YASKAWA

Machine Controller MP2000/MP3000 Series

Engineering Tool

MPE720 Version 7

USER'S MANUAL

Model: CPMC-MPE780

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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:

- MP2000 Series: A Machine Controller in the MP2000 Series.
- MP3000 Series: A Machine Controller in the MP3000 Series.
- MPE720: The MPE720 version 7 Engineering Tool, or a personal computer running the Engineering Tool.
- PLC: A Programmable Logic Controller.
- 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.
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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.

Indicates items for which caution is required or precautions to prevent operating mistakes.

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 MP2000/MP3000 Series Machine Controller System Setup Manual	SIEP C880725 00	Describes the functions of the MP2000/MP3000-series Machine Controllers and the procedures that are required to use the Machine Controllers, from installation and connections to settings, programming, trial operation, and debugging.
	Machine Controller MP3000 Series Troubleshooting and Maintenance Manual	SIEP C880725 01	Describes troubleshooting an MP3000-series Machine Controller.
	Machine Controller MP3000 Series Basic Units User's Manual	SIEP C880725 10	Describes the specifications and system configuration of the Basic Units in an MP3000-series 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 MP2000-series Motion Modules (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 Controllers.
	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.
	Machine Controller MP2000/MP3000 Series 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 CD-ROMs 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

The following signal words and marks are used to indicate safety precautions in this manual.

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, could possibly result in loss of life or serious injury.
⚠ CAUTION	Indicates precautions that, if not heeded, could result in relatively serious or minor injury, or property damage. If not heeded, even precautions classified as cautions (⚠ CAUTION) can lead to serious results depending on circumstances.
PROHIBITED	Indicates prohibited actions. For example, indicates prohibition of open flame.
MANDATORY	Indicates mandatory actions. For example, indicates that grounding is required.

The following precautions are for storage, transportation, installation, wiring, operation, maintenance, inspection, and disposal. These precautions are important and must be observed.

◆ General Precautions

⚠ DANGER

- 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 touch anything inside the Machine Controller.
  There is a risk of electrical shock.
- Always keep the front cover attached when power is being supplied.
  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, an accident, 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 product, or burning.
- Do not attempt to modify the Machine Controller in any way.
  There is a risk of injury or device damage.
- 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.
- Allow only specified personnel to perform installation.
  There is a risk of electrical shock or injury if the installation is not suitable.

◆ Storage and Transportation

⚠ CAUTION

- Do not install or store the Machine Controller in any of the following locations.
  There is a risk of fire, electrical shock, or device damage if the installation or storage location is not suitable.
  - Locations that are subject to direct sunlight
  - Locations that are subject to ambient temperatures that exceed the storage or operating conditions
  - Locations that are subject to ambient humidity exceeding the storage or 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
- 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 halogens (fluorine, chlorine, bromine, or iodine) during transportation or installation.
  There is a risk of device damage or an accident.
- 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 a halogen, which include chlorine, fluorine, bromine, or iodine, can contribute to the erosion of the capacitors.

◆ Installation

⚠ CAUTION

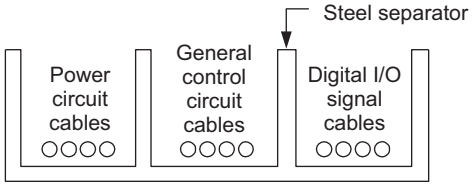
- Never use the Machine Controller in locations subject to water, corrosive atmospheres, or flammable gas, or near combustible objects.
  There is a risk of electrical shock or fire.
- Do not step on the Machine Controller or place heavy objects on the Machine Controller.
  There is a risk of injury 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 element deterioration inside, an accident, or fire.
- Always mount the Machine Controller in the specified orientation.
  There is a risk of an accident.
- Provide the specified space between the Machine Controller and control panel and other devices.
  There is a risk of fire or an accident.
- Do not subject the Machine Controller to strong shock.
  There is a risk of an accident.

◆ Wiring

⚠ CAUTION

- Check the wiring to be sure it has been performed correctly.
  There is a risk of motor run-away, injury, or an accident.
- Always use a power supply of the specified voltage.
  There is a risk of fire or an accident.
- In places with poor power supply conditions, take all steps necessary to 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.
  There is a risk of device damage.
  - 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
- Configure the circuits to turn ON the power supply to the CPU Unit before the 24-V I/O power supply.
  If the power supply to the CPU Unit is turned ON after the external power supply, e.g., the 24-V I/O power supply, the outputs from the CPU Unit may momentarily turn ON when the power supply to the CPU Unit turns ON.
- 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.
- Before connecting the Battery, confirm that the polarity is correct.
  There is a risk of battery damage or explosion.
- Only qualified safety-trained personnel must be allowed to replace the Battery.
  If the Battery is replaced incorrectly, electrical shock may result. Also, machine malfunction may occur, possibly resulting in injury or machine damage.
- Do not touch the electrodes when replacing the Battery.
  Static electricity may damage the electrodes.
- Consider the following items when selecting the external I/O signal lines to connect the Machine Controller to external devices.
  - Mechanical strength
  - Noise interference
  - Wiring distance
  - Signal voltage, etc.
- Separate the I/O signal lines from the power lines both inside and outside the control box to reduce the influence of noise from the power lines.
  If the I/O signal lines and power lines are not separated properly, malfunction may occur.

Example of Separated External Cables



◆ Operation

⚠ CAUTION

- Perform operation and trial operation according to the procedures and instructions in the user's manual for the Machine Controller.
  Operating mistakes while the Servomotor and machine are connected may damage the machine or even cause accidents resulting in injury or death.
- Implement monitoring, interlocks, 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 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 self-diagnosis of the Machine Controller.

  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 for finite length axes
  - Parameters for simple absolute infinite length position control for an infinite length axis

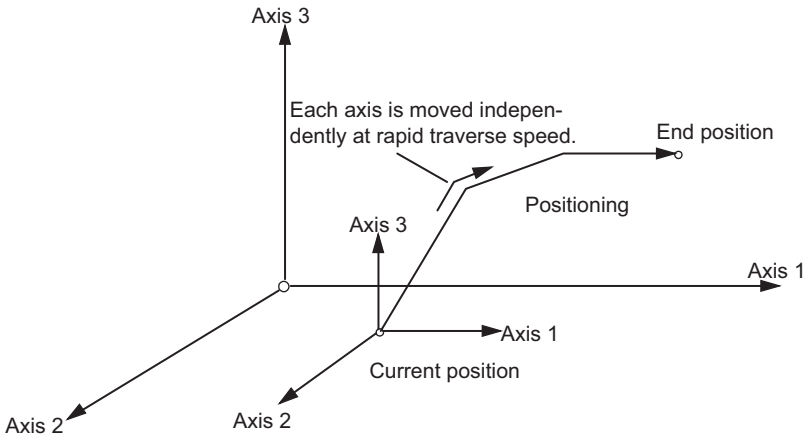
  🕮 *MP3000 Series Motion Control User's Manual* (Manual No.: SIEP C880725 11)

  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 for 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.

⚠ CAUTION

- When programming the following axis movement instructions, check the path to make sure that there are no tools or other obstacles in the way of the workpiece.
  The following axis movement instructions must be checked.
  - 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



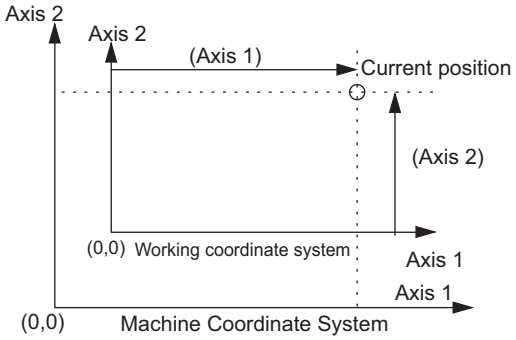
Example of Basic Path for Positioning (MOV) Instruction

Failure to perform the above checks may result in damage to equipment, serious personal injury, or even death.

⚠ CAUTION

- The same coordinate word will create a completely different travel operation in Absolute Mode and in Incremental Mode. Before starting operation, make sure that the ABS and INC instructions are used correctly.
  Failure to perform this check may result in damage to equipment, serious personal injury, or even death.
- The travel path for the Positioning (MOV) instruction will not necessarily be a straight line like the one that occurs for linear interpolation. When programming, check the path to make sure that there are no tools or other obstacles in the way of the workpiece.
  Failure to perform this check may result in damage to equipment, serious personal injury, or even death.
- The Linear Interpolation (MVS) instruction can be executed for either linear or rotary axes. However, if a rotary axis is included, the linear interpolation path will not necessarily be a straight line. When programming, check the path to make sure that there are no tools or other obstacles in the way of the workpiece.
  Failure to perform this check may result in damage to equipment, serious personal injury, or even death.
- The linear interpolation axis for a Helical Interpolation (MCW or MCC) instruction can be either a linear or rotary axis. However, depending on how the linear axis is taken, the path of helical interpolation will not be a helix. When programming, check the path to make sure that there are no tools or other obstacles in the way of the workpiece.
  Failure to perform this check may result in damage to equipment, serious personal injury, or even death.
- The Set Current Position (POS) Instruction creates a new working coordinate system. Therefore, if the POS instruction is executed incorrectly, the subsequent travel operations will be different from those that are expected. Before starting operation, make sure that the correct working coordinate system has been created.
  Failure to perform this check may result in damage to equipment, serious personal injury, or even death.
- The Move on Machine Coordinates (MVM) instruction temporarily performs positioning to a coordinate position on the machine coordinate system. Therefore, if the instruction is executed when the zero point of the machine coordinate system cannot be confirmed, unexpected operation may occur. Before starting operation, make sure that the correct positions on the machine coordinate system are specified.
  Failure to perform this check may result in damage to equipment, serious personal injury, or even death.
- If the following coordinate instructions are specified incorrectly, the subsequent travel operations will be different from those that are expected. Before starting operation, make sure that the settings for the following instructions are correct.
  The following coordinate movement instructions must be checked:
  - Absolute Mode (ABS)
  - Incremental Mode (INC)
  - Current Position Set (POS)

Example



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

Failure to perform the above checks may result in damage to equipment, serious personal injury, or even death.

◆ Maintenance and Inspection

⚠ CAUTION
• Do not attempt to modify or disassemble the Machine Controller. There is a risk of electrical shock, injury, or machine damage. • Do not change wiring while power is being supplied. There is a risk of electrical shock, injury, or machine damage. • After you replace the CPU Unit, restart operation only after you transfer the programs and parameters from the old CPU Unit to the new CPU Unit. If you operate the CPU Unit without transferring this data, unexpected operation may occur. There is a risk of injury or device damage.

◆ Disposal

⚠ CAUTION
• Dispose of the Machine Controller as general industrial waste. • The Machine Controller contains a lithium battery. When you replace the Battery, separate the used Battery from normal waste and dispose of it according to all local ordinances.

◆ Other General Precautions

Observe the following general precautions to ensure safe application.
• The products shown in 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 drawings 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 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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Flow of Initial Settings

1

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

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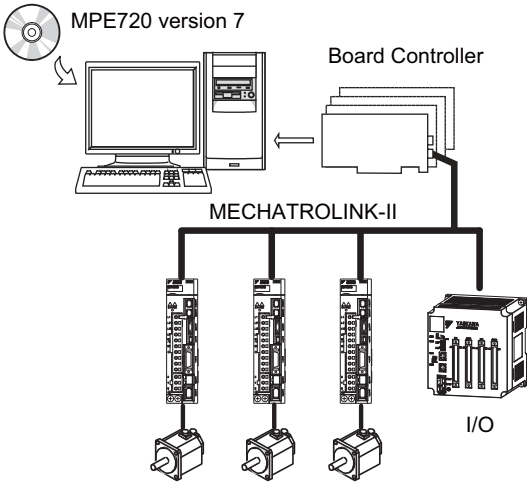
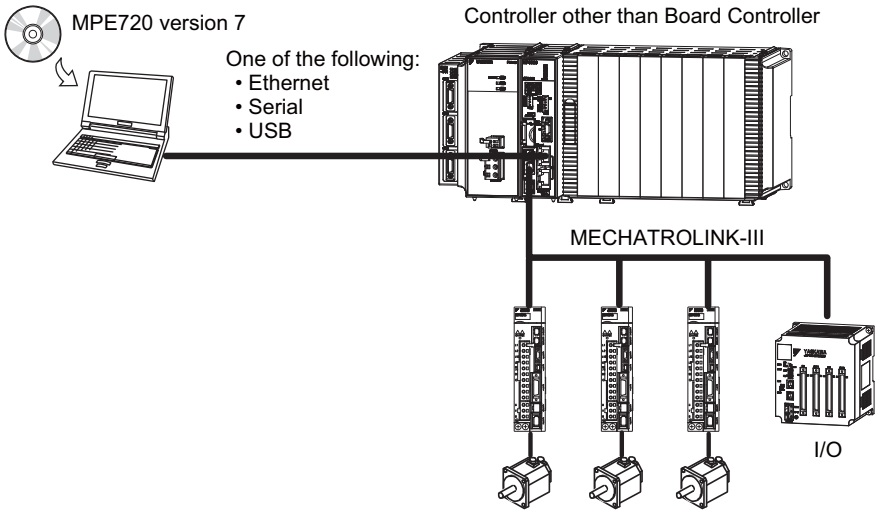
1.1 Introduction

This section describes the various methods that you can use to connect the MPE720 to a Machine Controller, and gives the flow for setting up each connection.

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.

<table>
<tr><th colspan="2">Type of Connection</th><th>Controller Type</th><th>Conceptual Illustration of Connection</th></tr>
<tr><td rowspan="2">Online connections</td><td rowspan="2">Normal connections</td><td>Board Controller</td><td> 
</td></tr>
<tr><td>Not a Board Controller</td><td> 
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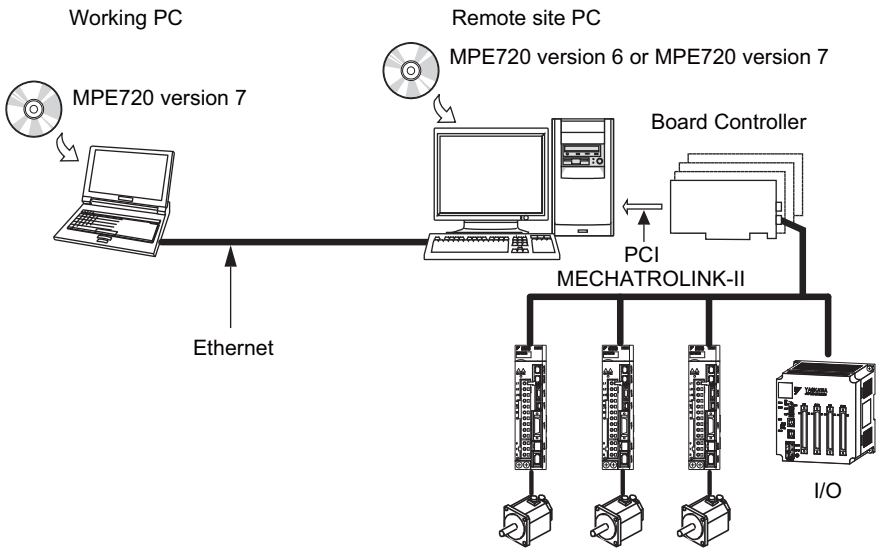
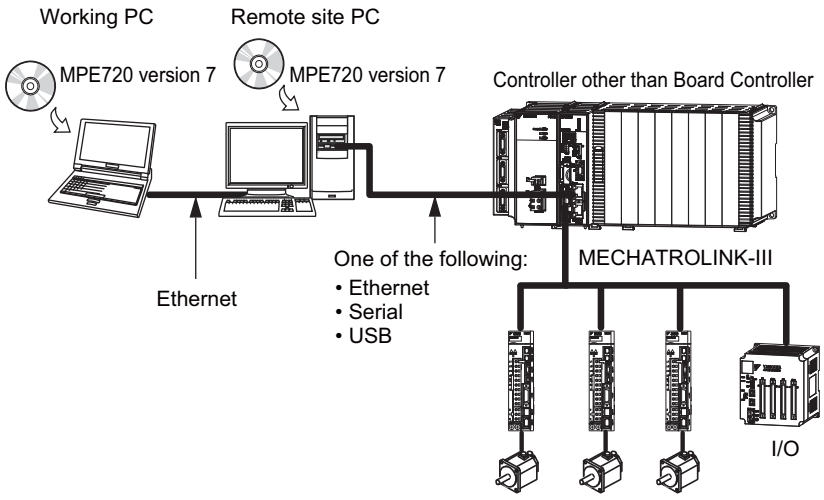
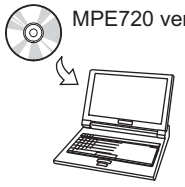
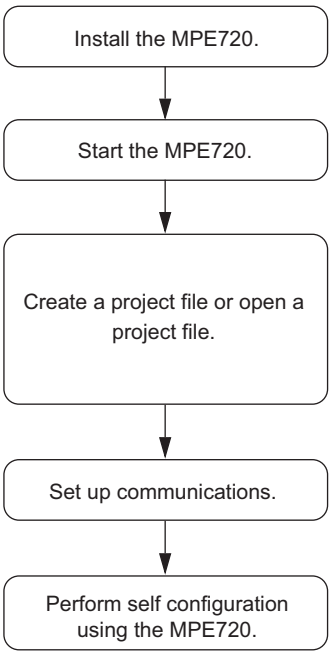
Type of Connection		Controller Type	Conceptual Illustration of Connection
Online connections	Remote connections	Board Controller	
		Not a Board Controller	
Offline operation		–	

Flow of Settings

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

Online Connections

◆ For a Normal Connection to a Board Controller



☞ *Installing the MPE720 on a PC (page 1-7)*

☞ *Starting the MPE720 (page 1-16)*

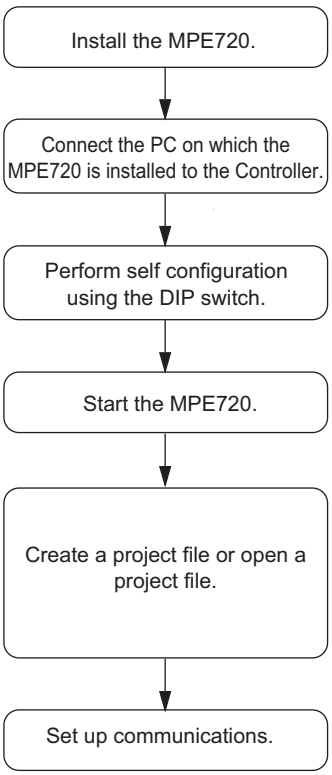
☞ *Creating a Project File (page 1-17)*

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.
☞ *1.3 Editing Data and Storage Location (page 1-52)*

☞ *Setting Up Communications (page 1-21)*

☞ *3.1 Automatically Recognizing Information on Devices Connected to the Controller (page 3-2)*

◆ For a Normal Connection to a Controller That Is Not a Board Controller



☞ *Installing the MPE720 on a PC (page 1-7)*

☞ *Connecting the MPE720 to a Controller (page 1-12)*

☞ *Automatically Recognizing Information on Devices Connected to the Controller (page 1-14)*

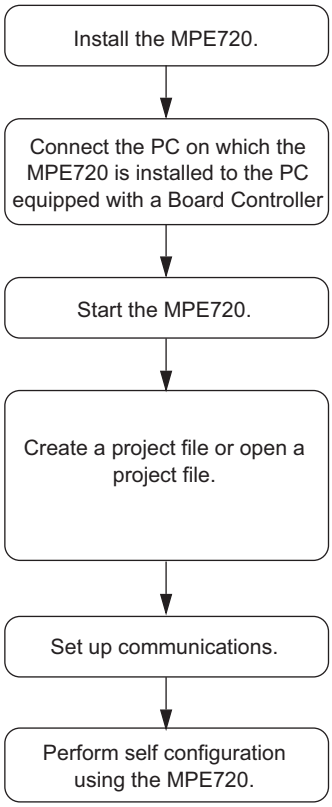
☞ *Starting the MPE720 (page 1-16)*

☞ *Creating a Project File (page 1-17)*

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.
☞ *1.3 Editing Data and Storage Location (page 1-52)*

☞ *Setting Up Communications (page 1-21)*

◆ For a Remote Connection to a Board Controller



☞ *Installing the MPE720 on a PC (page 1-7)*

☞ *Connecting the MPE720 to a Controller (page 1-12)*

☞ *Starting the MPE720 (page 1-16)*

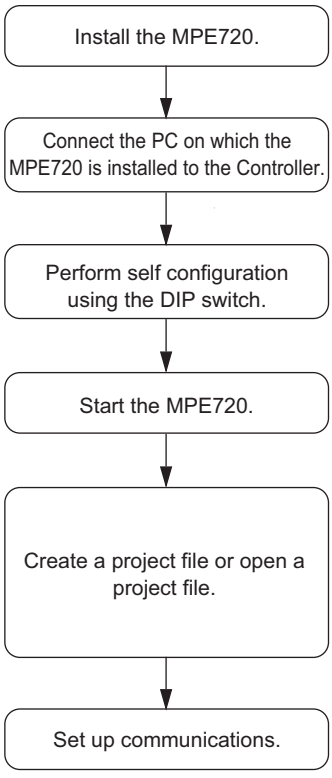
☞ *Creating a Project File (page 1-17)*

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.
☞ *1.3 Editing Data and Storage Location (page 1-52)*

☞ *Setting Up Communications (page 1-21)*

☞ *3.1 Automatically Recognizing Information on Devices Connected to the Controller (page 3-2)*

◆ For a Remote Connection to a Controller That Is Not a Board Controller



☞ *Installing the MPE720 on a PC (page 1-7)*

☞ *Connecting the MPE720 to a Controller (page 1-12)*

☞ *Automatically Recognizing Information on Devices Connected to the Controller (page 1-14)*

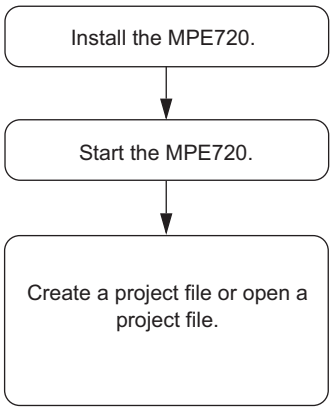
☞ *Starting the MPE720 (page 1-16)*

☞ *Creating a Project File (page 1-17)*

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.
☞ *1.3 Editing Data and Storage Location (page 1-52)*

☞ *Setting Up Communications (page 1-21)*

Offline Operation



☞ *Installing the MPE720 on a PC (page 1-7)*

☞ *Starting the MPE720 (page 1-16)*

☞ *Creating a Project File (page 1-17)*

☞ *3.9 Creating, Editing, and Saving Project Files – Opening an Existing Project File (page 3-32)*

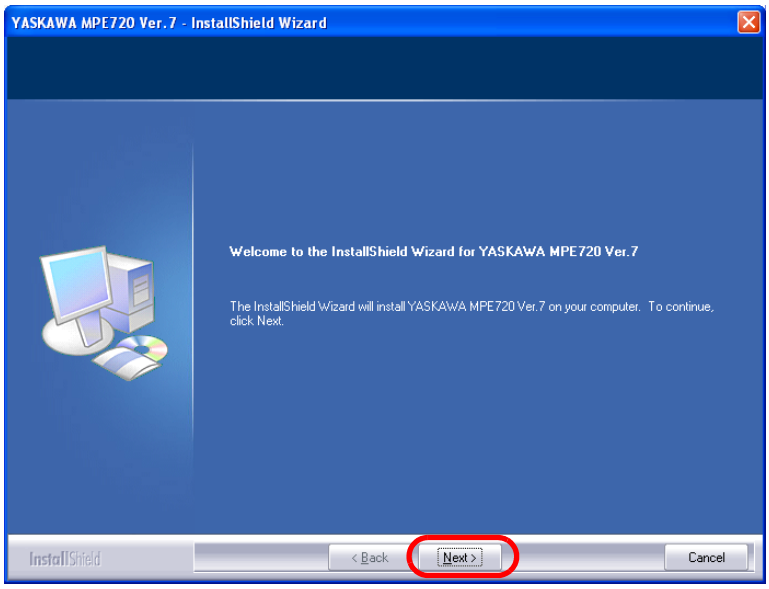
1.2 Detailed Procedures

This section describes the tasks that must be performed before you can use the MPE720.

Installing the MPE720 on a PC

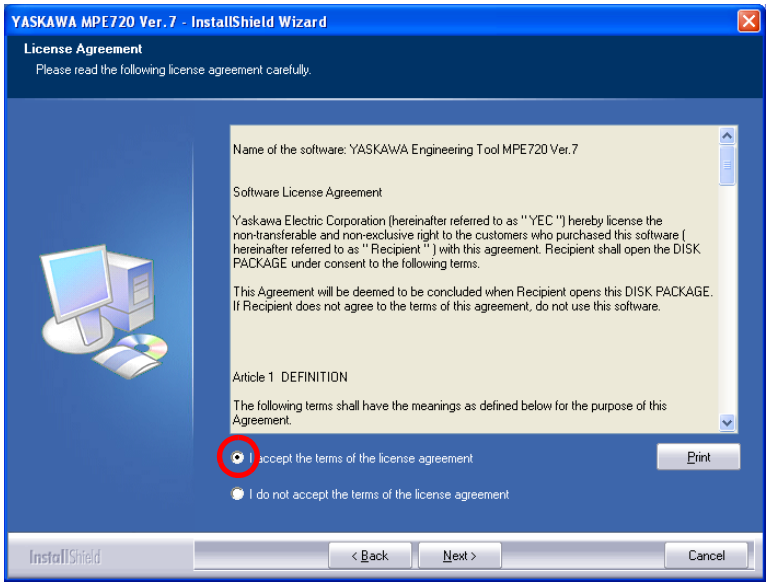
Use the following procedure to install the MPE720 on a PC.

1. Insert the MPE720 installation CD-ROM into the PC.
   The Installer will start automatically.
2. Click the **Install** Button.
   When the application is ready to be installed, the YASKAWA MPE720 Ver.7 - InstallShield Wizard Dialog Box will be displayed.
3. Click the **Next** Button.

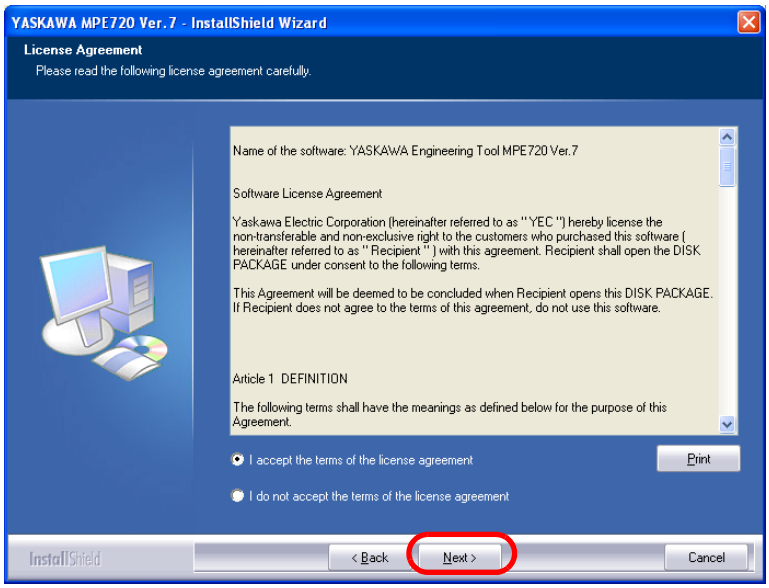


   The License Agreement will be displayed.

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

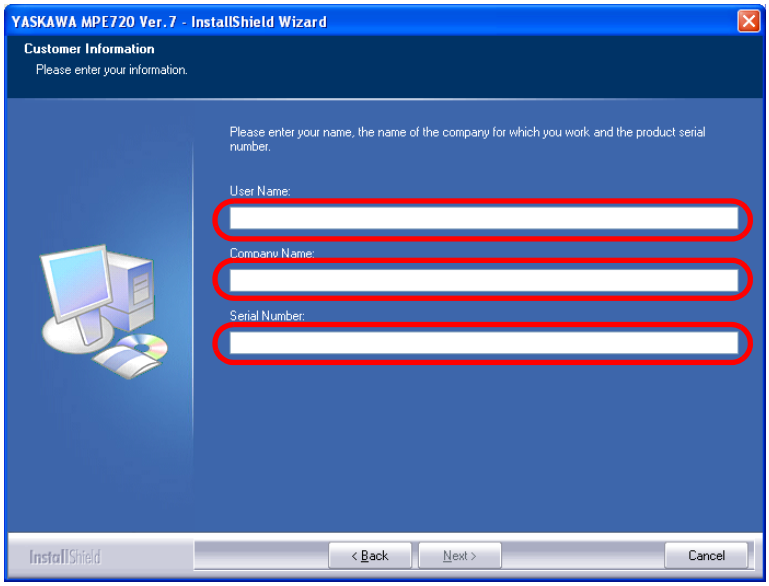


5. Click the **Next** Button.

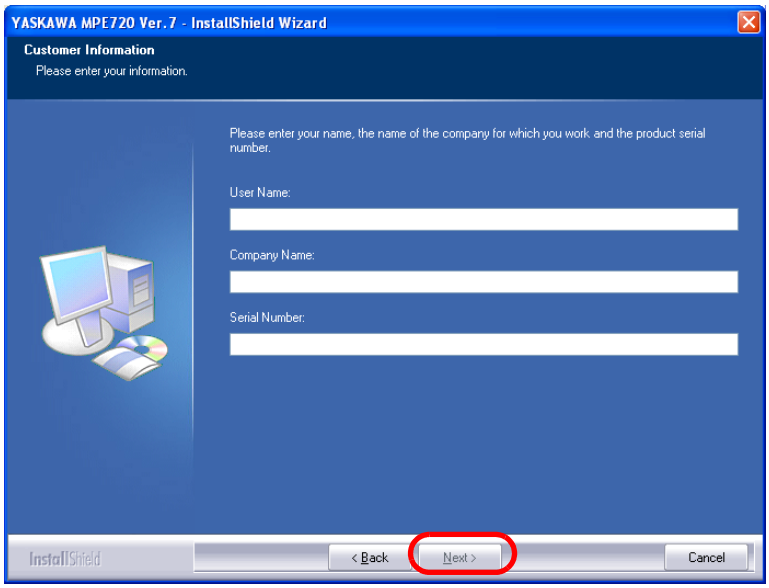


6. Enter the following information.

- User Name
- Company Name
- Serial Number: Enter the number that is printed on the CD-ROM package.

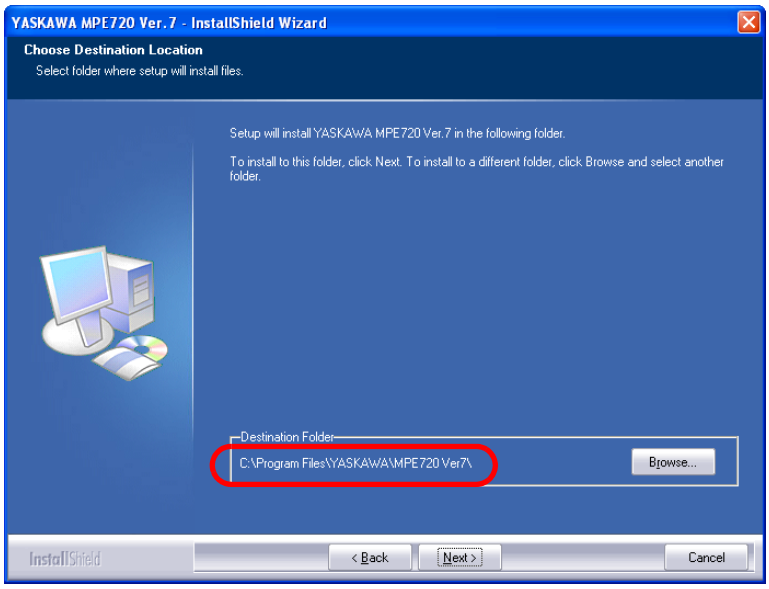


7. Click the **Next** Button.

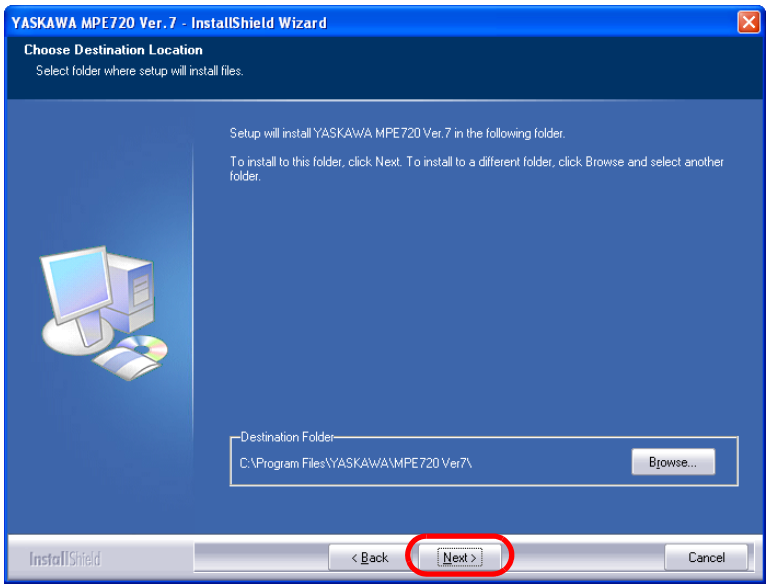


8. Select the destination folder.

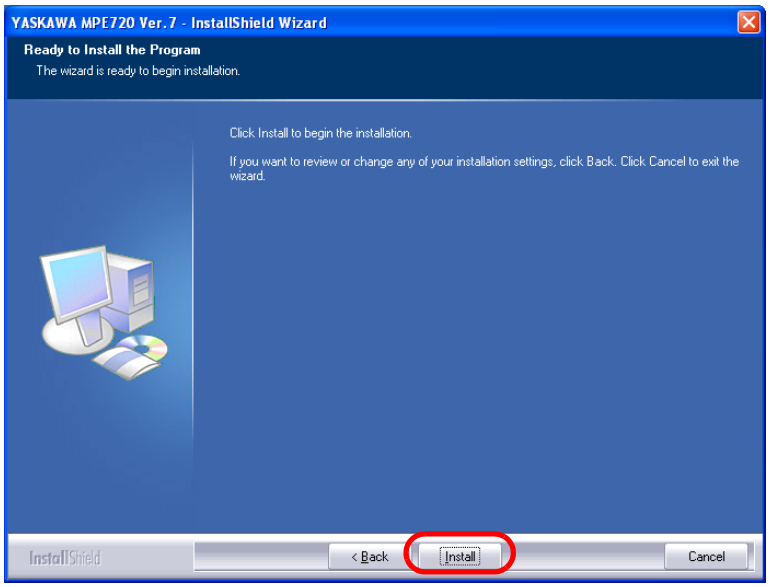
- To install to the folder shown under **Destination Folder**: proceed to step 9.
- To change the destination folder: Click the **Browse** Button and select the desired destination by following the guidance displayed in the dialog box.



9. Click the **Next** Button.

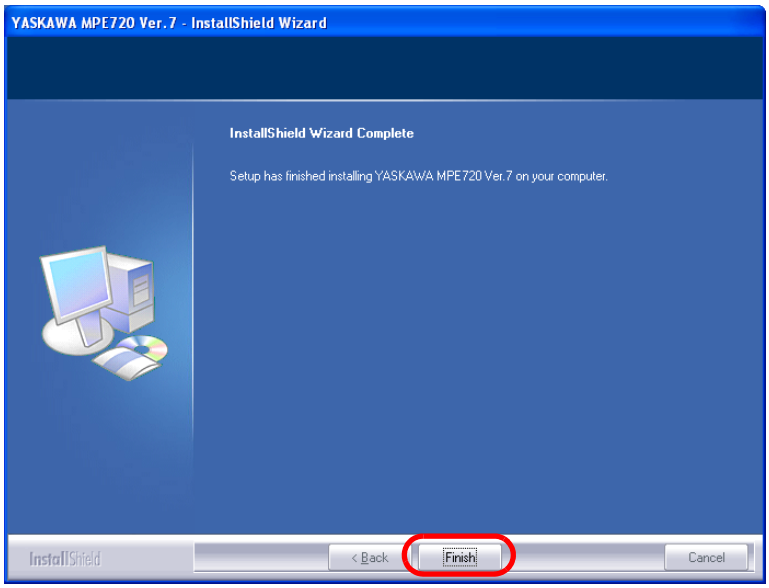


10. Click the **Install** Button.



The installation will begin.

11. Click the **Finish** Button.



This concludes the installation of the MPE720 on the PC.

Connecting the MPE720 to a Controller

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

The connection method depends on the type of connection and the type of Controller (Board Controller or not a Board Controller).

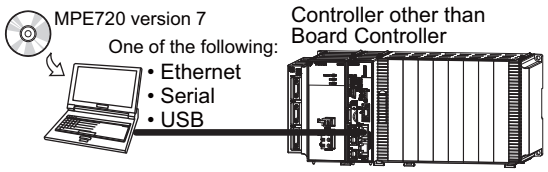
Information

Refer to the following manual for information on connecting the power supply and other devices (such as Servo Drives) to the Controller.

📖 *MP2000/MP3000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880725 00)

Information

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

Type of Connection	Controller Type	Conceptual Illustration of Connection	Cable Specifications
Normal connections	Board Controller	A cable is not required for the connection.	
	Not a Board Controller		■ 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.

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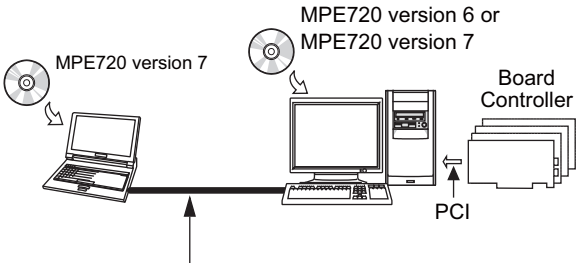
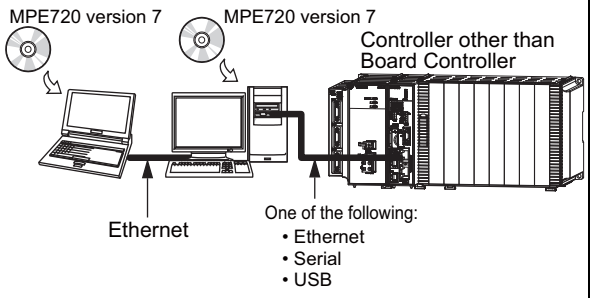
Type of Connection	Controller Type	Conceptual Illustration of Connection	Cable Specifications
Remote connections	Board Controller		■ Ethernet Use a commercially available cable that meets the following conditions: • Ethernet specification: 100Base-TX • Category 5 or higher • Twisted-pair cable with RJ-45 connectors
	Not a Board Controller	 Note: Two cables are required.	■ 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.

