YASKAWA

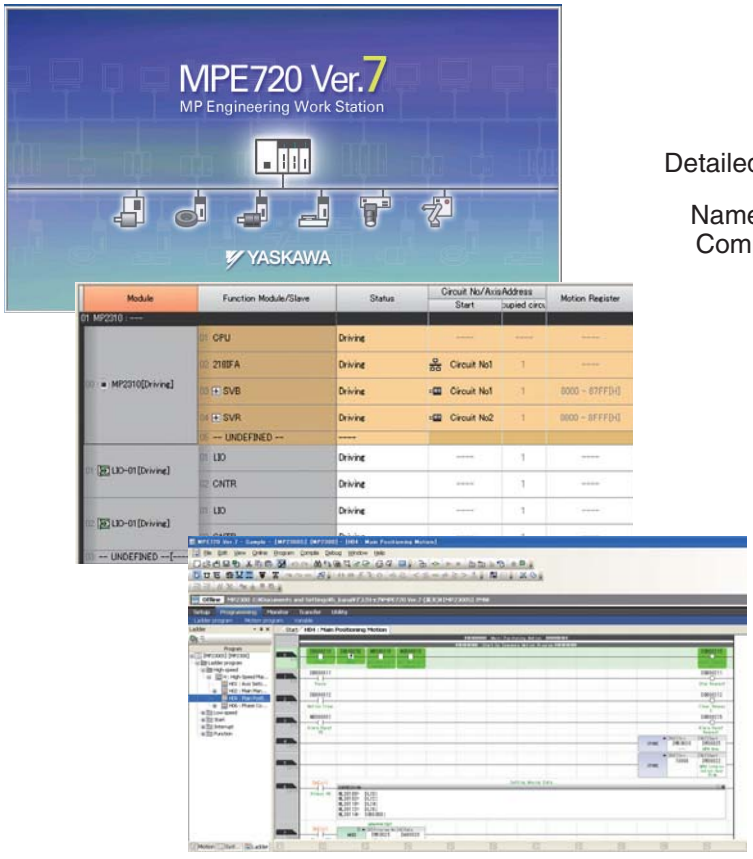
Machine Controller MP2000/MP3000 Series

Engineering Tool

MPE720 Version 7

USER'S MANUAL

Model: CPMC-MPE780



MANUAL NO. SIEP C880761 03E

About this Manual

This manual describes the installation and operation of the MPE720 version 7 Engineering Tool.

Read this manual carefully to ensure the correct usage of the Machine Controller and apply the Machine Controller to control your manufacturing system.

Keep this manual in a safe place so that it can be referred to whenever necessary.

Using this Manual

◆ Basic Terms

Unless otherwise specified, the following definitions are used:

Basic Terms	Meaning
MP2000-series Machine Controller	A Machine Controller in the MP2000 Series.
MP3000-series Machine Controller	A Machine Controller in the MP3000 Series.
Machine Controller	MP2000-series or MP3000-series Machine Controller.
MPE720	The MPE720 version 7 Engineering Tool, or a personal computer running the Engineering Tool.
PLC	A Programmable Logic Controller.
Engineering	Setting up, adjusting, and programming devices to create a system and maintaining and managing that system.
Basic Units	A generic name for the Power Supply Unit, CPU Unit, and Base Unit.

◆ Trademarks

- MECHATROLINK is a trademark of the MECHATROLINK Members Association.
- Ethernet is a registered trademark of the Xerox Corporation.
- Microsoft, Windows, Windows NT, and Internet Explorer are trademarks or registered trademarks of the Microsoft Corporation.
- Adobe Reader is a trademark or registered trademark of Adobe Systems Incorporated.
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◆ Visual Aids

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

Indicates precautions or restrictions that must be observed.

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

Example Indicates operating or setting examples.

Information Indicates supplemental information to deepen understanding or useful information.

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

Related Manuals

The following table lists the manuals that are related to the MP2000/MP3000-series Machine Controllers. Refer to these manuals as required.

Function	Manual Name	Manual Number	Description
Basic functionality	Machine Controller MP3000 Series Machine Controller System Setup Manual	SIEP C880725 00	Describes the functions of the MP3000-series Machine Controllers and the procedures that are required to use the Machine Controller, from installation and connections to settings, programming, trial operation, and debugging.
	Machine Controller MP2000 Series Machine Controller System Setup Manual	SIEP C880732 14	Describes the functions of the MP2000-series Machine Controllers and the procedures that are required to use the Machine Controller, from installation and connections to settings, programming, trial operation, and debugging.
	Machine Controller MP3000 Series Machine Controller System Troubleshooting Manual	SIEP C880725 01	Describes troubleshooting an MP3000-series Machine Controller.
	Machine Controller MP3000 Series MP3100 Product Manual	SIEP C880725 24	Describes the specifications and system configuration of an MP3000-series MP3100 Machine Controller and the functions of the CPU.
	Machine Controller MP3000 Series MP3200 Product Manual	SIEP C880725 10	Describes the specifications and system configuration of an MP3000-series MP3200 Machine Controller and the functions of the CPU Unit.
	Machine Controller MP3000 Series MP3300 Product Manual	SIEP C880725 21	Describes the specifications and system configuration of an MP3000-series MP3300 Machine Controller and the functions of the CPU Unit.
	Machine Controller MP210□/ MP210□M User's Manual Design and Maintenance	SIEP C880700 01	Describes the functions, specifications, setup procedures, and operating methods of the MP2100/MP2100M.
	Machine Controller MP2200 User's Manual	SIEP C880700 14	Describes the functions, specifications, and operating methods of the MP2200 Machine Controllers.
	Machine Controller MP2101T/ MP2101TM User's Manual Design and Maintenance	SIEP C880712 00	Describes the functions, specifications, and operating methods of the MP2101 Machine Controllers.
	Machine Controller MP2300 Basic Module User's Manual	SIEP C880700 03	Describes the functions, specifications, setup procedures, and operating methods of the MP2300.
	Machine Controller MP2300S Basic Module User's Manual	SIEP C880732 00	Describes the functions, specifications, setup procedures, and operating methods of the MP2300S.
	Machine Controller MP2310 Basic Module User's Manual	SIEP C880732 01	Describes the functions, specifications, setup procedures, and operating methods of the MP2310.
	Machine Controller MP2400 User's Manual	SIEP C880742 00	Describes the functions, specifications, setup procedures, and operating methods of the MP2400.
	Machine Controller MP2500/ MP2500M/ MP2500D/MP2500MD User's Manual	SIEP C880752 00	Describes how to use the MP2500, MP2500M, MP2500D, and MP2500MD Machine Controllers.
	Machine Controller MP2000 Series MPU-01 Multi-CPU Module User's Manual	SIEP C880781 05	Describes the functions, specifications, and operating methods of the MPU-01.

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Function	Manual Name	Manual Number	Description
Communications functionality	Machine Controller MP3000 Series Communications User's Manual	SIEP C880725 12	Describes the specifications, system configuration, and communications connection methods for the Ethernet communications that are used with an MP3000-series Machine Controller.
	Machine Controller MP2000 Series Communication Module User's Manual	SIEP C880700 04	Provides information on the Communications Modules that can be connected to an MP2000-series Machine Controller and describes the communications methods.
	Machine Controller MP2300S/ MP2310/MP2400 Basic Module Supplement for Ethernet Communications	SIEP C880700 37	Describes a specific method of communications between the MP2300S, MP2310, or MP2400 Machine Controllers and Ethernet-connected remote equipment, such as PLCs and Windows computers.
	Machine Controller MP2000 Series 262IF-01 FL-net Communication Module User's Manual	SIEP C880700 36	Describes the specifications and communications methods for the FL-net Communications Module that can be connected to an MP2000-series Machine Controller.
	Machine Controller MP2000 Series 263IF-01 EtherNet/IP Communication Module User's Manual	SIEP C880700 39	Describes the specifications and communications methods for the EtherNet/IP Communications Module that can be connected to an MP2000-series Machine Controller.
Motion control functionality	Machine Controller MP3000 Series Motion Control User's Manual	SIEP C880725 11	Describes the specifications, system configuration, and operating methods for the SVC32/SVR32 Motion Function Modules that are used in an MP3000-series Machine Controller.
	Machine Controller MP2000-series SVA-01 Motion Module User's Manual	SIEP C880700 32	Describes the functions, specifications, and operating methods of the MP2000-series SVA-01 Motion Module.
	Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual	SIEP C880700 33	Describes the functions, specifications, and operating methods of the MP2000-series Motion Module (built-in Function Modules: SVB, SVB-01, and SVR).
	Machine Controller MP2000 Series SVC-01 Motion Module User's Manual	SIEP C880700 41	Describes the functions, specifications, and operating methods of the MP2000-series SVC-01 Motion Module.
	Machine Controller MP2000 Series Pulse Output Motion Module PO-01 User's Manual	SIEP C880700 28	Describes the functions, specifications, and operating methods of the MP2000-series PO-01 Motion Module.

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Function	Manual Name	Manual Number	Description
Programming	Machine Controller MP3000 Series Ladder Programming Manual	SIEP C880725 13	Describes the ladder programming specifications and instructions of MP3000-series Machine Controller.
	Machine Controller MP3000 Series Motion Programming Manual	SIEP C880725 14	Describes the motion programming and sequence programming specifications and instructions of MP3000-series Machine Controllers.
	Machine Controller MP900/MP2000 Series User's Manual Ladder Programming	SIEZ-C887-1.2	Describes the instructions used in MP2000 ladder programming.
	Machine Controller MP2000 Series User's Manual for Motion Programming	SIEP C880700 38	Describes the instructions used in MP2000 motion programming.
	Machine Controller MP900/MP2000 Series New Ladder Editor Programming Manual	SIEZ-C887-13.1	Describes the programming instructions of the New Ladder Editor, which assists MP900/MP2000-series design and maintenance.
	Machine Controller MP900/MP2000 Series New Ladder Editor User's Manual	SIEZ-C887-13.2	Describes the operating methods of the New Ladder Editor, which assists MP900/MP2000-series design and maintenance.
Engineering Tools	Engineering Tool for MP2000 Series Machine Controllers MPE720 Version 6 User's Manual	SIEP C880700 30	Describes how to install and operate the MPE720 version 6 Engineering Tool for MP2000-series Machine Controllers.
	Machine Controller MP2000/ MP3000 Series MPLoader Version 4 User's Manual	SIEP C880761 01	Describes how to install and operate the MPLoader.
	MP2000/MP3000 Series Machine Controller MPLoad Maker Version 4 User's Manual	SIEP C880761 02	Describes how to install and operate the MPLoad Maker.
I/O Modules	Machine Controller MP2000 Series I/O Module User's Manual	SIEP C880700 34	Describes the functions, specifications, and operating methods of the LIO-01, LIO-02, LIO-04, LIO-05, LIO-06, and DO-01 I/O Modules for MP2000-series Machine Controllers.
	Machine Controller MP2000 Series Analog Input/Analog Output Module AI-01/AO-01 User's Manual	SIEP C880700 26	Describes the functions, specifications, and operating methods of the AI-01 and AO-01 I/O Modules for MP2000-series Machine Controllers.
	Machine Controller MP2000 Series Counter Module CNTR-01 User's Manual	SIEP C880700 27	Describes the functions, specifications, and operating methods of the CNTR-01 Counter Module for MP2000-series Machine Controllers.
MECHATROLINK I/O	MECHATROLINK-III Compatible I/O Module User's Manual	SIEP C880781 04	Describes the functions, specifications, operating methods, and MECHATROLINK- III communications for the Remote I/O Modules for MP2000/ MP3000-series Machine Controllers.
	Machine Controller MP900/MP2000 Series Distributed I/O Module User's Manual MECHATROLINK System	SIE-C887-5.1	Describes MECHATROLINK distributed I/O for MP900/MP2000-series Machine Controllers.

Operating Precautions

- It is strictly prohibited to copy or use MPE720 version 7 for any purpose other than to design and maintain applications for MP2000/MP3000-series Machine Controllers.
- Store the DVD containing MPE720 version 7 in a safe place.
- It is strictly prohibited to decompile, disassemble, or reverse engineer MPE720 version 7.
- You may not give, exchange, lend, or otherwise provide the MPE720 version 7, in part or whole, to any third party without the prior permission of the Yaskawa Electric Corporation.

Safety Precautions

◆ 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

- Indicates precautions that, if not heeded, are likely to result in loss of life, serious injury, or fire.

⚠ WARNING

- Indicates precautions that, if not heeded, could result in loss of life, serious injury, or fire.

⚠ CAUTION

- Indicates precautions that, if not heeded, could result in relatively serious or minor injury, or in fire.

NOTICE

- Indicates precautions that, if not heeded, could result in property damage.

◆ Precautions That Must Always Be Observed

■ General Precautions

⚠ WARNING

- The installation must be suitable and it must be performed only by an experienced technician.
  There is a risk of electrical shock or injury.
- Before connecting the machine and starting operation, make sure that an emergency stop procedure has been provided and is working correctly.
  There is a risk of injury.
- Do not approach the machine after a momentary interruption to the power supply. When power is restored, the Machine Controller and the device connected to it may start operation suddenly. Provide safety measures in advance to ensure human safety when operation restarts.
  There is a risk of injury.
- Do not touch anything inside the Machine Controller.
  There is a risk of electrical shock.
- Do not remove the front cover, cables, connector, or options while power is being supplied.
  There is a risk of electrical shock, malfunction, or damage.
- Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch the cables.
  There is a risk of electrical shock, operational failure of the Machine Controller, or burning.
- Never attempt to modify the Machine Controller in any way.
  There is a risk of injury or device damage.

■ Storage and Transportation Precautions

⚠ CAUTION

- **Do not store the Machine Controller in any of the following locations.**
  - Locations that are subject to direct sunlight
  - Locations that are subject to ambient temperatures that exceed the storage conditions
  - Locations that are subject to ambient humidity that exceeds the storage conditions
  - Locations that are subject to rapid temperature changes and condensation
  - Locations that are subject to corrosive or inflammable gas
  - Locations that are subject to excessive dust, dirt, salt, or metallic powder
  - Locations that are subject to water, oil, or chemicals
  - Locations that are subject to vibration or shock

  There is a risk of fire, electrical shock, or device damage.
- **Hold onto the main body of the Machine Controller when transporting it.**
  Holding the cables or connectors may damage them or result in injury.
- **Do not overload the Machine Controller during transportation. (Follow all instructions.)**
  There is a risk of injury or an accident.
- **Never subject the Machine Controller to an atmosphere containing halogen (fluorine, chlorine, bromine, or iodine) during transportation.**
  There is a risk of malfunction or damage.
- **If disinfectants or insecticides must be used to treat packing materials such as wooden frames, pallets, or plywood, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.**
  Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.
  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 the erosion of the capacitors.

■ Installation Precautions

⚠ CAUTION

- Do not install the Machine Controller in any of the following locations.
  - Locations that are subject to direct sunlight
  - Locations that are subject to ambient temperatures that exceed the operating conditions
  - Locations that are subject to ambient humidity that exceeds the operating conditions
  - Locations that are subject to rapid temperature changes and condensation
  - Locations that are subject to corrosive or inflammable gas
  - Locations that are subject to excessive dust, dirt, salt, or metallic powder
  - Locations that are subject to water, oil, or chemicals
  - Locations that are subject to vibration or shock

  There is a risk of fire, electrical shock, or device damage.
- Never install the Machine Controller in an atmosphere containing halogen (fluorine, chlorine, bromine, or iodine).
  There is a risk of malfunction or damage.
- Do not step on the Machine Controller or place heavy objects on the Machine Controller.
  There is a risk of injury or an accident.
- Do not block the air exhaust ports on the Machine Controller. Do not allow foreign objects to enter the Machine Controller.
  There is a risk of internal element deterioration, malfunction, or fire.
- Always mount the Machine Controller in the specified orientation.
  There is a risk of malfunction.
- Leave the specified amount of space between the Machine Controller, and the interior surface of the control panel and other devices.
  There is a risk of fire or malfunction.
- Do not subject the Machine Controller to strong shock.
  There is a risk of malfunction.
- Suitable battery installation must be performed and it must be performed only by an experienced technician.
  There is a risk of electrical shock, injury, or device damage.
- Do not touch the electrodes of the Battery.
  Static electricity may damage the Battery.

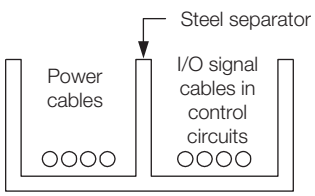
■ Wiring Precautions

⚠ CAUTION

- Check the wiring to be sure it has been performed correctly.
  There is a risk of motor run-away, injury, or accidents.
- Always use a power supply of the specified voltage.
  There is a risk of fire or accident.
- In places with poor power supply conditions, ensure that the input power is supplied within the specified voltage range.
  There is a risk of device damage.
- Install breakers and other safety measures to provide protection against shorts in external wiring.
  There is a risk of fire.
- Provide sufficient shielding when using the Machine Controller in the following locations.
  - Locations that are subject to noise, such as from static electricity
  - Locations that are subject to strong electromagnetic or magnetic fields
  - Locations that are subject to radiation
  - Locations that are near power lines

  There is a risk of device damage.
- Configure the circuits to turn ON the power supply to the CPU Unit/CPU Module before the 24-V I/O power supply. Refer to the following manuals for details on circuits.
  MP3000 Series CPU Unit Instructions Manual (Manual No.: TOBP C880725 16)
  MP3000 Series MP3300 CPU Module Instructions Manual (Manual No.: TOBP C880725 23)
  If the power supply to the CPU Unit/CPU Module is turned ON after the external power supply, e.g., the 24-V I/O power supply, the outputs from the CPU Unit/CPU Module may momentarily turn ON when the power supply to the CPU Unit/CPU Module turns ON. This can result in unexpected operation that may cause injury or device damage.
- Provide emergency stop circuits, interlock circuits, limit circuits, and any other required safety measures in control circuits outside of the Machine Controller.
  There is a risk of injury or device damage.
- If you use MECHATROLINK I/O Modules, use the establishment of MECHATROLINK communications as an interlock output condition.
  There is a risk of device damage.
- Connect the Battery with the correct polarity.
  There is a risk of battery damage or explosion.
- Suitable battery replacement must be performed and it must be performed only by an experienced technician.
  There is a risk of electrical shock, injury, or device damage.
- Do not touch the electrodes of the Battery when you replace the Battery.
  Static electricity may damage the Battery.
- Select the I/O signal wires for external wiring to connect the Machine Controller to external devices based on the following criteria:
  - Mechanical strength
  - Noise interference
  - Wiring distance
  - Signal voltage
- Separate the I/O signal cables for control circuits from the power cables both inside and outside the control panel to reduce the influence of noise from the power cables.
  If the I/O signal lines and power lines are not separated properly, malfunction may occur.

Example of Separated Cables



■ Operation Precautions

⚠ CAUTION

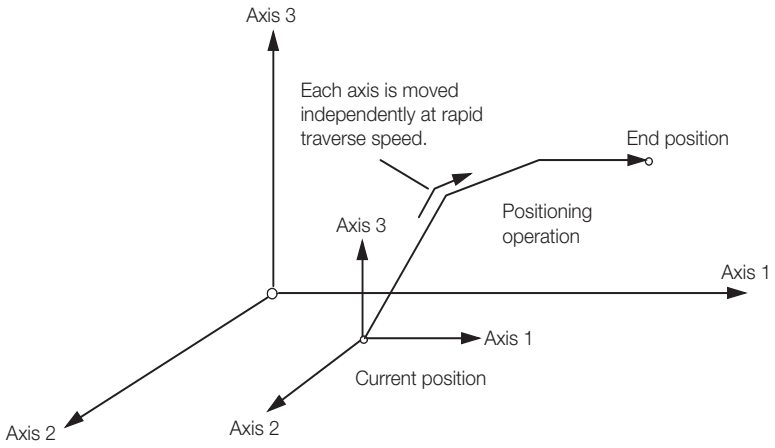
- **Follow the procedures and instructions in the user's manuals for the relevant Machine Controllers to perform normal operation and trial operation.**
  Operating mistakes while the Servomotor and machine are connected may damage the machine or even cause accidents resulting in injury or death.
- **Implement interlock signals and other safety circuits external to the Machine Controller to ensure safety in the overall system even if the following conditions occur.**
  - Machine Controller failure or errors caused by external factors
  - Shutdown of operation due to Machine Controller detection of an error in self-diagnosis and the subsequent turning OFF or holding of output signals
  - Holding of the ON or OFF status of outputs from the Machine Controller due to fusing or burning of output relays or damage to output transistors
  - Voltage drops from overloads or short-circuits in the 24-VDC output from the Machine Controller and the subsequent inability to output signals
  - Unexpected outputs due to errors in the power supply, I/O, or memory that cannot be detected by the Machine Controller through self-diagnosis.

  There is a risk of injury, device damage, or burning.
- **Observe the setting methods that are given in the manual for the following parameters.**
  - Parameters for absolute position detection when the axis type is set to a finite-length axis
  - Parameters for simple absolute infinite-length position control when the axis type is set to an infinite-length axis

  MP3000 Series Motion Control User's Manual (Manual No. SIEP C880725 11)

  If any other methods are used, offset in the current position when the power supply is turned OFF and ON again may result in device damage.
- **OL□□□48 (Zero Point Position Offset in Machine Coordinate System) is always valid when the axis type is set to a finite-length axis. Do not change the setting of OL□□□48 while the Machine Controller is operating.**
  There is a risk of machine damage or an accident.
- **Always check to confirm the paths of axes when any of the following axis movement instructions are used in programs to ensure that the system operates safely.**
  - Positioning (MOV)
  - Linear Interpolation (MVS)
  - Circular Interpolation (MCC or MCW)
  - Helical Interpolation (MCC or MCW)
  - Set-time Positioning (MVT)
  - Linear Interpolation with Skip Function (SKP)
  - Zero Point Return (ZRN)
  - External Positioning (EXM)

Example



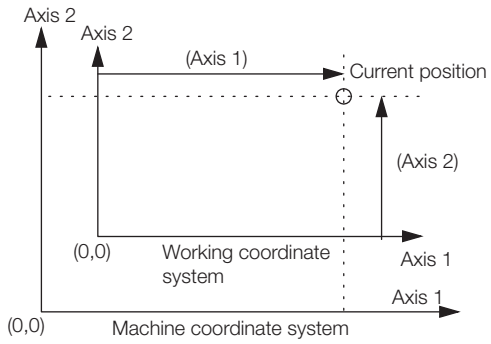
Example of Basic Path for Positioning (MOV)

There is a risk of injury or device damage.

⚠ CAUTION

- The same coordinate word will create a completely different travel operation in Absolute Mode and in Incremental Mode. Make sure that the ABS and INC instructions are used correctly before you start operation.
  There is a risk of injury or device damage.
- The travel path for the Positioning (MOV) instructions will not necessarily be a straight line. Check to confirm the paths of the axis when this instruction is used in programs to ensure that the system operates safely.
  There is a risk of injury or device damage.
- The Linear Interpolation (MVS) instruction can be used on both linear axes and rotary axes. However, if a rotary axis is included, the path will not necessarily be a straight line like the one that occurs for linear interpolation. Check to confirm the paths of the axis when this instruction is used in programs to ensure that the system operates safely.
  There is a risk of injury or device damage.
- The linear interpolation for the Helical Interpolation (MCW and MCC) instructions can be used for both linear axes and rotary axes. However, depending on how the linear axis is handled, the path of helical interpolation will not be a helix. Check to confirm the paths of the axis when this instruction is used in programs to ensure that the system operates safely.
  There is a risk of injury or device damage.
- Unexpected operation may occur if the following coordinate instructions are specified incorrectly: Always confirm that the following instructions are specified correctly before you begin operation.
  - Absolute Mode (ABS)
  - Incremental Mode (INC)
  - Current Position Set (POS)

Example



Example of Working Coordinate System Created with the Set Current Position (POS)

There is a risk of injury or device damage.

- The Set Current Position (POS) Instruction creates a new working coordinate system. Therefore, unexpected operation may occur if the POS instruction is specified incorrectly. When you use the POS instruction, always confirm that the working coordinate system is in the correct position before you begin operation.
  There is a risk of injury or device damage.
- The Move on Machine Coordinates (MVM) instruction temporarily performs positioning to a coordinate position in the machine coordinate system. Therefore, unexpected operation may occur if the instruction is executed without confirming the zero point position in the machine coordinate system first. When you use the MVM instruction, always confirm that the machine zero point is in the correct position before you begin operation.
  There is a risk of injury or device damage.

■ Maintenance and Inspection Precautions

⚠ CAUTION

- Do not attempt to disassemble or repair the Machine Controller.
  There is a risk of electrical shock, injury, or device damage.
- Do not change wiring while power is being supplied.
  There is a risk of electrical shock, injury, or device damage.
- Do not forget to perform the following tasks when you replace the CPU Unit/CPU Module:
  - Back up all programs and parameters from the CPU Unit/CPU Module that is being replaced.
  - Transfer all saved programs and parameters to the new CPU Unit/CPU Module.

  If you operate the CPU Unit/CPU Module without transferring this data, unexpected operation may occur. There is a risk of injury or device damage.
- Do not touch the heat sink on the CPU Unit/CPU Module while the power supply is turned ON or for a sufficient period of time after the power supply is turned OFF.
  - The heat sink may be very hot, and there is a risk of burn injury.

■ Disposal Precautions

- Dispose of the Machine Controller as general industrial waste.
- Observe all local laws and ordinances when you dispose of used Batteries.

■ Other General Precautions

- The products shown in the illustrations in this manual are sometimes shown without covers or protective guards. Always replace the cover or protective guard as specified first, and then operate the products in accordance with the manual.
- The illustrations that are presented in this manual are typical examples and may not match the product you received.
- If the manual must be ordered due to loss or damage, inform your nearest Yaskawa representative or one of the offices listed on the back of this manual.

Warranty

◆ Details of Warranty

■ Warranty Period

The warranty period for a product that was purchased (hereinafter called “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.

■ Warranty Scope

Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the warranty period above. 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
- Abuse 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

◆ 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.

◆ 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.

◆ 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.

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3 Names and Descriptions of GUI Components and View Settings

4 Setup

Revision History

Introduction

1

This chapter introduces the MPE720 and describes the flow of tasks and settings that must be completed before you can use the MPE720.

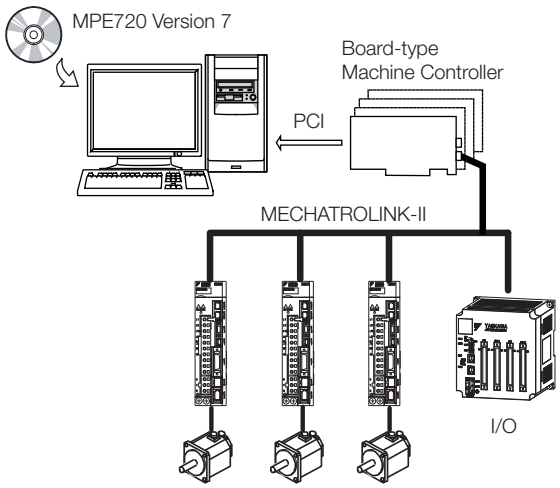
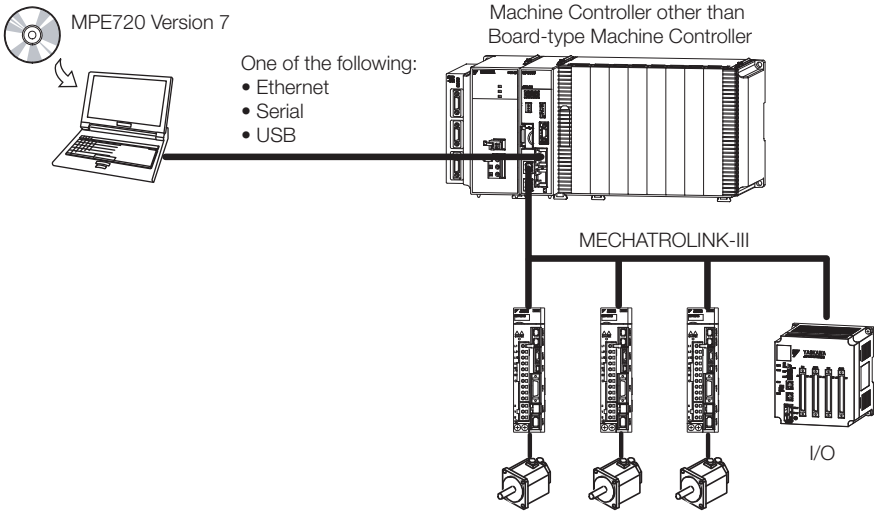
1.1 What Is the MPE720?

MPE720 version 7 is an Integrated System Engineering Tool that can be used for more than just programming Machine Controllers. It also provides optimum functionality for the entire development process, including functions to set up, adjust, program, maintain, and inspect other devices required in machine designs, such as Servo Drives, Inverters, and Distributed I/O Devices.

The MPE720 is installed in a PC and the PC can be connected to a Machine Controller to operate the Machine Controller from the PC interface.

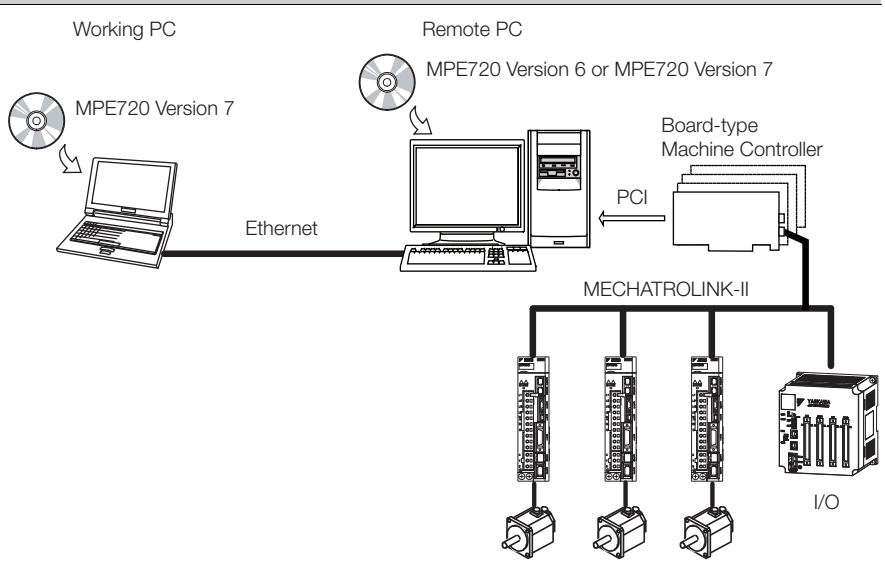
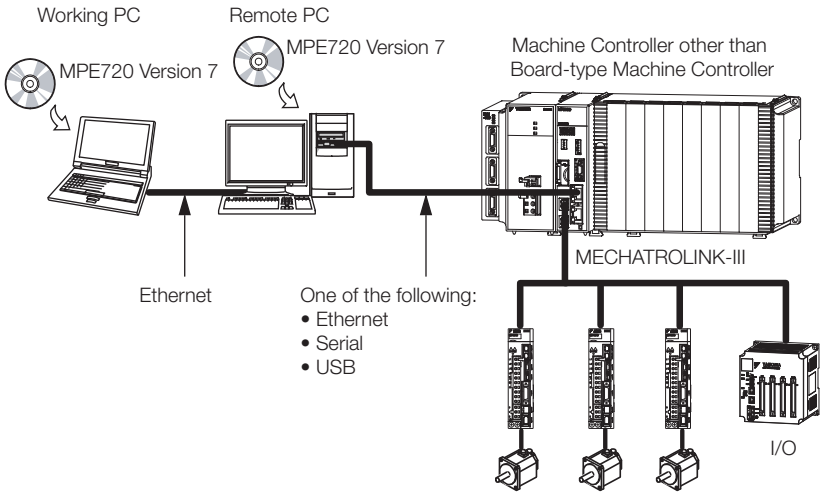
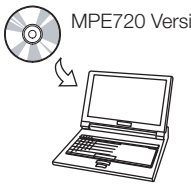
1.2 Types of Connections

There are five ways to connect a PC on which the MPE720 is installed with a Machine Controller, depending on the type of connection and the type of Machine Controller.

Type of Connection		Machine Controller Type	Conceptual Illustration of Connection
Online connections	Normal connections	Board	
		Other than Board	

Continued on next page.

Continued from previous page.

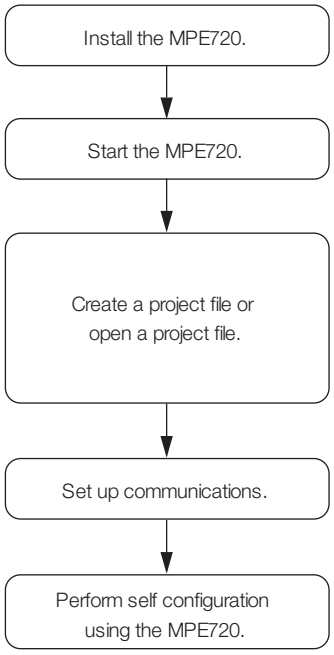
<table>
<tr><th colspan="2">Type of Connection</th><th>Machine Controller Type</th><th>Conceptual Illustration of Connection</th></tr>
<tr><td rowspan="2">Online connections</td><td rowspan="2">Remote connections</td><td>Board</td><td> 
</td></tr>
<tr><td>Other than Board</td><td> 
</td></tr>
<tr><td colspan="2">Offline operation</td><td>–</td><td> 
</td></tr>
</table>

1.3 Flow of Settings

The flow for setting up each connection format is given below.

1.3.1 Online Connections

For a Normal Connection to a Board-type Machine Controller



☞ *2.1 Installing the MPE720 on a PC* on page 2-2

☞ *2.4 Starting the MPE720* on page 2-16

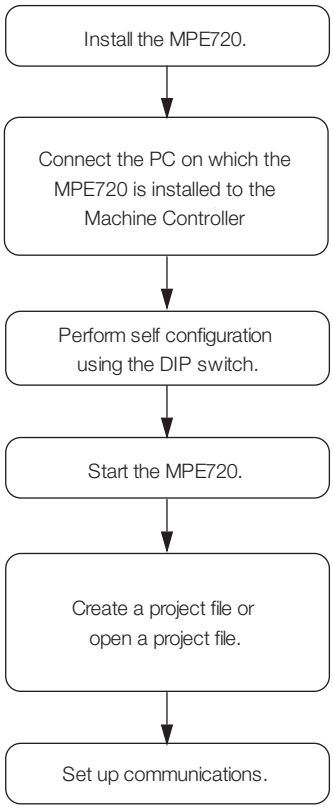
☞ *2.5 Creating a Project File* on page 2-17

Note: This step is not necessary when using a direct connection to the Machine Controller, where changes are saved in the Machine Controller instead of the PC.
Refer to the following section for details on using a direct connection.
☞ *1.4 Editing Data and Storage Locations* on page 1-8

☞ *2.6 Setting Up Communications* on page 2-21

☞ *4.1 Automatically Recognizing Information on Devices Connected to the Machine Controller* on page 4-3

For a Normal Connection to a Machine Controller Other Than a Board-type Machine Controller



☞ *2.1 Installing the MPE720 on a PC* on page 2-2

☞ *2.2 Connecting the MPE720 to a Machine Controller* on page 2-12

☞ *2.3 Automatically Recognizing Information on Devices Connected to the Machine Controller* on page 2-14

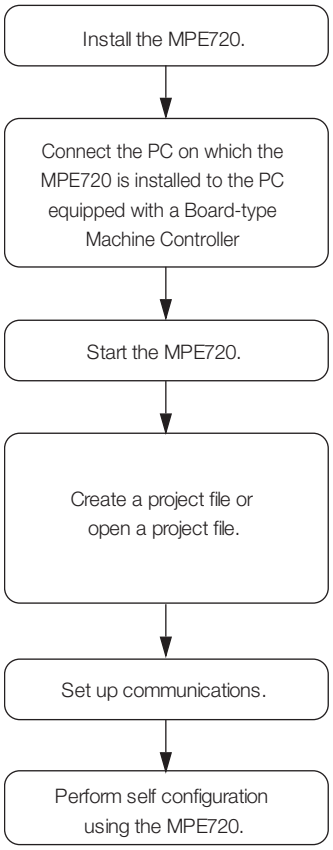
☞ *2.4 Starting the MPE720* on page 2-16

☞ *2.5 Creating a Project File* on page 2-17

Note: This step is not necessary when using a direct connection to the Machine Controller, where changes are saved in the Machine Controller instead of the PC.
Refer to the following section for details on using a direct connection.
☞ *1.4 Editing Data and Storage Locations* on page 1-8

☞ *2.6 Setting Up Communications* on page 2-21

For a Remote Connection to a Board-type Machine Controller



☞ *2.1 Installing the MPE720 on a PC* on page 2-2

☞ *2.2 Connecting the MPE720 to a Machine Controller* on page 2-12

☞ *2.4 Starting the MPE720* on page 2-16

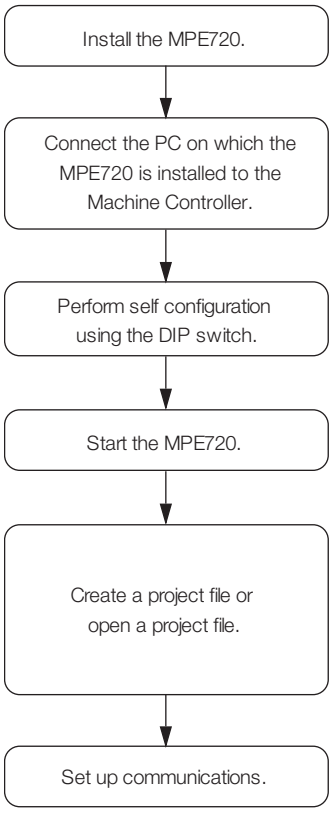
☞ *2.5 Creating a Project File* on page 2-17

Note: This step is not necessary when using a direct connection to the Machine Controller, where changes are saved in the Machine Controller instead of the PC.
Refer to the following section for details on using a direct connection.
☞ *1.4 Editing Data and Storage Locations* on page 1-8

☞ *2.6 Setting Up Communications* on page 2-21

☞ *4.1 Automatically Recognizing Information on Devices Connected to the Machine Controller* on page 4-3

For a Remote Connection to a Machine Controller Other Than a Board-type Machine Controller



☞ *2.1 Installing the MPE720 on a PC* on page 2-2

☞ *2.2 Connecting the MPE720 to a Machine Controller* on page 2-12

☞ *2.3 Automatically Recognizing Information on Devices Connected to the Machine Controller* on page 2-14

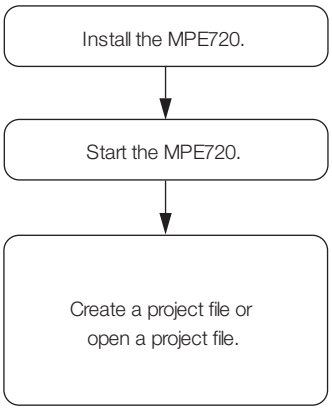
☞ *2.4 Starting the MPE720* on page 2-16

☞ *2.5 Creating a Project File* on page 2-17

Note: This step is not necessary when using a direct connection to the Machine Controller, where changes are saved in the Machine Controller instead of the PC.
Refer to the following section for details on using a direct connection.
☞ *1.4 Editing Data and Storage Locations* on page 1-8

☞ *2.6 Setting Up Communications* on page 2-21

1.3.2 Offline Operation



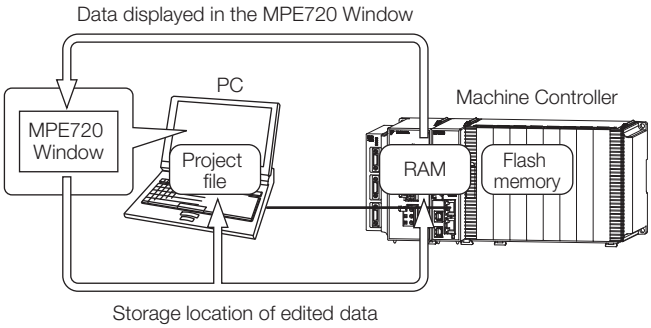
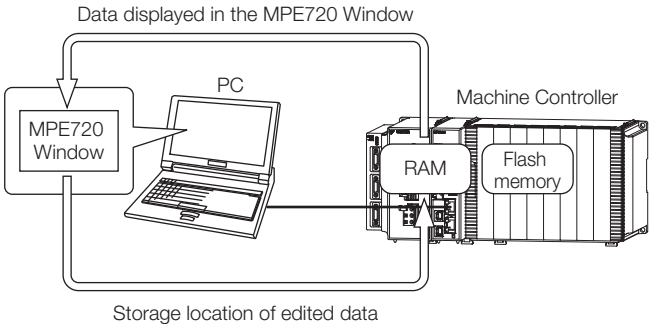
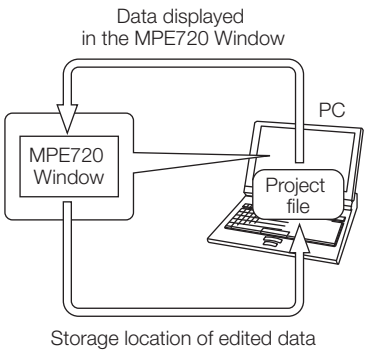
☞ *2.1 Installing the MPE720 on a PC* on page 2-2

☞ *2.4 Starting the MPE720* on page 2-16

☞ *2.5 Creating a Project File* on page 2-17
☞ *4.11.2 Opening an Existing Project File* on page 4-42

1.4 Editing Data and Storage Locations

The data that is displayed in the MPE720 Window and the storage location for edited data depend on the type of connection and the status of the project file. The following table provides illustrations of this.

Type of Connection	Status of Project File	Connection Name	Data Displayed in the MPE720 Window	Storage Location of Edited Data	Illustration
Online connections	Open	Project link connection	Data in Machine Controller RAM	In the open project file and the Machine Controller 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 Machine Controller RAM are the same before you start. Refer to the following sections for details. ☞ *8.8 Comparing Data* on page 8-70
	Not open	Direct connection	Data in Machine Controller RAM	Machine Controller RAM	
Offline operation	Open	–	In the open project file	In the open project file	

Information

Differences between the Machine Controller RAM and Flash Memory

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

We recommend saving the data to the flash memory.

Detailed Initial Setting Procedures

2

This chapter describes the tasks and settings that must be performed to use the MPE720.

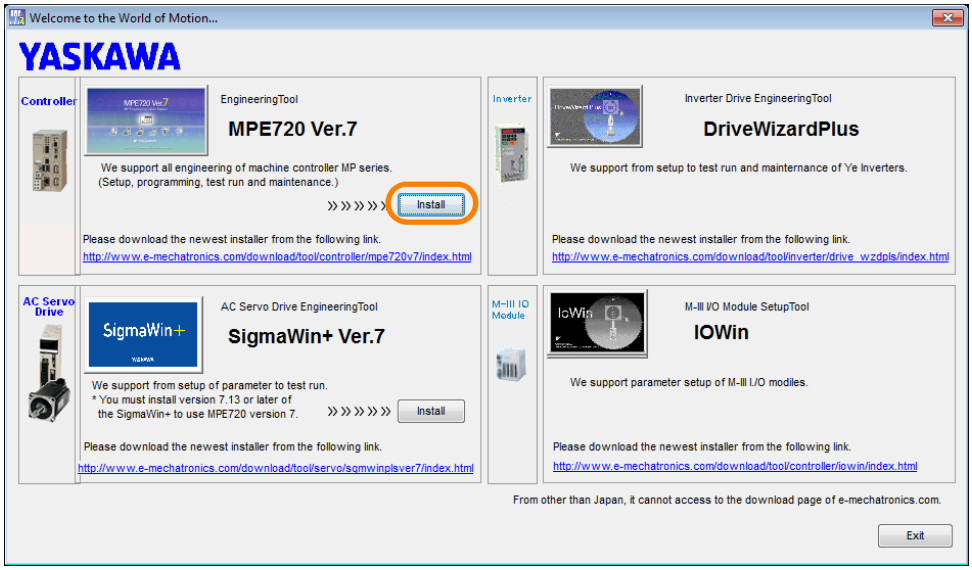
2.1 Installing the MPE720 on a PC

Use the following procedure to install the MPE720 on a PC.

1. Insert the MPE720 installation DVD into the PC.
   The Installer will start automatically.

2. Execute the Setup.exe file in the folder.
   When execution of Setup.exe starts, the Welcome to the World of Motion... Dialog Box will be displayed.

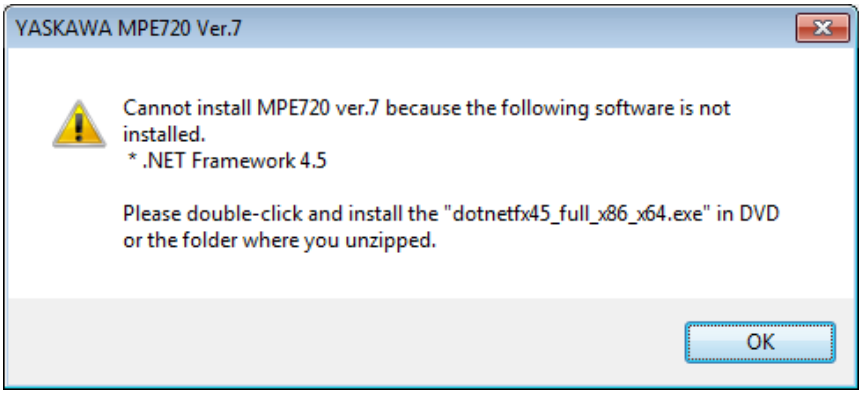
3. Click the **Install** Button for MPE720 Ver. 7.



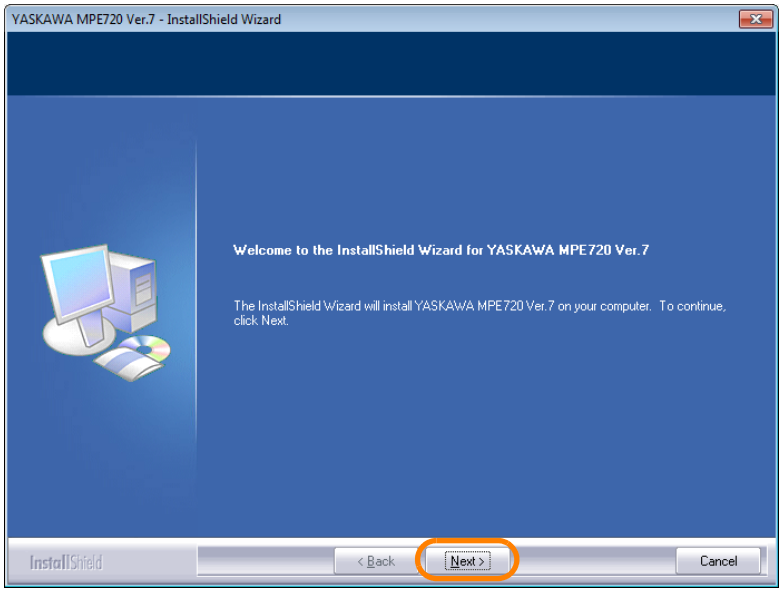
When the application is ready to be installed, the YASKAWA MPE720 Ver. 7 - InstallShield Wizard Dialog Box will be displayed.

Important

If .NET Framework 4.5 or higher is not installed on the PC, the following dialog box will be displayed. If that occurs, execute the dotnetfx45_full_x86_x64.exe file in the DVD folder to install it and then execute step 2 again.

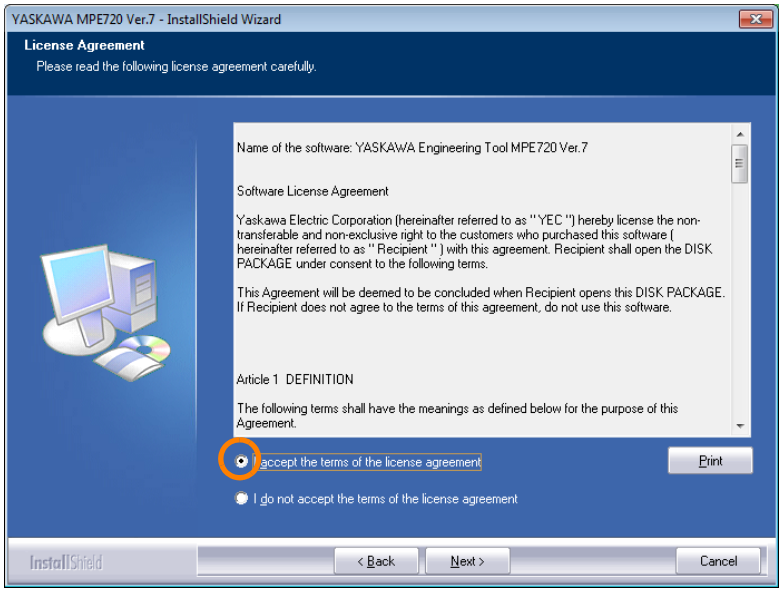


4. Click the **Next** Button.

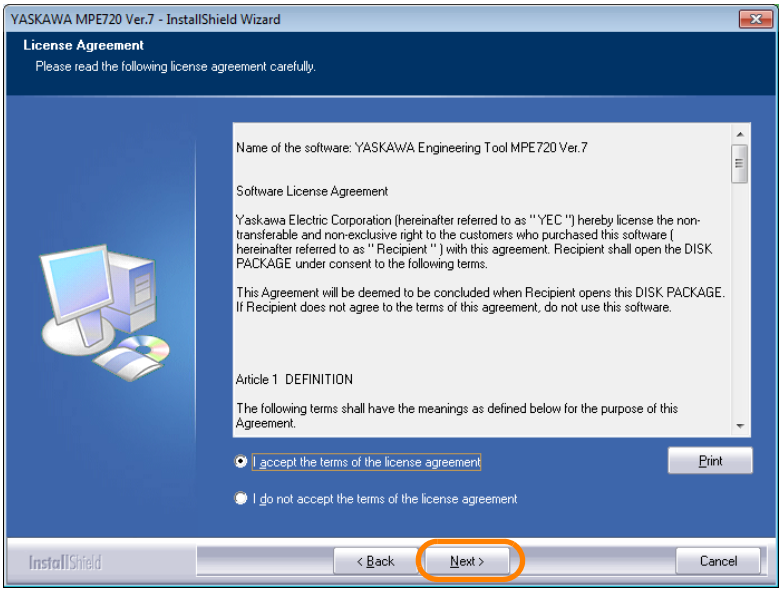


The License Agreement will be displayed.

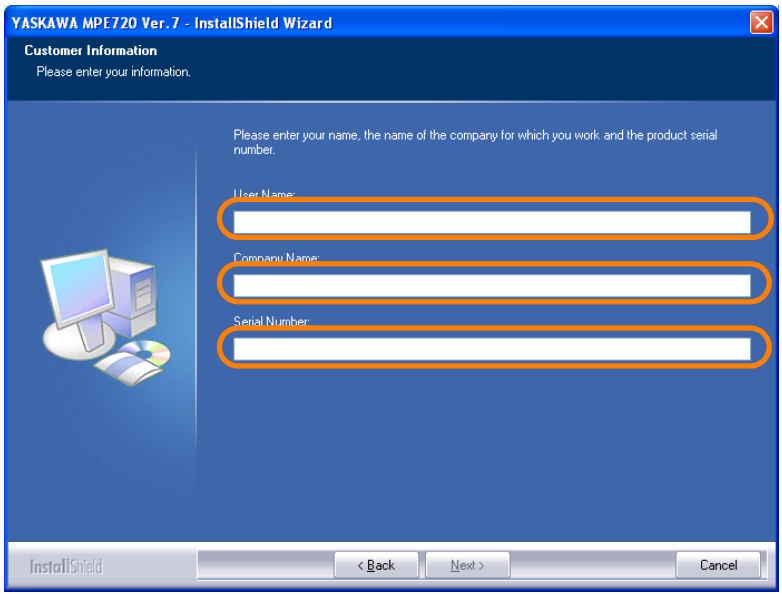
5. Read the agreement, and then select the **I accept the terms of the license agreement** Option.



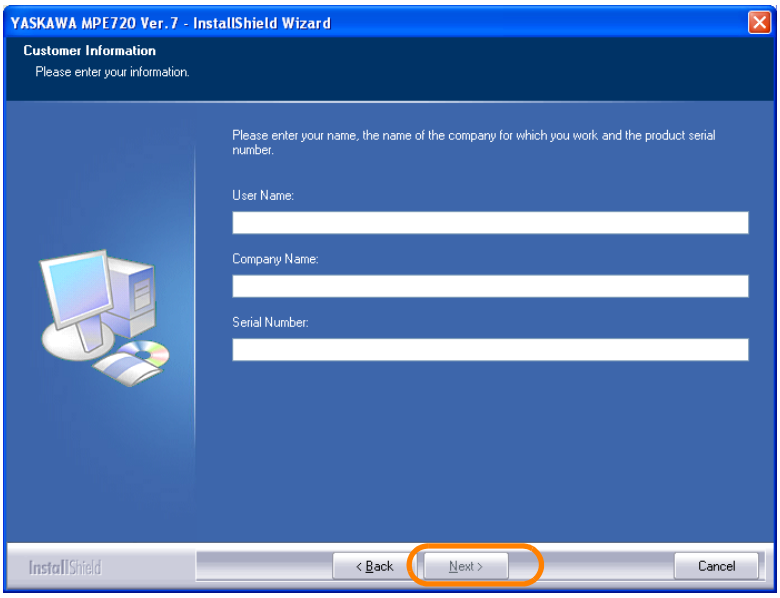
6. Click the **Next** Button.



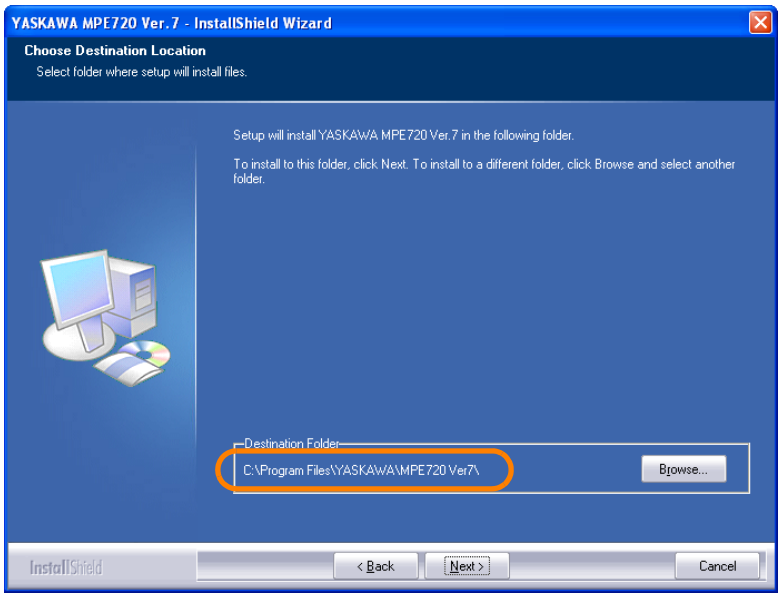
7. Enter the following information.
   - User Name
   - Company Name
   - Serial Number: Enter the number that is printed on the DVD package.



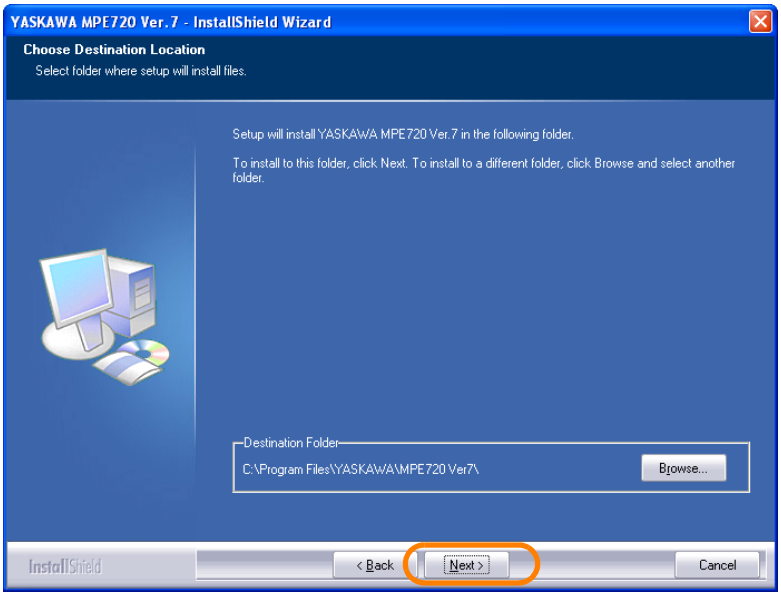
8. Click the **Next** Button.



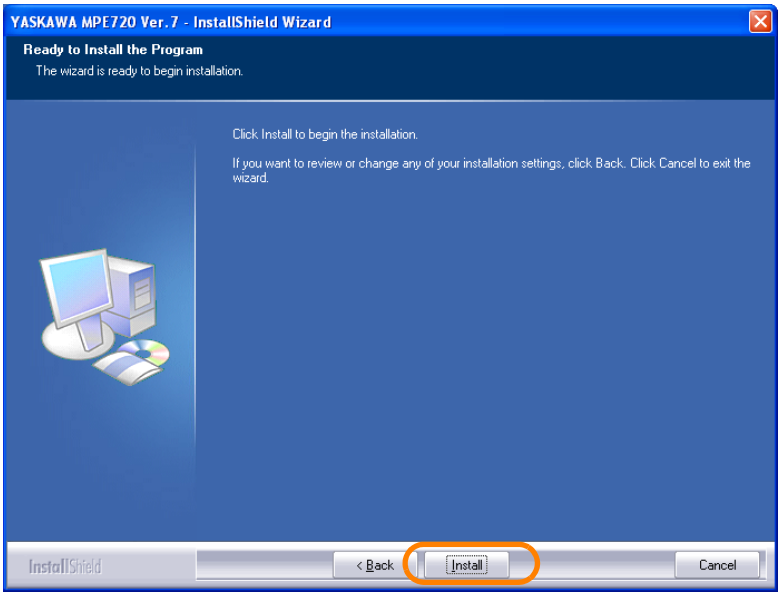
9. Select the destination folder.
   - To install to the folder shown under **Destination Folder**: Proceed to step 10.
   - To change the destination folder: Click the **Browse** Button and select the desired destination by following the guidance displayed in the dialog box.



10. Click the **Next** Button.

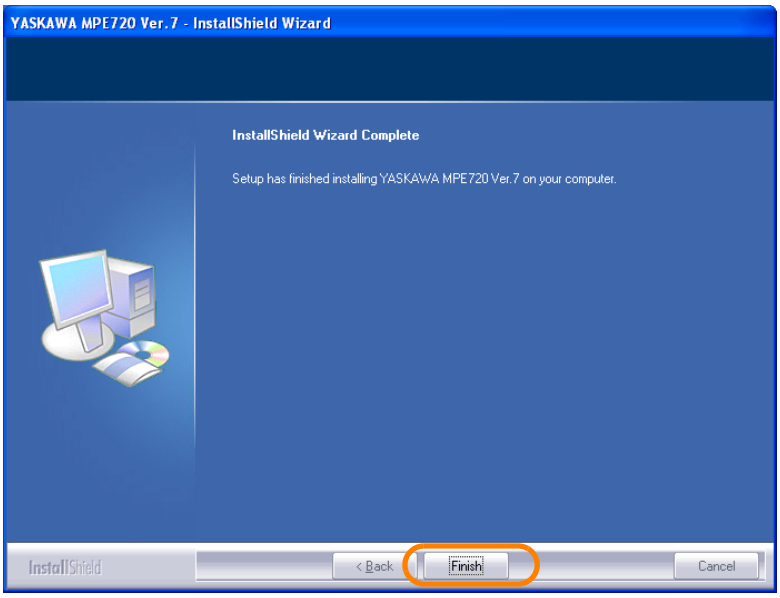


11. Click the **Install** Button.



The installation will begin.

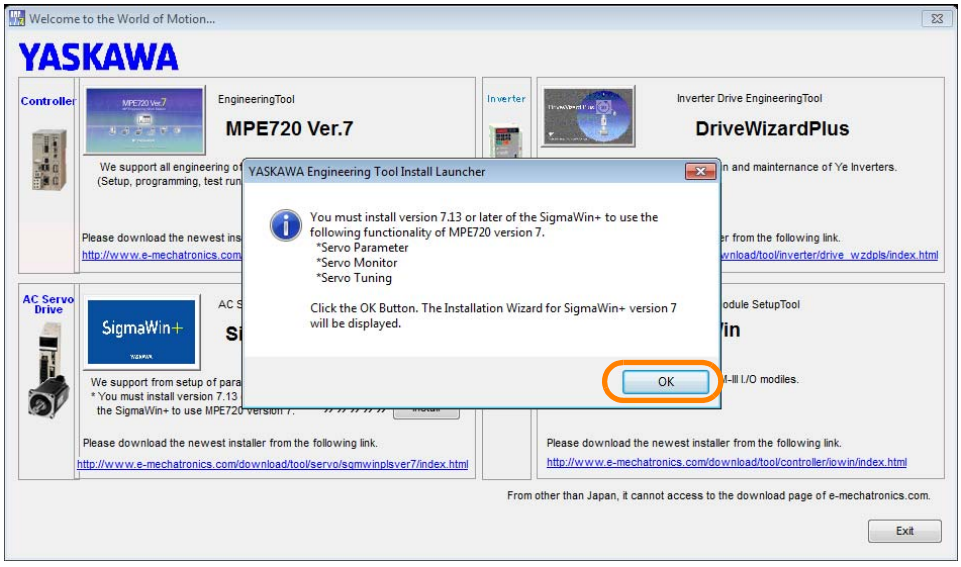
12. Click the **Finish** Button.



This concludes the installation of the MPE720 on the PC.
Installation of SigmaWin+ Ver. 7 will start next in the following cases. Proceed to step 13.

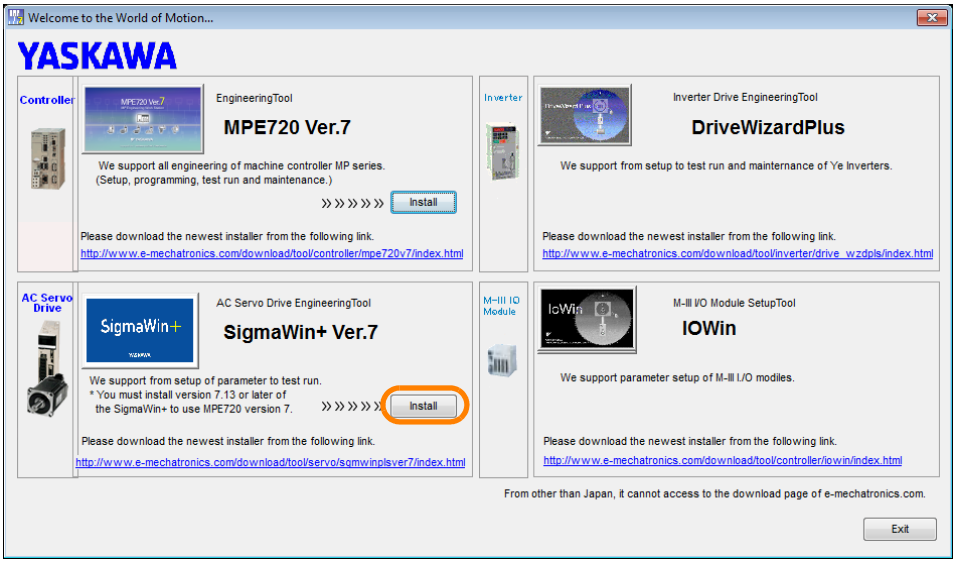
- SigmaWin+ Ver. 7 is not installed in the PC.
- The version of SigmaWin+ Ver. 7 installed in the PC is lower than version 7.13.
- The version of SigmaWin+ Ver. 7 installed in the PC is higher than version 7.13, but the version on the DVD is higher than the installed version.

13. The following dialog box will be displayed. Click the **OK** Button.



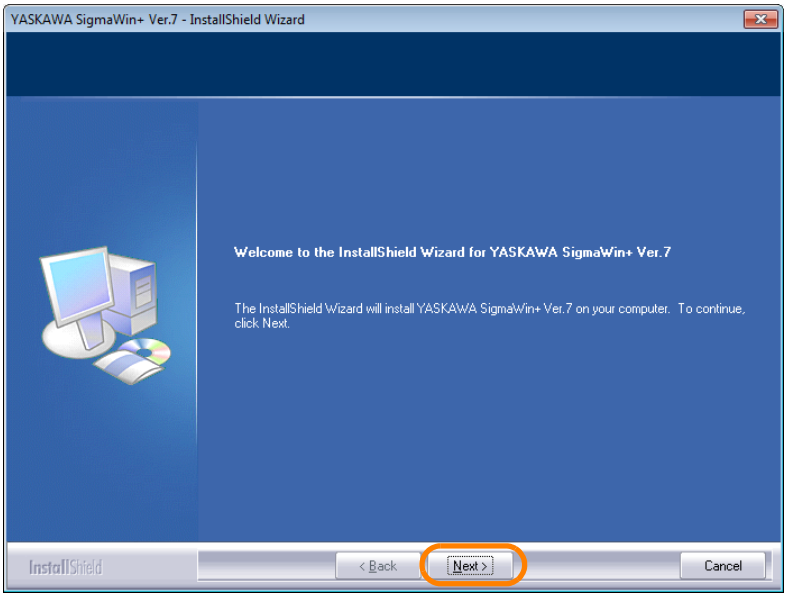
The Installer will start automatically.

14. Click the **Install** Button for SigmaWin+ Ver. 7.



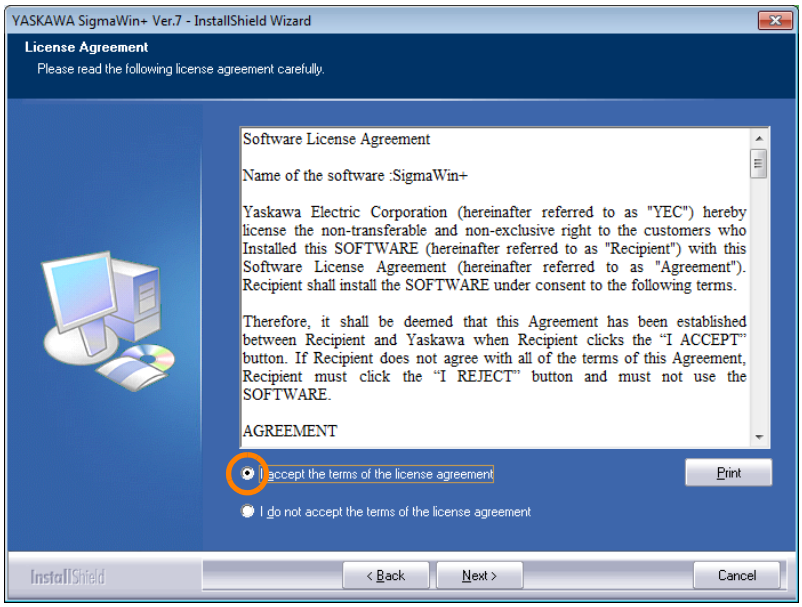
When the application is ready to be installed, the YASKAWA SigmaWin+ Ver. 7 - InstallShield Wizard Dialog Box will be displayed.

15. Click the **Next** Button.

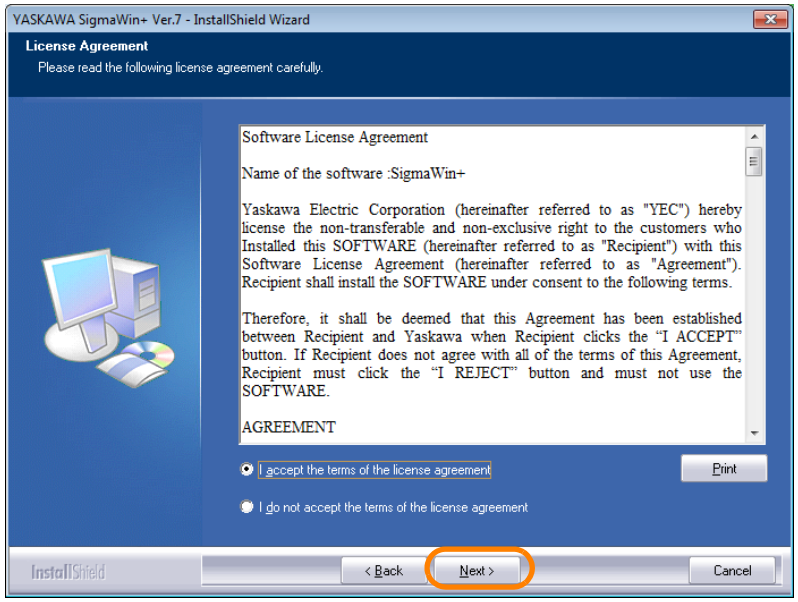


The License Agreement will be displayed.

16. Read the agreement, and then select the **I accept the terms of the license agreement** Option.

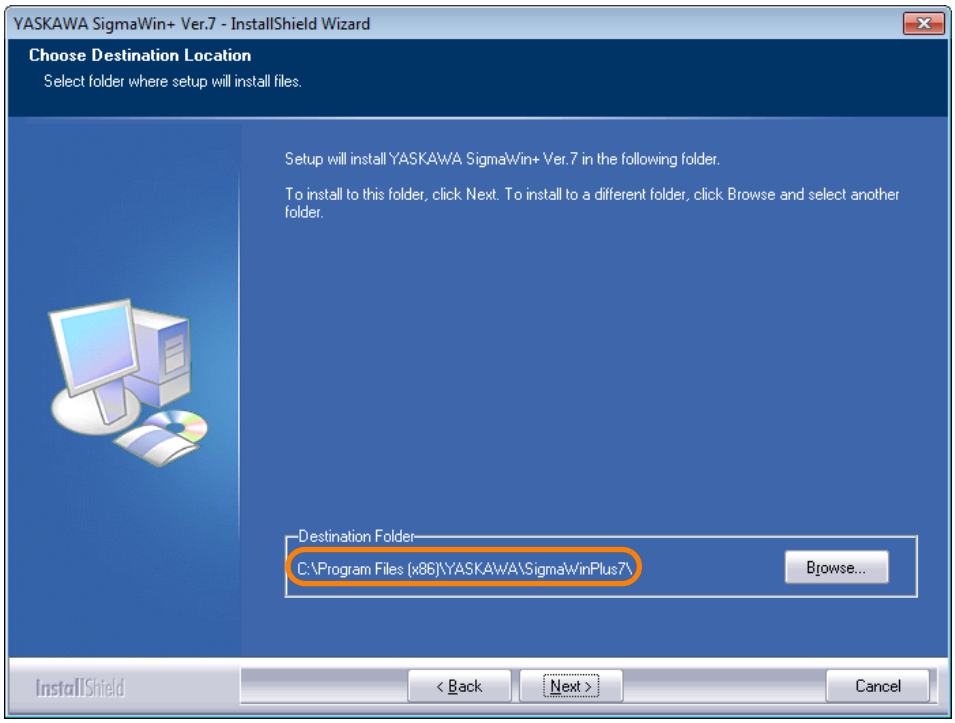


17. Click the **Next** Button.

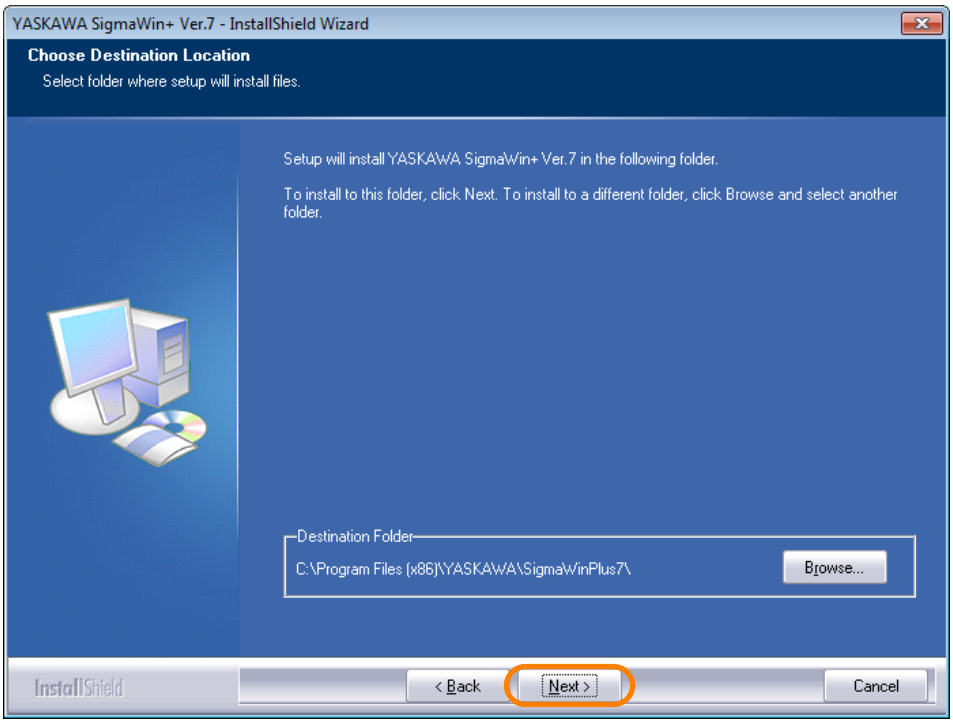


18. Select the destination folder.

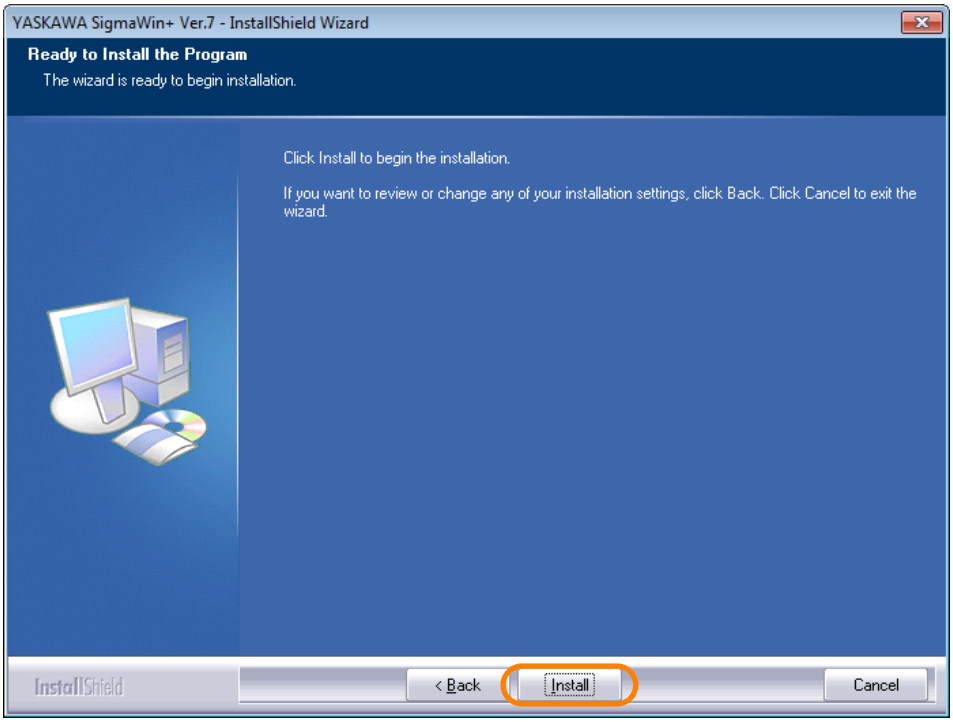
- To install to the folder shown under **Destination Folder**: Proceed to step 19.
- To change the destination folder: Click the **Browse** Button and select the desired destination by following the guidance displayed in the dialog box.



19. Click the **Next** Button.

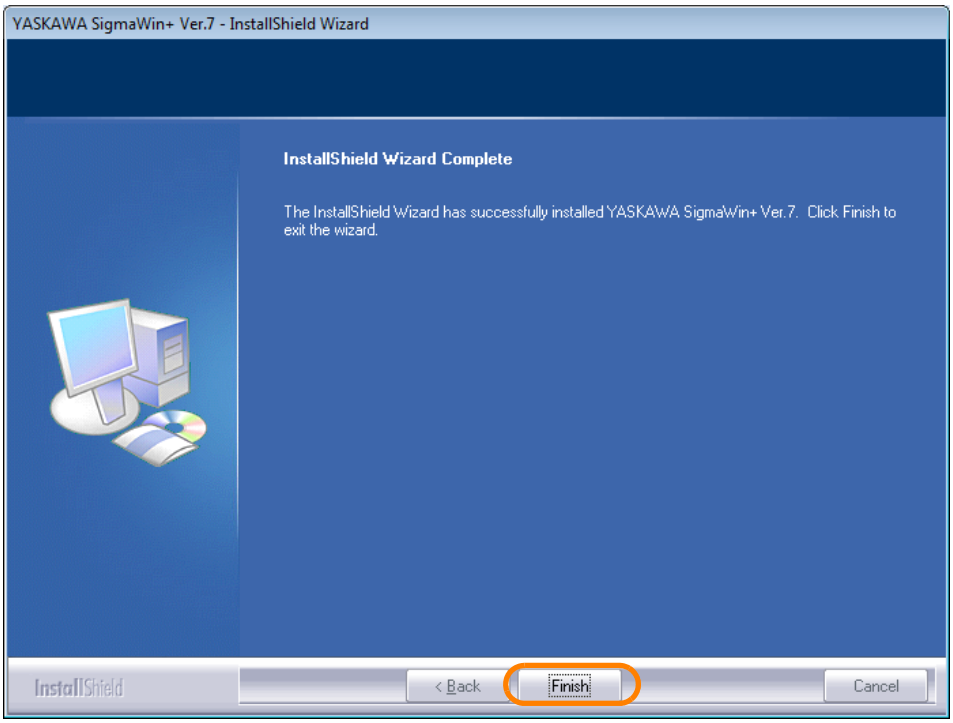


20. Click the **Install** Button.



The installation will begin.

21. Click the **Finish** Button.



This concludes the installation of SigmaWin+ Ver. 7 on the PC.

2.2 Connecting the MPE720 to a Machine Controller

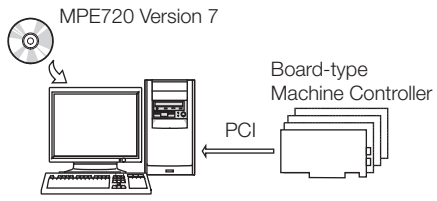
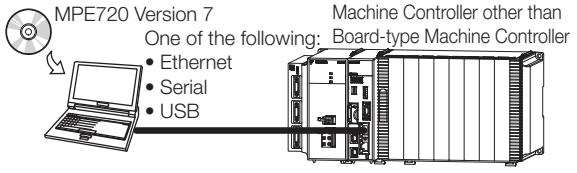
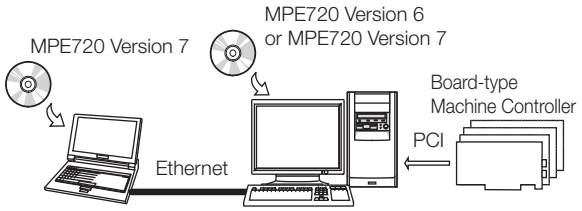
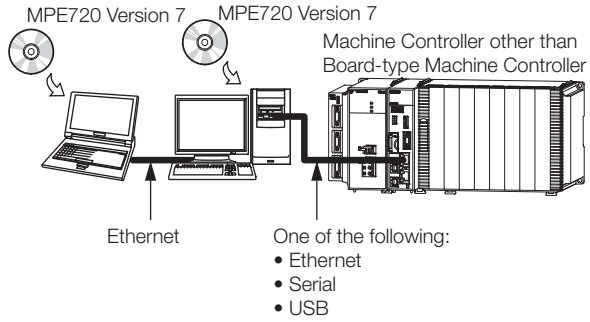
This section describes how to connect the PC on which the MPE720 is installed to a Machine Controller.

The connection method depends on the type of connection and the type of Machine Controller (Board-type Machine Controller or Machine Controller other than a Board-type Machine Controller).

Information Refer to the following manual for information on connecting the power supply and other devices (such as Servo Drives) to the Machine Controller and for information on connecting Machine Controllers to each other to use them together.

- *MP3000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880725 00)
- *MP2000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880732 14)

Information It is not necessary to connect the MPE720 to a Machine Controller when using a normal connection to a Board-type Machine Controller, or for offline operation.

<table>
<tr><th>Type of Connection</th><th>Machine Controller Type</th><th>Conceptual Illustration of Connection</th><th>Cable Specifications</th></tr>
<tr><td rowspan="2">Normal connections</td><td>Board</td><td>A cable is not required for the connection.
 
</td><td>–</td></tr>
<tr><td>Other than Board</td><td> 
</td><td rowspan="3">■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
■Serial
Use one of the following cables from Yaskawa Controls Co., Ltd.
• Model: JEPMC-W5311-03 (length: 2.5 m)
• Model: JEPMC-W5311-15 (length: 15 m)
■USB
Use a commercially available USB cable.</td></tr>
<tr><td rowspan="2">Remote connections</td><td>Board</td><td> 
</td></tr>
<tr><td>Other than Board</td><td> 

Note: Two cables are required.</td></tr>
</table>

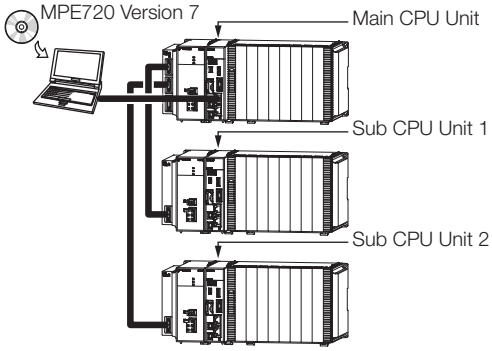
Using More Than One CPU Unit

If you connect the MPE720 to a Main CPU Unit, you can perform engineering for all of the CPU Units, including a Sub CPU Unit.

If you connect the MPE720 to a Sub CPU Unit, the CPU Units for which you can perform engineering depends on the method used to connect the CPU Units.

The following figures show the CPU Units for which engineering is possible.

◆ MPE720 Connected to Main CPU Unit

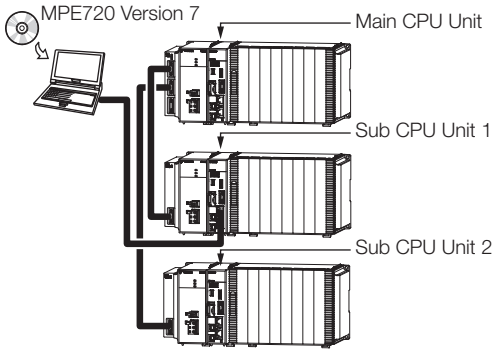


Engineering is possible for all of the CPU Units (the Main CPU Unit, Sub CPU Unit 1, and Sub CPU Unit 2).

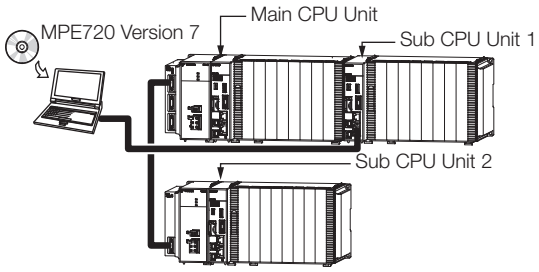
◆ MPE720 Connected to a Sub CPU Unit

The CPU Units for which engineering is possible depends on the method used to connect the CPU Units.

■ CPU Units with a Bus Connection

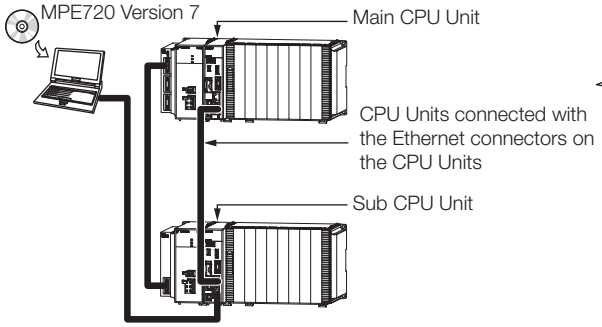


Engineering is possible only for Sub CPU Unit 1. To perform engineering for the Main CPU Unit and Sub CPU Unit 2, the MPE720 must be reconnected to these CPU Units.



Engineering is possible only for Sub CPU Unit 1. To perform engineering for the Main CPU Unit and Sub CPU Unit 2, the MPE720 must be reconnected to these CPU Units.

■ CPU Units with an Ethernet Connection



Engineering is possible for all of the CPU Units (the Main CPU Unit and Sub CPU Unit).

2.3 Automatically Recognizing Information on Devices Connected to the Machine Controller

The MP2000/MP3000-series Machine Controllers have a self configuration feature that automatically recognizes all the Optional Modules that are installed in the Machine Controller and all the slave devices that are connected via the MECHATROLINK connector (such as Servo Drives), and creates the module configuration definition files based on that information. Self configuration greatly reduces the steps that are required to set up the system.

There are two ways to execute self configuration.

Method	Reference
DIP switch on the MP2000/MP3000-series Machine Controller	*2.3.1 Self Configuration Using the DIP Switch* on page 2-14
MPE720	*4.1 Automatically Recognizing Information on Devices Connected to the Machine Controller* on page 4-3

Information If you use more than one CPU Unit together, you must perform self configuration for all of them.

The procedures are given below.

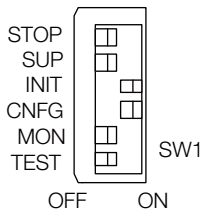
2.3.1 Self Configuration Using the DIP Switch

Use the following procedure to execute the self configuration using the DIP switch on the MP2000/MP3000-series Machine Controller.

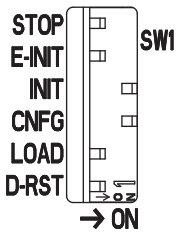
1. Check the following points.
- The power supply to the MP2000/MP3000-series Machine Controller must be OFF.
- The power supply to all components that are not part of the MP2000/MP3000-series Machine Controllers, such as SERVOPACKs, must be ON.

2. Turn ON only the INIT and CNFG pins on the DIP switch (SW1) on the MP2000/MP3000-series Machine Controller.

MP2000-series Machine Controller



MP3000-series Machine Controller



Information
1. INIT Pin
If the power supply to the Machine Controller is turned ON while the INIT pin is set to ON, all of the following data will be deleted from the Machine Controller.
- Definition files
- User programs
- Registers

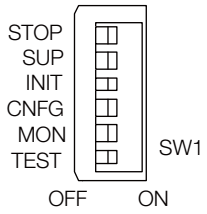
2. CNFG Pin
If the power supply to the Machine Controller is turned ON while the CNFG pin is turned ON, the self configuration will begin and all of the following data will be created and/or updated.
- Definition files: Created again or updated.
- User programs: Not affected by ON/OFF state of CNFG pin.
- Registers: Not affected by ON/OFF state of CNFG pin.

3. Turn ON the power supply to the MP2000/MP3000-series Machine Controller.
Self configuration will be executed.

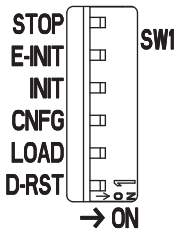
4. Confirm that the indicators on the MP2000/MP3000-series Machine Controller change in the following way:
   - RDY: Goes out, and then lights.
   - RUN: Goes out, flashes, and then lights.

5. Turn OFF the INIT and CNFG pins on the DIP switch (SW1) on the MP2000/MP3000-series Machine Controller.

MP2000-series Machine Controller



MP3000-series Machine Controller



This concludes the settings.

Important

1. INIT Pin on the DIP Switch and RAM Data
   If the power supply is turned OFF and ON again when the INIT pin on the Machine Controller SW1 DIP switch is set to ON, the RAM data will be cleared.
   If the power supply is turned OFF and ON again while the INIT pin is set to OFF, the data from the flash memory will be loaded and the RAM data will be overwritten with it. Therefore, if the power supply must be turned OFF while writing or editing a program, make sure you save the data to the Machine Controller's flash memory to protect the RAM data.
2. Power Interruptions after Self Configuration
   After performing self configuration, turn OFF the power supply to the Machine Controller only after the definition data is saved to the flash memory of the Machine Controller.
   If by chance the power supply is turned OFF before the data is saved, perform self configuration again.
   Refer to the following manual for details on saving data to the flash memory.
   - 📖 *MP3000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880725 00)
   - 📖 M*P2000 Series Machine Controller System Setup* Manual (Manual No.: SIEP C880732 14)

2.3.2 Self Configuration Using the MPE720

To execute self configuration from the MPE720, you must first start the MPE720 and set the communications settings.

Refer to the following sections for details.

☞ *2.4 Starting the MPE720* on page 2-16
☞ *2.6 Setting Up Communications* on page 2-21

Refer to the following section for information on performing self configuration with the MPE720.

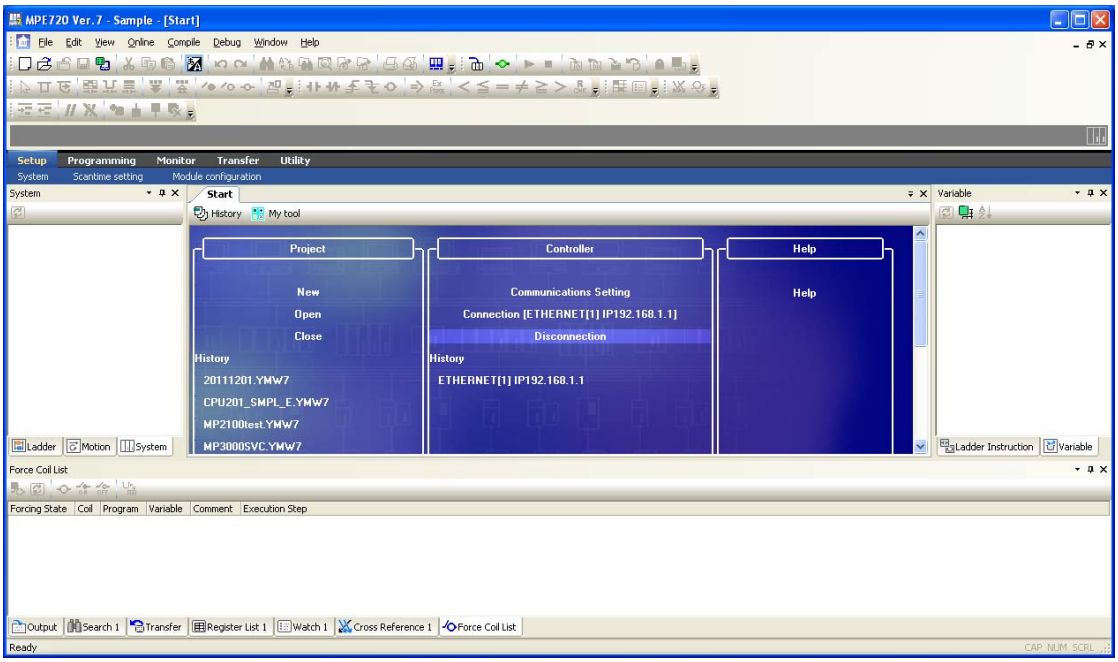
☞ *4.1 Automatically Recognizing Information on Devices Connected to the Machine Controller* on page 4-3

2.4 Starting the MPE720

Start the MPE720 with one of the following methods.

- Double-click the **MPE720 Ver. 7** Icon.
- Select ***Programs - YE_Applications - MPE720 Ver. 7*** from the Windows Start Menu.

When the application starts, the following window will appear.



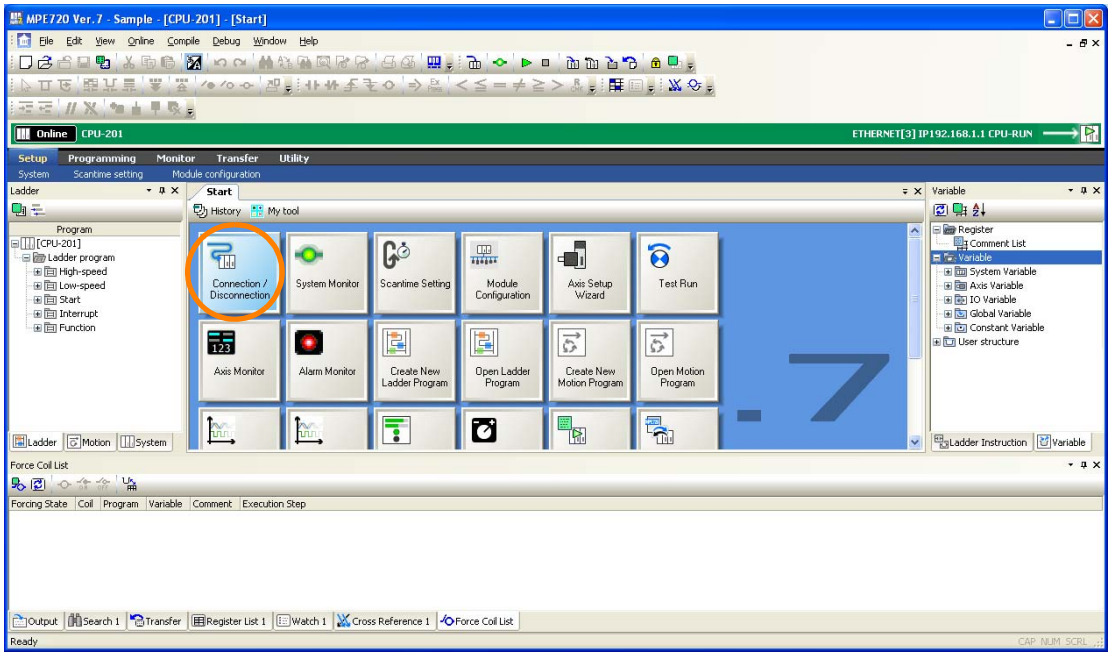
This concludes the procedure.

2.5 Creating a Project File

Use the following procedure to create a project file.

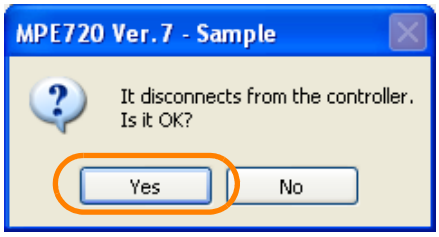
Information Project files are created when the MPE720 is offline.

1. If the MPE720 is online, click the **Connection/Disconnection** Button on the My Tool View of the Start Tab Page.



The MPE720 Ver. 7 Dialog Box will be displayed.

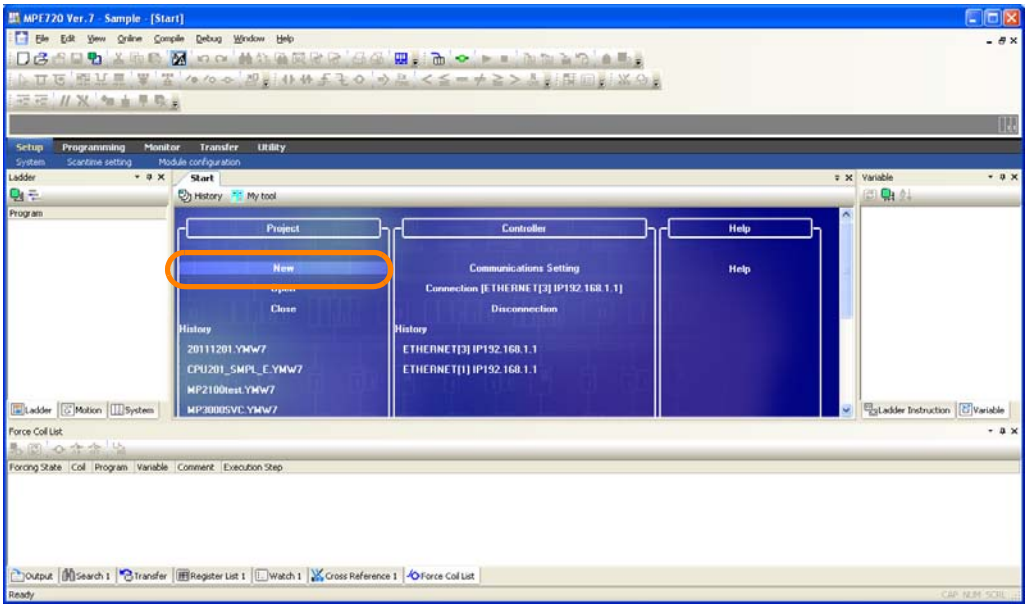
2. Click the **Yes** Button.



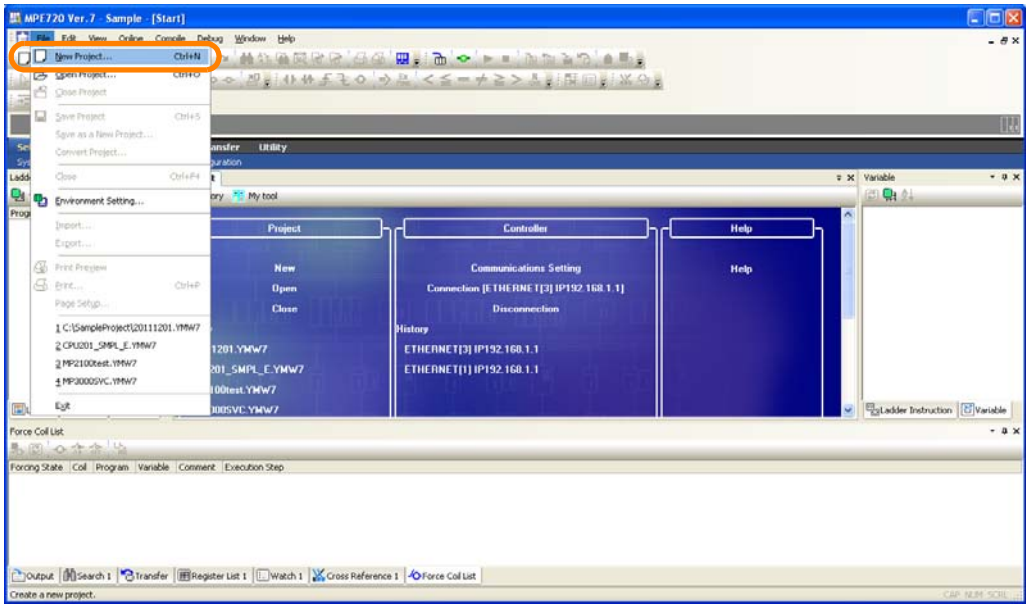
Communications between the MPE720 and the Machine Controller will be disconnected, and the History View will be displayed.

3. Start creating a project file with either of the following two methods.

- Hold down the **Ctrl** Key and press the **N** Key.
- Select ***New*** from the **Project** Area.



- Select ***File – New Project*** from the menu bar.



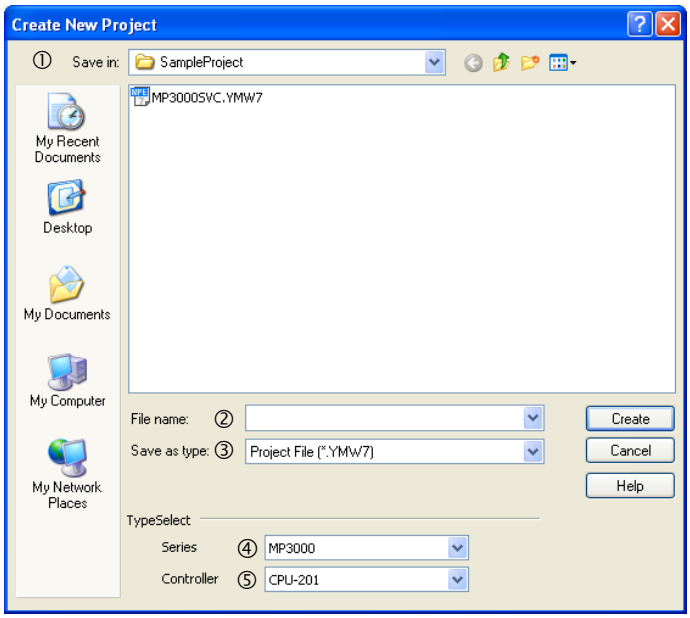
Information

If there is an edited file, a message will be displayed asking whether the file is to be compiled and saved. The result of clicking each of the buttons is described below.

Yes Button: The current project will be compiled and saved by overwriting the previous version, and editing will be ended.
No Button: Editing will be ended without compilation and saving any changes.
Cancel Button: Creating a project will be canceled and you can continue to edit the current project.

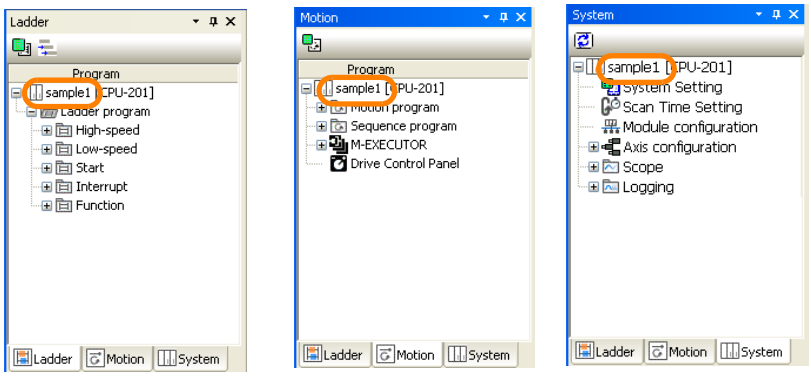
The Create New Project Dialog Box will be displayed.

4. Enter the information from ① to ⑤.



No.	Item	Description
①	Save in	Select the folder in which to save the project file data.
②	File name	Enter the name of the project file to create. Note: The file name cannot contain any of the following characters: / \ : * ? " < > |
③	Save as type	Select the file extension for the project file. The following project file extensions can be selected. MP2000 Series: .YMW or .YMW7 MP3000 Series: .YMW7
④	Series	Select the series of the Machine Controller to use.
⑤	Controller	Select the model of the CPU Unit.

5. Click the **Create** Button.
A message will be displayed saying, “The project file will be created and opened.” The project file will be created in the specified folder and the new project file name will be displayed in the Ladder Pane, Motion Pane, and System Pane.



This concludes the procedure.

2.5.1 What Is a Project File?

A project file is the application file for the MPE720. It includes the following information.

System configuration	• System definitions • Scan time definitions • Module configuration definitions • Data tracing information
Programs	• Ladder programs (high-speed, low-speed, start, interrupt, and function programs) • Motion programs (main program, subprograms, and group definitions) • Table data • Variables (axis, I/O, global, constant, and user-defined structure variables) • Comments (I/O, global, and constant comments)
Registers	• M (data registers) • D (internal registers) • C (constant registers) • S (system registers) • I (input registers) • O (output registers) • G (data registers)*

* These registers are supported only by MP3000-series Machine Controllers.

The project file includes files for all of the above information but allows you to handle them as a single file in Windows. The project file extension is ".YMW7".

Opening a project file enables editing all of these files.

Only one project file can be opened in a single window with MPE720 Version 7. The same project file cannot be opened in more than one window with MPE720 Version 7. 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.

Information You can also use project files that were created on MPE720 Version 6.0 (extension ".YMW"). Select the ".YMW" extension if you need to also use the project file on version 6.

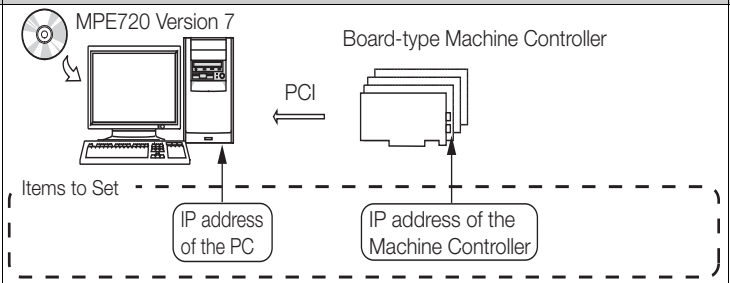
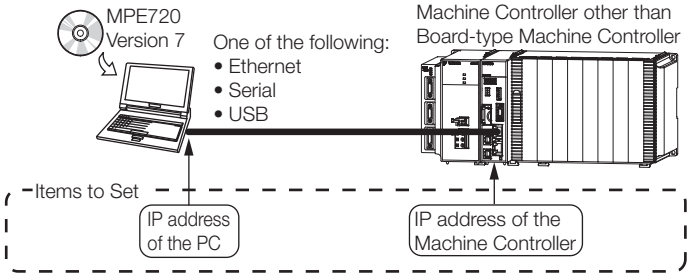
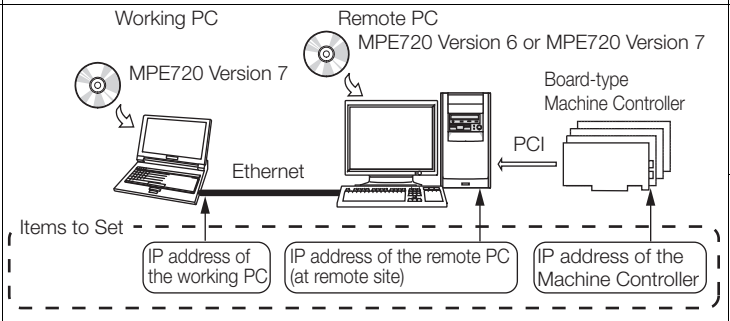
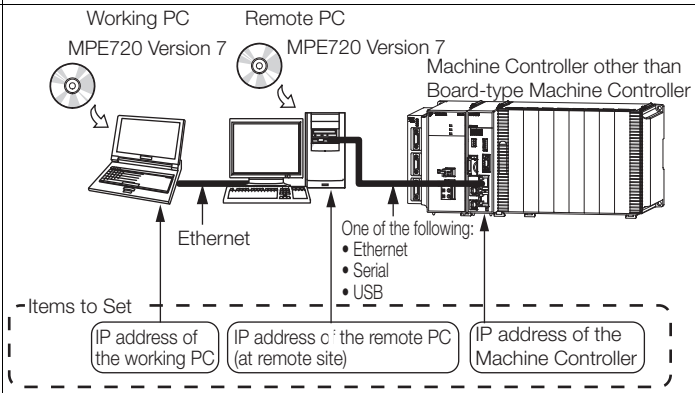
Information To prevent data loss in case of a CPU Unit failure, always store a backup copy of the project file. We recommend that you save a copy of the project file before you make any modifications to it (changing the module configuration definitions, the ladder programs, the motion programs, etc.).

2.6 Setting Up Communications

In order to connect the MPE720 installed on a PC to a Machine Controller, it is necessary to make the communications settings (such as the IP addresses of the PC and the Machine Controller).

The procedure to set up communications depends on the type of connection, the type of Machine Controller, and the method used to specify the IP addresses.

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

Type of Connection		Machine Controller Type	Illustration	Reference
Online connections	Normal connections	Board		☞ *2.6.1 Using a Normal Connection to a Board-type Machine Controller* on page 2-22
		Other than Board		☞ *2.6.2 Automatically Setting the IP Addresses for a Normal Connection to a Machine Controller Other Than a Board-type Machine Controller* on page 2-25 ☞ *2.6.3 Manually Setting the IP Addresses for a Normal Connection to a Machine Controller Other Than a Board-type Machine Controller* on page 2-31
	Remote connections	Board		☞ *2.6.4 Using a Remote Connection with MPE720 Version 6 Installed on the Remote PC* on page 2-39 ☞ *2.6.5 Using a Remote Connection with MPE720 Version 7 Installed on the Remote PC* on page 2-48
		Other than Board		☞ *2.6.5 Using a Remote Connection with MPE720 Version 7 Installed on the Remote PC* on page 2-48
Offline operation*		–	–	–

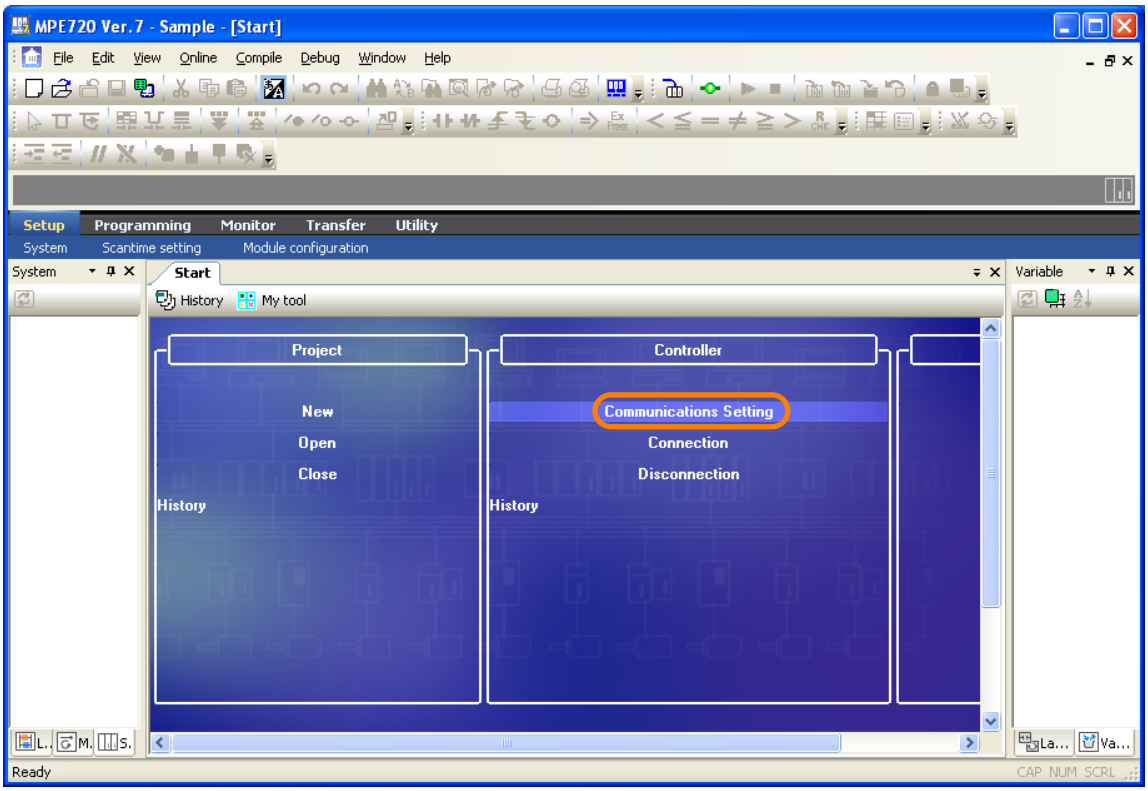
* No communications settings are required for offline operation.

The procedures are given below.

2.6.1 Using a Normal Connection to a Board-type Machine Controller

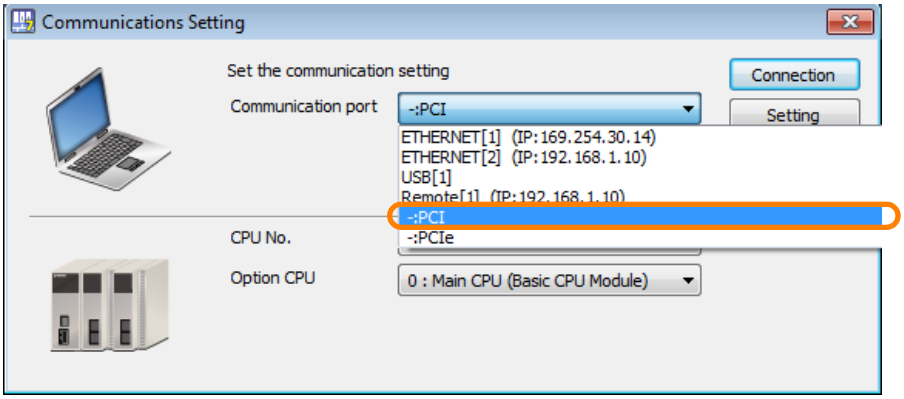
Use the following procedure to establish a normal connection from the PC on which the MPE720 is installed to a Board-type Machine Controller.

1. Select ***Communications Setting***.

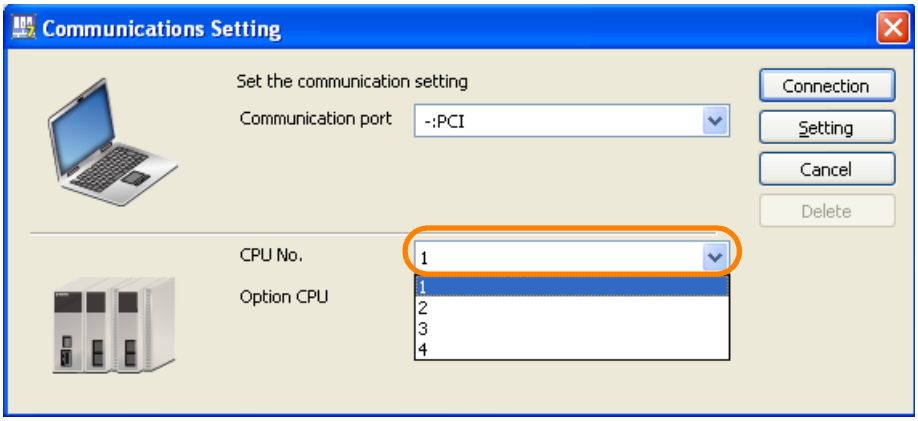


The Communications Setting Dialog Box will be displayed.

2. Select **-:PCI** in the **Communication port** Box.

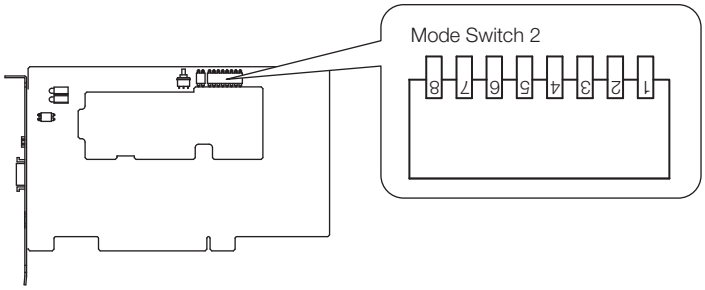


3. Set the CPU number in the **CPU No.** Box.
Set the CP number of the destination Machine Controller.



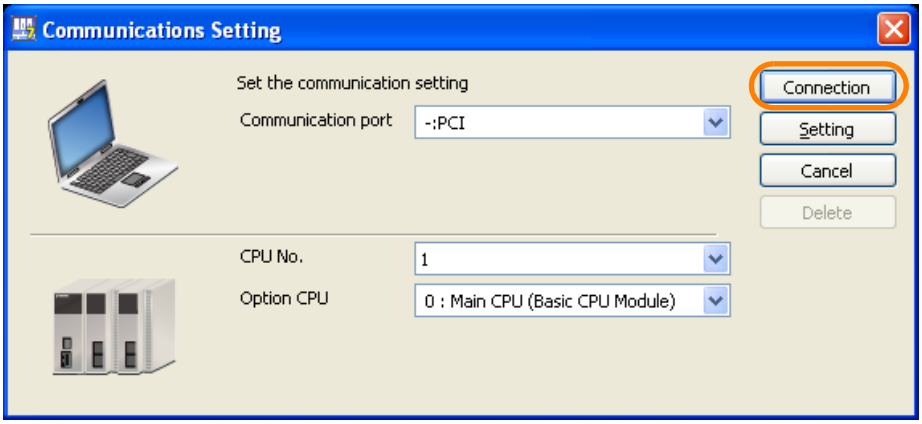
Information

Check the CP number that is defined by pins 7 and 8 in Mode Switch 2 on the Board-type Machine Controller and enter the same number here.



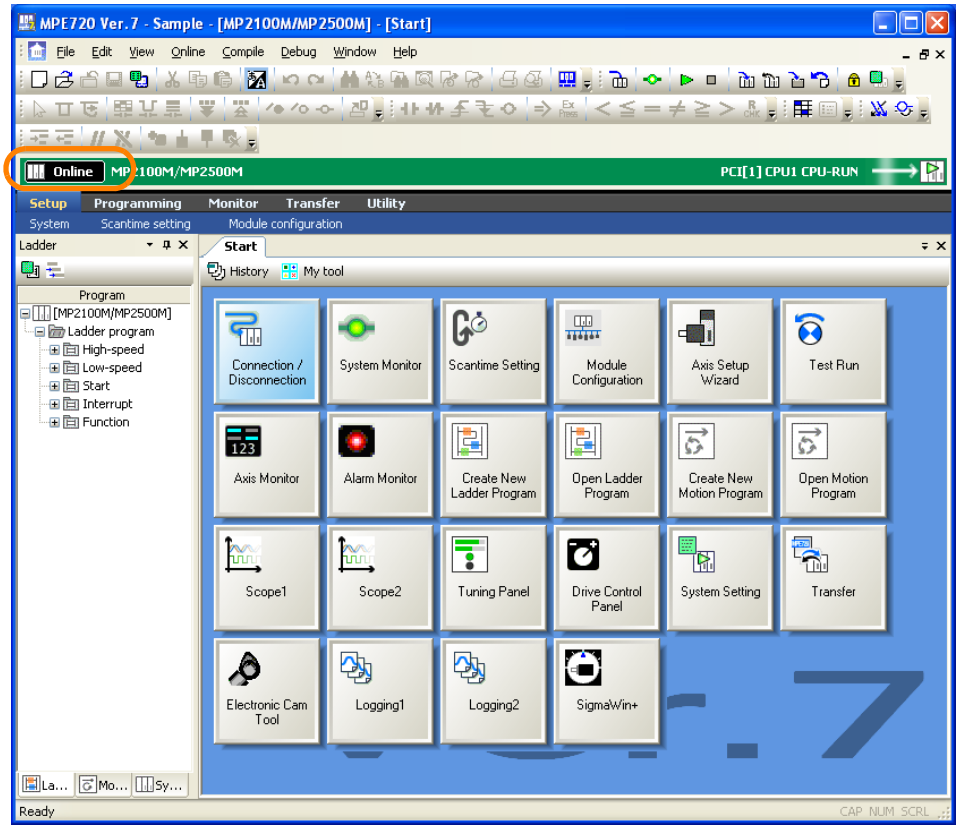
State of Pin 8	State of Pin 7	CP Number
OFF	OFF	1
OFF	ON	2
ON	OFF	3
ON	ON	4

4. Click the **Connection** Button.



The MPE720 Ver. 7 Window will appear.

5. Confirm that “Online” appears to the upper left of the Launcher.



This concludes the procedure.

2.6.2 Automatically Setting the IP Addresses for a Normal Connection to a Machine Controller Other Than a Board-type Machine Controller

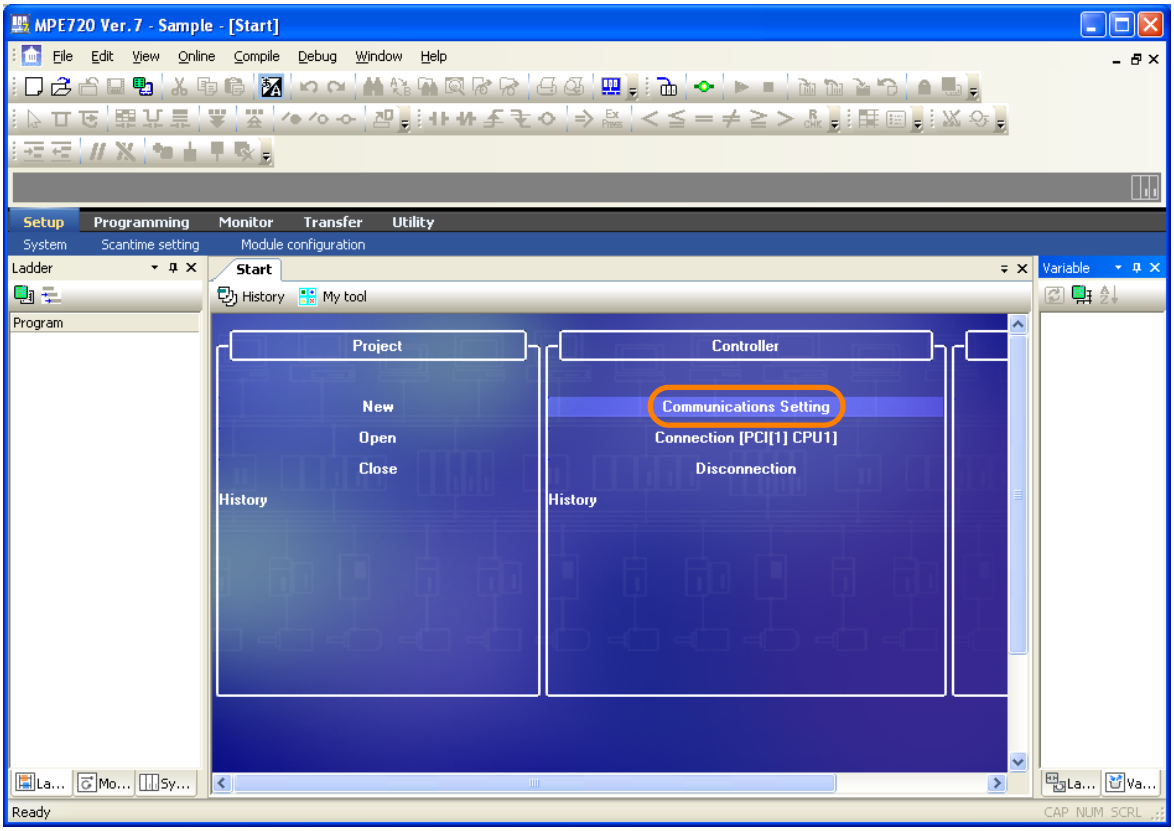
Use the following procedure to establish a normal connection from the PC on which the MPE720 is installed to a Machine Controller other than a Board-type Machine Controller by automatically assigning IP addresses.

Important

- Use this procedure only when the PC and Machine Controller are connected using the Ethernet connector on the Machine Controller.
- The IP addresses cannot be assigned automatically if you are using Windows 7. Set the IP addresses manually. Refer to the following section for details.

☞ *2.6.3 Manually Setting the IP Addresses for a Normal Connection to a Machine Controller Other Than a Board-type Machine Controller* on page 2-31

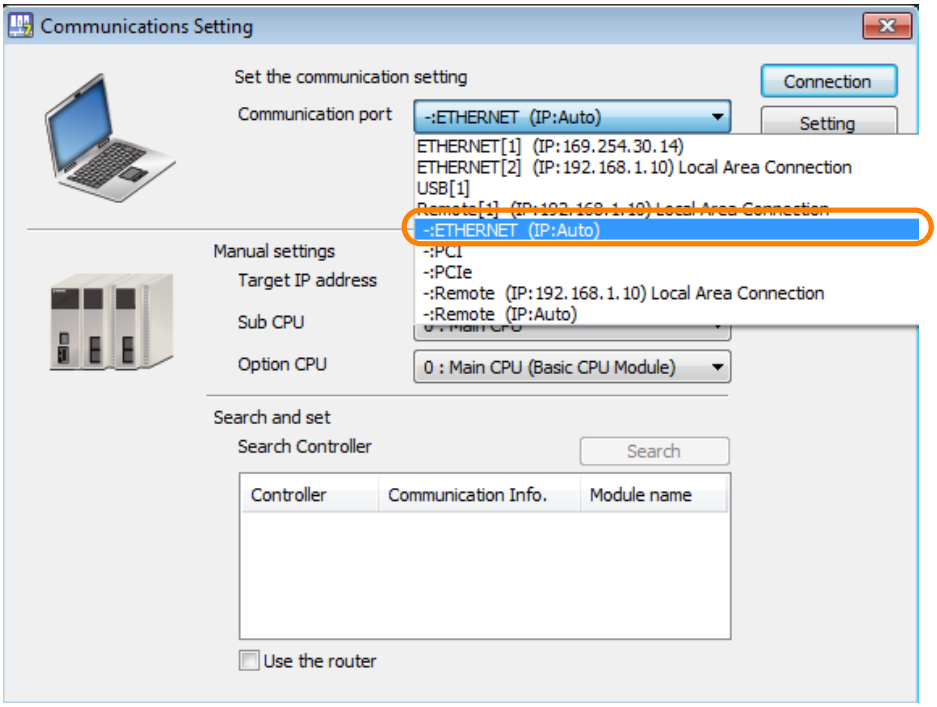
1. Select ***Communications Setting***.



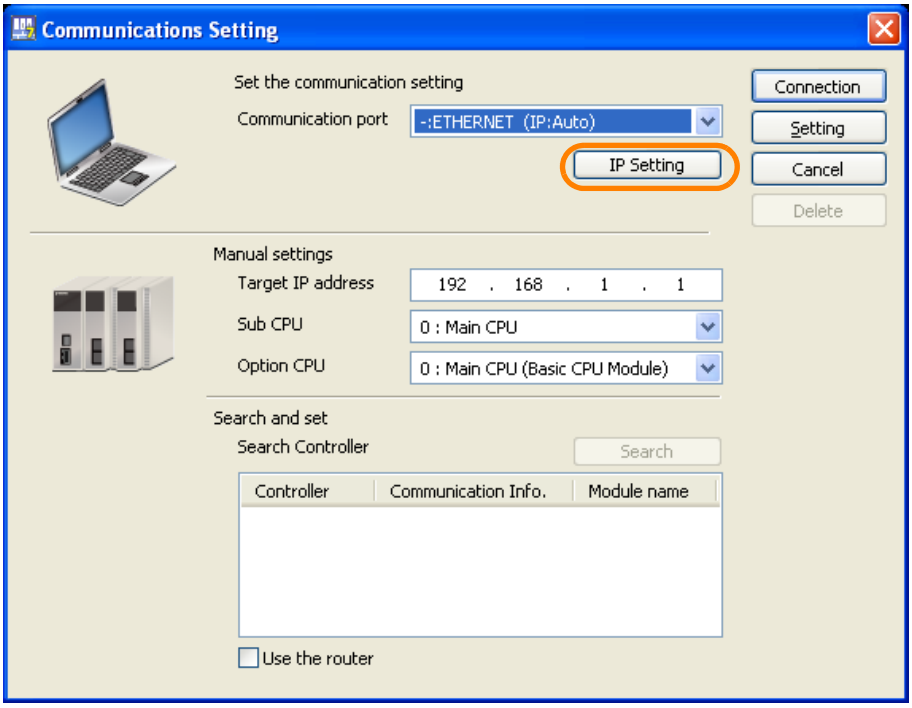
The Communications Setting Dialog Box will be displayed.

2. Select **-:ETHERNET (IP: Auto)** in the **Communication port** Box.

Information If the list already contains the target Ethernet communications port, (i.e., IP: 192.168.1.□□□), select that entry and proceed to step 8.

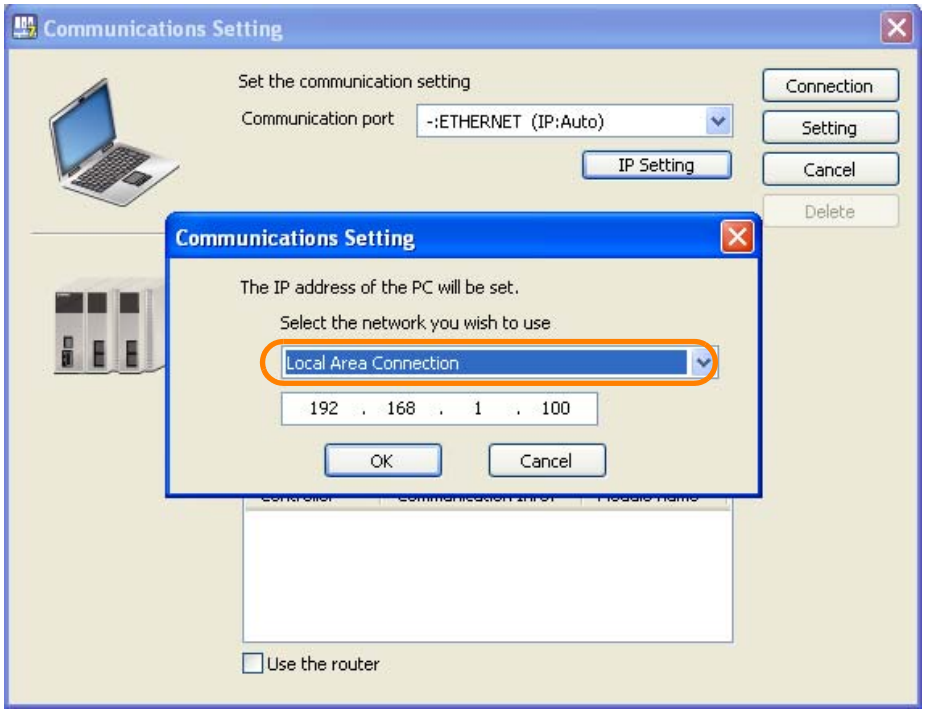


3. Click the **IP Setting** Button.



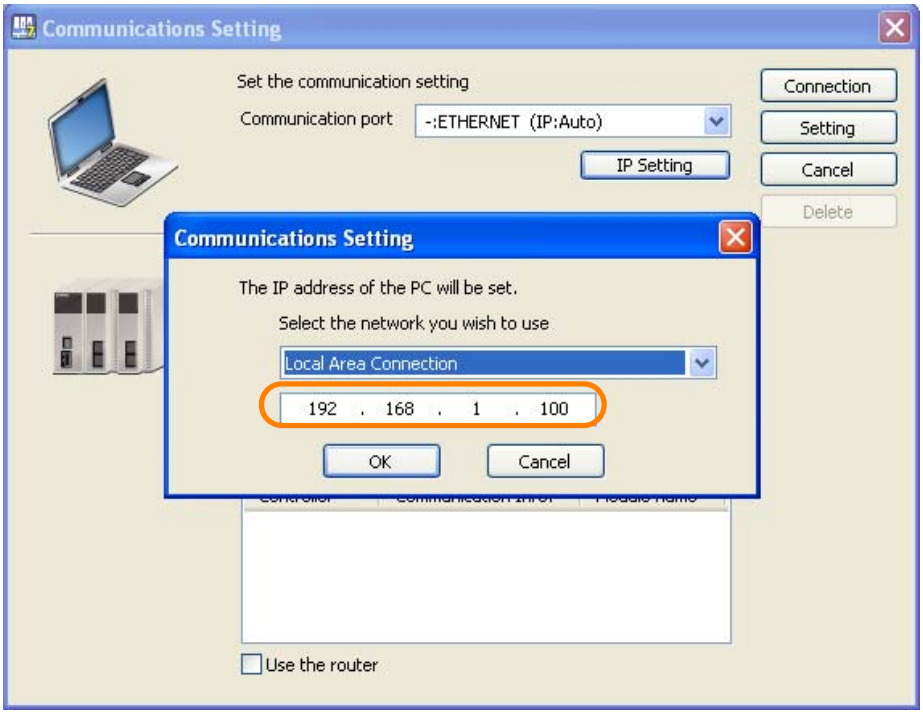
A different Communications Setting Dialog Box will be displayed.

4. Select **Local Area Connection** in the **Select the network you wish to use** Box.

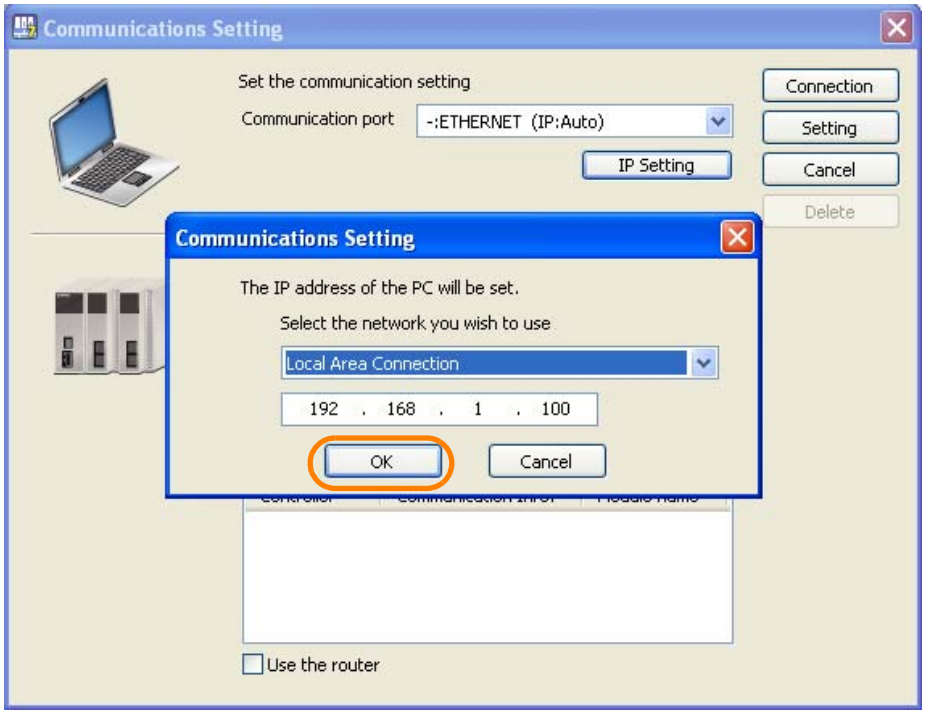


5. Enter the IP address.

Information Do not set the MPE720 to the same IP address that is set for the Machine Controller (default: 192.168.1.1).



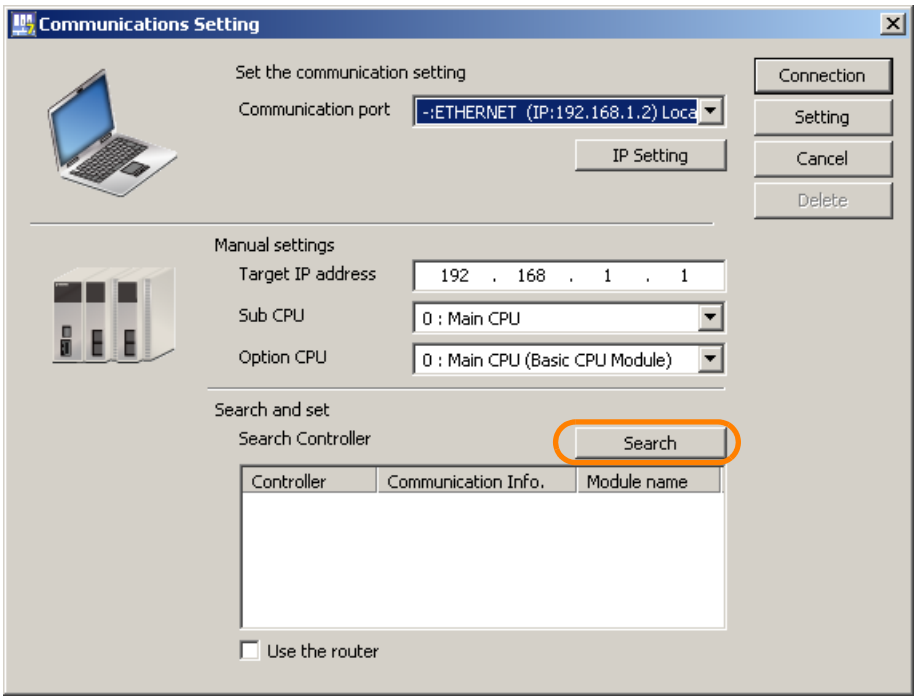
6. Click the **OK** Button.



The Communications Setting Dialog Box will close and the IP address entered in step 6 will appear in the **Communications port** Box.

7. Click the **Search** Button.

Note: The **Search** Button is enabled only when the PC and Machine Controller are connected using the Ethernet connector on the Machine Controller.
If the connection is made using a 218IF-01 Communications Module, an Optional Module, nothing will be displayed if you click the **Search** Button.

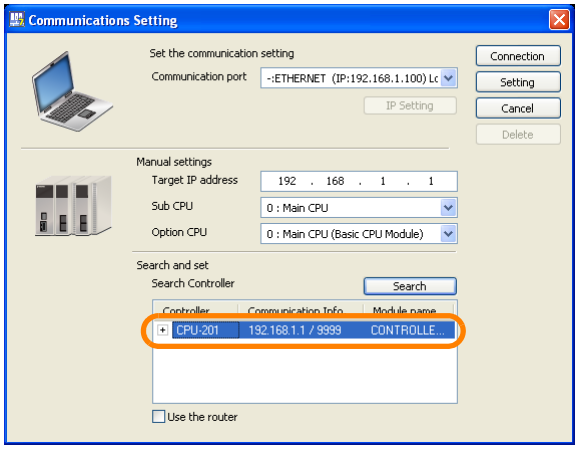


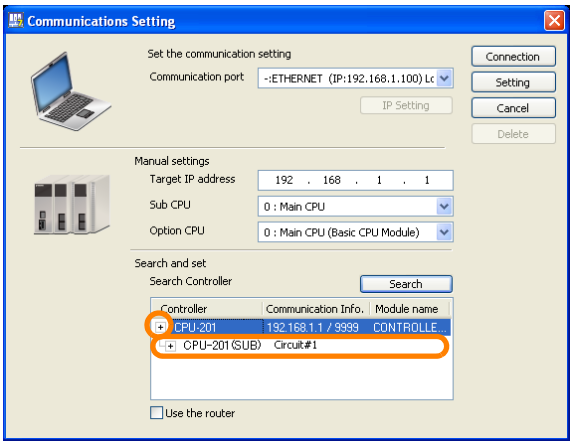
The search results will be displayed in the **Search Controller** Box.

Information If the MPE720 is connected to a Sub CPU Unit, “CPU-201SUB” will be displayed in the **Controller** Column.

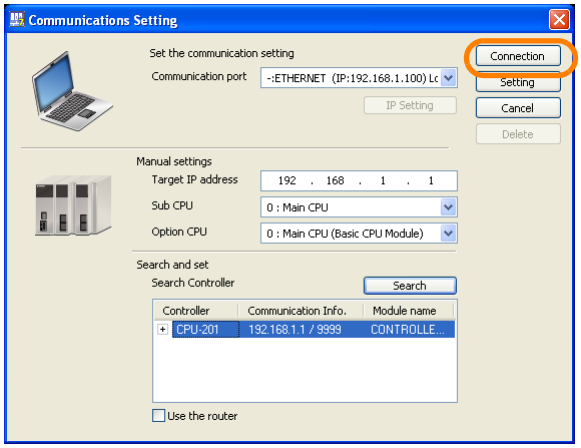
8. Select the Machine Controller that is directly connected to the MPE720 from the **Search Controller** Box.

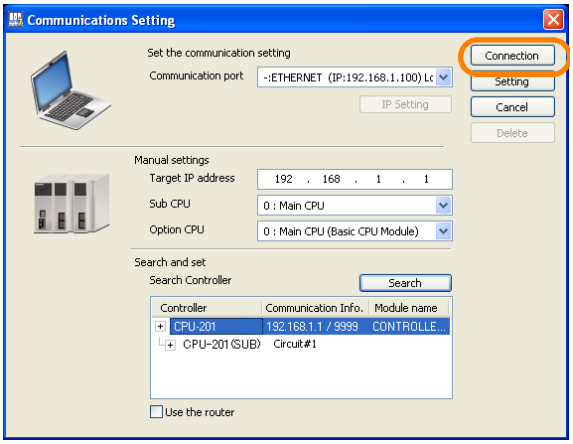
> Important
> If you are using more than one CPU Unit together, Click the **+** icon in the **Controller** Column and then double-click the Machine Controller that is directly connected to the MPE720 to select it.





9. Click the **Connection** Button.

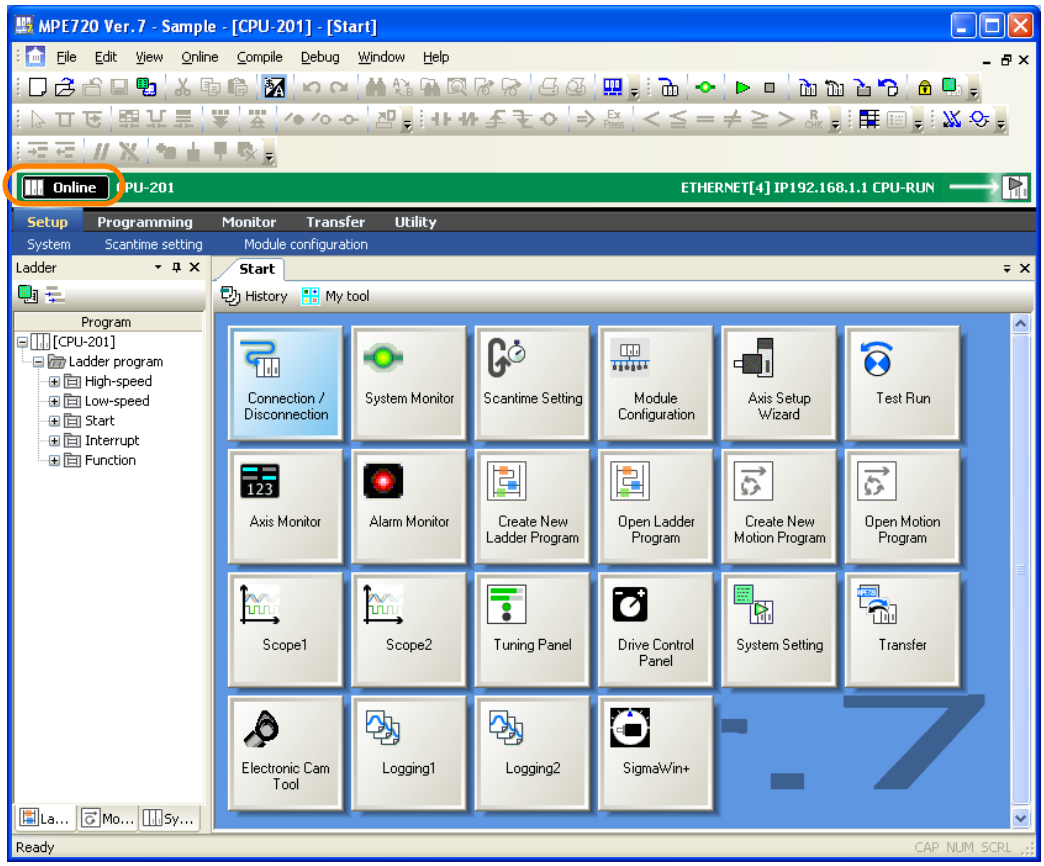




The MPE720 Ver. 7 Window will appear.

2.6.2 Automatically Setting the IP Addresses for a Normal Connection to a Machine Controller Other Than a Board-type Machine Controller

10. Confirm that “Online” appears to the upper left of the Launcher.

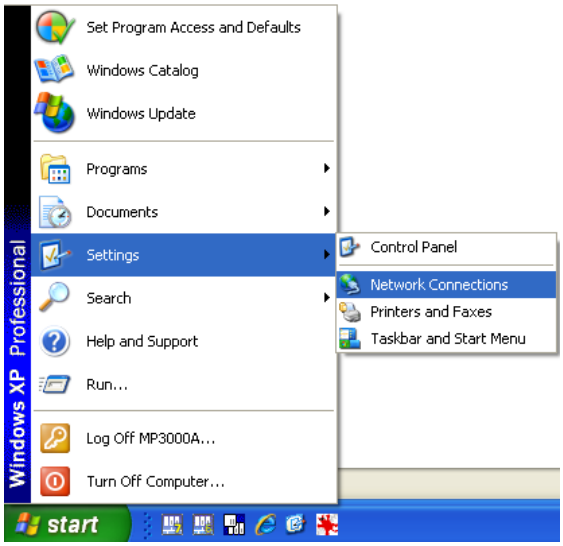


This concludes the procedure.

2.6.3 Manually Setting the IP Addresses for a Normal Connection to a Machine Controller Other Than a Board-type Machine Controller

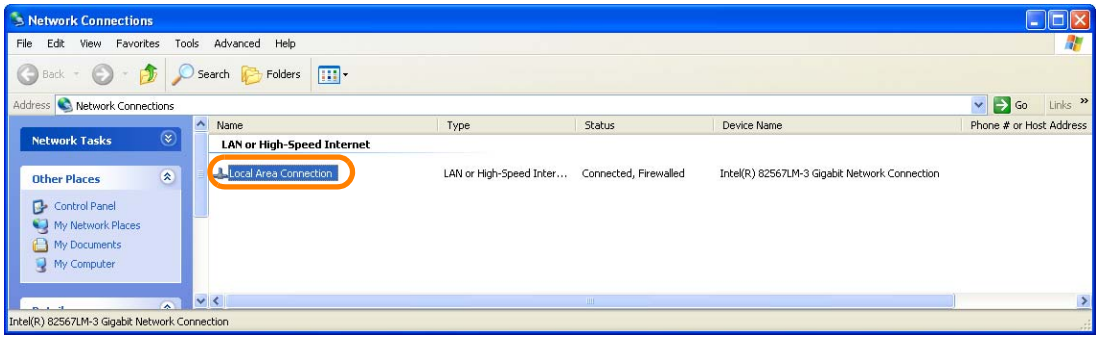
Use the following procedure to establish a normal connection from the PC on which the MPE720 is installed to a Machine Controller other than a Board-type Machine Controller by manually assigning IP addresses.

1. Click ***Settings*** – ***Network Connections*** from the Windows Start Menu.



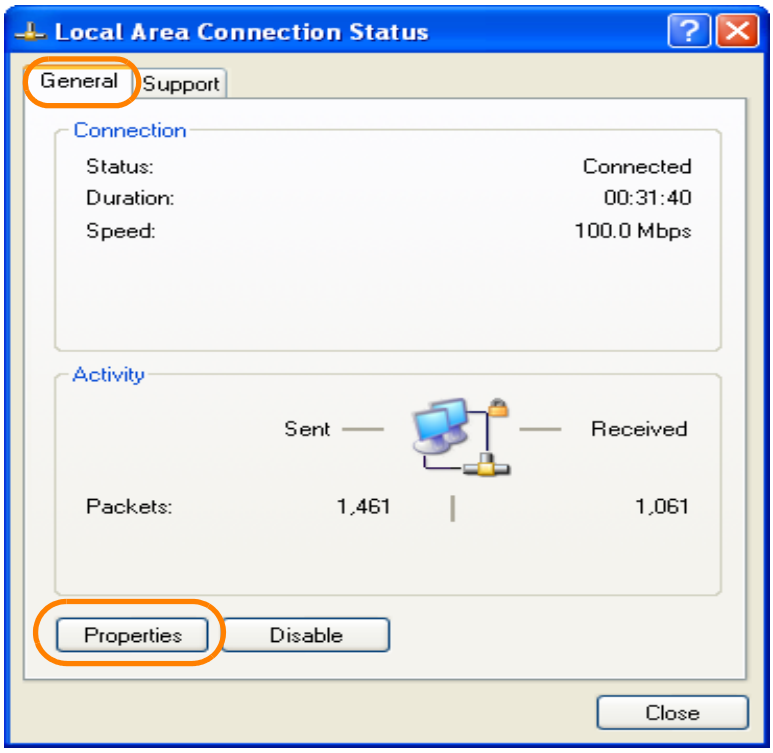
The Network Connections Window will appear.

2. Double-click **Local Area Connection**.



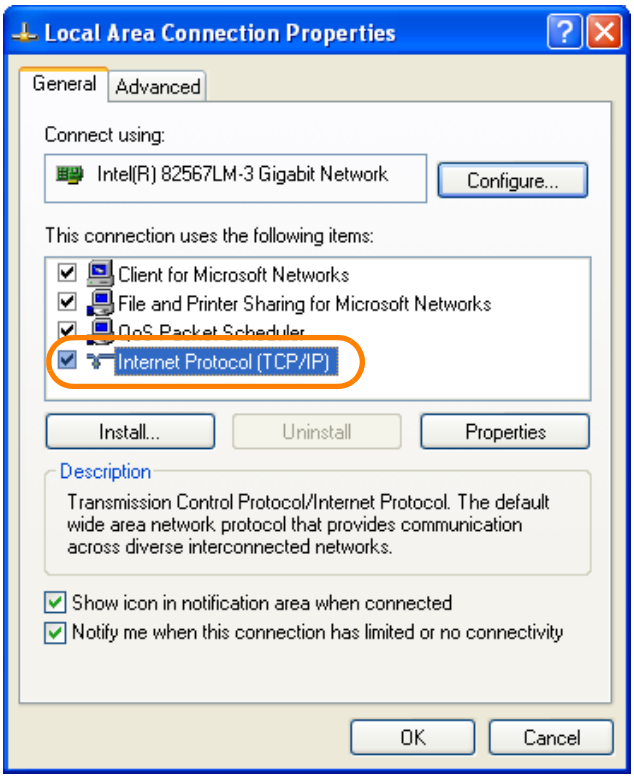
The Local Area Connection Status Dialog Box will be displayed.

3. Click the **Properties** Button on the General Tab Page.



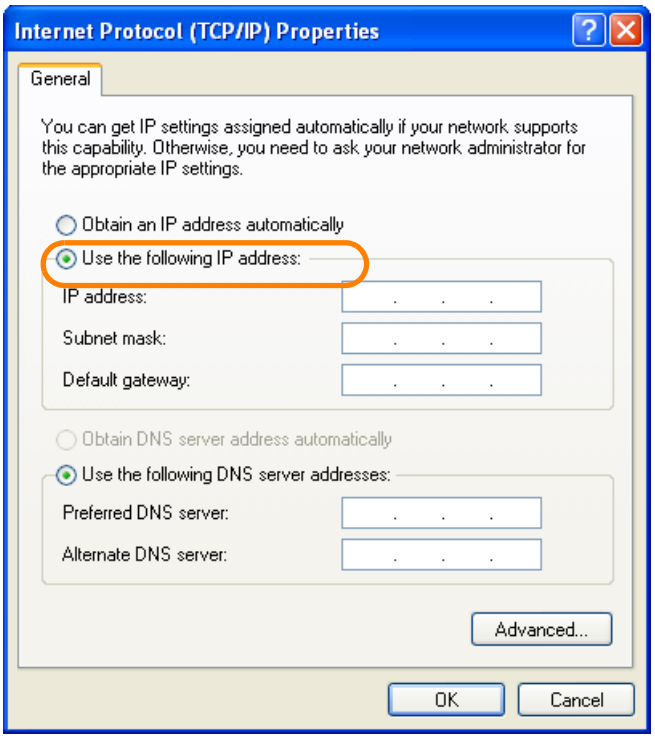
The Local Area Connection Properties Dialog Box will be displayed.

4. Double-click **Internet Protocol (TCP/IP)** in the **This connection uses the following items** Box.



The Internet Protocol (TCP/IP) Properties Dialog Box will be displayed.

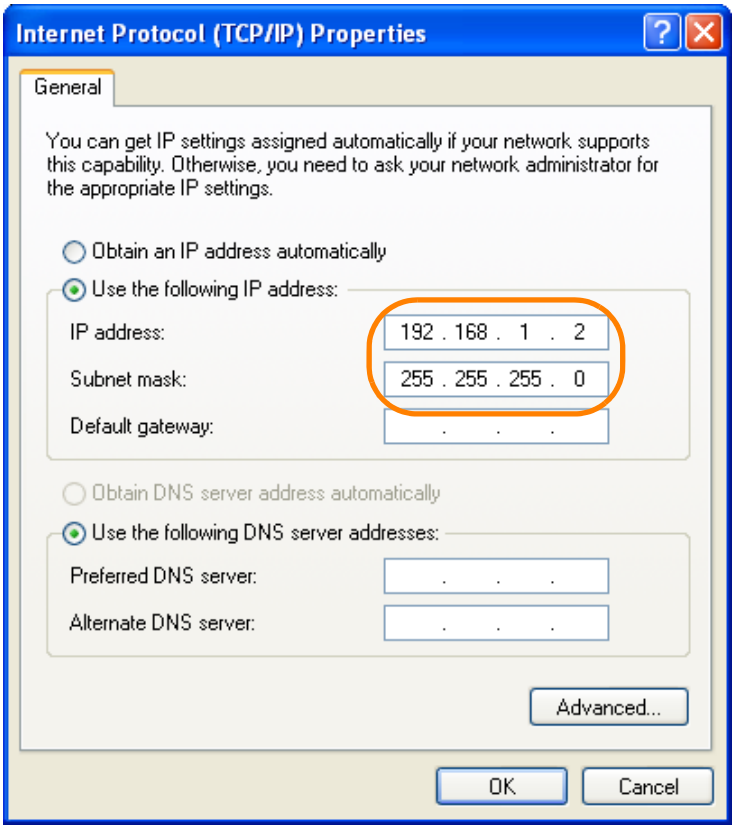
5. Select the **Use the following IP address** Option.



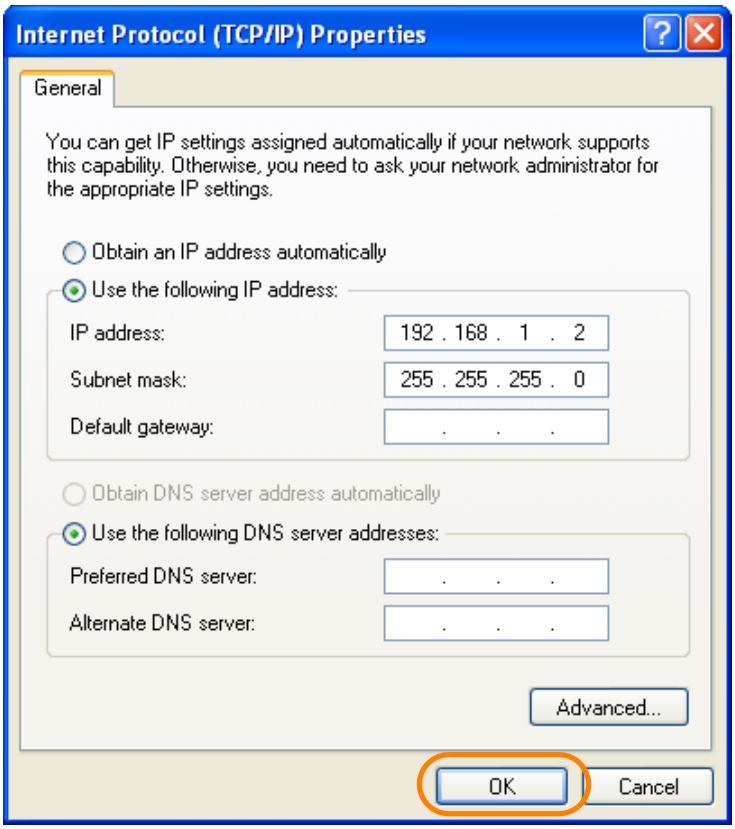
6. Enter the following information.
   - IP address = 192.168.1.□□□
   - Subnet mask = 255.255.255.0

Information Do not use the same IP address as the IP address of the Machine Controller or any other device.

Information It is not necessary to change or specify the default gateway.

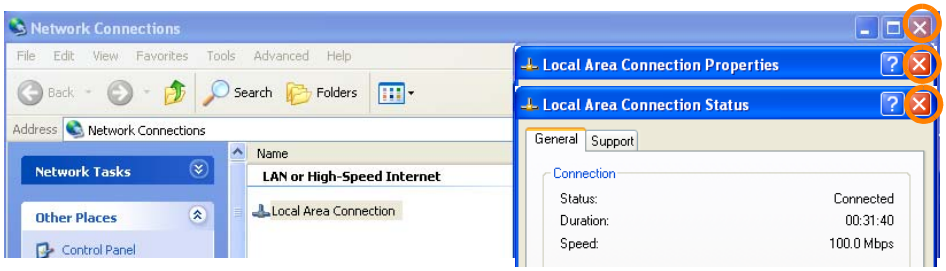


7. Click the **OK** Button.



This concludes setting the IP addresses. The Internet Protocol (TCP/IP) Properties Dialog Box will close.

8. Click the **Close** Button in the following dialog boxes and windows.
   - Network Connections Window
   - Local Area Connection Properties Dialog Box
   - Local Area Connection Status Dialog Box

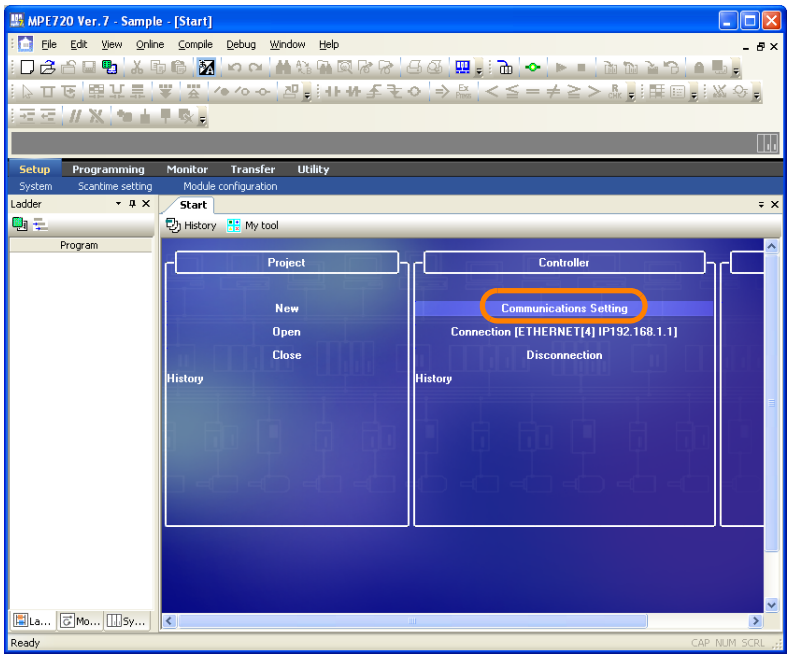


9. Double-click the **MPE720 Ver. 7** Icon.

The MPE720 will start and the MPE720 Ver. 7 Window will appear.

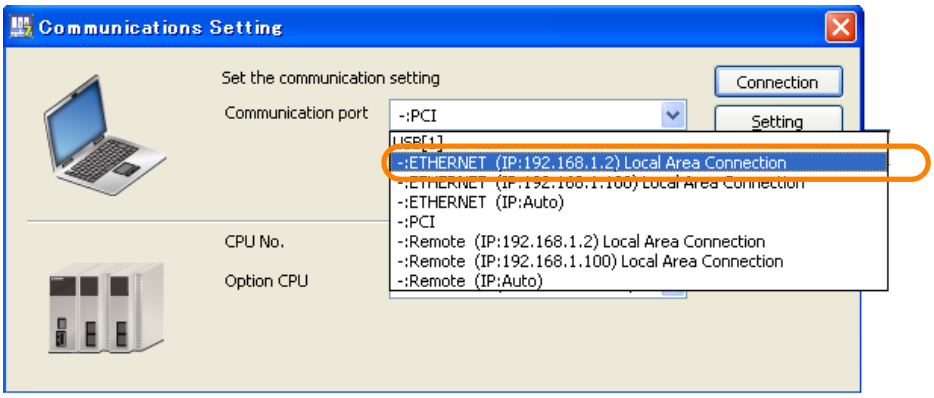
2.6.3 Manually Setting the IP Addresses for a Normal Connection to a Machine Controller Other Than a Board-type Machine Controller

10. Select ***Communications Setting***.

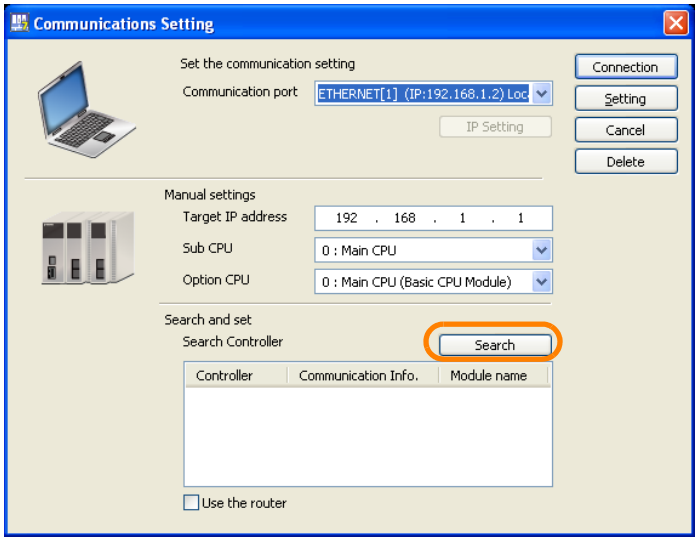


The Communications Setting Dialog Box will be displayed.

11. Select the IP address that was set in step 6 from the list of ports in the **Communication port** Box.



12. Click the **Search** Button.

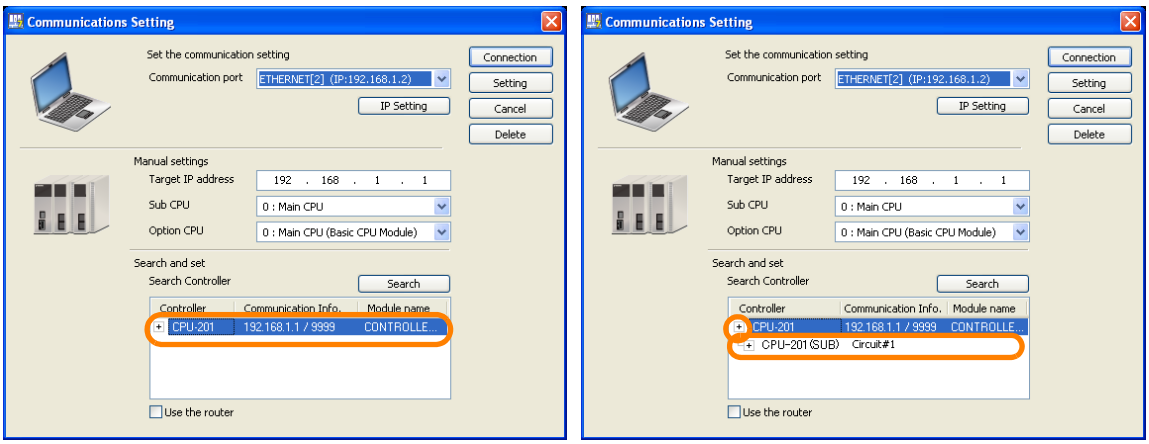


The search results will be displayed in the **Search Controller** Box.

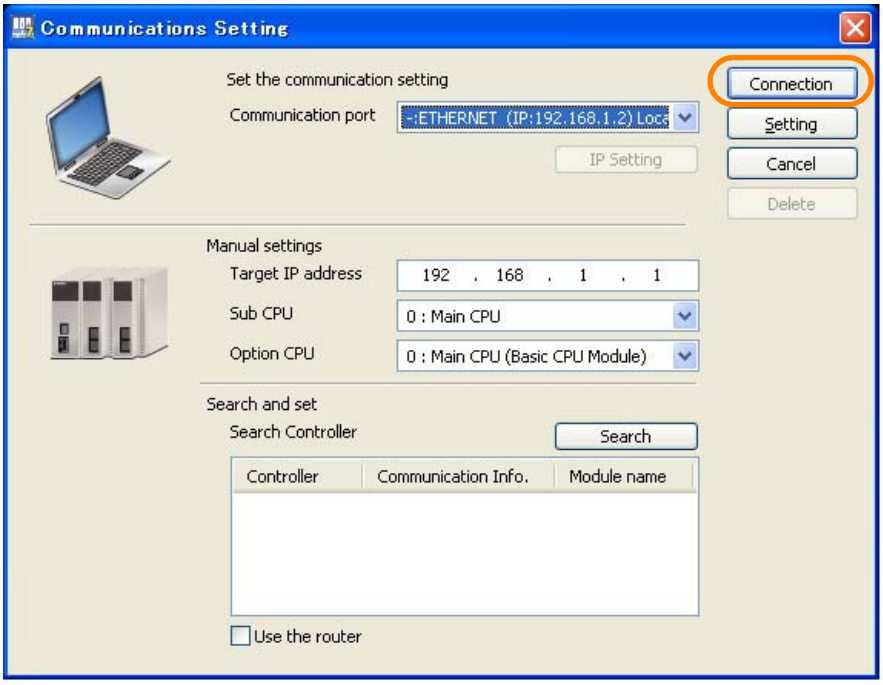
Information If the MPE720 is connected to a Sub CPU Unit, “CPU-201SUB” will be displayed in the **Controller** Column.

13. Select the Machine Controller that is directly connected to the the MPE720 from the **Search Controller** Box.

Important If you are using more than one CPU Unit together, Click the **+** icon in the **Controller** Column and then double-click the Machine Controller that is directly connected to the MPE720 to select it.



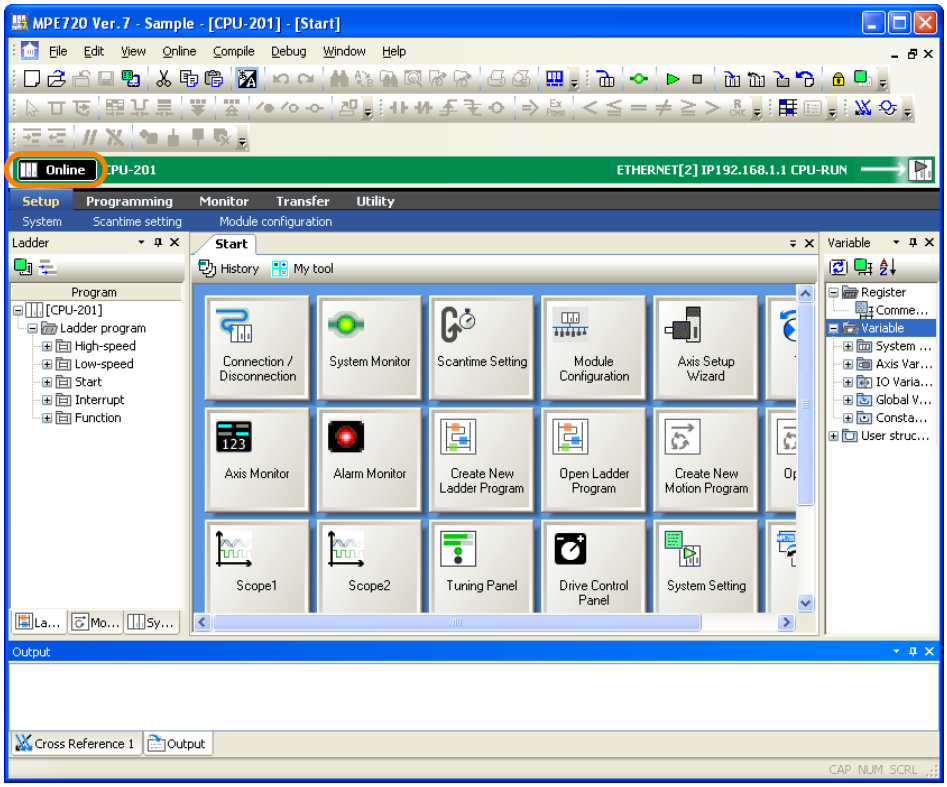
14. Click the **Connection** Button.



The MPE720 Ver. 7 Window will appear.

2.6.3 Manually Setting the IP Addresses for a Normal Connection to a Machine Controller Other Than a Board-type Machine Controller

15. Confirm that “Online” appears to the upper left of the Launcher.



This concludes the settings.

2.6.4 Using a Remote Connection with MPE720 Version 6 Installed on the Remote PC

Use the following procedure to establish a remote connection from a PC on which MPE720 Version 7 is installed to a PC on which MPE720 Version 6 is installed and a Board-type Machine Controller.

Refer to the following section for a conceptual illustration of this connection.

☞ *2.6 Setting Up Communications* on page 2-21

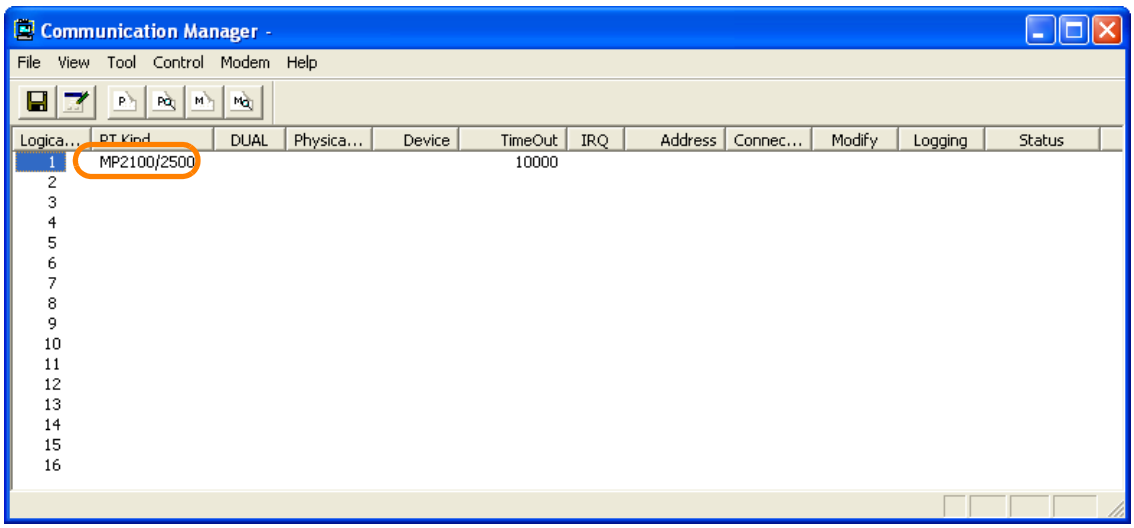
Begin by setting the remote PC.

1. Select ***Programs*** – ***YE_Applications*** – ***Communication Manager*** from the Windows Start Menu.
   The **Communications Manager** Button will be displayed at the bottom right of the PC screen.

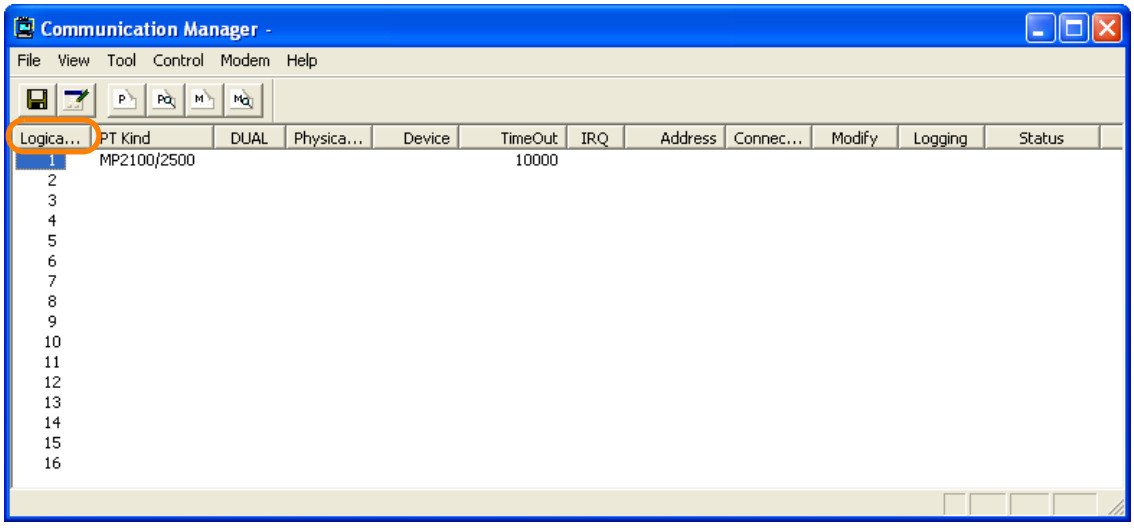
2. Double-click the **Communications Manager** Button.

   The Communications Manager Window will be displayed.

3. Set the **PT Kind** for **Logical PT 1** to **MP2100/2500.**



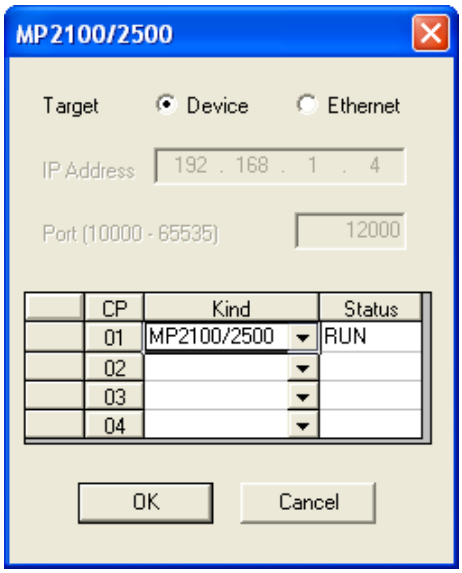
4. Double-click the header of the **Logical PT** Column.



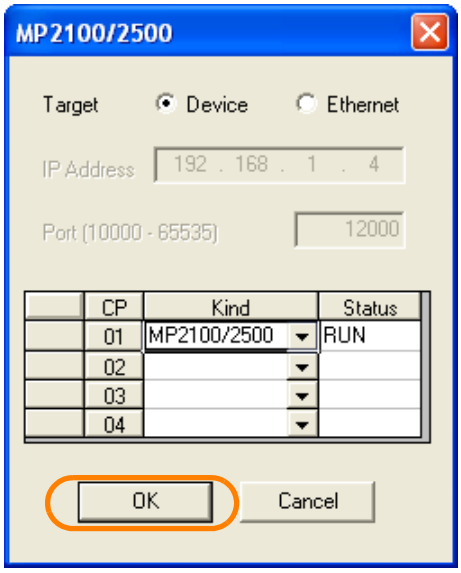
   The Assignment Dialog Box will be displayed.

5. Click the **Details** Button.
   The MP2100/2500 Dialog Box will be displayed.

6. Assign the settings based on the CP number that was specified for the Board-type Machine Controller.

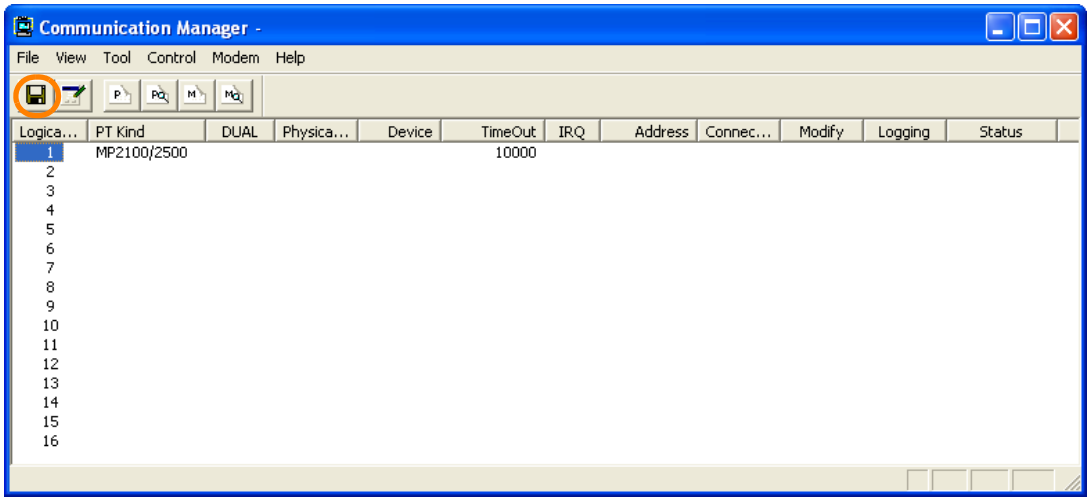


7. Click the **OK** Button.



The MP2100/2500 Dialog Box will close.

8. Click the **Save** Button in the Communications Manager Window.



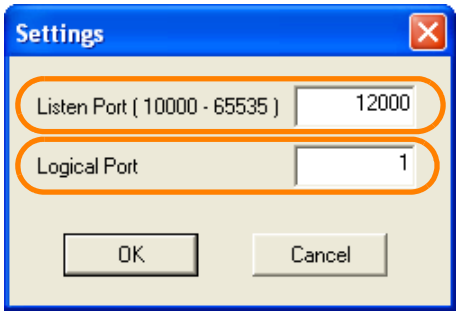
The allocations are enabled.

9. Under the **My Computer** Icon, select ***Local Disk*** – ***YeTools*** – ***CpComSys*** – ***CpUtility.exe***.
The CpUtility will start and the **CpUtility** Icon will appear at the lower right of the PC screen.

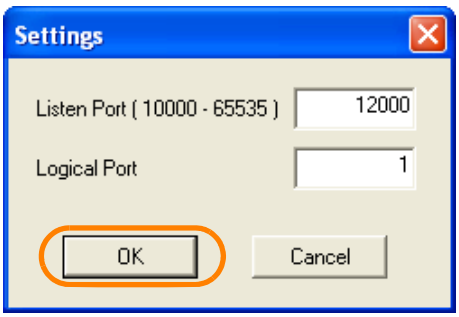
10. Click the **CpUtility** Icon.

The Settings Dialog Box will be displayed.

11. Check the settings and correct them if required.
- Listen Port: Change this value only if it conflicts with another application.
- Logical Port: Set the number of the logical port that was set in step 3.



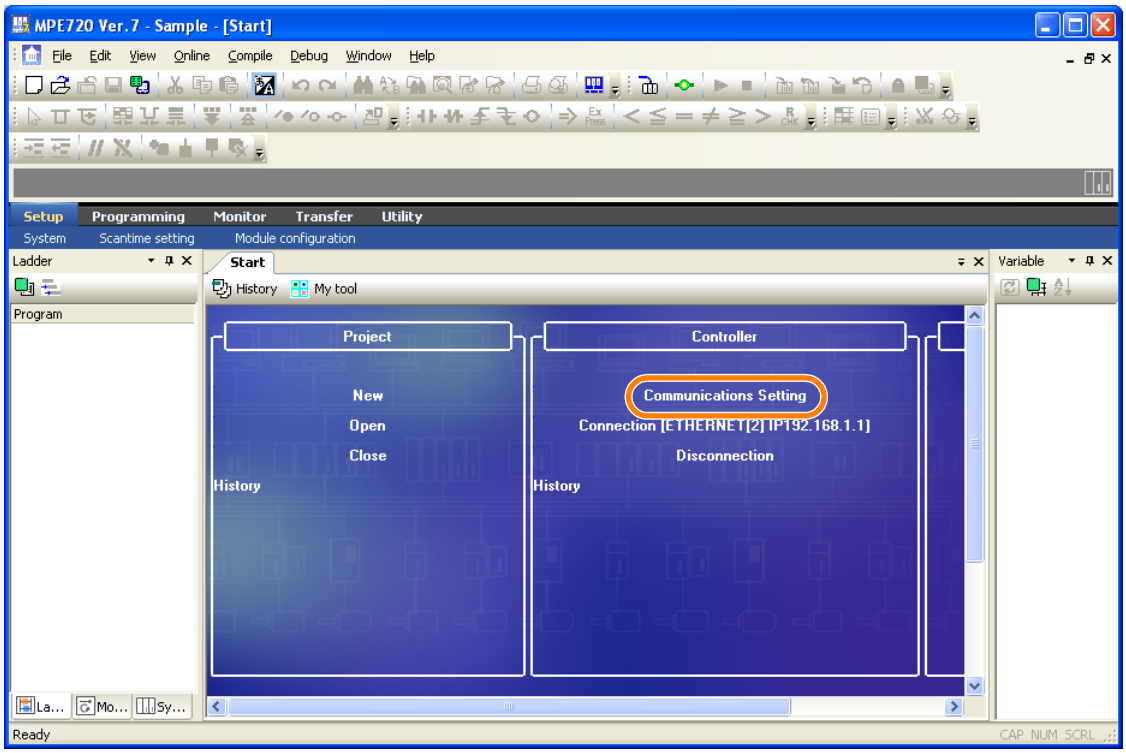
12. Click the **OK** Button.



The Settings Dialog Box will close and the settings will be enabled.

This concludes the setup of the remote PC.
Next, set up the working PC.

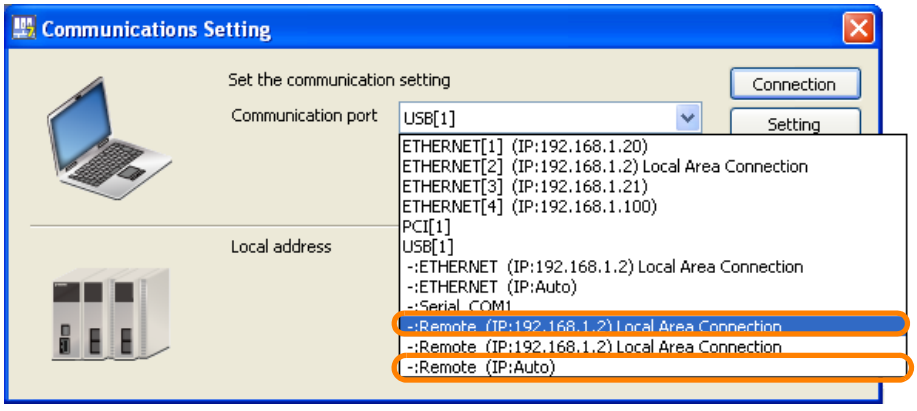
13. Select ***Communications Setting***.



The Communications Setting Dialog Box will be displayed.

14. Select **-:Remote (IP: 192.168.1.□□□) Local Area Connection** or **-:Remote (IP:Auto)** in the **Communication port** Box.

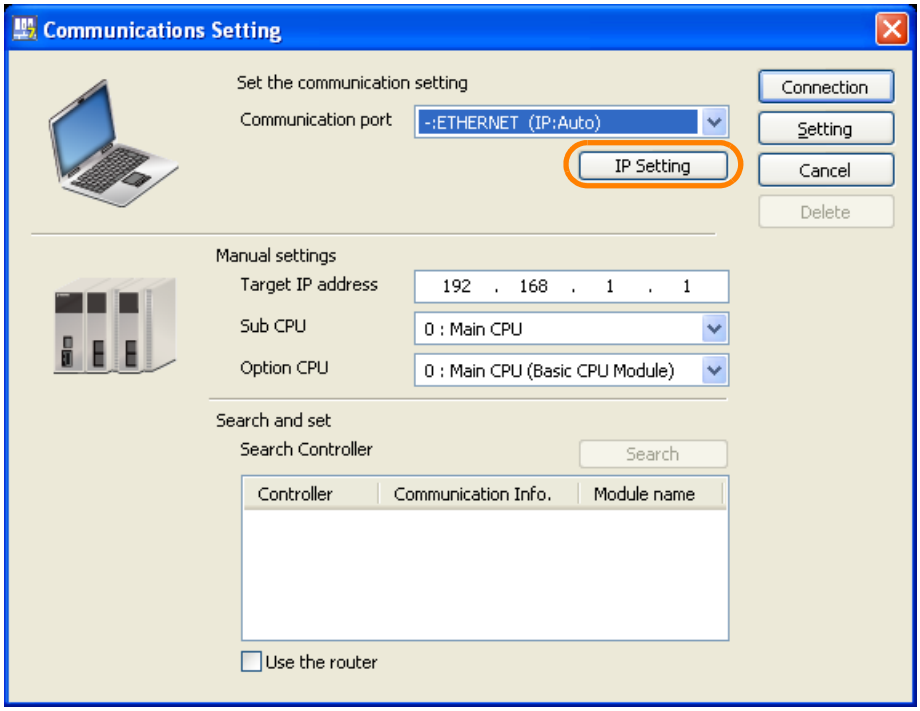
Note: You cannot set -:**Remote (IP:Auto)** if you are using Windows 7.



If you selected **-:Remote (IP: 192.168.1.□□□) Local Area Connection** in step 14, proceed to step 19.

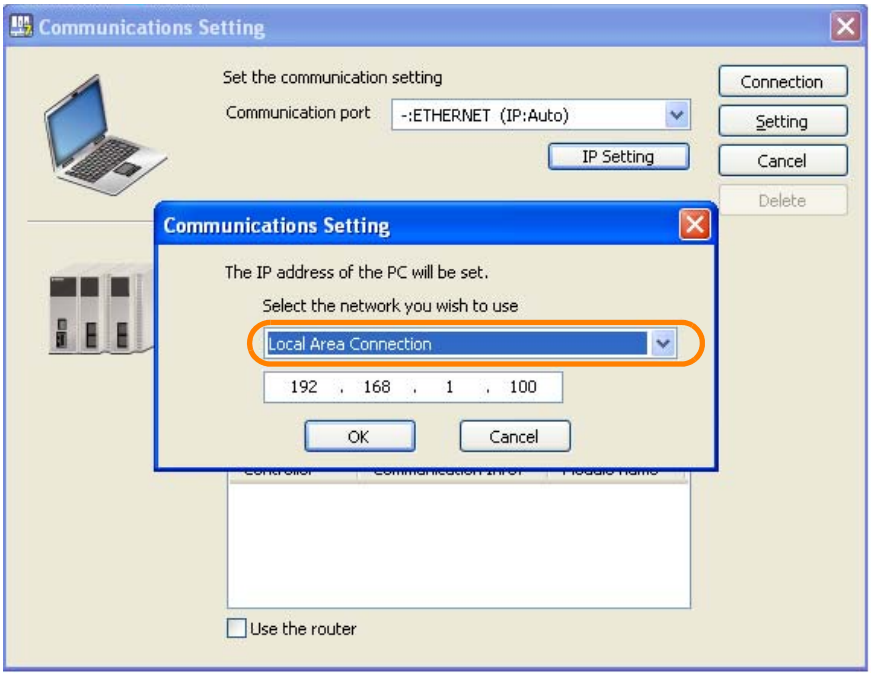
If you selected **-:Remote (IP:Auto)** in step 14, proceed to step 15.

15. Click the **IP Setting** Button.



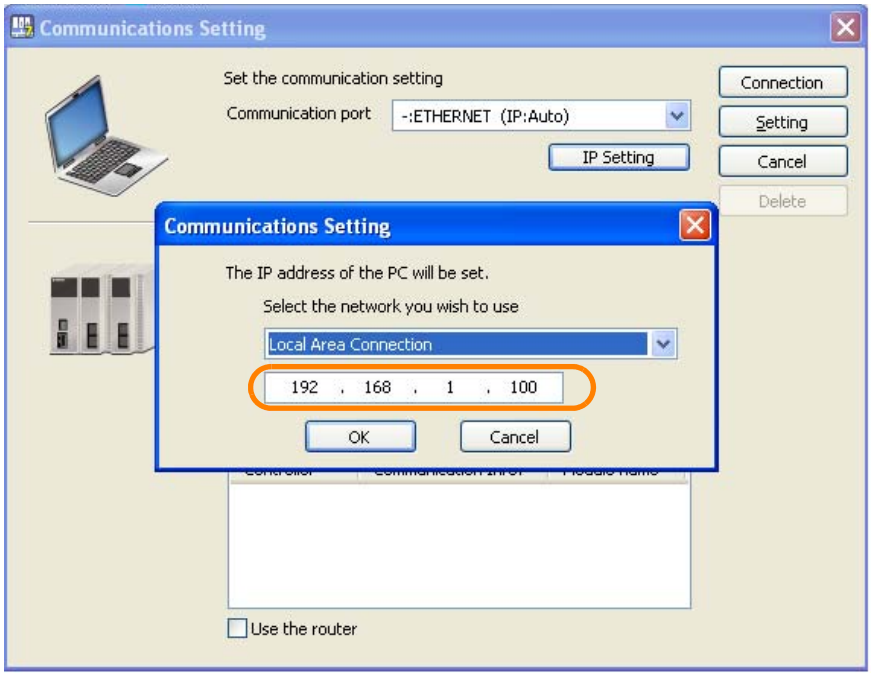
A different Communications Setting Dialog Box will be displayed.

16. Select **Local Area Connection** in the **Select the network you wish to use** Box.

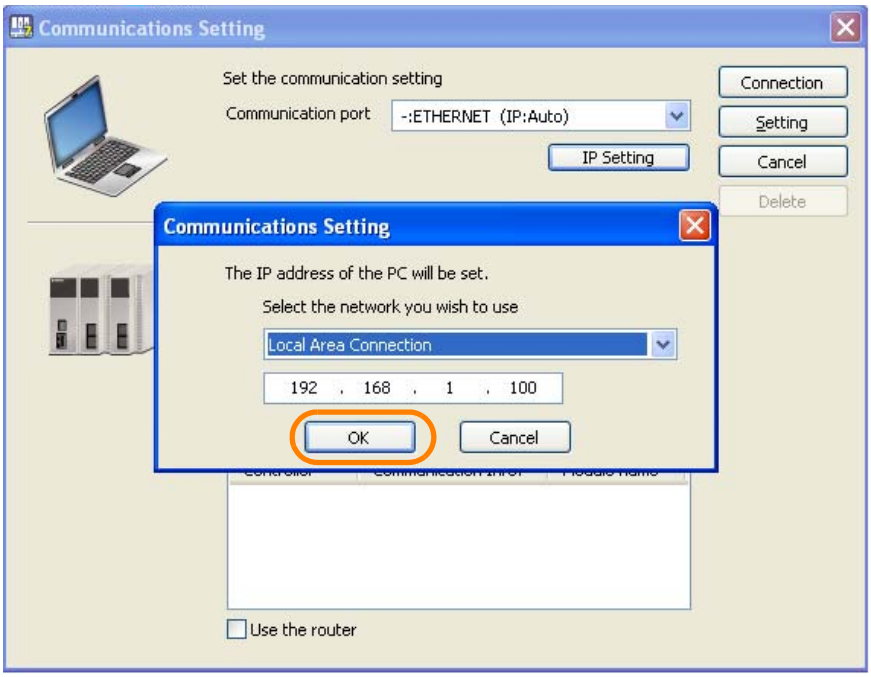


17. Enter the IP address.

Information Do not set the MPE720 to the same IP address that is set for the Machine Controller (default: 192.168.1.1).

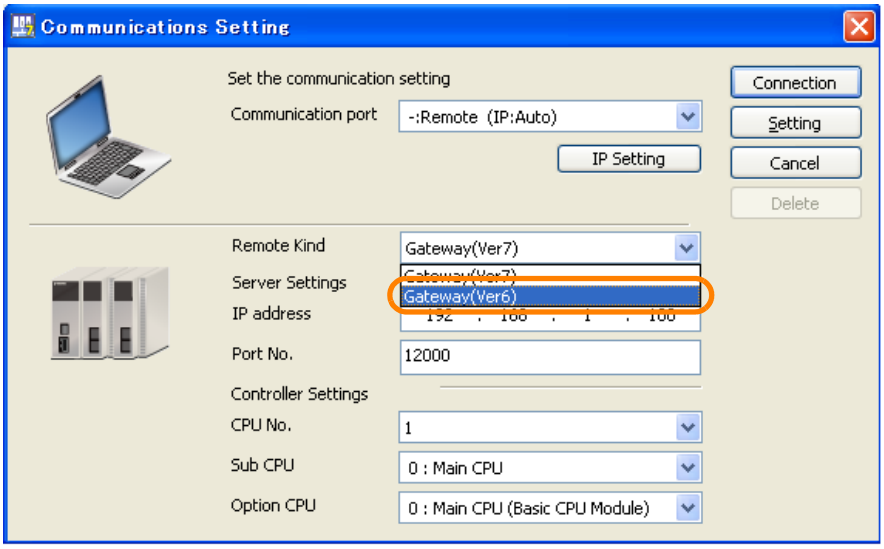


18. Click the **OK** Button.



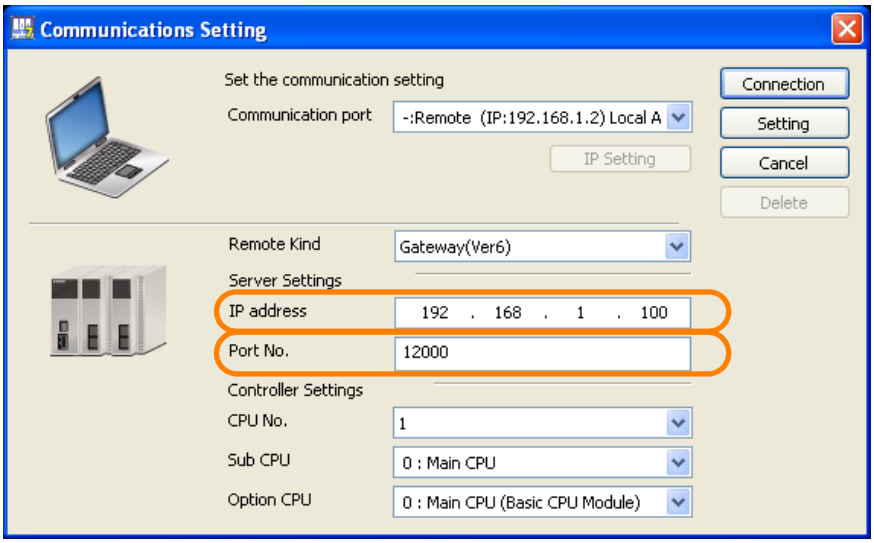
The Communications Setting Dialog Box will close and the IP address entered in step 17 will appear in the **Communication port** Box.

19. Select **Gateway(Ver6)** in the **Remote Kind** Box.

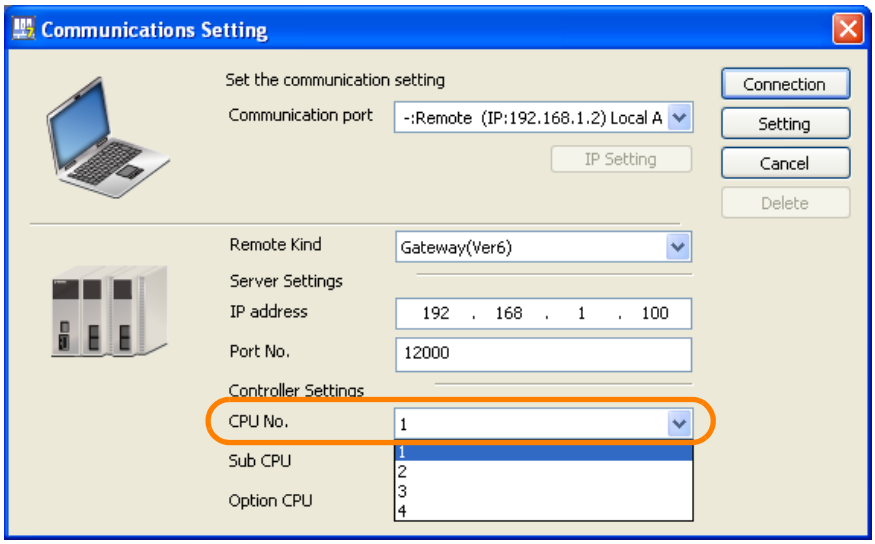


20. Enter values in the **IP address** and **Port No.** Boxes in the **Server Settings** Area.

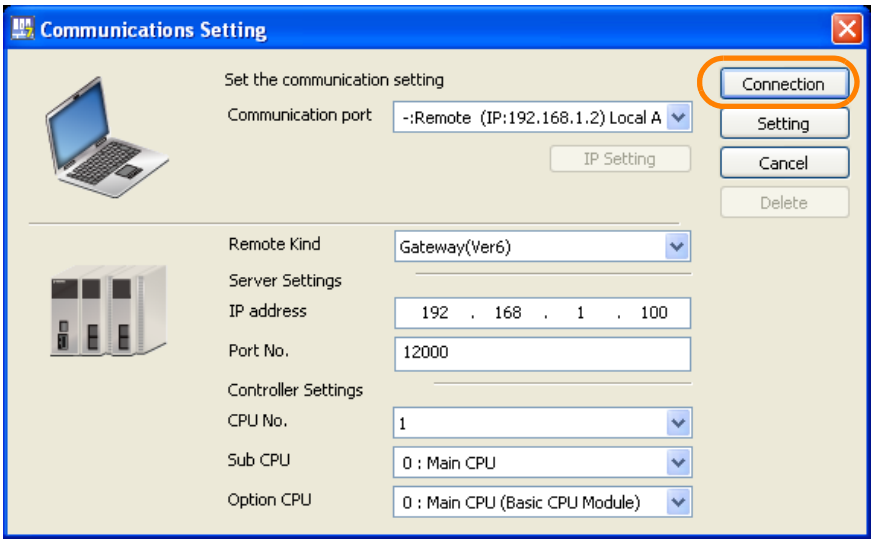
- IP address: Enter the IP address for the remote PC (at the remote site).
- Port No.: Specify the port number (the same number that was specified in the **Listen Port** Box in step 11) that was set for the CpUtility on the remote PC (at the remote site).



21. Select the CP number of the Board-type Machine Controller in the **CPU No.** Box in the **Controller Settings** Area.
Refer to the following section for details on CP numbers.
☞ *2.6.1 Using a Normal Connection to a Board-type Machine Controller* on page 2-22

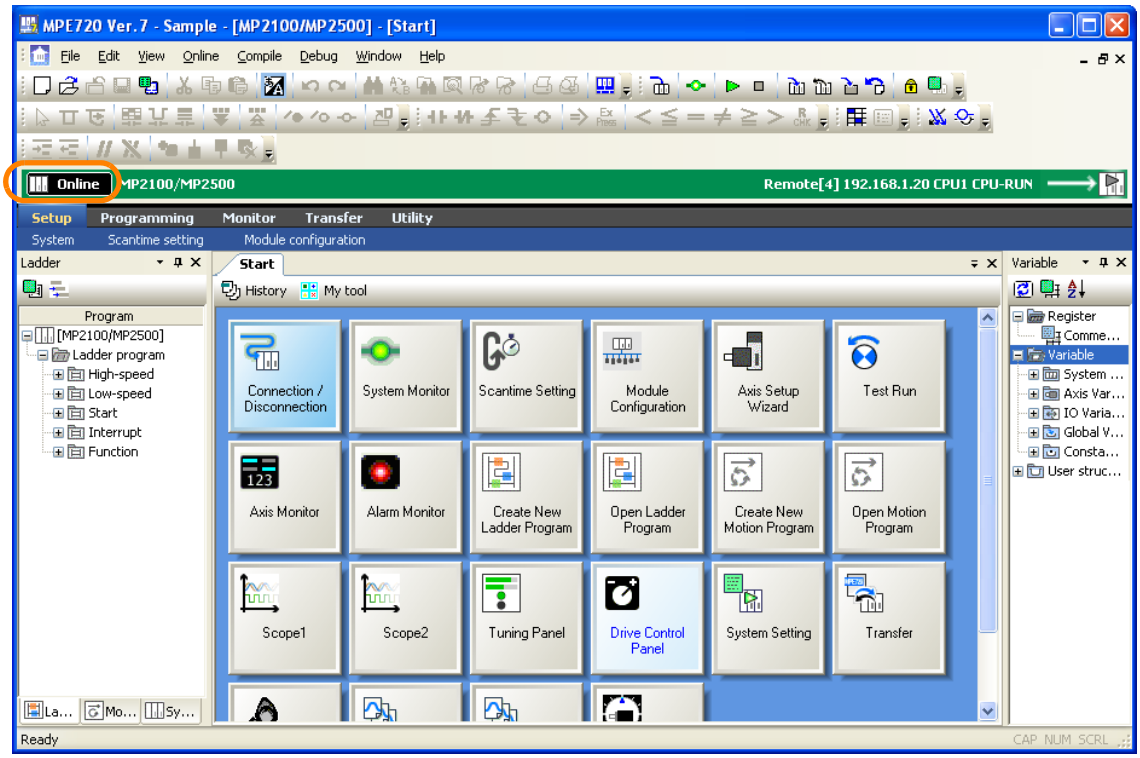


22. Click the **Connection** Button.



The MPE720 Ver. 7 Window will appear.

23. Confirm that “Online” appears to the upper left of the Launcher.



This concludes the procedure.

2.6.5 Using a Remote Connection with MPE720 Version 7 Installed on the Remote PC

Use the following procedure to establish a remote connection between two PCs on which MPE720 version 7 is installed to a Machine Controller (either a board-type or other than a board-type Machine Controller).

Refer to the following section for a conceptual illustration of this connection.

☞ *2.6 Setting Up Communications* on page 2-21

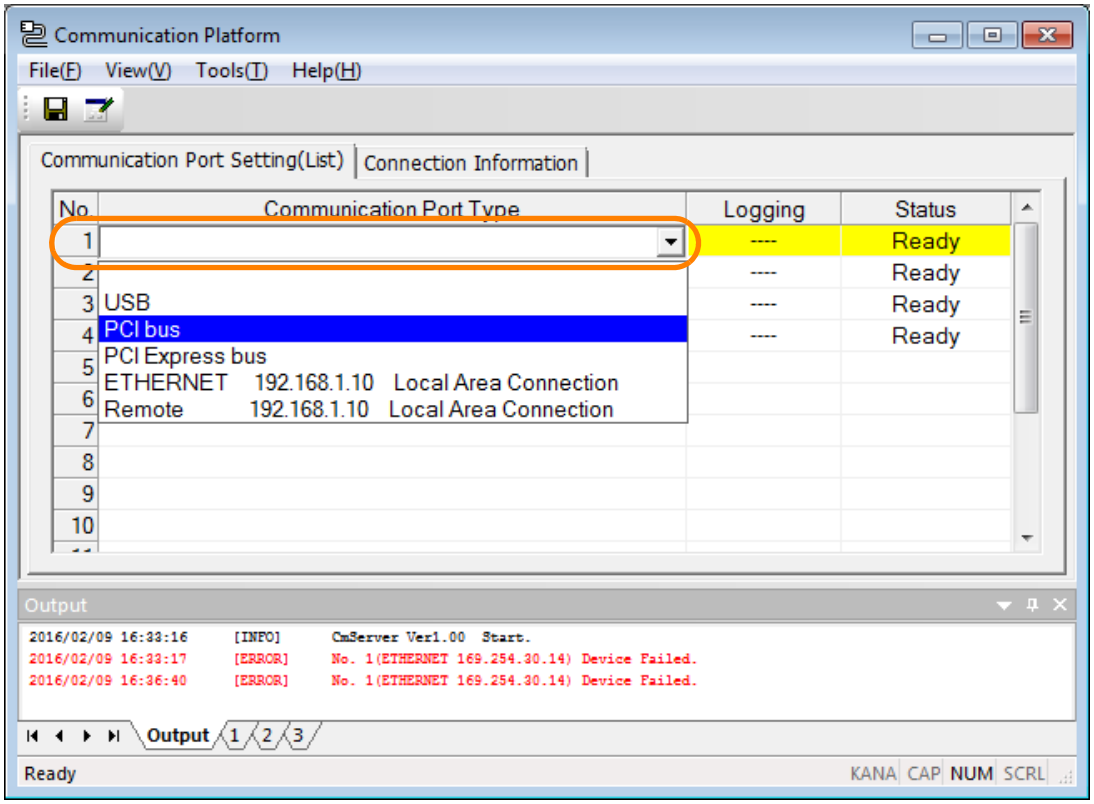
Begin by setting the remote PC.

1. Select ***Programs*** – ***YE_Applications*** – ***Communication Platform*** from the Windows Start Menu.
   The **Communications Platform** Icon will be displayed at the bottom right of the PC screen.

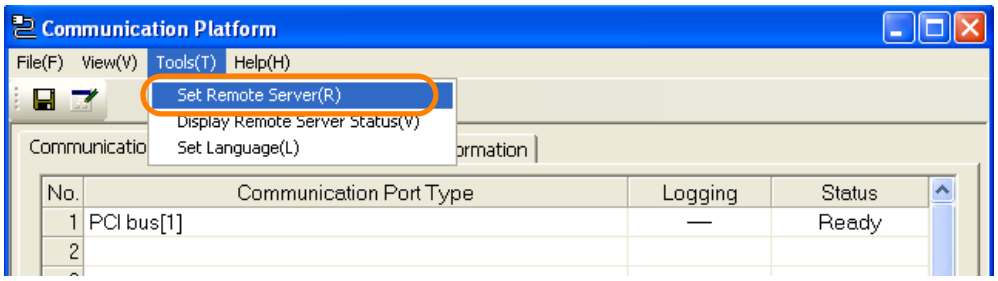
2. Double-click the **Communications Platform** Button.

   The Communication Platform Window will be displayed.

3. Assign communications interfaces to the logical ports.
   - Board-type Machine Controller: Select **PCI**.
   - Other Machine Controllers: Select **Serial, USB**, or **ETHERNET**.

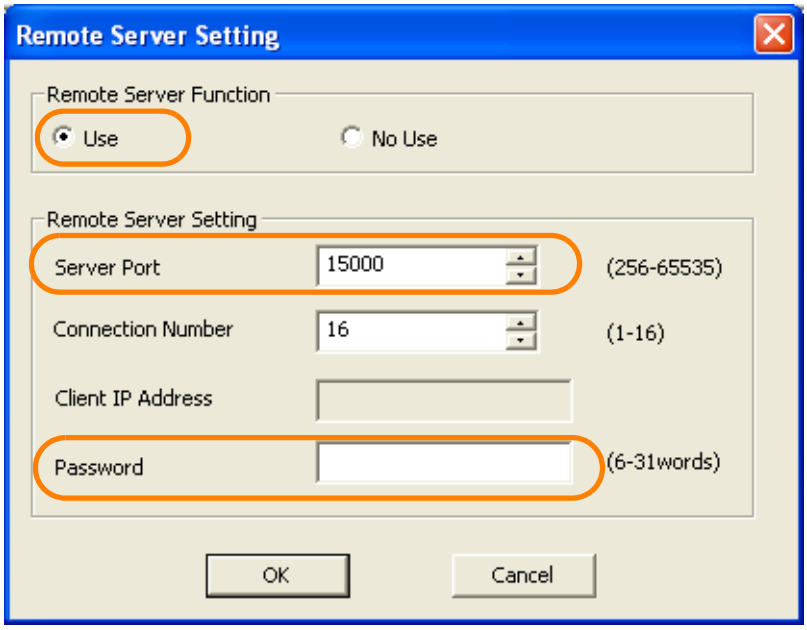


4. Select ***Tools*** – ***Set Remote Server*** from the menu bar.

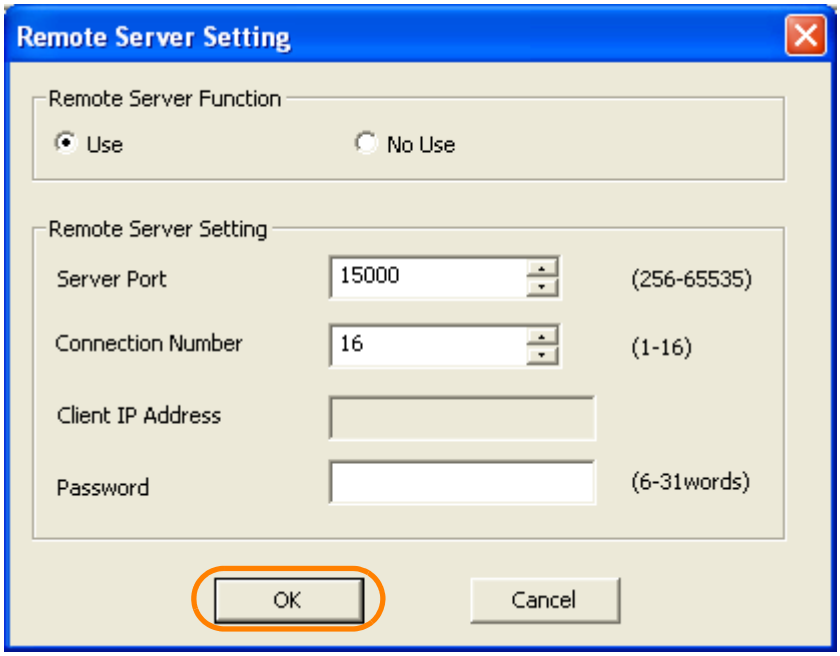


The Remote Server Setting Dialog Box will be displayed.

5. Enter the following settings.
   - Remote Server Function: Select the **Use** Option.
   - Server Port: Change this value only if it conflicts with another application.
   - Connection Number: It is not necessary to change this setting.
   - Password: If you wish to set a password for when the connection is established, enter it here.

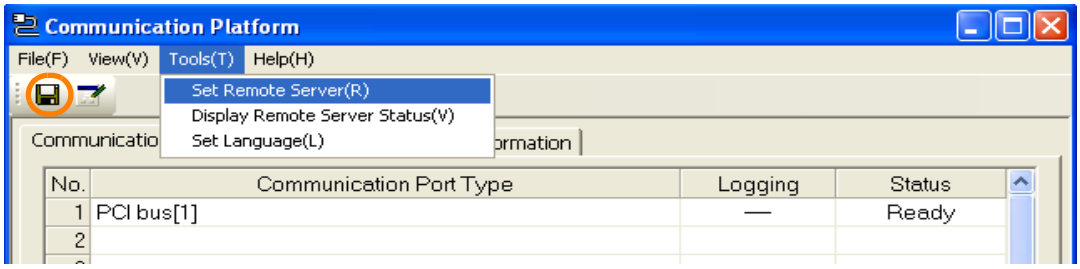


6. Click the **OK** Button.



The Remote Server Setting Dialog Box will close.

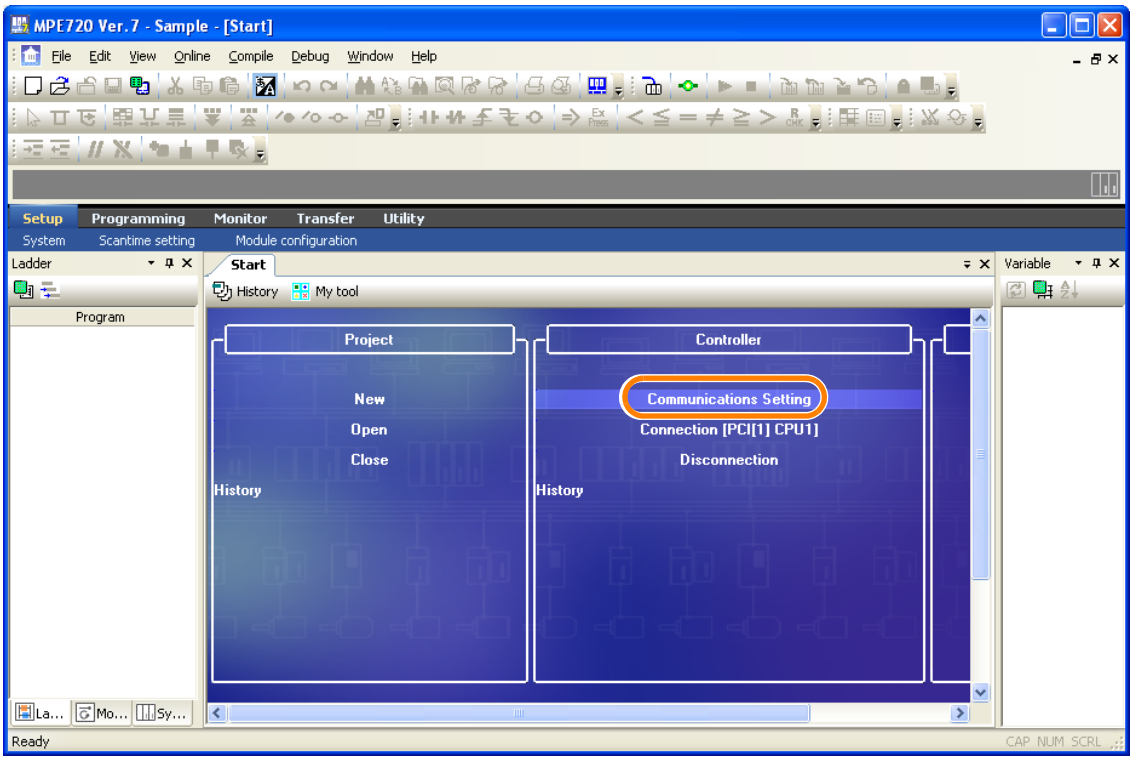
7. Click the **Save** Button in the Communications Platform Window.



The allocations are enabled.

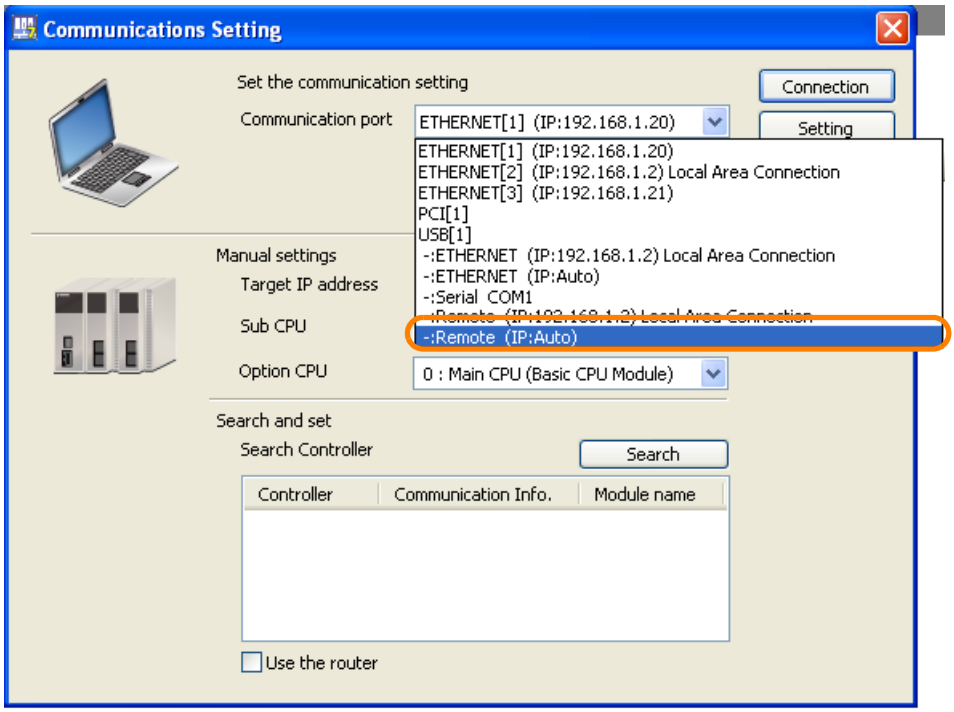
This concludes the setup of the remote PC.
Next, set up the working PC.

8. Select ***Communications Setting***.

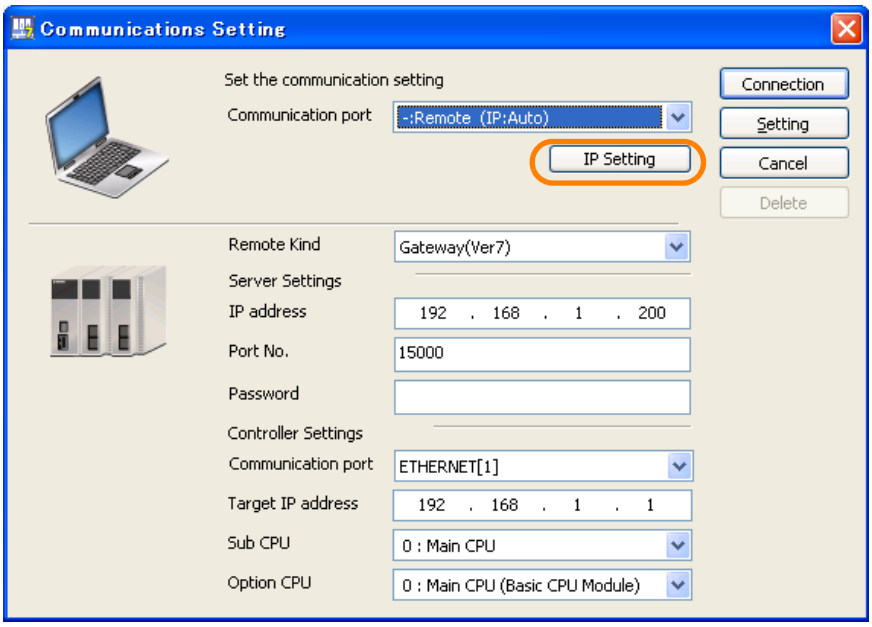


The Communications Setting Dialog Box will be displayed.

9. Select **-:Remote (IP: Auto)** in the **Communication port** Box.

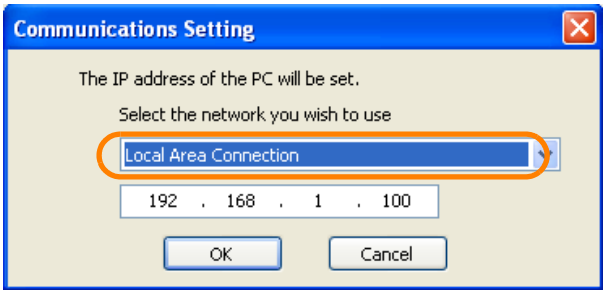


10. Click the **IP Setting** Button.

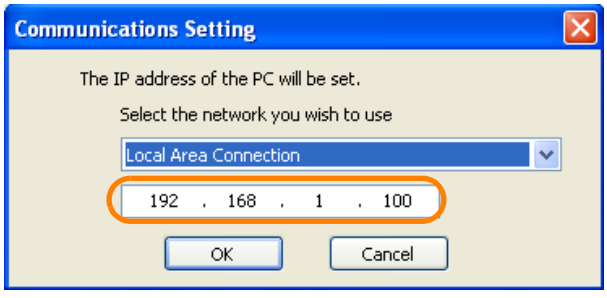


A different Communications Setting Dialog Box will be displayed.

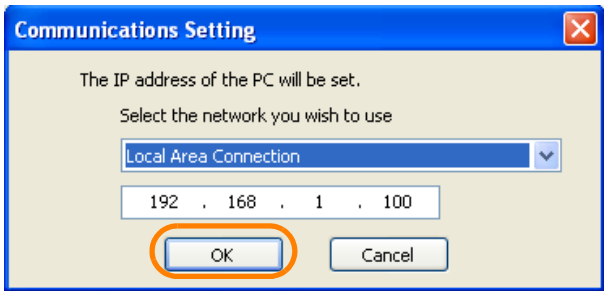
11. Select **Local Area Connection** in the **Select the network you wish to use** Box.



12. Enter the IP address to use.

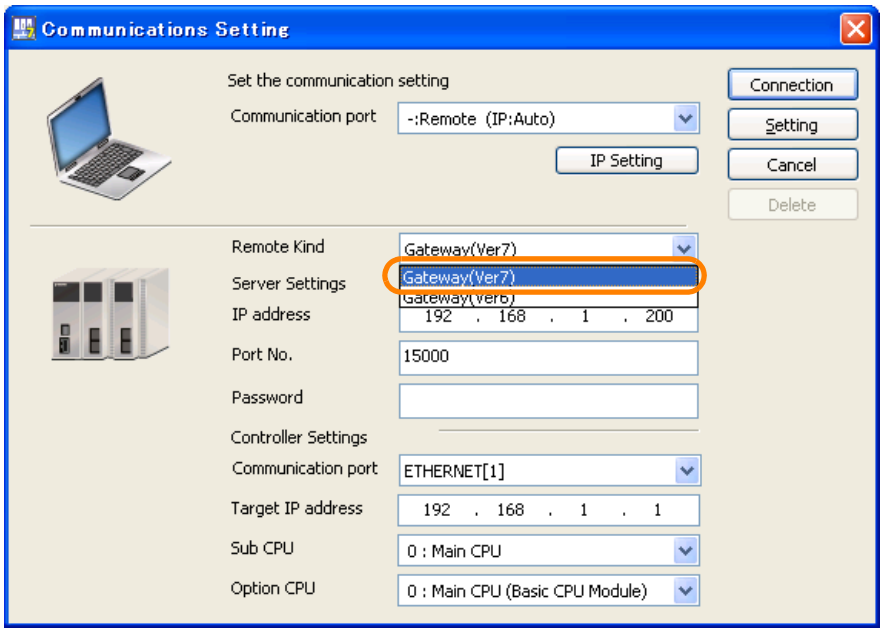


13. Click the **OK** Button.



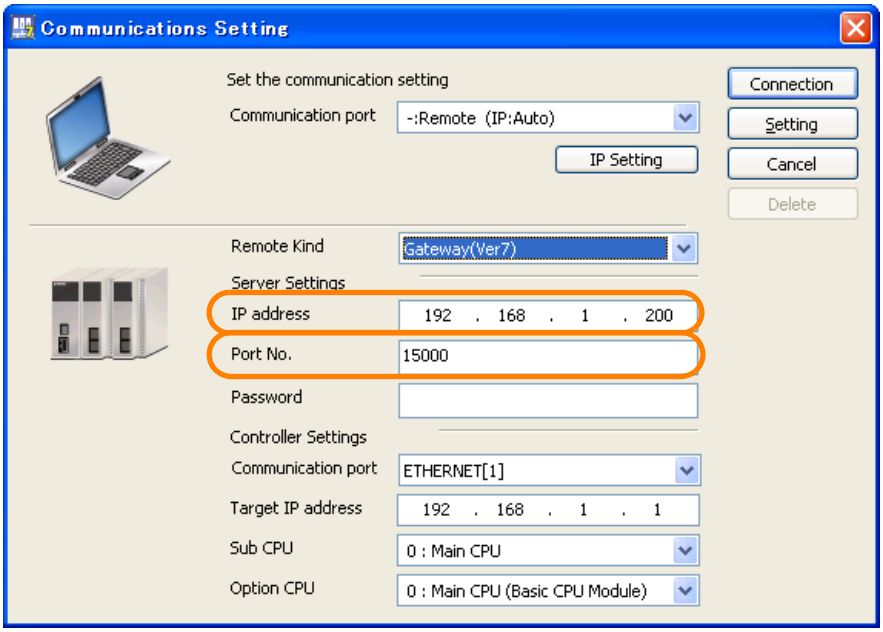
The Communications Setting Dialog Box will close.

14. Select **Gateway(Ver7)** in the **Remote Kind** Box.

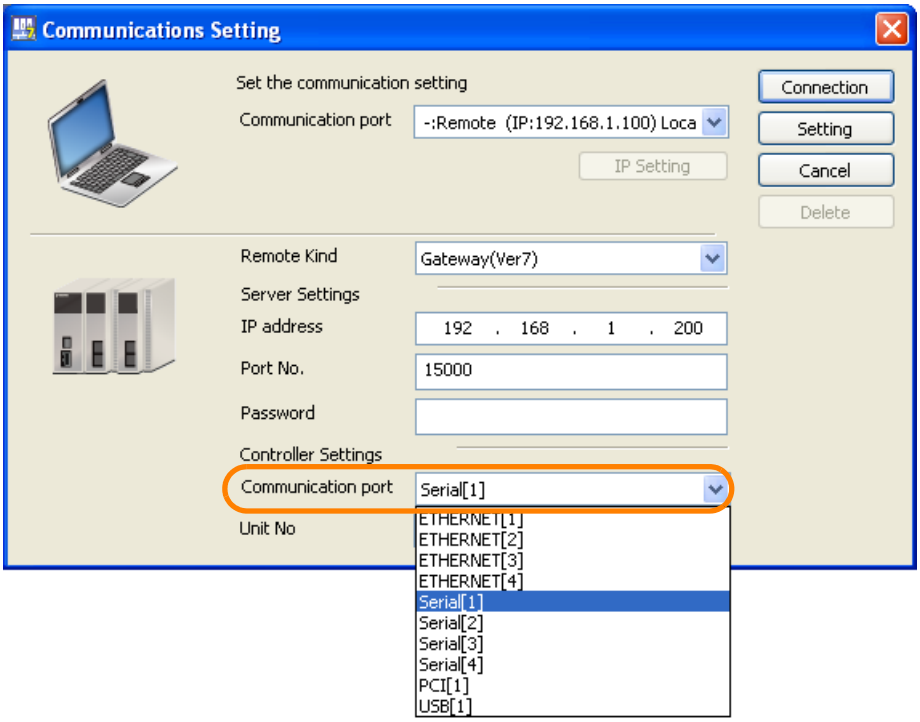


15. Enter values in the **IP address** and **Port No.** Boxes in the **Server Settings** Area.

- IP address: Enter the IP address for the remote PC (at the remote site).
- Port No.: Specify the port number (the same number that was specified in the **Server Port** Box in step 5) that was set for the CpUtility on the remote PC (at the remote site).

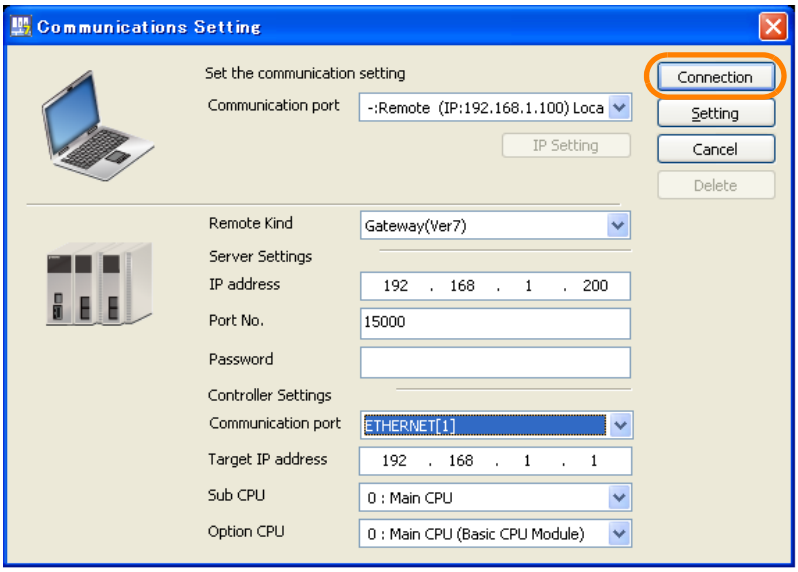


16. Select the communications interface in the **Communication port** Box in the **Controller Settings** Area.
    - Board-type Machine Controller: Select **PCI**.
    - Other Machine Controllers: Select **Serial, USB**, or **ETHERNET**.



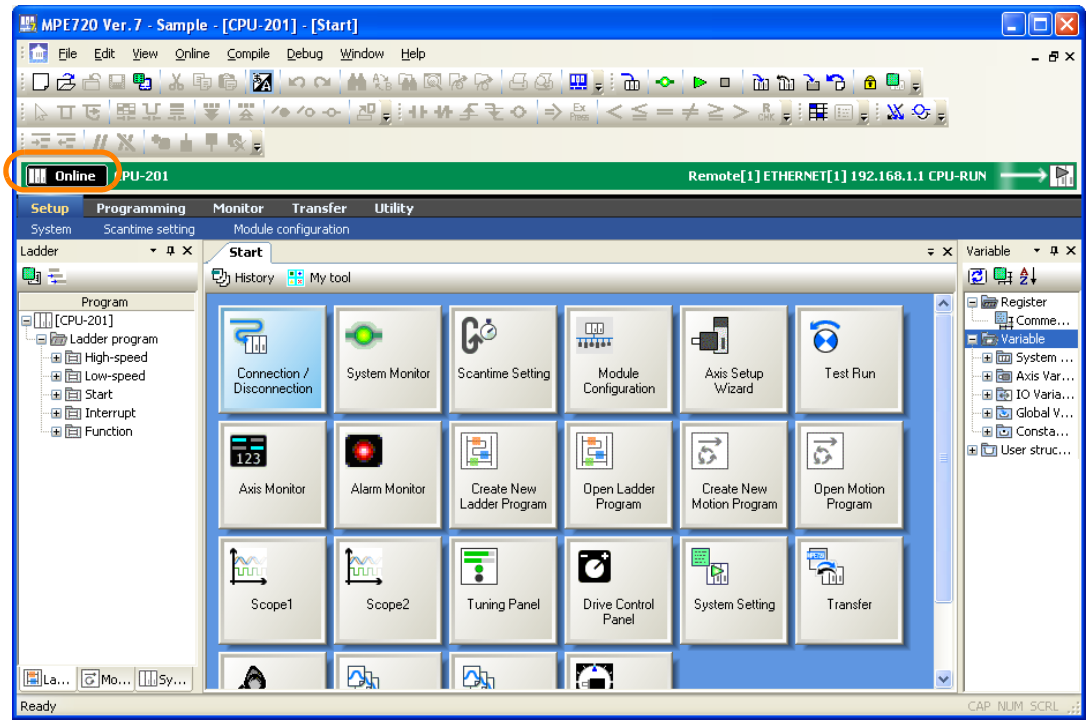
17. Specify one of the following.
    - If you selected **PCI** in step 16: Set the CP number of the Board-type Machine Controller in the **CPU No.** Box. Refer to the following section for details on CP numbers.
      ☞ *2.6.1 Using a Normal Connection to a Board-type Machine Controller* on page 2-22
    - If you selected **Serial** in step 16: Enter a value in the **Unit No.** Box.
    - If you selected **USB** or **ETHERNET** in step 16: Enter the IP address of the remote Machine Controller in the **Target IP address** Box of the **Controller Settings** Area.

18. Click the **Connection** Button.



The MPE720 Ver. 7 Window will appear.

19. Confirm that “Online” appears to the upper left of the Launcher.

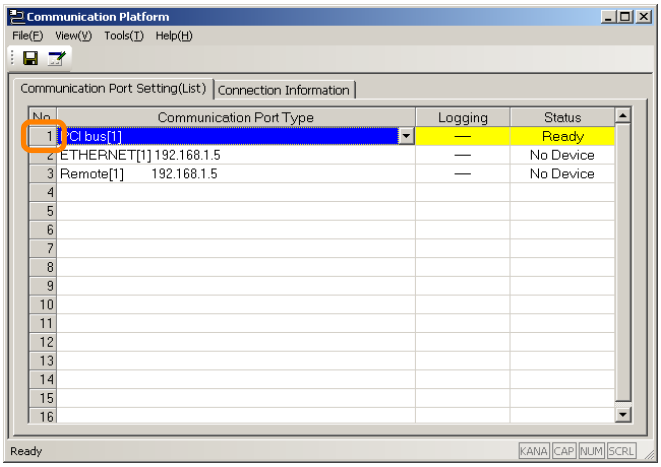


This concludes the procedure.

2.7 Setting an Upper Limit to the Communications Size

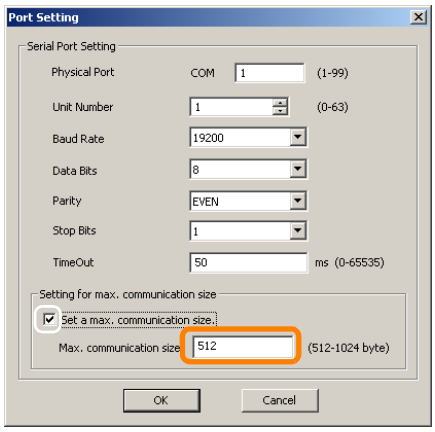
You can set an upper limit to the communications size when you use a serial, USB, or Ethernet communications port. Use the following procedure.

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

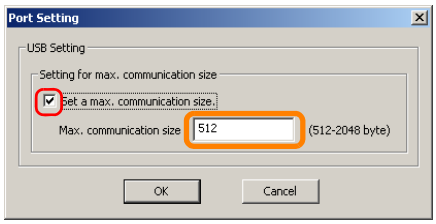


The Port Setting Dialog Box will be displayed.

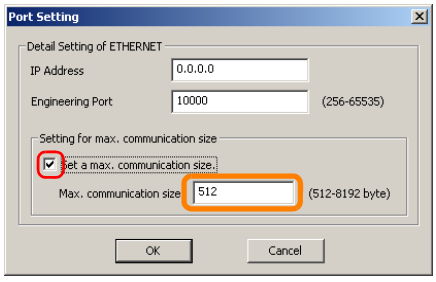
2. Select the **Set a max. communication size** Option and enter the maximum size.
   - Communications Port Type: Serial



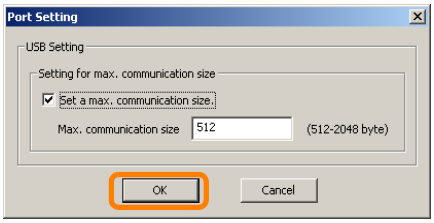
   - Communications Port Type: USB



   - Communications Port Type: Ethernet



3. Click the **OK** Button.



The maximum communications size setting is enabled.

This concludes the procedure.

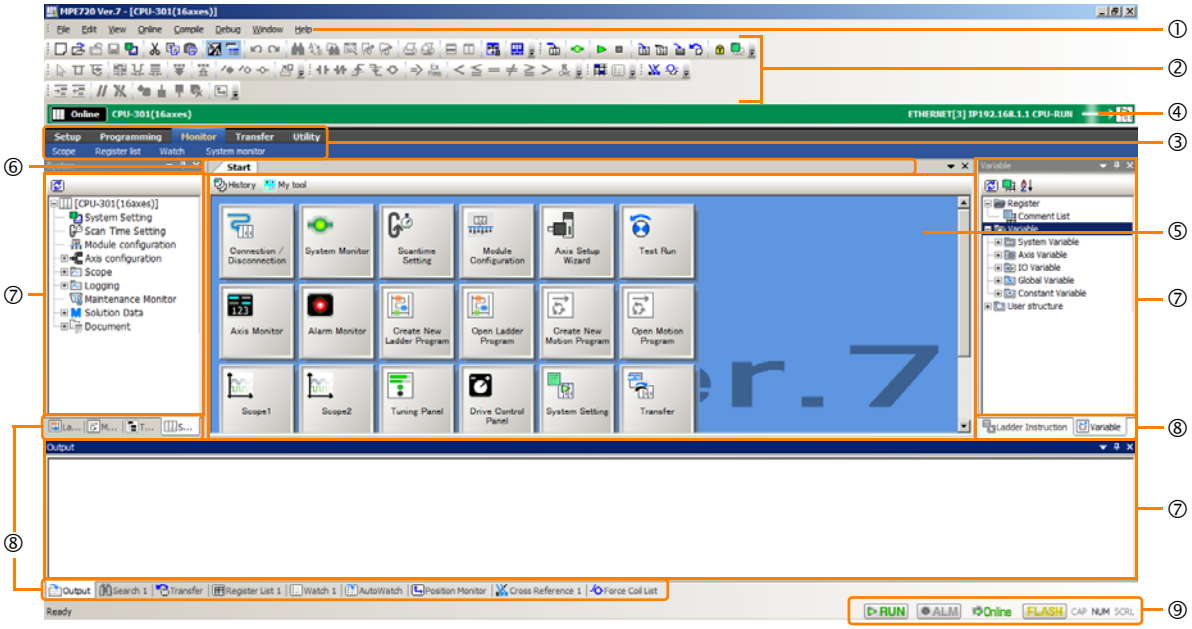
Names and Descriptions of GUI Components and View Settings

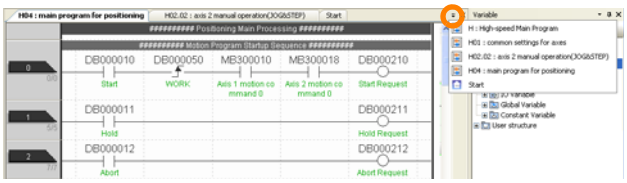
3

This chapter describes the basic items that are displayed in windows and dialog boxes in the MPE720 and the available view settings.

3.1 MPE720 Ver. 7 Window

This section describes each of the MPE720 Ver. 7 Window components.



No.	Name	Description	Reference
①	Menu Bar	Use the menu bar to select functions that are required to use the MPE720.	*3.2 Menu Bar* on page 3-5
②	Toolbars	Used to facilitate using functions related to project file management and programming. You can display or hide each toolbar.	*3.3 Toolbars* on page 3-9
③	Launcher	A submenu bar is displayed for quick and easy access to commonly used functions of the MPE720. You can display or hide the launcher.	*3.4 Launcher* on page 3-14
④	Caption Bar	The caption bar displays the Machine Controller connection status (online or offline), Machine Controller name, CPU status (when online), and project file name (when offline).	*3.5 Caption Bar* on page 3-15
⑤	Main Pane	The following tab pages and views are displayed depending on the selected function. • History View • My Tool View • Edit Ladder Program Tab Page • Edit Motion Program Tab Page • Edit Trace Tab Page • Comment List Tab Page • Tuning Panel Tab Page	*3.6 Main Pane* on page 3-16
⑥	Page Tabs	The page tabs are used to select the page that is displayed in the foreground when multiple tab pages are available. If there are many tab pages and not all of the tabs can be displayed, click the ▼ Button to display a list of tab pages to choose from. 	–

Continued on next page.

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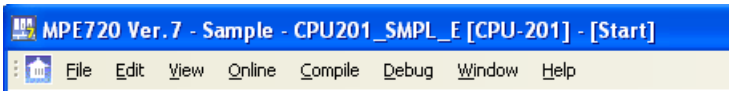
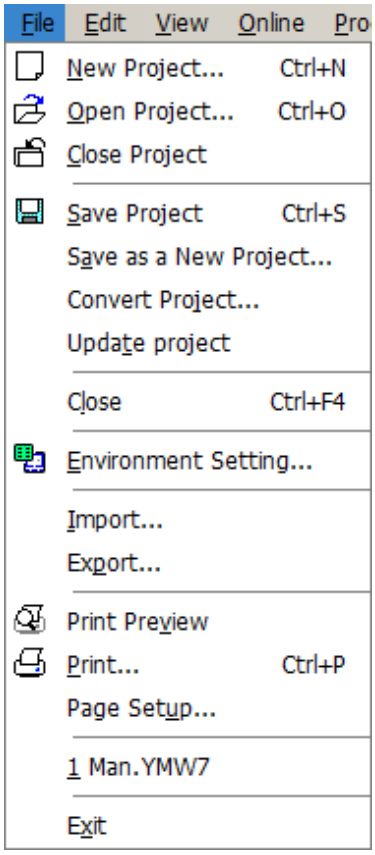
No.	Name	Description	Reference
⑦	Panes	Panes are subwindows that supplement the work in the Main Pane. You can display multiple panes. These panes are displayed depending on the selected function. • System Pane • Ladder Pane • Ladder Instruction Pane • Motion Pane • Task List Pane • Variables Pane • Cross Reference Pane • Check for Multiple Coils Pane • Register List Pane • Watch Pane • Position Monitor Pane • Output Pane • Search Pane • Transfer Pane • Forced Coil List Pane • Auto Watch Pane	*3.7 Panes* on page 3-42
⑧	Pane Tabs	The pane tabs are used to select the pane that is displayed in the foreground when multiple panes are available.	–
⑨	Status Bar	The status bar displays the Machine Controller status (online, offline, and alarm), the CPU status, and the state of the memory in the Machine Controller.	*3.8 Status Bar* on page 3-49

3.2 Menu Bar

This section gives details on the menu bar.

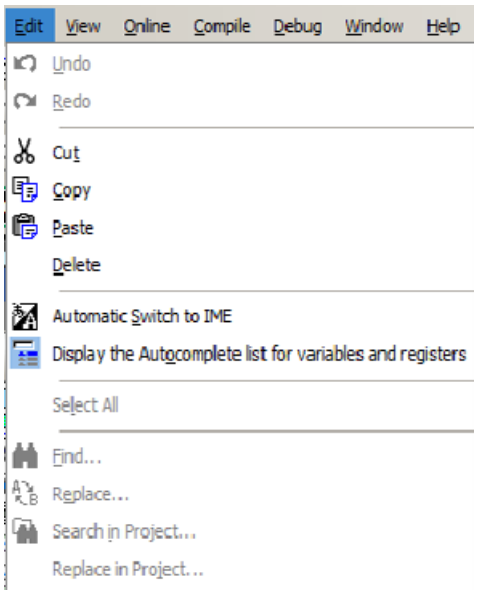


3.2.1 File Menu



New Project... Ctrl+N	Creates a project file.
Open Project... Ctrl+O	Selects and opens a project file.
Close Project	Closes the currently open project file.
Save Project Ctrl+S	Saves by overwriting the currently open project file.
Save as a New Project...	Saves the currently open project file as a separate file.
Convert Project...	Converts project files that were originally created for an MP2000-series Machine Controller for use with an MP3000-series Machine Controller.
Update project	Updates Module configuration definition information and ladder instruction information.
Close Ctrl+F4	Closes the currently open program.
Environment Setting...	Displays the Environment Setting Dialog Box.
Import...	Imports files.
Export...	Exports files.
Print Preview	Displays a printing preview.
Print... Ctrl+P	Displays the Print Dialog Box.
Page Setup...	Displays the Page Setup Dialog Box.
1 Man.YMW7	Displays the names of the last five project files that were opened. Click a file name to open that project file.
Exit	Exits the MPE720.

3.2.2 Edit Menu



Reverses the effect of the last operation.

Performs the last operation that was reversed using ***Undo***.

Cuts the contents in the selected range.

Copies the contents in the selected range.

Inserts the contents that has been cut or copied.

Deletes the contents in the selected range.

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.

Selects the entire range in the currently displayed view.

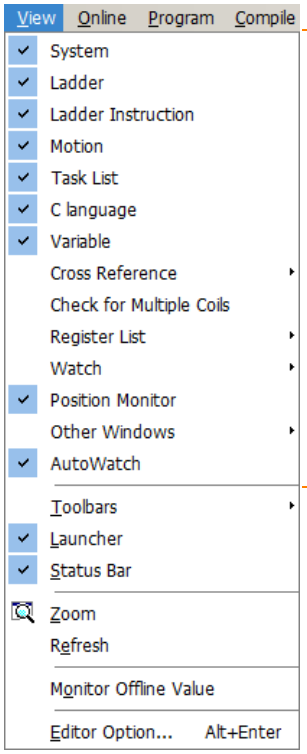
Displays the Search Dialog Box, which allows you to search for registers and other items.

Displays the Replace Dialog Box, which allows you to replace registers and other items.

Displays the Search Dialog Box, which allows you to search for registers and other items in a specified project.

Displays the Replace Dialog Box, which allows you to replace registers and other items in a specified project.

3.2.3 View Menu



Toggle between displaying and hiding the selected panes.

Toggles between displaying and hiding the selected toolbars.

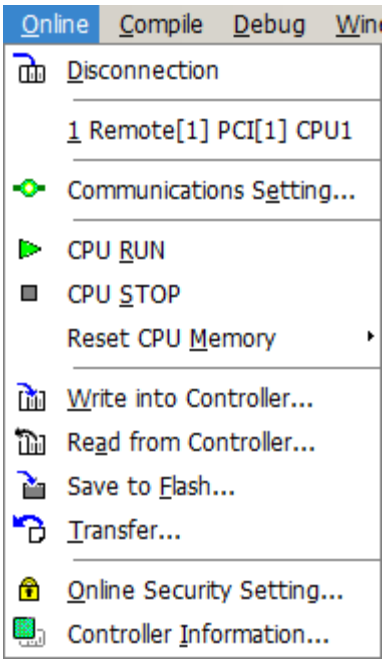
Toggles between displaying and hiding the launcher.

Toggles between displaying and hiding the status bar.

Changes the display magnification.

Updates the Ladder Pane, Motion Pane, and Variables Pane with the latest information.

3.2.4 Online Menu



Establishes a logical connection between the PC on which the MPE720 is installed and a Machine Controller.

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.

Opens the Communications Setting Dialog Box to set up communications between the PC on which the MPE720 is installed and a Machine Controller.

Starts the CPU of the connected Machine Controller.

Stops the CPU of the connected Machine Controller.

Clears CPU memory.

Writes the contents of the project file into the Machine Controller.

Writes the data from the Machine Controller into the project file.

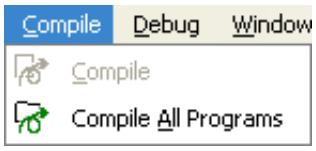
Saves the Machine Controller RAM contents to the flash memory of the Machine Controller.

Transfers data, such as programs and registers.

Opens the Security Setting Dialog Box.

Displays information about the Machine Controller.

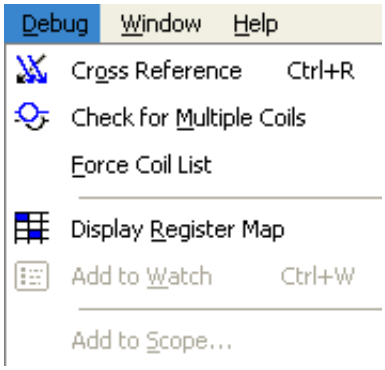
3.2.5 Compile Menu



Compiles the currently displayed program.

Compiles all programs.

3.2.6 Debug Menu



Performs a search on variables or registers currently used in the program.

Searches all ladder programs for different coils that use the same register.

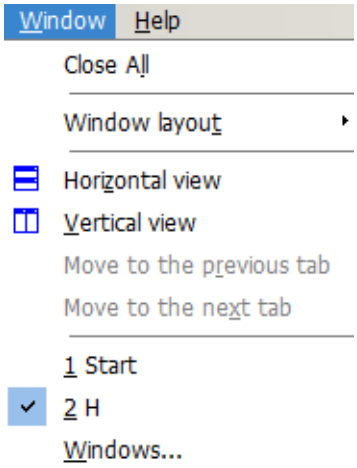
Searches ladder programs for coils that are forced ON or OFF.

Displays the values (memory map) of registers at consecutive addresses.

Adds the selected register to the Watch Pane.

Adds the selected register to the Trace Pane.

3.2.7 Window Menu



If more than one tab page is open in the Main Pane, this command will close all tab pages except the Start Tab Page.

Restores the Main Pane to its original state.

Splits the Main Pane vertically.

Splits the Main Pane horizontally.

Moves a split pane to the previous tab page.

Moves a split pane to the next tab page.

Displays the names of the tab pages currently displayed in the Main Pane.

If more than one tab page is open in the Main Pane, this command allows you to bring the selected tab page to the front, or close or minimize the selected tab page.

3.2.8 Help Menu

Displays the table of contents for the help file.

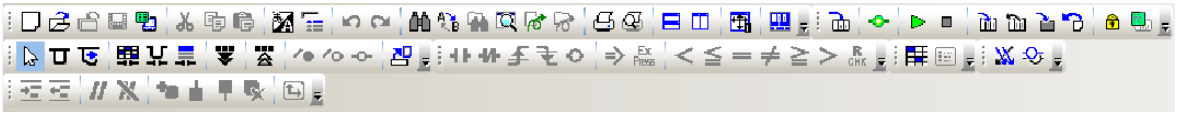
Displays the version, user name, company name, and serial number of the MPE720.

3.3 Toolbars

This section gives details on the toolbars and how to display or hide each toolbar.

3.3.1 Details

This section gives details on the toolbars.



Standard Toolbar

Icon	Description
	Creates a project file.
	Opens an existing project file.
	Closes the currently open project file.
	Saves by overwriting the currently open project file.
	Displays the Environment Setting Dialog Box.
	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 button is selected, the input from the keyboard is automatically switched between Japanese and English according to the box selected for input.
	When this button is selected, the Autocomplete is enabled.
	Reverses the effect of the last operation.
	Performs the last operation that was reversed using .
	Displays the Search Dialog Box, which allows you to search for registers and other items.
	Displays the Replace Dialog Box, which allows you to replace registers and other items.
	Displays the Search Dialog Box, which allows you to search for registers and other items in a specified project.
	Changes the display magnification.
	Compiles the currently displayed program.
	Compiles all programs.
	Displays the Print Dialog Box.
	Displays a printing preview.
	Splits the Main Pane vertically.
	Splits the Main Pane horizontally.
	Restores the window layout to the layout that was saved as layout 1.
	Displays the version, user name, company name, and serial number of the MPE720.

Online Toolbar

Icon	Description
	Establishes a logical connection between the PC on which the MPE720 is installed and a Machine Controller.
	Opens the Communications Setting Dialog Box to set up communications between the PC on which the MPE720 is installed and a Machine Controller.
	Starts the CPU of the connected Machine Controller.
	Stops the CPU of the connected Machine Controller.
	Writes the contents of the project file into the Machine Controller.
	Writes the data from the Machine Controller into the project file.
	Saves the Machine Controller RAM contents to the flash memory of the Machine Controller.
	Transfers data, such as programs and registers.
	Opens the Security Setting Dialog Box.
	Displays information about the Machine Controller.

Ladder Editor Toolbar

This toolbar is used when working in the Edit Ladder Program Tab Page.

Icon	Description
	Normal Edit Mode
	Branch Creation Mode
	Branch Edit 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.

Ladder Instruction Toolbar

This toolbar is used when working in the Edit Ladder Program Tab Page.

Icon	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.
	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.

Monitor Toolbar

Icon	Description
	Displays the values (memory map) of registers at consecutive addresses.
	Adds the selected register to the Watch Pane.

Debug Toolbar

Icon	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.

Motion Editor Toolbar

This toolbar is used when working in the Edit Motion Program Tab Page.

Icon	Description
	Indents the line by one level.
	Reverses the line indentation by one level.
	Puts the editor in Line Comment Entry Mode.
	Cancels Line Comment Entry Mode.
	Sets or cancels a bookmark.
	Jumps to the next bookmark.
	Jumps to the previous bookmark.
	Clears all bookmarks.
	Starts the Position Monitor.

3.3.2 Toggling between Display and Hide

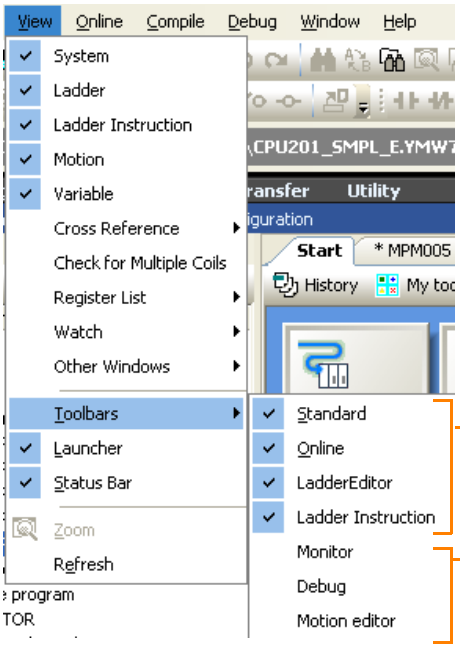
You can display or hide in the following two ways for toolbars:

- Display or hide entire toolbars.
- Display or hide individual buttons on each toolbar.

The procedures are given below.

Displaying and Hiding Entire Toolbars

To display or hide an entire toolbar, select ***View*** – ***Toolbars*** from the menu bar.



Toolbars with a check mark are displayed in the window. Selecting an item in this state hides the corresponding toolbar and removes the check mark.

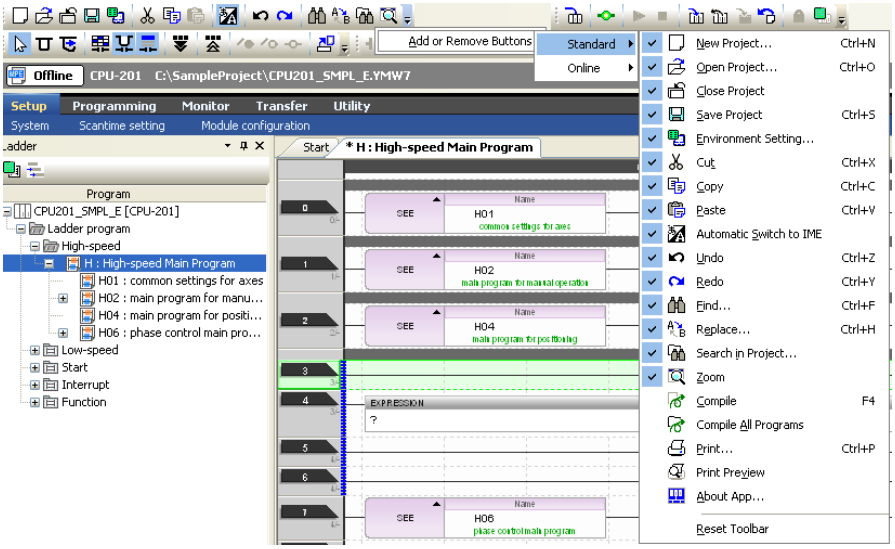
Toolbars without a check mark are not displayed in the window. Selecting an item in this state displays the corresponding toolbar and adds the check mark.

Displaying and Hiding Individual Buttons on Each Toolbar

Use the following procedure to display or hide individual buttons on a toolbar.

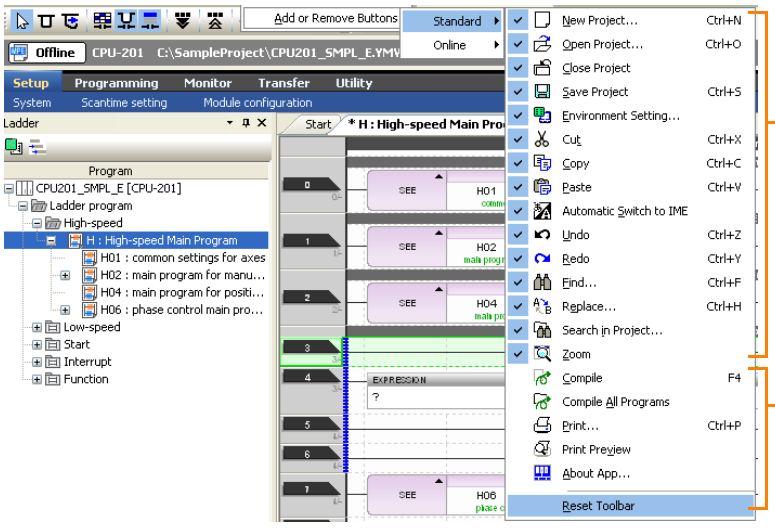
1. Click the  on the toolbar you wish to display or hide.

2. Select ***Add or Remove Buttons*** – □□□□ (toolbar name).



A list of the buttons that are included in that toolbar will be displayed.

3. Set whether to display or hide the buttons.



Buttons with a check mark are displayed on the toolbar. Selecting an item in this state hides the corresponding button and removes the check mark.

Buttons without a check mark are not displayed on the toolbar. Selecting an item in this state displays the corresponding button and adds the check mark.

This concludes the procedure.

3.4 Launcher

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

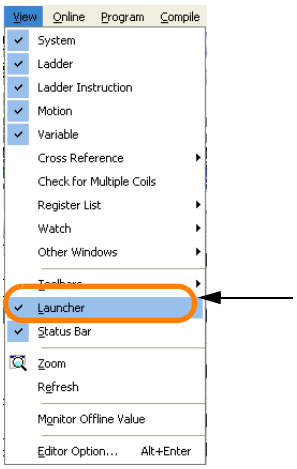
3.4.1 Details

This section gives details on the launcher.

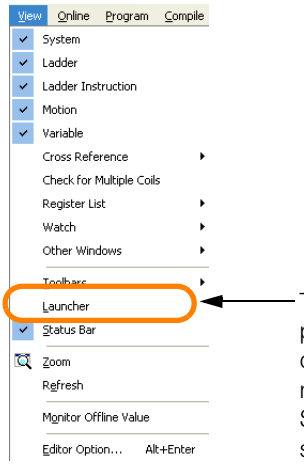
Item		Description
Setup	System	Displays the System Pane.
	Scantime Setting	Displays the Environment Setting Dialog Box and navigates to **Setup - Scantime Setting**.
	Module Configuration	Displays the Module Configuration Tab Page.
Programming	Ladder Program	Displays the Ladder Pane.
	Motion Program	Displays the Motion Pane.
	Variables	Displays the Variable Pane.
Monitor	Trace	Displays the Trace Type Dialog Box.
	Register List	Displays the Register List Pane.
	Watch	Displays the Watch Pane.
	System Monitor	Displays the System Monitor Dialog Box.
Transfer	Write into Controller	Displays the Transfer Program - Write into Controller Dialog Box.
	Read from Controller	Displays the Transfer Program - Read from Controller Dialog Box.
	Saving to Flash Memory	Displays the Transfer Program - Save to Flash Dialog Box.
	Transfer	Displays the Transfer Dialog Box.
Utility	Engineering Manager	Displays the Engineering Manager Window.
	Print Builder	Displays the Print Builder Window.
	Electronic Cam Data Preparation Tool	Displays the Electronic Cam Tool Window.
	Start Page	Displays the Start Tab Page.

3.4.2 Toggling between Display and Hide

To display or hide the launcher, select ***View*** – ***Launcher*** from the menu bar.



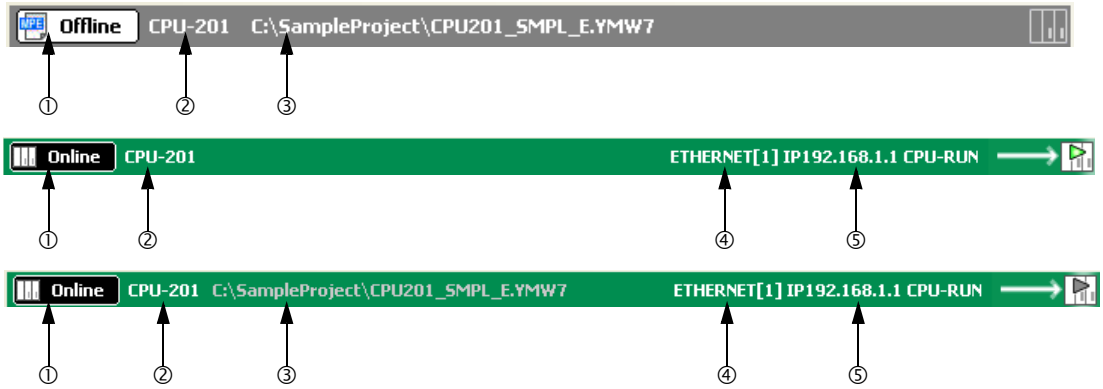
If it has a check mark, the Launcher is displayed in the window. Selecting ***Launcher*** in this state hides the Launcher and removes the check mark.



The Launcher is not displayed in the window if it does not have a check mark. Selecting ***Launcher*** in this state displays the Launcher and adds the check mark.

3.5 Caption Bar

This section gives details on the caption bar.



No.	Display	Description
①	Online	The MPE720 is correctly connected to the Machine Controller.
	Offline	The MPE720 is not connected to the Machine Controller.
②	Controller model	Displays the model of the Machine Controller that was set when the current project file was created.
③	Storage location and name of project file	Displays the storage location and file name of the currently open project file. This is displayed only when a project file is open.
④	Ethernet	Displays the communications interface between the MPE720 and the Machine Controller. This is displayed only in online mode.
	Serial	
	USB	
⑤	IP address of Machine Controller	Displays the IP address of the Machine Controller that is connected to the MPE720. This is displayed only in online mode.

3.6 Main Pane

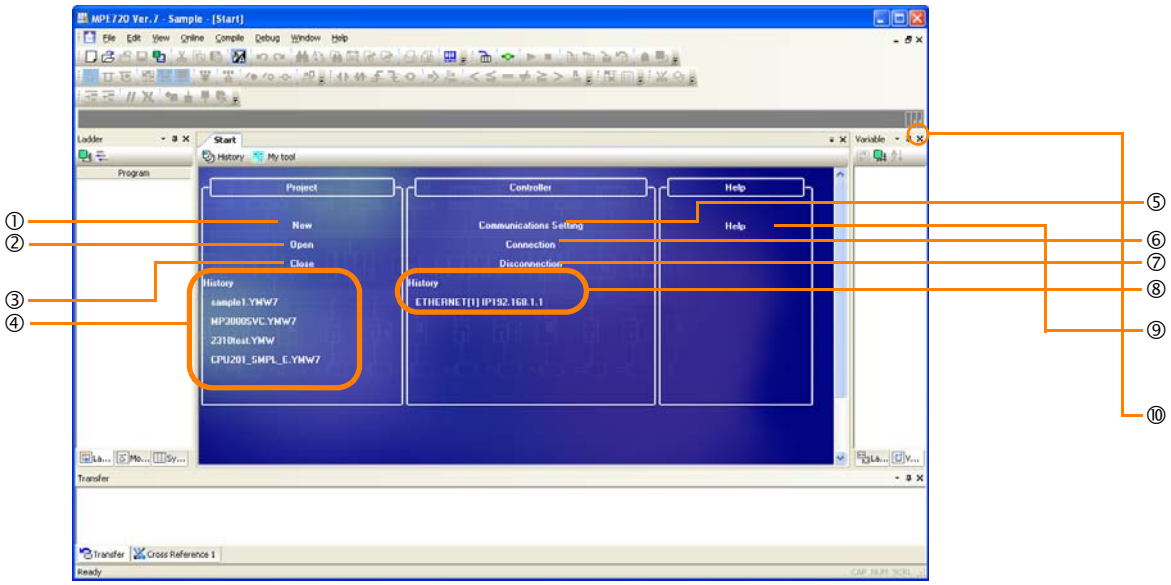
You can display the seven tab pages and views given below in the Main Pane.

- History View
- My Tool View
- Edit Ladder Program Tab Page
- Edit Motion Program Tab Page
- Edit Trace Tab Page
- Comment List Tab Page
- Tuning Panel Tab Page

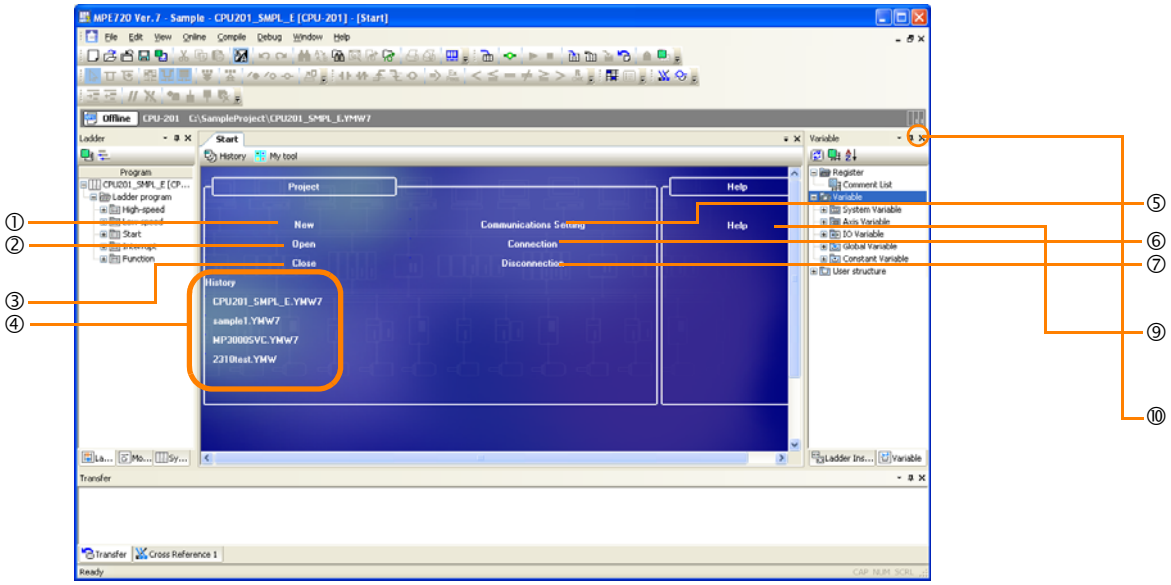
This section gives details on each tab page and view.

3.6.1 History View

The appearance of the History View depends on whether a project file is open.



When a Project File Is Not Opened



When a Project File Is Open

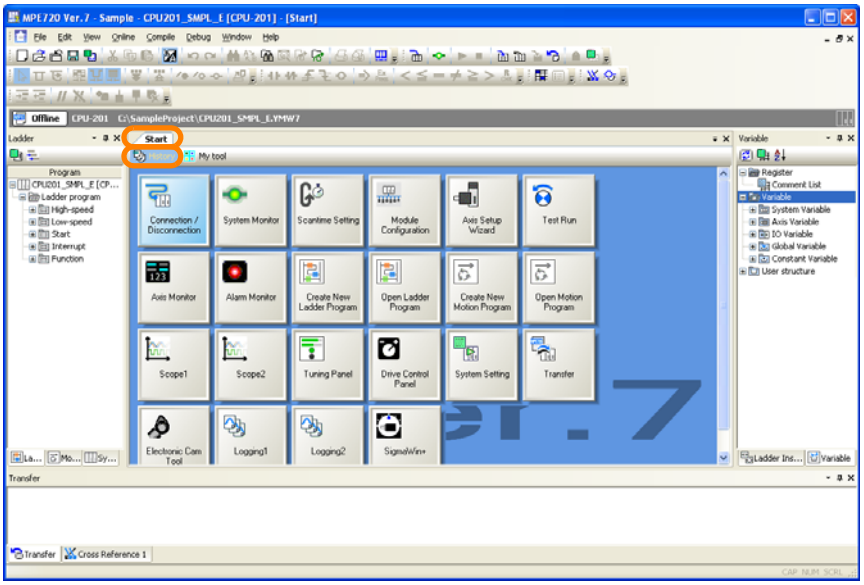
The following items are displayed in the History View.

No.	Item	Description
①	New*	Displays the Create New Project Dialog Box, which allows you to create a project file. Refer to the following section for details. ☞ *2.5 Creating a Project File* on page 2-17
②	Open*	Displays the Open Project Dialog Box, which allows you to select and open a project file.
③	Close*	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. ☞ *1.4 Editing Data and Storage Locations* on page 1-8
④	History (file name)*	Displays the names of the five project files that were most recently created or edited using the MPE720 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	Communication Setting	Displays the Communications Setting Dialog Box, which allows you to set the communications port and connect with the Machine Controller. Refer to the following section for details. ☞ *2.6 Setting Up Communications* on page 2-21
⑥	Connection	Enables a connection to the Machine Controller using the communications port that is currently set.
⑦	Disconnection	Closes the connection with the Machine Controller.
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 Machine Controller to which the connection is to be made.
⑨	Help	Starts Acrobat Reader and displays the Help Selection Dialog Box. Select a PDF file and click the **OK** Button to display help for the MPE720.
⑩	Close Button	Moves the tab page to the backmost level of the Main Pane. This button does not exit the MPE720. To exit the MPE720, either click the **Close** Button in the MPE720 Ver.7 Window, or select ***File*** – ***Exit*** from the menu bar.

* This command closes the current connection, if one exists, with the Machine Controller.

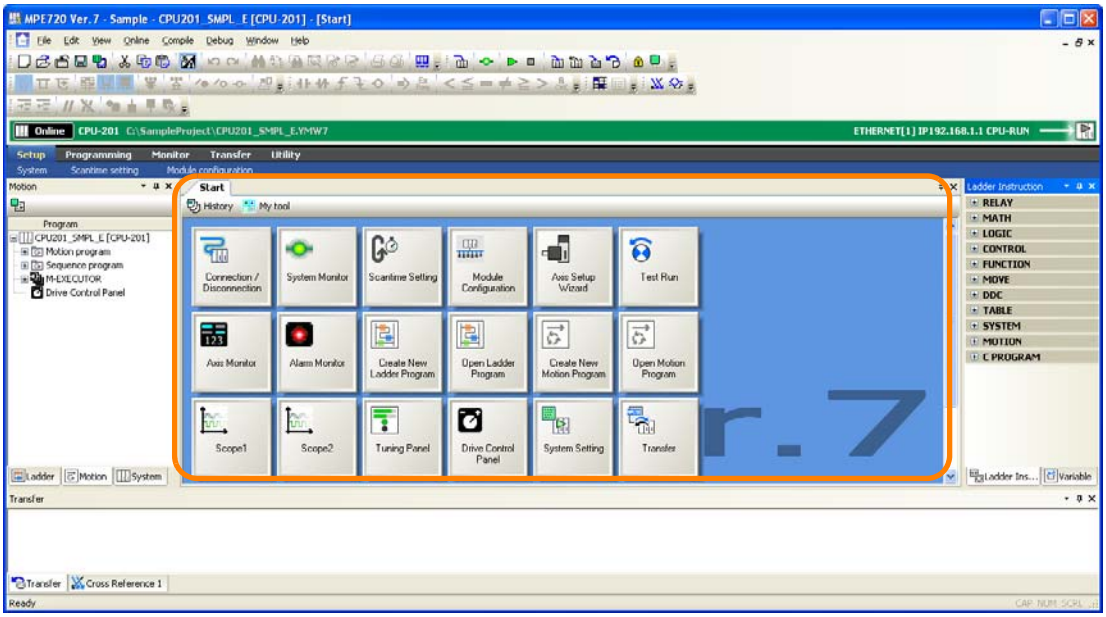
Displaying the History View

Select **History** on the Start Tab Page in the Main Pane to display the History View.



3.6.2 My Tool View

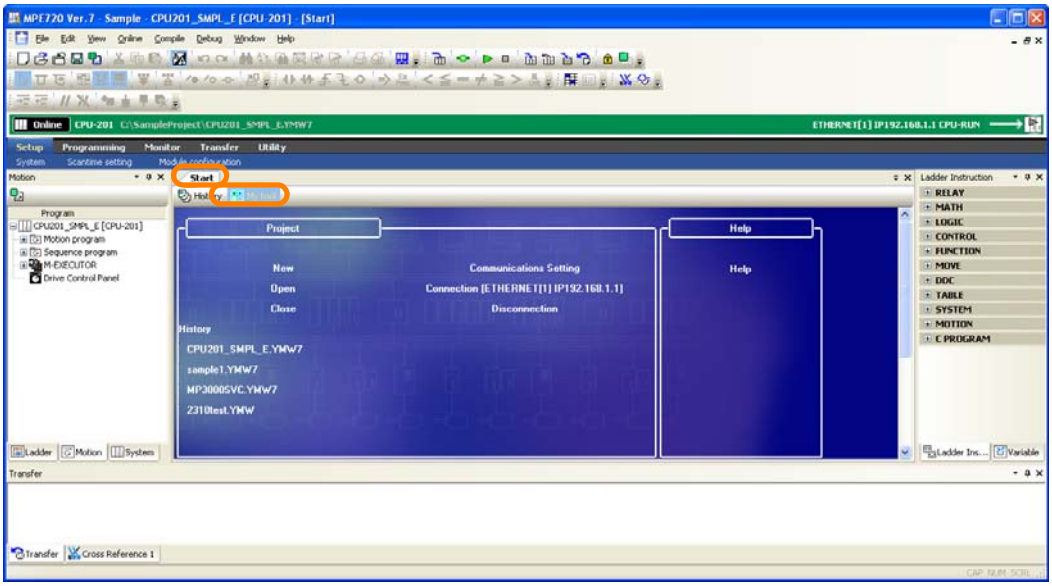
You can easily start any of the various functions by clicking on a button in the My Tool View. You can customize the buttons that are registered to the My Tool View, or you can register frequently used functions to enable engineering to be started quickly.



Displaying the My Tool View

The My Tool View is automatically displayed when a project file is opened, or a connection to the Machine Controller is established.

An alternative way to display the My Tool View is to click **My tool** from the **Start** Tab Page caption bar.



Names and Functions of Buttons on the My Tool View

This section describes the names and functions of the buttons that are displayed on the My Tool View.

Button Name	Function
Connection/Disconnection	Connects or disconnects the Machine Controller.
System Monitor	Displays the System Monitor.
Scantime Setting	Sets the high-speed and low-speed scan time.
Module Configuration	Opens the Module Configuration Tab Page.
Axis Setup Wizard	Used to set up the axes.
Test Run	Executes test operations of the axes in the Jog/Step Operation Mode.
Axis Monitor	Monitors the operation status of the axes.
Alarm Monitor	Monitors the alarm status of the axes.
Create New Ladder Program	Creates a ladder program. Allows you to create H, L, A, and I drawings and functions.
Open Ladder Program	Displays a ladder program that was selected from a list.
Create New Motion Program	Creates the main program and subprograms of a motion program and the main program and subprograms of a sequence program. You can specify the program numbers. Note: The Machine Controller must be compatible with sequence programs.
Open Motion Program	Displays a motion program that was selected from a list.
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.
Tuning Panel	Used to monitor, edit, and adjust the current value of variables from the panel.
Drive Control Panel	Controls the operation of motion programs from the panel.
System Setting	Displays the system settings.
Transfer	Displays the Transfer Dialog Box and executes transfer operations such as writing, reading, and comparing.
Electronic Cam Data Preparation Tool	Starts the Electronic Cam Tool to create cam data.
Logging 1	Performs logging of the register data set as logging condition 1. Note: Logging is supported only by MP3000-series Machine Controllers.
Logging 2	Performs logging of the register data set as logging condition 2. Note: Logging is supported only by MP3000-series Machine Controllers.
FTP Client Setting	Makes settings for an FTP client.
Maintenance Monitor	Allocates system registers for maintenance information.
Library Catalog	Makes settings for the library function.
Communication Setting*	Used to set up the communications to connect to the Machine Controller.
Scope 3*	Analyzes the data obtained by Scope 3 in the form of a trend graph or XY graph.
Scope 4*	Analyzes the data obtained by Scope 4 in the form of a trend graph or XY graph.
Write into Controller*	Writes the data from the project file to the Machine Controller.
Read from Controller*	Reads the data from the Machine Controller to a project file.
Save to Flash*	Writes the data in the Machine Controller RAM to the flash memory.
SigmaWin+*	Starts SigmaWin+ so that the SERVOPACKs can be adjusted
Module Configuration (EngineeringMgr)*	Displays the Module Configuration (EngineeringMgr) Tab Page.
Logging 3*	Performs logging of the register data set as logging condition 3. Note: Logging is supported only by MP3000-series Machine Controllers.
Logging 4*	Performs logging of the register data set as logging condition 4. Note: Logging is supported only by MP3000-series Machine Controllers.
Engineering Manager*	Displays the Engineering Manager.

* These buttons are not displayed by default.

Editing Buttons on the My Tool View

In the My Tool View, frequently used functions can be registered as buttons, and the names and the arrangement of the buttons can be customized for easier comprehension.

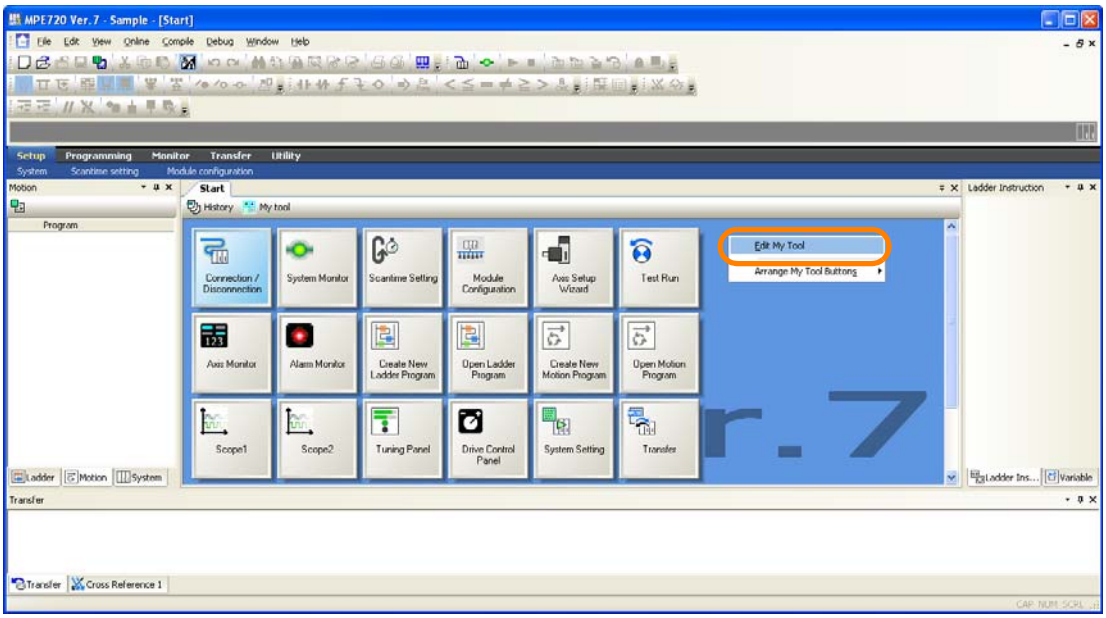
One customized setting is allowed for one installation of the MPE720.

This section gives the six procedures that are listed below.

☞ ◆ *Displaying Buttons on the My Tool View* on page 3-20
☞ ◆ *Hiding Buttons on the My Tool View* on page 3-23
☞ ◆ *Changing the Display Position of a Button* on page 3-25
☞ ◆ *Renaming a Button* on page 3-27
☞ ◆ *Changing the Icon of a Button* on page 3-29
☞ ◆ *Changing the Number of Buttons to be Displayed in Each Row* on page 3-31

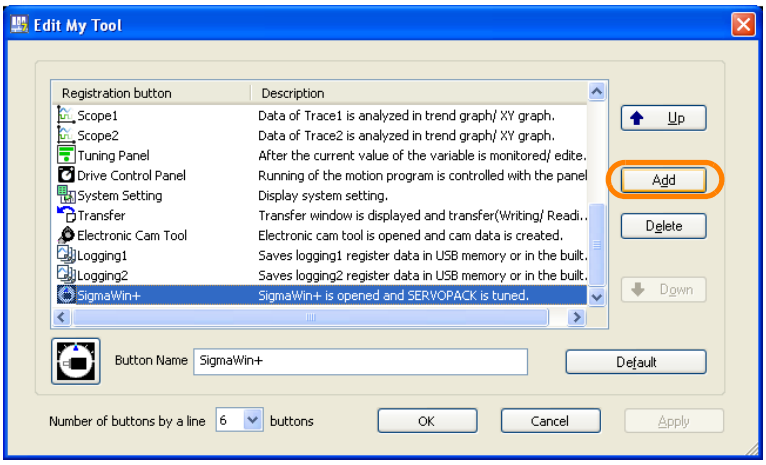
◆ Displaying Buttons on the My Tool View

1. Right-click on the My Tool View and select ***Edit My Tool***.



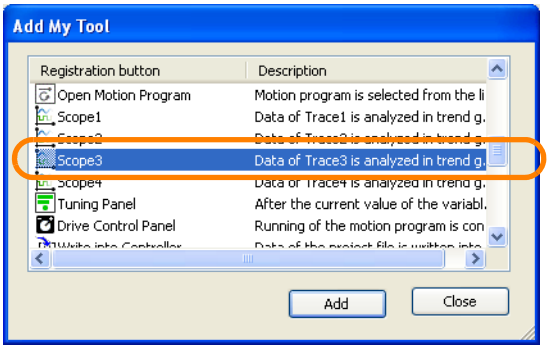
The Edit My Tool Dialog Box will be displayed.

2. Click the **Add** Button.

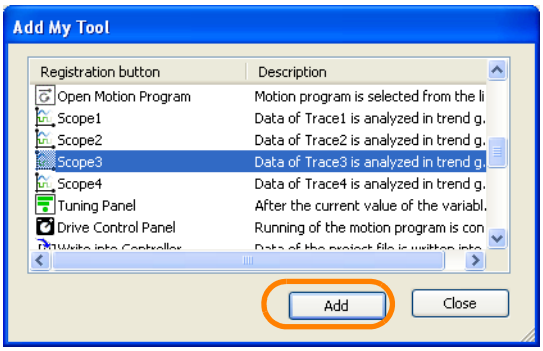


The Add My Tool Dialog Box will be displayed.

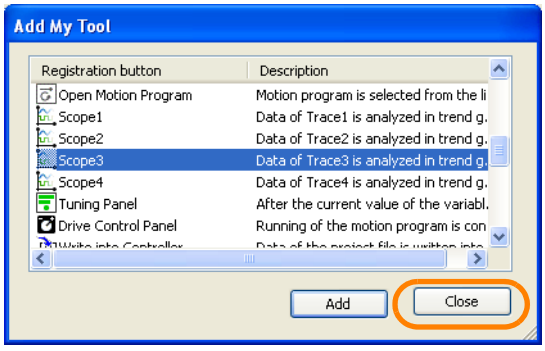
3. Select the function to add.



4. Click the **Add** Button.

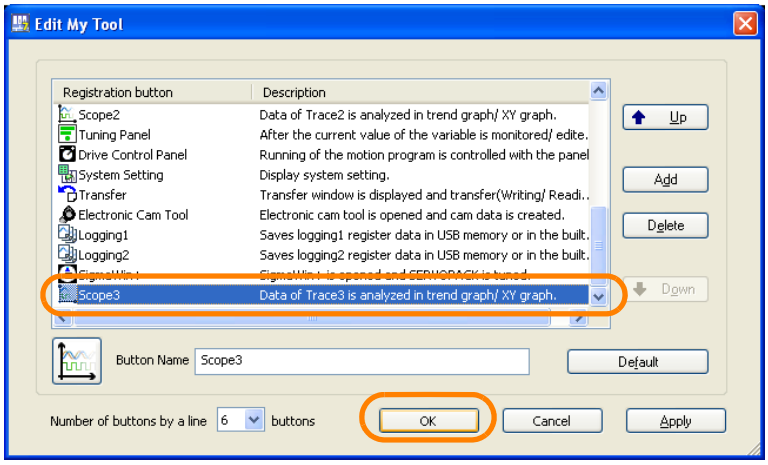


5. Click the **Close** Button.



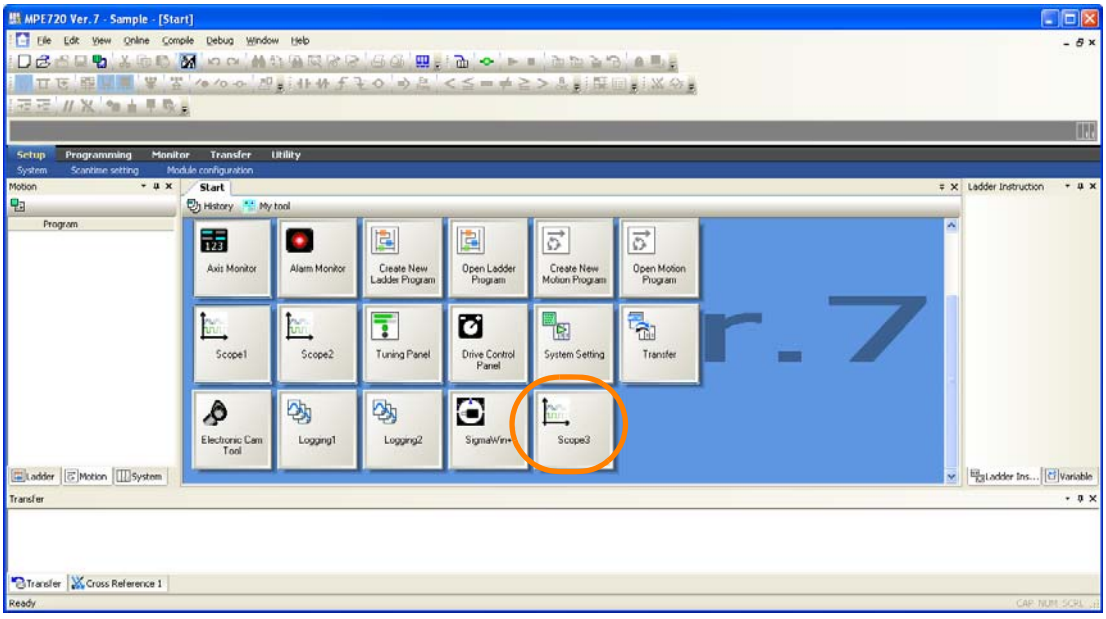
The Add My Tool Dialog Box will close.

6. Confirm that the button for the function that you selected in step 3 is added, and then click the **OK** Button.



The Edit My Tool Dialog Box will close.

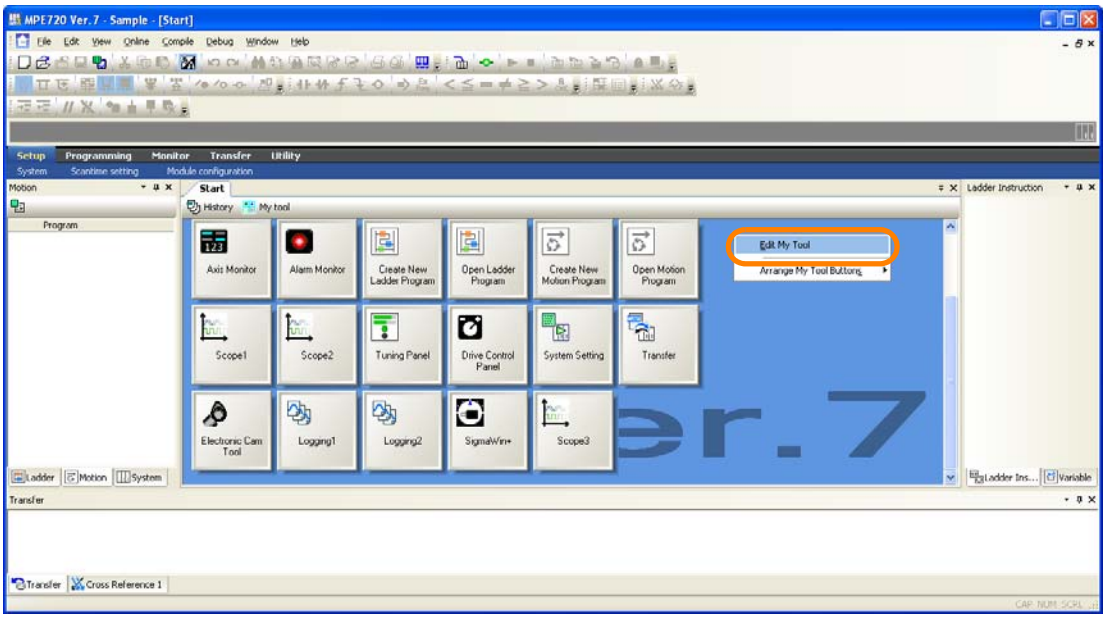
7. Confirm that the button appears in the My Tool View.



This concludes the procedure.

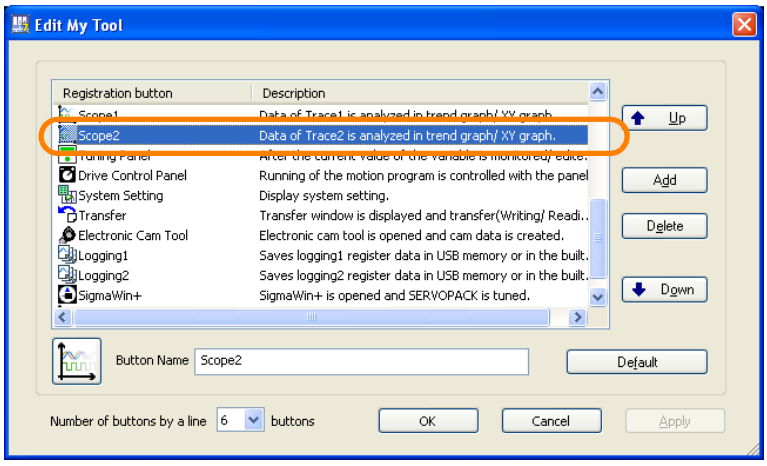
◆ Hiding Buttons on the My Tool View

1. Right-click on the My Tool View and select ***Edit My Tool***.

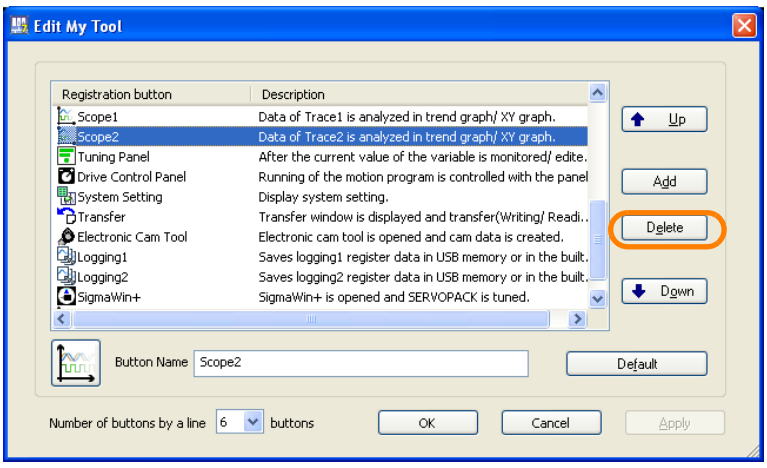


The Edit My Tool Dialog Box will be displayed.

2. Select the function to delete.

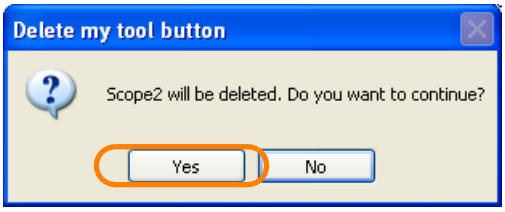


3. Click the **Delete** Button.

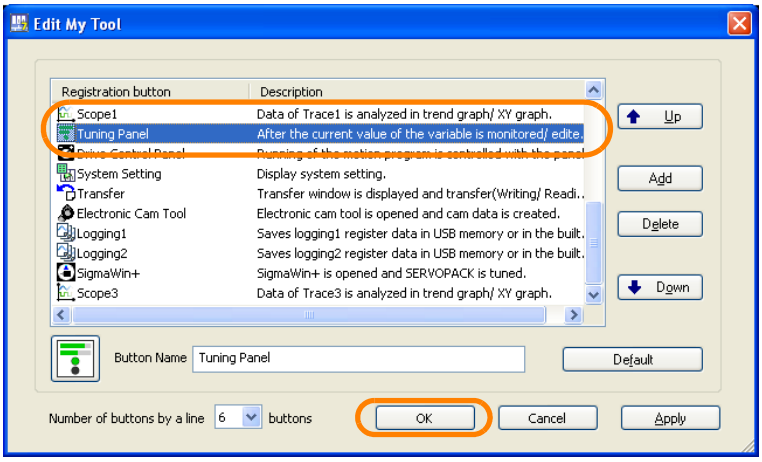


The Delete My Tool Button Dialog Box will be displayed.

4. Click the **Yes** Button.

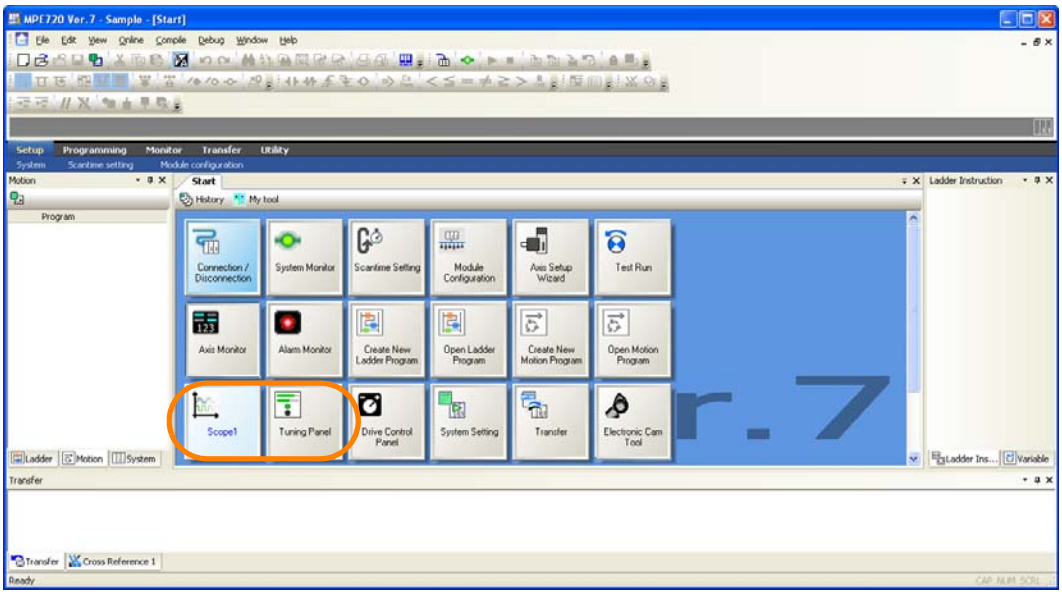


5. Confirm that the button for the function selected in step 2 is deleted, and then click the **OK** Button.



The Edit My Tool Dialog Box will close.

