection comment.

Enter the comment with a maximum length of 32 characters. Single-byte and double-byte characters can be mixed.

3.2.3 Status Tab Page



No.	Name	Meaning
(1)	CNO	Gives the connection number (1 to 20).
(2)	Trans Status	Gives the status for each connection.
(3)	Error status	Gives the details of an error if there is a transmission status error.

Continued on next page.

Continued from previous page.

No.	Name	Meaning
(4)	Send Count	Gives the number of packets transmitted to the remote station.
(5)	Receive Count	Gives the number of packets received from the remote station.
(6)	Error Count	Gives the number of errors that have occurred in each connection.
(7)	Response Time(ms)	Gives the time (ms) it took to receive a response after a command is sent with the MSG-SNDE function.
(8)	Connection Type	Gives the connection parameter connection type (TCP/UDP) set on the Parameter Setting Tab Page.
(9)	Protocol Type	Gives the connection parameter protocol type set on the Parameter Setting Tab Page.
(10)	Code	Gives the connection parameter code (ASCII/BIN/RTU) set on the Parameter Setting Tab Page.
(11)	Node Name	Gives the connection parameter remote station name set on the Parameter Setting Tab Page.

(1) CNO

The connection number is 01 only.

(2) Trans Status

This parameter gives the status for each connection.

Status	Meaning
IDLE	Waiting for execution of message function
WAIT	Waiting for establishment of TCP connection with remote station (Only when using TCP protocol)
CONNECT	Ready for data transmission to and from remote station
-	Unused connection

(3) Error Status

This parameter gives error details if a transmission status error occurs.

Status Display	Meaning	Remarks
No error	Normal	-
Socket creation error	System error	A socket could not be created.
Local station port number error	Setting error in local station port number (Bound to same address during TCP disconnection)	Binding error (Port number conflict)
		A binding error occurred while disconnected due to the Abort message function. An error will occur if Execute is turned ON within one minute of Complete after Abort.
		The remote station received a command from another function before connection was completed.
Changing socket attribute error	System error	An error occurred while setting the socket attribute.
Connection error (M-SND)	Connection error (Connection refused by the remote station during active open in TCP settings)	While trying to connect with MSG-SNDE function, the remote station refused connection and the command was reset.
		A connection attempt failed when retried one minute (default) after cable disconnection.
Connection error (M-RCV)	Connection error (If passive open with TCP settings)	A connection request error occurred with the MSG-RCVE function.

Continued on next page.

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Status Display	Meaning	Remarks
System error	System error	A socket polling (using Select) error occurred while receiving data.
TCP data sending error	Data sending error (There is no remote station in the TCP settings or it hasn't been started)	A response sending error occurred with the MSG-RCVE function. An error occurred with the MSG-SNDE function too. Occurs only with TCP when there is no transmission target or the transmission target is rebooted.
UDP data sending error	Data sending error (If UDP setting)	The data send request command was sent to a socket that does not exist.
TCP data reception error	Data reception error (Disconnection request was received from the remote station with TCP settings)	An error occurred while disconnected from the remote station. An error also occurred during normal close processing.
UDP data reception error	Data reception error (If UDP setting)	The data reception instruction was executed for a socket that does not exist.
Changing socket option error	System error	Error during socket option change
Data conversion error	Data conversion error	Protocol conversion error

(4) Send Count

This parameter gives the number of packets transmitted to the remote station.

(5) Receive Count

This parameter gives the number of packets received from the remote station.

(6) Error Count

This parameter gives the number of errors that have occurred in each connection.

(7) Response Time(ms)

This parameter gives the time (ms) it took to receive a response after a command is sent with the MSG-SNDE function.

(8) Connection Type

This parameter gives the connection parameter connection type (TCP/UDP) set on the Parameter Setting Tab Page.

(9) Protocol Type

This parameter gives the connection parameter protocol type set on the Parameter Setting Tab Page.

(10) Code

This parameter gives the connection parameter code (ASCII/BIN/RTU) set on the Parameter Setting Tab Page.

(11) Node Name

This parameter gives the connection parameter remote station name set on the Parameter Setting Tab Page.

3.3 Communications with a Touch Panel

When using Ethernet communications between the SERVOPACK and a touch panel from Schneider Electric, use the extended MEMOBUS protocol as the communications protocol. The extended MEMOBUS protocol allows the master to read and write the slave registers.

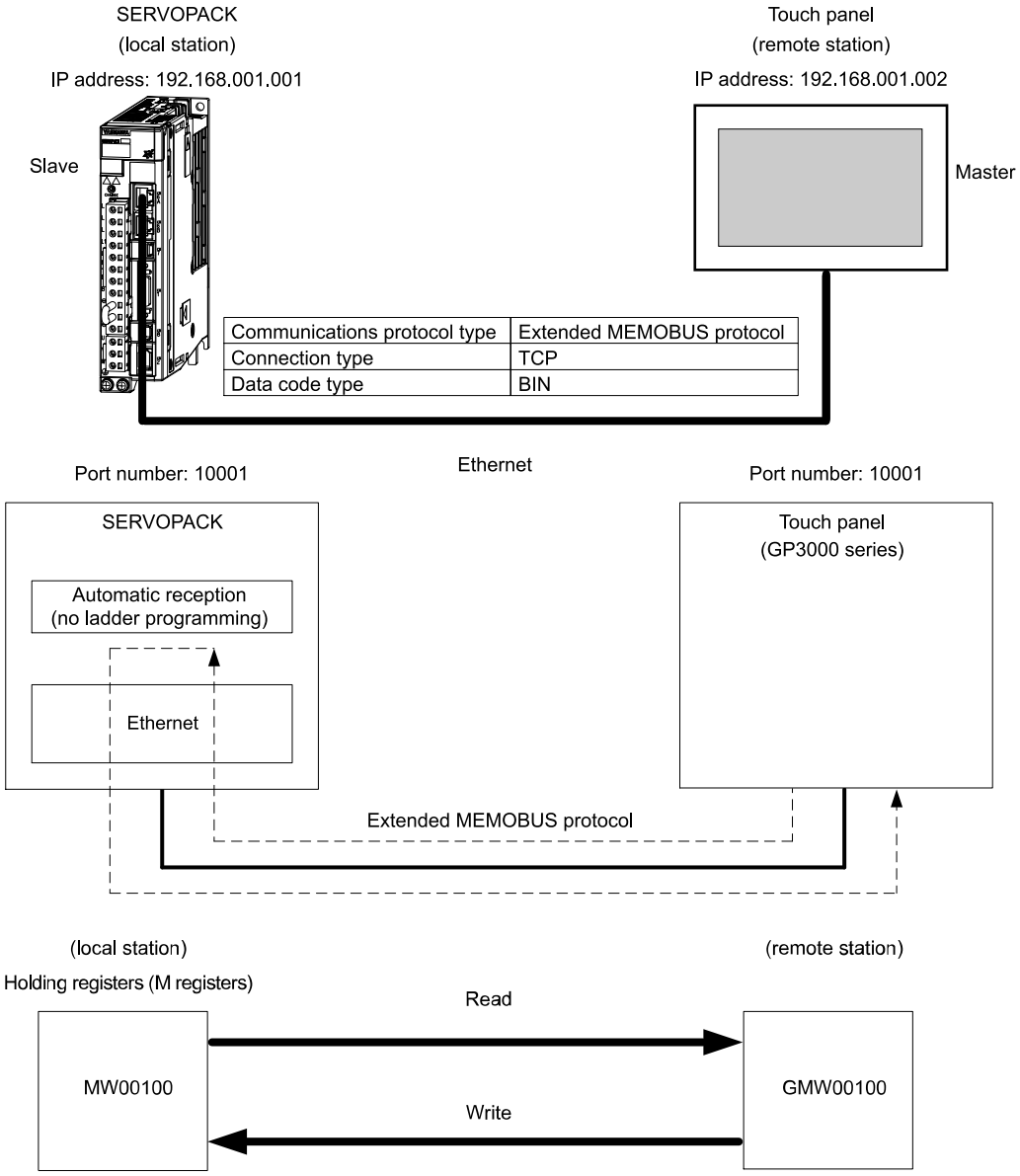
This section describes communications when the SERVOPACK acts as a slave.

3.3.1 Using Automatic Reception with the SERVOPACK as a Slave

This section describes how to communicate with a touch panel from Schneider Electric by using automatic reception.

(1) Setting Example

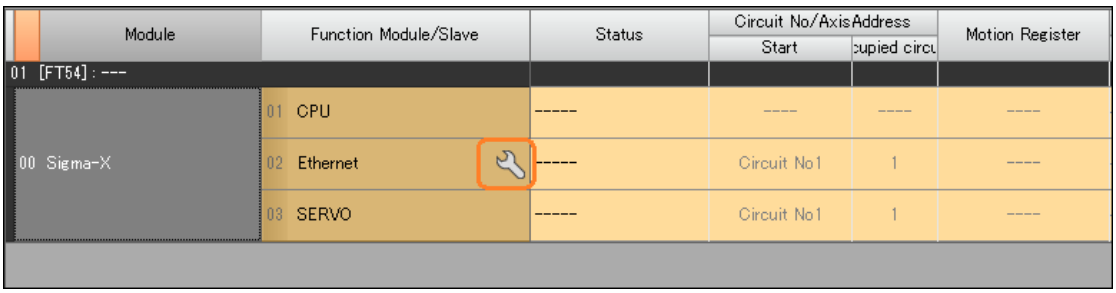
The following figure illustrates how the contents of the MW00100 holding register in the SERVOPACK (slave) is displayed on the touch panel, and written from the touch panel to the same register.



(2) Configuring the Module Configuration Definition

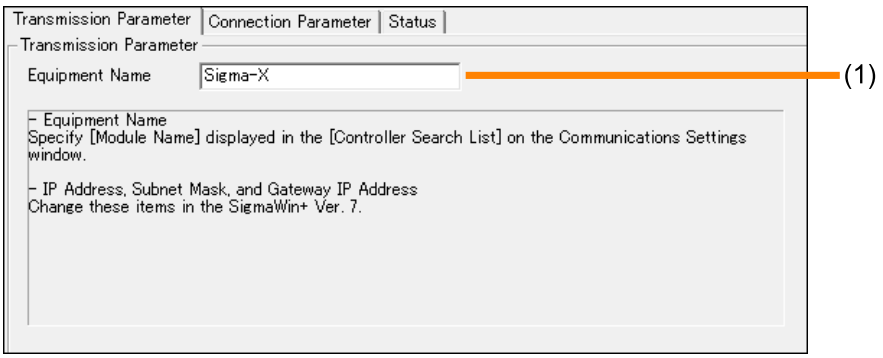
Use the following procedure to configure the module configuration definition.

1. **Double-click [🔧] for [Ethernet].**



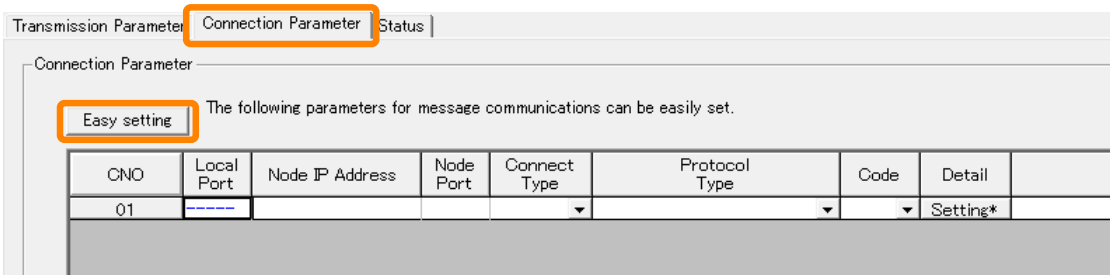
The Ethernet Detail Definition Window will be displayed.

2. **Select the [Transmission Parameter] tab to specify the Equipment Name.**



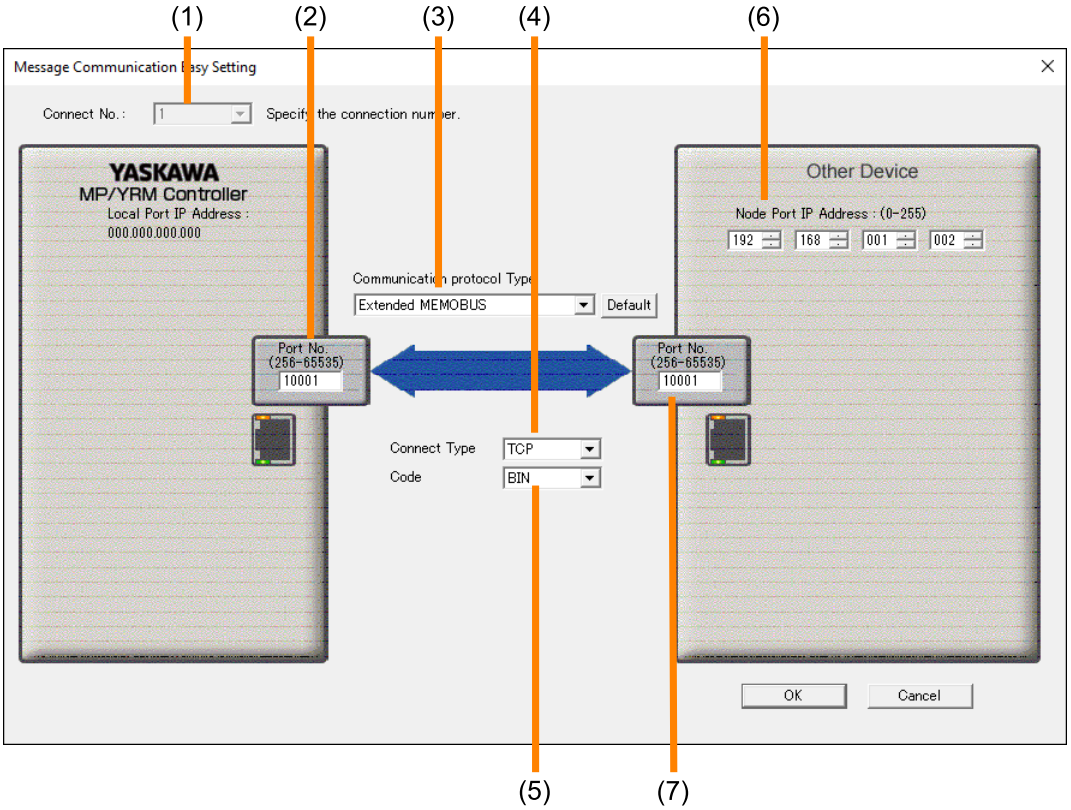
(1) Enter [Module name] displayed in the [Search Controller] on the [Communications Setting] window.
Default value: Sigma-X

3. **Select the [Connection Parameter] tab, and click the [Easy setting] button.**



The Message Communication Easy Setting window will be displayed.

4. **Set the connection parameters.**



(1) [Connect No.] is fixed to 1.

(2) Enter “10001” in the [Port No.] box for SERVOPACK.

(3) Select [Extended MEMOBUS] in the [Communication protocol Type] box, and then click the [Default] button.

(4) Select [TCP] in the [Connect Type] box.

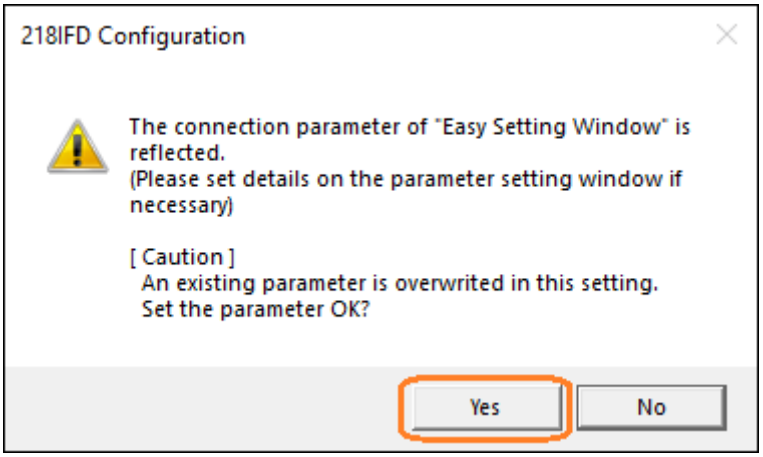
(5) Select [BIN] in the [Code] box.

(6) Enter the following address in the [Remote Station Port IP Address] boxes for the other device: “192.168.001.002”.

(7) Enter “10001” in the [Port No.] box for the other device.

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

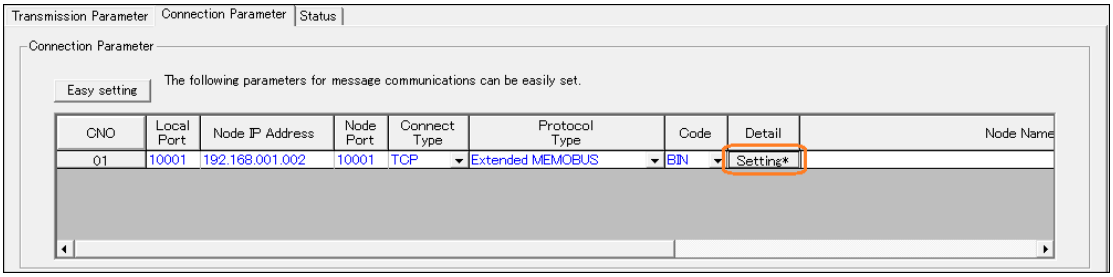
6. **Click the [Yes] button.**



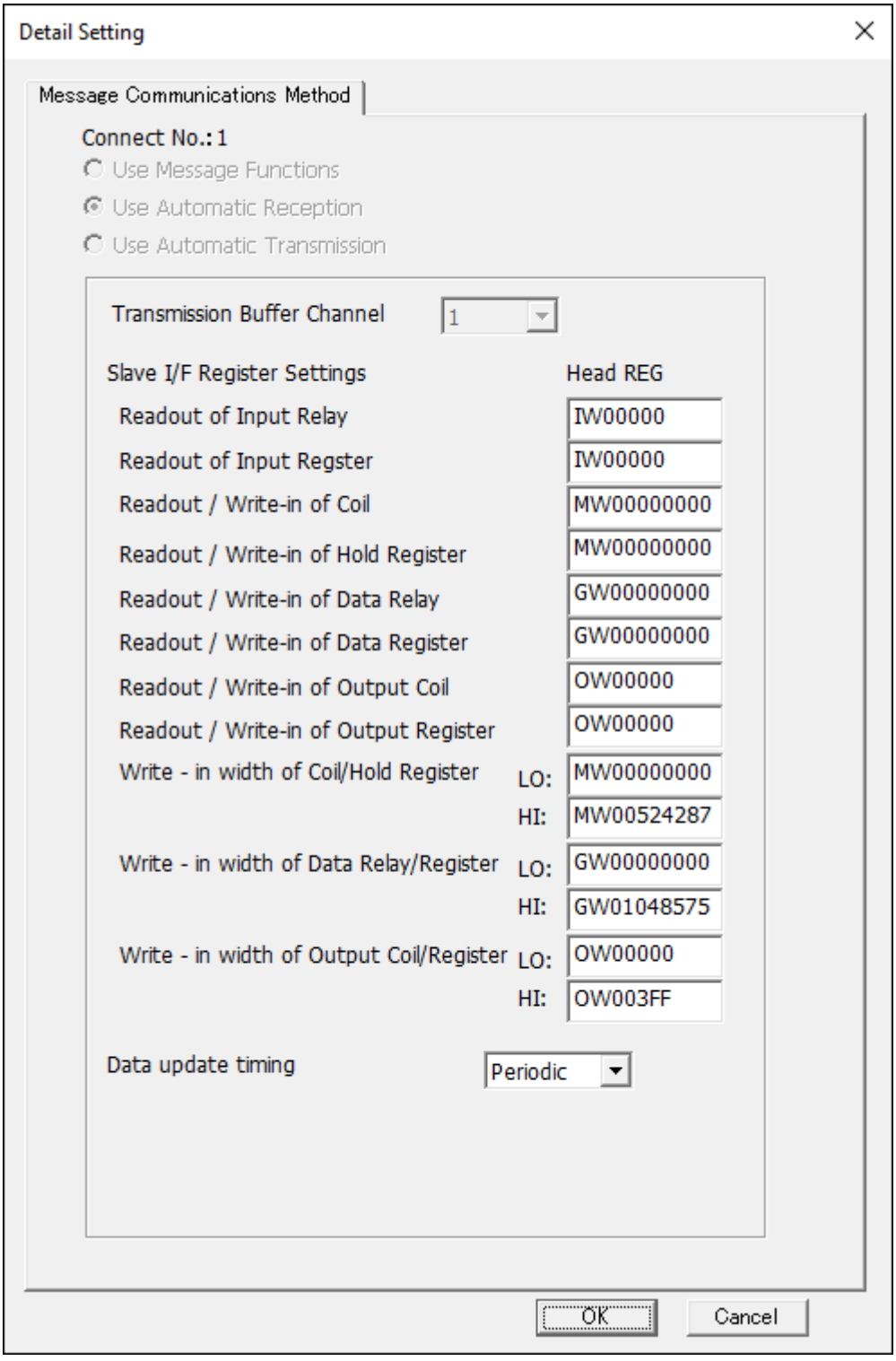
Note:

If parameters have already been set for the same connection number and you click the [Yes] button in the Transmission Parameters Confirmation dialog box, the settings will be overwritten by the parameters that are set in the Message Communication Easy Setting window.

7. **Check the settings and double-click the [Setting] button in the [Detail] column.**



8. **Check the content that was set. [Use Automatic Reception] is selected for the Message Communications Method as a fixed value.**



9. **Save the data to flash memory.**

Note:

Changes made to the transmission or connection parameters will become effective only after the changes have been saved to flash memory and the power has been cycled.

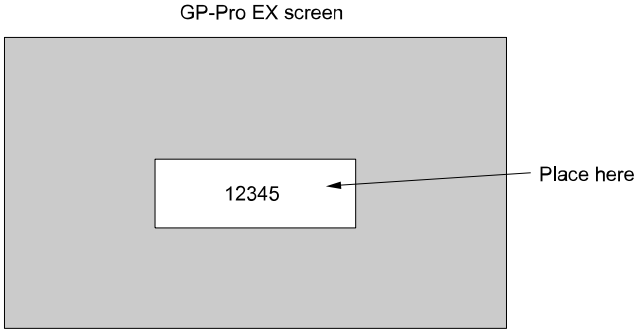
This concludes the settings for using the SERVOPACK as a slave.

(3) Setting Up the Touch Panel

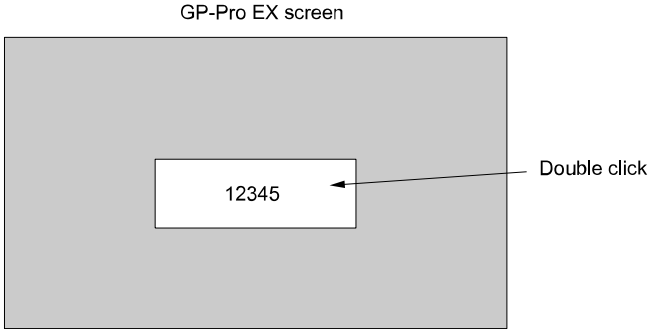
Refer to the manual for your touch panel for how to set it up.

(a) Screen Creation Example

1. **Create a base screen.**
2. **From the toolbar, select [Data Display] and place the object on the screen.**



3. **Double-click the [Data Display] placed on the screen.**



4. **Enter the following settings in the Data Display Dialog Box and click the [OK] button.**

Display Data	Numeric Display
Monitor Word Address	GMW00100

- The following table shows the relationship between the address display in GP-Pro EX and registers in the YRM1010.

Device	Address Display in GP-Pro EX	Registers in YRM1010
Coils as bits	GMB□□□□□□	MB□□□□□□
Coils as words	GMW□□□□□	MW□□□□□
Input relays as bits	GIB□□□□□	IB□□□□□
Input relays as words	GIW□□□□	IW□□□□

(4) Starting Communications

1. **Turn ON the power to the SERVOPACK to start message reception.**

The system will automatically start the message reception operation. No further operation is required.

2. **Start the GP3000-series touch panel to display the main screen.**

Communications with the SERVOPACK will start after the touch panel operating system starts.

Note:
Contact Schneider Electric for further information.

3.4 Checking, Editing, and Saving Parameters

You cannot use the SigmaWin+ AE to check, edit, or save servo parameters.

Use the SigmaWin+ Ver.7 to perform these operations.

Refer to the following section for operating details.

AC Servo Drive Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)

3.5 Using an Absolute Encoder

To use an absolute encoder, you must first initialize it.

3.5.1 Initialize the Absolute Encoder

Use the SigmaWin+ Ver.7 to initialize the absolute encoder.

Function to Use	Overview
Reset Absolute Encoder in the Sigma-Win+ Ver.7	This function initializes the absolute encoder. Refer to the following manual for details. Refer to the following manual for how to use Reset Absolute Encoder. 📖 AC Servo Drive Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)

4

Programming

This chapter provides an overview of programming and describes operations related to programming.

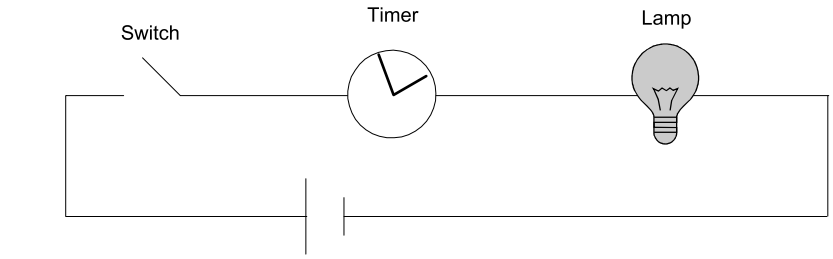
4.1 Ladder Program

This section provides an overview of ladder programming and describes operations that are required when creating a program.

4.1.1 What Is a Ladder Program?

A ladder program uses ladder language instructions and registers to symbolically represent electrical circuits consisting of switches, timers, lamps, and other devices.

<Conceptual Circuit>

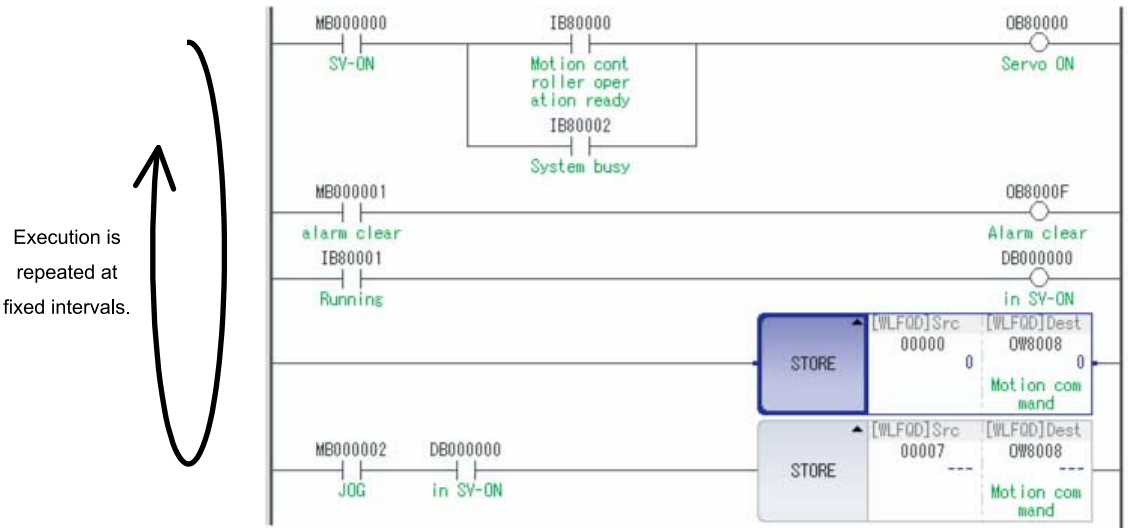


<Ladder Programming>

Ladder programming allows you to easily program large, complex circuits.

Each of the ladder programs that you create is executed in a single scan and then executed repeatedly at fixed intervals.

<Ladder Programming Example>

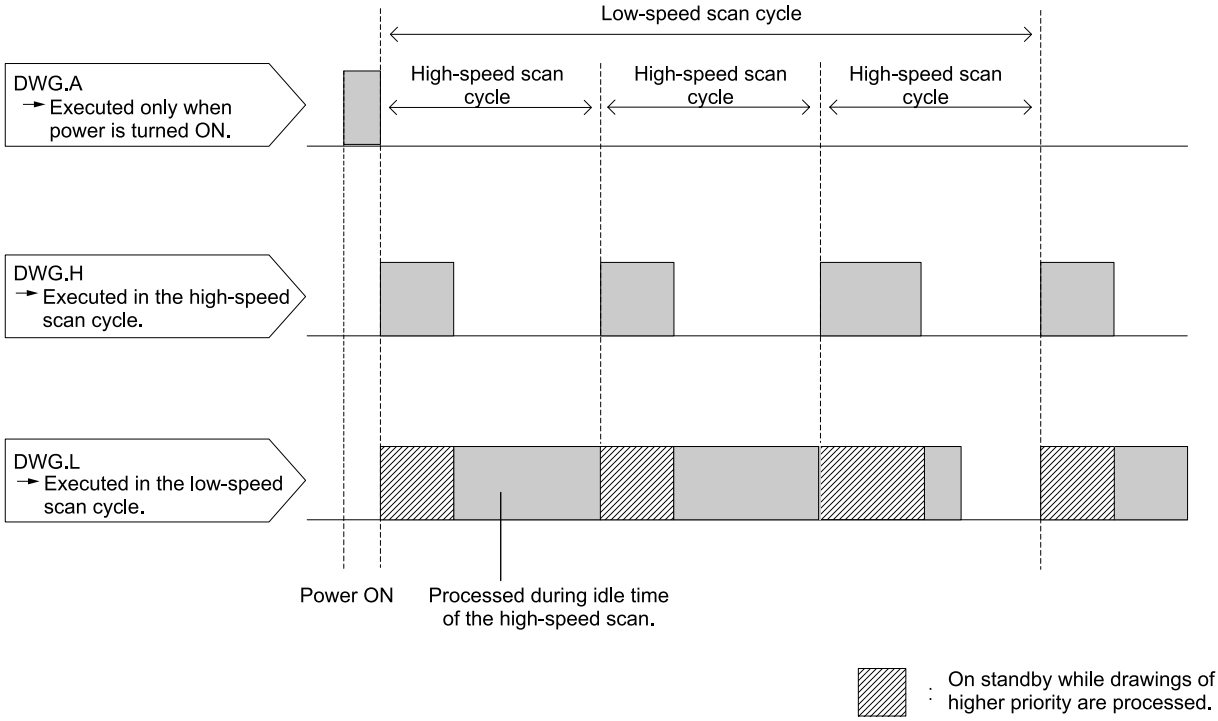


(1) The Various Execution Timing of Ladder Drawings

Ladder programs are managed in units of drawings (DWG). These are called ladder drawings.

Ladder drawings are executed at various times, as illustrated in the following figure.

Processing can be executed at the appropriate time by programming it in the appropriate ladder drawing.

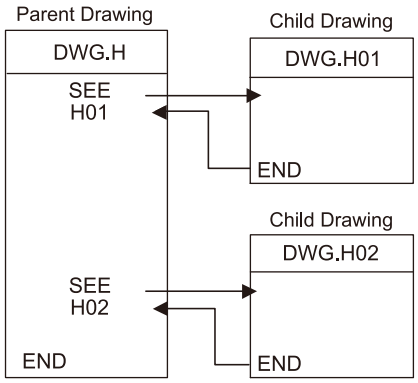


The following table gives the execution timing for each drawing.

Ladder Drawings	Priority	Execution Timing (Processing Example)
DWG.A	1 (High)	This drawing is executed only once when the power is turned ON (e.g., for data initialization).
DWG.H	2 (↑)	This drawing is executed every high-speed scan cycle (e.g., for motion control).
DWG.L	3 (Low)	This drawing is executed every low-speed scan cycle (e.g., for touch panel display processing).

(2) Program Modules

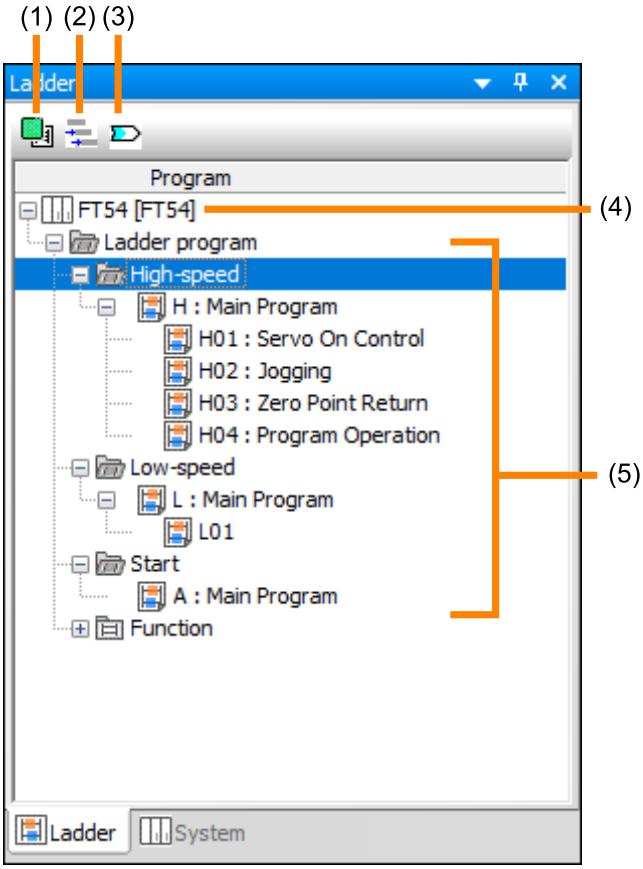
The main program can be separated into modular units to suit different processing requirements, such as child drawings, to make the program easier to read.

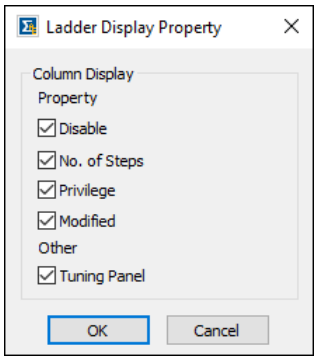
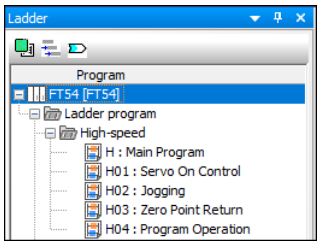
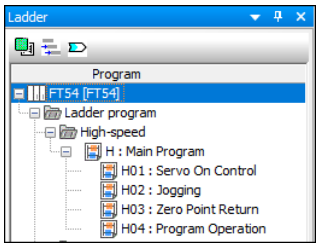
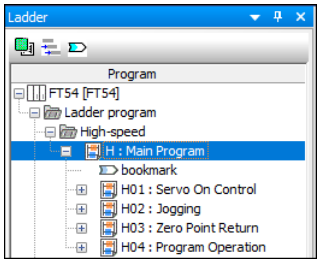


4.1.2 Window Configuration

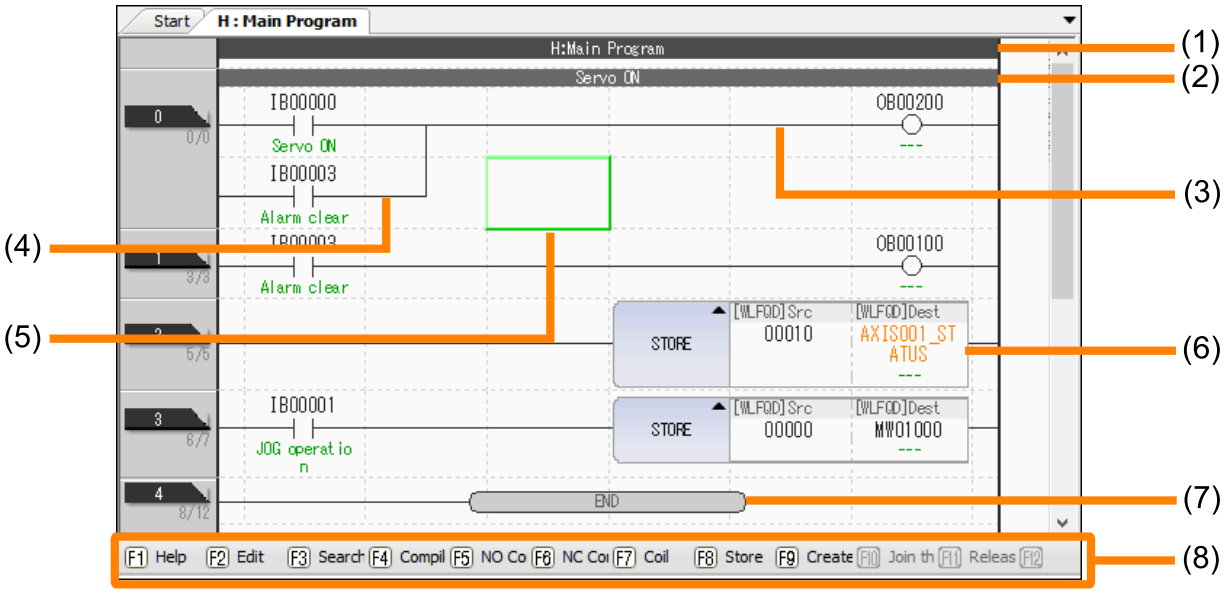
This section describes the names and views for each window used in creating and editing ladder programs.

(1) [Ladder] Window



No.	Name	Contents
(1)	Ladder Program Property	Click this button to display the [Ladder Display Property] window. Select the check boxes for the items to display in the [Ladder] window and click [OK]. Columns for those selected items will be displayed in the [Ladder] window. 
(2)	Switch Hierarchy Display	Click this button to change the level of the ladder program drawing.  
(3)	Show/Hide Bookmarks	If bookmarks were added to the ladder program, you can click this button to display or hide the bookmarks in the [Ladder] window. Refer to the following section for how to set bookmarks. ☞ *4.1.13 Setting Bookmarks on page 151* <When a Bookmark Is Displayed> 
(4)	Project File Name	The name of the project file and model are displayed.
(5)	Ladder Program	The created ladder programs are displayed. The ladder programs are displayed by drawing. Refer to the following section for details on drawings. ☞ *(1) The Various Execution Timing of Ladder Drawings on page 123* You can give the ladder programs a three level structure from level 1 to level 2. The level 1 program is called the main program, and only one main program can be created for each A, H, and L program. The level 2 programs are referenced with the SEE instruction from the program on the level above.

(2) Edit Ladder Program Window



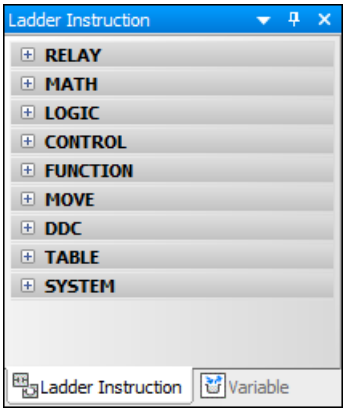
No.	Name	Contents
(1)	Program Comment	The program name that was set when the program was created is displayed. You can edit the program comment.
(2)	Rung Comment	This comment is for the following rung. You can set multiple rung comments for a single rung.
(3)	Rung	A reference line on which objects, such as instructions and branches, are placed.
(4)	Branch	A branch line on which to place instructions in parallel. You can create other branches underneath the branch.
(5)	Input Guide	Shows the input position of the object.
(6)	Instruction Object	The instruction name, registers, variable names, comment, and other information are displayed.
(7)	END Instruction	Shows the end of the program. You cannot edit the END instruction.
(8)	Function Keys	Functions to use when creating ladder programs are displayed as buttons. These buttons function the same as the function keys on the keyboard.

(3) [Variable] Window

Refer to the following section for details on the [Variable] window.

☞ *4.2 Variable on page 165*

(4) [Ladder Instruction] Window



The instructions to use in Edit Ladder Program Window are displayed on this window organized into categories. Click the [+] button to expand the ladder instructions organized into that category.

You can add an instruction to the ladder program by selecting the instruction in the [Ladder Instruction] window and then dragging and dropping it on the Edit Ladder Program Window.

4.1.3 Creating a Drawing

You must create a drawing before creating a ladder program.

There are the following two methods that you can use to create a drawing.

- Creating from the [My Tool] window
- Creating from the [Ladder] Window

The procedures are given below.

(1) Creating from the [My Tool] Window

Use the following procedure to create a new drawing from the [My Tool] window.

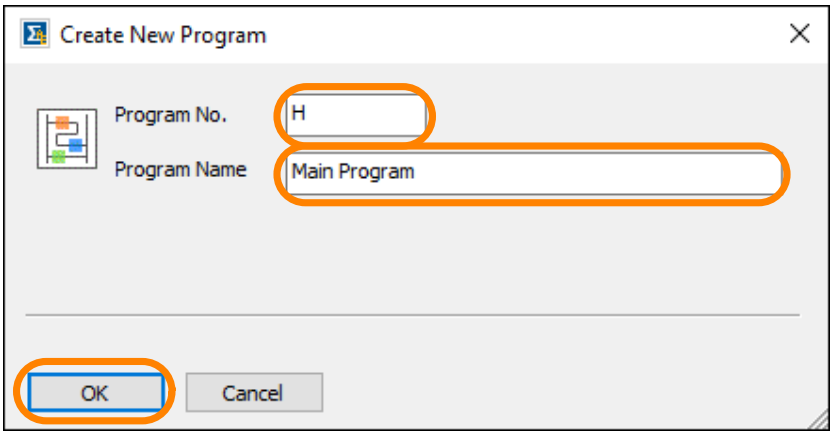
1. **Click the [Create New Ladder Program] button on the [My Tool] window.**

   The [Create New Program] window will be displayed.

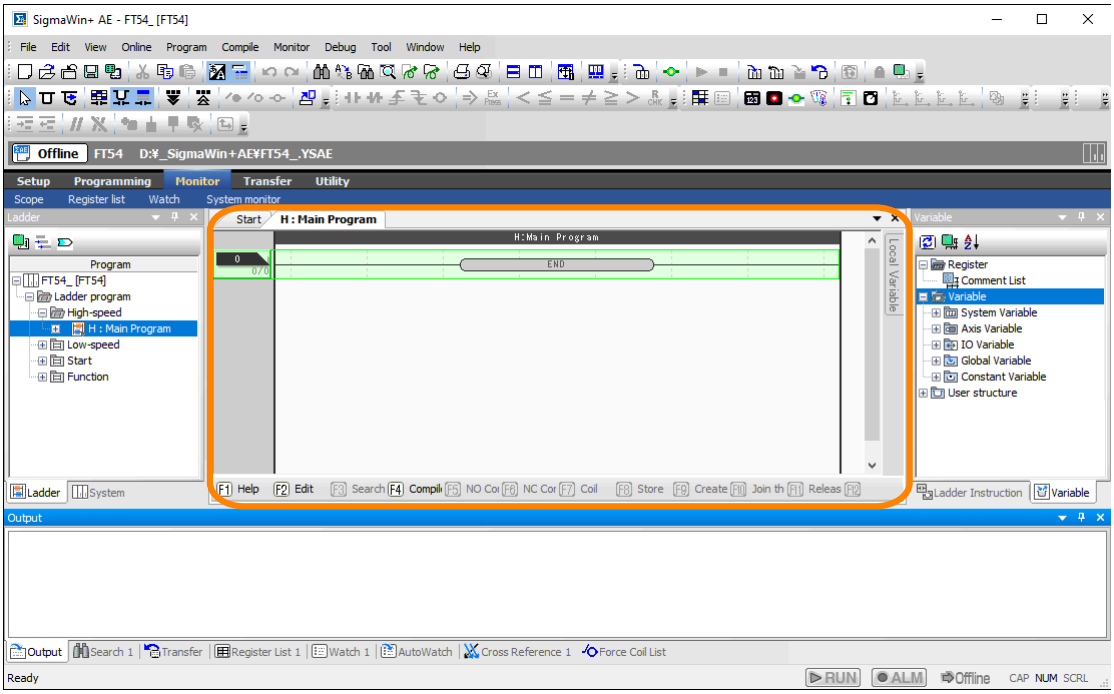
2. **Enter the program number and program name, and then click the [OK] button.**

   Information Refer to the following section for an example for the program number.

   ☞ *(3) Example for the Program Number on page 130*



The new drawing will be displayed.

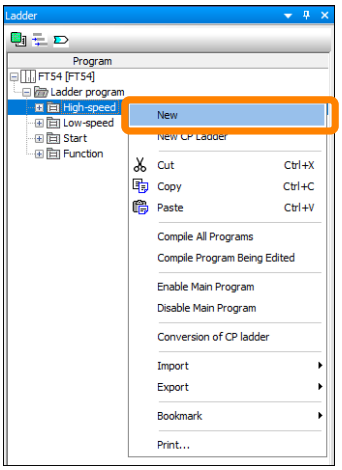


This concludes the procedure.

(2) Creating from the [Ladder] Window

Use the following procedure to create a new drawing from the [Ladder] window.

1. **Right-click the type of ladder program to create in the [Ladder] window, and select [New].**



Information

Creating Child Drawings
Child drawings can be created only if a parent drawing exists.
Right-click the program (parent drawing) for which to create a child drawing.

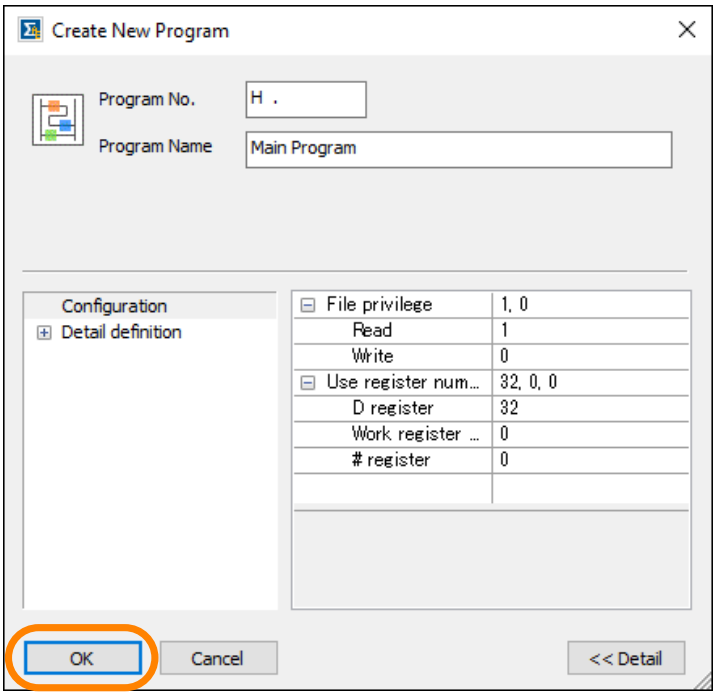
The [Create New Program] window will be displayed.

2. **Change the settings as required, and then click the [OK] button.**

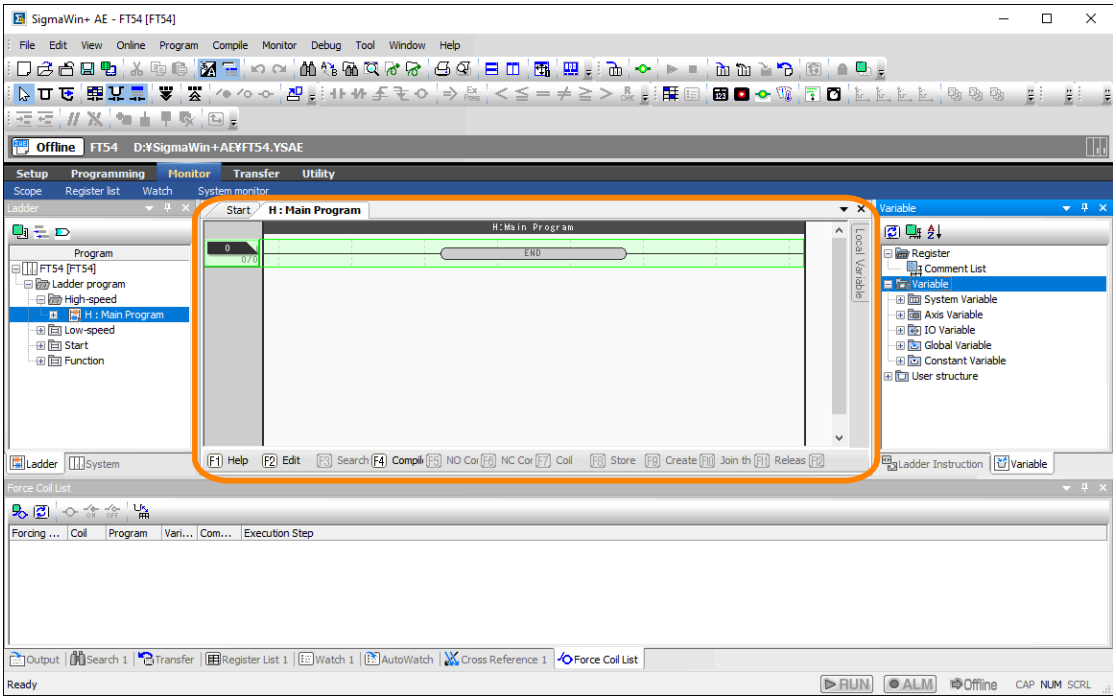
Information

Refer to the following section for an example for the program number.

☞ *(3) Example for the Program Number on page 130*



The new drawing will be displayed.



This concludes the procedure.

(3) Example for the Program Number

H 01

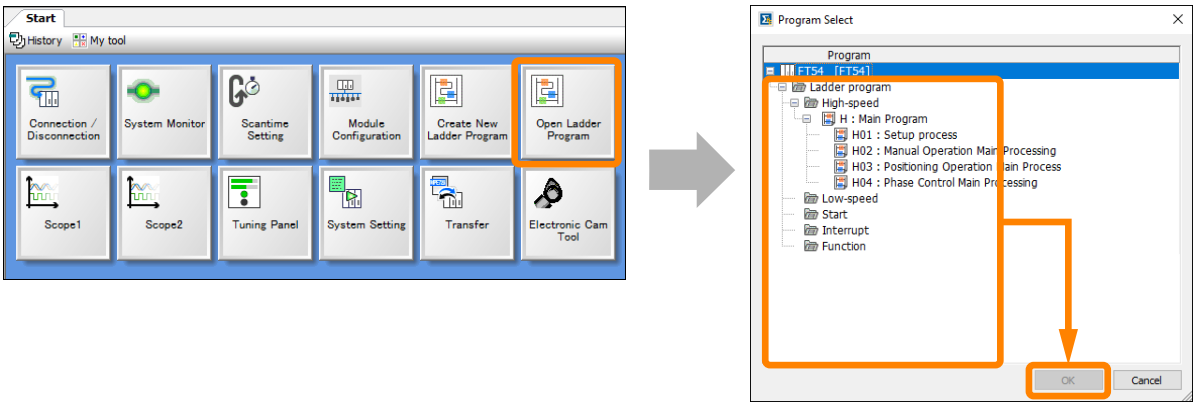
(1) (2)

No.	Item	Description
(1)	Parent drawing type	• A: Startup drawing • H: High-speed scan process drawing • L: Low-speed scan process drawing
(2)	Child drawing	Setting range: 01 to 99

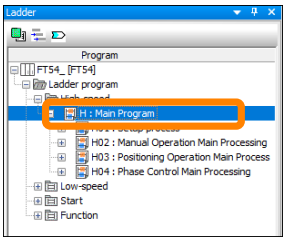
4.1.4 Opening a Drawing

Use one of the following methods to open a created drawing.

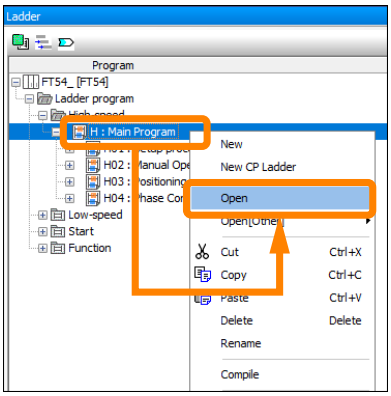
- Click the [Open Ladder Program] button on the [My Tool] window.
  The [Program Select] dialog box will be displayed. Click the drawing to open, and then click the [OK] button.



- Double-click the drawing to open on the [Ladder] window.



- Right-click the drawing to open on the [Ladder] window and select [Open].



4.1.5 Creating New Ladder Programs

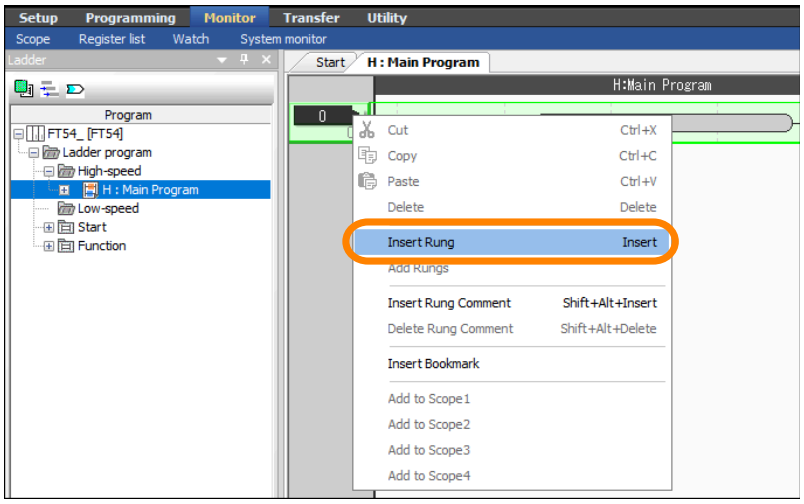
This section describes the following five operations to create ladder programs.

- Inserting a rung
- Inserting an instruction
- Setting the variable, register, and comment
- Inserting a branch
- Editing a rung

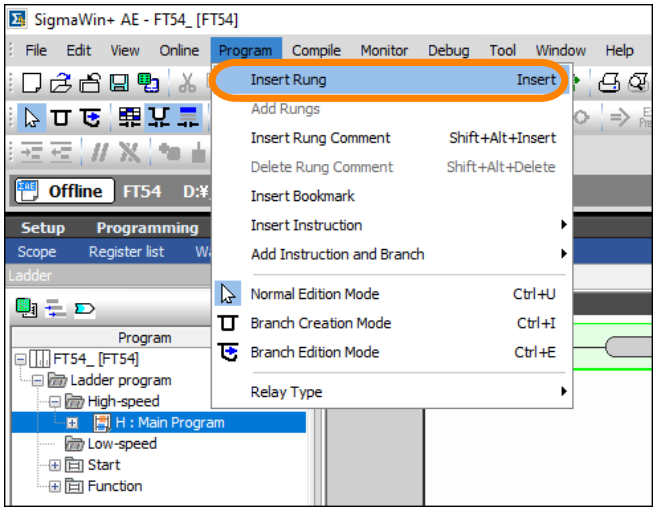
(1) Inserting a Rung

Use one of the following methods to insert a rung.

- Right-click where rung is to be inserted, and select [Insert Rung].



- Place the mouse cursor where the rung is to be inserted, and select [Insert Rung] from the [Program] menu.

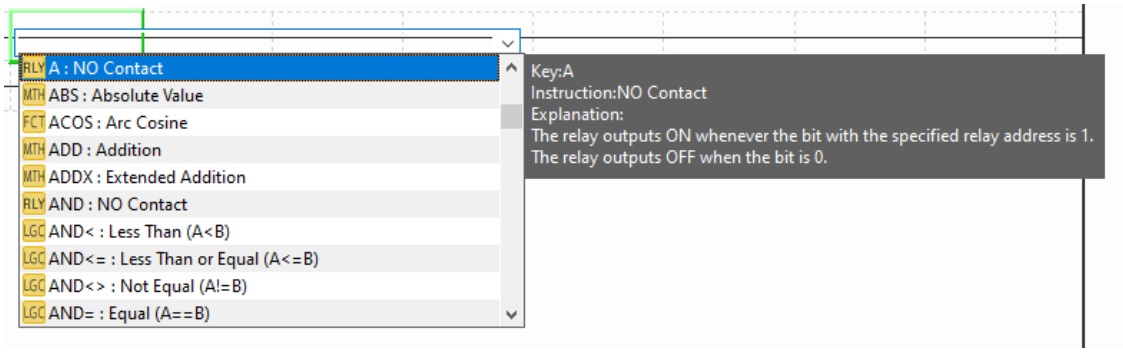


- Place the mouse cursor where the rung is to be inserted, and press the **Insert** key.

(2) Inserting an Instruction

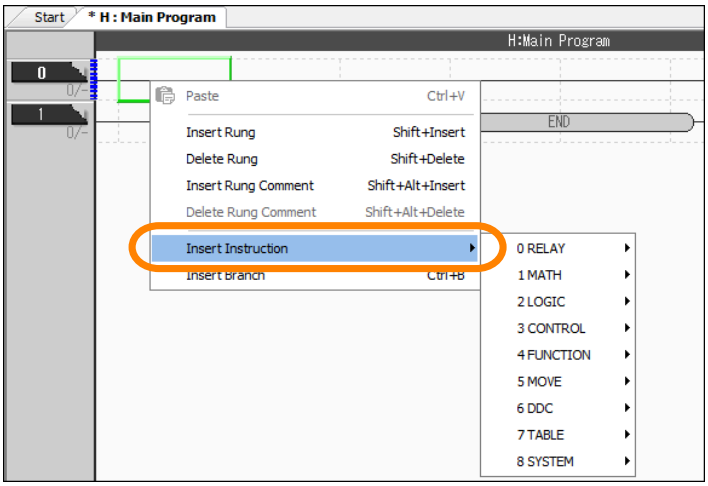
Use one of the following methods to insert an instruction.

- Enter a text string or double-click the location where the instruction is to be inserted, and select the instruction you want to insert from the list of instructions that is displayed. (The autocomplete function is used.)

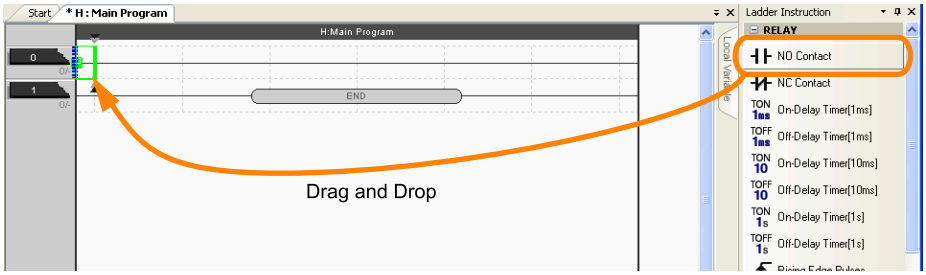


Refer to the following section for details on the autocomplete function.
☞ *4.1.16 Using the Autocomplete Function on page 155*

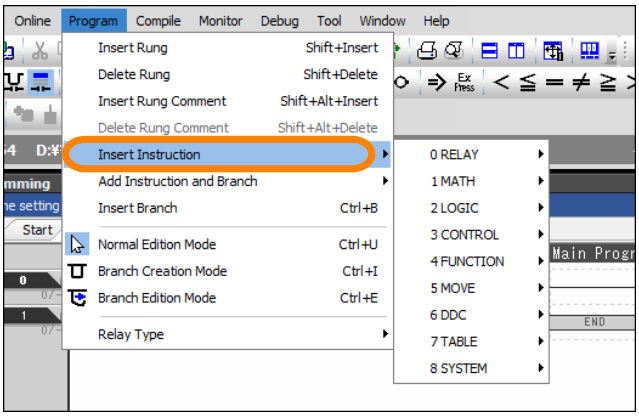
- Right-click where the instruction is to be inserted, and select the desired instruction under [Insert Instruction].



- Drag the desired instruction from the [Ladder Instruction] window to where the instruction is to be inserted.



- Place the mouse cursor where the instruction is to be inserted, and select [Insert Instruction] followed by the desired instruction from the [Program] menu.



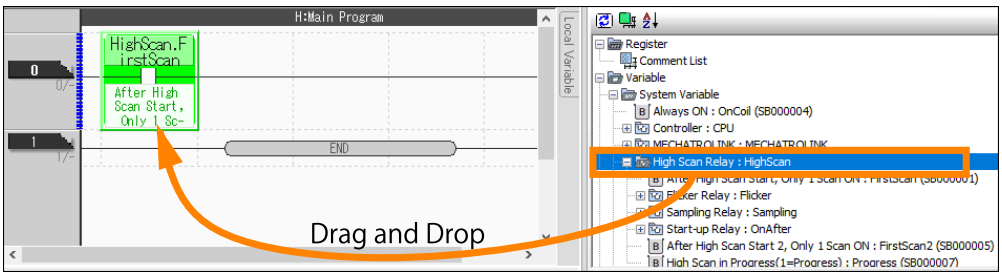
Detailed procedures are given only for setting the Expression instruction. Refer to the following section for details.

☞ *4.1.7 Easily Performing Numeric Operations in Ladder Programs on page 139*

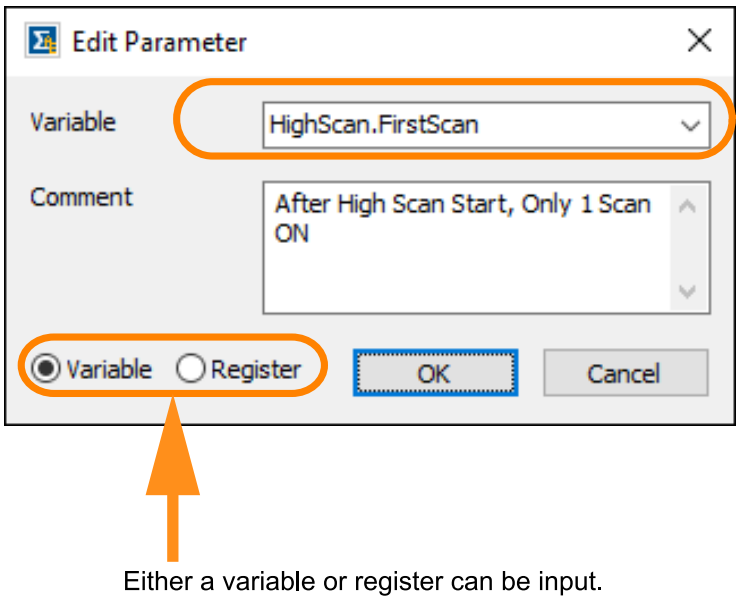
(3) Setting the Variable, Register, and Comment

After you insert the instruction, use one of the following methods to set the variable, register, and comment.

- If you drag a variable from the [Variable] window and drop it on an instruction, the variable will be set for that instruction.



- If you double-click ? or ---, the [Edit Parameter] window will be displayed, on which you can set the variable or register and comment.



(4) Insert a branch

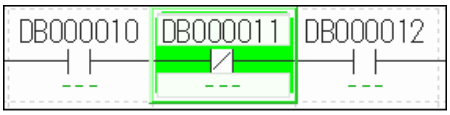
Use one of the following methods to insert a branch.

- Placing the same instruction parallel to the selected instruction
- Placing an arbitrary instruction in parallel

Information A branch can be inserted on the same rung only. You cannot create a branch that spans multiple rungs.

(a) Placing the Same Instruction Parallel to the Selected Instruction

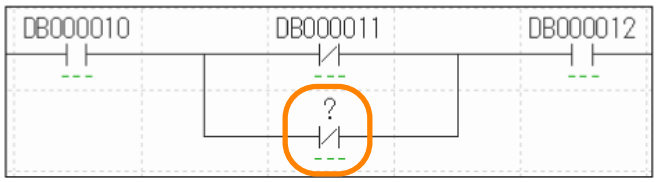
1. **Select the instruction object where the branch will be inserted.**



2. **Use one of the following methods to insert the object.**

   - Right-click the instruction object, and select [Insert Branch].
   - Select [Insert Branch] from the [Program] menu.
   - Press **Ctrl** + **B**.

   A branch will be inserted parallel to the selected instruction object, and the same instruction will be placed on that branch.

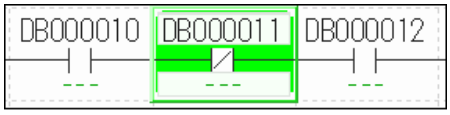


Information
- Only one instruction can be placed on the branch with this operation.
- The data, such as variable names and addresses, is not copied to the instruction placed in parallel.
- Refer to the following section for how to set the comment and register of the inserted instruction.

☞ *(3) Setting the Variable, Register, and Comment on page 133*

(b) Placing an Arbitrary Instruction in Parallel

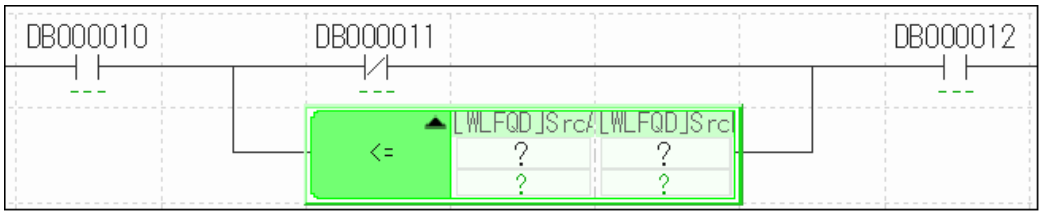
1. **Select the instruction object where the branch will be inserted.**



2. **Use one of the following methods to insert the object.**

- Right-click the instruction object, and select [Add Instruction and Branch] - [(Instruction Type)] - [(Instruction)].
- Select [Add Instruction and Branch] - [(Instruction Type)] - [(Instruction)] from the [Program] menu.
- Drag and drop an instruction in the [Ladder Instruction] window to the instruction object in step 1.

A branch will be inserted parallel to the instruction object selected in step 1, and the instruction selected in step 2 will be placed on that branch.



Information Refer to the following section for how to set the comment and register of the inserted instruction.

☞ *(3) Setting the Variable, Register, and Comment on page 133*

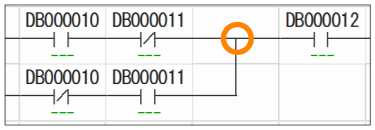
(5) Editing a Branch

There are the following four methods that you can use to edit a branch.

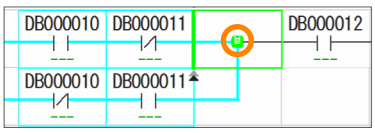
- Pasting a branch
- Moving a branch by dragging
- Changing a branching point
- Deleting a branch

(a) Pasting a Branch

1. **Click the branching point of the branch.**



The branch edit mark ( ) will be displayed, and the branch to cut or copy will be displayed in blue.



2. **Use one of the following methods to cut or copy the branch.**

- Right-click the edit mark, and select [Cut] or [Copy].
- Select [Cut] or [Copy] from the [Edit] menu.
- Press **Ctrl** + **X** (Cut) or **Ctrl** + **C** (Copy).

3. **Select the location to paste the branch.**

4. **Use one of the following methods to paste the branch.**

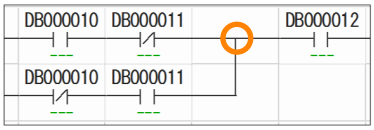
- Right-click the edit mark, and select [Paste].
- Select [Paste] from the [Edit] menu.
- Press **Ctrl** + **V**.

This will insert the branch that was cut or copied at the location of the input guide.

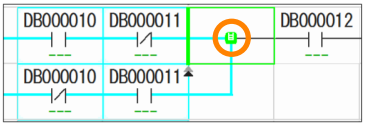
Information The branch can also be pasted on a rung on another ladder drawing.

(b) Moving a Branch by Dragging

1. **Click the branching point of the branch.**



The branch edit mark ( ) will be displayed, and the branch to move will be displayed in blue.



2. **Drag the edit mark, and release the mouse point where the input guide is displayed at the destination.**

Information The branch can also be moved to a rung on another ladder drawing.

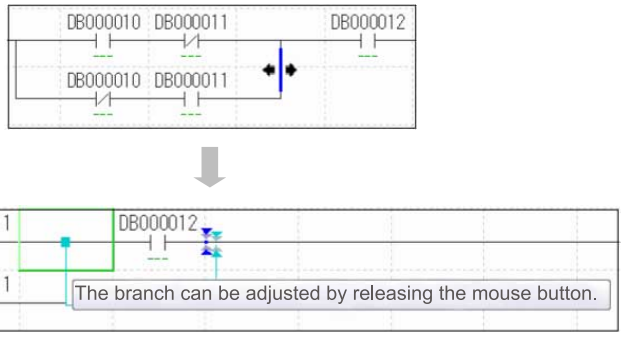
(c) Changing a Branching Point

1. **Use one of the following methods to set Branch Edition Mode.**

- Click the [Branch Edition Mode] button on the toolbar.
- Select [Branch Edition Mode] from the [Program] menu.

The cursor will change to the branch edit cursor.

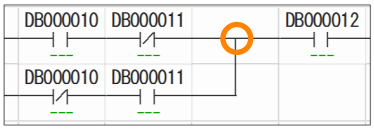
2. **Drag the branching line and release the mouse at the new branching location.**



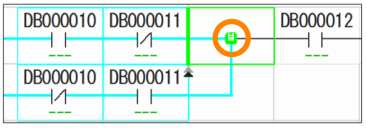
3. **Click the [Normal Edition Mode] button on the toolbar. Branch Edition Mode will end, and the cursor will return to normal.**

(d) Deleting a Branch

1. **Click the branching point of the branch.**



The branch edit mark ( ) will be displayed, and the branch to delete will be displayed in blue.

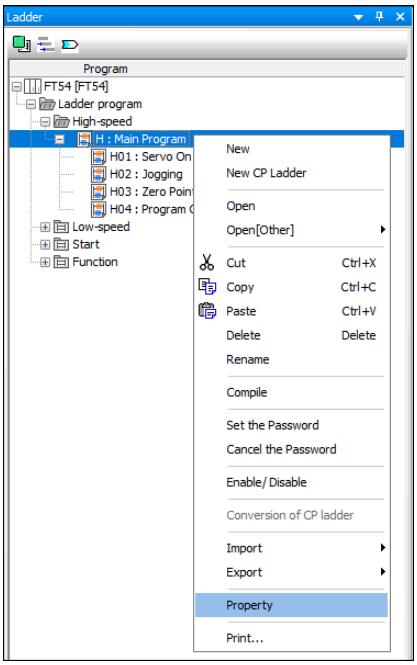


2. **Use one of the following methods to delete the branch.**
   - Right-click the edit mark, and select [Delete].
   - Select [Delete] from the [Edit] menu.
   - Press the **Delete** key

4.1.6 Checking the Properties of a Ladder Program

You can check the properties (configuration, detail definition, and modification history) of a ladder program. Use the following procedure.

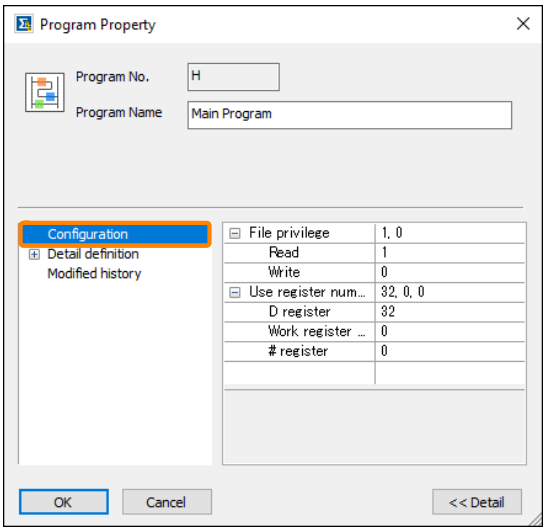
1. **In the [Ladder] window, right-click the ladder program file for which to view the properties.**
2. **Select [Property].**



The [Program Property] window will be displayed.

(1) Configuration Definition

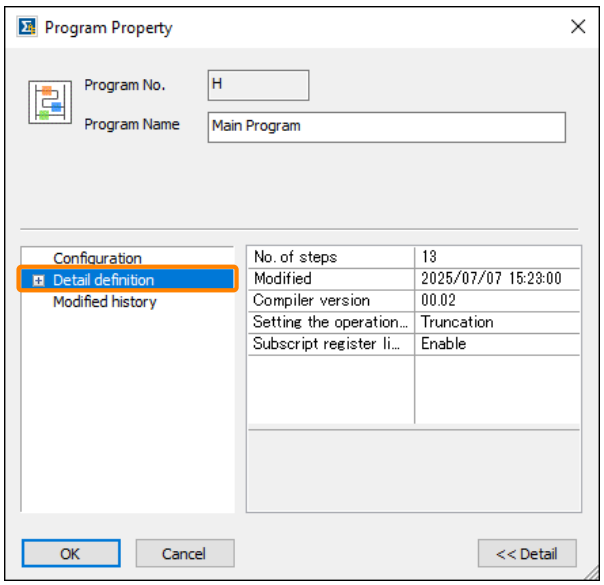
You can set the file privileges and number of registers that are used here.



Item	Description
File privilege	The read privilege level and write privilege level for this program are displayed. The program read privilege and write privilege levels are items created to maintain program security. To open a program, that user must have a user privilege level that is greater than or equal to the read privilege level of that program. In the same manner, to edit and save a program, that user must have a user privilege level that is greater than or equal to the write privilege level of that program. Refer to the following section for information on setting and checking the user privilege level. ☞ *7.1 User Management on page 300*
Read	Select the read privilege level for this program from 0 to 7. A higher number is a higher privilege level. You cannot enter a numeric value. You cannot set a read privilege level that is higher than your own user privilege level. For example, if your privilege level is 3, you cannot set the privilege level to 4 or higher.
Write	Select the write privilege level for this program from 0 to 7. A higher number is a higher privilege level. You cannot enter a numeric value. You cannot set a write privilege level that is higher than your own user privilege level.
Use register numbers	The number of D registers, work registers, # registers, and first addresses for auto assign that are used by this program are displayed.
D register	Set the maximum number of D registers that are used by this program between 0 and 16384. You can directly set a numeric value or use the spin buttons.
Work register	The number of D registers used by the system as work registers is displayed. You cannot set this value.
# register	Set the maximum number of # registers that are used by this program between 0 and 16384. You can directly set a numeric value or use the spin buttons.
First Address for Auto Assign	Set the first address of the D registers that are automatically assigned to the Param operand when the MLx instruction is inserted into the drawing. The setting range is 0 to 16383.

(2) Detail Definition

You can check the number of program steps to execute and the date/time the program was last modified, set the operation when performing real number casting, and display/set the subscript register limit check.



Item	Description
No. of steps	The number of steps that are being executed is displayed. This value cannot be changed.
Modified	The date and time the program was last modified is displayed. If you compile the program, the date and time will be updated. This value cannot be changed.

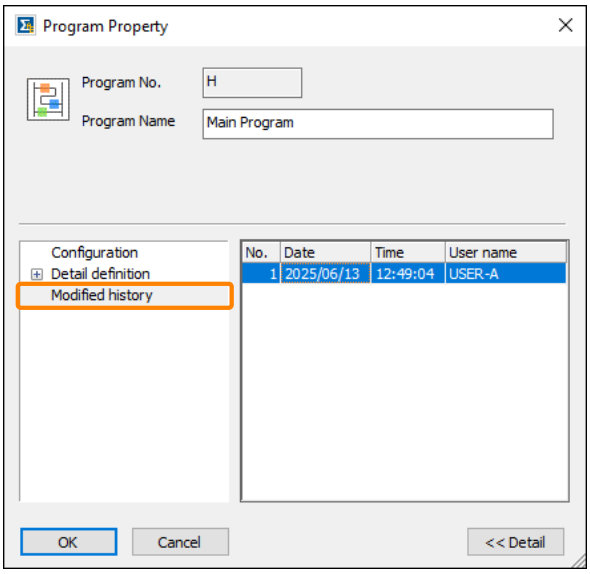
Continued on next page.

Continued from previous page.

Item	Description
Setting the operation when real number	You can set the operation when converting data from real numbers to integers.
Subscript register limit check	You can set the operation when using index registers. Enable: Detects index errors. Disable: Does not detect index errors.

(3) Modified History

You can check the modification history here.

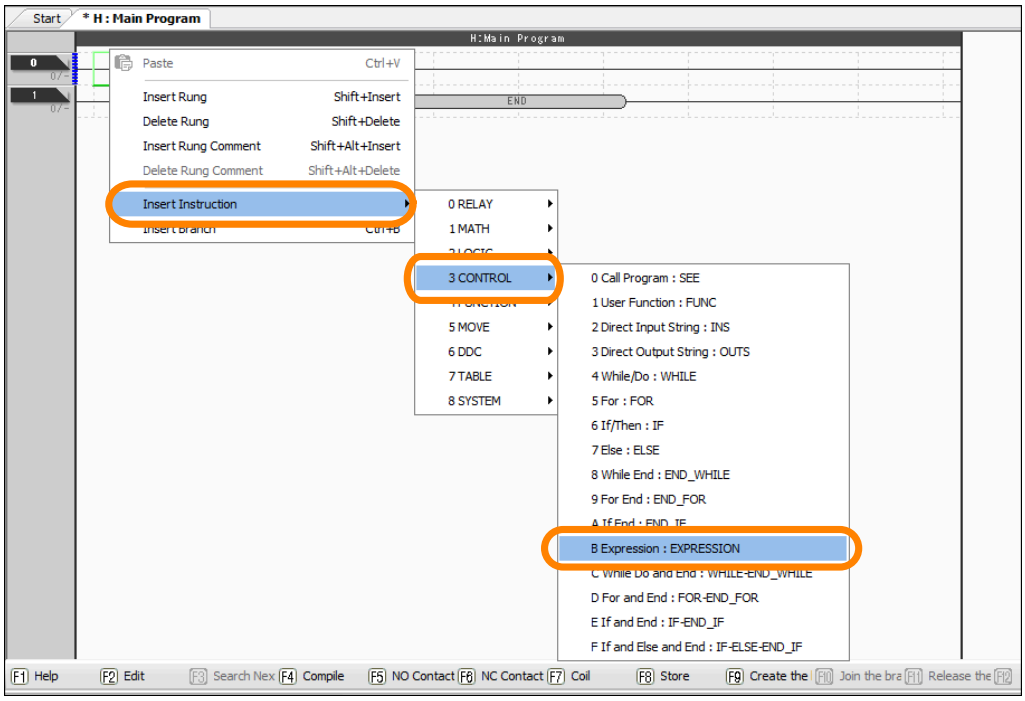


Item	Description
Modified history	The modification history of the program is displayed up to a maximum of 10 entries.

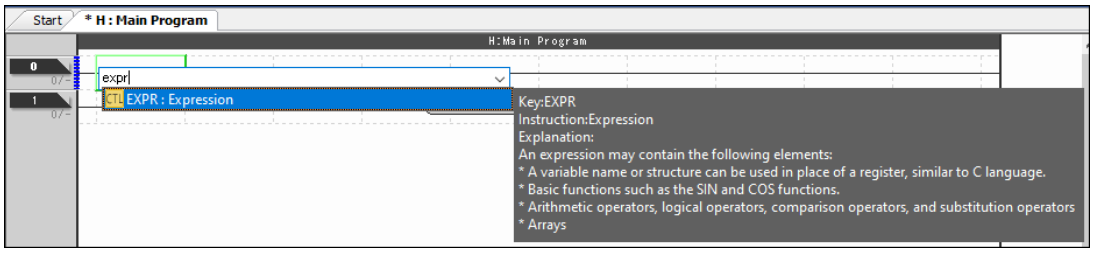
4.1.7 Easily Performing Numeric Operations in Ladder Programs

When performing numerical operations in ladder programming, several extra rungs must be used to store interim calculation results between numeric operations performed with instructions, such as ADD and SUB. With the Expression instruction, you can easily perform complex operations by writing complex formulas inside a single instruction. Use the following procedure.

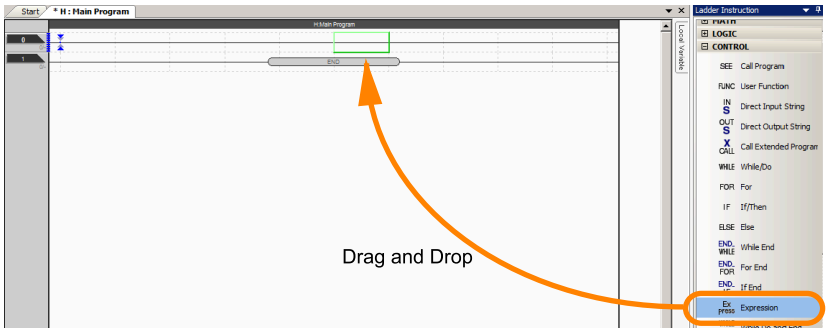
1. **Use one of the following methods to insert an Expression instruction.**
   - Right-click where the instruction is to be inserted, and select [Insert Instruction] - [CONTROL] - [Expression:EXPRESSION].



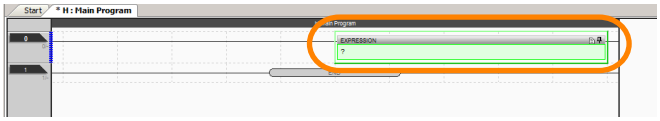
- Place the mouse cursor where the instruction is to be inserted, and enter “expr”.



- In the [Ladder Instruction] window, click the [+] button next to [CONTROL], and then drag the [Expression] instruction to where the instruction is to be inserted.

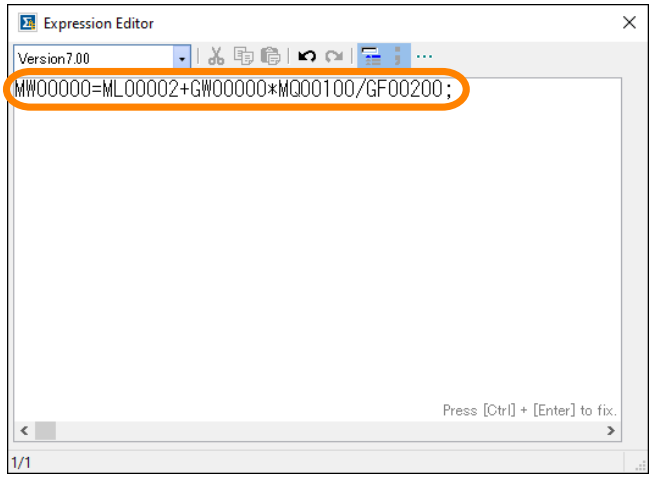


2. **Double-click the Expression instruction that was inserted.**



The [Expression Editor] window will be displayed.

3. **Enter the arithmetic expression.**

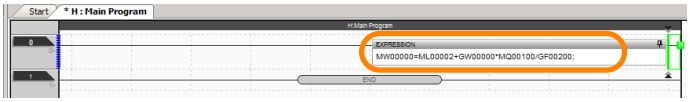


Refer to the following ladder programming manual for details on limitations on operators, instructions, and functions that can be used inside an Expression instruction.

YRM1000/MPX1000 Series Ladder Program Programming Manual (Manual No.: SIEP C890101 10)

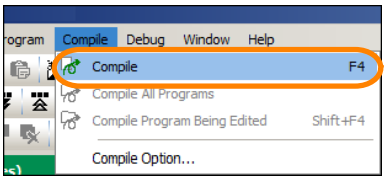
4. **Hold down the Ctrl key and press the Enter key.**

The [Expression Editor] window will close and the entered information will be displayed.

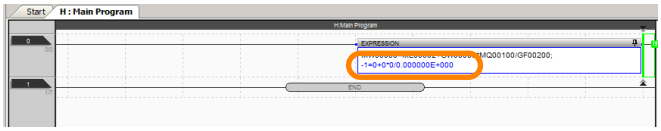


5. **Use one of the following methods to compile the program.**

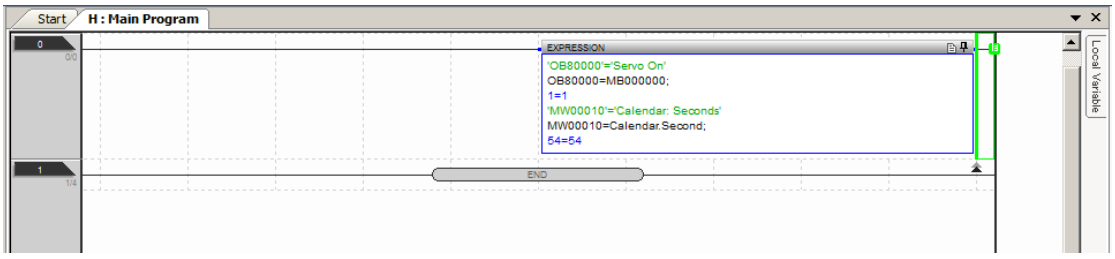
- Press the **F4** key.
- Select [Compile] from the [Compile] menu.



If the compilation is successful, the SERVOPACK will execute the Expression instruction and display the current value below the formula.



If there is a comment for a register used in the formula, the register comment will be displayed above the formula.



This concludes the procedure.

4.1.8 Automatically Registering Address Registers as Variables

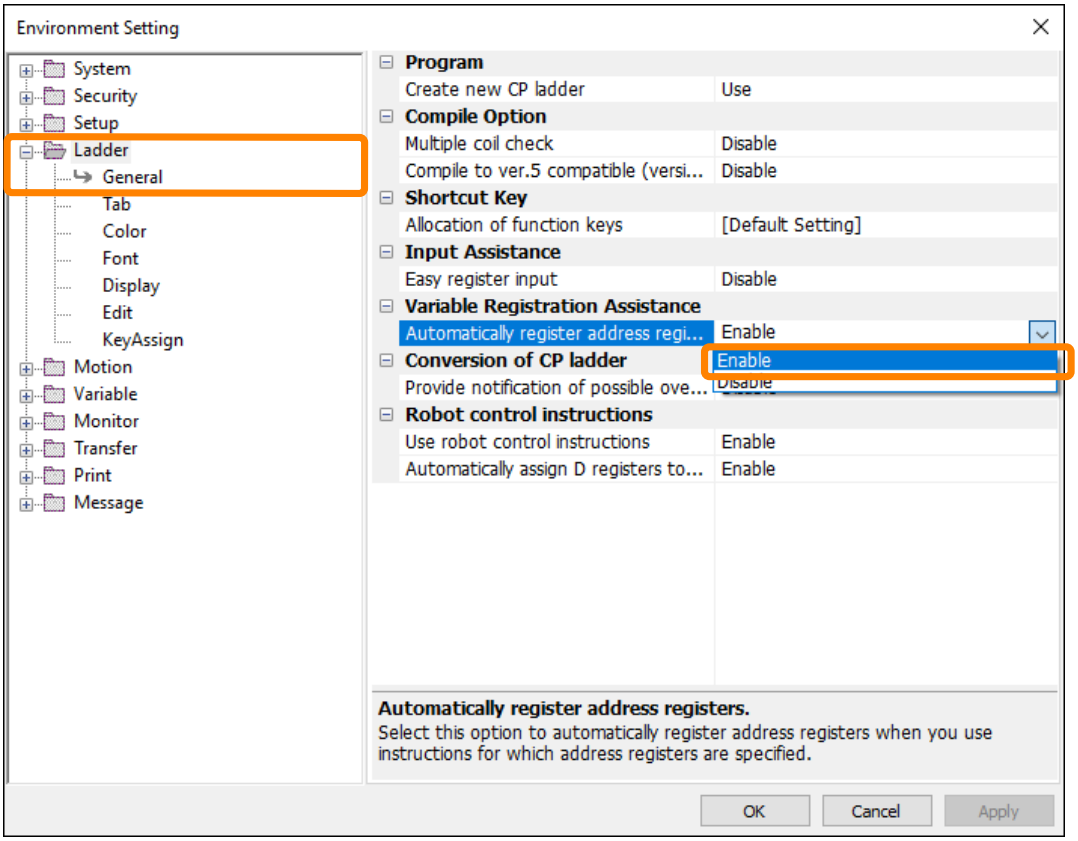
You can automatically register address registers as variables when you use instructions for which address registers are specified. If you register variables, detailed information on the parameters for the address registers will be displayed in window, eliminating the need to look up information in manuals and other resource materials.

Use the following procedure. The COUNTER instruction is used as an example.

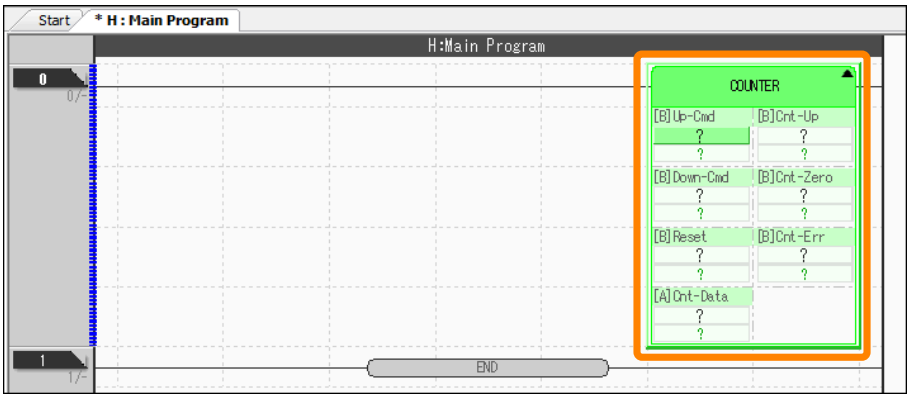
1. **On the [Environment Setting] window, select [Ladder] - [General], and then set [Automatically register address registers] to [Enable].**

   Refer to the following section for details on the [Environment Setting] window.

   ☞ *8.1 Environment Setting on page 325*

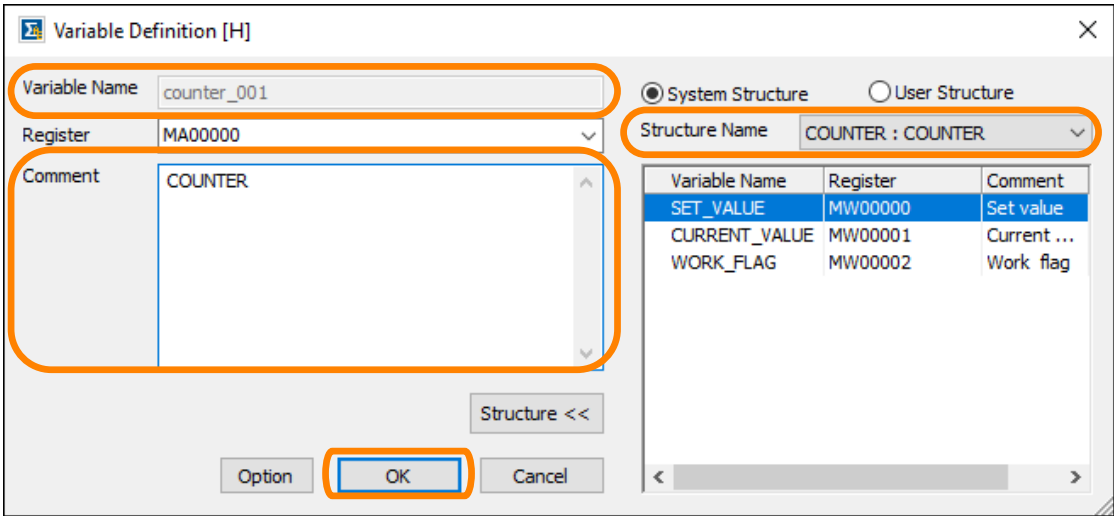


2. **On the Edit Ladder Program Window, insert the COUNTER instruction and enter the address of the address register.**



The [Variable Definition] window will be displayed.

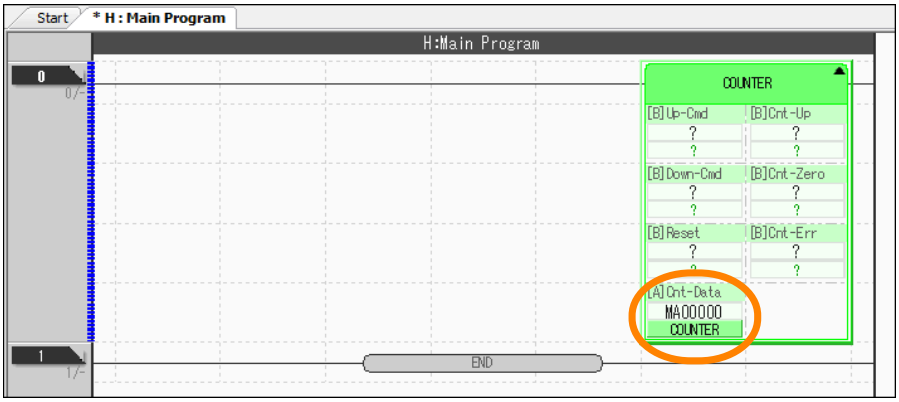
3. **Set the following items, and then click the [OK] button.**



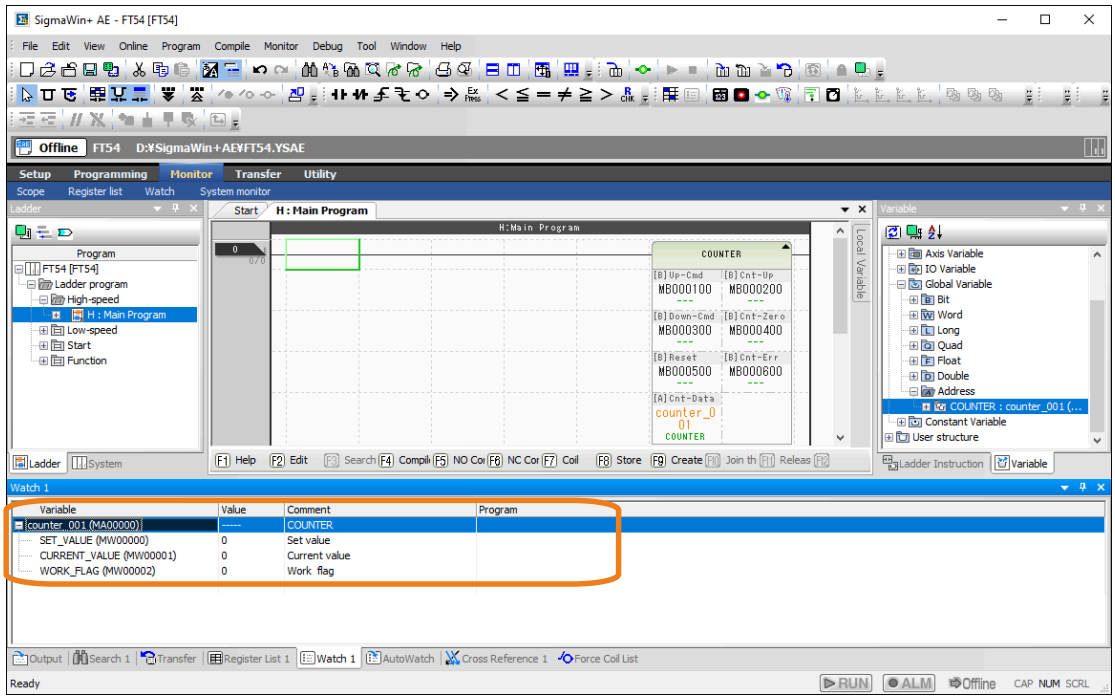
Item	Description
Variable	Enter a variable name. The following name is displayed by default: Structure_□□□. The boxes are automatically replaced with a number. <Setting Conditions> • 64 alphanumeric characters maximum. • The first character is an alphabetic character.
Comment	Enter a comment. Carriage returns and line feeds cannot be used. By default, the description of the ladder instruction that was inserted is entered. <Setting Conditions> 255 characters maximum.
Structure Name	Select a structure. Only structures that are related to the instruction that was inserted are displayed as candidates in the list.

The variable name and comment are displayed in the ladder program.

4. **Right-click the address register for which you want to check detailed information, and select [Add to Watch].**



Detailed information on the selected address register will be displayed in the [Watch] window.



This concludes the procedure.

4.1.9 Toggling the Display of Registers, Variables, and Comments

You can toggle whether to display or hide registers, variables, and comments in the Edit Ladder Program Window.

<When a Register, Variable, and Comment Are Displayed>

<When a Register and Comment Are Displayed>

<When a Variable and Comment Are Displayed>

<When Only a Register Is Displayed>

<When Only a Variable Is Displayed>

Information Variables and registers cannot be hidden at the same time.

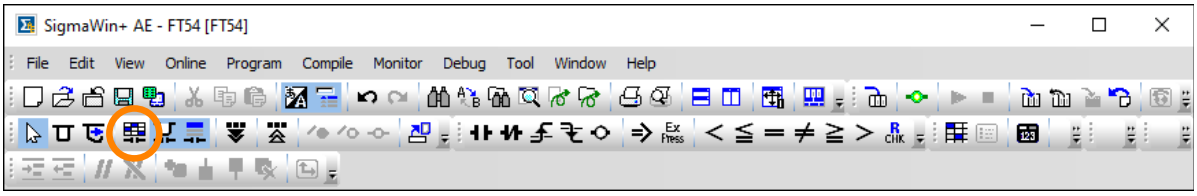
There are the following three methods that you can use to display or hide these elements.

- Using the buttons on the toolbar
- Using the shortcut keys
- Using the [Environment Setting] Window

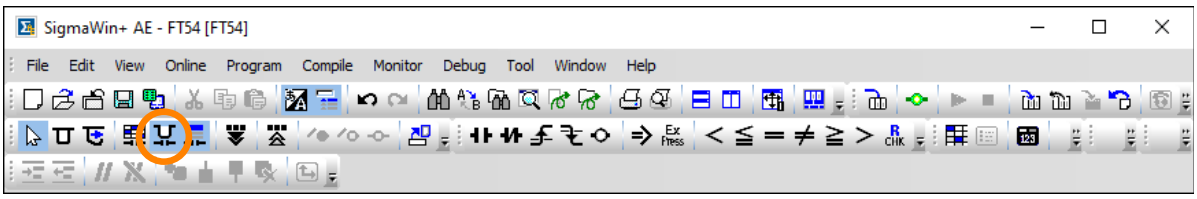
The procedures are given below.

(1) Using the Buttons on the Toolbar

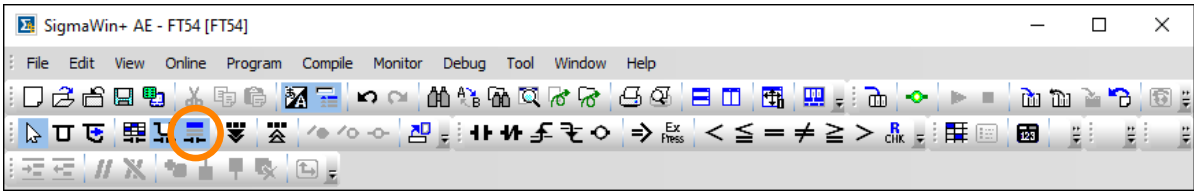
- Toggle between displaying and hiding registers.



- Toggle between displaying and hiding variables.



- Toggle between displaying and hiding comments.



(2) Using the Shortcut Keys

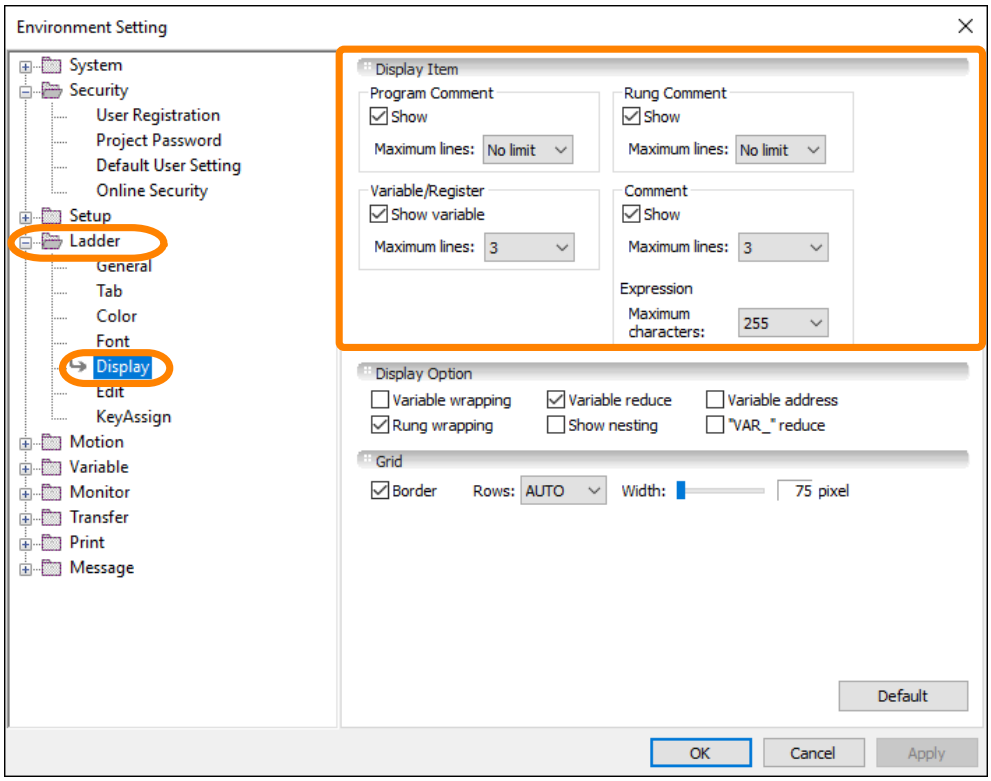
- Displaying or hiding registers: Hold down the **Ctrl** key and press the **F5** key.
- Displaying or hiding variables: Hold down the **Ctrl** key and press the **F7** key.
- Displaying or hiding comments: Hold down the **Ctrl** key and press the **F8** key.

(3) Using the [Environment Setting] Window

You can also toggle between displaying and hiding registers, variables, and comments on the [Environment Setting] window.

Refer to the following section for details on the [Environment Setting] window.

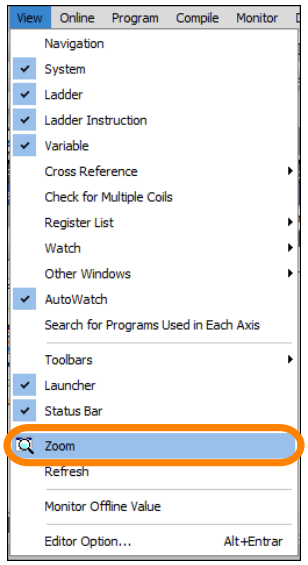
☞ *8.1 Environment Setting on page 325*



4.1.10 Zooming the Display

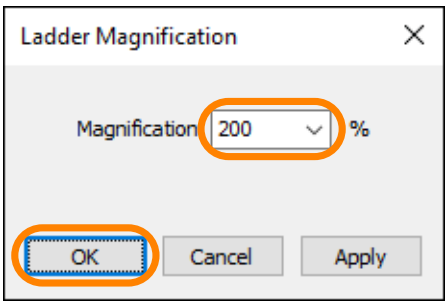
Use the following procedure to zoom the Edit Ladder Program Tab Page.

1. **Select [Zoom] from the [View] menu.**



The [Ladder Magnification] window will be displayed.

2. **Set a value for [Magnification], and click the [OK] button.**



The [Ladder Magnification] window will close, and the setting will be applied to the Edit Ladder Program Window.

This concludes the procedure.

4.1.11 Creating a CP Ladder Drawing

There are the following two methods that you can use to create a CP ladder drawing that are compatible with MPE720 Ver.5 or earlier versions of the engineering tool.

- Using the [Ladder] window
- Using the launcher

The procedures are given below.