Automatically Recognizing Information on Devices Connected to the 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 Controller	*Self Configuration Using the DIP Switch (page 1-14)*
MPE720	*3.1 Automatically Recognizing Information on Devices Connected to the Controller (page 3-2)*

The procedures are given below.

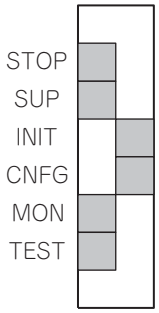
Self Configuration Using the DIP Switch

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

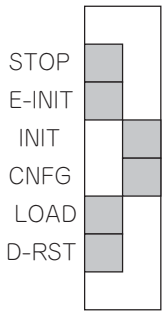
1. Check the following points.
- The power supply to the MP2000/MP3000-series Controller must be OFF.
- The power supply to all components that are not part of the MP2000/MP3000-series Machine Controllers, such as SERVOPACKs, must be ON.

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

MP2000-series Controller



MP3000-series Controller



Information

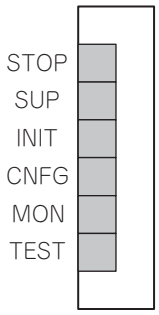
1. INIT Switch
   If the power supply to the Machine Controller is turned ON while the INIT switch is set to ON, all of the following data will be deleted from the Machine Controller.
   - Definition files
   - User programs
   - Registers
2. CNFG Switch
   If the power supply to the Machine Controller is turned ON while the CNFG Switch 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 switch.
   - Registers: Not affected by ON/OFF state of CNFG switch.

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

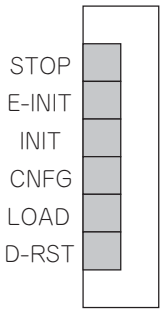
4. Confirm that the indicators on the MP2000/MP3000-series Machine Controller change in the following way:
- RDY: Goes out, and then lights.
- RUN: Goes out, flashes, and then lights.

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

MP2000-series Controller



MP3000-series Controller



This concludes the setup.

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.
📖 *MP2000/MP3000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880725 00)

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 section for details.

☞ *Starting the MPE720 (page 1-16)*

☞ *Setting Up Communications (page 1-21)*

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

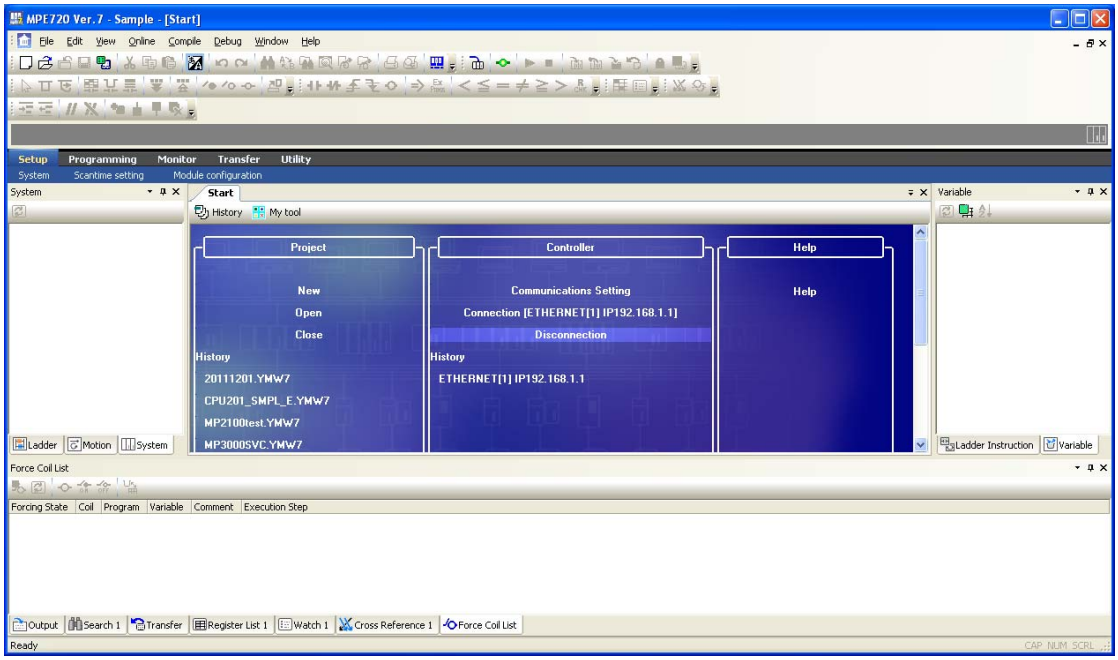
☞ *3.1 Automatically Recognizing Information on Devices Connected to the Controller (page 3-2)*

Starting the MPE720

Start the MPE720 with one of the following methods.

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

When the application starts, the following window will appear.



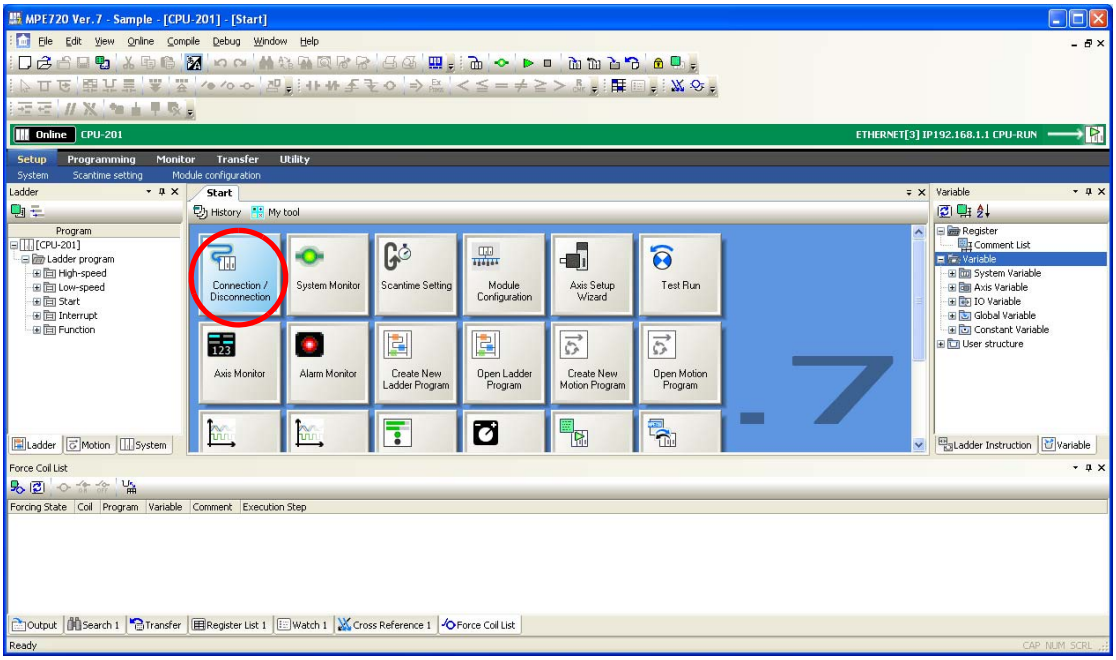
This concludes the procedure.

Creating a Project File

Use the following procedure to create a project file.

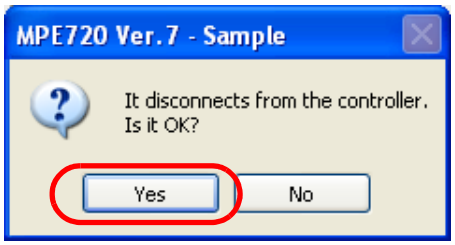
Information Project files are created when the MPE720 is offline.

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



The MPE720 Ver. 7 Dialog Box will be displayed.

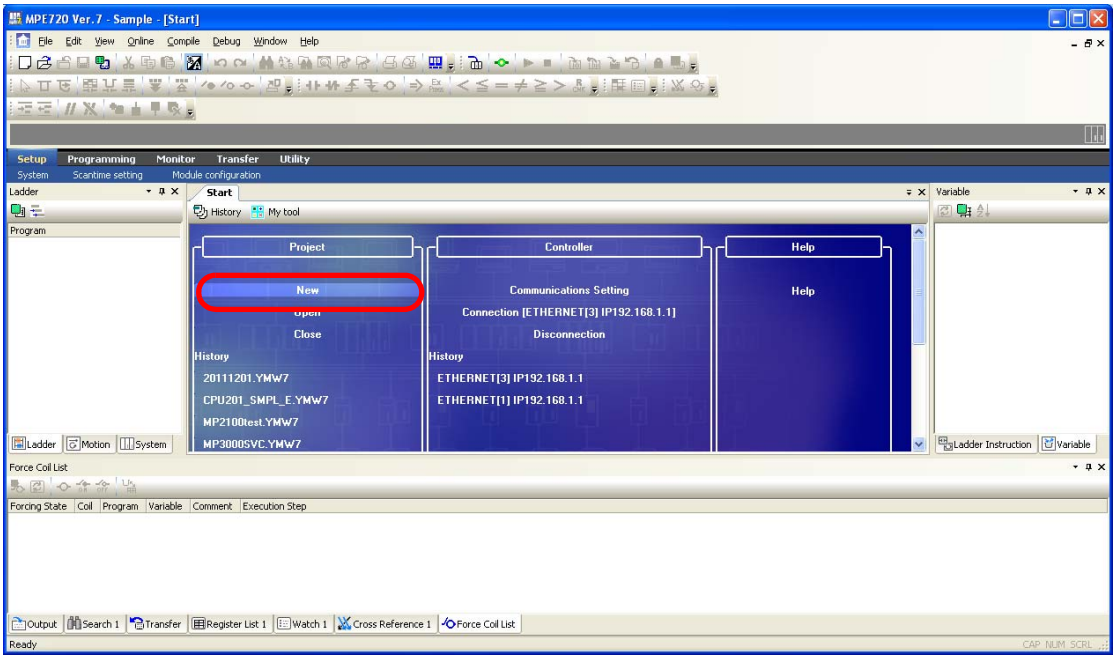
2. Click the **Yes** Button.



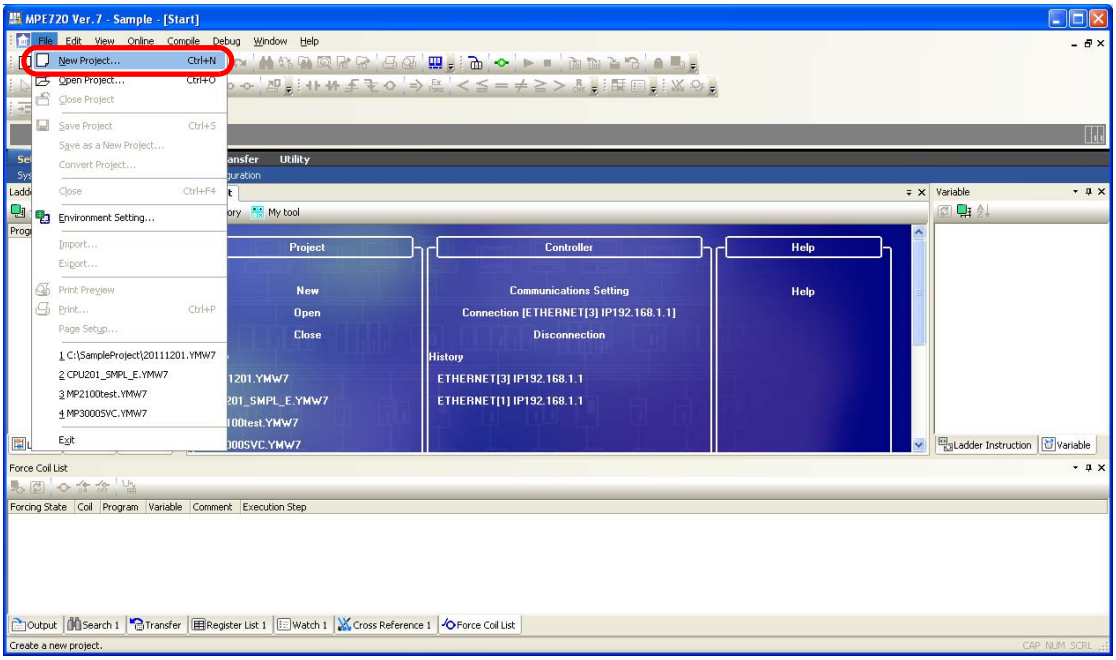
Communications between the MPE720 and the Machine Controller will be disconnected, and the History Pane will be displayed.

3. Create a project file with either of the following three 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.

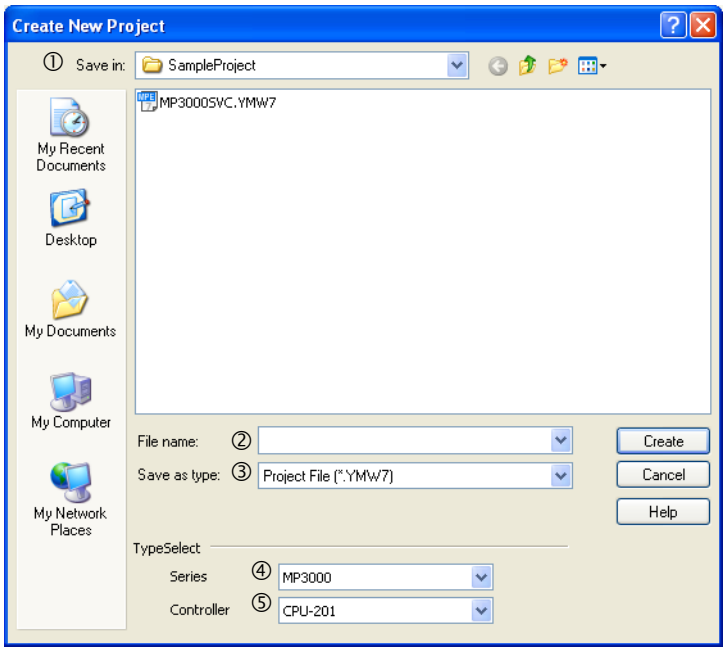
Yes Button: The current project will be compiled and saved by overwriting the previously version, and editing will be ended.

No Button: Editing will be ended without compilation and without 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.

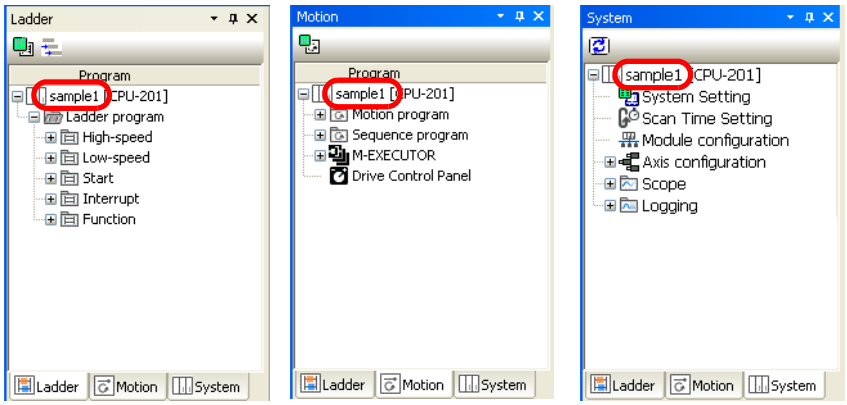
4. Enter the information from ① to ⑤.



No.	Item	Description
①	Save in	Select the folder in which to save the project file data.
②	File name	Enter a name for the project file to save. Note: The file name cannot contain any of the following characters: / \ : * ? " < > |
③	Save as type	Displays the extensions of the project file that can be selected. MP2000 Series: .YMW, .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.

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.

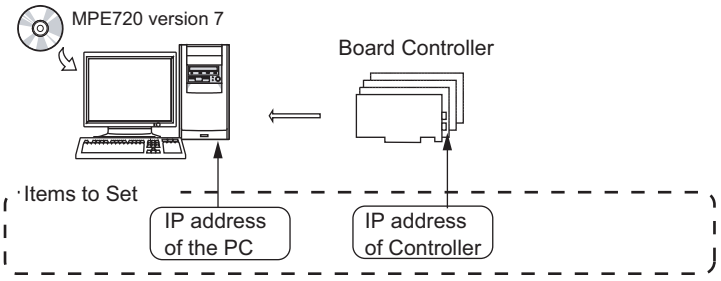
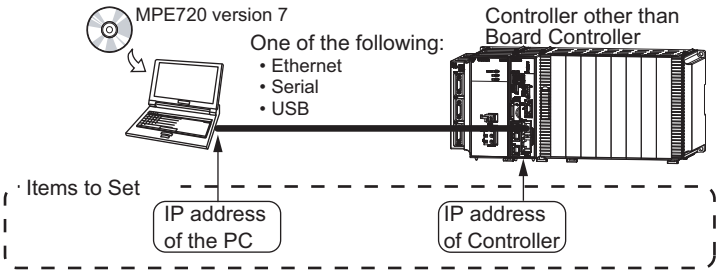
Information To prevent data loss in case of a CPU Unit failure, always store a backup copy of the project file. We recommend that you save a copy of the project file before you make any modifications to it (changing the module configuration definitions, the ladder programs, the motion programs, etc.).

Setting Up Communications

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

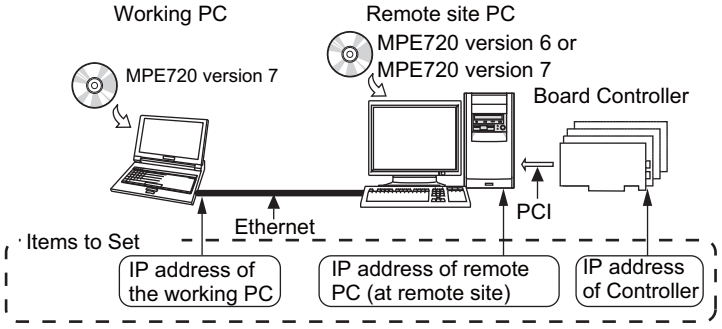
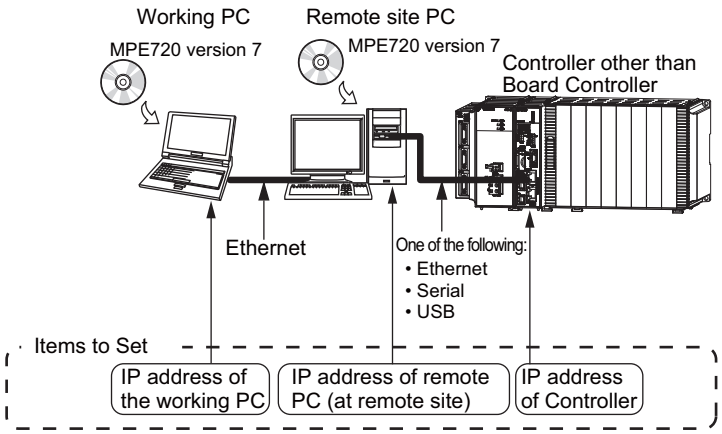
The procedure to set up communications depends on the type of connection, the type of Controller, and the method used to specify the IP addresses.

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

Type of Connection		Controller Type	Illustration	Reference
Online connections	Normal connections	Board Controller		☞ *Using a Normal Connection to a Board Controller (page 1-23)*
		Not a Board Controller		☞ *Automatically Setting the IP Addresses for a Normal Connection to a Controller That is Not a Board Controller (page 1-26)* ☞ *Manually Setting the IP Addresses for a Normal Connection to a Controller That is Not a Board Controller (page 1-32)*

Continued on next page.

Continued from previous page.

<table>
<tr><th colspan="2">Type of Connection</th><th>Controller Type</th><th>Illustration</th><th>Reference</th></tr>
<tr><td rowspan="2">Online connections</td><td rowspan="2">Remote connections</td><td>Board Controller</td><td> 
</td><td rowspan="2">☞ Using a Remote Connection with MPE720 Version 6 Installed on the Remote PC (page 1-39)
☞ Using a Remote Connection with MPE720 Version 7 Installed on the Remote PC (page 1-45)</td></tr>
<tr><td>Not a Board Controller</td><td> 
</td></tr>
<tr><td colspan="2">Offline operation*</td><td>–</td><td>–</td><td>–</td></tr>
</table>

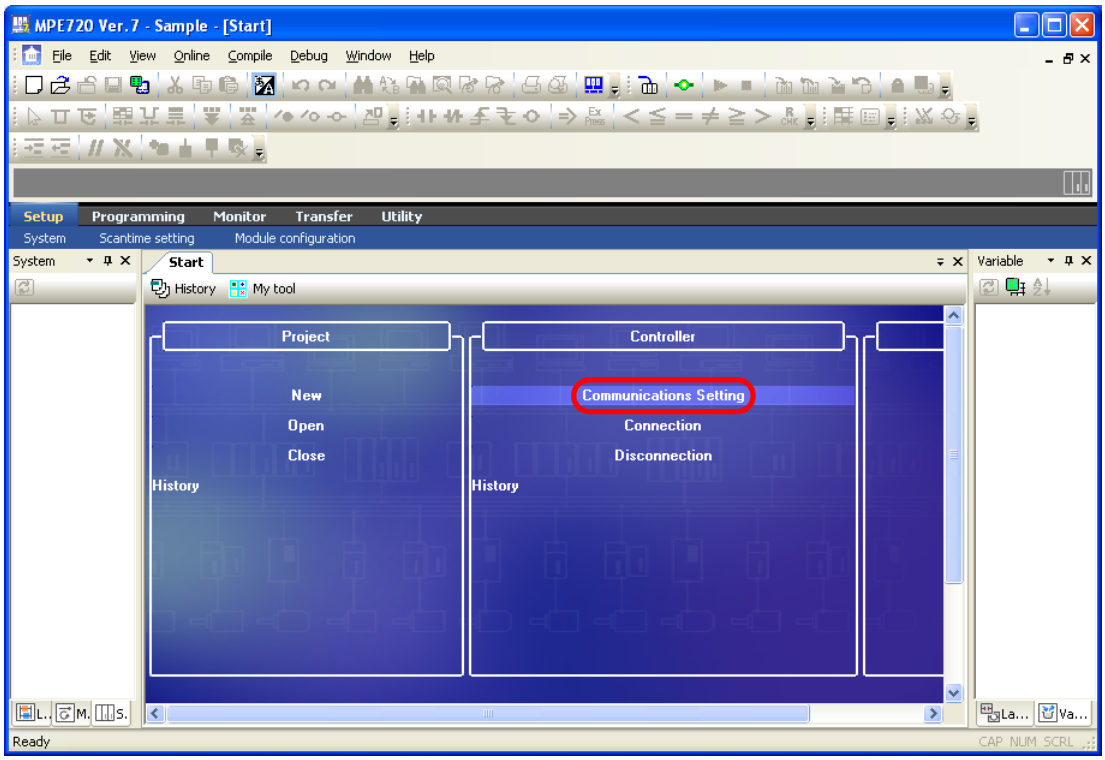
* No communications settings are required for offline operation.

The procedures are given below.

Using a Normal Connection to a Board Controller

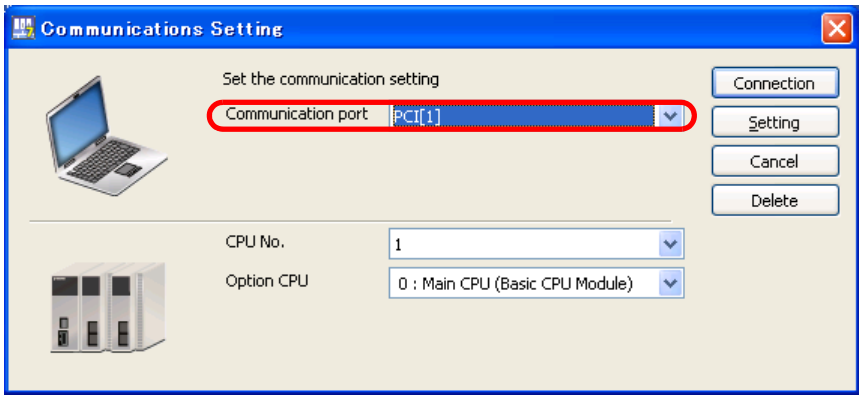
Use the following procedure to establish a normal connection from the PC on which the MPE720 is installed to a Board Controller.

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

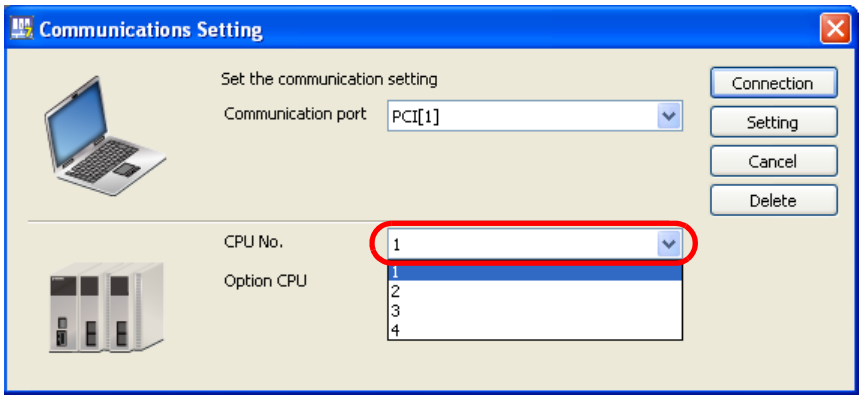


The Communications Setting Dialog Box will be displayed.

2. Select **PCI[1]** in the **Communication port** Box.

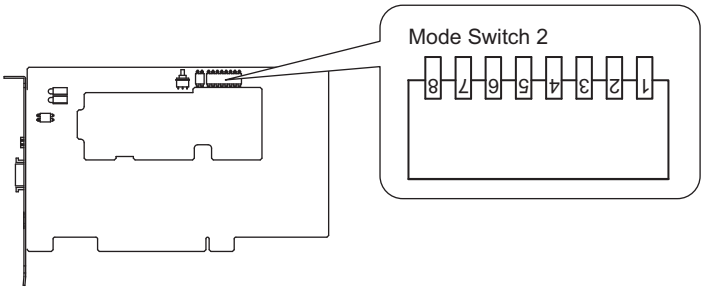


3. Set the CPU number in the **CPU No.** Box.
Set the CP number of the destination Controller.



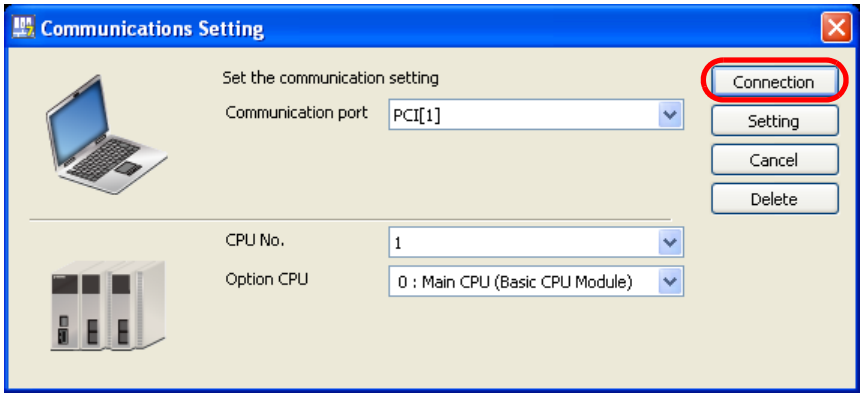
Information

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



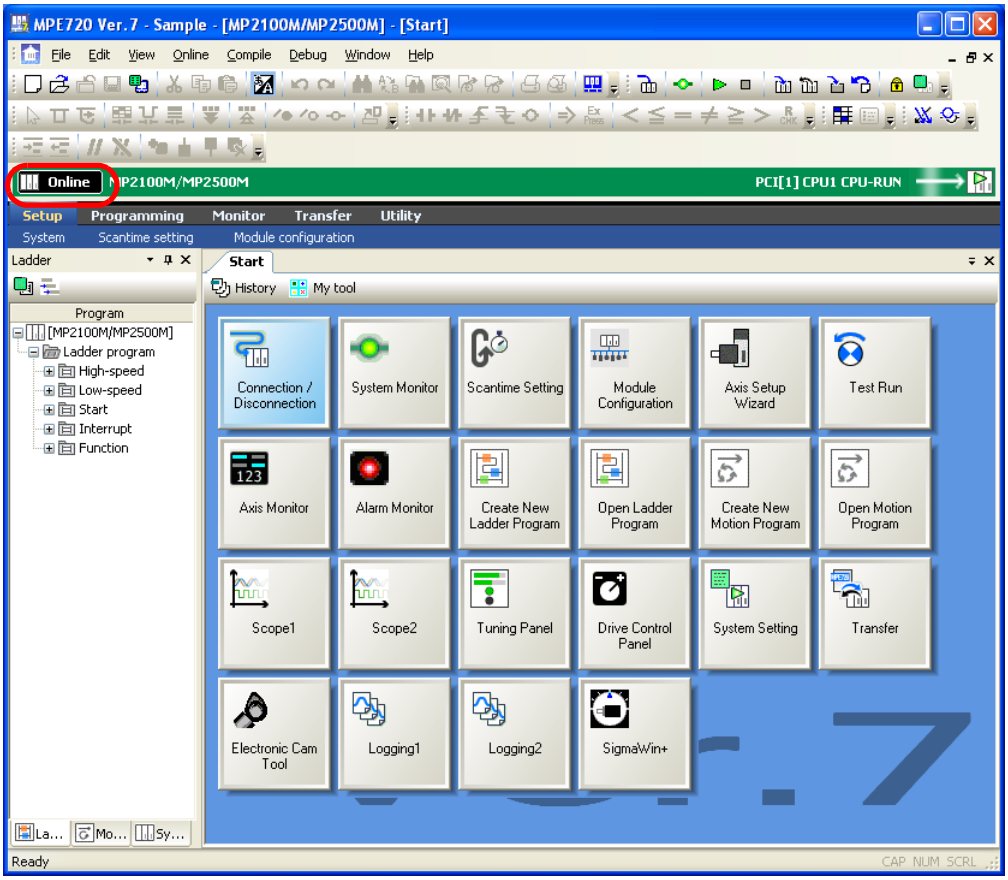
State of Pin 8	State of Pin 7	CP Number
OFF	OFF	1
OFF	ON	2
ON	OFF	3
ON	ON	4

4. Click the **Connection** Button.



The MPE720 Ver. 7 Window will appear.

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

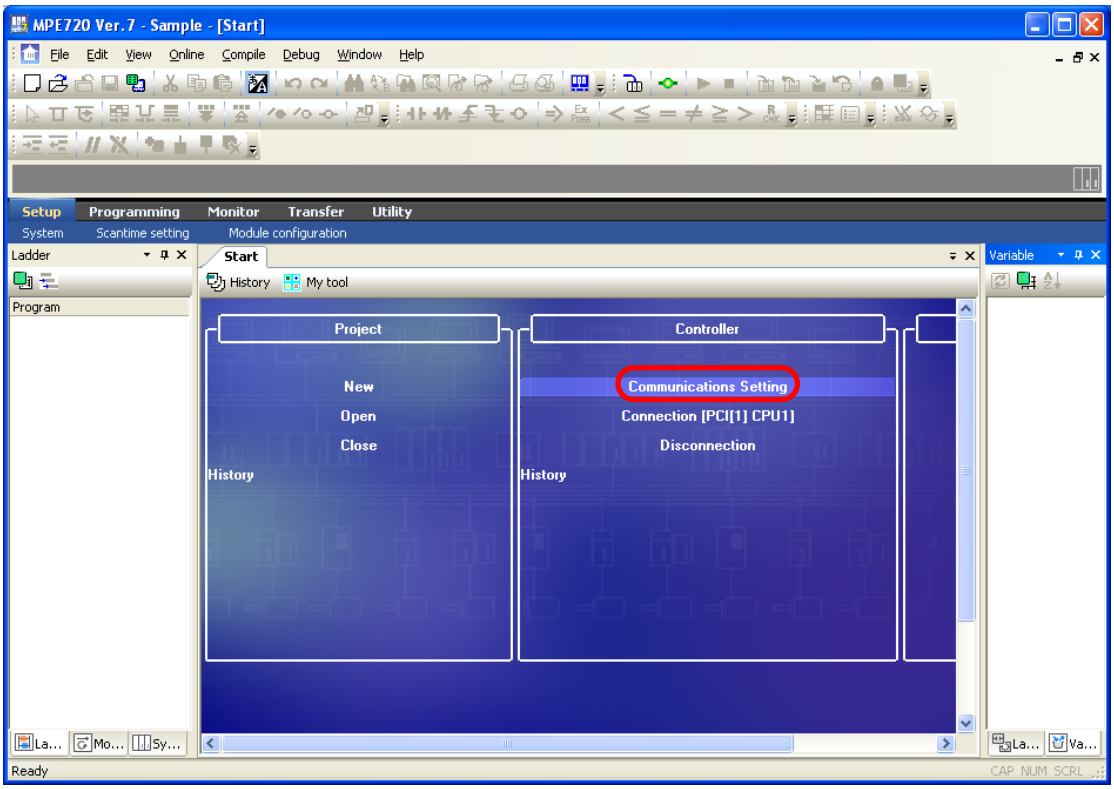


This concludes the procedure.

Automatically Setting the IP Addresses for a Normal Connection to a Controller That is Not a Board Controller

Use the following procedure to establish a normal connection from the PC on which the MPE720 is installed to a Controller that is not a Board Controller by automatically assigning IP addresses.

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

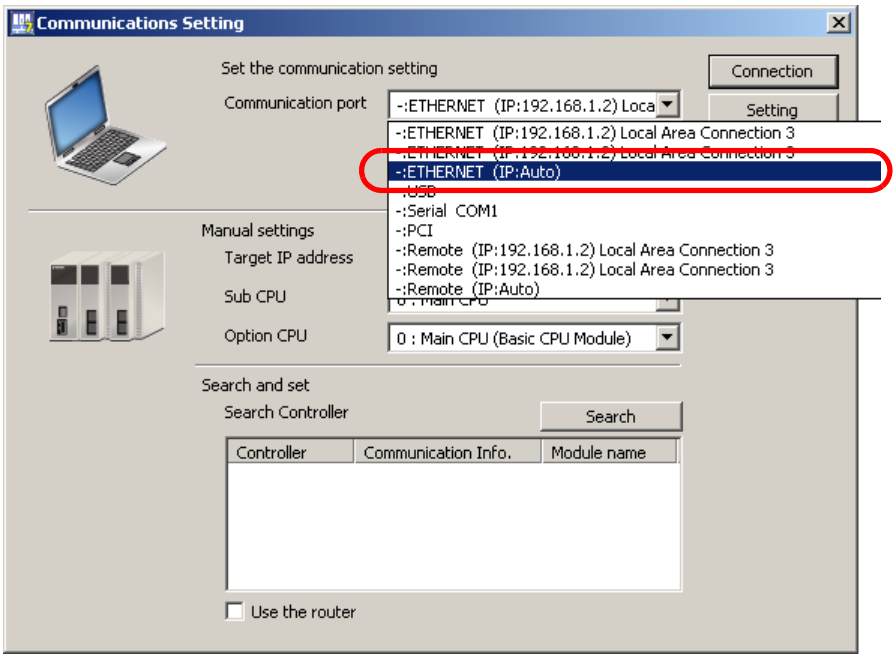


The Communications Setting Dialog Box will be displayed.

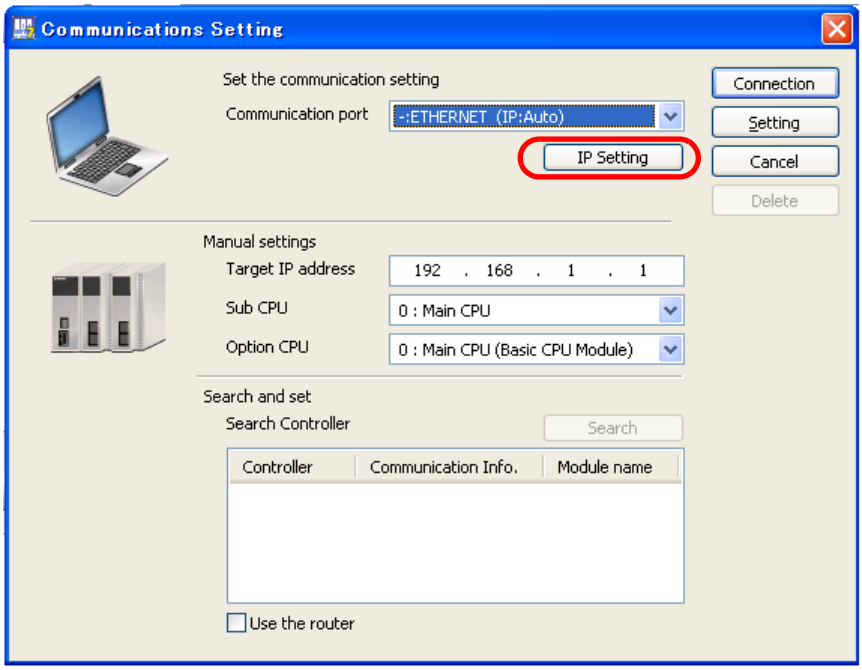
2. Select **-:ETHERNET (IP: Auto)** in the **Communication port** Box.

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.