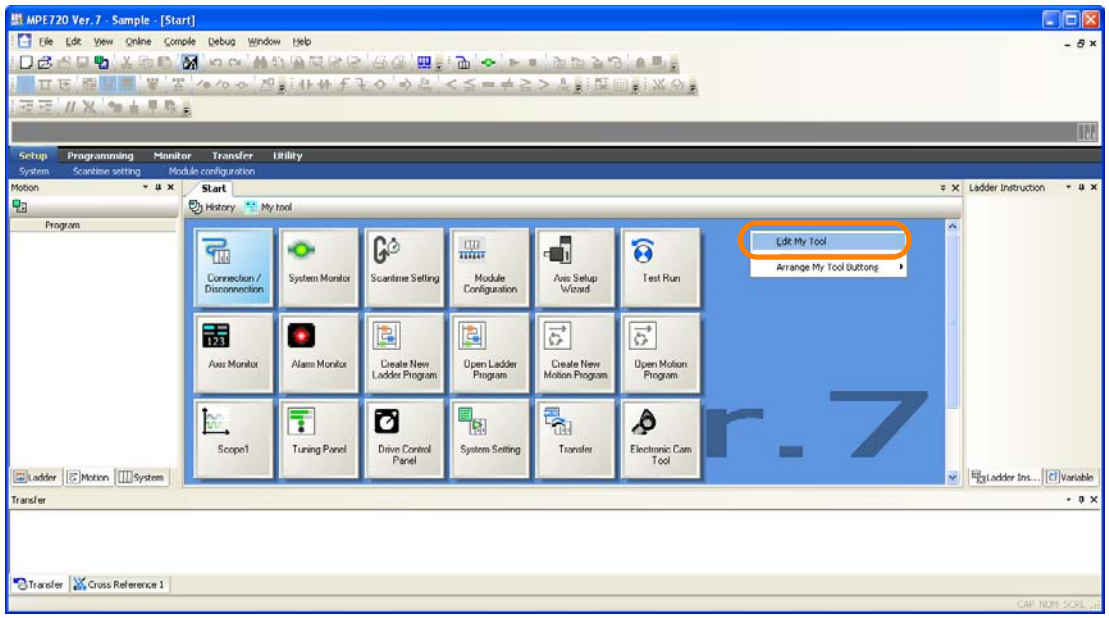
6. Confirm that the button for the selected function no longer appears in the My Tool View.



This concludes the procedure.

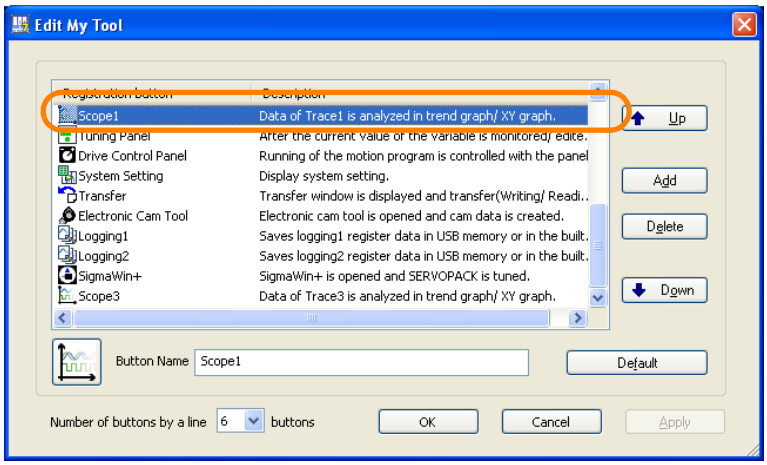
◆ Changing the Display Position of a Button

1. Right-click on the My Tool View and select ***Edit My Tool***.

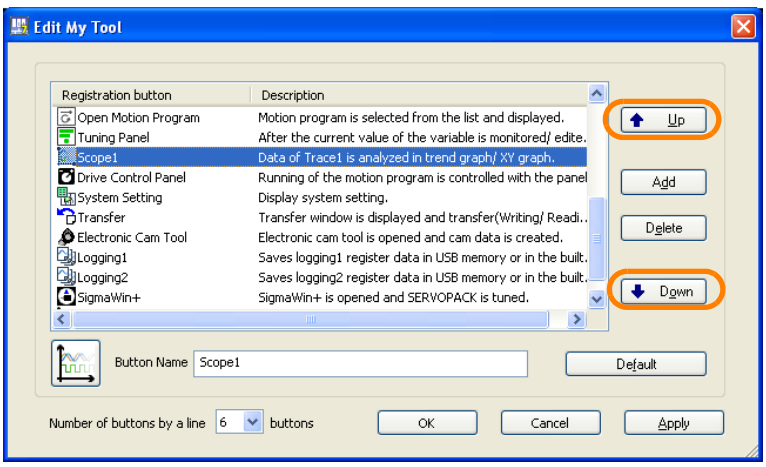


The Edit My Tool Dialog Box will be displayed.

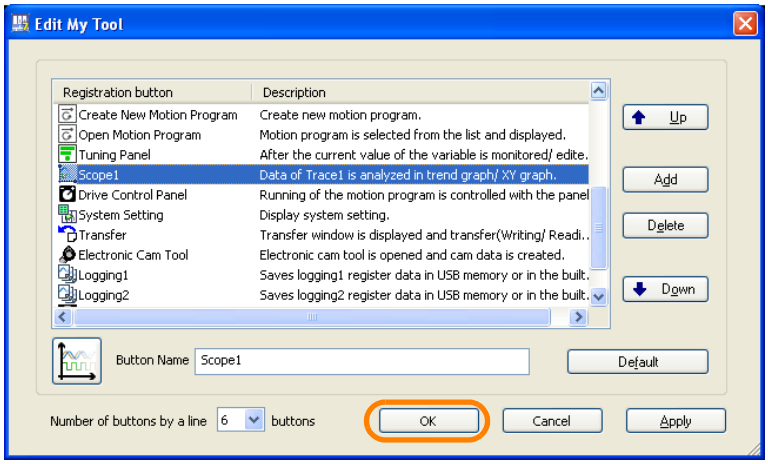
2. Select the function for which to change the display position.



3. Click the **Up** or **Down** Button to change the display position.

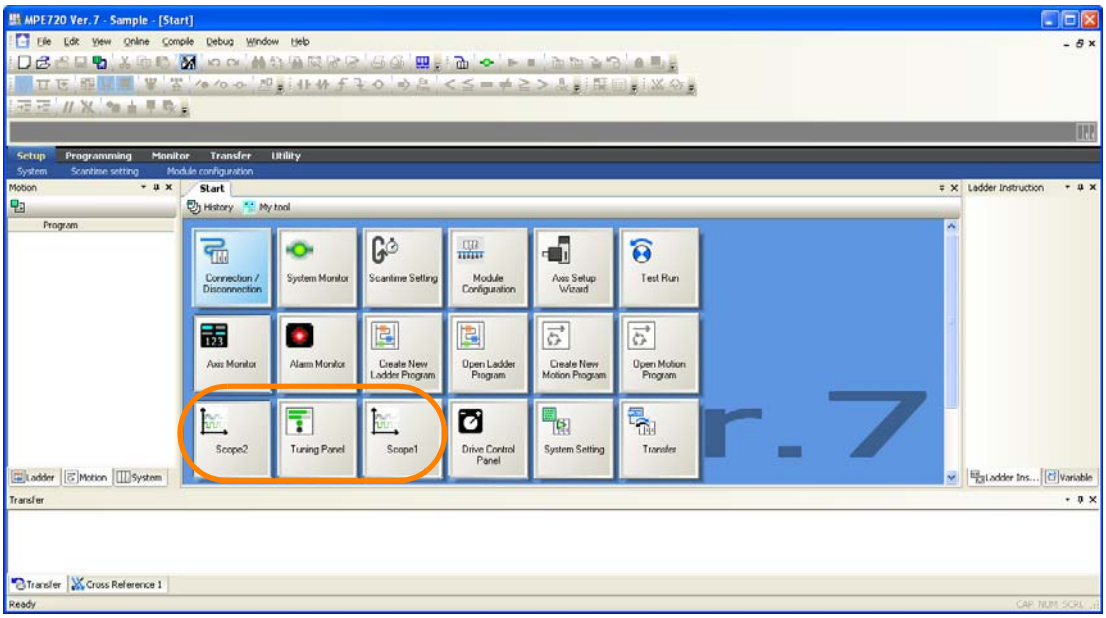


4. Click the **OK** Button.



The Edit My Tool Dialog Box will close.

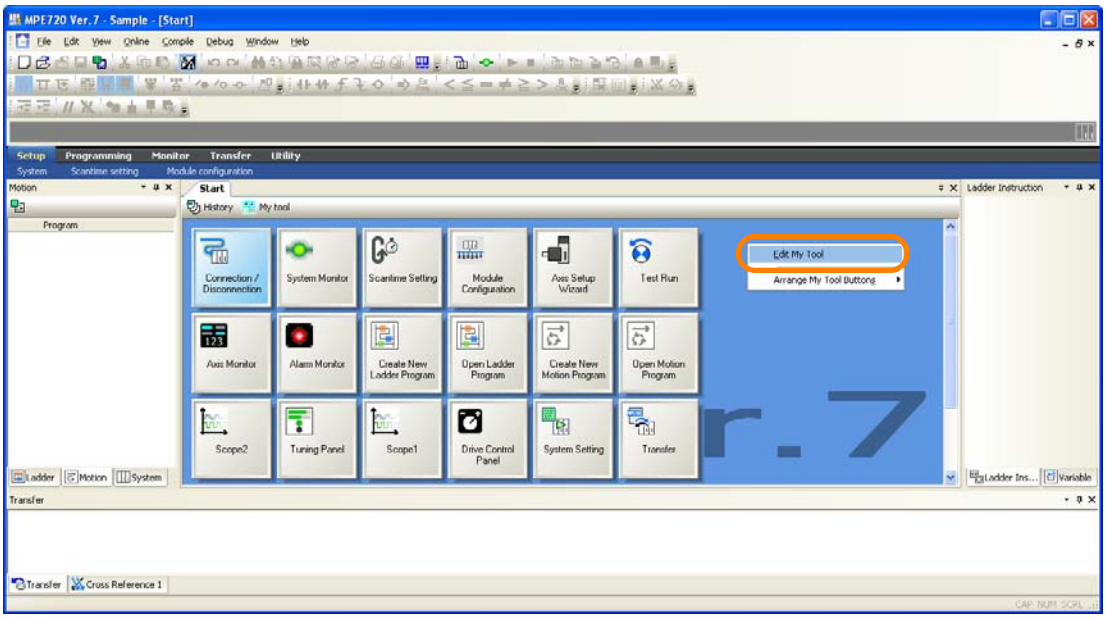
5. Confirm that the display position of the button has changed.



This concludes the procedure.

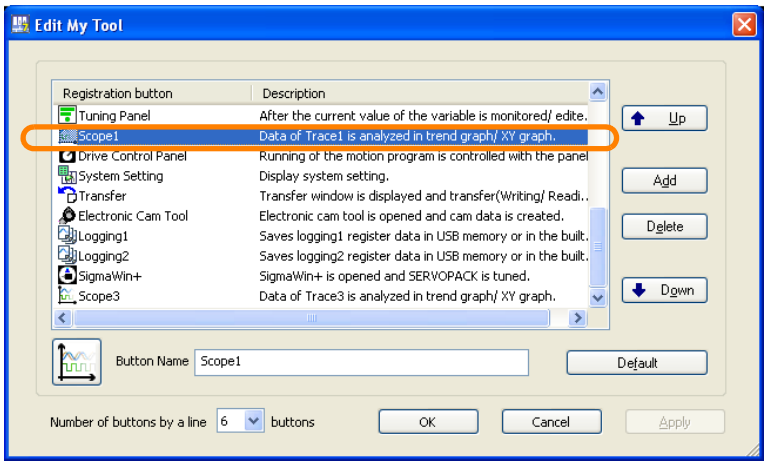
◆ Renaming a Button

1. Right-click on the My Tool View and select ***Edit My Tool***.

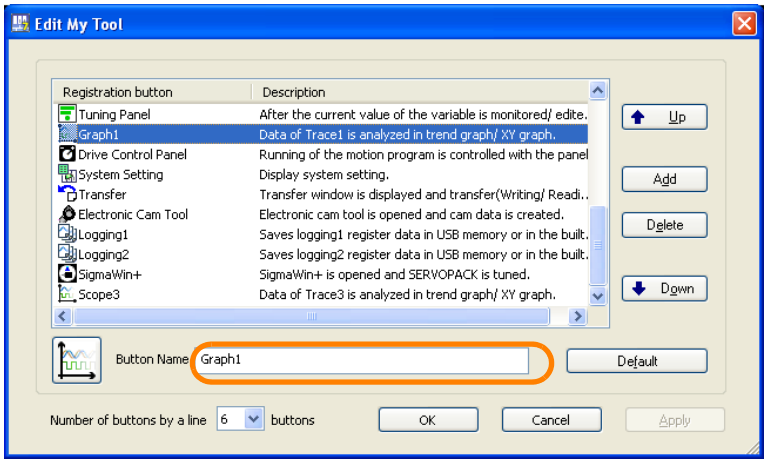


The Edit My Tool Dialog Box will be displayed.

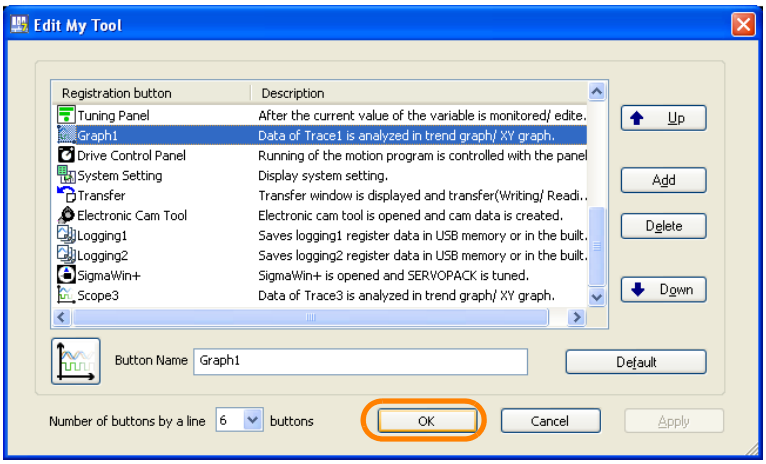
2. Select the function for which to change the name.



3. Enter a new name in the **Button Name** Box.

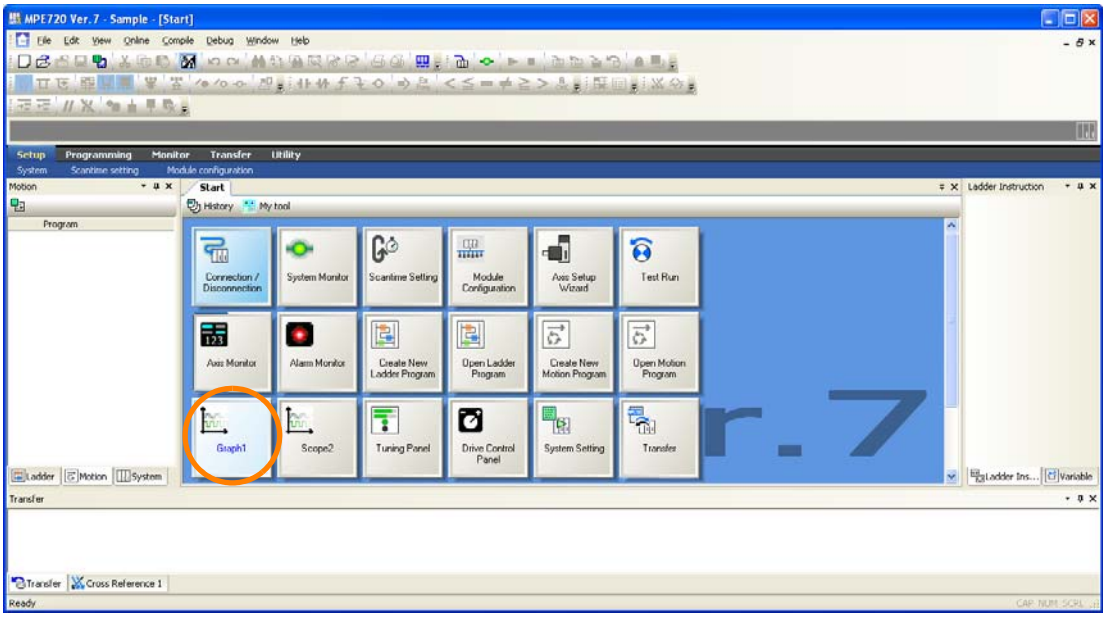


4. Click the **OK** Button.



The Edit My Tool Dialog Box will close.

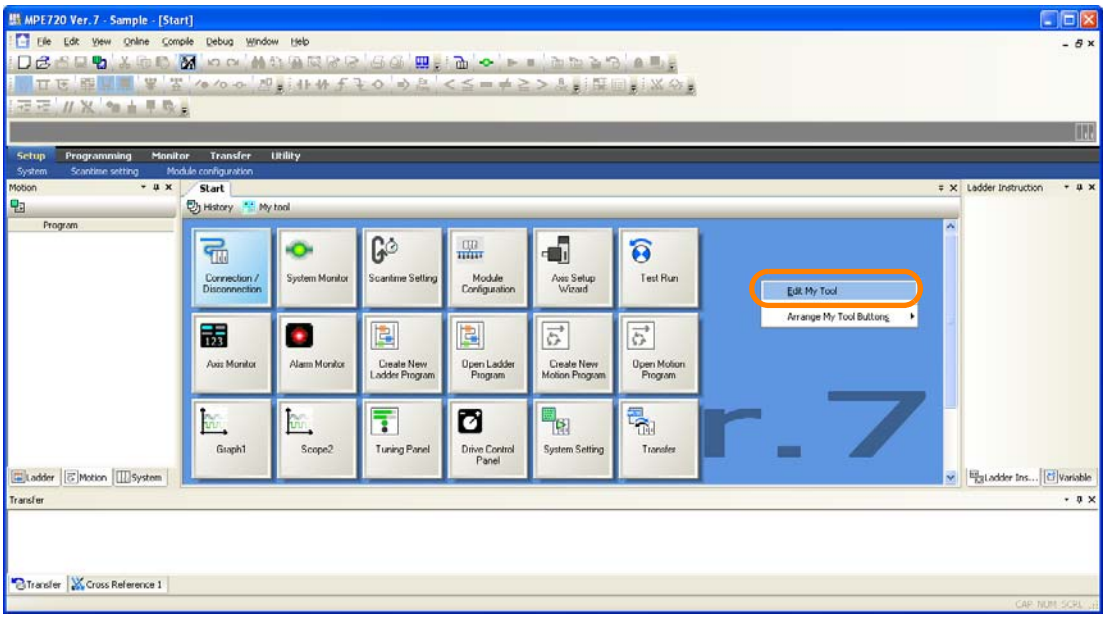
5. Confirm that the name of the button has changed.



This concludes the procedure.

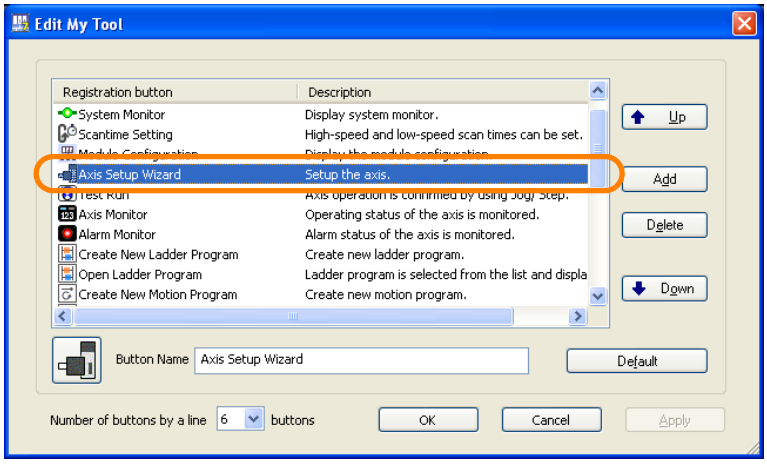
◆ Changing the Icon of a Button

1. Right-click on the My Tool View and select ***Edit My Tool***.

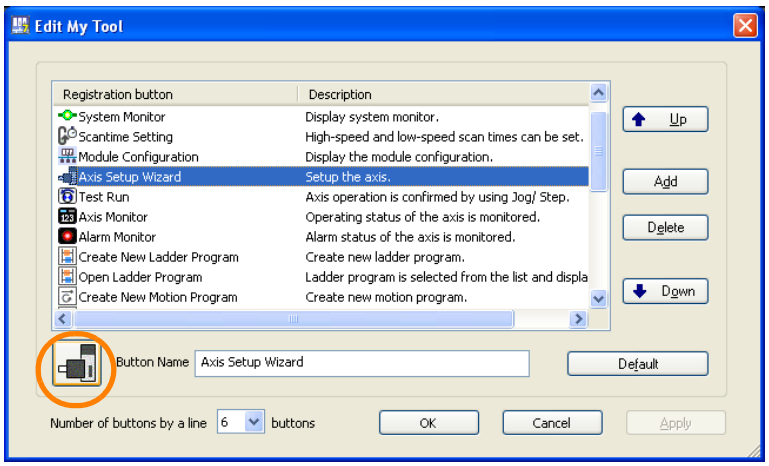


The Edit My Tool Dialog Box will be displayed.

2. Select the function for which to change the icon.

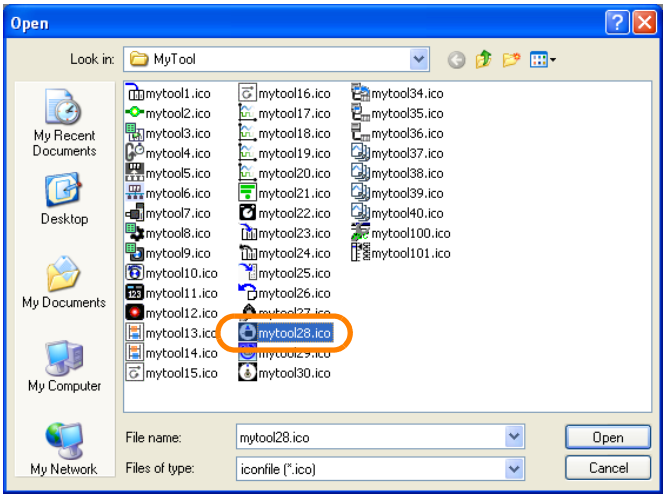


3. Click the icon.

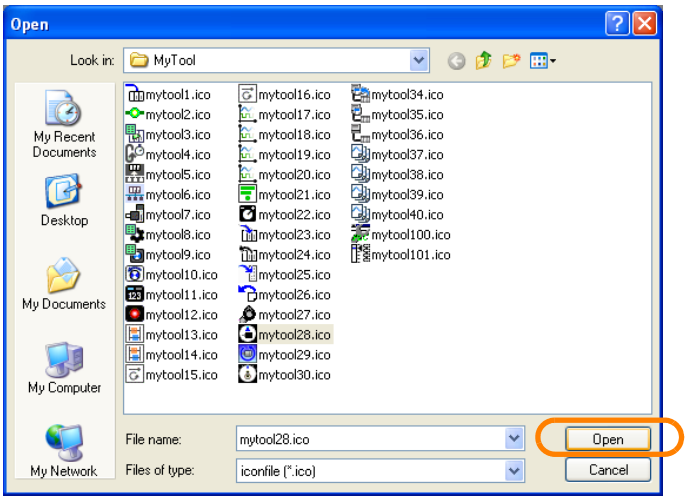


The Open Dialog Box will be displayed.

4. Select the image to register.

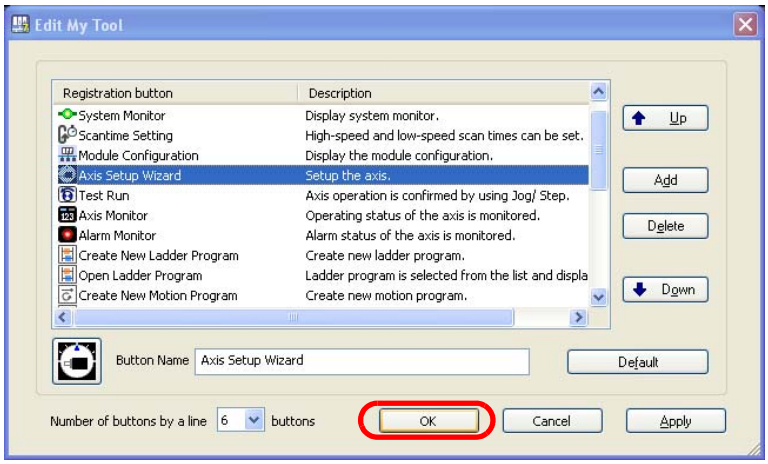


5. Click the **Open** Button.



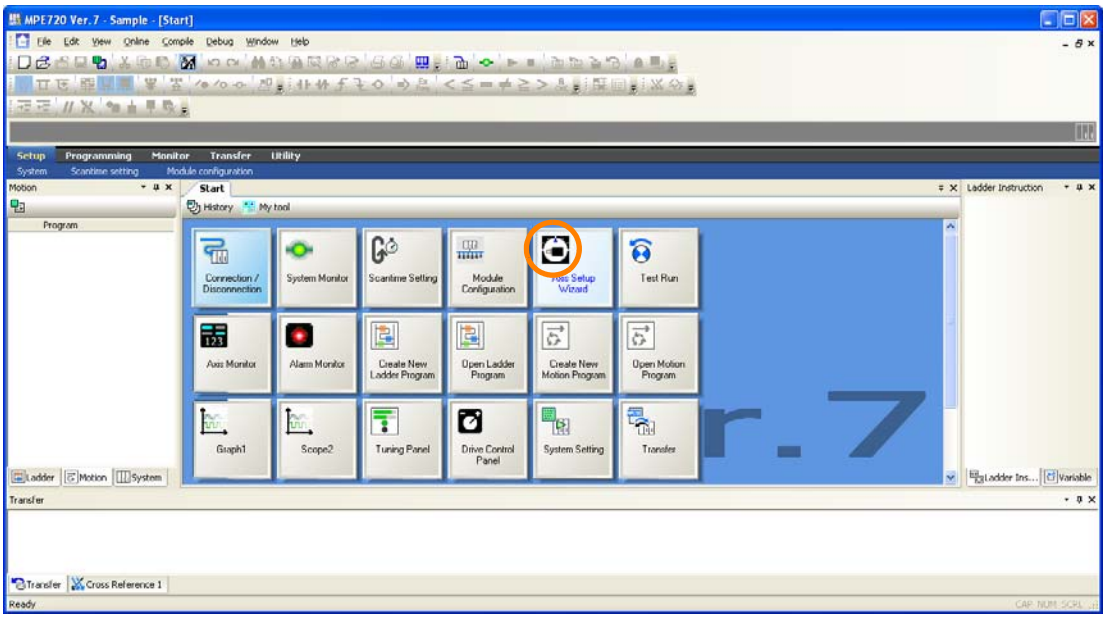
The Open Dialog Box will close.

6. Click the **OK** Button.



The Edit My Tool Dialog Box will close.

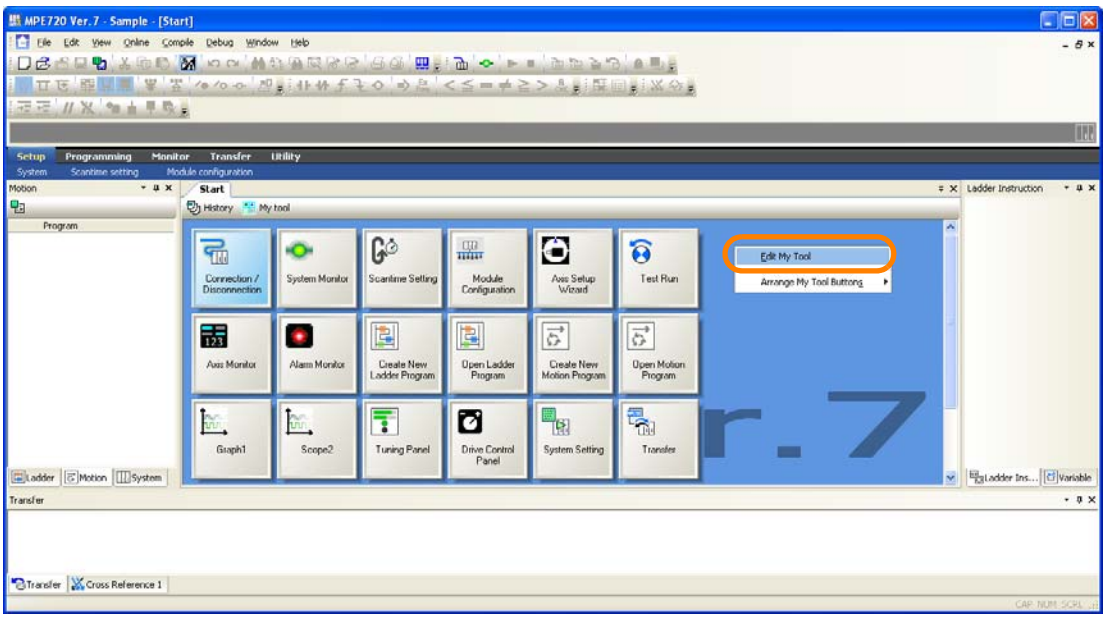
7. Confirm that the icon for the button has changed.



This concludes the procedure.

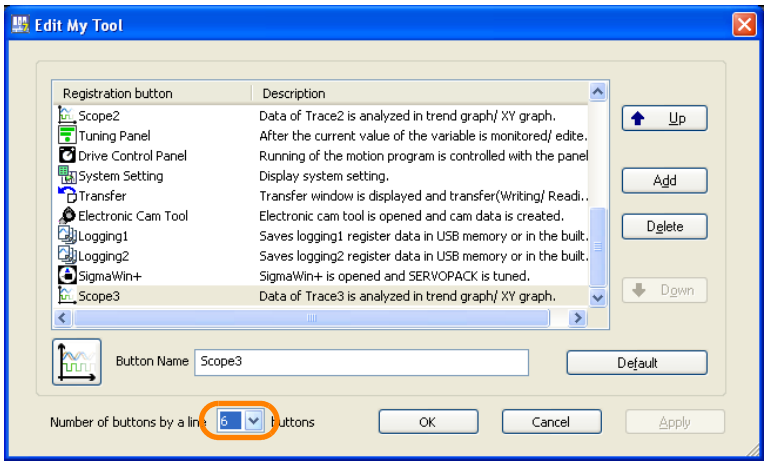
◆ Changing the Number of Buttons to be Displayed in Each Row

1. Right-click on the My Tool View and select ***Edit My Tool***.

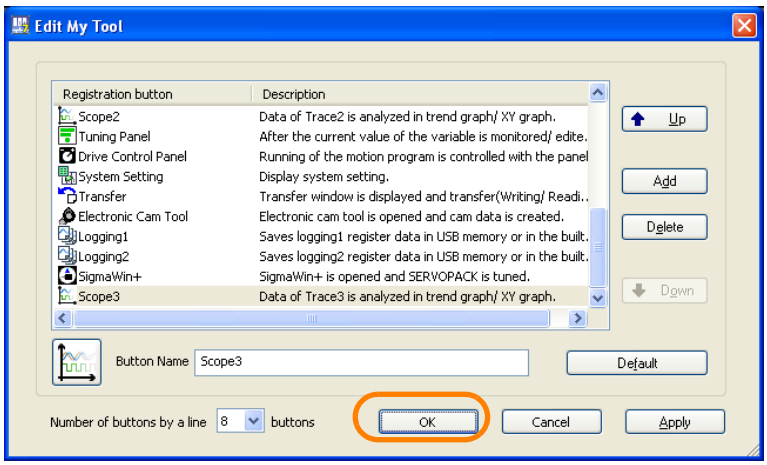


The Edit My Tool Dialog Box will be displayed.

2. Select the number of buttons to display in a line in the **Number of buttons by a line** Box.

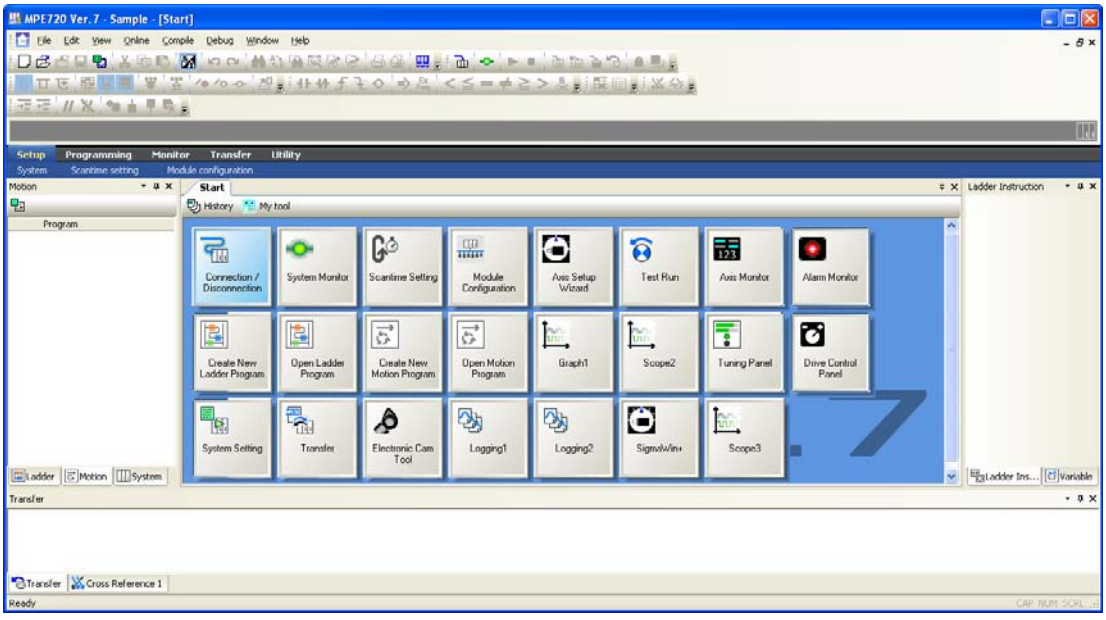


3. Click the **OK** Button.



The Edit My Tool Dialog Box will close.

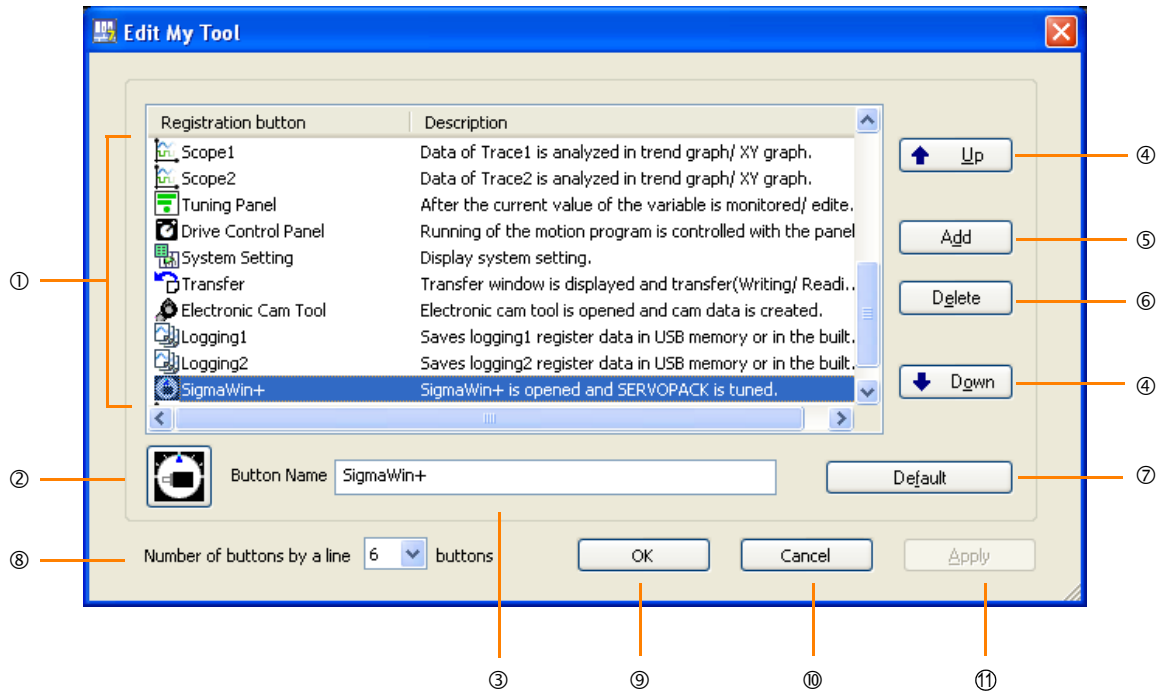
4. Confirm that the number of buttons that are displayed for a line matches the number that you selected in step 2.



This concludes the procedure.

Edit My Tool Dialog Box

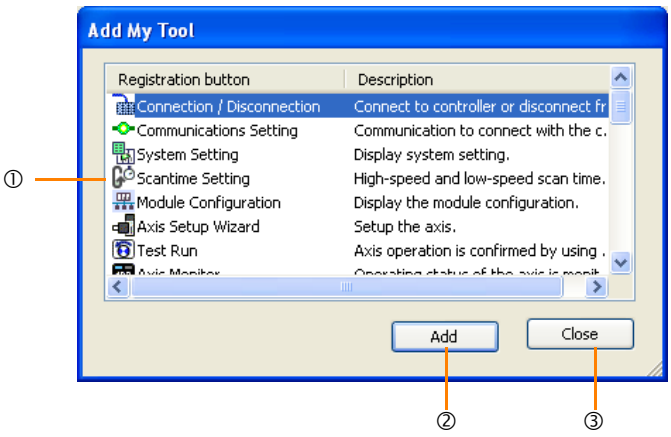
This dialog box allows you to add, delete, sort, and perform other editing operations on the buttons.



No.	Item	Description
①	Registration button/ Description	Displays the registered buttons and their descriptions. The selected button is highlighted.
②	Icon	Displays the icon for the button selected in ①.
③	Button Name	Displays the name of the button selected in ①.
④	Up/Down	Moves the button selected in ① up or down.
⑤	Add Button	Displays the Add My Tool Dialog Box, and adds registered buttons. Refer to the following section for details on adding buttons. ☞ ◆ *Displaying Buttons on the My Tool View* on page 3-20
⑥	Delete Button	Deletes the button selected in ①.
⑦	Default Button	Restores the default name and icon of the edited button.
⑧	Number of buttons by a line	Sets the number of buttons to display in a single row on the My Tool View. Setting range: 3 to 10 buttons
⑨	OK	Confirms the edited settings of the button and returns you to the My Tool View.
⑩	Cancel	Cancels the edited settings of the button and returns you to the My Tool View.
⑪	Apply Button	Confirms the edited settings of the button.

Add My Tool Dialog Box

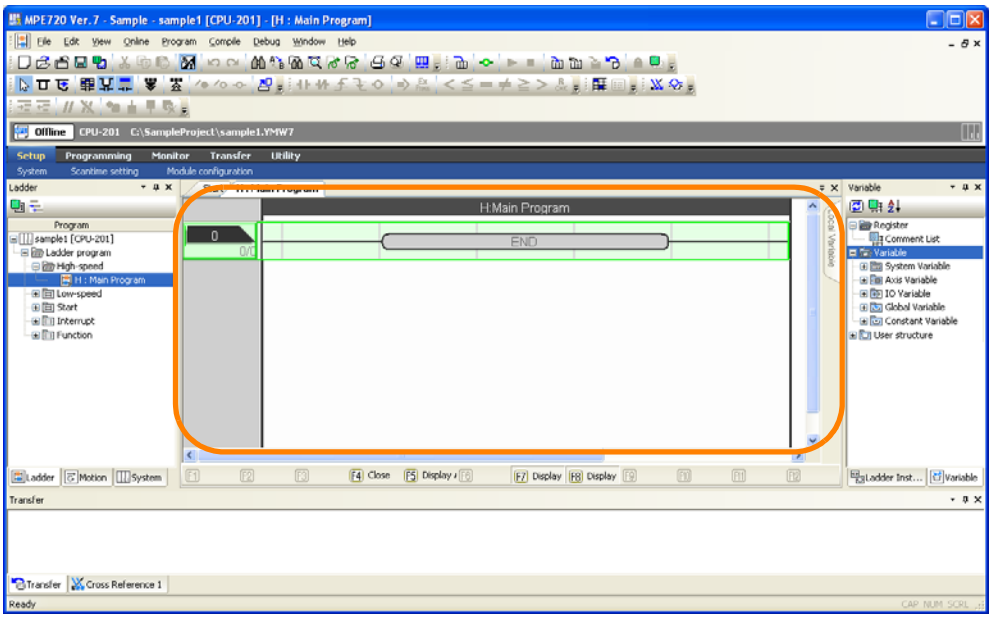
Clicking the **Add** Button in the Edit My Tool Tool Dialog Box will display the Add My Tool Dialog Box, which allows you to add a button.



No.	Item	Description
①	Registration button/ Description	Displays the registered buttons and their descriptions. The selected button is highlighted.
②	Add Button	Adds the button selected in ①.
③	Close	Closes the Add My Tool Dialog Box and returns you to the Edit My Tool Dialog Box.

3.6.3 Edit Ladder Program Tab Page

This tab page is used to create and edit ladder programs.



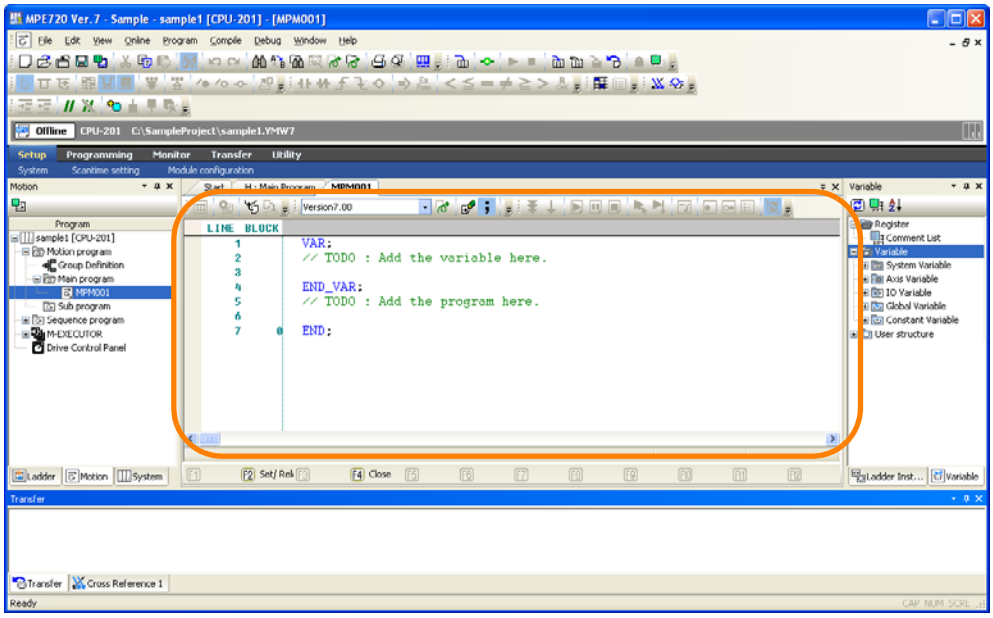
◆ Displaying the Edit Ladder Program Tab Page

Refer to the following section for details on how to display the Edit Ladder Program Tab Page.

☞ *5.1.1 Creating New Ladder Programs* on page 5-3

3.6.4 Edit Motion Program Tab Page

This tab page is used to create and edit motion programs.



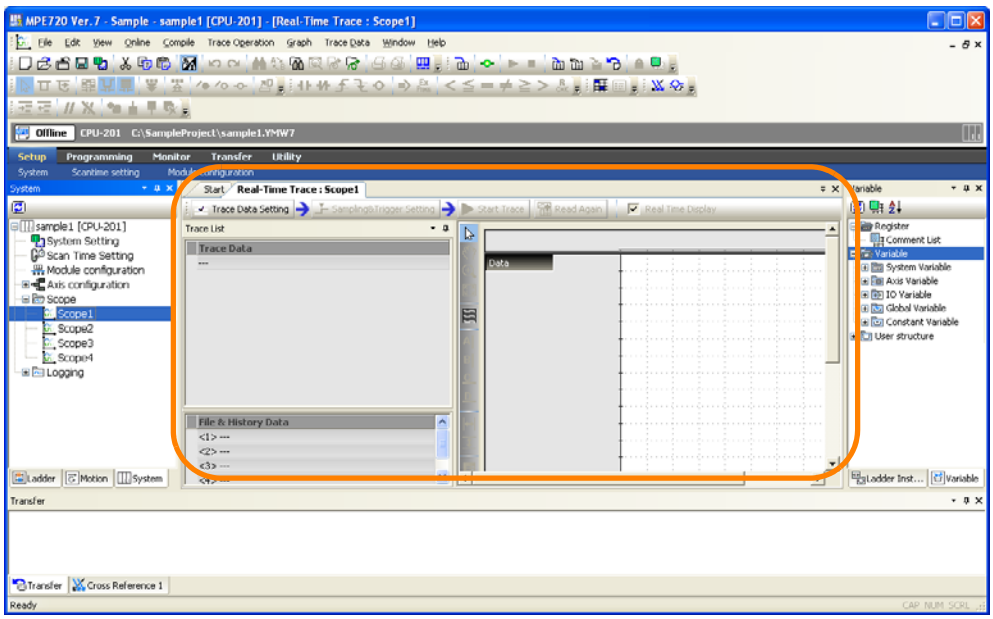
◆ Displaying the Edit Motion Program Tab Page

Refer to the following section for details on how to display the Edit Motion Program Tab Page.

☞ *5.2.2 Creating a Motion Program* on page 5-55

3.6.5 Edit Trace Tab Page

This tab page is used to trace data.



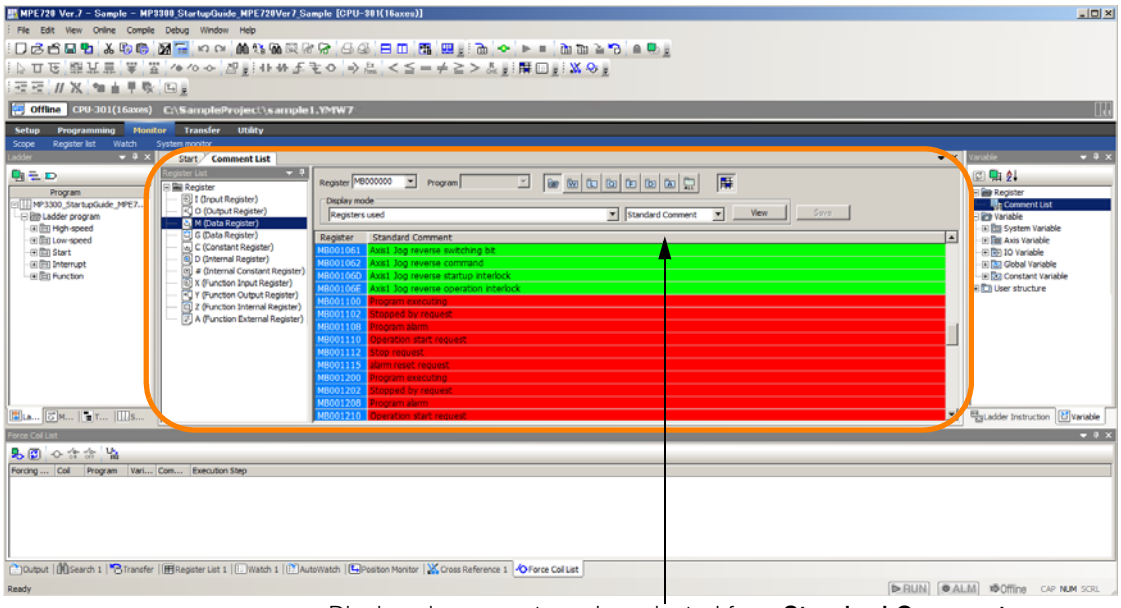
◆ Displaying the Edit Trace Tab Page

Refer to the following section for details on how to display the Edit Trace Tab Page.

☞ *9.1.2 Startup* on page 9-4

3.6.6 Comment List Tab Page

This tab page is used to access and edit comments assigned to the registers.



Displayed comment can be selected from **Standard Comment**, **Expanded Comment 1**, **Expanded Comment 2**, **Expanded Comment 3**, and **All Comments**.

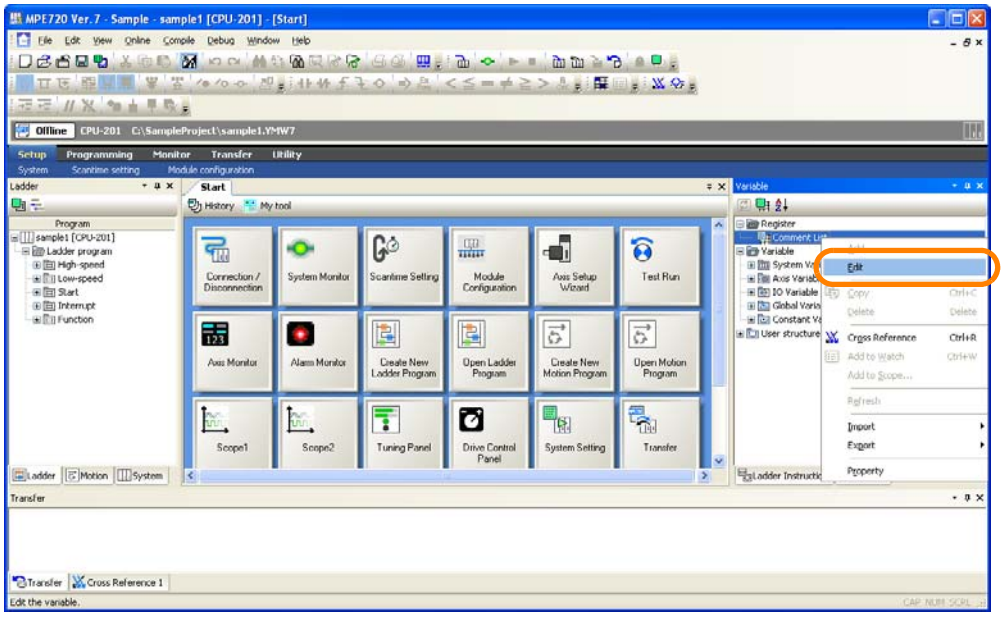
Information

Interpreting the Comment List

Cell 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 or motion programming
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.

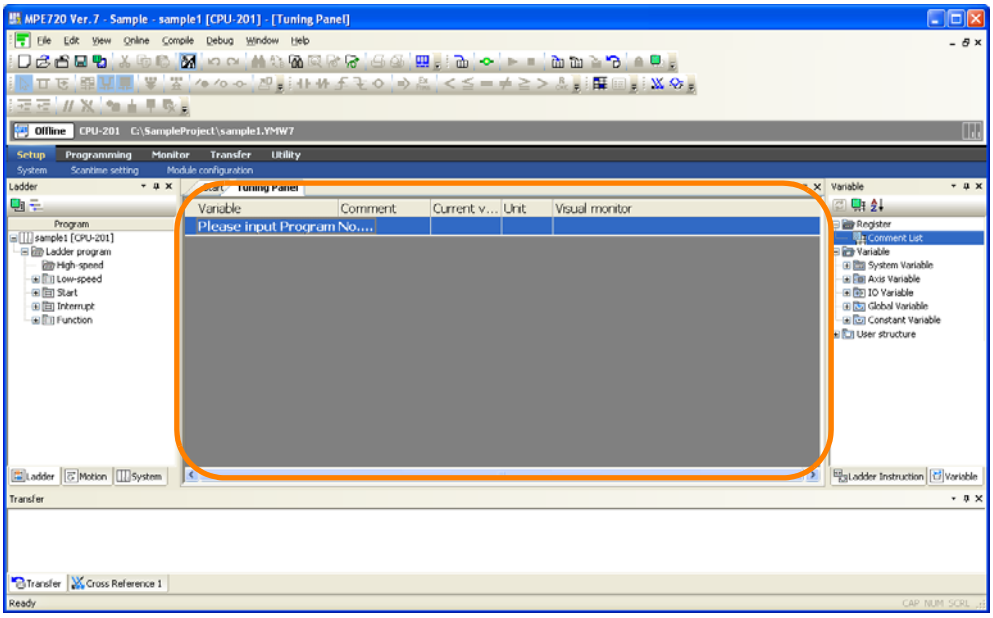
◆ Displaying the Comment List Tab Page

To display the Comment List Tab Page, right-click **Comment List** in the Variable Pane and select ***Edit***.



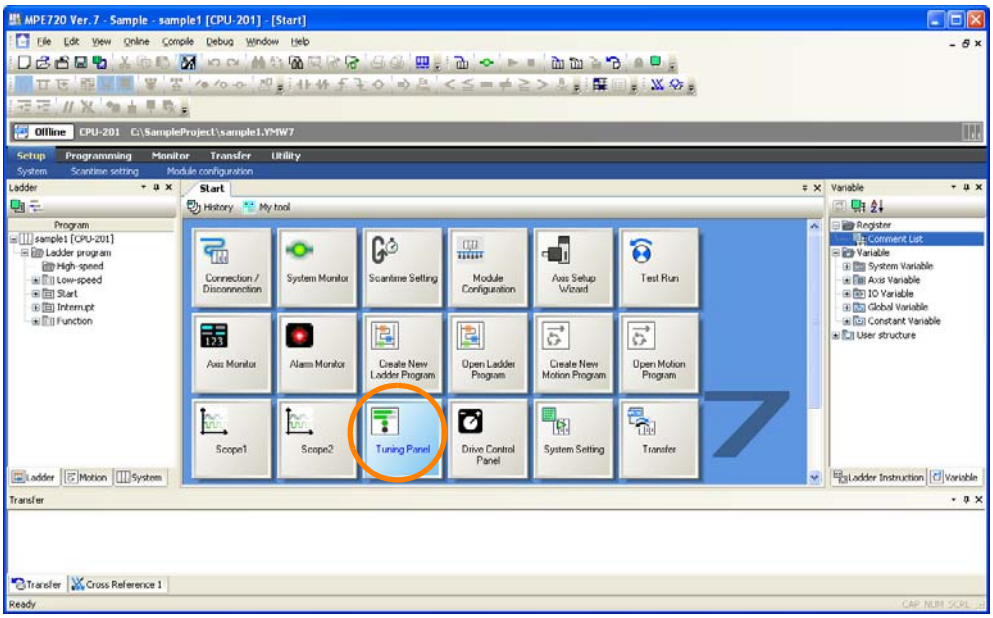
3.6.7 Tuning Panel Tab Page

This tab page is used to set and edit registers to display the current values.



◆ Displaying the Tuning Panel Tab Page

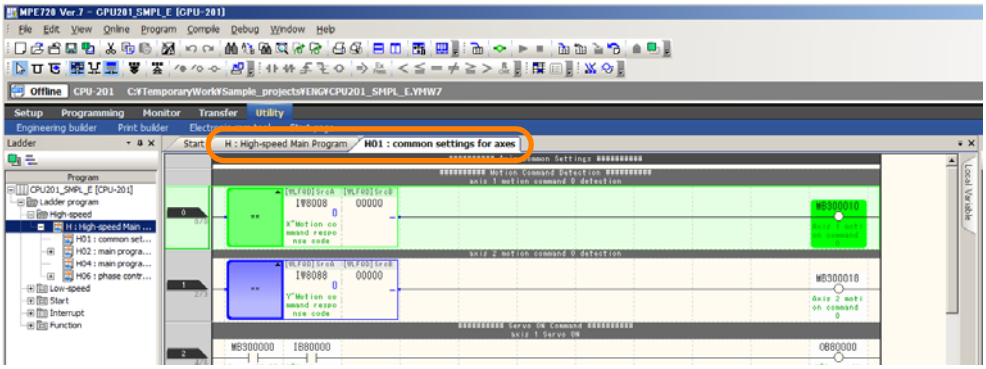
To display the Tuning Panel Tab Page, click the **Tuning Panel** Button on the My Tool View.



3.6.8 Splitting the Edit Ladder Program Tab Page

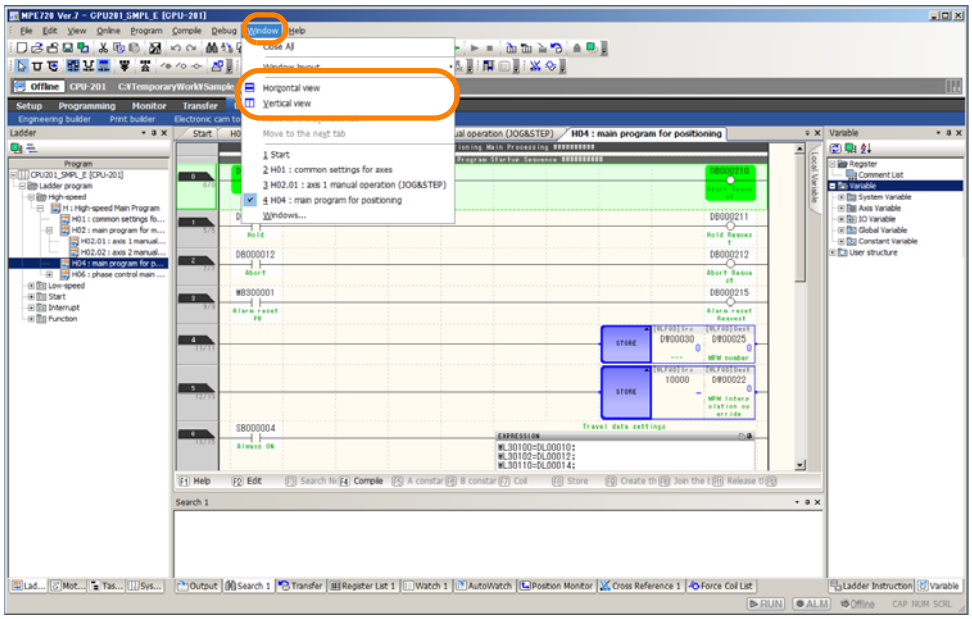
You can display the Edit Ladder Program Tab Page in more than one pane. You can use them simultaneously to display and edit more than one ladder program.

1. Connect to the Machine Controller. Or, open a project file.
2. Open at least two program drawings.

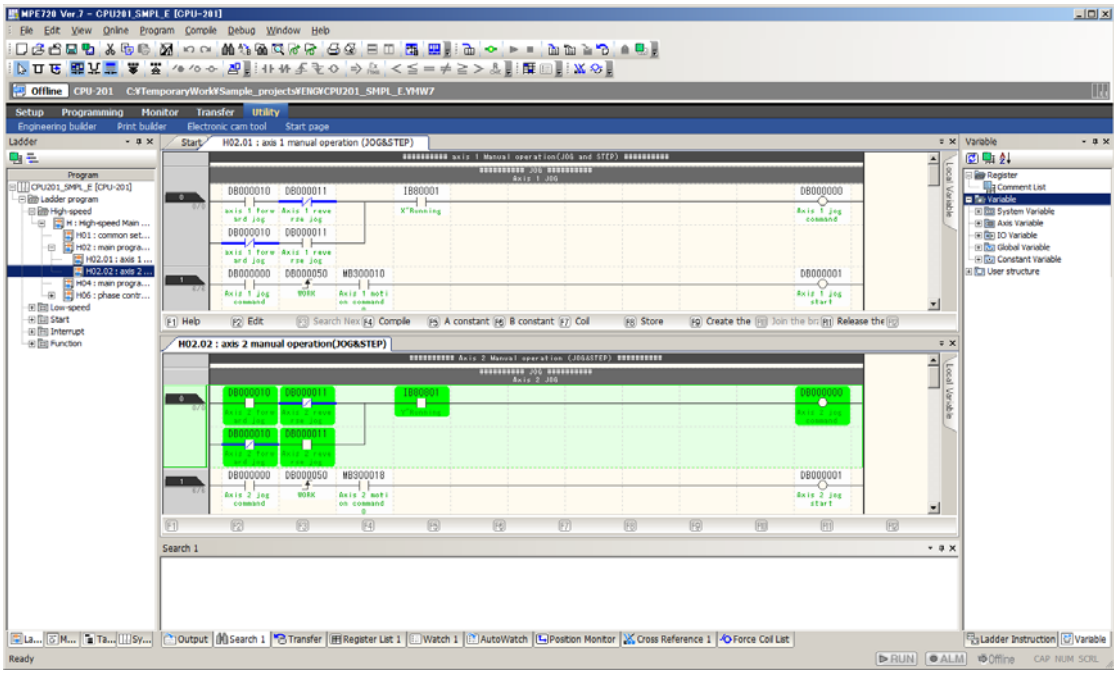


3. Select ***Window*** – ***Vertical view*** or ***Window*** – ***Horizontal view*** from the menu bar.

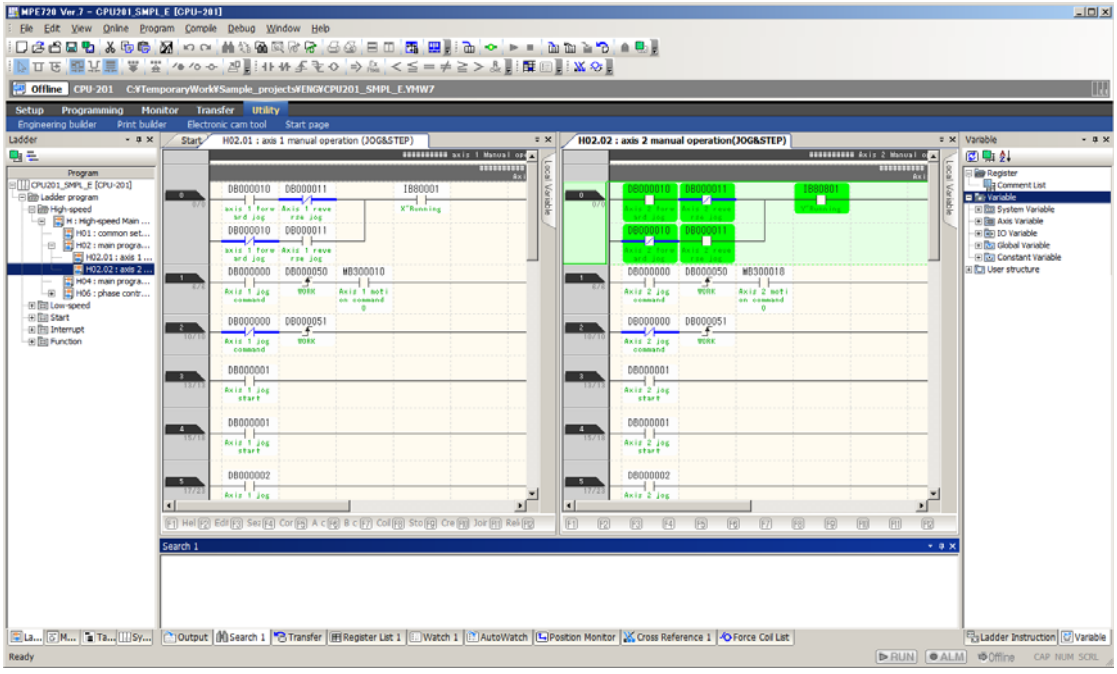
Information Or, click the corresponding button on the toolbar.



4. The open program tab pages will be displayed in separate panes according to the selected method.
   - When ***Vertical view*** Is Selected



   - When ***Horizontal view*** Is Selected



This concludes the procedure.

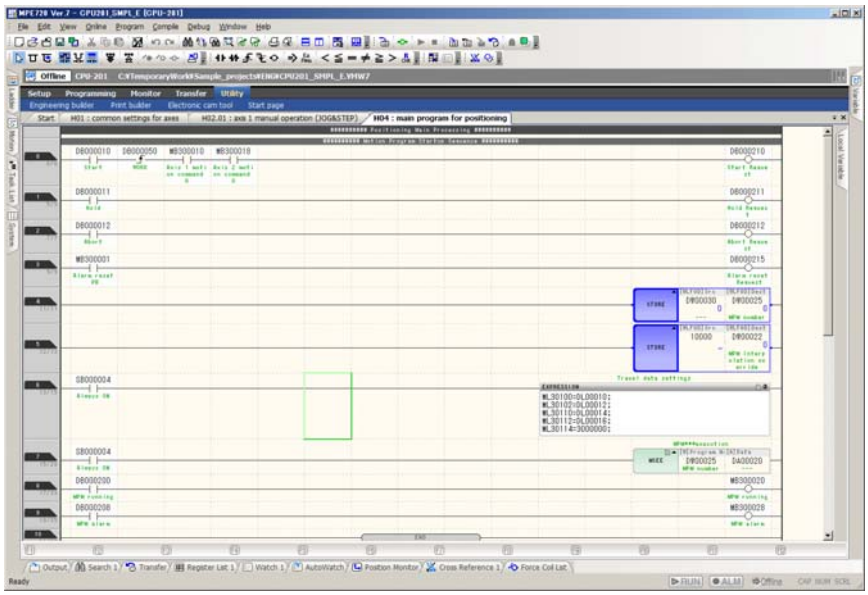
3.6.9 Registering Window Layouts for Edit Ladder Program Tab Pages

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

Registering Window Layouts in Advance

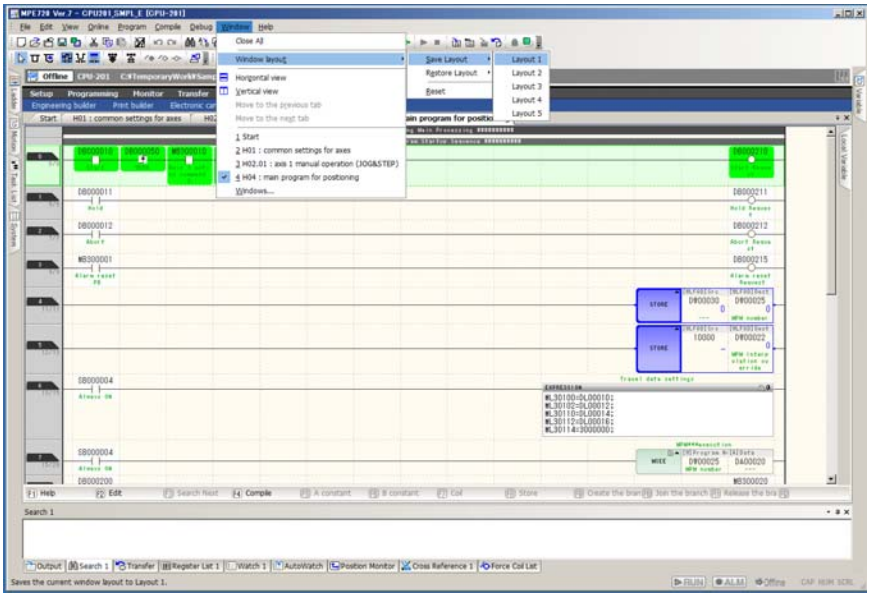
1. Connect to the Machine Controller. Or, open a project file.
2. Move or add window elements to achieve the layout that you want to register.

   Example Window Layout for Programming with All Other Panes Hidden



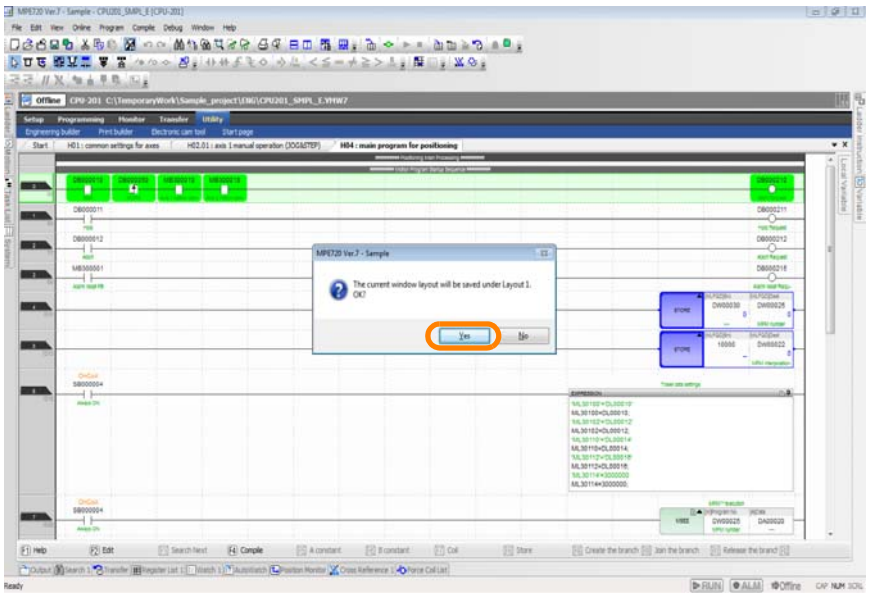
3. Select ***Window*** - ***Window layout*** - ***Save Layout*** from the menu bar and select the desired layout number.

   Information To register other window layouts, repeat steps 2 and 3, but select a different layout number.



The MPE720 Ver. 7 Dialog Box will be displayed.

4. Read the precaution, and then click the **Yes** Button.

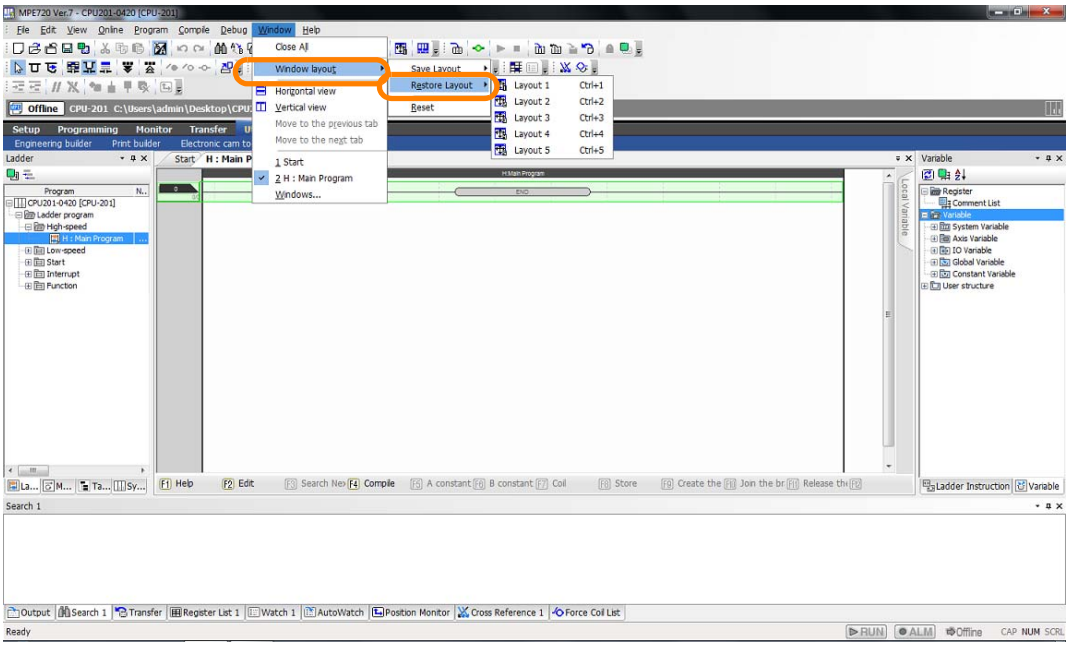


This concludes the procedure.

Changing to Previously Registered Window Layouts

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

- Select ***Window*** - ***Window layout*** - ***Restore Layout*** from the menu bar and select the desired layout number.



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

This concludes the procedure.

3.7 Panes

There are 15 types of panes, as listed below.

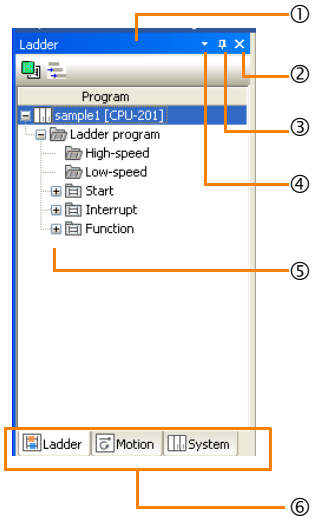
Sub Pane Name	Menu Bar	Default Display Position
Ladder Pane	***View - Ladder***	To the left of the Main Pane
Motion Pane	***View - Motion***	
Task List	***View - Task List***	
System Pane	***View - System***	
Ladder Instruction Pane	***View - Ladder Instruction***	To the right of the Main Pane
Variables Pane	***View - Variable***	
Output Pane	***View - Other Windows - Output***	Below the Main Pane
Search 1 Pane*1	***View - Other Windows - Search 1***	
Transfer Pane	***View - Other Windows - Transfer***	
Check for Multiple Coils Pane	***View - Check for Multiple Coils***	
Register List 1 Pane*2	***View - Register List - Register List 1***	
Watch 1 Pane*2	***View - Watch - Watch 1***	
Auto Watch Pane	***View - Auto Watch***	
Position Monitor Pane	***View - Position Monitor***	
Cross Reference 1 Pane*2	***View - Cross Reference - Cross Reference 1***	
Forced Coil List Pane	***View - Other Windows - Forced Coil List***	

*1. You can display two of these panes at the same time.
*2. You can display three of these panes at the same time.

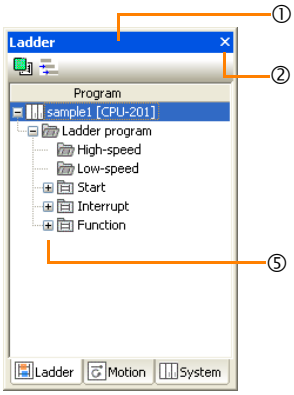
3.7.1 Names and Descriptions of Pane Components

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

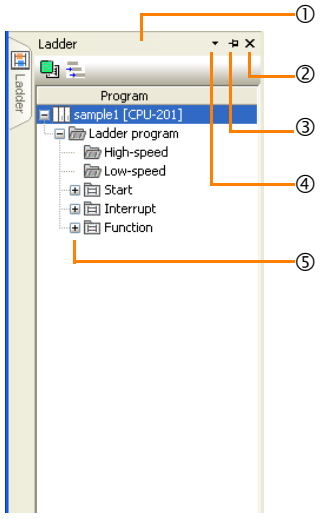
Docked Pane



Floating Pane



Auto Hide Pane



No.	Name	Description
①	Title Bar	Displays the title of the currently selected (activated) pane.
②	Close Button	Hides the currently selected pane. To display the pane again, select the pane name from the View Menu.

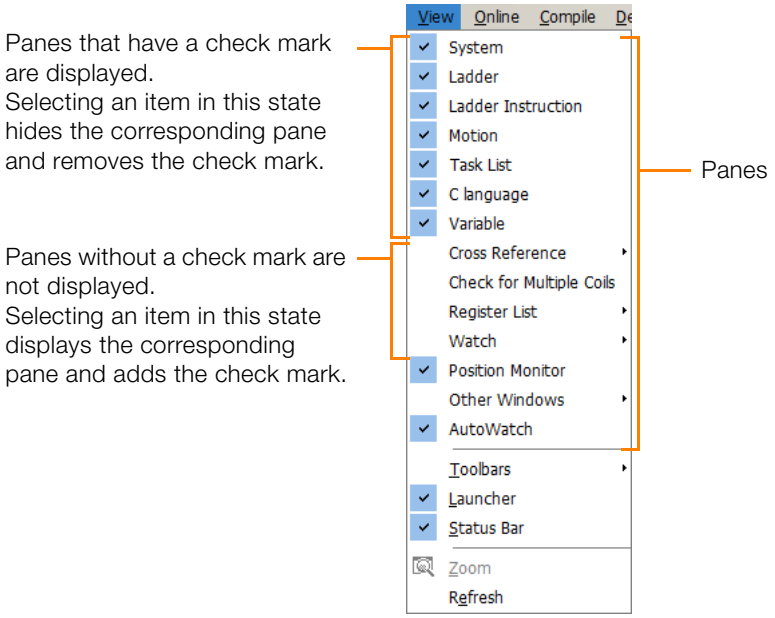
Continued on next page.

Continued from previous page.

No.	Name	Description
③	Auto Hide Button	Toggles the display format of the pane between Auto Hide and Docked.
④	Menu Button	Displays a menu for selecting the display format of the pane.
⑤	Expand Button	Appears when the pane 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	Tabs	Change the pane that is displayed. The order of the tabs can be changed by dragging one tab over another tab. The pane display type can be changed from docked to floating by dragging the tab for that pane to a position outside of the currently displayed pane.

3.7.2 Displaying and Hiding Panes

Panes can be selected for display from the View Menu. If you click a pane that is currently displayed, the check box is cleared and the pane is hidden.



3.7.3 Updating Pane Data

The data displayed in a Ladder, Motion, or Variable Pane can be updated either by selecting ***View*** - ***Refresh*** from the menu bar. This will also update the data in the Comment List.

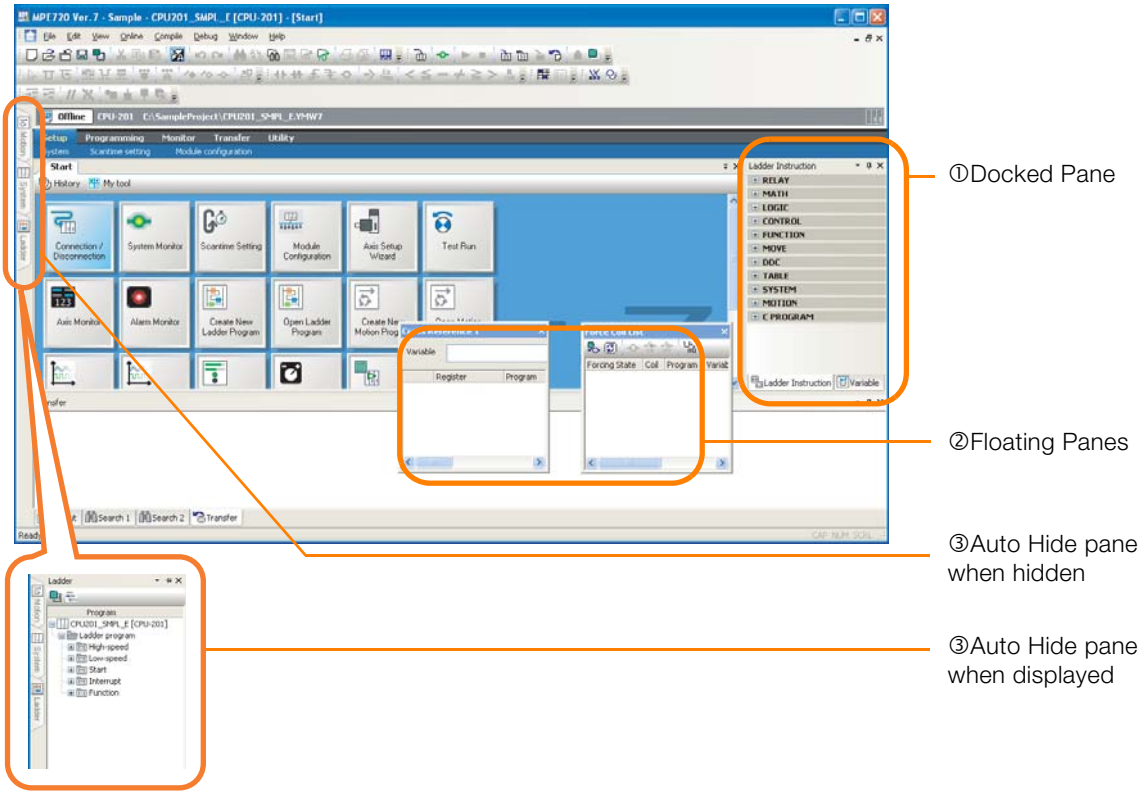
3.7.4 Types of Pane Displays

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

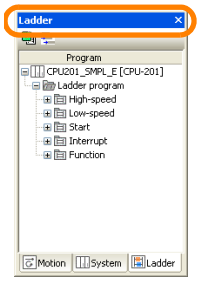
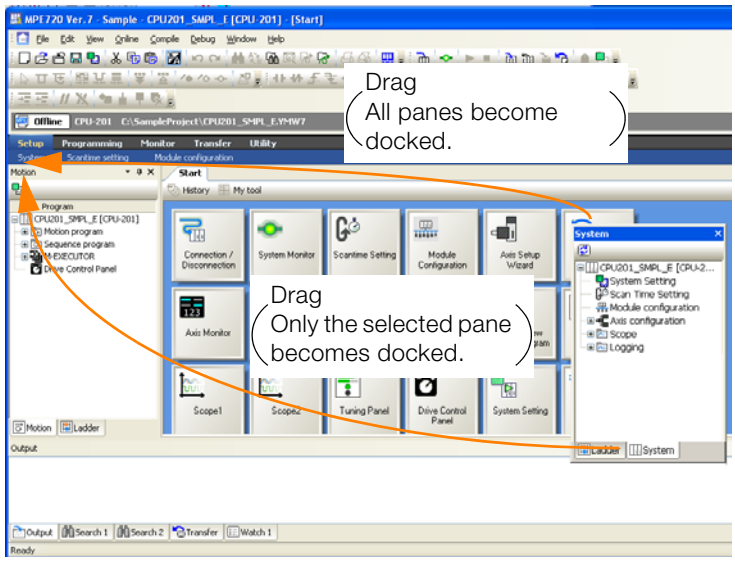
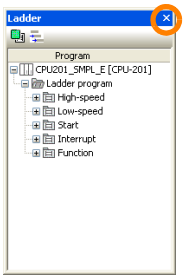
① Docked Panes
This is the default display type. Multiple panes are displayed on top of each other as tab pages, just like in the Main Pane. The top tab page can be changed by clicking a tab.

② Auto Hide Panes
The pane slides out from the side when the relevant tab is clicked, and closes when any location outside of the pane is clicked.

③ Floating Panes
Floating panes are displayed separate from the MPE720 Ver.7 Window. A floating pane can be freely moved by dragging the title bar.



Changing the Pane Display Type

<table>
<tr><th>Current Display Type</th><th>New Display Type</th><th>Operating Procedure</th></tr>
<tr><td rowspan="4">Floating Pane</td><td rowspan="2">Docked Pane</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 Pane.
  </td></tr>
<tr><td>Auto Hide Pane</td><td>Change the pane to a docked pane first.
A floating pane cannot be directly changed to an auto hide pane.</td></tr>
<tr><td>Hidden</td><td>• Click the Close Button.
  </td></tr>
</table>

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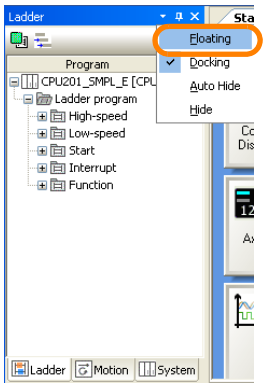
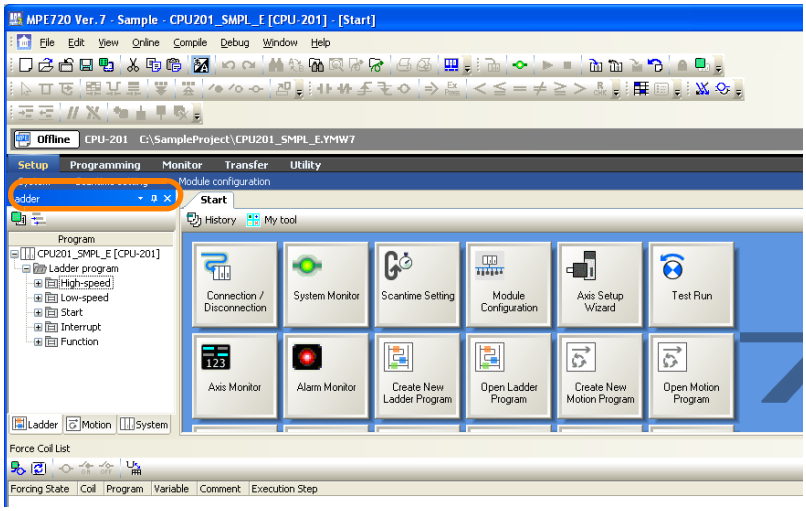
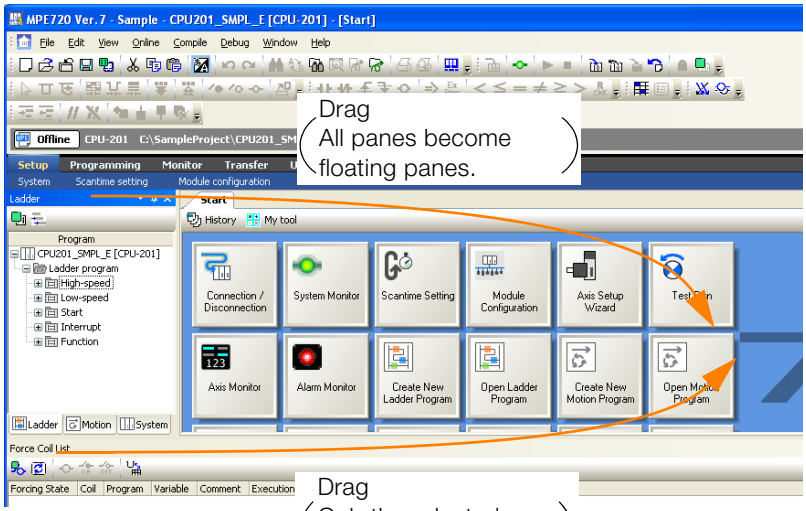
Current Display Type	New Display Type	Operating Procedure
Docked Pane	Floating Pane	• Click the **Menu** Button ▼ on the title bar and select ***Floating***. 
		• Double-click the title bar. 
		• Drag the tab or title bar to the desired position. 

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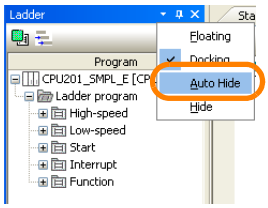
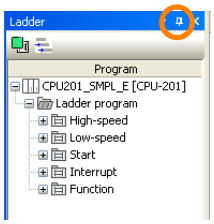
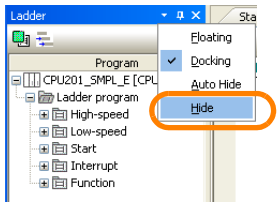
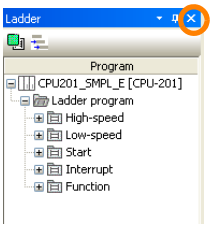
<table>
<tr><th>Current Display Type</th><th>New Display Type</th><th>Operating Procedure</th></tr>
<tr><td rowspan="4">Docked Pane</td><td rowspan="2">Auto Hide Pane</td><td>• Click the Menu Button ▼ on the title bar and select Auto Hide.
 

If multiple panes are displayed on top of each other, all of the panes become auto hide panes.</td></tr>
<tr><td>• Click the Auto Hide Button .
 

If multiple panes are displayed on top of each other, all of the panes become auto hide panes.</td></tr>
<tr><td rowspan="2">Hidden</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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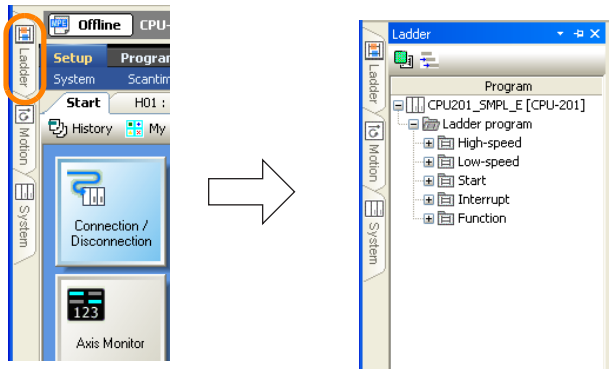
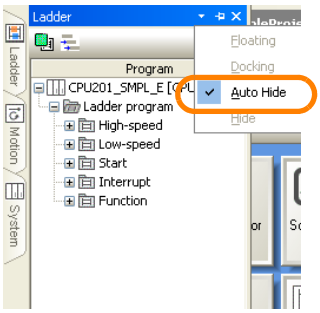
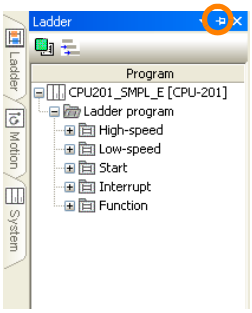
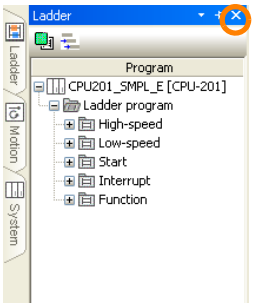
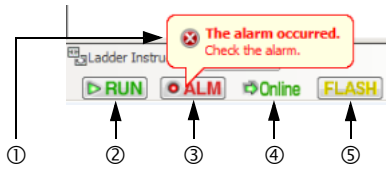
<table>
<tr><th>Current Display Type</th><th>New Display Type</th><th>Operating Procedure</th></tr>
<tr><td rowspan="4">Auto Hide Pane</td><td colspan="2">Before performing the following procedure, display the tab page by clicking on its tab.
 
</td></tr>
<tr><td>Floating Pane</td><td>Change the pane to a docked pane first.
An auto hide pane cannot be directly changed to floating pane.</td></tr>
<tr><td rowspan="2">Docked Pane</td><td>• Click the Menu Button ▼ on the title bar and select Auto Hide.
 

If multiple panes are displayed on top of each other, all of the panes become docked panes.</td></tr>
<tr><td>• Click the Auto Hide Button .
 

If multiple panes are displayed on top of each other, all of the panes become docked panes.</td></tr>
<tr><td>Hidden</td><td>• Click the Close Button.
 
</td></tr>
</table>

3.8 Status Bar

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	Lit while the CPU of the Machine Controller is running. The button is grayed out while the CPU is stopped.	You can click the **RUN** Button to start the System Monitor.
③	ALM	Lit while there is an alarm in the Machine Controller. The button is grayed out when there is no alarm.	You can click the **ALM** Button to start the System Monitor.
④	Online	Displayed while the MPE720 is correctly connected to the Machine Controller.	–
	Offline	Displayed while the MPE720 is not connected to the Machine Controller.	
⑤	FLASH	Lit when the Machine Controller RAM and flash memory do not match. The button is grayed out when they match.	Clicking the **FLASH** Button displays the Save to Flash Dialog Box.

Setup

4

This chapter describes the basic operations for using the MPE720.

4.1 Automatically Recognizing Information on Devices Connected to the Machine Controller

Use the following procedure to automatically recognize the Modules that are installed in the Machine Controller by using the MPE720.

Information

Refer to the following section for details on how to specify a range of Modules to automatically recognize.

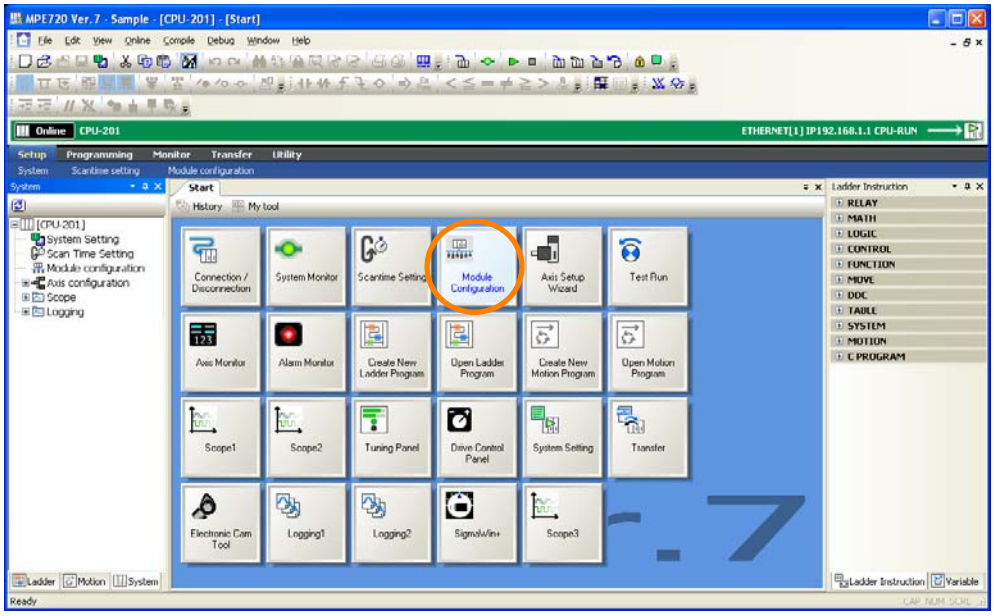
☞ *4.2 Automatically Recognizing a Range of Modules* on page 4-5

Information

Refer to the following section for details on how to automatically recognize the Modules installed in the Machine Controller using the DIP switch on the MP2000/MP3000-series Machine Controller.

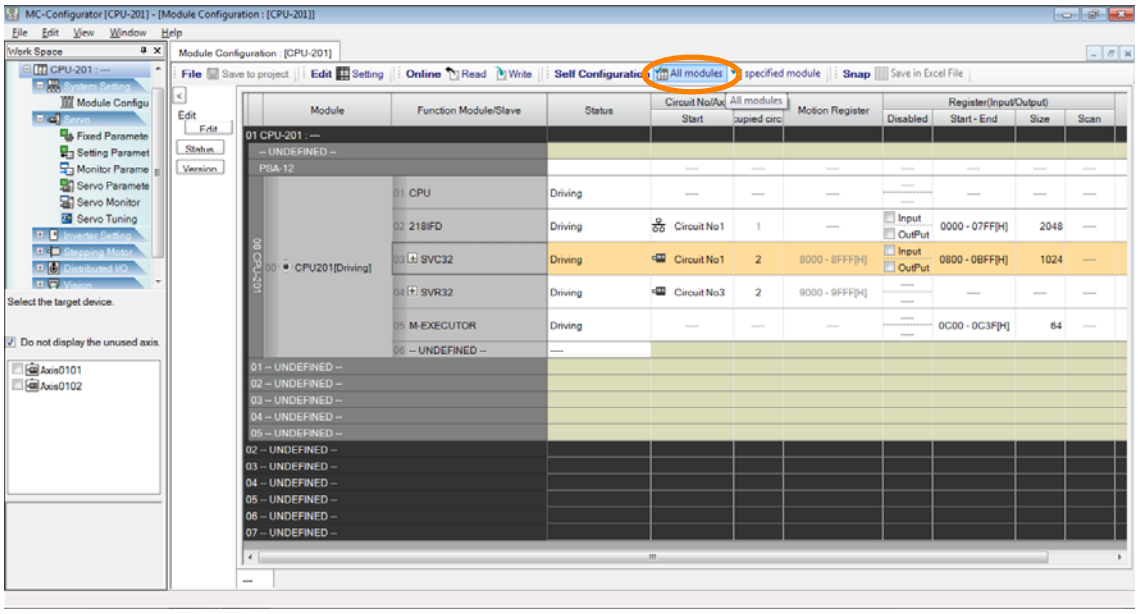
☞ *2.3.1 Self Configuration Using the DIP Switch* on page 2-14

1. Click the **Module Configuration** Button on the My Tool View.



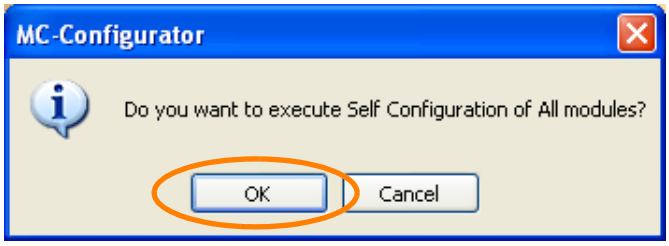
The Module Configuration Tab Page will be displayed.

2. Click the **All modules** Button.



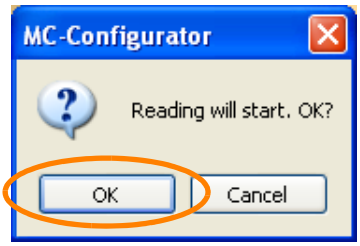
The MC-Configurator Dialog Box will be displayed.

3. Click the **OK** Button.



Self configuration for all Modules will be executed. When self configuration has been completed, a different MC-Configurator Dialog Box will be displayed.

4. Click the **OK** Button.



The self configuration results are saved in the MPE720.

This concludes the procedure.

4.2 Automatically Recognizing a Range of Modules

Use the following procedure to automatically recognize a specified range of installed Modules by using the MPE720.

Information

Refer to the following section for details on automatically recognizing all of the Modules that are installed.

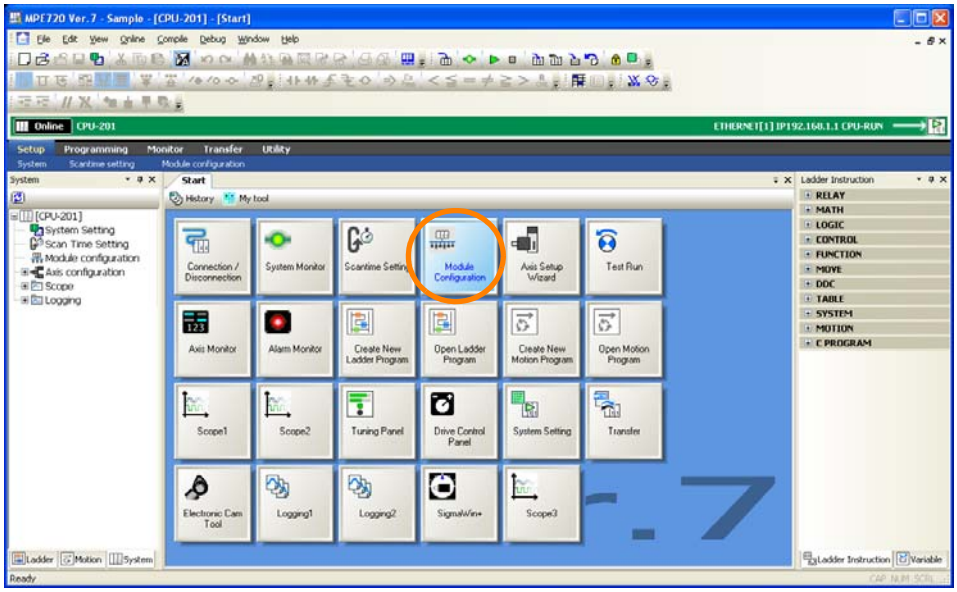
☞ *4.1 Automatically Recognizing Information on Devices Connected to the Machine Controller* on page 4-3

Information

Refer to the following section for details on how to automatically recognize the Modules installed in the Machine Controller using the DIP switch on the MP2000/MP3000-series Machine Controller.

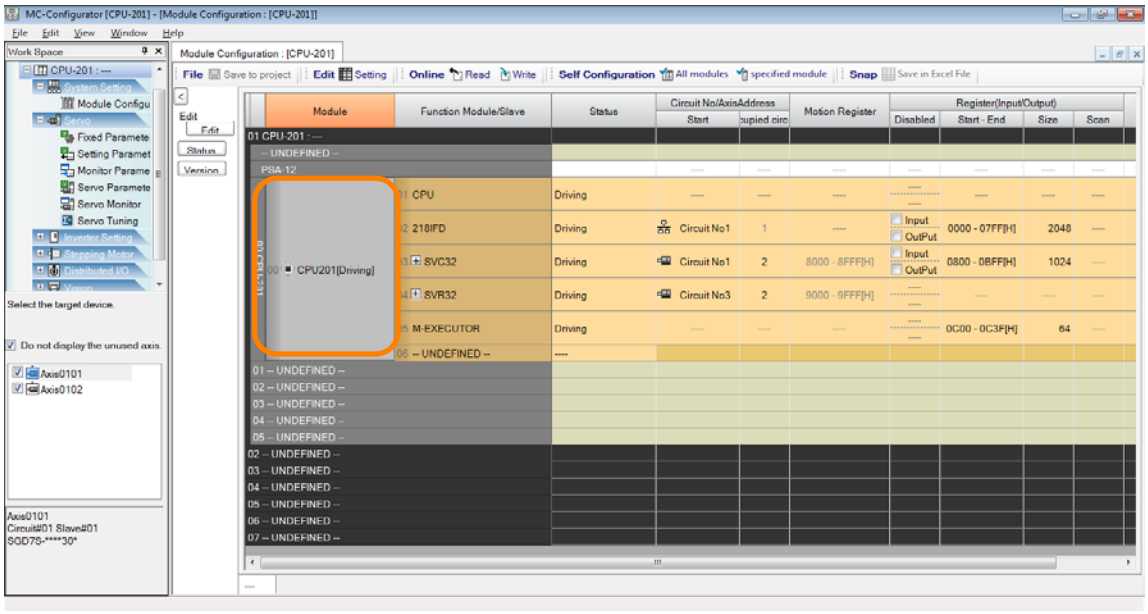
☞ *2.3.1 Self Configuration Using the DIP Switch* on page 2-14

1. Click the **Module Configuration** Button on the My Tool View.

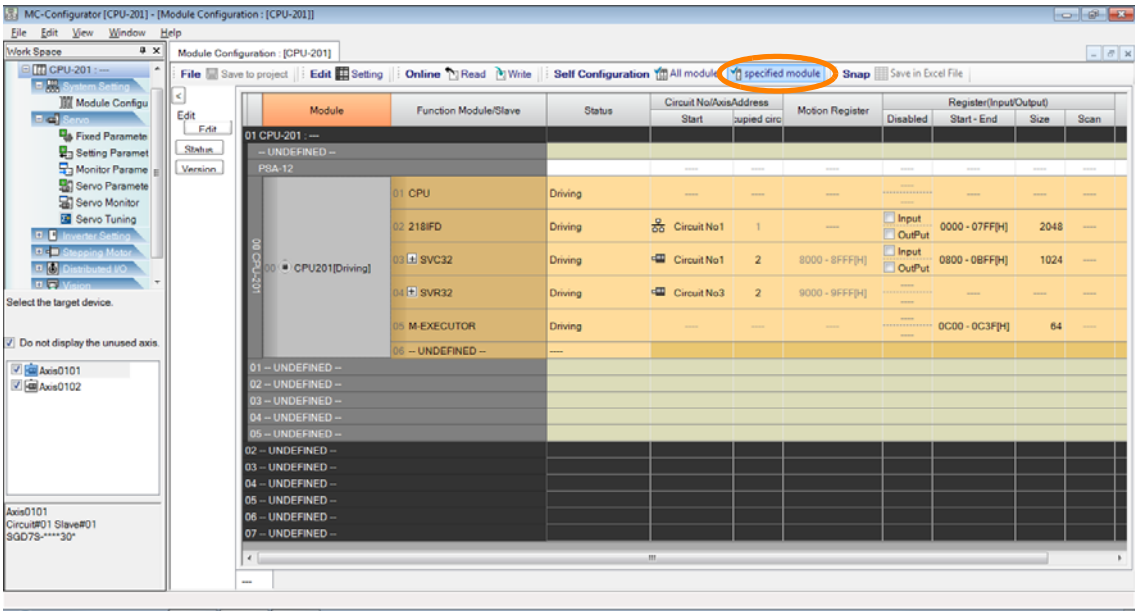


The Module Configuration Tab Page will be displayed.

2. Select the Modules to automatically recognize.

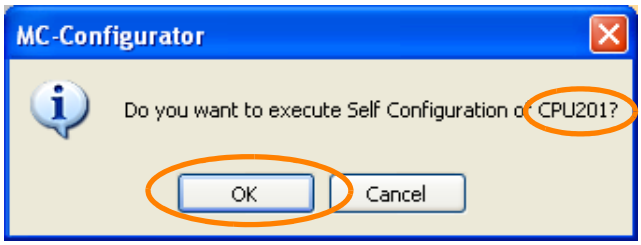


3. Click the **specified module** Button.



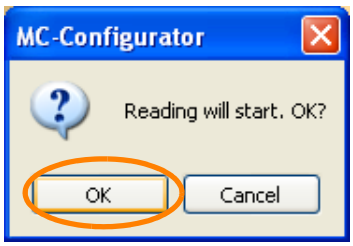
The MC-Configurator Dialog Box will be displayed.

4. Confirm the name of the Module, and then click the **OK** Button.



Self configuration for the selected Module will be executed. When self configuration has been completed, a different MC-Configurator Dialog Box will be displayed.

5. Click the **OK** Button.



The self configuration results are saved in the MPE720.

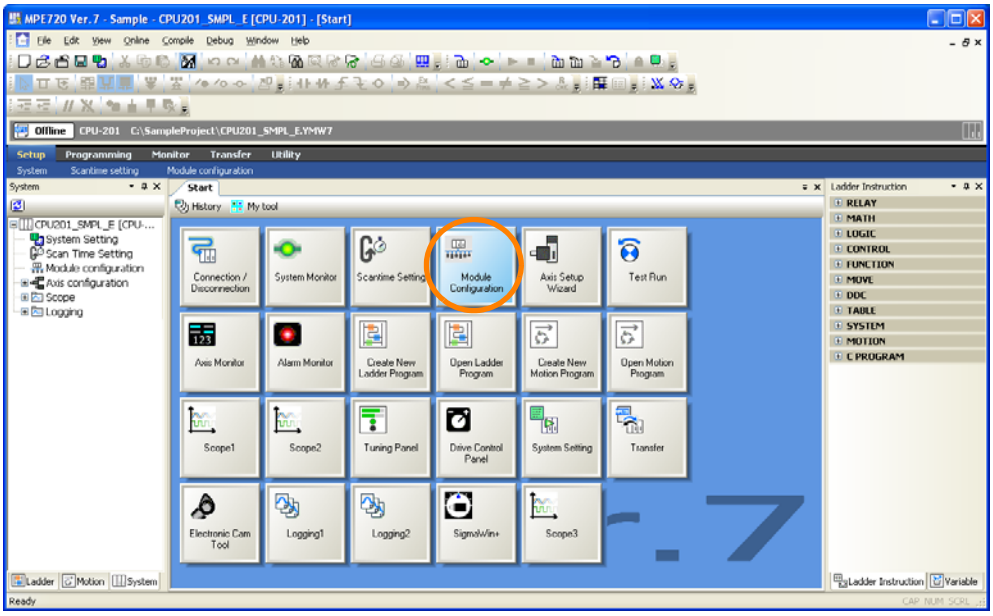
This concludes the procedure.

4.3 Manually Setting the Module Configuration

If you do not have the actual field devices, i.e., SERVOPACKs, motors, etc., you can set up the device configuration manually instead of using self configuration. Use the following procedure to manually set up the device configuration in the project file.

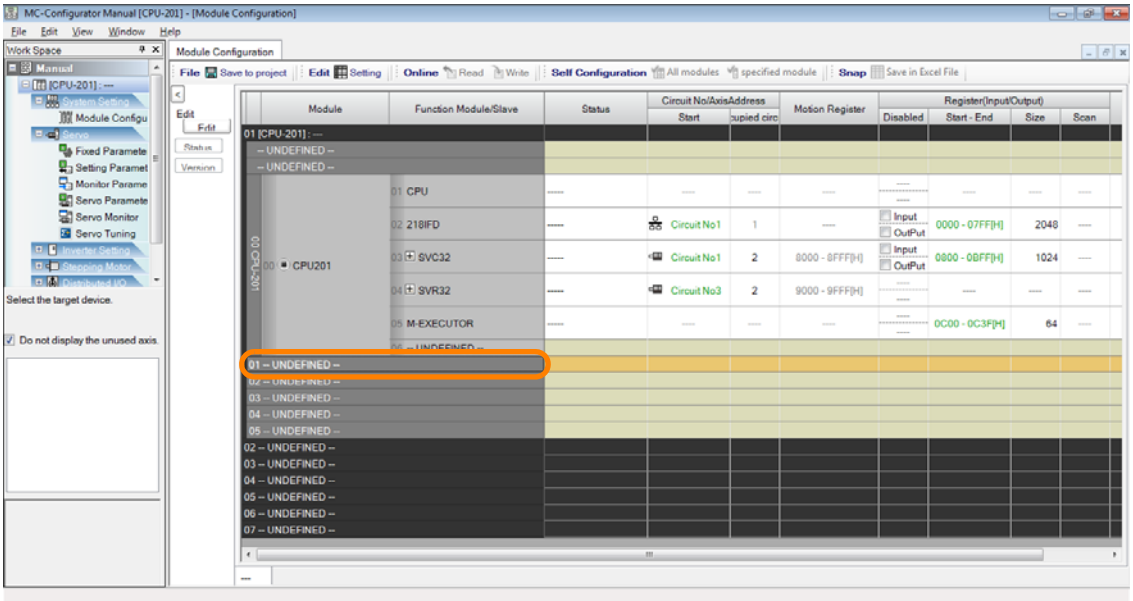
The procedure is based on the following system as an example: an MP3000-series CPU Unit is connected to a Base Unit that has an SVB-01 Optional Module that controls two axes.

1. Click the **Module Configuration** Button on the My Tool View.



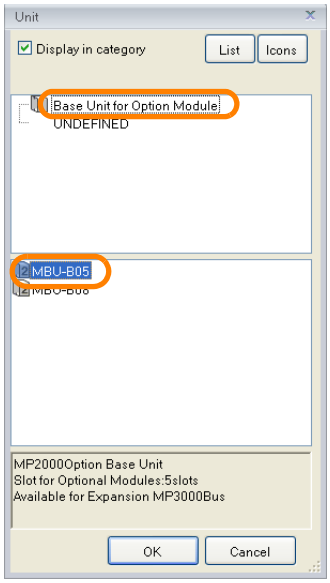
The Module Configuration Tab Page will be displayed.

2. Double-click **01 --UNDEFINED --**.

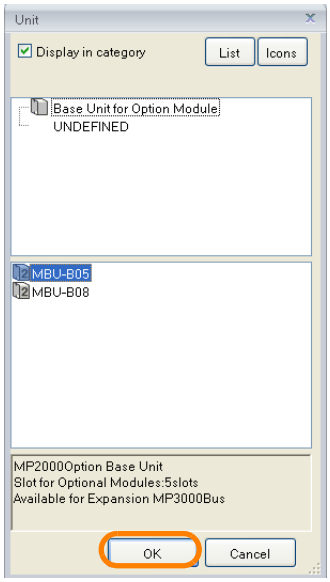


The Unit Dialog Box will be displayed.

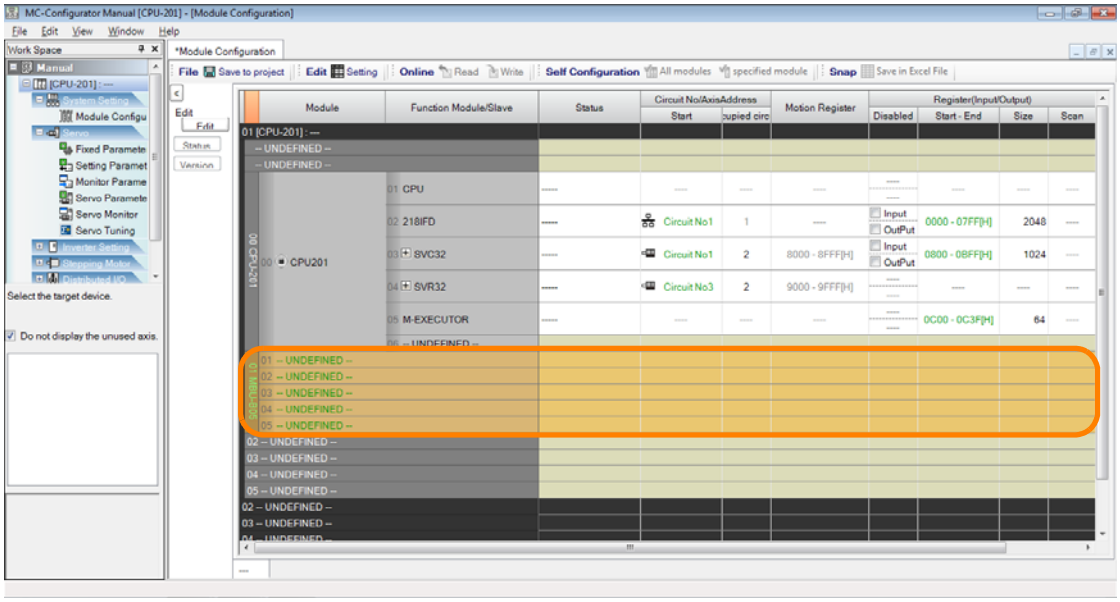
3. Select **Base Unit for Option Module**- **MBU-B05**.



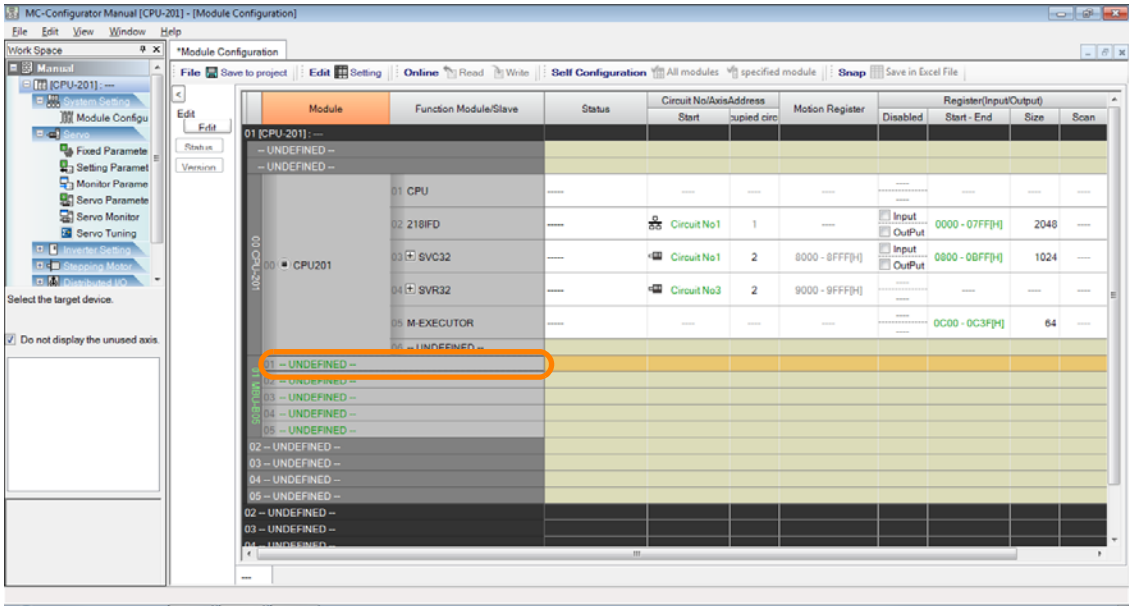
4. Click the **OK** Button.



The fields for the MBU-B05 are created on the Module Configuration Tab Page.

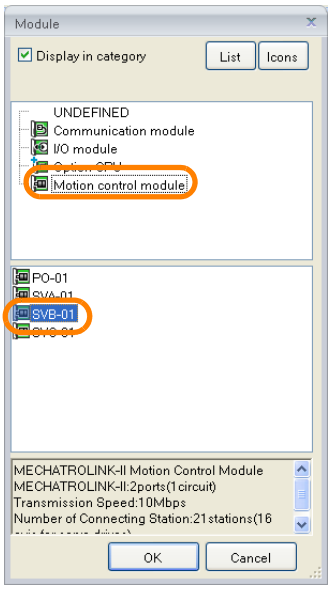


5. Double-click **01 --UNDEFINED --** in the **01 MBU-B05** Fields.

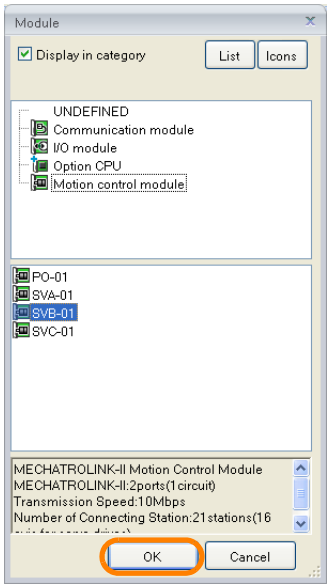


The Module Dialog Box will be displayed.

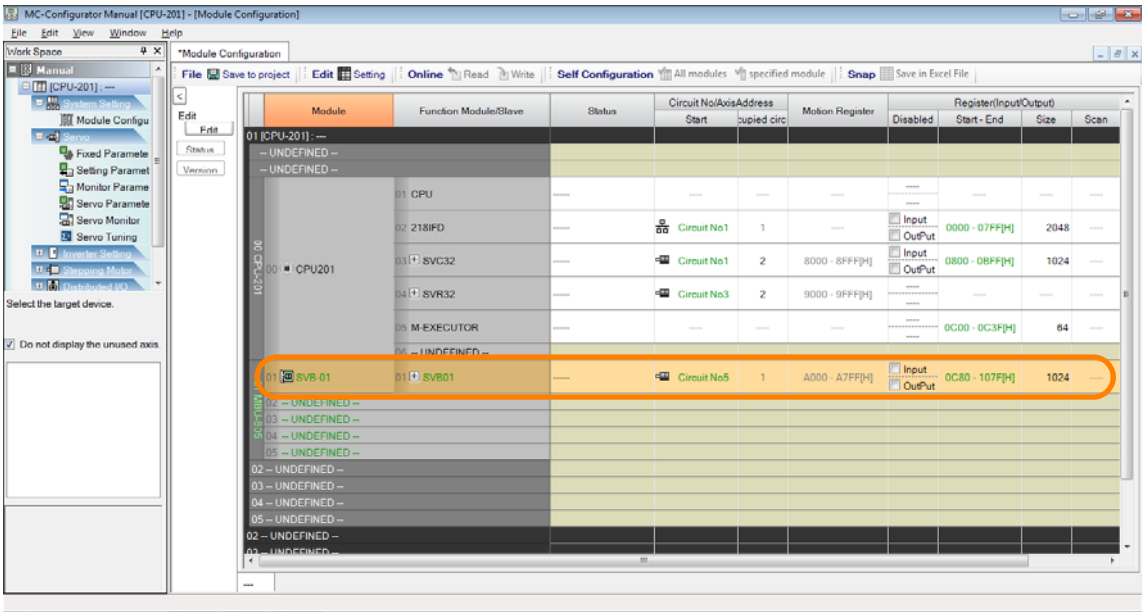
6. Select **Motion control module** - **SVB-01**.



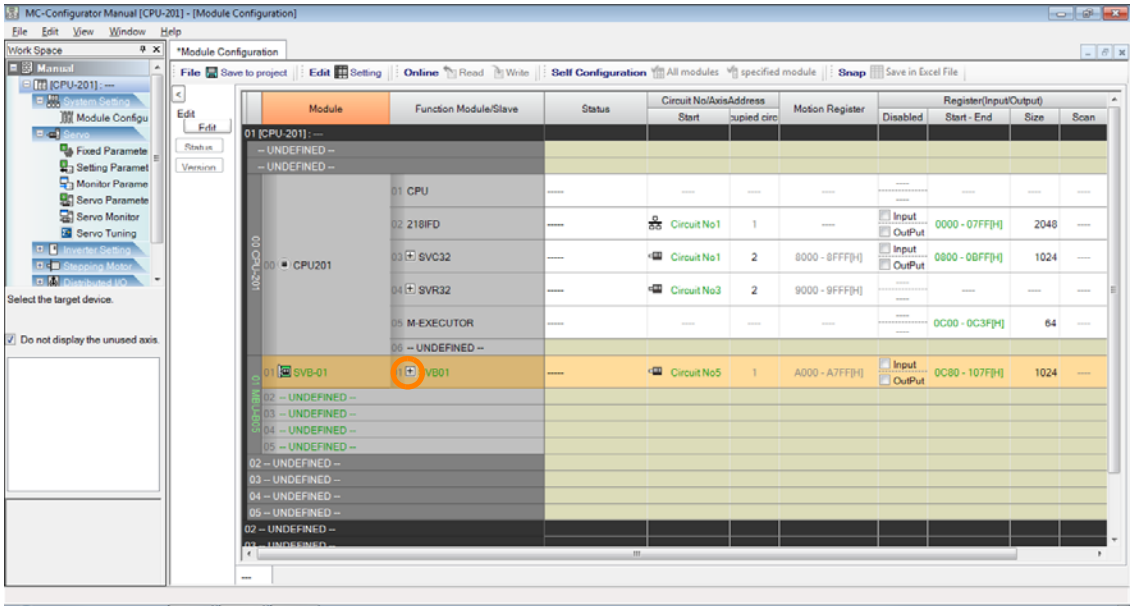
7. Click the **OK** Button.



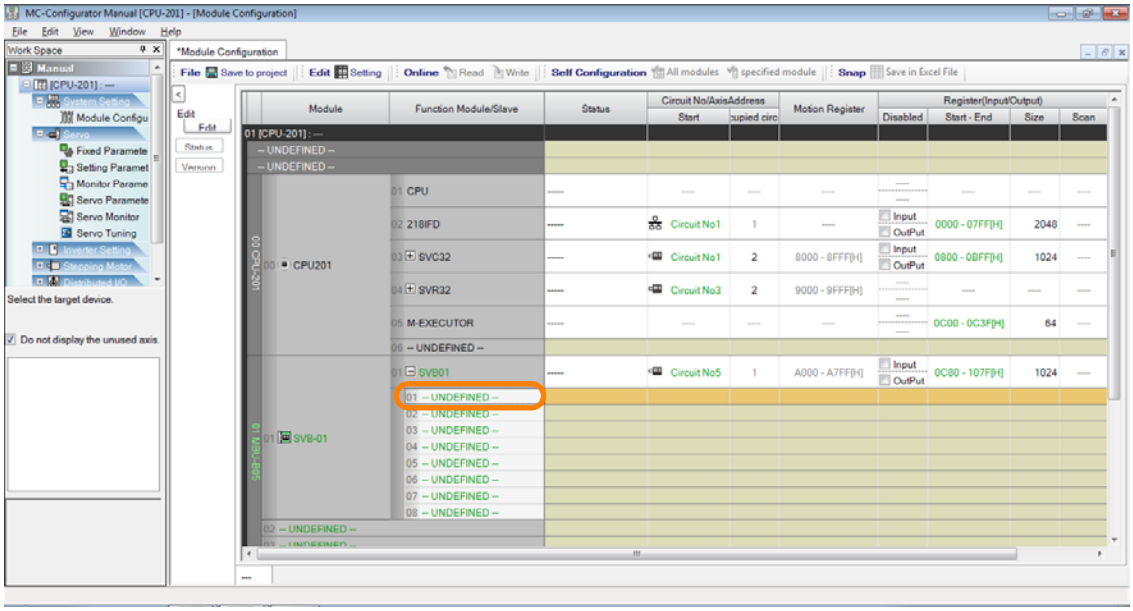
The fields for the SVB-01 are created on the Module Configuration Tab Page.



8. Click the **+** Button next to the **SVB-01** Cell.

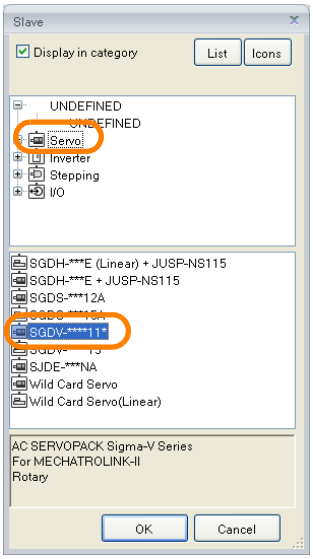


9. Double-click ☐☐ **--UNDEFINED --** where the axis is to be assigned.

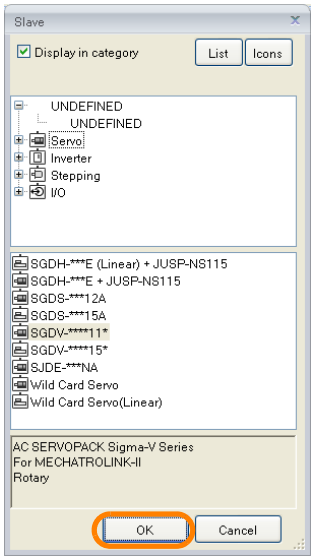


The Slave Dialog Box will be displayed.

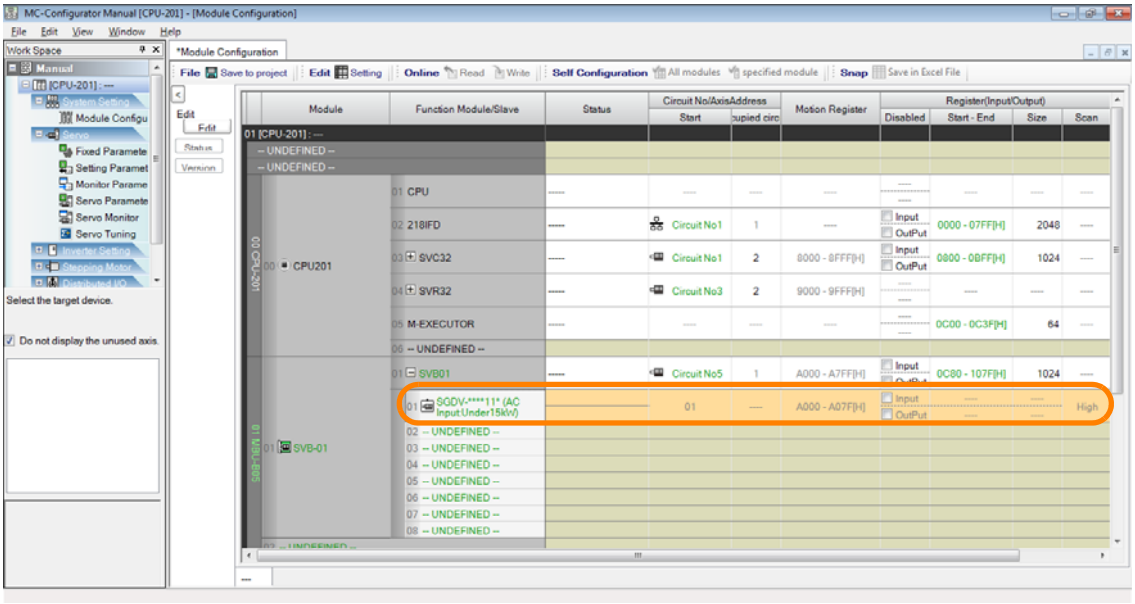
10. Select the model to set up.



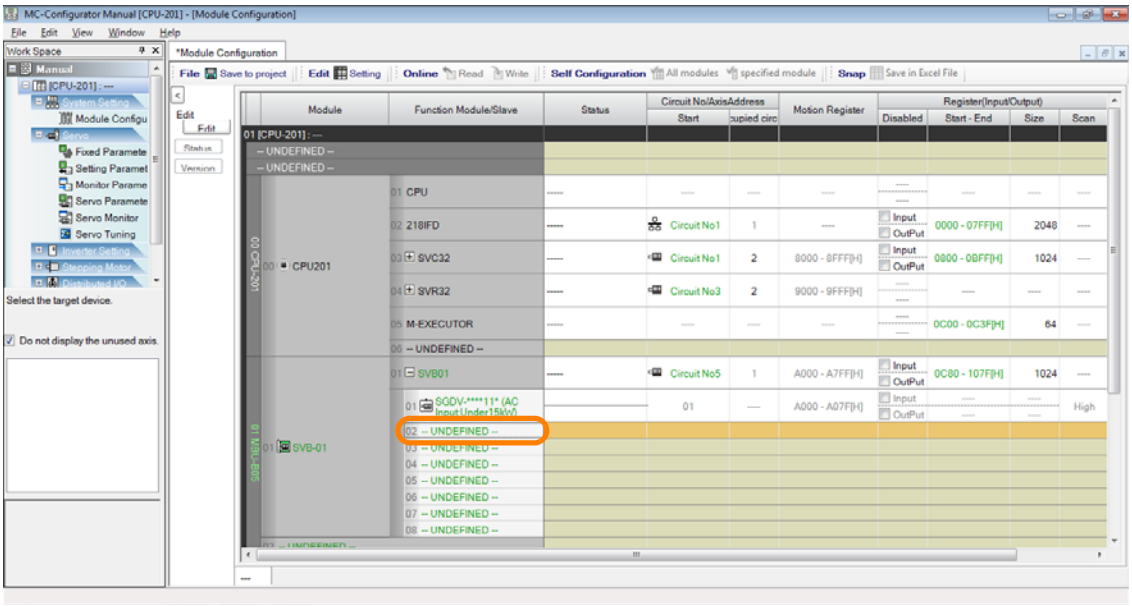
11. Click the **OK** Button.



The device will be added to the Module Configuration Tab Page.

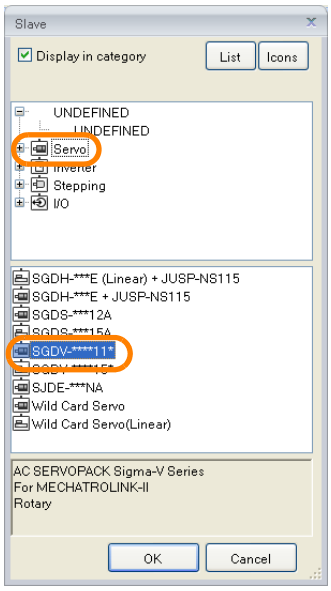


12. Double-click □□ **--UNDEFINED --** where the axis is to be assigned.

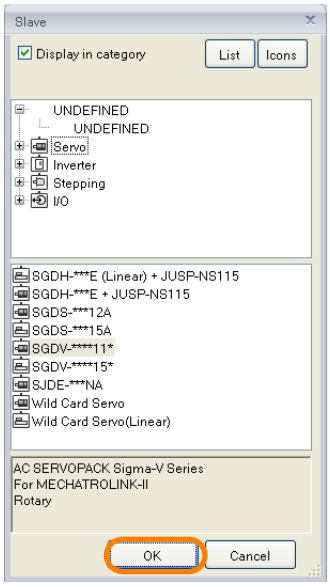


The Slave Dialog Box will be displayed.

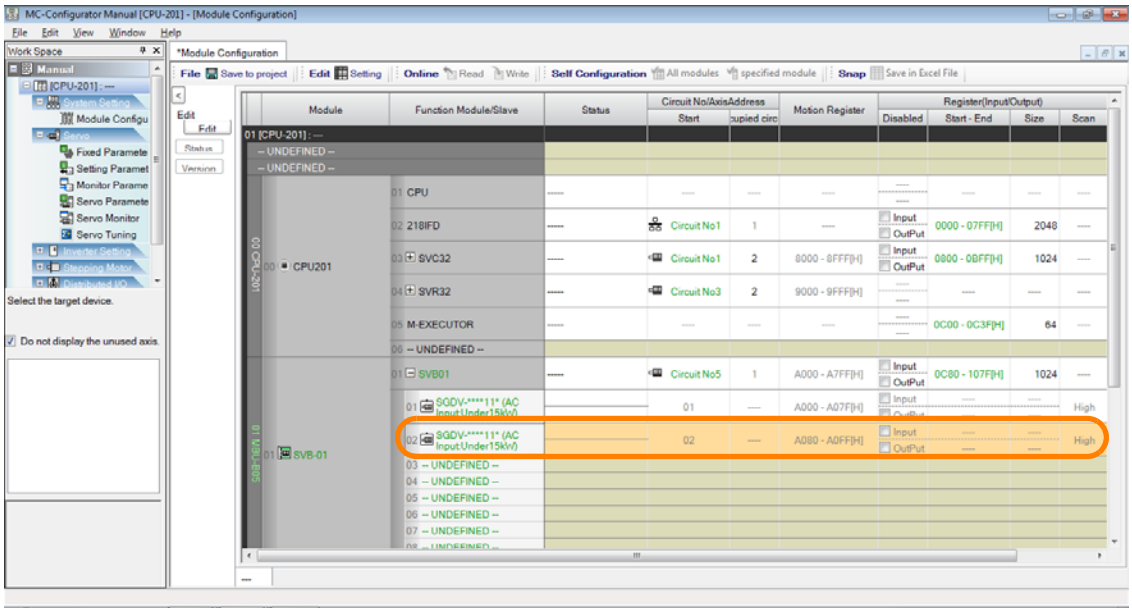
13. Select the model to set up.



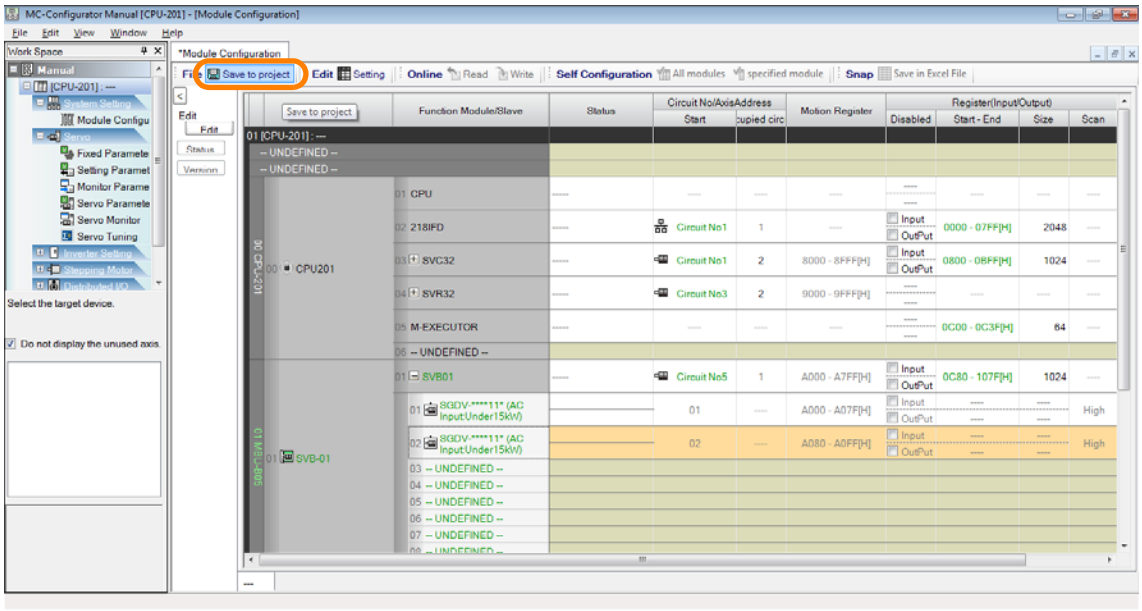
14. Click the **OK** Button.



The device will be added to the Module Configuration Tab Page.



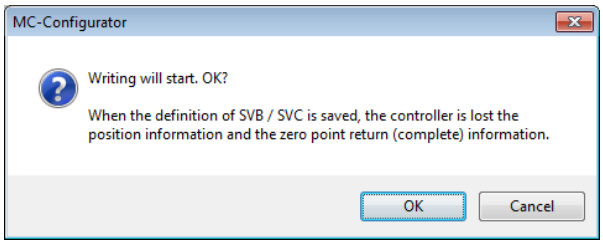
15. Click the **Save to project** Button.



This saves the manually specified settings in the project file.

Information

If allocations for an SVB or SVC are changed online (e.g., if you add or delete MECHATROLINK devices or change communications parameters), the following warning dialog box will be displayed when you save the definitions.



This concludes the procedure.

Changing Models after the Device Configuration Has Been Set

There are the following two ways to change a SERVOPACK once allocations have been made.

- Inherit the parameters and change only the model.
- Delete the allocation and set up the model again.

The procedures are given below.

◆ Inheriting the Parameters and Changing Only the Model

If you change a model as shown in the following table, you can inherit the fixed and setting parameters that were previously set and change only the model. (Servo parameters are not inherited.)

Information

Refer to the following section for the procedure to change the model in ways not shown in the following table.

☞ ◆ *Deleting the Allocation and Setting Up the Model Again* on page 4-17

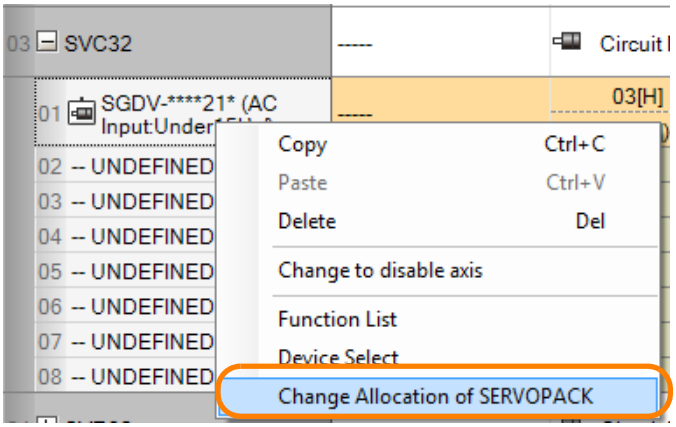
Before Change	After Change
Σ-7-series SERVOPACK	Servo amplifier from another company (Wild Card Servo)
Σ-V-series SERVOPACK	Σ-7-series SERVOPACK or servo amplifier from another company (Wild Card Servo)
Servo amplifier from another company (Wild Card Servo)	Σ-V-series SERVOPACK or Σ-7-series SERVOPACK

The following conditions must be met to change only the model.

- The change must be made offline.
- The allocations must be saved. (You cannot make the change during editing.)

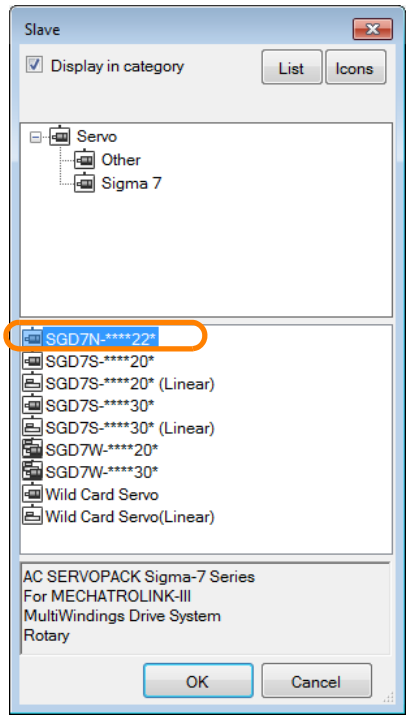
Use the following procedure.

1. Right-click the SERVOPACK allocated to the SVB or SVC on the Module Configuration Tab Page.
2. Select ***Change Allocation of SERVOPACK***.



A list of SERVOPACKs that you can change to will be displayed.

3. Select the model to change to.



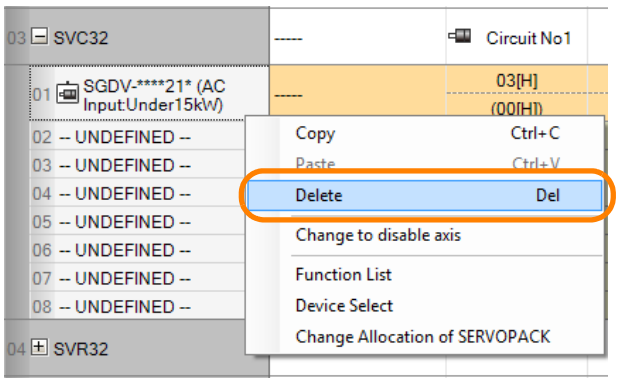
This concludes the procedure.

◆ Deleting the Allocation and Setting Up the Model Again

Use the following procedure to delete the allocation and set up the model again.

1. Right-click the SERVOPACK allocated to the SVB or SVC on the Module Configuration Tab Page.

2. Select ***Delete***.



The SERVOPACK allocation will be deleted.

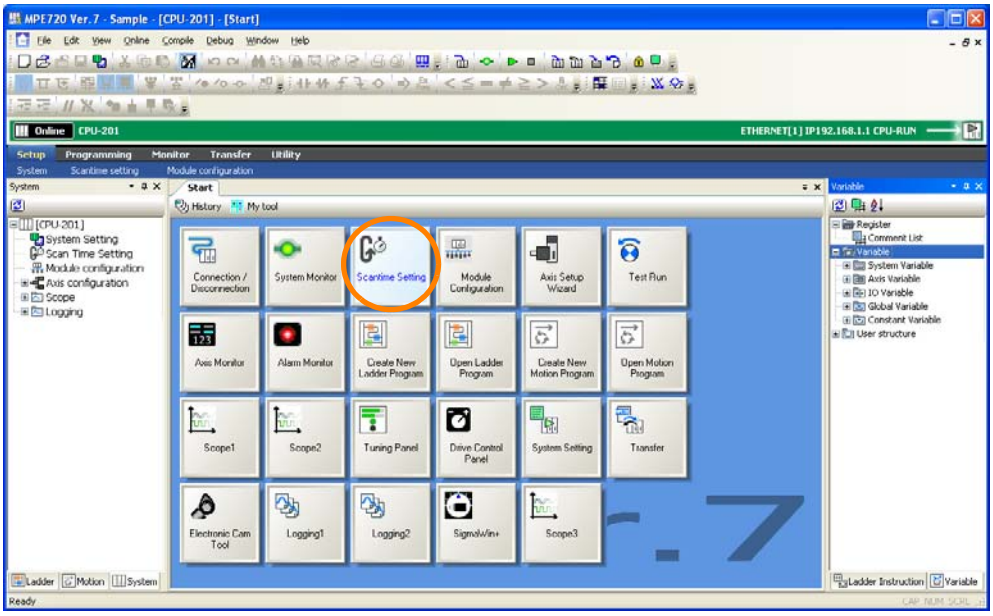
3. Set up the model again.
Refer to the following section for the procedure to set up the device configuration.
☞ *4.1 Automatically Recognizing Information on Devices Connected to the Machine Controller* on page 4-3
☞ *4.3 Manually Setting the Module Configuration* on page 4-7

This concludes the procedure.

4.4 Confirming and Changing the Execution Cycle

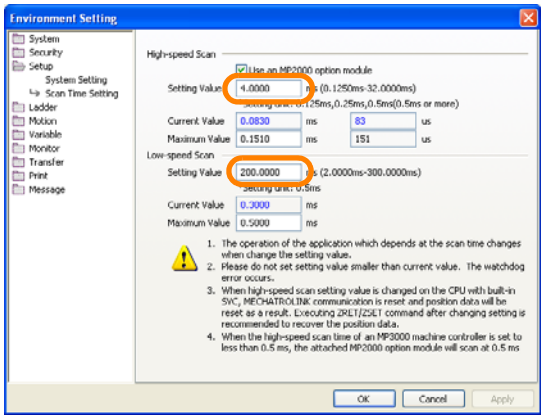
Confirm the execution cycle of your application.
Change the High-speed Scan Setting or Low-speed Scan Setting as required.
Use the following procedure to confirm or change scan time settings.

1. Click the **Scantime Setting** Button on the My Tool View.



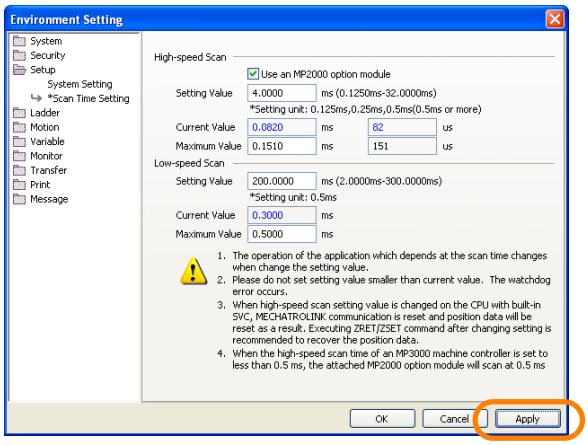
The Environment Setting Dialog Box will display the scan time settings.

2. Confirm the following information and enter the setting value as required.
   - High-speed Scan Setting Value
   - Low-speed Scan Setting Value



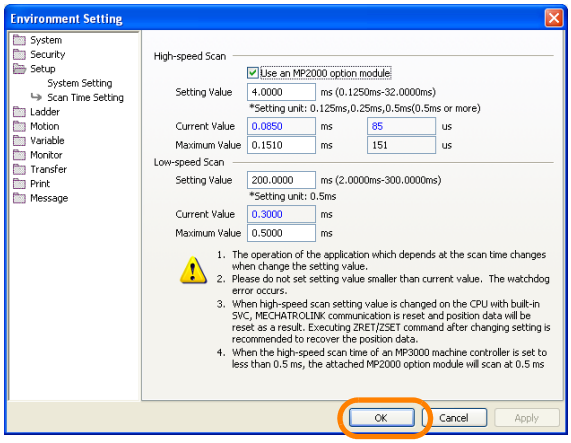
Information Refer to the following manual for details on the set values.
- *MP3000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880725 00)
- *MP2000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880732 14)

3. Click the **Apply** Button.



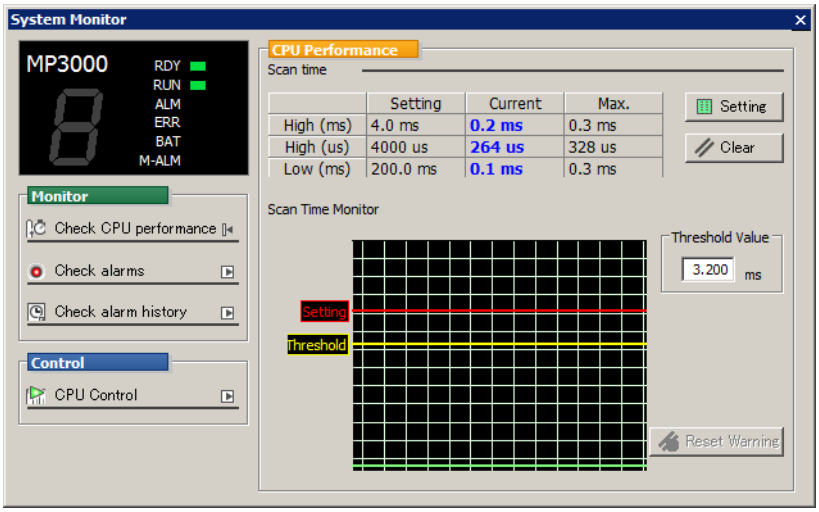
The values that you entered in step 2 will be set.

4. Click the **OK** Button.



The Environment Setting Dialog Box will close.

Information The current value can be checked on System Monitor Dialog Box. You can also change the threshold for the high-speed scan time.



This concludes the procedure.

4.5 Saving Data in the Machine Controller

The program data must be saved in the flash memory of the Machine Controller.

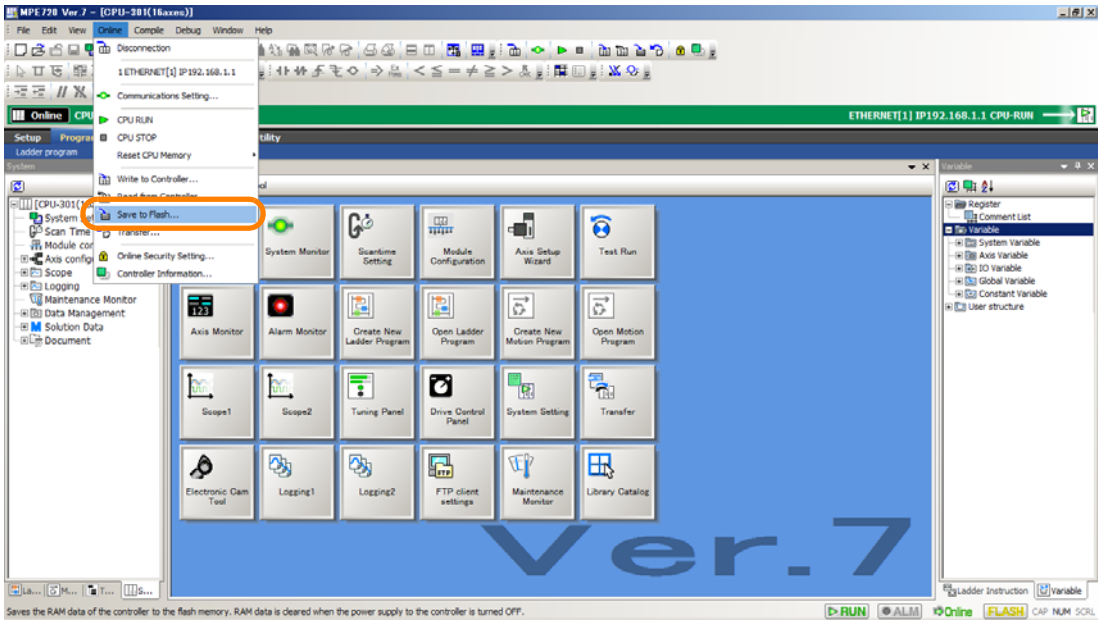
> Important
>
> If you turn the power OFF and ON again without saving data to the flash memory, any changes to the program or definition data will be lost.
> In the Environment Setting Dialog Box, you can set to automatically save data to flash memory when the connection to the Machine Controller is disconnected. Refer to the following section for details.
>
> ☞ *4.5.2 Automatically Saving Data to Flash Memory at Disconnection* on page 4-22

4.5.1 Manually Saving Data to Flash Memory

Use the following procedure to manually save data in the Machine Controller.

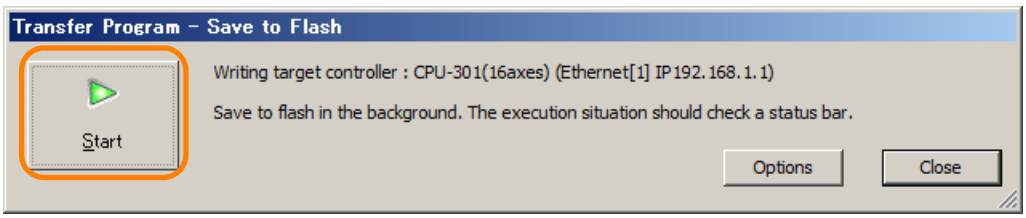
1. Select ***Online*** – ***Save to Flash*** from the menu bar.

   Information This can also be performed by clicking the **Transfer** Button on the My Tool View and then clicking the **Save to Flash** Button in the Transfer Dialog Box.

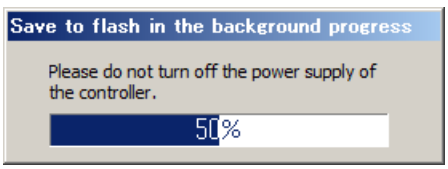


The Transfer Program - Save to Flash Dialog Box will be displayed.

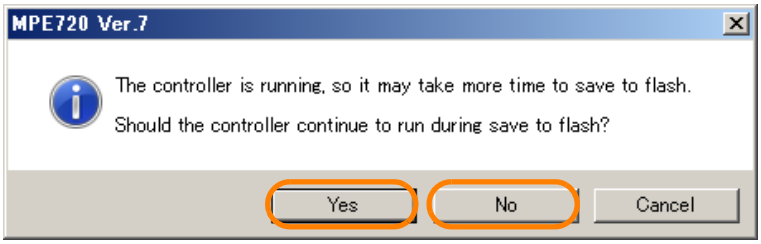
2. Click the **Start** Button.



Writing to the target Machine Controller will begin and the following dialog box will be displayed.

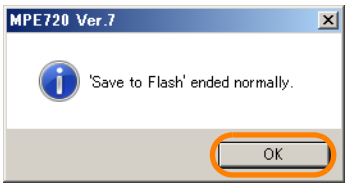


Information If the CPU Unit is in RUN mode, the following message will be displayed. The data transfer to the target Machine Controller starts when you click the **Yes** Button or the **No** Button.



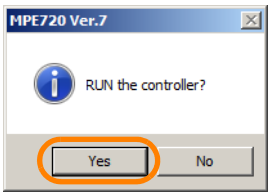
When the data has been saved, the MPE720 Ver. 7 Dialog Box will be displayed.

3. Click the **OK** Button.



The MPE720 Ver. 7 Dialog Box will close.

Information If you clicked the **No** Button in step 2, the following message will be displayed. Click the **Yes** Button to put the CPU Unit in the RUN status.



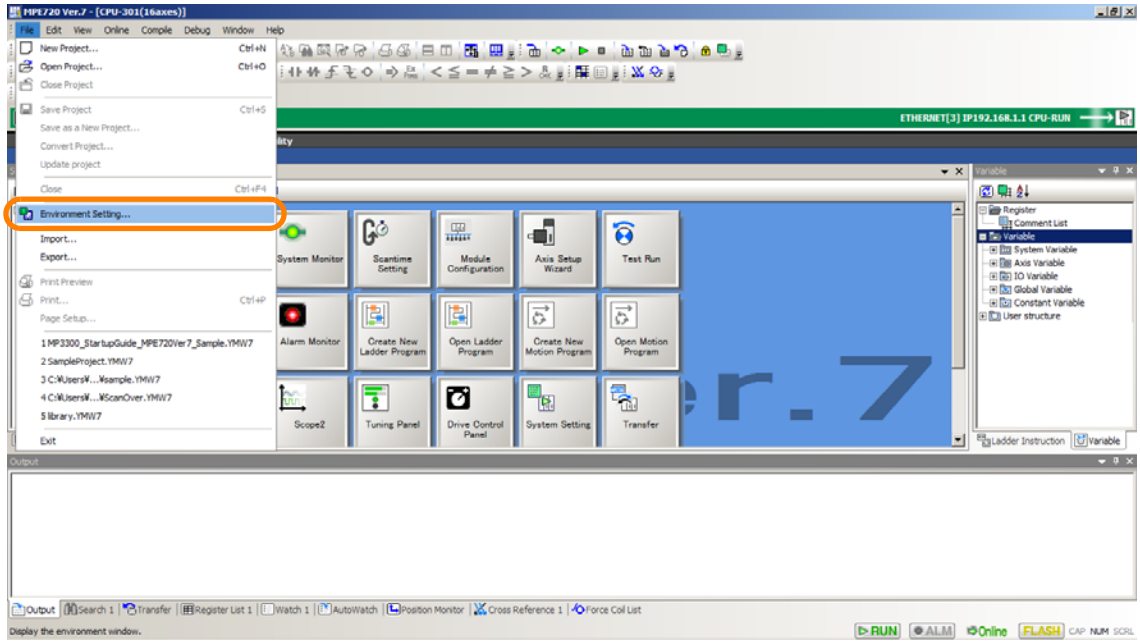
This concludes the procedure.

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

4.5.2 Automatically Saving Data to Flash Memory at Disconnection

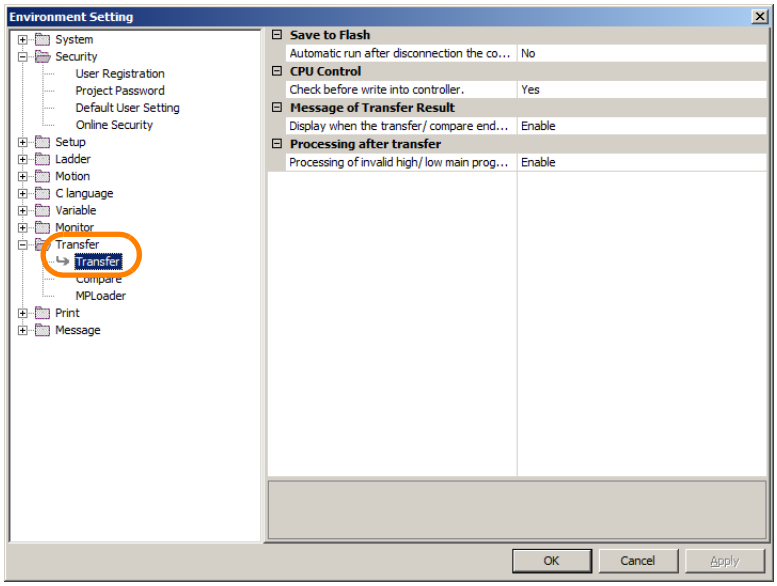
Data in RAM is compared with data in flash memory when the connection to the Machine Controller is disconnected. If the data does not match, data can automatically be saved to flash memory. The following shows the setting procedure.

1. Select ***File*** - ***Environment Setting*** from the menu bar.

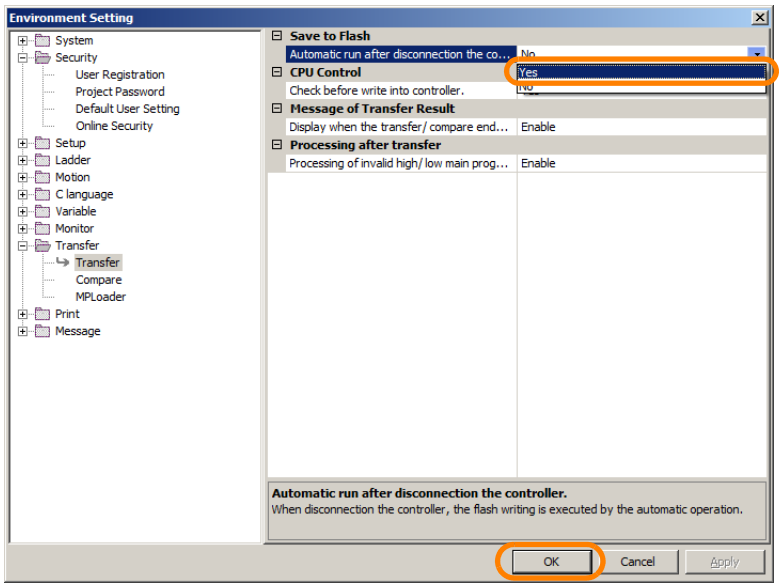


The Environment Setting Dialog Box will be displayed.

2. Select **Transfer** - **Transfer**.



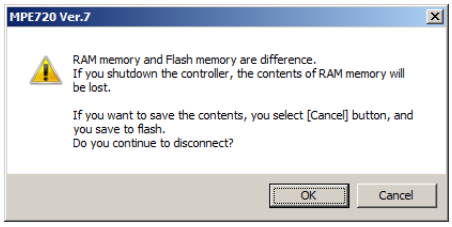
3. Select **Yes** to the right of the **Automatic run after disconnection the controller** Box, and click the **OK** Button.



This concludes the procedure.

Information

Even if this setting is not made, data in RAM is compared with data in flash memory when the connection to the Machine Controller is disconnected. If the data does not match, the message will be displayed.

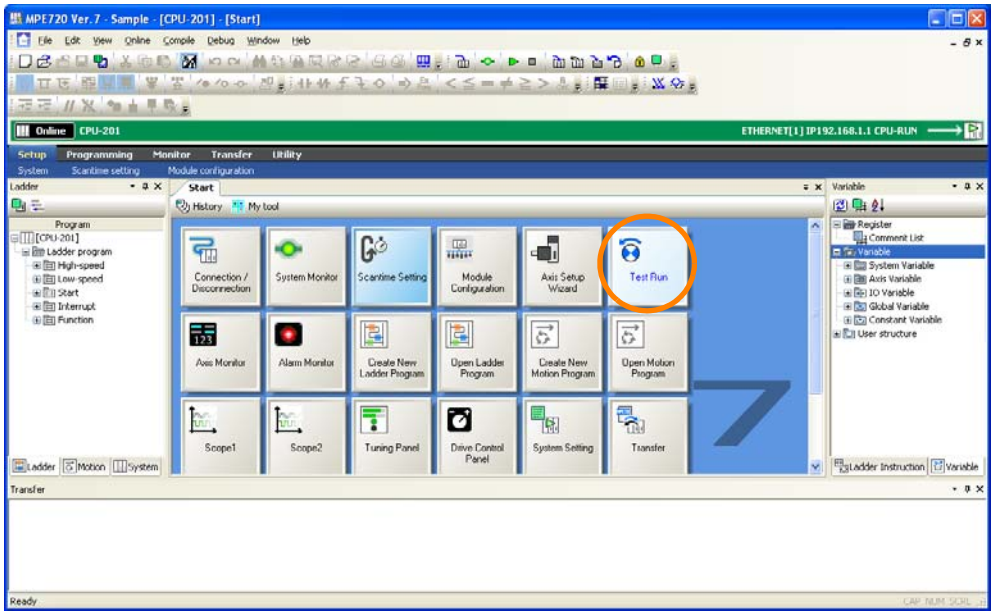


4.6 Testing Motor Operation

Use the following procedure to check the operation of the motor before you create any programs.

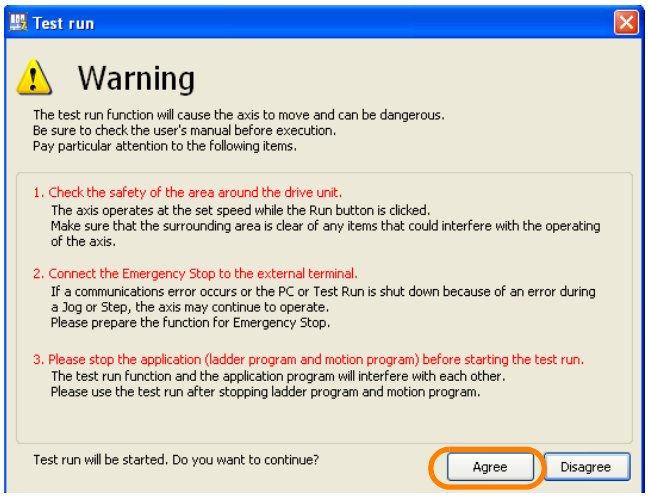
Information Perform this procedure with the SERVOPACK and Servomotor connected to the Machine Controller.

1. Click the **Test Run** Button on the My Tool View.



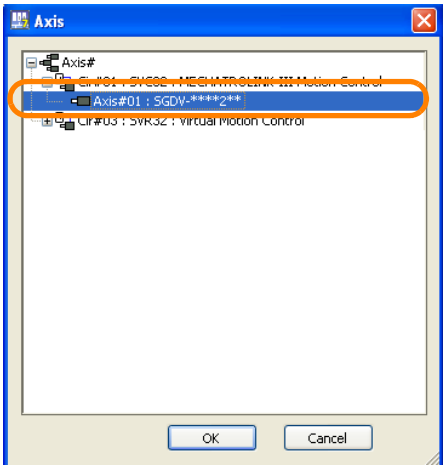
The Test Run Warning Dialog Box will be displayed.

2. Read the warnings and click the **Agree** Button.

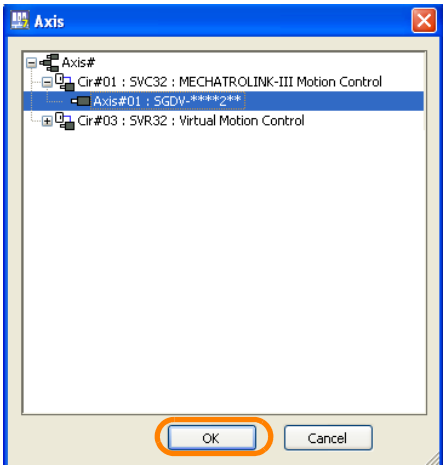


The Axis Dialog Box will be displayed.

3. Select the axis to test.

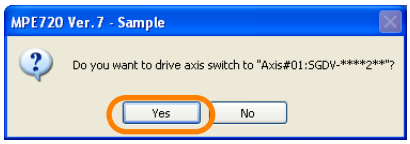


4. Click the **OK** Button.



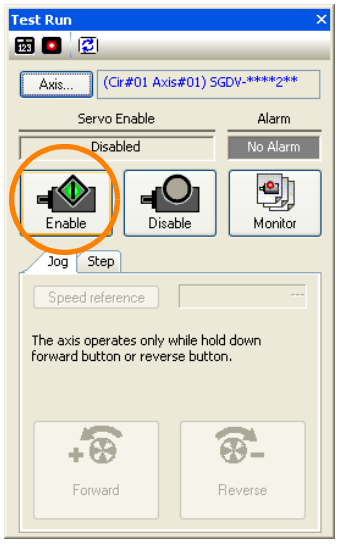
The following confirmation message about switching the axis will be displayed.

5. Click the **Yes** Button.

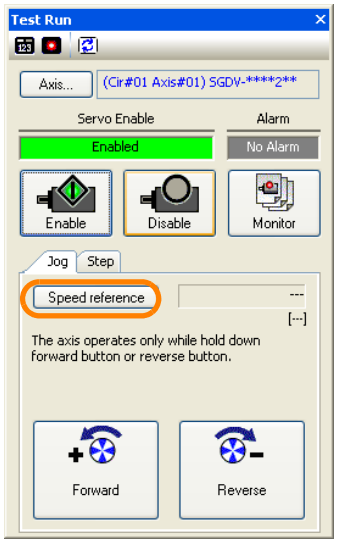


The Test Run Dialog Box will be displayed.

6. Click the **Enable** Button.

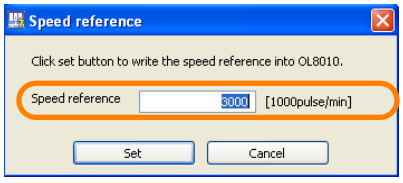


7. Click the **Speed reference** Button on the Jog Tab Page.

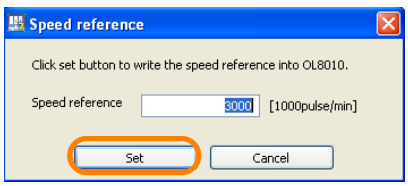


The Speed Reference Dialog Box will be displayed.

8. Enter the speed reference.



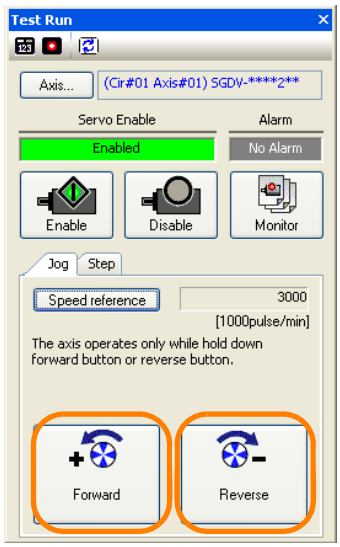
9. Click the **Set** Button.



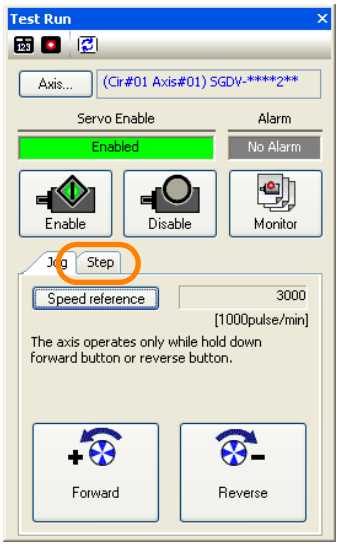
The Speed Reference Dialog Box will close.

10. Confirm the following information.

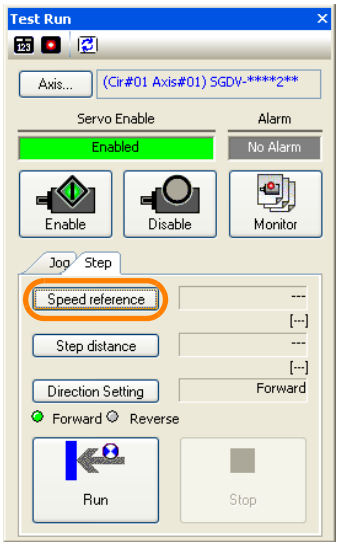
- While the **Forward** Button is pressed, the motor rotates in the forward direction.
- While the **Reverse** Button is pressed, the motor rotates in the reverse direction.



11. Click the **Step** Tab.

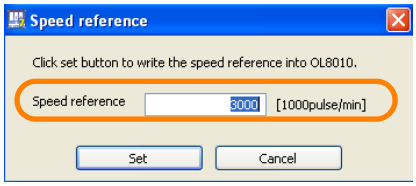


12. Click the **Speed reference** Button.

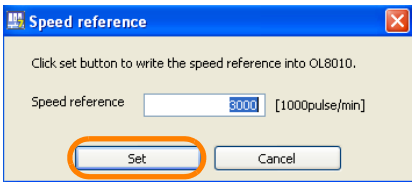


The Speed Reference Dialog Box will be displayed.

13. Enter the speed reference.

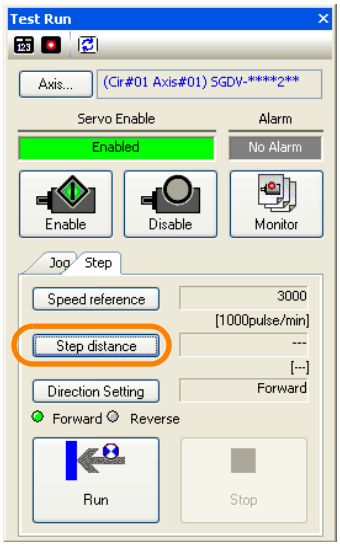


14. Click the **Set** Button.



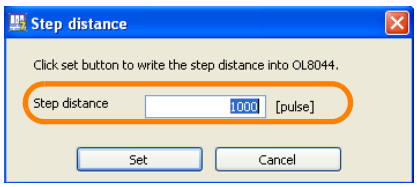
The Speed Reference Dialog Box will close.

15. Click the **Step distance** Button.

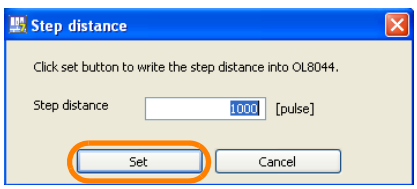


The Step Distance Dialog Box will be displayed.

16. Enter the step travel distance.

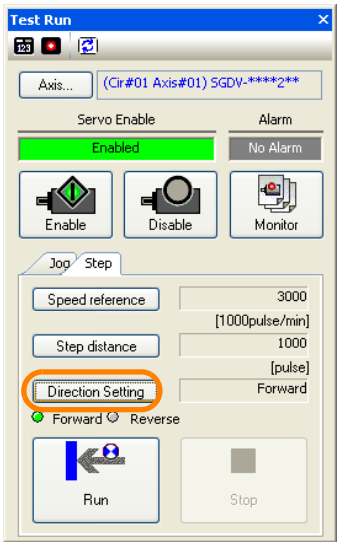


17. Click the **Set** Button.



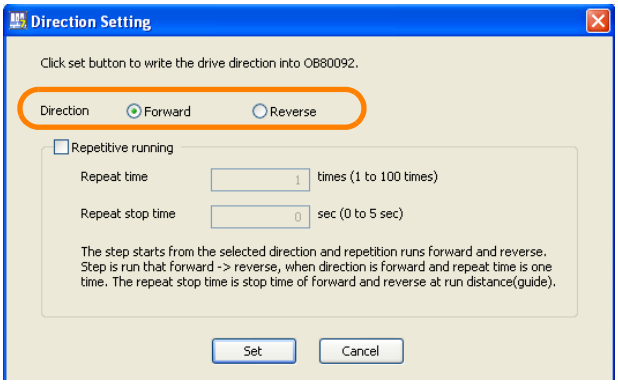
The Step Distance Dialog Box will close.

18. Click the **Direction Setting** Button.

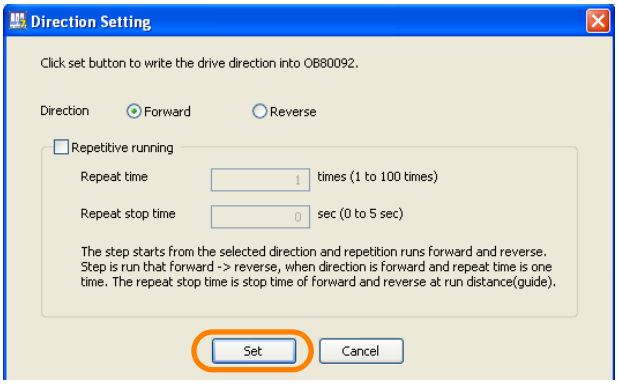


The Direction Setting Dialog Box will be displayed.

19. Select the direction of operation.



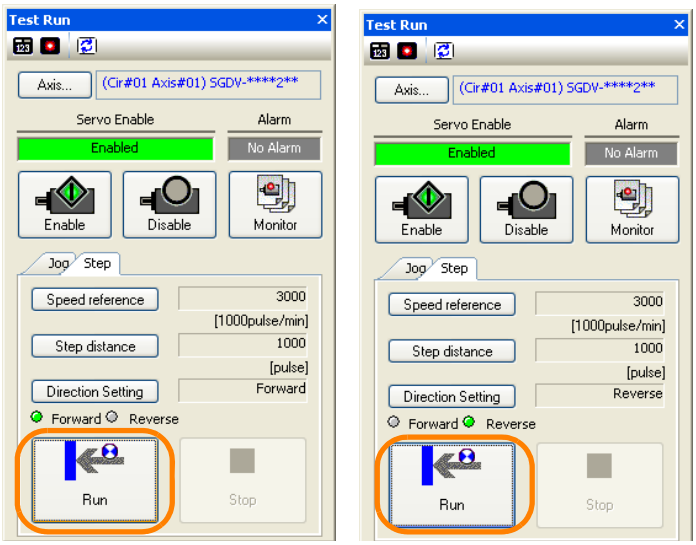
20. Click the **Set** Button.



The Direction Setting Dialog Box will close.

21. Confirm the following information.

- If the **Direction Setting** is set to **Forward** in step 19: Clicking the **Run** Button causes the motor to turn in the forward direction.
- If the **Direction Setting** is set to **Reverse** in step 19: Clicking the **Run** Button causes the motor to turn in the reverse direction.



22. When you have finished checking the motor, click the **Close** Button.
The Test Run Dialog Box will close.

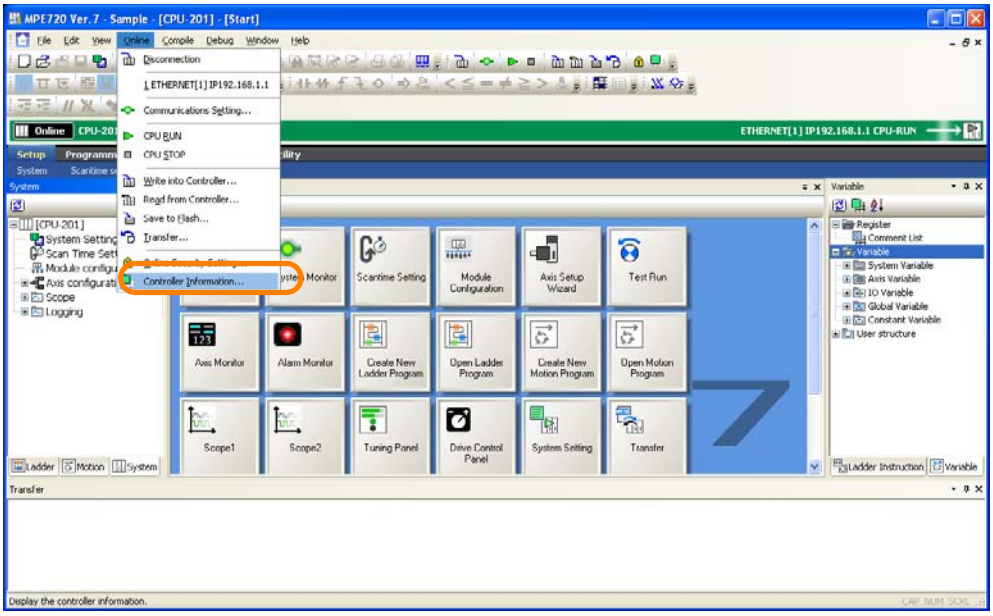
This concludes the procedure.

4.7 Confirming Information on the Machine Controller

Some functions may not be available for your Machine Controller depending on the firmware version. In this case, you need to confirm the information on the connected Machine Controller from the MPE720.

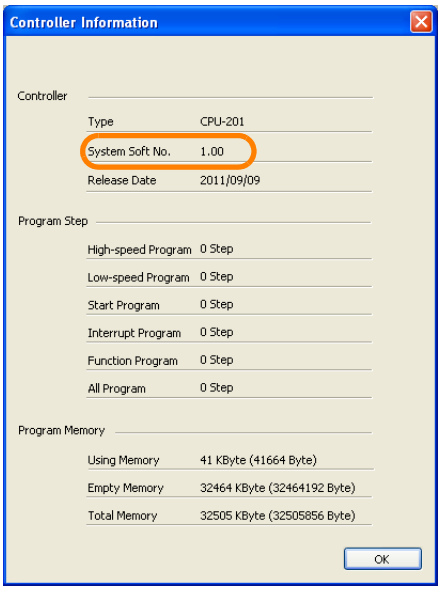
Use the following procedure to confirm the firmware version of the Machine Controller.

1. Select ***Online*** – ***Controller Information*** from the menu bar.

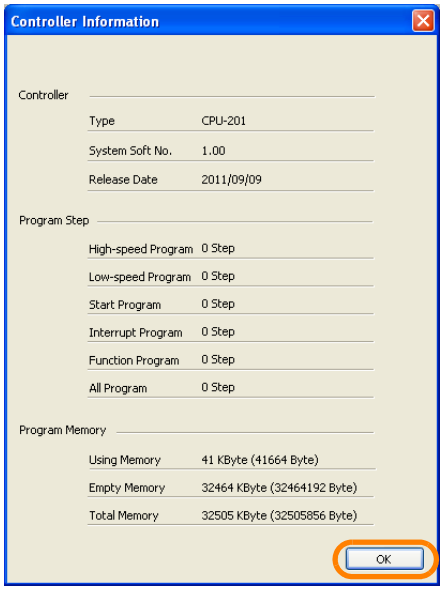


The Controller Information Dialog Box will be displayed.

2. Confirm the version that is given for the **System Soft No**.



3. Click the **OK** Button.



The Controller Information Dialog Box will close.

This concludes the procedure.

4.8 Setting Battery Connection Status of Machine Controller

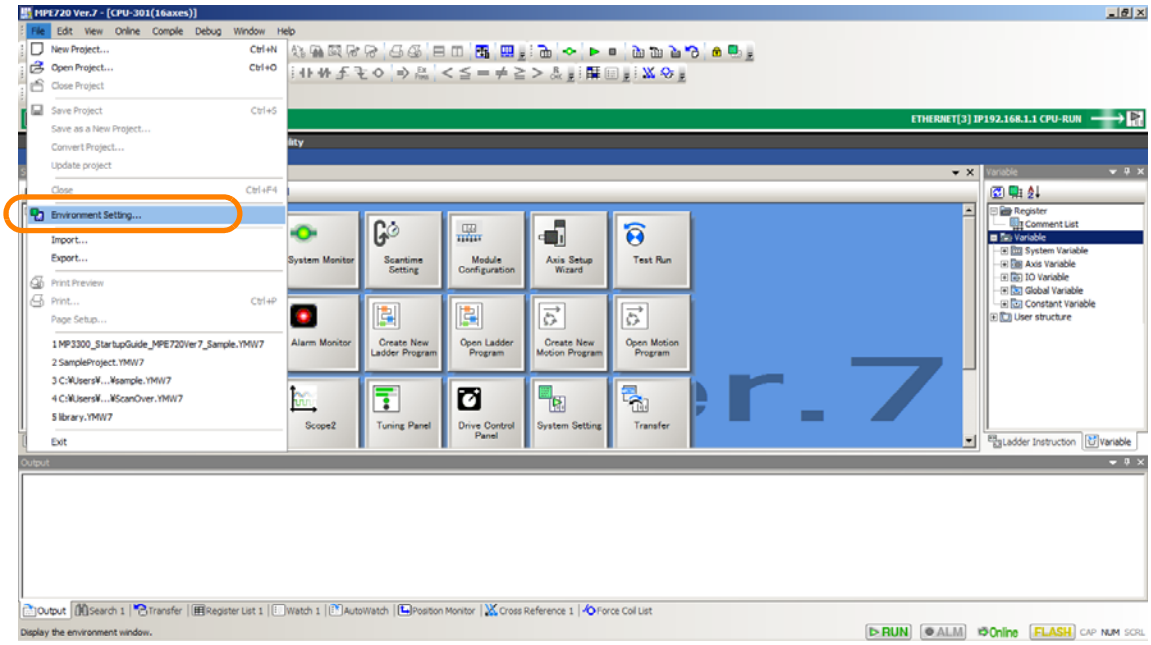
Use the following procedure to set the battery connection status of Machine Controller.

Information The setting is available for MP3000-series version 1.36 or later.

Information The setting for MP3100 is alsays **Battery Connection: Connect** and cannot be changed.

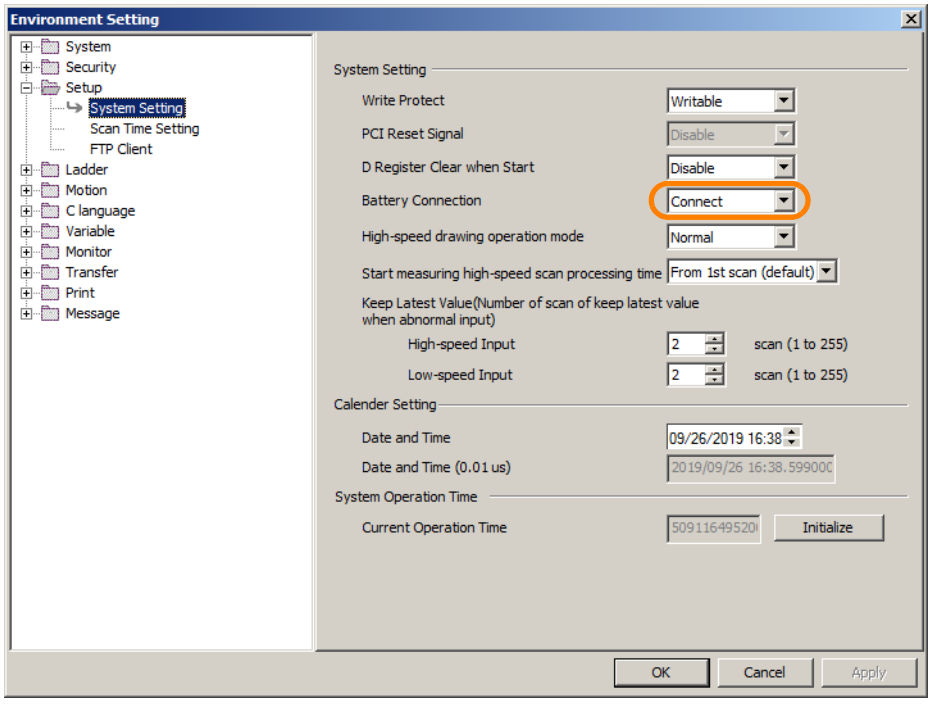
Begin by setting the FTP access privileges.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

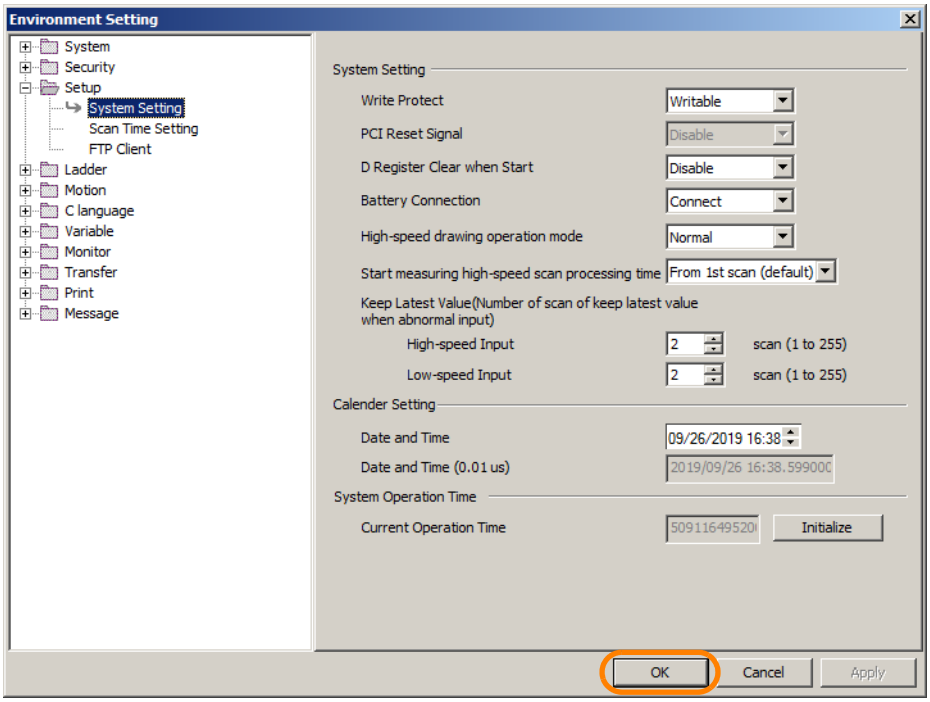


The Environment Setting Dialog Box will be displayed.

2. Select **Setup - System Setting - Battery Connection.**



3. Click **OK**.



This concludes setting.

4.9 Setting Calendars on Machine Controllers

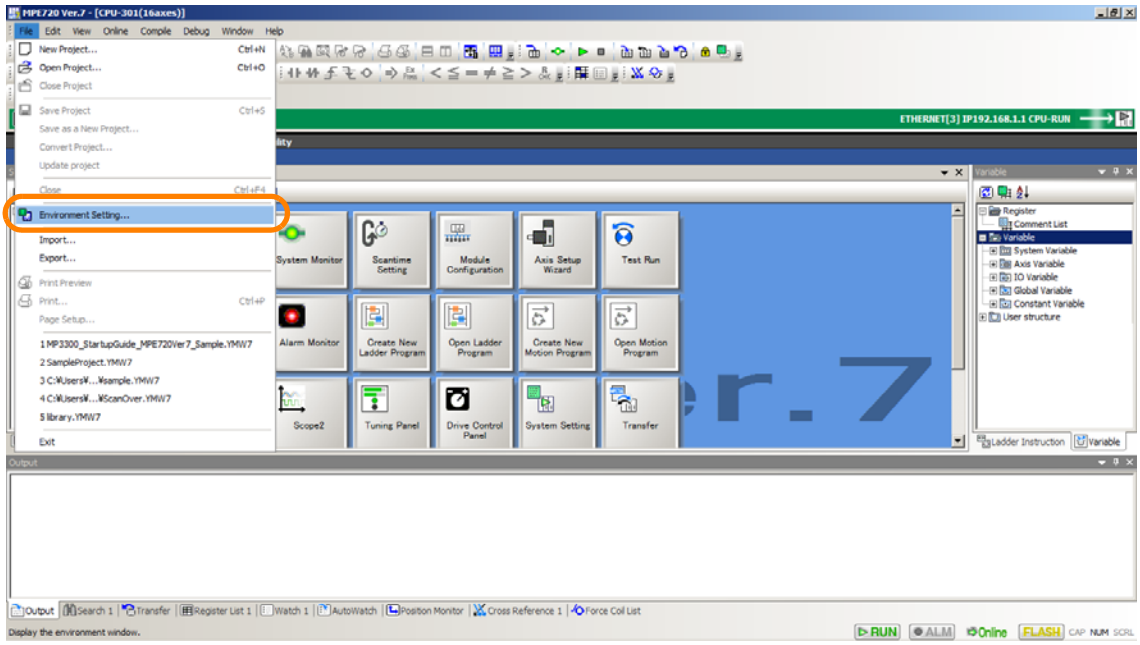
Set the calendar in advance. When an alarm occurs, the date and time (unit: s or 0.01 us) will be recorded automatically.

The power is supplied from battery. There will not be any gap even if you switch OFF the CPU unit (accuracy: 1 minutes/month).

The date and time information can be set, changed or referred in system registers. Refer to the instruction manuals of the Machine Controller.

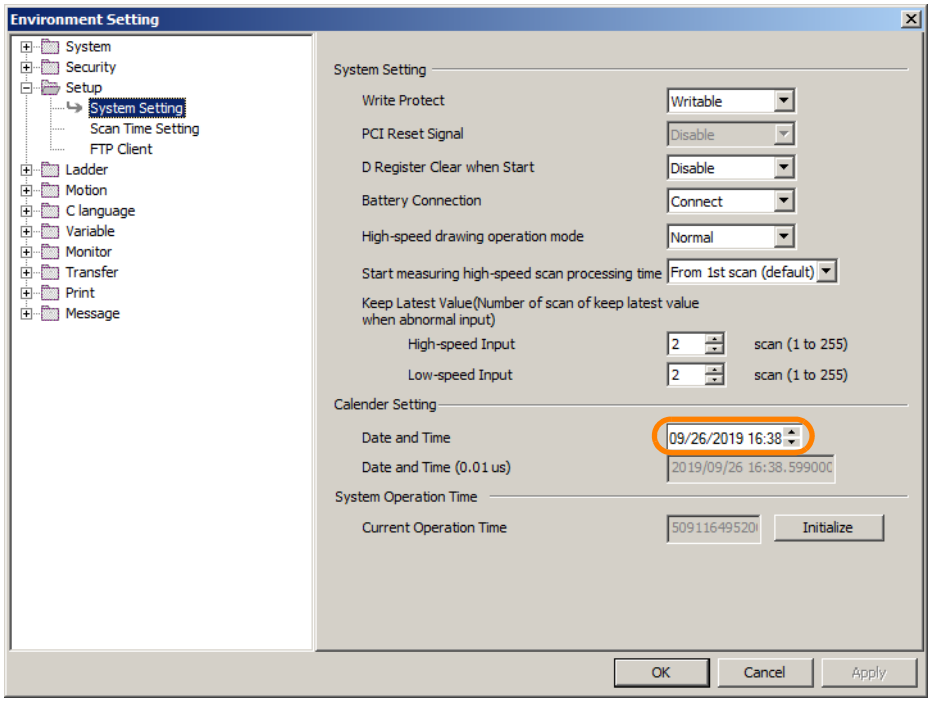
Use the following procedures to set the calendar of Machine Controller.

1. Select **File** – **Environment Setting** from the menu bar.

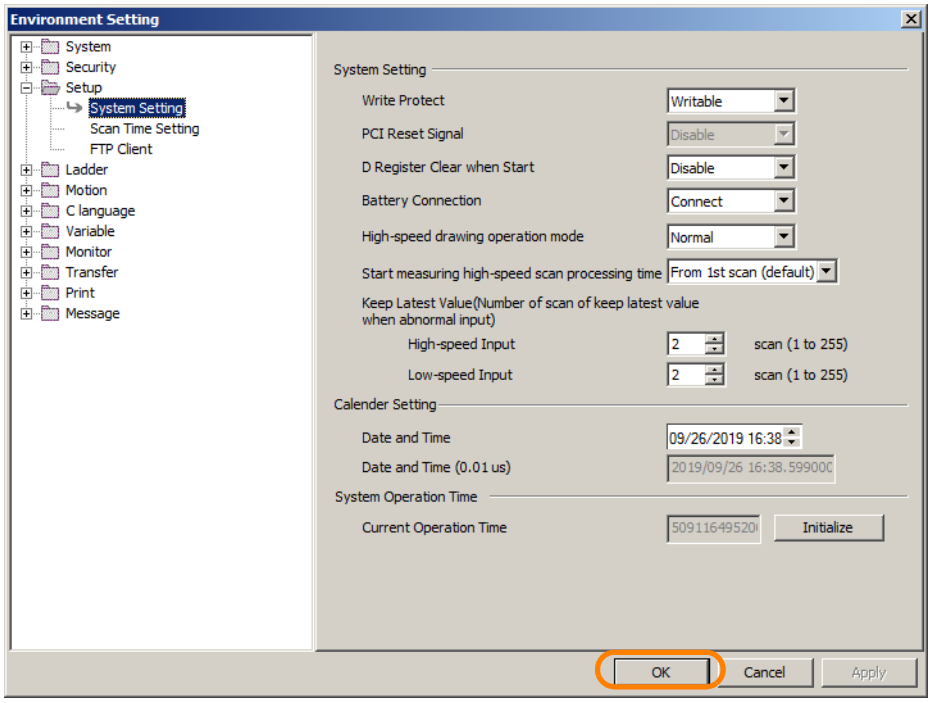


Displays the **Environment Setting** Dialog Box.

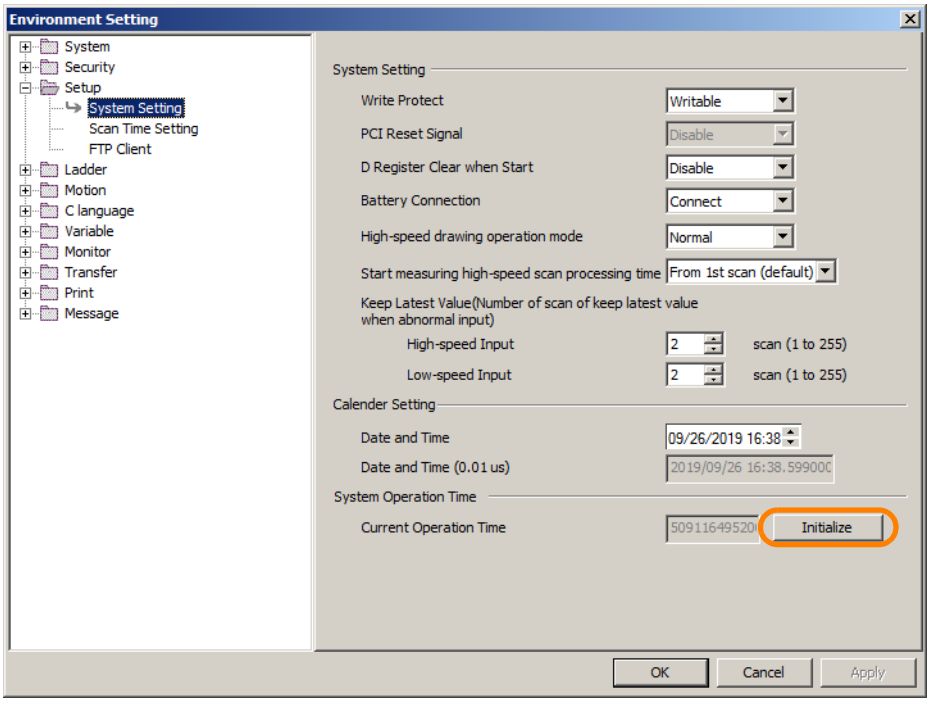
2. Select **Setup** – **System Setting** - **Date and Time**.



3. Click the **OK** Button.



Information Click **Initialize** to initialize system operation time.



This concludes the procedure.

Regular Calendar and μs Calendar

There are two types of calendars: the regular calendar and the μs calendar. The following table gives the major differences between the two.

Item	Regular Calendar	μs Calendar
Supported Versions	All versions	• MP3000 Series: Version 1.44 or higher • Σ-7C: Version 1.09 or higher • MP2000 Series: Not compatible
Unit	s	0.01 μs
System Register	SW00015 onward	SW15815 onward
	Refer to the manual of the Machine Controller that you are using for details.	
Update Timing	Updated in system background processing.	The value of the μs calendar and that of the regular calendar will be the same when specifying or changing regular calendar settings, and when the power is turned on. Thereafter, the μs calendar is updated when high-speed scan is executed.
	Due to this difference, a deviation of approximately a few seconds per day may occur between the regular calendar and μs calendar.	

Information If you want to change the set date and time, change the regular calendar settings.

System Operation Time

The system operation time is the total time that the system has been operating. Use of a battery backup for the calendar enables the count to be increased even when the power of the Machine Controller is turned OFF. The count of the total time is increased when high-speed scan is executed.

Software versions of the Machine Controller are shown below:

- MP3000 Series: Version 1.44 or higher
- Σ-7C: Version 1.09 or higher
- MP2000 Series: Not compatible

The maximum value for system operation time is 99999999999999999 (approx. 277,777 hours).

The system operation time is reset to zero and counting restarted if any of the following occurs.

- The system operation time when the power is turned on exceeds the maximum value.
- Initialization operation is performed by using the MP720.
- Other than MP3100: The power is turned ON with the **Battery Connection** set to **Not connect** under **Environment Setting** - **Setup** in the MPE720.
- Other than MP3100: The power is turned on when the Battery is not connected.
- MP3100 only: The power is turned ON after setting the calendar function of MP3100 as asynchronized with host PC while using with Main CPU mode.

4.10 Accessing Machine Controller Data from a Host PC

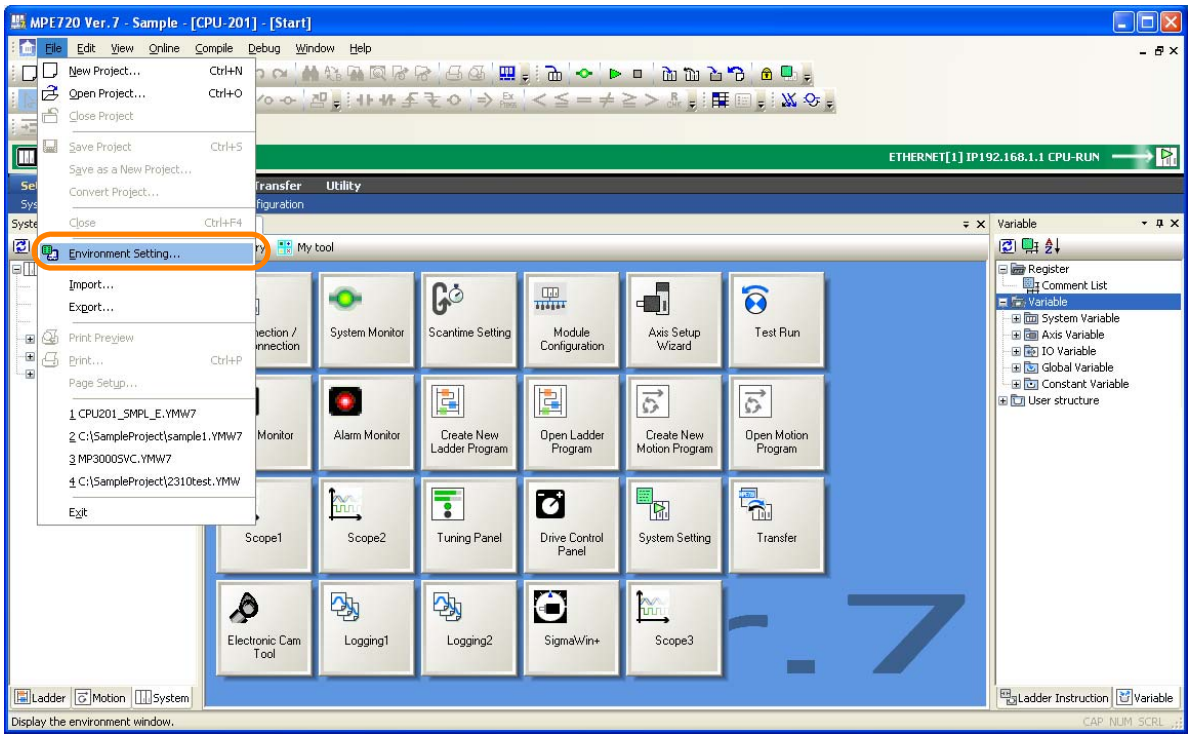
Use the following procedure to access data in the Machine Controller from a host PC by using FTP.

Information

1. FTP is supported only for MP3000-series Machine Controllers.
2. Access using FTP is limited to the data inside the USB memory device that is mounted to the CPU Unit. If the data to acquire is saved in the CPU Unit, move it to the USB memory device beforehand.

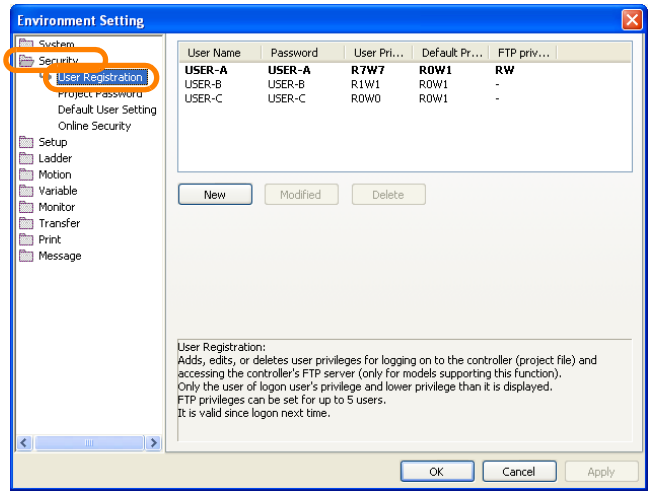
Begin by setting the FTP access privileges.

1. Select ***File*** – ***Environment Setting*** from the menu bar.



The Environment Setting Dialog Box will be displayed.

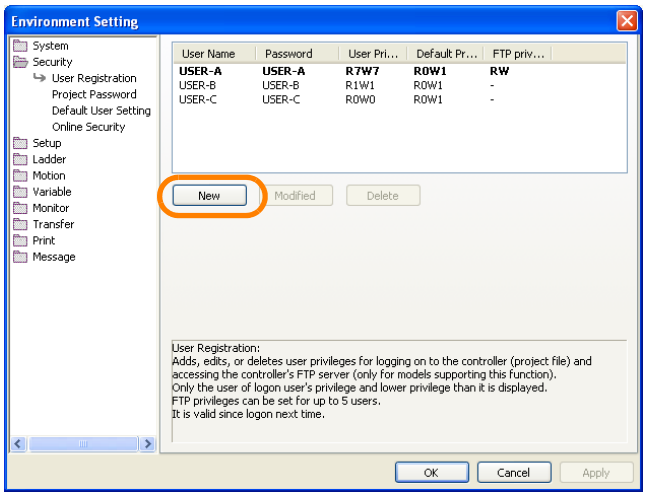
2. Select **Security - User Registration**.



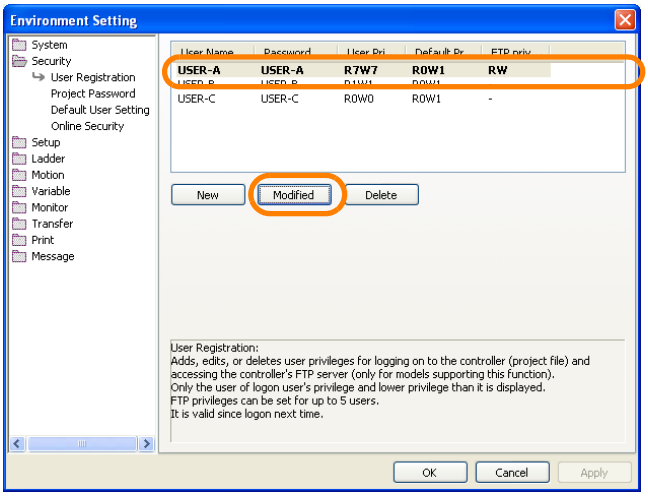
The FTP privileges for each user will be displayed.

3. Any of the following operations can be used.

- To add a new user: Click the **New** Button.



- To change registered information: Select the user name for the FTP privileges to be changed and click the **Modified** Button.

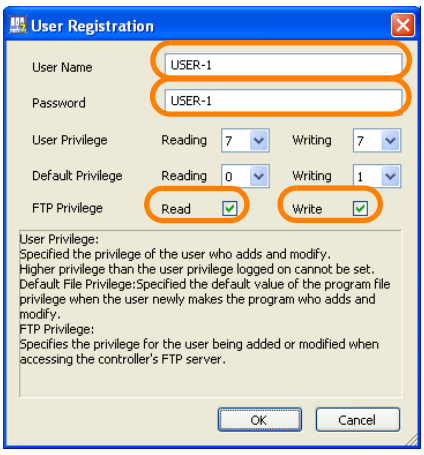


The User Registration Dialog Box will be displayed.

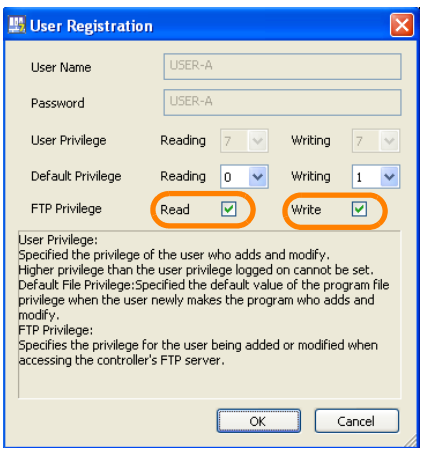
4. Select the **Read** and **Write** Check Boxes for the **FTP Privilege**.

Information If you clicked the **New** Button, also enter settings into the **User Name** and **Password** Boxes.

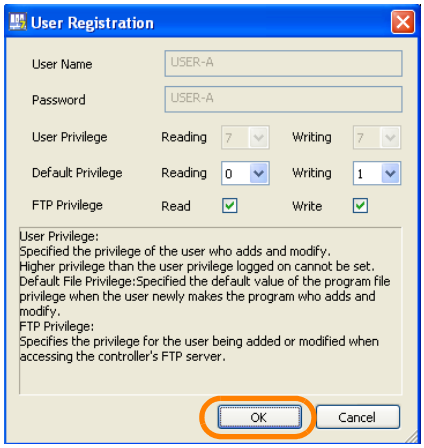
If You Clicked the **New** Button



If You Clicked the **Modified** Button

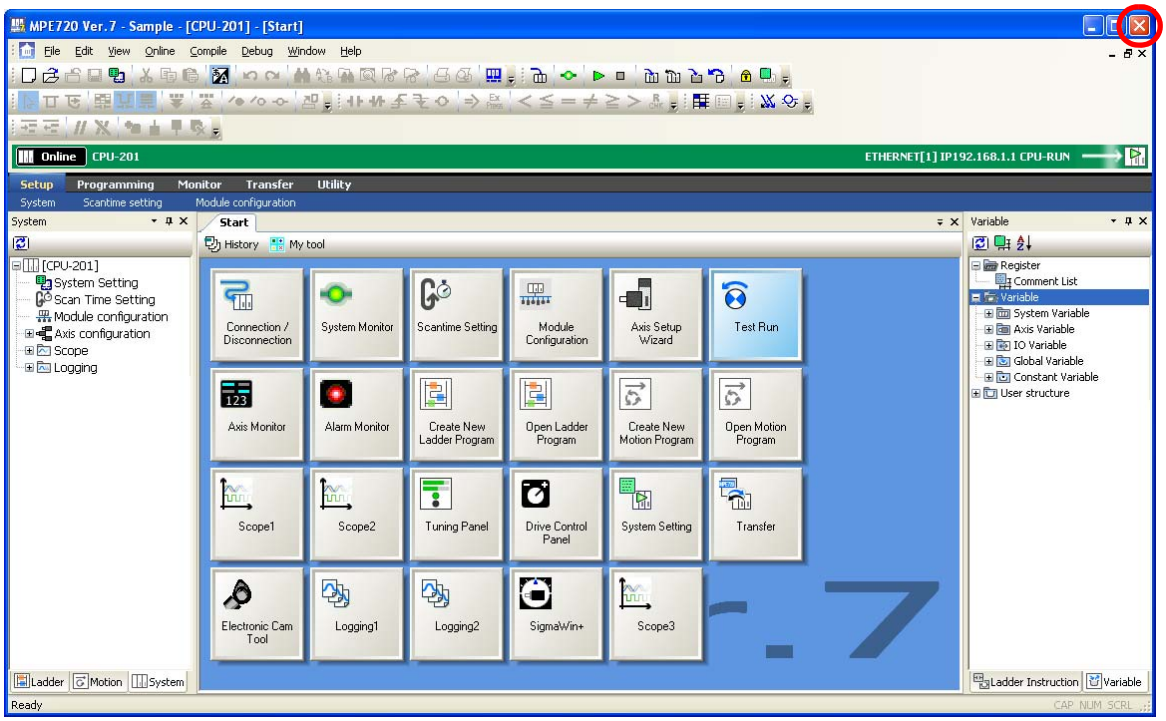


5. Click the **OK** Button.



The User Registration Dialog Box will close.

6. Click the **Close** Button on the MPE720 Window.

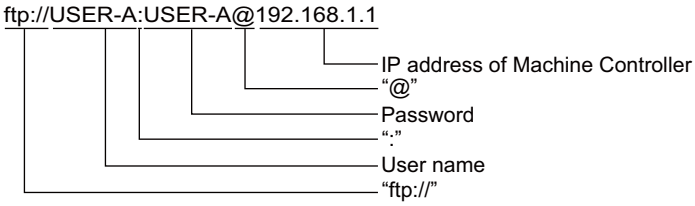


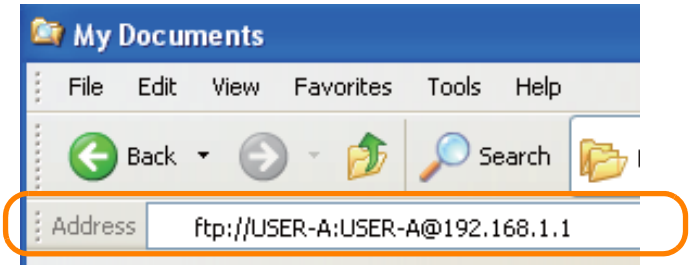
The FTP privileges will be activated.

This concludes setting the FTP privileges.

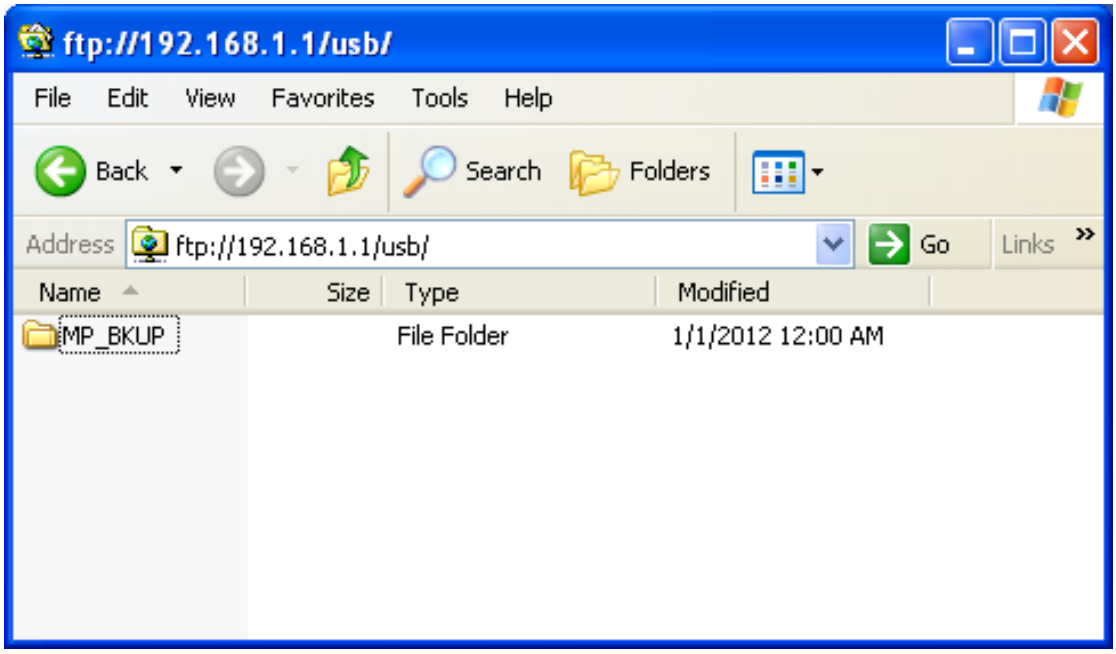
The next step is to use a host PC to acquire data from the Machine Controller using FTP. This section describes how to access the FTP server from a Windows PC.

7. Enter the address in the address bar.
The address structure is as follows:





8. Press the **Enter** Key.
The folder of the FTP server will be displayed. That is, the contents of the USB memory device that is mounted in the CPU Unit will be displayed.



This concludes the procedure.

4.11 Creating, Editing, and Saving Project Files

This section gives the procedures for creating, editing, and saving project files.

4.11.1 Creating a Project File

Refer to the following section for details on creating a project file.
☞ *2.5 Creating a Project File* on page 2-17

4.11.2 Opening an Existing Project File

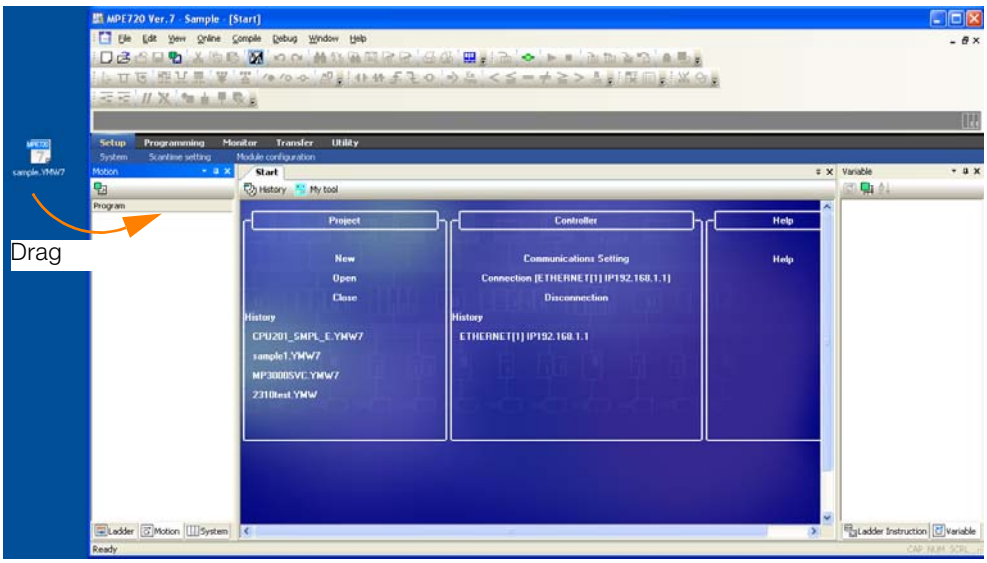
You can open an existing project file by using one of the following three methods.

Information You cannot have more than one project open at a time. When opening a project file, make sure you do not have another project file open.

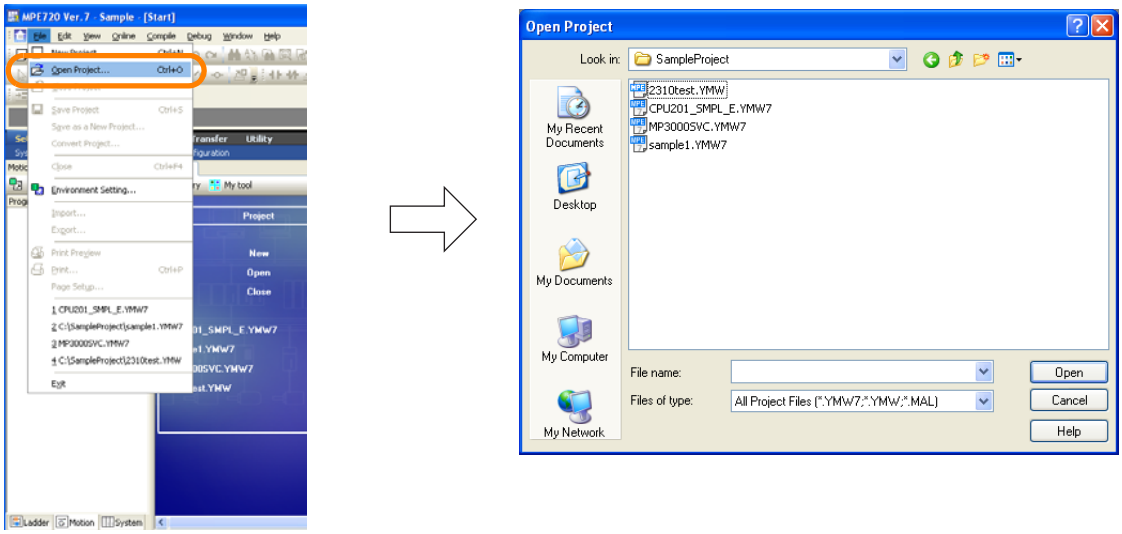
- Drag the icon for the project file to open onto the MPE720 Ver. 7 Icon.

Drag

- Drag the icon for the project file to open into an MPE720 Ver. 7 Window that is already running.



- Select ***File*** - ***Open Project*** from the menu bar, and then select a project file in the Open Project Dialog Box.



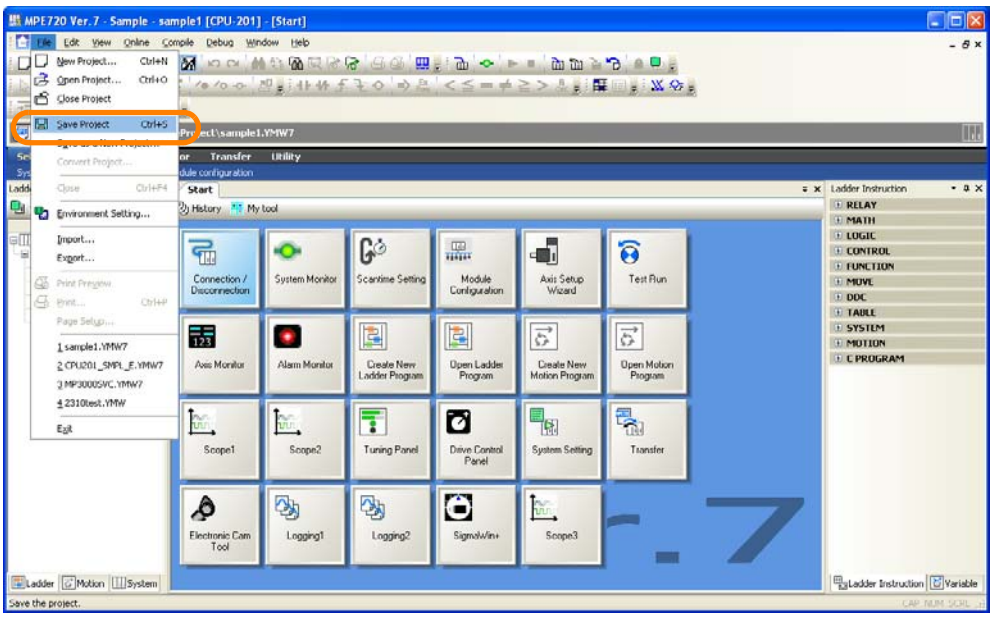
4.11.3 Saving Project Files

A project file can be overwritten or the data can be saved in a new project file.

Overwriting Project Files

Use the following procedure to overwrite an existing project file.

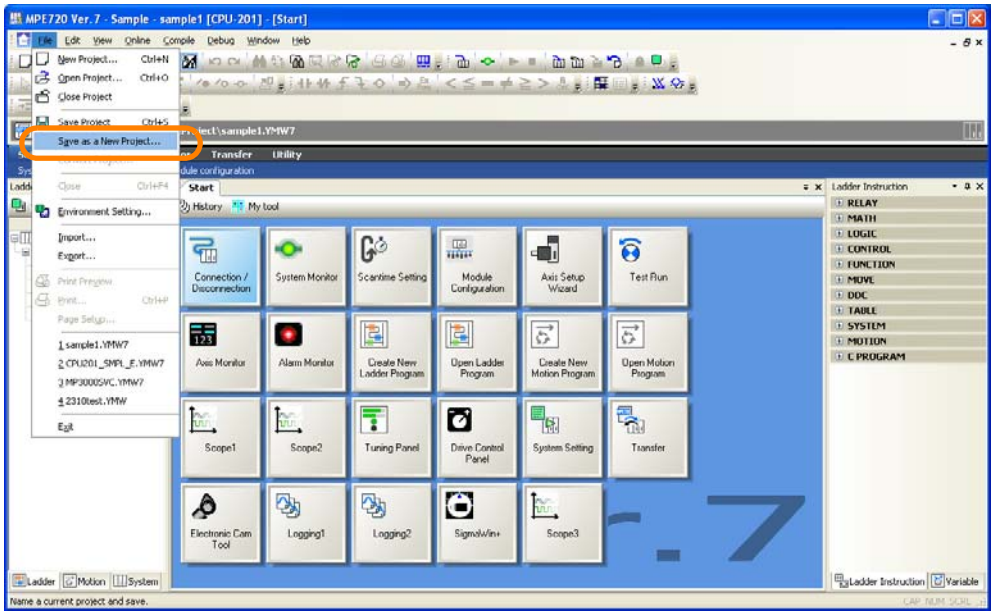
- Select ***File*** – ***Save Project*** from the menu bar.



Saving a New Project File

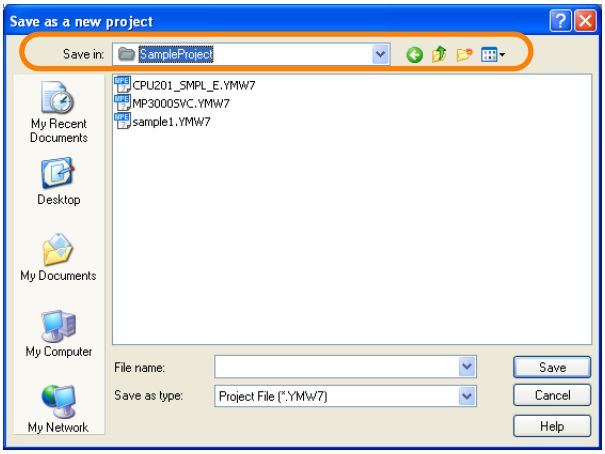
Use the following procedure to save the data in a new project file.

1. Select ***File – Save as a New Project*** from the menu bar.

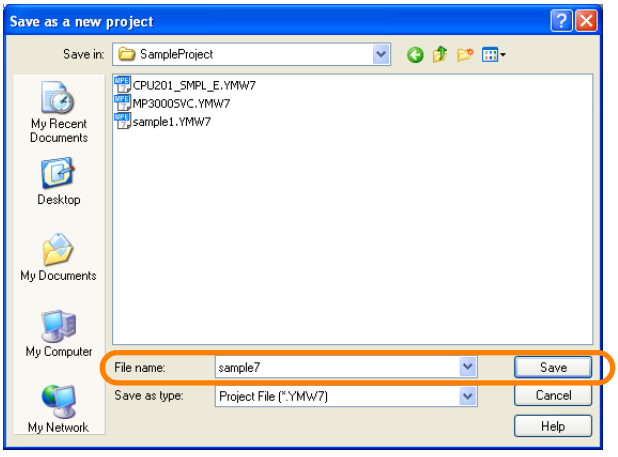


The Save As a New Project Dialog Box will be displayed.

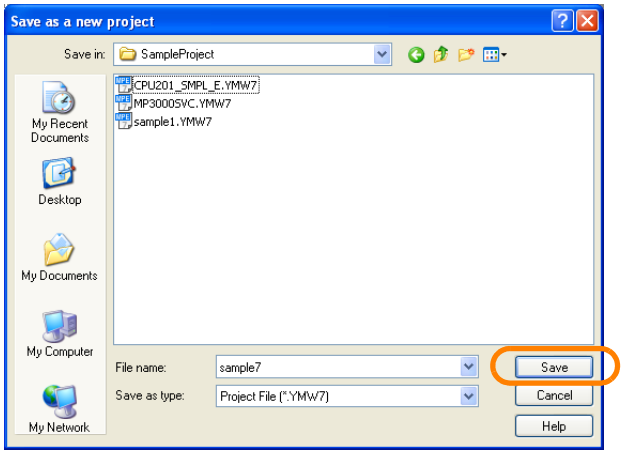
2. Select the folder in which to save the new project file.



3. Enter a file name.



4. Click the **Save** Button.

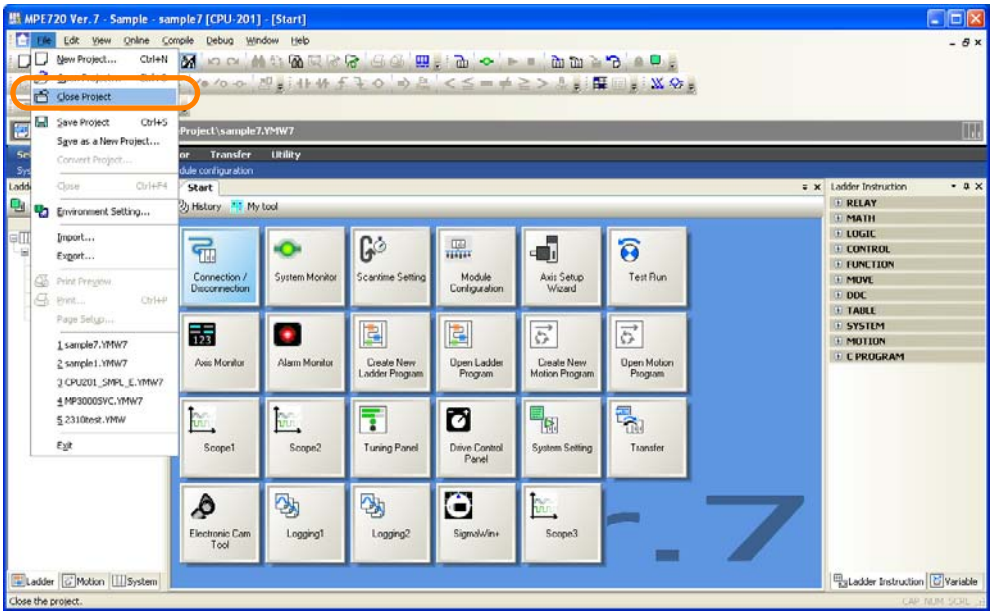


This concludes the procedure.

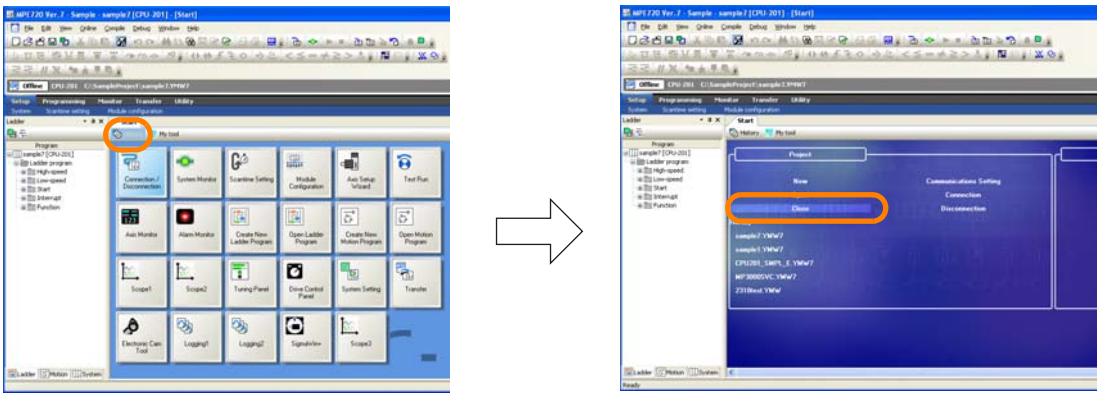
4.11.4 Closing a Project File

You can close an existing project file by using one of the following two methods.

- Select ***File*** – ***Close Project*** from the menu bar.



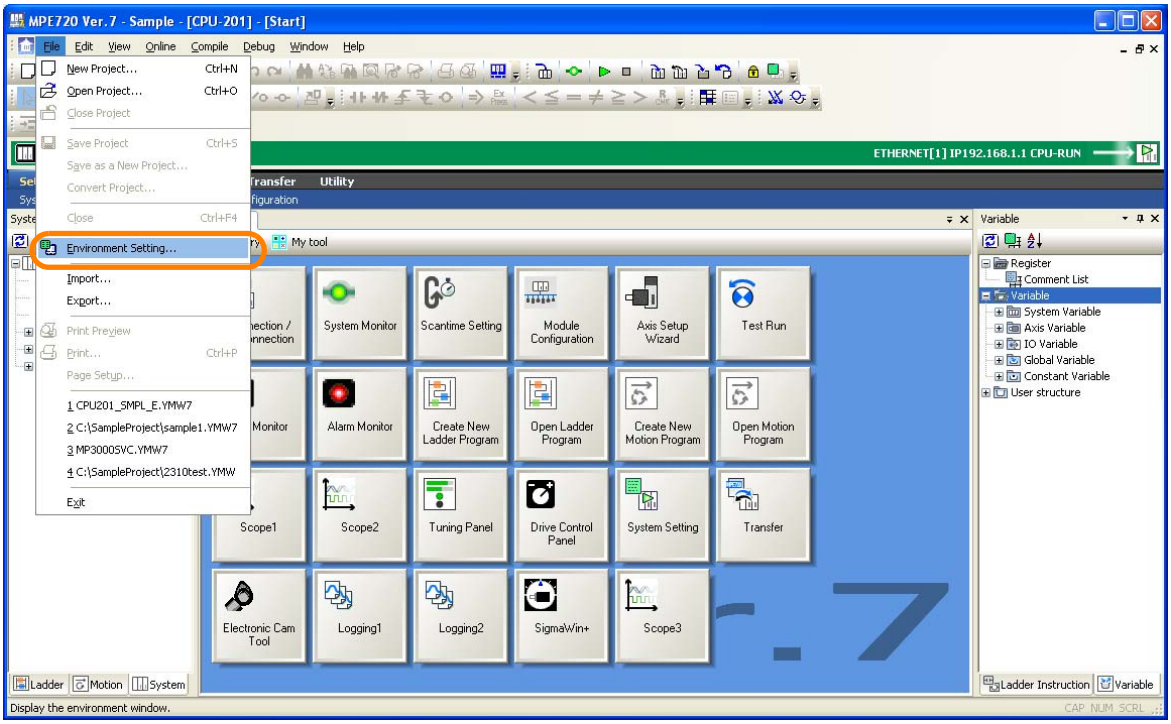
- Select **History** on the Start Tab Page, then select ***Close***.



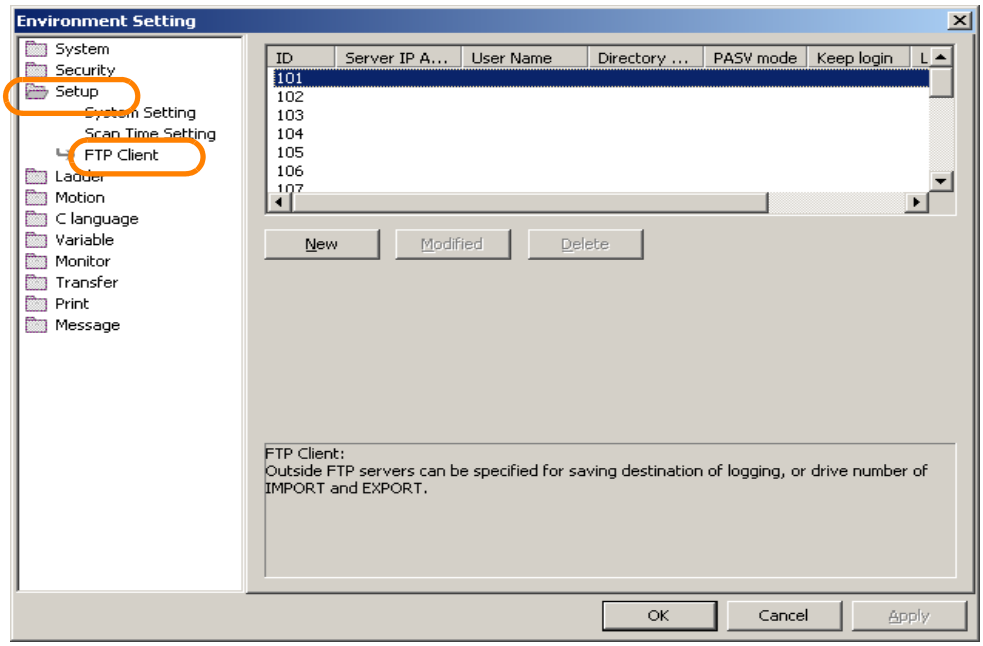
4.12 Using an FTP Client

You must register an FTP server to use the FTP client. You can specify a registered FTP server as the destination for saving log data and as the drive number for the Export and Import ladder instructions. Use the following procedure to register or set FTP servers.

1. Select ***File*** – ***Environment Setting*** from the menu bar.



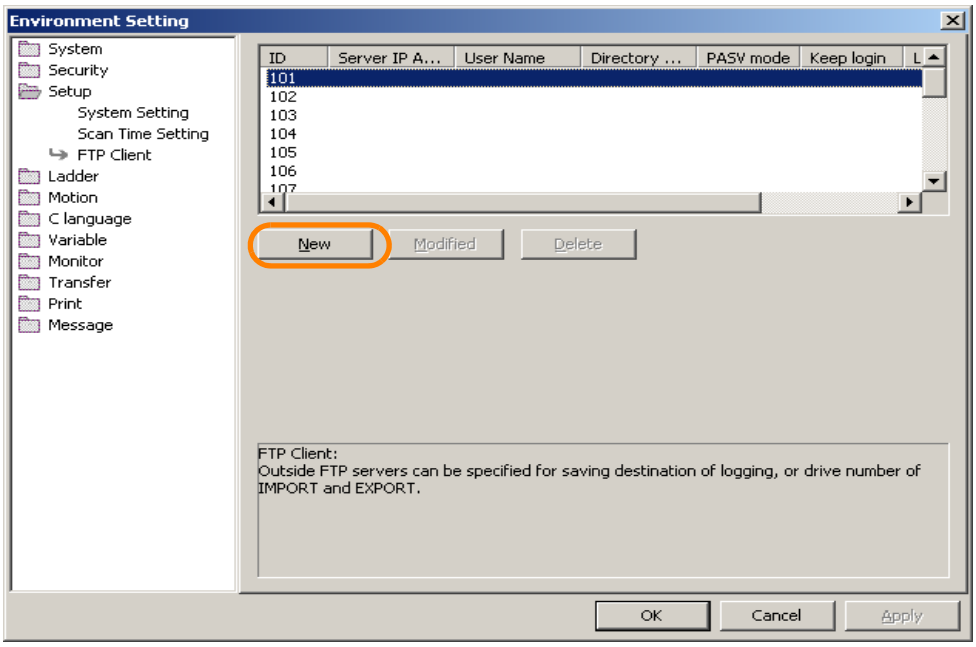
2. Select **Setup - FTP Client**.



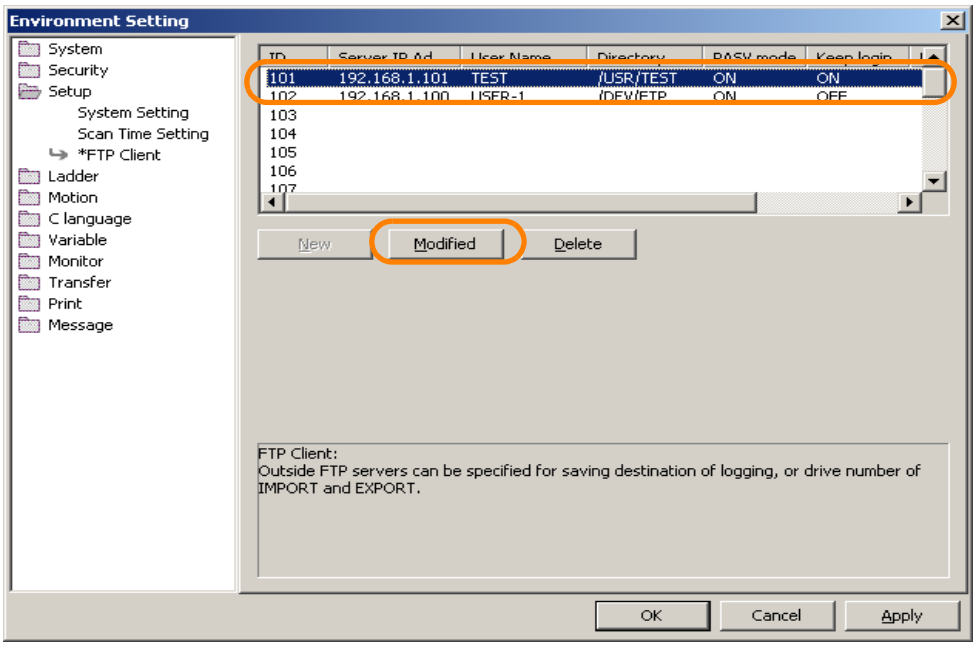
A list of FTP servers will be displayed.

3. Any of the following operations can be used.

- To add a new FTP server: Click the **New** Button.



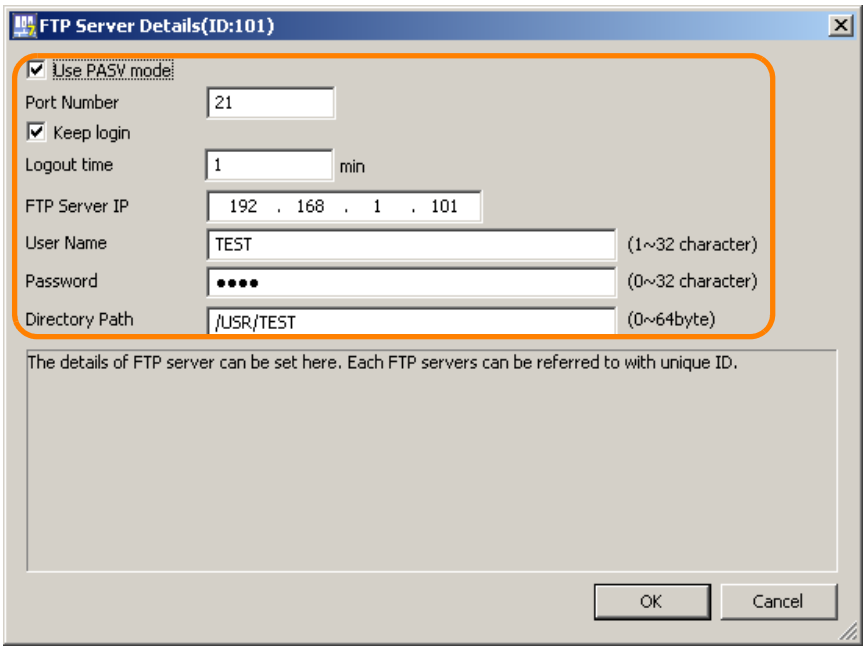
- To change registered information: Select the FTP server to be changed and click the **Modified** Button.



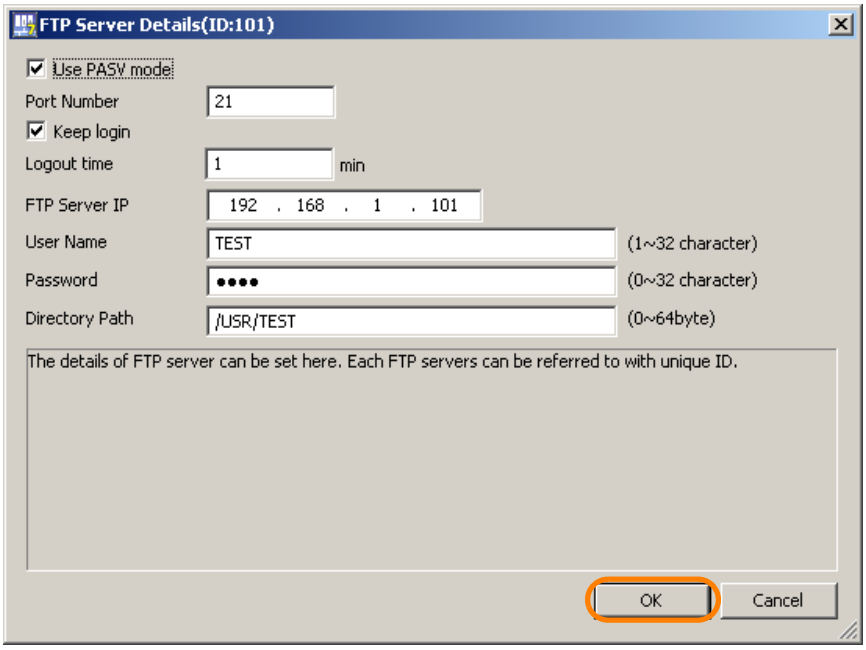
Information To delete an FTP server: Select the FTP server to delete and click the **Delete** Button.

The FTP Server Details Dialog Box will be displayed.

4. Make the settings for the FTP server.
Set the items according to the specified FTP server.



5. Click the **OK** Button.



The FTP Server Details Dialog Box will close.

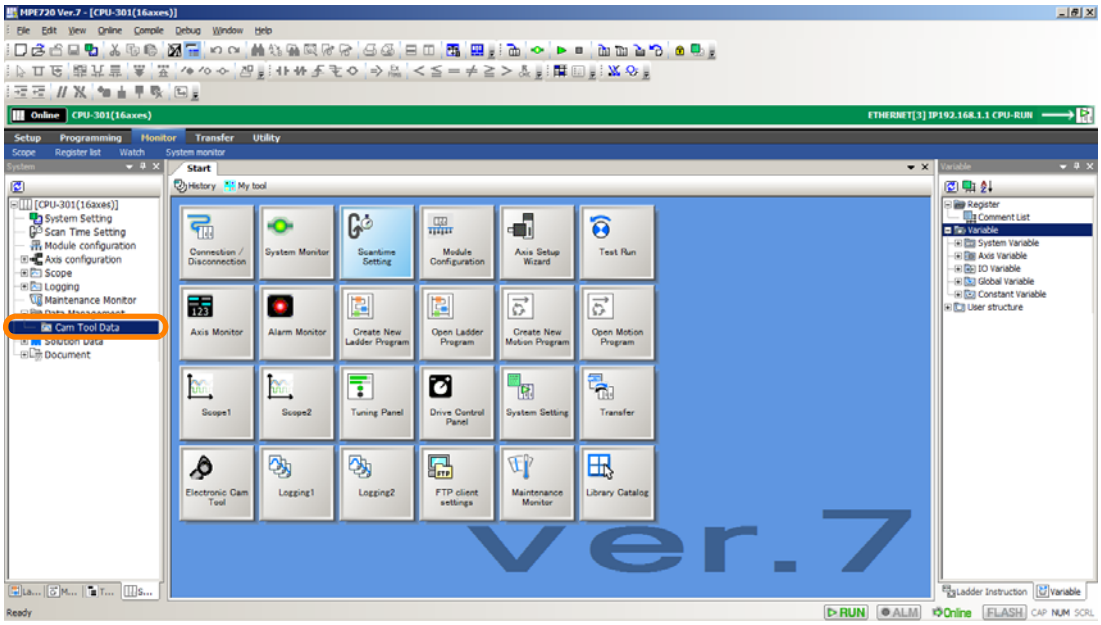
This concludes the procedure.

4.13 Importing Cam Tool Data

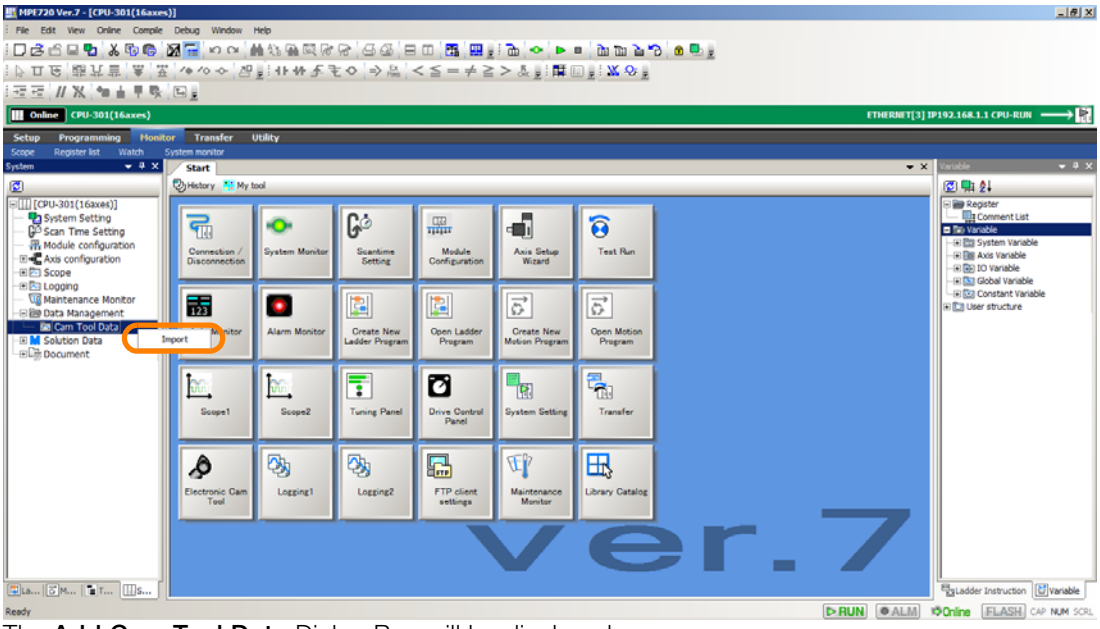
Cam tool data saved on a PC can be imported to MPE720. The following is the procedure to import cam tool data.

1. Connect to the Machine Controller or open the project file.

2. Right-click the cam tool data in the system subwindow.

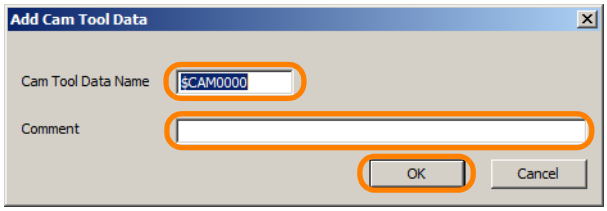


3. Click **Import**.



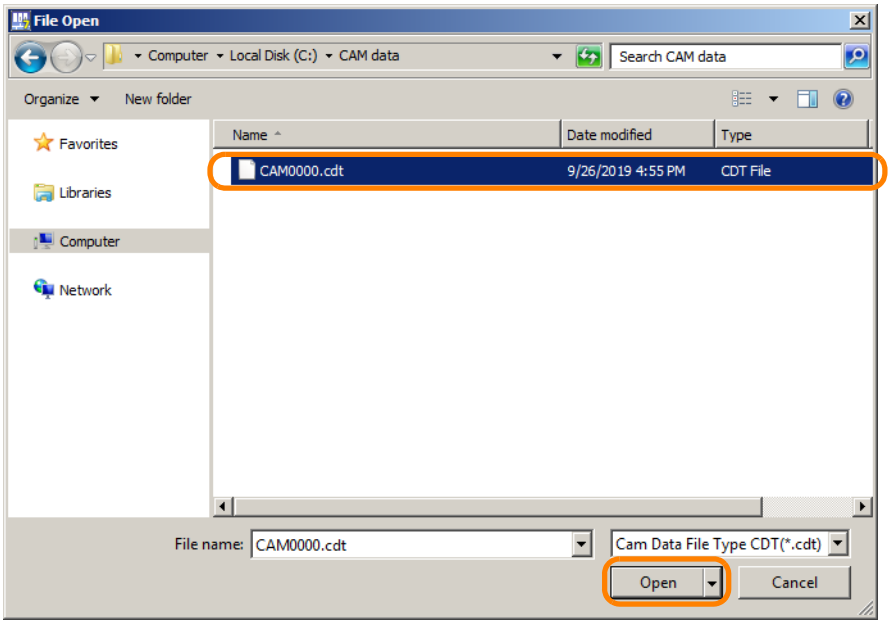
The **Add Cam Tool Data** Dialog Box will be displayed.

4. Enter the cam tool data name and comment, and click **OK**.

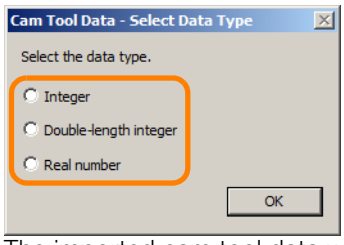


The **File Open** Dialog Box will be displayed.

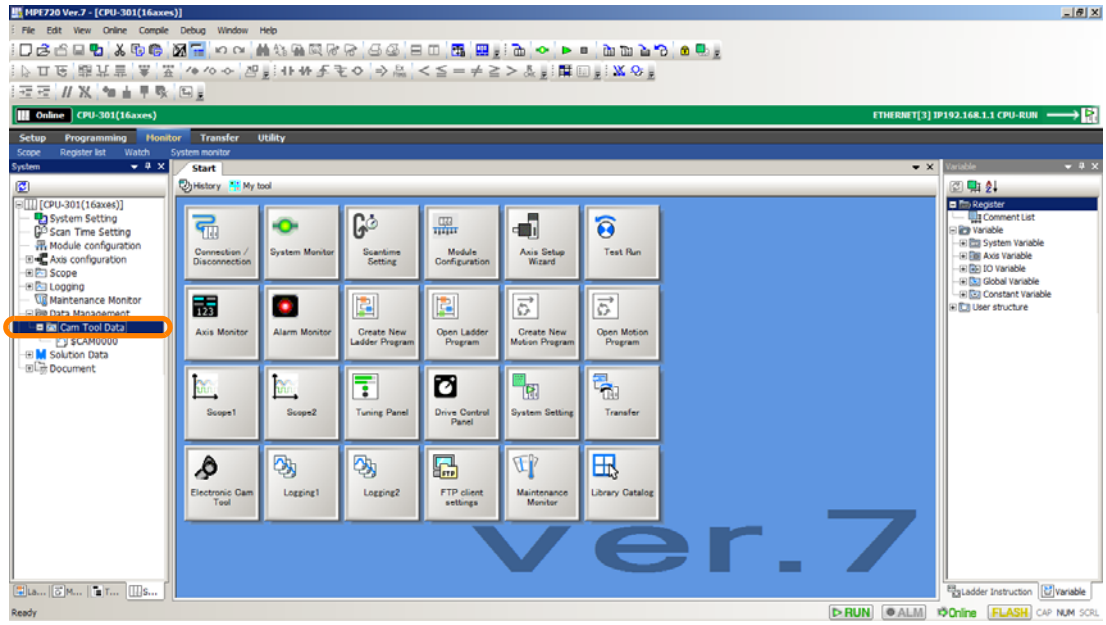
5. Select the cam data file to import, and click **Open**.



6. Select data type and click **OK**.



The imported cam tool data will be displayed on Pane.



This concludes the procedure.

Programming

5

This chapter describes the operations that are used in ladder programming and motion programming.

5.1 Ladder Programming

This section describes the operations that are used in ladder programming.

5.1.1 Creating New Ladder Programs

There are the following two methods that you can use to create ladder programs.

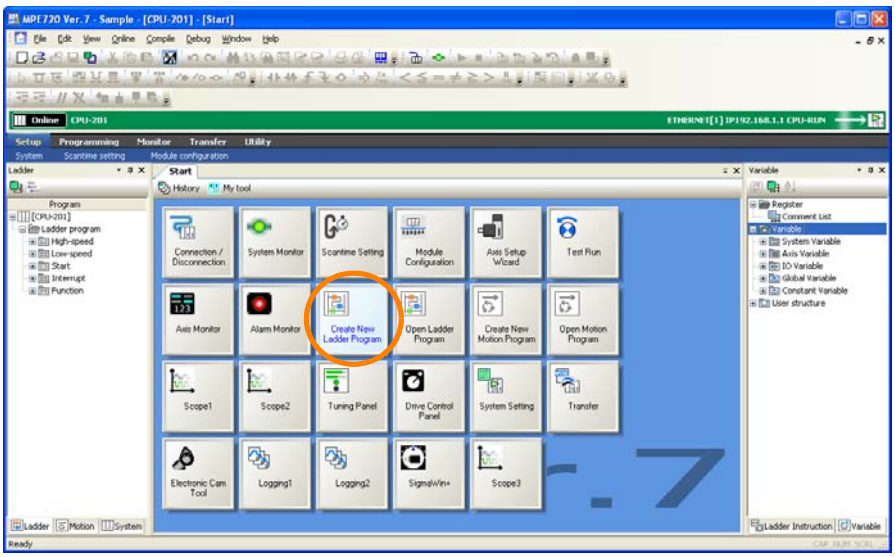
- Creating from the My Tool View
- Creating from the Ladder Pane

The procedures are given below.

Creating from the My Tool Tab View

Use the following procedure to create a new ladder program from the My Tool View in the MPE720 Ver. 7 Window.

1. Click the **Create New Ladder Program** Button.

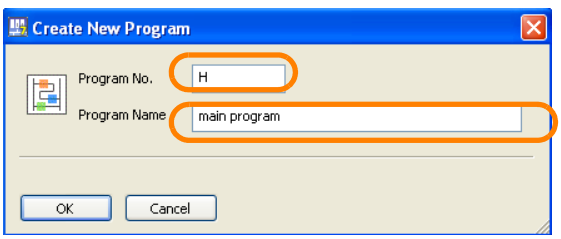


The Create New Program Dialog Box will be displayed.

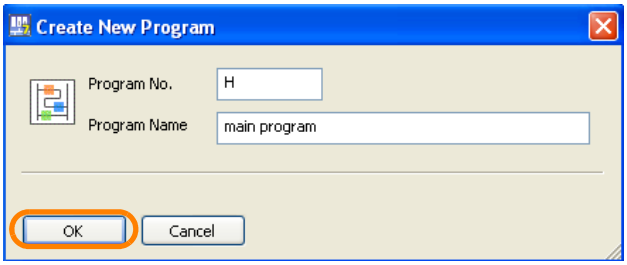
2. Enter the program number and program name.

- Example for the Program Number: H 01 . 01

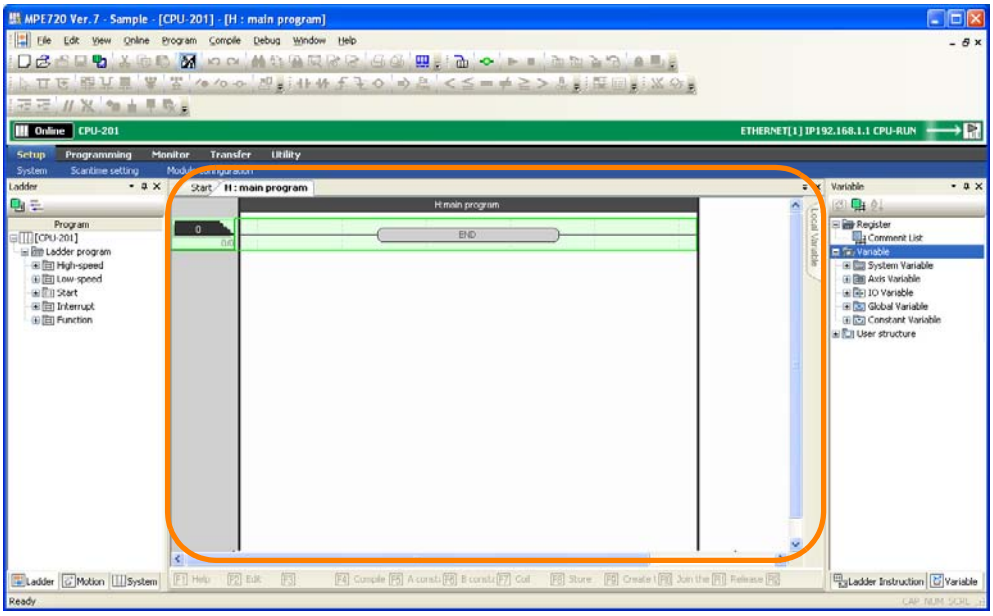
Grandchild drawing number (setting range: 01 to 99)
Period
Child drawing number (setting range: 01 to 99)
Parent drawing type
- A: Startup drawing
- I: Interrupt drawing
- H: High-speed scan drawing
- L: Low-speed scan drawing



3. Click the **OK** Button.



A new ladder program will be displayed.

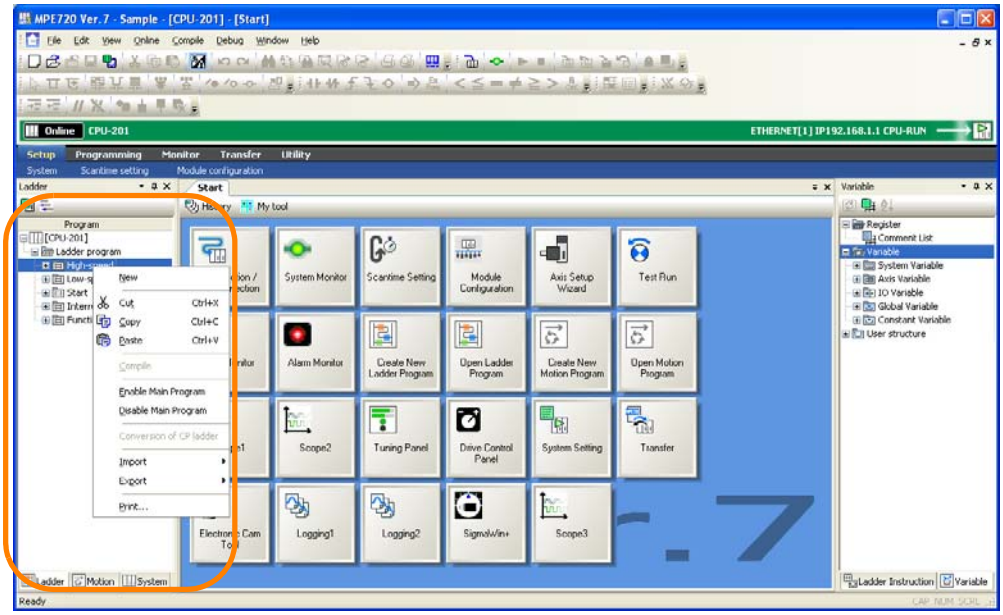


This concludes the settings.

Creating from the Ladder Pane

Use the following procedure to create a new ladder program from the Ladder Pane In the MPE720 Ver. 7 Window.

1. Right-click the type of ladder program to create in the Ladder Pane.

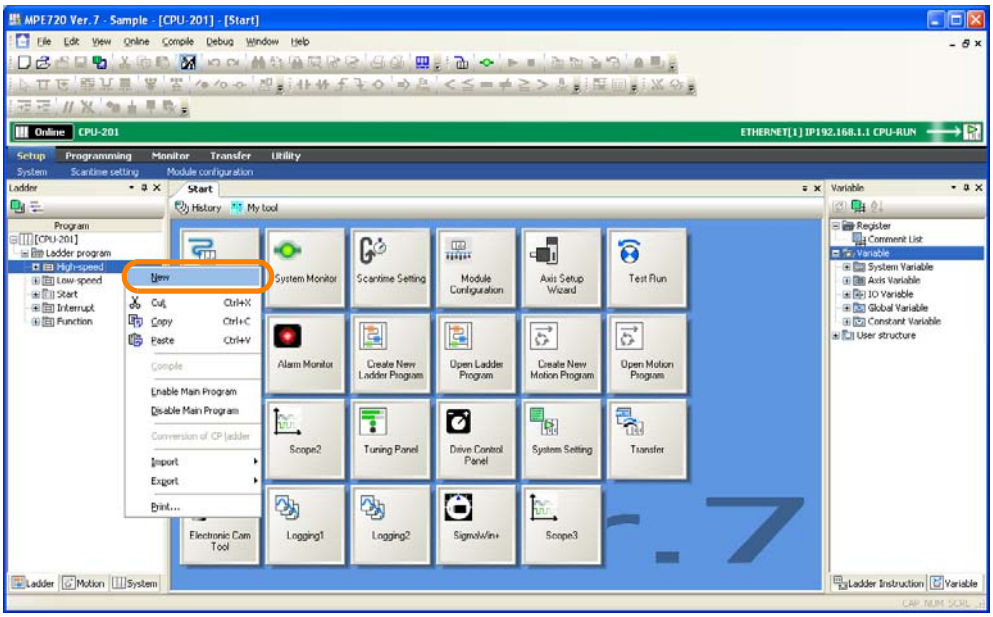


Information

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.

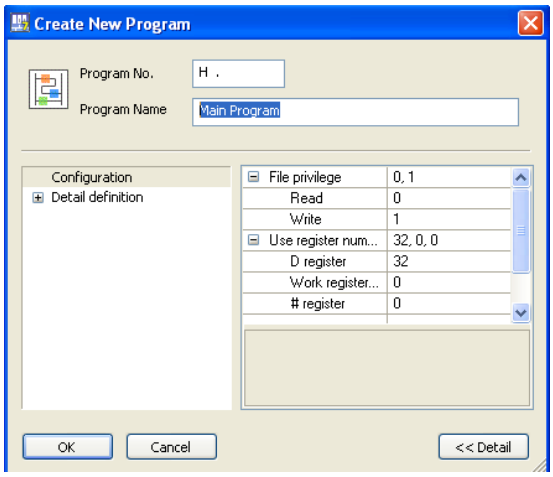
Creating Grandchild Drawings
Grandchild drawings can be created only if both parent and child drawings exist.
Right-click the program (child drawing) for which to create a grandchild drawing.

2. Select ***New***.

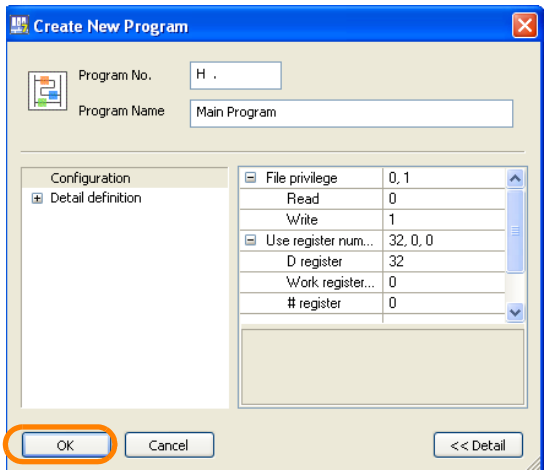


The Create New Program Dialog Box will be displayed.

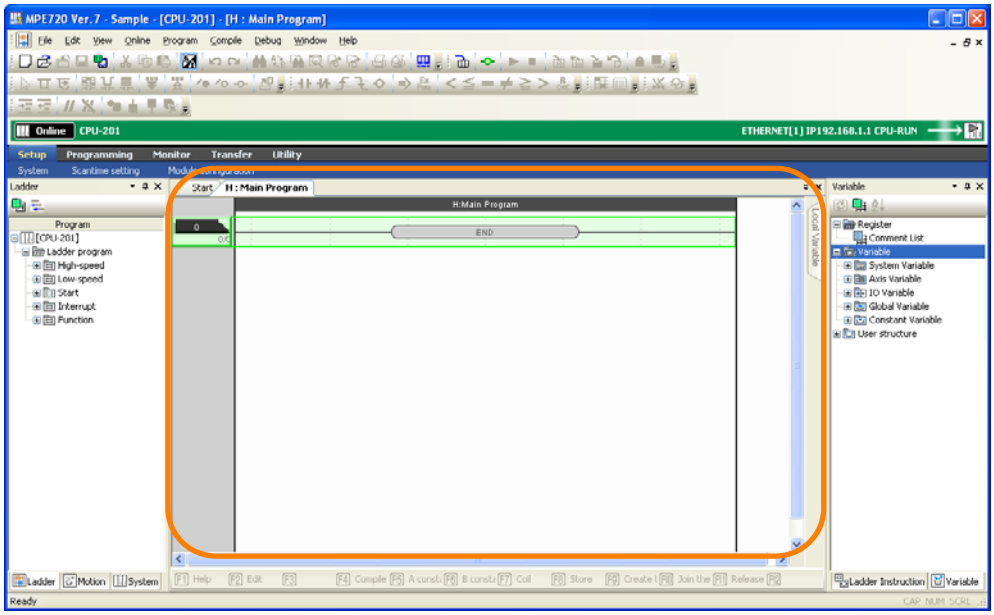
3. Change the settings as required.



4. Click the **OK** Button.



A new ladder program will be displayed.



This concludes the settings.

5.1.2 Editing Ladder Programs

This section describes the following three operations to edit ladder programs.

- Inserting a rung
- Inserting an instruction
- Setting parameters

Information

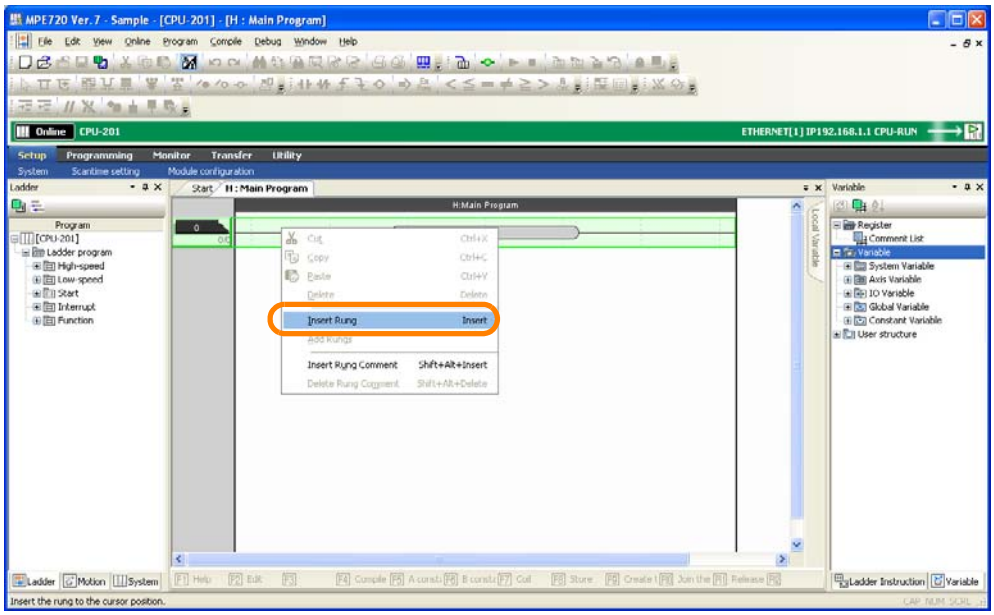
This section describes only the operating procedures for editing. Refer to the following manual for details on specific instructions and settings.

MP3000 Series Ladder Programming Manual (Manual No.: SIEP C880725 14)

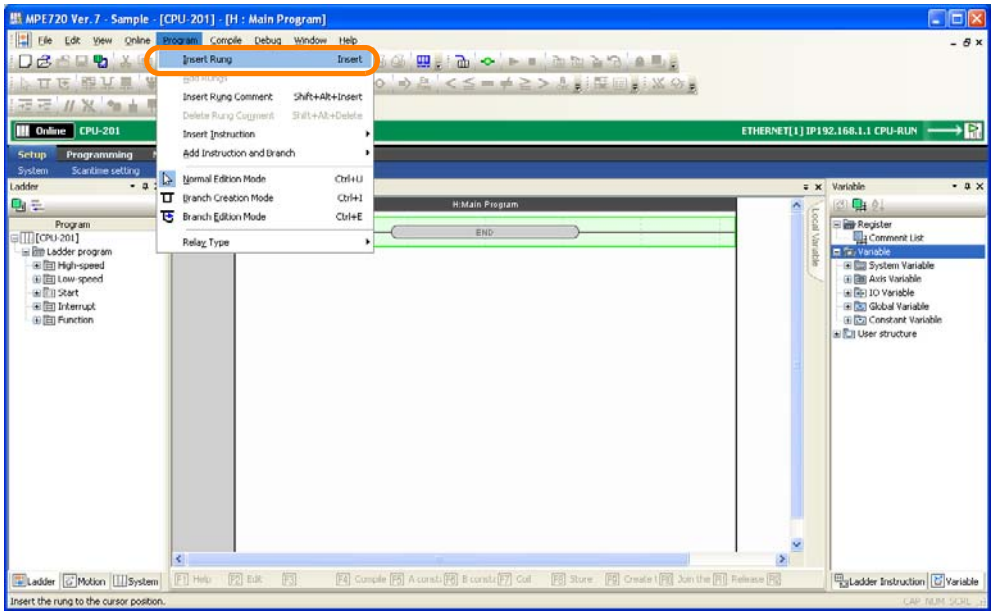
Inserting a Rung

There are the following three methods that you can use to insert rungs.

- 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 ***Program*** – ***Insert Rung*** from the menu bar.

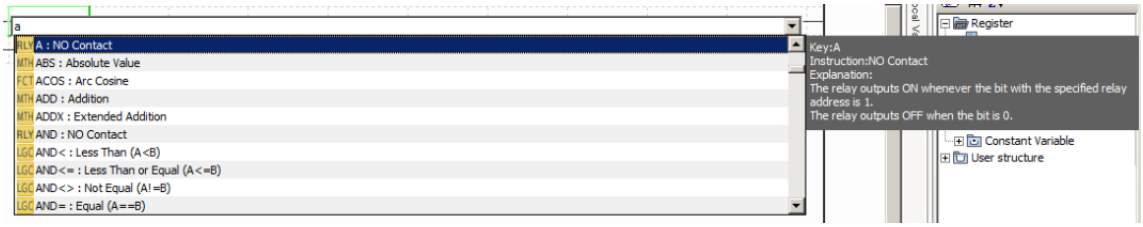


- Place the mouse cursor where the rung is to be inserted, and press the **Insert** Key.

Inserting an Instruction

There are the following four methods that you can use to insert instructions.

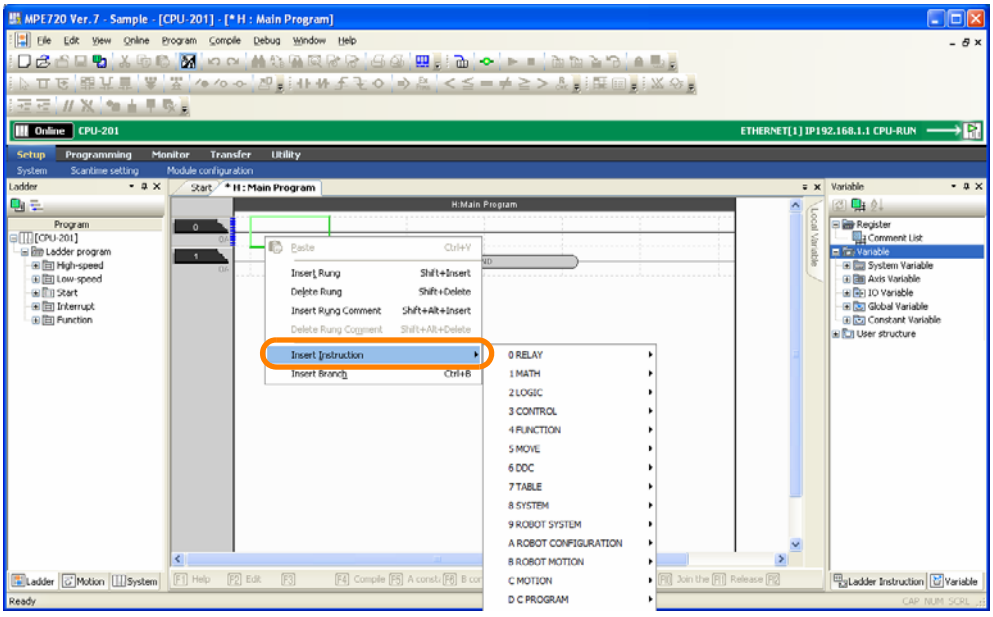
- Enter a text string or double-click the location where the instruction is to be inserted, and select the instruction you want to insert from the list of instructions that is displayed. (The Autocomplete function is used.)



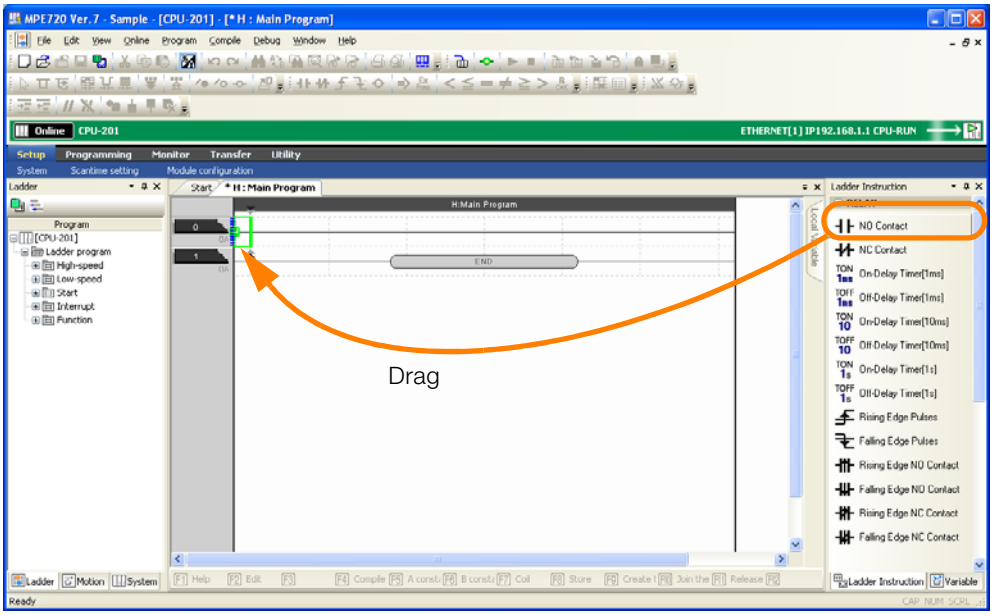
Refer to the following section for details on the Autocomplete function.

☞ *5.3.1 Using the Autocomplete Function* on page 5-81

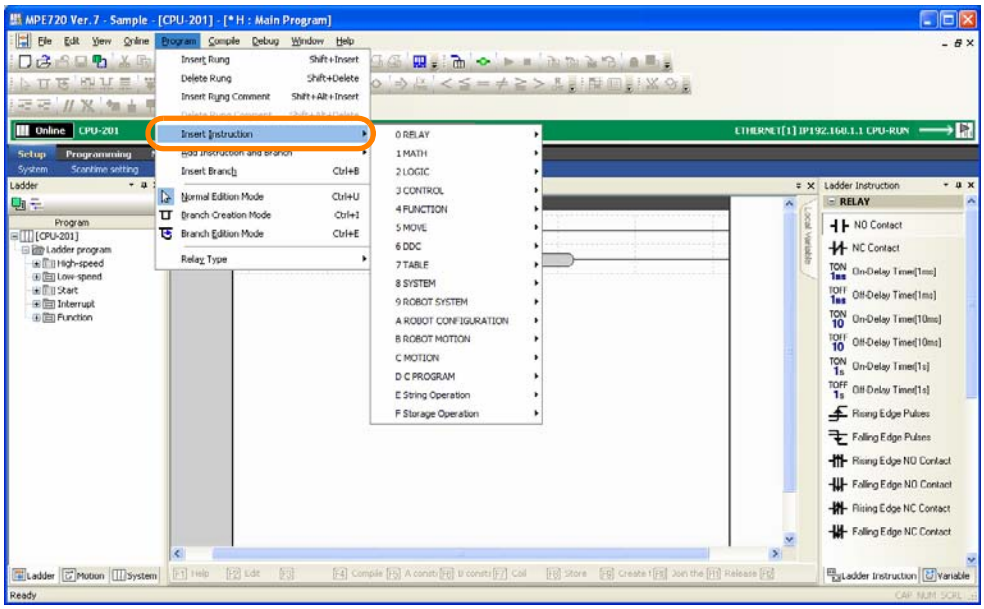
- Right-click where the instruction is to be inserted, and select the required instruction under ***Insert Instruction***.



- Drag the desired instruction from the Ladder Instruction Pane to where the instruction is to be inserted.



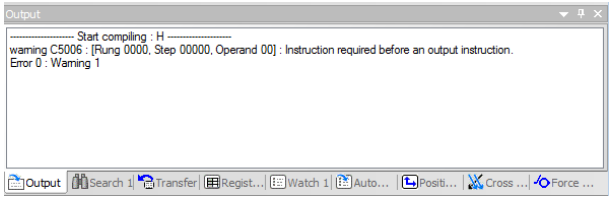
- Place the mouse cursor where the instruction is to be inserted, and select ***Program*** – ***Insert Instruction*** followed by the desired instruction from the menu bar.



Important

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.

- 1-ms ON-Delay Timer (TON(1ms))
- 1-ms OFF-Delay Timer (TOFF(1 ms))
- 10-ms ON-Delay Timer (TON(10ms))
- 10-ms OFF-Delay Timer (TOFF(10ms))
- 1-s ON-Delay Timer (TON(1s))
- 1-s OFF-Delay Timer (TOFF(1s))
- Rising-edge Pulses (ON-PLS)
- Falling-edge Pulses (OFF-PLS)
- Coil (COIL)
- Reverse Coil (REV-COIL)
- Rising-edge Detection Coil (ONP-COIL)
- Falling-edge Detection Coil (OFFP-COIL)
- Set Coil (S-COIL)
- Reset Coil (R-COIL)



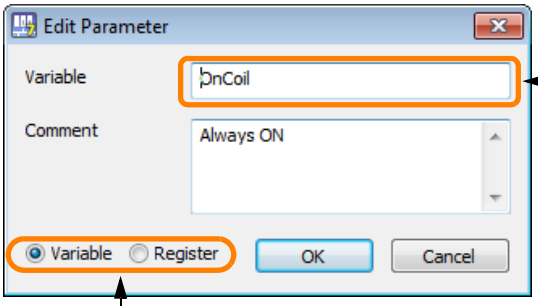
Detailed procedures are given only for setting the Expression instruction. Refer to the following section for details.

☞ *5.1.4 Easily Performing Numeric Operations in Ladder Programs* on page 5-11

Setting Parameters

Insert the instruction, and then set the variables, registers, and comment as necessary.

Double-click ? or --- to display the Edit Parameter Dialog Box and enable editing.



The Autocomplete function can be used. Refer to the following section for details.

☞ *5.3.1 Using the Autocomplete Function* on page 5-81

Either a variable or register can be input.

Information

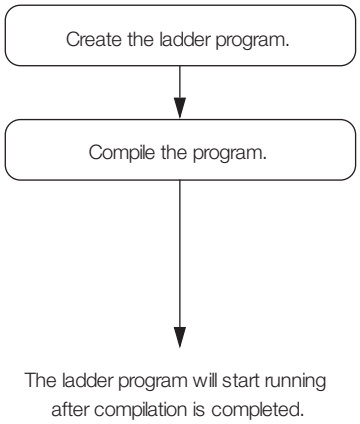
If the **Register** of the following instructions has a value of 5 digits or more in the project file created with MPE720 version 5 or 6, the values after the 6th digit will be automatically deleted and changed to the 5-digit value when the **Parameter Setting** Dialog Box is displayed. In such cases, the program needs to be complied.

- On-Delay Timer (TON (10 ms))
- Off-Delay Timer (TOFF (10 ms))
- On-Delay Timer (TON (1 s))
- Off-Delay Timer (TOFF (1 s))

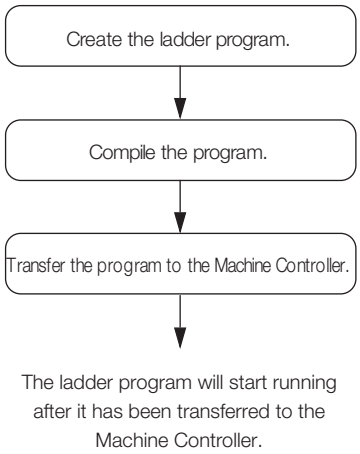
5.1.3 Running Your Ladder Programs

The flow that is used to run ladder programs on the Machine Controller depends on whether the program was created online or offline.
Each flow is given below.

Ladder Programs Created Online



Ladder Programs Created Offline



☞ *5.1.1 Creating New Ladder Programs* on page 5-3

☞ *5.3.10 Compiling Programs* on page 5-102

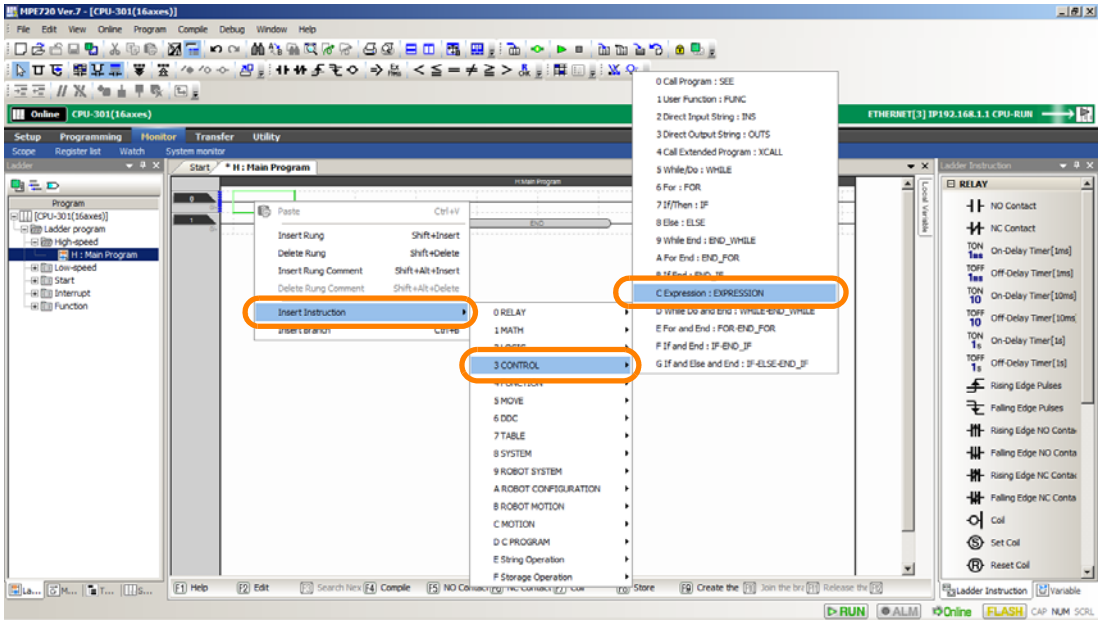
☞ *8.6 Transferring Data Between the Machine Controller and Project Files* on page 8-60

5.1.4 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.

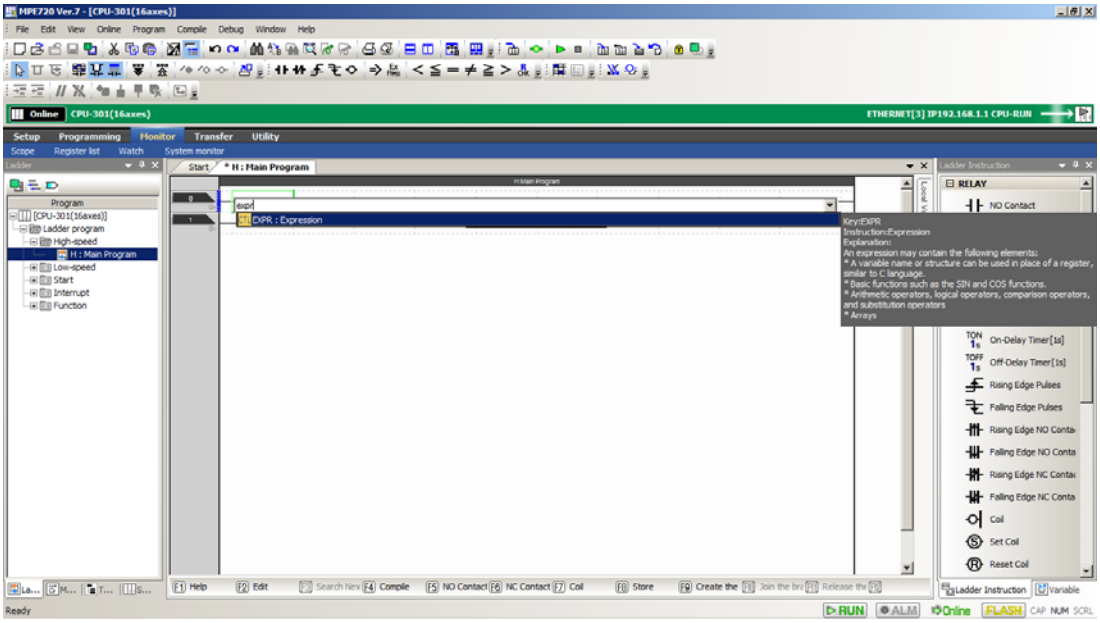
The procedure is given below.

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***.

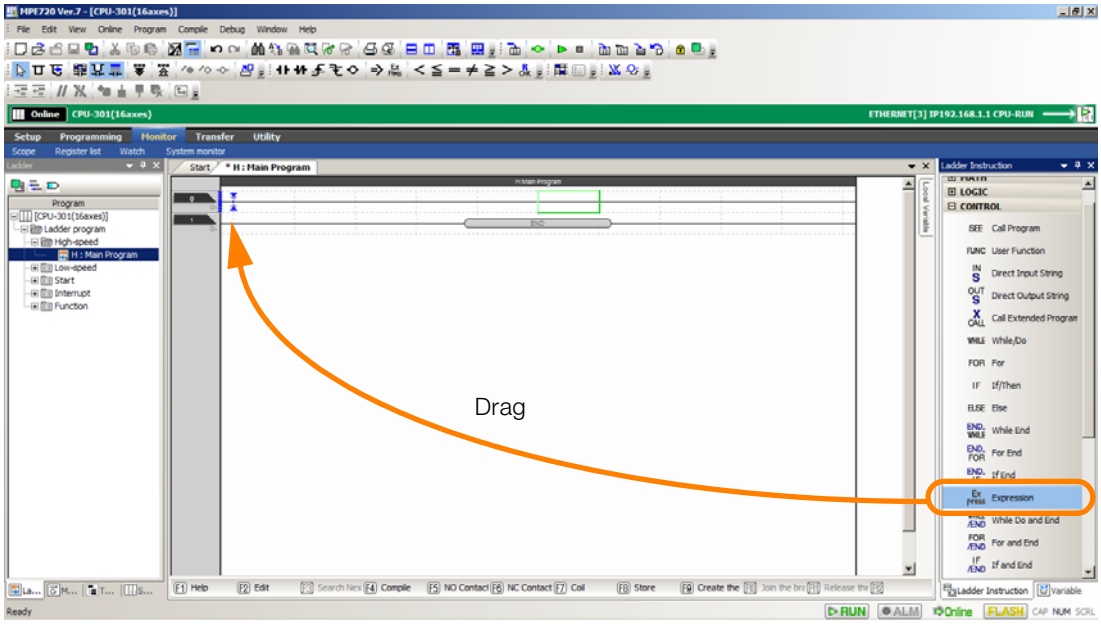


   - Place the mouse cursor where the instruction is to be inserted, and enter “expr”.

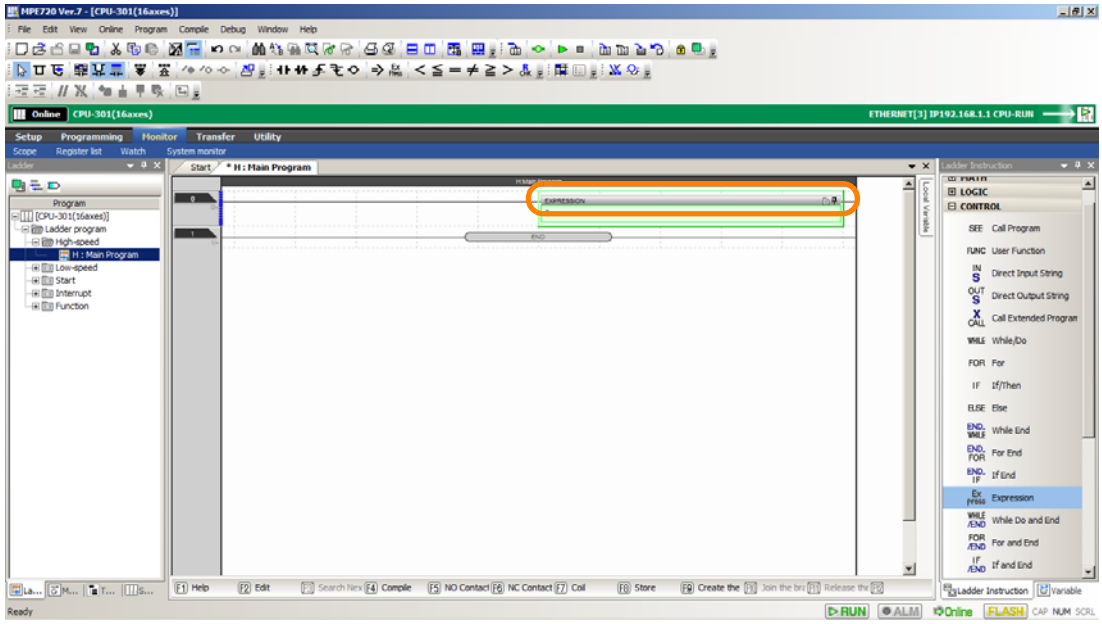
Information The Autocomplete function can be used. Refer to the following section for details.
☞ *5.3.1 Using the Autocomplete Function* on page 5-81



- In the Ladder Instruction Pane, click the **+** Button next to **CONTROL**, and then drag the Expression instruction to where the instruction is to be inserted.

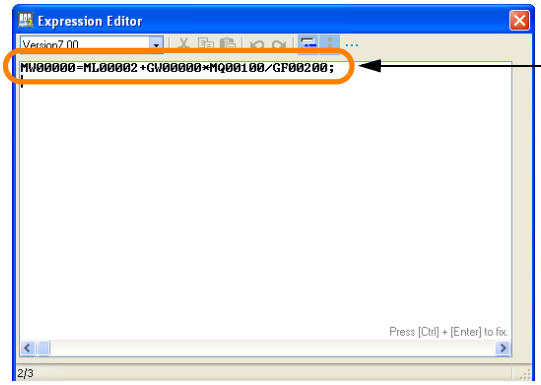


2. Double-click the input box for the Expression instruction.



The Expression Editor Window will be displayed.

3. Enter the arithmetic expression.



The Autocomplete function can be used. Refer to the following section for details.

☞ *5.3.1 Using the Autocomplete Function* on page 5-81

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

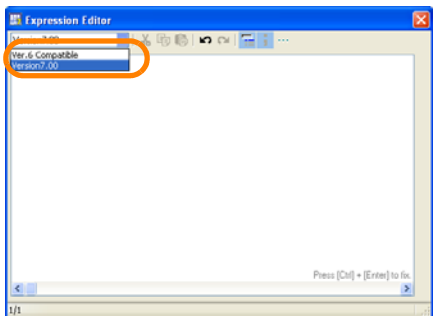
🕮 *MP3000 Series Ladder Programming Manual* (Manual No.: SIEP C880725 13)

Information

There are the following two versions of the Expression instruction. The instructions that can be used depend on the version of the Expression instruction.

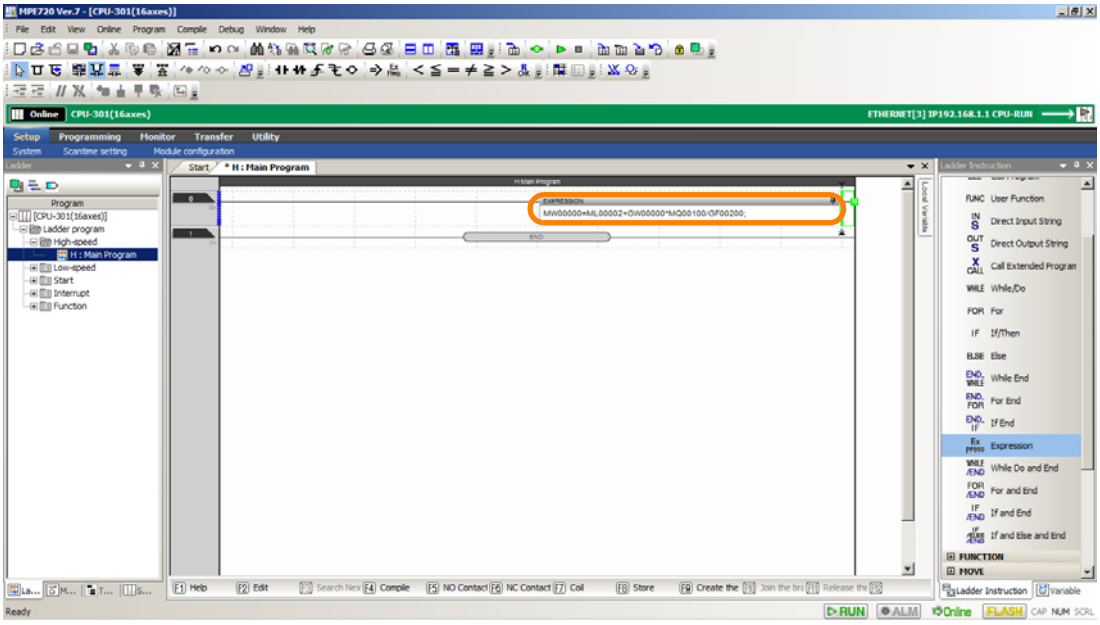
- Expression instruction version 6: Compatible with the Expression instruction from MPE720 Version 6.
- Expression instruction version 7.00: Not compatible with the Expression instruction from MPE720 Version 6. New functions and operators that were added for MPE720 Version 7 are supported.