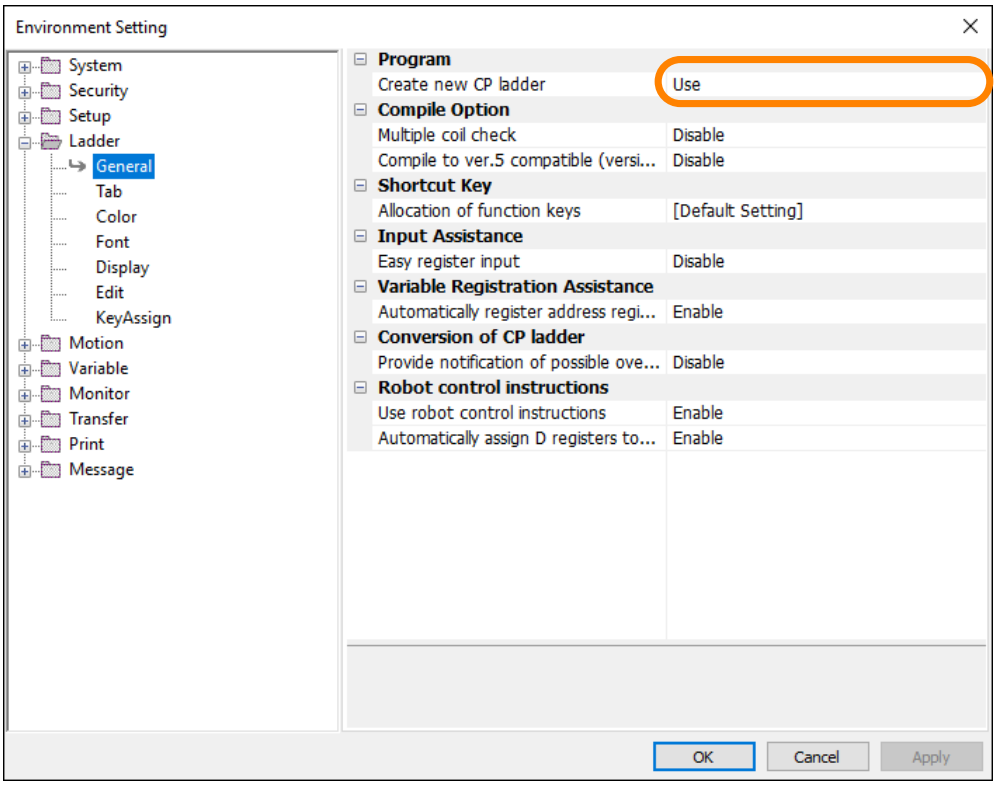
(1) Using the [Ladder] window

Use the following procedure to create a new CP ladder drawing using the [Ladder] window.

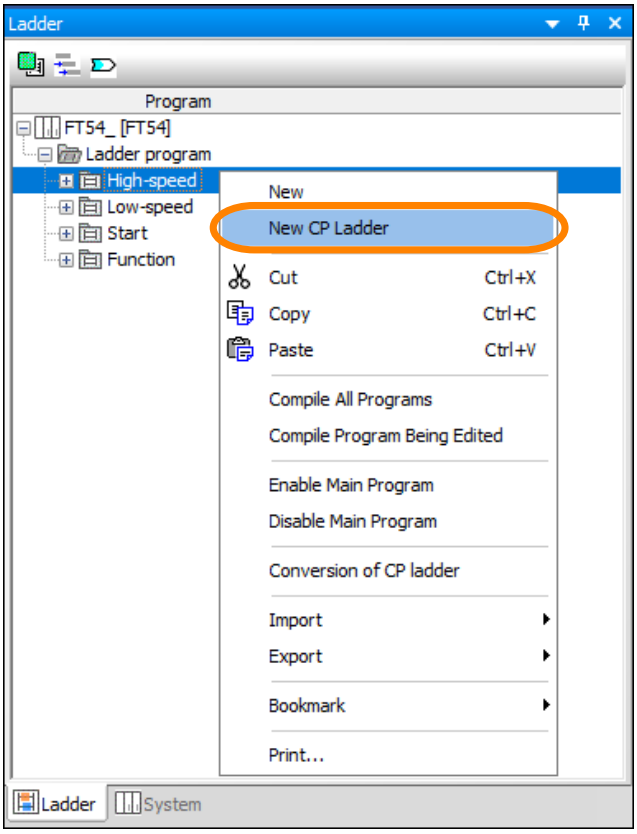
1. **On the [Environment Setting] window, set [Create new CP ladder] to [Use].**

Refer to the following section for details on the [Environment Setting] window.

☞ *8.1 Environment Setting on page 325*

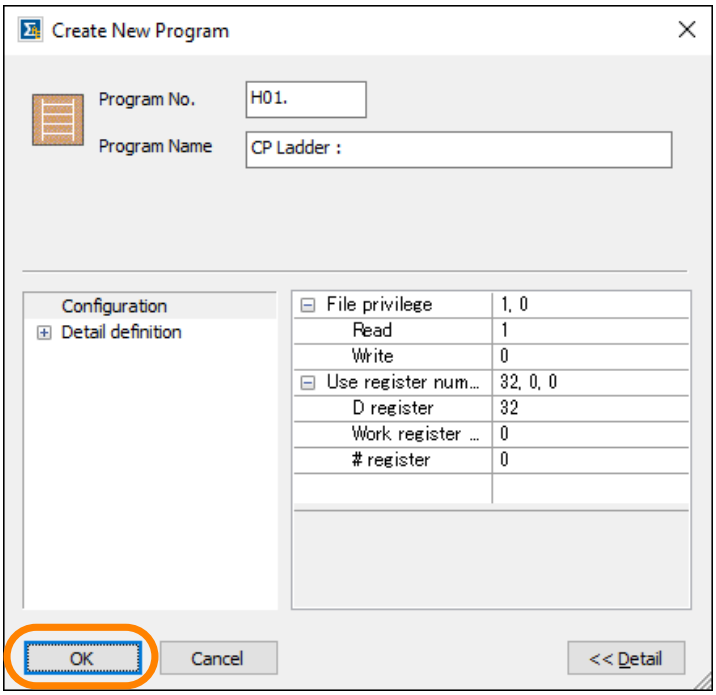


2. **Right-click in the [Ladder] window, and select [New CP Ladder].**

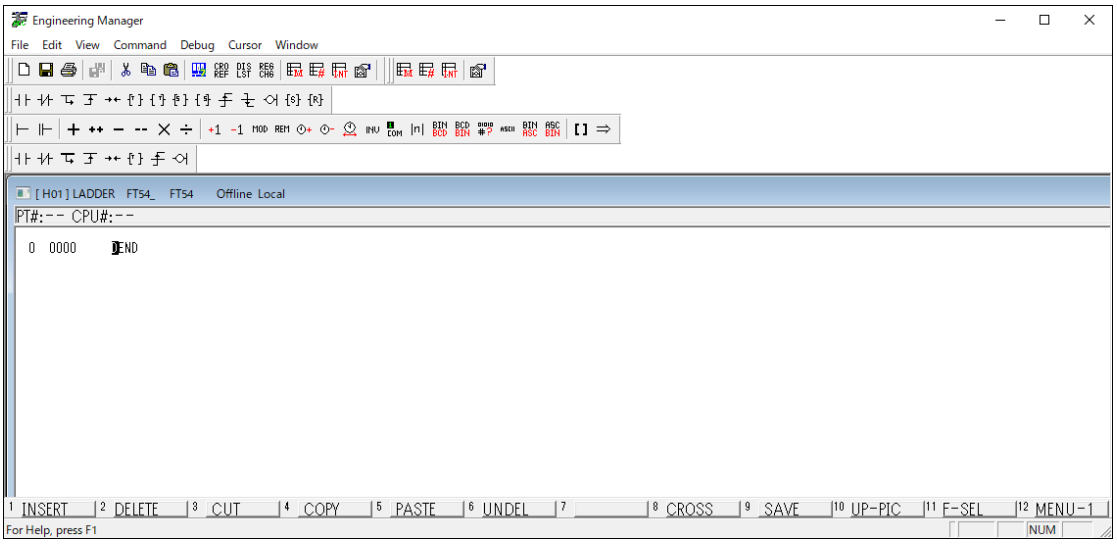


The [Create New Program] window will be displayed.

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



The Edit CP Ladder Window will be displayed inside the Engineering Manager Window.



Refer to the following manual for details on the features and operating procedures of the Engineering Manager.

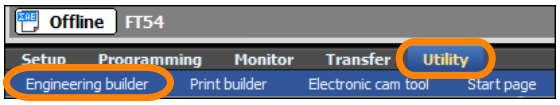
Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (Manual No.: SIEP C880700 05)

This concludes the procedure.

(2) Using the launcher

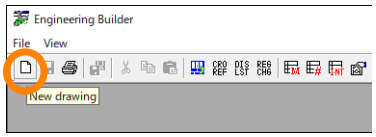
Use the following procedure to create a new CP ladder drawing using the launcher.

1. **Select [Utility] - [Engineering builder] from the launcher.**



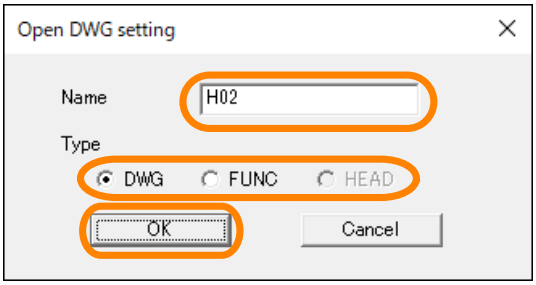
The [Engineering Builder] window will be displayed

2. **Click the [New drawing] button.**

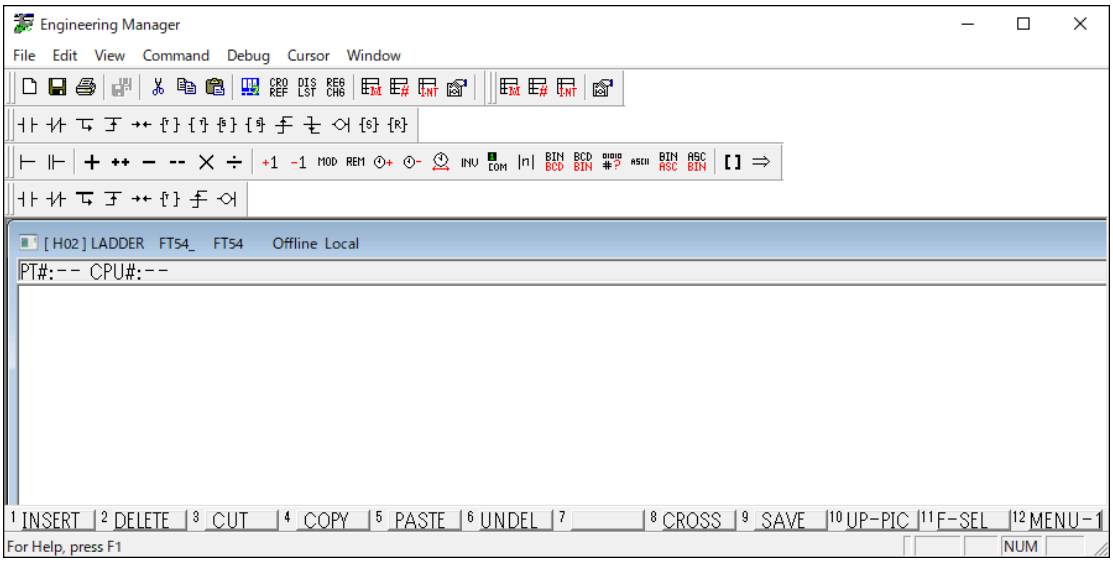


The [Open DWG setting] window will be displayed.

3. **Set [Name] and [Type], and then click the [OK] button.**



The Edit CP Ladder Window will be displayed inside the Engineering Manager Window.



Refer to the following manual for details on the features and operating procedures of the [Engineering Manager].

Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (Manual No.: SIEP C880700 05)

This concludes the procedure.

4.1.12 Specifying the Data Type of the Operation Result of an Expression Instruction

When you use the Expression instruction to perform a numeric operation in a ladder program, the result may not be as intended because of differences in data types.

You can avoid producing unintended operation results by using the cast operator as follows:

- Convert the data type of the operand
- Convert the data type of the operation result
- Specify the data type of the entire arithmetic expression

Each method is described below.

(1) Converting the Data Type of the Operand

You can convert the data type of an operand by placing the cast operator in front of that operand.

<Example>

DL00010 = 14000 - ((WORD) DF00012 + 100))

In this example, floating point data in DF00012 is converted to integer data and then the calculation is performed.

(2) Converting the Data Type of the Operation Result

You can convert the data type of an arithmetic expression by placing the cast operator in front of the arithmetic expression.

<Example>

DL00010 = 14000 - LONG (DF00012 + 100))

In this example, the result of the operation (DF00012 + 100) is converted to a double-length integer.

(3) Specify the Data Type of the Entire Arithmetic Expression

You can specify the data type of the entire arithmetic expression by placing an arithmetic expression data type operator in front of the arithmetic expression.

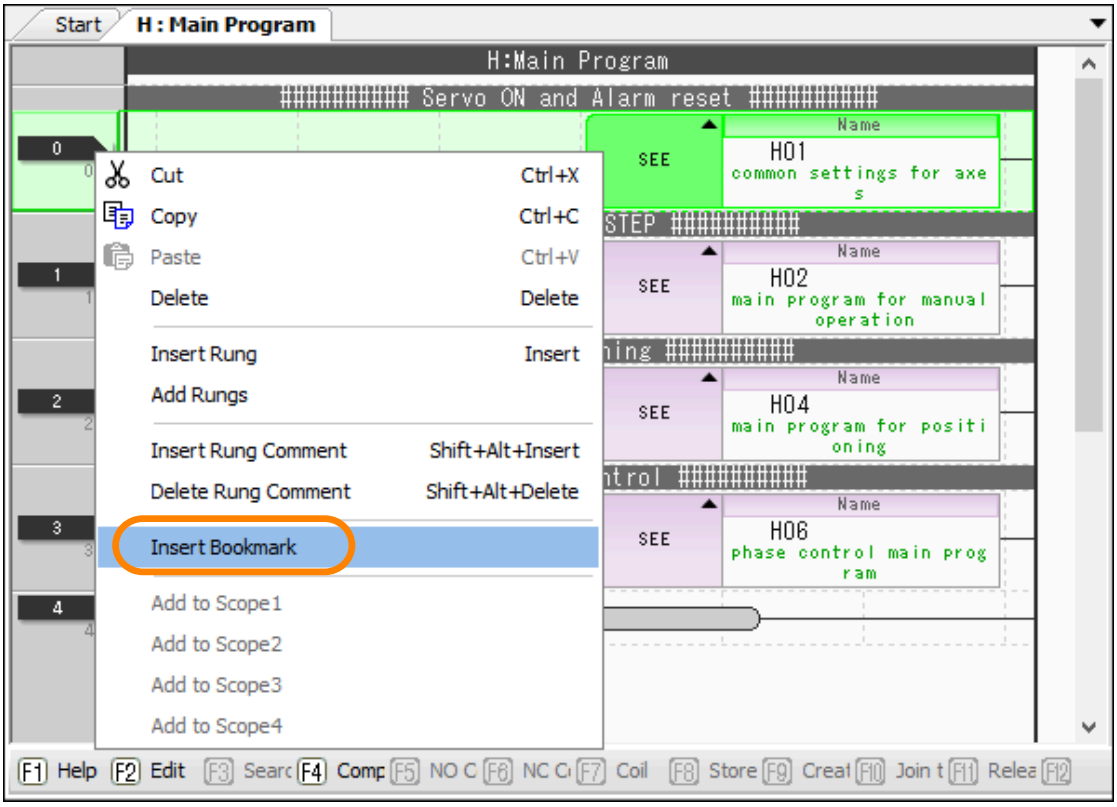
<Example>

DW00010 = FTYPE (14000 - (DF00012 * 100 / 2))
In this example, the operation on the right side is calculated as if the values were all floating decimal data.

4.1.13 Setting Bookmarks

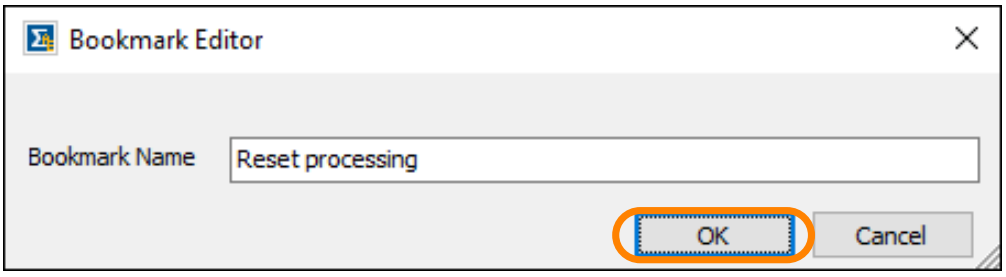
You can set bookmarks at the desired locations in ladder programs. Use the following procedure.

1. **Right-click where the bookmark is to be inserted, and select [Insert Bookmark].**

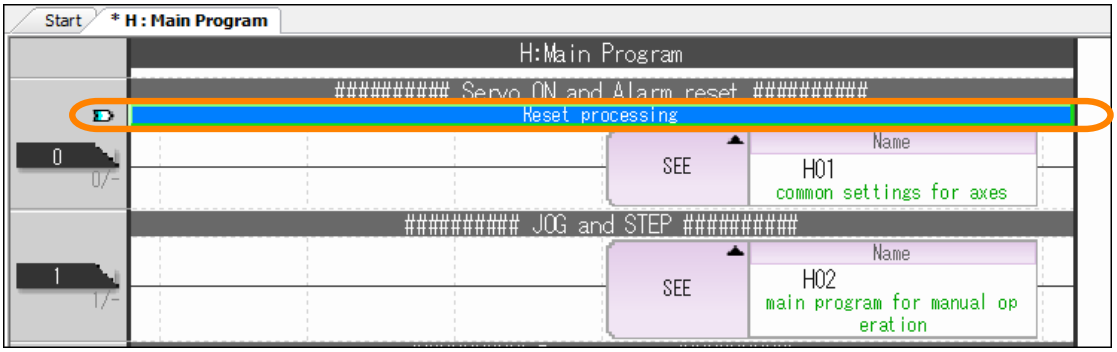


The [Bookmark Editor] window will be displayed.

2. **Enter a name, and click the [OK] button.**



The name of the inserted bookmark will be displayed in the program.

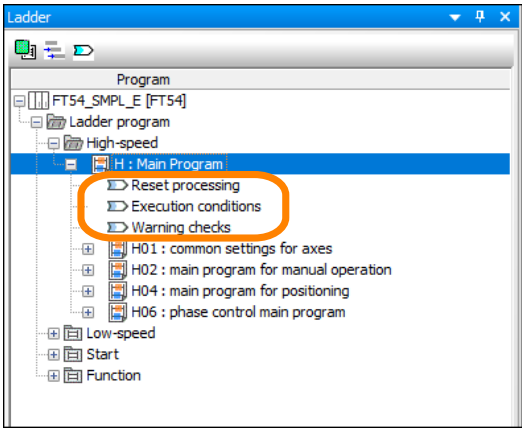


Note:

The above screen capture shows the bookmark while it is being edited. For the bookmark to be recognized, the program must be compiled.

3. **Use one of the following methods to compile the program.**

   - Press the F4 key.
   - Select [Compile] from the [Compile] menu.



The list of bookmarks will be displayed in the [Ladder] window.

This concludes the procedure.

4.1.14 Enabling and Disabling Ladder Programs by Drawings

You can enable or disable ladder programs by drawings when debugging or in other cases.

Use the following procedure.

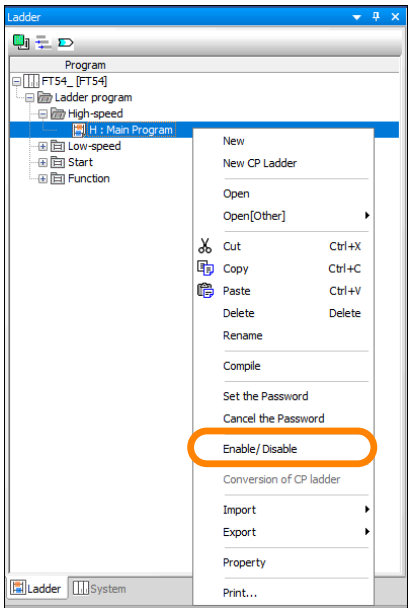
1. **Open the project file.**
2. **Right-click the program to enable or disable in the [Ladder] window, and select [Enable/ Disable].**

Information

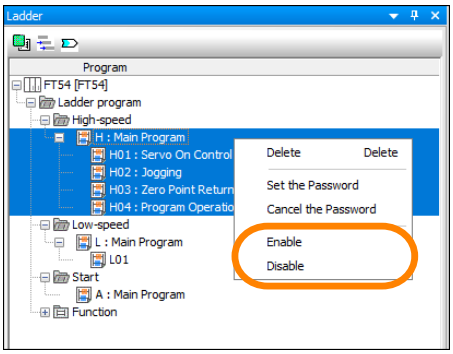
You can select more than one drawing.

- To open a number of consecutive drawings: Select the first drawing in the group of drawings to open, hold down the **Shift** key, and then select the last drawing in the group of drawings to open.
- To open a number of drawings that are not consecutive: Hold down the **Ctrl** key and click the drawings to open.

<if Only One Drawing Is Selected>



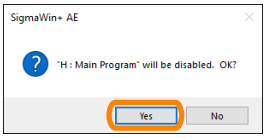
<If More Than One Drawing Is Selected>



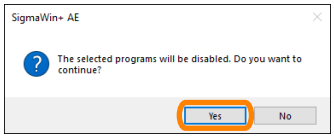
A message dialog box will be displayed.

3. **Click the [Yes] button.**

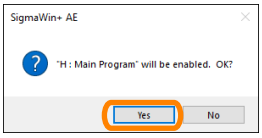
<Disabling with Only One Drawing Selected>



<Disabling with More Than One Drawing Selected>



<Enabling>



The drawing will be enabled or disabled.

4. **Confirm that the icon for the drawing has changed in the [Ladder] window.**

- Drawing is enabled: 
- Drawing is disabled: 

This concludes the procedure.

4.1.15 Shortcut Keys for Ladder Programming

The following tables list the shortcut keystrokes that are useful when creating ladder programs.

Information

If your shortcut keys are assigned to "Ver.6 Compatible" in the [Environment Setting] window, they will not be the same as the assignments that are described in this section.

Refer to the following manual for the shortcut key assignments for MPE720 Ver.6.

Engineering Tool for MP2000 Series Machine Controller MPE720 Version 6 User's Manual (Manual No.: SIEP C880700 30)

(1) Function Keys

Function	Key
Help	F1
Edit	F2
Compile	F4
Input an NO Contact	F5
Input an NC Contact	F6
Input a Coil instruction	F7
Input a Store instruction	F8
Create a branch	F9
Confirm branches	F10
Cancel a branch	F11
Input an NO Contact in parallel	Shift + F5
Input an NC Contact in parallel	Shift + F6
Input a Coil in parallel	Shift + F7
Input an Expression instruction	Shift + F8
Input a Rising Edge NO Contact	Alt + F5
Input a Falling Edge NO Contact	Alt + F7
Input a Rising Edge NC Contact	Alt + F8
Input a Falling Edge NC Contact	Alt + F9
Input a Rising Edge NO Contact in parallel	Alt + Shift + F5

Continued on next page.

Continued from previous page.

Function	Key
Input a Falling Edge NO Contact in parallel	Alt + Shift + F7
Input a Rising Edge NC Contact in parallel	Alt + Shift + F8
Input a Falling Edge NC Contact in parallel	Alt + Shift + F9
Exit	Alt + F4
Switch windows	Alt + F6
Switch tabs	Ctrl + F6

(2) Edit

Function	Key
Undo	Ctrl + Z
Redo	Ctrl + Y
Cut	Ctrl + X
Copy	Ctrl + C
Paste	Ctrl + V
Delete	Delete
Select all	Ctrl + A
Search	Ctrl + F
Replace	Ctrl + H

(3) Programming

Function	Key
Insert a rung	Insert, Shift + Insert
Delete a rung	Shift + Delete
Insert a rung comment	Shift + Alt + Insert
Delete a rung comment	Shift + Alt + Delete
Insert a branch	Ctrl + B
Normal Edit Mode	Ctrl + U
Branch Creation Mode	Ctrl + I
Branch Edition Mode	Ctrl + E
Edit an instruction comment	Ctrl + Alt + Enter
Edit an instruction	F2
Delete an instruction	Ctrl + Delete
Edit parameters	Ctrl + Enter

(4) Debugging

Function	Key
Cross Reference	Ctrl + R
Display register map	Ctrl + W

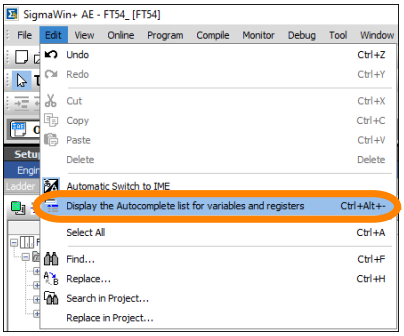
4.1.16 Using the Autocomplete Function

The autocomplete function displays candidates to aid entry when entering variables, registers and instructions.
The following shows how the autocomplete function is used.

(1) Enabling the Autocomplete Function

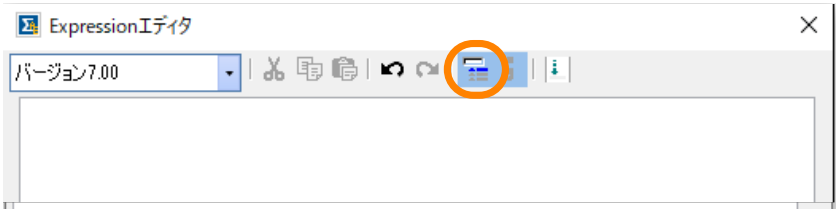
The autocomplete function is enabled by default. When the autocomplete function is disabled, enable the autocomplete function by one of the following methods.

- Select [Display the Autocomplete list for variables and registers] from the [Edit] menu.

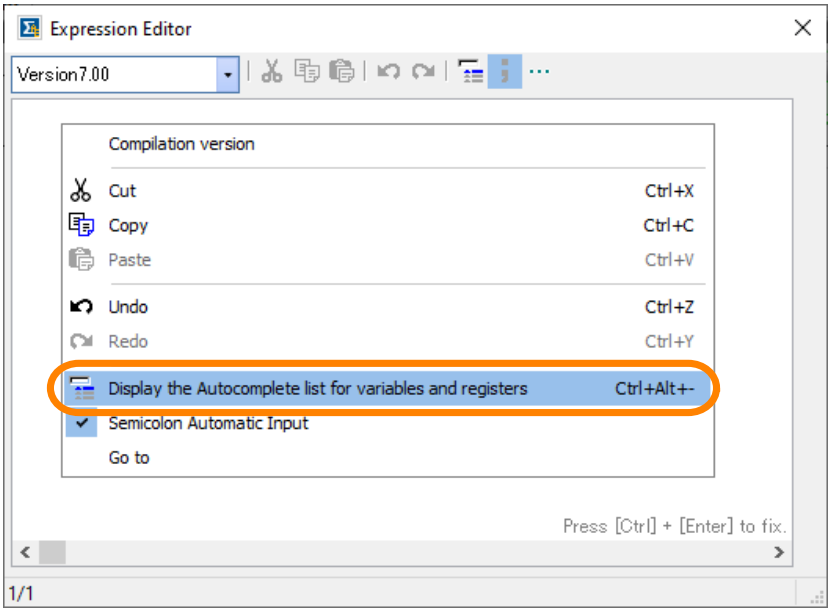


- Hold down the **Ctrl** key + **Alt** key + **–** key simultaneously.
- Click the [Turn Autocomplete for variables and registers ON/OFF] button on the toolbar.

- Click the [Turn Autocomplete for variables and registers ON/OFF] button in the [Expression Editor] window.



- Right-click on the [Expression Editor] window, and select [Display the Autocomplete list for variables and registers].

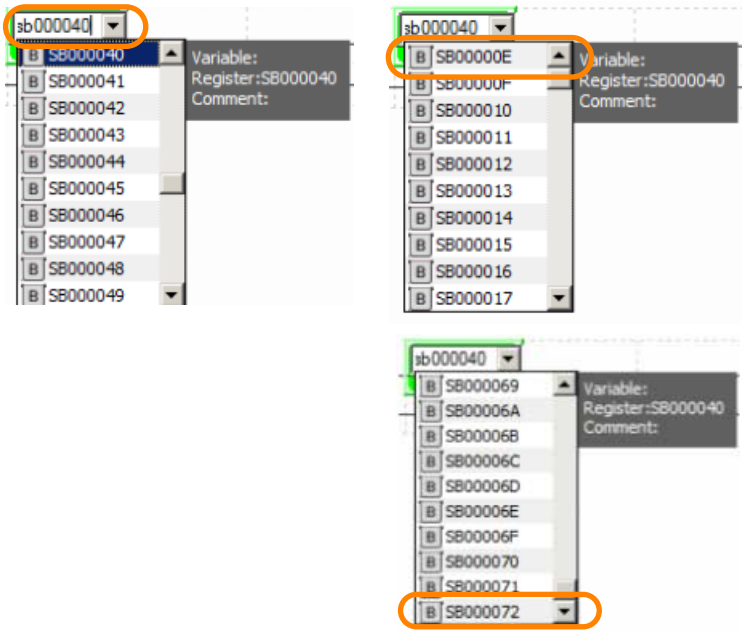


(2) Autocomplete Operating Procedure

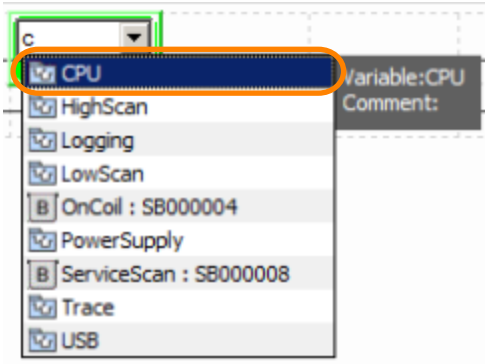
If you enter a text string or double-click the location where the variable, register or instruction is to be inserted, a list of entry candidates will be displayed. Select the desired entry item from the list of entry candidates either by clicking the item or by pressing the **Enter** key with the item displayed in blue.

The following gives details on the autocomplete operating procedure.

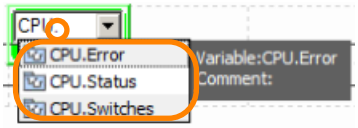
- When a text string of two characters or longer is entered, candidates that match the start of the item or partially match that text string will be displayed. When only one character is entered as the text string, all candidates will be displayed.
- When a location is double-clicked, all candidates will be displayed.
- When a register address is entered, the 50 addresses preceding and following the entered register address will be displayed as the list of candidates.
  <Example>
  When “SB000040” is entered, the 50 addresses preceding and following the entered register address (i.e, SB00000E to SB000072) will be displayed as the list of candidates.



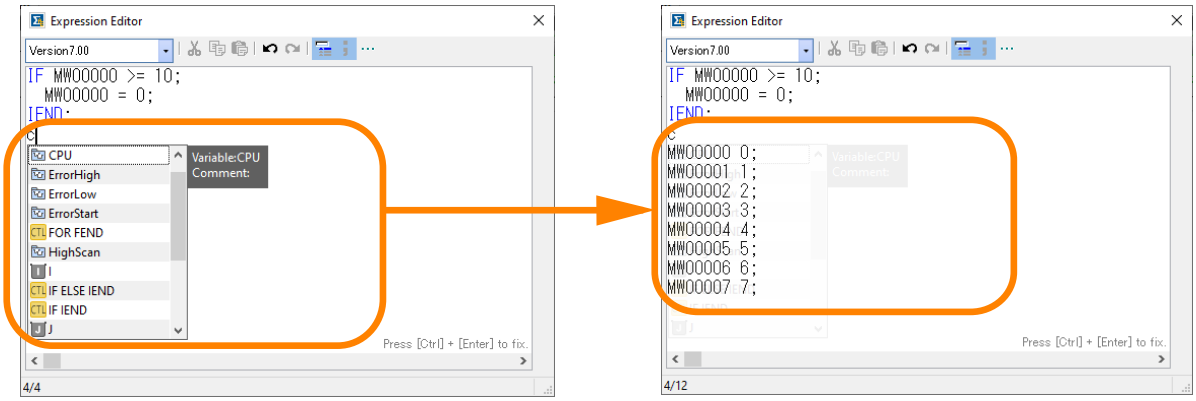
- In the case of a variable, if “.” is entered, a list of candidates at the lower level will be displayed.
  <Example>
  Variable name: Select CPU.



If “.” is entered, a list of candidates at the lower level of “Variable: CPU” will be displayed.



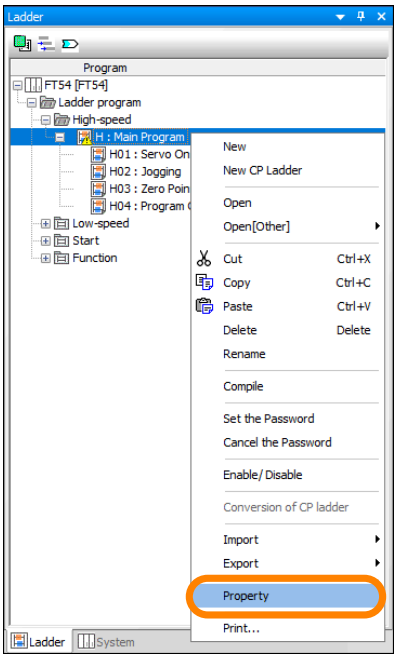
- The list can be made transparent by pressing the **Ctrl** key when the list of entry candidates is displayed. This feature is convenient for checking parts that are hidden by the list.
  <Example>



4.1.17 Increasing the Number of Usable D Registers

D registers are local registers that are unique within each specific program. By default, there are 32 D registers. The following procedure shows how to increase the number of D registers using motion programming as an example.

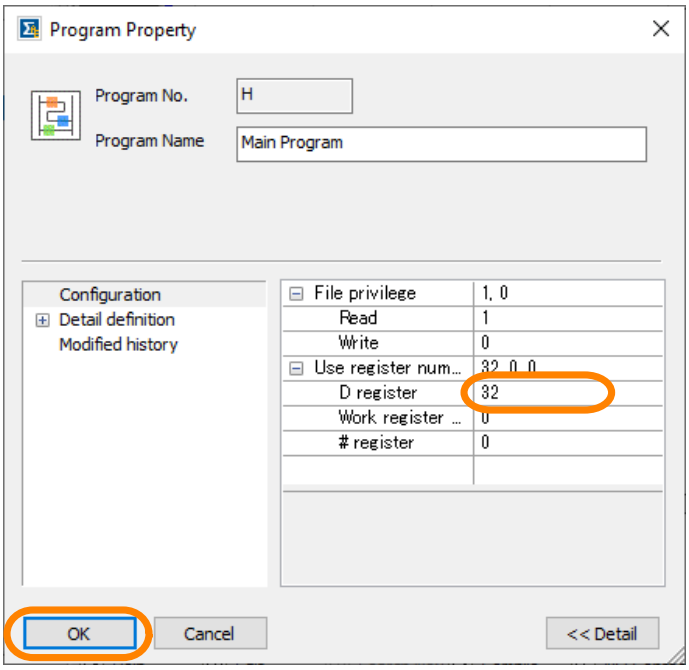
1. **In the [Ladder] window, right-click the program for which you want to increase the number of D registers, and select [Property].**



   The [Program Property] window will be displayed.

2. **Set a value for [D register] under [Use register number], and then click the [OK] button.**

   The setting range is 0 to 16384.



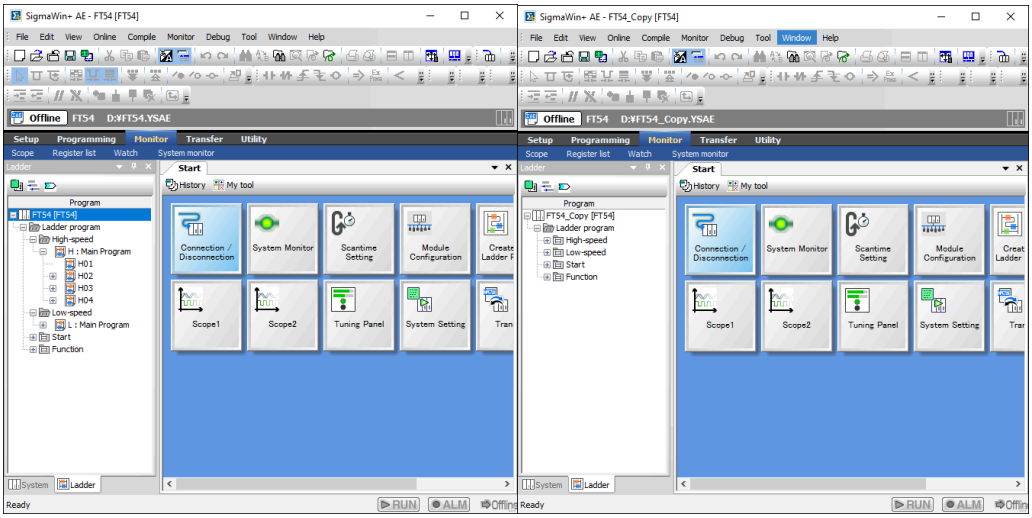
This concludes the procedure.

4.1.18 Copying or Moving Drawings

(1) Procedure

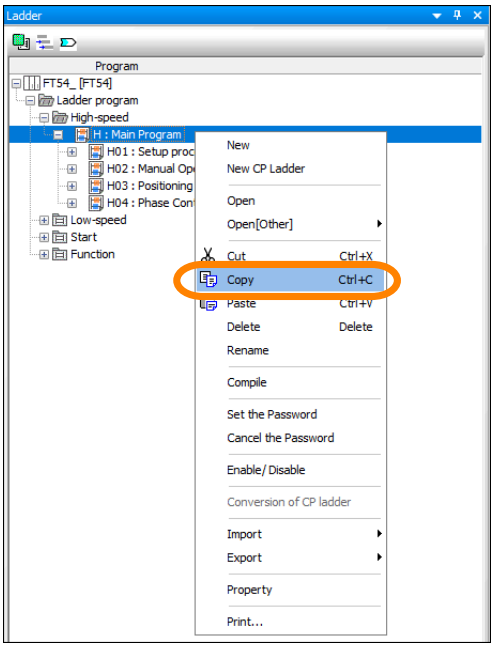
Use the following procedure to copy or move drawings.

Information
- Drawings cannot be copied if you are using a direct connection. If the SigmaWin+ AE is online, set it offline.
- If you open two instances of the SigmaWin+ AE on the same PC, you can also copy or move drawings between different project files.

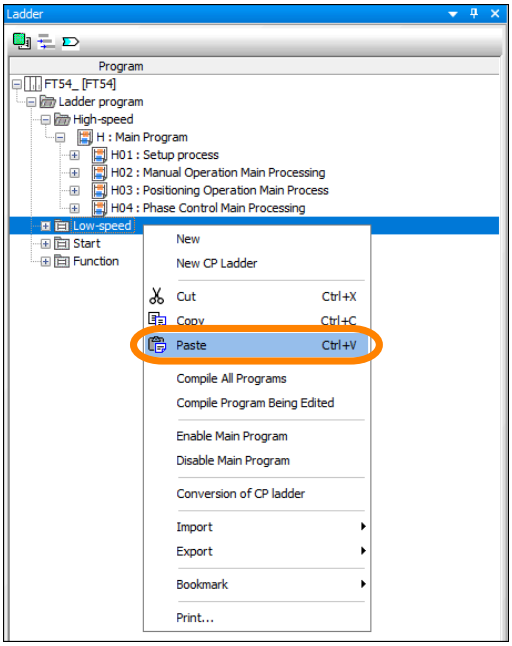


1. **Open the project file that contains the drawing to copy or move.**
2. **Right-click the drawing to copy or move in the [Ladder] window, and select [Copy] or [Cut].**

Information
- You can also copy or move files by folder. Refer to the following section for details.
☞ *(2) Restrictions on Copying and Moving a Drawing on page 160*
- This section shows the screenshots for the procedure to copy a drawing in the [Ladder] window and paste it into the same project file.



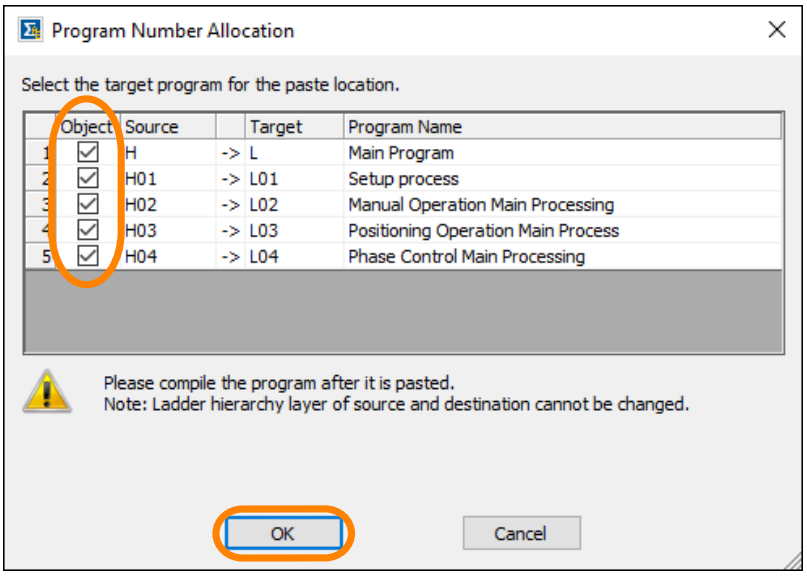
3. **Right-click the destination program where the drawing will be pasted in the [Ladder] window, and select [Paste].**



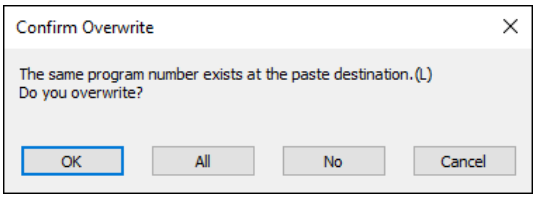
The [Program Number Allocation] window will be displayed.

4. **Select the [Object] check boxes for the drawings to copy or move, and click the [OK] button.**

Information
- You can change [Target] and [Program Name] as necessary.
- The drawing may start being copied or moved without the [Program Number Allocation] window being displayed, depending on the selected drawing.



If the program number is in use at the destination, a message dialog box will be displayed. Click the appropriate button.



The selected drawings will be copied.

This concludes the procedure.

(2) Restrictions on Copying and Moving a Drawing

The restrictions on copying and moving a drawing are given below.

- You can copy and move a drawing only when offline.
- If [User Privilege] is set on the [User Registration] window, you can copy and move a drawing only when logged in with a user that has those privileges or higher.
- You can copy and move a drawing only when "○" appears in the following table.

○: Can copy/move, ×: Cannot copy/move

Drawing	Item	Same Drawing	Different Drawing
Ladder	Copy single drawing (parent drawing)	×	○
	Copy single drawing (other than parent drawing)	○	○
	folder *1/Copy	×	○
	Move single drawing (parent drawing)	×	○
	Move single drawing (other than parent drawing)	○	○
	folder *1/Move	×	○

*1 A folder is the upper level of the drawings. That means a folder is the named folders listed below.

– Ladder program: High-speed, Low-speed, Start, and Function

4.1.19 Deleting Drawings

Use the following procedure to delete drawings.

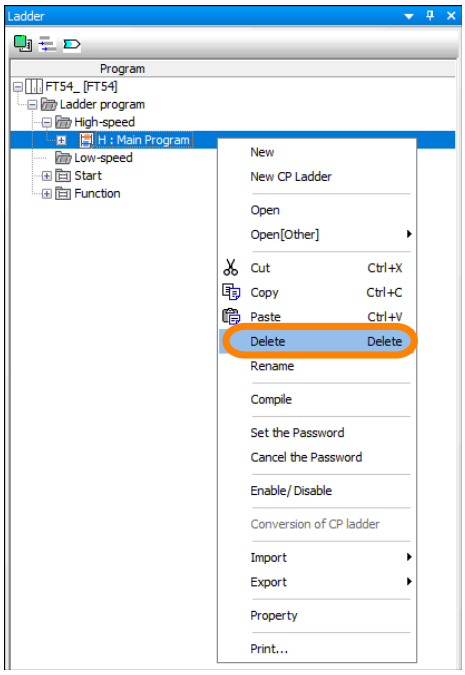
1. **Open the project file.**
2. **In the [Ladder] window, right-click the drawing to delete, and then select [Delete].**

Information

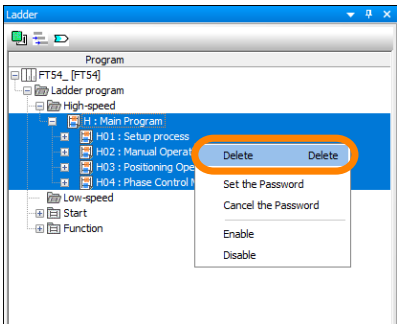
You can also select more than one drawing and delete them all.

- After you click the drawing, if you click another drawing while holding the **Ctrl** key, you can select multiple drawings in the amount of clicked drawings.
- After you click the drawing, if you click another drawing while holding the **Shift** key, you can select all of the drawings between the first and second drawings you clicked.

<If Only One Drawing Is Selected>



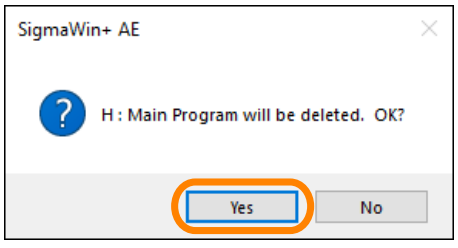
<If More Than One Drawing Is Selected>



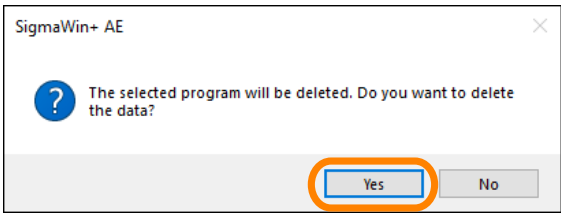
A message dialog box will be displayed.

3. **Click the [Yes] button.**

<If Only One Drawing Is Selected>



<If More Than One Drawing Is Selected>



The drawing will be deleted.

This concludes the procedure.

4.1.20 Compiling Programs

Compiling programs is the process of verifying that the syntax of the created program is correct and creating the internal data that can be executed by the SERVOPACK.

Information

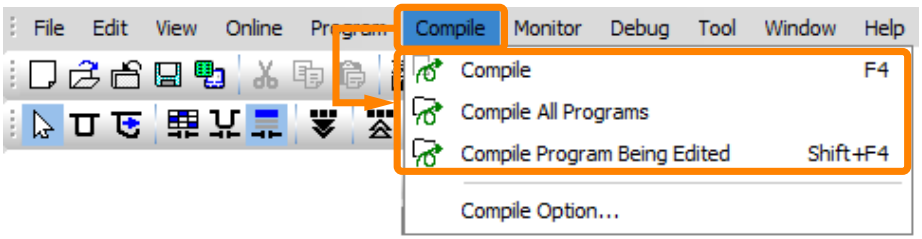
Compiling a program verifies if its syntax is correct, but it does not verify that the program operates as intended.

(1) Compiling Programs

Use one of the following methods to compile the program.

- Click the [Compile] button on the toolbar.

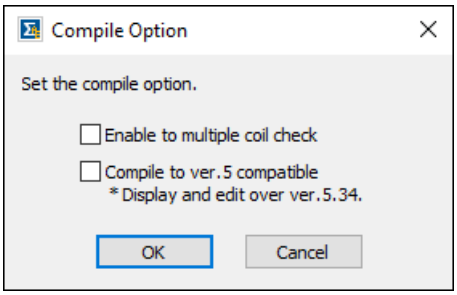
- Select one of the following items on the [Compile] menu.



Type	Description
Compile	Compiles the selected program.
Compiles All Programs *1	Compiles all programs in the project that is currently open offline.
Compile Program Being Edited *1	Compiles multiple programs that were edited in the project that is currently open offline.

*1 Cannot be executed when online.

Select [Compile Option] from the [Compile] menu to display the [Compile Option] window. You can set the following options in this window.



- [Enable to multiple coil check]: This option enables checks for multiple coils when compiling the program.
- [Compile to ver.5 compatible]: Cannot be used.

When the program is finished being compiled, the results will be displayed in the [Output] window.

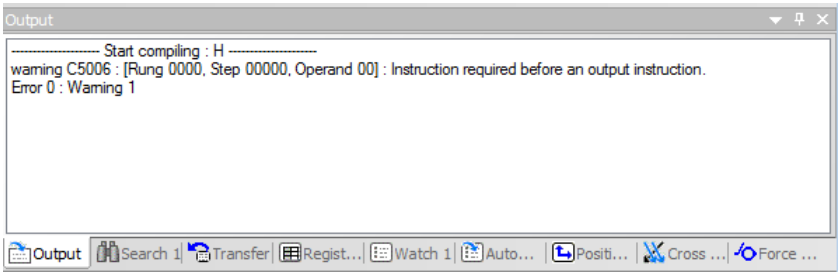
If there is an error or warning, resolve the issue by referring to the information displayed in the window.

(2) Precautions for Compiling a Program

The precautions for compiling a program are given below.

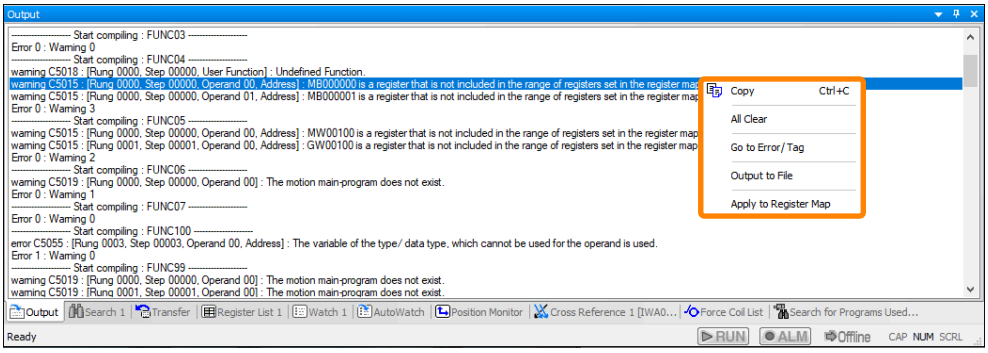
- The following restrictions apply when you compile programs while connected to the SERVOPACK.
  Program is being executed: You cannot compile programs.
  Program is being debugged: You can compile a program while single block execution is stopped.
- A warning message will be displayed if a program is compiled and any of the following instructions does not receive an output from another instruction on the left side of it.
  - On-Delay Timer (TON (1 ms))
  - Off-Delay Timer (TOFF (1 ms))
  - On-Delay Timer (TON (10 ms))
  - Off-Delay Timer (TOFF (10 ms))
  - On-Delay Timer (TON (1 s))
  - Off-Delay Timer (TOFF (1 s))
  - Rising-edge Pulses (ON-PLS)

– Falling-edge Pulses (OFF-PLS)
– Coil (COIL)
– Reverse Coil (REV-COIL)
– Rising-edge Detection Coil (ON-PLS-COIL)
– Falling-edge Detection Coil (OFF-PLS-COIL)
– Set Coil (S-COIL)
– Reset Coil (R-COIL)



(3) Context Menu for the Compilation Results (I.e., [Output] Window)

The context menu displayed by right-clicking on the [Output] window is described below.



Item	Description
[Copy] *1	Clicking this item copies the selected row of text.
[All Clear]	Clicking this item clears the display in the [Output] window.
[Go to Error/Tag]	Clicking this item displays the target program of the selected row. The program cursor will be displayed at the target location.
[Output to File]	Click this item to display the [Save As] window. Specify the destination folder and file name for the data and click the [Save] button to output the [Output] window contents to a file.
[Apply to Register Map] *1	Clicking this item adds the content to [Copy Register Settings] on the [Register Map] window as a new row. The row that was automatically added based on the [Output] window results will be highlighted. Check the content, correct if necessary, and then click the [Save] button on the [Register Map] window.

*1 You can select more than one row and perform an operation on those rows as a group.

- To select multiple continuous rows: Select the first row to select, hold down the **Shift** key, and then select the last row to select.
- To select multiple rows that are not continuous: Hold down the **Ctrl** key and individually click the rows to select.

4.1.21 Saving Programs While Editing

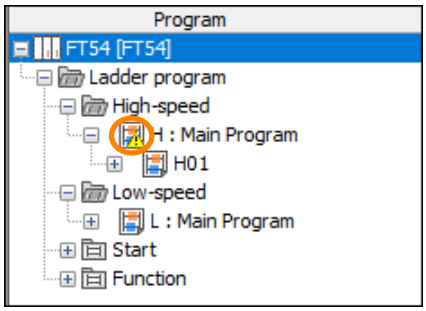
Use one of the following methods to save programs that are enabled for editing (while a compilation error exists).

- Select [Save Project] from the [File] menu.

- Hold down the **Ctrl** key and press the **S** key.

The following kinds of icons are displayed for programs that are saved while editing.

<Ladder Program>



Information If the SigmaWin+ AE is online, a program cannot be saved if it is enabled for editing. Make sure to save the programs after compilation has been completed.

4.2 Variable

This section provides an overview of variables and describes operations related to variables.

4.2.1 What Are Variables?

Variables are registers with labels (variable names) and comments.

The following tables list the types of variables.

- Variables That Are Automatically Assigned by the System
  Users cannot add or delete the following variables.

Type	Description
System Variable	These variables are prepared by the system to represent the status of the SERVOPACK.
I/O Variable	These variables are used as SERVOPACK I/O signals, the SERVOPACK's status, and to control the SERVOPACK.

- Variables That Can Be Set by Users
  Users can add, edit, and delete the following variables.

Type	Description
Global Variable	These variables can be shared between ladder programs, user functions.
Constant Variable	These variables are set with a predetermined value by the user. These variables can be referenced in programs only. The values cannot be changed.
Local Variable	These variables are used within drawings. They cannot be used in other drawings.

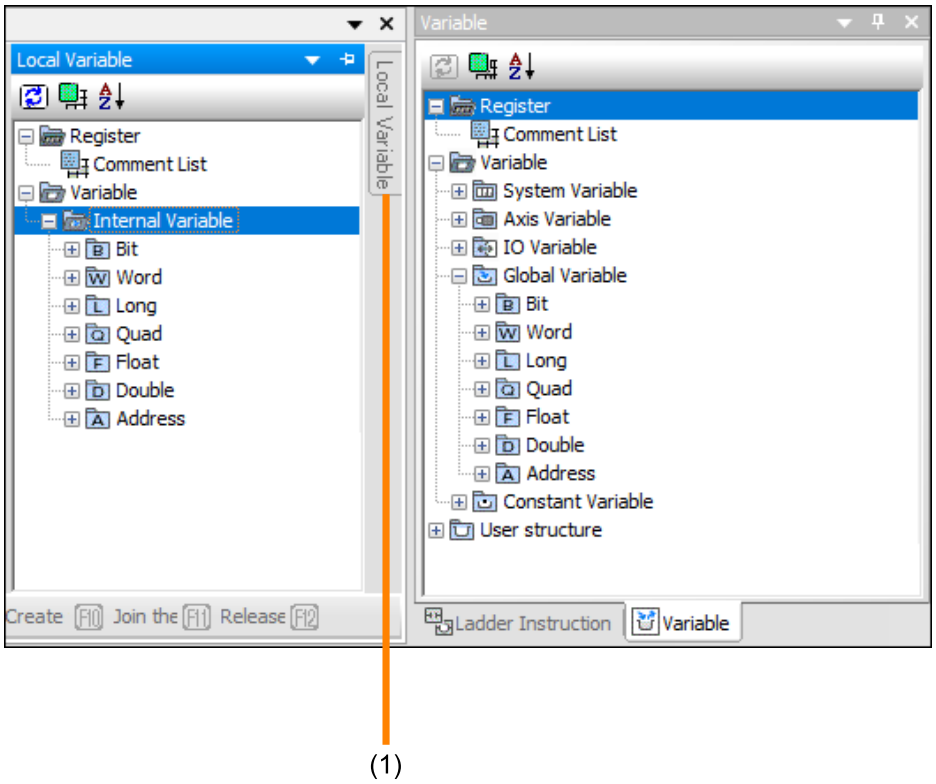
You use variables in instructions inside programs and in various windows.

For example, you can use variables for the following types of operations. Refer to the following sections for details.

- Ladder instruction input
  ☞ *(3) Setting the Variable, Register, and Comment on page 133*
- [Search] window input
  ☞ *5.6 Search on page 224*
- [Replace] window input
  ☞ *5.7 Replace on page 227*
- [Cross Reference] window input
  ☞ *5.8 Cross Reference on page 230*
- [Watch] window input
  ☞ *5.2 Watch on page 210*

4.2.2 Window Configuration

Variables are displayed in the [Variable] window and the [Local Variable] window.



No.	Item	Description
(1)	[Local Variable] Window	Displayed when the mouse cursor is placed on the [Local Variable] tab that is displayed when a ladder program is opened.

4.2.3 Variables That Are Automatically Assigned by the System

(1) System Variable

System variables are system registers (S registers) that have been registered as variables. System variables are preset in the SigmaWin+ AE.

Users cannot change settings related to system variables.

(2) I/O Variable

The I/O variables are variables to which I register and O register addresses have been automatically registered by the system, and the allocations of these variables are fixed.

You cannot change the registers, but you can change the variable names and comments.

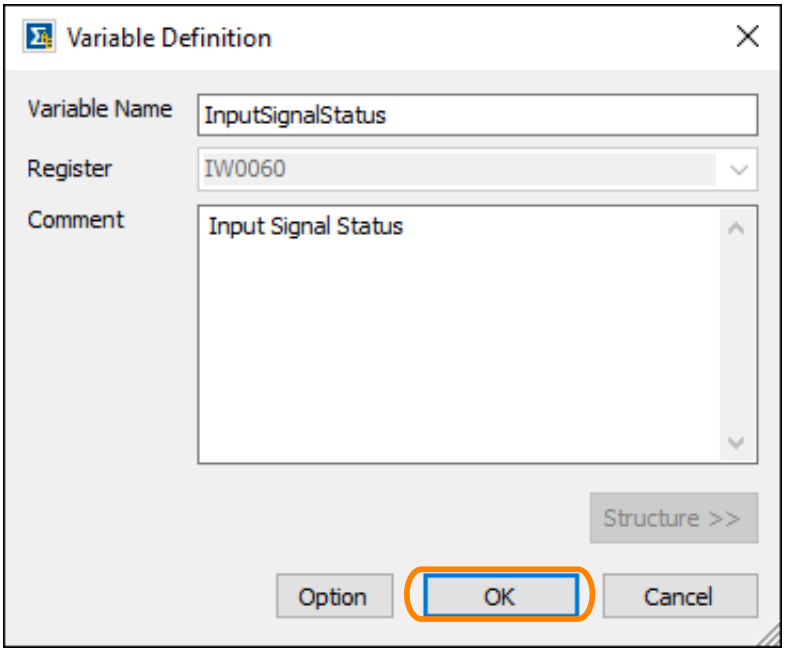
(a) Changing the Variable Name and Comment

Use the following procedure to change the variable name and comment of an I/O variable.

1. **Right-click the variable name to edit, and select [Edit]. Or double-click the variable name.**

   The [Variable Definition] window will be displayed.

2. **Set the items to change, and then click the [OK] button.**



Item	Description
Variable	Set the name of the I/O module. <Setting Conditions> • 16 alphanumeric characters maximum. • The first character is an alphabetic character. • Do not enter a space.
Comment	Set a comment. Carriage returns and line feeds cannot be used.

The content in the [Variable] window will be changed. If the changed variable was entered in a program, the variable name and comment in that program will also be changed.

This concludes the procedure.

4.2.4 Variables That Can Be Set by Users

(1) Global Variable

Global variables are displayed in the [Variable] window separated into different levels by data type.

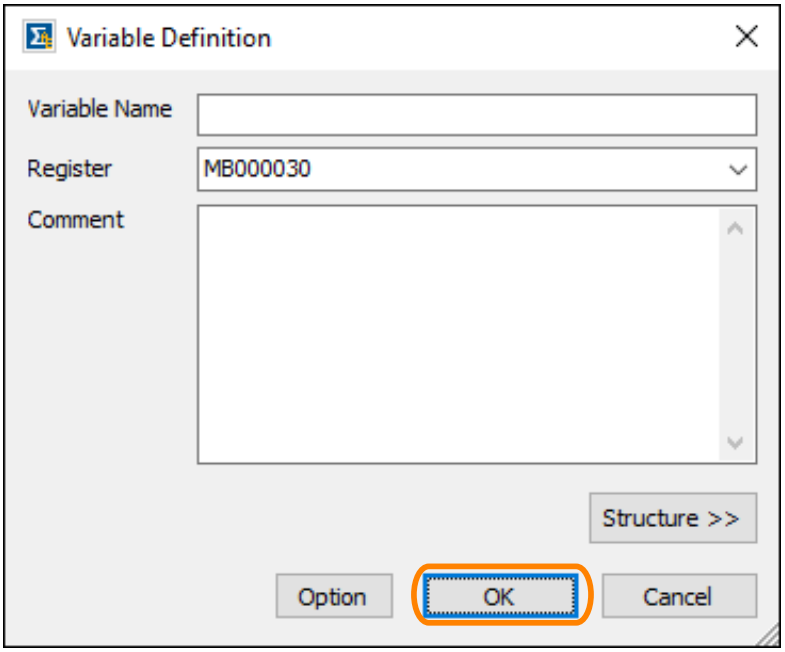
(a) Registering a Global Variable

Use the following procedure to register a global variable.

1. **In the [Variable] window, right-click [Global Variable] or a data type folder (Bit, Word, Long, Quad, Float, Double, or Address), and then select [Add].**

   The [Variable Definition] window will be displayed.

2. **Set the following items, and then click the [OK] button.**



Item	Description
Variable	Set a variable name. <Setting Conditions> • 64 alphanumeric characters maximum. • The first character is an alphabetic character. • The following values are not valid: – The same value as the register – A variable name that is already registered
Register	Set the register. <Setting Conditions> • The register must be within the range of registers. The list box displays the smallest address out of the available registers. • Address if a structure is registered.
Comment	Set a comment. Carriage returns and line feeds cannot be used. <Setting Conditions> 255 characters maximum.
[Structure] Button	Displays the list of structures. System structure: Sets of variables prepared in advance. User structure: Sets of variables that can be registered by the user. Refer to the following section for details. ☞ *(3) User-Defined Structures on page 172*
[Option] Button	Displays the [Environment Setting] window.

The [Variable Definition] window will close, and the registered variable will be displayed in the [Variable] window.

The registered variable name and comment will be displayed in the program that uses the register of the registered variable.

This concludes the procedure.

(b) Editing a Global Variable

Use the following procedure to edit a global variable.

1. **Right-click the global variable to edit in the [Variable] window, and select [Edit]. Or double-click the global variable to edit.**

The [Variable Definition] window will be displayed.

2. **Set the items to edit, and then click the [OK] button.**

   The [Variable Definition] window will close, and the changes will be applied to the variable in the [Variable] window.

This concludes the procedure.

(c) Deleting a Global Variable

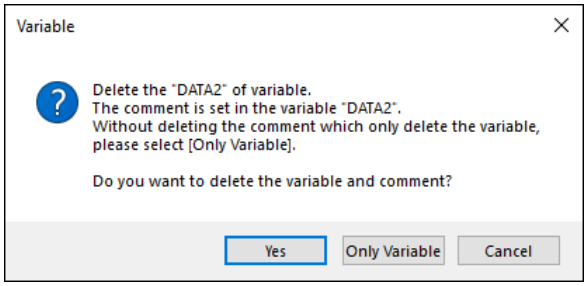
Use the following procedure to delete a global variable.

1. **Right-click the global variable to delete in the [Variable] window, and select [Delete]. Or select the global variable to delete, and press the Delete key.**

   A message dialog box will be displayed.

2. **Click the [Yes] button.**

Information When a comment is set for the variable to delete, the following message dialog box will be displayed. Click the [Only Variable] button to delete the variable but leave the comment in the comment list.



The selected variable will be deleted from the [Variable] window.

The deleted variable will be replaced with the register when the program that used the deleted variable is displayed next.

This concludes the procedure.

(2) Constant Variable

Constant variables are C registers that have been registered as variables.

After you register a range of C registers as a constant group, you can name that range of C registers and set the constant value, unit (pulse, mm, deg, inch, and μm), and comment.

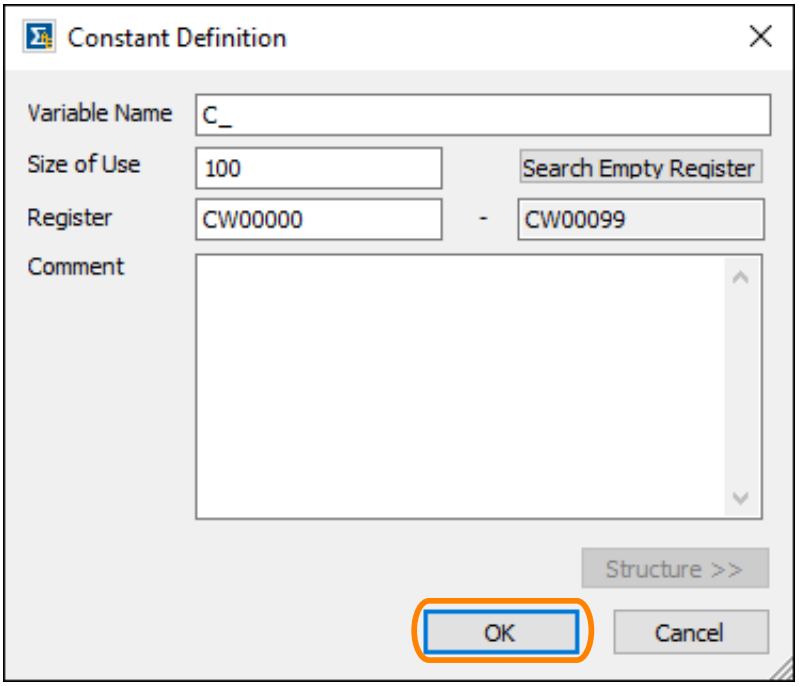
(a) Registering a Constant Group

Use the following procedure to register a constant group.

1. **Right-click [Constant Variable] in the [Variable] window, and select [Add].**

   The [Constant Definition] window will be displayed.

2. **Set the following items, and then click the [OK] button.**



Item	Description
Variable	Set a variable name. The letters "C_" are automatically displayed at the beginning. <Setting Conditions> 8 alphanumeric characters maximum.
Size of Use	Enter the number of word registers to use starting from the first address that is set in the [Register] field. Click the [Search Empty Register] button to search for the number of available registers that is set in the [Size of Use] box. The ending address will be entered automatically.
Register	Enter the first word address of the C registers to register as the group.
Comment	Set a comment. Carriage returns and line feeds cannot be used. <Setting Conditions> 255 alphanumeric characters maximum.

The [Constant Definition] window will close, and the registered variable group will be displayed in the [Variable] window.

This concludes the procedure.

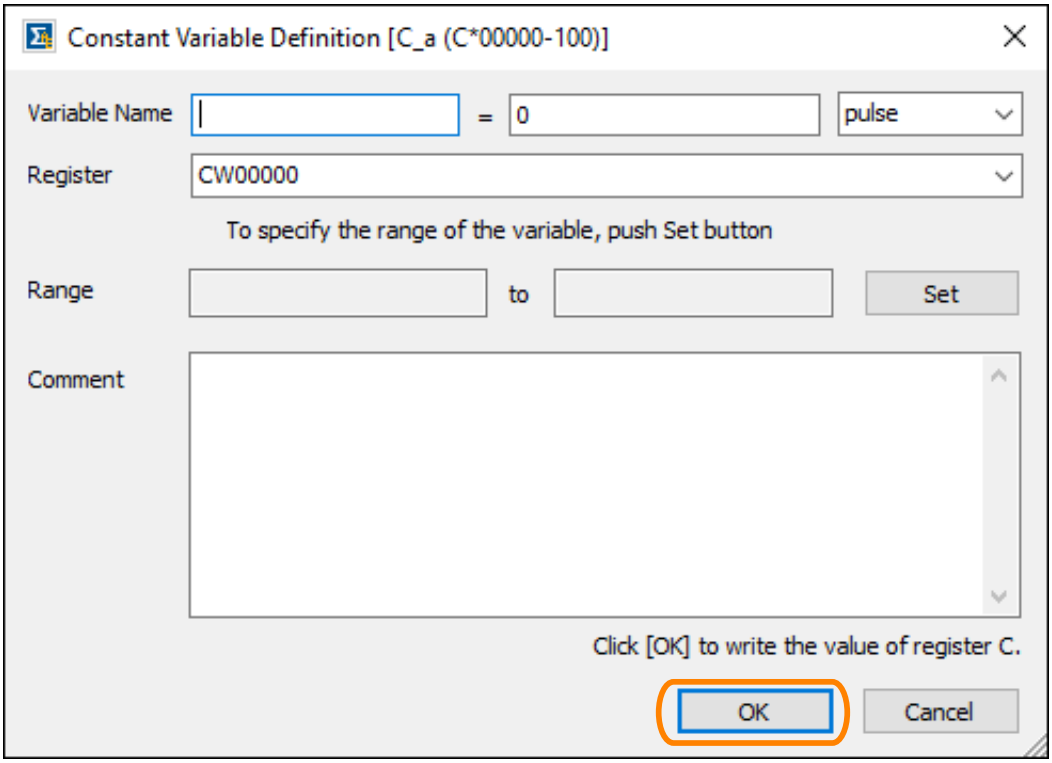
(b) Registering a Constant Variable

Use the following procedure to register a constant variable to a constant group.

1. **Right-click the constant group to which the variable will be registered in the [Variable] window, and select [Add].**

   The [Constant Variable Definition] window will be displayed.

2. **Set the following items, and then click the [OK] button.**



Item	Description
Variable	Set a variable name. <Setting Conditions> • 64 alphanumeric characters maximum. • The first character is an alphabetic character. • The following values are not valid: – The same value as the register – A variable name that is already registered in the same group
Numerical Value	Enter the numerical value to store in the register. <Setting Conditions> The range of the numerical value that can be set depends on the data type of the register as shown below. WORD: -32768 to 32767 LONG: -2147483648 to 2147483647 QUAD: -9223372036854775808 to 9223372036854775807 FLOAT: ±(1.175495 to 3.40283), 0 DOUBLE: ±(2.225E-308 to 1.798E+308), 0
Unit	Directly enter the unit or select the unit from the list.
Register	Set the C register to register as the variable. The list box displays the smallest address in the range of registers set in the group for each data type (W, L, Q, F, and D).
Range	Set the upper and lower limits of the constant as required. To set the range, click the [Set] button, enter the upper and lower limits of the constant in the window that is displayed, and click the [OK] button.
Comment	Set a comment. Carriage returns and line feeds cannot be used. <Setting Conditions> 255 alphanumeric characters maximum.

The [Constant Variable Definition] window will close, and the registered variable will be displayed in the [Variable] window.

This concludes the procedure.

(c) Editing a Constant Group or Constant Variable

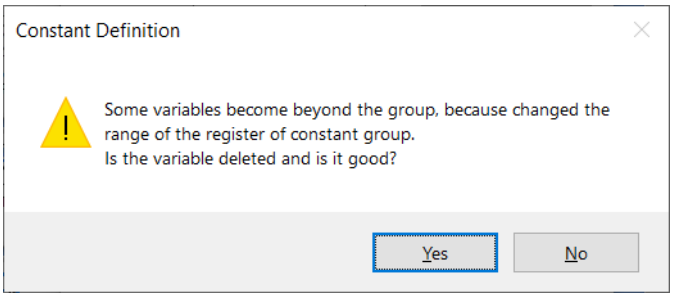
Use the following procedure to edit a constant group or constant variable.

1. **Right-click the constant group or constant variable to edit in the [Variable] window, and select [Edit]. Or double-click the constant group or constant variable to edit.**

   The [Constant Definition] window or the [Constant Variable Definition] window will be displayed.

2. **Set the items to edit, and then click the [OK] button.**

   Information If you change the range of registers in the [Constant Definition] window and variables exist outside the range of registers in that group, the following message dialog box will be displayed. Click the [Yes] button to delete the relevant variable.



   The window will close, and the changes will be applied to the variable in the [Variable] window.

This concludes the procedure.

(d) Deleting a Constant Group or Constant Variable

Use the following procedure to delete a constant group or constant variable.

Information If a constant group is deleted, the variables that belong to that group will also be deleted.

1. **Right-click the constant group or constant variable to delete in the [Variable] window, and select [Delete]. Or select the the constant group or constant variable to delete, and press the Delete key.**

   A message dialog box will be displayed.

2. **Click the [Yes] button.**

   The selected constant group or constant variable will be deleted from the [Variable] window.

   If the deleted variable was used in a program, the variable name will be replaced with the register when the program is displayed.

This concludes the procedure.

(3) User-Defined Structures

User-defined structures are multiple variables, registers, and comments that have been registered as a set.

The registers that are registered in a user-defined structure are called "structure members". You can register up to 100 structure members for one user-defined structure.

User-defined structures are used by assigning them to address global variables and local variables.

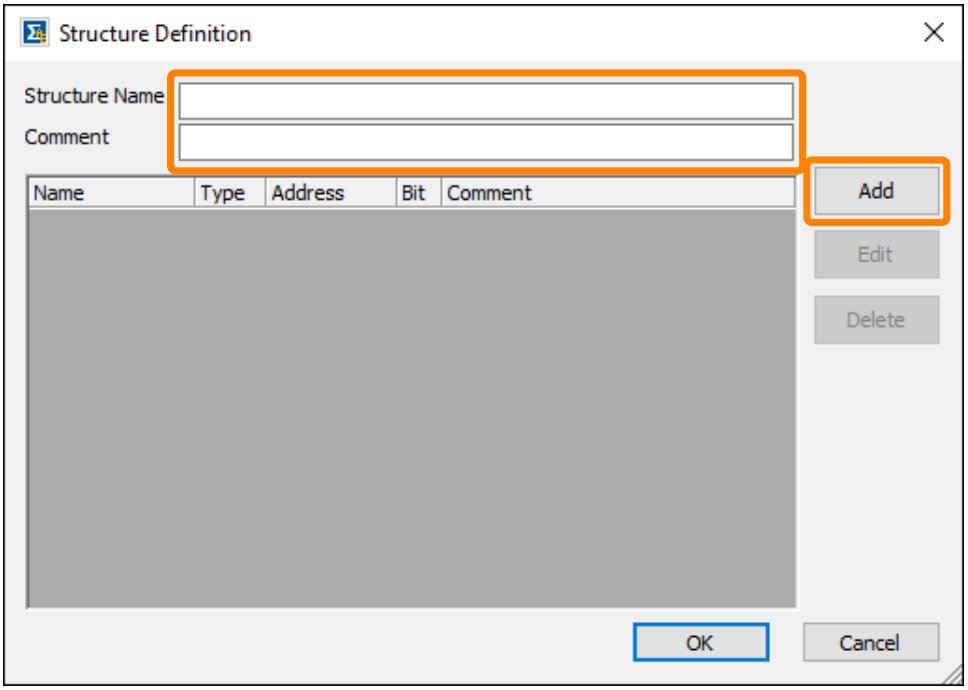
(a) Registering a User-Defined Structure

Use the following procedure to register a user-defined structure.

1. **Right-click [User structure] in the [Variable] window, and select [Add].**

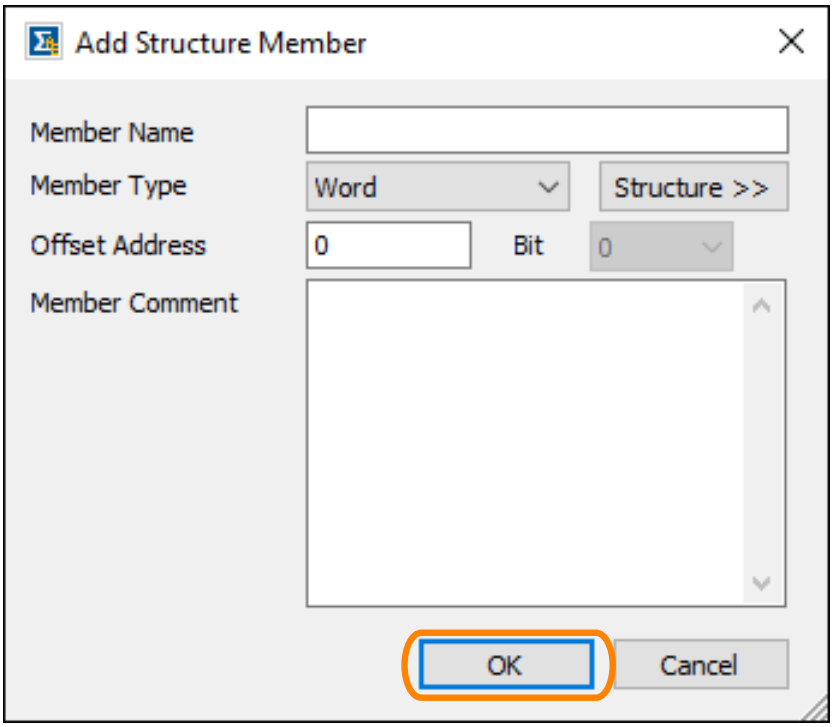
   The [Structure Definition] window will be displayed.

2. **Enter values for [Structure] and [Comment], and click the [Add] button.**



The [Add Structure Member] window will be displayed.

3. **Set the following items, and then click the [OK] button.**



Item	Description
Member Name	Set the member name. <Setting Conditions> • 64 alphanumeric characters maximum. • The first character is an alphabetic character. • The following values are not valid: – The same value as the register – A variable name that is already registered
Member Type	Select the data type (Bit, Word, Long, Quad, Float, Double, or Address) from the list.

Continued on next page.

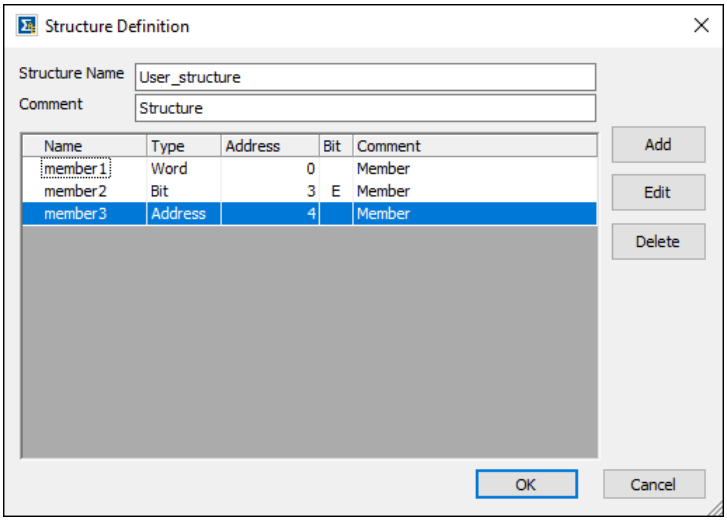
Continued from previous page.

Item	Description
Offset Address	Set the offset address.
Member Comment	Set a comment. Carriage returns and line feeds cannot be used. <Setting Conditions> 255 alphanumeric characters maximum.

You will return to the [Structure Definition] window.

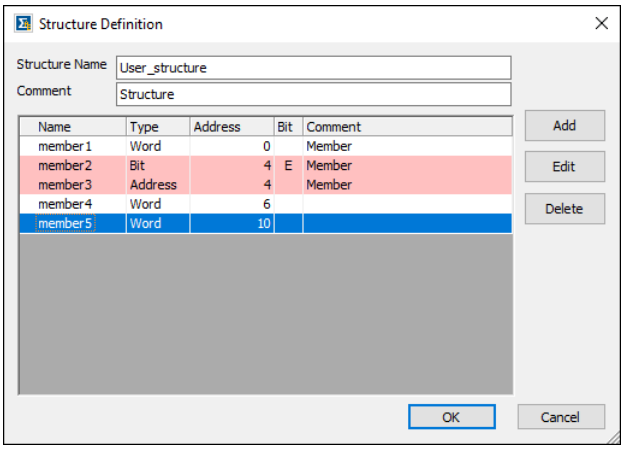
4. **Repeat steps 1 to 3 to add structure members.**

The registered structure members will be displayed in the list.

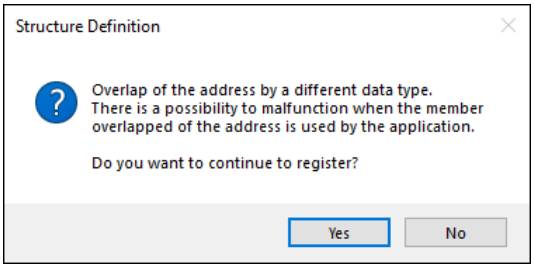


Note:

If register addresses are duplicated:
If an address is a duplicate of the address of another structure member that is already registered in a single user-defined structure, the lines of the duplicated structure members will be highlighted in pink.



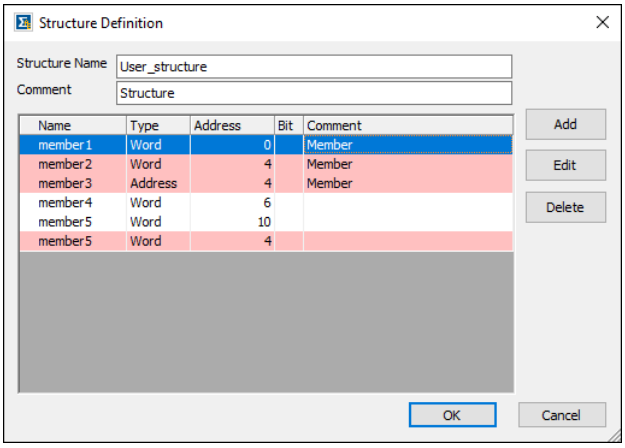
Click the [OK] button and the following message dialog box will be displayed.



Click the [Yes] button to register the structure to add.

Note:

If the same register exists in the structure:
If a member type (data type), address, and bit are duplicates of those of another structure member that is already registered in a single user-defined structure, the lines of the duplicated structure members will be highlighted in pink.



Click the [OK] button and the following message dialog box will be displayed. Change one of the structure members.

5. **Click the [OK] button in the [Structure Definition] window.**

   The [Structure Definition] window will close, and the registered user-defined structure will be displayed in the [Variable] window.

This concludes the procedure.

(b) Editing a User-Defined Structure

Use the following procedure to edit a user-defined structure.

1. **Right-click the user-defined structure or structure member to edit in the [Variable] window, and select [Edit]. Or double-click the user-defined structure or structure member to edit.**

   The [Structure Definition] window will be displayed.

2. **Set the items to edit, and then click the [OK] button.**

   The window will close, and the changes will be applied to the user-defined structure in the [Variable] window.

   Note:

   If the user-defined structure that was edited is already assigned to a global variable or local variable:

   • Name of structure member was changed: Change is also applied to the variable.

   • Comment of structure member was changed: Change is not applied to the variable. Apply the change manually.

   • Structure member was deleted: Structure member is deleted from the variable.

This concludes the procedure.

(c) Deleting a User-Defined Structure

Use the following procedure to delete a user-defined structure.

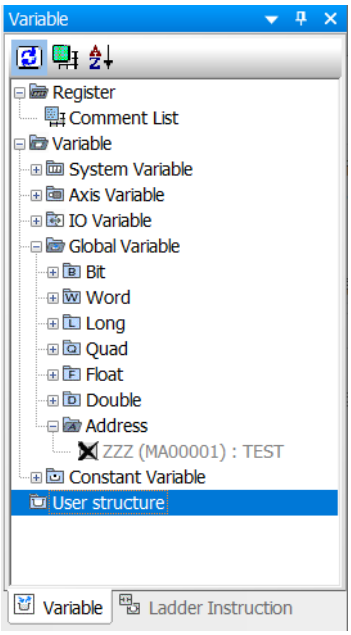
1. **Right-click the user-defined structure to delete in the [Variable] window, and select [Delete]. Or select the user-defined structure to delete, and press the Delete key.**

   A message dialog box will be displayed.

2. **Click the [Yes] button.**

   The selected user-defined structure will be deleted from the [Variable] window.

Information If the deleted user-defined structure was assigned to a variable, the user-defined structure under that variable will be inactivated and not deleted.



This concludes the procedure.

(4) Local Variable

Local variables are D registers that have been registered as variables.

Local variables are registered in each individual ladder program, and they can be used in that program only.

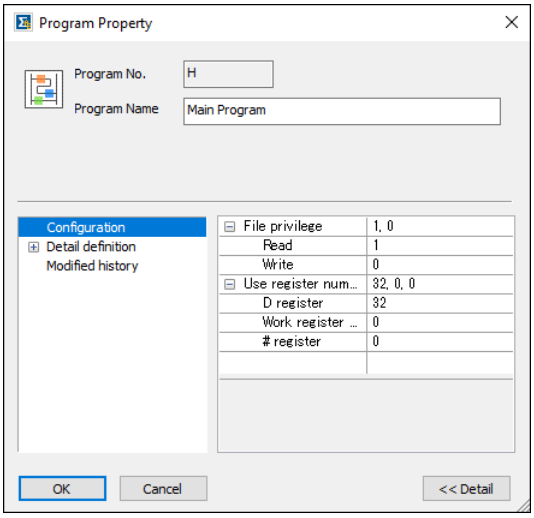
(a) Registering a Local Variable

Use the following procedure to register a local variable.

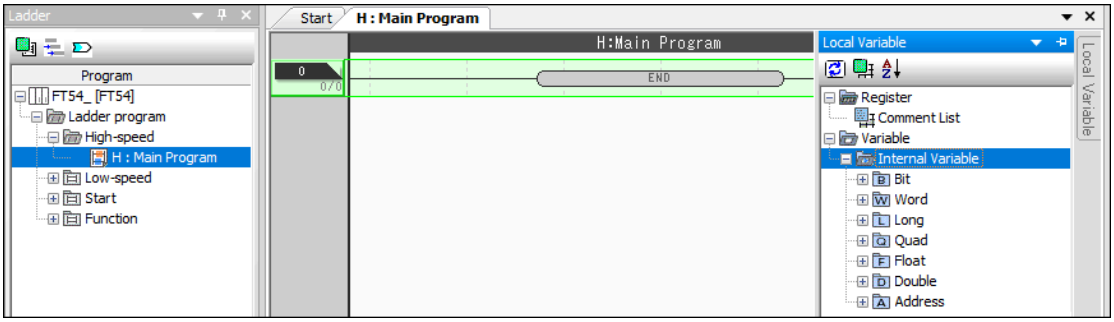
Information Even if you register D registers as variables, you can use only the number of D registers that was set in the [Program Property] window when the variables are used in a program.

Refer to the following section for how to increase the number of D registers that can be used.

☞ *4.1.17 Increasing the Number of Usable D Registers on page 157*



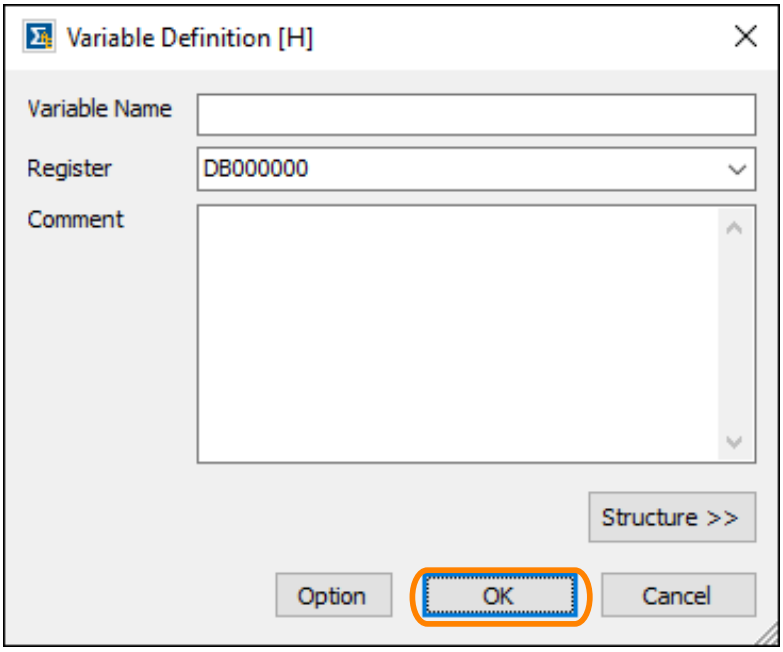
1. **With the ladder program open, place the mouse cursor on the [Local Variable] tab to display the [Local Variable] window.**



2. **Right-click [Internal Variable], and select [Add].**

   The [Variable Definition] window will be displayed.

3. **Set the following items, and then click the [OK] button.**



Item	Description
Variable	Set a variable name. <Setting Conditions> • 60 alphanumeric characters maximum (64 characters when "VAR_" is added to the beginning of the variable name). • The following values are not valid: – A variable name that is already registered in the same program
Register	Enter the register to register as the variable. The list box displays the smallest address in the range of available D registers for each data type. You can also register the same address if the data type is different (e.g., DB00000 and DW00000). However, when registering the variable, a message will be displayed warning you of the risk of malfunction.
Comment	Set a comment. Carriage returns and line feeds cannot be used when entering comments. <Setting Conditions> 255 alphanumeric characters maximum.

Continued on next page.

Continued from previous page.

Item	Description
[Structure] Button	Displays the list of structures. System structure: Sets of variables prepared in advance. User structure: Sets of variables that can be registered by the user. Refer to the following section for details. ☞ *(3) User-Defined Structures on page 172*
[Option] Button	Displays the [Environment Setting] window.

The [Variable Definition] window will close, and the registered variable will be displayed in the [Local Variable] window.

Information "VAR_" will be displayed at the beginning of the variable name to show it is a local variable.

This concludes the procedure.

(b) Editing a Local Variable

Use the following procedure to edit a local variable.

1. **Open the ladder program in which the variable to edit was set.**
2. **Right-click the variable to edit in the [Local Variable] window, and select [Edit]. Or double-click the variable.**

   The [Variable Definition] window will be displayed.
3. **Set the items to edit, and then click the [OK] button.**

   The window will close, and the changes will be applied to the variable in the [Local Variable] window.

This concludes the procedure.

(c) Deleting a Local Variable

Use the following procedure to delete a local variable.

1. **Open the ladder program in which the variable to delete was set.**
2. **Right-click the variable to delete in the [Local Variable] window, and select [Delete]. Or press the Delete key when the variable is selected.**

   A message dialog box will be displayed.
3. **Click the [Yes] button.**

   The selected variable will be deleted from the [Local Variable] window.

This concludes the procedure.

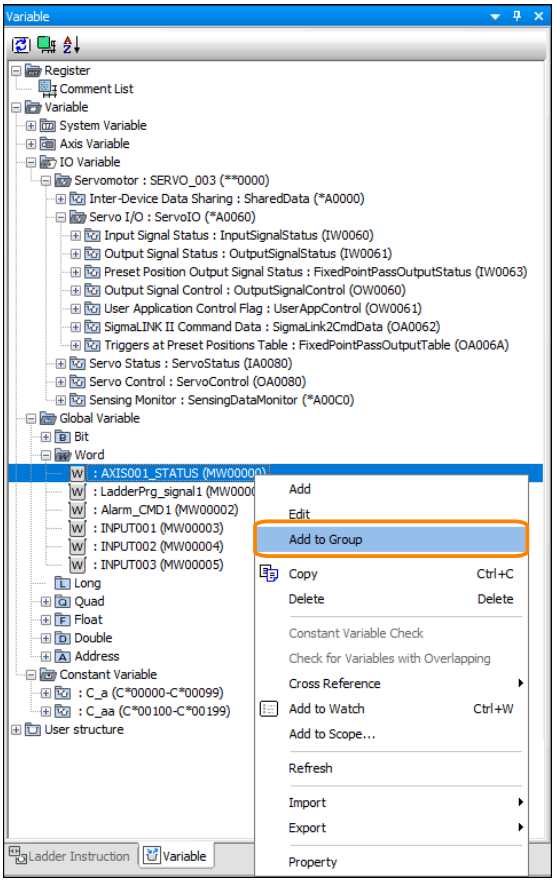
4.2.5 Operations on the [Variable] Window

(1) Manipulating Global Variables and Local Variables as Groups

You can group global variables and local variables and name the groups to manipulate them and manage them as groups. Use the following procedure.

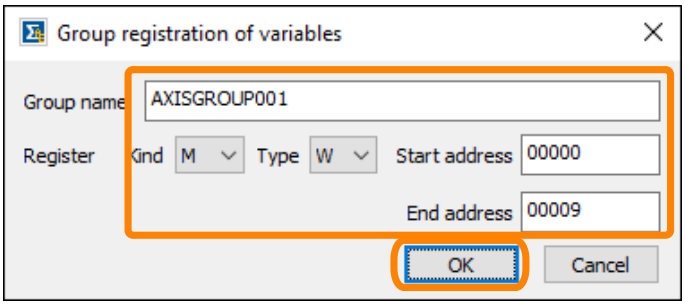
(a) Creating a Variable Group

1. **Right-click any location under [Global Variable], and select [Add to Group].**

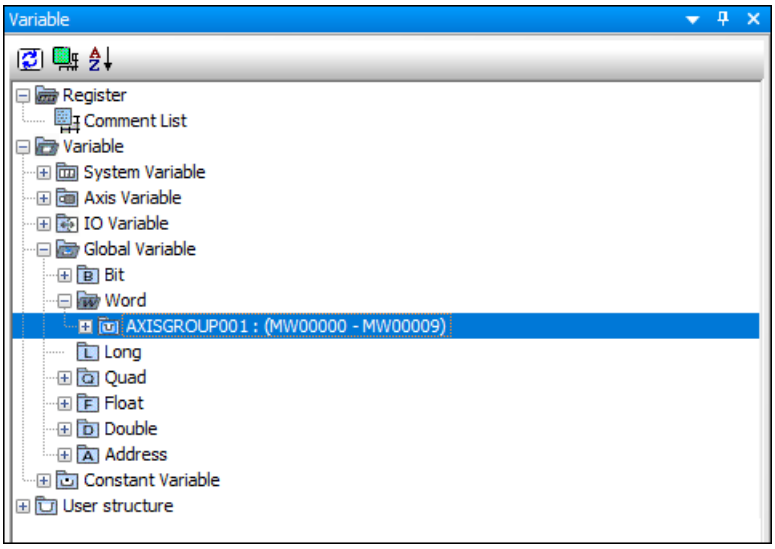


The [Group registration of variables] window will be displayed.

2. **Set the group name and range of registers, and then click the [OK] button.**



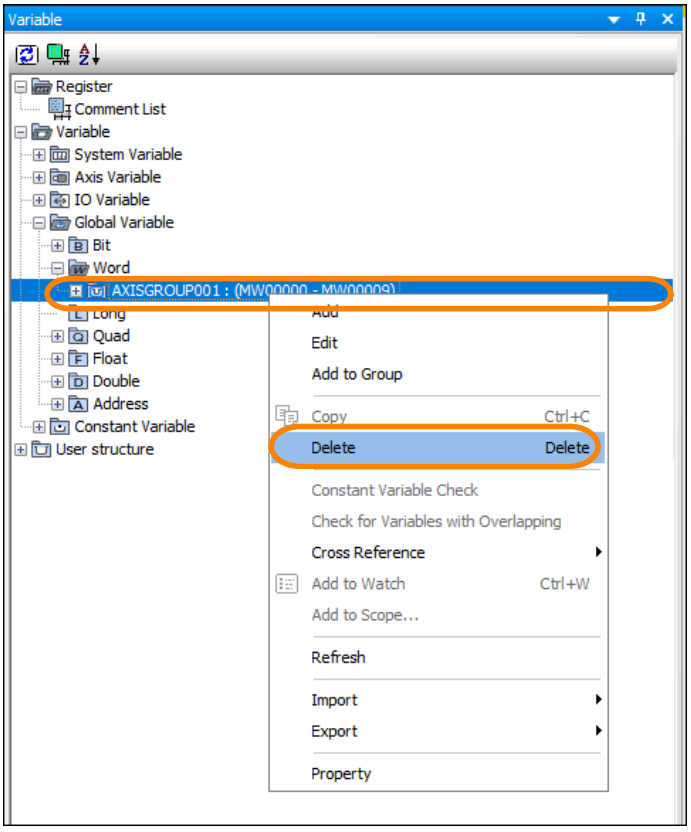
The variables in the specified range of registers will be grouped and the group will be displayed.



This concludes the procedure.

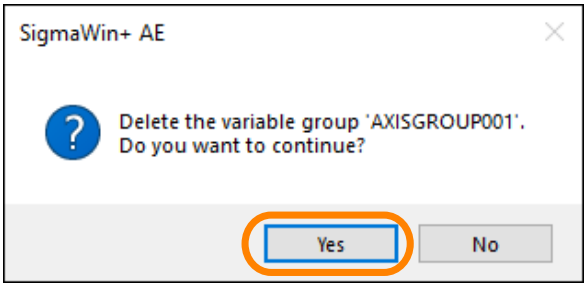
(b) Deleting a Variable Group

1. **Right-click the global variable group to delete, and select [Delete].**

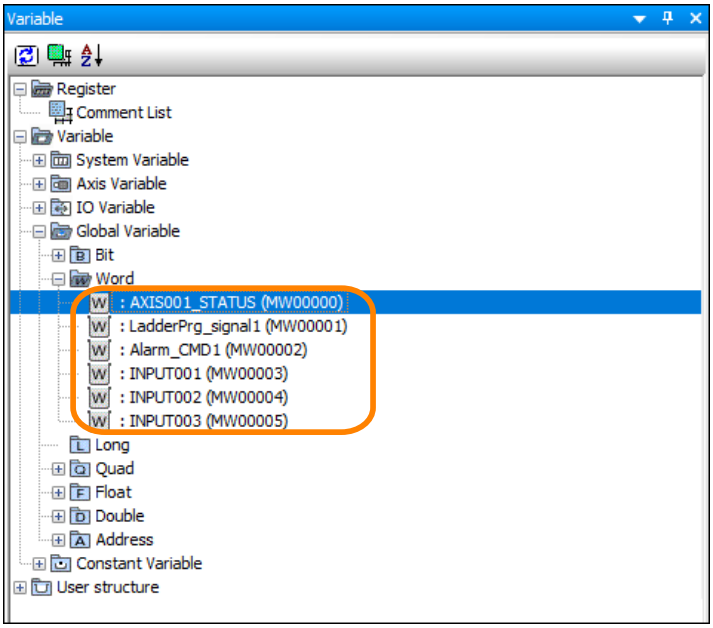


A message dialog box will be displayed.

2. **Click the [Yes] button.**



The variables will be ungrouped.

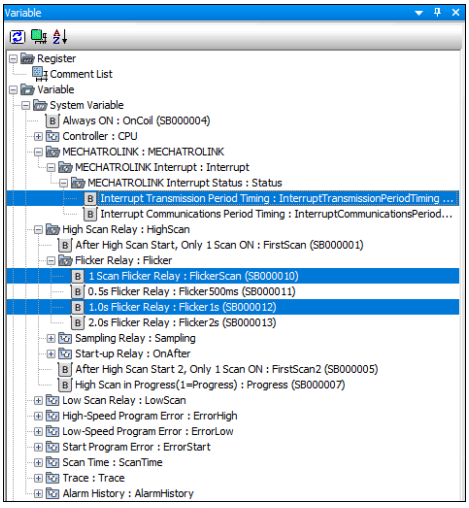


This concludes the procedure.

(2) Manipulating Multiple Variables at the Same Time

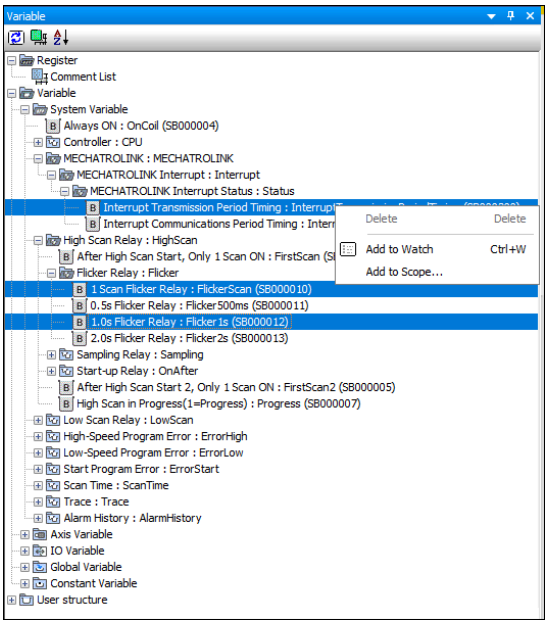
You can manipulate more than one system variable or user variable at the same time. Use the following procedure.

1. **Select the variables to manipulate together in the [Variable] window.**

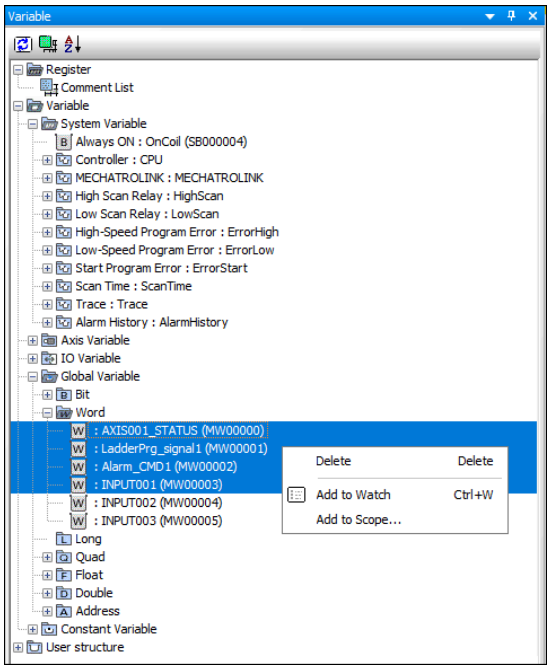


2. **Right-click on the [Variable] window, and select the command to use.**

<System Variables>



<User Variables>



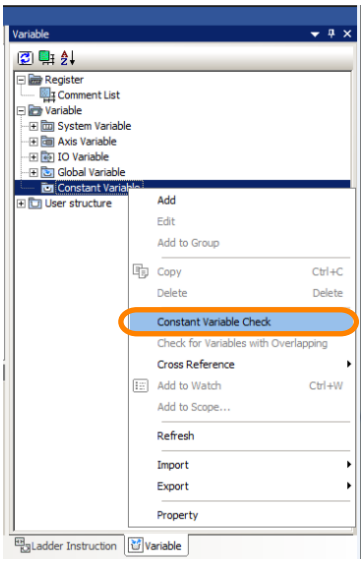
Item	Description
Delete	Deletes the selected variable. This command is disabled when a system variable is selected.
Add to Watch	Registers the selected variables for a watch.
Add to Scope	Registers the selected variables for a scope.

This concludes the procedure.

(3) Comparing Constant Variable Setting Values with Current Values in C Registers

Normally, the setting values registered to constant variables are the same as the current values in C registers. However, these values sometimes differ for some reason. When you use this function, the setting values registered to constant variables are compared with the current values in C registers, and, if the values do not match, the current values in C registers are automatically corrected to the same values as the setting values registered to constant variables.

To compare the setting values of constant variables with the current values in C registers, right-click on [Constant Variable] in the [Variable] window, and select [Constant Variable Check].