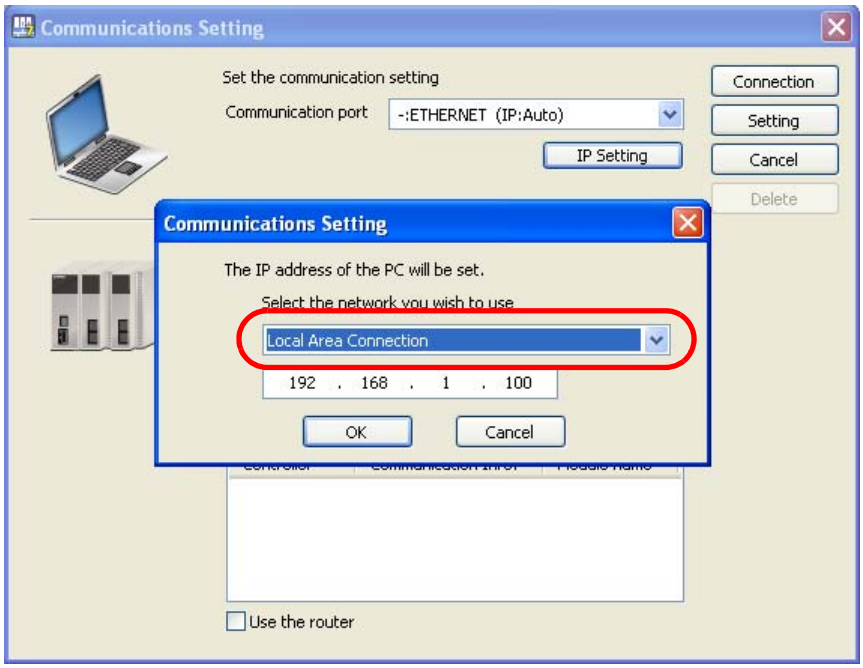


3. Click the **IP Setting** Button.



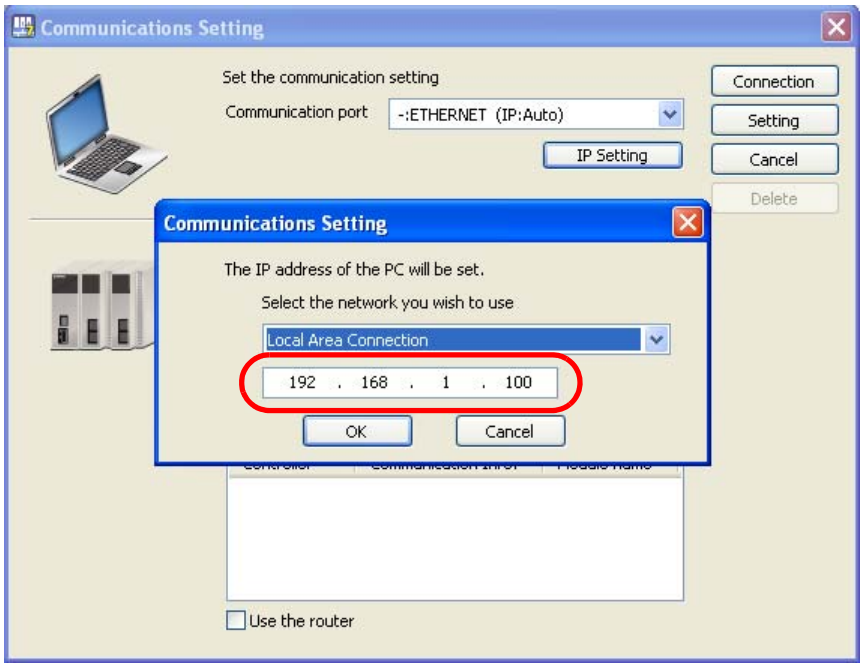
Another Communications Setting Dialog Box will be displayed.

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

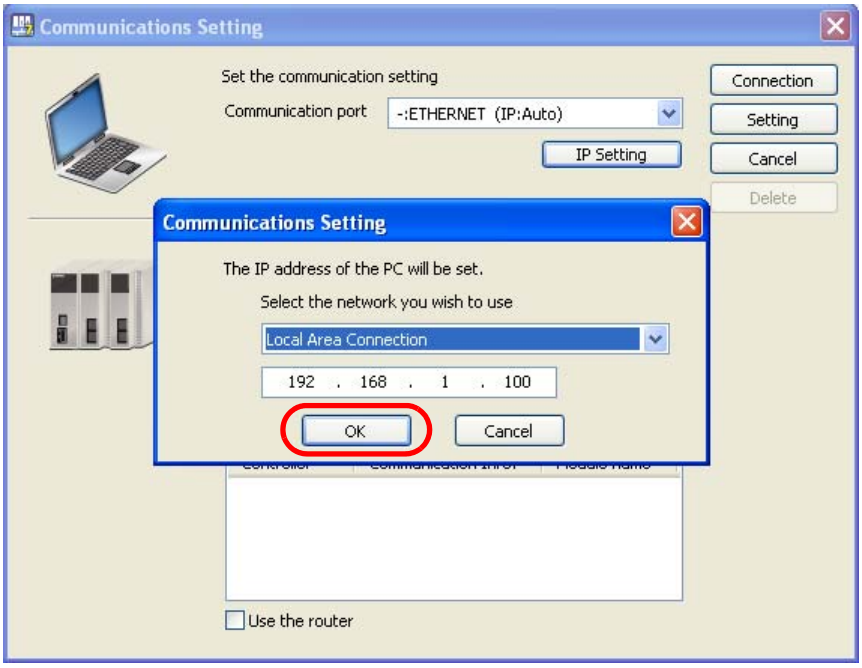


5. Enter the IP address.

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



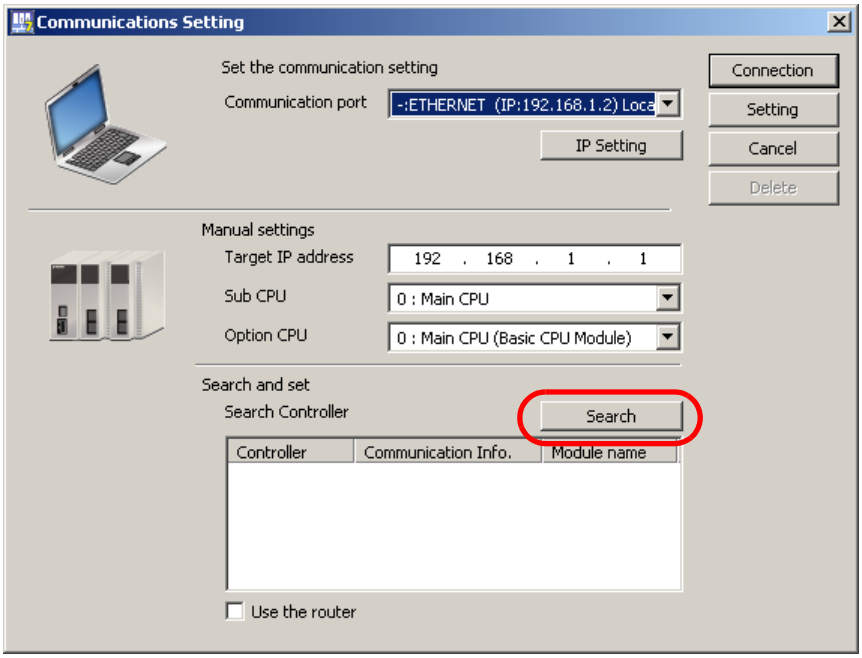
6. Click the **OK** Button.



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

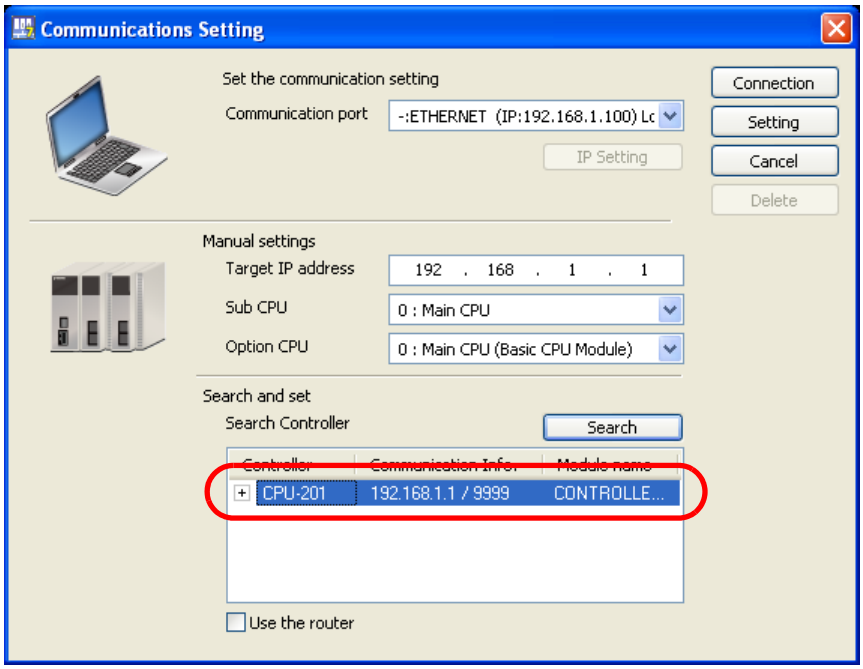
7. Click the **Search** Button.

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 Communications Module, an Optional Module, or through any other communications medium, the **Search** Button will be disabled.

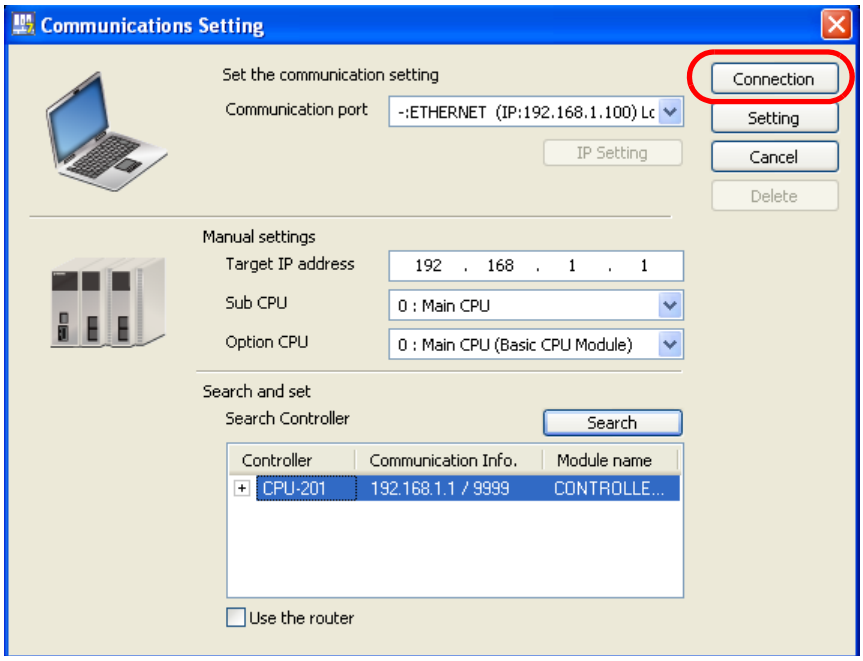


The search results will be displayed in the **Search Controller** Box.

8. Select the Controller to use from the **Search Controller** Box.

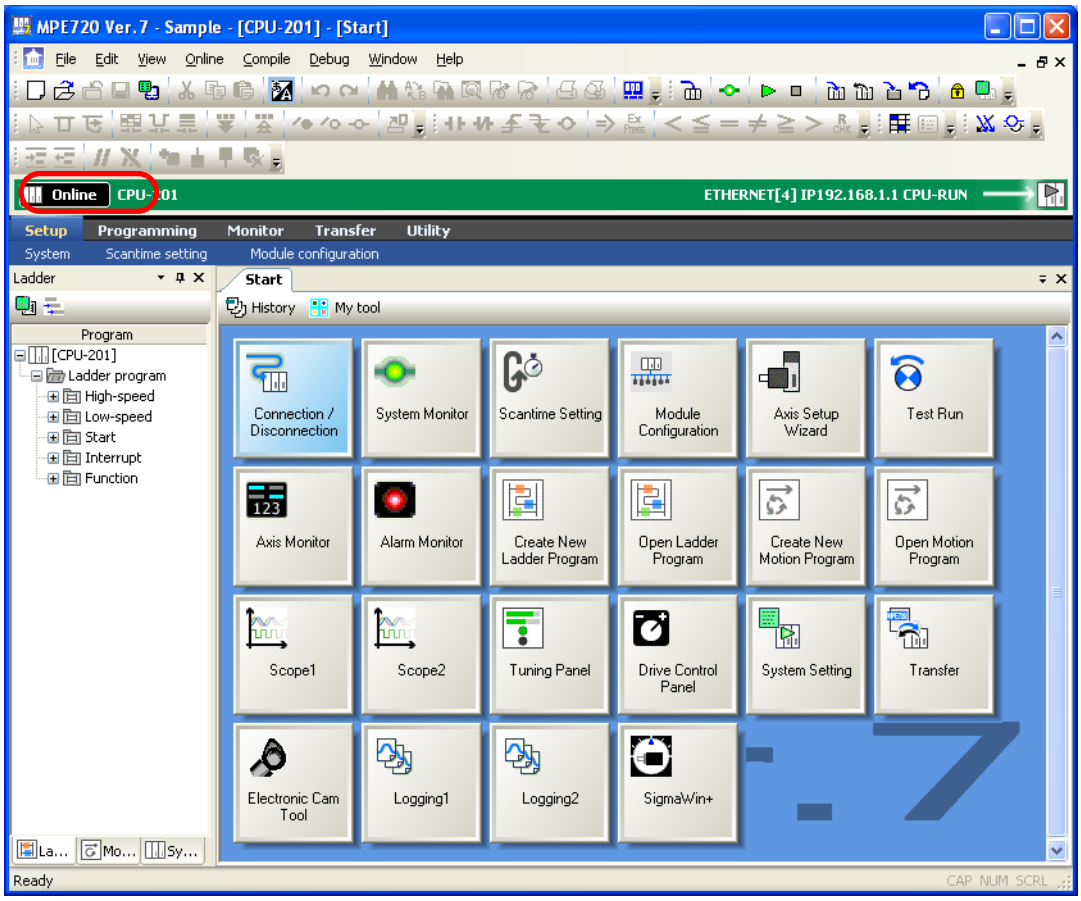


9. Click the **Connection** Button.



The MPE720 Ver. 7 Window will appear.

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

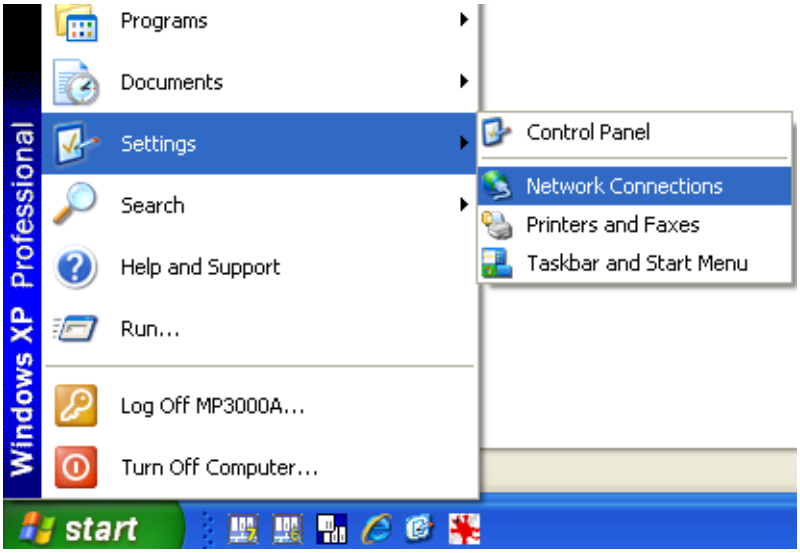


This concludes the procedure.

Manually Setting the IP Addresses for a Normal Connection to a Controller That is Not a Board Controller

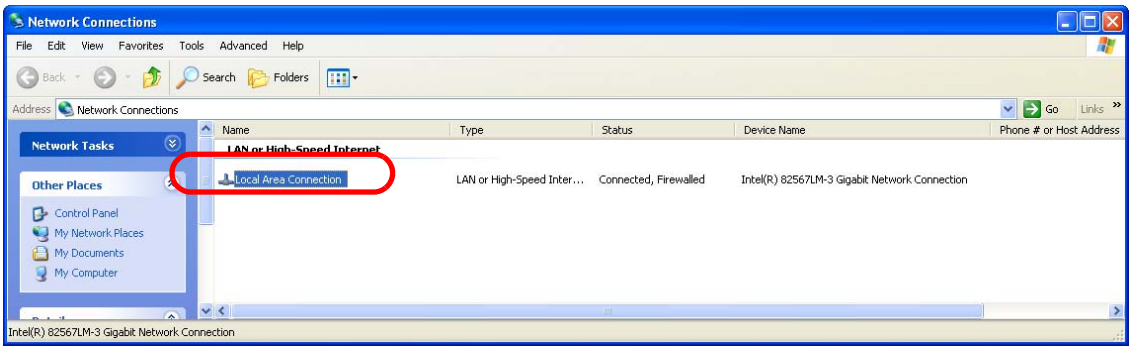
Use the following procedure to establish a normal connection from the PC on which the MPE720 is installed to a Controller that is not a Board Controller by manually assigning IP addresses.

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



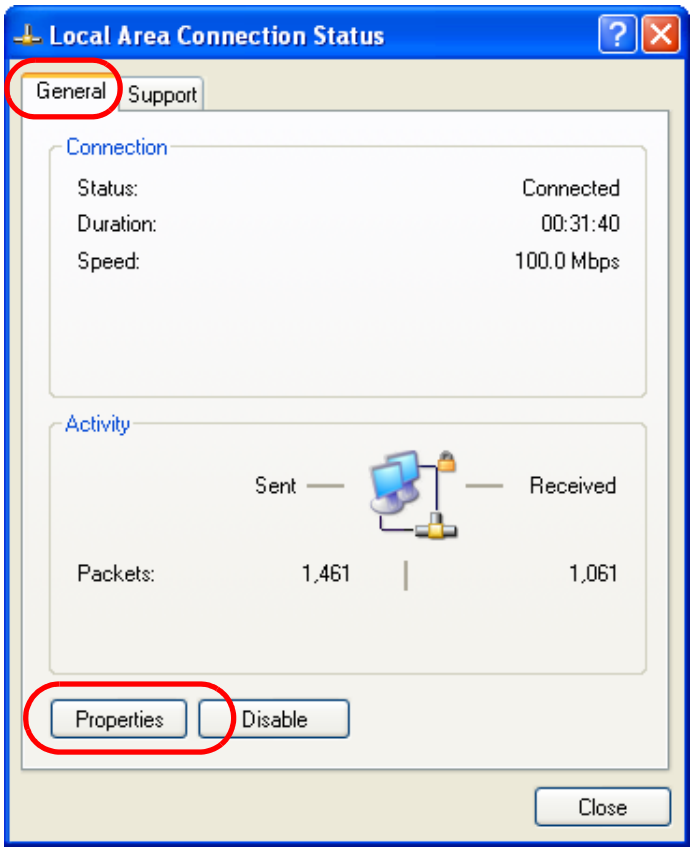
The Network Connections Window will appear.

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



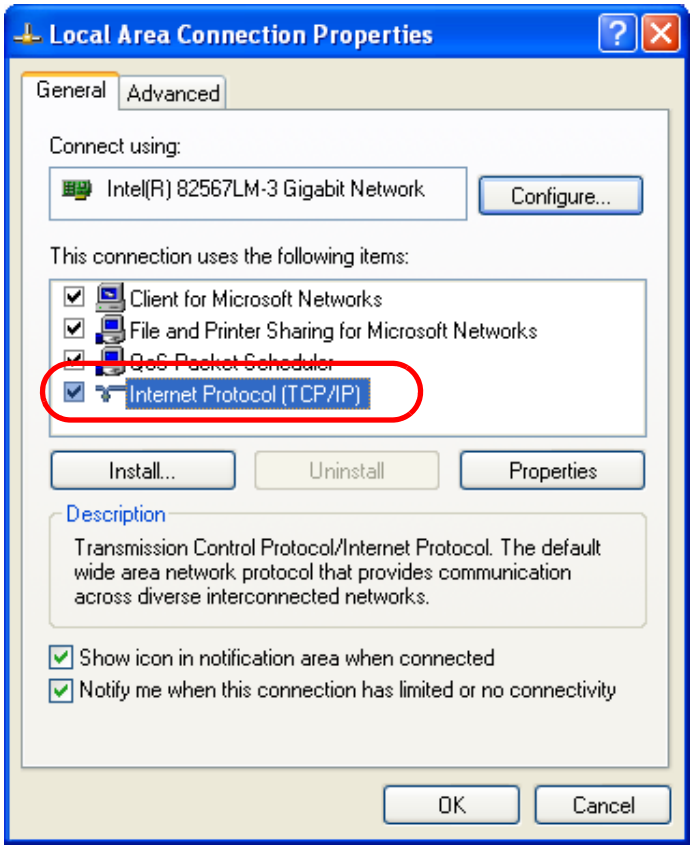
The Local Area Connection Status Dialog Box will be displayed.

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



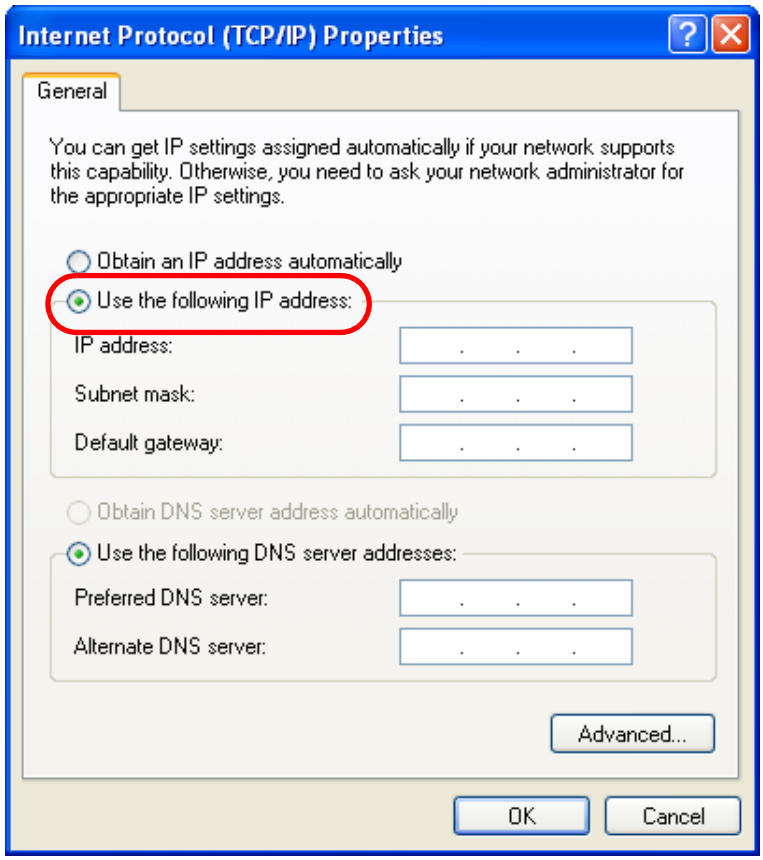
The Local Area Connection Properties Dialog Box will be displayed.

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.

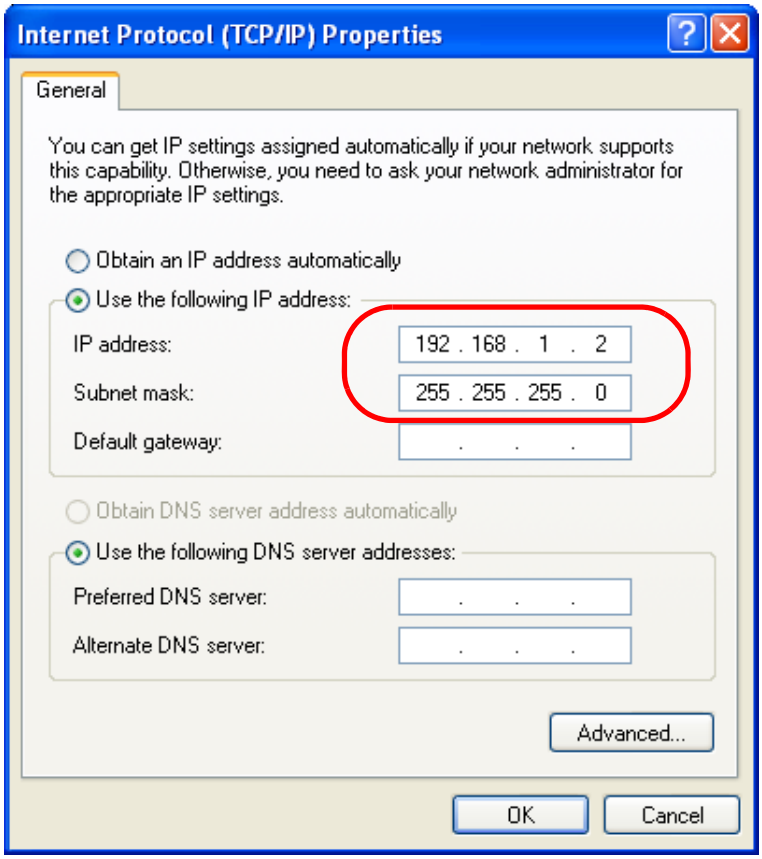


6. Enter the following information.

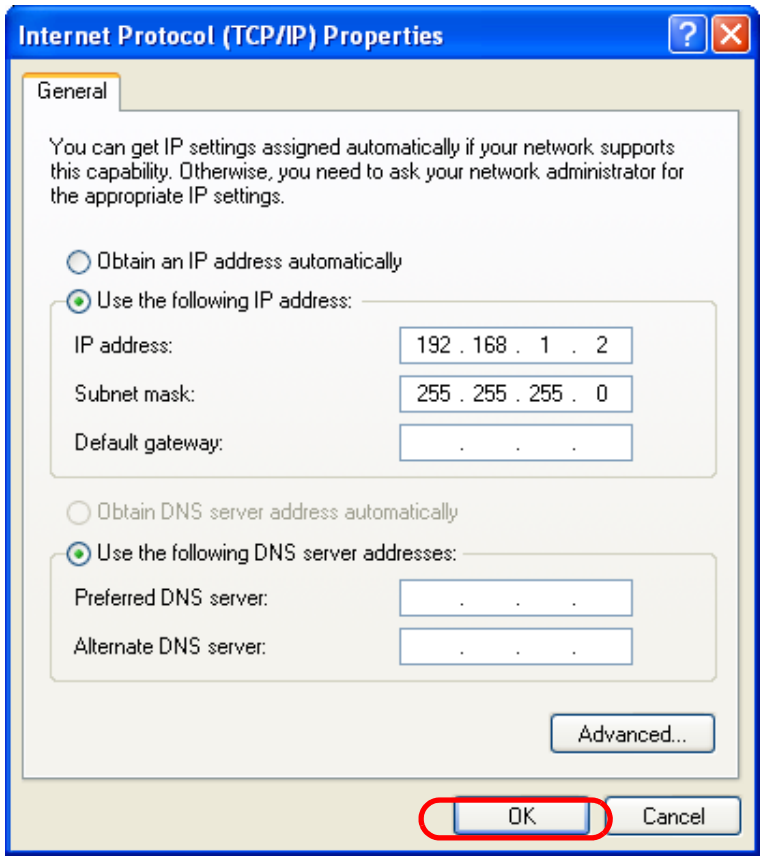
- IP address = 192.168.1.□□□
- Subnet mask = 255.255.255.0

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.



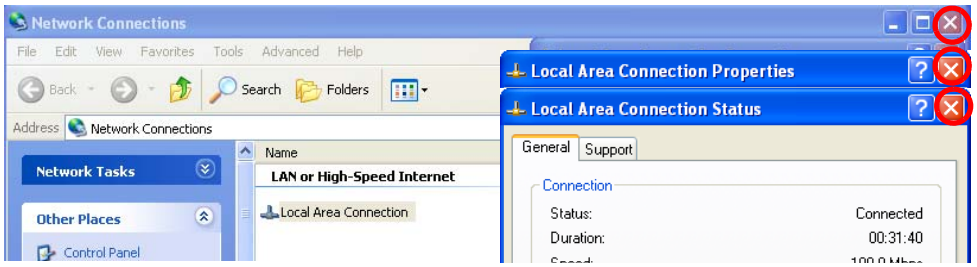
7. Click the **OK** Button.



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.

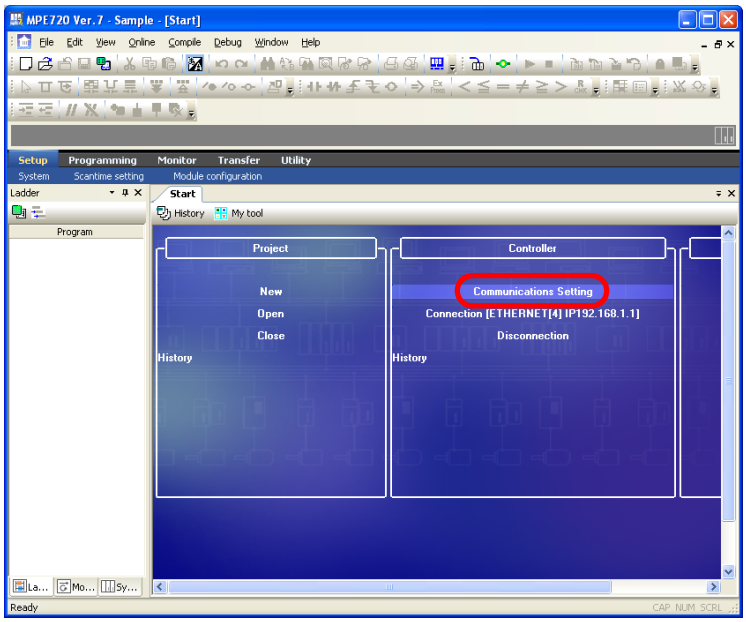
- Network Connections Window
- Local Area Connection Properties Dialog Box
- Local Area Connection Status Dialog Box



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

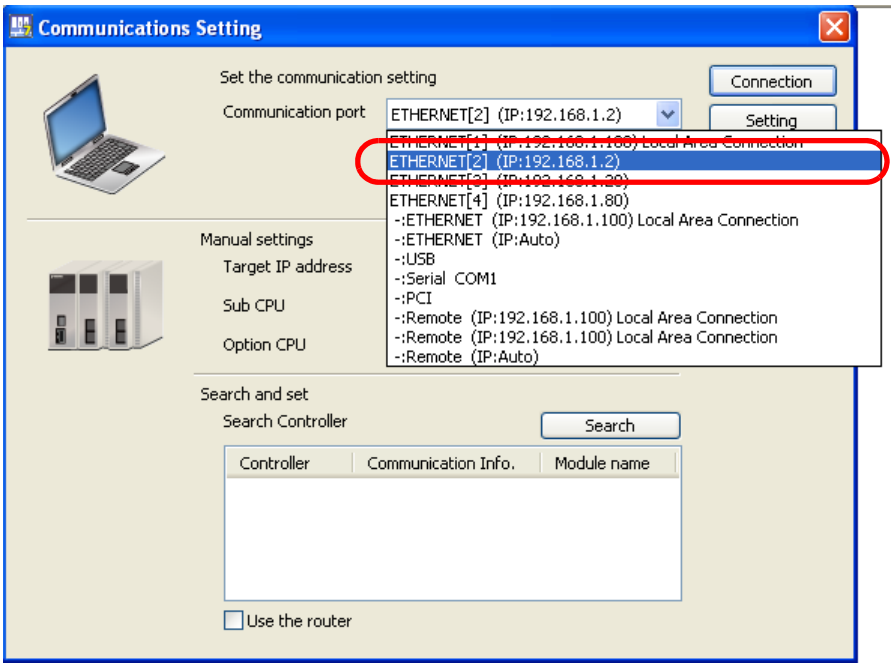
The MPE720 will start and the MPE720 Ver. 7 Window will appear.

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

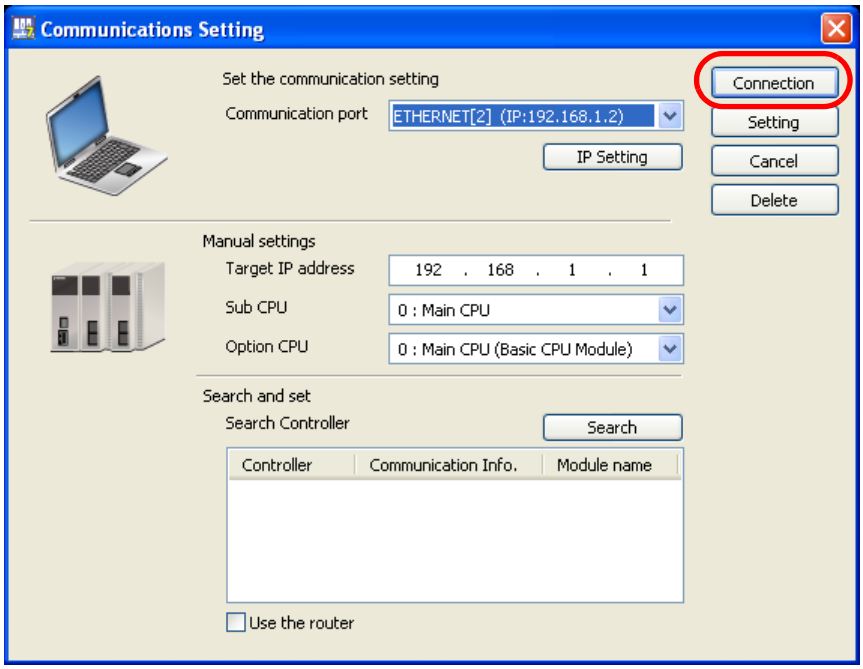


The Communications Setting Dialog Box will be displayed.

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

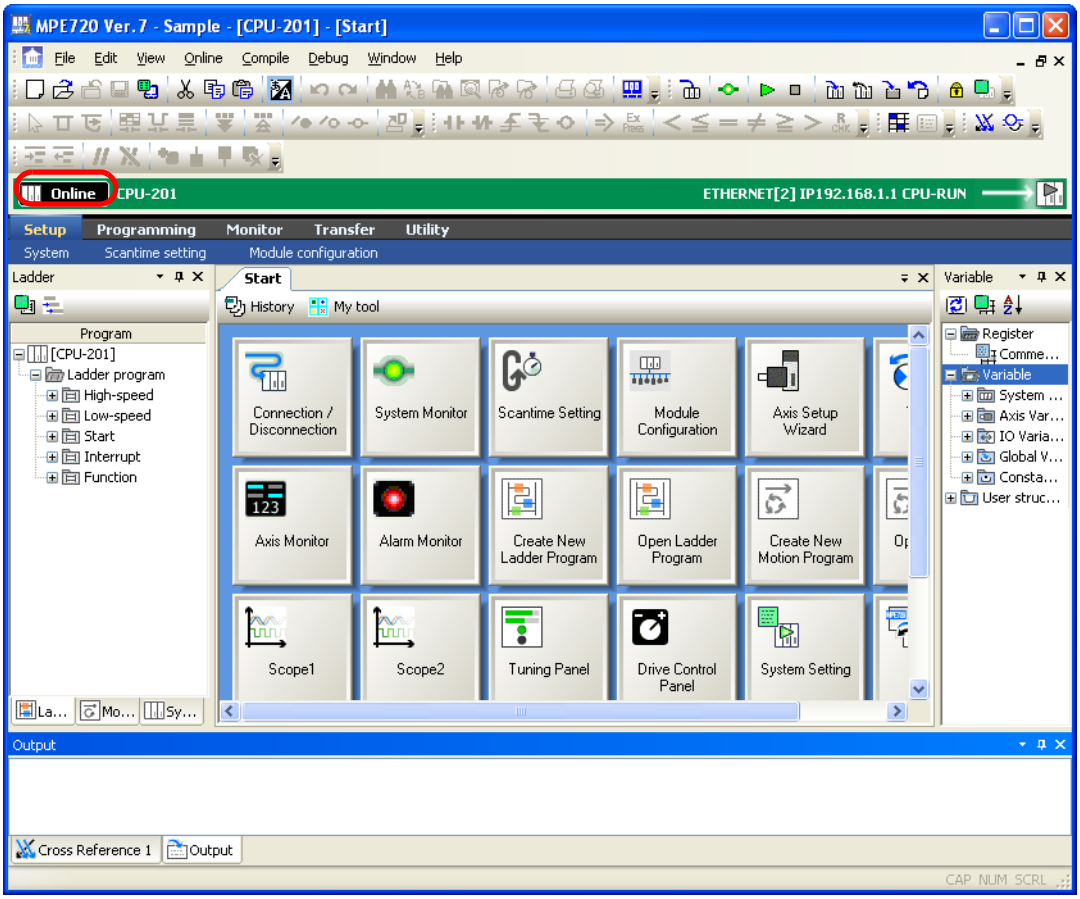


12. Click the **Connection** Button.



The MPE720 Ver. 7 Window will appear.

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



This concludes the setup.

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 Controller.

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

☞ *Setting Up Communications (page 1-21)*

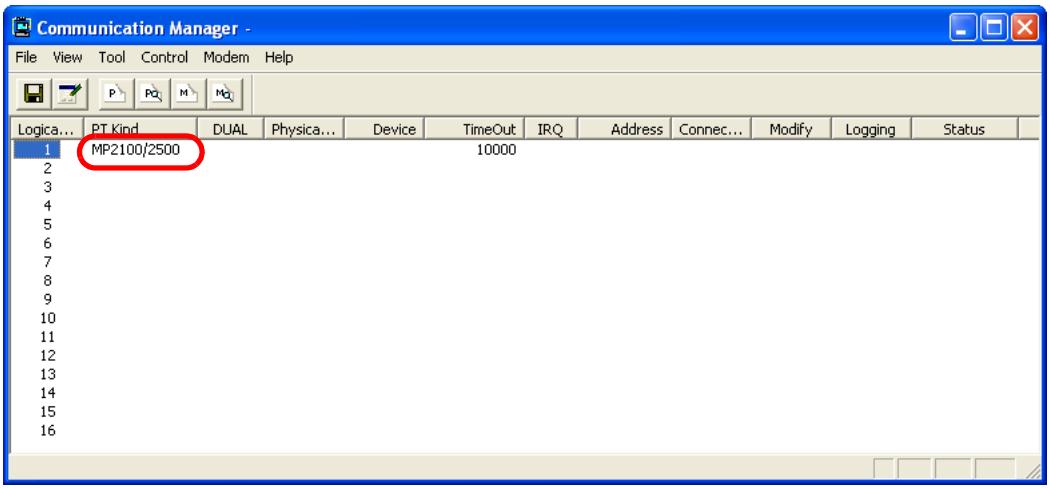
Begin by setting the remote PC.