To change the version, use the list box in the Expression Editor Window.

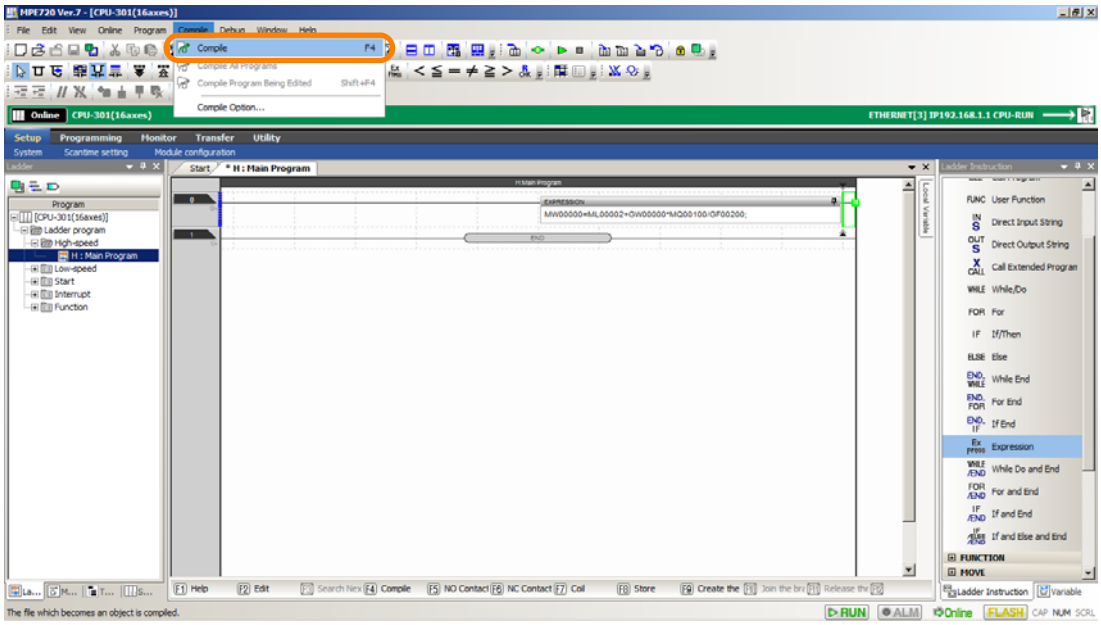


4. Hold down the **Ctrl** Key and press the **Enter** Key.

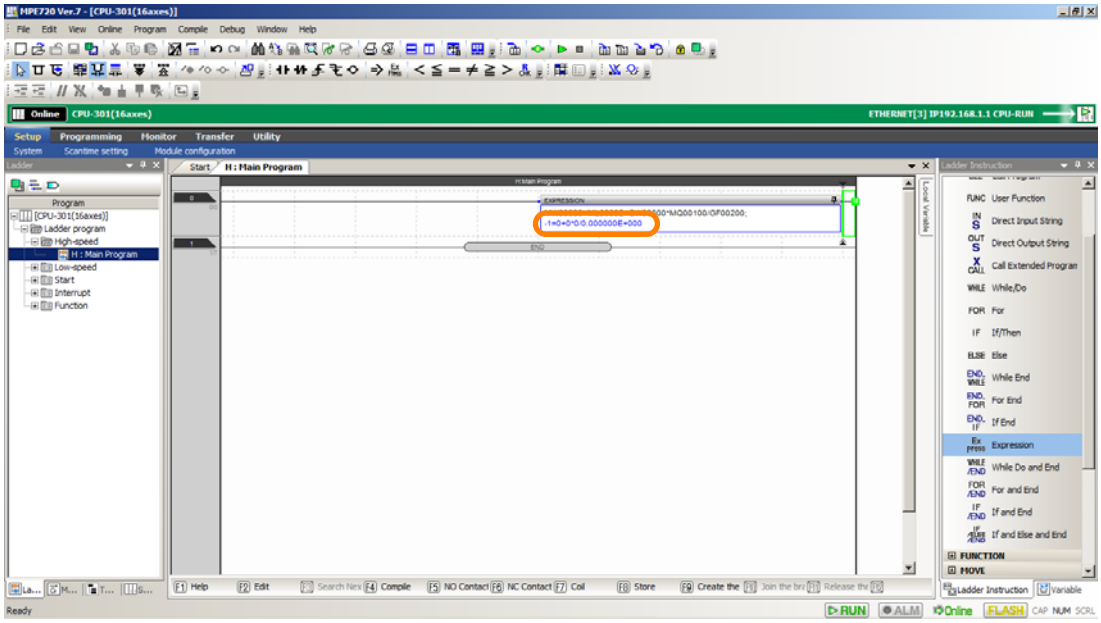
The Expression Editor Window will close and the entered information will be displayed.



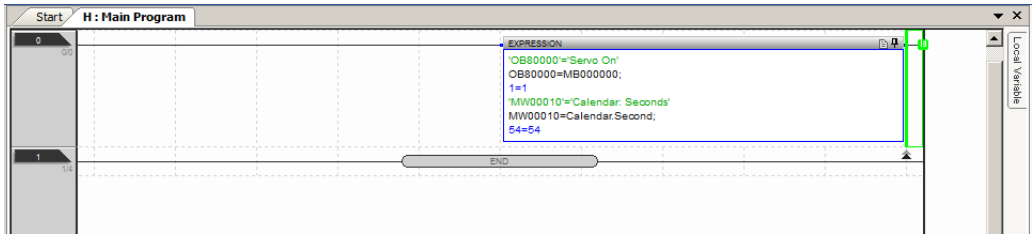
5. Use one of the following methods to compile the program.
   - Press the **F4** Key.
   - Select ***Compile*** – ***Compile*** from the menu bar.



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



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



There is a limit to the number of characters in Comment display. The number of characters can be changed. Refer to the following section for details.

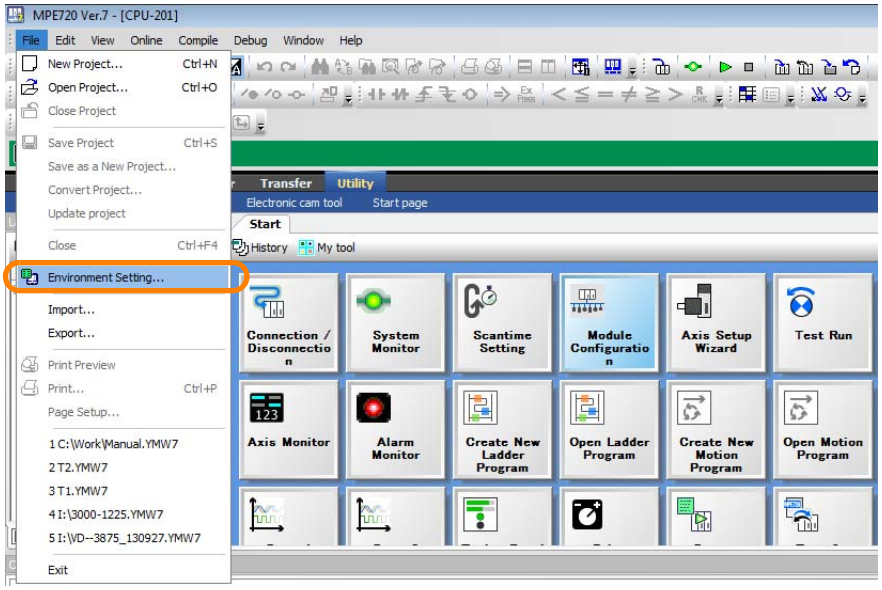
☞ *5.1.5 Setting the Maximum Number of Characters for Register Comments* on page 5-15

This concludes the procedure.

5.1.5 Setting the Maximum Number of Characters for Register Comments

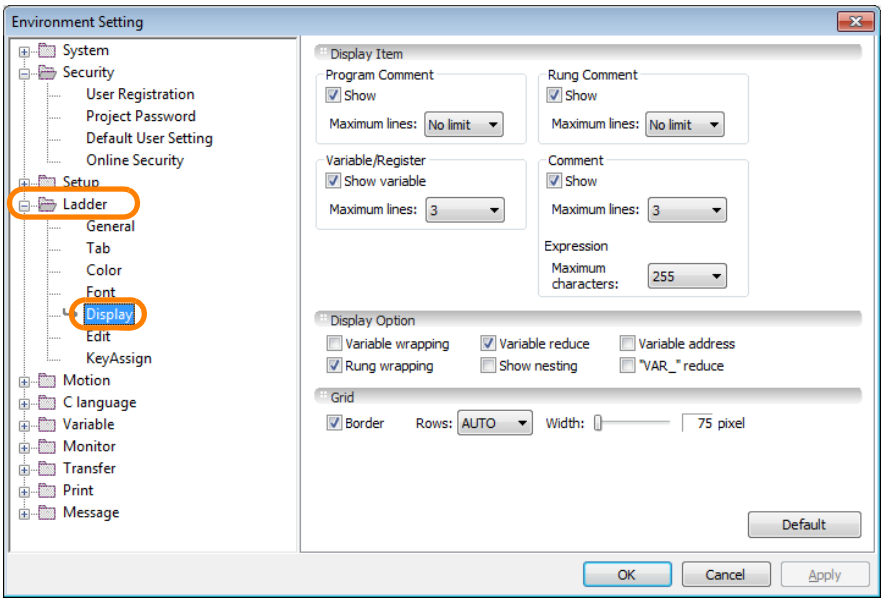
Use the following procedure to set the maximum number of characters for register comments displayed for the Expression instruction.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

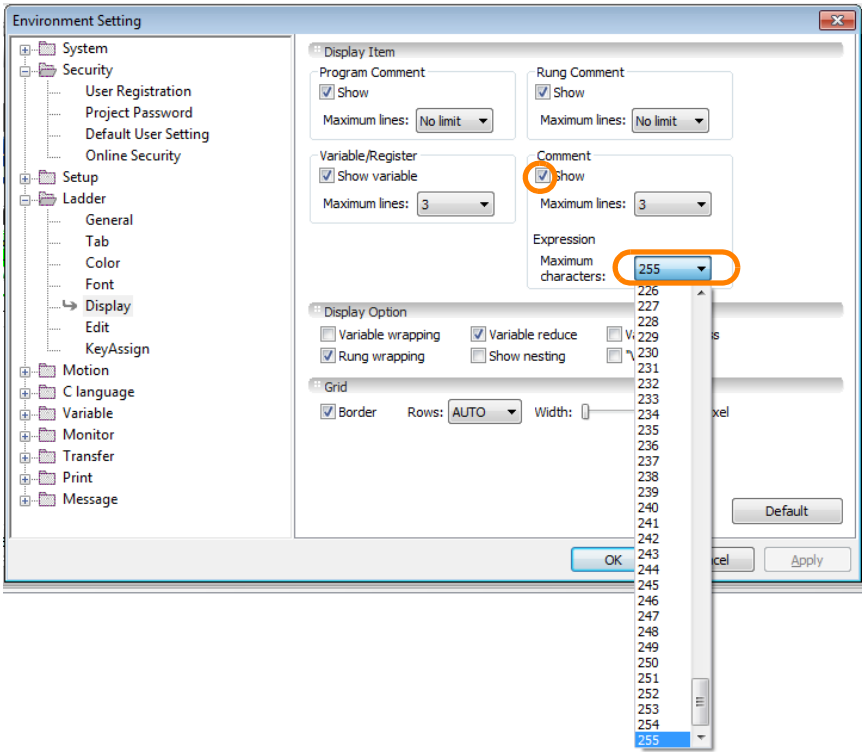


The Environment Setting Dialog Box will be displayed.

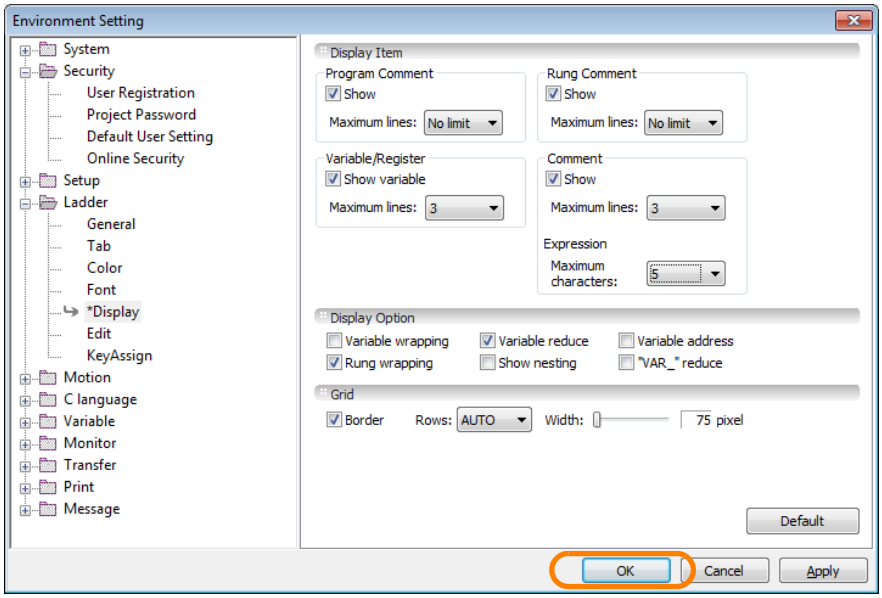
2. Select **Ladder** – **Display**.



3. Select the **Show** Check Box in the **Comment** Area, and then set the maximum number of characters in the **Maximum characters** Box for **Expression**.



4. Click the **OK** Button.



If a register comment exceeds the maximum number of characters that is set, "~" will be displayed.

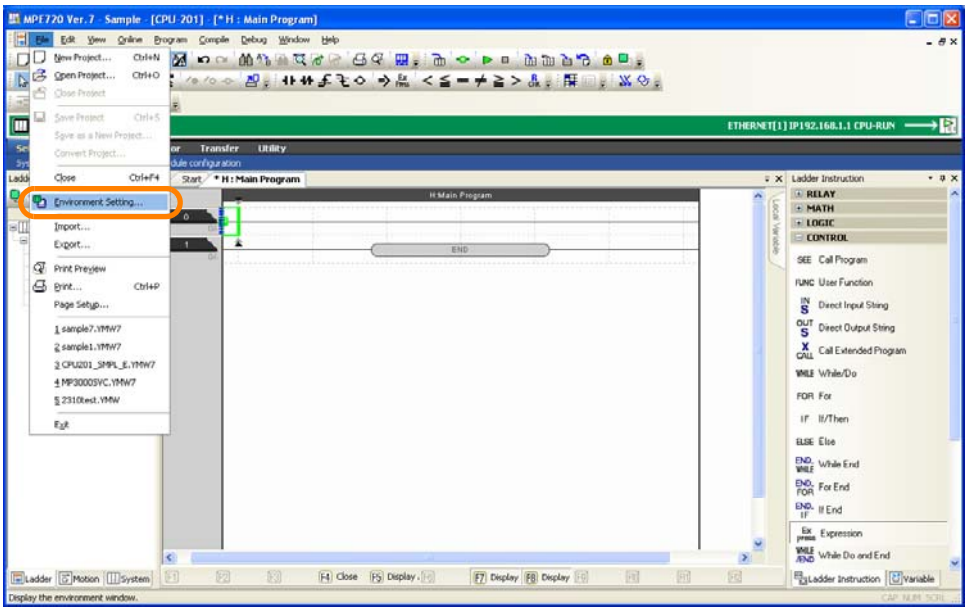
This concludes the procedure.

5.1.6 Changing Function Key Assignments for Ladder Operations to the Same Assignments as MPE720 Version 6

The function key assignments differ between the MPE720 Version 7 and Version 6, but can be reassigned to match the assignments that are used in Version 6.

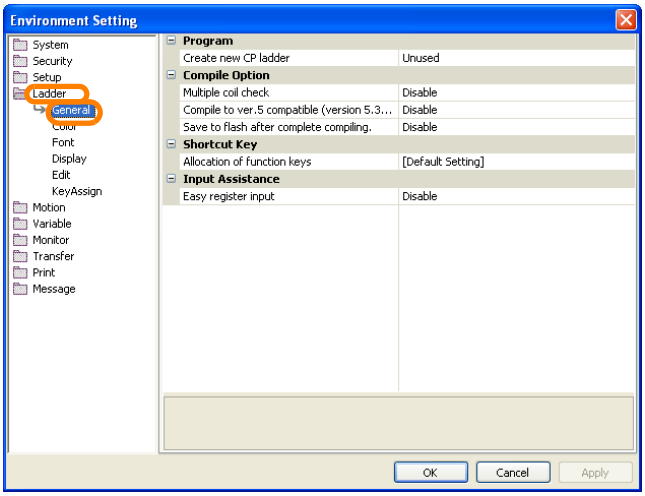
Use the following procedure.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

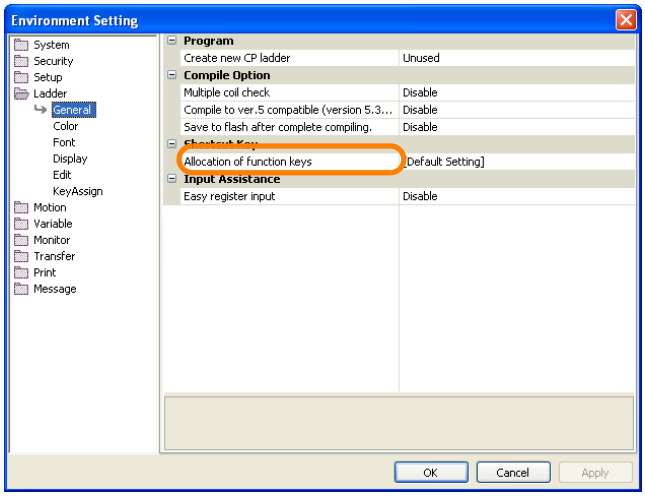


The Environment Setting Dialog Box will be displayed.

2. Select **Ladder - General**.

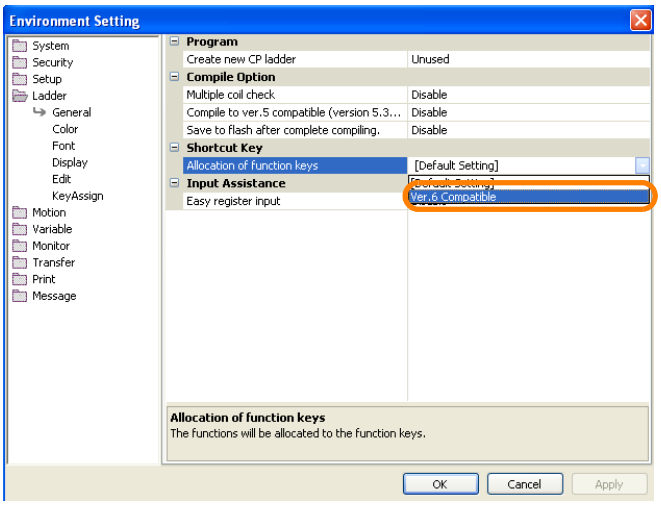


3. Click **Allocation of function keys**.

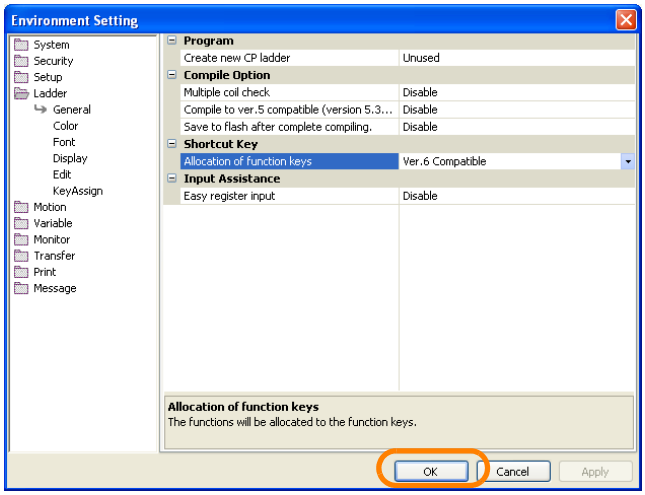


The box on the right will become selectable.

4. Select **Ver. 6 Compatible** from the **Allocation of function keys** List.



5. Click the **OK** Button.



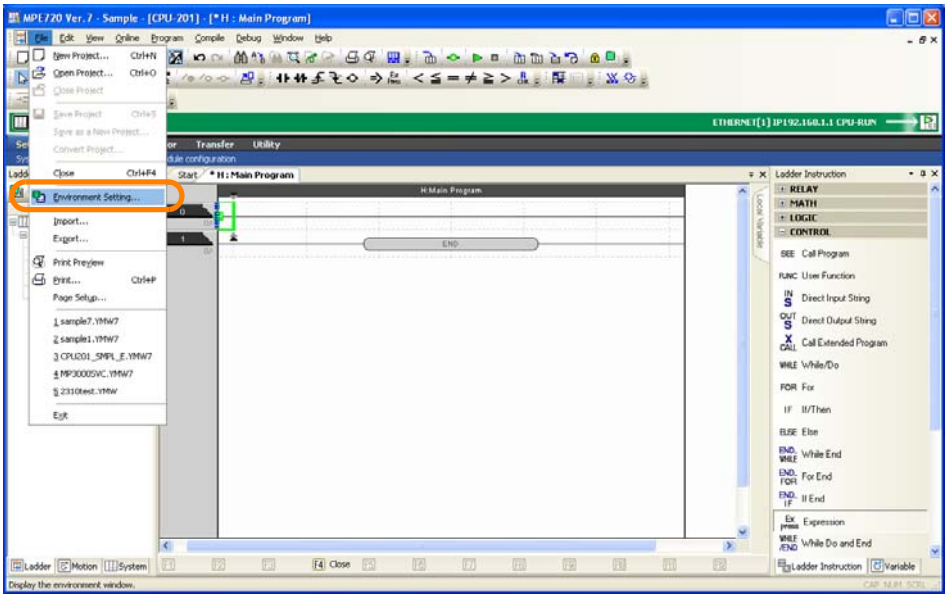
This concludes the procedure.

5.1.7 Changing the Cursor Movement Order in the Edit Ladder Program Tab Page

When you are editing a ladder program, you can press the **Enter** Key to move the cursor. You can change the order the cursor moves by changing a setting.

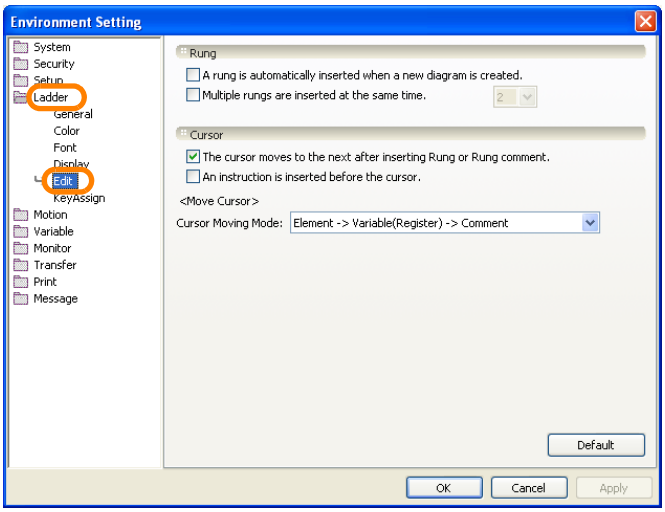
Use the following procedure.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

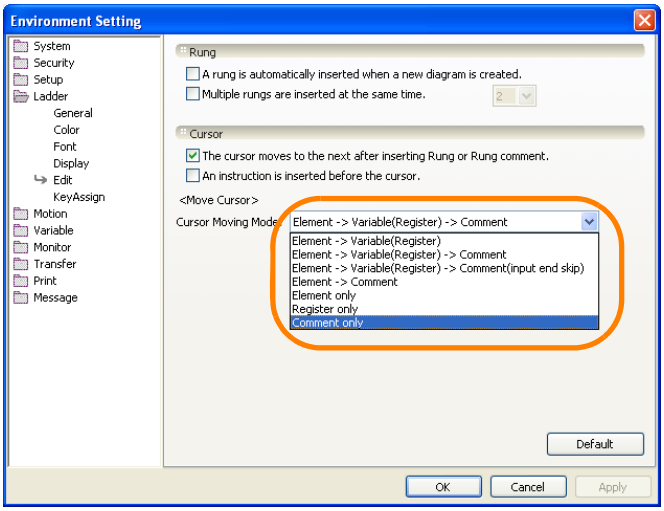


The Environment Setting Dialog Box will be displayed.

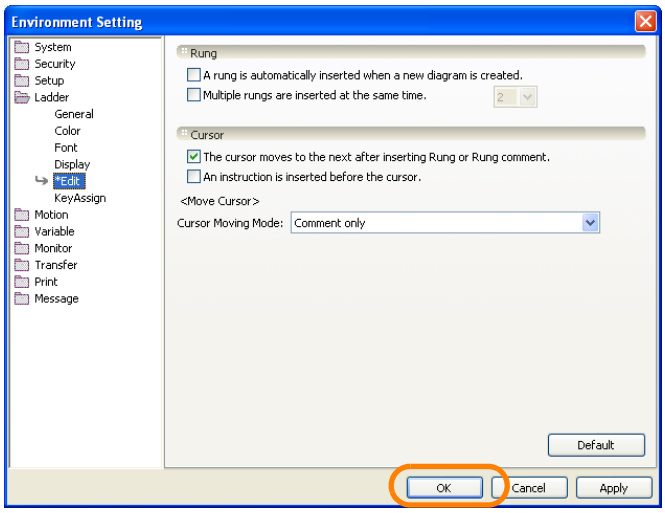
2. Select **Ladder - Edit**.



3. Select the desired order from the **Cursor Moving Mode** Box.



4. Click the **OK** Button.



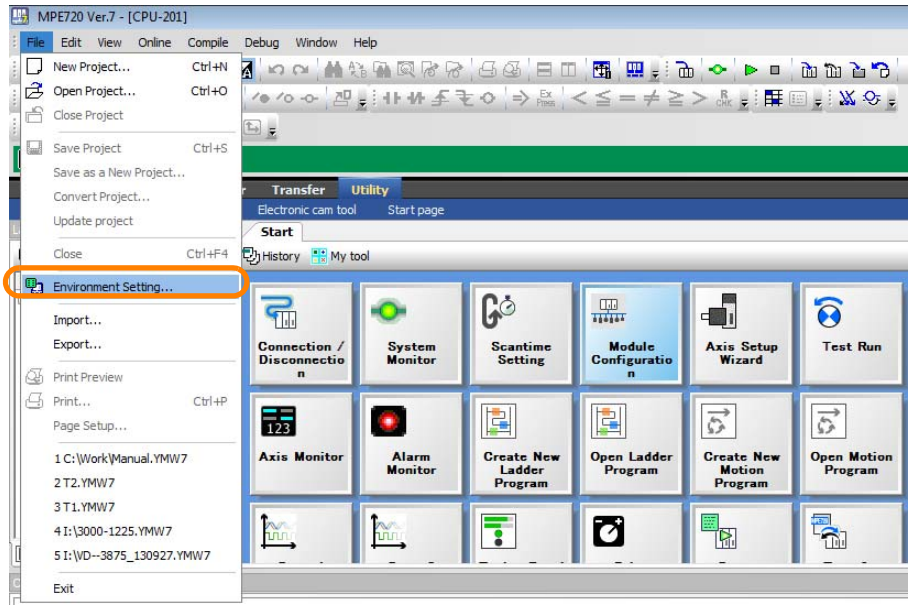
This concludes the procedure.

5.1.8 Changing Tab Widths

You can press the Tab Key to insert blank space (a tab) into the Expression Editor Window or Comment Editor Window. You can set the width of the tab that will be inserted.

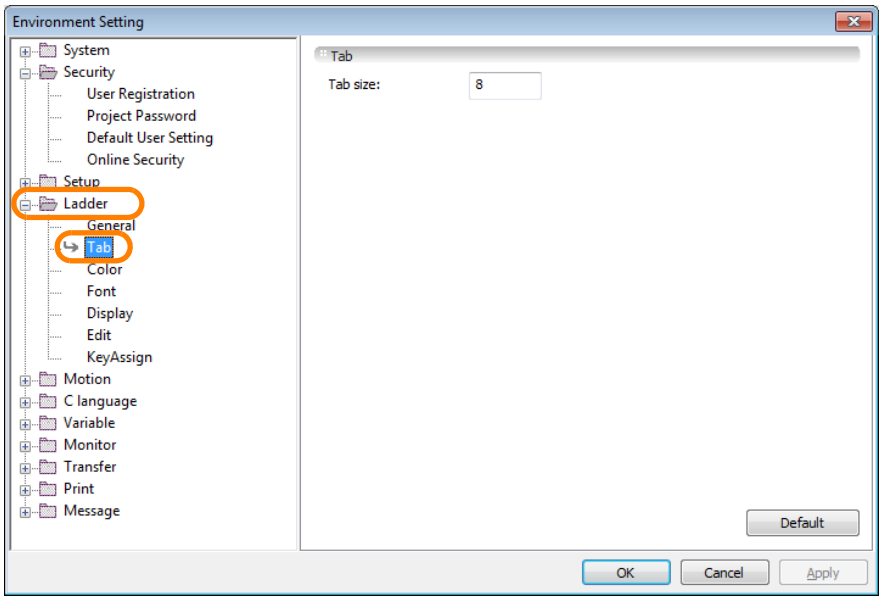
Use the following procedure.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

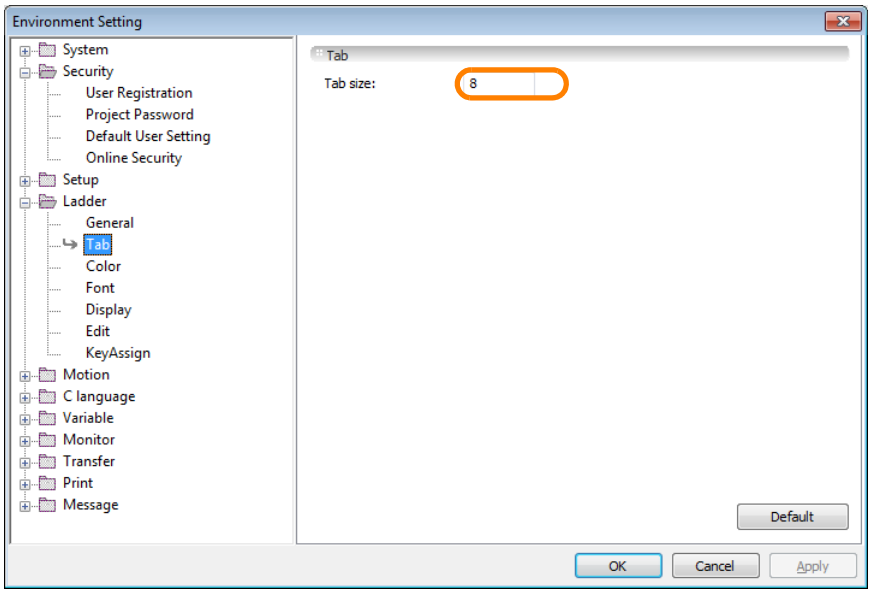


The Environment Setting Dialog Box will be displayed.

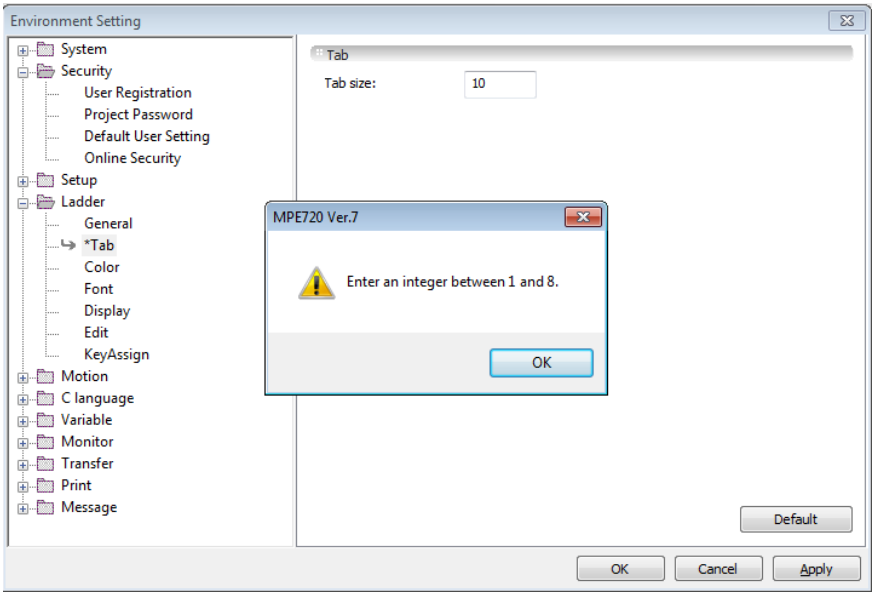
2. Select **Ladder** – **Tab**.



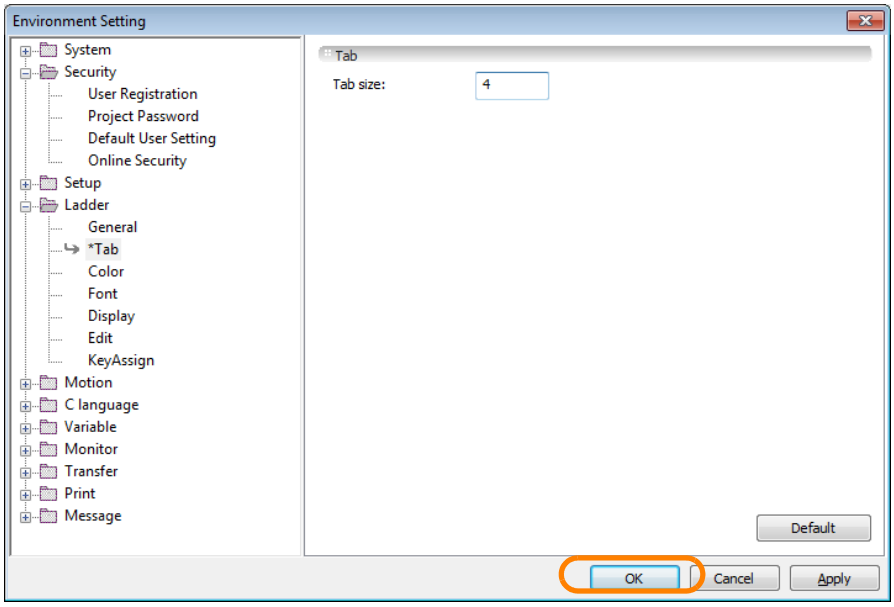
3. Enter an integer in the **Tab size** Box.



Note: You can enter any integer between 1 and 8. The following warning message will be displayed if you enter any other integer.



4. Click the **OK** Button.



This concludes the procedure.

5.1.9 Using Variable Names for Registers

Any of the following three variables can be used for the registers that are used in a program.

Variable Name	Description	Applicable Register Types
Global variables	These variables are shared by ladder programs, user functions, motion programs, and sequence programs.	M registers, G registers, I registers*, or O registers*
Constant variables	You can access these variables from ladder programs, user functions, motion programs, and sequence programs.	C registers
User-defined structures	Structures consist of global variables and constant variables that are grouped into manageable units.	All registers

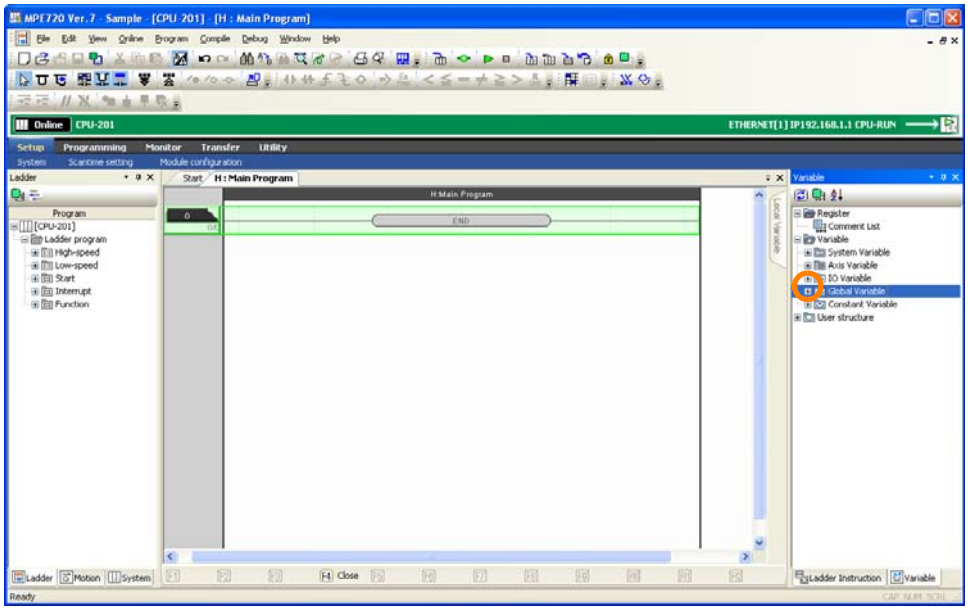
* Axis variables and other system-defined registers and S registers cannot be used as global variables.

The procedures are given below.

Global Variables

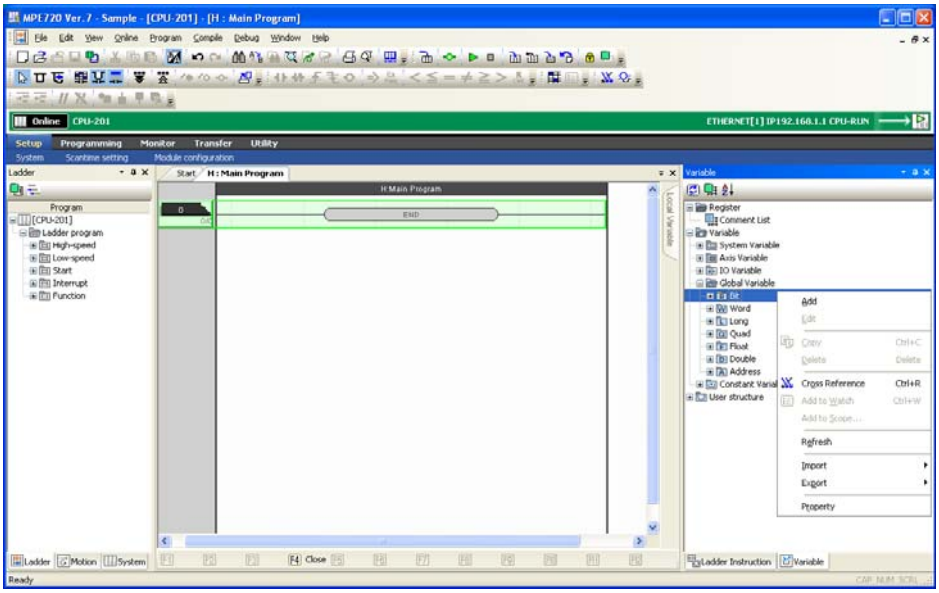
Use the following procedure to assign a global variable to a register.

1. Click the + Button next to **Global Variable** in the Variable Pane.

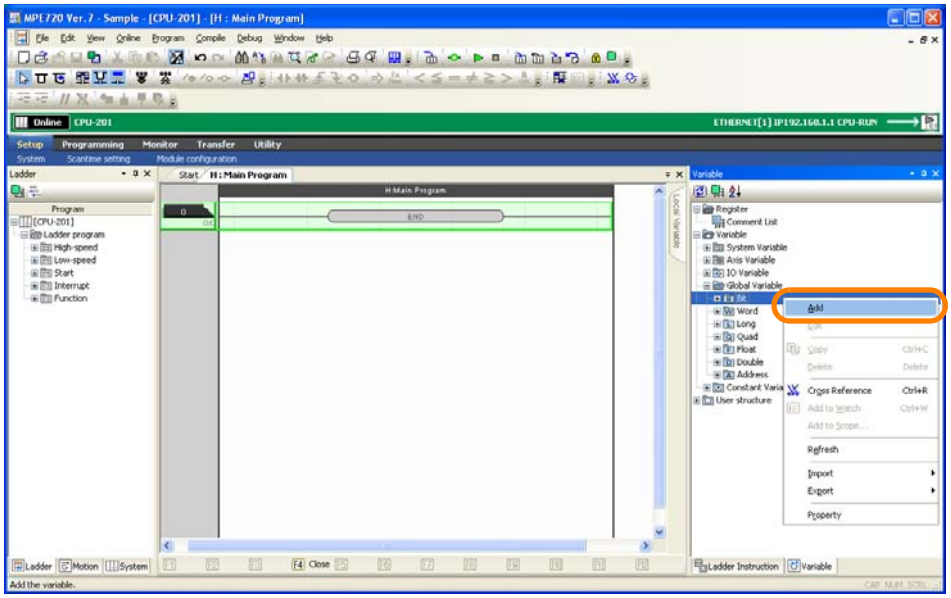


A list of data types will be displayed.

2. Right-click the data type for the variable to define.

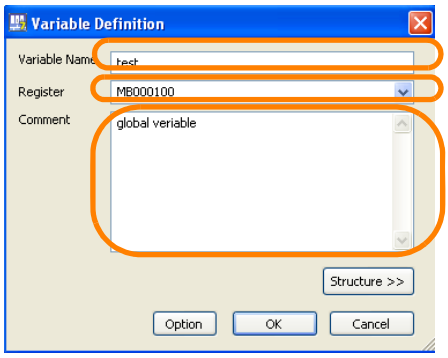


3. Select ***Add***.

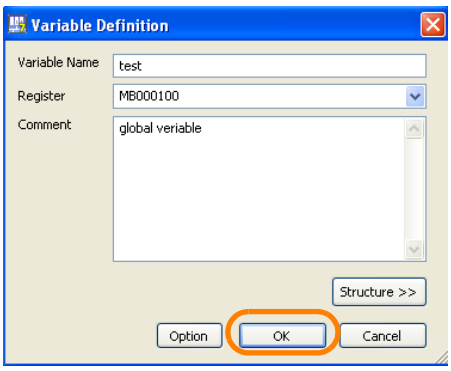


The Variable Definition Dialog Box will be displayed.

4. Enter the following information.
   - Variable Name: You can enter a maximum of 64 alphanumeric characters. The variable name must start with a letter of the alphabet.
   - Register
   - Comment: You can enter a maximum of 255 alphanumeric characters. Carriage returns and line feeds cannot be used when entering comments.



5. Click the **OK** Button.

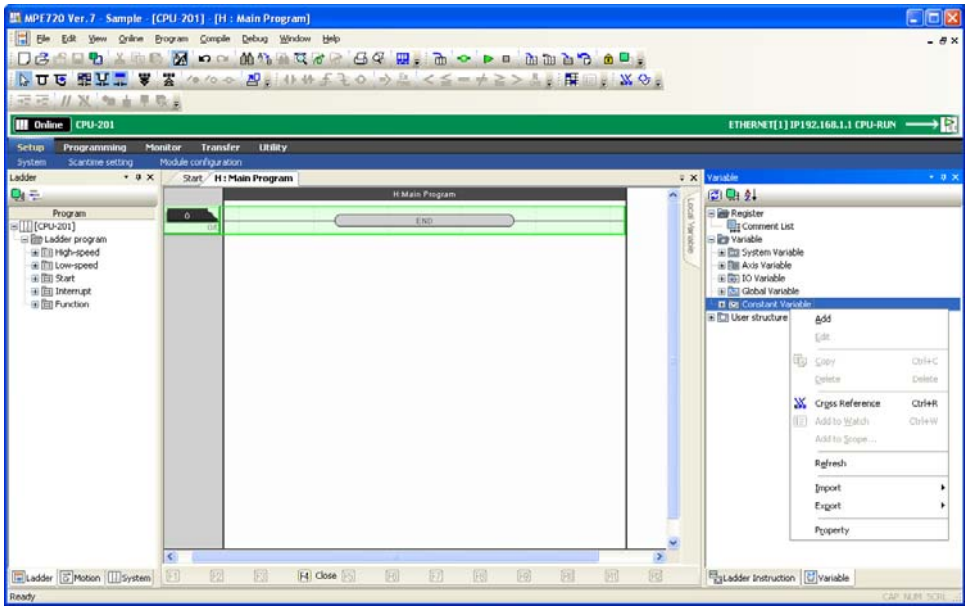


This concludes the procedure.

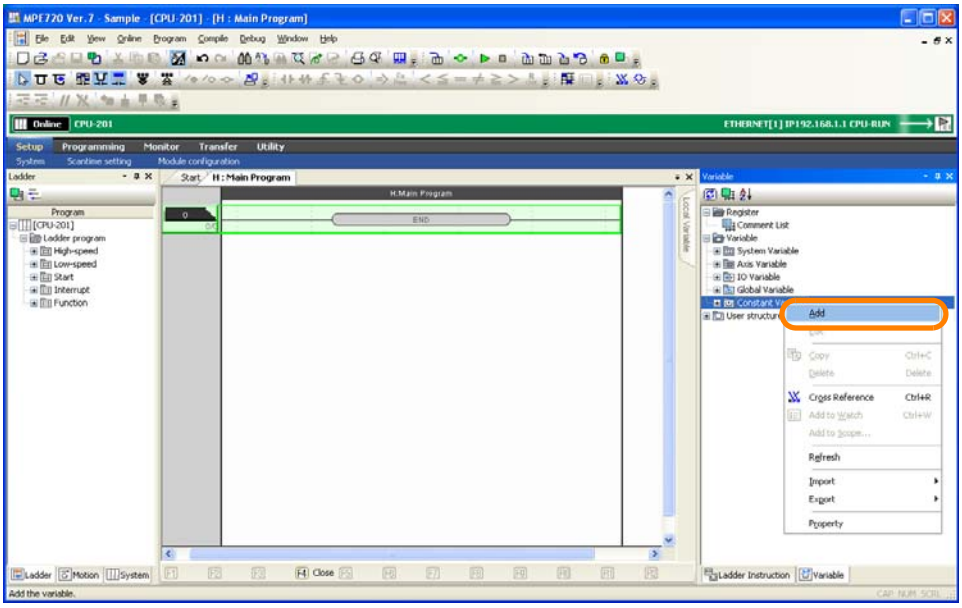
Constant Variables

Use the following procedure to assign a constant variable to a register.

1. Right-click **Constant Variable** in the Variable Pane.

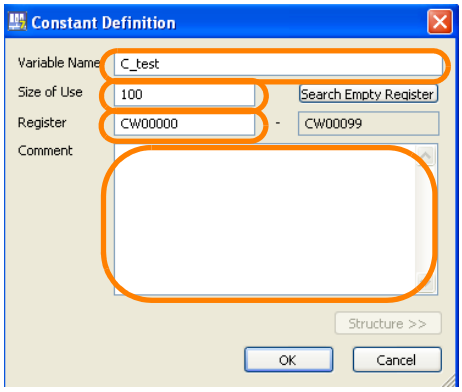


2. Select ***Add***.

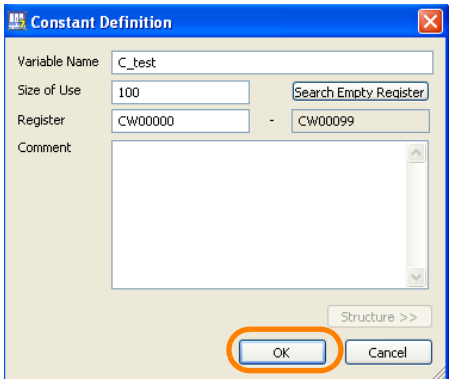


The Constant Definition Dialog Box will be displayed.

3. Enter the following information.
   - Variable Name: You can enter a maximum of 8 alphanumeric characters. The letters “C_” are automatically displayed at the beginning.
   - 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 starting address will automatically be entered in the **Register** Box.
   - Register: Enter the first word address of the C registers to assign.
   - Comment: You can enter a maximum of 255 alphanumeric characters. Carriage returns and line feeds cannot be used when entering comments.

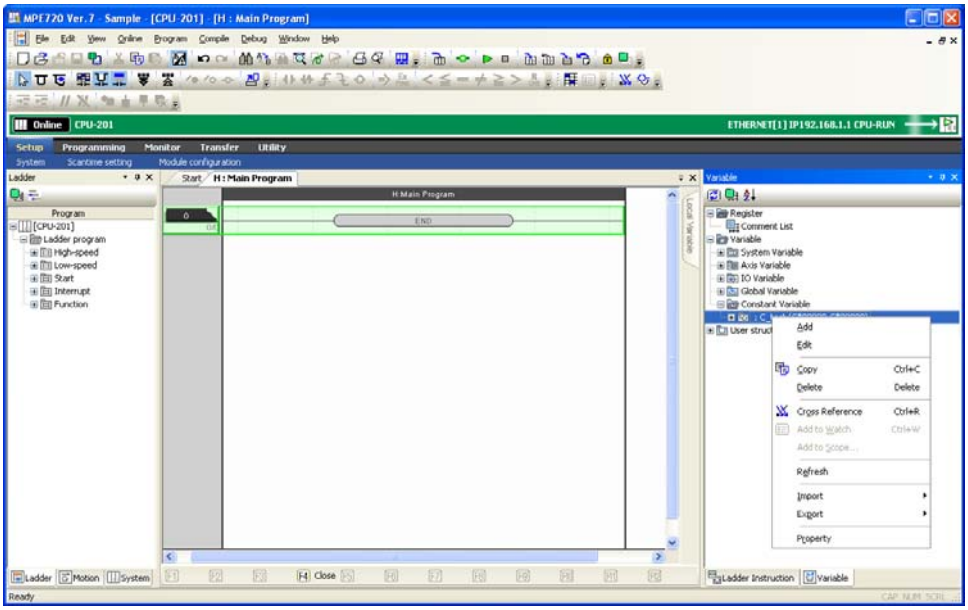


4. Click the **OK** Button.

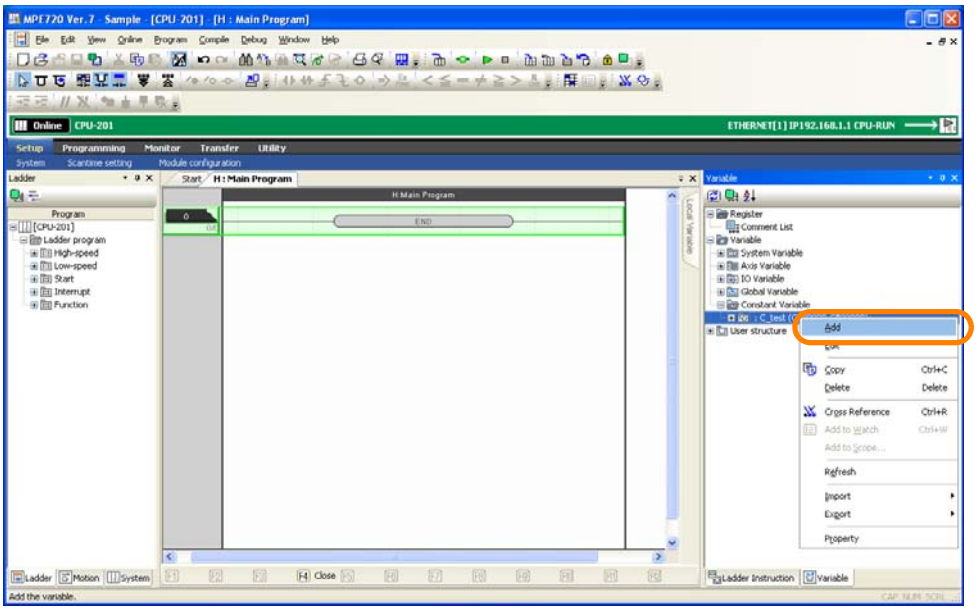


The Constant Definition Dialog Box will close.

5. In the Variable Pane, right-click the variable name that you defined in step 3.

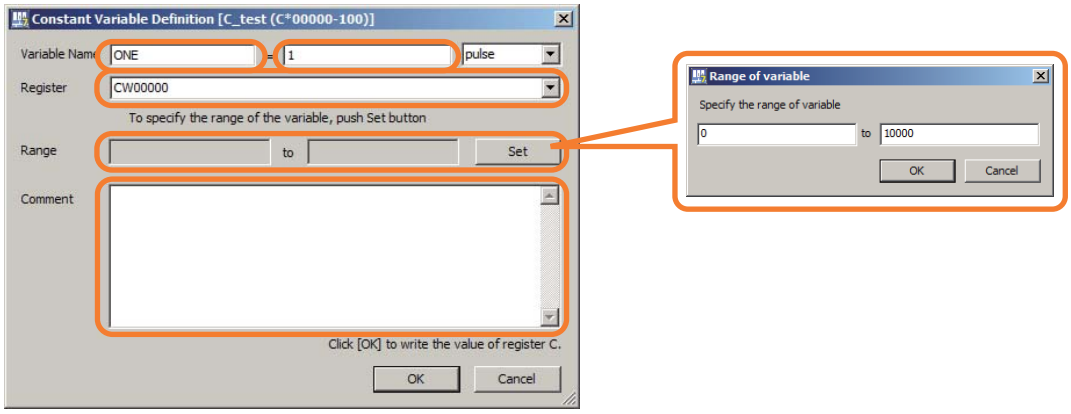


6. Select ***Add***.

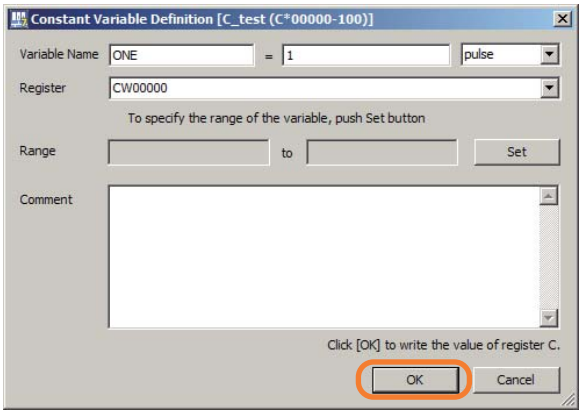


The Constant Variable Definition Dialog Box will be displayed.

7. Enter the following information.
   - Variable Name: You can enter a maximum of 64 alphanumeric characters.
   - Register
   - Setting range: The upper and lower limits of constants can be set, as required. To set a limit, click the **Set** Button, enter the upper and lower limits of the constant in the dialog box that is displayed, and click the **OK** Button.
   - Comment: You can enter a maximum of 255 alphanumeric characters. Carriage returns and line feeds cannot be used when entering comments.



8. Click the **OK** Button.

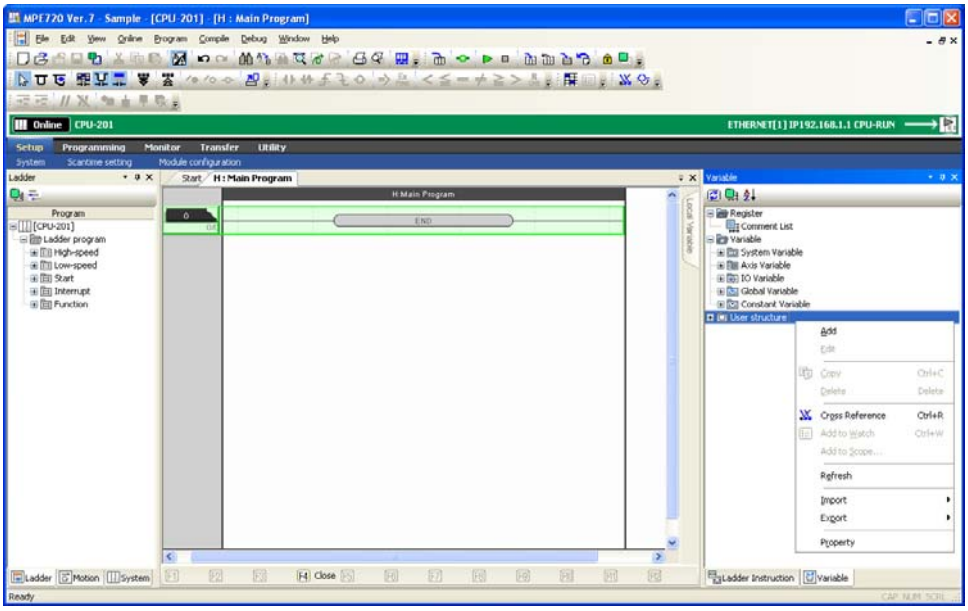


This concludes the procedure.

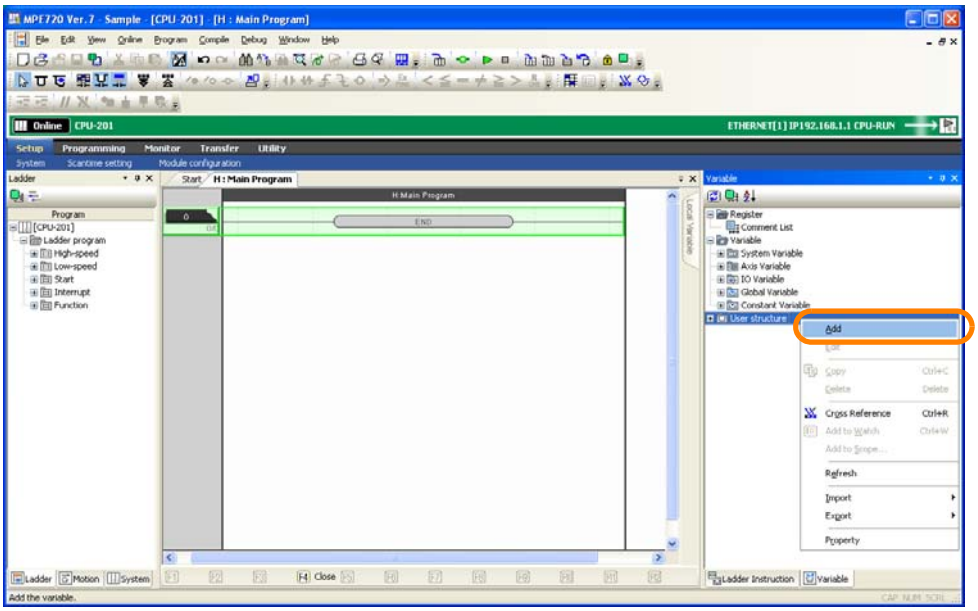
User-defined Structures

Use the following procedure to assign registers of different data types to a single structure.

1. Right-click **User structure** in the Variable Pane.

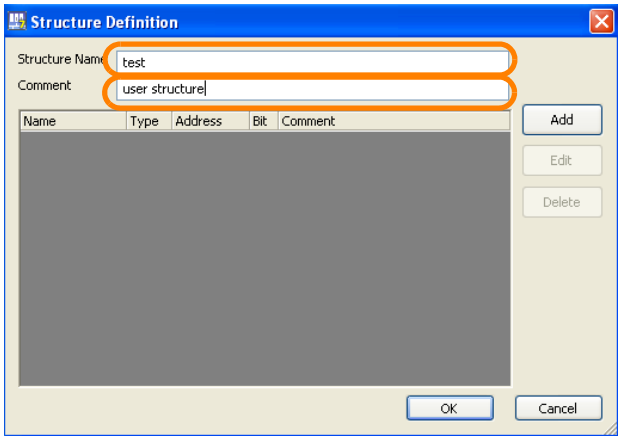


2. Select ***Add***.

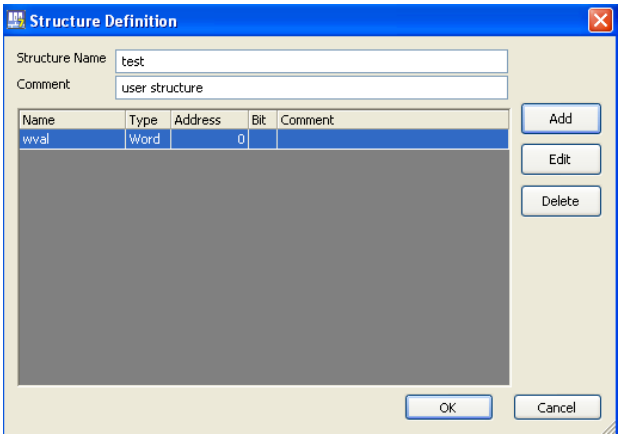


The Structure Definition Dialog Box will be displayed.

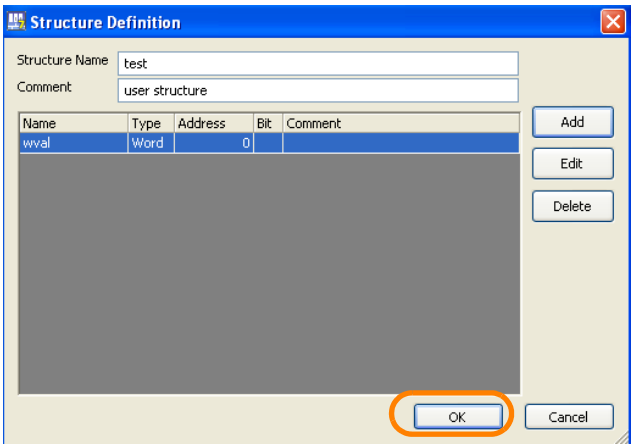
3. Enter the following information.
   - Structure Name: You can enter a maximum of 64 alphanumeric characters. The variable name must start with a letter of the alphabet.
     The following names will result in an error.
     - The name of a register
     - A structure name that is already registered
     - Reserved words, such as motion instructions
   - Comment: You can enter a maximum of 255 alphanumeric characters. Carriage returns and line feeds cannot be used when entering comments.



4. The following buttons are used to set the registers to include in the structure.
   - Add Button
   - Edit Button
   - Delete Button



5. Click the **OK** Button.



This concludes the procedure.

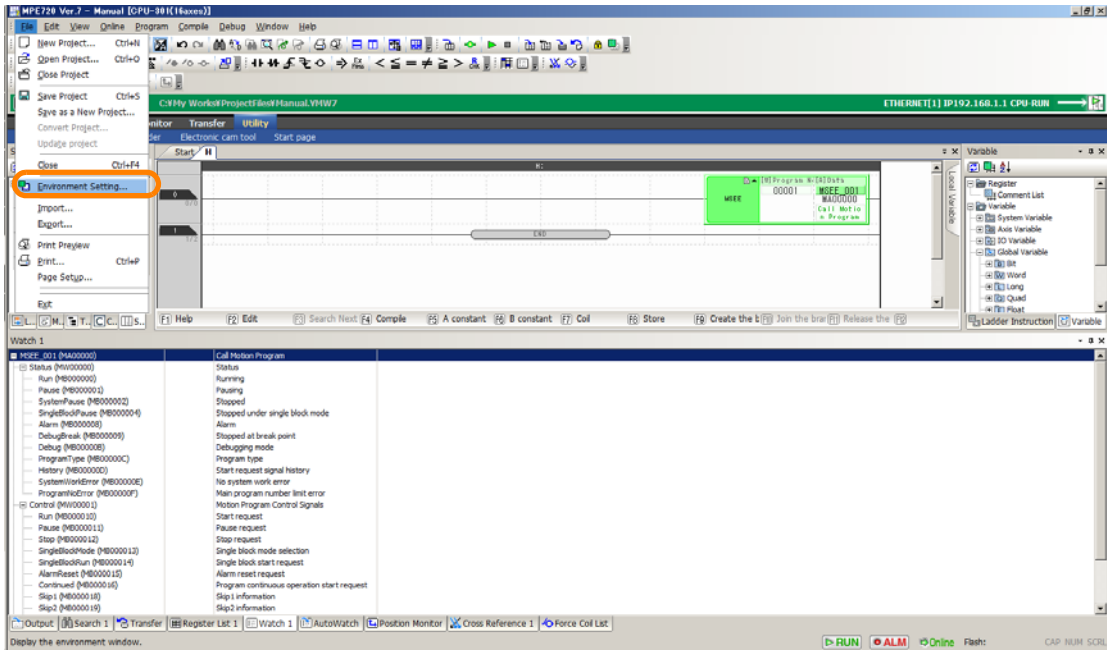
5.1.10 Automatically Registering Address Registers as Variables

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 the pane, eliminating the need to look up information in manuals and other resource materials.

Enabling Variable Registration Assistance

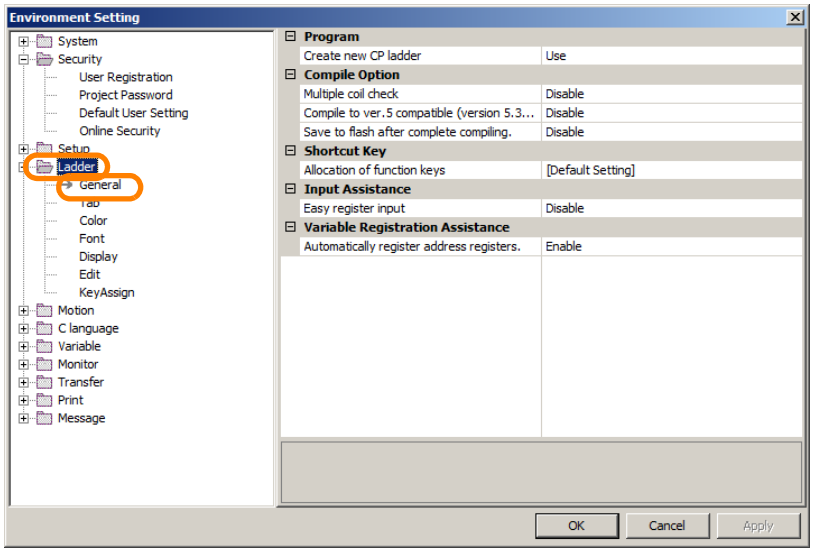
You must enable variable registration assistance in order to automatically register address registers as variables. Use the following procedure.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

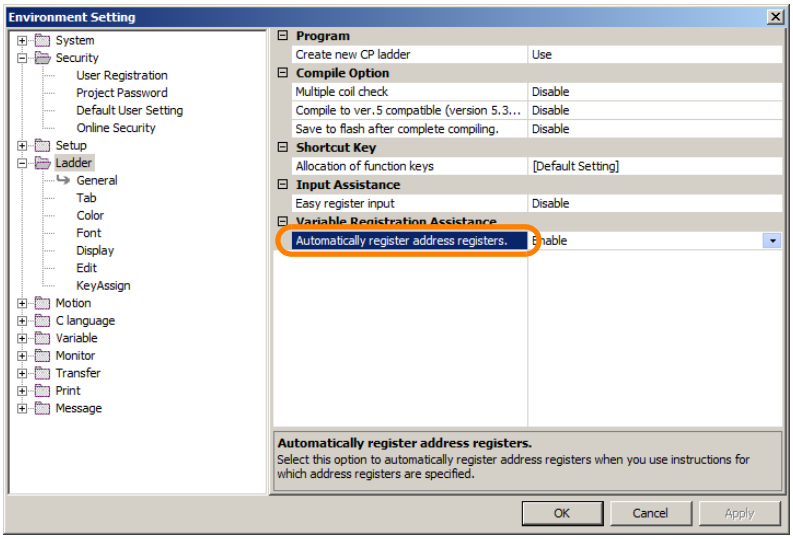


The Environment Setting Dialog Box will be displayed.

2. Select **Ladder - General**.

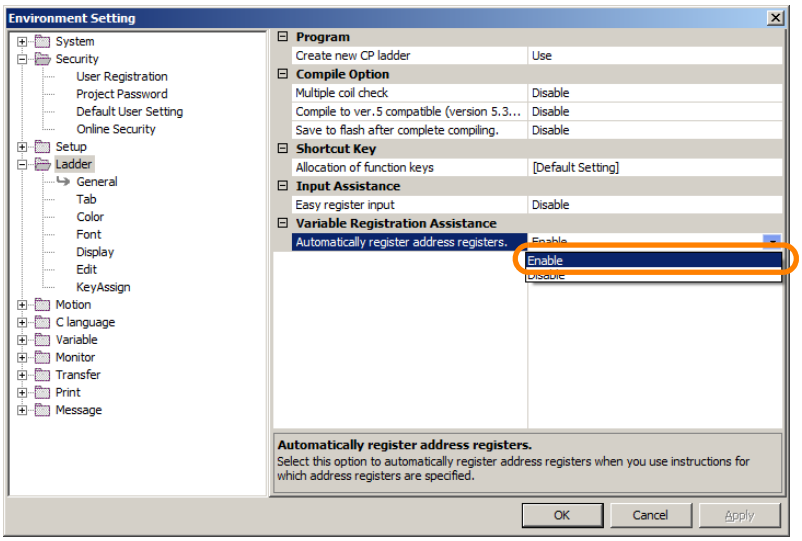


3. Click **Automatically register address registers.**

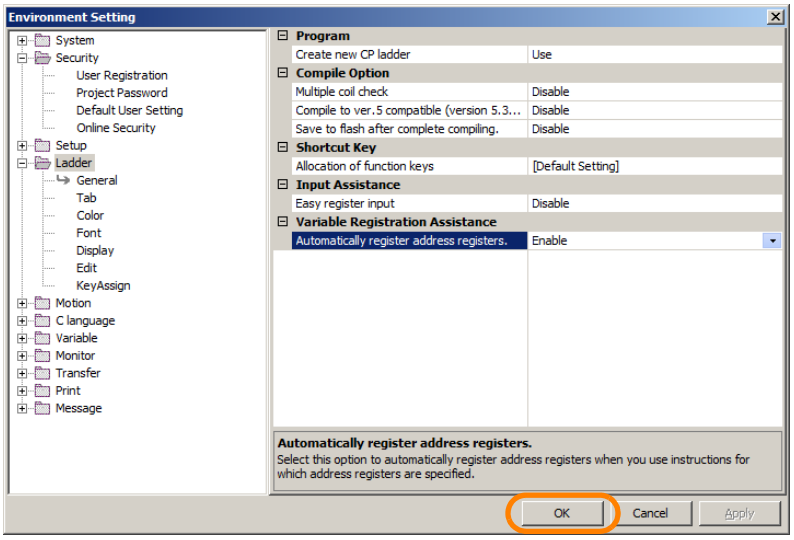


The box on the right will become selectable.

4. Select **Enable** in the **Automatically register address registers** Box.



5. Click the **OK** Button.

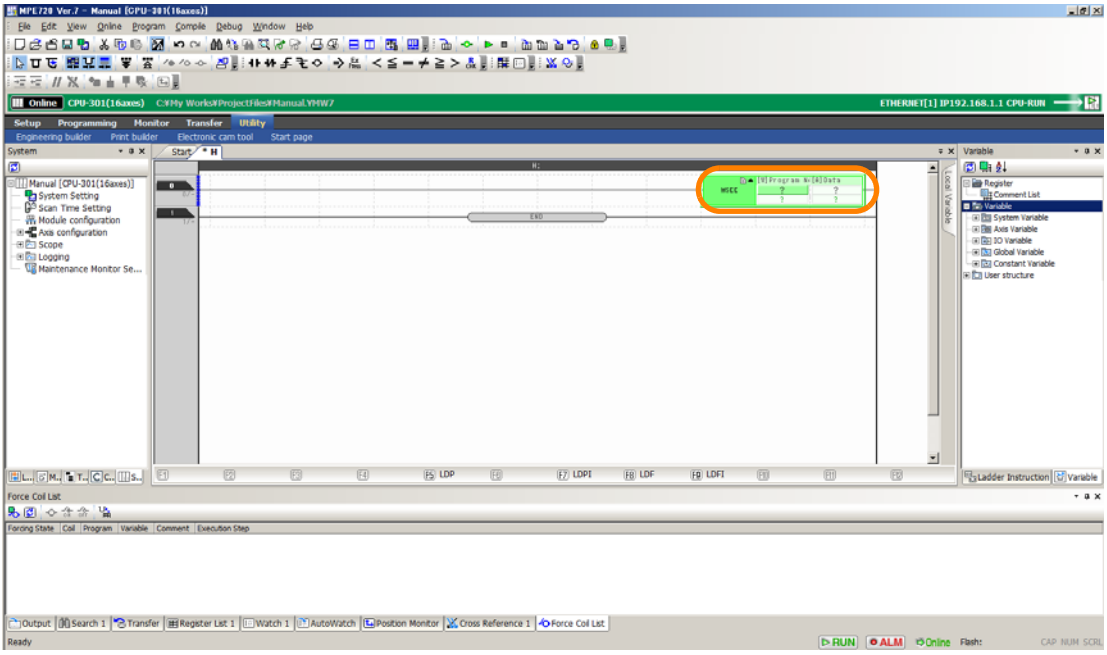


This concludes the procedure.

Registering Address Registers as Variables

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

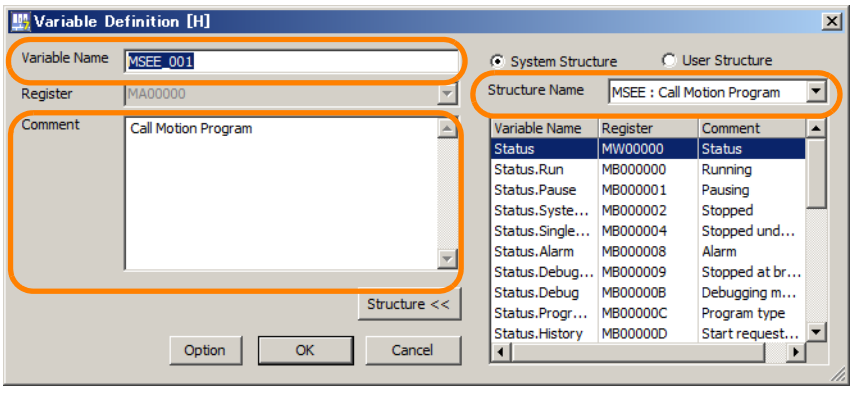
1. Insert the MSEE instruction and enter the motion program number and the address of the address register.



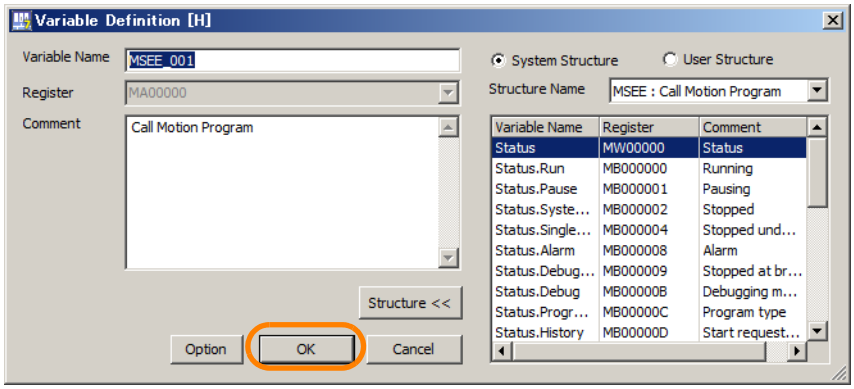
The Variable Definition Dialog Box will be displayed.

2. Enter the following information.

Item	Entry	Remarks
Variable Name	Enter a name for the variable.	The following name is displayed by default: Structure_□□□. The boxes are automatically replaced with a number. You can enter a maximum of 64 alphanumeric characters. The variable name must start with a letter of the alphabet.
Comment	Enter a comment for the variable.	By default, the description of the ladder instruction that was inserted in step 1 is entered. You can enter a maximum of 255 alphanumeric characters. Carriage returns and line feeds cannot be used when entering comments.
Structure Name	Select the structure that matches the instruction that was inserted in step 1.	Only structures that are related to the instruction that was inserted in step 1 are displayed as candidates in the list.

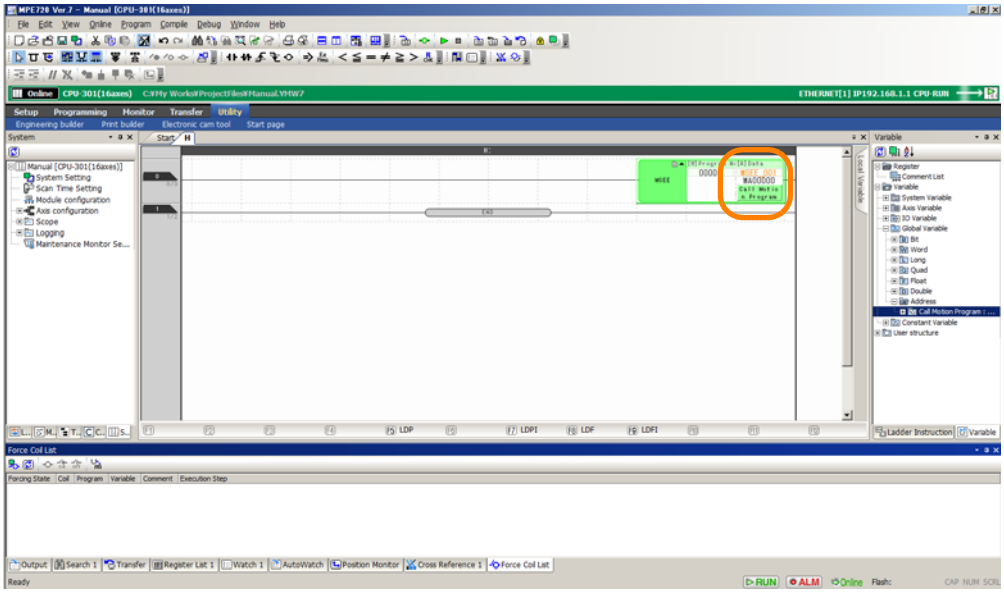


3. Click the **OK** Button.

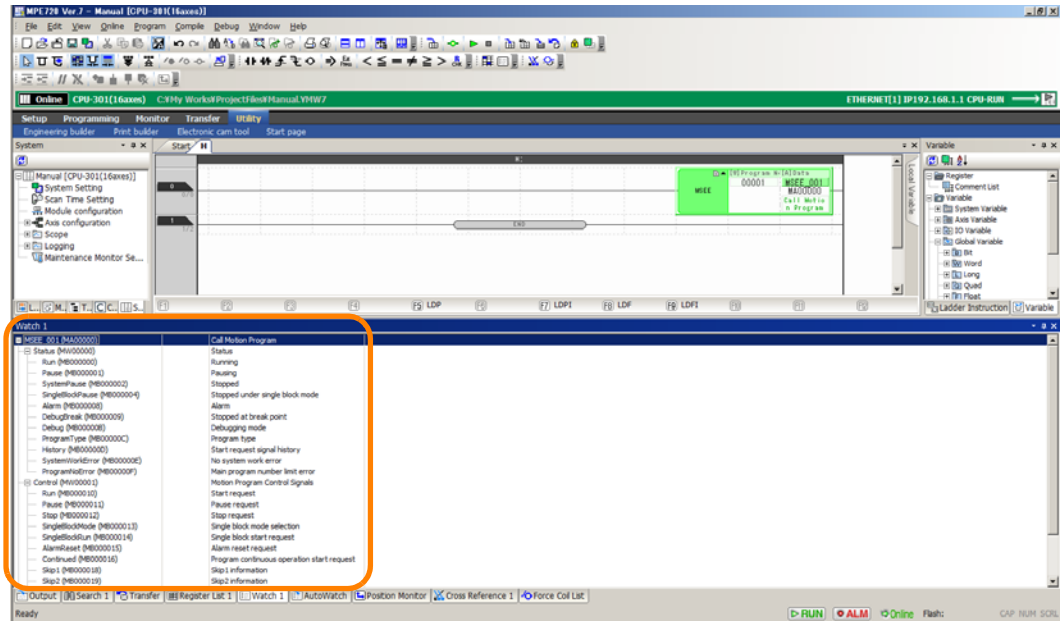


The variable name and comment are displayed in the ladder program.

4. Select the address register for which you want to check detailed information and select ***Add to Watch*** from the pop-up menu.



Detailed information on the selected address register will be displayed in the Watch 1 Pane.

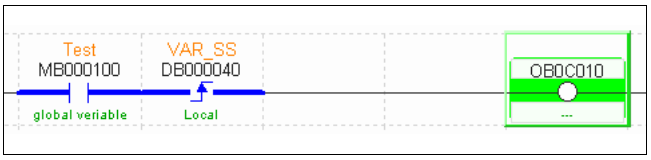


This concludes the procedure.

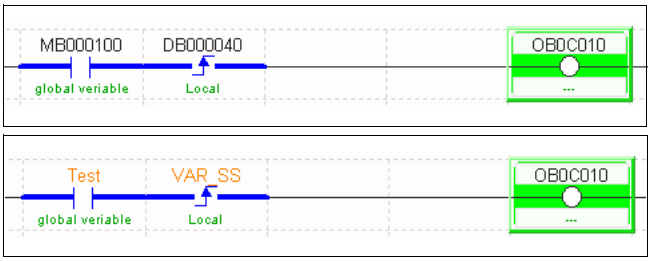
5.1.11 Toggling the Display of Registers, Variables, and Comments

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

The following example shows the registers, variables, and comments.

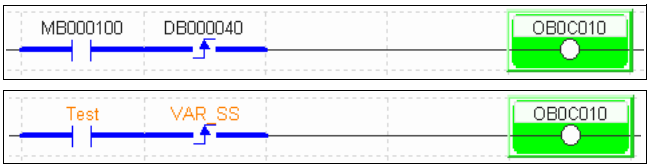


The following examples show either registers and comments, or variables and comments.



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

The following examples show either registers or variables.



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

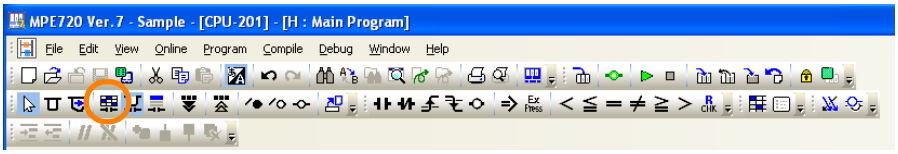
- Using the buttons on the toolbar
- Using the shortcut keys
- Using the Environment Setting Dialog Box

The procedures are given below.

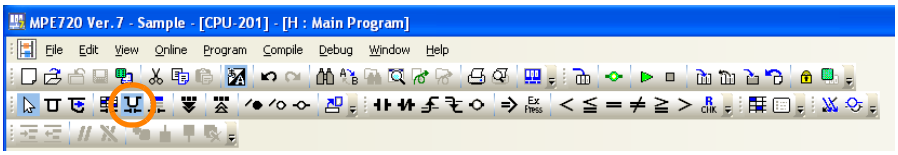
Using the Buttons on the Toolbar

Use the buttons on the toolbar given below to display or hide the registers, variables, and comments.

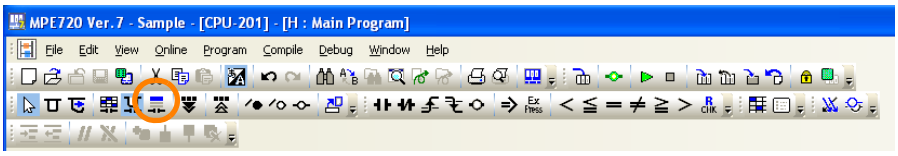
- Displaying or hiding registers: Click the **Registers** Button.



- Displaying or hiding variables: Click the **Variables** Button.



- Displaying or hiding comments: Click the **Comments** Button.



Using the Shortcut Keys

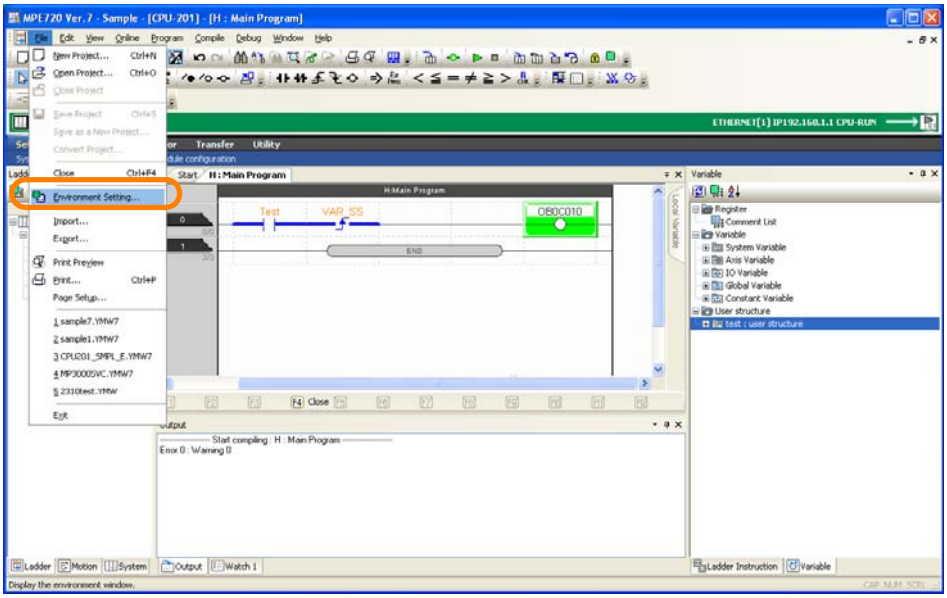
Use the following shortcut keys to display or hide the registers, variables, and comments.

- 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.

Using the Environment Setting Dialog Box

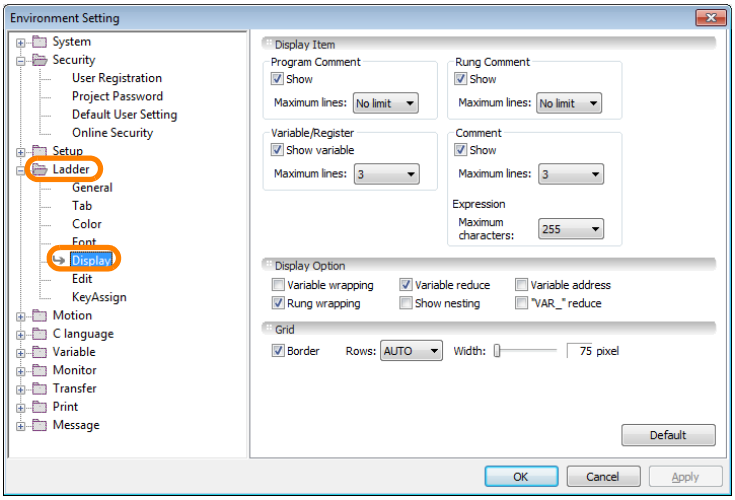
Use the Environment Setting Dialog Box to display or hide the registers, variables, and comments.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

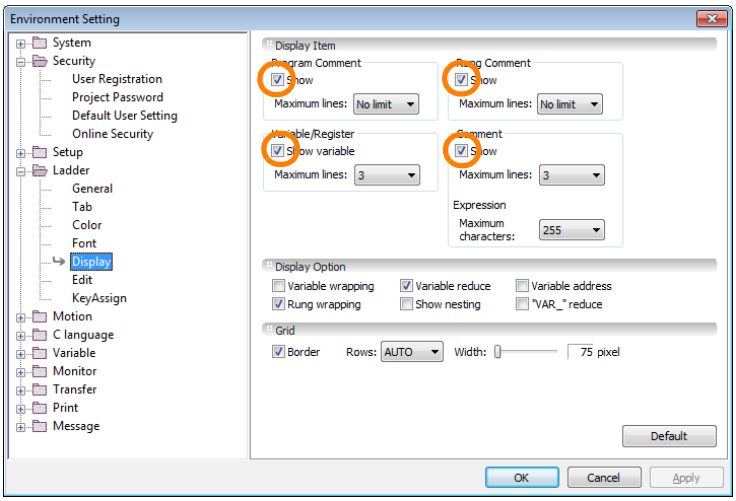


The Environment Setting Dialog Box will be displayed.

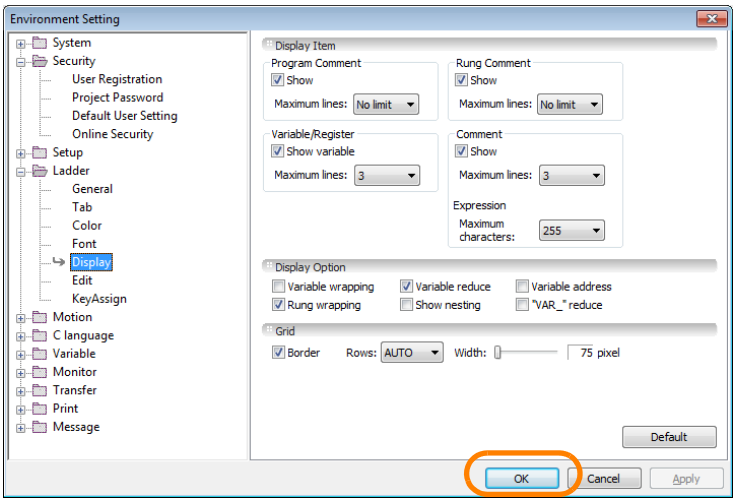
2. Select **Ladder - Display**.



3. Set the items in the **Display Item** Group.
   - To display the registers: Clear the **Show variable** Check Box in the **Variable/Register** Area.
   - To display the variables: Select the **Show variable** Check Box in the **Variable/Register** Area.
   - To display the comments: Select the **Show** Check Box in the **Comment** Area.



4. Click the **OK** Button.



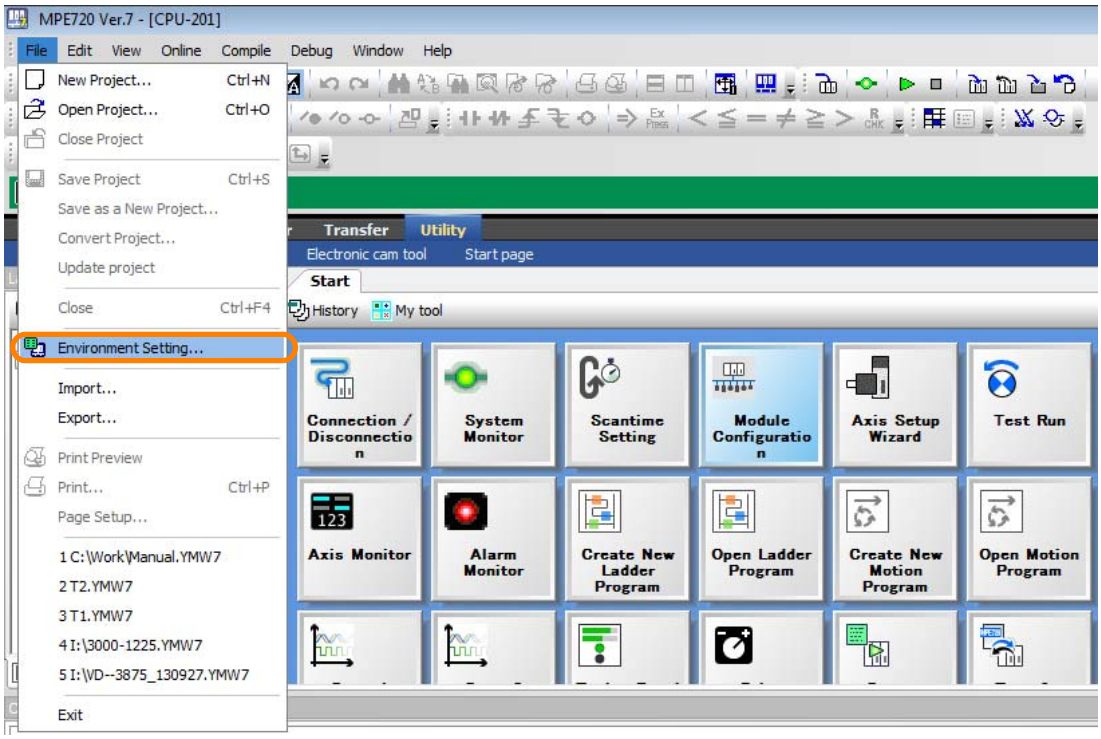
The Environment Setting Dialog Box will close and the settings will be applied to the Edit Ladder Program Tab Page.

This concludes the procedure.

5.1.12 Shortening Variable Names for Local Registers

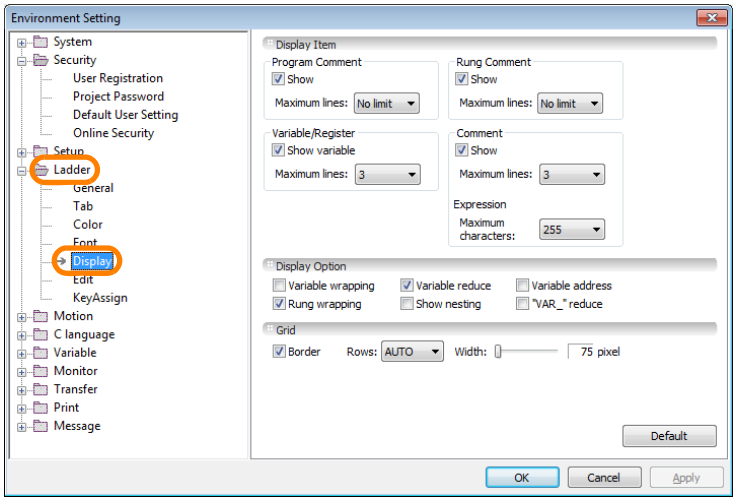
Use the following procedure to omit “VAR_” from the beginning of variable names for local registers.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

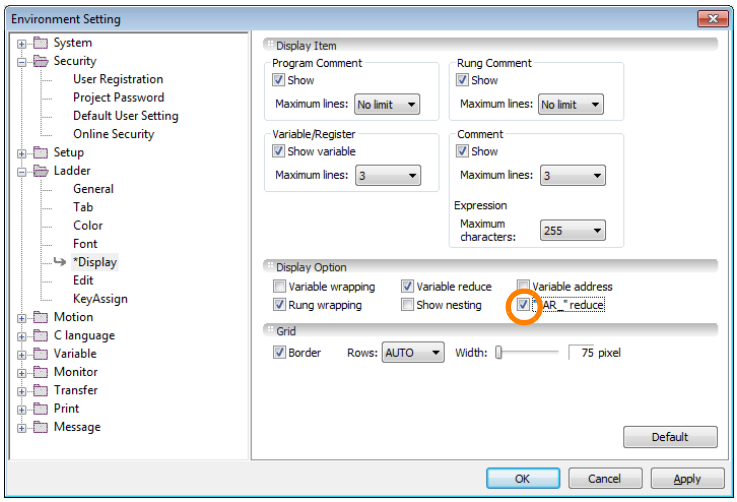


The Environment Setting Dialog Box will be displayed.

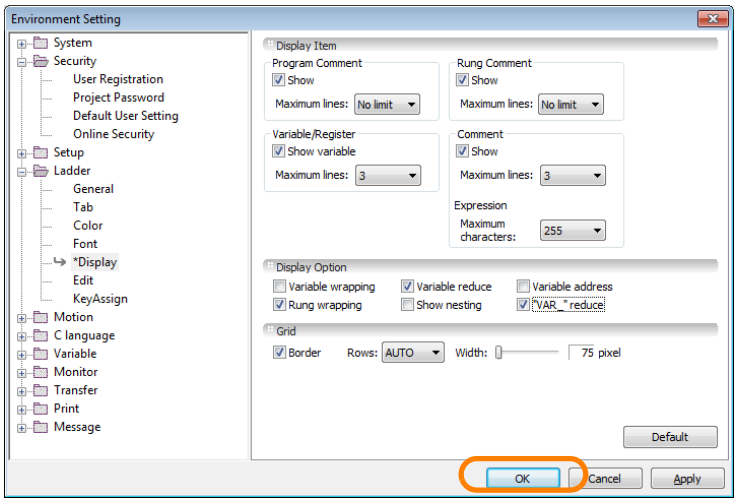
2. Select **Ladder** – **Display**.



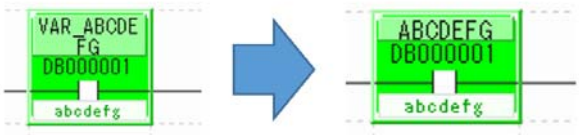
3. Select the **"VAR_" reduce** Check Box in the **Display Option** Group.



4. Click the **OK** Button.



The "VAR_" prefix of variables registered for local registers will be omitted from the variable names in the Ladder Editor.

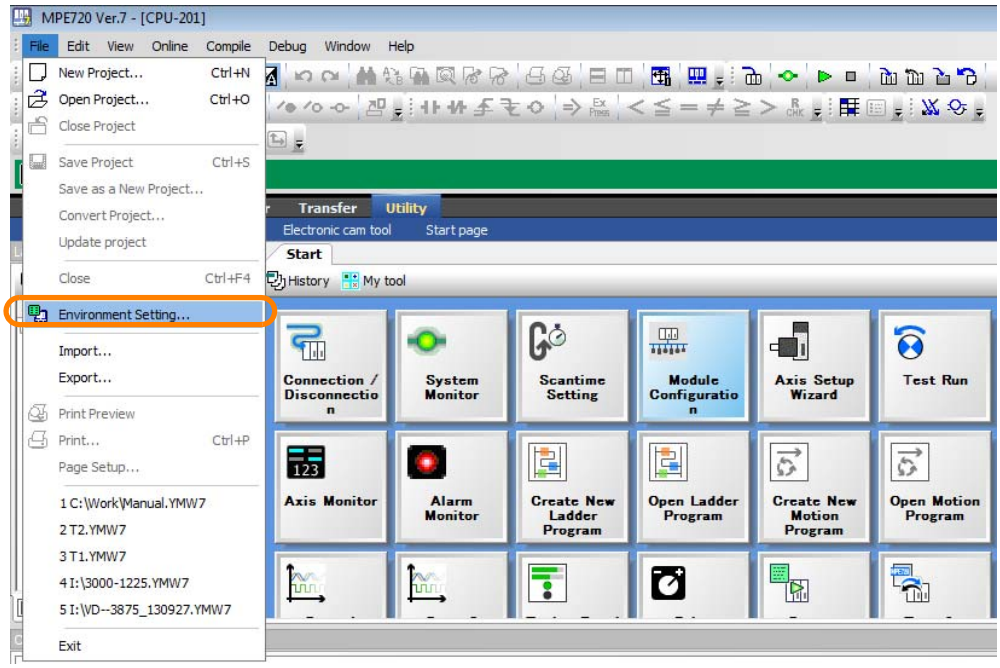


This concludes the procedure.

5.1.13 Displaying Delimiters Every Three Numeric Digits

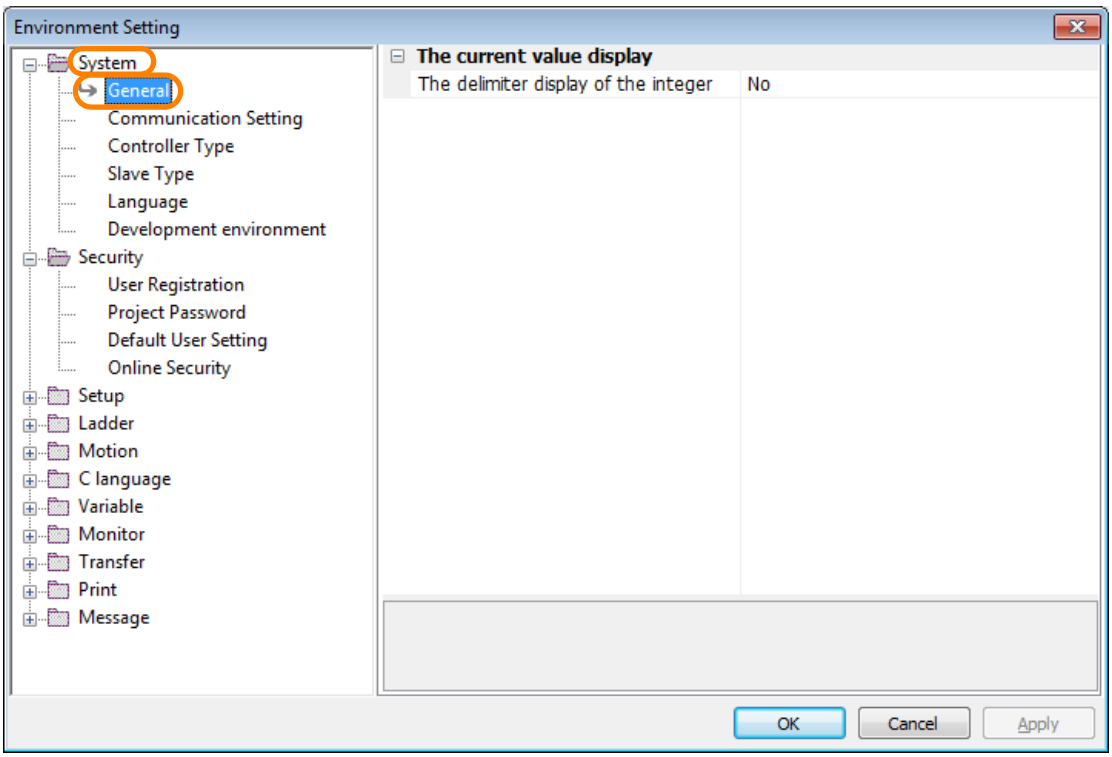
You can specify inserting a comma every three digits for the numeric values displayed in the Ladder Editor and the current values of registers. The setting procedure is given below.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

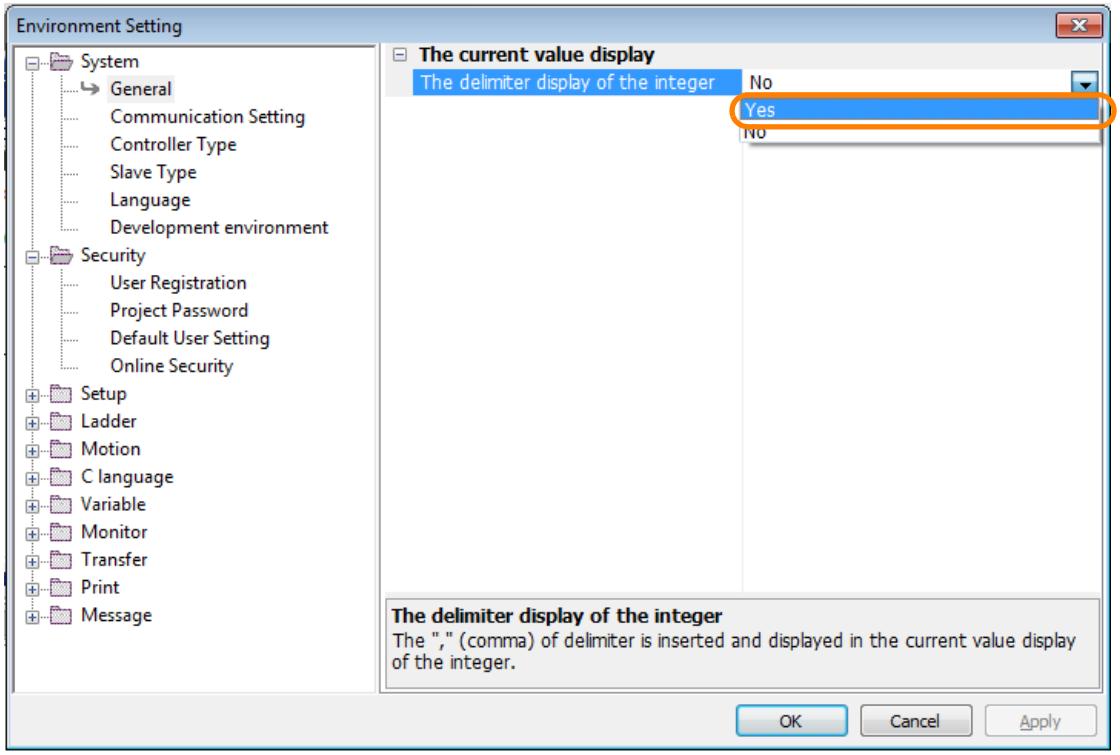


The Environment Setting Dialog Box will be displayed.

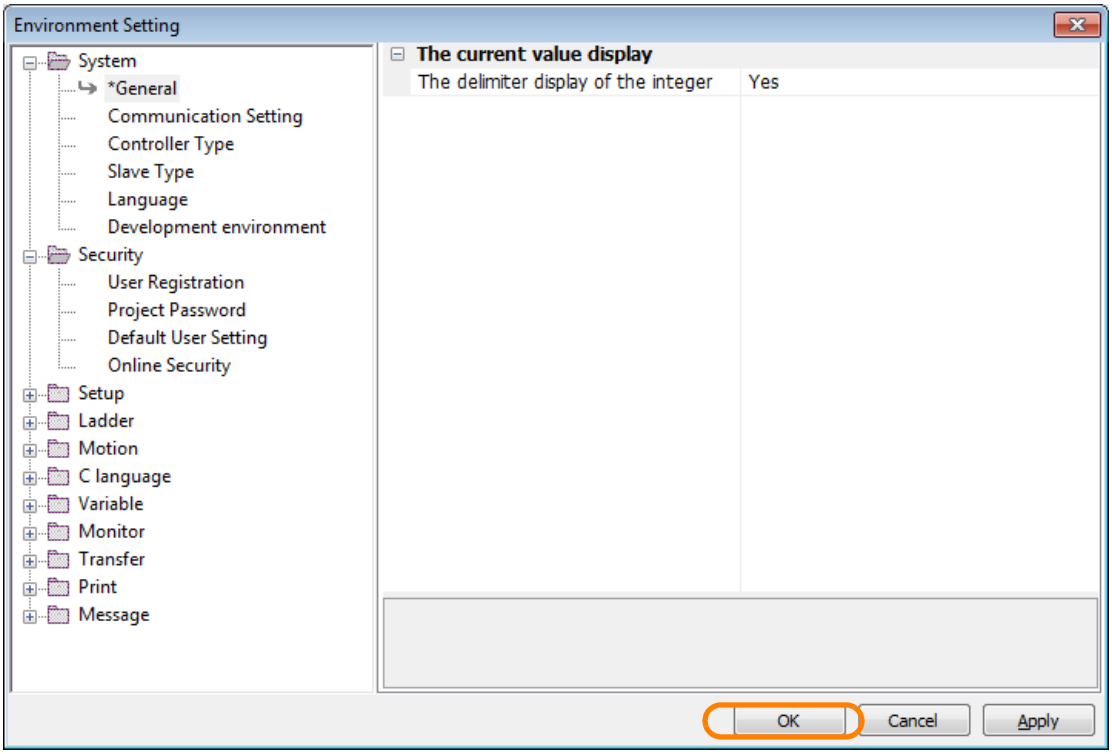
2. Select **System** – **General**.



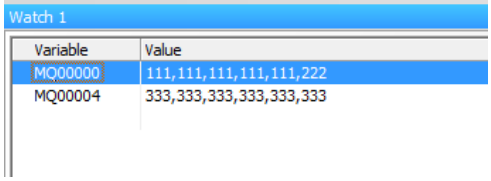
3. Select **Yes** in the **The delimiter display of the integer** Box.



4. Click the **OK** Button.



A comma will be inserted every three digits for the numeric values on the display.

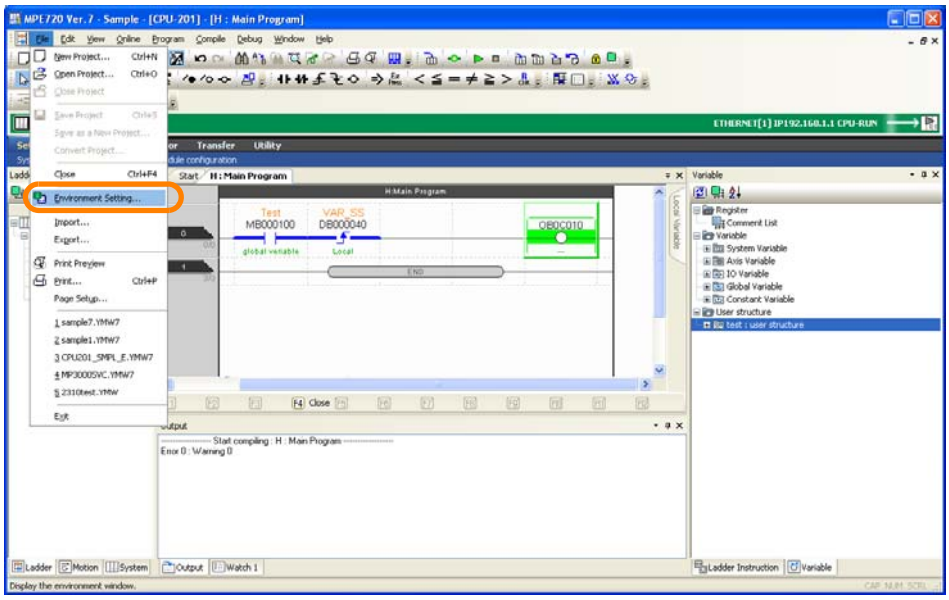


This concludes the procedure.

5.1.14 Increasing the Amount of Information Displayed in the Ladder Program

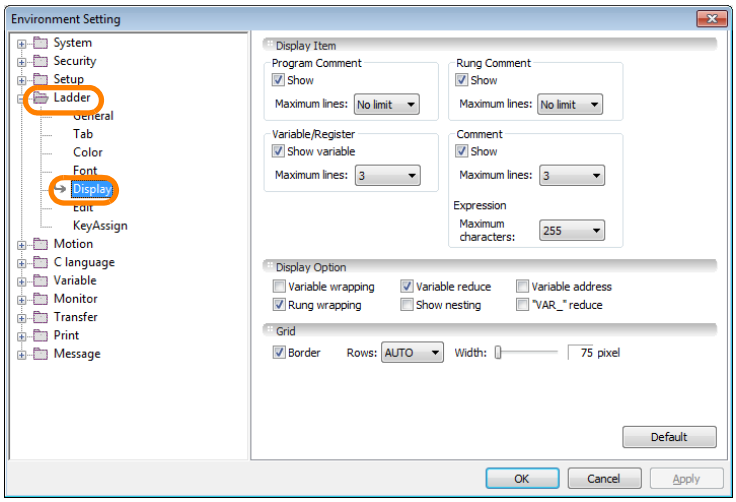
Use the following procedure to increase the number of lines of registers, variables, and comments that are displayed in the Edit Ladder Program Tab Page.

1. Select ***File*** – ***Environment Setting*** from the menu bar.



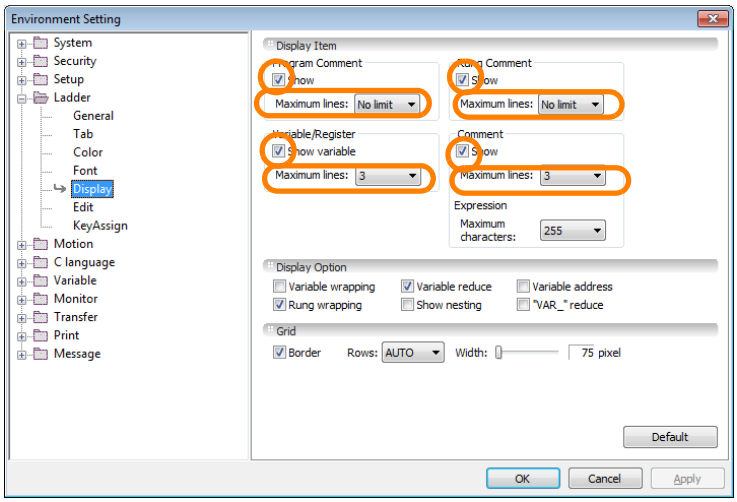
The Environment Setting Dialog Box will be displayed.

2. Select **Ladder - Display.**

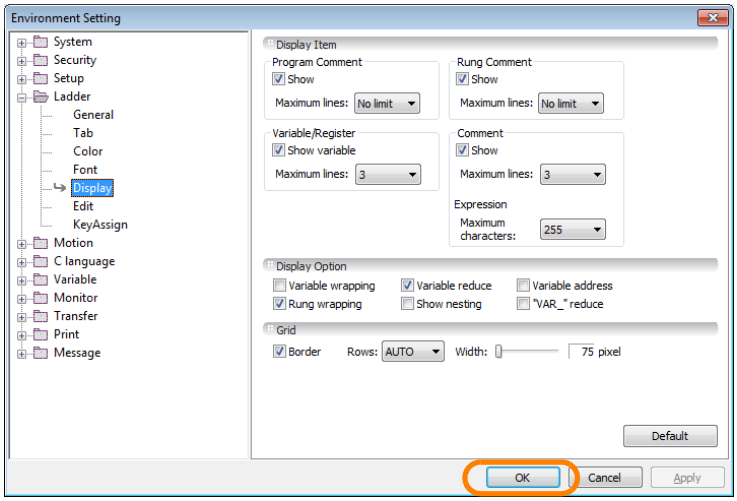


3. Set a value in the **Maximum lines** Box in the **Display Item** Group.
   - To set the number of lines to display for registers: Set a value in the **Maximum lines** Box in the **Variable/Register** Area.
   - To set the number of lines to display for variables: Select the **Show variable** Check Box in the **Variable/Register** Area, and then set a value in the **Maximum lines** Box.
   - To set the number of lines to display for comments: Select the **Show** Check Box in the **Comment** Area, and then set a value in the **Maximum lines** Box.

   Information If the variable or comment is longer than the maximum number of lines, the complete comment will not be displayed.



4. Click the **OK** Button.



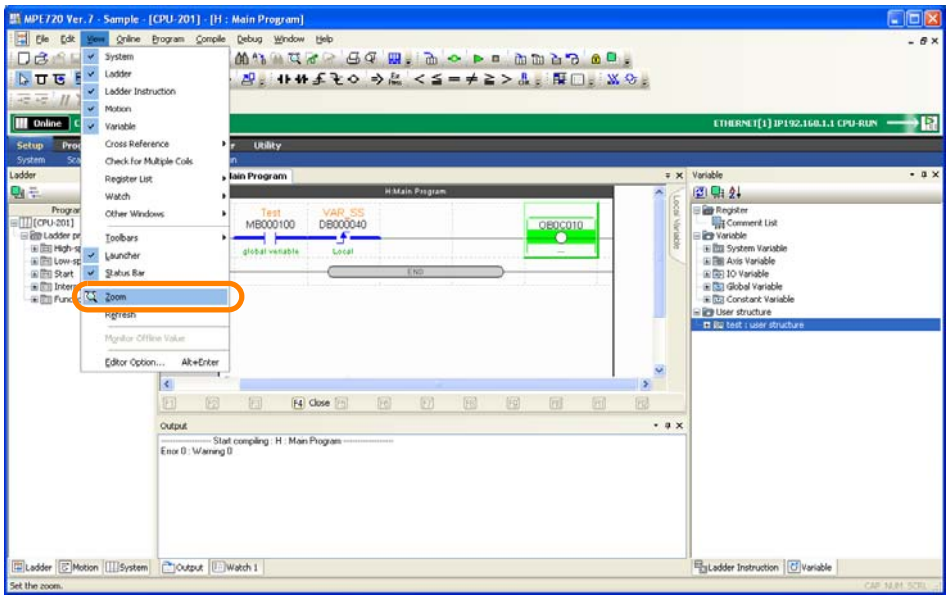
The Environment Setting Dialog Box will close and the settings will be applied to the Edit Ladder Program Tab Page.

This concludes the procedure.

5.1.15 Zooming the Display

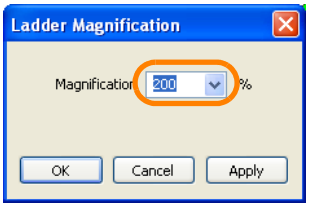
Use the following procedure to zoom the Edit Ladder Program Tab Page.

1. Select ***View*** – ***Zoom*** from the menu bar.

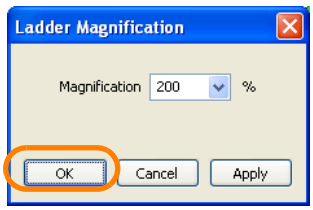


The Ladder Magnification Dialog Box will be displayed.

2. Use one of the following methods to set the desired value in the **Magnification** Box.
   - Enter a value in the **Magnification** Box.
   - Select a value from the **Magnification** Box.



3. Click the **OK** Button.



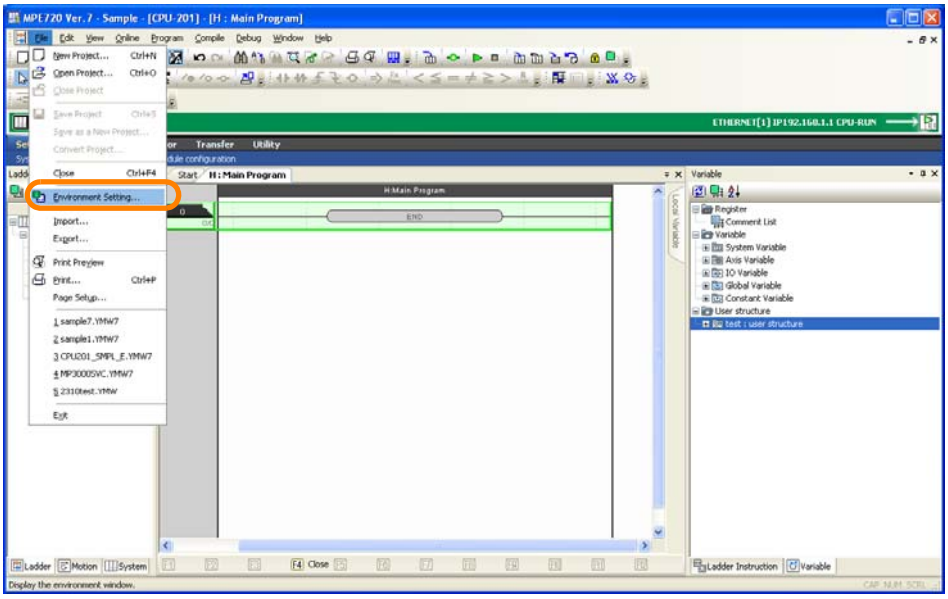
The Ladder Magnification Dialog Box will close and the Edit Ladder Program Tab Page will be displayed with these settings.

This concludes the procedure.

5.1.16 Making the Ladder Program Compatible with Version 5

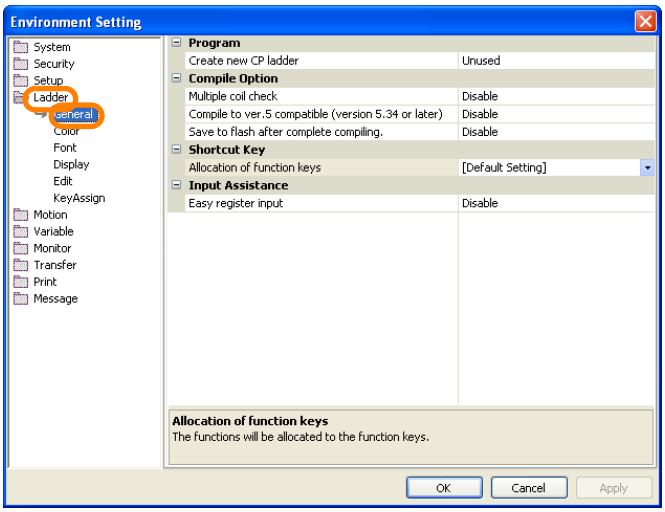
Use the following procedure to make the data format of the ladder program compatible with MPE720 Version 5.

1. Open the project file that contains the program to be opened in MPE720 Version 5.
2. Select ***File*** – ***Environment Setting*** from the menu bar.

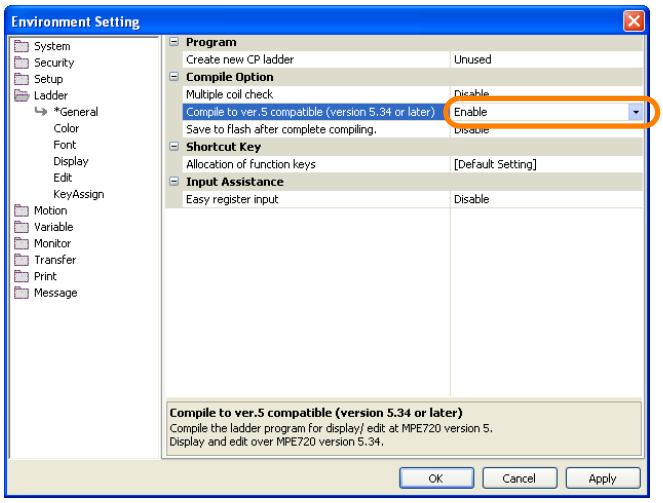


The Environment Setting Dialog Box will be displayed.

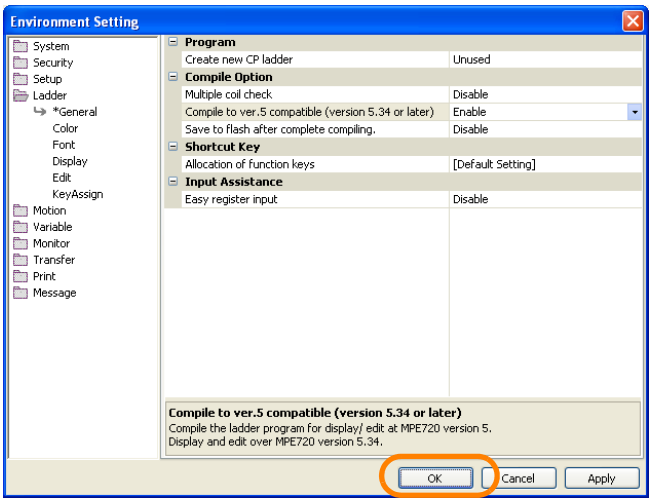
3. Select **Ladder - General**.



4. Set **Compile to ver. 5 compatible (version 5.34 or later)** in the **Compile Option** Group to **Enable.**



5. Click the **OK** Button.



This concludes the procedure.

5.1.17 Creating CP Ladder Programs

There are the following two methods that you can use to create CP ladder programs that are compatible with MPE720 Version 5 or earlier versions of the Engineering Tool.

- Using the Ladder Pane
- Using the Launcher

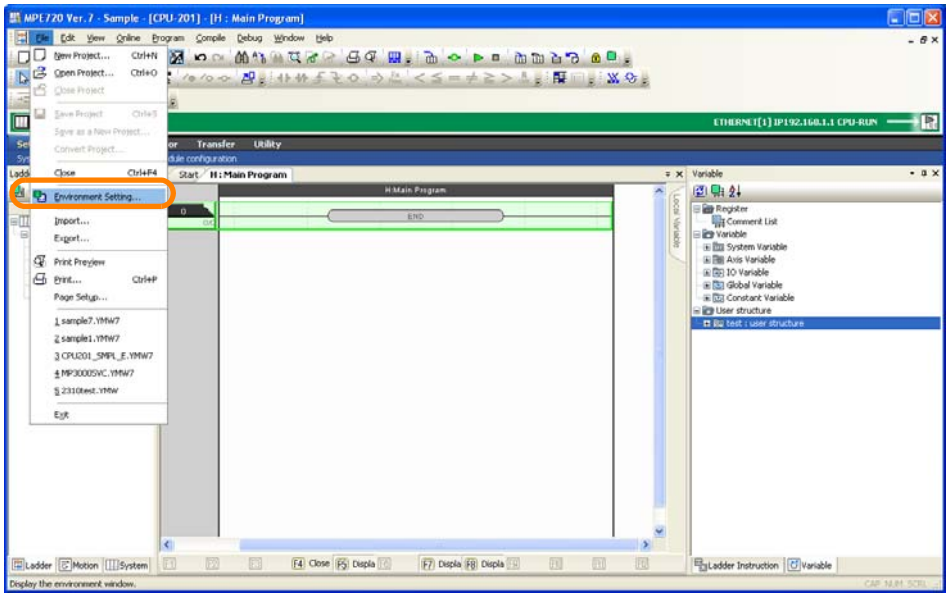
The procedures are given below.

> Important
>
> You can use CP ladder programs for MP2000-series or MP3000-series Controllers, but the types and ranges of registers and the data types that can be used will be limited to the range specifications of the MP2000-series Controllers.
> Refer to the following manual for details.
> 🕮 Machine Controller MP2000 Series User's Manual Ladder Programming (Manual No.: SIE-C887-1.2)

Using the Ladder Pane

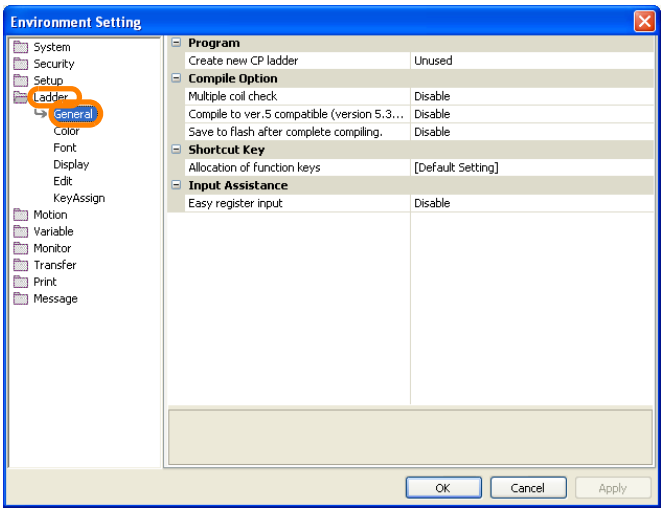
Use the following procedure to create a new CP ladder program using the Ladder Pane.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

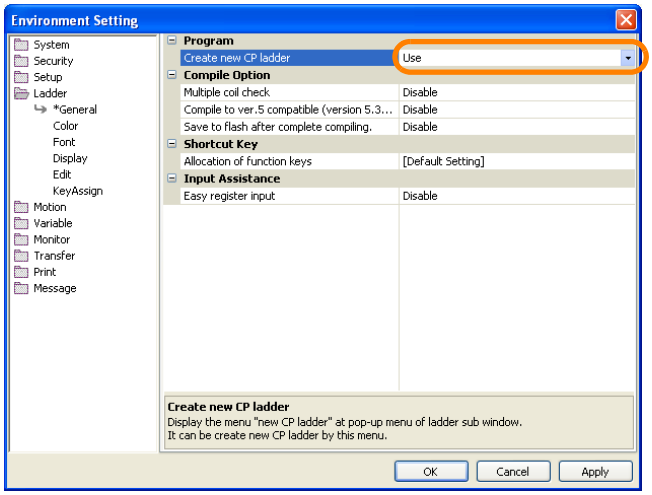


The Environment Setting Dialog Box will be displayed.

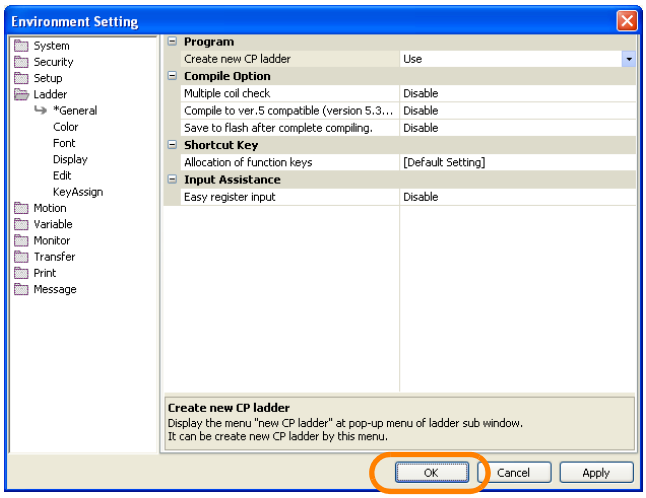
2. Select **Ladder - General**.



3. Set **Create new CP ladder** in the **Program** Group to **Use**.

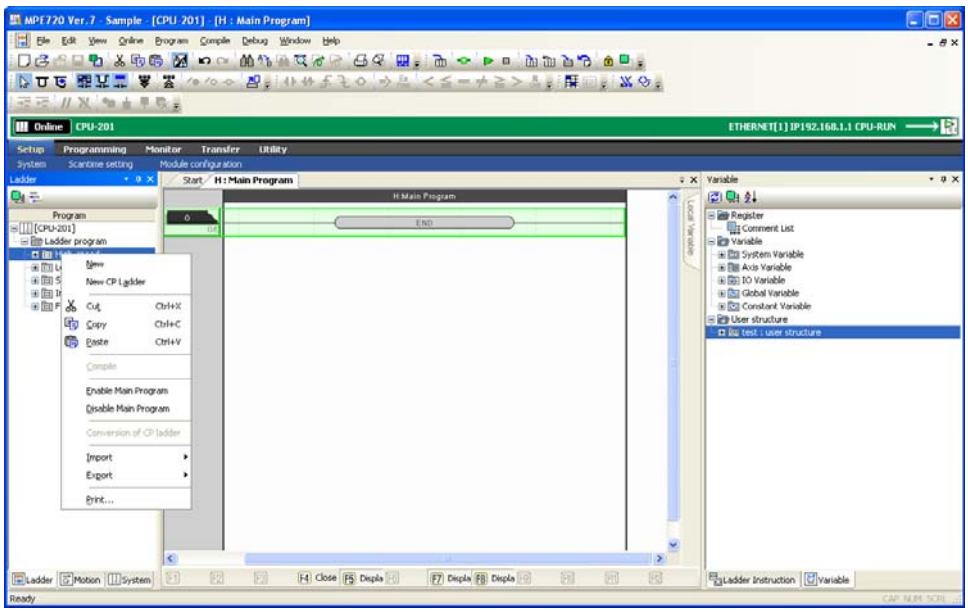


4. Click the **OK** Button.

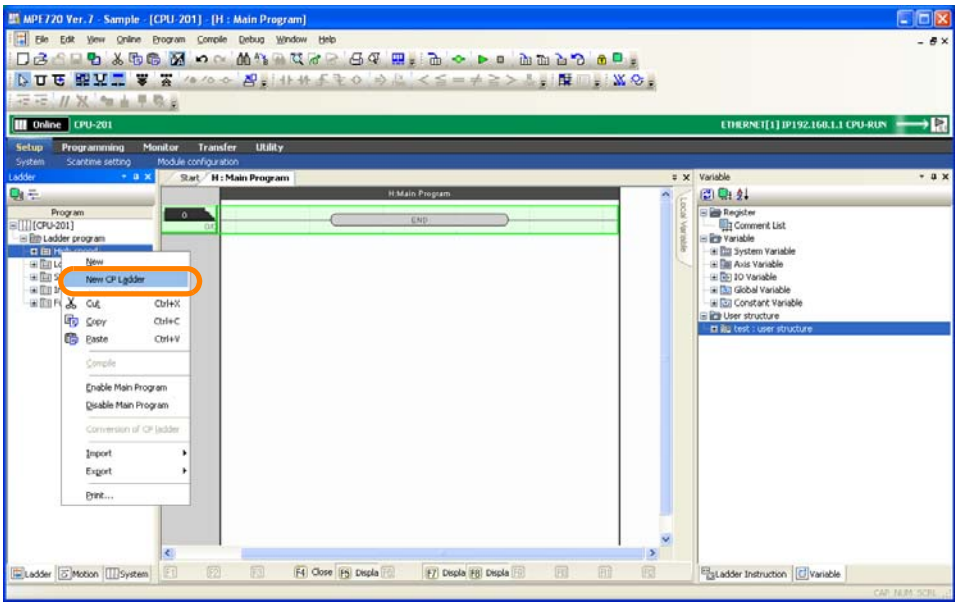


The Environment Setting Dialog Box will close and the settings will be applied.

5. Right-click on the Ladder Pane.

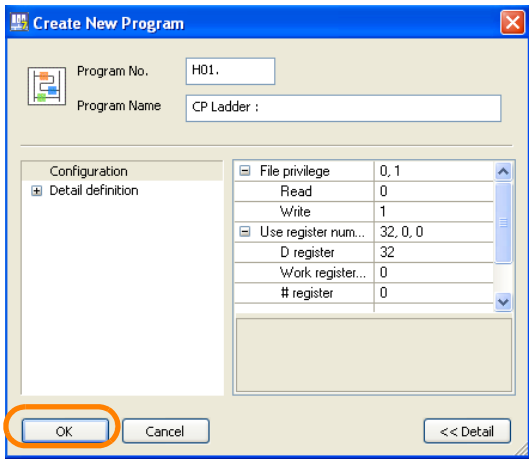


6. Select ***New CP Ladder***.

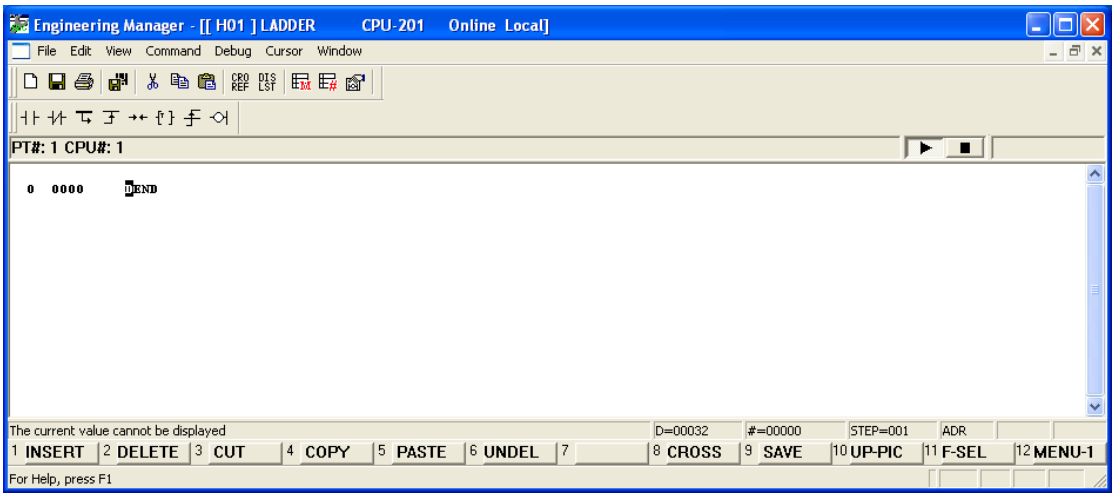


The Create New Program Dialog Box will be displayed.

7. 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.

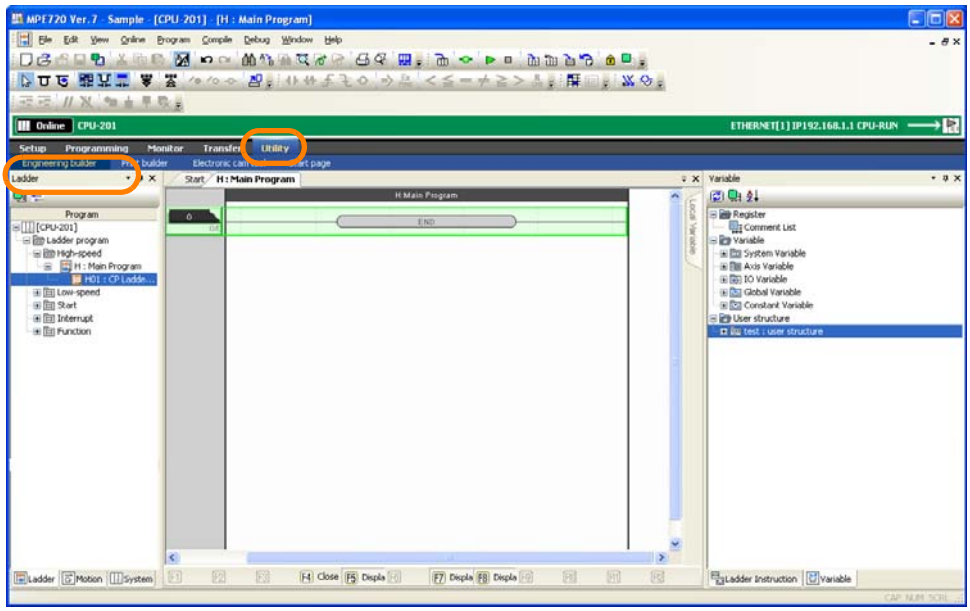
📖 *Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual* (Manual No.: SIEP C880700 05)

This concludes the procedure.

Using the Launcher

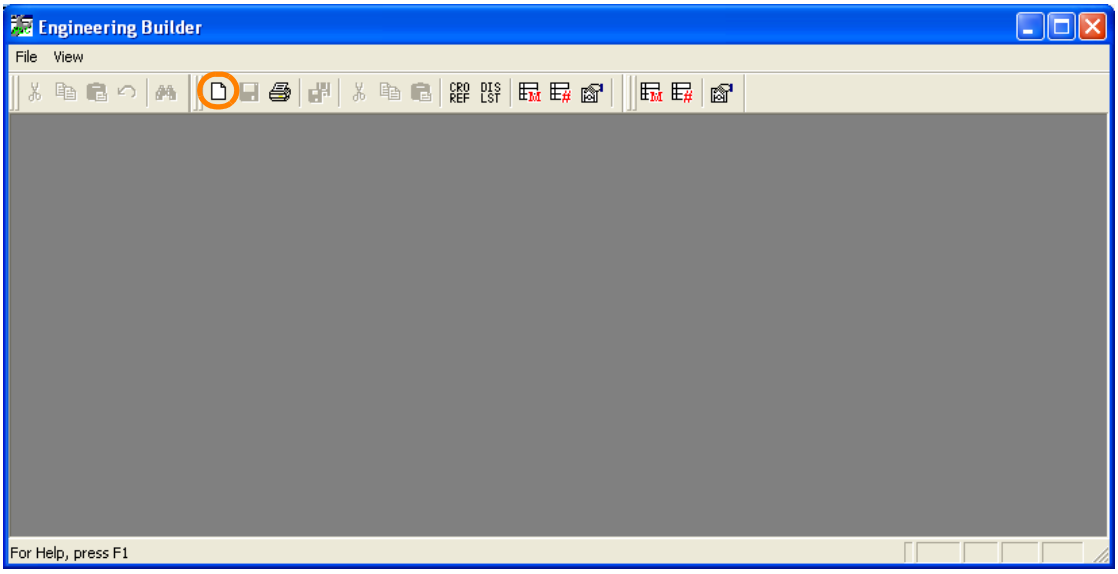
Use the following procedure to create a new CP ladder program using the Launcher.

1. Select ***Utility - Engineering Builder*** from the Launcher.



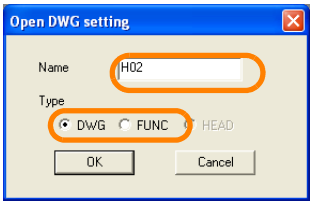
The Engineering Builder Window will be displayed.

2. Click the **New** Button.

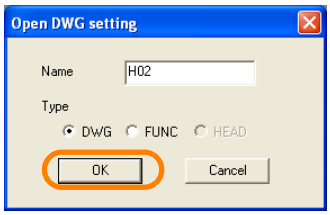


The Open DWG Setting Dialog Box will be displayed.

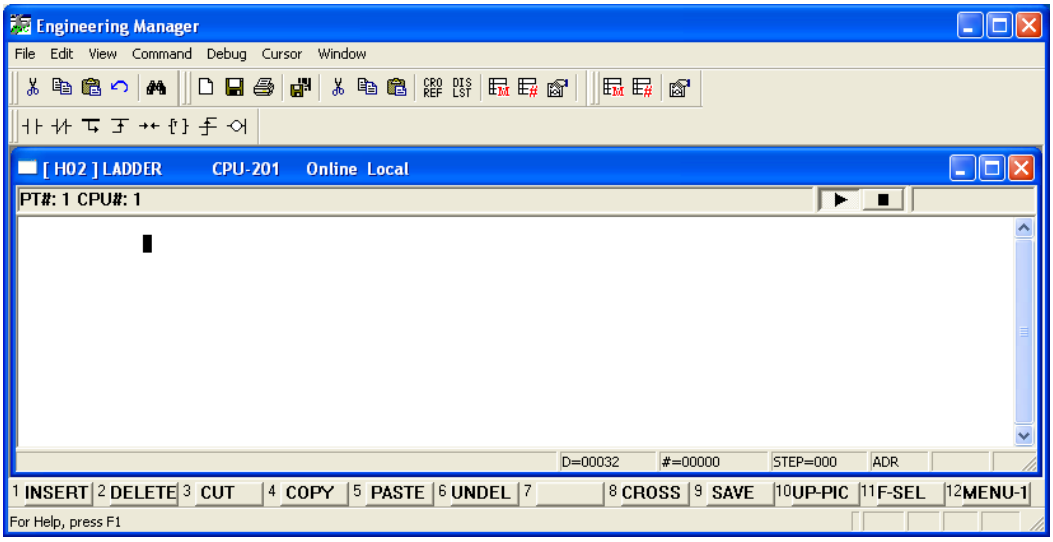
3. Enter the drawing name in the **Name** Box, and select the drawing type from the **Type** Options.



4. 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.

5.1.18 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.

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.

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.

Specifying the Operation Type

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

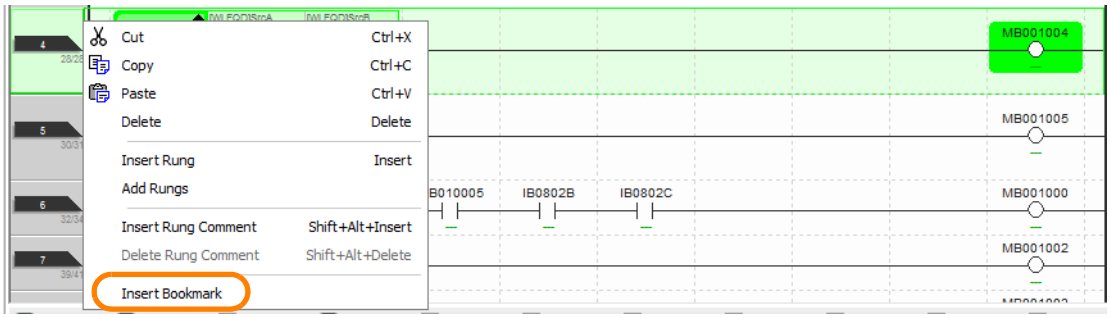
DW00010 = FTYPE (14000 - (DF00012 * 100 / 2))
In this example, the operation on the right side is calculated as if the values were all floating decimal data.

Refer to the following section for details on numeric operations in the Expression instruction.
☞ *Casting* on page 14-9

5.1.19 Setting Bookmarks

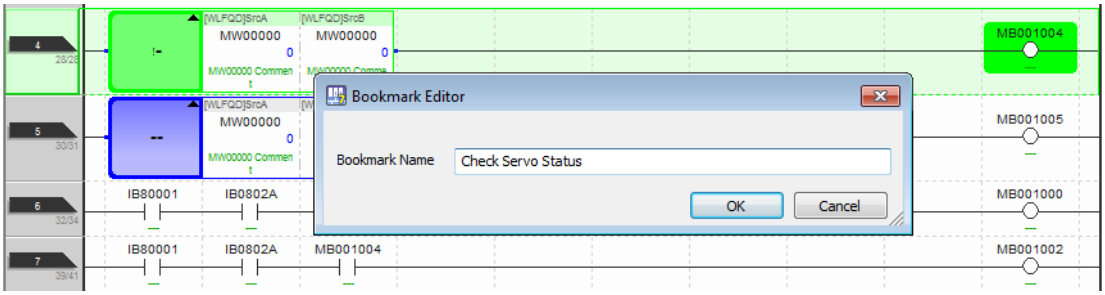
You can set bookmarks at the desired locations in ladder programs. Use the following procedure.

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

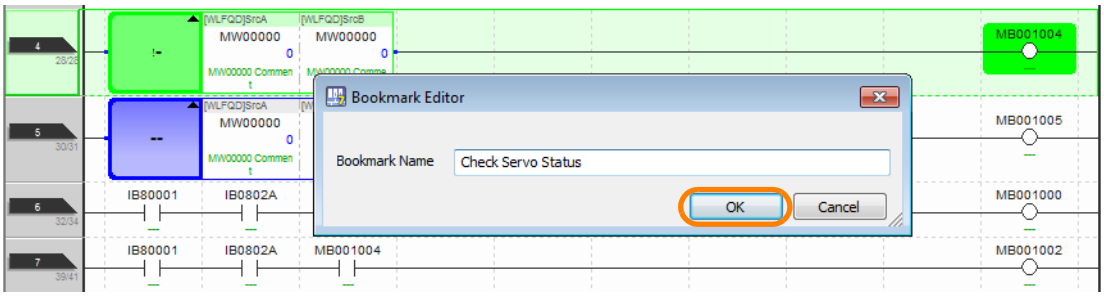


The Bookmark Editor Dialog Box will be displayed.

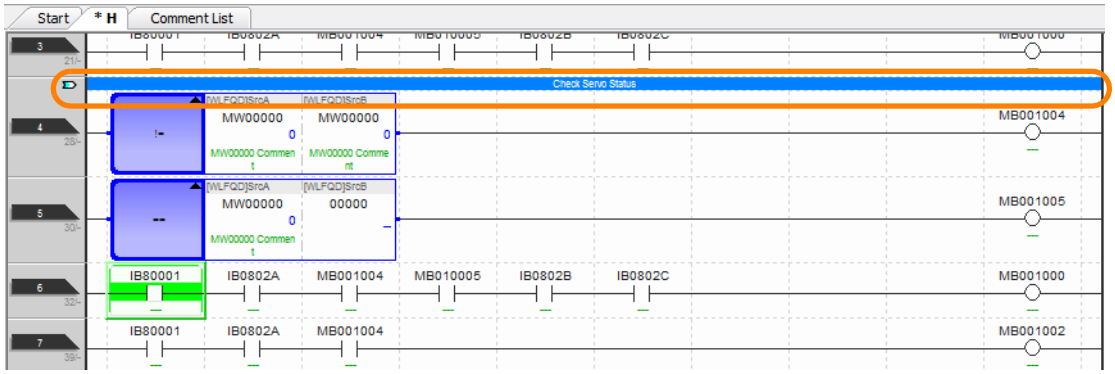
2. Enter a name for the bookmark.



3. Click the **OK** Button.



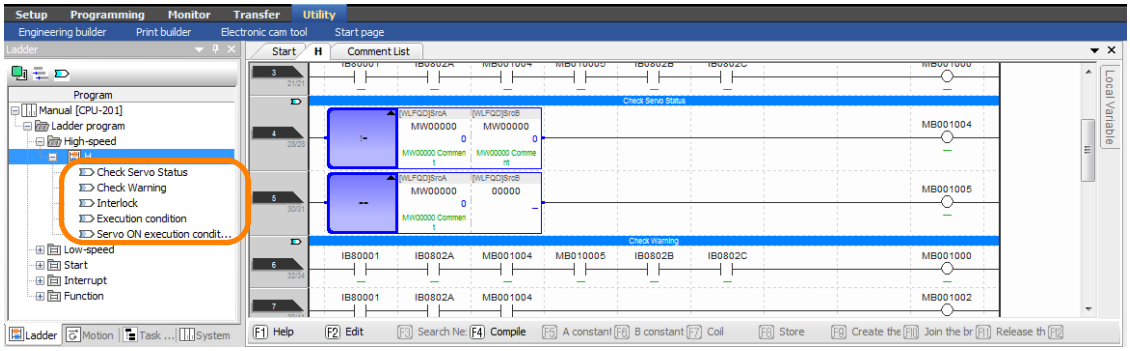
The name of the inserted bookmark will be displayed in the program.



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

4. Use one of the following methods to compile the program.

- Press the **F4** Key.
- Select ***Compile*** – ***Compile*** from the menu bar.



A list of bookmarks will be displayed in the hierarchy tree in the pane on the left.

This concludes the procedure.

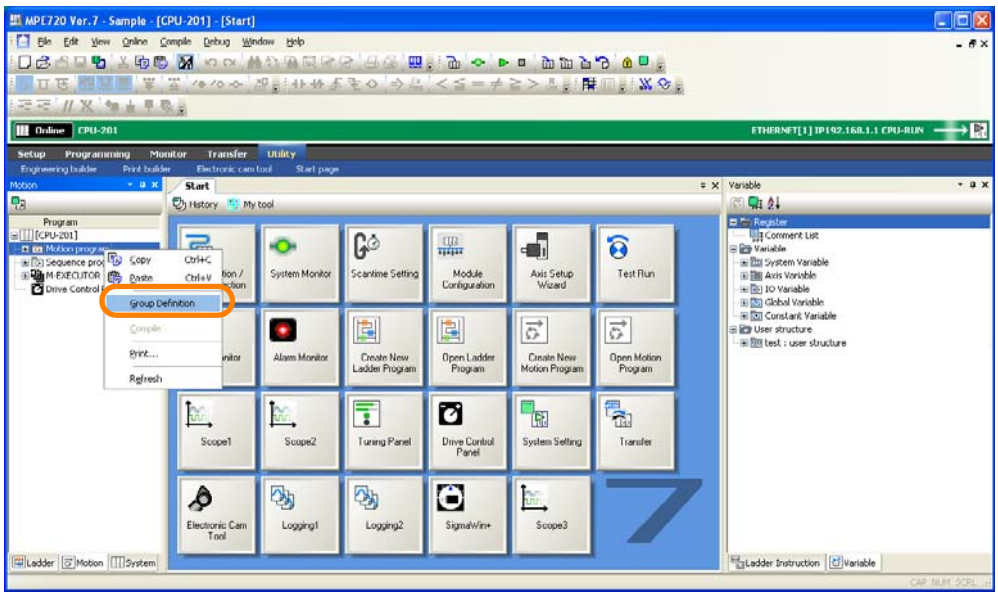
5.2 Motion Programming

This section describes the operations used in motion programming.

5.2.1 Setting Group Definitions

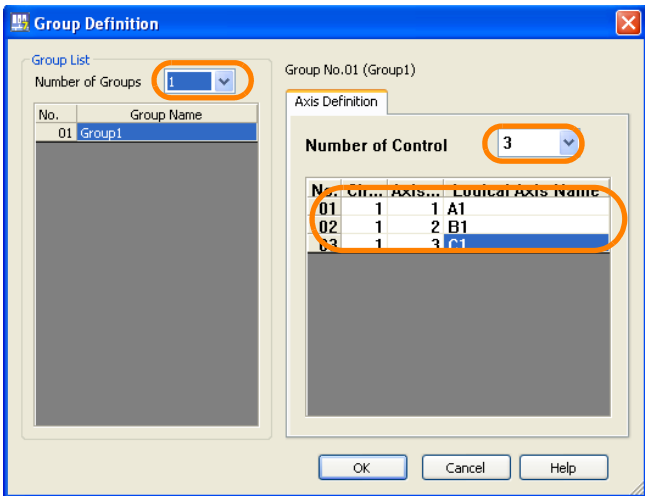
The group definition must be set before you create a motion program.
The procedure is given below.

1. Right-click on the Motion Pane and select ***Group Definition***.

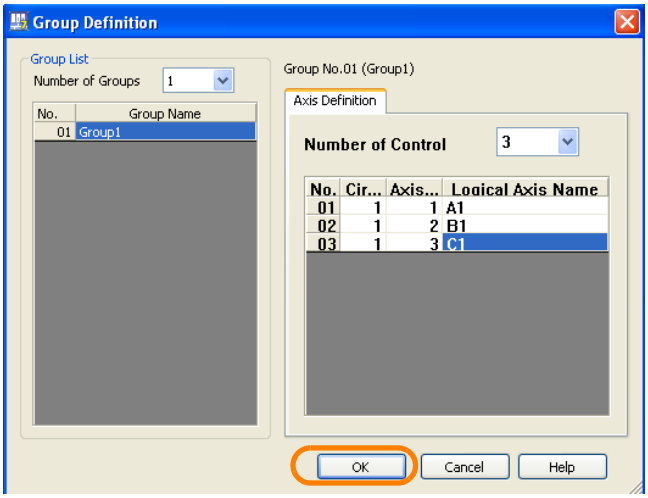


The Group Definition Dialog Box will be displayed.

2. Set a group definition.
Refer to the following manual for details on the settings.
📖 *MP3000 Series Motion Programming Manual* (Manual No.: SIEP C880725 14)



3. Click the **OK** Button.



The settings will be saved and the Group Definition Dialog Box will close.

This concludes the procedure.

5.2.2 Creating a Motion Program

There are the following two methods that you can use to create motion programs.

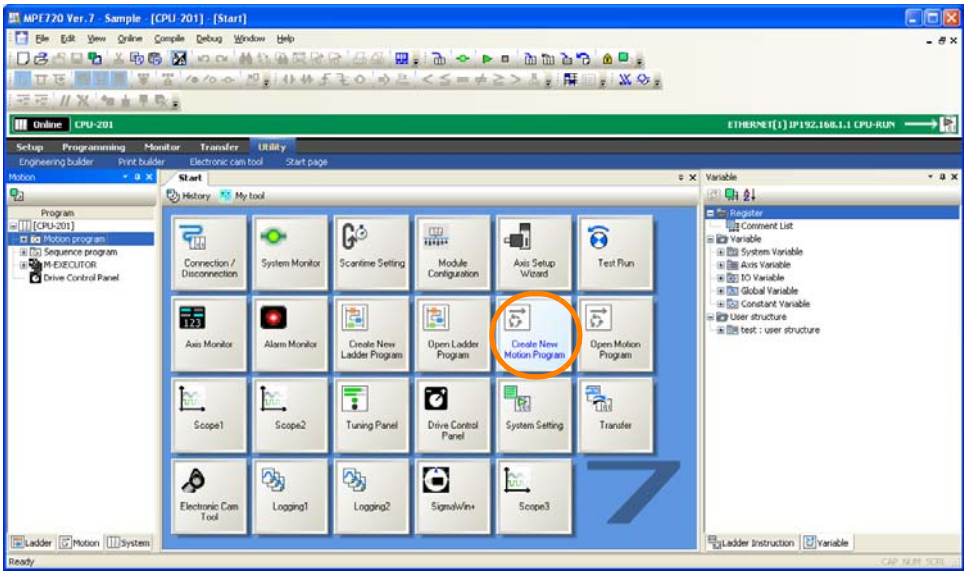
- Creating from the My Tool View
- Creating from the Motion Pane

The procedures are given below.

Creating from the My Tool View

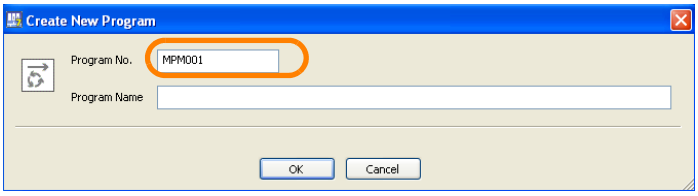
Use the following procedure to create a new motion program from the My Tool View in the MPE720 Ver. 7 Window.

1. Click the **Create New Motion Program** Button on the My Tool View.



The Create New Program Dialog Box will be displayed.

2. Enter the program number.



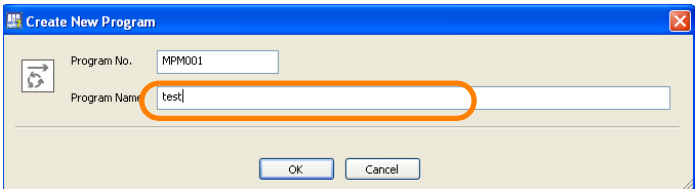
Note: You cannot use the same program number for main programs and subprograms.

- Entry example: MPM 001

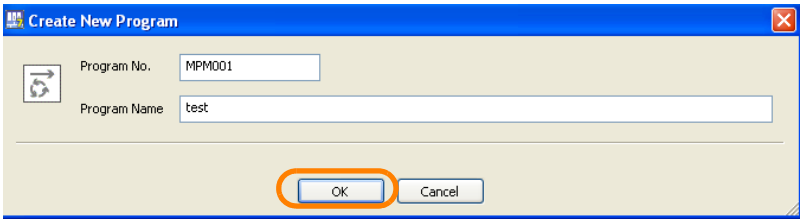
  Setting range for program numbers
  - MP2000-series Machine Controllers: 001 to 255
  - MP3000-series Machine Controllers: 001 to 512

  Type of program
  - MPM: Main program
  - MPS: Subprogram

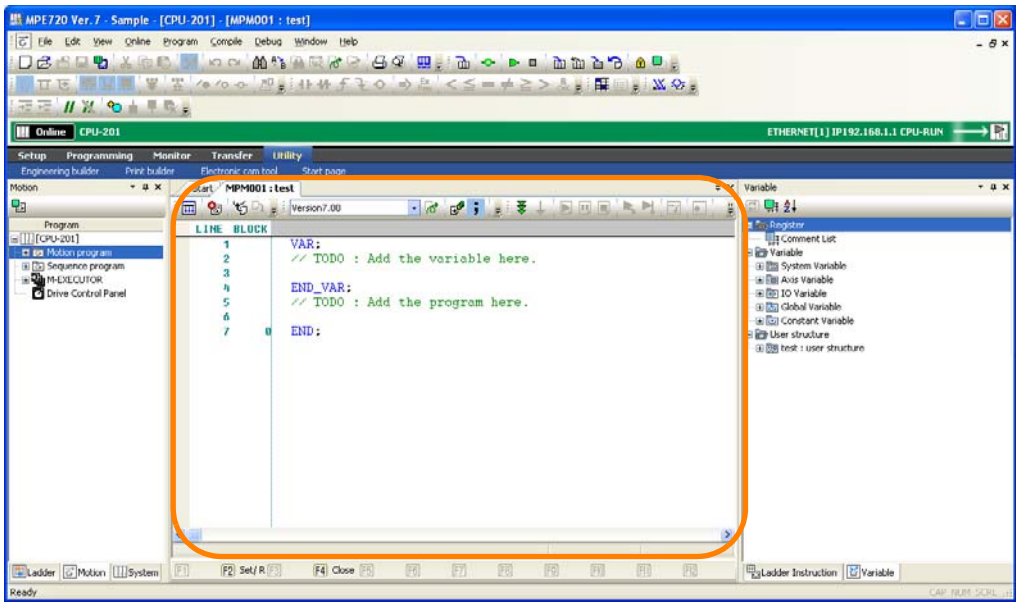
3. Enter the program name.



4. Click the **OK** Button.



A new motion program will be displayed.

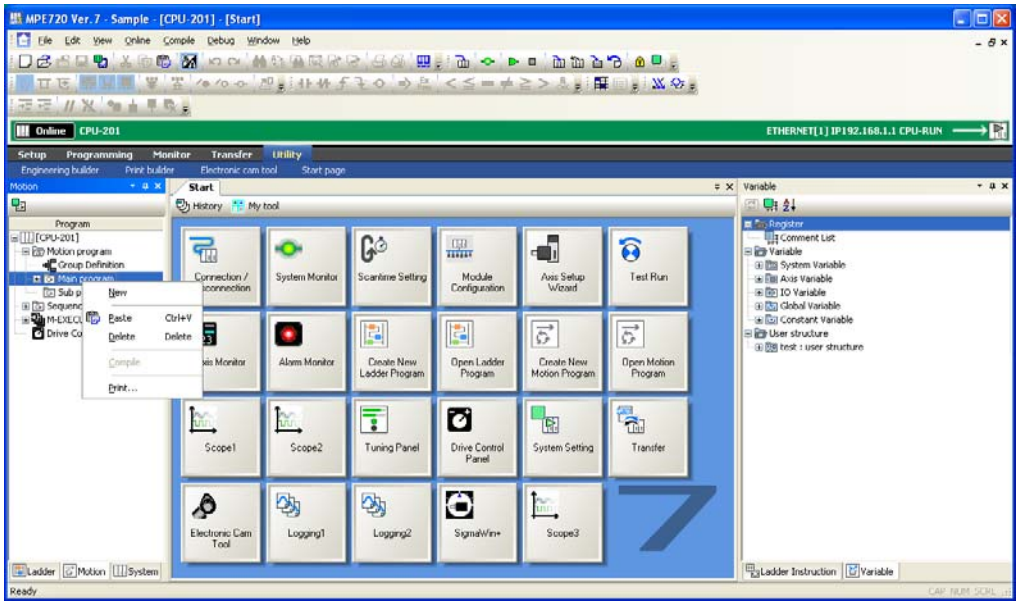


This concludes the procedure.

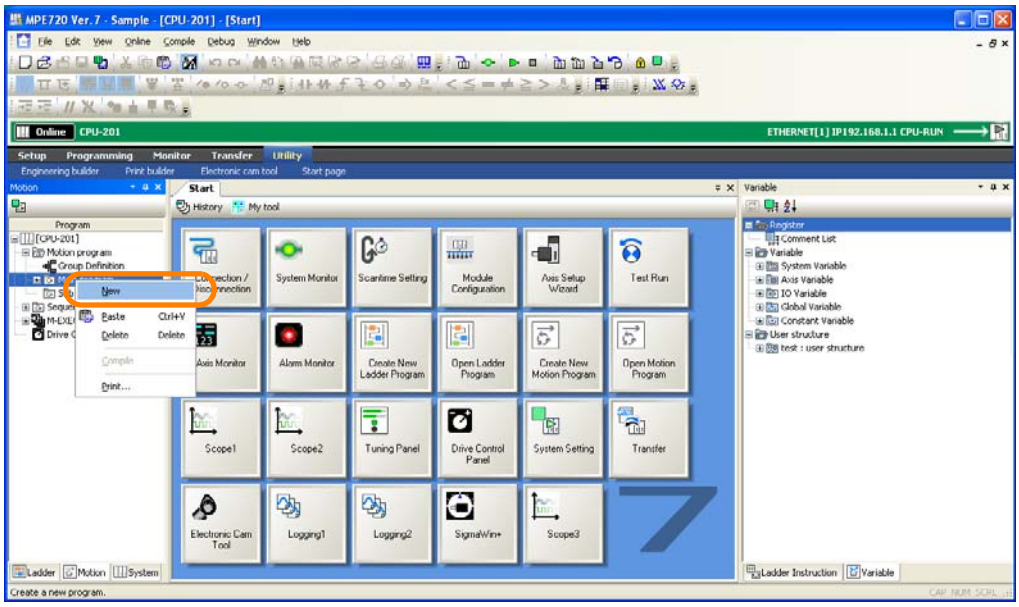
Creating from the Motion Pane

Use the following procedure to create a new motion program on the Motion Pane in the MPE720 Ver. 7 Window.

1. Right-click on the type of motion program to create in the Motion Pane.



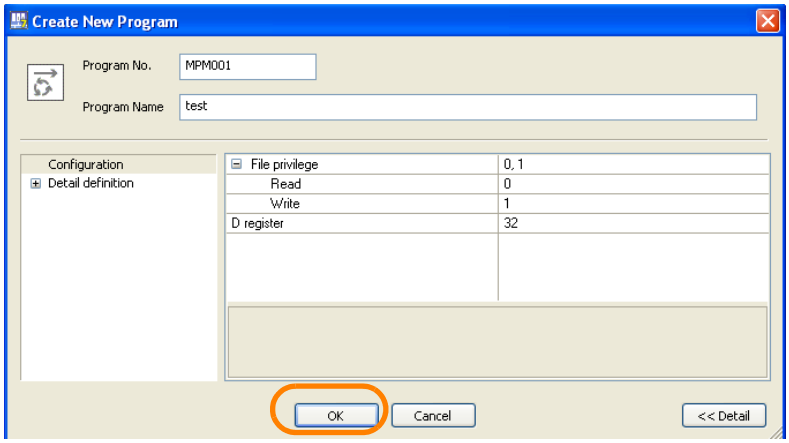
2. Select ***New***.



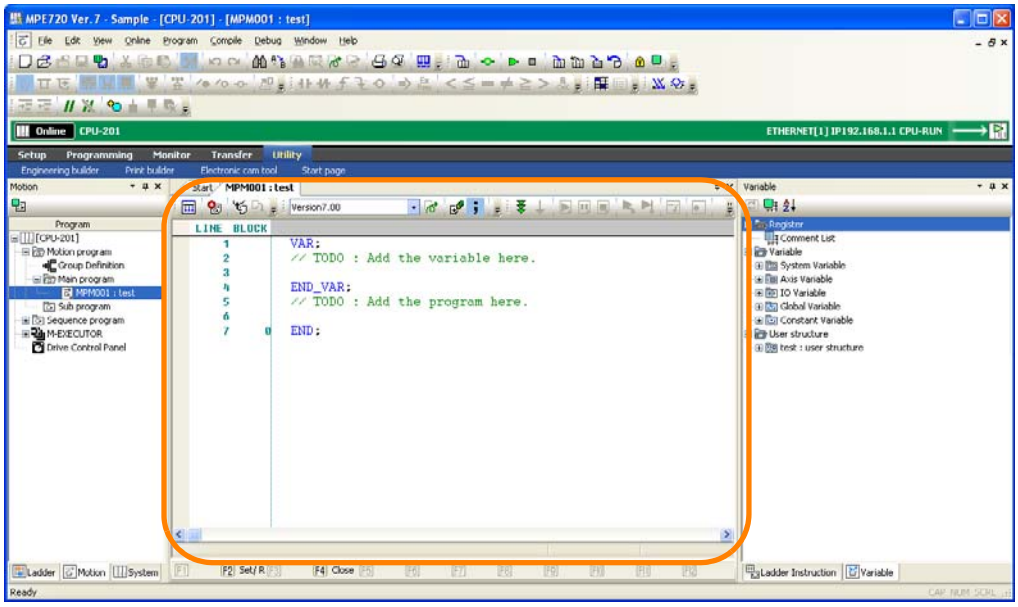
The Create New Program Dialog Box will be displayed.

3. Change the settings as required.

4. Click the **OK** Button.



A new motion program will be displayed.

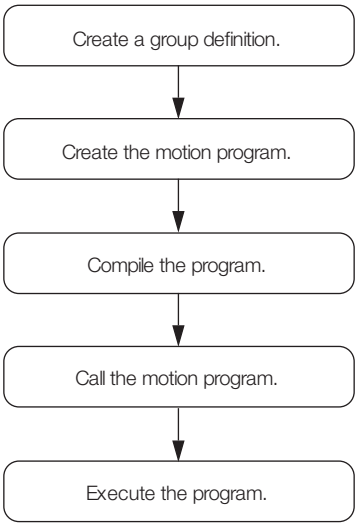


This concludes the procedure.

5.2.3 Running Your Motion Programs

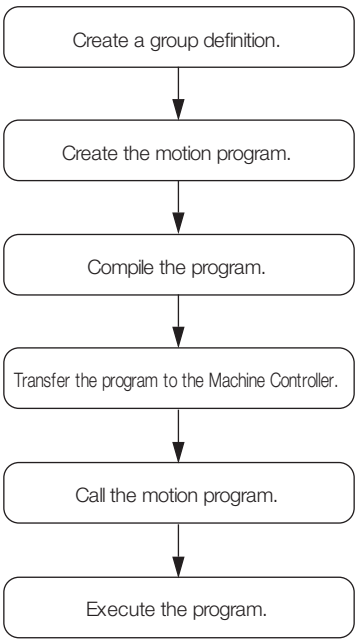
The flow used to run motion programs on the Machine Controller depends on whether the program was created online or offline.
Each flow is given below.

Motion Programs Created Online



☞ *5.2.1 Setting Group Definitions* on page 5-54
☞ *5.2.2 Creating a Motion Program* on page 5-55
☞ *5.3.10 Compiling Programs* on page 5-102
☞ *Calling Motion Programs from a Ladder Program* on page 5-60
☞ *5.2.5 Executing Motion Programs* on page 5-68

Motion Programs Created Offline



☞ *5.2.1 Setting Group Definitions* on page 5-54
☞ *5.2.2 Creating a Motion Program* on page 5-55
☞ *5.3.10 Compiling Programs* on page 5-102
☞ *8.6 Transferring Data Between the Machine Controller and Project Files* on page 8-60
☞ *Calling Motion Programs from a Ladder Program* on page 5-60
☞ *5.2.5 Executing Motion Programs* on page 5-68

5.2.4 Registering a Motion Program for Execution

There are the following two methods that you can use to register motion programs for execution.

- Calling from a ladder program
- Registering in the M-EXECUTOR

This section describes each method.

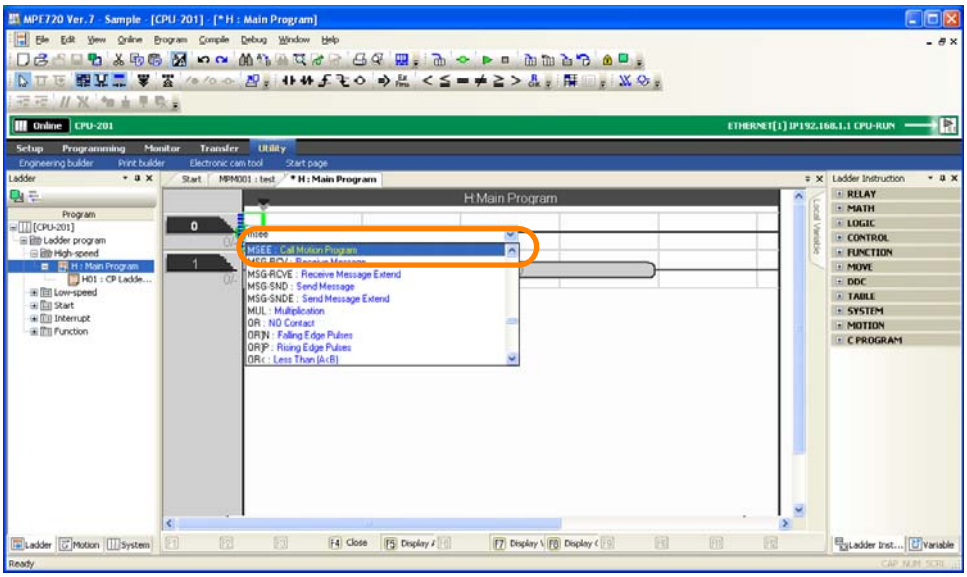
Calling Motion Programs from a Ladder Program

To call a motion program from a ladder program, use the MSEE instruction. Use the following procedure.

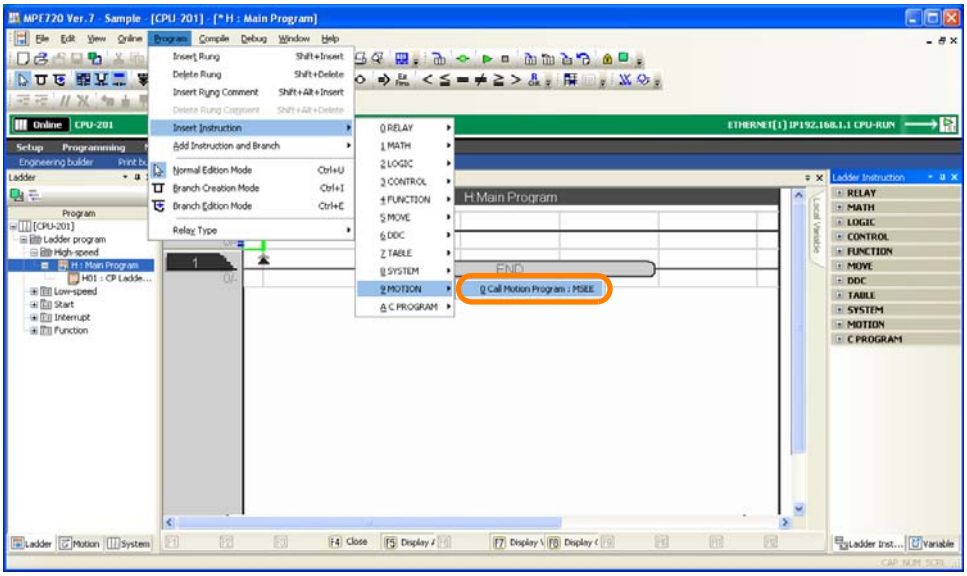
1. Create a new H drawing for a ladder program.
   Refer to the following section for details on creating ladder programs.
   ☞ *5.1.1 Creating New Ladder Programs* on page 5-3

2. Use one of the following methods to insert an MSEE instruction.
   - Enter “msee”, and select **MSEE: Call Motion Program** from the displayed list of instructions.

   Information The Autocomplete function can be used. Refer to the following section for details.
   ☞ *5.3.1 Using the Autocomplete Function* on page 5-81

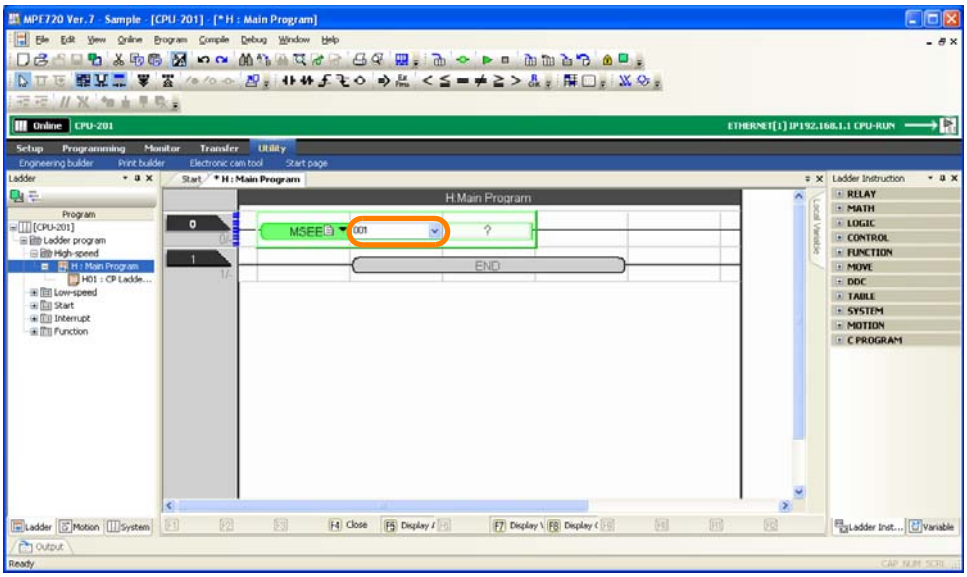


- Select ***Program - Insert Instruction - MOTION - Call Motion Program: MSEE*** from the menu bar.

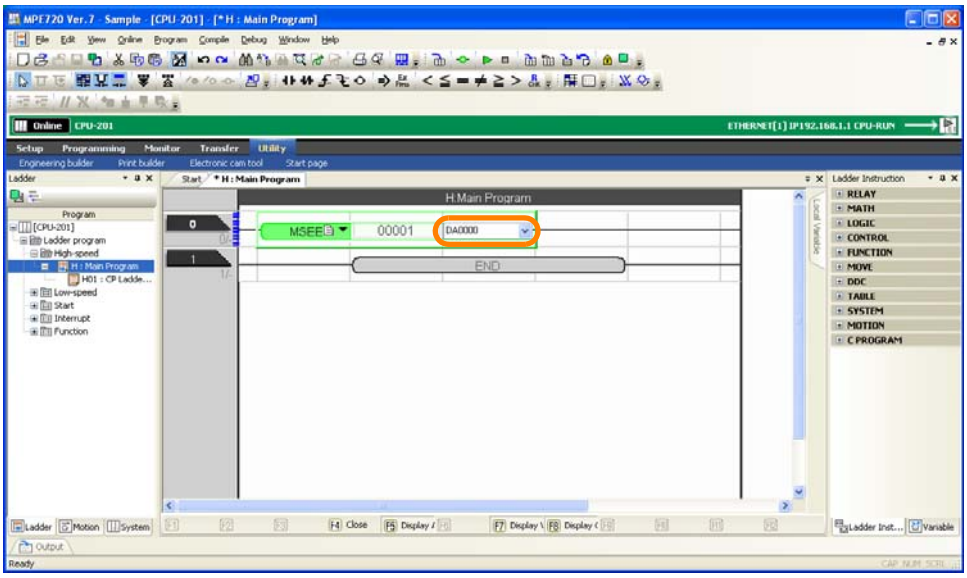


An MSEE instruction will be inserted.

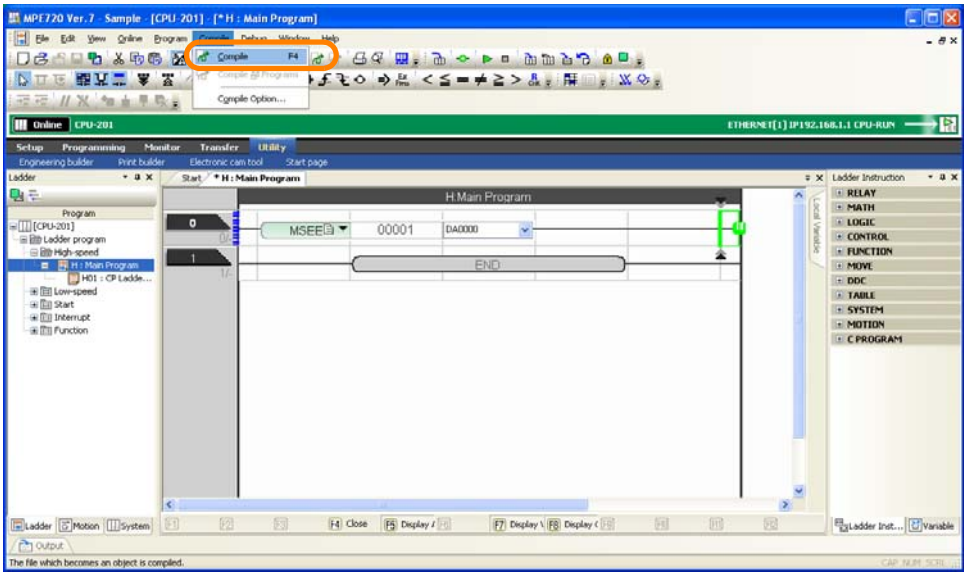
3. Enter the number of the motion program to execute.



4. Enter the first work register for execution.



5. Use one of the following methods to compile the program.
   - Press the **F4** Key.
   - Select ***Compile*** – ***Compile*** from the menu bar.

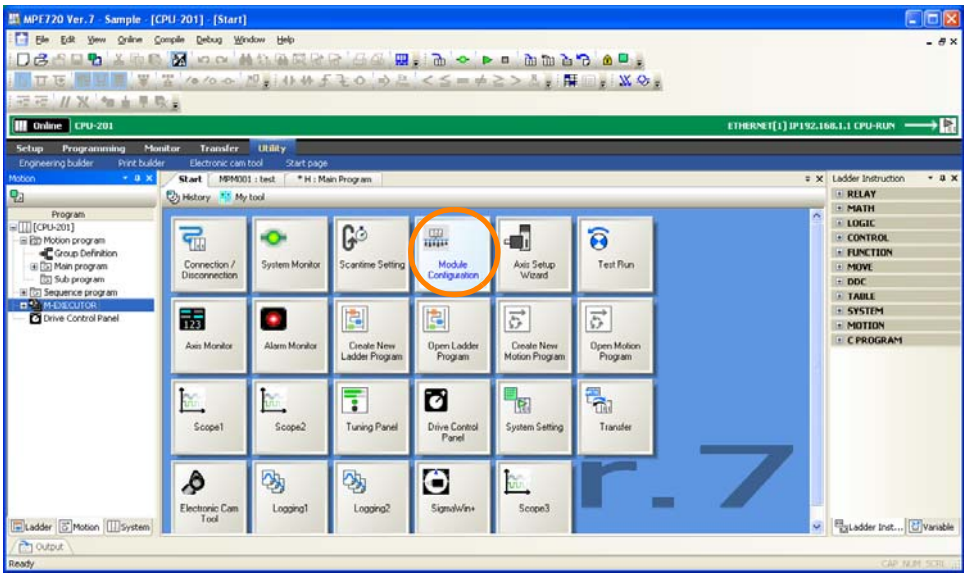


This concludes the procedure.

Registering in the M-EXECUTOR

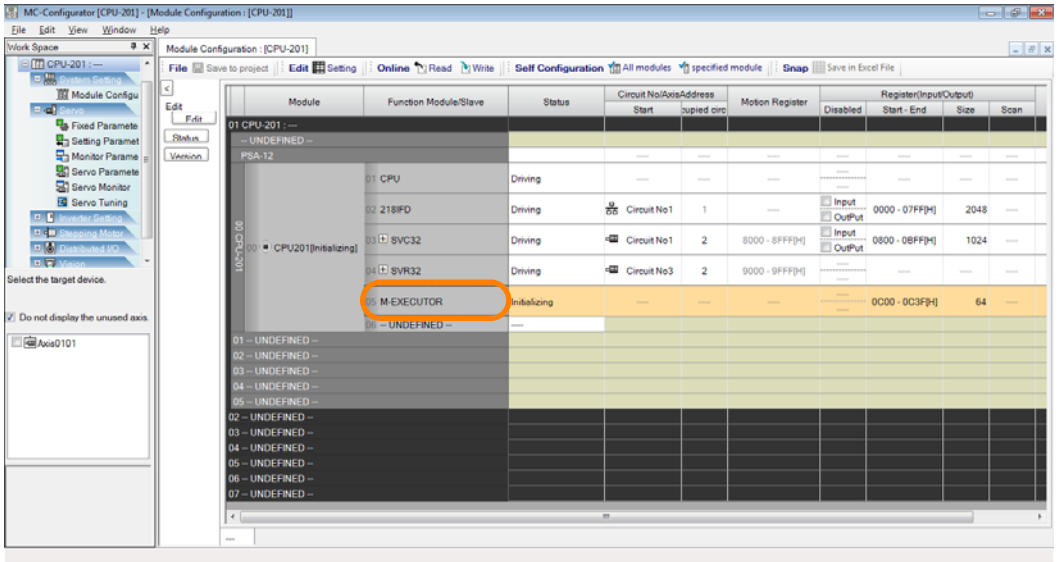
Use the following procedure to register a ladder program in the M-EXECUTOR for execution.
If there is an expand button next to **M-EXECUTOR** in the Motion Pane, start from step 9.
You must first set the number of tasks to assign to M-EXECUTOR.

1. Click the **Module Configuration** Button on the My Tool View.



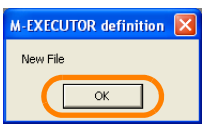
The Module Configuration Tab Page will be displayed.

2. Double-click **M-EXECUTOR**.



The M-EXECUTOR Definition Dialog Box will be displayed.

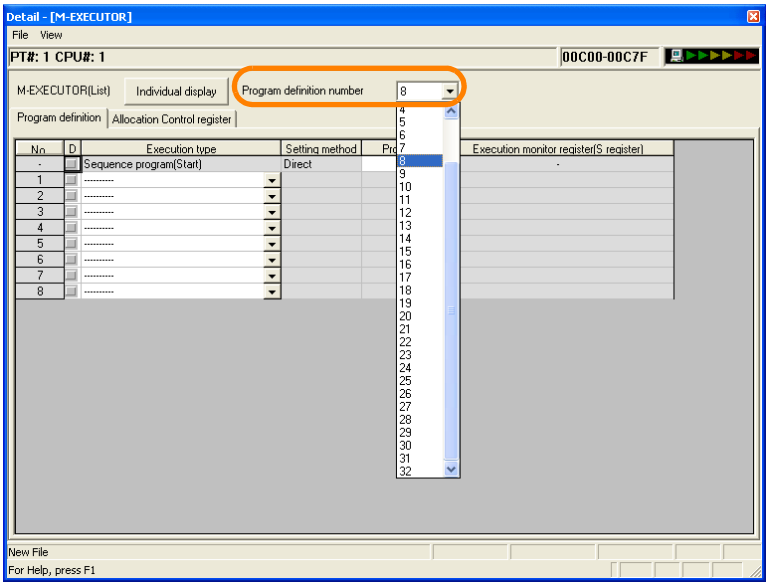
3. Click the **OK** Button.



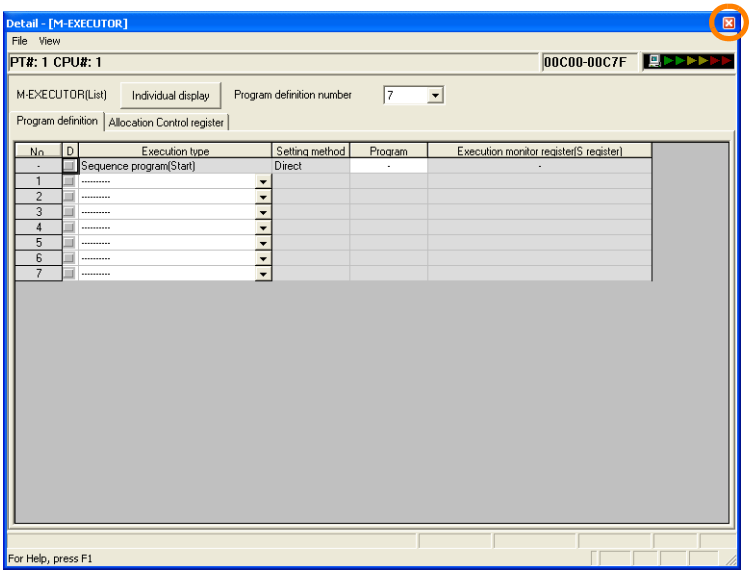
The Detail - [M-EXECUTOR] Dialog Box will be displayed.

4. Set the desired number in the **Program definition number** Box.

Note: If you need to set the program definition number to 8, first set any other number and then select “8”.



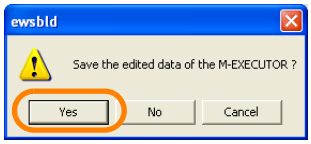
5. Click the **Close** Button.



The Ewsbld Dialog Box will be displayed.

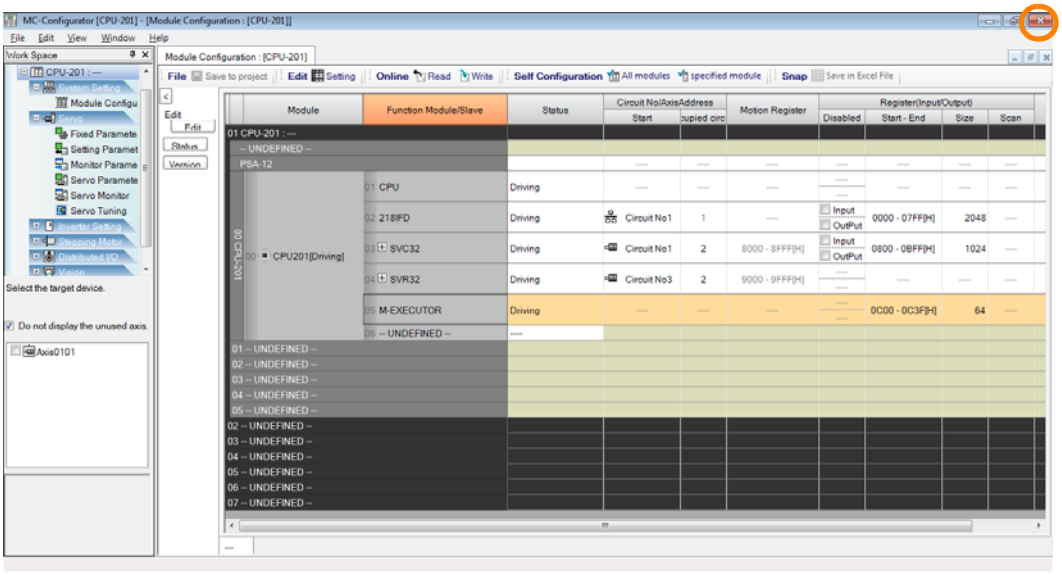
Note: If the Ewsbld Dialog Box does not appear, start over from step 2.

6. Click the **Yes** Button.



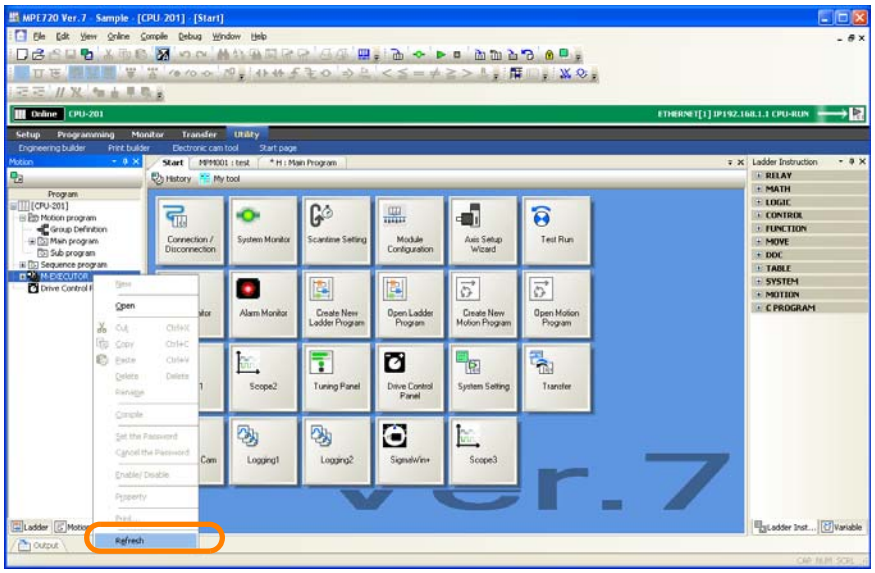
The Detail - [M-EXECUTOR] Dialog Box will close.

7. Click the **Close** Button on the Module Configuration Tab Page.



The Module Configuration Tab Page will close.

8. Use one of the following methods to refresh the data in the Motion Pane.
   - Click on the Motion Pane to make it the active pane, then press the **F4** Key.
   - Right-click on **M-EXECUTOR** in the Motion Pane and select ***Refresh***.

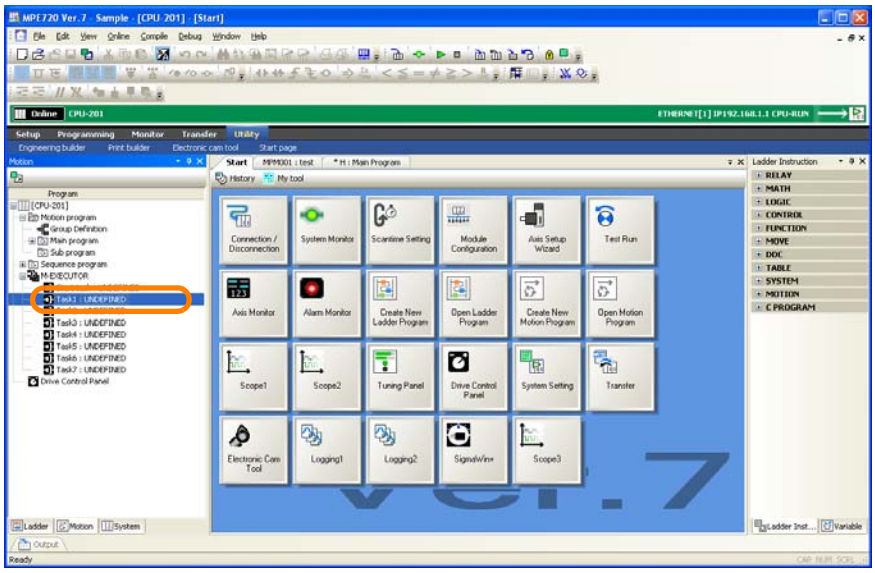


The number of tasks that was set in step 4 will be displayed below the M-EXECUTOR.

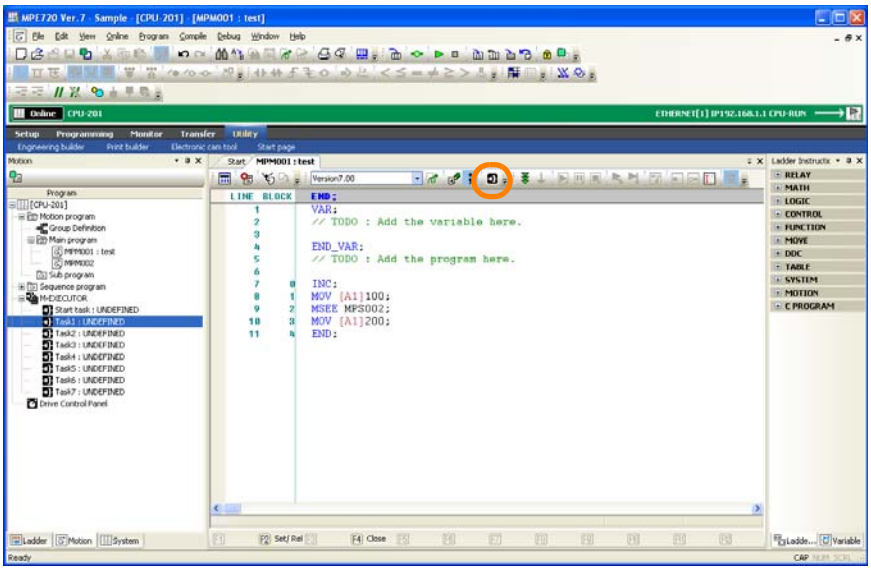
This concludes the process for setting the number of tasks to assign to M-EXECUTOR.
Next, register the contents of the motion program to execute in M-EXECUTOR.

9. Any of the following operations can be used.

- Double-click one of the **Task□:UNDEFINED** entries under **M-EXECUTOR** in the Motion Pane.



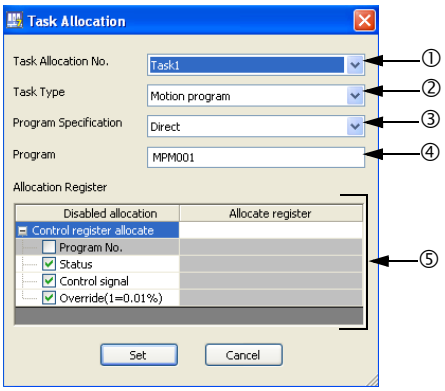
- Click the **Task Allocation** Button on the Edit Motion Program Tab Page.



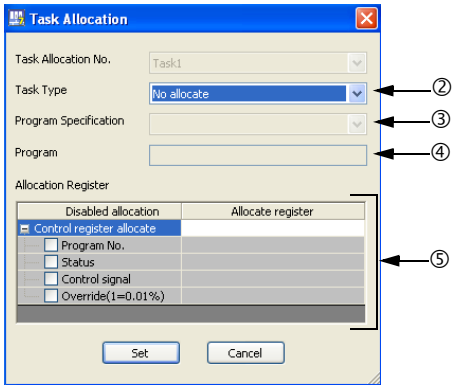
The Task Allocation Dialog Box will be displayed.

10. Set the items from ① to ⑤.

After Using the Motion Pane in Step 9

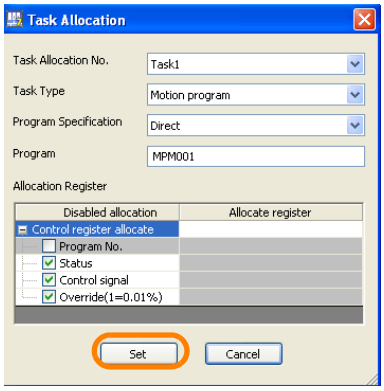


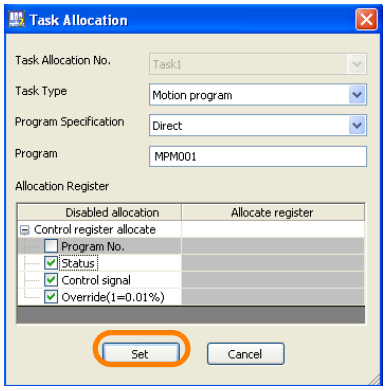
After Using Edit Motion Program Tab Page in Step 9



No.	Name	Description
①	Task Allocation No.	Select the task number to assign to the motion program. If you displayed the Task Allocation Dialog Box from the Edit Motion Program Tab Page, this setting will be disabled.
②	Task Type	Select **Motion program**.
③	Program Specification	Select **Direct**.
④	Program	Set the number of the motion program to assign.
⑤	Allocation Register	Set the registers to assign. You can set any kind of register: I registers, O registers, or M registers.

11. Click the **Set** Button.





The settings will be saved and the Task Allocation Dialog Box will close.

This concludes the procedure.

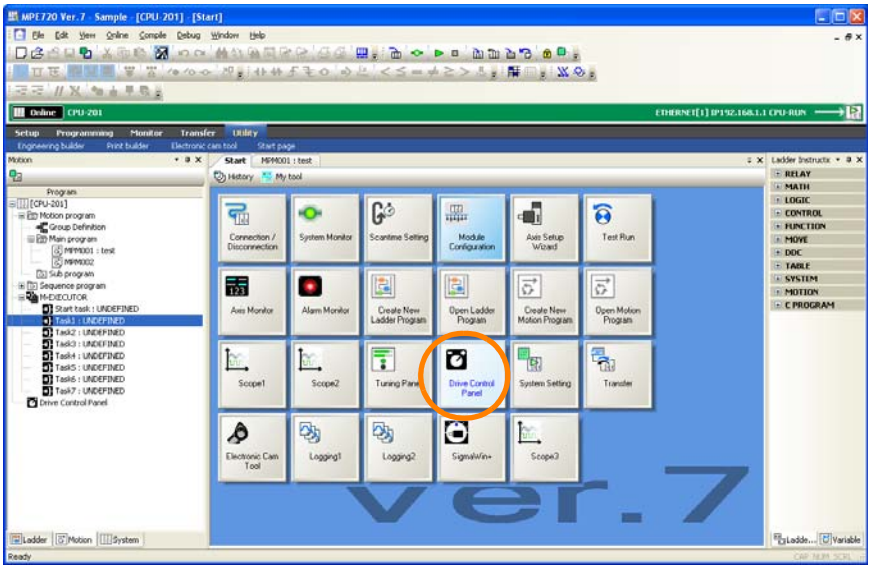
5.2.5 Executing Motion Programs

The method that is used to execute a motion program depends on how the motion program is registered for execution.

- If the motion program is called from a ladder program: Operate the device to turn ON the Start Bit for ladder program execution.
- If the motion program was registered in M-EXECUTOR: Turn ON the **Start request** Bit in the Drive Control Panel Tab Page.

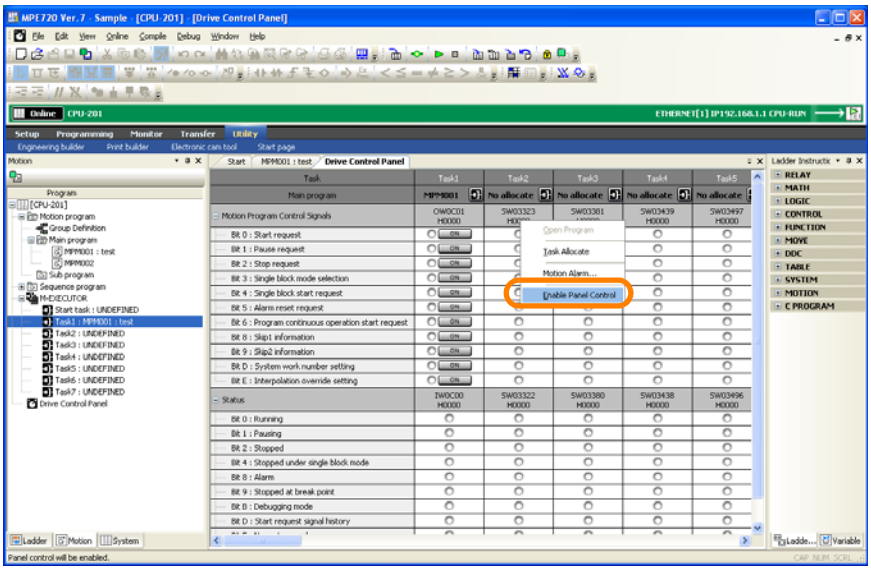
Use the following procedure to execute a motion program that was registered in the M-EXECUTOR.

1. Click the **Drive Control Panel** Button on the My Tool View.



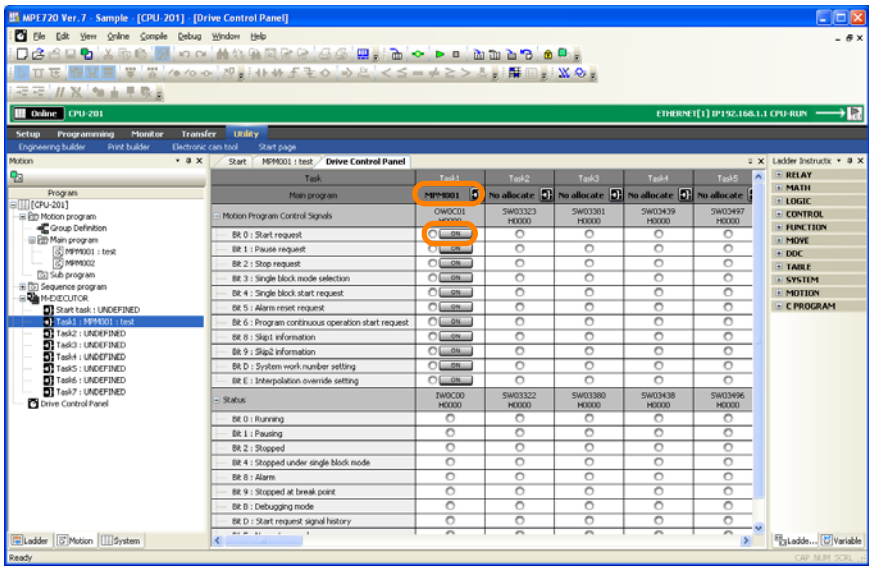
The Drive Control Panel Window will be displayed.

2. Right-click on the Drive Control Panel Tab Page and select ***Enable Panel Control***.

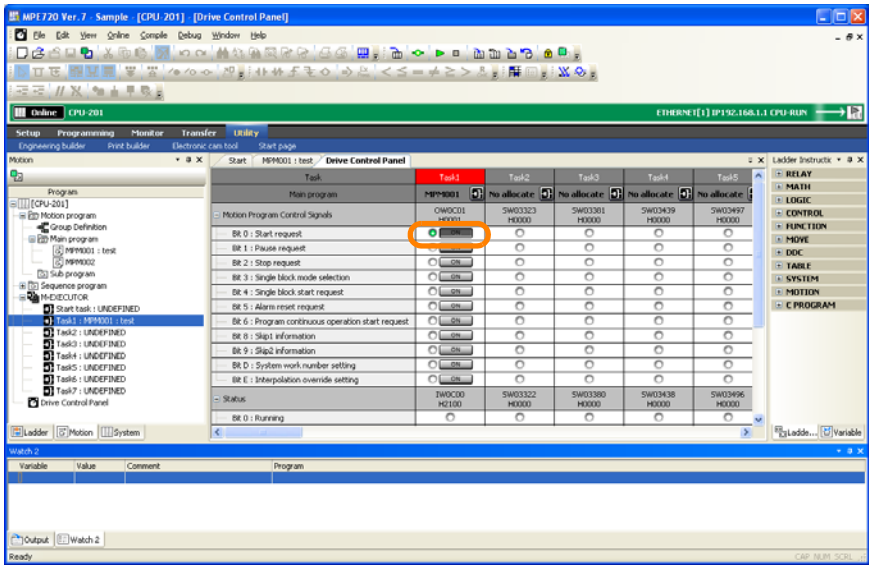


The controls on this panel will be enabled.

3. Click ON in the **Bit 0: Start Request** Cell for the task that is assigned to the motion program to execute.



4. Confirm that display changes from ○ ON to ● ON.



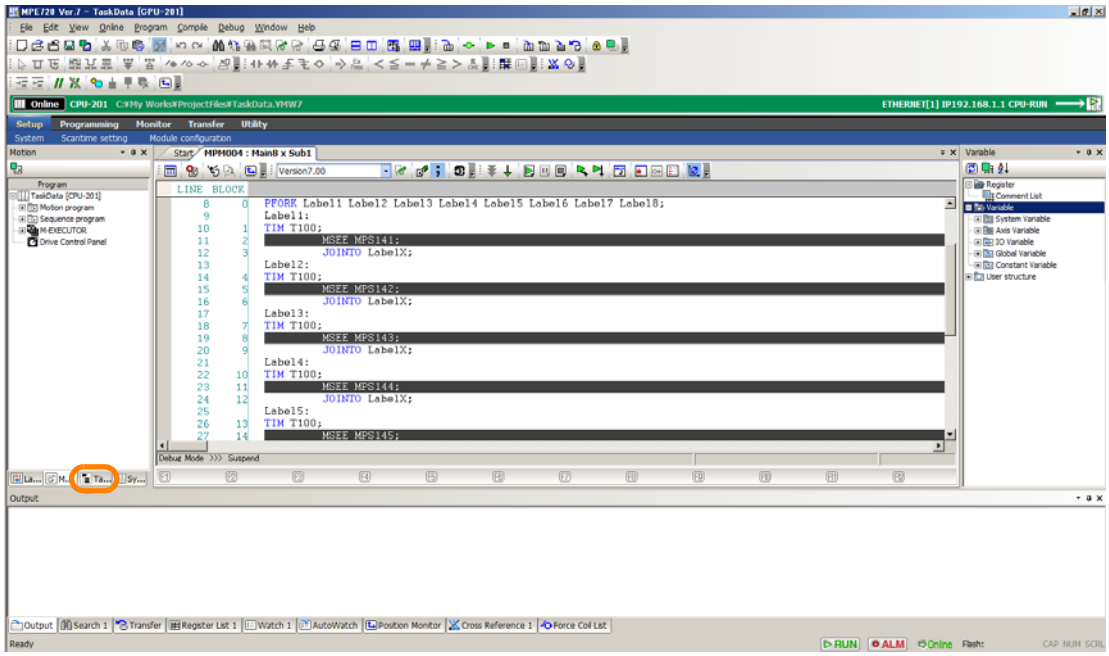
This concludes the procedure.

5.2.6 Checking Motion Programs during Execution

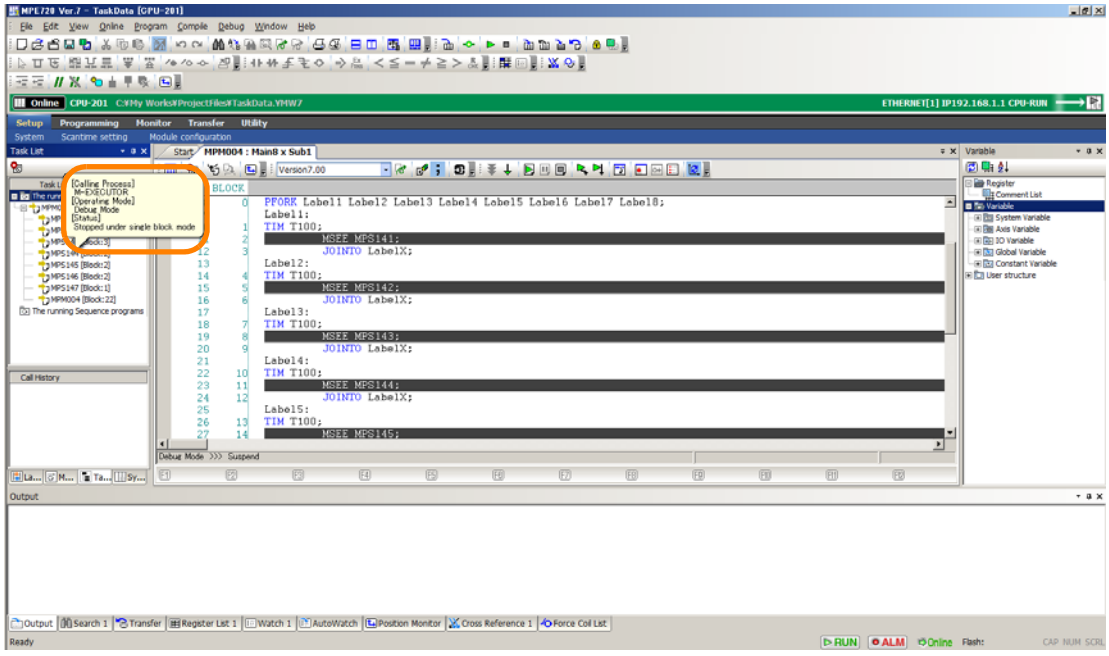
Use the following procedure to check motion programs during execution.

1. Execute the motion program.

2. Click the **Task List** Tab in the pane.
   The program numbers and block numbers of all of the motion programs that are currently being executed will be displayed in the Task List.



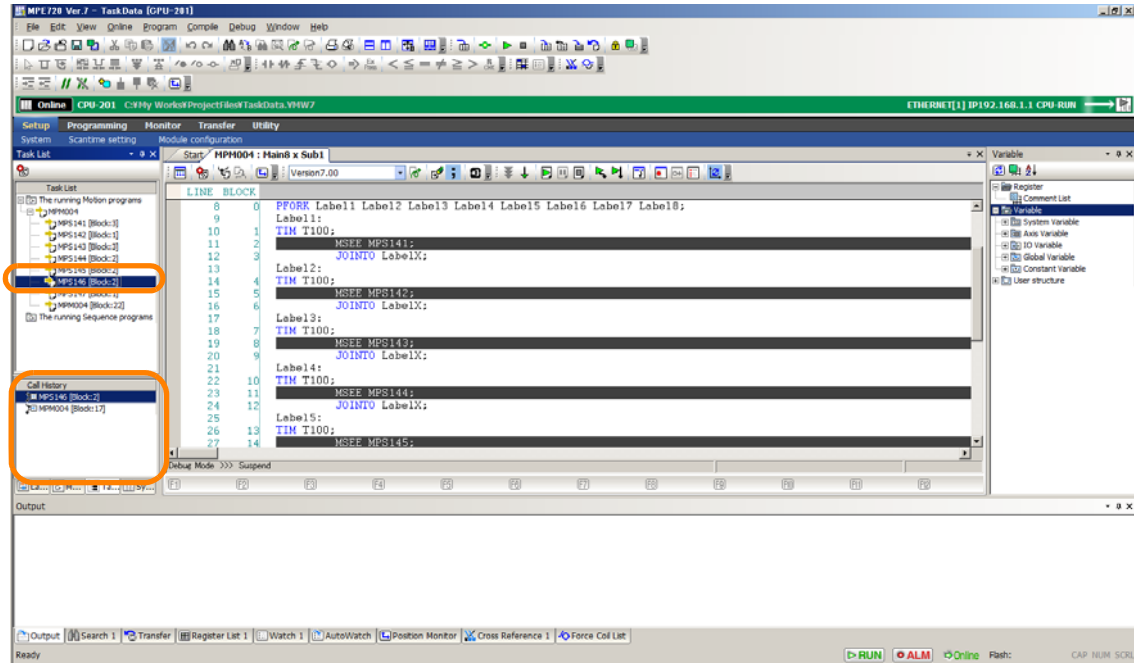
3. Move the mouse cursor over a motion program displayed in the Task List.
   The motion program status information (calling process, operating mode, and status) will be displayed in a balloon.



The items displayed in the balloon are described in the following table.

Item	Displayed Information	Description
Calling Process	Ladder	The motion program was called by the MSEE instruction in a ladder program.
	M-EXECUTOR	The motion program was called by a task assigned to M-EXECUTOR.
Operating Mode	Running	The motion program is being executed in the normal operating mode.
	Debug Mode	The motion program is being executed in Debug Mode.
Status	Paused	Information will be displayed on the status signal.
	Stopped	
	Stopped under single block mode	
	Alarm occurred	
	Break active	
	Start request signal history	
	No System Work Available Error	
	Main Program Number Limit Exceeded Error	

4. Click a motion program displayed in the Task List.
The call history (program numbers and block numbers) of the selected motion program from the main program will be displayed in the Call History Area.

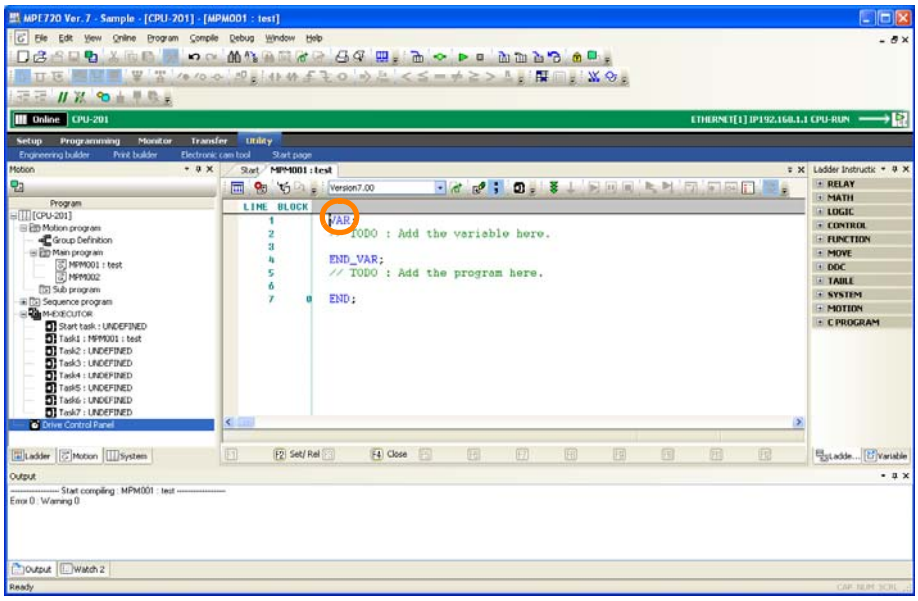


This concludes the procedure.

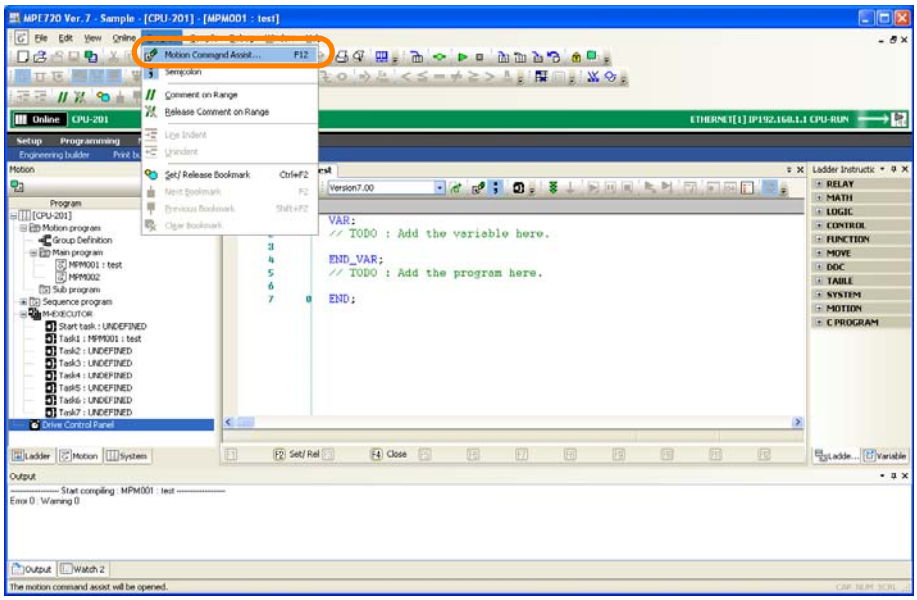
5.2.7 Using Instruction Input Assistance for Motion Programs

Use the following procedure to activate instruction input assistance to help you edit motion programs.

1. Place the mouse cursor where the instruction is to be inserted.



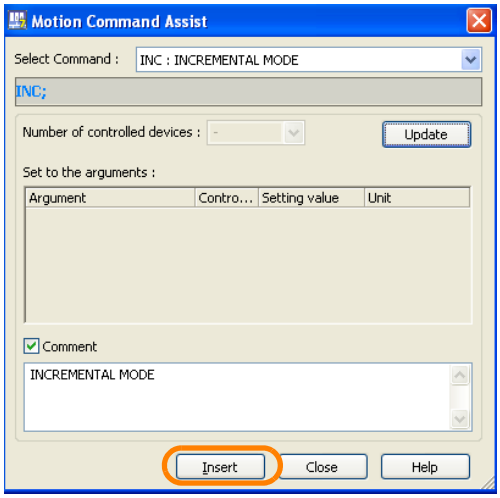
2. Select ***Program*** – ***Motion Command Assist*** from the menu bar.



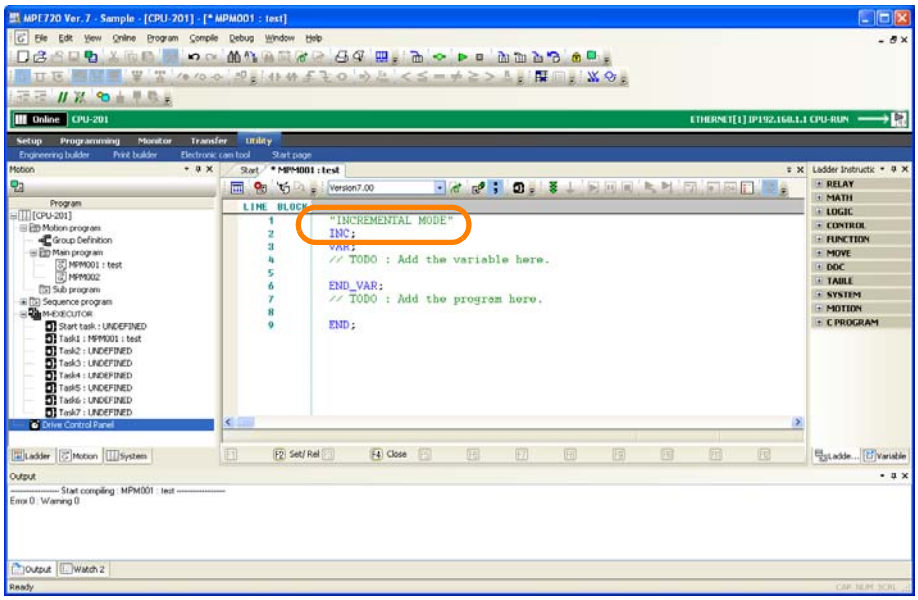
The Motion Command Assist Dialog Box will be displayed.

3. Set the items as required.
Refer to the following manual for details on the settings.
📖 *MP3000 Series Motion Programming Manual* (Manual No.: SIEP C880725 14)

4. Click the **Insert** Button.



The settings will be applied to the motion program.

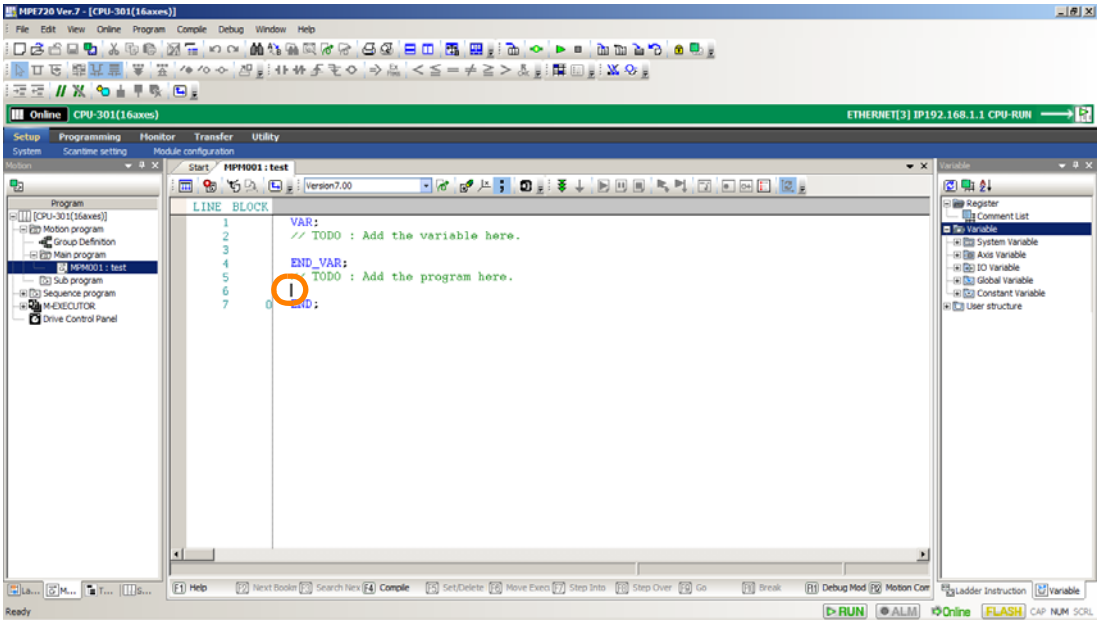


This concludes the procedure.

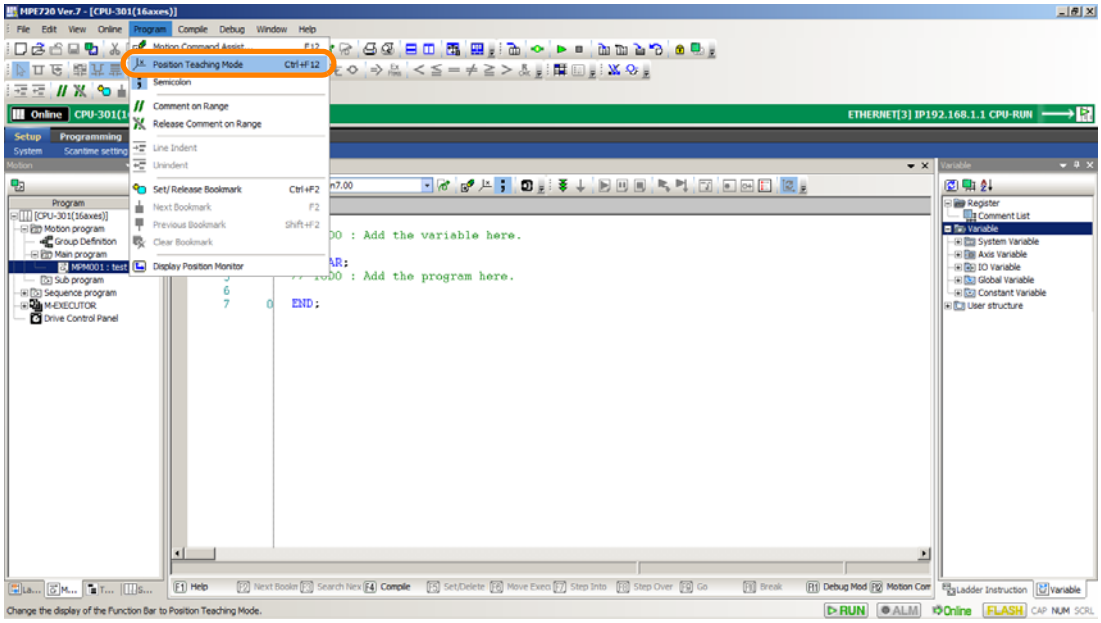
5.2.8 Inserting a Feedback Position of the Axes into Motion Programs

Use the following procedure to insert a feedback position of the axes into Motion Programs.

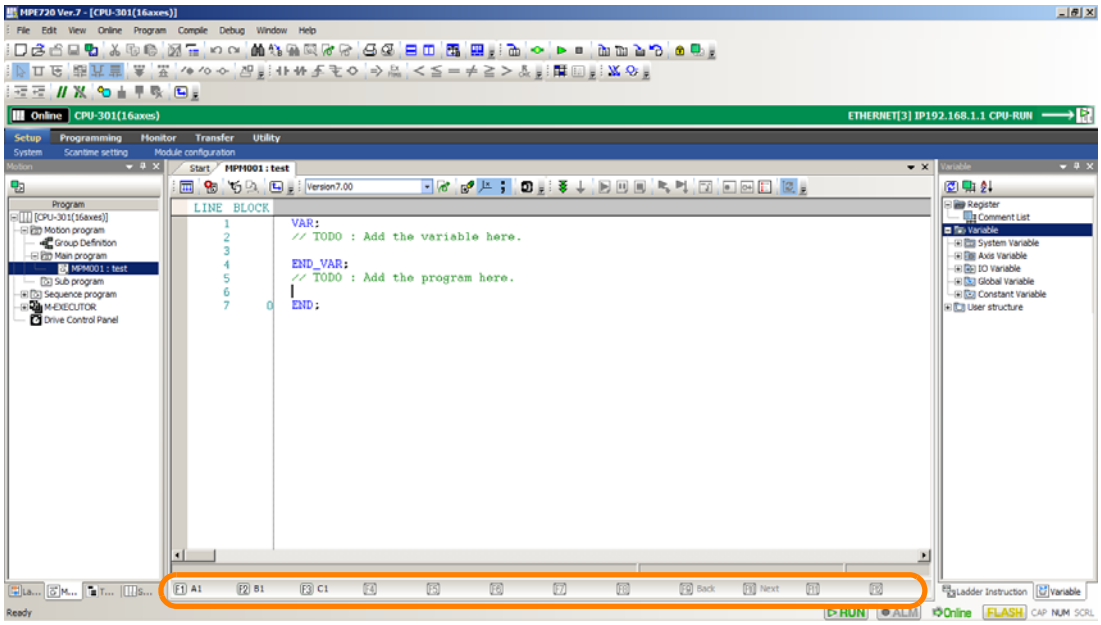
1. Place the mouse cursor where the feedback position of the axes is to be inserted.



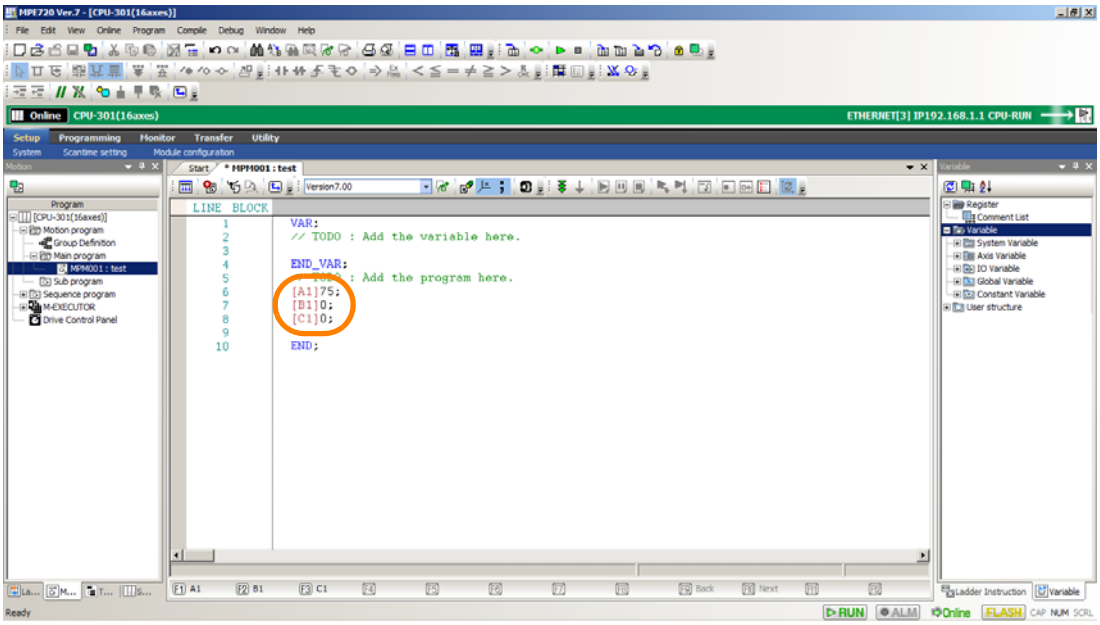
2. Select **Position Teaching Mode** - **Program** from the menu bar.



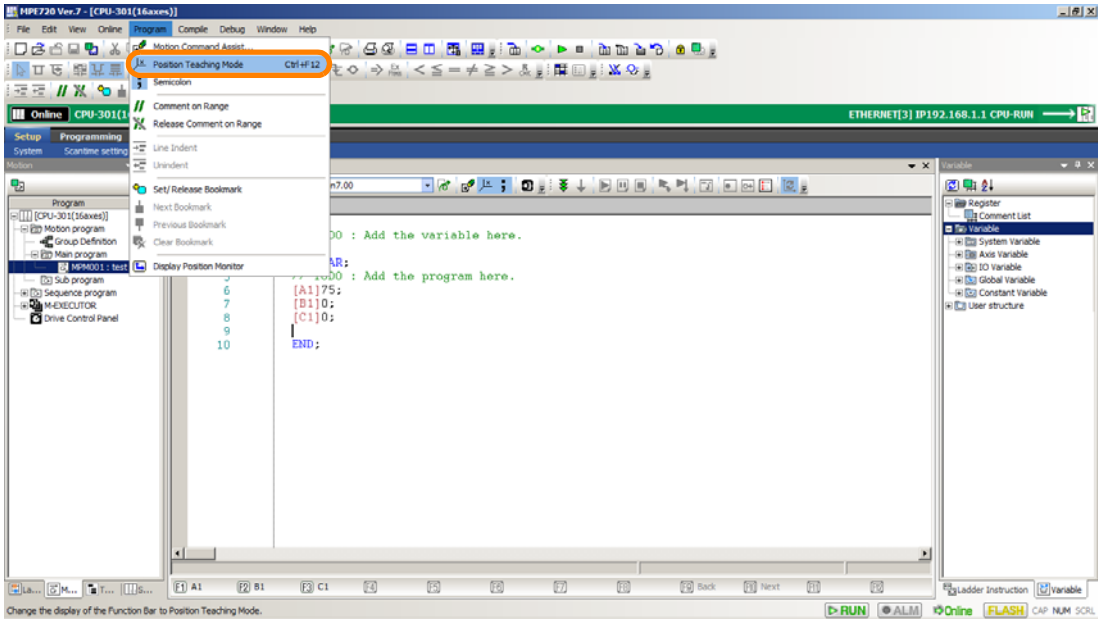
The display of the function bar will be changed to position teaching mode.



3. Press a function key to insert axes.
The feedback position of the axes will be inserted.



4. Select **Position Teaching Mode** - **Program** from the menu bar.



The display of the function bar will be changed and returns you to the normal mode.

This concludes the procedure.

5.2.9 Using Variables in Motion Programs

Variable names that are used in ladder programs cannot be used within motion programs. Instead, you can use variables by defining them inside a declaration block that starts with VAR and ends with END_VAR. Declared definitions can be used within the program.

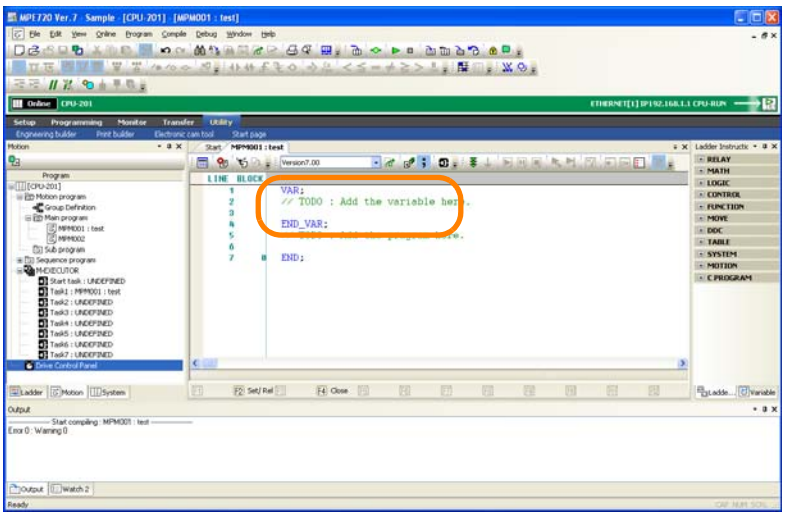
Important

To use variables in motion programs, the compilation version of the MPE720 must be set to version 7.00.
Check the **Compilation Version** Box in the Edit Motion Program Tab Page. Select **Version 7.00** if it is set to a different version.

Use the following procedure to use variables in a motion program.

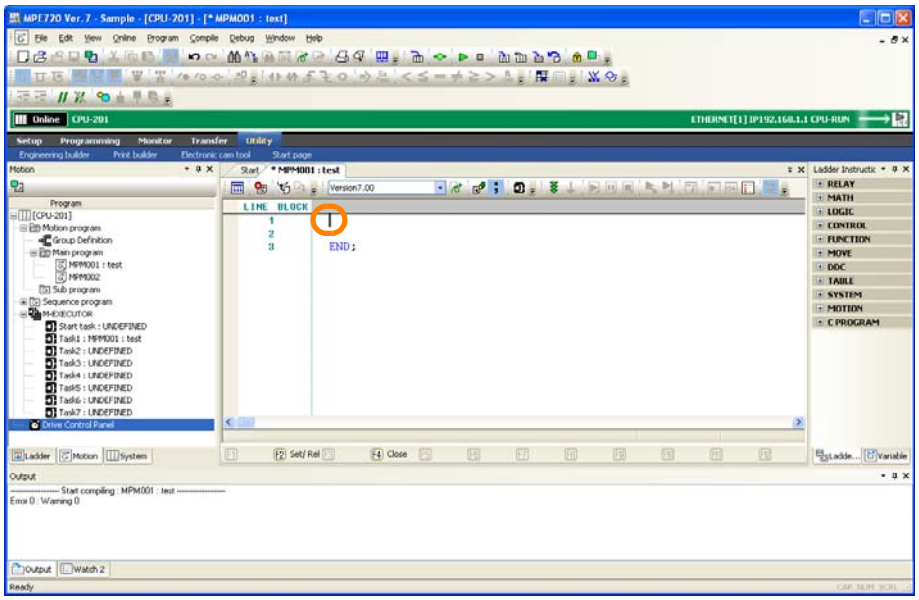
Information

If you created a new motion program with the MPE720 compilation version set to 7.00, the program will be pre-filled with an empty “VAR” and “END_VAR” block.

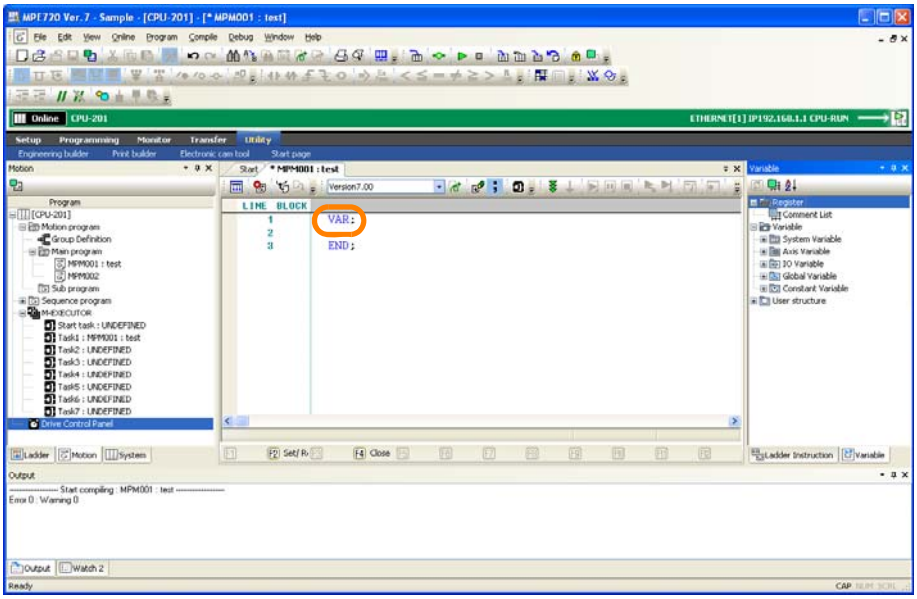


Refer to the following procedure to start a new block with the VAR instruction.

1. Place the mouse cursor where the motion program variable is to be inserted.

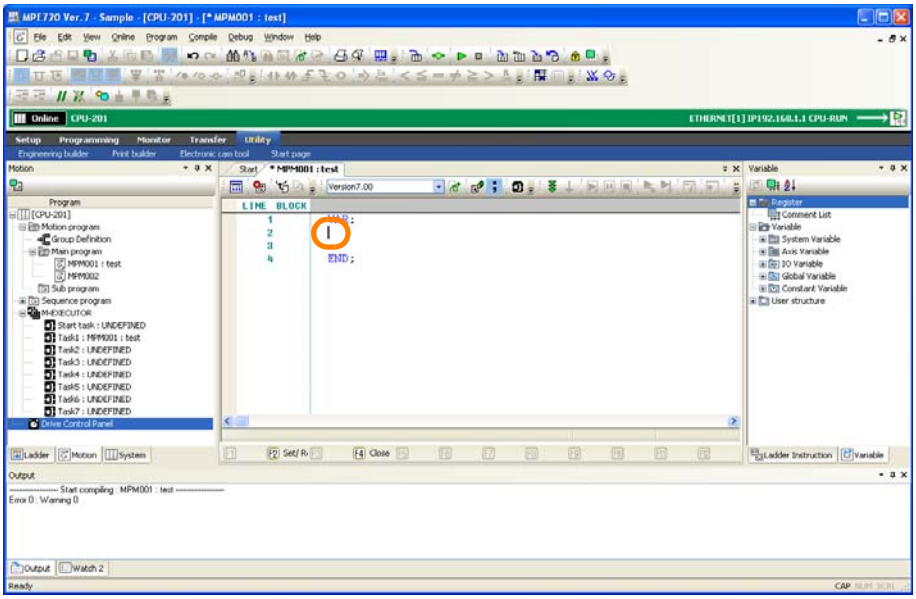


2. Enter “VAR;”.



3. Press the Enter Key.

The cursor will move to the next line.



4. Enter the definition to declare.

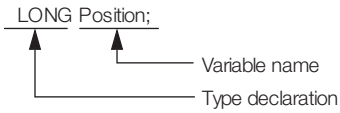
Note: The following limitations apply to variables.

- Declarations: 1,000 maximum per program
- Variable name length: 255 bytes maximum
- Characters allowed: Alphanumerics and the underline (The variable name must start with a letter of the alphabet.)

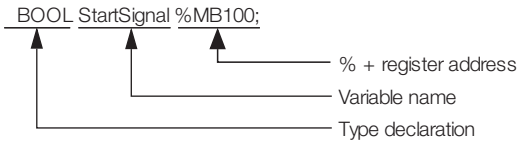
Information

The syntax for definitions is shown below.

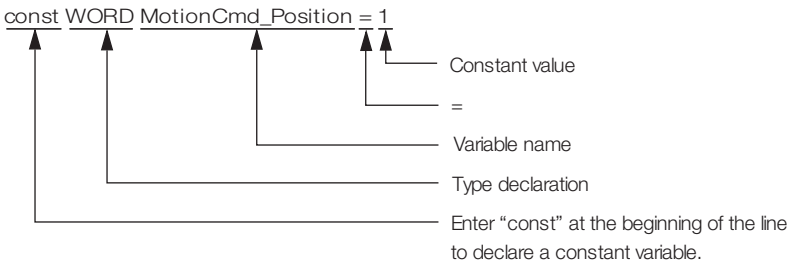
- Declaring Automatic Variables



- Declaring Variables That Specify Registers

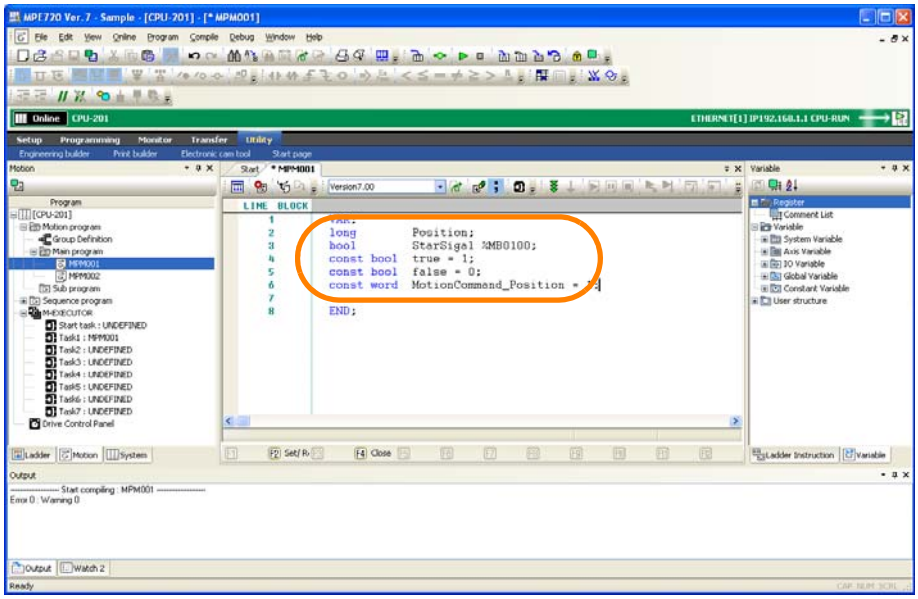


- Declaring Constant Variables

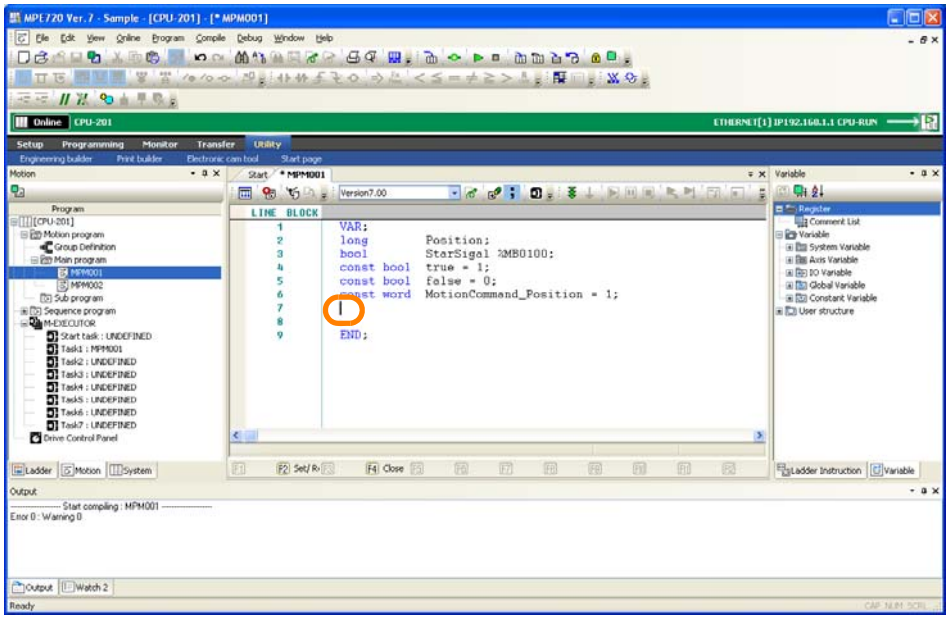


Refer to the following section for details on type declarations.

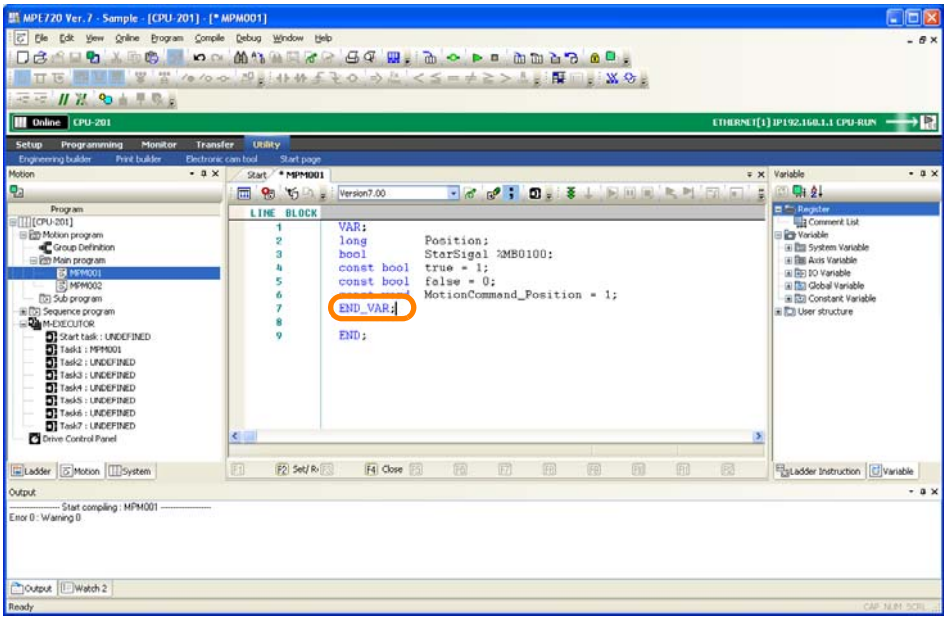
☞ *Type Declarations That Are Usable in Definitions* on page 5-80



5. Press the Enter Key.
The cursor will move to the next line.



6. Enter “END_VAR;”.



This concludes the procedure.

Type Declarations That Are Usable in Definitions

Type declaration	Data Type	Array Specification*
BOOL	Bit	Possible
WORD	One-word signed integer	Possible
SINT		
LONG	Two-word signed integer	Possible
DINT		
QUAD	Four-word signed integer	Possible
LONGLONG		
LINT		
FLOAT	Single-precision floating point number	Possible
REAL		
DOUBLE	Double-precision floating point number	Possible
LREAL		
ADDRESS	Address	Not possible
Names of user-defined structures	Structure	Possible

* Array specifications can be used only with MP3000-series Machine Controllers.

5.3 Common Information for Ladder Programs and Motion Programs

This chapter describes operations that are common to ladder programming and motion programming.

5.3.1 Using the Autocomplete Function

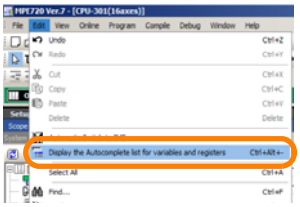
The Autocomplete function displays candidates to aid entry when entering variables, registers and instructions.

The following shows how the Autocomplete function is used.

Enabling the Autocomplete Function

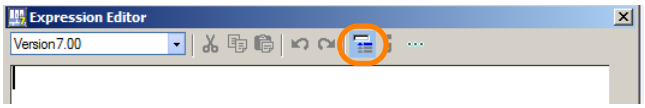
The Autocomplete function is enabled by default. When the Autocomplete function is disabled, enable the Autocomplete function by one of the following methods.

- Select ***Edit*** - ***Display the Autocomplete list for variables and registers*** from the menu bar.

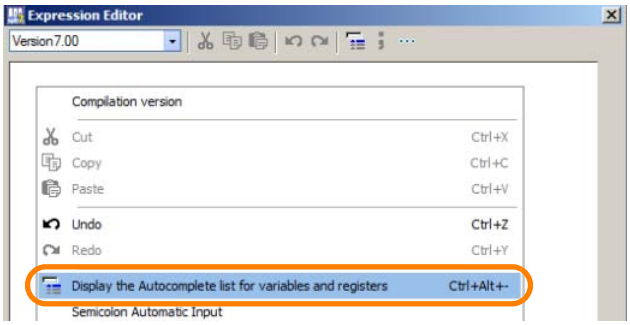


- Hold down the **Ctrl** Key + **Alt** Key + **–** Key simultaneously.
- Click the **Turn Autocomplete for variables and registers ON/OFF** Icon on the Standard Toolbar.

- Click the **Turn Autocomplete for variables and registers ON/OFF** Icon in the Expression Editor Window.



- Right-click on the Expression Editor Window, and select ***Display the Autocomplete list for variables and registers***.



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.

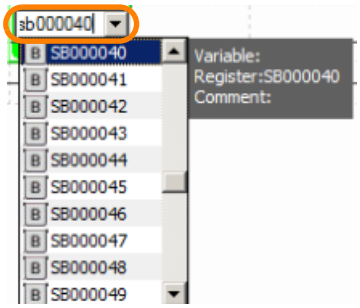
The following gives details on the Autocomplete operating procedure.

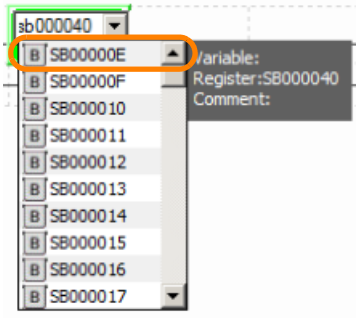
- When a text string of two characters or longer is entered, candidates that match the start of the item or partially match that text string will be displayed. When only one character is entered as the text string, all candidates will be displayed.

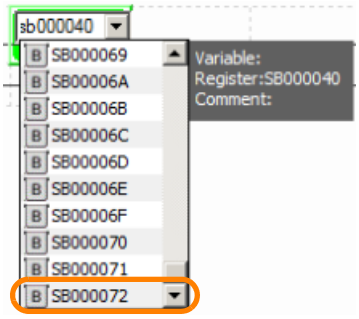
- When a location is double-clicked, all candidates will be displayed.
- When a register address is entered, the 50 addresses preceding and following the entered register address will be displayed as the list of candidates.

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.



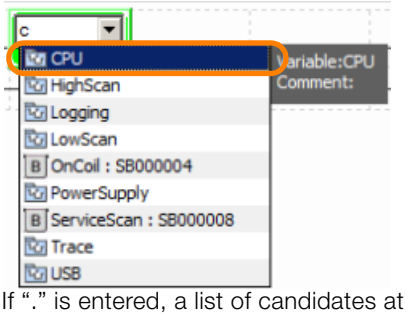




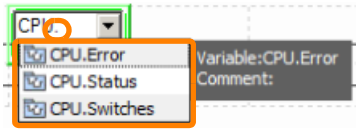
- In the case of a variable, if “.” is entered, a list of candidates at the lower level will be displayed.

Example

Select CPU.

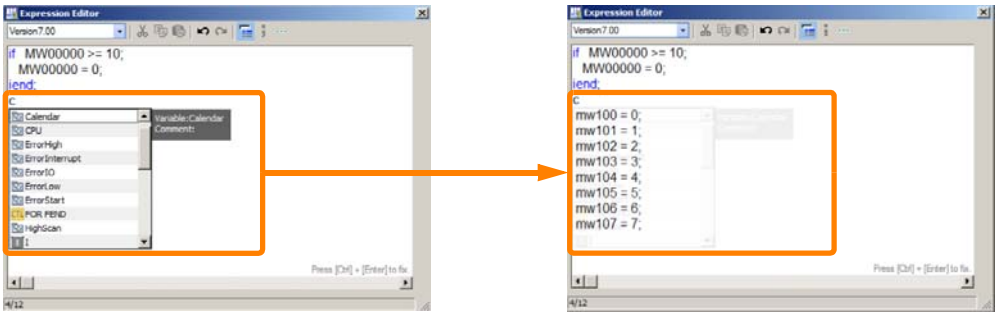


If “.” is entered, a list of candidates at the lower level of “Variable: CPU” will be displayed.



- 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.

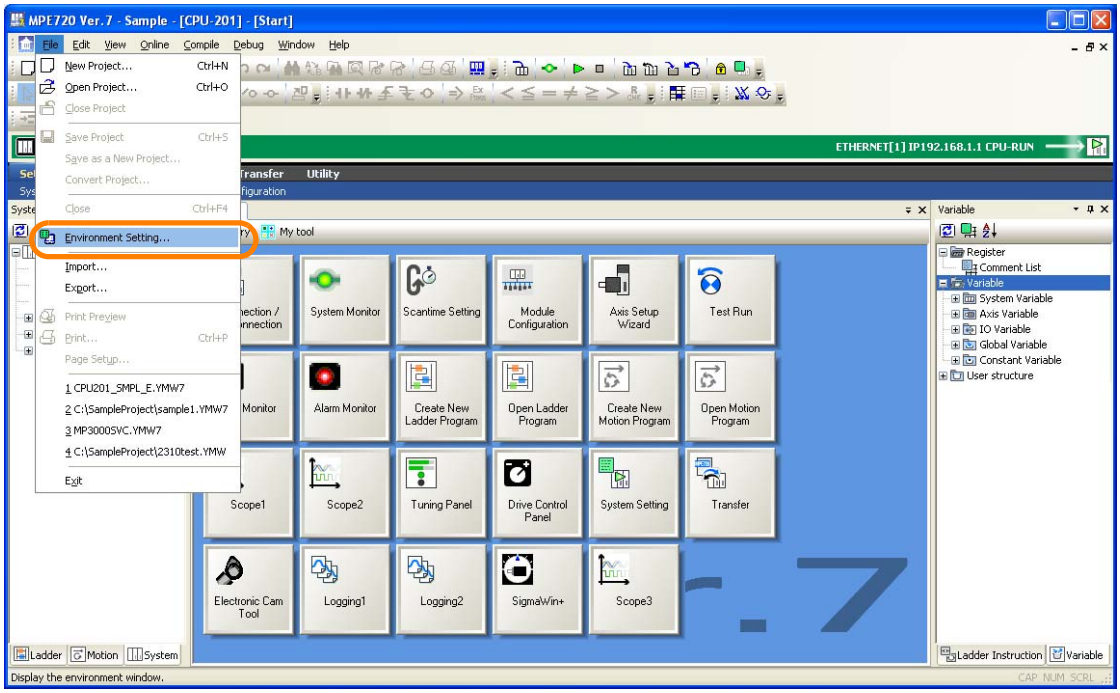
Example



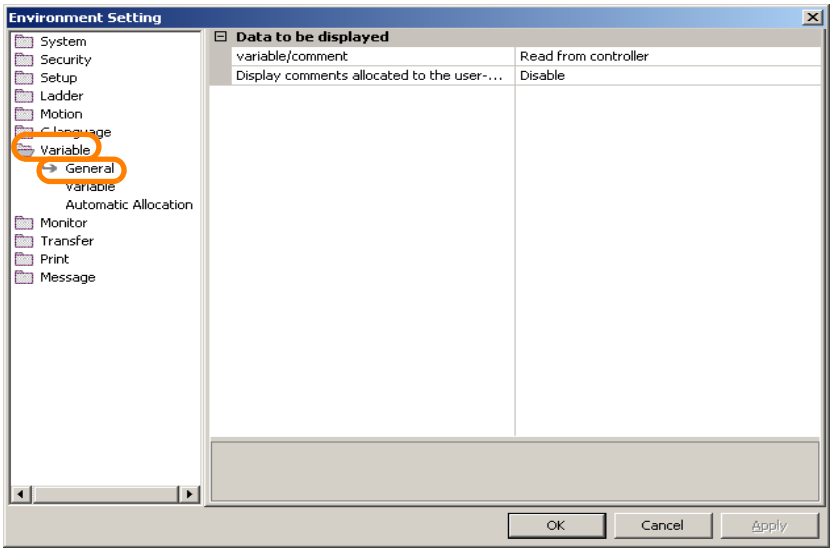
5.3.2 Changing the Read Source for Global Register Variables and Comments

Use the following procedure to set the read source for the global register variables and comments that are displayed on the MPE720.

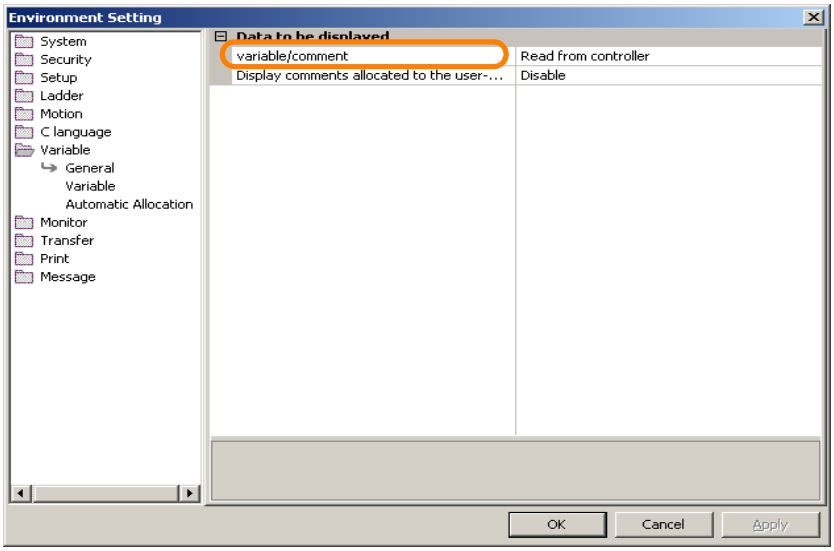
1. Select ***File*** – ***Environment Setting*** from the menu bar.



2. Select **Variable - General**.

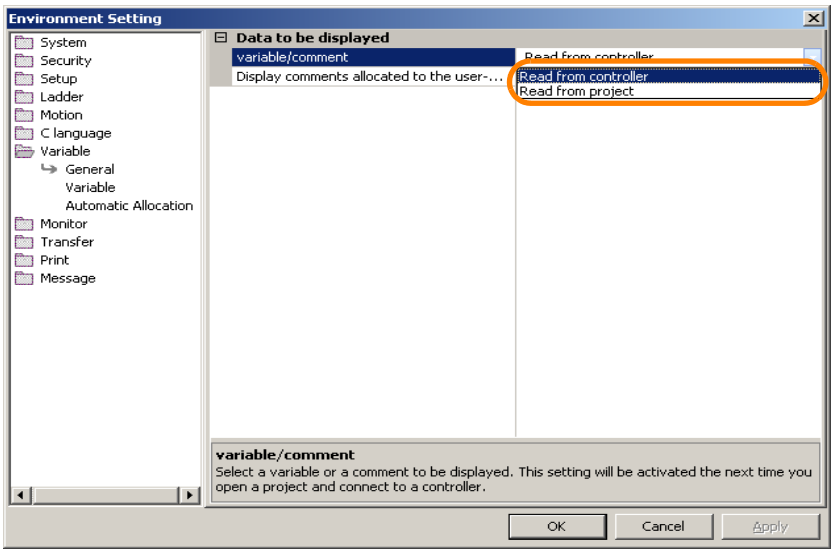


3. Click **variable/comment.**

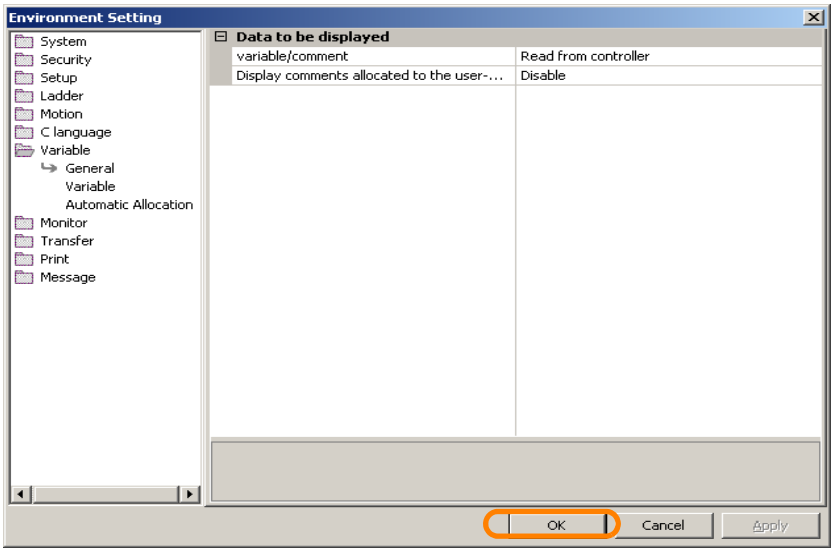


The box on the right will become selectable.

4. Select **Read from controller** or **Read from project.**



5. Click the **OK** Button.



The read source that is set will be enabled the next time you connect to a Machine Controller.

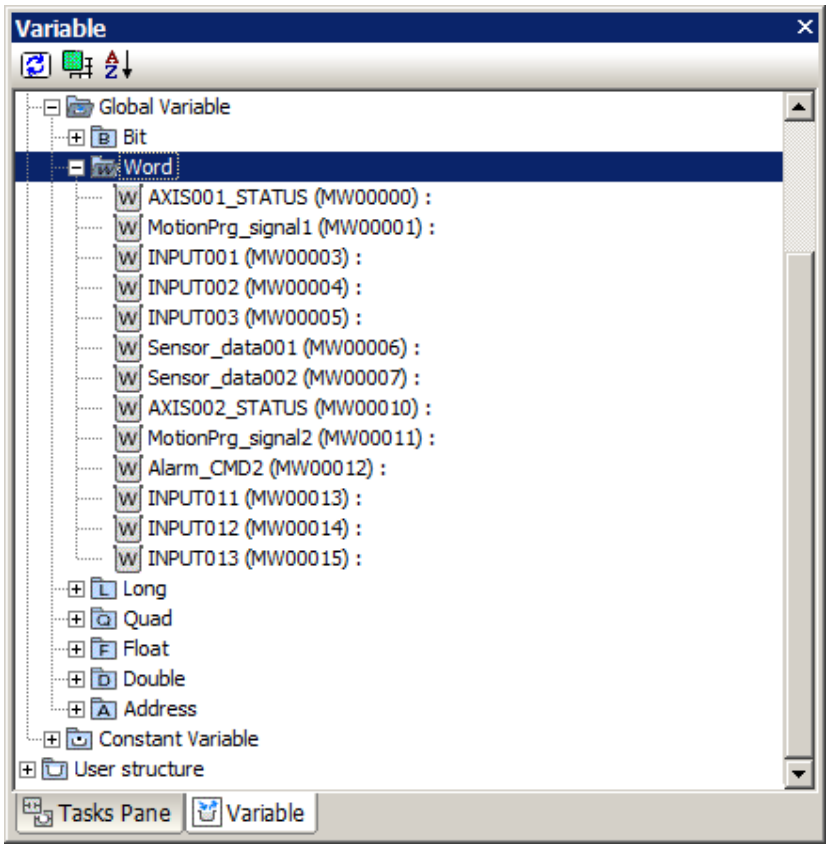
This concludes the procedure.

5.3.3 Manipulating Global Variables and Local Variables as Groups

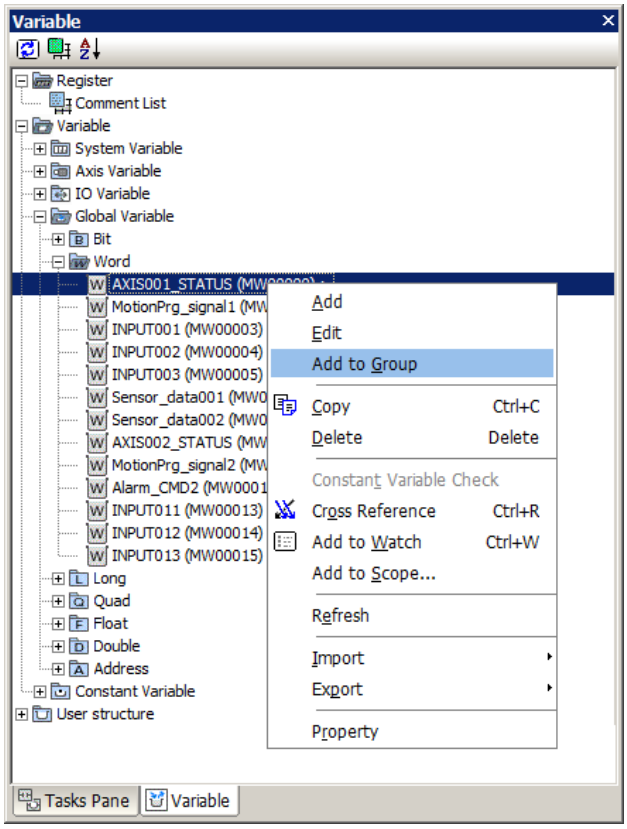
You can group global variables and local variables and name the groups to manipulate them and manage them as groups. Use the following procedure.

Creating Variable Groups

1. Open the project file.
2. Create and register global variables.
   Refer to the following section for details.
   ☞ *Global Variables* on page 5-24

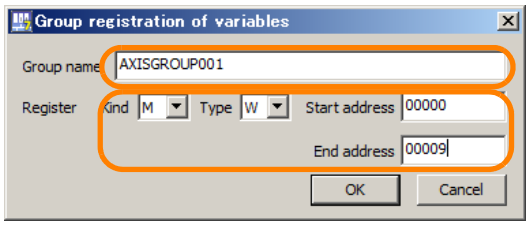


3. Click the + Button by **Global Variable** in the Variable Pane, right-click somewhere under **Global Variable,** and select ***Add to Group*** from the menu.

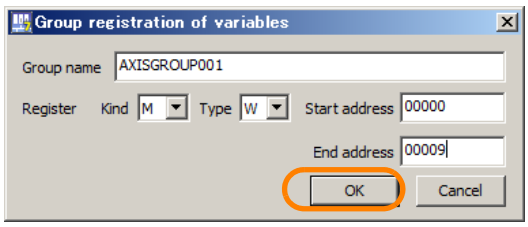


The Group Registration of Variables Dialog Box will be displayed.

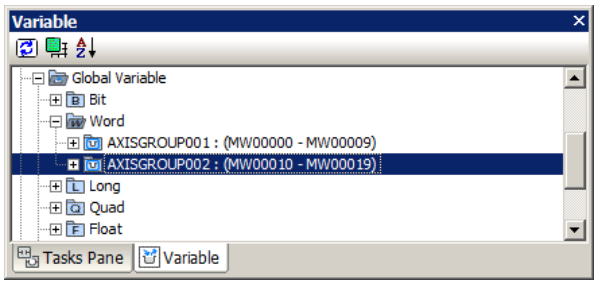
4. Enter the following information.
   - Group name: Enter a name for the group.
   - Register: Select and enter the range of registers to include in the group.



5. Click the **OK** Button.



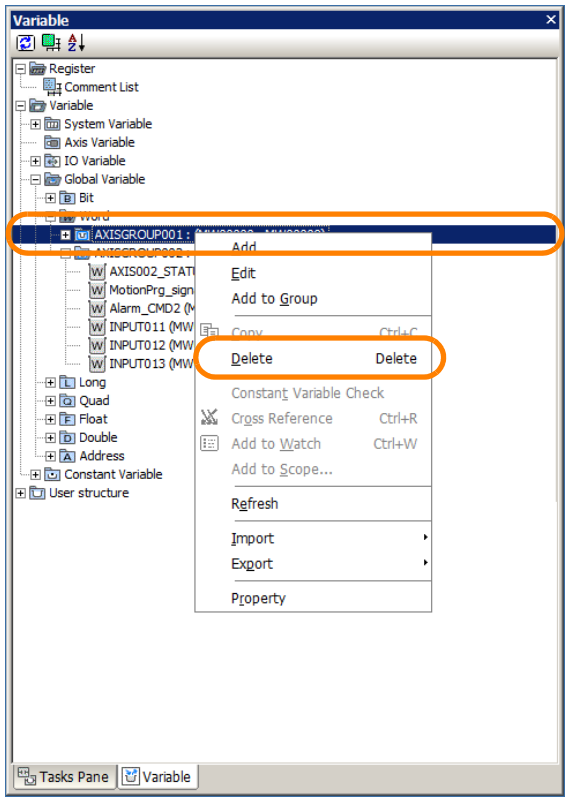
The variables in the specified range of registers will be grouped and the group will be displayed.



This concludes the procedure.

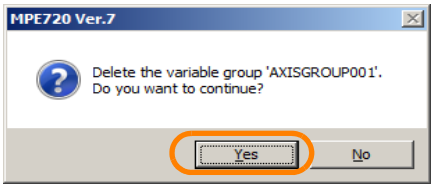
Deleting Variable Groups

1. Right-click the grouped global variable name to delete in the Variable Pane and select ***Delete.***

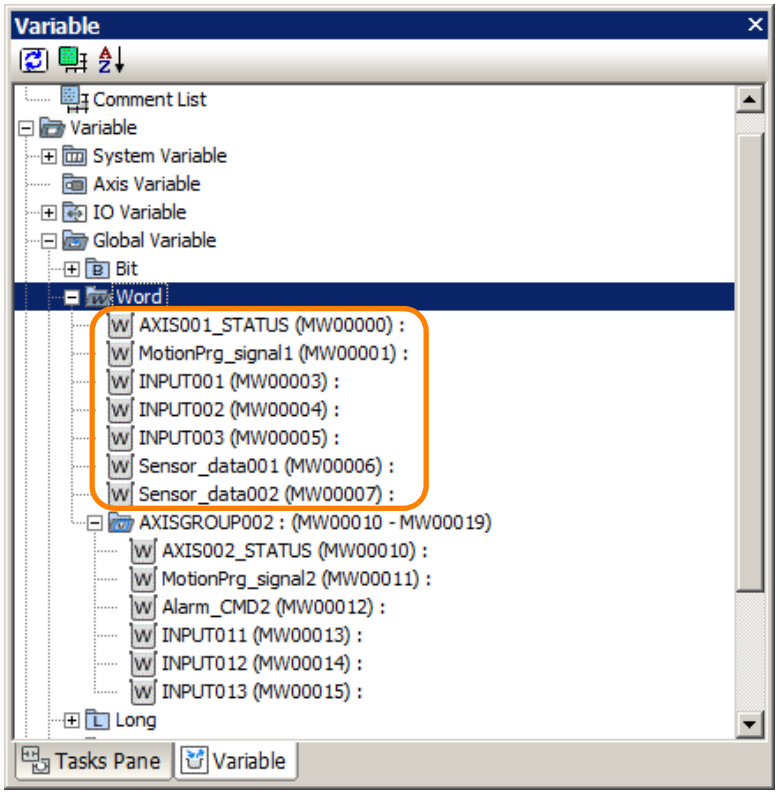


The MPE720 Ver. 7 Dialog Box will be displayed.

2. Click the **Yes** Button.



The variables will be ungrouped.



This concludes the procedure.

5.3.4 Manipulating Multiple Variables at the Same Time

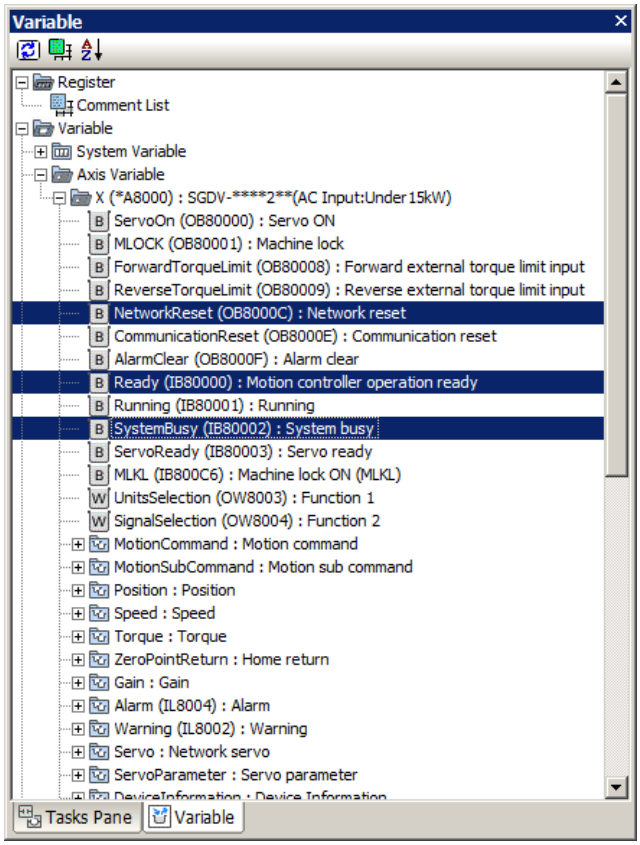
You can manipulate more than one system variable or user variable at the same time. Use the following procedure.

Term

System Variable
A variable that cannot be changed or deleted by the user.
Examples: Axis variables and I/O variables

User Variable
A variable that can be added, edited, or deleted by the user.
Examples: Global variables, constant variables, local variables, and user-defined structures

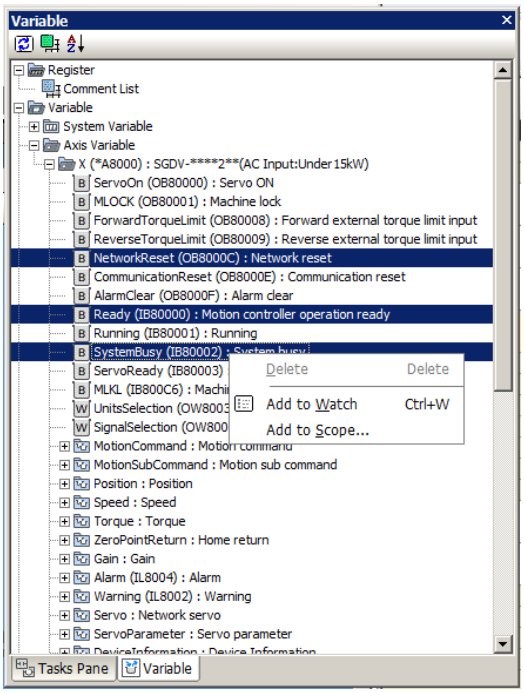
1. Open the project file.
2. Use one of the following methods to select the variables to manipulate together in the Variable Pane.
   - Selecting a number of consecutive variables: Select the first drawing in the group of drawings to select, hold down the **Shift** Key, and then select the last drawing in the group of drawings to select.
   - To select variables that are not consecutive: Hold down the **Ctrl** Key and click the drawings to select.



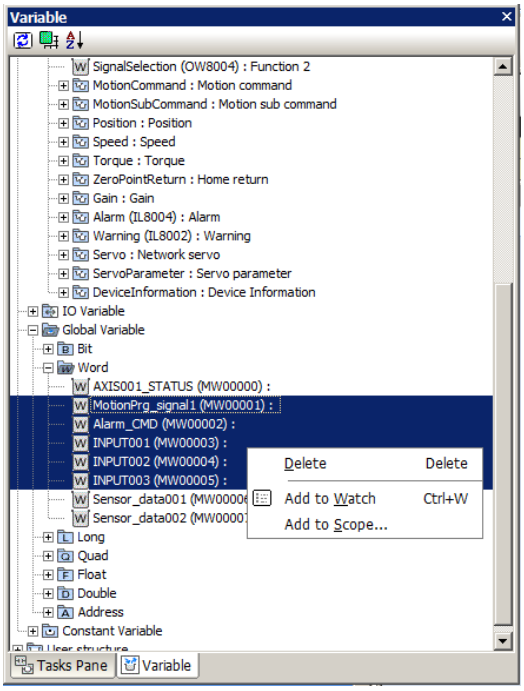
3. Right-click on any of the highlighted selected drawings and select the operation to execute.
You can execute the following operations for multiple selected variables.

Operation	Description
Delete	Deletes the selected variables. You cannot select this operation if a system variable is selected.
Add to Watch	Registers the selected variables for watching.
Add to Scope	Registers the selected variables for a scope.

If System Variables Are Selected



If User Variables Are Selected

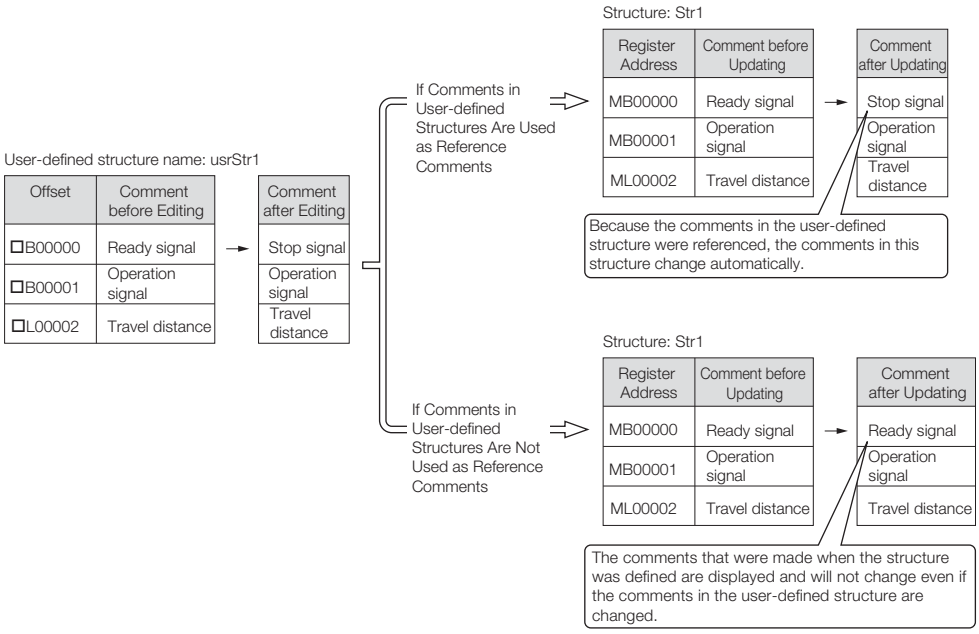


This concludes the procedure.

5.3.5 Using Comments in User-defined Structures as Reference Comments

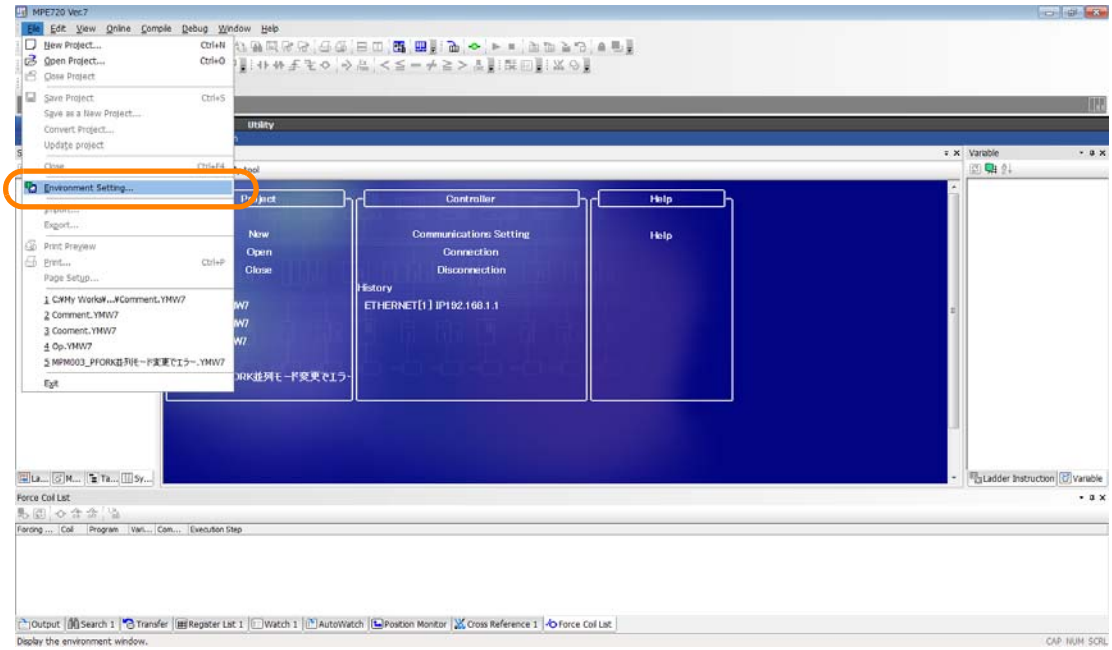
You can use register comments that are registered for user-defined structures as reference comments. By using them as reference comments, the comments in a structure in which the addresses are assigned will be automatically updated when the comments are edited in the user-defined structure.

Example



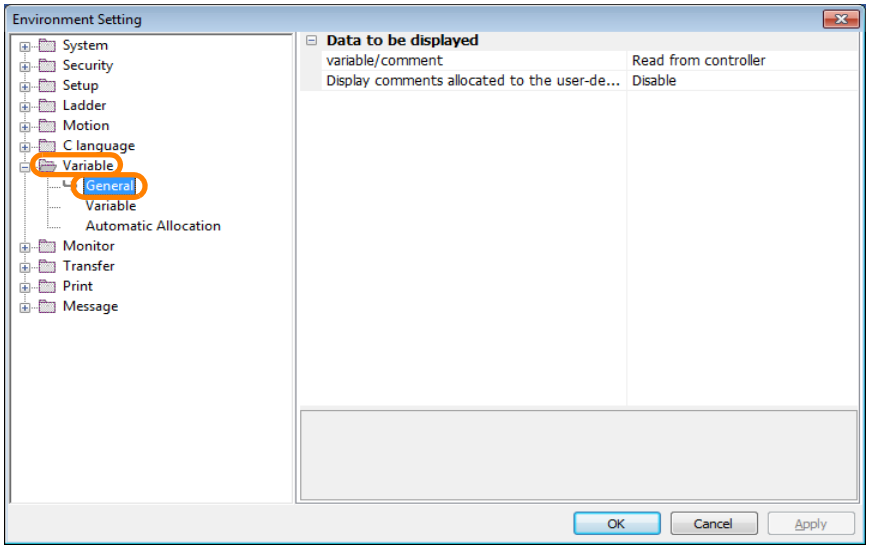
The setting procedure is given below.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

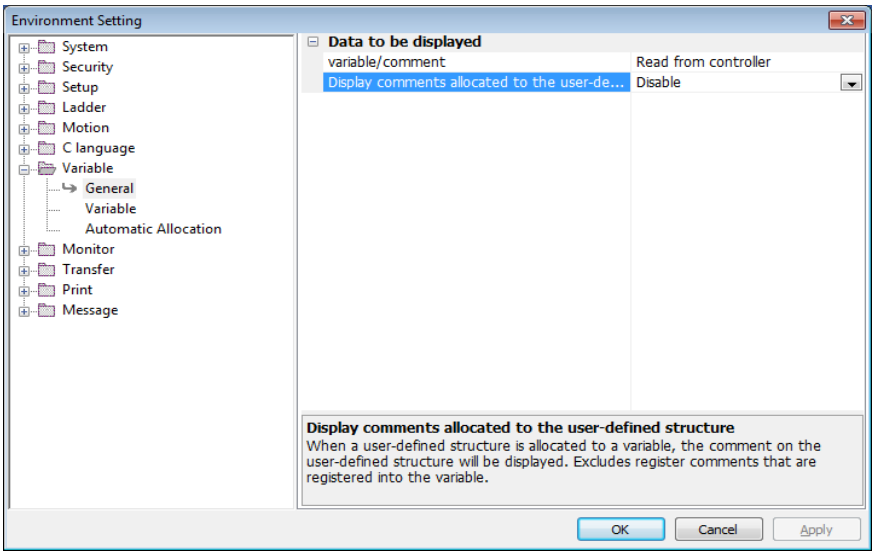


The Environment Setting Dialog Box will be displayed.

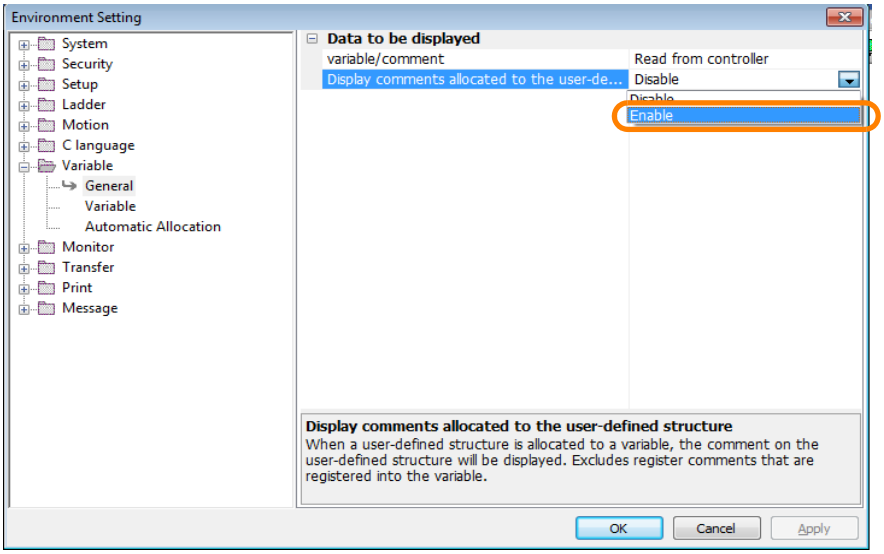
2. Select **Variable** – **General**.



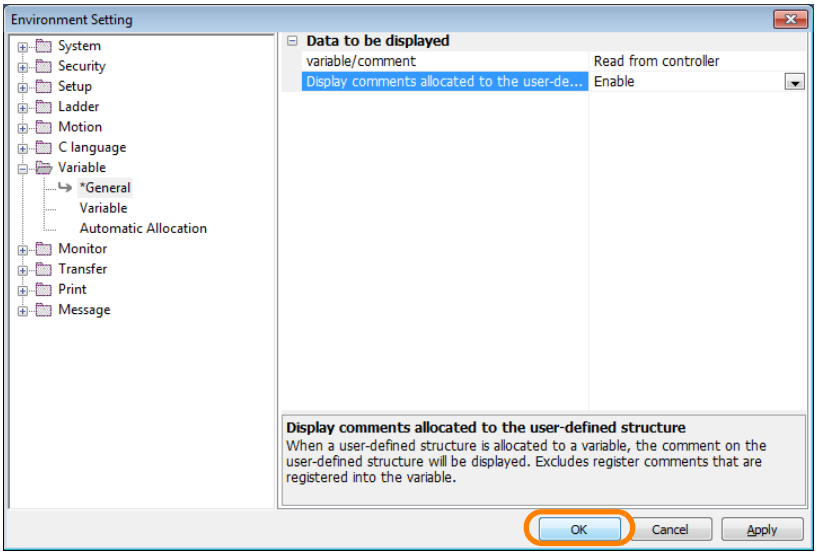
3. Click **Display comments allocated to the user-defined structure.**
The box on the right will become selectable.



4. Select **Enable** from the **Display comments allocated to the user-defined structure** Box.



5. Click the **OK** Button.



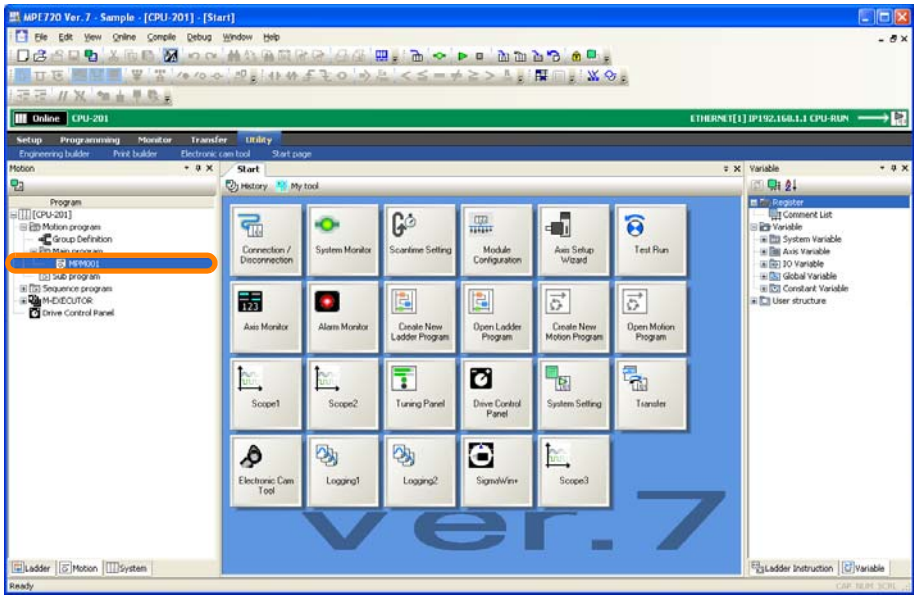
The Environment Setting Dialog Box will close and the settings will be enabled.

This concludes the procedure.

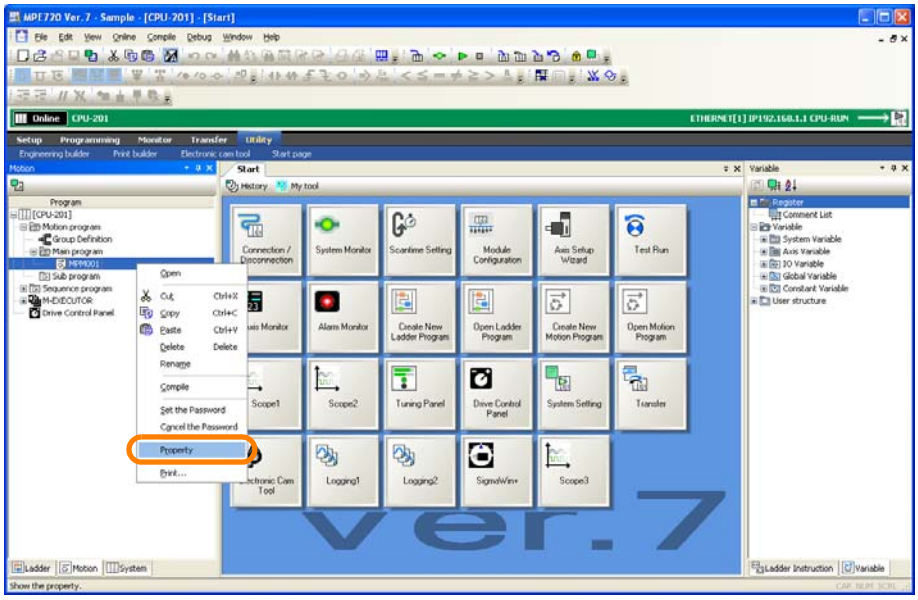
5.3.6 Increasing the Number of Usable D Registers

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 Pane or Motion Pane, click on the program for which you want to increase the number of D registers.



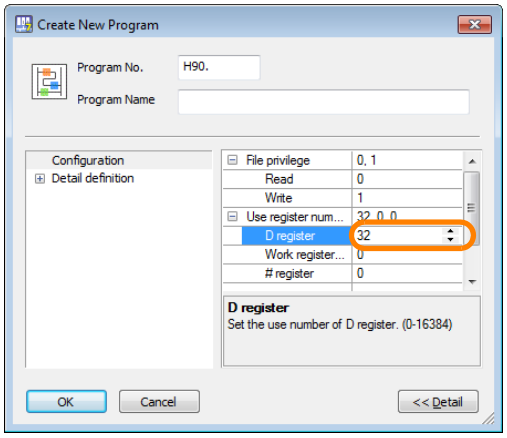
2. Right-click and select ***Property***.



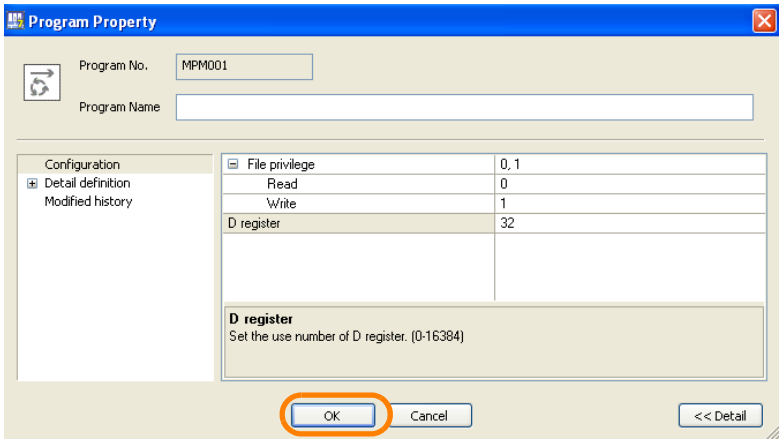
The Program Property Dialog Box will be displayed.

3. Use one of the following methods to specify the number of D registers to use.
   - Enter a value in the box to the right of the **D register** Column.
   - Use the Spin Buttons in the box to the right of the **D register** Column.

Information Setting range: 0 to 16,384 registers



4. Click the **OK** Button.



The Program Property Dialog Box will close and the settings will be applied.