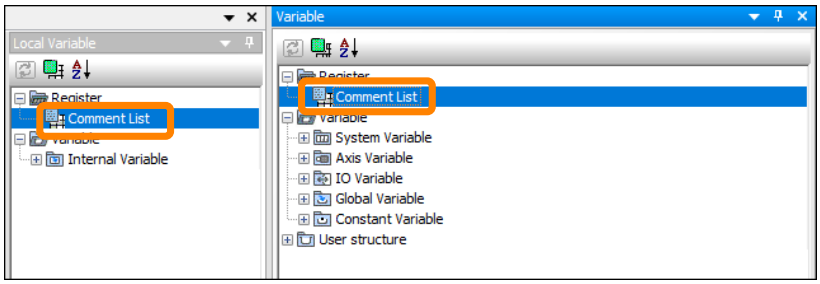
4.2.6 Comment List

(1) Displaying the Comment List

You can browse and edit the comments registered for registers in the comment list. This section describes the procedure to display the comment list.

Double-click [Comment List] in the [Variable] window or the [Local Variable] window.

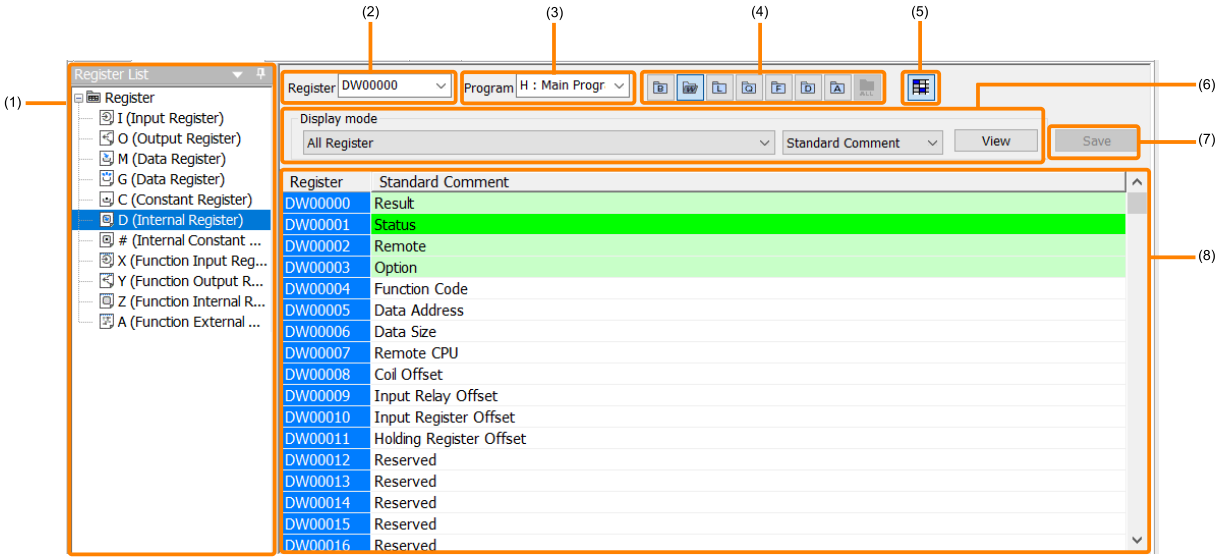
Information The [Local Variable] window is displayed when the mouse cursor is placed on the [Local Variable] tab that is displayed when a ladder program is opened.



The [Comment List] tab page will be displayed.

This concludes the procedure.

(2) [Comment List] Tab Page



No.	Item	Description
(1)	Register List	The list of registers is displayed. Double-click a register type to apply that register type to the register address (first character) in [Register].
(2)	Register	Select the first register of the registers to display in the comment list.
(3)	Program	Select the program to reference when the selected register type is a local register (D, #, X, Y, Z or A).
(4)	Data Type	The data type buttons are displayed. Click a button to apply that data type to the register address (second character) in [Register].
(5)	[Display/Hide Register Map] Button	When this button is enabled, the cells in the comment list are given colors. *1
(6)	Display Mode	Select one of the following items and click the [View] button to update the contents of the comment list. • Select the registers to display from "All Register", "Registers used", or "Registers used (Also displays registers other than first register in color)". • Select the comments to display from "Standard Comment", "Extended Comment 1", "Extended Comment 2", "Extended Comment 3", or "All Comments".
(7)	[Save] Button	Saves the content that was set.
(8)	Comment List	You can browse and edit the comments.

*1 The color of the cell indicates the status of the register.

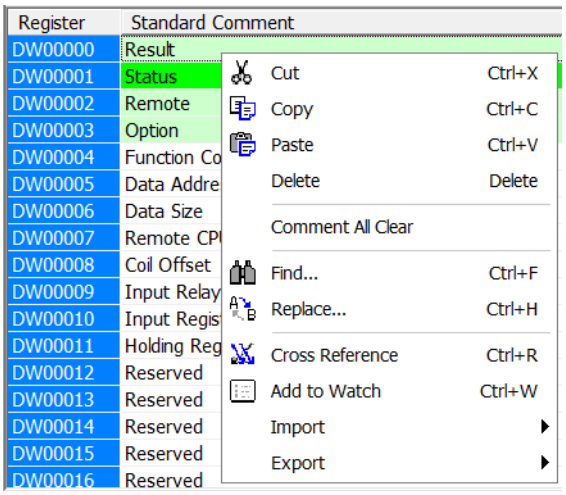
Color	Meaning
Light green	Address registers or registers that specify the number of transfer data with constants for specific instructions (SETW, MOVW, XCHG, and COPYW)
Red	Registers that use the same memory address as other registers
Green	Registers used in ladder programming
Yel-low	Registers that are used as the starting addresses for indexing (i or j) or registers that are used for specific instructions (SETW, MOVW, XCHG, and COPYW) for indirect addressing of the number of words to transfer. **Note:** An unspecified range of registers may be used after these registers.

(3) Editing the Comment List

Double-click a comment in the comment list to edit it.

You can also right-click a comment in the comment list and edit it from the displayed menu.

After you edit the comment, it will be updated in all programs and windows that use the relevant registers.



Item	Description
Cut	Cut, copy, paste, and delete the comments in the selected comment cells.
Copy	
Paste	
Delete	
Comment All Clear	Clears all comments that are currently displayed. Use caution because you cannot restore the comments after they have been cleared.
Search	Searches the comments that are currently displayed.
Replace	Replaces the comments that are currently displayed.
Cross Reference	A cross reference for the register of the selected comment will be executed, and the results will be displayed in the [Cross Reference] window. Refer to the following section for details on the cross reference. ☞ *5.8 Cross Reference on page 230*
Add to Watch	Add the register of the selected comment to the [Watch] window.
Import	Import and export comments. Refer to the following section for details. ☞ *8.3 Export/Import on page 347*
Export	

(4) Saving a Comment

You can save a comment changed in the SigmaWin+ AE by selecting [Save Project] or [Save as a New Project] from the [File] menu. You can also save variable comments in the same manner.

The following table shows the read source and write destination of comment data according to the connection status by register.

Important

If there are differences in the registers between the read source project file and the write destination project file + SERVOPACK in a project link connection, data may be erased because the read source data will overwrite the write destination data.

Connection Status	Register	Read Source	Write Destination
Offline	S/I, O	Fixed by system	Cannot be written.
	M, I, O, G	Project file	Project file
	C	Project file	Project file
	D, #, X, Y, Z, A	Programs in project file	Programs in project file
Project Link Connection	S/I, O	Fixed by system	Cannot be written.
	M, I, O, G	Project file	Project file + SERVOPACK
	C	SERVOPACK	SERVOPACK
	D, #, X, Y, Z, A	Programs in SERVOPACK	Programs in SERVOPACK
Direct Connection	S/I, O	Fixed by system	Cannot be written.
	M, I, O, G	SERVOPACK	SERVOPACK
	C	SERVOPACK	SERVOPACK
	D, #, X, Y, Z, A	Programs in SERVOPACK	Programs in SERVOPACK

4.3 Data Management

This section describes operations related to the various types of data management required in programming.

4.3.1 Cam Tool Data

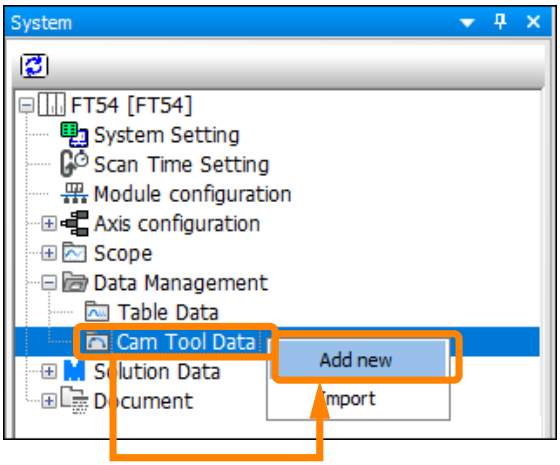
Cam tool data is data that is used in the Electronic Cam Tool and managed in the SigmaWin+ AE.
This section describes the operations to create, import, edit, and delete cam tool data from the SigmaWin+ AE.
Refer to the following manual for how to use the Electronic Cam Tool.

Machine Controller MP900/MP2000 Series Electronic Cam Data Preparation Tool Operation Manual (Manual No.: SIEP C880700 18)

(1) Creating Cam Tool Data

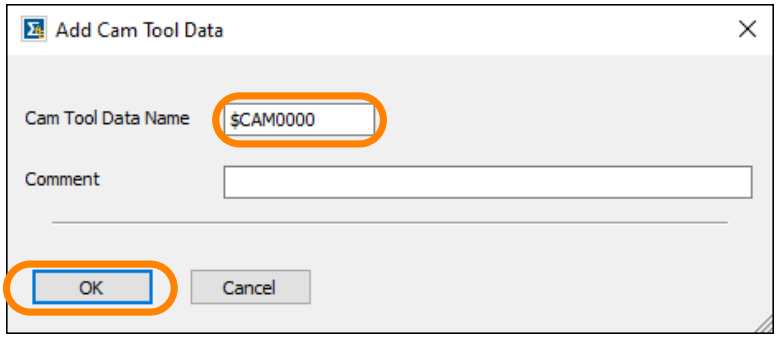
Use the following procedure to create cam tool data.

1. **In the [System] window, right-click [Cam Tool Data] and select [Add new].**



The [Add Cam Tool Data] window will be displayed.

2. **Enter the cam tool data name, and click the [OK] button.**

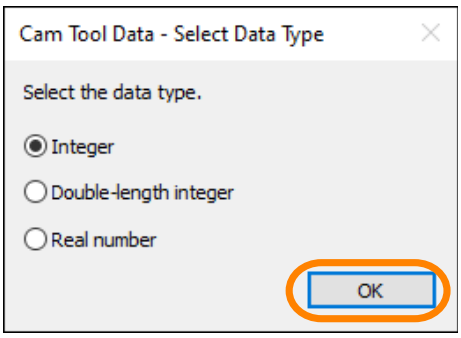


The Electronic Cam Tool will start, and the [Set Style] window will be displayed.

3. **Create and save the cam tool data using the Electronic Cam Tool.**

When you return to the SigmaWin+ AE, the [Cam Tool Data - Select Data Type] window will be displayed.

4. **Select the data type, and then click the [OK] button.**



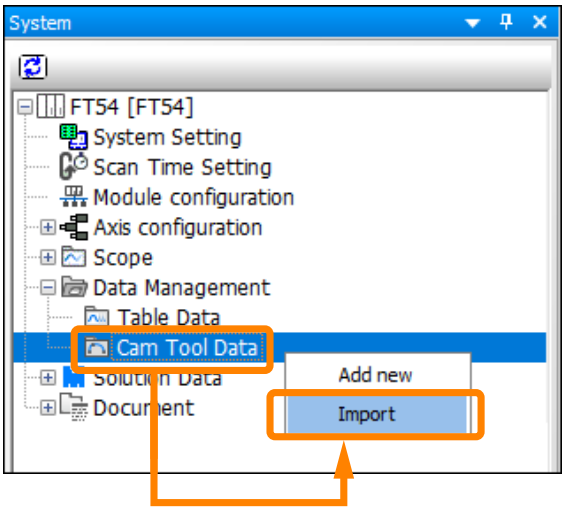
The created cam tool data will be displayed in the [System] window.

This concludes the procedure.

(2) Importing Cam Tool Data

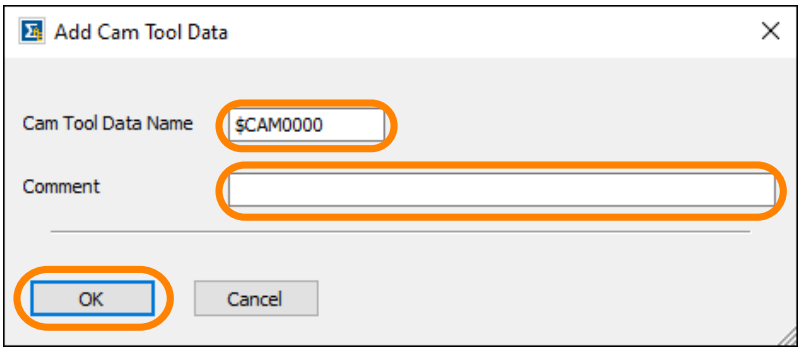
Use the following procedure to import cam tool data that was saved on the PC into the SigmaWin+ AE.

1. **Establish an online connection to the SERVOPACK or open a project file.**
2. **In the [System] window, right-click [Cam Tool Data] and select [Import].**



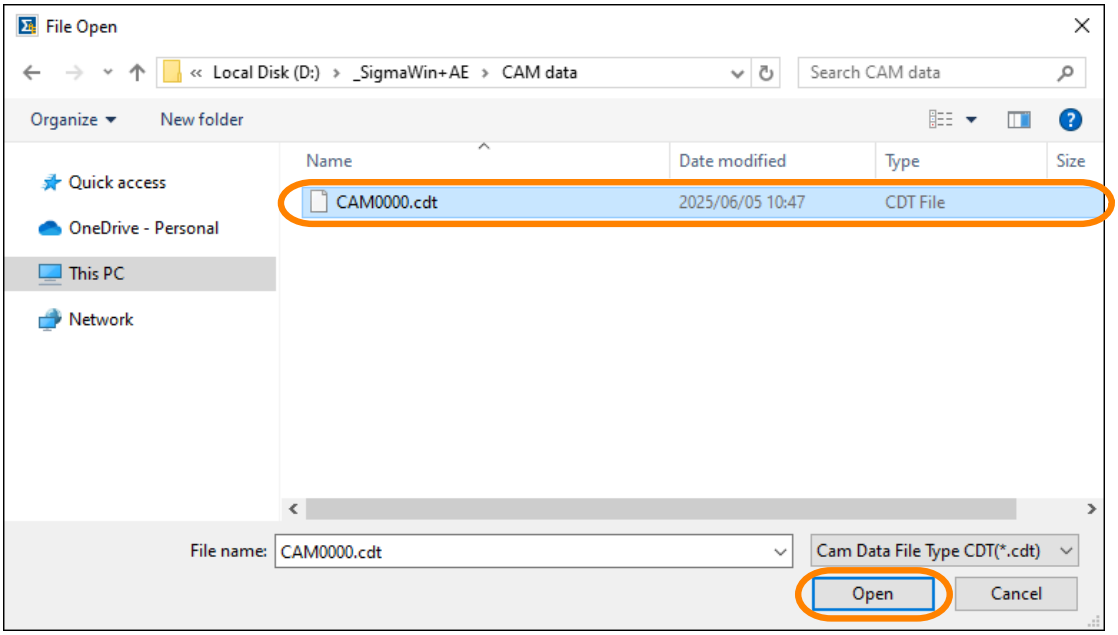
The [Add Cam Tool Data] window will be displayed.

3. **Enter the cam tool data name and comment, and click the [OK] button.**

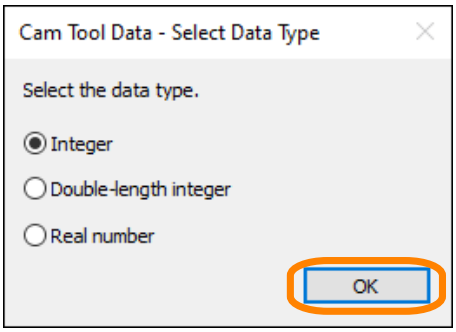


The [File Open] window will be displayed.

4. **Select the cam tool data file to import, and then click the [Open] button.**



5. **Select the data type, and then click the [OK] button.**



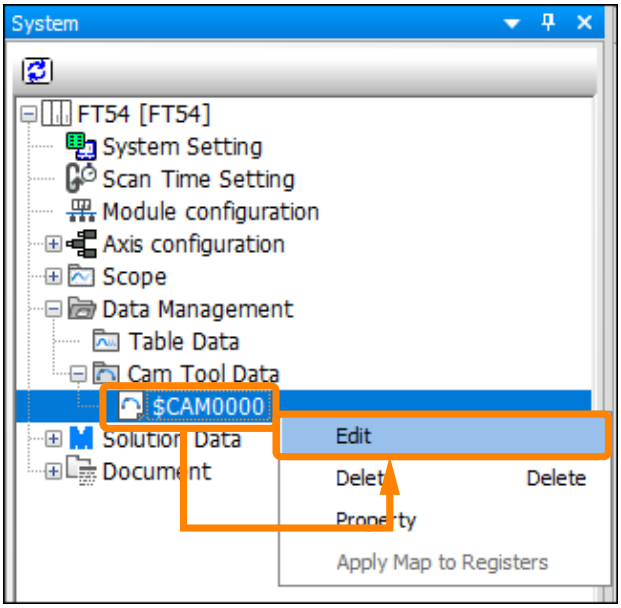
The imported cam tool data will be displayed in the [System] window.

This concludes the procedure.

(3) Editing Cam Tool Data

Use the following procedure to edit cam tool data.

1. **In the [System] window, right-click the cam tool data to edit and select [Edit].**



The Electronic Cam Tool will start, and graph of the data will be displayed.

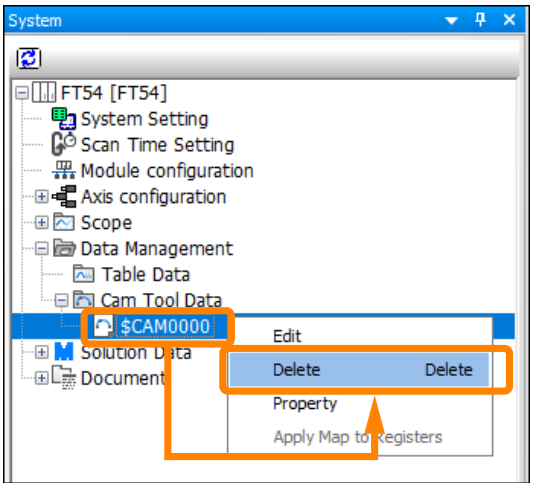
2. **Edit the cam tool data using the Electronic Cam Tool.**

This concludes the procedure.

(4) Deleting Cam Tool Data

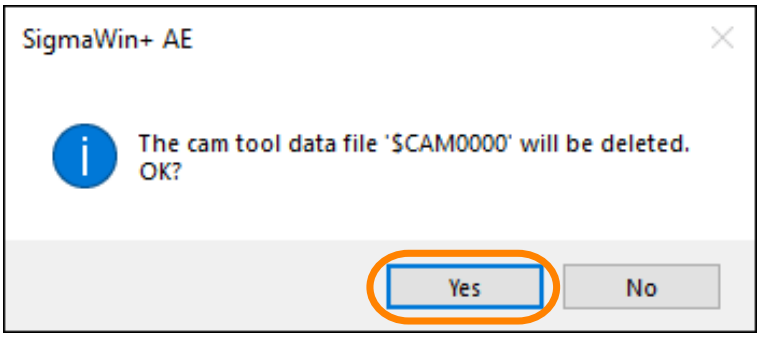
Use the following procedure to delete cam tool data.

1. **In the [System] window, right-click the cam tool data to delete and select [Delete].**



A message dialog box will be displayed.

2. **Click the [Yes] button.**



This concludes the procedure.

4.3.2 Table Data

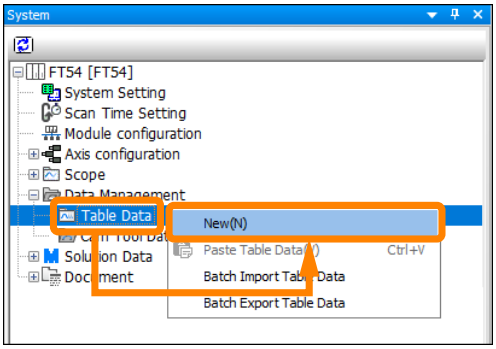
Table data is data in tabular form (arrays) that is used in the main program of a ladder program.

This section describes the operations to create, edit, delete, export, and import table data using the SigmaWin+ AE.

(1) Creating Table Data

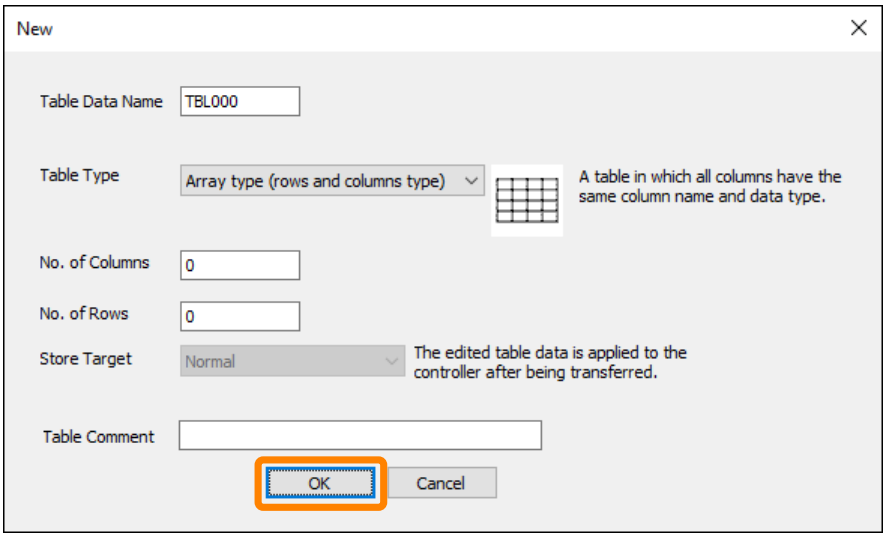
Use the following procedure to create table data.

1. **In the [System] window, right-click [Table Data] and select [New].**



The [New] window will be displayed.

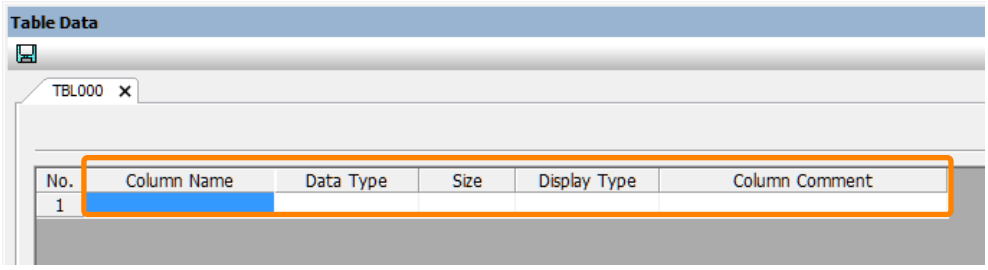
2. **Set the following items, and then click the [OK] button.**



Item	Description
Table Data Name	Set the name of the table data. <Setting Conditions> • 8 characters maximum. • The first character is an alphabetic character or "$". • The second character and subsequent characters are alphabetic characters, numbers, "-", or "_". • Do not enter a space. • Do not enter the following characters that correspond to system reserved words in the Engineering Manager. COM1, COM2, COM3, COM4, PRN, NUL, LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, LPT9, AUX, CLOCK$, CON, USERENV **Note:** If you enter a lowercase character, it will be automatically converted to uppercase.
Table Type	Select the table type. • Array type (rows and columns type): A table in which all columns have the same column name and data type. • Record type (list of columns type): A table in which the column name and data type are set for each column.
No. of Columns	Set the number of columns in the table. The maximum number of columns is 32,767.
No. of Rows	Set the number of rows in the table. The maximum number of rows is 65,535.
Store Target	Cannot be used.
Table Comment	Set a comment related to the table.

The [Table Data] window will be displayed.

3. **Set the following items.**



Item	Description
Column Name	Set the column name. <Setting Conditions> 8 characters maximum.
Data Type	Double-click the cell and select one of the following data types. Integer, double-length integer, quadruple-length integer, real number, double-precision real number, or text string
Size	The size of the column is displayed. If the data type is set to text string, you can enter a value between 1 and 80.
Display Type	The display type is displayed according to the data type. If you selected integer, double-length integer, or quadruple-length integer for the data type, you can double-click the cell and select binary, decimal, or hexadecimal.
Column Comment	Set a comment related to the column.

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

This concludes the procedure.

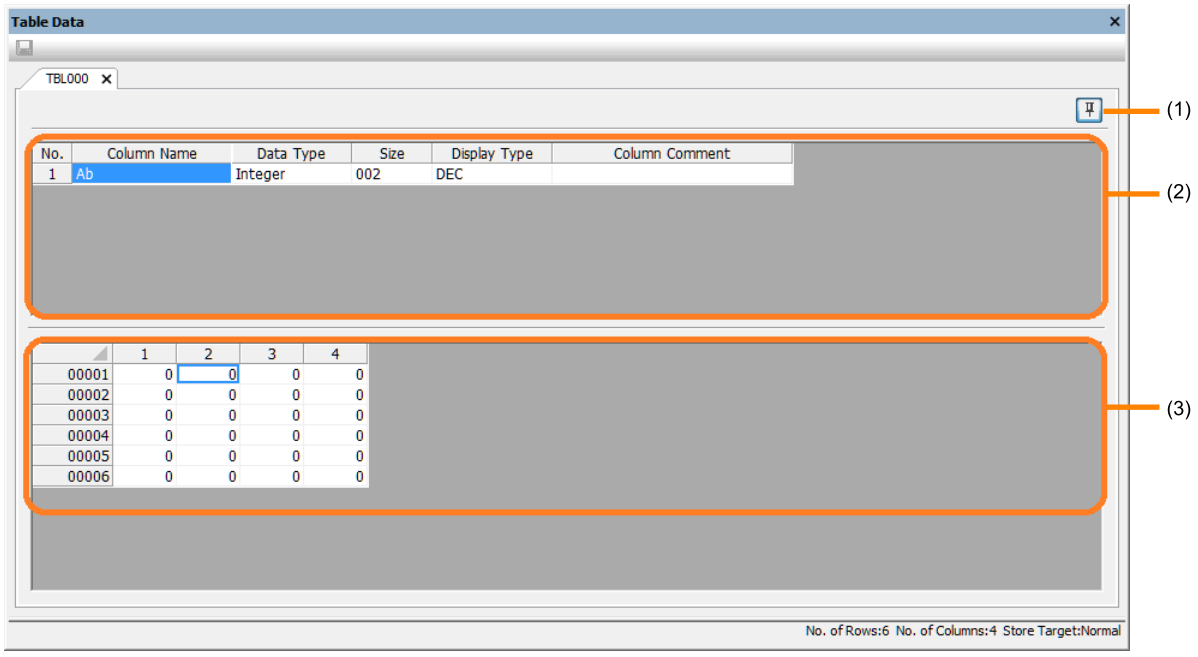
(2) Editing Table Data

Two modes are available for editing table data on the [Table Data] window: Edit Column Attributes Mode allows you to edit the column attributes and Edit Table Data Mode allows you to edit the table data.

(a) Window Description

◆ Edit Column Attributes Mode

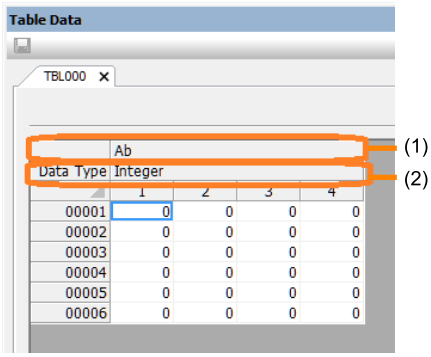
This mode is used to edit the column attributes.



No.	Item	Description
(1)	[] (Pin) Button	Use this button to lock the display of the column attributes area.  : Not pinned.  : Pinned. When pinned, you can edit both the column attributes area and the table data area. The pinned state is canceled when the [Table Data] window is closed.
(2)	Column Attributes Area	This area is used to edit the column attributes (column name, data type, size, display type, and column comment). If the table type is array type (rows and columns type), all of the column attributes are the same. If the table type is record type (list of columns type), a different attribute can be set for each column.
(3)	Table Data Area	This area is used to edit the contents of the table data, as well as to add and delete rows and columns.

◆ Edit Table Data Mode

This mode is used to edit the table data.

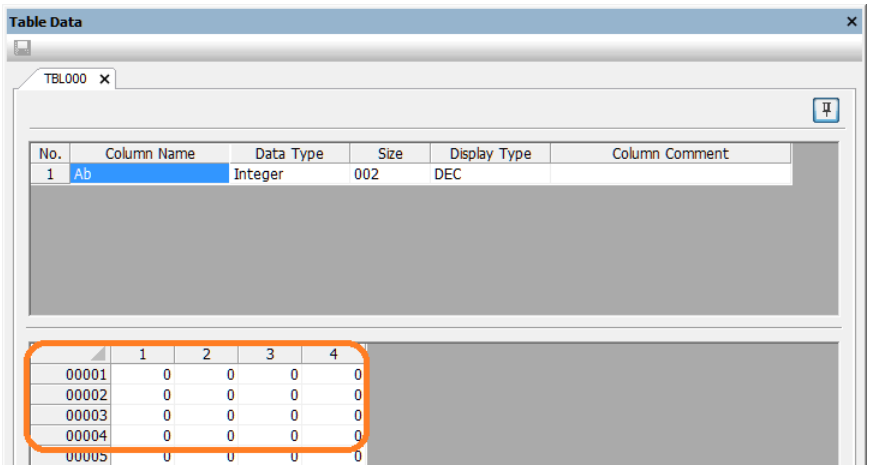


No.	Item	Description
(1)	Table Data	The table data name is displayed.
(2)	Data Type	The data type is displayed.

(b) Switching the Edit Modes

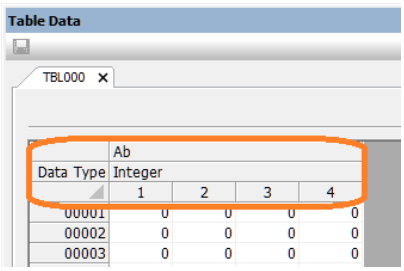
◆ Edit Column Attributes Mode → Edit Table Data Mode

Double-click inside the colored frame on the following window to switch to Edit Table Data Mode.



◆ Edit Table Data Mode → Edit Column Attributes Mode

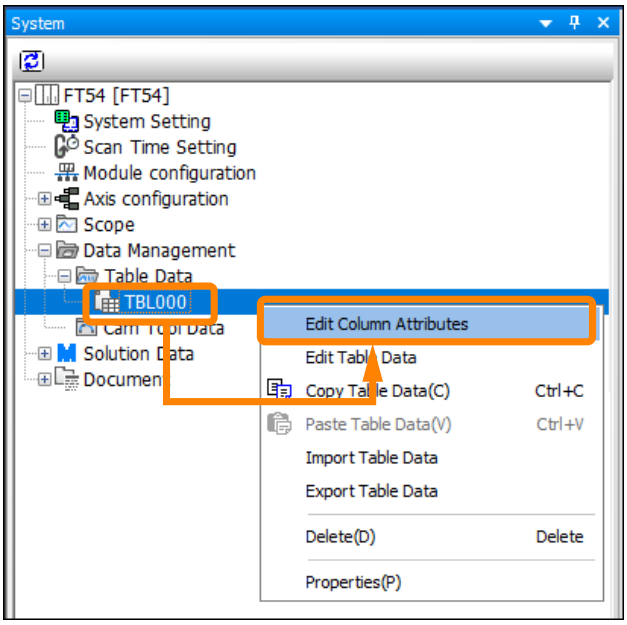
Double-click inside the colored frame on the following window to switch to Edit Column Attributes Mode.



(c) Editing Column Attributes

Use the following procedure to edit column attributes.

1. **In the [System] window, right-click the table data to edit and select [Edit Column Attributes].**



The [Table Data] window will be displayed in Edit Column Attributes Mode.

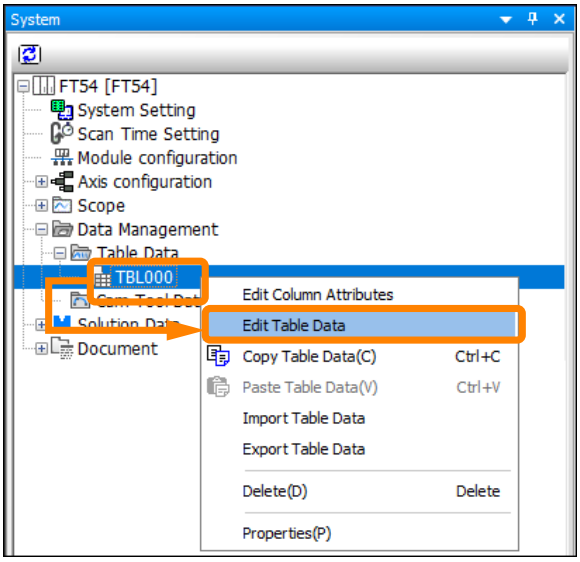
2. **Change the column attributes as required, and then click the [ ] button.**

This concludes the procedure.

(d) Editing Table Data

Use the following procedure to edit table data.

1. **In the [System] window, right-click the table data to edit and select [Edit Table Data].**



The [Table Data] window will be displayed in Edit Table Data Mode.

2. **Change the table data as required, and then click the [ ] button.**

Refer to the following section for details on inserting and deleting columns and rows.

☞ ◆ *Inserting a Row or Column on page 195*

☞ ◆ *Deleting a Row or Column on page 196*

Information

You can also use the following procedure to edit table data.

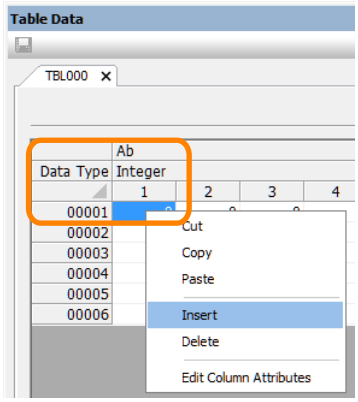
1. Double-click the table data.
2. Click the pin.
3. Edit the table data in the edit table data area.

This concludes the procedure.

◆ Inserting a Row or Column

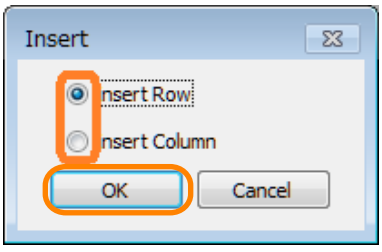
Use the following procedure to insert a row or column into the table data.

1. **Right-click anywhere in the colored box, and select [Insert].**



The [Insert] window will be displayed.

2. **Select [Insert Row] or [Insert Column], and click the [OK] button.**

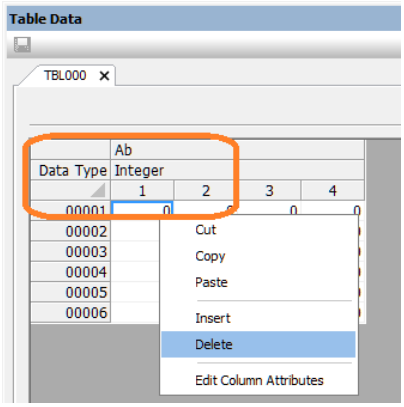


This concludes the procedure.

◆ **Deleting a Row or Column**

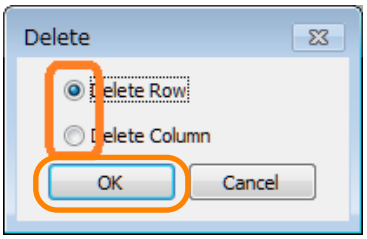
Use the following procedure to delete a row or column from the table data.

1. **Right-click anywhere in the colored box, and select [Delete].**



The [Delete] window will be displayed.

2. **Select [Delete Row] or [Delete Column], and click the [OK] button.**

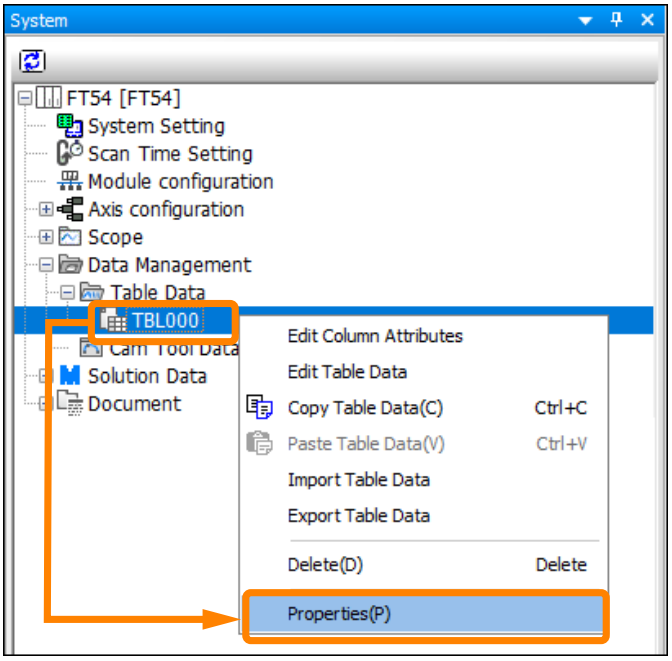


This concludes the procedure.

(3) Changing the Properties of Table Data

Use the following procedure to change the properties of table data.

1. **In the [System] window, right-click the table data to change and select [Properties].**

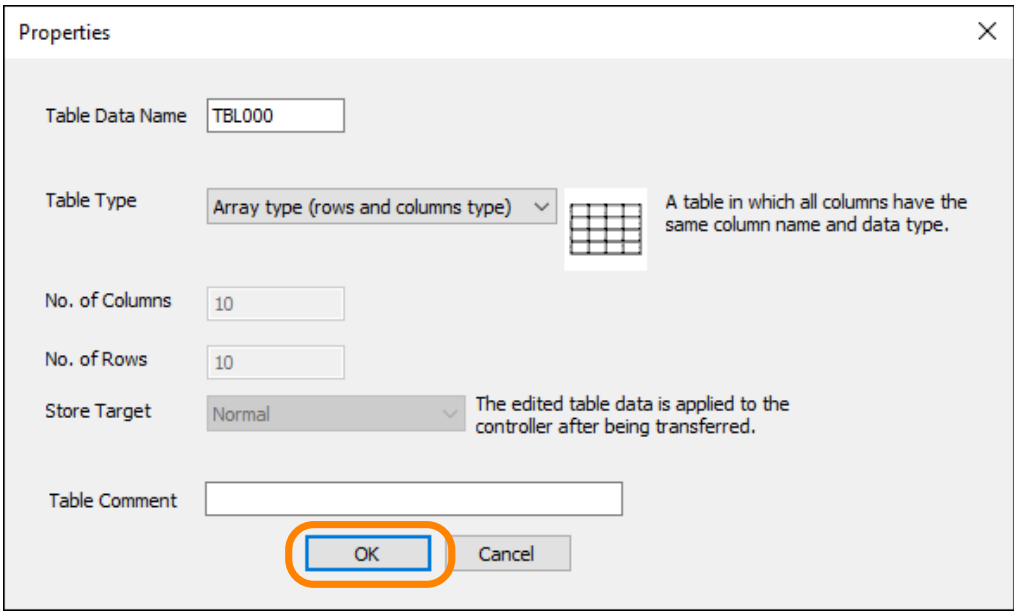


The [Properties] window will be displayed.

2. **Change the properties as required, and then click the [OK] button.**

Note:

You cannot change the number of columns or the number of rows.

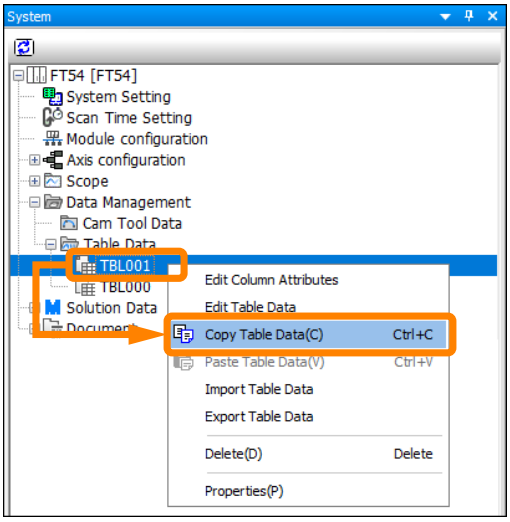


This concludes the procedure.

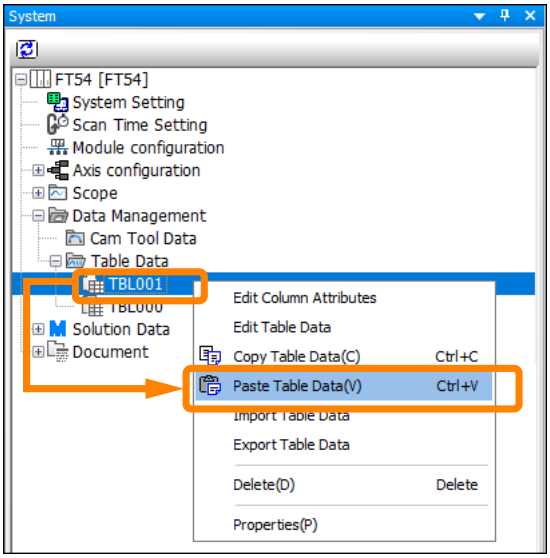
(4) Copying Table Data

Use the following procedure to copy existing table data.

1. **In the [System] window, right-click the table data to copy and select [Copy Table Data].**

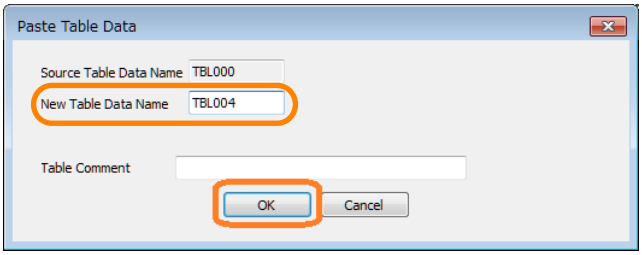


2. **In the [System] window, right-click [Table Data] and select [Paste Table Data].**



The [Paste Table Data] window will be displayed.

3. **Enter the new table data name, and click the [OK] button. The table comment is optional.**

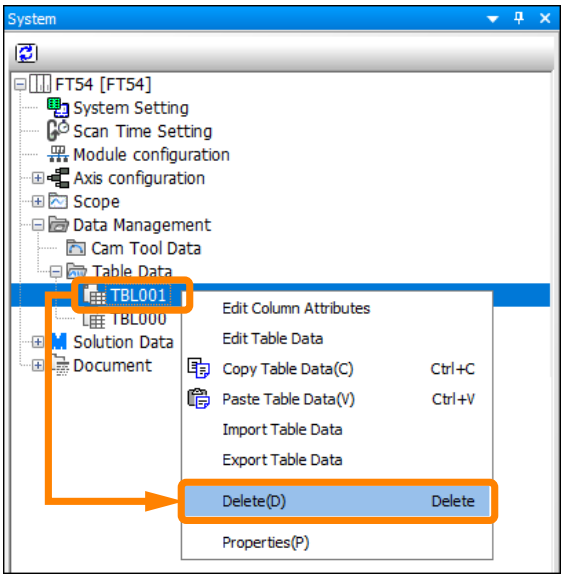


This concludes the procedure.

(5) Deleting Table Data

Use the following procedure to delete table data.

1. **In the [System] window, right-click the table data to delete and select [Delete].**



A message dialog box will be displayed.

2. **Click the [Yes] button.**

This concludes the procedure.

(6) Exporting and Importing Table Data

Use the following procedures to export and import table data.

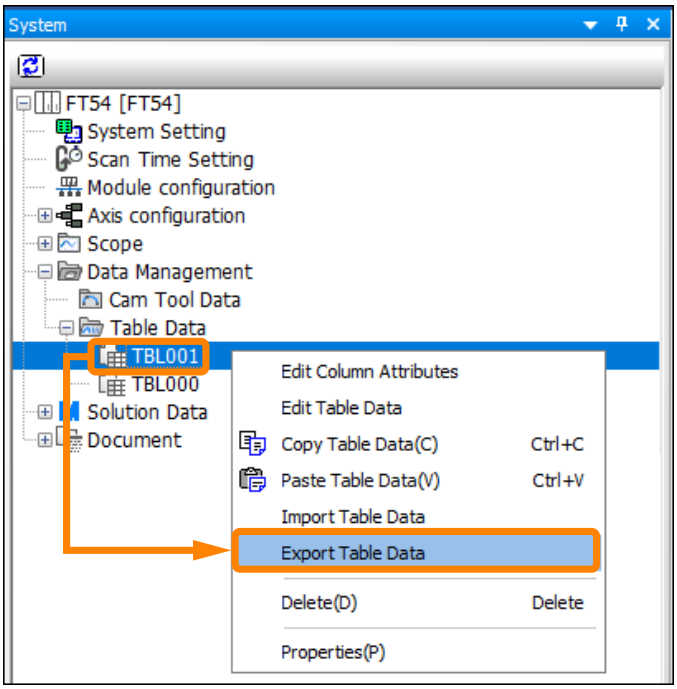
(a) Export

> Important
>
> You cannot export table data when in online mode.

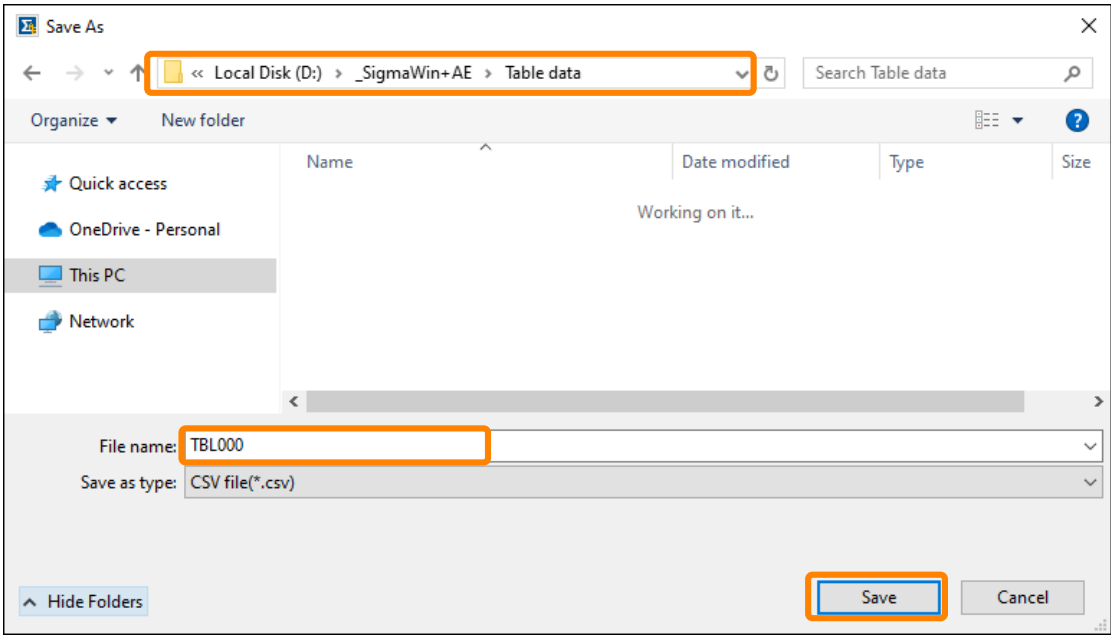
Use the following procedure to export table data.

◆ Exporting One Set of Table Data

1. **Open the project file.**
2. **In the [System] window, right-click the table data to export and select [Export Table Data].**

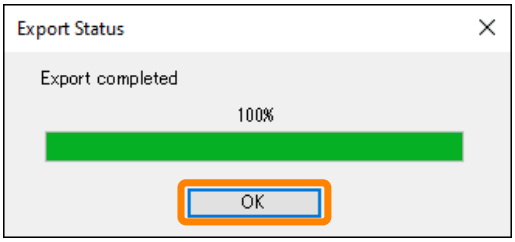


3. **Set the saving location and file name, and click the [Save] button.**



The [Export Status] window will be displayed.

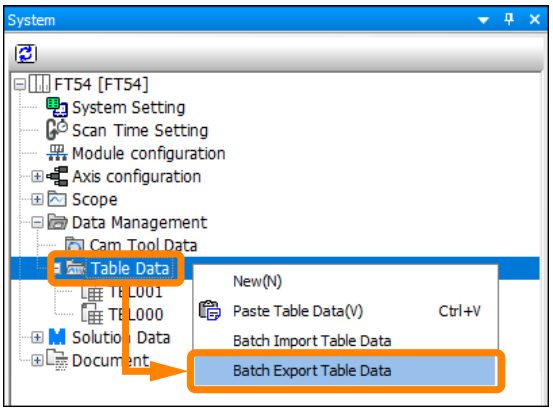
4. **Click the [OK] button.**



This concludes the procedure.

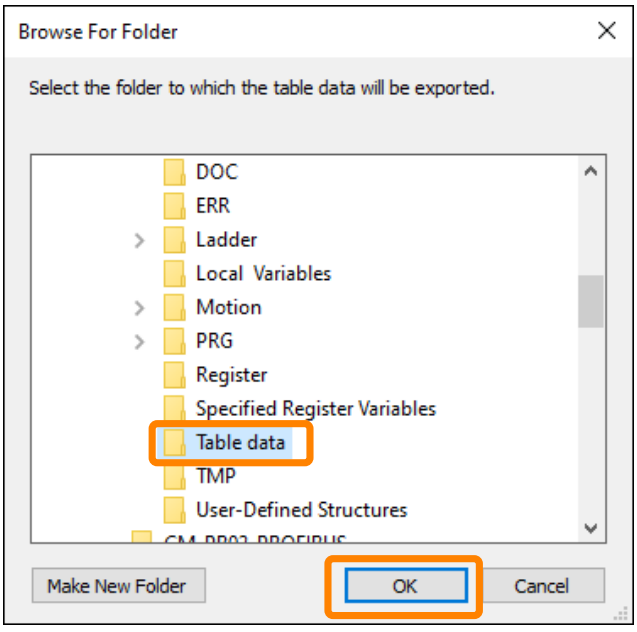
◆ **Exporting Multiple Sets of Table Data**

1. **In the [System] window, right-click [Table Data] and select [Batch Export Table Data].**



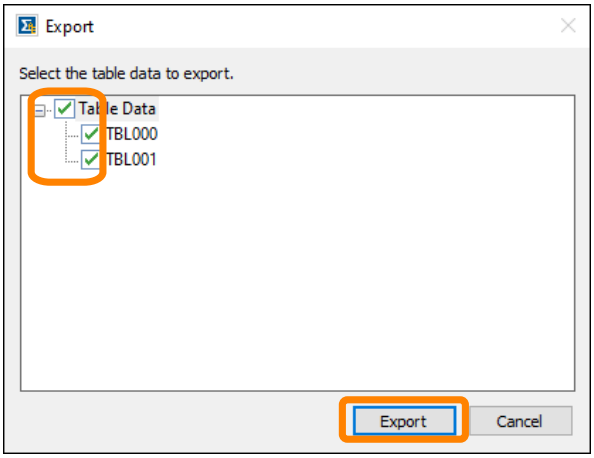
The [Browse For Folder] window will be displayed.

2. **Select the saving location, and click the [OK] button.**

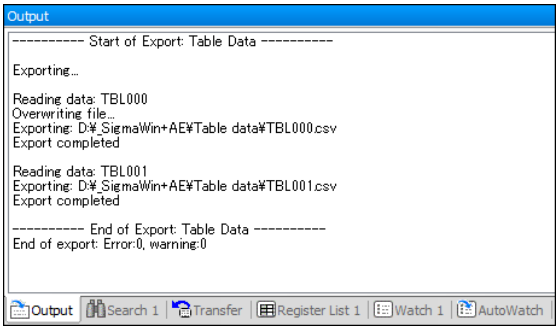


The [Export] window will be displayed.

3. **Select the table data to export, and click the [Export] button.**



The data will be exported, and the results will be displayed in the [Output] window.



This concludes the procedure.

(b) Import

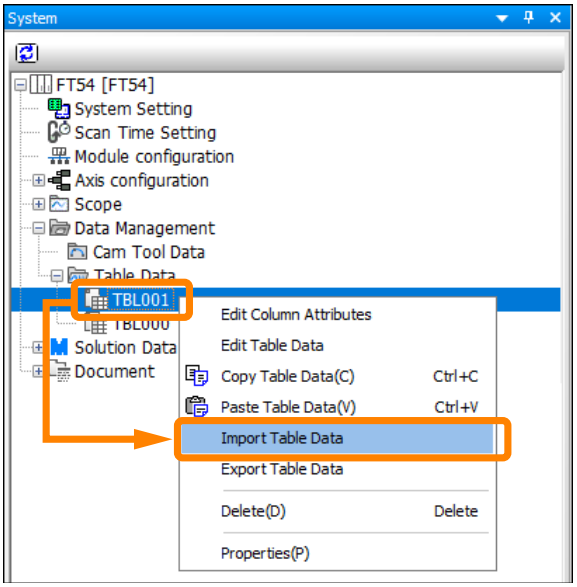
- You cannot import table data when in online mode.
- When importing multiple sets of table data, you can import the table data only when there is table data with the same name as the file name to import inside the project file.

Use the following procedure to import table data.

◆ Importing One Set of Table Data

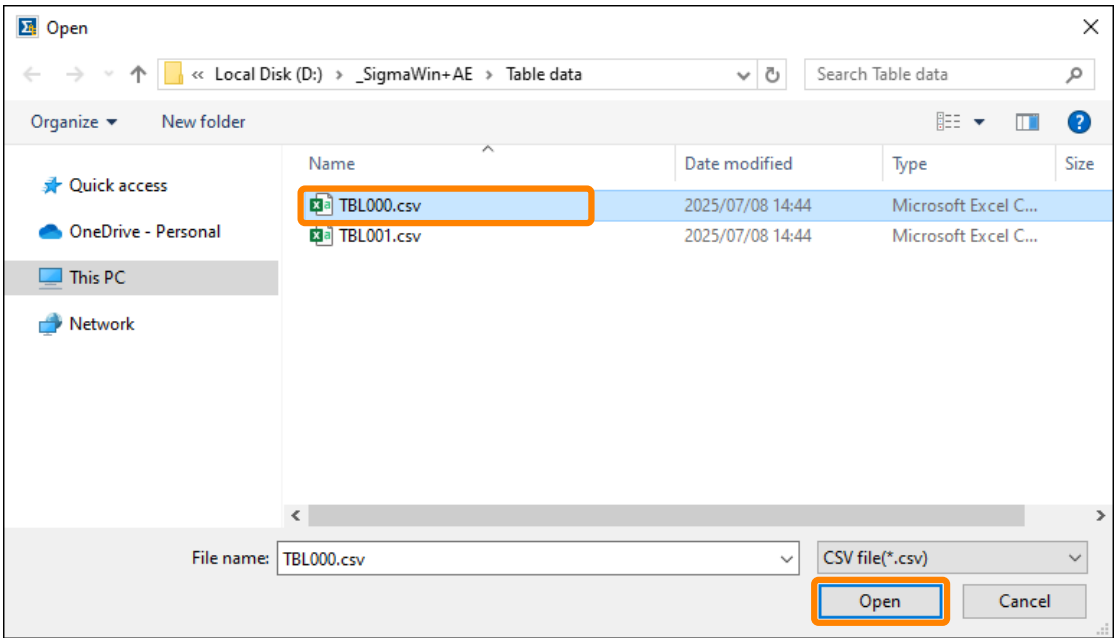
1. **Open the project file.**

2. **In the [System] window, right-click the destination table data and select [Import Table Data].**



The [Open] window will be displayed.

3. **Select the CSV file to import, and click the [Open] button.**

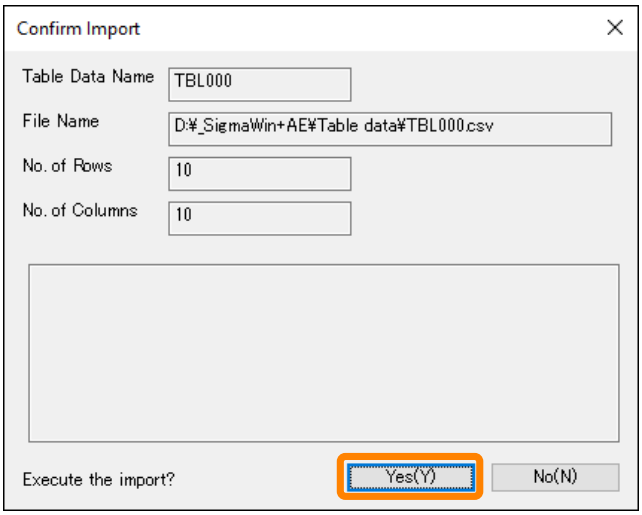


The [Confirm Import] window will be displayed.

4. **Check the destination table data name and the file name to import, and click the [Yes] button.**

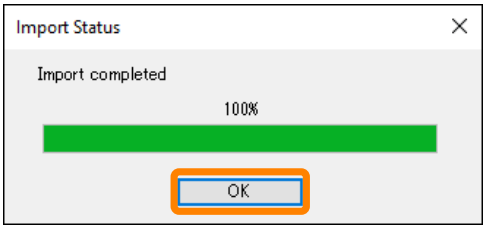
Note:

You can import the table data even if the table data name and file name are different.



The [Import Status] window will be displayed.

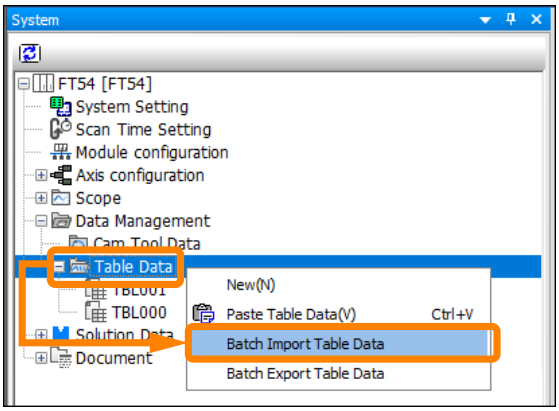
5. **Click the [OK] button.**



This concludes the procedure.

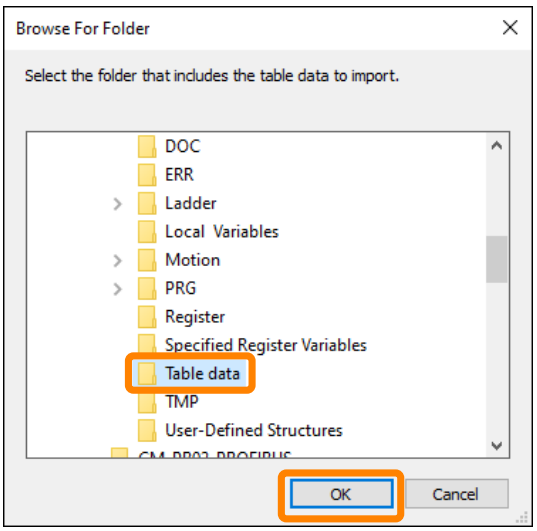
◆ Importing Multiple Sets of Table Data

1. **In the [System] window, right-click [Table Data] and select [Batch Import Table Data].**



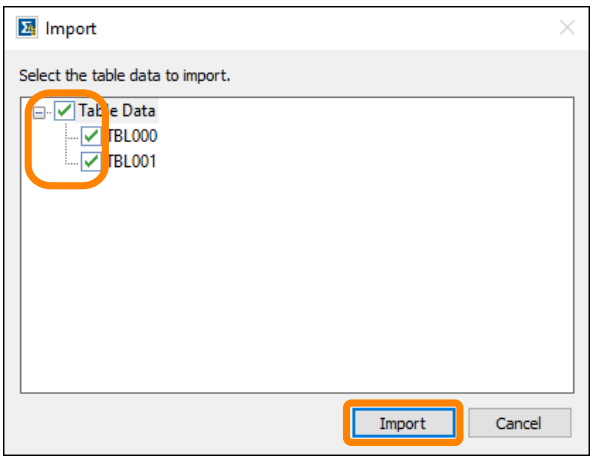
The [Browse For Folder] window will be displayed.

2. **Select the saving location of the files to import, and click the [OK] button.**

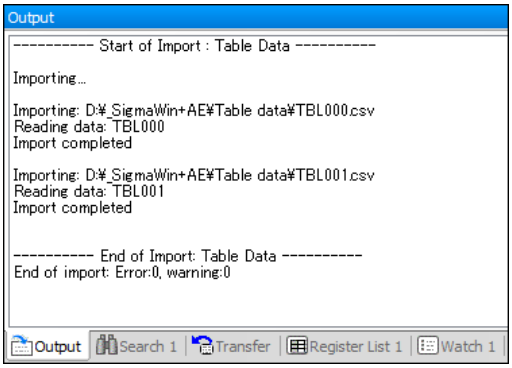


The [Import] window will be displayed.

3. **Select the table data to import, and click the [Import] button.**



The data will be imported, and the results will be displayed in the [Output] window.



This concludes the procedure.

5

Debugging

This chapter describes the functions for debugging ladder programs.

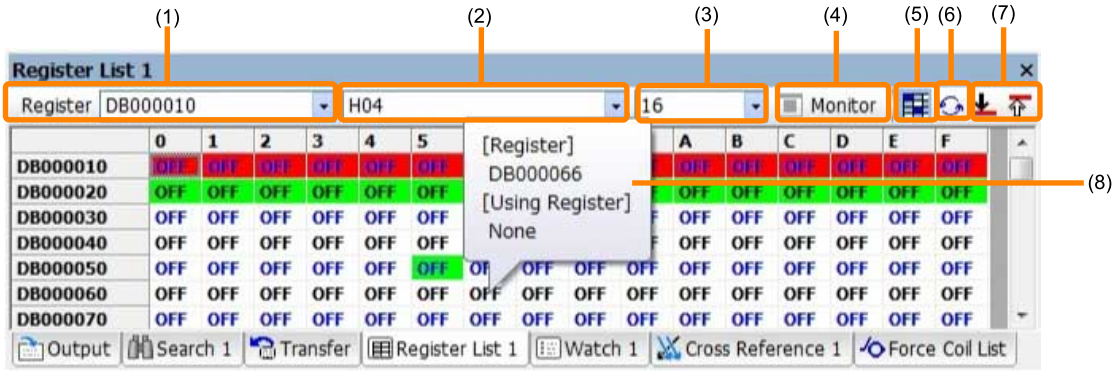
5.1 Register List

Register lists allow you to monitor the current values of the registers in a continuous area (register map). Real-time monitoring and editing of values is possible if the SERVOPACK is connected.

Information
- If you use a project link connection, the displayed results do not always match the project file because the data in the SERVOPACK is displayed.
  If you display the register map when using a project link connection, first always transfer the SERVOPACK data to the project file.
- The register list can display S, I, O, M, C, D, and G registers. However, C registers are read-only. They cannot be edited.

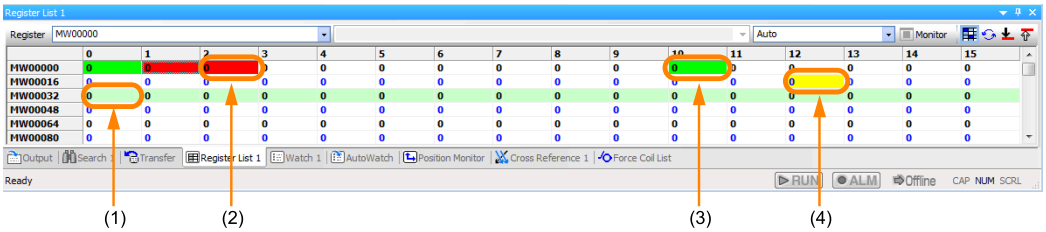
5.1.1 [Register List] Window

Information The displayed items and other elements will depend on the connection status.



No.	Item	Description
(1)	Register	Enter the address of the register for which to display a register map.
(2)	Program Number	For a D register, enter the program number.
(3)	Number of Registers Displayed in One Row	Enter the number of registers to display on one row of the register list, or select the value from the list. • Bit registers: Fixed to 16. • Other registers: You can set the number between 1 and 16. If you select [Auto], the number of displayed registers will be set automatically based on the width of the [Register List] window.
(4)	[Monitor] Button	This button is enabled only in online mode. Click this button to switch between monitoring ON (Monitor) and monitoring OFF (Monitor). When monitoring is ON, the displayed register values are updated. When monitoring is OFF, the displayed register values are not updated.
(5)	/ Button	Click this button to display ( ) and hide ( ) the register map. When the register map is displayed, registers that are used in the ladder program are displayed with a green background, and registers that are used for more than one data type are displayed with a red background.
(6)	Button	Refreshes the values in the register map.
(7)	/ Button	Searches for redundant registers. The [ ] button searches for redundant registers upward, and the [ ] button searches downward. Redundant registers are displayed in blue cells.
(8)	Balloon Window	If you place the cursor over the register map, a balloon will show the register and the status at the cursor position.

Information Interpreting the Register List

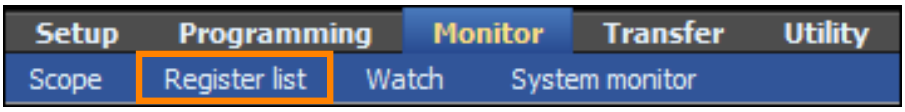


No.	Color	Meaning
(1)	Light green	Address registers or registers that specify the number of transfer data with constants for specific instructions (SETW, MOVW, XCHG, and COPYW)
(2)	Red	Registers that use the same memory address as other registers
(3)	Green	Registers used in ladder programming
(4)	Yellow	Registers that are used as the starting addresses for indexing (i or j) or registers that are used for specific instructions (SETW, MOVW, XCHG, and COPYW) for indirect addressing of the number of words to transfer. **Note:** An unspecified range of registers may be used after these registers.

5.1.2 Displaying a Register Map

Use the following procedure to display a register map.

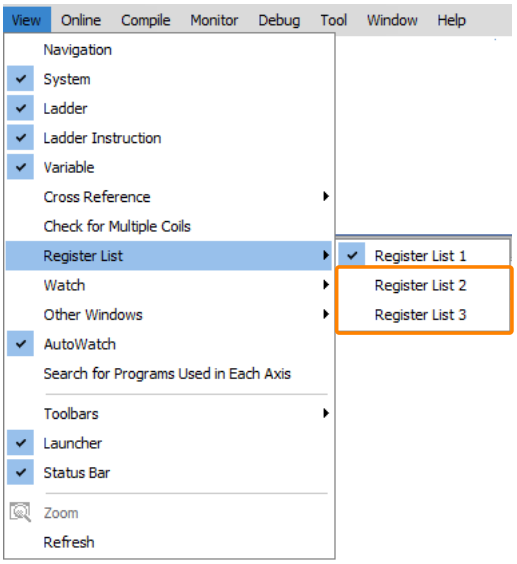
1. **Select [Monitor] − [Register List] from the launcher.**



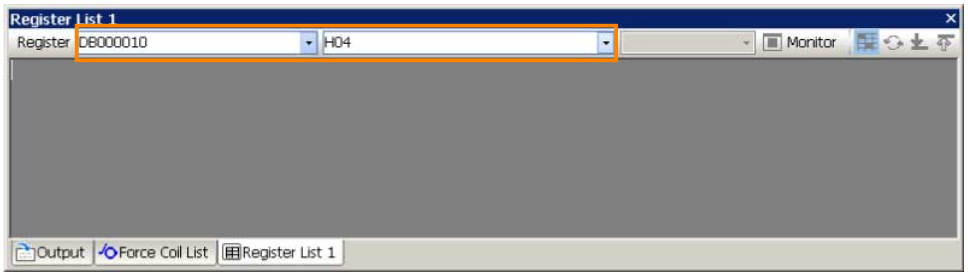
The [Register List] window will be displayed.

Note:

Up to three [Register List] windows can be displayed. The window displayed with the method above is the [Register List 1] window. To open the [Register List 2] and [Register List 3] windows, select [Register List] from the [View] menu.



2. **Enter the address of the register for which to display a register map in [Register]. For a D register, also enter the program number.**



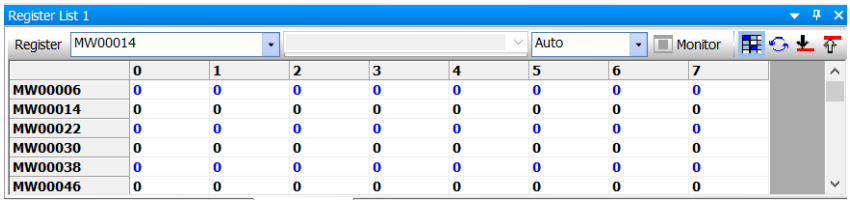
Information You can also display the register map by opening the program, selecting a register, and clicking [Debug] - [Display Register Map] from the menu.

3. **Press the Enter key.**

The specified register will be displayed in the top row of the register map.

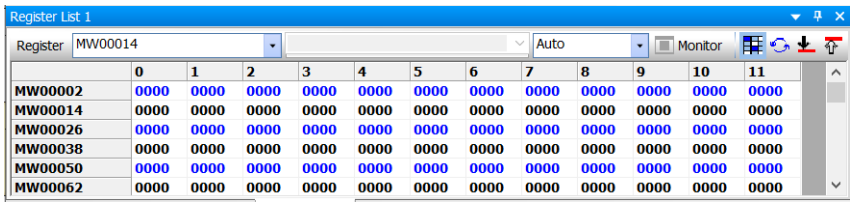
Information Right-click on the register map and select [Decimal], [Hexadecimal], [BIN], [ASCII], or [ON/OFF] to switch the display format of the register value.

<Decimal View>



	0	1	2	3	4	5	6	7
MW00006	0	0	0	0	0	0	0	0
MW00014	0	0	0	0	0	0	0	0
MW00022	0	0	0	0	0	0	0	0
MW00030	0	0	0	0	0	0	0	0
MW00038	0	0	0	0	0	0	0	0
MW00046	0	0	0	0	0	0	0	0

<Hexadecimal View>



	0	1	2	3	4	5	6	7	8	9	10	11
MW00002	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
MW00014	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
MW00026	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
MW00038	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
MW00050	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
MW00062	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

5.1.3 Editing a Register Map

You can perform the following editing operations by double-clicking cells on the register map or by pressing the **F2** key to display the text cursor.

- Directly entering values
- Deleting values (setting values to 0)
- Copying and pasting data

Press the **Enter** key to confirm the change. If the SERVOPACK is online, any changes in the values immediately affect the operation of the SERVOPACK.

5.2 Watch

The Watch function allows you to monitor the values and comments of the specified registers. Realtime monitoring and editing of values is possible if the SERVOPACK is connected.

Information
- When a project link connection is used, the data registered in the [Watch] window and [AutoWatch] window is saved only to the SERVOPACK. To apply the watch data to the project file, transfer the data from the SERVOPACK.
- The Watch function can display S, I, O, M, C, D, and G registers. However, C registers are read-only. They cannot be edited.

5.2.1 Displaying Watch Data

There are the following two methods that you can use to display watch data.

- [Watch] window: Allows you to monitor the values in registers with different data types.
- [AutoWatch] window: Allows you to monitor the values of registers just by selecting an instruction in a ladder program.

The procedures are given below.

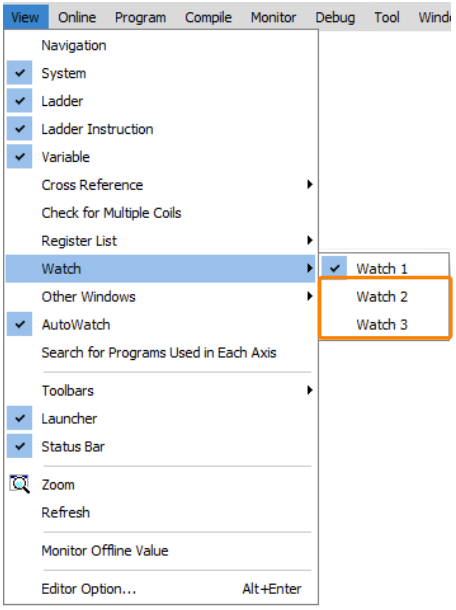
(1) Displaying Data with the [Watch] Window

1. **Select [Monitor] − [Watch] from the launcher.**

The [Watch] window will be displayed.

Note:

Up to three [Watch] windows can be displayed. The window displayed with the method above is the [Watch 1] window. To open the [Watch 2] and [Watch 3] windows, select [Watch] from the [View] menu.

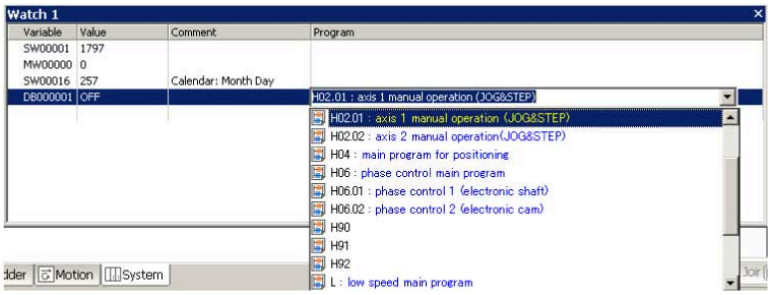


2. **Use one of the following methods to enter a register or variable name to display as watch data.**

- Double-click the [Variable] column or press **F2** to display the text cursor, and then enter the register or variable name.

  Note:

  For D registers, enter the program number as shown below.



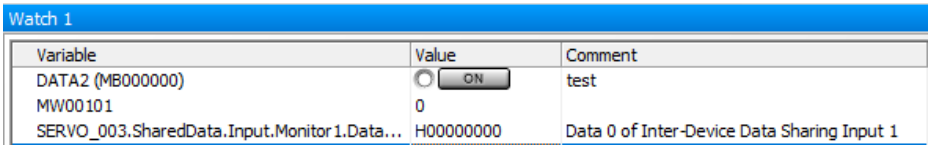
- Drag and drop a ladder program instruction to the [Watch] window.
- Drag and drop a variable in the [Variable] window to the [Watch] window.

3. **Press the Enter key.**

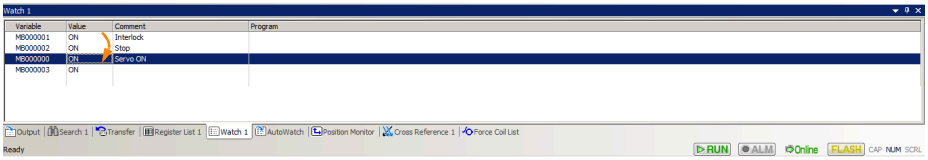
The values and comments of the specified registers will be displayed.

Information

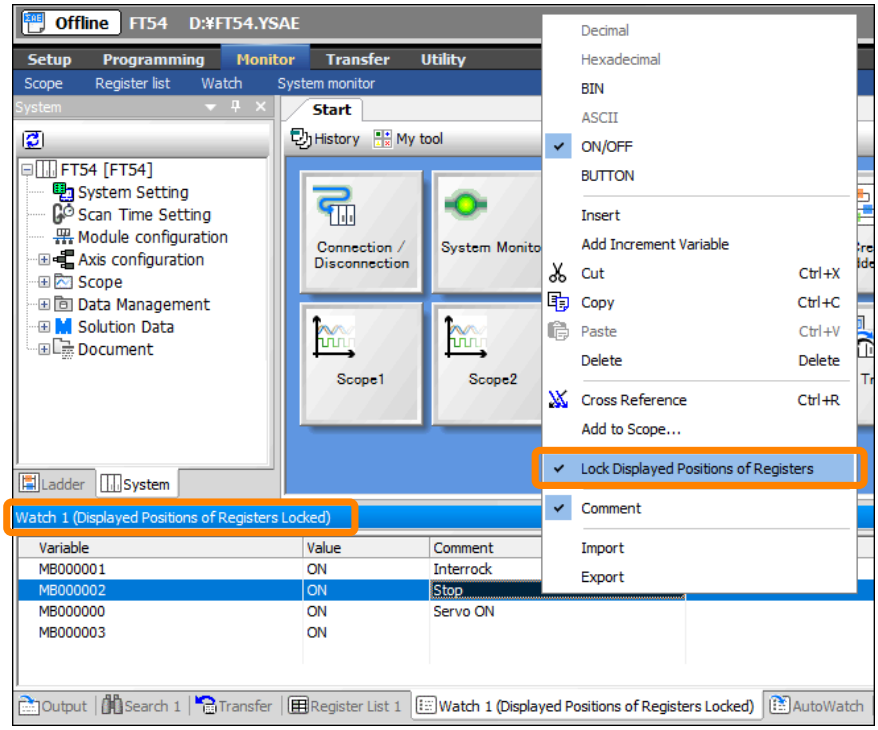
- Right-click on the [Watch] window and select [Decimal], [Hexadecimal], [BIN], [ASCII], or [ON/OFF] to switch the display format of the register value.
You can set the display format for each individual register.



- You can change the order of the registers displayed in the [Watch] window by dragging and dropping them.



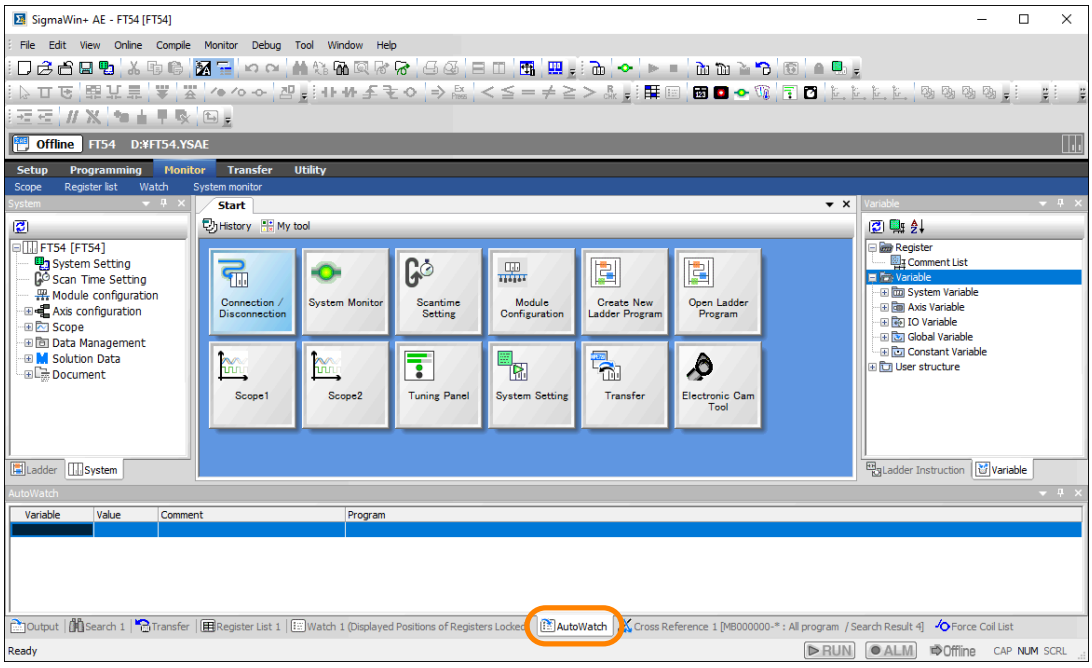
- You can also lock the [Watch] window so that the position of the displayed registers cannot be changed. Right-click on the [Watch] window and select [Lock Displayed Positions of Registers]. The positions of the displayed registers will be locked and "Displayed Positions of Registers Locked" will be displayed in the title of the [Watch] window.



(2) Displaying Data with the [AutoWatch] Window

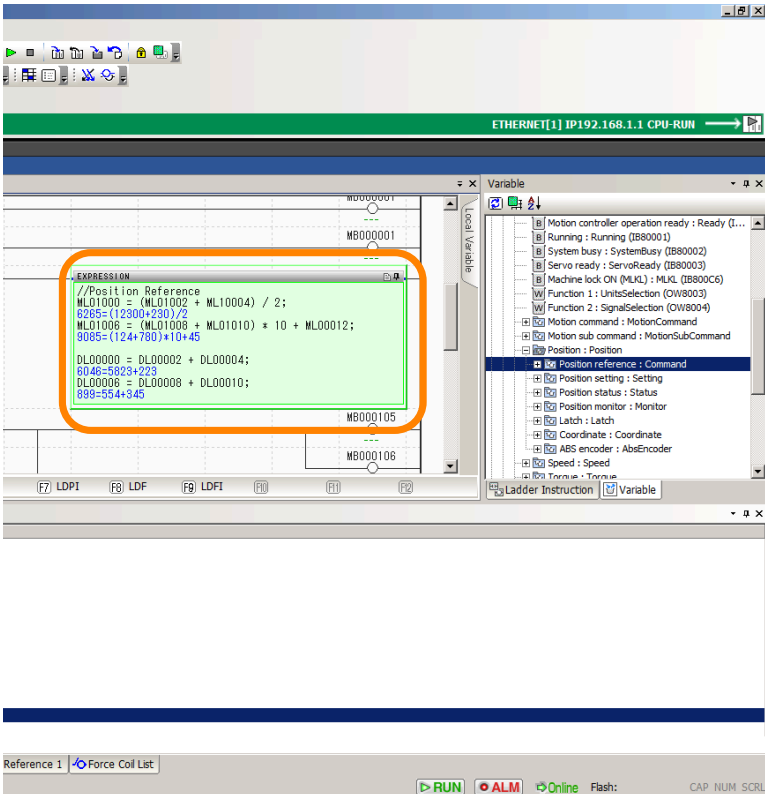
1. **Use one of the following methods to open the [AutoWatch] window.**

- If the window is already open, select the [AutoWatch] tab.

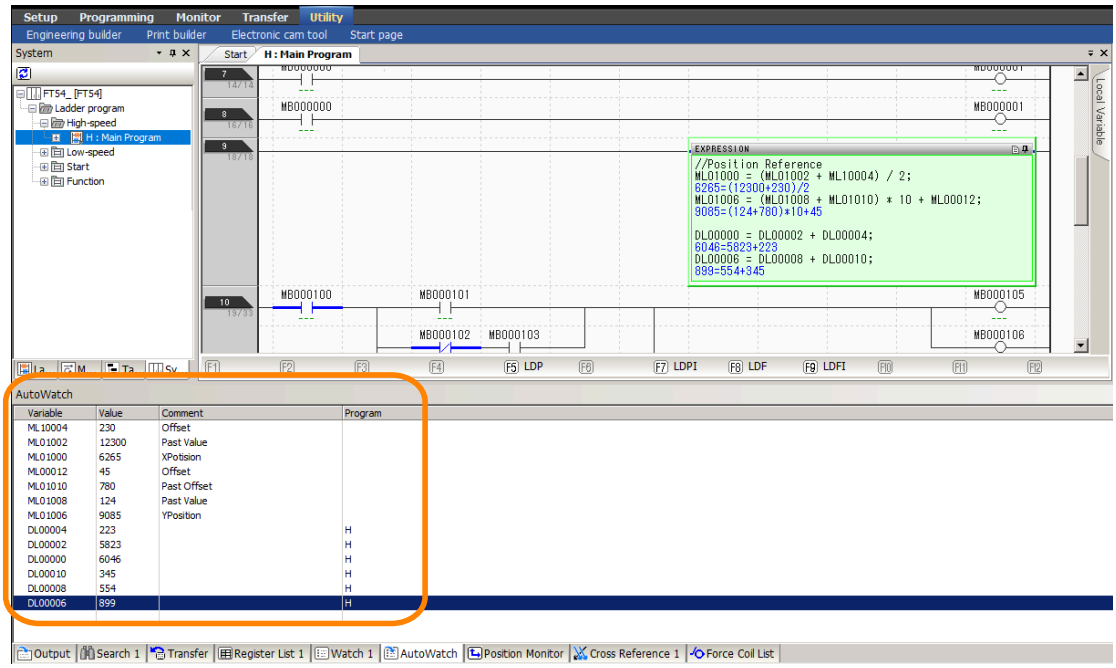


- If the window is not open, select [AutoWatch] from the [View] menu.

2. **Select the instruction that includes the registers to display as watch data.**



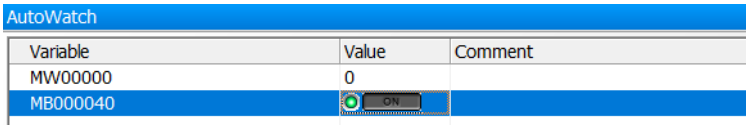
The values and comments of the registers included in the specified instruction will be displayed.



Information

Right-click on a register and select [Decimal], [Hexadecimal], [BIN], [ASCII], or [ON/OFF] to switch the display format of the register value.

You can set the display format for each individual register.



5.2.2 Editing Watch Data Values

You can perform the following editing operations by double-clicking a cell in the [Watch] window or the [Auto-Watch] window or by press the **F2** key to display the text cursor.

- Directly entering values
- Deleting values (setting values to 0)
- Copying and pasting

Press the **Enter** key to confirm the change. If the SERVOPACK is online, any changes in the values immediately affect the operation of the SERVOPACK.

5.3 Displaying Current Values

You can display the current values of registers in the Edit Ladder Program Window.

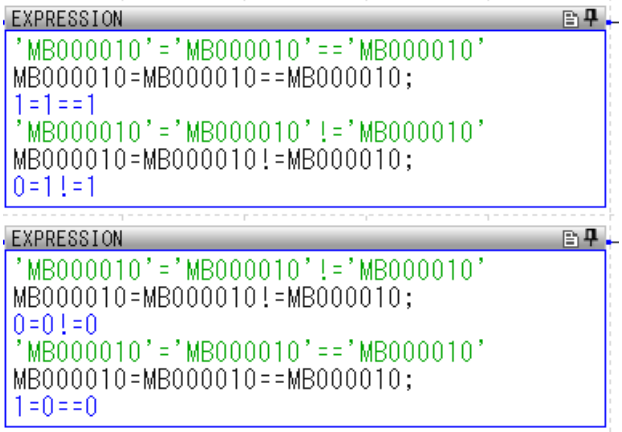
5.3.1 Online Current Values

You can monitor the status of registers in the Edit Ladder Program Window when there is an online connection to the SERVOPACK. The status of registers is displayed as described below.

- Instruction objects are displayed with the current values of registers in blue.
- Instructions for contacts, coils, and so on are highlighted when the value of the register is 1.
- IF and ELSE instructions are highlighted when the condition is satisfied.

Important

If "!=" is used in the expression for an EXPRESSION instruction, the operand on the right side may display an inverted value. In this case, be aware that following types of inconsistencies will occur in online current values because 1 will be displayed when 0 should be displayed.

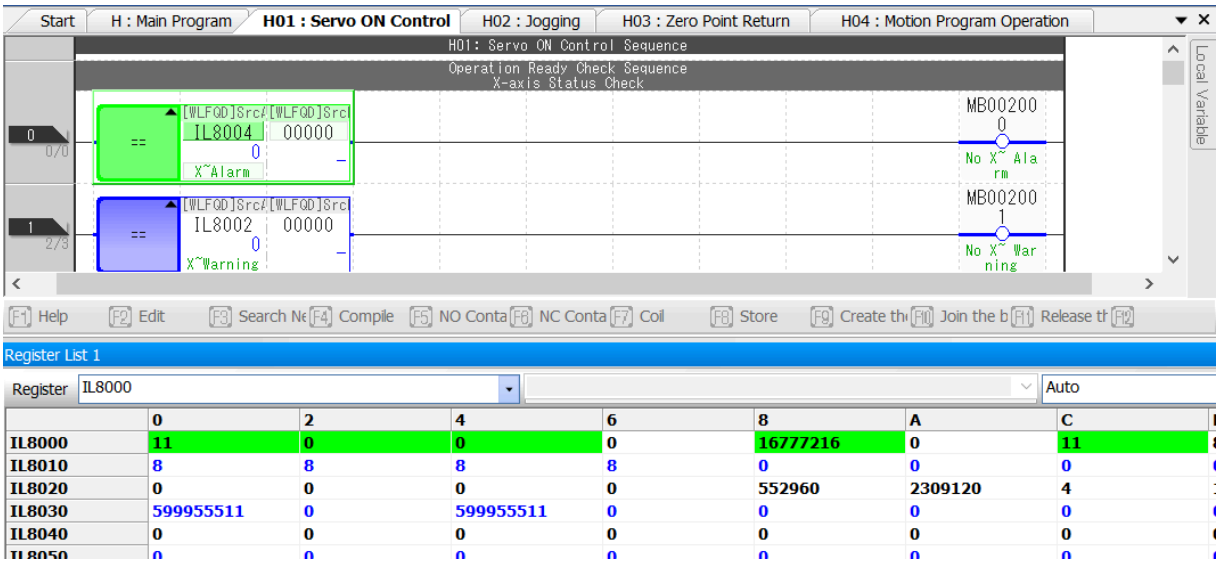


5.3.2 Offline Current Values

Select [Monitor Offline Value] from the [View] menu when the SERVOPACK is not connected. The register values are displayed in blue in the Edit Ladder Program Window.

Information

- The current value cannot be displayed when offline for IF, ELSE, WHILE, and EXPRESSION instructions.
- When register data is transferred from the SERVOPACK, the register data that was read will be displayed.
- If you changed a register value in a register list or by another means, the data for the relevant register will be updated, but the simulation will not be run (e.g., writing will not be performed by programming conditions being satisfied). For this reason, the data in other registers will not be updated.



Register List 1

Register IL8000 Auto

	0	2	4	6	8	A	C
IL8000	11	0	0	0	16777216	0	11
IL8010	8	8	8	8	0	0	0
IL8020	0	0	0	0	552960	2309120	4
IL8030	599955511	0	599955511	0	0	0	0
IL8040	0	0	0	0	0	0	0
IL8050	0	0	0	0	0	0	0

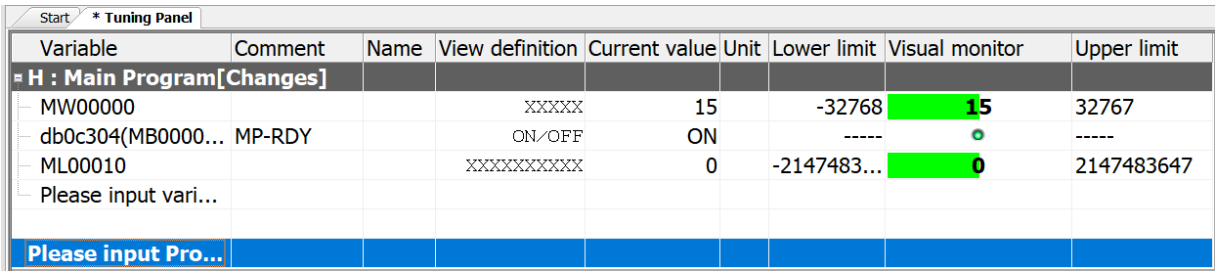
5.4 Tuning Panel

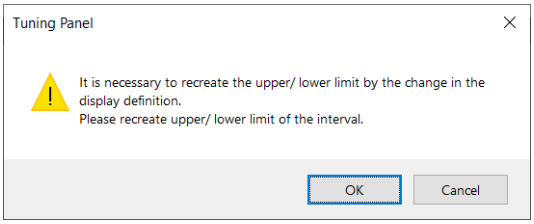
The Tuning Panel allows you to check the operation of a created program by adding registers and displaying and editing current values.

5.4.1 [Tuning Panel] Tab Page

Click the [Tuning Panel] button in the [My Tool] window to display the [Tuning Panel] tab page.

The items displayed in the [Tuning Panel] tab page are described below.



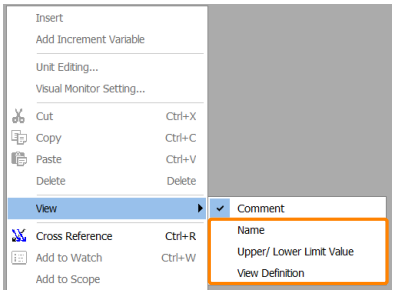
Item	Description
Variable	The variable names or registers are displayed.
Comment	The comment registered for the registers is displayed. If a comment is edited in the [Tuning Panel] tab page, the change will be applied to the variable in the [Variable] window and the comment list. <Setting Conditions> 255 alphanumeric characters maximum.
Name *1	Set a name, for example, when you want to identify the purpose of the variable. <Setting Conditions> 48 alphanumeric characters maximum.
View definition *1	Set the display format of the value. • "X" indicates the number of digits to display. • "." indicates the position of the decimal point. • "U" at the beginning indicates an unsigned decimal number. • "X" at the beginning indicates a hexadecimal number. **Note:** If the upper/lower limits must be changed because this setting was changed, the following message dialog box will be displayed. 
Current value	The current value of the register is displayed. The current value is updated at fixed intervals. The current value can be edited by double-clicking this column to display the [Edit] window.
Unit	The unit is displayed. The unit can be specified by double-clicking this column to display the [Edit] window.

Continued on next page.

Continued from previous page.

Item	Description
Lower limit/Upper limit	The lower limit and upper limit of the normal range is displayed. The value can be set by double-clicking this column to display the [Visual Monitor Setting] window.
Visual monitor *1	The current value of the register is displayed in a visual manner. The visual monitor checks the current value against the upper and lower limits, and highlights the values in different colors to indicate whether they are within the range. When the current value is within the upper and lower limits: Displayed in green When the current value is outside the upper and lower limits: Displayed in red

*1 These items are not displayed by default. Right-click on the [Tuning Panel] tab page and select the item from [View] to add the column.

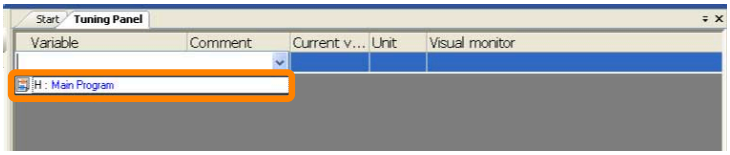


5.4.2 Adding a Register

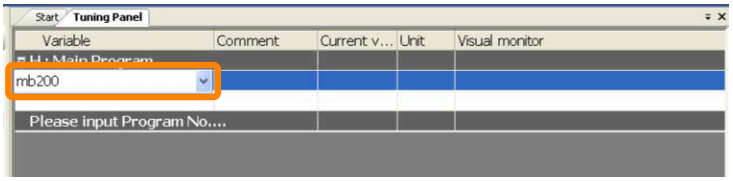
Use the following procedure to add a register to the Tuning Panel.

1. **In the [Tuning Panel] tab page, select the program type.**

   Information Programs that you have created will be listed as options in the box.

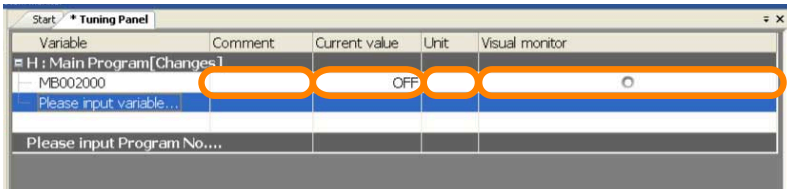


2. **Enter the register to display in the [Variable] column.**



3. **Press the Enter key.**

   Information will be displayed in the [Comment], [Current value], [Unit], and [Visual monitor] columns.

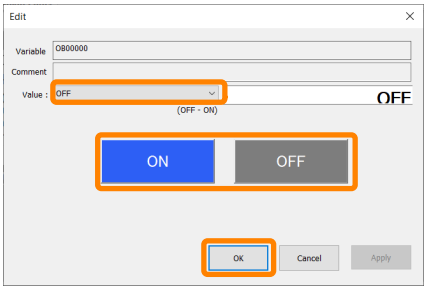


This concludes the procedure.

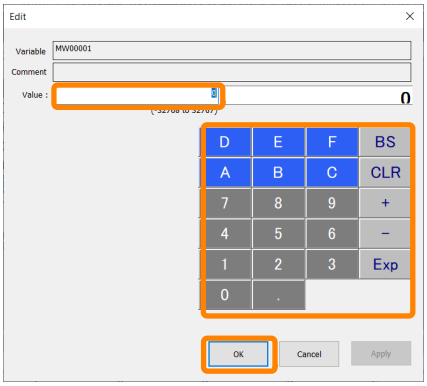
5.4.3 Editing a Current Value

Double-click the [Current value] column for a register that was added or directly enter a value to display the [Edit] window.

- Bit Register
  Edit the current value by selecting the value from the [Value] list or by clicking the [ON] and [OFF] buttons.

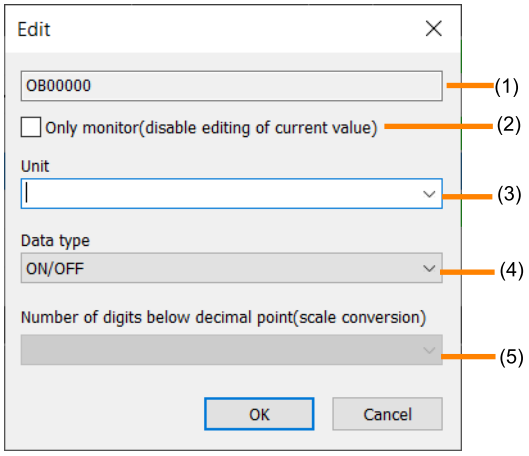


- All Other Registers
  Edit the current value by directly entering the value in [Value], by entering the value with the keyboard, or by using the keypad in the window.



5.4.4 Editing a Unit

Double-click the [Unit] column for a register that was added or directly enter a value to display the [Edit] window.



No.	Item	Description
(1)	Register	The register that was added is displayed.
(2)	Only monitor	Select this check box to disable editing of the current value.

Continued on next page.

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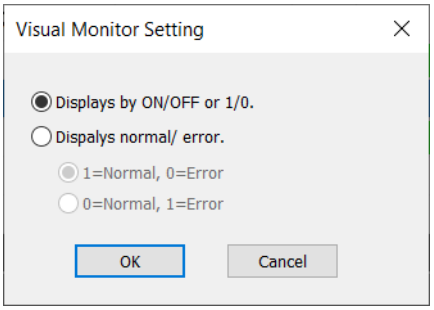
No.	Item	Description
(3)	Unit	Select the unit from the options below. pulse, mm, deg, inch, and µm
(4)	Data Type	Select the display format from the options below. Signed decimal, Unsigned decimal, and Hexadecimal
(5)	Number of digits below decimal point	Select the number of digits after the decimal point.

5.4.5 Editing the Visual Monitor

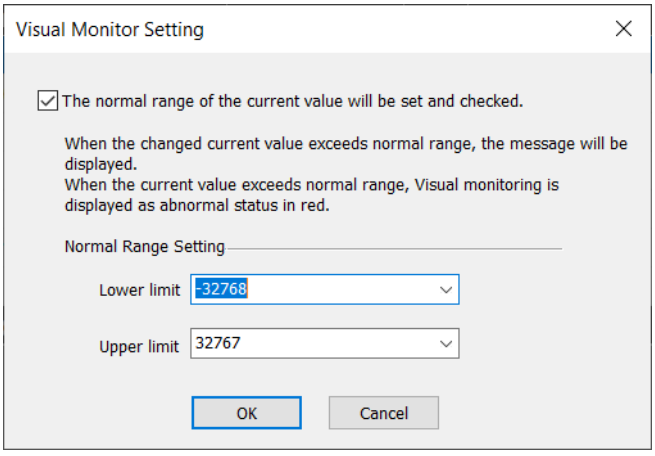
Double-click the [Visual monitor] column for a register that was added or directly enter a value to display the [Visual Monitor Setting] window.

- Bit Register



Item	Description
Displays by ON/OFF or 1/0	Indicates the ON/OFF or 1/0 status of the register with a lit or not lit button.
Displays normal/error	Indicates the ON/OFF or 1/0 status of the register with green (normal) and red (error). Select whether 1 or 0 is normal.

- All Other Registers



Item	Description
The normal range of the current value will be set and checked	Select this check box to enable the normal range settings.
Normal Range Setting	Set the upper and lower limits.

5.4.6 Saving Tuning Panel Data

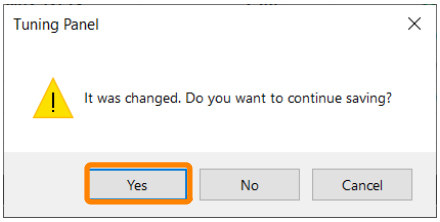
You can save the data edited in the Tuning Panel to the registered program. Use the following procedure.

Information If you delete a ladder program, the Tuning Panel data is also deleted.

1. **Select [Save Project] from the [File] menu.**

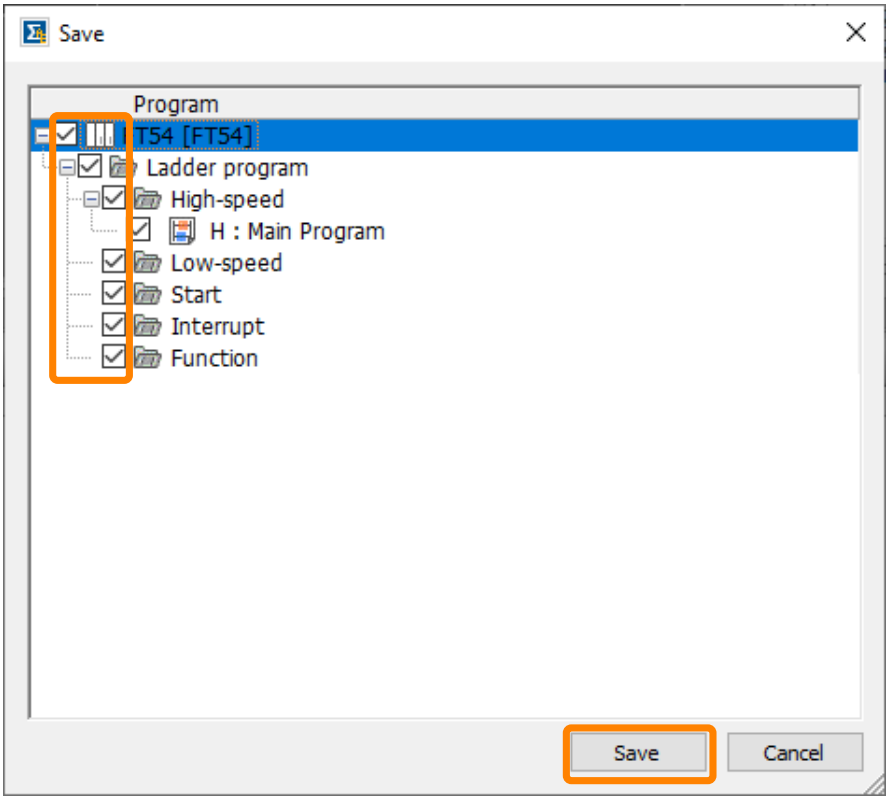
   A message dialog box will be displayed.

2. **Click the [Yes] button.**



   The [Save] window will be displayed.

3. **Select the ladder programs to save, and click the [Save] button.**



   The Tuning Panel data will be saved.

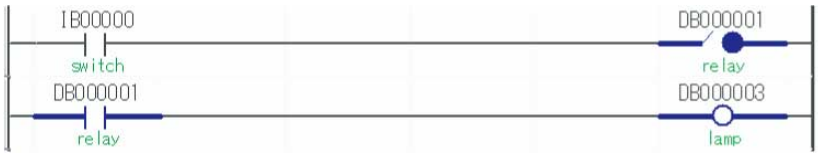
This concludes the procedure.

5.5 Forcing Coils ON and OFF

You can specify a coil in a ladder program and force it ON or OFF.

The coil will output ON or OFF regardless of the output of the instruction to the left of the coil.

In the following ladder program example, you can simulate turning ON the switch (IB00000) by forcing the DB000001 relay ON even though the physical switch does not exist.