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

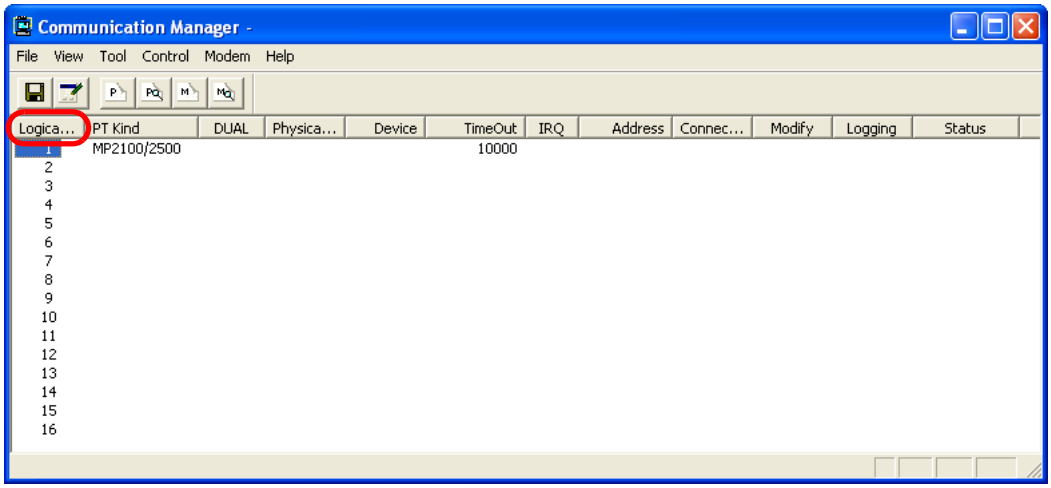
2. Double-click the **Communications Process** Icon.

   The Communications Manager Window will be displayed.

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



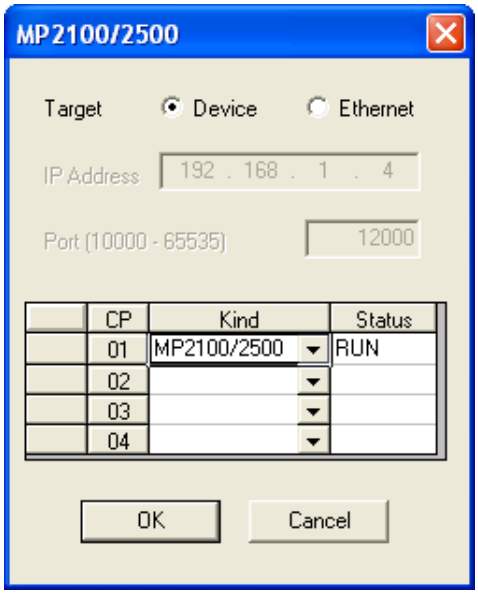
4. Double-click the header of the **Logical PT** Column.



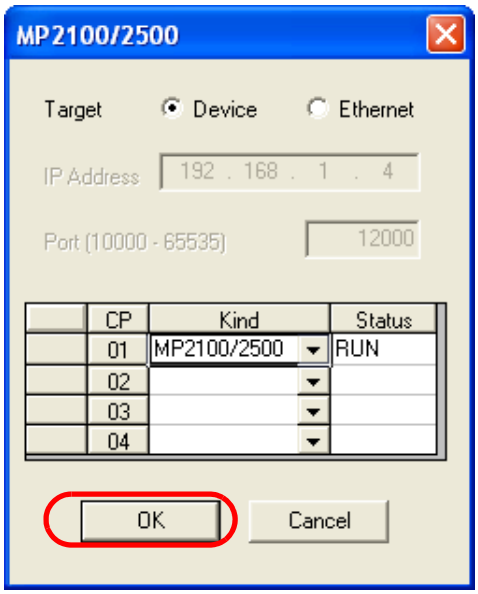
   The Assignment Dialog Box will be displayed.

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 Controller.



7. Click the **OK** Button.



   The MP2100/2500 Dialog Box will close and the assignment will be enabled.

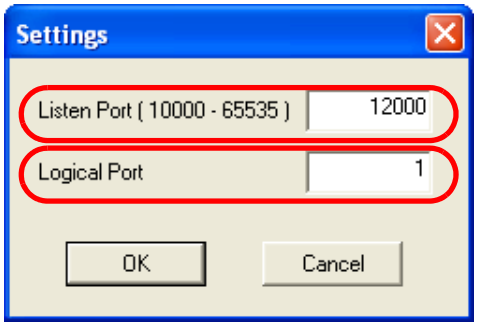
8. Under the **My Computer** Icon, select ***Local Disk*** – ***YeTools*** – ***CpComSys*** – ***CpUtility.exe***.
   The CpUtility will start and the **CpUtility** Icon will appear at the lower right of the PC screen.

9. Click the **CpUtility** Icon.

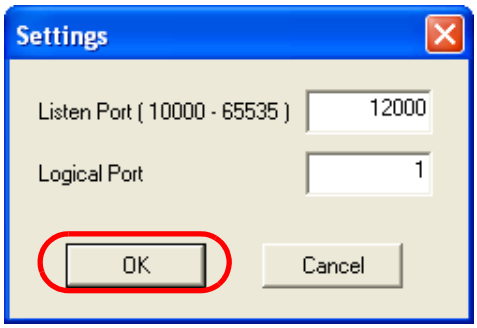
   The Settings Dialog Box will be displayed.

10. 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.



11. Click the **OK** Button.

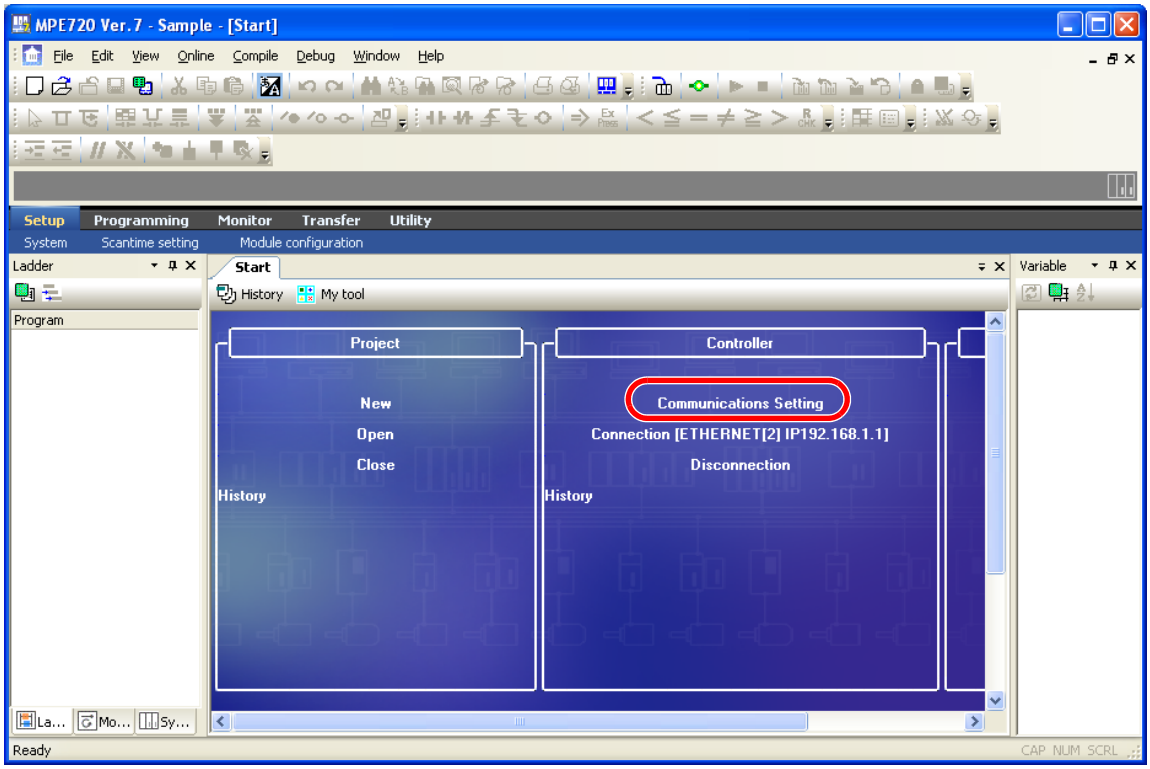


The Settings Dialog Box will close and the settings will be enabled.

This concludes the setup of the remote PC.

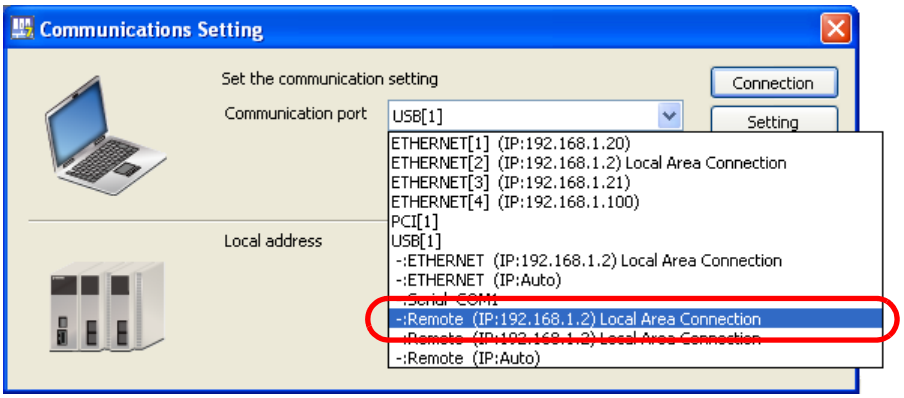
Next, set up the working PC.

12. Select ***Communications Setting***.

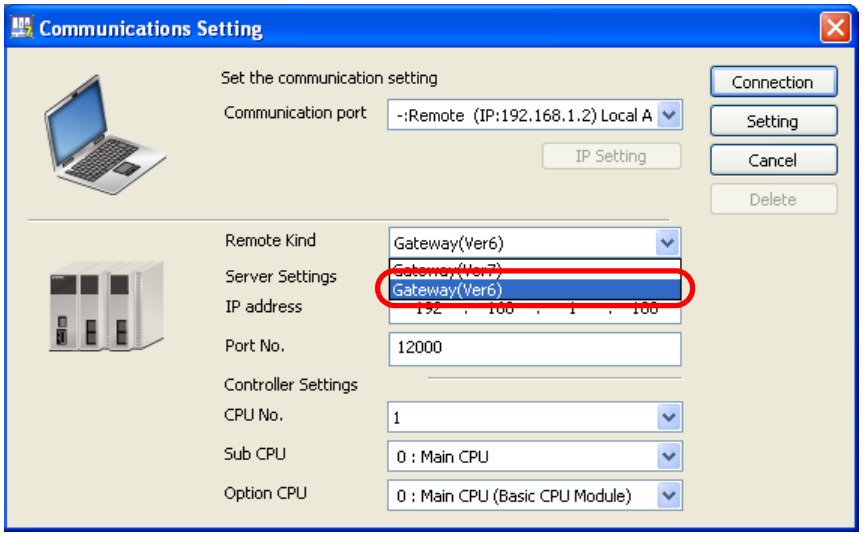


The Communications Setting Dialog Box will be displayed.

13. Select –**:Remote (IP: 192.168.1.□□□) Local Area Connection** in the **Communications port** Box.

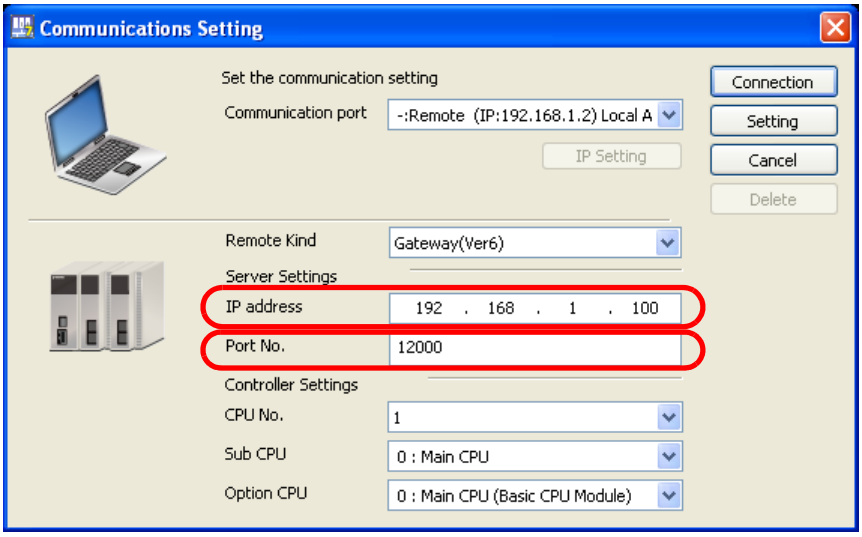


14. Select **Gateway(Ver6)** in the **Remote Kind** Box.



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

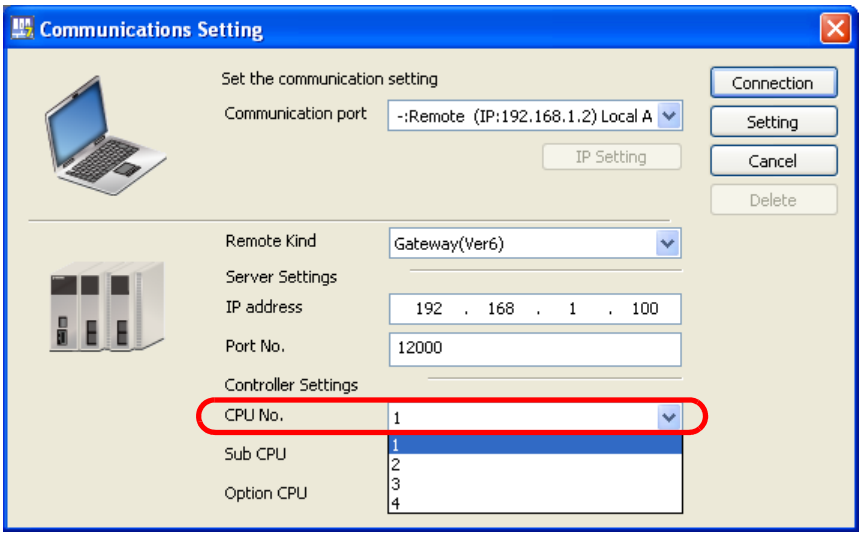
- IP address: Enter the IP address for the remote PC (at the remote site).
- Port No.: Specify the port number (the same number that was specified in the **Listen Port** Box in step 10) that was set for the CpUtility on the remote PC (at the remote site).



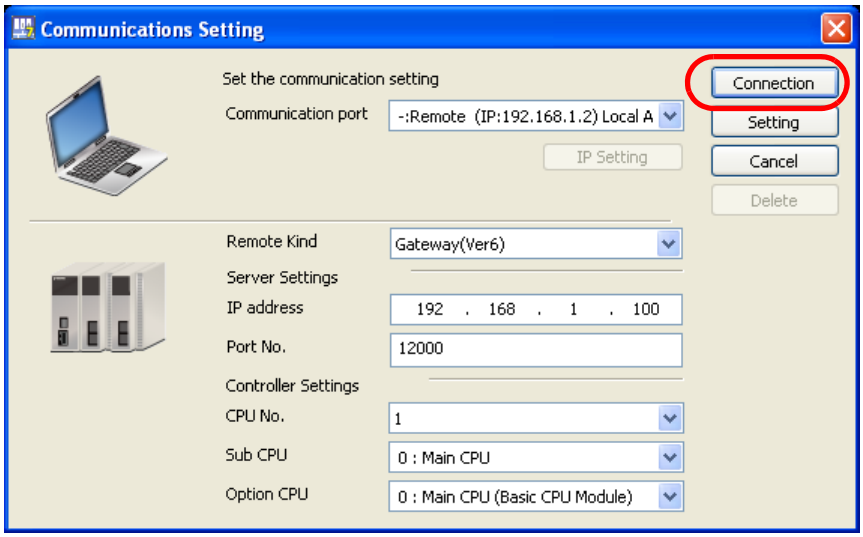
16. Select the CP number of the Board Controller in the **CPU No.** Box in the **Controller Settings** Area.

Refer to the following section for details on CP numbers.

☞ *Using a Normal Connection to a Board Controller (page 1-23)*

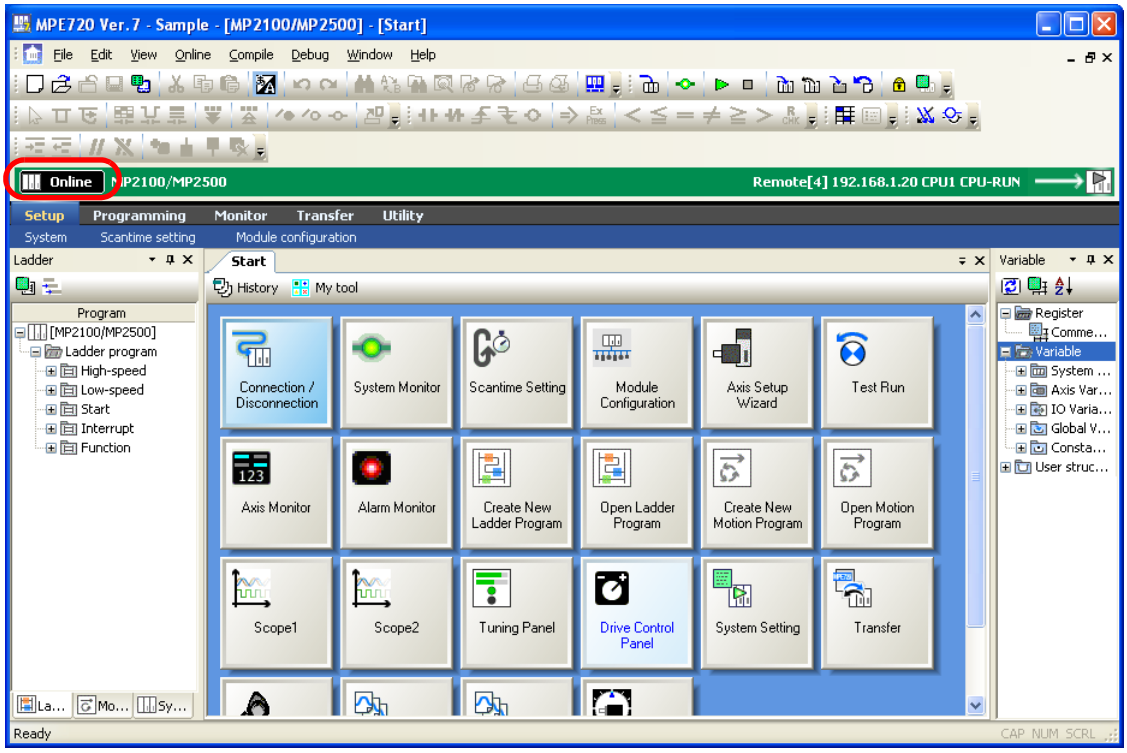


17. Click the **Connection** Button.



The MPE720 Ver. 7 Window will appear.

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



This concludes the procedure.

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 Controller (either a Board Controller or not a Board Controller).

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

☞ *Setting Up Communications (page 1-21)*

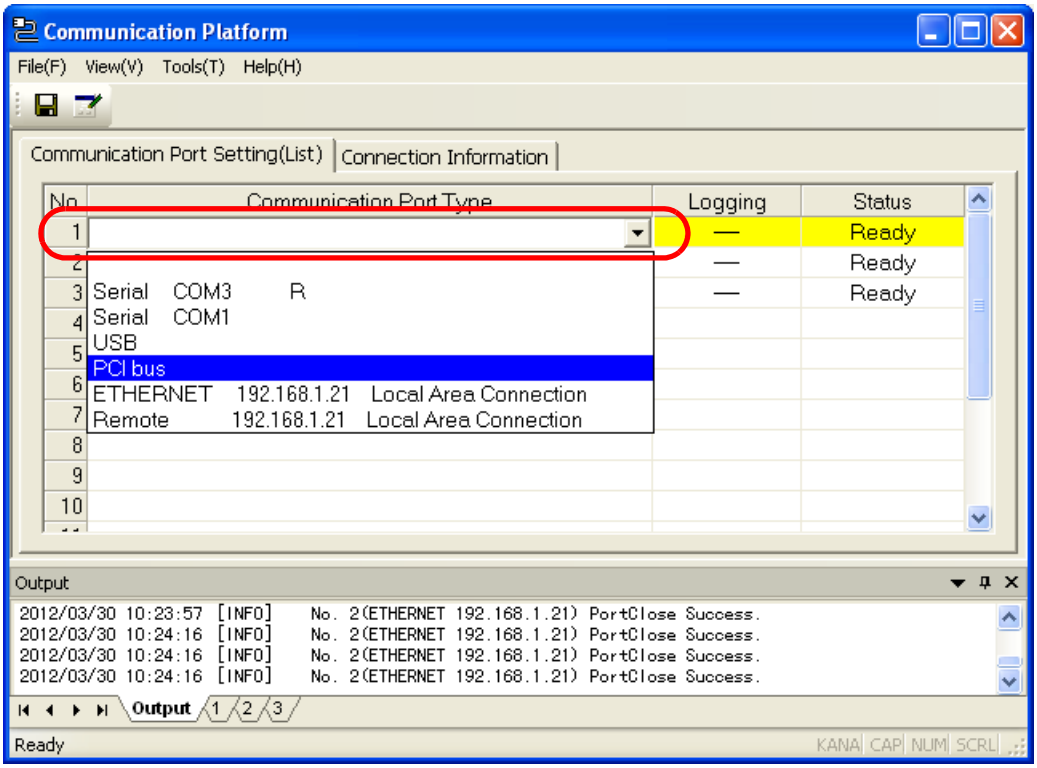
Begin by setting the remote PC.

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.

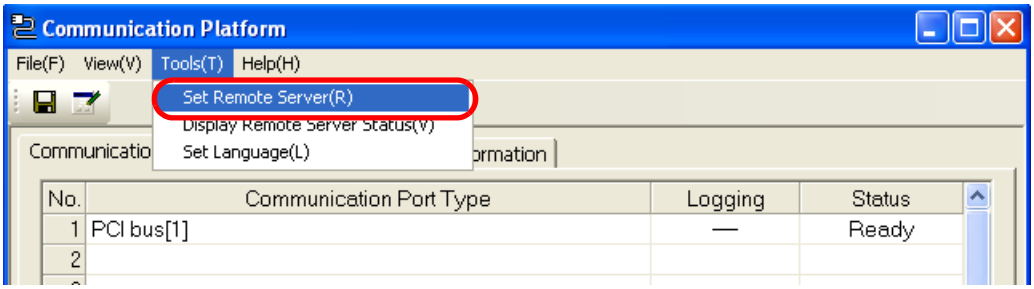
2. Double-click the **Communications Platform** Icon.

   The Communication Platform Window will be displayed.

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



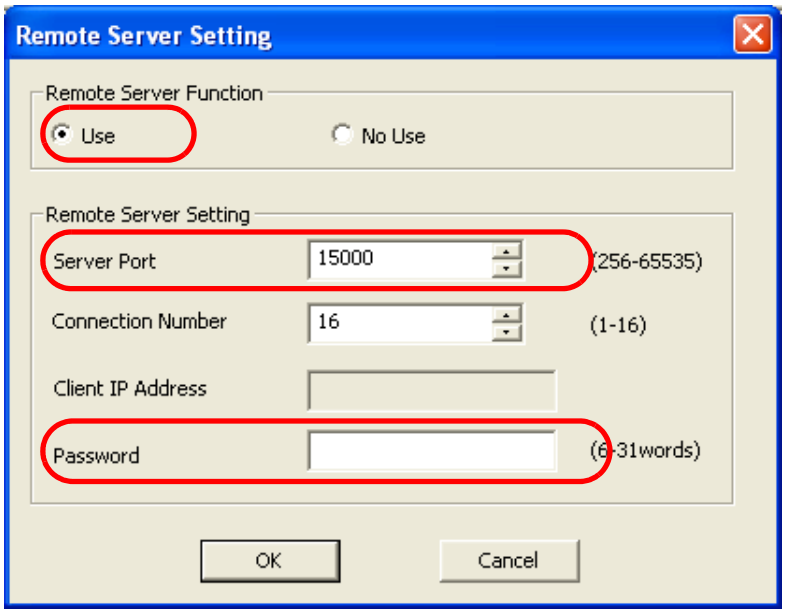
4. Select ***Tools*** – ***Set Remote Server*** from the menu bar.



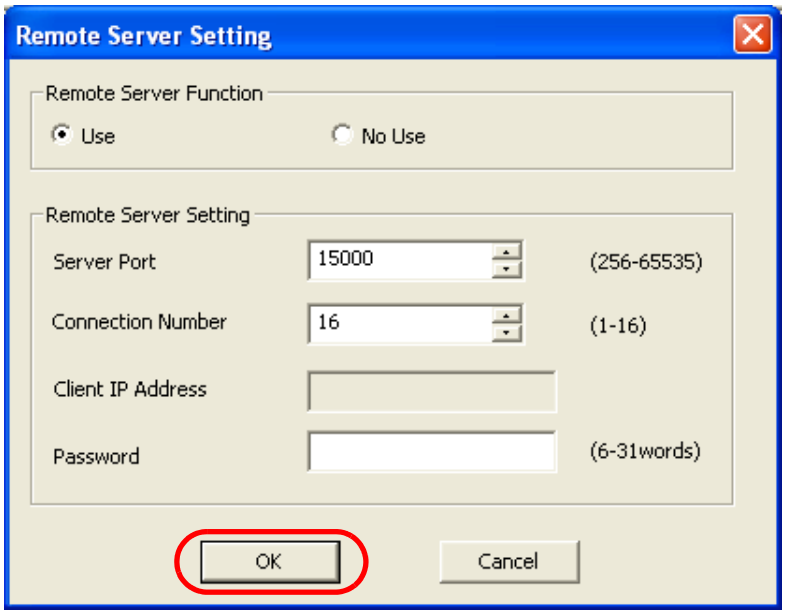
The Remote Server Setting Dialog Box will be displayed.

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.

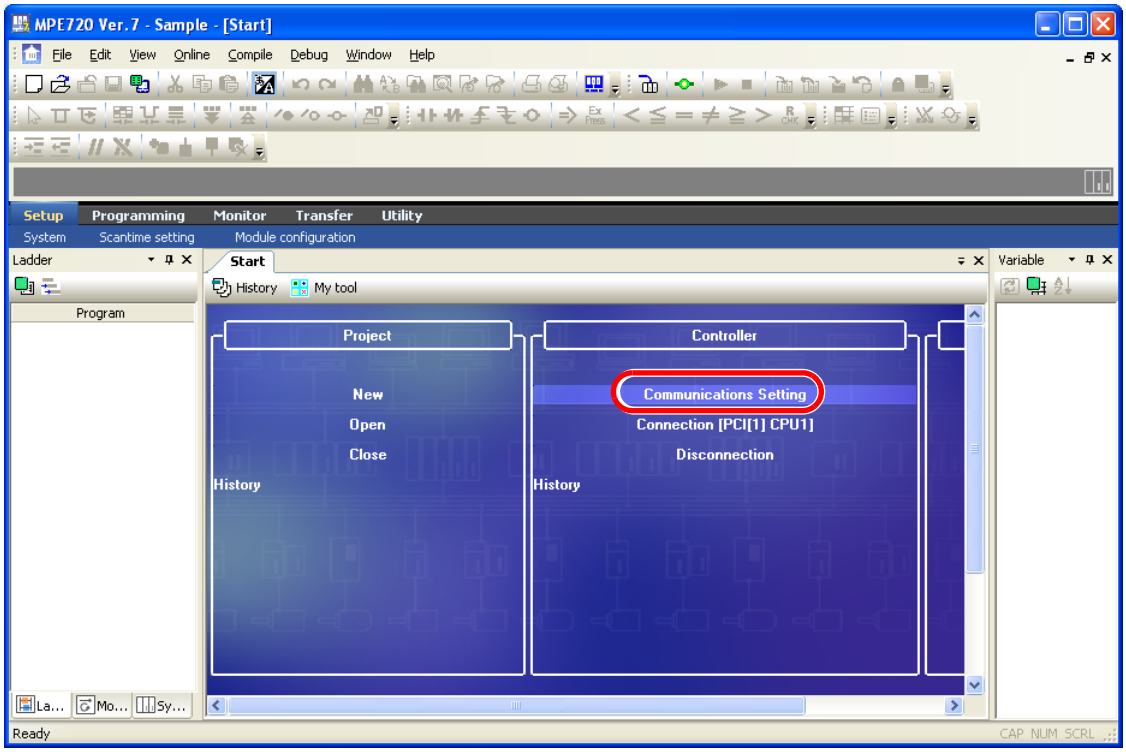


The Remote Server Setting Dialog Box will close and the settings will be enabled.

This concludes the setup of the remote PC.

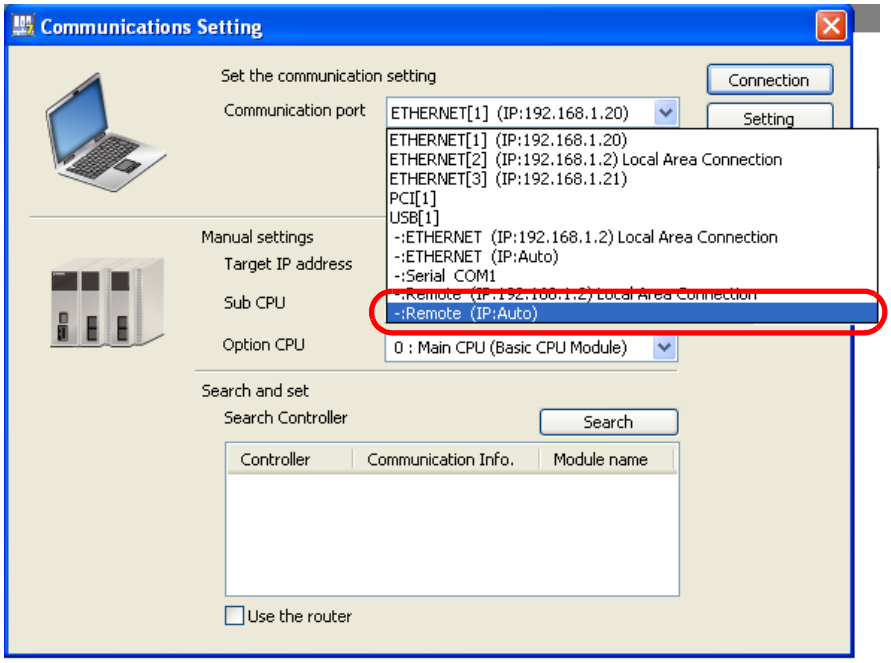
Next, set up the working PC.

7. Select ***Communications Setting***.

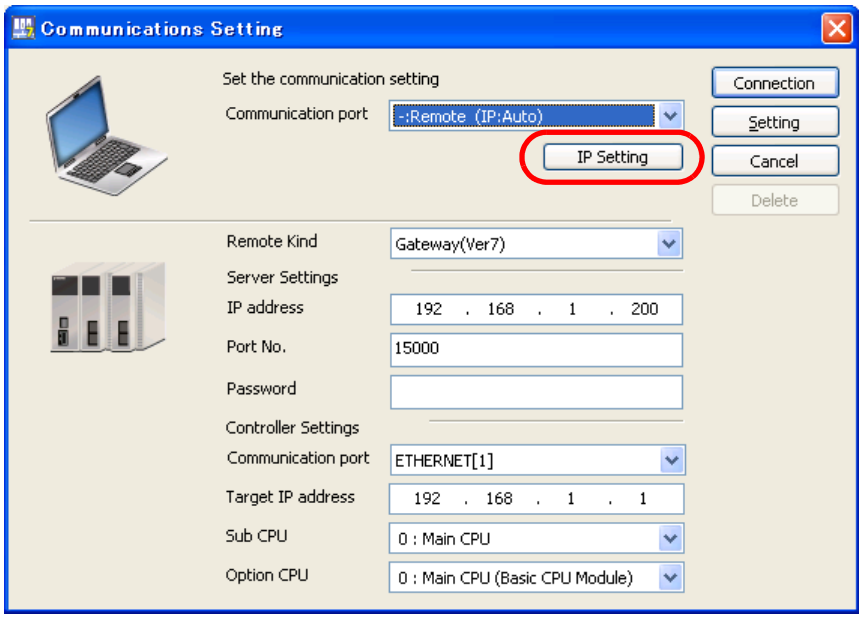


The Communications Setting Dialog Box will be displayed.

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

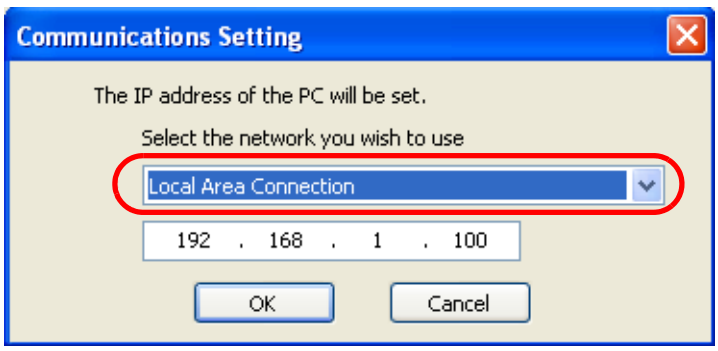


9. Click the **IP Setting** Button.

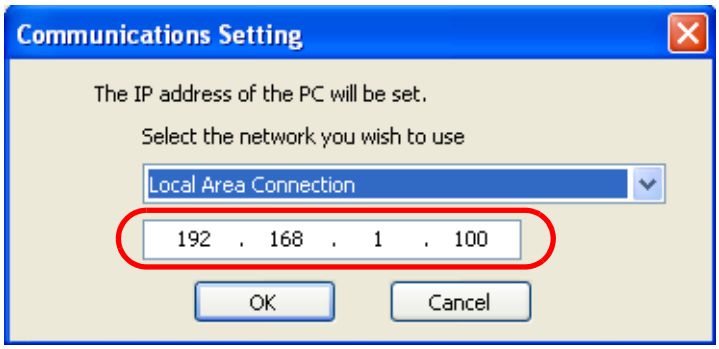


The Communications Setting Dialog Box will be displayed.

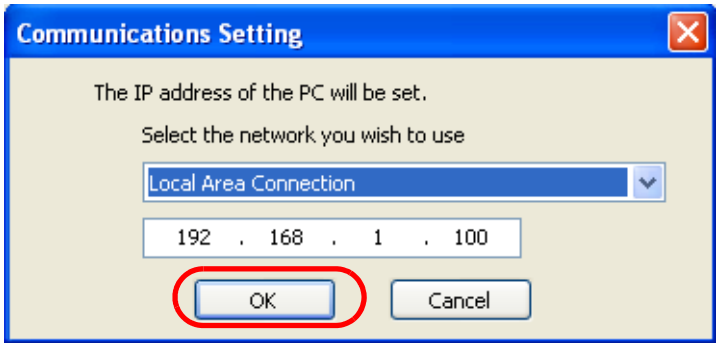
10. Select **Local Area Connection** as the network to use.



11. Enter the IP address to use.

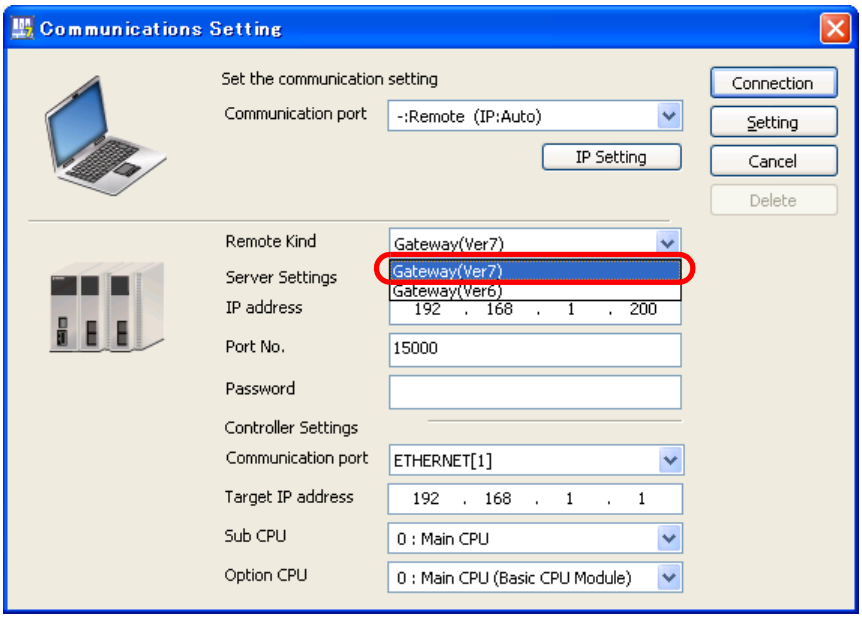


12. Click the **OK** Button.



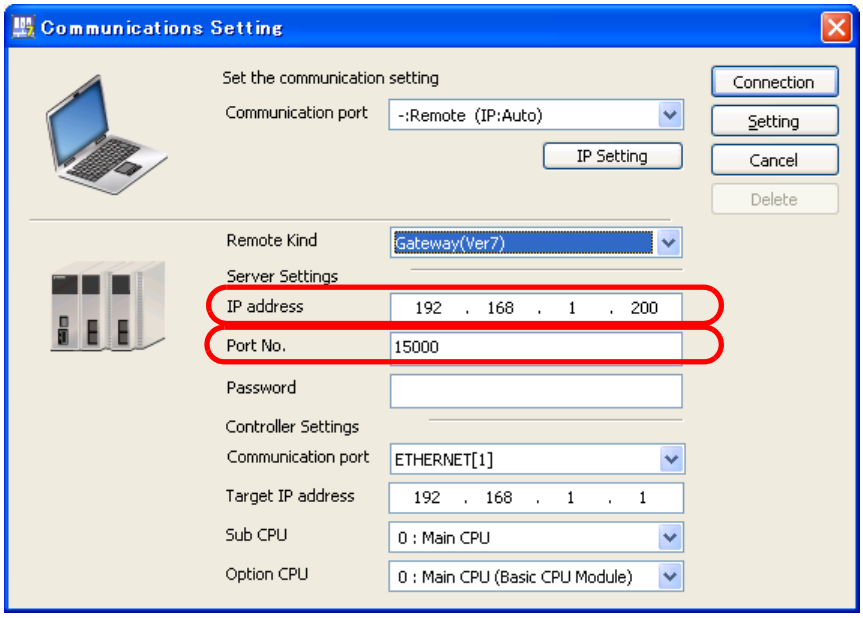
The Communications Setting Dialog Box will close.