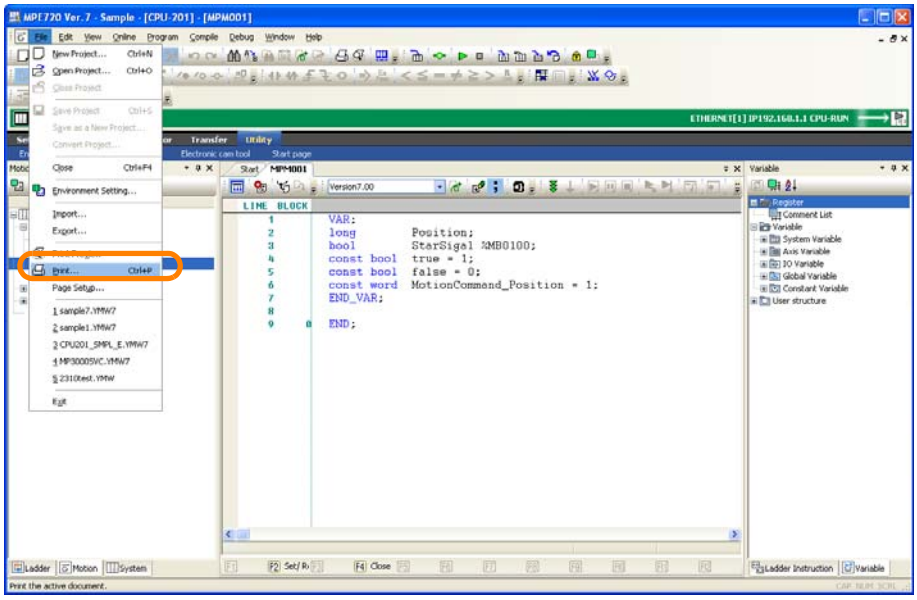
This concludes the procedure.

5.3.7 Printing Ladder Programs and Motion Programs

Use the following procedure to print ladder programs and motion programs.

1. Open the program to print.

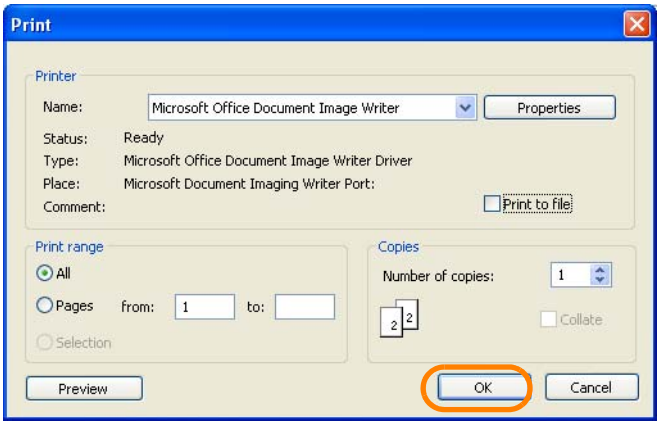
2. Select ***File*** – ***Print*** from the menu bar.



The Print Dialog Box will be displayed.

3. Change the settings for printing as required.
Refer to the manual for your PC or printer for details on the settings.

4. Click the **OK** Button.



Printing will start.

This concludes the procedure.

5.3.8 Copying Drawings

There are the following three methods that you can use to copy ladder programs and motion programs.

Project File	Program	Reference
Within the same project file	Ladder program	*Copying Ladder Programs* on page 5-95
	Motion program	*Copying a Motion Program* on page 5-98
Between project files	Ladder programs and motion programs	*Copying between Different Project Files* on page 5-100

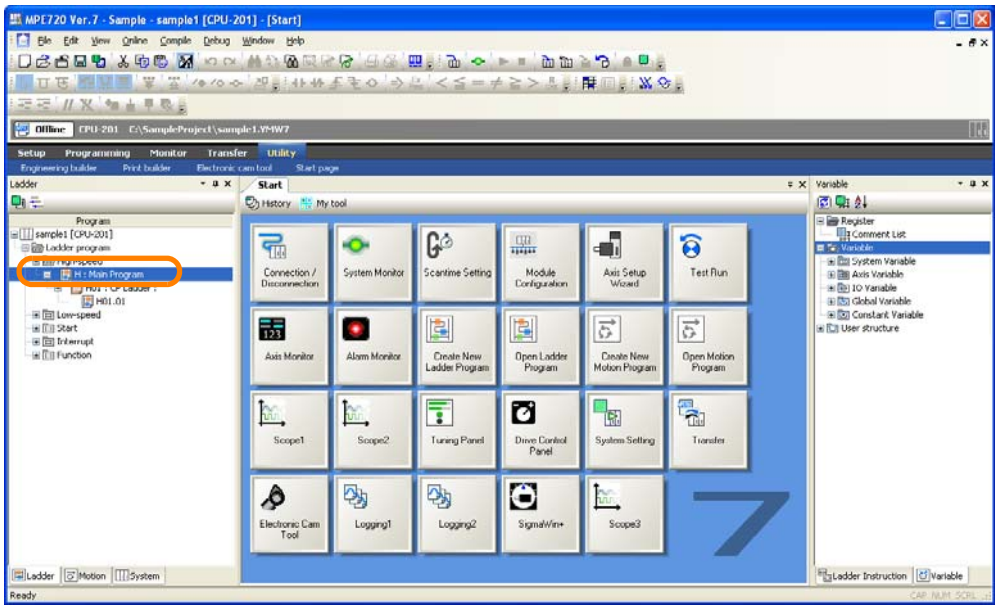
Information Programs cannot be copied if you are using a direct connection. Change to an offline connection.

The procedures are given below.

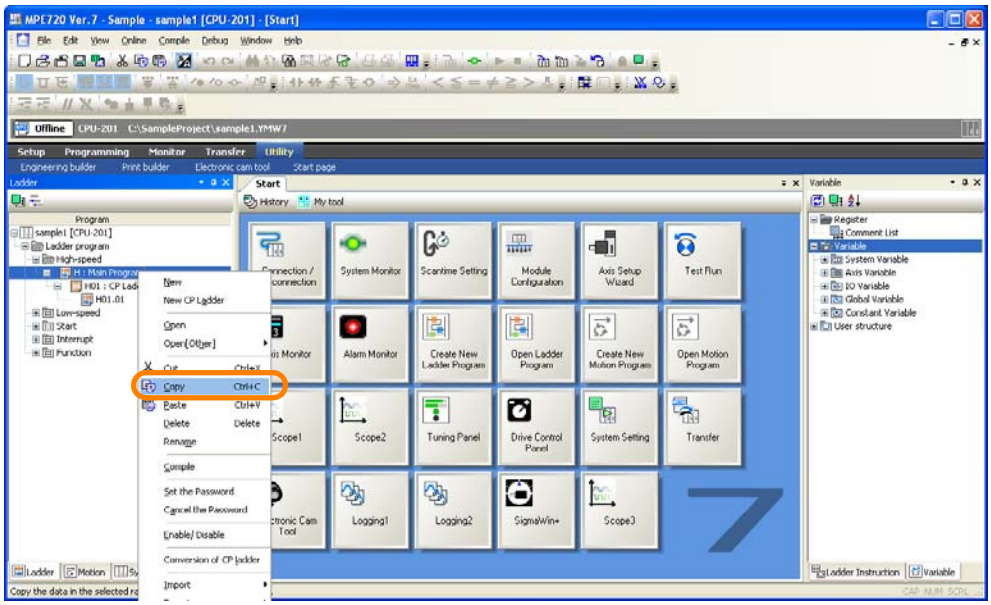
Copying Ladder Programs

Use the following procedure to copy ladder programs within the same project file.

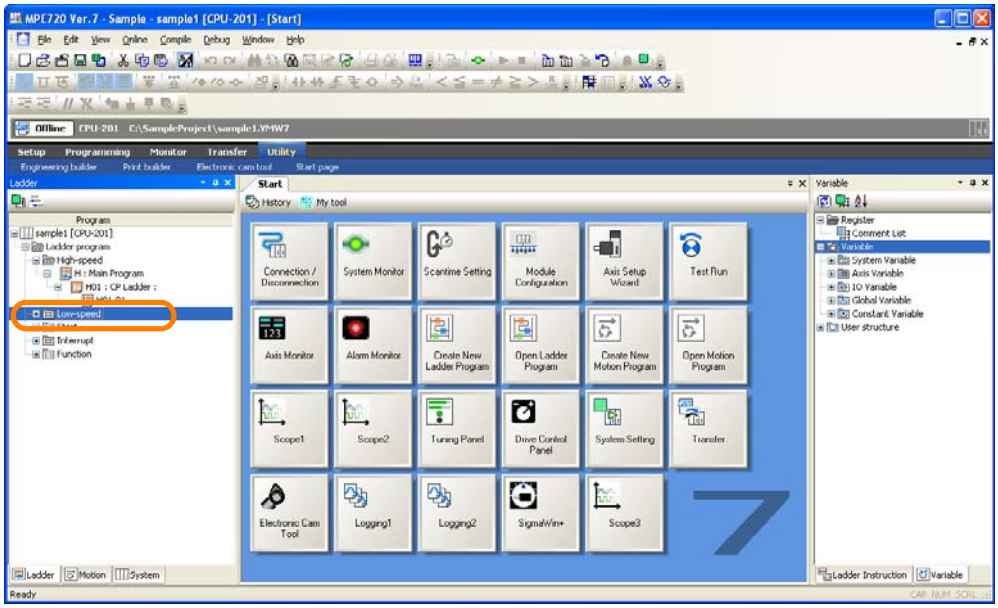
1. Open the project file that contains the program to copy.
2. In the Ladder Pane, select the program to copy.



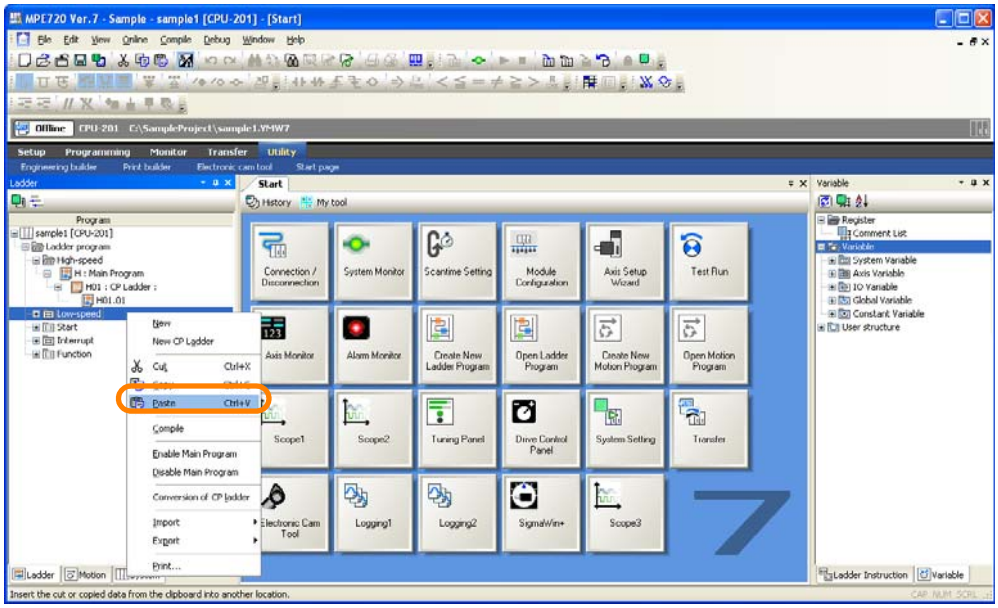
3. Right-click and select ***Copy***.



4. In the Ladder Pane, select the destination program where the program is to be pasted.

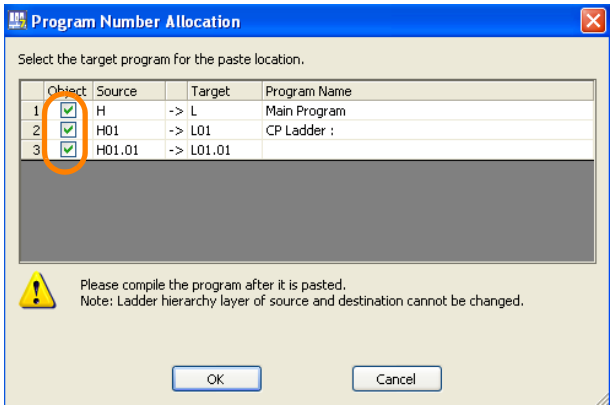


5. Right-click and select ***Paste***.

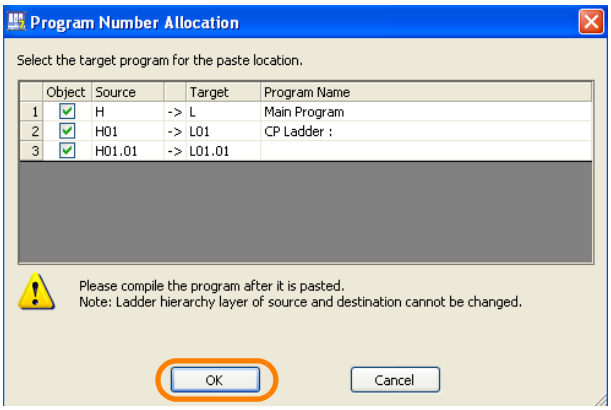


The Program Number Allocation Dialog Box will be displayed.

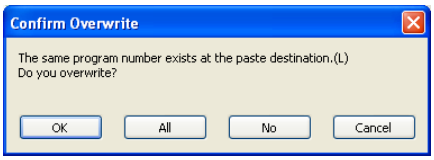
6. Select the **Object** Box for the program to copy.



7. Click the **OK** Button.



If the program number is in use at the destination, a Confirm Overwrite Dialog Box will be displayed. Click the appropriate button.



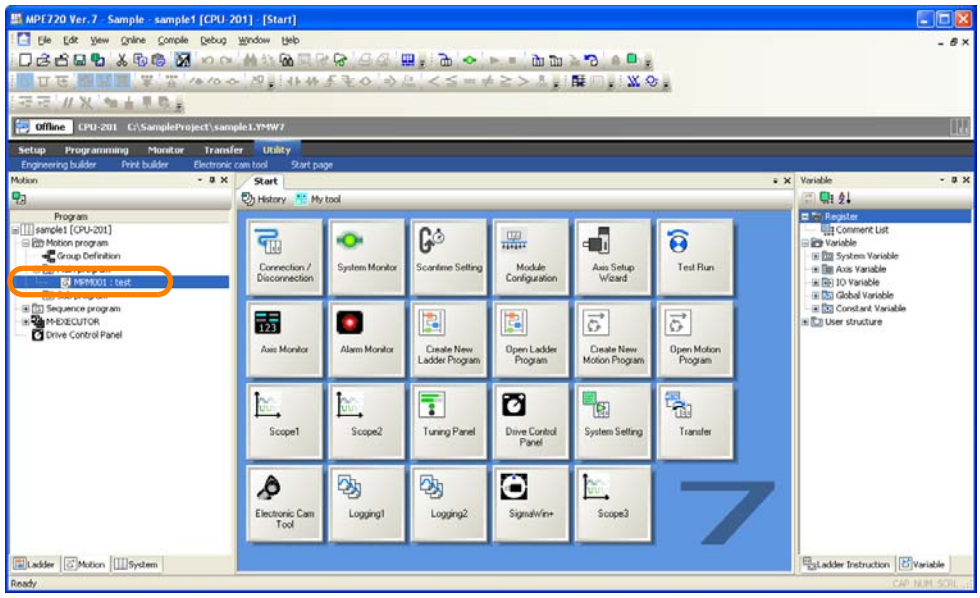
The selected program will be copied and the Program Number Allocation Dialog Box will close.

This concludes the procedure.

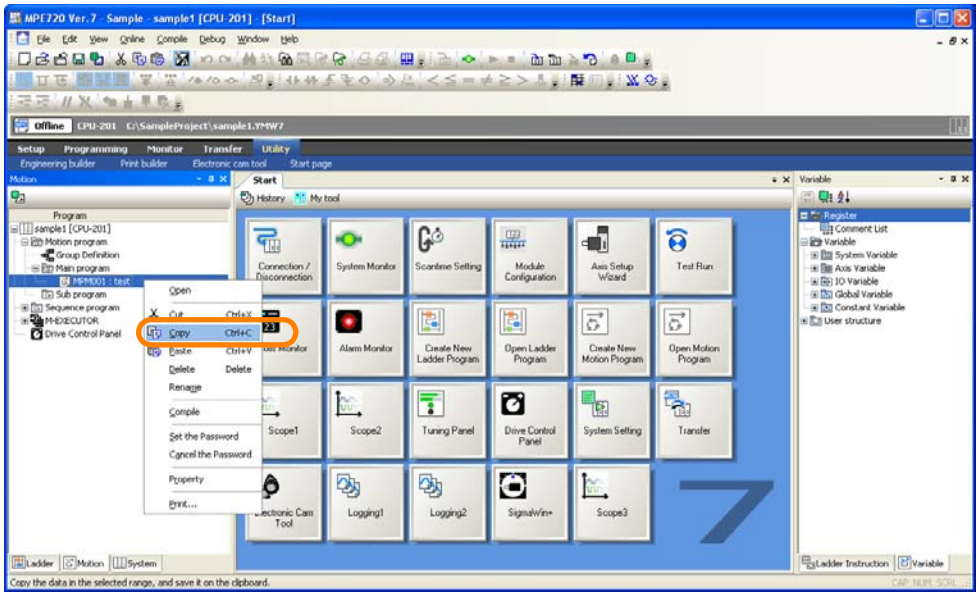
Copying a Motion Program

Use the following procedure to copy motion programs within the same project file.

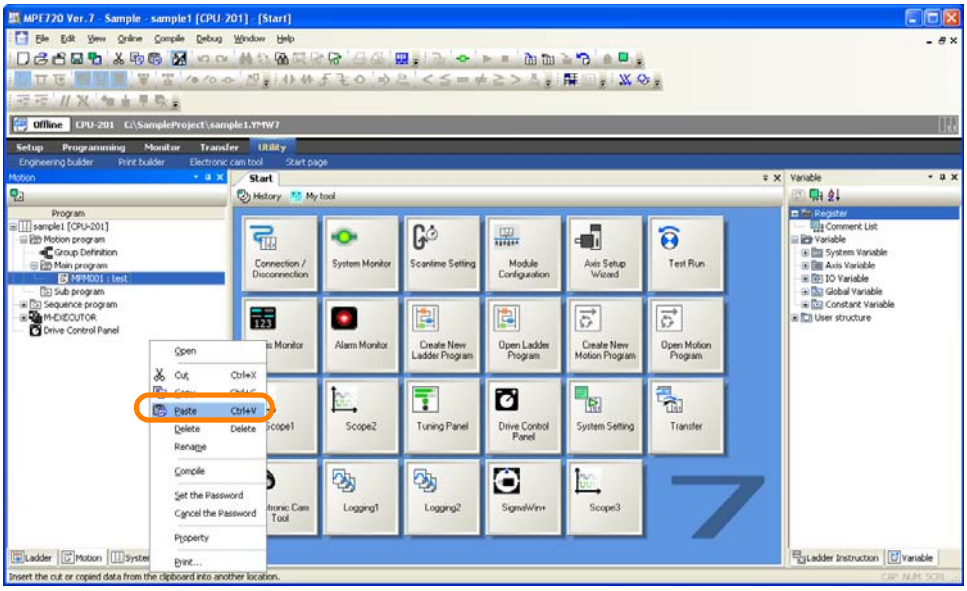
1. Open the project file that contains the program to copy.
2. In the Motion Pane, select the program to copy.



3. Right-click and select ***Copy***.

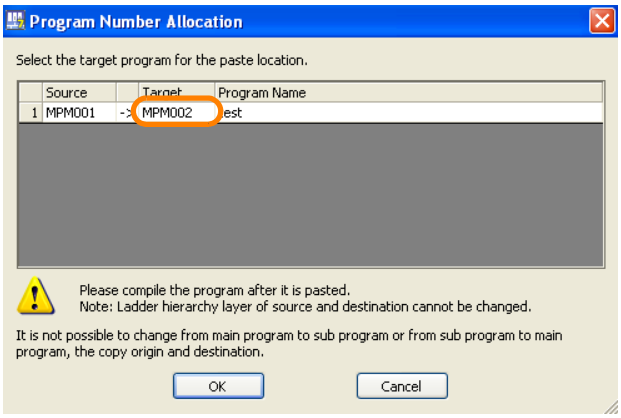


4. Right-click in the Motion Pane and select ***Paste***.

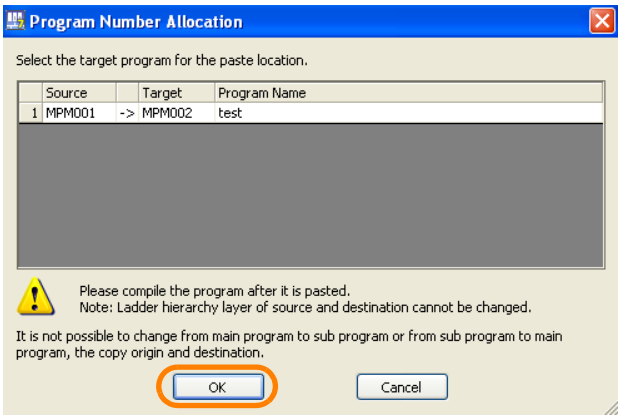


The Program Number Allocation Dialog Box will be displayed.

5. Enter the program number in the cell under **Target**.



6. Click the **OK** Button.



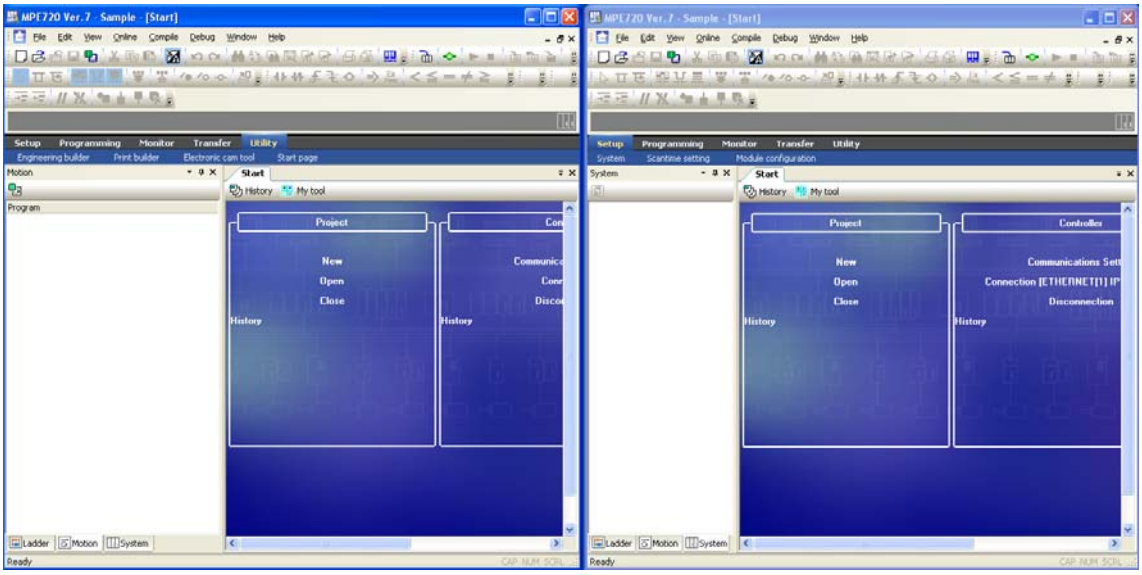
The selected program will be copied and the Program Number Allocation Dialog Box will close.

This concludes the procedure.

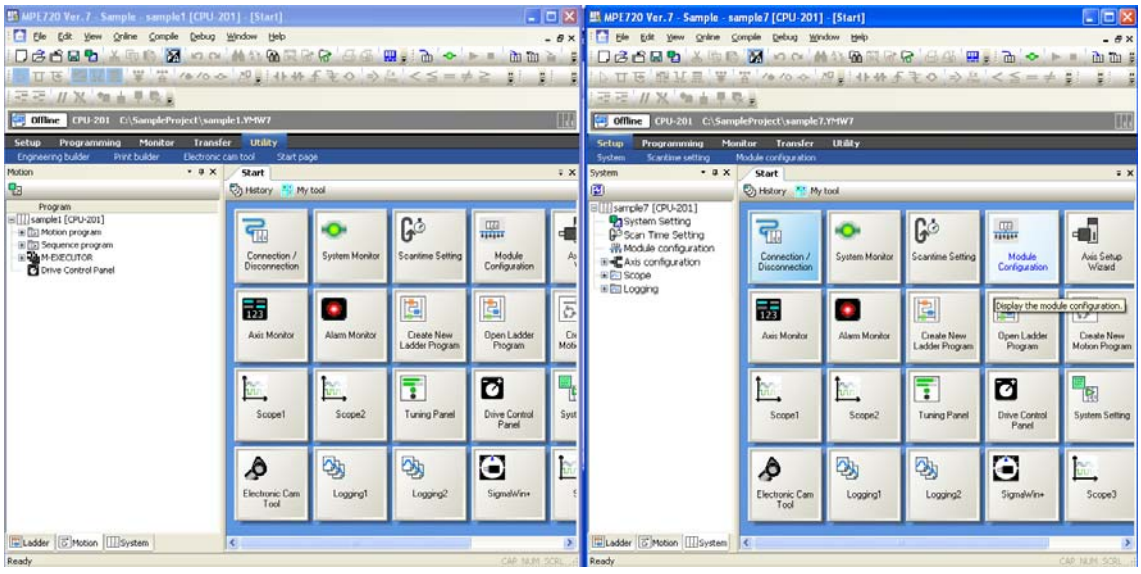
Copying between Different Project Files

Use the following procedure to copy programs between different projects.

1. Open two instances of the MPE720 on the same PC.



2. In one window, open the project file that contains the program to copy, and in the other window, open the project file that contains the program to receive the copy.



3. Refer to either of the following sections to complete this procedure according to the type of program to copy.
   - Ladder Programs
     ☞ Step 2 and onward in *Copying Ladder Programs* on page 5-95
   - Motion Programs
     ☞ Step 2 and onward in *Copying a Motion Program* on page 5-98

This concludes the procedure.

5.3.9 Deleting Drawings

Use the following procedure to delete ladder programs and motion programs.

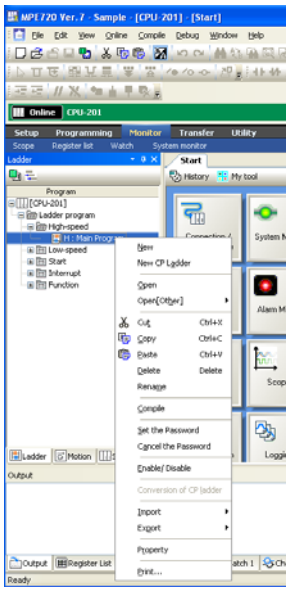
1. Open the project file.

2. In the Ladder Pane or Motion Pane, select the drawings that you want to delete and then right-click on one of the highlighted selected drawings.

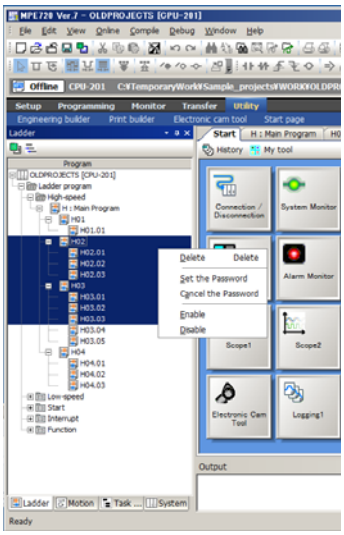
   Information

   You can select more than one drawing.
   - Selecting a number of consecutive drawings: Select the first drawing in the group of drawings to select, hold down the **Shift** Key, and then select the last drawing in the group of drawings to select.
   - To select drawings that are not consecutive: Hold down the **Ctrl** Key and click the drawings to select.

If Only One Drawing Is Selected

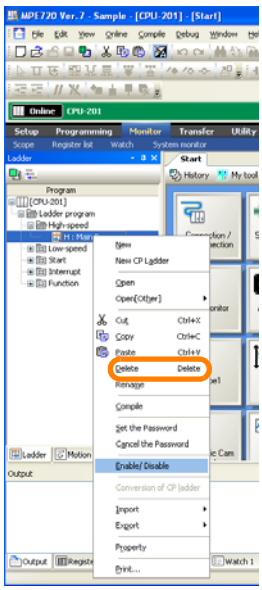


If More Than One Drawing Is Selected

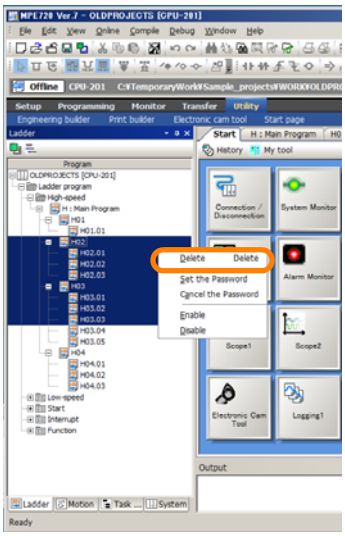


3. Select ***Delete*** from the menu.

If Only One Drawing Is Selected



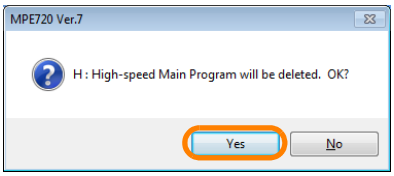
If More Than One Drawing Is Selected



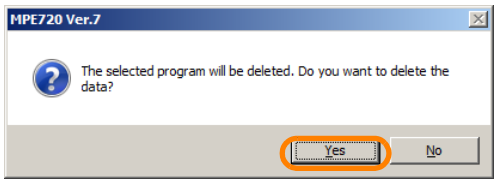
The MPE720 Ver. 7 Dialog Box will be displayed.

4. Click the **Yes** Button.

If Only One Drawing Is Selected



If More Than One Drawing Is Selected



The drawings will be deleted.

This concludes the procedure.

5.3.10 Compiling Programs

There are three ways to compile ladder programs or motion programs.

Type	Introduction	Reference
Compiling	Compiles the selected program.	*Compiling* on page 5-102
Compiling All Programs*	Compiles all programs in the projects opened offline.	*Compiling All Programs* on page 5-103
Compiling Programs Being Edited*	Compiles the multiple edited projects opened offline at the same time.	*Compiling Programs Being Edited* on page 5-103

* Available only in the offline mode.

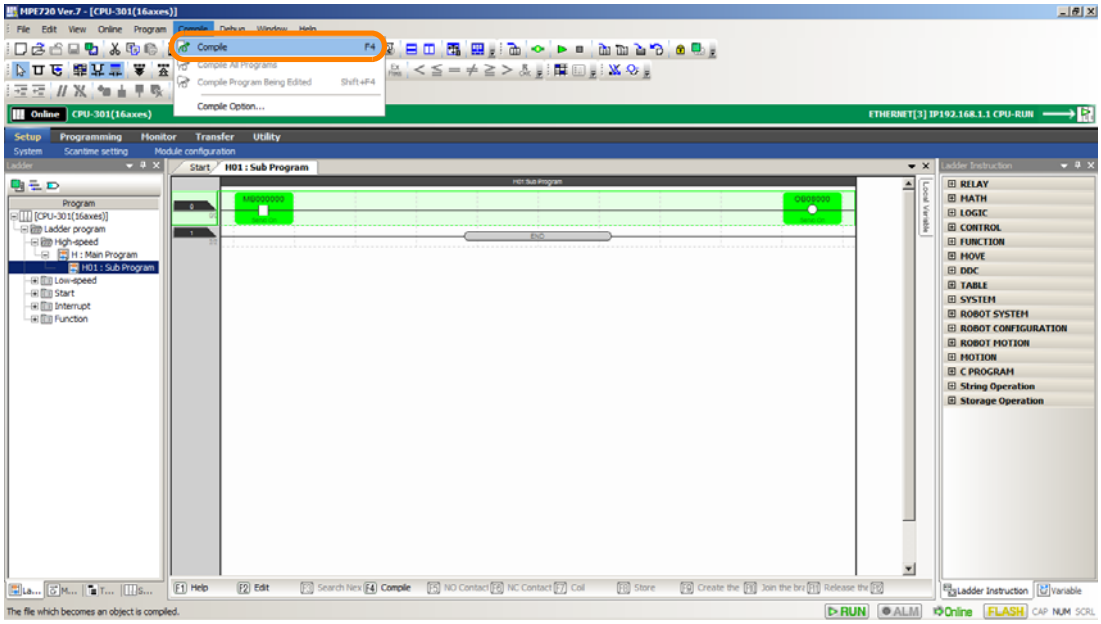
Information You can set the options in **Compile Option...** Dialog Box.

The procedures are given below.

Compiling

Use the following procedure to compile the selected program.

1. Open the project file that contains the program to compile.
2. Select and open the program to compile.
3. Select **File** - **Compile**.



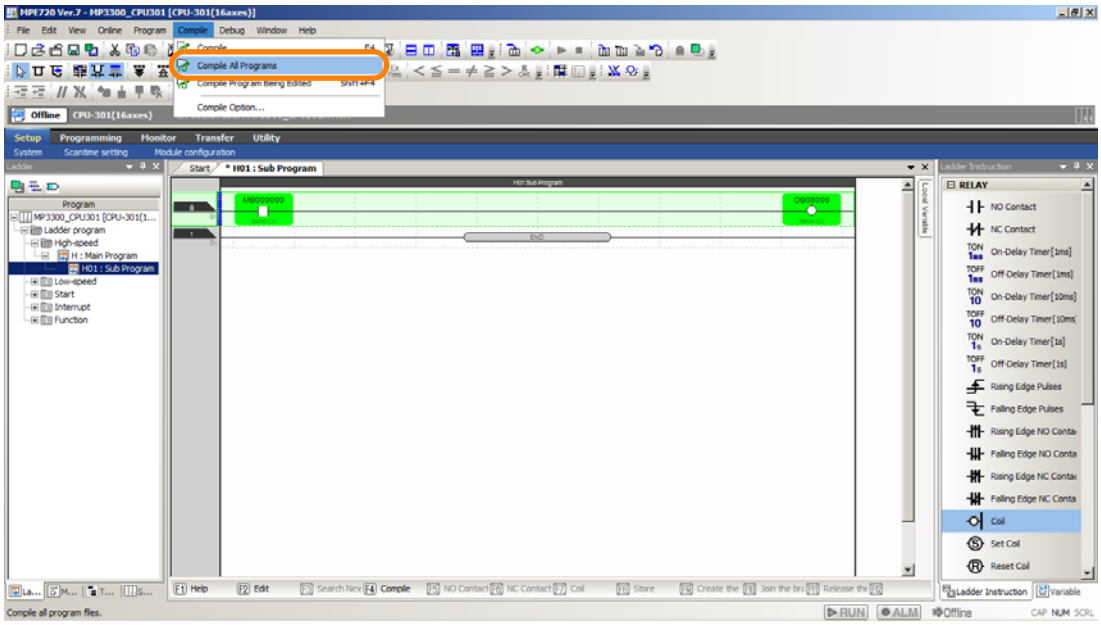
Information You can also compile the program by pressing **F4** key.

This concludes the procedure.

Compiling All Programs

Use the following procedure to compile all programs in the projects opened offline.

1. Open the project file that contains the program to compile.
2. Select and open the program to compile.
3. Select **File** - **Compile All Programs**.

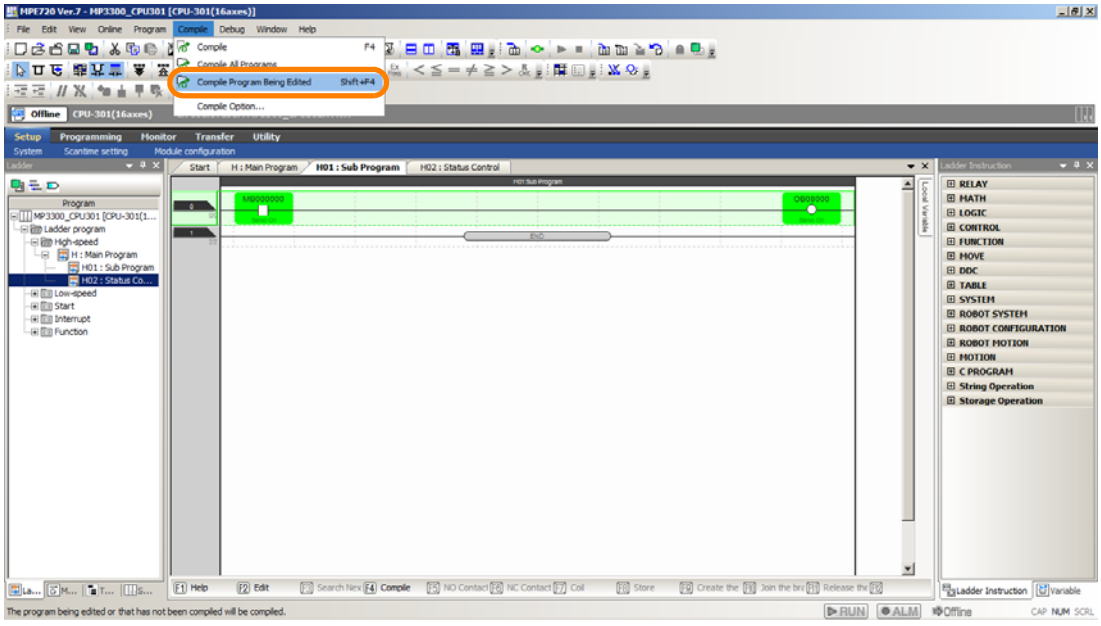


This concludes the procedure.

Compiling Programs Being Edited

Compiles the multiple edited projects opened offline at the same time.

1. Open the project file that contains the program to compile.
2. Select and open the program to compile.
3. Select **File** - **Compile Program being Edited**.



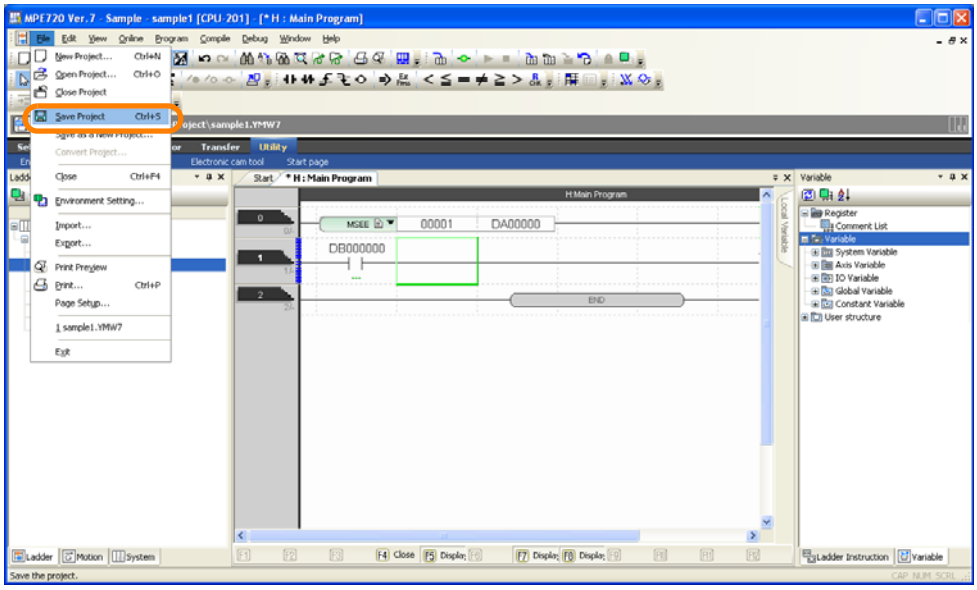
This concludes the procedure.

5.3.11 Saving Programs While Editing

Operating Procedure

Use one of the following methods to save programs that are enabled for editing (while a compilation error exists).

- Select ***File*** – ***Save Project*** from the menu bar.

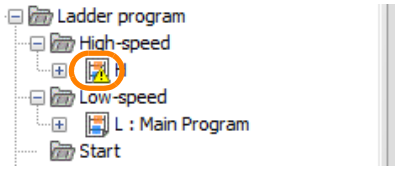


- Hold down the **Ctrl** Key and press the **S** Key.

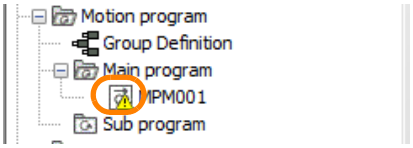
Information If the MPE720 is online, a program cannot be saved if it is enabled for editing. Make sure to save the programs after compilation has been completed.

Icons for Programs That Are Saved before Editing Is Completed

- Ladder Programs



- Motion Programs



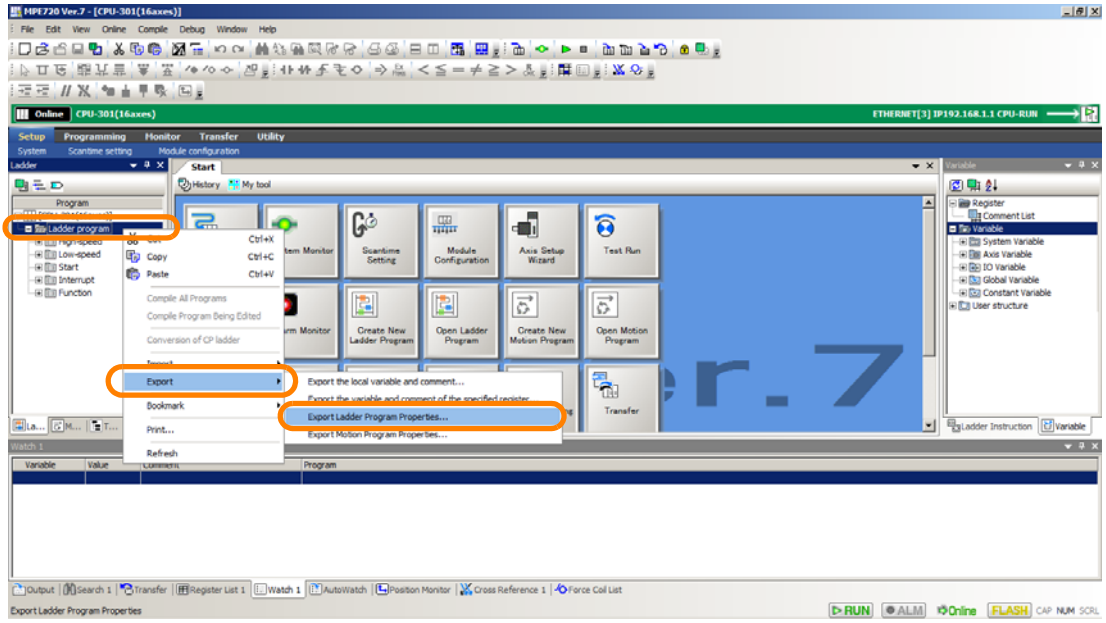
5.3.12 Exporting Properties

The properties information of the Motion Programs and Ladder Programs can be exported to CSV files.

Exporting the Properties of Ladder Programs

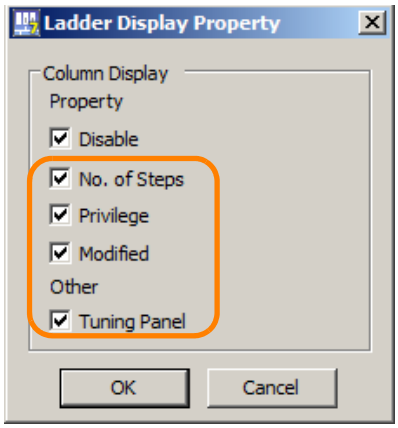
Use the following procedure to export the properties information of Ladder Program to a CSV file.

1. Open an online connection or a project file.
2. Display the Ladder Pane.
3. Right-click on the ladder program and select **Export** - **Export Ladder Program Properties...**.

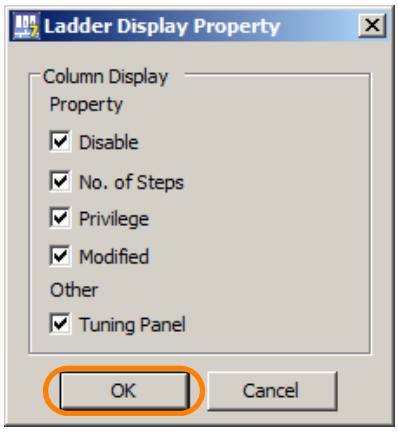


The **Ladder Display Property** Dialog Box will be displayed.

4. Select a property to export.

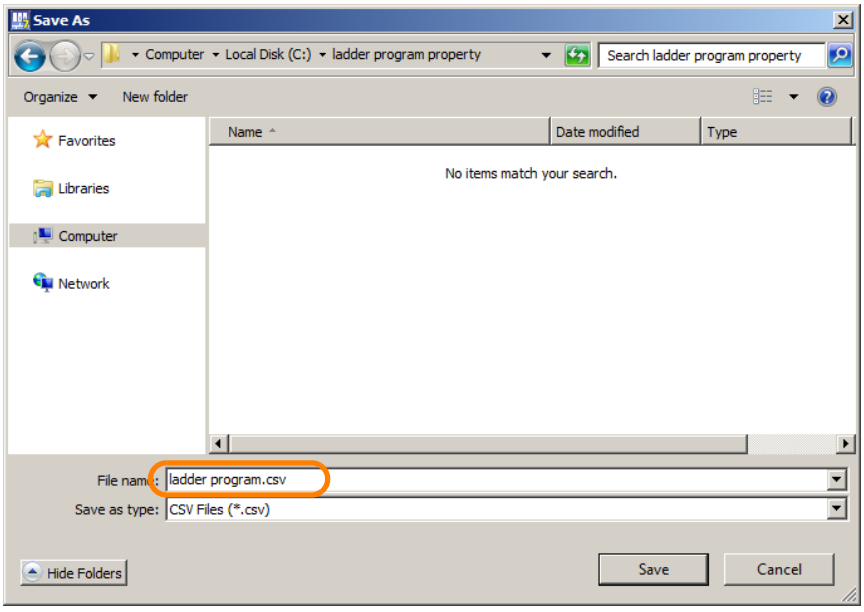


5. Click the **OK** Button.

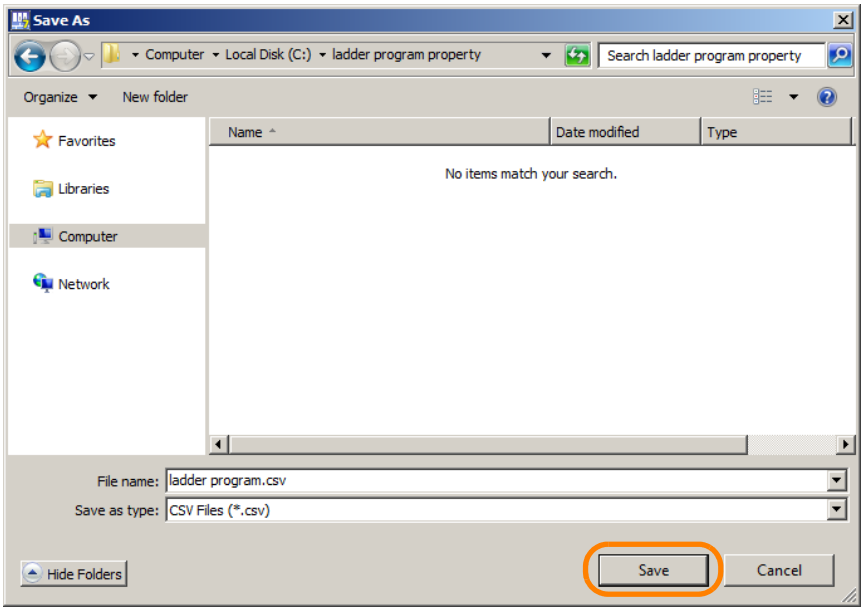


The **Save As** Dialog Box will be displayed.

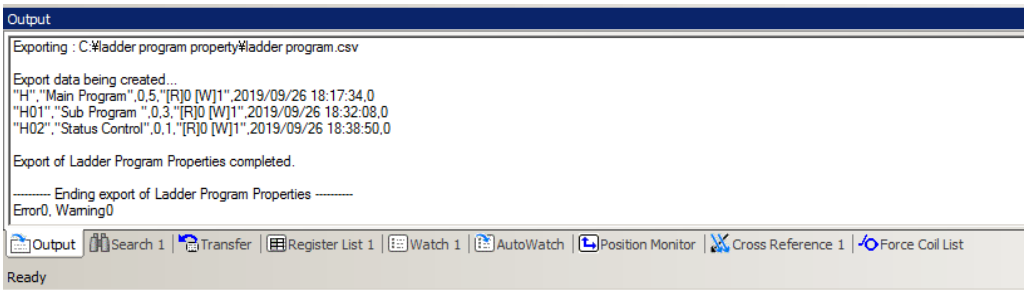
6. Enter a file name.



7. Click the **Save** Button.



The register data will be exported, and the results will be displayed in the **Output** Pane.



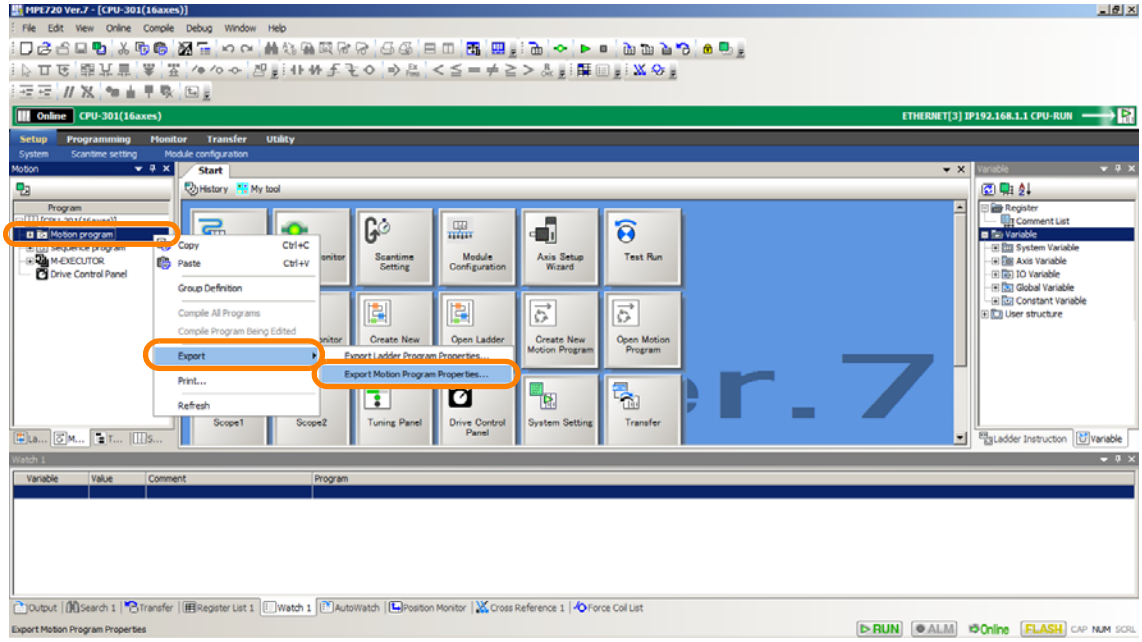
8. Confirm that the exported data has been stored in the selected file.

This concludes the procedure.

Exporting the Properties of Motion Programs

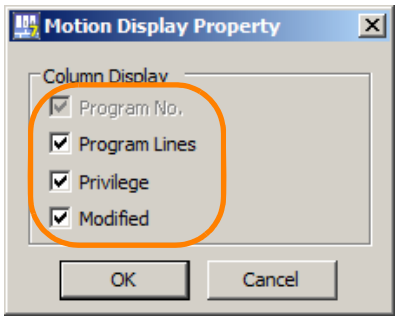
Use the following procedure to export the properties information of Motion Program to a CSV file.

1. Open an online connection or a project file.
2. Display the Motion Pane.
3. Right-click on the motion program and select **Export** - **Export Motion Program Properties...**.

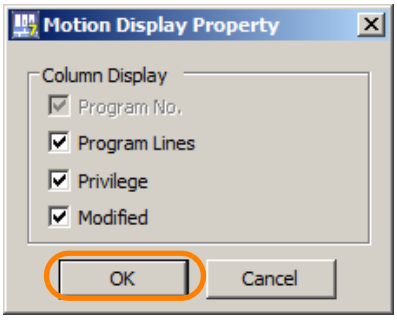


The **Motion Display Property** Dialog Box will be displayed.

4. Select a property to export.

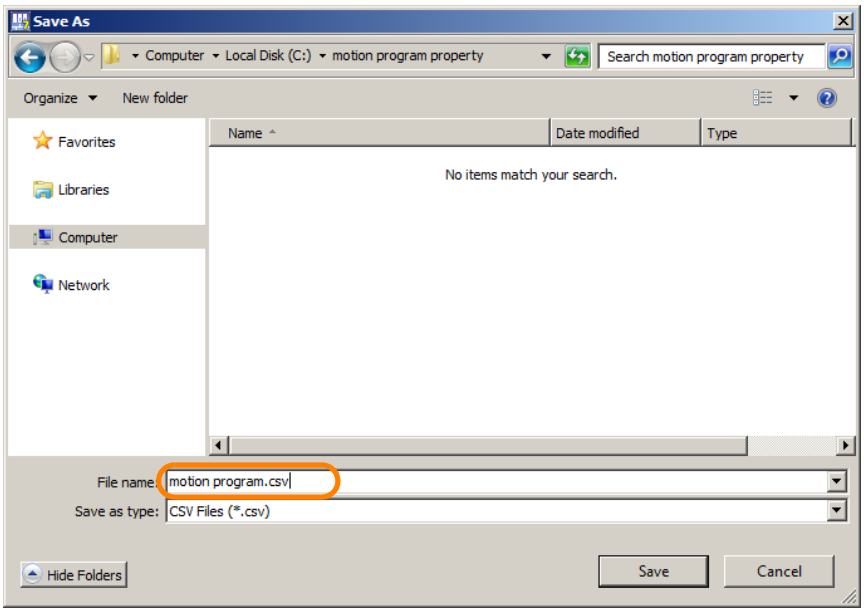


5. Click the **OK** Button.

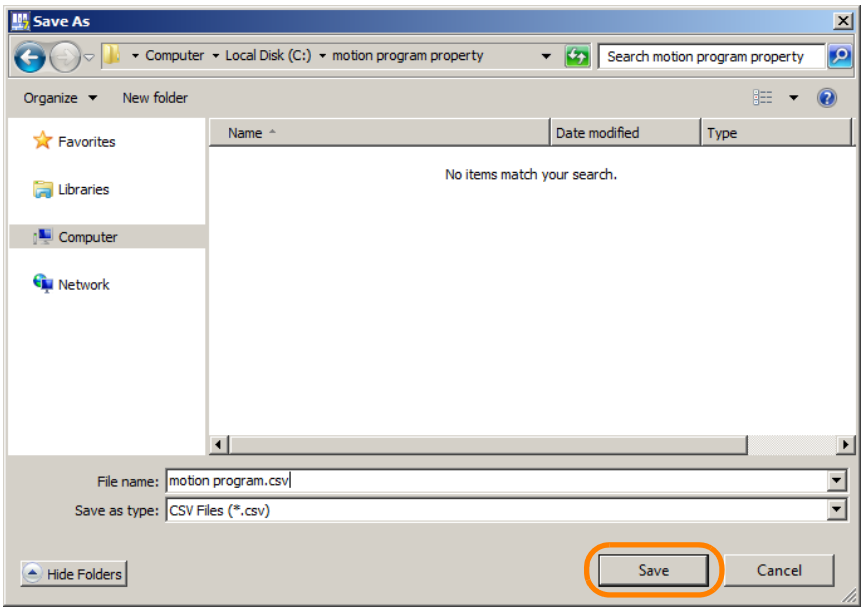


The Save As Dialog Box will be displayed.

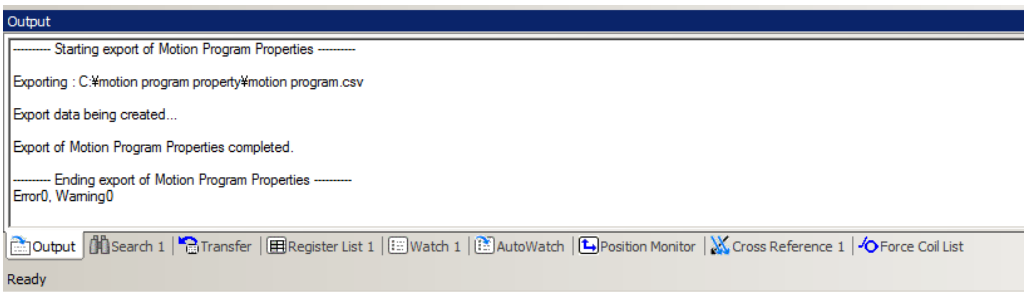
6. Enter a file name.



7. Click the **Save** Button.



The register data will be exported, and the results will be displayed in the **Output** Pane.



8. Confirm that the exported data has been stored in the selected file.

This concludes the procedure.

Debugging

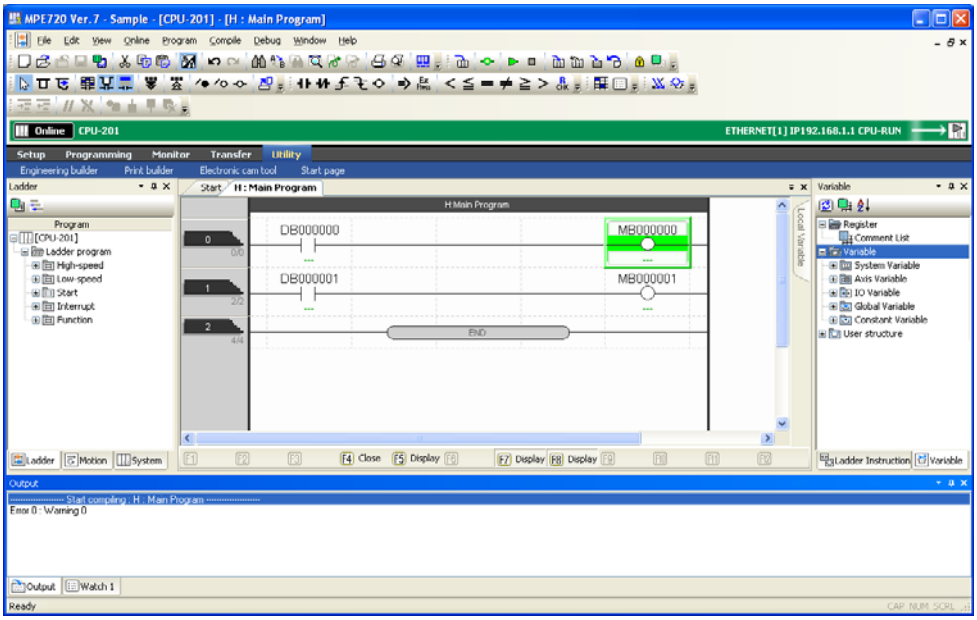
6

This chapter describes the operations that are used for debugging ladder programs and motion programs.

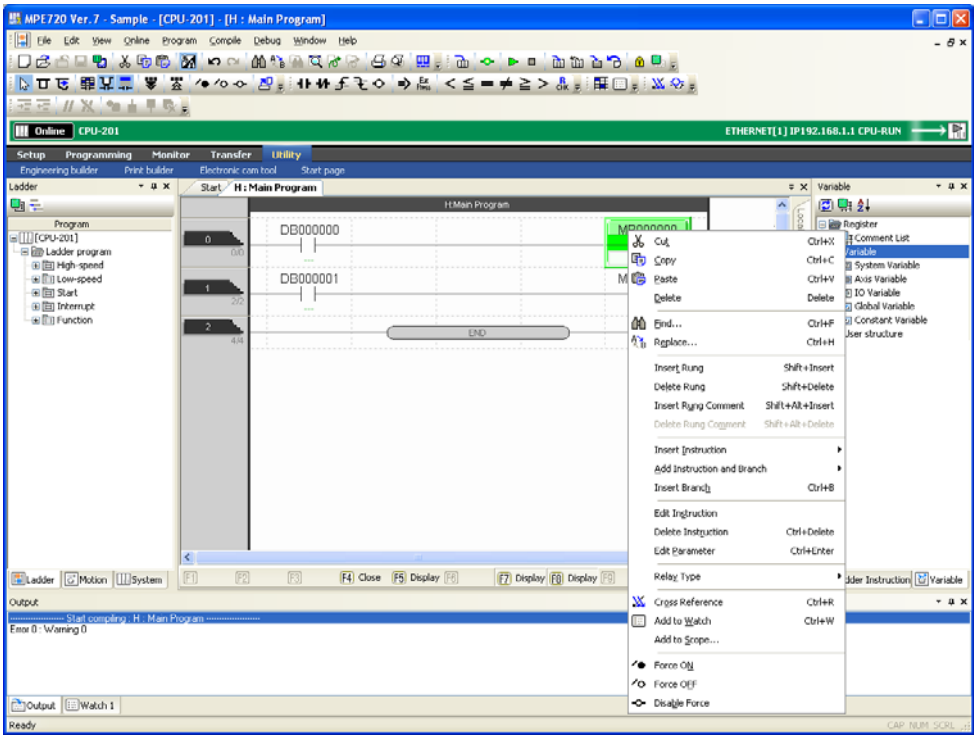
6.1 Forcing Coils ON and OFF

Use the following procedure to force a specific coil ON or OFF.

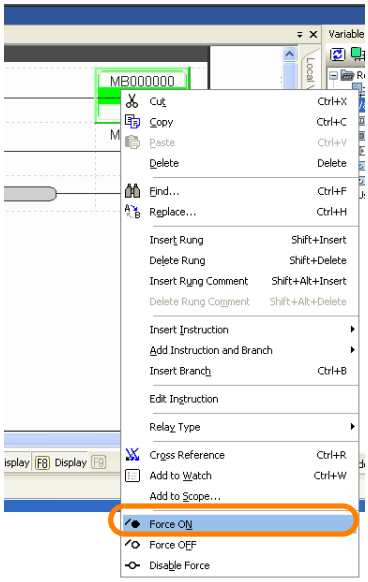
1. Display the target ladder program.

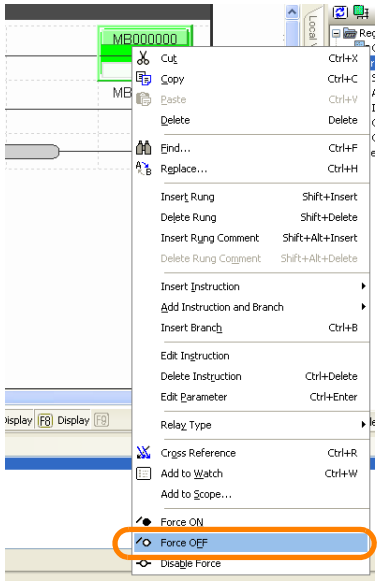


2. Right-click the coil to control.

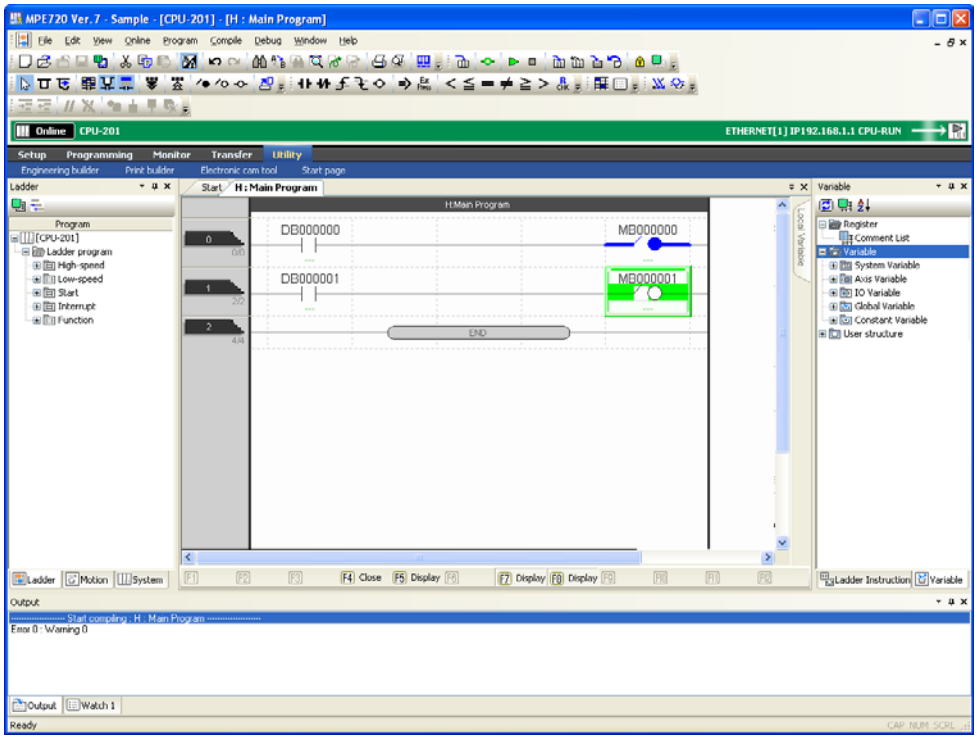


3. Select ***Force ON*** or ***Force OFF***.





4. Confirm that the coil is forced ON or OFF.
   - Forced ON state: —/●—
   - Forced OFF state: —/○—

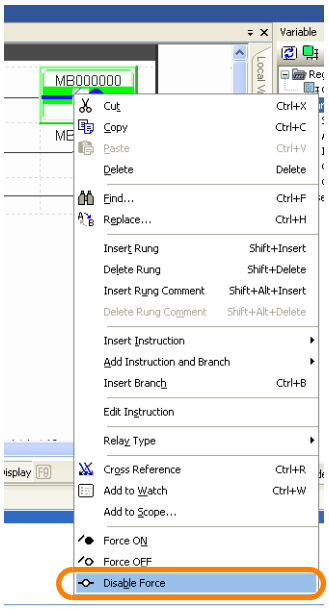


This concludes the procedure.

Information

Releasing the Forced State

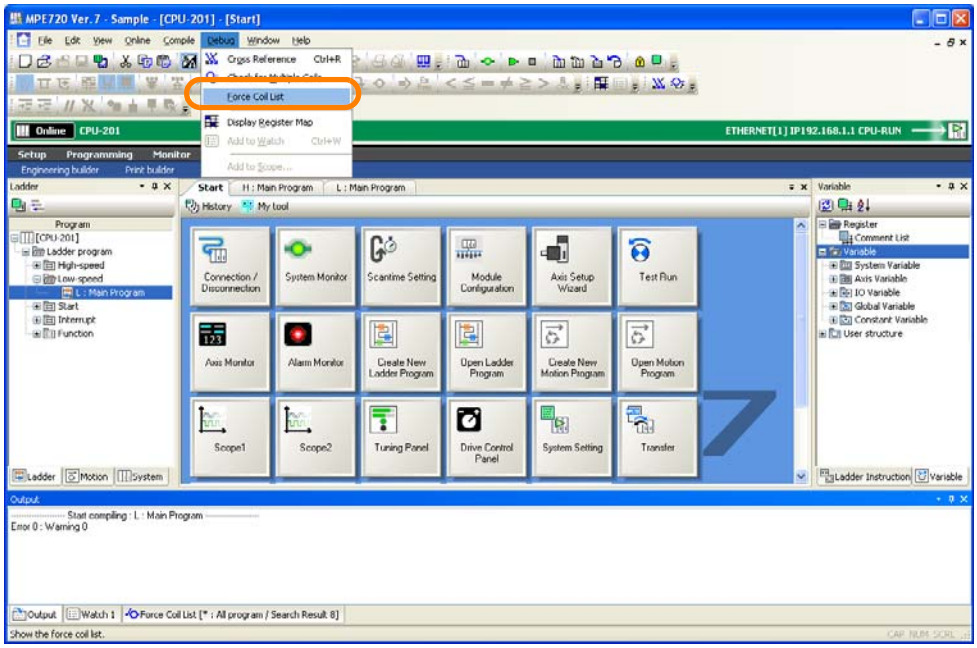
Right-click the coil to release, and select ***Disable Force*** from the menu.



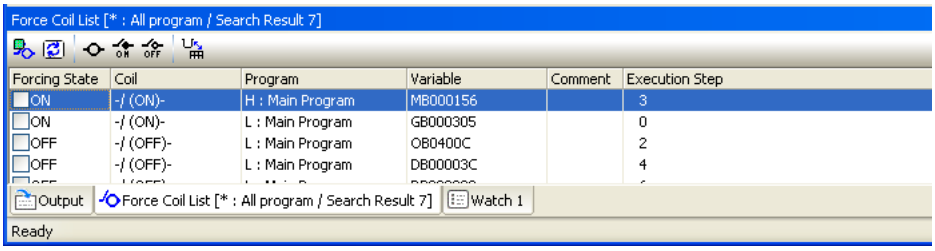
6.2 Listing Coils in Forced ON or OFF State

Use the following procedure to display a list of coils that are in forced ON or forced OFF state.

1. Select ***Debug*** – ***Force Coil List*** from the menu bar.



A list of the forced coils will be displayed in the Force Coil List Pane.



Refer to the following manual for details on the Force Coil List Pane.

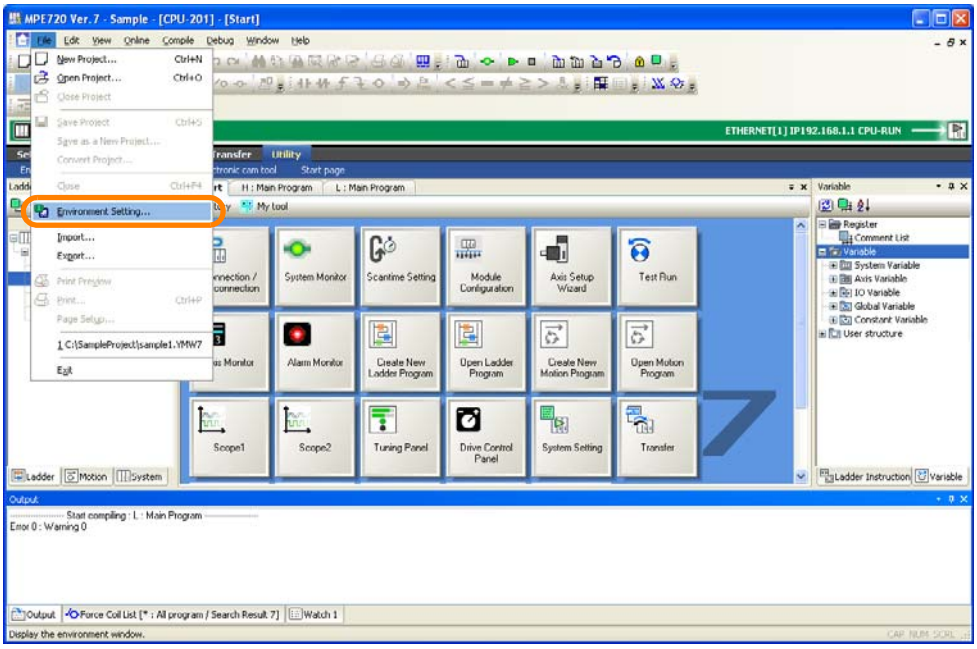
- 🕮 *MP3000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880725 00)
- 🕮 *MP2000 Series Machine Controller System Setup* Manual (Manual No.: SIEP C880732 14)

This concludes the procedure.

6.3 Enabling Checking for Registers Used in Multiple Coil Instructions

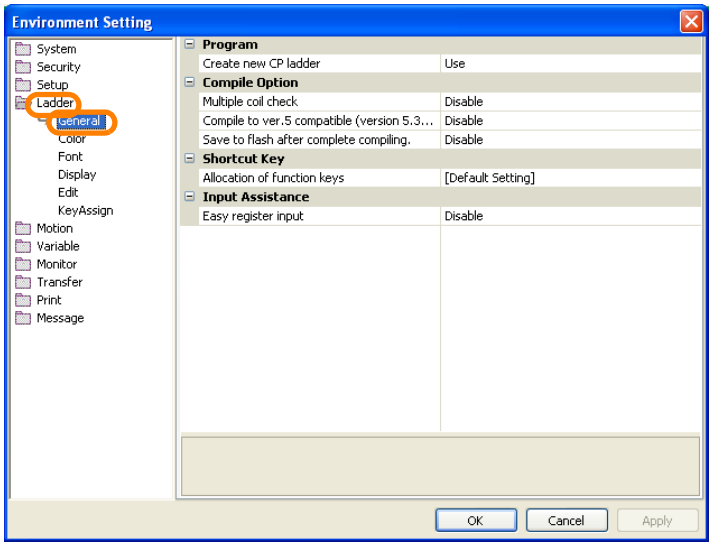
Use the following procedure to enable checking for registers used in multiple coil instructions.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

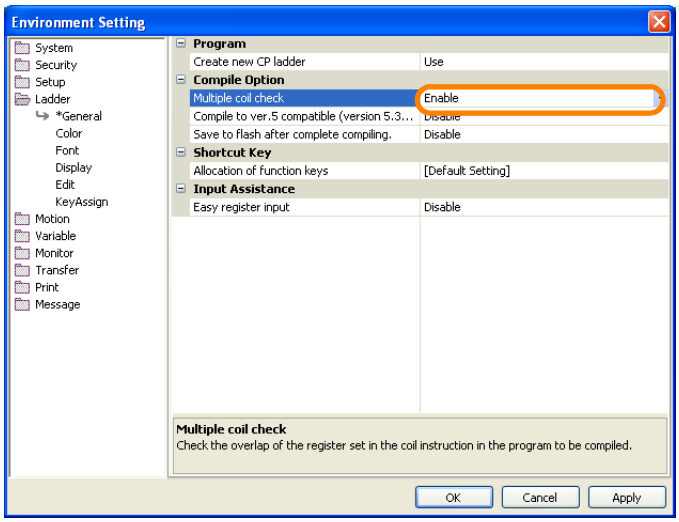


The Environment Setting Dialog Box will be displayed.

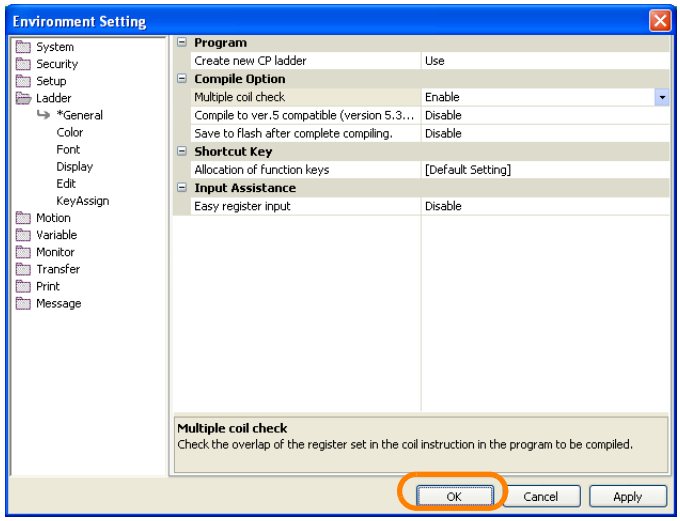
2. Select **Ladder** – **General**.



3. Set **Multiple coil check** in the **Compile Option** Group to **Enable**.



4. Click the **OK** Button.

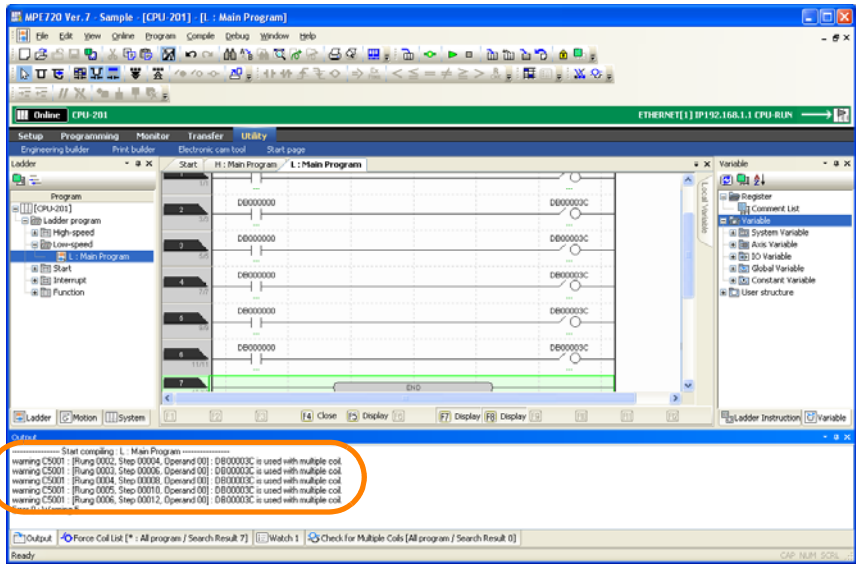


Checking for registers used in multiple coil instructions will be enabled, and the Environment Setting Dialog Box will close.

This concludes the procedure.

Information

If you compile a program that uses the same register in more than one coil instruction, a multiple coil error message will be displayed in the Output Pane.



6.4 Debugging Motion Programs

There are the following three methods that you can use to check the operation of motion programs.

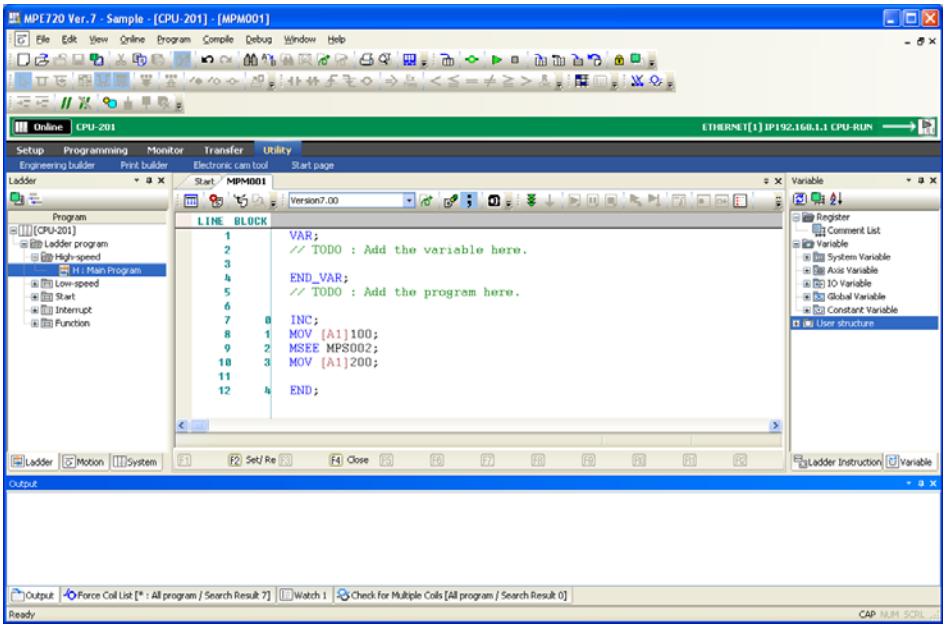
- Debugging with step execution: Program operation is checked by executing one step at a time.
- Debugging by setting breakpoints: The operation of a specified range of the program is checked.
- Debugging by checking the execution status and control signal status: The operating state of the program and the conditions when an alarm occurs are checked.

The procedures are given below.

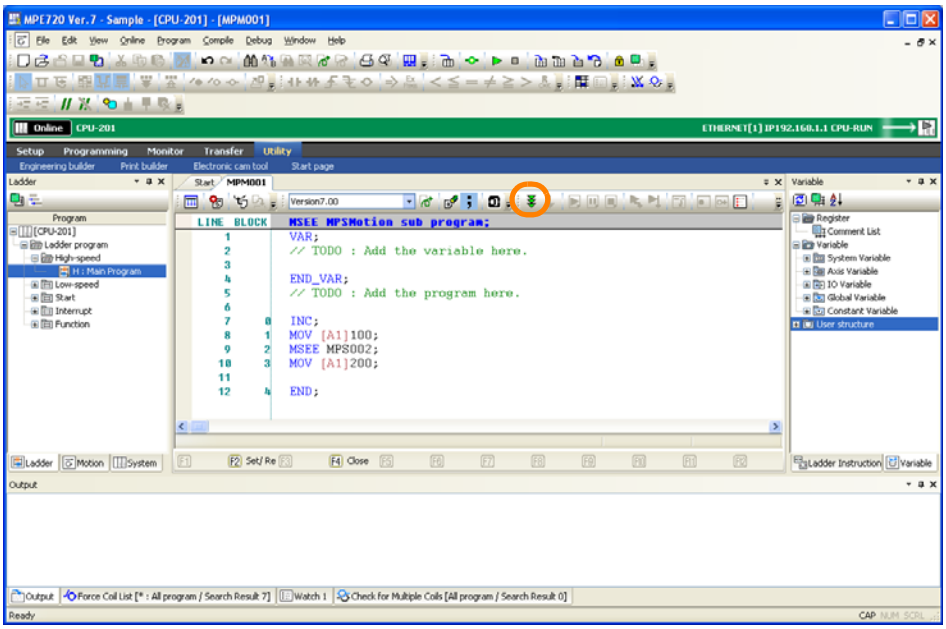
6.4.1 Performing Step Execution

Use the following procedure to perform step execution.

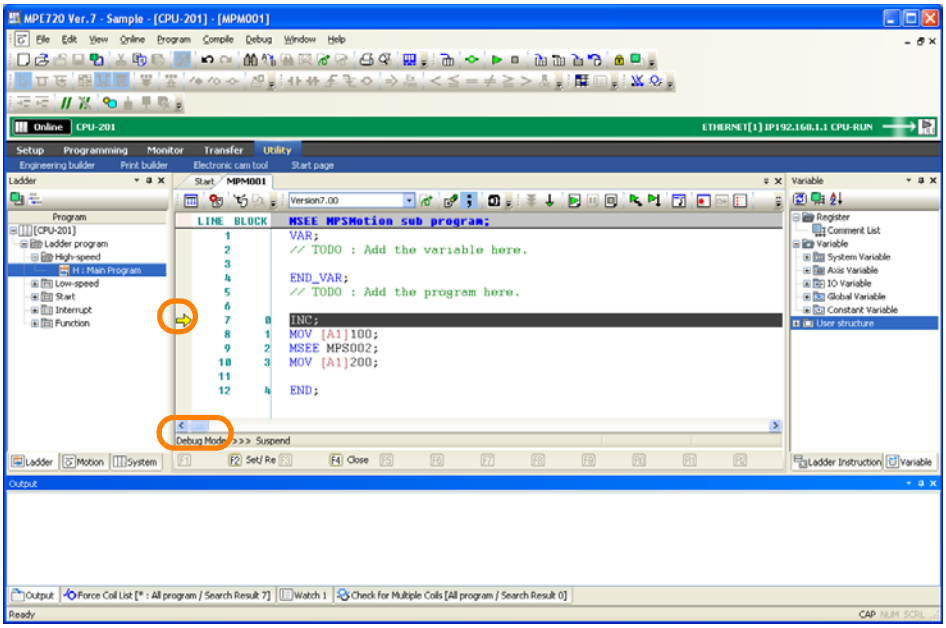
1. Open the motion program to debug.



2. Click the **Debug Mode** Button on the toolbar.



The Edit Motion Program Tab Page will change to Debug Mode and an arrow will appear in front of the line that is about to be executed.

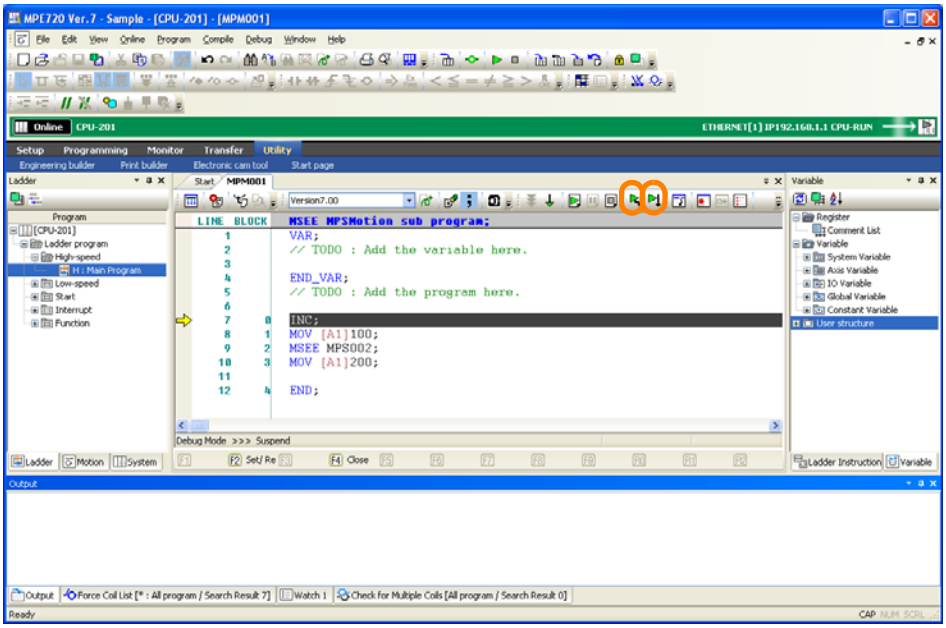


3. Click the **Step In** or **Step Over** Button.

Information

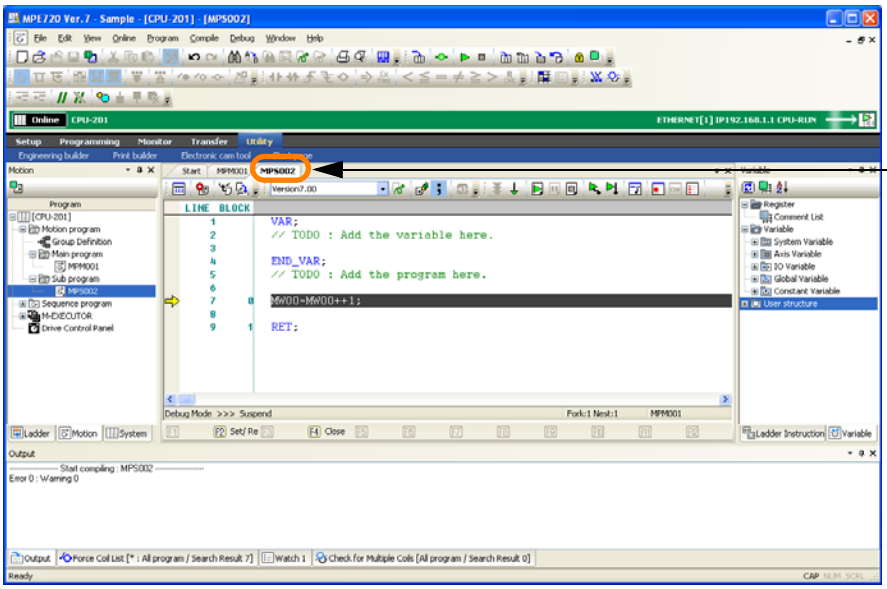
Differences between Step In and Step Over

- Step In
  If the program has an MSEE or SSEE instruction, the called program is opened and debugging is performed for each line in it.
- Step Over
  If the program has an MSEE or SSEE instruction, the called program is not opened and debugging continues.



Each line in the motion program will be executed.

- Step In Button
  When an MSEE or SSEE instruction in the main program is executed, the called subprogram and its execution steps through each line from the beginning are displayed in the Edit Motion Program Tab Page.



The tab displays the subprogram MPS002, which was specified by the MSEE instruction in the main program.

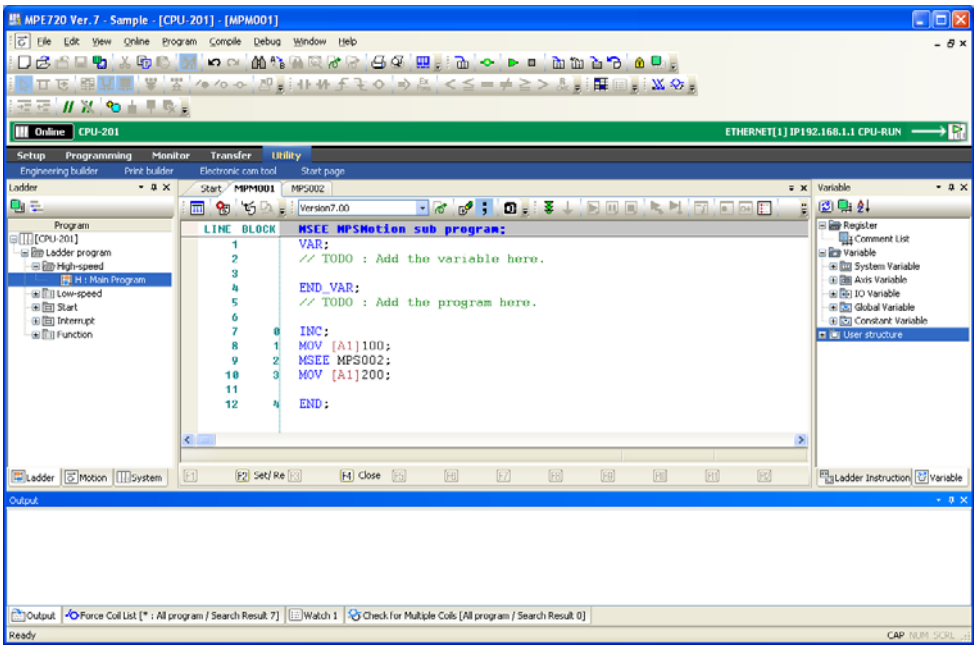
Click the **Step In** Button until you have finished debugging the subprogram. When you have finished debugging the subprogram, execution will return to the main program.

This concludes the procedure.

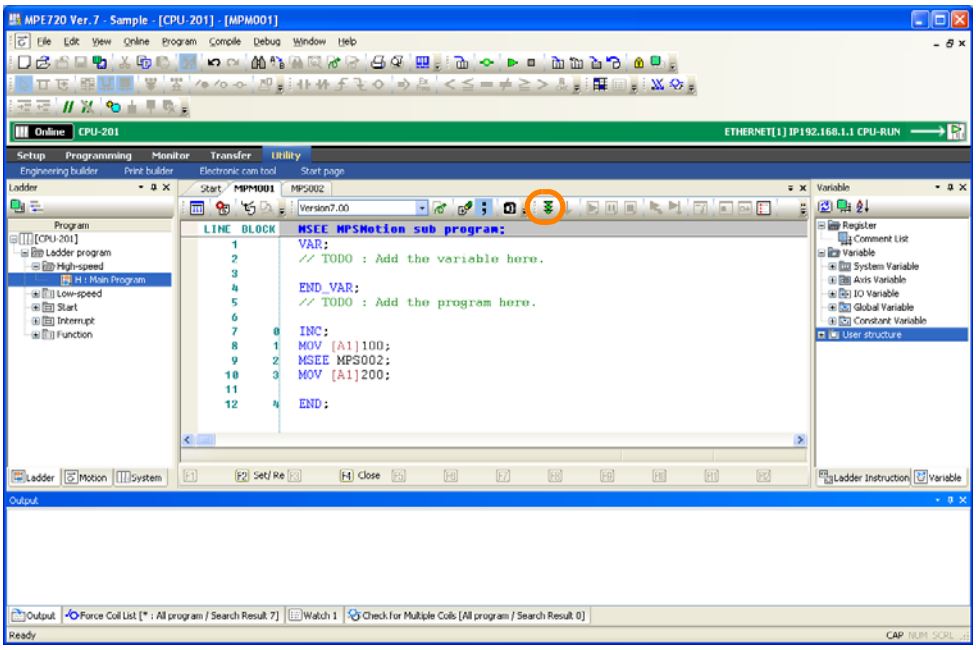
6.4.2 Setting Breakpoints

Use the following procedure to set breakpoints.

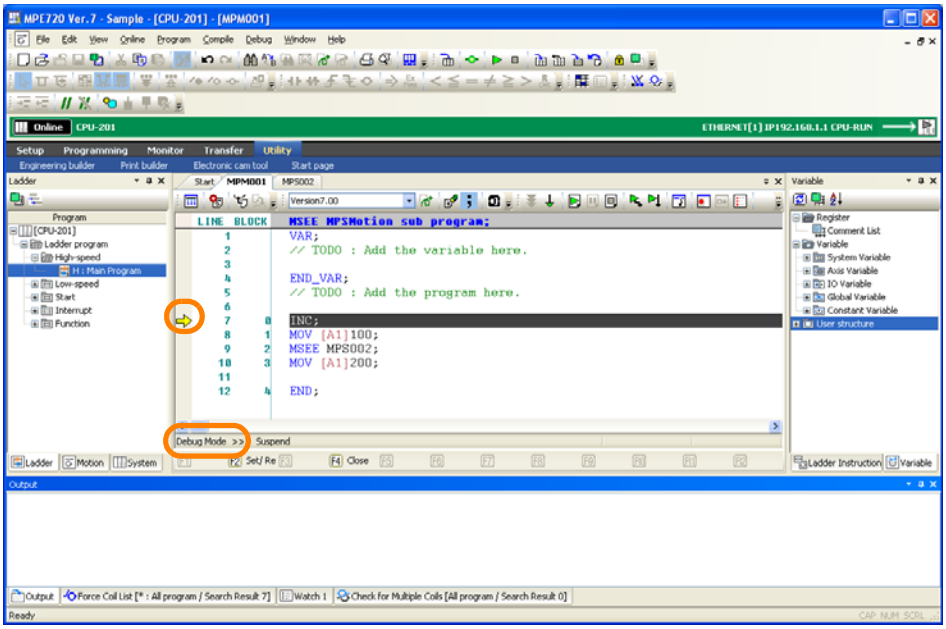
1. Open the motion program to debug.



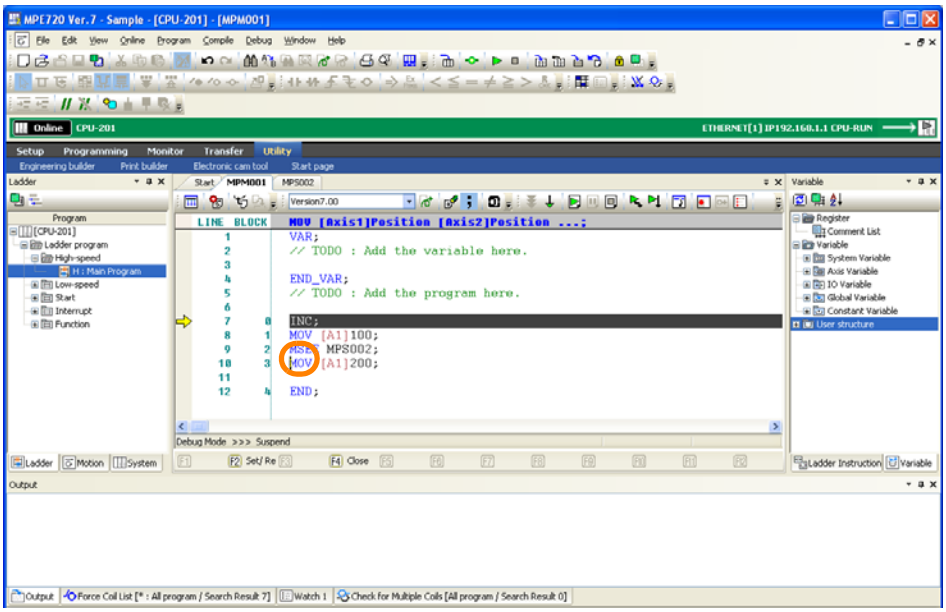
2. Click the **Debug Mode** Button on the toolbar.



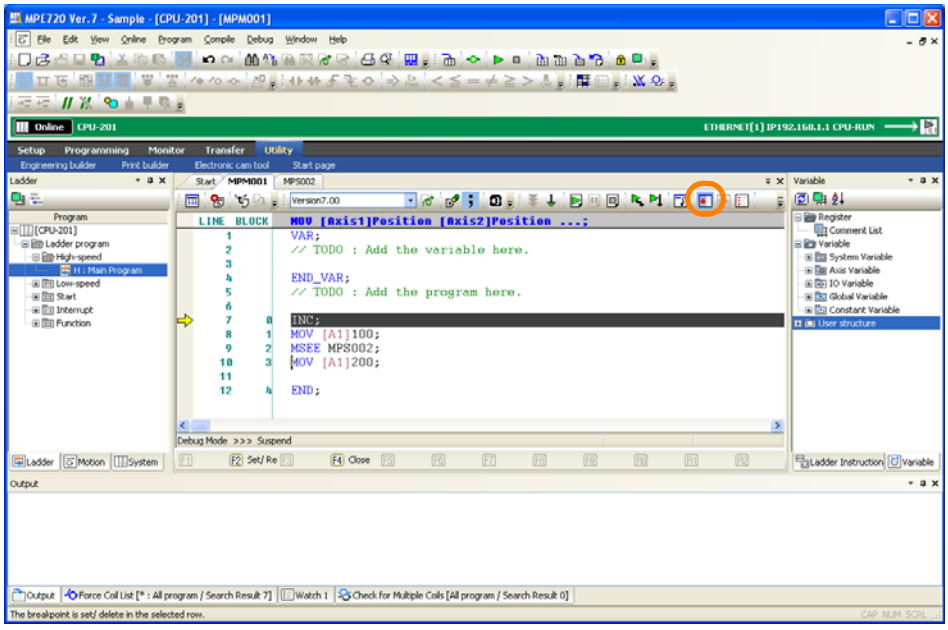
The Edit Motion Program Tab Page will change to Debug Mode and an arrow will appear in front of the line that is about to be executed.



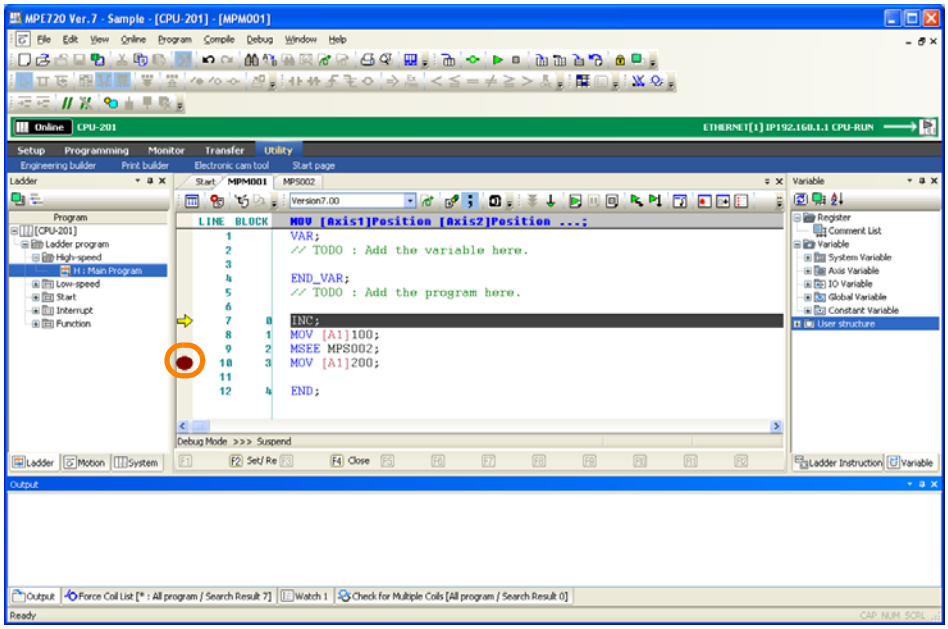
3. Move the cursor to the line at which to set a breakpoint.



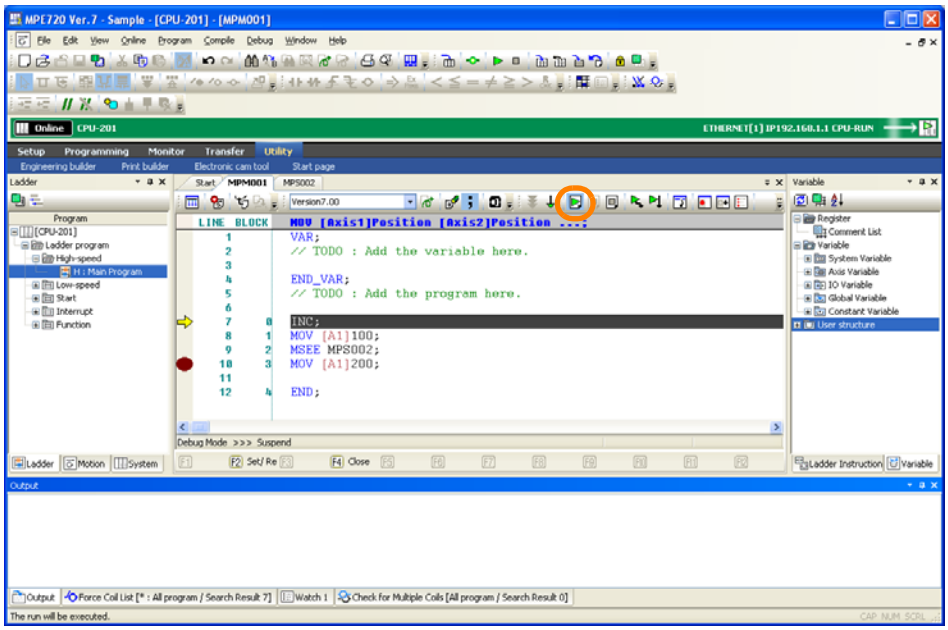
4. Click the **Set/Remove Breakpoint** Button.



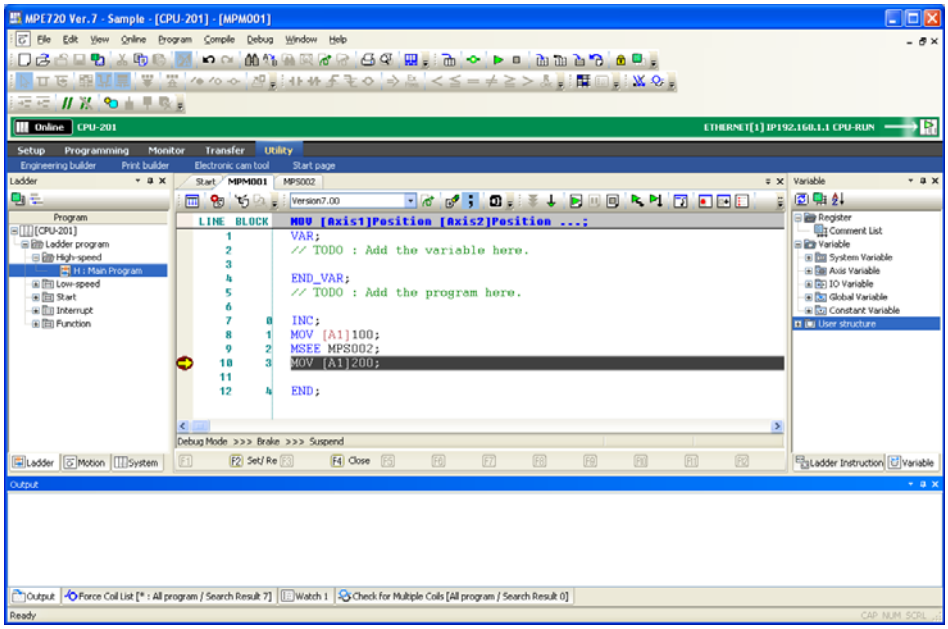
A red dot will be displayed to indicate a breakpoint has been set.



5. Click the **Run** Button.



Execution continues to the line with the breakpoint.



This concludes the procedure.

Information

Removing Breakpoints
Select the line with the breakpoint to remove and click the **Set/Remove Breakpoints** Button on the toolbar.

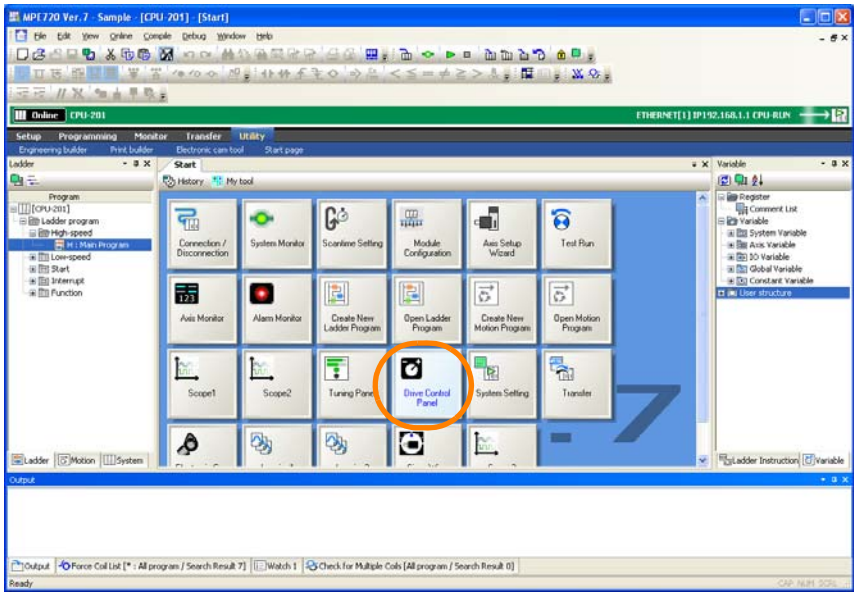
6.4.3 Monitoring the Execution Status and Control Signal Status

The procedure that is used to monitor the execution status and control signal status depends on the method used to call the motion program. The procedures are given below.

Using the M-EXECUTOR

Use the following procedure to monitor the execution status and control signal status for motion programs that are called by the M-EXECUTOR.

1. Click the **Drive Control Panel** Button on the My Tool View.



The Drive Control Panel Tab Page will be displayed.

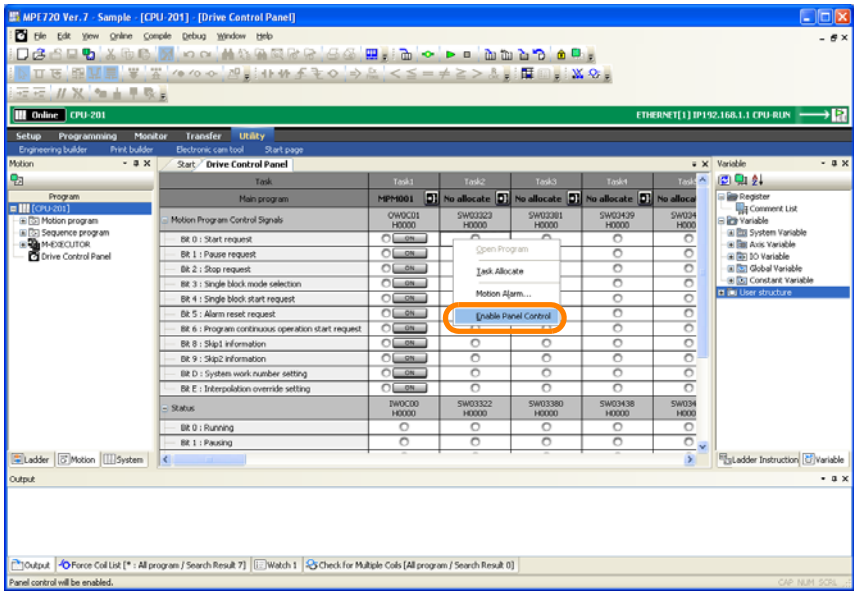
2. Monitor the execution status and control signal status of a motion program that is assigned in the M-EXECUTOR.

-  : Control signal ON
-  : Control signal OFF
-  : The control signal is not assigned or the status signal is OFF.
-  : Status signal ON

  However, bit 8 (alarm status signal) is displayed as  when the signal is ON.

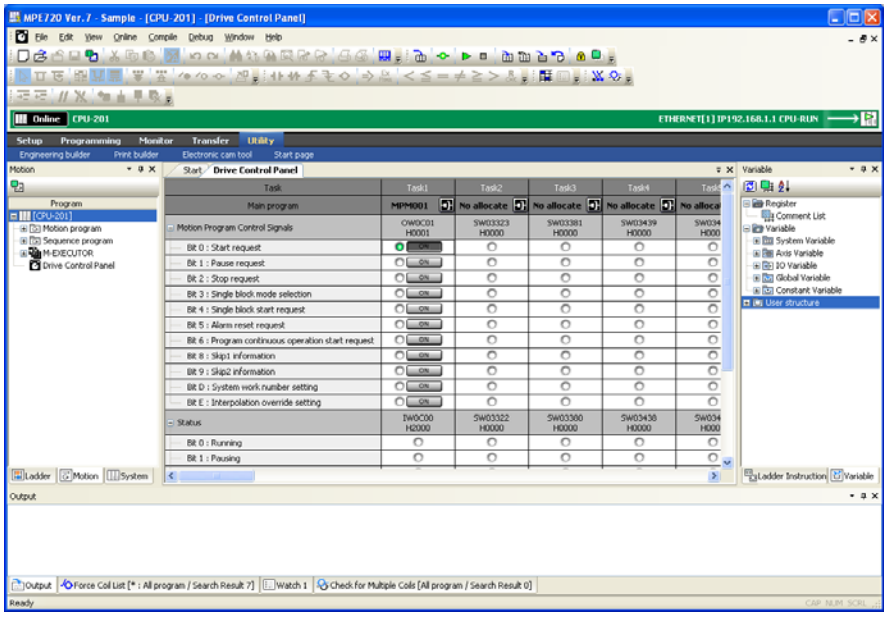
Perform the next step only if it is necessary to set control signals from the Drive Control Panel. If no settings need to be made, this concludes the procedure.

3. Right-click on the Drive Control Panel Tab Page and select ***Enable Panel Control***.



The controls on this panel will be enabled.

4. Use the  or  Button to set the state of the control signals.

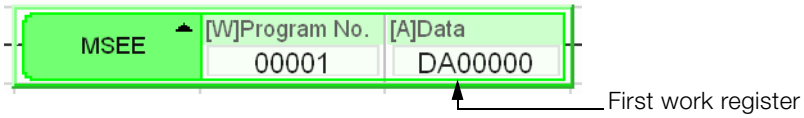


This concludes the procedure.

Using a Ladder Program

Use the following procedure to monitor the execution status and the status of the control signals for a motion program that is called from a ladder program.

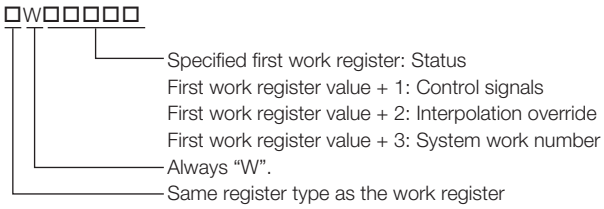
This procedure will be described with the work register set to DA00000 as an example.



Information

Structure of Work Registers

Work registers consist of four word registers. Information is set in each register.
The word registers are addressed based on the setting value of the first work register, as shown below.



Example

First Work Register Set to DA00000

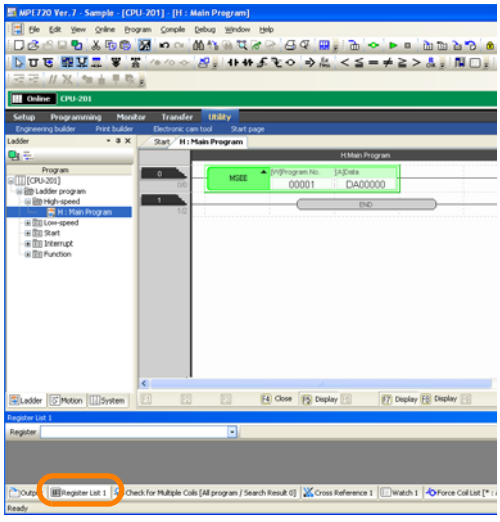
DW00000: Status
DW00001: Control signals
DW00002: Interpolation override
DW00003: System work number

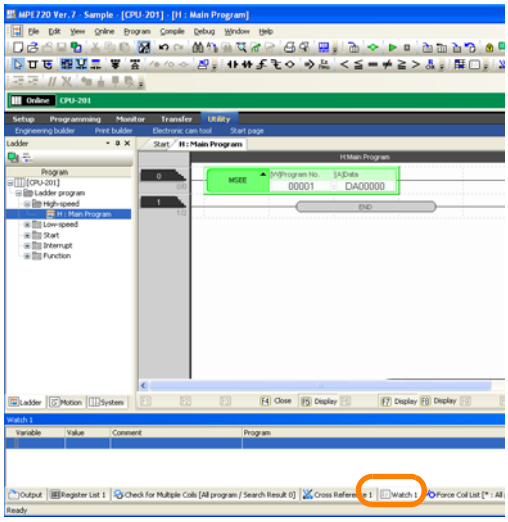
Example

First Work Register Set to MA01015

MW01015: Status
MW01016: Control signals
MW01017: Interpolation override
MW01018: System work number

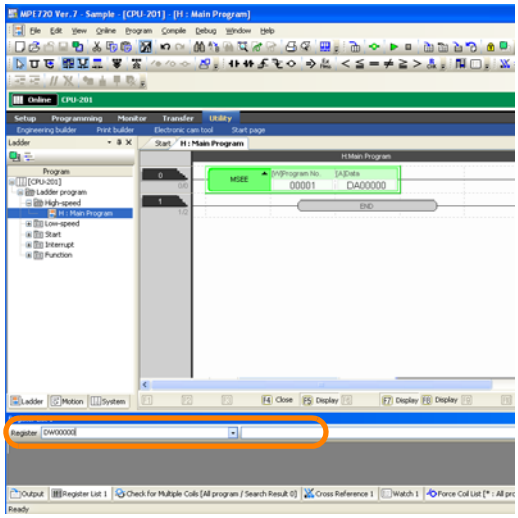
1. Click the **Register List 1** Tab or the **Watch 1** Tab.

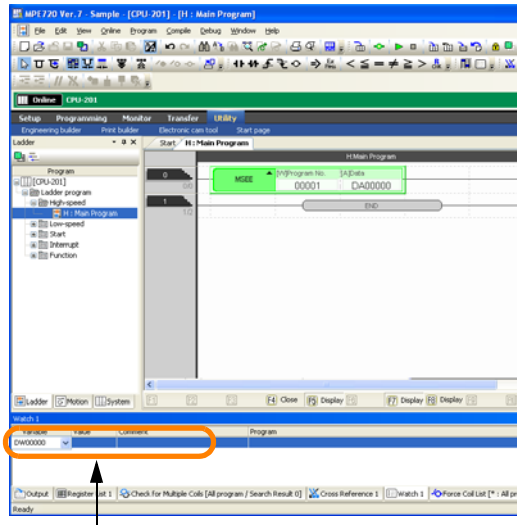




The Register List Pane or Watch Pane will be displayed.

2. Enter the register address for the status.

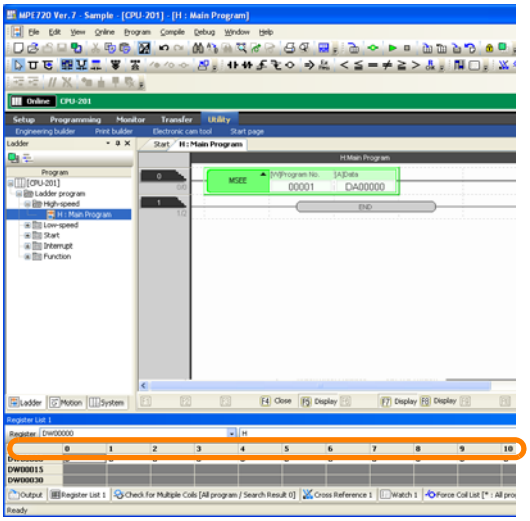


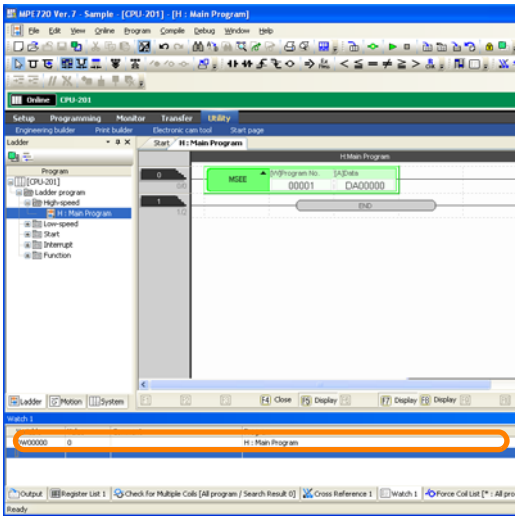


The Autocomplete function can be used. Refer to the following section for details.

☞ *5.3.1 Using the Autocomplete Function* on page 5-81

3. Press the **Enter** Key.
The status will be displayed.

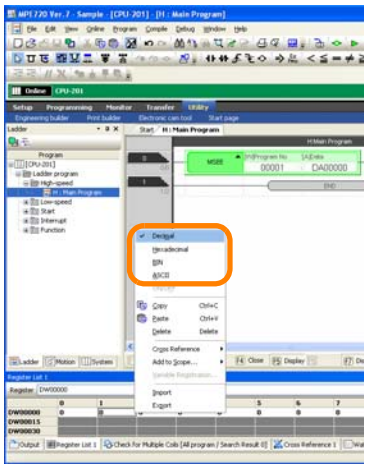


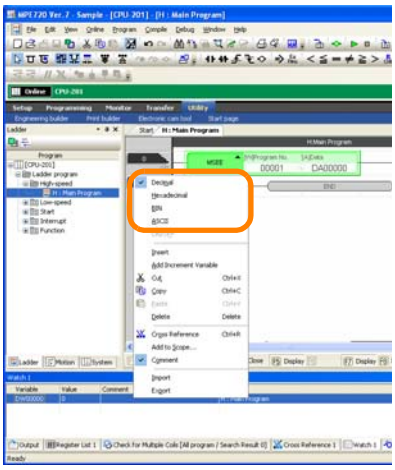


Information

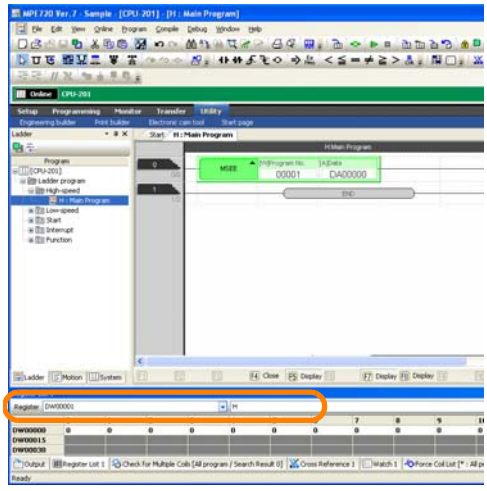
Refer to the following manual for details on how to interpret the displayed information.
MP3000 Series Motion Programming User's Manual (Manual No.: SIEP C880725 14)

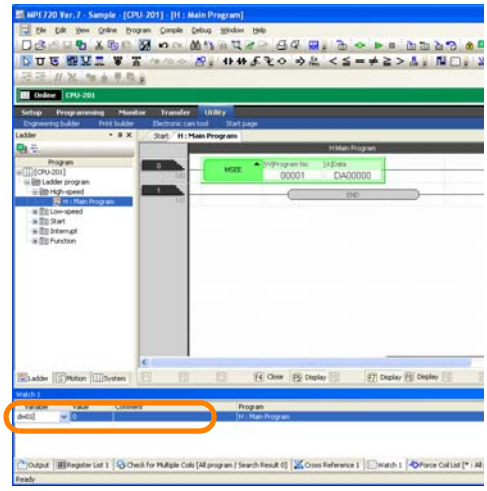
Information To change the display format, right-click in the pane and click the desired format from the menu.



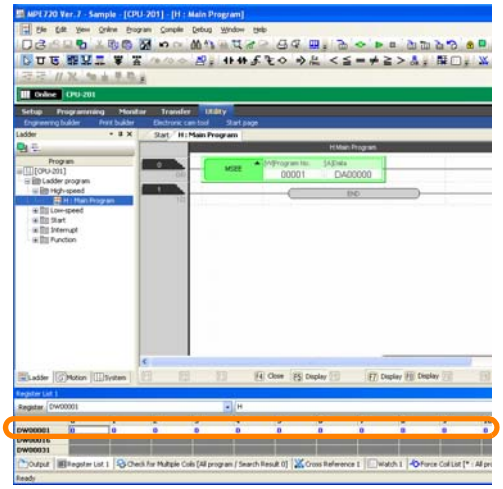


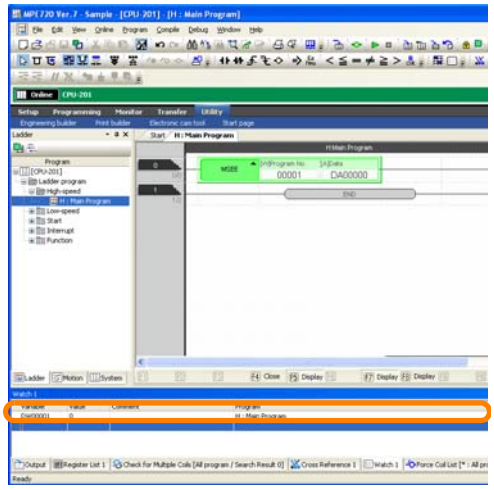
4. Enter the register address for the control signals.





5. Press the **Enter** Key.
The control signal status will be displayed.





Information Refer to the following manual for details on how to interpret the displayed information.
📖 *MP3000 Series Motion Programming User's Manual* (Manual No.: SIEP C880725 14)

Information Refer to the information given in step 3 to change the display format.

This concludes the procedure.

6.5 Searching for Registers Used In a Drawing

You can use either of the following methods to search for registers that are used in ladder programs or motion programs.

- Using Cross References
- Using Read Searches and Write Searches

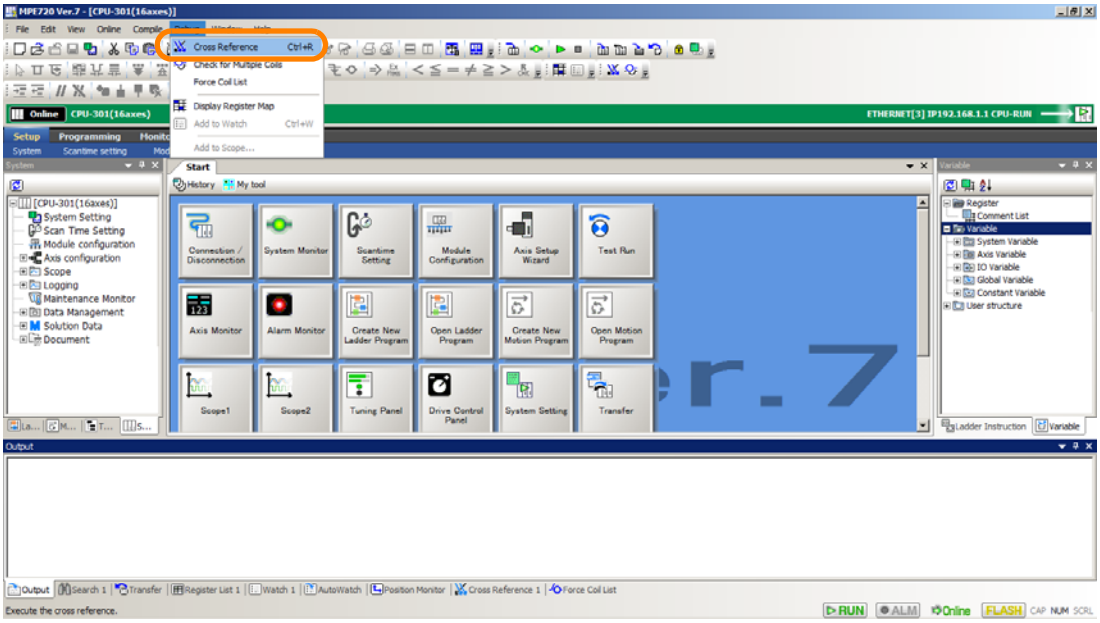
To search only for registers that are used to write data (i.e., output registers), perform a write search.

To search only for registers that are used to read data (i.e., input registers), perform a read search.

6.5.1 Cross References

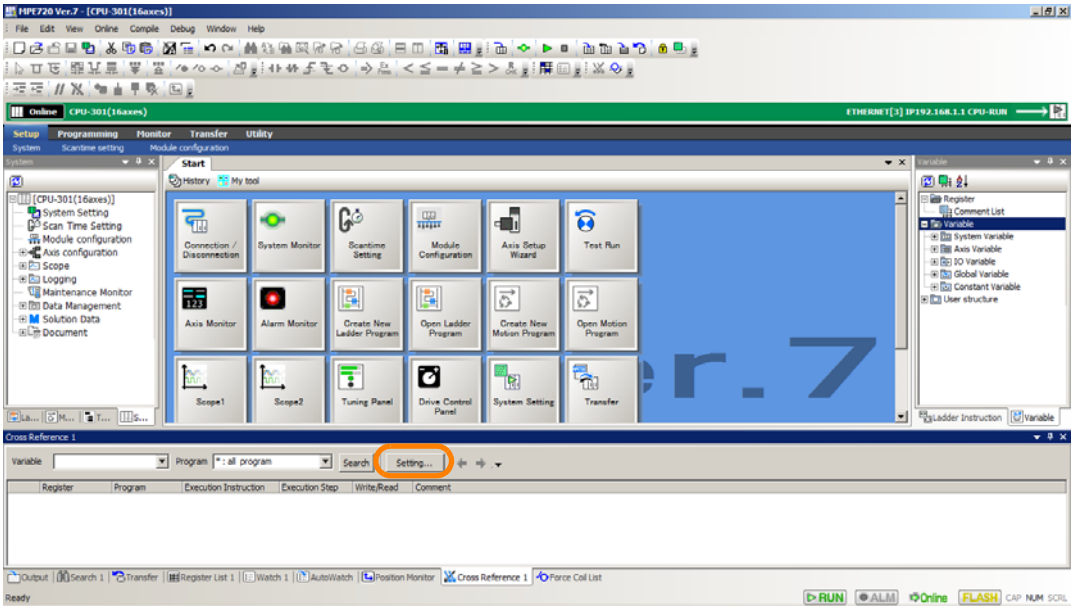
Use the following procedure to search a register using a cross reference.

1. Select ***Debug*** – ***Cross Reference*** from the menu bar.



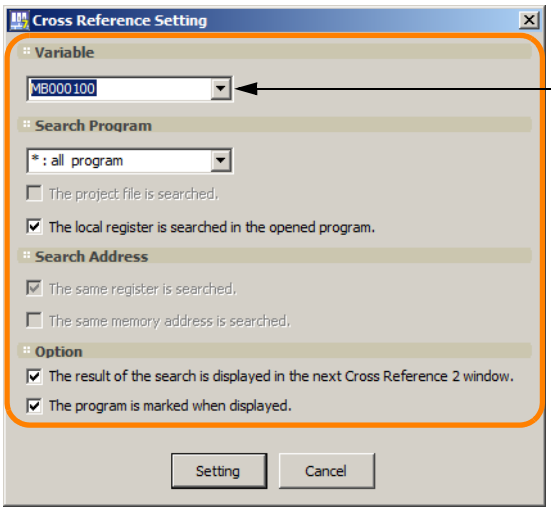
The Cross Reference 1 Pane will be displayed.

2. Click the **Setting** Button.



The Cross Reference Setting Dialog Box will be displayed.

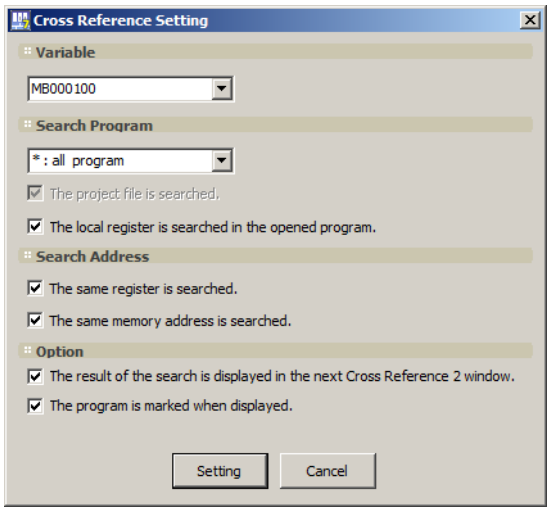
3. Set the conditions.



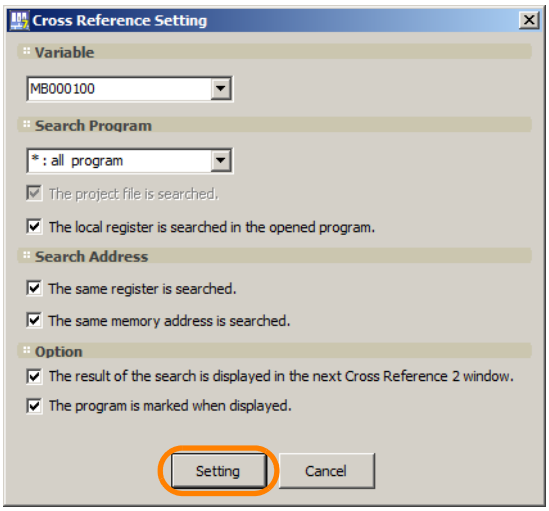
The Autocomplete function can be used. Refer to the following section for details.

☞ *5.3.1 Using the Autocomplete Function* on page 5-81

Information When offline, check [The same memory address is searched.]. You can search for the same memory address.

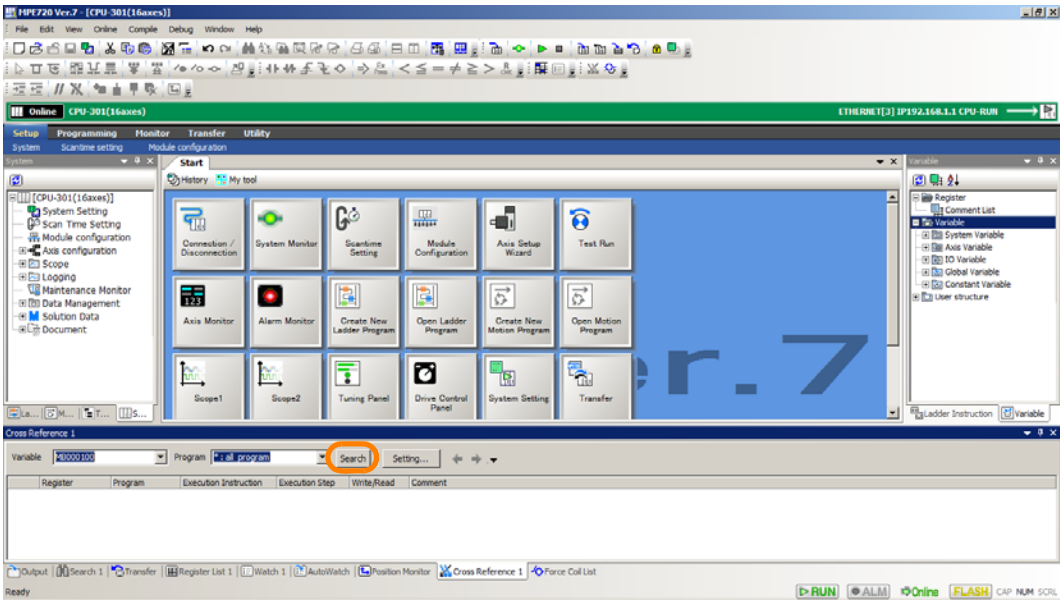


4. Click the **Setting** Button.



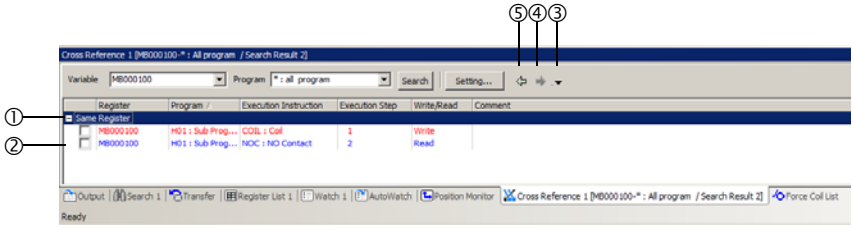
The Cross Reference Setting Dialog Box will close, and the settings will be displayed in the Cross Reference 1 Pane.

5. Click the **Search** Button.

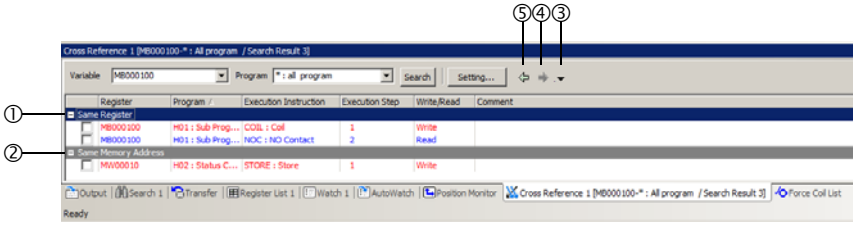


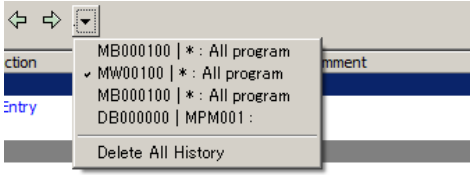
The search will be executed, and the search results will be displayed in the Cross Reference 1 Pane.

- When online (without same memory address search)



- When offline (with same memory address search)



No.	Item	Description
①	Same Register	This group displays the programs, execution instructions, execution steps, write/read status, and comments for the search register. Registers that are used to read (referenced) data are displayed in blue, and registers that are used to write data are displayed in red.
②	Same Memory Address	This group displays registers that are assigned to the same memory address. Registers that are used to read (referenced) data are displayed in blue, and registers that are used to write data are displayed in red. 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.
③	History Button	This 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. 

Continued on next page.

Continued from previous page.

No.	Item	Description
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.

This concludes the procedure.

Information

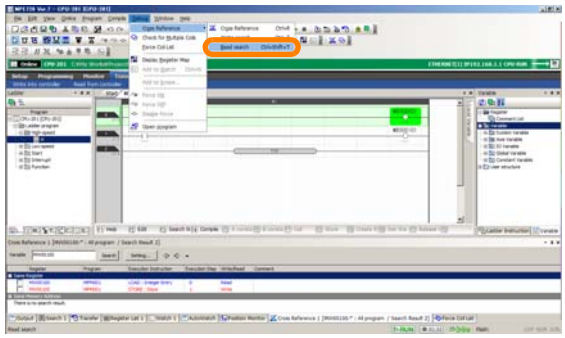
Searching for Registers Using Shortcut Keys
Click the register to search for in the Edit Ladder Program Tab Page, and then hold down the **Ctrl** Key and press the **R** Key. This allows you to cross reference the register in a single operation.

6.5.2 Write Searches and Read Searches

To perform a write search or a read search, select the register to search for on the program editing tab page and select ***Debug - Cross Reference - Write search*** or ***Debug - Cross Reference - Read search*** from the menu bar.

Information

Searching with Shortcut Keys
- Write search: Hold down the **Ctrl** Key and press the **T** Key.
- Read search: Hold down the **Ctrl** Key and **Shift** Key and press the **T** Key.



The search results will be displayed in the Cross Reference Pane and the drawing in which the register is written or read will be displayed.

6.6 Searching for Instructions Used In a Drawing

Use the following procedures to search for ladder instructions that are used in ladder programming.

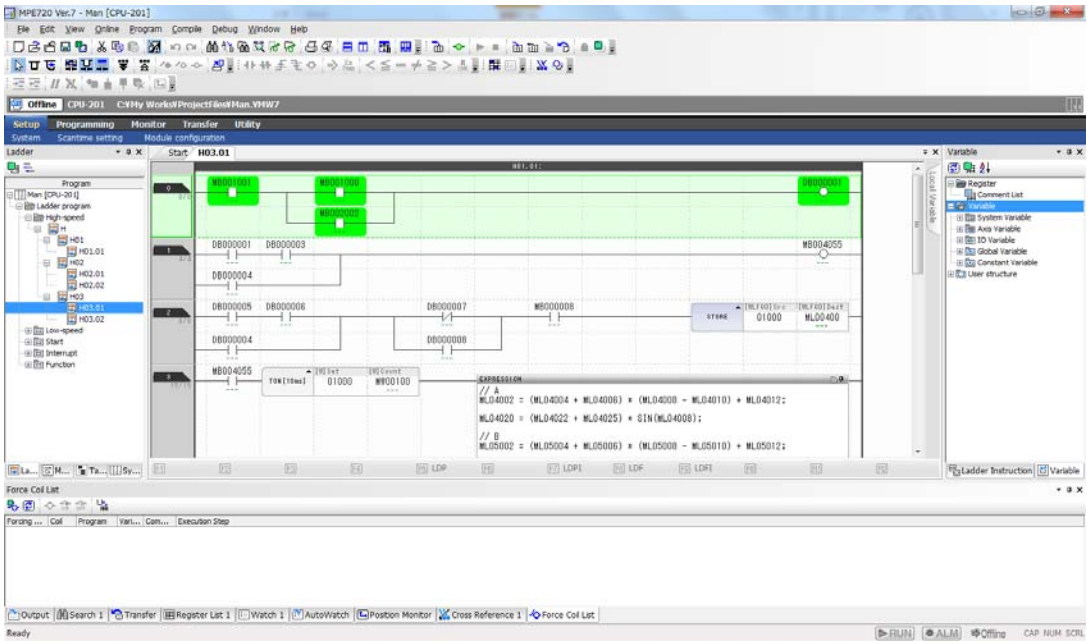
There are the following two methods that you can use to search for ladder instructions.

- Searching within a program: All occurrences of the instruction within the program that is currently open in the Edit Ladder Program Tab Page are found.
- Searching within a project: All occurrences of the instruction in the specified target programs are found. This method can be executed only in Offline Mode.

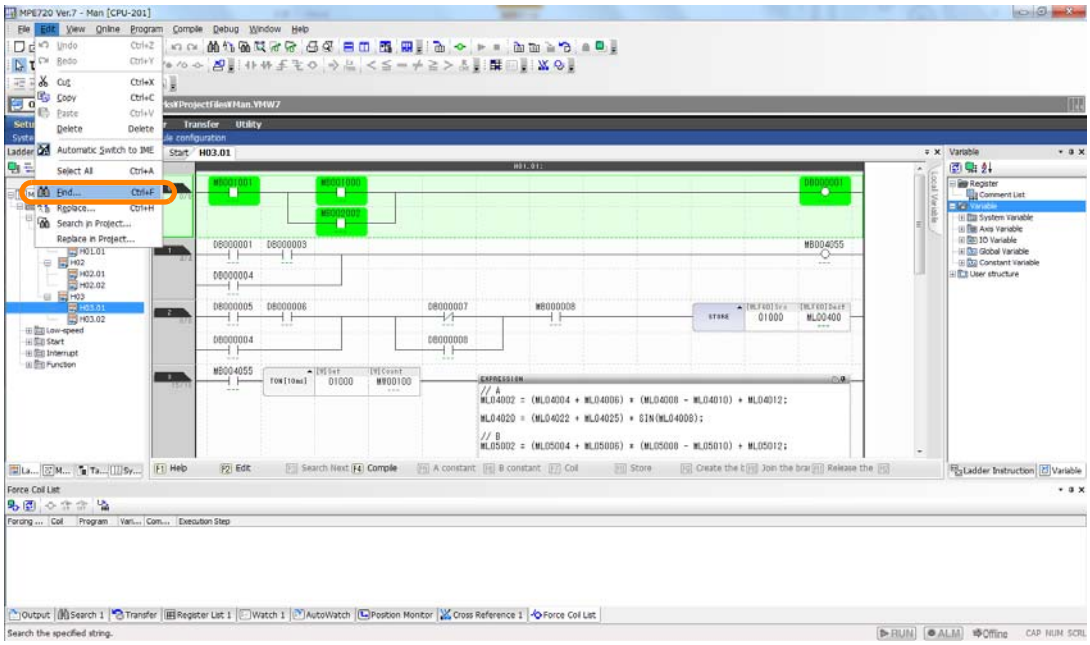
The procedures are given below.

6.6.1 Searching within a Program

1. Bring the program in which to search for the ladder instruction to the foreground of the Main Pane.

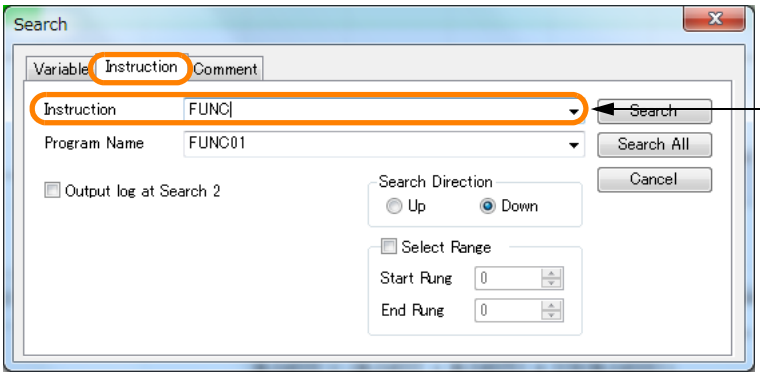


2. Select ***Edit – Find*** from the menu bar.



The Search Dialog Box will be displayed.

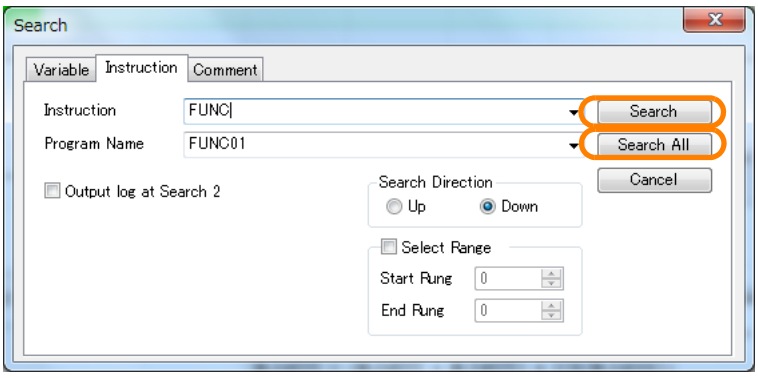
3. Click the **Instruction** Tab and enter an instruction.



The Autocomplete function can be used. Refer to the following section for details.

☞ *5.3.1 Using the Autocomplete Function* on page 5-81

4. Click the **Search** Button or the **Search All** Button.

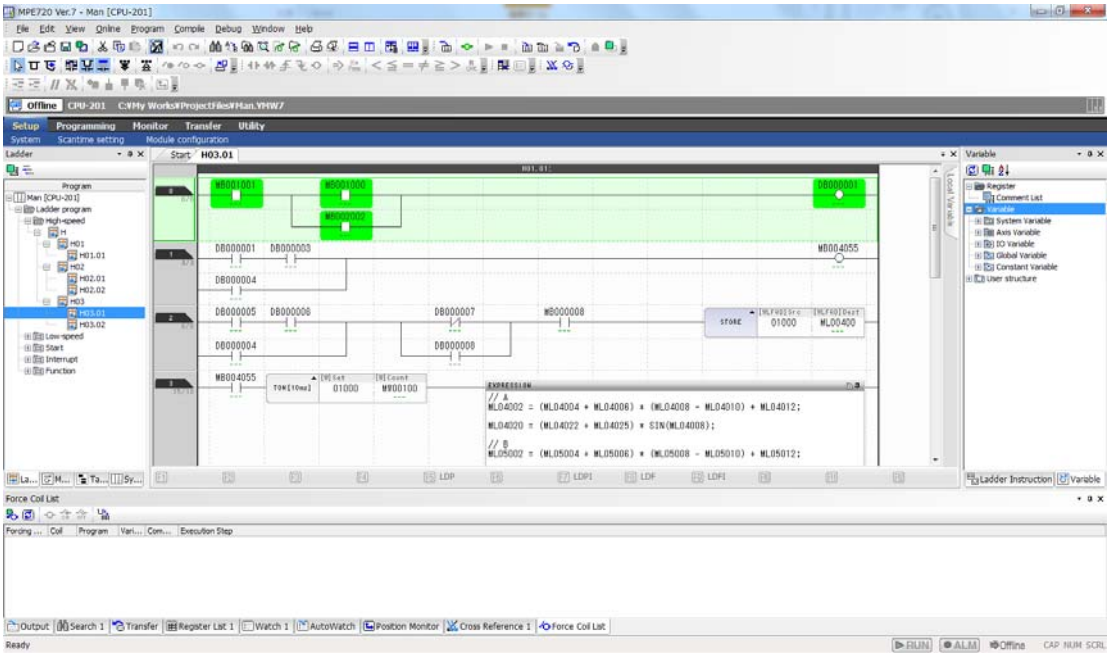


The search will be executed.

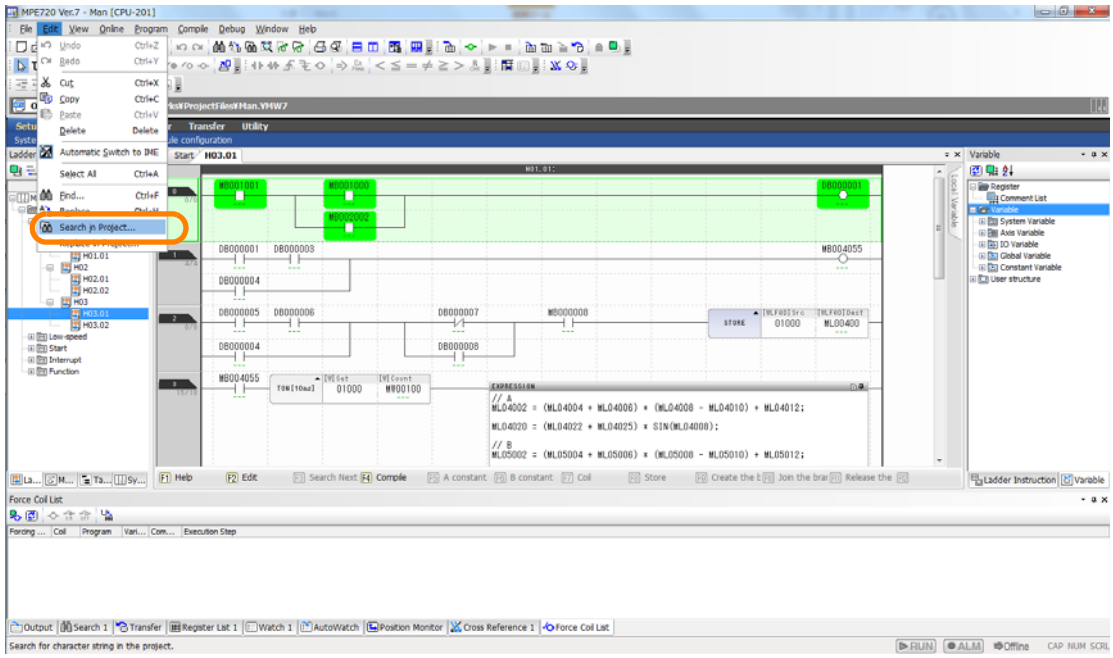
This concludes the procedure.

6.6.2 Searching within a Project

1. Open the project file in which to search for the ladder instruction.

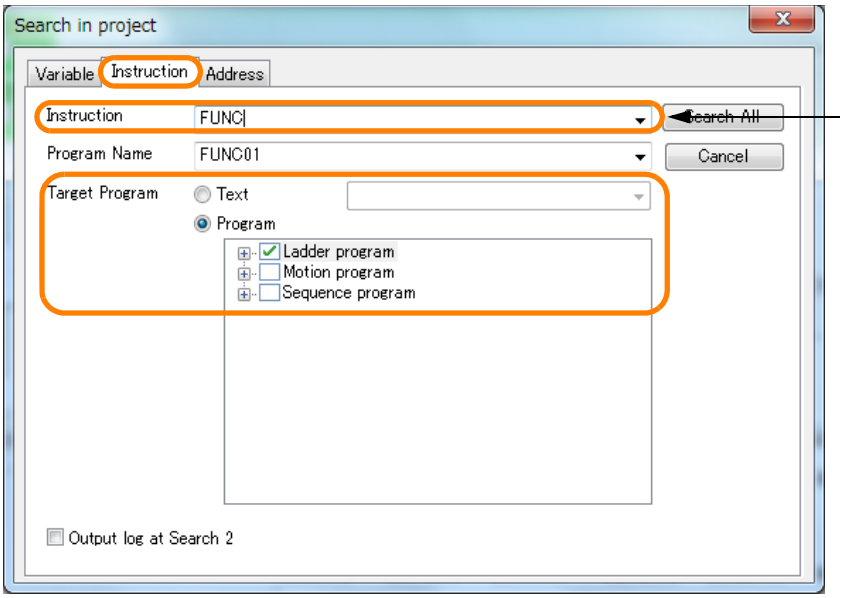


2. Select ***Edit*** – ***Search in Project*** from the menu bar.



The Search in Project Dialog Box will be displayed.

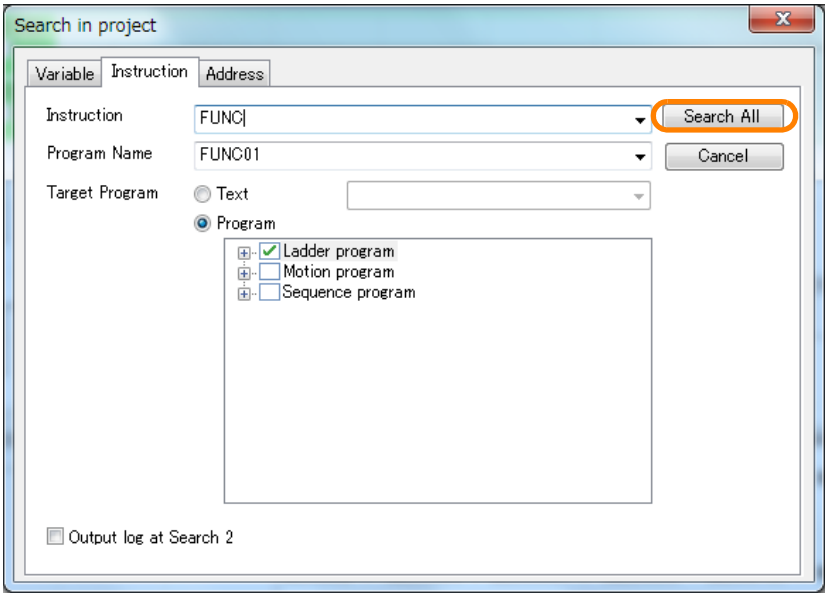
3. Click the **Instruction** Tab and enter or select an instruction and target program.



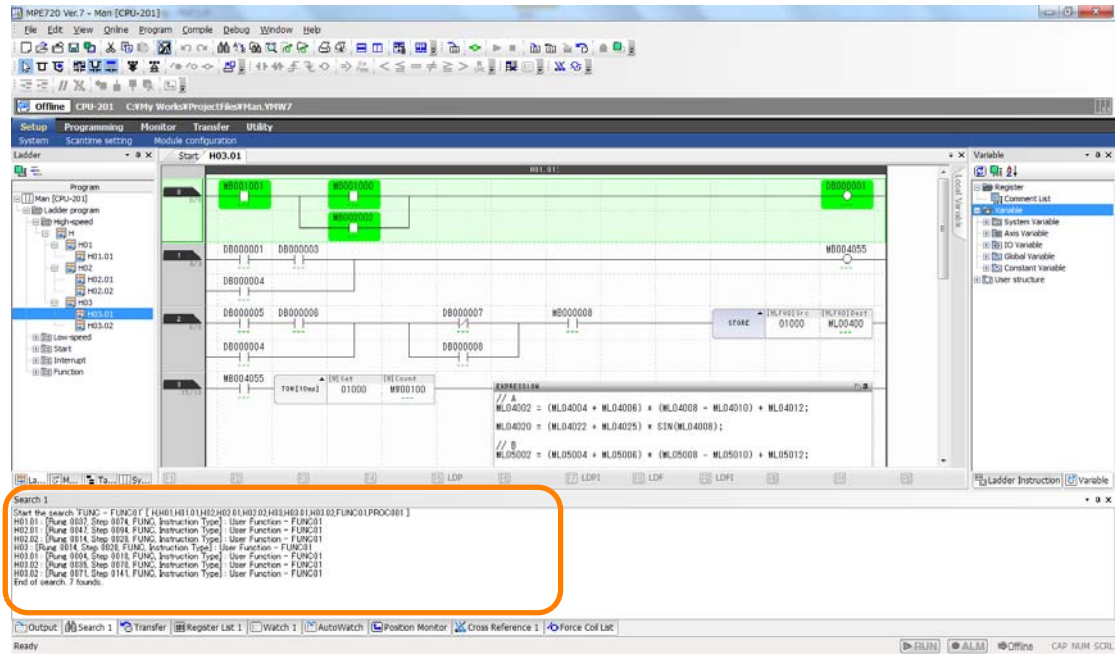
The Autocomplete function can be used. Refer to the following section for details.

☞ *5.3.1 Using the Auto-complete Function* on page 5-81

4. Click the **Search All** Button.



All target programs will be searched for the ladder instruction and the search results will be displayed in the Search Pane.



This concludes the procedure.

6.7 Replacing Registers

This section gives the procedures that are used to replace registers in ladder programs and motion programs.

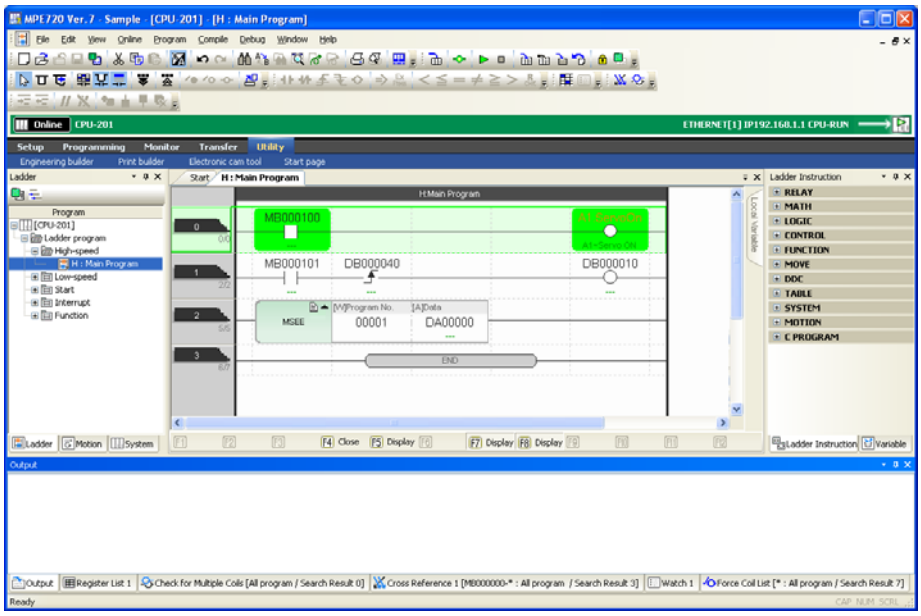
There are the following two methods that you can use to replace registers.

- Replacing within a program: All occurrences of the registers within the program that is currently open in the Edit Ladder Program Tab Page or Edit Motion Program Tab Page are replaced.
- Replacing within a project: All occurrences of the register in the specified target program are replaced. This method can be executed only in Offline Mode.

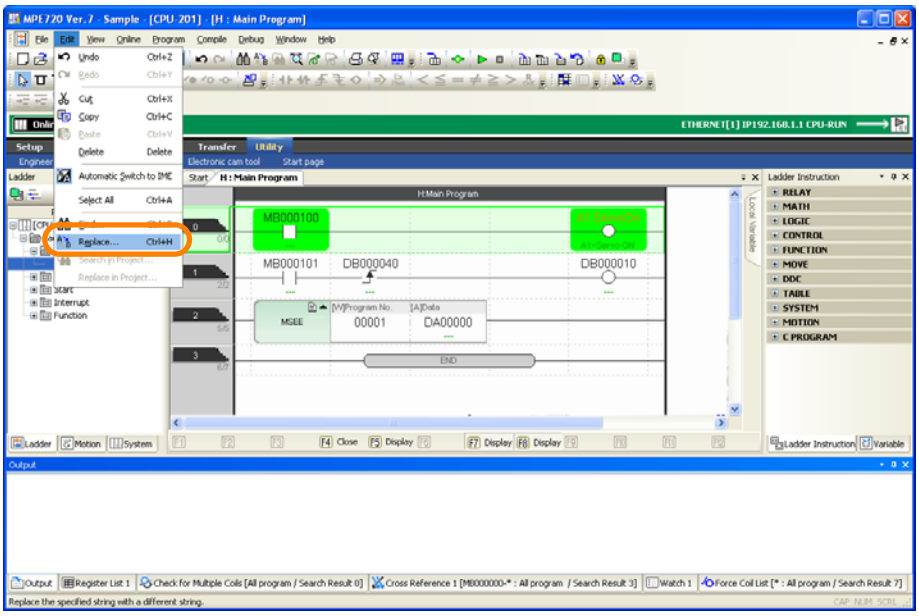
The procedures are given below.

6.7.1 Replacing within a Program

1. Connect to the Machine Controller.
2. Bring the program that contains the registers to replace to the foreground of the Main Pane.

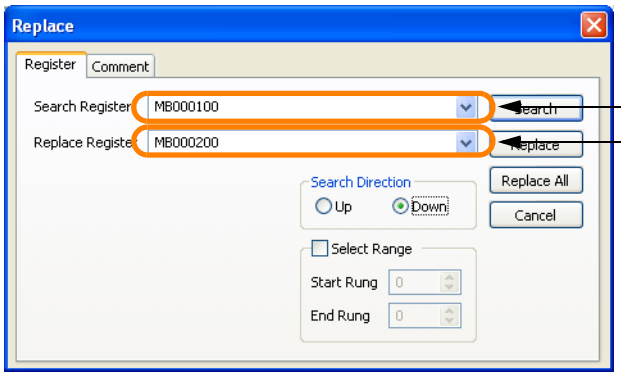


3. Select ***Edit*** – ***Replace*** from the menu bar.



The Replace Dialog Box will be displayed.

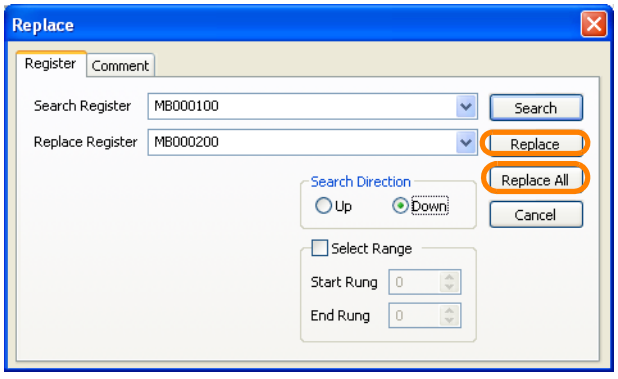
4. Enter the registers in the **Search Register** and **Replace Register** Boxes.



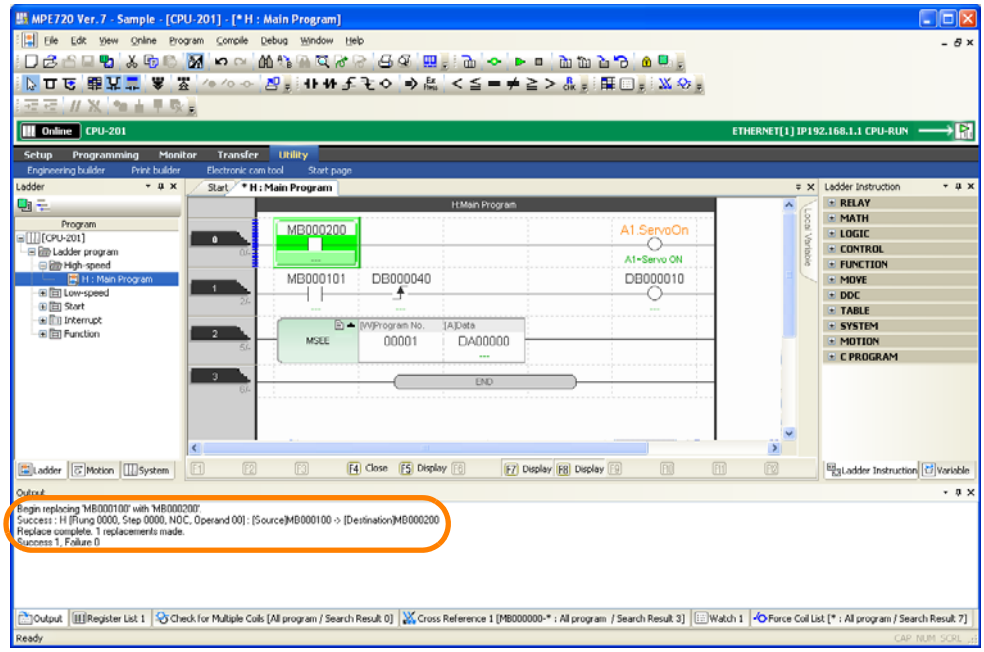
The Autocomplete function can be used. Refer to the following section for details.

☞ *5.3.1 Using the Autocomplete Function* on page 5-81

5. Click the **Replace** or **Replace All** Button to perform the replacement.



The registers will be replaced and the replacement results will be displayed in the Output Pane.



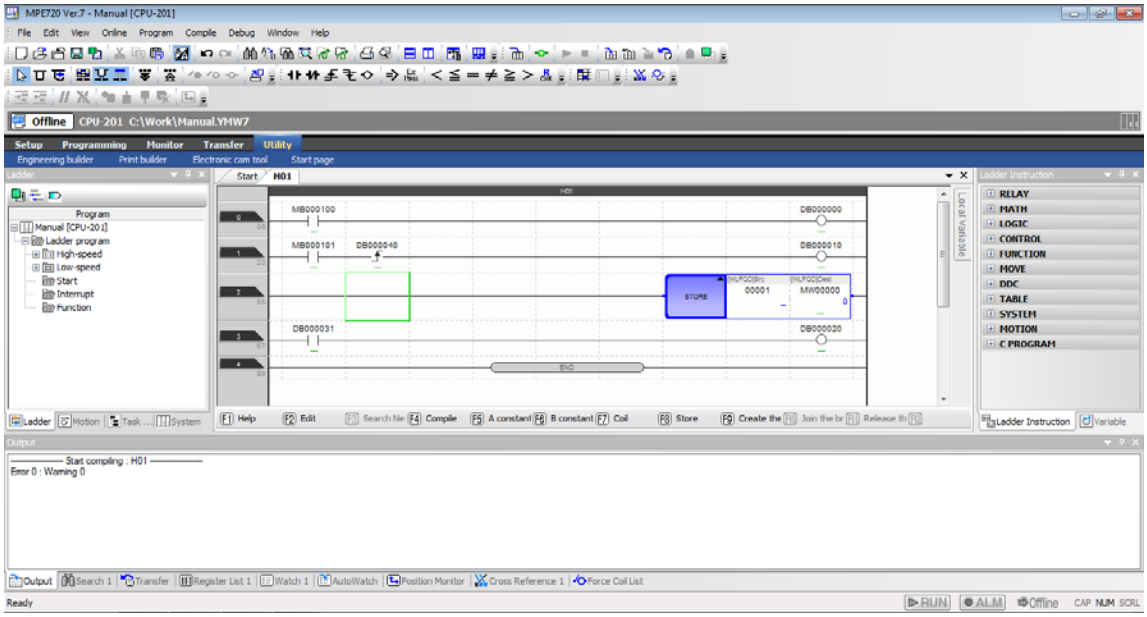
This concludes the procedure.

6.7.2 Replacing within a Project

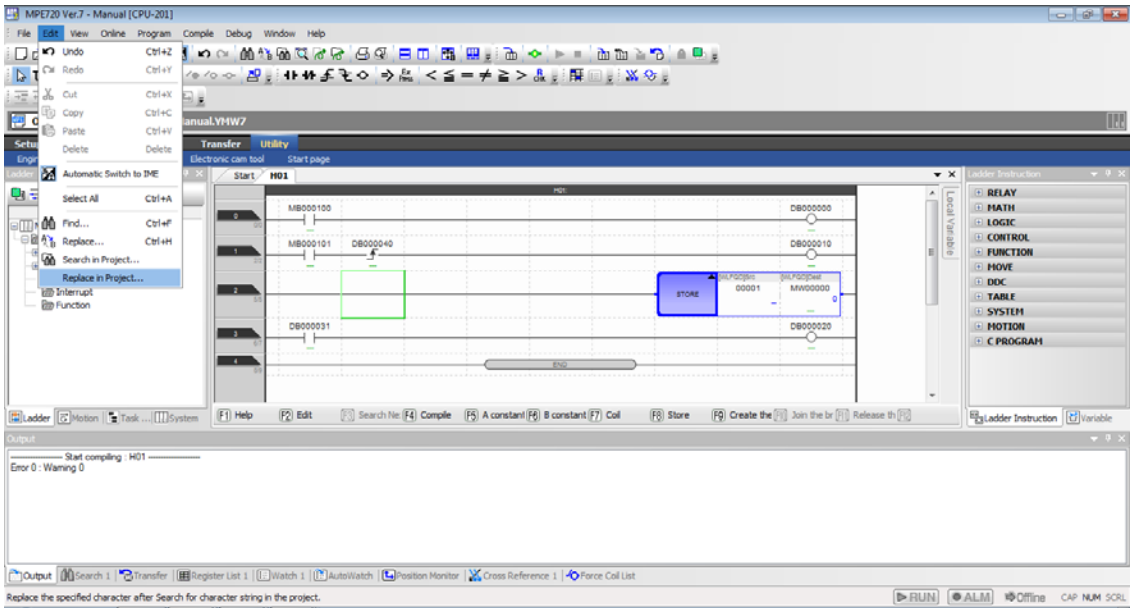
When you make replacements in a project, you can replace a single register or you can replace multiple registers at the same time. The procedures are given below.

Replacing a Single Register

1. Display the project file that contains the register to replace.

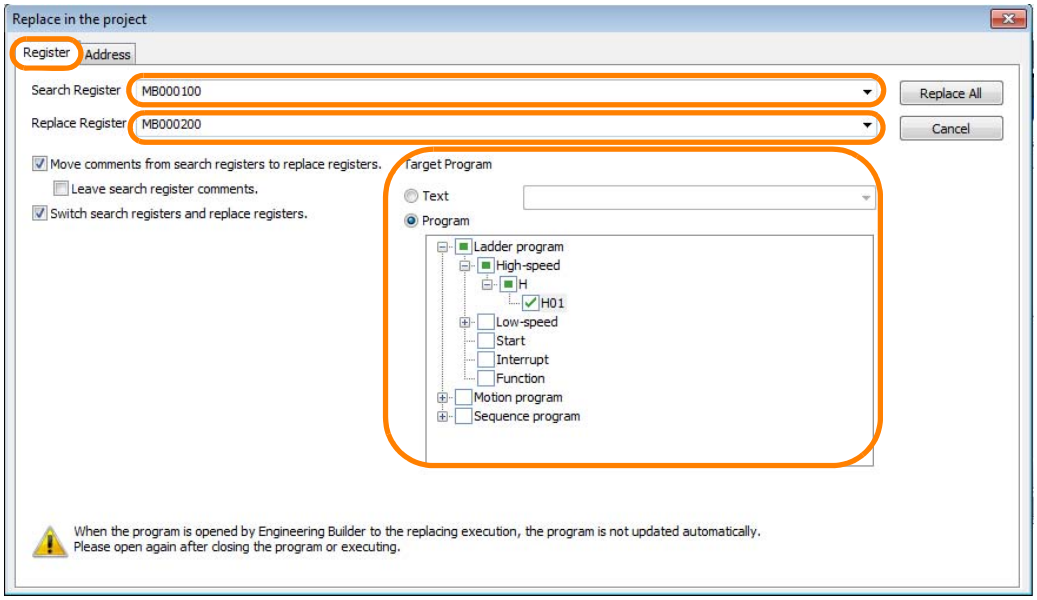


2. Select ***Edit*** – ***Replace in Project*** from the menu bar.

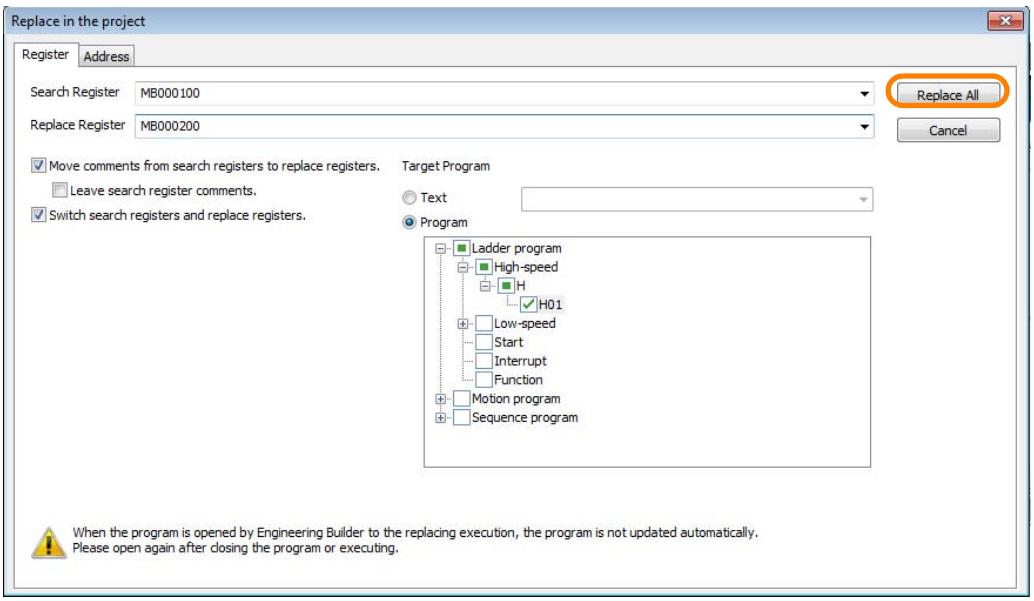


The Replace in the Project Dialog Box will be displayed.

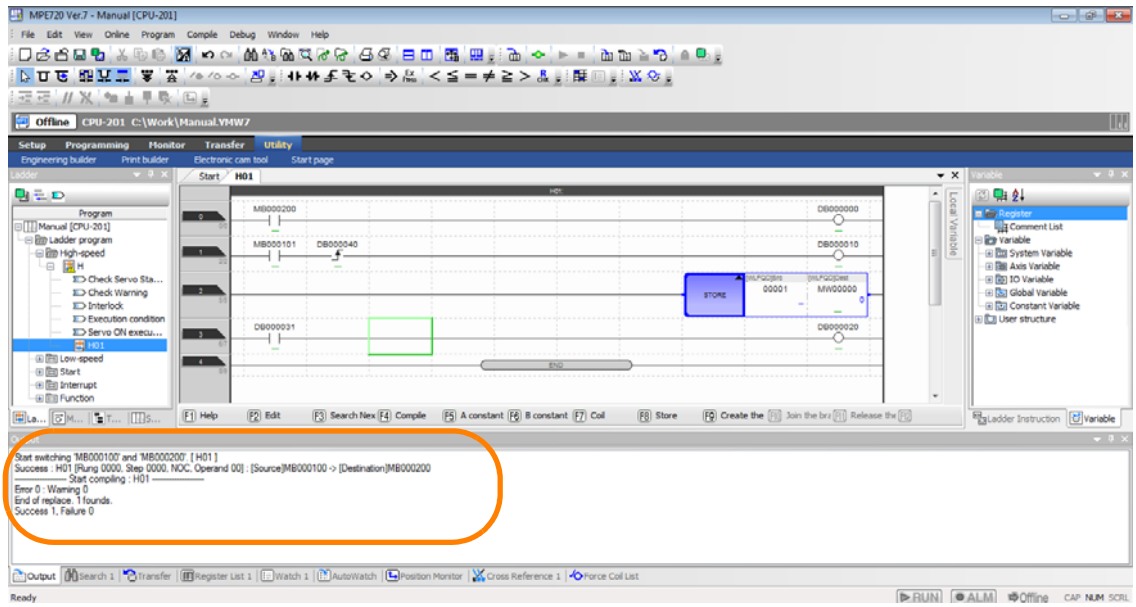
3. Click the **Register** Tab, and then enter or select the registers and program in the **Search Register** Box, **Replace Register** Box, and **Target Program** Area.



4. Click the **Replace All** Button.



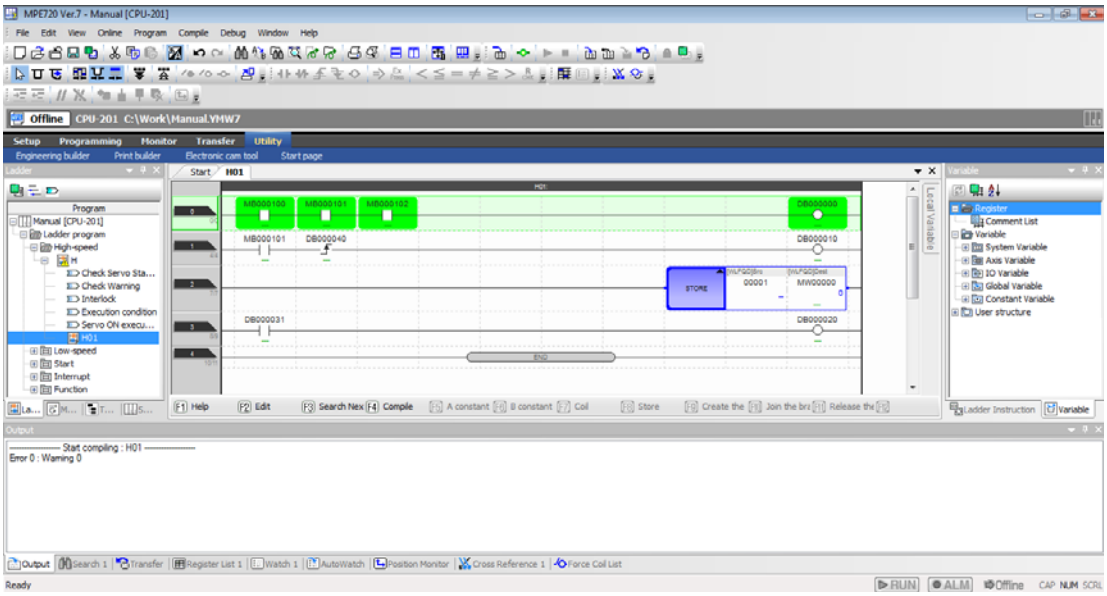
All instances of the search register in the target program will be replaced and the results will be displayed in the Output Pane.



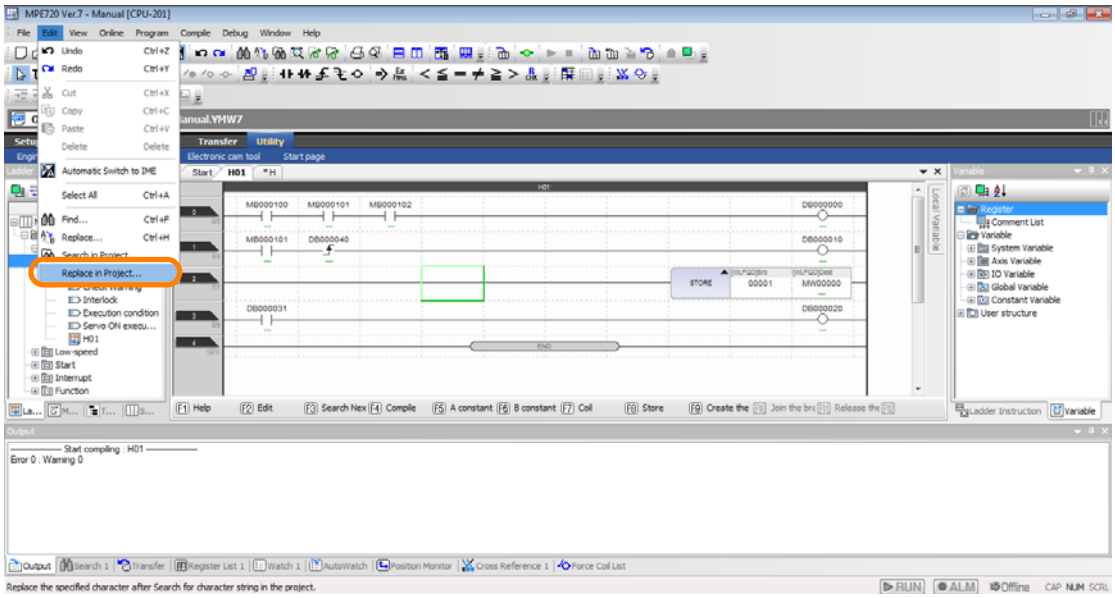
This concludes the procedure.

Replacing Multiple Registers

1. Display the project file that contains the registers to replace.

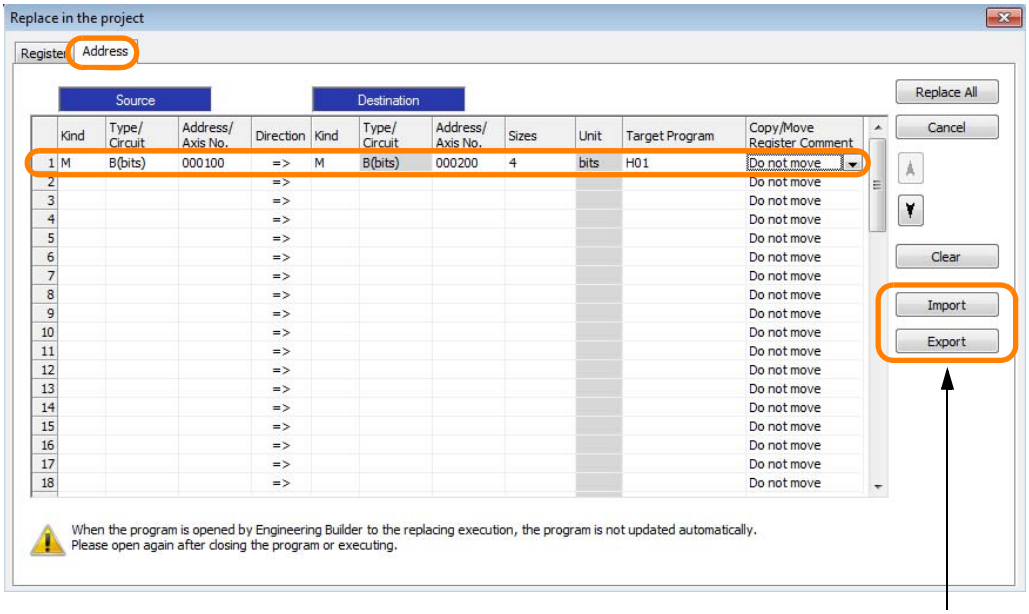


2. Select ***Edit*** – ***Replace in Project*** from the menu bar.



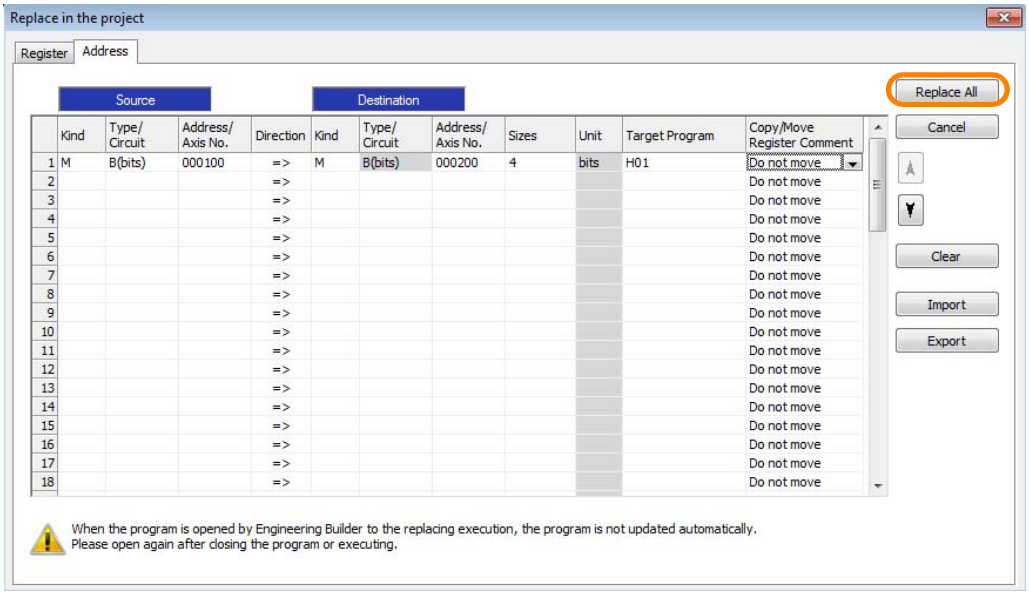
The Replace in the Project Dialog Box will be displayed.

3. Click the **Address** Tab, and then enter or select the following items.
   - **Kind**, **Type/Circuit**, and **Address/Axis No.** for the **Source**
   - **Direction**
   - **Kind** and **Address/Axis No.** for the **Destination**
   - **Sizes**
   - **Target Program**
   - **Copy/Move Register Comment**

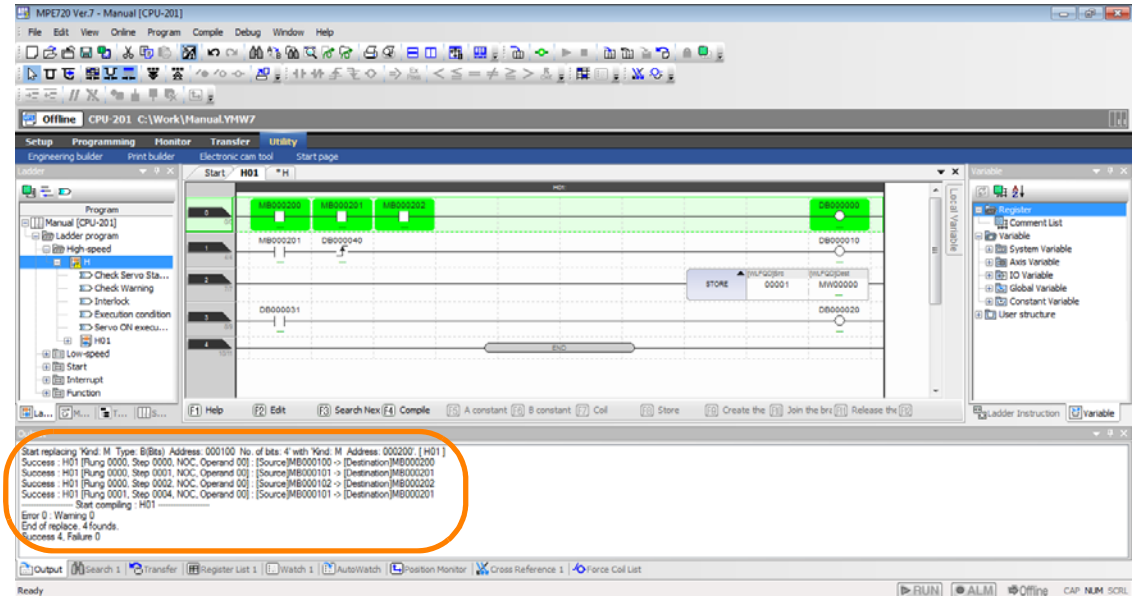


If you click the **Import** Button, the previously exported replacement settings can be imported.
If you click the **Export** Button, the current replacement settings can be exported.

4. Click the **Replace All** Button.



All registers in the target programs that meet the conditions will be replaced and the results will be displayed in the Output Pane.

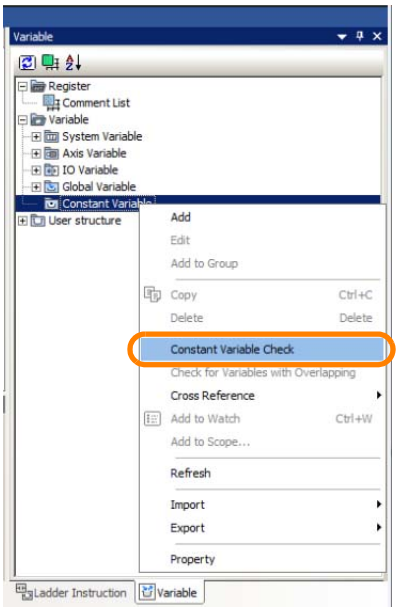


This concludes the procedure.

6.8 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 Pane, and select ***Constant Variable Check***.



6.9 Monitoring the Current Values and Checking the Usage of Registers

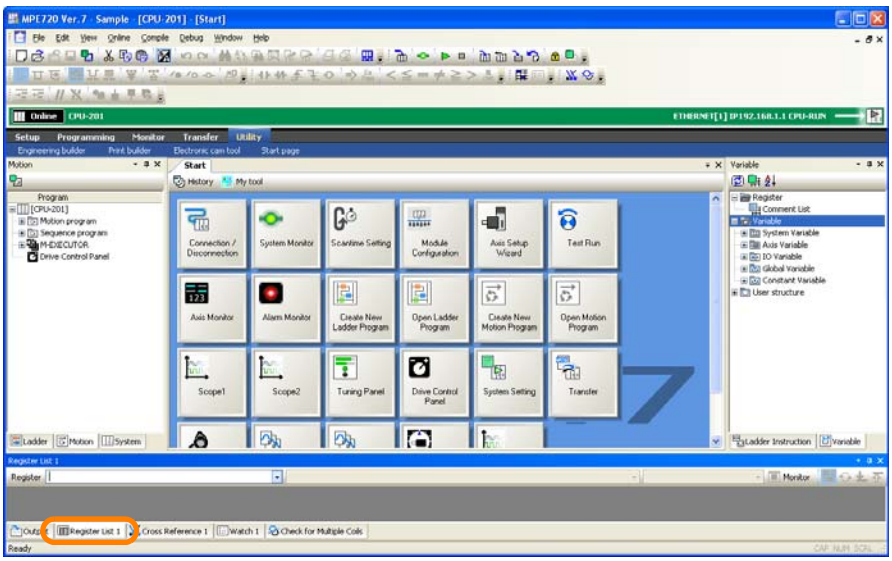
There are the following three methods that you can use to monitor the current values and check the usage of registers.

- Monitoring in the Register List Pane
- Monitoring in the Watch Pane (This allows you to monitor the values in registers with different register types and data types at the same time.)
- Monitoring in the Auto Watch Pane (This allows you to monitor the values of registers just by selecting a ladder instruction in a ladder program or a motion instruction in a motion program.)

The procedures are given below.

6.9.1 Monitoring in the Register List Pane

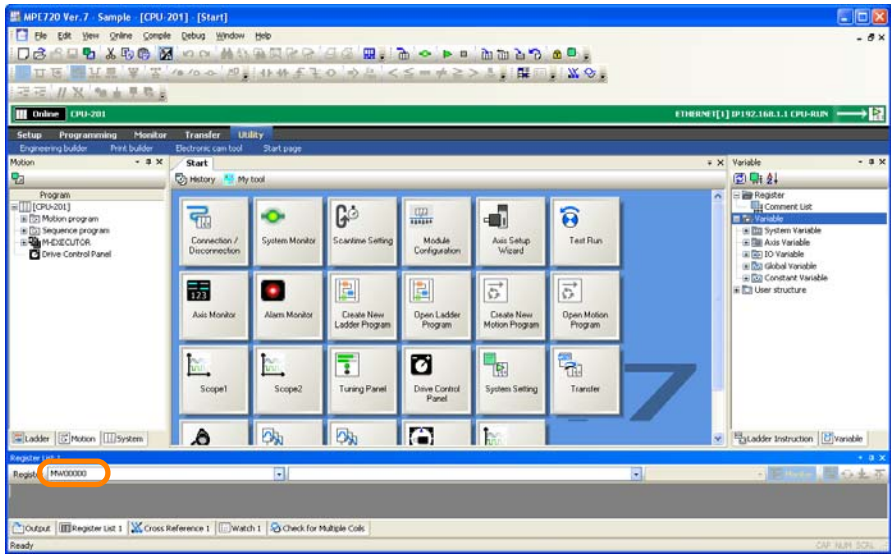
1. Connect to the Machine Controller.
2. Click the **Register List** Tab.



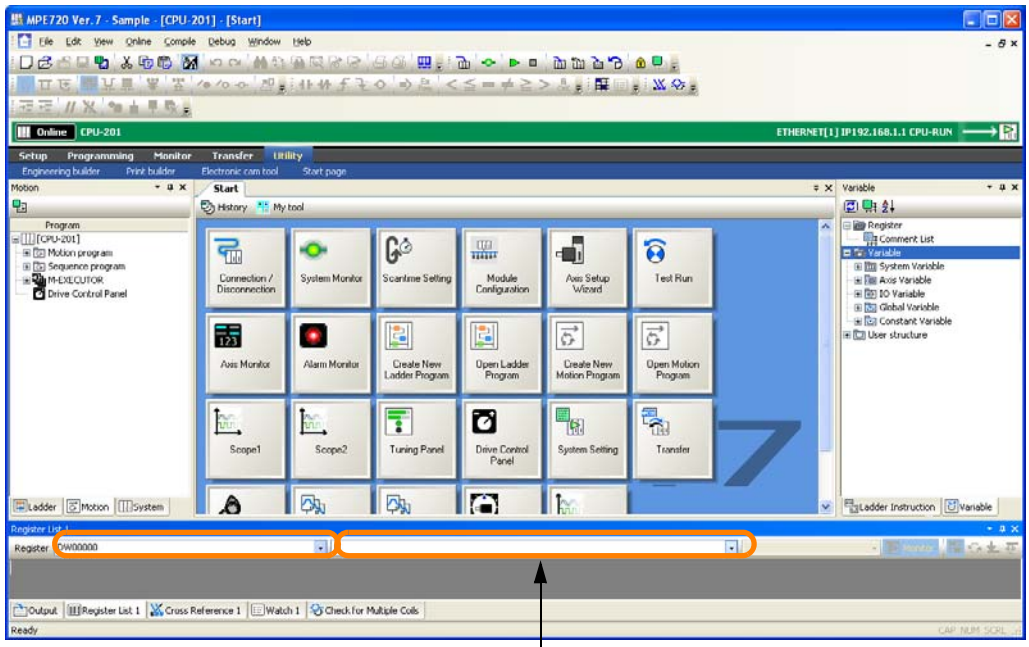
The Register List Pane will be displayed.

3. Enter the following information.

- For a global register: Register address



- For a local register: Register address and program name

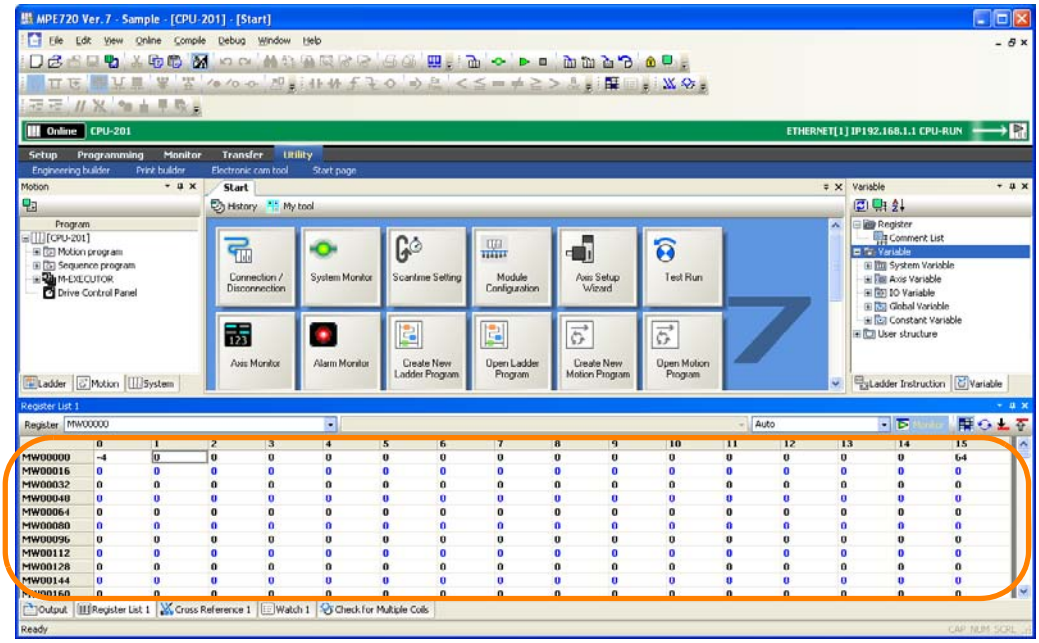


The Autocomplete function can be used. Refer to the following section for details.

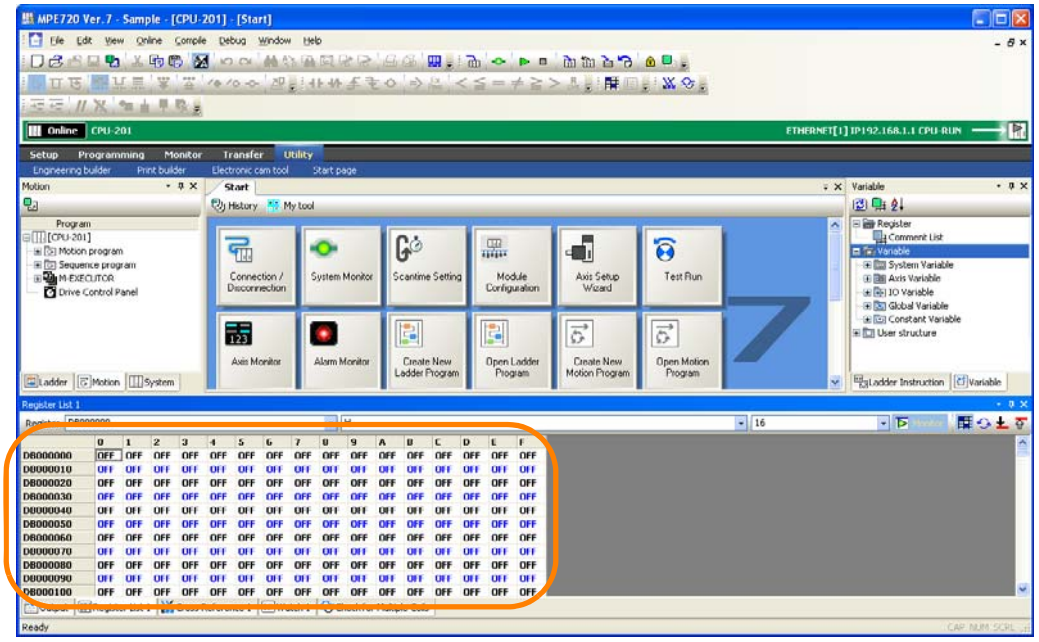
☞ *5.3.1 Using the Autocomplete Function* on page 5-81

The current values and usage will be displayed in the Register List Pane.

- Global Registers



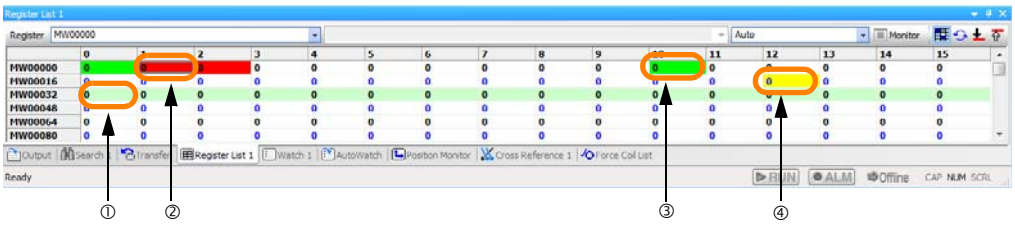
- Local Registers



This concludes the procedure.

Information

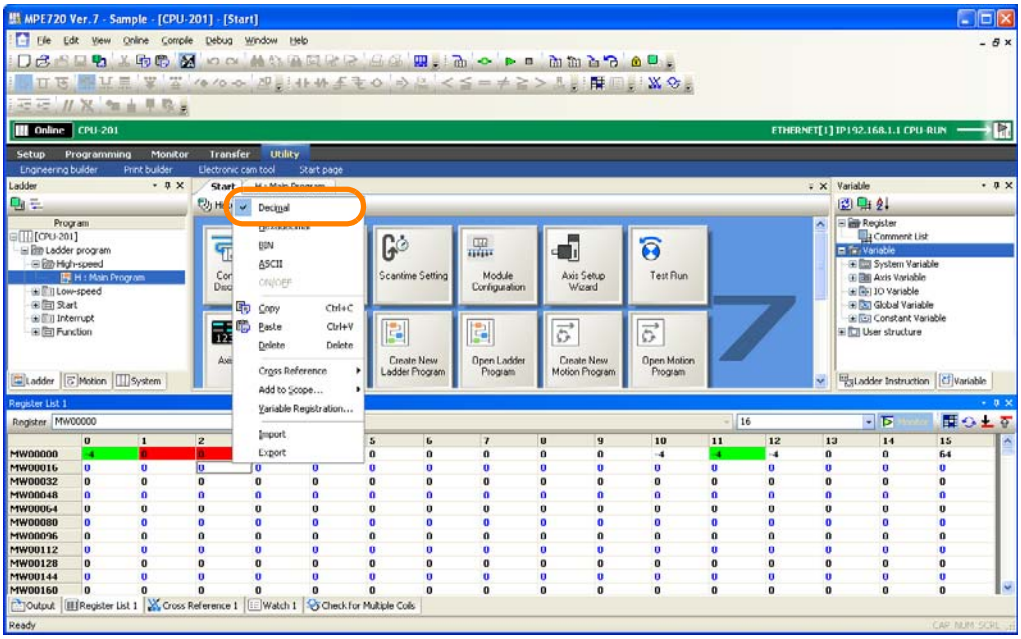
Interpreting the Register List



No.	Cell 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 or motion 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.

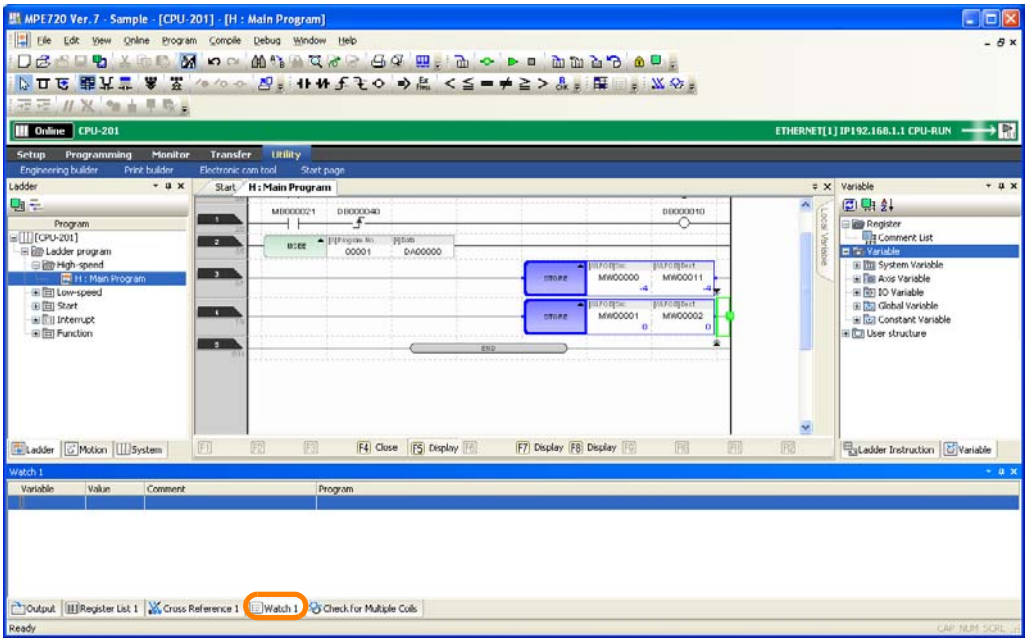
Information

To switch the display format to decimal or hexadecimal, right-click in the Register List Pane and select the desired format.



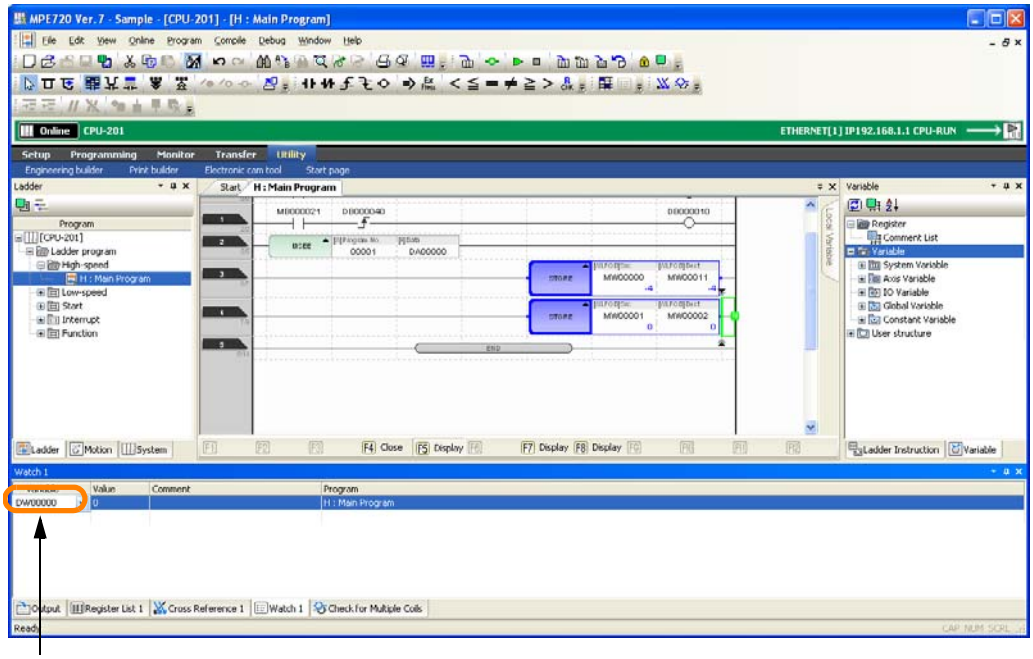
6.9.2 Monitoring in the Watch Pane

1. Connect to the Machine Controller.
2. Click the **Watch1** Tab.



The Watch Pane will be displayed.

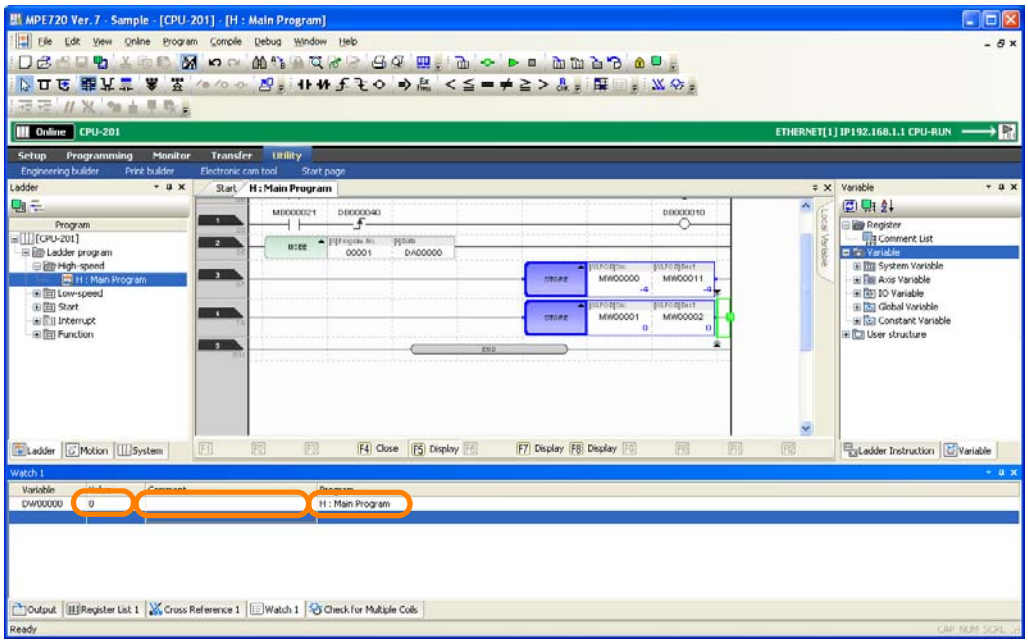
3. Enter the variables or registers to monitor in the **Variable** Column.



The Autocomplete function can be used. Refer to the following section for details.

☞ *5.3.1 Using the Autocomplete Function* on page 5-81

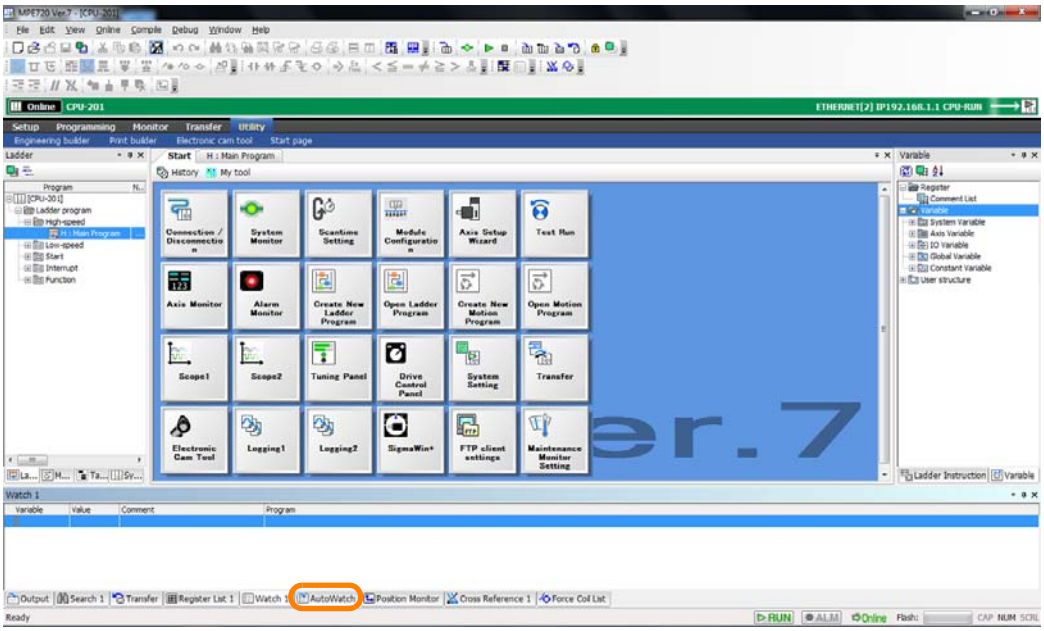
4. Press the **Enter** Key.
   Information will be displayed in the **Value**, **Comment**, and **Program** Columns.



This concludes the procedure.

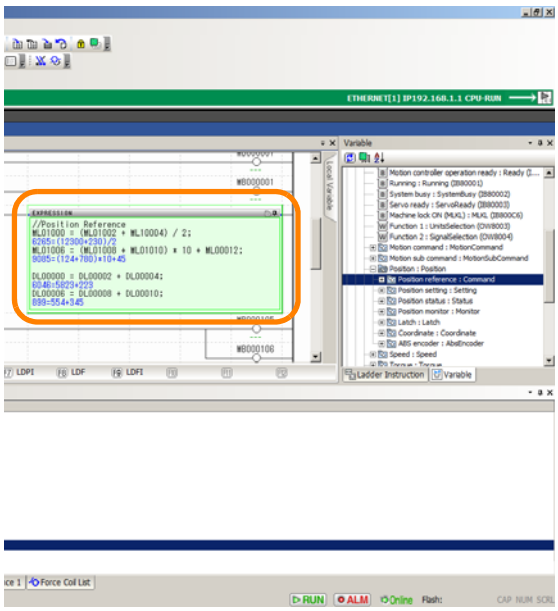
6.9.3 Monitoring in the Auto Watch Pane

1. Connect to the Machine Controller.
2. Click the **AutoWatch** Tab.

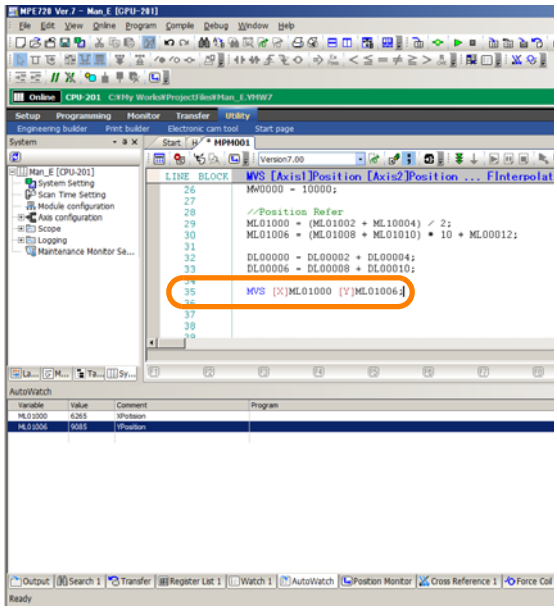


3. Select a ladder instruction or motion instruction that contains the variable or register to monitor.

Ladder Program

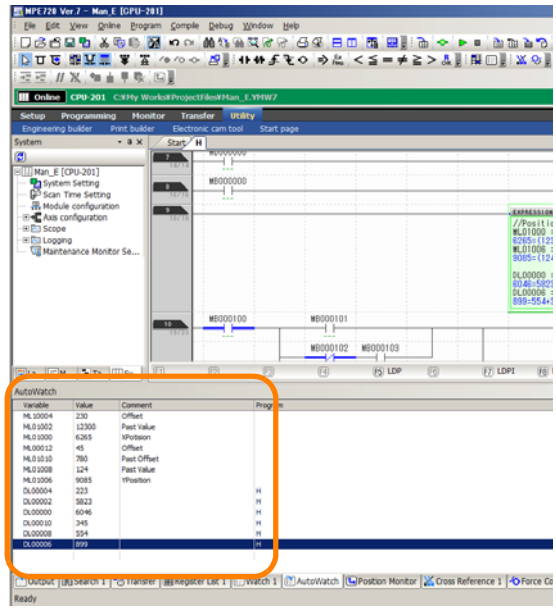


Motion Program

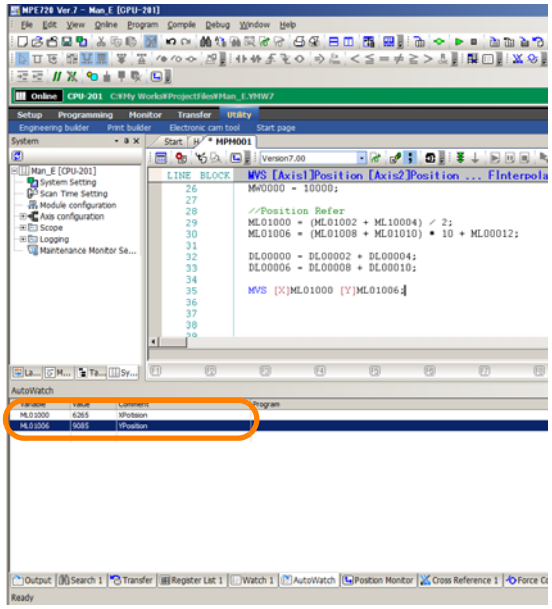


The current value of the register will be displayed in the **Value**, **Comment**, and **Program** Columns in the AutoWatch Pane.

Ladder Program



Motion Program



This concludes the procedure.

6.9.4 Changing the Display Format for Bit Register Values

The values of bit registers can be displayed in any of the following three formats. You can display the current value for each registered register.

- Binary (BIN)

Variable	Value
MB000000	0
MB000001	0

- ON/OFF

Variable	Value
MB000000	OFF
MB000001	ON

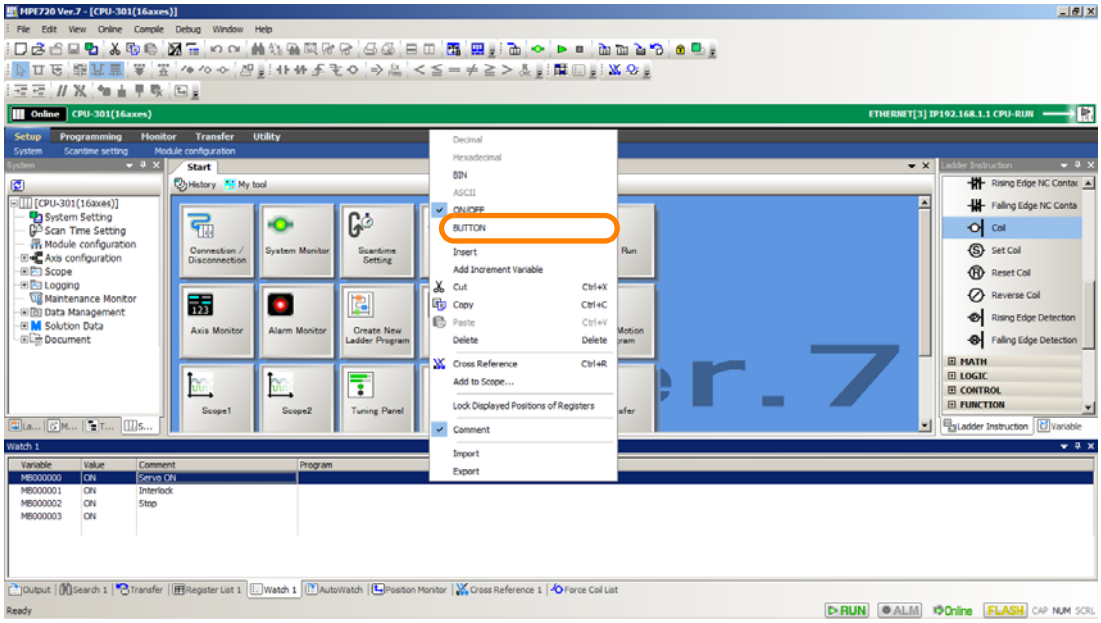
- BUTTON

Variable	Value
MB000000	ON
MB000001	ON

Operating Procedure

Use the following procedure to change the display format.

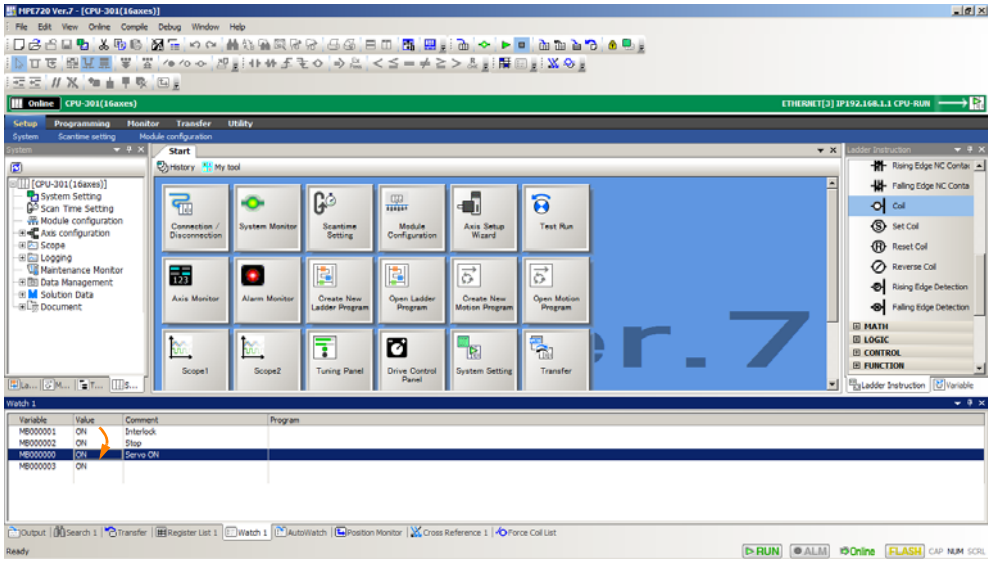
1. Select the register of the Watch Pane to change the display format, and right-click.
2. Select the display format that you want to use.



The register values will be displayed in the selected format.

Information

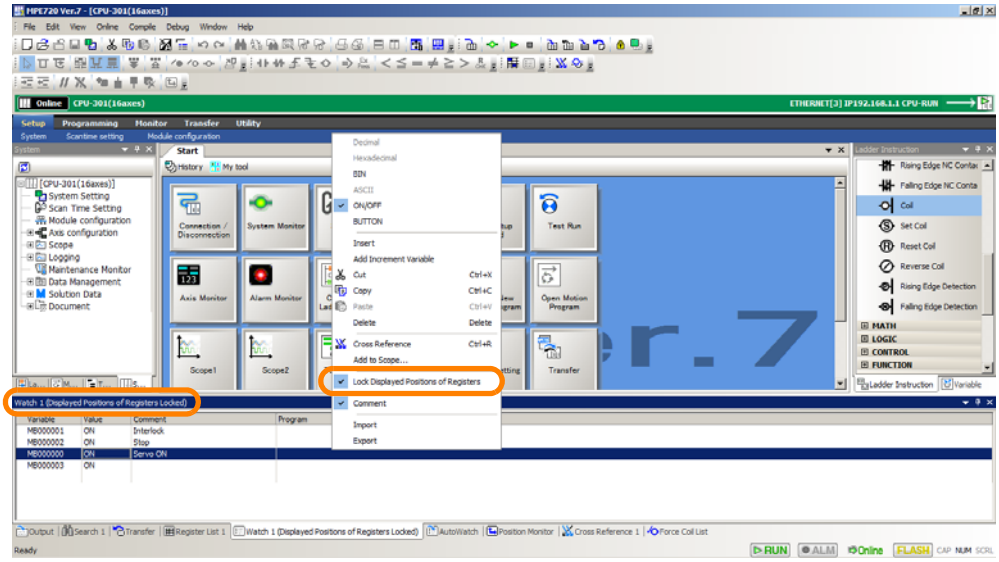
The registers displayed in the Watch Pane can be changed by dragging and dropping them.



You can also lock the displayed positions of registers.

Use the following procedure to lock the displayed position of registers.

1. Right-click on the Watch Pane and select **Lock Displayed Positions of Registers**. **Displayed Positions of Registers Locked** will be displayed in the title part of the Watch Pane, and the displayed position of register is locked.



This concludes the procedure.

6.9.5 Exporting and Importing the Watch Data

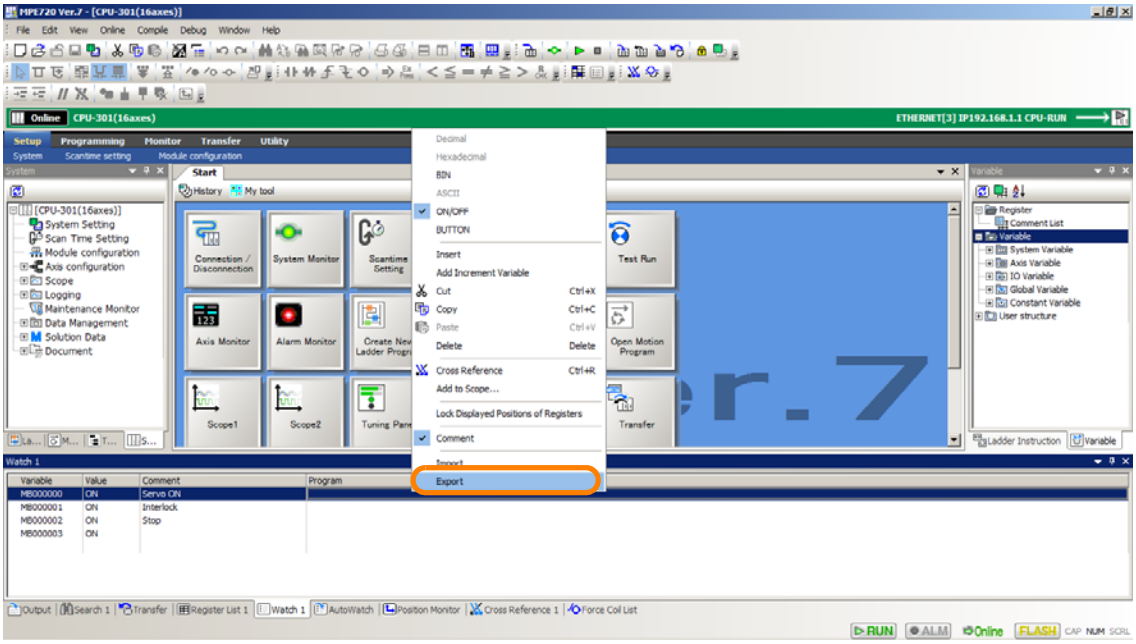
The watch data (variables or registers) registered in the Watch Pane can be exported to a CSV file, or import an exported CSV file.

Use the following procedure to export the watch data to a CSV file or import a CSV file.

Exporting

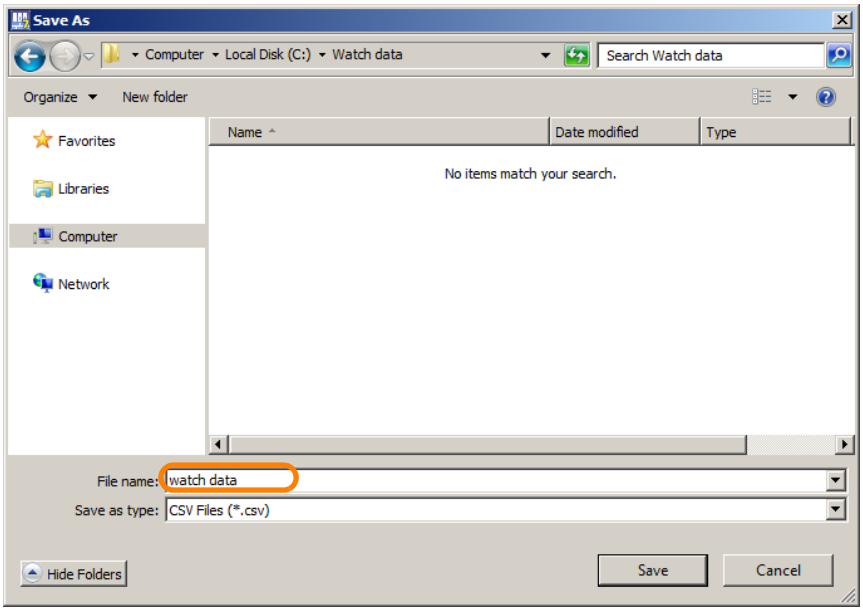
Use the following procedure to export the watch data (variables or registers) registered in the Watch Pane to a CSV file.

1. Open an online connection or a project file.
2. Register the watch data to be exported to the Watch Pane.
3. Right-click on the Watch Pane and select Export.

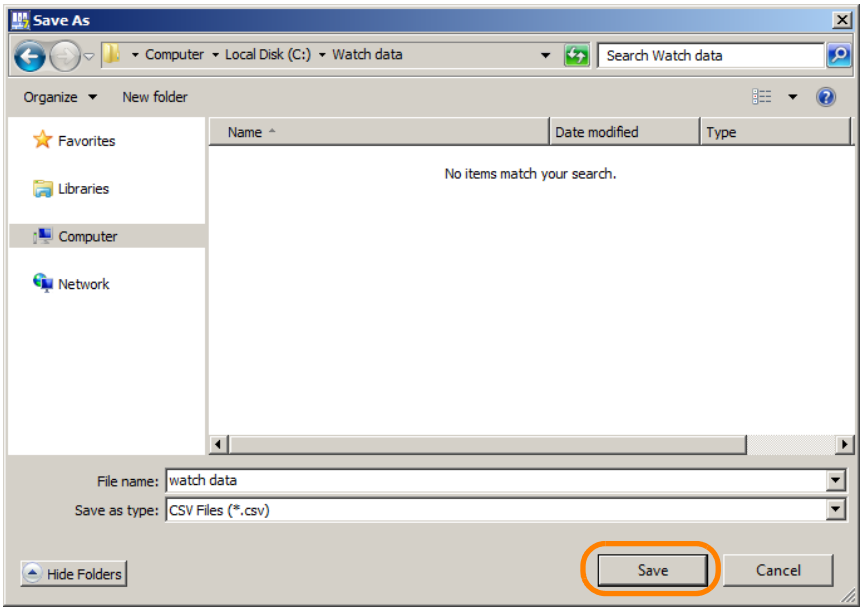


The **Save As** Dialog Box will be displayed.

4. Enter a file name.



5. Click the **Save** Button.



The register data will be exported, and the results will be displayed in the **Output** Pane.

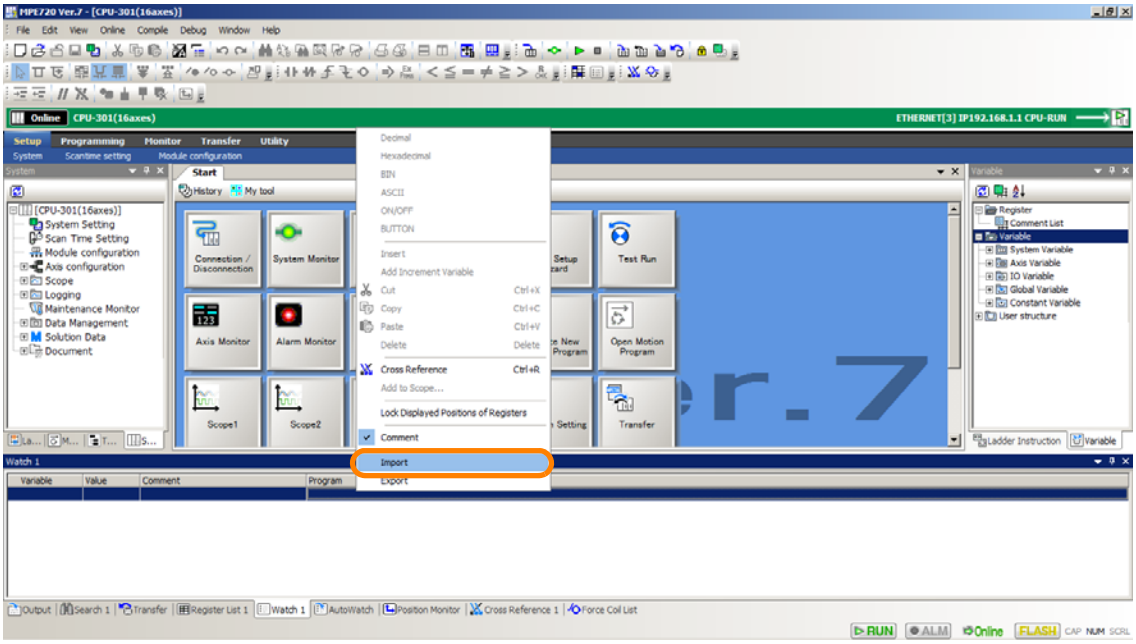
6. Confirm that the exported data has been stored in the selected file.

This concludes the procedure.

Importing

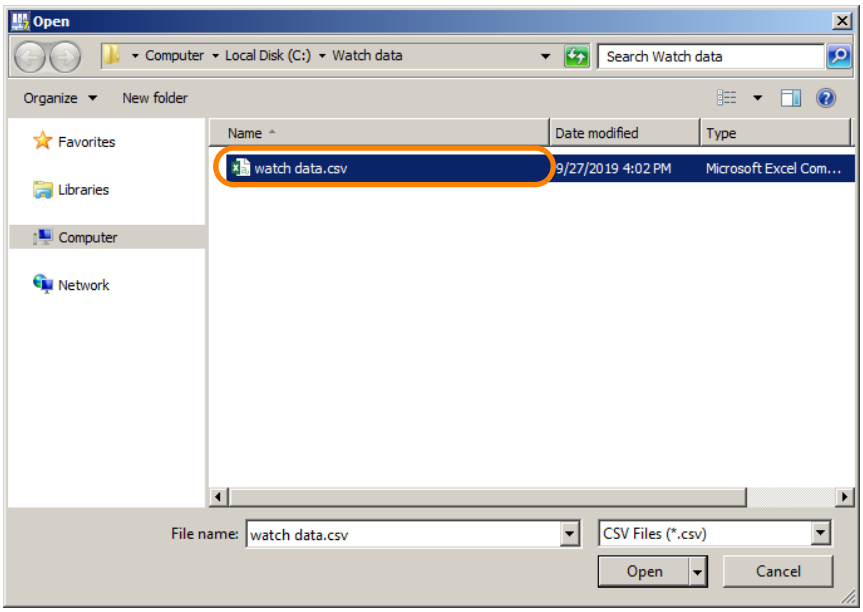
Use the following procedure to import the watch data (variables or registers) from a CSV file.

1. Open an online connection or a project file.
2. Right-click on the motion program and select **Import**.

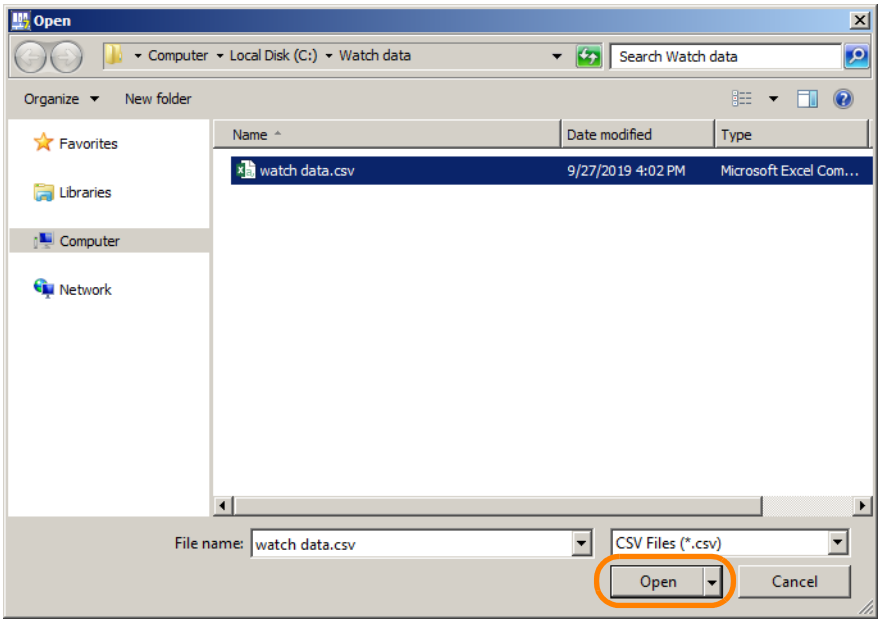


The **Open** Dialog Box will be displayed.

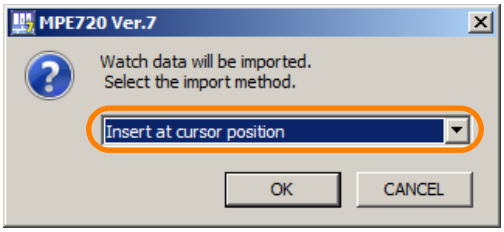
3. Select the CSV file to import the watch data.



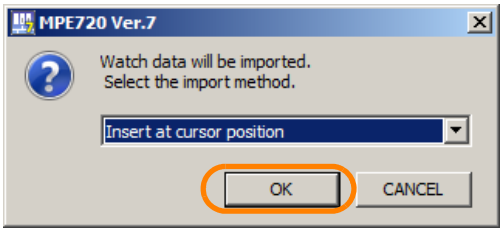
4. Click the **Open** Button.



5. Select the import method.



6. Click the **OK** Button.

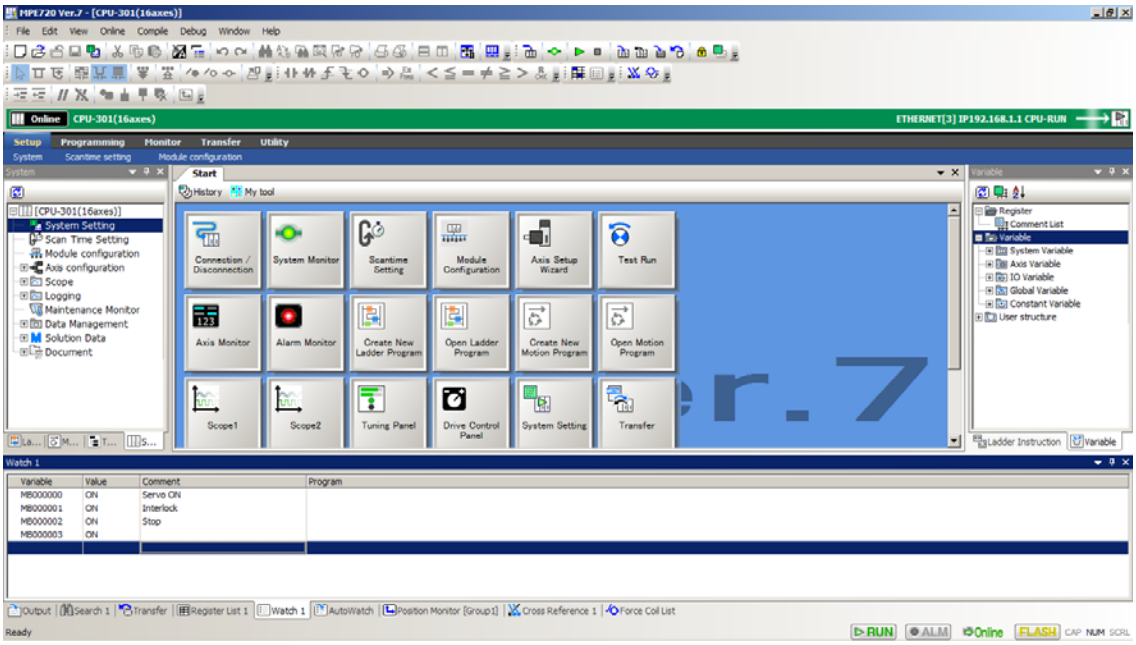


Important

If the MPE720 is connected to a Machine Controller, 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 register data will be imported, and the results will be displayed in the **Output** Pane.

7. Confirm that the watch data has been imported in the Watch Pane.

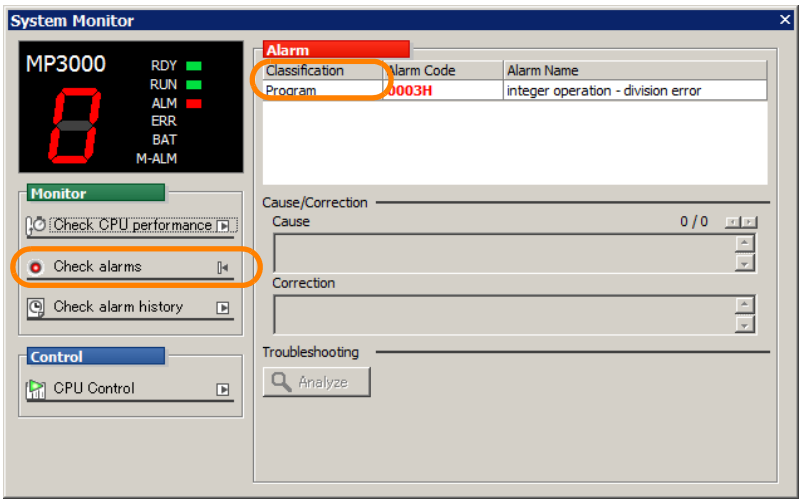


This concludes the procedure.

6.10 Isolating and Analyzing the Causes of Alarms

6.10.1 Alarm Categories

When an error or alarm occurs in the CPU, the System Monitor Dialog Box will be displayed. Click the **Check alarms** Button to display the categories in the **Alarm** Area.



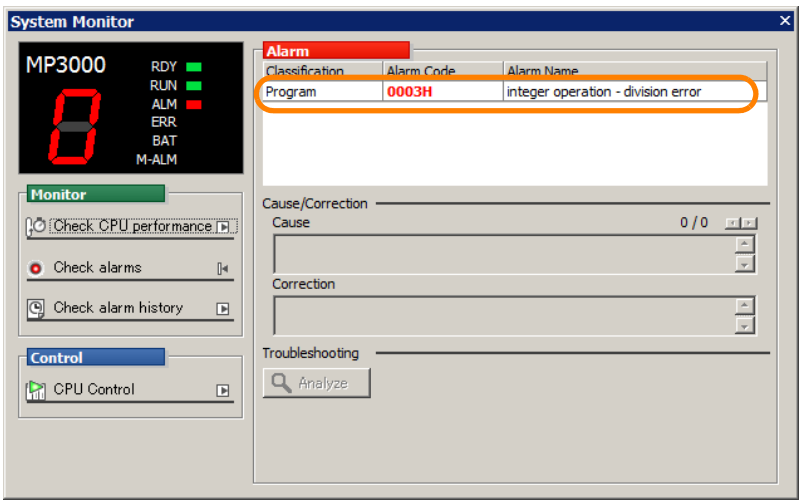
The alarm categories and names are given in the following table. Refer to the reference sections for information on resolving alarms.

Alarm Category	Alarm Name	Reference
Program	Operation error	*Resolving Operation Errors* on page 6-53
	Motion program alarm	*Resolving Motion Alarms* on page 6-56
Module	Motion parameter alarm	*Resolving Motion Module Alarms* on page 6-57
	I/O error	*Resolving I/O Errors* on page 6-59
CPU	Battery alarm	*Resolving Battery Alarms* on page 6-60
Servo	Servo alarm	*Resolving Servo Alarms* on page 6-61

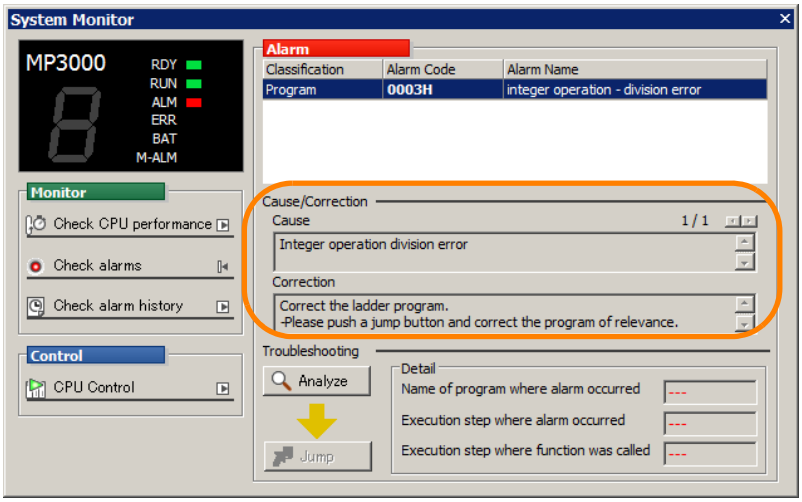
6.10.2 Resolving Alarms for Each Alarm Category

Resolving Operation Errors

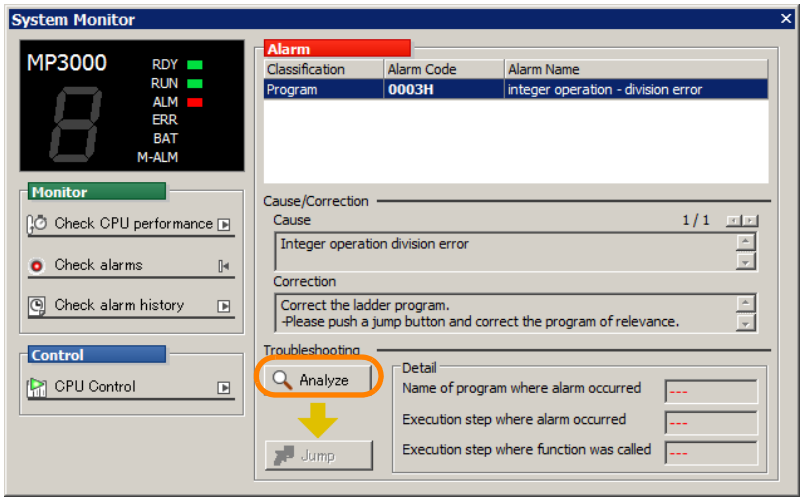
1. Click the alarm on which to access information.



The cause and correction method will be displayed.

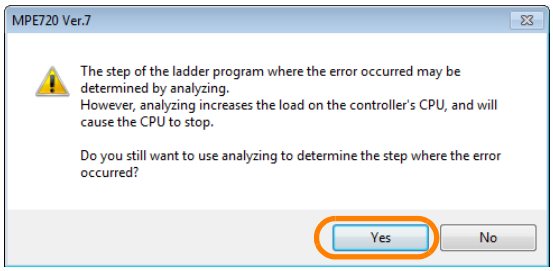


2. Click the **Analyze** Button.

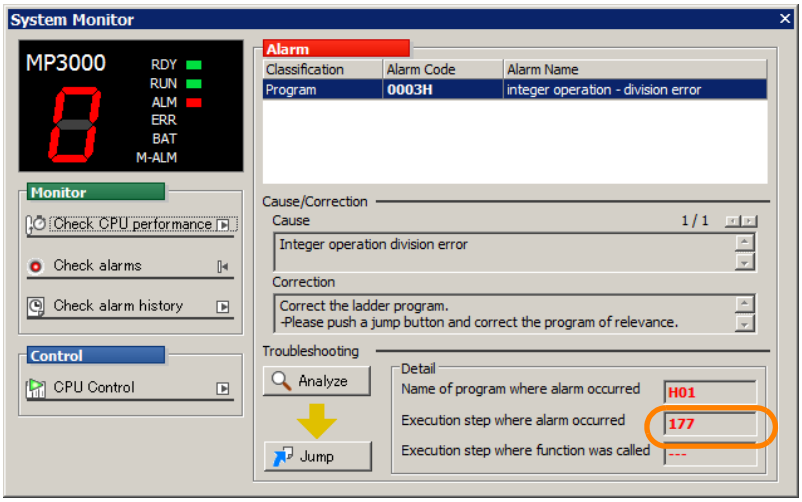


The MPE720 Ver. 7 Dialog Box will be displayed.

3. Click the **Yes** Button.

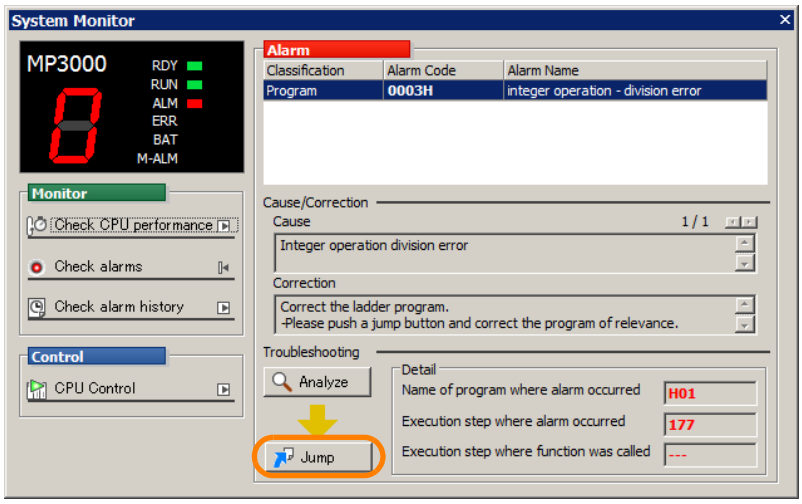


The **Execution step where alarm occurred** Box shows the step number where the alarm occurred.



Information The **Execution step where alarm occurred** Box is displayed only when an MP3000-series Machine Controller is used. Only the **Name of program where alarm occurred** Box is displayed for an MP2000-series Machine Controller.

4. Click the **Jump** Button.
The display will jump to the drawing that contains the operation error.



5. Resolve the operation error.
Refer to the following manual for details on how to resolve operation errors.
MP3000 Series Ladder Programming Manual (Manual No.: SIEP C880725 13)

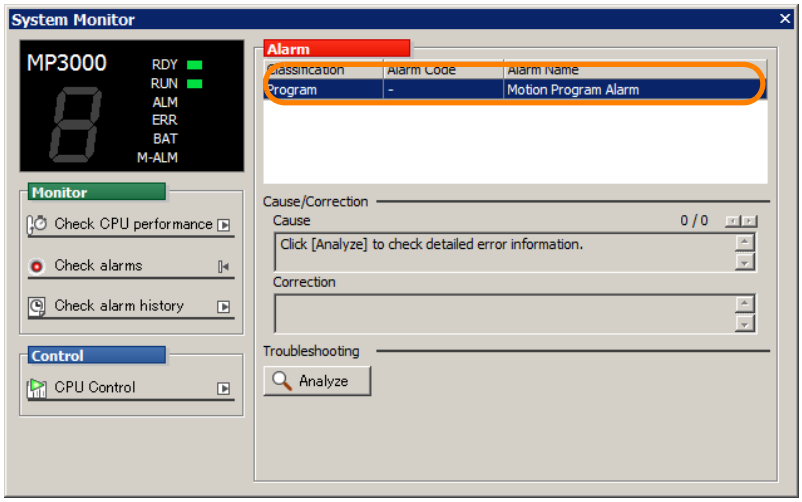
6. Make the Edit Ladder Program Tab Page the active view and press the **F4** Key.
The program will be compiled.

7. Confirm that the alarm is no longer displayed in the System Monitor Dialog Box.

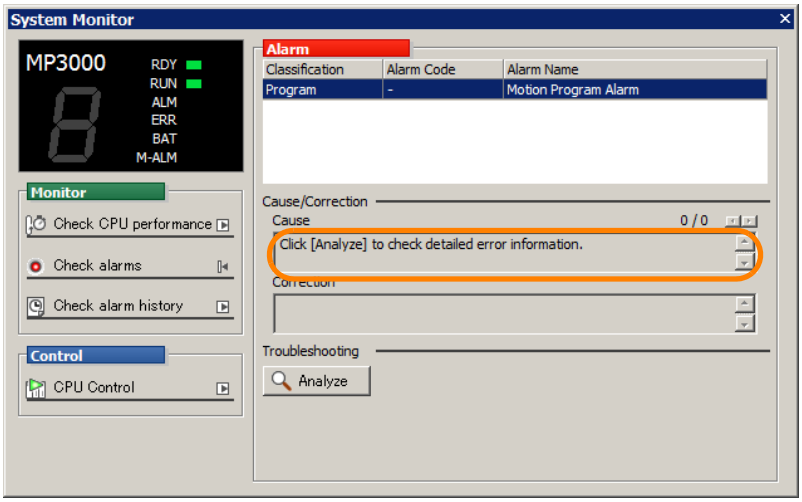
This concludes the procedure.

Resolving Motion Alarms

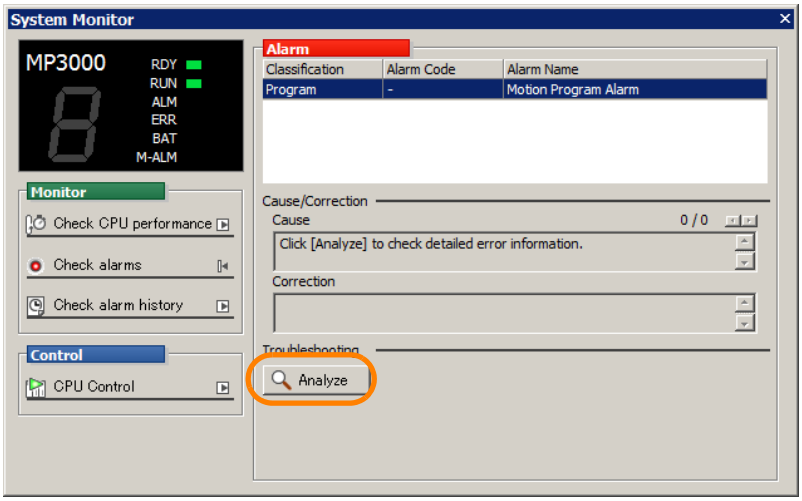
1. Click the alarm on which to access information.



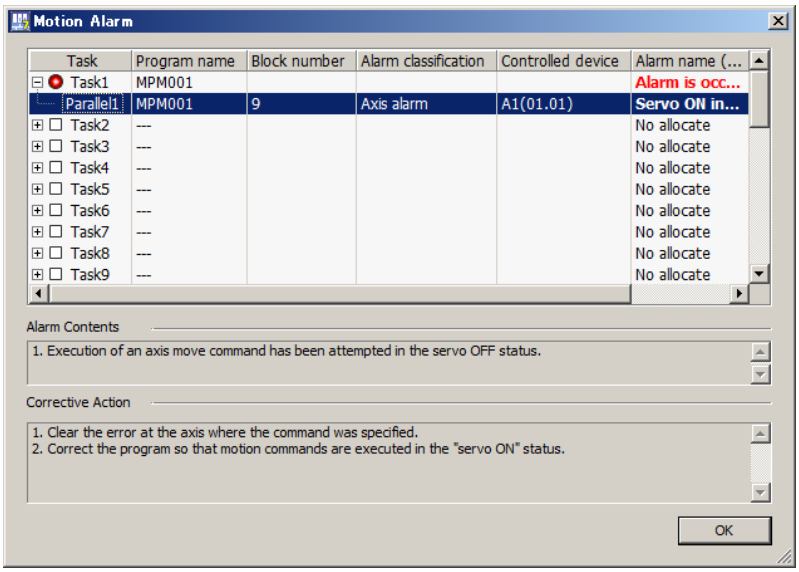
The cause will be displayed.



2. Click the **Analyze** Button.



The Motion Alarm Dialog Box will be displayed.



3. Resolve the motion alarm.
Refer to the following manual for details on how to resolve motion alarms.
MP3000 Series Motion Programming Manual (Manual No.: SIEP C880725 14)

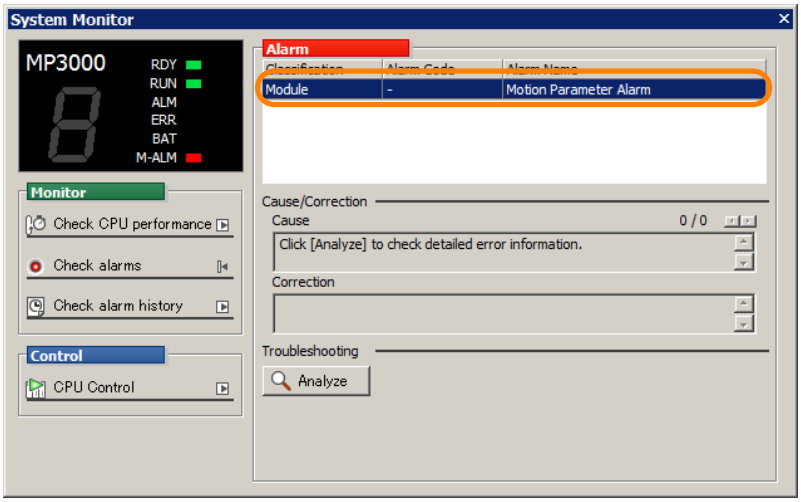
4. Make the Edit Motion Program Tab Page the active view and press the **F4** Key.
The program will be compiled.

5. Confirm that the alarm is no longer displayed in the System Monitor Dialog Box.

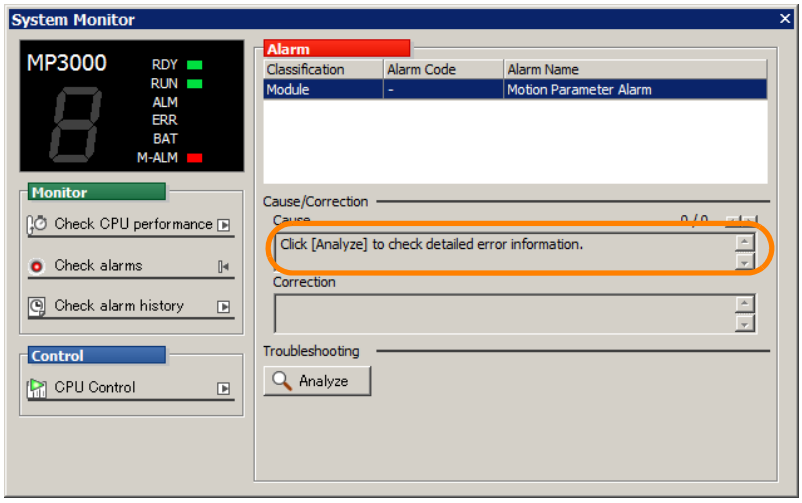
This concludes the procedure.

Resolving Motion Module Alarms

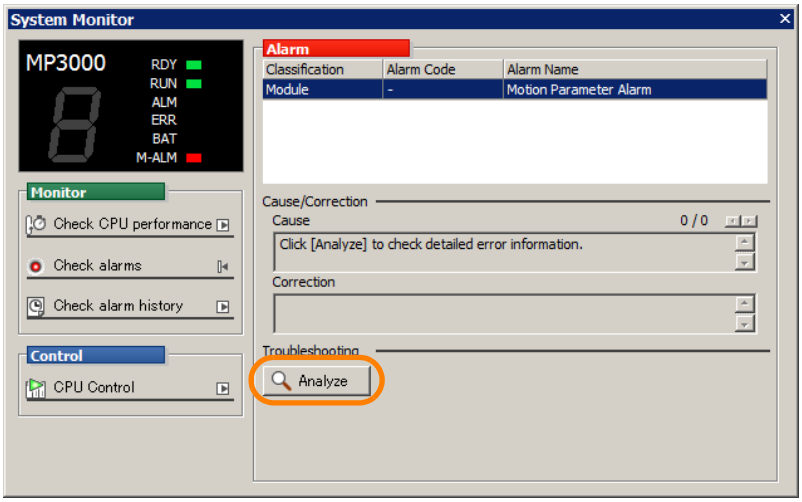
1. Click the alarm on which to access information.



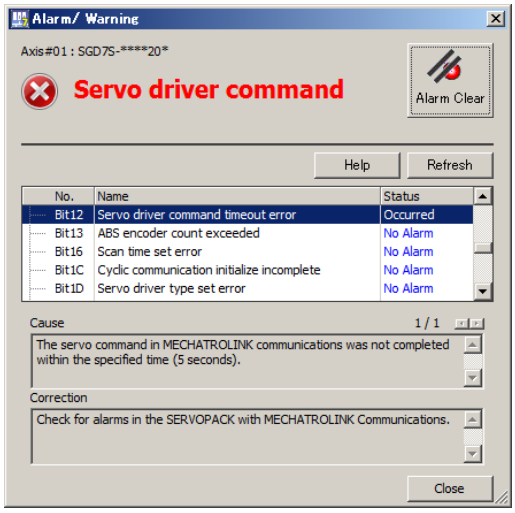
The cause will be displayed.



2. Click the **Analyze** Button.



The Alarm/Warning Dialog Box will be displayed.



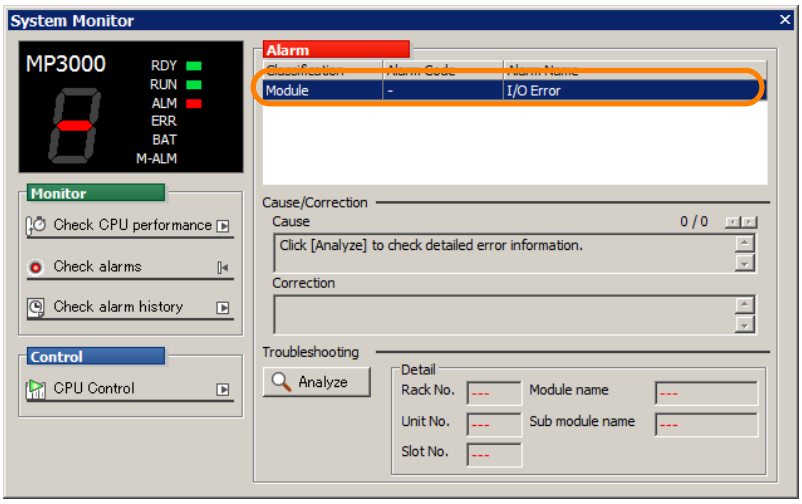
3. Resolve the motion module alarm.
Refer to one of the following manuals for details on how to resolve motion module alarms.
📖 *MP3000 Series Motion Control User's Manual SVC32/SVR32* (Manual No. SIEP C880725 11)
📖 *MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (Manual No.: SIEP C880700 33)

4. Confirm that the alarm is no longer displayed in the System Monitor Dialog Box.

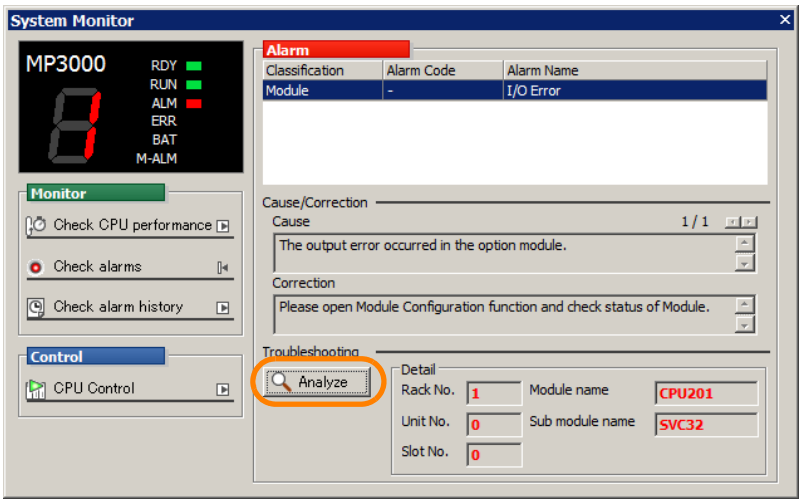
This concludes the procedure.

Resolving I/O Errors

1. Click the alarm on which to access information.



2. Click the **Analyze** Button.



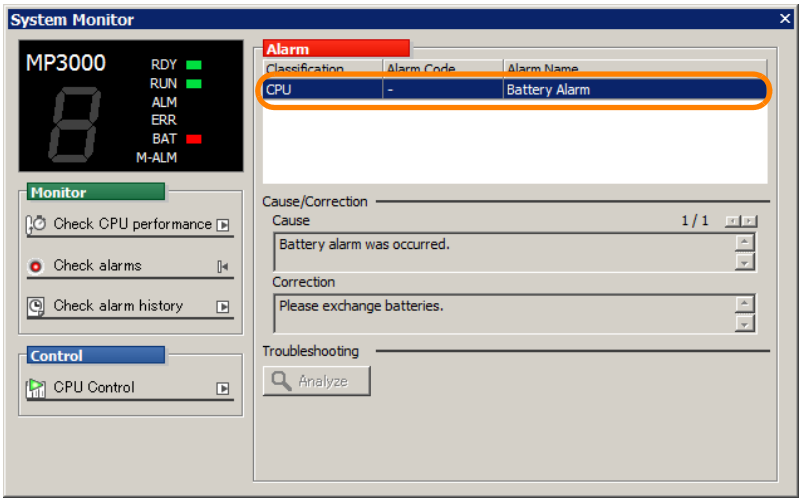
3. Resolve the I/O error.
   Resolve the error by referring to the rack number, unit number, slot number, Module name, and Sub-module name given in the **Detail** Area and to the relevant Communications Module manual.

4. Confirm that the alarm is no longer displayed in the System Monitor Dialog Box.

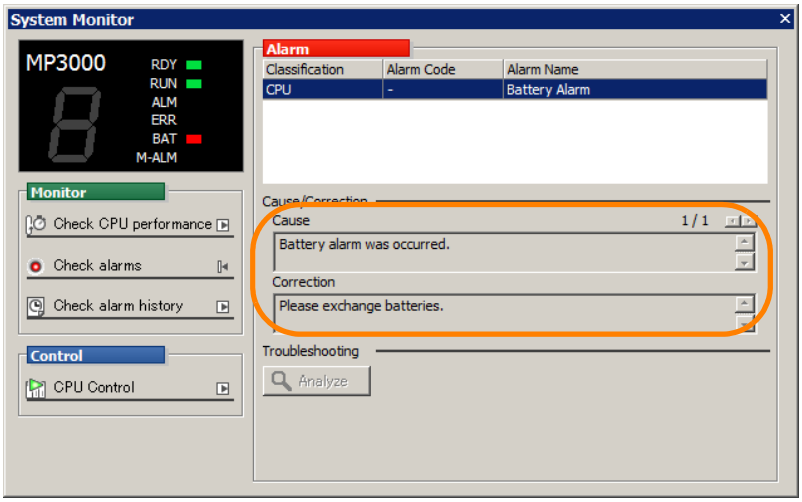
This concludes the procedure.

Resolving Battery Alarms

1. Click the alarm on which to access information.



The cause and correction method will be displayed.



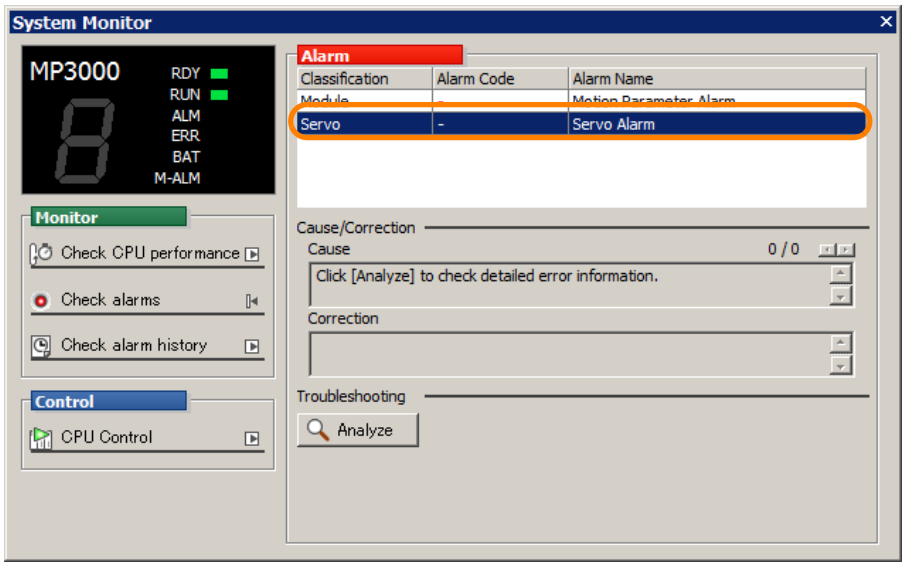
2. Replace the Battery.
   Refer to the following manual for Battery replacement procedures.
   - *MP3000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880725 00)
   - *MP2000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880732 14)

3. Confirm that the alarm is no longer displayed in the System Monitor Dialog Box.

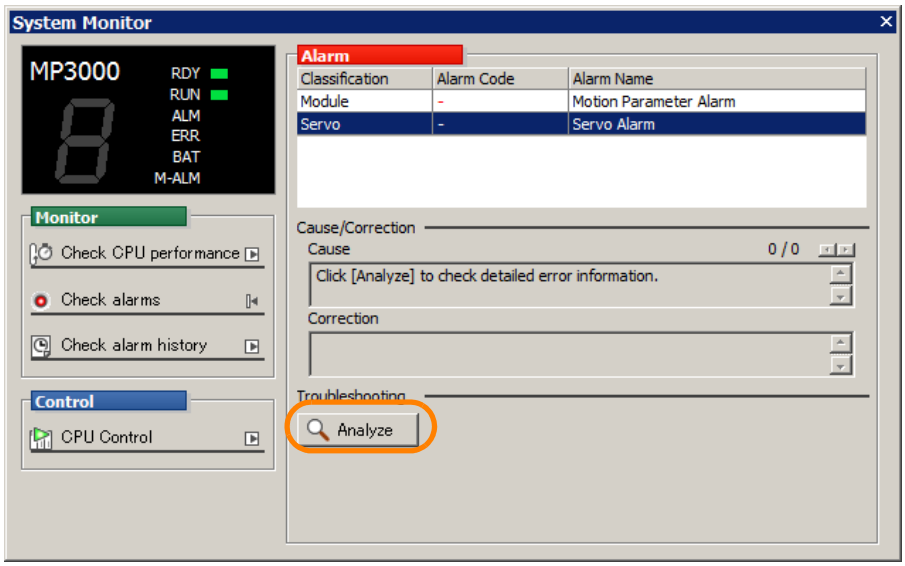
This concludes the procedure.

Resolving Servo Alarms

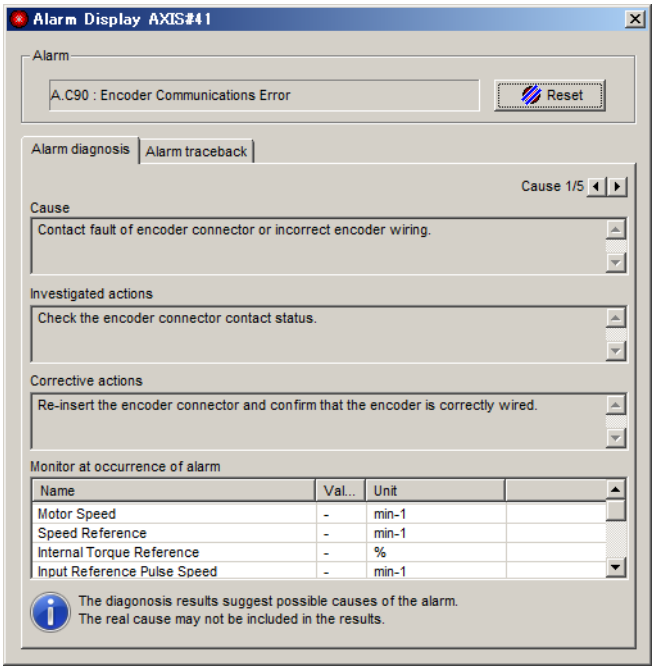
1. Click the alarm on which to access information.



2. Click the **Analyze** Button.



The Alarm Display Dialog Box will be displayed.



3. Resolve the servo alarm.
   Refer to the manual for the SERVOPACK that you are using for methods to resolve servo alarms.

4. Confirm that the alarm is no longer displayed in the System Monitor Dialog Box.

This concludes the procedure.

6.10.3 Checking Alarm Histories

Use the following procedure to check the errors and alarms that have occurred in the Machine Controller.

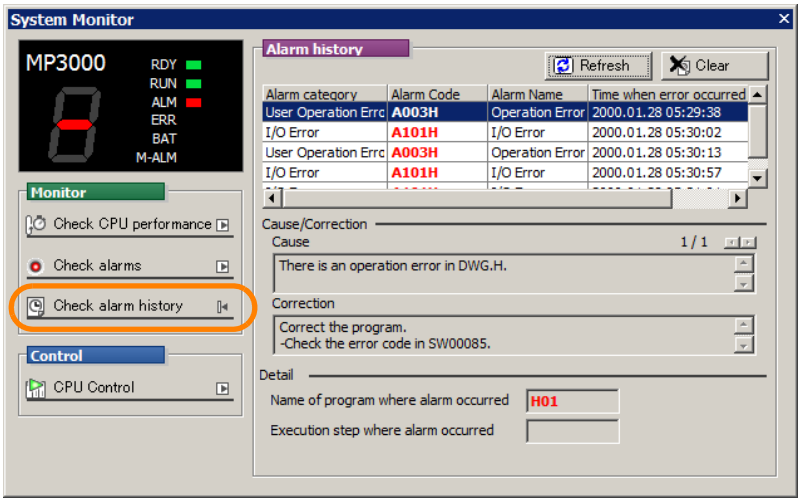
The alarm history retains up to 100 records.

Information

You can check the alarm history only with an MP3000-series Machine Controller. You cannot check an alarm history for an MP2000-series Machine Controller.

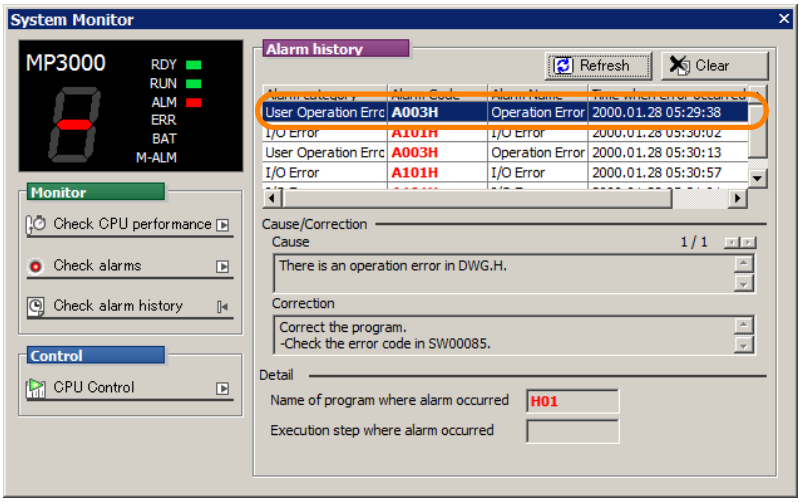
1. Click the **System Monitor** Button on the My Tool View.
   The System Monitor Dialog Box will be displayed.

2. Click the **Check alarm history** Button.

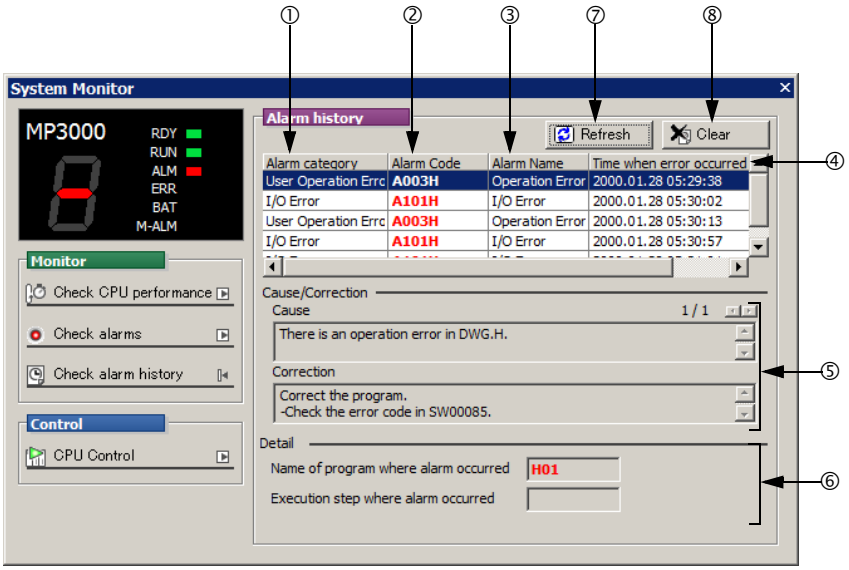


The alarm history will be displayed in the **Alarm history** Area.

3. Click the alarm on which to access information.



4. Check the alarm information.



No.	Item	Description
①	Alarm category	Displays the category of the alarm that occurred.
②	Alarm Code	Displays the code of the alarm that occurred.
③	Alarm Name	Displays the name of the alarm that occurred.
④	Time when alarm occurred	Displays the date and time when the alarm occurred.
⑤	Cause/Correc-tion	Displays the cause of and correction for the alarm that occurred.
⑥	Detail	Displays the detailed information on the alarm that occurred.
⑦	Refresh	Click this button to update to the most recent information.
⑧	Clear	Click this button to delete the records currently stored in the alarm history.

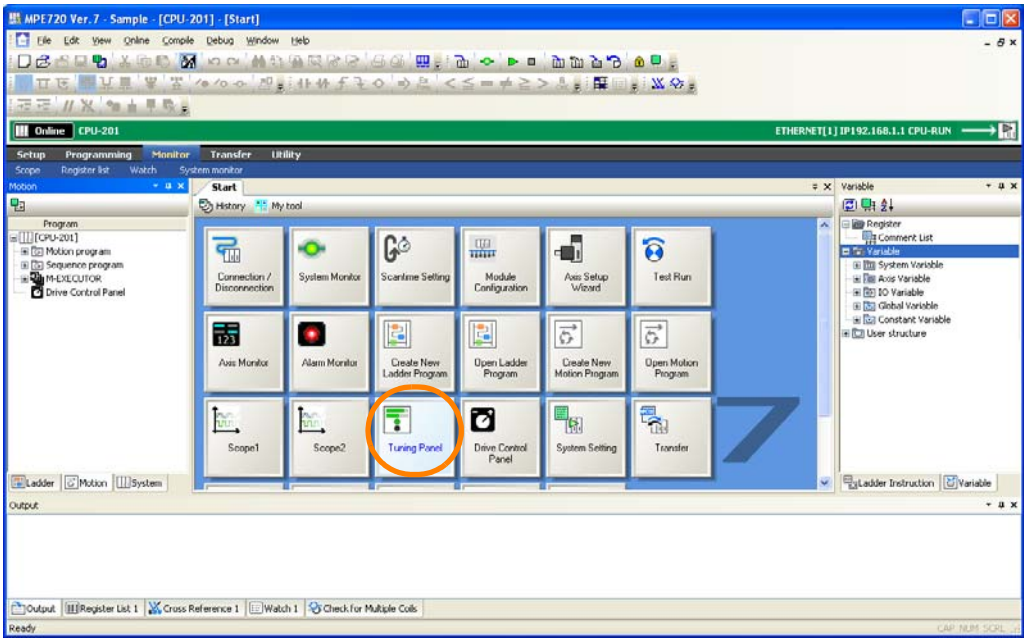
This concludes the procedure.

6.11 Displaying and Adjusting Only Specific Registers

Use the following procedure to display and adjust specific registers by using the Tuning Panel Tab Page.

1. Connect to the Machine Controller. Or, open a project file.

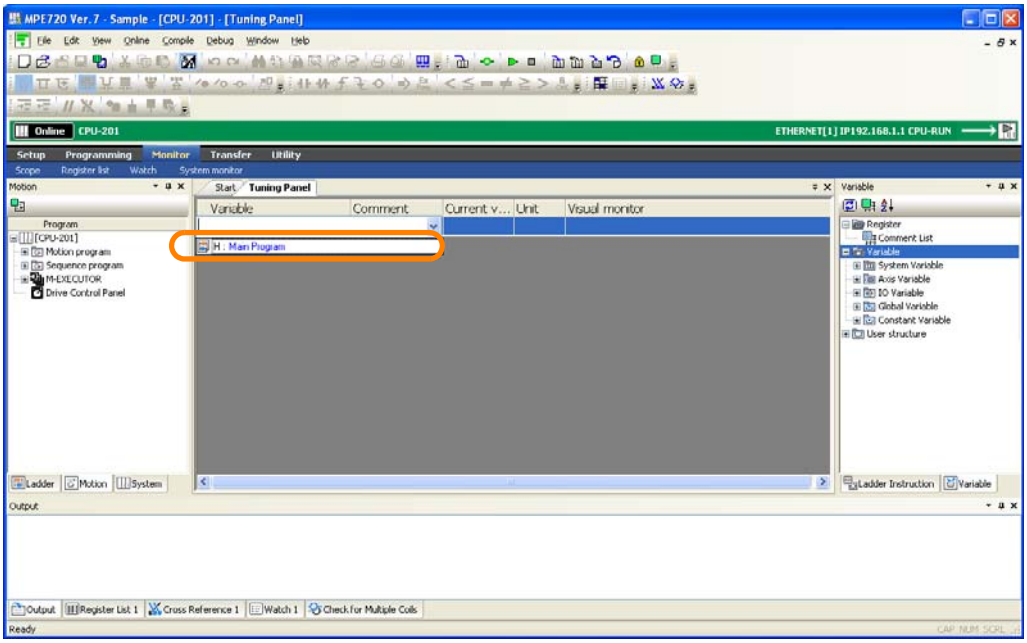
2. Click the **Tuning Panel** Button on the My Tool View.



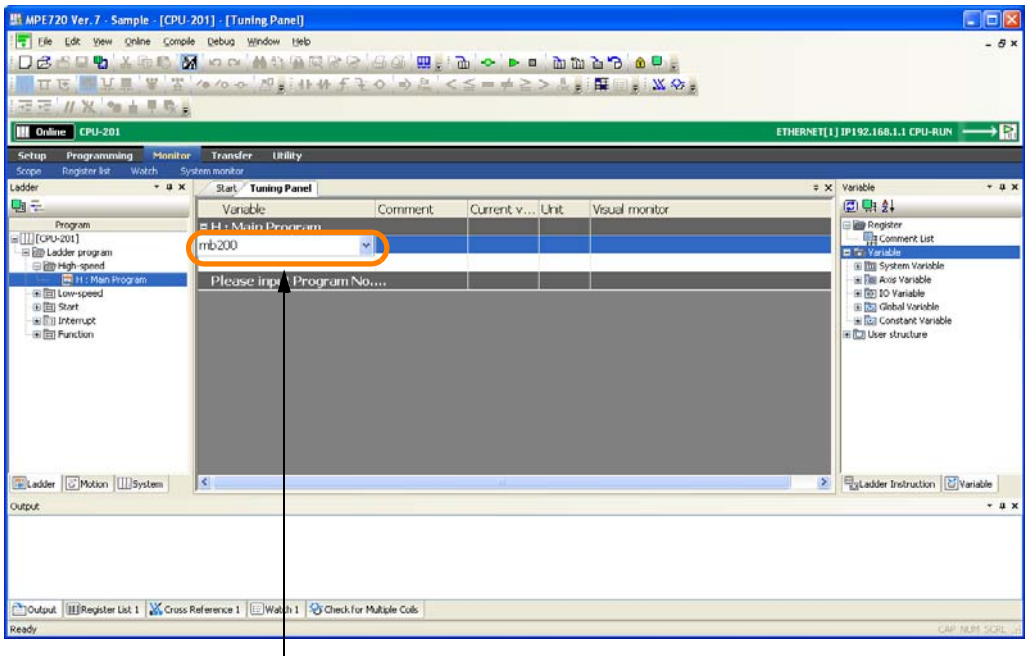
The Tuning Panel Tab Page will be displayed.

3. Select the type of program.

Information Programs that you have created will be listed as options in the box.



4. Enter the register to monitor in the **Variable** Column.

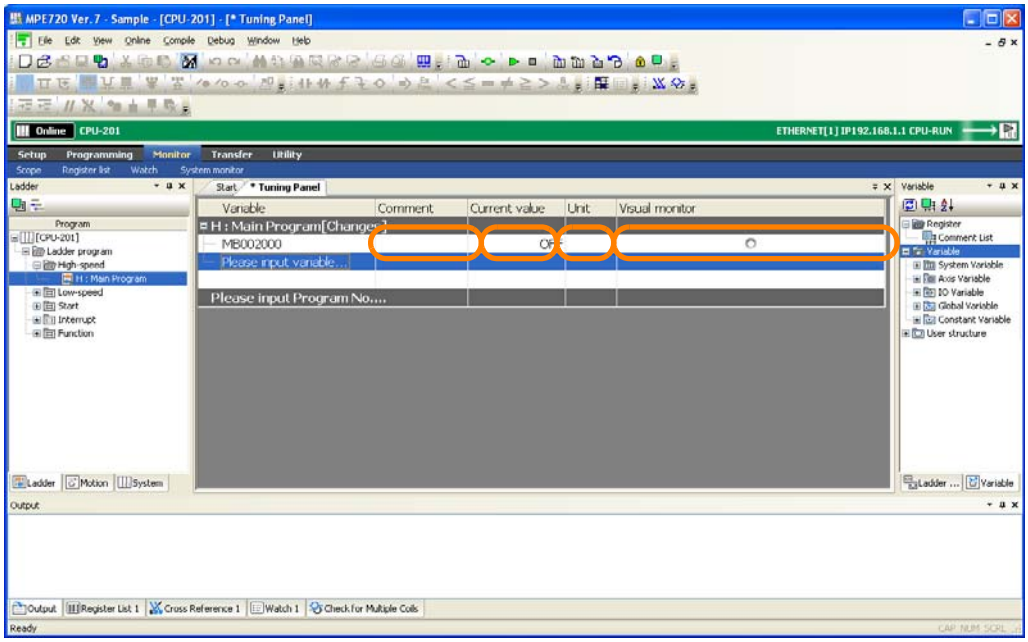


The Autocomplete function can be used. Refer to the following section for details.

☞ *5.3.1 Using the Autocomplete Function* on page 5-81

5. Press the **Enter** Key.

Information will be displayed in the **Comment**, **Current value**, **Unit**, and **Visual monitor** Columns.



Information

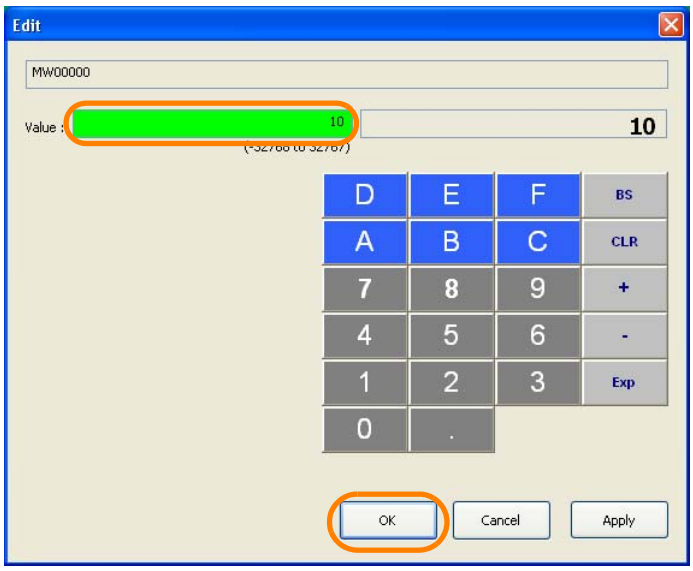
The information that is displayed in each column is described below.

Name	Description
Variable	Displays the variables or registers.
Comment	Displays the comment registered for the variables. The comment entered here will be reflected in the list of variables and in the list of comments in the Variable Pane. Characters that are allowed: Up to 255 alphanumeric characters
Current value	Displays the current value of the variables in the specified format. The current value is updated at fixed intervals. The current value can be edited by double-clicking this column to display the Edit Dialog Box.
Unit	Displays the unit. The unit can be specified by double-clicking this column to display the Edit Dialog Box.
Visual monitor	Monitors the current values of the variables (registers). 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 upper and lower limits. 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

Information

To edit the current value, perform one of the following operations.

- Enter the value directly in the **Current value** Cell for the variable to edit.
- Double-click the **Current value** Cell for the variable to edit, enter the value in the Edit Dialog Box, and click the **OK** Button.



The value that was entered in the Edit Dialog Box will be applied to the Tuning Panel Tab Page.

This concludes the procedure.

6.12 Enabling and Disabling Ladder Programs by Drawings

Use the following procedure to enable or disable ladder programs by drawings.

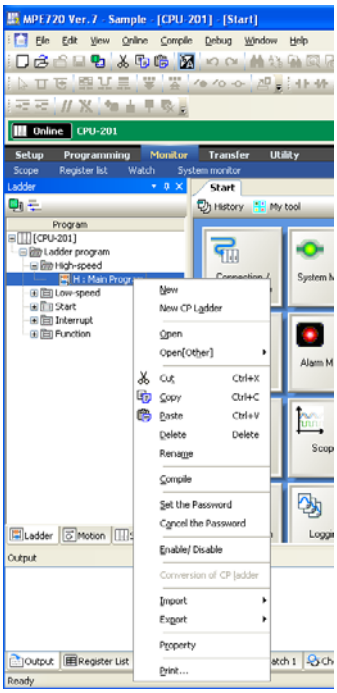
1. Open the project file.
2. Select the drawings to enable or disable in the Ladder Pane and right-click on the highlighted selection.

Information

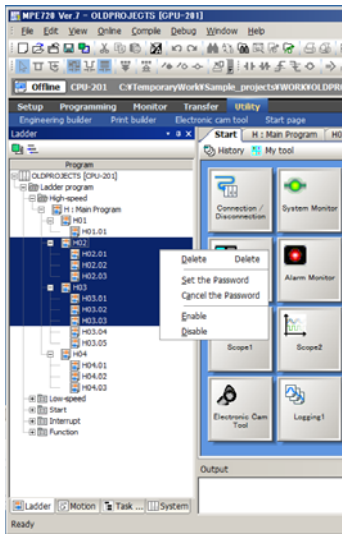
You can select more than one drawing.

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

If Only One Drawing Is Selected

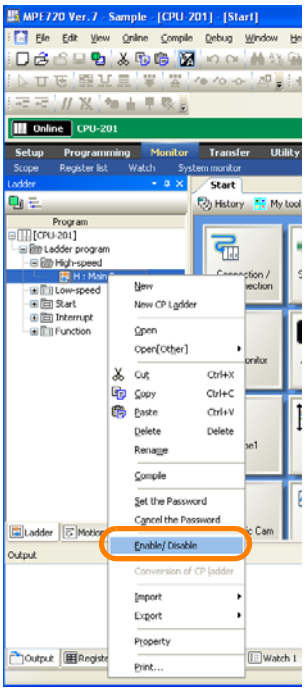


If More Than One Drawing Is Selected

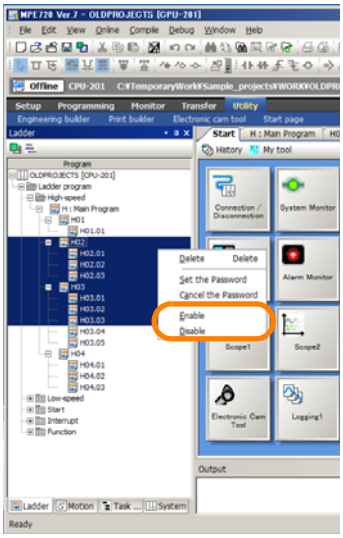


3. Select ***Enable/Disable*** from the menu.

If Only One Drawing Is Selected



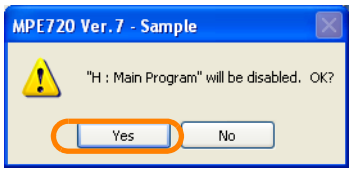
If More Than One Drawing Is Selected



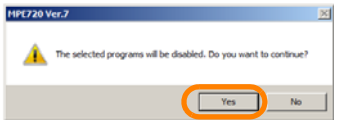
The MPE720 Ver. 7 Dialog Box will be displayed.

4. Click the **Yes** Button.

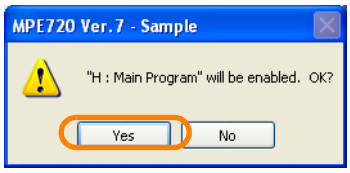
Disabling with Only One Drawing Selected



Disabling with More Than One Drawing Selected



Enabling



The drawing will be enabled or disabled.

5. Confirm that the icon for the drawing has changed in the Ladder Pane.

- Drawing is enabled: 
- Drawing is disabled: 

This concludes the procedure.

Adjusting the Servo

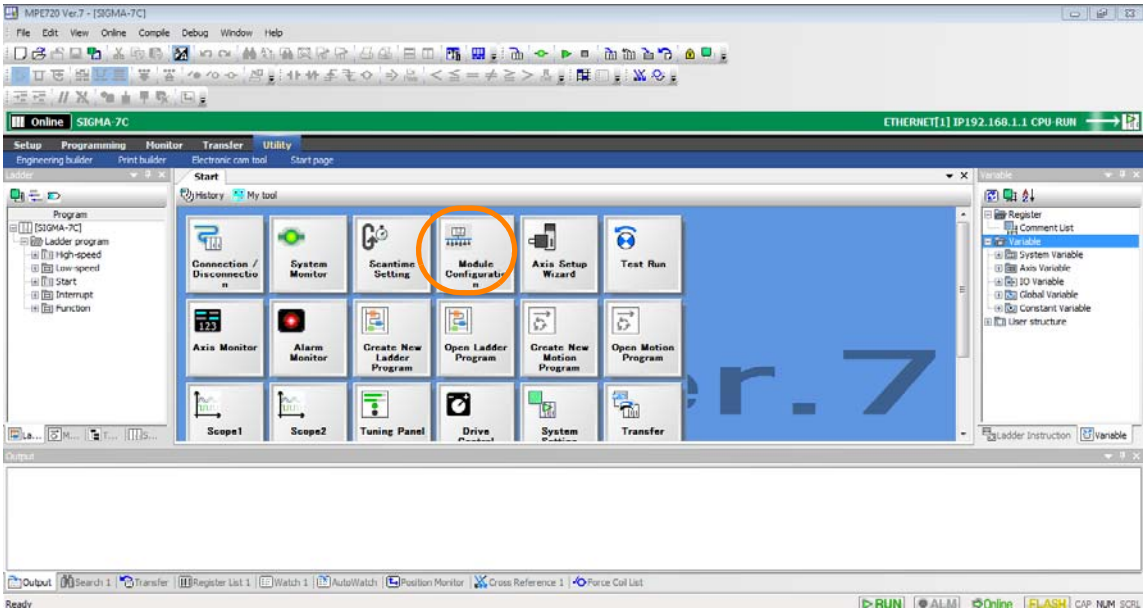
7

This chapter describes the operations that are used to adjust the Servo.

7.1 Check the Servo Status

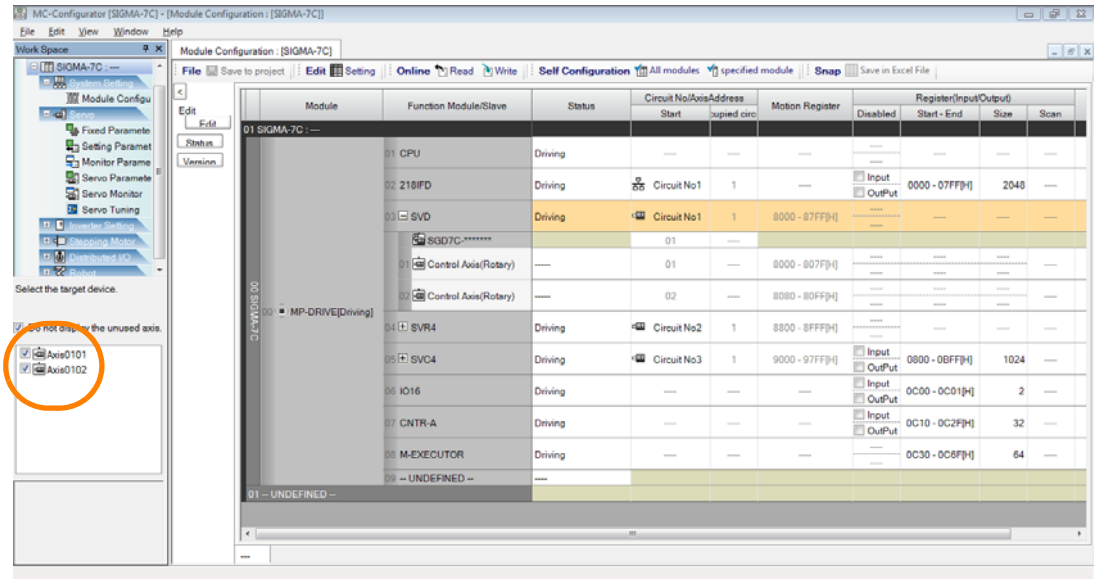
Use the following procedure to check the servo status.