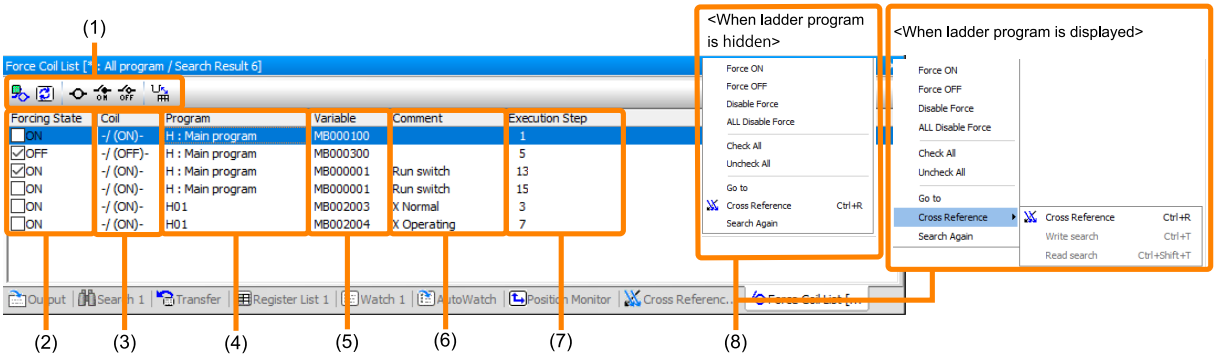


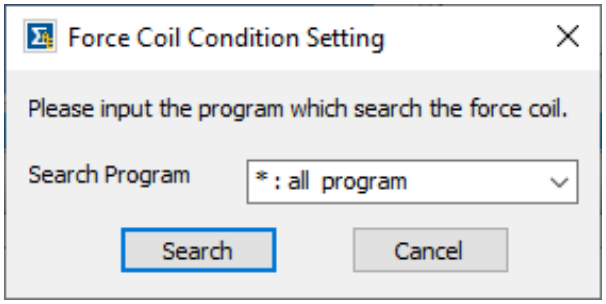
5.5.1 Operations on the [Force Coil List] Window

Select [Force Coil List] from the [Debug] menu to display the [Force Coil List] window.

The [Force Coil List] window lists the ON/OFF status of the forced coils in the ladder program.

You can select a coil in the window and change or delete the forced ON/OFF status.

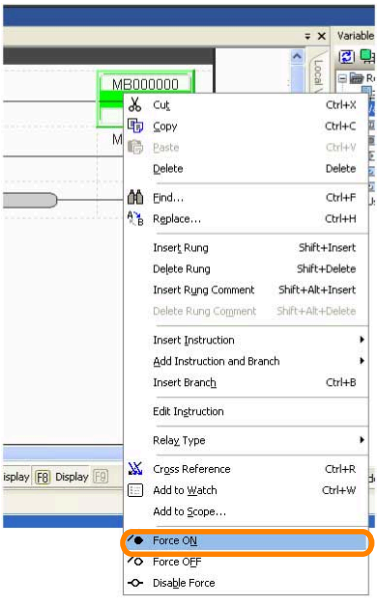


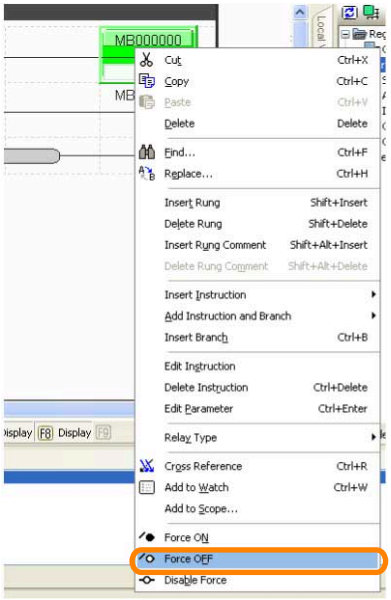
No.	Item	Description
(1)	 [Force Coil Condition Setting]	Displays the [Force Coil Condition Setting] window. Select the program and search for coils. 
	 [Search Again]	Searches for coils again after you change the condition setting and so on.
	 [Disable Force]	Cancels the forced status of the selected coils.
	 [Force ON]	Forces ON the selected coils.
	 [Force OFF]	Forces OFF the selected coils.
	 [Switch Variable]	Switches the display of the register that is used by the coil between a register or a variable.
(2)	Forcing State	The forced ON or OFF status of the coils that were found are displayed.
(3)	Coil	The coils that were found are displayed. The display will depend on the type of coil. • Coil: "−/ (ON)−" and "−/ (OFF)−" • Set Coil: "−/ (S ON)−" and "−/ (S OFF)−" • Reset Coil: "−/ (R ON)−" and "−/ (R OFF)−"
(4)	Program	The names of the programs that use the found coils are displayed.
(5)	Variable	The variables or registers that are set for the found coils are displayed.
(6)	Comment	The comments of the variables are displayed.
(7)	Execution Step	The execution step numbers of the found coils are displayed.
(8)	Context Menu	Right-click on the [Force Coil List] window to display the context menu. The displayed menu depends on whether the Edit Ladder Program window is displayed.
	[Force ON]	Refer to item (1) in this table.
	[Force OFF]	
	[Disable Force]	
	[All Disable Force]	Cancels the forced status of all coils displayed in the current window, regardless of the check box selections.
	[Check All]	Click this item to select all check boxes in the (2) [Forcing State] column of this table.
	[Uncheck All]	Click this item to clear all check boxes in the (2) [Forcing State] column of this table.
	[Go to]	The target location in the program will be displayed.
	[Cross Reference] [Write search] [Read search]	A cross reference, write search, or read search for the row of registers that was right-clicked will be executed, and the results will be displayed in the [Cross Reference] window. Refer to the following section for details on the cross reference. ☞ *5.8 Cross Reference on page 230*
	[Search Again]	Refer to item (1) in this table.

5.5.2 Operations on the Edit Ladder Program Window

Use the following procedure in the Edit Ladder Program Window to force the specified coil ON or OFF.

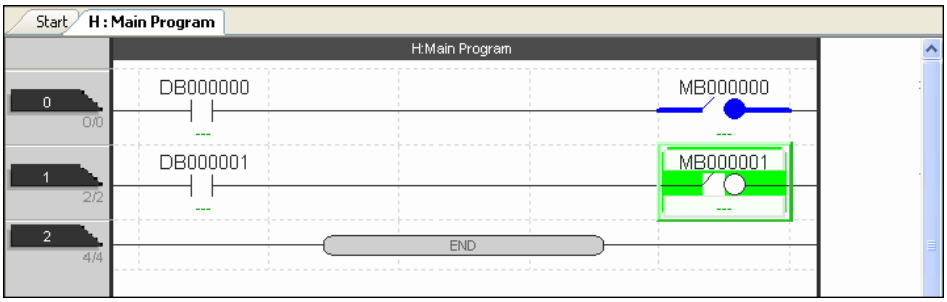
1. **Right-click the coil to control, and select [Force ON] or [Force OFF].**



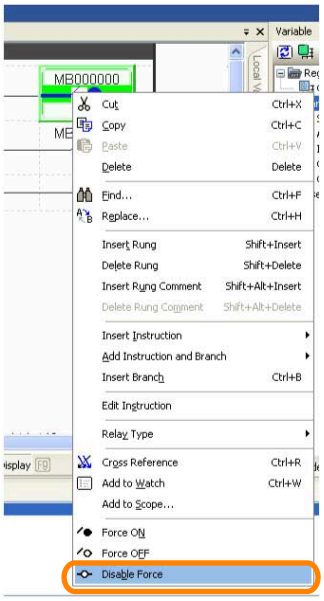


2. **Confirm that the coil is forced ON or OFF.**

- Forced ON state: 
- Forced OFF state: 



Information To release a coil, right-click the coil, and select [Disable Force].



This concludes the procedure.

5.6 Search

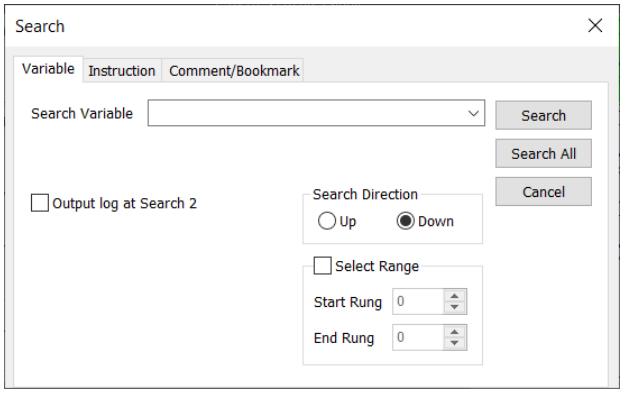
You can search for variables, instructions, and comments used in a program. There are the following two methods that you can use for searching.

- Searching within a program (searching within the displayed program)
- Searching within a project (searching within programs in the open project file)

The procedures are given below.

5.6.1 Searching within a Program

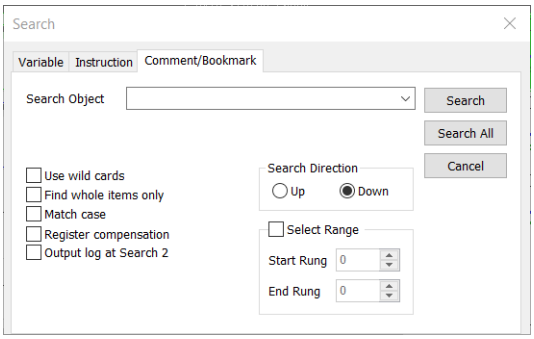
When a ladder program is displayed, select [Find] from the [Edit] menu to display the [Search] window.



- [Variable] tab page: Allows you to search for variables or registers. You can also enter the variable by copying it from the [Variable] window.
- [Instruction] tab page: Allows you to search for instructions or instruction keys.
- [Comment/Bookmark] tab page: Allows you to search for object comments, rung comments, program comments, expression comments, and bookmark names.

Information

- The search results are output to the [Search 1] window by default. Select the [Output log at Search 2] check box to display the search results in the [Search 2] window without changing the contents of the [Search 1] window.
- The detailed setting items on the [Comment/Bookmark] tab page are described below.

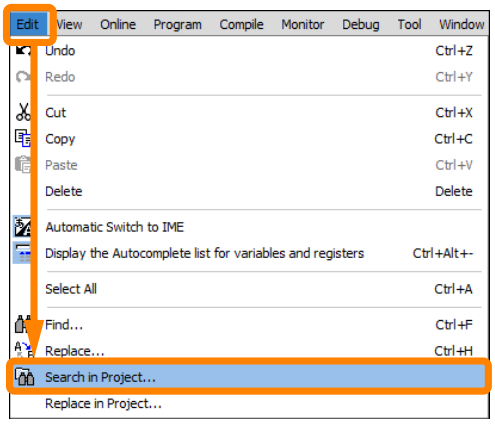


Item	Description
Use wild cards	Select this check box to use wildcard characters (* and ?) in the search string.
Find whole items only	Select this check box to search for comments where the string in the comment box is exactly the same as the search string.
Match case	Select this check box to search by differentiating between uppercase and lowercase characters.
Register compensation	Select this check box to search by converting search strings that are recognized as registers into register notation.

5.6.2 Search in Project

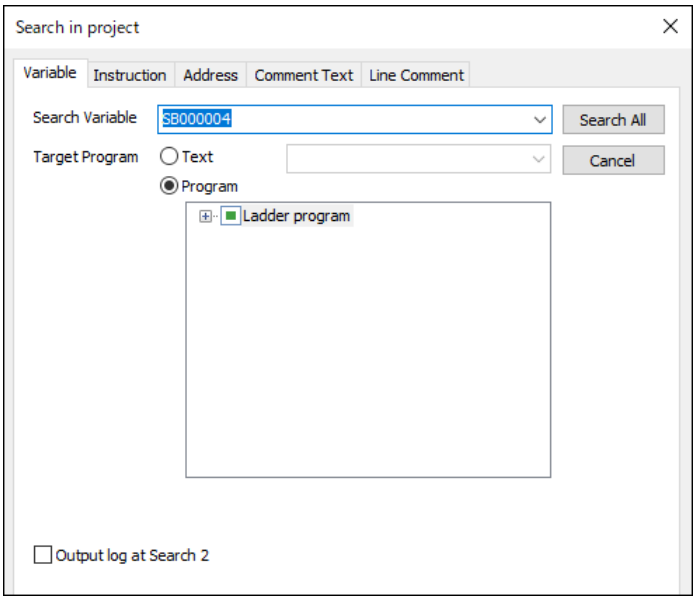
You can search in a project only when offline.

1. **Click [Edit] - [Search in Project] from the menu.**



The [Search in project] window will be displayed.

2. **Enter the search conditions and click [Search All].**



- [Variable] tab page: Allows you to search for variables or registers. You can also enter the variable by copying it from the [Variable] window.
- [Instruction] tab page: Allows you to search for instructions or instruction keys.
- [Address] tab page: Allows you to search for addresses.
- [Comment Text] tab page: Allows you to search for rung comments, program comments, and bookmark names.
- [Line comment] tab page: Lists rung comments, program comments, and bookmark names in the specified range in the [Search] window. If you select the [Display First Line of Line Comment Only] check box, only the first line will be displayed when there are multiple lines of comments.

Information

- The search results are output to the [Search 1] window by default. Select the [Output log at Search 2] check box to display the search results in the [Search 2] window without changing the contents of the [Search 1] window.
- Insert commas and spaces to specify more than one program in [Text] under [Target Program]. The following wildcard (*) combinations can also be used:

Examples of [Text] Input		Description
Ex. 1	*	Performs the search in all programs in the project.
Ex. 2	H*,L*	Performs the search in all H drawings and L drawings in the project.
	H* L*	

Add the wildcard after the project type. Other uses, such as “H01.*”, are not allowed.

5.7 Replace

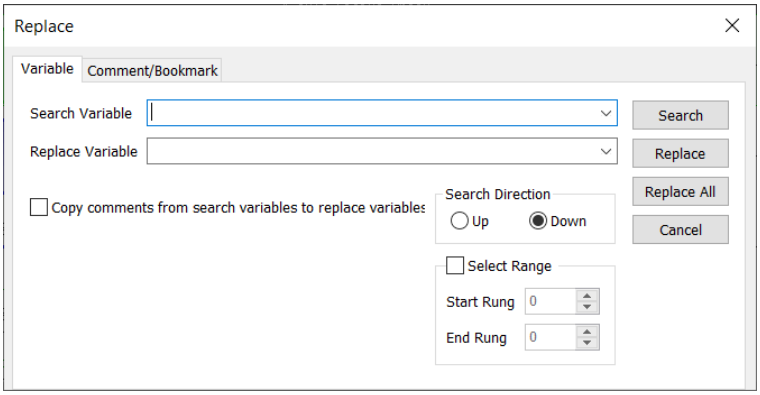
You can replace variables, comments, and other items used in a program. There are the following two methods that you can use for replacing.

- Replacing within a program (replacing within the displayed program)
- Replacing within a project (replacing within programs in the open project file)

The procedures are given below.

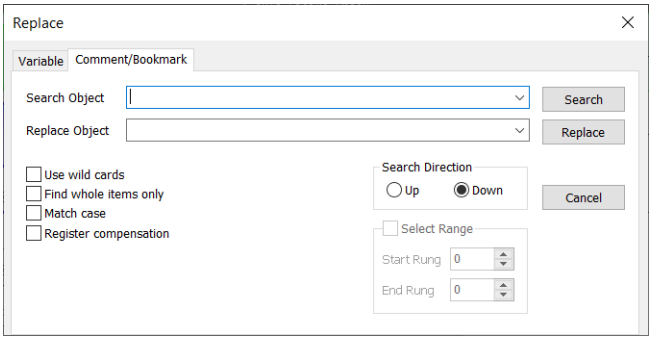
5.7.1 Replacing within a Program

When a ladder program is displayed, select [Replace] from the [Edit] menu to display the [Replace] window.



- [Variable] tab page: Allows you to replace variables or registers. You can also enter the variable by copying it from the [Variable] window.
- [Comment/Bookmark] tab page: Allows you to replace object comments, rung comments, program comments, expression comments, and bookmark names.

Information The detailed setting items on the [Comment/Bookmark] tab page are described below.



Item	Description
Use wild cards	Select this check box to use wildcard characters (* and ?) in the search string. If you enter an * or a ? character in [Replace Variable] or [Replace Object], they will not be handled as wildcards, but as regular characters.
Find whole items only	Select this check box to search for comments where the string in the comment box is exactly the same as the search string.
Match case	Select this check box to search by differentiating between uppercase and lower-case characters.
Register compensation	Select this check box to search by converting search strings that are recognized as registers into register notation.

5.7.2 Replacing within a Project

1. **Create a backup of the project file before replacement as necessary.**

   Refer to the following section for details on backups.

   ☞ *2.2.4 Saving a New Project File on page 82*

   Important

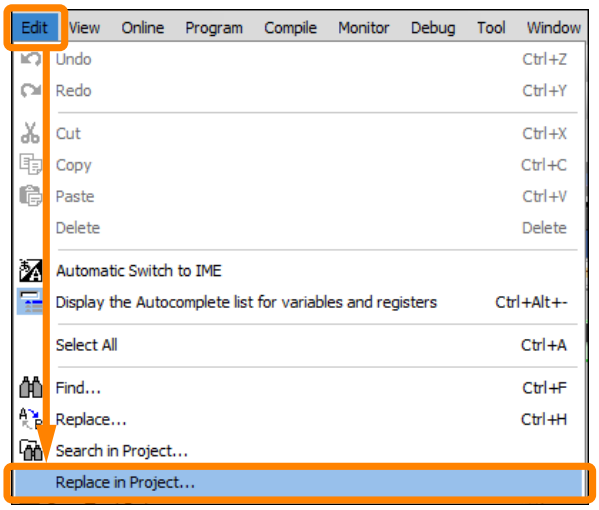
   After you perform a replace operation in a project, the project file will be compiled and saved, and there will be no way to return to the previous version. Always create a backup before performing replacements on important files.

2. **If a CP ladder program is already open in Engineering Builder, close it.**

   Information

   If a CP ladder program is already open in the Engineering Builder before the replacement is executed, the program will not be automatically updated. Close the CP ladder program before executing the replacement operation.

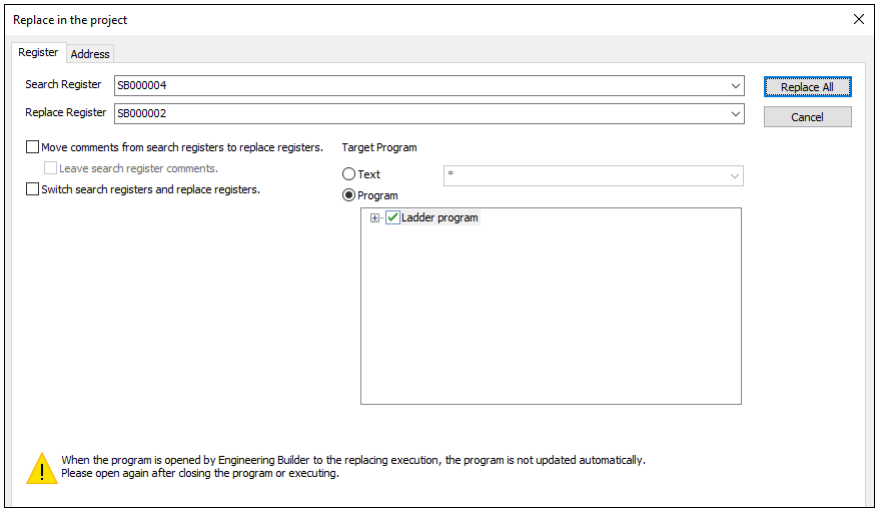
3. **Click [Edit] - [Replace in Project] from the menu.**



   The [Replace in the project] window will be displayed.

4. **Enter the replacement conditions and click [Replace All].**

   - [Register] Tab Page



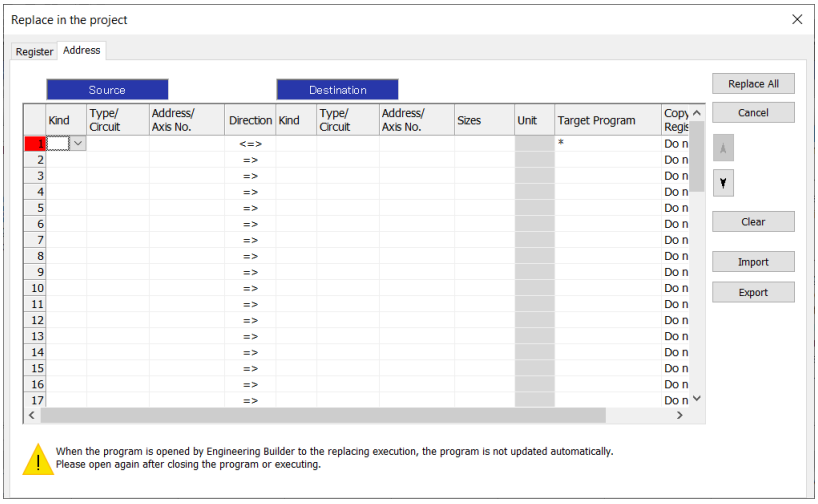
Information

Insert commas and spaces to specify more than one program in [Text] under [Target Program]. The following wildcard (*) combinations can also be used:

Examples of [Text] Input		Description
Ex. 1	*	Performs the replacement in all programs in the project.
Ex. 2	H*,L*	Performs the replacement in all H drawings and L drawings in the project.
	H* L*	

Add the wildcard after the project type. Other uses, such as “H01.*”, are not allowed.

- [Address] Tab Page



Information

If you click the [Import] button, the previously exported replacement settings can be imported.

If you click the [Export] button, the current replacement settings can be exported.

5.8 Cross Reference

Cross referencing allows you to check whether a register is used in a program, and where it is used.

If the value of a register is changes from its set value, it means that the value of the register may have been over-written somewhere in the program. In this case, you can search for the registers using cross references and locate the program that is overwriting them.

5.8.1 Cross Referencing

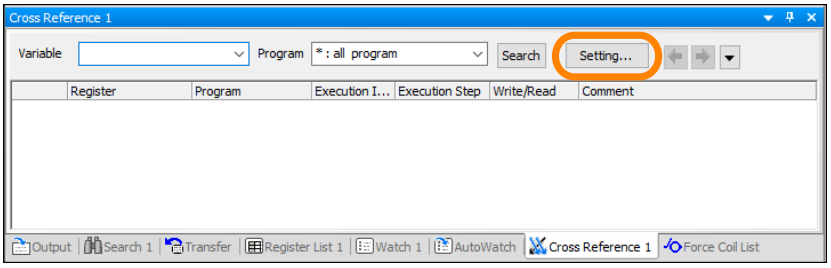
Use the following procedure to search for registers using cross referencing.

Information Click the register to search for in the Edit Ladder Program Window, and then hold down the **Ctrl** key and press the R key. This allows you to search the register in a single operation.

1. **Select [Cross Reference] from the [Debug] menu.**

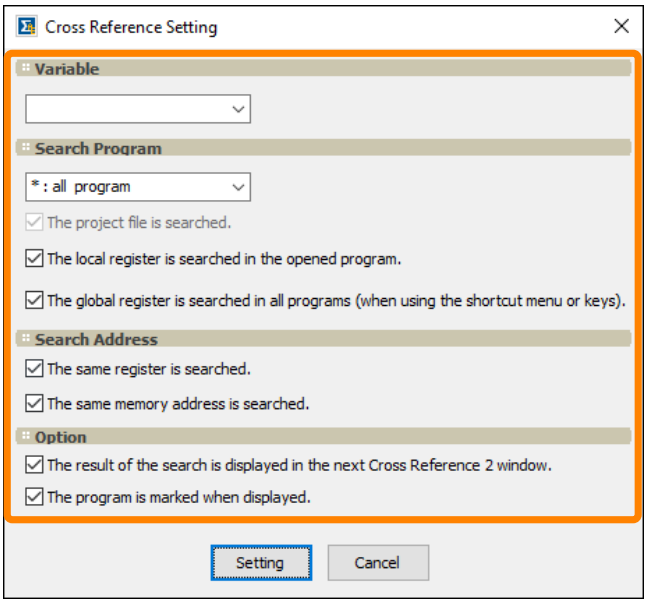
   The [Cross Reference] window will be displayed.

2. **Click the [Setting] button.**



   The [Cross Reference Setting] window will be displayed.

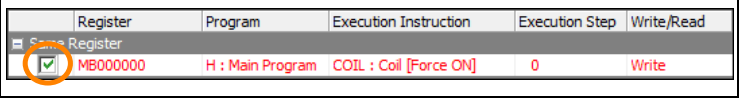
3. **Set the following items, and then click the [Setting] button.**



Item	Description
Variable	Enter the variable or register to search.
Search Program	Enter the programs to search.
The project file is searched	Select this check box to search for the register from the project file when using a project link connection. Clear this check box to search for the register from the SERVOPACK.

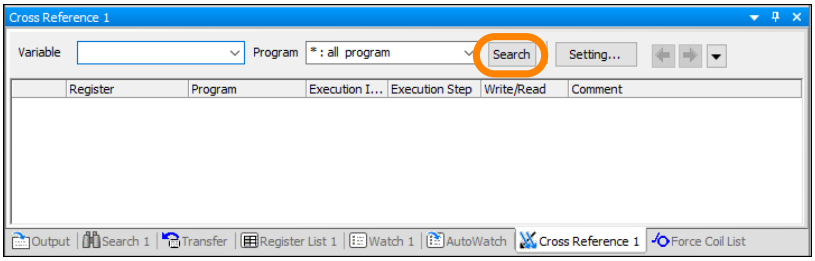
Continued on next page.

Continued from previous page.

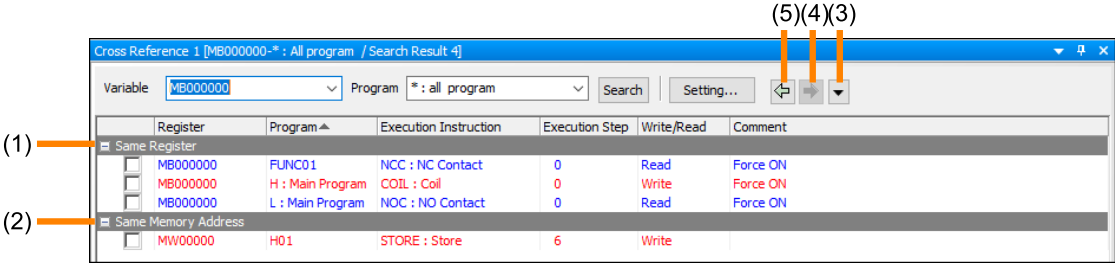
Item	Description
The local register is searched in the opened program	Select this check box to search local registers (D registers) in the one drawing that is currently active. Clear this check box to search local registers (D registers) in the specified drawing.
The global register is searched in all programs (when using the shortcut menu or keys).	Select this check box to set all programs to be the search target when executing a cross reference for global registers using a shortcut.
The same register is searched	Select this check box to search for the same register as the specified register. For example, the same register will be displayed in a list when you search the following instruction for MW00000. Clear this check box if it is not necessary to search for the same register. 
The same memory address is searched	Select this check box to search for the same memory address. For example, registers with the same memory address will be displayed in a list when you search the following instruction for a different data type, such as ML00000. Clear this check box not to search for the same memory address. 
The result of the search is displayed in the next Cross Reference 2 window	Select this check box to display the search results in a separate cross reference window when you perform cross referencing. Cross reference results can be displayed in up to 3 windows. Clear this check box to display the search results by updating the same cross reference window.
The program is marked when displayed	Select this check box to add a check mark to the left of the register when a program that displayed in the search results is open. 

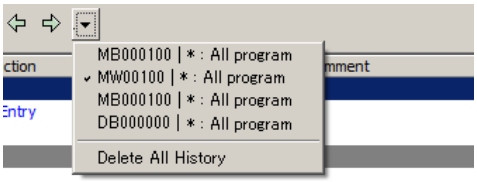
The [Cross Reference Setting] window will close, and the set conditions will be displayed in the [Cross Reference] window.

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



The search will be executed, and the search results will be displayed in the [Cross Reference] window.



No.	Item	Description
(1)	Same Register	Information is displayed on locations in the searched program where the same register is used as the search variable (search register). • [Write/Read] column Read (blue text): The register is used in reading (reference). Write (blue text): The register is used in writing.
(2)	Same Memory Address	Information is displayed on locations in the searched program where the used memory overlaps with the search variable (search register). <Example> For example, MW00001 and ML00000 are different registers, but they used the same memory address because ML00000 used two words of memory (MW00000 and MW00001). A search is made for registers like these. The details on the columns are the same as (1) in this table.
(3)	History Button	Displays a cross reference history. Select an entry in the displayed history list to display the previous reference results and the drawing for the reference. Up to 20 records are saved in the history. 
(4)	Next Button	Every time you click this button, the next item in the cross reference history will be displayed.
(5)	Previous Button	Every time you click this button, the previous item in the cross reference history will be displayed.

Information Double-click on a row to go to the line with the instruction in the program where the search target register is used. However, you cannot go to a line from the registers listed in [Reference setting].

This concludes the procedure.

5.8.2 Write Searches and Read Searches

To search only for registers that are used to write data (i.e., output registers), perform a write search.

To search only for registers that are used to read data (i.e., input registers), perform a read search.

1. **Click the register to search for in the Edit Ladder Program Window.**
2. **Select [Cross Reference] - [Write search] or [Read search] from the [Debug] menu.**

   The search results will be displayed in the [Cross Reference] window and the drawing in which the selected register is written or read will be displayed.

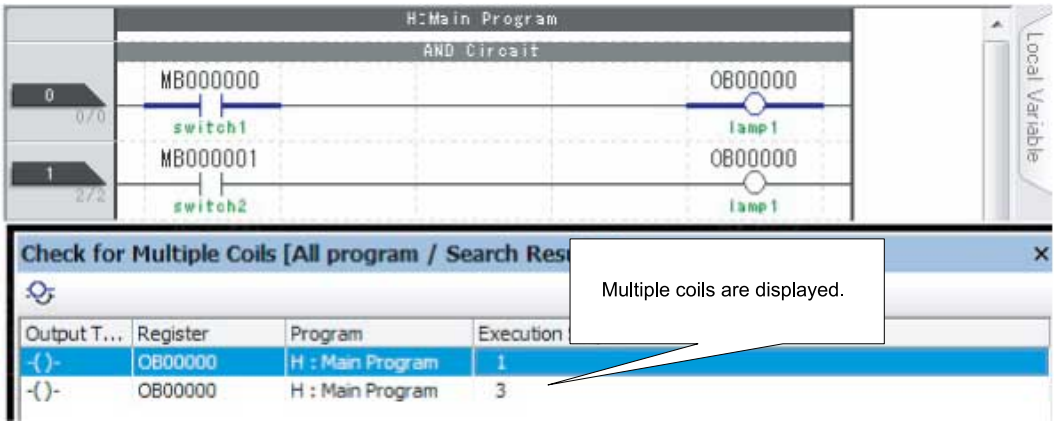
This concludes the procedure.

5.9 Check for Multiple Coils

Checking for multiple coils allows you to check for multiple coils (different coils that use the same register) in an entire ladder program and display the search results.

Select [Check for Multiple Coils] from the [Debug] menu to start searching for multiple coil and display the results in the [Check for Multiple Coils] window.

Double-click a row in the [Check for Multiple Coils] window or right-click and click [Go to] to display the target location in the program.



Information

- When you use a project link connection, the data in the project file is used. Sometimes the displayed results do not match the data in the linked SERVOPACK.
  If you check for multiple coils when using a project link connection, first always transfer the SERVOPACK data to the project file.
- If [Enable to multiple coil check] is enabled in the compile options, a search for multiple coils will be performed during compilation and the results will be displayed in the [Output] window.
- Right-click a row in the [Check for Multiple Coils] window and click [Cross Reference] to execute a cross reference for the target row of registers. The results will be displayed in the [Cross Reference] window. Refer to the following section for details on the cross reference.
  ☞ *5.8 Cross Reference on page 230*

6

Monitor

This chapter describes the methods to monitor the status of the connected SERVOPACK and the status of registers.

6.1 System Monitor

Use the System Monitor to monitor the status of SERVOPACK after establishing an online connection between the SigmaWin+ AE and SERVOPACK.

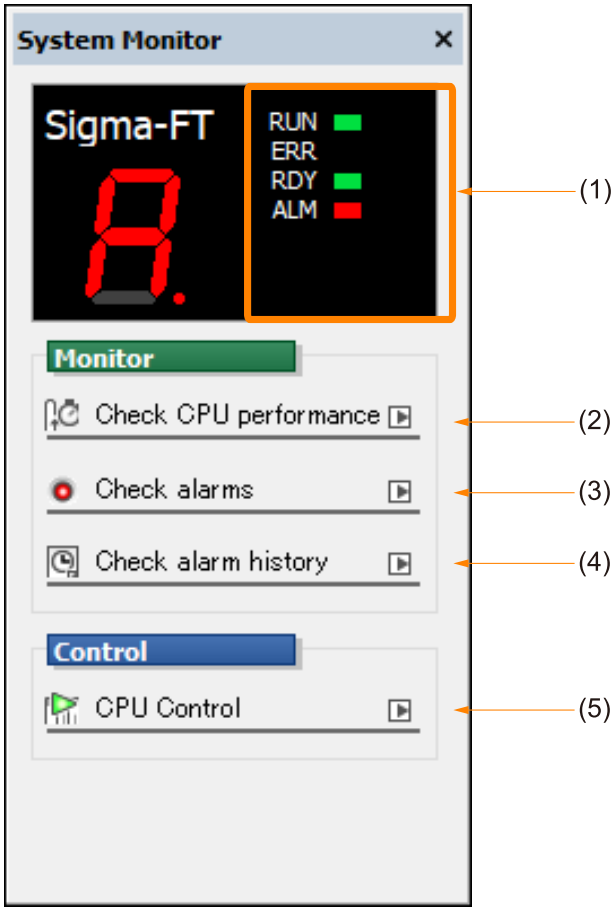
You can monitor the following items.

- Operating status of the SERVOPACK
- Scan time
- Errors that occur on the SERVOPACK
- Alarm history

6.1.1 [System Monitor] Window

Click the [System Monitor] button in the [My Tool] window to display the [System Monitor] window.

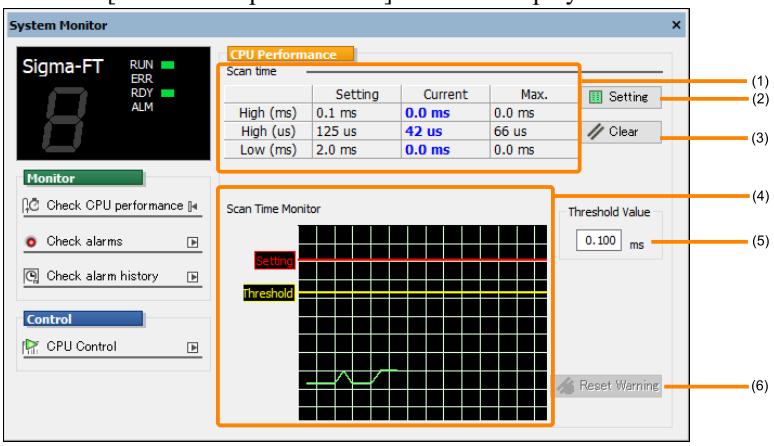
The [System Monitor] window will be automatically displayed if an error occurs on the SERVOPACK.



No.	Item	Description
(1)	Operating Status	The operating status of the SERVOPACK is displayed.
(2)	CPU Performance	Refer to the following section for details. ☞ *(1) CPU Performance on page 237*
(3)	Alarms	Refer to the following section for details. ☞ *(2) Alarms on page 237*
(4)	Alarm History	Refer to the following section for details. ☞ *(3) Alarm History on page 240*
(5)	CPU Control	You can RUN and STOP the CPU and execute error reset and save to flash memory.

(1) CPU Performance

Click the [Check CPU performance] button to display the scan time values and graph.



No.	Item	Description
(1)	Scan Time	The set values, current values, and maximum values of the scan times are displayed.
(2)	[Setting] Button	Displays the [Environment Setting] window. You can change the set values for the scan times.
(3)	[Clear] Button	Clears the maximum values of the scan times.
(4)	Scan Time Monitor	The current value of the high-speed scan time is displayed as a green waveform. You can drag the cursor position of the threshold value to change it.
(5)	Threshold Value	Set the threshold value for the high-speed scan time. If the current value or maximum value of the high-speed scan time exceeds the threshold value, the [System Monitor] window will become active and a warning will be displayed.
(6)	[Reset Warning] Button	Resets the warning.

(2) Alarms

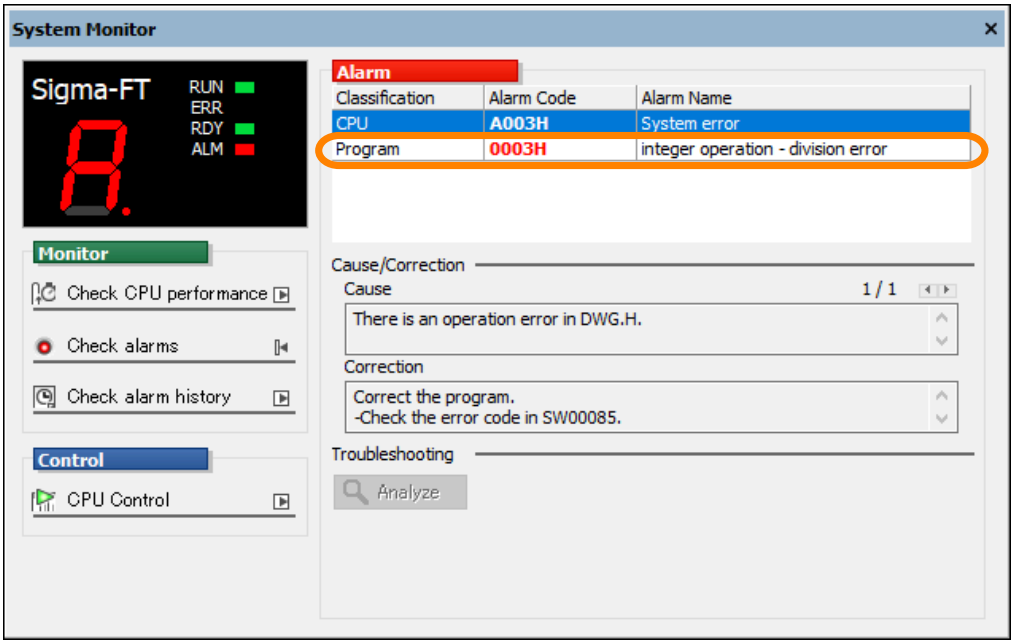
Click the [Check alarms] button to display detailed information on alarms. The content that is displayed depends on the type of alarm that occurred.

(a) Operation Errors

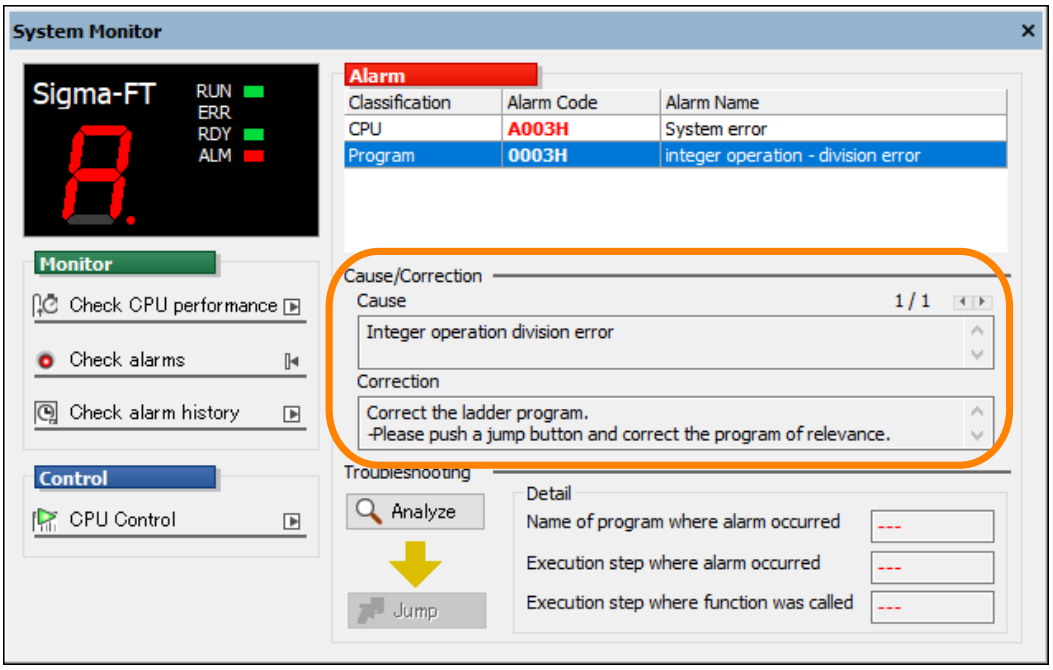
Operation errors are errors related to operations in ladder programs.

How to interpret and analyze the displayed information is shown below.

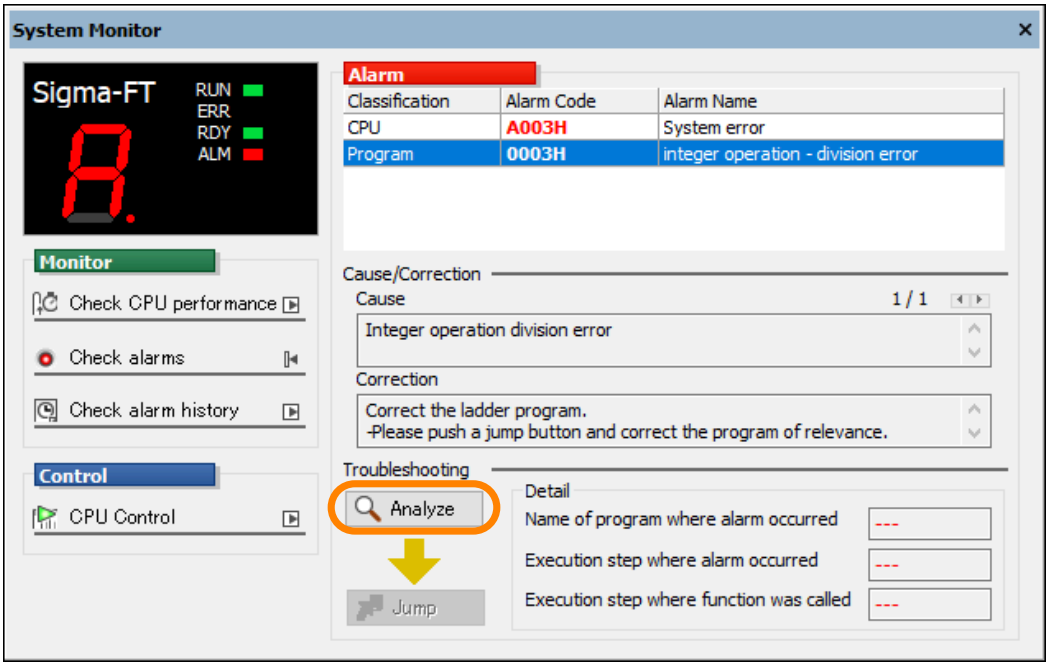
1. **Click the alarm on which to access information.**



The cause and correction method will be displayed.

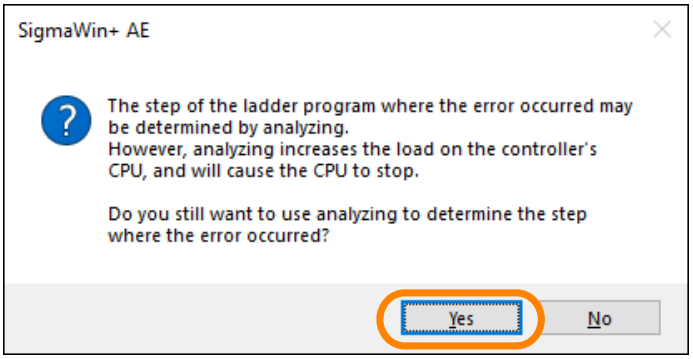


2. **Click the [Analyze] button.**

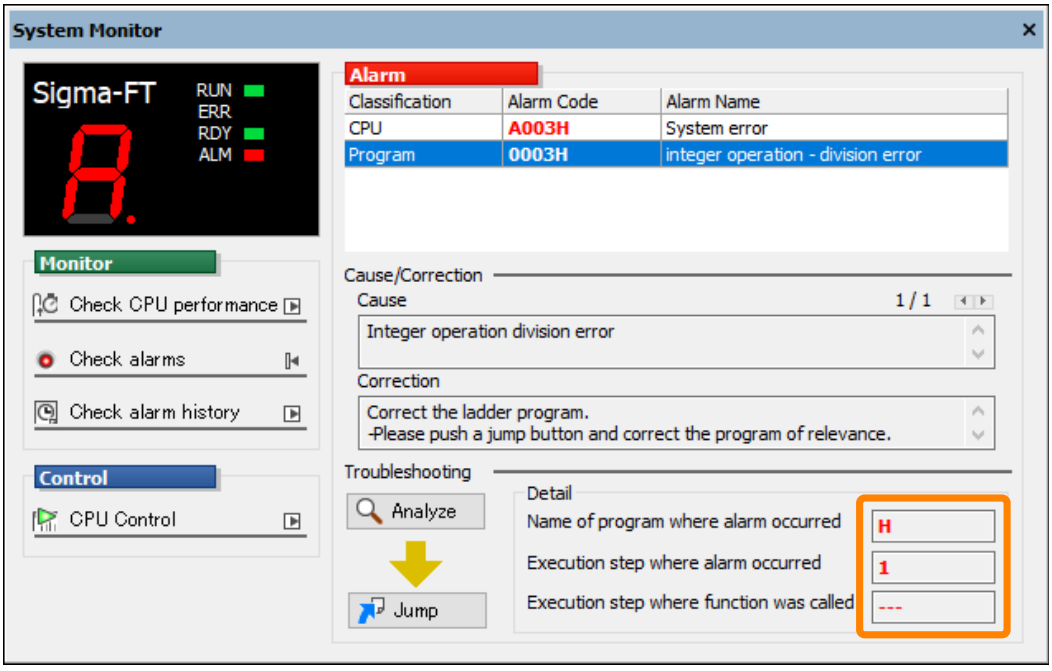


A message dialog box will be displayed.

3. **Click the [Yes] button.**

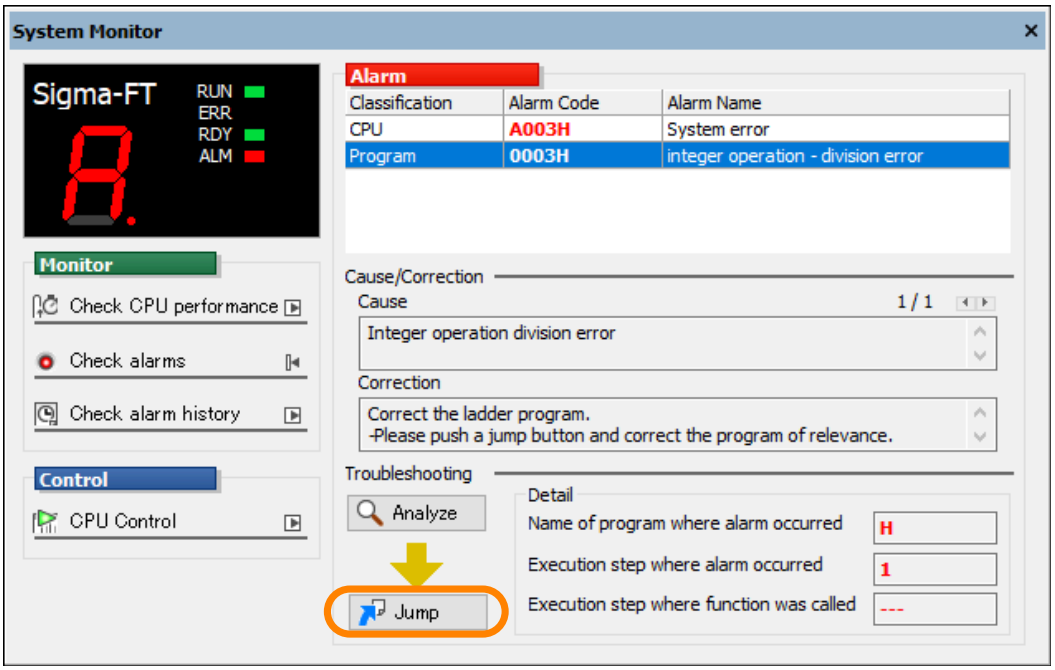


The location where the alarm occurred will be displayed.



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

   The drawing where the operation error occurred will be displayed.



5. **Resolve the operation error.**

   Refer to the following manual for details on how to resolve operation errors.

   YRM1000/MPX1000 Series Ladder Program Programming Manual (Manual No.: SIEP C890101 10)

6. **Make the Edit Ladder Program Tab Page the active view and press the F4 key.**

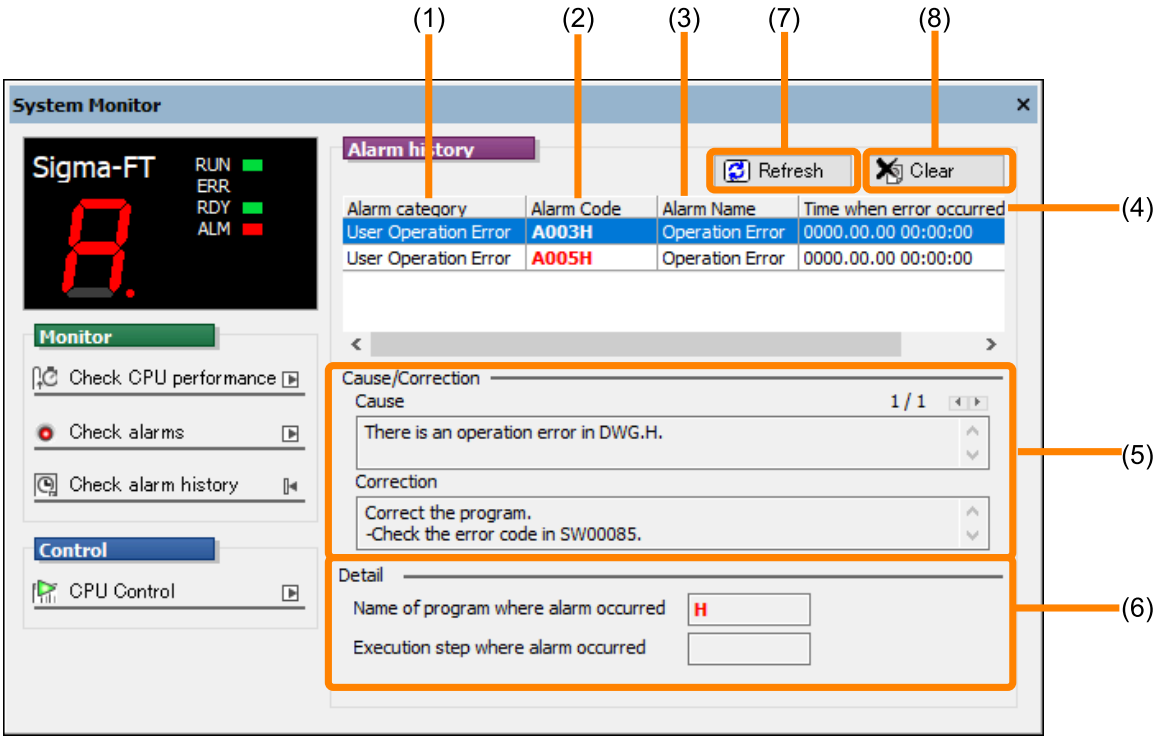
   The program will be compiled.

7. **Confirm that the alarm is no longer displayed in the [System Monitor] window.**

This concludes the procedure.

(3) Alarm History

Click the [Check alarm history] button to display the history of alarms that occurred. The alarm history retains up to 100 records.



No.	Item	Description
(1)	Alarm Category	The category of the alarm that occurred is displayed.
(2)	Alarm Code	The code of the alarm that occurred is displayed.
(3)	Alarm Name	The name of the alarm that occurred is displayed.
(4)	Time when alarm occurred	The date and time when the alarm occurred is displayed.
(5)	Cause/Correction	The cause and correction method is displayed when an alarm is selected in the list.
(6)	Detailed Information	Detailed information is displayed when an alarm is selected in the list.
(7)	[Update] Button	Click this button to update to the most recent information.
(8)	[Clear] Button	Click this button to delete the alarm history that is displayed.

6.2 Trace

6.2.1 Overview

Tracing allows you to obtain and display the specified data from a SERVOPACK.

The SigmaWin+ AE has the following three trace functions.

Function Name	Description	
Real-Time Trace	You can monitor specified registers. This allows you to analyze register data to debug ladder programs.	You can monitor registers in real time. A maximum of 64 trace data can be monitored.
Trace Manager *1		You can monitor registers only during a specified time period. A maximum of 16 trace data can be monitored.
XY Trace	This trace function acquires the position data (target position, feedback position) of the X axis and Y axis every scan, and displays the data in a 2-dimensional graph. The 2-axis paths can be visually checked.	

*1 There are restrictions when using Trace Manager. Refer to the following section for details.

☞ *(1) Restrictions in Use of Trace Manager on page 242*

(1) Restrictions in Use of Trace Manager

The Trace Manager cannot be used for some register types and data types for tracing. Refer to the following table for details. Use a Real-Time Trace when the Trace Manager cannot be used.

- Register Types

Type	Applicable Range	Support	
		Trace Manager	Real-Time Trace
S Register	SW00000 to SW08191	○	○
	SW08192 to SW65534	×	○
M Registers	MW00000 to MW65534	○	○
	MW65535 to MW1048575	×	○
G Registers	GW0000000 to GW2097151	×	○
I Registers	IW00000 to IW0FFFF	○	○
	IW10000 to IW27FFF	×	○
O Registers	OW00000 to OW0FFFF	○	○
	OW10000 to OW27FFF	×	○
D register	DW00000 to DW16383	○	○

- Data Types

Symbol	Data Type	Support	
		Trace Manager	Real-Time Trace
B	Bit	○	○
W	Integer	○	○
L	Double-length integer	○	○
Q	Quadruple-length integer	×	○
F	Real number	○	○
D	Double-precision real number	×	○
A	Address	×	×

(2) Trace Buffer Size

The maximum applicable trace buffer size that can be used for the trace function as follows.

Maximum Applicable Trace Buffer Size	
Real-Time Trace/XY Trace	**Trace Manager**
128 kwords	128 kwords

(3) External Files

Trace data can be saved as an external file or read from an external file. However, supported file formats differ according to the trace function as follows.

Tracing	Command to Use on the [File] Menu	Supported File Formats	
		csv	dat/trd
Real-Time Trace	[Open Trace File]	○	○
	[Open External File]	○	○
	[Save in External File]	○	○ *1
Trace Manager	[Import]	○	○/-
	[Export]	○	–
XY Trace	[Open External File]	○	○
	[Save in External File]	○	○ *1

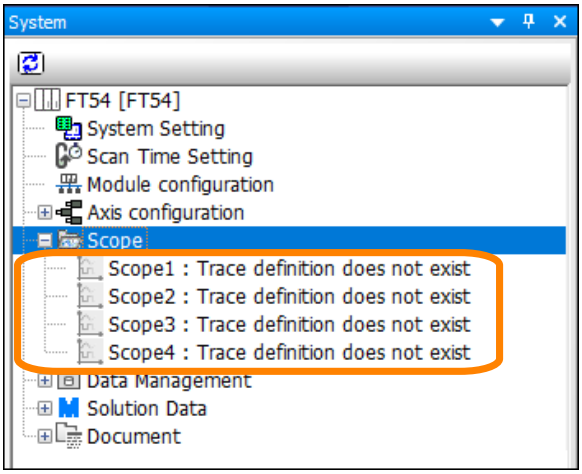
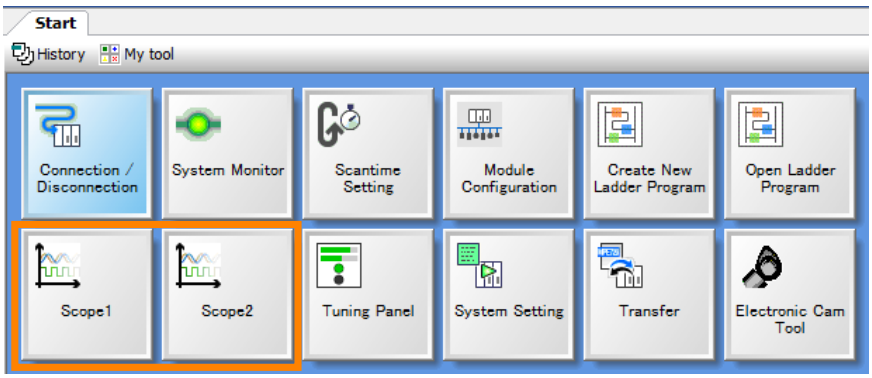
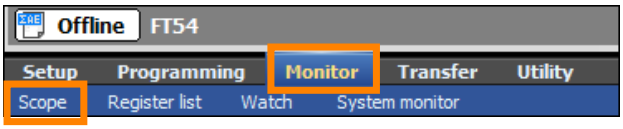
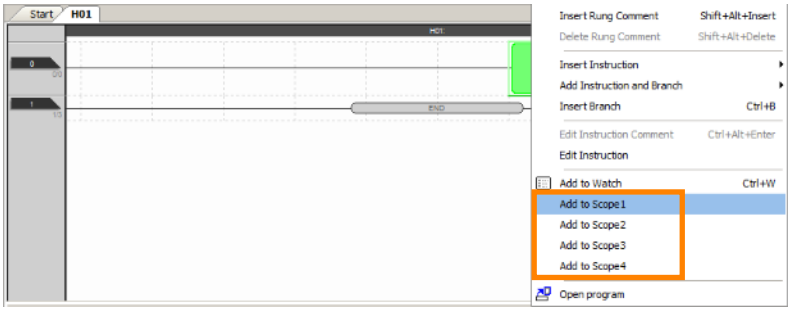
*1 For MP2000-series machine controllers, trace data can be saved to only dat files, and for machine controllers other than the MP2000 series, trace data can be saved to only trd files.

6.2.2 Startup

Use the following procedure to start tracing.

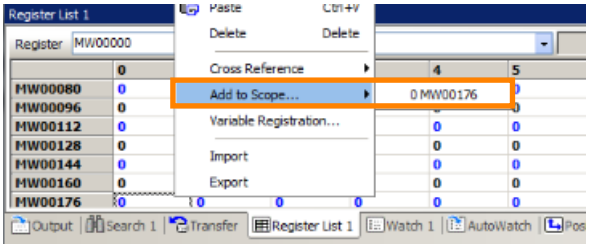
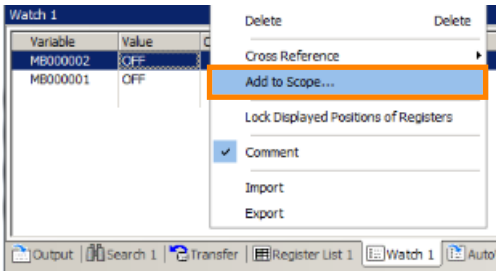
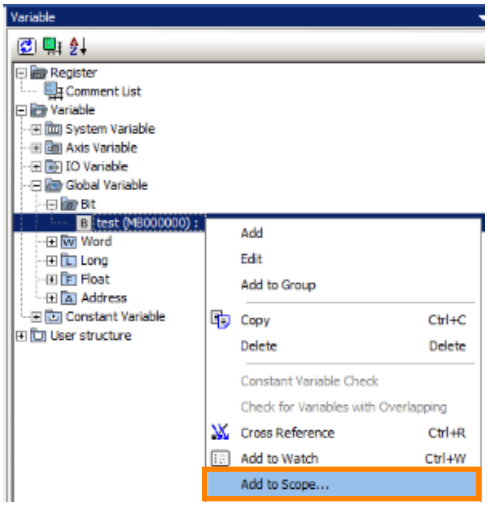
1. **Use one of the following methods to display the [Trace Type] window.**

Information There are four buttons for tracing, Scope1 to Scope4. The settings when tracing is executed are stored to the [Scope1] to [Scope4] buttons. This means that you can store up to four trace settings.

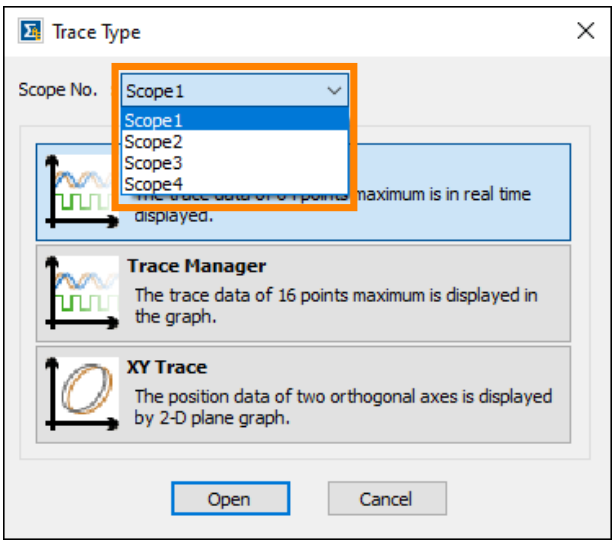
Screen Used for Startup	Operation
[System] Window	Double-click one of [Scope1] to [Scope4].  The same operation is also possible by right-clicking one of [Scope1] to [Scope4] and selecting [Open Real-Time Trace], [Open Trace Manager], or [Open XY Trace]. When this operation is performed, tracing will be started without displaying the [Trace Type] window.
[My Tool] Window	Click either [Scope1] or [Scope2].  The [Scope3] and [Scope4] are not displayed in the [My tool] window.
Launcher	Click [Monitor] – [Scope]. 
Edit Ladder Program Window (Only the Real-Time Trace window can be started up.)	Right-click on the register used by the ladder instruction, and select [Add to Scope□].  • If you right-click on the operand, that register will be targeted for tracing. • If you right-click on the instruction, the registers included in that instruction will be targeted for tracing. • If you right-click on the rung, all registers included on that rung will be targeted for tracing. • If you right-click with multiple instructions or multiple rungs selected, all registers included in the selected range will be targeted for tracing.

Continued on next page.

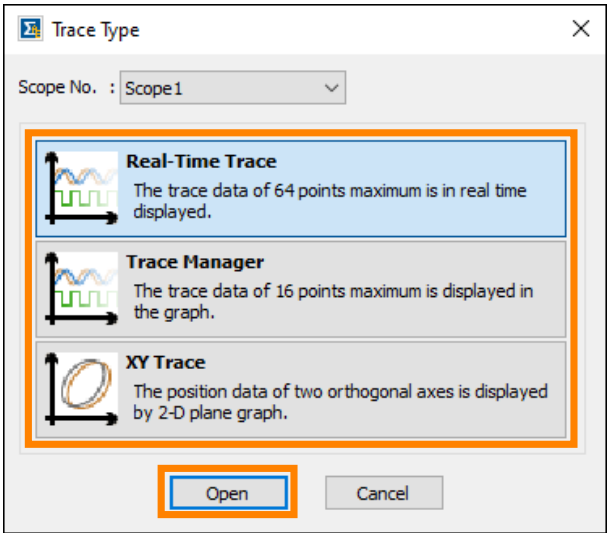
Continued from previous page.

Screen Used for Startup	Operation
[Register List] Window (Only the Real-Time Trace window and Trace Manager window can be started up.)	Right-click on the register address, and select [Add to Scope] – register address. 
[Watch] window (Only the Real-Time Trace window and Trace Manager window can be started up.)	Right-click on the variable, and select [Add to Scope].  Information [Add to Scope] is disabled when the variable register is outside the range of CPU registers in the project. Reselect the variable and execute the operation again.
[Variable] Window (Only the Real-Time Trace window and Trace Manager window can be started up.)	Right-click on a registered variable, and select [Add to Scope]. 

2. **When Scope1 to Scope4 are not selected in Step 1, select [Scope No.].**



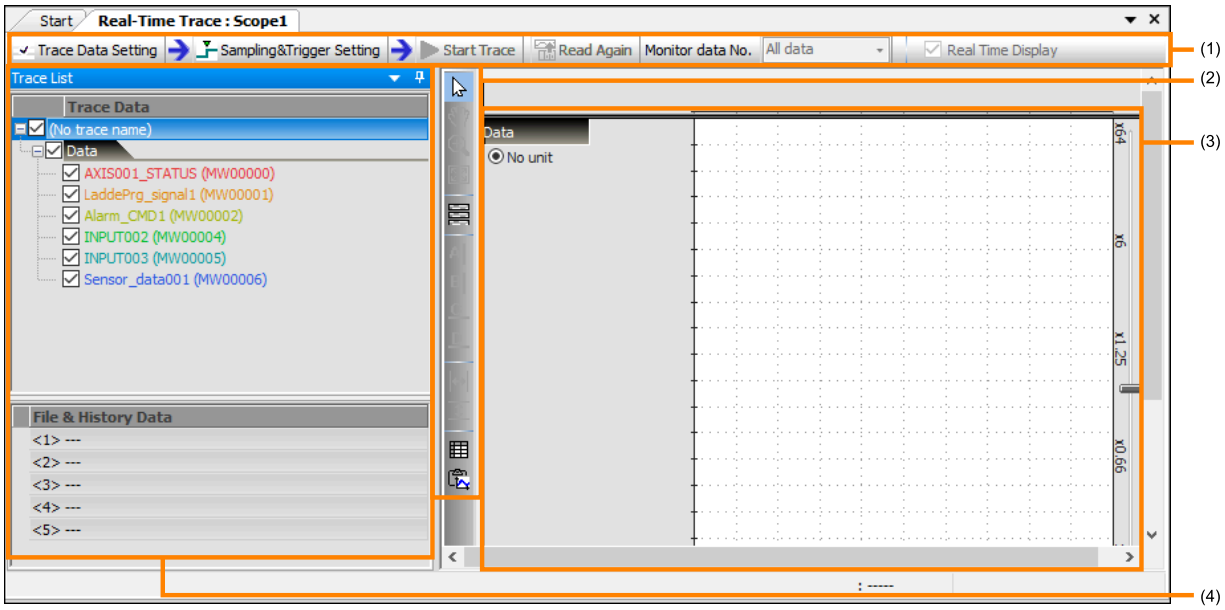
3. **Click the trace type, and click the [Open] button.**



The selected trace tab page will be displayed.

This concludes the procedure.

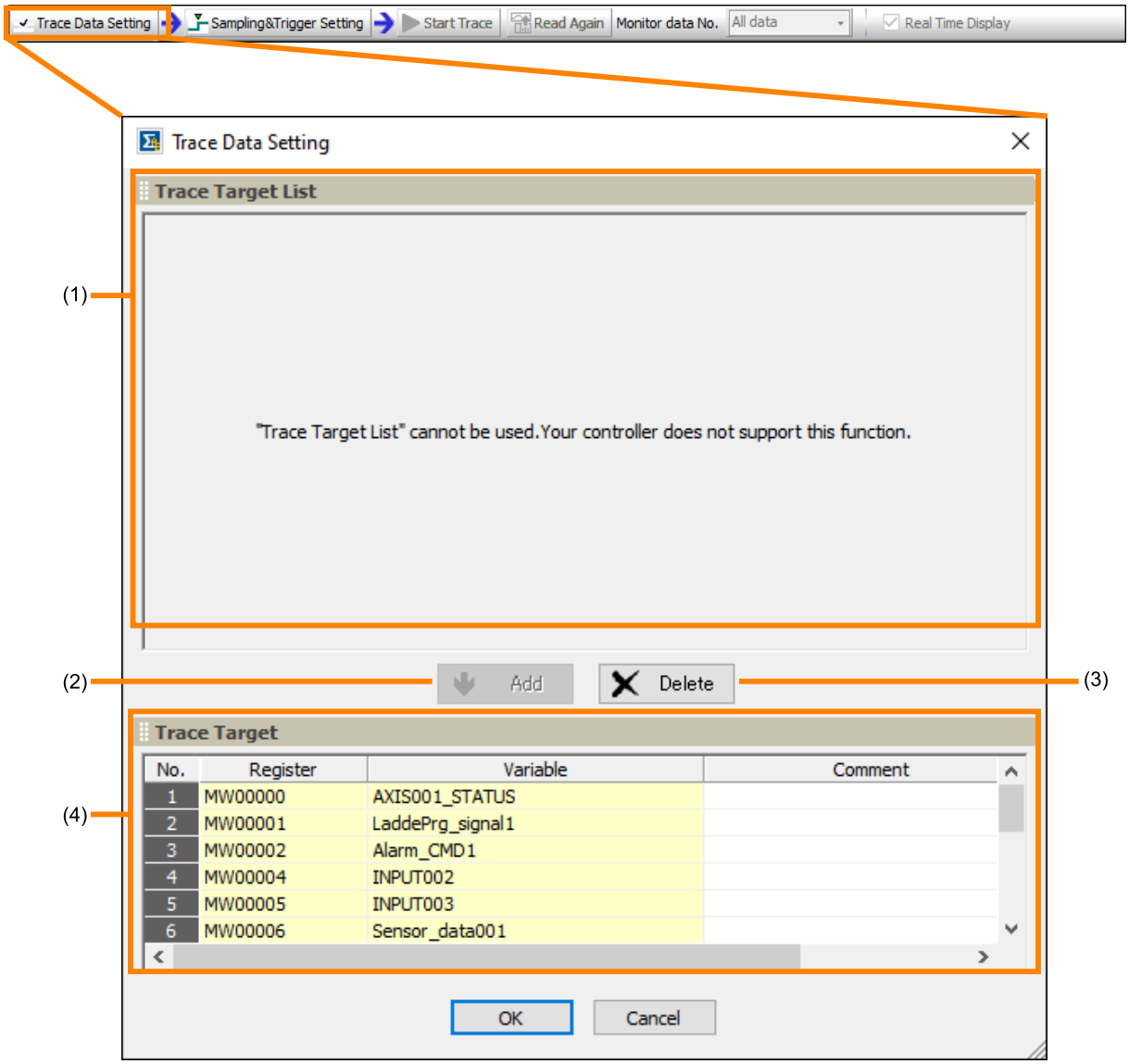
6.2.3 [Real-Time Trace] Tab Page



No.	Item	Description	Reference
(1)	Trace Data Setting	Set the trace target.	☞ *(1) Trace Data Setting on page 247*
	Sampling and Trigger Settings	Set the trace conditions.	☞ *(2) Sampling and Trigger Settings on page 249*
	Start Trace/Stop Trace	Starts and stops the trace. When the trace is started, the trace data is acquired and displayed in real time. When the trace is stopped, the buffer data of all traces is acquired and displayed.	-
	Read Again	Re-reads the trace data in the SERVOPACK. By executing re-reading, the content of the trace data accumulated at that point can be checked. When re-reading is executed during execution of a trace, the real time display mode automatically turns OFF.	-
	Monitor Data No.	The number of trace data to acquire from the SERVOPACK can be set. The actual number of acquired trace data is displayed at the bottom right of the trend graph.	-
	Real Time Display	When this check box is selected, the display shows the data moving during tracing in real time. When multiple trace tab pages are open, only one tab page is displayed.	-
(2)	Graph Toolbar	Groups together the buttons used for analyzing trace data.	☞ *(3) Graph Toolbar on page 253*
(3)	Trend Graph	The trace data is displayed. The graph toolbar, sliders and cursors can be used to analyze trace data in the Real-Time Trace Window.	☞ *(4) Trend Graph on page 254*
(4)	[Trace List] Window	A list of the registers that can be selected for tracing is displayed.	☞ *(5) [Trace List] Window on page 255*

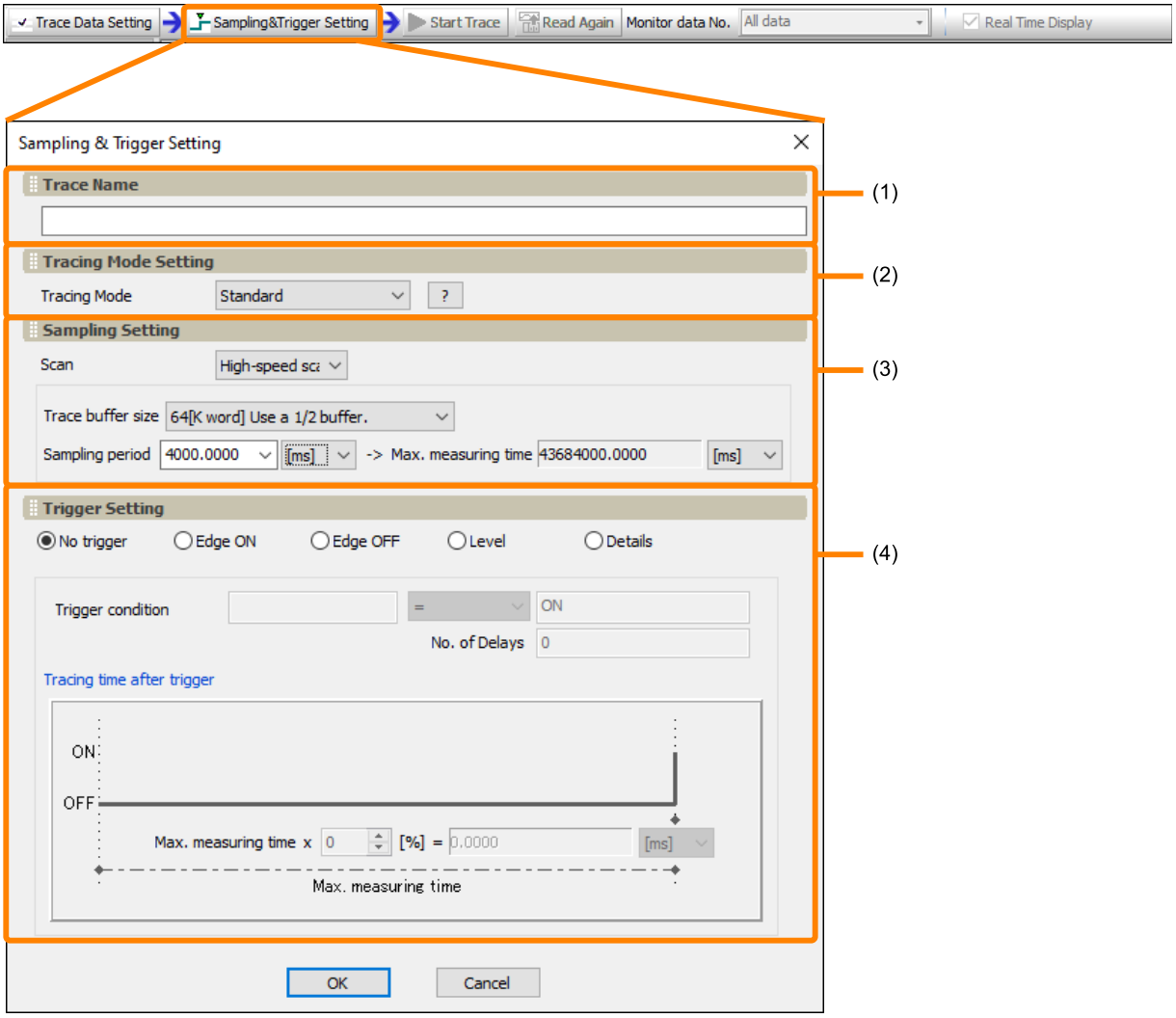
(1) Trace Data Setting

This is for setting the trace target.



No.	Item	Description
(1)	Trace Target List	Cannot be used.
(2)	Add	Cannot be used.
(3)	Delete	Deletes the entered register.
(4)	Trace Target	Used to directly enter the register to trace.

(2) Sampling and Trigger Settings



No.	Item	Description
(1)	Trace Name	Set the trace name. <Setting Conditions> 32 characters maximum.
(2)	Tracing Mode Setting	Set the tracing mode. Refer to the following section for details. ☞ *(a) Details of Tracing Mode Setting on page 249* Clicking [?] displays a detailed description of trace mode.
(3)	Sampling Setting	Set the data sampling rate. Setting a value for [Sampling Period] will display an approximate maximum measuring time.
(4)	Trigger Setting	Specify the condition at which trace is executed. Refer to the following section for details. ☞ *(b) Details of Trigger Setting on page 250*

(a) Details of Tracing Mode Setting

The following describes the differences between trace operation according to individual tracing mode.

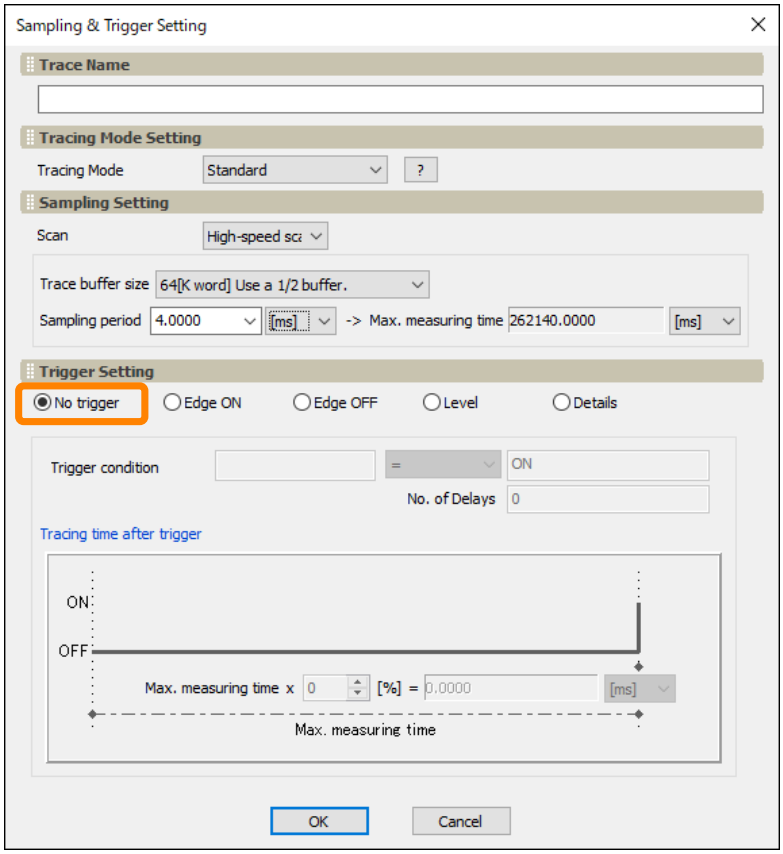
Status	Tracing Mode	
	Standard Mode	MP2000 Compatible
Trace definitions have been written to the SERVOPACK	Tracing is started by clicking the [Start Trace] button.	There is no need to click the [Start Trace] button. Tracing is performed automatically.
Trace start trigger turns ON after the trace stop trigger condition is satisfied	Tracing is not performed.	Tracing is performed automatically.
Both the trace stop trigger and trace start trigger turn ON simultaneously	Tracing is not performed.	Tracing is performed automatically for one scan.

(b) Details of Trigger Setting

Specify the condition at which trace is executed. There are five setting options.

◆ [No trigger]

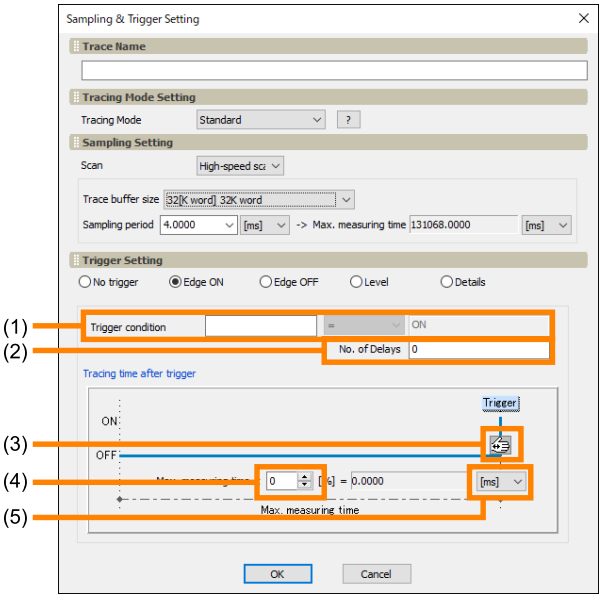
Start/stop of tracing can be performed manually.



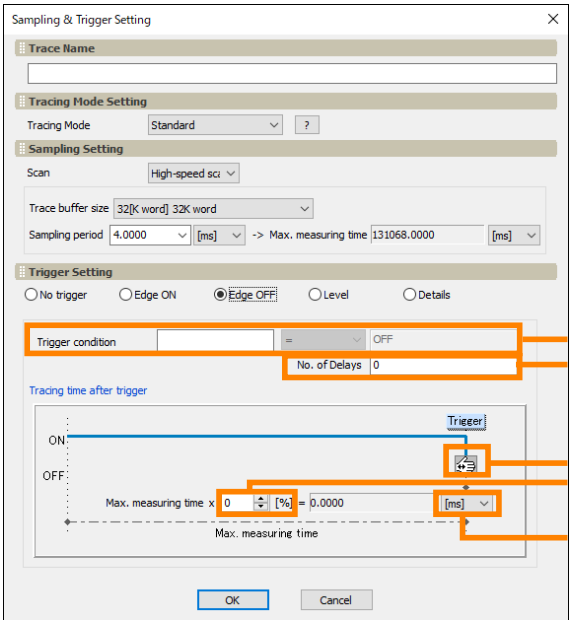
◆ [Edge ON] [Edge OFF]

When a specific bit changes state from OFF to ON or from ON to OFF, the preceding and subsequent data is acquired.

Edge ON:



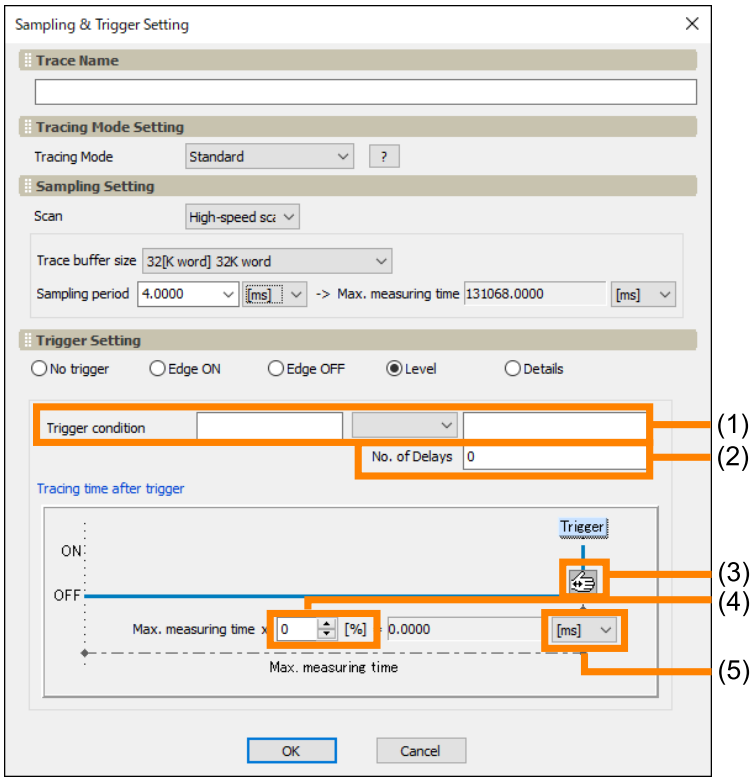
Edge OFF:



No.	Item	Description
(1)	Trigger Condition	Enter the register to be used as the trigger condition. Only bit registers (data type (B)) can be entered. Data types integer (W), double-length integer (L), quadruple-length integer (Q), real number (F), double-precision real number (D), and address (A) cannot be entered.
(2)	No. of Delays	Specify how many times sampling is performed before the trace is stopped after the stop conditions are satisfied.
(3)		Drag to move this button and set the trigger position.
(4)	[%]	Select the numerical values, and set the trigger position.
(5)	Unit Selection	Set the unit for the maximum trace measuring time after a trigger condition is satisfied.

◆ **[Level]**

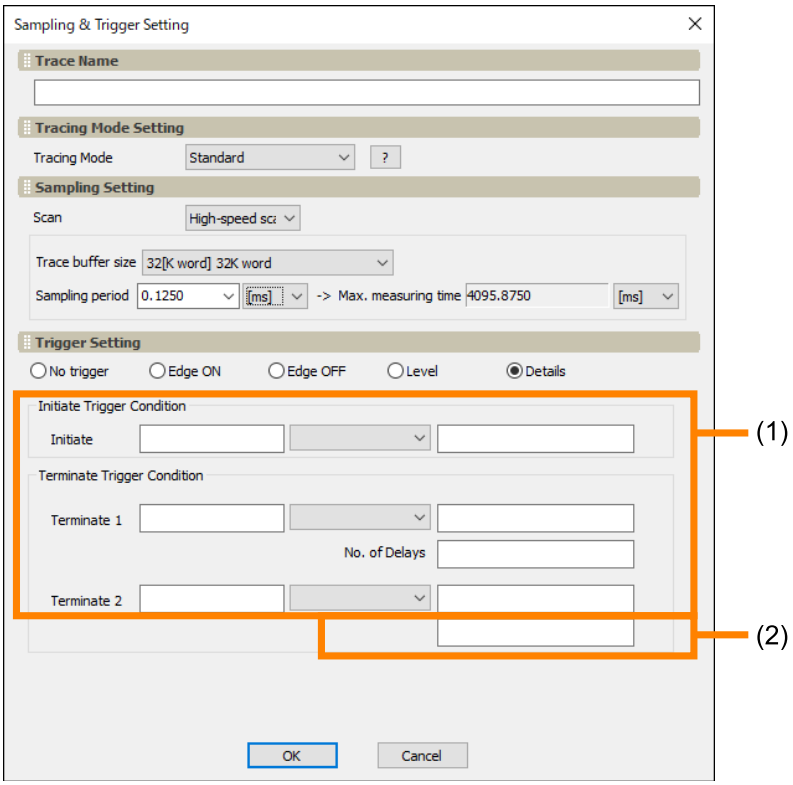
When a specific register matches the trigger condition, the preceding and subsequent data is acquired.



No.	Item	Description
(1)	Trigger Condition	Set the trigger condition for the trace. Only registers having the data type integer (W), double-length integer (L), quadruple-length integer (Q), real number (F), and double-precision real number (D) can be entered. Registers having the data type bit (B) and address (A) cannot be entered.
(2)	No. of Delays	Specify how many times sampling is performed before the trace is stopped after the stop conditions are satisfied.
(3)		Drag to move this button and set the trigger position.
(4)	[%]	Select the numerical values, and set the trigger position.
(5)	Unit Selection	Set the unit for the maximum trace measuring time after a trigger condition is satisfied.

◆ **[Details]**

Any register set as the trigger can be traced. Tracing can be performed by freely combining the start and stop triggers.



No.	Item	Description
(1)	Trigger Condition	Set the start trigger condition and stop trigger condition for the trace. Only registers having the data type bit (B), integer (W), real number (F), and double-length integer (L) can be entered. Data types quadruple-length integer (Q), double-precision real number (D), and address (A) cannot be entered. If the start trigger is not specified, the trace is started at the same time as start of sampling. If the stop trigger is not specified, the trace is executed until stop of sampling.
(2)	No. of Delays	Specify how many times sampling is performed before the trace is stopped after the stop conditions are satisfied.

(3) Graph Toolbar

The functions of each button are as follows.

Button	Function
	Double-clicking this allows you to zoom the graph.
	Dragging this allows you to scroll the graph. Double-clicking this also allows you to zoom the graph.
	Dragging or double-clicking this allows you to zoom the graph.
	Restores an enlarged graph to its original size.
	Displays the graph split into sections.
	Displays cursor A and the value at the intersecting point on the graph.
	Displays cursor B and the value at the intersecting point on the graph.
	Displays cursor C and the value at the intersecting point on the graph.
	Displays cursor D and the value at the intersecting point on the graph.

Continued on next page.

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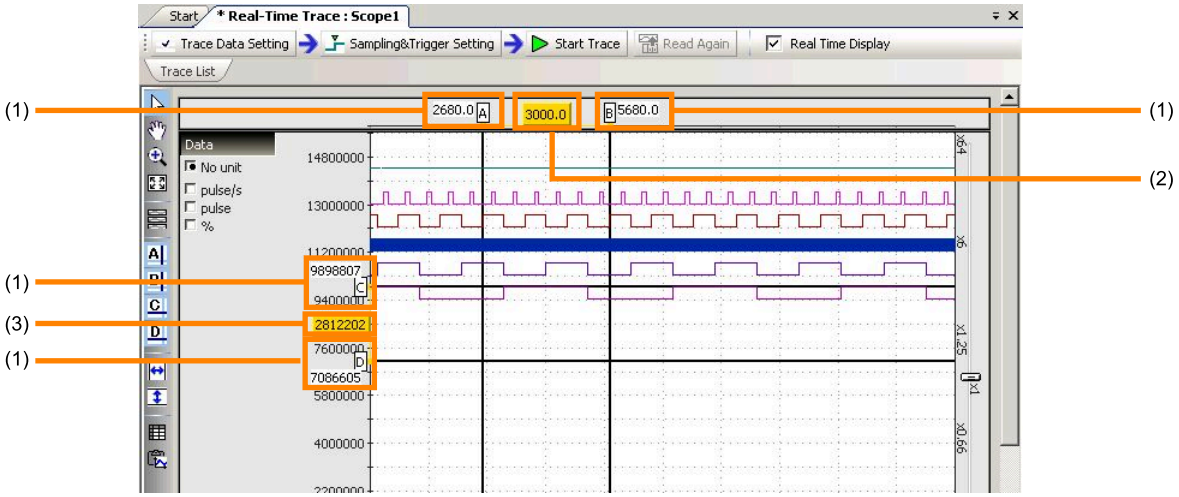
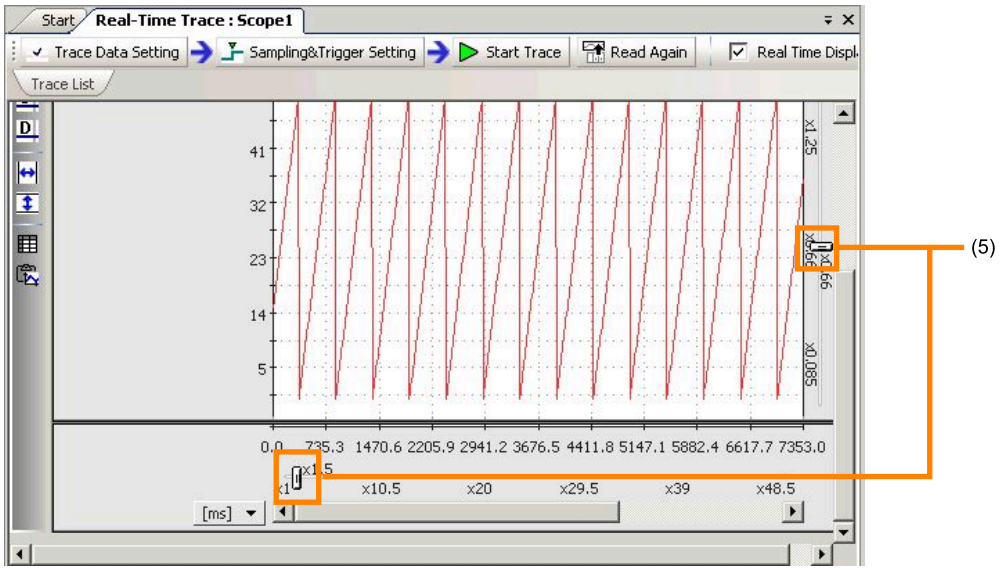
Button	Function
	Causes cursors A and B to move at a fixed width interlocked with each other.
	Causes cursors C and D to move at a fixed width interlocked with each other.
	Displays the list.
	Copies an image of the graph to the clipboard.

(4) Trend Graph



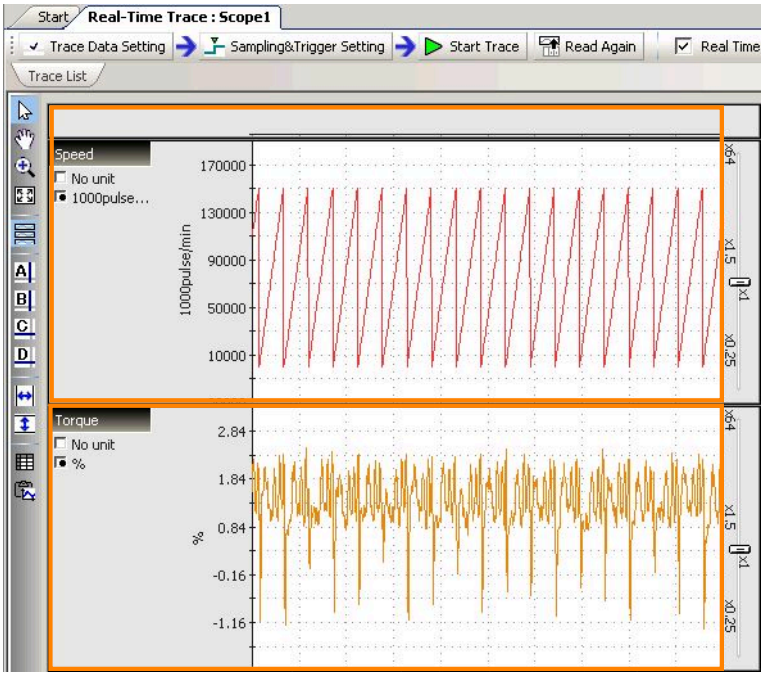


No.	Item	Description
(1)	Cursor Position	The value on the cursor position is displayed.
(2)	Cursor A-B Difference	The difference in values between the A and B cursor positions is displayed.
(3)	Cursor C-D Difference	The difference in values between the C and D cursor positions is displayed.
(4)	Graph Unit	The unit of the parameter selected in the [Trace Target List] of the [Trace Data Setting] window is displayed. When the currently displayed trace data includes two or more unit systems, you can switch the unit displayed on the vertical axis of the graph. The scale of the vertical axis is changed and the waveform is displayed to match the information (unit and number of digits after the decimal point) held by each axis. When the unit is switched, trace targets other than the selected unit are displayed by a line in the lighter color of the current color.
(5)	Scale	Moving the sliders horizontally and vertically allows you to rescale the graph. The scalable amounts in the horizontal and vertical directions are as follows: Vertical scale: 0.085x to 64x Horizontal scale:1x to 48.5x

(a) Graph Split View

Click the [] button on the graph toolbar to group the trace data and display it in split views.

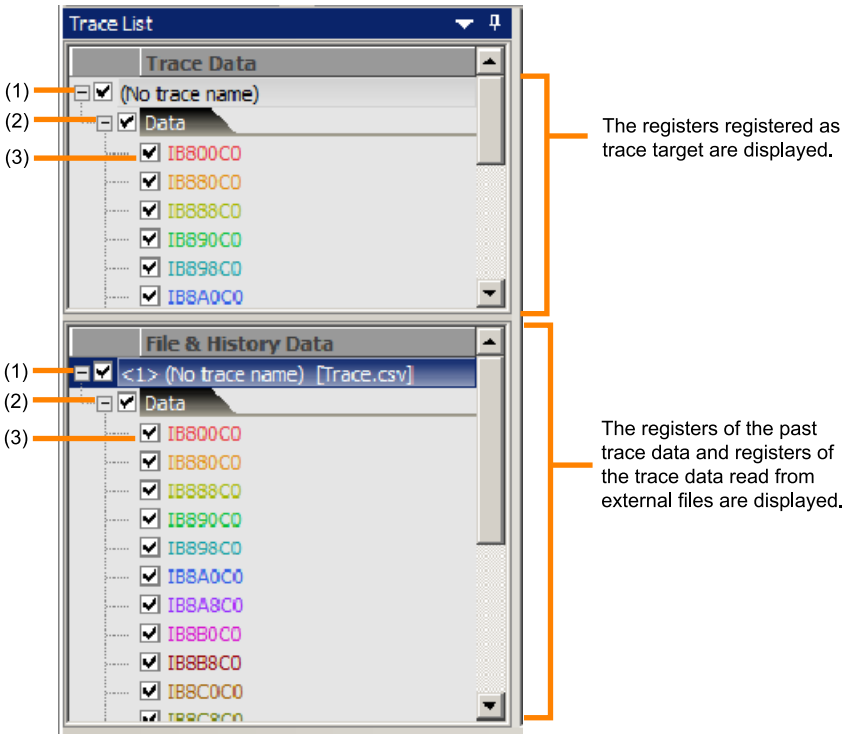
Trace targets are categorized by groups on the [Trace Target List] tabs of the [Trace Data Setting] window and by other groups of registers.



(5) [Trace List] Window

A list of the registers that can be selected for tracing is displayed.

Waveforms on the graphs can be displayed or hidden by selecting or deselecting respective check boxes.



No.	Item	Description
(1)	Trace Name	The trace name is displayed.
(2)	Trace Group Name	Registers are displayed categorized by groups on the [Trace Target List] tabs of the [Trace Data Setting] window (example: position, speed) and by other “Data” groups.
(3)	Register	Registers are displayed in the same color as the graph.

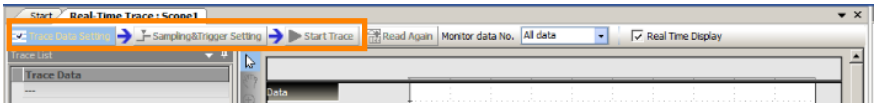
6.2.4 Overview of Real-Time Trace Operations

The flow for using real-time trace is given below.

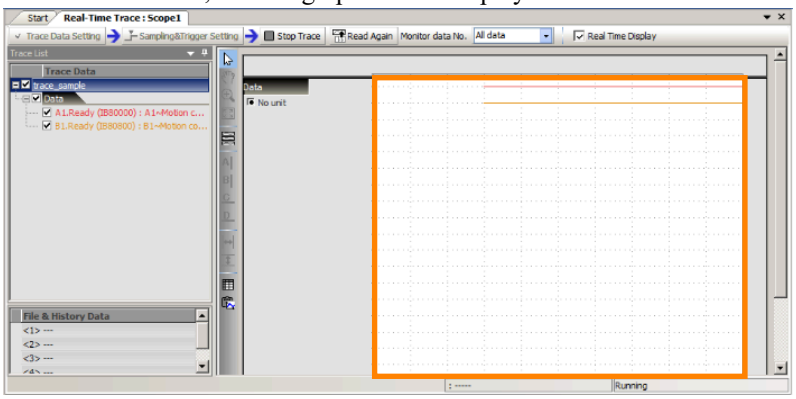
1. **Display the [Real-Time Trace] tab page.**
2. **Set [Trace Data Setting] and [Sampling & Trigger Setting] in that order, and then click the [Start Trace] button.**

   Refer to the following section for details on the setting items displayed in the window.

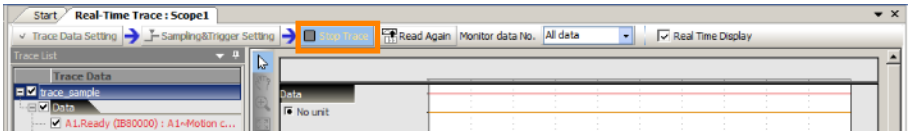
   ☞ *6.2.3 [Real-Time Trace] Tab Page on page 246*



The trace will start, and the graph will be displayed in real-time.



3. **To stop the trace, click the [Stop Trace] button.**



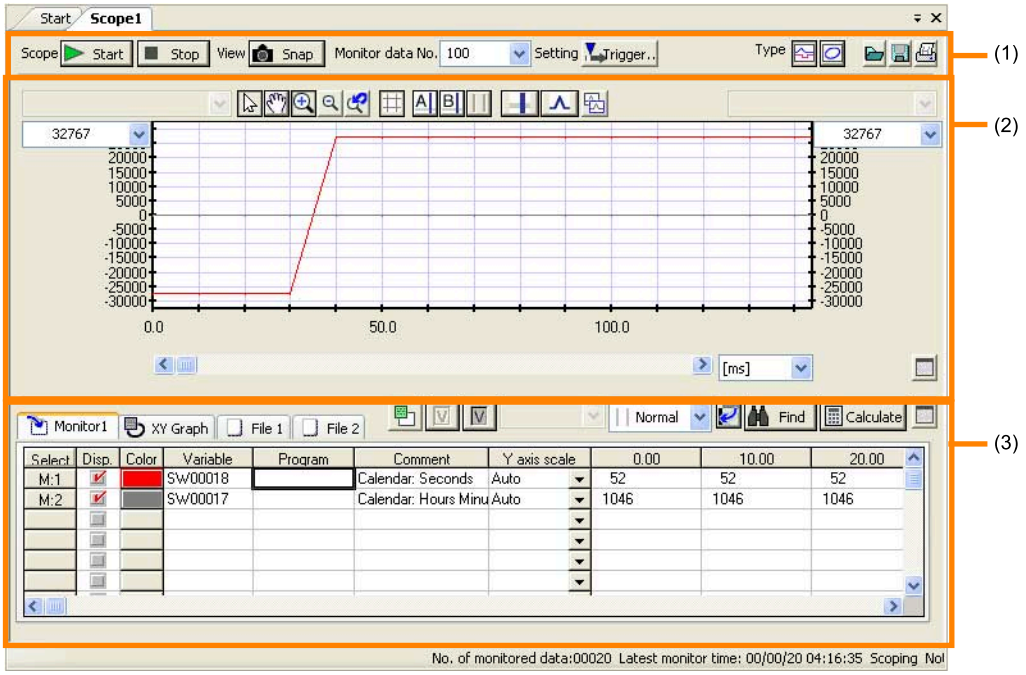
Tracing will stop.

This concludes the basic procedure.

The following table lists the other operations available in Real-Time Trace and the reference information.

Operation	Reference
Reading Trace Definition Files	☞ *6.2.9 Reading Trace Definition Files on page 280*
Checking Sampling and Trigger Settings	☞ *6.2.10 Checking Sampling and Trigger Settings on page 281*
Deleting Trace Definitions and Trace Data	☞ *6.2.11 Deleting Trace Definitions and Trace Data on page 282*
Changing the Enabled/Disabled Setting of the Trace Definition Settings	☞ *6.2.12 Changing the Enabled/Disabled Setting of the Trace Definition Settings on page 283*
Scaling the Trace Data Waveform	☞ *6.2.13 Scaling the Trace Data Waveform on page 284*
Comparing I/O Registers and M Registers	☞ *(1) Comparing I/O Registers and M Registers on page 286*
Comparing with Past Acquired Data	☞ *6.2.15 Comparing with Past Acquired Data on page 288*
Checking the Trace Status	☞ *6.2.18 Checking the Trace Status on page 292*
Saving Trace Data	☞ *6.2.19 Saving Trace Data on page 292*
Reading Trace Data	☞ *6.2.20 Reading Trace Data on page 294*
Switching Between Graph View and List View	☞ *6.2.21 Switching Between Graph View and List View on page 295*
Copying an Image of the Graph	☞ *6.2.22 Copying an Image of the Graph on page 296*

6.2.5 [Trace Manager] Tab Page



No.	Item	Description	Reference
(1)	Control Panel Area	Used for starting/stopping traces, setting triggers, etc., and for executing general operations relating to tracing. This area is displayed at all times regardless of the graph or list view mode.	☞ *(1) Control Panel on page 258*
(2)	Graph Area	The trace data graph is displayed. Graphs are displayed in either of the following formats: • Trend graph • X-Y graph When in the maximum view mode of the list, the graph area is not displayed.	☞ *(2) Graph Area on page 260*
(3)	List Area	Used for the operation of registering and clearing monitor variables. Monitor variables are displayed in list format. When in the maximum view mode of the graph, the list area is not displayed.	☞ *(3) List Area on page 264*

Term

Monitor Variables :

A variable (register) that is targeted for graph plotting and monitoring is called a "monitor variable." A monitor variable must be registered so that a variable (register) is treated as a monitor variable. Refer to the following sections for details on registration of monitor variables.