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



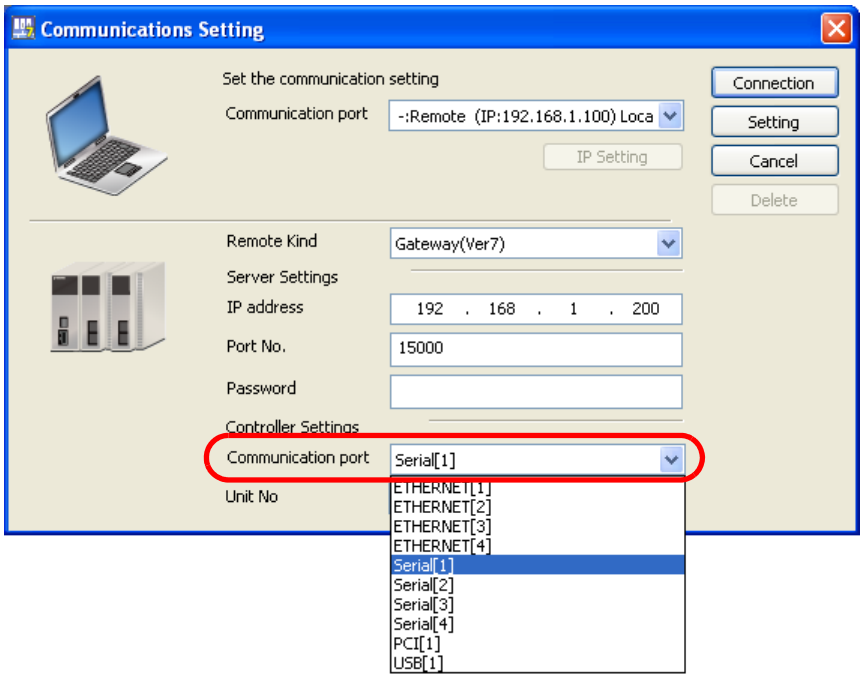
14. Enter values in the **IP address** and **Port No.** Boxes in the **Server Settings** Area.

- 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).



15. Select the communications interface in the **Communication port** Box in the **Controller Settings** Area.

- Board Controller: Select **PCI**.
- Other Controllers: Select **Serial**, **USB**, or **ETHERNET**.



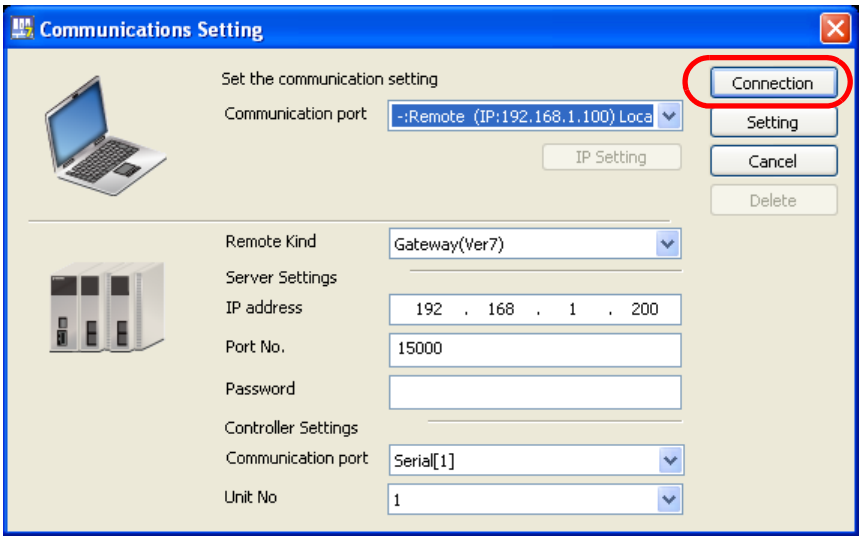
16. Specify one of the following.

- If you selected **PCI** in step 15: Set the CP number of the Board Controller in the **CPU No.** Box. Refer to the following section for details on CP numbers.

  ☞ *Using a Normal Connection to a Board Controller (page 1-23)*

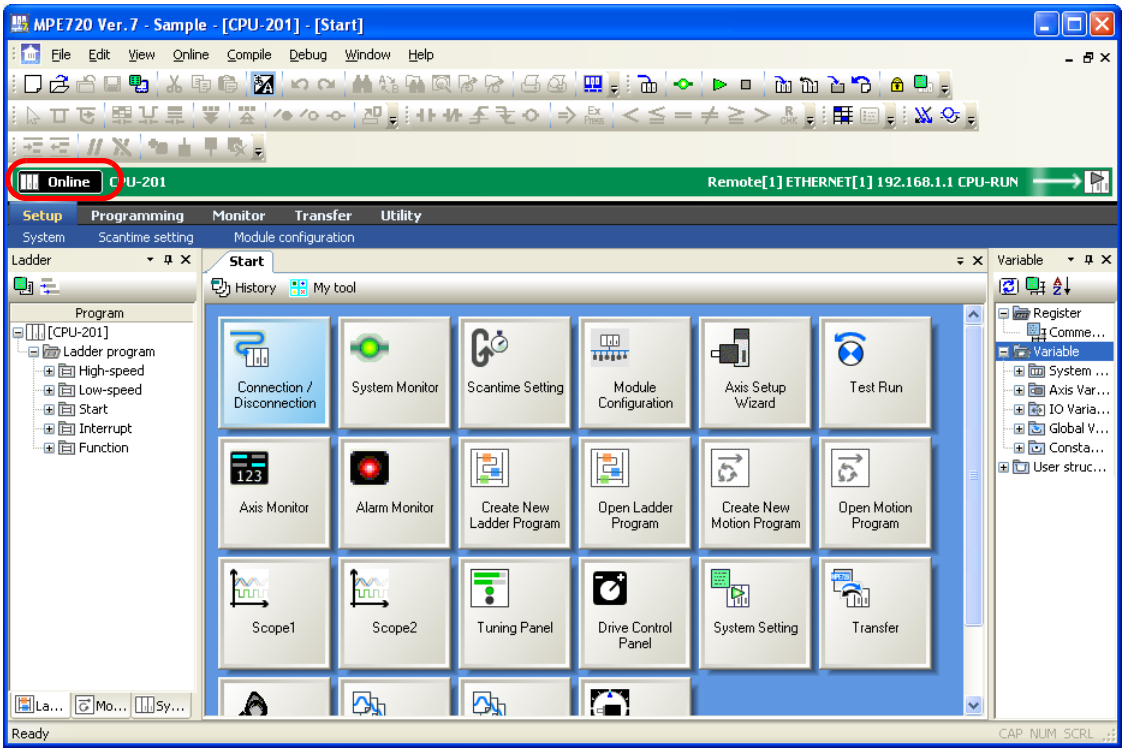
- If you selected **Serial** in step 15: Enter a value in the **Unit Number** Box.
- If you selected **USB** or **ETHERNET** in step 15: Enter the remote IP address of the remote Controller in the **IP address** Box.

17. Click the **Connection** Button.



The MPE720 Ver. 7 Window will appear.

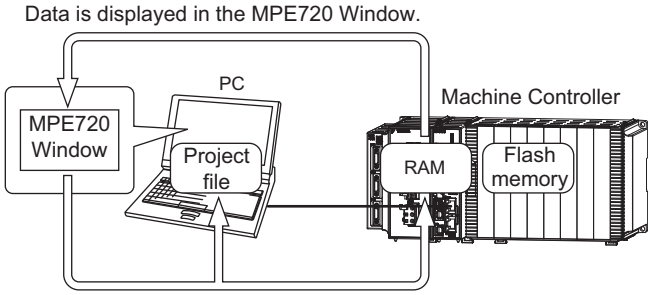
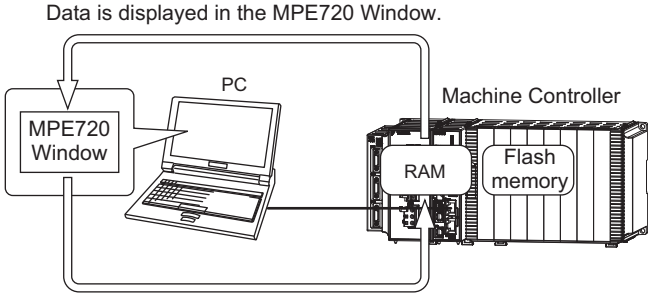
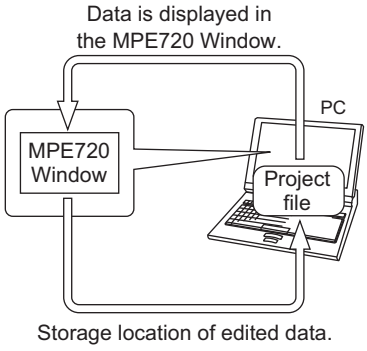
18. Confirm that “Online” appears to the upper left of the Launcher.



This concludes the procedure.

1.3 Editing Data and Storage Location

The data that is displayed in the MPE720 Window and the storage location for edited data depend on the type of connection and the state 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	Data Storage Location	Illustration
Online connections	Open	Project link connection	Data in Machine Controller RAM	In the 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.
	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.

Names and Descriptions of GUI Components

2

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

2.1 MPE720 Ver. 7 Window 2-3

2.2 Menu Bar 2-5

File Menu 2-5
Edit Menu 2-6
View Menu 2-6
Online Menu 2-7
Compile Menu 2-7
Debug Menu 2-7
Window Menu 2-8
Help Menu 2-8

2.3 Toolbars 2-9

Details 2-9
Toggling between Display and Hide 2-12

2.4 Launcher 2-14

Details 2-14
Toggling between Display and Hide 2-14

2.5 Caption Bar 2-15

2.6 Main Pane 2-16

History Tab Page 2-16
My Tool Tab Page 2-18
Edit Ladder Program Tab Page 2-34
Motion Editor Tab Page 2-35
Trace Tab Page 2-35

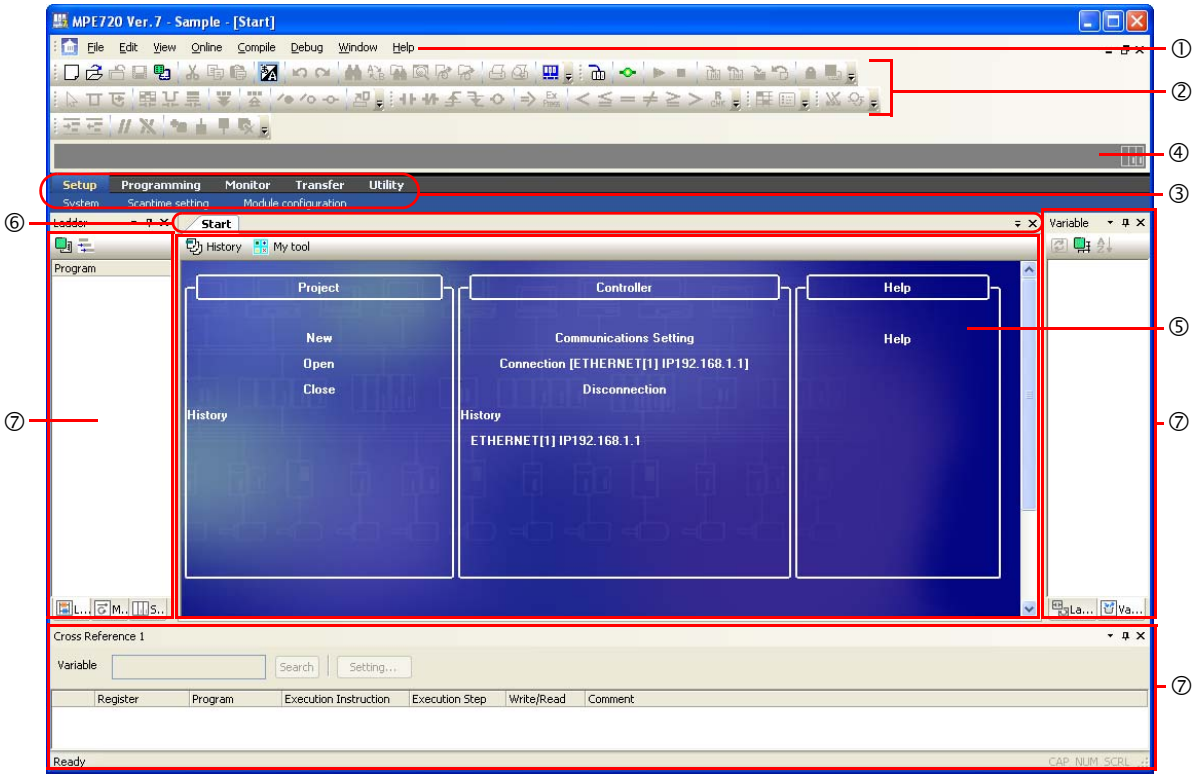
Comment List Tab Page 2-36
Tuning Panel Tab Page 2-37

2.7 Panes 2-38

Names and Descriptions of Pane Components 2-38
Displaying and Hiding Panes 2-39
Updating Pane Data 2-39
Types of Pane Displays 2-40

2.1 MPE720 Ver. 7 Window

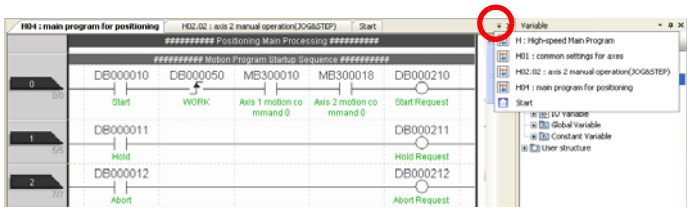
This section describes each of the MPE720 Ver. 7 Window components.



No.	Name	Description	Reference
①	Menu bar	Use the menu bar to select functions that are required to use the MPE720.	*Menu Bar (page 2-5)*
②	Toolbars	Used to facilitate using functions related to project file management and programming. You can display or hide each toolbar.	*Toolbars (page 2-9)*
③	Launcher	A submenu bar is displayed for quick and easy access to commonly use functions of the MPE720. You can display or hide the launcher.	*Launcher (page 2-14)*
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).	*Caption Bar (page 2-15)*
⑤	Main Pane	The following tab pages are displayed depending on the selected function. • History Tab Page • My Tool Tab Page • Edit Ladder Program Tab Page • Motion Editor Tab Page • Trace Tab Page • Comment List Tab Page • Tuning Panel Tab Page	*Main Pane (page 2-16)*

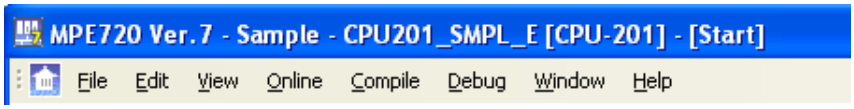
Continued on next page.

Continued from previous page.

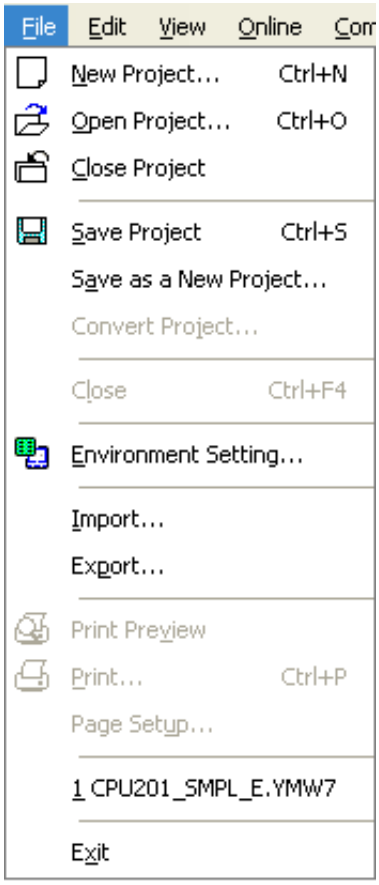
No.	Name	Description	Reference
⑥	Page Tabs	The page tabs are used to select the page that is displayed in the foreground when multiple tab pages are available. If there are many tab pages and not all of the tabs can be displayed, click the [▼] Button to display a list of tab pages to choose from. 	–
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 • Variables Pane • Cross Reference Pane • Check for Multiple Coils Pane • Register List Pane • Watch Pane • Output Pane • Search Pane • Transfer Pane • Forced Coil List Pane • Auto Watch Pane	*Panes (page 2-38)*

2.2 Menu Bar

This section gives details on the menu bar.



File Menu



Creates a project file.

Selects and opens a project file.

Closes the currently open project file.

Saves by overwriting the currently open project file.

Saves the currently open project file as a separate file.

Converts project files that were originally created for an MP2000-series Controller for use with an MP3000-series Controller.

Closes the currently open program.

Displays the Environment Setting Dialog Box.

Imports files.

Exports files.

Displays a printing preview.

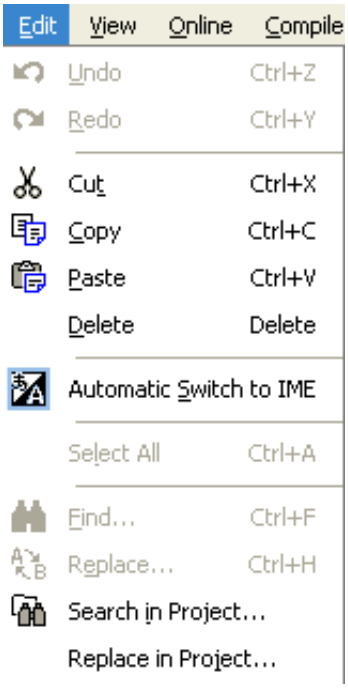
Displays the Print Dialog Box.

Displays the Page Setting Dialog Box.

Displays the names of the last five project files that were opened.
Click a file name to open that project file.

Exits the MPE720.

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 button is selected, the input from the keyboard is automatically switched between Japanese and English according to the box that is selected for input.

Selects the entire range in the currently displayed view.

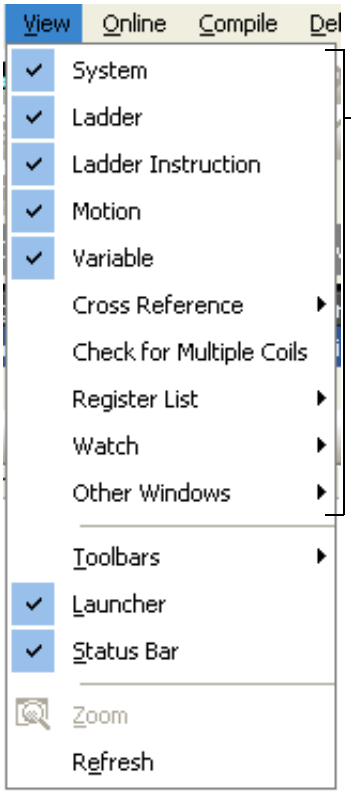
Displays the **Search** Dialog Box, which allows you to search for registers and other items.

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.

View Menu



Toggle between displaying and hiding the selected panes.

Toggles between displaying and hiding the selected toolbars.

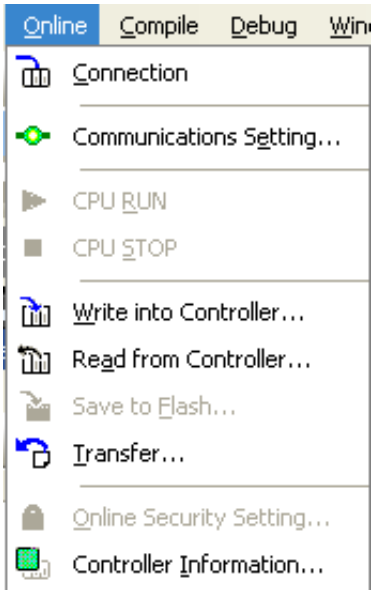
Toggles between displaying and hiding the launcher.

Toggles between displaying and hiding the status bar.

Changes the display magnification.

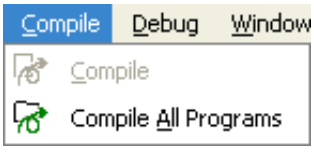
Updates the Ladder Pane, Motion Pane, and Variables Pane with the latest information.

Online Menu



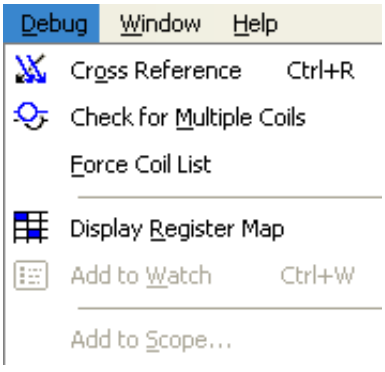
Connection	Establishes a logical connection between the PC on which the MPE720 is installed and a Controller.
Communications Setting...	Opens the Communications Setting Dialog Box to set up communications between the PC on which the MPE720 is installed and a Controller.
CPU RUN	Starts the CPU of the connected Controller.
CPU STOP	Stops the CPU of the connected Controller.
Write into Controller...	Writes the contents of the project file into the Controller.
Read from Controller...	Writes the data from the Controller into the project file.
Save to Flash...	Saves the contents of the Machine Controller RAM data to the flash memory in the Machine Controller.
Transfer...	Transfers data, such as programs and registers.
Online Security Setting...	Opens the Security Setting Dialog Box.
Controller Information...	Displays information about the Machine Controller.

Compile Menu



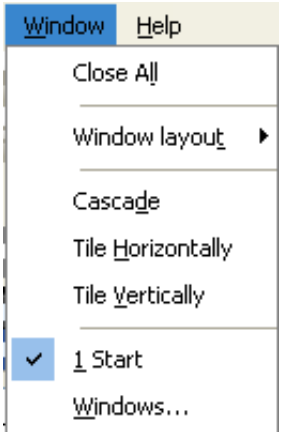
Compile	Compiles the currently displayed program.
Compile All Programs	Compiles all programs.

Debug Menu



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

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.

Displays the tab pages in the Main Pane arranged in a cascade.

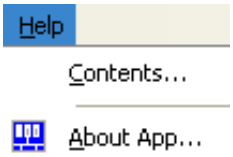
Displays the tab pages in the Main Pane arranged in a vertical stack.

Displays the tab pages in the Main Pane arranged side by side.

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.

Help Menu



Displays the table of contents for the help file.

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

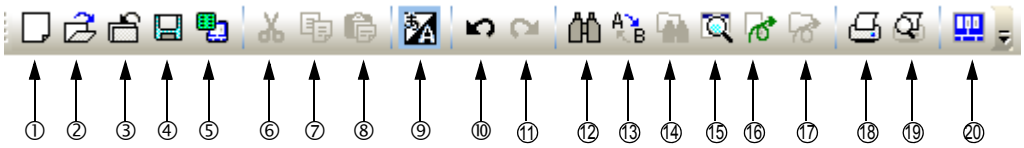
2.3 Toolbars

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

Details

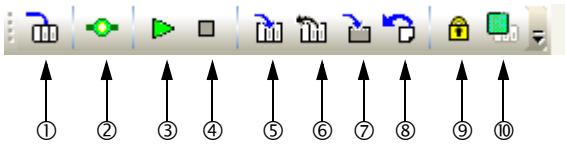
This section gives details on the toolbars.

Standard Toolbar



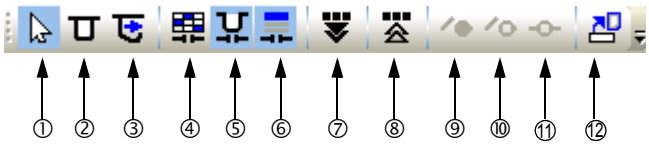
No.	Description
①	Creates a project file.
②	Opens an existing project file.
③	Closes the currently open project file.
④	Saves by overwriting the currently open project file.
⑤	Displays the Environment Setting Dialog Box.
⑥	Cuts the contents in the selected range.
⑦	Copies the contents in the selected range.
⑧	Inserts the contents that has been cut or copied.
⑨	When this button is selected, the input from the keyboard is automatically switched between Japanese and English according to the box selected for input.
⑩	Reverses the effect of the last operation.
⑪	Performs the last operation that was reversed using **Undo**.
⑫	Displays the Search Dialog Box, which allows you to search for registers and other items.
⑬	Displays the Replace Dialog Box, which allows you to replace registers and other items.
⑭	Displays the Search Dialog Box, which allows you to search for registers and other items in a specified project.
⑮	Changes the display magnification.
⑯	Compiles the currently displayed program.
⑰	Compiles all programs.
⑱	Displays the Print Dialog Box.
⑲	Displays a printing preview.
⑳	Displays the version, user name, company name, and serial number of the MPE720.

Online Toolbar



No.	Description
①	Establishes a logical connection between the PC on which the MPE720 is installed and a Controller.
②	Opens the Communications Setting Dialog Box to set up communications between the PC on which the MPE720 is installed and a Controller.
③	Starts the CPU of the connected Controller.
④	Stops the CPU of the connected Controller.
⑤	Writes the contents of the project file into the Controller.
⑥	Writes the data from the Controller into the project file.
⑦	Saves the contents of the Machine Controller RAM data to the flash memory in the Machine Controller.
⑧	Transfers data, such as programs and registers.
⑨	Opens the Security Setting Dialog Box.
⑩	Displays information about the Machine Controller.

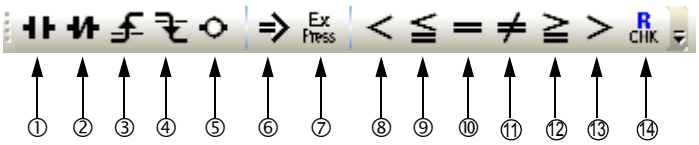
Ladder Editor Toolbar



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

No.	Description
①	Normal Edit Mode
②	Branch Creation Mode
③	Branch Edit Mode
④	Toggles between displaying and hiding register addresses.
⑤	Toggles between displaying and hiding register variables.
⑥	Toggles between displaying and hiding register comments.
⑦	Turns ON batch scoping.
⑧	Turns OFF batch scoping.
⑨	Forces ON the coils in the selected register.
⑩	Forces OFF the coils in the selected register.
⑪	Clears a selected register that has been forced ON or forced OFF.
⑫	Lists program locations that have called the current position.

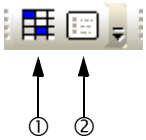
Ladder Instruction Toolbar



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

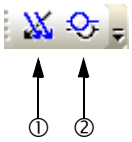
No.	Description
①	Inputs an NO contact.
②	Inputs an NC contact.
③	Inputs a rising-edge pulse.
④	Inputs a falling-edge pulse.
⑤	Inputs a coil.
⑥	Inputs a Store (=>) instruction.
⑦	Inputs an Expression instruction.
⑧	Inputs a Less Than (<) instruction.
⑨	Inputs a Less Than or Equal (<=) instruction.
⑩	Inputs an Equal (==) instruction.
⑪	Inputs a Not Equal (!=) instruction.
⑫	Inputs a Greater Than or Equal (>=) instruction.
⑬	Inputs a Greater Than (>) instruction.
⑭	Checks that the input data is within the upper and lower limits.

Monitor Toolbar



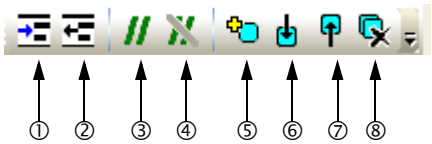
No.	Description
①	Displays the values (memory map) of registers at consecutive addresses.
②	Adds the selected register to the Watch Pane.

Debug Toolbar



No.	Description
①	Performs a search on variables or registers currently used in the program.
②	Searches all ladder programs for different coils that use the same register.

Motion Editor Toolbar



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

No.	Description
①	Indents the line by one level.
②	Reverses the line indentation by one level.
③	Puts the editor in Line Comment Entry Mode.
④	Cancels Line Comment Entry Mode.
⑤	Sets or cancels a bookmark.
⑥	Jumps to the next bookmark.
⑦	Jumps to the previous bookmark.
⑧	Clears all bookmarks.

Toggling between Display and Hide

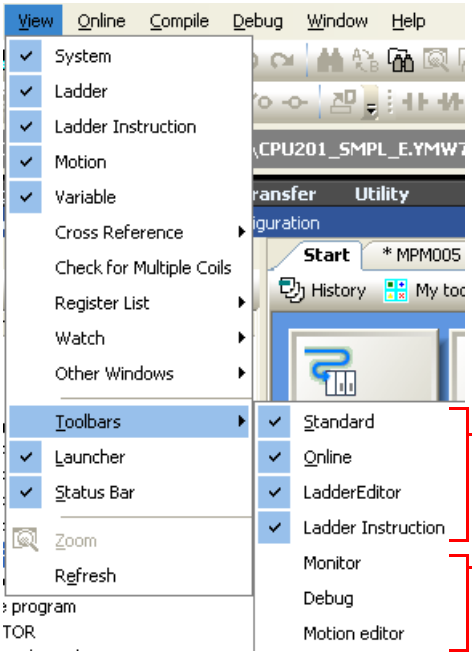
You can display or hide in the following two ways for toolbars:

- 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 ***Toolbars*** on the ***View*** Menu.



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.

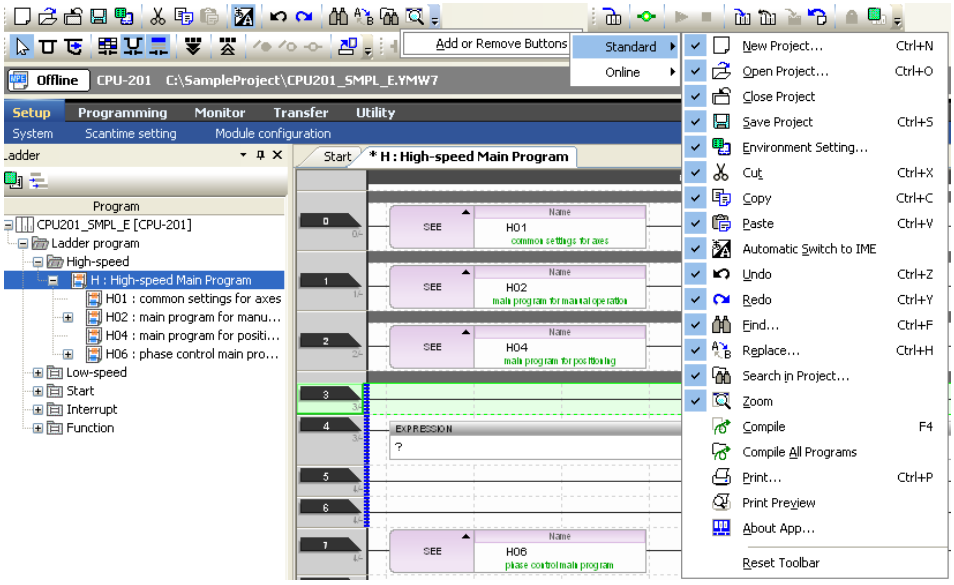
Toolbars without a check mark are not displayed in the window.
Selecting an item in this state displays the corresponding toolbar and adds the check mark.

Displaying and Hiding Individual Buttons on Each Toolbar

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

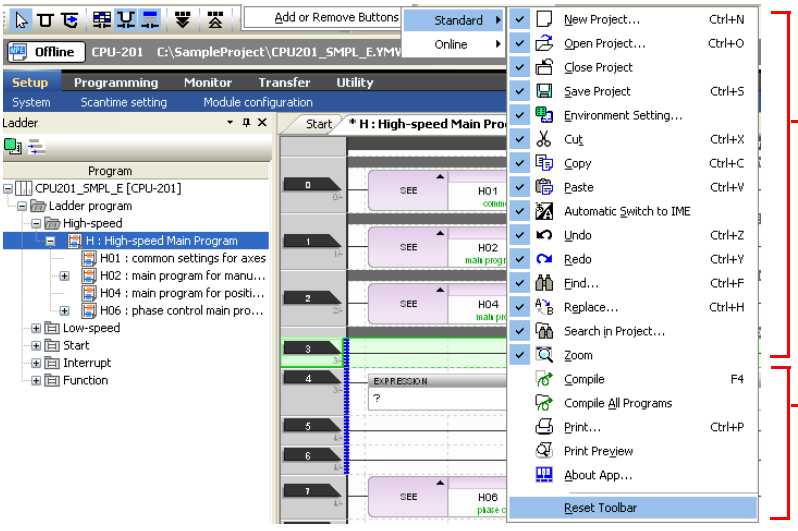
1. Click the on the toolbar you wish to display or hide.

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.

2.4 Launcher

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

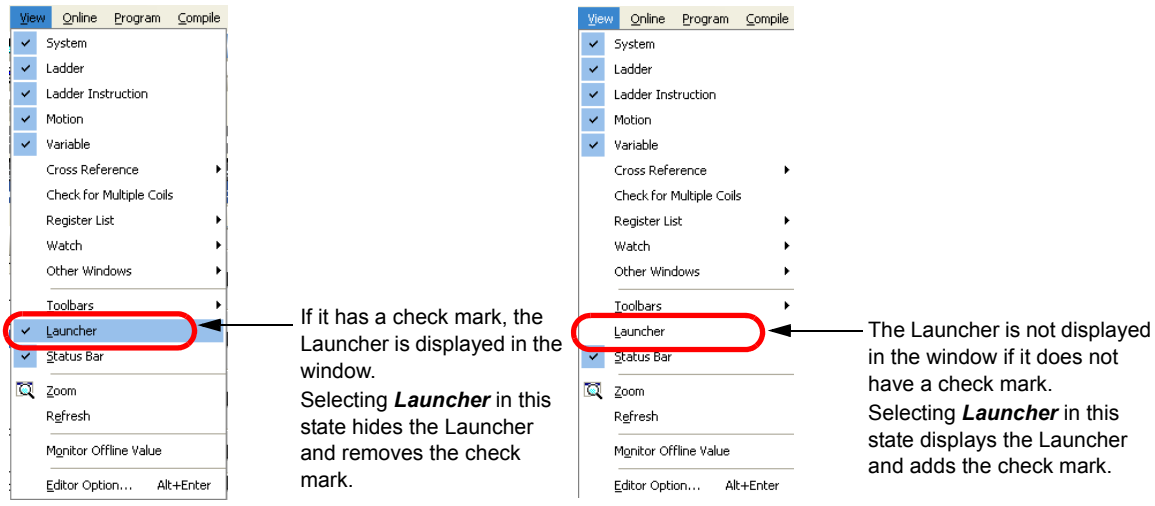
Details

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.

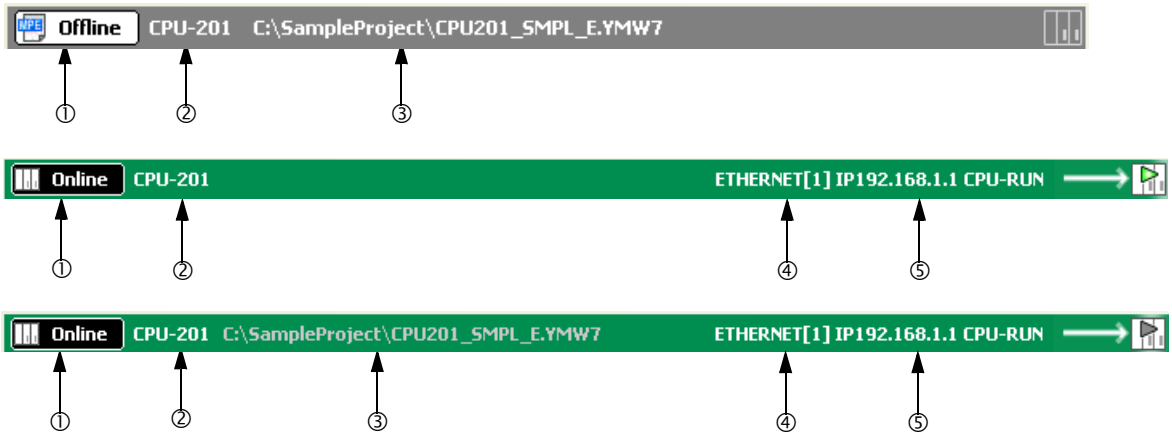
Toggling between Display and Hide

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



2.5 Caption Bar

This section gives details on the Caption Bar.



No.	Display	Description
①	Online	The MPE720 is logically connected to the Controller.
	Offline	The MPE720 is not logically connected to the Controller.
②	Controller model	Displays the model of the 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 Controller. This is displayed only in online mode.
	Serial	
	USB	
⑤	IP address of Controller	Displays the IP address of the Controller that is connected to the MPE720. This is displayed only in online mode.

2.6 Main Pane

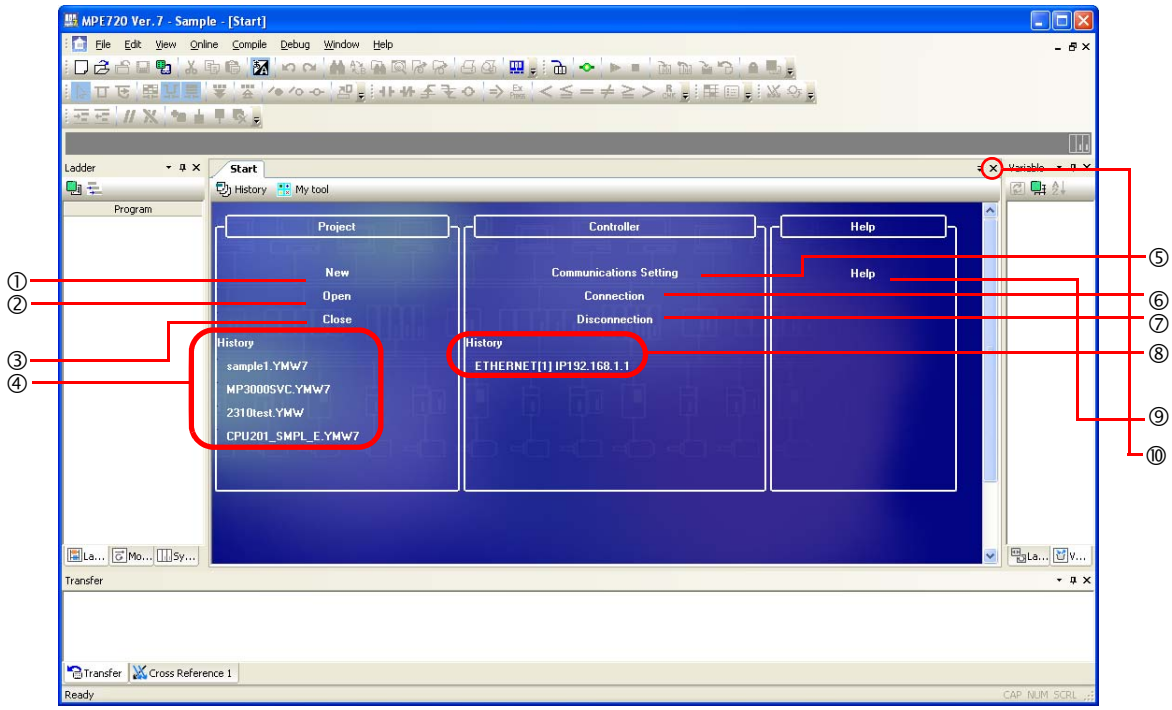
You can display the seven tab pages given below in the Main Pane.