1. Click the **Module Configuration** Button on the My Tool View

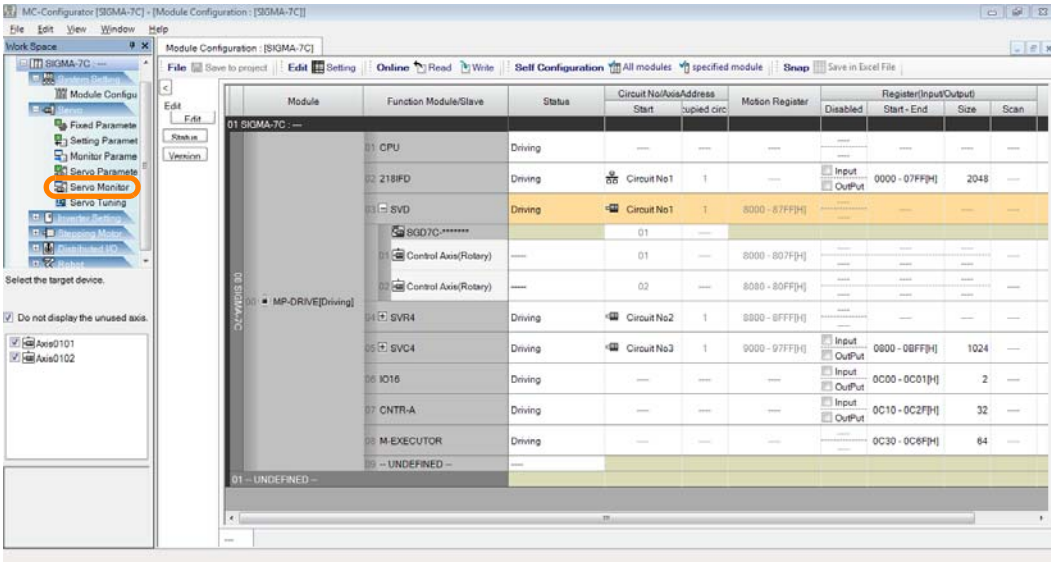


The Module Configuration Tab Page will be displayed.

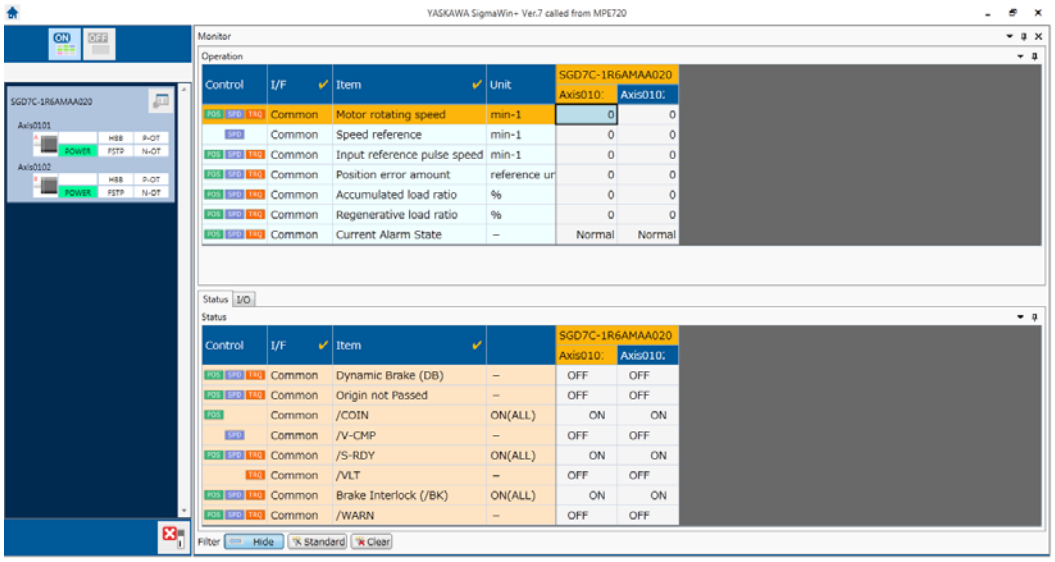
2. In the Work Space Pane, select the check boxes for the servo axes for which you want to check the status.



3. Double-click **Servo Monitor**.



SigmaWin+ Ver. 7 will be started with the servo axes for which to check the status already allocated, and the Monitor Window will be displayed.



This concludes the procedure.

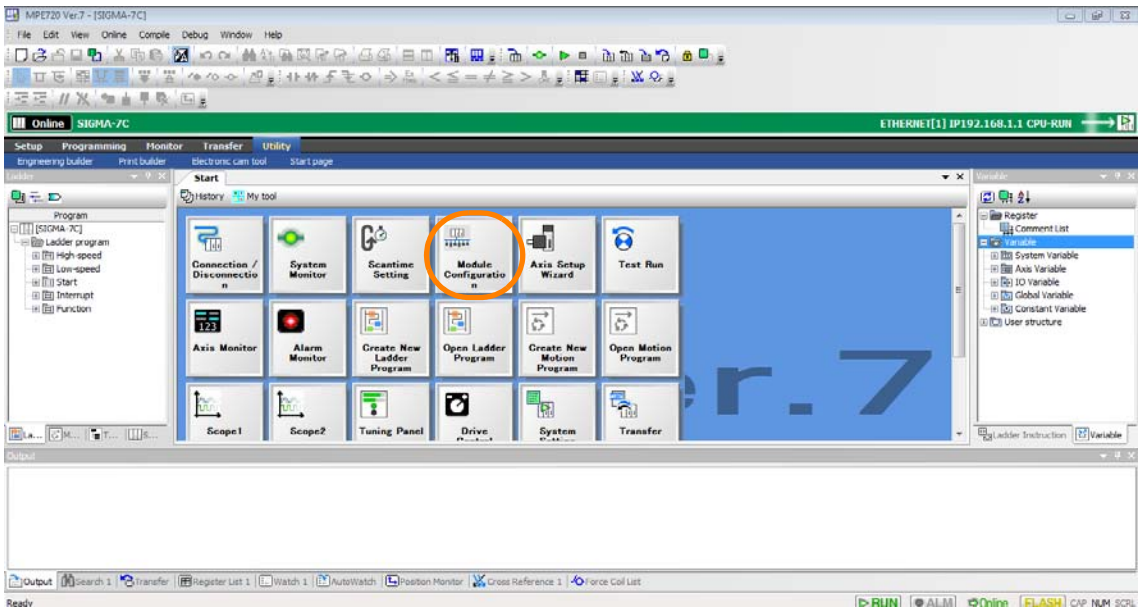
7.2 Adjusting the Servo

Tuning is performed to improve the Servo response to the condition of the machine and actual operating conditions. Use the following procedure to tune an axis through the Machine Controller.

Information

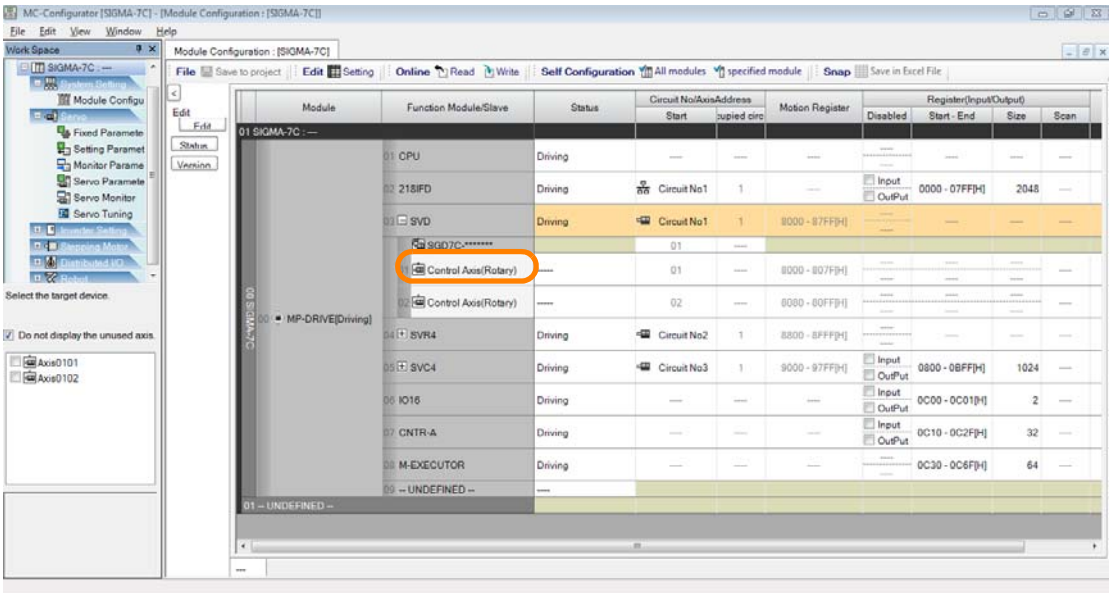
The following procedure is supported by MPE720 version 7.37 or higher.
For MPE720 version 7.36 or lower, refer to the procedures in the following section.
☞ *14.6.1 Adjusting the Servo* on page 14-23

1. Click the **Module Configuration** Button on the My Tool View



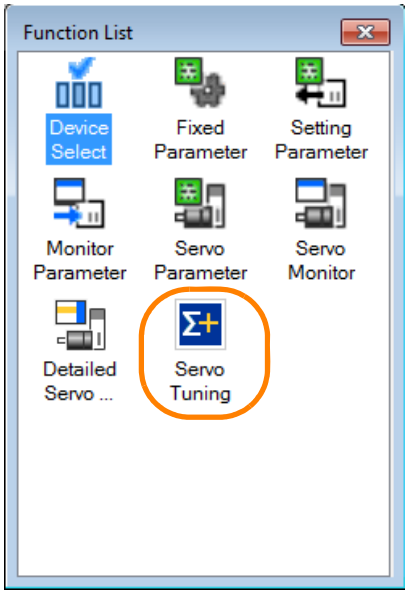
The Module Configuration Tab Page will be displayed.

2. Double-click the servo axis to tune in the list on the Module Configuration Tab Page.



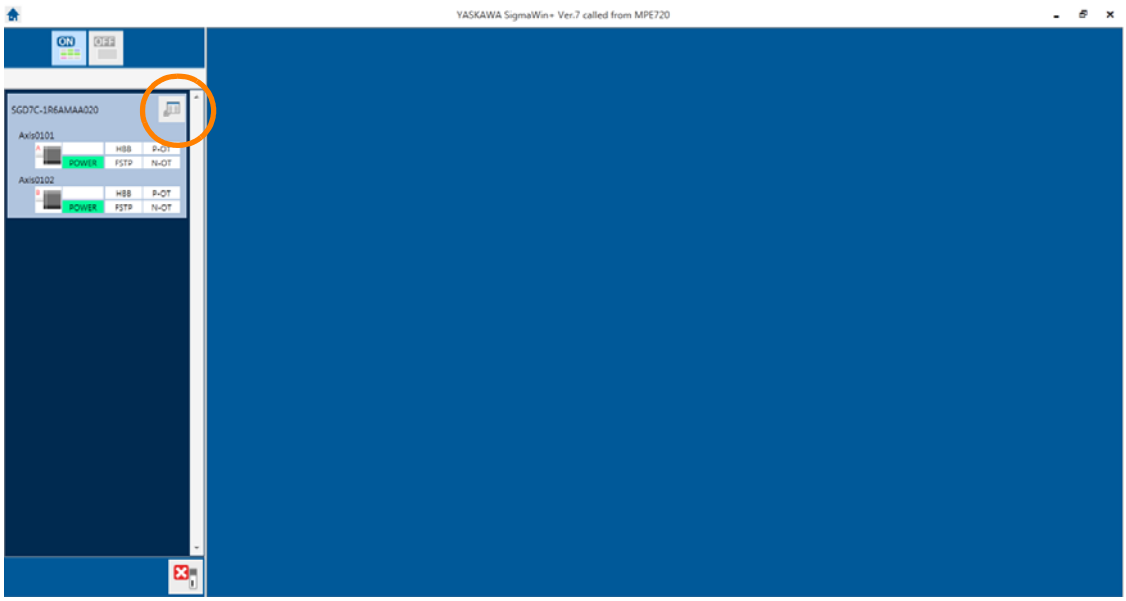
The Function List Dialog Box will be displayed.

3. Click the Servo Tuning Icon.



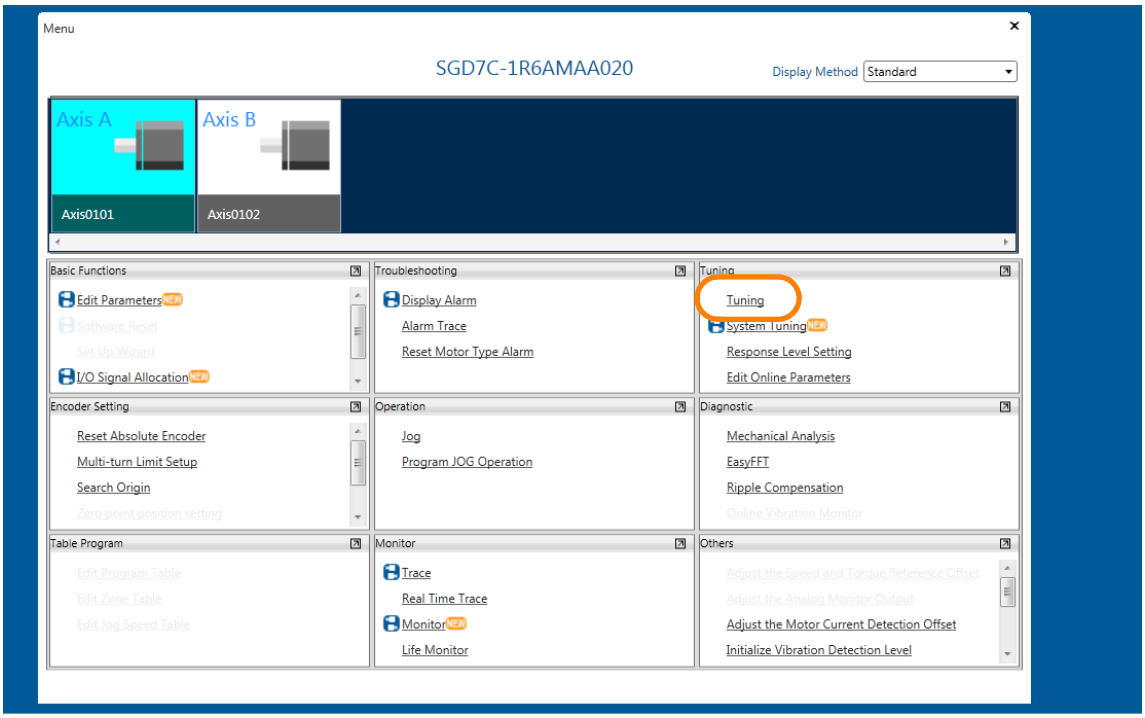
SigmaWin+ Ver. 7 will be started with the servo axes to tune already allocated.

4. Click the **Menu** Button.



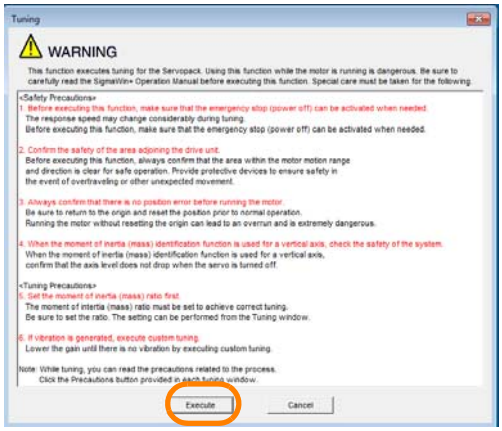
The Menu Window will be displayed.

5. Click **Tuning**.

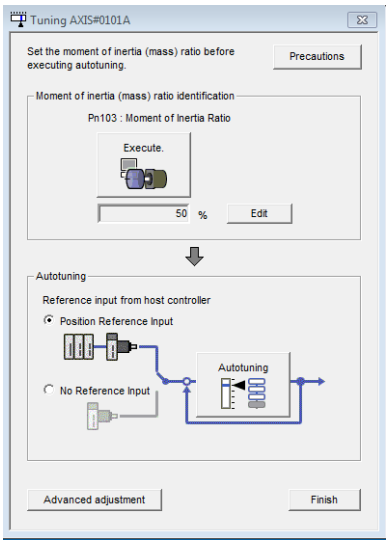


The Tuning Dialog Box will be displayed.

6. Read the precautions, and then click the **Execute** Button.



The Tuning Dialog Box will be displayed.



Refer to the following manual for operating procedures and details on tuning.

📖 *AC Servo Drive Engineering Tool SigmaWin+ Online Manual* (Manual No.: SIEP S800000 73)

This concludes the procedure.

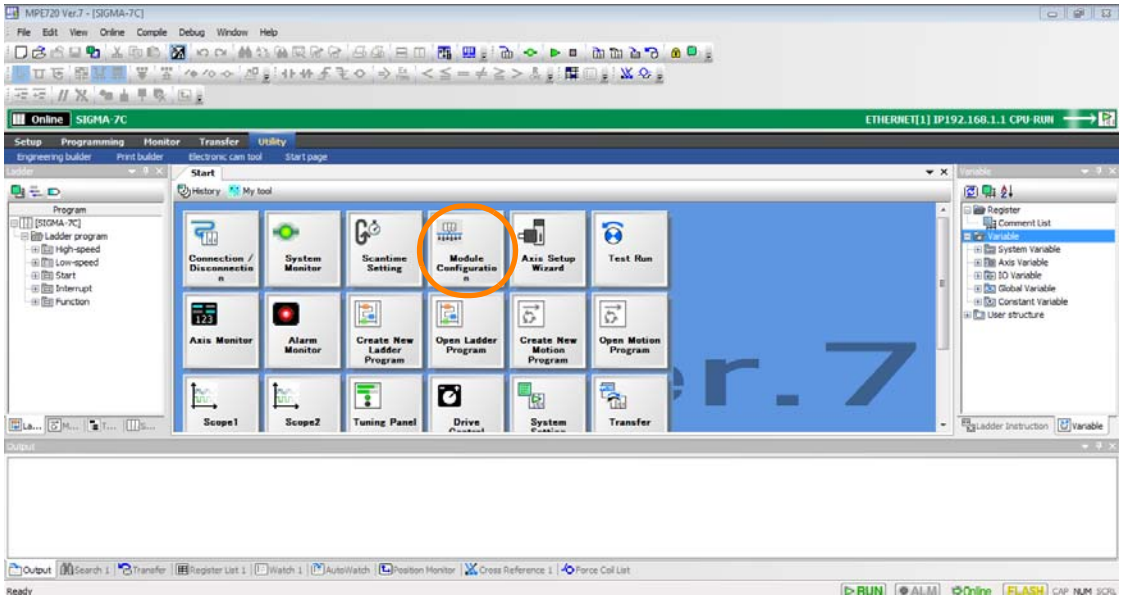
7.3 Checking Operation by Sensing Individual Motion Commands

You may want to check operation for individual motion commands with the current configuration. However, writing ladder programs or other programs just for this purpose can be time consuming. The MPE720 allows you to send individual motion commands to check operation. Use the following procedure.

Information

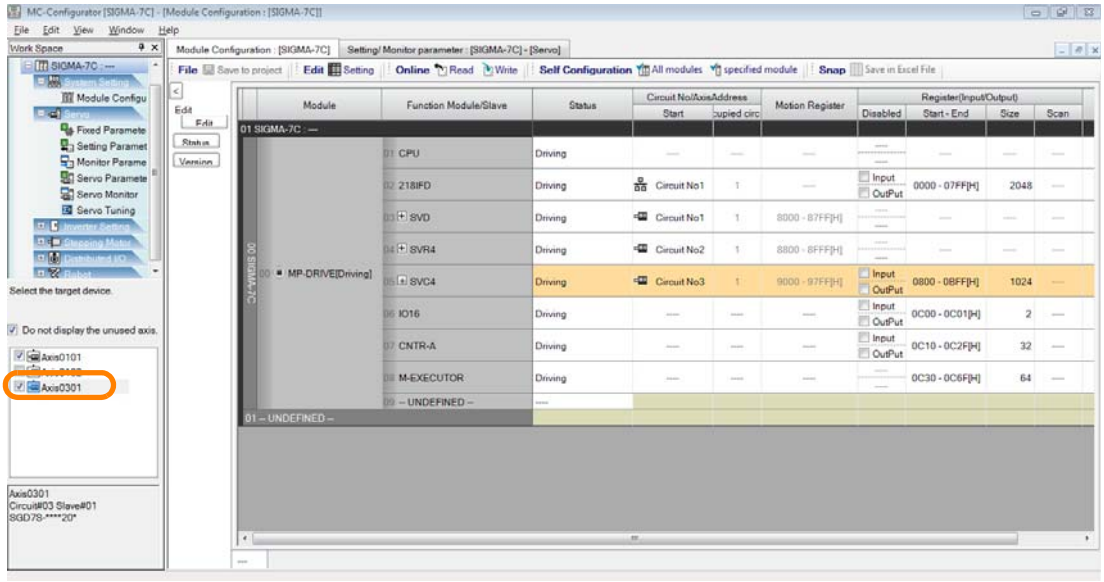
The following procedure is supported by MPE720 version 7.37 or higher.
For MPE720 version 7.36 or lower, refer to the procedures in the following section.
☞ *14.6.2 Checking Operation by Sensing Individual Motion Commands* on page 14-25

1. Click the **Module Configuration** Button on the My Tool View

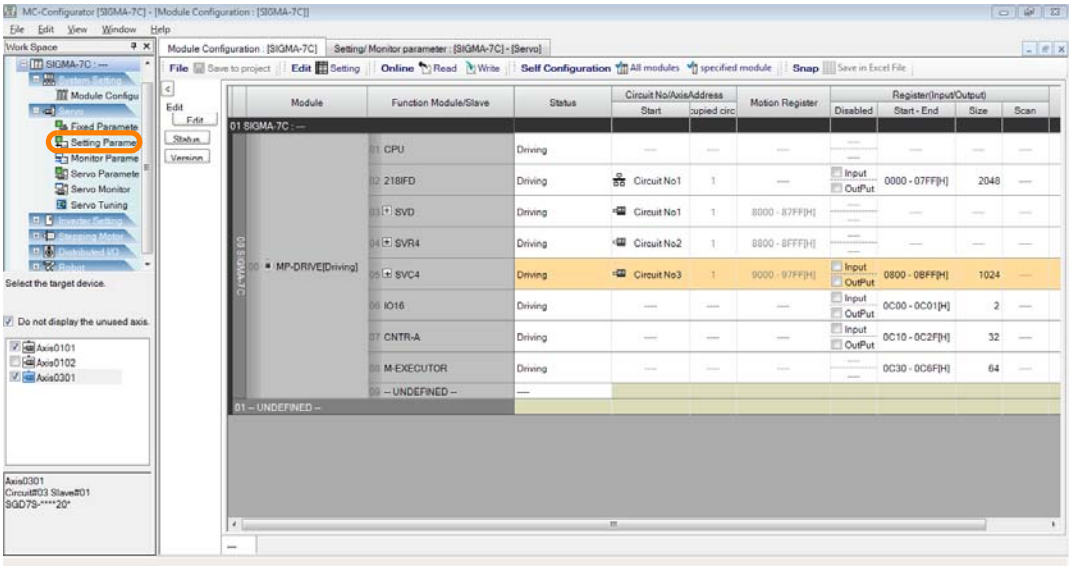


The Module Configuration Tab Page will be displayed.

2. In the Work Space Pane, select the check boxes for the servo axes for which you want to check operation.

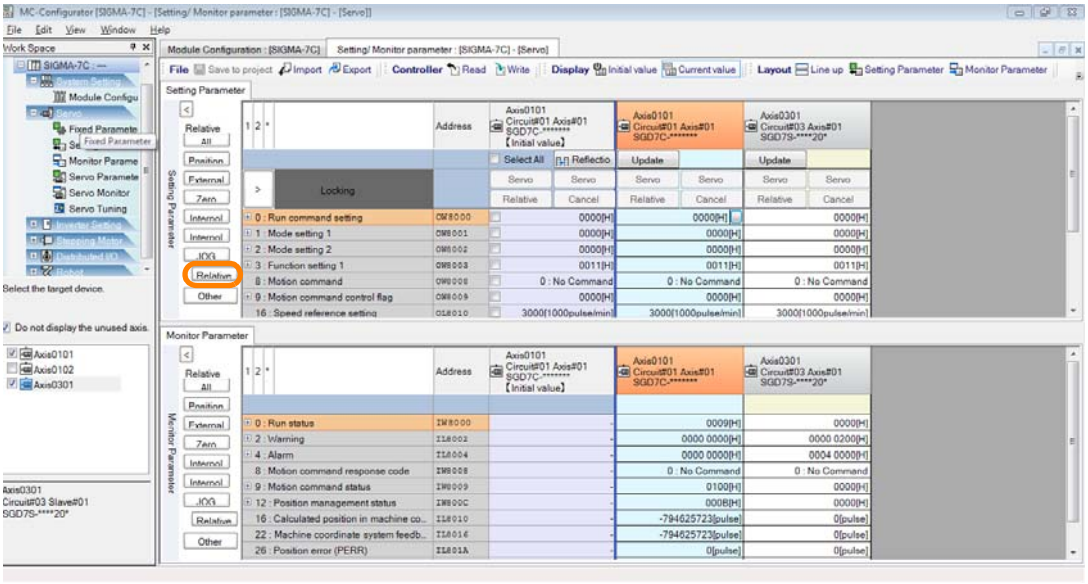


3. Double-click **Setting Parameters**.



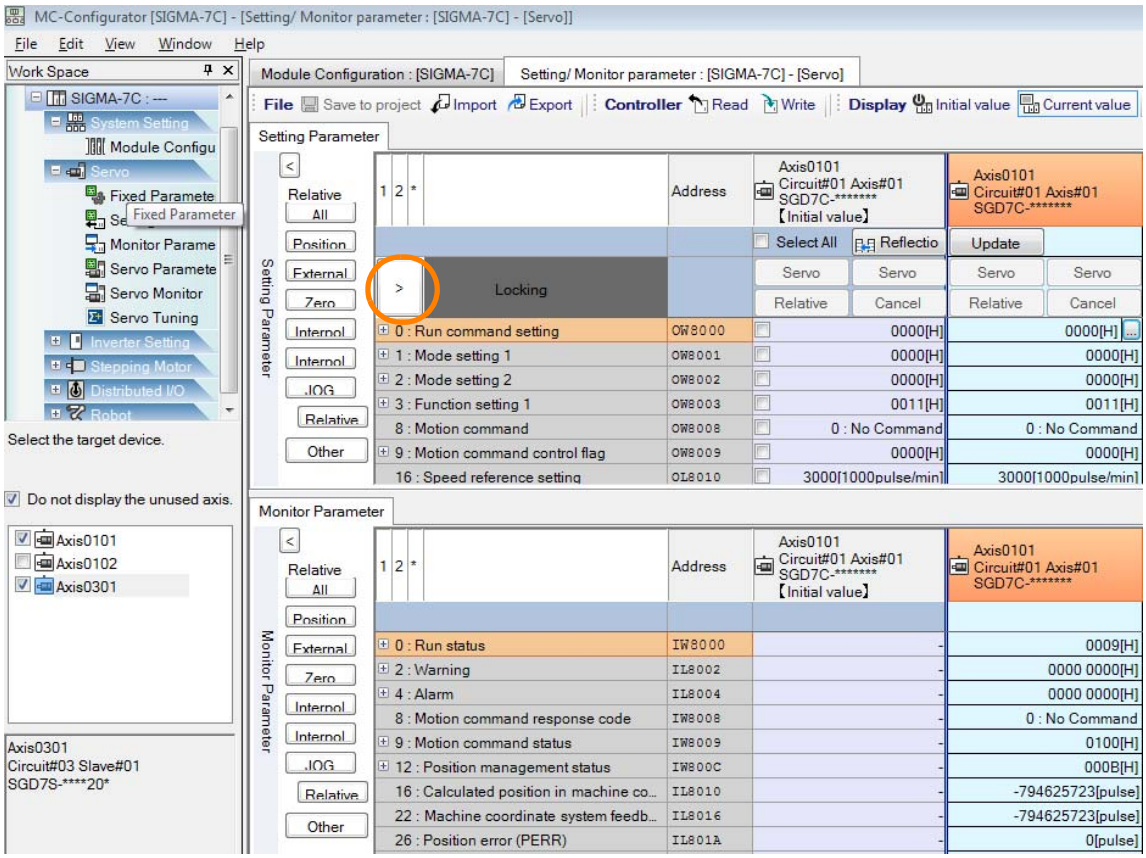
The Setting/Monitor Parameter Tab Page will be displayed.

4. Select the motion command for which to check the operation.

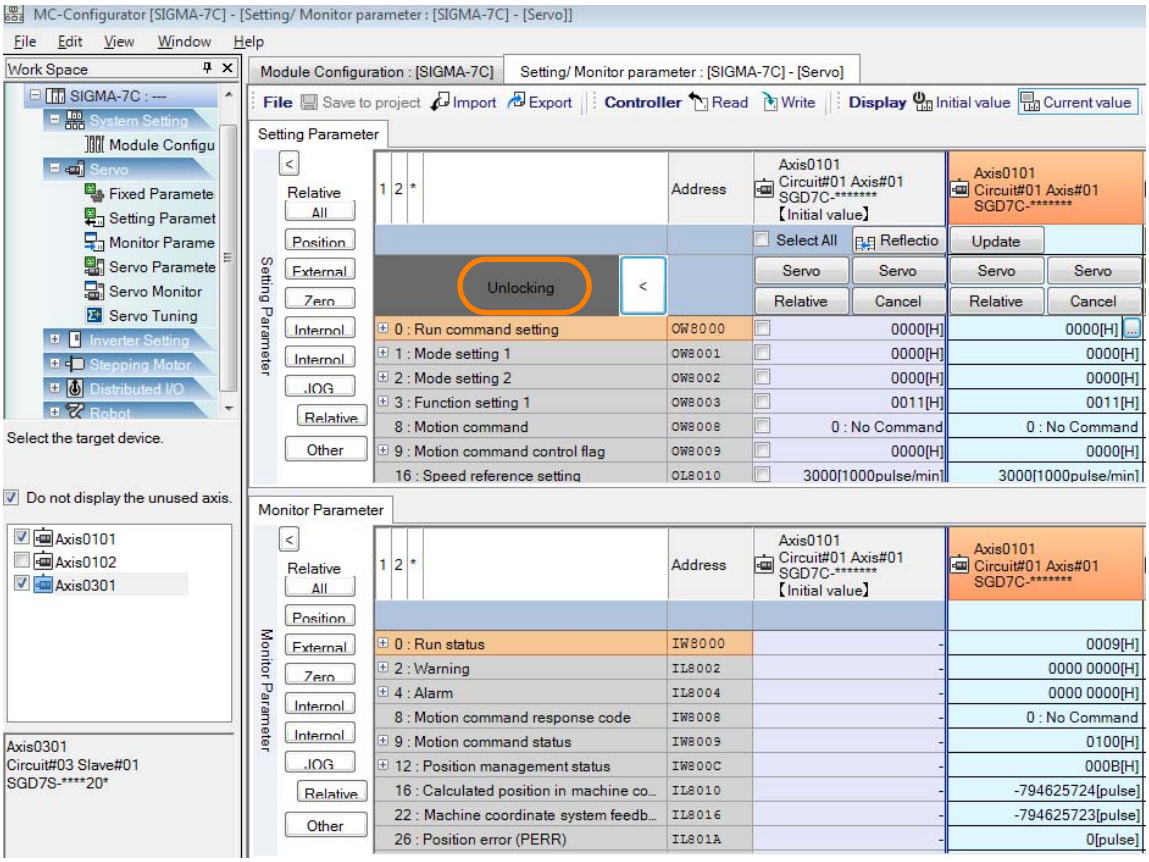


The parameters that are related to the selected motion command will be displayed.

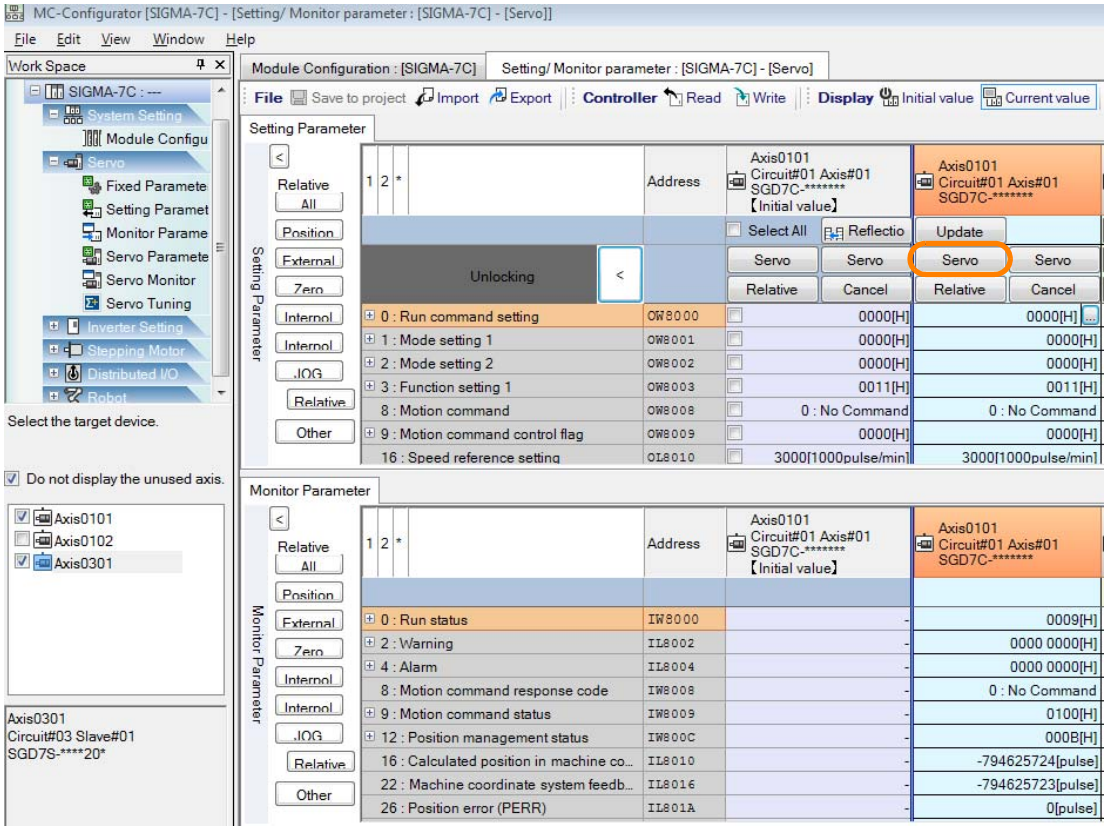
5. Click and hold down the ▶ Button next to the word “Locking” and slide it to the right.



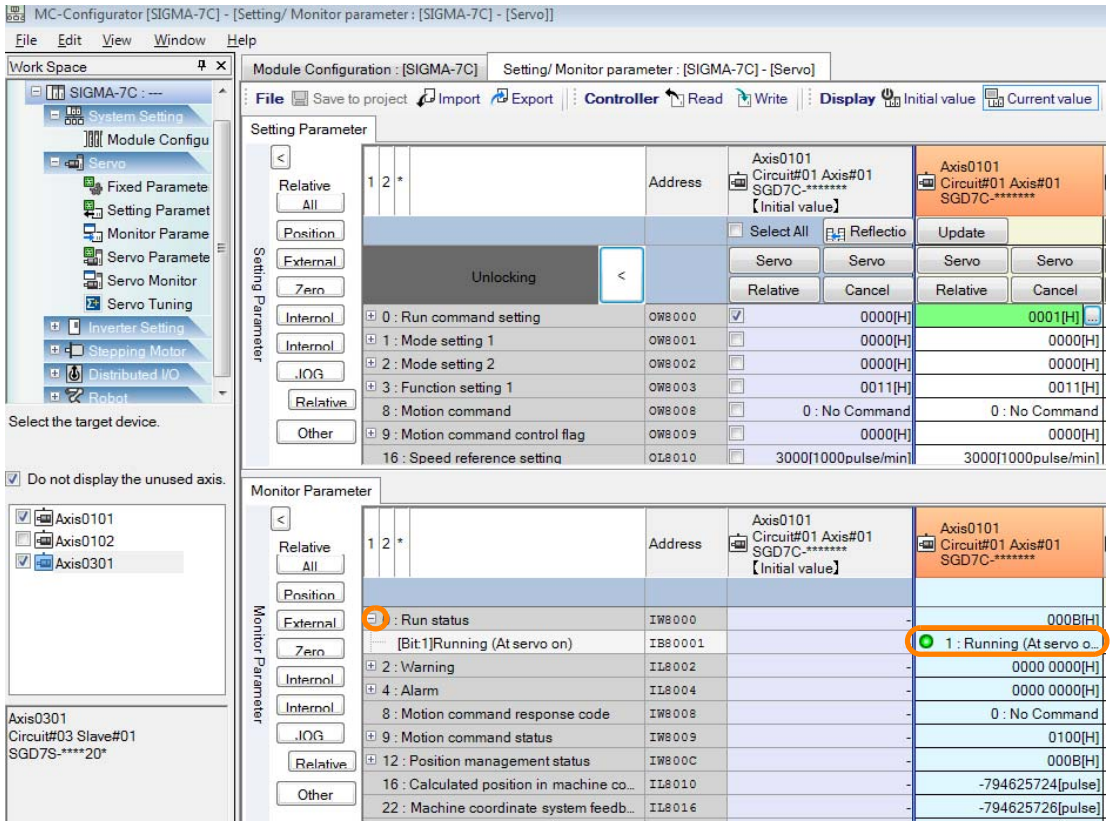
The controls will be unlocked.



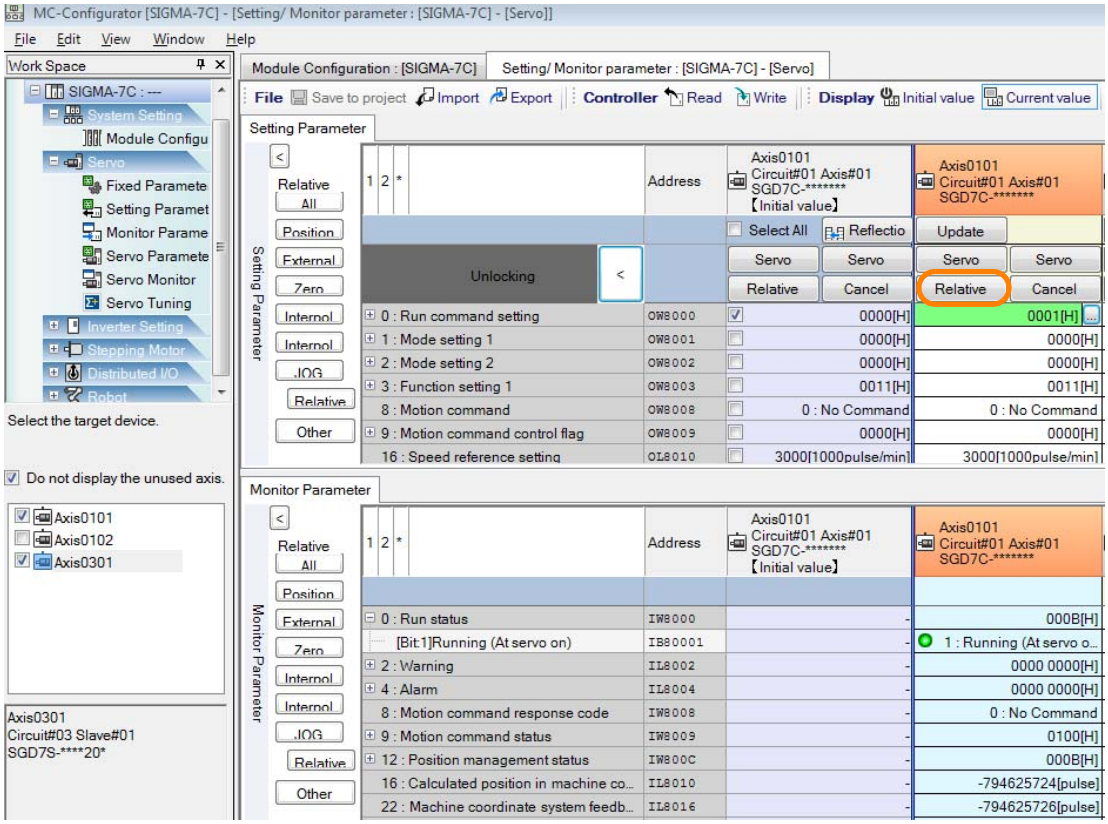
6. Click the **Servo** Button on the left side.



7. Click the + Button next to **0: Run status** on the Monitor Parameter Tab Page, and confirm that the cell that corresponds to **[Bit:1] Running (At servo on)** is set to **1: Running (At servo on)**.



8. Click a motion command button.

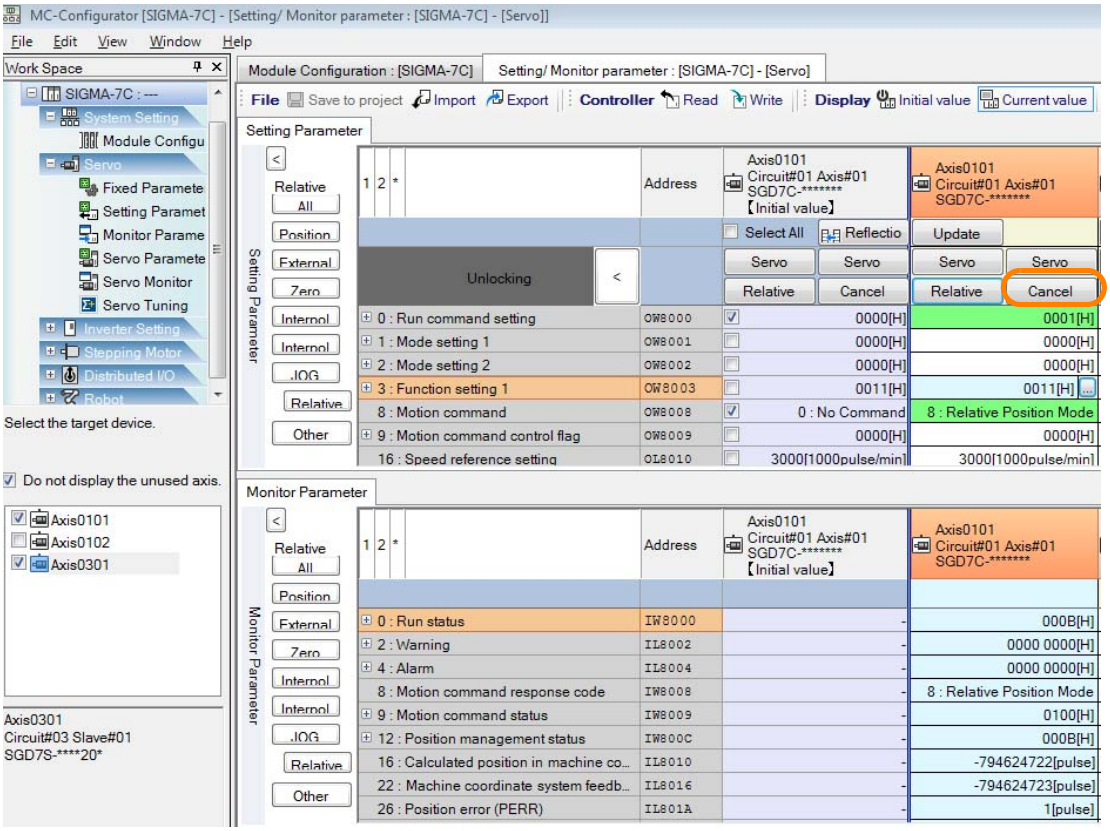


Information The **Relative** Button is shown in the example given above.

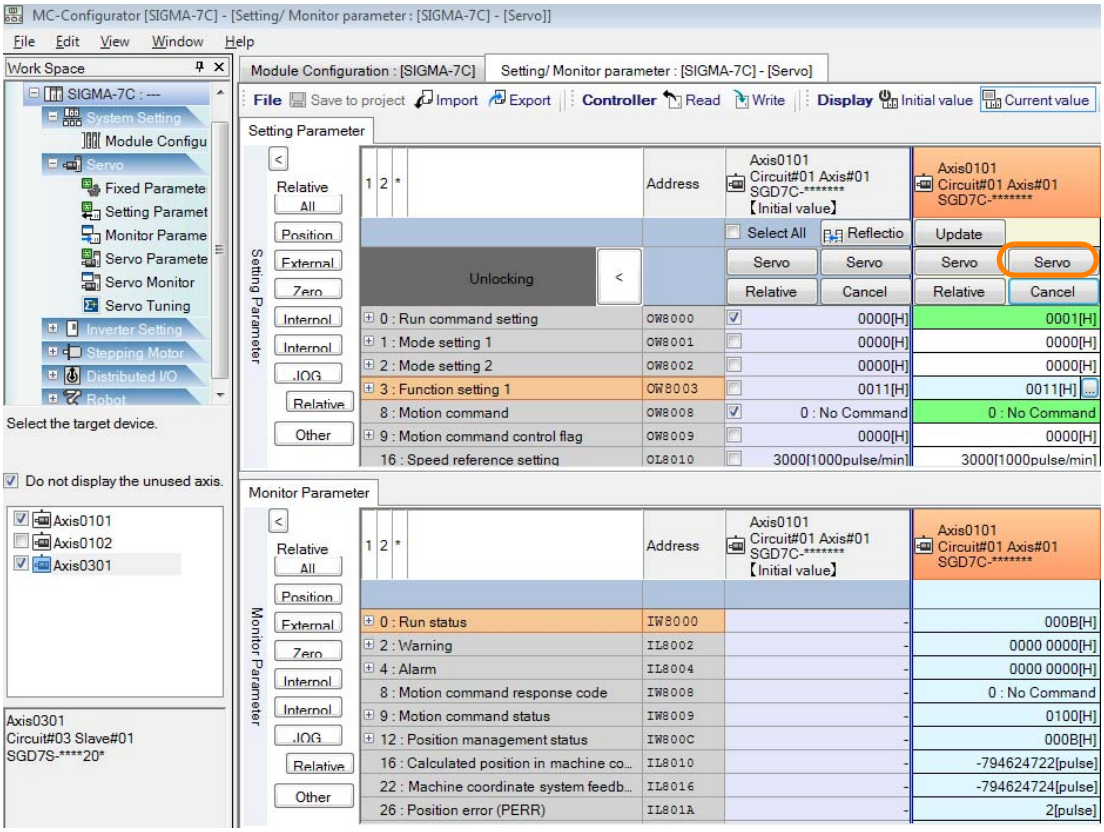
The motion command will be sent to the SERVOPACK.

9. Check the operation of the SERVOPACK.

10. Click the **Cancel** Button.



11. Click the **Servo** Button on the right side.



This concludes the procedure.

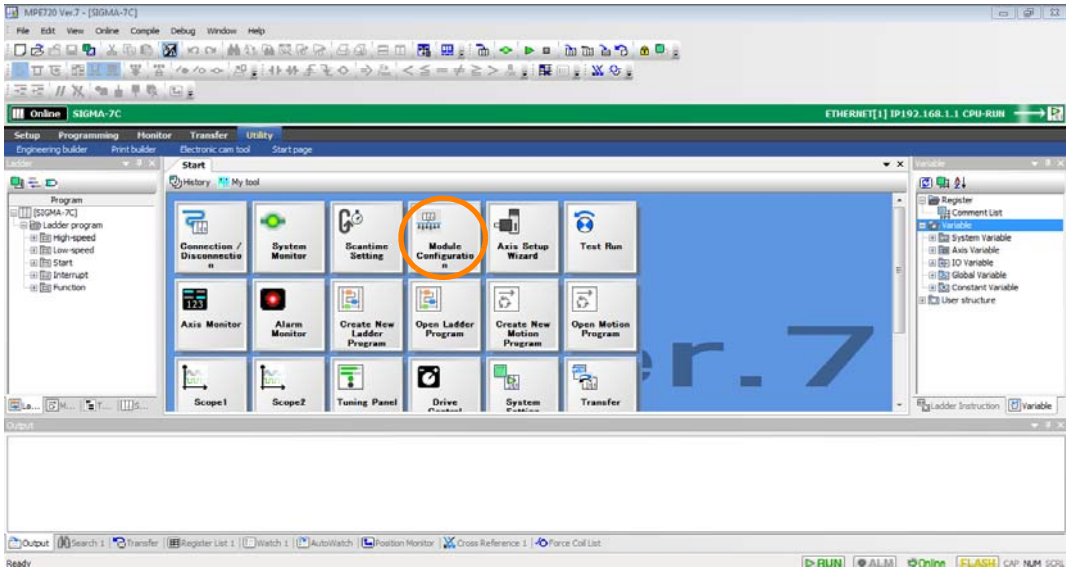
7.4 Comparing Parameters for Different Axes

When working with multi-axis configurations, it may be necessary to compare the parameters that are used for different axes. The MPE720 allows you to display the results of the comparison of the parameters for different axes. Use the following procedures to compare axes. However, you can compare only the fixed parameters and setting parameters between axes.

Information

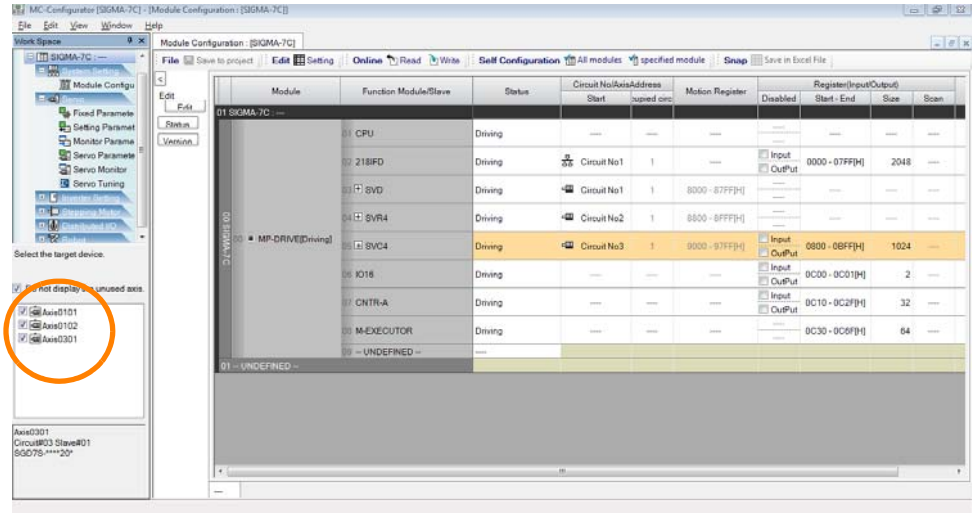
The following procedure is supported by MPE720 version 7.37 or higher.
For MPE720 version 7.36 or lower, refer to the procedures in the following section.
☞ *14.6.3 Comparing Parameters for Different Axes* on page 14-31

1. Click the **Module Configuration** Button on the My Tool View

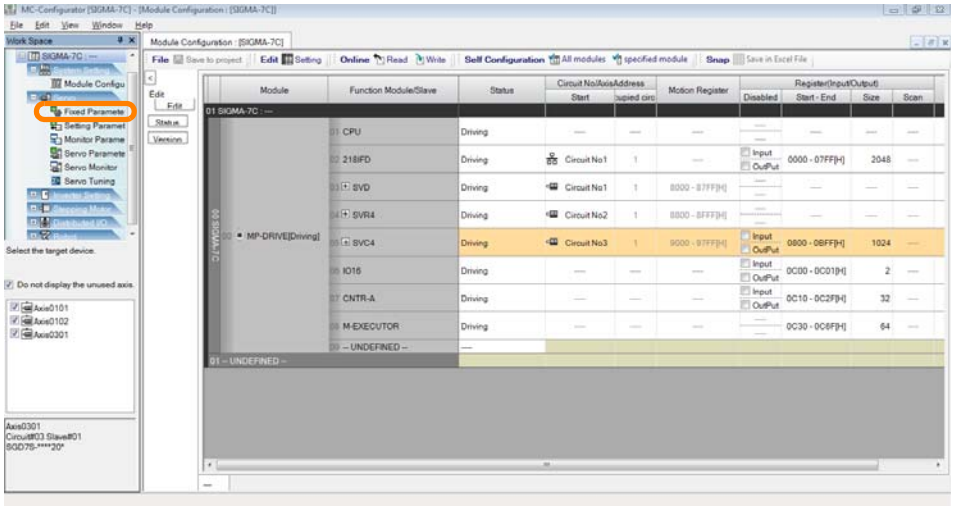


The Module Configuration Tab Page will be displayed.

2. In the Work Space Pane, select the check boxes for the servo axes for which you want to compare parameters.

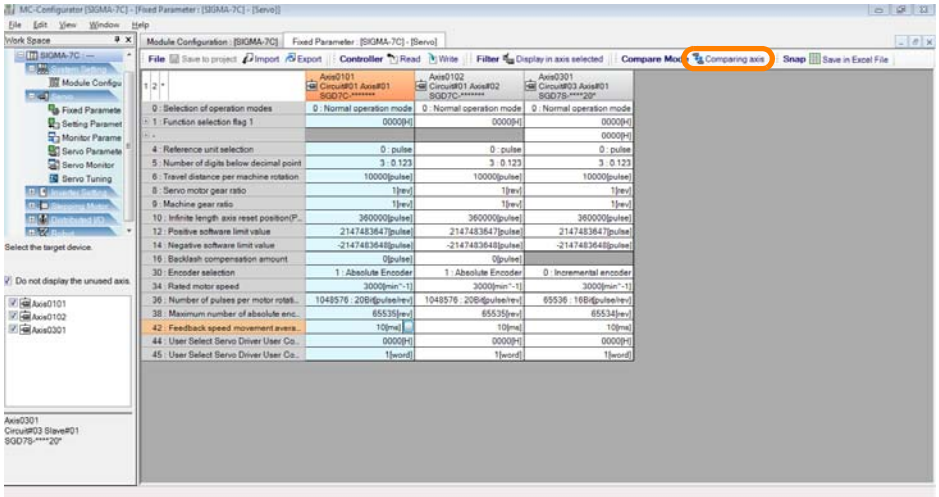


3. Double-click **Fixed Parameters**.

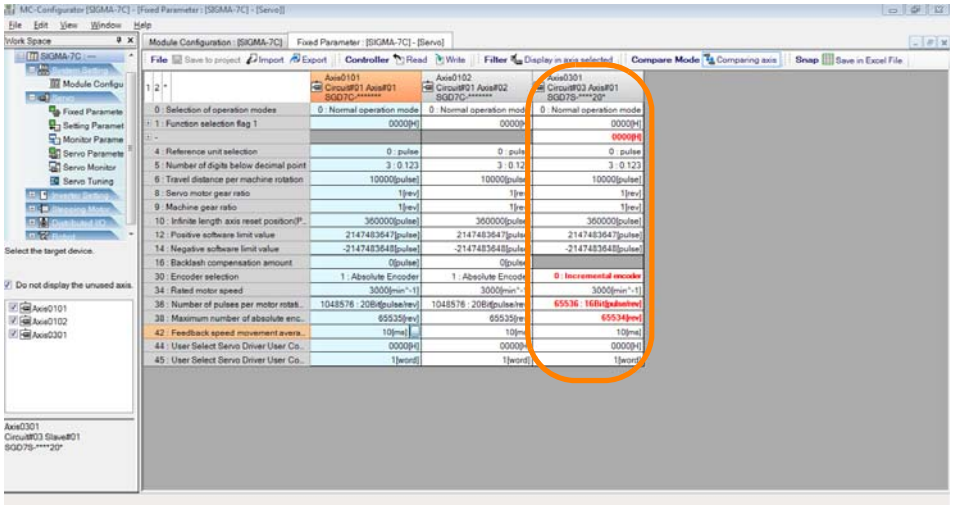


The parameters for the specified axes will be displayed.

4. Select the column of the axis to use as the source, and then click the **Comparing axis** Button next to **Compare Mode**.



The parameters that differ from the source axis will be highlighted in red.



This concludes the procedure.

7.5 Checking Servo Parameter Settings

The procedure to check the settings of servo parameters is different for standard models (i.e, Σ-V-series models and Σ-7-series models without FT/EX specifications) and for other models. The procedures are given below.

Information The following procedure is supported by MPE720 version 7.37 or higher.
For MPE720 version 7.36 or lower, refer to the procedures in the following section.
☞ *14.6.5 Checking Servo Parameter Settings* on page 14-37

7.5.1 Checking Parameters for Standard SERVOPACKs

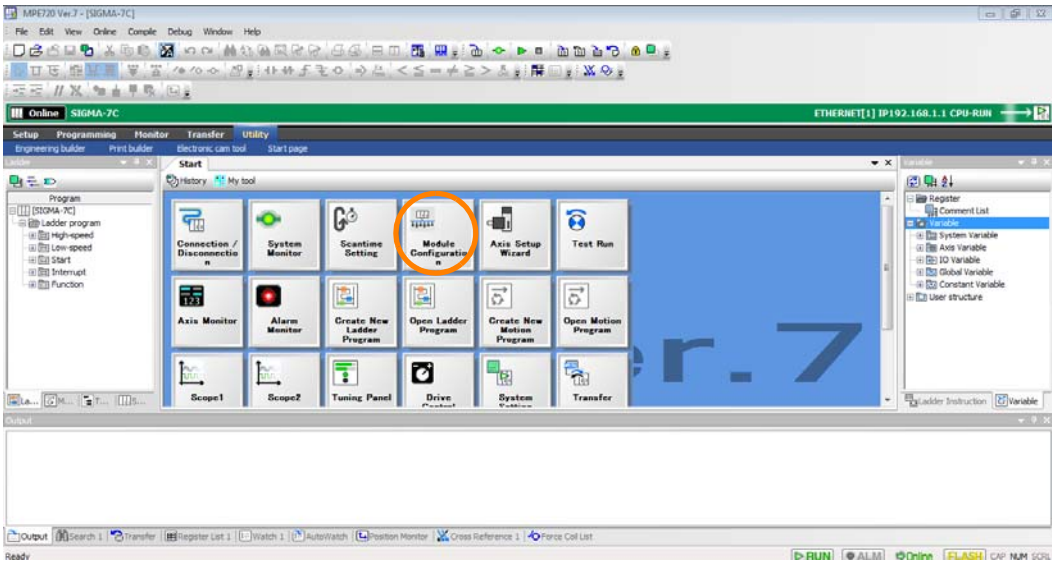
The servo parameters are saved in the following two locations.

- In the SERVOPACK
- In the Machine Controller

This section describes the procedures to check the servo parameter settings for each of these.

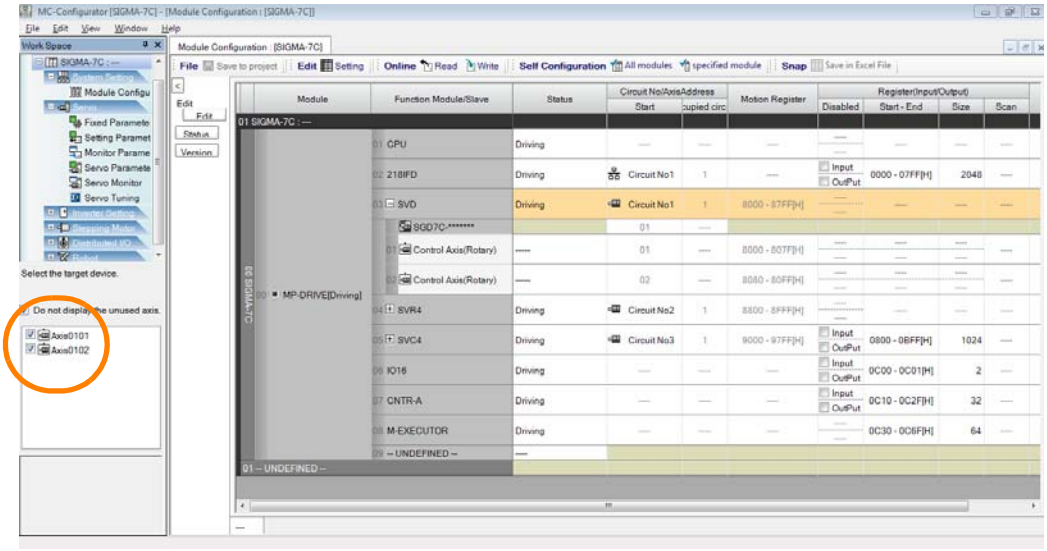
Checking Servo Parameter Settings in the SERVOPACK

1. Click the **Module Configuration** Button on the My Tool View

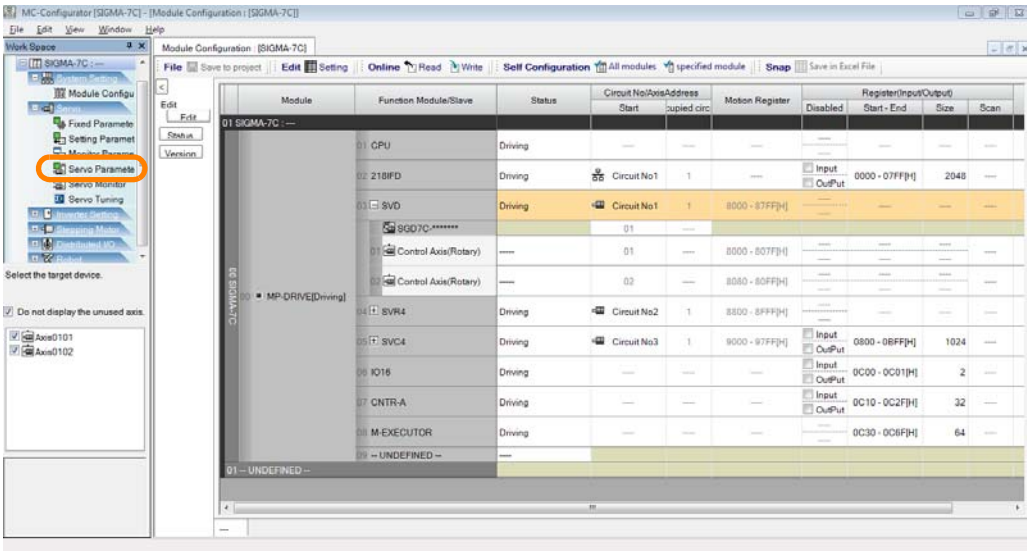


The Module Configuration Tab Page will be displayed.

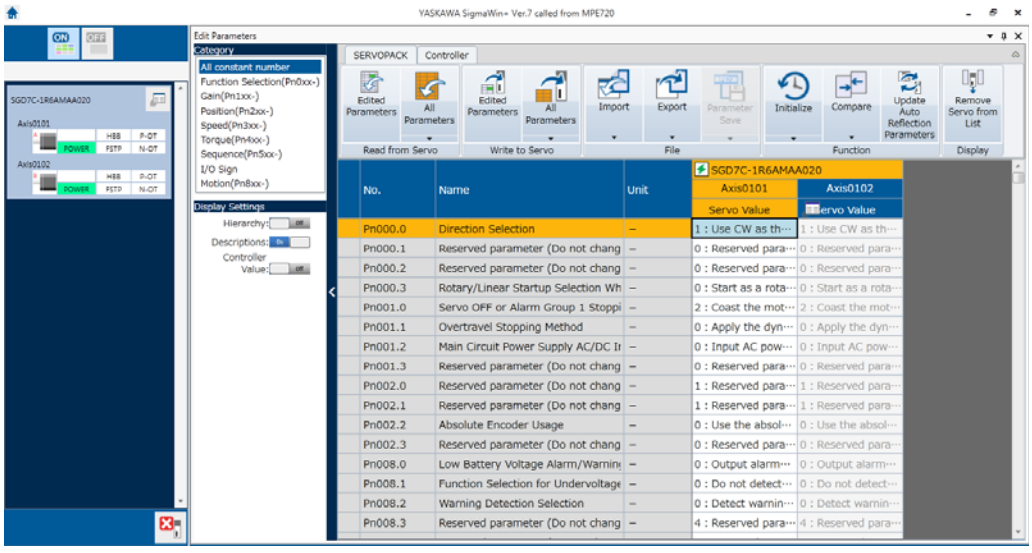
2. In the Work Space Pane, select the check boxes for the servo axes for which you want to check the parameter settings.



3. Double-click **Servo Parameters**.



SigmaWin+ Ver. 7 will be started with the servo axes for which to check parameter settings already allocated, and the Edit Parameter Window will be displayed.

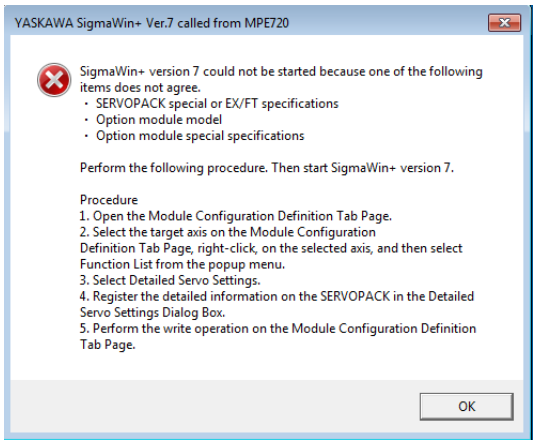


This concludes the procedure.

Information

If you attempt to use the above procedure to check parameter settings for a SERVOPACK that is not a standard model, an error will occur when SigmaWin+ Ver. 7 is started and the following dialog box will be displayed. Always use the following procedure for non-standard SERVOPACK models.

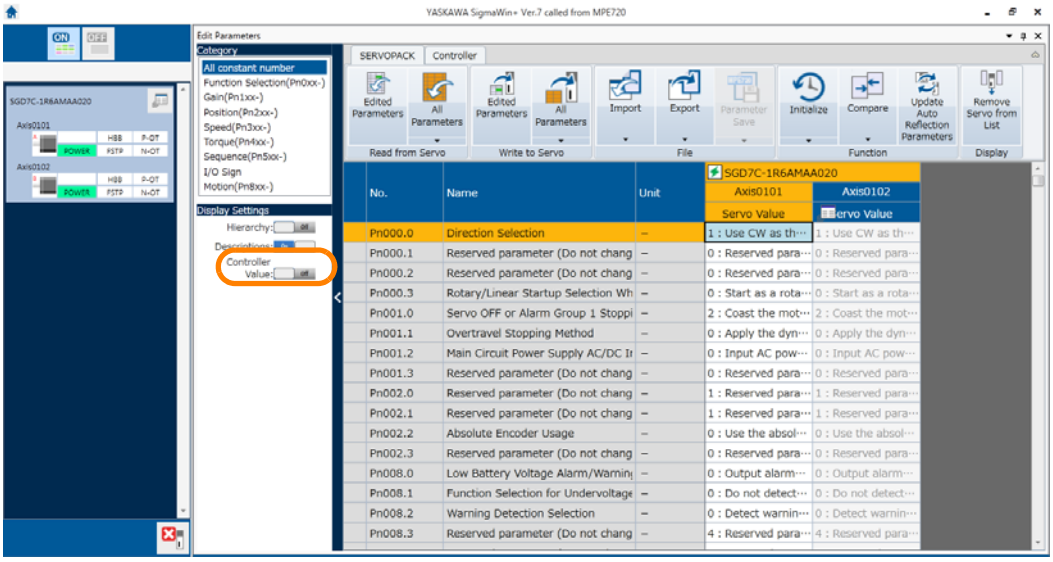
☞ *7.5.2 Checking Parameters for SERVOPACKs That Are Not Standard Models* on page 7-20



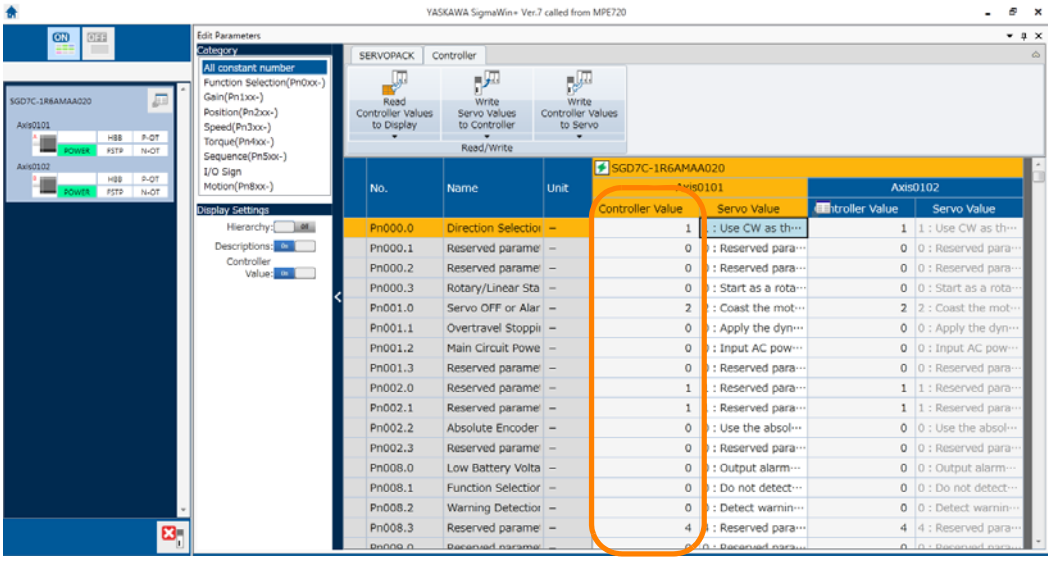
Checking Servo Parameter Settings in the Machine Controller

1. Display the servo parameter settings in the SERVOPACK.
   Refer to the following section for the procedure.
   ☞ *Checking Servo Parameter Settings in the SERVOPACK* on page 7-16

2. Turn ON the **Controller Value** setting in the Display Settings Group.



The SERVOPACK parameters from the Controller will be displayed.



Information If the parameters are not saved in the Controller, "-" will be displayed in the **Controller Value** Column.

No.	Name	Unit	SGD7C-1R6AMAA020 Axis0101 Controller Value	Servo Value
Pn000.0	Direction Selection	–	–	1 : Use CW as th···

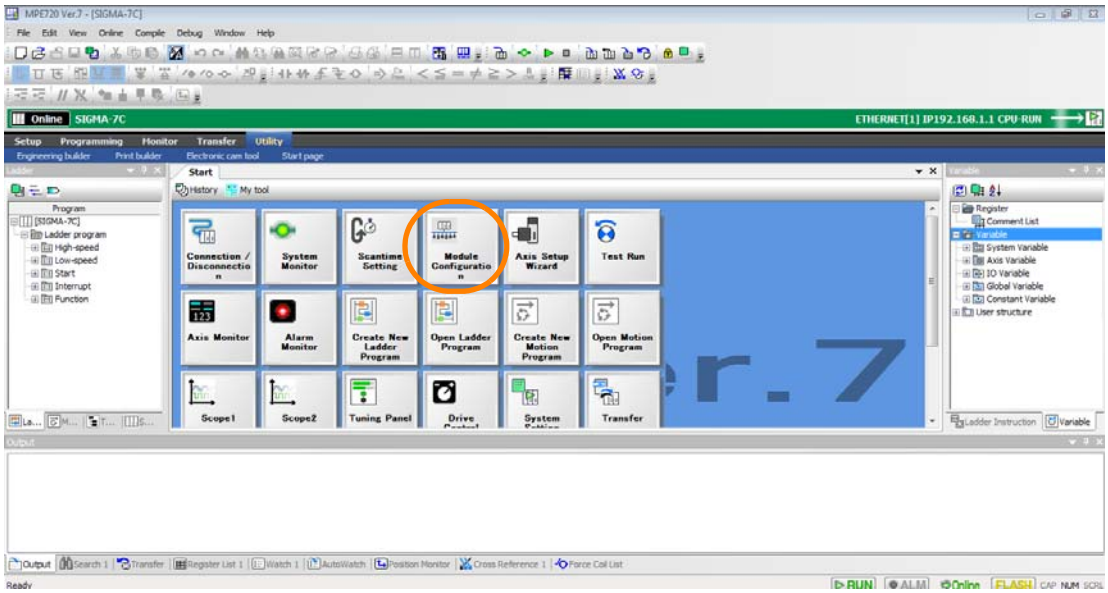
If the servo values and Controller values are different, the Controller value will be displayed in red.

No.	Name	Unit	SGD7C-1R6AMAA020 Axis0101 Controller Value	Servo Value
Pn100	Speed Loop Gain	0.1Hz	400	500

This concludes the procedure.

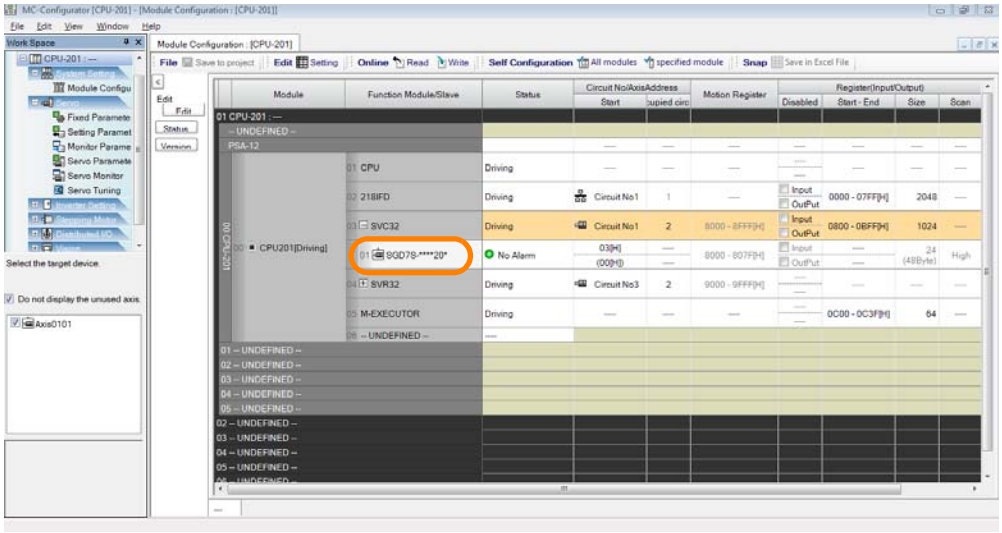
7.5.2 Checking Parameters for SERVOPACKs That Are Not Standard Models

1. Click the **Module Configuration** Button on the My Tool View



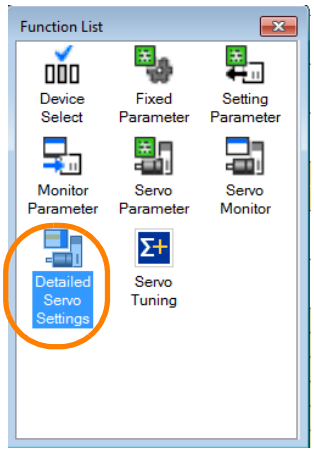
The Module Configuration Tab Page will be displayed.

2. Double-click the servo axis for which to check the parameter settings in the list on the Module Configuration Tab Page.



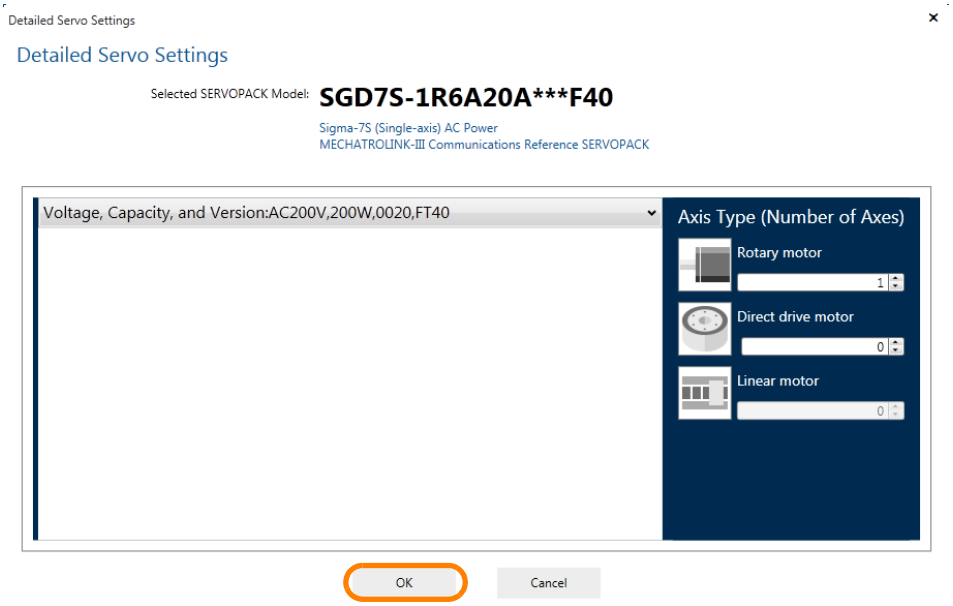
The Function List Dialog Box will be displayed.

3. Click the **Detailed Servo Settings** Icon.

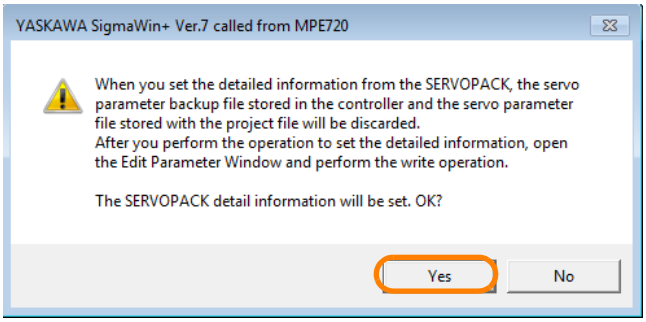


SigmaWin+ Ver. 7 will be started and the Detailed Servo Settings Dialog Box for the selected servo axis will be displayed.

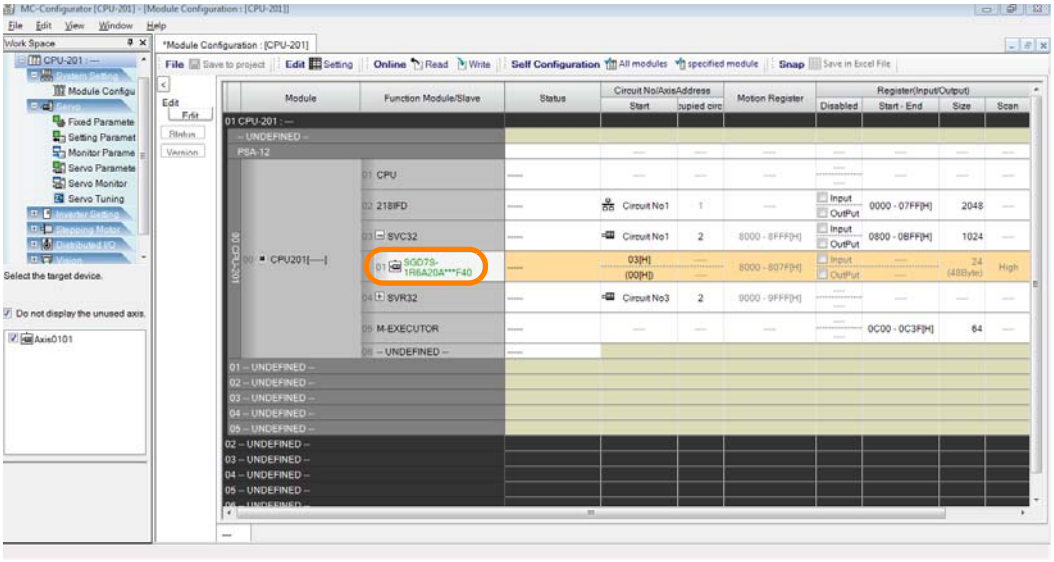
4. Click the **OK** Button.



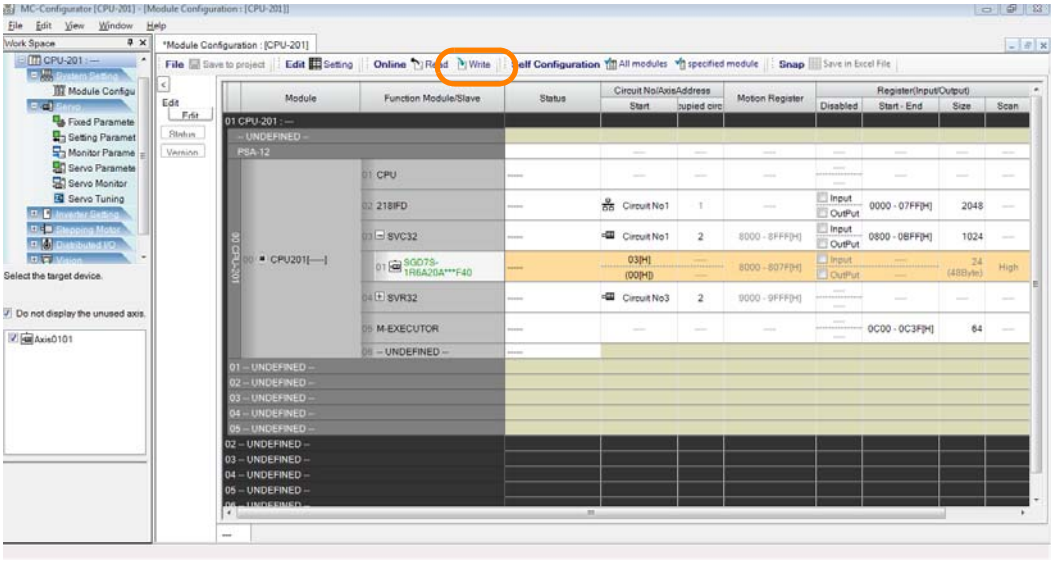
5. Click the **Yes** Button.



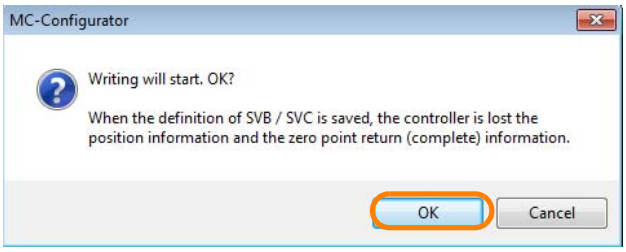
Detailed information on the SERVOPACK will be set for the servo axis on the Module Configuration Tab Page.



6. Click the **Write** Button.

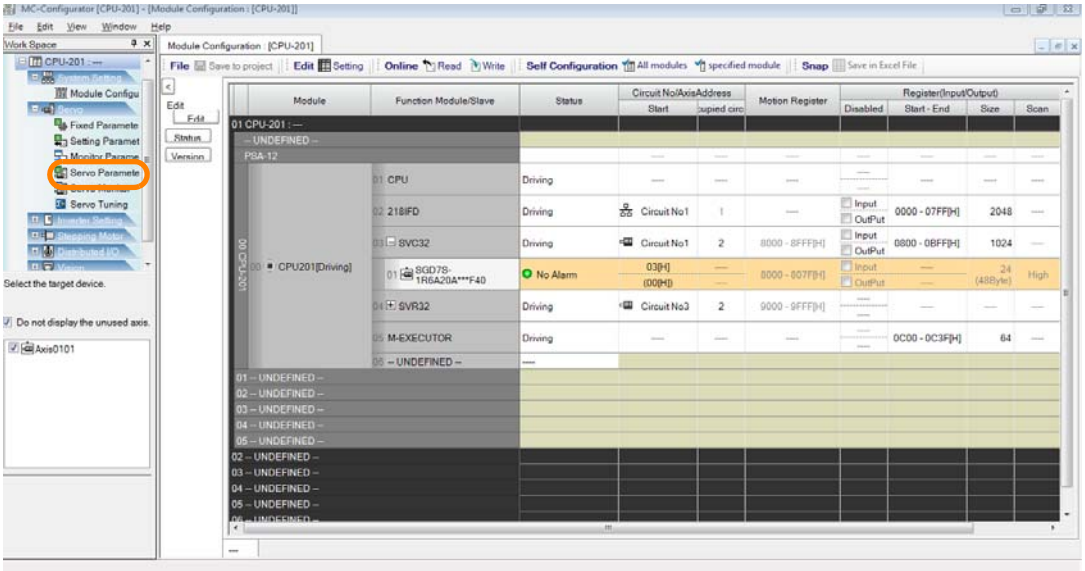


7. Click the **OK** Button.

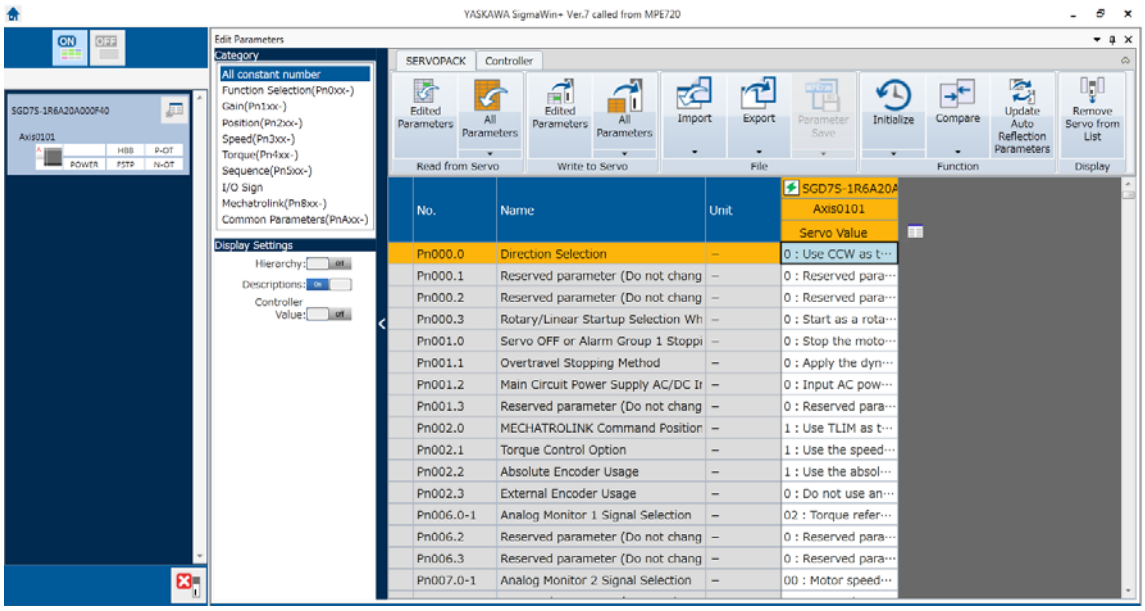


The detailed SERVOPACK settings will be written to the Controller.

8. Double-click **Servo Parameters**.



SigmaWin+ Ver. 7 will be started with the servo axes for a non-standard model already allocated, and the Edit Parameter Window will be displayed.



This concludes the procedure.

7.6 Writing Parameters to the SERVOPACK or Machine Controller

Information The following procedure is supported by MPE720 version 7.37 or higher.
For MPE720 version 7.36 or lower, refer to the procedures in the following section.
☞ *14.6.6 Writing Parameters to the SERVOPACK or Machine Controller* on page 14-41

7.6.1 Parameters That Are Written and Save Locations

The parameters that are written and where they are saved depends on the connection status, the parameter data that is displayed, and the writing method.

Written Parameters: Fixed Parameters and Setting Parameters

Type of Connection	Project File Status	Connection Name	Parameter Data Displayed in the MPE720 Window	Writing Method	Parameter Data Save Location
Online connection	Open	Project link connection	Data in Machine Controller RAM	Saving in project	In the open project file
				Writing	RAM in the Machine Controller
	Not open	Direct connection	Data in Machine Controller RAM	Saving in project	–
				Writing	RAM in the Machine Controller
Offline connection	Open	–	In the open project file	Saving in project	In the open project file
				Writing	–

Written Parameters: SERVOPACK Parameters (Σ-V-Series SERVOPACKs and Later SERVOPACKs)

Type of Connection	Project File Status	Connection Name	Parameter Data Displayed in the SigmaWin+ Edit Parameter Window	Writing Method		Parameter Data Save Location
				MPE720	SigmaWin+	
Online connection	Open	Project link connection	Data saved in SERVOPACK*1	Saving in project	–	In the open project file
				–	Writing to servo	SERVOPACK
					Writing servo values to Controller	RAM in Machine Controller and open project file*2
					Writing Controller values to servo	SERVOPACK and open project file*2
	Not open	Direct connection	Data saved in SERVOPACK*1	–	Writing to servo	SERVOPACK
					Writing servo values to Controller	RAM in Machine Controller
					Writing Controller values to servo	SERVOPACK

Continued on next page.

Continued from previous page.

Type of Connection	Project File Status	Connection Name	Parameter Data Displayed in the SigmaWin+ Edit Parameter Window	Writing Method		Parameter Data Save Location
				MPE720	SigmaWin+	
Offline connection	Open	–	In the open project file	Saving in project	–	In the open project file
				–	Saving parameters	In the open project file*2

*1. This is the default display status. You can also display the RAM data from the Machine Controller at the same time. Refer to the following section for details.
☞ *Servo Parameters* on page 7-32

*2. A temporary file is saved. To save the data to the project file, click the **Save to project** Button in the Module Configuration Tab Page.

Information The servo common parameters that are defined in the standard servo profile for MECHATROLINK-III can be displayed on the SigmaWin+ when it is started from the MPE720. Although you can display the servo common parameters, you cannot write them.

Written Parameters: SERVOPACK Parameters for Σ-III-Series SERVOPACKs and Later SERVOPACKs, or Servo Amplifier from Another Company

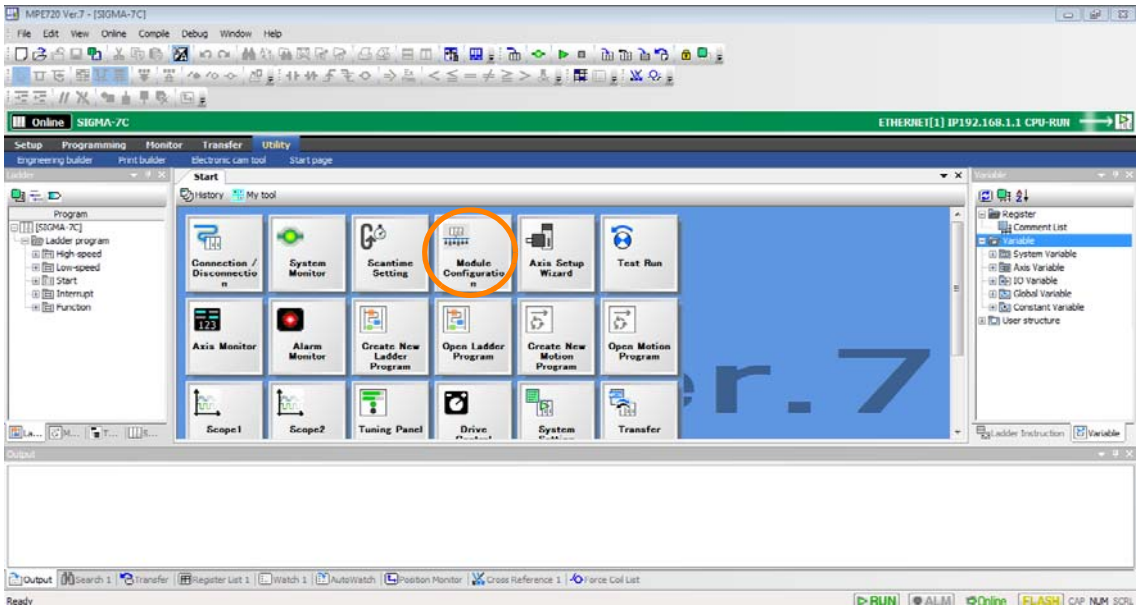
Type of Connection	Project File Status	Connection Name	Parameter Data Displayed in the MPE720 Window	Writing Method	Parameter Data MPE720 SigmaWin+ Save Location
Online connection	Open	Project link connection	Data saved in SERVOPACK	Saving in project	In the open project file
				Writing	SERVOPACK and open project file
	Not open	Direct connection	Data saved in SERVOPACK	Saving in project	–
				Writing	SERVOPACK
Offline connection	Open	–	In the open project file	Saving in project	In the open project file
				Writing	–

7.6.2 Operating Procedure

The procedure to write parameters to the SERVOPACK or Machine Controller is different for the parameters. The procedures are given below.

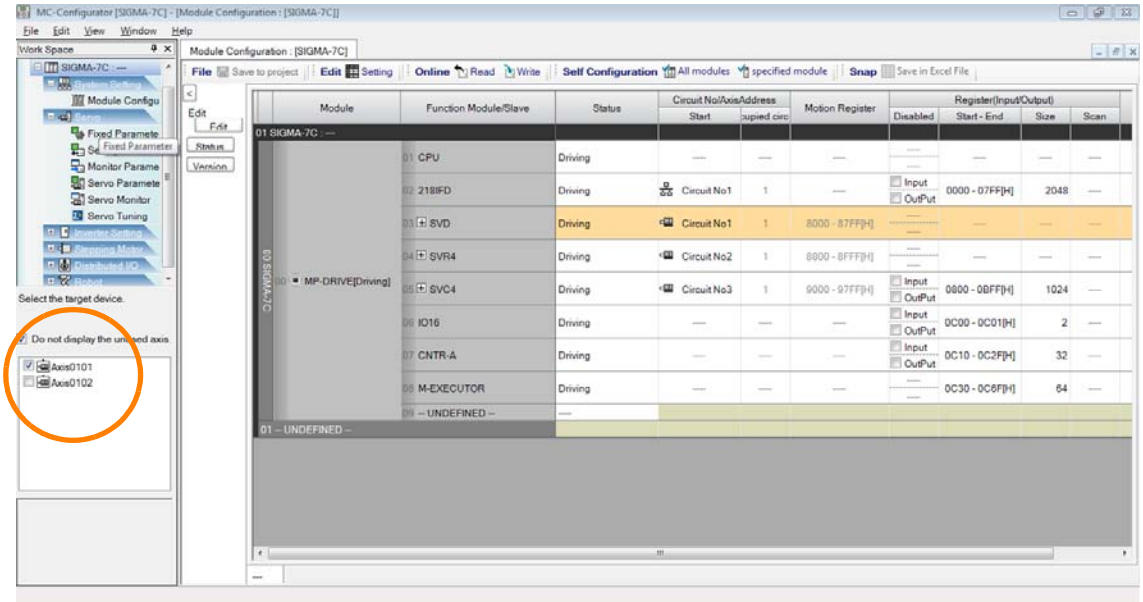
Fixed Parameters

1. Click the **Module Configuration** Button on the My Tool View.

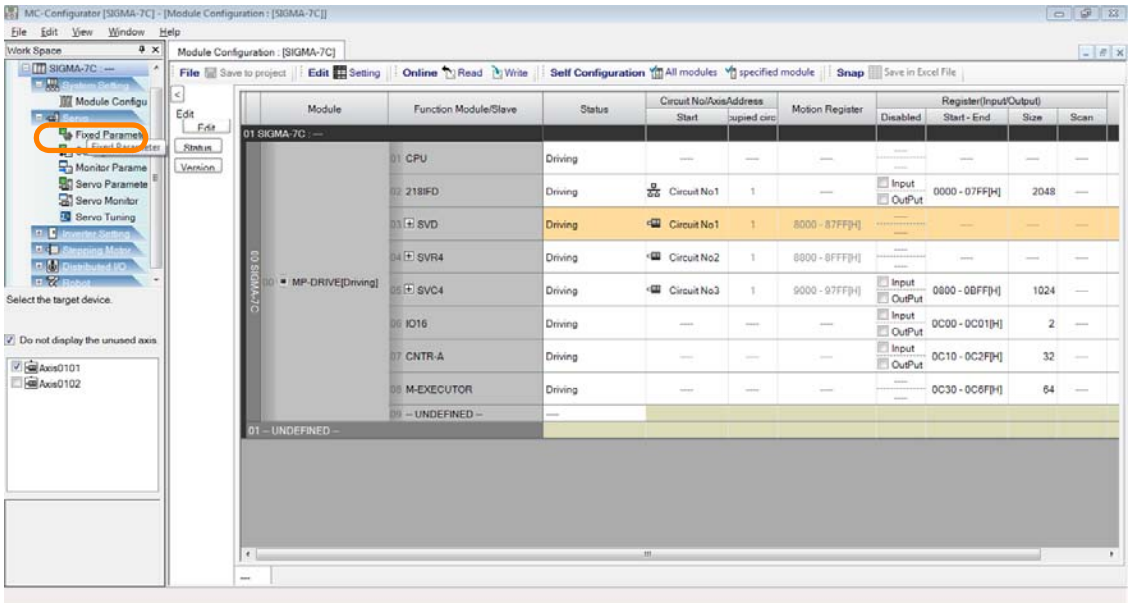


The Module Configuration Tab Page will be displayed.

2. In the Work Space Pane, select the check boxes for the servo axes for which you want to write the parameters.

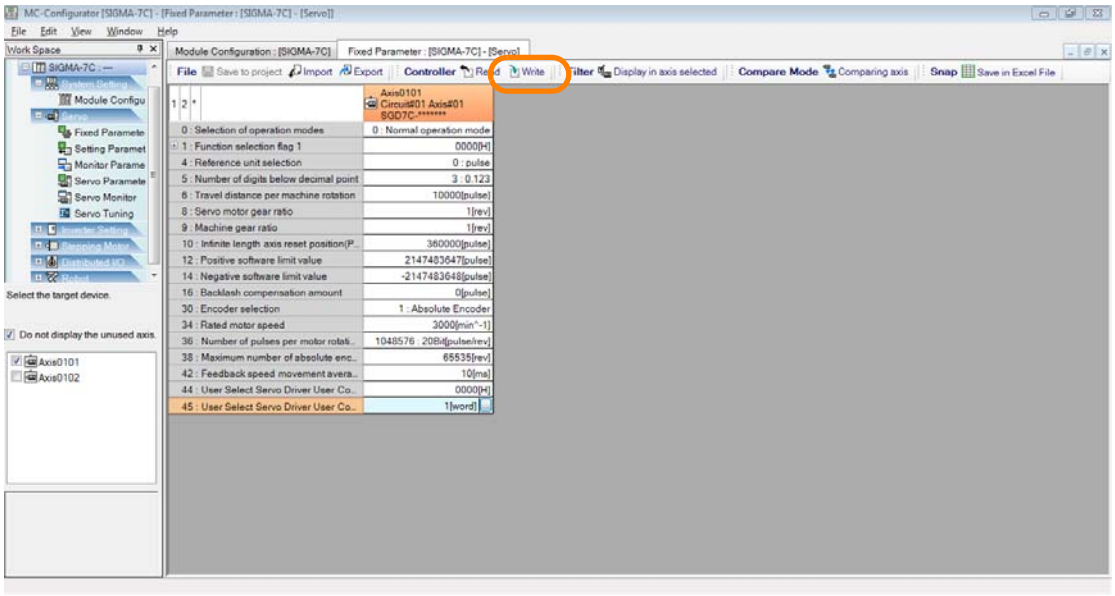


3. Double-click **Fixed Parameters**.



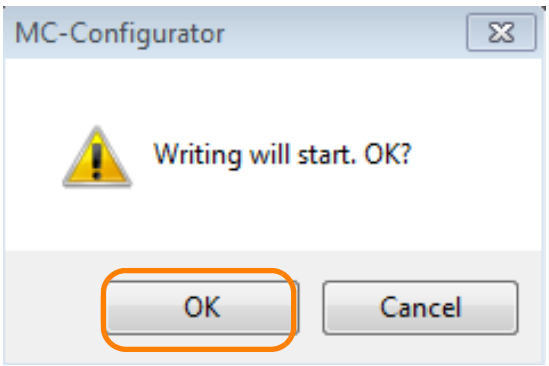
The parameters for the specified axes will be displayed.

4. Click the **Write** Button next to **Controller**.



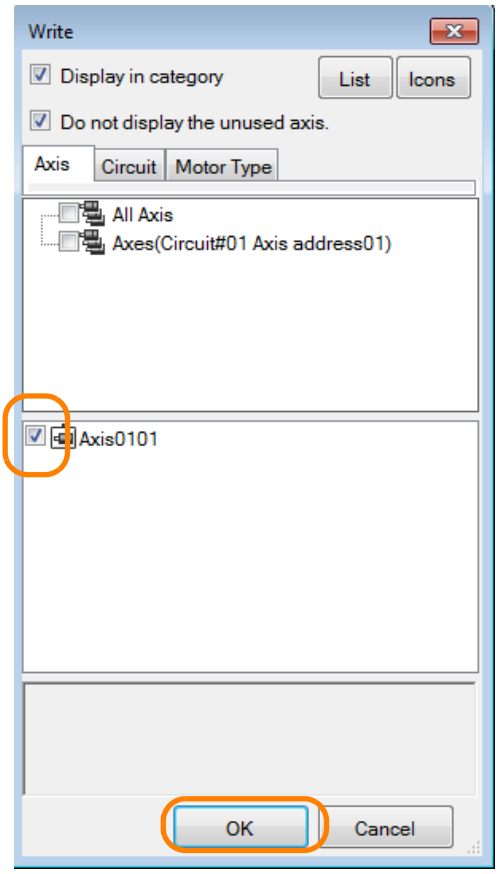
The MC-Configurator Dialog Box will be displayed.

5. Click the **OK** Button.



The Write Dialog Box will be displayed.

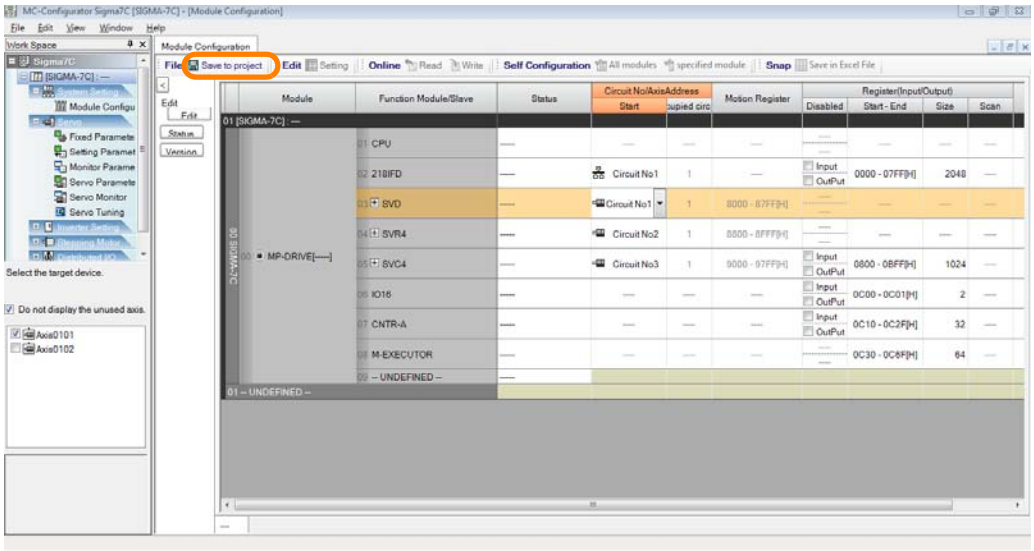
6. Select the axes to which to write the parameters and click the **OK** Button.



The write will be executed.

Perform the following step only when you want to save the parameters in the project file. If you do not want to save them in the project file, then this concludes the procedure.

7. Click the **Save to Project** Button next to **File.**

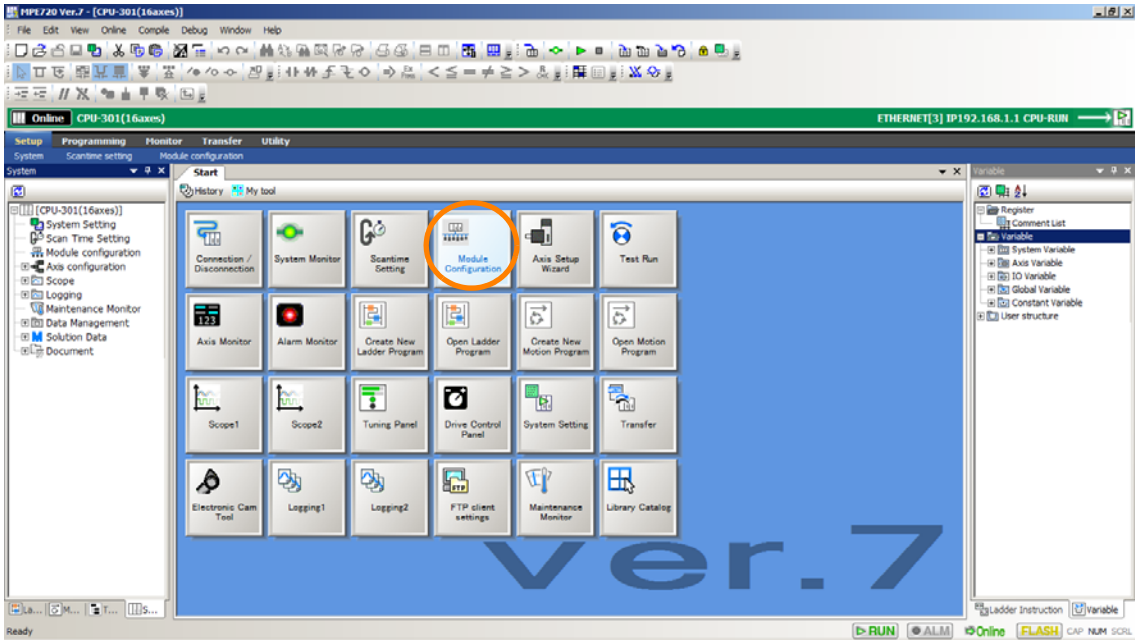


The parameters will be saved to the project file.

This concludes the procedure.

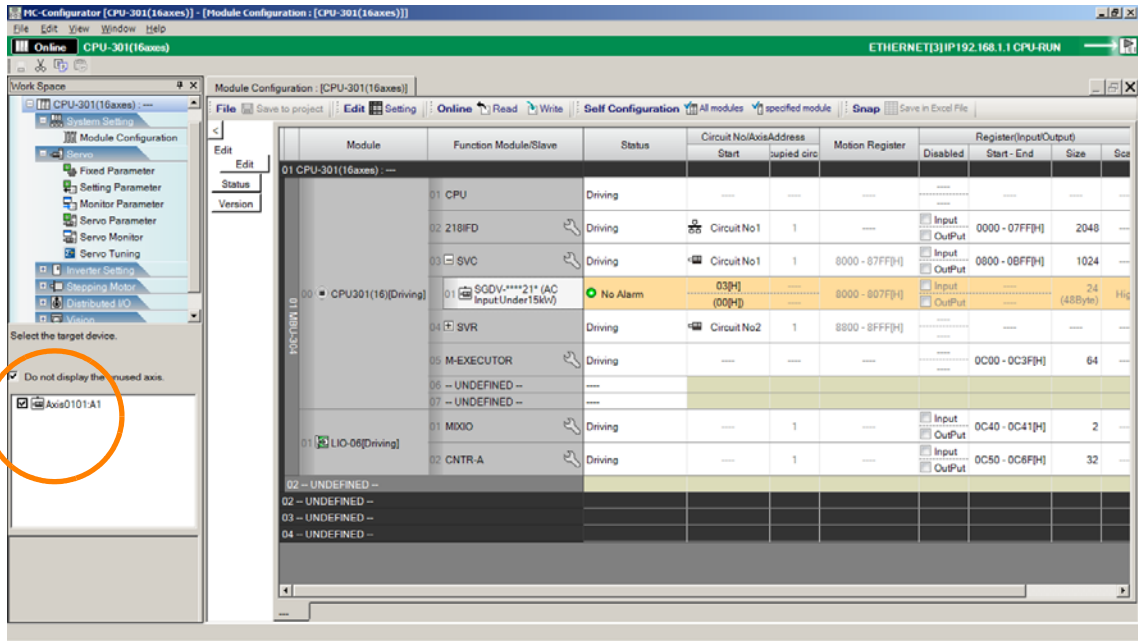
Setting Parameters

1. Click the **Module Configuration** Button on the My Tool View?

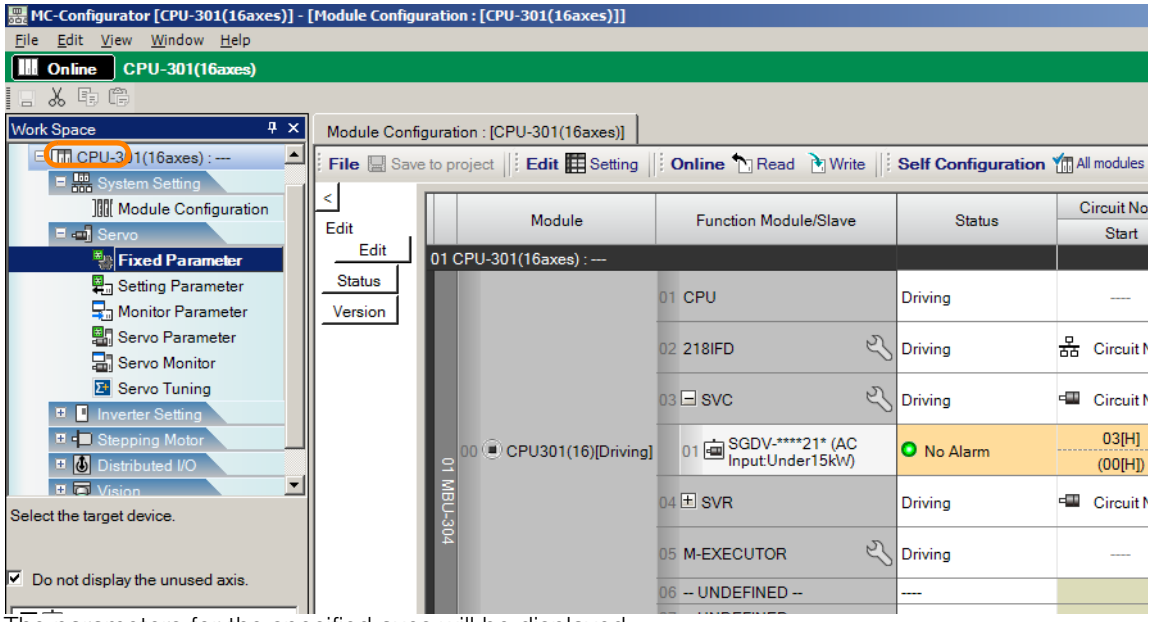


The Module Configuration Tab Page will be displayed.

2. In the Work Space Pane, select the check boxes for the servo axes for which you want to write the parameters.

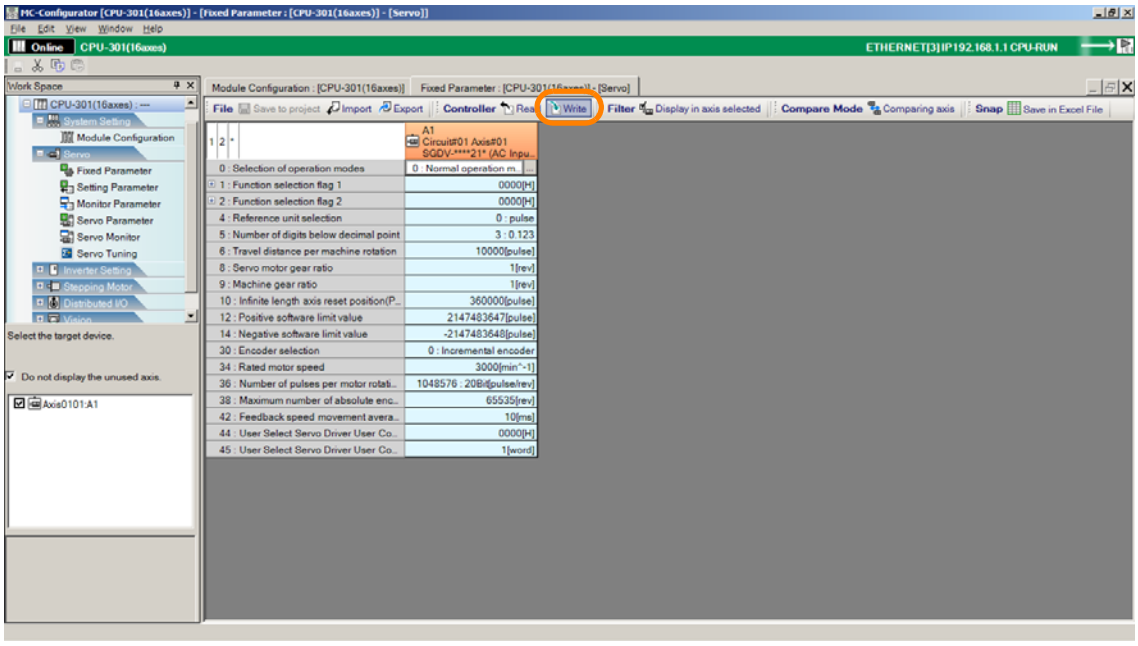


3. Double-click **Fixed Parameters**.



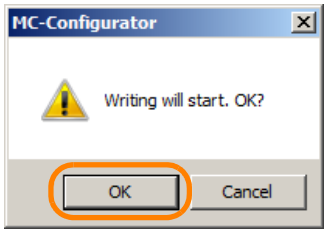
The parameters for the specified axes will be displayed.

4. Click the **Write** Button next to **Controller**.



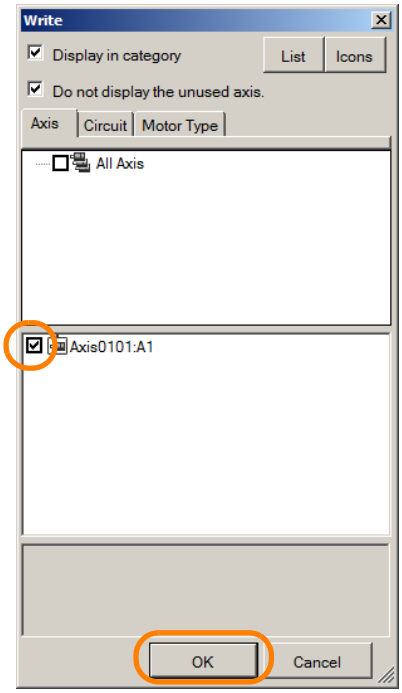
The MC-Configurator Dialog Box will be displayed.

5. Click the **OK** Button.



The Write Dialog Box will be displayed.

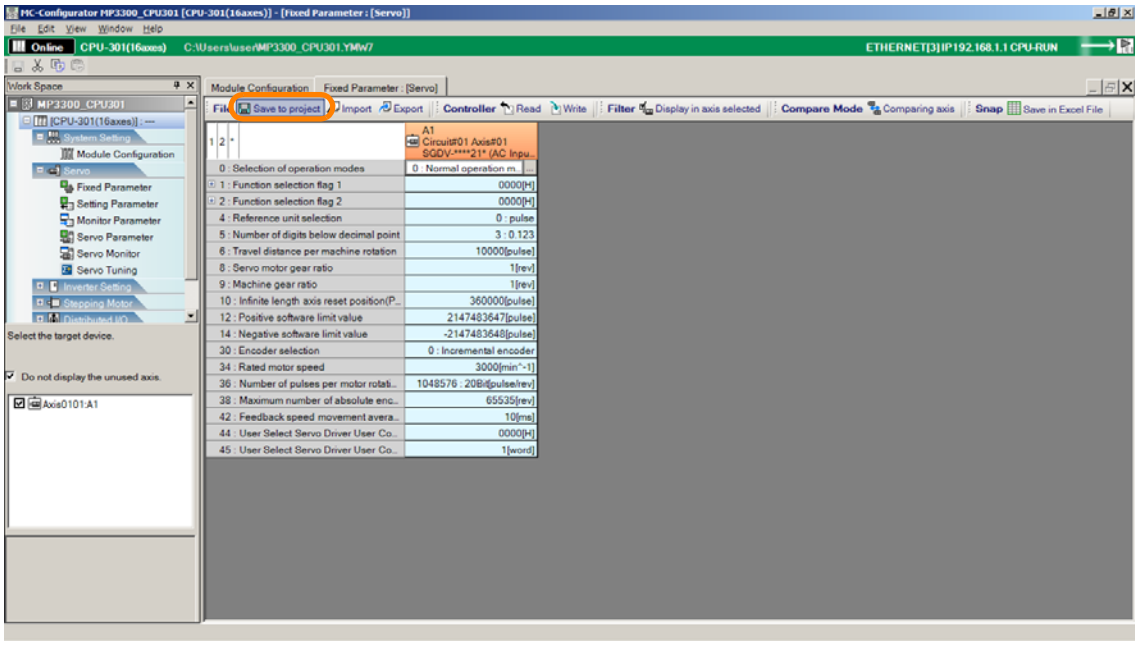
6. Select the axes to which to write the parameters and click the **OK** Button.



The write will be executed.

Perform the following step only when you want to save the parameters in the project file. If you do not want to save them in the project file, then this concludes the procedure.

7. Click the **Save to Project** Button next to **File**.



The parameters will be saved to the project file.

This concludes the procedure.

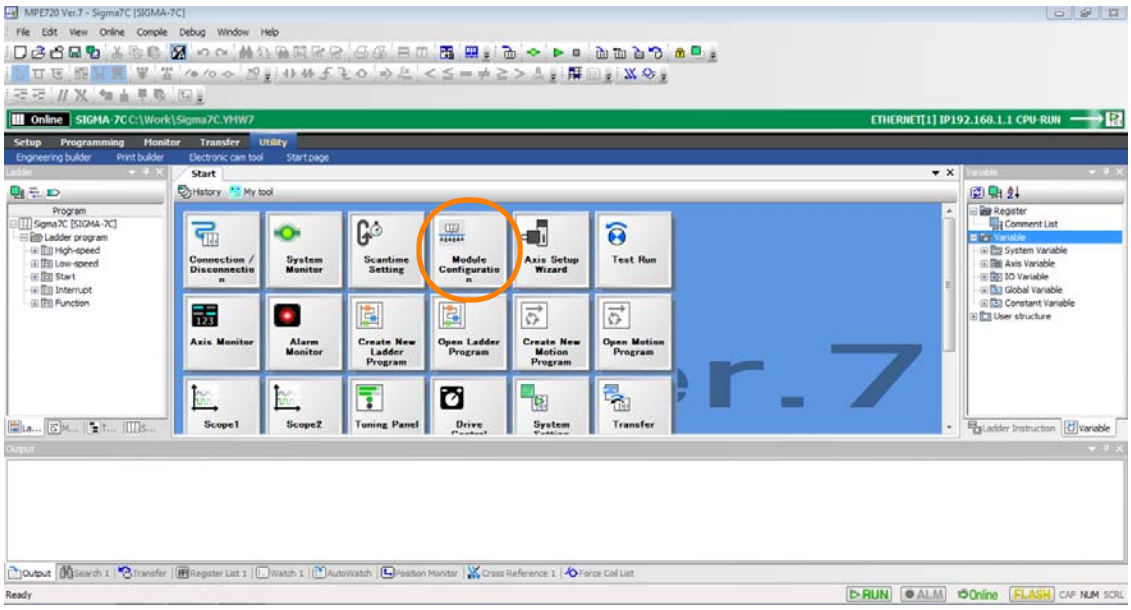
Servo Parameters

This section describes the procedure for writing parameter settings that have been edited on the MPE720 to the SERVOPACK, Machine Controller, and project file.

The procedure to write parameters is different for the SERVOPACKS.

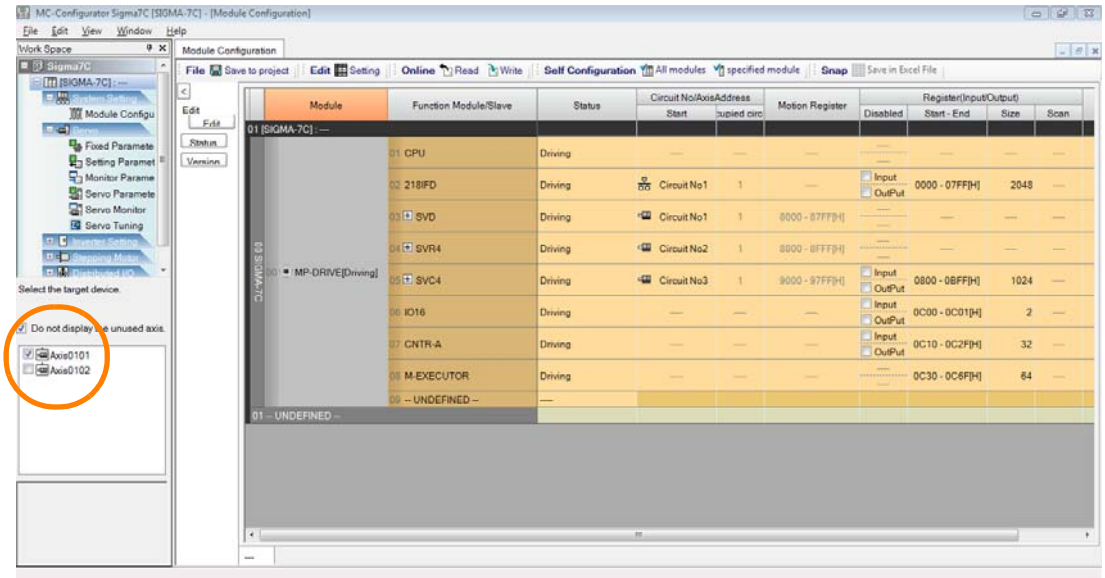
◆ For SERVOPACKs in the Σ-V series or later

1. Click the **Module Configuration** Button on the My Tool View.

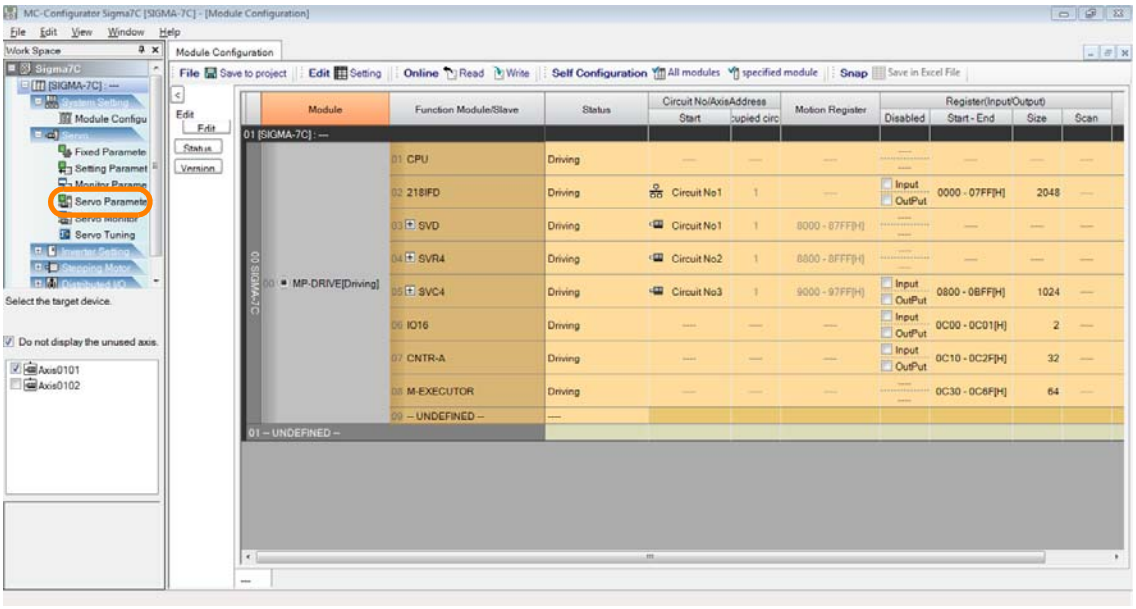


The Module Configuration Tab Page will be displayed.

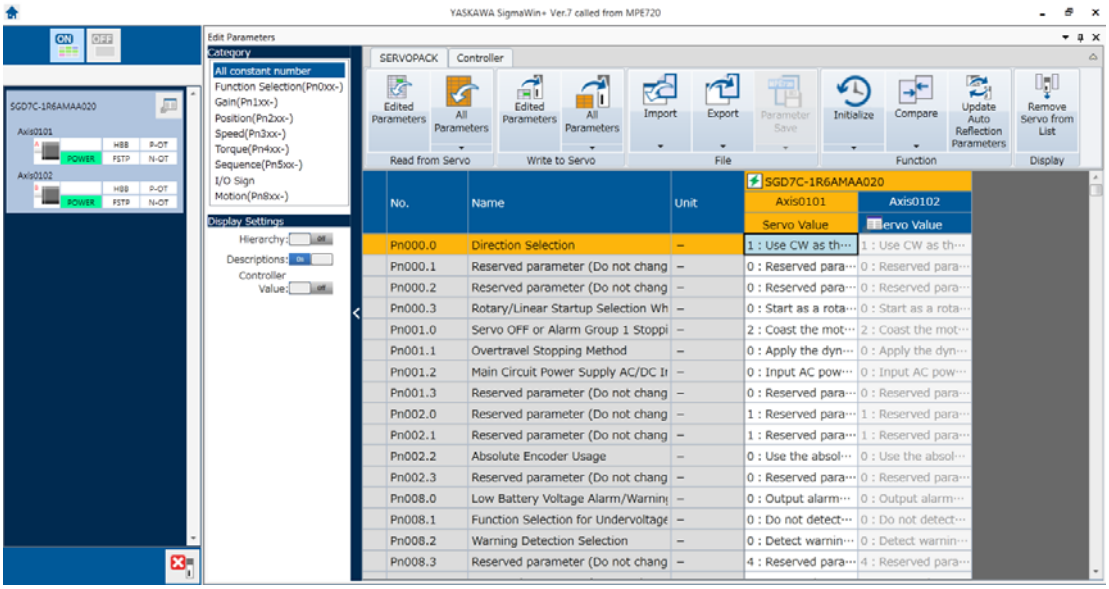
2. In the Work Space Pane, select the check boxes for the servo axes for which you want to write the parameters.



3. Double-click **Servo Parameters**.

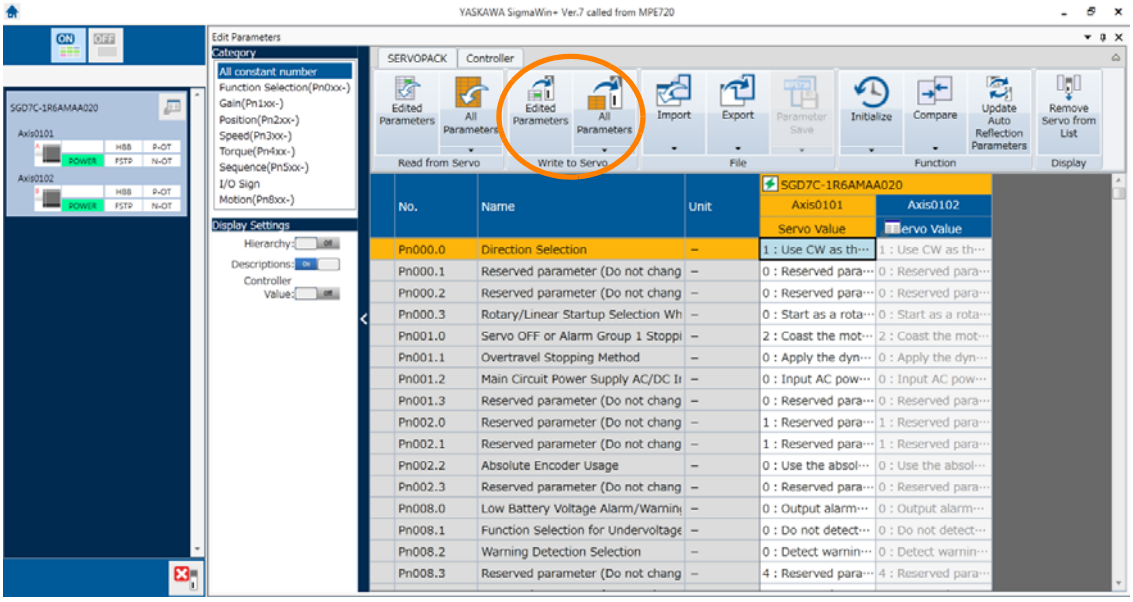


SigmaWin+ Ver. 7 will be started with the servo axes for which to write the parameters already allocated, and the Edit Parameter Window will be displayed.

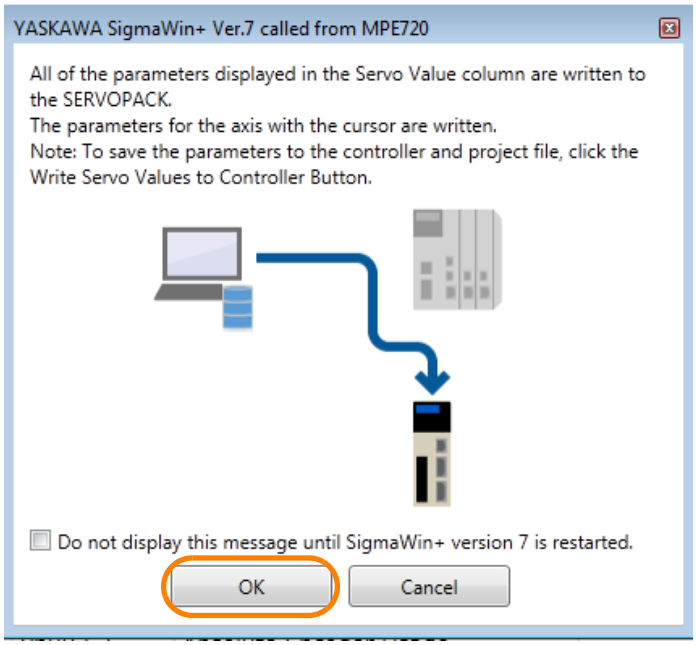


4. Use either of the following operations to reflect the parameters edited on the MPE720 to the SERVOPACK.
   - To write all of the parameters, click **All Parameters** above **Write to Servo**.
   - To write only specific parameters, edit the parameters to write and then click **Edited Parameters** above **Write to Servo**.

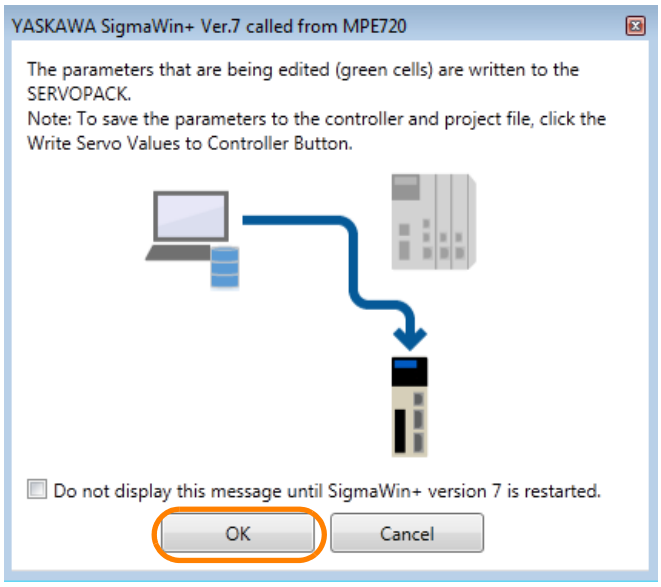
   Information
   In the following cases, proceed to step 6:
   - When reading parameter settings in the Machine Controller to the MPE720 window
   - When writing the SERVOPACK values to the Machine Controller
   - When writing parameter settings in the Machine Controller to the SERVOPACK



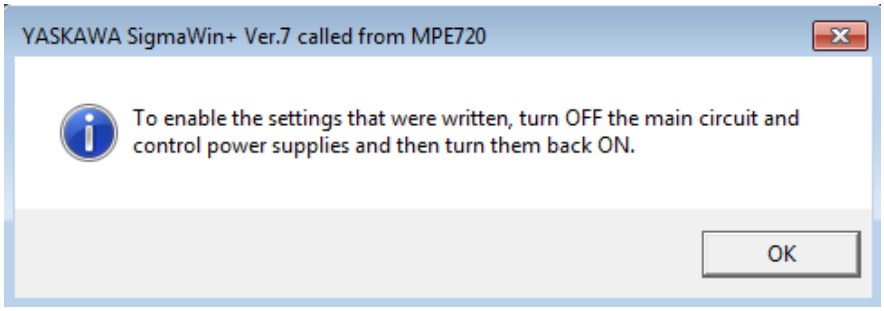
5. The following dialog box will be displayed. Click the **OK** Button.
   - When All Parameters Is Selected



- When Edited Parameters Is Selected

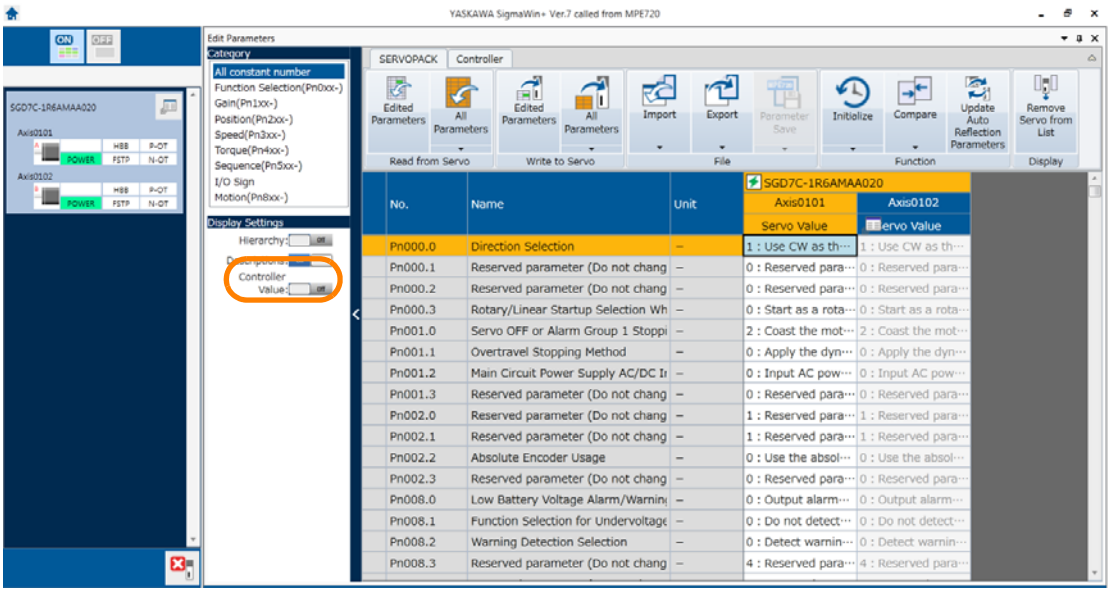


Information If you write parameters that are enabled only after the power supply is turned OFF and ON again, the following dialog box will be displayed. To enable the written parameters, click the **OK** Button and then turn the power supply OFF and ON again or perform a software reset.

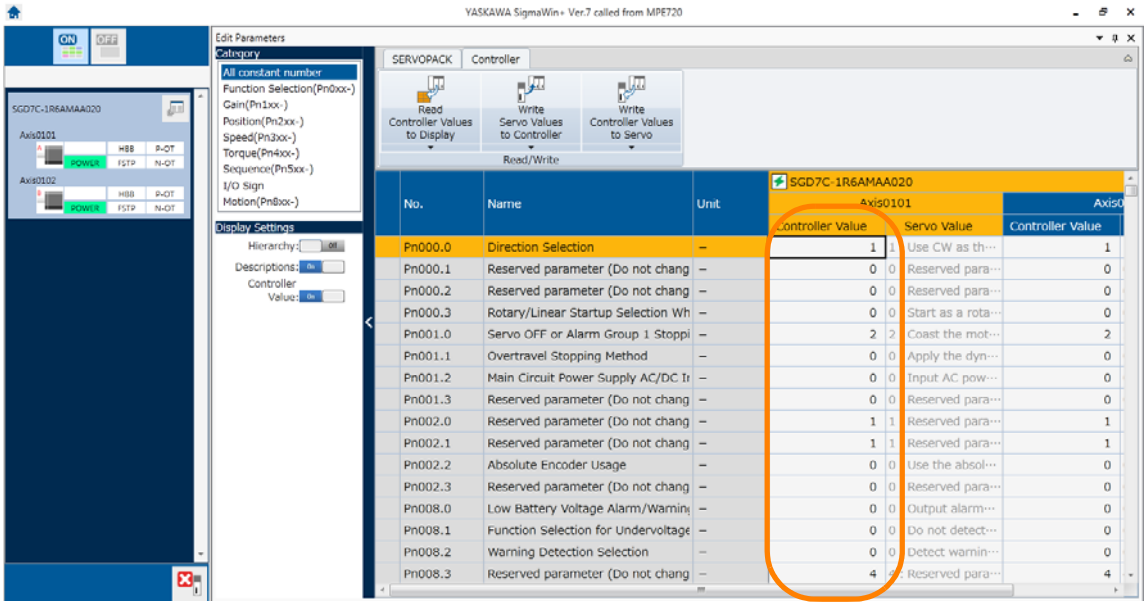


Perform the following steps only when you want to save the parameters in the project file. If you do not want to save them in the project file, then this concludes the procedure.

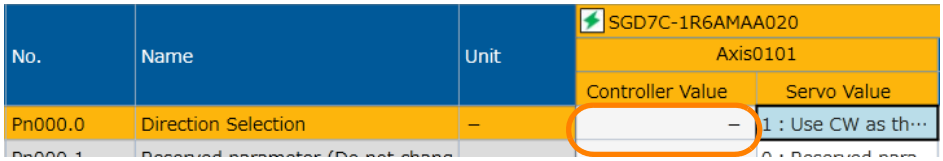
6. Turn ON the **Controller Value** setting in the Display Settings Group.



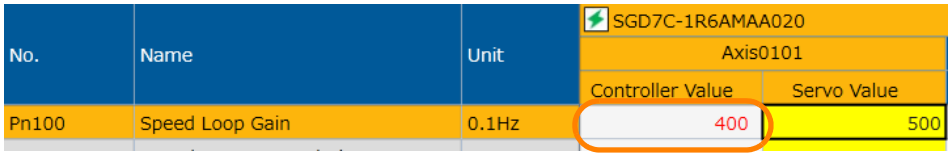
The SERVOPACK parameters from the Controller will be displayed.



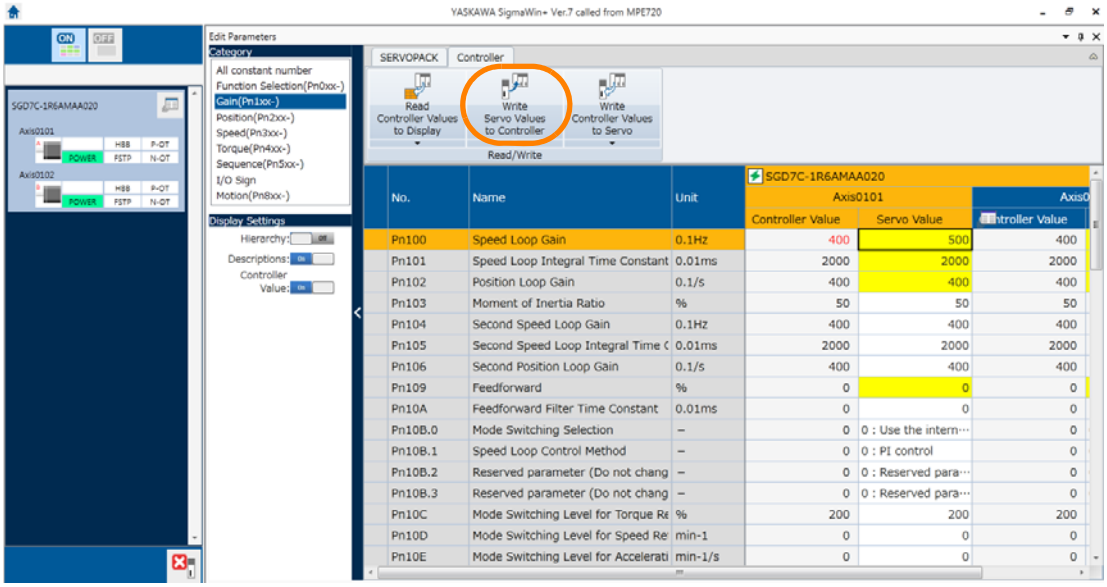
Information If the parameters are not saved in the Controller, "-" will be displayed in the **Controller Value** Column.



If the servo values and Controller values are different, the Controller value will be displayed in red.



7. Click the **Controller** Tab, and then select **Write Servo Values to Controller**.

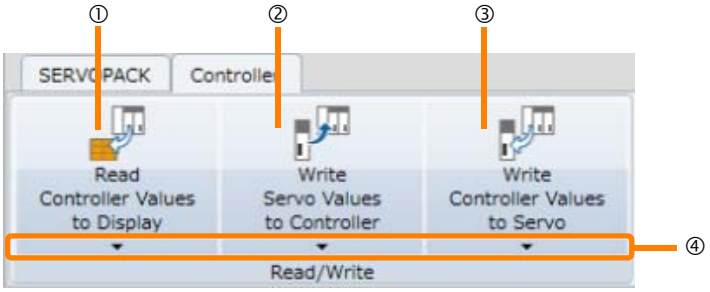


The servo values will be written to the Controller.

No.	Name	Unit	SGD7C-1R6AMAA020 Axis0101	
			Controller Value	Servo Value
Pn100	Speed Loop Gain	0.1Hz	500	500

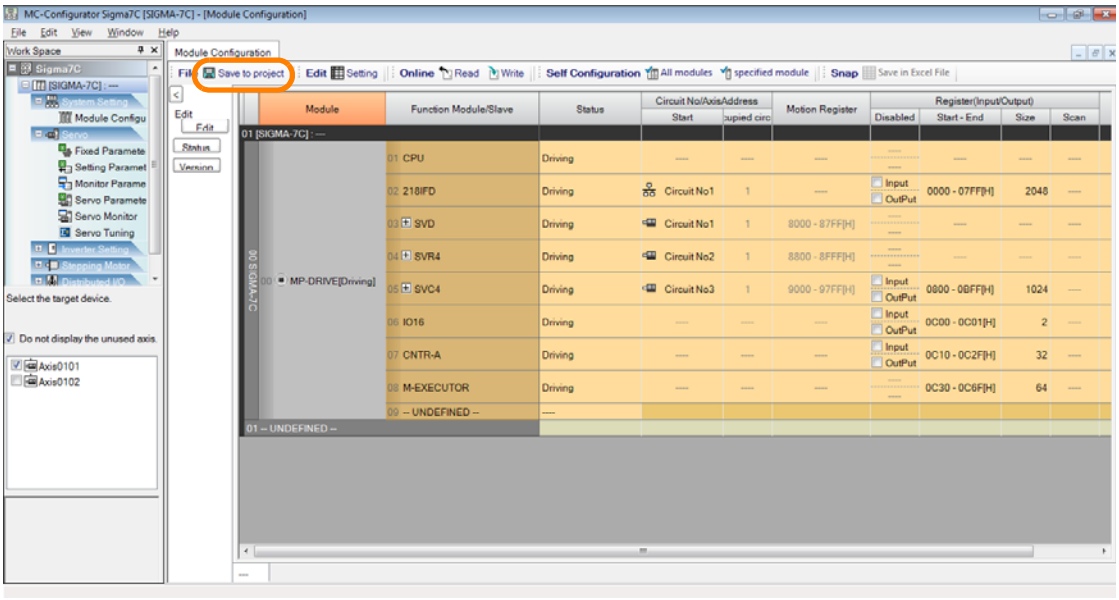
Information

The following table gives the action when each button on the Controller Tab Page is clicked.



No.	Description
①	Reads the backup SERVOPACK parameters that are currently saved in the Machine Controller, and displays the parameters in the window.
②	Writes the values in the window to the Machine Controller as backup SERVOPACK parameters.
③	Writes the backup SERVOPACK parameters that are currently saved in the Machine Controller to the SERVOPACK.
④	You can select either **Selected Axis** or **All Axes** as the axis to read or write.

8. Change to the Module Configuration Tab Page, and click the **Save to Project** Button next to **File**.

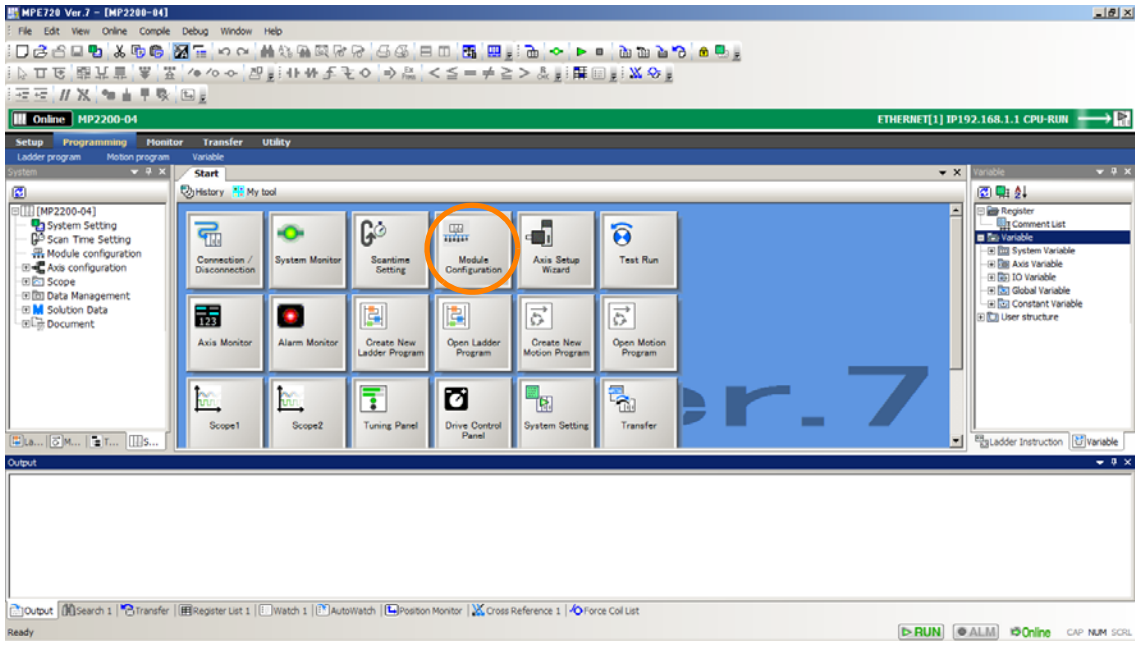


The parameters will be saved to the project file.

This concludes the procedure.

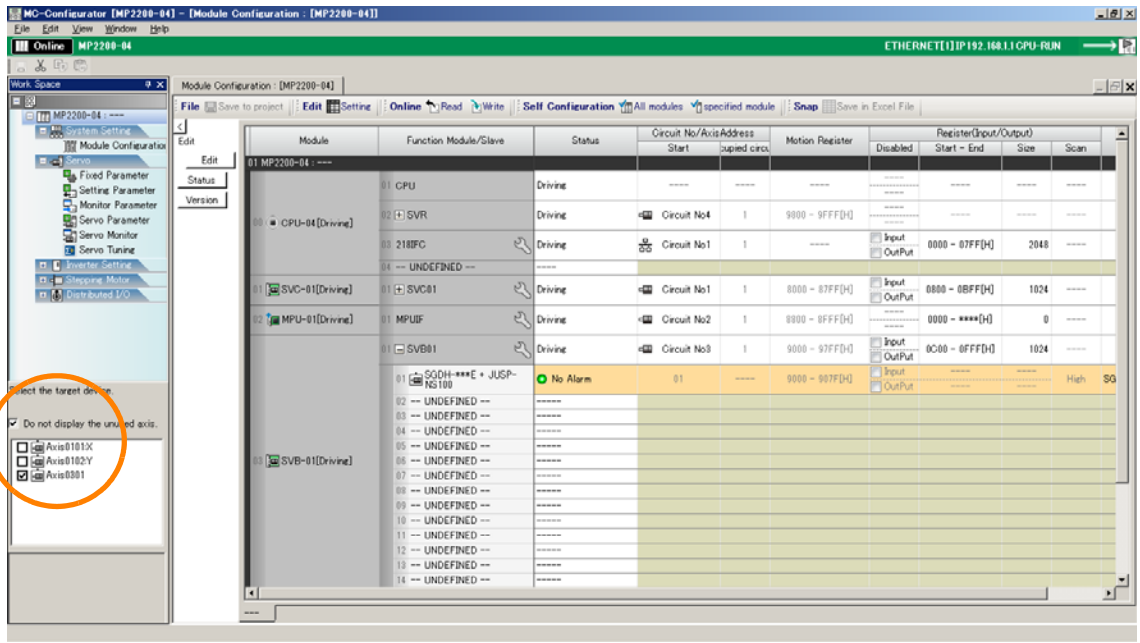
◆ For SERVOPACKs in the Σ-III series or lower, or servo amplifier from another company

1. Click the **Module Configuration** Button on the My Tool View.

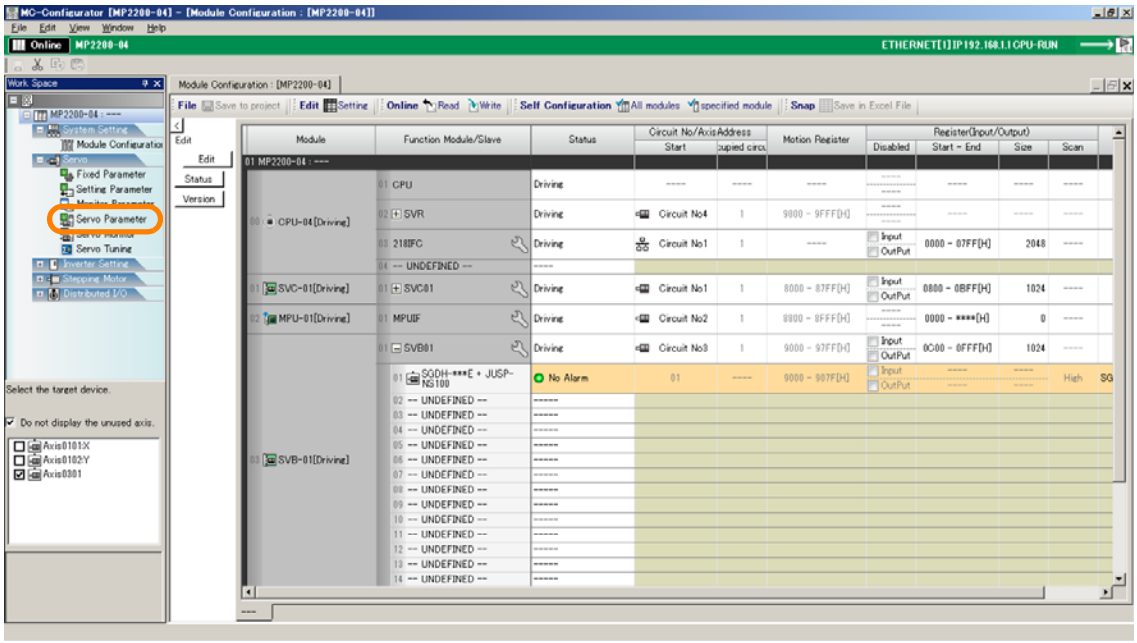


The Module Configuration Tab Page will be displayed.

2. In the Work Space Pane, select the check boxes for the servo axes for which you want to write the parameters.



3. Double-click **Servo Parameters**.

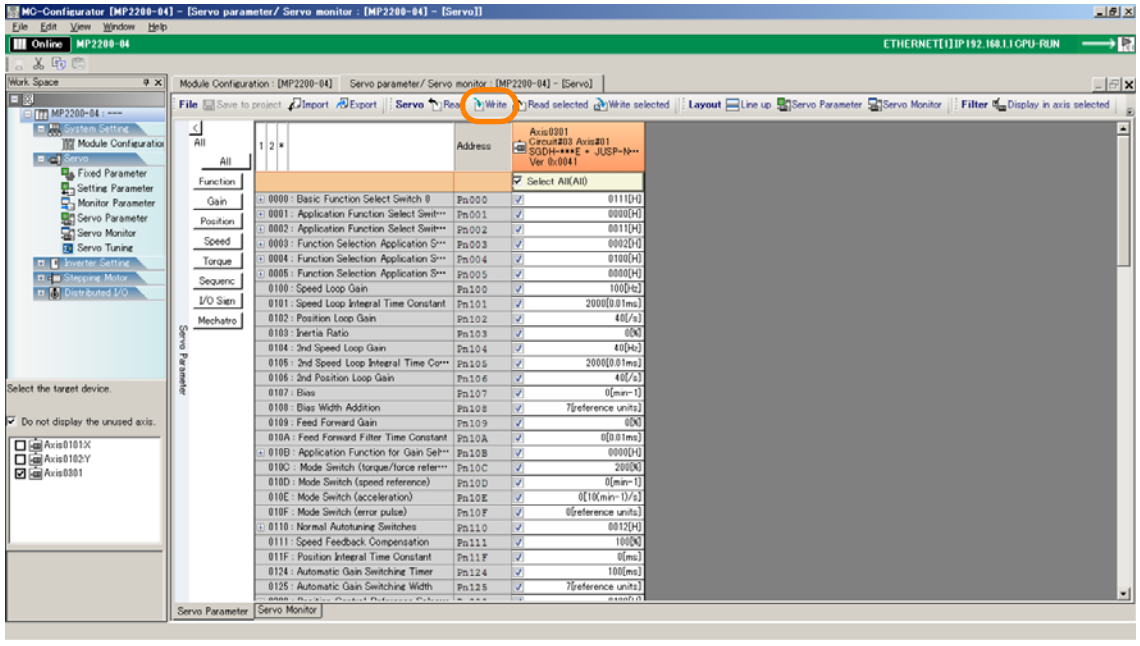


The **MC-Configurator** Dialog Box will be displayed.

4. Click the **OK** Button.

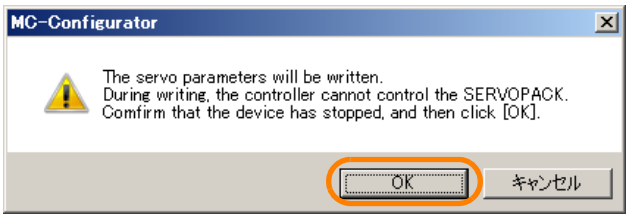
The parameters for the specified axes will be displayed.

5. Click the **Servo - Write** Button.



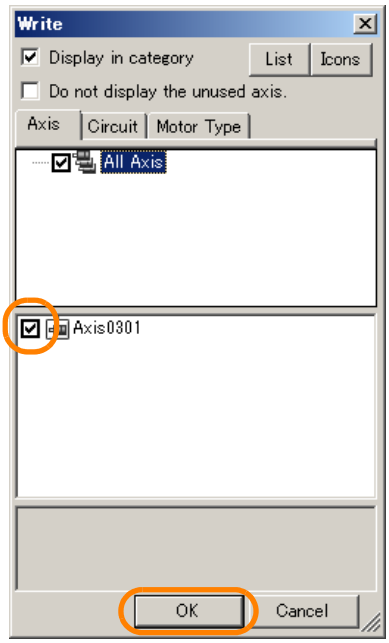
The **MC-Configurator** Dialog Box will be displayed.

6. Click the **OK** Button.



The Write Dialog Box will be displayed.

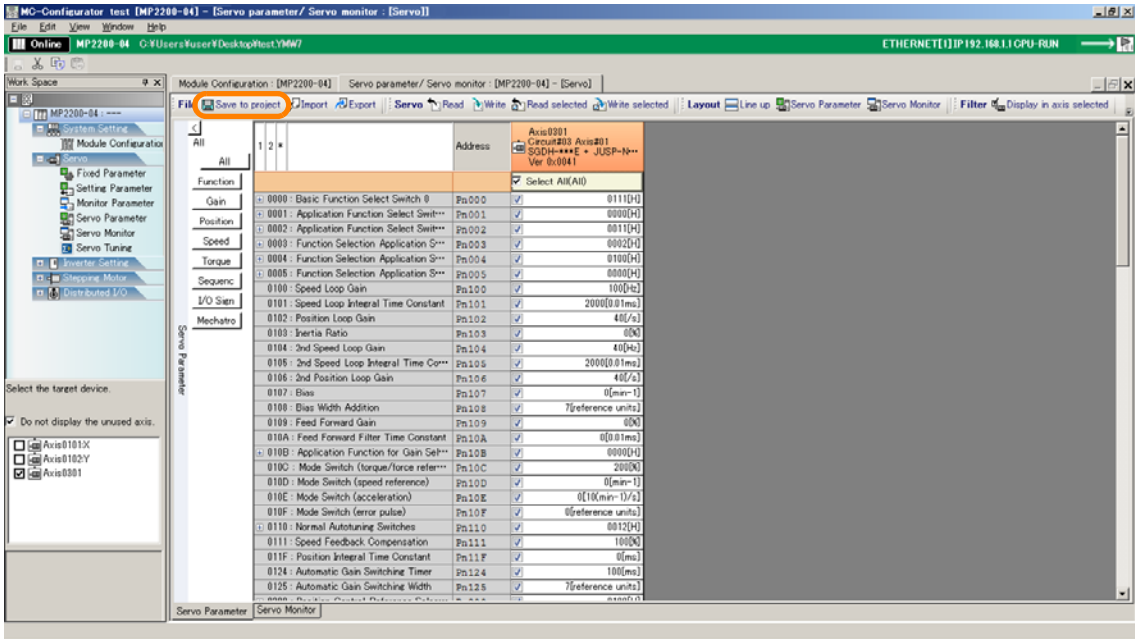
7. Select the axes to which to write the parameters and click the **OK** Button.



The write will be executed.

Perform the following step only when you want to save the parameters in the project file. If you do not want to save them in the project file, then this concludes the procedure.

8. Click the **Save to Project** Button next to **File**.

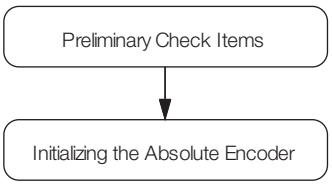


The parameters will be saved to the project file.

This concludes the procedure.

7.7 Using an Absolute Encoder

The flow for setting up an absolute encoder is given below.



☞ *7.7.1 Preliminary Check Items* on page 7-41

☞ *7.7.2 Initializing the Absolute Encoder (SVC Module)* on page 7-47

☞ *7.7.3 Initializing the Absolute Encoder (SVB Module)* on page 7-52

Note: The procedure to initialize the absolute encoder depends on whether the Optional Module that is used is an SVB Module or SVC Module (the difference being whether you are using SERVOPACKs with MECHATROLINK-II communications or MECHATROLINK-III communications).

Information The following procedure is supported by MPE720 version 7.37 or higher.
For MPE720 version 7.36 or lower, refer to the procedures in the following section.
☞ *14.6.7 Using an Absolute Encoder* on page 14-46

7.7.1 Preliminary Check Items

Confirm that all preliminary check items that are listed below are satisfied.

Check Item	Checking Method*1	Action If the Preliminary Check Item Is Not Satisfied*2
The Servomotor, SERVOPACK, and Cables must be compatible with an absolute encoder.	Refer to the manual provided with each device for checking methods.	Replace the Servomotor, SERVOPACK, or Cables with products that are compatible with an absolute encoder.
The SERVOPACK and Servomotor must be ready for synchronized communications.	Bit 0 (Motion controller operation ready) in motion monitor parameter IW□□□00 must be set to 1 (Operation Ready).	Refer to one of the following manuals for details on Monitor Parameters. 📖 *MP3000 Series Motion Control User's Manual* (Manual No. SIEP C880725 11) 📖 *MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (Manual No.: SIEP C880700 33)
The Servo to the Servomotor must be turned OFF.	Bit 1 (Running (At Servo ON)) in motion monitor parameter IW□□□00 must be set to 0 (Servo OFF).	Set bit 0 (Servo ON) in motion setting parameter OW□□□00 to 0 (OFF).
Motion command execution must be completed.	Motion monitor parameter IW□□□08 (Motion command response code) must be set to 0 (No command).	Set motion setting parameter OW□□□08 (Motion command) to 0 (No command).
	Bit 0 (Command execution flag) in motion monitor parameter IW□□□09 must be set to 0 (Ready).	Wait until command execution is completed, or until command cancellation is completed.
The Servo parameters must be set to use the encoder as an absolute encoder.	The second digit (Use of absolute encoder) of Servo parameter Pn002 must be set to 0 (Use absolute encoder as an absolute encoder).	Set the second digit (Use of absolute encoder) of Servo parameter Pn002 to 0 (Use absolute encoder as an absolute encoder).

*1. Refer to the following section for detailed procedures.
☞ *Checking Parameters* on page 7-42

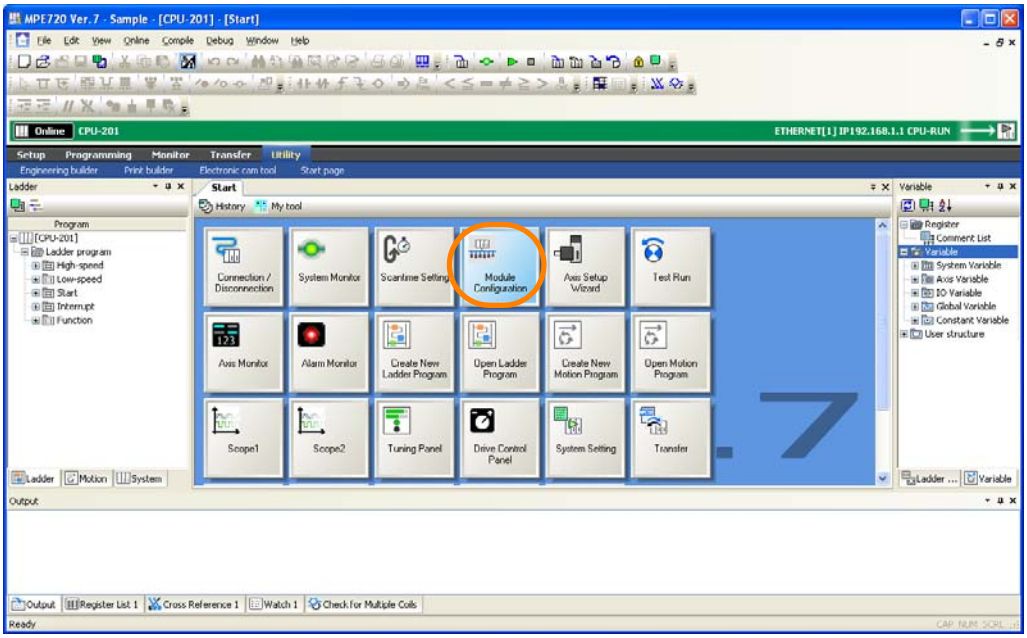
*2. Refer to the following section for detailed procedures.
☞ *Changing Parameter Settings* on page 7-44

Information The □□□ portion of the register address for motion parameters is determined by the circuit number and the axis number.
Refer to the following manual for details.
📖 *MP3000 Series Motion Control User's Manual* (Manual No. SIEP C880725 11)

Checking Parameters

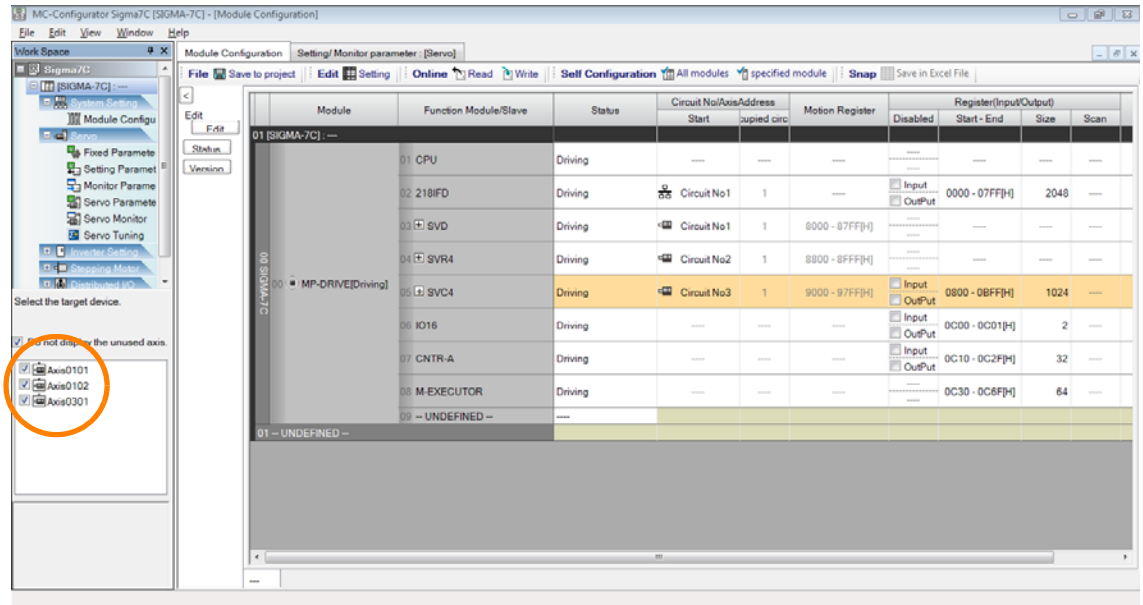
This section gives the procedure for checking parameters, in preparation for using an absolute encoder.

1. Click the **Module Configuration** Button on the My Tool View.

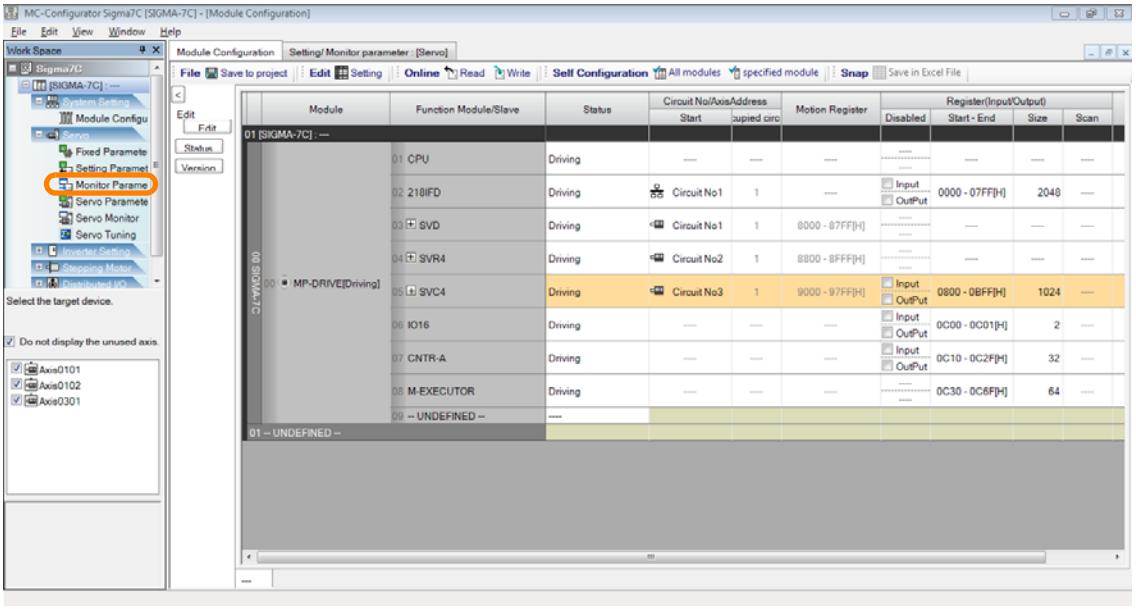


The Module Configuration Tab Page will be displayed.

2. In the Work Space Pane, select the check boxes for the servo axes for which you want to check the parameters.

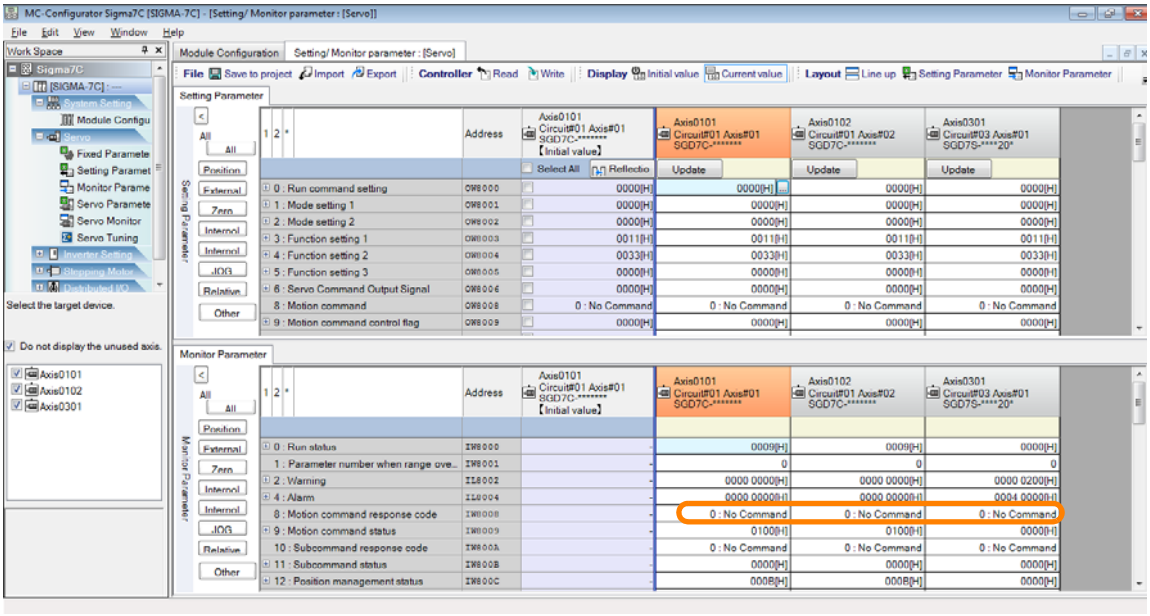


3. Double-click **Monitor Parameters**.

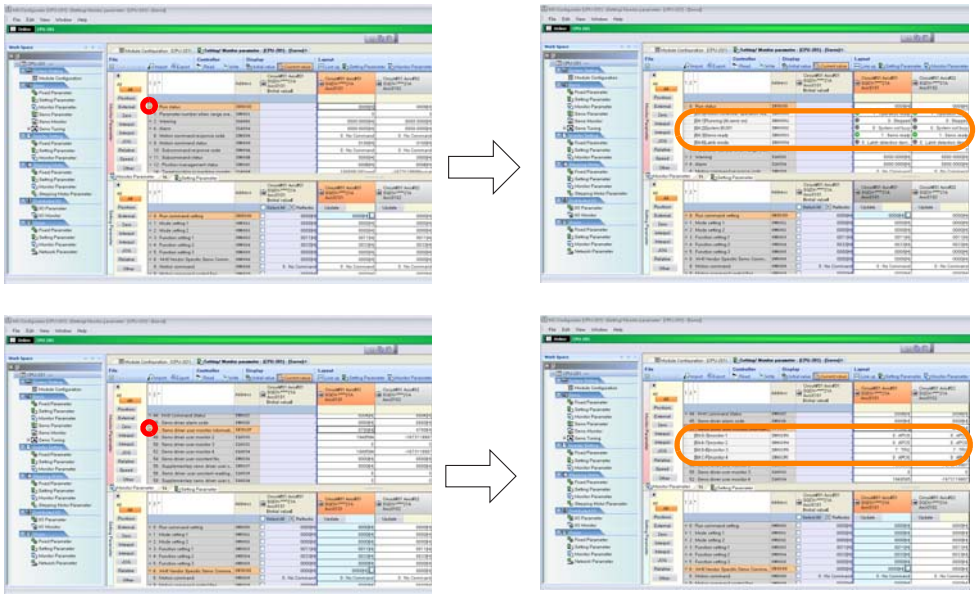


The parameters for the selected axes will be displayed.

4. Check the setting in the cell that corresponds to the parameter number to check.



Information To check individual bits or digits, click the + Button next to the parameter name to expand the display.

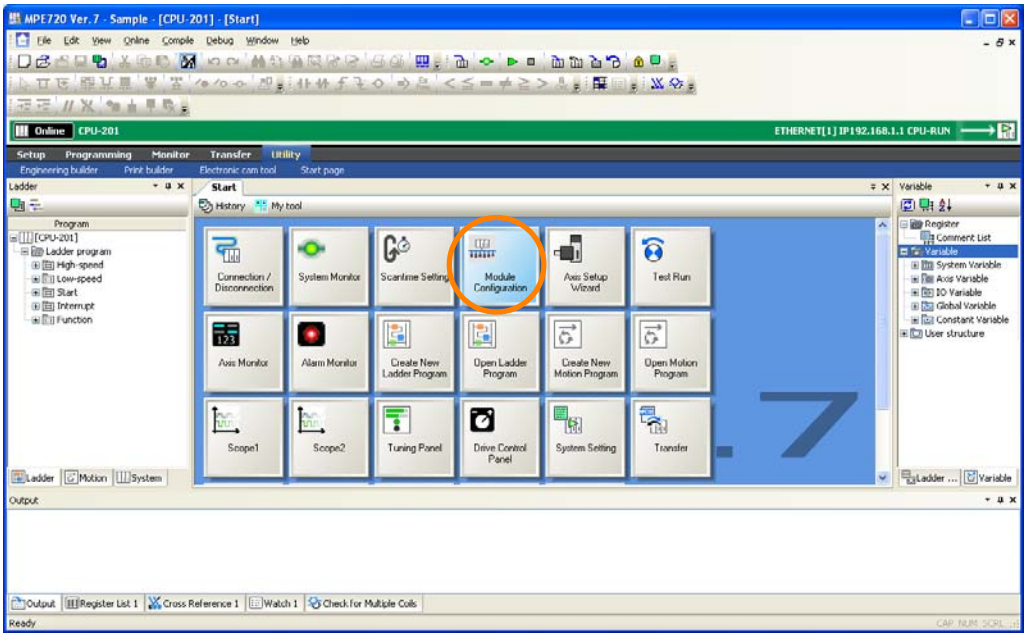


This concludes the procedure.

Changing Parameter Settings

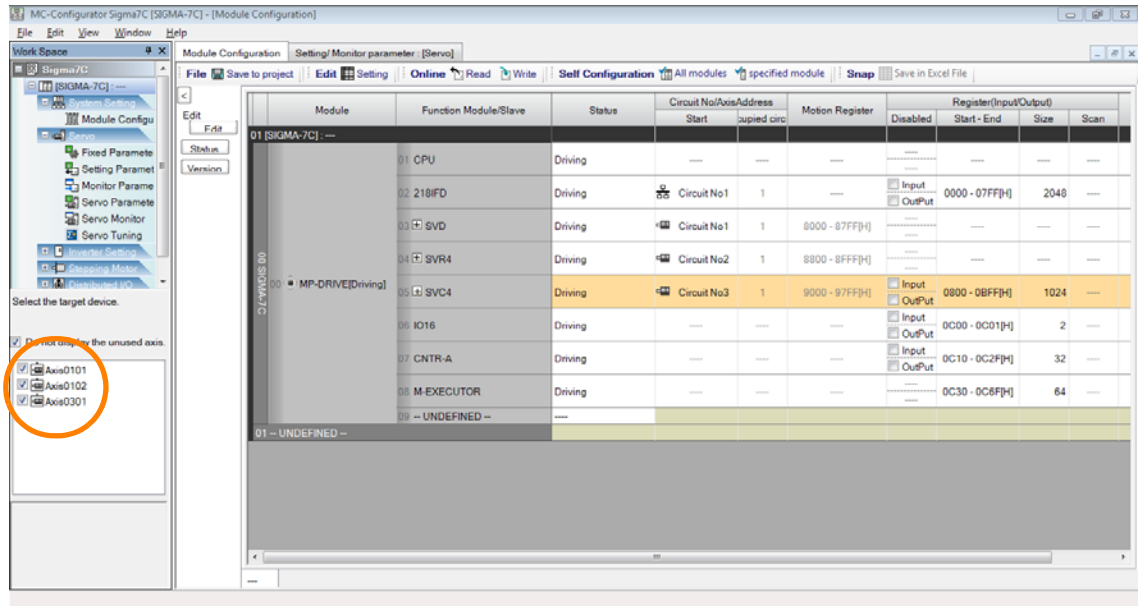
This section gives the procedure for changing parameter settings.

1. Click the **Module Configuration** Button on the My Tool View.

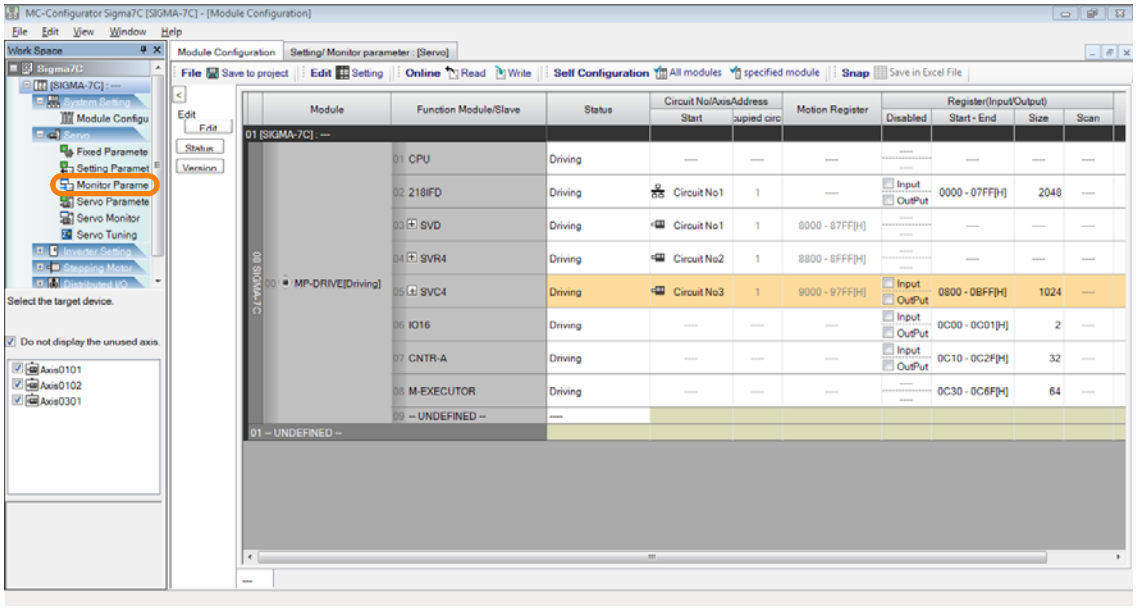


The Module Configuration Tab Page will be displayed.

2. In the Work Space Pane, select the check boxes for the servo axes for which you want to change the parameter settings.

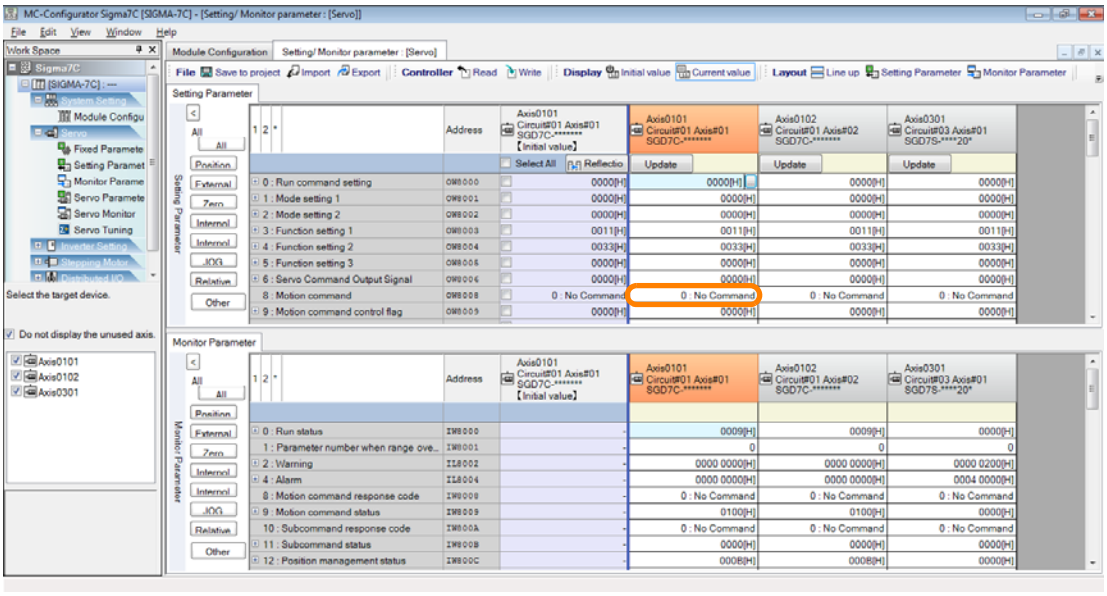


3. Double-click **Setting Parameters**.

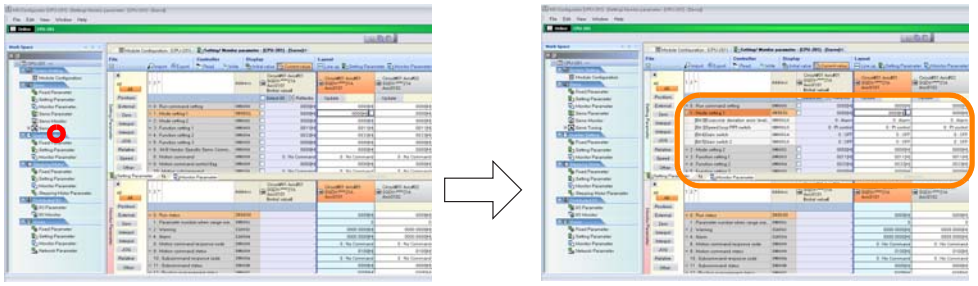


The parameters for the selected axes will be displayed.

4. Double-click the cell that corresponds to the parameter number for which to change the setting.

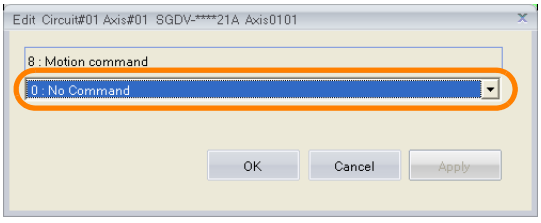


Information To check individual bits or digits, click the + Button next to the parameter name to expand the display.

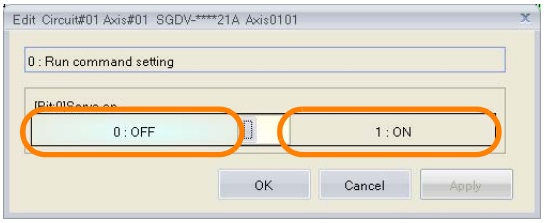


The Edit Dialog Box will be displayed.

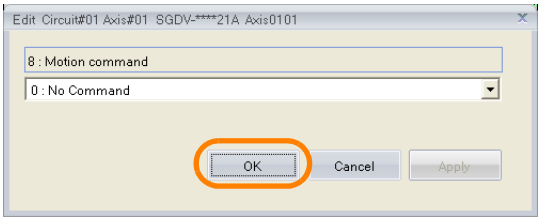
5. Select the new setting.
   - If a list box appears: Select the value to set from the list.

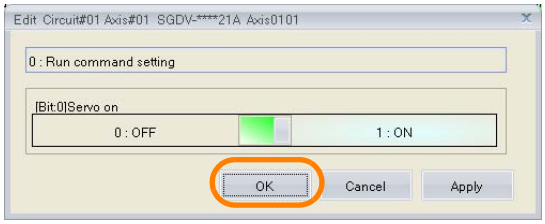


   - If an ON or OFF selection appears: Click the setting to set. The button that is highlighted in light blue is the currently selected setting.



6. Click the **OK** Button.





The settings will be applied and the dialog box will close.

Information If there are multiple axes, change the setting for all axes.

This concludes the procedure.

7.7.2 Initializing the Absolute Encoder (SVC Module)

There are two methods that you can use to initialize the absolute encoder if you are using the SVC Module.

Tab Page Used	Introduction	Reference
Edit Ladder Program Tab Page	Create a ladder program to initialize the absolute encoder. It may take time to create a ladder program for this, but once it has been created, it can be used repeatedly whenever it is necessary to initialize the absolute encoder. This is the recommended approach if you have to initialize the absolute encoder often.	🕮 *MP3000 Series Motion Control User's Manual* (Manual No. SIEP C880725 11)
Module Configuration Tab Page	The absolute encoder is initialized by temporarily changing parameters in the Module Configuration Tab Page. This approach is recommended if you want to initialize the absolute encoder for testing purposes.	☞ *Initializing the Absolute Encoder Using the Module Configuration Tab Page (SVC Module)* on page 7-48

Initializing the Absolute Encoder Using the Module Configuration Tab Page (SVC Module)

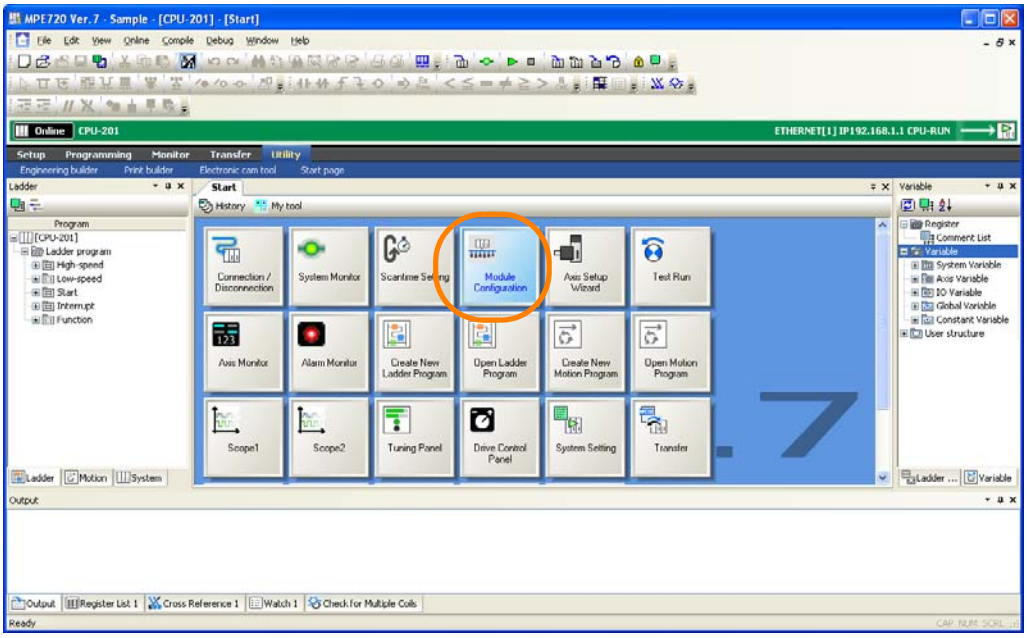
Use the following procedure to initialize the absolute encoder by using the Module Configuration Tab Page.

Information

Refer to the following section for procedures on how to change parameter settings.

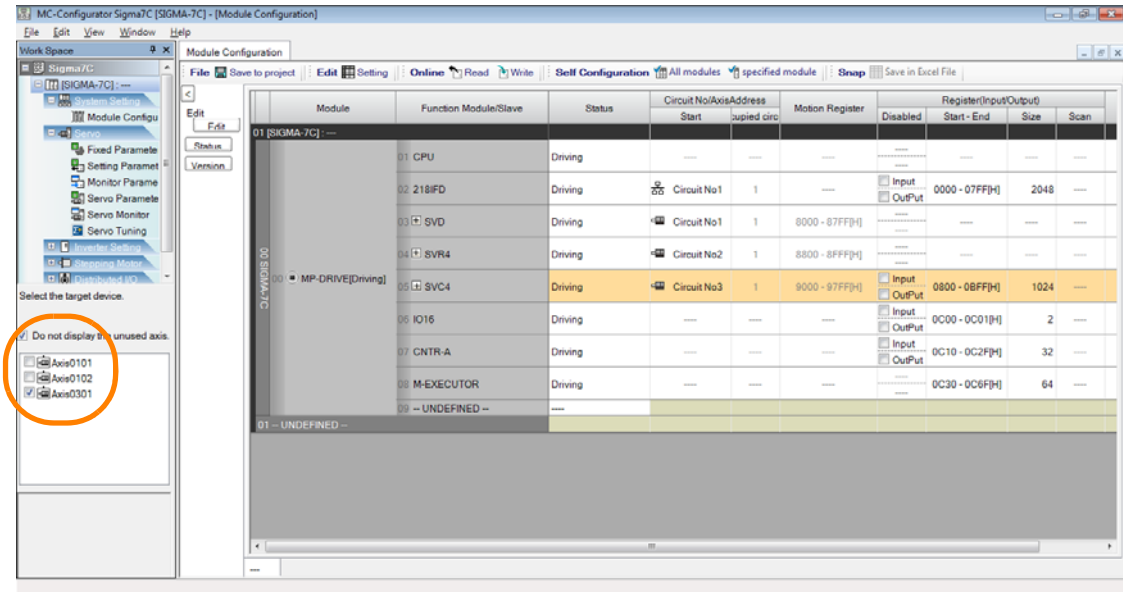
☞ *Changing Parameter Settings* on page 7-44

1. Click the **Module Configuration** Button on the My Tool View.

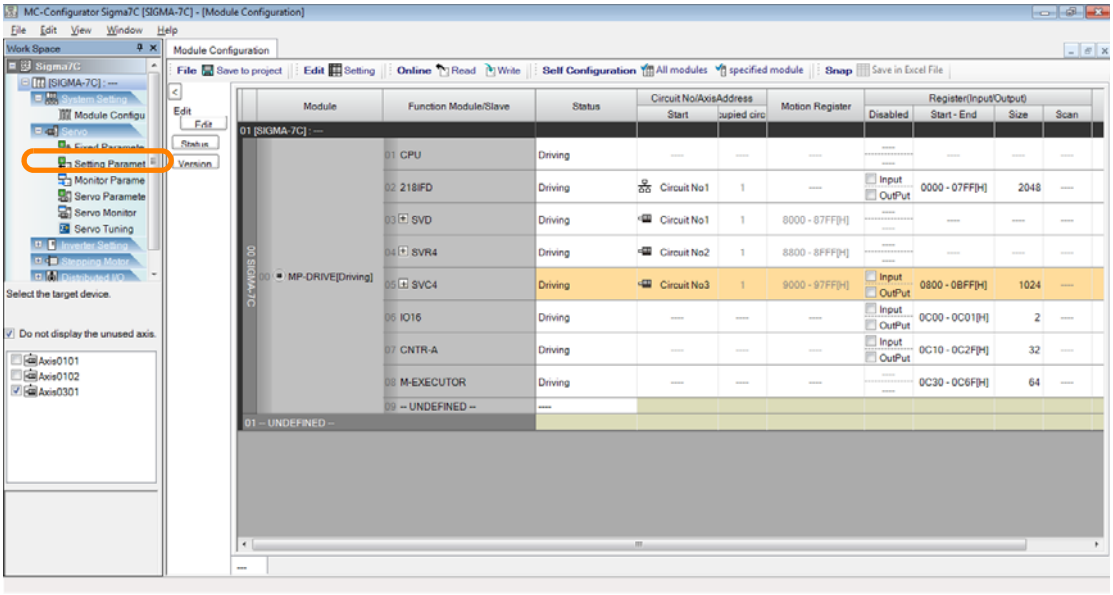


The Module Configuration Tab Page will be displayed.

2. In the Work Space Pane, select the check boxes for the servo axes for which you want to initialize the absolute encoders.

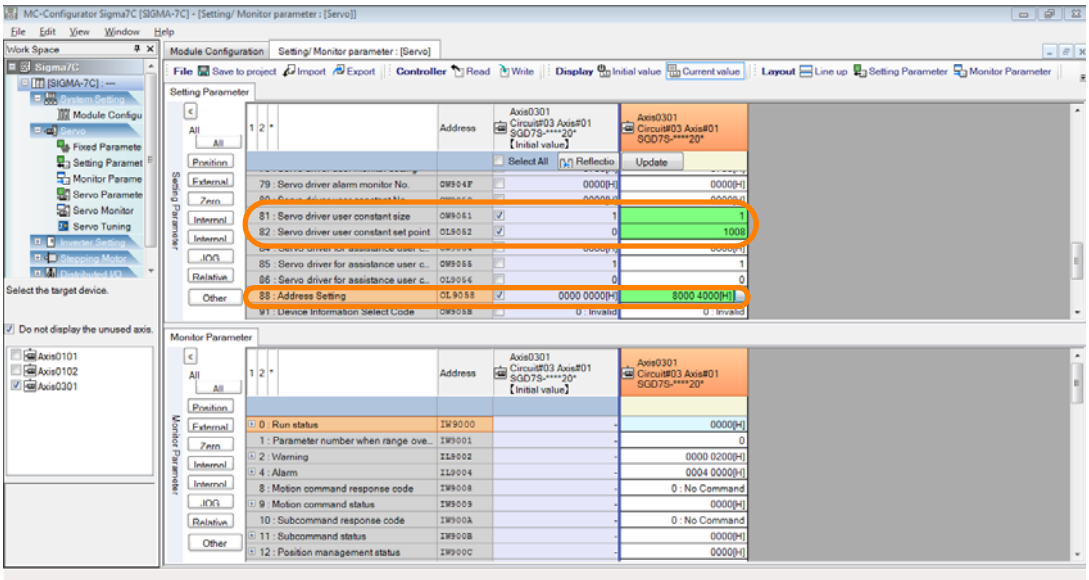


3. Double-click **Setting Parameter** in the Work Space Pane.



4. Set the following setting parameters to the values that are given below.

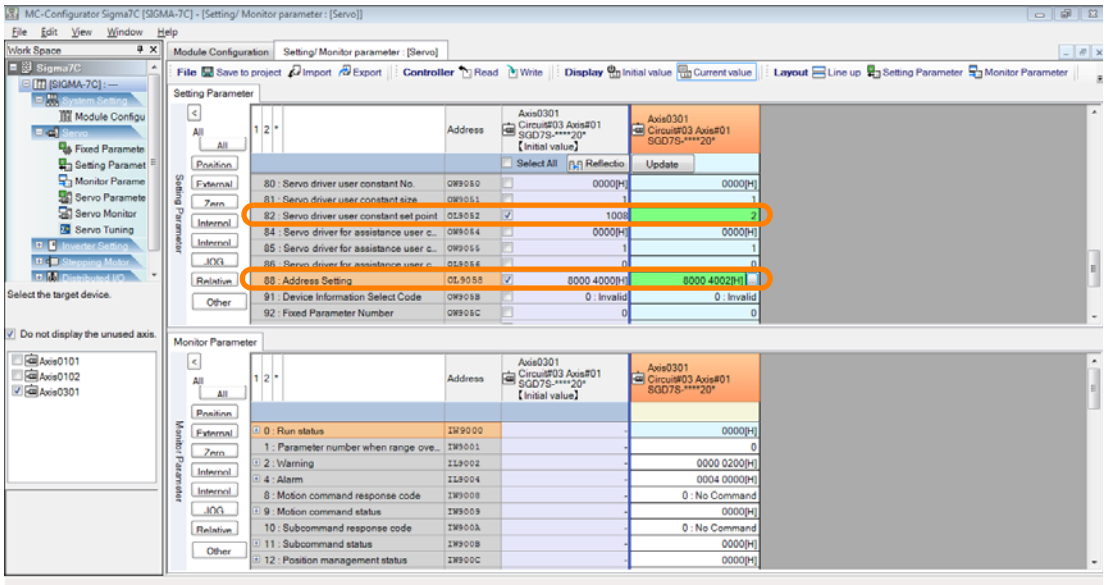
Register Address	Parameter Name	Setting	Description
OW□□□51	Servo driver user constant size	1	Number of words
OL□□□52	Servo driver user constant set point	1008 hex	Absolute encoder reset request code
OL□□□58	Address Setting	80004000 hex	Virtual memory address in the SERVOPACK



The absolute encoder initialization request will be sent.

5. Set the following setting parameters to the values that are given below.

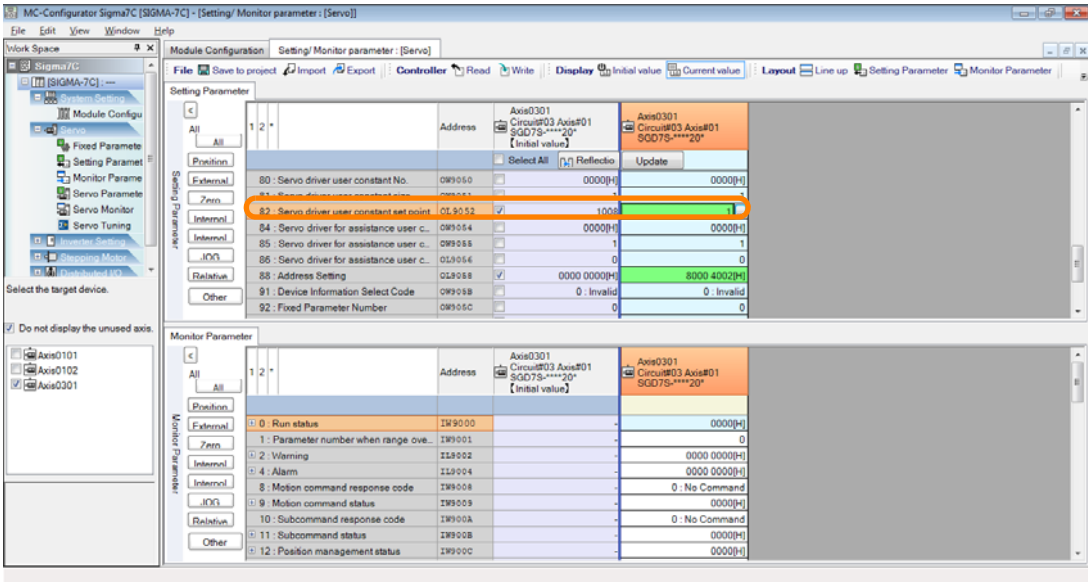
Register Address	Parameter Name	Setting	Description
OL□□□52	Servo driver user constant set point	2	The code required for the preliminary processing
OL□□□58	Address Setting	80004002 hex	Virtual memory address in the SERVOPACK



Preparations will be made for execution of the absolute encoder initialization.

6. Set the following setting parameters to the values that are given below.

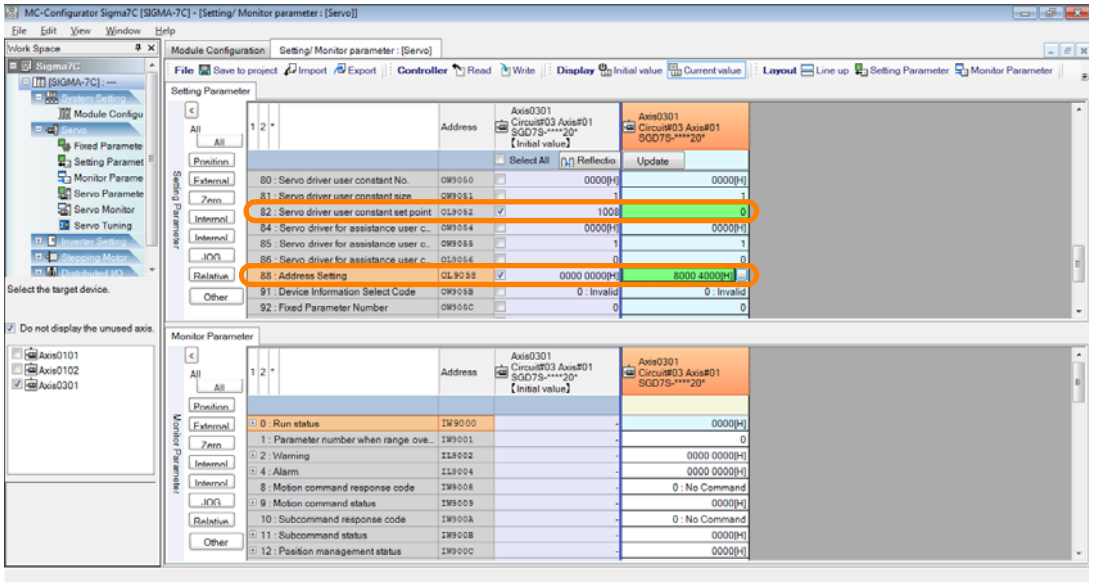
Register Address	Parameter Name	Setting	Description
OL□□□52	Servo driver user constant set point	1	The code required to send the data and perform the calibration operation



The absolute encoder will be initialized.

7. Set the following setting parameters to the values that are given below.

Register Address	Parameter Name	Setting	Description
OL□□□52	Servo driver user constant set point	0	The code required to send the data and complete the calibration operation
OL□□□58	Address Setting	80004000 hex	Virtual memory address in the SERVOPACK



This concludes execution of the absolute encoder initialization.

8. Turn the power supply to the SERVOPACK OFF and ON again.
The settings will be enabled.

This concludes the procedure.

7.7.3 Initializing the Absolute Encoder (SVB Module)

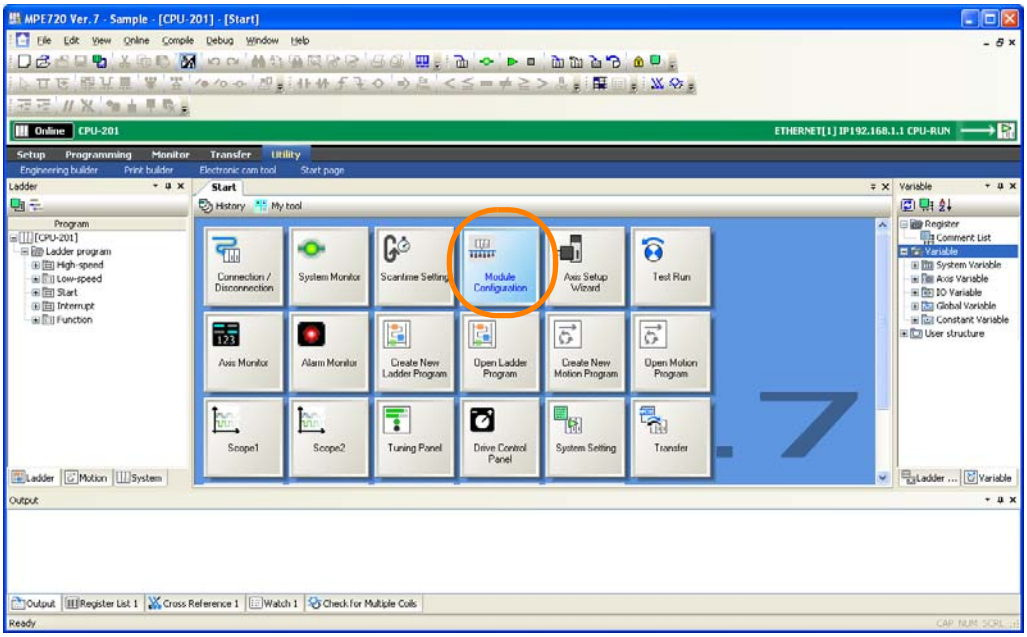
Use the following procedure to initialize the absolute encoder if you are using the SVB Module.

Information

Refer to the following sections for procedures on how to confirm and change parameter settings.

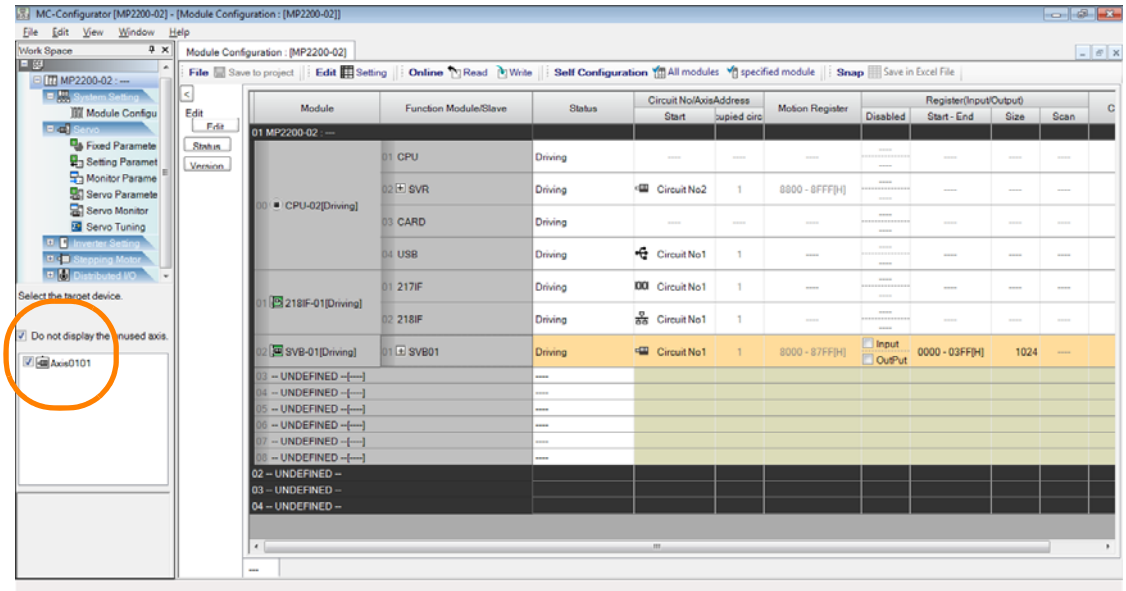
☞ *Checking Parameters* on page 7-42
☞ *Changing Parameter Settings* on page 7-44

1. Click the **Module Configuration** Button on the My Tool View.

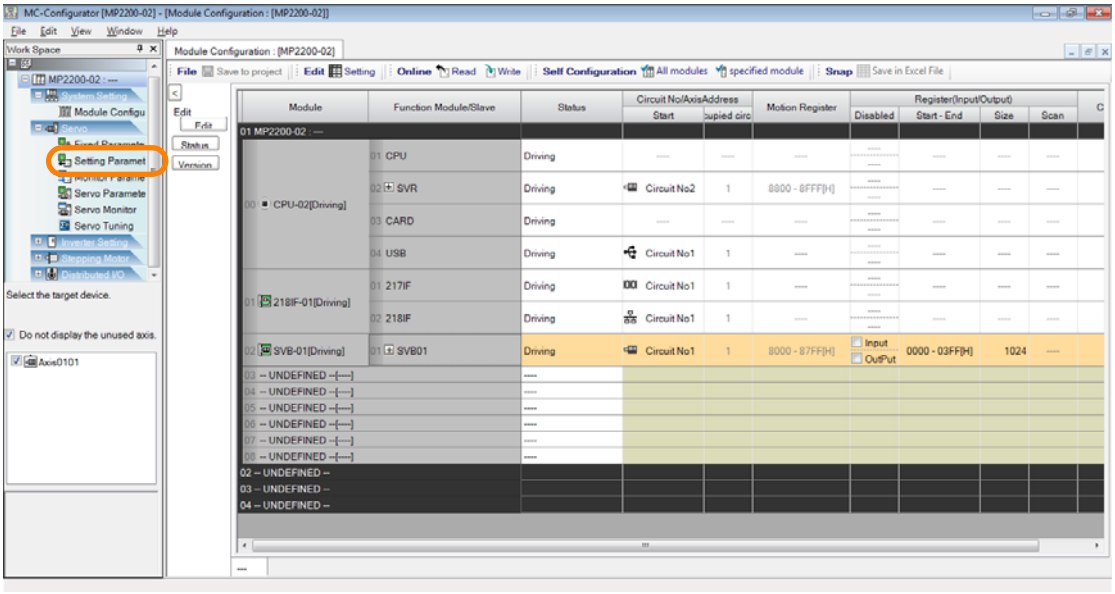


The Module Configuration Tab Page will be displayed.

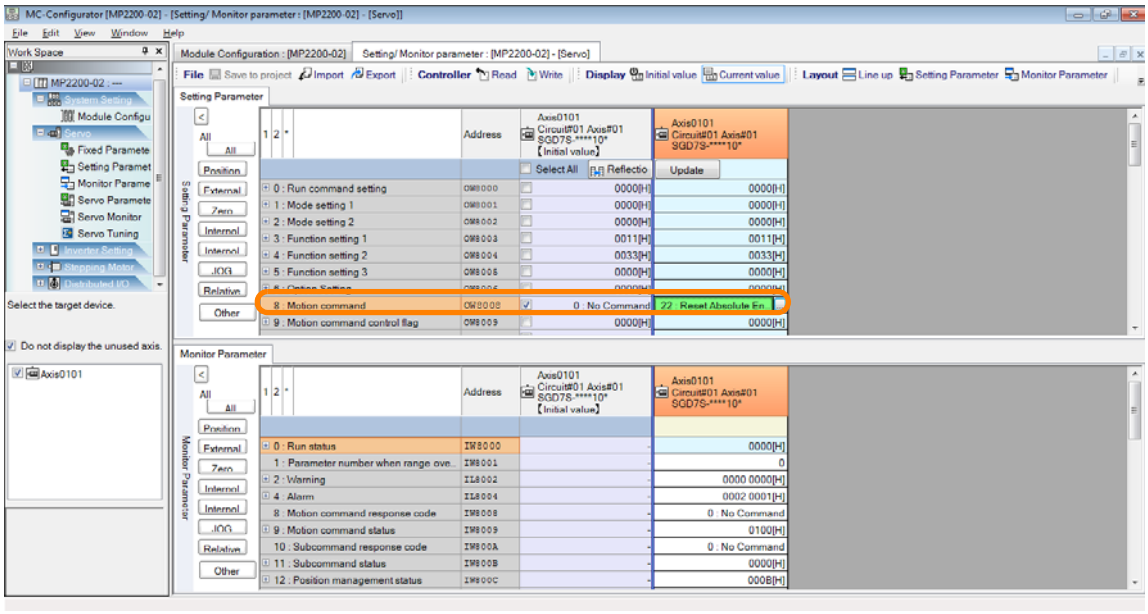
2. In the Work Space Pane, select the check boxes for the servo axes for which you want to initialize the absolute encoders.



3. Double-click **Setting Parameters**.

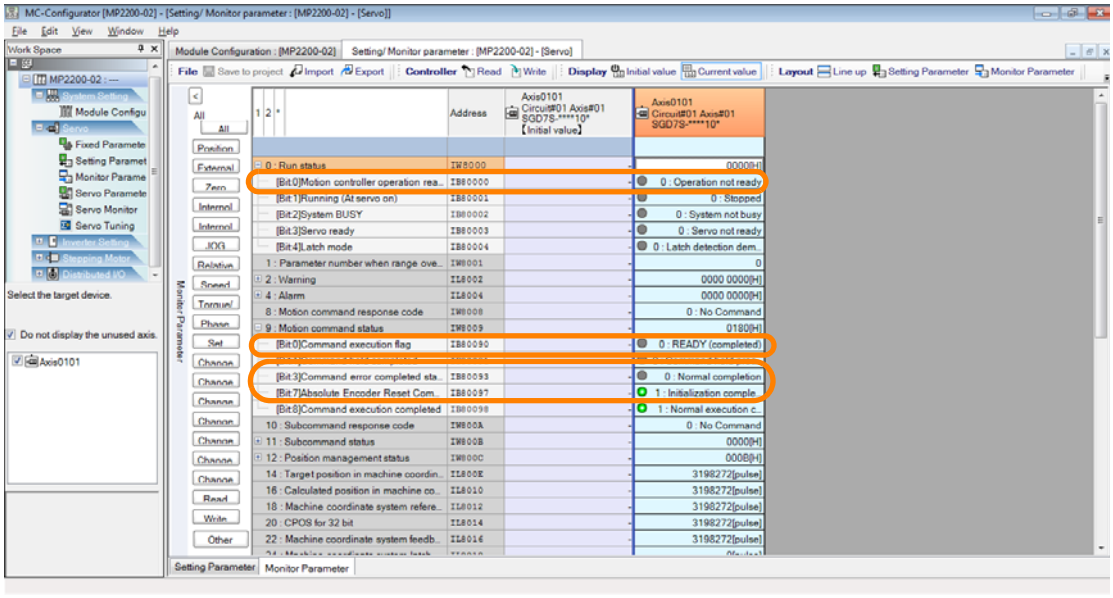


4. Set OW□□□08 (Motion command) to 22 (Reset Absolute Encoder).

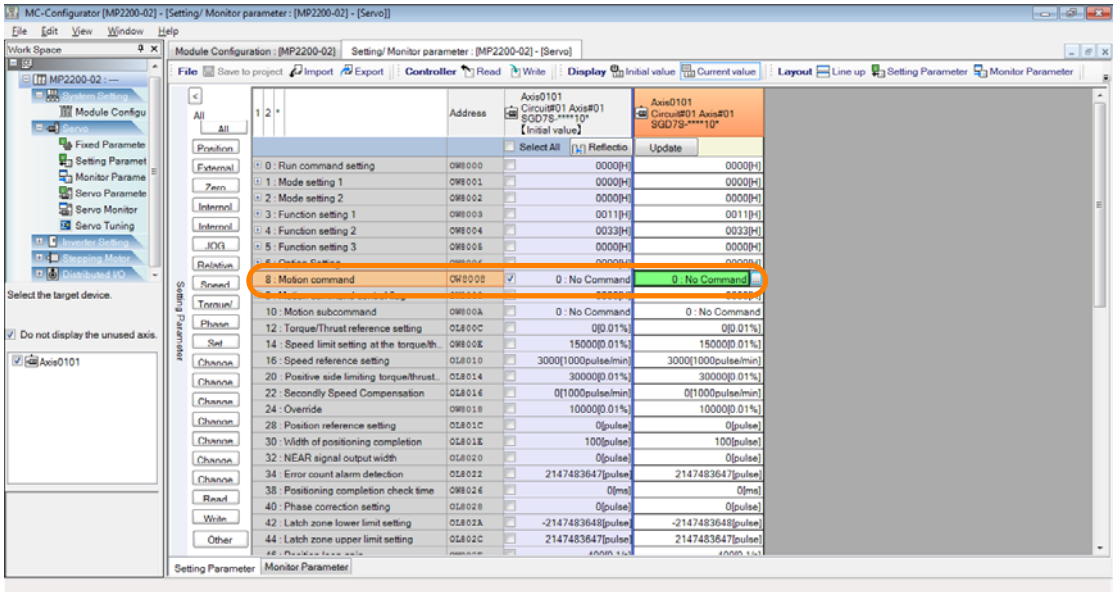


The absolute encoder will be initialized.

5. Check that the following motion monitor parameters are set as given below.
   - IW□□□00 bit 0 (Motion controller operation ready) is 0 (Operation not ready).
   - IW□□□09 bit 0 (Command execution flag) is 0 (READY (completed)).
   - IW□□□09 bit 3 (Command error completed status) is 0 (Normal completion).
   - IW□□□09 bit 7 (Absolute Encoder Reset Completed) is 1 (Initialization completed).



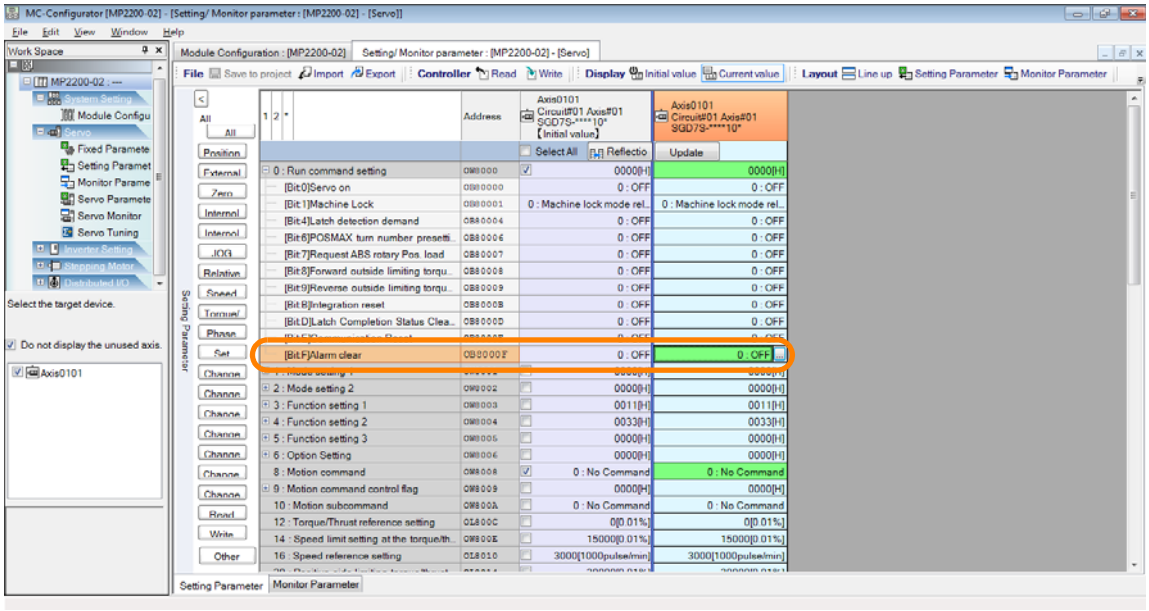
6. Set OW□□□08 (Motion command) to 0 (No Command).



This concludes the initialization of the absolute encoder.

7. Turn the power supply to the SERVOPACK OFF and ON again.

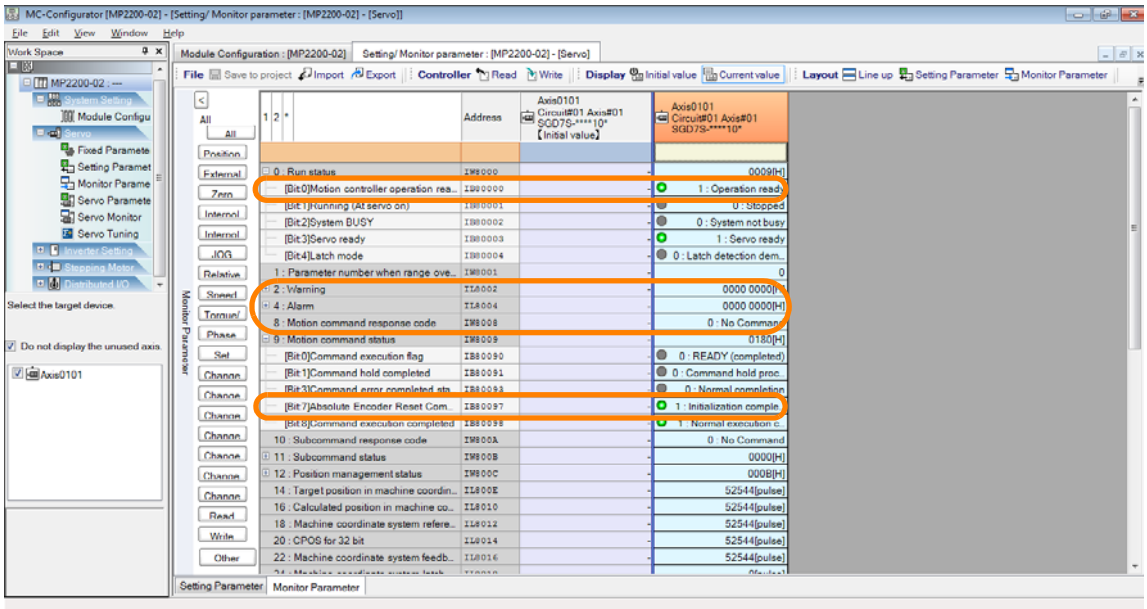
8. Set OW□□□00 bit F (Alarm clear) to 1 (ON).



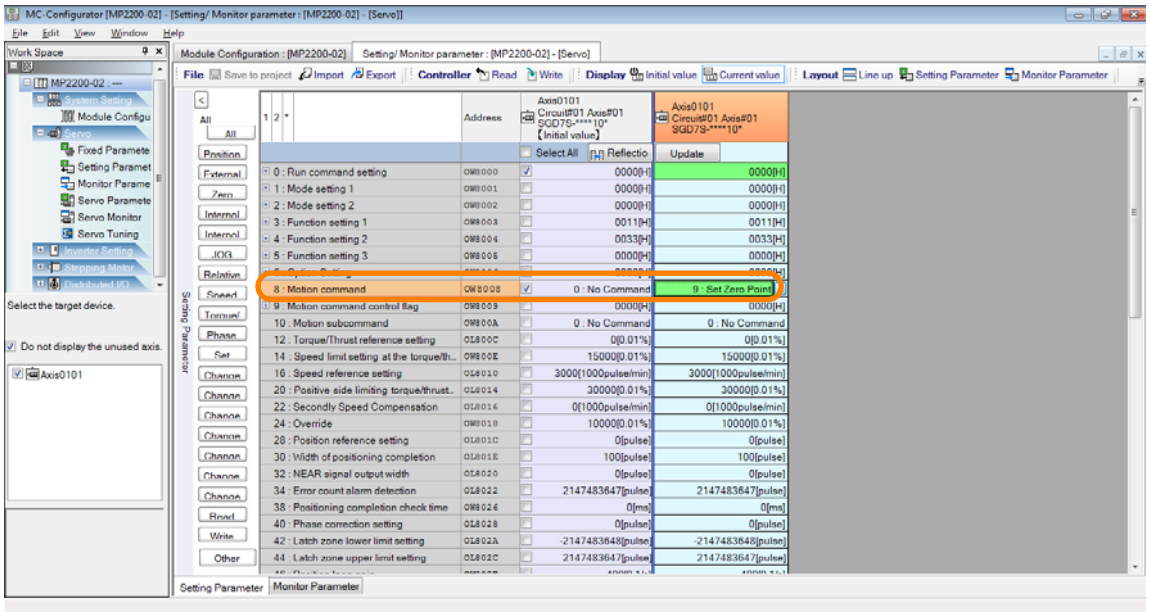
Any alarms that occurred while initializing the absolute encoder will be reset.

9. Check that the following motion monitor parameters are set as given below.

- IB□□□00 (Motion controller operation ready) is 1 (Operation ready).
- IL□□□02 (Warning) is 0.
- IL□□□04 (Alarm) is 0.
- IW□□□08 (Motion command response code) is 0 (No Command).
- IW□□□09 bit 7 (Absolute Encoder Reset Completed) is 1 (Initialization completed).



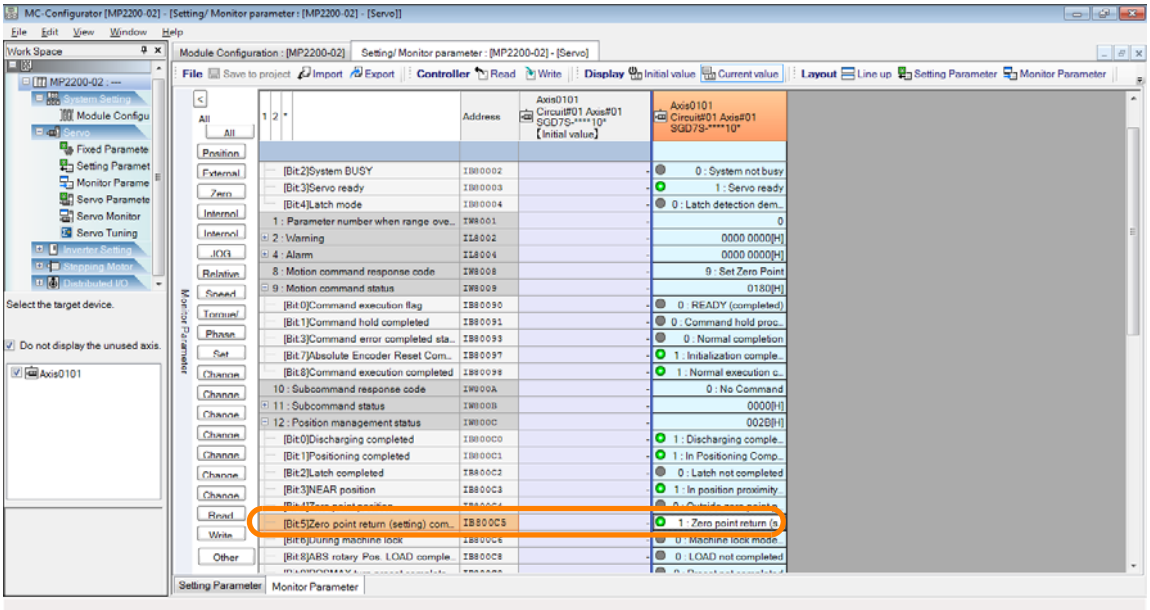
10. Set OW□□□08 (Motion command) to 9 (Set Zero Point).



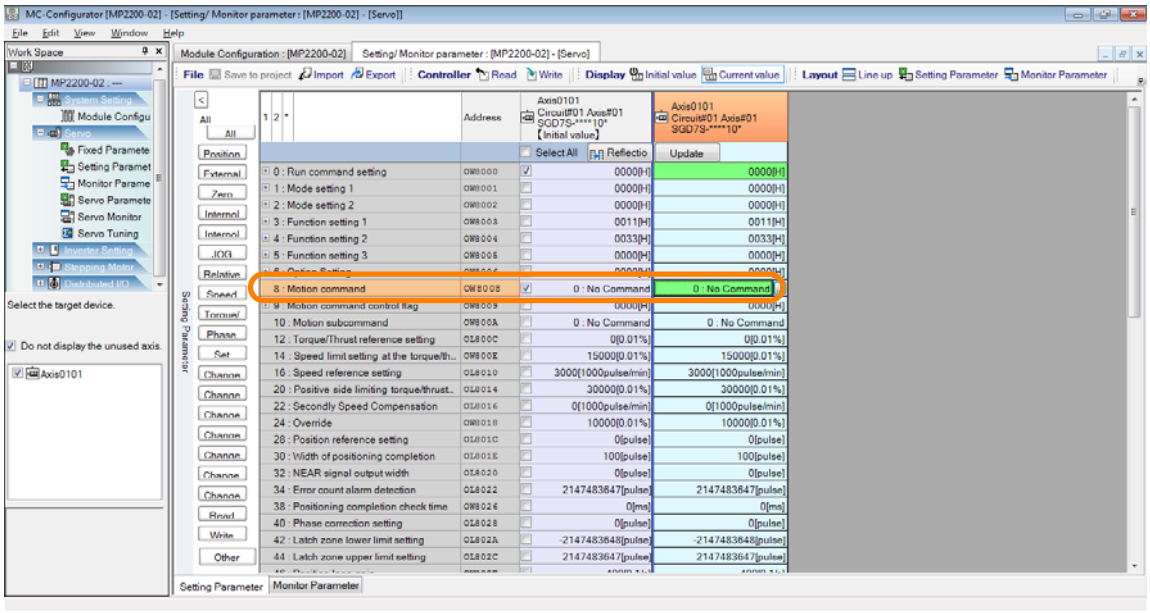
The zero point will be set.

11. Check that the following motion monitor parameter is set as given below.

- IW□□□0C bit 5 (Zero point return (setting) completed) is 1 (Zero point return completed).

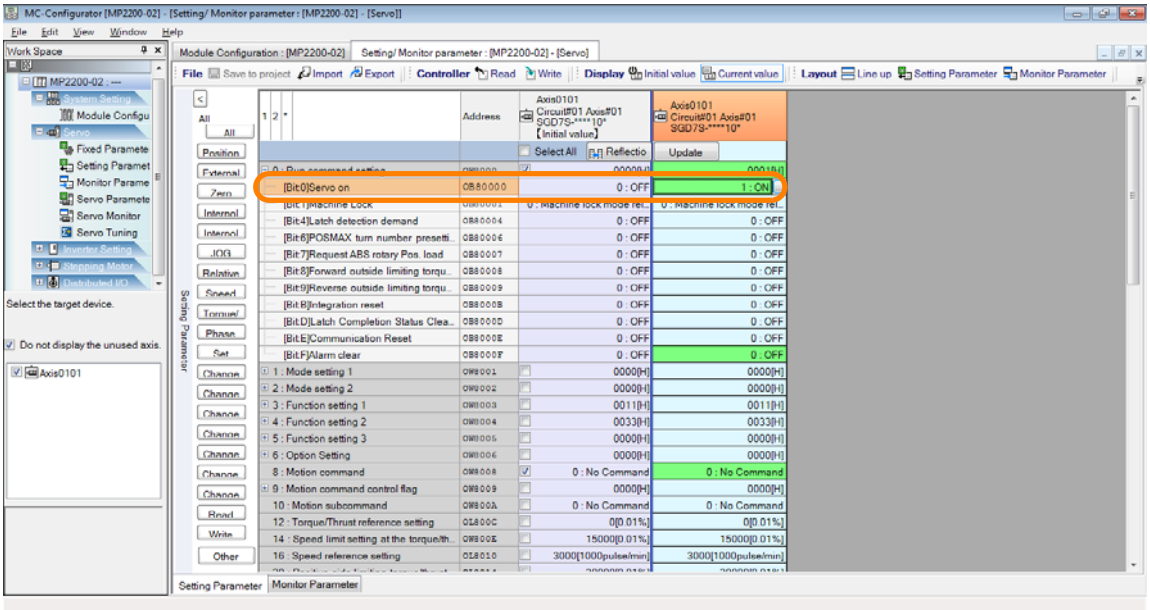


12. Set OW□□□08 (Motion command) to 0 (No Command), and set OW□□□00 bit F (Alarm clear) to 0 (OFF).



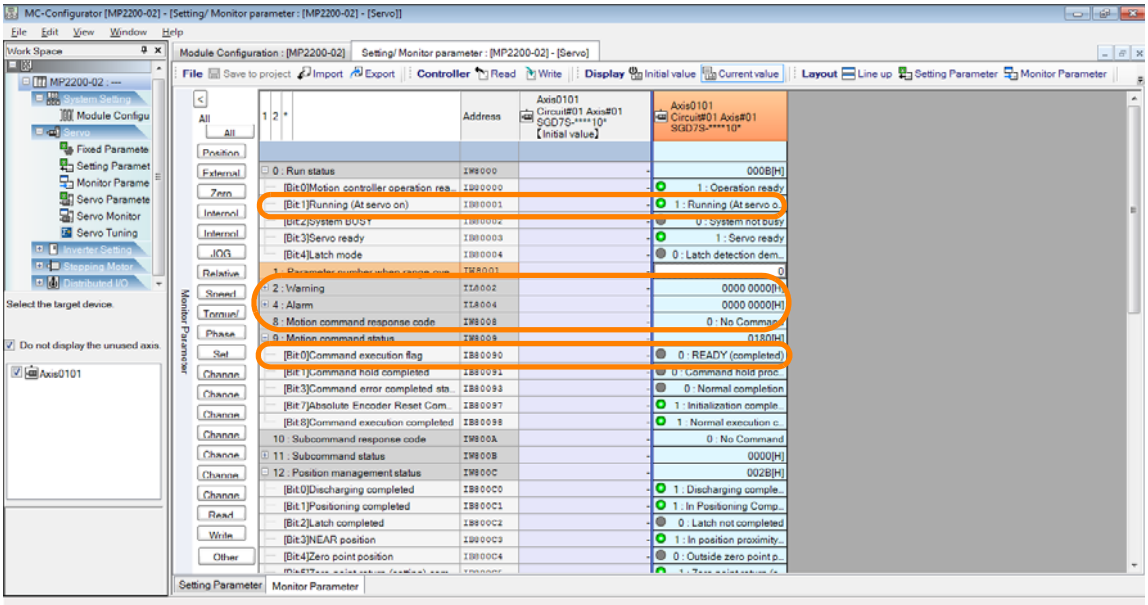
This concludes the zero point setting.

13. Set OW□□□00 bit 0 (Servo on) to 1 (ON).

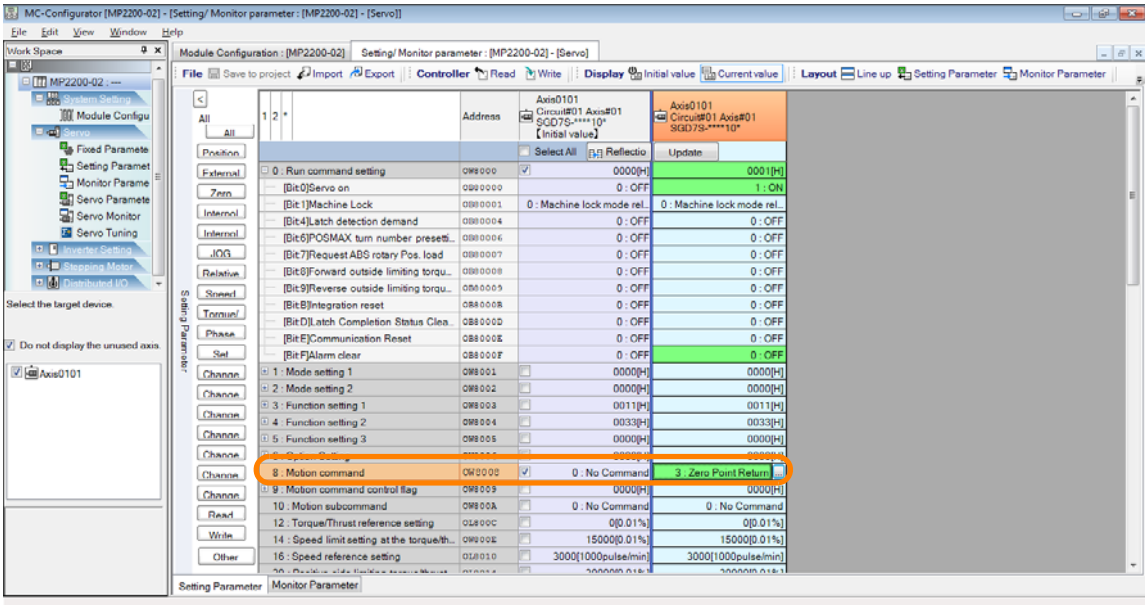


14. Check that the following motion monitor parameters are set as given below.

- IW□□□00 bit 1 (Running (At servo on) is 1 (Running (At servo on).
- IL□□□02 (Warning) is 0.
- IL□□□04 (Alarm) is 0.
- IW□□□08 (Motion command response code) is 0 (No Command).
- IW□□□09 bit 0 (Command execution flag) is 0 (READY (completed)).

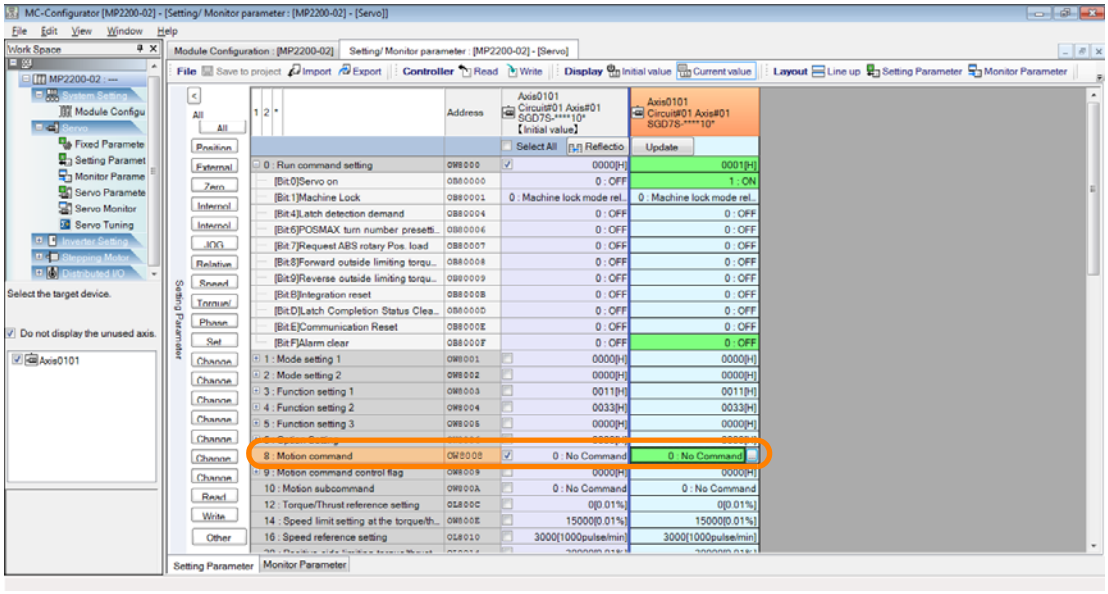


15. Set OW□□□08 (Motion command) to 3 (Zero Point Return).



A zero point return will be executed.

16. Set OW□□□08 (Motion command) to 0 (No Command).



This concludes the zero point return.

This concludes the procedure.

Transferring Data

8

This chapter describes the operations that are used to transfer data.

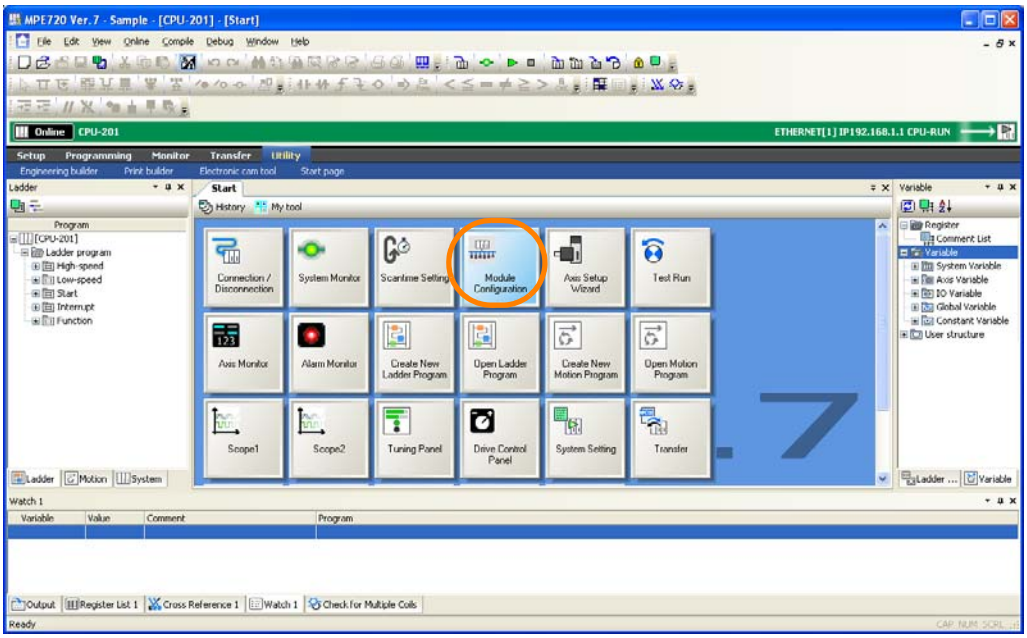
8.1 Exporting and Importing Axis Parameters

This section gives the procedures for exporting axis parameters to and importing axis parameters from external CSV files.

8.1.1 Exporting

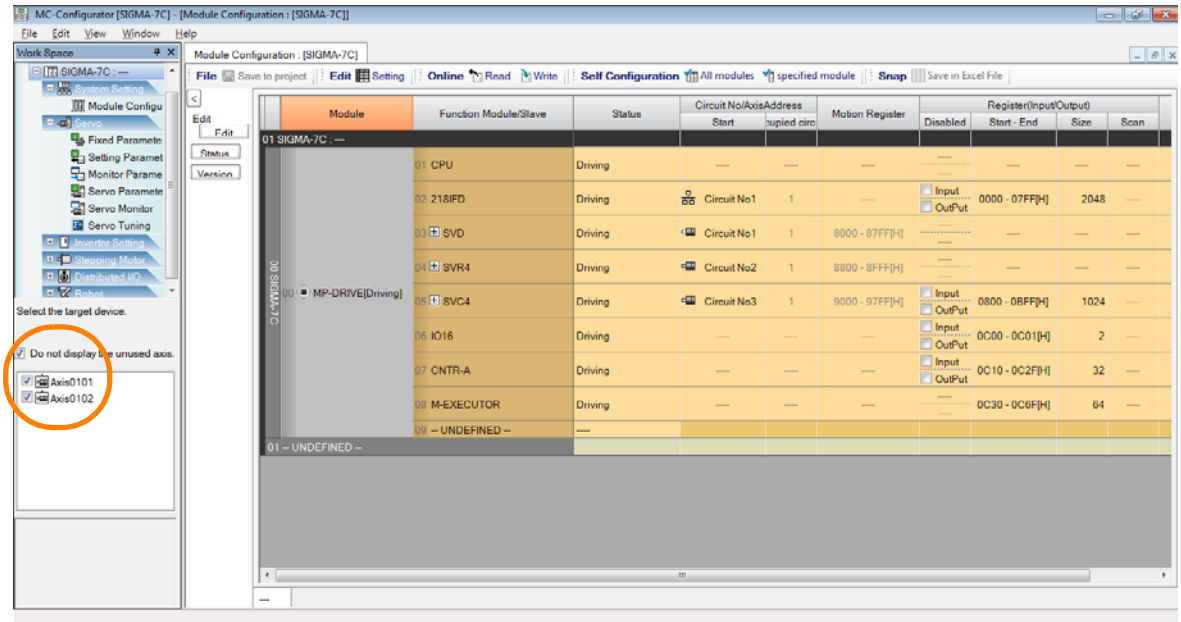
Use the following procedure to export axis parameters to an external CSV file.

1. Establish an online connection or open a project file.
2. Click the **Module Configuration** Button on the My Tool View.

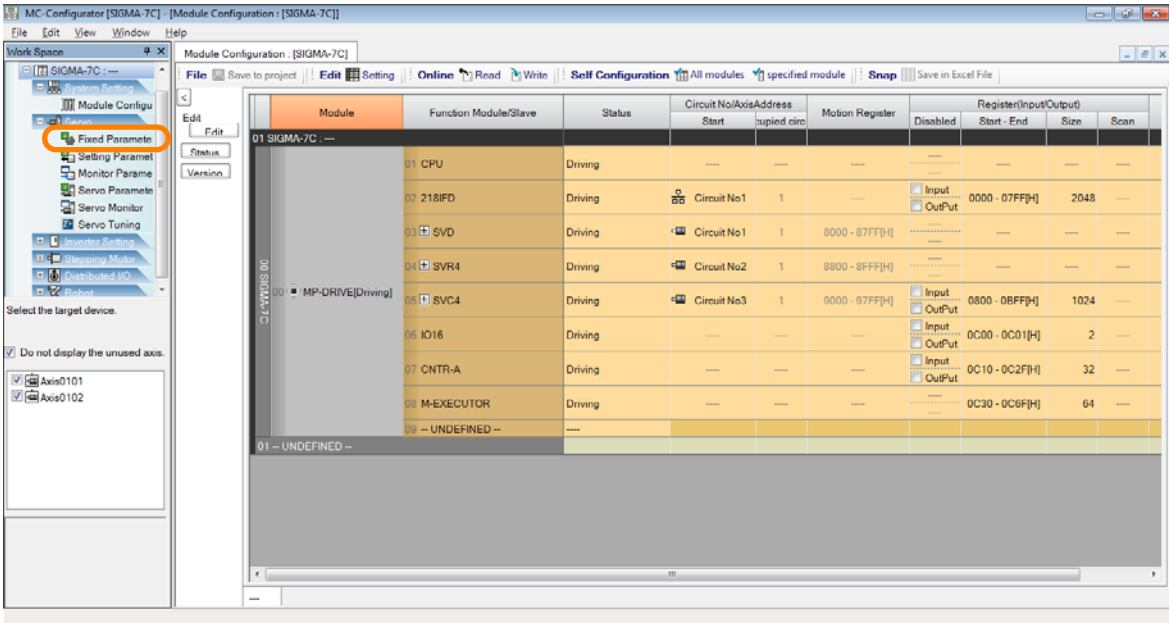


The Module Configuration Tab Page will be displayed.

3. In the Work Space Pane, select the check boxes for the servo axes for which you want to export the parameters.

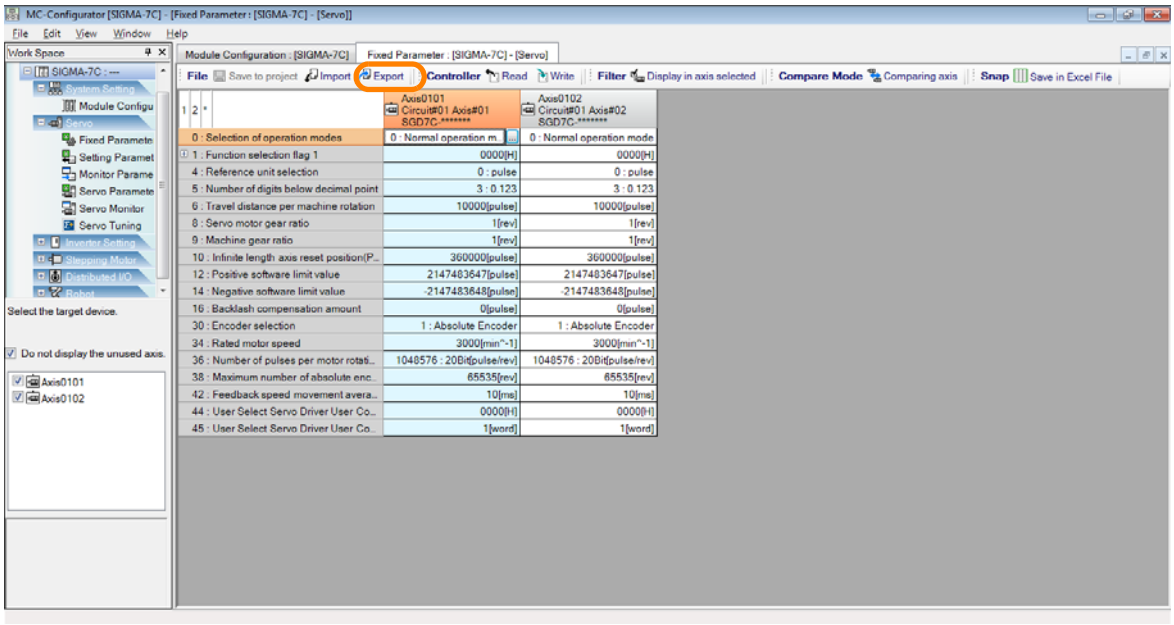


4. Double-click **Fixed Parameters**.



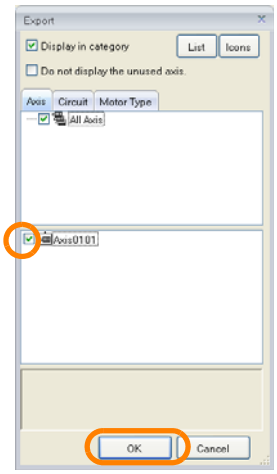
A tab page for the selected axes will be displayed.

5. Click the **Export** Button next to **File**.



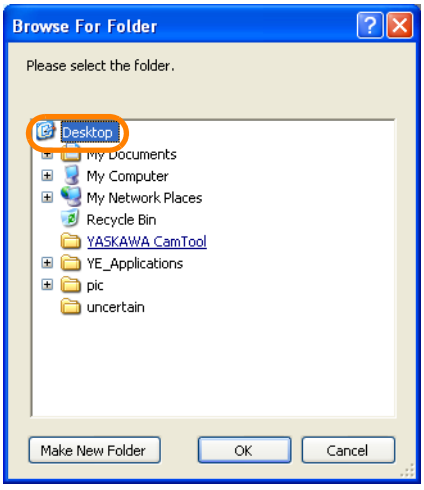
The Export Dialog Box will be displayed.

6. Select the axis for which to export the parameters and click the **OK** Button.

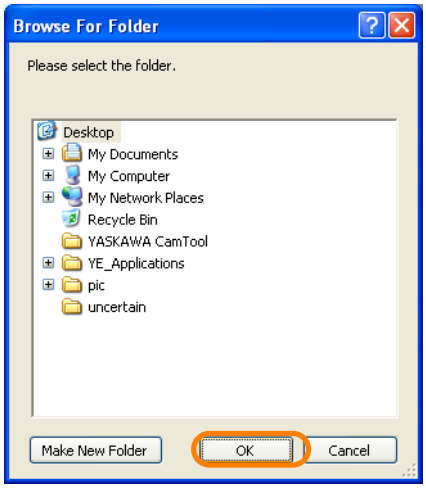


The Browse for Folder Dialog Box will be displayed.

7. Select the folder in which to store the exported CSV file.

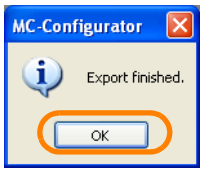


8. Click the **OK** Button.



When the export has been completed, the MC-Configurator Dialog Box will be displayed.

9. Click the **OK** Button.



10. Confirm that the exported data has been stored in the selected folder.

Information

The name of the data will be displayed as given below.

Data name example:FixPrm _ □□ □□ .csv

- Extension
- Circuit number
- Axis number
- Underbar
- Parameter name
  - Fixed parameters: FixPrm
  - Setting parameters: SetPrm
  - Servo parameters: SrvPrm

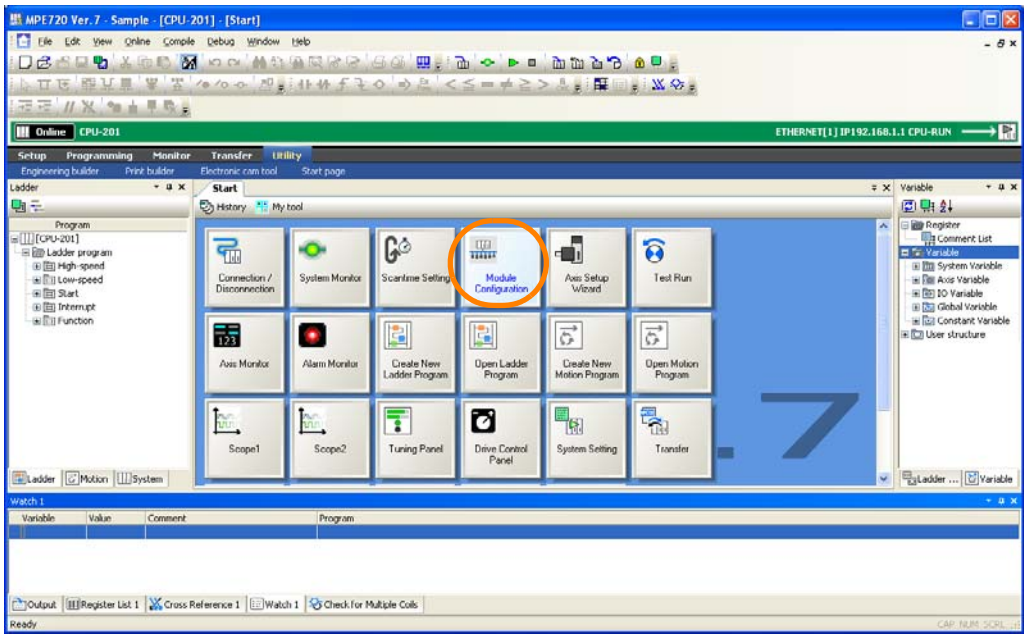
This concludes the procedure.

8.1.2 Importing

Use the following procedure to import axis parameters from an external CSV file.

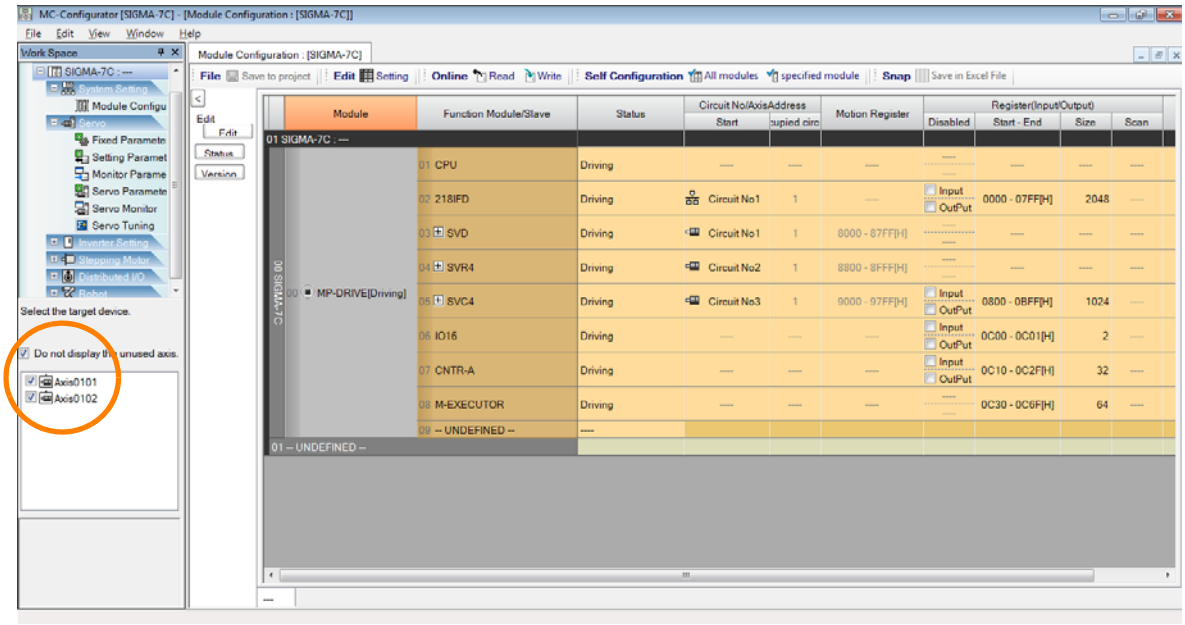
1. Establish an online connection or open a project file.

2. Click the **Module Configuration** Button on the My Tool View.

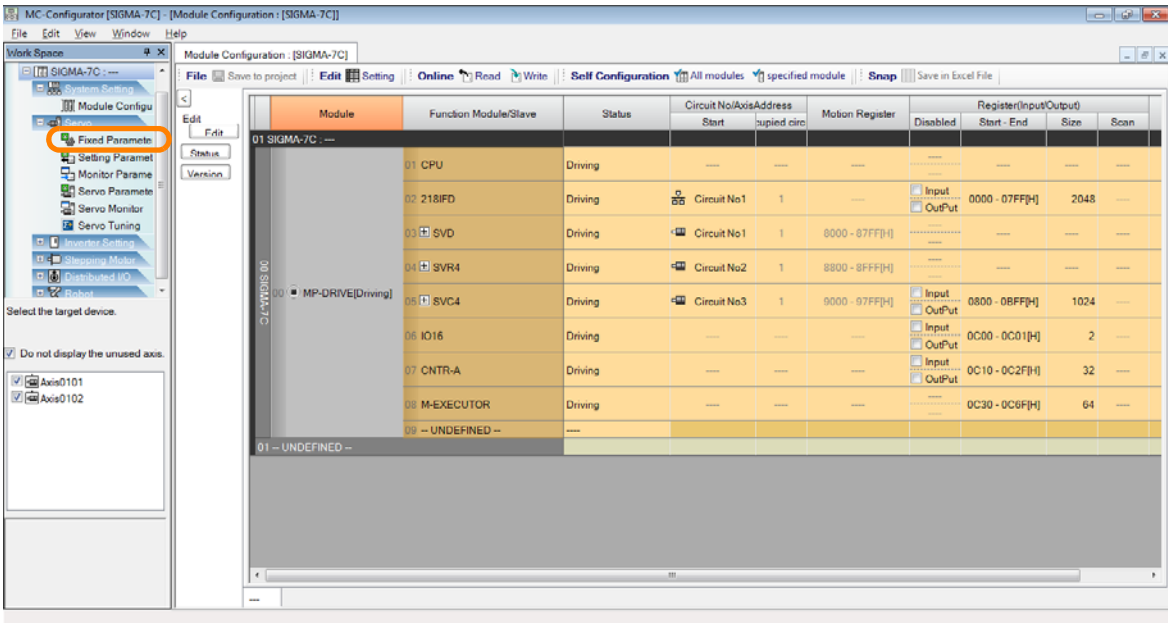


The Module Configuration Tab Page will be displayed.

3. In the Work Space Pane, select the check boxes for the servo axes for which you want to import the parameters.

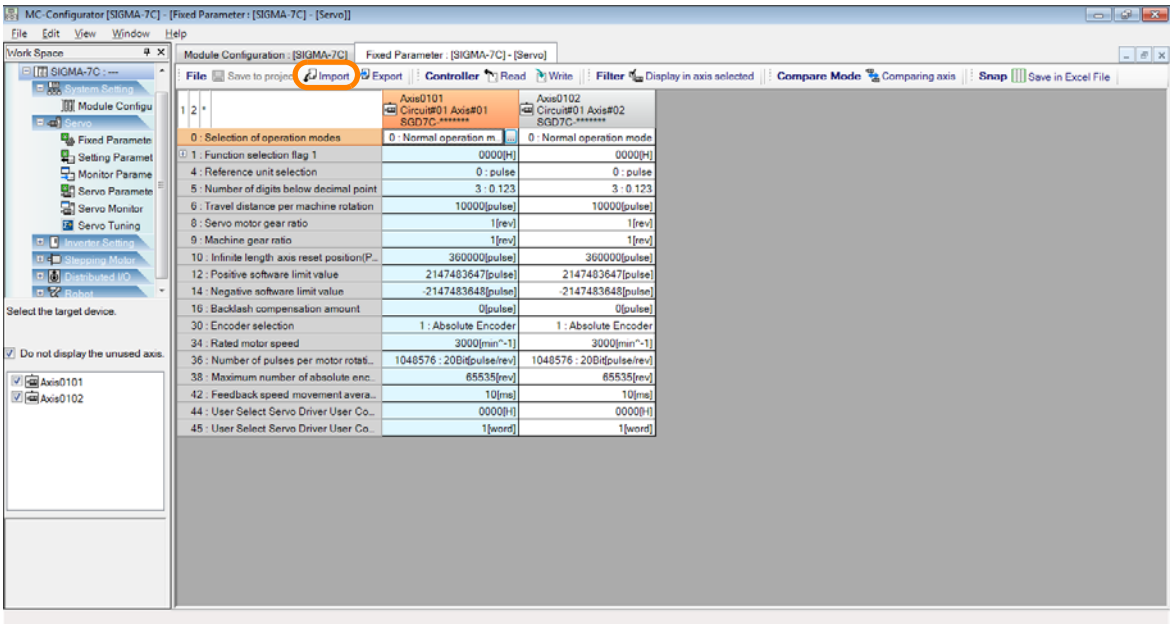


4. Double-click **Fixed Parameters**.



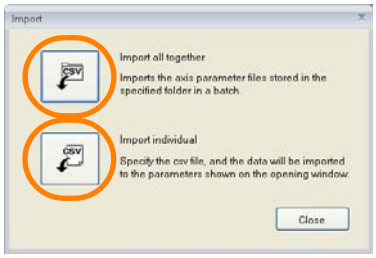
A tab page for the selected axes will be displayed.

5. Click the **Import** Button.



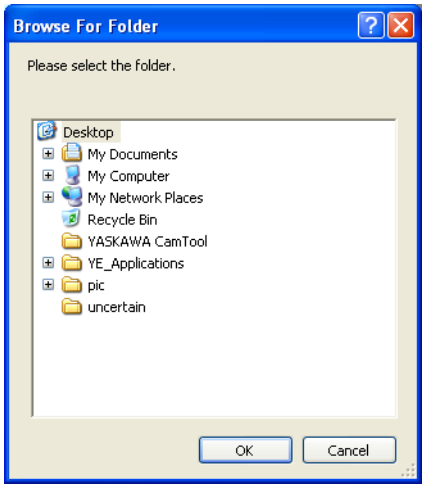
The Import Dialog Box will be displayed.

6. Click the **Import all together** Button or the **Import individual** Button.
   - Import all together: Imports multiple axis parameters in a batch.
   - Import individual: Imports individual axis parameters.

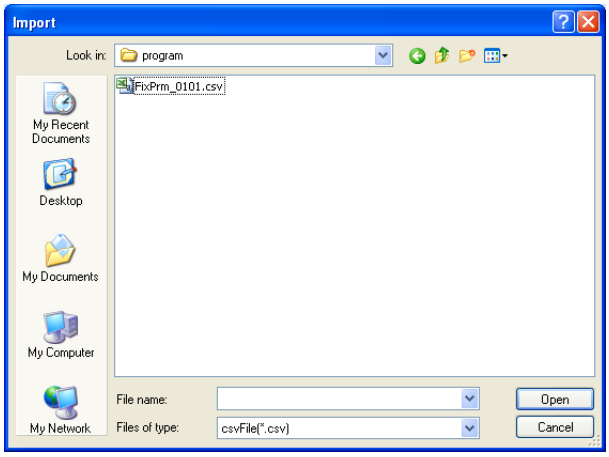


   - If you clicked the **Import all together** Button: The Browse for Folder Dialog Box will be displayed.
   - If you clicked the **Import individual** Button: The Import Dialog Box will be displayed.

Import All Together

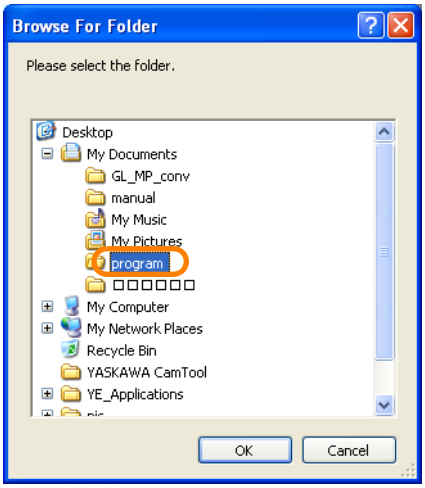


Import Individual

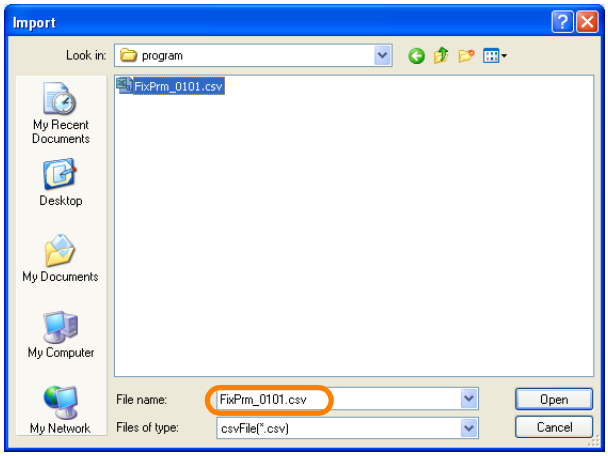


7. Select the folder or file to import.
   - Import all together: Select the folder that contains multiple files to import.
   - Import individual: Select the file to import.

Import All Together

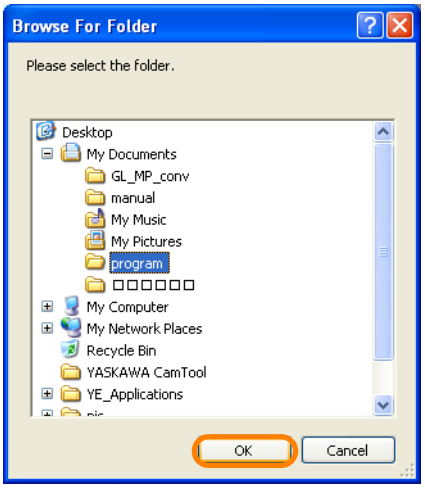


Import Individual

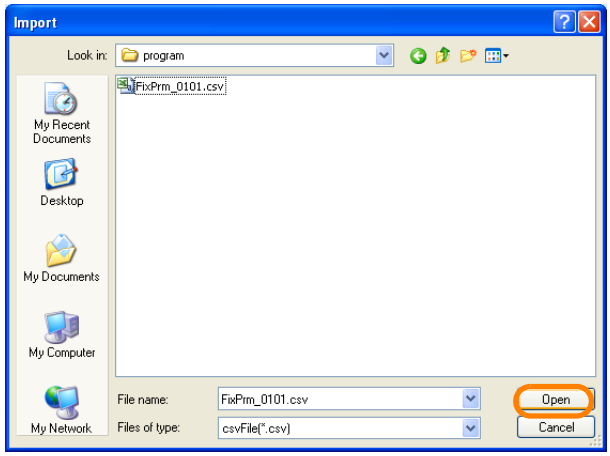


8. Click the **OK** Button or the **Open** Button.

Import All Together

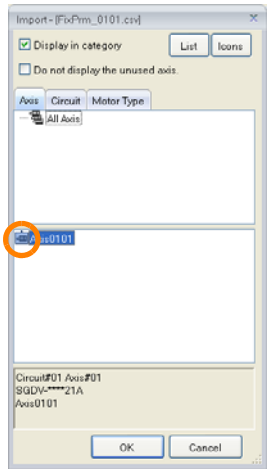


Import Individual

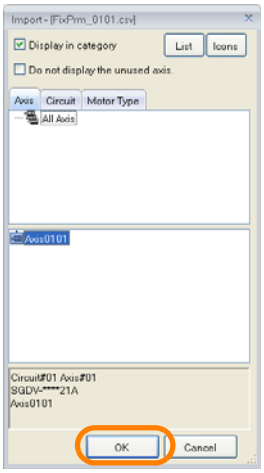


The Import Dialog Box will be displayed.

9. Select the axis for which to import the parameters.

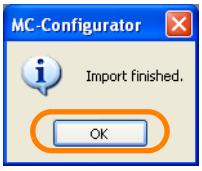


10. Click the **OK** Button.



When the import has been completed, the MC-Configurator Dialog Box will be displayed.

11. Click the **OK** Button.



This concludes the procedure.

8.2 Exporting and Importing Register Data

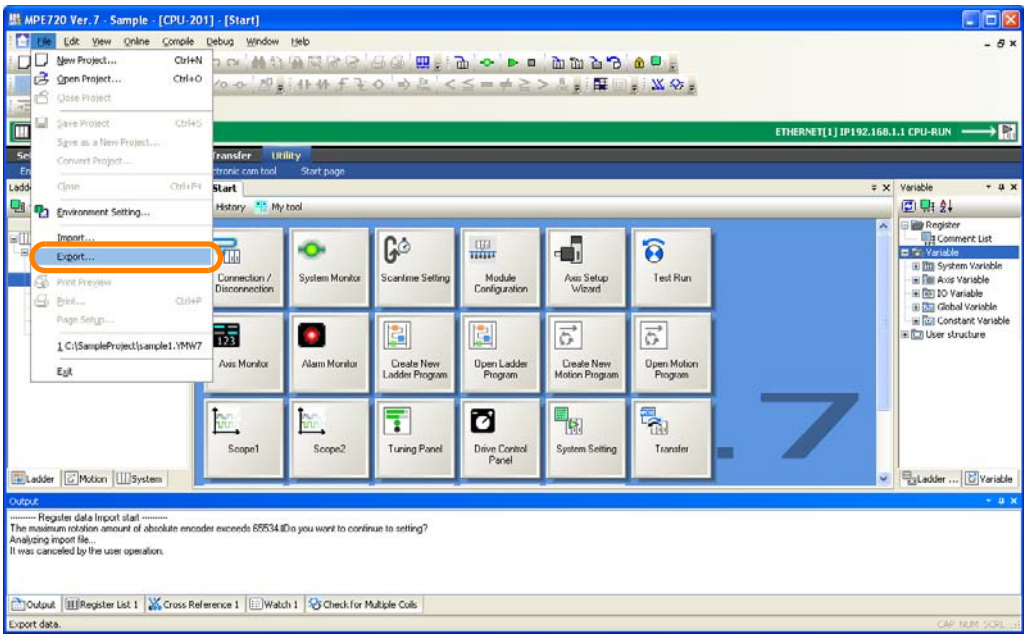
You can export register data to or import register data from external CSV files to easily back up or change the register data. Users may also create the data that is imported.

This section gives the procedures for exporting axis parameters to and importing register data from external CSV files.

8.2.1 Exporting

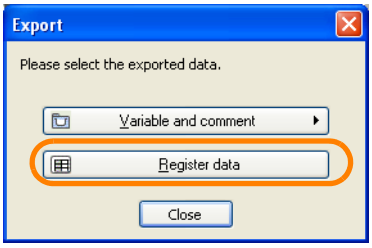
Use the following procedure to export register data to an external CSV file.

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.



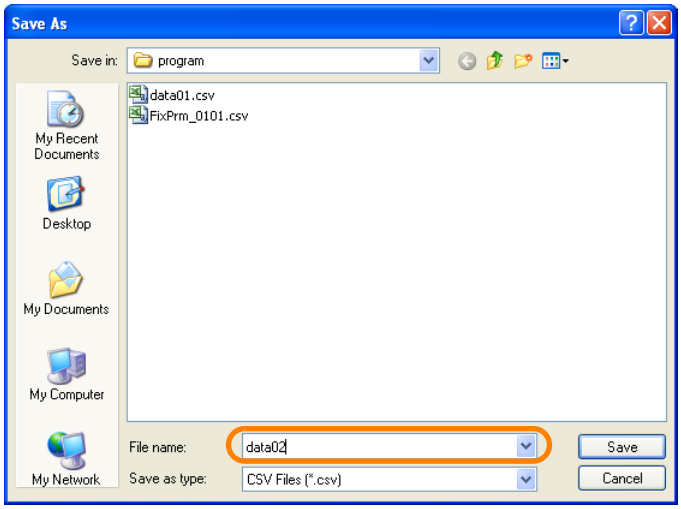
The Export Dialog Box will be displayed.

3. Click the **Register data** Button.

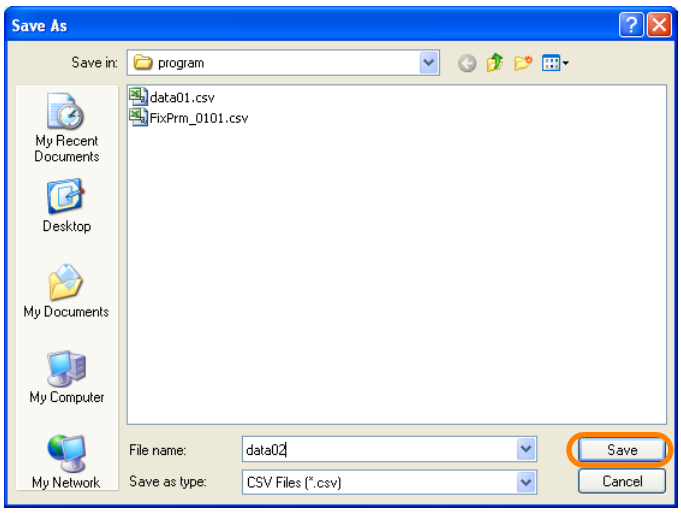


The Save As Dialog Box will be displayed.

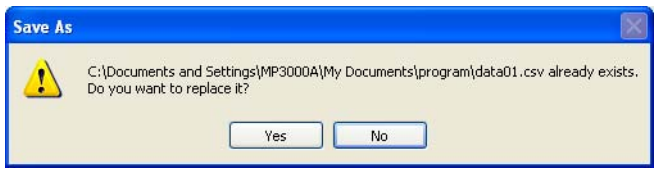
4. Select the CSV file to which to export the register data.
To save the data in a new file, enter a file name.



5. Click the **Save** Button.

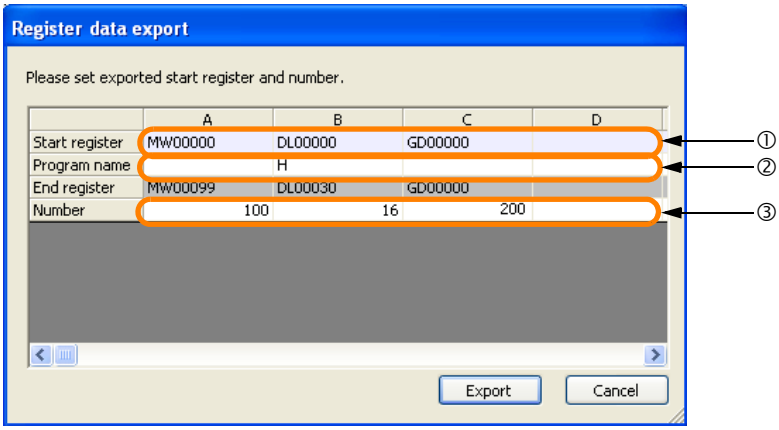


Information If you select an existing file, the following dialog box will be displayed. Click the **Yes** Button.

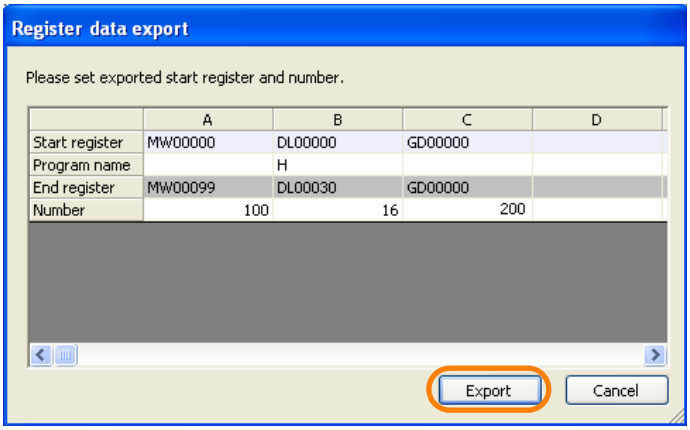


The Register Data Export Dialog Box will be displayed.

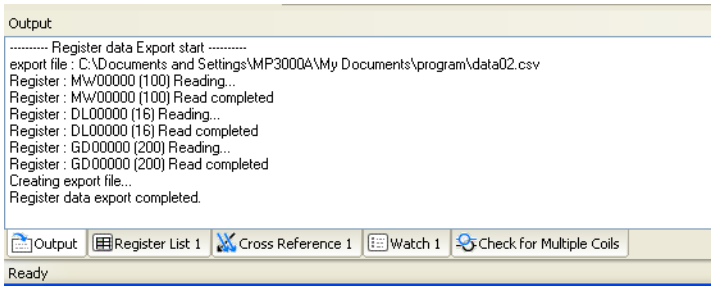
6. Enter the following information.
   ① The first address of the registers to export
   ② The program name (for local registers only)
   ③ The number of registers from the first address of the registers to export



7. Click the **Export** Button.



The register data will be exported, and the results will be displayed in the Output Pane.



8. Confirm that the exported data has been stored in the specified file.

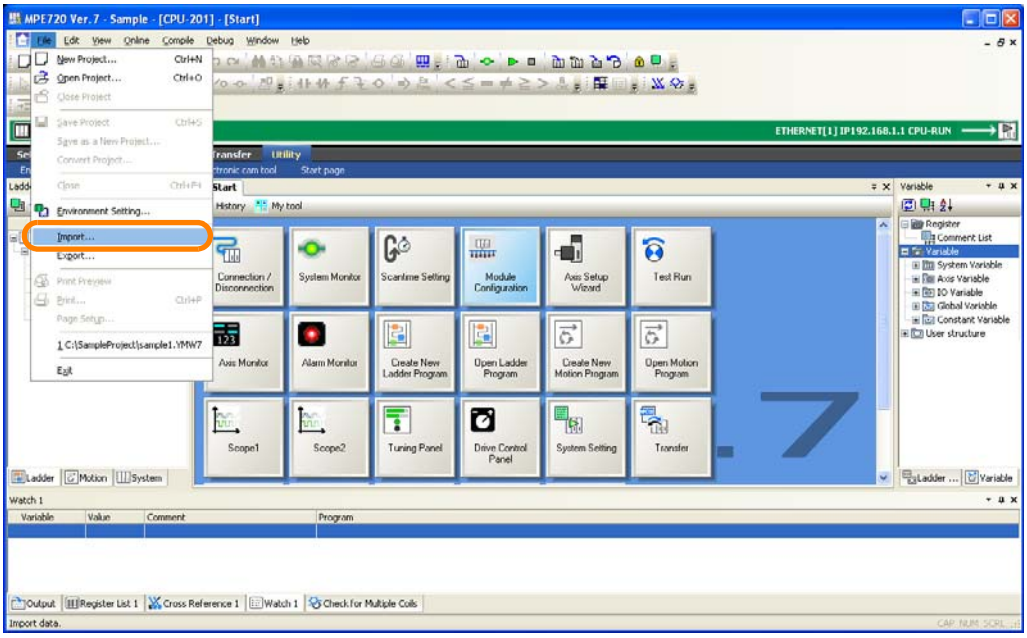
> Important
> If a warning dialog box appears, the specified register address may be outside the register range, or the format may be incorrect. Change the value and try again.

This concludes the procedure.

8.2.2 Importing

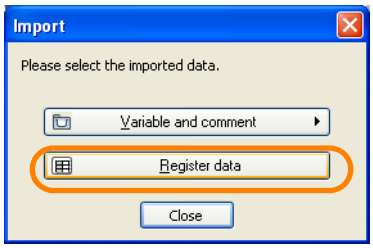
Use the following procedure to import register data from an external CSV file.

1. Select ***File*** – ***Import*** from the menu bar.



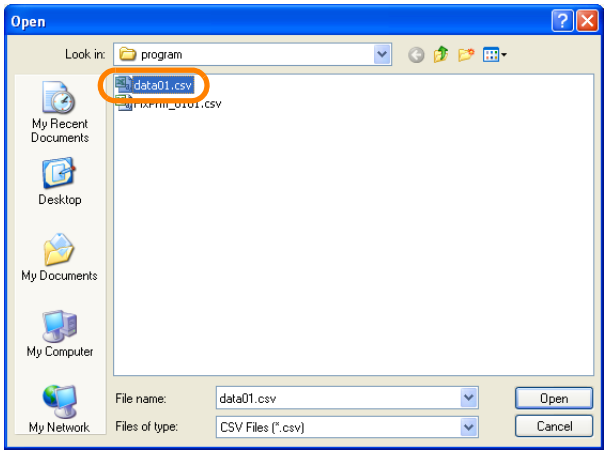
The Import Dialog Box will be displayed.

2. Click the **Register data** Button.

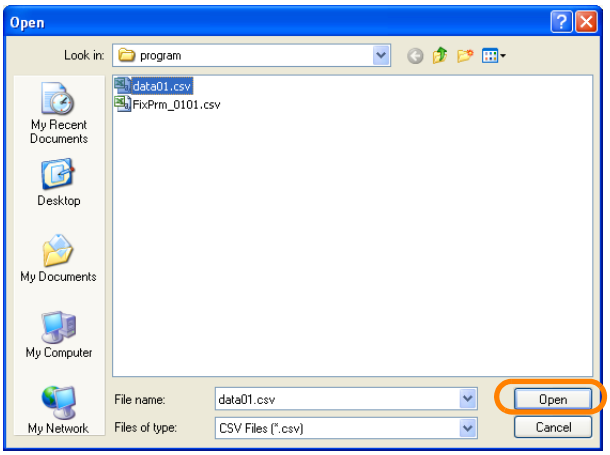


The Open Dialog Box will be displayed.

3. Select the CSV file from which to import the register data.

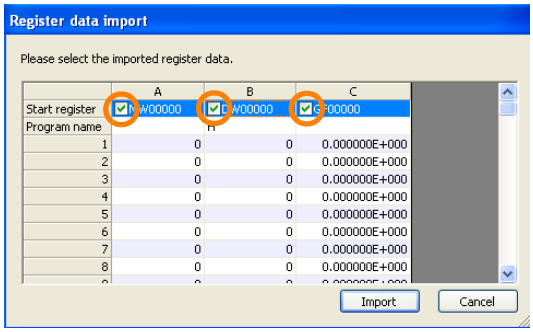


4. Click the **Open** Button.

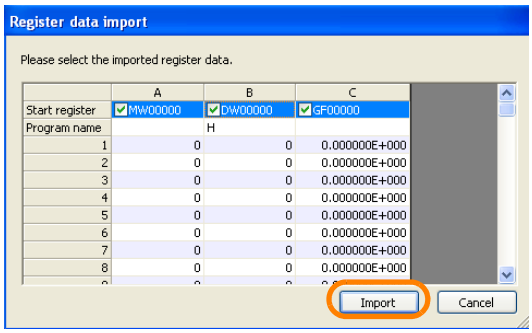


The Register Data Import Dialog Box will be displayed.

5. Select the check boxes for the registers to import.



6. Click the **Import** Button.



The data will be imported.

Important

If the MPE720 is connected to a Machine Controller, 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 Exporting and Importing Comments and Variables

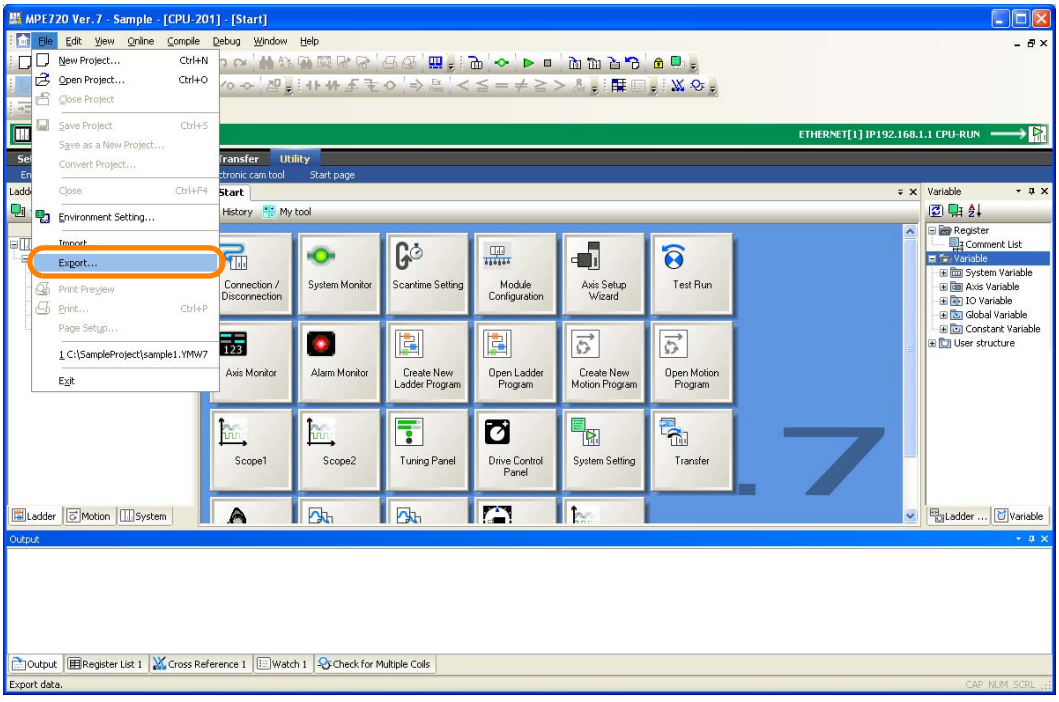
This section gives the procedures for exporting and importing comments and variables.
The nine procedures that are listed below are given.

- Exporting Global Variables and Comments
- Exporting Local Variables and Comments
- Exporting Specified Register Variables and Comments
- Exporting Constant Variables
- Exporting User-defined Structures
- Importing Global Variables and Comments
- Importing Local Variables and Comments
- Importing Constant Variables
- Importing User-defined Structures
- Importing MPE720 Version 5 CMT Files

8.3.1 Exporting Global Variables and Comments

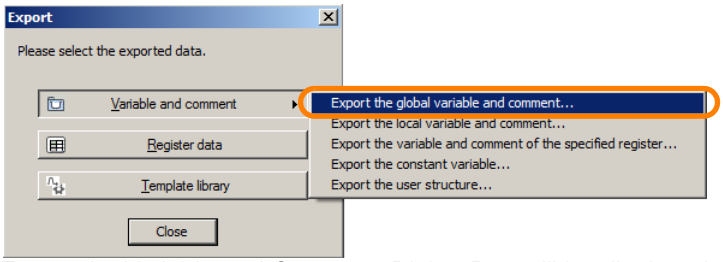
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.

Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Export*** – ***Export the global variable and comment***.



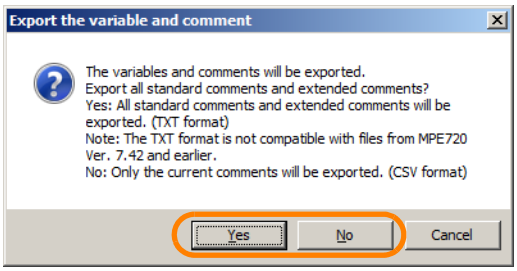
The Export Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Export the global variable and comment**.



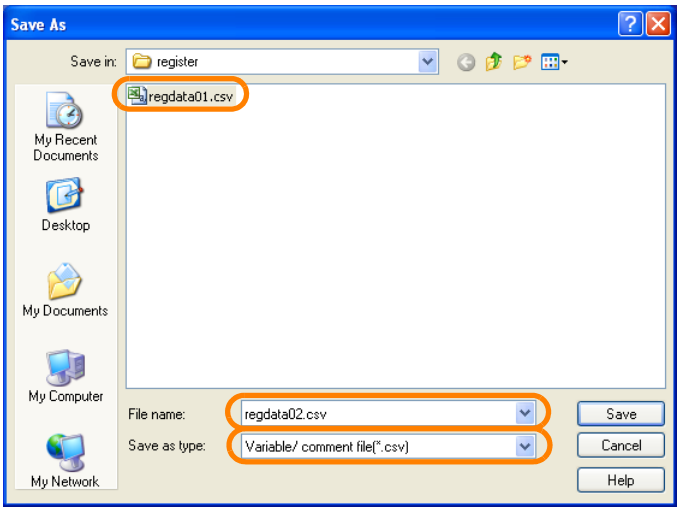
Export the Variable and Comment Dialog Box will be displayed.

4. Click the **Yes** Button or **No** Button.

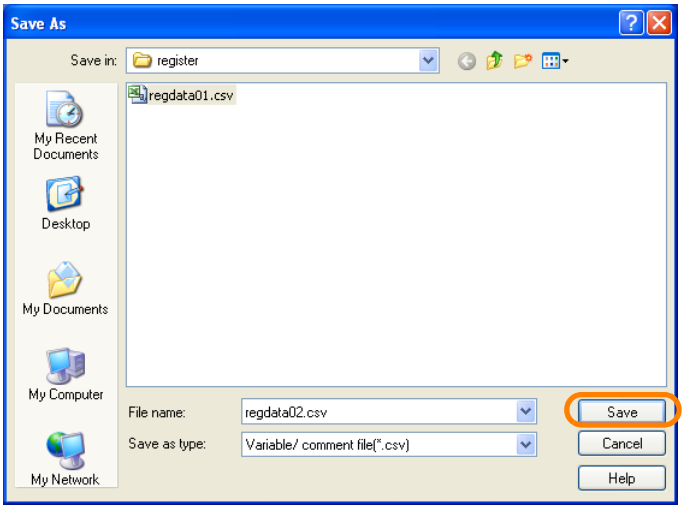


The Save As Dialog Box will be displayed.

5. Select the file to which to export the variable and comment data.
To save the data in a new file, enter a file name.

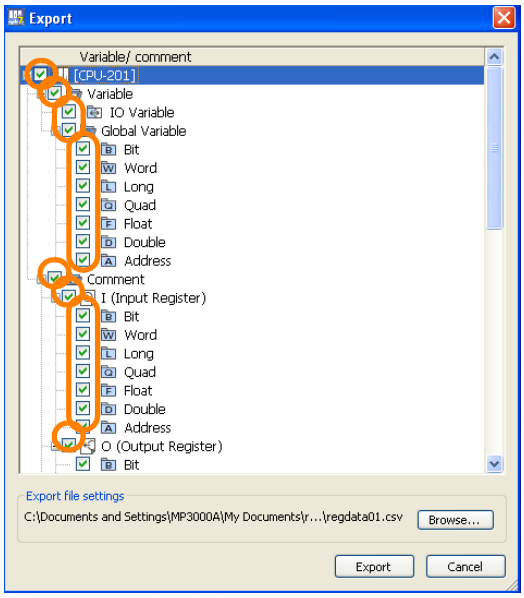


6. Click the **Save** Button.

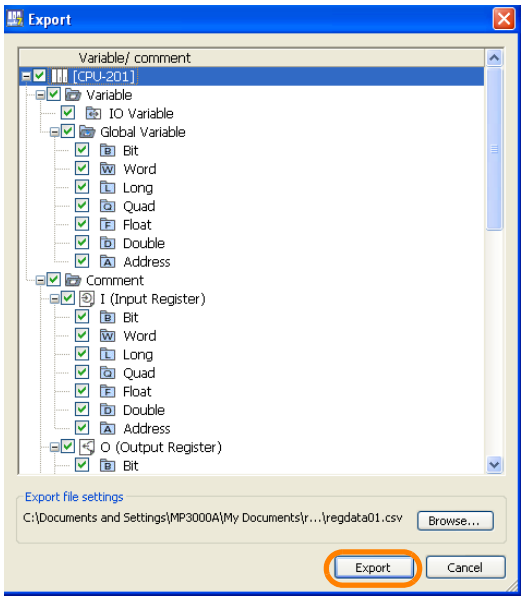


The Export Dialog Box will be displayed.

7. Select the check boxes for the variables and comments to export.



8. Click the **Export** Button.



The data will be exported.

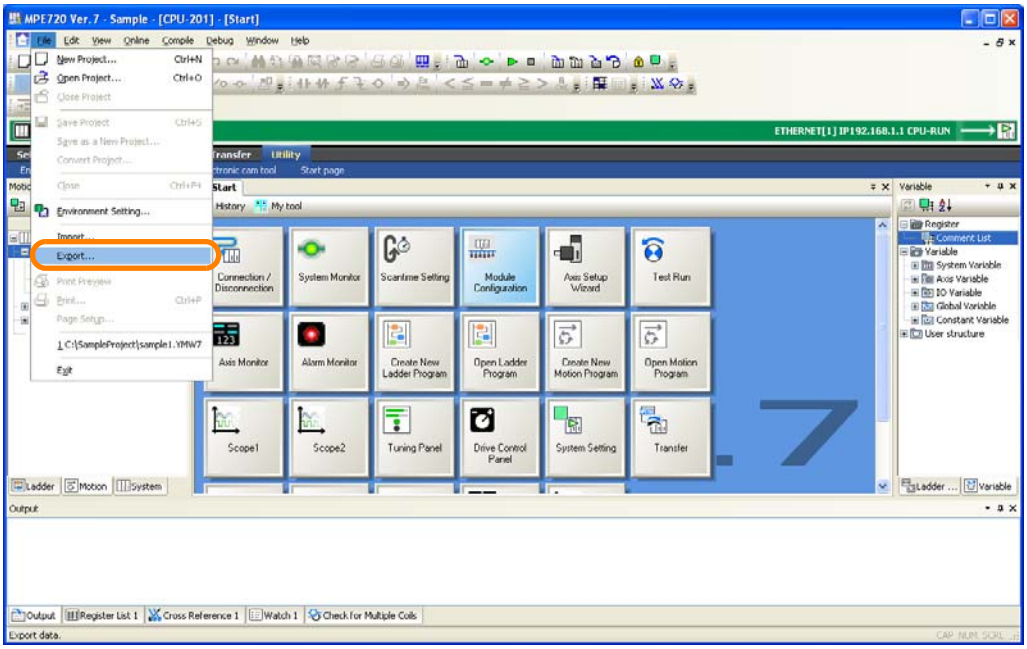
9. Confirm that the exported data has been stored in the specified file.

This concludes the procedure.

8.3.2 Exporting Local Variables and Comments

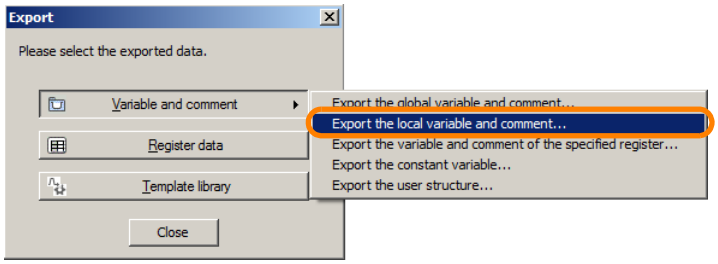
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.

   Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Export*** – ***Export the local variable and comment***.



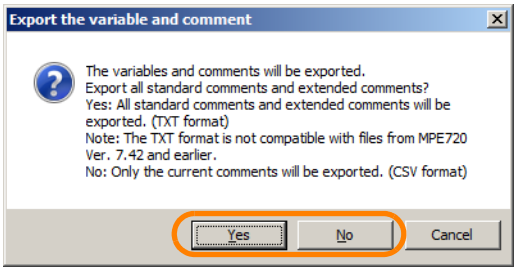
The Export Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Export the local variable and comment**.



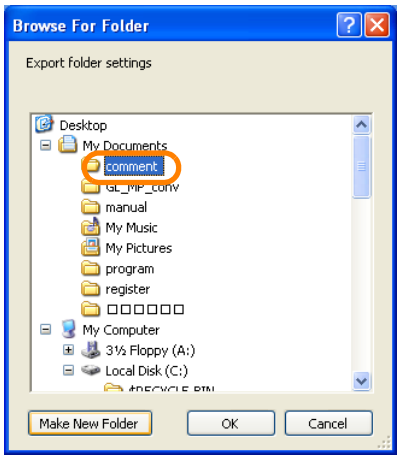
Export the Variable and Comment Dialog Box will be displayed.

4. Click the **Yes** Button or **No** Button.

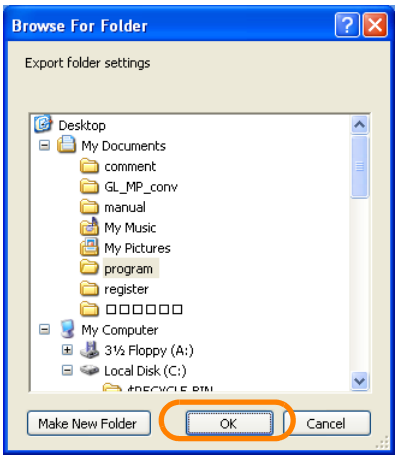


The Browse for Folder Dialog Box will be displayed.

5. Select the folder to which to export the local variable and comment data.

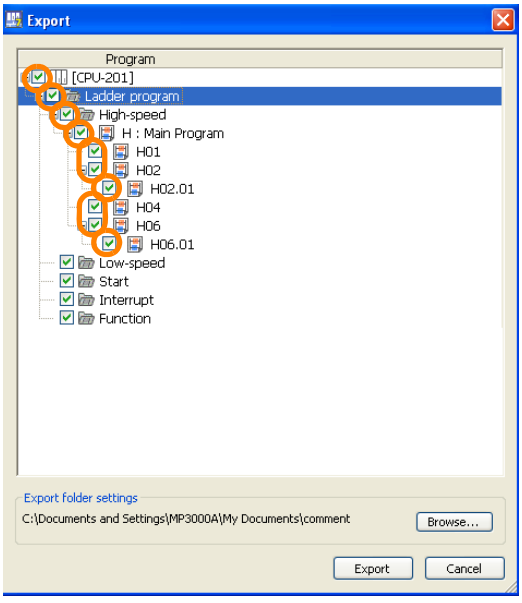


6. Click the **OK** Button.

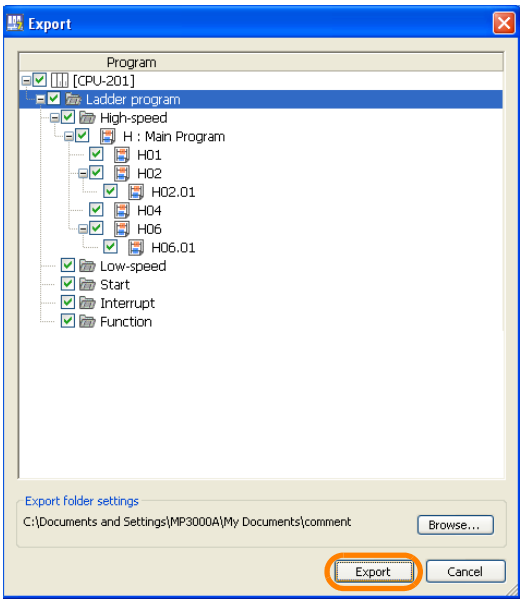


The Export Dialog Box will be displayed.

7. Select the check boxes for the programs to export.



8. Click the **Export** Button.



The data will be exported.

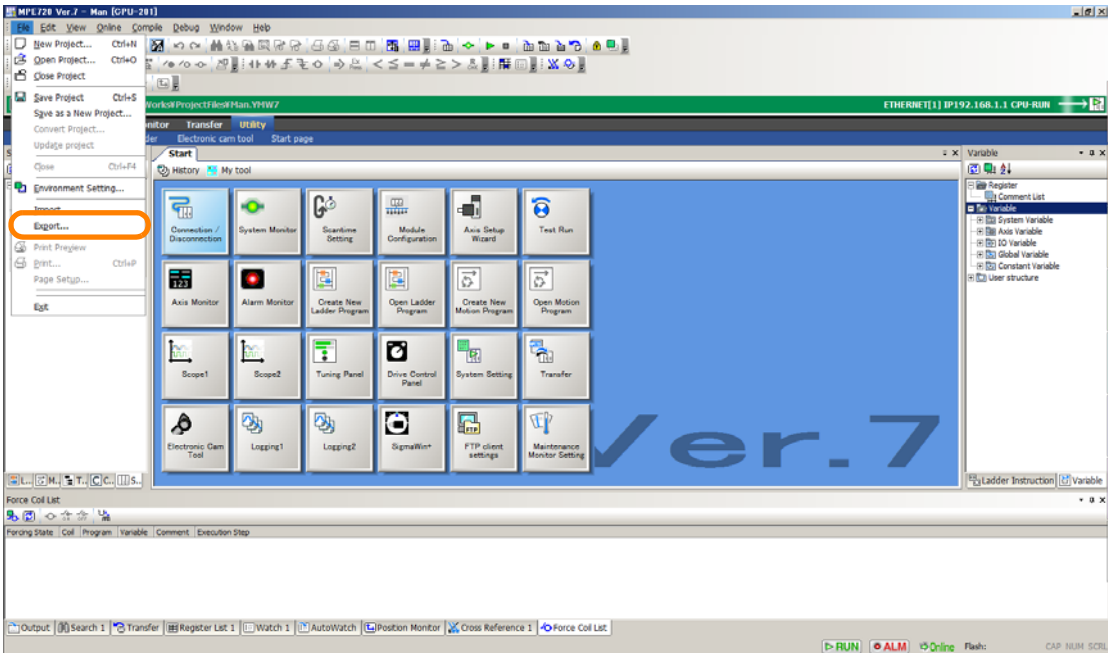
9. Confirm that the exported data has been stored in the selected file.

This concludes the procedure.

8.3.3 Exporting Specified Register Variables and Comments

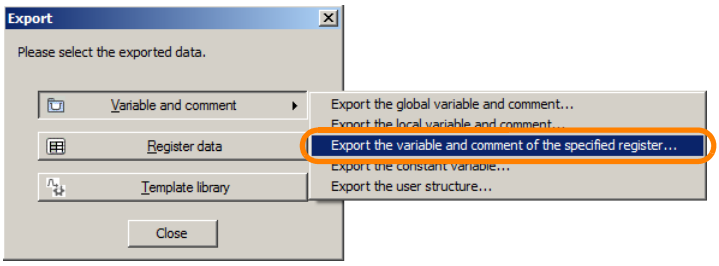
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.

Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Export*** – ***Export the variable and comment of the specified register***.



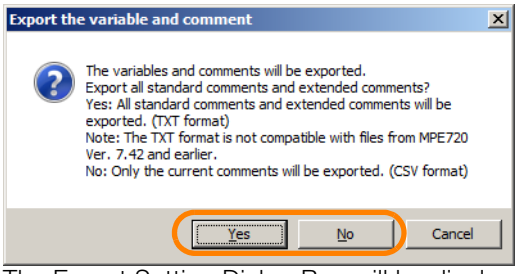
The Export Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Export the variable and comment of the specified register**.



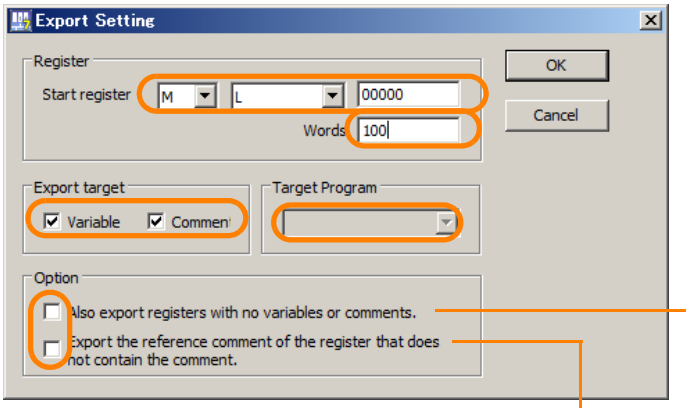
Export the Variable and Comment Dialog Box will be displayed.

4. Click the **Yes** Button or **No** Button.



The Export Setting Dialog Box will be displayed.

5. Set the information on the registers to export (register type, data type, start address, and number of words) as well as the export target, target program, and options, and then click the **OK** Button.

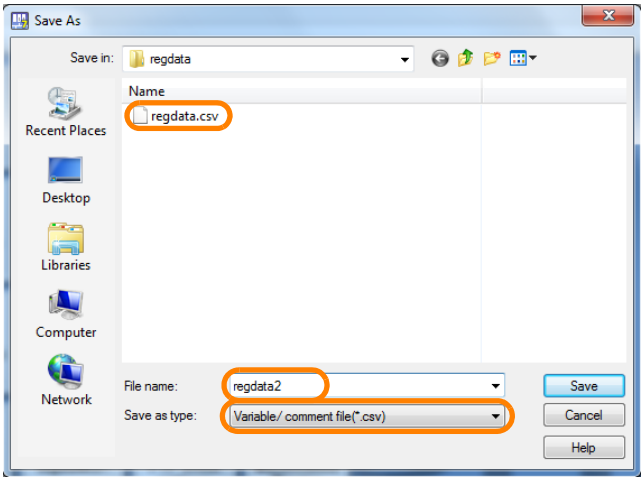


If this check box is selected, the specified range of registers will be exported even if there are registers for which variables and comments are not registered.

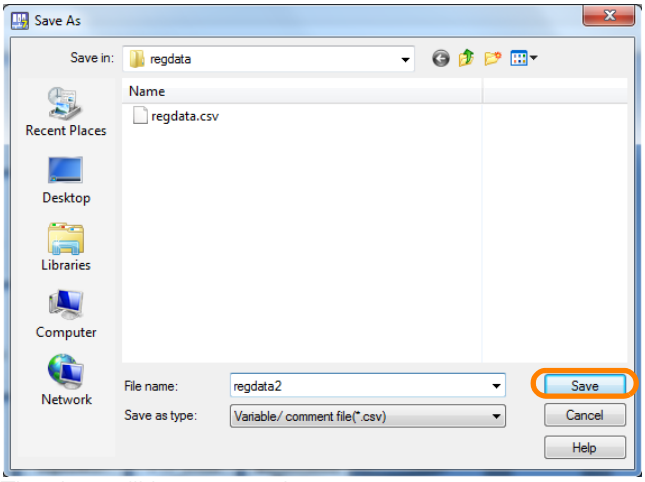
If this check box is selected, reference comments will also be exported.

The Save As Dialog Box will be displayed.

6. Select the file to which to export the variable and comment data.
To save the data in a new file, enter a file name.



7. Click the **Save** Button.



The data will be exported.

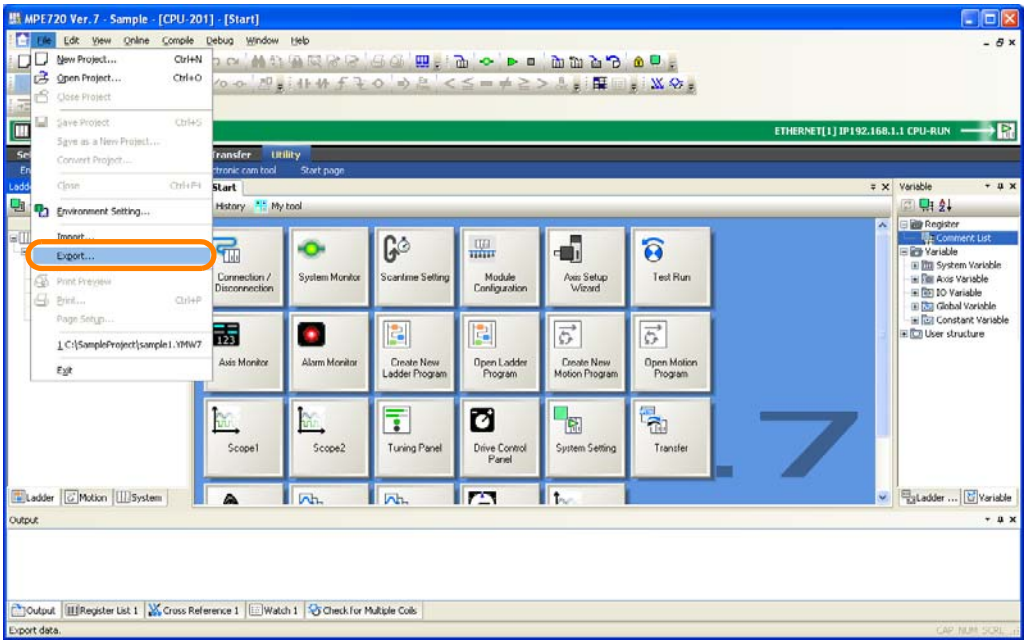
8. Confirm that the exported data has been stored in the specified file.

This concludes the procedure.

8.3.4 Exporting Constant Variables

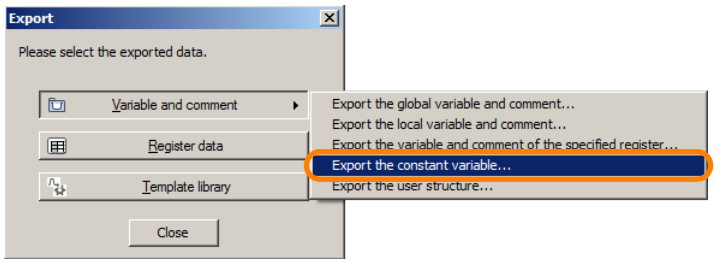
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.

Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Export*** – ***Export the constant variable***.



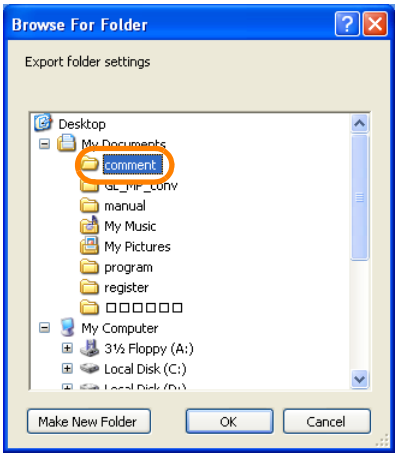
The Export Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Export the constant variable**.

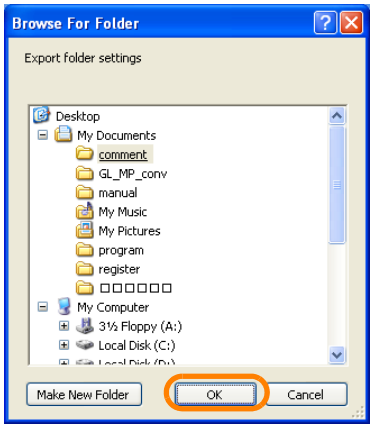


The Browse for Folder Dialog Box will be displayed.

4. Select the folder to which to export the constant variable data.

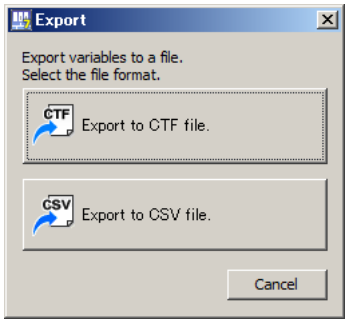


5. Click the **OK** Button.

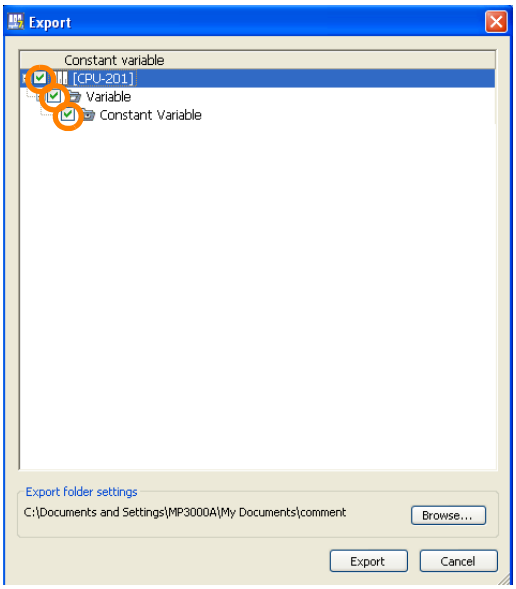


The Export Dialog Box will be displayed.

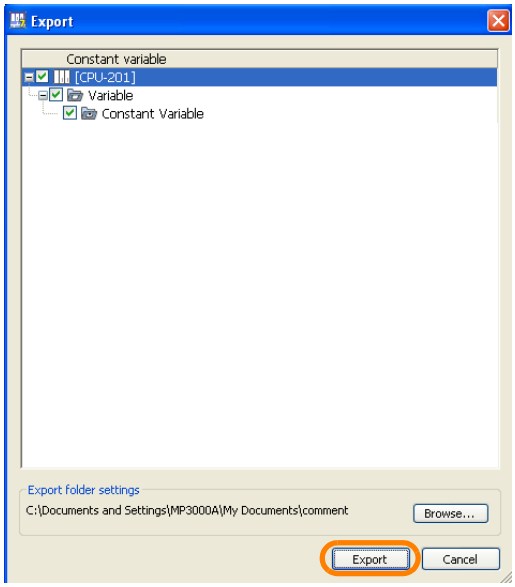
6. Select the format of the file to export.
   - CTF file: Binary file format
   - CSV file: CSV file format



7. Select the check boxes for the constant variables to export.



8. Click the **Export** Button.



The data will be exported.

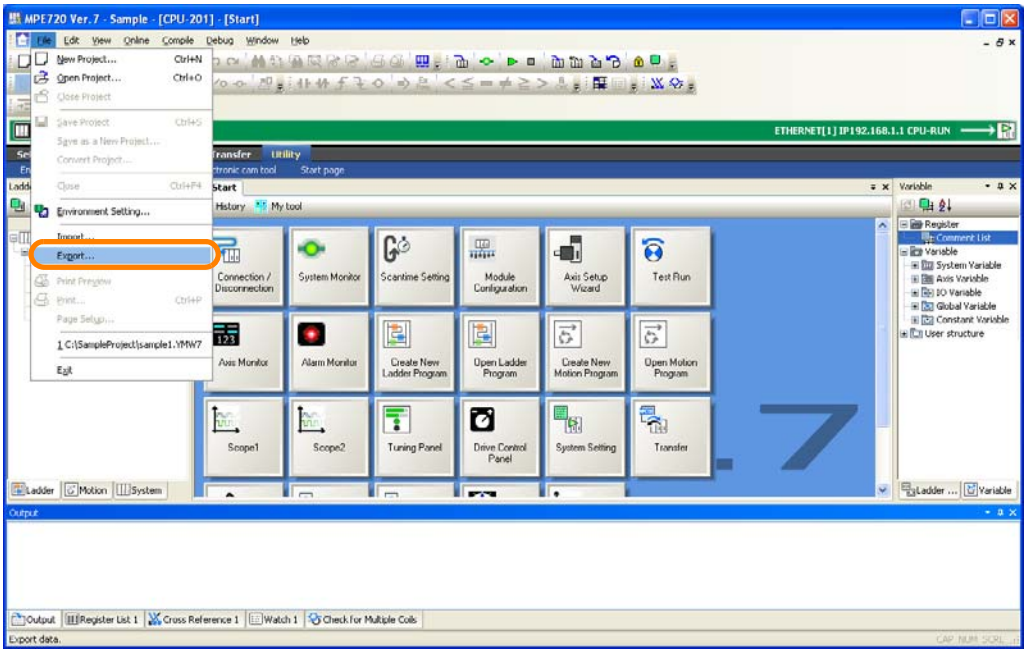
9. Confirm that the exported data has been stored in the selected file.

This concludes the procedure.

8.3.5 Exporting User-defined Structures

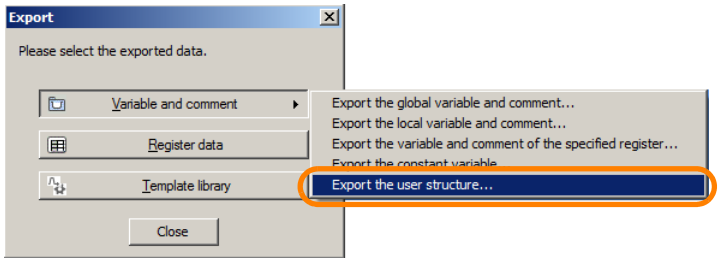
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.

   Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Export*** – ***Export the user structure***.



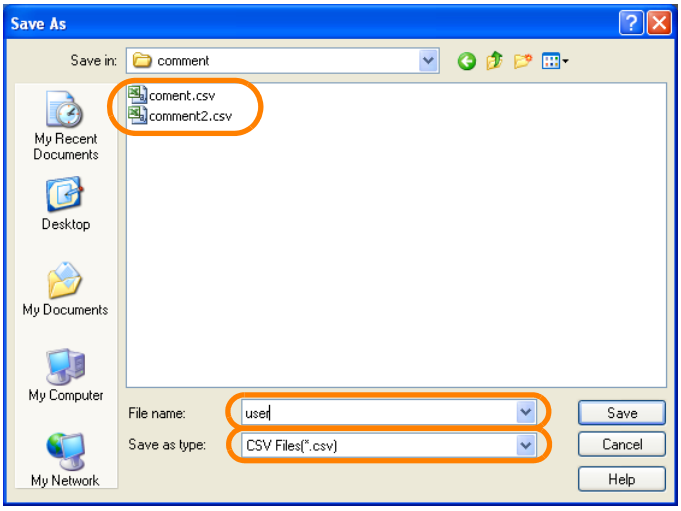
The Export Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Export the user structure**.

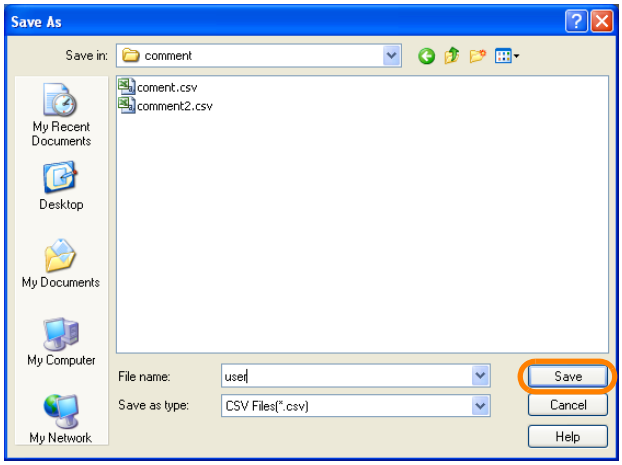


The Save As Dialog Box will be displayed.

4. Select the file to which to export the user-defined structure data.
   To save the data in a new file, enter a file name.

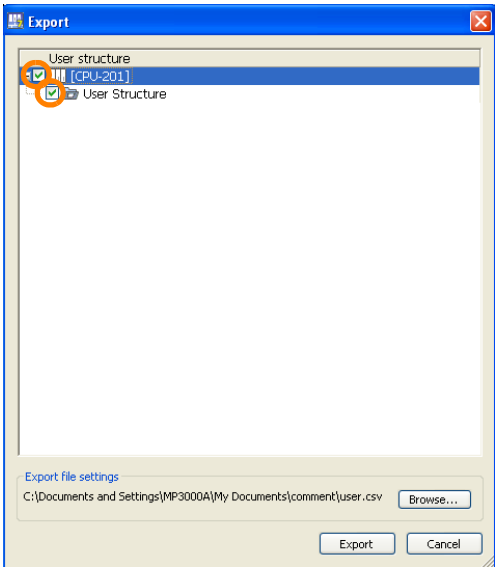


5. Click the **Save** Button.

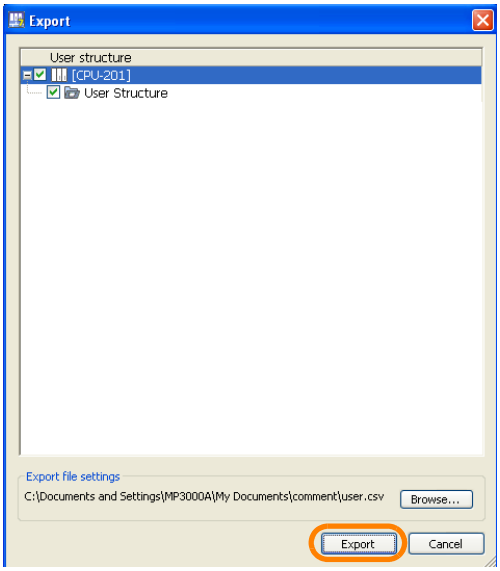


The Export Dialog Box will be displayed.

6. Select the check boxes for the user-defined structure data to export.



7. Click the **Export** Button.



The data will be exported.

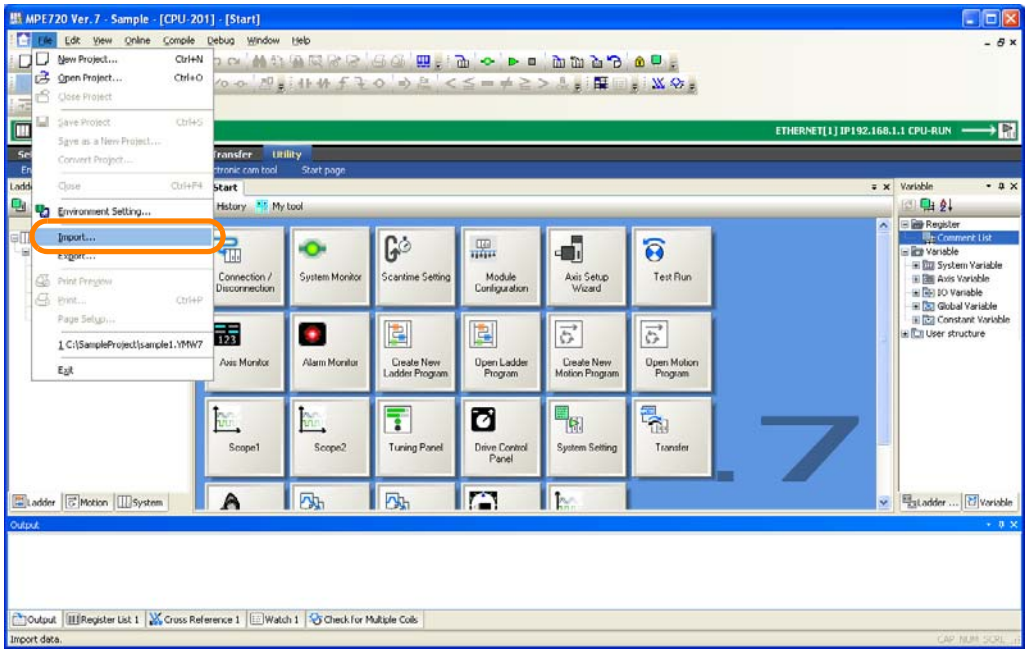
8. Confirm that the exported data has been stored in the specified file.

This concludes the procedure.

8.3.6 Importing Global Variables and Comments

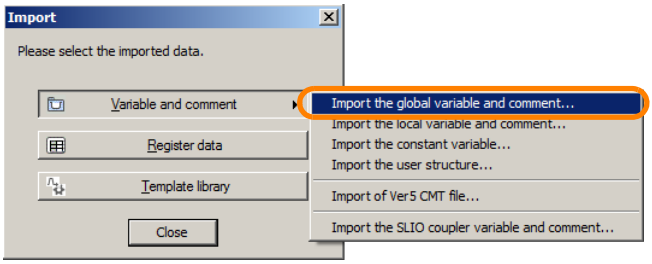
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Import*** from the menu bar.

   Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Import*** – ***Import the global variable and comment***.



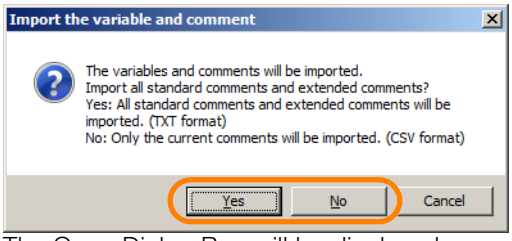
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import the global variable and comment**.



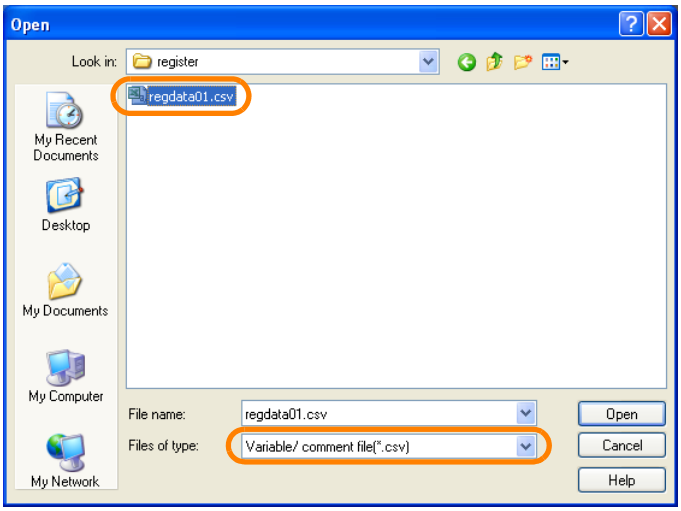
The Import the Variable and Comment Dialog Box will be displayed.

4. Click the **Yes** Button or **No** Button.

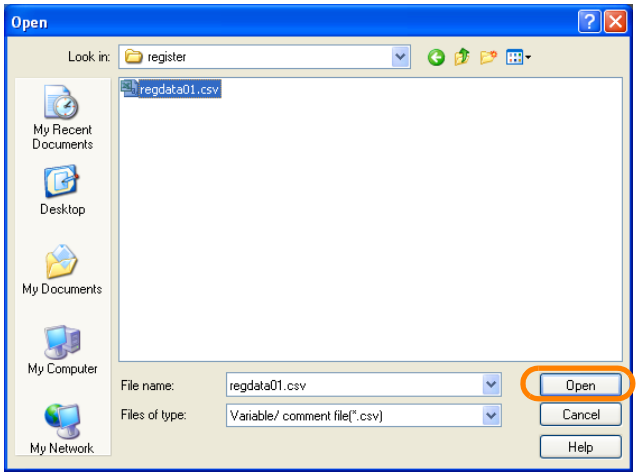


The Open Dialog Box will be displayed.

5. Select the file from which to import the global variable and comment data.

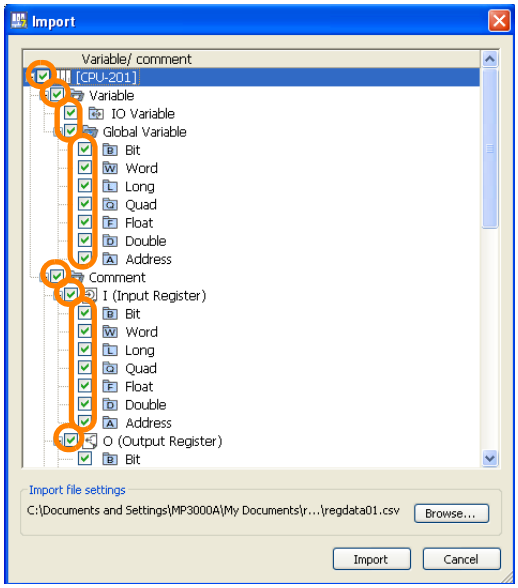


6. Click the **Open** Button.

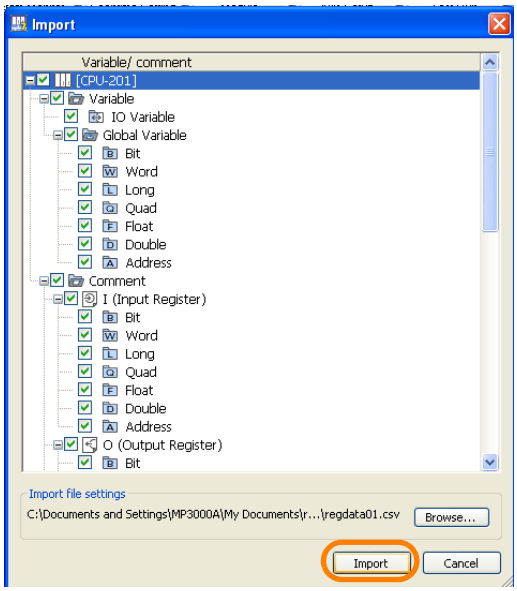


The Import Dialog Box will be displayed.

7. Select the check boxes for the programs to import.

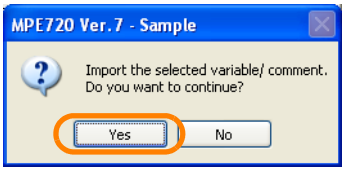


8. Click the **Import** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

9. Click the **Yes** Button.



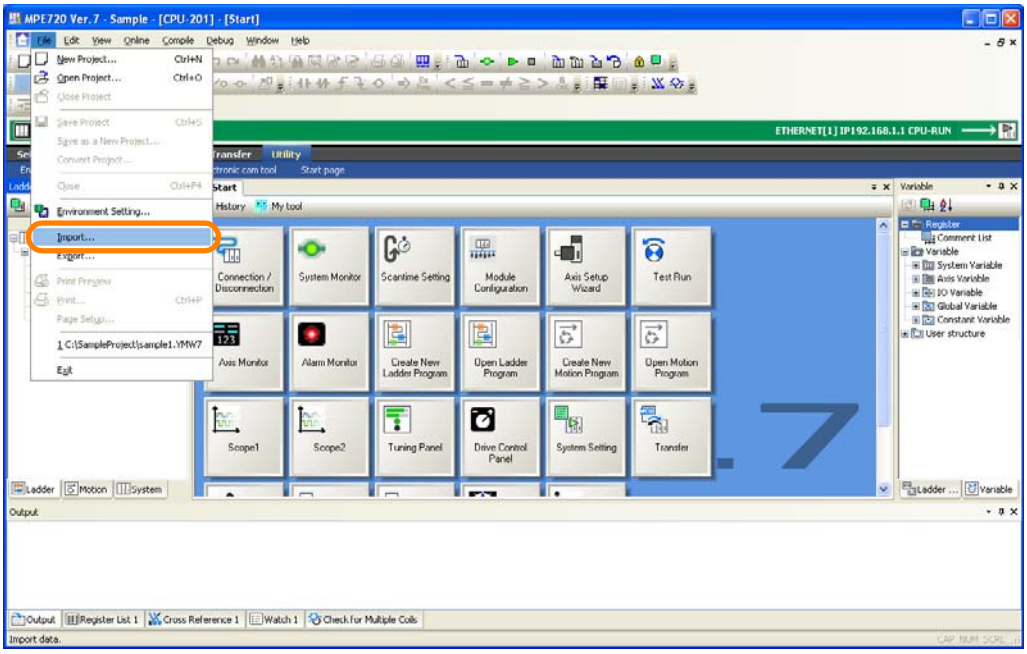
The data will be imported.

This concludes the procedure.

8.3.7 Importing Local Variables and Comments

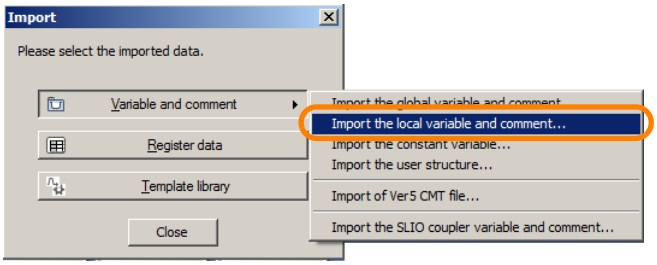
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Import*** from the menu bar.

   Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Import*** – ***Import the local variable and comment***.



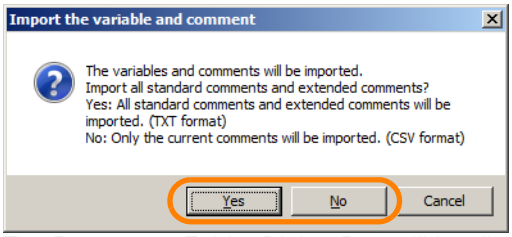
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import the local variable and comment**.



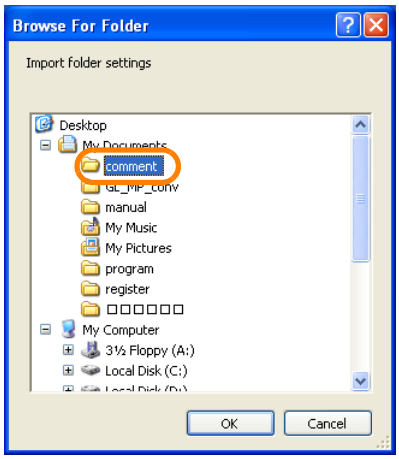
The Import the Variable and Comment Dialog Box will be displayed.

4. Click the **Yes** Button or **No** Button.

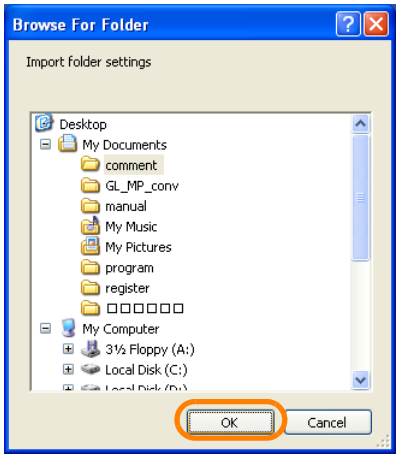


The Browse for Folder Dialog Box will be displayed.

5. Select the folder from which to import the local variable and comment data.

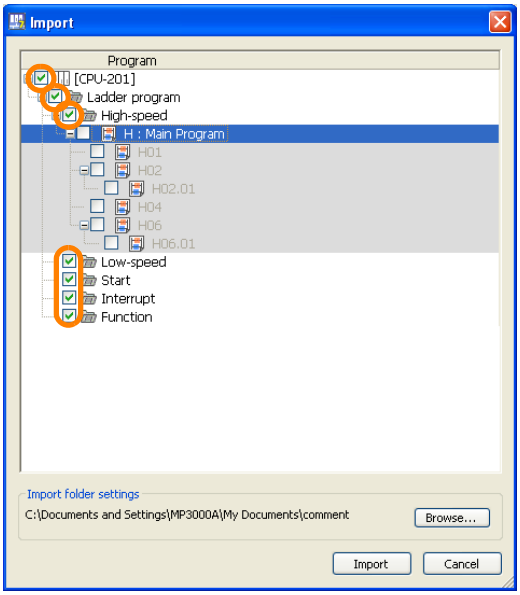


6. Click the **OK** Button.

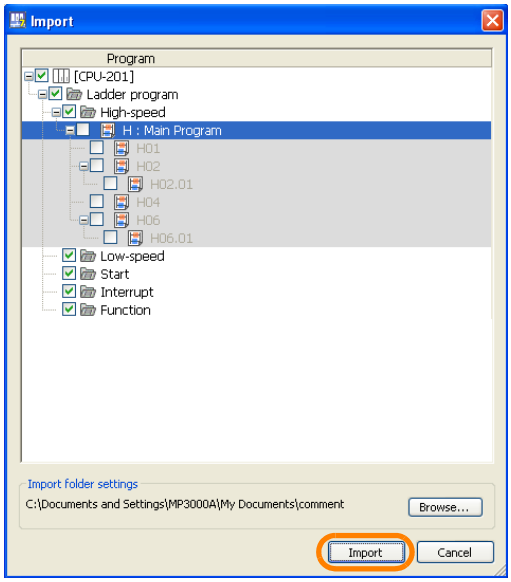


The Import Dialog Box will be displayed.

7. Select the check boxes for the programs to import.

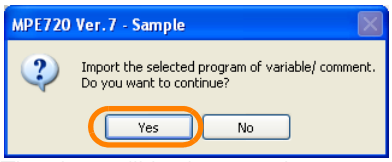


8. Click the **Import** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

9. Click the **Yes** Button.



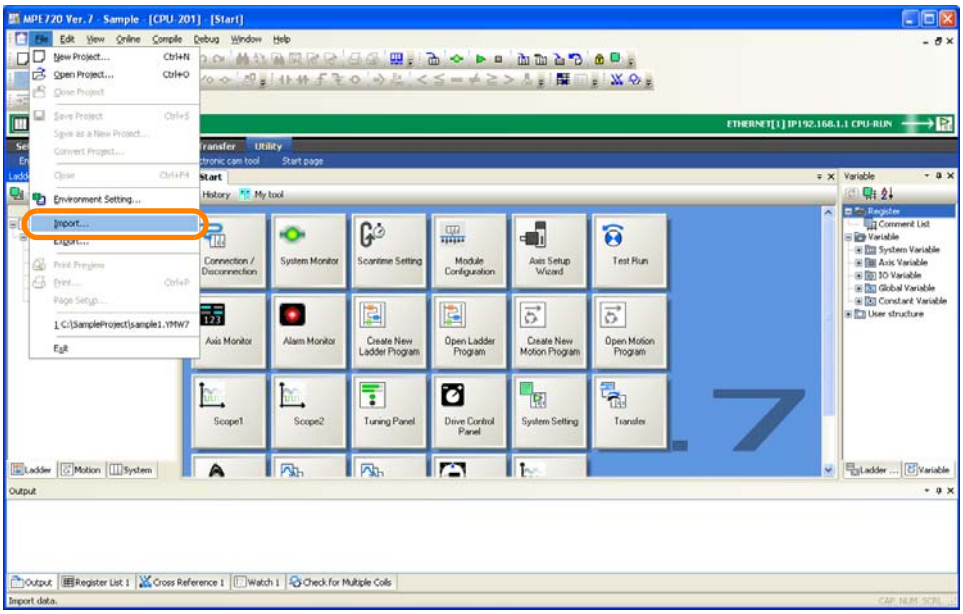
The data will be imported.

This concludes the procedure.

8.3.8 Importing Constant Variables

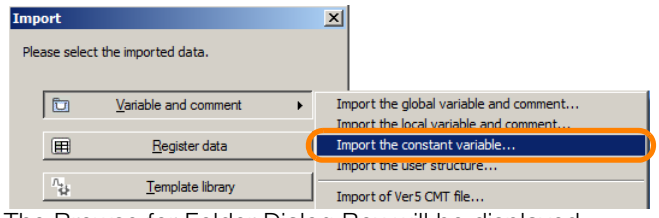
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Import*** from the menu bar.

Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Import*** – ***Import the constant variable***.



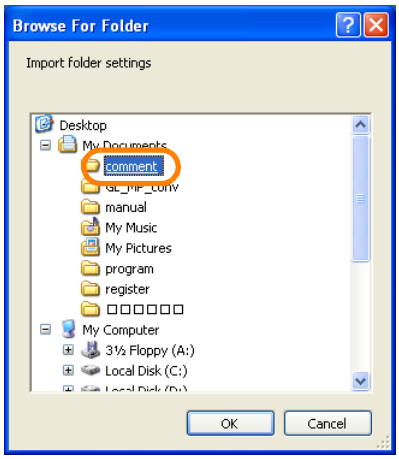
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import the constant variable**.

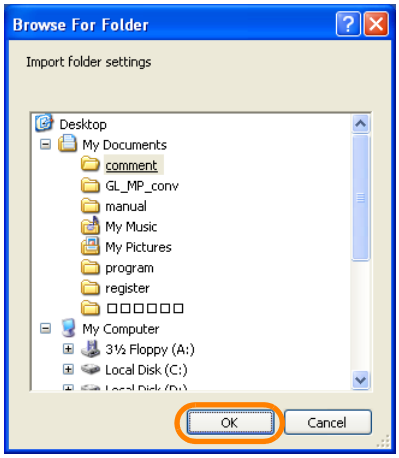


The Browse for Folder Dialog Box will be displayed.

4. Select the folder from which to import the constant variable and comment data.

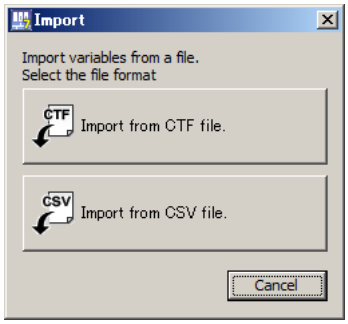


5. Click the **OK** Button.



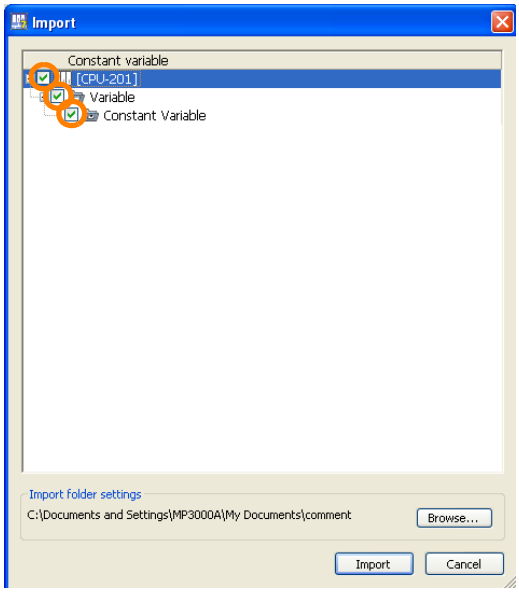
The Import Dialog Box will be displayed.

6. Select the format of the file to import.
   - CTF file: Binary file format
   - CSV file: CSV file format

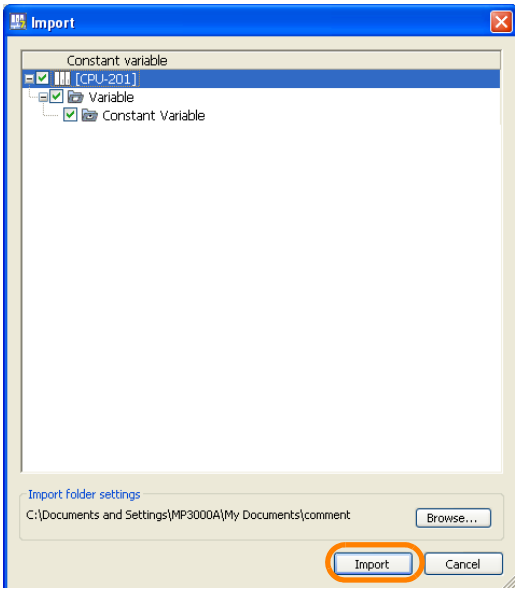


7. Select the check boxes for the variables and comments to import.

Information If the number of constant variables to import exceeds 200, you may not be able to import them.
We recommend that you import them in pieces.

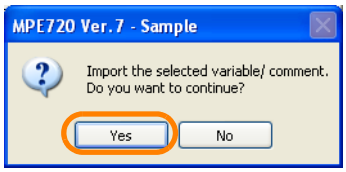


8. Click the **Import** Button.

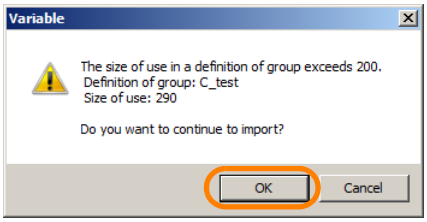


The MPE720 Ver. 7 Dialog Box will be displayed.

9. Click the **Yes** Button.



Information If you import more than 200 constant variables, the following dialog box will be displayed. Click **OK** Button to start the import.



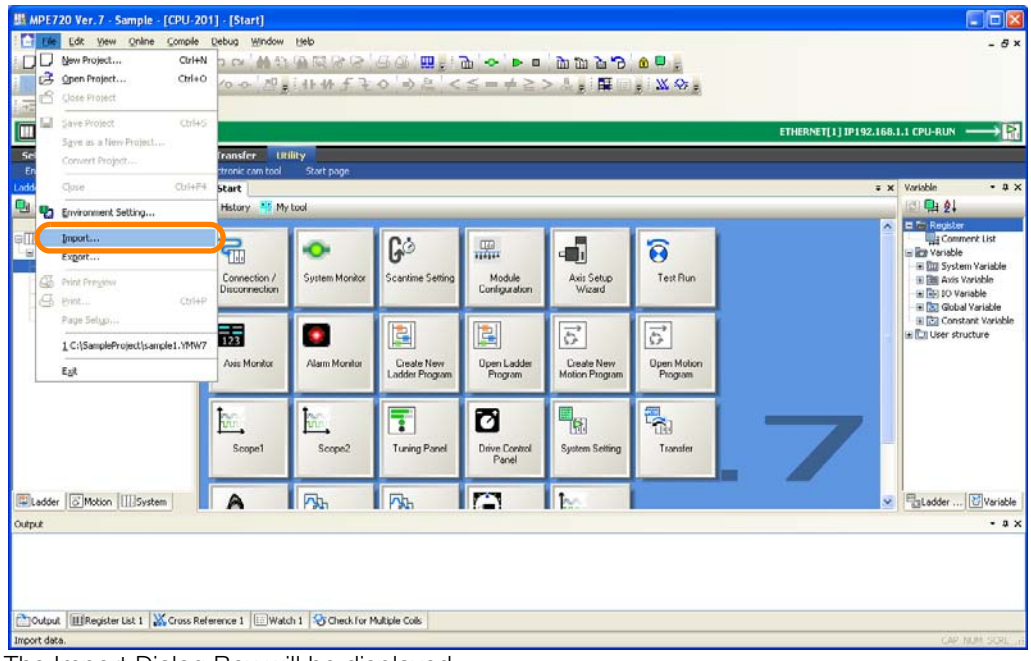
The data will be imported.

This concludes the procedure.

8.3.9 Importing User-defined Structures

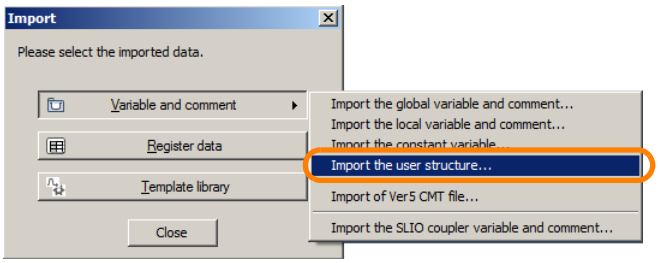
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Import*** from the menu bar.

Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Import*** – ***Import the user structure***.



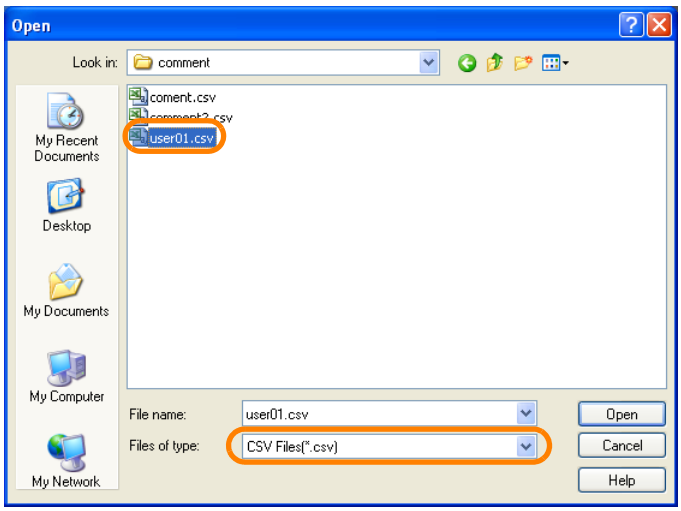
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import the user structure**.

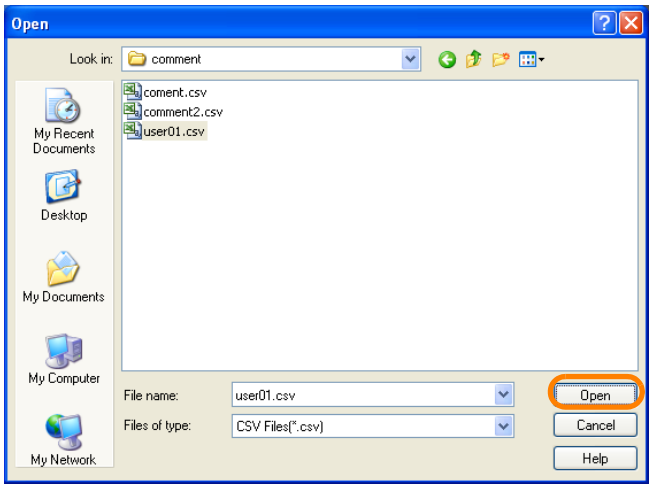


The Open Dialog Box will be displayed.

4. Select the file from which to import the user-defined structure data.

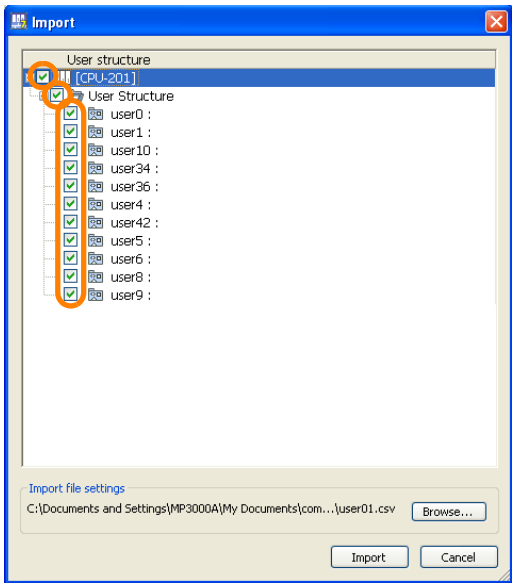


5. Click the **Open** Button.

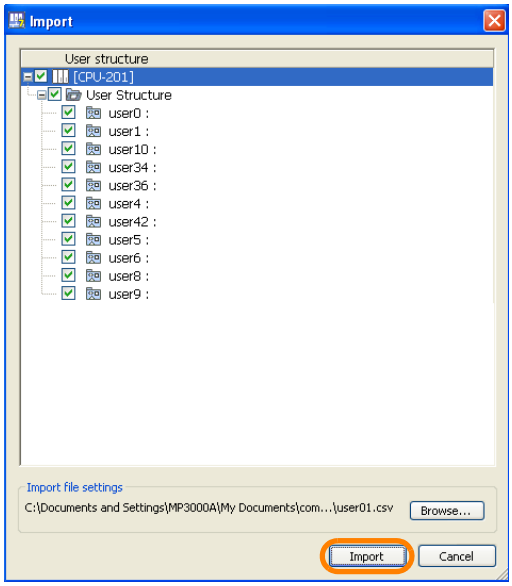


The Import Dialog Box will be displayed.

6. Select the check boxes for the variables and comments to import.

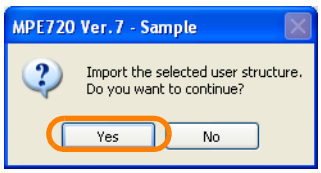


7. Click the **Import** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

8. Click the **Yes** Button.



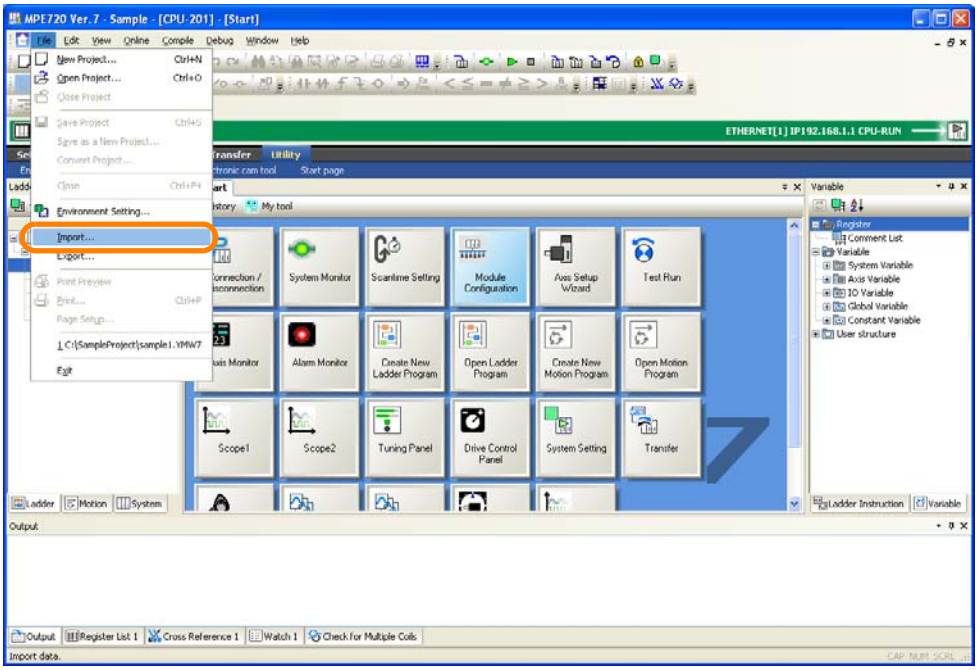
The data will be imported.

This concludes the procedure.

8.3.10 Importing MPE720 Version 5 CMT Files

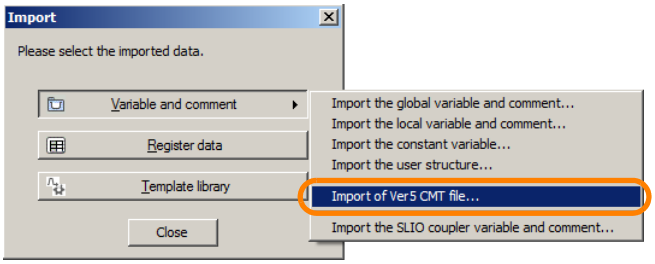
1. Establish an online connection or open a project file.
2. Select ***File*** – ***Import*** from the menu bar.

   Information This can also be performed by right-clicking on the Variable Pane and then selecting ***Import*** – ***Import of Ver5 CMT file***.



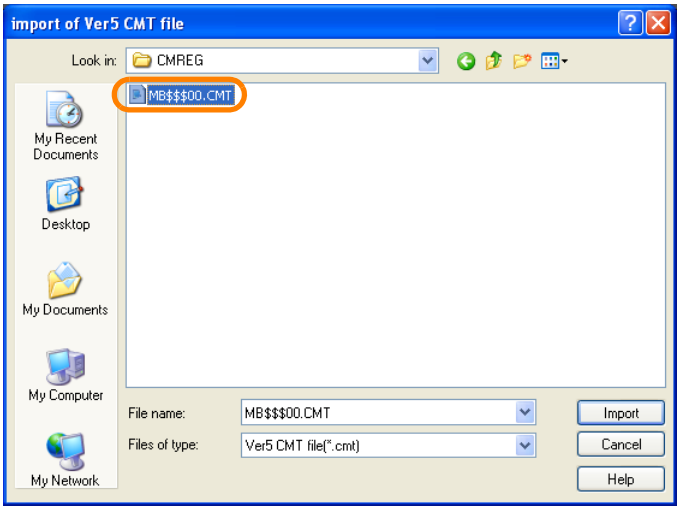
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import of Ver5 CMT file**.

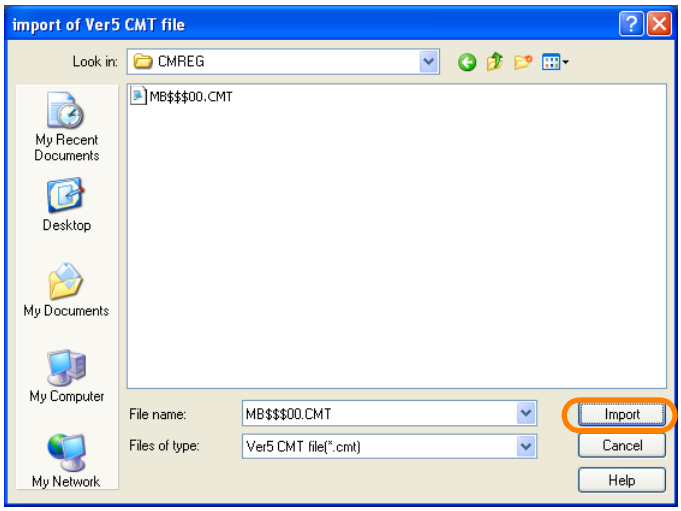


The Import of Ver5 CMT File Dialog Box will be displayed.

4. Select the Version 5 CMT file to import.

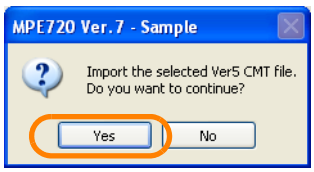


5. Click the **Import** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

6. Click the **Yes** Button.



The data will be imported.

This concludes the procedure.

8.4 Data Formats for Exporting and Importing

This section describes the data formats for exporting and importing
If you wish to create your own data to import, use the following format.

Information Exported constant variable data cannot be edited.

Axis Parameters

0	Selection of operation modes	0	
1	Function selection flag 1	0000 H	-
2	Function selection flag 2	0000 H	-
4	Reference unit selection	0	
5	Number of digits below decimal point	3	
6	Travel distance per machine rotation	10000	pulse
8	Servo motor gear ratio	1	rev
9	Machine gear ratio	1	rev
10	Infinite length axis reset position(POSMAX)	360000	pulse
12	Positive software limit value	2147483647	pulse
14	Negative software limit value	-2147483648	pulse
30	Encoder selection	1	
34	Rated motor speed	3000	min^-1
36	Number of pulses per motor rotation	1048576	pulse/rev
38	Maximum number of absolute encoder turns rotation	65535	rev
42	Feedback speed movement averaging time constant	10	ms
44	User Select Servo Driver User Constant Number	0000 H	-
45	User Select Servo Driver User Constant Size	1	word

Unit
Set value
Parameter name
Parameter number

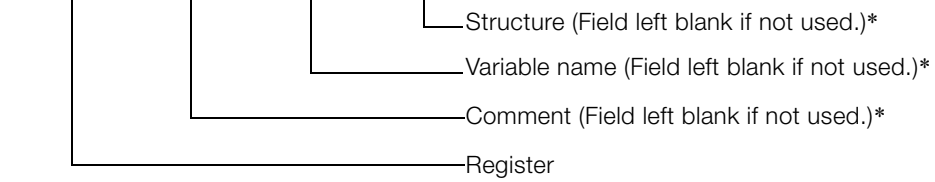
Register Data

MW00000	DL00000	GD01000		
	H			
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0	0	0.00E+00		
0		0.00E+00		

Register addresses
Drawing type (for local registers only)
Data
Specified register information

Global Variables and Comments

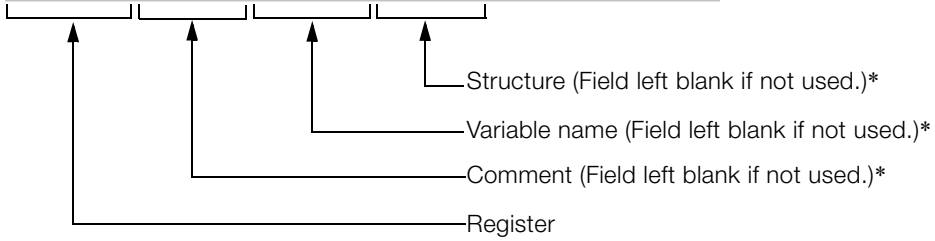
MB000000		test		
MW00001		test2		
MW00002		test3		



* There are restrictions to the information that can be entered. Refer to the following section for details.
☞ *Global Variables* on page 5-24

Local Variables and Comments

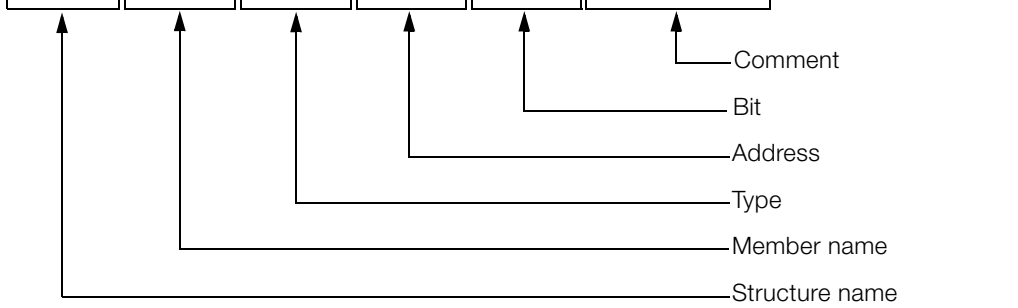
DB000000		VAR_test			
DW00001		VAR_test2			
DW00002		VAR_test3			



* There are restrictions to the information that can be entered. Refer to the following section for details.
☞ *Global Variables* on page 5-24

User-defined Structures

test					User structure		
test	member1	Word	0				
test	member2	Word	1				
test	member3	Long	2				
test	member4	Long	4				



8.5 Acquiring Trace Data Over an Extended Period of Time

Data logging is useful when it is necessary to acquire as much trace data as possible. The logging function stores data in external memory so that large amounts of data can be acquired. Use the following procedure to acquire logged data.

8.5.1 Using the MPE720

This section describes the operating procedure for data logging using the MPE720.

Information

Refer to the following section for configuring logging settings from tools other than the MPE720.

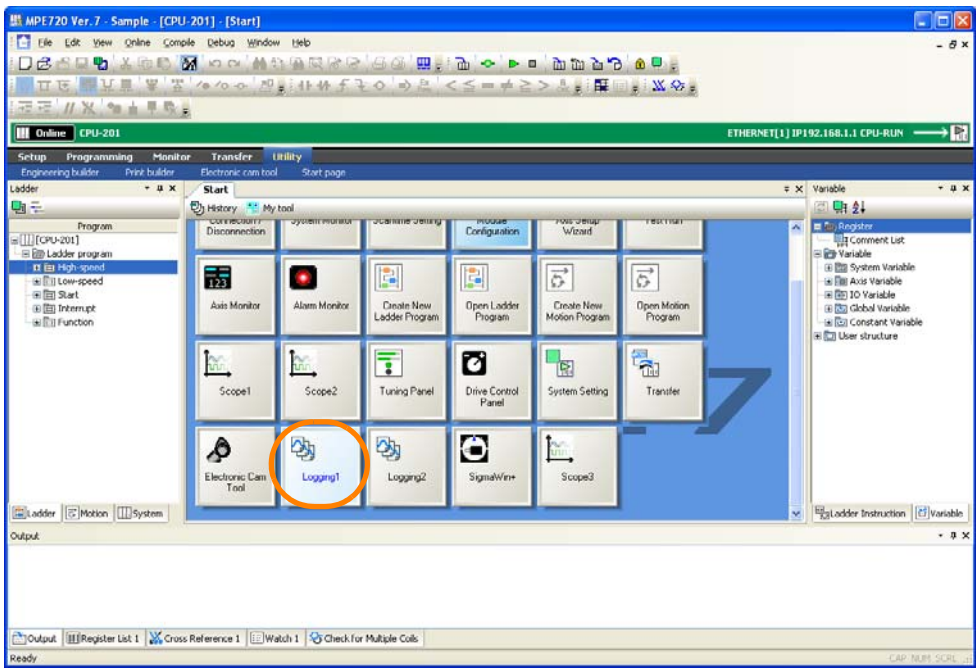
☞ *8.5.2 Preparations When Using Tools Other Than the MPE720* on page 8-54

1. Click the **Logging** Button on the My Tool View.

Information

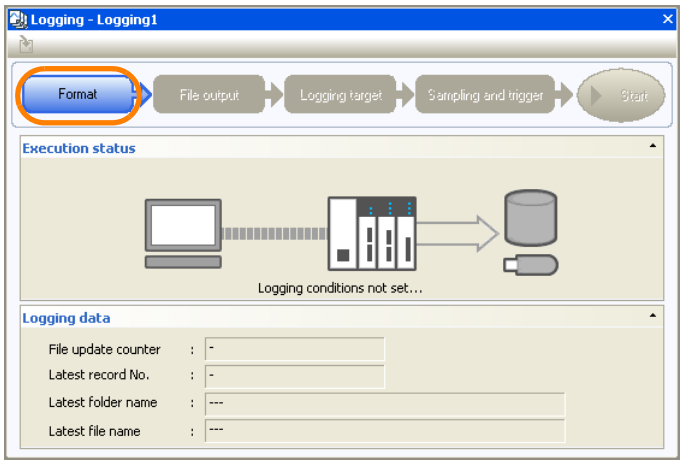
There are four buttons for logging, from **Logging1** to **Logging4**. Logging conditions are stored with the button that is used to execute logging. You can store up to four logging conditions by using the **Logging1** Button to **Logging4** Button.
The **Logging3** and **Logging4** Buttons are not displayed by default. Refer to the following section for details on displaying buttons.

☞ ◆ *Displaying Buttons on the My Tool View* on page 3-20



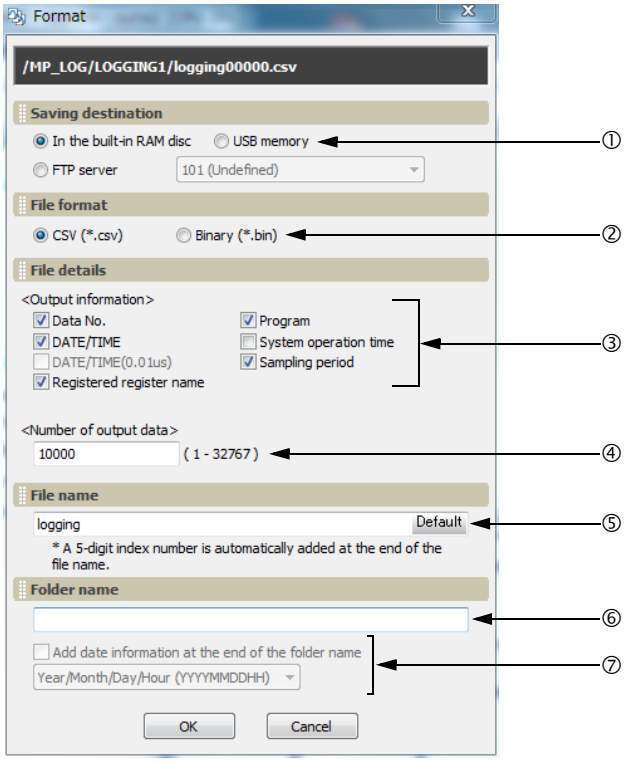
The Logging Dialog Box will be displayed.

2. Click the **Format** Button.



The Format Dialog Box will be displayed.

3. Specify the logging format.



①Select the storage location.

Selection	Description
In the built-in RAM disk	Writes the sampled data to the built-in RAM disk in the CPU Unit.
USB memory	Writes the sampled data to the USB memory device in the CPU Unit.
FTP server	Writes the sampled data to an FTP server. (This selection is not displayed when using an MP3100)
PC (MotionAPI)	Writes the sampled data to a PC. (This selection is displayed only when using an MP3100.)

②Select the file format.

Selection	Description
CSV	This file format can be opened in general-purpose applications such as Excel and Notepad.
Binary	This file format is not affected by the range of character codes. Binary files are smaller than CSV files, so they can be written faster and with less overhead on the scan.

③Select the file information to output.

The selected items are appended to the header information in the output file.

Selection	Description	
Data No.	This is the number that is assigned to the sampled data.	
DATE/TIME	This is the date and time when the data was sampled (unit: sec.).	Make sure to set the calendar in advance. Refer to the manual for your Machine Controller for details.
DATE/TIME (0.01us)	This is the date and time when the data was sampled (unit: 0.01 μs).	
Registered register name	This is the name of the register.	
Program	This is the name of the program.	
System operation time	This is the system operation time when the data was sampled (unit: μs). Refer to the manual for your Machine Controller for details.	
Sampling period	This is the frequency at which data was sampled. Set this in the Sampling and Trigger Dialog Box that is explained later in this section.	

④Enter the number of data items to output.

Enter the number of lines to write to a single file.

- Input range: 1 to 32,767

⑤Set the file name.

- Characters allowed: Alphabet A to Z and a to z, numerals 0 to 9, the minus sign, and the underscore.
- Maximum string length: 32 characters

Information

1. A five-digit index number that starts from 00001 is automatically added to the end of the specified file name.
2. Click the **Default** Button to enter “logging”.

⑥Set the name of the folder to create.

- Characters allowed: Alphabet A to Z and a to z, numerals 0 to 9, the minus sign, and the underscore.
- Maximum string length: 32 characters

Information

If this box is left blank, a folder will not be created. Instead, the file will be created in the root directory of the specified storage location.

⑦Select whether to add date information to the folder name.

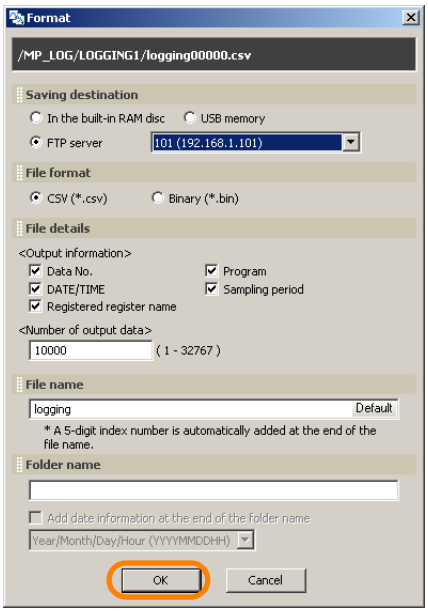
- To omit date information, clear the selection of the check box.
- To add date information, select the check box and select the date format from the list.

Selection	Description
Year (YYYY)	Adds the year to the specified folder name. Example: □□□2011
Year/Month (YYYYMM)	Adds the year and month to the specified folder name. Example: □□□201109
Year/Month/Day (YYYYMMDD)	Adds the year, month, and day to the specified folder name. Example: □□□20110920
Year/Month/Day/Hour (YYYYMMDDHH)	Adds the year, month, and day to the specified folder name, and creates another folder directly below it named with the hour. Example: □□□20110920 └12 (Acquired data is stored in this folder.)

Information

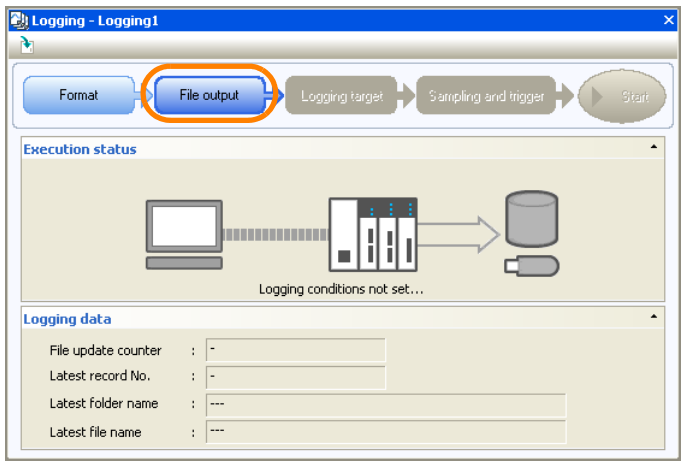
Click the **Cancel** Button to return to the Logging Dialog Box without registering the settings.

4. Click the **OK** Button.



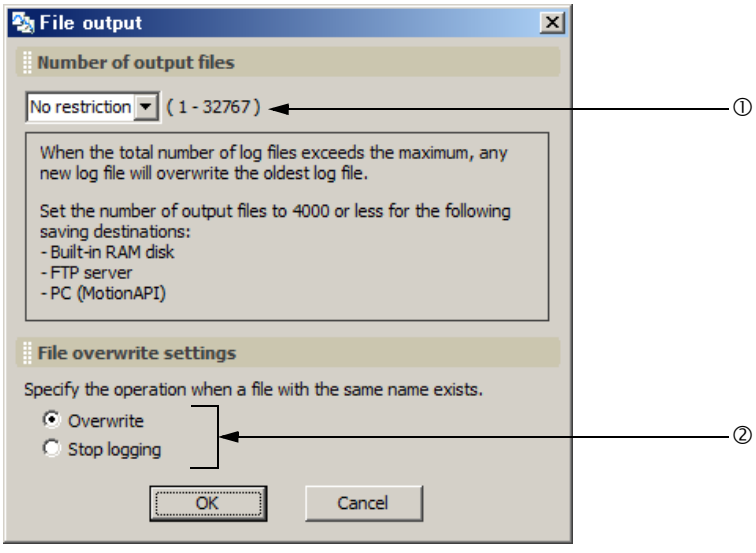
The Logging Dialog Box will be displayed.

5. Click the **File output** Button.



The File Output Dialog Box will be displayed.

6. Specify the file output settings.



①Set the number of output files (total number of files that are created from when the power supply is turned ON to when it is turned OFF).

- Settings: No restriction, 1, 10, 50, 100, 500, or 1,000
  You can also input values directly.

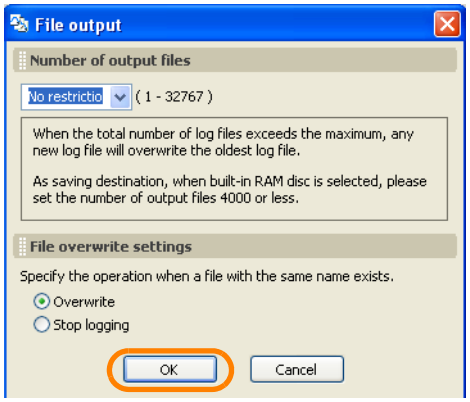
Note: 1. If you specify **No restriction** when the saving destination is a USB memory device, the upper limit will be 10,000 files. If you want to output 10,001 or more files, directly input the desired value.
2. If you specify **No restriction** when the saving destination is other than a USB memory device, the upper limit will be 32,767 files.

②Set the file overwrite settings.

Selection	Description
Overwrite	When the file number reaches the upper limit on the specified number of output files, older files will be deleted to allow the creation of new files.
Stop logging	When the file number reaches the upper limit of the specified number of output files, logging will stop.

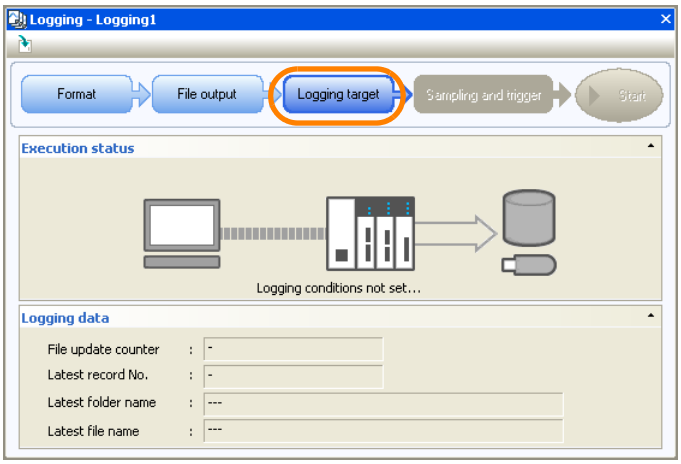
Information Click the **Cancel** Button to return to the Logging Dialog Box without registering the settings.

7. Click the **OK** Button.



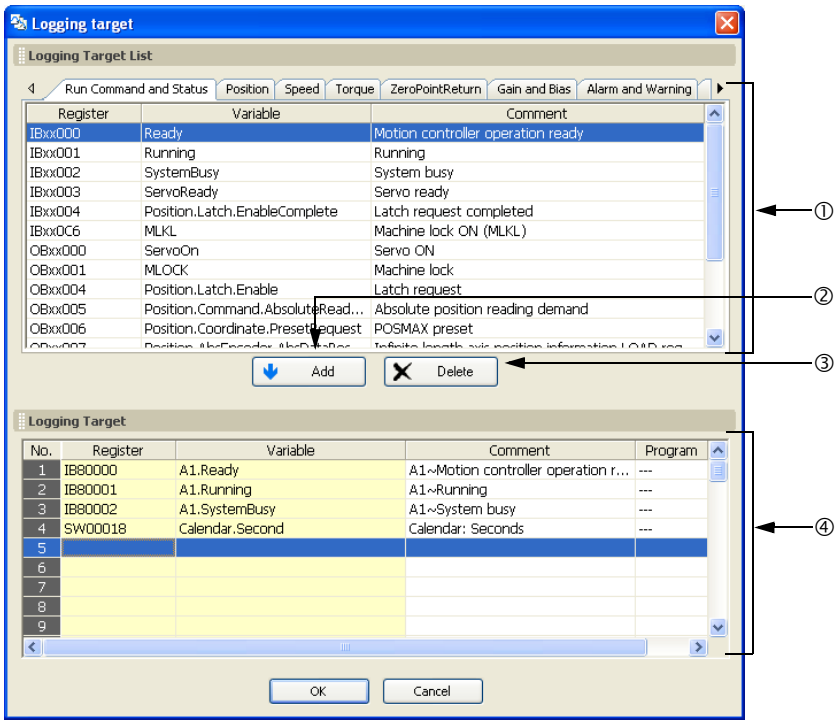
The Logging Dialog Box will be displayed.

8. Click the **Logging target** Button.



The Logging Target Dialog Box will be displayed.

9. Set the logging target settings.



No.	Item	Description
①	Logging Target List	Displays a list of the registers that can be selected for logging. • Right-click in the Logging Target List to display the pop-up menu to select or deselect registers. ***Add to Trace***: Adds the selected register to the Trace Target List. ***Clear***: Clears the selection when multiple registers have been selected using the **Shift** or **Ctrl** Key. ***Select All***: Selects all registers shown on the tab page.
②	Add Button	Adds the selected register to the list of registers to be logged.
③	Delete Button	Removes the selected registers from the list of registers to be logged.
④	Logging Target Area	Displays a list of the registers that will be logged. Registers can be added to this list either by selecting them from the Logging Target List or by entering them directly. • Right-click in the Logging Target Area to display the pop-up menu to edit the registers to be logged. ***Insert Row***: Inserts a blank row. ***Delete Row***: Deletes a row. If a logging target was added, then it will be deleted. • The maximum number of logging target MP3000 **Series** Version 1.43 or lower, or Σ-7C Version 1.08 or lower: 64 MP3000 **Series** Version 1.44 or later, or Σ-7C Version 1.09 or later: 256

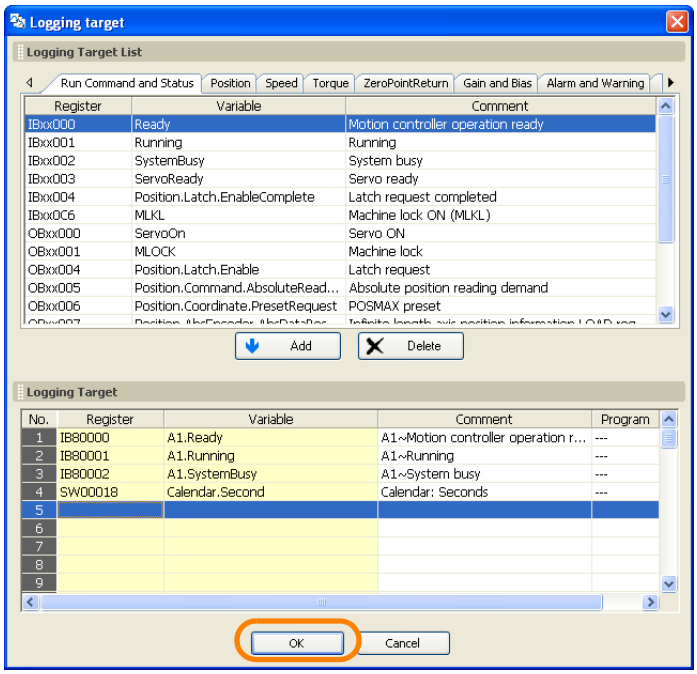
Information The following register types can be logged.
• S, M, G, I, O, and D registers

Information Refer to the following table for the data size for each data type.

Data Type	Data Size
B: Bit	1 word
W: Integer	1 word
L: Double-length integer	2 words
Q: Quadruple-length integer	4 words
F: Single-precision real number	2 words
F: Double-precision real number	4 words

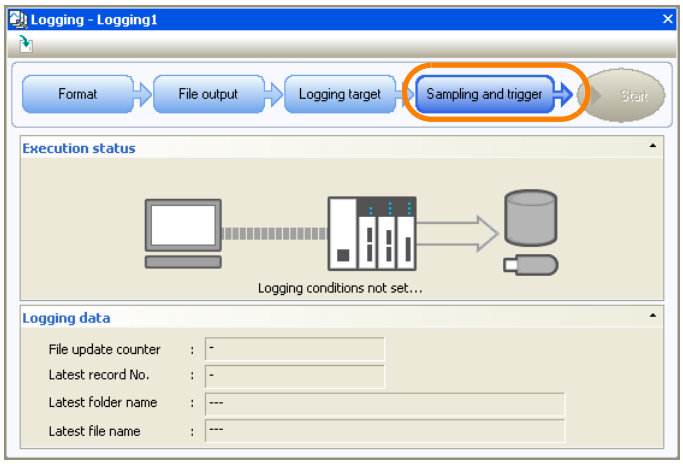
Information Click the **Cancel** Button to return to the Logging Dialog Box without registering the settings.

10. Click the **OK** Button.



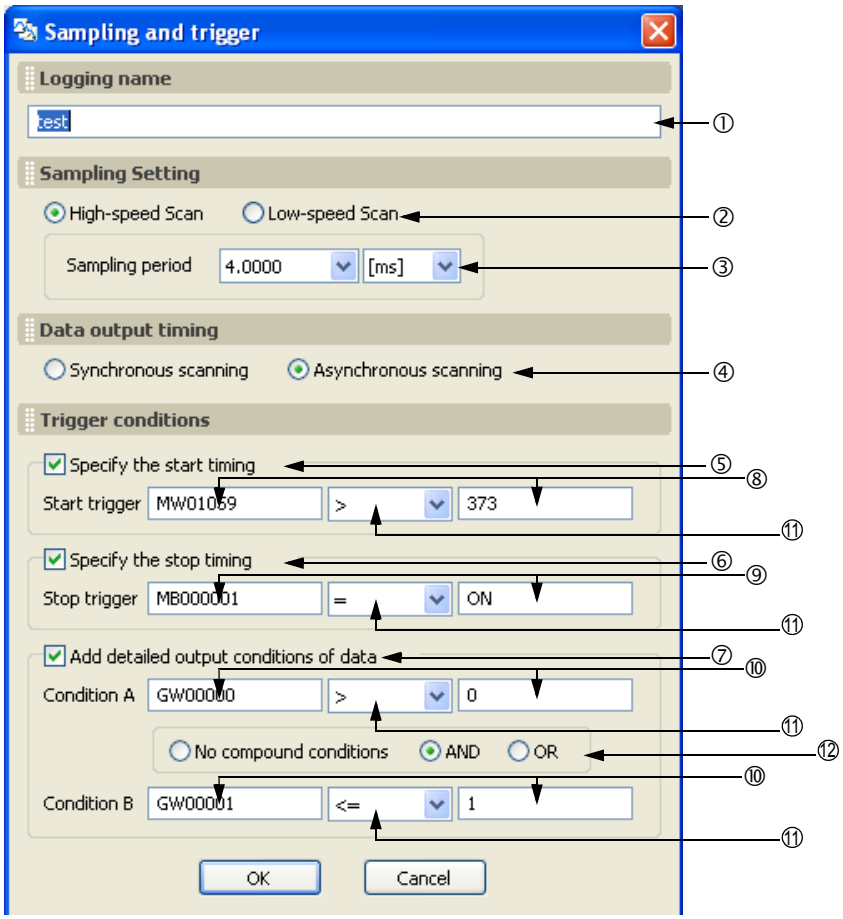
The Logging Dialog Box will be displayed.

11. Click the **Sampling and trigger** Button.



The Sampling and Trigger Dialog Box will be displayed.

12. Set the sampling and trigger settings.



①Set the logging name.
Maximum name length: 32 characters

②Set the data sampling rate.

Selection	Description
High-speed Scan	Samples data synchronized with the high-speed scan. Data is sampled immediately after completing execution of the DWG.H ladder program.
Low-speed Scan	Samples data synchronized with the low-speed scan. Data is sampled immediately after completing execution of the DWG.L ladder program.

③Set the data sampling period.
Specify the value and unit to control whether data is sampled every scan or once in more than one scan.
To sample data every scan, specify the same value as the scan set value.

④Specify whether data is to be logged synchronized or asynchronized with the scan.

Selection	Description	Merit	Demerit
Synchronous scanning	Data is written to the log synchronized with the scan	No data is lost.	This creates an overhead on the scan and can cause watchdog errors (E.001), or cause the CPU Unit to go down.
Asynchronous scanning	Data is written to the log asynchronously with the scan.	There is no overhead on the scan.	If the scan setting is set to a fast rate or if the idle time of the scan is low, logging can fall behind or data can be missed if there are too many data points to sample.

Refer to the manual for your Machine Controller for scan setting guidelines.

Information Due to the large overhead, **Synchronous scanning** cannot be set if **USB memory** is set as the **Saving destination** on the Format Dialog Box.

Set the logging output conditions using items ⑤ to ⑫.

<table>
<tr><th>No.</th><th>Item</th><th>Description</th></tr>
<tr><td>⑤</td><td>Specify the start timing</td><td>• To not specify the start timing: Clear the check box.
• To specify the start timing: Select the check box and specify the items ⑧ and ⑪ and their conditions. Logging starts when the conditions are met.</td></tr>
<tr><td>⑥</td><td>Specify the stop timing</td><td>• To not specify the stop timing: Clear the check box.
• To specify the stop timing: Select the check box and specify the items ⑨ and ⑪ and their conditions. Logging stops when the conditions are met.</td></tr>
<tr><td>⑦</td><td>Add detailed output conditions of data</td><td>• To not specify detailed output conditions: Clear the check box.
• To specify detailed output conditions: Select the check box and specify the items ⑩, ⑪, and ⑫, and their conditions. Logging starts when the conditions are met. Even if logging stops when the output conditions are no longer met, it will start when the conditions are met again.</td></tr>
<tr><td>⑧</td><td>Start trigger</td><td rowspan="2">Specify any S, M, G, I, or O register, and numeric value.</td></tr>
<tr><td>⑨</td><td>Stop trigger</td></tr>
<tr><td>⑩</td><td>Condition A and Condition B</td><td>Specify any S, M, G, I, or O register, and numeric value. If a condition is entered for both condition A and condition B, specify the condition at ⑫.</td></tr>
<tr><td>⑪</td><td>Conditions</td><td>Select one of the following operators.
<table>
<tr><th>Selection</th><th>Description</th></tr>
<tr><td>></td><td>The condition is met when the left register value is greater than the right register value.</td></tr>
<tr><td><</td><td>The condition is met when the left register value is less than the right register value.</td></tr>
<tr><td>=</td><td>The condition is met when the left register value is equal to the right register value.</td></tr>
<tr><td><></td><td>The condition is met when the left register value is not equal to the right register value.</td></tr>
<tr><td>>=</td><td>The condition is met when the left register value is greater than or equal to the right register value.</td></tr>
<tr><td><=</td><td>The condition is met when the left register value is less than or equal to the right register value.</td></tr>
</table></td></tr>
<tr><td>⑫</td><td>Compound conditions</td><td>If a condition is entered for both condition A and condition B, specify one of the following conditions.
<table>
<tr><th>Selection</th><th>Description</th></tr>
<tr><td>No compound conditions</td><td>The compound condition is met when Condition A is met. Condition B will be ignored, even if it is specified.</td></tr>
<tr><td>AND</td><td>The compound condition is met when both condition A and condition B are met.</td></tr>
<tr><td>OR</td><td>The compound condition is met when either condition A or condition B is met.</td></tr>
</table></td></tr>
</table>

Example

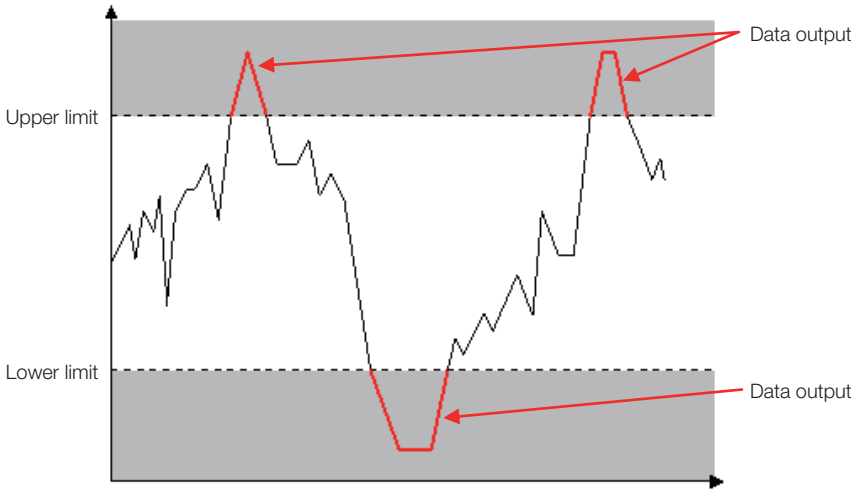
To automatically start logging when the power is turned ON, set the start trigger conditions as follows:

- When **USB memory** is selected as the saving destination
  Setting example: Start trigger SB006540 = ON
  Note: The SB006540 register turns ON when the system recognizes insertion of a USB memory device.
- When **In the built-in RAM disk** is selected as the saving destination
  Setting example: Start trigger SB000001 or SB000003 = ON
  Note: The SB000001 register turns ON for only one high-speed scan.
  The SB000003 register turns ON for only one low-speed scan.

Example

In the following example, the output conditions are set to log only the data in the shaded region.

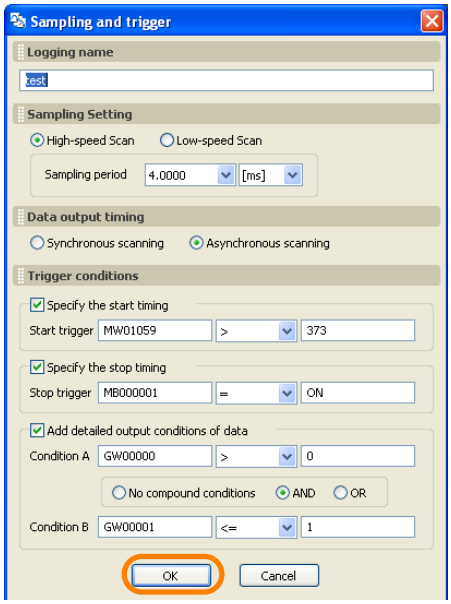
Setting example: Condition A >= Upper limit, Condition B <= Lower limit, Compound condition = OR



Information

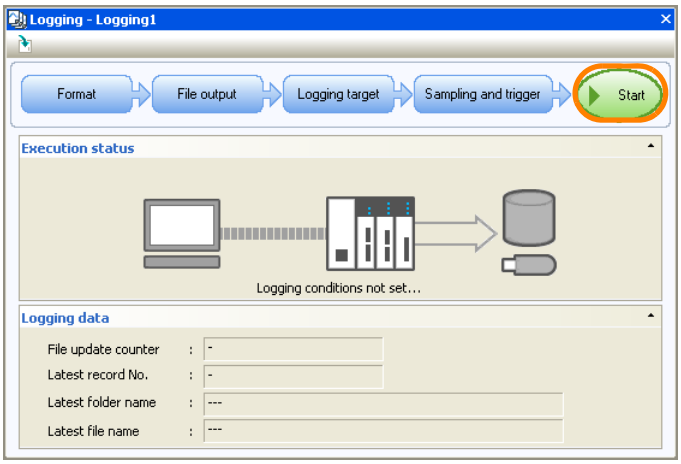
Click the **Cancel** Button to return to the Logging Dialog Box without registering the settings.

13. Click the **OK** Button.



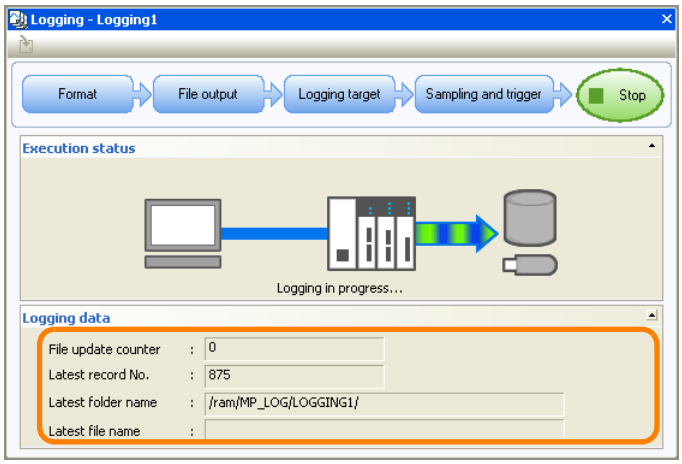
The Logging Dialog Box will be displayed.

14. Click the **Start** Button.

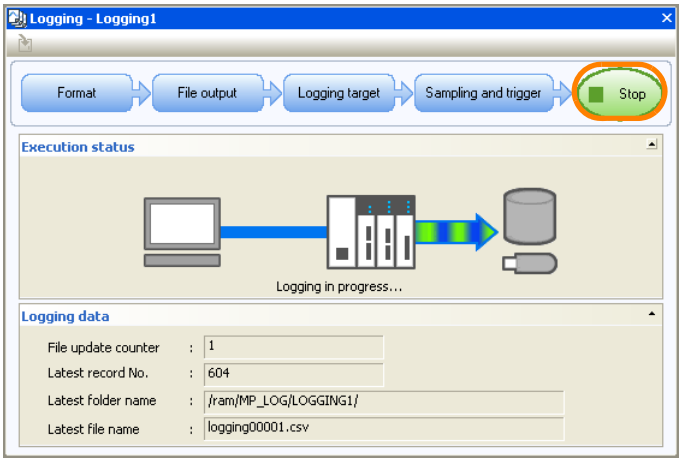


Logging will start. While logging is in progress, the following items are displayed in the Logging data Area.

- File update counter
- Latest record number
- Latest folder name
- Latest file name



15. Click the **Stop** Button to stop logging.



Logging stops.

Each of the data ranges and reset timings are as follows.

Data Name	Range		Reset Timing
File name	When **USB memory** is set as the saving destination	logging00001 to logging10000	The file is set to logging00001 when the power is turned ON. This file is overwritten if it already exists in memory.
	When **In the built-in RAM disk** is set as the saving destination	logging00001 to logging4000	
Latest record number	0 to 18,446,744,073,709,551,615		After logging stops, this is reset when next logging is started.

This concludes the procedure.

8.5.2 Preparations When Using Tools Other Than the MPE720

This section describes the operating procedure for preparations for performing data logging using tools other than the MPE720.

Information Refer to the following section when performing data logging using the MPE720.
☞ *8.5.1 Using the MPE720* on page 8-43

Introduction

If you enable **Permit Settings from Tools other than MPE720**, you can change the target registers for logging from tools other than the MPE720.

Overhead for logging processing (the processing time for data acquisition and file writing) is added to the regular duration of time required for scanning. When you change the target registers for logging, the maximum value for scan time may exceed the setting value, resulting in the Watchdog Timer Error (E.001) occurring and the CPU shutting down. For this reason, the system is usually configured so that the target registers for logging cannot be changed while operating the machine.

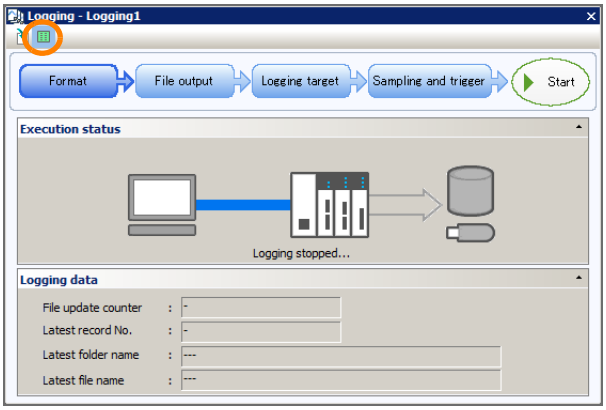
When you use this function, the maximum number of target registers for logging is configured. When you execute logging after configuring the setting, the overhead for logging processing for the configured number of target registers for logging is added to the scan time. Based on this, with the MPE720, you can set the scan time in advance so that this error does not occur. Doing so can prevent an error from occurring when the maximum value for scan time exceeds the setting value, even if you change the target registers for logging from a tool other than MPE720 while operating the machine.

Information To calculate the overhead, perform a simulation at maximum load. The register for logging will be a double-precision real number (4 words) (e.g. SD□□□□□).
When actually executing the logging function with a tool other than the MPE720, the overhead time may be shorter than calculated.

Setting Procedure

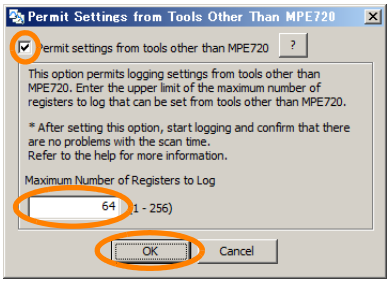
The setting procedure for performing logging setting from a tool other than the MPE720 is described below.

1. Click the **Permit Settings from Tools Other Than MPE720** Icon.



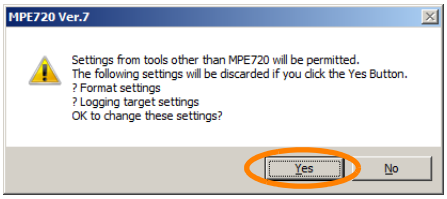
The Permit Settings from Tools Other Than MPE720 Dialog Box will be displayed.

2. Select the check box for **Permit settings from tools other than MPE720**, enter the number of log registers to permit under **Maximum Number of Registers to Log**, and then click the **OK** Button.



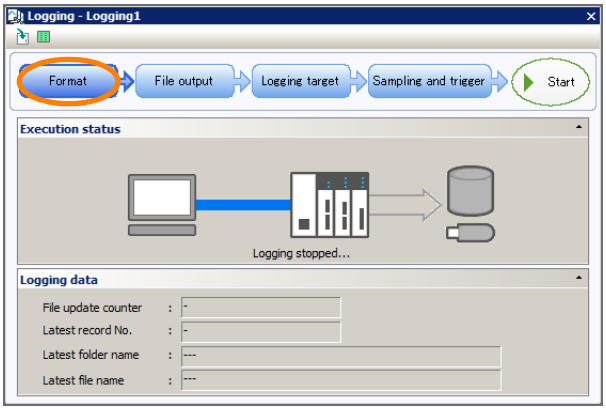
A message will be displayed.

3. Click the **Yes** Button.



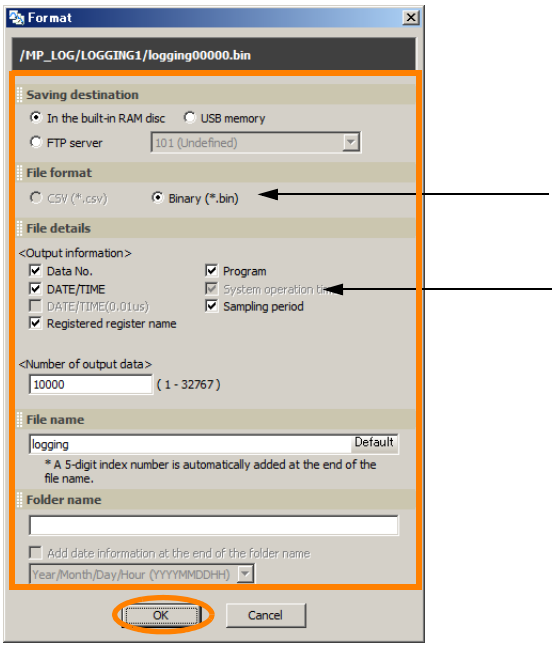
The message will close and the Logging Dialog Box will be displayed.

4. Click the **Format** Button.



The Format Dialog Box will be displayed.

5. Set the format, and then click the **OK** Button.



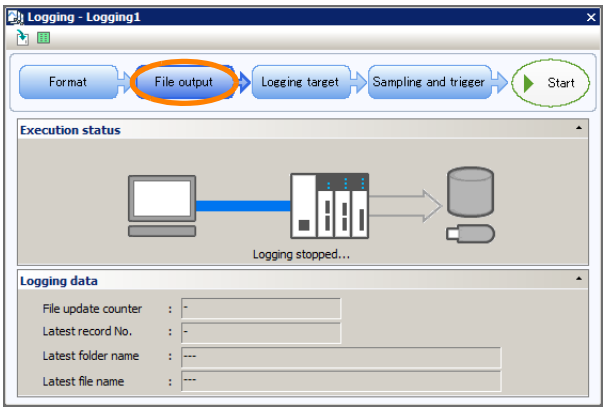
For this setting, it is locked to **Binary (*.bin)**.

For this setting, **System operation time** Check Box cannot be cleared.

Information Settings are the same as those when using the data logging with the MPE720. Refer to the following section for details.
☞ *8.5.1 Using the MPE720* on page 8-43

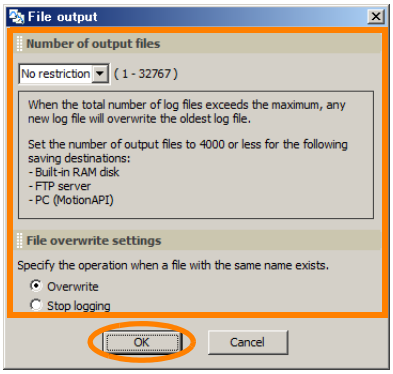
The Format Dialog Box will close and the Logging Dialog Box will be displayed.

6. Click the **File output** Button.



The File Output Dialog Box will be displayed.

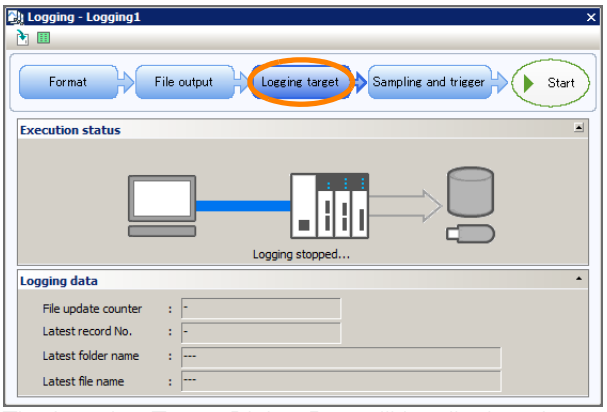
7. Set the file output, and then click the **OK** Button.



Information Settings are the same as those when using the data logging with the MPE720. Refer to the following section for details.
☞ *8.5.1 Using the MPE720* on page 8-43

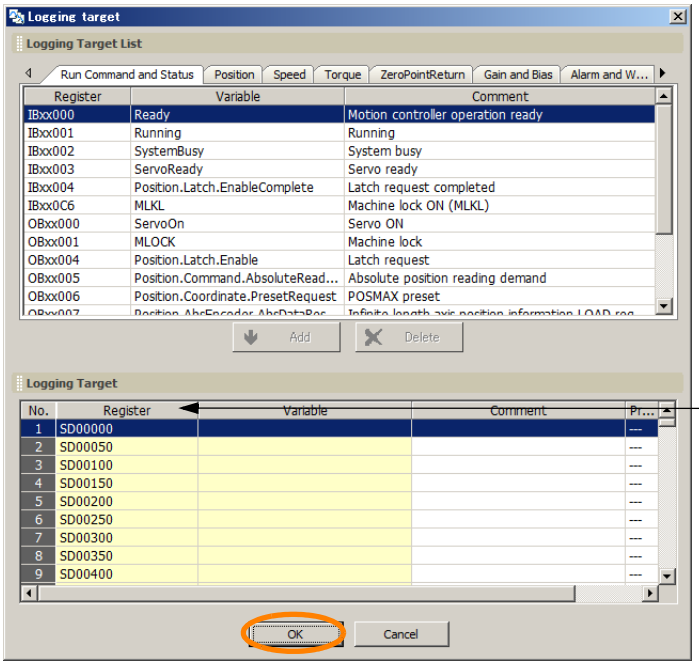
The File Output Dialog Box will close and the Logging Dialog Box will be displayed.

8. Click the **Logging target** Button.



The Logging Target Dialog Box will be displayed.

9. Click the **OK** Button.

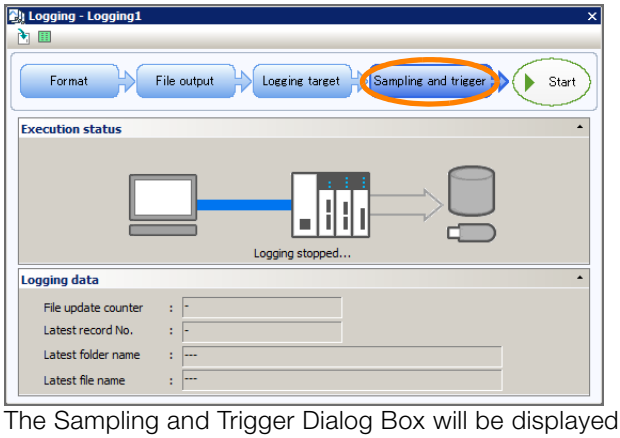


Dummy registers for logging will be automatically registered to calculate the overhead.

Information As this dialog box is the settings window for simulations, the register cannot be changed. Change registers during actual logging from the actual tool after completing this setting.

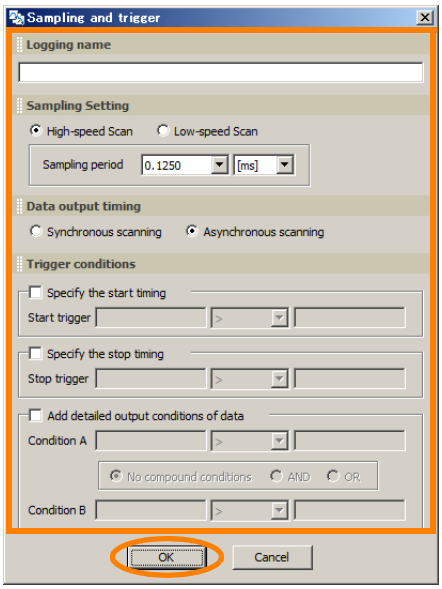
The Logging Target Dialog Box will close and the Logging Dialog Box will be displayed.

10. Click the **Sampling and trigger** Button.



The Sampling and Trigger Dialog Box will be displayed.

11. Set the sampling and trigger, and then click the **OK** Button.



Information

Settings are the same as those when using the data logging with the MPE720. Refer to the following section for details.

☞ *8.5.1 Using the MPE720* on page 8-43

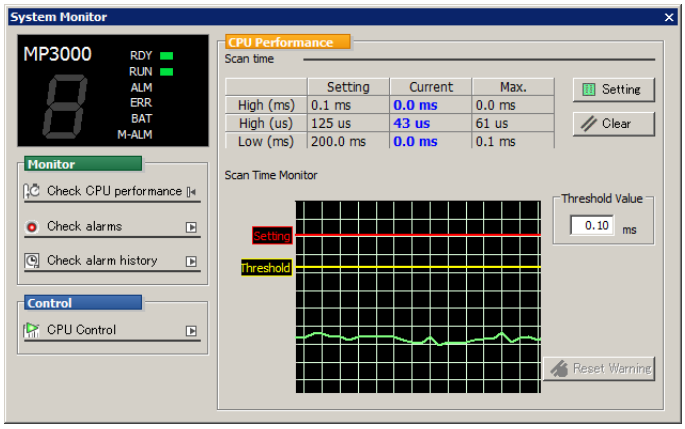
The Sampling and Trigger Dialog Box will close and the Logging Dialog Box will be displayed.

This completes configuration of the settings for logging simulation.

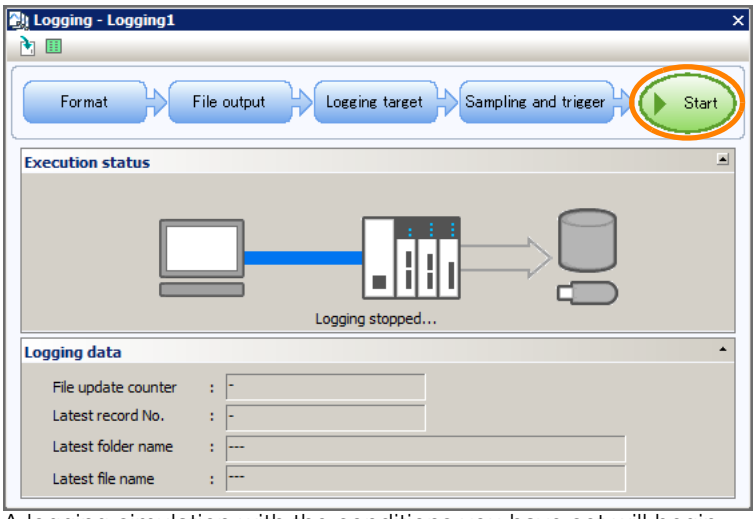
The next steps describe the procedure for executing and checking the results of a logging simulation.

12. Click **Monitor** – **System monitor** from the Launcher in the MPE720 Window.

The System Monitor Dialog Box will be displayed.



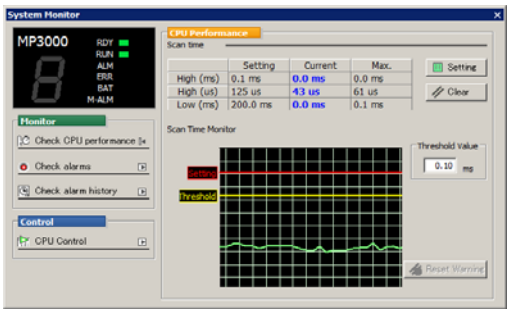
13. Return to the Logging Dialog Box, and click the **Start** Button.



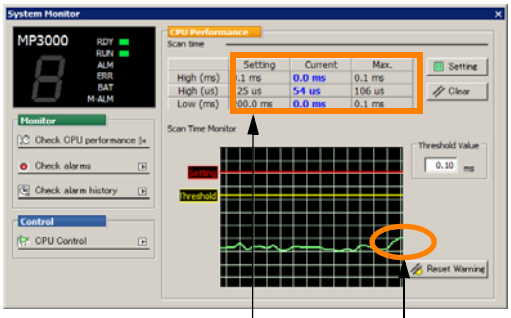
A logging simulation with the conditions you have set will begin.

14. In the System Monitor Dialog Box, check that there is no problem with scan time increment.

<Before Logging Begins>



<After Logging Begins>



This increment is the overhead from logging.

If the maximum value after logging begins is smaller than the set value, there is no problem.

Information

If the scan time exceeds the set value, click the **Setting** Button in the System Monitor Dialog Box and change the scan time in the dialog box that appears.
After you have changed the scan time, click **Start** Button in the Logging Dialog Box and perform logging simulation again.

This concludes the settings.

After completing these steps, you can configure logging settings from tools other than the MPE720.

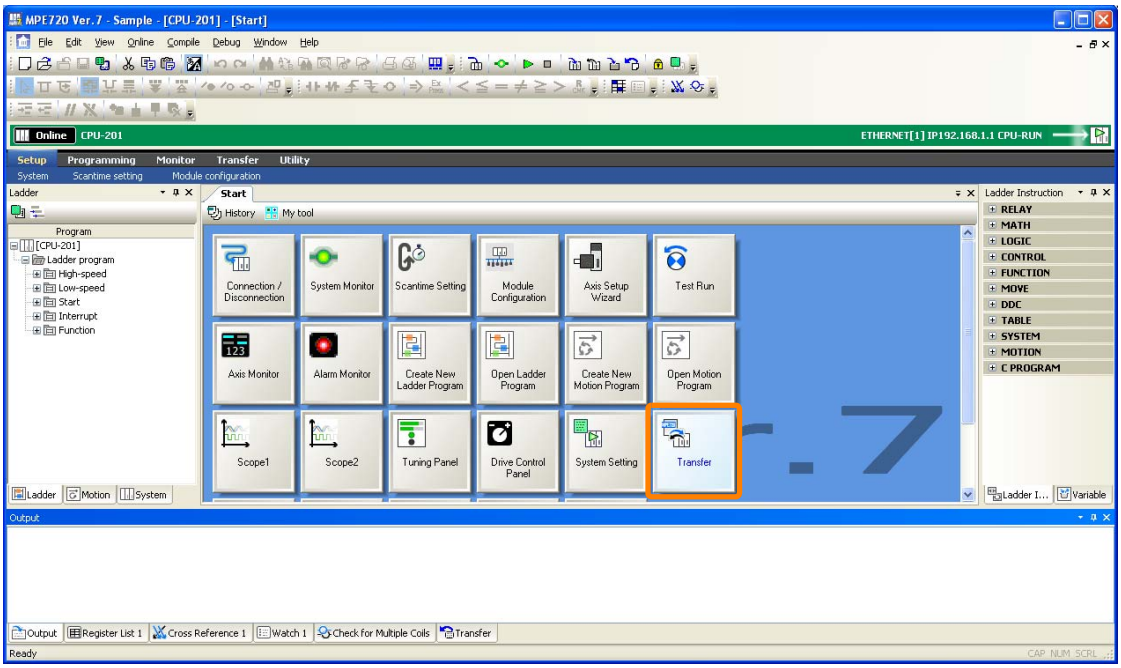
8.6 Transferring Data Between the Machine Controller and Project Files

The types of data transfer between the Machine Controller and project files are summarized in the table below.

Transfer Source	Transfer Destination	Button Used in Transfer Dialog Box	Reference
Project file	Machine Controller	Write to Controller	*8.6.1 Writing to Controller/Reading from Controller* on page 8-60
Machine Controller	Project file	Read from Controller	
Open project file	Other project file	Write to Project	*8.6.2 Writing to Project and Reading from Project* on page 8-63
Other project file	Open project file	Read from Project	

8.6.1 Writing to Controller/Reading from Controller

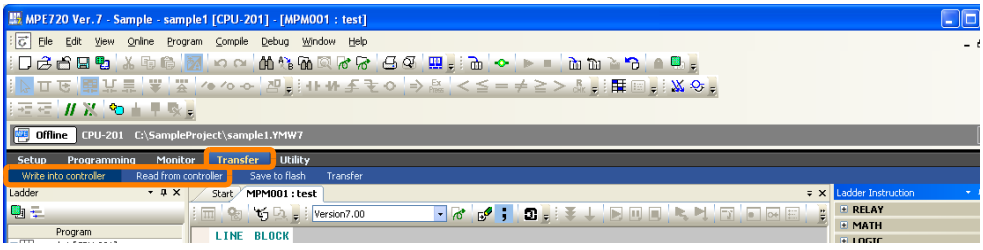
1. Click the **Transfer** Button on the My Tool View.



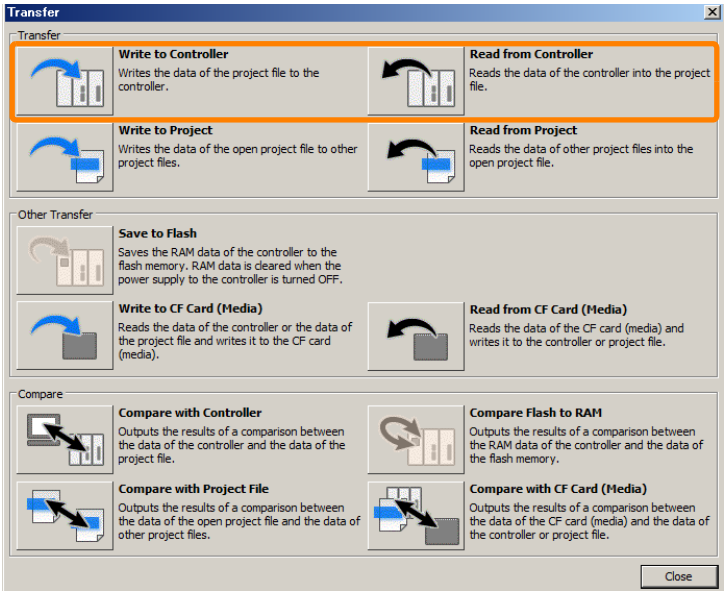
The Transfer Dialog Box will be displayed.

Information

This can also be performed by selecting ***Transfer*** – ***Write to controller*** or ***Read from controller*** from the Launcher with a project file already open. In this case, proceed to step 3.



2. Click the **Write to Controller** or **Read from Controller** Button.



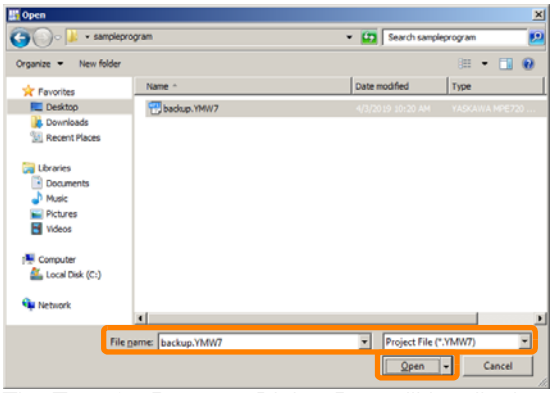
If you clicked the **Write to Controller** Button, the Open Dialog Box will be displayed.
If you clicked the **Read from Controller** Button, the Save As Dialog Box will be displayed.

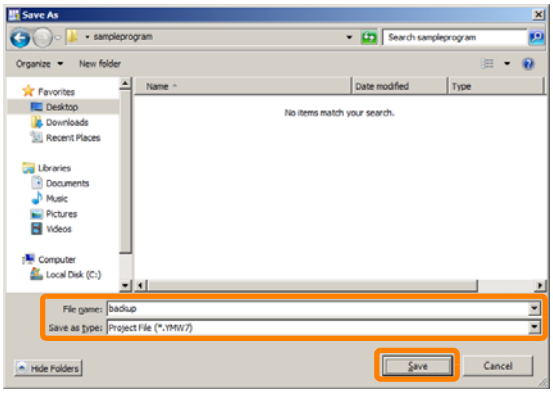
Information

Data can be transferred between the Machine Controller and project files only when the MPE720 is online. When the MPE720 is offline, the Communications Setting Dialog Box will be displayed. Make an online connection by configuring settings in the dialog box. Refer to the following section for details.

☞ *2.6 Setting Up Communications* on page 2-21

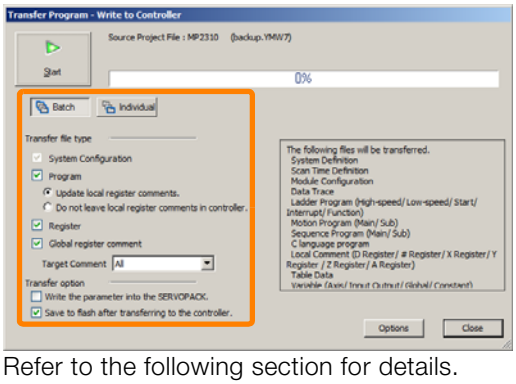
3. **Write to Controller**: Select the project file at the transfer source, then click the **Open** Button.
Read from Controller: Select the project file at the transfer destination (or create a new project file), then click the **Save** Button.

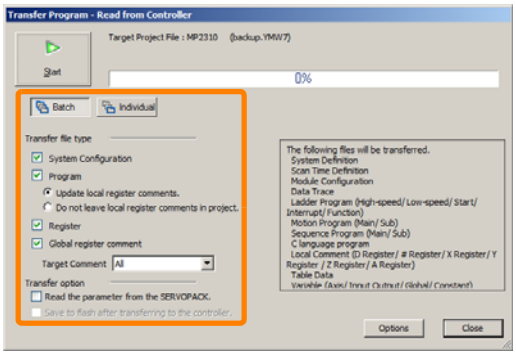




The Transfer Program Dialog Box will be displayed.

4. Specify the transfer settings as required.

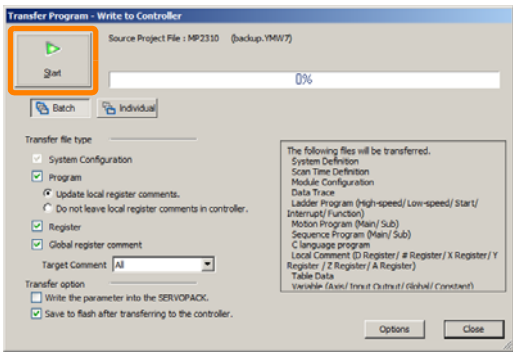


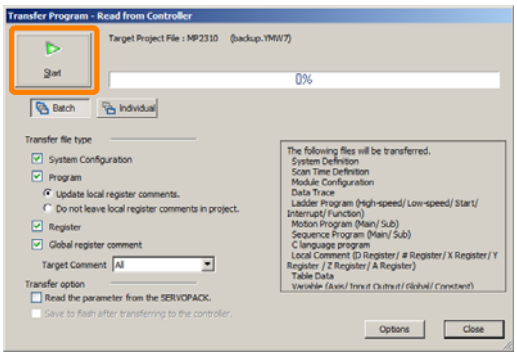


Refer to the following section for details.

☞ *8.6.3 Transfer Program Dialog Box* on page 8-65

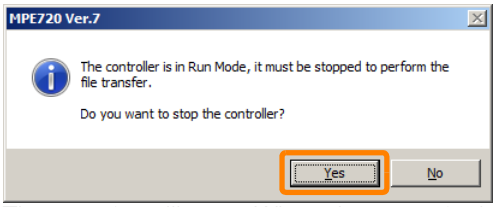
5. Click the **Start** Button.





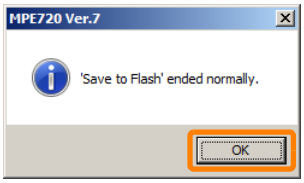
Write to Controller: A message will be displayed. Proceed to next step.
Read from Controller: Data transfer will start. When data transfer is completed, a message will be displayed. Proceed to step 7.

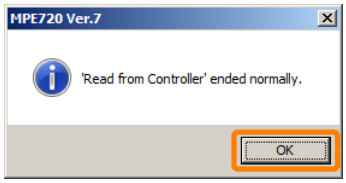
6. **Write to Controller**: Check the message that is displayed, and click the **Yes** Button.



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

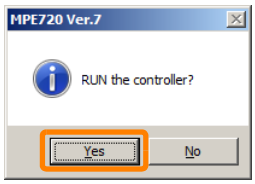
7. Click the **OK** Button.





Information

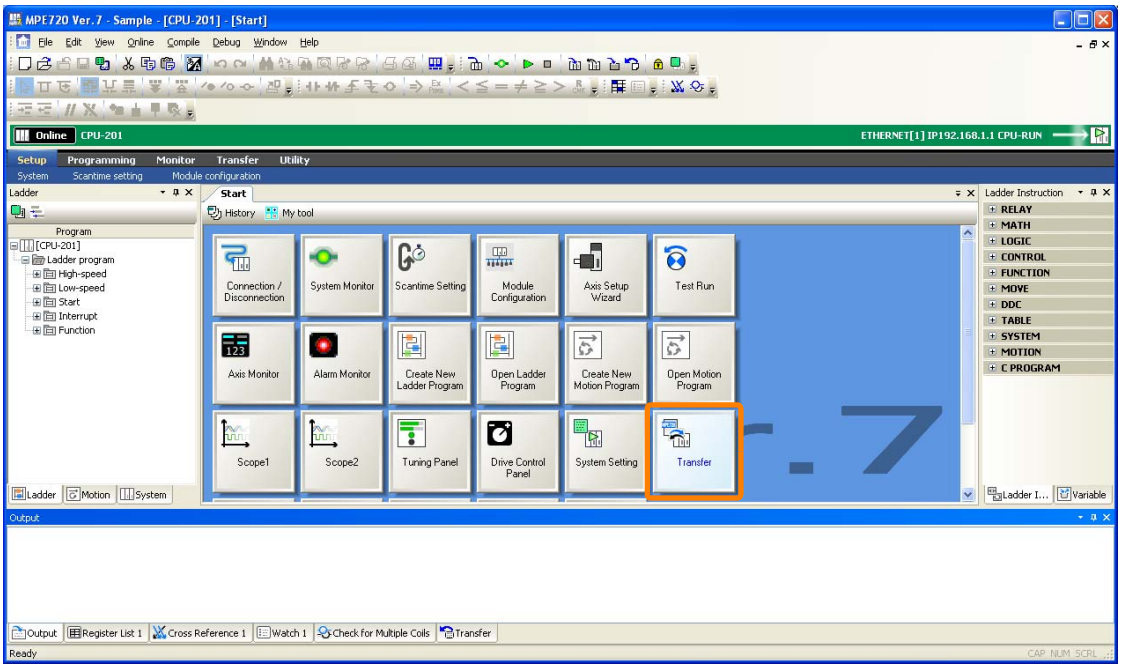
Write to Controller: The following dialog box will be displayed. Click the **Yes** Button.



This concludes the procedure.

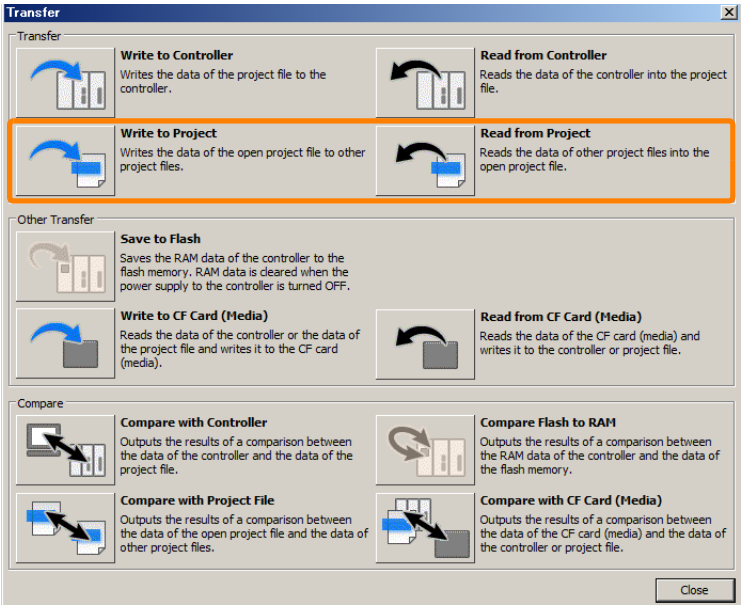
8.6.2 Writing to Project and Reading from Project

1. Click the **Transfer** Button on the My Tool View.



The Transfer Dialog Box will be displayed.

2. Click **Write to Project** or **Read from Project** Button.

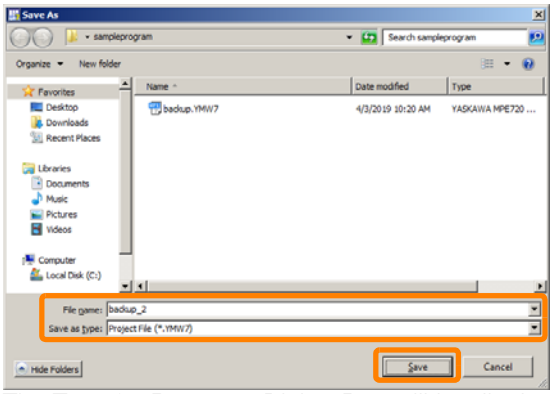


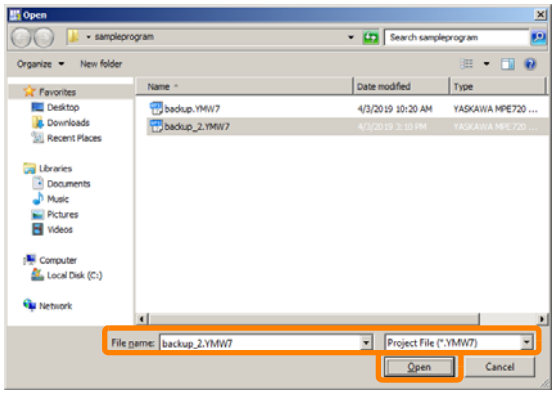
If you clicked **Write to Project**, the Open Dialog Box will be displayed.
If you clicked **Read from Project**, the Save As Dialog Box will be displayed.

Information

Data can be transferred between project files only when the MPE720 is offline. When the MPE720 is online, these buttons cannot be clicked. Disconnect communications, and start the procedure from Step 1.

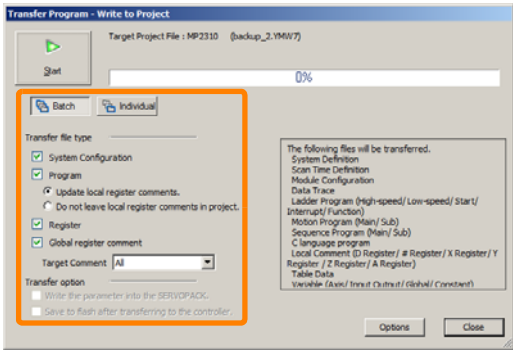
3. **Write to Project**: Select the project file at the transfer destination (or create a new project file), then click the **Save** Button.
Read from Project: Select the project file at the transfer source, then click the **Open** Button.

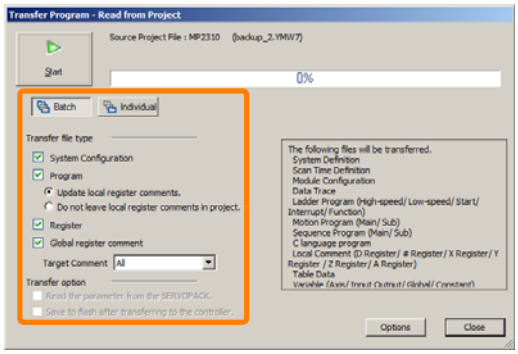




The Transfer Program Dialog Box will be displayed.

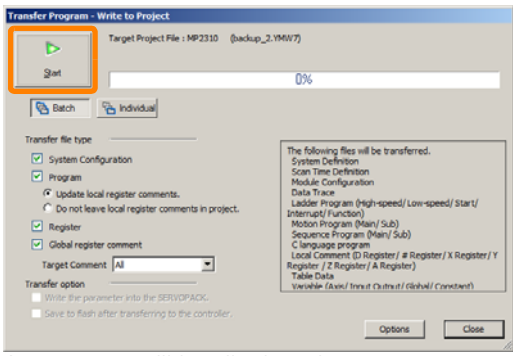
4. Specify the transfer settings as required.

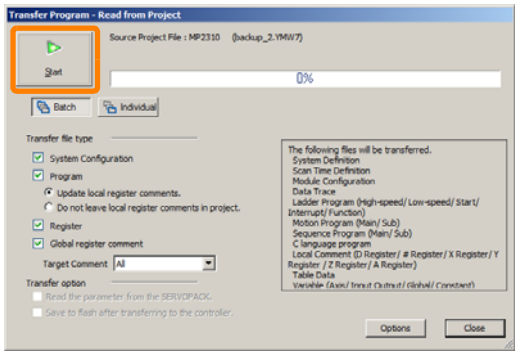




Refer to the following section for details.
☞ *8.6.3 Transfer Program Dialog Box* on page 8-65

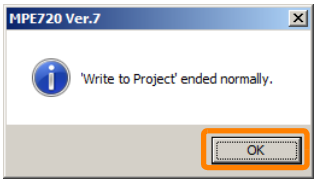
5. Click the **Start** Button.

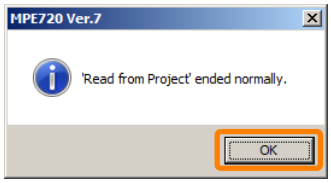




A message will be displayed.

6. Click the **OK** Button.





This concludes the procedure.

8.6.3 Transfer Program Dialog Box

The various transfer settings can be made in the Transfer Program Dialog Box.

- Click the **Batch** Button to transfer all of the data that is listed below. After the **Batch** Button is clicked, settings can be changed in the **Transfer file type** and **Transfer option** Area.
- Click the **Individual** Button to select the transfer file types and the data to transfer from the details pane.

Transfer File Type	Description		
System Configuration	System definitions		
	Scan time definitions		
	Module configuration definitions		
	Data tracing information		
	Data logging		
Program	Ladder programs	High-speed	Program name
		Low-speed	Program name
		Startup	Program name
		Interrupts	Program name
		Function	Program name
	Motion programs	Main program	Program name
		Subprogram	Program name
		Group definition	
	Sequence programs	Main program	Program name
		Subprogram	Program name
	C language	C language tasks	
		C language functions	
	Table data		
	Variables	Input variables (I registers)	
		Output variables (O registers)	
		Global variables (M and G registers)	
		Constant variables (C registers)	
	User-defined structures		
	Watch programs		
	Update local register comments. If you select this, 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. If you select this, 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.		
Global register comment	Target Comment: All		
	Target Comment: Standard Comment		
	Target Comment: Extended Comment 1		
	Target Comment: Extended Comment 2		
	Target Comment: Extended Comment 3		

The following options can be specified for the transfer.

Transfer Option	Description
Write the parameter into the SERVOPACK.	Writes the SERVOPACK parameters that were edited in the MPE720 to the SERVOPACK.
Read the parameter from the SERVOPACK.	Reads the SERVOPACK parameters that are saved in the SERVOPACK to a project file.
Save to flash after transferring to the controller.	Saves the transferred data to the flash memory in the Machine Controller.

- Clicking the **Options** Button displays the Environment Setting Dialog Box, and you can change transfer related settings.

8.7 Transferring Data Between the Machine Controller and CF Card

When data is transferred to a Machine Controller via a display or other device that supports CF cards, use of a CF card frees the operator from the trouble of connecting the MPE720 to the Machine Controller.

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

Use the following procedure to write to and read from the CF card.

Information With methods of use described above, the MPE720 is not used to read from CF card. Data is read from CF card, for example, to check content written to CF card or to write data to the Machine Controller during maintenance.

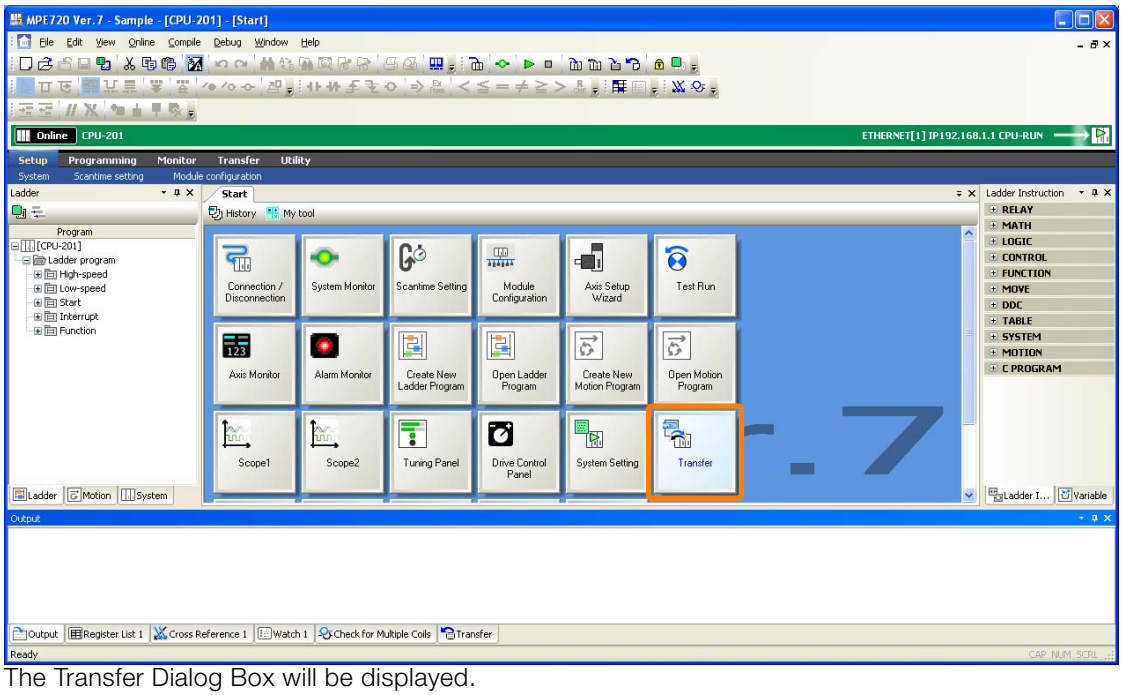
1. Check the project file status and MPE720 connection status according to the direction that you want to the transfer the data.

Type of Transfer	Transfer Source and Transfer Destination	Project File Status	MPE720 Connection Status
Write to CF card	Project file to CF card	Open	–
	RAM in Machine Controller to CF card	Closed	Online
Read from CF card	CF card to project file	Open	–
	CF card to RAM in Machine Controller	Closed	Online


Important

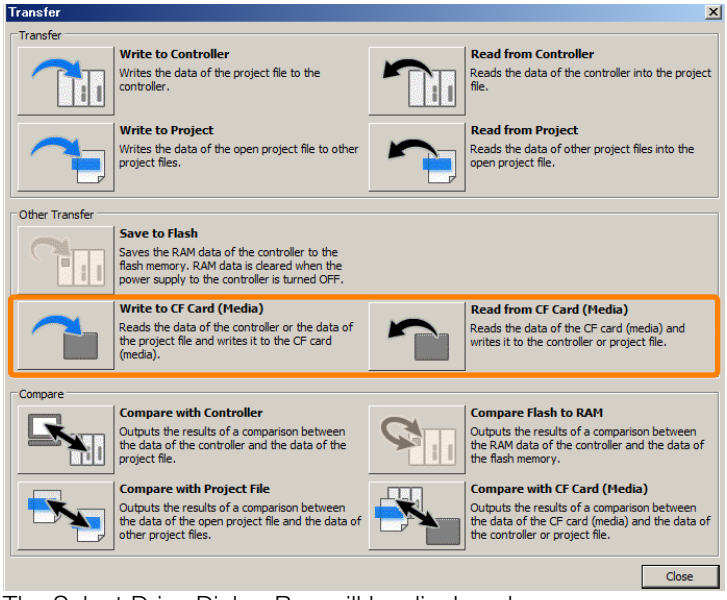
- When the **Apply File Reading Restriction** Check Box is selected in the security settings on the MPE720, data transfer from RAM in Machine Controller to CF card is not possible. To transfer data, change the security settings in ***Online*** – ***Online Security Setting*** from the menu bar.
- If CARD and SAVE on the DIP switch (SW2) are ON when the MP2200/CPU-02 is in use, data transfer from RAM in Machine Controller to CF card is not possible. To transfer data, set CARD and SAVE on the DIP switch (SW2) to ON.

2. Click the **Transfer** Button on the My Tool View.



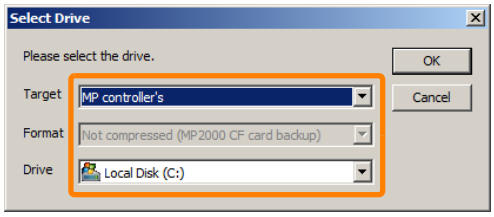
The Transfer Dialog Box will be displayed.

3. Click **Write to CF Card** or **Read from CF Card** Button.



The Select Drive Dialog Box will be displayed.

4. Specify the transfer settings, and click the **OK** Button.

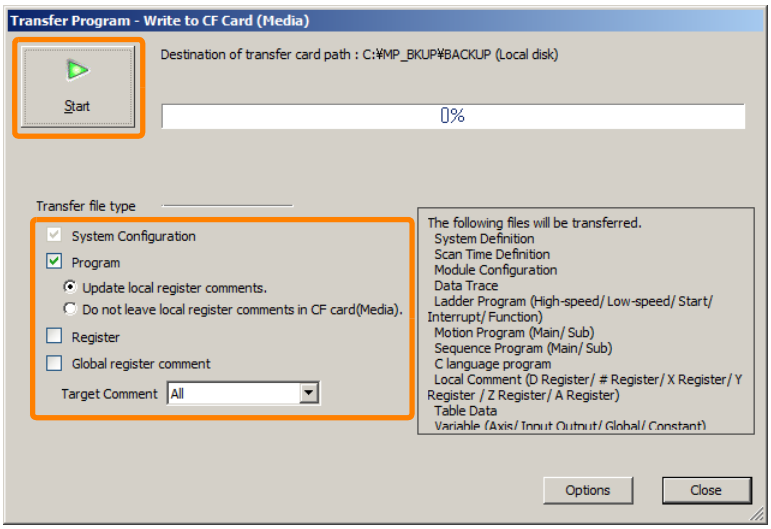


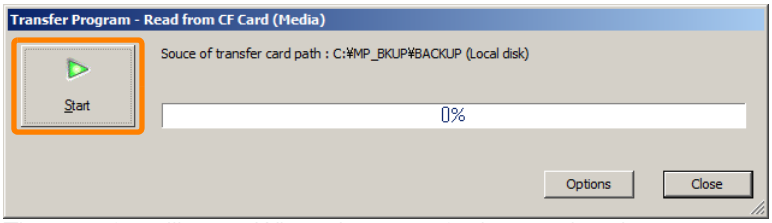
Important

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 Dialog Box that is displayed next.

The Transfer Program Dialog Box will be displayed.

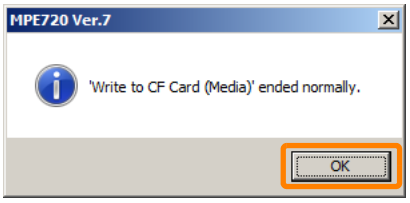
5. Make the transfer file type settings, as necessary, and click the **Start** Button.
Refer to the following section for details on the transfer file type settings.
☞ *8.6.3 Transfer Program Dialog Box* on page 8-65

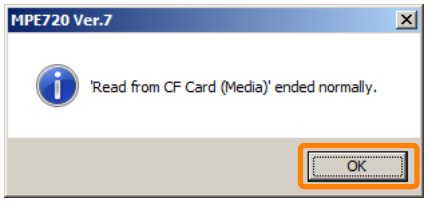




The transfer will start. When data transfer is completed, a message will be displayed.

6. Click the **OK** Button.





This concludes the procedure.

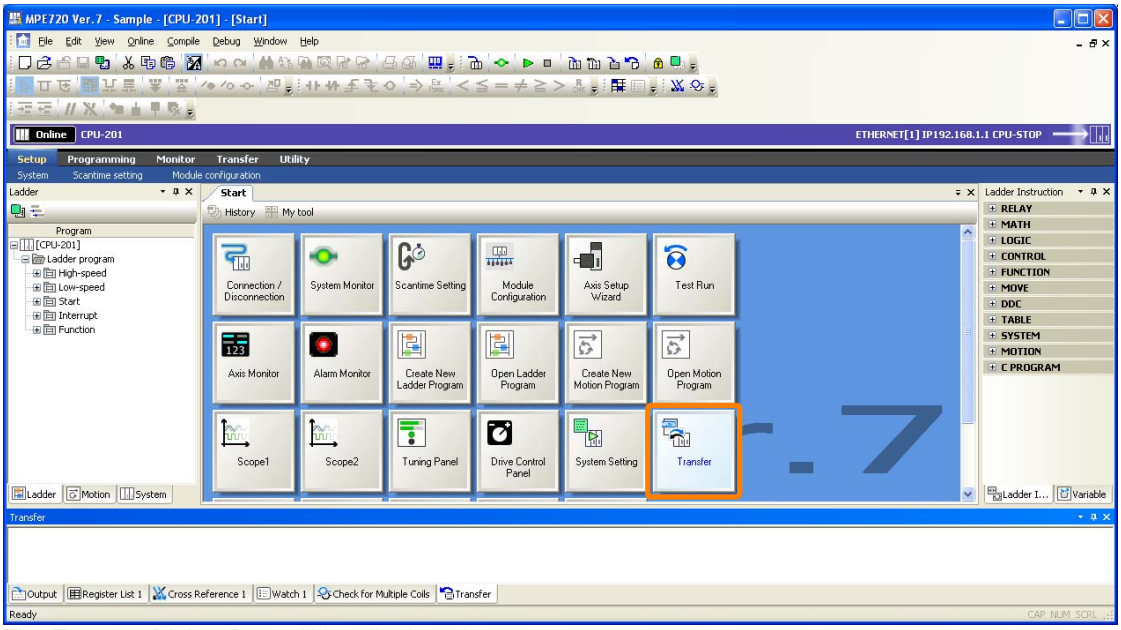
8.8 Comparing Data

The following data can be compared.

Data to Compare		Button Used in Transfer Dialog Box
Machine Controller	Project file	Compare with Controller
RAM in the Machine Controller	Flash memory in Machine Controller	Compare Flash to RAM
Project file	Other project file	Compare with Project File
CF card	Machine Controller	Compare with CF card (Media)
	Project file	

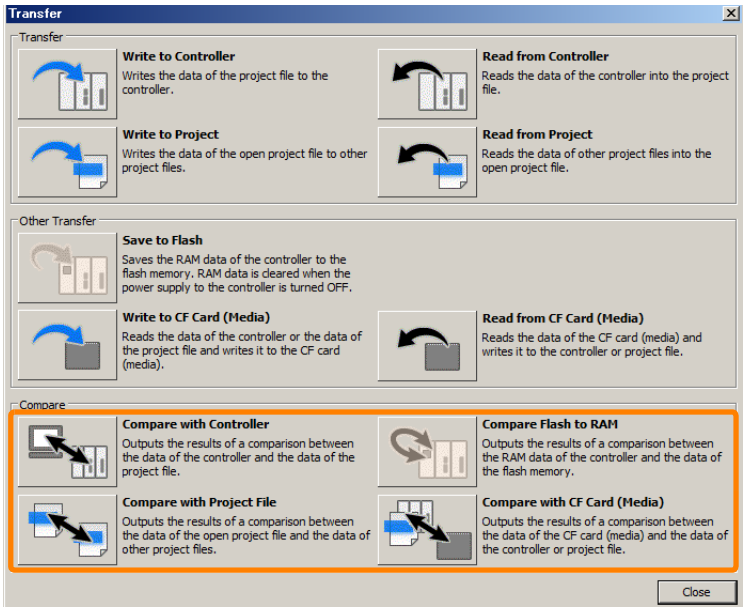
Use the following procedure to compare data.

1. Click the **Transfer** Button on the My Tool View.



The Transfer Dialog Box will be displayed.

2. Click one of the buttons in the **Compare** Area.



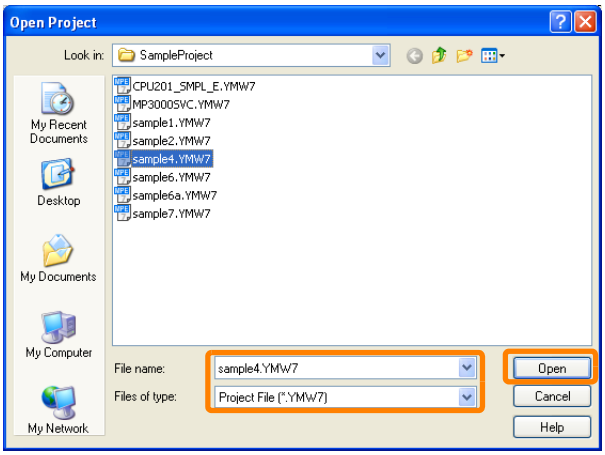
The dialog box will be displayed. The dialog box that is displayed differs according to the button that is clicked.

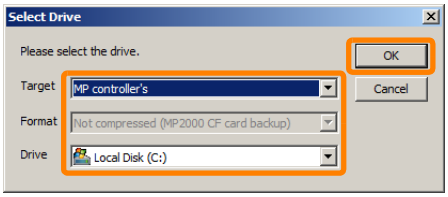
3. Set by following the displayed guidance, and click the **Open** Button or the **OK** Button.

Information

When Machine Controller is set as the comparison target, data can be compared only in online mode. In offline mode, the Communications Setting Dialog Box will be displayed. Make an online connection by configuring settings in the dialog box. Refer to the following section for details.

☞ *2.6 Setting Up Communications* on page 2-21



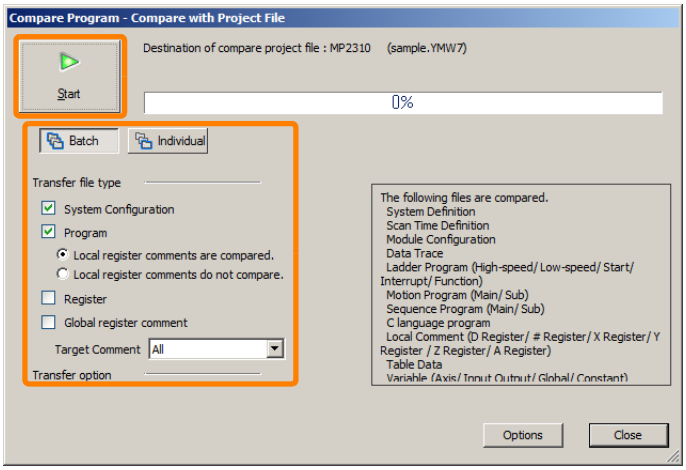


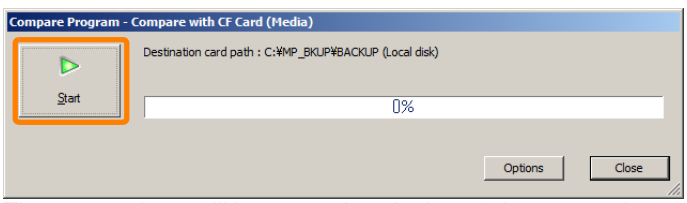
The Compare Program Dialog Box will be displayed.

4. Make the transfer file type settings, as necessary, and click the **Start** Button.

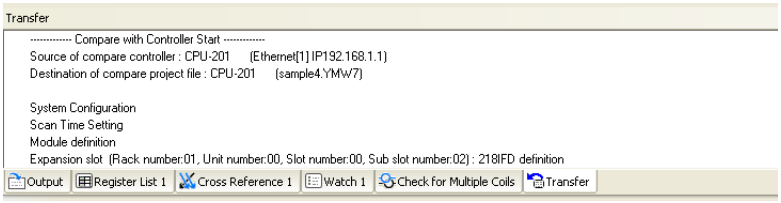
Refer to the following section for details on the transfer file type settings.

☞ *8.6.3 Transfer Program Dialog Box* on page 8-65



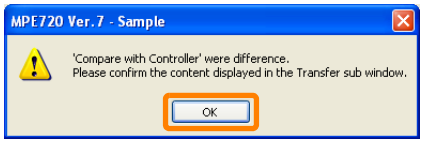


The comparison will be started and a log of the comparison operation will be displayed in the Transfer Pane.

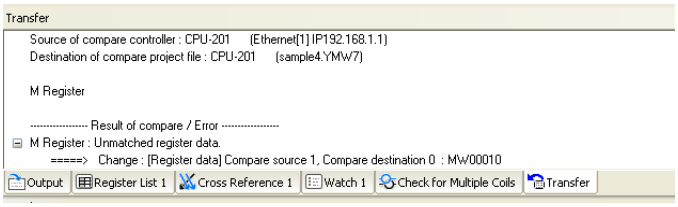


When the comparison has been completed, a dialog box that asks for confirmation will be displayed.

5. Click the **OK** Button.

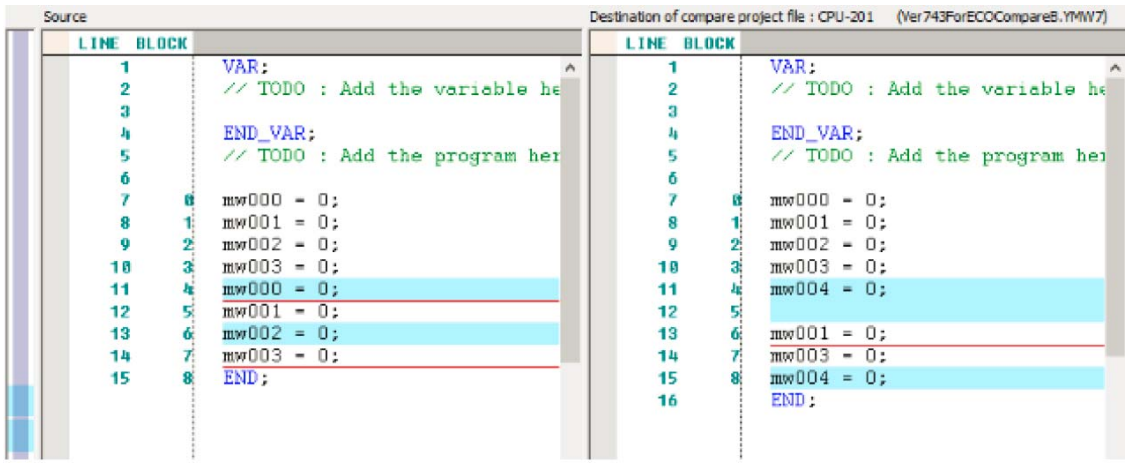


6. If differences were found, click the Transfer Pane.



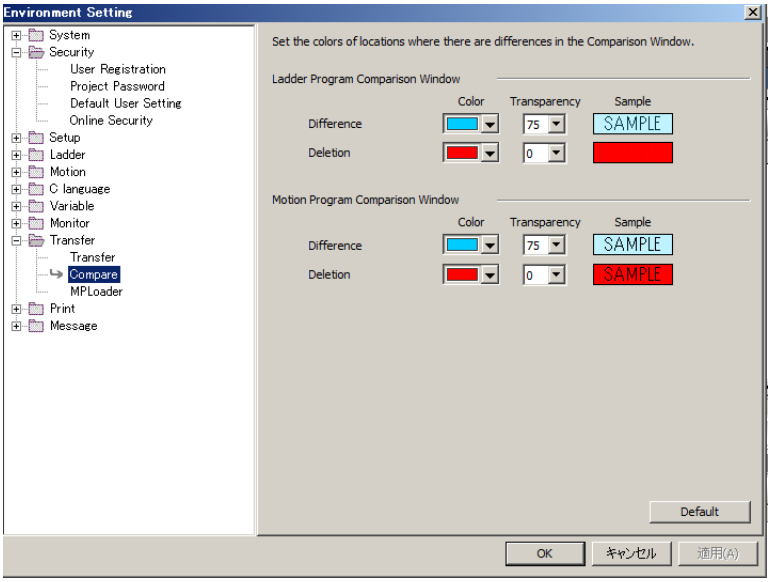
The results of comparing programs will be displayed in the Edit Ladder Program Tab Page or Edit Motion Program Tab Page.

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



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 pane can be changed by **Transfer** – **Compare** in the Environment Setting Dialog Box that is displayed by selecting ***File*** – ***Environment Setting*** from the menu bar.



This concludes the procedure.

Tracing

9

This chapter describes the operations that are used for tracing.

9.1 Introduction to Tracing

9.1.1 Introduction

The MPE720 has the following three trace functions.

Function Name	Detail	
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*		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.	

* There are restrictions to use of this function. Refer to the following section for details.
☞ *Restrictions in Use of Trace Manager* on page 9-3

Trace-related 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.

Trace Function	Operation on Trace-related Data: File Menu	Supported File Format	
		csv	dat/trd
Real-Time Trace	Open Trace File	○	○
	Open External File	○	○
	Save in External File	○	○*
Trace Manager	Import	○	○/–
	Export	○	–
XY Trace	Open External File	○	○
	Save in External File	○	○*

* 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.

Restrictions in Use of Trace Manager

The Trace Manager cannot be used for some register types, data types, and trace buffer types for trace target. Refer to the following table for details. Use a Real-Time Trace when the Trace Manager cannot be used.

◆ Register Types

Type	Name	Applicable Range	Support	
			Trace Manager	Real-Time Trace
S	System registers (S registers)	SW00000 to SW08191	○	○
		SW08192 to SW65534	×	○
M	Data registers (M registers)	MW00000 to MW65534	○	○
		MW65535 to MW1048575	×	○
G	G registers	GW0000000 to GW2097151	×	○
I	Input registers (I registers)	IW00000 to IW0FFFF	○	○
		IW10000 to IW27FFF	×	○
O	Output registers (O registers)	OW00000 to OW0FFFF	○	○
		OW10000 to OW27FFF	×	○
D	D registers	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-length real number	×	○
A	Address	×	×

Trace Buffer Size

The maximum applicable trace buffer size that can be used for the trace function depends on the model of Machine Controller as follows.

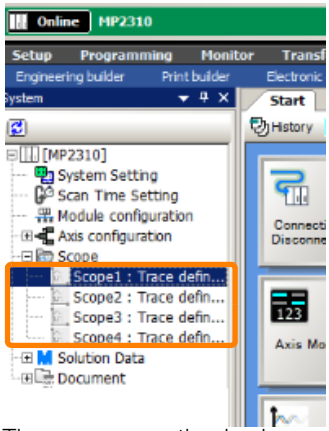
Model		Maximum Applicable Trace Buffer Size	
		Real-Time Trace/XY Trace	Trace Manager
MP2000 Series		32 kwords	
MP3000 Series		1024 kwords	32 kwords
	CPU-201, CPU-201 (SUB), CPU-202, CPU-202 (SUB), CPU-301 (32 axes)		
	CPU-301 (16 axes)	256 kwords	

9.1.2 Startup

This section describes the procedure for displaying each of the trace tab pages.

1. Use one of the following methods to display the Trace Type Dialog Box.

Information There are four buttons for tracing, **Scope1** to **Scope4**. Trace conditions are stored to the button that is used to execute tracing. This means that you can store up to four trace conditions by using the **Scope1** to **Scope4** Button.

No.	Screen Used for Startup	Operation
1	System Pane	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, the trace tab page, not the Trace Type Dialog Box will be displayed.

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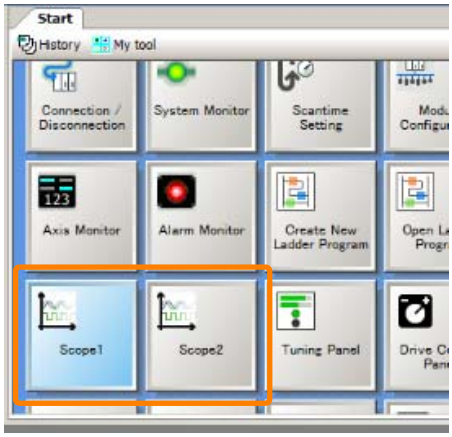
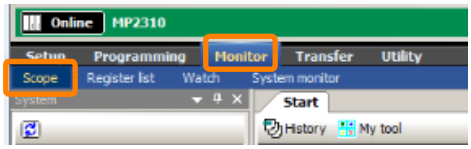
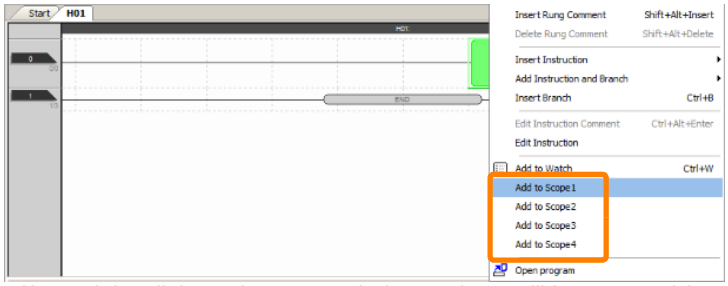
No.	Screen Used for Startup	Operation
2	My Tool	Click one of the **Scope1** to **Scope4** Buttons.  The **Scope3** and **Scope4** Buttons are not displayed by default. Refer to the following section for details on displaying buttons. ☞ ◆ *Displaying Buttons on the My Tool View* on page 3-20
3	Launcher	Click ***Monitor*** – ***Scope***. 
4	Edit Ladder Program Tab Page (Only the Real-Time Trace Tab Page 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.

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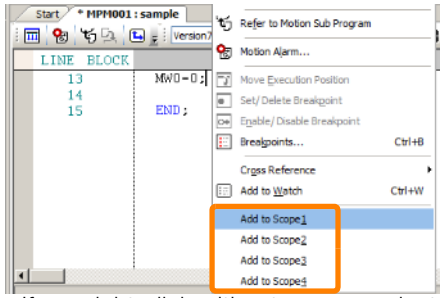
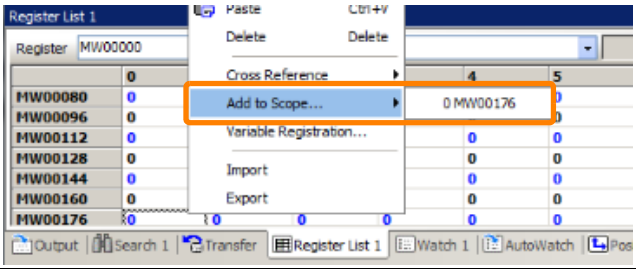
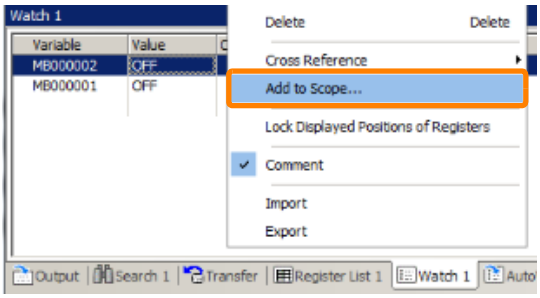
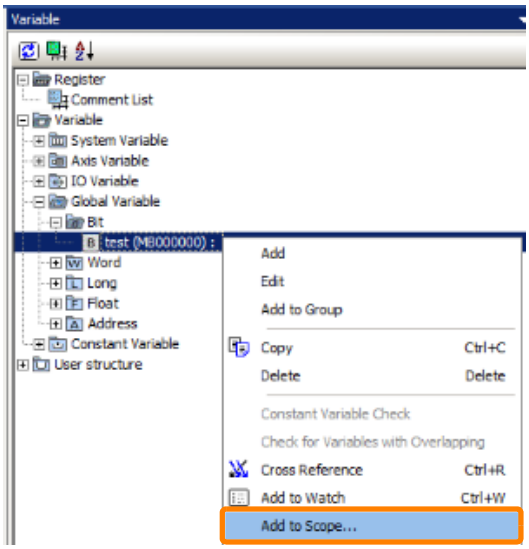
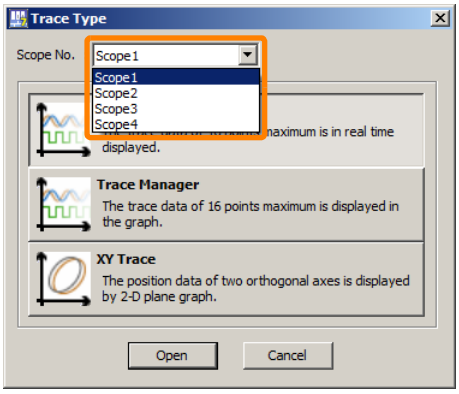
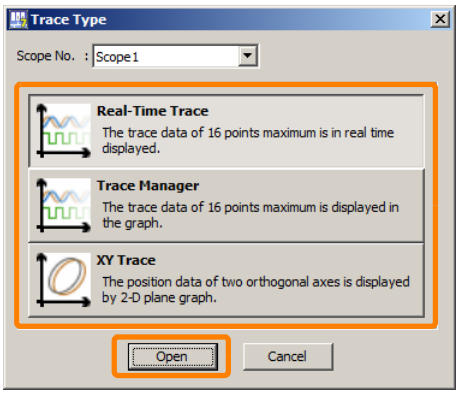
No.	Screen Used for Startup	Operation
5	Edit Motion Program Tab Page (Only the Real-Time Trace Tab Page can be started up.)	Right-click on the register used by the motion program, and select ***Add to Scope*** ☐.  • If you right-click without a range selected, the registers included on that cursor line will be targeted for tracing. • If you right-click with a range selected, all registers included in the selected range will be targeted for tracing.
6	Register List Pane (Only the Real-Time Trace Tab Page and Trace Manager Tab Page can be started up.)	Right-click on the register address, and select ***Add to Scope*** – register address. 
7	Watch Pane (Only the Real-Time Trace Tab Page and Trace Manager Tab Page can be started up.)	Right-click on the variable, and select ***Add to Scope***. 
8	Variable Pane (Only the Real-Time Trace Tab Page and Trace Manager Tab Page can be started up.)	Right-click on the variable registered to Variable Pane, and select ***Add to Scope***. 

2. When **Scope1** to **Scope4** are not selected in Step 1, select the scope No. to use.



3. Click the trace type, and click the **Open** Button.



The selected trace tab page will be displayed.

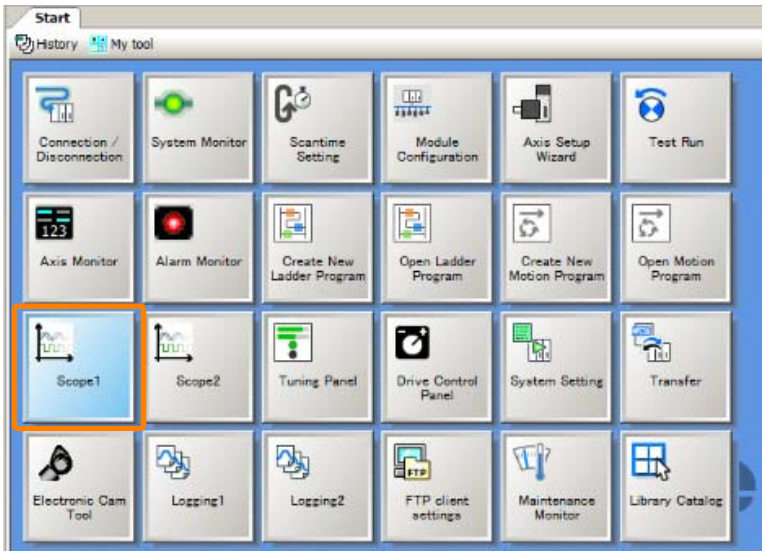
This concludes the procedure.

9.1.3 Overview of Trace Operations

This section describes an overview of operation procedures for each trace type.

Overview of Real-Time Trace Operations

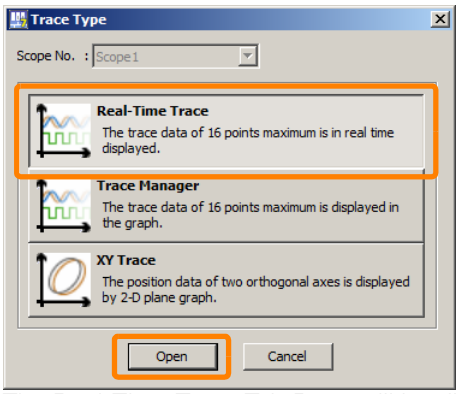
1. Click the **Scope☐** Button on the My Tool View.



The Trace Type Dialog Box will be displayed.

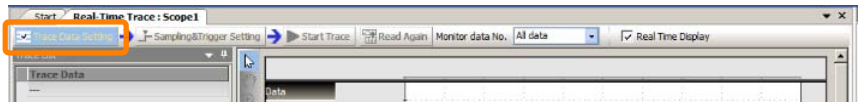
Information Refer to the following section for details on how to display the Trace Type Dialog Box.
☞ *9.1.2 Startup* on page 9-4

2. Click **Real-Time Trace**, and click the **Open** Button.



The Real-Time Trace Tab Page will be displayed.

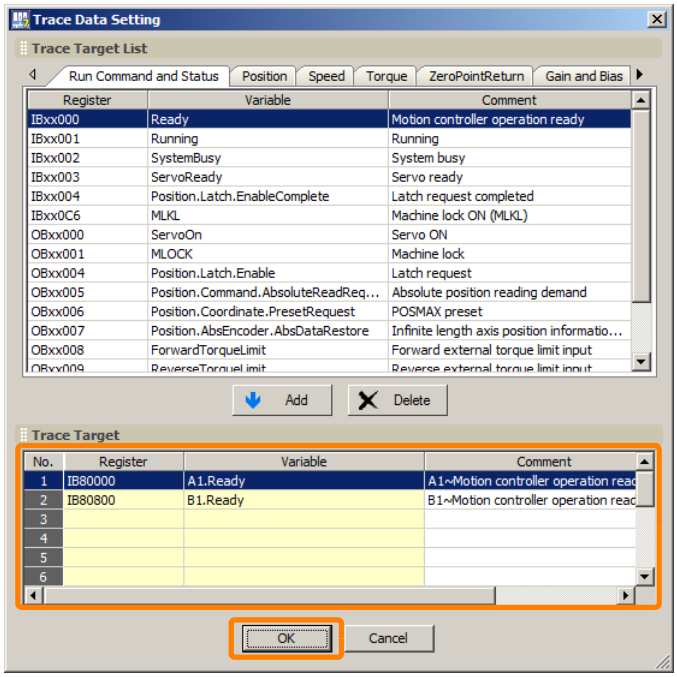
3. Click the **Trace Data Setting** Button.



The Trace Data Setting Dialog Box will be displayed.

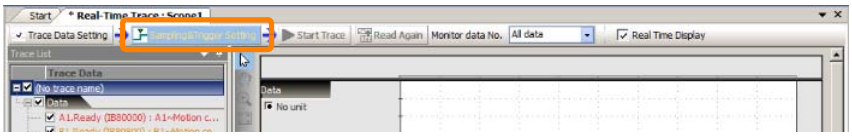
4. Use one of the following methods to specify the registers to trace, and click the **OK** Button.
   - Select the registers to trace from the **Trace Target List** Area, and then click the **Add** Button. The Axis Dialog Box will be displayed. Select the check boxes for the axes to trace, and click the **OK** Button.
   - Enter the register address directly in the Register Column in the **Trace Target** Area.

Refer to the following section for details on the settings.
☞ *Trace Data Setting* on page 9-40



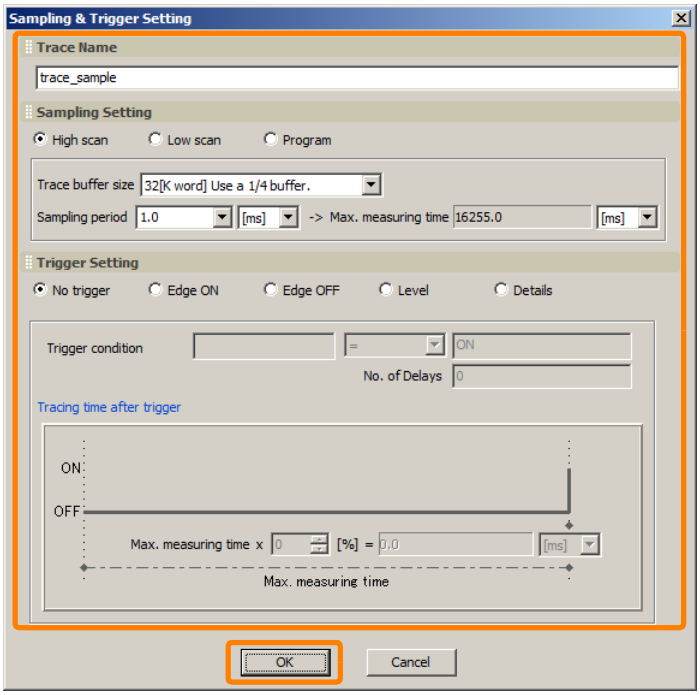
The Trace Data Setting Dialog Box will close.

5. Click the **Sampling & Trigger Setting** Button.



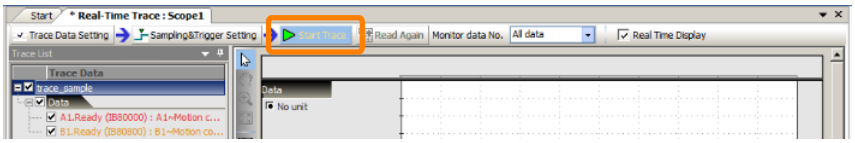
The Sampling & Trigger Setting Dialog Box will be displayed.

6. Set the items, and then click the **OK** Button.
Refer to the following section for details on the settings.
☞ *Sampling and Trigger Settings* on page 9-41

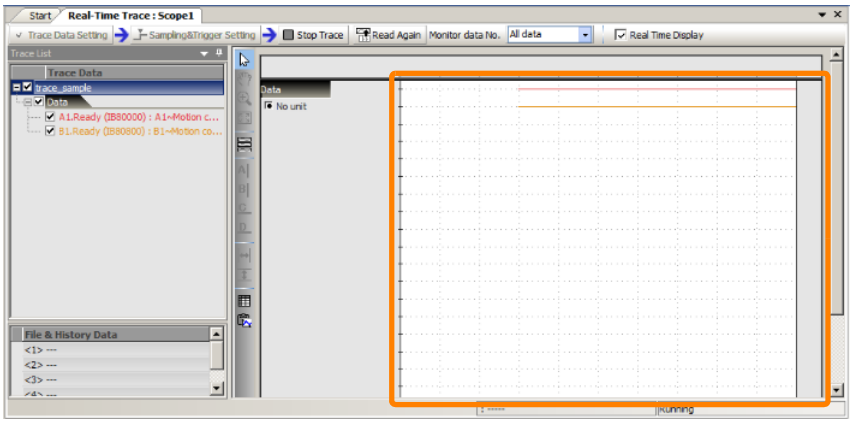


The Sampling & Trigger Setting Dialog Box will close.

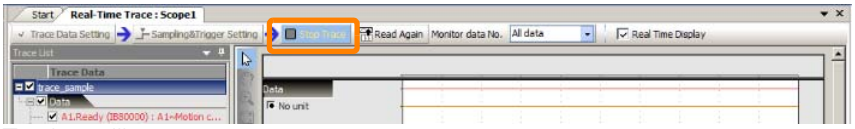
7. Click the **Start Trace** Button.



The trace will start, and a realtime graph will be displayed on the Real-Time Trace Tab Page.
The trace buffer can be re-read by clicking the **Read Again** Button.



8. Click the **Stop Trace** Button to stop tracing.

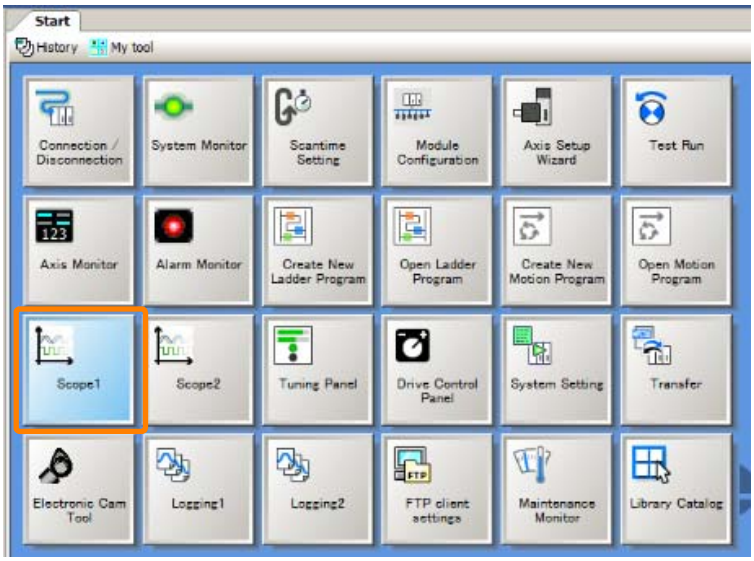


Tracing will stop.

This concludes the procedure.

Overview of Trace Manager Operations

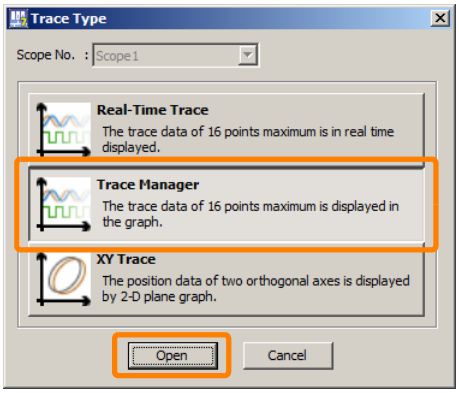
1. Click the **Scope□** Button on the My Tool View.



The Trace Type Dialog Box will be displayed.

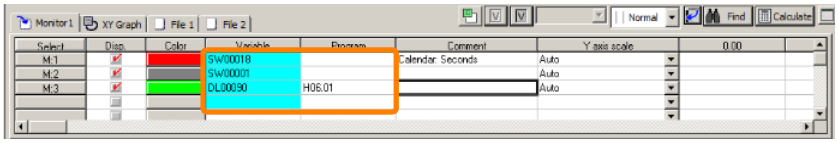
Information Refer to the following section for details on how to display the Trace Type Dialog Box.
☞ *9.1.2 Startup* on page 9-4

2. Click **Trace Manager**, and click the **Open** Button.



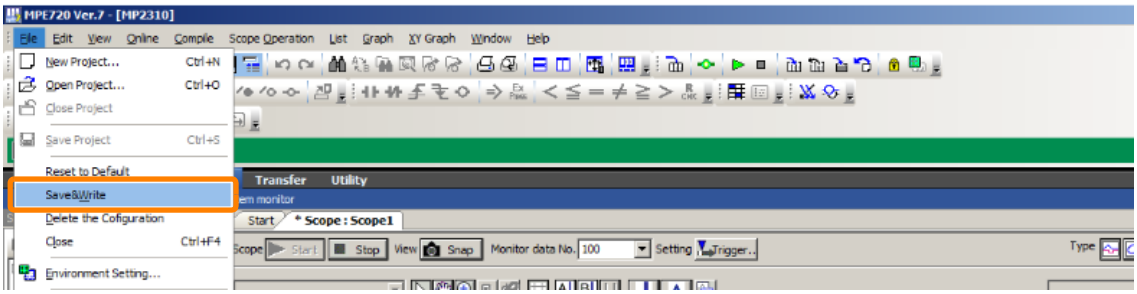
The Trace Manager Tab Page will be displayed.

3. 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.



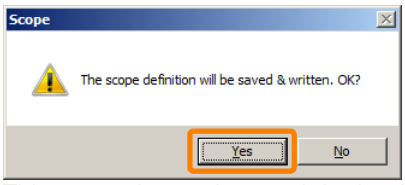
Note: 1. The variable can also be entered by dragging and dropping from the Variable Pane.
2. Total of 16 registers and variables can be entered.
3. When a comment was previously set to an entered variable, the comment will be displayed as a result of entering that variable.
4. A **Variable** Field with a light blue background indicates that the field has not been saved.

4. Select ***File*** - ***Save & Write*** from the menu bar.



The Scope Dialog Box will be displayed.

5. Click the **Yes** Button.



This saves the setting, and the background color of the **Variable** Field in the list returns to white.

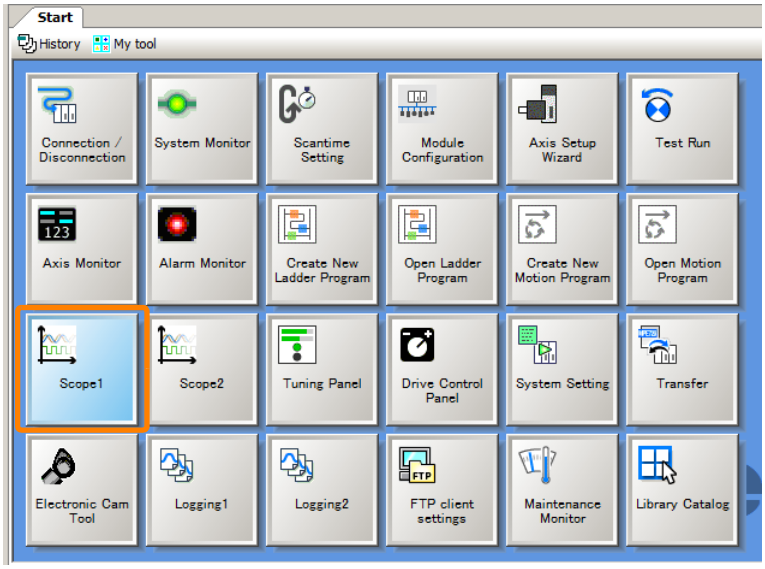
6. To start a trace, click the **Start** Button (Start) on the control panel, and to stop a trace, click the **Stop** Button (Stop). Also, to upload the current information in trace memory, click the **Snap** Button (Snap).
A message indicating that data is being acquired will be displayed, and then a graph of the acquired data will be displayed in the graph area.

Note: 1. Various data trace related operations can be performed by using the buttons on the control panel. Refer to the following section for details.
☞ *9.3.1 Control Panel* on page 9-54
2. The graph type can be switched between trend graph and X-Y graph. How graphs are displayed can be set in more detail. Refer to the following section for details.
☞ *9.3.2 Graph Area* on page 9-56
3. In the list area, you can set other details, besides variable settings, relating to target variables such as graph display color and display/hide graph. Refer to the following section for details.
☞ *9.3.3 List Area* on page 9-62

This concludes the procedure.

Overview of XY Trace Operations

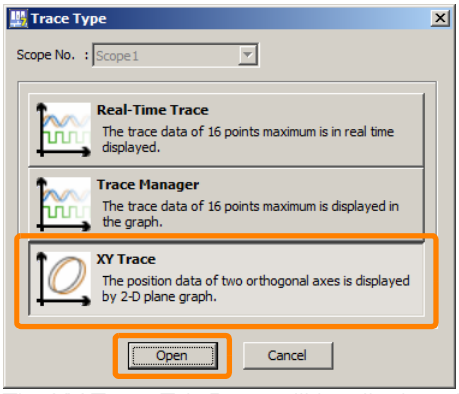
1. Click the **Scope□** Button on the My Tool View.



The Trace Type Dialog Box will be displayed.

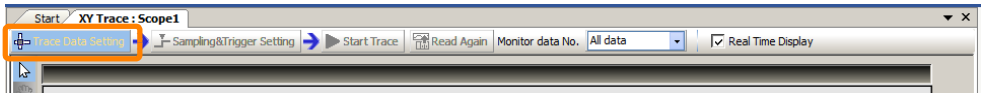
Information Refer to the following section for details on how to display the Trace Type Dialog Box.
☞ *9.1.2 Startup* on page 9-4

2. Click **XY Trace**, and click the **Open** Button.



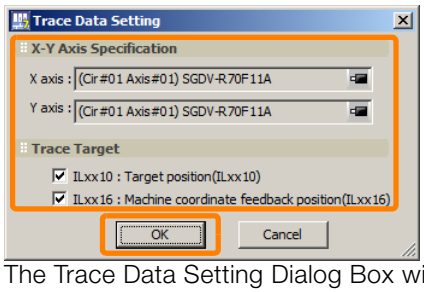
The XY Trace Tab Page will be displayed.

3. Click the **Trace Data Setting** Button.



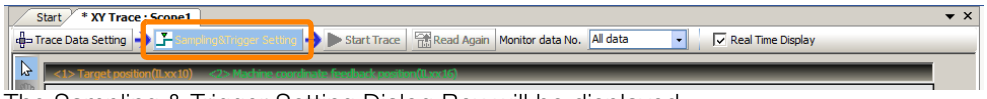
The Trace Data Setting Dialog Box will be displayed.

4. Set the items, and then click the **OK** Button.
Refer to the following section for details on the settings.
☞ *Trace Data Setting* on page 9-75



The Trace Data Setting Dialog Box will close.

5. Click the **Sampling & Trigger Setting** Button.

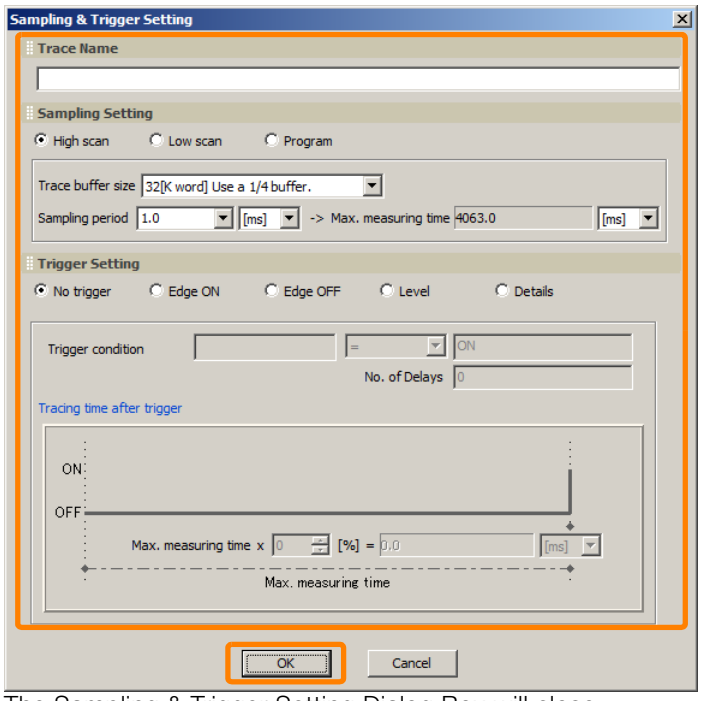


The Sampling & Trigger Setting Dialog Box will be displayed.

6. Set the items, and then click the **OK** Button.

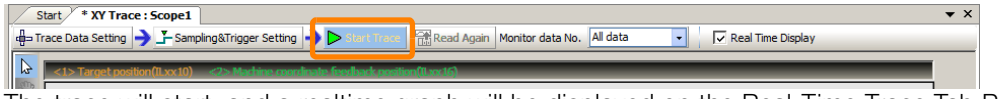
Refer to the following section for details on the settings.

☞ *Sampling and Trigger Settings - Motion Analyzer* on page 9-75

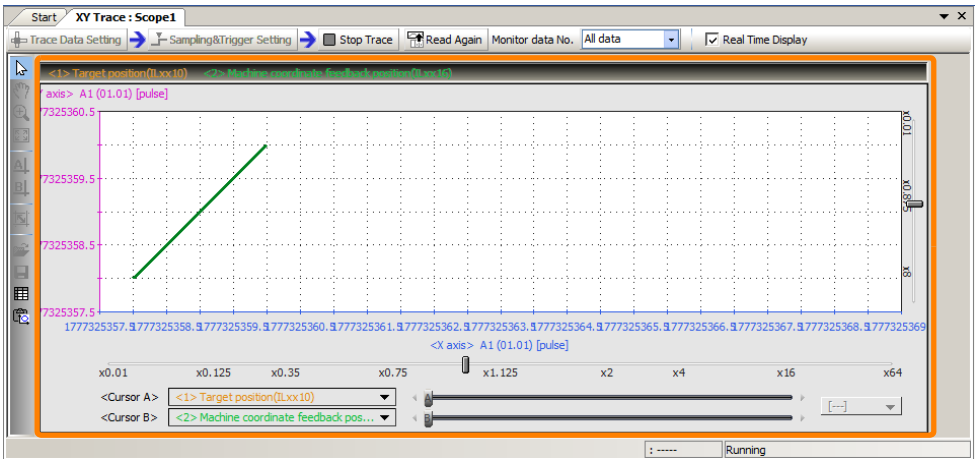


The Sampling & Trigger Setting Dialog Box will close.

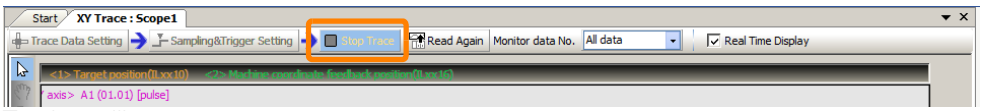
7. Click the **Start Trace** Button.



The trace will start, and a realtime graph will be displayed on the Real-Time Trace Tab Page.
The trace buffer can be re-read by clicking the **Read Again** Button.



8. Click the **Stop Trace** Button to stop tracing.



Tracing will stop.

This concludes the procedure.

9.1.4 Checking the Sampling & Trigger Settings

You can check the trace sampling & trigger settings.

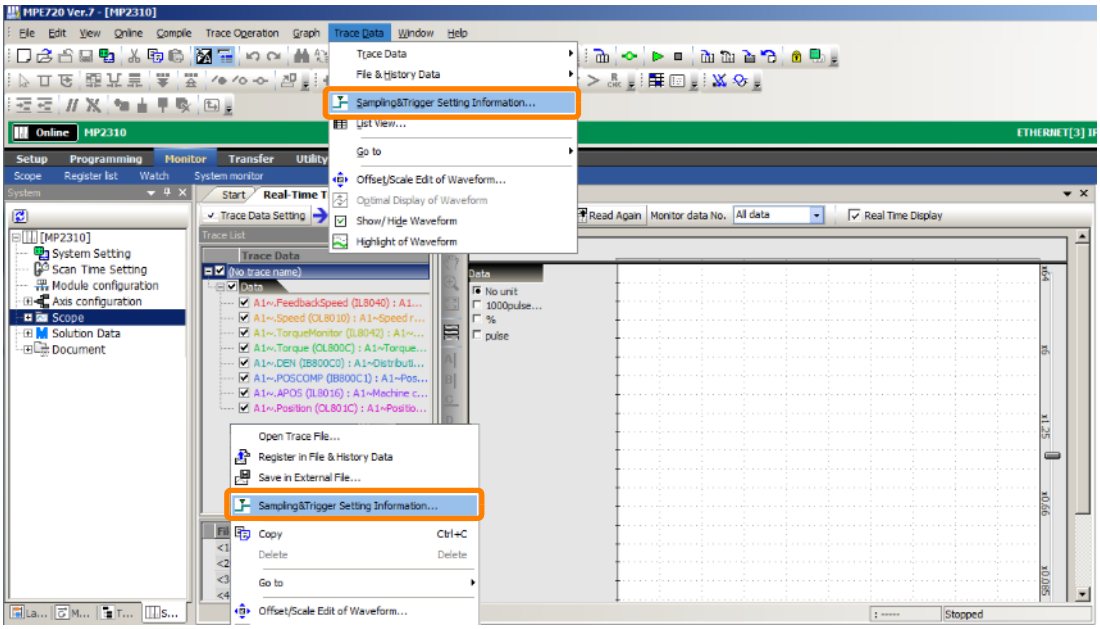
This operation is possible only with Real-Time Trace.

Information This operation involves checking only. When reusing existing trace definition information (trace data settings and sampling & trigger settings) to create a new trace definition, refer to the following section.

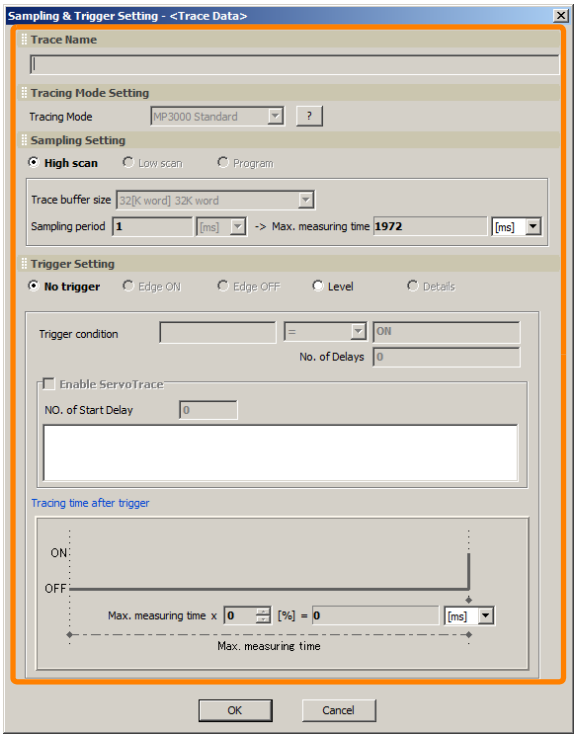
☞ *9.1.5 Reading Trace Definition Files* on page 9-15

Use one of the following methods to display the Sampling & Trigger Setting Dialog Box.

- Select ***Trace Data*** – ***Sampling & Trigger Setting Information*** from the menu bar.
- Right-click on the Trace List Pane, and select ***Sampling & Trigger Setting Information*** from the pop-up menu.



The Sampling & Trigger Setting Dialog Box will be displayed. Check the settings.



This concludes the procedure.

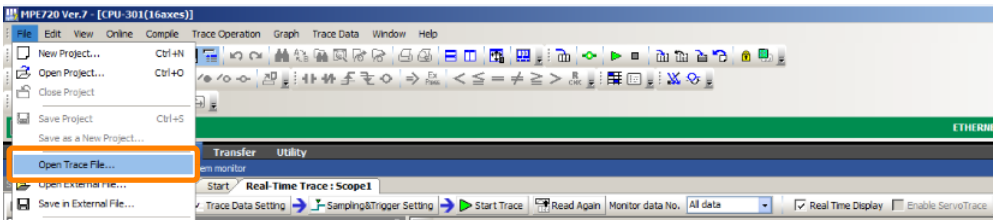
9.1.5 Reading Trace Definition Files

This operation is possible only with Real-Time Trace.

By reading a saved file, existing trace definitions (trace settings and sampling & trigger settings) can be easily reused. Refer to the following section for details on file formats that can be read.

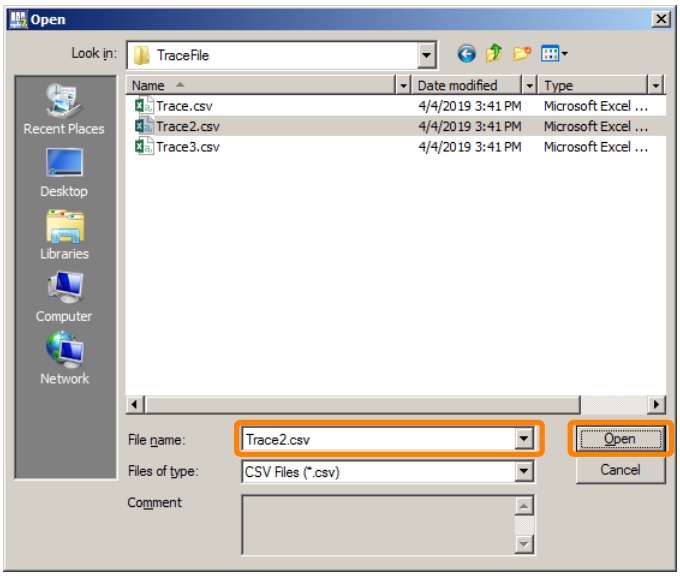
☞ *9.1.1 Introduction* on page 9-3

1. Select ***File*** – ***Open Trace File*** from the menu bar.



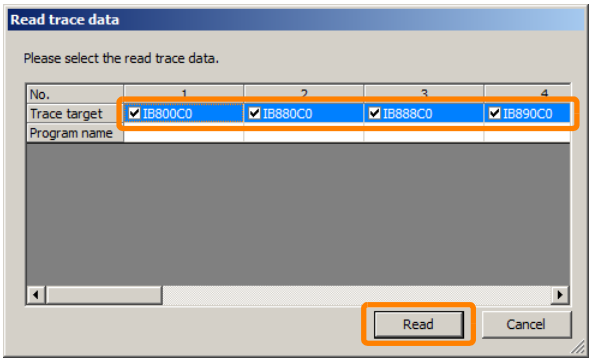
The Open Dialog Box will be displayed.

2. Select the file containing the trace definitions you want to reuse, and click the **Open** Button.



The Read Trace Data Dialog Box will be displayed.

3. Select the check box of trace settings you want to read and click the **Read** Button.



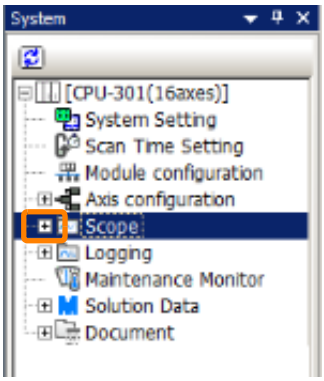
This reads the sampling & trigger settings and trace settings that you selected.

This concludes the procedure.

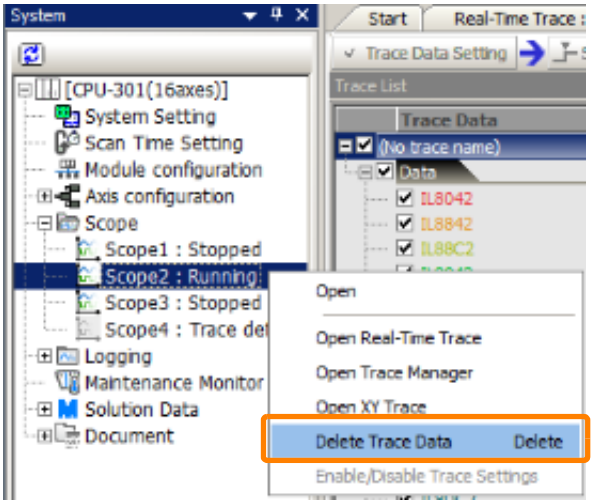
9.1.6 Deleting Trace Definitions and Trace Data

Use the following procedure to delete trace definitions and trace data acquired by the Machine Controller.

1. Expand the **Scope** Tree in the System Pane.

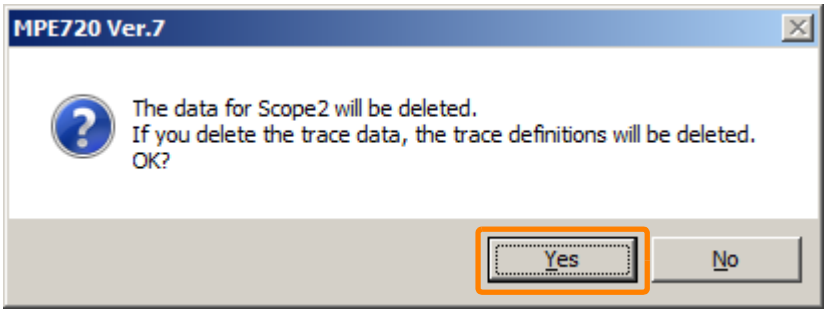


2. Right-click on the trace group you want to delete, and select ***Delete Trace Data***.



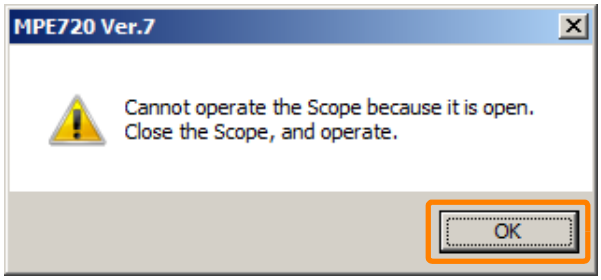
A dialog box will be displayed.

3. Read the message, and then click the **Yes** Button.



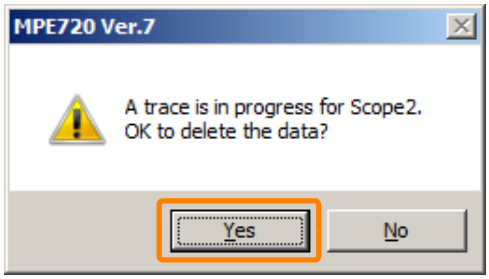
Information

If the trace you are about to delete is open, the following dialog box will be displayed. Click the **OK** Button to close the dialog box, close the trace tab page, and repeat the operation from Step 1.



Information

If the trace you are about to delete is executing, the following dialog box will be displayed. Click the **Yes** Button.



This concludes the procedure.

9.1.7 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 reset. 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.

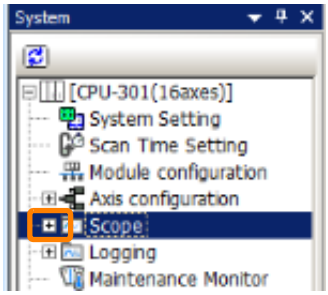
Models and software versions that support enabled/disabled switching of the trace definition settings are shown below:

- Machine Controller in the MP3000 Series: Ver. 1.37 or later
- Σ-7C SERVOPACK: Ver. 1.04 or later

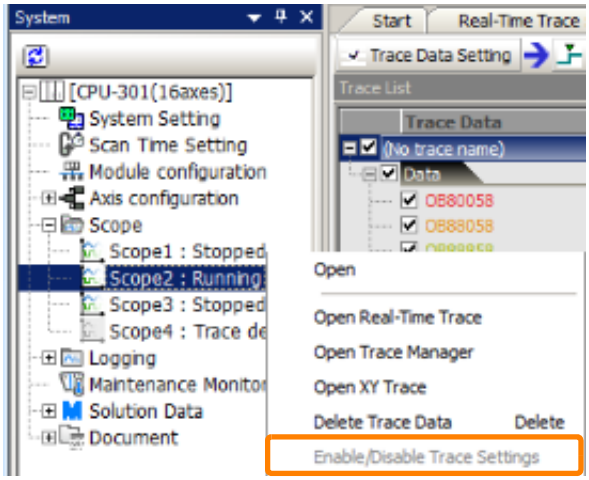
MP2000-series Machine Controllers do not support this function.

Use the following procedure to switch the trace definition settings between enabled and disabled.

1. Expand the **Scope** Tree in the System Pane.

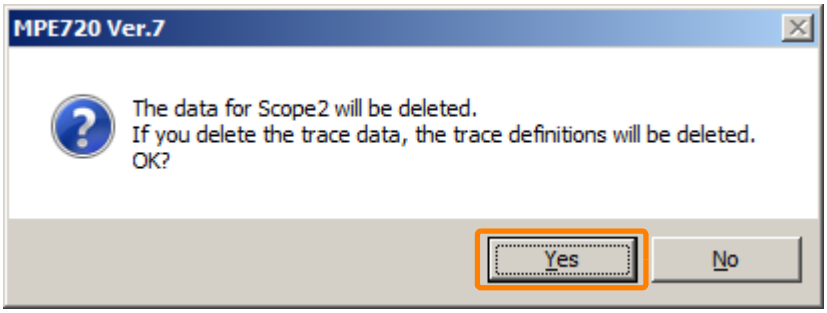


2. Right-click on the trace group whose trace definition settings you want to change, and select ***Enable/Disable Trace Settings***.

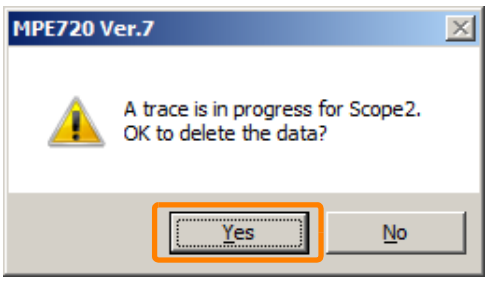


A dialog box will be displayed.

3. Read the message, and then click the **Yes** Button.



Information If the trace definition you are about to disable is executing, the following dialog box will be displayed. Click the **Yes** Button.



This concludes the procedure.

9.1.8 Scaling the Trace Data Waveform

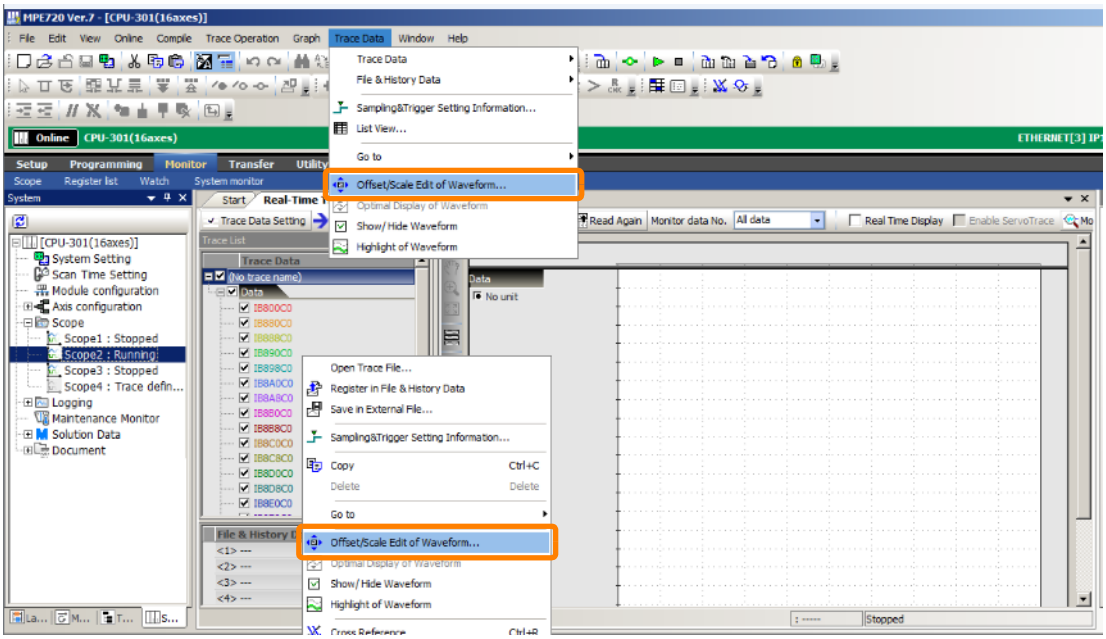
This operation is possible only with Real-Time Trace.

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.

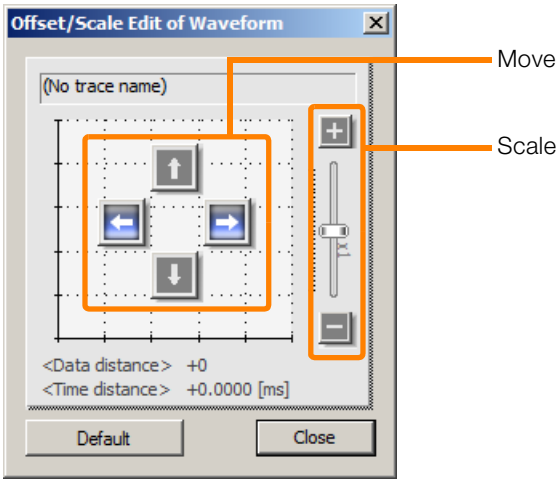
Edit trace data in the Offset/Scale Edit of Waveform Dialog Box. Use one of the following methods to display the Offset/Scale Edit of Waveform Dialog Box.

- Select ***Trace Data*** – ***Offset/Scale Edit of Waveform*** from the menu bar.
- Right-click on the register you want to edit in the **Trace Data** or **File & History Data** on the Trace List Pane, and select ***Offset/Scale Edit of Waveform*** from the pop-up menu.

Information
- When monitor data is updated, changes will be reset.
- When you click on the trace group name, all of the waveforms in the group can be edited collectively.



Move or scale the trace data waveform by using the move arrow buttons or slider in the Offset/Scale Edit of Waveform Dialog Box.



Refer to the following section for details on the Offset/Scale Edit of Waveform Dialog Box.

☞ *Offset/Scale Edit of Waveform Dialog Box* on page 9-52

9.1.9 Superimposing SERVOPACK Trace Results

This operation is possible only with Real-Time Trace and XY Trace.

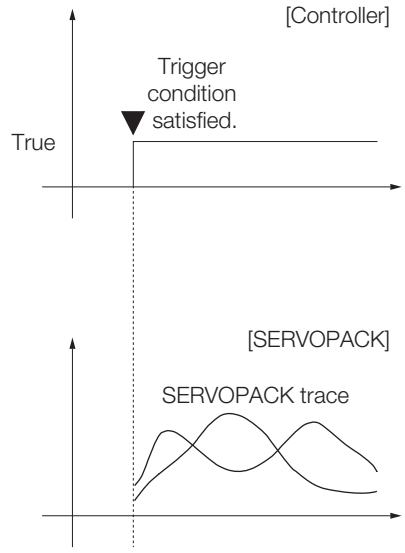
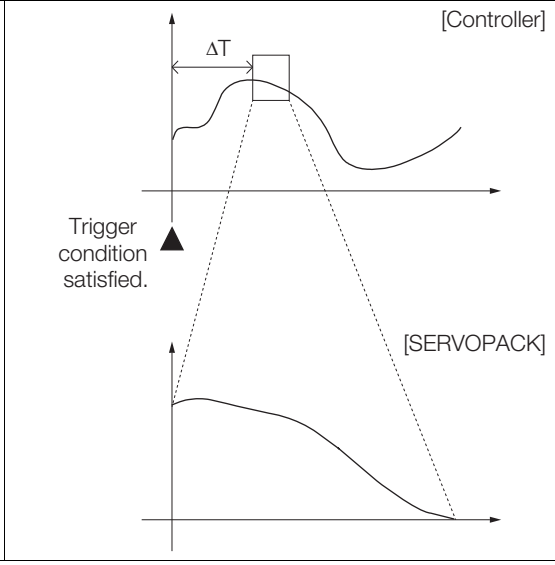
If an MP3000-series Machine Controller and a MECHATROLINK-III SERVOPACK in the Σ-7 Series or later are connected, you can superimpose the trace results for a Machine Controller trace and SERVOPACK trace for multiple axes. This section describes how to link the Machine Controller trace function and the SERVOPACK trace function.

Applications

Superimposing traces can be used for the following types of applications.

① Executing SERVOPACK traces in sync with a trigger condition on a Machine Controller

② Analyzing local behavior by repeating operation based on a trigger condition in the Machine Controller
Condition: Repeating operation, e.g., every machine cycle, based on a trigger signal

①Synchronizing Traces on a Machine Controller Trigger	②Analyzing Local Behavior by Repeating Operation
	

Execution Conditions

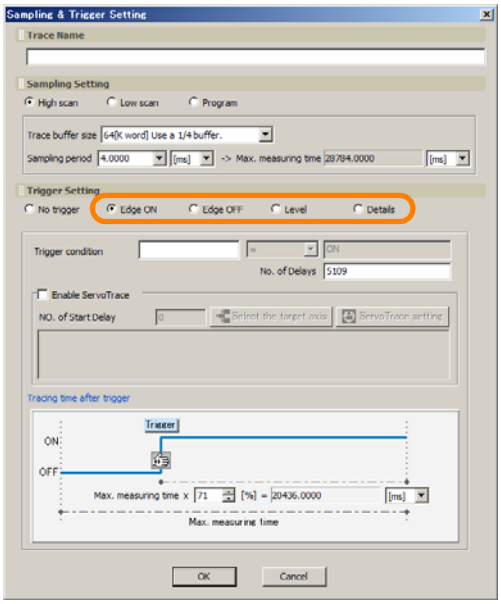
- There must be an online connection.
- The SERVOPACK for which to execute the trace must be connected and usable.
- The trace trigger must be set.
  Refer to the following section for details on the settings.
  ☞ *Trace Definition Setting Procedure* on page 9-21

Trace Definition Setting Procedure

Use the following setting procedure to link with a SERVOPACK trace.

1. Register the registers to trace for a Real-Time Trace or XY Trace.
   Refer to the following section for details.
   ☞ *9.1.3 Overview of Trace Operations* on page 9-7

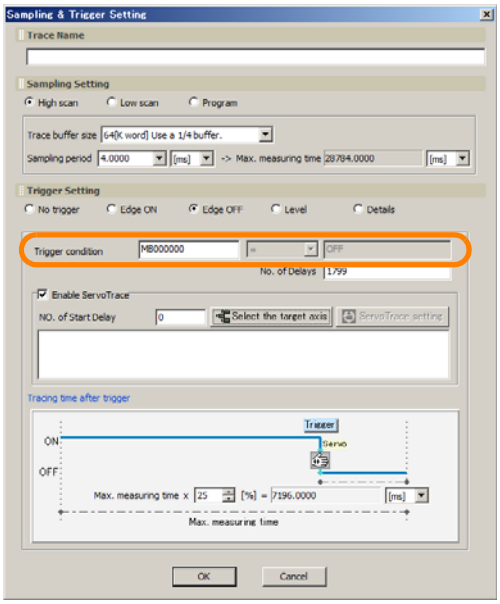
2. Select one of the following in the Sampling & Trigger Setting Dialog Box.
   - Edge ON
   - Edge OFF
   - Level
   - Details



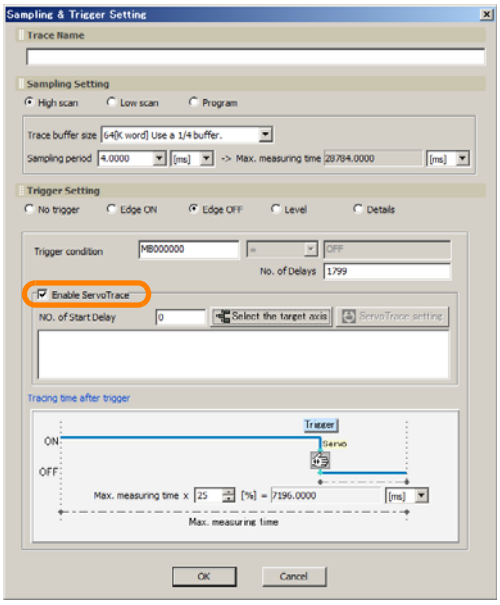
3. Set the trigger condition.

   ① Synchronizing Traces on a Machine Controller Trigger
   Set the trigger condition on which to execute a SERVOPACK trace.

   ② Analyzing Local Behavior by Repeating Operation
   Set the register to use as the starting point for repeating operation from the viewpoint of the Machine Controller, such as one operation cycle of the application.

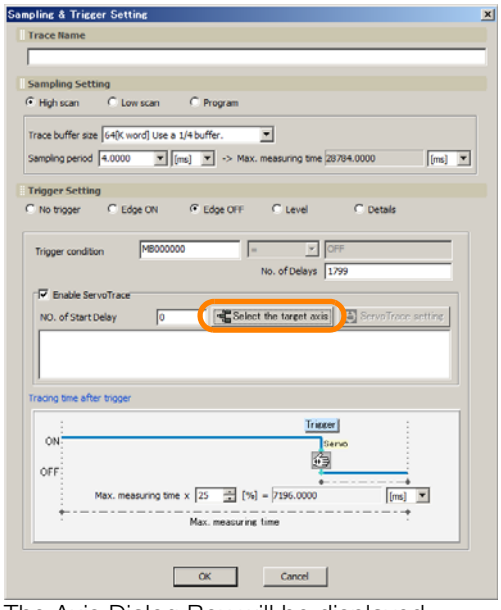


4. Select the **Enable ServoTrace** Check Box in the Sampling & Triggering Setting Dialog Box.



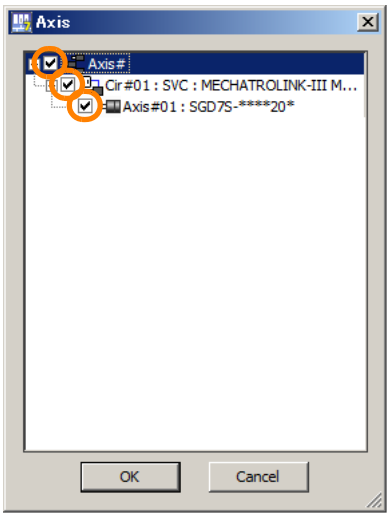
You will now be able to set the required locations.

5. Click the **Select the target axis** Button.

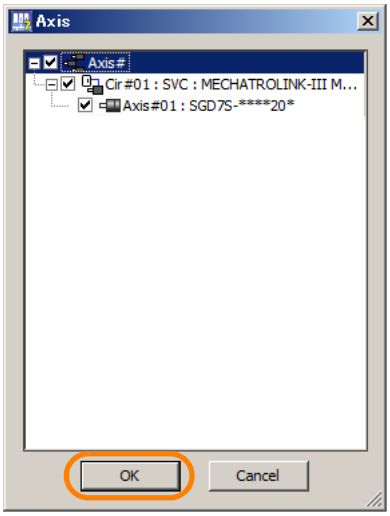


The Axis Dialog Box will be displayed.

6. Select the axis for which to perform a SERVOPACK trace in sync with the trigger condition.
You can select up to four axes.

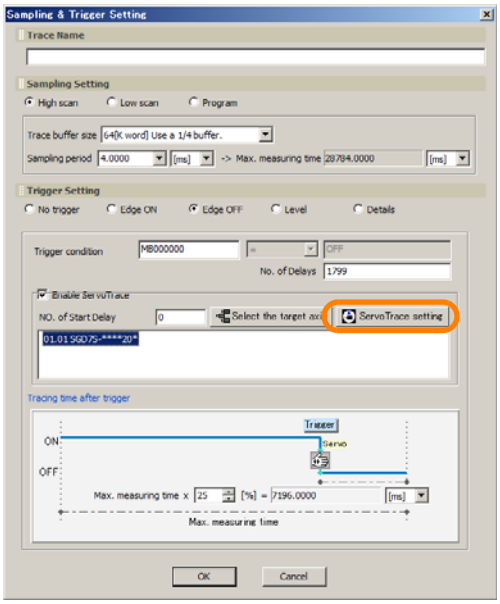


7. Click the **OK** Button.



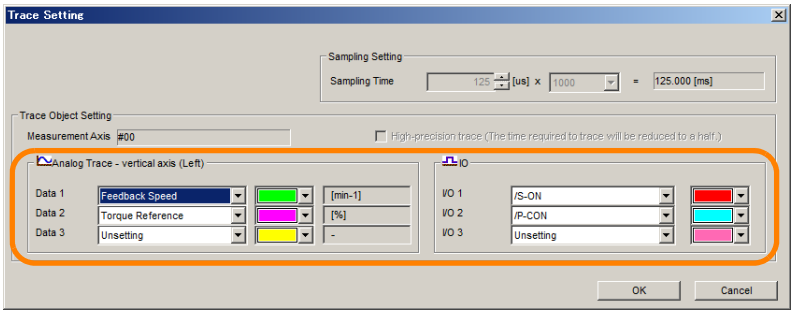
The axis settings will be applied and the Axis Dialog Box will close.

8. Click the **ServoTrace setting** Button.

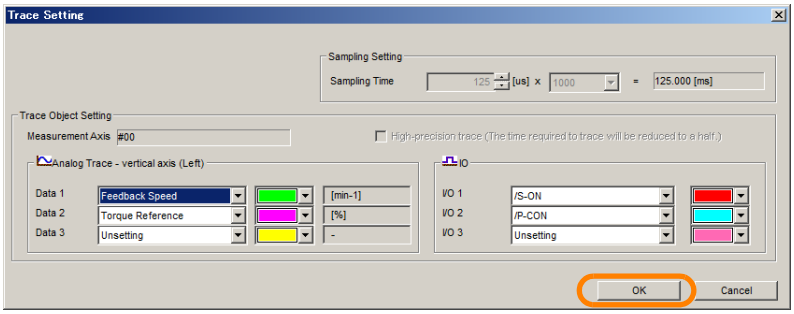


The Trace Setting Dialog Box will be displayed.

9. Set the SERVOPACK trace conditions.
Select the items to trace for the **Data 1** to **Data 3** Boxes and the **I/O 1** to **I/O 3** Boxes.
The preset trace conditions will be applied to all of the selected axes.



10. Click the **OK** Button.



The trace settings will be applied and the Trace Setting Dialog Box will close.

This concludes the procedure.

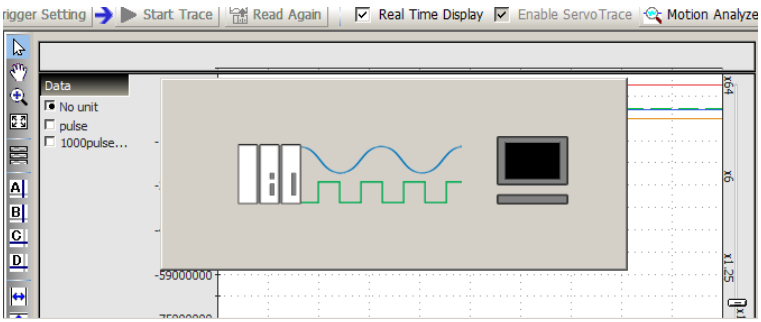
SERVOPACK Trace Execution Procedure

Use the following operating procedure to link with a SERVOPACK trace.

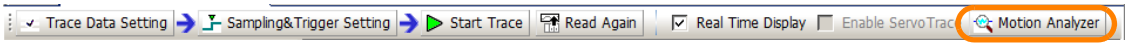
◆ Synchronizing Traces on a Machine Controller Trigger

1. Confirm that the trace definition settings have been completed.
Refer to the following section for details.
☞ *Trace Definition Setting Procedure* on page 9-21

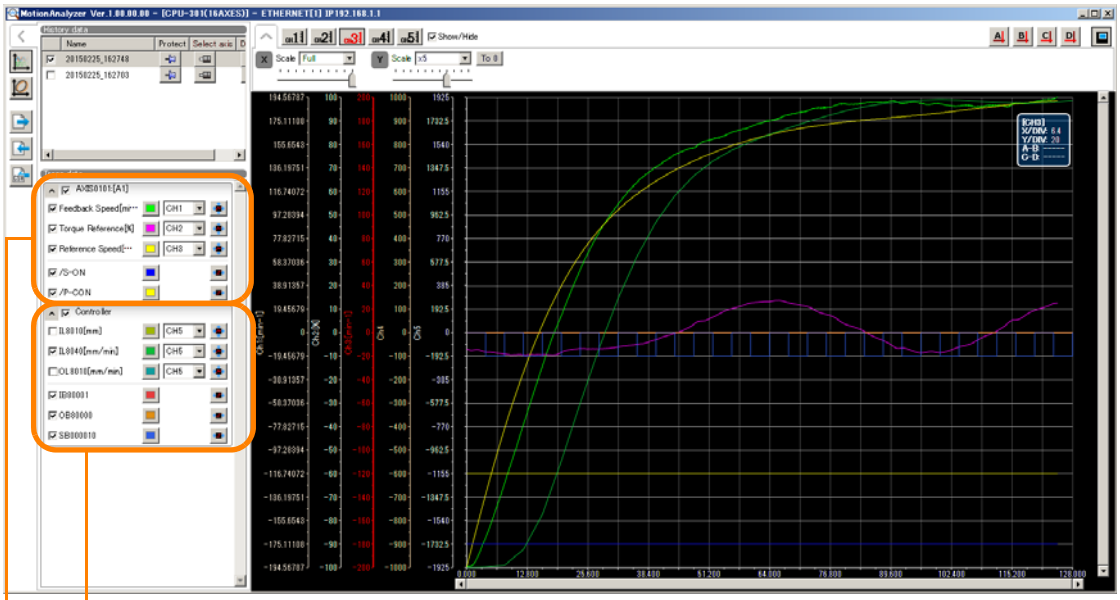
2. Click the **Start Trace** Button.
When the Machine Controller trigger condition is met, the SERVOPACK trace will be executed. When the trace is completed, the trace data will be automatically read from the Machine Controller.



3. When the data has been read, click the **Motion Analyzer** Button.



The Motion Analyzer Dialog Box will be displayed and the trace results from the Machine Controller and SERVOPACK will be superimposed on the display.



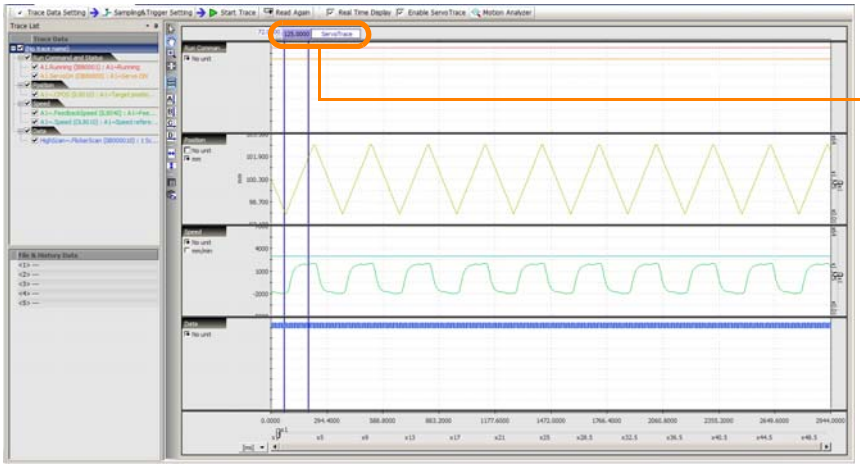
This concludes the procedure.

◆ Analyzing Local Behavior by Repeating Operation

1. Confirm that the trace definition settings have been completed.
Refer to the following section for details.
☞ *Trace Definition Setting Procedure* on page 9-21

2. Click the **Start Trace** Button.
The Machine Controller and SERVOPACK traces will be executed and the trace results will be displayed when they are completed.

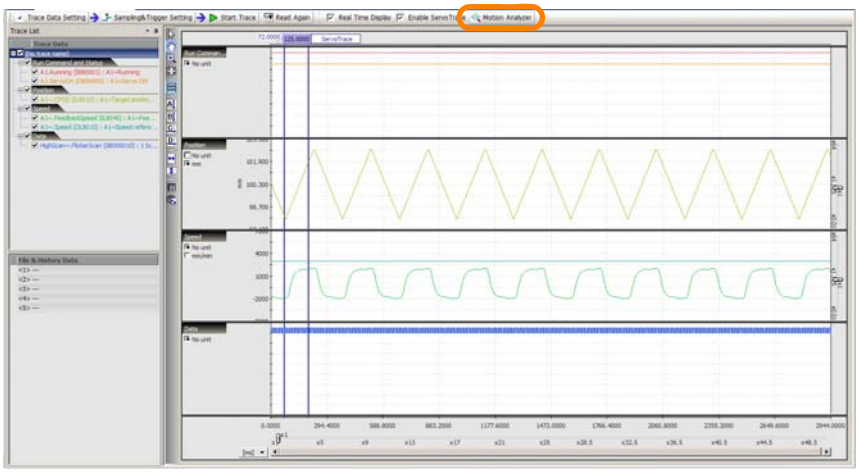
3. With the **ServoTrace** Button still selected, you can fine-tune the region of the SERVOPACK trace results by moving the cursor to the location of the desired results.



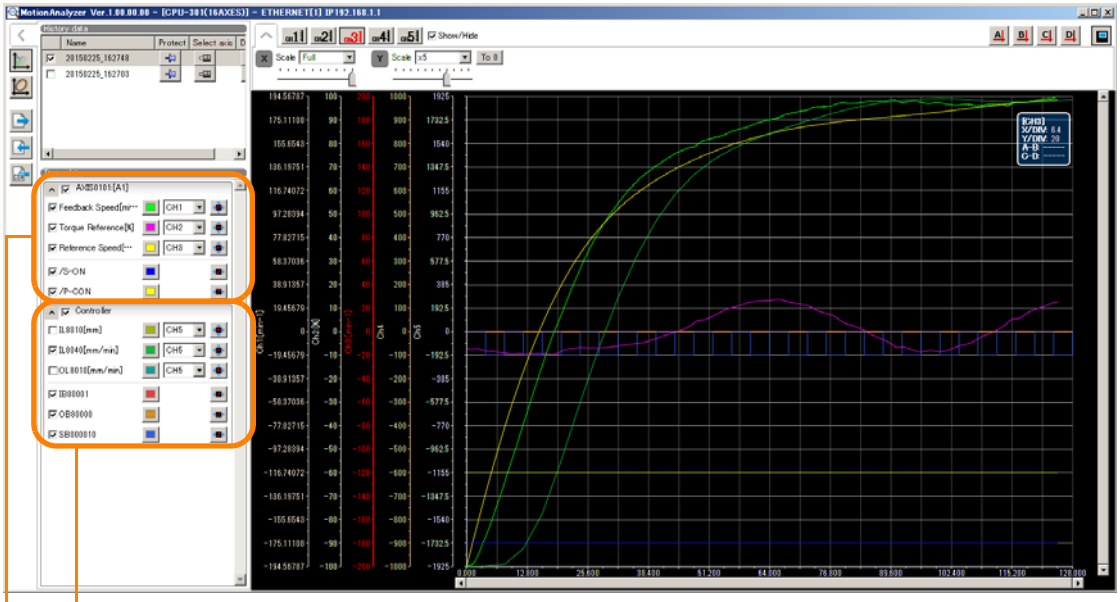
The time that is set in the **Sampling Time** Box in the Trace Setting Dialog Box is displayed.

4. Click the **Start Trace** Button.
The Machine Controller and SERVOPACK traces will be performed for the range specified in step 3.

5. Click the **Motion Analyzer** Button.



The Machine Controller and SERVOPACK trace results for the specified region will be superimposed on the display.



This concludes the procedure.

9.1.10 Analyzing Differences Between Target Values and Actual Values

Trace data can be analyzed by editing trace data or scaling waveforms.

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 ***Trace Data*** – ***Edit Trace Data*** from the menu bar. Or, right-click on **File & History Data** on the Trace List Pane, and select ***Edit Trace Data*** from the pop-up menu.
3. Using the arrow keys in the Edit Trace Data Pane, 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.

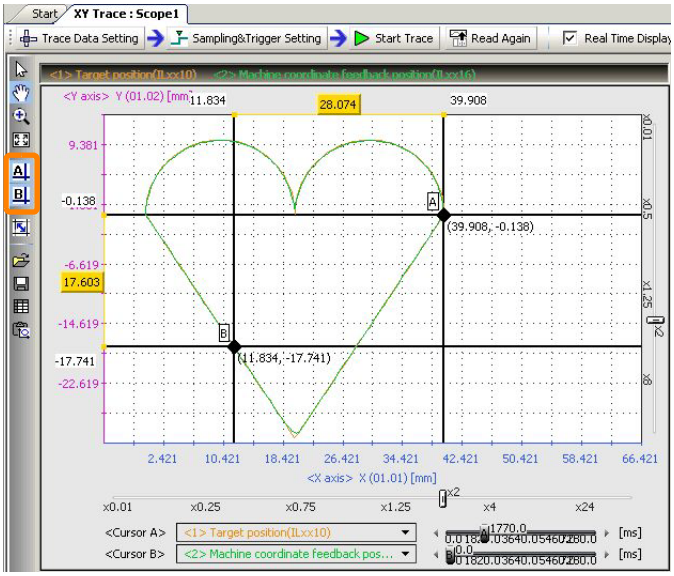
5. Analyze the difference between the waveform of the preset register and the waveform of the actually output register.

This concludes the procedure.

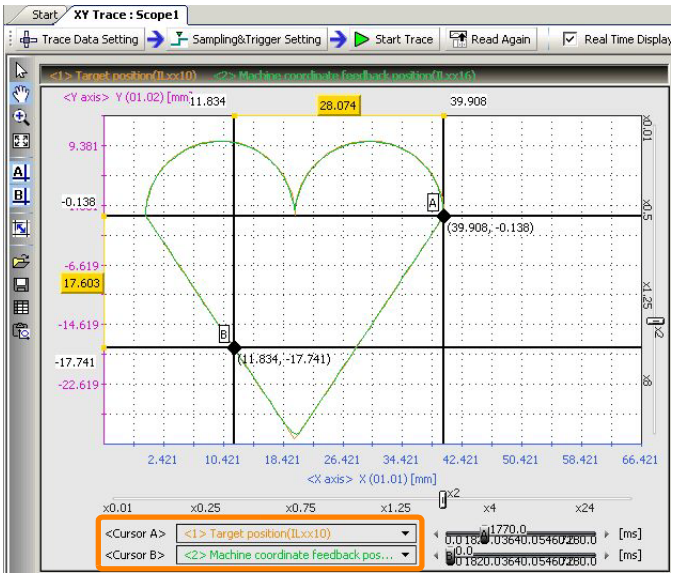
Comparing Target Position and Feedback Position

This operation is possible only with XY Trace.

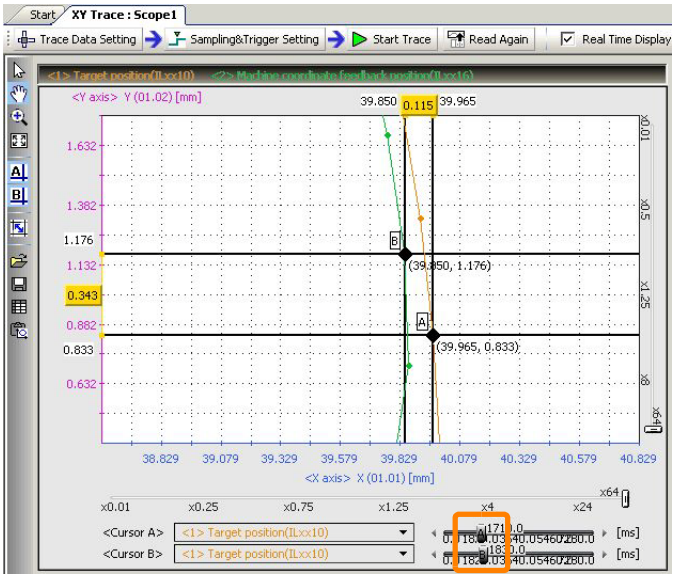
1. Click cursors A and B in the graph toolbar to display the cursor.



2. Select the target position and feedback position for cursors A and B from the Cursor Setting Drop-down List.

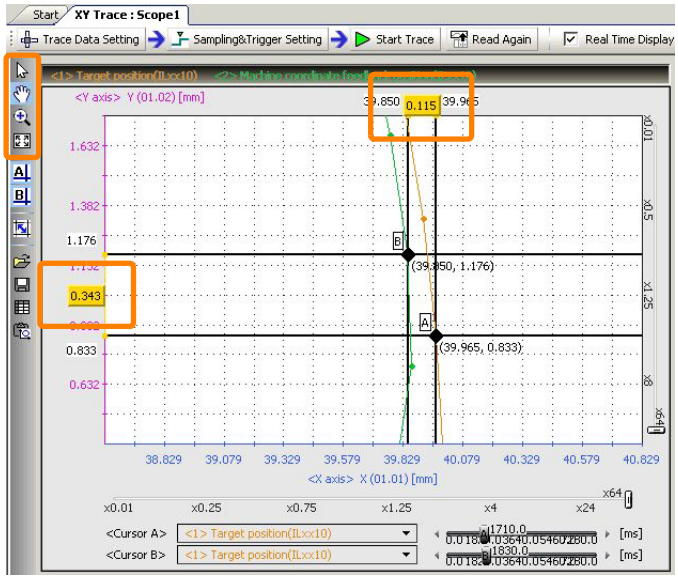


3. Align the Buffer Data Time Axis Sliders with the time to analyze.



4. Compare the difference value between the target position and feedback position.

Information The target location can be scaled by using the graph toolbar.

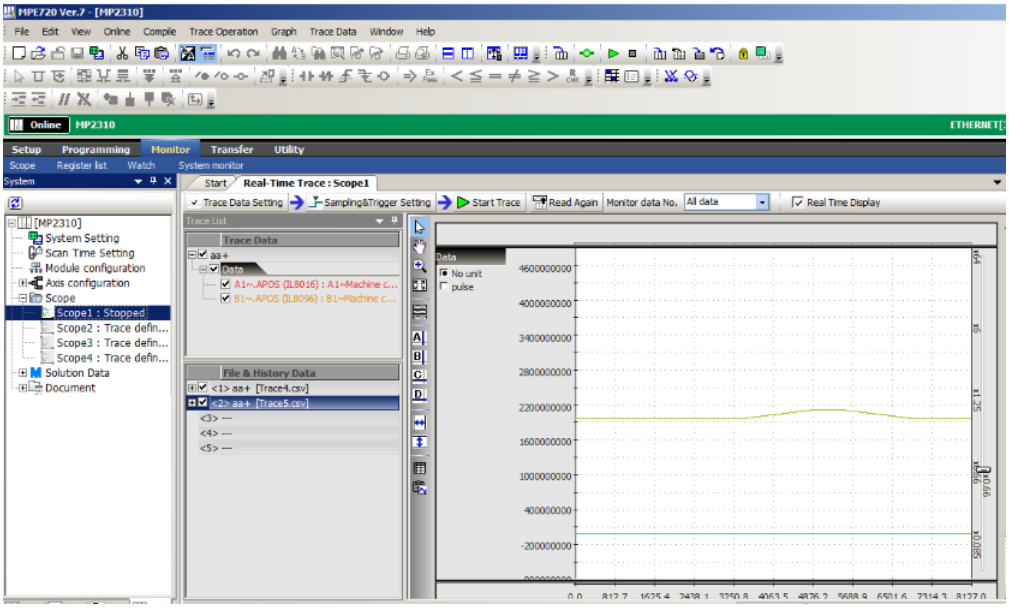


This concludes the procedure.

9.1.11 Comparing with Past Acquired Data

Compare trace data read from the Machine Controller 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.
   ☞ *9.1.16 Reading Trace Data* on page 9-36

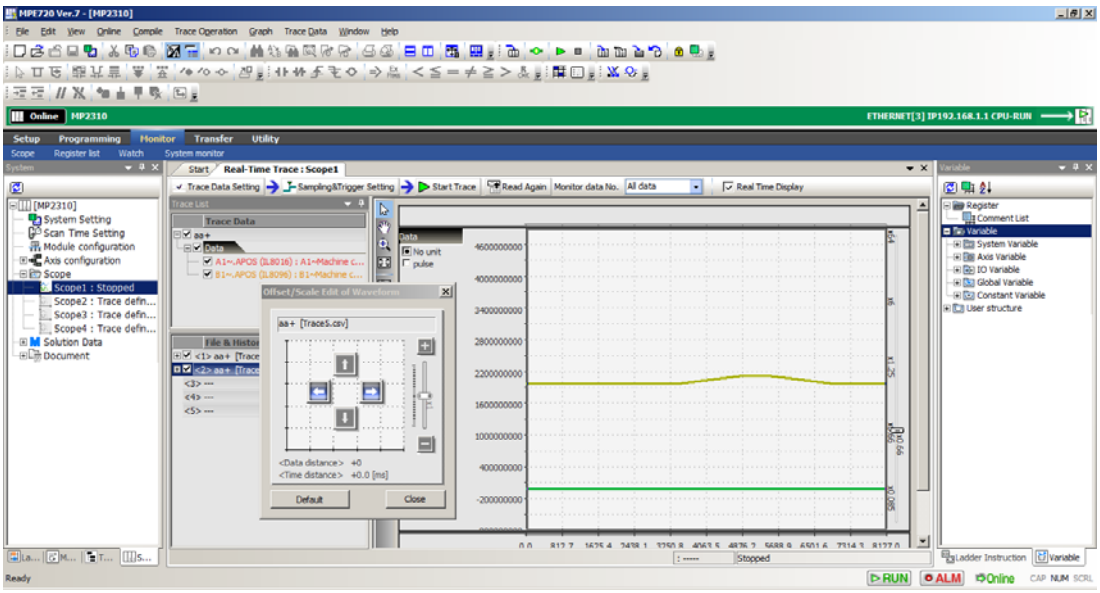


   A waveform of the trace data will be displayed.

2. Using the arrow keys in the pane, move the data start position to the desired location.

3. Select ***Trace Data*** – ***Offset/Scale Edit of Waveform*** from the menu bar. Or, right-click on **File & History Data** on the Trace List Pane, and select ***Offset/Scale Edit of Waveform*** from the pop-up menu.
   The Offset/Scale Edit of Waveform Dialog Box will be displayed.

4. Using the edit functions (scale, slider, etc.), compare with the past trace data.
   Refer to the following section for details on the Offset/Scale Edit of Waveform Dialog Box.
   ☞ *Offset/Scale Edit of Waveform Dialog Box* on page 9-52

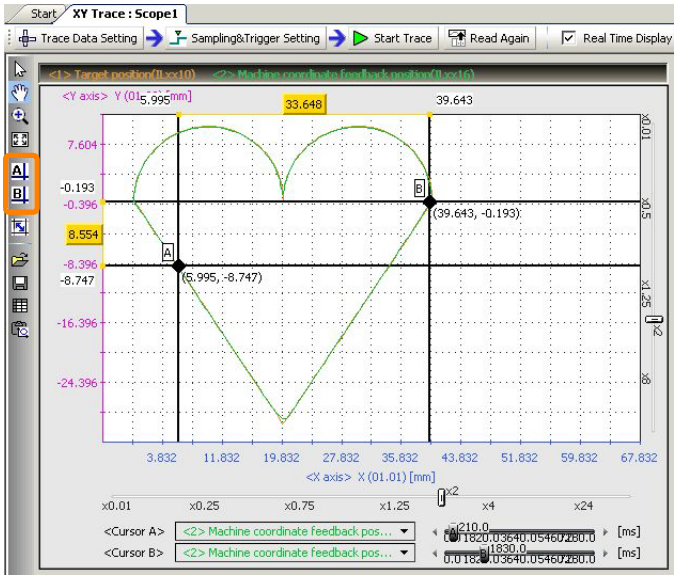


This concludes the procedure.

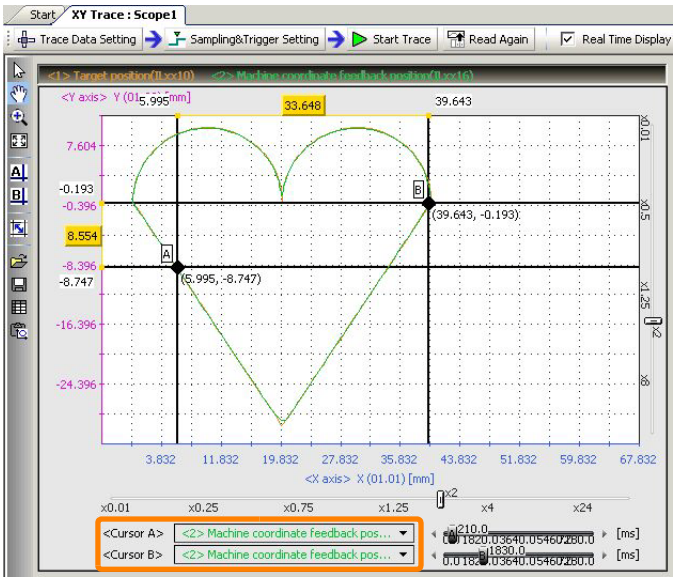
9.1.12 Measuring the Travel Time of the Axis

This operation is possible only with XY Trace.

1. Click cursors A and B in the graph toolbar to display the cursor.



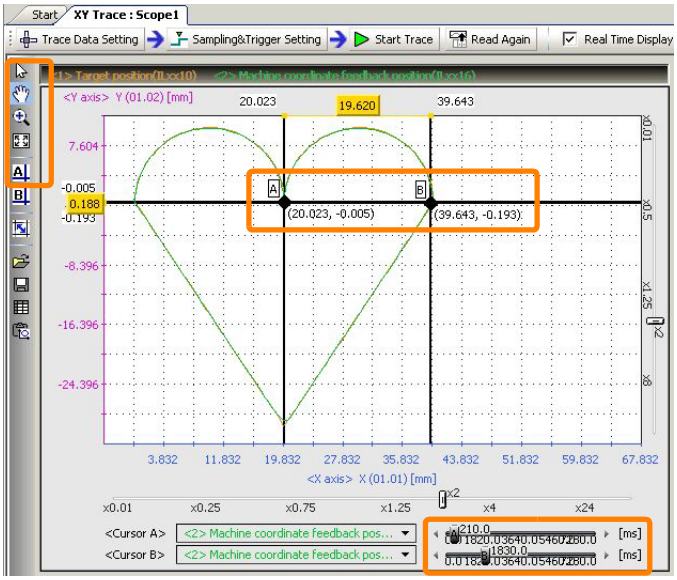
2. Set the same data to cursors A and B from the Cursor Setting Drop-down List.



3. Select the two points to measure.

4. Measure the time difference between the two points using the Time Axis Sliders.

Information The target location can be scaled by using the graph toolbar.

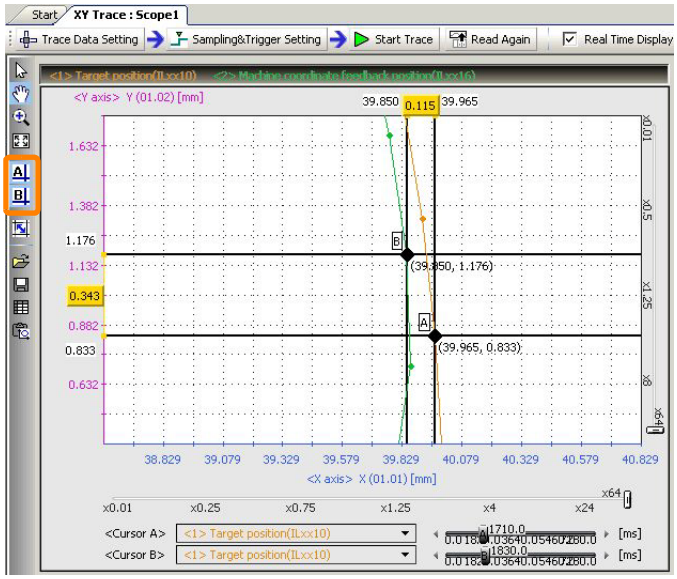


This concludes the procedure.

9.1.13 Replaying the Axis Path

This operation is possible only with XY Trace.

1. Click cursors A and B in the graph toolbar to display the cursor.



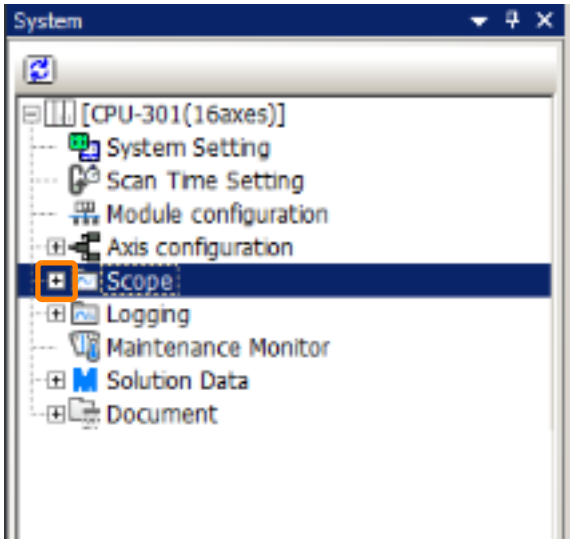
2. Select the data for cursors A and B from the Cursor Setting Drop-down List.

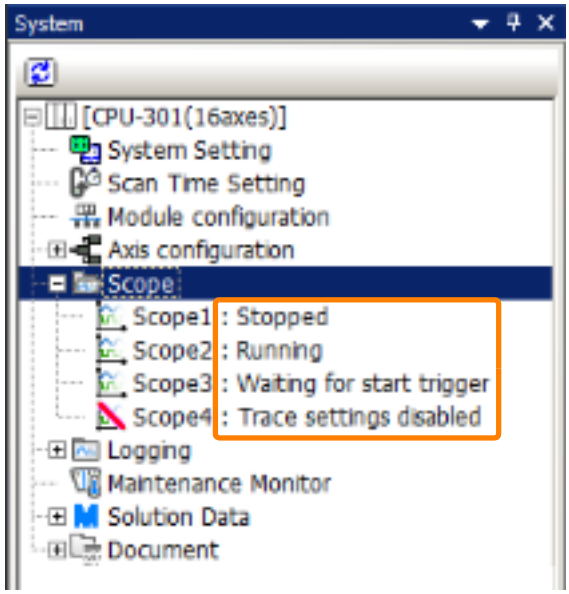
3. Move the Time Axis Slider, and analyze the axis path.

This concludes the procedure.

9.1.14 Displaying Trace Status

Trace status can be checked when the **Scope** Tree is expanded in the System Pane.





The details of the trace status display are as follows.

Connection	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 is not defined
	Trace settings disabled	State when trace definition setting is set to disabled
	Unconfirmed trace definition exists	State when trace definition during editing is present
Offline	Trace definition exists	State when trace is defined
	Trace definition does not exist	State when trace is not defined
	Trace settings disabled	State when trace definition setting is set to disabled

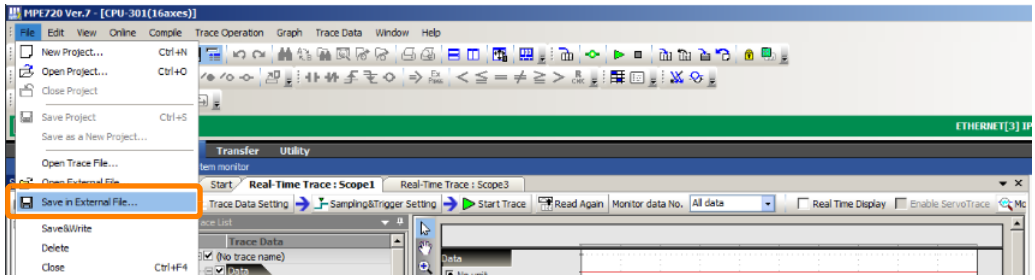
9.1.15 Saving Trace Data

Trace data saved in an external file can be analyzed later on.

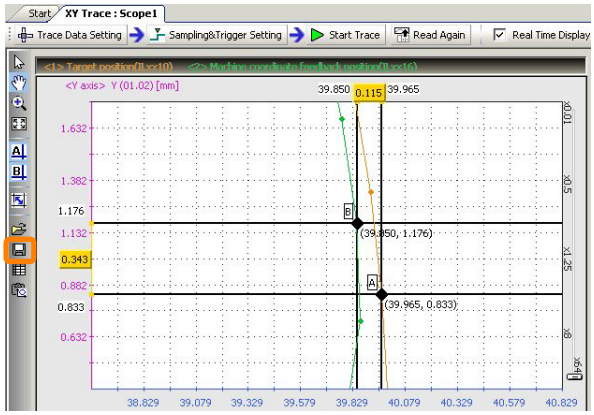
This operation is possible only with Real-Time Trace and XY Trace.

Information Trace data can also be pasted to an Excel file by displaying List and copying the trace target list.

1. With the trace data to save already displayed, select ***File*** – ***Save in External File*** from the menu bar.

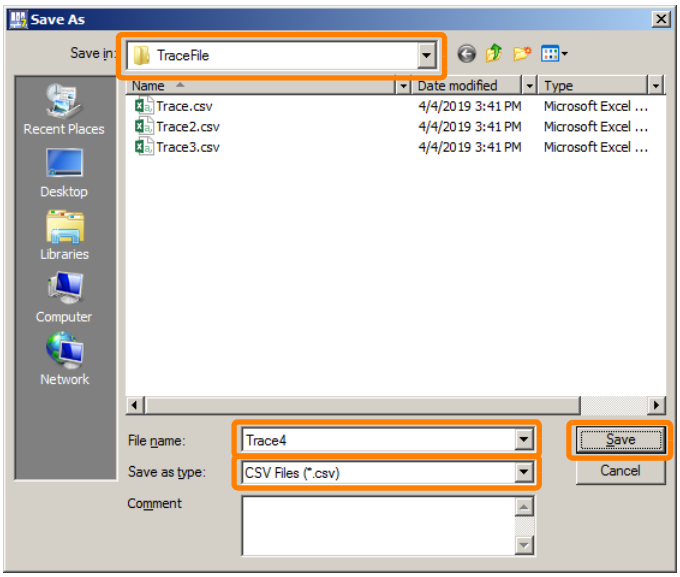


Information With XY Trace, save operations are also possible using the **Save in External File** Icon on the toolbar.



The Save As Dialog Box will be displayed.

2. Select **Save as type** and **Save in**, enter the file name at **File name**, and click the **Save** Button.



This concludes the procedure.

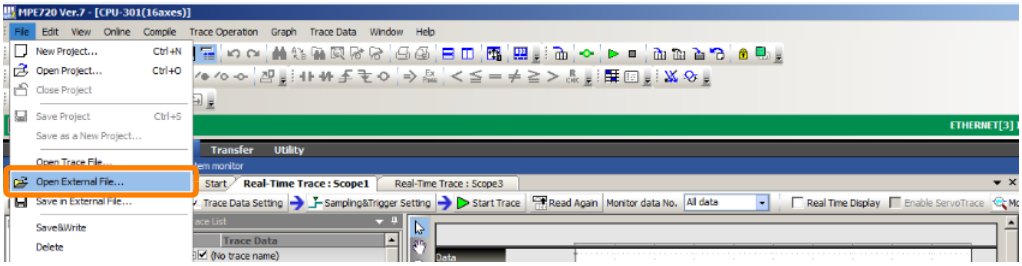
9.1.16 Reading Trace Data

Trace data saved in an external file can be read.

This operation is possible only with Real-Time Trace and XY Trace.

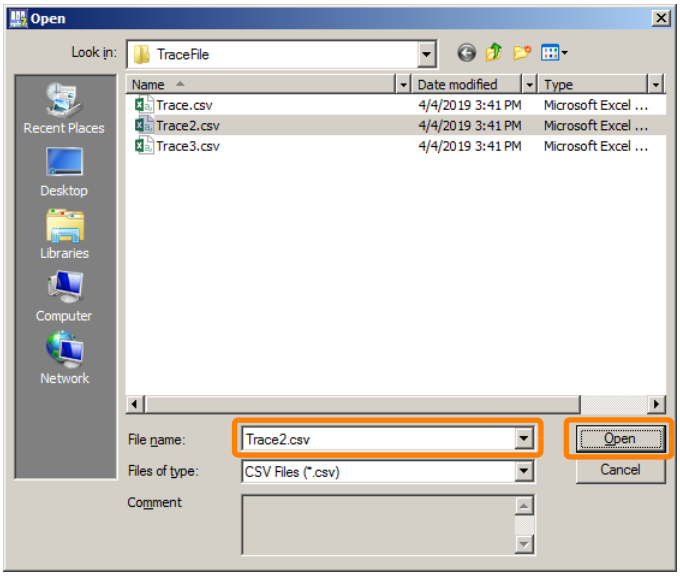
1. Select ***File*** – ***Open External File*** from the menu bar.

   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 Pane is selected.



The Open Dialog Box will be displayed.

2. Click the trace data file to read, and click the **Open** Button.



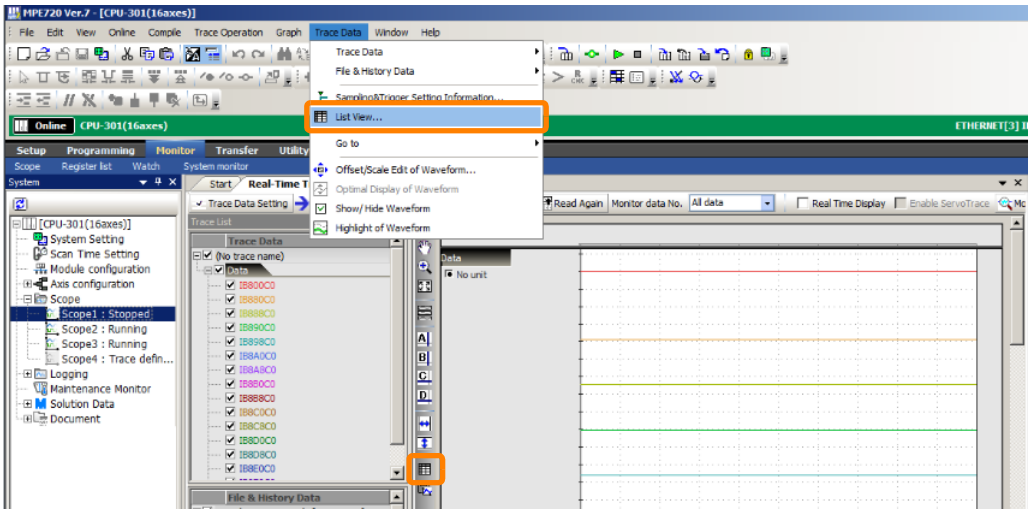
This concludes the procedure.

9.1.17 Switching Between Graph View and List View

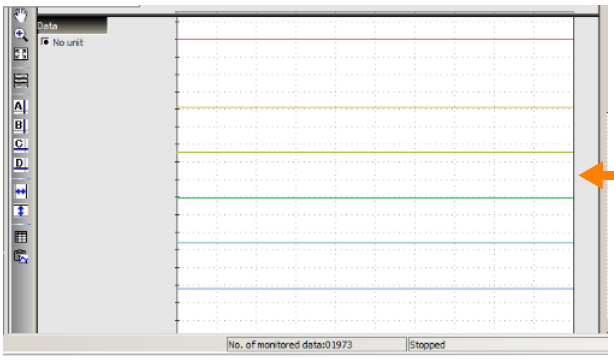
Data currently displayed as a graph can be displayed in list format. Monitor and history data also can be displayed as a list.

This operation is possible only with Real-Time Trace and XY Trace. It is also possible while tracing is being executed.

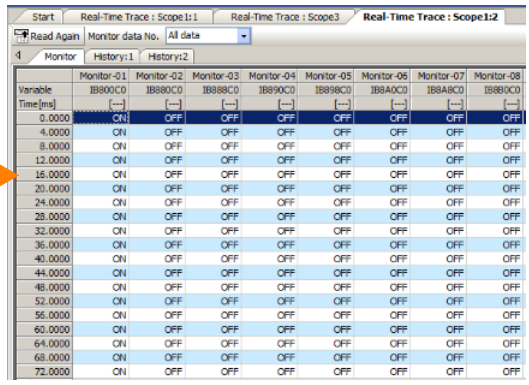
Select ***Trace Data*** – ***List View*** from the menu bar. Or, click the **List View** Icon. This allows you to switch between graph view and list view.



<Graph View>



<List View>

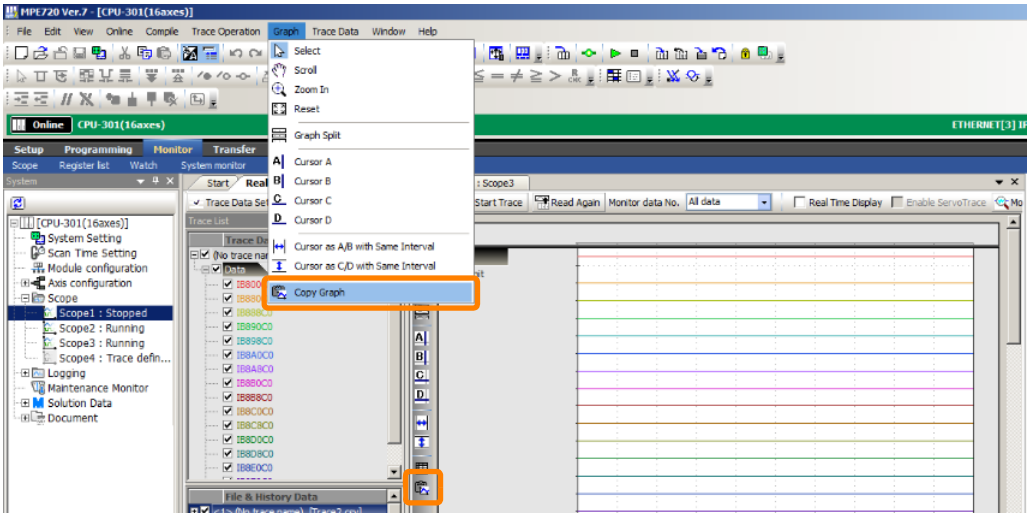


9.1.18 Copying an Image of the Graph

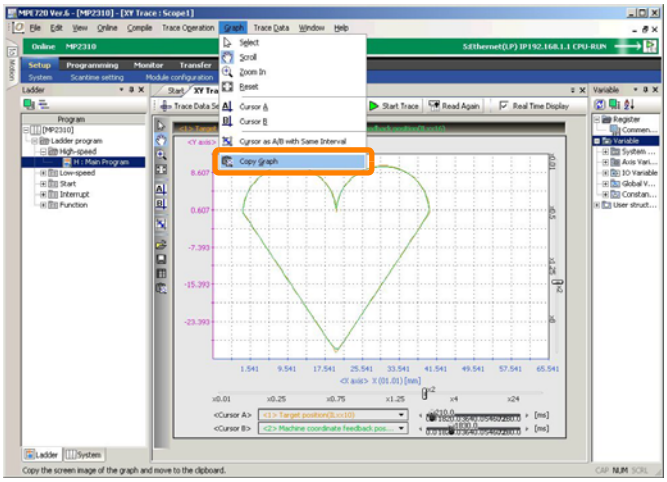
This operation is possible only with Real-Time Trace and XY Trace.

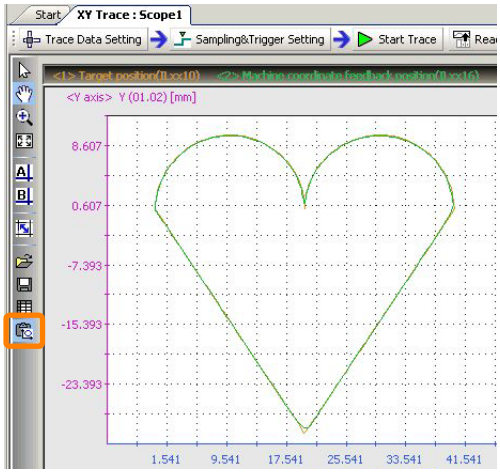
Select ***Graph*** – ***Copy Graph*** from the menu bar. Or, click **Copy Graph** Icon on the toolbar. This copies an image of the graph to the clipboard.

<Real-Time Trace>

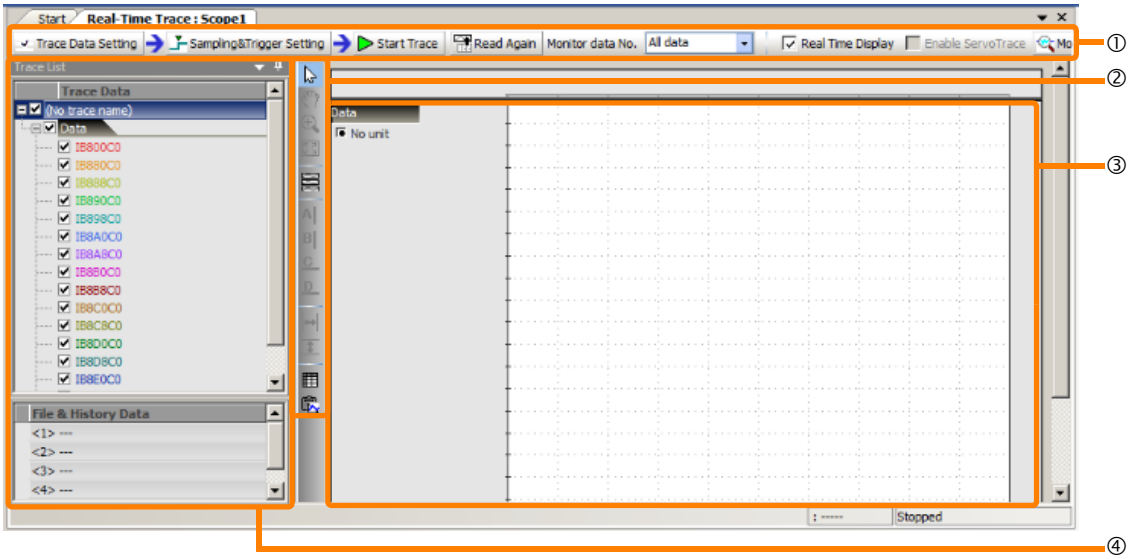


<XY Trace>





9.2 Names and Descriptions of Real-Time Trace Tab Page Components

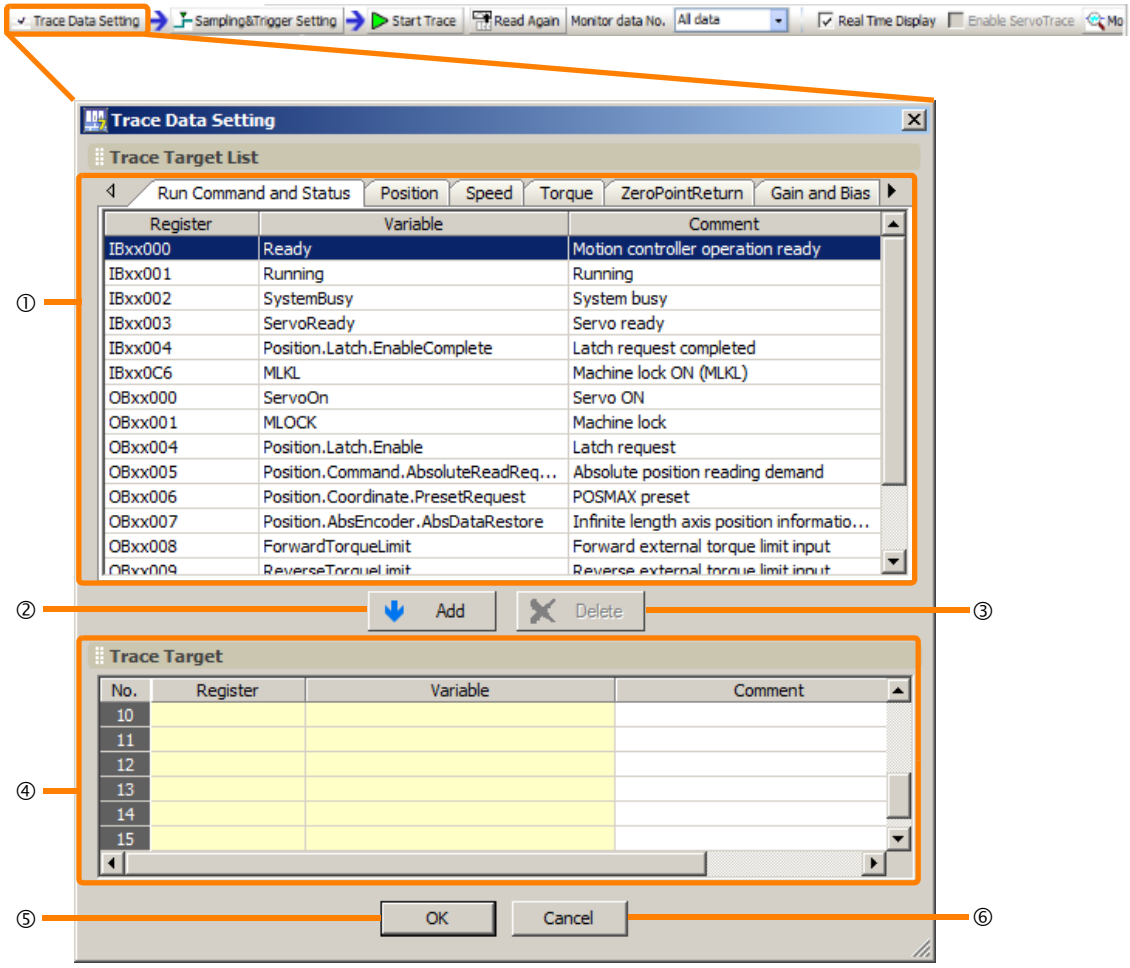


No.	Item	Description	Reference
①	Trace execution toolbar	Select the axis, set the trace data acquisition conditions, and execute trace, in that order.	☞ *9.2.1 Trace Execution Toolbar* on page 9-40
②	Graph toolbar	Groups together the buttons used for analyzing trace data.	☞ *9.2.2 Graph Toolbar* on page 9-48
③	Trend graph	Displays the trace data. The graph toolbar, sliders and cursors can be used to analyze trace data in the Real-Time Trace Tab Page.	☞ *9.2.3 Trend Graph* on page 9-49
④	Trace List Pane	Displays the trace targets, trace files and trace histories.	☞ *9.2.4 Trace List Pane* on page 9-51

9.2.1 Trace Execution Toolbar

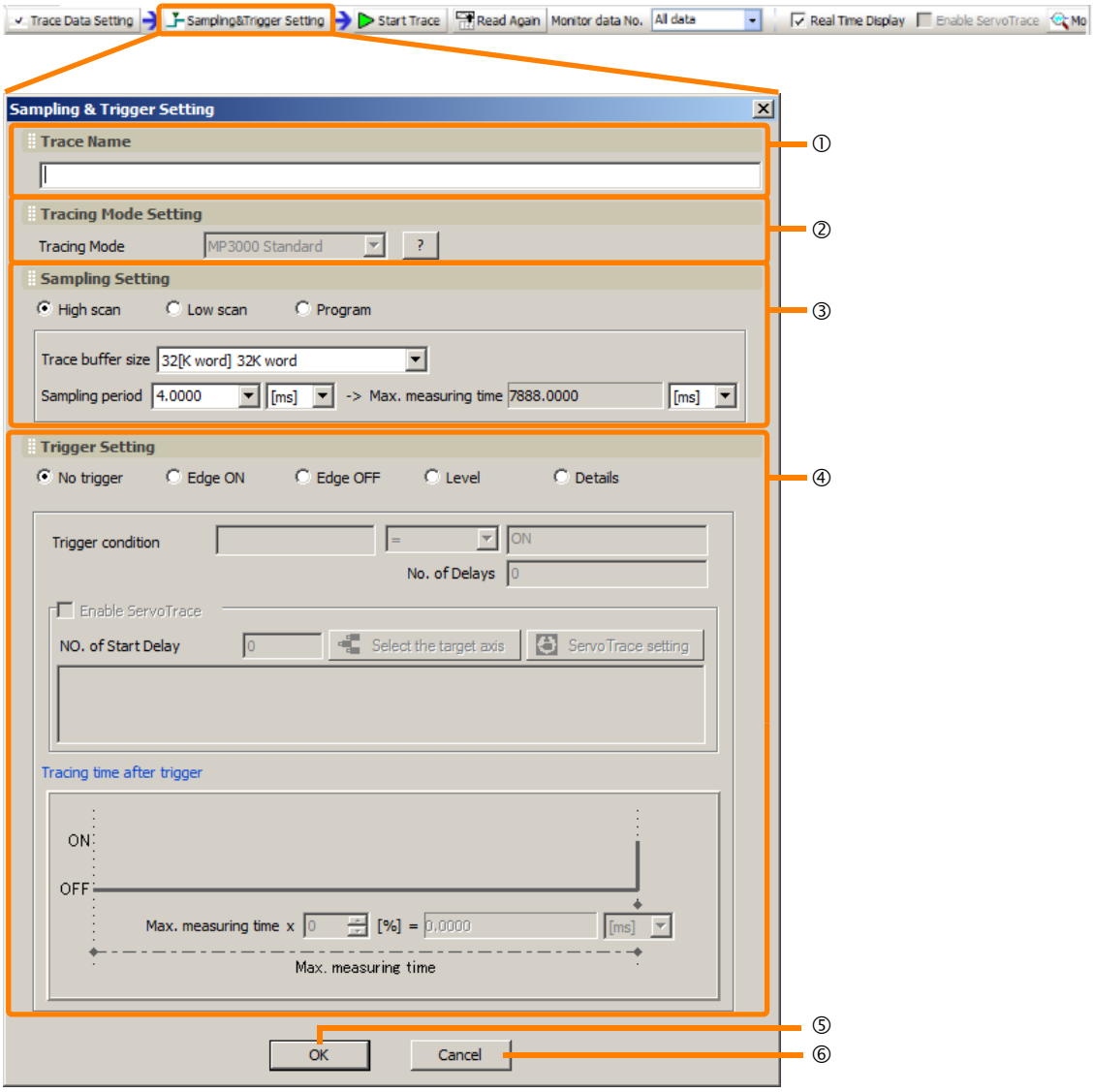
Trace Data Setting

This is for setting the trace target.



No.	Item	Description
①	Trace Target List	Displays a list of the registers that can be selected for tracing. Right-click in the Trace Target List to display the pop-up menu to select or deselect registers. ***Add to Trace***: Adds the selected register to the Trace Target List. ***Clear***: Clears the selection when multiple registers have been selected using the **Shift** or **Ctrl** Key. ***Select All***: Selects all registers shown on the tab page.
②	Add Button	Adds the selected register to the list of registers to be traced. Clicking this button displays the Axis Dialog Box. Select the check boxes for the axes to trace, and click the **OK** Button to add the selected register to the list of registers to be traced.
③	Delete Button	Removes the selected registers from the list of registers to be traced.
④	Trace Target	Displays the registers targeted for tracing. Registers can be added to this list either by selecting them from the Trace Target List or by entering them directly. Right-click in the Trace Target List to display the pop-up menu to edit the registers to be traced. ***Insert the Line***: Inserts a blank row. ***Delete the Line***: Deletes a row. If a trace target was added, then it will be deleted.
⑤	OK Button	Applies the trace target settings, and enables the **Sampling & Trigger Setting** Button.
⑥	Cancel Button	Returns to the Real-Time Trace Tab Page without applying the trace target settings.

Sampling and Trigger Settings



No.	Item	Description
①	Trace Name	A name can be registered as a comment. A text string up to 32 characters can be specified.
②	Tracing Mode Setting	Sets the tracing mode. Refer to the following section for details. ☞ ◆ *Details of Tracing Mode Setting* on page 9-42 Details of the tracing mode setting can also be checked by clicking the [**?**] Button. Models and software versions that support the tracing mode setting are shown below: • Machine Controller in the MP3000 Series: Ver. 1.30 or later • Σ-7C SERVOPACK: Ver. 1.01 or later
③	Sampling Setting	Specify the data sampling conditions. The approximate maximum measuring time will be displayed.
④	Trigger Setting	Sets the trace data acquisition method. Refer to the following section for details. ☞ ◆ *Details of Trigger Setting* on page 9-42
⑤	OK Button	Applies the sampling settings and trigger acquisition method, and enables the **Start Trace** Button.
⑥	Cancel Button	Returns to the Real-Time Trace Tab Page without applying the sampling settings and trigger acquisition method.

◆ Details of Tracing Mode Setting

The following describes the differences between trace operation according to individual tracing mode.

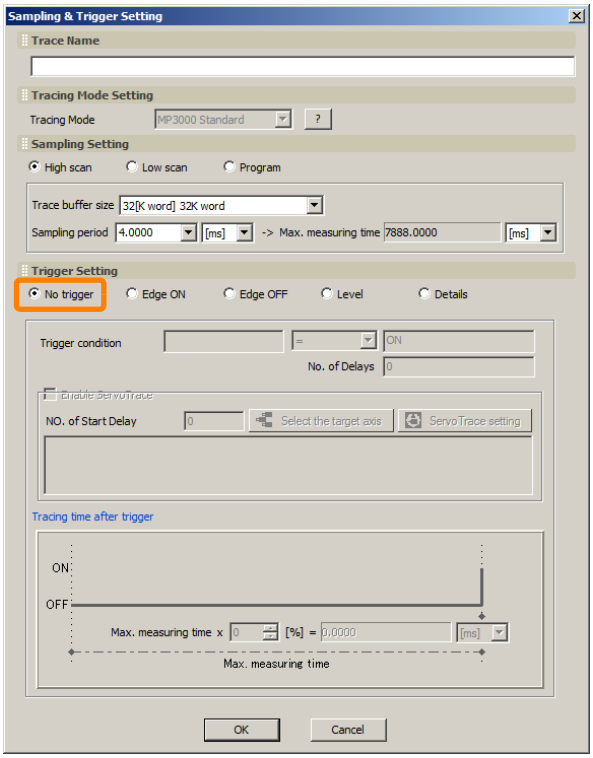
Status	Trace Operation	
	MP3000 Standard Mode	MP2000 Compatible Mode
Trace definitions have been written to the Machine Controller	Tracing is started by clicking the **Start Trace** Button.	There is no need to click the **Start Trace** Button. Tracing is performed automatically.
Trace start trigger turns 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.

◆ Details of Trigger Setting

Specify the condition at which trace is executed. There are five setting options.

■ No trigger

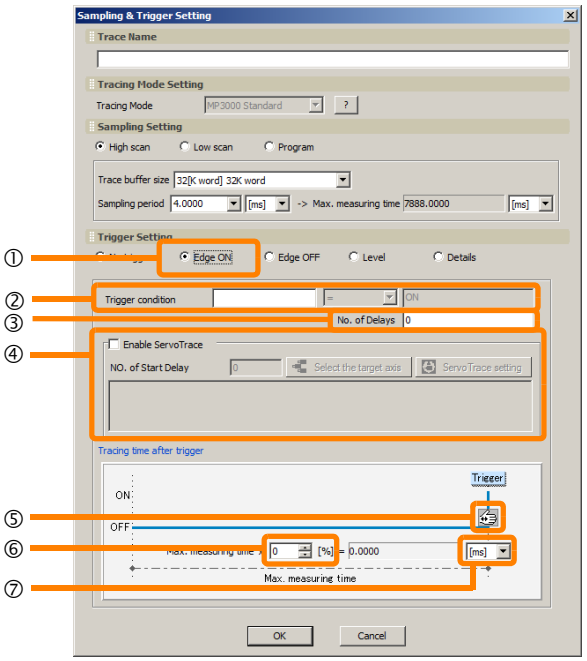
Start/stop of tracing can be performed manually.



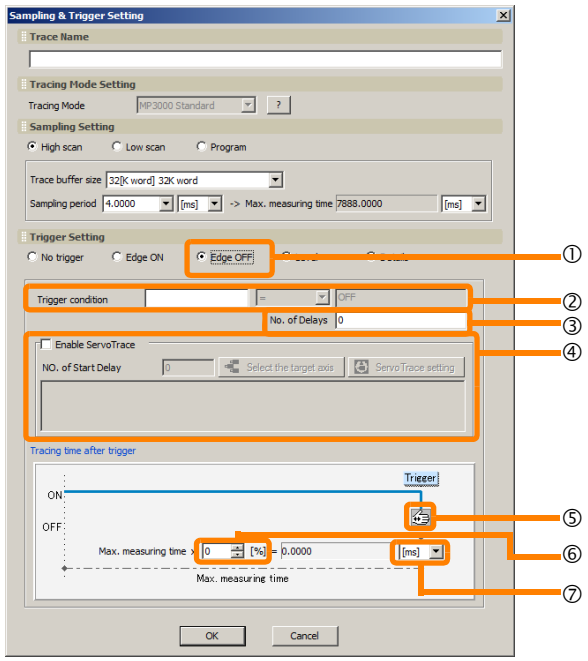
■ Edge ON/Edge OFF

When a specific bit changes state from OFF to ON or from ON to OFF, the preceding and subsequent data is acquired.

Edge ON:



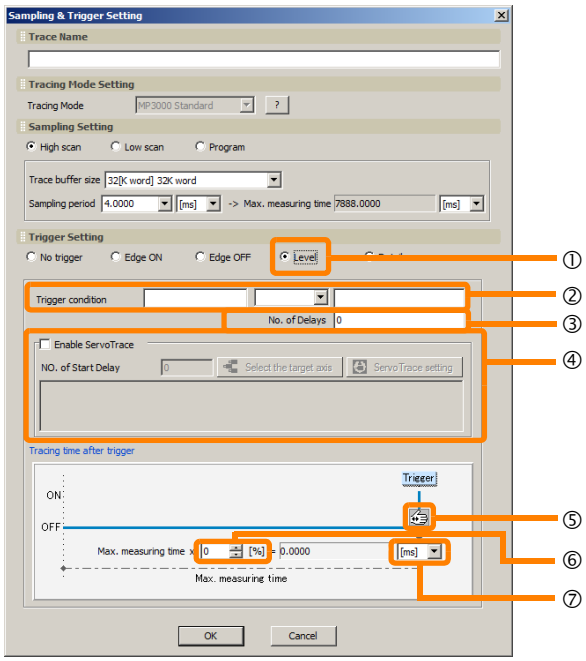
Edge OFF:



No.	Item	Description
①	Edge ON	When a specific bit changes state from OFF to ON, the preceding and subsequent data is acquired.
	Edge OFF	When a specific bit changes state from ON to OFF, the preceding and subsequent data is acquired.
②	Trigger condition: Target register	Enter the target 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.
③	No. of Delays	Specify how many times sampling is performed before the trace is stopped after the stop conditions are satisfied.
④	Enable ServoTrace No. of Start Delay Select the target axis ServoTrace setting	If an MP3000-series Machine Controller and a MECHATROLINK-III SERVOPACK in the Σ-7 Series or later are connected, you can superimpose the trace results for a Machine Controller trace and SERVOPACK trace on multiple axes for analysis. Refer to the following section for details on the settings. ☞ *9.1.9 Superimposing SERVOPACK Trace Results* on page 9-20
⑤		Drag to move this button and set the trigger position.
⑥	[%]	Select the numerical values, and set the trigger position.
⑦	Unit selection	Displays the maximum trace measuring time after a trigger condition is satisfied. Select the unit from the available options.

■ Level

When a specific register matches the trigger condition, the preceding and subsequent data is acquired.



No.	Item	Description
①	Level	When a specific register matches the trigger condition, the preceding and subsequent data is acquired.
②	Trigger condition: Target register	Enter the target register to be used as the trigger condition. 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.
	Trigger condition: Condition satisfied	Select the following operators.
	Trigger condition: Value	Enter the compared value.

Operator	Trigger generation
>	The trigger is generated when the register value is greater than the compared value.
<	The trigger is generated when the register value is less than the compared value.
=	The trigger is generated when the register value is equal to the compared value.
<>	The trigger is generated when the register value is not equal to the compared value.
>=	The trigger is generated when the register value is greater than or equal to the compared value.
<=	The trigger is generated when the register value is less than or equal to the compared value.
> (Differential)*	The trigger is generated when the register value changes from a value less than to a value greater than the compared value.
< (Differential)*	The trigger is generated when the register value changes from a value greater than to a value less than the compared value.
= (Differential)*	The trigger is generated when the register value changes from a value different from to a value equal to the compared value.
<> (Differential)*	The trigger is generated when the register value changes from a value equal to the compared value to a different value.
>= (Differential)*	The trigger is generated when the register value changes from a value less than the compared value to a value equal to or greater than the compared value.
<= (Differential)*	The trigger is generated when the register value changes from a value greater than the compared value to a value equal to or less than the compared value.

Continued on next page.

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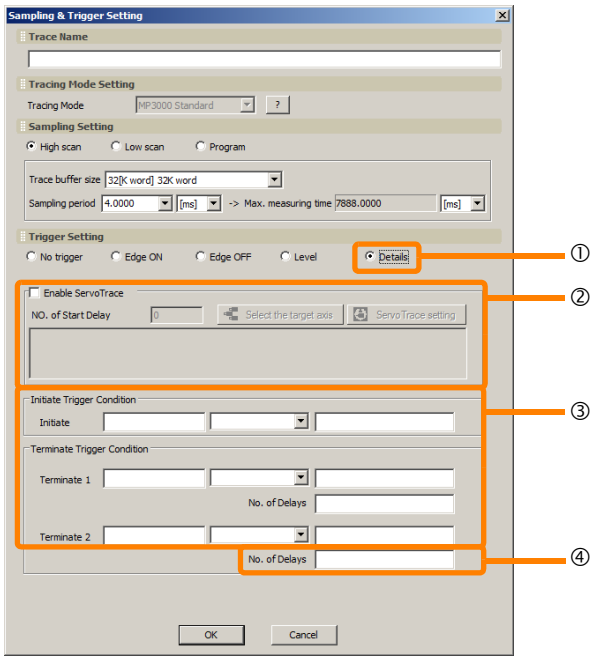
No.	Item	Description
③	No. of Delays	Specify how many times sampling is performed before the trace is stopped after the stop conditions are satisfied.
④	Enable ServoTrace No. of Start Delay Select the target axis ServoTrace setting	If an MP3000-series Machine Controller and a MECHATROLINK-III SERVOPACK in the Σ-7 Series or later are connected, you can superimpose the trace results for a Machine Controller trace and SERVOPACK trace on multiple axes for analysis. Refer to the following section for details on the settings. ☞ *9.1.9 Superimposing SERVOPACK Trace Results* on page 9-20
⑤		Drag to move this button and set the trigger position.
⑥	[%]	Select the numerical values, and set the trigger position.
⑦	Maximum trace measuring time	Select the display unit of the time. Displays the maximum trace measuring time after a trigger condition is satisfied by the display unit set here.

* Supported only by MP3000-series Machine Controllers.

■ Details

Any register set as the trigger can be traced.



No.	Item	Description
①	Details	Sets the trace method of the trigger according to any register (Bit, Word, Float, Long). Tracing can be performed by freely combining the start and stop triggers.
②	Enable ServoTrace No. of Start Delay Select the target axis ServoTrace setting	If an MP3000-series Machine Controller and a MECHATROLINK-III SERVOPACK in the Σ-7 Series or later are connected, you can superimpose the trace results for a Machine Controller trace and SERVOPACK trace on multiple axes for analysis. Refer to the following section for details on the settings. ☞ *9.1.9 Superimposing SERVOPACK Trace Results* on page 9-20

Continued on next page.

Continued from previous page.

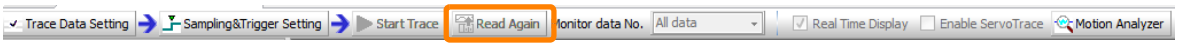
<table>
<tr><th>No.</th><th>Item</th><th>Description</th></tr>
<tr><td rowspan="3">③</td><td>Initiate Trigger Condition: Target register</td><td rowspan="2">Enter the target register to be used as the trigger condition.
Only registers having the data type bit (B), integer (W), real number (F), and double-length 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.</td></tr>
<tr><td>Terminate Trigger Condition: Target register</td></tr>
<tr><td>Trigger condition: Condition satisfied</td><td>Select the following operators.
<table>
<tr><th>Operator</th><th>Trigger generation</th></tr>
<tr><td>></td><td>The trigger is generated when the register value is greater than the compared value.</td></tr>
<tr><td><</td><td>The trigger is generated when the register value is less than the compared value.</td></tr>
<tr><td>=</td><td>The trigger is generated when the register value is equal to the compared value.</td></tr>
<tr><td><></td><td>The trigger is generated when the register value is not equal to the compared value.</td></tr>
<tr><td>>=</td><td>The trigger is generated when the register value is greater than or equal to the compared value.</td></tr>
<tr><td><=</td><td>The trigger is generated when the register value is less than or equal to the compared value.</td></tr>
<tr><td>> (Differential)*</td><td>The trigger is generated when the register value changes from a value less than to a value greater than the compared value.</td></tr>
<tr><td>< (Differential)*</td><td>The trigger is generated when the register value changes from a value greater than to a value less than the compared value.</td></tr>
<tr><td>= (Differential)*</td><td>The trigger is generated when the register value changes from a value different from to a value equal to the compared value.</td></tr>
<tr><td><> (Differential)*</td><td>The trigger is generated when the register value changes from a value equal to the compared value to a different value.</td></tr>
<tr><td>>= (Differential)*</td><td>The trigger is generated when the register value changes from a value less than the compared value to a value equal to or greater than the compared value.</td></tr>
<tr><td><= (Differential)*</td><td>The trigger is generated when the register value changes from a value greater than the compared value to a value equal to or less than the compared value.</td></tr>
</table></td></tr>
<tr><td></td><td>Value</td><td>Enter the compared value.</td></tr>
<tr><td>④</td><td>No. of Delays</td><td>Specify how many times sampling is performed before the trace is stopped after the stop conditions are satisfied.</td></tr>
</table>

* Supported only by MP3000-series Machine Controllers.

Start Trace/Stop Trace/Real Time Display

Function	Description
Start Trace	Starts the trace. The trace data is acquired and displayed in real time. Tracing cannot be started when **Program** is selected at Sampling Setting in the Sampling & Trigger Setting Dialog Box. Only **Read Again** is possible.
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.
Stop Trace	Stops the trace. When the trace is stopped, the buffer data of all traces is acquired and displayed.

Read Again

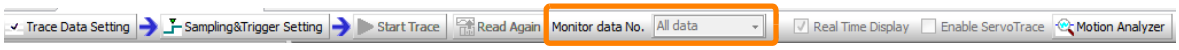


Clicking this button re-reads the trace data in the Machine Controller.

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.

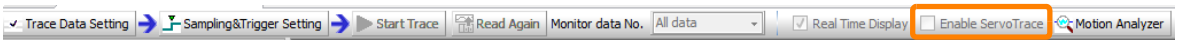
Monitor Data No.



The number of trace data to acquire from the Machine Controller can be set.

The actual number of acquired trace data is displayed at the bottom right of the trend graph.

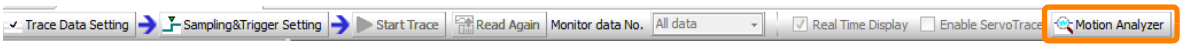
Enable ServoTrace



Enables the ServoTrace function. Refer to the following section for details on the settings.