☞ ◆ *How to Register Monitor Variables on page 266*

(1) Control Panel

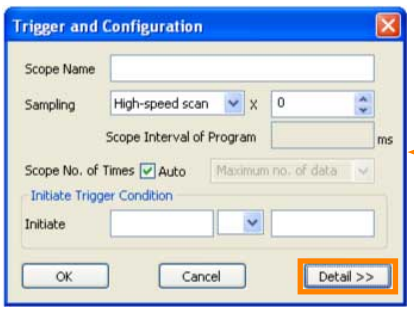
The functions of each button are as follows.

Button	Function
Start	Starts and stops the trace.
Stop	Start Stop: Trace is executing (or waiting for trigger condition). Start Stop: Trace is stopped. This button is enabled only in the online mode. If a trace definition file has been loaded, the trace is started at the same time that the trace tab page is started up. So, the [Stop] button is ON at first.
Snap	Clicking this button acquires and displays the content of the trace data memory for one scan. This button is enabled only in the online mode.
100 / All data / 100 / 1000	The maximum value of the trace data that is acquired when the [Stop] button or the [Snap] button is clicked can be set. You can either select from the available options or click inside the cell and directly enter the value. The maximum value that can be entered directly is “32158”.
Trigger..	Clicking this displays the [Trigger & Configuration Setting] window. Refer to the following section for details. ☞ *(a) [Trigger and Configuration Setting] Window on page 259*
	Clicking this displays the trend graph. The trend graph displays the values of registered monitor variables in time series as a graph. Refer to the following section for details. ☞ *(2) Graph Area on page 260*
	Clicking this displays the X-Y graph. The X-Y graph displays the relation between variable X and variable Y at a certain time as a graph with two specified monitor variables (variable X and variable Y) taken for the horizontal axis and vertical axis. Refer to the following section for details. ☞ *(2) Graph Area on page 260*
	Clicking this displays the [Open] window, and the trace data and data definitions can be read from the selected file.
	Clicking this opens the [Save As] window, and you can save trace data and trace definitions as a file.
	Clicking this displays the [Print] window, and you can print the [Trace Manager] window.

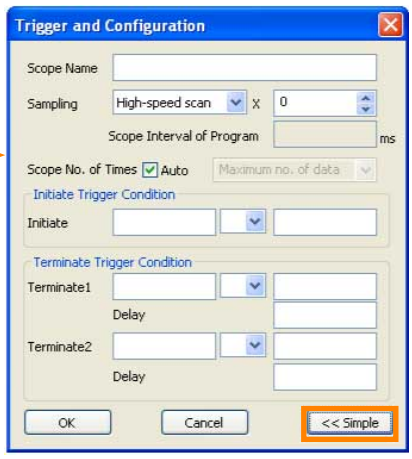
(a) [Trigger and Configuration Setting] Window

This window is displayed by clicking the [Trigger..] button on the control panel.

<Simple Settings View>



<Detail Settings View>

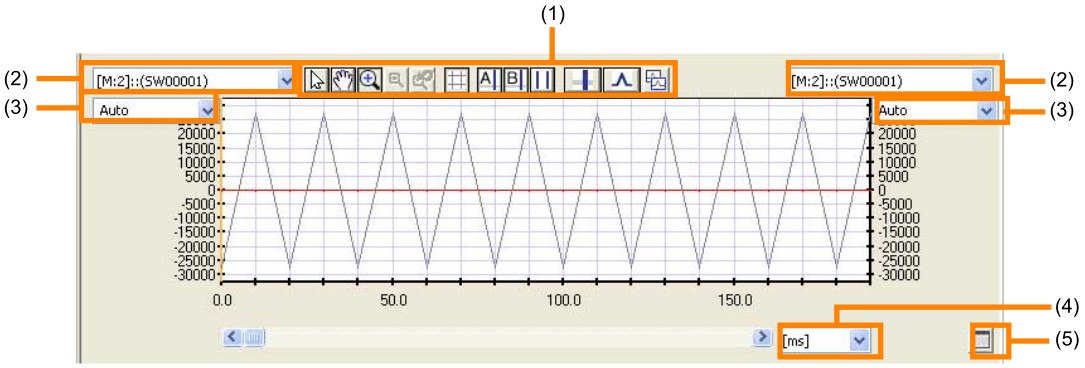


Item		Description
Scope Name		Set the trace condition name. <Setting Conditions> 32 characters maximum.
Sampling	Sampling Conditions	Set the data sampling rate.
	Sampling Interval	Set the data sampling interval. When “0” is set, trace is executed at every scan. <Setting Range> 0 to 32767
Scope Interval of Program		Specify the time in ms units. The value specified here is used for the time axis. This setting is enabled only when sampling conditions are set to "Program designation". <Setting Range> 0.1 to 999.9
Scope No. of Times		Specify the number of points of data to acquire. When [Auto] is selected, the trace is executed until the stop trigger condition is satisfied or when the [Stop] button is clicked.
Initiate		Set the register, operator and numerical value that are used as the trigger for starting the trace. If the start trigger is not specified, the trace is started at the same time as start of sampling.
Terminate 1/2		Set the register, operator and numerical value that are used as the trigger for stopping the trace. Up to two stop triggers can be set. If the stop trigger is not specified, the trace is executed until stop of sampling.
Delay		Specify how many times sampling is performed before the trace is stopped after the stop conditions are satisfied. <Setting Range> 0 to 65534

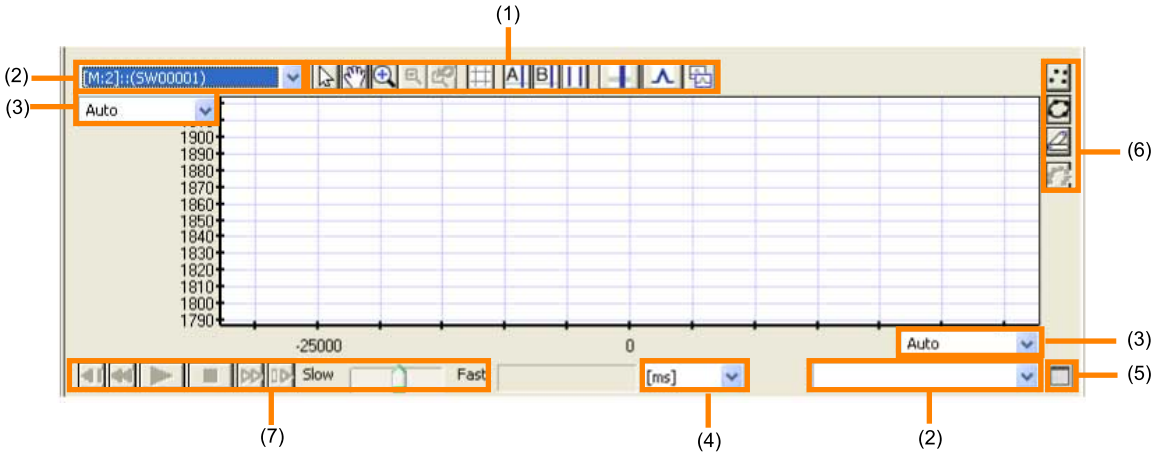
(2) Graph Area

Two graph view modes provided for the graph area are trend graph view and X-Y graph view. The view can be switched by clicking the [] button and the [] button.

<Trend Graph>

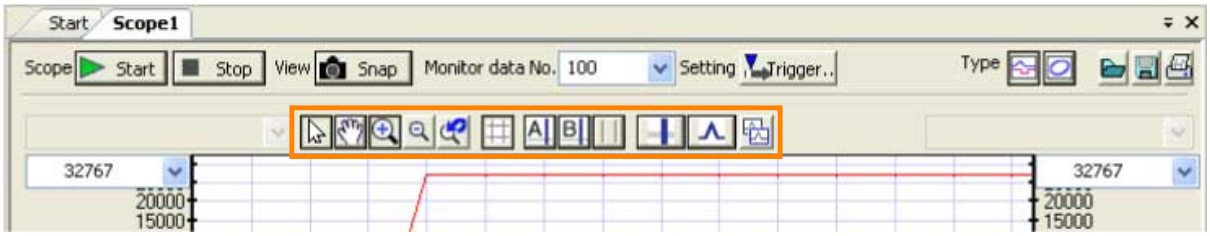


<X-Y Graph>



No.	Item	Description
(1)	Graph Area Operation Buttons	The graph area operation buttons are common to both the trend graph view mode and the X-Y graph view mode. The pointer and cursors can be set and switched, and the graph display can be switched, for example. Refer to the following section for details. ☞ *(a) Graph Area Operation Buttons on page 262*
(2)	Monitor Variable Selection	Different variable names and maximum values (units) can be set to the left and right vertical axes of trend graphs. Clicking the [V] button displays all variables as a list whose display setting is currently ON in the list area. Select the variables to set to the left and right vertical axes.
		Different variable names can be set to the vertical and horizontal axes of X-Y graphs. Clicking the [V] button displays all variables as a list whose display setting is currently ON in the list area. Select the variables to set to the vertical axis and the horizontal axis.
(3)	Maximum Value Selection	The maximum values of different monitor variables can be set to the left and right vertical axes of trend graphs. Double-clicking a cell allows you to enter directly. When [Auto] is selected, the maximum values are adjusted so that all of the acquired trace data is displayed in the graph area.
		The maximum values of different monitor variables can be set to the vertical axis and the horizontal axis of X-Y graphs. Double-clicking a cell allows you to enter directly. When [Auto] is selected, the maximum values are adjusted so that all of the acquired trace data is displayed in the graph area.
(4)	Unit Selection	The display unit of the horizontal axis (time axis) can be selected from [ms], [sec], [min] or [Data].
(5)		When the [] button is clicked, the list area is hidden so that the graph area becomes the maximum size, and the [] button is displayed. When the [] button is clicked, the graph area returns to its original size, and the list area is displayed.
		
(6)	X-Y Graph View Setting Operation Buttons	The view settings of the X-Y graph can be modified. Refer to the following section for details. ☞ *(b) X-Y Graph View Setting Operation Buttons on page 264*
(7)	Playback Related Operation Buttons	The playback function plays back and displays data acquired until the trace is stopped or data acquired by snapshot. Operations possible by this function include playback, stop, fast forward/rewind, and frame advance/return. Playback can be executed when in the X-Y graph view mode. As the X-Y graph does not include time information, this function is provided for displaying changes in data that are caused by the lapse of time. Refer to the following section for details. ☞ *(c) Playback Related Operation Buttons on page 264*

(a) Graph Area Operation Buttons



Button	Description	
	Dragging this allows you to vertically scroll the graph. Graph areas for which “Auto” is selected as the maximum vertical axis value on the list cannot be moved.	
	Dragging this allows you to horizontally scroll the graph.	
	Dragging this enlarges the selected area.	
	Clicking this when the graph is displayed enlarged makes the graph one step smaller. This is enabled when the graph is displayed enlarged.	
	Restores an enlarged graph to its original size. This is enabled when the graph is displayed enlarged.	
	Toggles between displaying and hiding the grid.	
	Toggles between displaying and hiding cursor A.	Refer to the following section for details. ☞ ◆ *Details of Cursor A, Cursor B, Cursor A/B with Same Interval on page 262*
	Toggles between displaying and hiding cursor B.	
	Causes cursors A and B to move at a fixed width interlocked with each other. This is enabled when both cursors A and B are displayed.	
	Displays the [Cursor Setting] window. Refer to the following section for details. ☞ ◆ *[Cursor Setting] Window on page 262*	
	Displays the [Scale Offset Adjust] window. Refer to the following section for details. ☞ ◆ *[Scale Offset Adjust] Window on page 263*	
	Copies the graph to the clipboard. The copied graph image can also be pasted to other Windows applications.	
	Hides the list area and maximizes the graph. This is enabled in the normal list view.	
	Displays the list area and restores the graph to its normal view. This is enabled in the maximum graph view.	

◆ Details of Cursor A, Cursor B, Cursor A/B with Same Interval

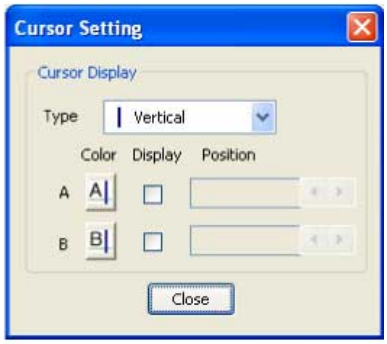
Two mouse cursors, cursor A and B, are provided for the graph area. You can use either one or both of these.

The cursor moves as described below according to the status of the graph area by left-clicking inside the graph.

Status		Cursor Movement
When only cursor A (or B) is displayed		Cursor A (B) moves to the place you clicked.
When both cursors A and B are displayed and movement of cursors A and B is interlocked		Cursor A moves to the place you clicked with cursors A and B interlocked with each other at a fixed width.
When both cursors A and B are displayed and movement of cursors A and B is not interlocked	When the cursor mode in the list area is either Normal or Cursor A	Cursor A moves to the place you clicked. At this time, cursor B does not move.
	When the cursor mode in the list area is Cursor B	Cursor B moves to the place you clicked. At this time, cursor A does not move.

◆ [Cursor Setting] Window

The [Cursor Setting] window is displayed by clicking the [ ] button in the graph area operation buttons.

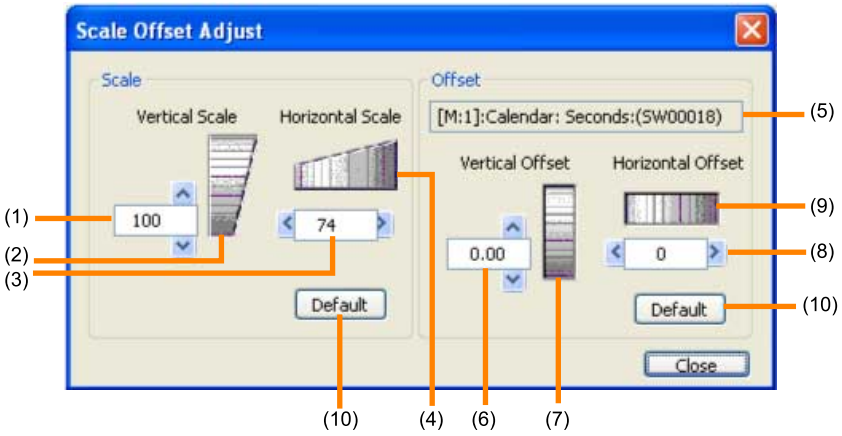


Item	Description
Type	Select the cursor shape. A vertical cursor (|) or cross cursor (+) can be selected. The cross cursor is displayed when a monitor variable is selected in the [Select] field in the list area. At this time, the center of the cross moves to on the selected monitor variable.
Color	Clicking this button displays the [Color Setting] window. The color of the cursor is selected of cursors A and B individually.
Display	The cursor of the selected check box is displayed.
Position	Set the display position of the cursor. Either enter directly or set by clicking the spin buttons. When the numerical value is entered directly, the display position is adjusted to the nearest grid position.

◆ [Scale Offset Adjust] Window

The [Scale Offset Adjust] window is displayed by clicking the [ ] button in the graph area operation buttons. In this window, the scale (maximum value) of each axis and offset (shift from center) can be adjusted.

Information Offset adjustment is enabled when a variable for offset adjustment is selected in the [Select] field in the list area.



No.	Item	Description
(1)	Vertical Scale Setting	Set the vertical scale either by entering directly or clicking the spin buttons. <Setting Range> 100 to 1000
(2)	Vertical Scale Adjustment Bar	Drag this vertically to set the vertical scale.
(3)	Horizontal Scale Setting	Set the horizontal scale either by entering directly or clicking the spin buttons. <Setting Range> 10 to 1000
(4)	Horizontal Scale Adjustment Bar	Drag this horizontally to set the horizontal scale.
(5)	Variable Targeted for Offset adjustment	The name of the variable targeted for offset adjustment is displayed.

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No.	Item	Description
(6)	Vertical Offset Setting	Set the vertical offset either by entering directly or clicking the spin buttons. <Setting Range> -100.00 to 100.00
(7)	Vertical Offset Adjustment Bar	Drag this vertically to set the vertical offset.
(8)	Horizontal Offset Setting	Set the horizontal offset either by entering directly or clicking the spin buttons. <Setting Range> • When the target (sampling time) is selected on the [Monitor] tab page or the [File] tab page: -99 to 99 • When the target (variable) is selected on the [XY Graph] tab page: -100.00 to 100.00
(9)	Horizontal Offset Adjustment Bar	Drag this horizontally to set the horizontal offset.
(10)	Default	Restores the scale or offsets to their defaults. Vertical scale: 100 Horizontal scale: 100 Vertical offset: 0.00 Horizontal offset: 0 The horizontal offset default is 0.00 when the target on the [XY Graph] tab page is selected.

(b) X-Y Graph View Setting Operation Buttons

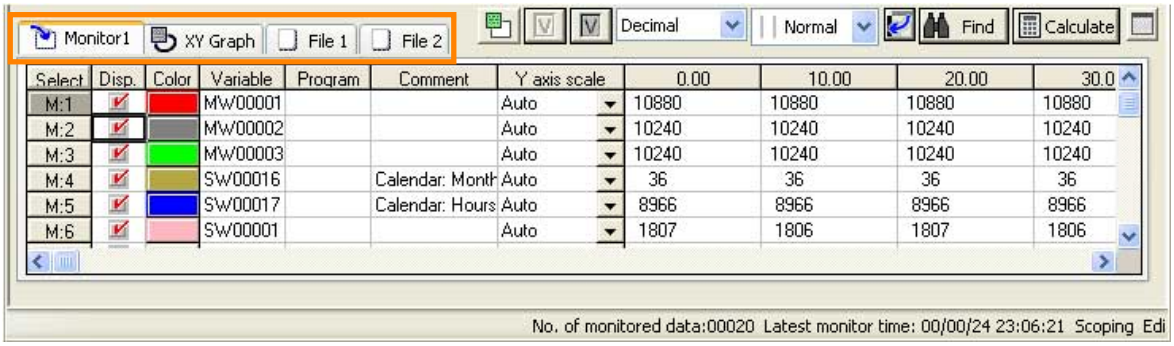
Button	Item	Description
	Point Display	Displays each coordinate as a point.
	Line Display	Displays each coordinate connected by a line.
	Model Display	Displays each coordinate connected by a line according to the information of the connection point. Refer to the following section for details on connection points. ☞ *(b) [XY Graph] Tab Page on page 266*
	Leave Trace	Select whether or not to leave a trace. This is enabled only for point display.

(c) Playback Related Operation Buttons

Button	Item	Description
	Playback	Plays back the X-Y graph from the beginning of the traced data.
	Stop	Stops the X-Y graph during playback.
	Fast Forward/Rewind	Fast forwards and rewinds by a specified magnification. Playback is automatically continued when this operation is canceled. This operation is possible only during playback.
	Frame Advance/Return	Advances and returns playback one frame at a time.
	Magnification Setting	Set the magnification of fast forward/rewind.
	Run Time	The run time of the playback display is displayed. The unit can be selected from [ms], [sec], [min] or [Data].

(3) List Area

Three types of tab pages are displayed in the list area: [Monitor], [XY Graph], and [File].

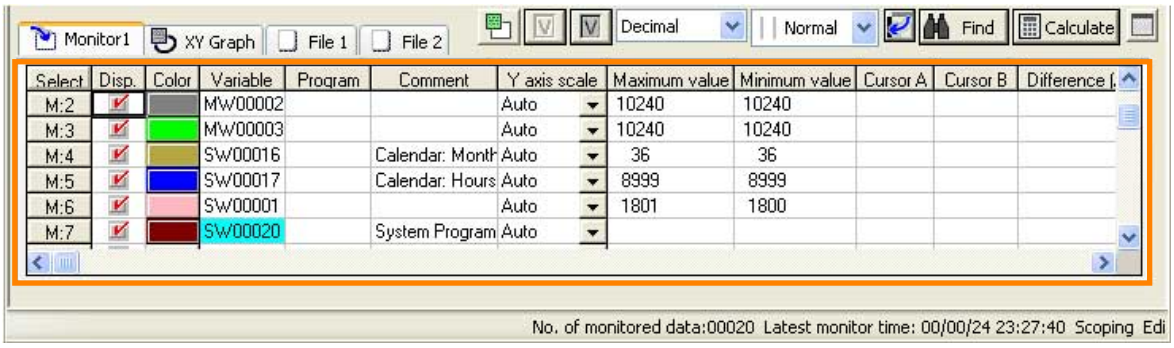


(a) [Monitor] Tab Page

In the [Monitor] tab page, monitor variables can be displayed, registered, deleted, and edited.

Refer to the following section for details on registration and editing of monitor variables.

☞ ◆ *How to Register Monitor Variables on page 266*



Item	Description
Select	Clicking this button selects the variable. Switching of data view, find, calculation, offset adjustment, and cross cursor display will be possible for the selected variable. The following describes the display items: • M:y : No.y of monitor • Fx:y: No.y of file x • SUB : Difference between 2 variables • ADD: Sum of 2 variables • REF : Reference variable
Display	Selecting this check box displays the variable graph.
Color	Double-clicking this button displays the [Color] window on which you can set the graph color.
Variable	Enter the name of the variable or the register to be traced.
Program	When entering a D register, enter the name of the program that is currently using the D register.
Comment	The comment is displayed.
Y axis scale	Select the scale of the Y-axis from "Auto", "Y1 axis" and "Y2 axis". When "Auto" is set, the scale is automatically adjusted and displayed for each individual monitor variable. When "Y1 axis" is selected, data is displayed according to the scale on the left edge of the graph, and when "Y2 axis" is selected, data is displayed according to the scale on the right edge of the graph
Maximum value	This is displayed by selecting [Minimum/Maximum Value] from the [List] menu. The maximum value of the trace data is displayed.
Minimum value	This is displayed by selecting [Minimum/Maximum Value] from the [List] menu. The minimum value of the trace data is displayed.
Cursor A	This is displayed by selecting [Cursor Position Value] from the [List] menu. The value of cursor A is displayed.
Cursor B	This is displayed by selecting [Cursor Position Value] from the [List] menu. The value of cursor B is displayed.

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Item	Description
Difference (A – B)	This is displayed by selecting [Cursor Position Value] from the [List] menu. The difference (A – B) between the values for cursors A and B is displayed.
Conversion unit (x N)	This is displayed by selecting [Unit Conversion] from the [List] menu. The value for the convert unit is displayed as a multiplying factor. Data is displayed by variable value x multiplying factor. Set this value, for example, when swapping over to the machine coordinate system.

◆ How to Register Monitor Variables

Traces can be used by registering the variables that are to be monitored (monitor variables) in the list area. Up to 16 monitor variables can be registered.

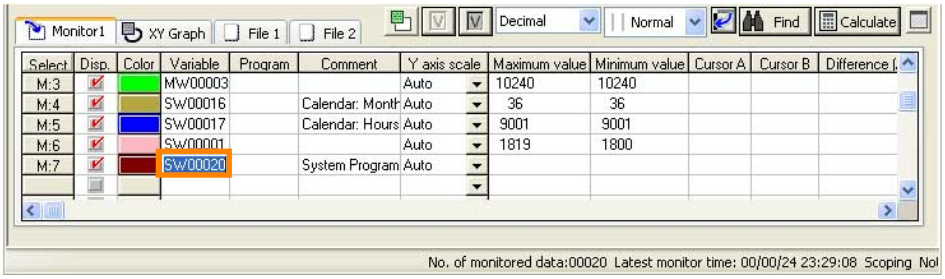
Note:

Up to 64 (16 x 4) monitor variables can be registered by setting the monitor in the [Select Monitor Setting] window. Up to 16 monitor variables, however, can be displayed at one time. Refer to the following section for details.

☞ ◆ *[Select Monitor Setting] Window on page 268*

The following methods can be used to register monitor variables.

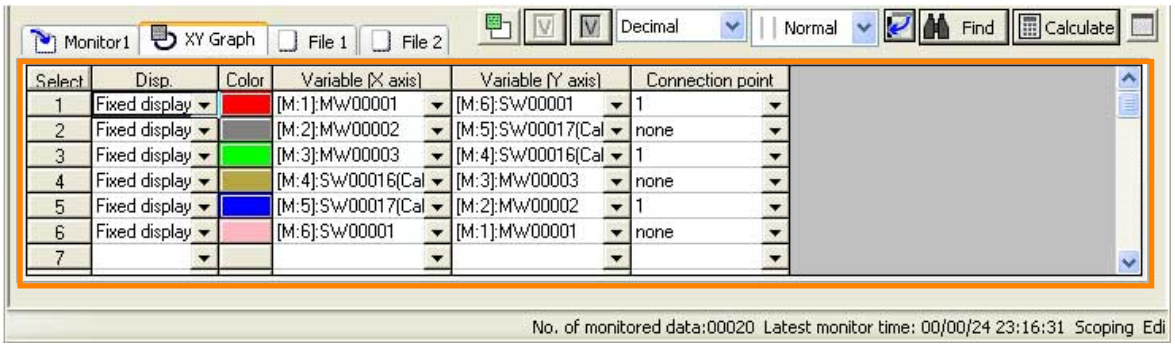
- Registering Variables on the [Monitor] Tab Page
  You can enter the variable by double-clicking the [Variable] cell. The variable name (register) can either be directly entered or it can be entered by dragging and dropping the variable from the [Variable] window.



- Registering Variables from the Edit Ladder Program Window
  Right-click an object in the Edit Ladder Program Window and select [Add to Scope] from the pop-up menu.

(b) [XY Graph] Tab Page

In the [XY Graph] tab page, the monitor variables to display on the X-Y graph can be registered, deleted, edited, and displayed.



Item	Description
Select	Clicking this button selects the variable. Offset adjustment and the cross cursor can be displayed for the selected variable.
Display	Select how the graph is displayed. • Hide: Data is not displayed on a graph. • Fixed display: Data is displayed on a graph when trace is executed. • Playback: Data is displayed on a graph when playback is executed.
Color	Double-clicking this button displays the [Color] window on which you can set the graph color.
Variable (X axis)	Specify the name of a variable to be traced on the X-axis (horizontal axis). The variable name can be selected from the variables set on the [Monitor] tab page.

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Item	Description
Variable (Y axis)	Specify the name of a variable to be traced on the Y-axis (vertical axis). The variable name can be selected from the variables set on the [Monitor] tab page.
Connection point	Set the No. in the model display to connect to. Select from none or the [Select] numbers of this tab page.
Cursor A	This is displayed by selecting [Cursor Position Value] from the [List] menu. The value of cursor A is displayed.
Cursor B	This is displayed by selecting [Cursor Position Value] from the [List] menu. The value of cursor B is displayed.
Difference (A – B)	This is displayed by selecting [Cursor Position Value] from the [List] menu. The difference (A – B) between the values for cursors A and B is displayed.

(c) [File] Tab Page

Monitor variable data imported from specified files (CSV files) can be displayed in the [File] tab page.

Use the following procedure to import the data.

1. **Display the [File] tab page in the list area.**
2. **Select [Import] from the [File] menu.**

   The [Open] window will be displayed.
3. **Select the file (.csv) from which to import data, and click the [Open] button.**

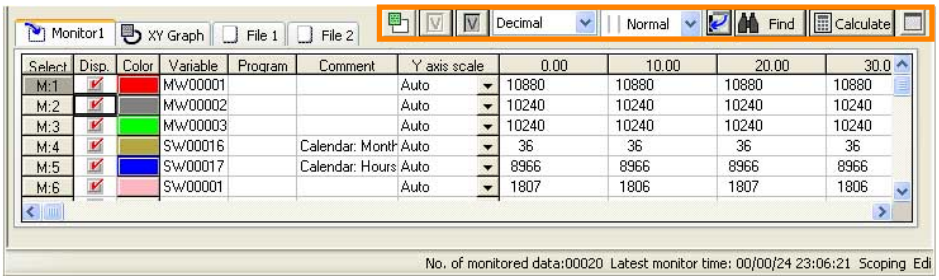
   The data in the selected file will be displayed.

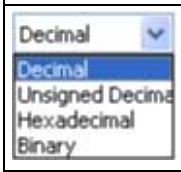
The items displayed on a [File] tab page are the same as those on a [Monitor] tab page. Variables, programs, and comments depend on data imported from files, so they cannot be edited.

Information

- Variables displayed on a [File] tab page are registered as monitor variables to be monitored on a [Monitor] tab page. Refer to the following section for details.
  ☞ ◆ *[Object Variable Setting] Window on page 268*
- The default setting for the number of [File] tab page displayed is two, but the number can be set for a maximum of eight. Refer to the following section for how to set the number of tab pages displayed.
  ☞ *(d) [List] Tab Page on page 273*

(d) List Operation Buttons



Button	Description
	Clicking this button displays the [Select Monitor Setting] window. You can add [Monitor] tab pages that are displayed to expand the targets for monitoring. Refer to the following section for details. ☞ ◆ *[Select Monitor Setting] Window on page 268*
	Clicking this button displays the [Object Variable Setting] window. You can register the variables in the imported file as monitor variables. Refer to the following section for details. ☞ ◆ *[Object Variable Setting] Window on page 268*
	Select the display format for variables selected in the list.

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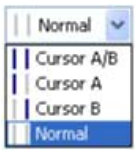
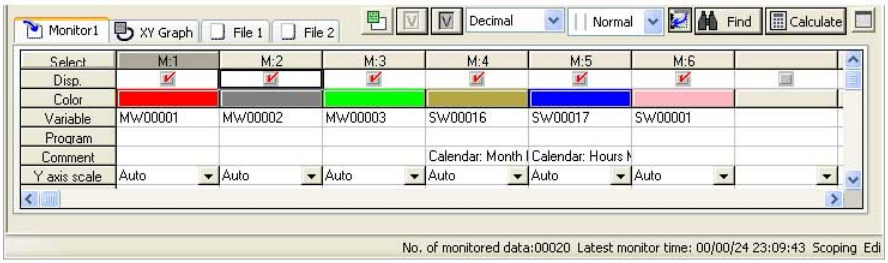
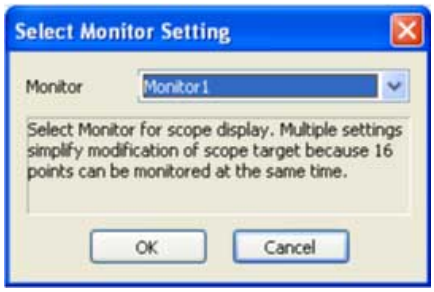
Button	Description
	Select the cursor linked to the display positions. When Cursor A, Cursor B, or Cursor A/B is selected, the cursor position on the graph is linked with the data displayed on the [Monitor] tab page and [File] tab page of the list area. When cursor A (or cursor B) is not displayed, [Cursor A] (or [Cursor (B)]) cannot be selected. When [Cursor A/B with Same Interval] is not set in the graph area, [Cursor A/B] cannot be selected. The status will not change if unexecutable selections are selected.
	Toggles the display orientation of the list. When ON, all variable data is displayed in the vertical direction. When OFF, all variable data is displayed in the horizontal direction. <Vertical List Display Example> 
	Clicking this button with a monitor variable in the list selected displays the [Find] window, and the maximum value, minimum value, local maximum value, local minimum value, and time axis of the graph can be found. Refer to the following section for details. ☞ ◆ *[Find] Window on page 269*
	Clicking this button with a monitor variable in the list selected displays the [Calculate] window, and the area, average, and absolute average calculation results for the selected variable can be referenced. Refer to the following section for details. ☞ ◆ *[Calculate] Window on page 270*
	Hides the graph and maximizes the list. This is enabled in the normal list view.
	Clears the maximum list view and restores the list to its normal view (graph and list). This is enabled in the maximum list view.

◆ [Select Monitor Setting] Window

Click the [] button to display the [Select Monitor Setting] window. The [Monitor] tab pages displayed in the window can be selected from [Monitor 1] to [Monitor 4].

The default setting is for only [Monitor 1] tab page to be displayed. For example, selecting [Monitor 3] and clicking the [OK] button will display the [Monitor 3] tab page.

A maximum of 16 monitor variables can be registered on a single [Monitor] tab page. The number of targets to be monitored can be expanded by using multiple tab pages.

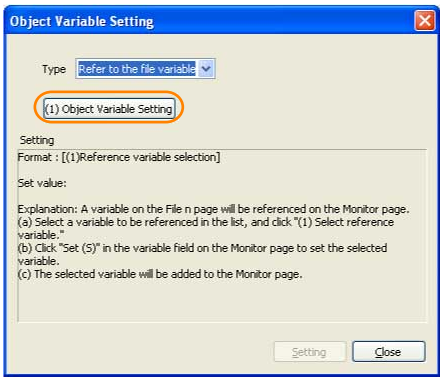


◆ [Object Variable Setting] Window

Click the [] button to display the [Object Variable Setting] window. Variables displayed on a [File] tab page can be registered to a [Monitor] tab page as monitor variables.

Use the following procedure to register a monitor variable.

1. **Select the variable to register in the list on the [File] tab page, and then click the [(1) Object Variable Setting] button in the [Object Variable Setting] window.**

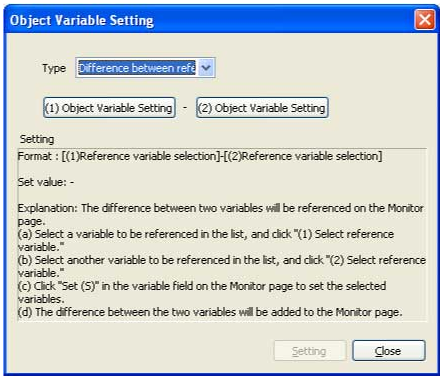


The selected variable name will be displayed in [Set value].

2. **Select the [Variable] field on the [Monitor] tab page, and then click the [Setting] button in the [Object Variable Setting] window.**

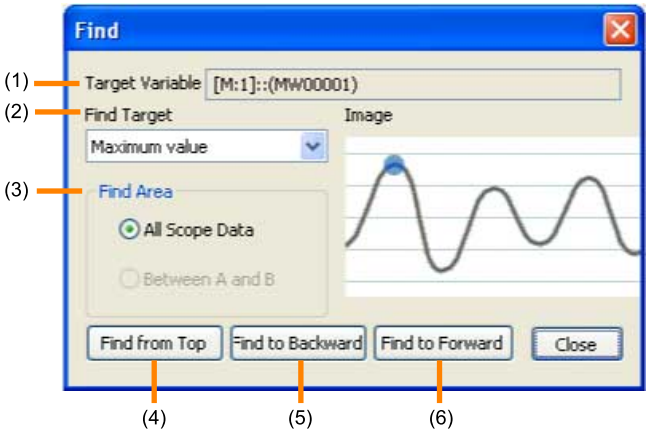
The variable will be added to the selected [Variable] field.

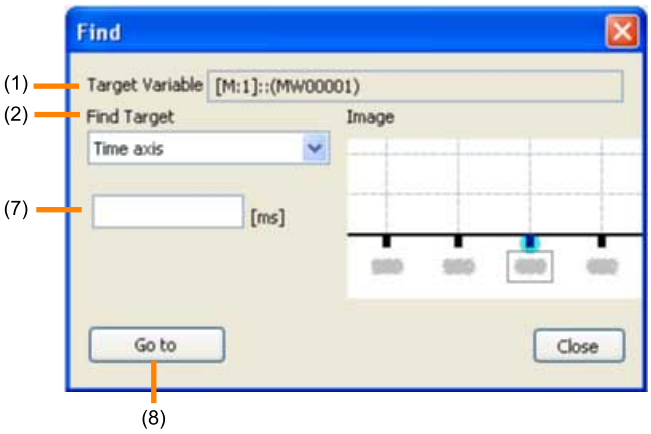
Information If you select [Difference between reference variables] or [Sum of reference variables] in the [Type] list box, you can register the difference or sum of register values.



◆ [Find] Window

Click the [Find] button with a monitor variable selected in the list to display the [Find] window. The maximum value, minimum value, local maximum value, local minimum value, and time axis of the of the selected variable can be found.

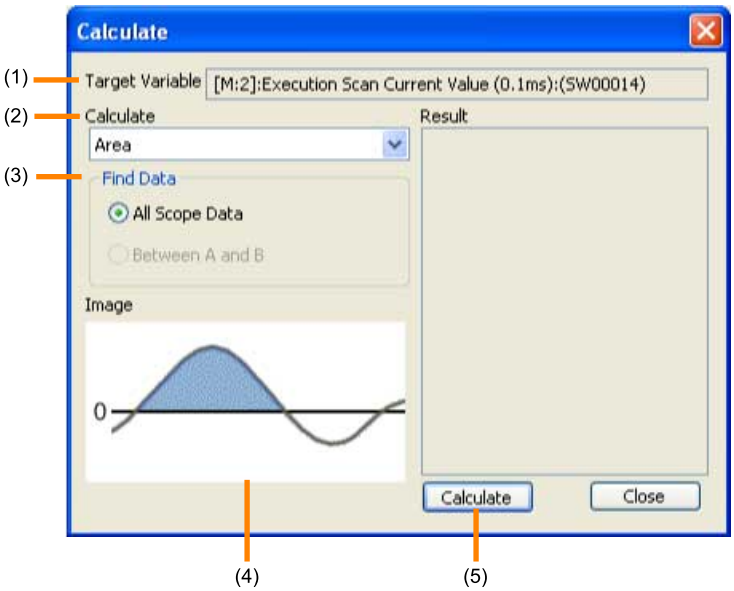




No.	Item	Description
(1)	Target Variable	The selected variable name is displayed.
(2)	Find Target	Select one of the following as the find target: “Maximum value”, “Minimum value”, “Local maximum value”, “Local minimum value”, and “Time axis”.
(3)	Find Area	Select the search range. “Between A and B” cannot be selected when cursors A and B are hidden.
(4)	Find from Top	Searches from the top of the find area.
(5)	Find to Backward	Searches backward from the current position.
(6)	Find to Forward	Searches forward from the current position.
(7)	Time Setting	Set the destination time to jump to in units of ms.
(8)	Go to	Jumps to the data for the set time (proximity).

◆ [Calculate] Window

Click [Calculate] with a monitor variable selected in the list to display the [Calculate] window. The area, average, and absolute average calculation results for the selected variable can be referenced.



No.	Item	Description
(1)	Target Variable	The selected variable name is displayed.
(2)	Calculate	Select one of the following as the calculation type: [Area], [Average], or [Absolute average].
(3)	Find Data	Select the search range. “Between A and B” cannot be selected when cursors A and B are hidden.

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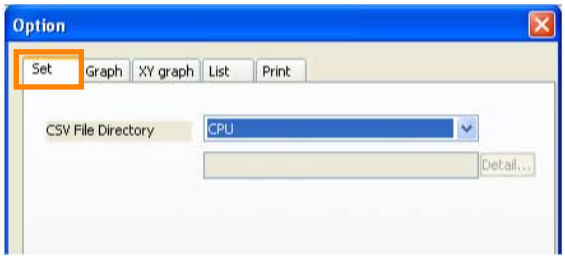
No.	Item	Description
(4)	Results Area	The calculation result is displayed.
(5)	Calculate	Executes the calculation.

(4) Optional Settings

Select [Option] from the [View] menu to display the [Option] window. There are five tab pages: [Set], [Graph], [XY graph], [List], and [Print].

(a) [Set] Tab Page

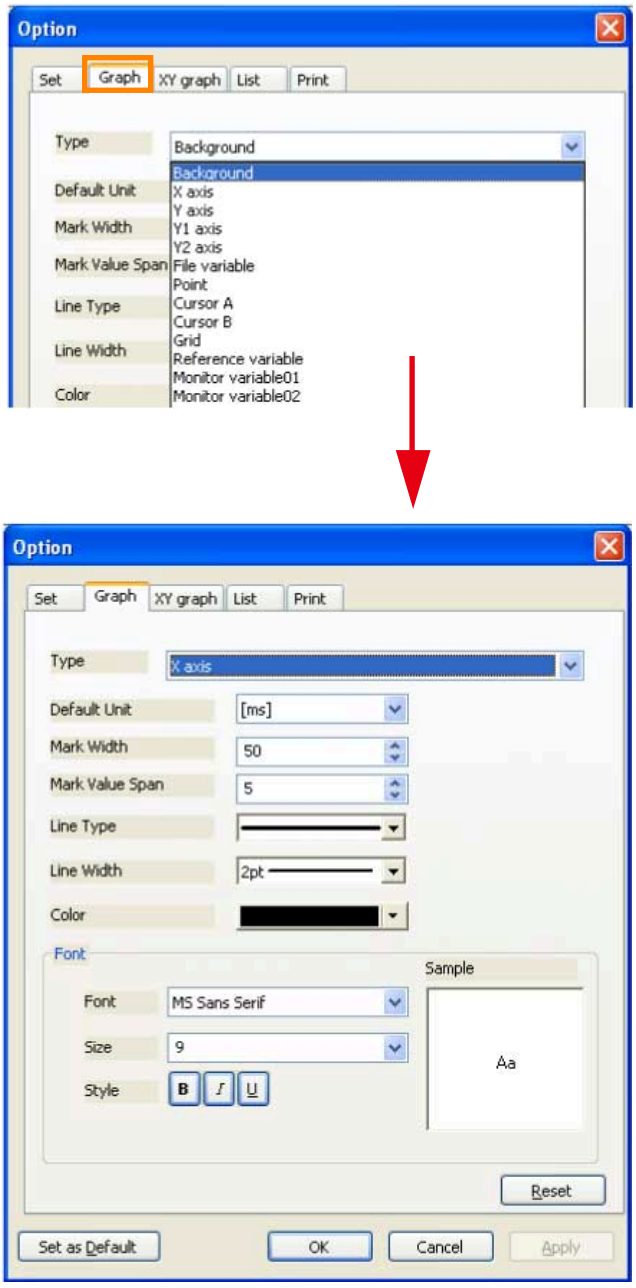
This tab page is used to set the default directory for when trace data is imported or exported.



Selection	Description
CPU	The directory to which the SigmaWin+ AE is installed is set.
User setting	Click the [Detail] button and set the directory with the [Browse Folder] window.

(b) [Graph] Tab Page

General graph settings can be made on this tab page. Select the item to be set from [Type], and then set the detailed items.



The detailed items that are displayed depend on the item that was selected for [Type].

Item	Description
Default Unit	Set the default value for the X-axis unit (No. of data, ms, sec, mm).
Mark Width	Set the size of one X-axis mark. <Example> When the default unit is ms and the mark width is 50: one mark will be 50 ms.
Mark Value Span	Set the span of values (step) displayed for marks.
Line Type	Select a line type from solid line, wavy line, broken line, etc.
Line Width	Select a line width from 1 pt. to 6 pt.
Color	Clicking this button displays the [Color] window.
Font	Select the font for characters.
Size	Select a font size from 8 to 72 points. You can also input values directly. A decimal point cannot be entered.

Continued on next page.

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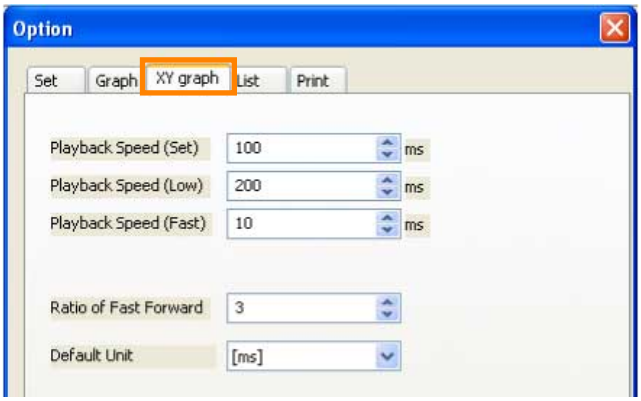
Default Unit	Set the default value for the X-axis unit (No. of data, ms, sec, mm).
Style	Set the font style as required. You can select more than one. • B: Bold • *I*: Italic • U: Underline
Sample	A sample will be displayed here when you set the font, size, and style.

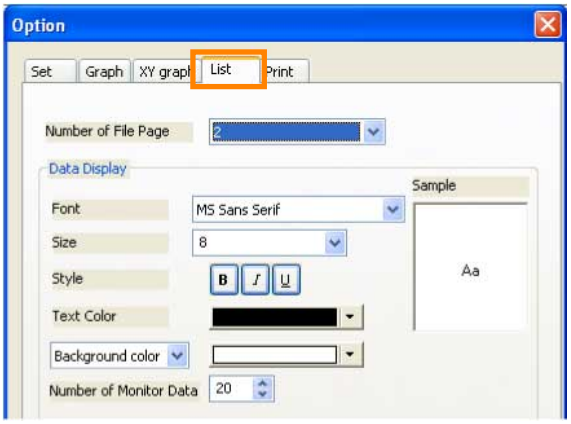
(c) [XY Graph] Tab Page

Settings related to X-Y graph playback can be made on this tab page.



(d) [List] Tab Page

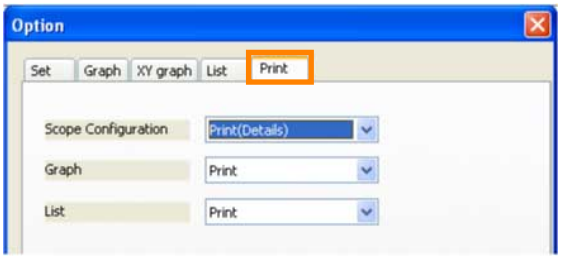
Settings related to the list area display can be made on this tab page.



Item	Description
Number of File Page	Select the default number of [File] tab page in the list area, from 1 to 8.
Monitor Data No.	Set the number of data items to be displayed in the list area while tracing is being executed. All data is displayed when stopped or when a snapshot is taken.

(e) [Print] Tab Page

Settings related to the print object can be made on this tab page.



Information

Select [Print Setting] from the [File] menu to display the [Print Object Setting] window.
The content set on the [Option] window will be applied to the display items on the [Print Object Setting] window.
<Example>
When [List] is set to [Do not print] in the [Option] window, [List] is disabled in the [Print Object Setting] window.

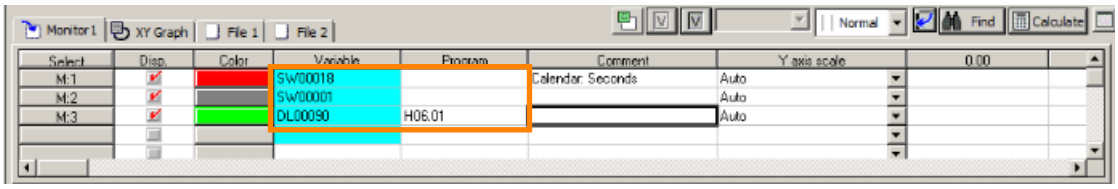
6.2.6 Overview of Trace Manager Operations

The flow for using Trace Manager is given below.

1. **Display the [Trace Manager] tab page.**
2. **Double-click the [Variable] field in the list area to display the text cursor, enter the register or variable name to monitor, and press the [Enter] key. When entering a D register, enter the name of the program to monitor in the [Program] field.**

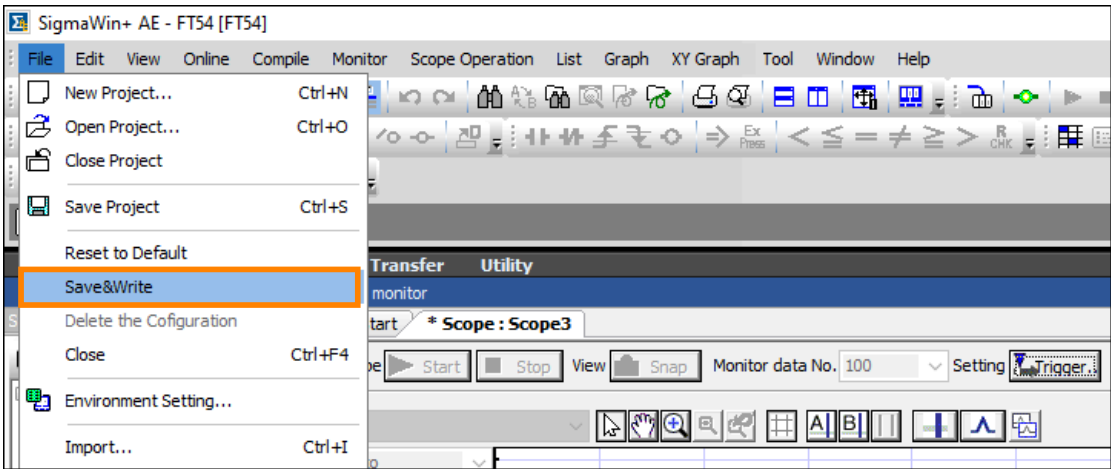
   Refer to the following section for details on the setting items displayed in the window.

   ☞ *6.2.5 [Trace Manager] Tab Page on page 258*



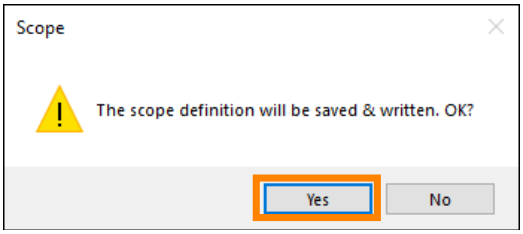
   The background of the edited fields will change to blue.

3. **Select [Save & Write] from the [File] menu.**



   A message dialog box will be displayed.

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



   This saves the setting, and the background color of the [Variable] field in the list returns to white.

5. **Click the [Start] button on the control panel.**

   A message indicating that data is being acquired will be displayed, and then a graph of the acquired data will be displayed in the graph area.

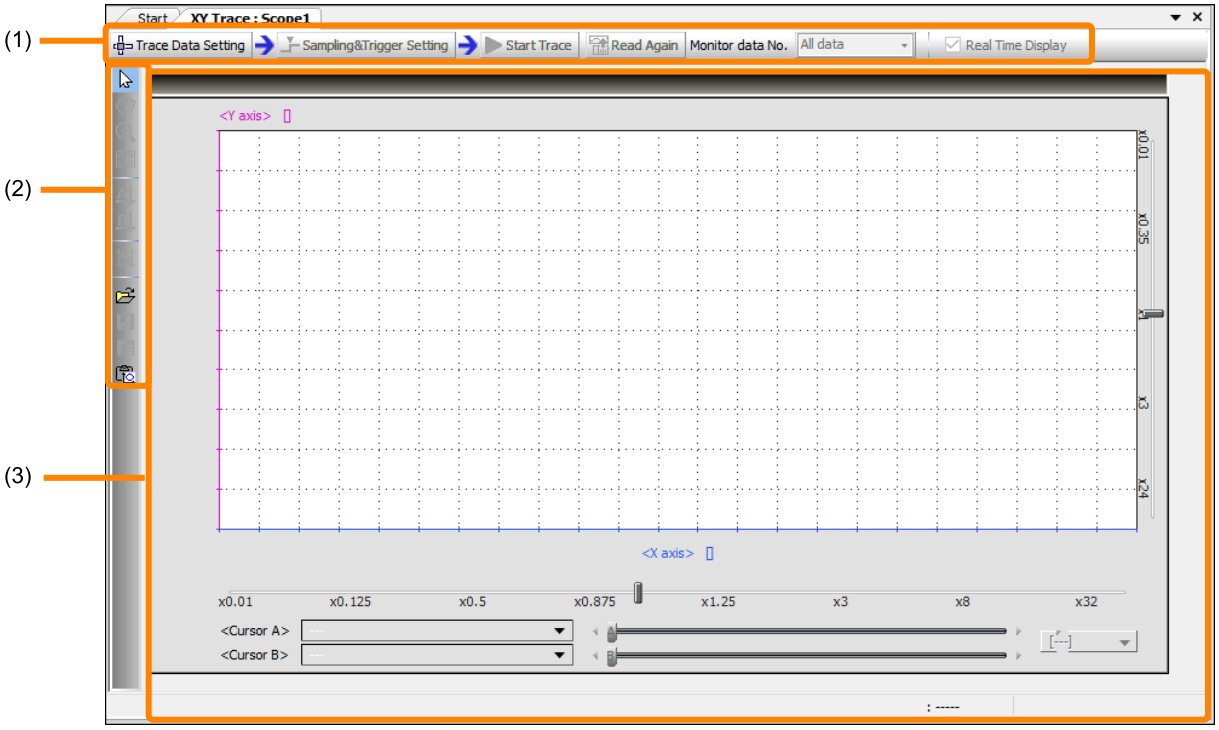
6. **Click the [Stop] button to stop tracing. Also, to upload the current information in trace memory, click the [Snap] button.**

This concludes the basic procedure.

The following table lists the other operations available in Trace Manager and the reference information.

Operation	Reference
Deleting Trace Definitions and Trace Data	☞ *6.2.11 Deleting Trace Definitions and Trace Data on page 282*
Changing the Enabled/Disabled Setting of the Trace Definition Settings	☞ *6.2.12 Changing the Enabled/Disabled Setting of the Trace Definition Settings on page 283*
Checking the Trace Status	☞ *6.2.18 Checking the Trace Status on page 292*

6.2.7 [XY Trace] Tab Page



No.	Item	Description	Reference
(1)	Trace Data Setting	Select the axis and then set the trace target.	☞ *(1) Trace Data Setting on page 276*
	Sampling and Trigger Settings	Set the trace conditions.	Settings are the same as those in Real-Time Trace. ☞ *(2) Sampling and Trigger Settings on page 249*
	Start Trace/Stop Trace	Starts and stops the trace. When the trace is started, the trace data is acquired and displayed in real time. When the trace is stopped, the buffer data of all traces is acquired and displayed.	-
	Read Again	Re-reads the trace data in the controller. By executing re-reading, the content of the trace data accumulated at that point can be checked. When re-reading is executed during execution of a trace, the real time display mode automatically turns OFF.	-
	Monitor Data No.	The number of trace data to acquire from the controller can be set. The actual number of acquired trace data is displayed at the bottom right of the graph.	-
	Real Time Display	When this check box is selected, the display shows the data moving during tracing in real time.	-
(2)	Graph Toolbar	Groups together the buttons used for analyzing trace data.	☞ *(2) Graph Toolbar on page 276*
(3)	XY Graph	The trace data is displayed. The graph toolbar, sliders and cursors can be used to analyze trace data in the XY Trace Window.	☞ *(3) XY Graph on page 277*

(1) Trace Data Setting

Select the axis and then set the trace target.

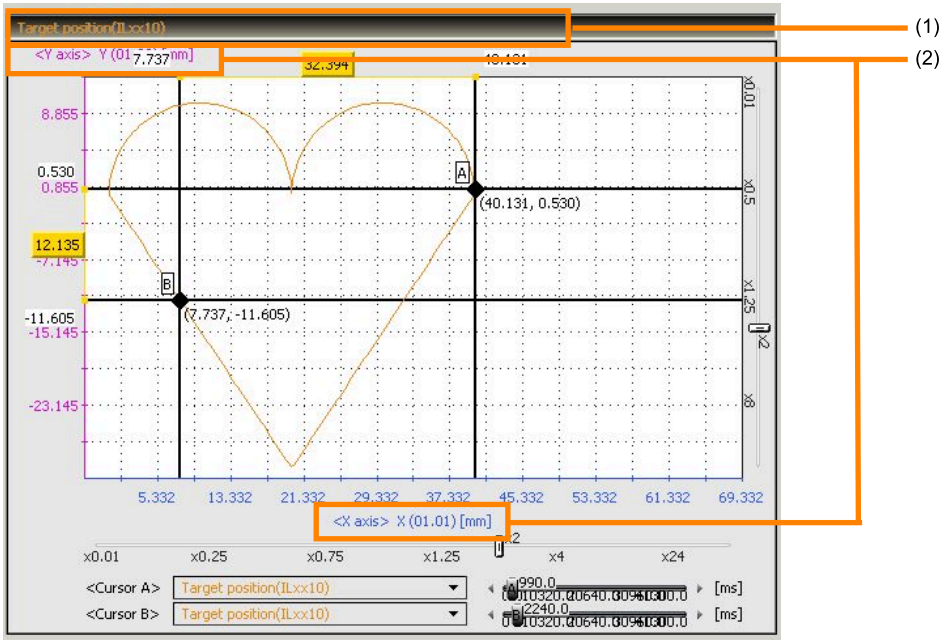
No.	Item	Description
(1)	X-Y Axis Specification	Select the X- and Y-axes.
(2)	Trace Target	Set the trace target. There are two motion parameters as follows: • IL□□10: Calculated position in machine coordinate system • IL□□16: Machine coordinate system feedback position

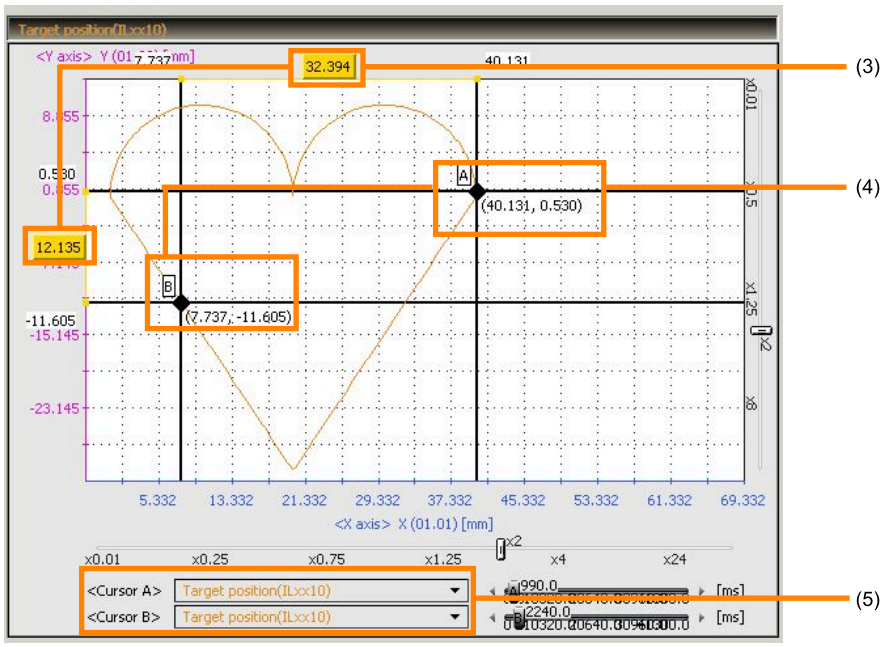
(2) Graph Toolbar

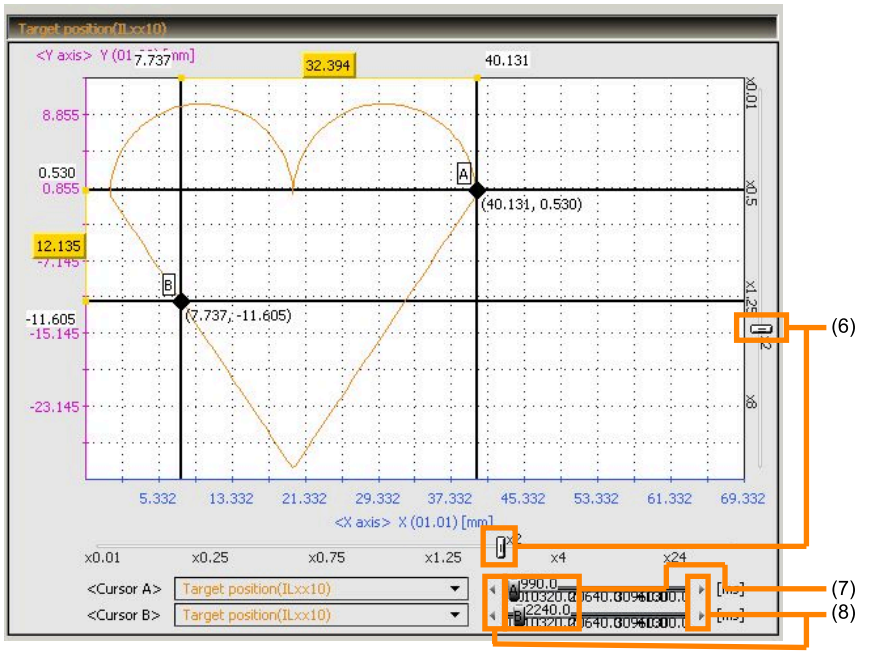
The functions of each button are as follows.

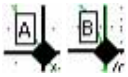
Button	Function
	Double-clicking this allows you to zoom the graph.
	Dragging this allows you to scroll the graph. Double-clicking this also allows you to zoom the graph.
	Dragging or double-clicking this allows you to zoom the graph.
	Restores an enlarged graph to its original size.
	Displays cursor A and the value at the intersecting point on the graph.
	Displays cursor B and the value at the intersecting point on the graph.
	Causes cursors A and B to move at a fixed width interlocked with each other.
	Displays the [Open] window, and the trace data can be read.
	The [Save As] window will be displayed.
	Displays the list.
	Copies an image of the graph to the clipboard.

(3) XY Graph







No.	Item	Description
(1)	Parameter Name	The parameters selected for the trace target are displayed.
(2)	X-axis, Y-axis	The X-axis, Y-axis, and unit will be displayed.
(3)	Difference	The difference in values between the A and B cursor positions is displayed.
(4)		The X and Y values at the intersecting point of cursor A and the graph, and the intersecting point of cursor B and the graph are displayed.
(5)	<Cursor A> <Cursor B>	Set the trace target. • IL□□10: Calculated position in machine coordinate system • IL□□16: Machine coordinate system feedback position
(6)		Moving the sliders horizontally and vertically allows you to rescale the graph. Scaling can be set within 0.01x to 64x.
(7)		Dragging these to the left and right moves cursors A and B.
(8)		Clicking these arrow buttons makes the sliders move along the time axis by each individual marked scan interval.

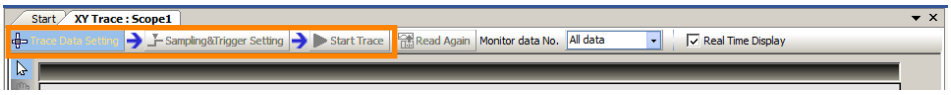
6.2.8 Overview of XY Trace Operations

The flow for using XY trace is given below.

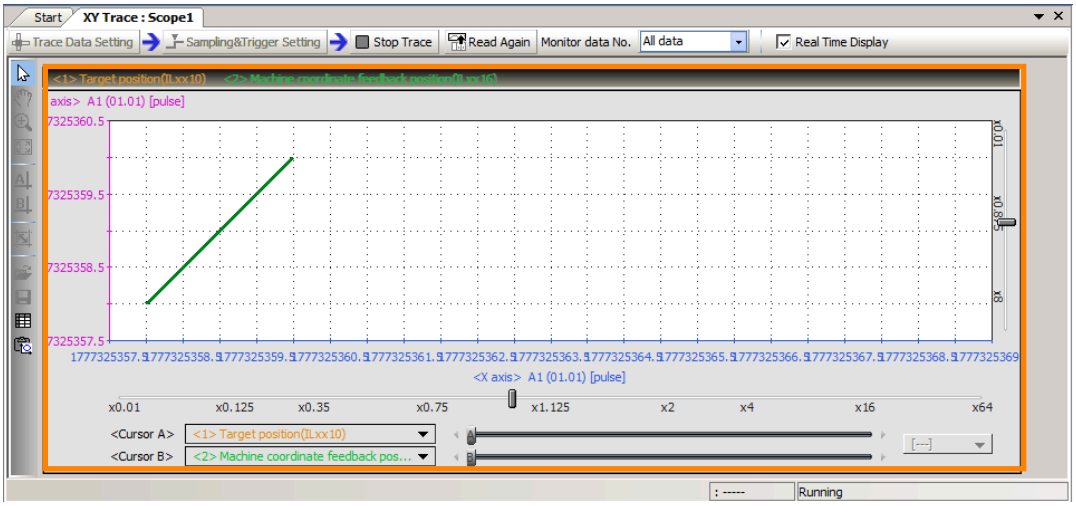
1. **Display the [XY Trace] tab page.**
2. **Set [Trace Data Setting] and [Sampling & Trigger Setting] in that order, and then click the [Start Trace] button.**

   Refer to the following section for details on the setting items displayed in the window.

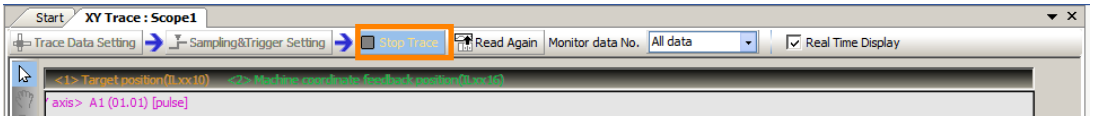
   ☞ *6.2.7 [XY Trace] Tab Page on page 275*

   The trace will start, and the graph will be displayed in real-time.

3. **To stop the trace, click the [Stop Trace] button.**

   Tracing will stop.

This concludes the basic procedure.

The following table lists the other operations available in XY Trace and the reference information.

Operation	Reference
Deleting Trace Definitions and Trace Data	☞ *6.2.11 Deleting Trace Definitions and Trace Data on page 282*
Changing the Enabled/Disabled Setting of the Trace Definition Settings	☞ *6.2.12 Changing the Enabled/Disabled Setting of the Trace Definition Settings on page 283*
Comparing Target Position and Feedback Position	☞ *(2) Comparing Target Position and Feedback Position on page 286*
Measuring the Travel Time of the Axis	☞ *6.2.16 Measuring the Travel Time of the Axis on page 289*
Replaying the Axis Path	☞ *6.2.17 Replaying the Axis Path on page 290*
Checking the Trace Status	☞ *6.2.18 Checking the Trace Status on page 292*
Saving Trace Data	☞ *6.2.19 Saving Trace Data on page 292*
Reading Trace Data	☞ *6.2.20 Reading Trace Data on page 294*

Continued on next page.

Continued from previous page.

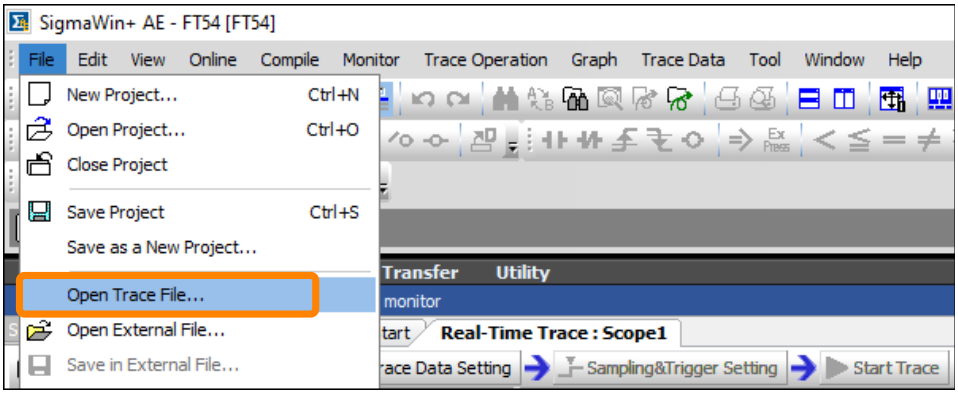
Operation	Reference
Switching Between Graph View and List View	☞ *6.2.21 Switching Between Graph View and List View on page 295*
Copying an Image of the Graph	☞ *6.2.22 Copying an Image of the Graph on page 296*

6.2.9 Reading Trace Definition Files

This operation is possible only with Real-Time Trace.

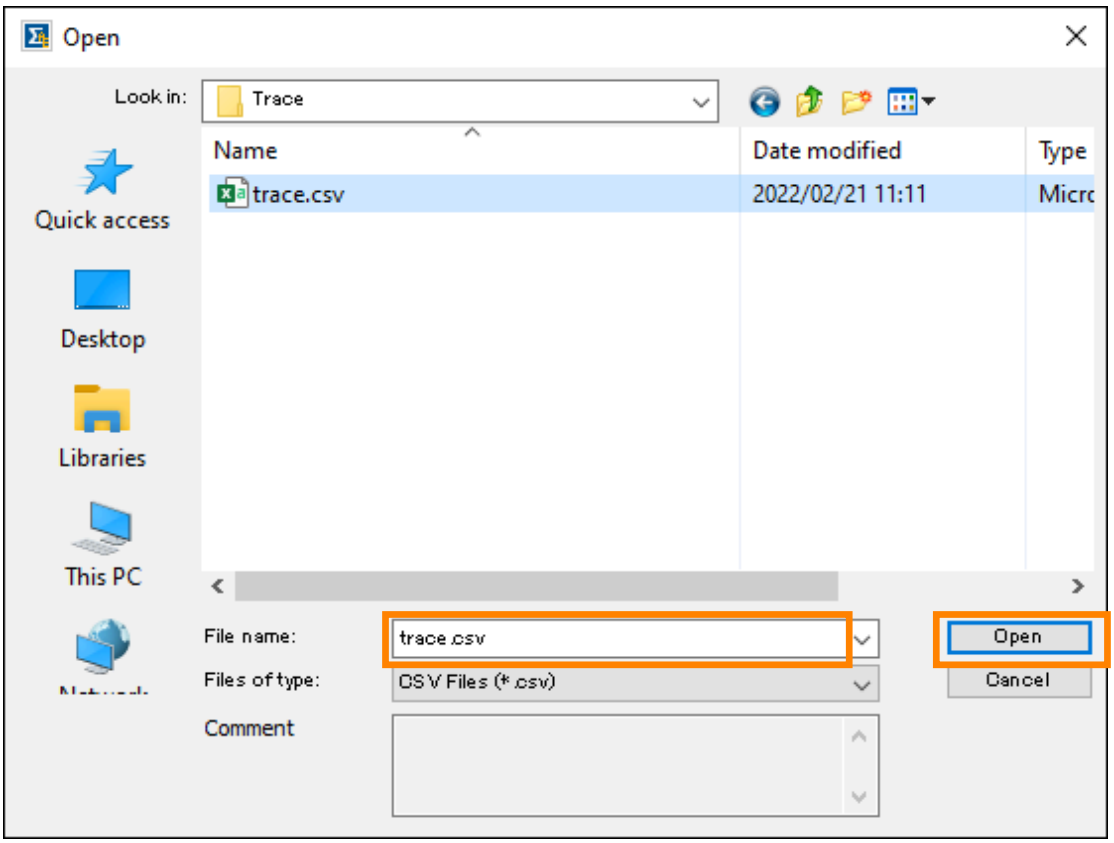
By reading a file that was saved in the past, existing trace definitions (trace settings and sampling & trigger settings) can be easily reused. Use the following procedure.

1. **Select [Open Trace File] from the [File] menu.**



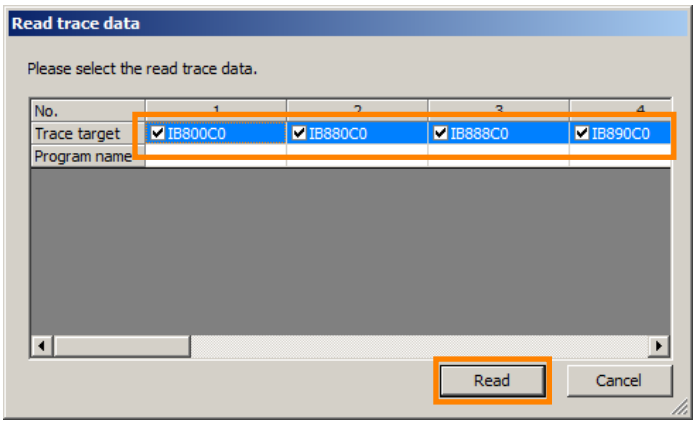
The [Open] window will be displayed.

2. **Select the file containing the trace definitions you want to reuse, and click the [Open] button.**



The [Read trace data] window will be displayed.

3. **Select the check box of trace settings you want to read and click the [Read] button.**



This reads the sampling & trigger settings and trace settings that you selected.

This concludes the procedure.

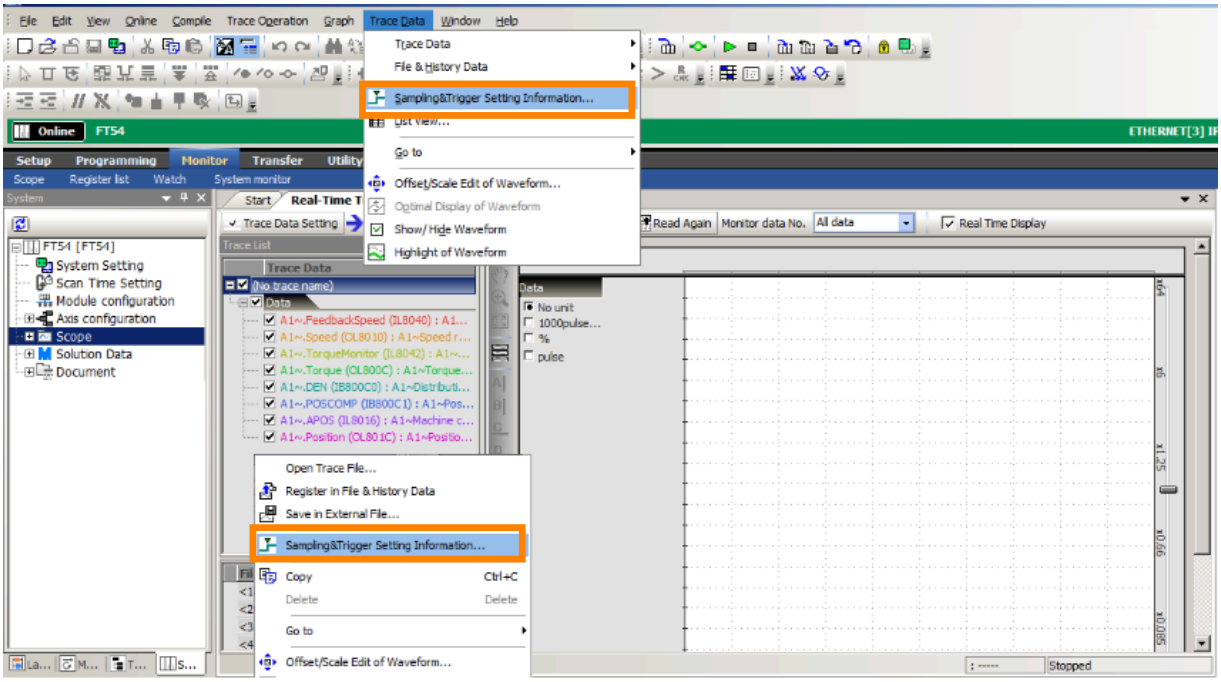
6.2.10 Checking Sampling and Trigger Settings

This operation is possible only with Real-Time Trace.

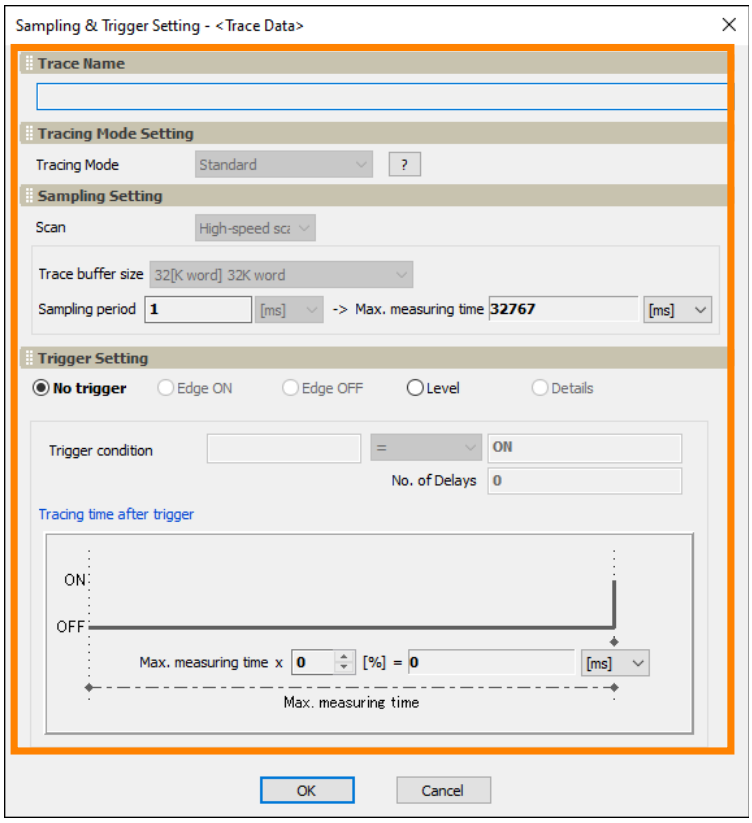
You can check the sampling and trigger settings for a trace when you read an existing trace definition file and in other situations. Use the following procedure.

Use one of the following methods to display the [Sampling & Trigger Setting] window.

- Select [Sampling & Trigger Setting Information] from the [Trace Data] menu.
- Right-click on the [Trace List] window, and select [Sampling & Trigger Setting Information] from the displayed menu.



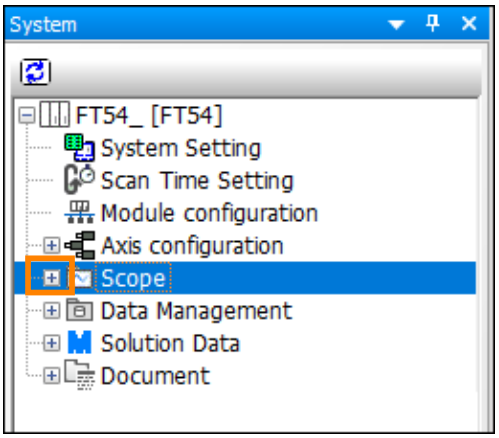
The [Sampling & Trigger Setting] window will be displayed. Check the settings in the window.



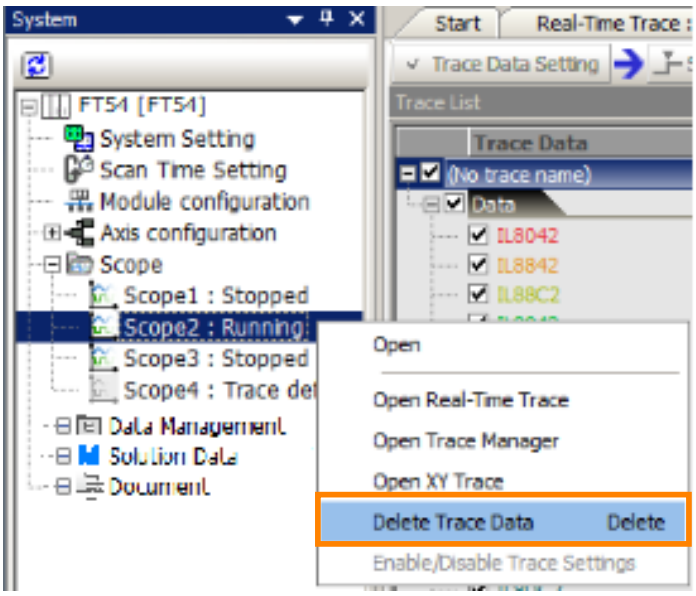
6.2.11 Deleting Trace Definitions and Trace Data

Use the following procedure to delete trace definitions and trace data acquired by the SERVOPACK.

1. **Expand the [Scope] tree in the [System] window.**

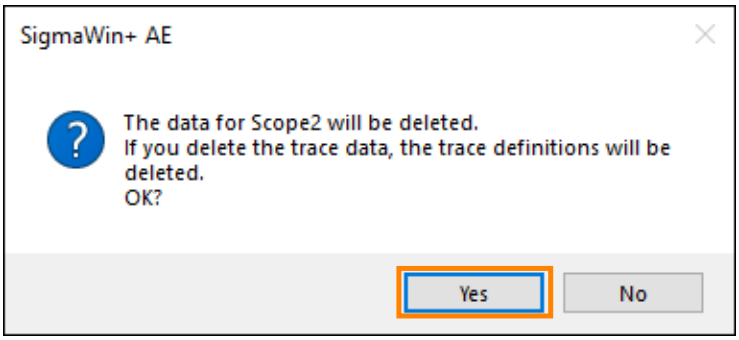


2. **Right-click on the trace group you want to delete, and select [Delete Trace Data].**



A message dialog box will be displayed.

3. **Read the message, and then click the [Yes] button.**



This concludes the procedure.

6.2.12 Changing the Enabled/Disabled Setting of the Trace Definition Settings

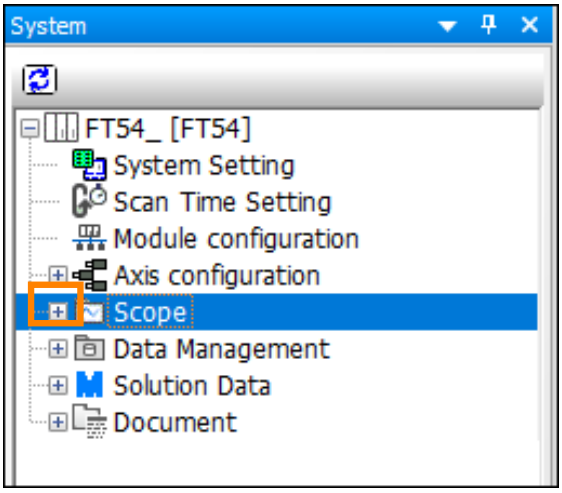
The trace definition settings can be switched between enabled and disabled.

Examples of use of this function are shown below.

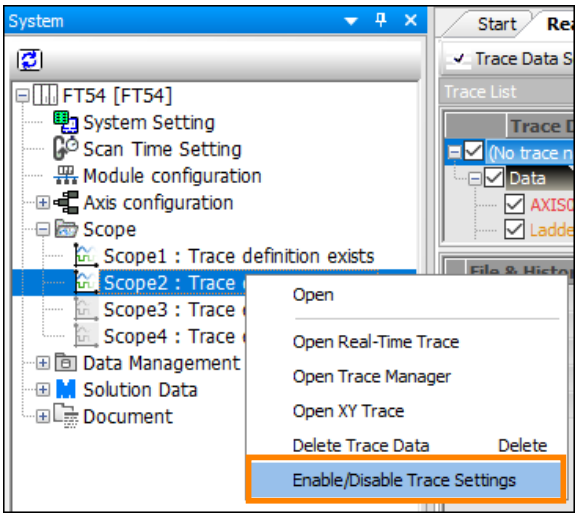
Tracing is no longer possible when the trace buffer size set to Scope 1 to Scope 4 exceeds the maximum applicable trace buffer size. Without this function, some trace groups must be deleted to reduce the total trace buffer size. When a trace group is deleted, trace definitions must be set again. However, if trace definitions are disabled, the total trace buffer size will be reduced temporarily and tracing can be performed without deleting a trace group.

Use the following procedure.

1. **Expand the [Scope] tree in the [System] window.**

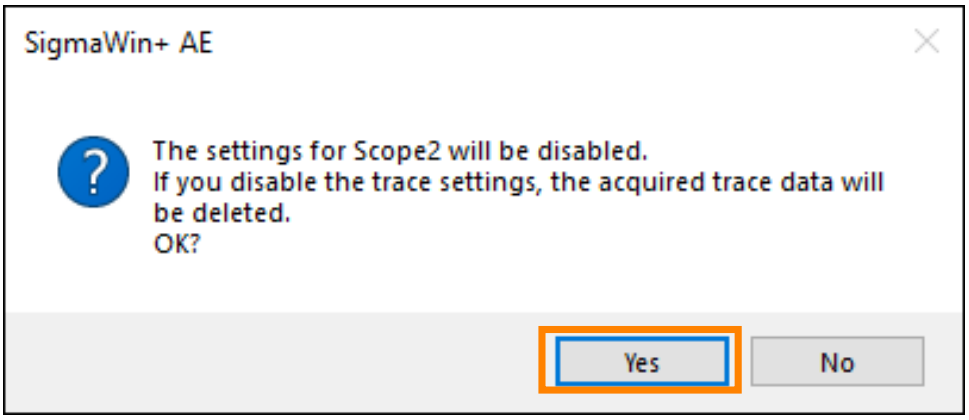


2. **Right-click on the trace group whose settings you want to change, and select [Enable/Disable Trace Settings].**



A message dialog box will be displayed.

3. **Read the message, and then click the [Yes] button.**



This concludes the procedure.

6.2.13 Scaling the Trace Data Waveform

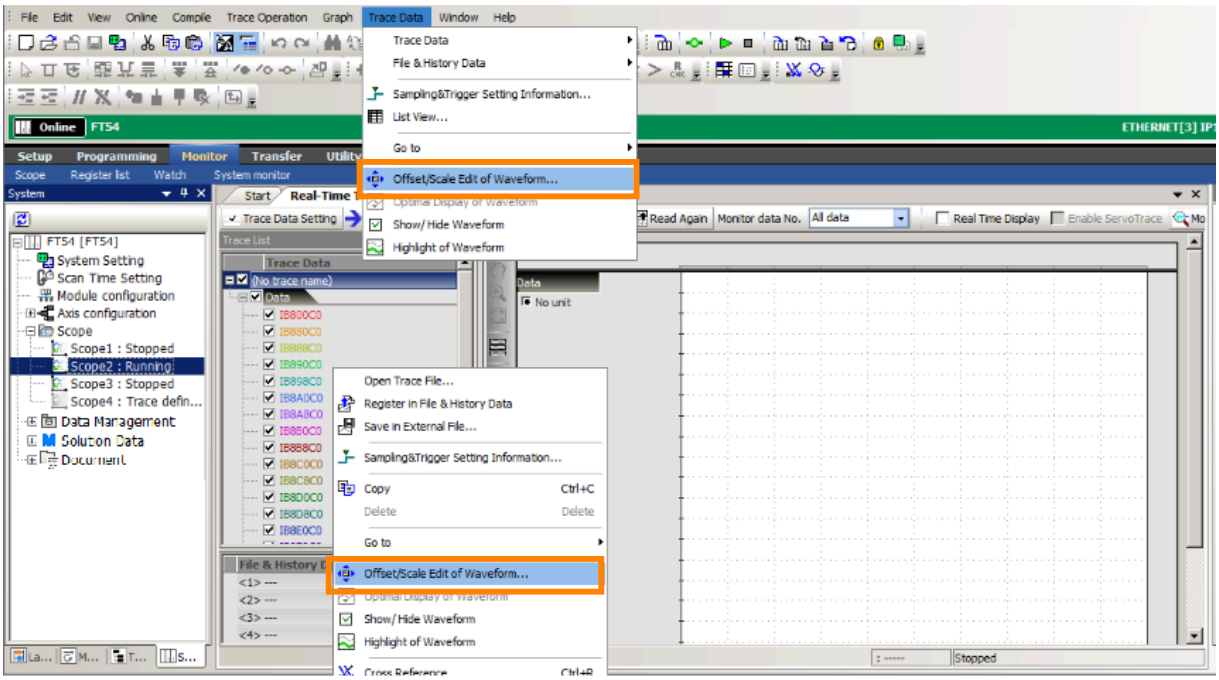
This operation is possible only with Real-Time Trace.

You can scale the waveform of the trace data and move the position of the waveform. By editing the size and position of the waveform, you can compare the waveform with other waveforms to analyze it.

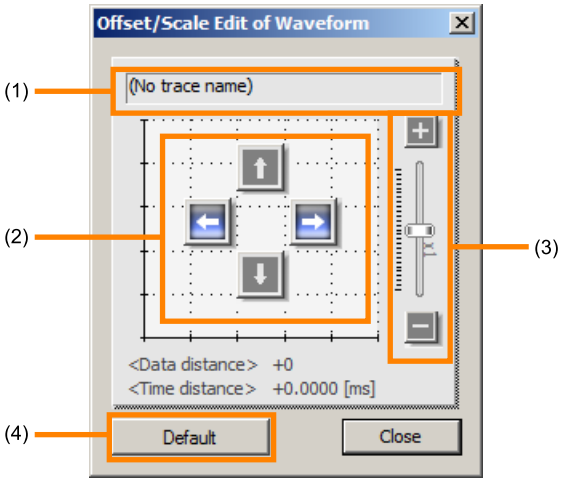
Edit trace data in the [Offset/Scale Edit of Waveform] window. Use one of the following methods to display the [Offset/Scale Edit of Waveform] window.

- Select [Offset/Scale Edit of Waveform] Enable [Trace Data] menu.
- Right-click a register on the [Trace List] window, and select [Offset/Scale Edit of Waveform] from the displayed menu.

Information
- When monitor data is updated, changes will be reset.
- When a trace group name is selected, all of the waveforms in the group can be edited collectively.



The [Offset/Scale Edit of Waveform] window will be displayed.



No.	Display	Function
(1)	Trace Name	The trace name and file name are displayed.
(2)	Offset Move Buttons	Moves the waveform of the specified trace target register up, down, left, and right.
(3)	Scale Adjustment Slider	Scales the data amplitude of the specified trace target register.
(4)	[Default] Button	Restores the edited settings to the default settings.

6.2.14 Analyzing Differences Between Target Values and Actual Values

You can analyze the trace data by using the [Offset/Scale Edit of Waveform] window and toolbar buttons.

(1) Comparing I/O Registers and M Registers

This operation is possible only with Real-Time Trace.

1. **Display the trace data to analyze on the graph.**
2. **Select [Offset/Scale Edit of Waveform] from the [Trace Data] menu bar. Or, right-click on [File & History Data] on the [Trace List] window, and select [Offset/Scale Edit of Waveform] from the displayed menu.**
3. **Using the arrow keys in the [Offset/Scale Edit of Waveform] window, move the waveform to the location you want to compare.**
4. **Click cursors A and B or cursors C and D in the graph toolbar to display the cursor, and align the cursor with the register to analyze.**

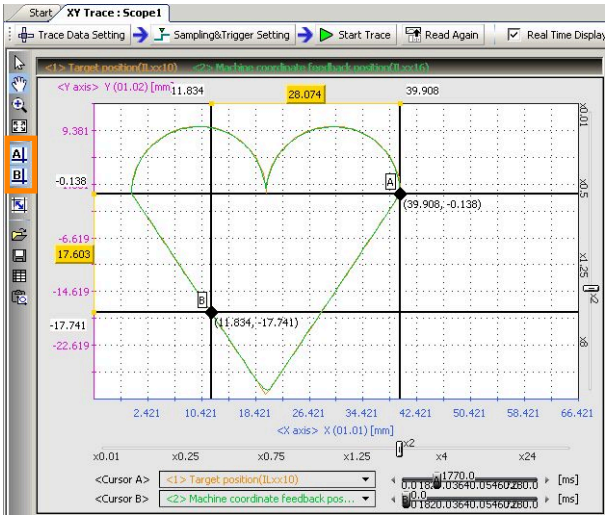
5. **Analyze the difference between the waveform of the preset register and the waveform of the actually output register.**

This concludes the procedure.

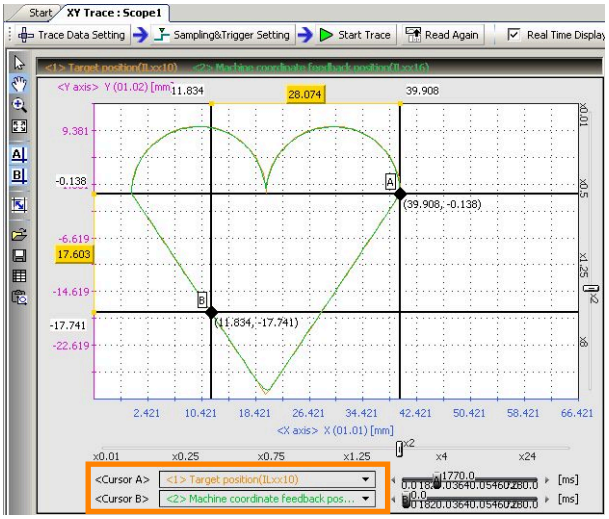
(2) Comparing Target Position and Feedback Position

This operation is possible only with XY Trace.

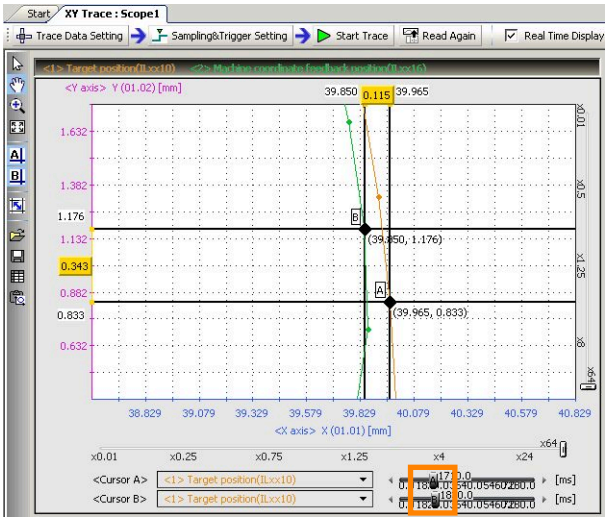
1. **Click cursors A and B in the graph toolbar to display the cursor.**



2. **Select the target position and feedback position for [Cursor A] and [Cursor B].**

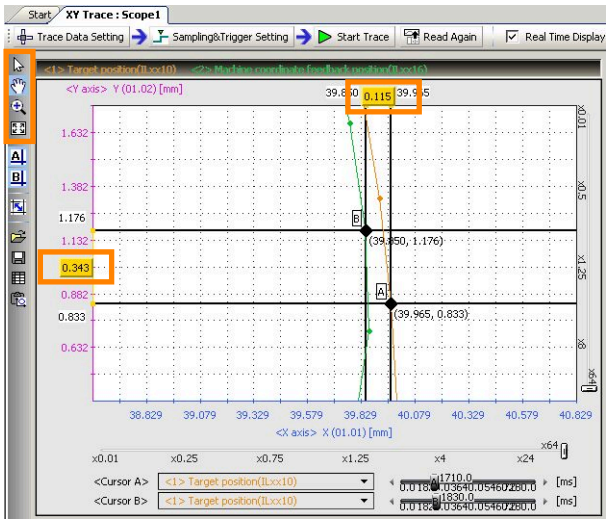


3. **Align the sliders with the time to analyze.**



4. **Compare the difference value between the target position and feedback position.**

Information The target location can be scaled by using the graph toolbar.



This concludes the procedure.

6.2.15 Comparing with Past Acquired Data

Compare trace data read from the SERVOPACK with trace data acquired in the past.

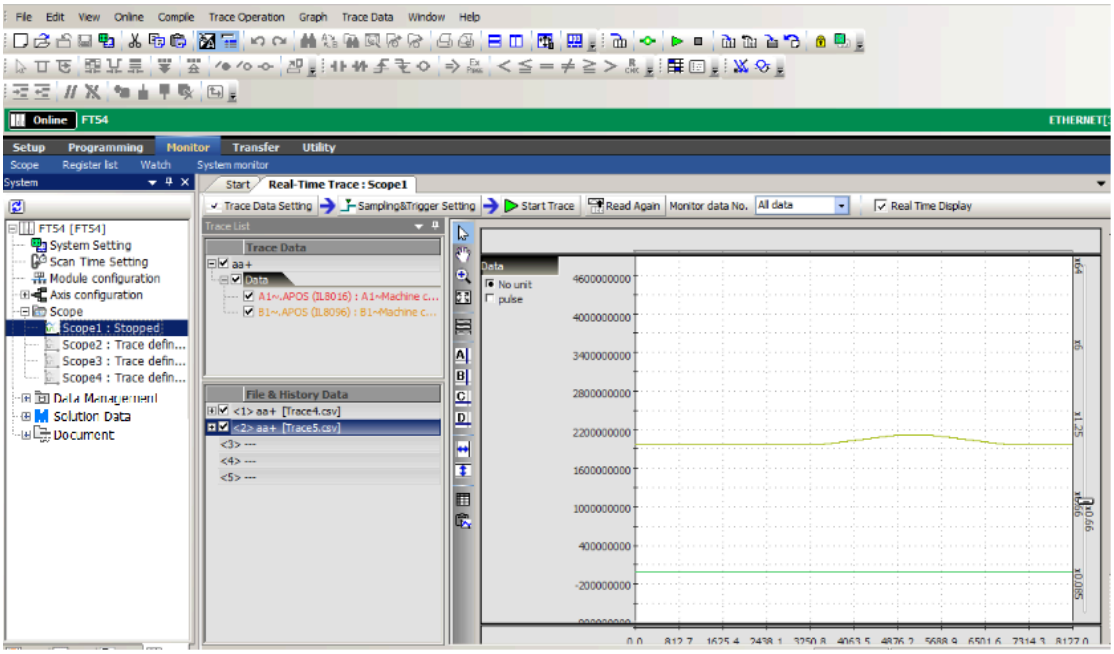
This operation is possible only with Real-Time Trace.

1. **Read trace data acquired in the past.**

   Refer to the following section for operating details.

   ☞ *6.2.20 Reading Trace Data on page 294*

   A waveform of the trace data will be displayed.



2. **Using the arrow keys in the window, move the data start position to the desired location.**

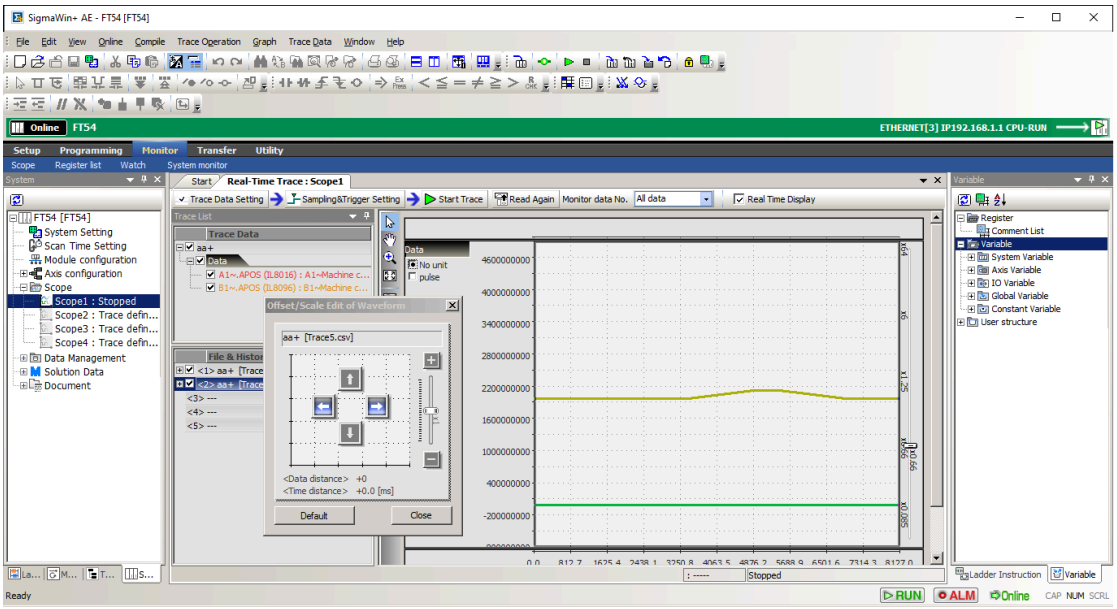
3. **Select [Offset/Scale Edit of Waveform] from the [Trace Data] menu. Or, right-click on [File & History Data] on the [Trace List] window, and select [Offset/Scale Edit of Waveform] from the displayed menu.**

   The [Offset/Scale Edit of Waveform] window will be displayed.

4. **Use the [Offset/Scale Edit of Waveform] window to compare the data with the previous trace data.**

   Refer to the following section for details on the [Offset/Scale Edit of Waveform] window.

   ☞ *6.2.13 Scaling the Trace Data Waveform on page 284*

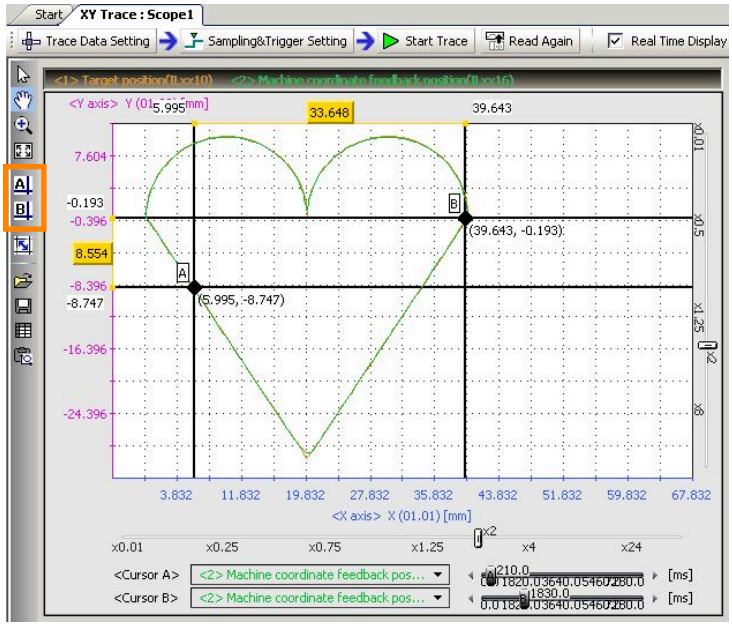


This concludes the procedure.

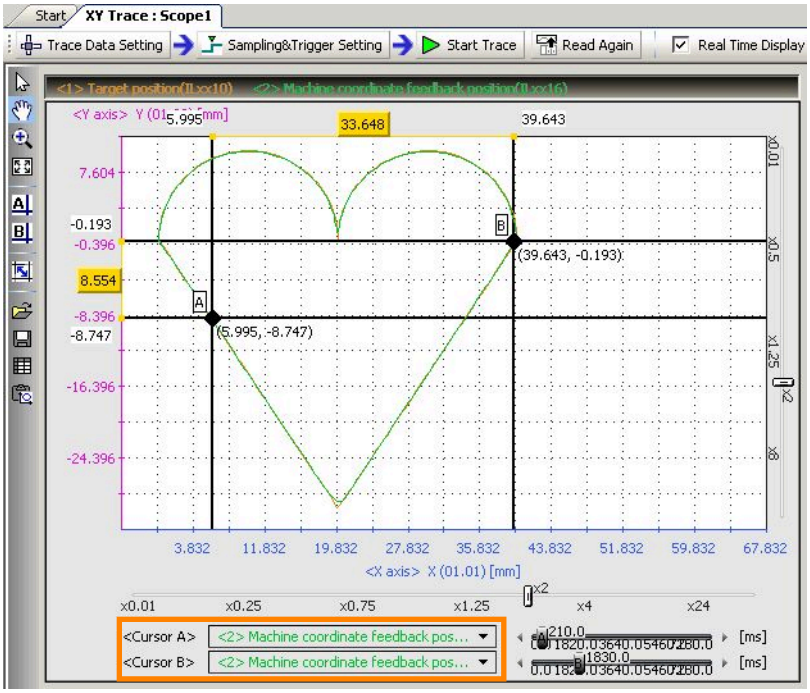
6.2.16 Measuring the Travel Time of the Axis

This operation is possible only with XY Trace.

1. **Click cursors A and B in the graph toolbar to display the cursor.**



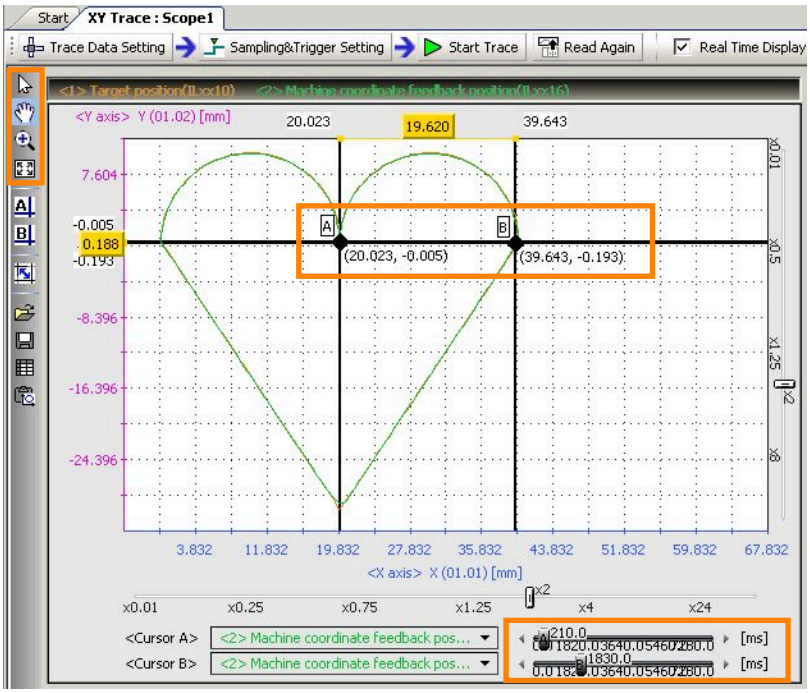
2. **Set [Cursor A] and [Cursor B] to the same data.**



3. **Select the two points to measure.**

4. **Measure the time difference between the two points using the sliders.**

Information The target location can be scaled by using the graph toolbar.