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

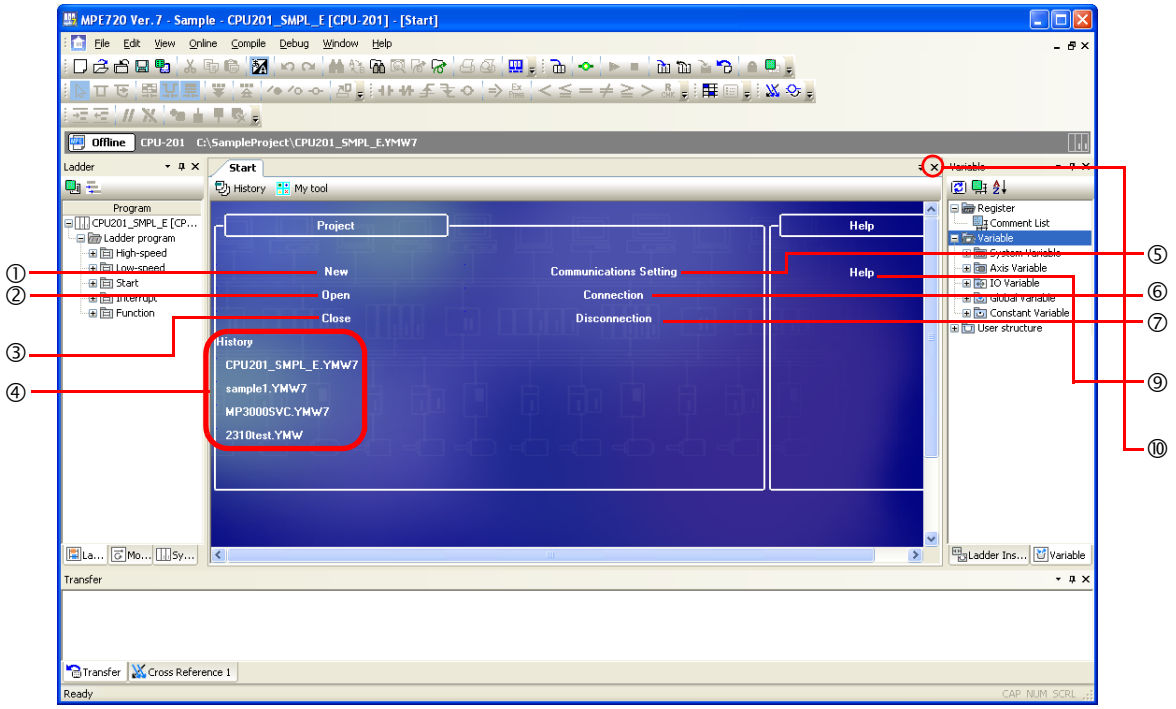
This section gives details on each tab page.

History Tab Page

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



When a Project File Is Not Opened



When a Project File Is Open

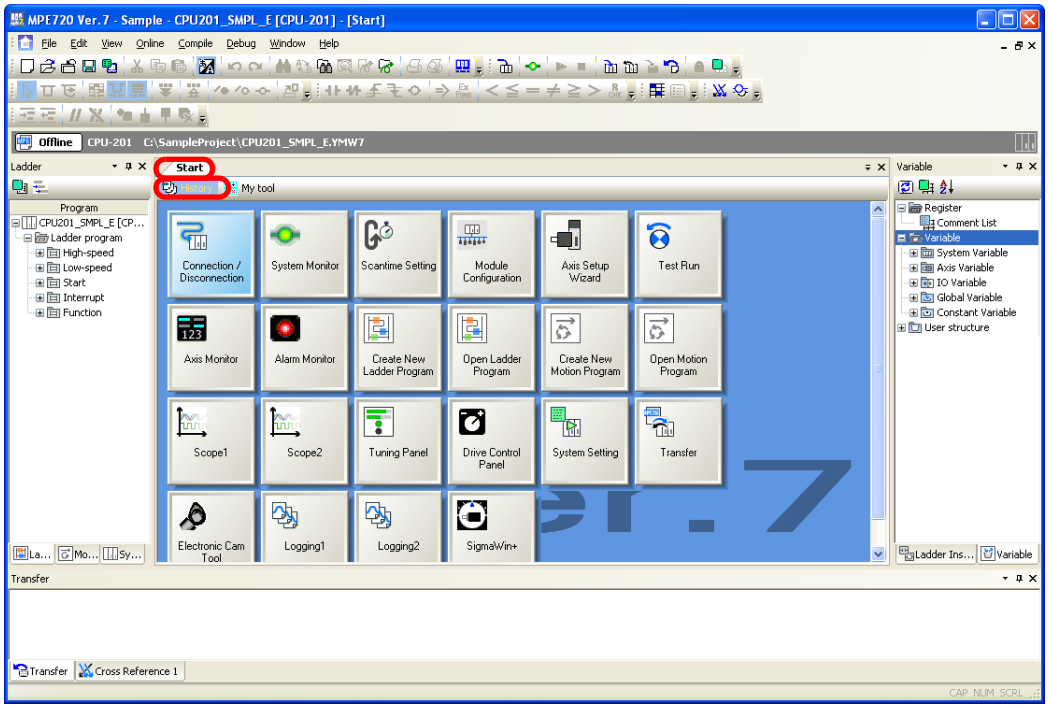
The following items are displayed in the History Tab Page.

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. ☞ *1.2 Detailed Procedures – Creating a Project File (page 1-17)*
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 sections for details on using a project link connection. ☞ *1.3 Editing Data and Storage Location (page 1-52)*
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. ☞ *1.2 Detailed Procedures – Setting Up Communications (page 1-21)*
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.

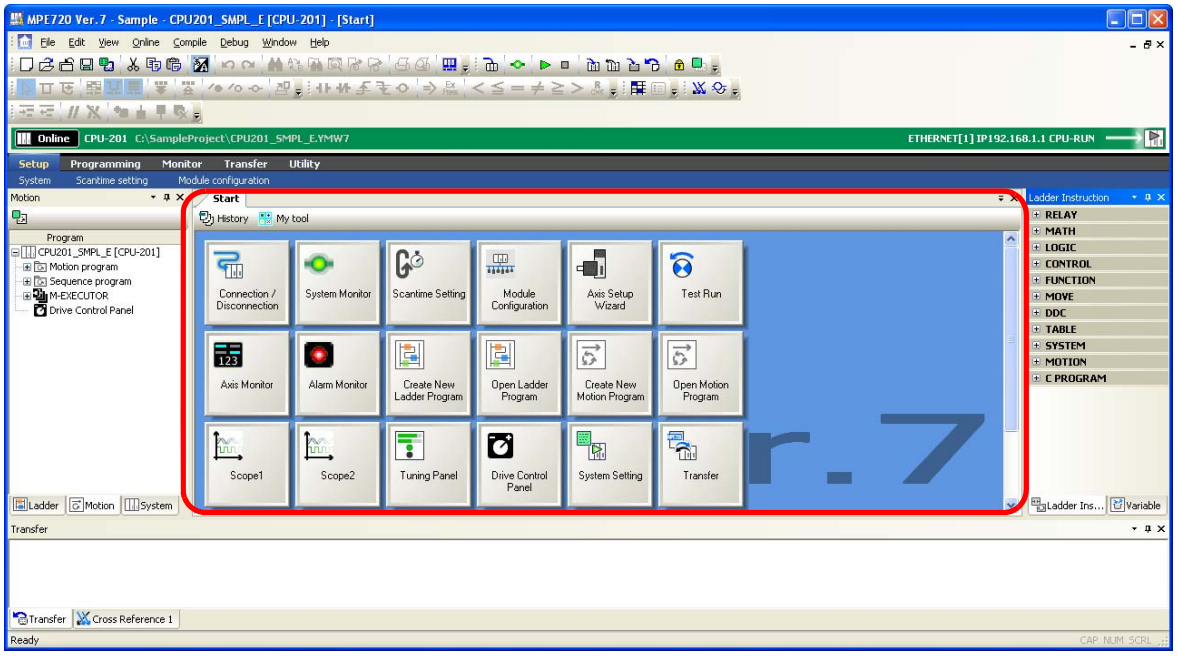
Displaying the History Tab Page

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



My Tool Tab Page

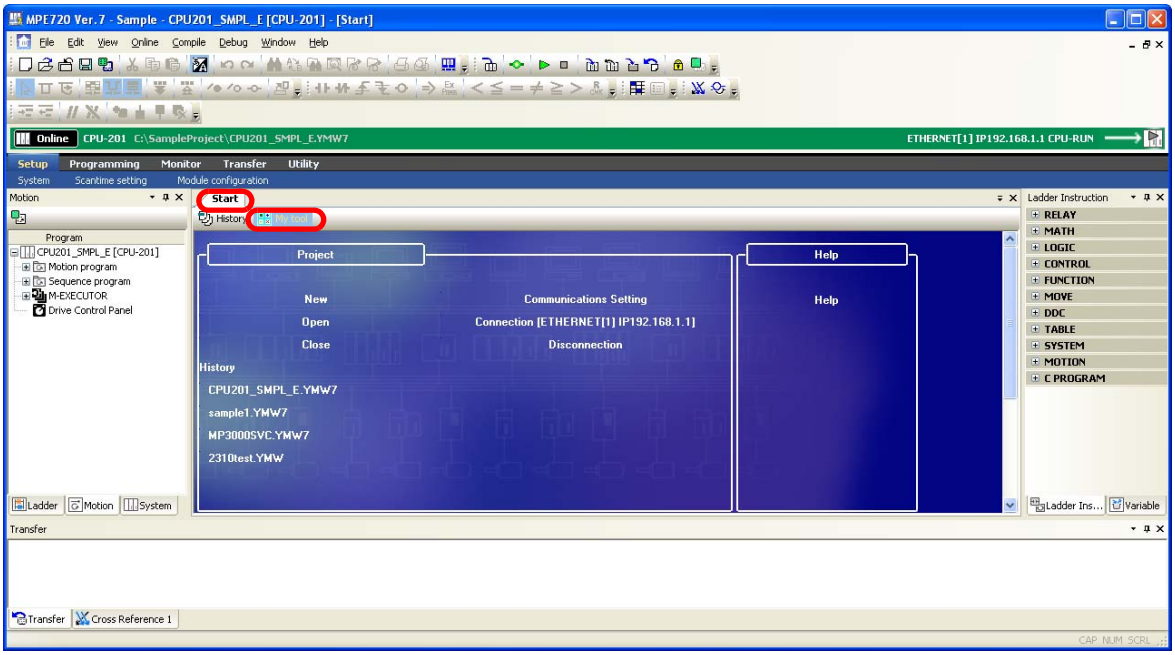
You can easily start any of the various functions by clicking on a button in the My Tool Tab Page. You can customize the buttons that are registered to the My Tool Tab Page, or you can register frequently used functions to enable engineering to be started quickly.



Displaying the My Tool Tab Page

The My Tool Tab Page 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 Tab Page is to click **My tool** from the **Start** Tab Page caption bar.



Names and Functions of Buttons on the My Tool Tab Page

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

Button Name	Function
Connection/Disconnection	Connects or disconnects the Controller.
Scantime Setting	Sets the high-speed and low-speed scan time.
Module Configuration	Opens the Module Configuration Definition 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 Controller must be compatible with sequence programs.
Open Motion Program	Displays a motion program that was selected from a list.
Tuning Panel	Used to monitor, edit, and adjust the current value of variables from the tuning panel.
Scope1	Analyzes the data obtained by Scope 1 in the form of a trend graph or XY graph.
Scope2	Analyzes the data obtained by Scope 2 in the form of a trend graph or XY graph.
Drive Control Panel	Controls the operation of motion programs from the panel.
SigmaWin+	Starts SigmaWin+ and makes adjustments for SERVOPACKs.

Continued on next page.

Continued from previous page.

Button Name	Function
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.
Communication Setting	Used to set up the communications to connect to the Controller.
System Setting	Displays the system settings.
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 Controller.
Read from Controller*	Reads the data from the Controller to a project file.
Save to Flash*	Writes the data in the Controller RAM to the flash memory.

* These buttons are not displayed by default.

Editing Buttons on the My Tool Tab Page

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

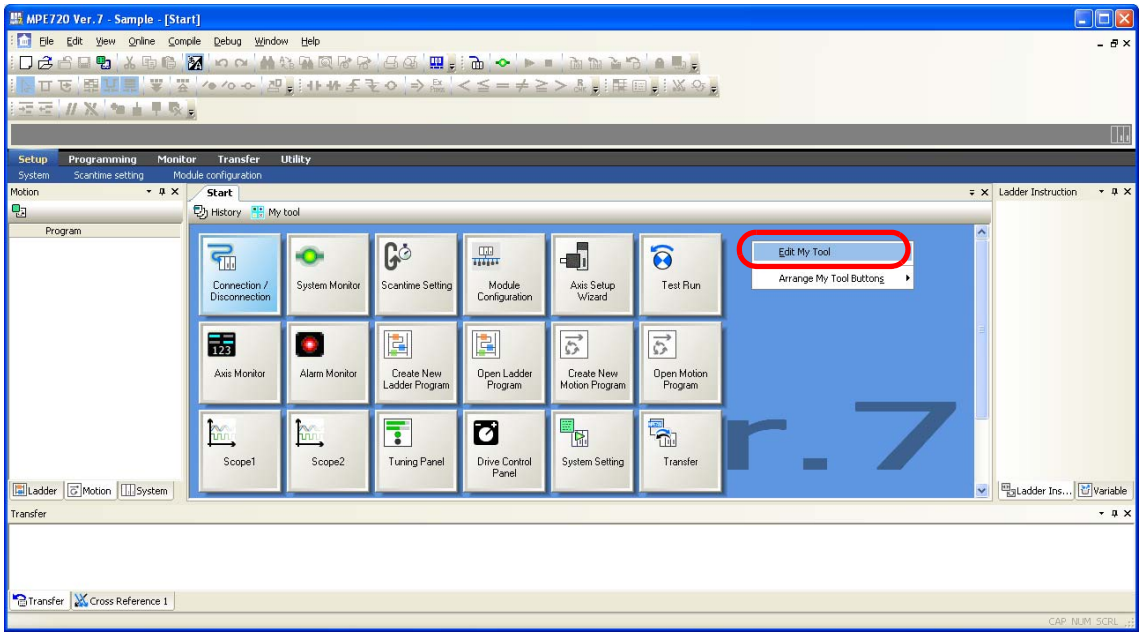
One customized setting is allowed for one installation of the MPE720.

The section gives the six procedures that are listed below.

☞ ◆ *Displaying Buttons on the My Tool Tab Page (page 2-20)*
☞ ◆ *Hiding Buttons on the My Tool Tab Page (page 2-23)*
☞ ◆ *Changing the Display Position of a Button (page 2-25)*
☞ ◆ *Renaming a Button (page 2-27)*
☞ ◆ *Changing the Icon of a Button (page 2-29)*
☞ ◆ *Changing the Number of Buttons to be Displayed in Each Row (page 2-31)*

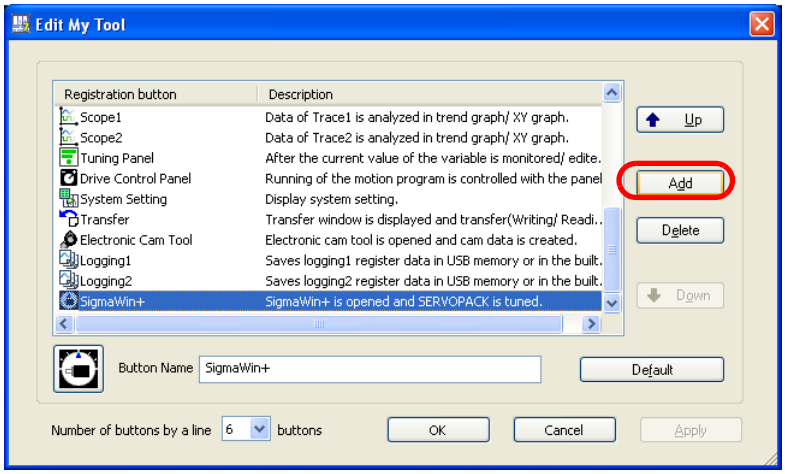
◆ Displaying Buttons on the My Tool Tab Page

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



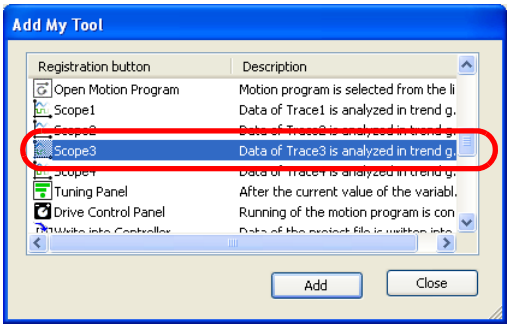
The Edit My Tool Dialog Box will be displayed.

2. Click the **Add** Button.

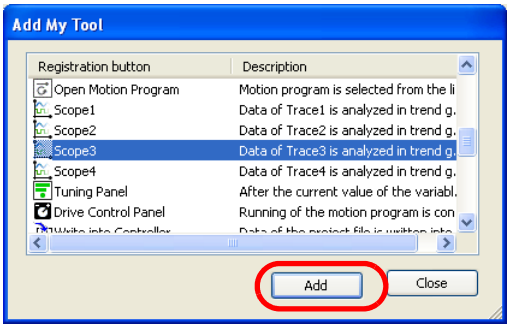


The Add My Tool Dialog Box will be displayed.

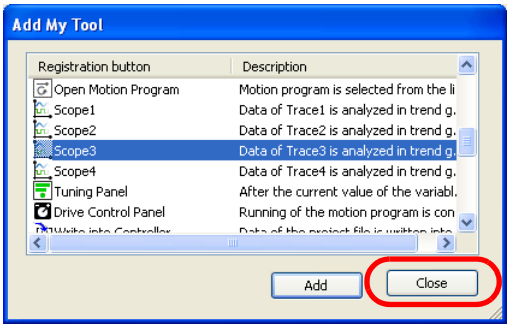
3. Select the function to add.



4. Click the **Add** Button.

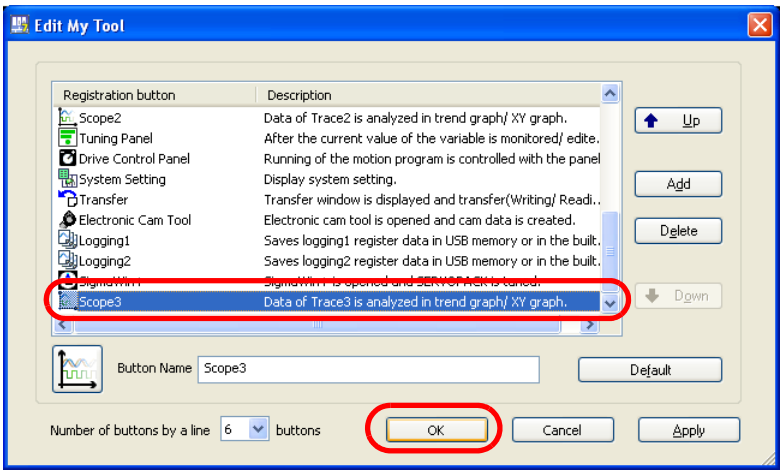


5. Click the **Close** Button.



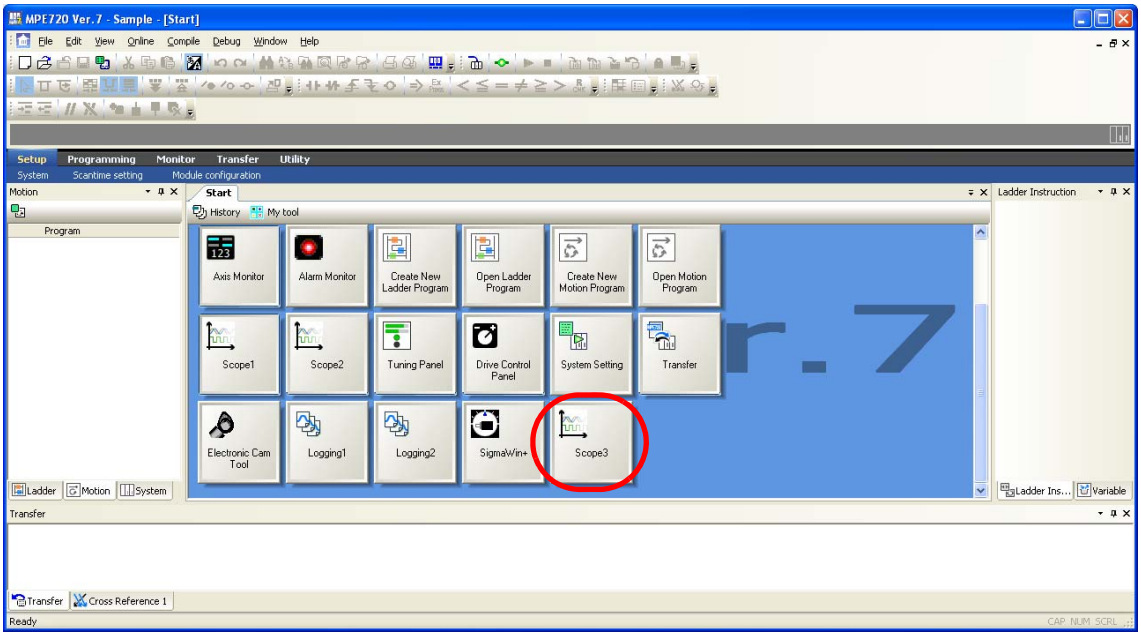
The Add My Tool Dialog Box will close.

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.

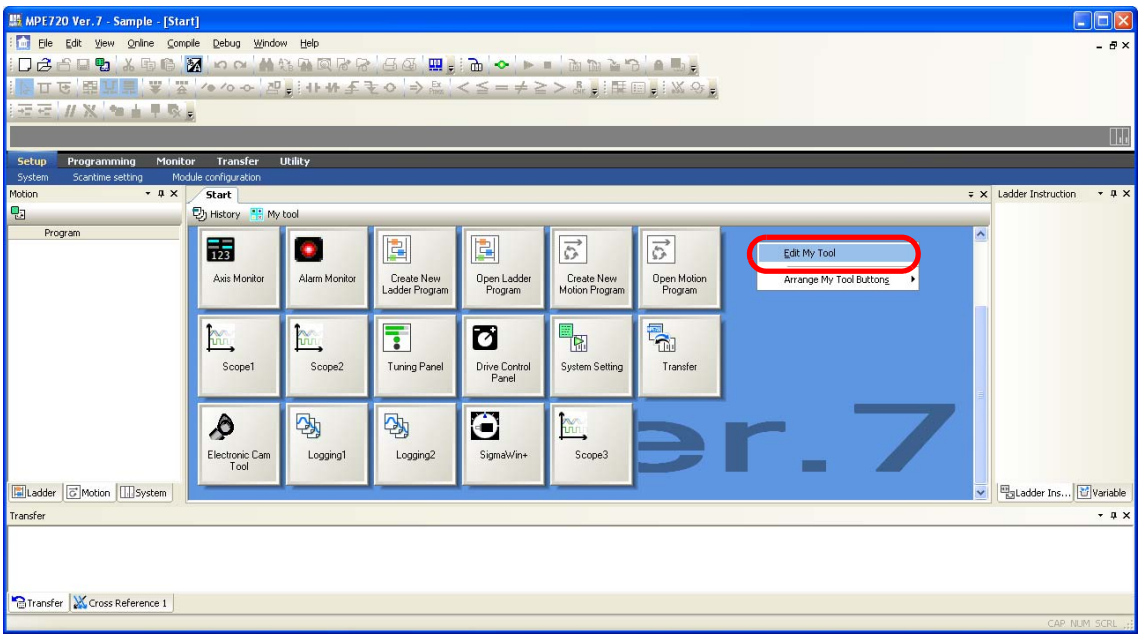
7. Confirm that the button appears in the My Tool Tab Page.



This concludes the procedure.

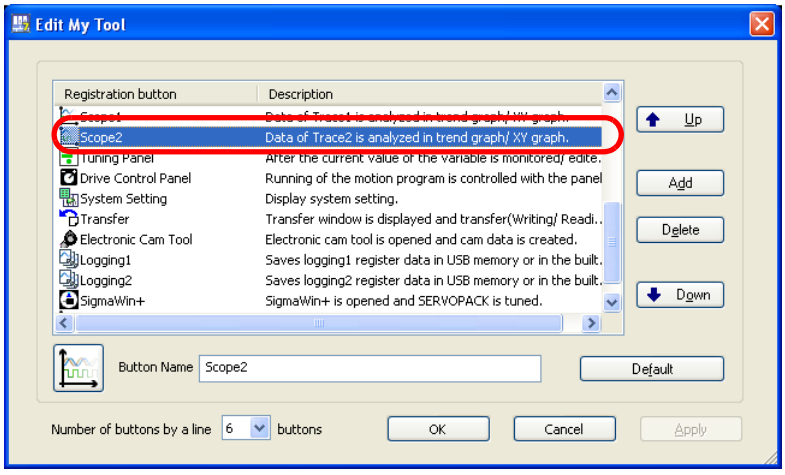
◆ Hiding Buttons on the My Tool Tab Page

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

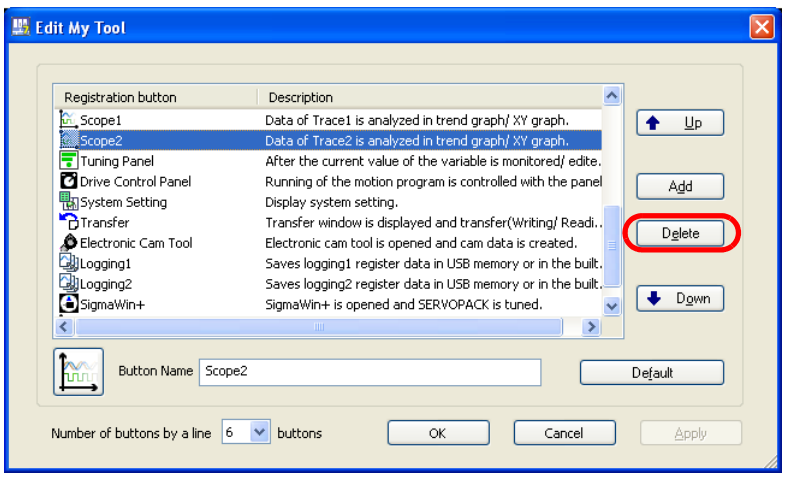


The Edit My Tool Dialog Box will be displayed.

2. Select the function to delete.

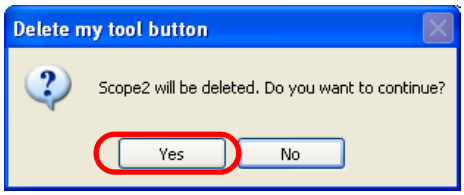


3. Click the **Delete** Button.

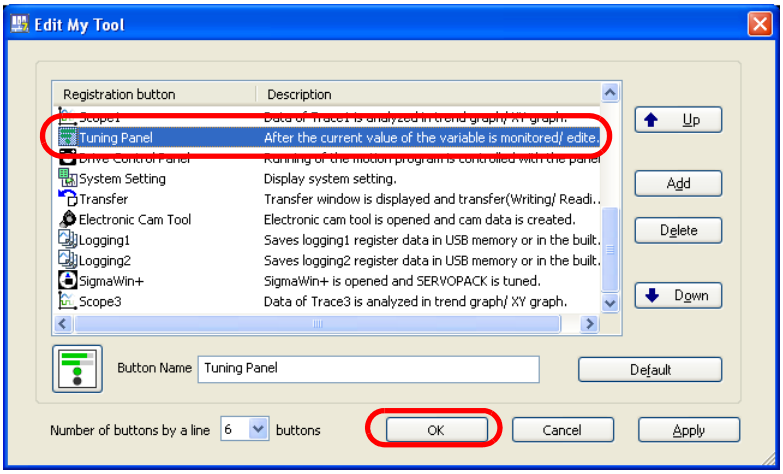


The Delete My Tool Button Dialog Box will be displayed.

4. Click the **Yes** Button.

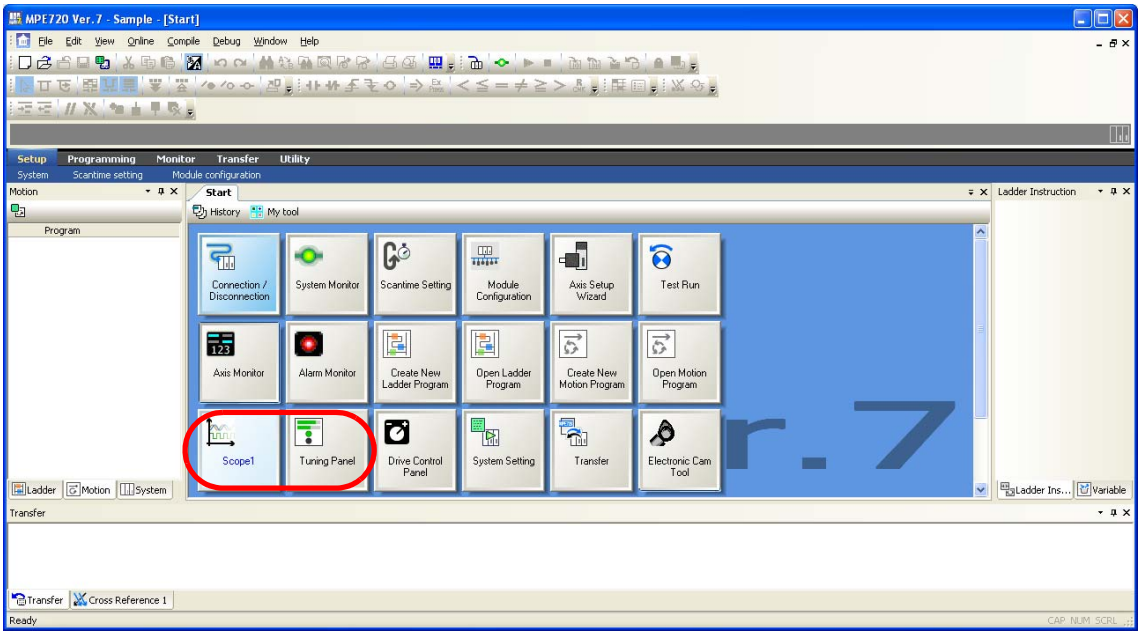


5. Confirm that the button for the function selected in step 2 is deleted, and then click the **OK** Button.



The Edit My Tool Dialog Box will close.

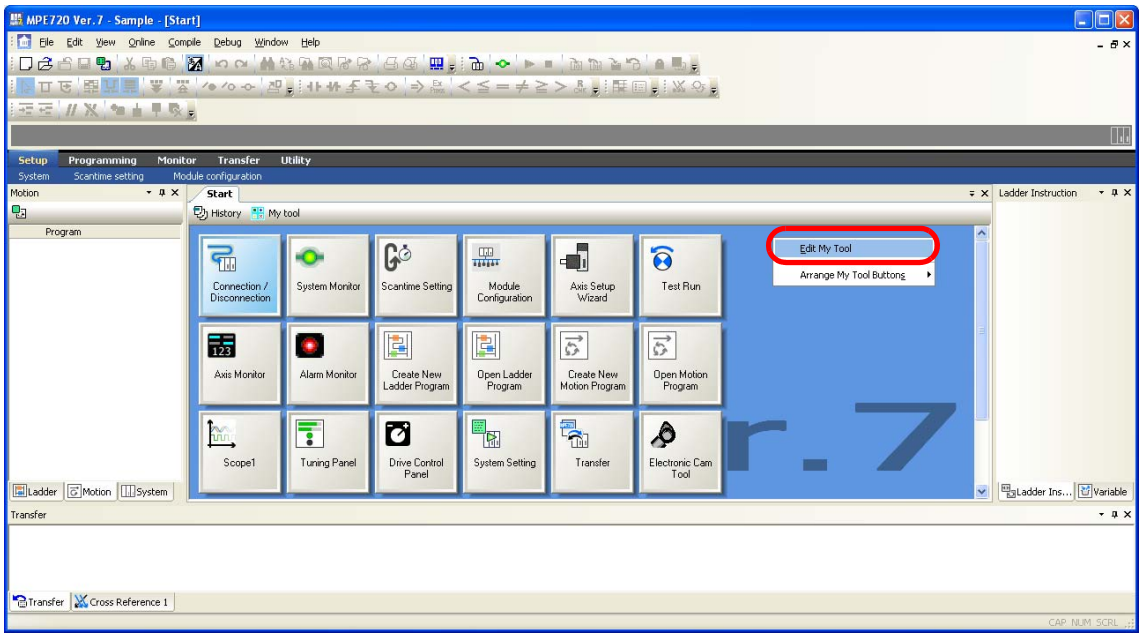
6. Confirm that the button for the selected function no longer appears in the My Tool Tab Page.



This concludes the procedure.

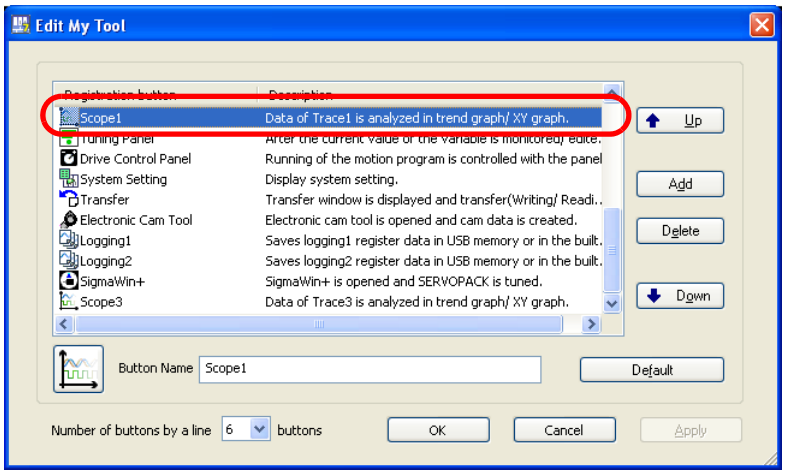
◆ Changing the Display Position of a Button

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

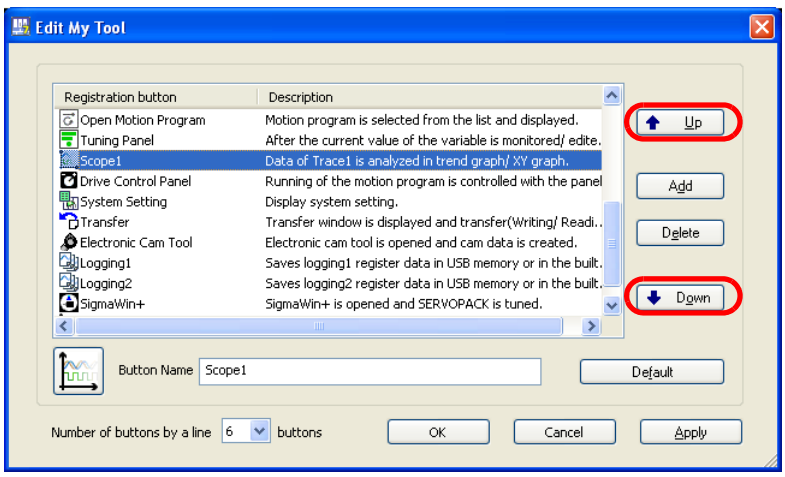


The Edit My Tool Dialog Box will be displayed.

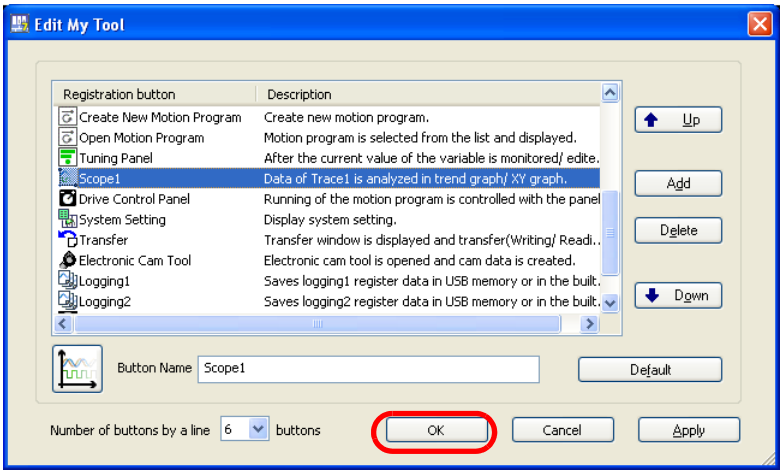
2. Select the function for which to change the display position.



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

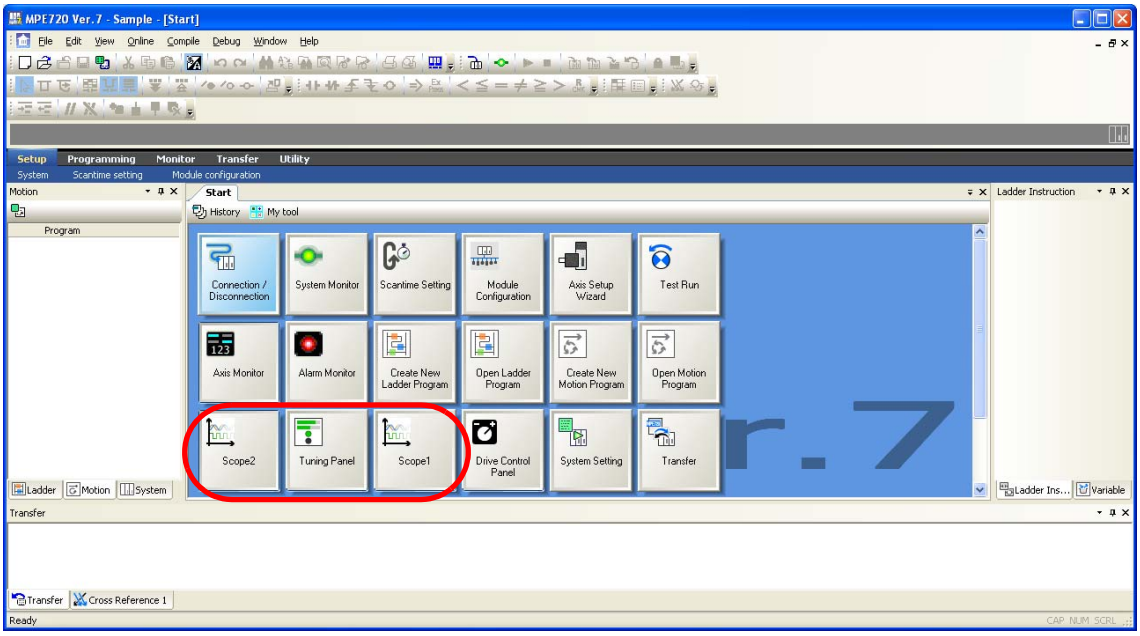


4. Click the **OK** Button.



The Edit My Tool Dialog Box will close.