☞ *9.1.9 Superimposing SERVOPACK Trace Results* on page 9-20

Motion Analyzer



Starts up the Motion Analyzer Window. Refer to the following section for details on the settings.

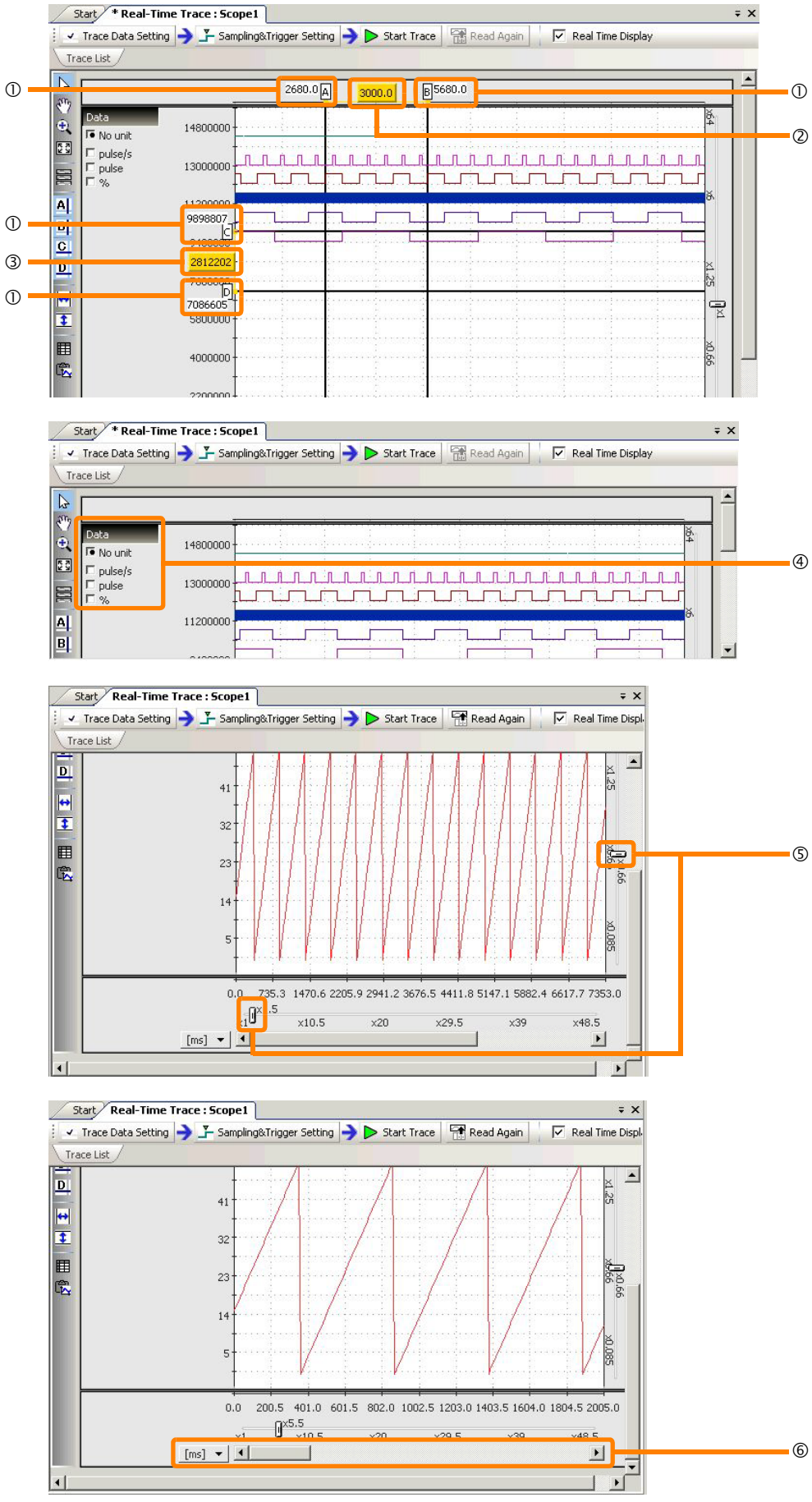
☞ *9.1.9 Superimposing SERVOPACK Trace Results* on page 9-20

9.2.2 Graph Toolbar

The functions of each icon are as follows.

Icon	Function
	Clicking the **Select** Icon and double-clicking the target location allows you to zoom in on the selected location.
	Clicking the **Scroll** Icon allows you to move the target location. Double-clicking the desired location allows you to zoom in on the selected location.
	Clicking the **Zoom In** Icon and dragging or double-clicking the target location allows you to zoom in on the selected location.
	Clicking the **Reset** Icon allows you to restore the graph to its original size.
	Clicking the **Split Graph Split** Icon displays the graph split into sections.
	Clicking the **Cursor A** Icon displays cursor A and the value at the intersecting point on the graph.
	Clicking the **Cursor B** Icon displays cursor B and the value at the intersecting point on the graph.
	Clicking the **Cursor C** Icon displays cursor C and the value at the intersecting point on the graph.
	Clicking the **Cursor D** Icon displays cursor D and the value at the intersecting point on the graph.
	Clicking the **Cursor as A/B with Same Interval** Icon causes cursors A and B to move at a fixed width interlocked with each other.
	Clicking the **Cursor as C/D with Same Interval** Icon causes cursors C and D to move at a fixed width interlocked with each other.
	Clicking the **List View** Icon displays the list.
	Clicking the **Copy Graph** Icon copies an image of the graph to the clipboard.

9.2.3 Trend Graph



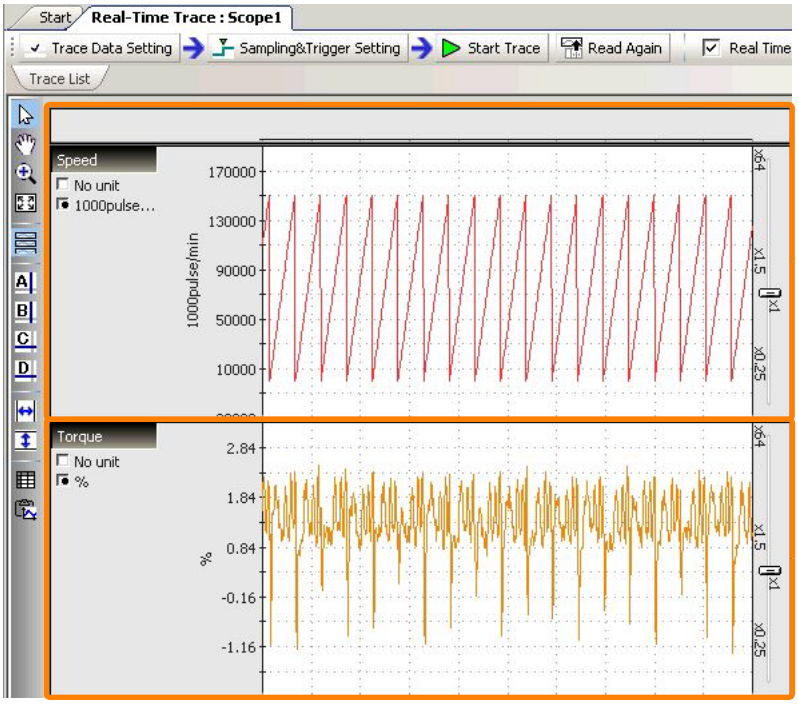
No.	Display	Function
①		Displays the value on the cursor position.
②	–	Displays the difference in values between the A and B cursor positions.
③	–	Displays the difference in values between the C and D cursor positions.
④	Graph unit	The unit of the parameter selected in the Trace Target List of the Trace Data Setting Dialog Box will be 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. • The unit that can be selected differs according to the information held by the axis. • The unit can be switched regardless of how the graph is displayed (single display, split display). 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	Sliders	Dragging the **Rescale** Sliders and moving the graph 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
⑥	Scroll	Scroll left and right to display parts of the graph that are hidden off screen.

Graph Split View

The trace data waveform on the graph can be grouped by category of trace target, and a single graph can be prepared for each category group so that the group can be displayed in each split section of the graph display.

Trace targets are categorized by groups on the Trace Target List Area tabs of the Trace Data Setting Dialog Box and by other groups of registers.

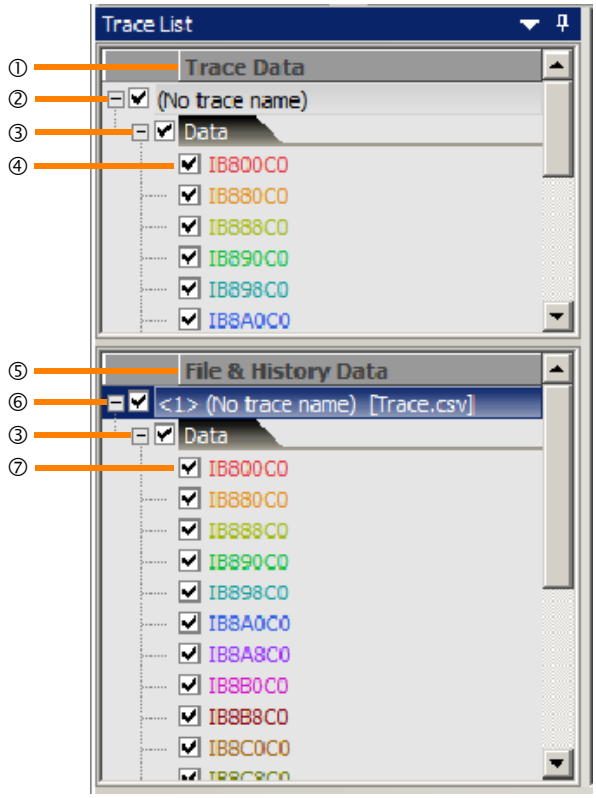
The graph can be switched between single display and split display.



9.2.4 Trace List Pane

Measured trace targets, trace targets read from external files and trace targets of past data are displayed.

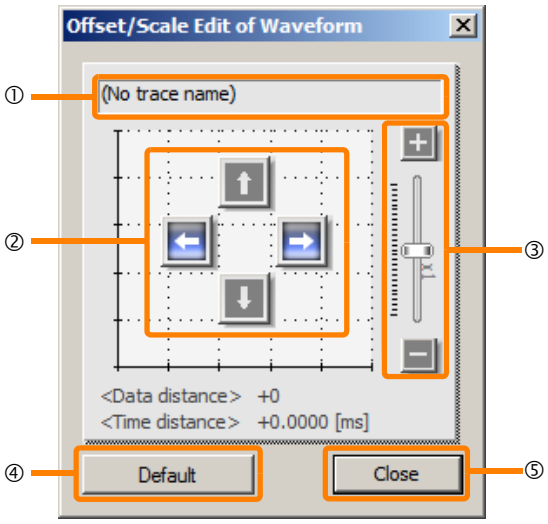
Waveforms on the graphs of trace targets can be displayed or hidden by selecting or deselecting respective check boxes.



No.	Display	Function
①	Trace Data	Displays the trace data of measured trace targets.
②	Trace Name	Displays the trace name.
③	Trace Group Name	Trace data is displayed categorized by groups on the Trace Target List Area tabs of the Trace Data Setting Dialog Box (example: position, speed) and by other “Data” groups.
④	Registers	Displays the registers of measured trace targets. Registers are displayed in the same color as the graph.
⑤	File & History Data	Displays the trace targets registered from Trace Data Area and the trace data of trace targets read from external files.
⑥	Trace Name	Displays the trace targets registered from Trace Data Area and the trace name of trace targets read from external files. Up to five traces can be backed up to **File & History Data**.
⑦	Registers	Displays the trace targets registered from Trace Data Area and the registers of trace targets read from external files. Registers are displayed in the same color as the graph.

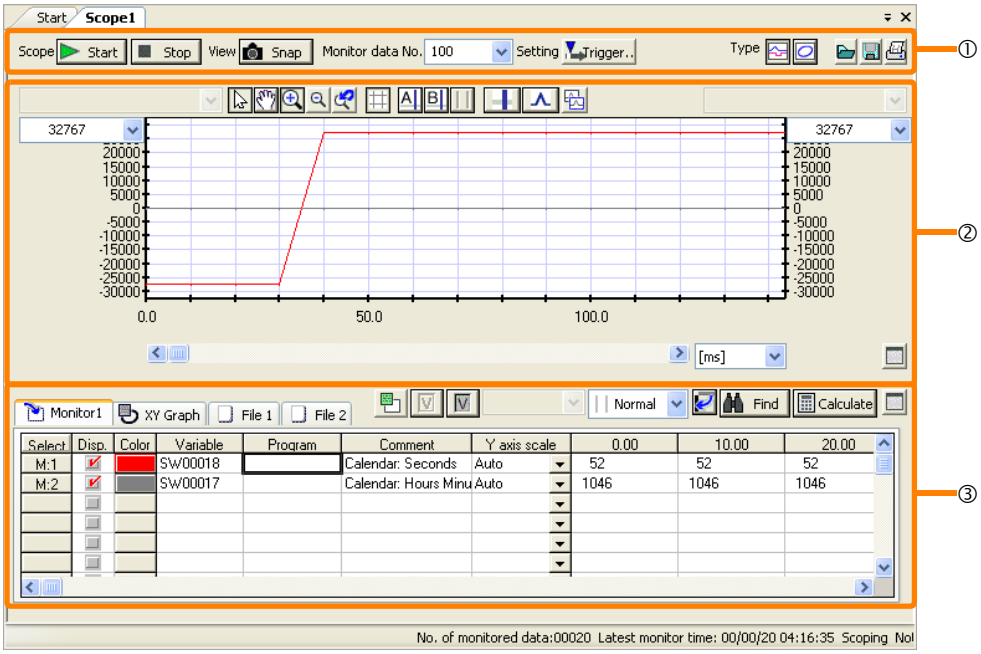
9.2.5 Other

Offset/Scale Edit of Waveform Dialog Box



No.	Display	Function
①	Trace Name	Displays the trace name and file name.
②	Offset Move Buttons	Move the waveform of the specified trace target up, down, left and right.
③	Scale Adjustment Slider	Scales the data amplitude of the specified trace target.
④	Default Button	Restores the trace data to its default after editing.
⑤	Close Button	Closes the dialog box.

9.3 Names and Descriptions of the Trace Manager Tab Page Components



No.	Item	Description	Reference
①	Control Panel Area	Used for starting/stopping traces, setting triggers, etc., and for executing general operations relating to the data tracing. This area is displayed at all times regardless of the graph or list view mode.	☞ *9.3.1 Control Panel* on page 9-54
②	Graph Area	Displays the trace data. 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.	☞ *9.3.2 Graph Area* on page 9-56
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.	☞ *9.3.3 List Area* on page 9-62

Term

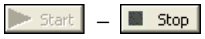
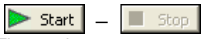
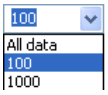
Monitor Variables

A variable (register) that is targeted for graph plotting and data 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 9-63

9.3.1 Control Panel

The functions of each icon are as follows.

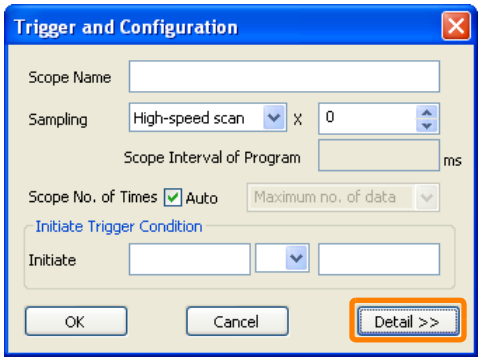
Icon	Name	Function
	Start Button	Starts/stops the trace (taking a record of register values at every scan). When one setting is ON, the other setting is OFF.  : Trace is executing (or waiting for trigger condition)  : Trace is stopped These buttons are enabled only in the online mode. The trace is started at the same time that the trace tab page is started up. So, the **Stop** Button is ON at first.
	Stop Button	
	Snap Button	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.
	–	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 and Configuration Setting	Clicking this button displays the Trigger and Configuration Setting Dialog Box. Refer to the following section for details on the Trigger and Configuration Setting Dialog Box. ☞ *Trigger and Configuration Dialog Box* on page 9-55
	Trend Graph	Clicking this icon displays the trend graph. The trend graph displays the set monitor variables (registers) in time series as a graph. Refer to the following section for details on display settings and setting methods of trend graphs. ☞ *9.3.2 Graph Area* on page 9-56
	X-Y Graph	Clicking this icon 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 on display settings and setting methods of X-Y graphs. ☞ *9.3.2 Graph Area* on page 9-56
	Import	Clicking this icon displays the Open Dialog Box, and the trace data and data trace definitions can be read from a selected file to the trace tab page.
	Export	Clicking this icon opens the Save As Dialog Box, and you can save trace data and data trace definitions as a file.
	Print	Clicking this icon displays the Print Dialog Box, and you can print the Trace Manager Tab Page.

Trigger and Configuration Dialog Box

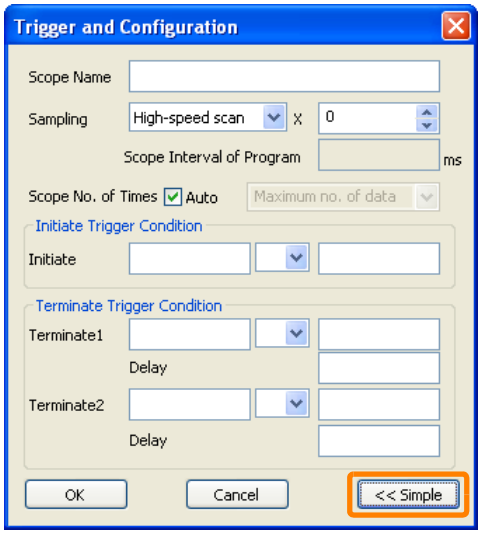
This dialog box is displayed by clicking the **Trigger and Configuration Setting** Button (Trigger...) on the control panel.

You can switch between the simple settings view and detail settings view by clicking the **Detail>>** and **<<Simple** Buttons.

<Simple Settings View>



<Detail Settings View>



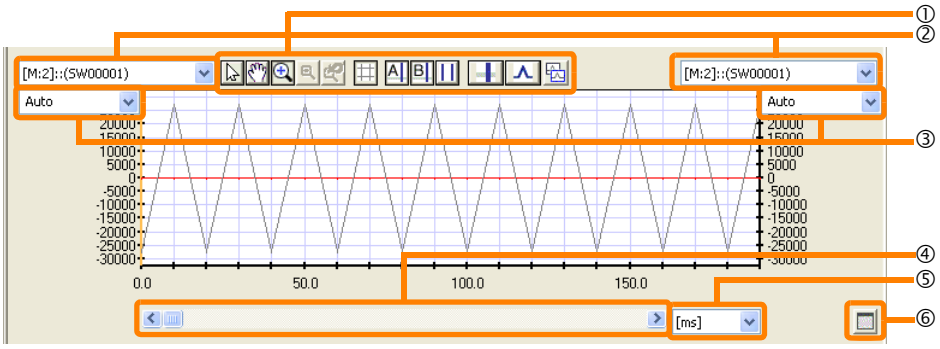
The following describes each of the items on the Trigger and Configuration Dialog Box.

Item	Description	Setting
Scope Name	A name can be assigned to trace conditions by specifying the name of the set of conditions that is set in this dialog box.	Text string up to 32 characters
Sampling Conditions	Specify the data sampling conditions. Samples are acquired at the same execution cycle of the selected program.	High-speed scan, low-speed scan, program specification
Sampling Interval	Specify the data sampling interval. When “0” is set, trace is executed at every scan.	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**.	0.1 to 999.9
Scope No. of Times (number of data)	Specify the number of data traces. When **Auto** Check Box is selected, the trace is executed until the stop trigger condition is satisfied or when the **Stop** Button is clicked.	Auto, Maximum no. of data, 100, 1000, 1 to 999999
Initiate	Sets the register No., logic 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.	Register No., > / < / = / < > / >= / <=, Numerical value
Terminate 1/2 (Not displayed in simple settings view.)	Sets the register No., logic 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.	Register No., > / < / = / < > / >= / <=, Numerical value
No. of Delays (Not displayed in simple settings view.)	Specify how many times sampling is performed before the trace is stopped after the stop conditions are satisfied.	0 to 65534

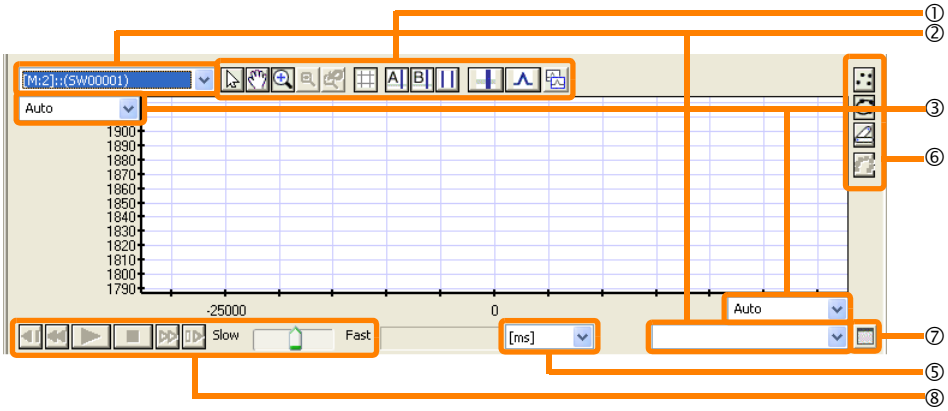
9.3.2 Graph Area

Two graph view modes are provided for the graph are:, trend graph view and X-Y graph view. The view mode can be switched by clicking the **Trend Graph** Button ( ) and the **X-Y Graph** Button ( ) on the control panel.

<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. ☞ *Graph Area Operation Buttons/Pop-up Menu* on page 9-57
②	Monitor variable selection (left/right): Trend graphs only	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.
	Monitor variable selection (vertical axis/horizontal axis): X-Y graphs only	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	Max. value selection (left/right): Trend graphs only	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.
	Max. value selection (vertical axis/horizontal axis): X-Y graphs only	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.

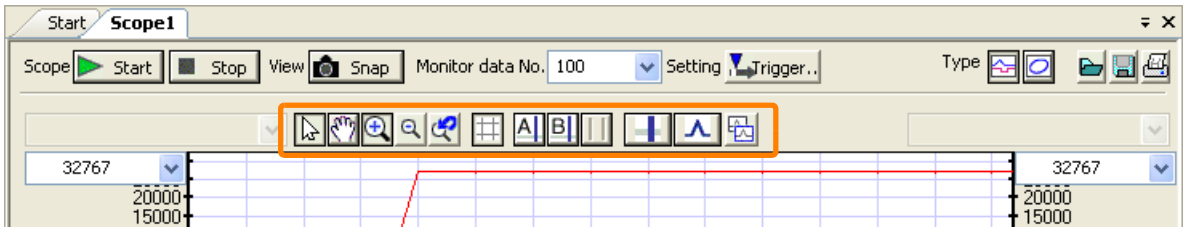
Continued on next page.

Continued from previous page.

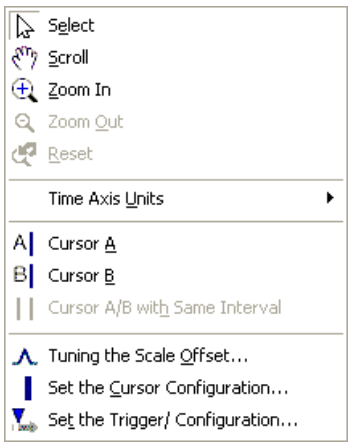
No.	Item	Description
④	Scroll bar: Trend graphs only	The part to monitor can be moved by either dragging the slider or clicking the < or > Button.
⑤	Unit selection	The display unit of the horizontal axis (time axis) can be selected from **[ms]**, **[sec]**, **[min]** or **[Data]**.
⑥	X-Y graph view setting operation buttons	The view settings of the X-Y graph can be modified. Refer to the following section for details. ☞ *X-Y Graph View Setting Operation Buttons* on page 9-61
⑦	Maximum view button ( )	When the maximum view button is clicked, the list area is hidden so that the graph area becomes the maximum size, and the normal view button is displayed. When the normal view button is clicked, the graph area returns to its original size, and the list area is displayed.
	Normal view button ( )	
⑧	Playback related operation buttons: X-Y graphs only	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.

Graph Area Operation Buttons/Pop-up Menu

Information The graph area operation buttons are common to both the trend graph view mode and the X-Y graph view mode.



Right-clicking on the graph area displays the pop-up menu shown below.



The following describes the functions of the graph area operation buttons and the pop-up menu.

Icon	Name	Description	
Mouse cursor settings	Select	Clicking this changes the mouse cursor to the offset adjustment cursor of the graph area, and dragging by this cursor allows the graph to be scrolled vertically. Graph areas for which **Auto** is selected as the maximum vertical axis value on the list cannot be moved.	
	Scroll	Clicking this changes the mouse cursor to the graph scroll cursor, and dragging by this cursor allows the graph to be scrolled horizontally.	
	Zoom in	Clicking this changes the mouse cursor to the graph enlarge cursor, and dragging by this cursor displays the selected area enlarged,	
	Zoom out	Clicking this when the graph is displayed enlarged makes the graph one step smaller. This is enabled when the graph is displayed enlarged.	
	Reset	This restores an enlarged graph to its original size. This is enabled when the graph is displayed enlarged.	
	Grid	This toggles between displaying and hiding the grid.	
Time Axis Units		The display unit of the horizontal axis (time axis) can be selected from **[ms]**, **[sec]**, **[min]** or **[Data]**. This is displayed only as a pop-up menu.	
Cursor operations	Cursor A	Of the two cursors, cursor A and cursor B, this 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 9-59
	Cursor B	Of the two cursors, cursor A and cursor B, this toggles between displaying and hiding cursor B.	
	Cursor A/B with Same Interval	Clicking this 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.	
	Cursor Details Setting	Displays the Cursor Setting Dialog Box. Refer to the following section for details. ☞ ◆ *Cursor Setting Dialog Box* on page 9-59	
	Scale Offset Adjustment	Displays the Scale Offset Adjustment Dialog Box. Refer to the following section for details. ☞ ◆ *Scale Offset Adjust Dialog Box* on page 9-60	
	Copy Graph	Clicking this copies the graph to the clipboard. The copied graph can also be pasted as a graph image to other Windows applications.	
	Maximum graph view	Clicking this hides the list area and maximizes the graph. This is enabled in the normal list display.	
	Normal graph view	Clicking this displays the list area and restores the graph to its normal view. This is enabled only in the maximum graph view.	
Set the Trigger/Configuration		Clicking this displays the Trigger and Configuration Dialog Box. Refer to the following section for details. ☞ *Trigger and Configuration Dialog Box* on page 9-55 This is displayed only as a pop-up menu.	

◆ 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.

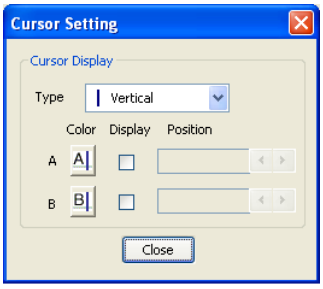
The cursor moves as described below according to the status of the graph area by left-clicking inside the graph.

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.

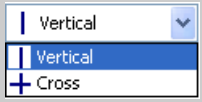
* When **Cursor A/B with Same Interval** is not selected, **Cursor A/B** cannot be selected as the cursor mode in the list area. Alternatively, when **Cursor A/B with Same Interval** is selected, **Cursor A** and **Cursor B** cannot be selected as the cursor mode in the list area.

◆ Cursor Setting Dialog Box

The Cursor Setting Dialog Box is displayed by clicking the **Cursor Details Setting** Button () in the graph area operation buttons.

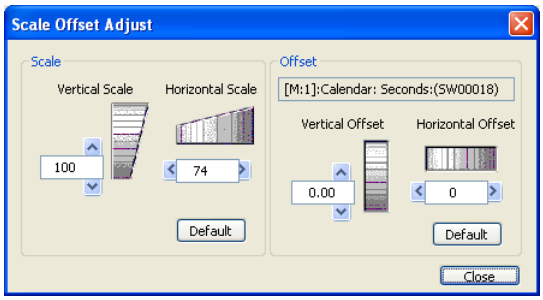


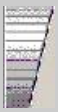
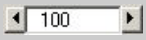
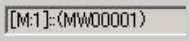
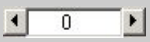
The following describes the settings of each of the items on the Cursor Setting Dialog Box.

Icon	Name	Description	Remarks
	Type	Selects the cursor shape. A vertical cursor (|) or cross cursor (+) can be selected.	The cross cursor is displayed when monitor variables are activated in the **Select** Field in the list area. At this time, the center of the cross moves to on the selected monitor variable.
	Cursor Color	The color of the cursor can be selected to cursors A and B individually.	Clicking this displays the Color Dialog Box.
	Display Check Box	This check box toggles between displaying and hiding cursors A and B individually.	The cursor of the selected check box is displayed.
	Display Position	Adjusts the display position of the cursor. Either enter directly or set by operating the spin buttons.	When the numerical value is entered directly, the display position is adjusted to the nearest grid position.

◆ Scale Offset Adjust Dialog Box

The Scale Offset Adjust Dialog Box is displayed by clicking the Scale Offset Adjustment Button ( ) in the graph area operation buttons. In this dialog box, the scale (maximum value) of each axis and offset (shift from center) can be adjusted.



Icon	Name	Description	Remarks
Scale adjustment		A specific target need not be selected for scale adjustment.	
	Vertical scale setting	Sets the vertical scale. Either enter directly or set by operating the spin buttons.	Input range: 100 to 1000
	Vertical scale adjustment bar	Adjusts the vertical scale. Operate by dragging the mouse up and down.	–
	Horizontal scale setting	Sets the horizontal scale. Either enter directly or set by operating the spin buttons.	Input range: 10 to 1000
	Horizontal scale adjustment bar	Adjusts the horizontal scale. Operate by dragging the mouse up and down.	–
Offset adjustment		Offset adjustment is enabled when a target of offset adjustment ∗ is selected in the **Select** Field in the list area. Offset adjustment can be set only by selecting an offset adjustment target. Offset adjustment also cannot be set when a target is deselected after the dialog box is displayed. In this case, offset adjustment can be enabled by selecting and activating an offset adjustment target on the list.	
	Variable targeted for offset adjustment	Displays the name of the variable targeted for offset adjustment.	–
	Vertical offset position setting	Sets the vertical offset position. Either enter directly or set by operating the spin buttons.	Input range: -100.00 to 100.00
	Vertical offset adjustment bar	Adjusts the vertical offset position. Operate by dragging the mouse up and down.	–
	Horizontal offset position setting	Sets the horizontal offset position. Either enter directly or set by operating the spin buttons.	Input range: • When the target (sampling time) is selected on the Monitor Page or the File Page: -99 to 99 • When the target (variable value) is selected on the XY Graph Page: -100.00 to 100.00
	Horizontal offset adjustment bar	Adjusts the horizontal offset position. Operate by dragging the mouse up and down.	–
Common to scale adjustment/offset adjustment		–	

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Icon	Name	Description	Remarks
Default	Default Button	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 when the target on the XY Graph Page is selected is 0.00.
Close	Close Button	Closes the Scale Offset Adjust Dialog Box.	–

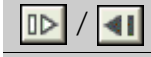
* The **Select** Field in the list is used for selecting the offset adjustment target. On the Monitor Page and File Page, the selection target is a monitor variable, and the horizontal and vertical axes of offset adjustment are the sampling time and the data value of the selected monitor variable, respectively. On the XY Graph Page, the set of monitor variables that are set to the horizontal and vertical axes are targeted. The horizontal and vertical axes of offset adjustment are the data values of the variables that are set respectively. Refer to the following section for details on pages.

☞ *Page Switching* on page 9-62

X-Y Graph View Setting Operation Buttons

Icon	Name	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. ☞ ◆ *XY Graph Page* on page 9-64
	Leave Trace	Selects whether or not to leave a trace. This is enabled only for **Point Display**.

Playback Related Operations

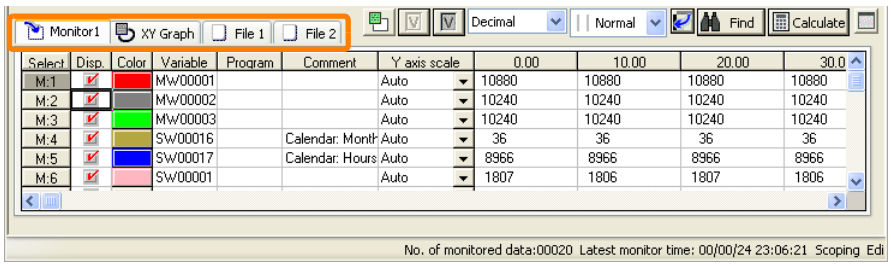
Icon	Name	Description
	Playback	Plays back the X-Y graph from the beginning of the traced data.
	Stop	Clicking this button stops playback of the X-Y graph.
	Fast forward/rewind	Fast forwards and rewinds by a specified magnification. Playback is automatically continued when this operation is canceled. This operation is possible only during playback.
	Frame advance/ return	Advances and returns playback one frame at a time.
–	Go to Top	Select ***XY Graph*** – ***Go to Top*** from the menu bar. Returns playback to the beginning of the traced data.
–	Go to End	Select ***XY Graph*** – ***Go to End*** from the menu bar. Advances playback to the end of the traced data.
	Magnification setting	Sets the magnification of fast forward/rewind.
	Run time	Displays the run time of the playback display. The unit can be selected from **[ms]**, **[sec]**, **[min]** or **[Data]**.

9.3.3 List Area

Operations possible in the list area are monitor settings, selection of variables, selection of reference variables, data view settings, cursor mode, switching between list horizontal/vertical display, find, calculations, and maximum list view. These operations can be performed in all modes regardless of list view mode (page).

Information Refer to the following section for details on registration of monitor variables.
☞ ■ *How to Register Monitor Variables* on page 9-63

Page Switching



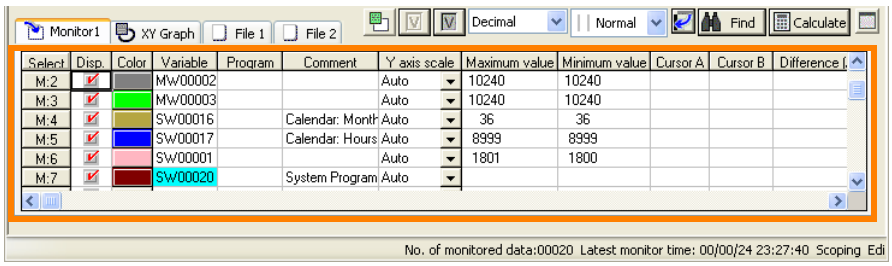
Select the tabs to switch the page. Three pages are displayed in the list area: Monitor Page, XY Graph Page, and File Page.

◆ Monitor Page

In the Monitor 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 9-63

The following shows a display example of the Monitor Page, and the table below describes the details of displayed content.



Item	Description
Select	Selects a monitor variable to be edited. Switching of data view, find, calculation, offset adjustment, and cross cursor display will be possible. 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
Disp.	Toggles between displaying ( ) and hiding ( ) the graph corresponding to the variable.
Color	Selects the color of the graph. Double-clicking a cell displays the Color Dialog Box, and you can select or set the color.
Variable	Enter the name of the variable or the register to be traced. • The variable can also be entered by dragging and dropping from the Variable Pane. • Total of 16 registers and variables can be entered.
Program	When entering a D register, enter the name of the program that is currently using the D register.
Comment	The comment is displayed (display only).

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Item	Description
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 ***List*** – ***Minimum/Maximum Value*** from the menu bar. The maximum value of the trace data is displayed (display only).
Minimum value*	This is displayed by selecting ***List*** – ***Minimum/Maximum Value*** from the menu bar. The minimum value of the trace data is displayed (display only).
Cursor A*	This is displayed by selecting ***List*** – ***Cursor Position*** from the menu bar. The value of cursor A is displayed (display only).
Cursor B*	This is displayed by selecting ***List*** – ***Cursor Position*** from the menu bar. The value of cursor B is displayed (display only).
Difference (A – B)*	This is displayed by selecting ***List*** – ***Cursor Position*** from the menu bar. The difference (A – B) between the values for cursors A and B is displayed (display only).
Conversion unit (× N)*	This is displayed by selecting ***List*** – ***Convert Unit*** from the menu bar. The value for the convert unit is displayed as a multiplying factor. Data is displayed by variable value × multiplying factor. Set this value, for example, when swapping over to the machine coordinate system.

* **Maximum value**, **Minimum value**, **Cursor A**, **Cursor B**, **Difference (A–B)**, and **Conversion unit (×N)** are hidden by default. If they do not appear in the list area when they have been displayed from the menu bar, then display them by reducing the cell widths.

■ How to Register Monitor Variables

The data trace function 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.

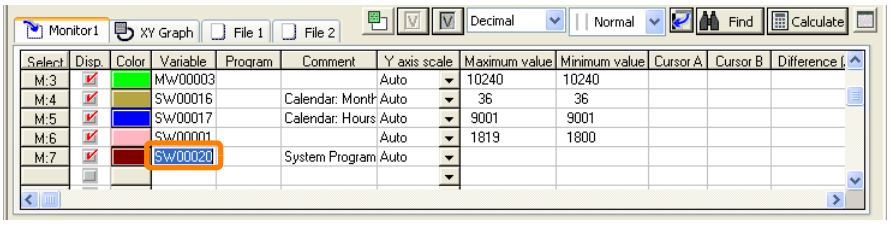
Note: Up to 64 (16 x 4) monitor variables can be registered by changing the monitor setting. Only 16 monitor variables, however, can be displayed at one time. Refer to the following section for details.

☞ ◆ *Select Monitor Setting Dialog Box* on page 9-67

The following methods can be used to register monitor variable.

• Entering the Variable Name (Register) to the Variable Cell in a Monitor Page

You can input the variable name (register) by double-clicking the cell. The variable name (register) can either be directly entered or it can be entered by dragging and dropping from the Variable Pane.



• Registering Variables from the Edit Ladder Program Tab Page

Right-click a variable object in the Edit Ladder Program Tab Page and select ***Add to Scope*** from the pop-up menu. The variable will be registered as a trace data variable.

Information

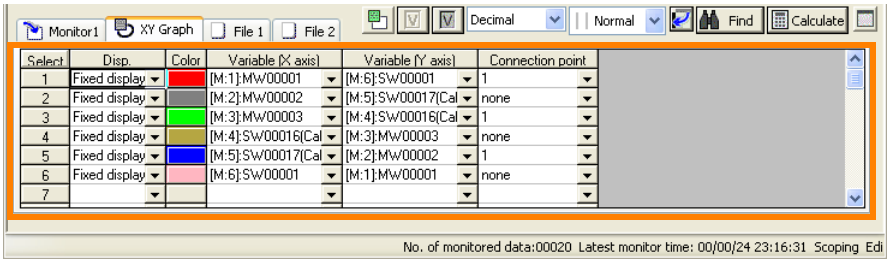
Deleting Variables from the List (1)
In the Monitor Page or XY Graph Page, right-click the variable to be deleted and select ***Delete*** from the pop-up menu. Alternatively, select ***Edit*** – ***Delete*** from the menu bar.
The selected variable will be deleted from the list, and that row will be left empty.

Deleting Variables from the List (2)
In the Monitor Page, select the variable to be deleted, and then select ***Edit*** – ***Delete the Record*** from the menu bar. The selected variable row will be deleted and rows underneath will be pushed up.

Inserting an Empty Row
In the Monitor Page, select the variable above which the row is to be inserted, and then select ***Edit*** – ***Insert the Record*** from the menu bar. An empty row will be inserted above the selected variable.

◆ XY Graph Page

In the XY Graph Page, the monitor variables for displaying the X-Y graph can be registered, deleted, edited, and displayed. The following shows the list area when the XY Graph Page is displayed.



The following table shows the items in the XY Graph Page.

Item	Description
Select	Selects the target to be activated. By making a target active, offset can be adjusted and the cross cursor can be displayed.
Disp.	Selects how the graph is displayed. Select from **Hide**, **Fixed display**, and **Playback**. • By the **Hide** setting, data is not displayed on a graph. • By the **Fixed display** setting, data is displayed on a graph when trace is executed. • By the **Playback** setting, data is displayed on a graph when playback is executed.
Color	Selects the color of the graph. Double-clicking a cell displays the Color Dialog Box, and you can select or set the 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 Page.
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 Page.
Connection point	Sets the No. in the model display to connect to. Select from **none** or the No. of **Select** Field set for the XY Graph Page.
Cursor A*	This is displayed by selecting ***List*** – ***Cursor Position*** from the menu bar. The value of cursor A is displayed (display only).
Cursor B*	This is displayed by selecting ***List*** – ***Cursor Position*** from the menu bar. The value of cursor B is displayed (display only).
Difference (A – B)*	This is displayed by selecting ***List*** – ***Cursor Position*** from the menu bar. The difference (A – B) between the values for cursors A and B is displayed (display only).

* **Cursor A**, **Cursor B**, and **Difference (A – B)** are hidden by default. If they do not appear in the list area, then display them by reducing the cell widths.

◆ File Page

Monitor variable data imported from specified files (CSV files) can be displayed in the File Page.

Use the following procedure to import the data.

1. Click the **File** Tab in the list area to display a File Page.
2. Select ***File*** – ***Import*** from the menu bar.
   The Open Dialog Box 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.

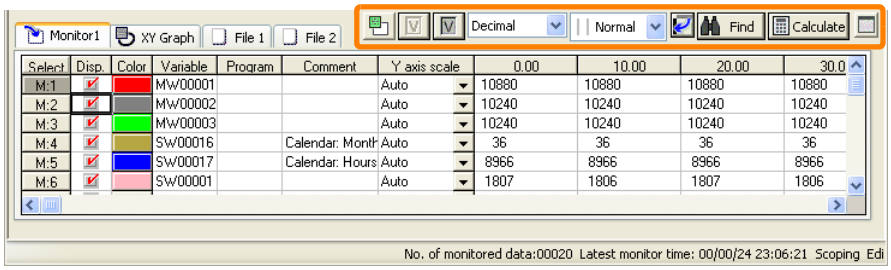
The items displayed on a File Page are the same as those on a Monitor Page. Variables, programs, and comments depend on data imported from files, so they cannot be edited.

The default setting for the number of File Pages displayed is two, but the number can be set for a maximum of eight.

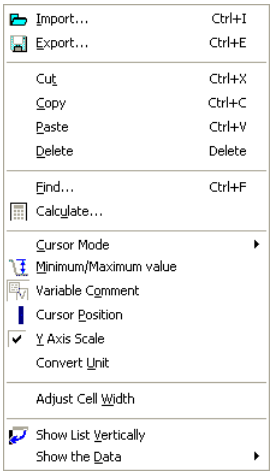
Note: 1. Variables displayed on a File Page can be registered as monitor variables to be monitored on a Monitor Page. Refer to the following section for details.
☞ ◆ *Object Variable Setting Dialog Box* on page 9-67

2. For details on setting the default number of File Pages displayed, refer to the following section.
☞ ■ *Setting the List Tab Page* on page 9-72

List Operation Buttons/Pop-up Menu



Right-clicking on the list area displays the pop-up menu shown below.



The following describes the details of the list operation buttons and the pop-up menu.

Icon	Name	Description
	Select Monitor	Clicking this displays the Select Monitor Setting Dialog Box, and you can set the number of data trace tab pages. Refer to the following section for details. ☞ ◆ *Select Monitor Setting Dialog Box* on page 9-67
	Reference Variable Options	Clicking this displays the Object Variable Setting Dialog Box so that the variables used by imported files can be registered as Monitor Page variables (monitor variables). Refer to the following section for details. ☞ ◆ *Object Variable Setting Dialog Box* on page 9-67

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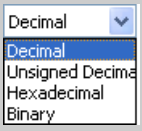
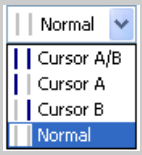
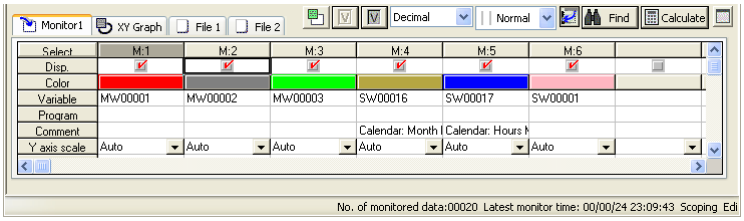
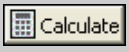
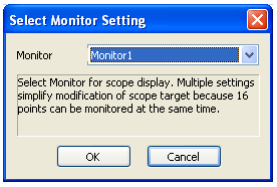
Icon	Name	Description
	Data Display	Switches the data display type for variables selected on the list. Decimal, unsigned decimal, hexadecimal, or binary can be selected. This is disabled when no variables are selected.
	Cursor Mode	Selects from **Cursor A/B**, **Cursor A**, **Cursor B**, and **Normal** for the cursors linked to data display positions. When **Cursor A**, **Cursor B**, or **Cursor A/B** is selected, the cursor position on the graph is linked with the data position displayed on the Monitor Page and File Page of the list area. • When cursor A (or cursor B) is not displayed, **Cursor A (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 executable selections are selected.
	List Scrolling Direction	This toggles the list display orientation between horizontal and vertical. • When OFF, all variable data is displayed in the horizontal direction. • When ON, all variable data is displayed in the vertical direction. <Vertical List Display Example> 
	Find	Clicking this button with a monitor variable in the list selected displays the Find Dialog Box, 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 Dialog Box* on page 9-68
	Calculate	Clicking this button with a monitor variable in the list selected displays the Calculate Dialog Box, and the area, average, and absolute average calculation results for the selected variable can be referenced. Refer to the following section for details. ☞ ◆ *Calculate Dialog Box* on page 9-69
	Maximum list view	Clicking this button hides the graph and maximizes the list. This button is enabled in the normal list view.
	Normal list view	Clicking this button clears the maximum list view and restores the list to its normal view (graph and list). This button is enabled only in the maximum list view.
	Minimum/ Maximum value: Pop-up menu only	This toggles between displaying and hiding the **Maximum value** and **Minimum value** in the list area. This functions in the same way as selecting ***List*** – ***Minimum/Maximum Value*** from the menu bar.
	Variable Comment: Pop-up menu only	This toggles between displaying and hiding **Comment** in the list area.
	Cursor Position: Pop-up menu only	This toggles between displaying and hiding **Cursor A**, **Cursor B**, and **Difference (A-B)** in the list area. This functions in the same way as selecting ***List*** – ***Cursor Position*** from the menu bar.
–	Convert Unit: Pop-up menu only	This toggles between displaying and hiding **Conversion unit** in the list area. This functions in the same way as selecting ***List*** – ***Convert Unit*** from the menu bar.
–	Adjust Cell Width: Pop-up menu only	Adjusts the width of cells in the list area to the width of the cell where the cursor is located.

◆ Select Monitor Setting Dialog Box

The Select Monitor Setting Dialog Box is displayed by clicking the **Select Monitor** Button ( ). The data trace tab page displayed in the Main Pane can be selected from **Monitor 1** to **Monitor 4**.

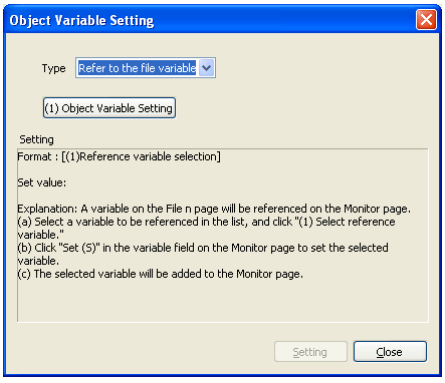
The default setting is for only Monitor 1 to be displayed. For example, selecting **Monitor 3** and clicking the **OK** Button will cause Monitor 1 and Monitor 3 to be displayed in the Main Pane.

A maximum of 16 monitor variables can be registered on a single data trace tab page (monitor tab page). The number of targets to be monitored can be expanded by setting multiple monitor tab pages, and the targets can be easily displayed by switching between the tab pages.



◆ Object Variable Setting Dialog Box

The Object Variable Setting Dialog Box shown below is displayed by clicking the **Reference Variable Options** Button ( ). In this dialog box, variables displayed on a File Page can be registered to a Monitor Page as monitor variables.

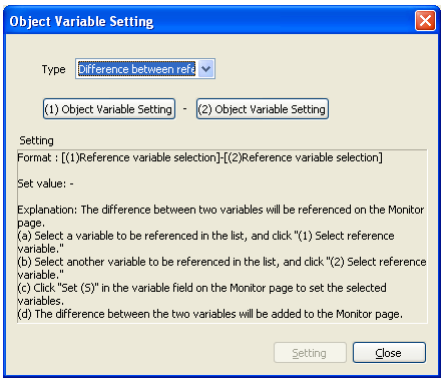


Use the following procedure to set a reference variable.

1. With the above dialog box displayed, select the variable to be referenced from the list and click the **(1) Object Variable Setting** Button.
   The selected variable name will be displayed in the **Set value** Area.

2. Select the **Variable** Field on the list of the Monitor Page that is to be set, and click the **Setting** Button in the Object Variable Setting Dialog Box.
   The selected reference variable will be added to the selected **Variable** Field.

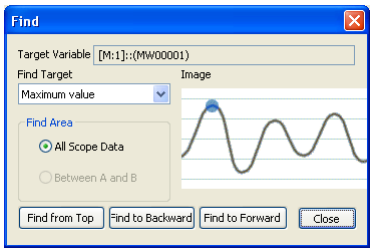
Not only file variable but also reference variable difference or sum can be selected as the reference variable type. When **Difference between reference variables** is selected as the type, the Object Variable Setting Dialog Box will be displayed as shown below. It will be the same when **Sum of reference variables** is selected.



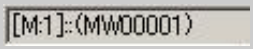
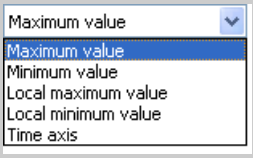
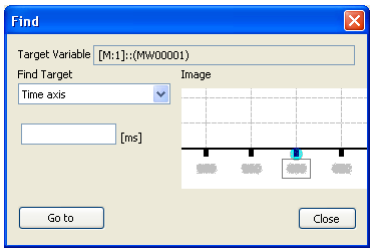
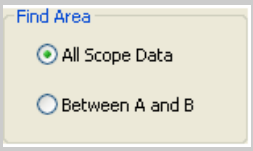
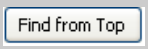
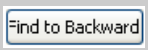
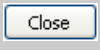
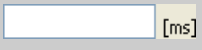
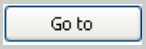
◆ Find Dialog Box

With a monitor variable selected in the list, click the **Find** Button (

). The Find Dialog Box will be displayed, and the maximum value, minimum value, local maximum value, local minimum value, and time axis can be found for the selected variable.

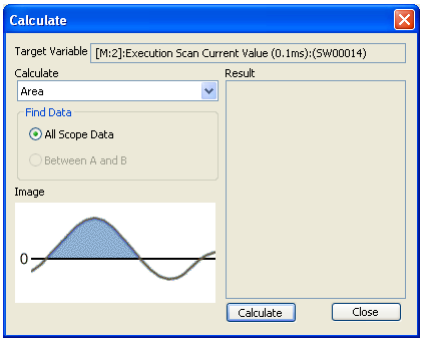


The following operations can be executed in the Find Dialog Box.

Icon	Name	Description
	Target Variable	Displays the name of variable that is selected to be found.
	Find Target	Selects one of the following as the find target: **Maximum value**, **Minimum value**, **Local maximum value**, **Local minimum value**, and **Time axis**. When **Time axis** is selected, the dialog box will be displayed as shown below. Display Example: When Time Axis is Selected 
	Find Area	Selects either **All Scope Data** or **Between A and B** as the find area. **Between A and B** cannot be selected when cursors A and B are hidden.
	Find from Top	Searches from the top of the find area.
	Find to Backward	Searches backward from the current position.
	Find to Forward	Searches forward from the current position.
	Close	Closes the Find Dialog Box.
	Time setting	Sets the destination time to jump to in units of ms. This is displayed only when **Time axis** is set as the find target.
	Go to	Jumps to the data for the set time (proximity). This is displayed only when **Time axis** is set as the find target.

◆ Calculate Dialog Box

With a monitor variable selected in the list, click the **Calculate** Button (Calculate). The Calculate Dialog Box will be displayed, and the area, average, and absolute average calculation results for the selected variable can be referenced.



The following operations can be executed in the Calculate Dialog Box.

Icon	Name	Description
[M:1]::(MW00001)	Target Variable	Displays the name of the variable that is selected to be calculated.
Area Area Average Absolute average	Calculate	Selects one of the following as the calculation type: **Area**, **Average**, or **Absolute average**.
Find Data All Scope Data Between A and B	Find Data	Selects either **All Scope Data** or **Between A and B** as the find area. **Between A and B** cannot be selected when cursors A and B are hidden.
Calculate	Calculate	Executes the calculation. The result is displayed in the **Result** Area.
Close	Close	Closes the Calculate Dialog Box.

Other Functions

This section describes other functions, including saving and deleting trace definition data, setting defaults, printing, and making optional settings.

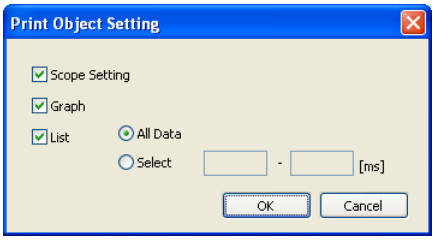
◆ Saving and Deleting Trace Definition Data and Setting Defaults

Operations such as saving and deleting trace definitions can be executed from the File Menu.

Item	Operation	Description	Remarks
Default Setting	***File* – *Reset to Default***	Restores the trace definitions to the default status.	All monitor variables that have been registered will be deleted.
Save Settings	***File* – *Save & Write***	Saves the trace definition.	–
Delete Settings	***File* – *Delete the Configuration***	Deletes the trace definition.	–

◆ Print Settings

Data trace definitions, graphs, and lists can be printed using the following procedure. Select ***File*** – ***Print Setting*** from the menu bar. The Print Object Setting Dialog Box will be displayed. Select the check boxes of the items to be printed, and click the **OK** Button.



Note: Items which are set to **Not print** on the Print Tab Page of the Option Dialog Box become disabled in the display. Refer to the following section for details.
☞ ■ *Setting the Print Tab Page* on page 9-73

When you select ***File*** – ***Print*** from the menu bar, printing will be executed according to the settings in the Print Object Setting Dialog Box.

◆ Optional Settings

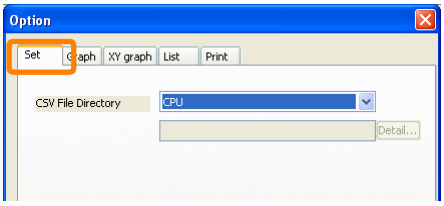
Optional settings related to display and printing can be made using the following procedure.

Select ***View*** – ***Option*** from the menu bar. The Option Dialog Box will be displayed. Optional settings can be made in the Set, Graph, XY graph, List, or Print Tab Page.

Button	Description
Reset	Clicking this button returns settings to their status when the dialog box was opened.
Set as Default	When this button is clicked, the following message will be displayed: “The option information will be set as default. OK?” Click the **OK** Button to set the current option data as the default.
Apply	Clicking this button overwrites the option data, and the settings will be immediately reflected.

■ Setting the Set Tab Page

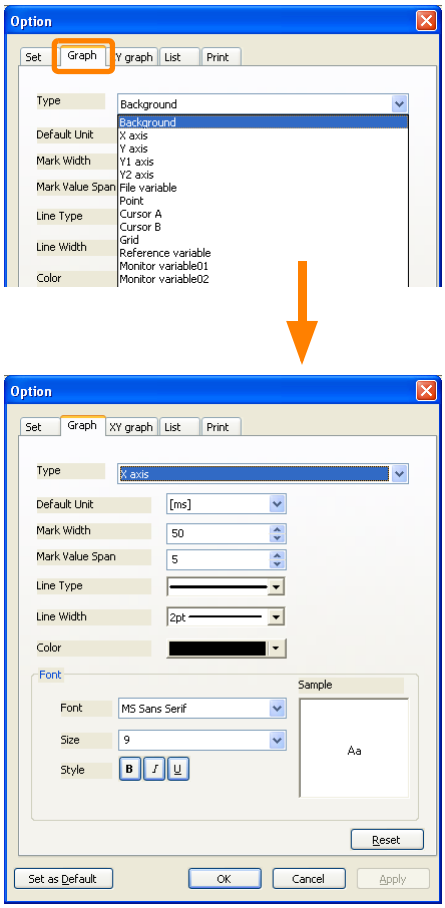
This tab page is used to set the default directory for when trace data is imported or exported.



Item	Description
CPU	The directory to which the MPE720 version 7 is installed is set.
User setting	Click the **Detail** Button and make the settings in the Browse Folder Dialog Box.

■ Setting the Graph Tab Page

General graph settings can be made on this tab page. Select the elements to be set from the **Type** List, and then set the items.



Item	Setting	Type							
		Back-ground color	X-axis	Y-axis, Y1-axis, Y2-axis	File variable	Point	Cursor A, B	Grid	Reference variable, monitor variable (1 to16)
Default Unit	Sets the default value for the X-axis unit (No. of data, ms, sec, mm).	–	○	–	–	–	–	–	–
Mark Width	Sets the size of one X-axis mark in the default units. (When the default unit is ms and the mark width is 50: one mark will be 50 ms.)	–	○	–	–	–	–	–	–
Mark Value Span	Sets the span of values (step) displayed for marks.	–	○	○	–	–	–	–	–
Line Type	Selects a line type from solid line, wavy line, broken line, etc.	–	○	○	○		○	○	○
Line Width	Selects a line width from 1 pt. to 6 pt.	–	○	○	○	○	○	○	○
Color	Clicking this displays the Color Dialog Box.	○	○	○	○	○	○	○	○

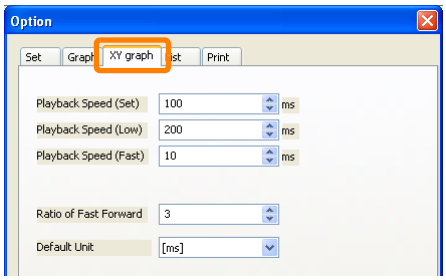
Continued on next page.

Continued from previous page.

Item		Setting	Type							
			Back-ground color	X-axis	Y-axis, Y1-axis, Y2-axis	File variable	Point	Cursor A, B	Grid	Reference variable, monitor variable (1 to16)
Font	Font	Selects the font for displayed characters.	–	○	○	–	–	–	–	–
	Size	Selects a size from 8 to 72 points. Can be entered directly. A decimal point cannot be entered.	–	○	○	–	–	–	–	–
	Style	• **B**: Bold • *I*: Italic • U: Underline Multiple selection is possible. • When OFF: Regular	–	○	○	–	–	–	–	–
	Sample	Displays a sample of font, size, and style settings (display only).	–	○	○	–	–	–	–	–

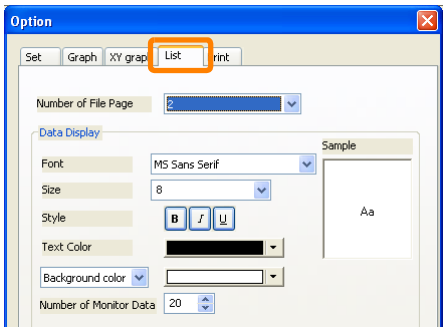
■ Setting the XY Graph Tab Page

Settings related to X-Y graph playback can be made on this tab page.



■ Setting the List Tab Page

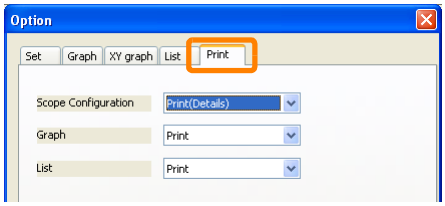
Settings related to the list area display can be made on this tab page.



Item	Description
Number of File Page	Select the default number of File Pages in the list area, from 1 to 8.
Number of Monitor Data	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.
Other settings	Refer to the following section for details. ☞ ■ *Setting the Graph Tab Page* on page 9-71

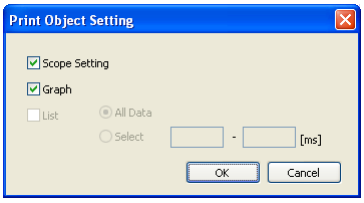
■ Setting the Print Tab Page

Settings related to print object settings (***File*** – ***Print Setting*** from the menu bar) can be made on this tab page.



Item		Description
Scope Configuration		–
	Print (Basic)	Used for trace data printing in a simple format when **Scope Setting** is selected as the print object.
	Print (Details)	Used for trace data printing in detailed format when **Scope Setting** is selected as the print object.
	Not print	**Scope Setting** cannot be selected as the print object.
Graph		–
	Print	**Graph** can be selected as the print object.
	Not print	**Graph** cannot be selected as the print object.
List		–
	Print	**List** can be selected as the print object.
	Not print	**List** cannot be selected as the print object.

Example Print Object Setting Dialog Box (When List Is Set to Not Print)



9.4 Names and Descriptions of XY Trace Tab Page Components

No.	Item	Description	Reference
①	Trace execution toolbar	Select the axis, set the trace data acquisition conditions, and execute trace, in that order.	☞ *9.4.2 Trace Execution Toolbar* on page 9-75
②	Graph toolbar	Groups together the buttons used for analyzing trace data.	☞ *9.4.1 Graph Toolbar* on page 9-74
③	XY graph	Displays the trace data. The graph toolbar, sliders and cursors can be used to analyze trace data in the XY Trace Tab Page.	☞ *9.4.3 XY Graph* on page 9-76

9.4.1 Graph Toolbar

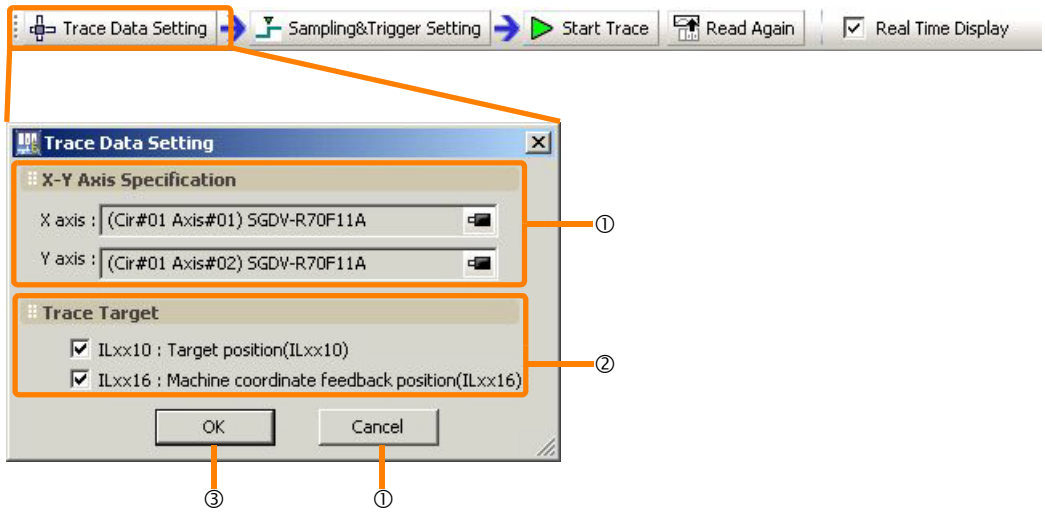
The functions of each icon are as follows.

Icon	Function
	Clicking the **Select** Icon and double-clicking the target location allows you to zoom in on the selected location.
	Clicking the **Scroll** Icon allows you to move the target location. Double-clicking the desired location allows you to zoom in on the selected location.
	Clicking the **Zoom In** Icon and dragging or double-clicking the target location allows you to zoom in on the selected location.
	Clicking the **Reset** Icon allows you to restore the graph to its original size.
	Clicking the **Cursor A** Icon displays cursor A and the value at the intersecting point on the graph.
	Clicking the **Cursor B** Icon displays cursor B and the value at the intersecting point on the graph.
	Clicking the **Cursor as A/B with Same Interval** Icon causes cursors A and B to move at a fixed width interlocked with each other.
	Clicking the **Open External File** Icon opens the Open Dialog Box and saved trace data can be read.
	Clicking the **Save** Icon displays the Save As Dialog Box.
	Clicking the **List View** Icon displays the list.
	Clicking the **Copy Graph** Icon copies an image of the graph to the clipboard.

9.4.2 Trace Execution Toolbar

Trace Data Setting

Select the axis and then set the trace target.



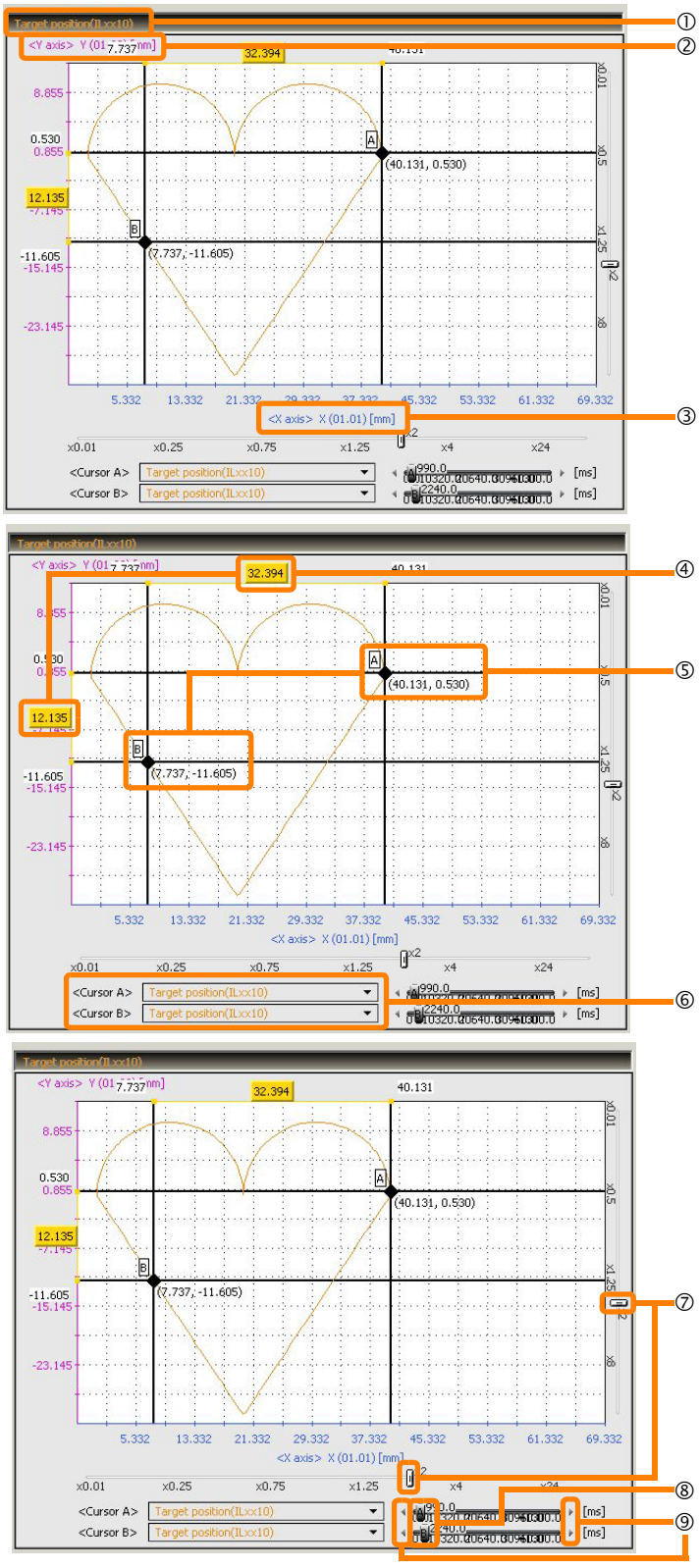
No.	Item	Description
①	X-Y Axis Specification	Select the X- and Y-axes.
②	Trace Target	Sets the trace target. There are two motion parameters as follows: • IL□□10: Calculated position in machine coordinate system • IL□□16; Machine coordinate system feedback position
③	OK	Applies the X-Y axes and trace target settings, and enables the **Sampling and Trigger Setting** Button.
①	Cancel	Returns to the XY Trace Tab Page without applying the X-Y axes and trace target settings.

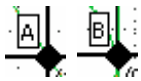
Sampling and Trigger Settings - Motion Analyzer

Settings and setting methods are the same as those in Real-Time Trace. Refer to the following sections for details.

☞ *Sampling and Trigger Settings* on page 9-41
☞ *Start Trace/Stop Trace/Real Time Display* on page 9-46
☞ *Read Again* on page 9-47
☞ *Monitor Data No.* on page 9-47
☞ *Enable ServoTrace* on page 9-47
☞ *Motion Analyzer* on page 9-47

9.4.3 XY Graph


①
②
③
④
⑤
⑥
⑦
⑧
⑨
Target position(ILxx10)
<Y axis> Y (01
7.737nm]
32.394
40.131
8.855
0.530
0.855
12.135
-11.605
-15.145
-23.145
(40.131, 0.530)
(7.737, -11.605)
5.332
13.332
21.332
29.332
37.332
45.332
53.332
61.332
69.332
<X axis> X (01.01) [mm]
x0.01
x0.25
x0.75
x1.25
x4
x24
<Cursor A>
<Cursor B>
Target position(ILxx10)
[ms]

No.	Display	Function
Graph		
①	–	The parameters selected for the trace target will be displayed.
②	–	The X- and Y-axes will be displayed.
③	–	The scales (marks) of the X- and Y-axes will be displayed.
Cursor		
④	–	Displays the difference in values between the A and B cursor positions.
⑤		Displays 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.
⑥	<Cursor A> <Cursor B>	Selects the trace target from Cursor Setting Drop-down List. • IL□□10: Calculated position in machine coordinate system • IL□□16; Machine coordinate system feedback position
Slider		
⑦		Dragging the **Rescale** Sliders and moving the graph horizontally and vertically allows you to rescale the graph. Scaling can be set within 0.01x to 64x.
⑧		Dragging the **Time Axis** Sliders and moving them to the left and right moves cursors A and B.
⑨		Clicking these arrow buttons makes the sliders move along the time axis by each individual marked scan interval.

Library Function

10

This chapter describes the operations for library function.

10.1 Overview of Library Function

Information that you want to reuse can be registered as a library in the library catalog.

The registered library can be reused for the following purposes.

- Importing to existing project files
- Creating new project files based on the registered library

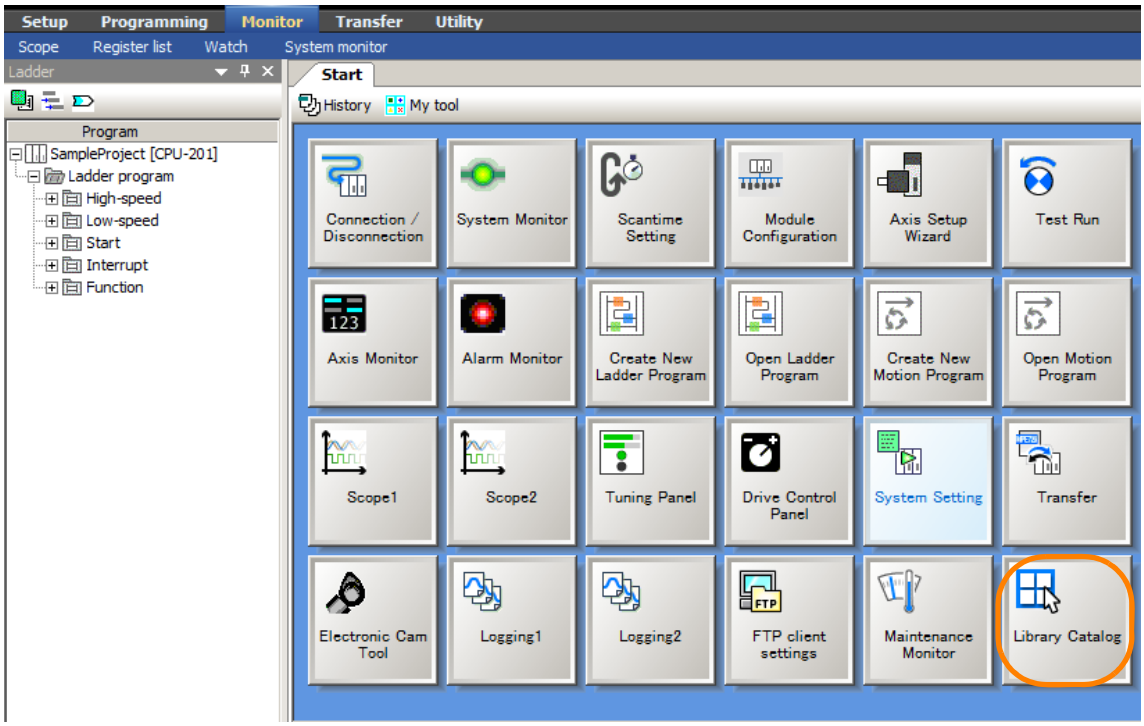
The following four types of libraries are available.

Type	Description
Program package	• This is a package where the ladder program and motion program are converted to a library. Refer to the following section for the procedure to create a program package library. ☞ *10.4.2 Creating a Program Package* on page 10-13 • This data can be imported to an existing project file. Refer to the following section for details. ☞ *10.7 Importing Libraries to a Project File* on page 10-28
Function package	• This is a package where a user function is converted to a library. Refer to the following section for the procedure to create a function package library. ☞ *10.4.3 Creating a Function Package* on page 10-18 • This data can be imported to an existing project file. Refer to the following section for details. ☞ *10.7 Importing Libraries to a Project File* on page 10-28
Base project package	• This is a package where the information serving as the base of the project file is converted to a library. Refer to the following section for the procedure to create a base project package library. ☞ *10.4.4 Creating a Base Project Package* on page 10-20 • This data and the configuration definition package can be used to create a new project file. Refer to the following section for details. ☞ *10.8 Creating a New Project File Using a Library* on page 10-37
Configuration definition package	• This is a package where a module configuration definition is converted to a library. Refer to the following section for the procedure to create a configuration definition package library. ☞ *10.4.5 Creating a Configuration Definition Package* on page 10-22 • This data and the base project package can be used to create a new project file. Refer to the following section for details. ☞ *10.8 Creating a New Project File Using a Library* on page 10-37

10.2 Opening a Library Catalog

Library operations are performed after opening the library catalog.
Use the following procedure to open the library catalog.

1. Create a new project file, or open an existing project file.
2. Click the **Library Catalog** Button on the My Tool View.

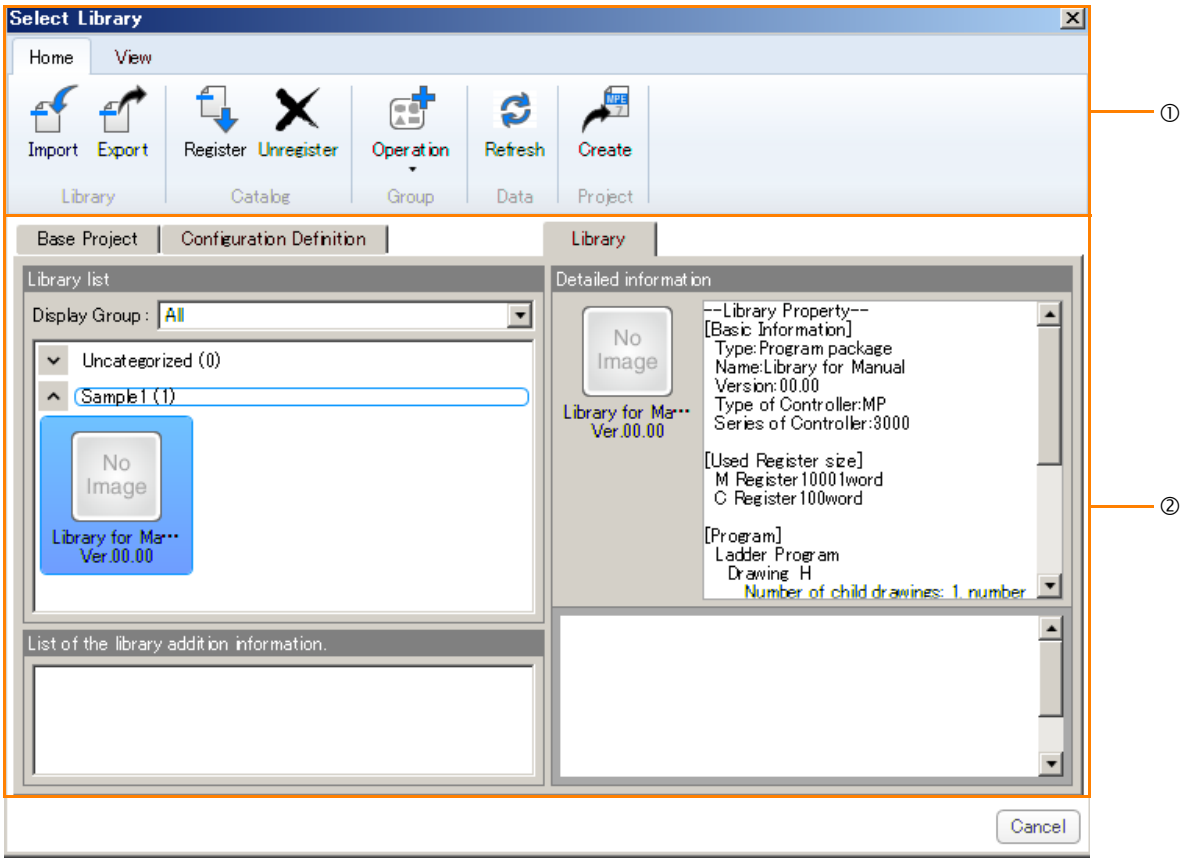


10.3 Names and View Settings for Library Windows

This section describes the names and view settings for the library windows.

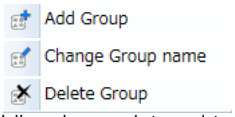
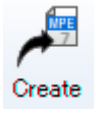
10.3.1 Select Library Window

This section provides the names and descriptions of the components of the Select Library Window.

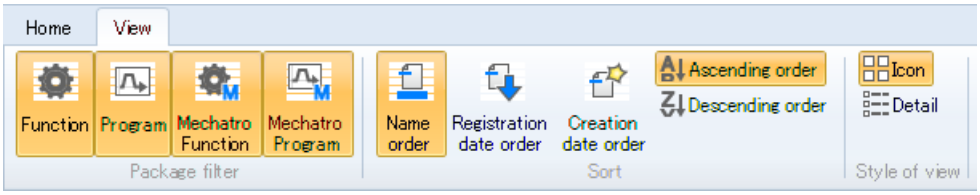


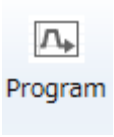
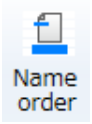
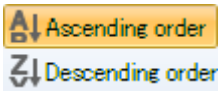
No.	Name	Description	Reference
①	Home Tab/ View Tab	Switches between display of the Home Tab Page and View Tab Page.	*Home Tab Page* on page 10-5 *View Tab Page* on page 10-6
②	Base Project Tab/ Configuration Definition Tab/ Library Tab	Switches between display of the Base Project Tab Page, Configuration Definition Tab Page, and Library Tab Page.	*Base Project Tab Page and Configuration Definition Tab Page* on page 10-7 *Library Tab Page* on page 10-8

Home Tab Page

Icon	Name	Description
	Import	Imports project package and function package library to a project file. The button is disabled if no library is selected. Refer to the following section for details on the import operation. ☞ *10.7 Importing Libraries to a Project File* on page 10-28
	Export	Creates a library. Refer to the following section for details on creating a library. ☞ *10.4 Creating a Library* on page 10-12
	Register	Registers the libraries for the base project package, configuration definition package, program package, and function package to the library catalog. The libraries that can be registered vary depending on the displayed tab pages. • When Base Project Tab Page is displayed: Base project package • When Configuration Definition Tab Page is displayed: Configuration definition package • When Library Tab Page is displayed: Program package and function package
	Unregister	Deletes the library registered in the library catalog.
	Operation	Clicking the ▾ Button displays the following three menu options.  Add Group : Adds a new group. Change Group name : Renames the group. Delete Group : Deletes the selected group. Libraries registered to deleted groups are moved to “Uncategorized”.
	Refresh	Refreshes the information in Library List for the Base Project Tab Page, Configuration Definition Tab Page, and Library Tab Page.
	Create	Creates a new project file using the library selected in the Create Project Box in the Base Project Tab Page or Configuration Definition Tab Page. The button is disabled if there is not at least one base project and configuration definition library registered in the Create Project Box.

View Tab Page



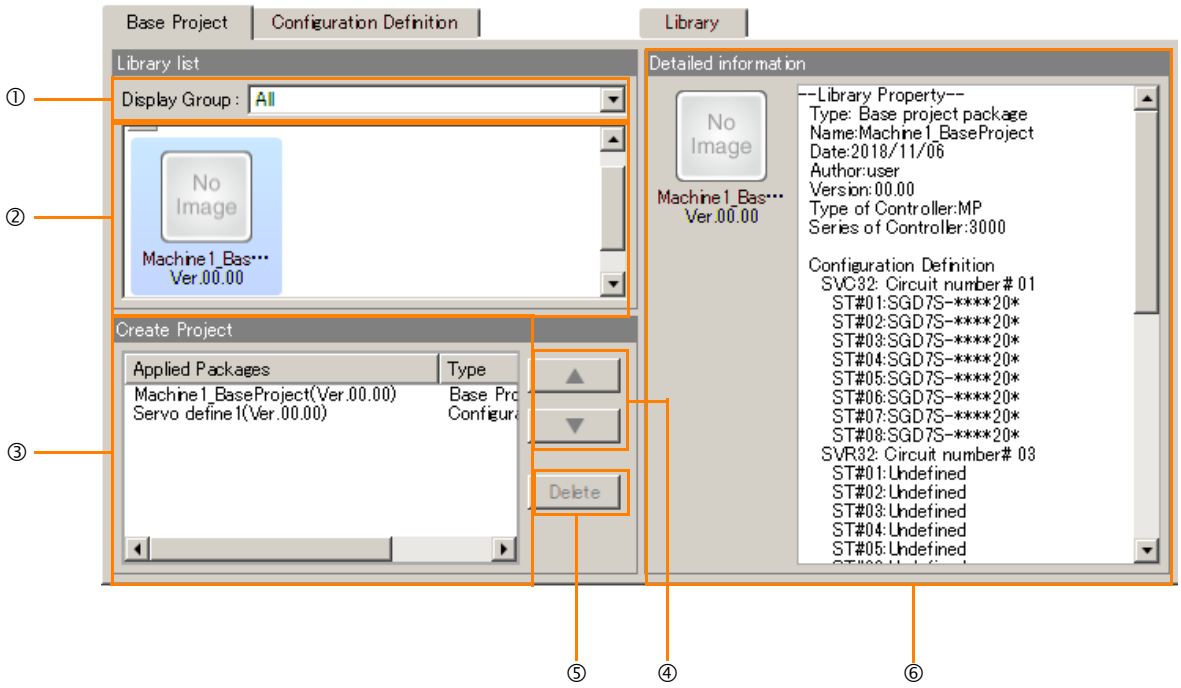
Type	Icon	Name	Description
Package filter*1		Function	Toggles between displaying and hiding the library of the function package attributes in the library list.
		Program	Toggles between displaying and hiding the library of the program package attributes in the library list.
		Mechatro Function	Toggles between displaying and hiding the library of the function package (Mechatro) attributes*2 in the library list.
		Mechatro Program	Toggles between displaying and hiding the library of the program package (Mechatro) attributes*2 in the library list.
Sort		Name order	Selects the display order within the library.
		Registration date order	
		Creation date order	
		Ascending order Descending order	Selects the display order (ascending or descending order) within the library.
Style of view		Icon Detail	Selects the display format (icons or details) within the library.

*1. If the Base Project Tab Page or Configuration Definition Tab Page is displayed, these buttons are hidden.
*2. Attributes assigned to libraries provided by Yaskawa.

Base Project Tab Page and Configuration Definition Tab Page

The names and descriptions of the elements are shown below using the Base Project Tab Page as an example.

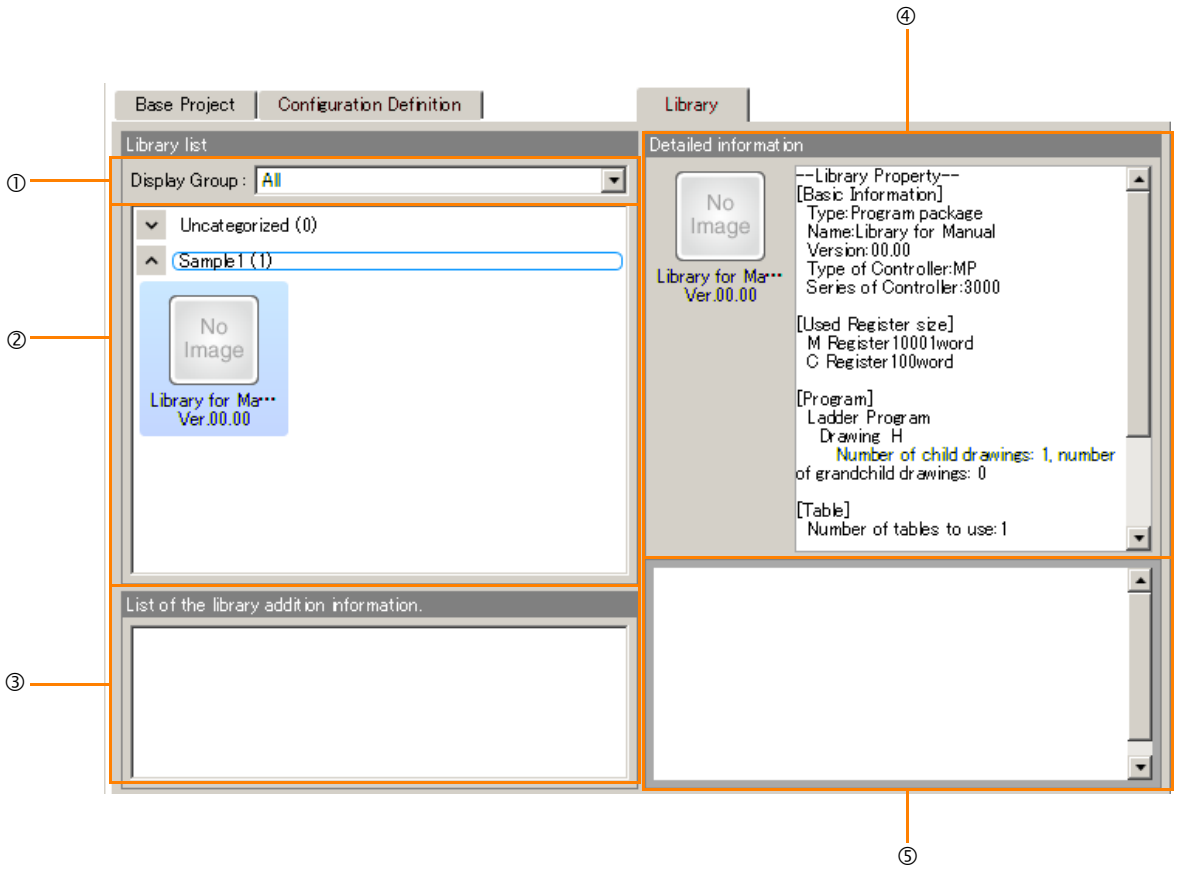
The names and descriptions of the elements in the Configuration Definition Tab Page are identical to those for the Base Project Tab Page.



No.	Item	Description
①	Display Group	Selects the library group displayed in the library list (② area). • All: Shows all libraries. • Unclassified: Shows libraries not belonging to any group. • User-defined Group: Shows libraries belonging to a specified group.
②	Library List	Displays the library list registered to the library catalog based on the settings for the display group (① area).
③*	Applied Package List	To register a library in this list, either double-click or drag and drop a library for a base project package or configuration definition package in the library list. (One base project package can be registered, and multiple configuration definition packages can be registered.)
④*	▲ Button ▼ Button	Change the order of a selected configuration definition package library within the applied package list. Select the target library, and click the ▲ Button or ▼ Button to move it up or down within the list. The order of a base project package library cannot be changed.
⑤	Delete Button	Deletes registered libraries for the base project package and configuration definition package. Select the target library, and click the **Delete** Button.
⑥	Detailed Information	Displays the properties information for the library selected in the library list (② area).

* The information in this item is shared between the Base Project Tab Page and Configuration Definition Tab Page. If the settings for one tab page are revised, the settings for the other tab page are also revised.

Library Tab Page



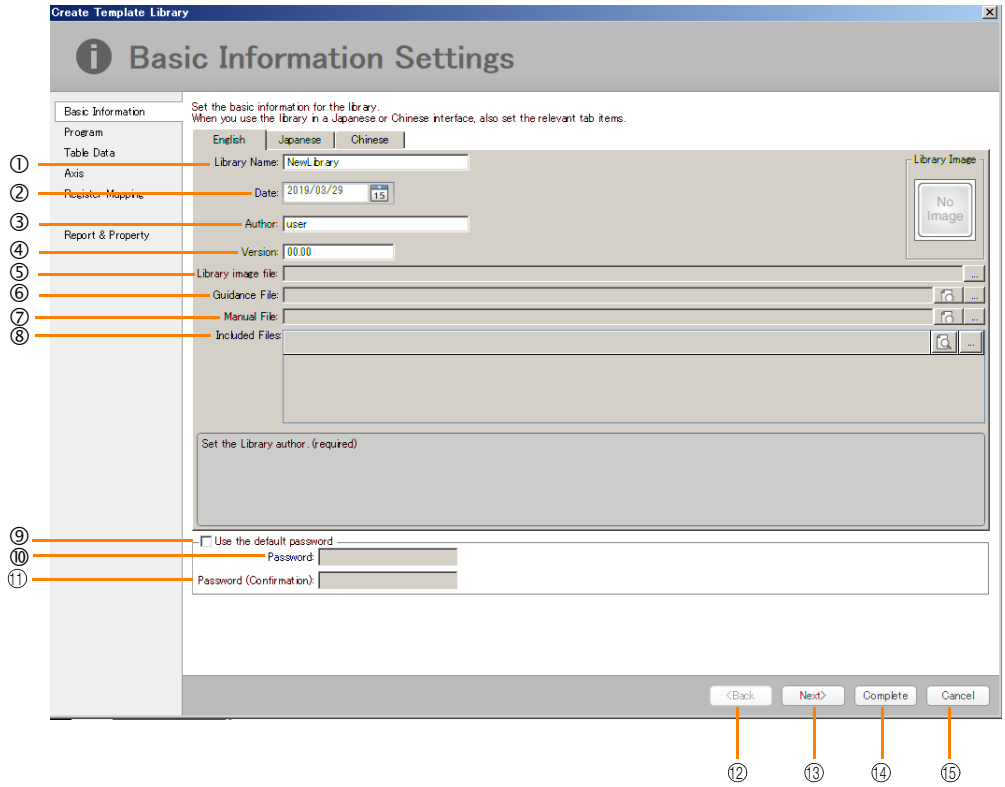
No.	Item	Description
①	Display Group	Selects the library group displayed in the library list (② area). • All: Shows all libraries. • Unclassified: Shows libraries not belonging to any group. • User-defined Group: Shows libraries belonging to a specified group.
②	Library List	Displays the library list registered to the library catalog based on the settings for the display group (① area).
③	List of the library addition information	Displays a list of library information that was previously expanded or saved (library expanded order or assignment information to library).
④	Detailed Information	Displays the properties information for the library selected in the library list (② area).
⑤	Guidance	Displays the information for the guidance file registered to the library selected in the library list (② area).

10.3.2 Basic Information Settings Window

The Basic Information Settings Window will be displayed first when creating a library.

This window is used to set basic information, such as the library name, author, and other details, and to set various information linking to the library after conversion to a library.

After the library is registered, the settings can be viewed as the detailed information of the library.



No.	Item	Description	Setting
①	Library Name	Sets the name of the library to be created.	Optional
②	Date	Sets the date that the library is created.	Optional
③	Author	Sets the author.	Required
④	Version	Sets the version of the library.	Optional
⑤	Library Image File	Selects the image (BMP, etc.) displayed when a library is imported to the catalog. Click the "..." Button at the right end to select the image from the Choose a Library Image Dialog Box.	Optional
⑥	Guidance File	Selects the library description file (TEXT, PDF) displayed when a library is registered. Entering the following information into the guidance file will make it easier to identify the library when it is imported to a project file. <Example of Information Entered into Guidance File> Number of IOs: 128 inputs, 64 outputs Size used: M register 1000 words	Optional
⑦	Manual File	Selects the manual file of the library. There are no restrictions on the manual file. After a library is imported to the project file, this manual file is displayed in **Document** of the System Pane.	Optional
⑧	Included File	Selects a file included within the project file. After a library is imported to the project file, this included file is displayed in **Document** of the System Pane.	Optional
⑨*	Use the default password	Select this check box to set a password for the library.	Optional

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No.	Item	Description	Setting
⑩*	Password	Enter a character string to set as the password.	Optional
⑪*	Password (Confirmation)	To confirm, re-enter the character string to set as the password. Always enter manually without copying the field above.	Optional
⑫	Back Button	This button is always disabled.	–
⑬	Next Button	Displays the next window. If the required fields in this window are not set, next window does not appear.	–
⑭	Complete Button	• When creating a program package, function package, or configuration definition package A dialog box appears with the message “The set value is not correct.”. Click the **OK** Button to display the next window. • When creating a base project package The next window is displayed.	–
⑮	Cancel Button	Cancels creation of the library.	–

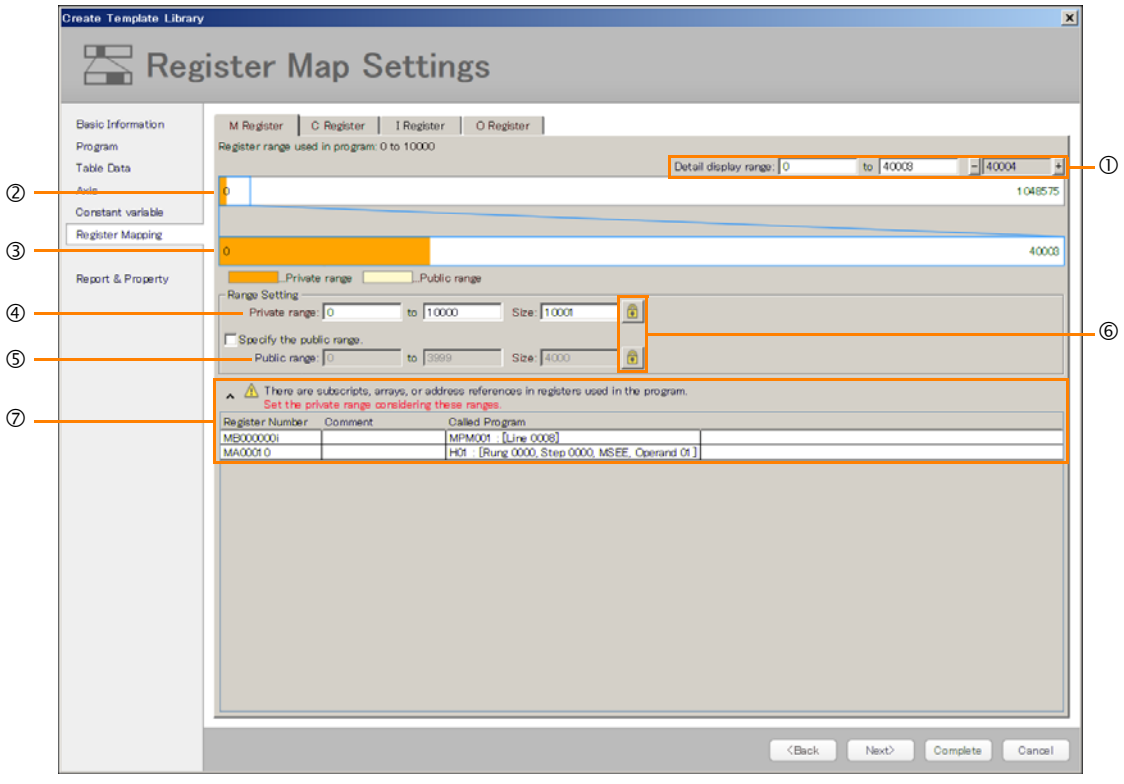
* This item does not appear when creating a configuration definition library.

10.3.3 Register Map Settings Window (at Creation of Library)

The Register Map Settings Window is displayed when creating a library.

In the Register Map Settings Window, the range of registers currently used in the program to export are displayed.

The range of registers can be changed as required.



No.	Item	Description	Setting
①	Detail display range	The range currently displayed in the lower graph is displayed in numeric values. When the blue frame of the upper graph is dragged horizontally, the numeric values of the detail display range also are changed. To considerably change the detail display range, click the **+** or **-** Button.	Required
②	Upper graph	Displays the entire range of registers (in the example above, the entire range of M registers).	Required

Continued on next page.

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No.	Item	Description	Setting
③	Lower graph	This is an enlarged view of the inside of the blue frame in the upper graph. Orange indicates the private range, and yellow indicates the public range.	Required
④	Private range	This is the range of the global registers that are used in the program. When the orange part of the lower graph is dragged horizontally, the numeric values of the private range also are changed. When changing the private range, include the register range that is currently used in the program in the project file. After the private range has been changed, the fields for entering numeric values change color to red if that private range is outside the register range that is currently used in the program in the project file.	Required
⑤	Public range	This is the range of registers to be reserved for sharing between two or more programs (range for performing communication with the touch panel or for transferring data between the libraries). This can be set when the **Specify the public range** Check Box is selected. When the yellow part of the lower graph is dragged horizontally, the numeric values of the public range also are changed.	Optional
⑥	 Button	Clicking the  Button grays out the size field and fixes the size. When the minimum value (or maximum value) is changed in this state, the maximum value (or minimum value) changes based upon the fixed size.	–
⑦	Precautions	If index registers, array registers, or address registers are used in the program, the used registers will be displayed here. If index registers, array registers, or address registers are used in the program, the range of registers used in the program cannot be completely identified. When setting the private range, take the range of these registers into consideration.	–

10.4 Creating a Library

Programs, user functions, information on which project files are based, and module configuration definitions can be exported from the project file to create libraries.

This section describes the procedure for creating a library


Important

Once a library is created, it cannot be edited.
If you want to change the content of an existing library, create a new one.

10.4.1 Operation Procedures Common for All Libraries

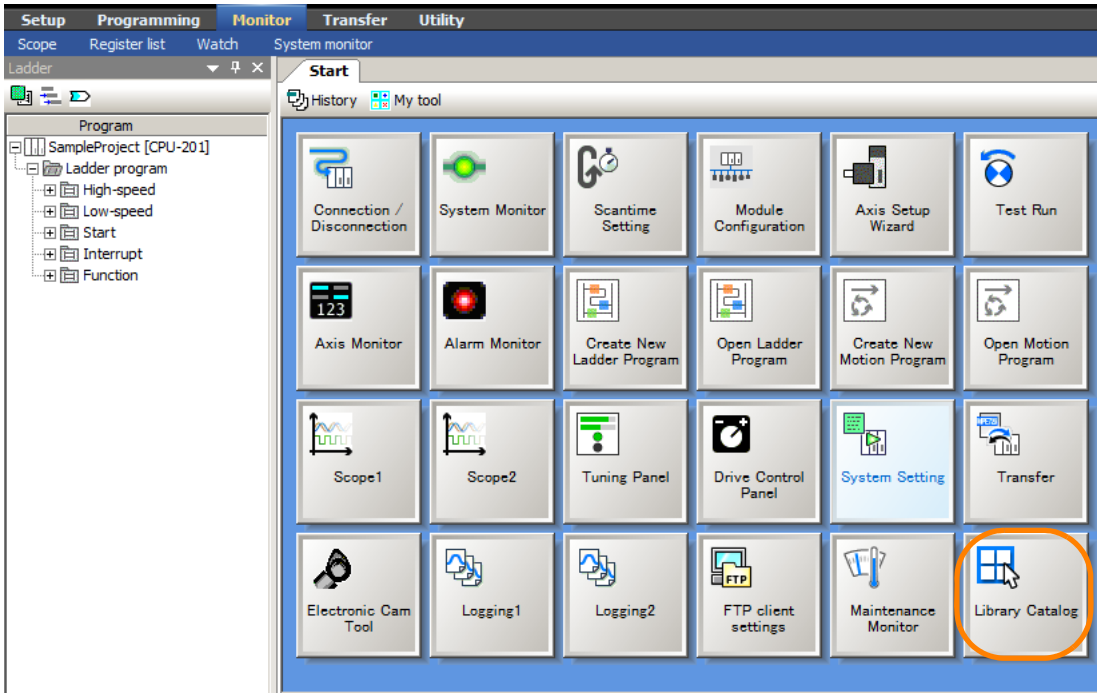
There are four types of libraries: Program package, function package, base project package, and configuration definition package.

The first operations when creating a library are the same for all four types.

The procedures common for all libraries are shown below.

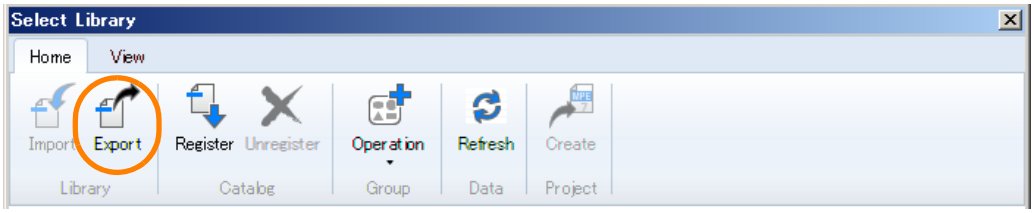
1. Open the project file that will be used to create the library.
   Refer to the following section for the detailed procedure.
   ☞ *4.11.2 Opening an Existing Project File* on page 4-42

2. Click the **Library Catalog** Button on the My Tool View.

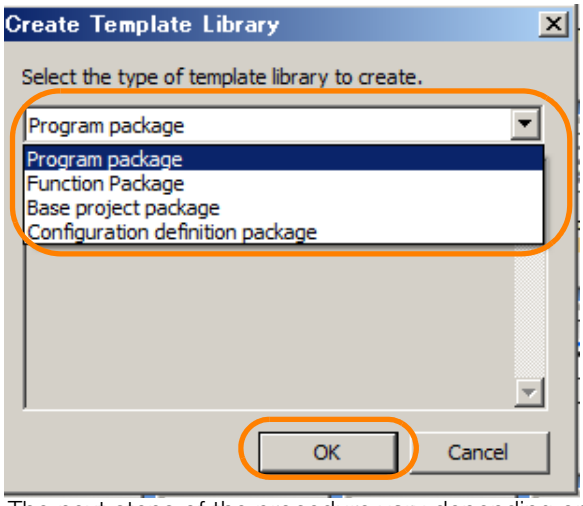


The Select Library Window will be displayed.

3. Click **Export**.



4. Select the type of library to be created, and click the **OK** Button.



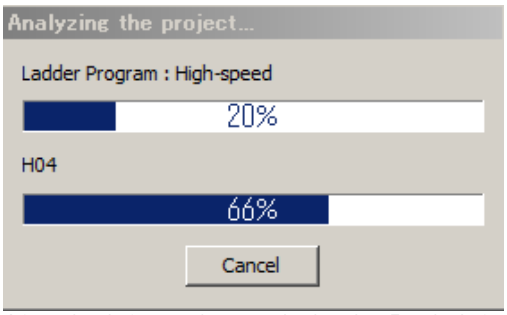
The next steps of the procedure vary depending on the selected item. Refer to the sections below based on the selected item.

Item	Reference
Program package	☞ *10.4.2 Creating a Program Package* on page 10-13
Function package	☞ *10.4.3 Creating a Function Package* on page 10-18
Base project package	☞ *10.4.4 Creating a Base Project Package* on page 10-20
Configuration definition package	☞ *10.4.5 Creating a Configuration Definition Package* on page 10-22

10.4.2 Creating a Program Package

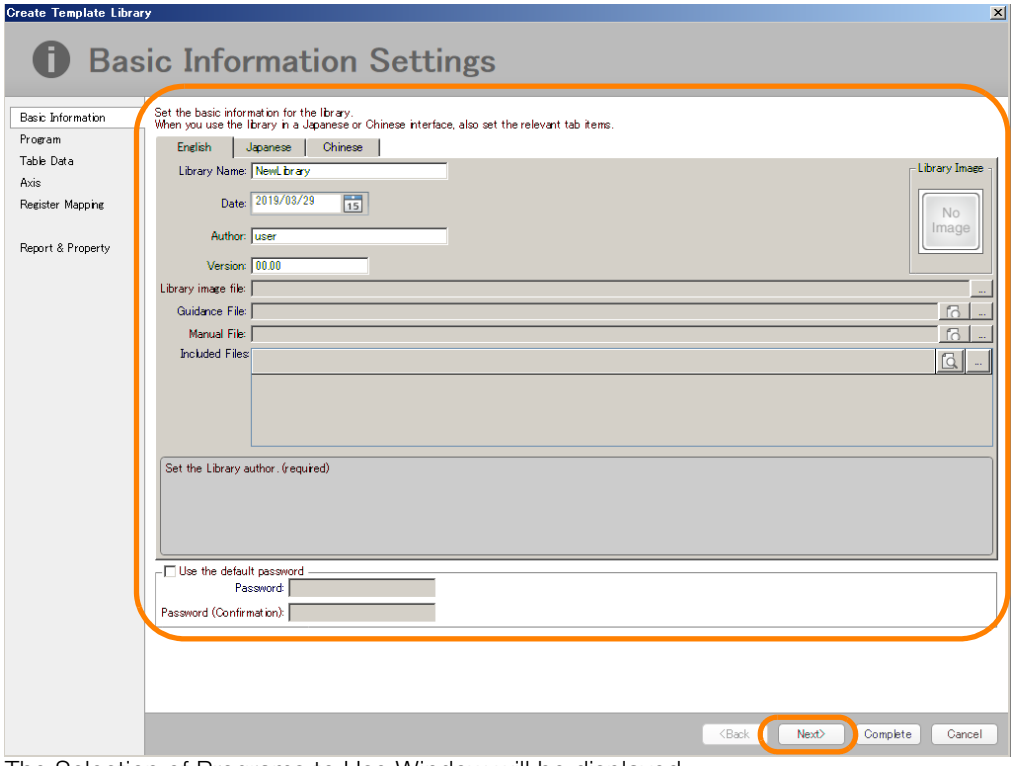
Use the following procedure to create a program package.

1. Perform the operations by referring to the section below.
   ☞ *10.4.1 Operation Procedures Common for All Libraries* on page 10-12
   Information analysis (registers, axis usage status, and other information collection) for the target project file will be performed.



After the information analysis, the Basic Information Settings Window will be displayed.

2. Set the basic information, and click the **Next** Button.
Refer to the following section for details on the Basic Information Settings Window.
☞ *10.3.2 Basic Information Settings Window* on page 10-9

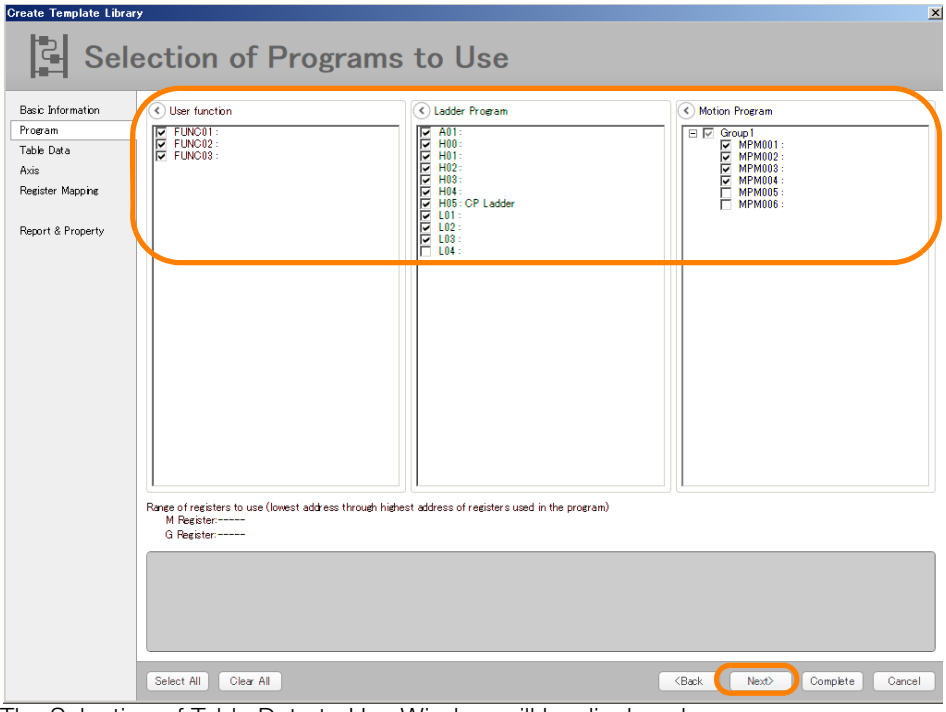


The Selection of Programs to Use Window will be displayed.

3. Select the check boxes for the user function, ladder program, and motion program that will be used, and click the **Next** Button.

Information

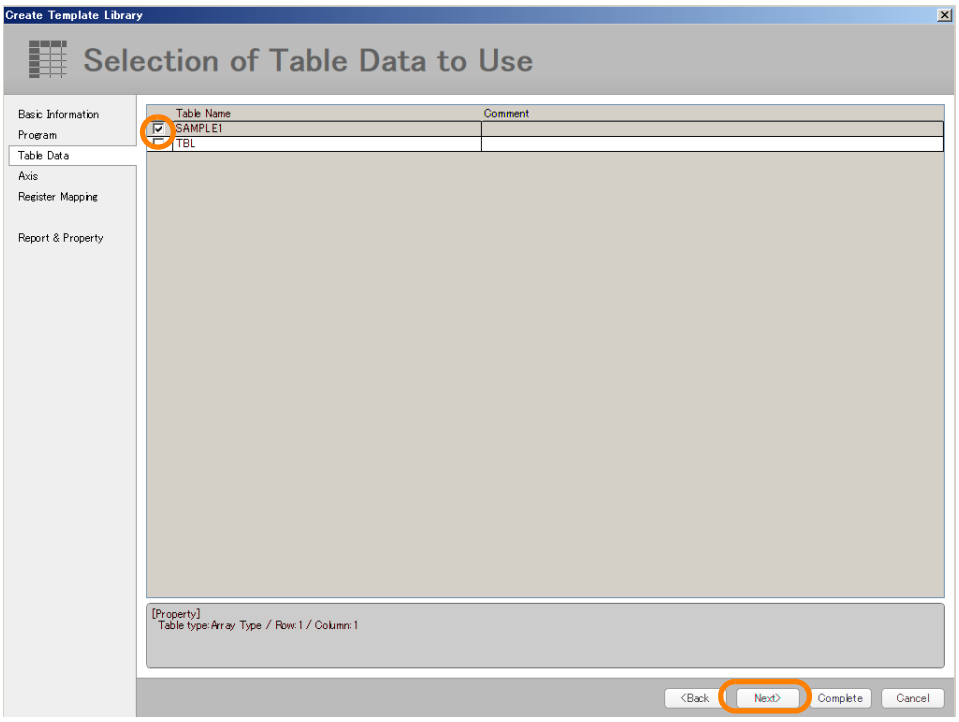
- When a check box is selected, the dependency relationship is automatically analyzed, and the check boxes for the dependent functions and motion programs are also selected. After the check boxes are selected automatically, you can select or clear the check individually.
- Clicking the **Select All** Button selects all check boxes.
  Clicking the **Clear All** Button clears all check boxes.



The Selection of Table Data to Use Window will be displayed.

4. Select the check boxes for the table data that will be used, and click the **Next** Button.

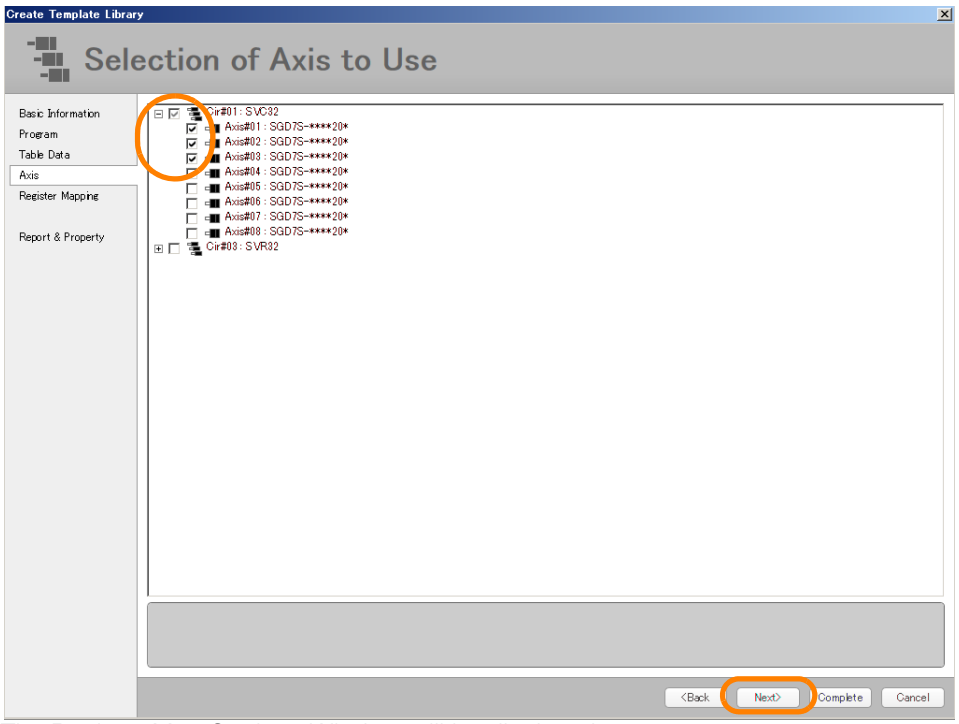
Information This window does not appear if there is no table data in the project file. If the window is not displayed, proceed to the next step.



The Selection of Axis to Use Window will be displayed.

5. Select the check boxes for the axes that will be used, and click the **Next** Button.

Information The axes used in the program selected in the previous window are analyzed by the system, and the check boxes are selected automatically. However, if a motion register is specified indirectly in the program, the axes that are used cannot be analyzed by the system. If this happens, a warning will be displayed. When a warning appears, confirm the selected check boxes for the axes to be used, and if necessary, manually adjust the selected check boxes.

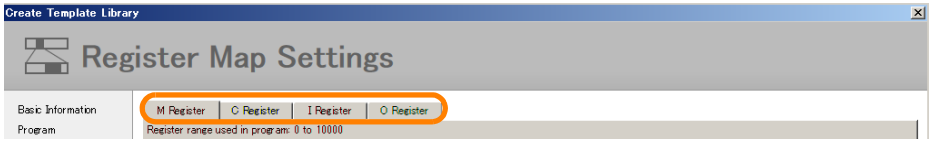


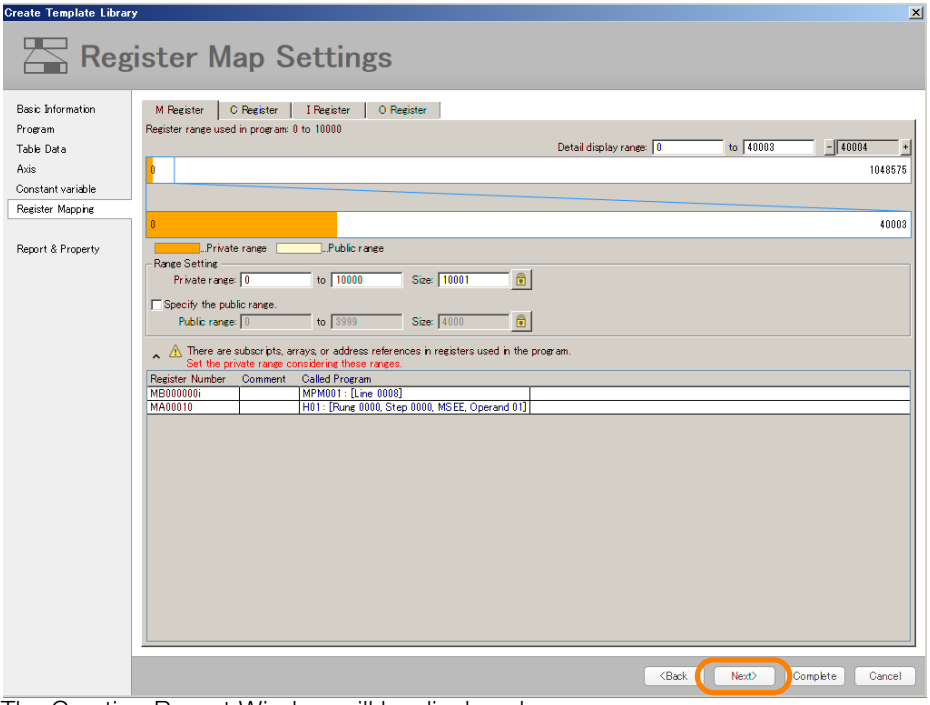
The Register Map Settings Window will be displayed.

6. Set the register range that is used in the program selected in the previous window, and click the **Next** Button.
Refer to the following section for details on this window.
☞ *10.3.3 Register Map Settings Window (at Creation of Library)* on page 10-10

Information

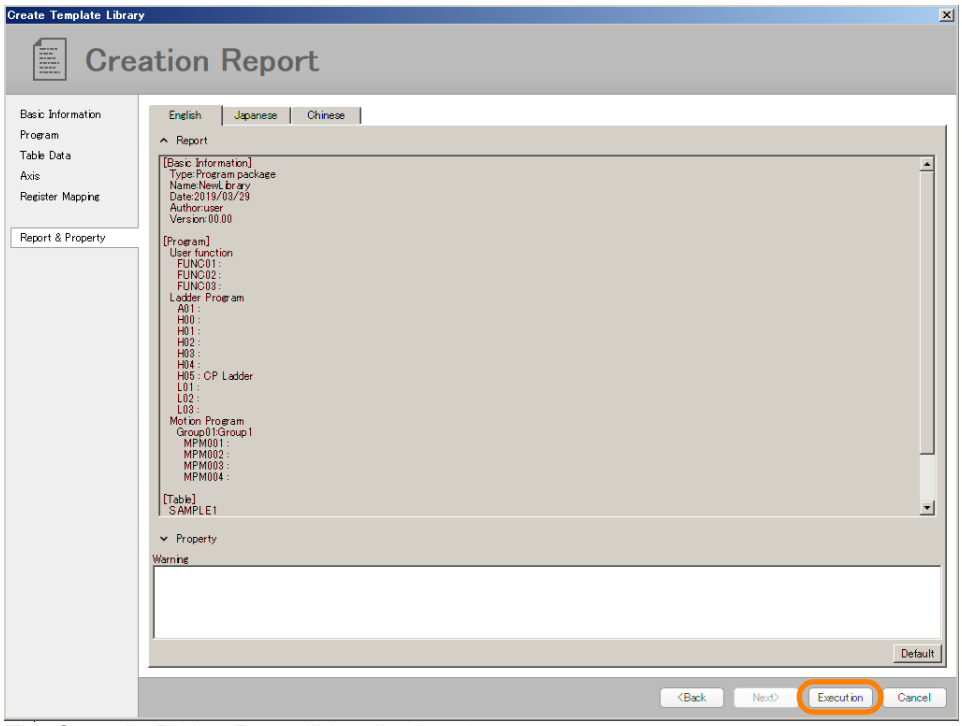
The register types are divided by tabs. Make the settings for all tab pages.





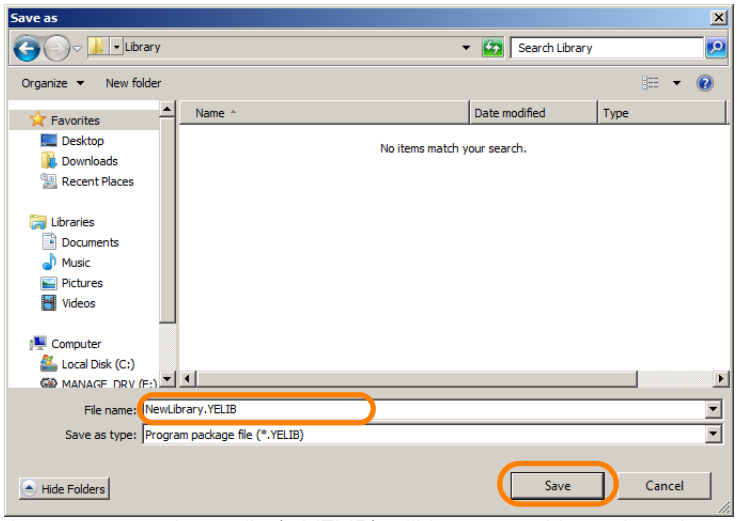
The Creation Report Window will be displayed.

7. The information that was set in the previous window will be displayed. Check this information, and click the **Execution** Button.
To change the settings, click the **Back** Button until the target window is displayed.



The Save As Dialog Box will be displayed.

8. Set the saving location and file name, and click the **Save** Button.



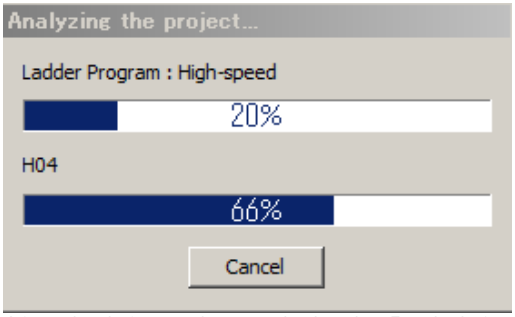
A program package file (*.YELIB) will be created based on these settings.

This concludes the procedure.

10.4.3 Creating a Function Package

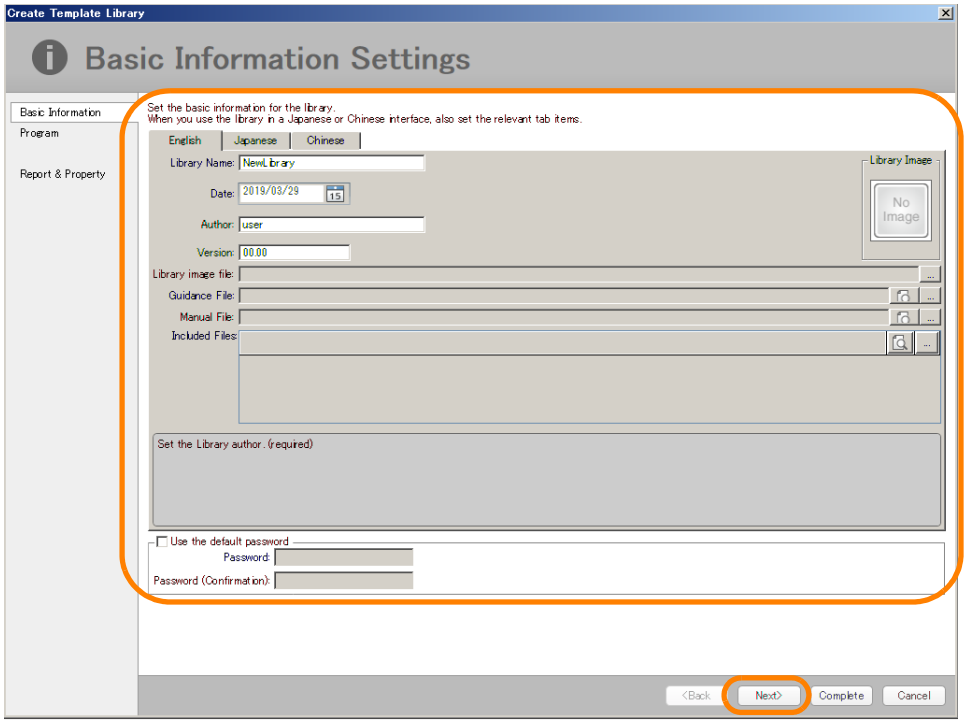
Use the following procedure to create a function package.

1. Perform the operations by referring to the section below.
   ☞ *10.4.1 Operation Procedures Common for All Libraries* on page 10-12
   Information analysis (registers, axis usage status, and other information collection) for the target project file will be performed.



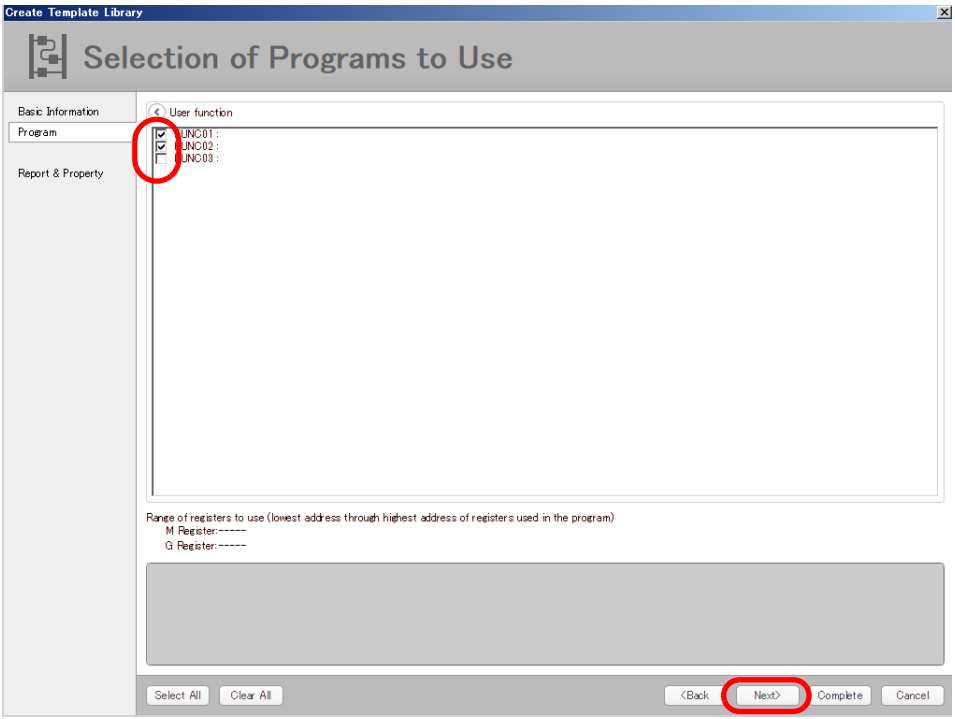
   After the information analysis, the Basic Information Settings Window will be displayed.

2. Set the basic information, and click the **Next** Button.
   Refer to the following section for details on the Basic Information Settings Window.
   ☞ *10.3.2 Basic Information Settings Window* on page 10-9



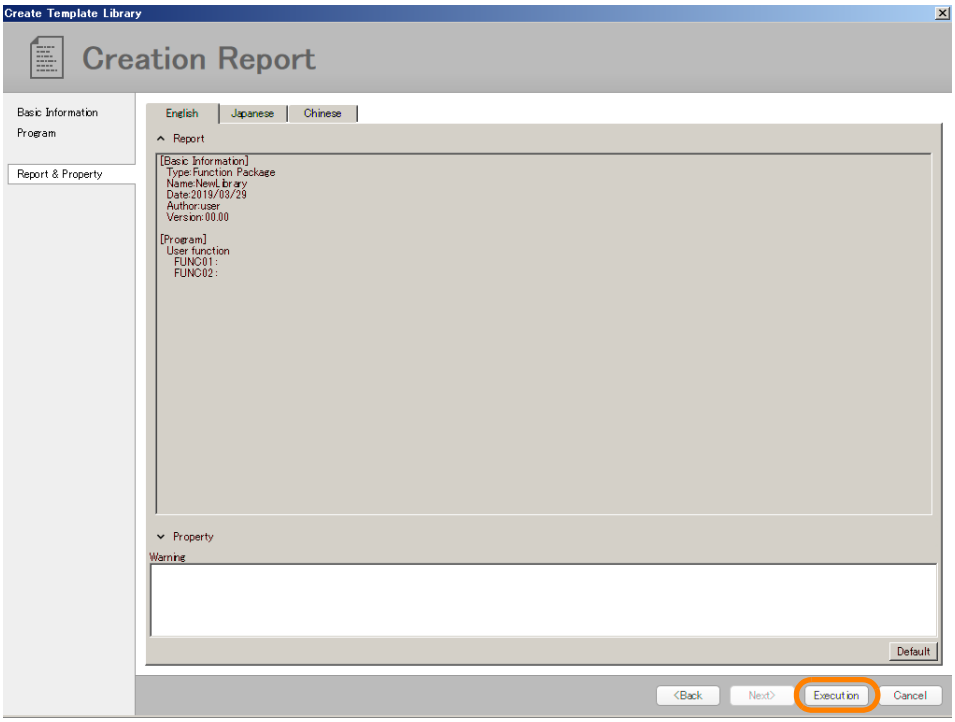
   The Selection of Programs to Use Window will be displayed.

3. Select the check boxes for the user functions that will be used, and click the **Next** Button.



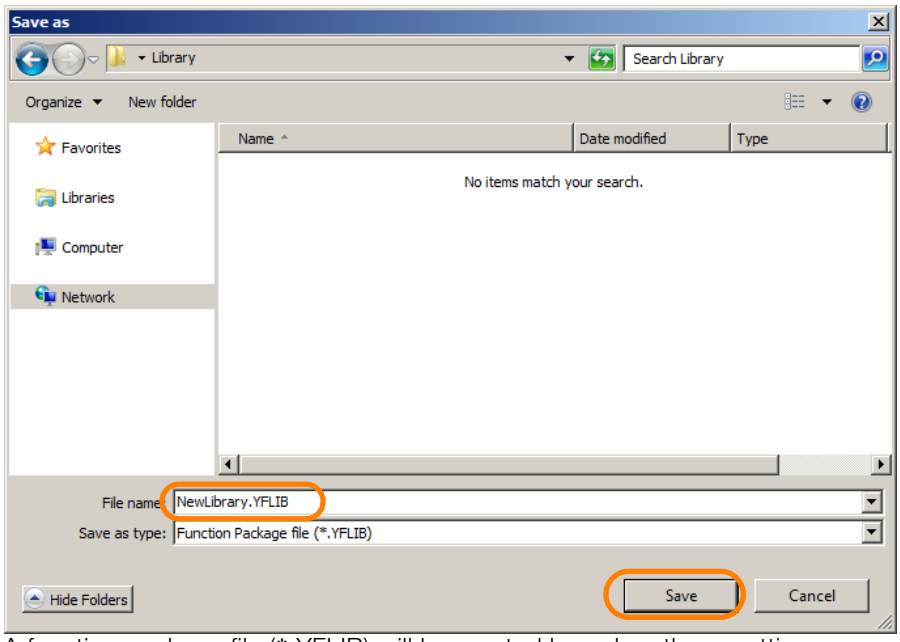
The Creation Report Window will be displayed.

4. The information that was set in the previous window will be displayed. Check this information, and click the **Execution** Button.
To change the settings, click the **Back** Button until the target window is displayed.



The Save As Dialog Box will be displayed.

5. Set the saving location and file name, and click the **Save** Button.



A function package file (*.YFLIB) will be created based on these settings.

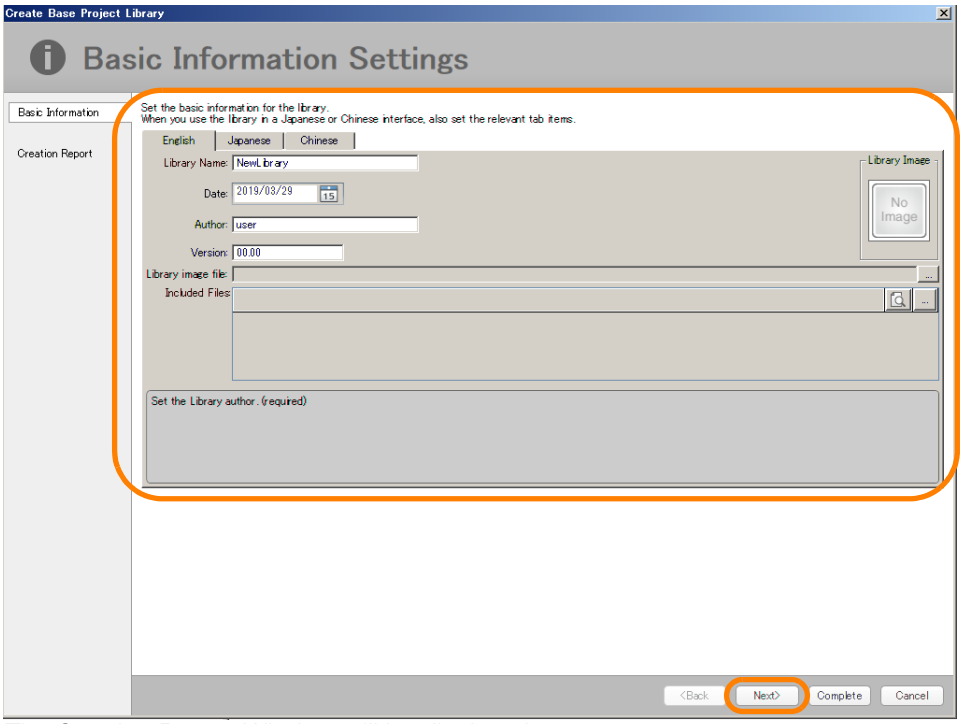
This concludes the procedure.

10.4.4 Creating a Base Project Package

Use the following procedure to create a base project package.

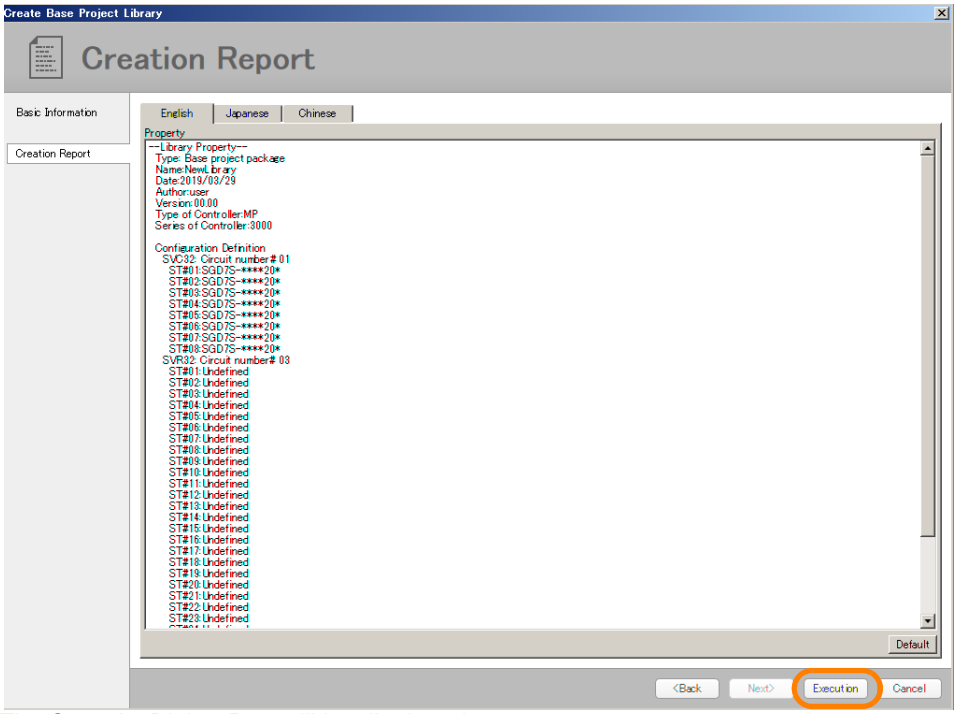
1. Perform the operations by referring to the section below.
   ☞ *10.4.1 Operation Procedures Common for All Libraries* on page 10-12
   The Basic Information Settings Window will be displayed.

2. Set the basic information, and click the **Next** Button.
   Refer to the following section for details on the Basic Information Settings Window.
   ☞ *10.3.2 Basic Information Settings Window* on page 10-9



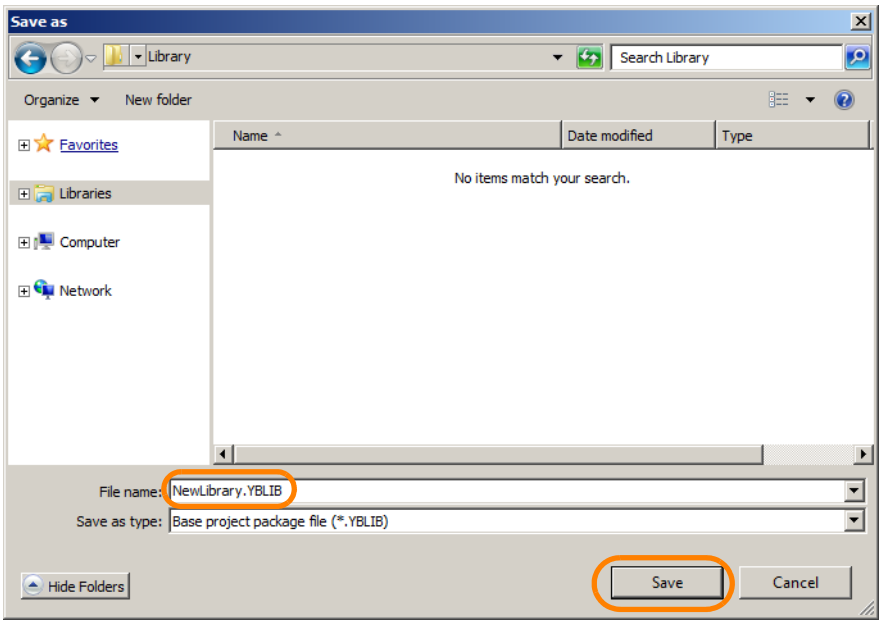
The Creation Report Window will be displayed.

3. The information that was set in the previous window will be displayed. Check this information, and click the **Execution** Button.
To change the settings, click the **Back** Button until the target window is displayed.



The Save As Dialog Box will be displayed.

4. Set the saving location and file name, and click the **Save** Button.



A base project package file (*.YBLIB) will be created based on these settings.

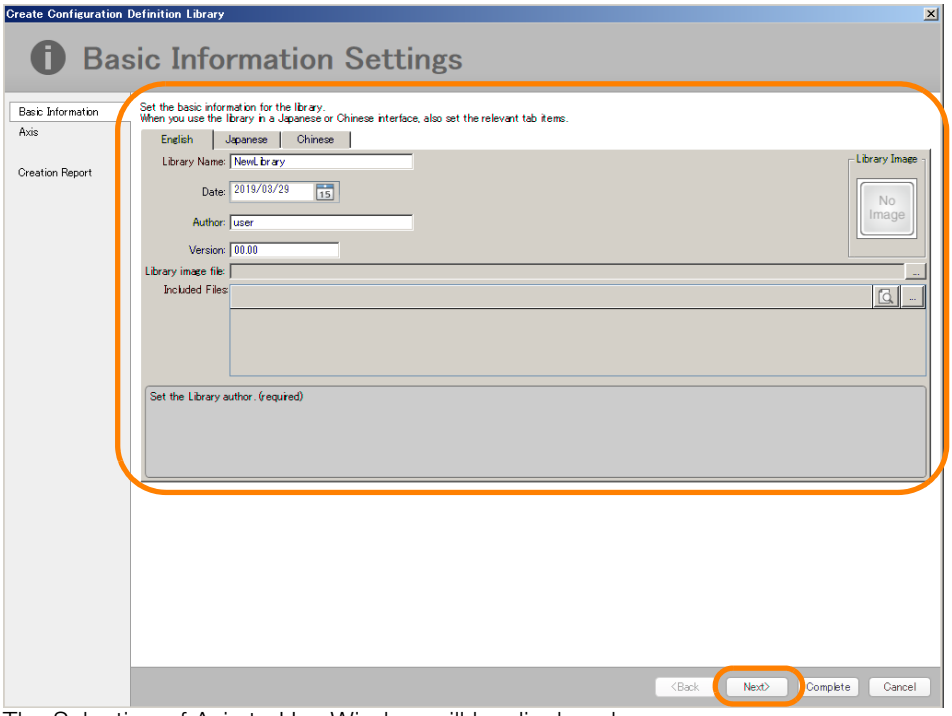
This concludes the procedure.

10.4.5 Creating a Configuration Definition Package

Use the following procedure to create a configuration definition package.

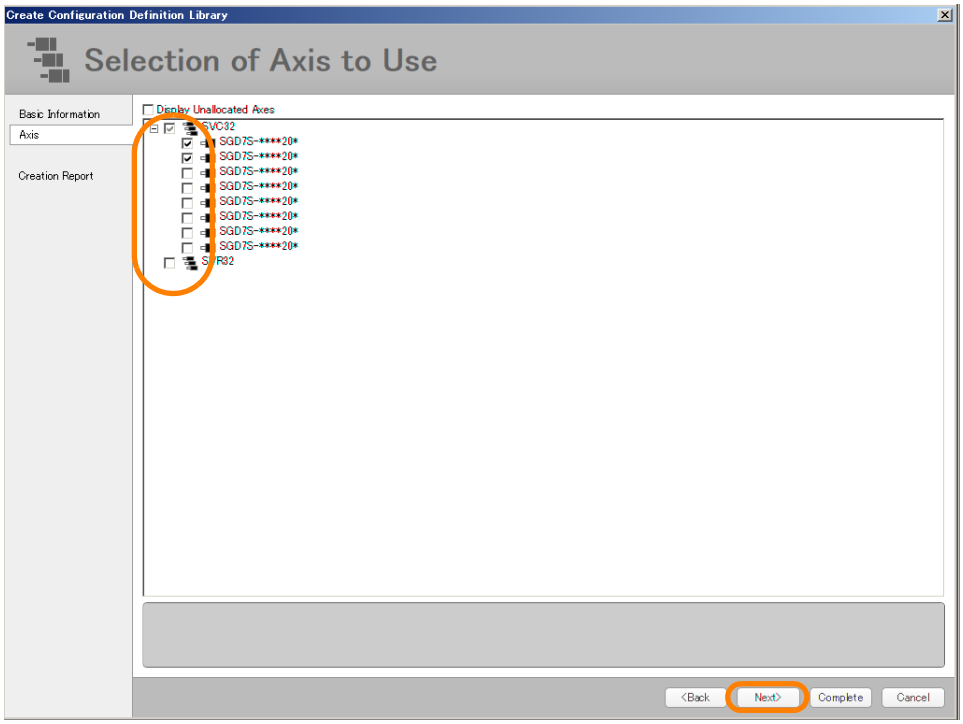
1. Perform the operations by referring to the section below.
   ☞ *10.4.1 Operation Procedures Common for All Libraries* on page 10-12
   The Basic Information Settings Window will be displayed.

2. Set the basic information, and click the **Next** Button.
   Refer to the following section for details on the Basic Information Settings Window.
   ☞ *10.3.2 Basic Information Settings Window* on page 10-9



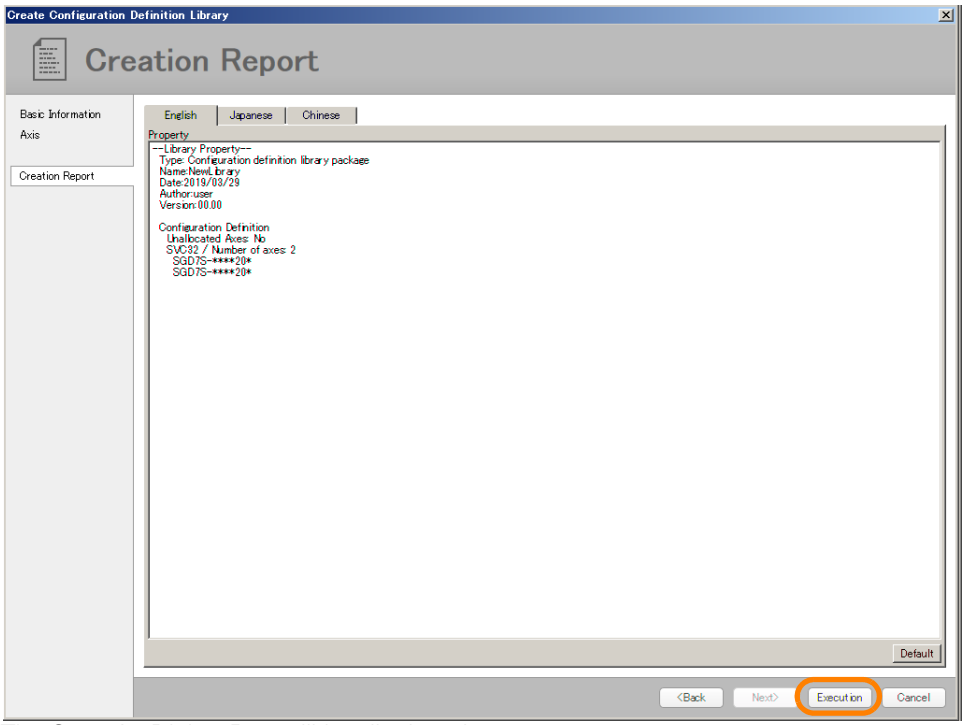
The Selection of Axis to Use Window will be displayed.

3. Select the axes that will be used, and click the **Next** Button.



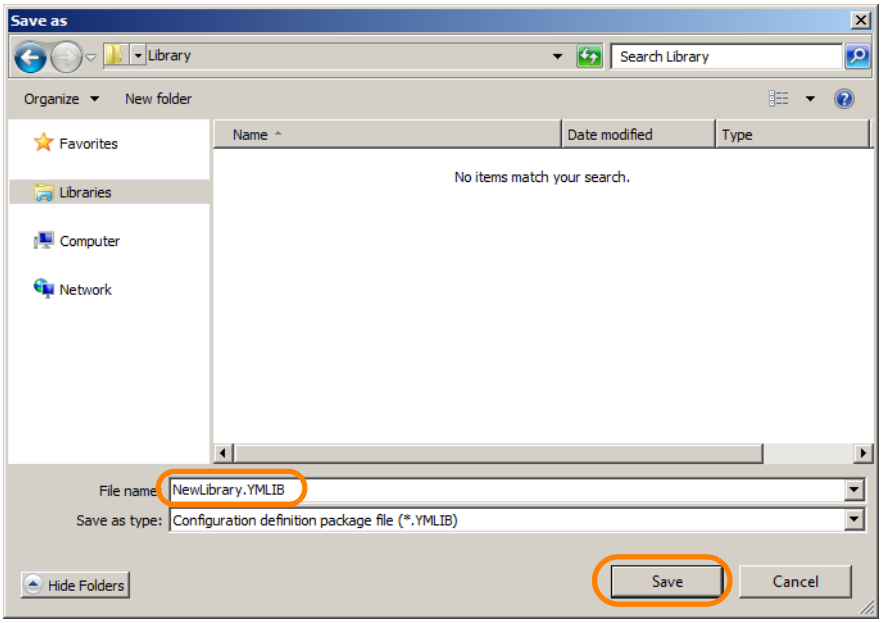
The Creation Report Window will be displayed.

4. The information that was set in the previous window will be displayed. Check this information, and click the **Execution** Button.
To change the settings, click the **Back** Button until the target window is displayed.



The Save As Dialog Box will be displayed.

5. Set the saving location and file name, and click the **Save** Button.



A configuration definition package file (*.YMLIB) will be created based on these settings.

This concludes the procedure.

10.5 Registering a Library to the MPE720

Use the following procedure to register a created library to the MPE720.

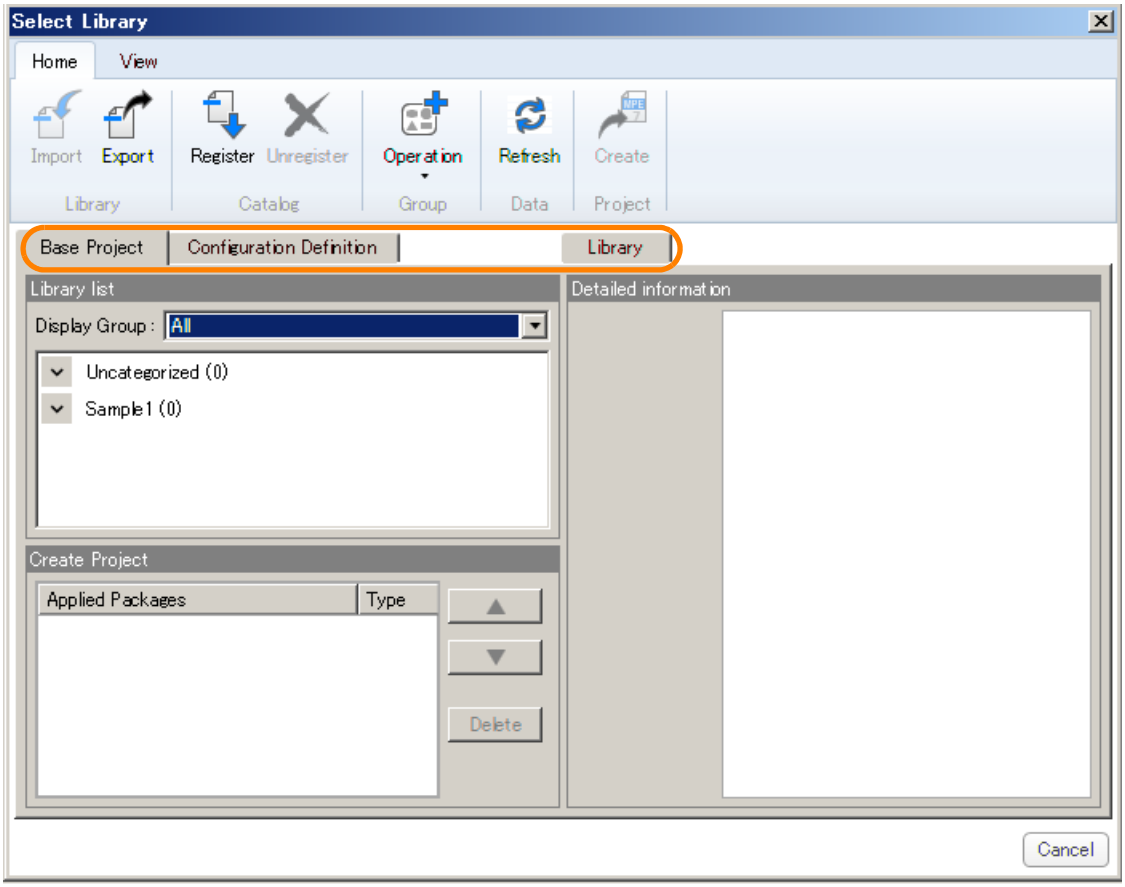
Information Refer to the following section for details on how to create libraries.
☞ *10.4 Creating a Library* on page 10-12

1. Open the library catalog.
The Select Library Window will be displayed.

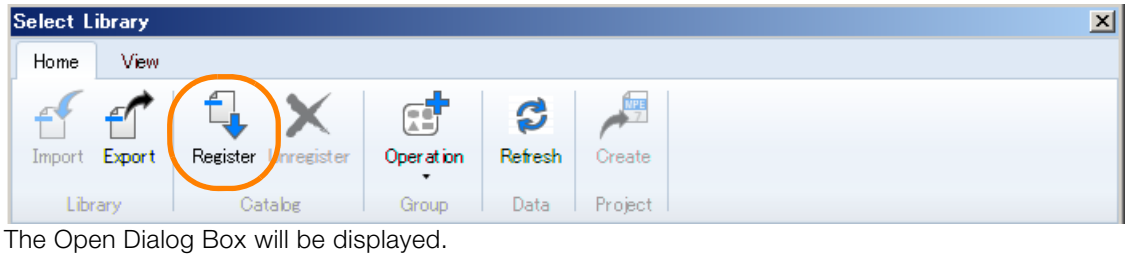
Information Refer to the following section for details on how to open the library catalog.
☞ *10.2 Opening a Library Catalog* on page 10-3

2. Open the tab page for the library to be imported.
The tab pages for the library to be imported are shown in the table below.

Item	Tab Page Name
Program package	Library Tab Page
Function package	
Base project package	Base Project Tab Page
Configuration definition package	Configuration Definition Tab Page



3. Click **Register**.



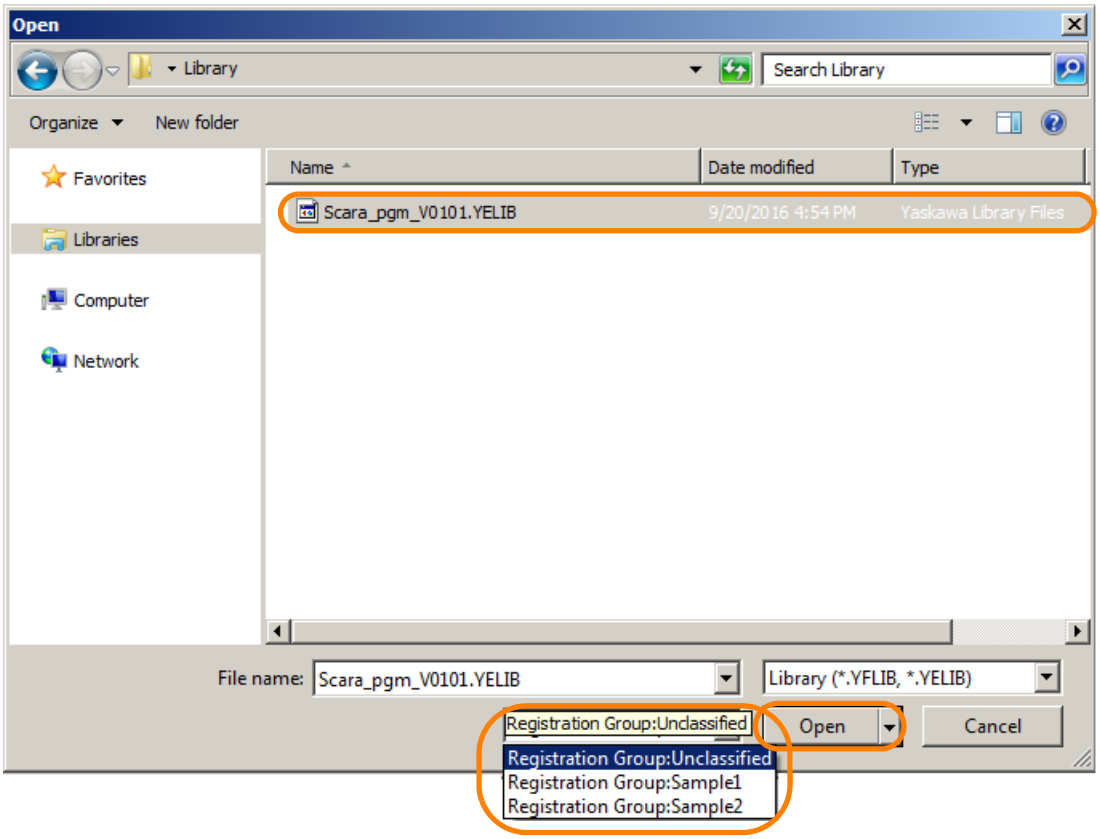
The Open Dialog Box will be displayed.

4. Select the library file to be imported and registration group, and click the **Open** Button.

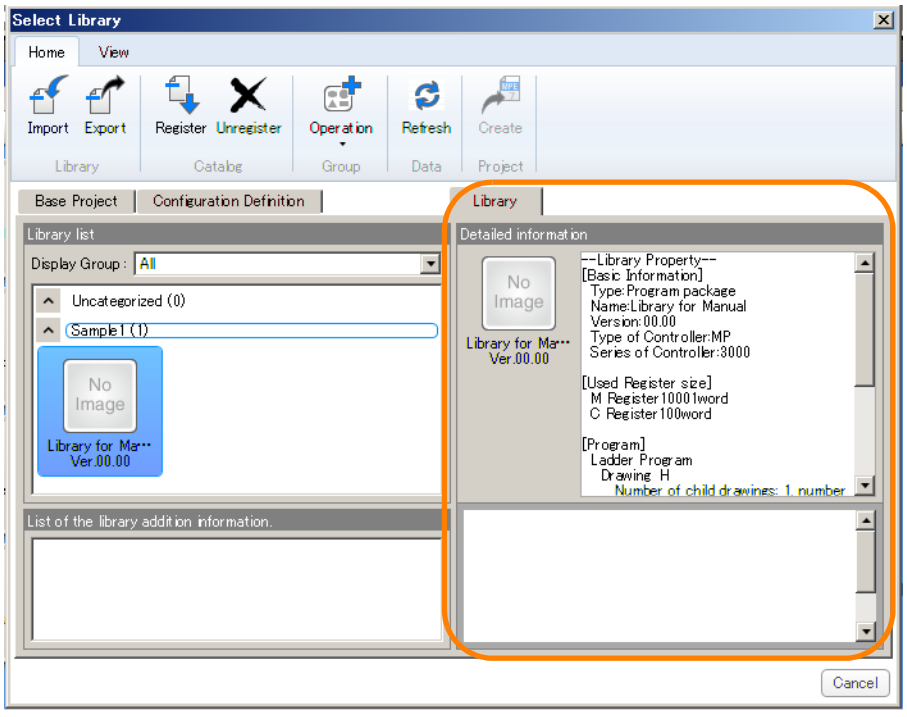
Information

The currently-registered groups are displayed as options. To classify the library file to be imported into a group that is not available as a option, first register it to one of the currently-registered groups, and then change the group later. Refer to the following section for details on adding and changing a group.

☞ *10.6 Classifying Libraries in Groups* on page 10-26



The data will be imported based on the settings.



Details on the library that was selected in the library list are displayed here.

This concludes the procedure.

10.6 Classifying Libraries in Groups

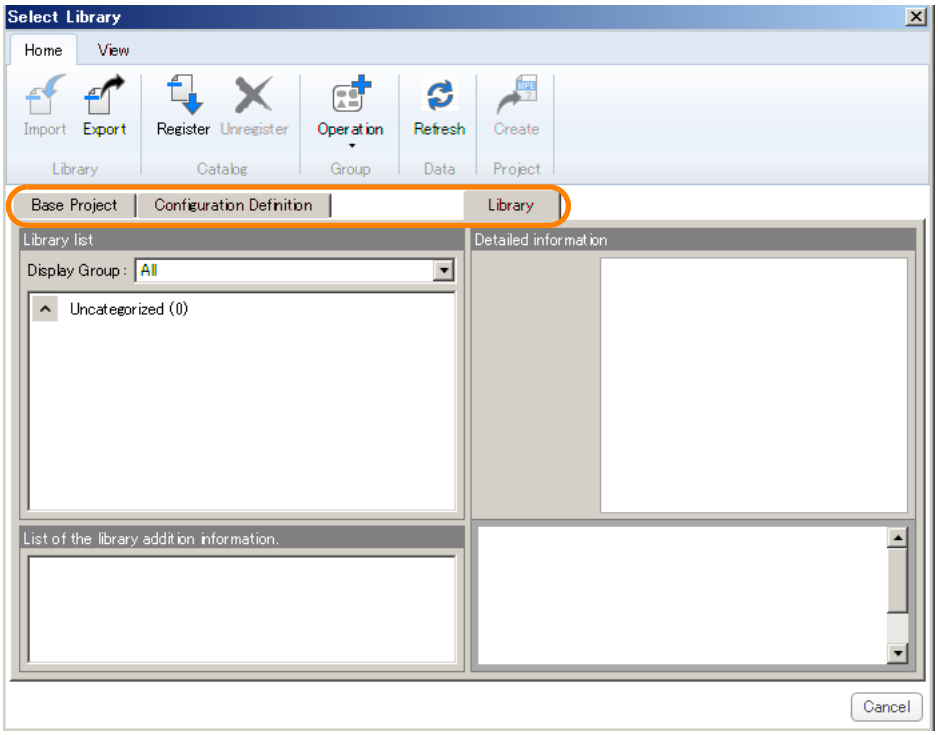
Libraries imported to the MPE720 can be easily managed if they are classified into groups. This section shows the procedures for groups.

10.6.1 Adding a Group

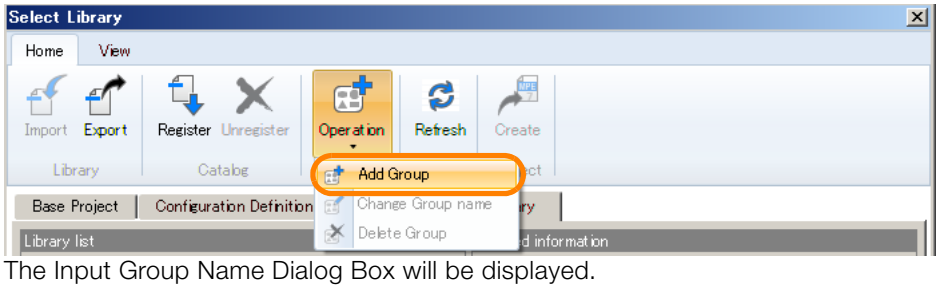
1. Open the library catalog.
   The Select Library Window will be displayed.

   Information
   Refer to the following section for details on how to open the library catalog.
   ☞ *10.2 Opening a Library Catalog* on page 10-3

2. Open the tab page where the group will be added.



3. Click **Operation** - **Add Group**.



   The Input Group Name Dialog Box will be displayed.

4. Enter the group name, and click the **OK** Button.

   The created group will be added to the library list.

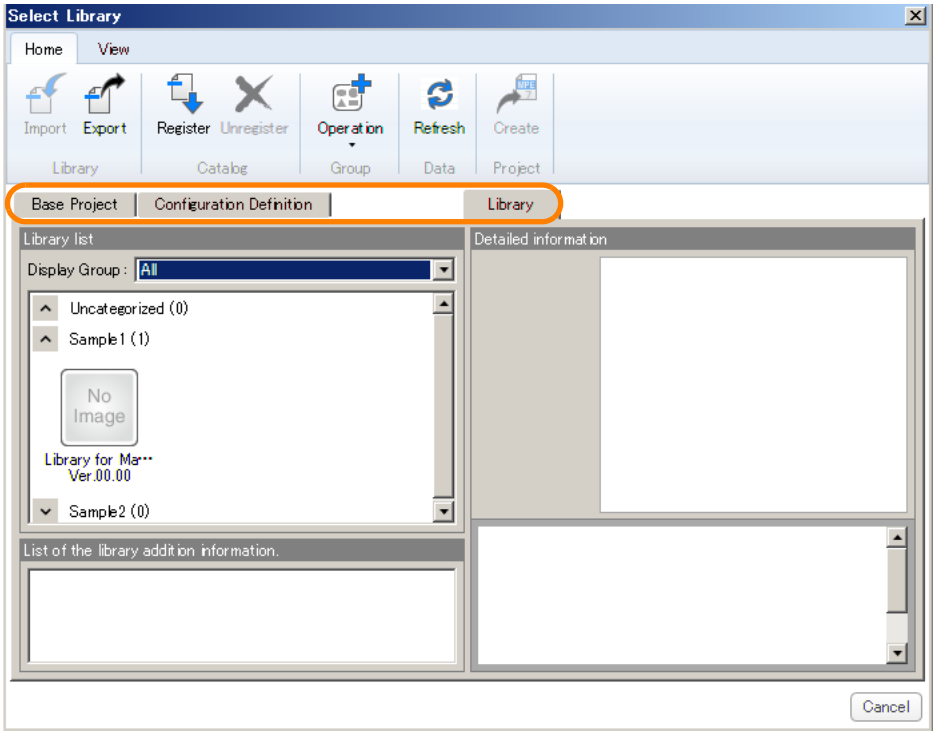
This concludes the procedure.

10.6.2 Changing a Group

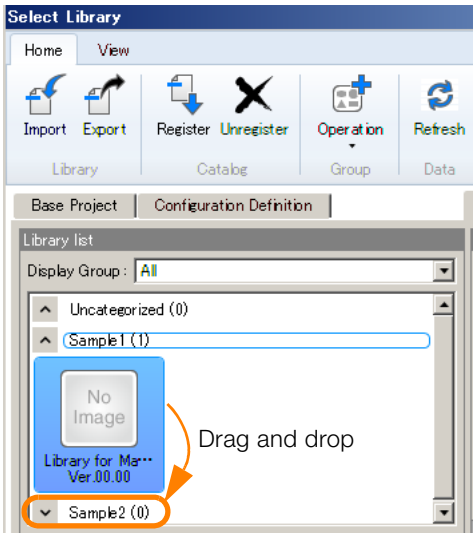
1. Open the library catalog.
   The Select Library Window will be displayed.

   Information Refer to the following section for details on how to open the library catalog.
   ☞ *10.2 Opening a Library Catalog* on page 10-3

2. Open the tab page where the group will be changed.



3. Drag and drop the library to the group where the library will be moved to. To move multiple libraries, select the libraries while holding down the **Shift** Key.



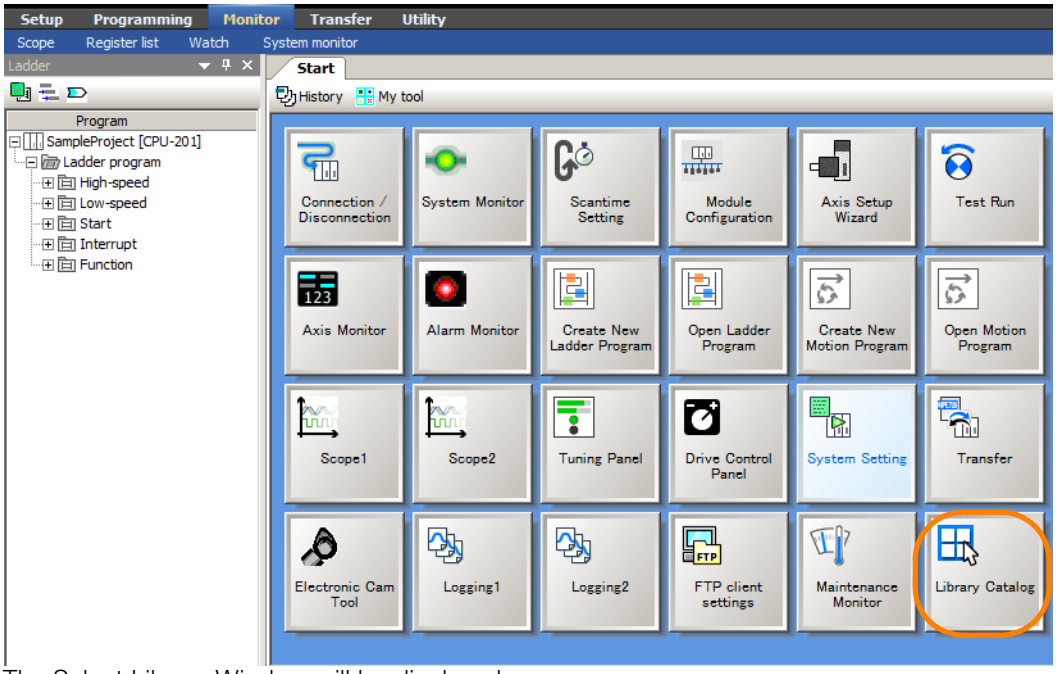
This concludes the procedure.

10.7 Importing Libraries to a Project File

Use the following procedure to import libraries to a project file.

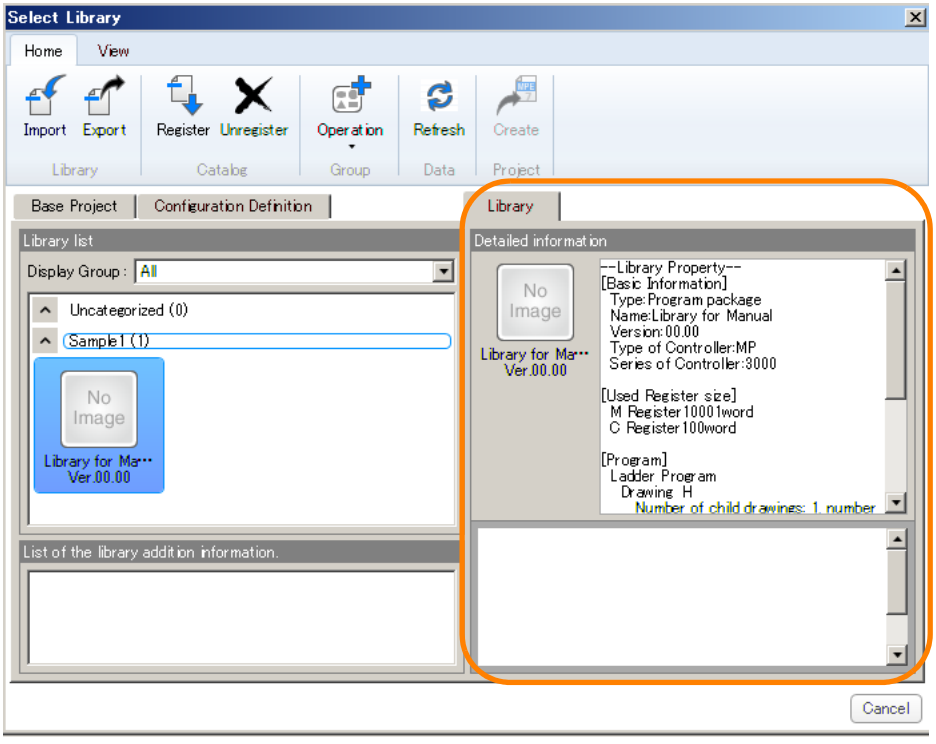
1. Open the project file where the library will be imported.
   Refer to the following section for the detailed procedure.
   ☞ *4.11.2 Opening an Existing Project File* on page 4-42

2. Click the **Library Catalog** Button on the My Tool View.



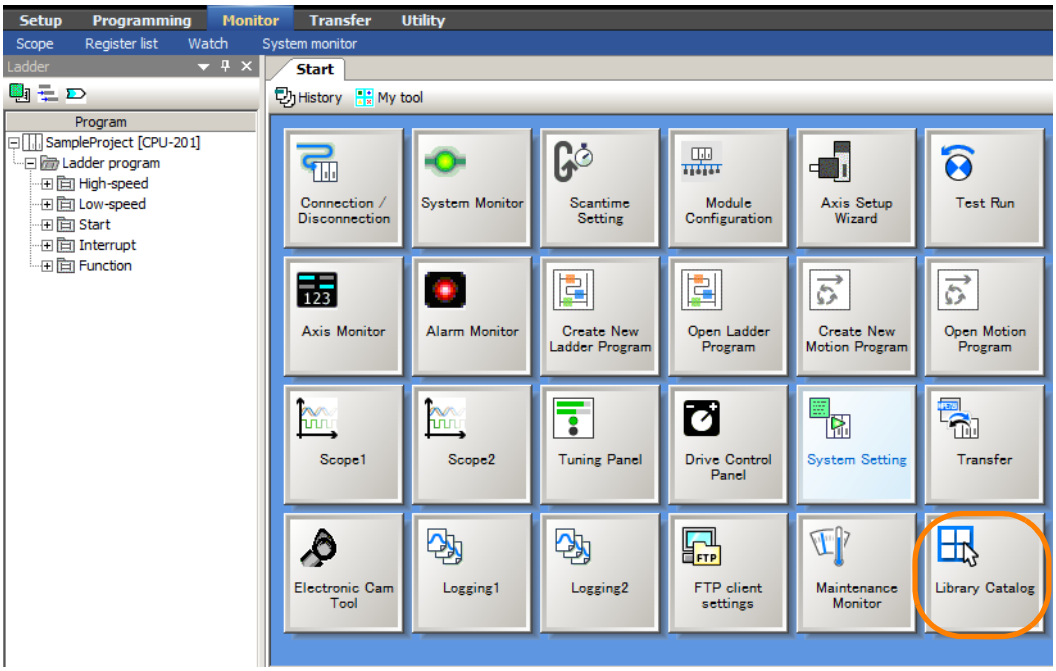
The Select Library Window will be displayed.

3. Open the Library Tab Page, select the library to be imported, and check the axes, module, and I/O assignments in **Detailed information**.



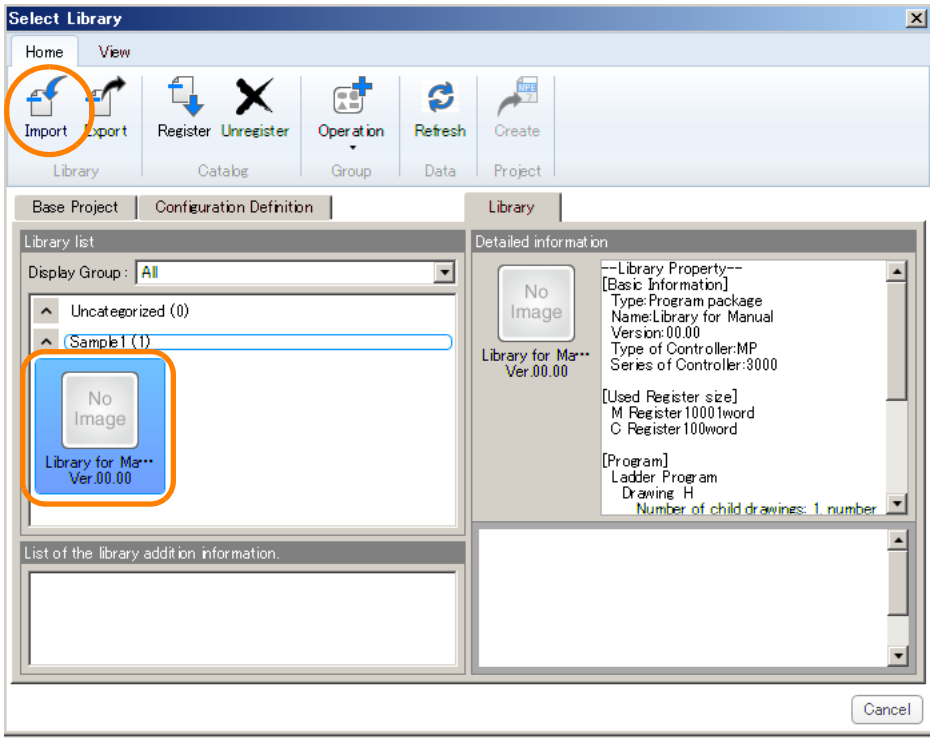
4. Set the module configuration definition to match the library information (axes, module, and I/O assignments) that is imported.
   Refer to the following section for details on module configuration definitions.
   ☞ *4.3 Manually Setting the Module Configuration* on page 4-7

5. Click the **Library Catalog** Button on the My Tool View.

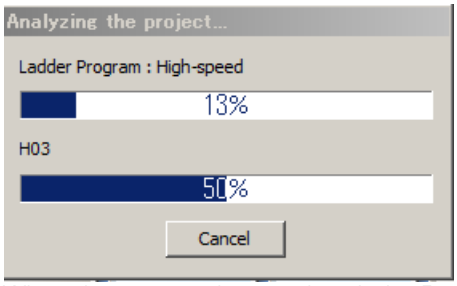


The Select Library Window will be displayed.

6. Open the Library Tab Page, select the library to be imported, and click **Import**.



The analysis process will be executed for the selected library.

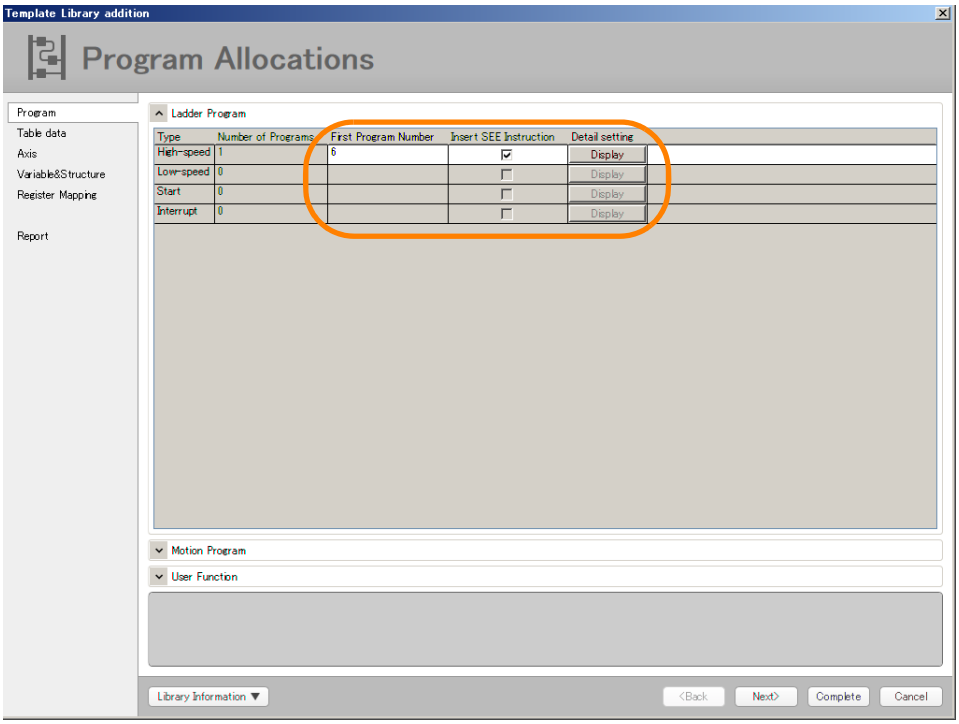


When the process is completed, the Program Allocations Window will be displayed.

7. Check that there are no problems with the first program number assigned to the project file and the SEE instruction insertion settings for the ladder program, motion program, and user function in the library.
To change the settings, click the **Display** Button.

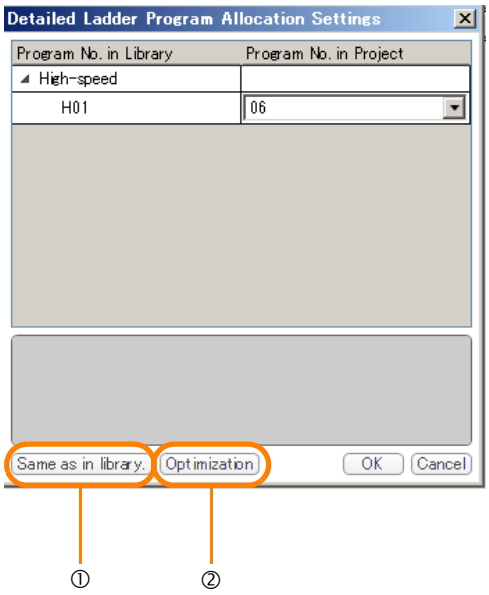
Information

The first program number in the library is found automatically by the system. The system automatically sets the first program number by referring to the search results and open program numbers in the project file.



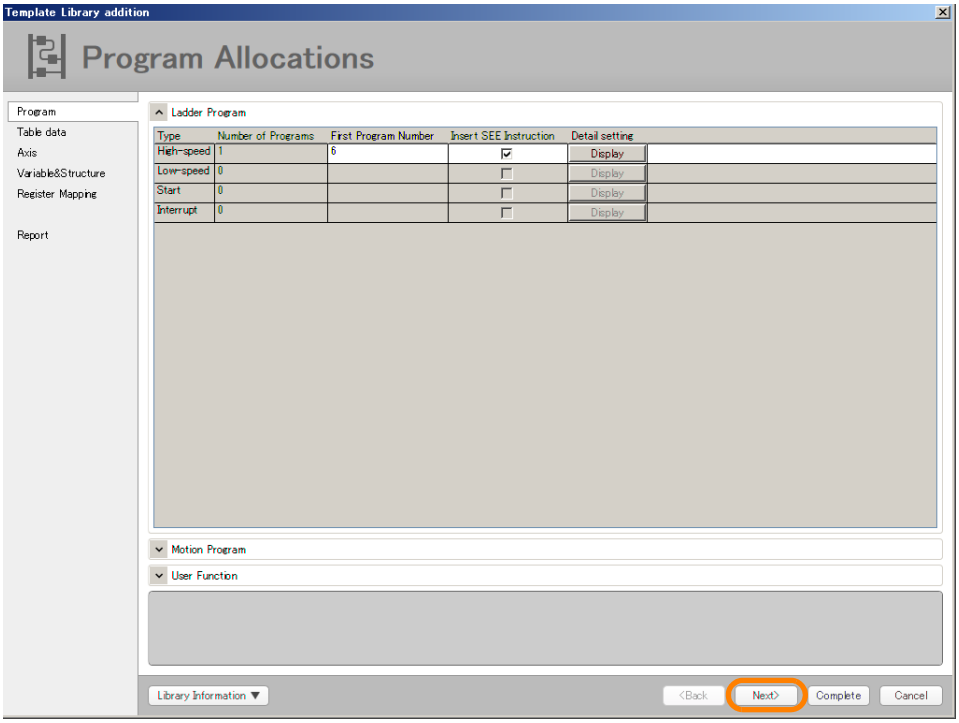
The Detailed Allocation Settings Dialog Box will be displayed.

8. Change the number in **Program No. in Project**, and click the **OK** Button.



No.	Item	Description
①	Same as in library	Sets the same number as the program number of the library to the program at the import target location.
②	Optimization	Sets the smallest consecutive number that can be assigned to the program at the import target location.

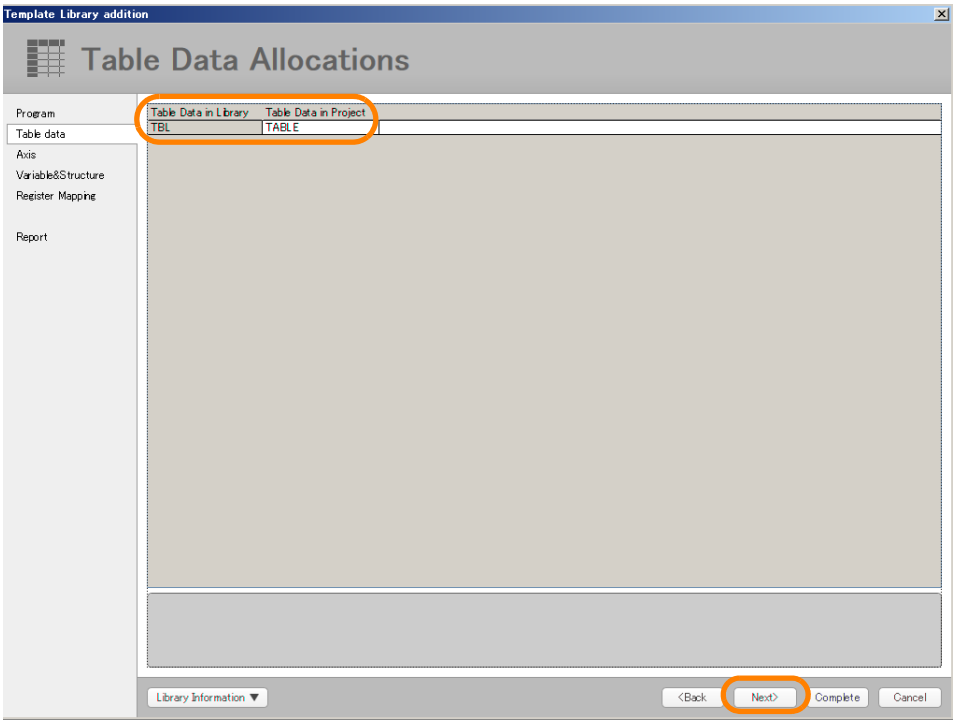
9. Click the **Next** Button.



The Table Data Allocation Window will be displayed.

10. Check that the name does not duplicate (indicated by red text) any table names in the library or any table names in the project file. If the name is duplicated, click the cell, revise the table name, and click the **Next** Button.

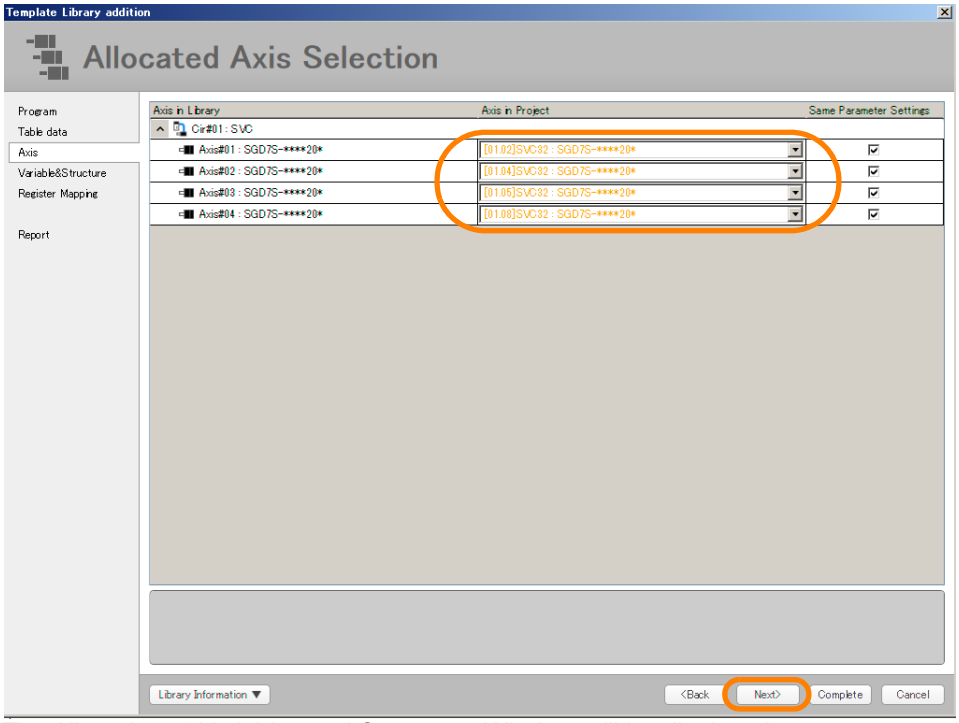
Information This window does not appear if there is no table data in the library to import, or if there is no table data in the project file. If the window is not displayed, proceed to the next step.



The Allocated Axis Selection Window will be displayed.

11. Set the axes that will be used in the project file, and click the **Next** Button.

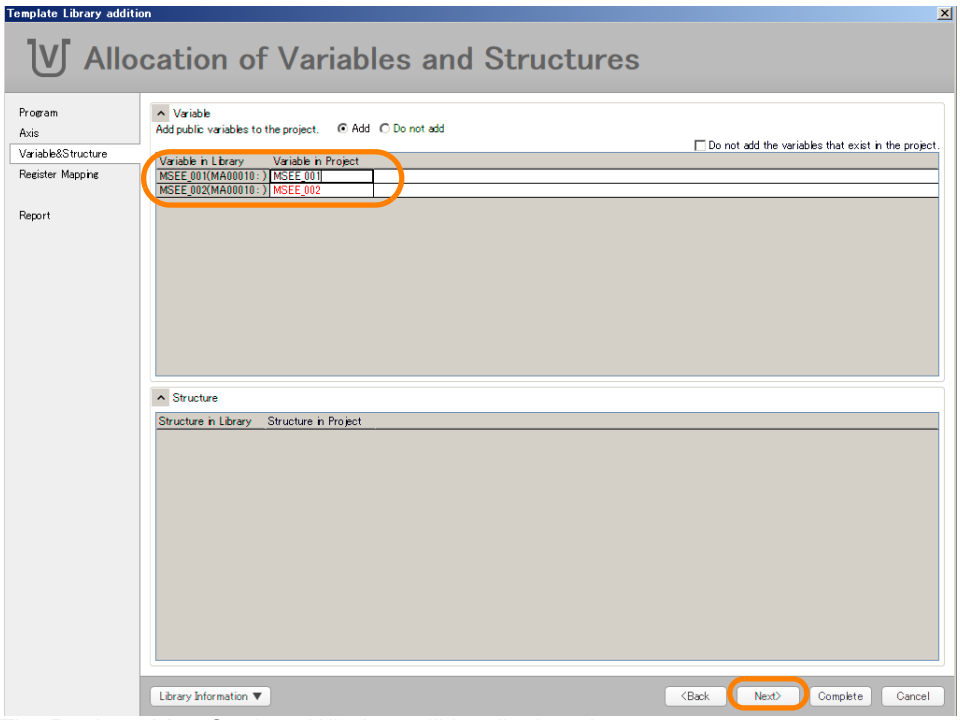
> Important
>
> If the text changes to yellow (warning indicator), this may be due to one of the following reasons.
> - The Motion Module type is different.
> - The SERVOPACK is different.
>
> Although you can still proceed to the next step while the yellow text (warning indicator) appears, be aware that the SERVOPACK parameter is not extracted to the project file at the import target location.



The Allocation of Variables and Structures Window will be displayed.

12. Check that the variable name and structure name in the library do not duplicate (indicated by red text) any variable names or structure names in the project file. If the name is duplicated, click the cell, revise the name, and click the **Next** Button.

Information This window does not appear if there are no variables in the library to import, or if there are no variables in the project file. If the window is not displayed, proceed to the next step.



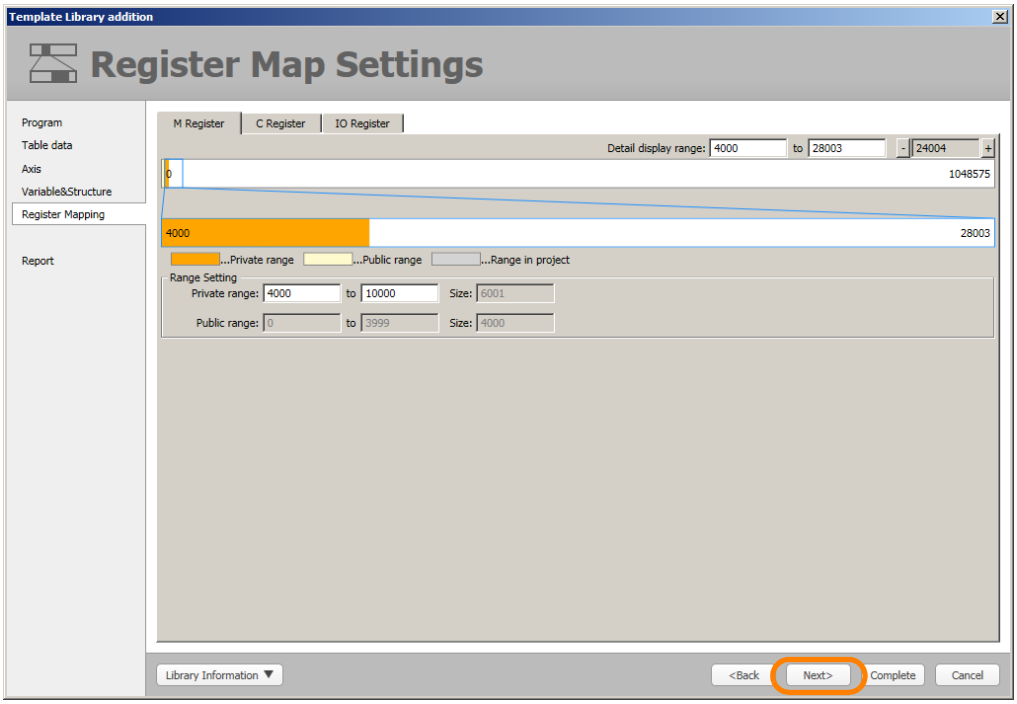
The Register Map Settings Window will be displayed.

13. Use one of the following methods to set the private range, and click the **Next** Button.

- Changing the values for the range setting
- Dragging the orange part to the range to be set

Information

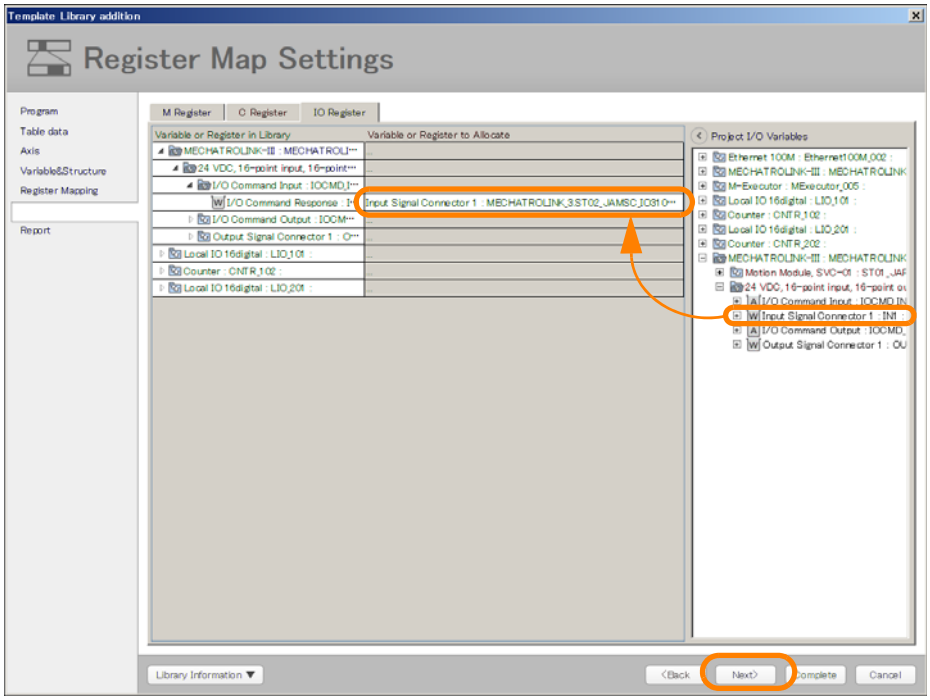
In the window below, the M register, G register, and C register are global registers. Make the settings for the M register, G register, and C register.



Note: The meaning of the terms appearing in the window are shown below.

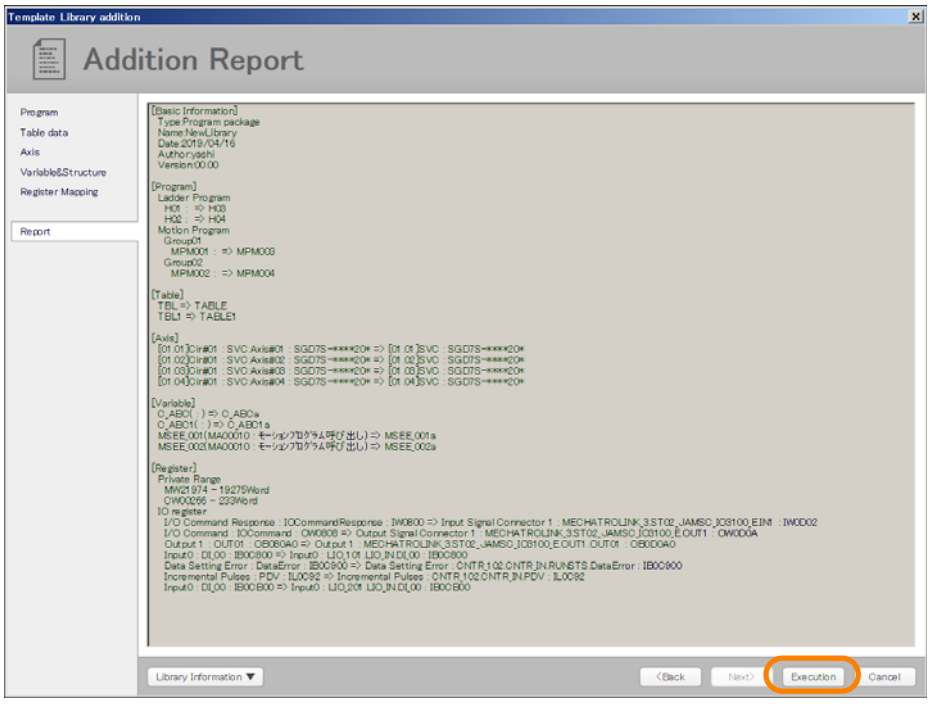
- Private range
  This is the range of the global registers that are used in the program to be imported to the project file.
- Public range
  This is the range of registers to be reserved for sharing between two or more programs (range for performing communication with the touch panel or for transferring data between the libraries).
  This is not displayed when the public range has not been set in the library.
- Range in project
  This is the range of registers that are already used in the project file.
  This is not displayed when no registers are currently in use or when the range is overlapping with the public range.

14. Open the IO Register Tab Page, drag and drop the variable or register to be assigned from the project I/O variables, and click the **Next** Button.



The Addition Report Window will be displayed.

15. Check the information in the execution report, and click the **Execution** Button.
To change the settings, click the **Back** Button until the target window is displayed.



The library import process will be executed.

This concludes the procedure.

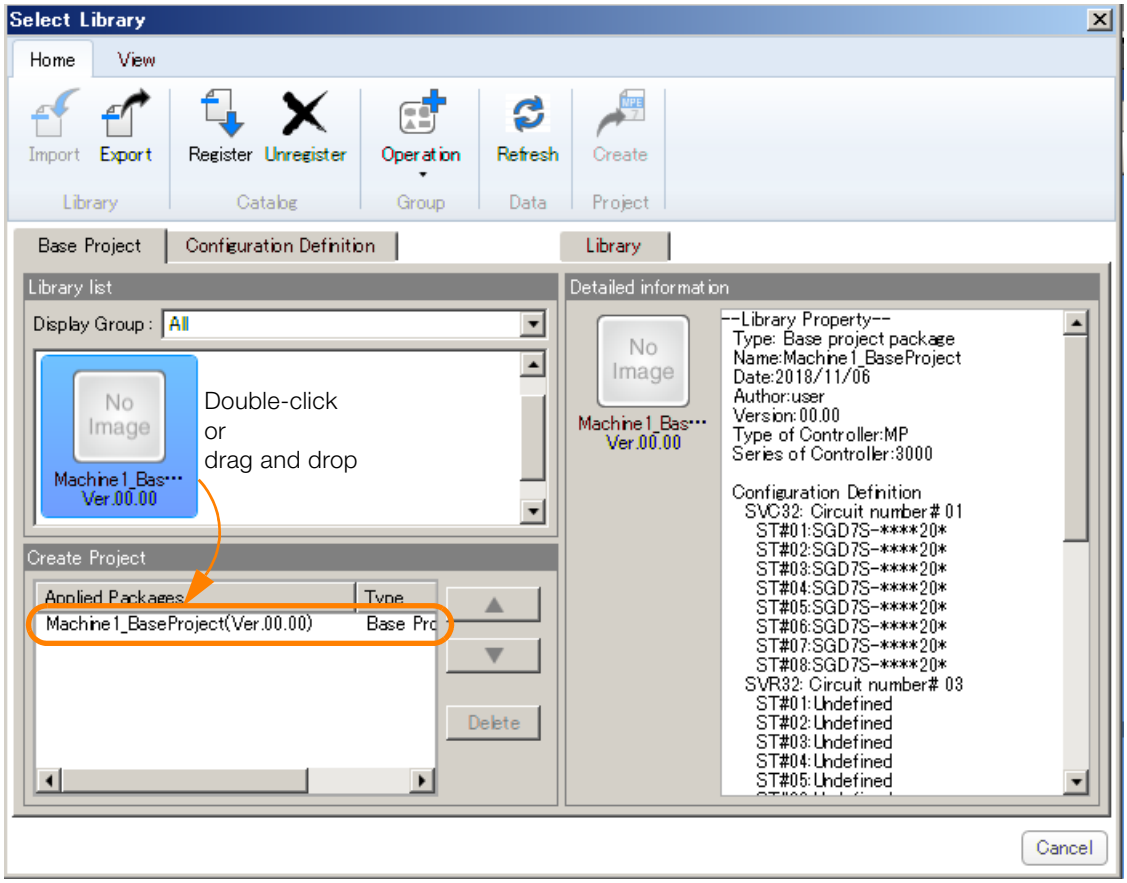
10.8 Creating a New Project File Using a Library

The base project package and configuration definition package in the library can be used to create a new project file.

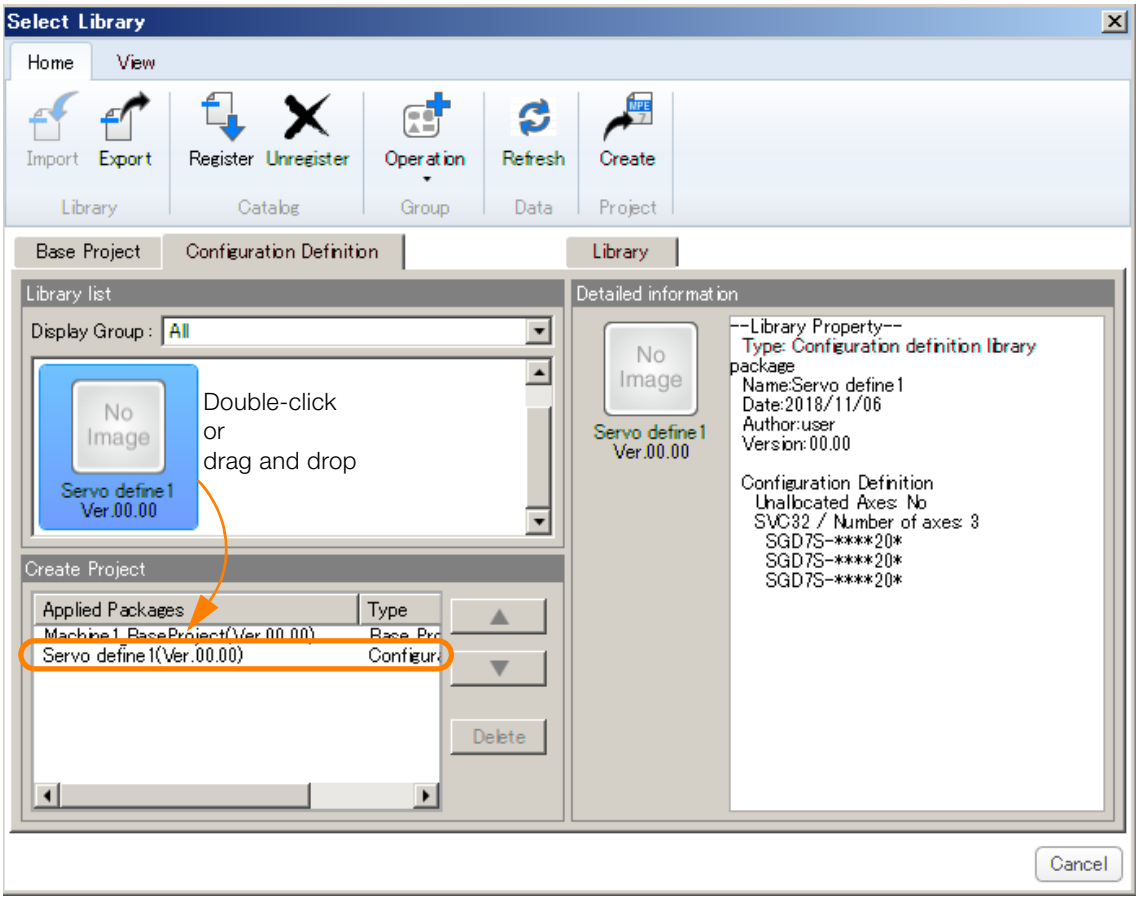
1. Open the library catalog.
   The Select Library Window will be displayed.

   Information Refer to the following section for details on how to open the library catalog.
   ☞ *10.2 Opening a Library Catalog* on page 10-3

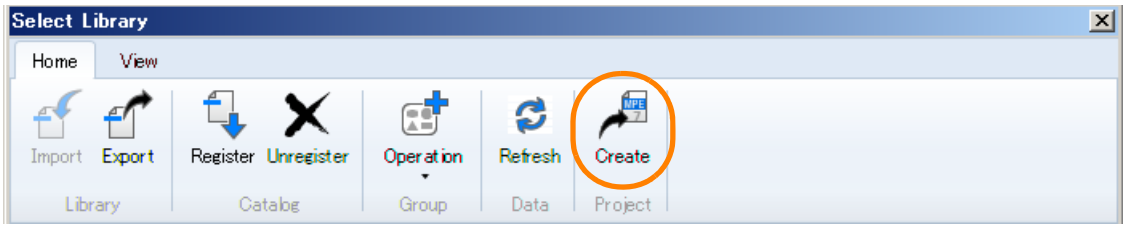
2. In the Base Project Tab Page, either double-click the library to be used, or drag and drop the library from the **Library List** Box to **Create Project** Box.



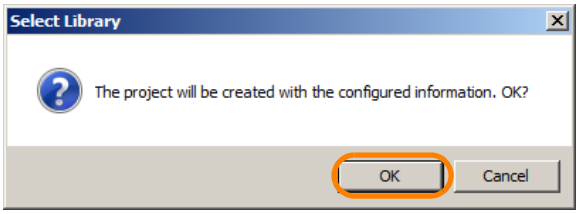
3. In the Configuration Definition Tab Page, either double-click the library to be used, or drag and drop the library from the **Library List** Box to **Create Project** Box.



4. Click **Create**.

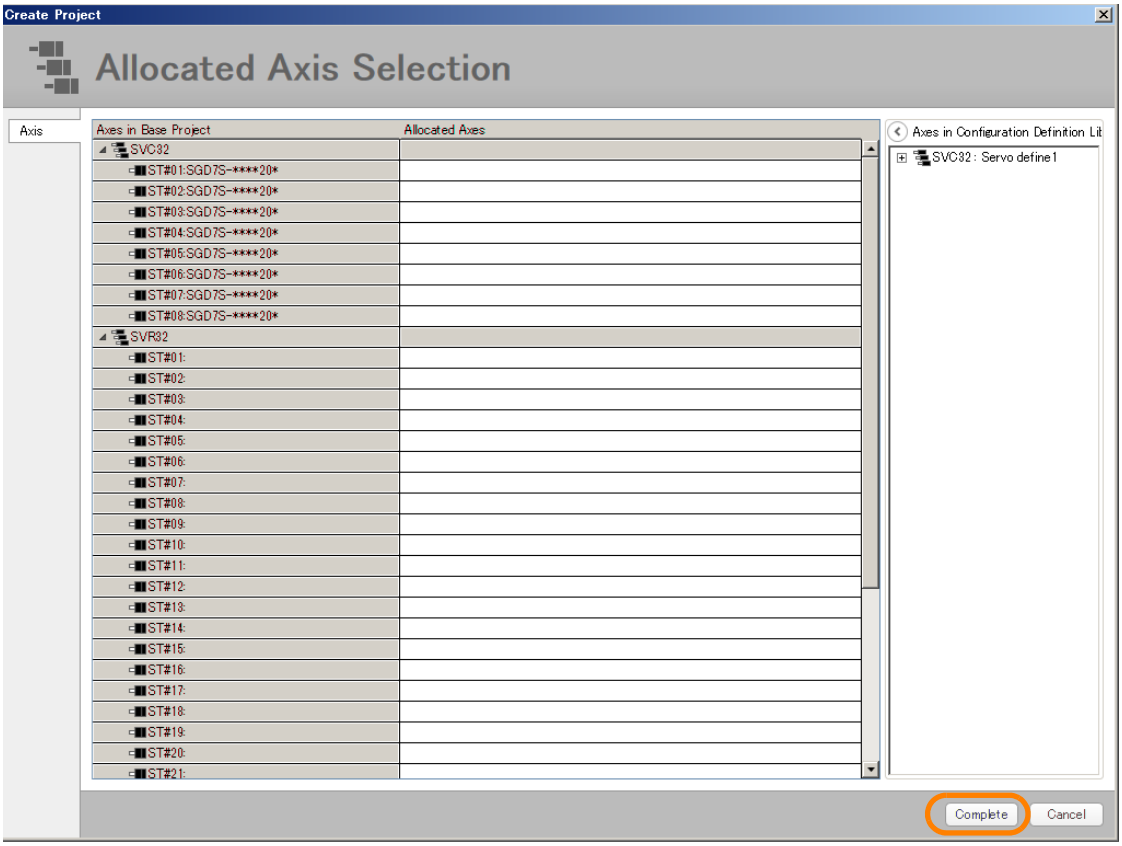


5. The following window will be displayed. Click the **OK** Button.



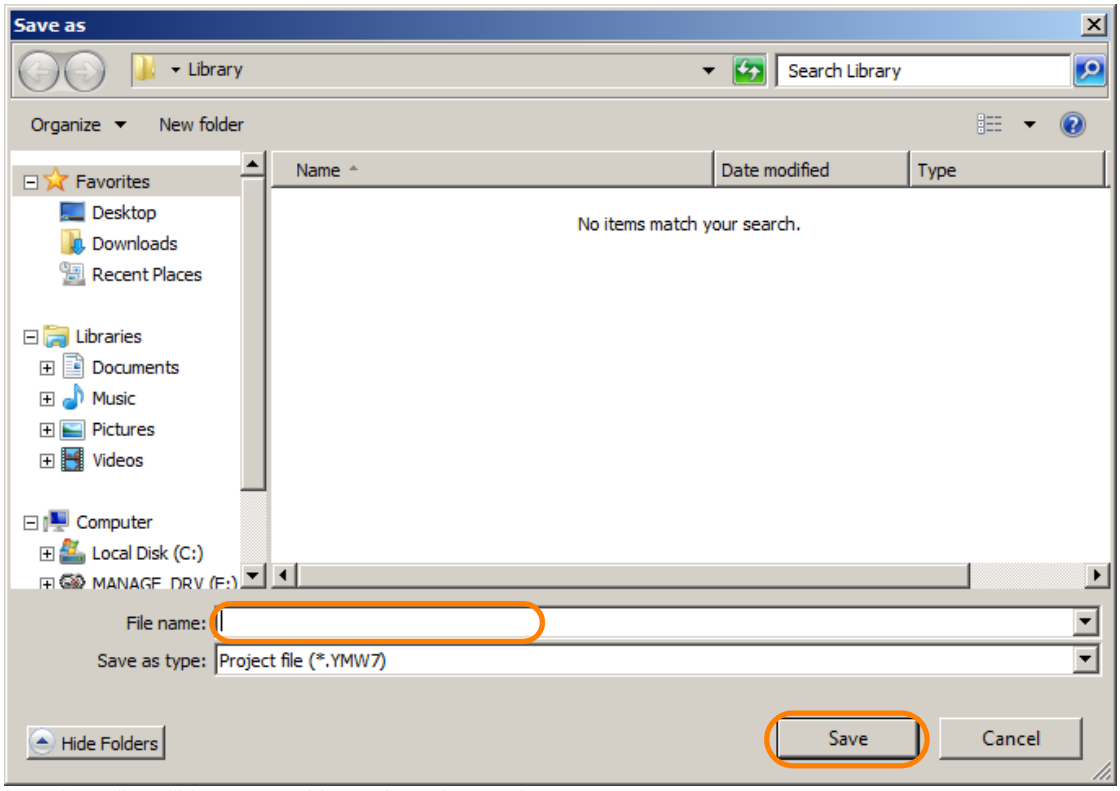
The Allocated Axis Selection Window will be displayed.

6. Click the **Complete** Button.



The Save As Dialog Box will be displayed.

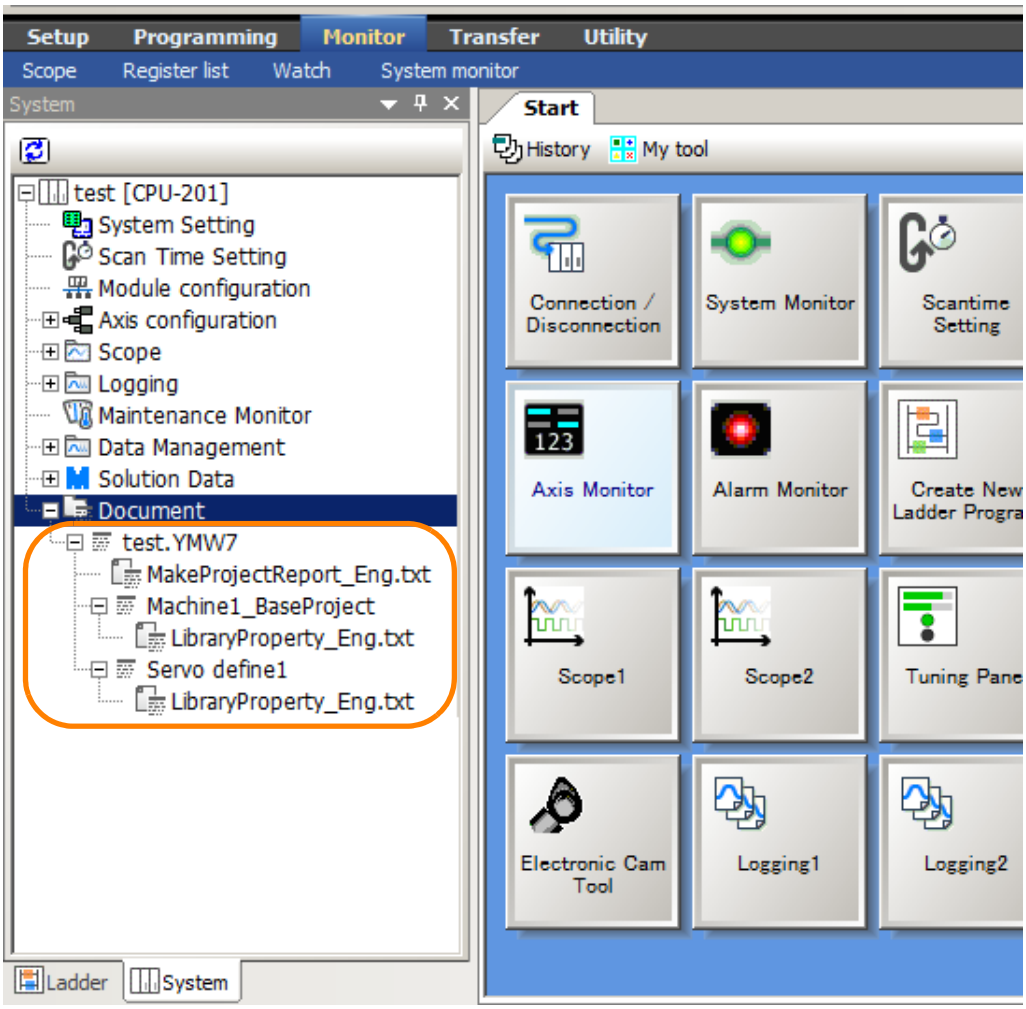
7. Set the file saving location and file name, and click the **Save** Button.



A project file will be created based on the settings.

Information

The library guidance information and document information can be checked in the System Pane for the new project file that was created using the library function. This shows the settings that were made when creating the library, and so the displayed information varies depending on the library content.



This concludes the procedure.

Security

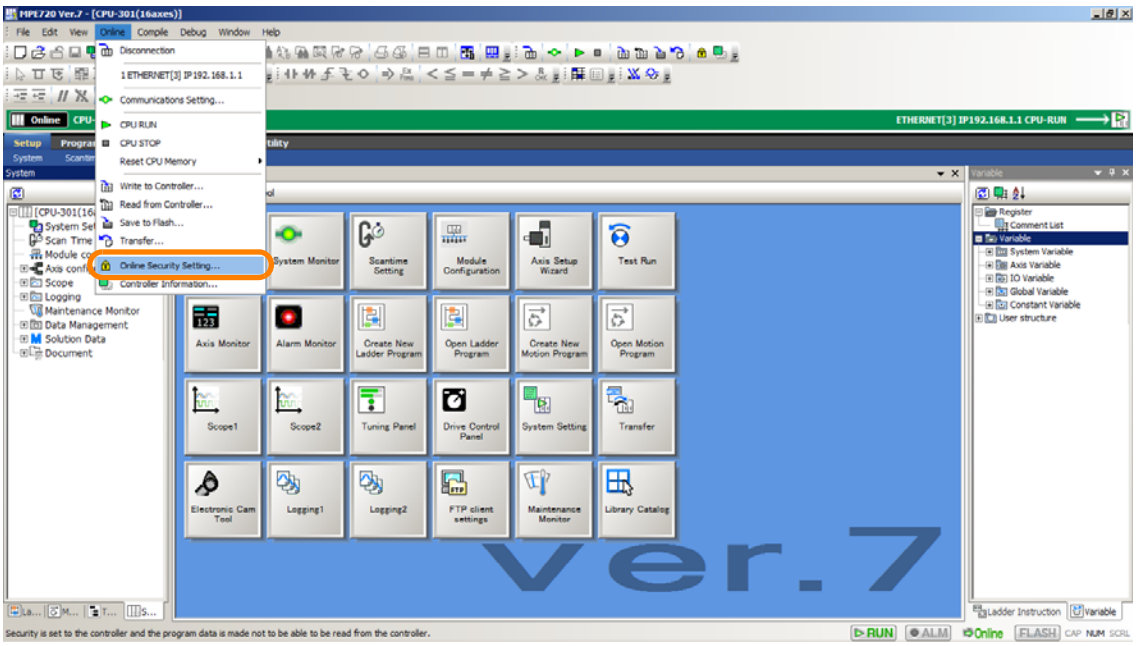
11

This chapter describes the operations that are used to manage security.

11.1 Security Settings for the Machine Controller

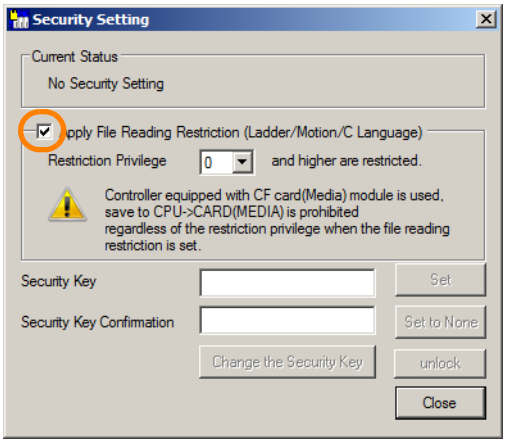
You can protect programs from being read from the Machine Controller by changing the Machine Controller's security settings. (This is called online security.) Use the following procedure to enable security on the Machine Controller.

1. Select ***Online*** – ***Online Security Setting*** from the menu bar.



The Security Setting Dialog Box will be displayed.

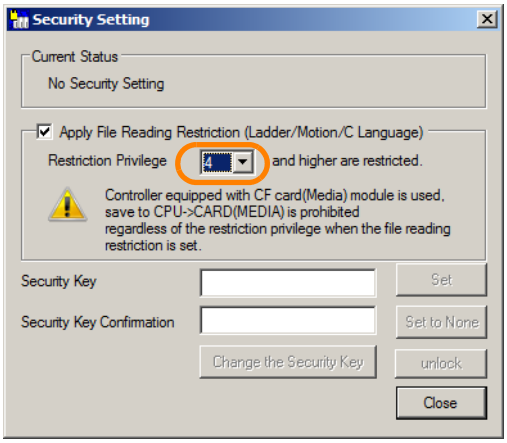
2. Select the **Apply File Reading Restriction (Ladder/Motion/C Language)** Check Box.



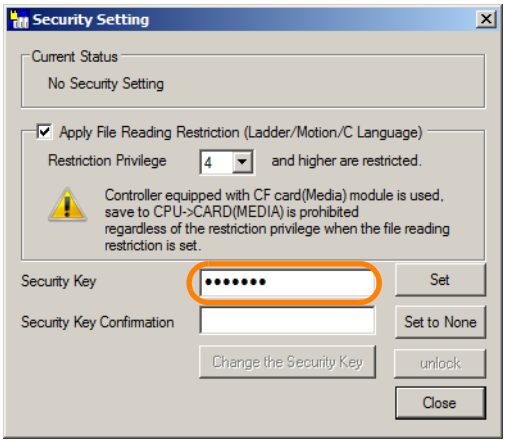
3. Specify the restriction level in the **Restriction Privilege** Box.
Setting range: 1 to 8

Information

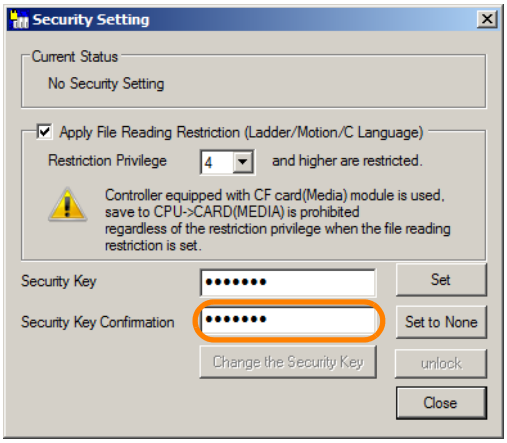
To read programs from a Machine Controller for which online security is enabled, the user must have the same or higher privilege level for reading as this setting.
You can confirm user privileges in the Environment Setting Dialog Box that is displayed by selecting ***File*** - ***Environment Setting*** from the menu bar.



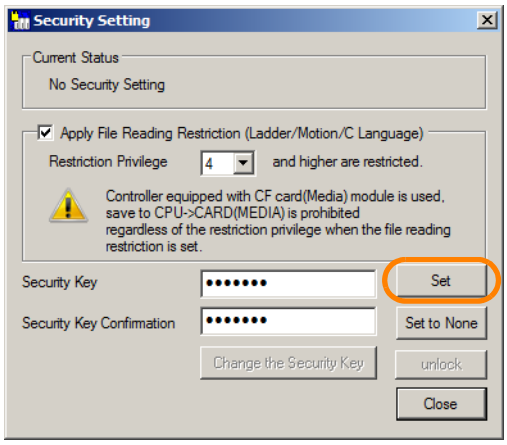
4. Enter a password of 8 or fewer alphanumeric characters in the **Security Key** Box.
Note: The password is case sensitive.



5. Confirm the security key by entering the password that was entered in step 4 in the **Security Key Confirmation** Box.

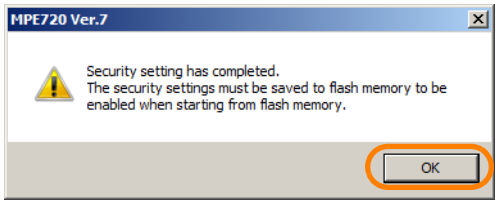


6. Click the **Set** Button.



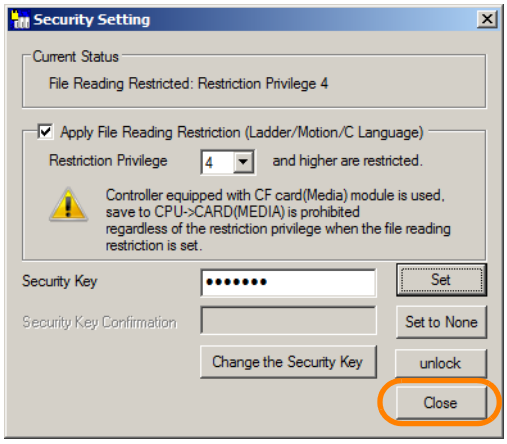
The MPE720 Ver. 7 Dialog Box will be displayed.

7. Click the **OK** Button.



The MPE720 Ver. 7 Dialog Box will close.

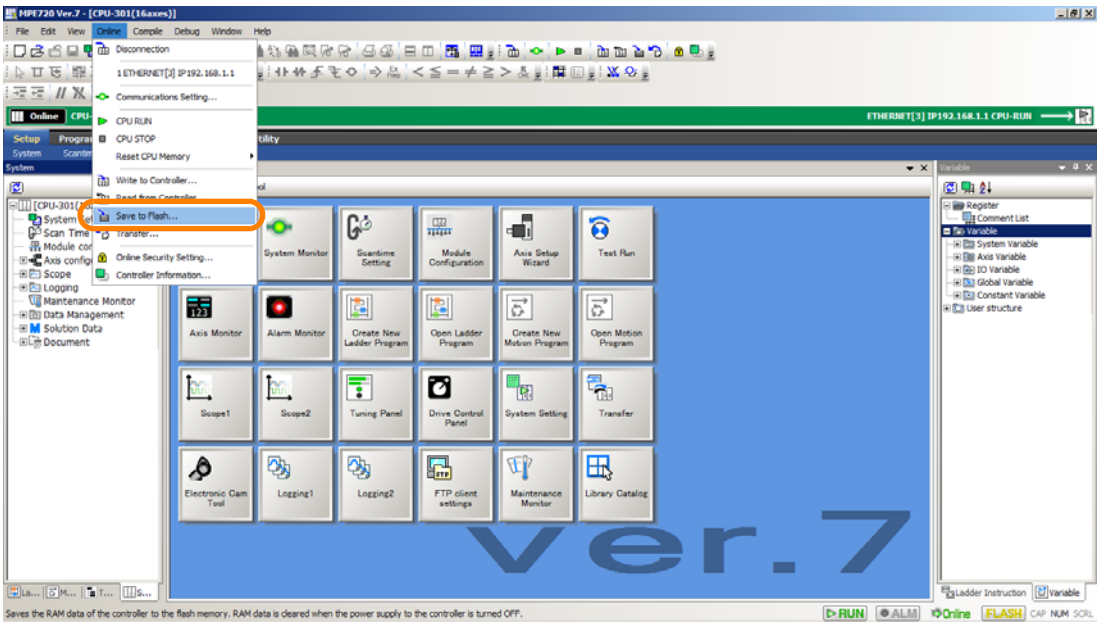
8. Click the **Close** Button.



The Security Setting Dialog Box will close.

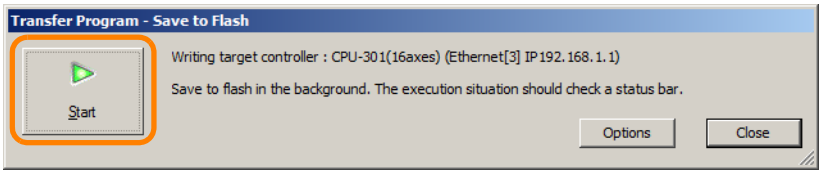
9. Select ***Online*** – ***Save to Flash*** from the menu bar.

Information This can also be performed by clicking the **Transfer** Button on the My Tool View and then clicking the **Save to Flash** Button in the Transfer Dialog Box.



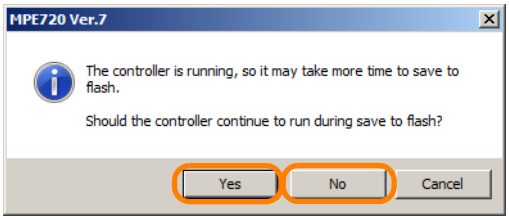
The Transfer Program – Save to Flash Dialog Box will be displayed.

10. Click the **Start** Button.



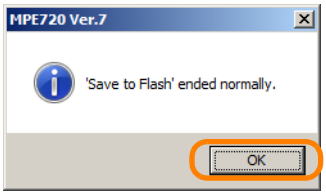
The MPE720 Ver. 7 Dialog Box will be displayed.

11. Click the **Yes** Button or the **No** Button.



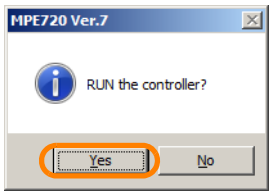
The MPE720 will begin saving the data to flash memory. When the transfer has been completed, a different MPE720 Ver.7 Dialog Box will be displayed.

12. Click the **OK** Button.



Information

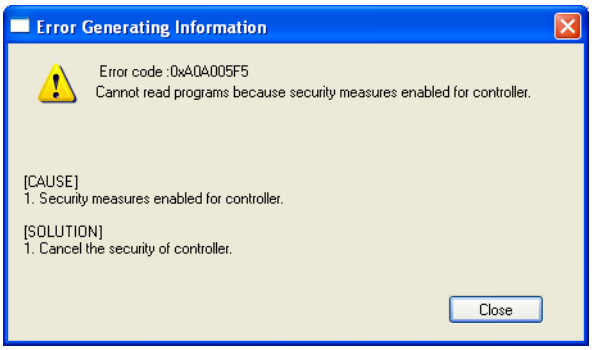
If you clicked the **No** Button in step 11, the following MPE720 Ver. 7 Dialog Box will be displayed. Click the **Yes** Button.



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 settings for read access, enter the security key and change the settings.
If security is temporarily disabled, it will become enabled again after the power supply is turned OFF and ON again.

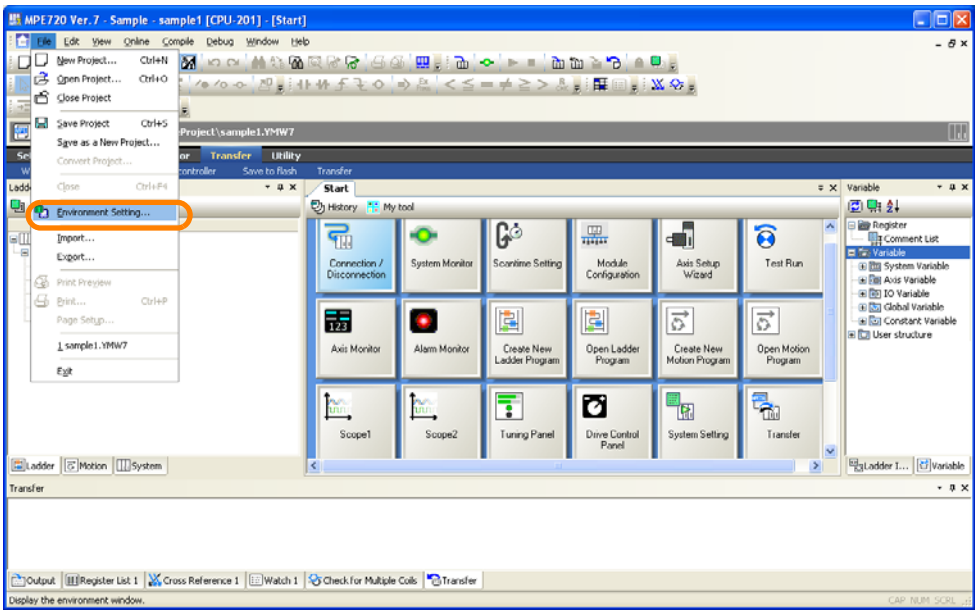
11.2 Security Settings for Project Files

This section gives the procedures for managing security settings for project files.

11.2.1 Protecting Project Files with a Password

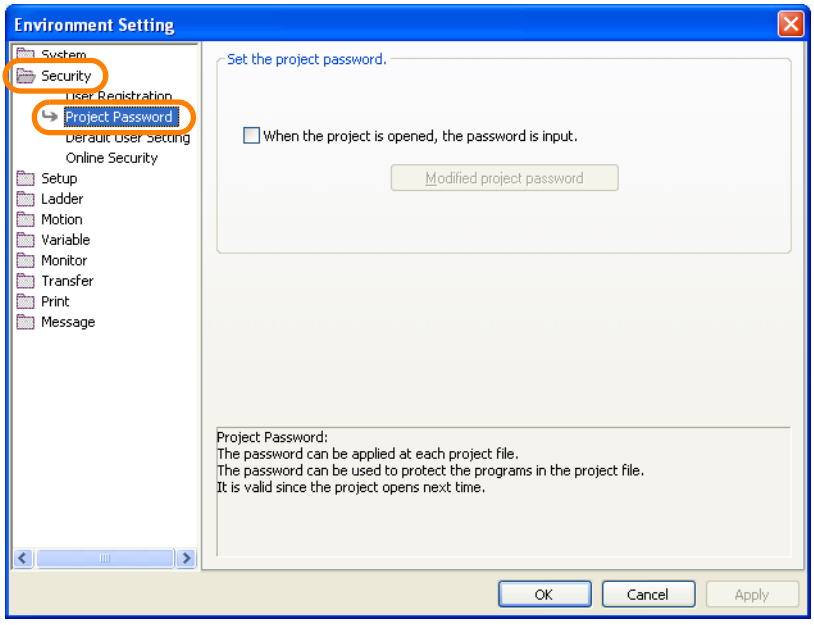
To protect project files with a password, you must first set the password. Use the following procedure.

1. Open the project file for which to enable password protection.
2. Select ***File*** – ***Environment Setting*** from the menu bar.

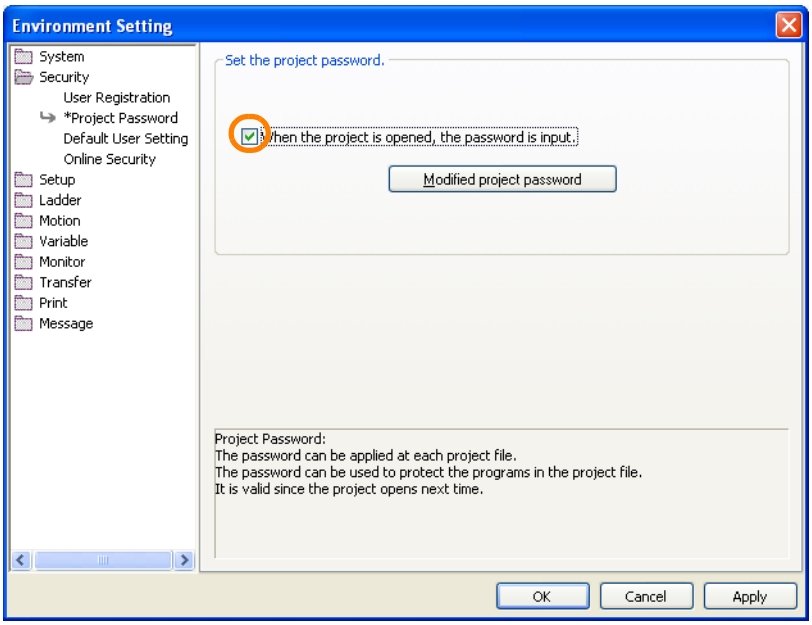


The Environment Setting Dialog Box will be displayed.

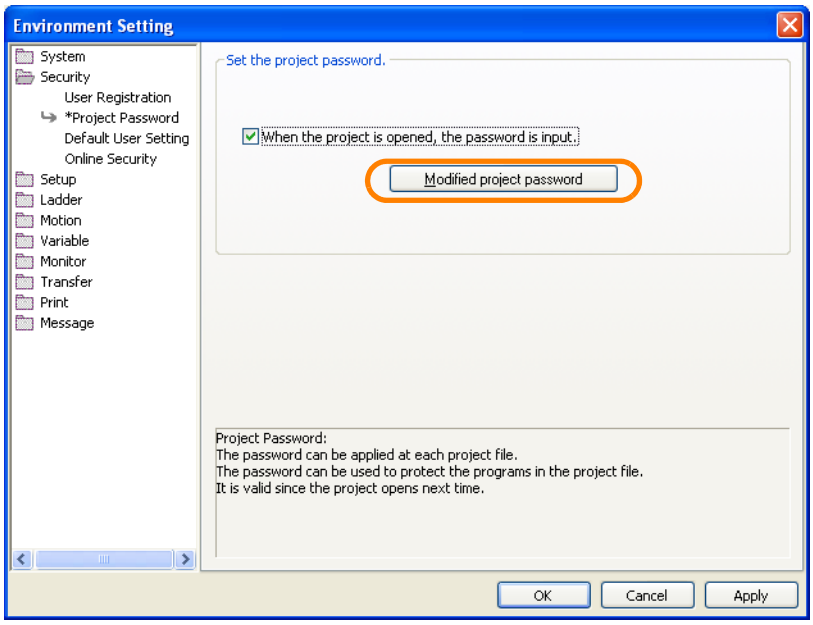
3. Select **Security** – **Project Password**.



4. Select the **When the project is opened, the password is input** Check Box.

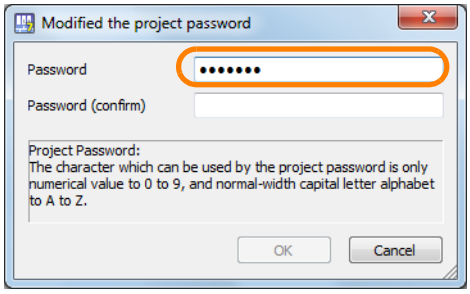


5. Click the **Modified project password** Button.

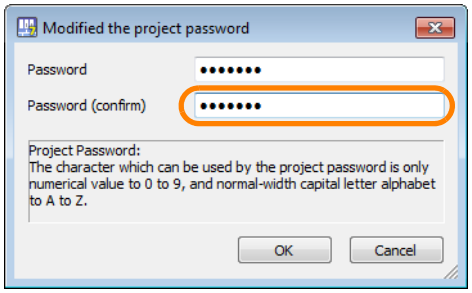


The Modified the Project Password Dialog Box will be displayed.

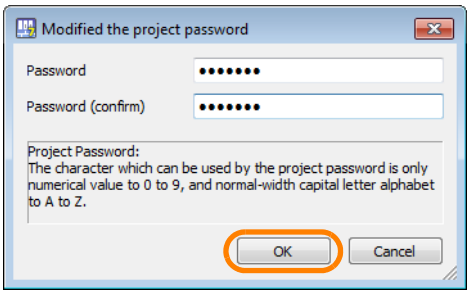
6. Enter a password of 16 or fewer alphanumeric characters in the **Password** Box.



7. Confirm the password by entering the password that was entered in step 6 in the **Password (confirm)** Box.

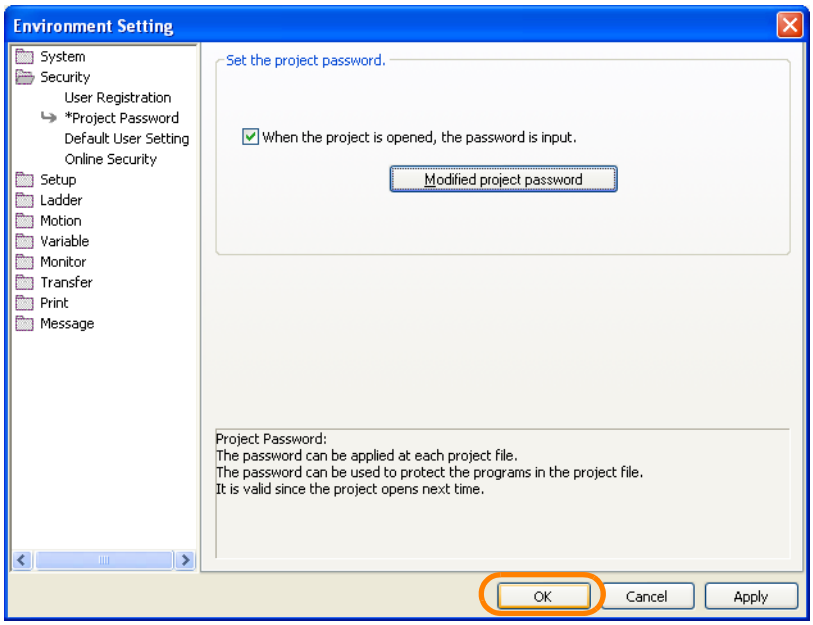


8. Click the **OK** Button.



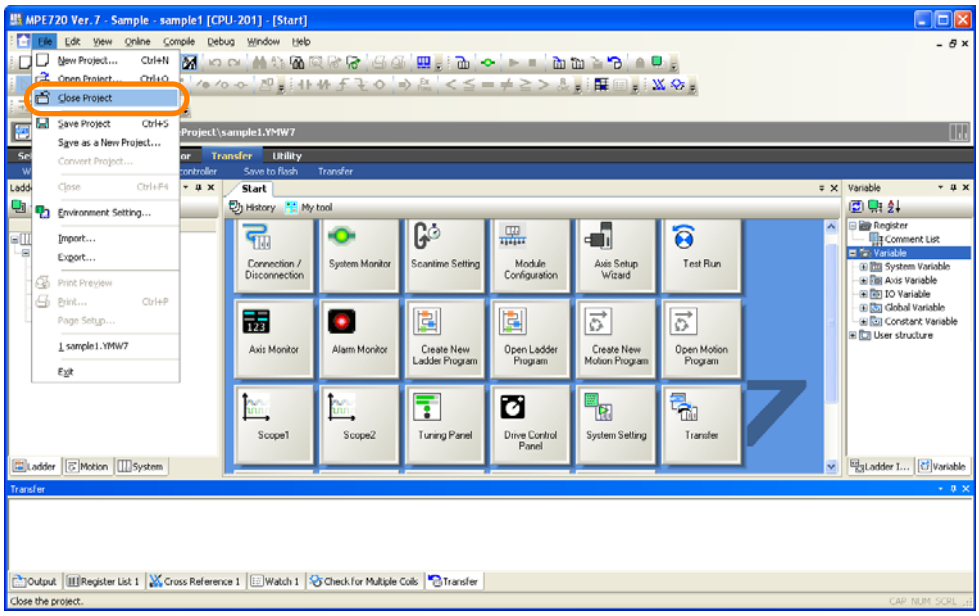
The Modified the Project Password Dialog Box will close.

9. Click the **OK** Button.



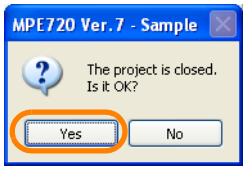
The Environment Setting Dialog Box will close.

10. Select ***File – Close Project*** from the menu bar.



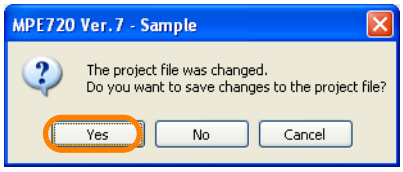
The MPE720 Ver. 7 Dialog Box will be displayed.

11. Click the **Yes** Button.



A different MPE720 Ver. 7 Dialog Box will be displayed.

12. Click the **Yes** Button.

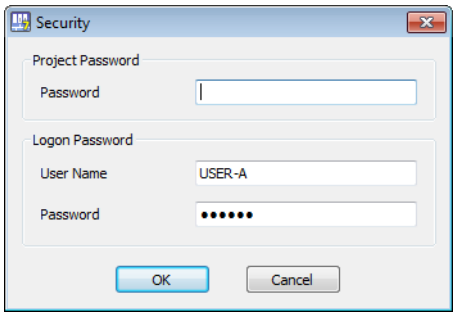


The project file will close, and password protection will be enabled for the project file.

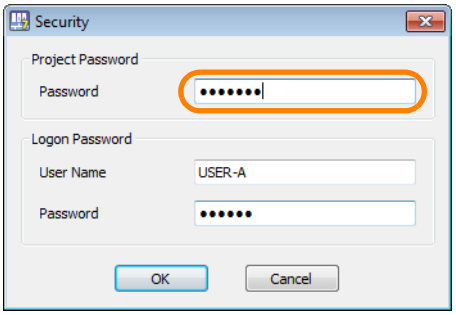
This concludes the procedure.

11.2.2 Opening a Password-protected Project File

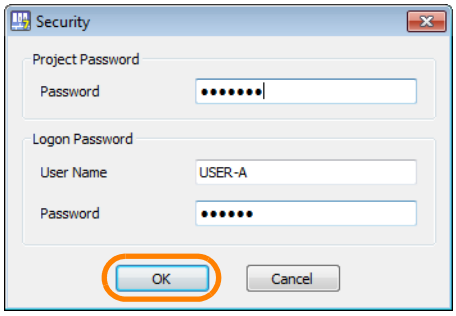
1. Open the project file.
   The Security Dialog Box will be displayed.



2. Enter the password that was set previously.



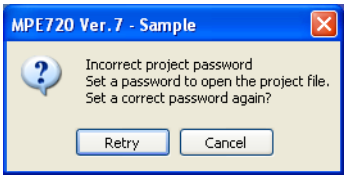
3. Click the **OK** Button.



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.

11.2.3 Changing the Project File Password

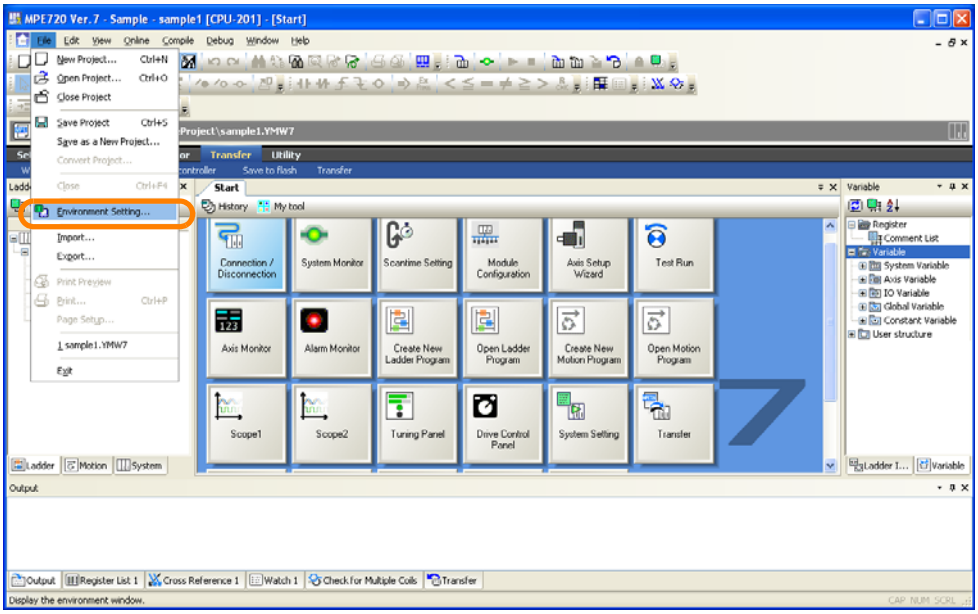
To change the password of a project file, perform the same procedure that you used to protect the project file with a password. Refer to the following sections for details.

☞ *11.2.1 Protecting Project Files with a Password* on page 11-7

11.2.4 Disabling Password Protection of a Project File

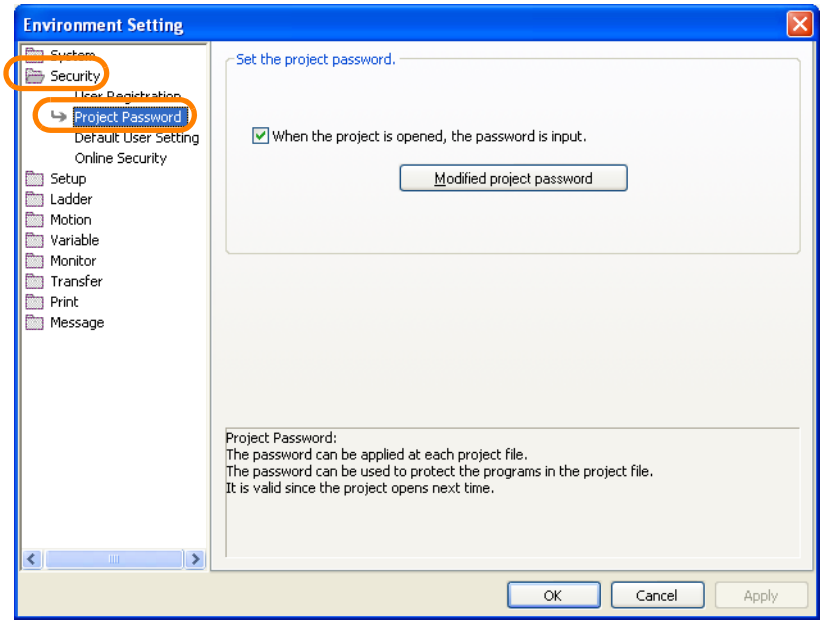
Use the following procedure to disable password protection of a project file.

1. Open the project file for which to disable password protection.
2. Select ***File*** – ***Environment Setting*** from the menu bar.

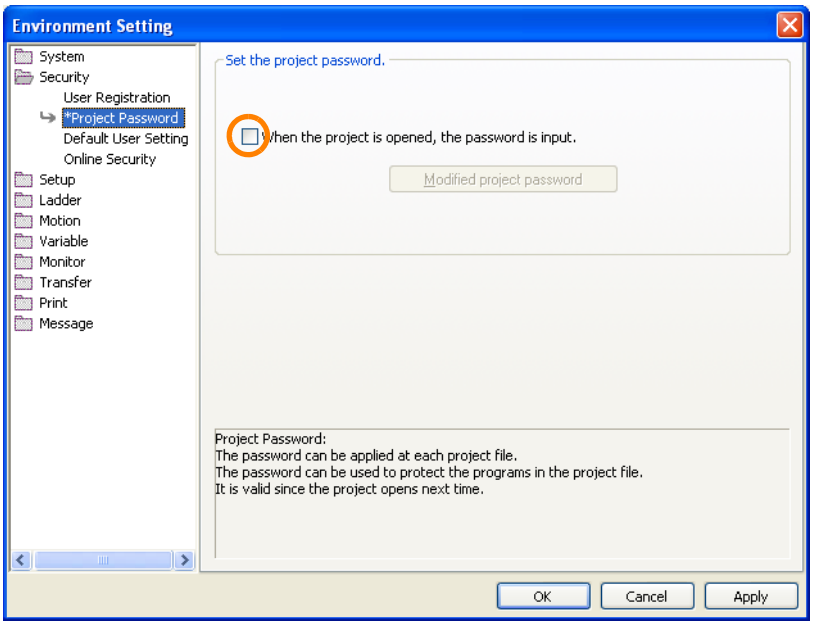


The Environment Setting Dialog Box will be displayed.

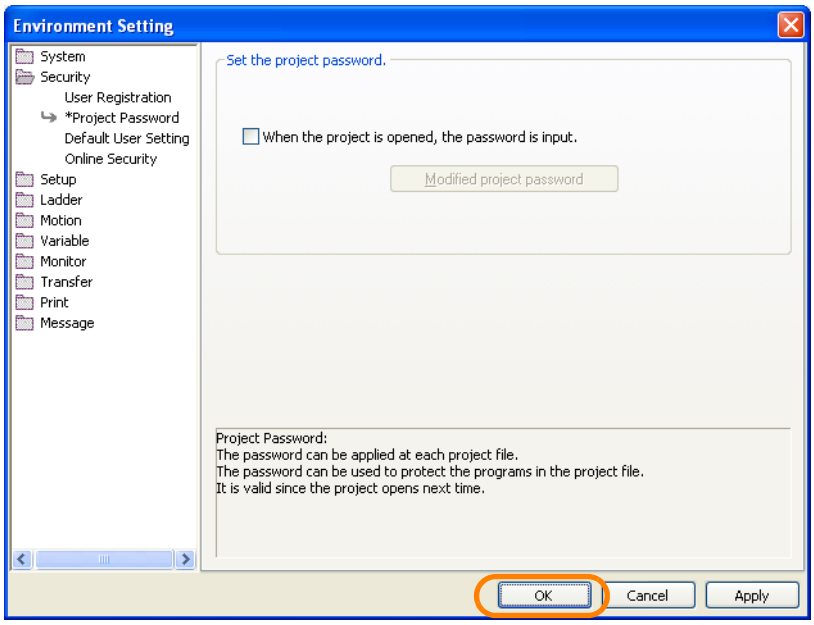
3. Select **Security** – **Project Password**.



4. Clear the **When the project is opened, the password is input** Check Box.



5. Click the **OK** Button.



This concludes the procedure.

11.3 Security Settings for Programs

This section gives the procedures for managing security settings for programs.

11.3.1 Protecting Programs with a Password

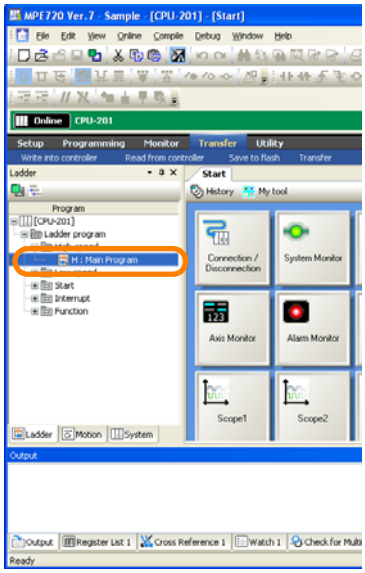
To protect programs with a password, you must first set a password. Use the following procedure.

1. Establish an online connection or open a project file.
2. In the Ladder Pane or Motion Pane, select the program for which to enable password protection.

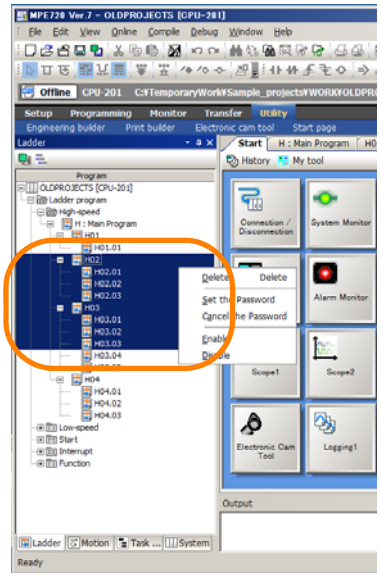
Information

You can select more than one drawing.
- Selecting a number of consecutive drawings: Select the first drawing in the group of drawings to select, hold down the **Shift** Key, and then select the last drawing in the group of drawings to select.
- Selecting drawings that are not consecutive: Hold down the **Ctrl** Key and click the drawings to select.

If Only One Drawing Is Selected

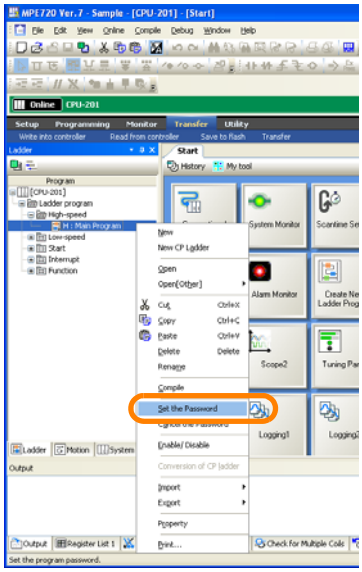


If More Than One Drawing Is Selected

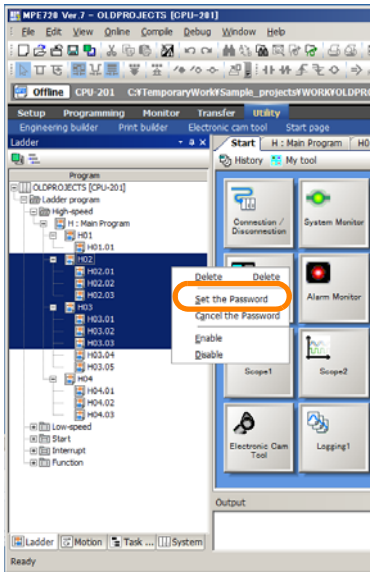


3. Right-click the program and select ***Set the Password***.

If Only One Drawing Is Selected



If More Than One Drawing Is Selected



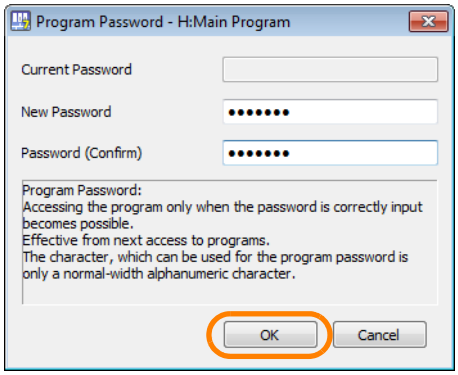
The Program Password Dialog Box will be displayed.

4. Enter a password of 8 or fewer alphanumeric characters in the **New Password** Box.

Information If you can enter a password into the Current Password Box, security is already active. Refer to the following section.
☞ *11.3.3 Changing Program Passwords* on page 11-16

5. Confirm the password by entering the password that was entered in step 4 in the **Password (Confirm)** Box.

6. Click the **OK** Button.



Information If more than one drawing is selected and a password was previously set for one of the drawings, an error will occur.

7. Confirm that the password-protected program has a password-locked icon ( ) displayed next to it.

This concludes the procedure.

11.3.2 Opening a Password-protected Program

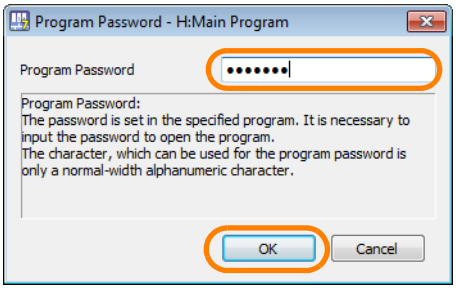
If you attempt to open a password-protected program, the Program Password Dialog Box will be displayed.

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** Box, 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.



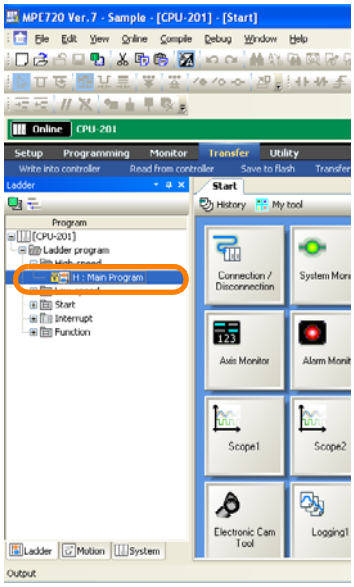
11.3.3 Changing Program Passwords

Use the following procedure to change the password of a program.

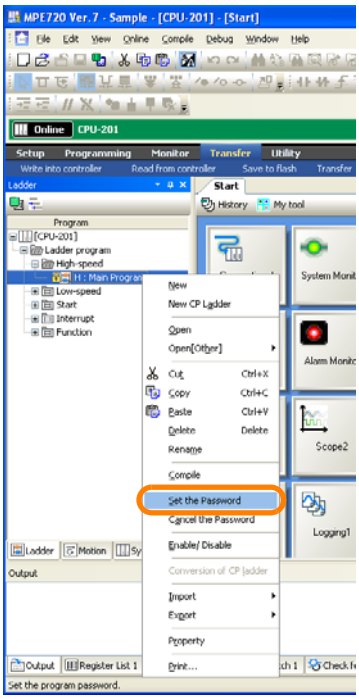
Information

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 Pane or Motion Pane, select the program for which to change the password.

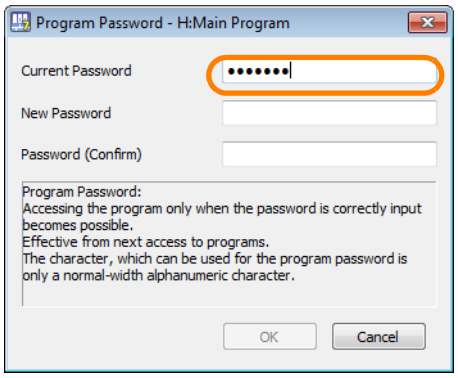


3. Right-click the program and select ***Set the Password***.



The Program Password Dialog Box will be displayed.

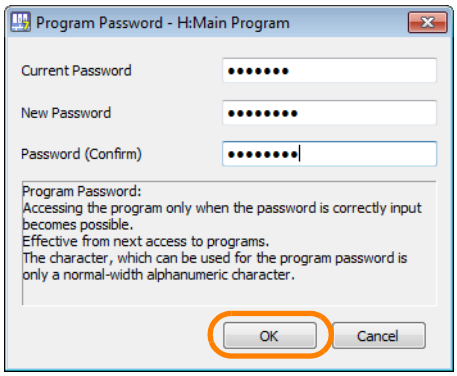
4. Enter the current password in the **Current Password** Box.



5. Enter a password of 8 or fewer alphanumeric characters in the **New Password** Box.

6. Confirm the password by entering the password that was entered in step 5 in the **Password (Confirm)** Box.

7. Click the **OK** Button.



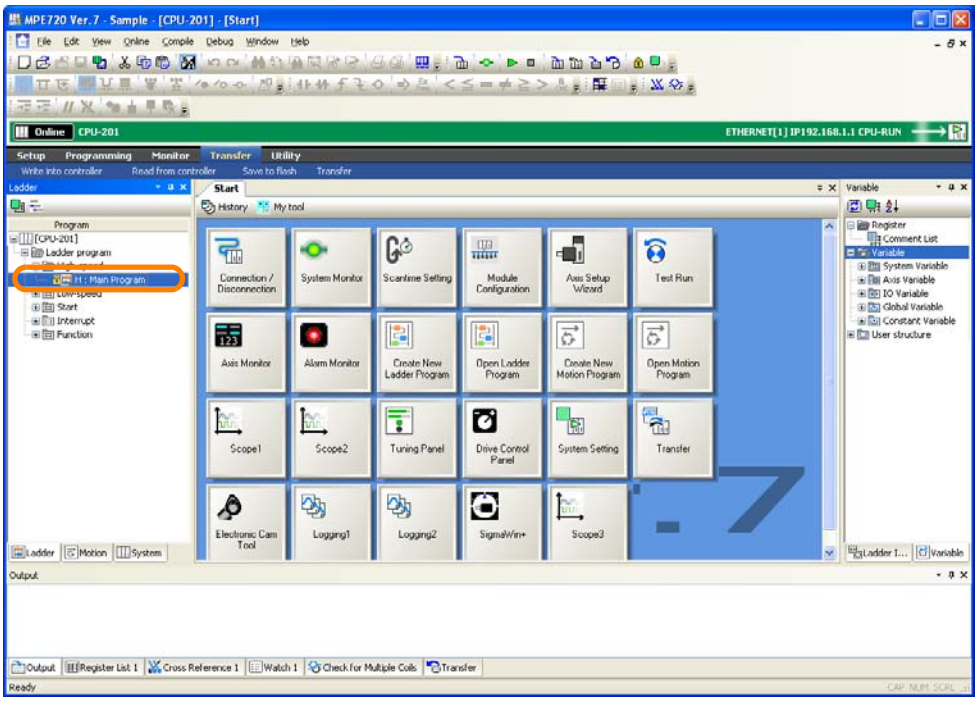
Information An error will occur if the current password is not correct.

This concludes the procedure.

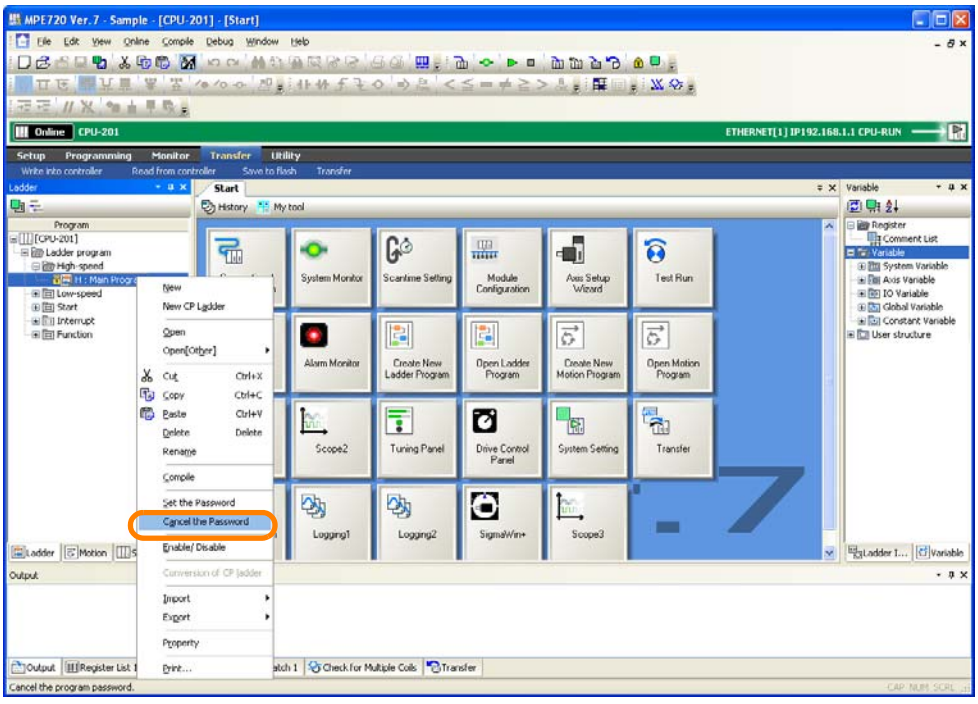
11.3.4 Disabling Password Protection of a Program

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 Pane or Motion Pane, select the program for which to disable password protection.



3. Right-click the program and select ***Cancel the Password***.



The Program Password Dialog Box will be displayed.

4. Enter the password in the **Program Password** Box.

5. Click the **OK** Button.

6. Confirm that the password-locked icon ( ) is no longer displayed for the program that was selected in step 2.

This concludes the procedure.

Maintenance and Management

12

This chapter describes the operations that are used for maintenance and management.

12.1 Updating Project Files

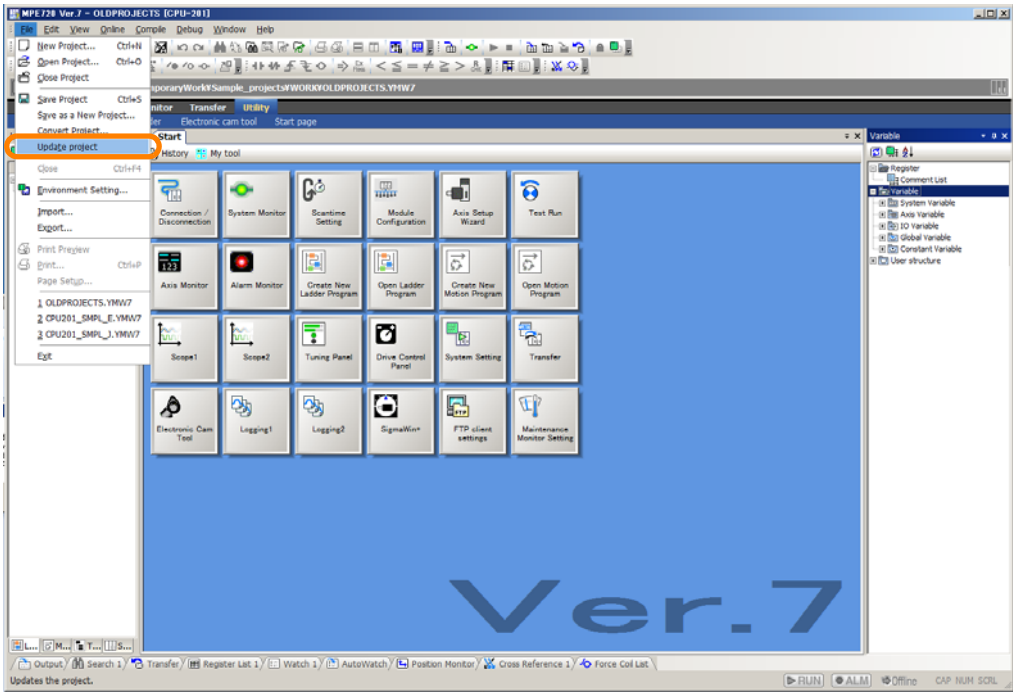
Project files contain information on the Modules and instructions that can be used with MPE720 Version 7. If you use a project file that was created with a previous version of MPE720 Version 7 on a newer version of MPE720 Version 7, you may not be able to use the functions that were added.

Use the procedure given below to update the following three types of information.

- Information on the Option Modules that can be used
- Information on the ladder instructions that can be used
- Information on new Machine Controller functions

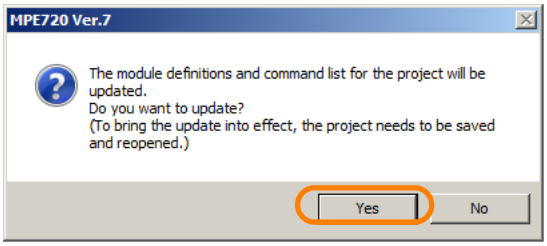
1. Open the project file.

2. Select ***File*** – ***Update project*** from the menu bar.



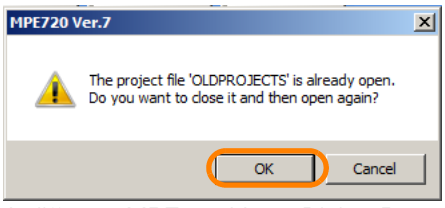
The MPE720 Ver. 7 Dialog Box will be displayed.

3. Read the precaution, and then click the **Yes** Button.



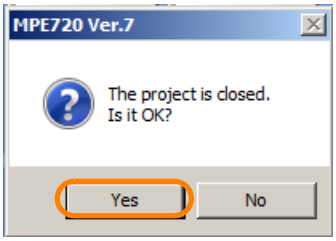
A different MPE720 Ver. 7 Dialog Box will be displayed.

4. Read the precaution, and then click the **OK** Button.



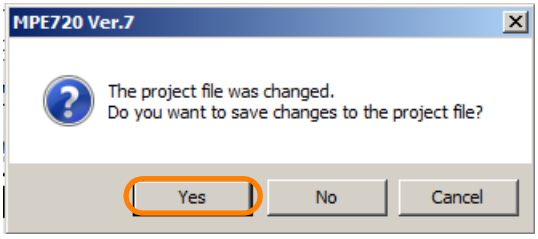
A different MPE720 Ver. 7 Dialog Box will be displayed.

5. Read the precaution, and then click the **Yes** Button.



A different MPE720 Ver. 7 Dialog Box will be displayed.

6. Read the precaution, and then click the **Yes** Button.



This concludes the procedure.

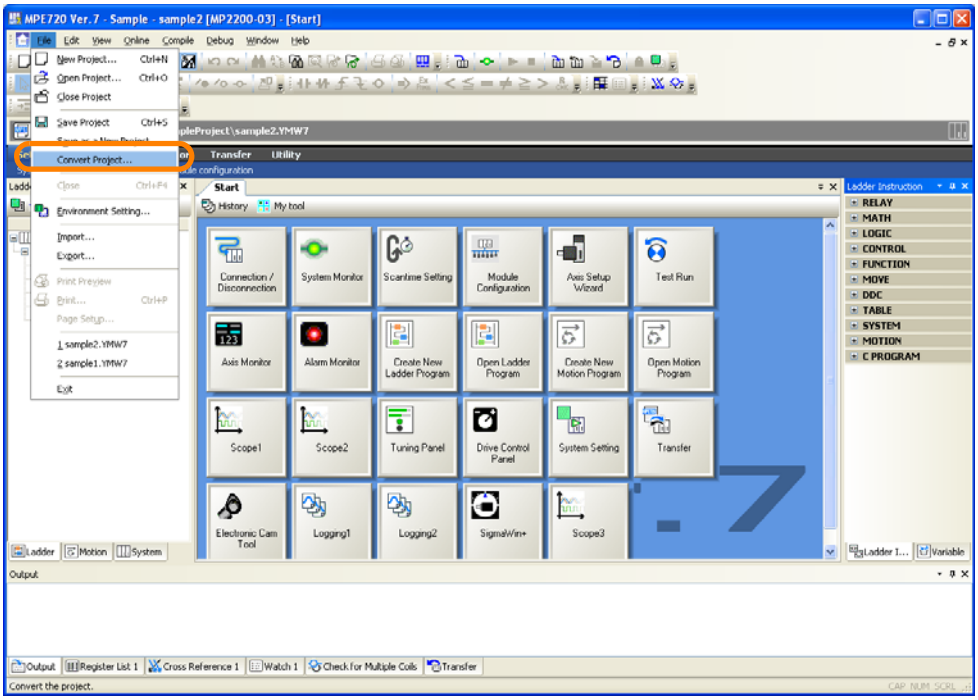
12.2 Changing the Machine Controller Model in an Existing Project File

If a project file was created for an MP2000-series Machine Controller, you can use the following procedure to change the setting to an MP3000-series Machine Controller.

This will allow you to continue using the data that was used with the MP2000-series Machine Controller.

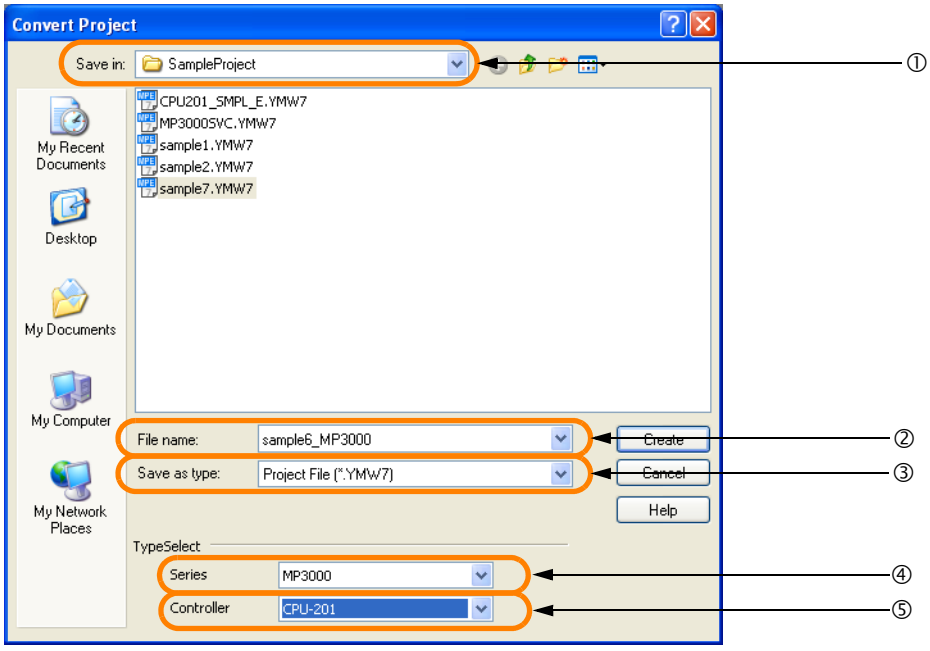
1. Open the project file for which to change the Machine Controller model.

2. Select ***File*** – ***Convert Project*** from the menu bar.



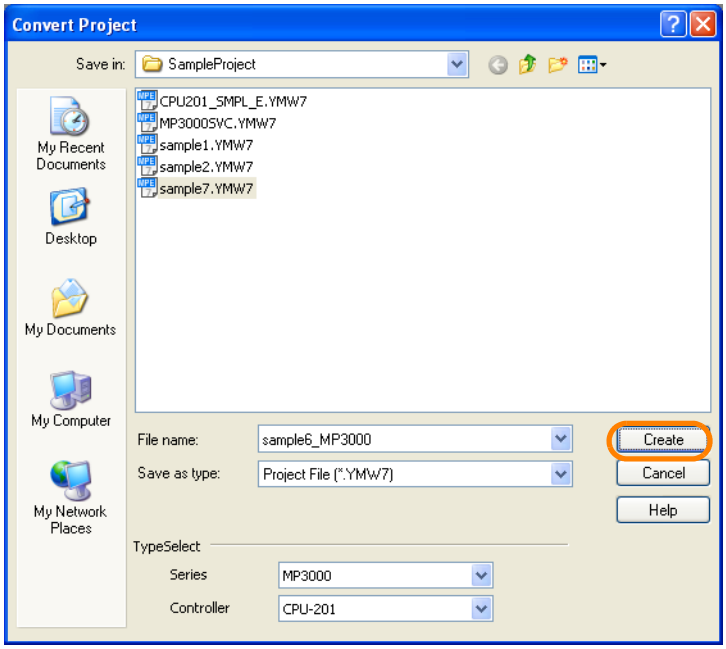
The Convert Project Dialog Box will be displayed.

3. Set the items from ① to ⑤.

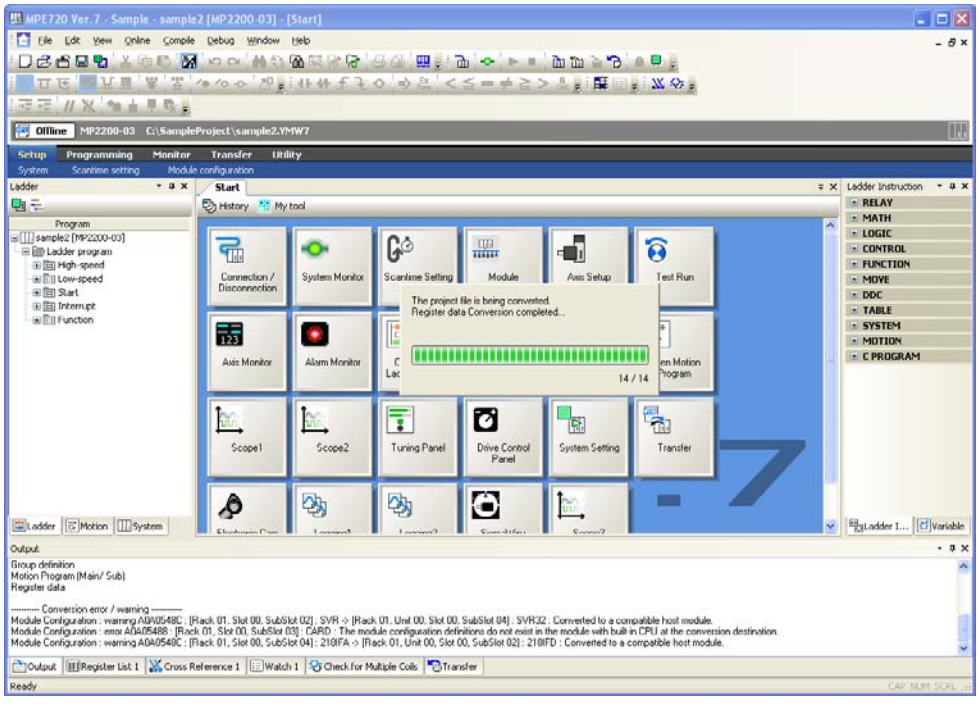


No.	Item	Description
①	Save in	Specify the location in which to save the converted project file.
②	File name	Enter the name to use for the converted project file.
③	Save as type	Select the type of the converted project file.
④	Series	Select **MP3000**.
⑤	Controller	Select the Machine Controller model to which to convert.

4. Click the **Create** Button.

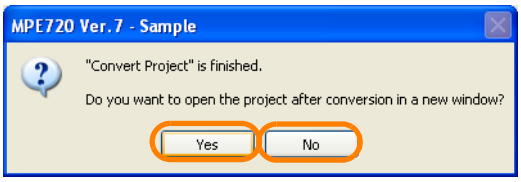


The conversion will start and a progress bar will be displayed. The progress of the conversion will also be displayed in the Output Pane.



When the conversion has been completed, the MPE720 Ver. 7 Dialog Box will be displayed.

5. Click the **Yes** Button or the **No** Button.



Yes Button: The converted project will open in a new tab page.
No Button: The display will return to the Main Window.

This concludes the procedure.

- Errors or Warnings during the Conversion

A dialog box that asks for confirmation will be displayed.
You can check the details of the conversion error or warning by viewing the Output Pane or the log file in the folder in which the converted file is to be saved.

12.3 Monitoring the Current Positions of Axes

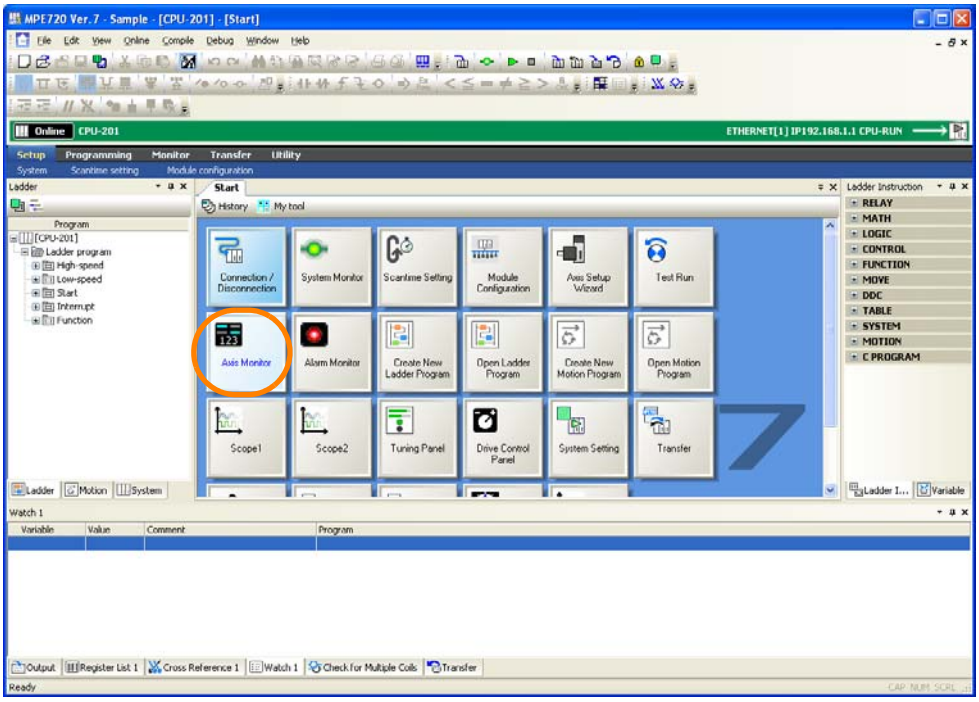
You can monitor the positions and operating status of specific axes. There are the following two methods to monitor current axis positions.

- Monitoring on the Axis Monitor
- Monitoring on the Position Monitor

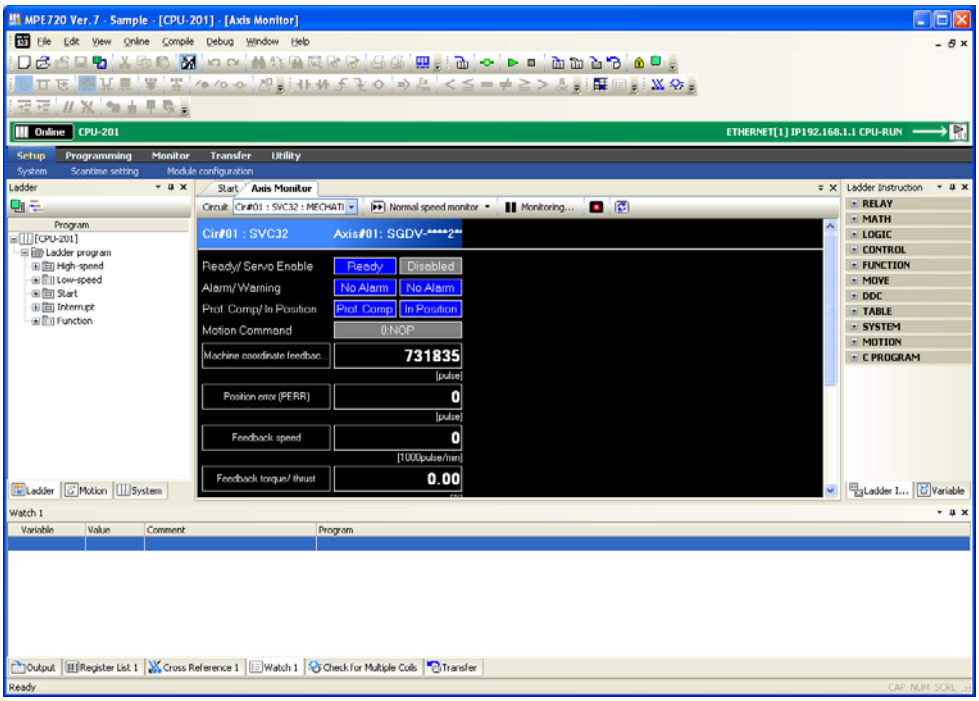
The procedures are given below.

12.3.1 Monitoring on the Axis Monitor

1. Click the **Axis Monitor** Button on the My Tool View.



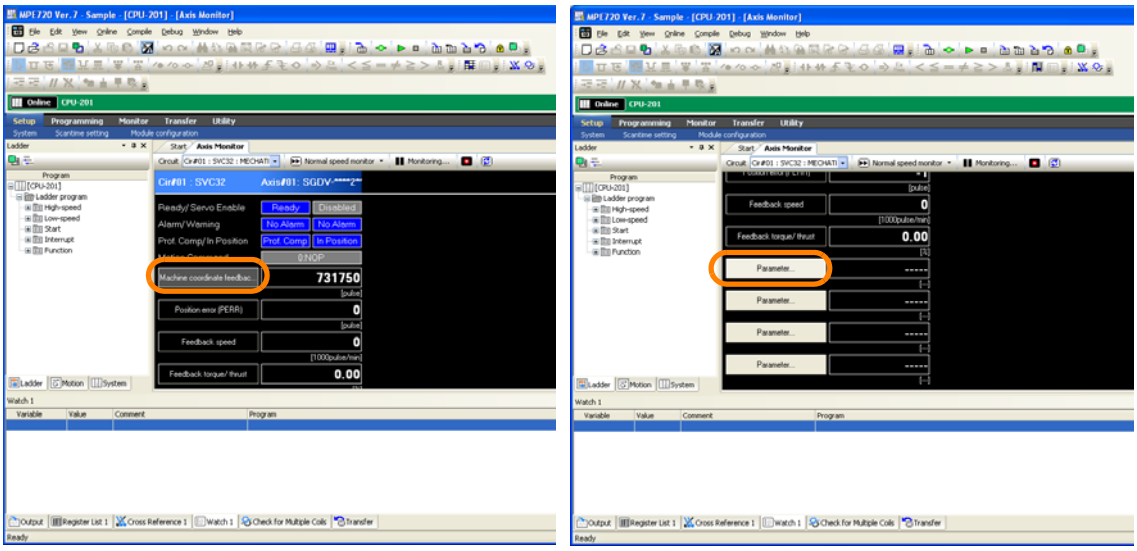
The Axis Monitor Tab Page will be displayed.



2. Check the current values of the parameters.

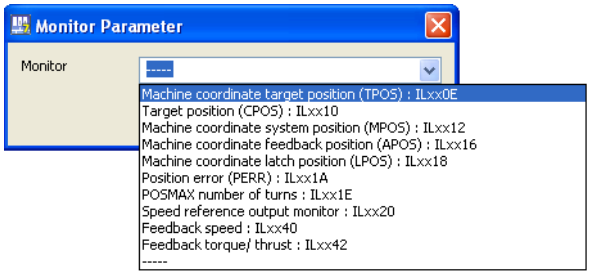
Perform the next step only if it is necessary to add or change the parameters to monitor.
If there are no parameters to add or change, this concludes the procedure.

3. Click the name of the parameter to add or change, or the **Parameter** Button.

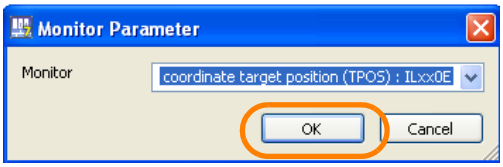


The Monitor Parameter Dialog Box will be displayed.

4. Select the parameter to monitor in the **Monitor** Box.



5. Click the **OK** Button.



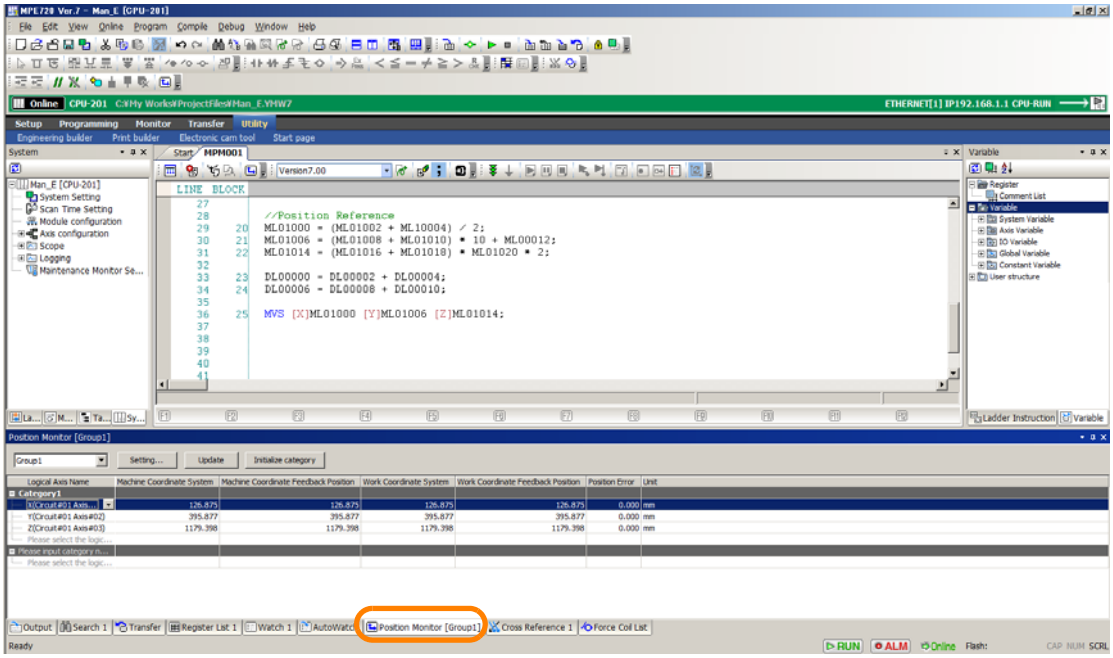
6. Confirm that the selected parameter has been changed or added.

This concludes the procedure.

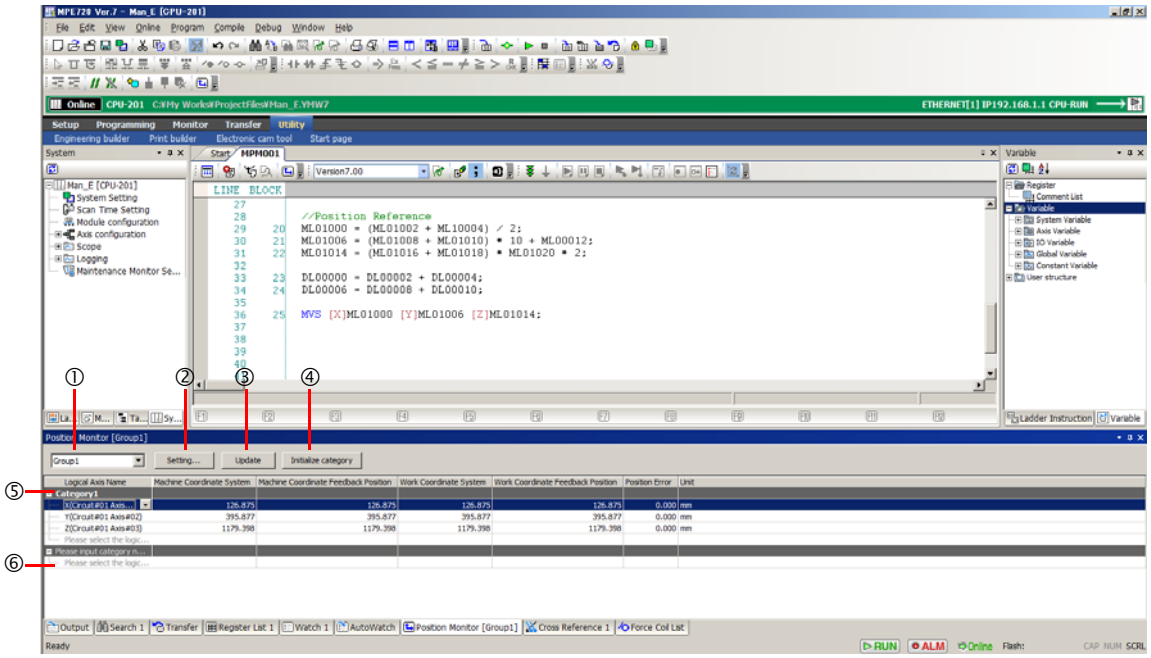
12.3.2 Monitoring on the Position Monitor

1. Set a group definition.
   Refer to the following section for the procedure to set group definitions.
   ☞ *5.2.1 Setting Group Definitions* on page 5-54

2. Click the **Position Monitor** Tab in the pane.



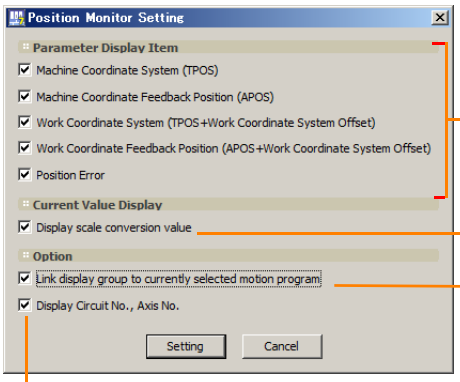
The following information will be displayed for each axis: Machine Coordinate System Target Position (TPOS), Machine Coordinate System Feedback Position (APOS), Work Coordinate System Target Position (TPOS + Work Coordinate System Offset), Work Coordinate System Feedback Position (APOS + Work Coordinate System Offset), and Position Deviation.