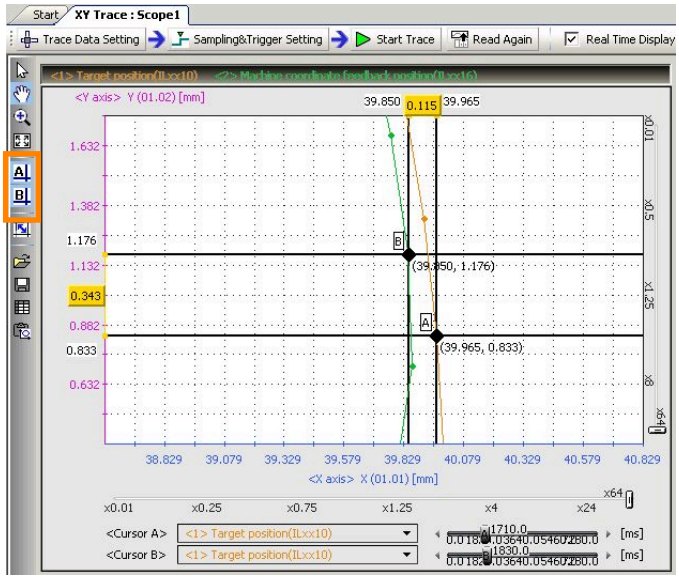
This concludes the procedure.

6.2.17 Replaying the Axis Path

This operation is possible only with XY Trace.

Use the following procedure to replay the axis path.

1. **Click cursors A and B in the graph toolbar to display the cursor.**



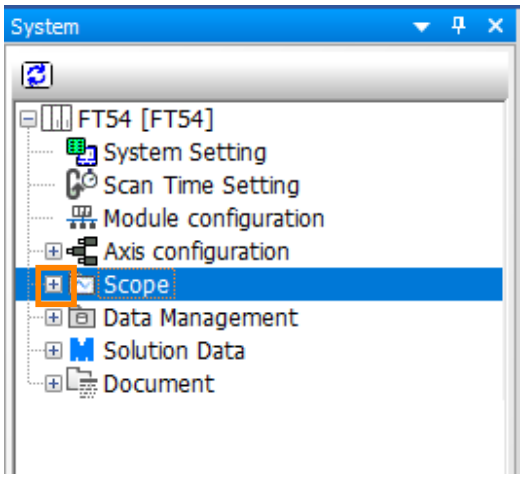
2. **Select [Cursor A] and [Cursor B].**

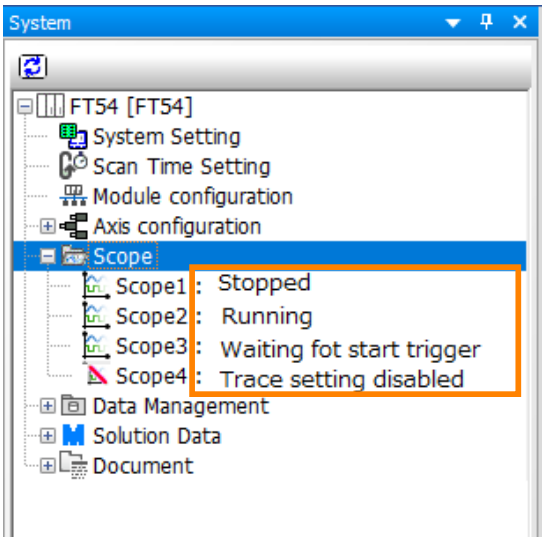
3. **Move the sliders and analyze the axis path.**

This concludes the procedure.

6.2.18 Checking the Trace Status

The trace status can be checked when the [Scope] tree is expanded in the [System] window.





The details of the trace status display are as follows.

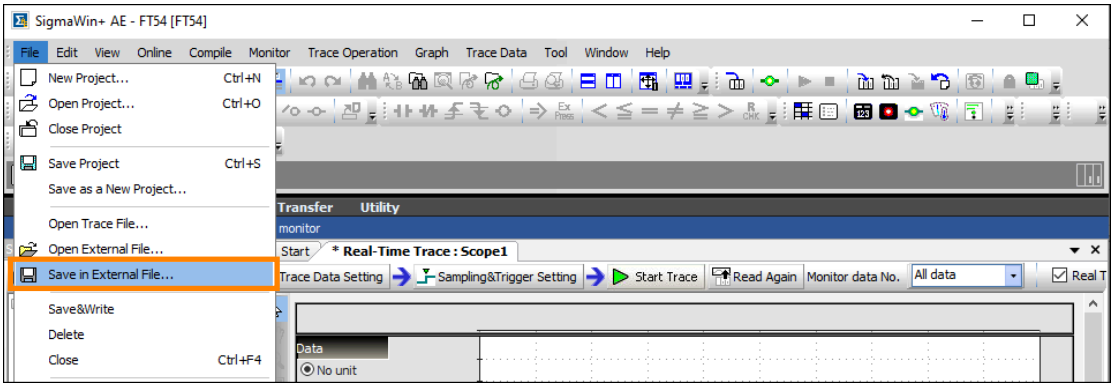
Connection Status	Status	Description
Online	Running	State while trace data is being acquired
	Waiting for start trigger	State when waiting for start trigger
	Stopped	State while trace is stopped
	Trace definition does not exist	State when trace definition is not set
	Trace settings disabled	State when trace definition setting is disabled
	Unconfirmed trace definition exists	State when trace definition during editing is present
Offline	Trace definition exists	State when trace definition is set
	Trace definition does not exist	State when trace definition is not set
	Trace settings disabled	State when trace definition setting is disabled

6.2.19 Saving Trace Data

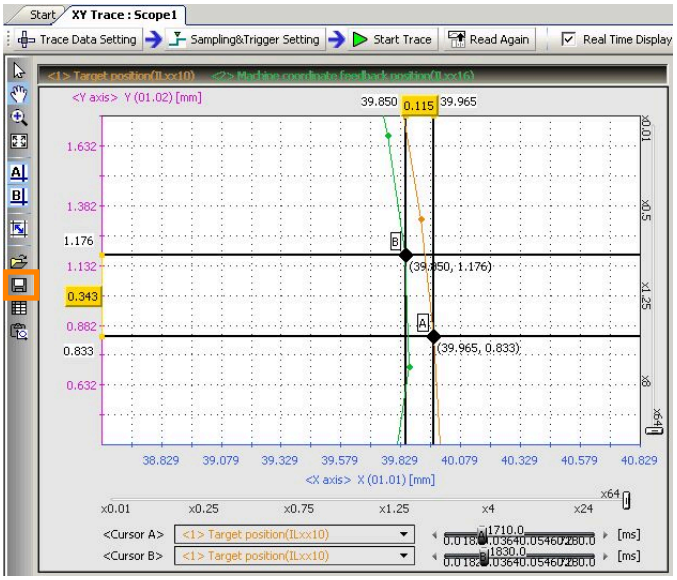
This operation is possible only with Real-Time Trace and XY Trace.

Use the following procedure to save trace data.

1. **With the trace data to save already displayed, select [Save in External File] from the [File] menu.**

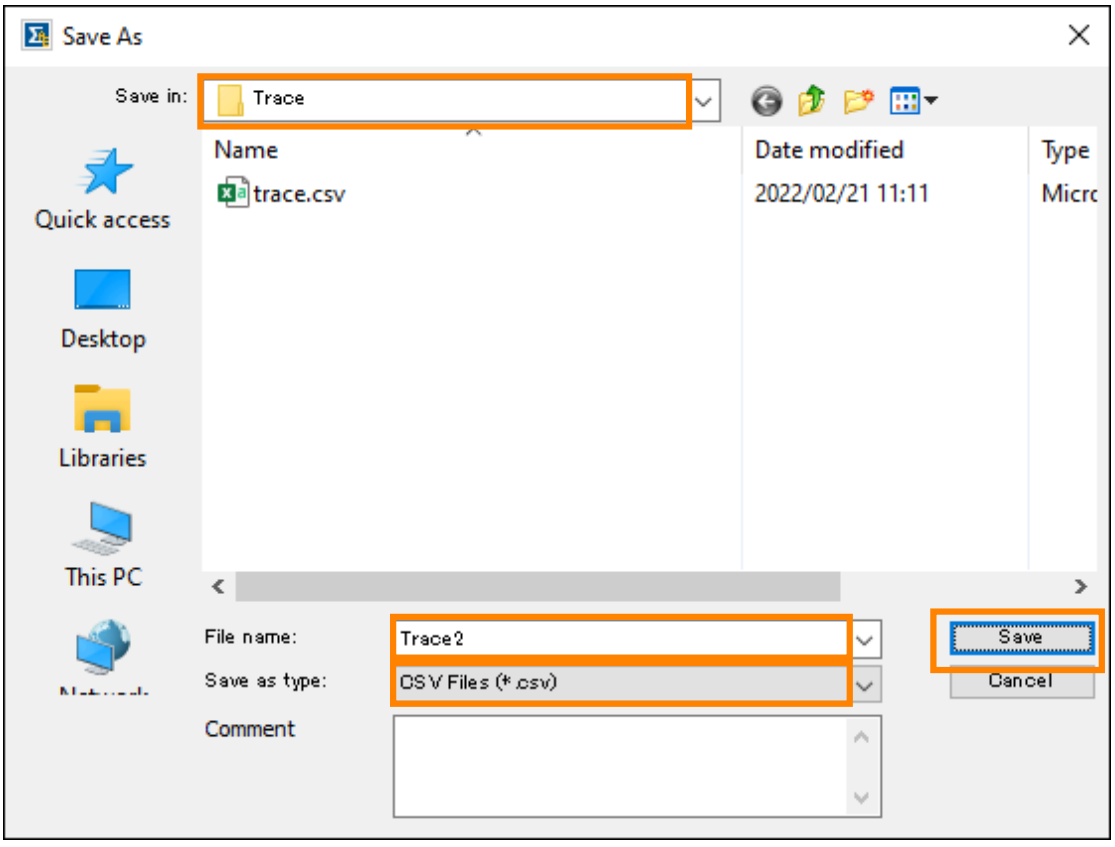


Information With XY Trace, save operations are also possible using the [Save in External File] button on the toolbar.

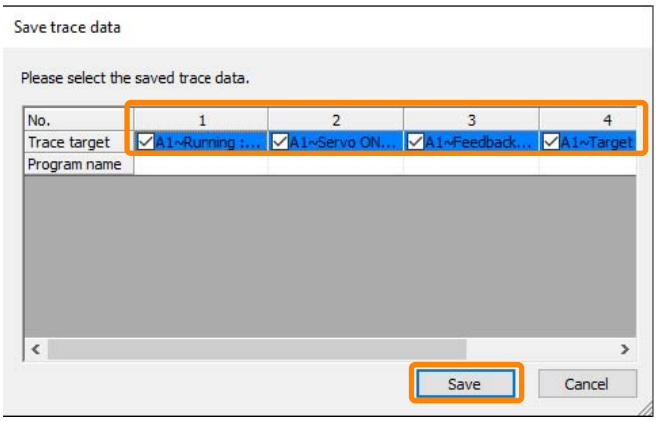


The [Save As] window will be displayed.

2. **Set [Save in], [File name], and [Save as type], and then click the [Save] button.**



3. **Select the ladder programs to save, and click the [Save] button.**



The selected trace data will be saved with the content set in step 2.

This concludes the procedure.

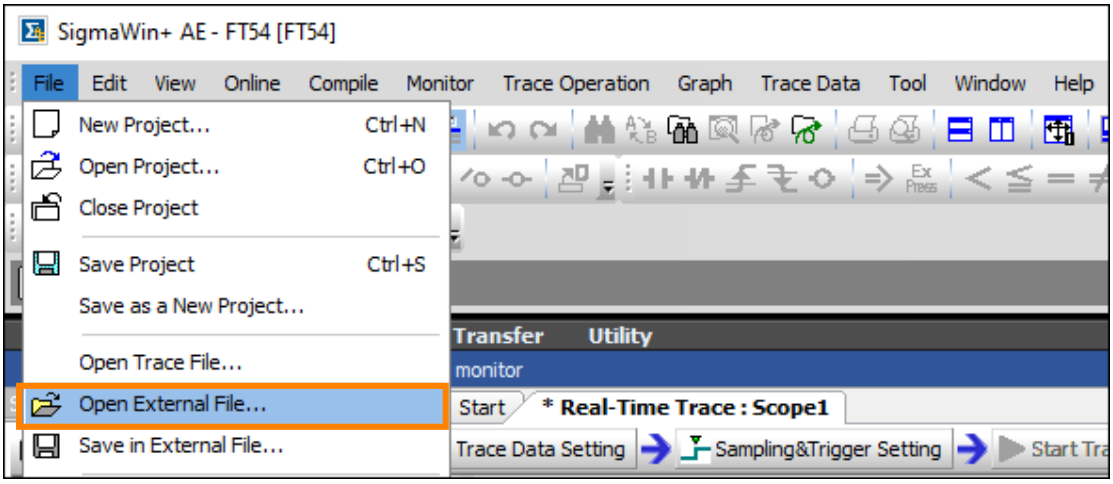
6.2.20 Reading Trace Data

This operation is possible only with Real-Time Trace and XY Trace.

Use the following procedure to read trace data that was saved.

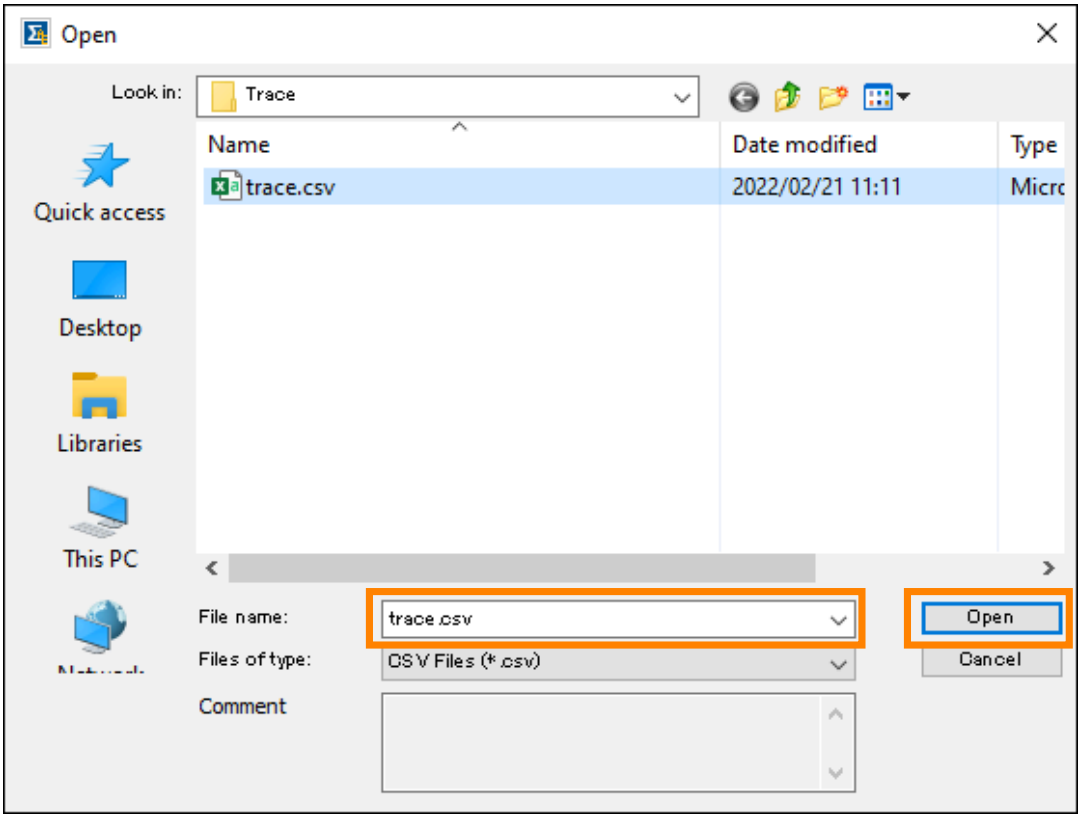
1. **Select [Open External File] from the [File] menu.**

Information When trace data has already been read, that trace data will be read when the trace definition check box at [File & History Data] on the [Trace List] window is selected.

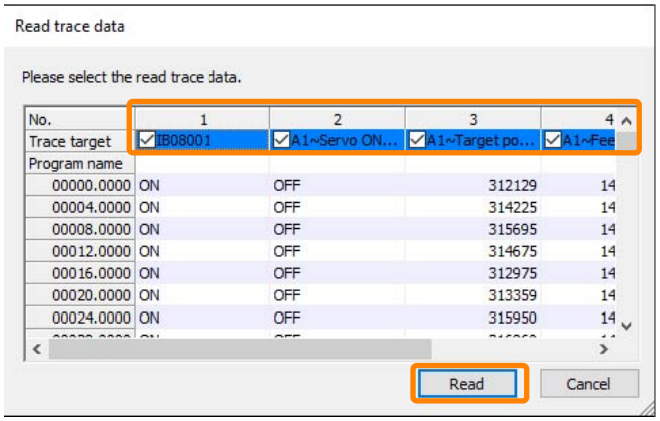


The [Open] window will be displayed.

2. **Click the trace data file to read, and click the [Open] button.**



3. **Select the check box of trace data you want to read and click the [Read] button.**



The selected trace data will be read.

This concludes the procedure.

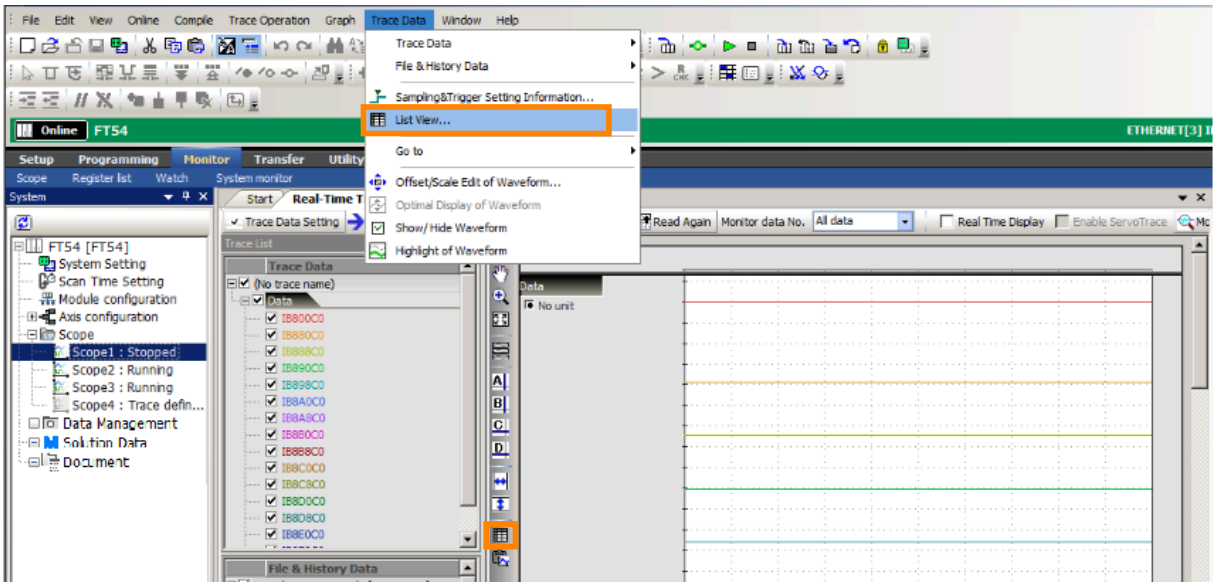
6.2.21 Switching Between Graph View and List View

This operation is possible only with Real-Time Trace and XY Trace.

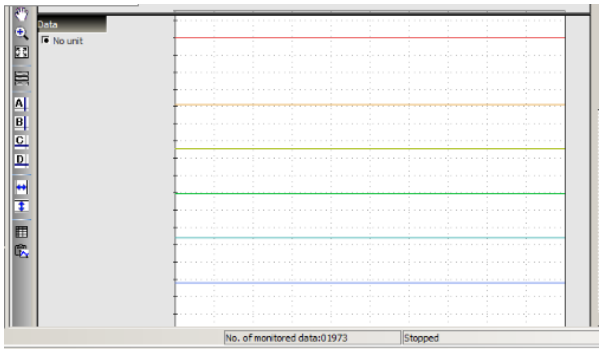
The monitor and history data currently displayed as a graph can be displayed in list format.

Select [List View] from the [Trace Data] menu or select the [List View] button to switch between the graph view and list view. You can also switch the view during tracing.

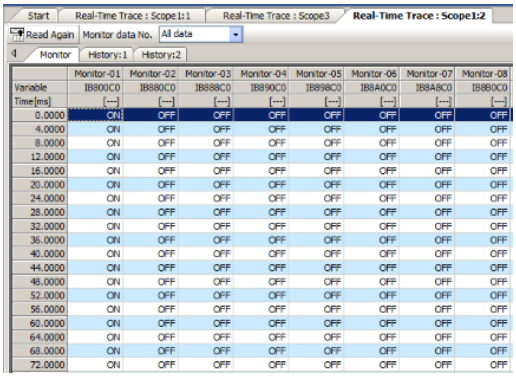
Information The trace data displayed in the list can be pasted to an Excel file.



<Graph View>



<List View>

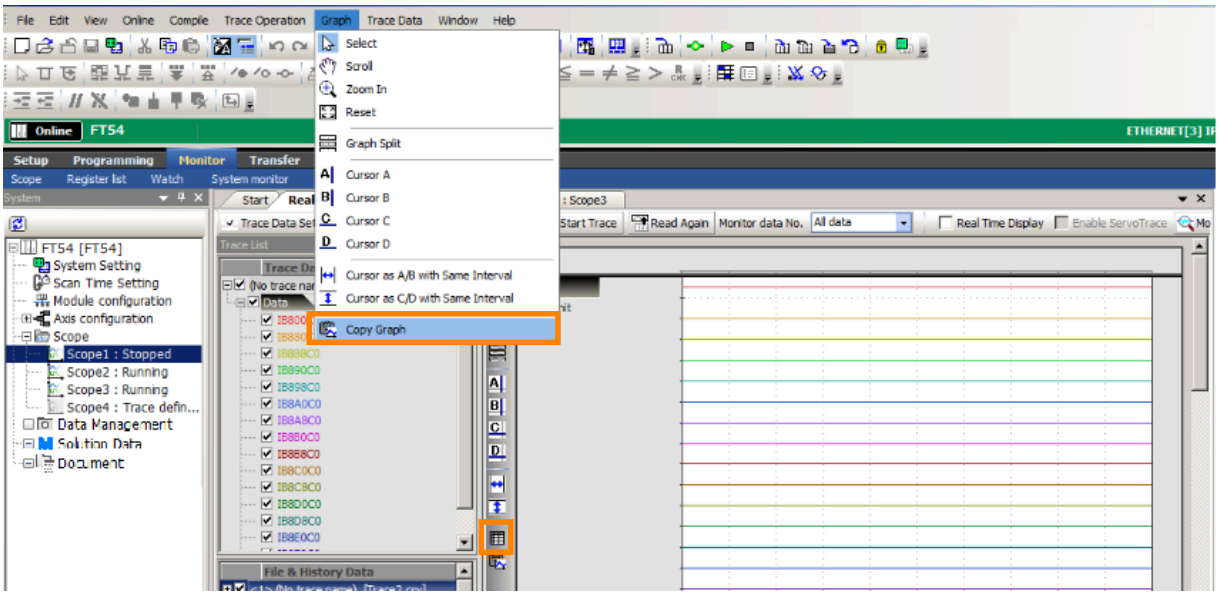


6.2.22 Copying an Image of the Graph

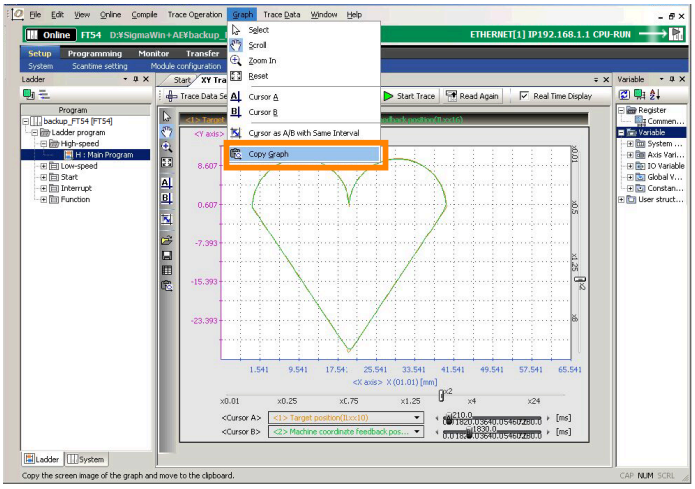
This operation is possible only with Real-Time Trace and XY Trace.

Select [Copy Graph] from the [Graph] menu or click the [Copy Graph] button on the toolbar to copy the graph image to the clipboard.

<Real-Time Trace>



<XY Trace>


Copy Graph
Start
XY Trace : Scope1
Trace Data Setting
Sampling&Trigger Setting
Start Trace
<Y axis> Y (01.02) [mm]
8.607
0.607
-7.393
-15.393
-23.393
1.541
9.541
17.541
25.541
33.541
41.541

7

Security

This chapter describes the security functions available in the SigmaWin+ AE for users, SERVOPACK, projects, and programs.

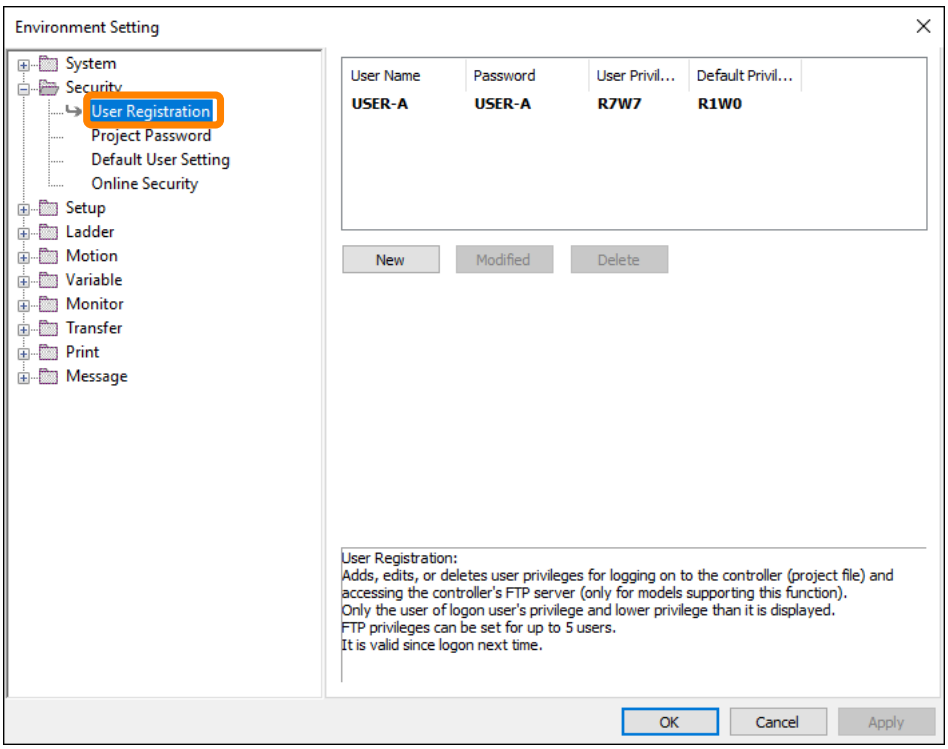
7.1 User Management

You can register and modify the users that can open project files.

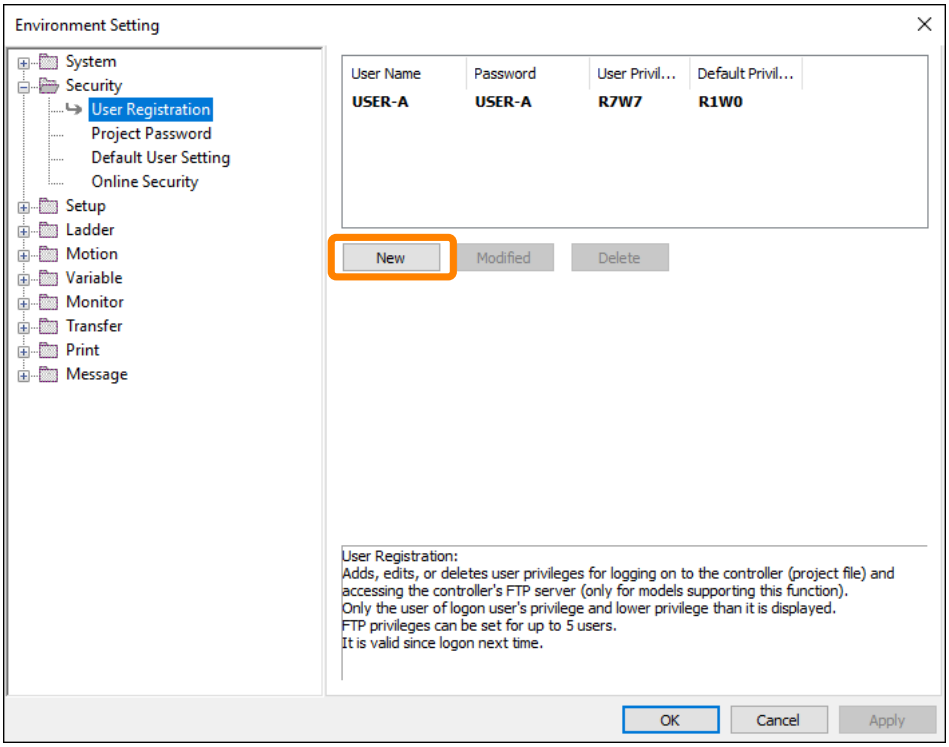
This function can be set only when a project file is open or a SERVOPACK is connected. Access and write privileges to the data in the SERVOPACK's RAM are set when using a direct connection to the SERVOPACK or a project link connection.

7.1.1 Adding a New User

1. **Select [Environment Setting] from the [File] menu.**
2. **Select [Security] - [User Registration].**



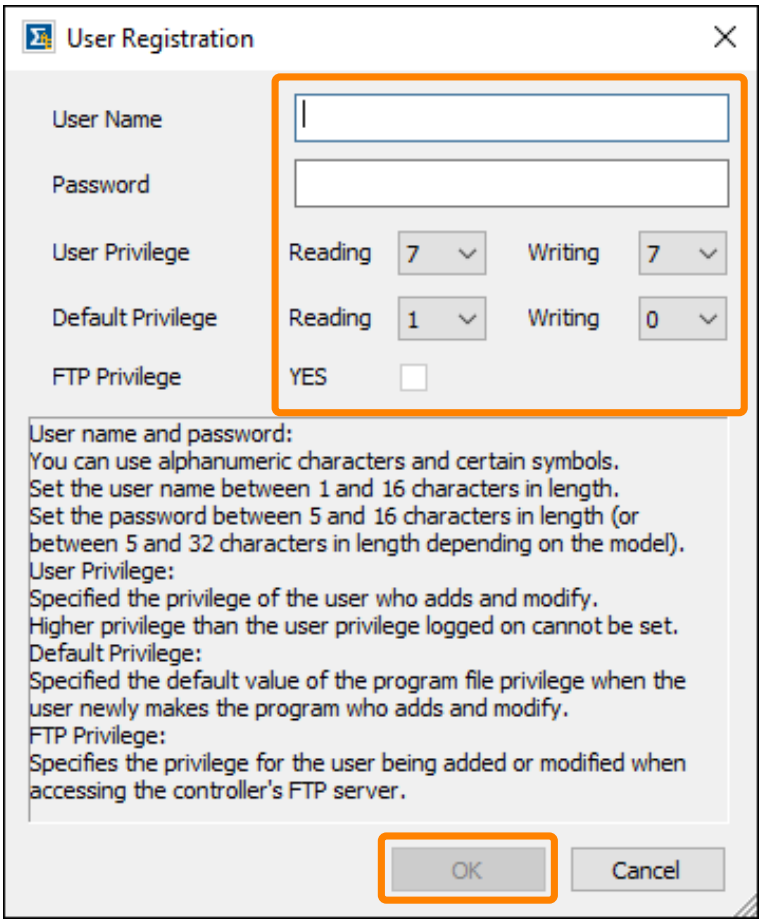
3. **Click the [New] button.**



The [User Registration] window will be displayed.

4. **Set the following items, and then click the [OK] button.**

Refer to text at the bottom of the window for the setting conditions of the item and other information.



Information

The higher the numbers of the user privilege the higher the privilege levels.

The read privilege and write privilege levels are items created to maintain program security.

To open a program, a user must have a user privilege level that is greater than or equal to the read privilege level of that program. In the same manner, to edit and save a program, a user must have a user privilege level that is greater than or equal to the write privilege level of that program.

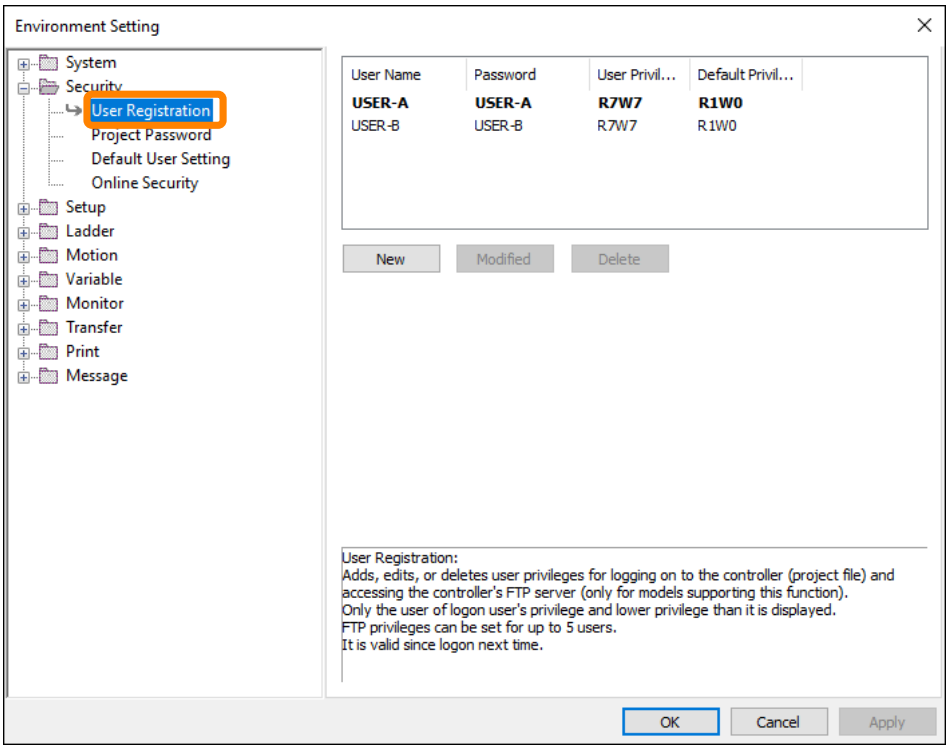
This concludes the procedure.

Important

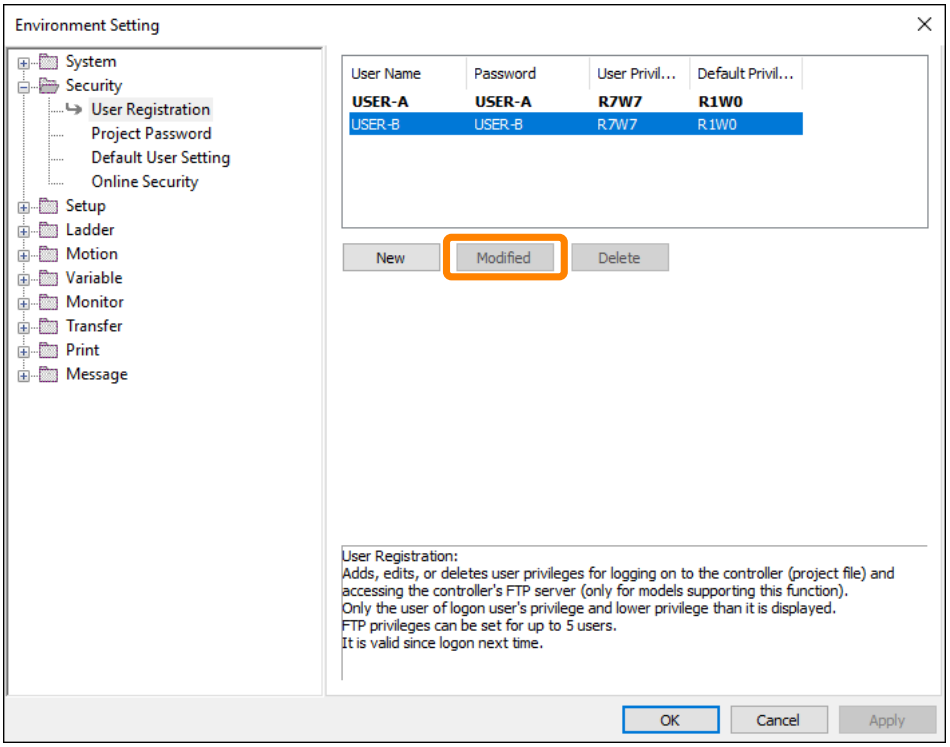
There is no way to recover a password if the user forgets it, so the user will no longer be able to open the project file. Be careful so that passwords are not forgotten.

7.1.2 Changing Registered Information

1. **Select [Environment Setting] from the [File] menu.**
2. **Select [Security] - [User Registration].**



3. **When the user with information to change is selected, click the [Modified] button.**



The [User Registration] window will be displayed.

4. **Change the required items.**
5. **Click the [OK] button.**

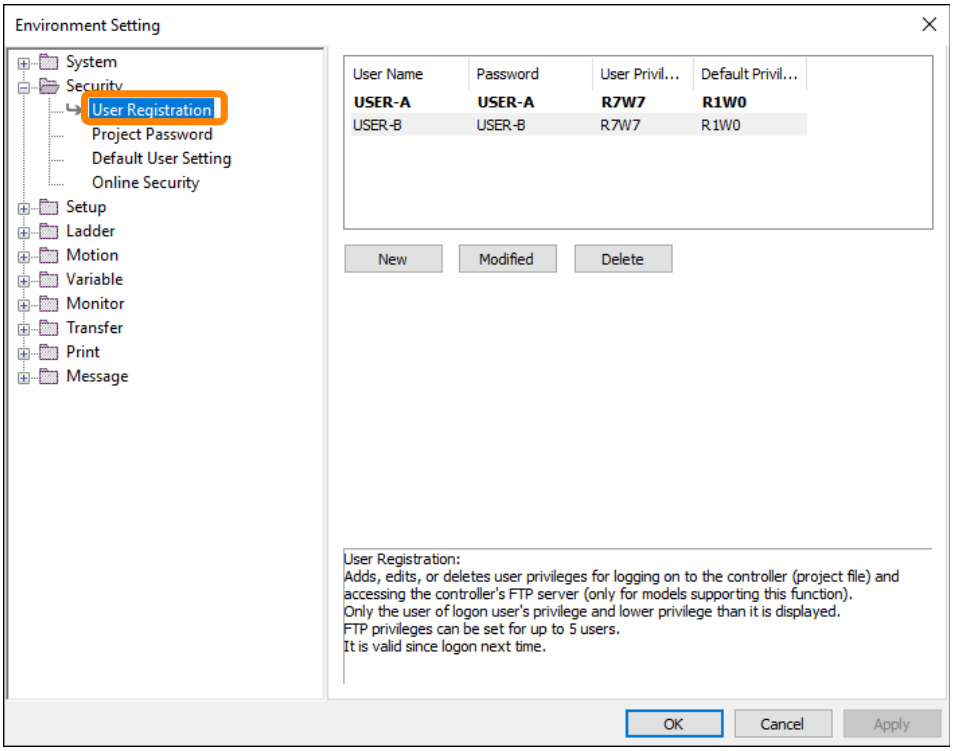
This concludes the procedure.

Information If the selected user is the default user, you can change only the default and FTP privileges.

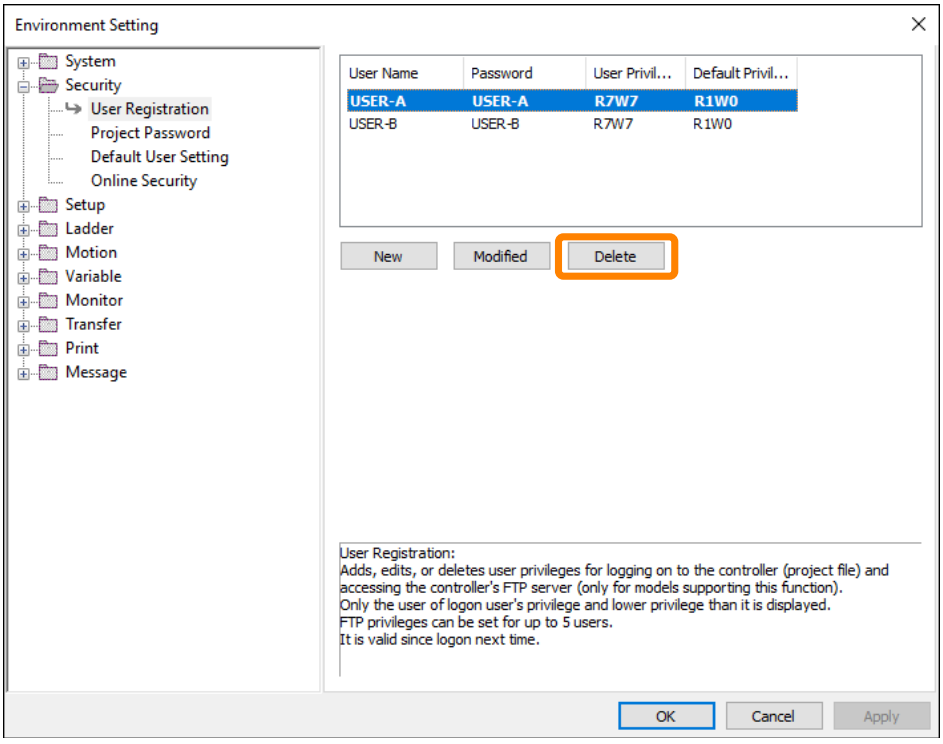
7.1.3 Deleting a Registered User

1. **Select [Environment Setting] from the [File] menu.**

2. **Select [Security] - [User Registration].**

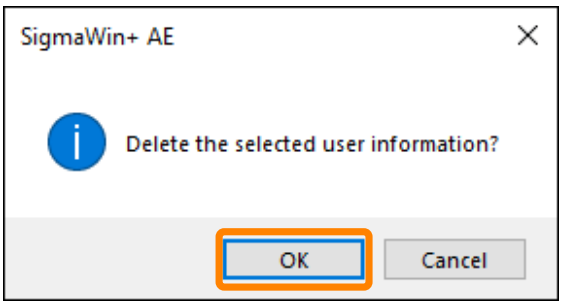


3. **When the user to delete is selected, click the [Delete] button.**



A message dialog box will be displayed.

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



This concludes the procedure.

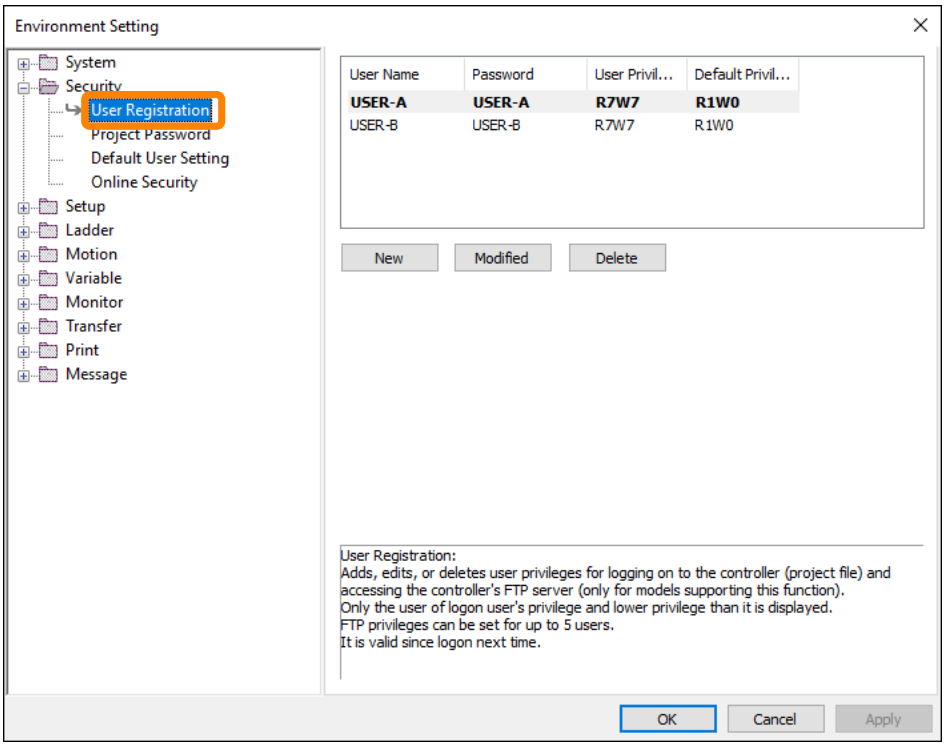
7.1.4 Checking and Switching the User

1. **Select [Environment Setting] from the [File] menu.**
2. **Select [Security] - [User Registration].**

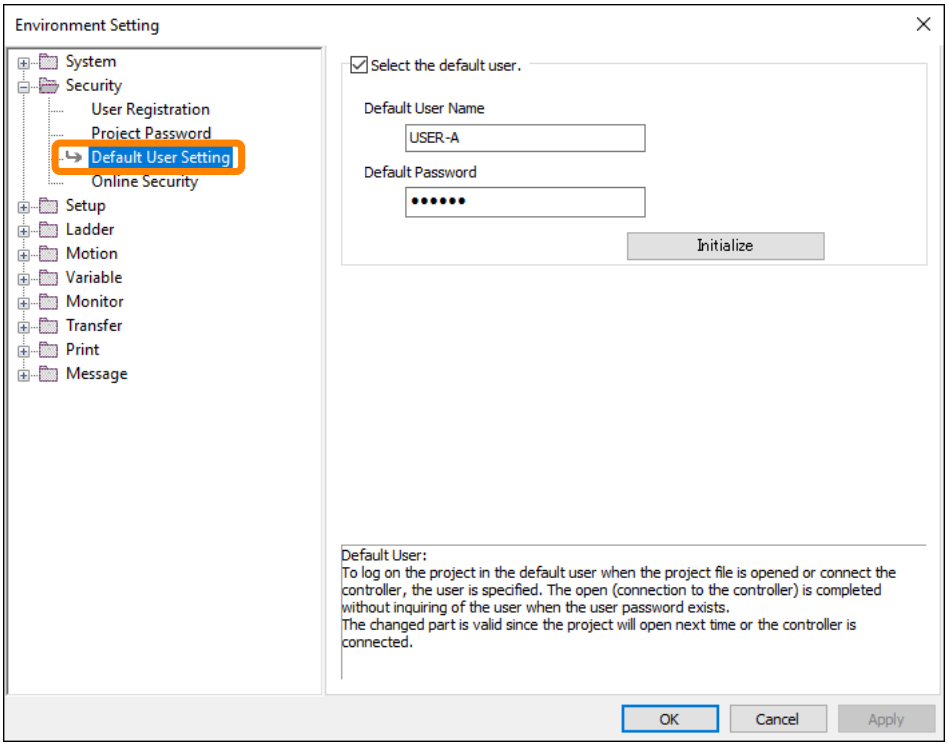
   The current user is displayed in bold text.

   To switch the user, you will need the [User Name] and [Password] for the user to switch to when you next log in. Once you have this information, proceed to the next step.

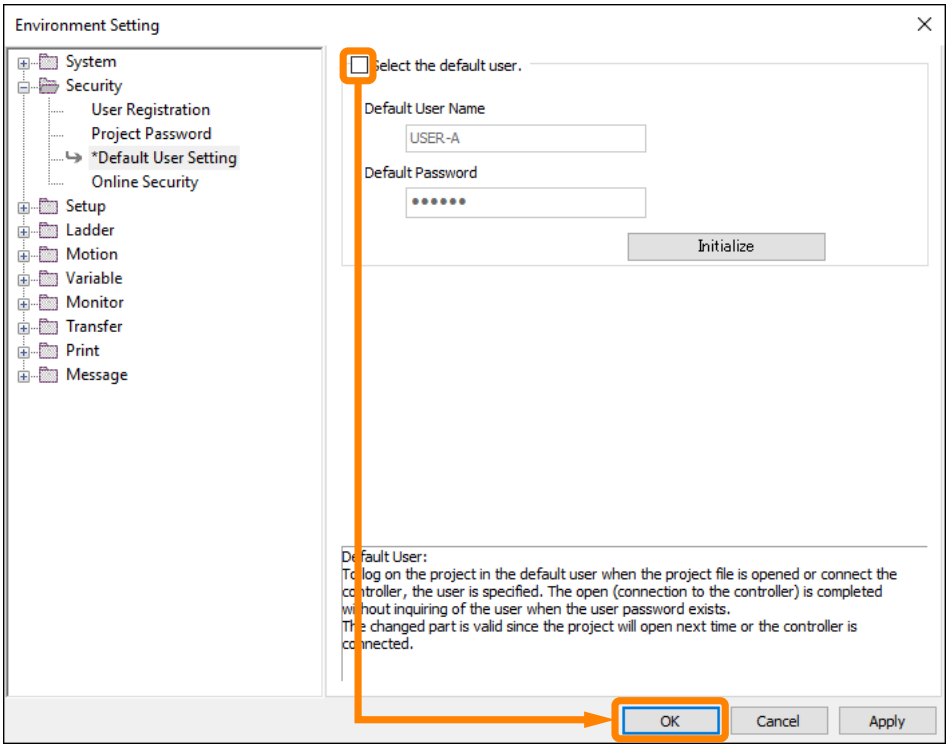
   If you do not need to switch the user, skip the rest of this procedure. Click the [Cancel] button.



3. **Select [Security] - [Default User Setting].**



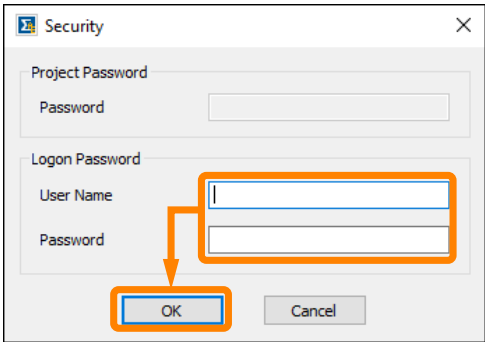
4. **Clear the [Select the default user] check box, and then click the [OK] button.**



5. **Close the project file or disconnect communications with the SERVOPACK.**
6. **Open the project file or connect to the SERVOPACK.**

   The [Security] dialog box will be displayed.

7. **Enter [User Name] and [Password] for the user to switch to, and then click the [OK] button.**



The project file will be opened or the connection to the SERVOPACK will be started with the user information you entered.

This concludes the procedure.

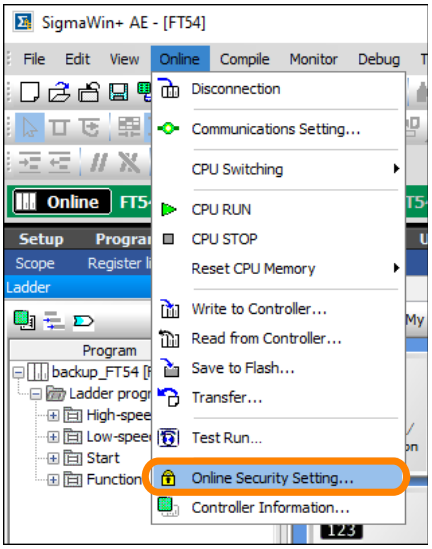
7.2 Security Settings for the SERVOPACK

You can protect programs from being read from the SERVOPACK by changing the SERVOPACK's security settings. (This is called online security.) Use the following procedure to enable security on the SERVOPACK.

1. **Confirm that the user privileges are R7W7.**

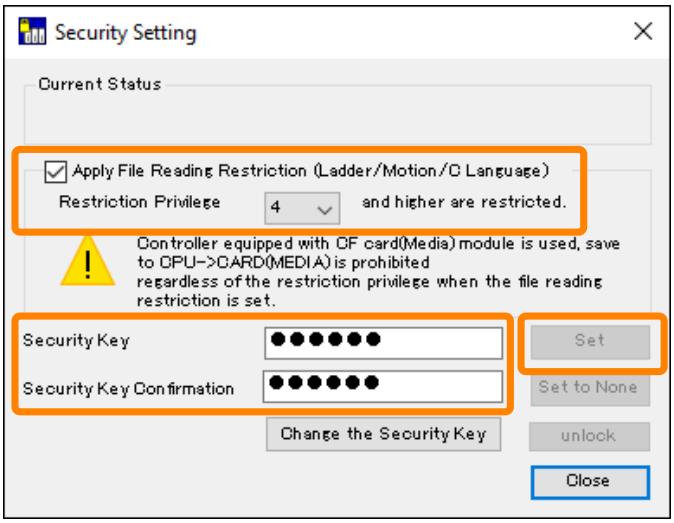
   Information You can confirm the user privileges by clicking [File] - [Environment Setting] to display the [Environment Setting] window, and then clicking [Security] - [User Registration] in that window.

2. **Select [Security Setting] from the [Online] menu.**



   The [Security Setting] window will be displayed.

3. **Set the following items, and then click the [Set] button.**



Item	Description
Apply File Reading Restriction (Ladder/Motion/C Language)	Select the check box.
Restriction Privilege	Set the restriction privilege. (Setting range: 0 to 7) Only users with a privilege level at least as high as this setting can open SERVOPACK programs and read programs from SERVOPACK. You can confirm user privileges in the [Environment Setting] window that is displayed by selecting [Environment Setting] from the [File] menu.

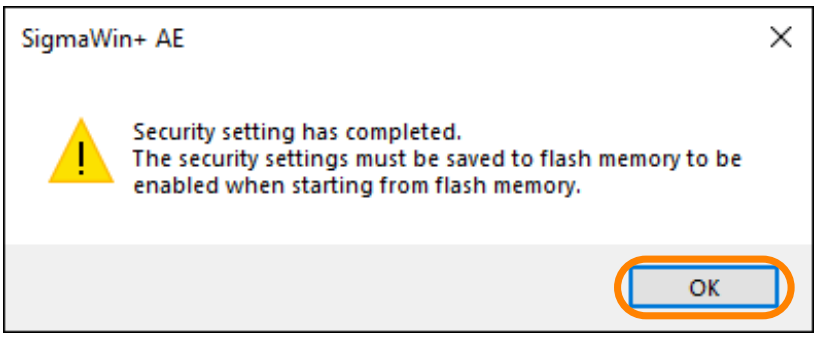
Continued on next page.

Continued from previous page.

Item	Description
Security Key	Set a password. <Setting Conditions> Between 5 and 8 alphanumeric characters. The password is case sensitive.
Security Key Confirmation	Enter the password again that was set in [Security Key].

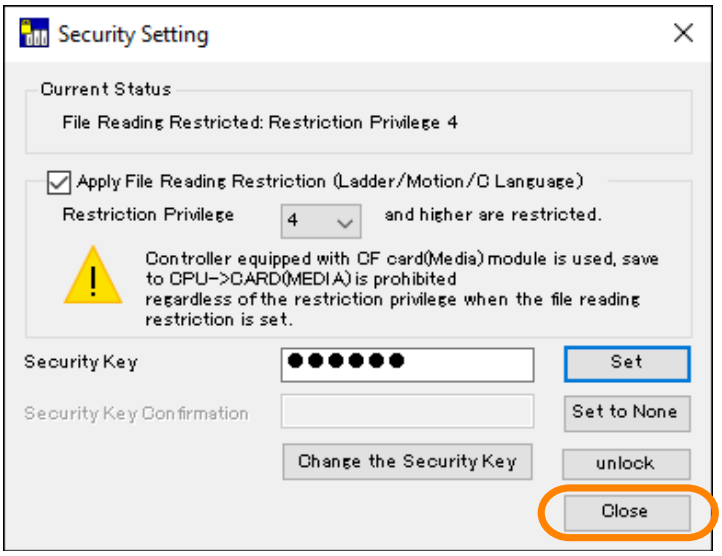
A message dialog box will be displayed.

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



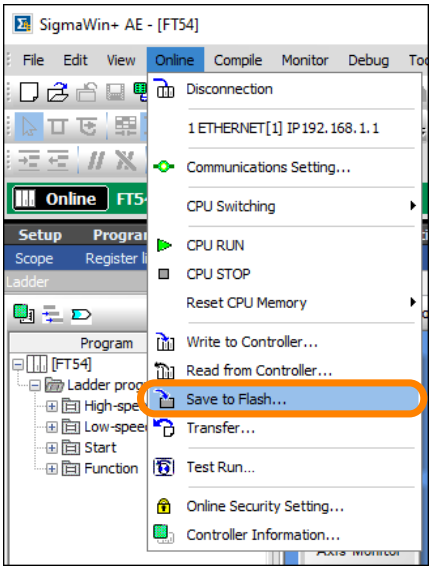
A message dialog box will close.

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



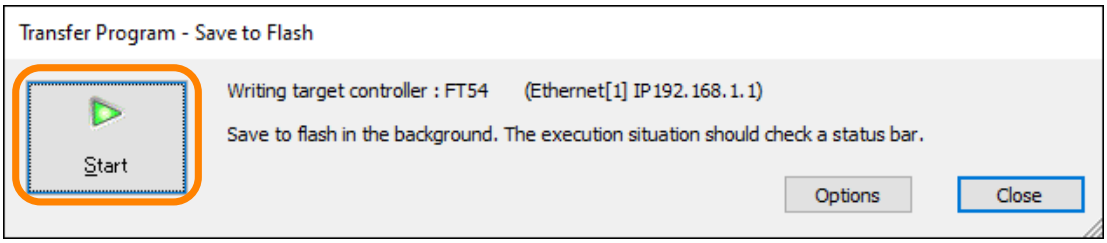
The [Security Setting] window will be closed.

6. **Select [Save to Flash] from the [Online] menu.**



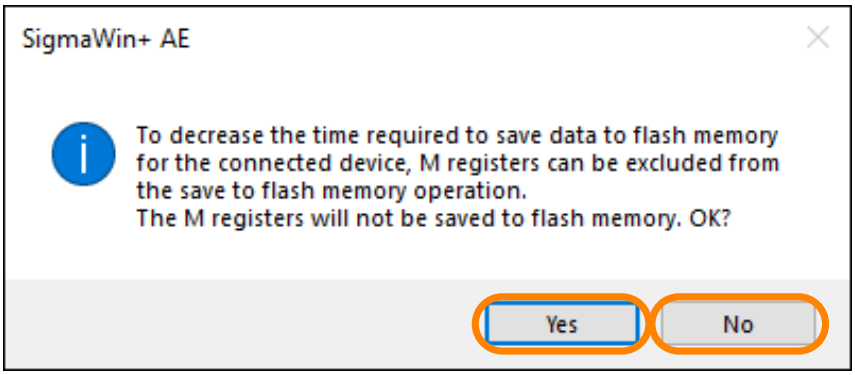
The [Transfer Program - Save to Flash] window will be displayed.

7. **Click the [Start] button.**

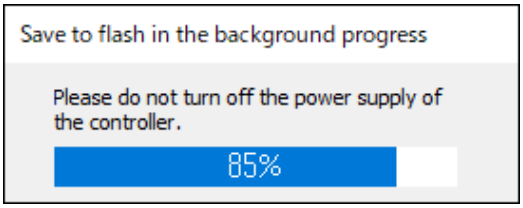


A message dialog box will be displayed.

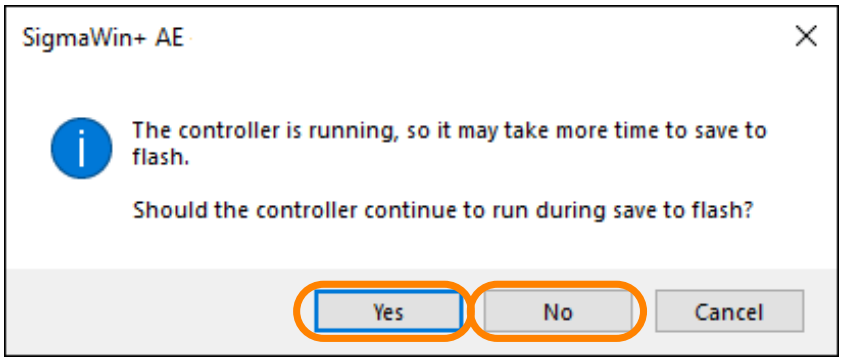
8. **Read the message, and click the [Yes] button or the [No] button.**



Save to flash will start, and the following window will be displayed.

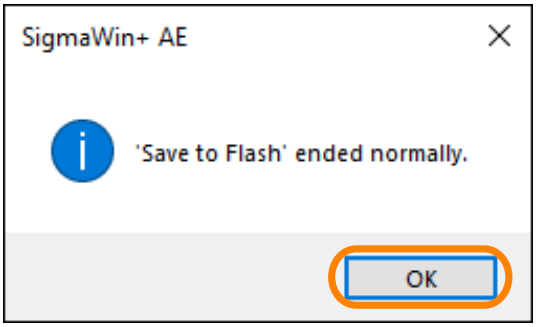


Information If the SERVOPACK is in RUN mode, the following message will be displayed. The data transfer to the SERVOPACK starts when you click the [Yes] button or the [No] button.



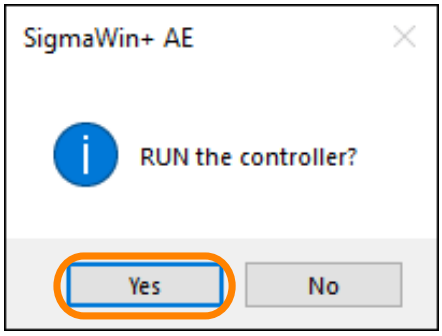
When save to flash is completed, a message dialog box will be displayed.

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



A message dialog box will close.

Information If you clicked the [No] button in step 8, the following message will be displayed.
Click the [Yes] button to put the CPU unit in the RUN status.



This concludes the procedure.

Important When online security is enabled, any attempt to open a program with a higher privilege level will cause the following message to appear, and reading the program will be denied.

Important To permanently or temporarily disable online security, or to change the security key or the restriction privilege, enter the security key.
If security is temporarily disabled, it will become enabled again after the power is turned OFF and ON again.

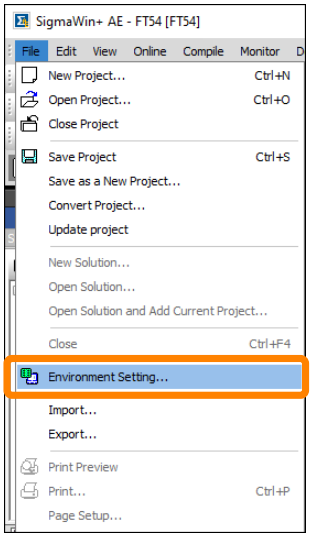
7.3 Security Settings for Project Files

This section gives the procedures for managing security settings for project files.

7.3.1 Protecting Project Files with a Password

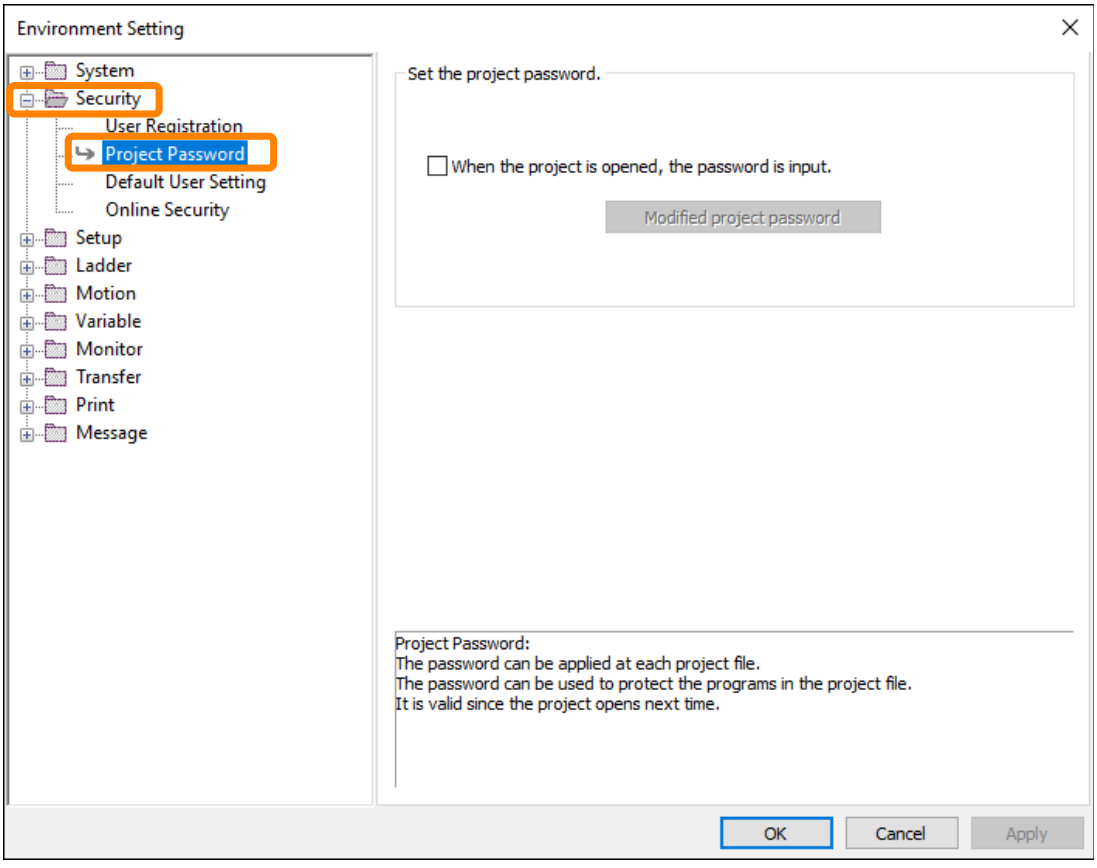
To protect project files with a password, you must first set the password. Use the following procedure.

1. **Open the project file for which to enable password protection.**
2. **Select [Environment Setting] from the [File] menu.**

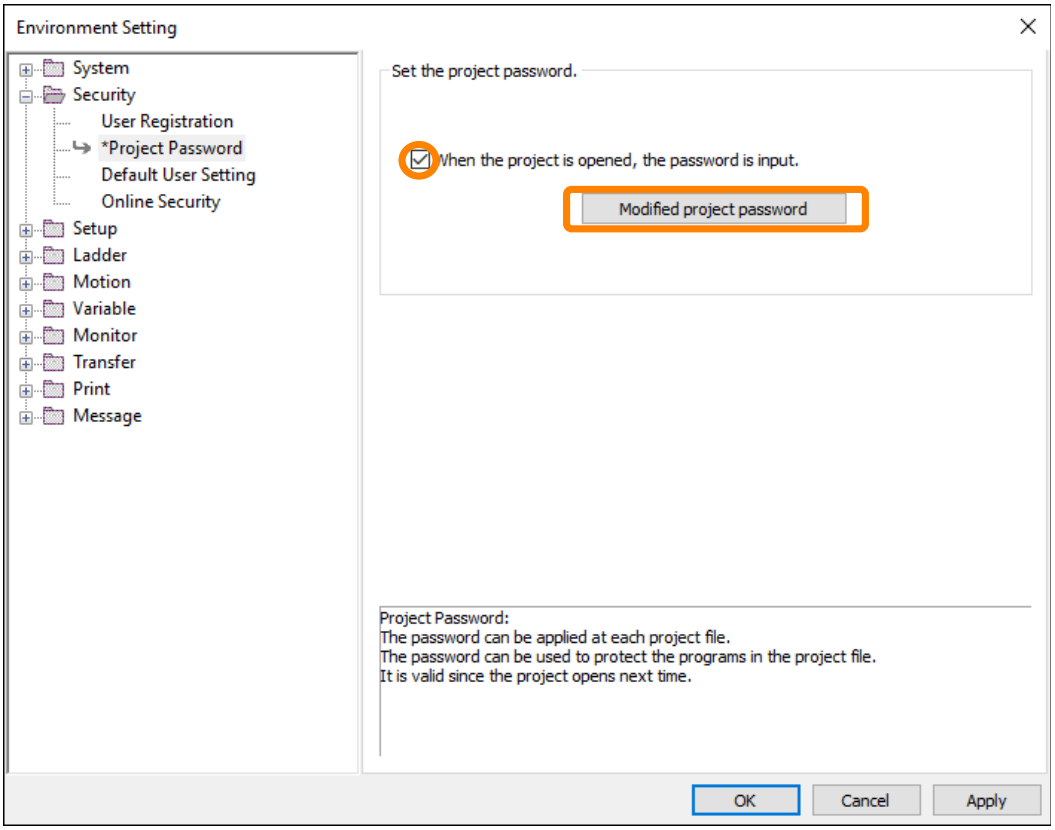


Displays the [Environment Setting] window.

3. **Select [Security] – [Project Password].**

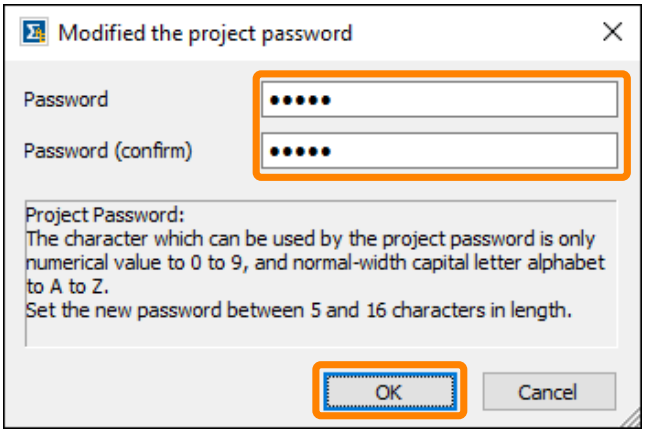


4. **Select the [When the project is opened, the password is input] check box, and then click the [Modified project password] button.**



The [Modified the project password] window will be displayed.

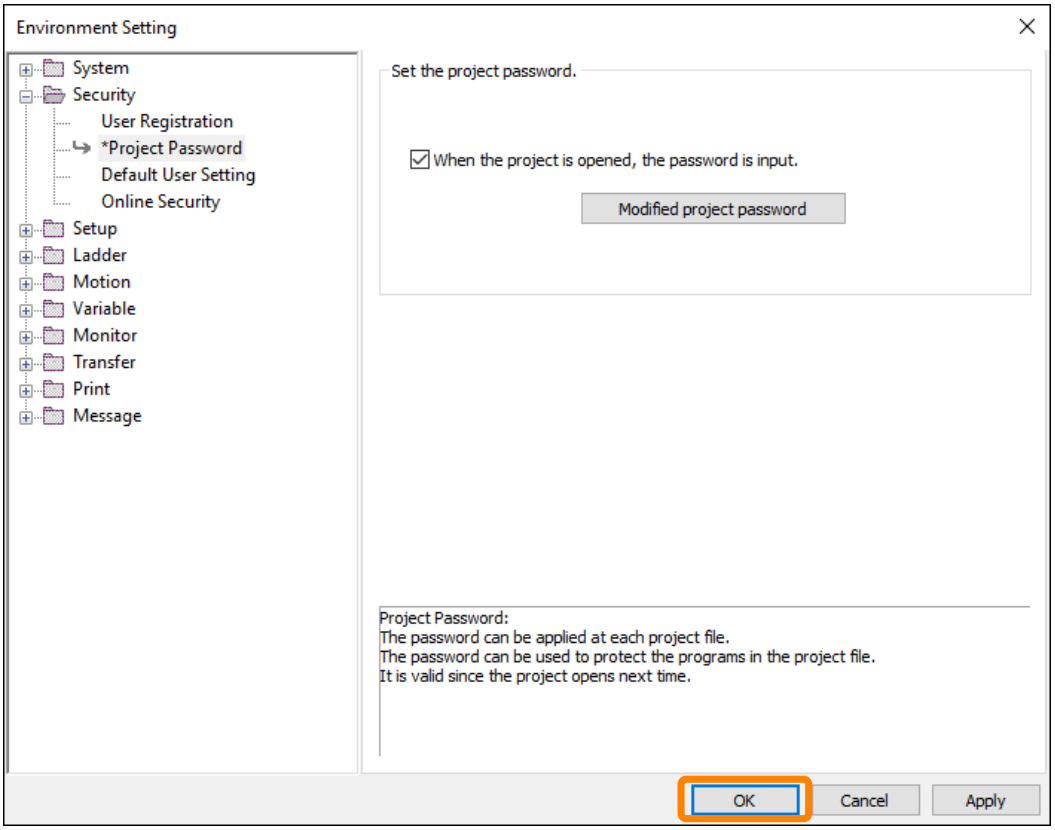
5. **Set the following items, and then click the [OK] button.**



Item	Description
Password	Set a password. Refer to text at the bottom of the window for the setting conditions.
Password (confirm)	Enter the password that was set in [Password].

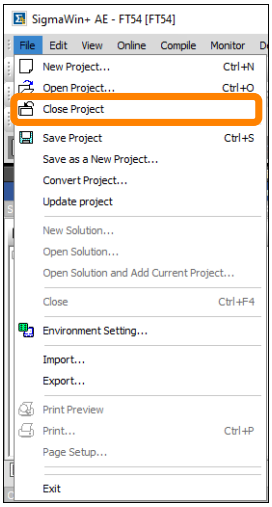
The [Modified the project password] window will be closed.

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



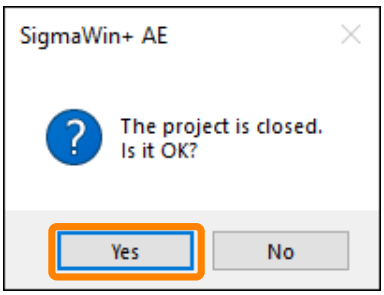
The [Environment Setting] window will be displayed.

7. **Select [Close Project] from the [File] menu.**



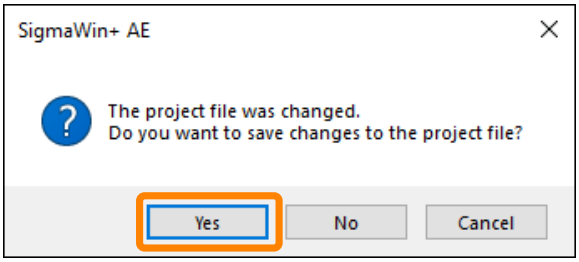
A message dialog box will be displayed.

8. **Click the [Yes] button.**



A message dialog box will be displayed.

9. **Click the [Yes] button.**



The project file will close, and password protection will be enabled for the project file.

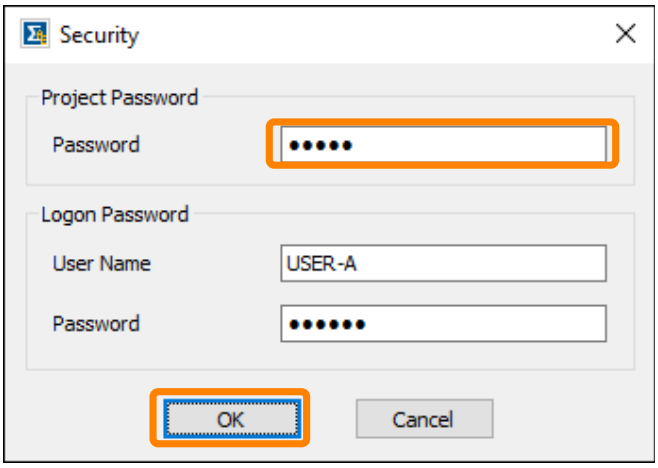
This concludes the procedure.

7.3.2 Opening a Password-protected Project File

1. **Open the project file.**

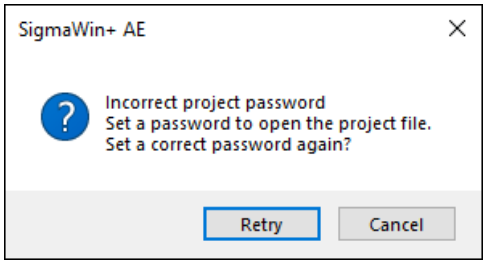
   The [Security] window will be displayed.

2. **Enter the password that was set previously, and click the [OK] button.**



The project file will be opened.

Information If the password is incorrect, the following dialog box will be displayed.



Click the [Retry] button and enter the password again.

This concludes the procedure.

7.3.3 Changing the Project File Password

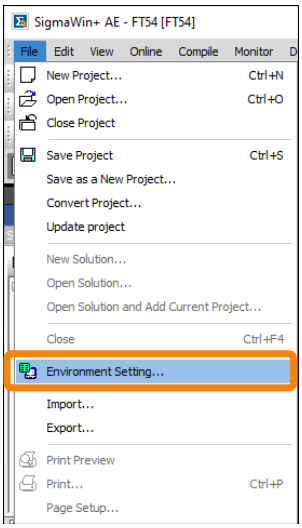
To change the password of a project file, perform the same procedure that you used to protect the project file with a password. Refer to the following section for details.

☞ *7.3.1 Protecting Project Files with a Password on page 312*

7.3.4 Disabling Password Protection of a Project File

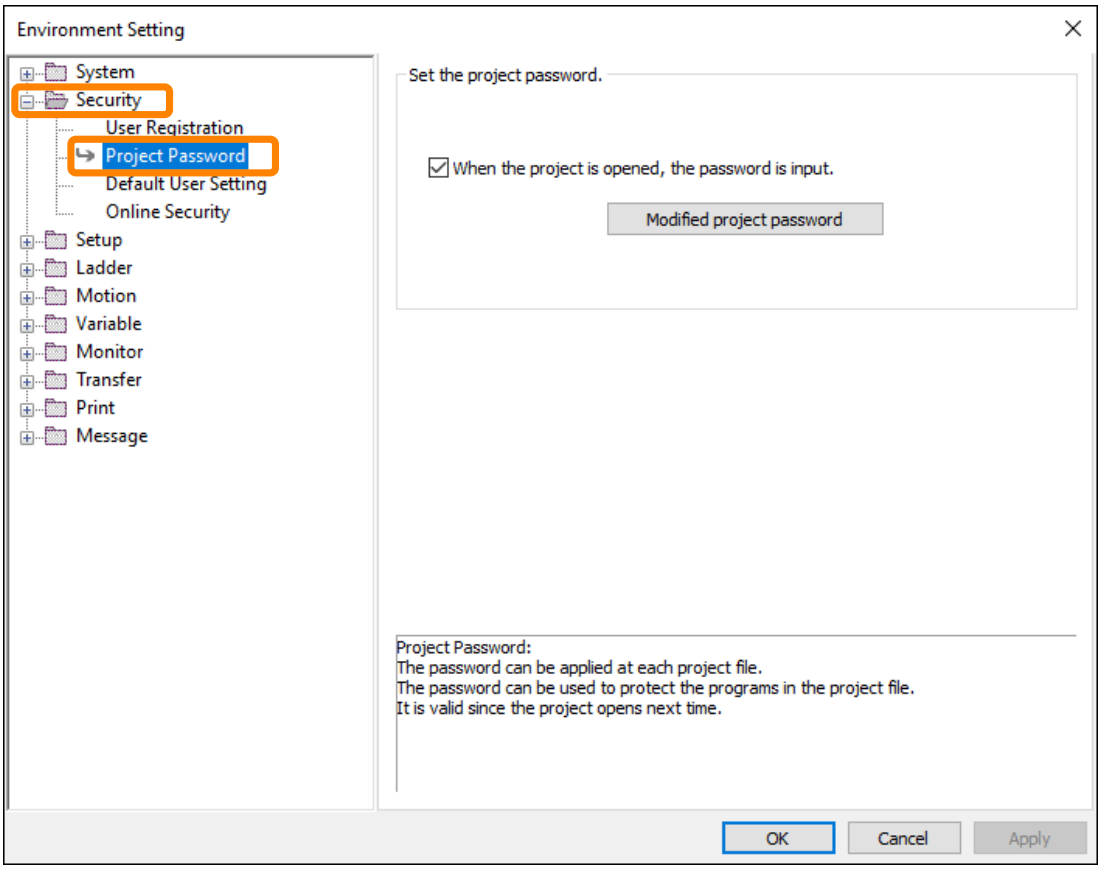
Use the following procedure to disable password protection of a project file.

1. **Open the project file for which to disable password protection.**
2. **Select [Environment Setting] from the [File] menu.**

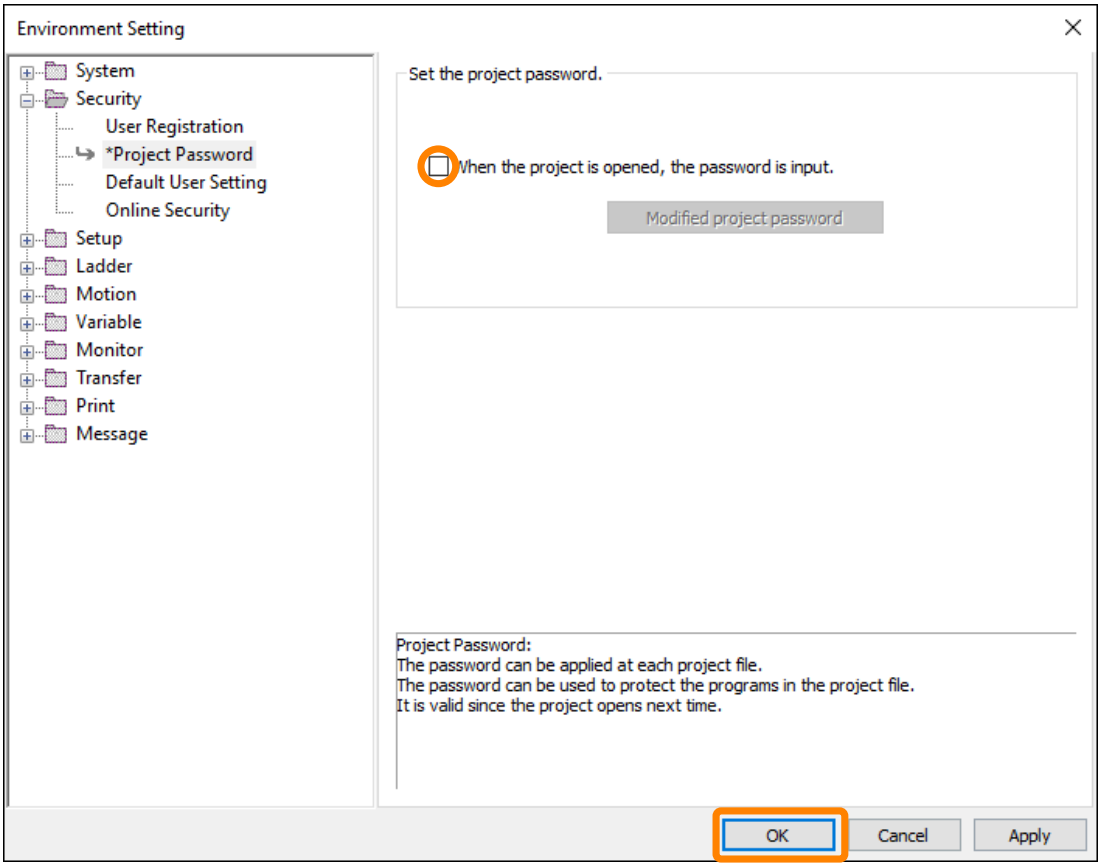


The [Environment Setting] window will be displayed.

3. **Select [Security] – [Project Password].**



4. **Clear the [When the project is opened, the password is input] check box, and then click the [OK] button.**



This concludes the procedure.

7.4 Security Settings for Programs

This section gives the procedures for managing security settings for programs.

7.4.1 Protecting Programs with a Password

To protect programs with a password, you must first set a password. Use the following procedure.

1. **Establish an online connection or open a project file.**
2. **In the [Ladder] window, right-click the program for which to set the password, and then select [Set the Password].**

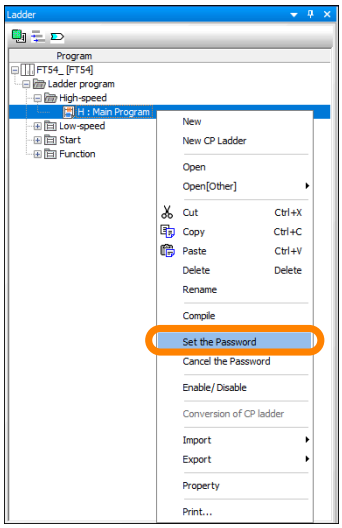
   Note:

   You can select more than one drawing.

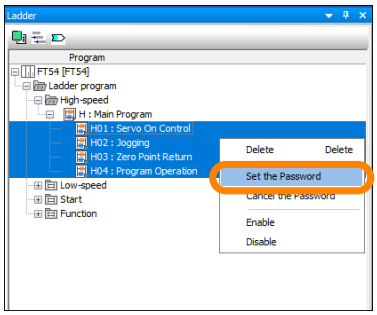
   • To open a number of consecutive drawings: Select the first drawing in the group of drawings to open, hold down the **Shift** key, and then select the last drawing in the group of drawings to open.

   • To open a number of drawings that are not consecutive: Hold down the **Ctrl** key and click the drawings to open.

   <If Only One Drawing Is Selected>

   <If More Than One Drawing Is Selected>

   The [Program Password] window will be displayed.

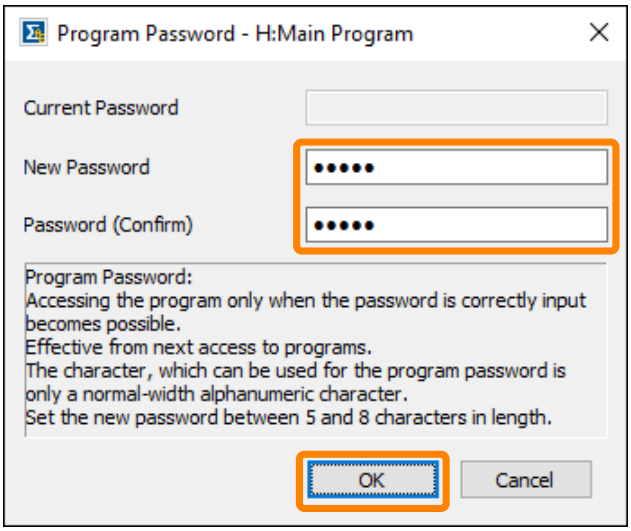
3. **Set the following items, and then click the [OK] button.**

Information

• If you can enter a password into [Current Password], security is already active. Refer to the following section.

☞ *7.4.3 Changing Program Passwords on page 319*

• If more than one drawing is selected and a password was previously set for one of the drawings, an error will occur.



Item	Description
Password	Set a password. Refer to text at the bottom of the window for the setting conditions.
Password (Confirm)	Enter the password that was set in [New Password].

The password-locked icon will be displayed next to the icon of the program set with the password.

This concludes the procedure.

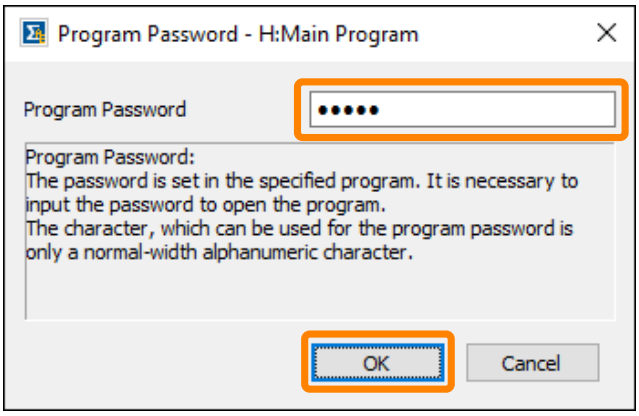
7.4.2 Opening a Password-protected Program

If you attempt to open a password-protected program, the [Program Password] window will be displayed.

Information You can open more than one drawing at the same time.

- To open a number of consecutive drawings: Select the first drawing in the group of drawings to open, hold down the **Shift** key, and then select the last drawing in the group of drawings to open.
- To open a number of drawings that are not consecutive: Hold down the **Ctrl** key and click the drawings to open.

Enter the password in the [Program Password], and then click the [OK] button to open the program. If more than one drawing is selected, you can open only the drawings that have the password that was entered.

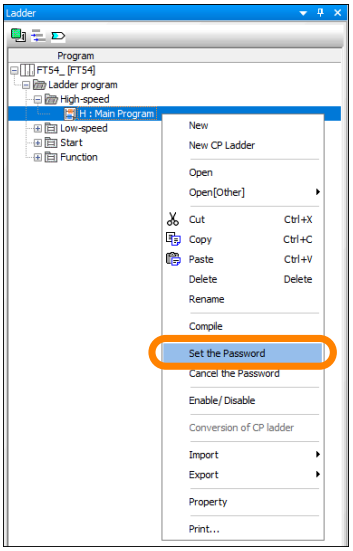


7.4.3 Changing Program Passwords

Use the following procedure to change the password of a program.

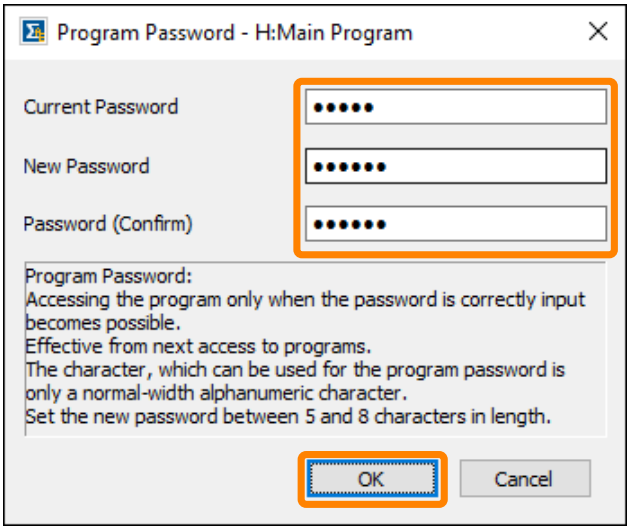
Information You cannot change the password for more than one drawing at the same time. Change the passwords one drawing at a time.

1. **Establish an online connection or open a project file.**
2. **In the [Ladder] window, right-click the program for which to change the password, and then select [Set the Password].**



The [Program Password] window will be displayed.

3. **Set the following items, and then click the [OK] button.**



Item	Description
Current Password	Enter the old password. If you enter the wrong password, an error will be displayed after you click the [OK] button.
New Password	Set the new password. Refer to text at the bottom of the window for the setting conditions.
Password (Confirm)	Enter the password that was set in [New Password].

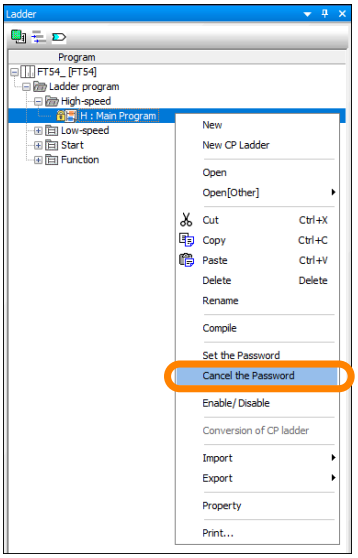
This concludes the procedure.

7.4.4 Disabling Password Protection of a Program

Use the following procedure to disable password protection of a program.

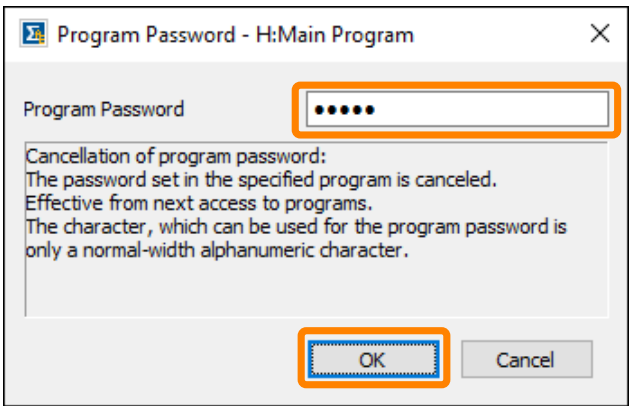
1. **Establish an online connection or open a project file.**

2. **In the [Ladder] window, right-click the program for which to disable the password, and then select [Cancel the Password].**



The [Program Password] window will be displayed.

3. **Enter the password in the [Program Password] box, and then click the [OK] button.**



The password-locked icon will disappear from the program that was selected in step 2.

This concludes the procedure.

8

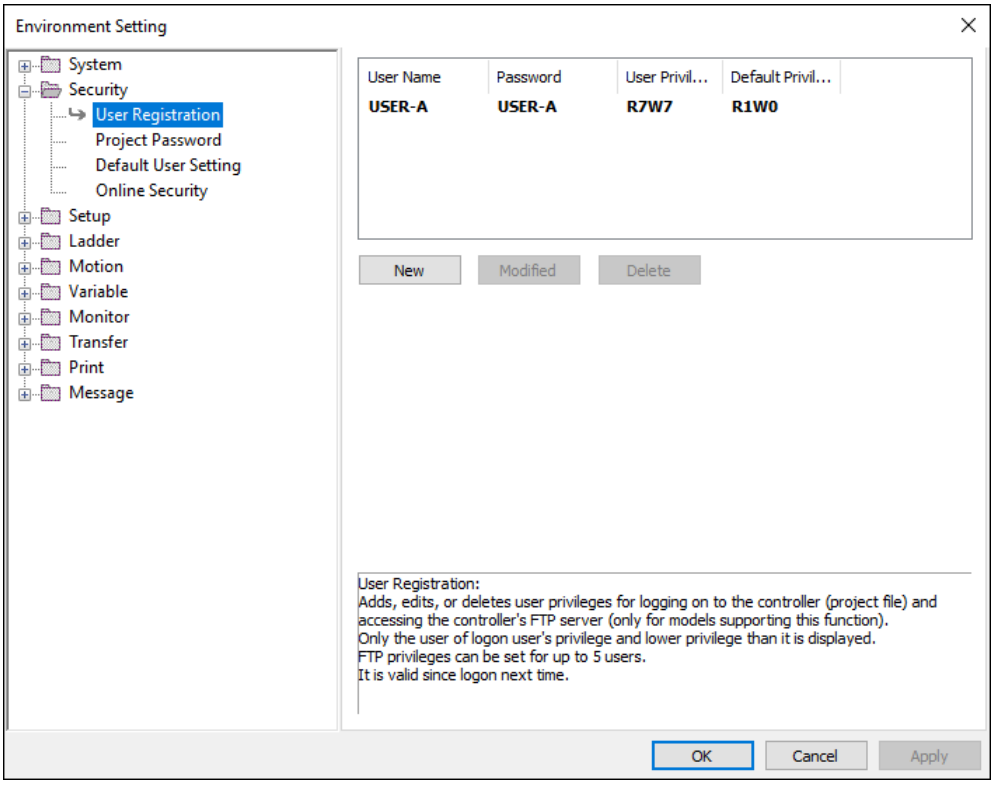
Convenient Functions

This chapter describes convenient functions in the SigmaWin+ AE, such as the environment settings, printing, and importing and exporting data.

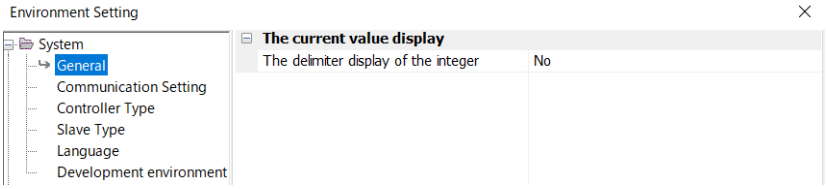
8.1 Environment Setting

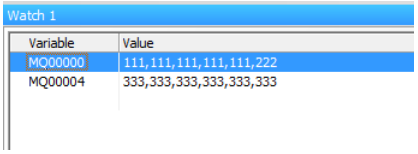
Select [File] - [Environment Setting] from the menu bar to display the [Environment Setting] window. You can configure the various settings related to the SigmaWin+ AE and project files on this window.

This section describes setting items on the [Environment Setting] window in the order the setting items are displayed in the tree.

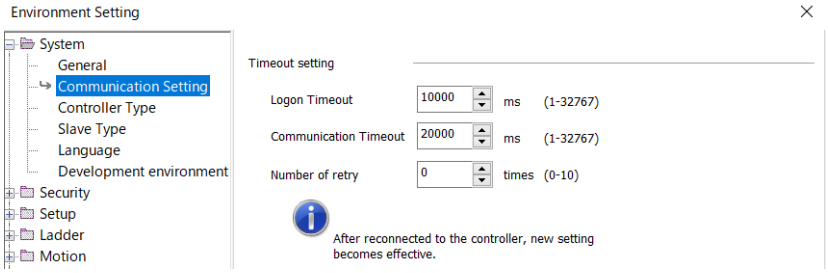


8.1.1 [System] - [General]



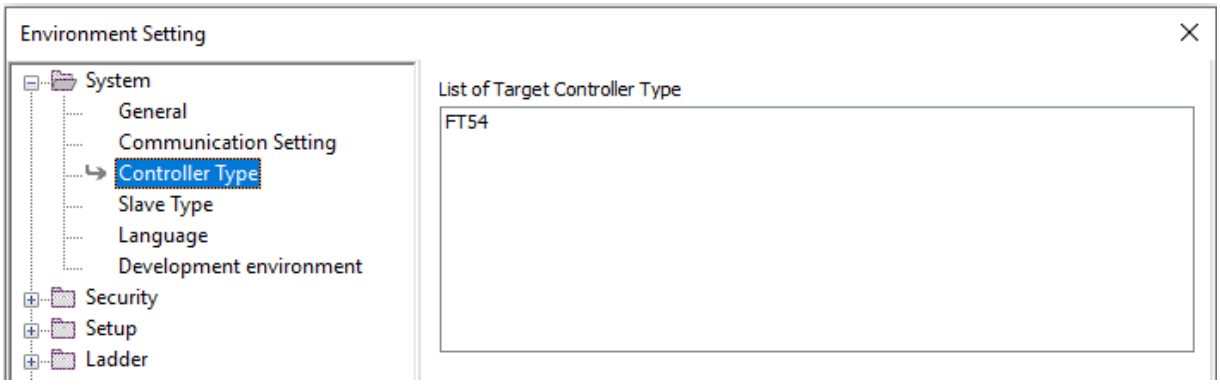
Item	Description
The delimiter display of the integer	If set to [Yes], a comma will be inserted into numeric values and current values every third digit. 

8.1.2 [System] - [Communication Setting]



Item	Description
Logon Timeout	Set the duration of the timeout when connecting to the SERVOPACK. An error will be displayed if the connection to the SERVOPACK is not completed within the set time.
Communication Timeout	Set the duration of the communications timeout with the SERVOPACK. An error will be displayed if communications with the SERVOPACK are not restarted within the set time when communications are lost.
Number of retry	Set the number of retries when communications with the SERVOPACK are lost.

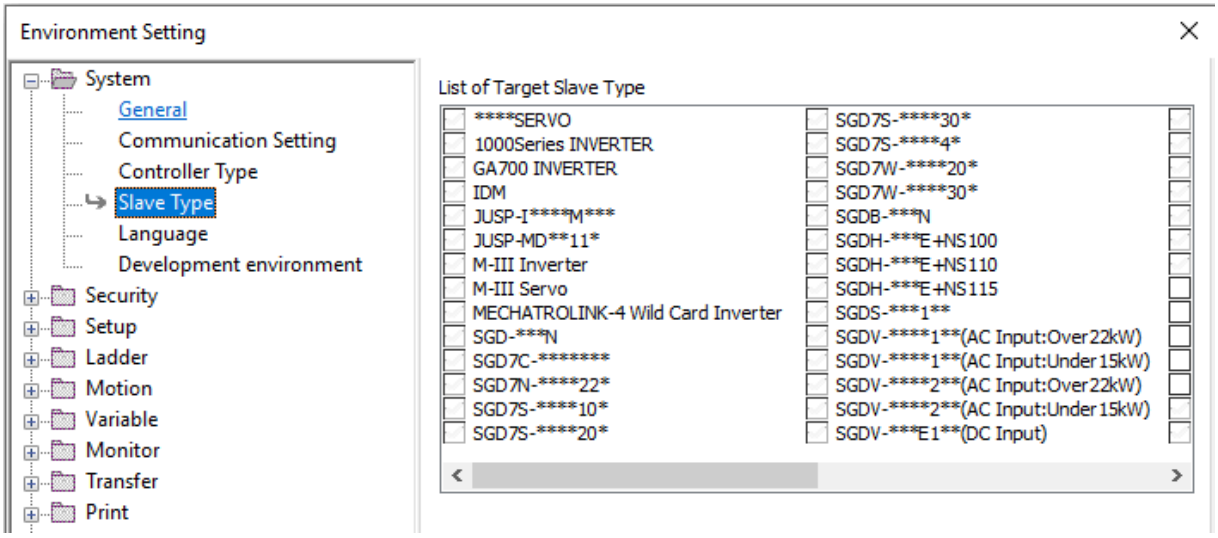
8.1.3 [System] - [Controller Type]



Item	Description
List of Target Controller Type	The SERVOPACK models are displayed that can be selected when creating a project file.

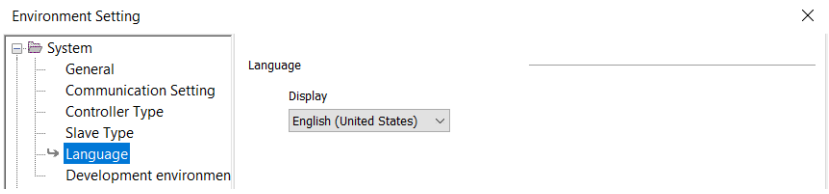
8.1.4 [System] - [Slave Type]

These settings cannot be used.



Item	Description
List of Target Slave Type	The slave models are displayed that can be allocated in module configuration definitions.

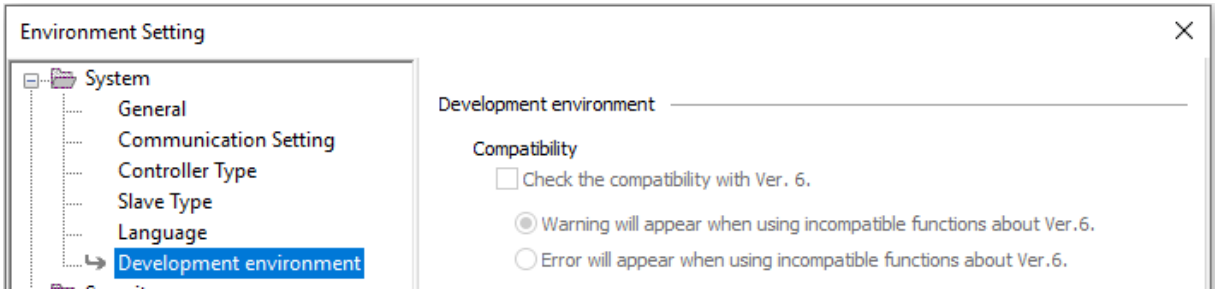
8.1.5 [System] - [Language]



Item	Description
Language	Select the language displayed in the SigmaWin+ AE from English, Japanese, Chinese (simplified), or Chinese (traditional). The change is applied after the SigmaWin+ AE is restarted.