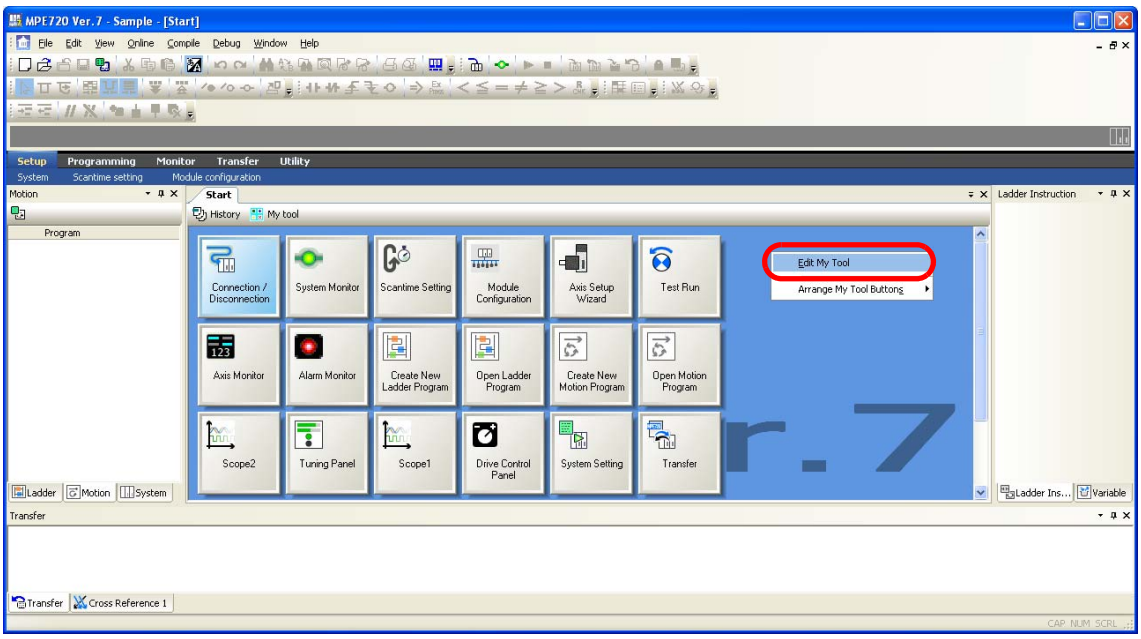
5. Confirm that the display position of the button has changed.



This concludes the procedure.

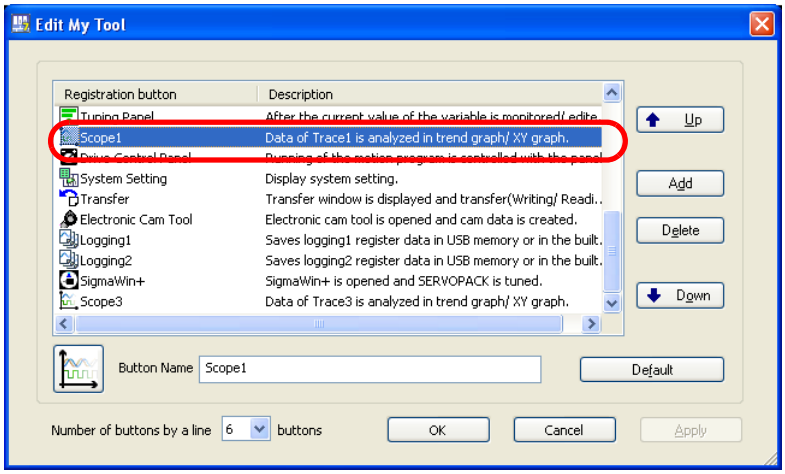
◆ Renaming a Button

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

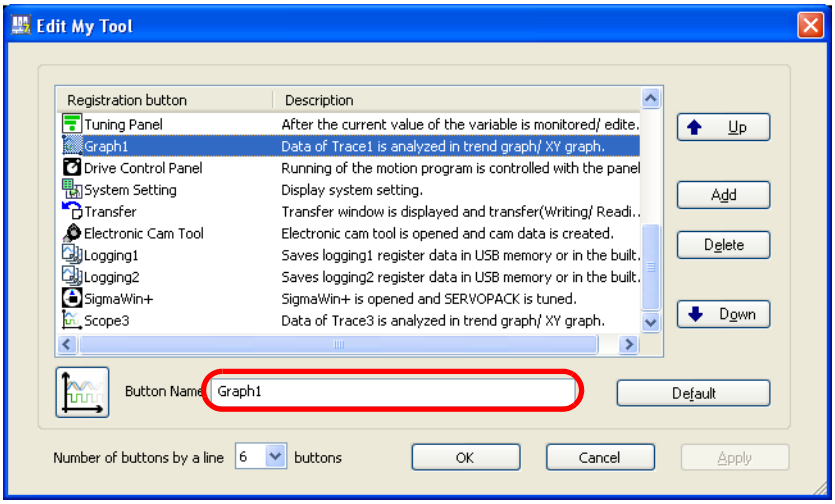


The Edit My Tool Dialog Box will be displayed.

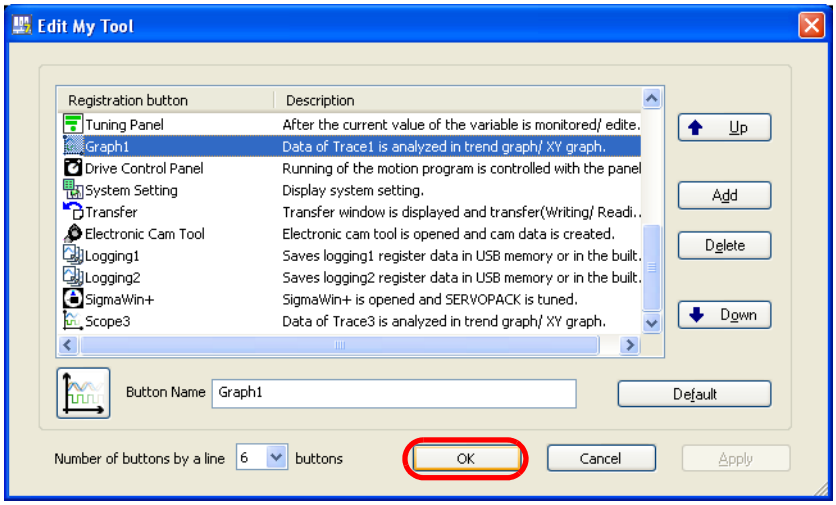
2. Select the function for which to change the name.



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

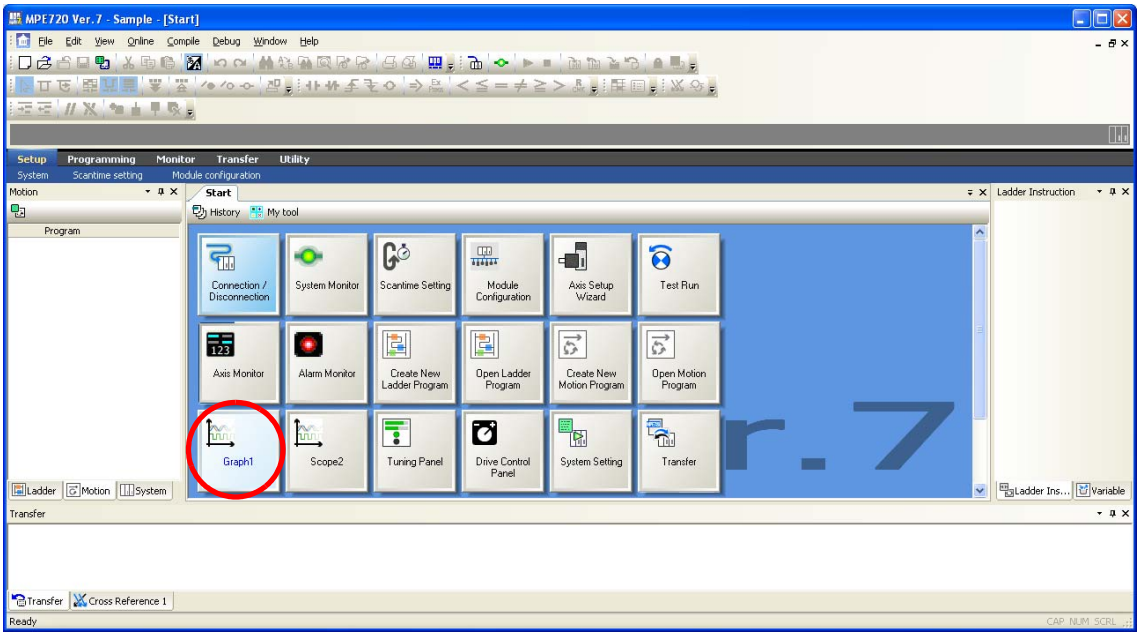


4. Click the **OK** Button.



The Edit My Tool Dialog Box will close.

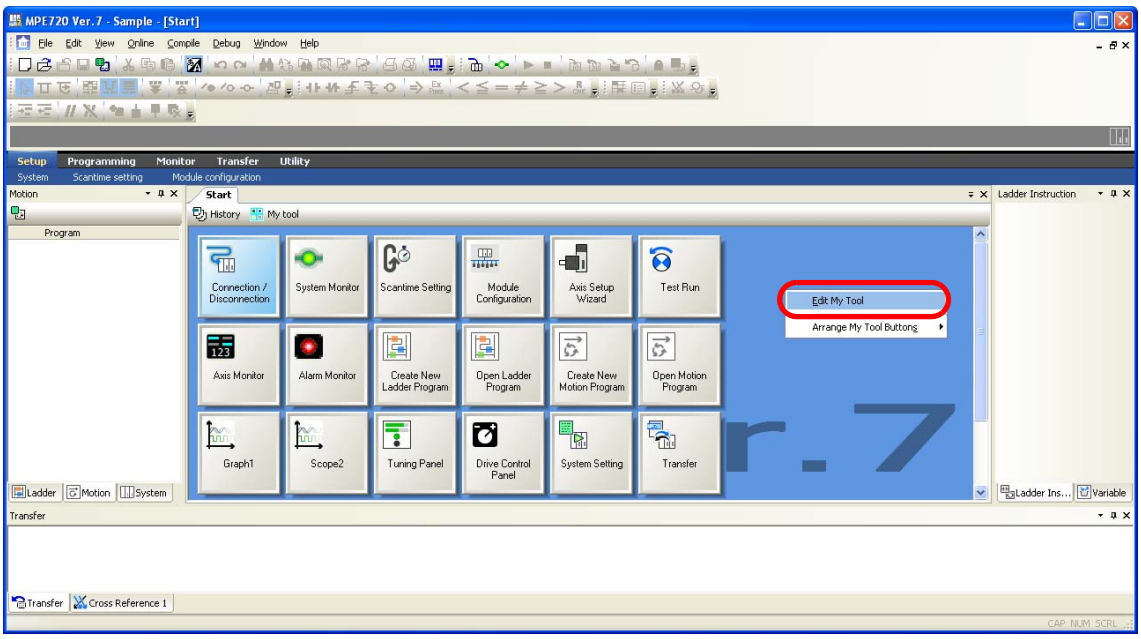
5. Confirm that the name of the button has changed.



This concludes the procedure.

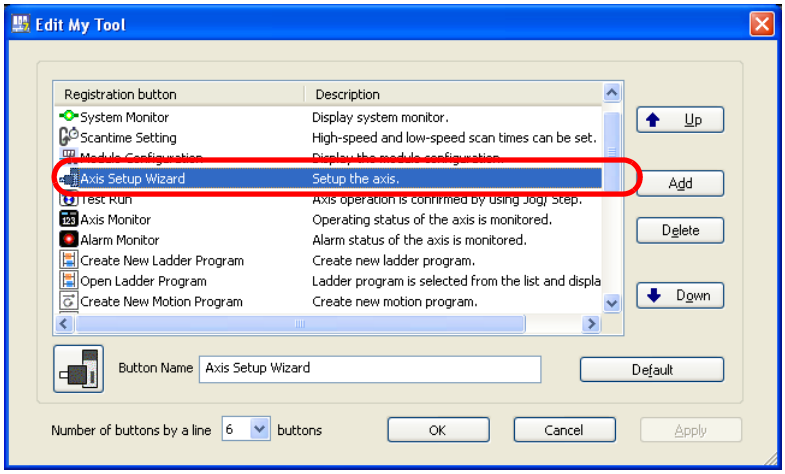
◆ Changing the Icon of a Button

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

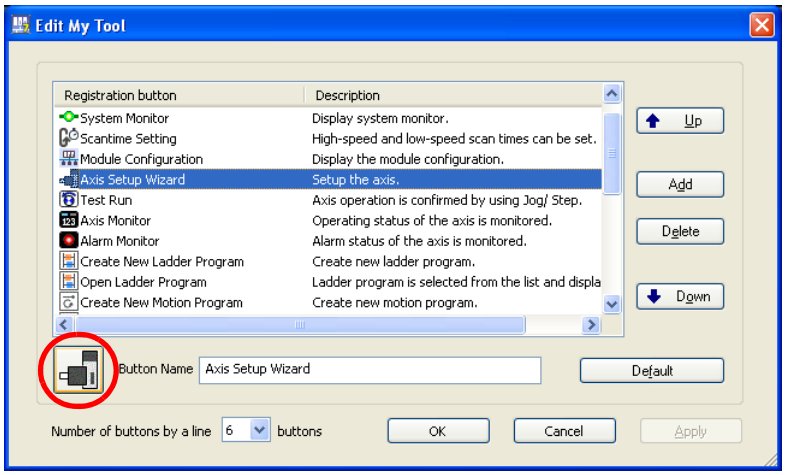


The Edit My Tool Dialog Box will be displayed.

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

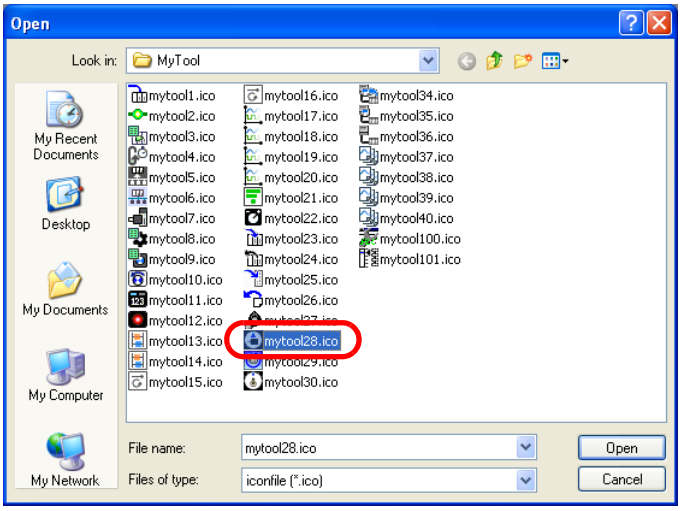


3. Click the icon.

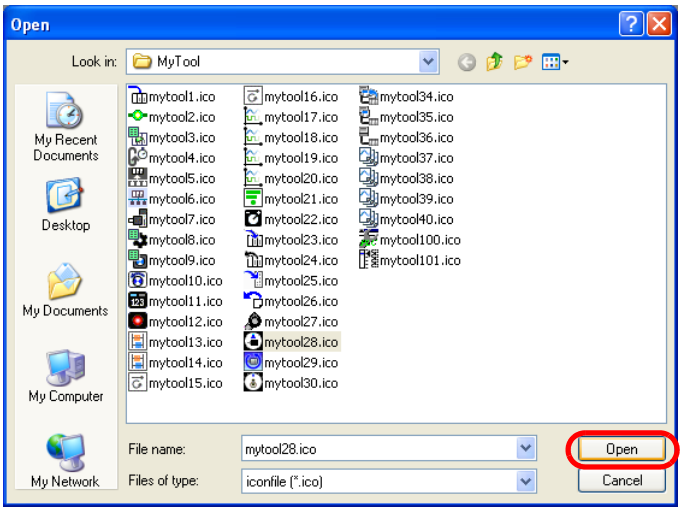


The File Open Dialog Box will be displayed.

4. Select the image to register.

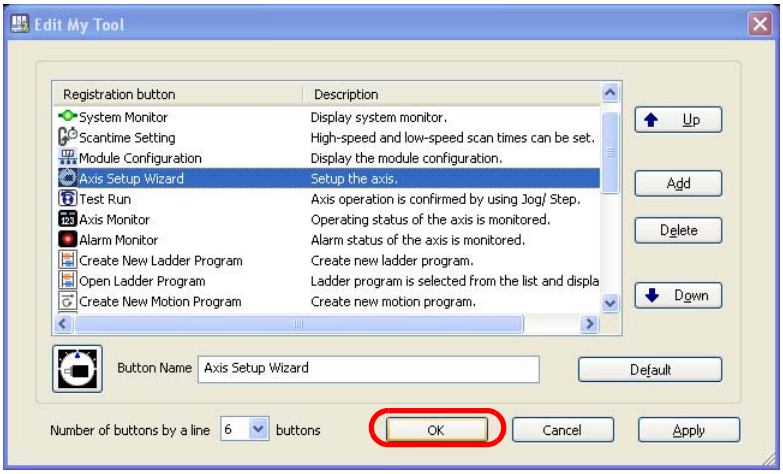


5. Click the **Open** Button.



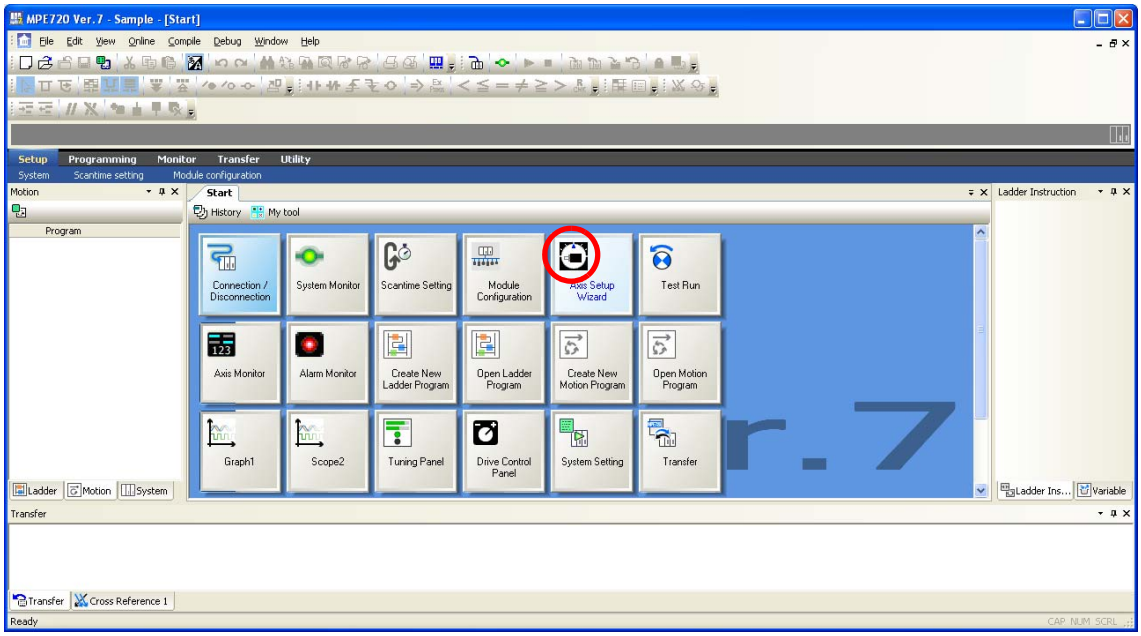
The File Open Dialog Box will close.

6. Click the **OK** Button.



The Edit My Tool Dialog Box will close.

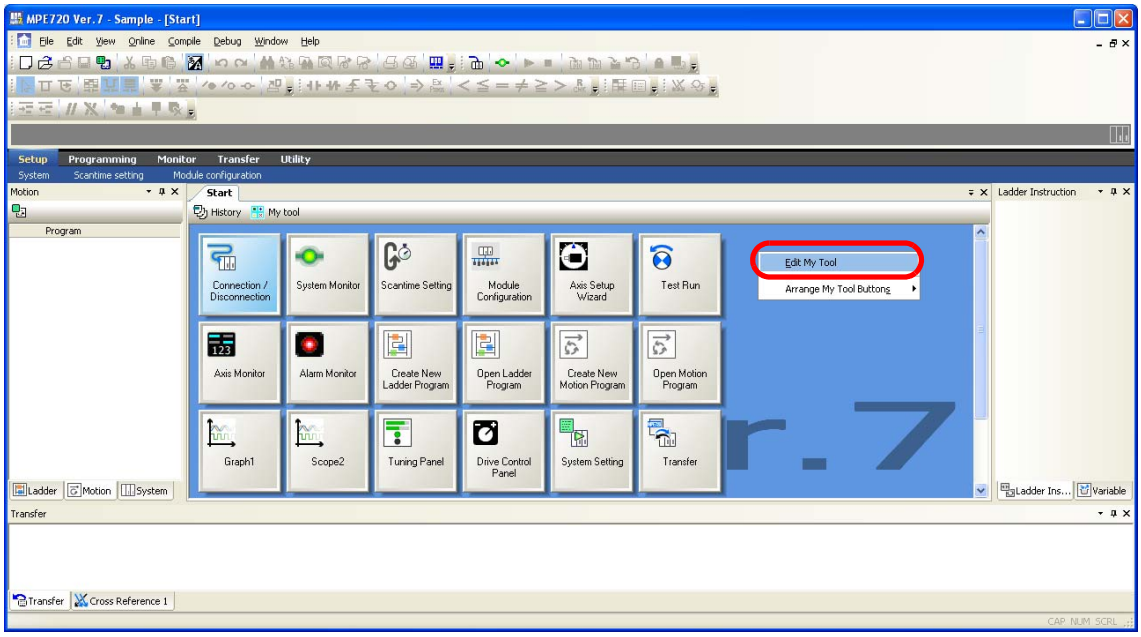
7. Confirm that the icon for the button has changed.



This concludes the procedure.

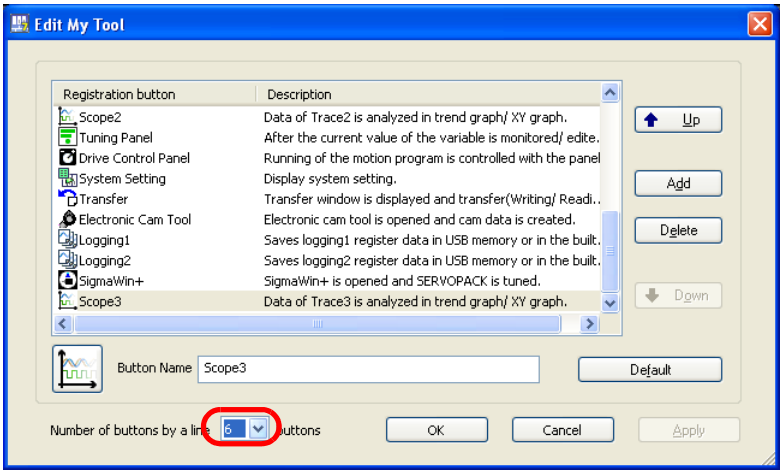
◆ Changing the Number of Buttons to be Displayed in Each Row

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

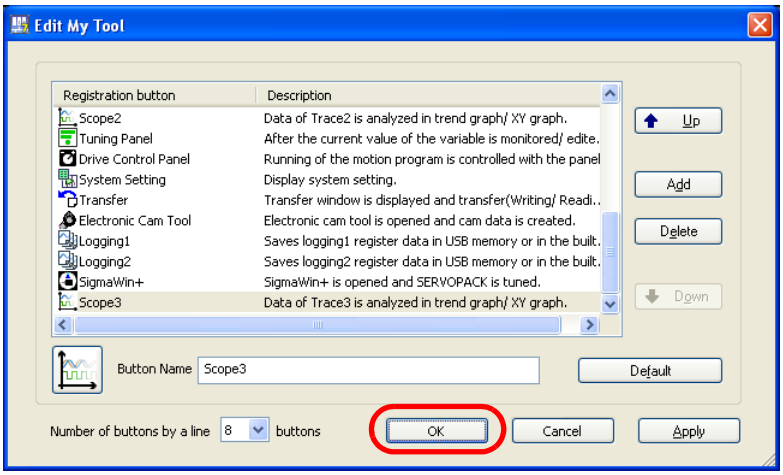


The Edit My Tool Dialog Box will be displayed.

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

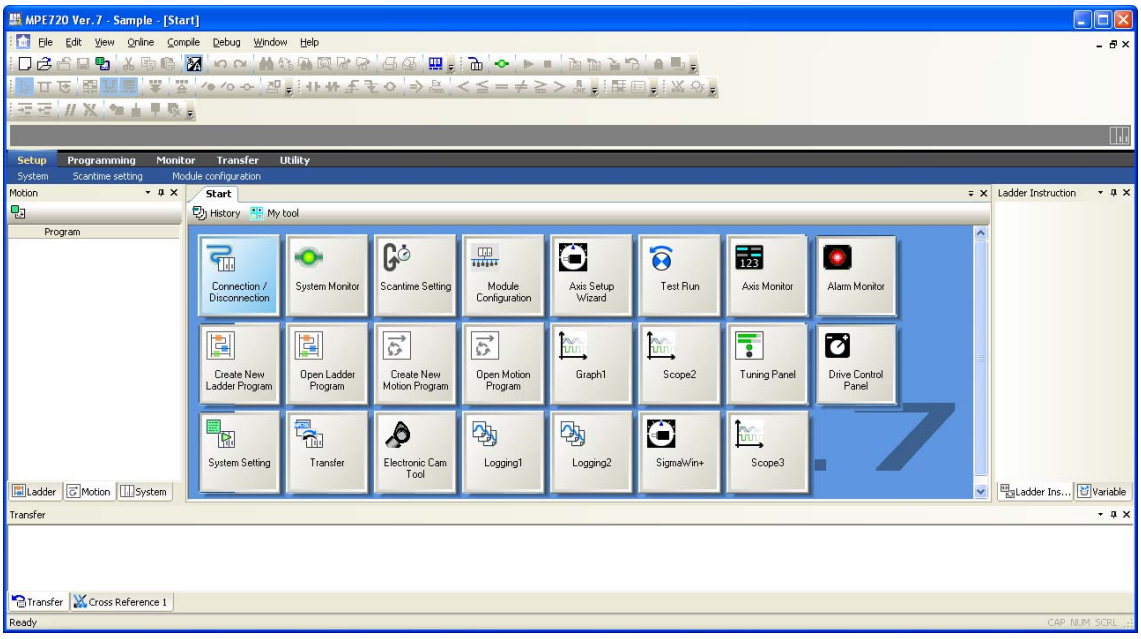


3. Click the **OK** Button.



The Edit My Tool Dialog Box will close.

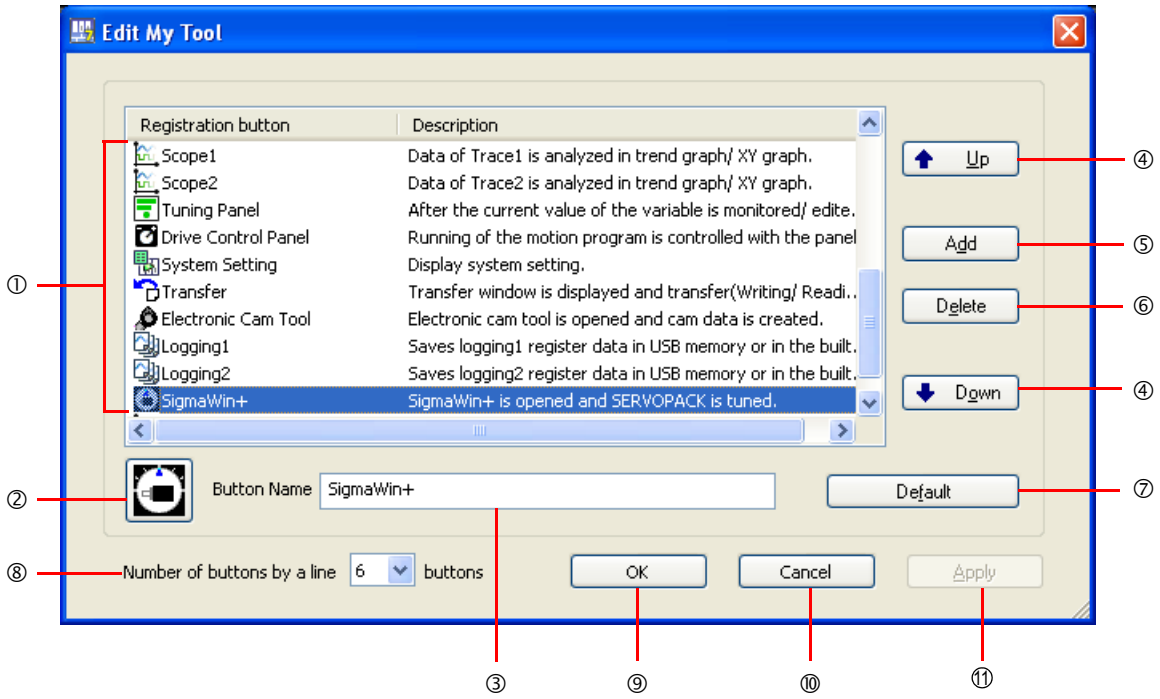
4. Confirm that the number of buttons that are displayed for a line matches the number that you selected in step 2.



This concludes the procedure.

Edit My Tool Dialog Box

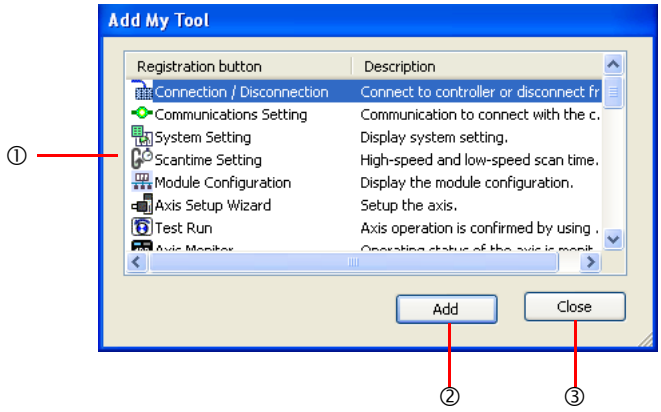
This dialog box allows you to add, delete, sort, and perform other editing operations on the buttons.



No.	Item	Description
①	Add Button/Description	Displays the registered buttons and their descriptions. The selected button is highlighted.
②	Icon	Displays the icon for the button that was 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 Tab Page (page 2-20)*
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 Tab Page. Setting range: 3 to 10 buttons
⑨	OK	Confirms the edited settings of the button and returns you to the My Tool Tab Page.
⑩	Cancel	Cancels the edited settings of the button and returns you to the My Tool Tab Page.
⑪	Apply Button	Confirms the edited settings of the button.

Add My Tool Dialog Box

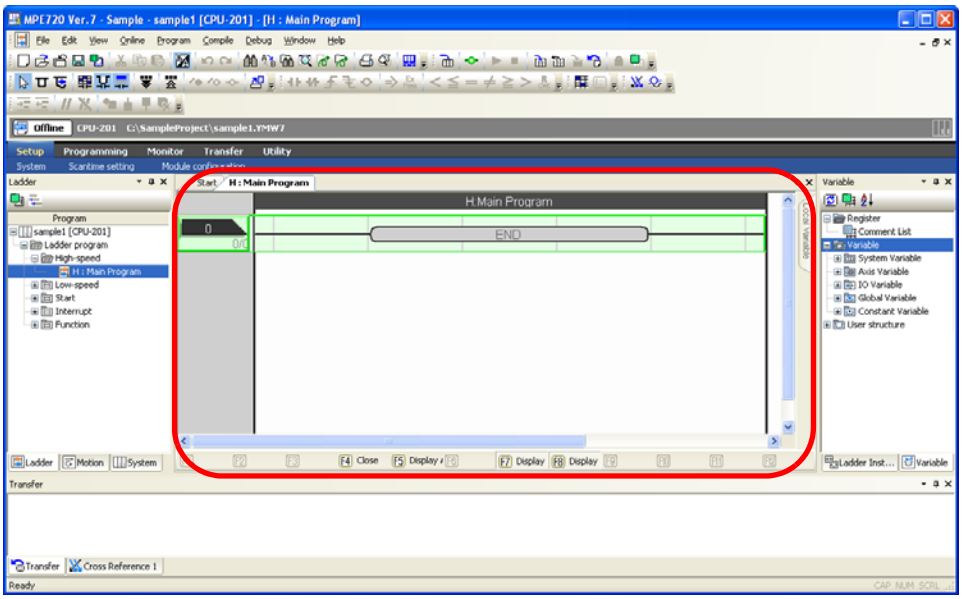
Clicking the **Add** Button in the Edit My Tool Dialog Box will display the Add My Tool Dialog Box, which allows you to add a button.



No.	Item	Description
①	Add 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.

Edit Ladder Program Tab Page

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



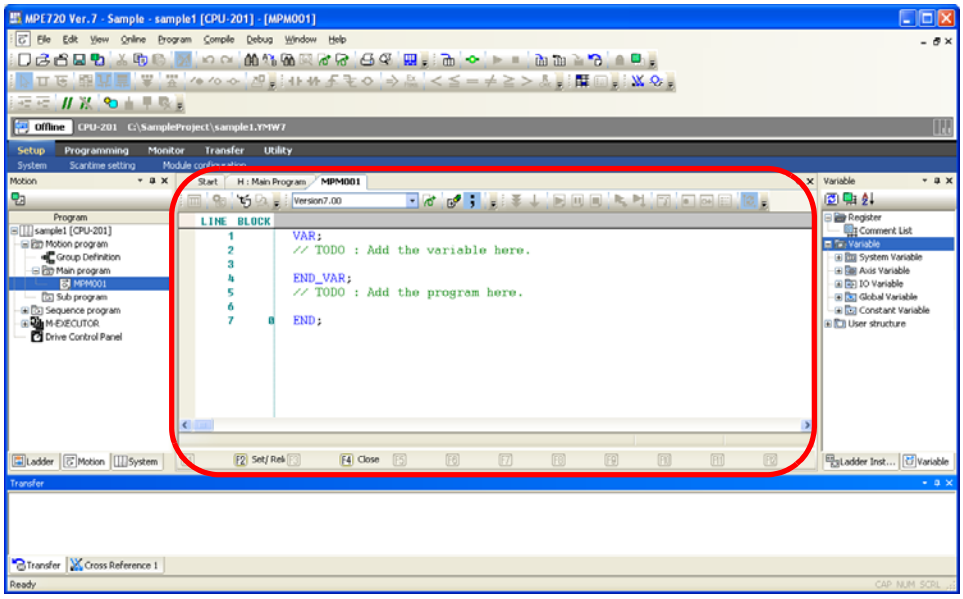
◆ Displaying the Ladder Editor Tab Page

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

☞ *4.1 Ladder Programming – Creating New Ladder Programs (page 4-3)*

Motion Editor Tab Page

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



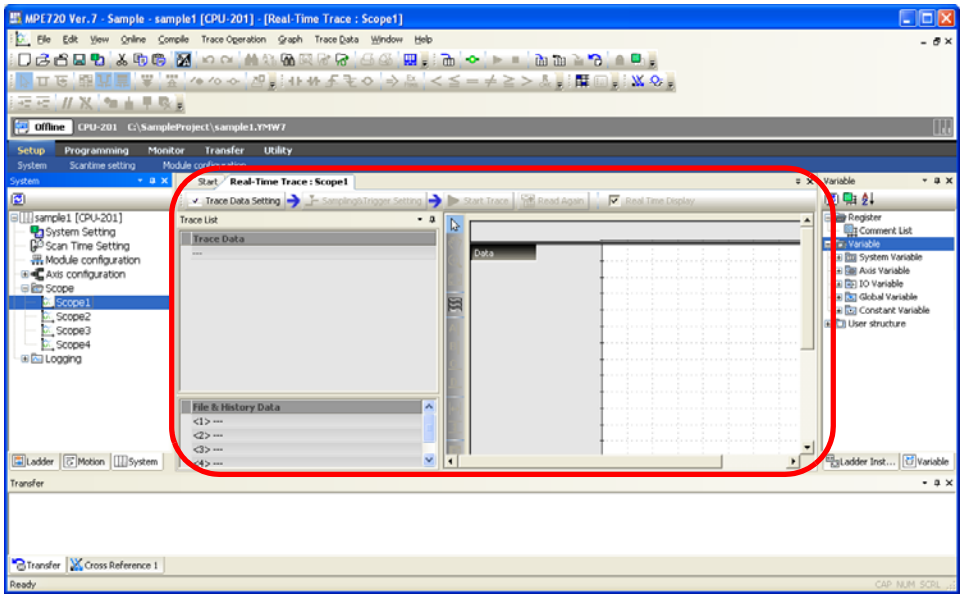
◆ Displaying the Motion Editor Tab Page

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

☞ *4.2 Motion Programming – Creating a Motion Program (page 4-42)*

Trace Tab Page

This tab page is used to trace data.