No.	Item	Description
①	Group name	If you select a group name, the information for all Servos in the selected group will be displayed in the Position Monitor Pane. Refer to the following manual for details on group names and servo definitions. 📖 *MP3000 Series Motion Programming Manual* (Manual No.: SIEP C880725 14)

Continued on next page.

Continued from previous page.

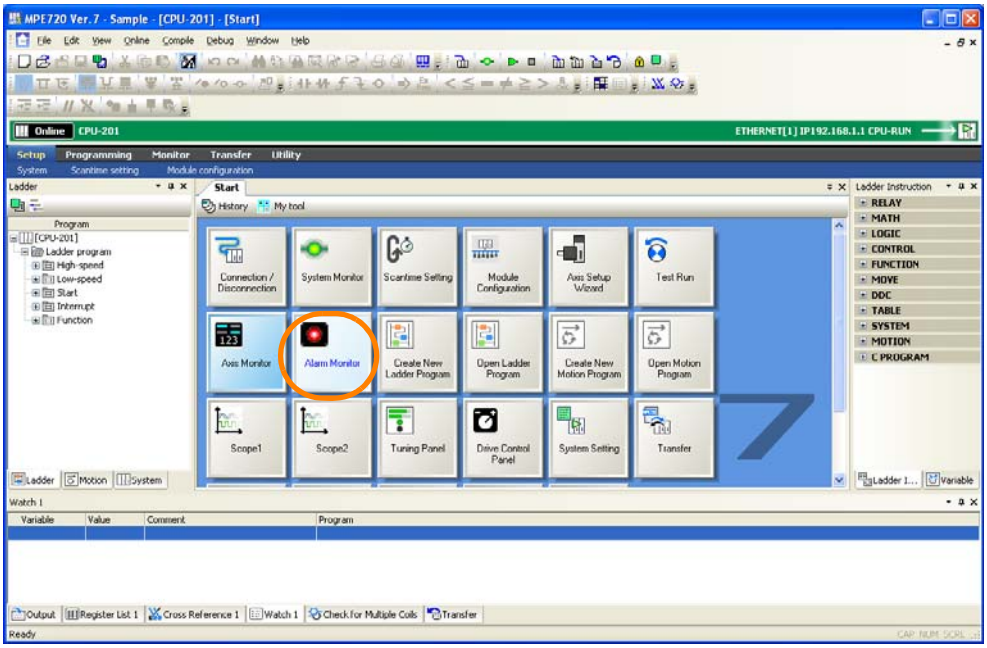
No.	Item	Description
②	Setting Button	Click this button to display the Position Monitor Setting Dialog Box and set the conditions for the information displayed in the pane.  The items for the check marks that are selected will be displayed in the pane. If this check box is selected, values are displayed in the unit set in the fixed parameters. If this check box is selected, the group displayed in the pane is automatically switched when a motion program is selected. If this check box is selected, the circuit number and axis number are displayed in the **Logical Axis Name** Column.
③	Update Button	Click this button to update any information that has changed in the group definitions or Module configuration definitions.
④	Initialize category Button	Click this button to initialize the display in the pane.
⑤	Category name	You can set the category name.
⑥	Servo selection	You can add and delete the Servos to display.

This concludes the procedure.

12.4 Monitoring the Alarm Status of Axes

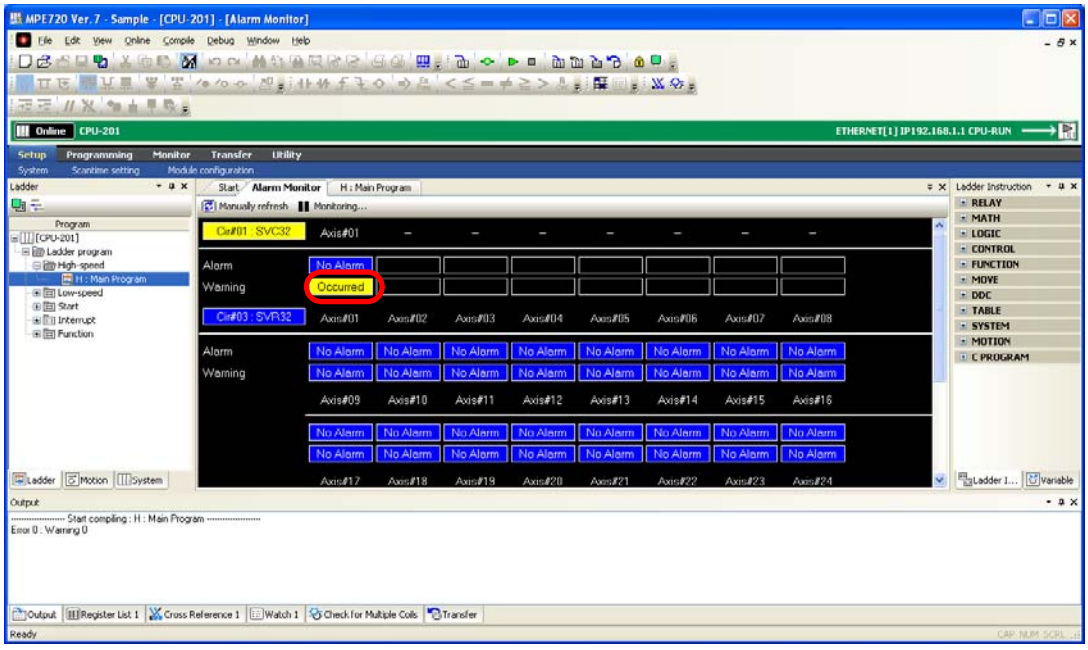
Use the following procedure to monitor alarms that occur while an axis is in motion.

1. Click the **Alarm Monitor** Button on the My Tool View.



The Alarm Monitor Tab Page will be displayed.

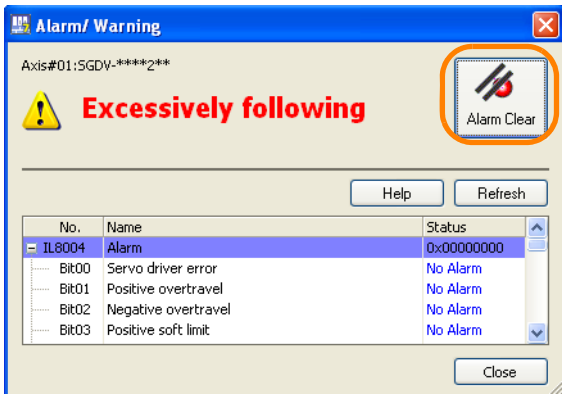
2. Click **Occurred**.



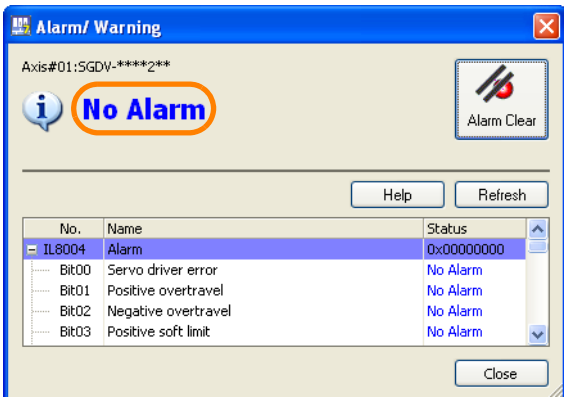
The Alarm/Warning Dialog Box will be displayed.

3. Check the alarm status and resolve the cause of the alarm.

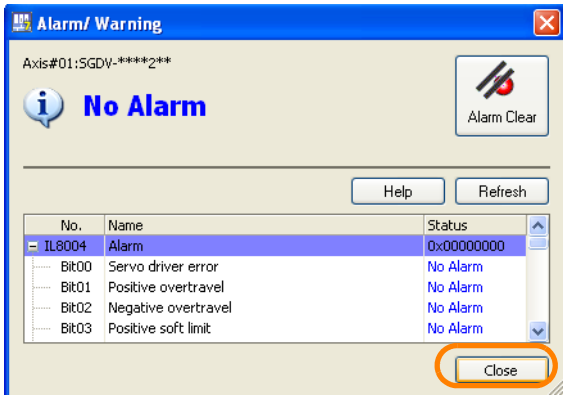
4. Click the **Alarm Clear** Button.



5. Confirm that the display changes to **No Alarm**.



6. Click the **Close** Button.

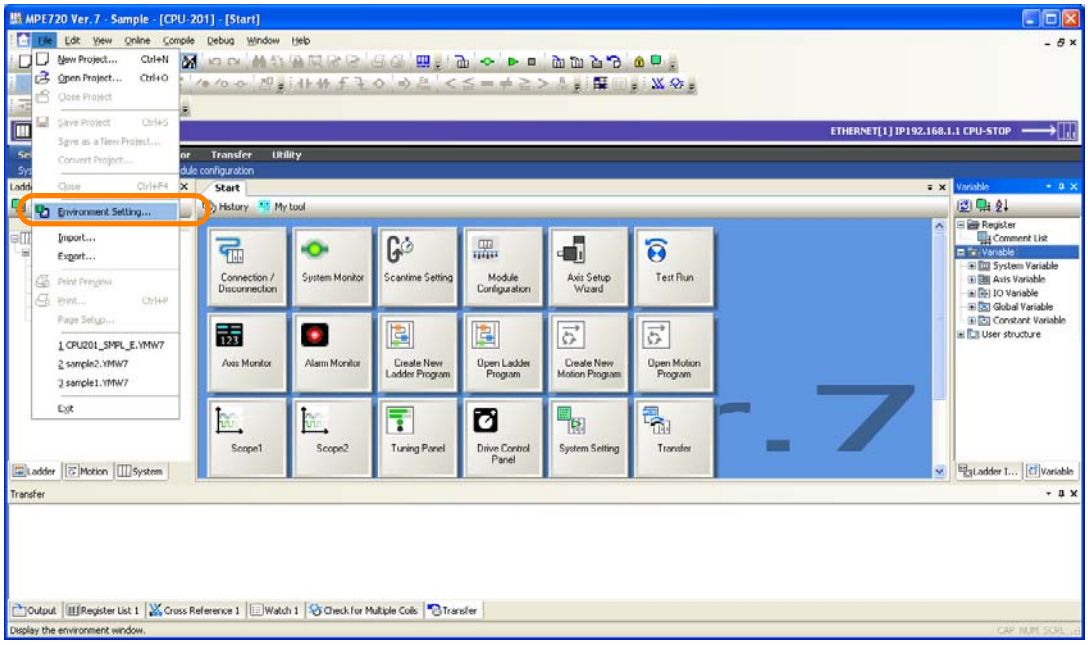


This concludes the procedure.

12.5 Changing the Display Language

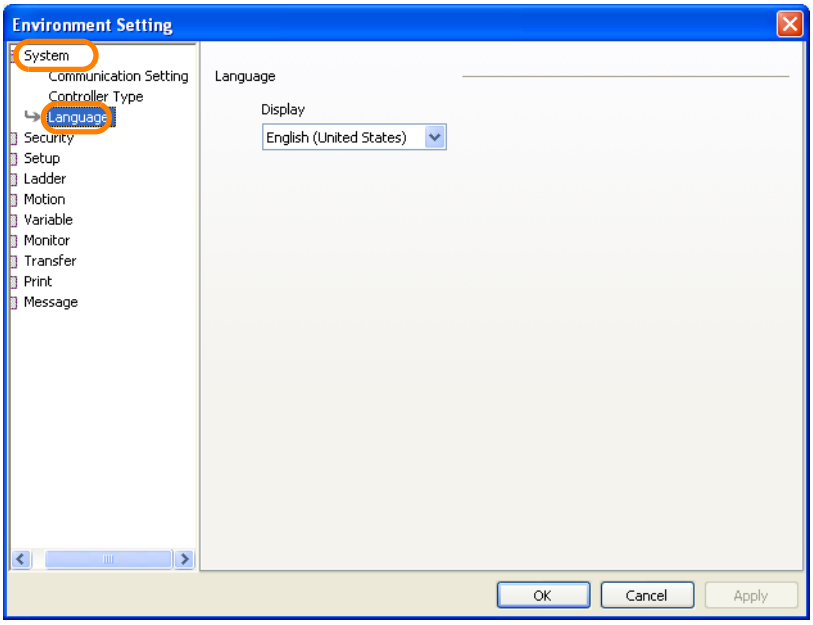
Use the following procedure to change the display language of the MPE720.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

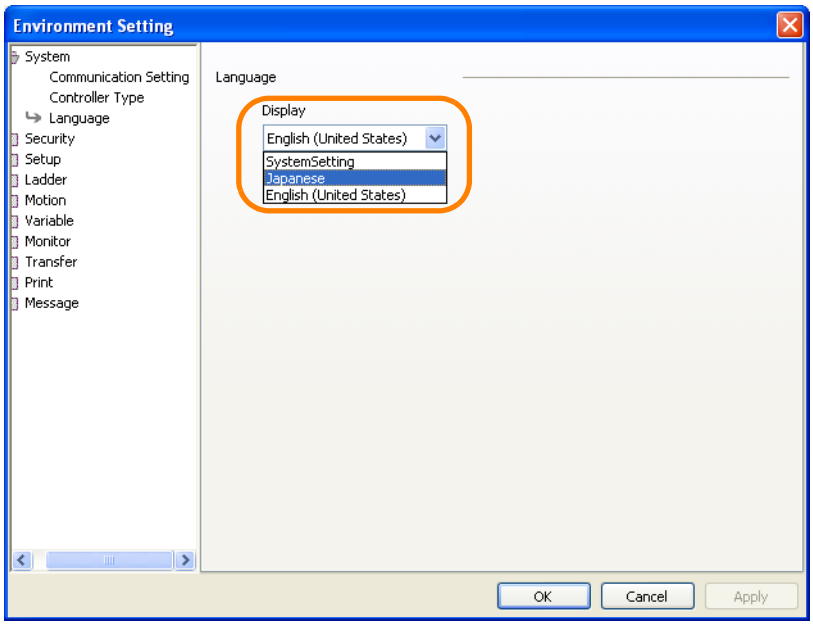


The Environment Setting Dialog Box will be displayed.

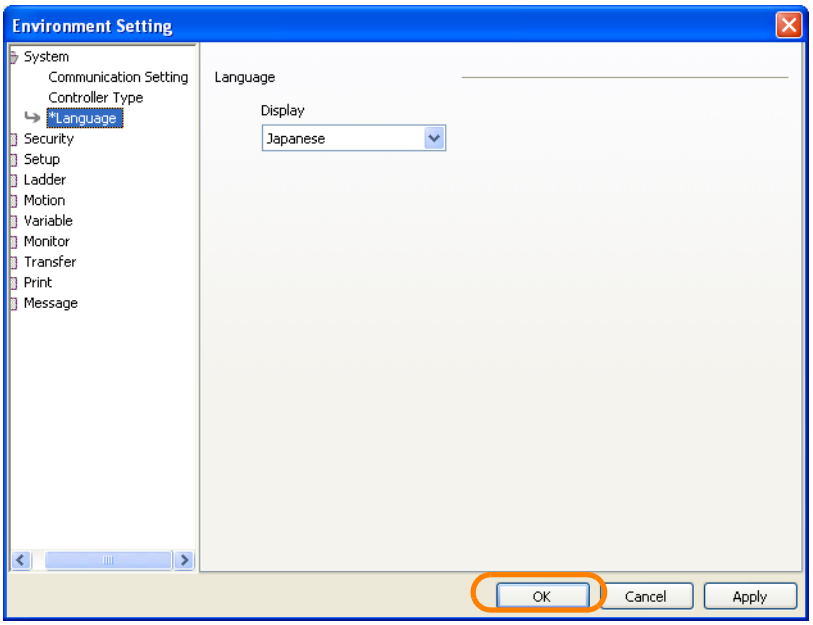
2. Select **System** – **Language**.



3. Select the language to use in the **Display** Box.

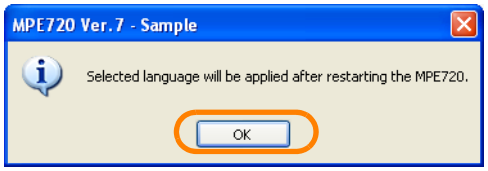


4. Click the **OK** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

5. Click the **OK** Button.



The Environment Setting Dialog Box will close.

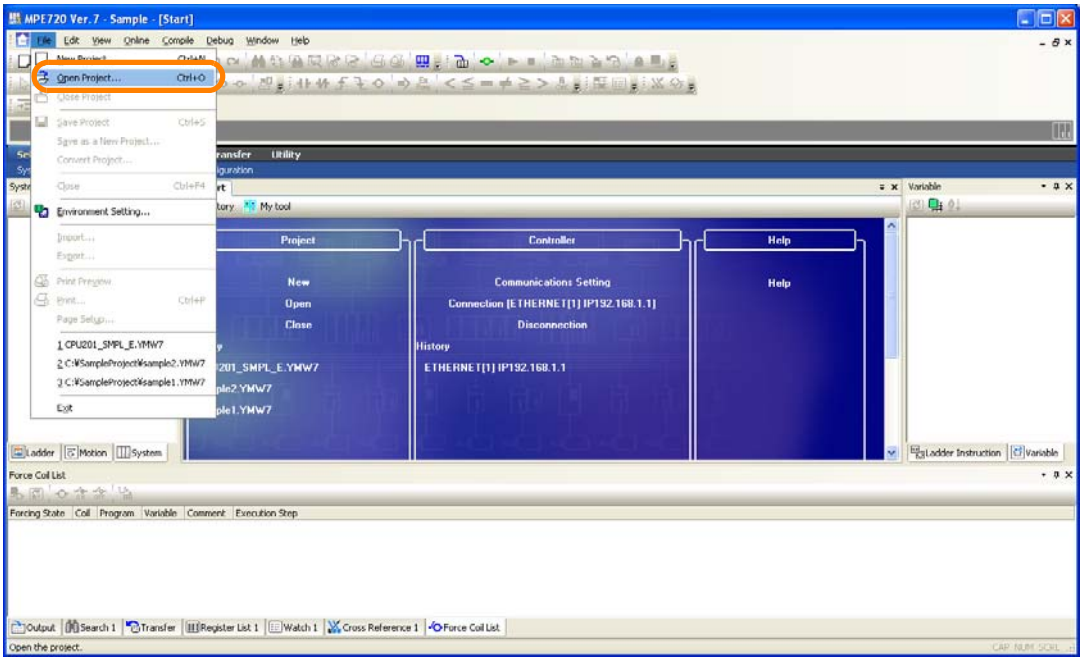
6. You must restart the MPE720 to enable changes in the environment settings.

This concludes the procedure.

12.6 Using MPE720 Version 7 to Open MAL Files

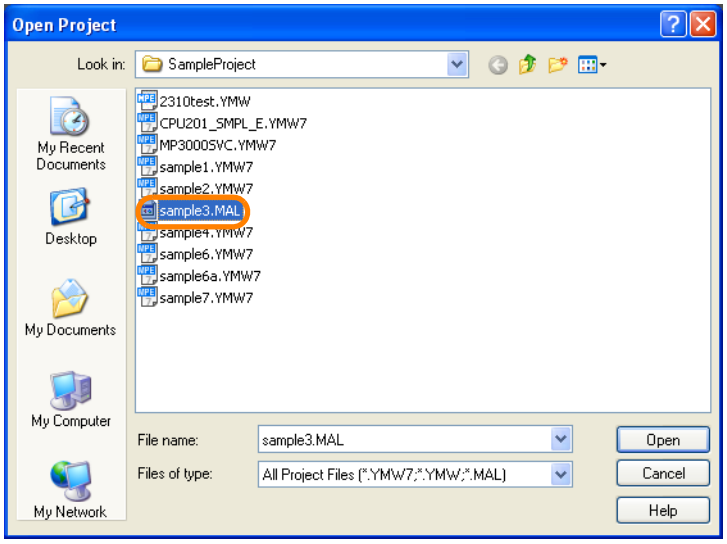
Use the following procedure to convert a MAL file (a PLC folder compressed into a file) that was used with MPE720 Version 5 to a file that can be opened with MPE720 Version 7.

1. Select ***File*** – ***Open Project*** from the menu bar.

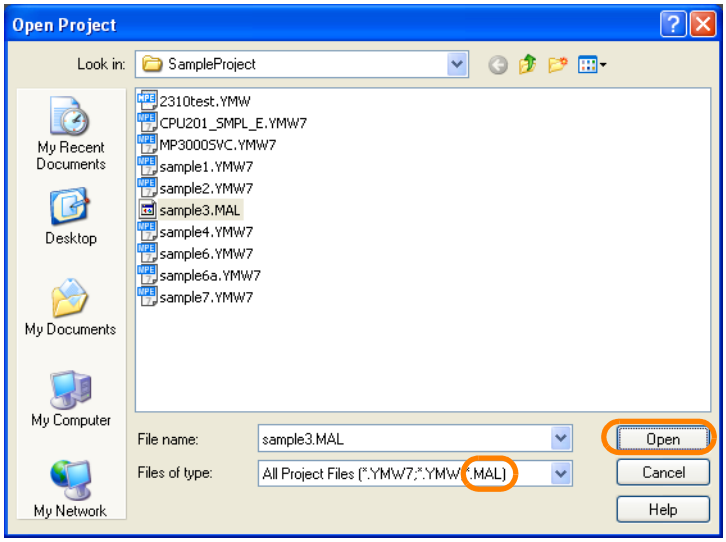


The Open Project Dialog Box will be displayed.

2. Select the MAL file to convert.

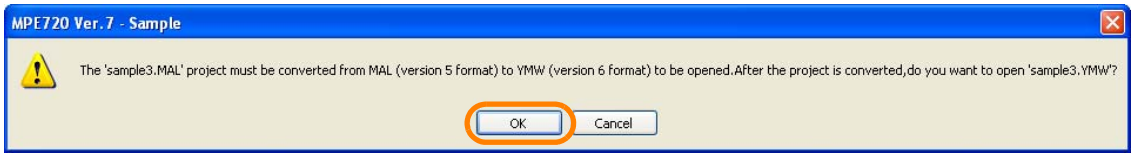


3. Confirm that the **Files of type** Box contains the "*.MAL" extension, and then click the **Open** Button.



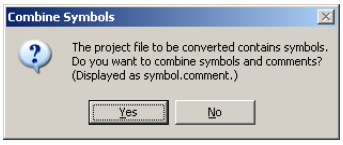
The MPE720 Ver. 7 Dialog Box will be displayed.

4. Click the **OK** Button.



Information

If the file to convert contains symbols, the Combine Symbols Dialog Box will be displayed.



To combine the symbols and comments, click the **Yes** Button. To not combine them, click the **No** Button.
If you click the **Yes** Button, the text entered for the symbol and the text entered for the comment will be separated with a period and added to the comment data in the converted file.

The project file will be converted, and the converted project file will be opened.

This concludes the procedure.

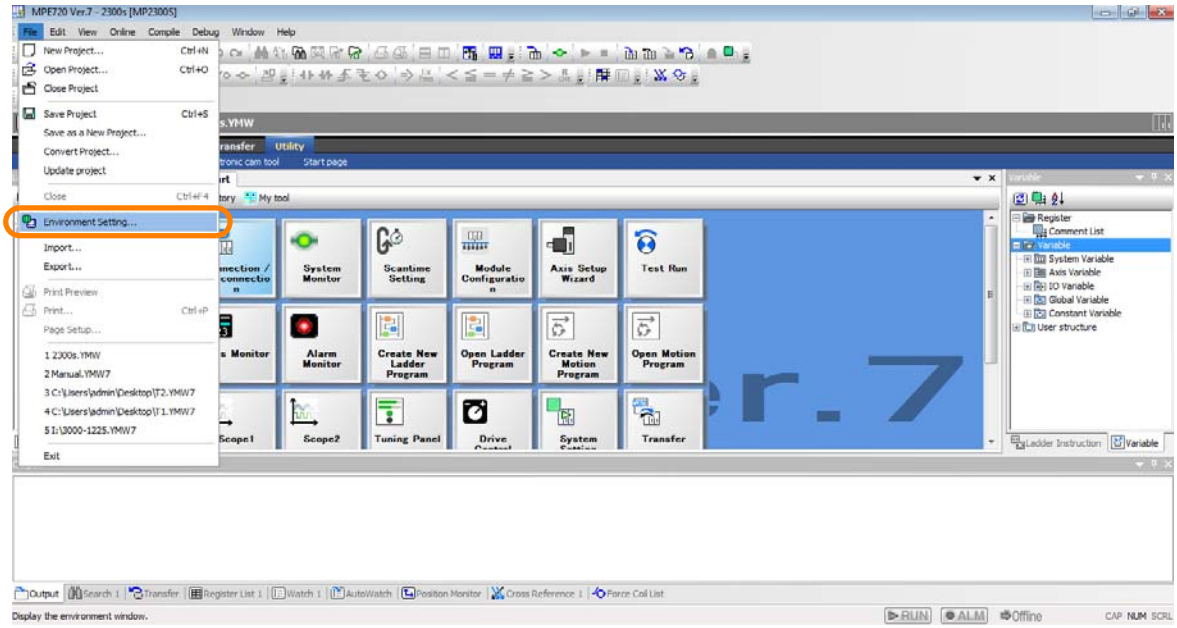
12.6.1 Checking for Compatibility with MPE720 Version 6

You can change the settings so that warning messages are displayed when functions or instructions that are not supported by MPE720 Version 6 are used.

Information You can use this function only for a version 6 project file (file name extension: .YMN).

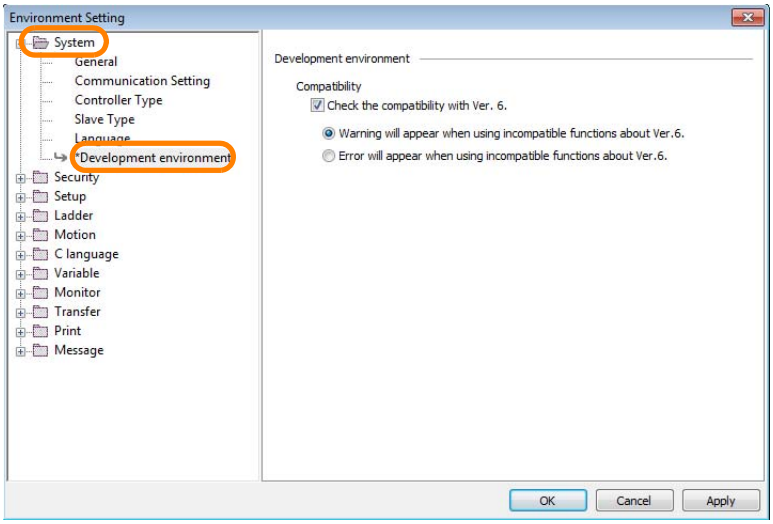
The procedure is given below.

1. Select ***File*** – ***Environment Setting*** from the menu bar.

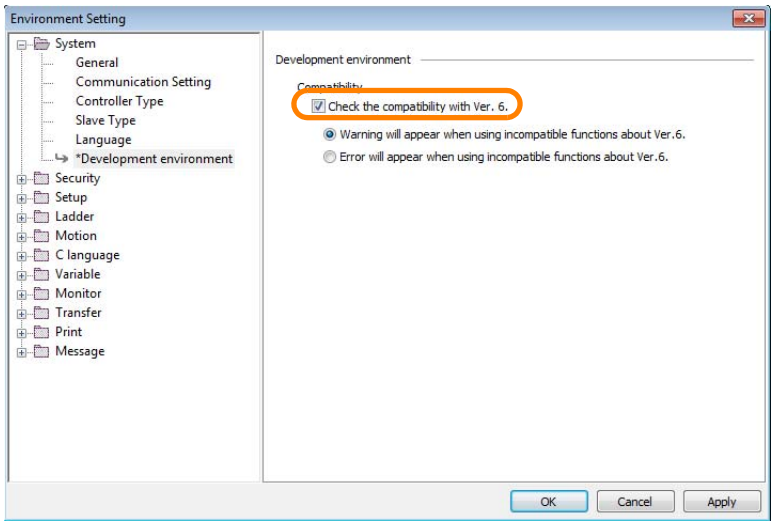


The Environment Setting Dialog Box will be displayed.

2. Select **System** – **Development environment**.



3. Select the **Check the compatibility with Ver. 6** Check Box.



If you select this check box, you can select whether to display a warning or an error for functions and instructions that cannot be used with MPE720 Ver. 6. Select the required detection method.

This concludes the procedure.

Important

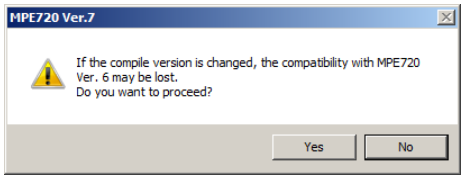
A warning message will be displayed in the following cases:

- When the Expression ladder program instruction or the motion program compiling mode is changed from compatibility with version 6 to version 7
- When a program is compiled while the version 7 compiling mode is selected for the Expression ladder program instruction or the motion program compiling mode
- When a ladder program that contains parallel rungs supported for version 7.20 or higher is compiled

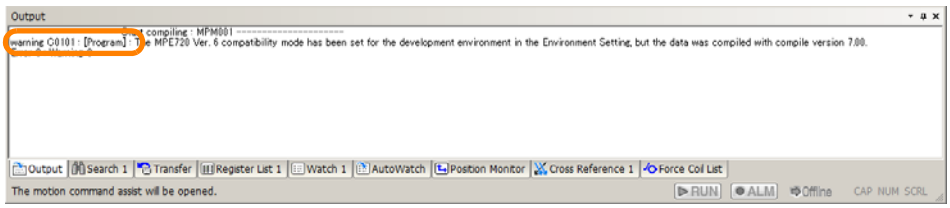
Example

The warning message will be displayed in a dialog box or the Output Pane.

- Dialog Box



- Output Pane



12.7 Monitoring Maintenance Data

You can use the Maintenance Monitor to monitor maintenance data in a Machine Controller or a Σ-7-series SERVOPACK that is connected to the Machine Controller with MECHATROLINK communications.

Information
- If you use the Maintenance Monitor while the SigmaWin is being used, the operating speed of both applications will slow down.
- It is possible to display up to 16 axes at the same time.

Specifications

The following table lists the applicable models and the maintenance data that you can monitor.

◆ Applicable Models

Applicable Model		Remarks	
Machine Controller	MP3100	–	Refer to the following section for details on applicable versions. ☞ *Monitoring in the Maintenance Monitor Window* on page 12-20
	MP3200	–	
	MP3300	–	
SERVOPACK	Σ-7S	Models that support MECHATROLINK-III communications only	
	Σ-7W		
MPE720	MPE720 Ver.7	–	

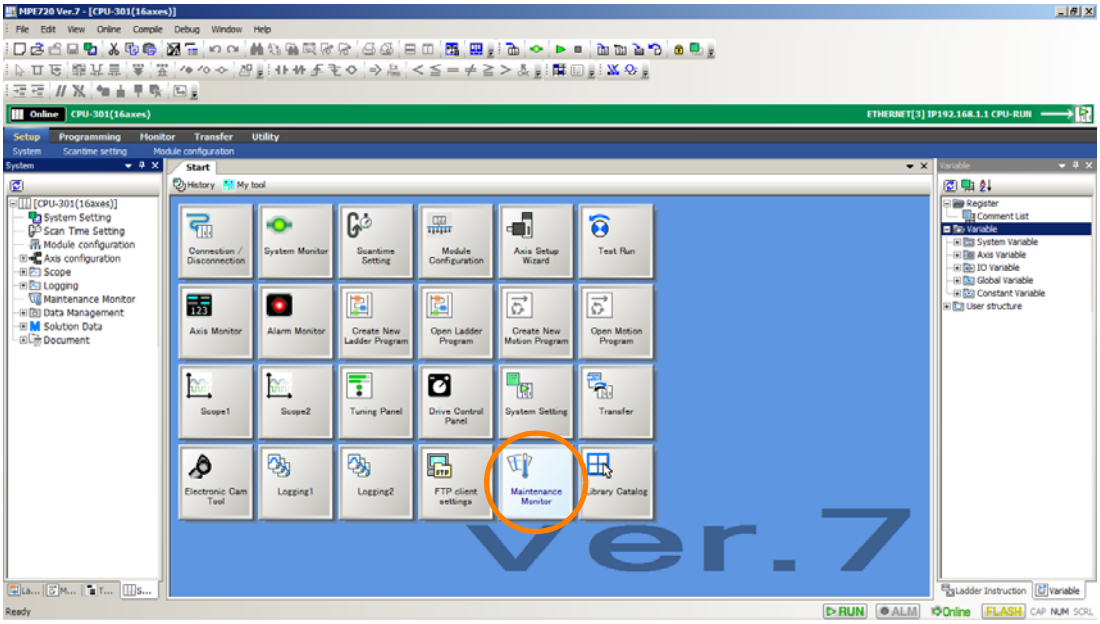
◆ Maintenance Data

Data Category	Details
Installation environment data	Temperature environment load status of Machine Controller, SERVOPACKs, and Servomotors
Power consumption data	Power consumption of SERVOPACKs and Servomotors
Life estimation data	• Total operating hours of SERVOPACKs • End of service life of consumable components (internal fan, capacitors, inrush prevention circuits, and dynamic brake circuits)
Sensing data	Data related to control, communication quality, and operating status calculated inside SERVOPACKs

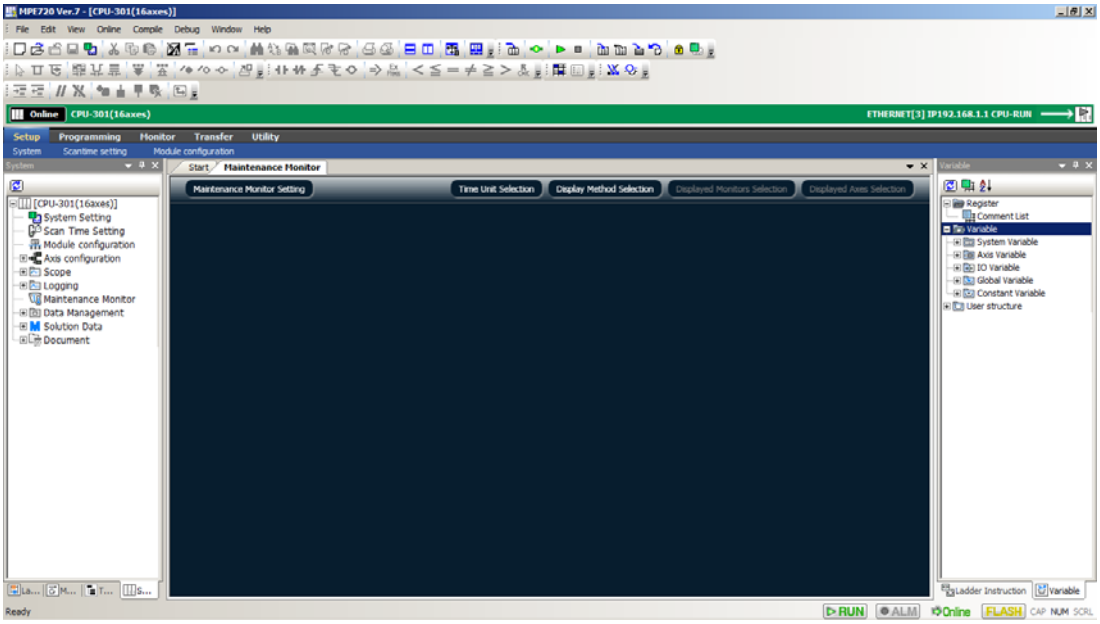
Monitoring in the Maintenance Monitor Window

Use the following procedure to monitor in the Maintenance Monitor Window.

1. Click the **Maintenance Monitor Setting** Button on the My Tool View.

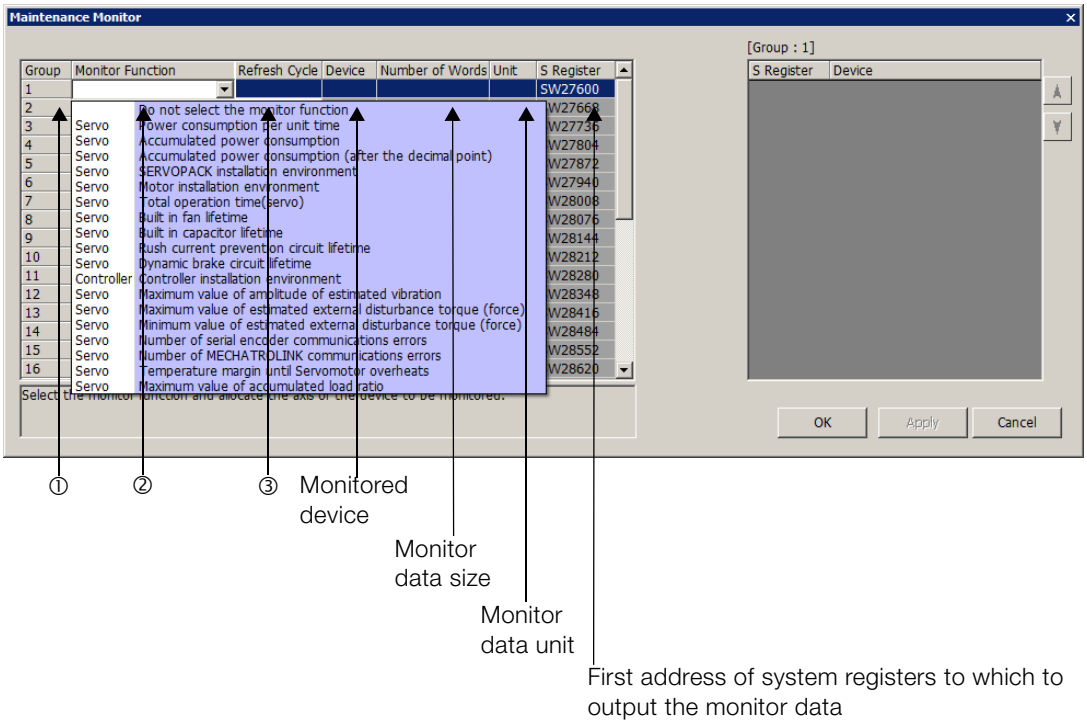


2. Click **Maintenance Monitor Setting**.



The Maintenance Monitor Setting Dialog Box will be displayed.

3. Set the maintenance data.



① Select a group number.

- Maximum number of groups: 32

② Select a monitor function.

Monitor Function	Description	Monitored Device	Number of Words	Unit	Supported Version
Power consumption per unit time	The power consumption per unit time is displayed.	SERVOPACK	2	1 Wh	• Machine Controller: Version 1.12 or higher • SERVOPACK: Ver. 000C or higher • MPE720: Version 7.28 or higher
Accumulated power consumption	The total power consumption from when operation was started is displayed.	SERVOPACK	2	1 Wh	
Accumulated power consumption (after the decimal point)	The three digits below the decimal point of the total power consumption from when operation was started are displayed.	SERVOPACK	2	0.001 Wh	
SERVOPACK installation environment	The load conditions of the temperature environment in the SERVOPACK are displayed.	SERVOPACK	1	1%	
Motor installation environment	The load conditions of the temperature environment in the Servomotor are displayed.	SERVOPACK	1	1%	
Total operation time (servo)	The total operating time of the SERVOPACK is displayed.	SERVOPACK	2	100 ms	
Built-in fan lifetime	The total operating time of the cooling fan is displayed as a percentage. When usage is started, 100% is displayed and the value decreases as the operating time increases. When 0% is displayed, it is time to replace the fan.	SERVOPACK	1	0.01%	

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Monitor Function	Description	Monitored Device	Number of Words	Unit	Supported Version
Built-in capacitor lifetime	The maintenance periods of the electrolytic capacitors (main circuit and control circuit) are displayed as percentages. When usage is started, 100% is displayed and the value decreases as the operating time increases. When 0% is displayed, it is time to replace the capacitor.	SERVOPACK	1	0.01%	• Machine Controller: Version 1.12 or higher • SERVOPACK: Ver. 000C or higher • MPE720: Version 7.28 or higher
Rush current prevention circuit lifetime	The maintenance period of the inrush prevention relay is displayed as a percentage. When usage is started, 100% is displayed and the value decreases as the operating time increases. When 0% is displayed, it is time to replace the relay.	SERVOPACK	1	0.01%	
Dynamic brake circuit lifetime	The maintenance period of the IGBT is displayed as a percentage. When usage is started, 100% is displayed and the value decreases as the operating time increases. When 0% is displayed, it is time to replace the IGBT.	SERVOPACK	1	0.01%	
Controller installation environment	The load conditions of the temperature environment load status in the Machine Controller will be displayed.	Machine Controller	1	1%	• Machine Controller: Ver. 1.14 or higher (not compatible with CPU-201) • MPE720: Version 7.30 or higher
Maximum value of amplitude of estimated vibration	The maximum value of vibration amplitude of the estimated vibration calculated inside the SERVOPACK is displayed. This is compared with the value during regular operation in order to determine changes in the device due to deterioration over time and similar causes. If this monitor value increases, vibration may occur in the device.	SERVOPACK	1	1 min^{-1}	• Machine Controller: Version 1.12 or higher • SERVOPACK: Ver. 002C or higher • MPE720: Version 7.46 or higher
Maximum value of estimated external disturbance torque (force)	The maximum value of the estimated external disturbance torque (force) calculated inside the SERVOPACK is displayed. This is compared with the value during regular operation in order to determine changes in the device due to deterioration over time and similar causes. If this monitor value increases, the external disturbance torque (force) applied to the Servomotors may increase.	SERVOPACK	1	1%	

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Monitor Function	Description	Monitored Device	Number of Words	Unit	Supported Version
Minimum value of estimated external disturbance torque (force)	The minimum value of the estimated external disturbance torque (force) calculated inside the SERVOPACK is displayed. This is compared with the value during regular operation in order to determine changes in the device due to deterioration over time and similar causes. If this monitor value decreases, the external disturbance torque (force) applied to the Servomotors may increase.	SERVOPACK	1	1%	• Machine Controller: Version 1.12 or higher • SERVOPACK: Ver. 002C or higher • MPE720: Version 7.46 or higher
Number of serial encoder communications errors	The number of serial encoder communications errors is displayed. If this monitor value increases, the communication quality may decrease.	SERVOPACK	2	1 time	
Number of MECHATROLINK communications errors	The number of MECHATROLINK communications errors is displayed. If this monitor value increases, the communication quality may decrease.	SERVOPACK	2	1 time	
Temperature margin until Servomotor overheats	The temperature margin until Servomotor overheating is displayed. The SERVOPACK detects A.860 (Encoder Overheat) if the temperature margin drops below 0 [°C]. Monitoring of this monitor allows you to prevent the system from stopping due to A.860. The following models of motors can be monitored: SGM7M, SGM7J, SGM7A, SGM7P, SGM7G, SGM7F, SGMCV	Servomotors	1	1°C	
Maximum value of accumulated load ratio	The maximum value of accumulated load ratio for the SERVOPACK is displayed. This is compared with the value during regular operation in order to determine changes in the device due to deterioration over time and similar causes. If this monitor value increases, the load applied to the Servomotors may increase.	SERVOPACK	1	1%	

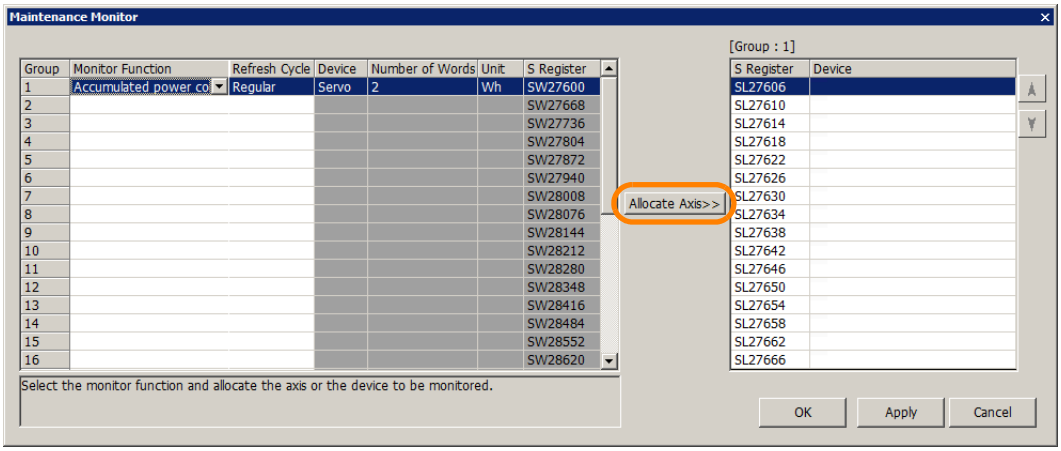
Information You can select the same monitor functions for other groups too.

③ Select the data refresh cycle.

Selection	Description
Frequent	Data is updated approx. every second.
Regular	Data is updated approx. every 10 s.
Infrequent	Data is updated approx. every 100 s.

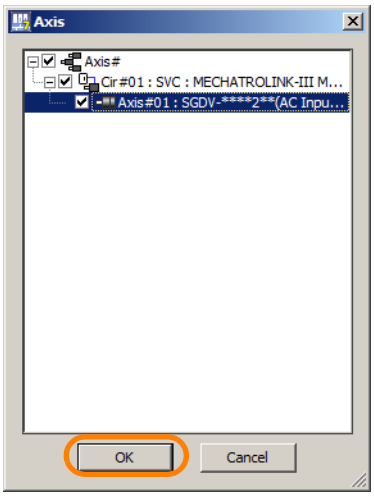
Information The data refresh cycle is an approximation. The refresh period will increase as the number of monitored axes increases.

4. Click the **Allocate Axis** Button.



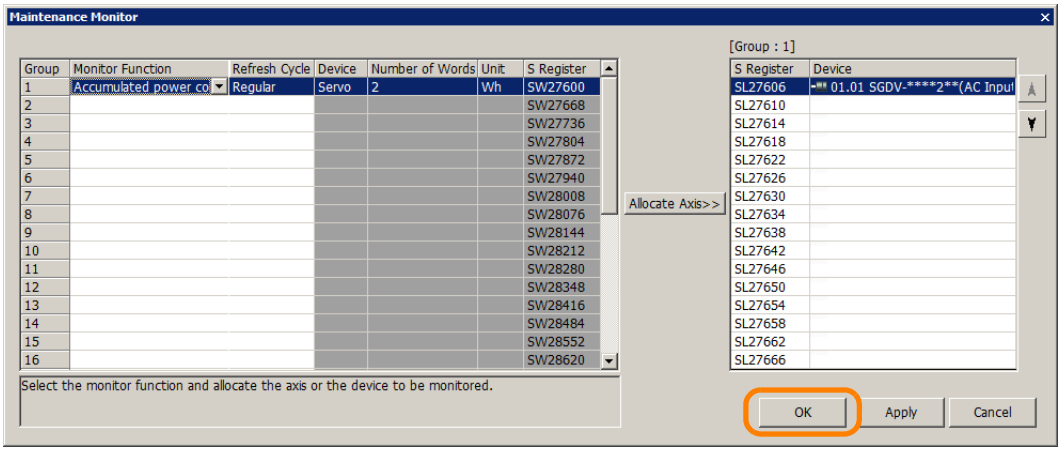
The Axis Dialog Box will be displayed.

5. Select the axis to allocate, and click **OK** Button.

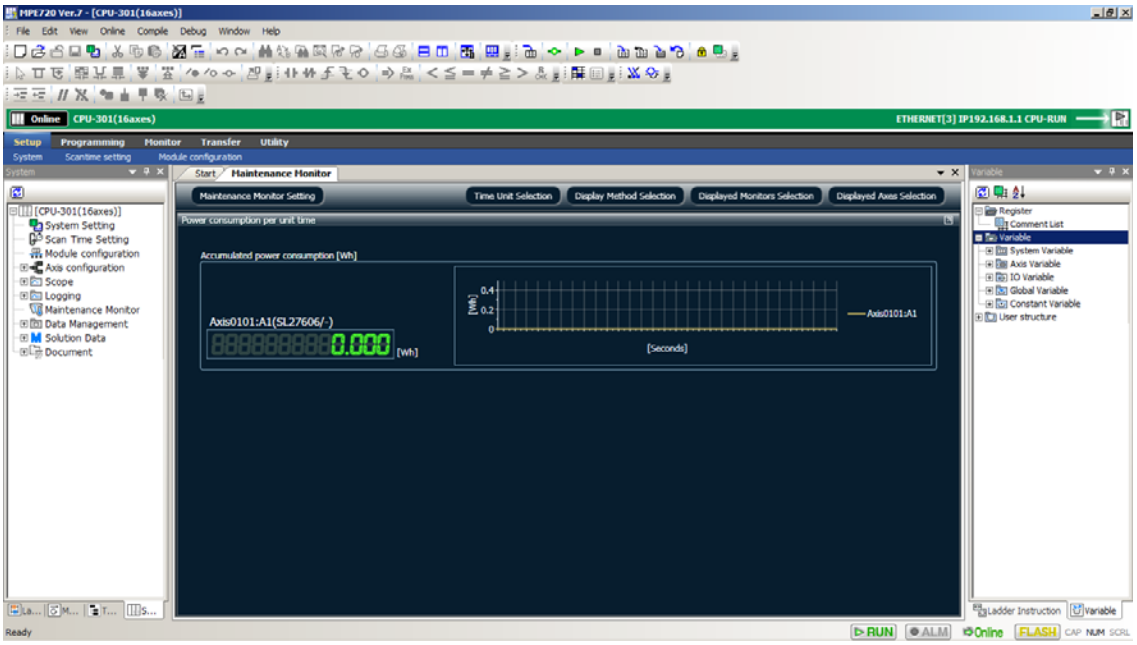


- Maximum number of allocated axes: 16 per group

6. Click the **OK** Button.



Monitoring will start.



Monitoring via System Register

The monitored data is stored in system registers.

The following table provides the detailed system register regions used for the Maintenance Monitor.

Information □□□□ is the first address of the system registers displayed on the Maintenance Monitor Setting Dialog Box.

System Register	Item		Remarks
SL□□□□ + 0	Reserved for system. (Monitor Parameter Type)		–
SW□□□□ + 2	Monitor size		0001 hex: Word 0002 hex: Long word
SW□□□□ + 3	Reserved for system.		–
SW□□□□ + 4	Axis 1	Circuit number	An error code is stored when an error occurs. ☞ ■ *Error Codes* on page 12-27
SW□□□□ + 5		Axis number	An error code is stored when an error occurs. ☞ ■ *Error Codes* on page 12-27
SL□□□□ + 6		Monitor value	–
SW□□□□ + 8	Axis 2	Circuit number	Same as above.
SW□□□□ + 9		Axis number	
SW□□□□ + 10		Monitor value	
SW□□□□ + 12	Axis 3	Circuit number	Same as above.
SW□□□□ + 13		Axis number	
SL□□□□ + 14		Monitor value	
SW□□□□ + 16	Axis 4	Circuit number	Same as above.
SW□□□□ + 17		Axis number	
SL□□□□ + 18		Monitor value	
SW□□□□ + 20	Axis 5	Circuit number	Same as above.
SW□□□□ + 21		Axis number	
SL□□□□ + 22		Monitor value	
SW□□□□ + 24	Axis 6	Circuit number	Same as above.
SW□□□□ + 25		Axis number	
SL□□□□ + 26		Monitor value	
SW□□□□ + 28	Axis 7	Circuit number	Same as above.
SW□□□□ + 29		Axis number	
SL□□□□ + 30		Monitor value	
SW□□□□ + 32	Axis 8	Circuit number	Same as above.
SW□□□□ + 33		Axis number	
SL□□□□ + 34		Monitor value	
SW□□□□ + 36	Axis 9	Circuit number	Same as above.
SW□□□□ + 37		Axis number	
SL□□□□ + 38		Monitor value	
SW□□□□ + 40	Axis 10	Circuit number	Same as above.
SW□□□□ + 41		Axis number	
SL□□□□ + 42		Monitor value	
SW□□□□ + 44	Axis 11	Circuit number	Same as above.
SW□□□□ + 45		Axis number	
SL□□□□ + 46		Monitor value	
SW□□□□ + 48	Axis 12	Circuit number	Same as above.
SW□□□□ + 49		Axis number	
SL□□□□ + 50		Monitor value	

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System Register	Item		Remarks
SW□□□□ + 52	Axis 13	Circuit number	Same as above.
SW□□□□ + 53		Axis number	
SL□□□□ + 54		Monitor value	
SW□□□□ + 56	Axis 14	Circuit number	Same as above.
SW□□□□ + 57		Axis number	
SL□□□□ + 58		Monitor value	
SW□□□□ + 60	Axis 15	Circuit number	Same as above.
SW□□□□ + 61		Axis number	
SL□□□□ + 62		Monitor value	
SW□□□□ + 64	Axis 16	Circuit number	Same as above.
SW□□□□ + 65		Axis number	
SL□□□□ + 66		Monitor value	

■ Error Codes

If the monitor data cannot be read completely, one of the following error codes is stored in the system registers that normally store the axis circuit number and axis number.

System Registers		Error
Circuit Number	Axis Number	
80 hex	18 hex	Relay error: An error was received during message communications with the SERVOPACK.
80 hex	22 hex	Timeout error: A response from the SERVOPACK was not received within 5 s.

◆ Monitoring Methods

You can use the following methods to monitor the data that is stored in the system registers.

- Using a Ladder Program
  Refer to the following section for operating details.
  ☞ *5.1 Ladder Programming* on page 5-3
- Using Tracing
  Refer to the following section for operating details.
  ☞ *Chapter 9 Tracing*
- Using Data Logging
  Refer to the manual for your Machine Controller for operating details.

Information You can also use a touch panel to monitor the stored data.

Appendix A

13

This chapter describes error messages and the corrective action to perform when an error is displayed.

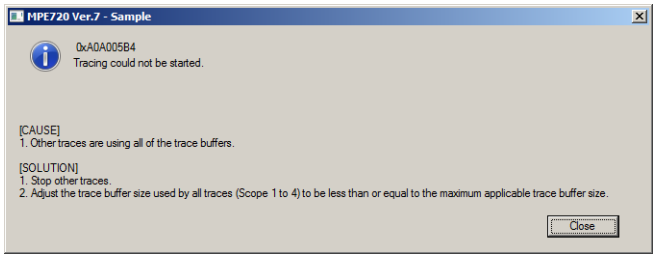
13.1 Error Messages and Reference Sections for Corrective Action

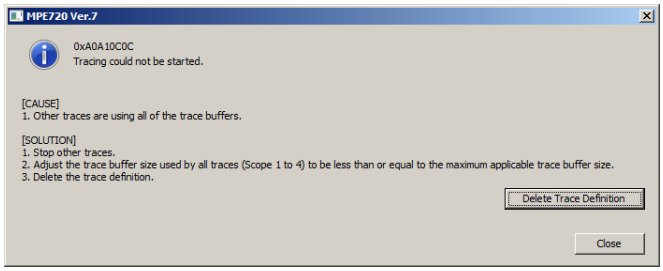
Error Message	Error No.	Reference Section
An error occurred during the transfer to the controller.	–	☞ *13.2.2 An error occurred during the transfer to the controller.* on page 13-6
The selected trace could not be started.	0xA0A10C0B	☞ *9.1.7 Changing the Enabled/Disabled Setting of the Trace Definition Settings* on page 9-17
Tracing could not be started.	0xA0A005B4	☞ *13.2.1 Tracing could not be started.* on page 13-3
	0xA0A10C0A	
	0xA0A10C0C	

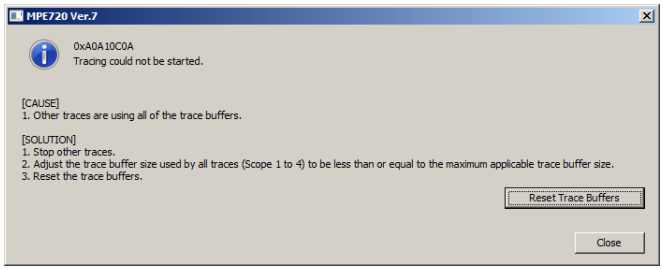
13.2 Corrective Action When an Error Message Is Displayed

13.2.1 Tracing could not be started.

Error Message Dialog Box







Corrective Action

1. Stop tracing of other groups.
2. Display the trace tab page again.
3. In the Sampling & Trigger Setting Dialog Box, 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.
   ☞ *Trace Buffer Size* on page 9-4
   When the trace buffer size is greater than the maximum applicable trace buffer size, change the settings in the Sampling & Trigger Setting Dialog Box.
4. Start tracing again by clicking the **Start Trace** Button.

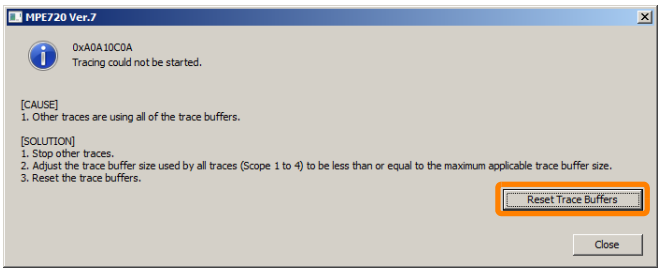
If no error messages are displayed, this concludes the procedure.
In the case of Machine Controllers Ver. 1.30 or higher, the error message is sometimes displayed again even if the above corrective action is taken. The trace definitions and trace buffers must be deleted only in this case. Refer to either of the following sections according to the message that is displayed.

☞ ◆ *Corrective Action (Continued): Deleting the Trace Buffer* on page 13-4
☞ ◆ *Corrective Action (Continued): Deleting Trace Definitions* on page 13-5

◆ Corrective Action (Continued): Deleting the Trace Buffer

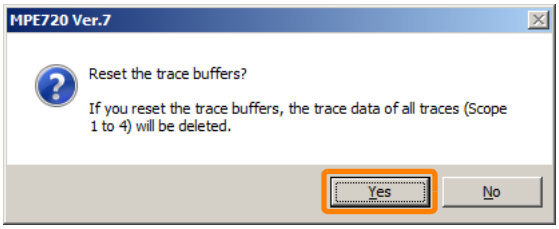
1. Confirm that adjustment of the trace buffer size has been completed.
   Refer to the following section for details.
   ☞ *Corrective Action* on page 13-3

2. Click the **Reset Trace Buffers** Button.



   A message will be displayed.

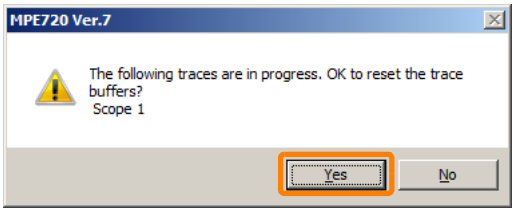
3. Click the **Yes** Button.



> Important
>
> When the trace buffers are reset, the acquired trace data is deleted. Even if trace buffers are reset, trace definitions are not deleted.
>
> To save acquired trace data, click the **No** Button, and perform the following procedure to save the trace data.
> • Open the trace – ***File*** – ***Save in External File***
> To save the trace data of two or more trace groups, perform this operation for each trace group.

   A message will be displayed.

4. Click the **Yes** Button.



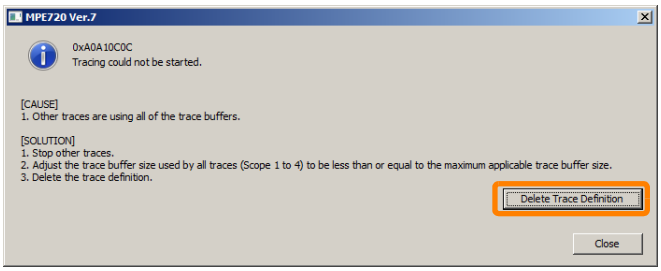
5. Start tracing again by clicking the **Start Trace** Button.

This concludes the procedure.

◆ Corrective Action (Continued): Deleting Trace Definitions

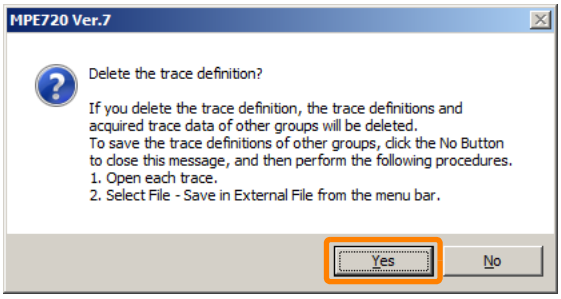
1. Confirm that adjustment of the trace buffer size has been completed.
   Refer to the following section for details.
   ☞ *Corrective Action* on page 13-3

2. Click the **Delete Trace Definition** Button.



   A message will be displayed.

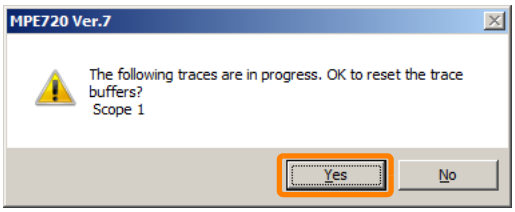
3. Click the **Yes** Button.



> **Important**
>
> When the trace definitions are deleted, the acquired trace data and trace definitions including other trace groups are deleted.
>
> To save the trace definitions and acquired trace data, click the **No** Button, and perform the following procedure to save the trace definitions and trace data.
> • Bring the target trace by clicking the tab – ***File*** – ***Save in External File***
> To save the trace definitions and trace data of two or more trace groups, perform this operation for each trace group.

   A message will be displayed.

4. Click the **Yes** Button.



5. Start tracing again by clicking the **Start Trace** Button.

This concludes the procedure.

13.2.2 An error occurred during the transfer to the controller.

Corrective Action

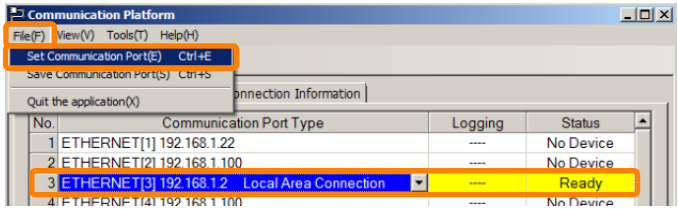
1. If the MPE720 is online, click the **Connection/Disconnection** Button on the My Tool View of the Start Tab Page to set the MPE720 to offline.

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.

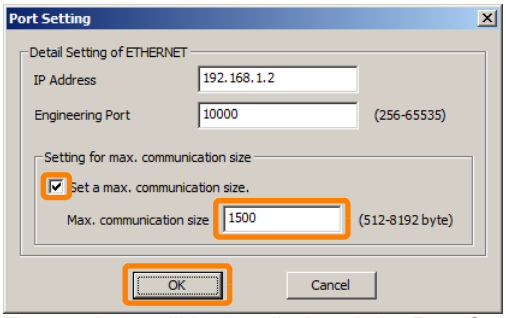
   The Communication Platform Window will be displayed.

4. Select a communication port that is in use, then click ***File*** – ***Set Communication Port***.



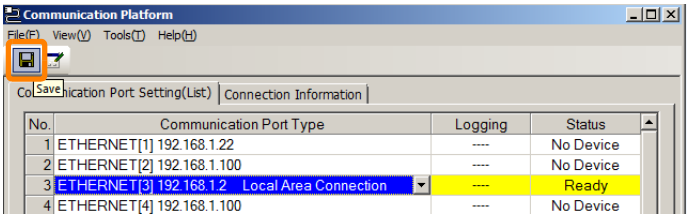
   The Port Setting Dialog Box will be displayed.

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 Dialog Box will close.

6. Click the **Save** Icon.



This concludes the procedure.

Appendix B

14

This chapter describes the shortcuts that you can use for ladder programming, and operators and instructions that you can use in Expression instructions. It also provides detailed information on registers and reserved words.

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

14.1.1 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
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
Quit	Alt + F4
Change pane	Alt + F6
Switch tabs	Ctrl + F6

14.1.2 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

14.1.3 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 Edit Mode	Ctrl + E
Edit an instruction comment	Ctrl + Alt + Enter
Edit an instruction	F2
Delete an instruction	Ctrl + Delete
Edit a parameter	Ctrl + Enter

14.1.4 Debugging

Function	Key
Cross references	Ctrl + R
Display the register map	Ctrl + W

14.2 Operators for Expression Instructions

The following list gives the operators that can be used in Expression instructions.

Classification	Instruction	Description	Usage Example
Arithmetic and logic operators	+	Add	MW00001 = MW00002 + MW00003
	–	Subtract	MW00001 = MW00002 – MW00003
	*	Multiply	MW00001 = MW00002 * MW00003
	/	Divide	MW00001 = MW00002 / MW00003
	%	Remainder	MW00001 = MW00002 % MW00003
	&	Bit-wise AND	MW00001 = MW00002 & 4096
	|	Bit-wise OR	MW00001 = MW00002 | 4096
	++	Extended Add	MW00001 = MW00001 ++ 1
	––	Extended Subtract	MW00001 = MW00001 –– 1
Logic Operators (Usable only with bit data)	&&	Inclusive AND	MB000010 = MB000011 && MB000012
	||	Inclusive OR	MB000010 = MB000011 || MB000012
	!	Logical NOT	MB000010 = !MB000011
Comparison operators	==	Equal to right-side value	MB000010 == MB000011
	!=	Unequal to right-side value	MB000010 != MB000011
	>	Right-side value is less than left-side value	MB000010 = MW00020 > MW00021
	>=	Right-side value is less than or equal to left-side value	MB000010 = MW00020 >= MW00021
	<	Right-side value is greater than left-side value	MB000010 = MW00020 < MW00021
	<=	Right-side value is greater than or equal to left-side value	MB000010 = MW00020 <= MW00021
Substitution operator	=	Substitutes left-side value with right-side value	MW00001 = MW00002
Cast operators	(WORD)	These operators cast the data written immediately after the operator to the specified data type.	MW00001 = (WORD)MF00100
	(LONG)		ML00001 = (LONG)MF00100
	(QUAD)		MQ00001 = (QUAD)MF00100
	(FLOAT)		MF00001 = (FLOAT)MF00100
	(DOUBLE)		MD00001 = (DOUBLE)MF00100
	FTYPE	These operators determine the data type of the entire arithmetic expression.	DW00010 = FTYPE(14000 – (DF00012 * 100 / 2))
	DTYPE		DW00010 = DTYPE(14000 – (DF00012 * 100 / 2))

14.2.1 Numeric Processing of Expression Instructions

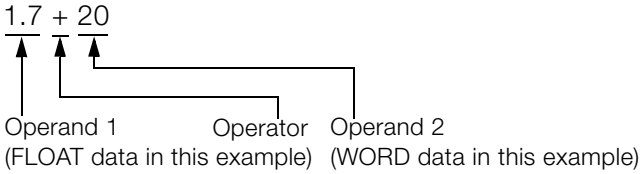
This section describes how casting works when Expression instructions are processed in compiler version 7.00.

Basic Numeric Operations

For basic numeric operations, the combination of the types of operands from left to right determines the type of the numeric processing.

Expression
Operand_1 Operator *Operand_2*

Expression Example



Type of Numeric Processing Based on the Combination of Operands

		Operand_2				
		WORD (Integer)	LONG (Double-length Integer)	QUAD (Quadruple-length Integer)	FLOAT (Real Number)	DOUBLE (Double-precision Real Number)
Operand_1	WORD (Integer)	LONG (WORD*)	LONG	FLOAT	FLOAT	DOUBLE
	LONG (Double-length Integer)	LONG	LONG	FLOAT	FLOAT	DOUBLE
	QUAD (Quadruple-length Integer)	QUAD	QUAD	QUAD	DOUBLE	DOUBLE
	FLOAT (Real Number)	FLOAT	FLOAT	DOUBLE	FLOAT	DOUBLE
	DOUBLE (Double-precision Real Number)	DOUBLE	DOUBLE	DOUBLE	DOUBLE	DOUBLE

* The numeric operation is processed as WORD data only if the operator is ADD (+) or SUB (-)

Information

1. If there are three or more operands, two operands are processed at a time based on the priority of the operators.
2. The numeric operation is processed in the same way whether the operand is a register or a number.
3. By using a cast operator, you can convert the type of numeric processing to a type that is not listed in the table. Refer to the following section for details.
☞ *Casting* on page 14-9

Important

If the numeric operation type and storage register type are different, the result of the numeric operation is recast to match the storage register type.
Whether decimal numbers are truncated or rounded depends on the setting in the Program Properties Dialog Box.

Example

Arithmetic Expression Example
DW00001 = 1.7 + 20 (WORD = FLOAT + WORD)
Details of Numeric Processing

Order	Interim Calculation	Description
1	21.7 = 1.7 + 20	This is addition between FLOAT data and WORD data, so the expression is calculated as FLOAT data.
2	DW00001 = 21 or DW00001 = 22	When the numeric operation result is stored in the WORD register, the FLOAT data value is converted to WORD data.

Example

Arithmetic Expression Example
DW00001 = 1.7 + 20 + 1.4 (WORD = FLOAT + WORD + FLOAT)
Details of Numeric Processing

Order	Interim Calculation	Description
1	21.7 = 1.7 + 20	This is addition between FLOAT data and WORD data, so the expression is calculated as FLOAT data.
2	23.1 = 21.7 + 1.4	This is addition between FLOAT data and FLOAT data, so the expression is calculated as FLOAT data.
3	DW00001 = 23	When the numeric operation result is stored in the WORD register, the FLOAT data value is converted to WORD data.

The following examples show the numeric processing for basic numeric operations.

◆ Example of an Integer Operation (WORD)

Arithmetic Expression Example

DL00010 = 14000 – (DW00012 + 100 – DW00009)

Details of Numeric Processing

Order	Interim Calculation	Description
1	WORD data value ① = DW00012 + 100	This is addition between two WORD data values, so the expression is calculated as WORD data.
2	WORD data value ② = WORD data value ① – DW00009	This is subtraction between two WORD data values, so the expression is calculated as WORD data.
3	WORD data value ③ = 14000 – WORD data value ②	This is subtraction between two WORD data values, so the expression is calculated as WORD data.
4	DL00010 = WORD data value ③	When the numeric operation result is stored in the LONG register, the WORD data value is converted to LONG data.

◆ Example 1 of an Integer Operation (LONG)

Arithmetic Expression Example

DL00010 = 14000 – (DW00012 * 100 / 3)

Details of Numeric Processing

Order	Interim Calculation	Description
1	LONG data value ① = DW00012 * 100	This is multiplication between two WORD data values, so the expression is calculated as LONG data.
2	LONG data value ② = LONG data value ① / 3	This is division between LONG data and WORD data, so the expression is calculated as LONG data.
3	LONG data value ③ = 14000 – LONG data value ②	This is subtraction between WORD data and LONG data, so the expression is calculated as LONG data.
4	DL00010 = LONG data value ③	The operation result is LONG data, so the result is stored in a register without any conversion.

◆ Example 2 of an Integer Operation (LONG)

Arithmetic Expression Example

DW00010 = 14000 – (100 / 3 * DL00012)

Details of Numeric Processing

Order	Interim Calculation	Description
1	LONG data value ① = 100 / 3	This is division between two WORD data values, so the expression is calculated as LONG data.
2	LONG data value ② = LONG data value ① * DW00012	This is multiplication between two LONG data values, so the expression is calculated as LONG data.
3	LONG data value ③ = 14000 – LONG data value ②	This is subtraction between WORD data and LONG data, so the expression is calculated as LONG data.
4	DW00010 = LONG data value ③	When the numeric operation result is stored in the WORD register, the LONG data value is converted to WORD data.

◆ Example of a Real Number Operation (FLOAT)

Arithmetic Expression Example

DW00010 = 14000 – (DF00012 * 100 / 2)

Details of Numeric Processing

Order	Interim Calculation	Description
1	FLOAT data value ① = DF00012 * 100	This is multiplication between FLOAT data and WORD data, so the expression is calculated as FLOAT data.
2	FLOAT data value ② = FLOAT data value ① / 2	This is division between FLOAT data and WORD data, so the expression is calculated as FLOAT data.
3	FLOAT data value ③ = 14000 – FLOAT data value ②	This is subtraction between WORD data and FLOAT data, so the expression is calculated as FLOAT data.
4	DW00010 = FLOAT data value ③	When the numeric operation result is stored in the WORD register, the FLOAT data value is converted to WORD data.

Casting

There are the following two types of cast operators.

- Operand type casting and numeric operation result type casting: The data written immediately after the cast operator is converted to the data type that is specified by the cast operator. The scope of the cast can be specified by using parentheses ( ).
- Arithmetic expression type casting: All calculations enclosed by parentheses ( ) immediately after the cast operator are converted to the type specified by the cast operator, regardless of the original data types that are used in the arithmetic expression.

Refer to the following sections for details on types of cast operators.

☞ *14.2 Operators for Expression Instructions* on page 14-5

The following examples show the numeric processing for casting.

◆ Example of Casting Operands

Arithmetic Expression Example

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

Valid range of cast operator

Cast operator

Details of Numeric Processing

Order	Interim Calculation	Description
1	WORD data value ① ← DF00012	The WORD cast operator converts the value of DF00012 to WORD data.
2	WORD data value ② = WORD data value ① + 100	This is addition between two WORD data values, so the expression is calculated as WORD data.
3	WORD data value ③ = 14000 - WORD data value ②	This is subtraction between two WORD data values, so the expression is calculated as WORD data.
4	DL00010 = WORD data value ③	When the numeric operation result is stored in the LONG register, the WORD data value is converted to LONG data.

◆ Example of Type Casting a Numeric Operation Result

Arithmetic Expression Example

DL00010 = 14000 – (LONG) (DF00012 + 100)

Valid range of cast operator

Cast operator

Details of Numeric Processing

Order	Interim Calculation	Description
1	FLOAT data value ① = DF00012 + 100	This is addition between FLOAT data and WORD data, so the expression is calculated as FLOAT data.
2	LONG data value ① ← LONG (FLOAT data value ①)	The LONG cast operator converts the FLOAT data value to LONG data.
3	LONG data value ② = 14000 – LONG data value ①	This is subtraction between WORD data and LONG data, so the expression is calculated as LONG data.
4	DL00010 = LONG data value ②	The operation result is LONG data, so the result is stored in a register without any conversion.

◆ Example 1 of Type Casting for an Arithmetic Expression: FTYPE

Arithmetic Expression Example

DW00010 = FTYPE (14000 – (DW00012 * 100 / 2))

Valid range of cast operator

Cast operator

Details of Numeric Processing

Order	Interim Calculation	Description
1	FLOAT data value ① = DW00012 * 100	This is multiplication between two WORD data values, but because of the FTYPE cast operator in the arithmetic expression, the expression is calculated as FLOAT data.
2	FLOAT data value ② = FLOAT data value ① / 2	This is division between FLOAT data and WORD data, so the expression is calculated as FLOAT data. Note: If the operation does not produce FLOAT data result, the FTYPE cast operator in the arithmetic expression will convert it to FLOAT data.
3	FLOAT data value ③ = 14000 – FLOAT data value ②	This is addition between WORD data and FLOAT data, so the expression is calculated as FLOAT data. Note: If the operation does not produce FLOAT data result, the FTYPE cast operator in the arithmetic expression will convert it to FLOAT data.
4	DW00010 = FLOAT data value ④	When the numeric operation result is stored in the WORD register, the FLOAT data value is converted to WORD data.

◆ Example 2 of Type Casting for an Arithmetic Expression: DTYPE

Arithmetic Expression Example

DW00010 = DTYPE (14000 – (DF00012 * 100 / 2))

Valid range of cast operator

Cast operator

Details of Numeric Processing

Order	Interim Calculation	Description
1	DOUBLE data value ① = DF00012 * 100	This is multiplication between FLOAT data and WORD data, but because of the DTYPE cast operator in the arithmetic expression, the expression is calculated as DOUBLE data.
2	DOUBLE data value ② = DOUBLE data value ① / 2	This is division between DOUBLE data and WORD data, so the expression is calculated as DOUBLE data. Note: If the operation does not produce DOUBLE data result, the DTYPE cast operator in the arithmetic expression will convert it to DOUBLE data.
3	DOUBLE data value ③ = 14000 – DOUBLE data value ②	This is subtraction between WORD data and DOUBLE data, so the expression is calculated as DOUBLE data. Note: If the operation does not produce DOUBLE data result, the DTYPE cast operator in the arithmetic expression will convert it to DOUBLE data.
4	DW00010 = DOUBLE data value ③	When the numeric operation result is stored in the WORD register, the DOUBLE data value is converted to WORD data.

14.3 Instructions for Expression Instructions

The following table lists the instructions that can be used in Expression instructions.

Classification	Instruction	Description	Usage Example
Program control instructions	for	Repeat for a FOR loop	MW00200=0; FOR J=0 TO 9 STEP 1; MW00200=MW00200+J; FEND;
	while	Repeat for a WHILE loop	J=0; WHILE J<10; MW00200=MW00200+J; WEND;
	if-iend	Conditional branching 1	IF J<10; MW00200=MW00200+J; IEND;
	if-else-iend	Conditional branching 2	IF J<10; MW00200=MW00200+J; ELSE; MW00200=MW00200-J; IEND;
Functions	sin() sin_w() sin_f() sin_d()	Sine	MW00001 = sin(MW00002) MW00001 = sin_w(MW00002) MF00001 = sin_f(MF00002) MD00001 = sin_d(MD00002)
	cos() cos_w() cos _f() cos_d()	Cosine	MF00002 = cos(MF00004) MW00002 = cos_w(MW00004) MF00002 = cos_f(MF00004) MD00002 = cos_d(MD00004)
	tan()	Tangent	MW00001 = tan(MW00002)
	asin() asin_w() asin_f() asin_d()	Arc Sine	MW00001 = asin(MW00002) MW00001 = asin_w(MW00002) MF00001 = asin_f(MF00002) MD00001 = asin_d(MD00002)
	acos()	Arc Cosine	MW00001 = acos(MW00002)
	atan()	Arc Tangent	MW00001 = atan(MF00002)
	sqrt() sqrt_w() sqrt _f() sqrt _d()	Square Root	MW00001 = sqrt(MW00002) MW00001 = sqrt_w(MW00002) MF00001 = sqrt_f(MF00002) MD00001 = sqrt_d(MD00002)
	abs()	Absolute Value	MW00001 = abs(MW00002)
	exp()	Exponential	MW00001 = exp(MW00002)
	log()	Natural Logarithm	MW00001 = log(MW00002)
	log10()	Common Logarithm	MW00001 = log10(MW00002)
Reserved words	true	TRUE for a logical expression	MB000010 == true
	false	FALSE for a logical expression	MB000010 == false
Others	()	Parentheses	MW00001 = (MW00002 + MW00003) / MW00004
	[]	Brackets for specifying an array	MW00001 = MW00002[100]

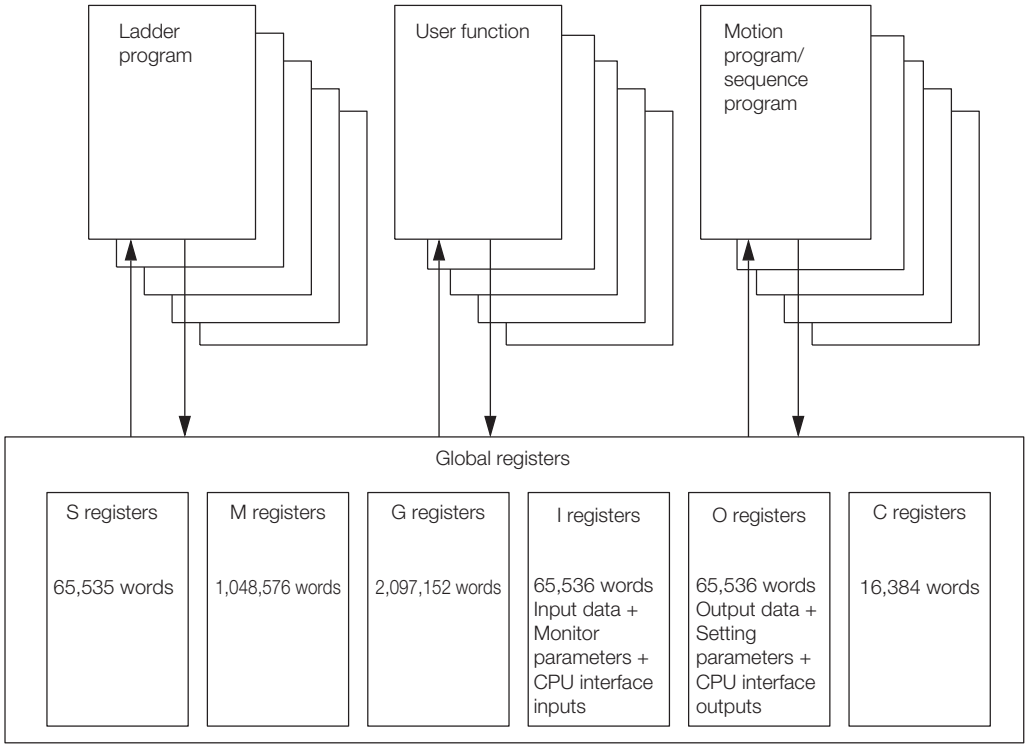
14.4 Register Details

Registers are areas that store data within the Machine Controller. Variables are registers with labels (variable names).

There are two kinds of registers: global registers that are shared between all programs, and local registers that are used only by a specific program.

Global Registers

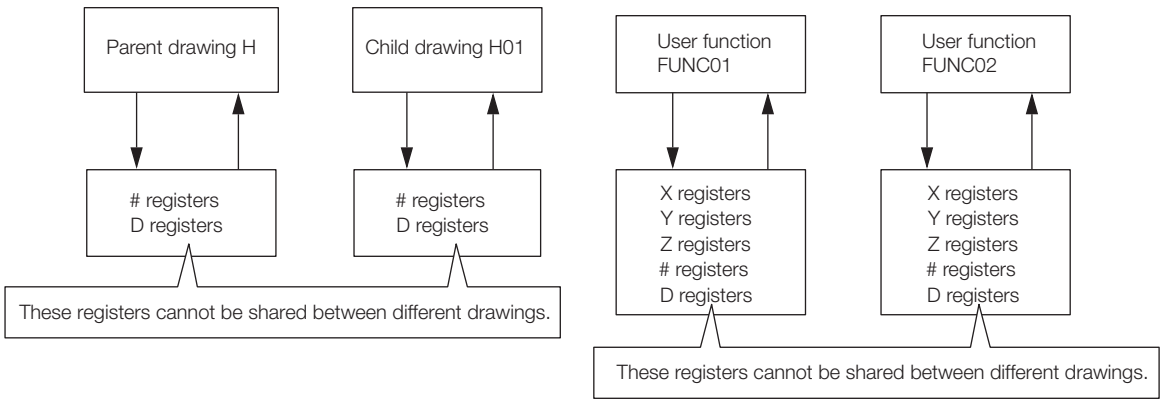
Global registers are shared by ladder programs, user functions, motion programs, and sequence programs. Memory space for global registers is reserved by the system for each register type.



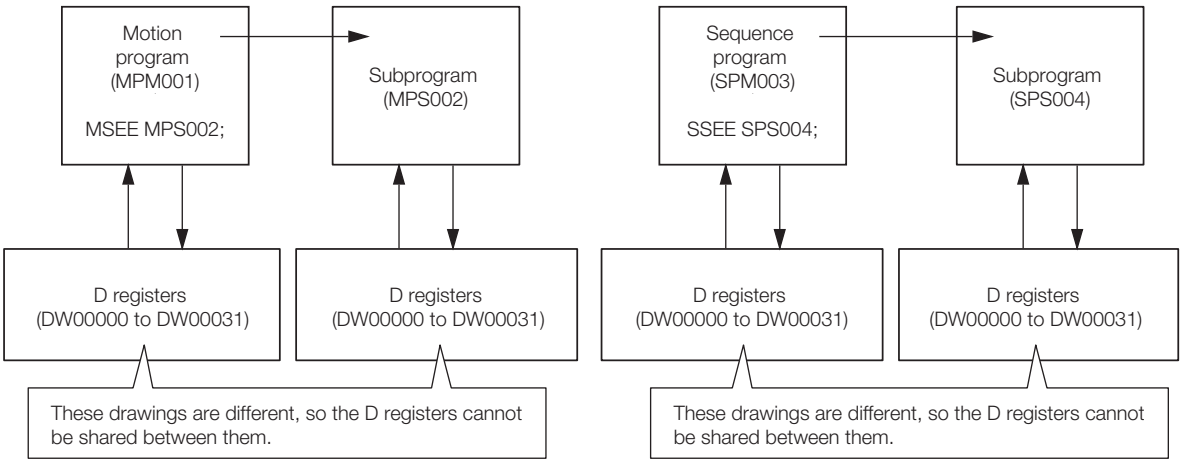
Local Registers

Local registers can be used within each specific drawing. These registers cannot be shared by other drawings. Local registers are stored in the program memory for each drawing.

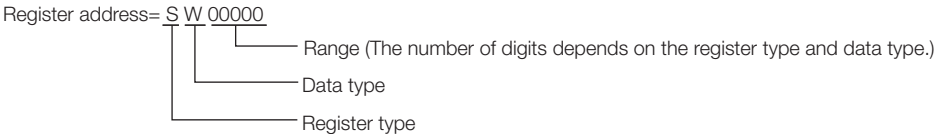
Ladder Program Conceptual Diagram



Motion Program Conceptual Diagram



Structure of Register Addresses



Information

You can also use index registers or array registers as variables to address specific registers. Refer to the following sections for details.

☞ *Index Registers (i, j)* on page 14-19
☞ *Array Registers ([ ])* on page 14-21

Register Types

This section describes global and local registers.

◆ Global Registers

Global registers are shared by ladder programs, user functions, motion programs, and sequence programs. In other words, the operation results of a ladder program can be used by other user functions, motion programs, or sequence programs.

Type	Name	Designation Method	Usable Range	Description
S	System registers (S registers)	SBnnnnnh, SWnnnnn, SLnnnnn, SQnnnnn, SFnnnnn, SDnnnnn, SAnnnnn	SW00000 to SW65534	These registers are prepared by the system. They report the status of the Machine Controller and other information. The system clears the registers from SW00000 to SW00049 to 0 at startup. They have a battery backup.
M	Data registers (M registers)	MBnnnnnnnh, MWnnnnnnn, MLnnnnnnn, MQnnnnnnn, MFnnnnnnn, MDnnnnnnn, MAnnnnnnn	MW0000000 to MW1048575	These registers are used as interfaces between programs. They have a battery backup.

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Type	Name	Designation Method	Usable Range	Description
G	G registers	GBnnnnnnnh, GWnnnnnnn, GLnnnnnnn, GQnnnnnnn, GFnnnnnnn, GDnnnnnnn, GAnnnnnnn,	GW0000000 to GW2097151	These registers are used as interfaces between programs. They do not have a battery backup.
I	Input registers (I registers)	IBhhhhhh, IWhhhhh, ILhhhhh, IQhhhhh, IFhhhhh, IDhhhhh, IAhhhhh,	IW00000 to IW07FFF and IW10000 to IW17FFF	These registers are used for input data.
			IW08000 to IW0FFFF	These registers store the motion monitor parameters. These registers are used for Motion Modules.
			IW20000 to IW21FFF	These registers (CPU interface registers) are used to interface CPU Modules when Expansion Racks are used.
O	Output registers (O registers)	OBhhhhhh, OWhhhhh, OLhhhhh, OQhhhhh, OFhhhhh, ODhhhhh, OAhhhhh,	OW00000 to OW07FFF and OW10000 to OW17FFF	These registers are used for output data.
			OW08000 to OW0FFFF	These store the motion setting parameters. These registers are used for Motion Modules.
			OW20000 to OW21FFF	These registers (CPU interface registers) are used to interface CPU Modules when Expansion Racks are used.
C	Constant registers (C registers)	CBnnnnnh, CWnnnnn, CLnnnnn, CQnnnnn, CFnnnnn, CDnnnnn, CAnnnnn	CW00000 to CW16383	These registers can be read in programs but they cannot be written. The values are set from the MPE720.

Note: n: decimal digit, h: hexadecimal digit

◆ Local Registers

Local registers are valid within only one specific program. The local registers in other programs cannot be accessed.

You specify the usable range from the MPE720.

Type	Name	Designation Method	Description	Features
#	# registers	#Bnnnnnh, #Wnnnnn, #Lnnnnn, #Qnnnnn, #Fnnnnn, #Dnnnnn, #Annnnn	These registers can be read in programs but they cannot be written. The values are set from the MPE720.	Program-specific
D	D registers	DBnnnnnh, DWnnnnn, DLnnnnn, DQnnnnn, DFnnnnn, DDnnnnn, DAnnnnn	These registers can be used for general purposes within a program. By default, 32 words are reserved for each program. The default value after startup depends on the setting of the **D Register Clear when Start** option. Refer to the following sections for details. ☞ *• Setting the D Register Clear When Start Option* on page 14-16	

Continued on next page.

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Type	Name	Designation Method	Description	Features
X	Function input registers	XBnnnnnh, XWnnnnn, XLnnnnn, XQnnnnn, XFnnnnn, XDnnnnn	These registers are used for inputs to functions. • Bit inputs: XB000000 to XB00000F • Integer inputs: XW00001 to XW00016 • Double-length integers: XL00001 to XL00015 • Quadruple-length integers: XQ00001 to XQ00013 • Real numbers: XF00001 to XF00015 • Double-precision real numbers: XD00001 to XD00013	Function-specific
Y	Function output registers	YBnnnnnh, YWnnnnn, YLnnnnn, YQnnnnn, YFnnnnn, YDnnnnn	These registers are used for outputs from functions. • Bit outputs: YB000000 to YB00000F • Integer outputs: YW00001 to YW00016 • Double-length integers: YL00001 to YL00015 • Quadruple-length integers: YQ00001 to YQ00013 • Real numbers: YF00001 to YF00015 • Double-precision real numbers: YD00001 to YD00013	
Z	Function internal registers	ZBnnnnnh, ZWnnnnn, ZLnnnnn, ZQnnnnn, ZFnnnnn, ZDnnnnn	These are internal registers that are unique within each function. You can use them for internal processing in functions. • Bits: ZB000000 to ZB00063F • Integers: ZW00000 to ZW00063 • Double-length integers: ZL00000 to ZL00062 • Quadruple-length integers: ZQ00000 to ZQ00060 • Real numbers: ZF00000 to ZF00062 • Double-precision real numbers: ZD00000 to ZD00060	
A	Function external registers	ABnnnnnh, AWnnnnn, ALnnnnn, AQnnnnn, AFnnnnn, ADnnnnn	These are external registers that use the address input value as the base address. When the address input value of an M or D register is provided by the source of the function call, then the registers of the source of the function call can be accessed from inside the function by using that address as the base.	

Note: n: decimal digit, h: hexadecimal digit


Important

User functions can be called from any programs, any number of times.

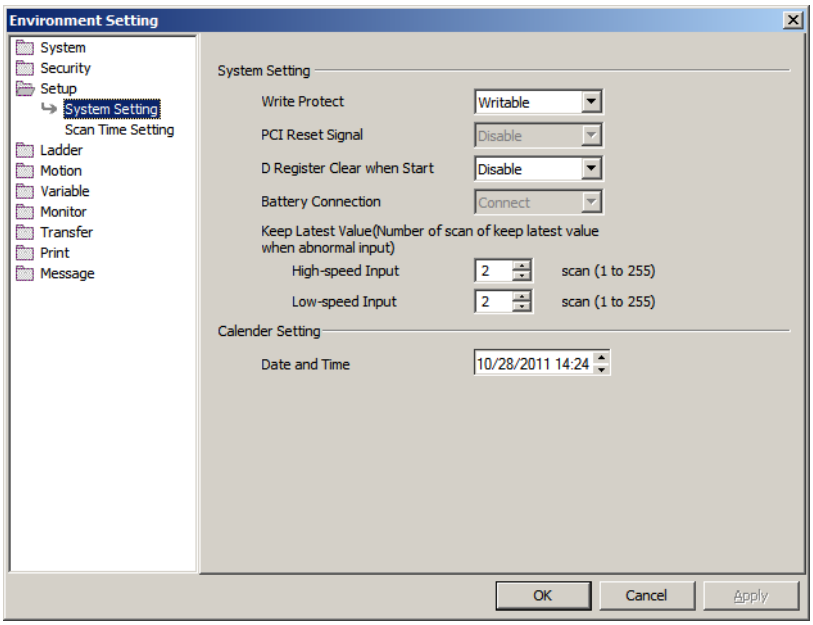
■ Precautions When Using Local Registers within a User Function

When you call a user function, consider what values could be in the local registers, and perform initialization as needed.

Name	Precaution
X registers (function input registers)	If input values are not set, the values will be uncertain. Do not use X registers that are outside of the range that is specified in the input definitions.
Y registers (function output registers)	If output values are not set, the values will be uncertain. Always set the values of the range of Y registers that is specified in the output definitions.
Z registers (function internal registers)	When the function is called, the previously set values will be lost and the values will be uncertain. These registers are not appropriate for instructions if the previous value must be retained. Use them only after initializing them within the function.
# registers	These are constant registers. Their values cannot be changed.
D registers	When the function is called, the previously set values are preserved. If a previous value is not necessary, initialize the value, or use a Z register instead. D registers retain the data until the power is turned OFF. The default value after startup depends on the setting of the **D Register Clear when Start** option. Refer to the following sections for details. ☞ • *Setting the D Register Clear When Start Option* on page 14-16

• Setting the D Register Clear When Start Option

1. Select ***File*** – ***Environment Setting*** from the MPE720 Version 7 Window.
2. Select **Setup** – **System Setting**.
3. Select **Enable** or **Disable** for the **D Register Clear when Start** option.
   Disable: The initial values will be uncertain.
   Enable: The initial values will be 0.



Data Types

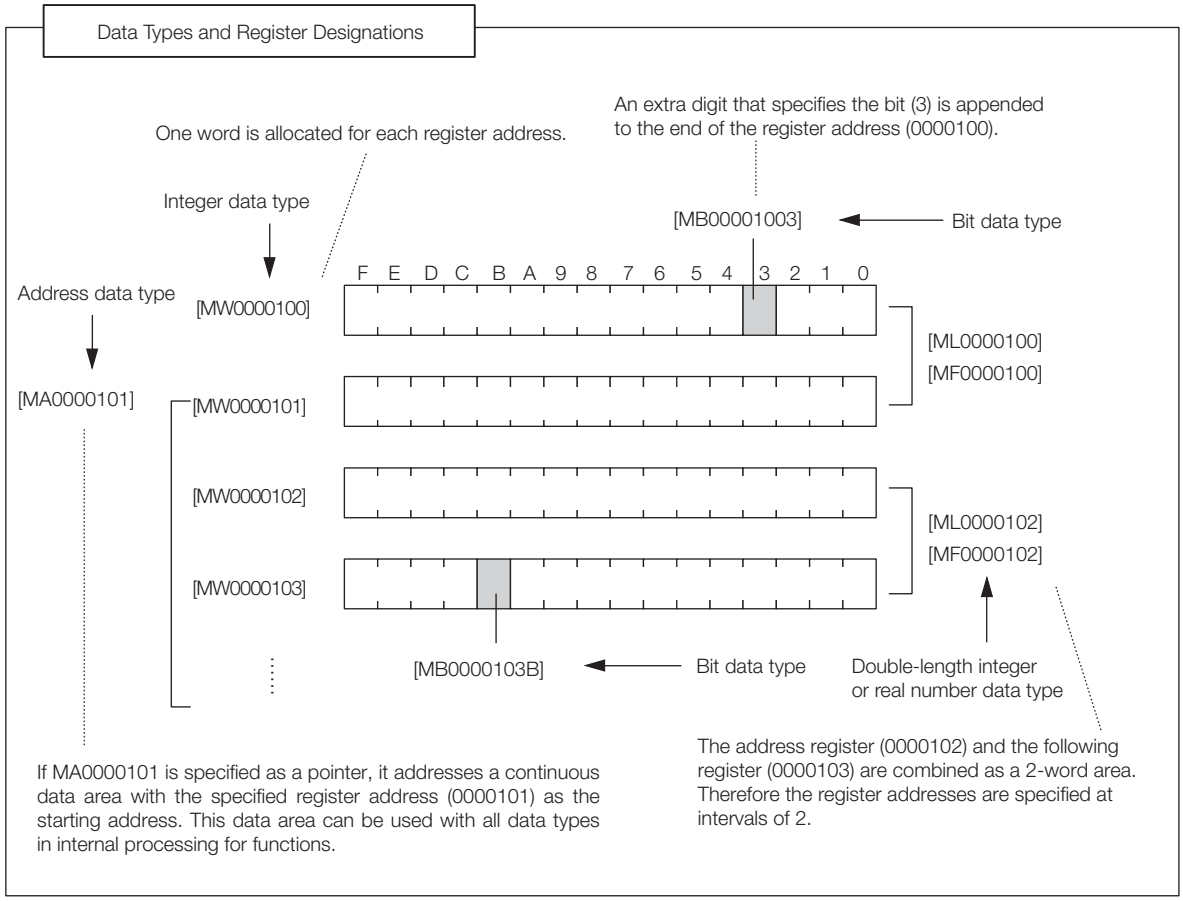
There are various data types that you can use depending on the purpose of the application: bit, integer, double-length integer, quadruple-length integer, real number, double-precision real number, and address.

Symbol	Data Type	Range of Values	Data Size	Remarks
B	Bit	1 (ON) or 0 (OFF)	–	Used in relay circuits and to determine ON/OFF status.
W	Integer	-32,768 to 32,767 (8000 hex to 7FFF hex)	1 word	Used for numeric operations. The values in parentheses on the left are for logical operations.
L	Double-length integer	-2,147,483,648 to 2,147,483,647 (80000000 hex to 7FFFFFFF hex)	2 words	Used for numeric operations. The values in parentheses on the left are for logical operations.
Q	Quadruple-length integer*1	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 (8000000000000000 hex to 7FFFFFFFFFFFFFFF hex)	4 words	Used for numeric operations. The values in parentheses on the left are for logical operations.
F	Real number	± (1.175E-38 to 3.402+E38) or 0	2 words	Used for advanced numeric operations.*2
D	Double-precision real number*1	±(2.225E-308 to 1.798E+308) or 0	4 words	Used for advanced numeric operations.*2
A	Address	0 to 2,097,152	–	Used only as pointers for addressing.

*1. These data types cannot be used for indirect designation of motion programs.
*2. Conforms to IEEE754 standards.

Important

The MP3000-series Machine Controller does not have separate registers for each data type. As shown in the following figure, the same address will access the same register even if the data type is different.
For example, MB00001003, a bit address, and the MW0000100, an integer address, have different data types, but they both access the same register, MW0000100.



Term

Pointer Designation
When an address is passed to a function as a parameter, this is referred to as pointer designation.
When pointer designation is used, the continuous data area starting from the address of the specified register number can be used in internal processing for functions with all data types.

◆ Precautions for Operations Using Different Data Types

If you perform an operation using different data types, be aware that the results will be different depending on the data type of the storage register, as described below.

- Storing Real Number Data in an Integer Register
  MW0000100 = MF0000200; the real number is stored after it is converted to an integer.
  (00001) (1.234)

  Note: There may be rounding error due to storing a real number in an integer register.
  Whether numbers are rounded or truncated when converting a real number to an integer can be set in the properties of the drawing.
  ☞ ■ *Setting for Real Number Casting* on page 14-18

  MW0000100 = MF0000200 + MF0000202; The result of the operation may be different
  (0124) (123.48) (0.02) depending on the value of the variable.
  (0123) (123.49) (0.01)

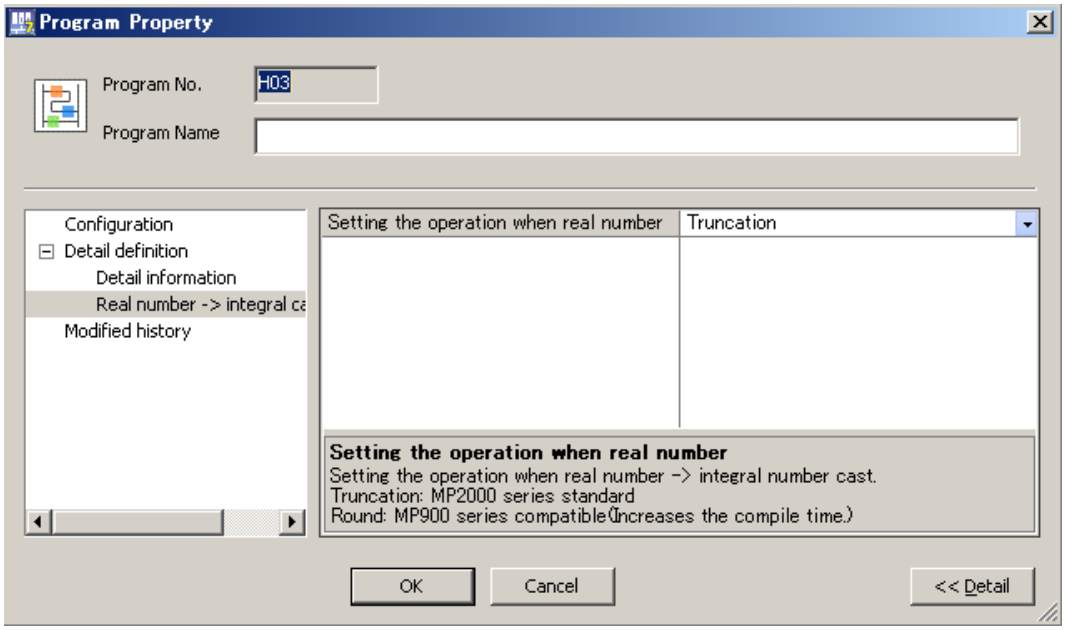
- Storing Real Number Data in a Double-length Integer Register
  ML0000100 = MF0000200; the real number is stored after it is converted to an integer.
  (65432) (65432.1)
- Storing Double-length Integer Data in an Integer Register
  MW0000100 = ML0000200; the lower 16 bits of the double-length integer are stored with-
  (-00001) (65535) out change.
- Storing Integer Data in a Double-length Integer Register
  ML0000100 = MW0000200; the integer is stored after it is converted to double-length inte-
  (0001234) (1234) ger data.

■ Setting for Real Number Casting

The casting method (truncating or rounding) can be set in the detailed definitions in the Drawing Properties Dialog Box.
The method to use for real number casting is set for each drawing.

Use the following procedure to display the Program Property Dialog Box.

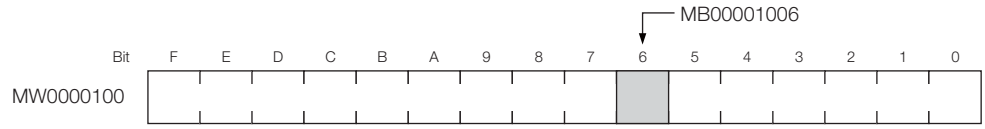
1. In the Ladder Pane, select the ladder program for which to view the properties.
2. Right-click the selected program and select ***Property*** from the pop-up menu.
   The Program Property Dialog Box will be displayed.



Information

The data is little endian, as shown in the following example.

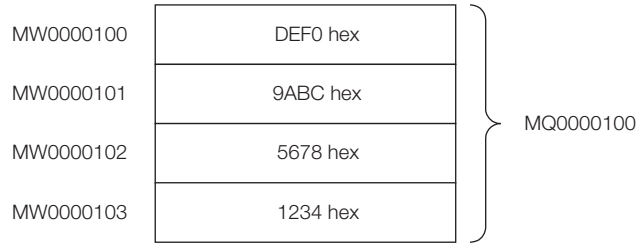
- MB00001006



- MW0000100 = 1234 hex

- ML0000100 = 12345678 hex

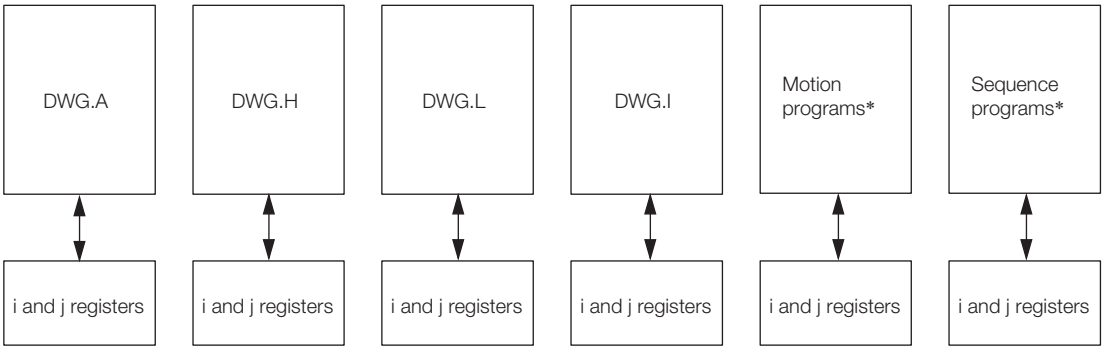
- MQ0000100 = 123456789ABCDEF0 hex



Index Registers (i, j)

There are two special registers, i and j, that are used to modify relay and register addresses. The functions of i and j are identical. They are used to handle register addresses like variables.

There are index registers for each program type, as shown in the following figure.



* Motion programs and sequence programs have separate i and j registers for each task.

Note: Functions reference the i and j registers that belong to the calling drawing.
For example, a function called by DWG.H will reference the i and j registers for DWG.H.

We will describe this with examples for each register data type.

◆ Attaching an Index to a Bit Register

Using an index is the same as adding the value of i or j to the register address.

For example, if i = 2, MB00000000i is the same as MB00000002.

```
i = 2;
DB000000 = MB00000000i;  <--- Equivalent ---> DB000000 = MB00000002;
```

◆ Attaching an Index to an Integer Register

Using an index is the same as adding the value of i or j to the register address.

For example, if j = 30, MW0000001j is the same as MW0000031.

```
j = 30;
DW00000 = MW0000001j;   <-- Equivalent --> DW00000 = MW0000031;
```

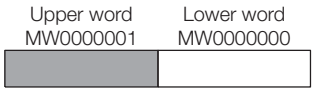
◆ Attaching an Index to a Double-length Integer or a Real Number Register

Using an index is the same as adding the value of i or j to the register address.

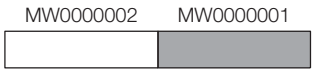
For example, if j = 1, ML0000000j is the same as ML0000001. Similarly, if j = 1, MF0000000j is the same as MF0000001.

Double-length Integers

If j = 0, ML0000000j is ML0000000.

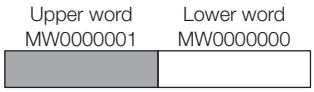


If j = 1, ML0000000j is ML0000001.



Real Numbers

If j = 0, MF0000000j is MF0000000.



If j = 1, MF0000000j is MF0000001.

Important

Double-length integers and real numbers use a region that is 2 words in size. For example, when using ML0000000j with both j = 0 and j = 1, the one-word area of MW0000001 will overlap. Be careful of overlapping areas when indexing double-length integer or real number register addresses.

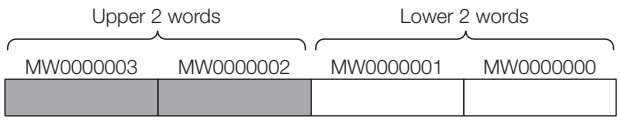
◆ Attaching an Index to a Quadruple-length Integer or a Double-precision Real Number Register

Using an index is the same as adding the value of i or j to the register address.

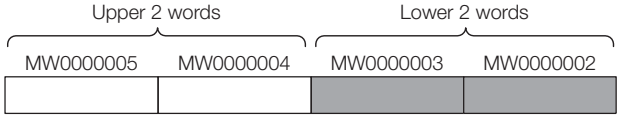
For example, if j = 2, MQ0000000j is the same as MQ0000002. Similarly, if j = 2, MD0000000j is the same as MD0000002.

Quadruple-length Integers

If j = 0, MQ0000000j is MQ0000000.

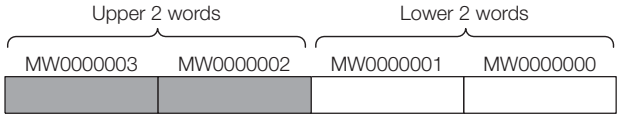


If j = 2, MQ0000000j is MQ0000002.

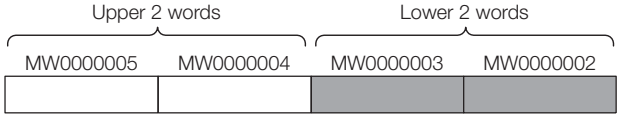


Double-precision Real Numbers

If j = 0, MF0000000j is MD0000000.



If j = 2, MD0000000j is MD0000002.



Important

Quadruple-length integers and double-precision real numbers use a region that is 4 words in size. For example, when using MQ0000000j with both j = 0 and j = 2, the two-word area of MW0000002 and MW0000003 will overlap. Be careful of overlapping areas when indexing quadruple-length integer or double-precision real number register addresses.

Array Registers ([ ])

Array registers are used to modify register addresses, and are denoted by square brackets [ ].

These are used to handle register addresses like variables.

Similarly to index registers, an offset is added to the register address.

◆ Attaching an Array Register to a Bit Register

Using an array register is the same as adding the value of the array register to the register address.

For example, if DW00000 = 2, MB00000000[DW00000] is the same as MB00000002.

```
DW00000 = 2;
DB000020 = MB00000000[DW00000];  <--Equivalent-->  DB000020 = MB00000002;
```

◆ Attaching an Array Register to a Register Other Than a Bit Register

Using an array register is the same as adding the word size of the data type of the array register times the value of the array register to the register address.

For example, if DW00000 = 30, ML0000002[DW00000] is the same as ML0000062.

DL00002 = ML00000 (30×2 + 2) = ML0000062

```
DW00000 = 30;
DL00002 = ML0000002[DW00000];  <--Equivalent-->  DL00002 = ML0000062;
```

14.5 Reserved Words

Do not use any of the following reserved words as variable names, regardless of capitalization.

Reserved Words			
ABS	FEND	ON	TCN
ACC	FLOAT	PFN	TCR
ACCMODE	FMX	PFORK	TCS
ACOS	FOR	PJOINT	TIM
ACS	GOTO	PLD	TOF
ARCTAN	IAC	PLN	TON
ASIN	IDC	PON	TPS
ASN	IEND	POS	TRUE
ATAN	IF	R{	TYPEDEF
ATN	IFP	REGISTER	UFC
AUTO	INC	RET	UNION
BCD	INP	RETURN	UNSIGNED
BIN	INT	S{	VCR
BLK	IOW	SCC	VCS
BREAK	JOINTO	SFL	VEL
CASE	KCC	SFORK	VOID
CHAR	KCW	SFR	VOLATILE
CLR	LCC	SHORT	WAX
CONST	LCW	SIGNED	WCD
CONTINUE	LOG	SIN	WCE
COS	LOG10	SIZEOF	WCT
DCC	LONG	SJOINT	WDA
DEFAULT	MCC	SKP	WDB
DO	MCW	SNGD	WDC
DOUBLE	MOD	SNGE	WDD
ELSE	MOV	SPH	WEND
END	MSEE	SPL	WHILE
ENUM	MUFC	SQRT	WPM
EOX	MVM	SQT	WSA
EXM	MVS	STATIC	ZRN
EXP	MVT	STRUCT	–
EXTERN	NON	SWITCH	–
FALSE	OFF	TAN	–

14.6 Adjusting the Servo with MPE720 Version 7.36 or Lower

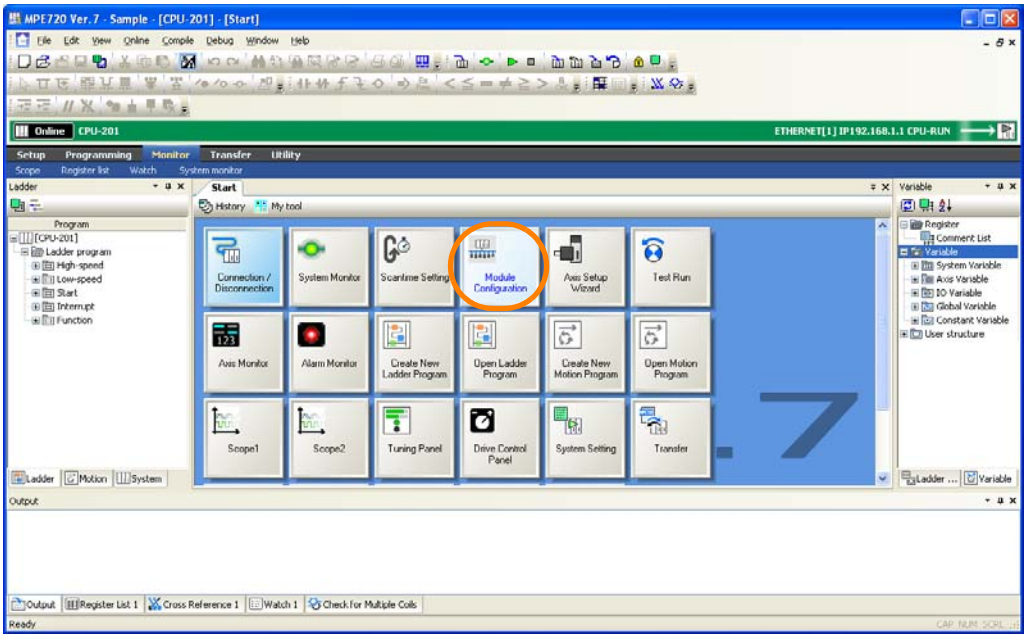
The procedure to adjust the servo is different for MPE720 version 7.36 and lower and version 7.37 and higher.

Use the following procedure to adjust the servo with MPE720 version 7.36 or lower.

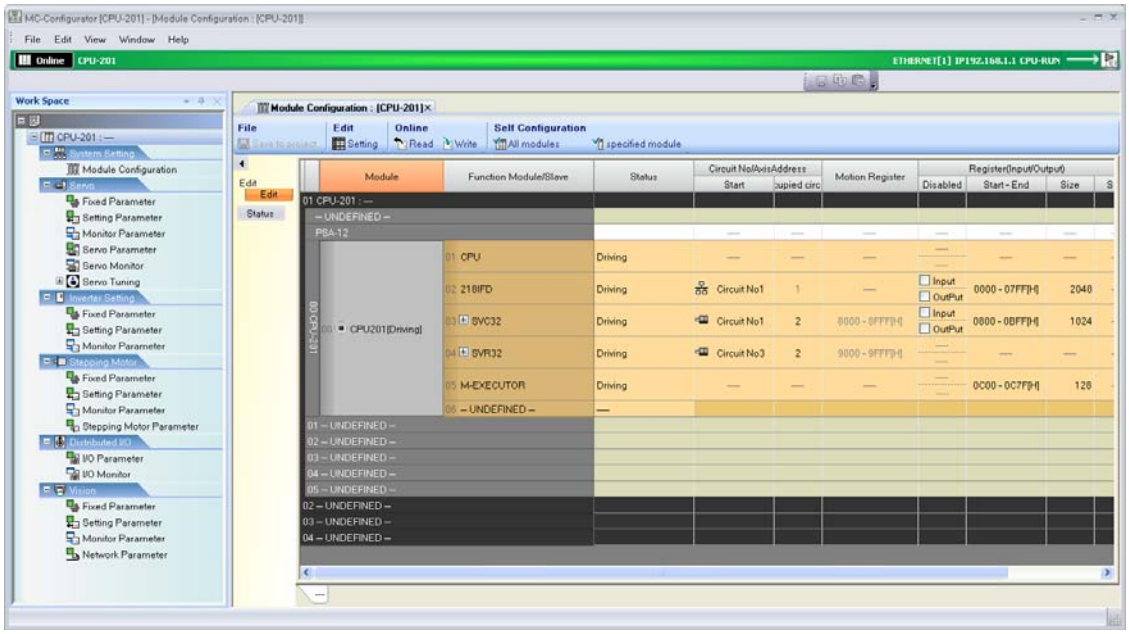
14.6.1 Adjusting the Servo

The servo is adjusted to improve the Servo response to the condition of the machine and actual operating conditions. Use the following procedure to tune an axis through the Machine Controller.

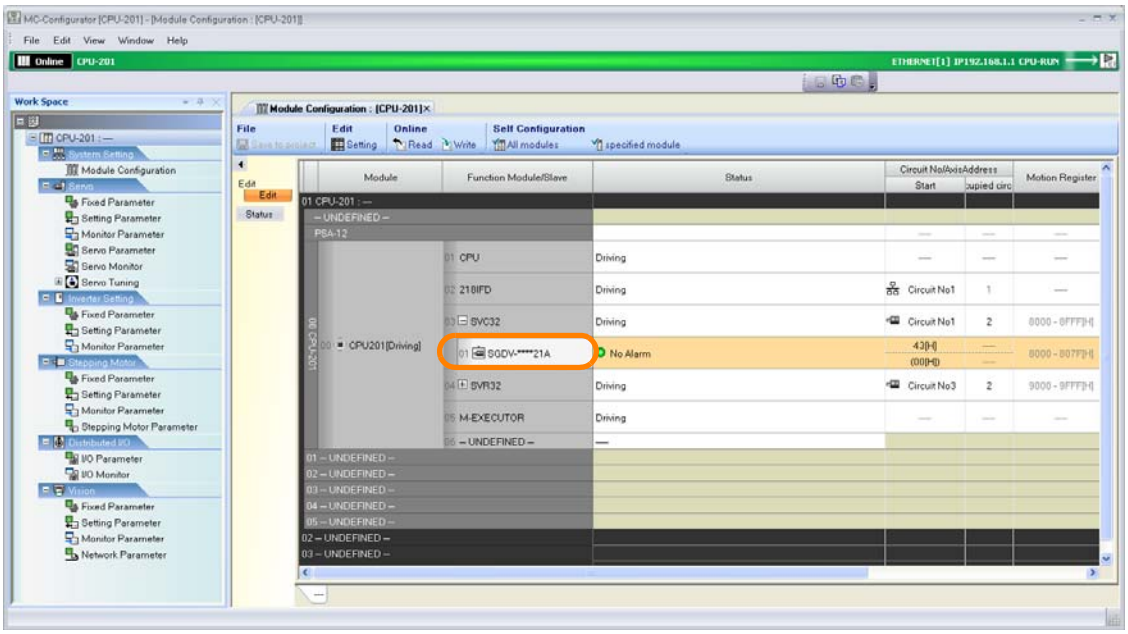
1. Click the **Module Configuration** Button on the My Tool View.



The Module Configuration Tab Page will be displayed.

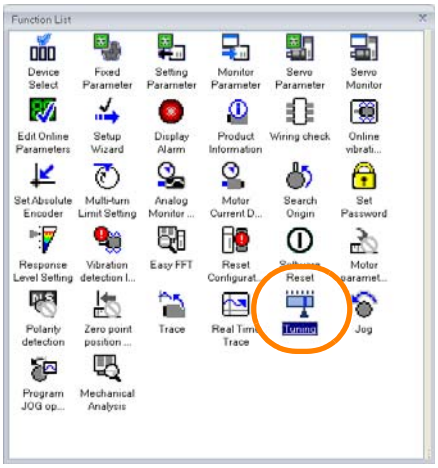


2. Double-click the Servo of the axis to tune in the list on the Module Configuration Tab Page.



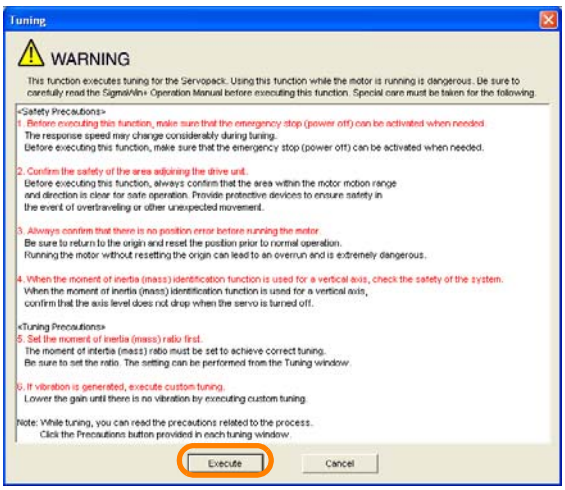
The Function List Dialog Box will be displayed.

3. Double-click the **Tuning** Icon.

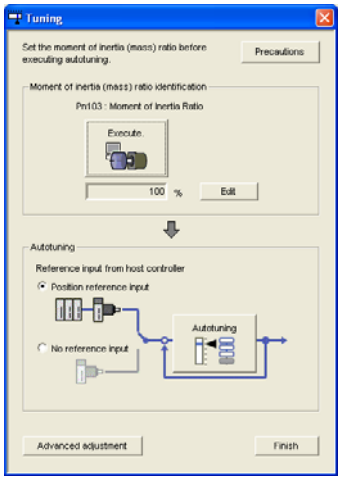


The Tuning Dialog Box will be displayed.

4. Read the precautions, and then click the **Execute** Button.



The Tuning Dialog Box will be displayed.



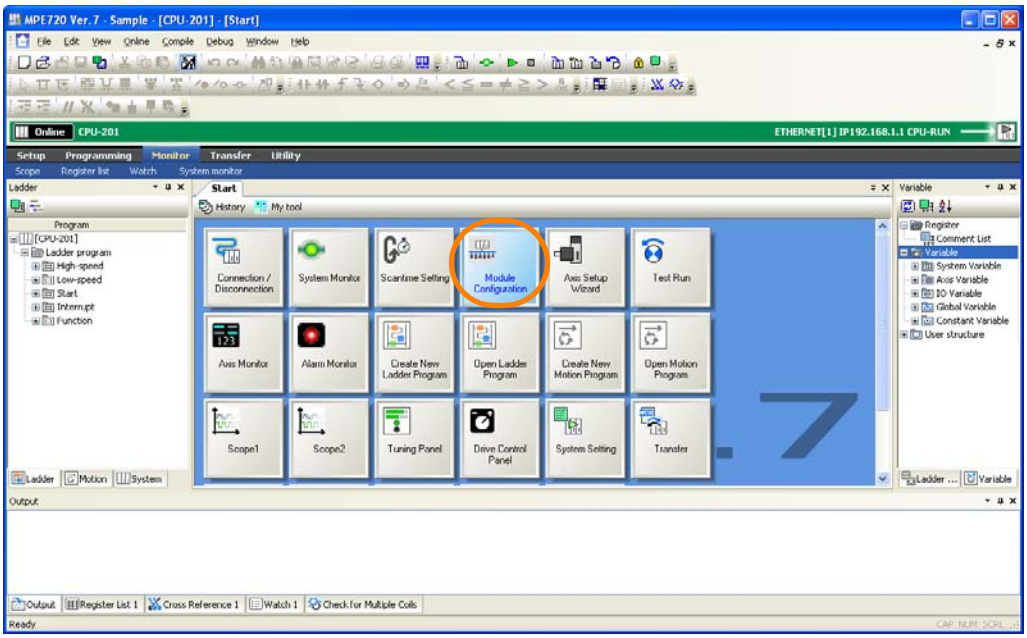
Refer to the following manual for operating procedures and details on adjusting the servo.
📖 *AC Servo Drive Engineering Tool SigmaWin+ Online Manual* (Manual No.: SIEP S800000 73)

This concludes the procedure.

14.6.2 Checking Operation by Sensing Individual Motion Commands

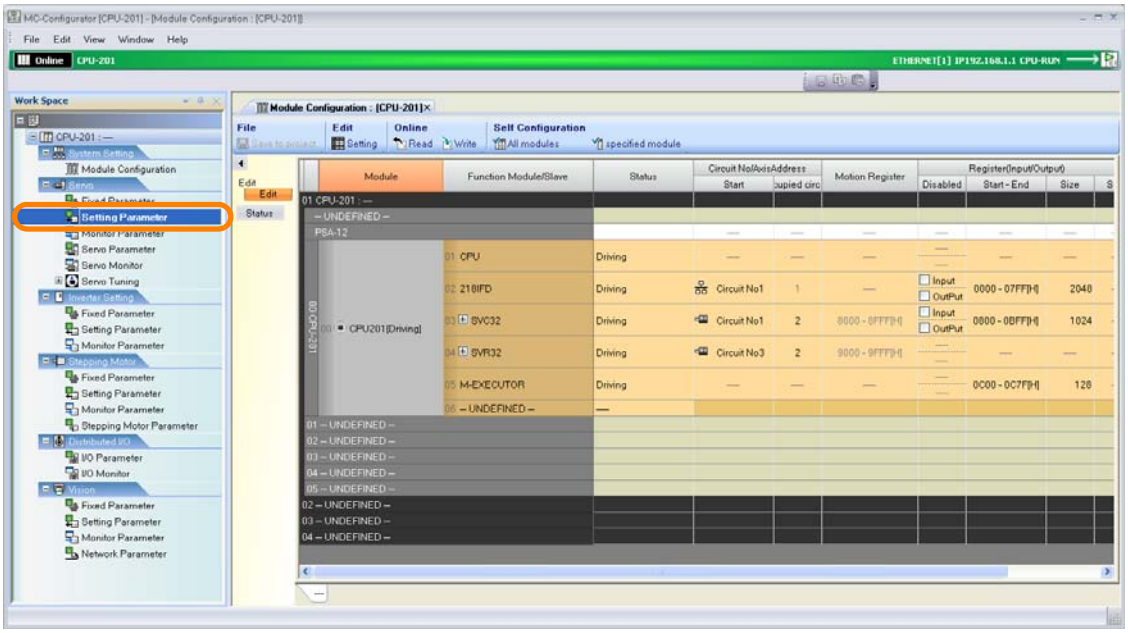
You may want to check operation for individual motion commands with the current configuration. However, writing ladder programs or other programs just for this purpose can be time consuming. The MPE720 allows you to send individual motion commands to check operation. Use the following procedure.

1. Click the **Module Configuration** Button on the My Tool View.



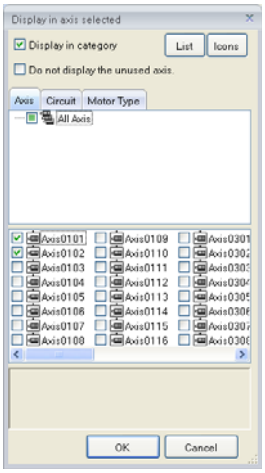
The Module Configuration Tab Page will be displayed.

2. Double-click **Setting Parameter** in the Work Space Pane.

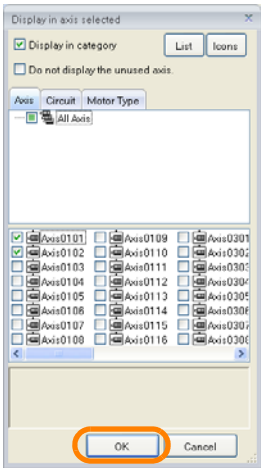


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes of the axes for which to check the operation.

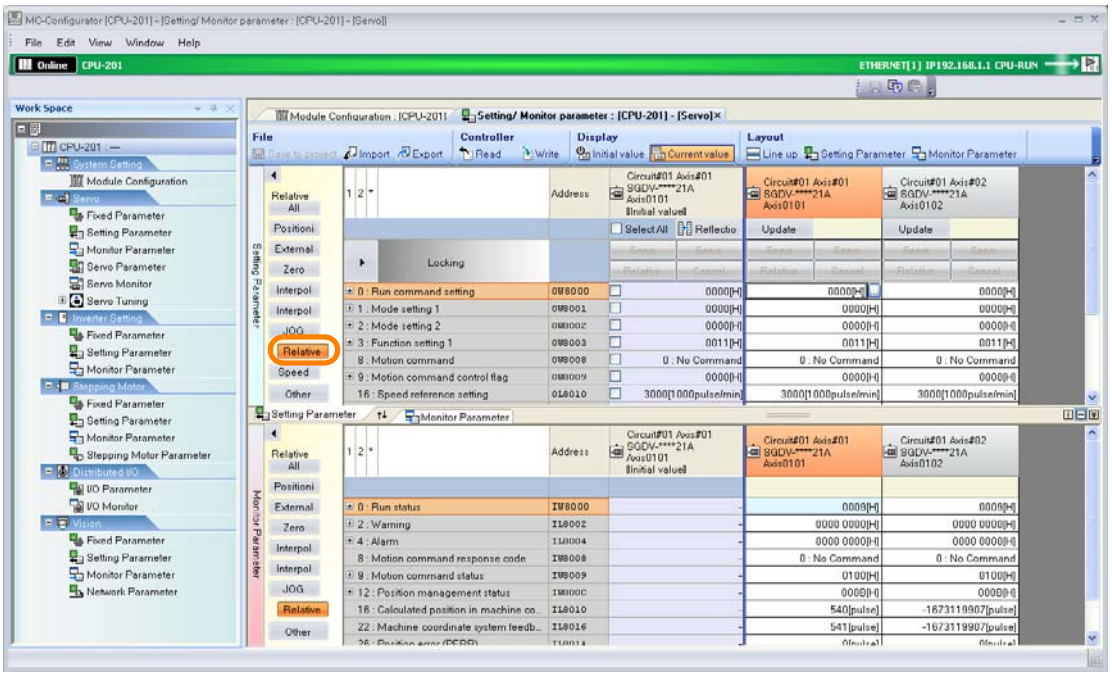


4. Click the **OK** Button.



The Setting/Monitor Parameter Tab Page will be displayed.

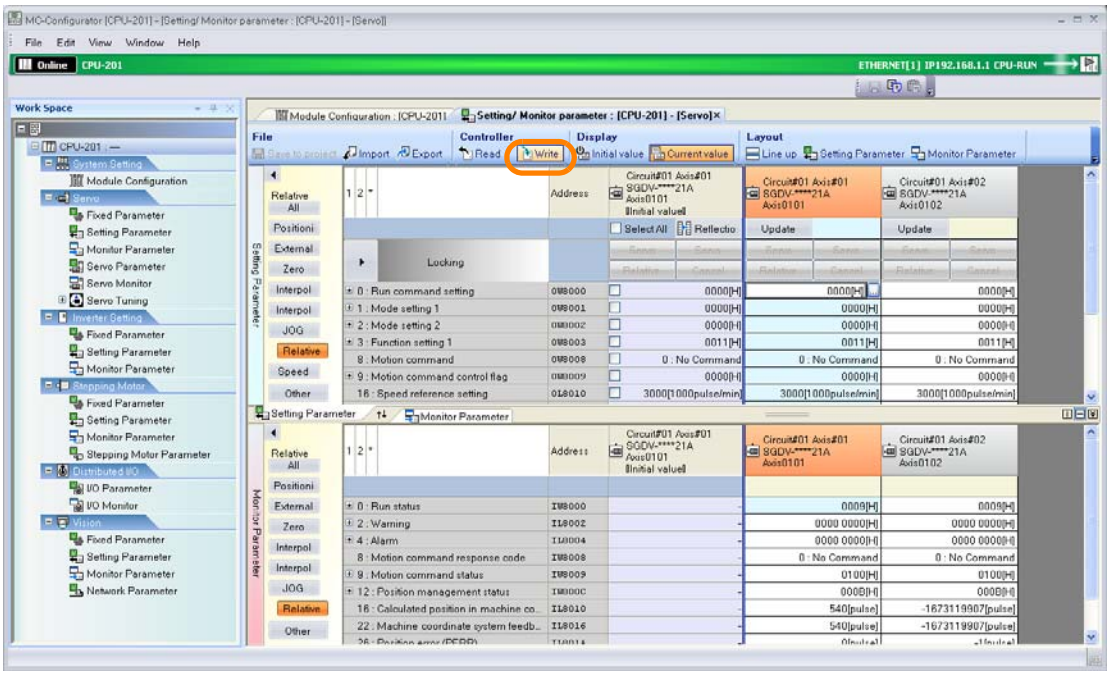
5. Select the motion command for which to check the operation.



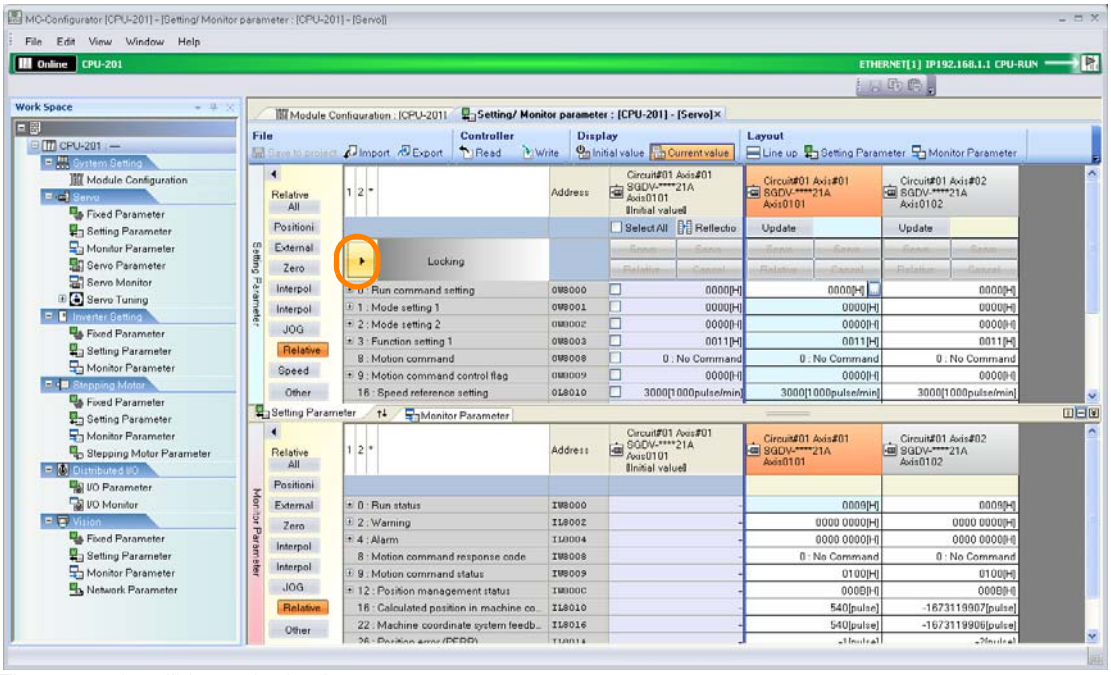
The parameters that are related to the selected motion command will be displayed.

6. Change the values of the parameters as required.

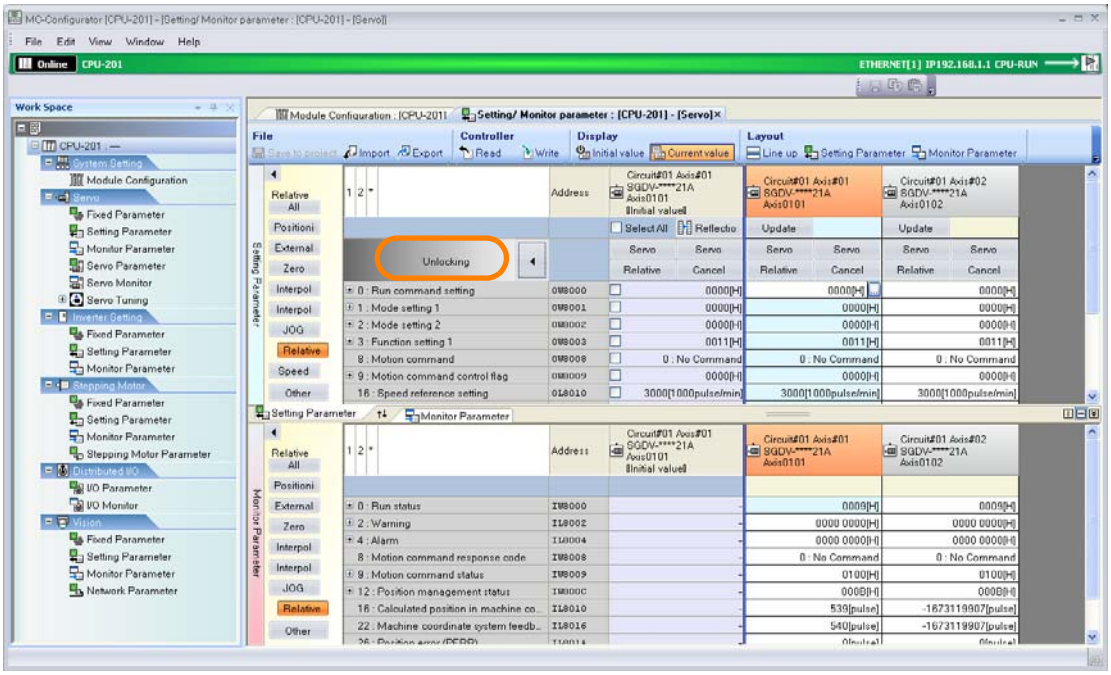
7. Click **Write** Button.



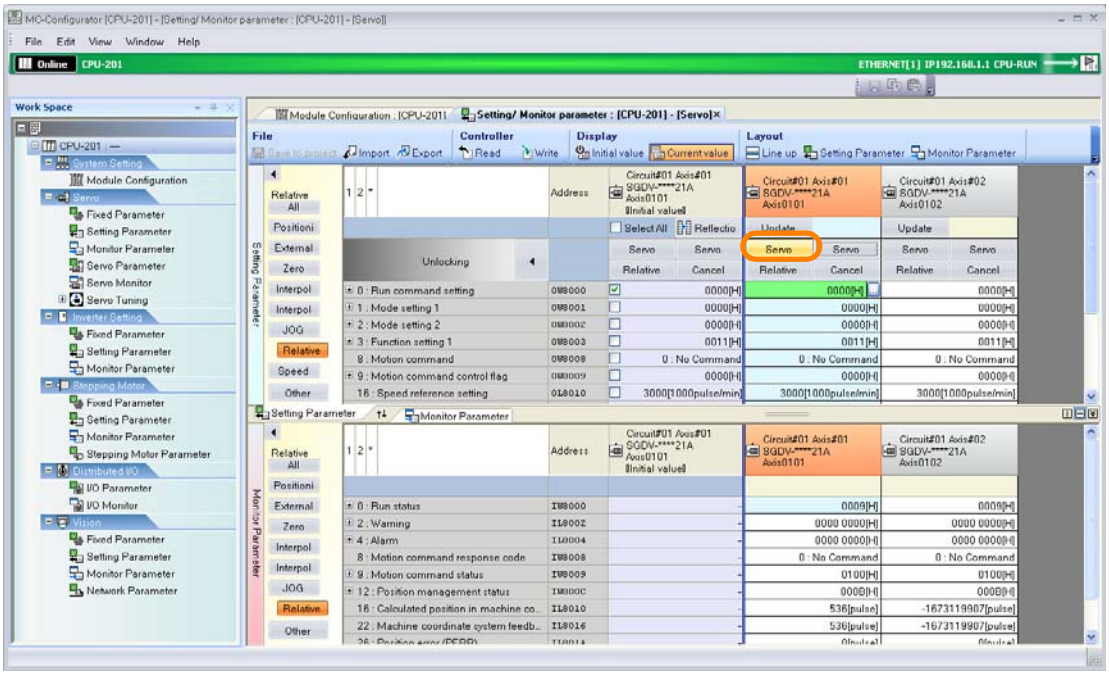
8. Click and hold down the ▶ Button next to the word “Locking” and slide it to the right.



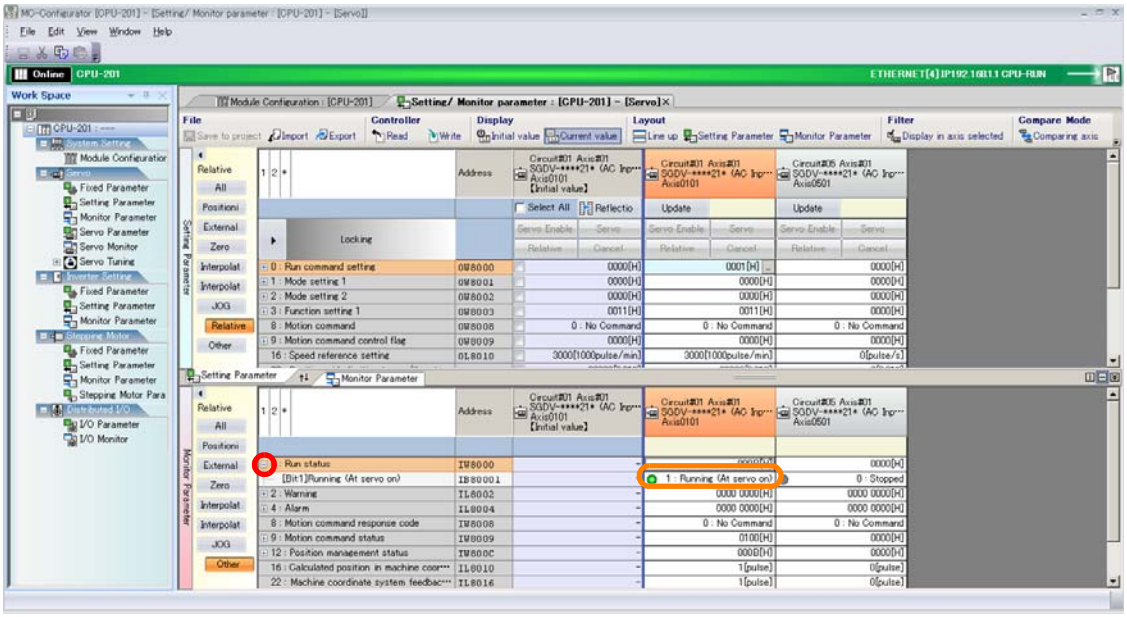
The controls will be unlocked.



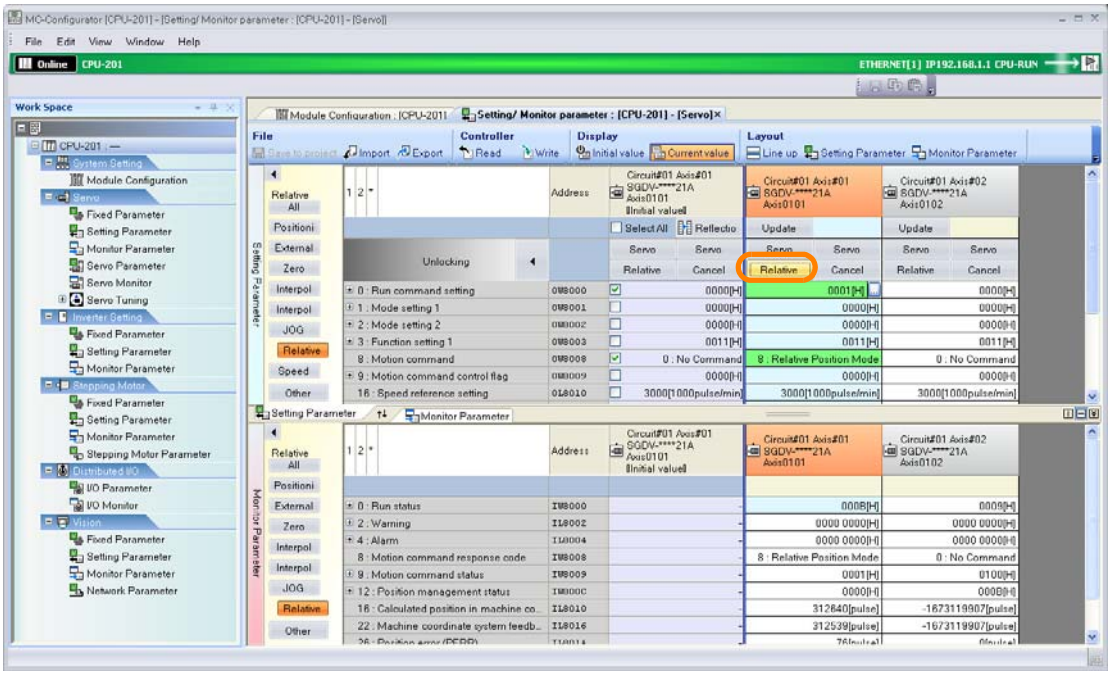
9. Click the **Servo** Button on the left side.



10. Click the **+** Button next to **0: Run status** on the Monitor Parameter Tab Page, and confirm that the cell that corresponds to **[Bit:1] Running (At servo on)** is set to **1 Running (At servo on)**.



11. Click a motion command button.

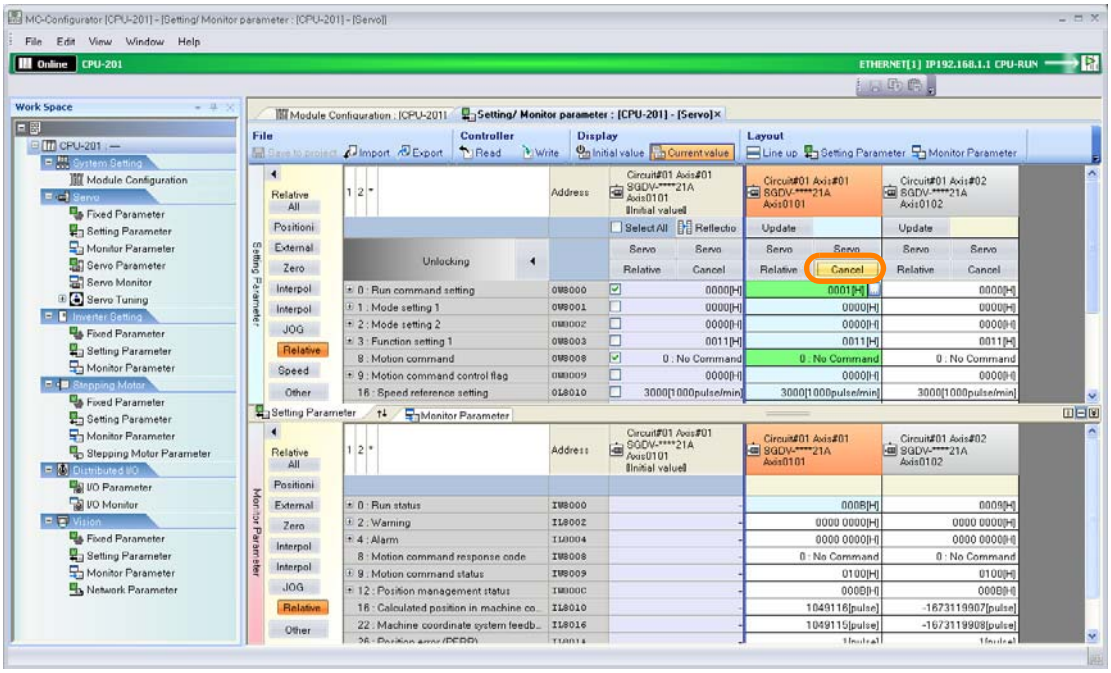


Information The **Relative** Button is shown in the example given above.

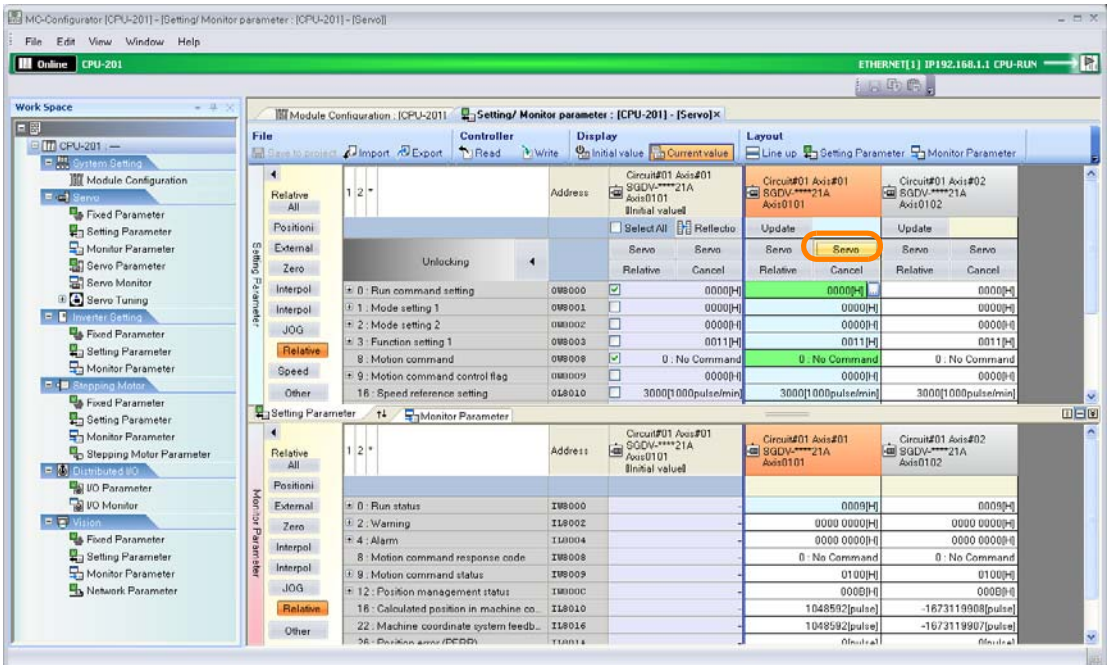
The motion command will be sent to the SERVOPACK.

12. Check the operation of the SERVOPACK.

13. Click the **Cancel** Button.



14. Click the **Servo** Button on the right side.

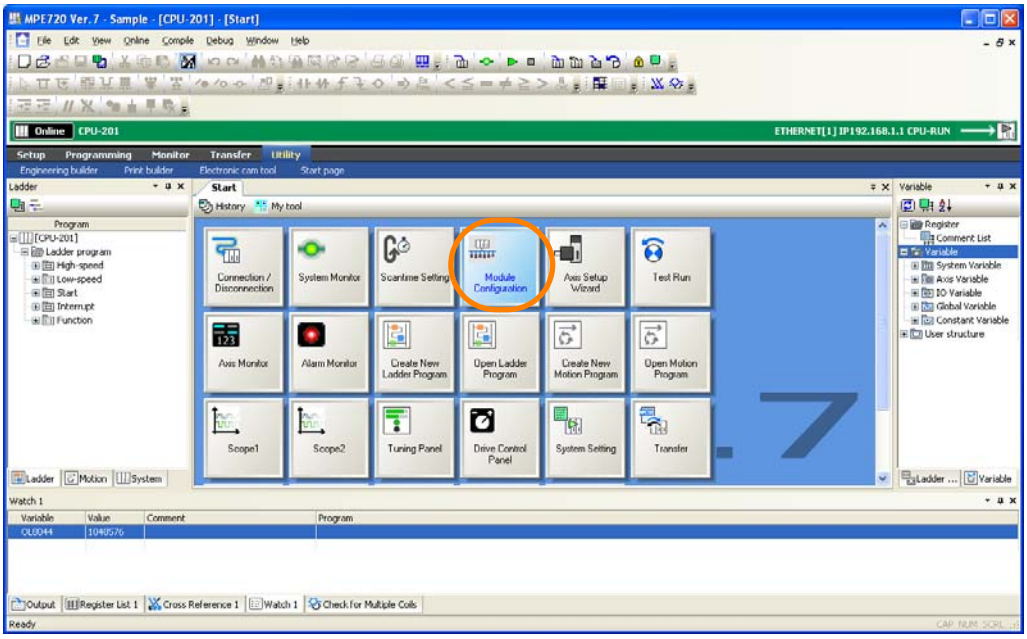


This concludes the procedure.

14.6.3 Comparing Parameters for Different Axes

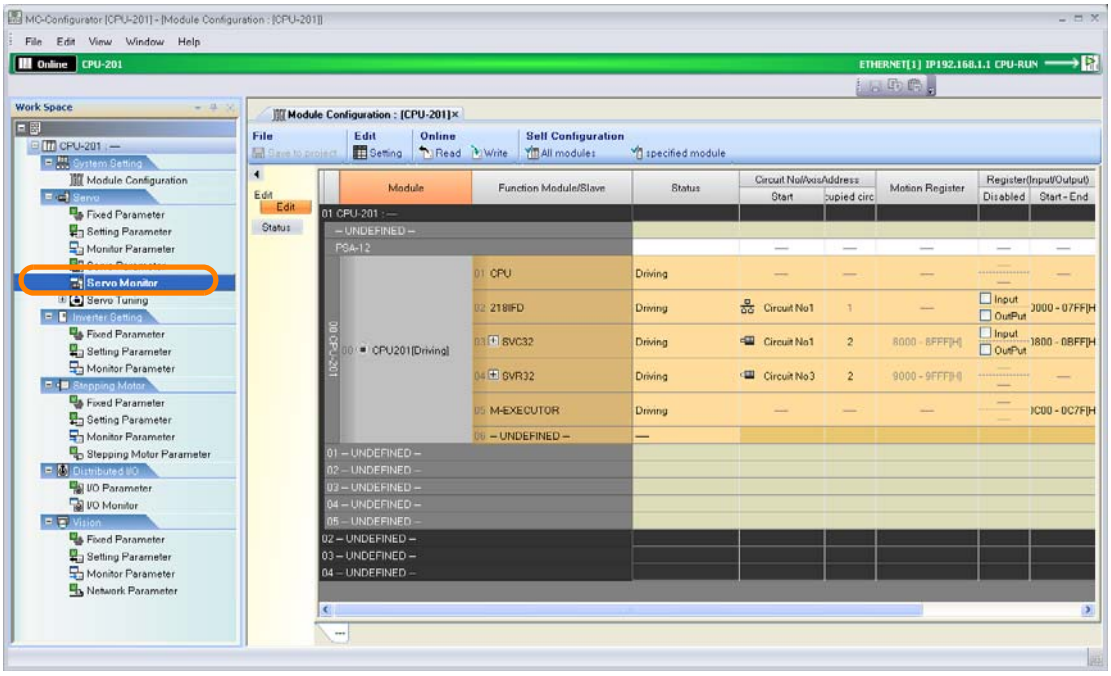
When working with multi-axis configurations, it may be necessary to compare the parameters that are used for different axes. The MPE720 allows you to display the results of the comparison of the parameters for different axes. Use the following procedures to compare axes.

1. Click the **Module Configuration** Button on the My Tool View.

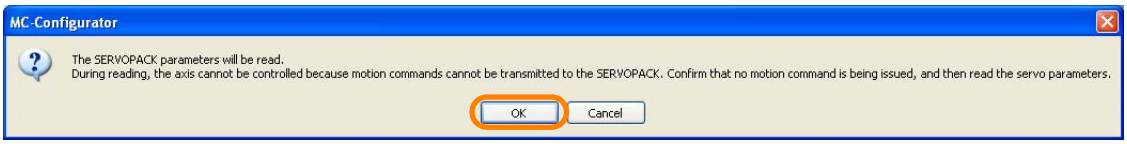


The Module Configuration Tab Page will be displayed.

2. Double-click the parameter to compare in the Work Space Pane.

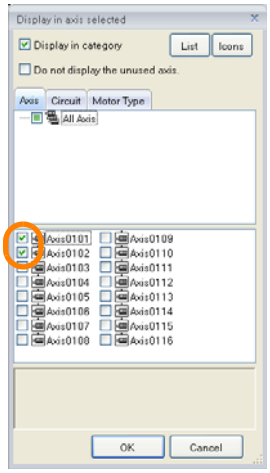


The MC-Configurator Dialog Box may be displayed, depending on the parameter.
Confirm the information in the dialog box, and then click the **OK** Button.

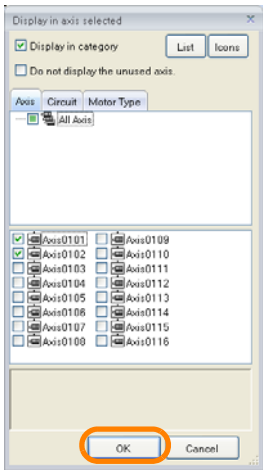


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to compare.

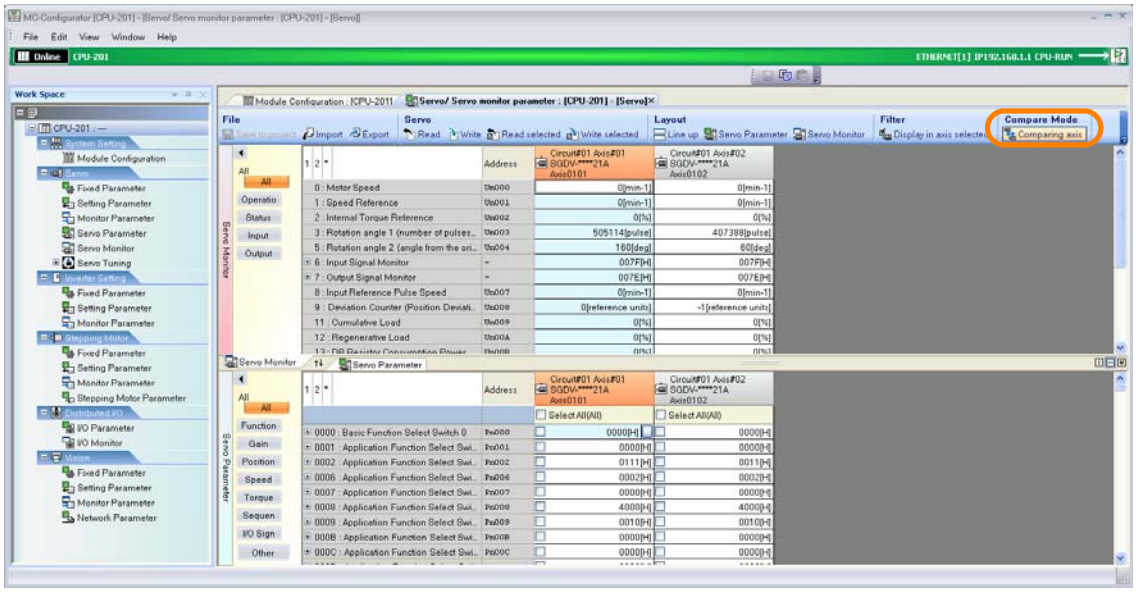


4. Click the **OK** Button.

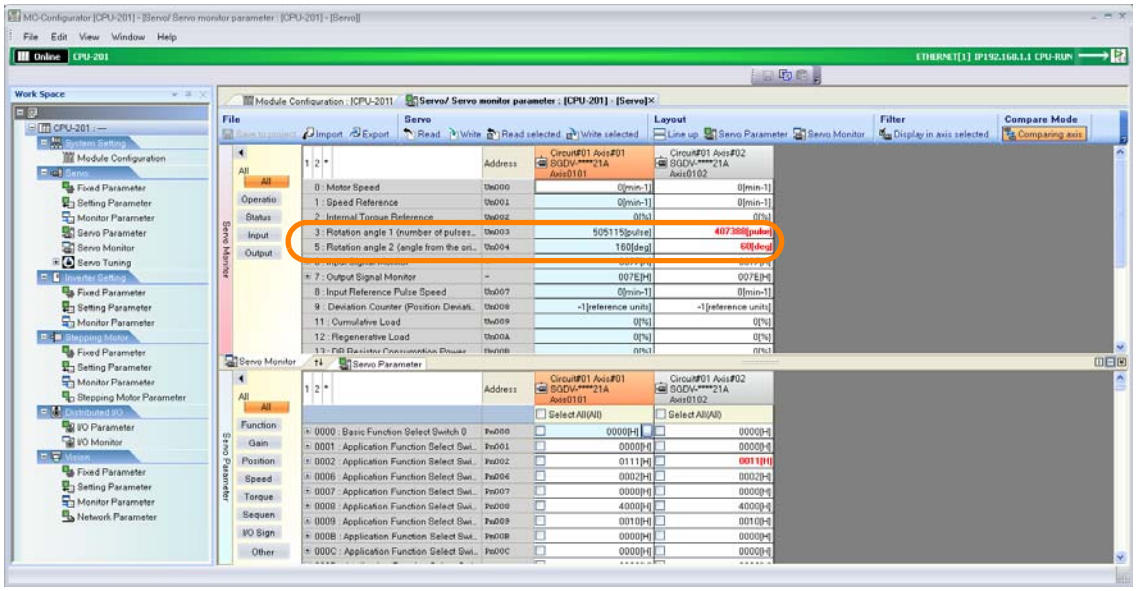


The parameters for the selected axes will be displayed.

5. Select the column of the axis to use as the source, and then select ***Compare Mode*** - ***Comparing axis***.



The parameters that differ from the source axis will be highlighted in red.

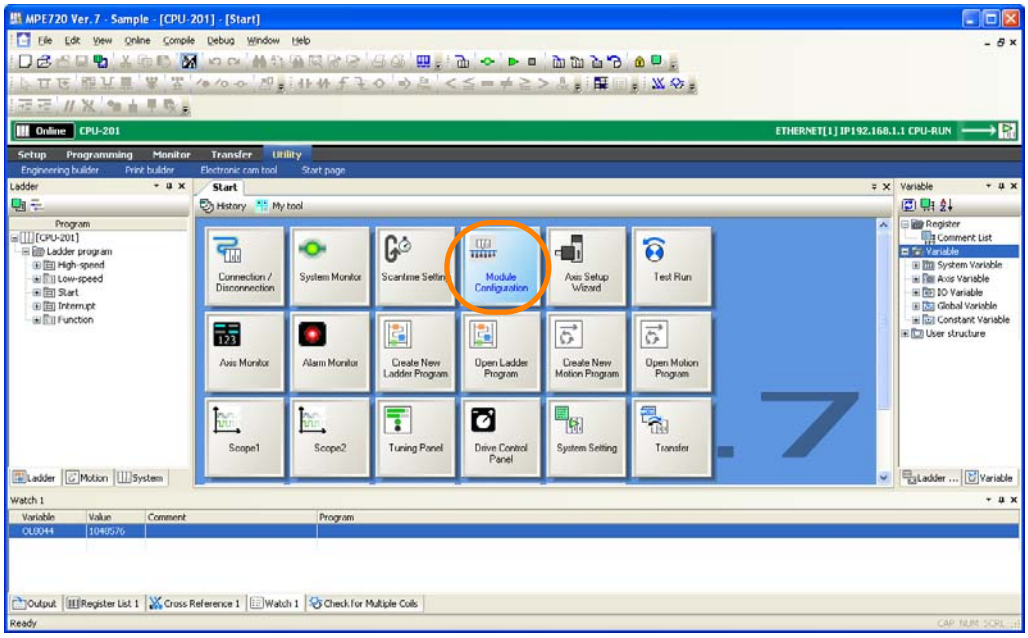


This concludes the procedure.

14.6.4 Displaying Reference Units Used in Motion Parameters Converted to Machine Units

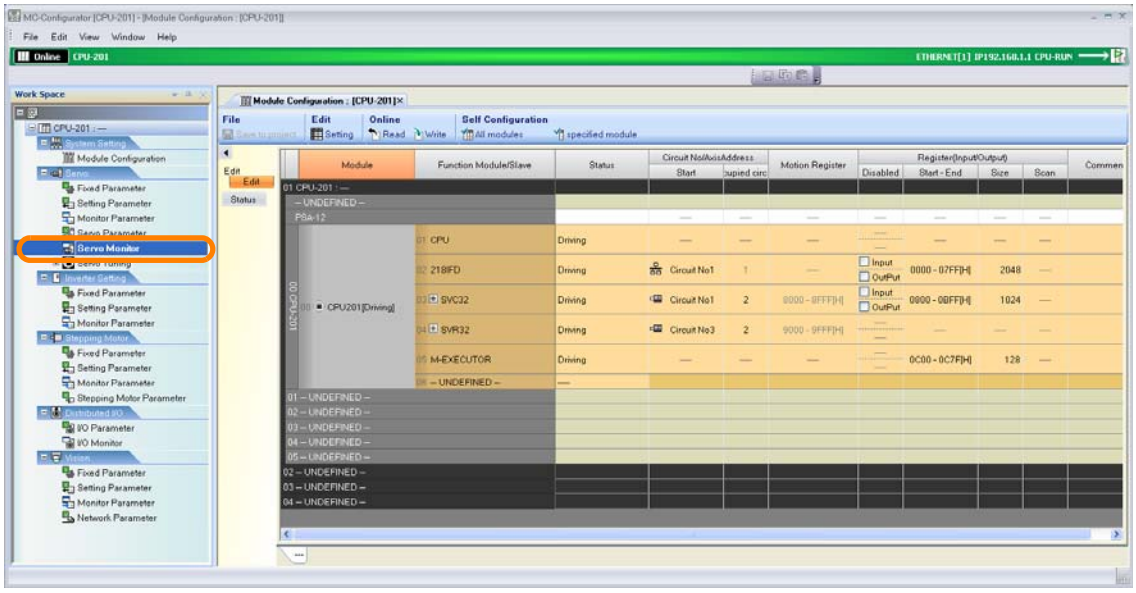
You can display the reference units that are used in motion Servo parameters converted into the machine units that are set in the Machine Controller. Use the following procedure.

1. Click the **Module Configuration** Button on the My Tool View.

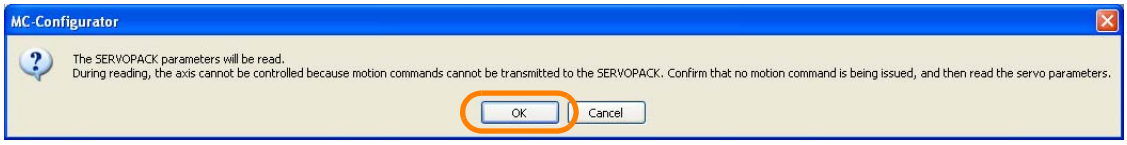


The Module Configuration Tab Page will be displayed.

2. Double-click the parameter for which to convert the units in the Work Space Pane.

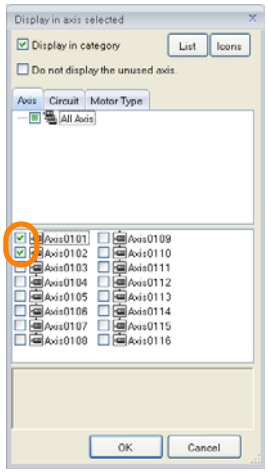


The MC-Configurator Dialog Box may be displayed, depending on the parameter. Confirm the information in the dialog box, and then click the **OK** Button.

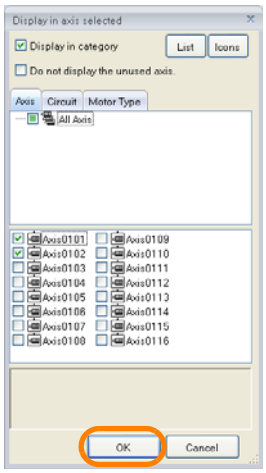


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes for which to convert the units.

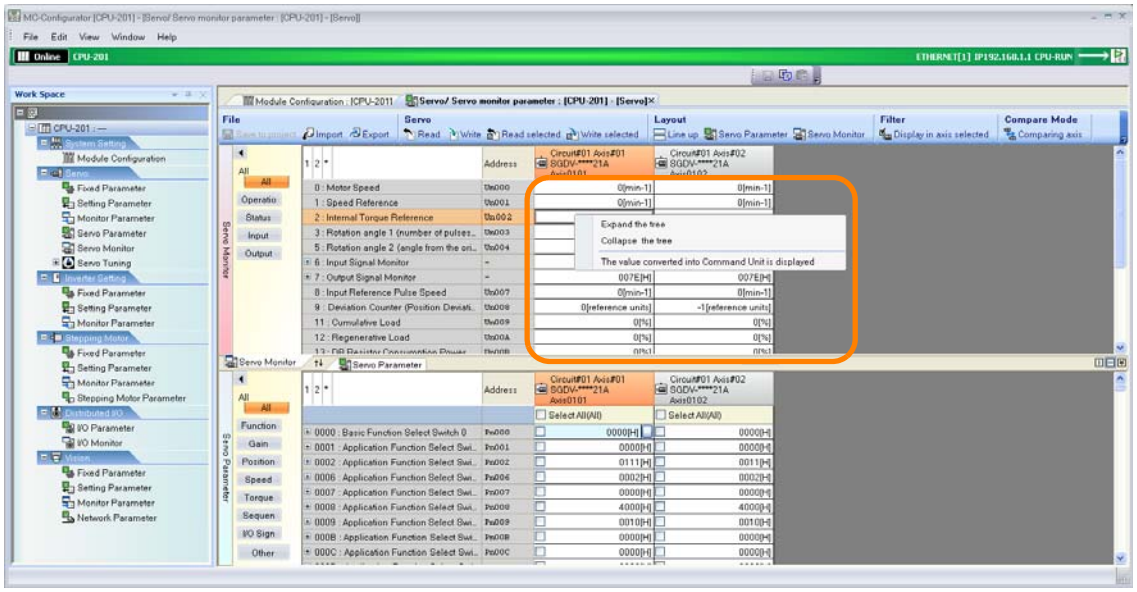


4. Click the **OK** Button.

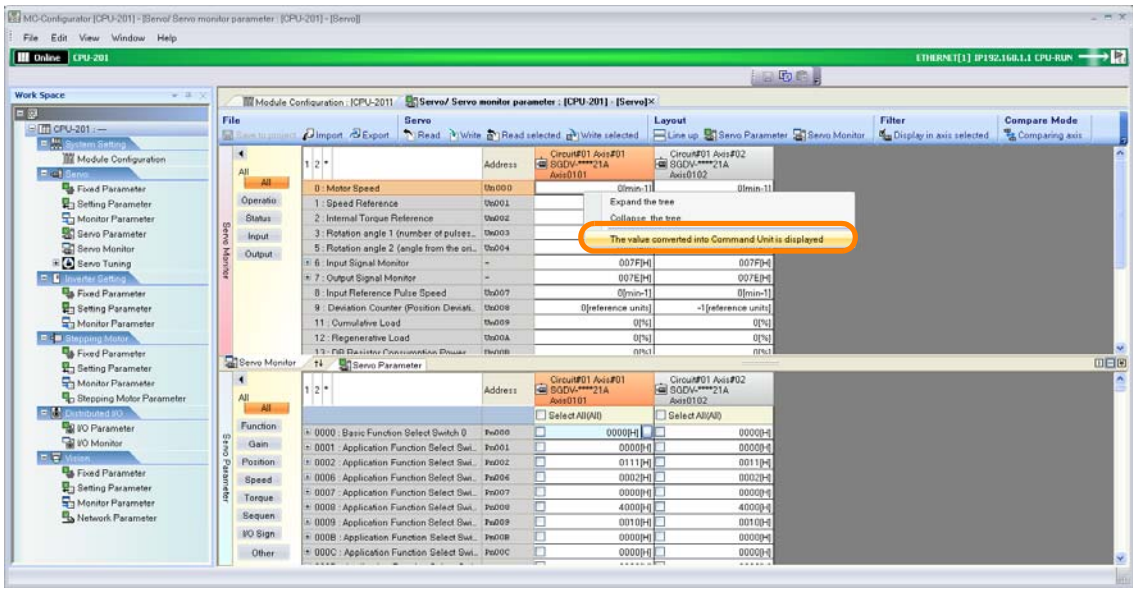


The parameters for the selected axes will be displayed.

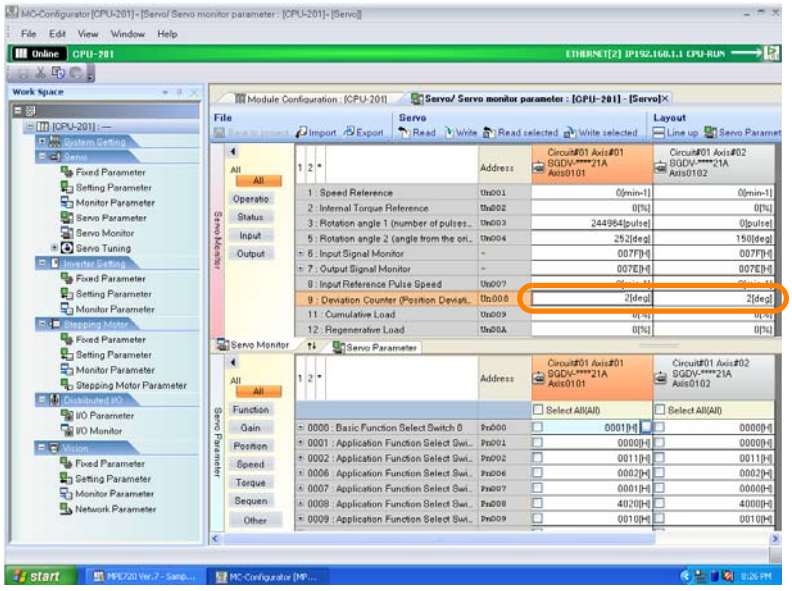
5. Right-click the parameter value.



6. Select ***The value converted into Command Unit is displayed***.



7. Confirm that the selected value has changed to the selected unit.



This concludes the procedure.

14.6.5 Checking Servo Parameter Settings

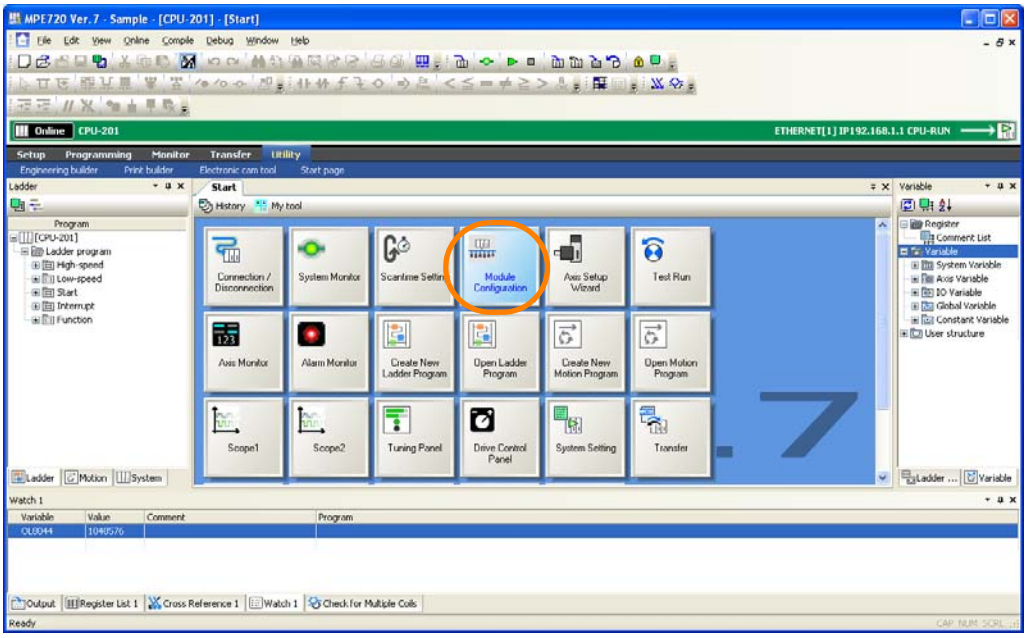
There are the following two ways to save Servo parameters.

- In the SERVOPACK
- In the Machine Controller

This section describes the procedures to check the Servo parameter settings for each of these.

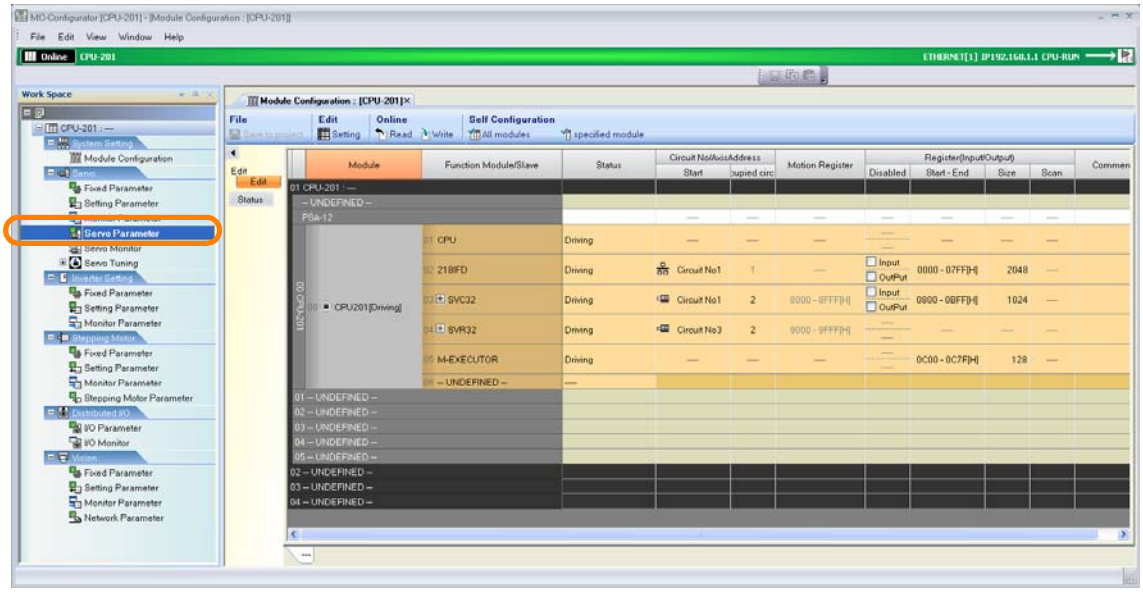
Checking Servo Parameter Settings in the SERVOPACK

1. Click the **Module Configuration** Button on the My Tool View.

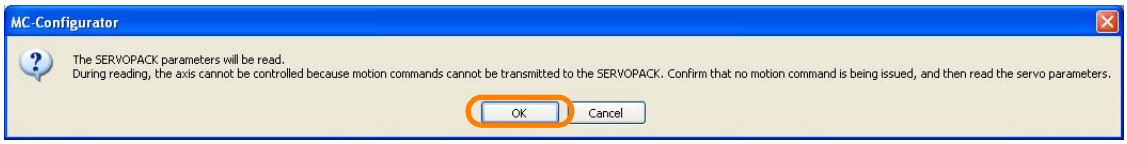


The Module Configuration Tab Page will be displayed.

2. Double-click the parameter for which to check the set value in the Work Space Pane.

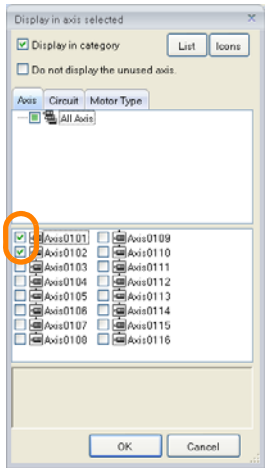


The MC-Configurator Dialog Box may be displayed, depending on the parameter.
Confirm the information in the dialog box, and then click the **OK** Button.

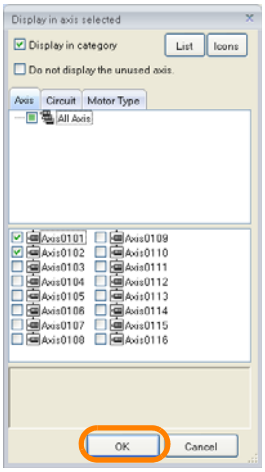


The Display in Axis Selected Dialog Box will be displayed.

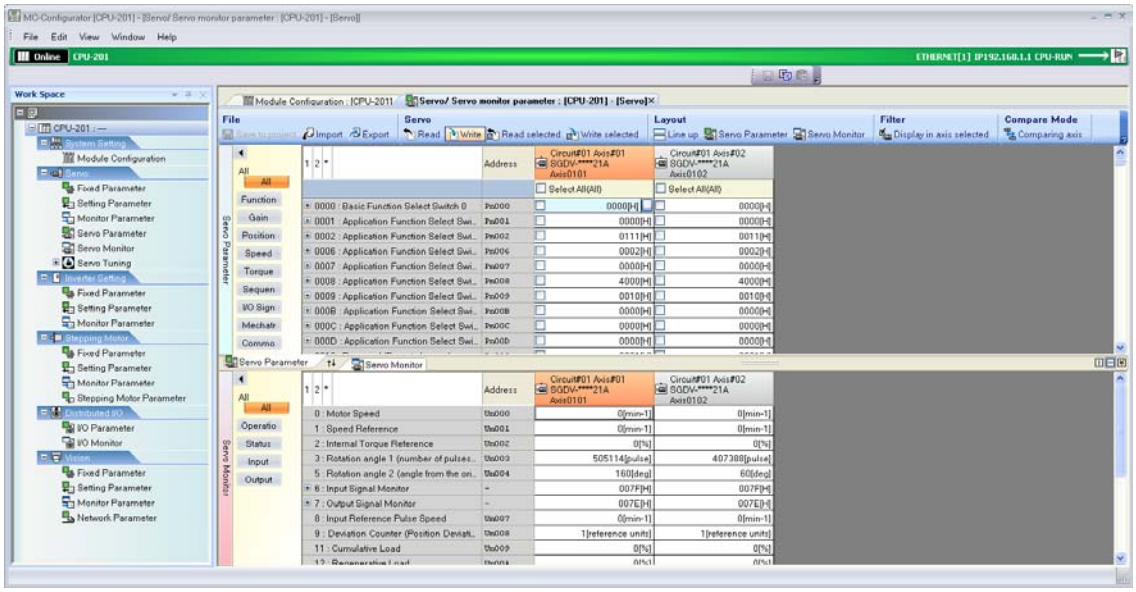
3. Select the check boxes for the axes for which to check the settings.



4. Click the **OK** Button.



The parameters for the selected axes will be displayed.

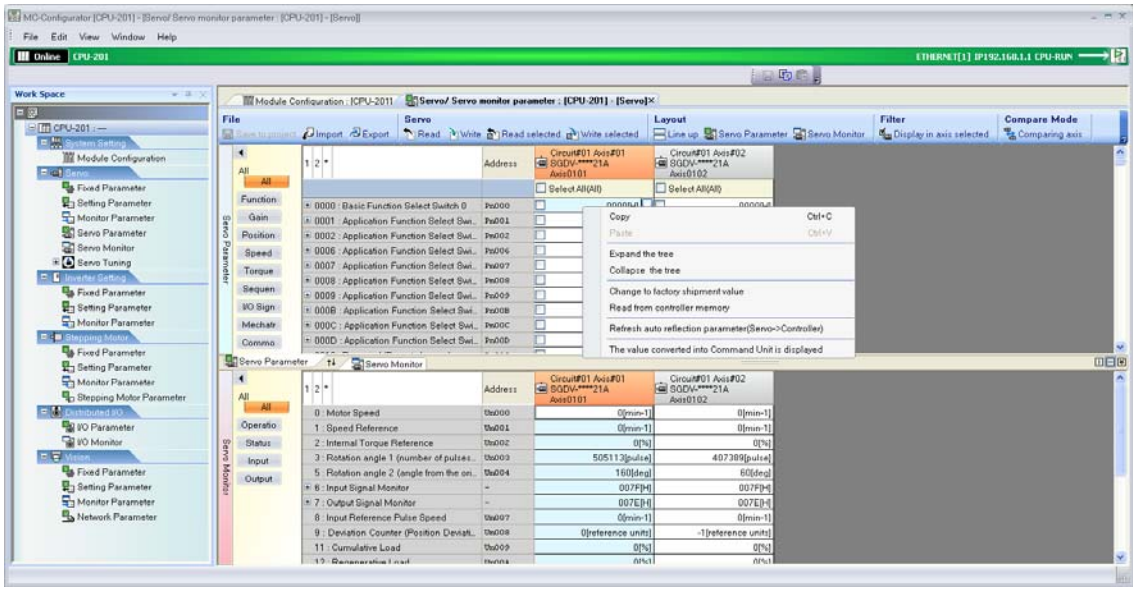


This concludes the procedure.

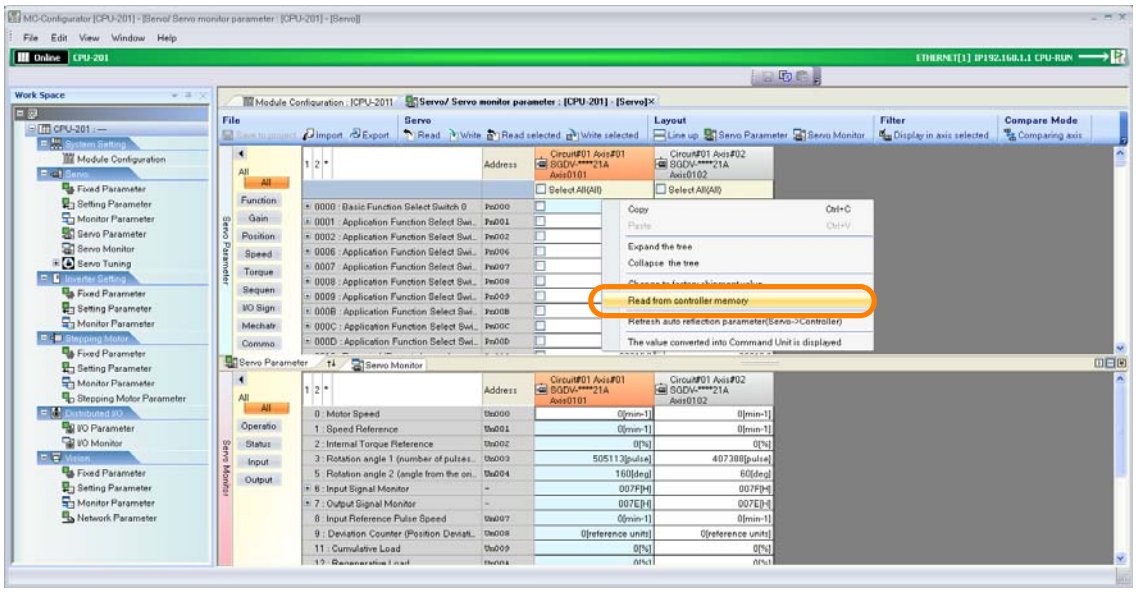
Checking Servo Parameter Settings in the Machine Controller

1. Display the servo parameter settings in the SERVOPACK.
   Refer to the following section for the procedure.
   ☞ *Checking Servo Parameter Settings in the SERVOPACK* on page 14-37

2. Select the parameter value to check and right-click.
   A menu will be displayed.

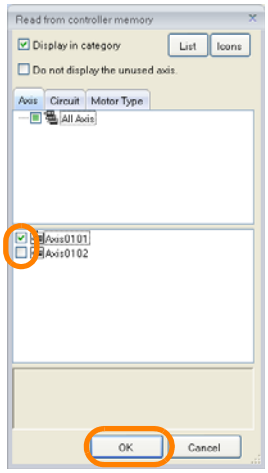


3. Click ***Read from controller memory.***

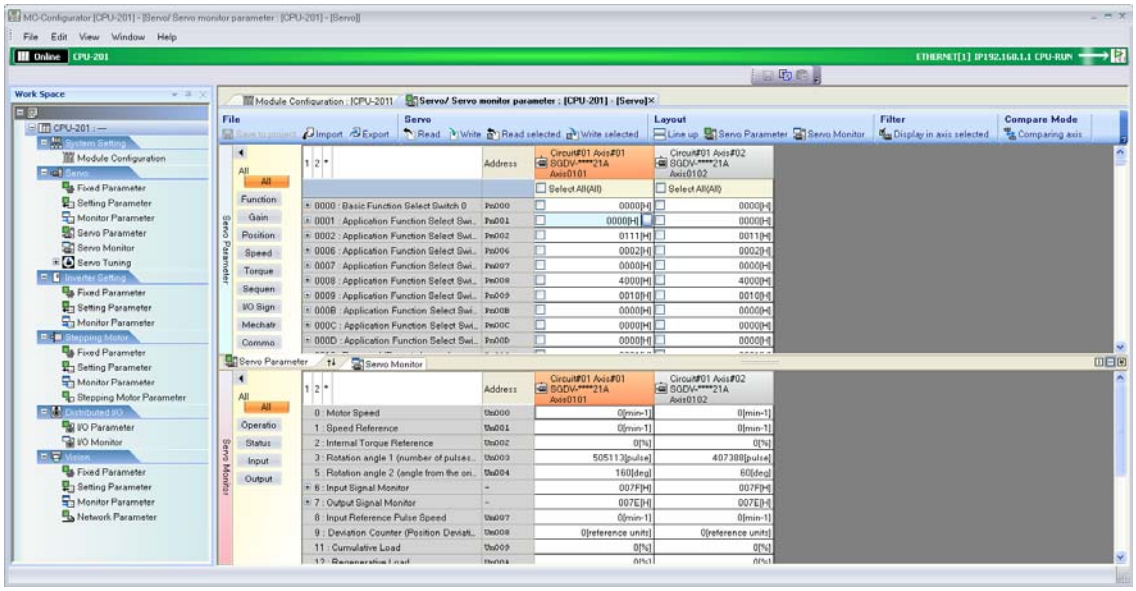


The Read from Controller Memory Dialog Box will be displayed.

4. Select the axes to check and click the **OK** Button.



The Servo parameter settings that are backed up in the Machine Controller will be displayed.



This concludes the procedure.

14.6.6 Writing Parameters to the SERVOPACK or Machine Controller

Parameters That Are Written and Save Locations

The parameters that are written and where they are saved depends on the connection status, the parameter data that is displayed, and the writing method.

- Written Parameters: Fixed Parameters and Setting Parameters

Types of Connection	Project File Status	Connection Name	Parameter Data Displayed in the MPE720 Window	Writing Method	Parameter Data Save Location
Online connections	Open	Project link connection	Data in Machine Controller RAM	Saving in project	In the open project file
				Writing	RAM in the Machine Controller
	Not open	Direct connection	Data in Machine Controller RAM	Saving in project	–
				Writing	RAM in the Machine Controller
Offline connections	Open	–	In the open project file	Saving in project	In the open project file
				Writing	–

- Written Parameters: SERVOPACK Parameters

Types of Connection	Project File Status	Connection Name	Parameter Data Displayed in the MPE720 Window	Writing Method	Parameter Data Save Location
Online connections	Open	Project link connection	Data saved in SERVOPACK*	Saving in project	In the open project file
				Writing	RAM in Machine Controller and SERVOPACK
	Not open	Direct connection	Data saved in SERVOPACK*	Saving in project	–
				Writing	RAM in Machine Controller and SERVOPACK
Offline connections	Open	–	In the open project file	Saving in project	In the open project file
				Writing	–

* This is the default display status. You can also display the RAM data from the Machine Controller. Refer to the following section for details.

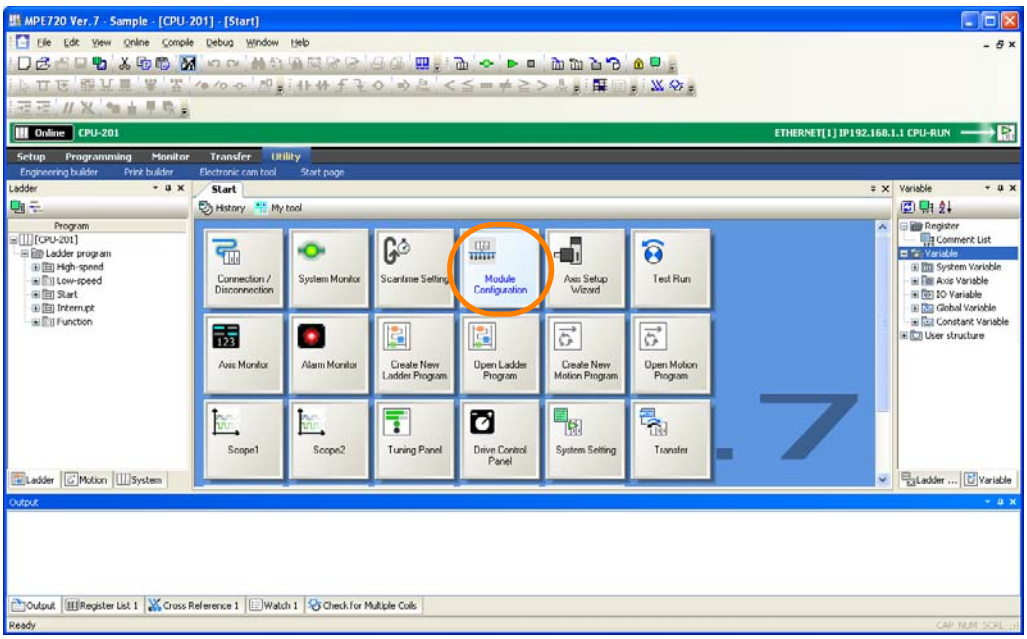
☞ *Checking Servo Parameter Settings in the Machine Controller* on page 14-39

Information The MPE720 can display the Servo common parameters that are defined in the standard Servo profile for MECHATROLINK-III. Although you can display the Servo common parameters, you cannot write them.

Operating Procedure

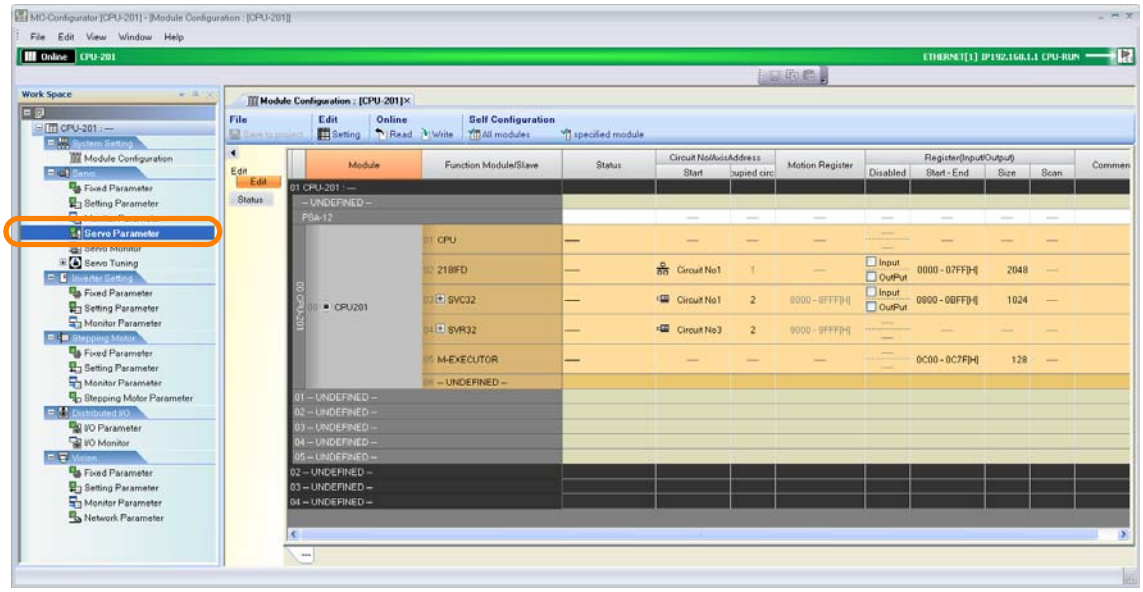
Use the following procedure to write parameters to the SERVOPACK or Machine Controller.

1. Click the **Module Configuration** Button on the My Tool View

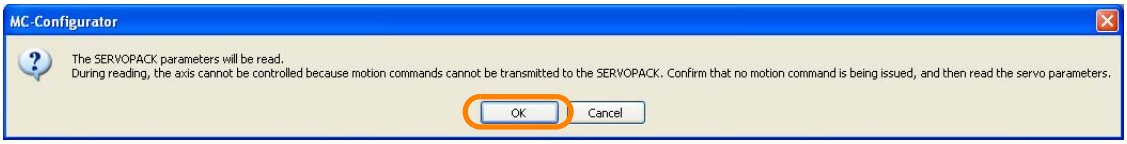


The Module Configuration Tab Page will be displayed.

2. Double-click the parameters to write in the Work Space Pane.

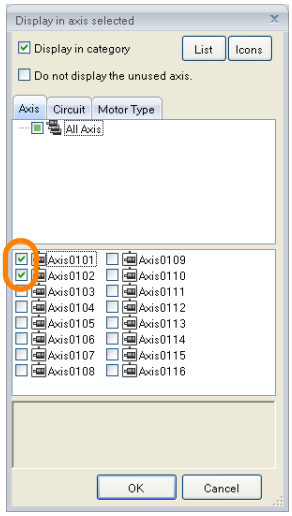


The MC-Configurator Dialog Box may be displayed, depending on the parameter.
Confirm the information in the dialog box, and then click the **OK** Button.

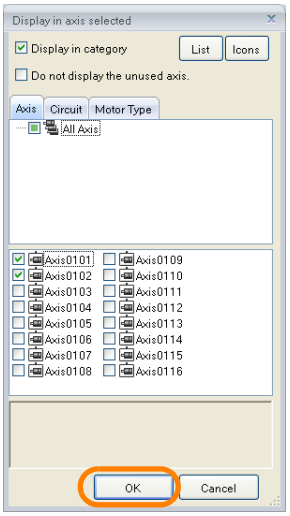


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to write.



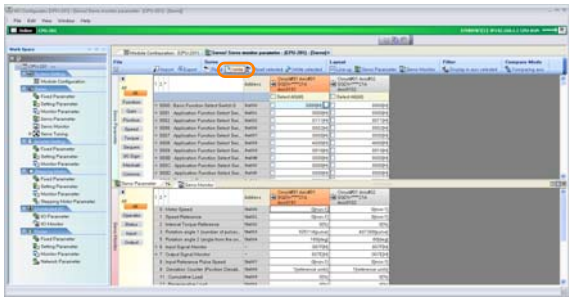
4. Click the **OK** Button.

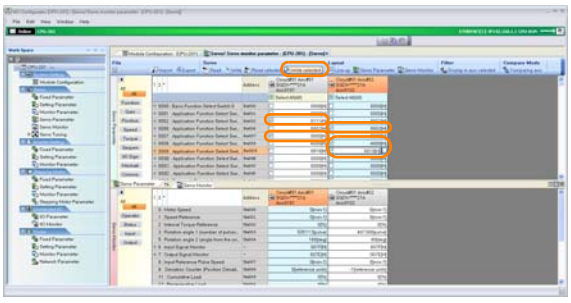


The parameters for the selected axes will be displayed.

5. Any of the following operations can be used.
   - To write all of the parameters, click **Servo** - **Write**.
   - To write only specific parameters, select the check boxes for the parameters to write and then click **Servo** - **Write Selected**.

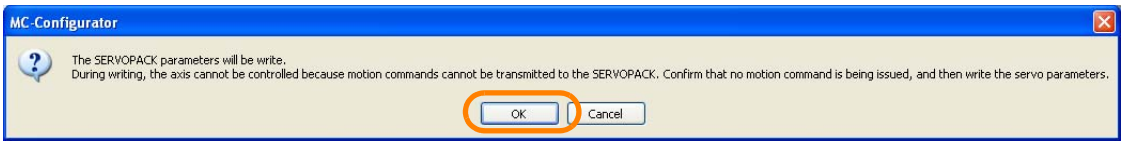
Information To save the parameters in the project file, you must first write them to the Machine Controller or SERVOPACK.





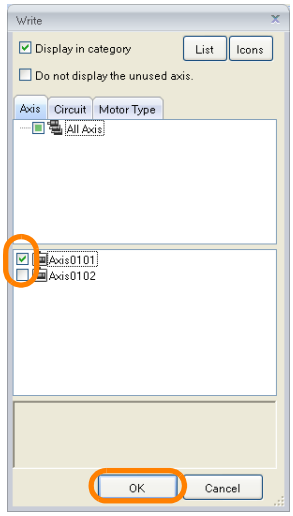
The MC-Configurator Dialog Box will be displayed.

6. Click the **OK** Button.



The Write Dialog Box will be displayed.

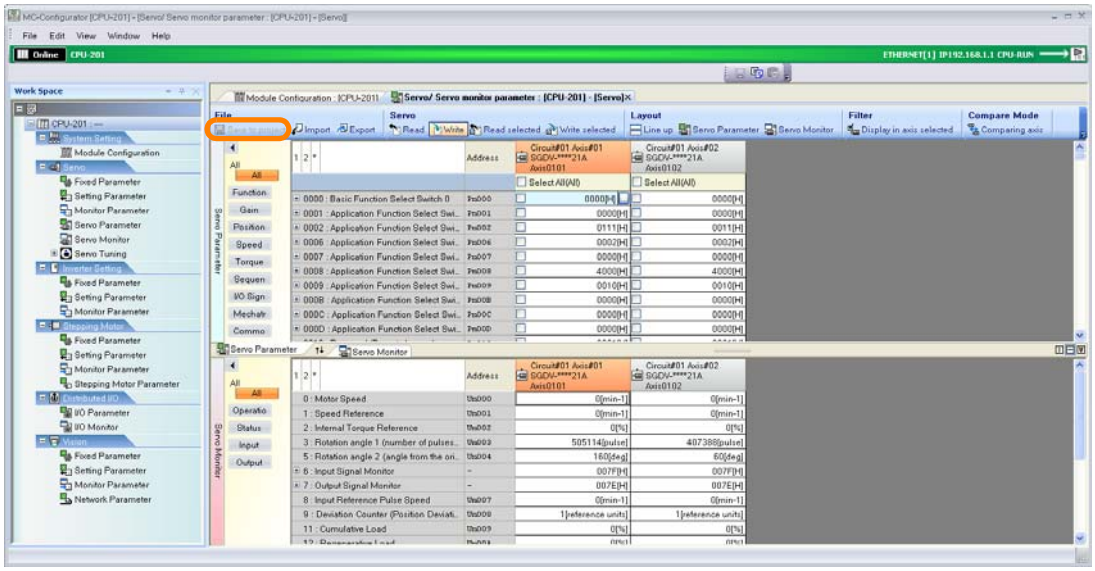
7. Select the axes to which to write the parameters and click the **OK** Button.



The write will be executed.

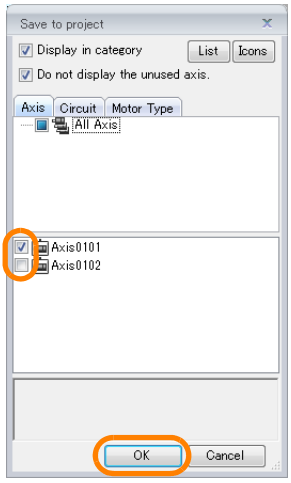
Perform the following steps only when you want to save the parameters in the project file. If you do not want to save them in the project file, then this concludes the procedure.

8. Click the **File - Save to Project** Button.



The Save to Project Dialog Box will be displayed.

9. Select the axes to which to write the parameters and click the **OK** Button.

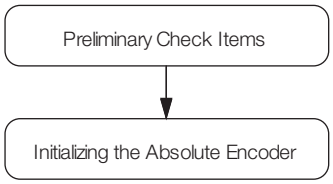


The parameters will be saved to the project file.

This concludes the procedure.

14.6.7 Using an Absolute Encoder

The flow for setting up an absolute encoder is given below.



☞ *Preliminary Check Items* on page 14-46

☞ *Initializing the Absolute Encoder (SVC Module)* on page 14-52
☞ *Initializing the Absolute Encoder (SVB Module)* on page 14-57

Note: The procedure to initialize the absolute encoder depends on whether the Optional Module that is used is an SVB Module or SVC Module (the difference being whether you are using SERVOPACKs with MECHATROLINK-II communications or MECHATROLINK-III communications).

Preliminary Check Items

Confirm that all preliminary check items that are listed below are satisfied.

Check Item	Checking Method*1	Action If the Preliminary Check Item Is Not Satisfied*2
The Servomotor, SERVOPACK, and Cables must be compatible with an absolute encoder.	Refer to the manual provided with each device for checking methods.	Replace the Servomotor, SERVOPACK, or Cables with products that are compatible with an absolute encoder.
The SERVOPACK and Servomotor must be ready for synchronized communications.	Bit 0 (Motion controller operation ready) in motion monitor parameter IW□□□00 must be set to 1 (Operation Ready).	Refer to one of the following manuals for details on Monitor Parameters. 🕮 *MP3000 Series Motion Control User's Manual* (Manual No. SIEP C880725 11) 🕮 *MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (Manual No.: SIEP C880700 33)
The Servo to the Servomotor must be turned OFF.	Bit 1 (Running (At Servo ON)) in motion monitor parameter IW□□□00 must be set to 0 (Servo OFF).	Set bit 0 (Servo ON) in motion setting parameter OW□□□00 to 0 (OFF).
Motion command execution must be completed.	Motion monitor parameter IW□□□08 (Motion command response code) must be set to 0 (No command).	Set motion setting parameter OW□□□08 (Motion command) to 0 (No command).
	Bit 0 (Command execution flag) in motion monitor parameter IW□□□09 must be set to 0 (Ready).	Wait until command execution is completed, or until command cancellation is completed.
The Servo parameters must be set to use the encoder as an absolute encoder.	The second digit (Use of absolute encoder) of Servo parameter Pn002 must be set to 0 (Use absolute encoder as an absolute encoder).	Set the second digit (Use of absolute encoder) of Servo parameter Pn002 to 0 (Use absolute encoder as an absolute encoder).

*1. Refer to the following section for detailed procedures.
☞ *Checking Parameters* on page 14-47

*2. Refer to the following section for detailed procedures.
☞ *Changing Parameter Settings* on page 14-49

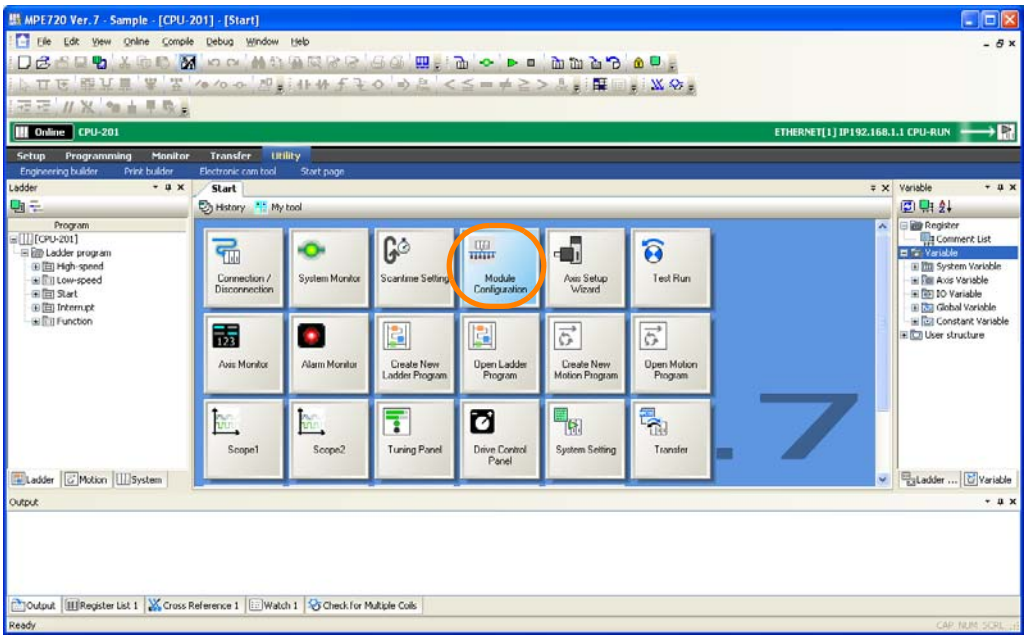
Information

The □□□ portion of the register address for motion parameters is determined by the circuit number and the axis number.
Refer to the following manual for details.
🕮 *MP3000 Series Motion Control User's Manual* (Manual No. SIEP C880725 11)

◆ Checking Parameters

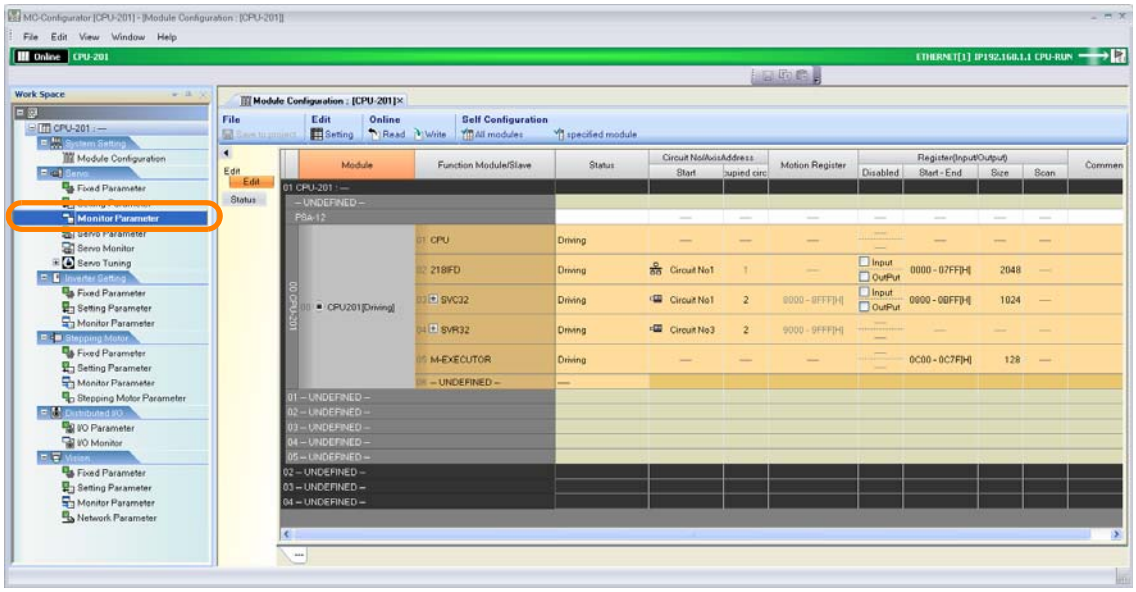
This section gives the procedure for checking parameters, in preparation for using an absolute encoder.

1. Click the **Module Configuration** Button on the My Tool View.



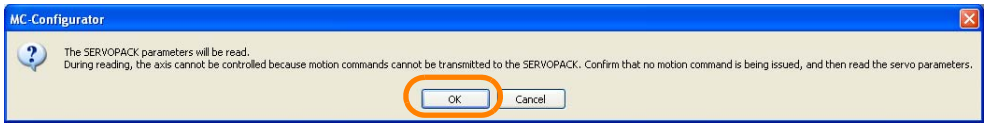
The Module Configuration Tab Page will be displayed.

2. Double-click the parameter to check in the Work Space Pane.



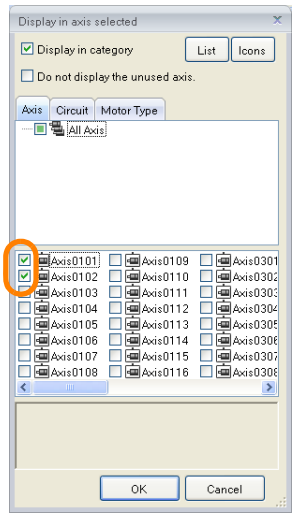
Information

If you double-click a Servo parameter, the following dialog box will be displayed. Read the contents, and then click the **OK** Button.

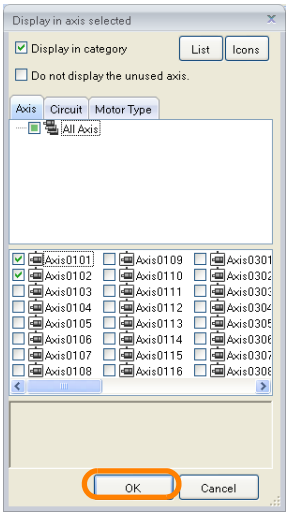


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to check.

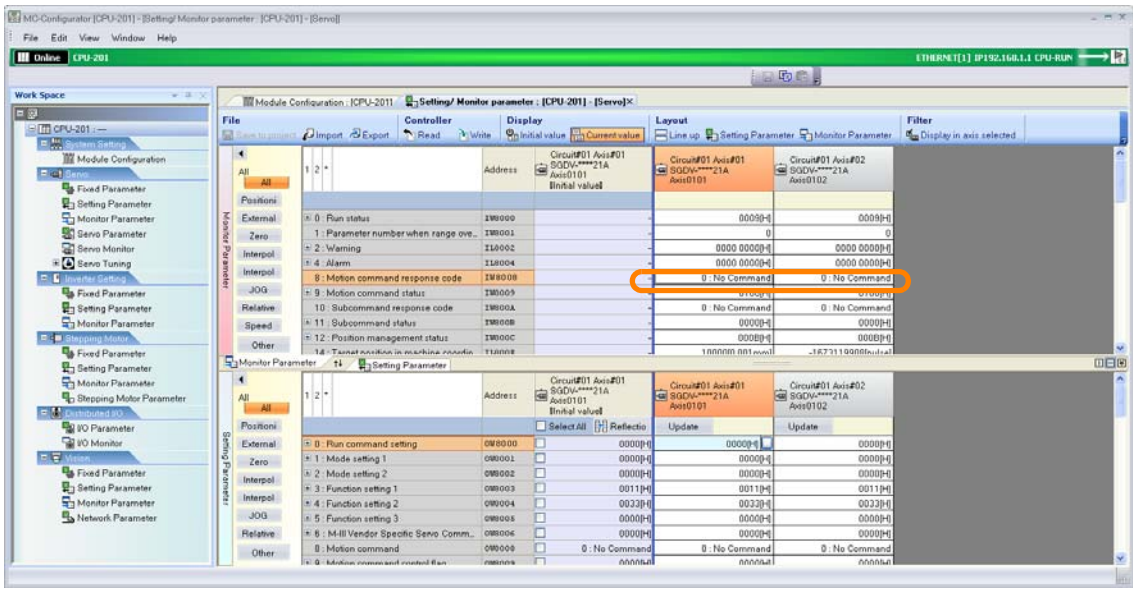


4. Click the **OK** Button.



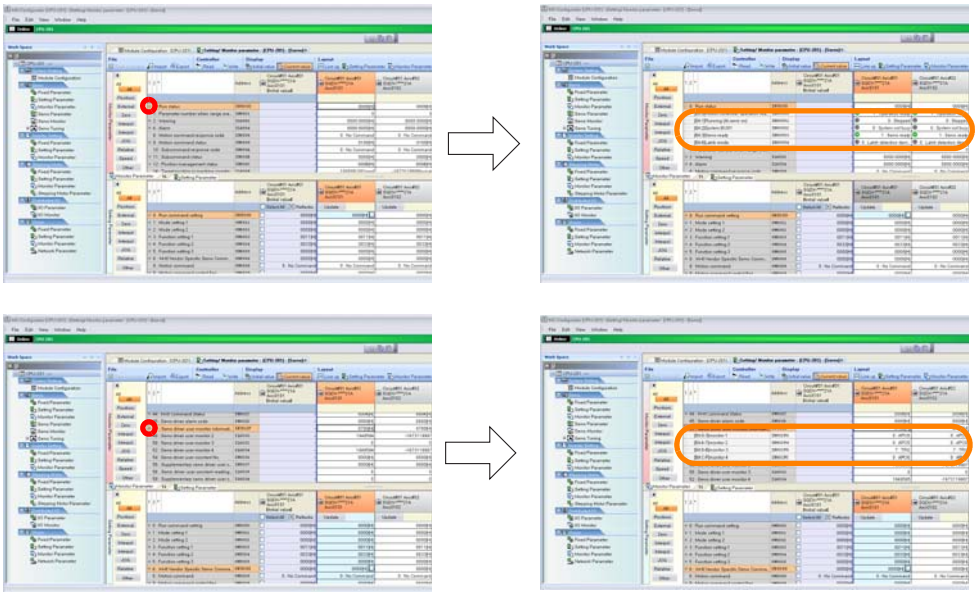
The parameters for the selected axes will be displayed.

5. Check the setting in the cell that corresponds to the parameter number to check.



Information

To check individual bits or digits, click the **+** Button next to the parameter name to expand the display.

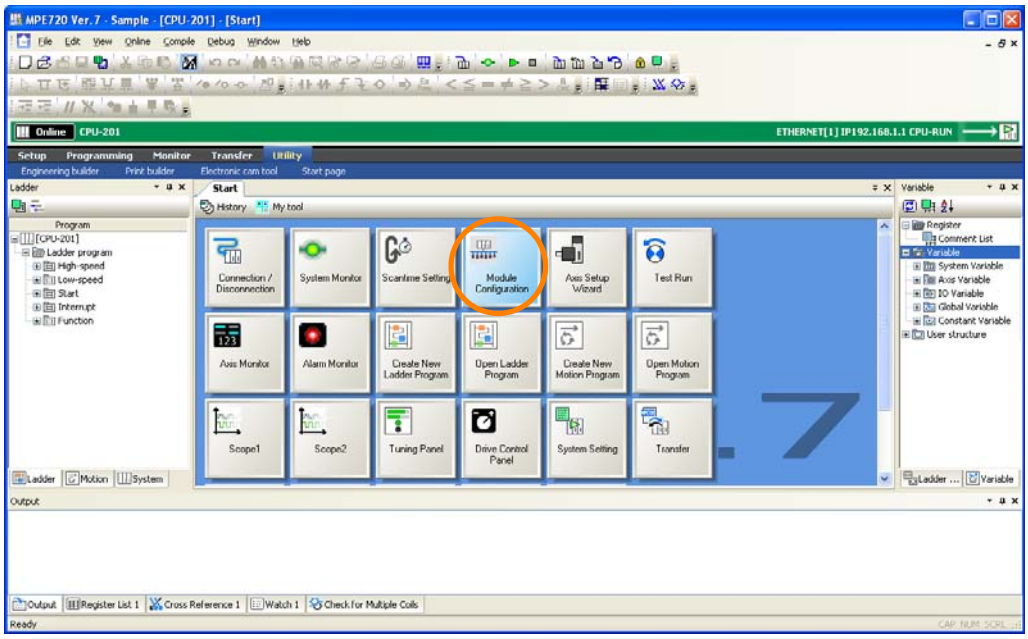


This concludes the procedure.

◆ Changing Parameter Settings

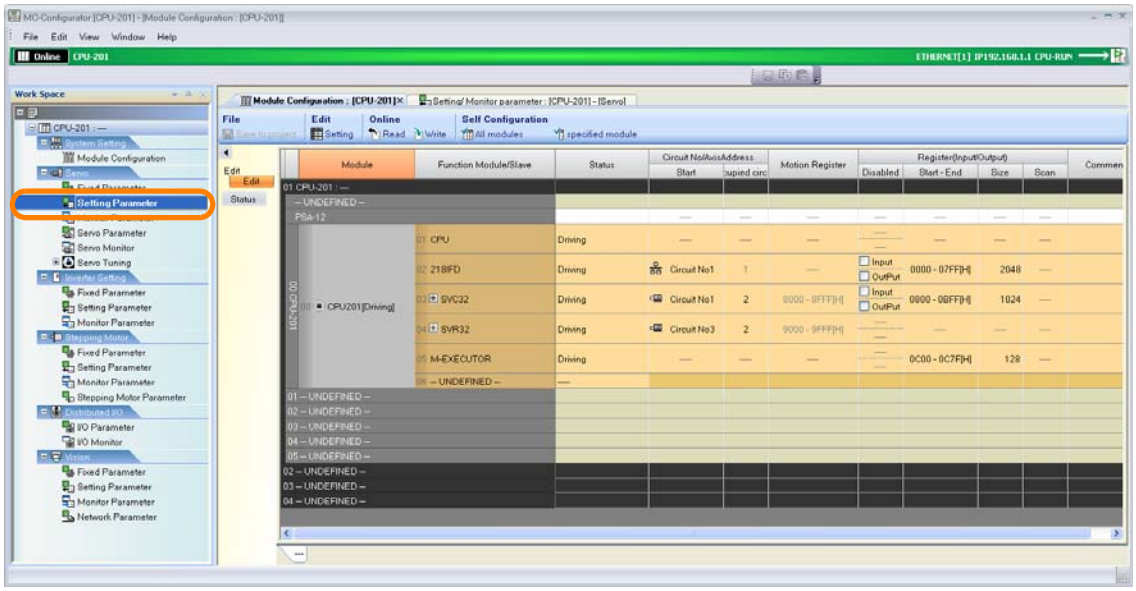
This section gives the procedure for changing parameter settings.

1. Click the **Module Configuration** Button on the My Tool View.



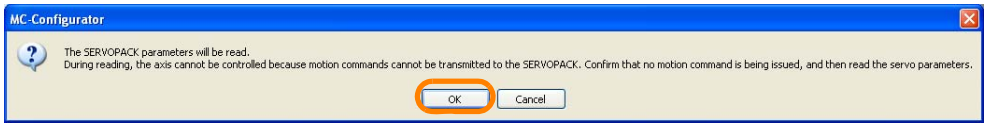
The Module Configuration Tab Page will be displayed.

2. Double-click the parameter for which to change the set value in the Work Space Pane.



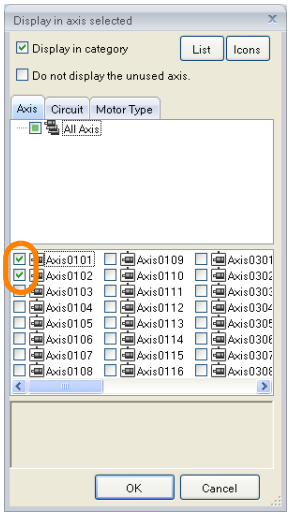
Information

If you double-click a Servo parameter, the following dialog box will be displayed. Read the contents, and then click the **OK** Button.

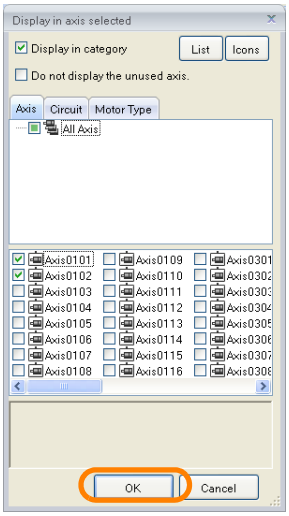


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes for which to change the settings.

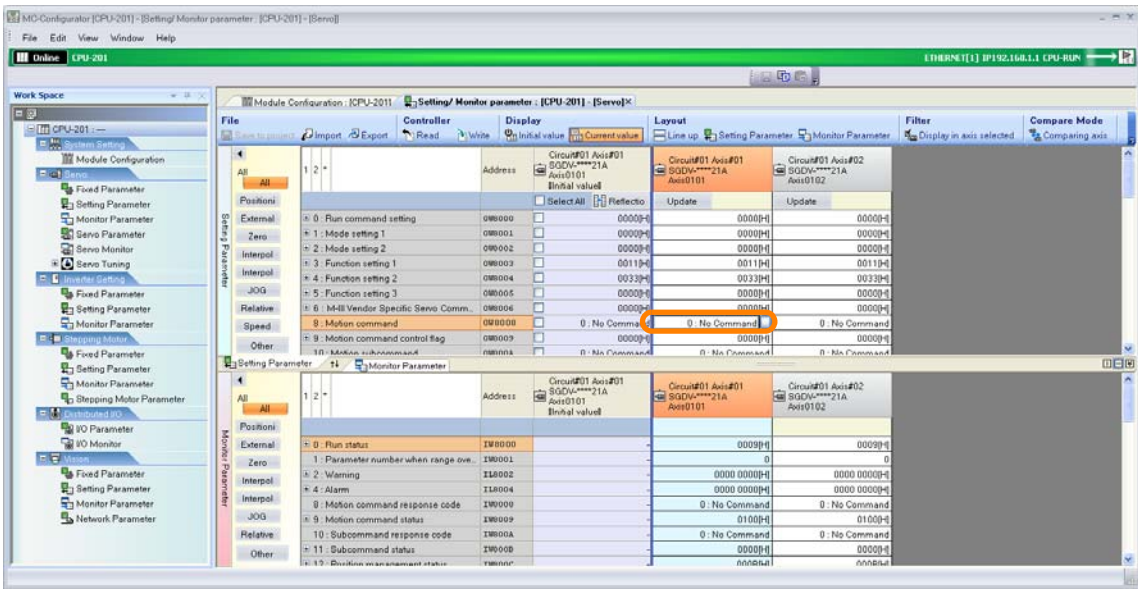


4. Click the **OK** Button.

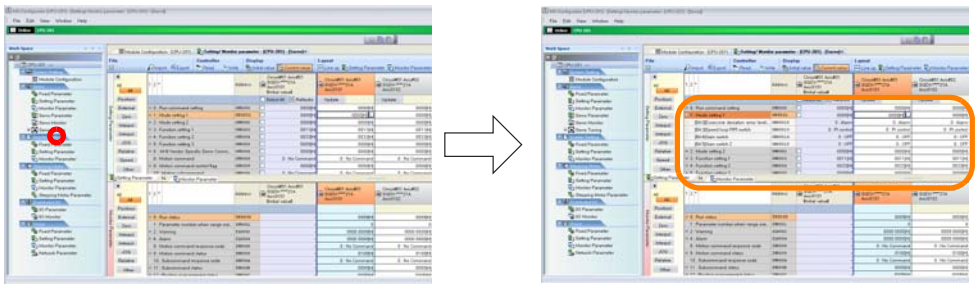


The parameters for the selected axes will be displayed.

5. Double-click the cell that corresponds to the parameter number for which to change the setting.

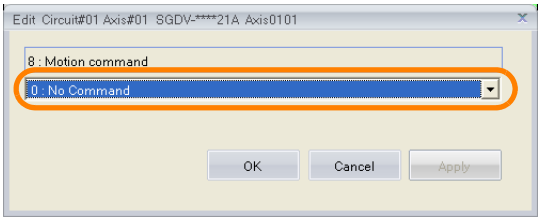


Information To check individual bits or digits, click the **+** Button next to the parameter name to expand the display.

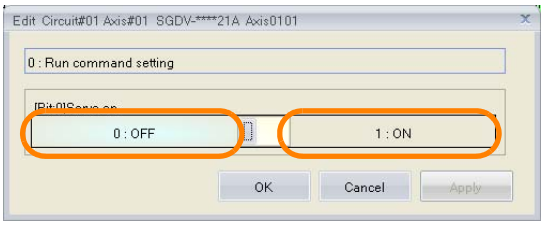


The Edit Dialog Box will be displayed.

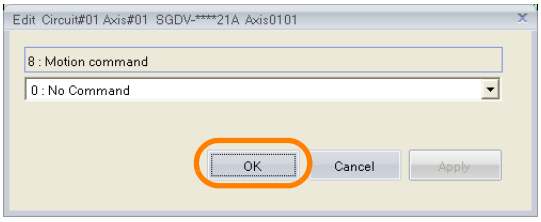
6. Select the new setting.
   - If a list box appears: Select the value to set from the list.

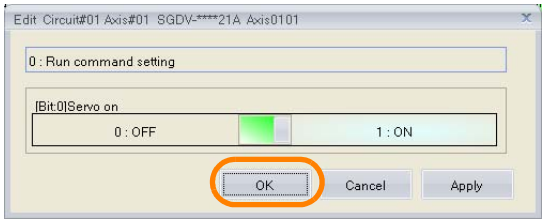


   - If an ON or OFF selection appears: Click the setting to set. The button that is highlighted in light blue is the currently selected setting.



7. Click the **OK** Button.





The settings will be applied and the dialog box will close.

Information If there are multiple axes, change the setting for all axes.

This concludes the procedure.

Initializing the Absolute Encoder (SVC Module)

There are two methods that you can use to initialize the absolute encoder if you are using the SVC Module.

Tab Page Used	Introduction	Reference
Edit Ladder Program Tab Page	Create a ladder program to initialize the absolute encoder. It may take time to create a ladder program for this, but once it has been created, it can be used repeatedly whenever it is necessary to initialize the absolute encoder. This is the recommended approach if you have to initialize the absolute encoder often.	🕮 *MP3000 Series Motion Control User's Manual* (Manual No. SIEP C880725 11)
Module Configuration Tab Page	The absolute encoder is initialized by temporarily changing parameters in the Module Configuration Tab Page. This approach is recommended if you want to initialize the absolute encoder for testing purposes.	☞ *Initializing the Absolute Encoder Using the Module Configuration Tab Page (SVC Module)* on page 14-53

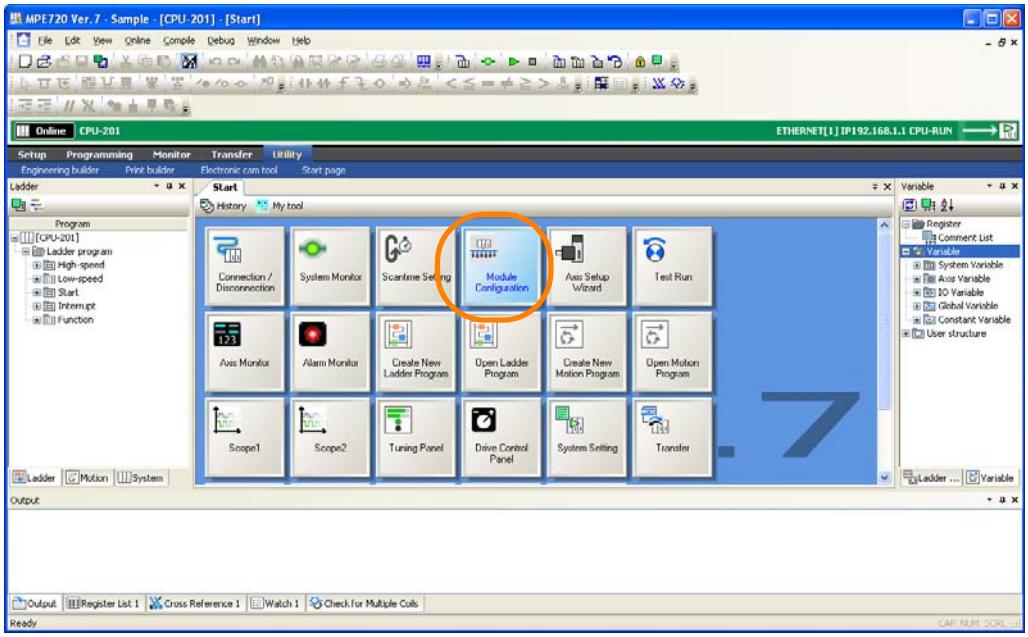
◆ Initializing the Absolute Encoder Using the Module Configuration Tab Page (SVC Module)

Use the following procedure to initialize the absolute encoder by using the Module Configuration Tab Page.

Information

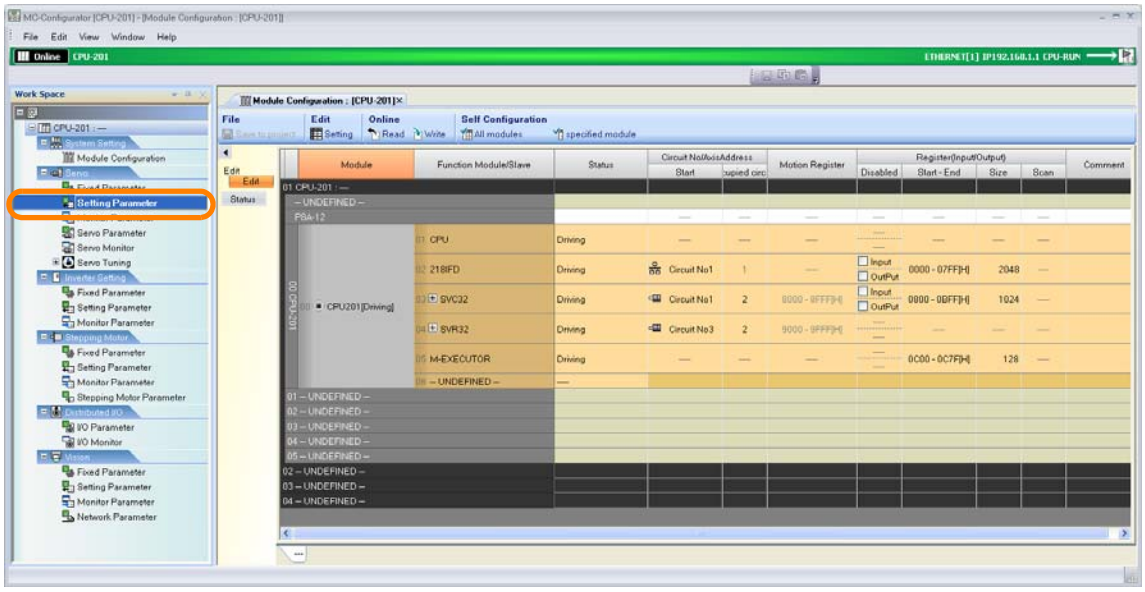
Refer to the following section for procedures on how to change parameter settings.
☞ *Changing Parameter Settings* on page 14-49

1. Click the **Module Configuration** Button on the My Tool View.



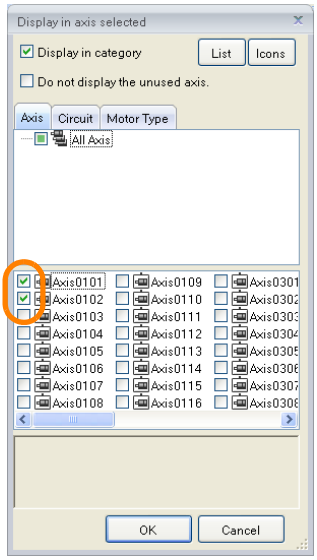
The Module Configuration Tab Page will be displayed.

2. Double-click **Setting Parameter** in the Work Space Pane.

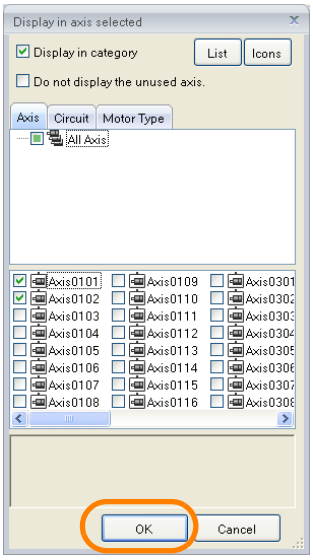


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to display.



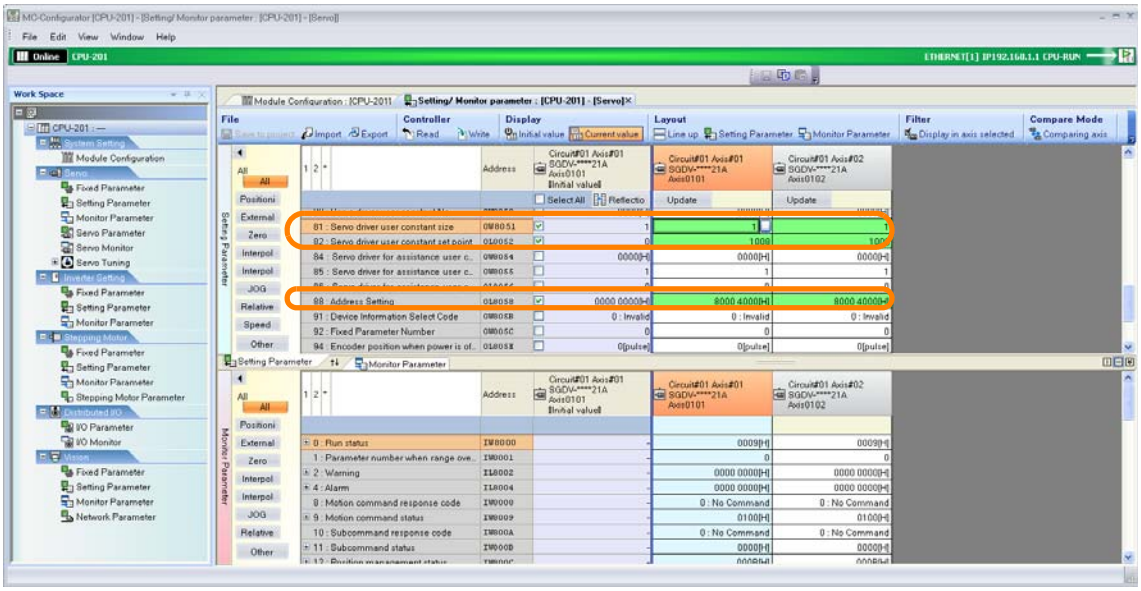
4. Click the **OK** Button.



The setting parameters for the selected axes will be displayed.

5. Set the following setting parameters to the values that are given below.

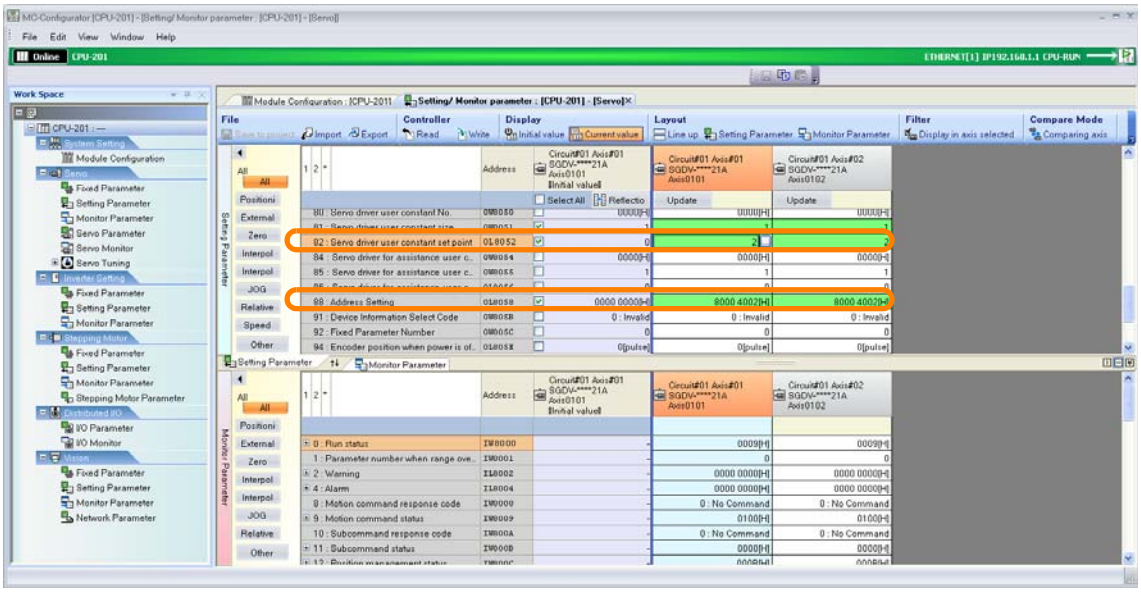
Register Address	Parameter Name	Setting	Description
OW□□□51	Servo driver user constant size	1	Number of words
OL□□□52	Servo driver user constant set point	1008 hex	Absolute encoder reset request code
OL□□□58	Address Setting	80004000 hex	Virtual memory address in the SERVOPACK



The absolute encoder initialization request will be sent.

6. Set the following setting parameters to the values that are given below.

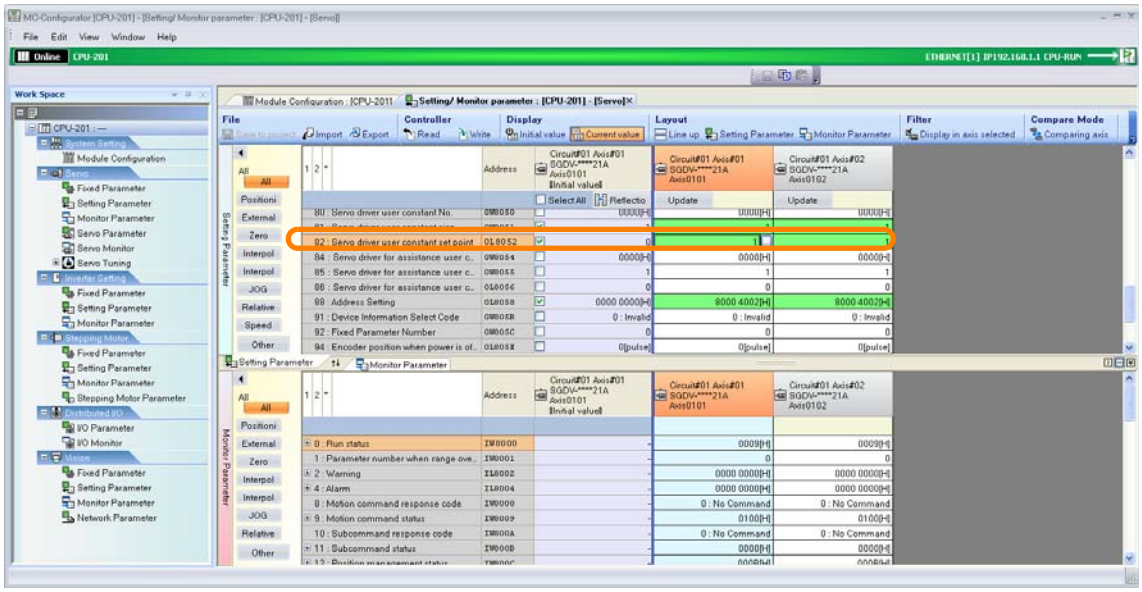
Register Address	Parameter Name	Setting	Description
OL□□□52	Servo driver user constant set point	2	The code required for the preliminary processing
OL□□□58	Address Setting	80004002 hex	Virtual memory address in the SERVOPACK



Preparations will be made for execution of the absolute encoder initialization.

7. Set the following setting parameters to the values that are given below.

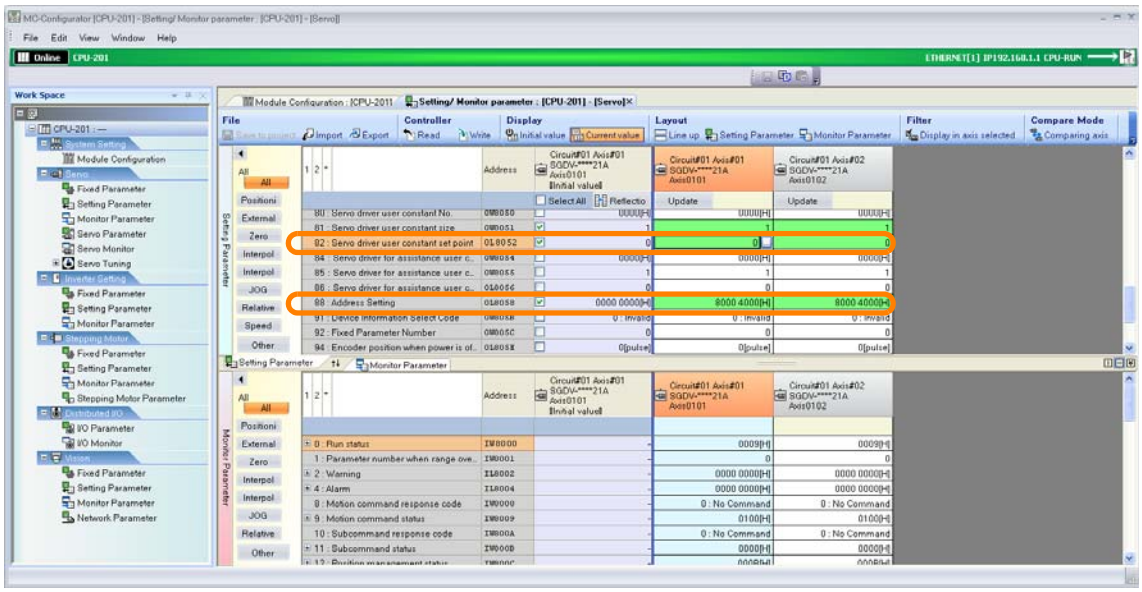
Register Address	Parameter Name	Setting	Description
OL□□□52	Servo driver user constant set point	1	The code required to send the data and perform the calibration operation



The absolute encoder will be initialized.

8. Set the following setting parameters to the values that are given below.

Register Address	Parameter Name	Setting	Description
OL□□□52	Servo driver user constant set point	0	The code required to send the data and complete the calibration operation
OL□□□58	Address Setting	80004000 hex	Virtual memory address in the SERVOPACK



This concludes execution of the absolute encoder initialization.

9. Turn the power supply to the SERVOPACK OFF and ON again.
The settings will be enabled.

This concludes the procedure.

Initializing the Absolute Encoder (SVB Module)

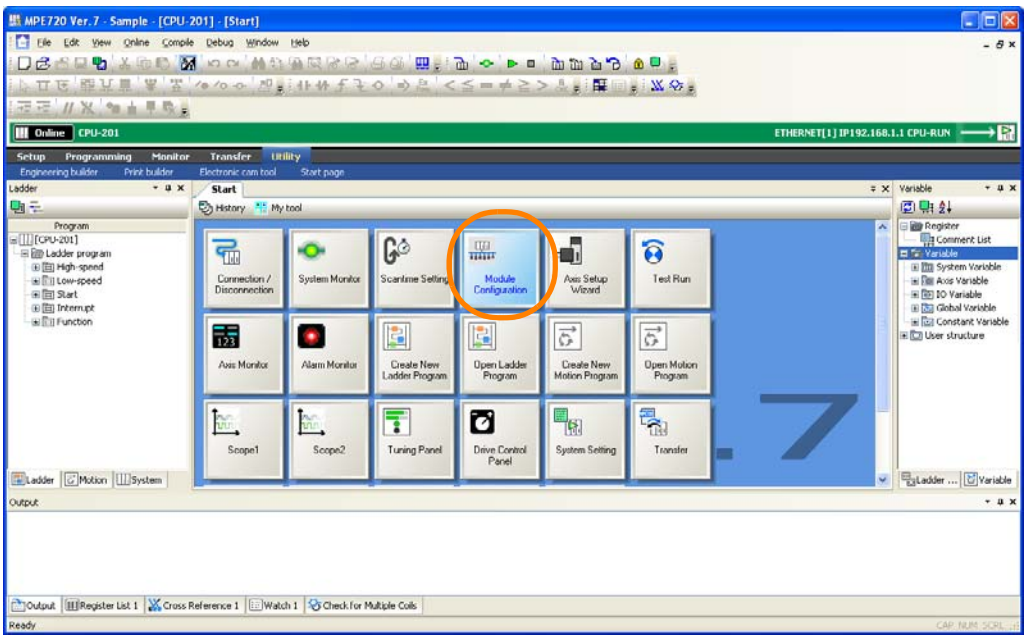
Use the following procedure to initialize the absolute encoder if you are using the SVB Module.

Information

Refer to the following sections for procedures on how to confirm and change parameter settings.

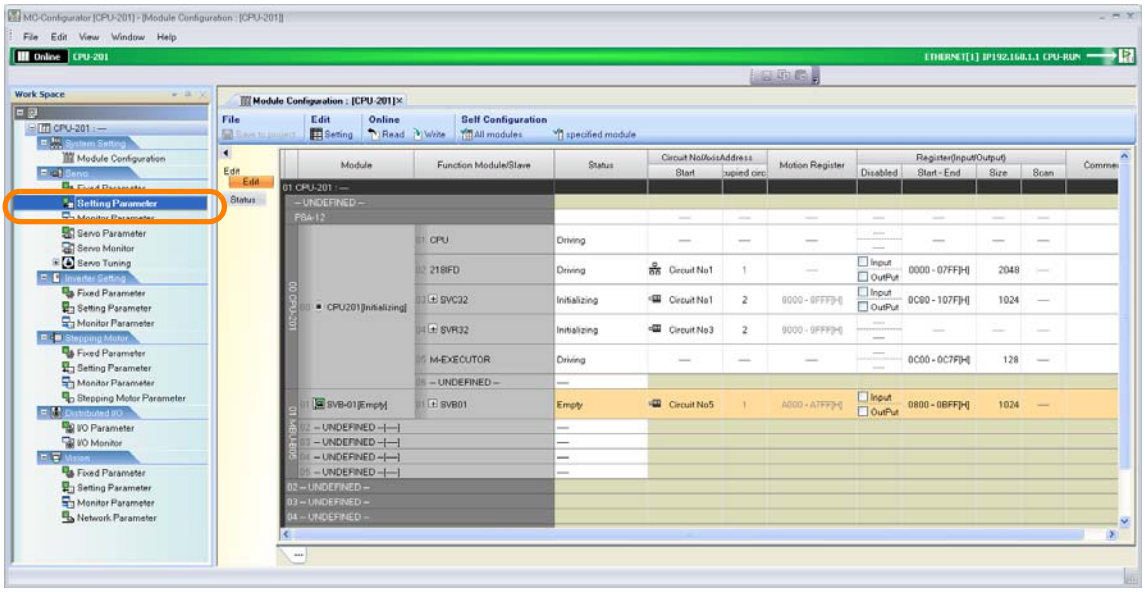
☞ *Checking Parameters* on page 14-47
☞ *Changing Parameter Settings* on page 14-49

1. Click the **Module Configuration** Button on the My Tool View.



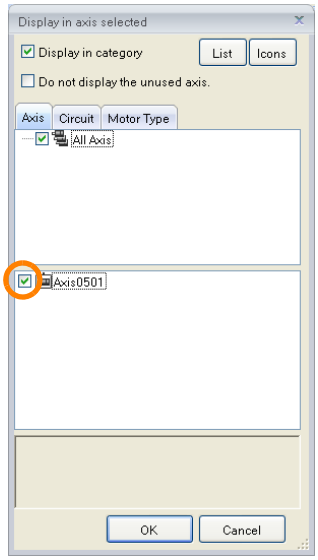
The Module Configuration Tab Page will be displayed.

2. Double-click **Setting Parameter** in the Work Space Pane.

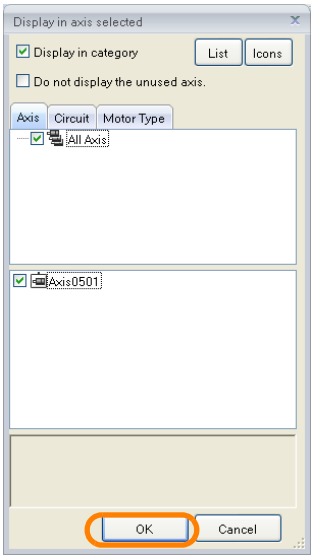


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to display.



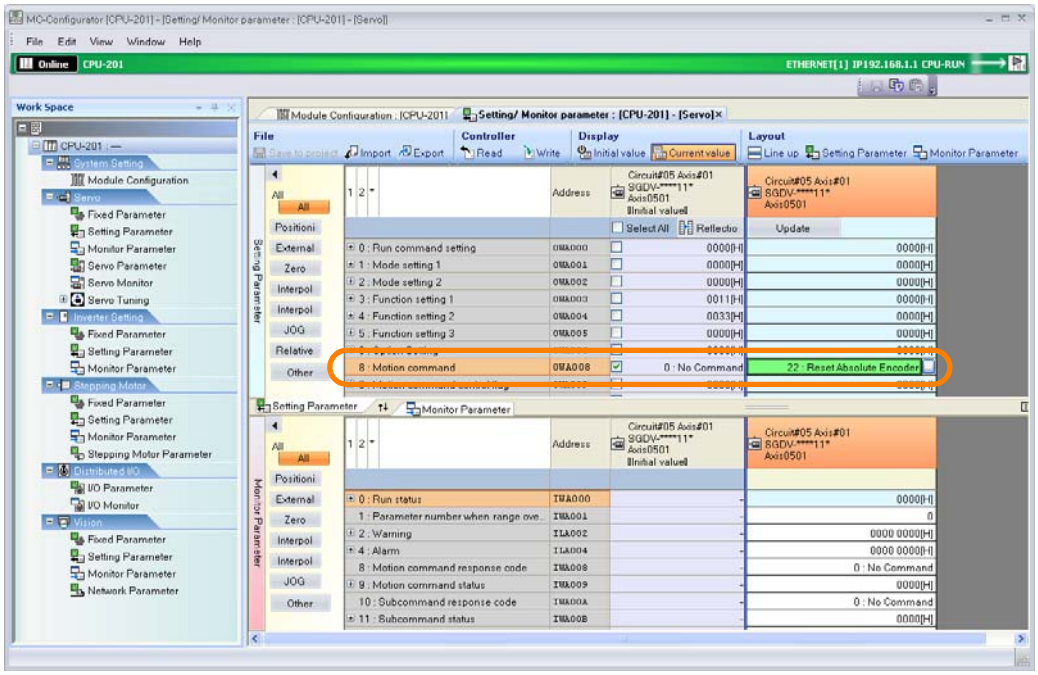
4. Click the **OK** Button.



The setting parameters for the selected axes will be displayed.

5. Set the following setting parameter to the value that is given below.

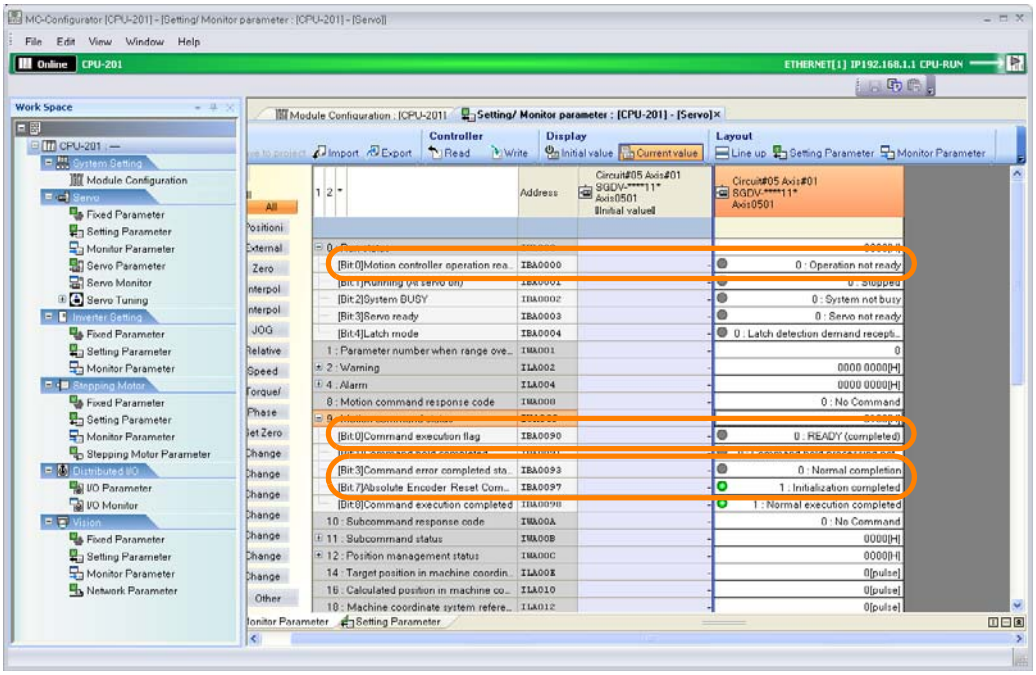
Register Address	Parameter Name	Setting
OW□□□08	Motion command	22 (Reset Absolute Encoder)



The absolute encoder will be initialized.

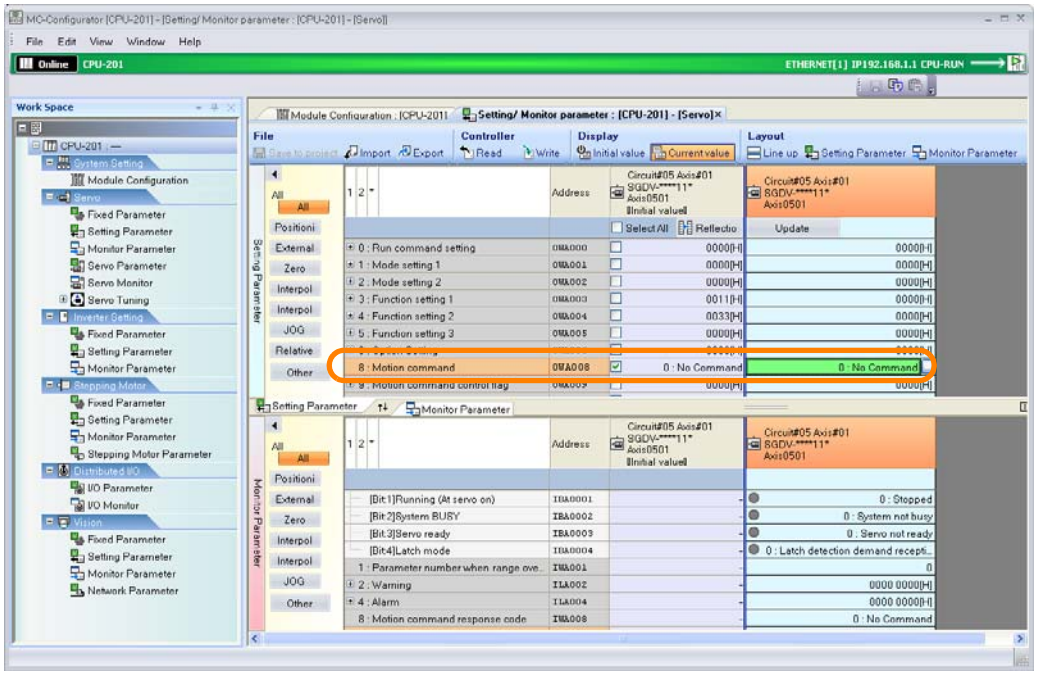
6. Check that the following motion monitor parameters are set as given below.

- IW□□□00 bit 0 (Motion controller operation ready) is 0 (Operation not ready).
- IW□□□09 bit 0 (Command execution flag) is 0 (READY (completed)).
- IW□□□09 bit 3 (Command error completed status) is 0 (Normal completion).
- IW□□□09 bit 7 (Absolute Encoder Reset Completed) is 1 (Initialization completed).



7. Set the following setting parameter to the value that is given below.

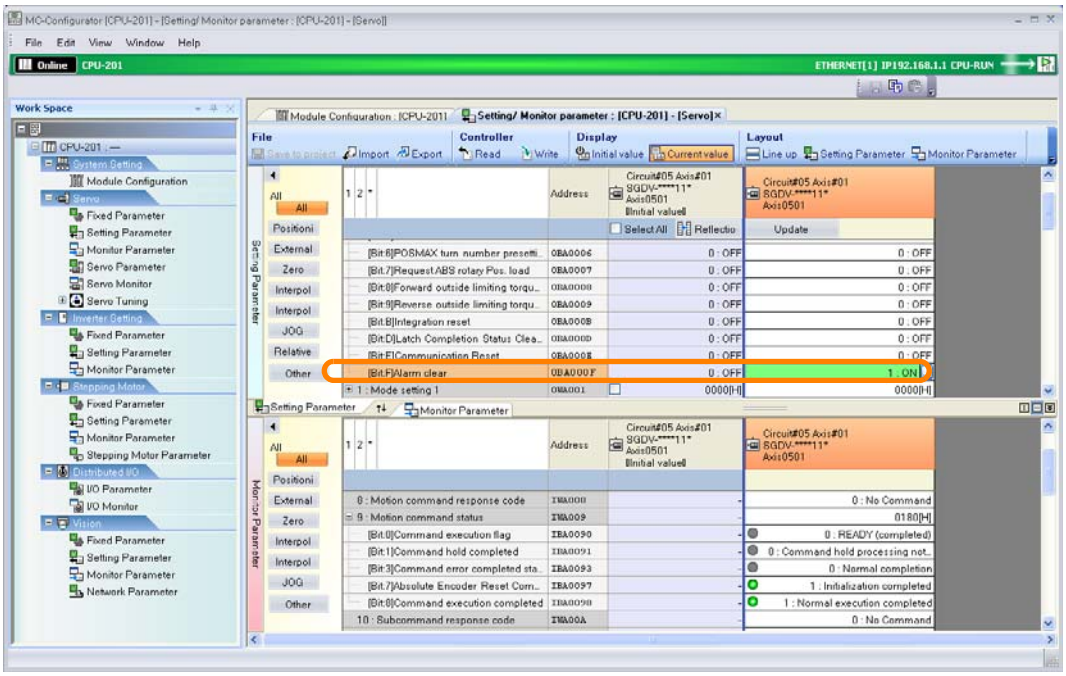
Register Address	Parameter Name	Setting
OW□□□08	Motion command	0 (No Command)



This concludes the initialization of the absolute encoder.

8. Set the following setting parameter to the value that is given below.

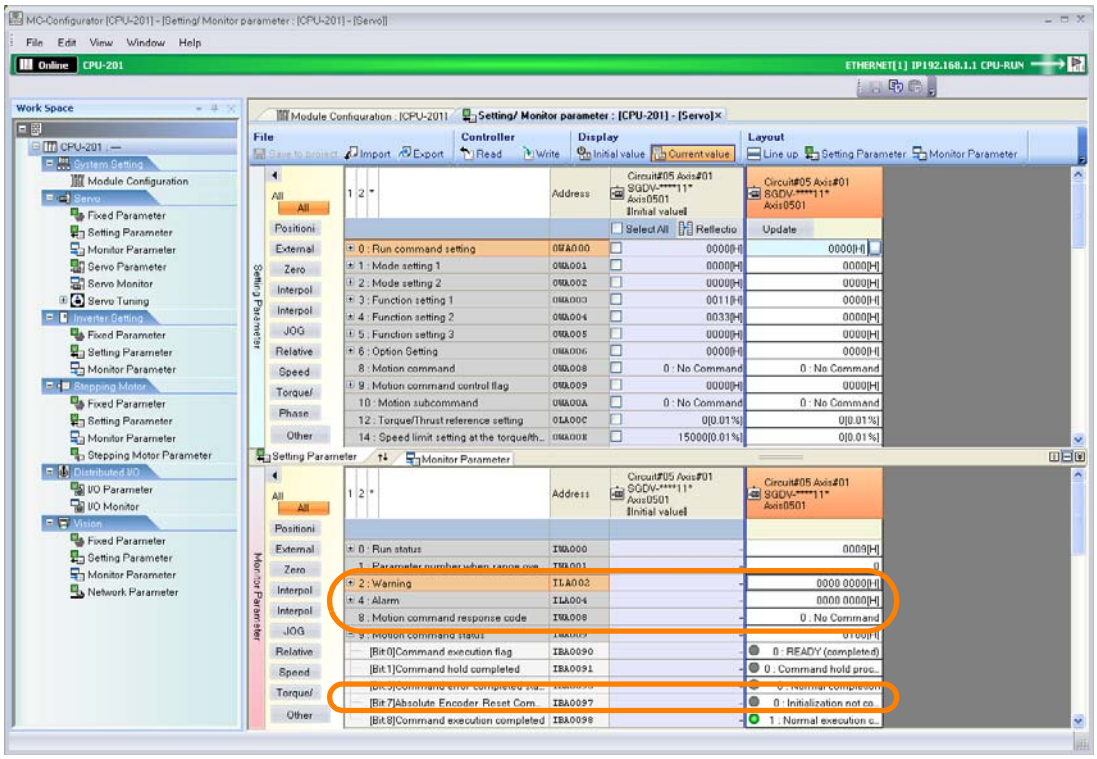
Register Address	Parameter Name	Setting
OW□□□00 BitF	Alarm clear	1: ON



Any alarms that occurred while initializing the absolute encoder will be reset.

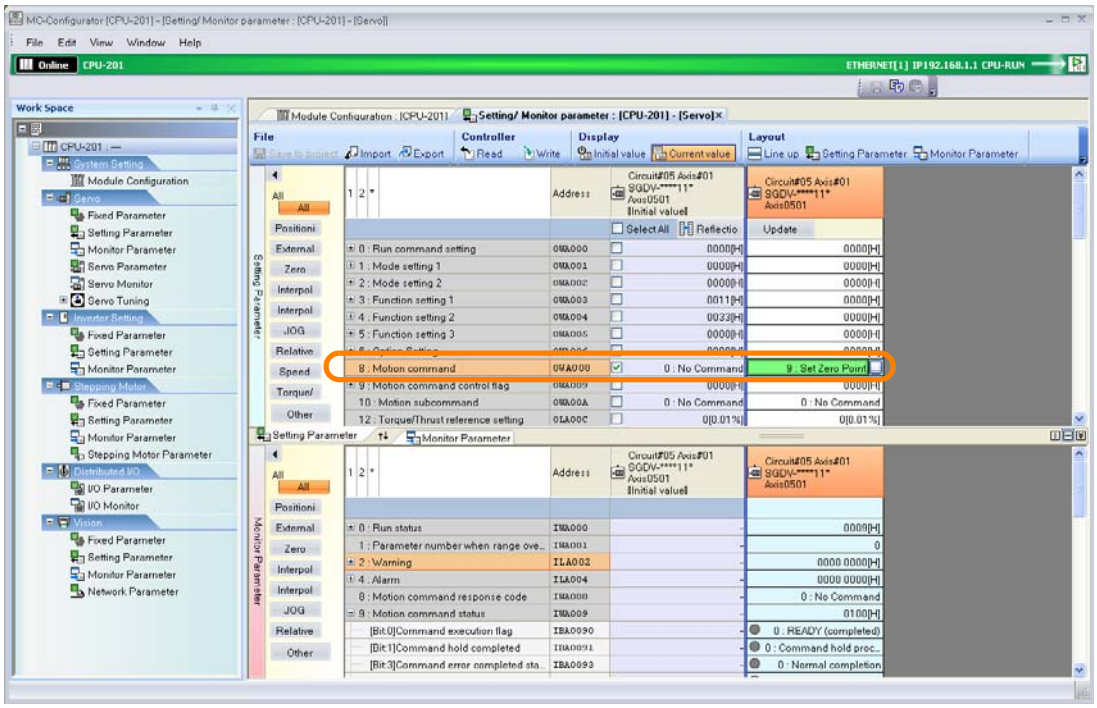
9. Check that the following motion monitor parameter is set as given below.

- IL□□□02 (Warning) is 0.
- IL□□□04 (Alarm) is 0.
- IW□□□08 (Motion command response code) is 0 (No Command).
- IW□□□09 bit 7 (Absolute Encoder Reset Completed) is 0 (Initialization not completed).



10. Set the following setting parameter to the value that is given below.

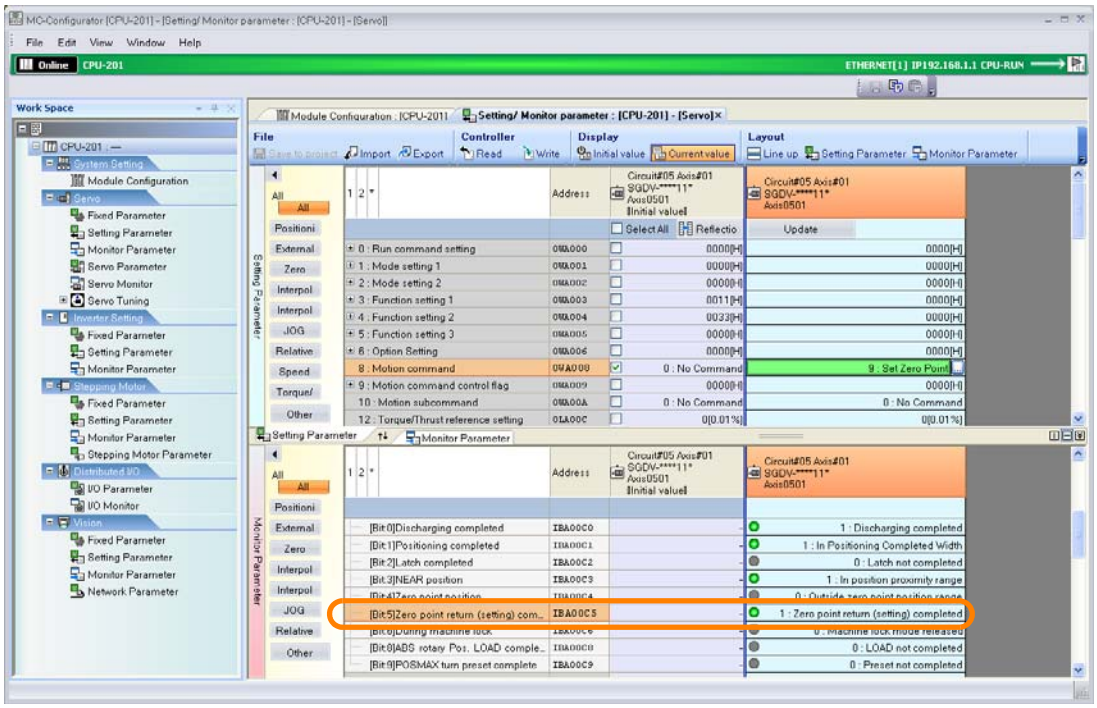
Register Address	Parameter Name	Setting
OW□□□08	Motion command	9 (Set Zero Point)



The zero point will be set.

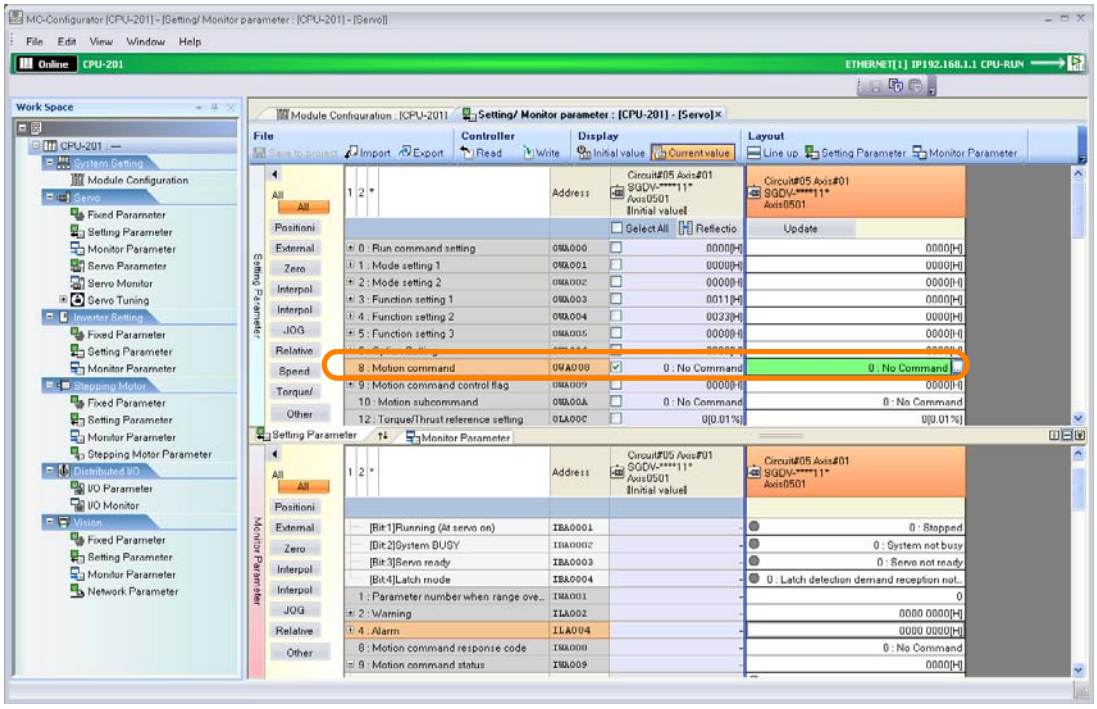
11. Check that the following motion monitor parameter is set as given below.

- IW□□□0C bit 5 (Zero point return (setting) completed) is 1 (Zero point return completed).



12. Set the following setting parameter to the value that is given below.

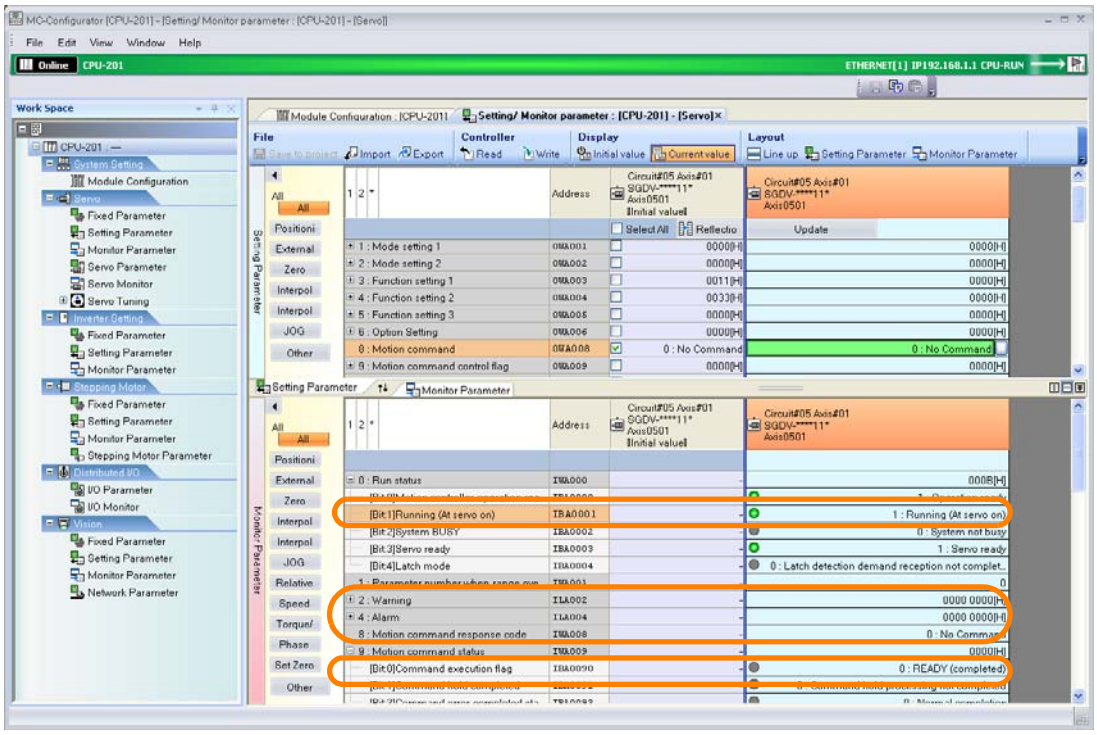
Register Address	Parameter Name	Setting
OW□□□08	Motion command	0 (No Command)



This concludes the zero point setting.

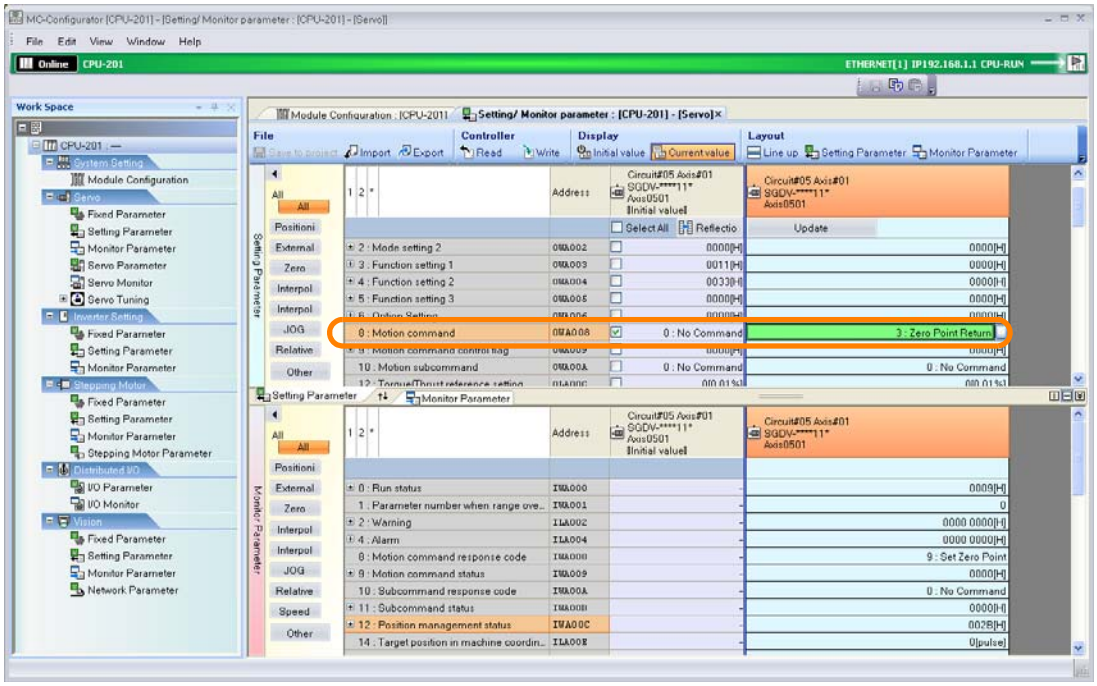
13. Check that the following motion monitor parameters are set as given below.

- IW□□□00 bit 1 (Running (At Servo ON) is 1 (Running (At Servo ON).
- IL□□□02 (Warning) is 0.
- IL□□□04 (Alarm) is 0.
- IW□□□08 (Motion command response code) is 0 (No Command).
- IW□□□09 bit 0 (Command Execution Flag) is 0 (READY (completed)).



14. Set the following setting parameter to the value that is given below.

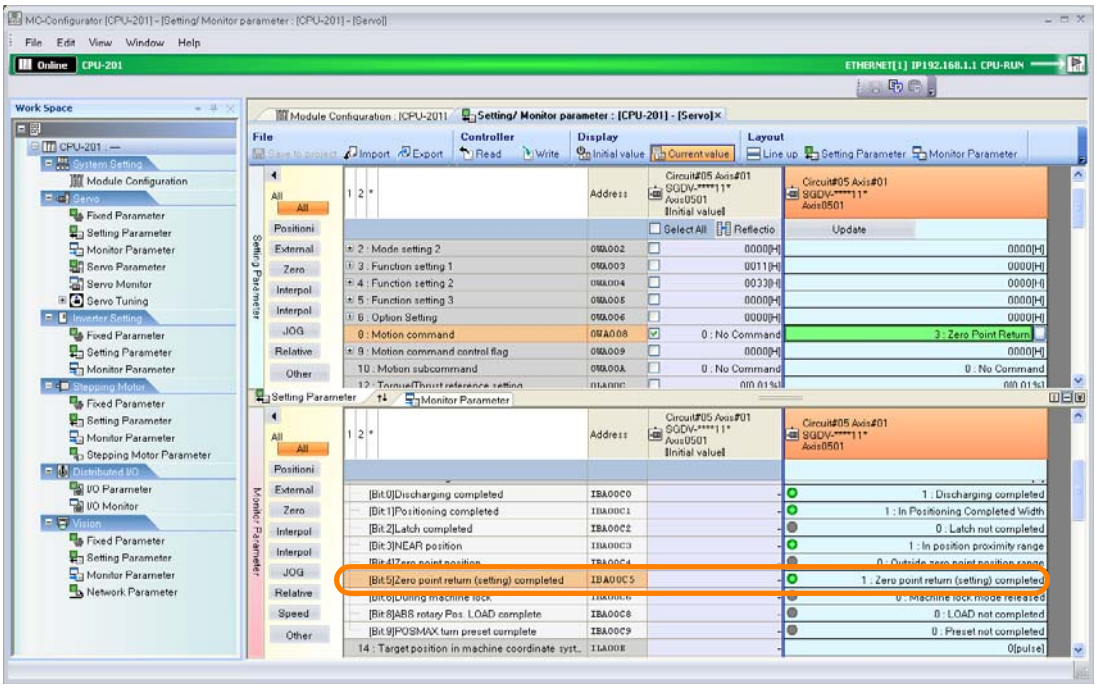
Register Address	Parameter Name	Setting
OW□□□08	Motion command	3 (Zero Point Return)



A zero point return will be executed.

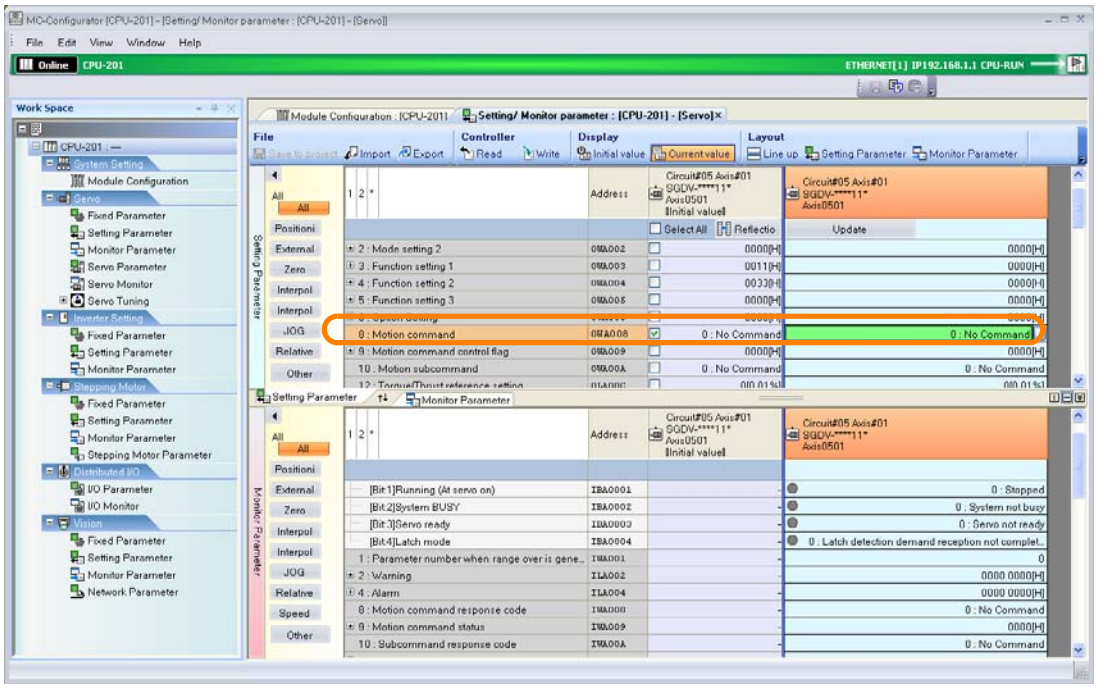
15. Check that the following motion monitor parameter is set as given below.

- IW□□□0C bit 5 (Zero point return (setting) completed) is 1 (Zero point return completed).



16. Set the following setting parameter to the value that is given below.

Register Address	Parameter Name	Setting
OW□□□08	Motion command	0 (No Command)



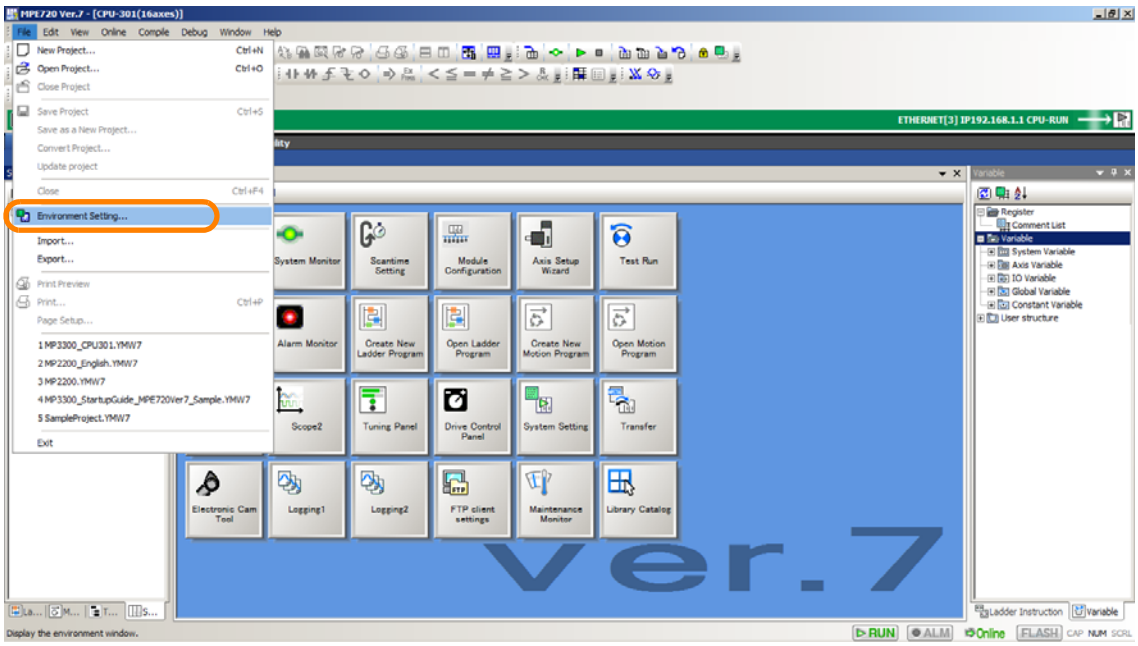
This concludes the zero point return.

This concludes the procedure.

14.7 How to Improve Operation Performance when Robot Control Instructions Are Not Used

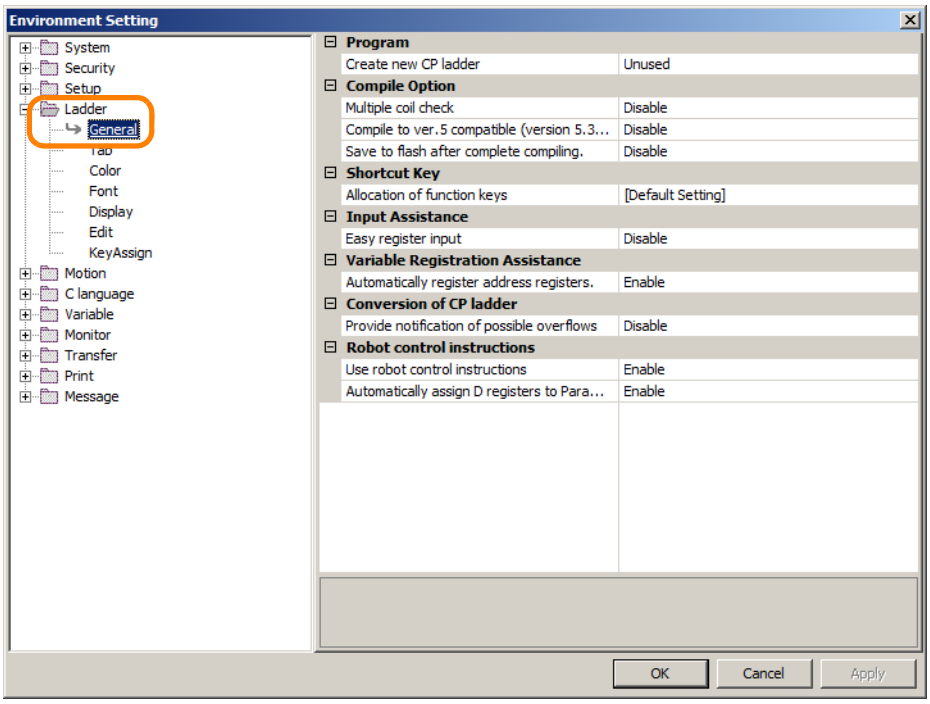
When robot control instruction (MLx functions) are not used in the ladder program, the MPE720 operation performance can be improved by changing the environment setting. The following shows the setting procedure.

1. Select **File** – **Environment Setting** from the menu bar.

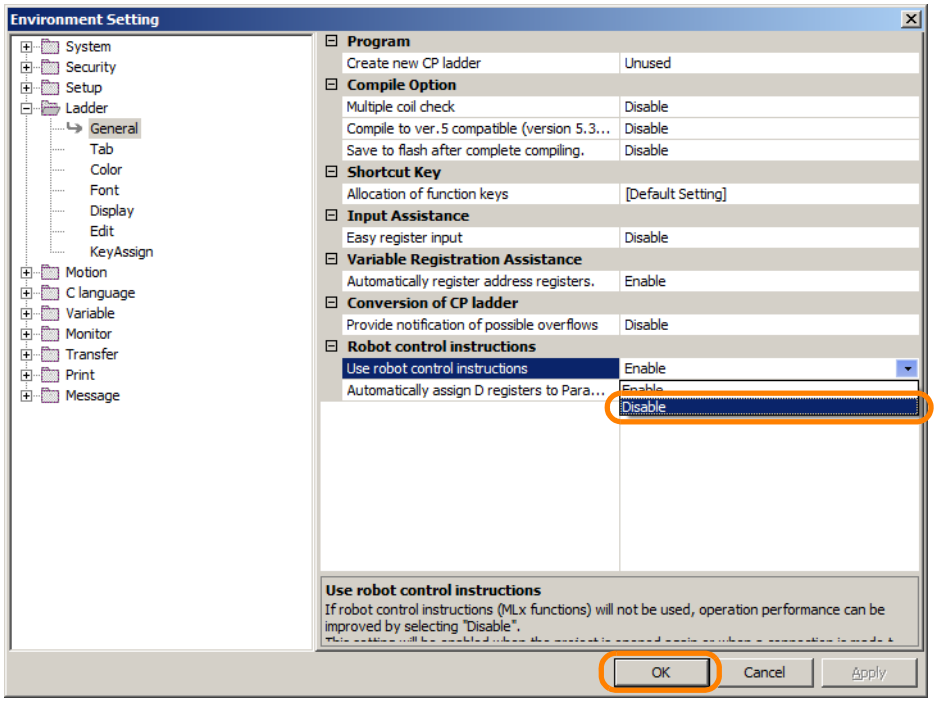


The **Environment Setting** Dialog Box will be displayed.

2. Select **Ladder - General**.



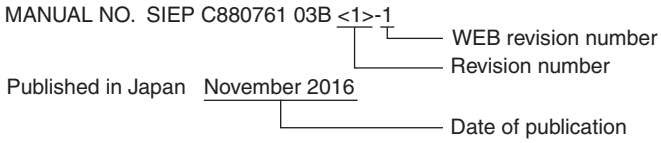
3. Select **Use robot control instructions** - **Disable**, and click **OK**.



This concludes the procedure.

Revision History

The revision dates and numbers of the revised manuals are given on the bottom of the back cover.



Data of Publication	Rev. No.	WEB Rev. No.	Section	Revised Contents
December 2019	<4>	0	4.4, 5.3.10, 7.6, 12.7	Partly revised.
			4.8, 4.9, 4.13, 5.2.8, 5.3.12, 6.9.5, 14.7, Index	Newly added.
June 2019	<3>	0	All chapters	Partly revised.
			Chapter 9	Completely revised.
			Chapters 10 and 13	Newly added.
			Back cover	Revision: Address
June 2017	<2>	0	All chapters	Partly revised.
			5.1.5, 5.1.8, 5.1.11, 5.1.13, 5.1.19, 6.8.4, 12.6	Newly added.
			2.1, Chapter 7	Revision: Information related to operating procedures on SigmaWin+
			Back cover	Revision: Address
November 2016	<1>	1	12.2.1	Revision: Style of Arithmetic Expression Example in Example of Type Casting a Numeric Operation Result
April 2016		0	Front cover	Revision: Format
			Preface	Partly revised.
			Chapter 1	Revision: Illustrations of MPE720 windows and dialog boxes Addition: Information related to the sub-CPU Revision: Chapter structure
			Chapter 2	Revision: Chapter structure
			2.6.4, 2.6.5	Addition: Procedure to save allocation information
			2.7	Newly added.
			Chapter 3	Addition: Descriptions of new icons, new panes, and new buttons
			3.8	Newly added.
			4.5	Addition: Information on saving data to flash memory
			4.10, 5.1.8, 5.2.6, 5.3.1 to 5.3.4, 5.3.8, 6.6, 6.8.3, 6.9, 7.5.2, 7.6.1, 8.3.3, 9.3, 11.1, 11.3.1, 11.3.2, 11.9, 11.10, 12.4, 12.5	Newly added.
			6.5	Addition: Read/write search method
			6.11, 10.3.1	Addition: Descriptions for selection of multiple drawings
			7.6.2	Addition: Method to write parameters to Machine Controller
			8.5	Addition: Information related to an FTP server
			8.6	Addition: Information on transferring local register comments
			9.1	Addition: Restrictions to Trace Manager functions
			Back cover	Revision: Address, format
September 2012	–	–	–	First edition

Machine Controller MP2000/MP3000 Series

Engineering Tool

MPE720 Version 7

USER'S MANUAL

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MANUAL NO. SIEP C880761 03E <4>-0

Published in Japan December 2019
19-10-16
Original instructions