8.1.6 [System] - [Development environment]

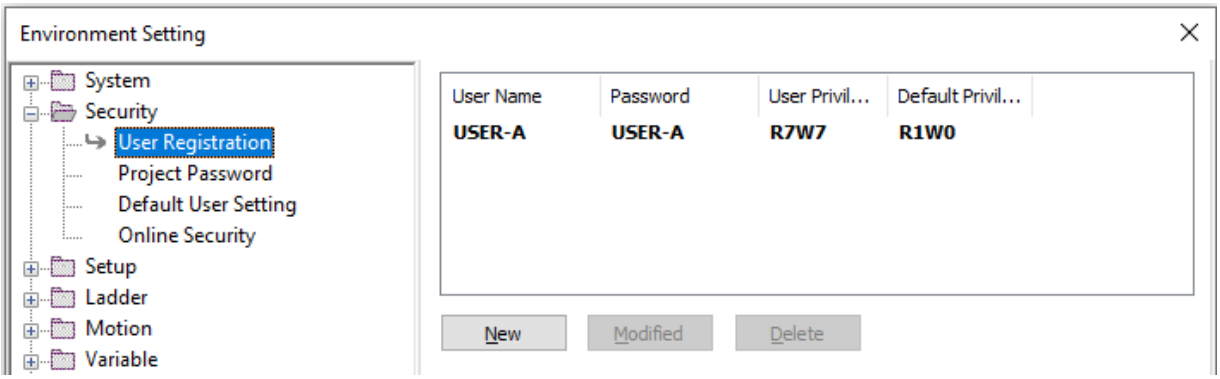
These settings cannot be used.



8.1.7 [Security] - [User Registration]

Refer to the following section for details on the settings.

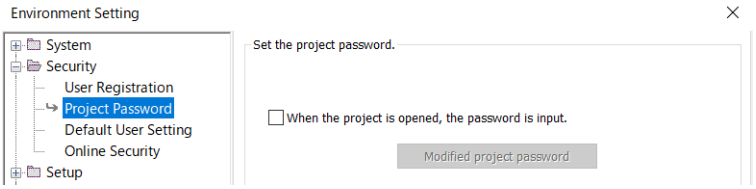
☞ *7.1 User Management on page 300*



8.1.8 [Security] - [Project Password]

Refer to the following section for details on the settings.

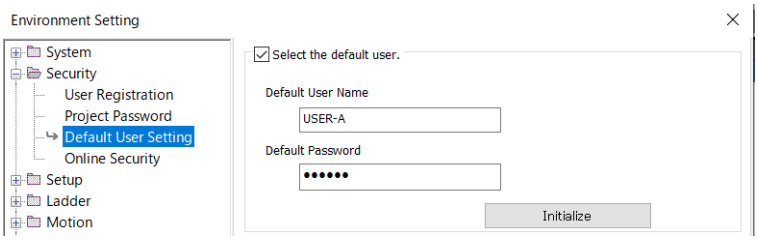
☞ *7.3 Security Settings for Project Files on page 312*



8.1.9 [Security] - [Default User Setting]

The user name and password set here will be required when opening a project file or connecting to the SERVOPACK.

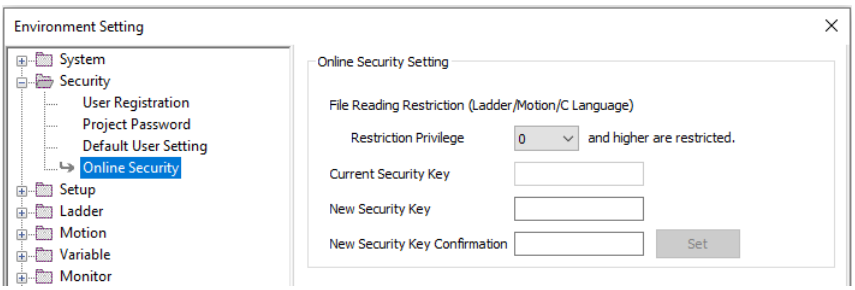
A project file can be opened without logging in if the user with the same settings is registered in the project file.



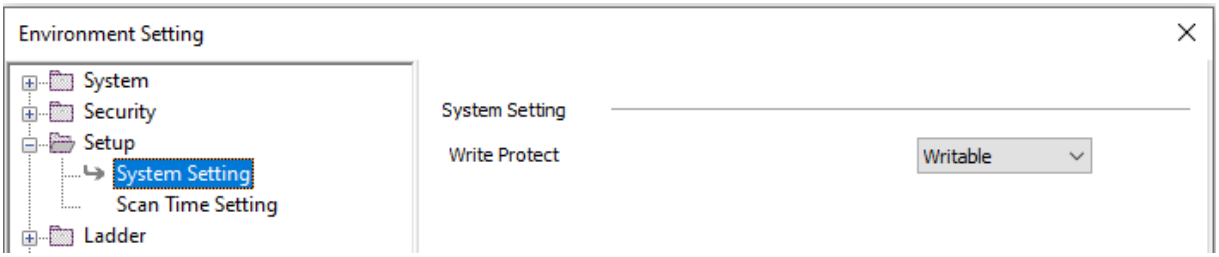
8.1.10 [Security] - [Online Security]

The setting items are the same as the setting items for online security described in the following section.

☞ *7.2 Security Settings for the SERVOPACK on page 308*

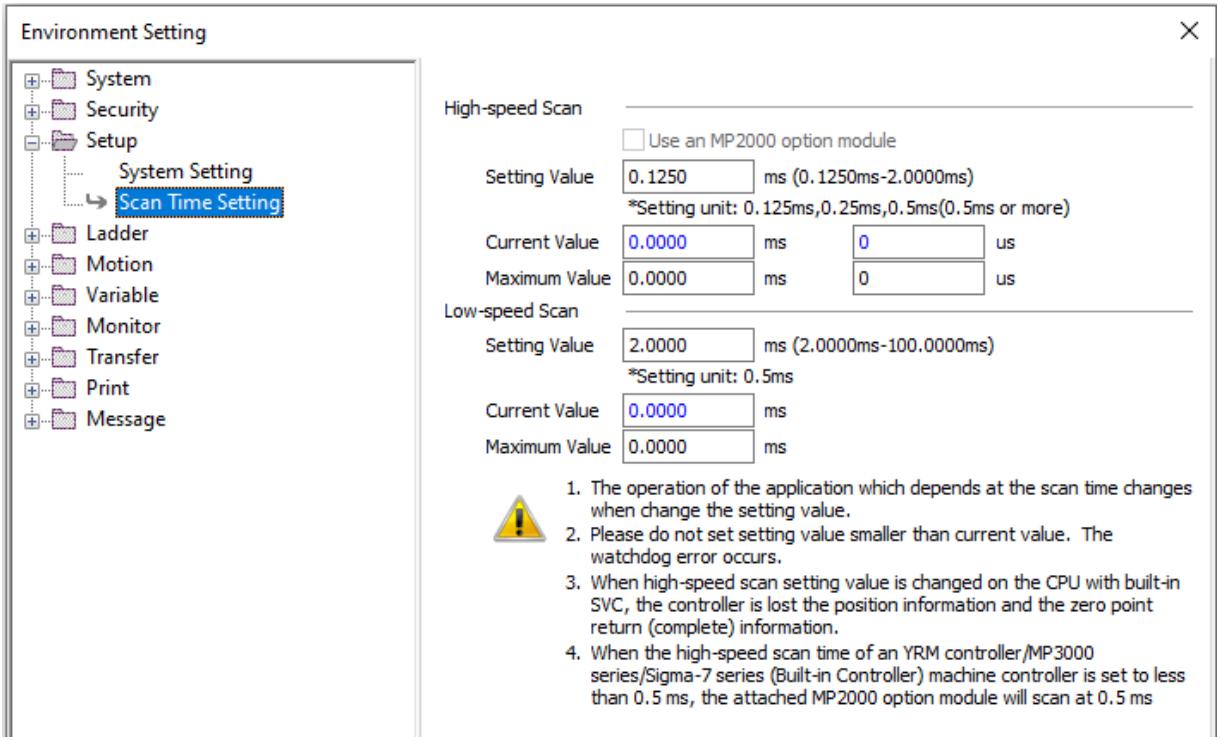


8.1.11 [Setup] - [System Setting]



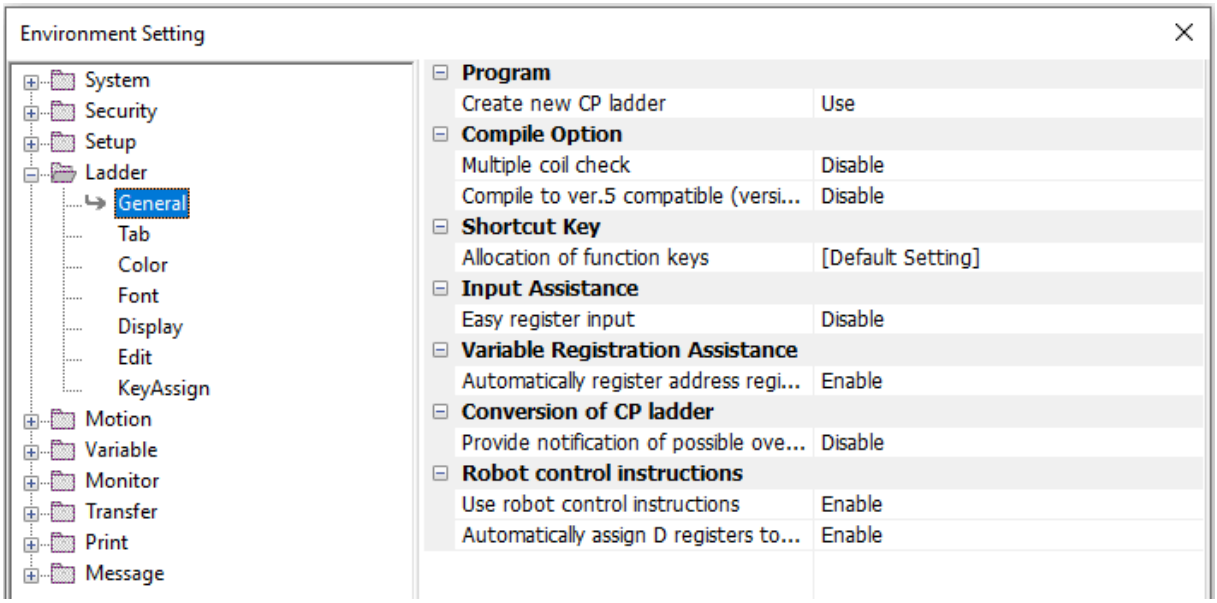
Item	Description
Write Protect	Select whether to permit writing program data to the SERVOPACK. If set to [Write Protect], data cannot be transfered to the SERVOPACK and program editing and compiling cannot be performed when online.

8.1.12 [Setup] - [Scan Time Setting]



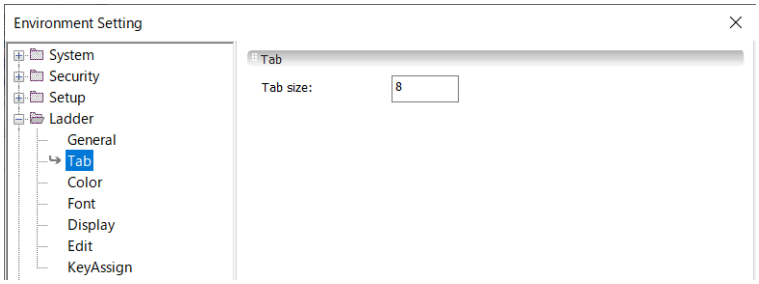
Item	Description
Use an MP2000 option module	Cannot be used.
Setting Value	Set the scan processing time.
Current Value	The actual scan processing time is displayed in real-time when online.
Maximum Value	The maximum value of the actual scan processing time is displayed. The maximum value can be edited. If the actual scan processing time exceeds the edited value, the value is updated.

8.1.13 [Ladder] - [General]



Item	Description
Create new CP ladder	If set to [Use], [New CP Ladder] will be displayed in the menu that is displayed when you right-click a program in the [Ladder] window.
Multiple coil check	If set to [Enable], a check will be performed for registers that are used multiple times in coil instructions when the ladder program is compiled. If multiple registers are being used, an error message will be displayed in the [Output] window.
Compile to ver.5 compatible	If set to [Enable], the ladder program will be compiled in a data format that can also be used in the MPE720 Ver. 5.
Allocation of function keys	The function keys are allocated differently in the MPE720 Ver. 7 and Ver. 6. If set to [Ver. 6 Compatible], the function keys will be allocated the same as in the MPE720 Ver. 6.
Easy register input	If set to [Enable], suggestions will be displayed when entering a register.
Automatically register address registers	If set to [Enable], address registers will be automatically registered as variables when you use instructions for which address registers are specified. Refer to the following section for details. ☞ *4.1.8 Automatically Registering Address Registers as Variables on page 142*
Provide notification of possible overflows	A warning will be displayed in the [Output] window if there is the possibility that an overflow may occur during CP ladder conversion.
Use robot control instructions	If set to [Disable], the operational performance of the SigmaWin+ AE will be improved. **Note:** MLx function structures will be simplified, so there will be an impact on the functionality and operations related to MLx functions. To use robot control instructions, set this item to [Enable].
Automatically assign D registers to Param operand	If set to [Enable], the D registers that are not used in the drawing are automatically assigned to the [Param] operand when an MLx instruction is inserted into the drawing.

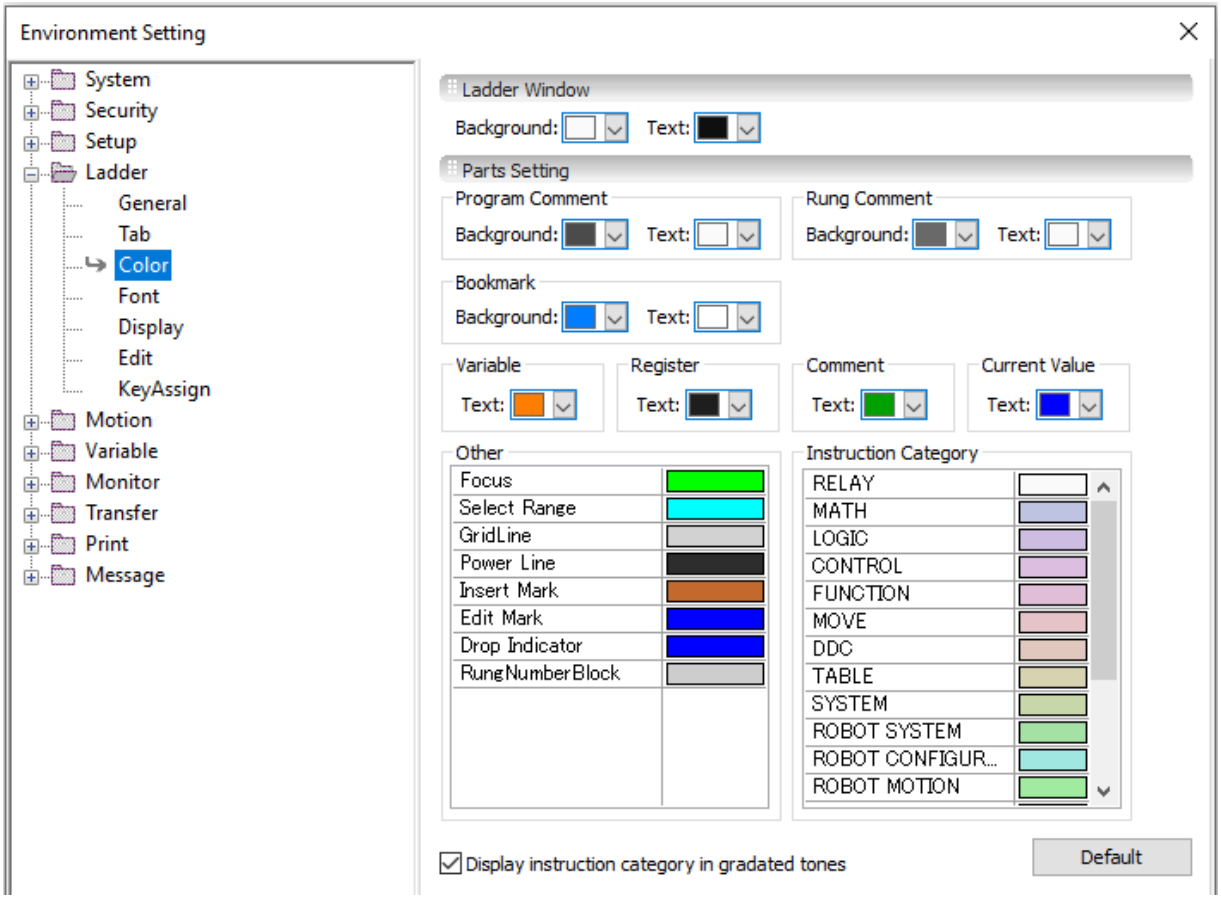
8.1.14 [Ladder] - [Tab]



Item	Description
Tab size	Set the size of the tab (white space) that is inserted when the **Tab** key is pressed in the editor on the [Expression Editor] window and other windows.

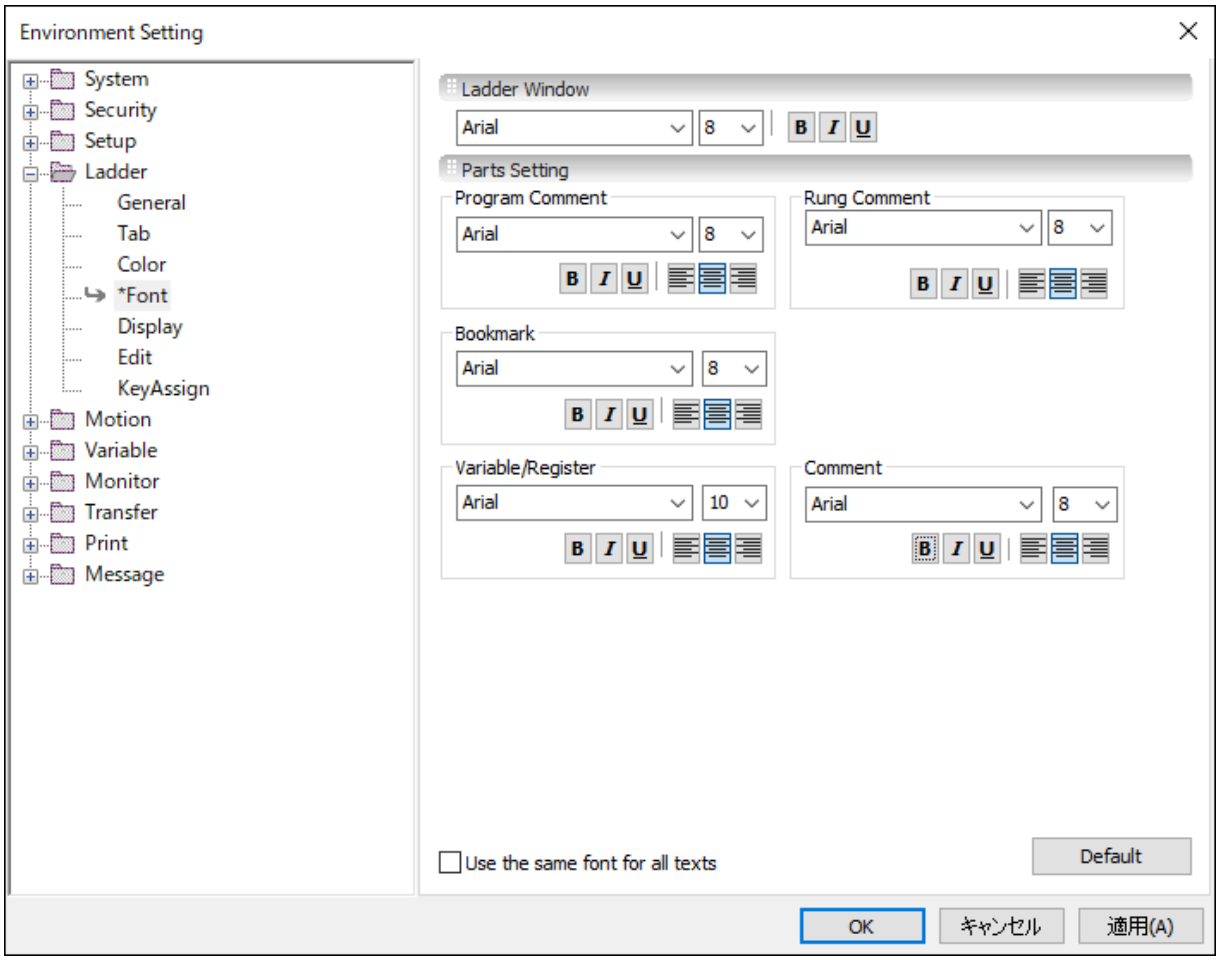
8.1.15 [Ladder] - [Color]

You can change the colors of the various elements displayed in the Edit Ladder Program Window.

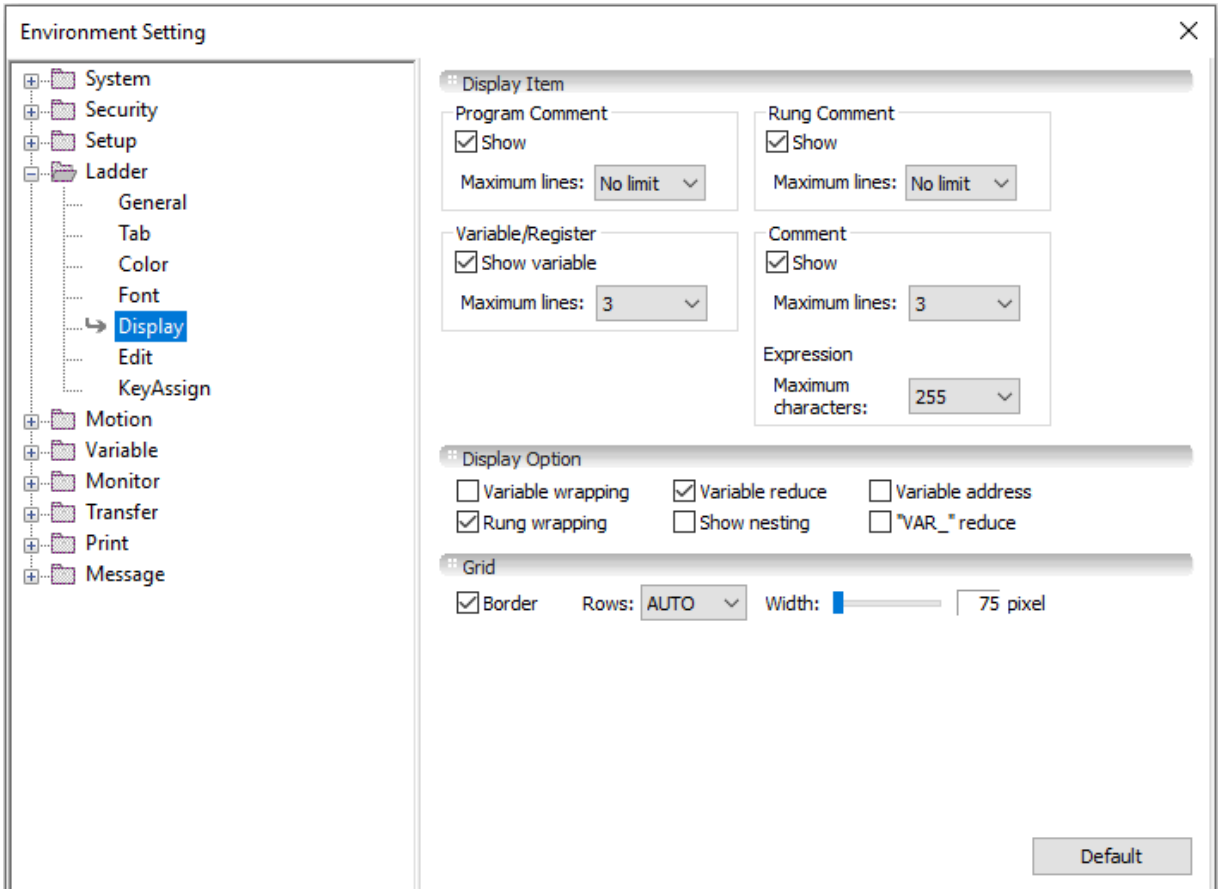


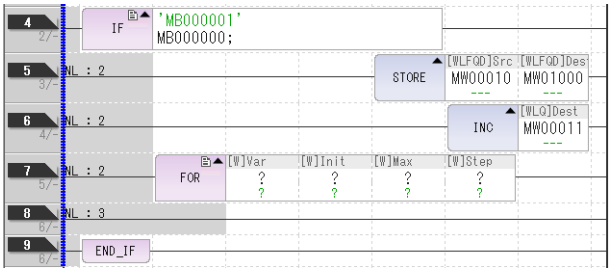
8.1.16 [Ladder] - [Font]

You can set the fonts of the various elements displayed in the Edit Ladder Program Window.

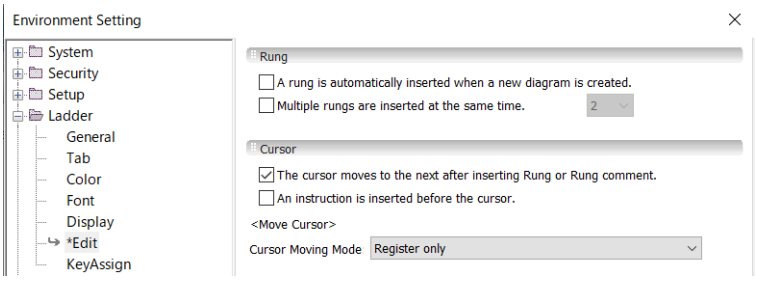

Environment Setting
System
Security
Setup
Ladder
General
Tab
Color
*Font
Display
Edit
KeyAssign
Motion
Variable
Monitor
Transfer
Print
Message
Ladder Window
Arial
8
Parts Setting
Program Comment
Arial
8
Rung Comment
Arial
8
Bookmark
Arial
8
Variable/Register
Arial
10
Comment
Arial
8
Use the same font for all texts
Default
OK
キャンセル
適用(A)

8.1.17 [Ladder] - [Display]



Item		Description
Display Item	Program Comment	Set whether to show or hide program comments and the maximum number of lines to use for those comments.
	Rung Comment	Set whether to show or hide rung comments and the maximum number of lines to use for those comments.
	Variable/Register	Set whether to show or hide variables or registers and the maximum number of lines to use for those comments.
	Comment	Set whether to show or hide register comments, the maximum number of lines to use for those comments, and the maximum number of characters to use for comments in the Expression instruction. If a comment exceeds the maximum number of characters that is set, "-" will be displayed.
Display Option	Variable wrapping	Wraps the variable if the variable is long.
	Variable reduce	Shortens the variable using "~" if the variable is long.
	Variable address	Displays the address of the register in the variable.
	Rung wrapping	Displays one rung using two lines if the window is narrow.
	Show nesting	Uses shading for the nested structure of IF, FOR, and WHILE instructions. 
	"VAR_" reduce	Omits the "VAR_" prefix of variables registered for local registers.
Grid	Border	If this check box is selected, the grid lines are displayed.
	Rows	Set the number of rows to display in the Edit Ladder Program window. If set to [AUTO], the number of rows changes according to the width of the window.
	Width	Set the width of the rows using the slider.

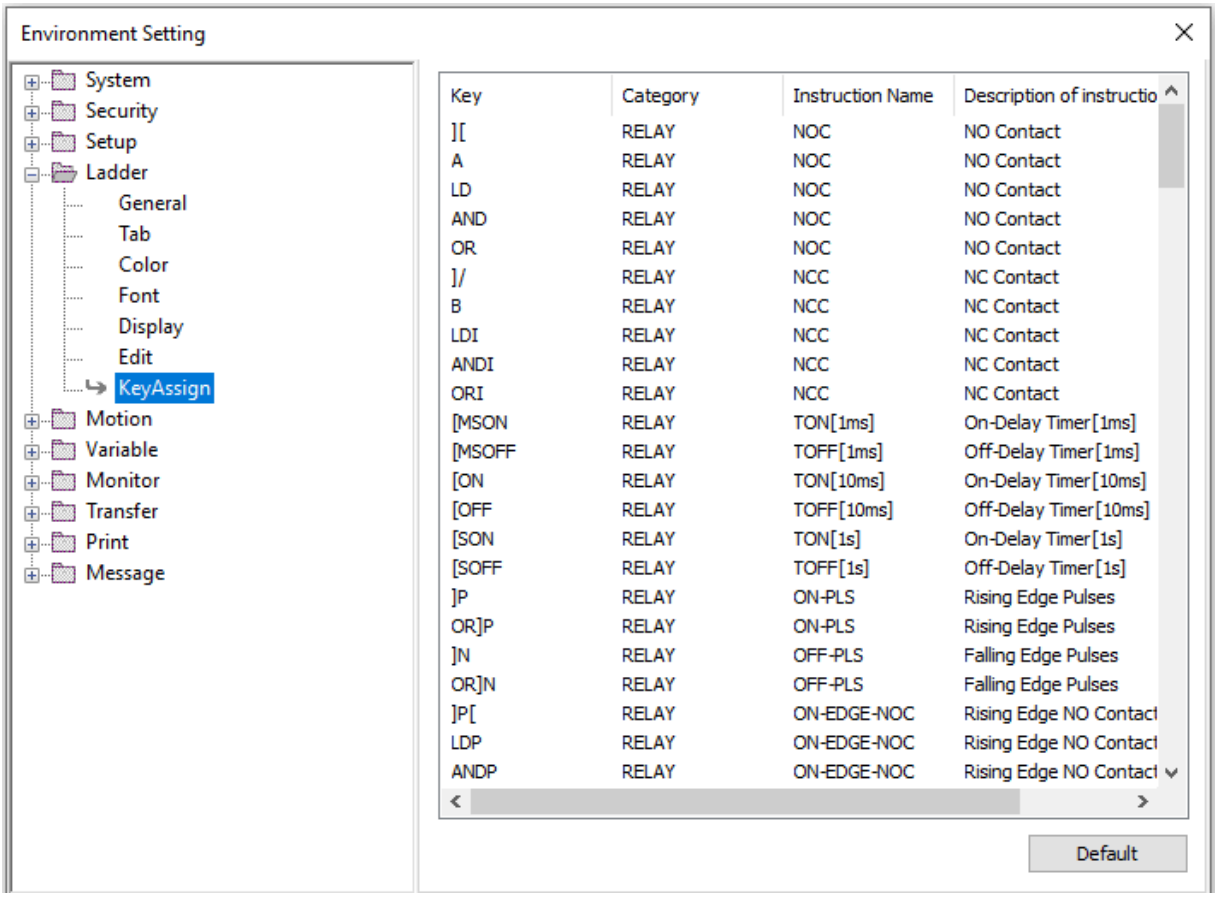
8.1.18 [Ladder] - [Edit]



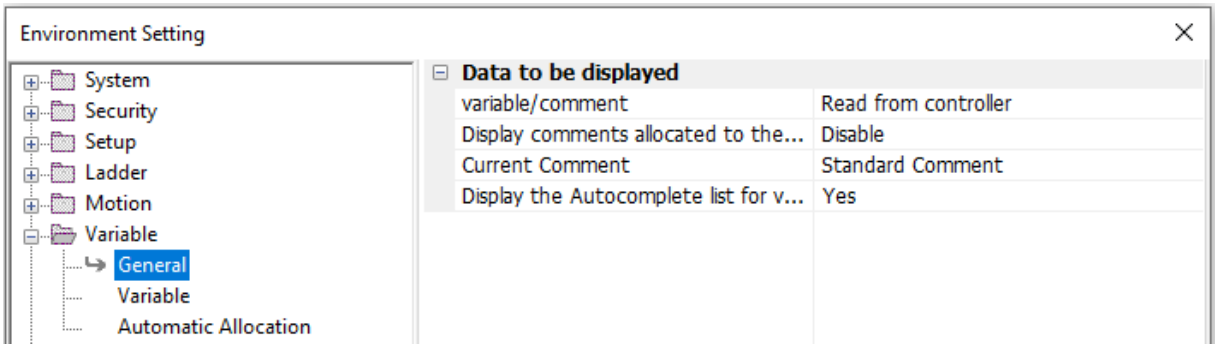
Item		Description
Rung	A rung is automatically inserted when a new diagram is created.	If this check box is selected, a drawing with one rung already inserted will be opened when creating a new drawing.
	Multiple rungs are inserted at the same time.	If this check box is selected and the number of rungs is set, that many rungs can be inserted at one time.
Cursor	The cursor moves to the next after inserting Rung or Rung comment.	If this check box is selected, the cursor is displayed on the rung after the rung is inserted.
	An instruction is inserted before the cursor.	If this check box is selected, an instruction is inserted before the object selected by the cursor.
	Cursor Moving Mode	The cursor can be moved when you press the **Enter** key in a program. You can change the order of the movement with this item.

8.1.19 [Ladder] - [KeyAssign]

The list of keys to use when entering instructions is displayed.

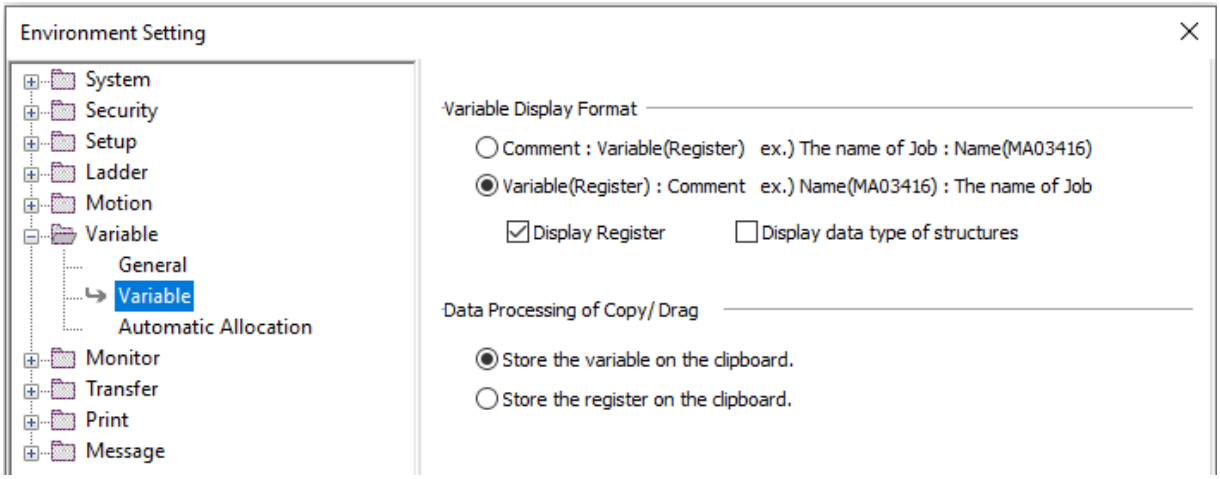


8.1.20 [Variable] - [General]



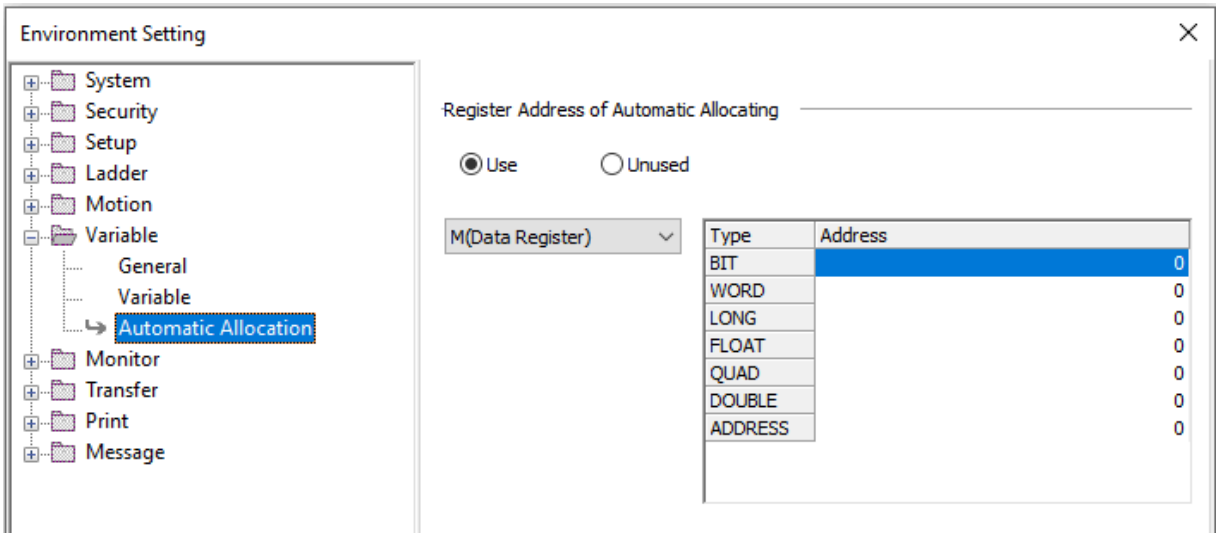
Item	Description
variable/comment	Select the reading source of the global register variables/comments to display in the SigmaWin+ AE from [Read from controller] or [Read from project]. The setting is enabled the next time the SERVOPACK is connected.
Display comments allocated to the user-defined structure	If set to [Enable], user-defined structure comments are displayed when user-defined structures are allocated to variables. However, register comments are excluded if registered to variables.
Current Comment	Select the type of comments that are displayed and updated from [Standard Comment], [Extended Comment 1], [Extended Comment 2], and [Extended Comment 3].
Display the Autocomplete list for variables and registers	Displays a list of possible variables and registers.

8.1.21 [Variable] - [Variable]



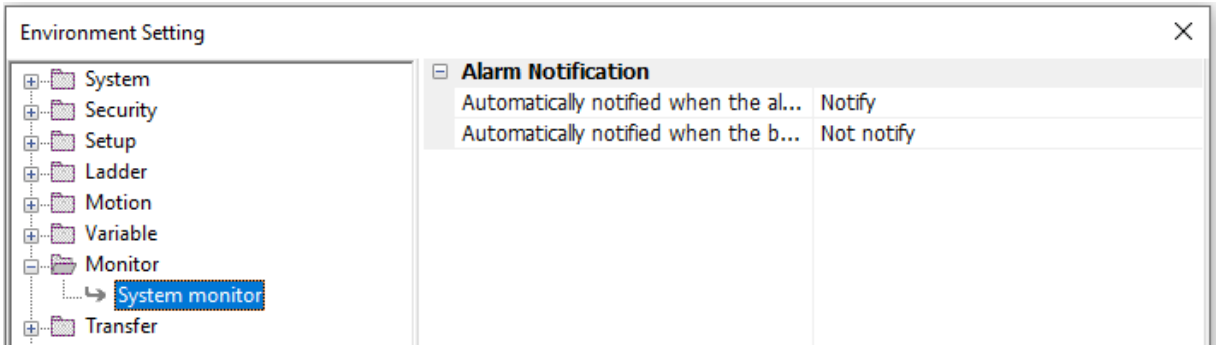
Item	Description
Variable Display Format	Set the display format of variables, registers, and comments. If [Display Register] or [Display data type of structures] are selected, the "ex.)" label will change according to the settings.
Data Processing of Copy/ Drag	Select the data to store in the clipboard when copying or dragging a variable.

8.1.22 [Variable] - [Automatic Allocation]



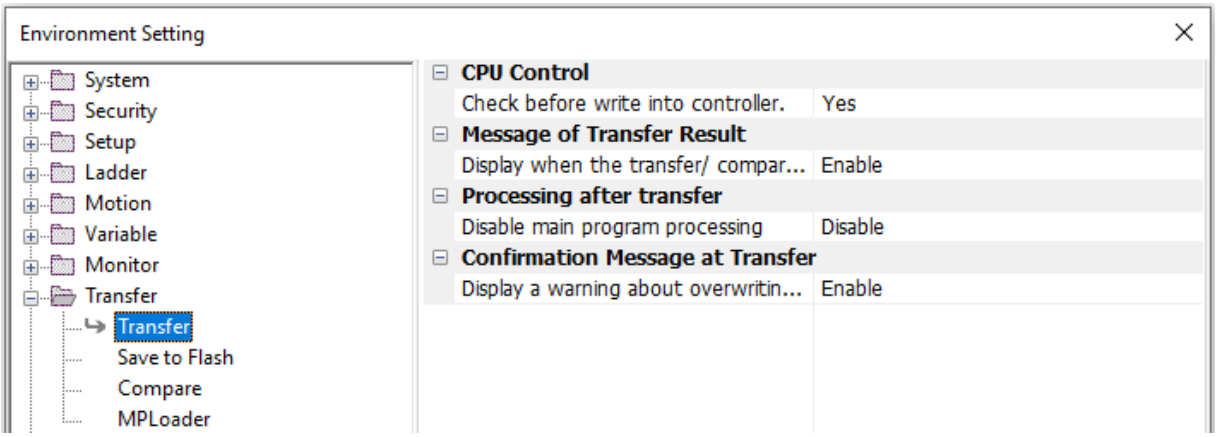
Item	Description
Register Address of Automatic Allocating	Set whether to automatically allocate the range of registers to use.

8.1.23 [Monitor] - [System monitor]



Item	Description
Automatically notified when the alarm occurs	If set to [Notify], the [System Monitor] window is automatically started and the alarm information is displayed when an alarm occurs.
Automatically notified when the battery alarm occurs	If set to [Notify], the [System Monitor] window is automatically started and the alarm information is displayed when a battery alarm occurs.

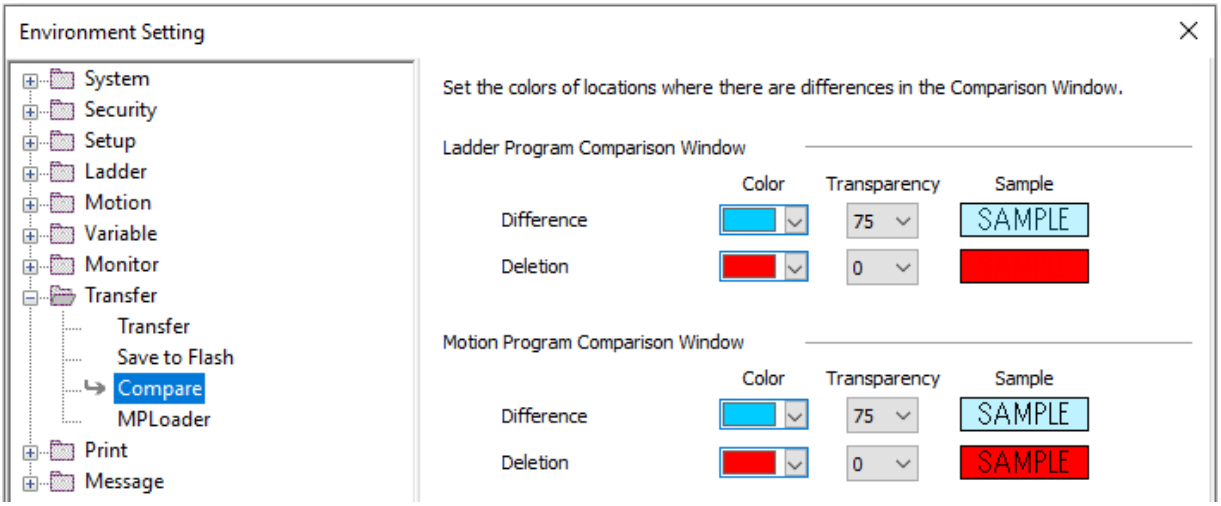
8.1.24 [Transfer] - [Transfer]



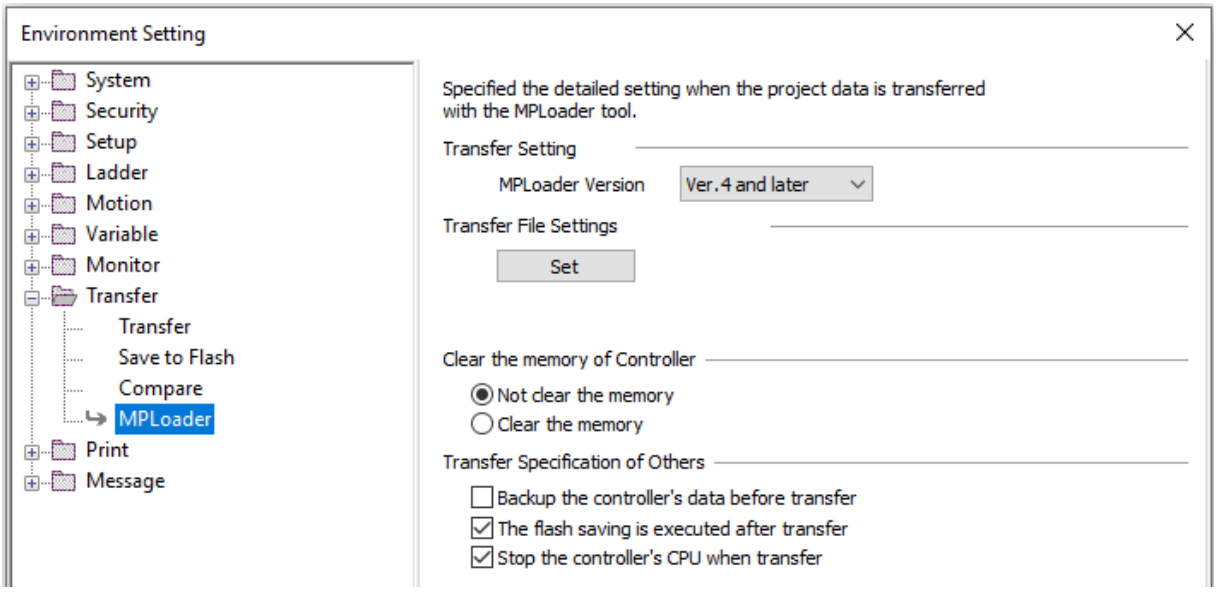
Item	Description
Check before write into controller.	If set to [Yes], a message asking for confirmation to stop the CPU will be displayed before writing data into the SERVOPACK.
Display when the transfer/compare ended.	If set to [Enable], a message will be displayed when the transfer or comparison has completed.
Disable main program processing	If set to [Enable], the main program will be disabled after a write error occurs.
Display a warning about overwriting drawing	If set to [Enable], a warning message will be displayed when overwriting the program with the same drawing number in the destination.

8.1.25 [Transfer] - [Compare]

You can change the colors of locations with differences that are displayed in the comparison window.

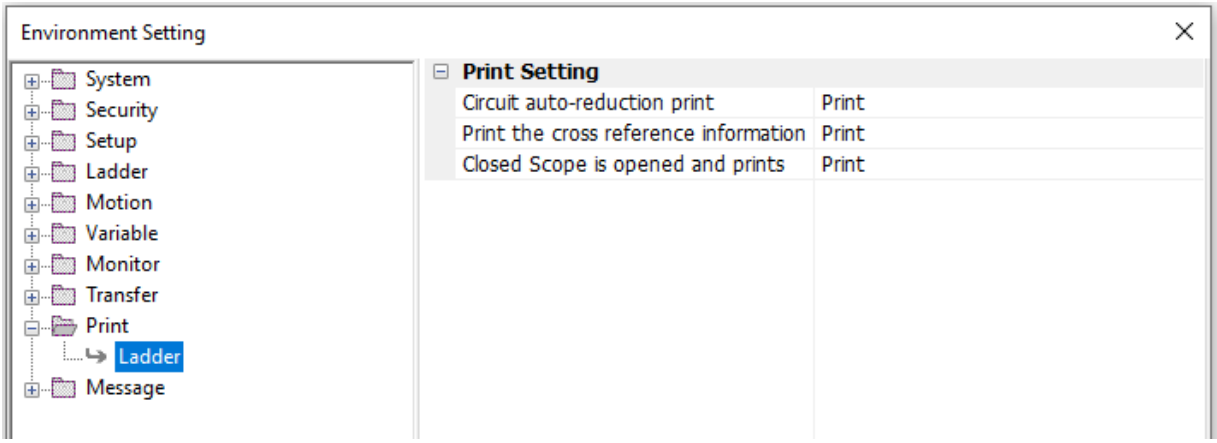


8.1.26 [Transfer] - [MPLoader]



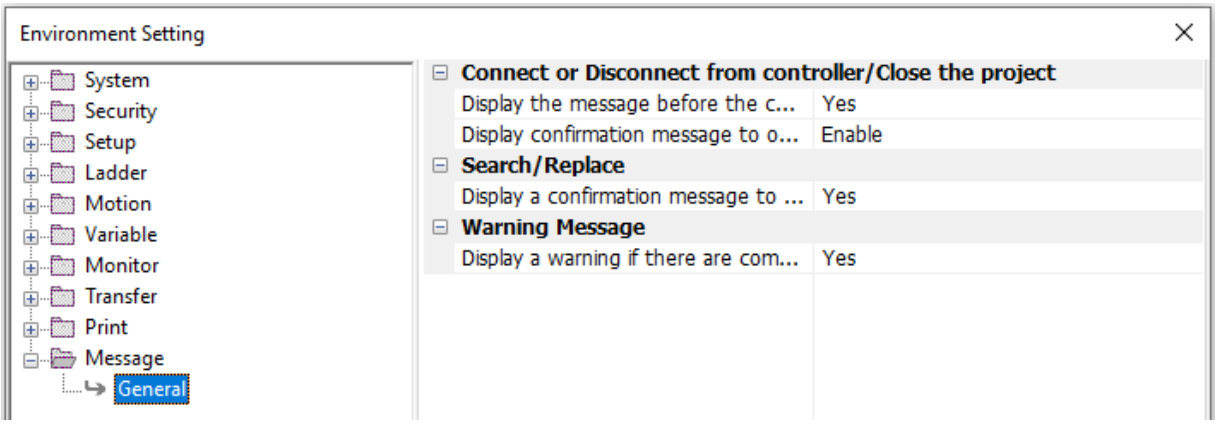
Item	Description
Transfer Setting	Select the MPLoader version.
Transfer File Settings	Click the [Set] button and select the data to transfer in the displayed window.
Clear the memory of Controller	Select whether to clear the memory of the SERVOPACK after the transfer.
Backup the controller's data before transfer	If this check box is selected, the SERVOPACK data is backed up before the transfer.
The flash saving is executed after transfer	If this check box is selected, save to flash memory is executed after the transfer.
Stop the controller's CPU when transfer	If this check box is selected, the SERVOPACK's CPU is stopped during the transfer.

8.1.27 [Print] - [Ladder]



Item	Description
Circuit auto-reduction print	If set to [Print], the drawing is reduced to fit the width of one page when printing.
Print the cross reference information	If set to [Print], the drawing is printed with the cross reference information displayed to the right of the ladder program.
Closed Scope is opened and prints	If set to [Print], the drawing is printed with all instruction objects displayed that were reduced.

8.1.28 [Message] - [General]



Item	Description
Display the message before the connecting, disconnecting or closing	If set to [Yes], a confirmation message is displayed when connecting/disconnecting the SERVOPACK and when closing the project file.
Display confirmation message to overwrite the project	If set to [Enable], an overwrite confirmation message is displayed when closing the project file. If set the [Disable], the project file is automatically overwritten.
Display a confirmation message to ask if you want to continue the search	If set to [Yes], a confirmation message is displayed when the search reaches the beginning or end of the program.
Display a warning if there are compatibility problems with units	If set to [Yes], a warning message is displayed if there is a risk that units in the module configuration definition cannot be displayed in older versions of MPE720.

8.2 Printing

The SigmaWin+ AE has the following printing functions.

- Printing ladder program
- Printing program information, register information, and definition information

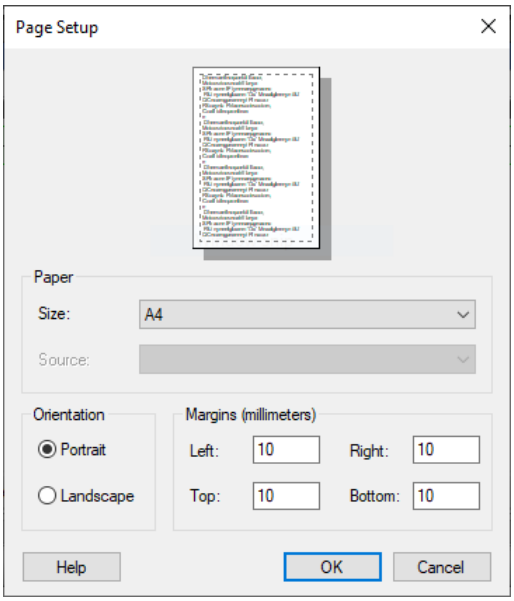
The printing procedures are given below.

8.2.1 Printing Drawings

This section describes the settings and operations for printing ladder program.

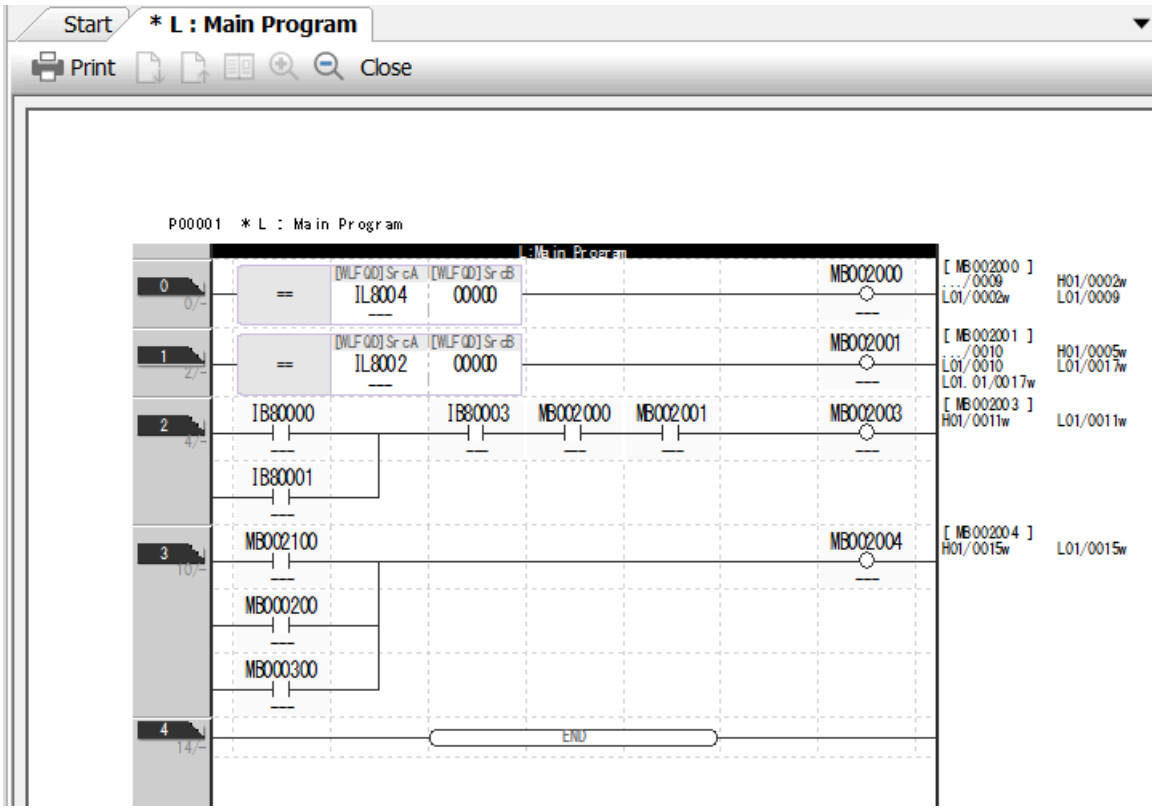
(1) Page Setup

Select [Page Setup] from the [File] menu to display the [Page Setup] window.
You can set the paper size, orientation, and margins here.



(2) Print Preview

Select [Print Preview] from the [File] menu to display the print preview tab page in the center window.



Item	Description
[Print] Button	Displays the [Print] window. You can set up the page and print the drawing.
	Moves between pages when the print preview has multiple pages.
	Changes the number of pages that are displayed when the print preview has multiple pages. Click this button to switch between displaying one page and two pages.
	Changes the magnification in three steps.
[Close] Button	Exits the print preview.

(3) Printing

There are the following two methods that you can use to print a program drawing.

- Printing from the [File] menu
- Printing from the [Ladder] window

The procedures are given below.

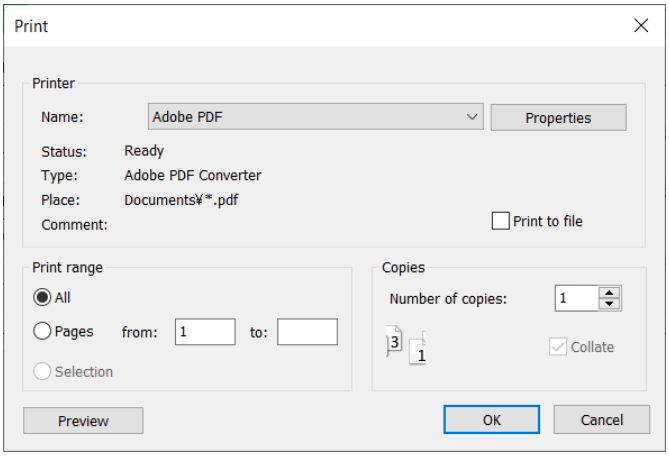
(a) Printing from the [File] Menu

Use the following procedure to print a drawing from the [File] menu.

1. **Open the drawing to print.**
2. **Select [Print] from the [File] menu.**

   The [Print] window will be displayed.

3. **Set the necessary items, and then click the [OK] button.**



This concludes the procedure.

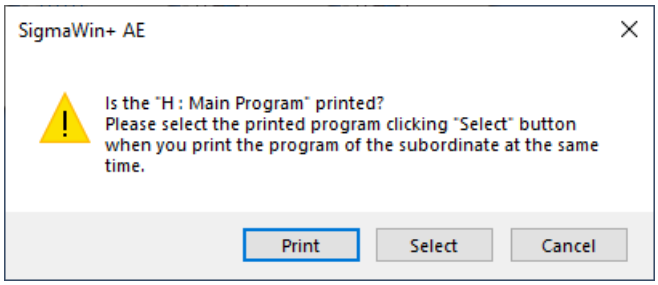
(b) Printing from the [Ladder] Window

Use the following procedure to print a drawing from the [Ladder] window.

1. **Right-click the drawing to print in the [Ladder] window, and select [Print].**

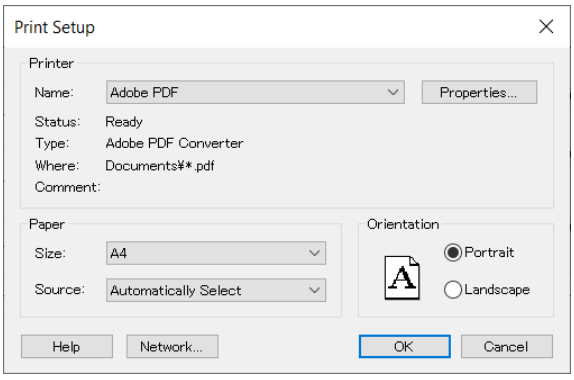
Information If there are drawings on the level under the selected drawing, the following message dialog box will be displayed.

To print only the selected drawing, click the [Print] button. To also print the program under the selected drawing, click the [Select] button.



The [Print Setup] window will be displayed.

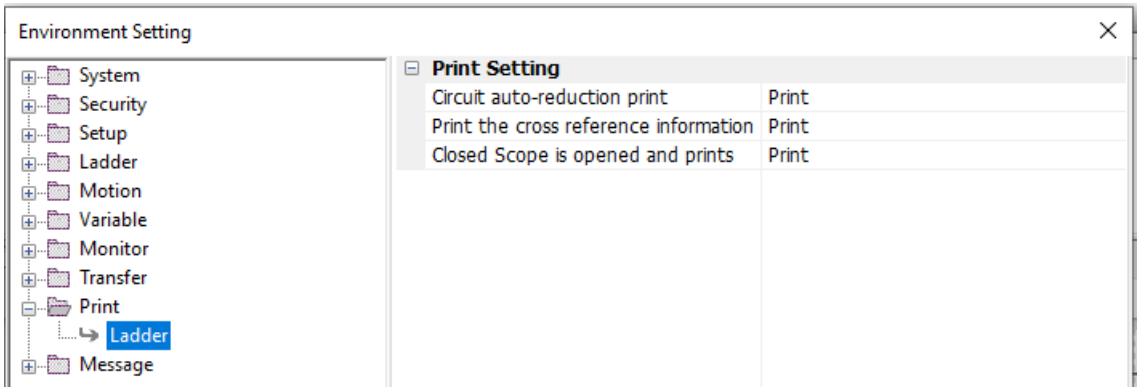
2. **Set the necessary items, and then click the [OK] button.**



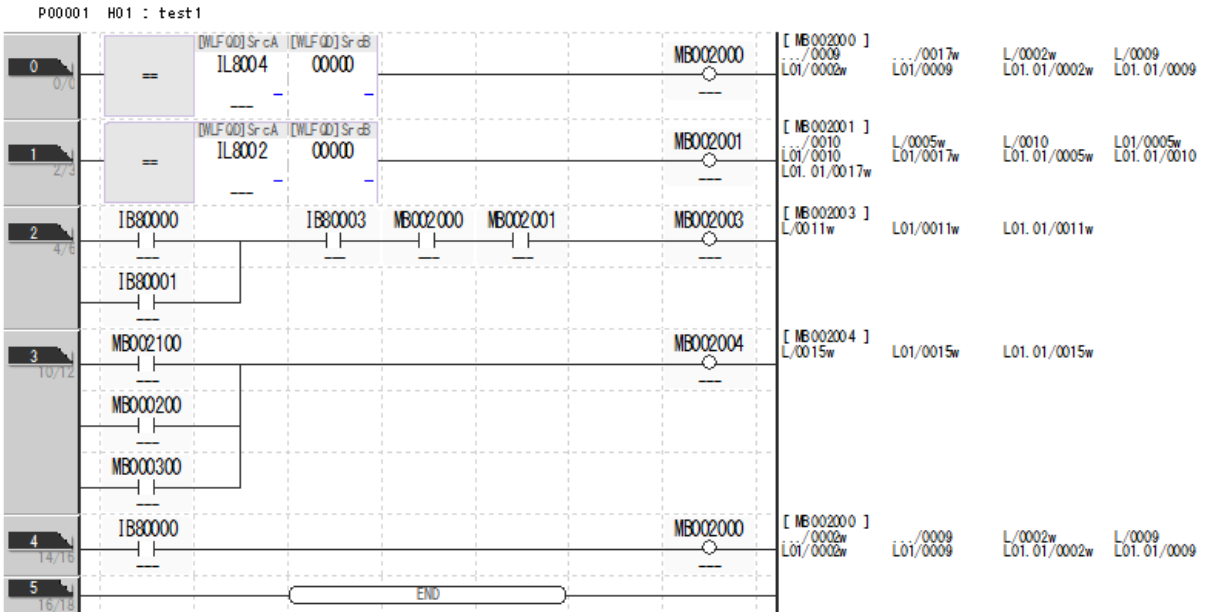
This concludes the procedure.

(4) Printing Cross Reference Information

If you set the following items in the [Environment Setting] window, you can print the cross reference information displayed to the right of the ladder program. The cross reference information can be printed only when the project file is opened offline.



The cross reference information is displayed in the following format: program number/step number + additional information.



Item	Description	Display Example
Program Number	The program numbers are displayed in the following order. High-speed → low-speed → start → function Level 1 → level 2	H H01.01 FUNC01
Step Number	The step number is displayed as a four digit number.	0001 1000
Additional Information	An index is displayed as "i" or "j".	H01/0010i H01/0010j
	An output register is displayed as "w".	H01/0010w

8.2.2 Printing Program Information, Register Information, and Definition Information

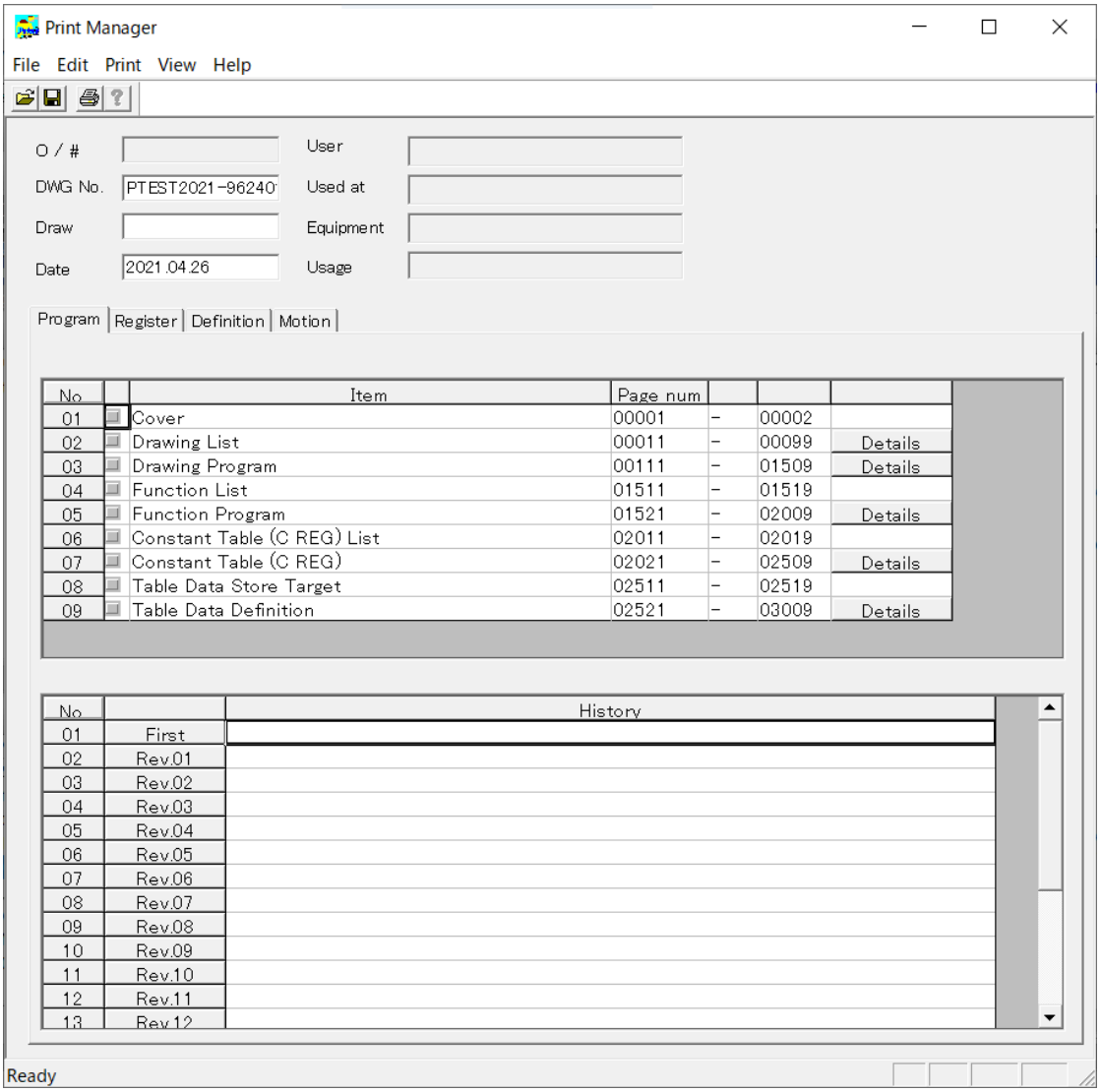
In the Print Manager, you can print program information, register information, and definition information. Use the following procedure.

1. **Select [Utility] - [Print builder] from the launcher.**

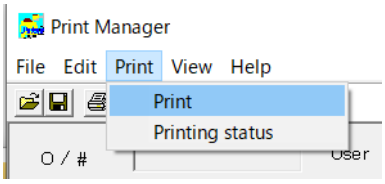
   The [Print Manager] window will be displayed.

   Information When you open the [Print Manager] window, the [List Manager] window will open at the same time and show the printing status.

2. **Select the items to print.**

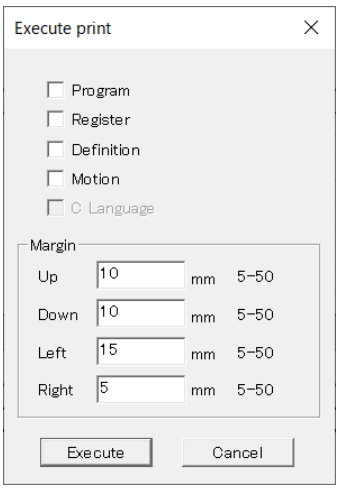


3. **Select [Print] from the [Print] menu.**



The [Execute print] window will be displayed.

4. **Set the printing targets and margins, and click the [Execute] button.**



The [Print Setup] window will be displayed.

5. **Set the necessary items, and then click the [OK] button.**

This concludes the procedure.

8.3 Export/Import

This section describes the procedures to export and import data in the SigmaWin+ AE.

8.3.1 Ladder Program

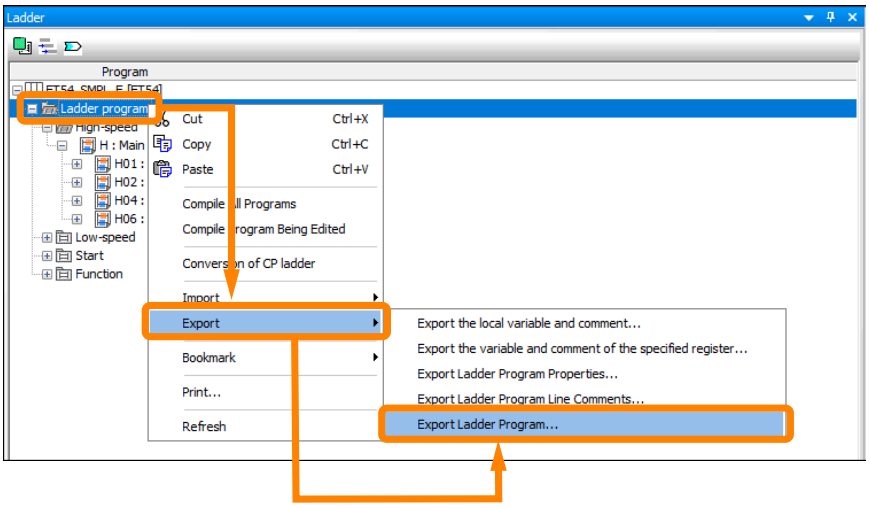
(1) Exporting Data

Use the following procedure to export ladder program.

> Important
>
> You cannot export a program when in online mode.

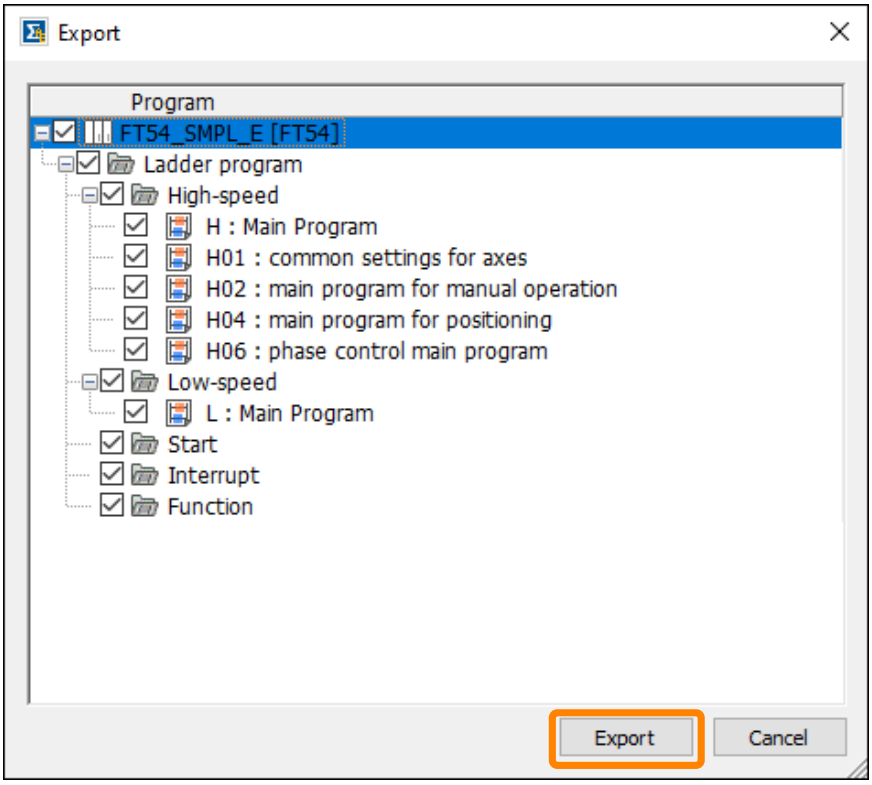
1. **Open the project file.**
2. **Perform one of the following operations depending on the SERVOPACK model and the program to export.**

Program to Export	Operation
Ladder program	In the [Ladder] window, right-click on [Ladder program], and select [Export] - [Export Ladder Program].



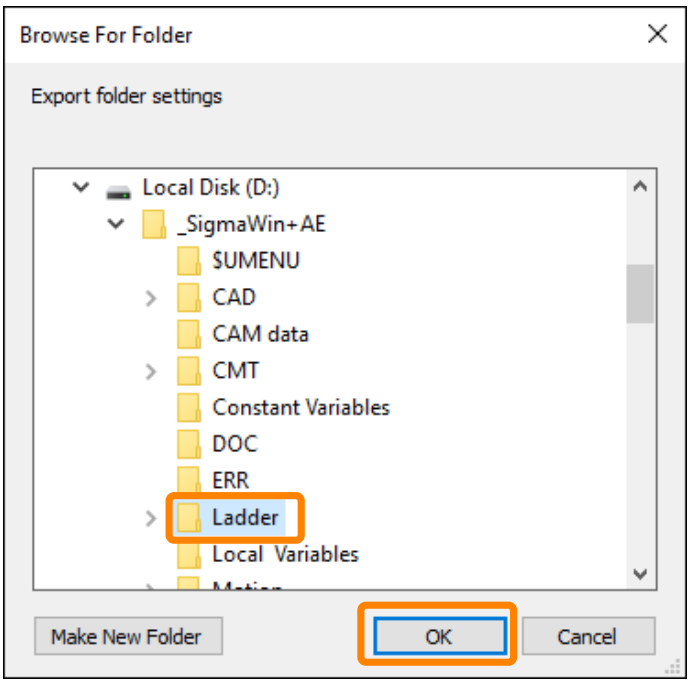
The [Export] window will be displayed.

3. **Select the check box of the programs to export, and click the [Export] button.**

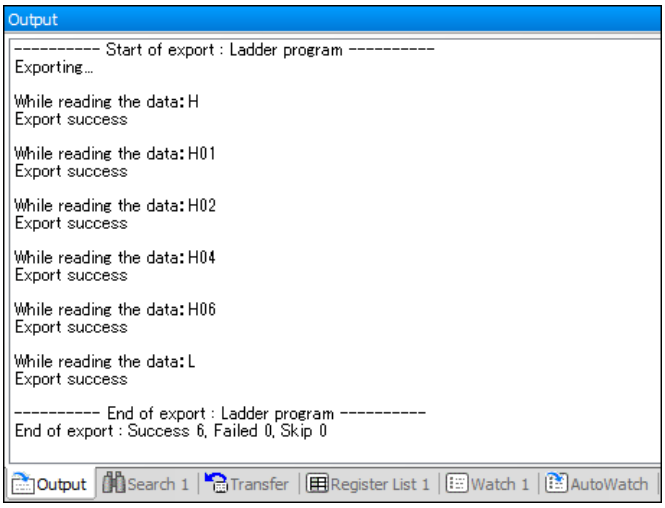


The [Browse For Folder] window will be displayed.

4. **Select the destination folder, and click the [OK] button.**



The data will be exported, and the results will be displayed in the [Output] window.



5. **Confirm that the exported files have been stored in the selected folder.**

   The file that will be exported is a YPI file.

This concludes the procedure.

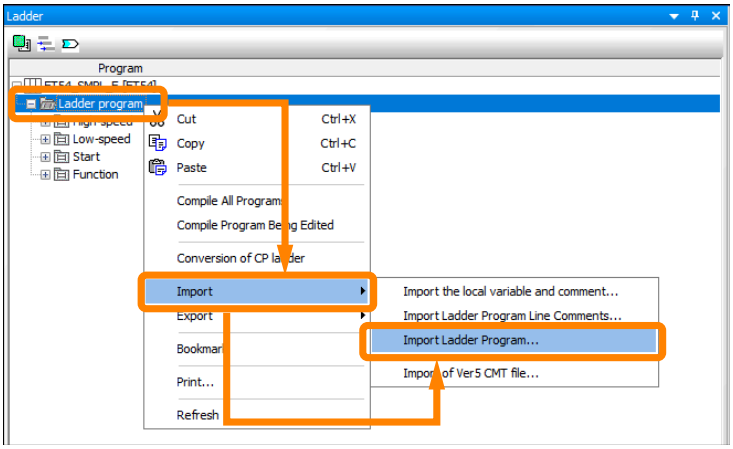
(2) Importing Data

Use the following procedure to import a ladder program.

> **Important**
>
> You cannot import a program when in online mode.

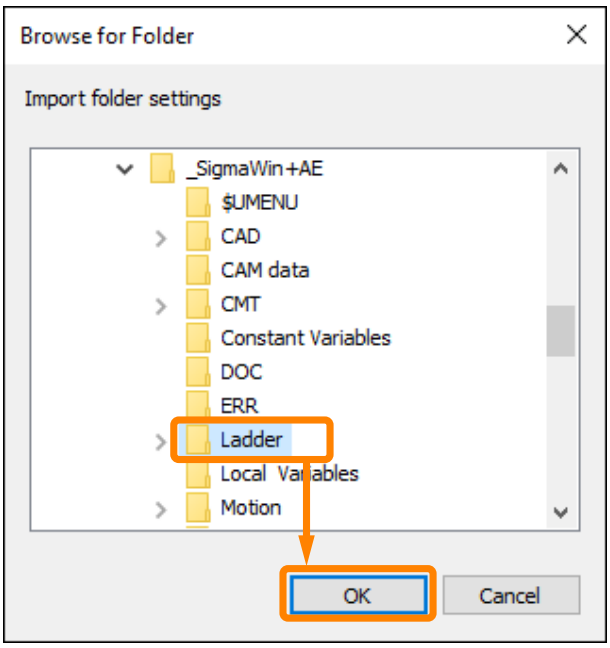
1. **Open the project file.**
2. **Perform one of the following operations depending on the SERVOPACK model and the program to import.**

Program to Import	Operation
Ladder program	In the [Ladder] window, right-click on [Ladder program], and select [Import] - [Import Ladder Program].

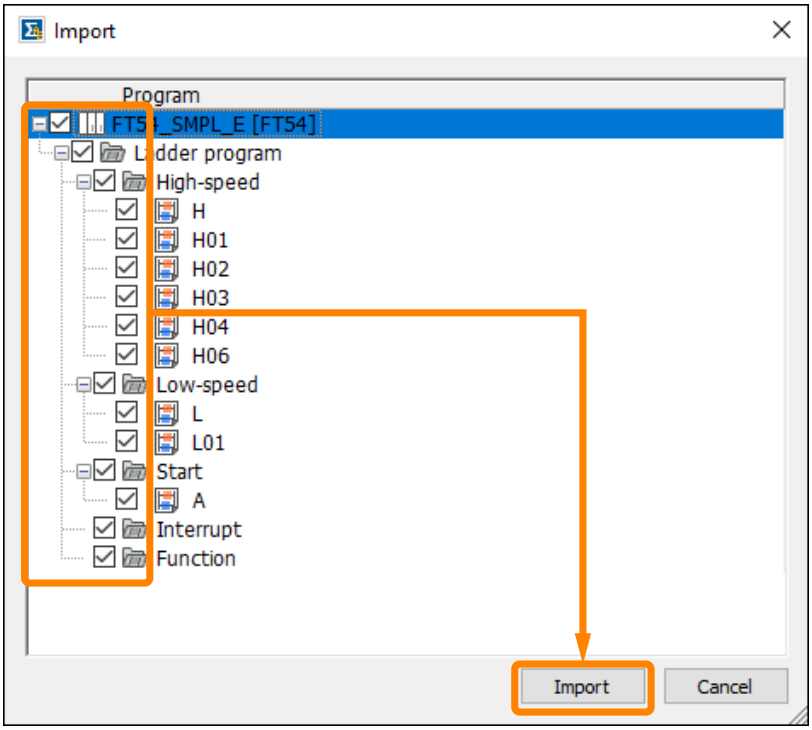


The [Browse For Folder] window will be displayed.

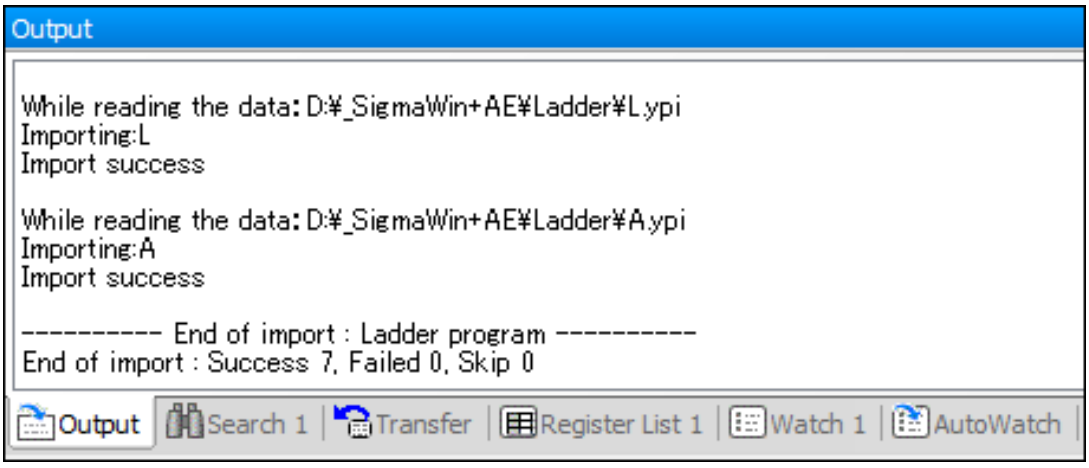
3. **Select the folder where the program to import is stored, and click the [OK] button.**



4. **Select the check box of the programs to import, and click the [Import] button.**



The data will be imported, and the results will be displayed in the [Output] window.



5. **Select [Compile Program Being Edited] from the [Compile] menu.**

This concludes the procedure.

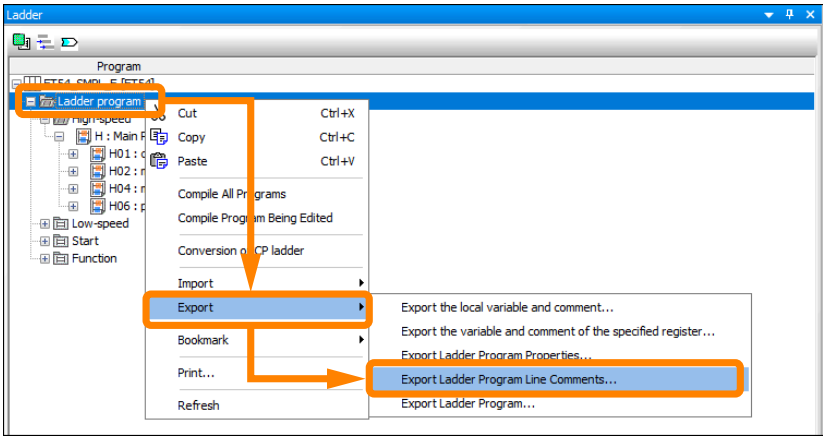
8.3.2 Ladder Program Line Comments

(1) Exporting Data

Use the following procedure to export ladder program line comments.

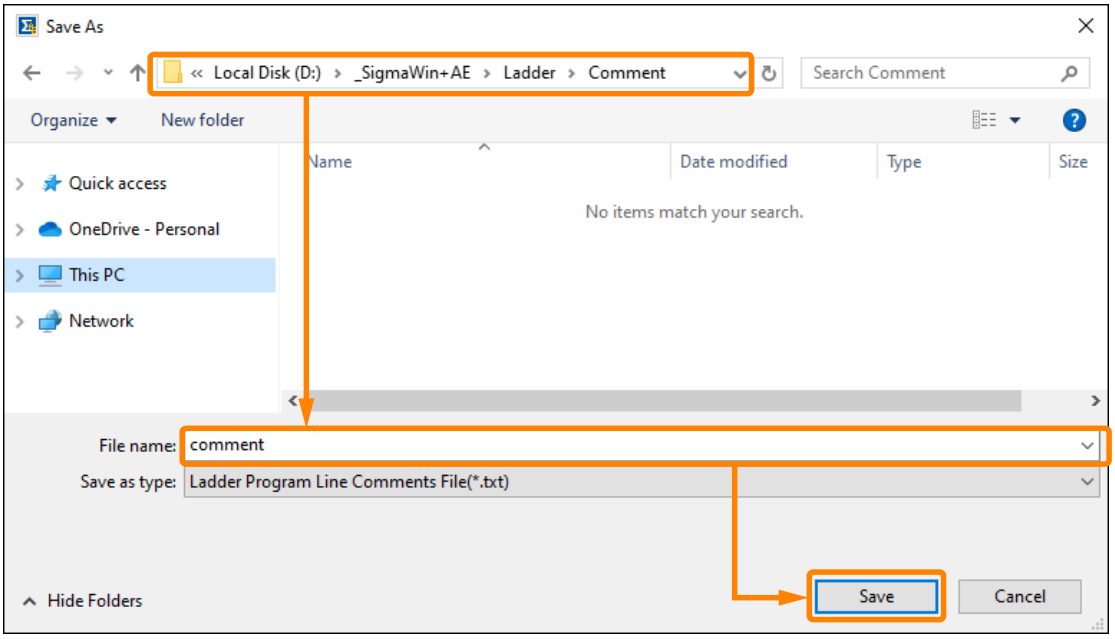
> Important
> You cannot export ladder program line comments when in online mode.

1. **Open the project file.**
2. **In the [Ladder] window, right-click on [Ladder program], and select [Export] - [Export Ladder Program Line Comments].**

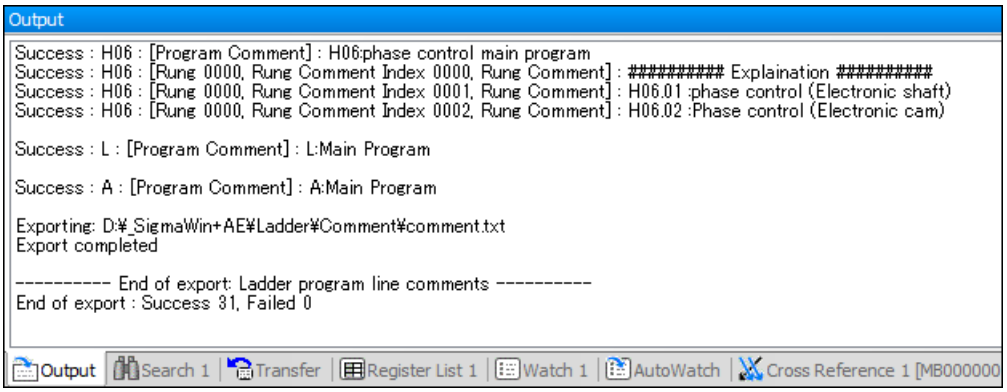


The [Save As] window will be displayed.

3. **Select the destination folder for the file, enter the file name, and click the [Save] button.**



The data will be exported, and the results will be displayed in the [Output] window.



4. **Confirm that the exported files have been stored in the selected folder.**

This concludes the procedure.

(2) Importing Data

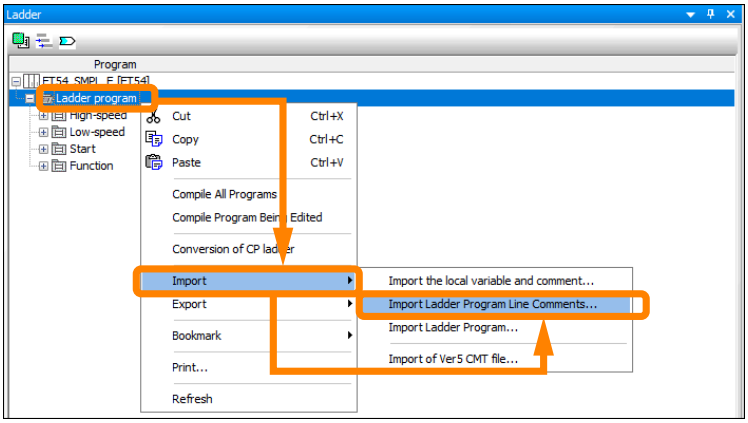
Use the following procedure to import ladder program line comments.

Important

- You cannot import ladder program line comments when in online mode.
- You can import a ladder program only when there is a program with the same name as the file name to import in the project file.

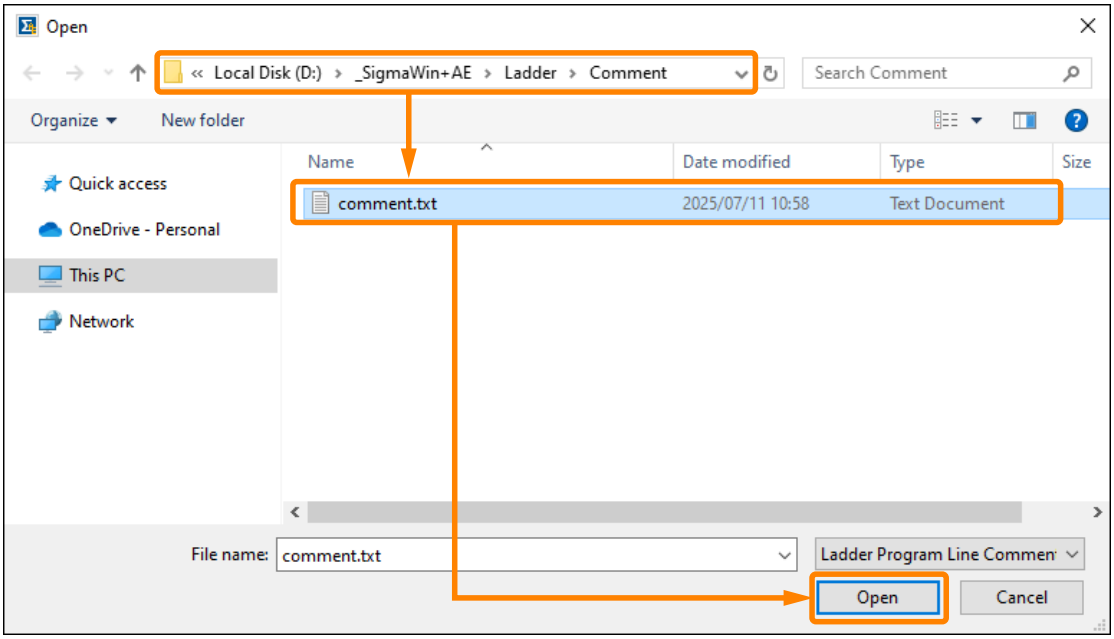
1. **Open the project file.**

2. **In the [Ladder] window, right-click on [Ladder program], and select [Import] - [Import Ladder Program Line Comments].**

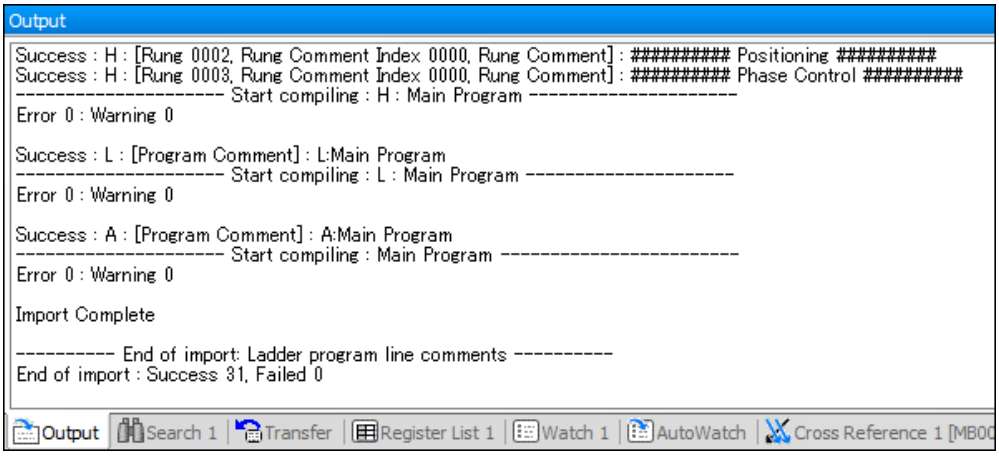


The [Open] window will be displayed.

3. **Select the folder where the program to import is stored, and click the [Open] button.**



The data will be imported, and the results will be displayed in the [Output] window.



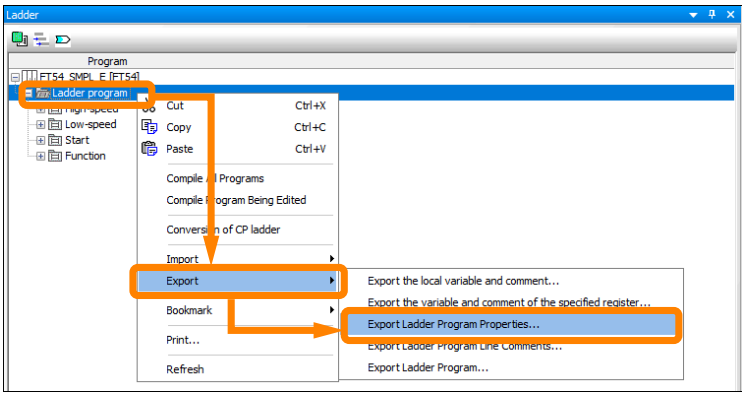
This concludes the procedure.

8.3.3 Program Properties

Use the following procedures to export the properties information of a ladder program to a CSV file.

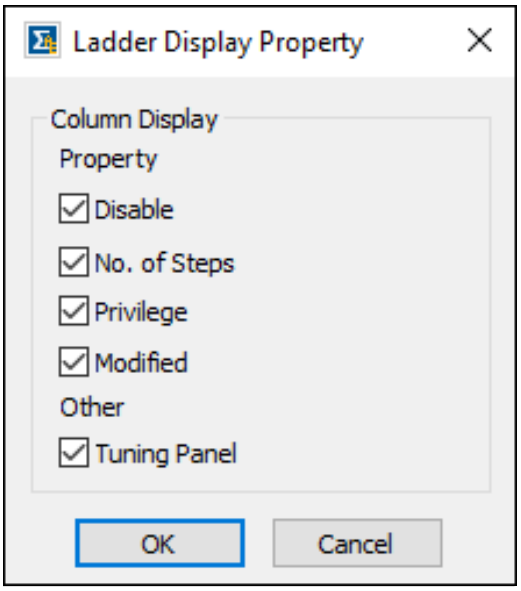
Use the following procedure to export the properties information of a ladder program.

1. **Establish an online connection or open a project file.**
2. **In the [Ladder] window, right-click on [Ladder program], and select [Export] - [Export Ladder Program Properties].**



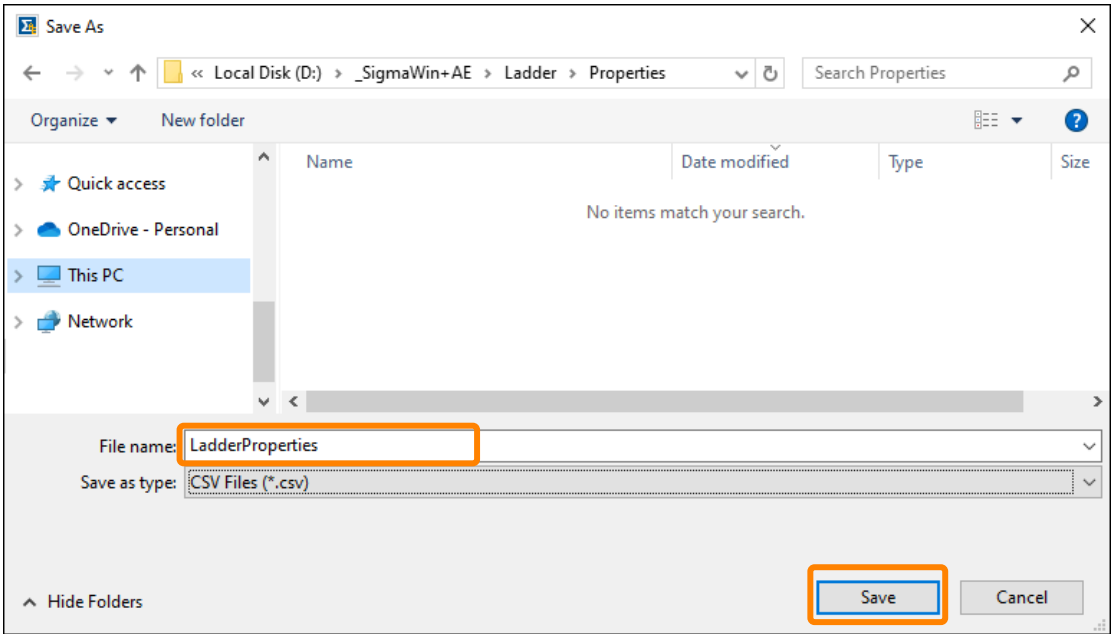
The [Ladder Display Property] window will be displayed.

3. **Select the properties to export, and click the [OK] button.**

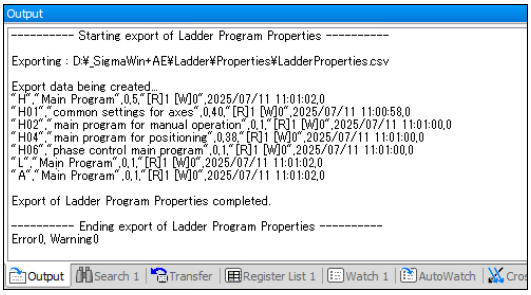


The [Save As] window will be displayed.

4. **Set the file name, and click the [Save] button.**



The data will be exported, and the results will be displayed in the [Output] window.



This concludes the procedure.

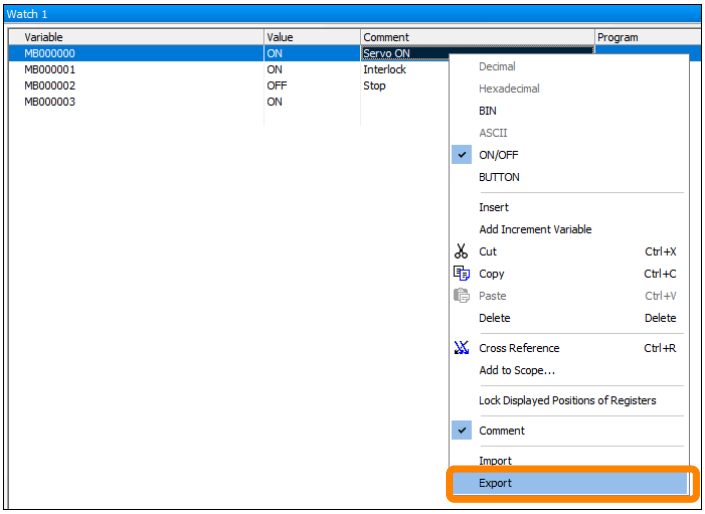
8.3.4 Watch Data

(1) Exporting Data

Use the following procedure to export watch data (variables or registers) registered to the [Watch] window.

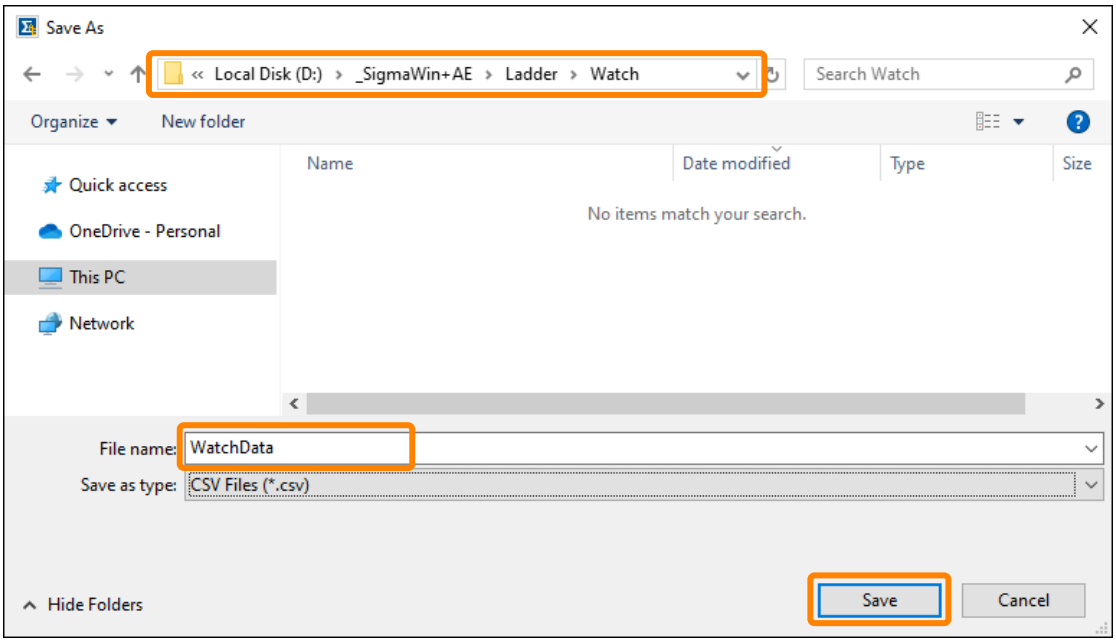
1. **Establish an online connection or open a project file.**
2. **Register the watch data to export to the [Watch] window.**

3. **Right-click on the [Watch] window, and select [Export].**

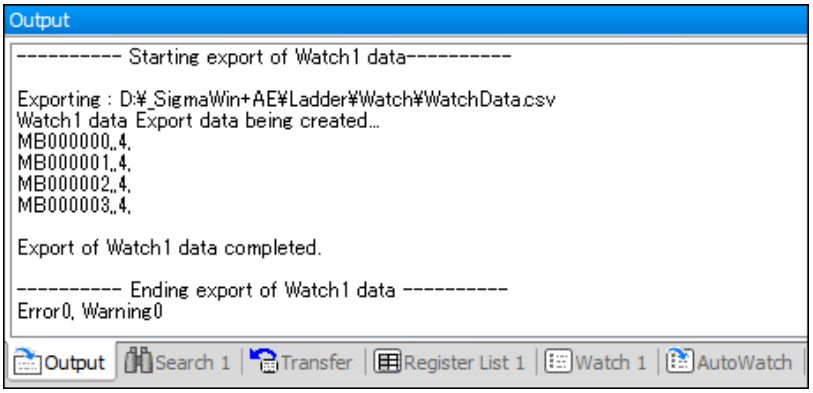


The [Save As] window will be displayed.

4. **Specify the destination folder and file name, and click the [Save] button.**



The data will be exported, and the results will be displayed in the [Output] window.

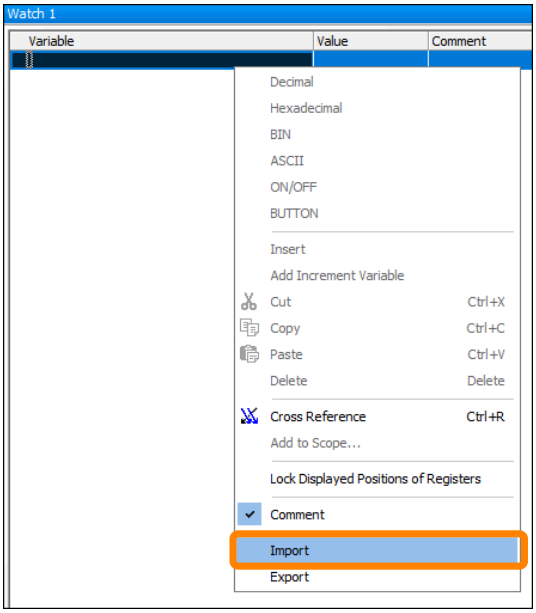


This concludes the procedure.

(2) Importing Data

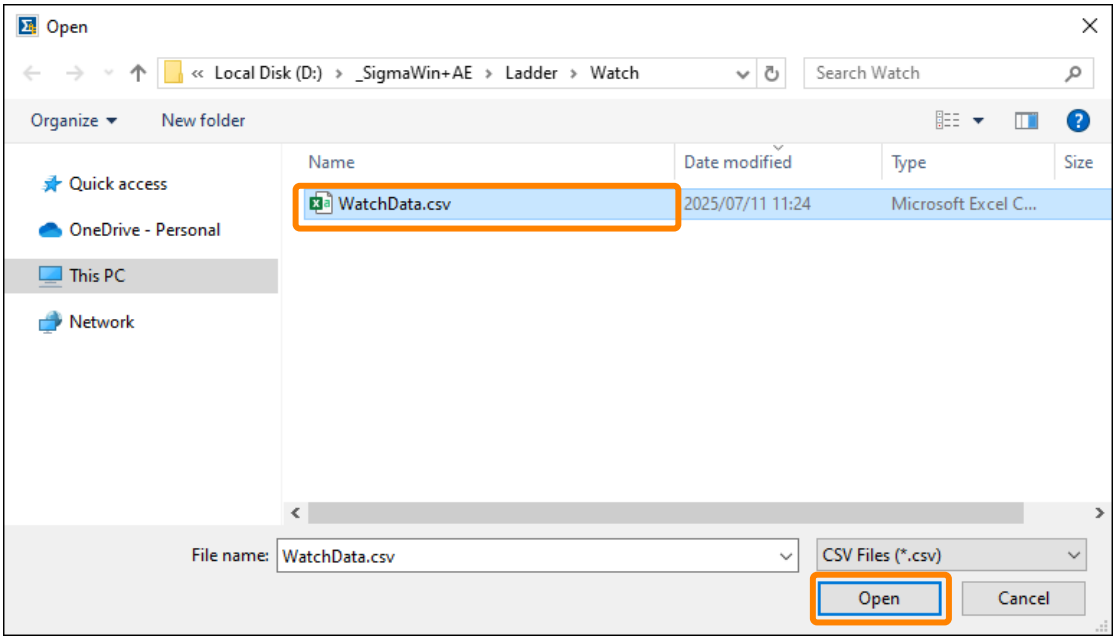
Use the following procedure to import watch data (variables or registers).

1. **Establish an online connection or open a project file.**
2. **Right-click on the [Watch] window, and select [Import].**

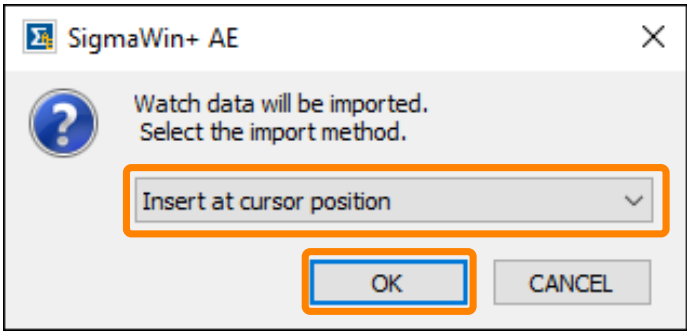


The [Open] window will be displayed.

3. **Specify the CSV file to import, and click the [Open] button.**

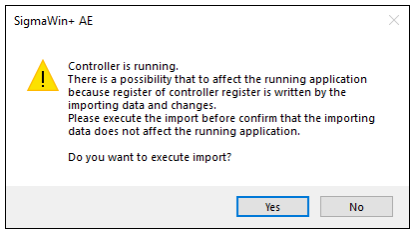


4. **Select the import method, and click the [OK] button.**

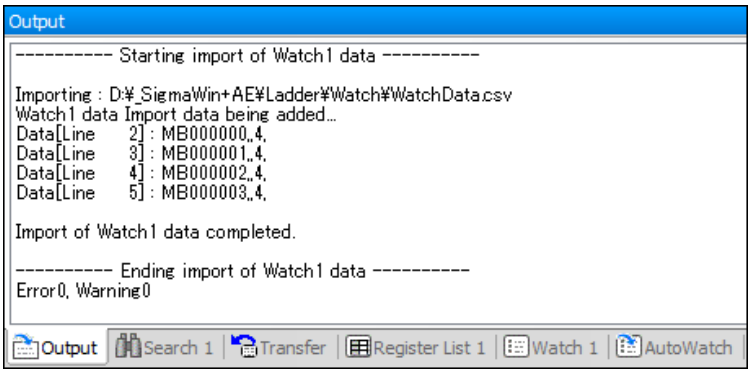


Important

If the SigmaWin+ AE is connected to a SERVOPACK, the following message will be displayed. Make sure that the application that is currently in execution will not be adversely affected before you execute the import.



The data will be imported, and the results will be displayed in the [Output] window.



This concludes the procedure.

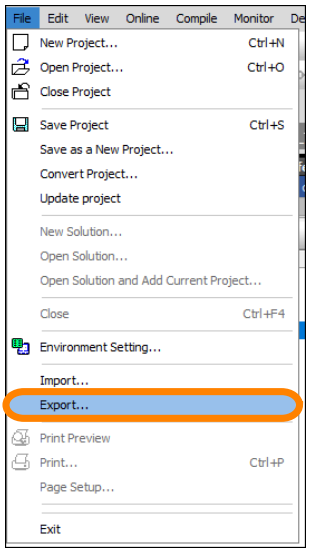
8.3.5 Register Data

You can export register data to or import register data from CSV files to easily back up or change the register data. Users may also create the data that is imported.

(1) Exporting Data

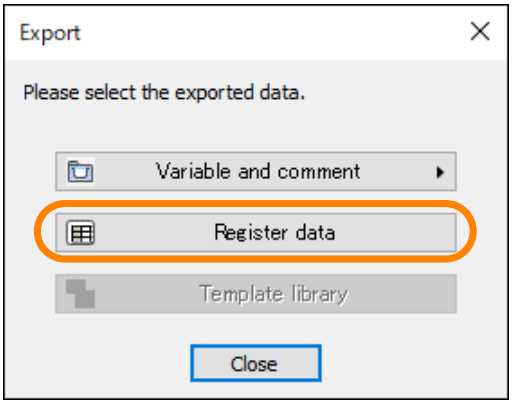
Use the following procedure to export register data.

1. **Establish an online connection or open a project file.**
2. **Select [Export] from the [File] menu.**



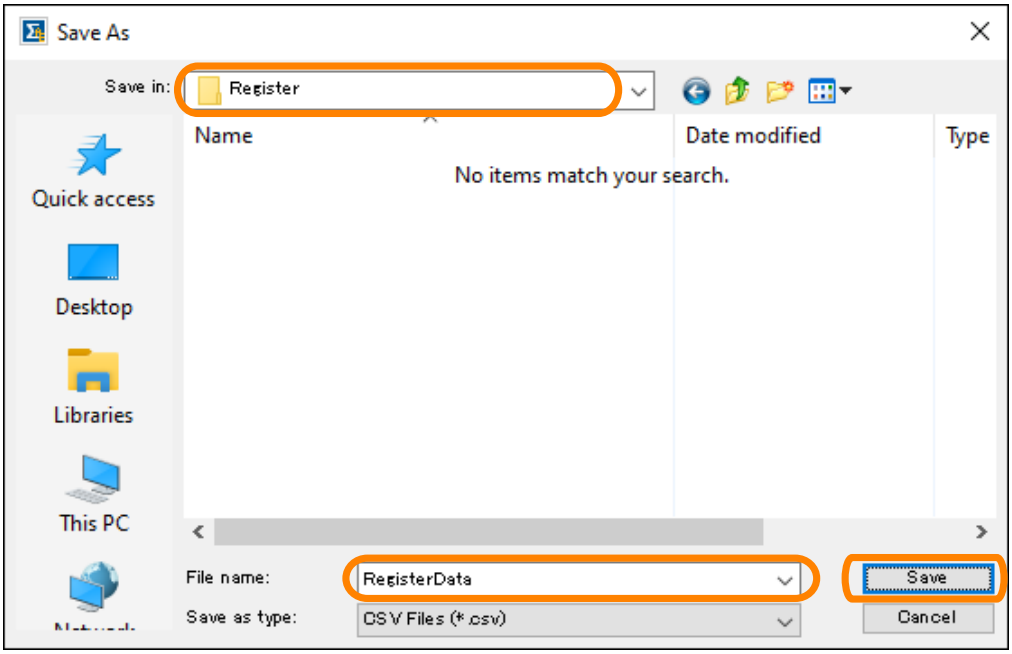
The [Export] window will be displayed.

3. **Click the [Register data] button.**



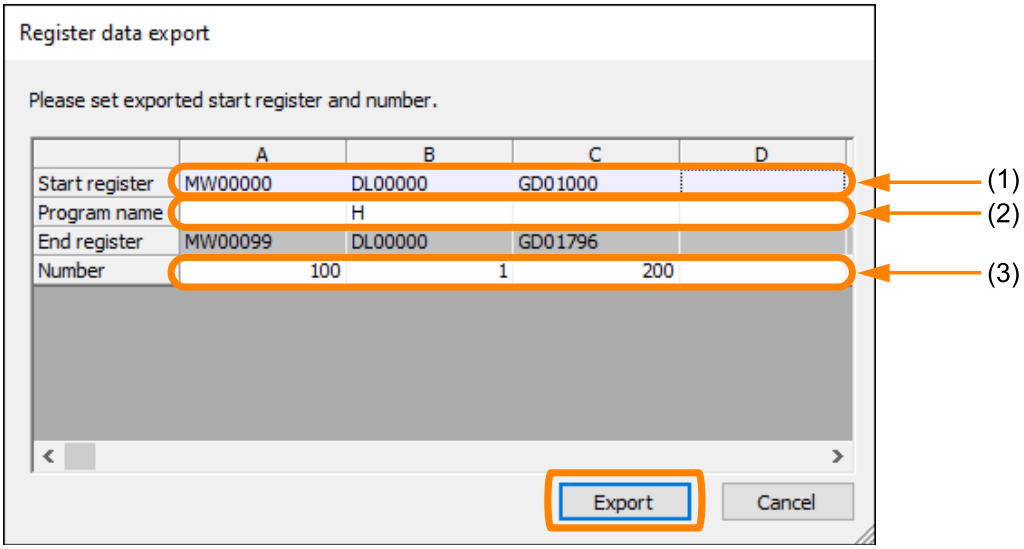
The [Save As] window will be displayed.

4. **Specify the destination folder and file name, and click the [Save] button.**



The [Register data export] window will be displayed.

5. **Enter the following items, and click the [Export] button.**

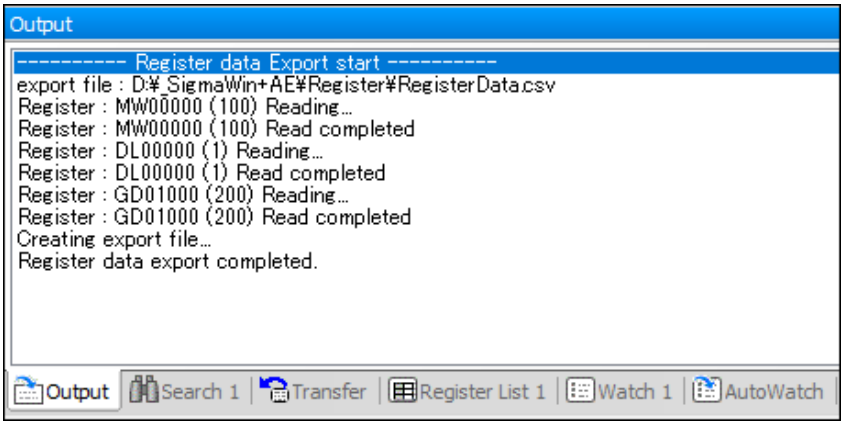


(1) The first address of the registers to export

(2) The program name (for local registers only)

(3) The number of registers from the first address of the registers to export

The data will be exported, and the results will be displayed in the [Output] window.



6. **Confirm that the exported data has been stored in the selected folder.**

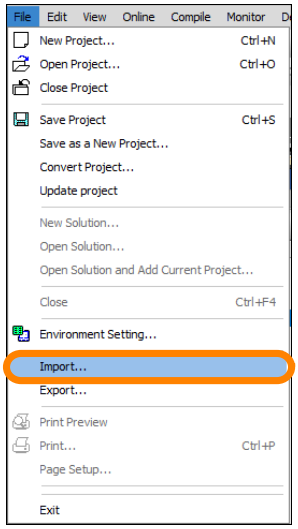
> Important
>
> If a warning dialog box appears, the specified register address may be outside the register range, or the format may be incorrect. Change the value and try again.

This concludes the procedure.

(2) Importing Data

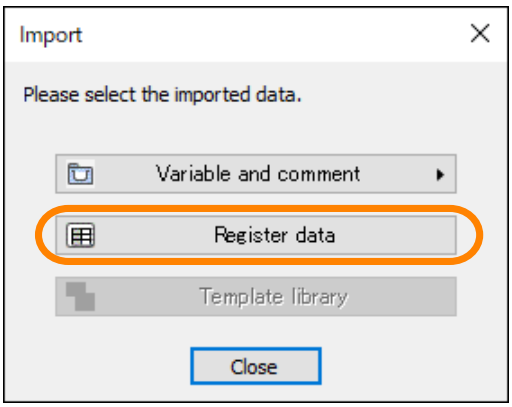
Use the following procedure to import register data.

1. **Select [Import] from the [File] menu.**



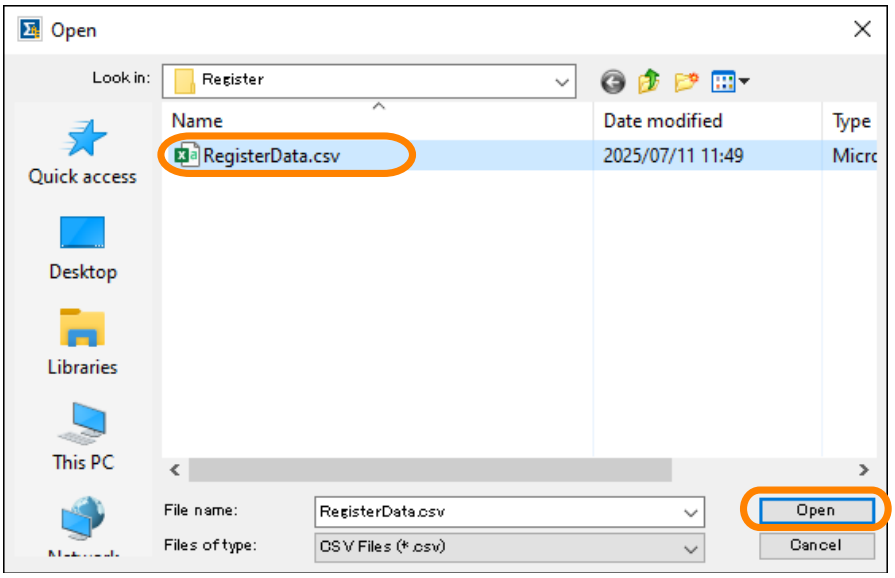
The [Import] window will be displayed.

2. **Click the [Register data] button.**



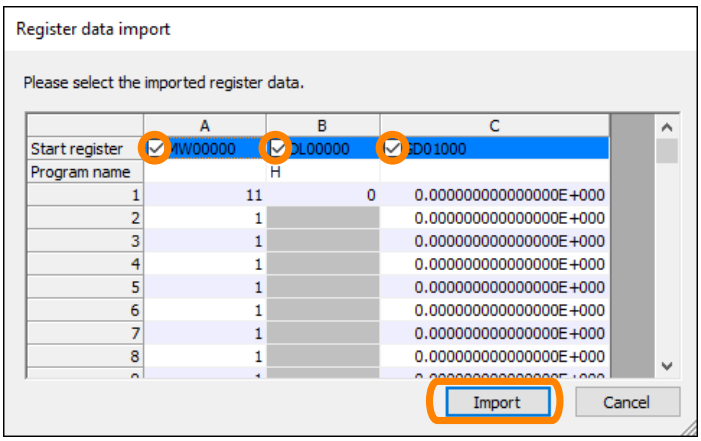
The [Open] window will be displayed.

3. **Select the CSV file to import, and click the [Open] button.**



The [Register data import] window will be displayed.

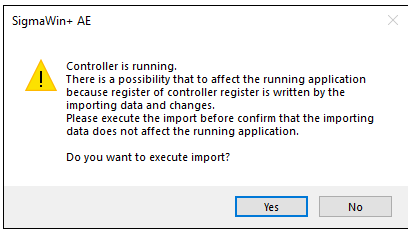
4. **Select the check box of the registers to import, and click the [Import] button.**



The data will be imported.

Important

If the SigmaWin+ AE is connected to a SERVOPACK, the following message will be displayed. Make sure that the application that is currently in execution will not be adversely affected before you execute the import.



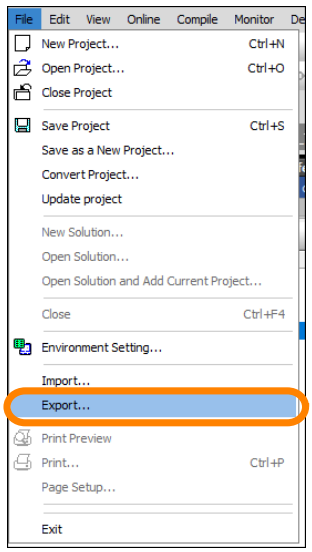
This concludes the procedure.

8.3.6 Global Variables and Comments

(1) Exporting Data

Use the following procedure to export global variables and comments.

1. **Establish an online connection or open a project file.**
2. **Select [Export] from the [File] menu.**

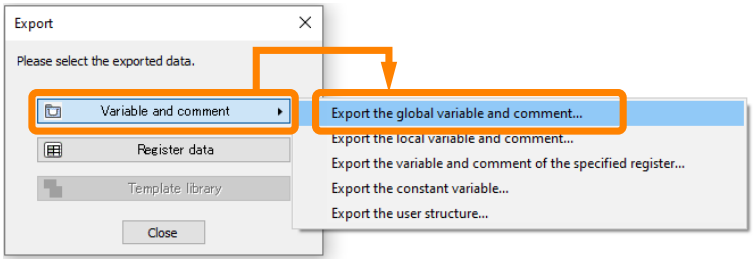


Information

You can also right-click on the [Comment List] tab page and select [Export] - [Export the global variable and comment].

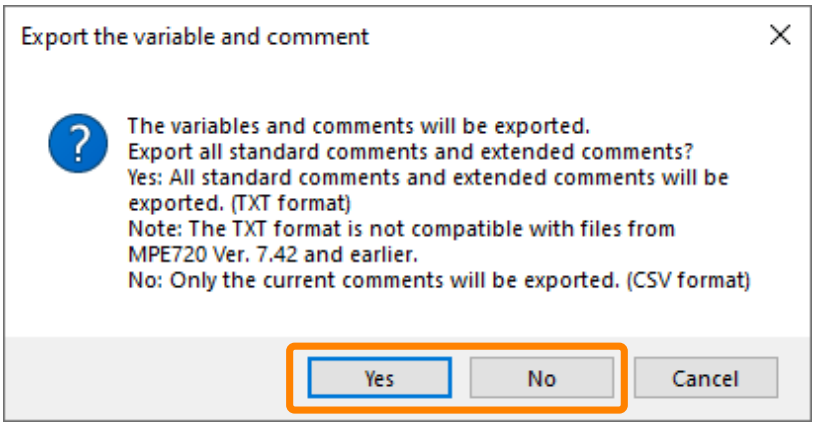
The [Export] window will be displayed.

3. **Click the [Variable and comment] button and select [Export the global variable and comment].**



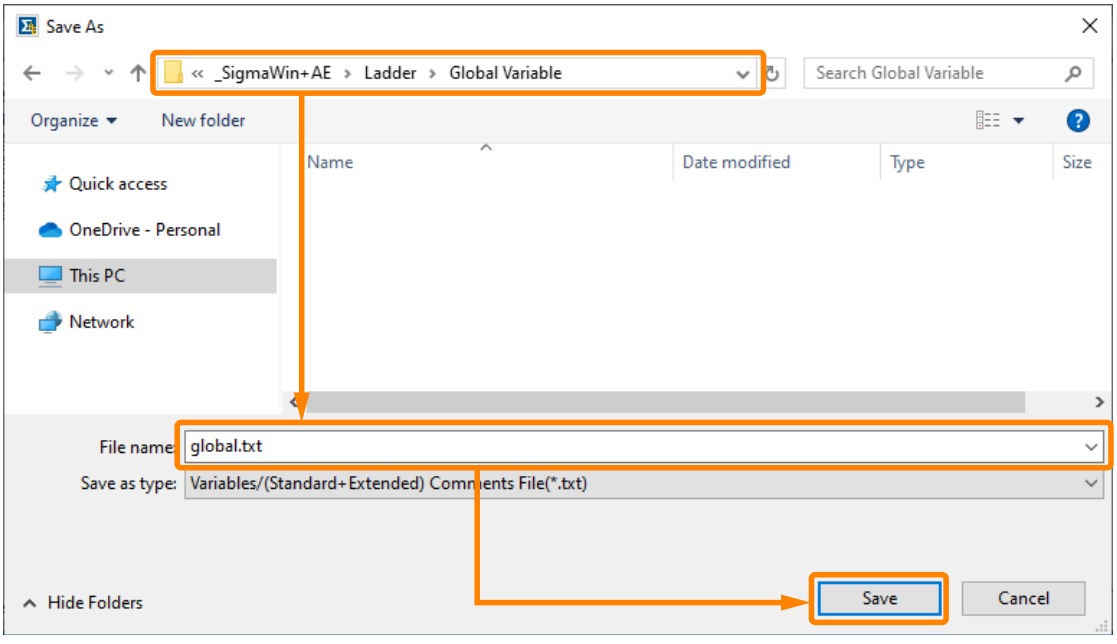
A message dialog box will be displayed.

4. **Select [Yes] or [No].**



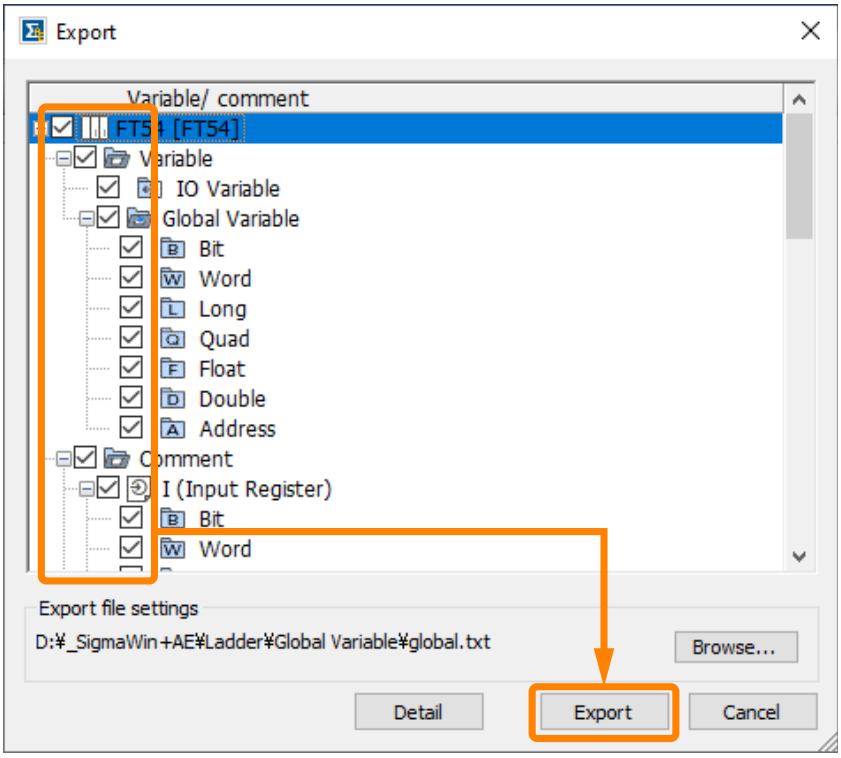
The [Save As] window will be displayed.

5. **Specify the destination folder and file name for the export data, and click the [Save] button.**



The [Export] window will be displayed.

6. **Select the check box of the variables and comments to export, and click the [Export] button.**



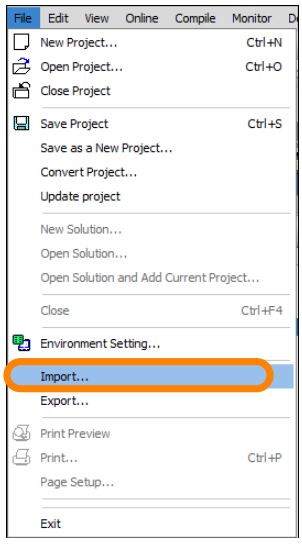
The data will be exported.

This concludes the procedure.

(2) Importing Data

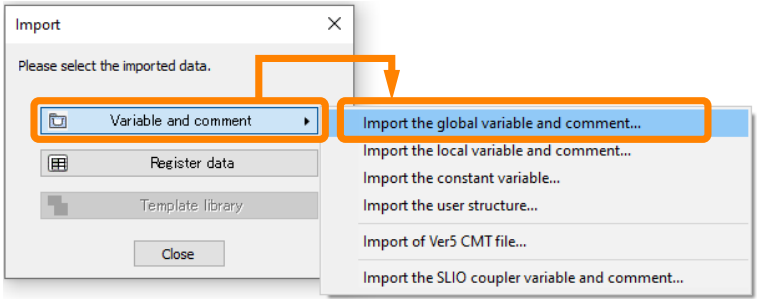
Use the following procedure to import global variables and comments.

1. **Establish an online connection or open a project file.**
2. **Select [Import] from the [File] menu.**



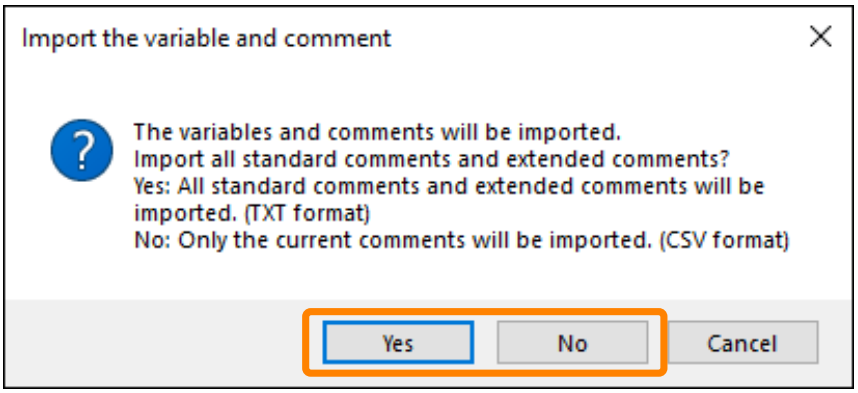
The [Import] window will be displayed.

3. **Click the [Variable and comment] button and select [Import the global variable and comment] or [Import Variables and Comments].**



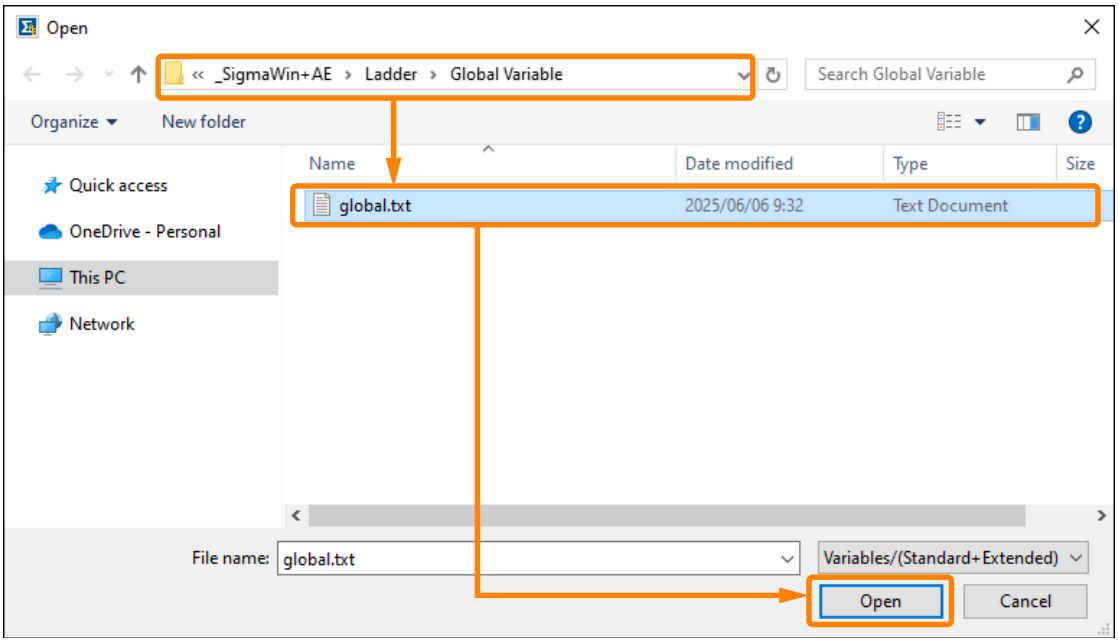
A message dialog box will be displayed.

4. **Select [Yes] or [No].**



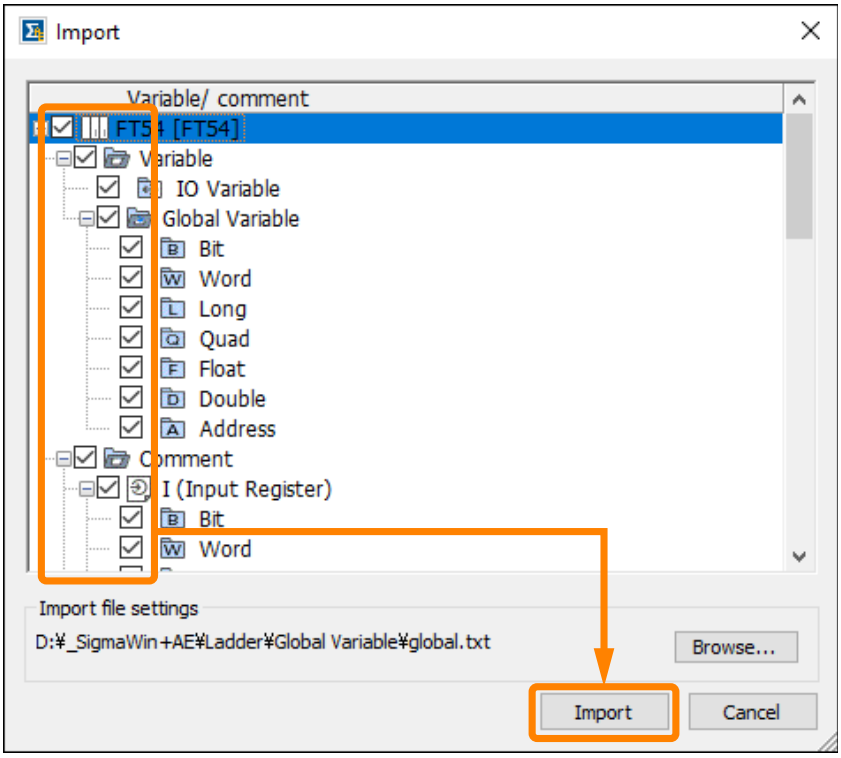
The [Open] window will be displayed.

5. **Specify the file to import, and click the [Open] button.**



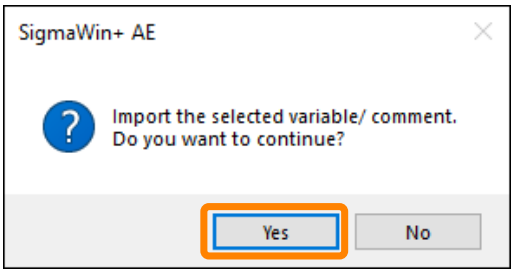
The [Import] window will be displayed.

6. **Select the check box of the variables and comments to import, and click the [Import] button.**



A message dialog box will be displayed.

7. **Click the [Yes] button.**



The data will be imported.

This concludes the procedure.

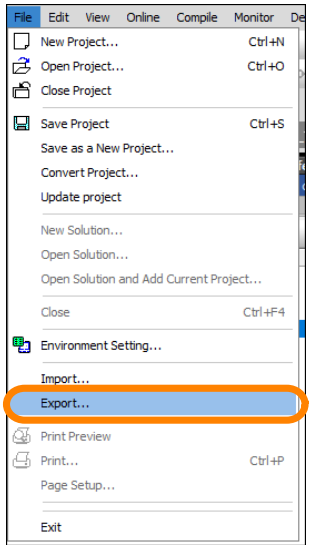
8.3.7 Local Variables and Comments

(1) Exporting Data

Use the following procedure to export local variables and comments.

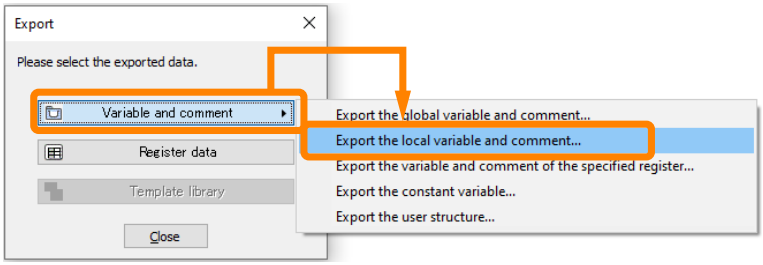
1. **Establish an online connection or open a project file.**

2. **Select [Export] from the [File] menu.**



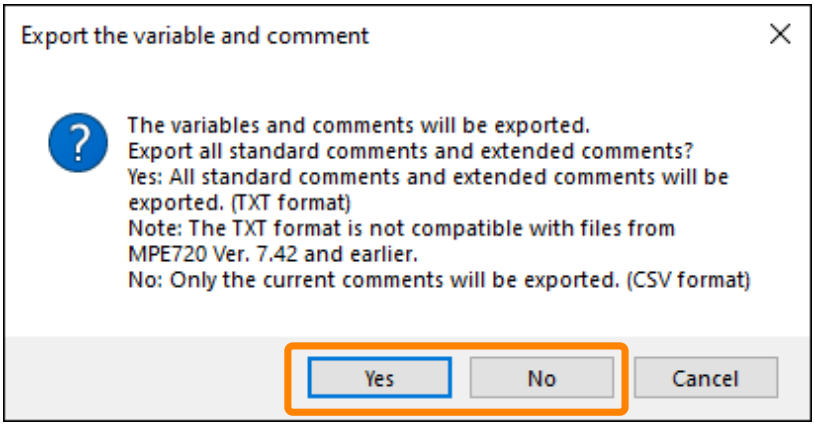
The [Export] window will be displayed.

3. **Click the [Variable and comment] button and select [Export the local variable and comment].**



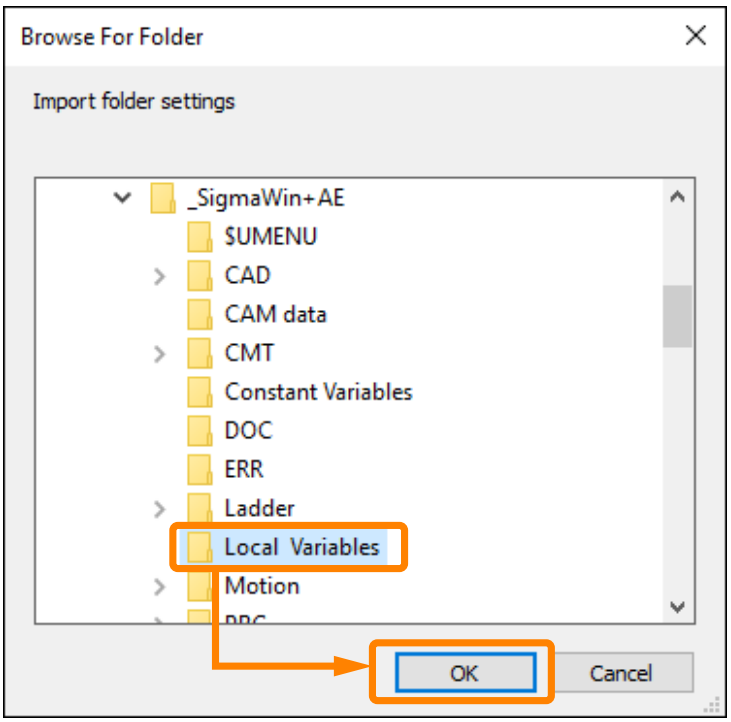
A message dialog box will be displayed.

4. **Select [Yes] or [No].**



The [Browse For Folder] window will be displayed.

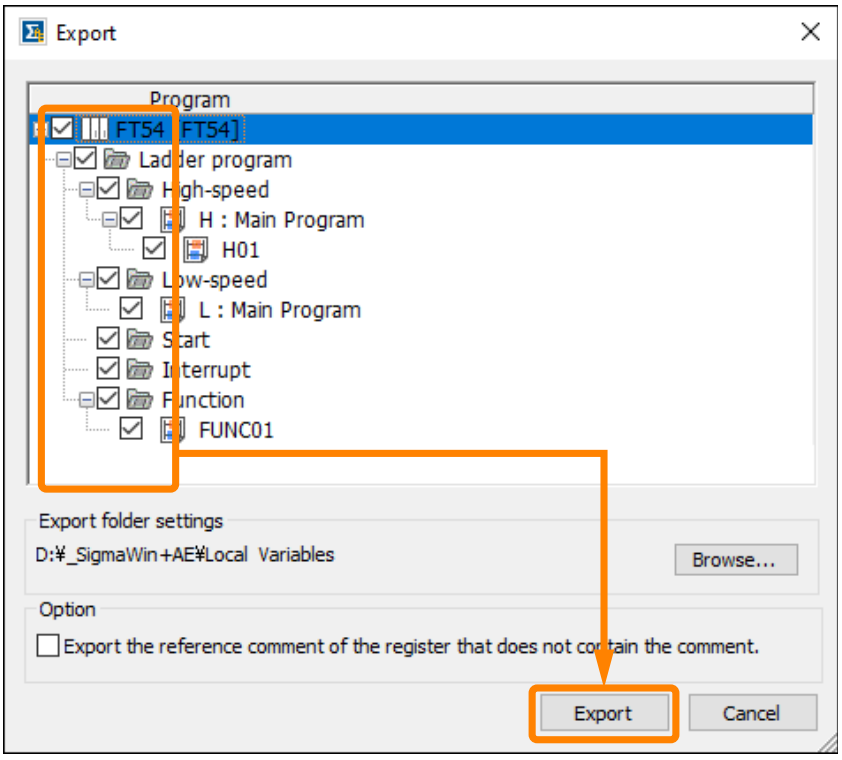
5. **Specify the folder to which the data will be exported, and click the [OK] button.**



The [Export] window will be displayed.

6. **Select the check box of the programs to export, and click the [Export] button.**

Information Select the check box under [Option] as necessary.



The data will be exported.

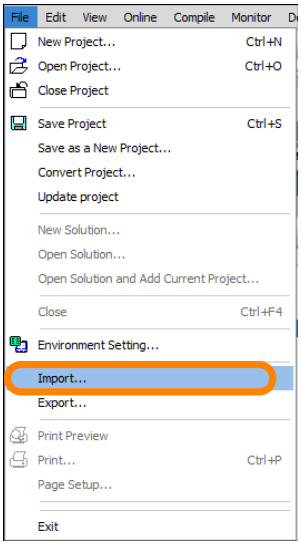
This concludes the procedure.

(2) Importing Data

Use the following procedure to import local variables and comments.

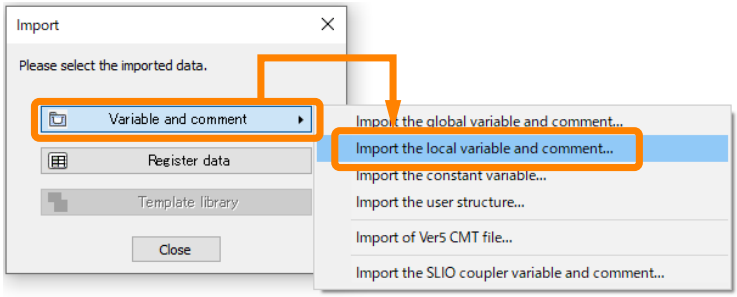
1. **Establish an online connection or open a project file.**

2. **Select [Import] from the [File] menu.**



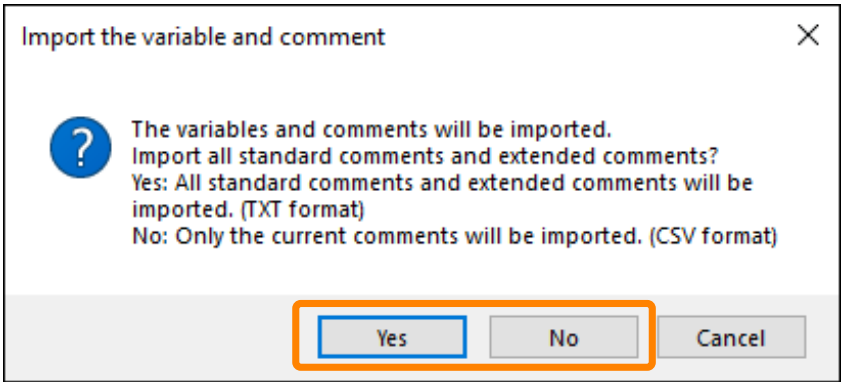
The [Import] window will be displayed.

3. **Click the [Variable and comment] button and select [Import the local variable and comment].**



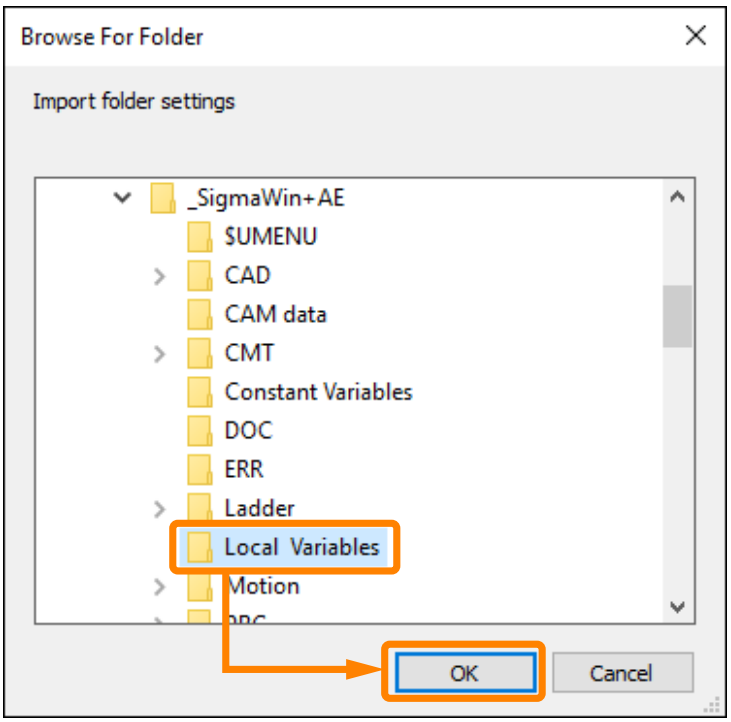
A message dialog box will be displayed.

4. **Select [Yes] or [No].**



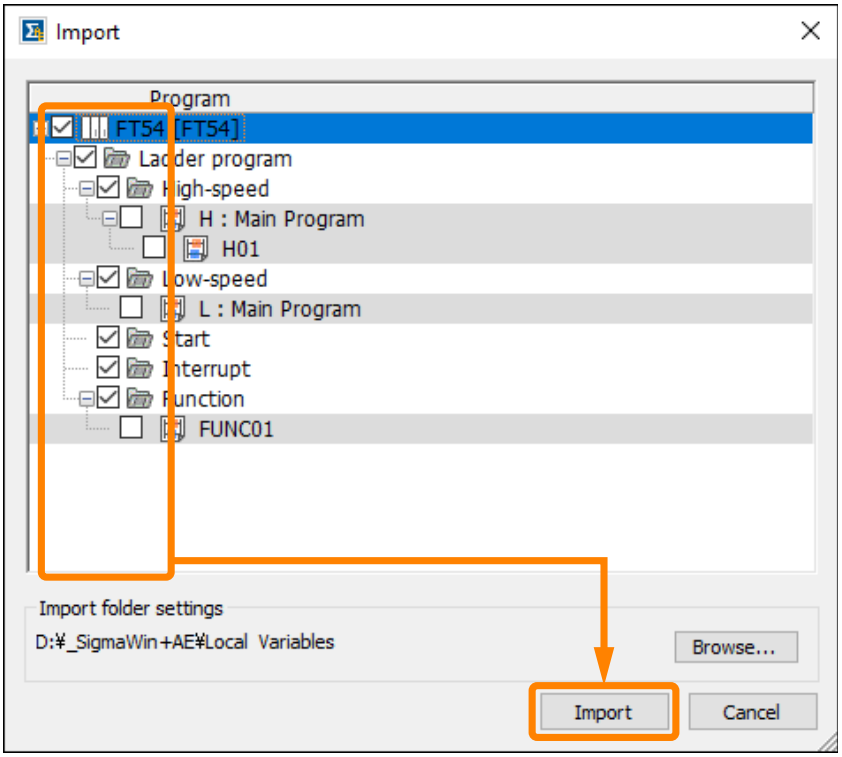
The [Browse For Folder] window will be displayed.

5. **Specify the folder from which the data will be imported, and click the [OK] button.**



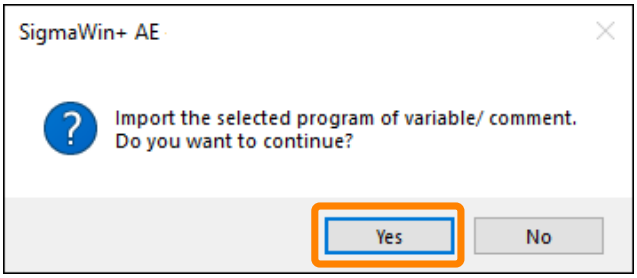
The [Import] window will be displayed.

6. **Select the check box of the programs to import, and click the [Import] button.**



A message dialog box will be displayed.

7. **Click the [Yes] button.**



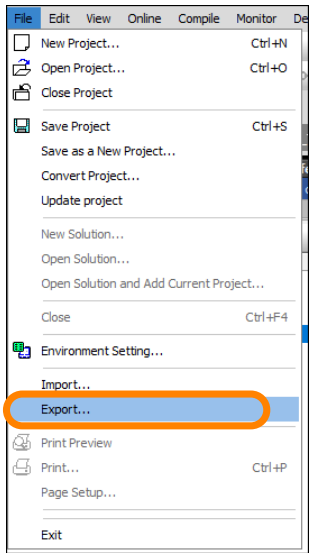
The data will be imported.

This concludes the procedure.

8.3.8 Specified Register Variables and Comments

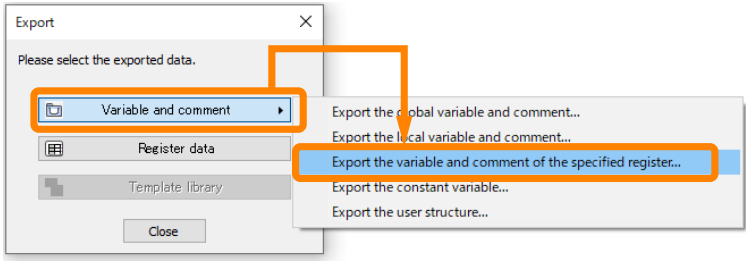
Use the following procedure to export the specified range of register variables and comments.

1. **Establish an online connection or open a project file.**
2. **Select [Export] from the [File] menu.**



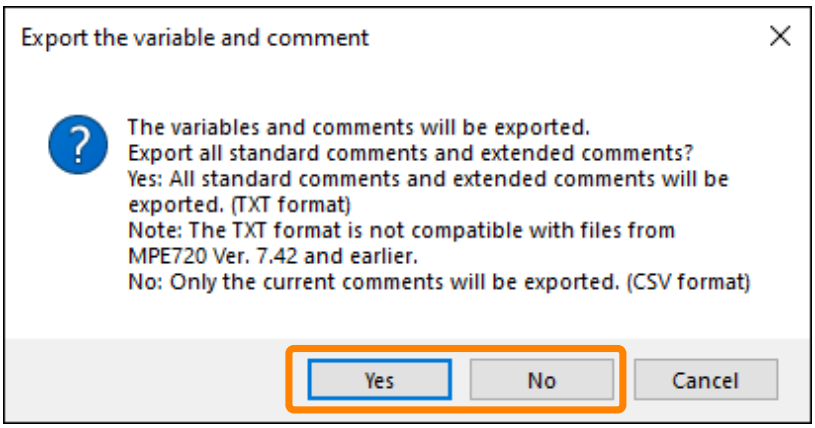
The [Export] window will be displayed.

3. **Click the [Variable and comment] button and select [Export the variable and comment of the specified register].**



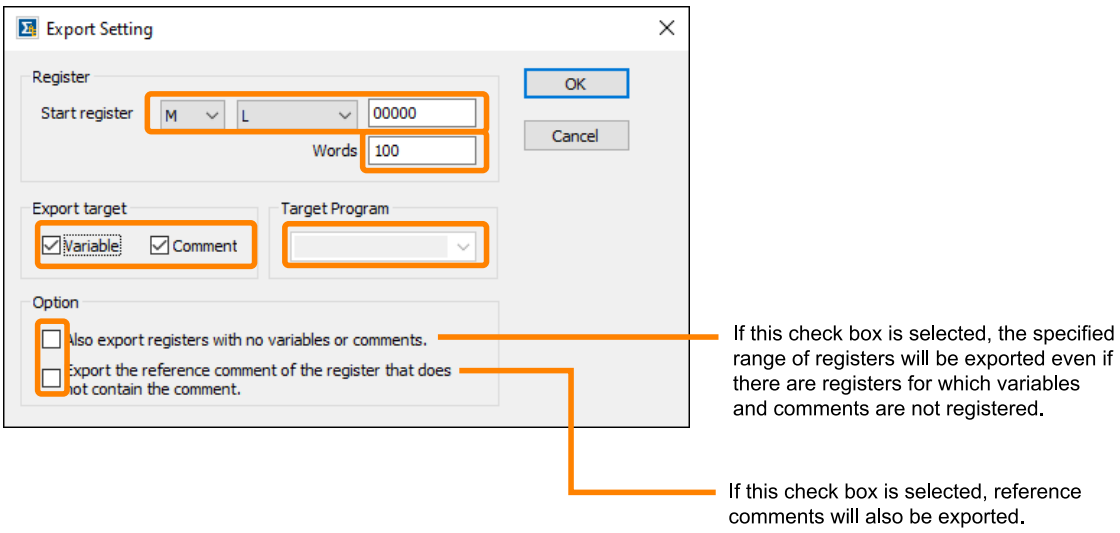
A message dialog box will be displayed.

4. **Select [Yes] or [No].**



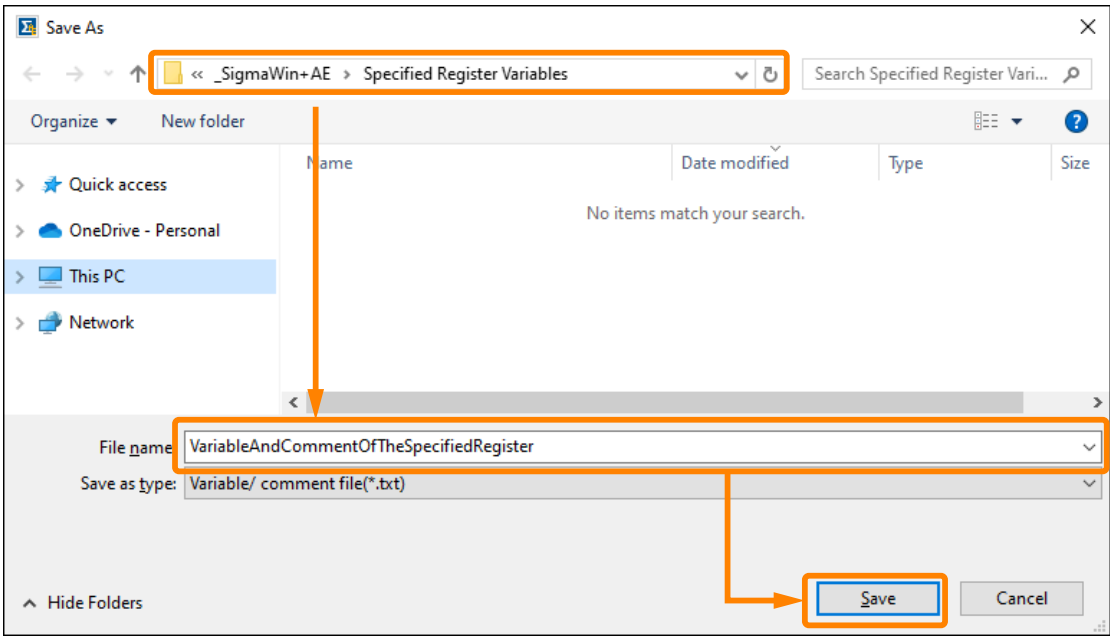
The [Export Setting] window will be displayed.

5. **Set the following items, and then click the [OK] button.**



The [Save As] window will be displayed.

6. **Specify the destination folder and file name, and click the [Save] button.**



The data will be exported.

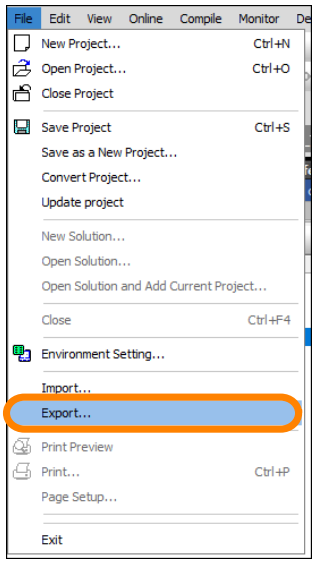
This concludes the procedure.

8.3.9 Constant Variable

(1) Exporting Data

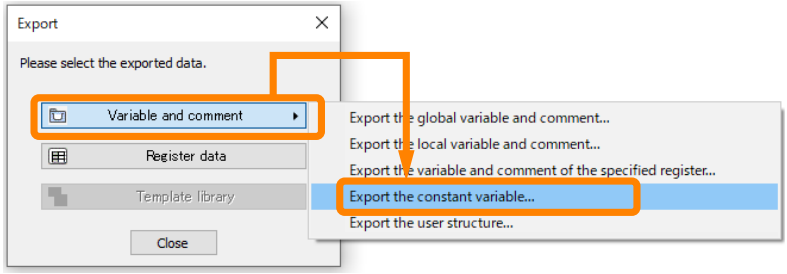
Use the following procedure to export constant variables.

1. **Establish an online connection or open a project file.**
2. **Select [Export] from the [File] menu.**



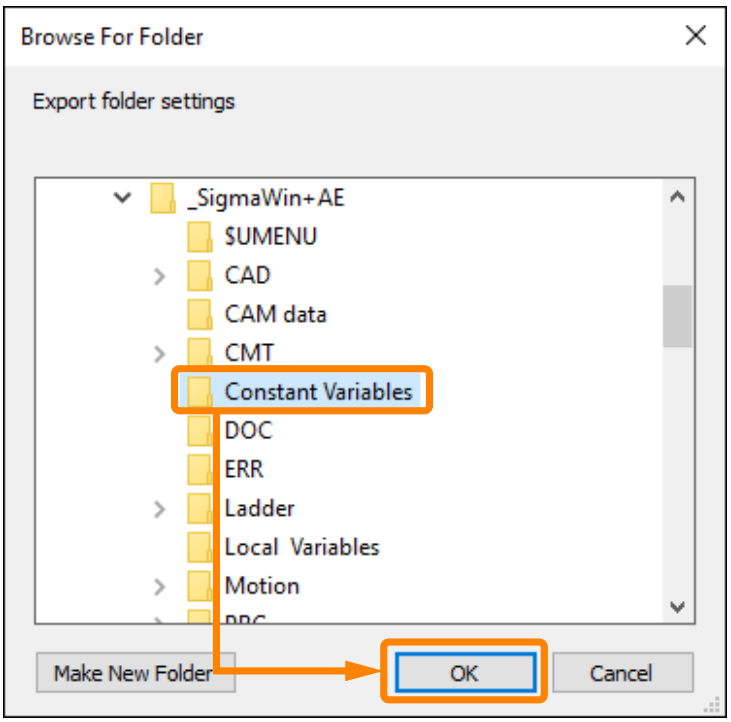
The [Export] window will be displayed.

3. **Click the [Variable and comment] button and select [Export the constant variable].**



The [Browse For Folder] window will be displayed.

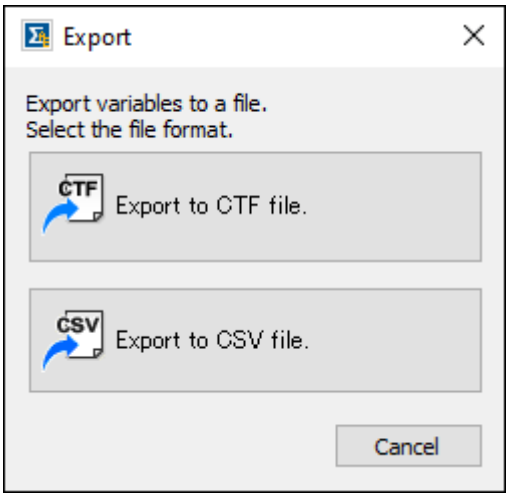
4. **Specify the folder to which the data will be exported, and click the [OK] button.**



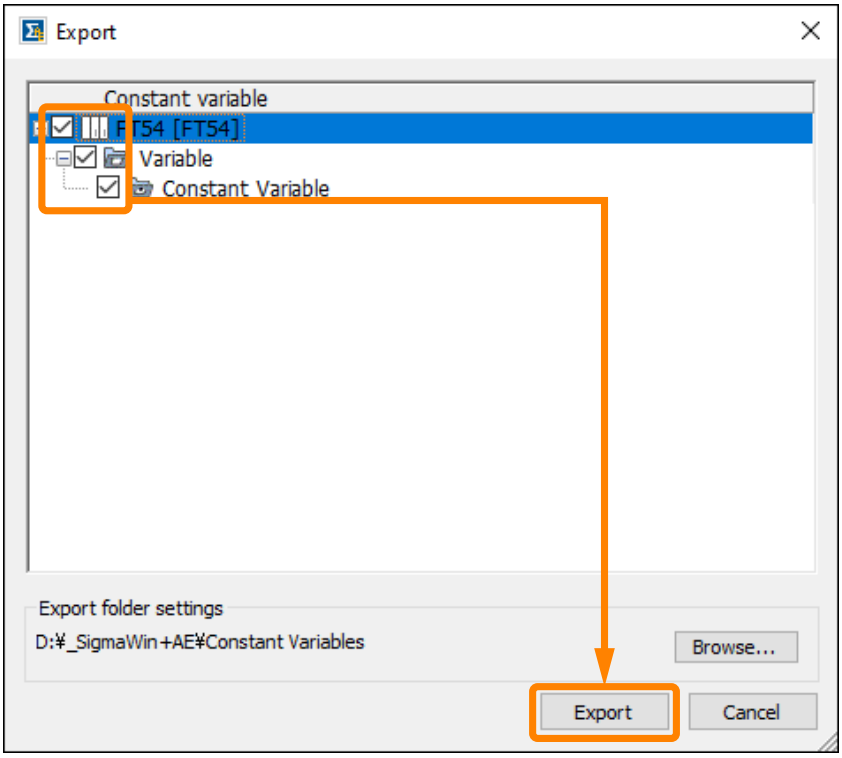
The [Export] window will be displayed.

5. **Select the format of the file to export.**

- CTF file: Binary file format
- CSV file: CSV file format



6. **Select the check box of the constant variables to export, and click the [Export] button.**



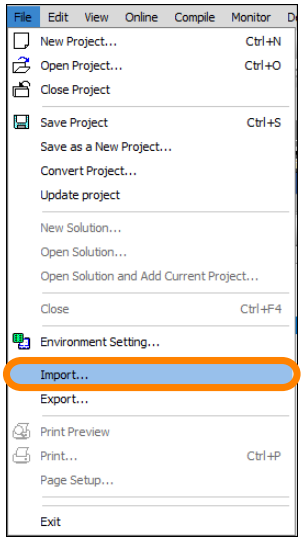
The data will be exported.

This concludes the procedure.

(2) Importing Data

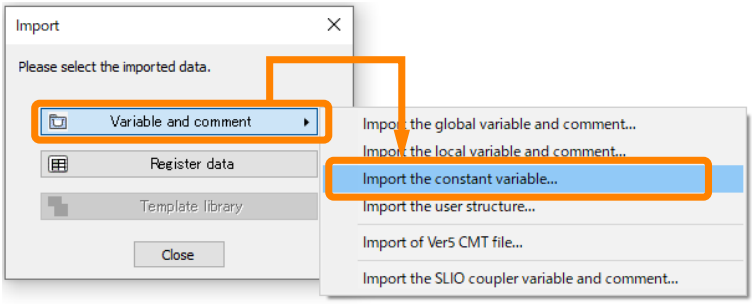
Use the following procedure to import constant variables.

1. **Establish an online connection or open a project file.**
2. **Select [Import] from the [File] menu.**



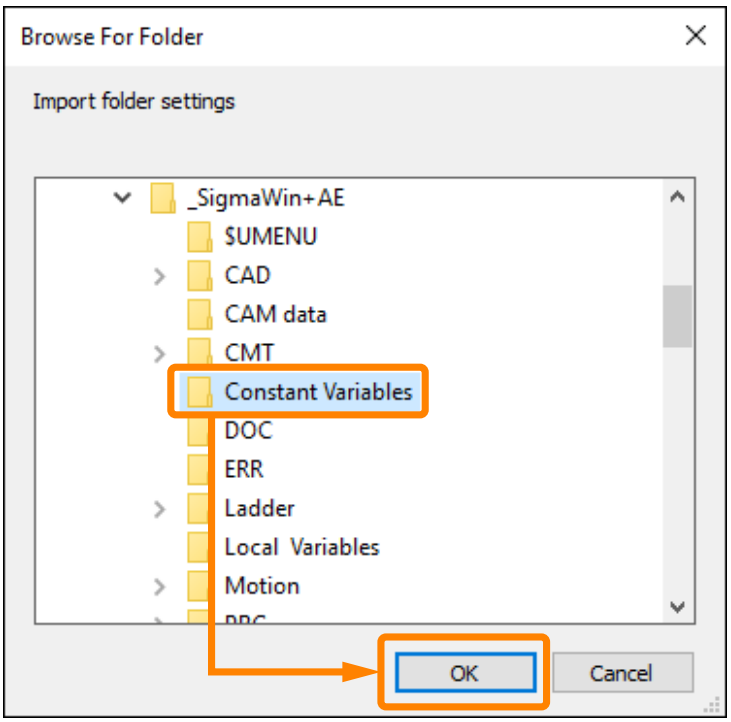
The [Import] window will be displayed.

3. **Click the [Variable and comment] button and select [Import the constant variable].**



The [Browse For Folder] window will be displayed.

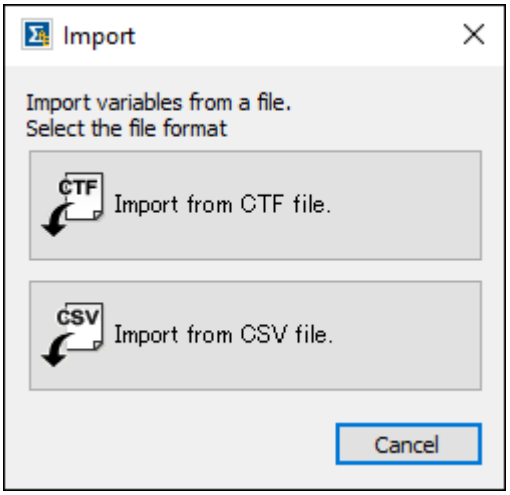
4. **Select the folder from which the data will be imported, and click the [OK] button.**



The [Import] window will be displayed.

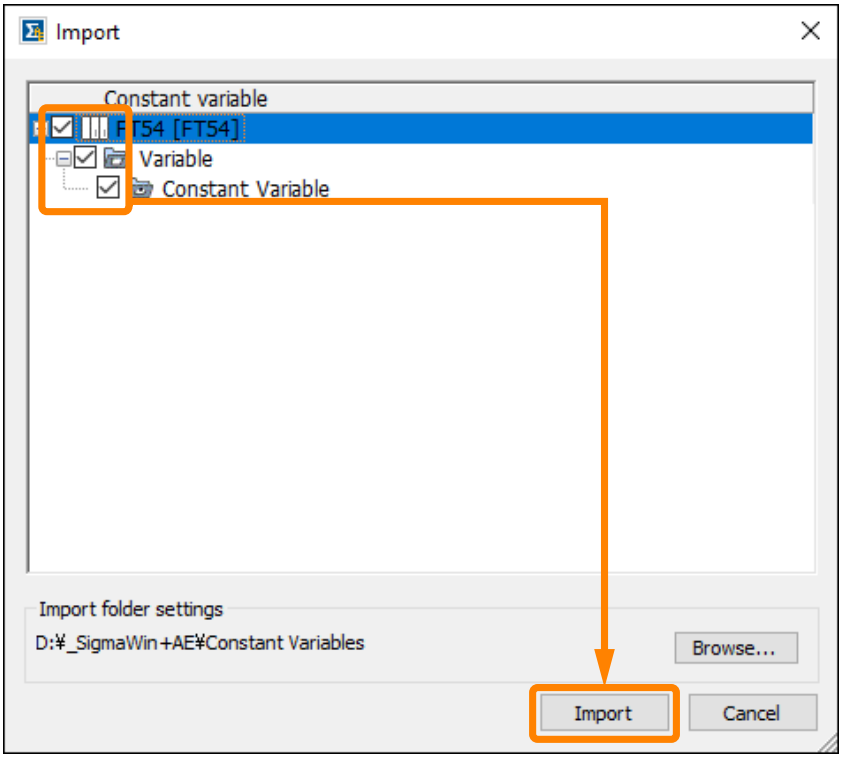
5. **Select the format of the file to import.**

- CTF file: Binary file format
- CSV file: CSV file format



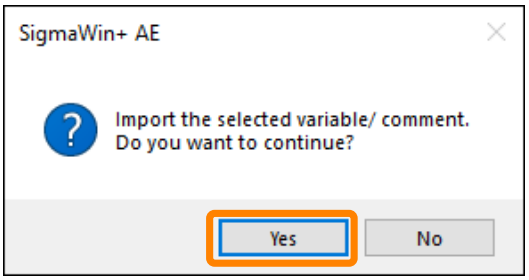
6. **Select the check box of the variables to import, and click the [Import] button.**

Information The import may fail if the number of constant variables to import exceeds 200 variables.
You can import more than 200 constant variables, but splitting those constant variables into smaller groups is recommended.

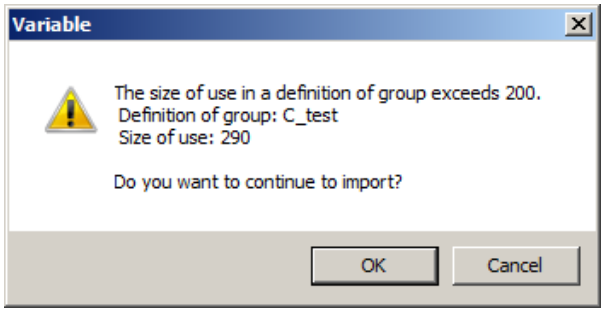


A message dialog box will be displayed.

7. **Click the [Yes] button.**



Information If there are more than 200 constant variables to import, the following message dialog box will be displayed. Click the [OK] button to execute the import.



The data will be imported.

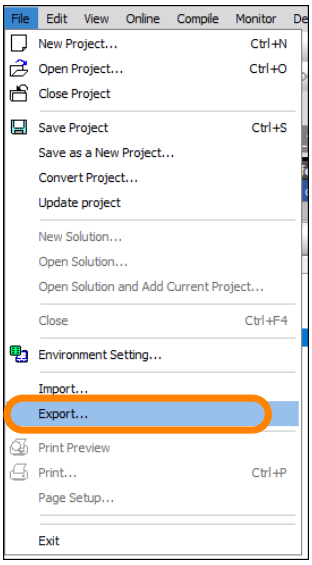
This concludes the procedure.

8.3.10 User-Defined Structures

(1) Exporting Data

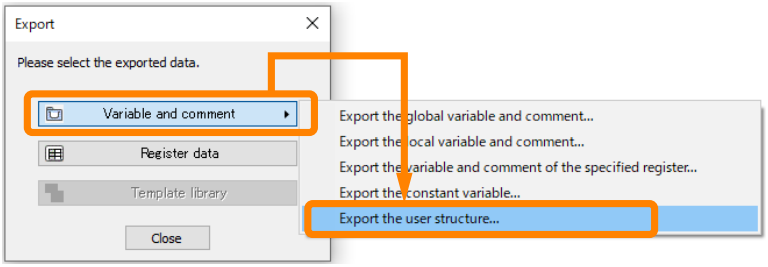
Use the following procedure to export user-defined structures.

1. **Establish an online connection or open a project file.**
2. **Select [Export] from the [File] menu.**



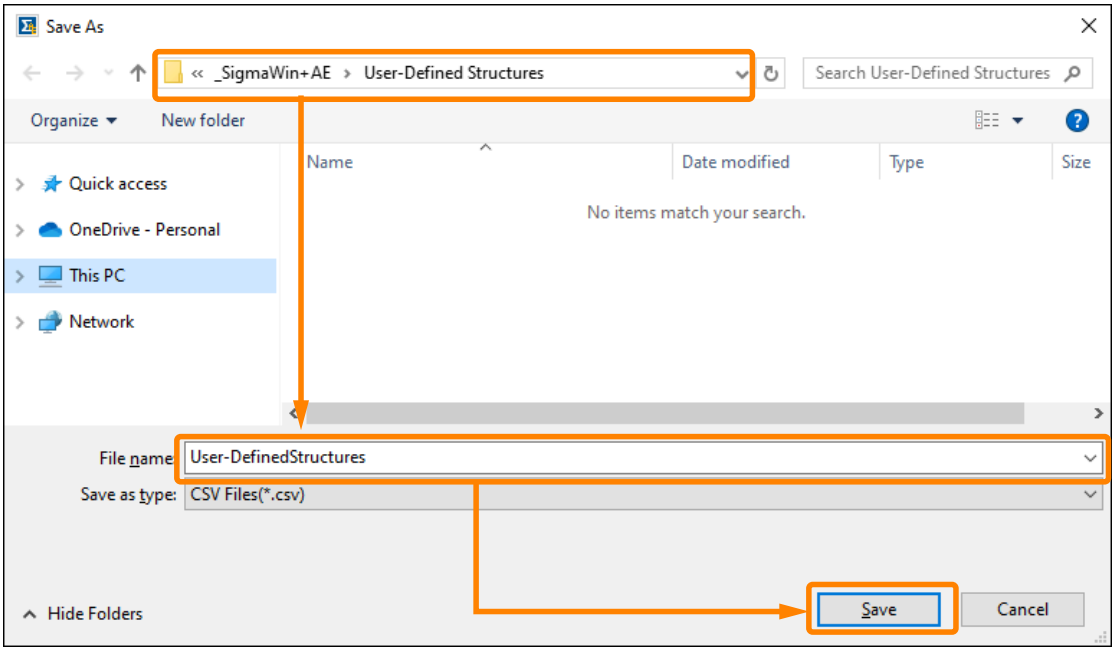
The [Export] window will be displayed.

3. **Click the [Variable and comment] button and select [Export the user structure].**



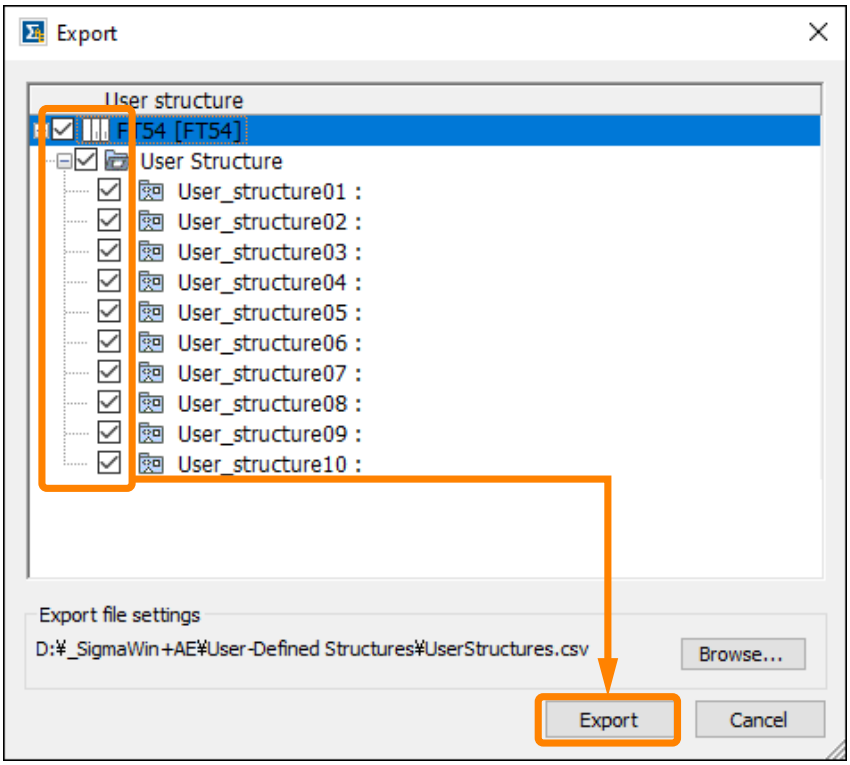
The [Save As] window will be displayed.

4. **Specify the destination folder and file name, and click the [Save] button.**



The [Export] window will be displayed.

5. **Select the check box of the user-defined structures to export, and click the [Export] button.**



The data will be exported.

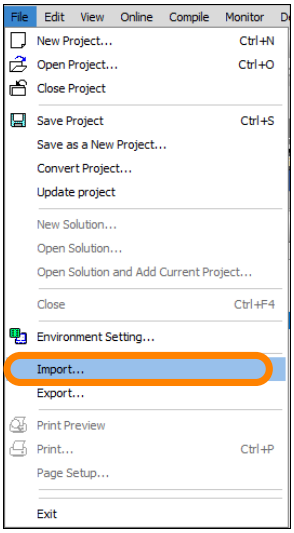
This concludes the procedure.

(2) Importing Data

Use the following procedure to import user-defined structures.

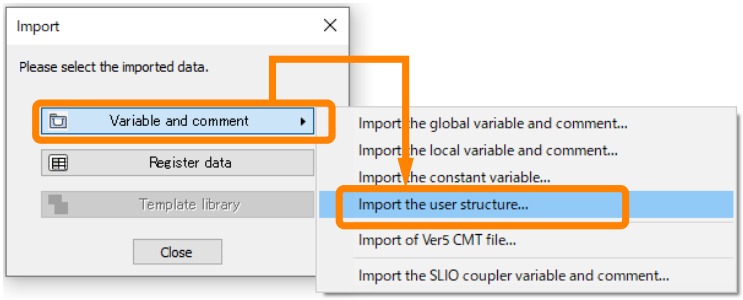
1. **Establish an online connection or open a project file.**

2. **Select [Import] from the [File] menu.**



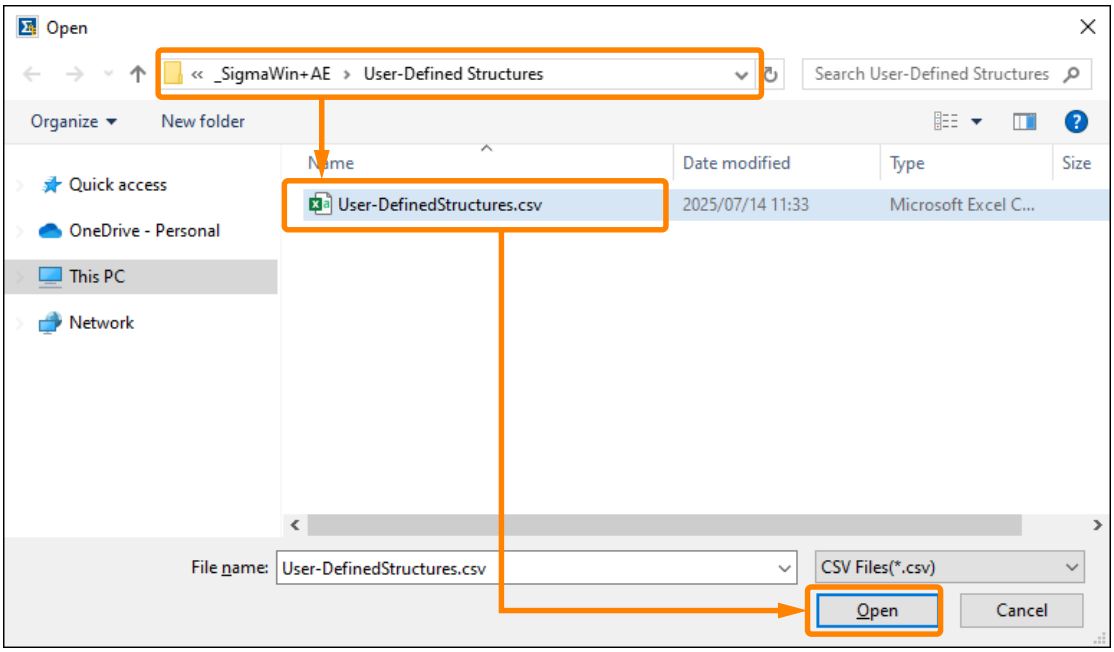
The [Import] window will be displayed.

3. **Click the [Variable and comment] button and select [Import the user structure].**



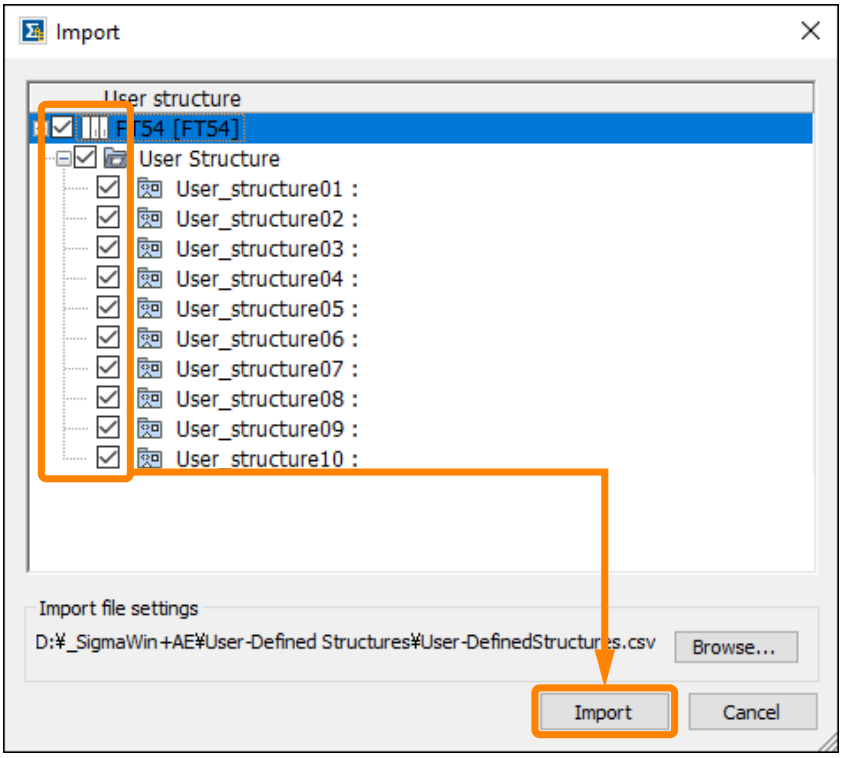
The [Open] window will be displayed.

4. **Specify the file to import, and click the [Open] button.**



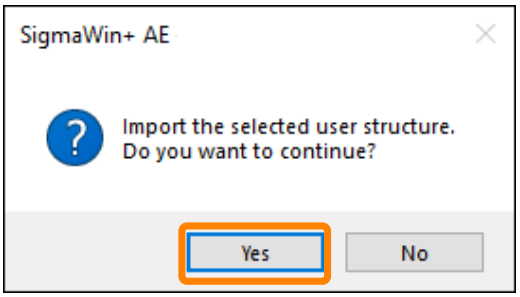
The [Import] window will be displayed.

5. **Select the check box of the user-defined structures to import, and click the [Import] button.**



A message dialog box will be displayed.

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



The data will be imported.

This concludes the procedure.

8.3.11 Data Formats for Exporting and Importing

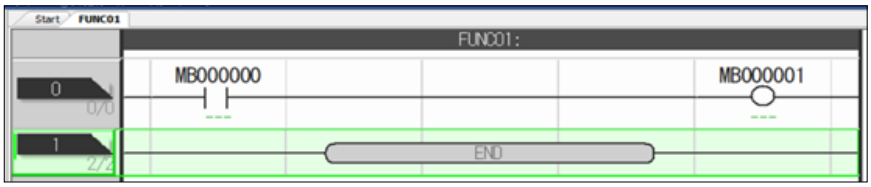
This section gives an overview of the data formats for exporting and importing.
To create your own import data, use the following format.

> Important
> Observe the following items when creating the import data.
> • Operation is not guaranteed (including the import operation itself) if a value is set outside the appropriate range.
> • Use the same character encoding as the export data.

Information Exported constant variable data cannot be edited.

(1) Ladder Program

"ProgramName.ypi" is the data name and extension of the export/import data for a ladder program.
An example of the ladder program (function) and import/export data is shown below.




```
VERSION_NUMBER=10
PROGRAM_MD5="-"
PROGRAM_COMMENT=7,"FUNC01:"
CONFIG_PROGRAM_TITLE=""
CONFIG_READ_PRIVILEGE=1
CONFIG_WRITE_PRIVILEGE=0
CONFIG_DREGISTER_COUNT=32
CONFIG_#REGISTER_COUNT=0
CONFIG_CAST_ACTION=0
CONFIG_IJ_LIMIT_CHECK=0
FUNCIO_INPUT_TYPE=1
FUNCIO_INPUT_COMMENT="B-VAL"
FUNCIO_ADDRESS_TYPE=128
FUNCIO_ADDRESS_COMMENT="Comment"
FUNCIO_OUTPUT_TYPE=1
FUNCIO_OUTPUT_COMMENT="B-VAL"
RUNG_SIZE=2
RUNG=0,0,1,4,1,0
MATRIX=0,0,0,0,0,2,0,0
MATRIX=0,1,1,0,1,4097,1,2,"MB000000",0
MATRIX=0,2,2,0,1,4105,1,2,"MB000001",0
MATRIX=0,3,3,0,0,3,0,0
RUNG=1,4,1,3,1,0
MATRIX=1,4,0,0,0,2,0,0
MATRIX=1,5,1,0,1,16388,0,0
MATRIX=1,6,2,0,0,3,0,0
```

The details of the import/export data for ladder programs are shown below.

Item	Description	Value
Header information		
VERSION_NUMBER	File version number	Fixed as "10"
PROGRAM_MD5	Not used	–
Program comment information		
PROGRAM_COMMENT	A comma (,) is used to separate the following content.	
	Program comment length	Any number
	Program comment	Any text string
Properties information		
CONFIG_PROGRAM_TITLE	Program name	Text string 48 characters maximum
CONFIG_READ_PRIVILEGE	Read privilege	0 to 7
CONFIG_WRITE_PRIVILEGE	Write privilege	0 to 7
CONFIG_DREGISTER_COUNT	Number of D registers	0 to 16384
CONFIG_#REGISTER_COUNT	# Number of registers	0 to 16384
CONFIG_CAST_ACTION	Setting the operation when real number	0: Truncate 1: Round
CONFIG_IJ_LIMIT_CHECK	Subscript register limit check	0: Enabled 1: Disabled
Properties information: I/O definitions (function only)		

Continued on next page.

Continued from previous page.

Item		Description	Value
	FUNCIO_INPUT_TYPE	Function input definition The file contains 1 to 16 items. When there are two or more inputs, "FUNCIO_INPUT_COMMENT" below is added to the file in the amount of inputs.	1: BIT (B-VAL) 16: WORD (I-REG) 32: LONG (L-REG) 48: FLOAT (F-REG) 64: QUAD (Q-REG) 80: DOUBLE (D-REG)
	FUNCIO_INPUT_COMMENT	A comment for the function input definition	Text string 8 characters maximum
	FUNCIO_ADDRESS_TYPE	Function address definition The file contains 0 or 1 item.	Fixed as "128: ADDRESS"
	FUNCIO_ADDRESS_COMMENT	A comment for the function address definition	Text string 8 characters maximum
	FUNCIO_OUTPUT_TYPE	Function output definition The file contains 1 to 16 items. When there are two or more outputs, "FUNCIO_OUTPUT_COMMENT" below is added to the file in the amount of outputs.	Same as "FUNCIO_INPUT_TYPE" above
	FUNCIO_OUTPUT_COMMENT	A comment for the function output definition	Text string 8 characters maximum
Program information *1			
	RUNG_SIZE	Number of rungs	–
	RUNG	Rung information	–
	RUNG_COMMENT	Rung comment	–
	MATRIX	Program information in rung	–

*1 If you will edit export data and import that data, do not correct the program information. Correct the program information on the Edit Ladder Program window after you import it.

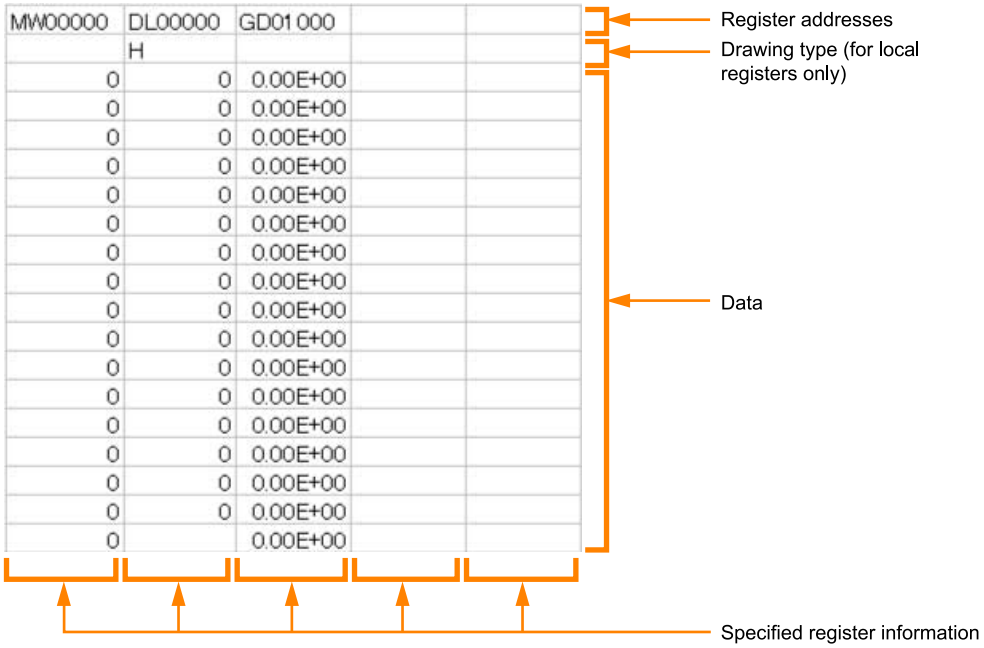
(2) Ladder Program Line Comments

Program No.	Comment Type	Rung No.	Rung Comment Index	Comment
H	Program Comment			H: Main program (Ver. 1.00)
H01	Program Comment			H01: Servo control drawing
H01	Program Comment			H01:AX1: Servo control drawing
H01	Rung Comment	0	0	Axis check
H01	Rung Comment	0	1	Alarm check
H01	Rung Comment	1	0	Warning check
H01	Rung Comment	2	0	Axial normal
H01	Rung Comment	3	0	
H01	Rung Comment	3	1	
H01	Rung Comment	3	2	External interlock
H01	Rung Comment	3	3	Startup interlock
H01	Rung Comment	4	0	Operation interlock

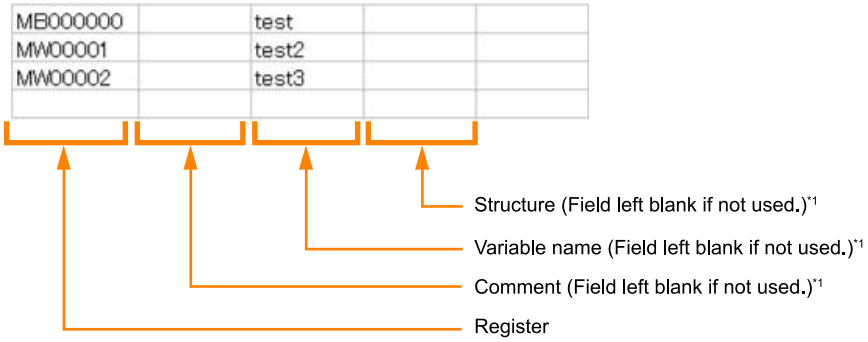
(3) Ladder Program Properties

Program No.	Program Name	Disable	No. of Steps	Privilege	Modified	Tuning Panel
H	Main program	0	5	[R]0 [W]1	5/10/12 19:25	0
H01	Servo control drawing	0	3	[R]0 [W]1	5/10/12 19:25	0
H01	AX1: Servo control drawing	0	68	[R]0 [W]1	2/25/13 13:58	0
H01	AX2: Servo control drawing	0	68	[R]0 [W]1	2/25/13 13:58	0
H02	JOG control drawing	0	3	[R]0 [W]1	5/10/12 19:25	0
H02	AX1: JOG control drawing	0	52	[R]0 [W]1	5/10/12 19:25	0
H02	AX2: JOG control drawing	0	52	[R]0 [W]1	5/10/12 19:25	0
H03	Origin setting control drawing	0	3	[R]0 [W]1	5/10/12 19:25	0
H04	Position control drawing	0	3	[R]0 [W]1	5/10/12 19:25	0

(4) Register Data



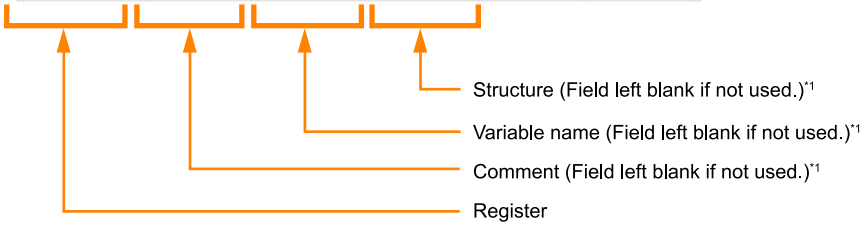
(5) Global Variables and Comments



*1 There are restrictions to the information that can be entered. Refer to the following section for details.
☞ *(a) Registering a Global Variable on page 167*

(6) Local Variables and Comments

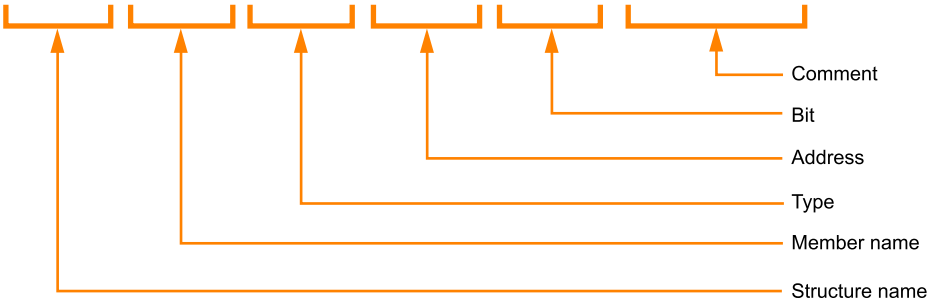
DB000000		VAR_test			
DW00001		VAR_test2			
DW00002		VAR_test3			



*1 There are restrictions to the information that can be entered. Refer to the following section for details.
☞ *(a) Registering a Local Variable on page 176*

(7) User-Defined Structures

test					User structure
test	member1	Word	0		
test	member2	Word	1		
test	member3	Long	2		
test	member4	Long	4		



9

Appendices

This chapter describes error messages and the corrective action to perform when an error is displayed.

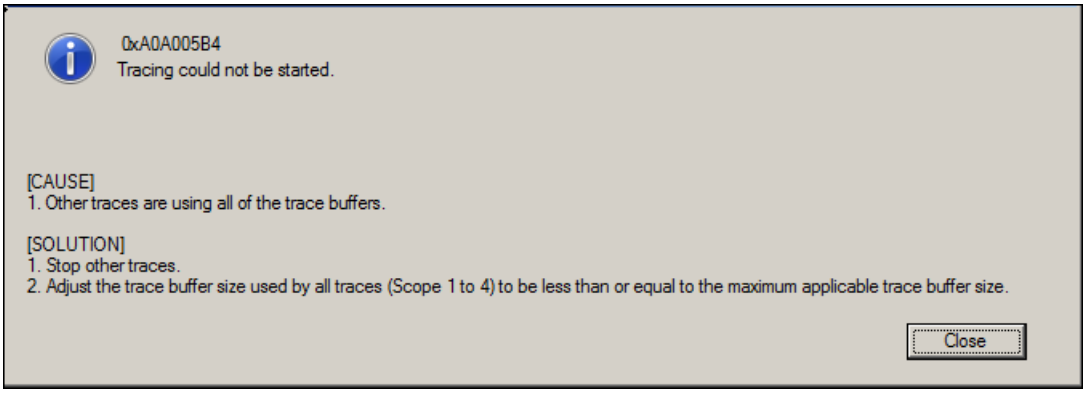
9.1 Error Messages and Reference Sections for Corrective Action

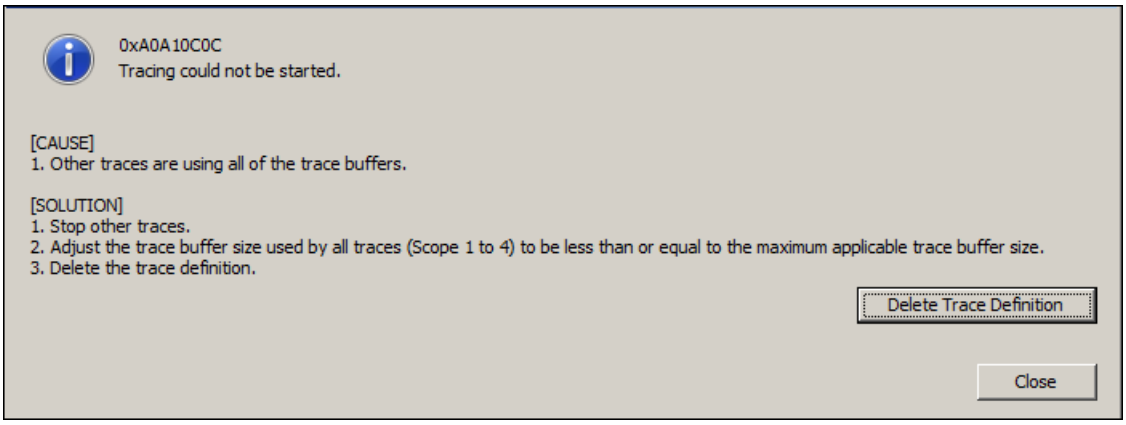
Error Message	Error No.	Reference
An error occurred during the transfer to the controller.	–	☞ *9.2.2 An Error Occurred during the Transfer to the Controller. on page 390*
The selected trace could not be started.	0xA0A10C0B	☞ *6.2.12 Changing the Enabled/Disabled Setting of the Trace Definition Settings on page 283*
Tracing could not be started.	0xA0A005B4	☞ *9.2.1 Tracing Could Not Be Started. on page 389*
	0xA0A10C0A	
	0xA0A10C0C	

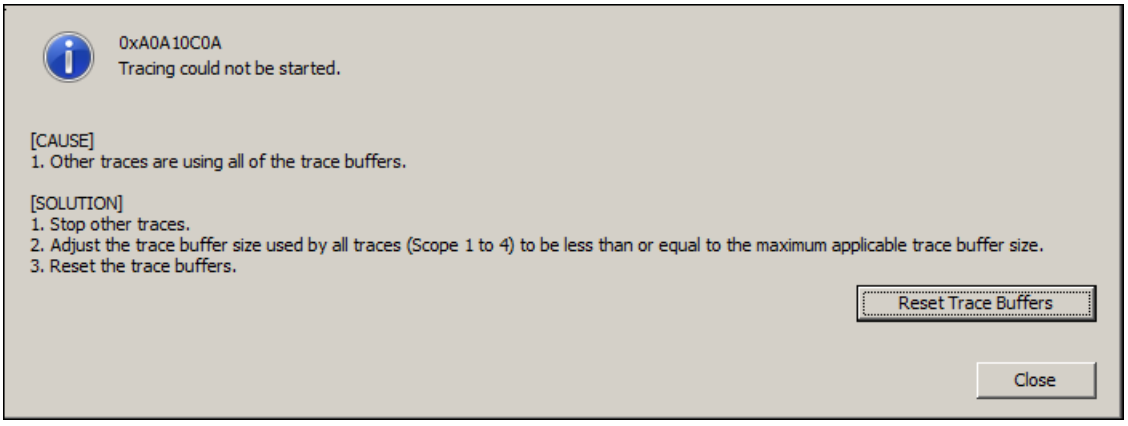
9.2 Corrective Action When an Error Message Is Displayed

9.2.1 Tracing Could Not Be Started.

(1) Error Message Dialog Box







(2) Corrective Action

1. **Stop tracing of other groups.**
2. **Display the trace window again.**
3. **In the [Sampling & Trigger Setting] window, check the trace buffer size, and check that the total value of the trace buffers of all groups is at or below the maximum applicable**

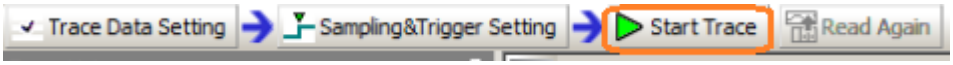
trace buffer size. When there are two or more trace groups, check the trace buffer size of all trace groups.

Refer to the following section for details on the maximum applicable trace buffer size.

☞ *(2) Trace Buffer Size on page 243*

When the trace buffer size is greater than the maximum applicable trace buffer size, change the settings in the [Sampling & Trigger Setting] window.

4. **Start tracing again by clicking the [Start Trace] button.**



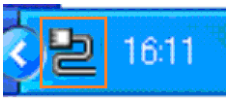
If no error messages are displayed, this concludes the procedure.

9.2.2 An Error Occurred during the Transfer to the Controller.

(1) Corrective Action

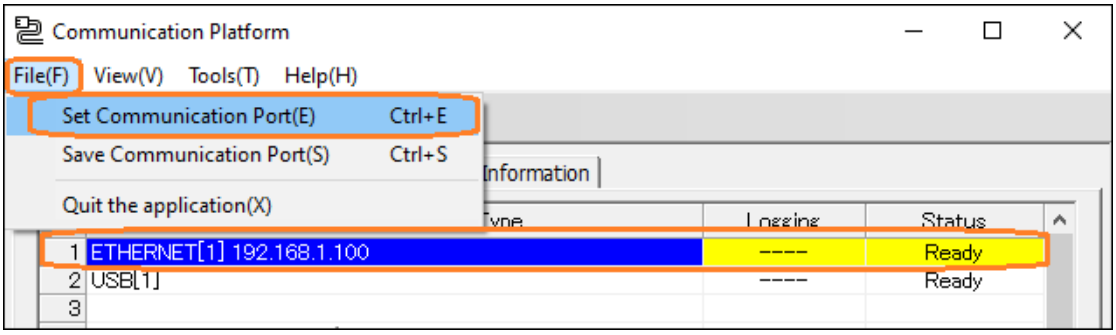
1. **If the SigmaWin+ AE is online, click the [Connection/Disconnection] button on the [My Tool] window of the [Start] tab page to set the SigmaWin+ AE to offline.**
2. **Select [Programs] − [YE_Applications] − [Communication Platform] from the Windows Start Menu.**

   The [Communication Platform] icon will be displayed at the bottom right of the PC screen.
3. **Double-click the [Communication Platform] icon.**



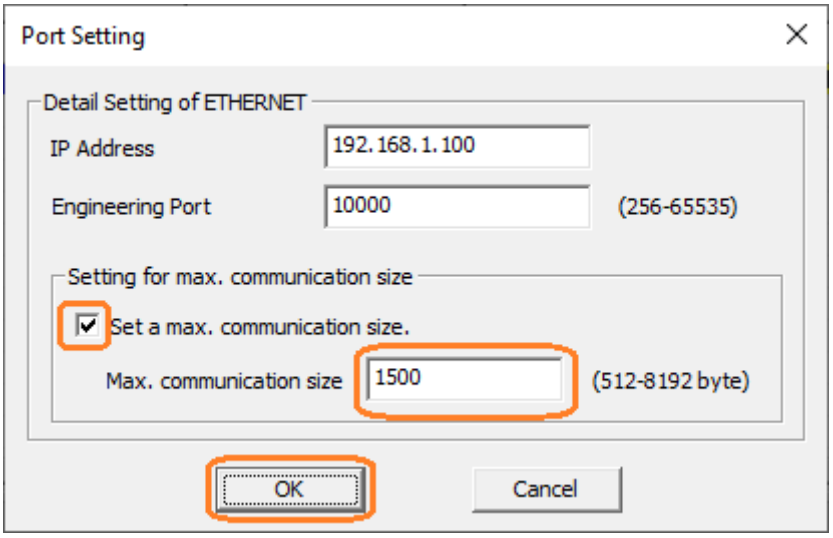
The [Communication Platform] window will be displayed.

4. **Select a communication port that is in use, then click [File] − [Set Communication Port].**



The [Port Setting] window will be displayed.

5. **Select the [Set a max. communication size.] check box, set [Max. communication size] to “1500”, and click the [OK] button.**



The settings will be applied and the [Port Setting] window will close.

6. **Click the [Save] icon.**

This concludes the procedure.

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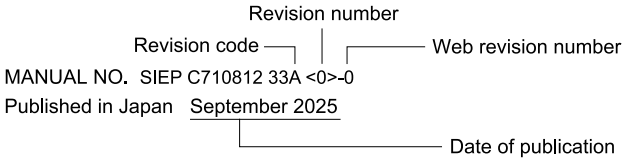
Revision History

The date of publication, revision code, revision number, and web revision number are given at the bottom right of the back cover. Refer to the following example.



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AC Servo Drive Engineering Tool

SigmaWin+ Application Editor

Operation Manual

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