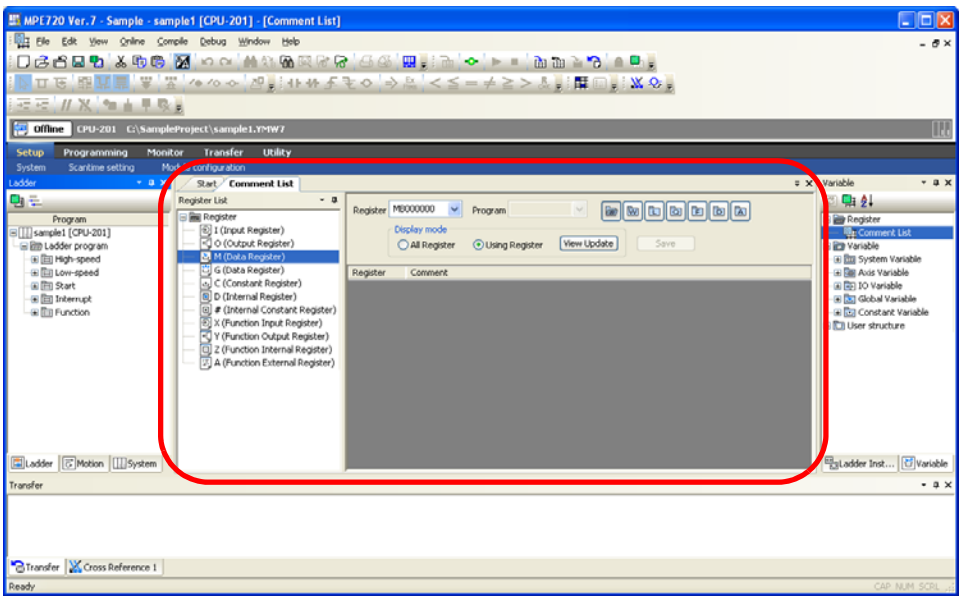
◆ Displaying the Trace Tab Page

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

☞ *8.2 Tracing the Motions of Axes (page 8-3)*

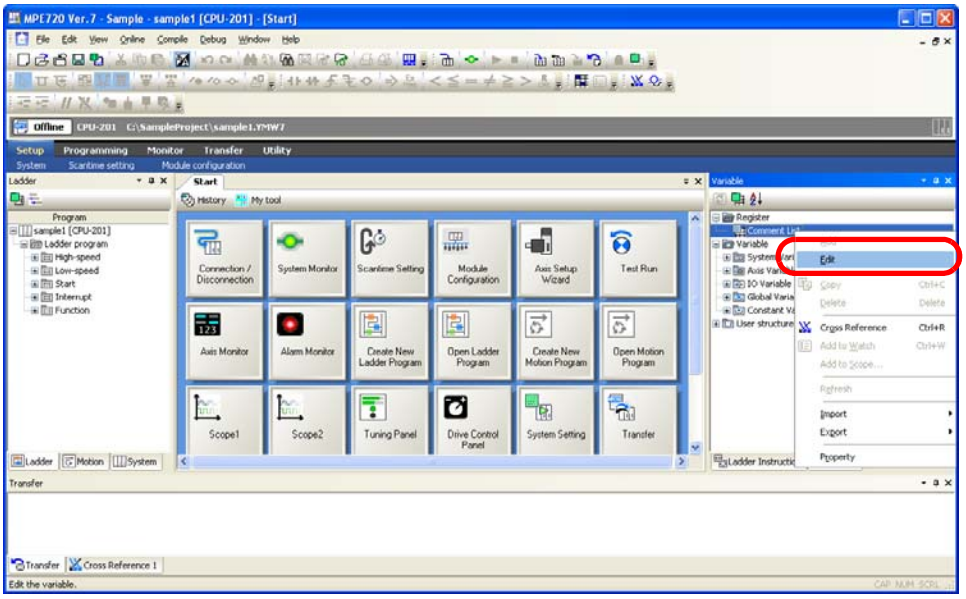
Comment List Tab Page

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



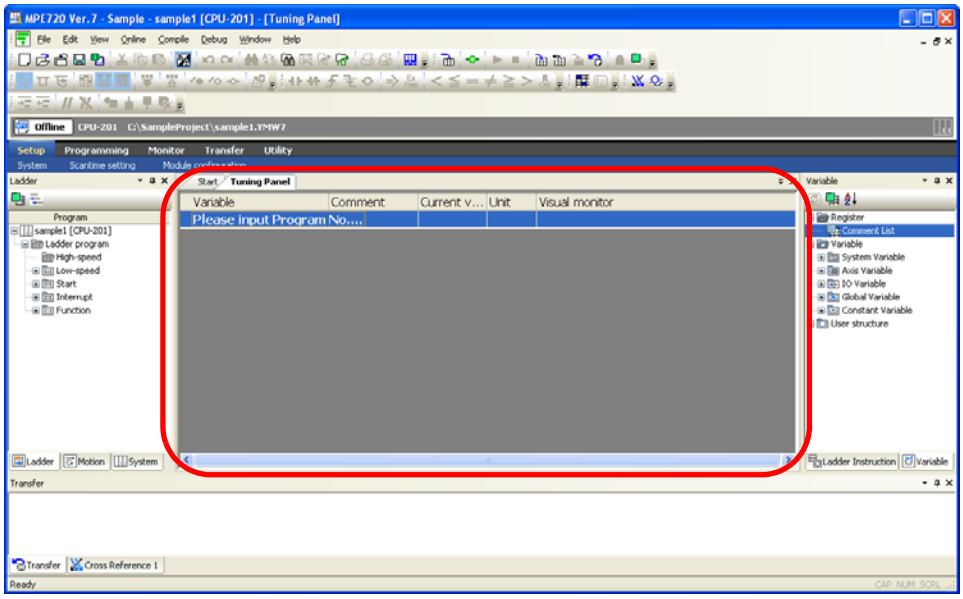
◆ Displaying the Comment List Tab Page

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



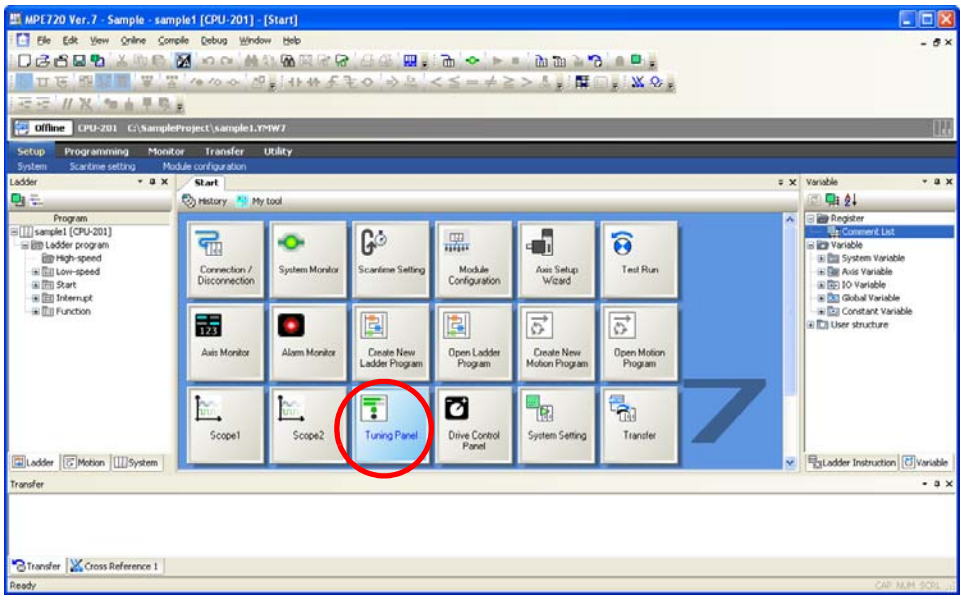
Tuning Panel Tab Page

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 Tab Page.



2.7 Panes

There are 13 types of panes, as listed below.

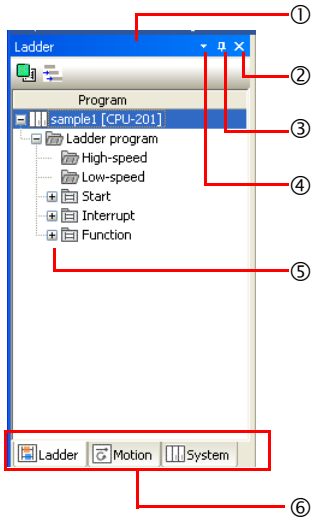
Pane Name	Menu bar	Default Display Position
Ladder Pane	View - Ladder	To the left of the Main Pain
Motion Pane	View - Motion	
System Pane	View - System	
Ladder Instruction Pane	View - Ladder Instruction	To the right of the Main Pane
Variables Pane	View - Variable	
Output Pane	View - Other Windows - Output	Below the Main Pane
Search Pane *1	View - Other Windows - Search 1	
Transfer Pane	View - Other Windows - Transfer	
Register List Pane *2	View - Register List - Register List 1	
Watch Pane *2	View - Watch - Watch 1	
Cross Reference 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.

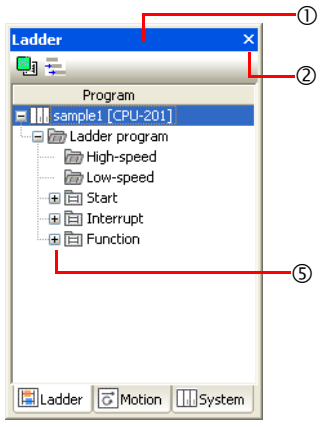
Names and Descriptions of Pane Components

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

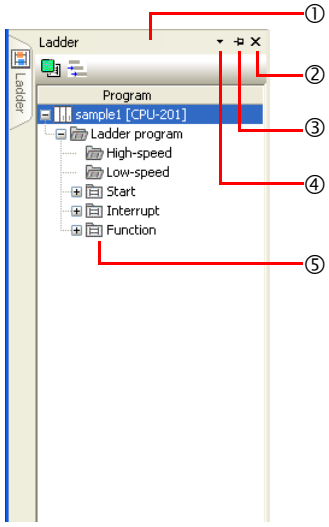
Docked Pane



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.
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.

Continued on next page.

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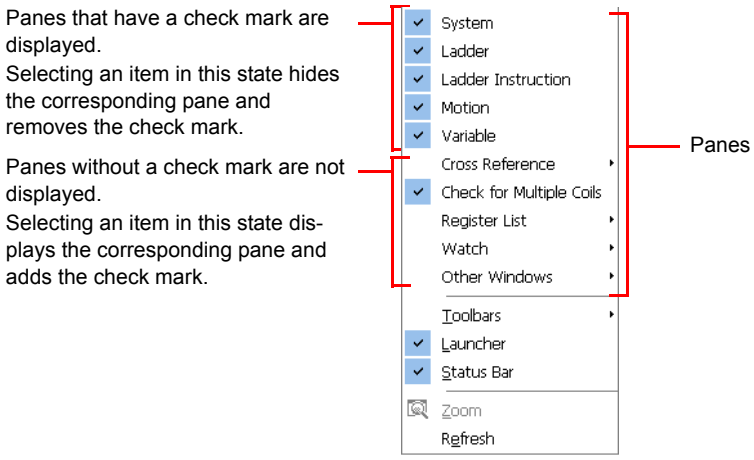
No.	Name	Description
⑤	Expand Button	Appears when the pane contains a tree hierarchy or categorized list. Expands the display to show the lower levels of the hierarchy or a list of items included in the category. Click the Collapse Button (-) to return the expanded list to its original state.
⑥	Tabs	Changes 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.

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.



Updating Pane Data

The data displayed in a Ladder, Motion, or Variable Pane can be updated either by selecting ***View*** – ***Refresh*** from the Main Menu, or by pressing the **F5** Key.

- This will also update the data in the Comment List.

Types of Pane Displays

There are three types of panes, as described below.

① Docked Panes

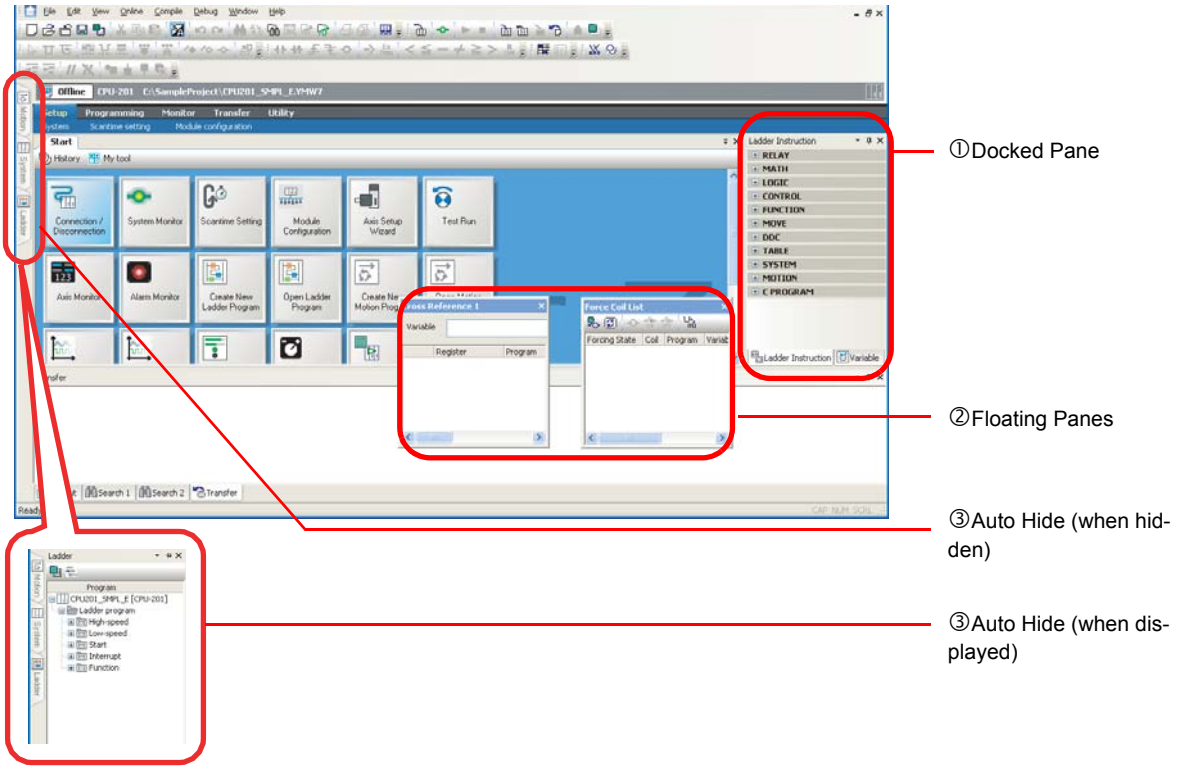
This is the default display type. Multiple panes are displayed on top of each other as tab pages, just like in the Main Pane. The top tab page can be changed by clicking a tab.

② Automatically Hidden

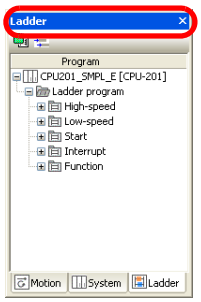
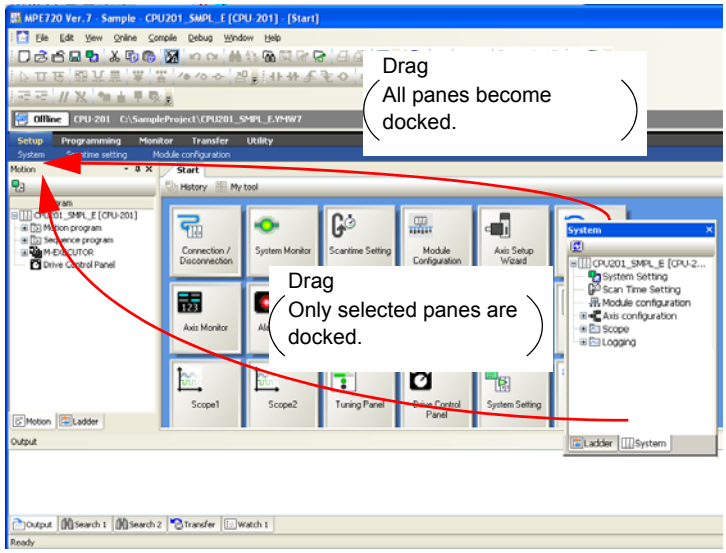
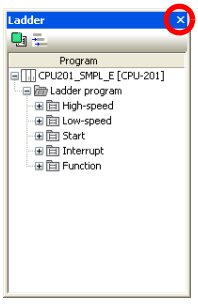
The pane slides out from the side when the relevant tab is clicked, and closes when any location outside of the pane is clicked.

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="3">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 Window.
  </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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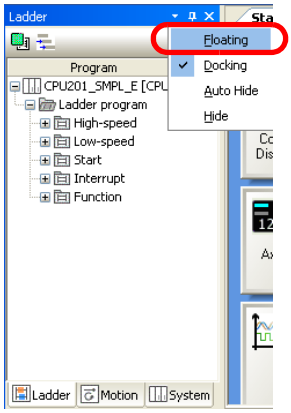
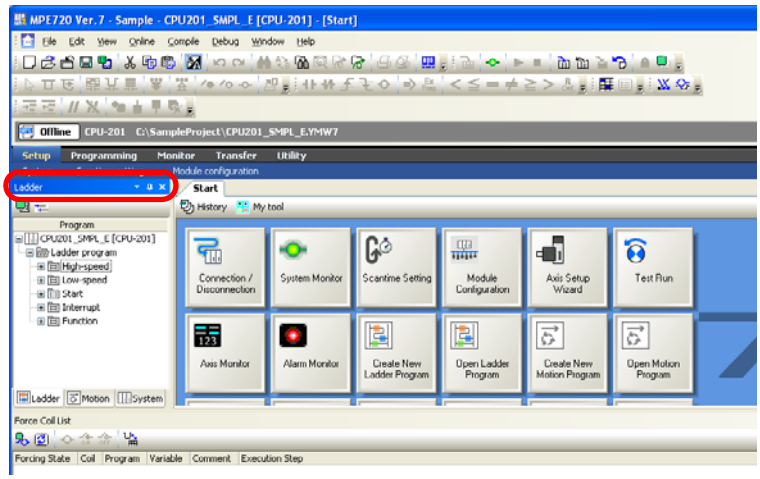
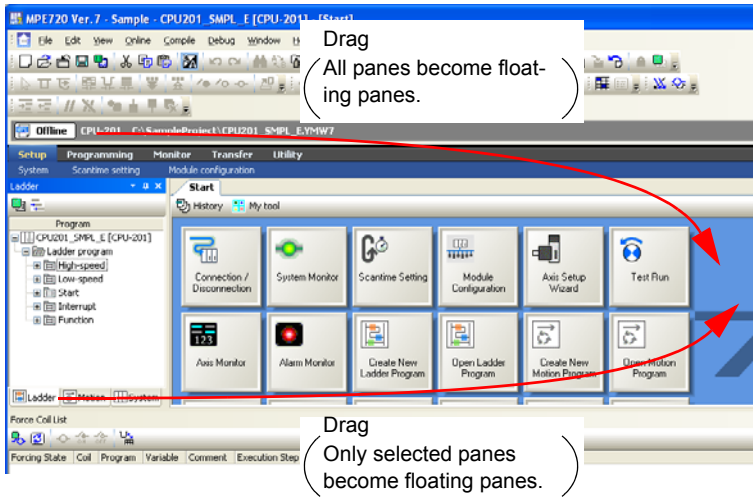
Current Display Type	New Display Type	Operating Procedure
Docked Pane	Floating Pane	• Click the Menu Button ▼ on the title bar and select ***Floating***. 
		• Double-click the title bar. 
		• Drag the tab or title bar to the desired position. 

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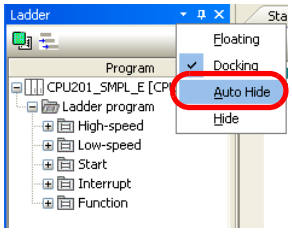
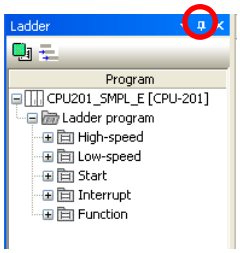
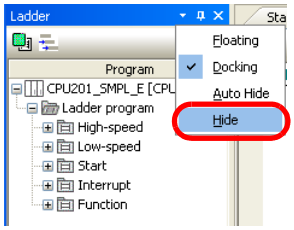
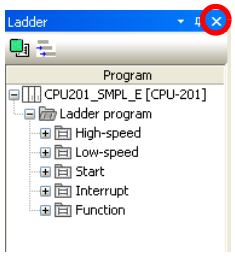
<table>
<tr><th>Current Display Type</th><th>New Display Type</th><th>Operating Procedure</th></tr>
<tr><td rowspan="3">Docked Pane</td><td rowspan="2">Auto Hide Pane</td><td>• Click the Menu Button ▼ on the title bar and select Auto Hide.
 

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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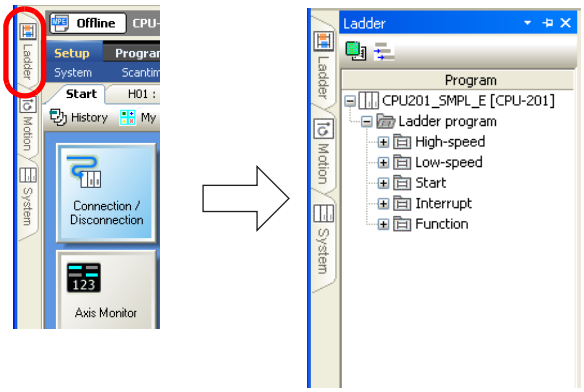
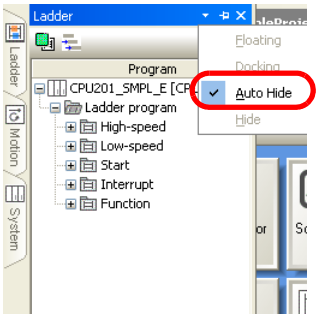
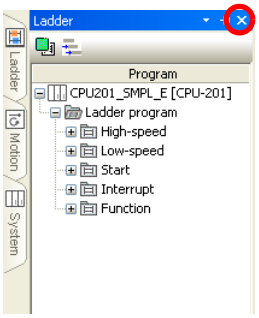
Continued from previous page.

<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>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>Hidden</td><td>• Click the Close Button.
 
</td></tr>
</table>

Setup

3

This chapter describes the basic operations for using the MPE720.

3.1 Automatically Recognizing Information on Devices Connected to the Controller 3-2

3.2 Automatically Recognizing a Range of Modules . 3-4

3.3 Manually Setting the Module Configuration 3-6

3.4 Changing the Execution Cycle 3-15

3.5 Saving Data in the Machine Controller 3-17

3.6 Testing Motor Operation 3-19

3.7 Confirming Information on the Machine Controller 3-26

3.8 Accessing Machine Controller Data from a Host PC 3-28

3.9 Creating, Editing, and Saving Project Files 3-32

Creating a Project File 3-32
Opening an Existing Project File 3-32
Saving Project Files 3-33
Closing a Project File 3-35

3.1 Automatically Recognizing Information on Devices Connected to the Controller

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

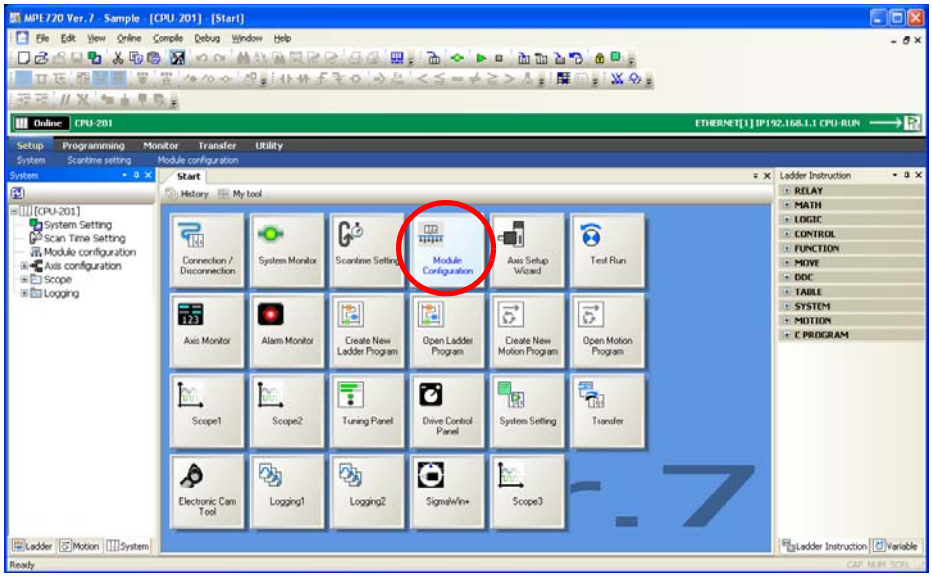
Information Refer to the following section for details on how to specify a range of Modules to automatically recognize.

☞ *Automatically Recognizing a Range of Modules (page 3-4)*

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.

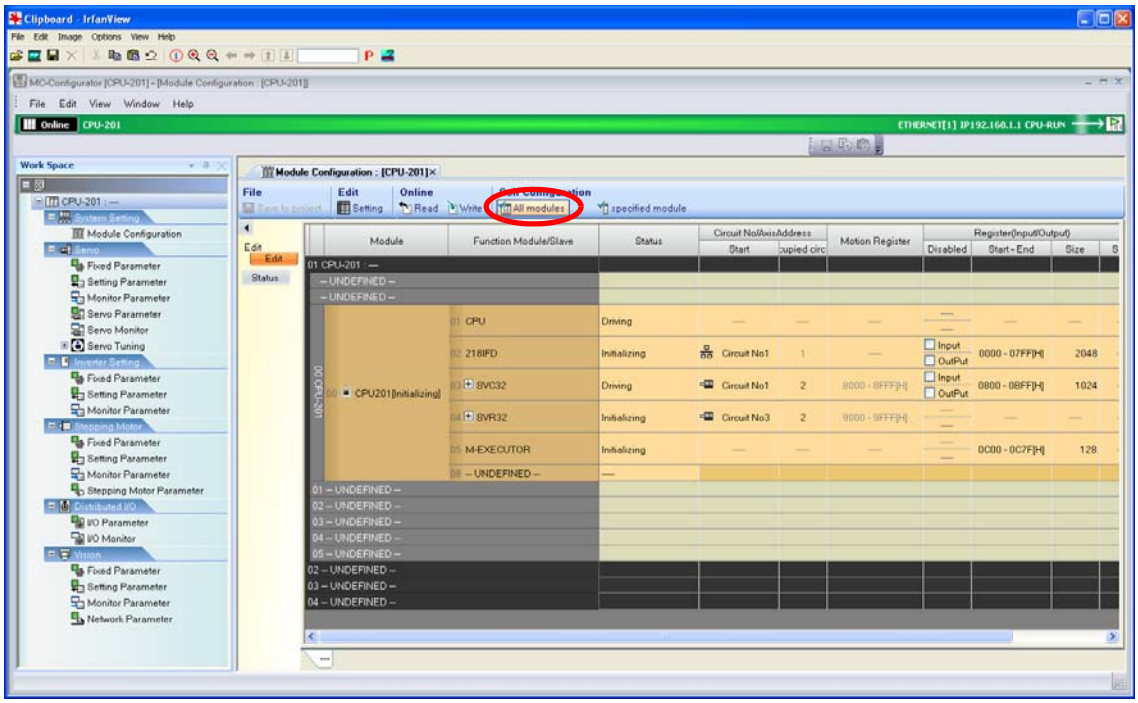
☞ *1.2 Detailed Procedures – Self Configuration Using the DIP Switch (page 1-14)*

1. Click the **Module Configuration** Button on the My Tool Tab Page.



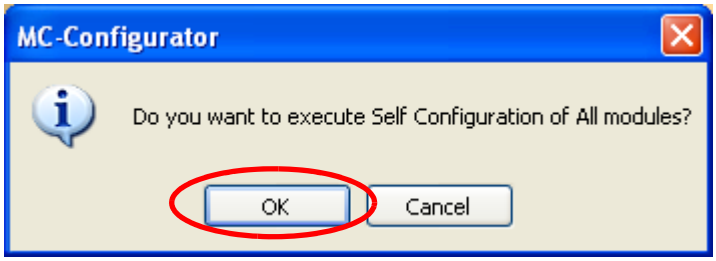
The Module Configuration Tab Page will be displayed.

2. Click **Self Configuration** – **All modules**.



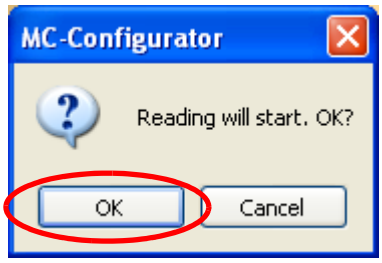
The MC-Configurator Dialog Box will be displayed.

3. Click the **OK** Button.



Self configuration for all Modules will be executed. When self configuration has been completed, the 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.

3.2 Automatically Recognizing a Range of Modules

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

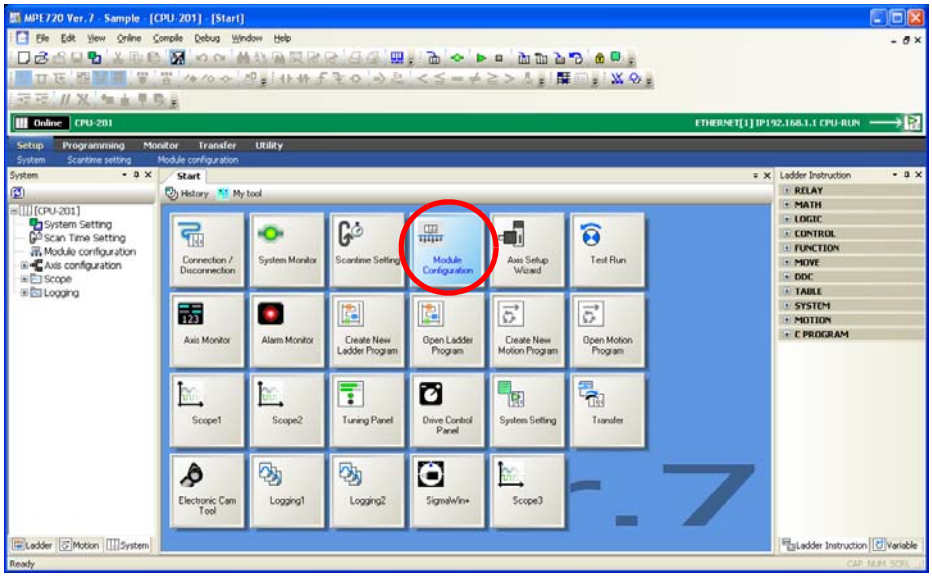
Information Refer to the following section for details on automatically recognizing all of the Modules that are installed.

☞ *Automatically Recognizing Information on Devices Connected to the Controller (page 3-2)*

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.

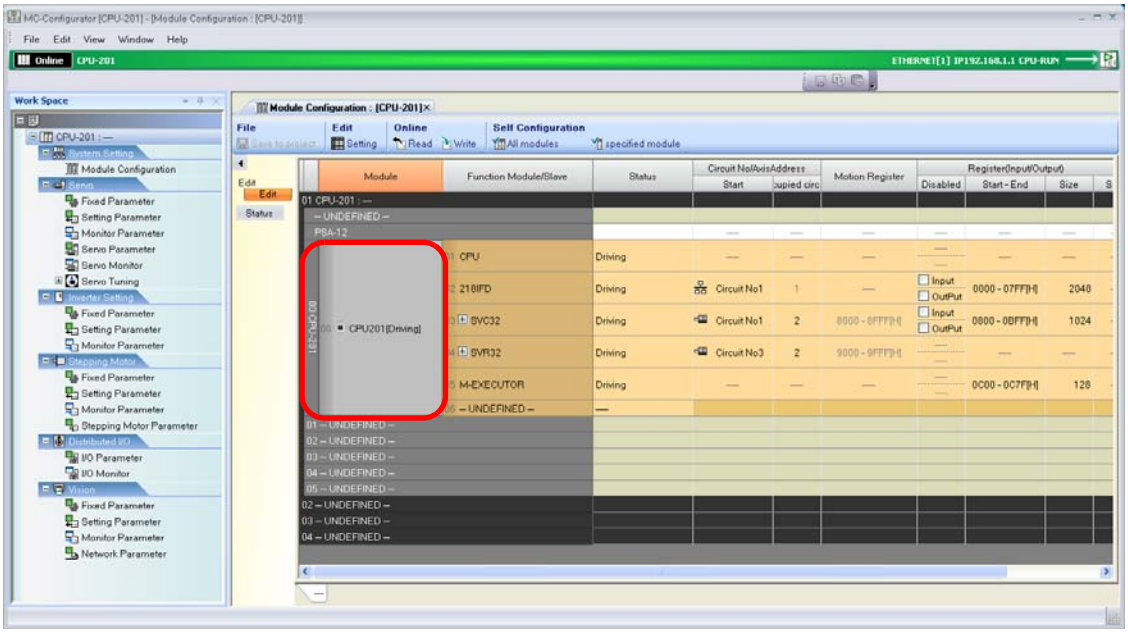
☞ *1.2 Detailed Procedures – Self Configuration Using the DIP Switch (page 1-14)*

1. Click the **Module Configuration** Button on the My Tool Tab Page.

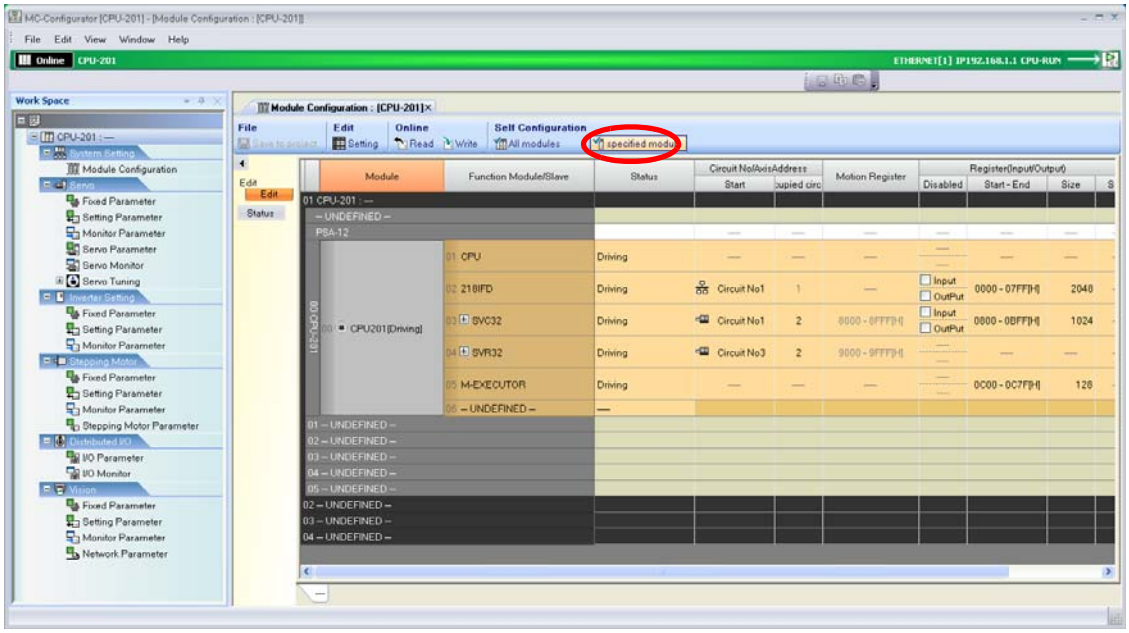


The Module Configuration Tab Page will be displayed.

2. Select the Modules to automatically recognize.

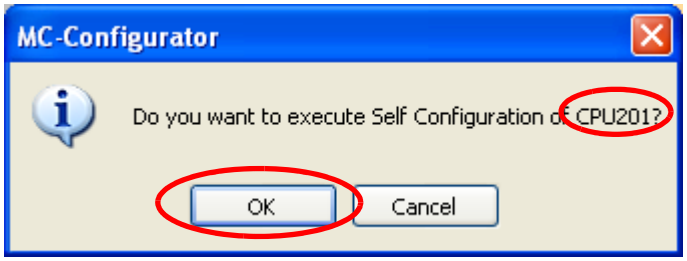


3. Click **Self Configuration** – **specified module**.



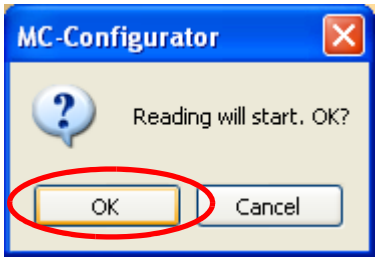
The MC-Configurator Dialog Box will be displayed.

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, the MC-Configurator Dialog Box will be displayed.

5. Click the **OK** Button.



The self configuration results are saved in the MPE720.

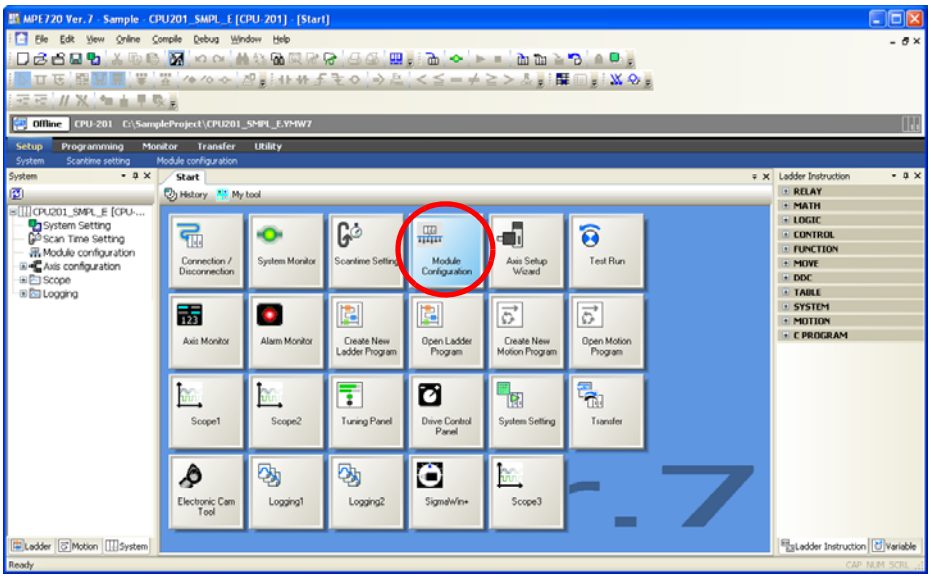
This concludes the procedure.

3.3 Manually Setting the Module Configuration

Use the following procedure to manually setting the Module configuration in the project file while offline, instead of using self configuration. This procedure is used when the actual field devices, i.e., SERVOPACKs, motors, etc., are not available.

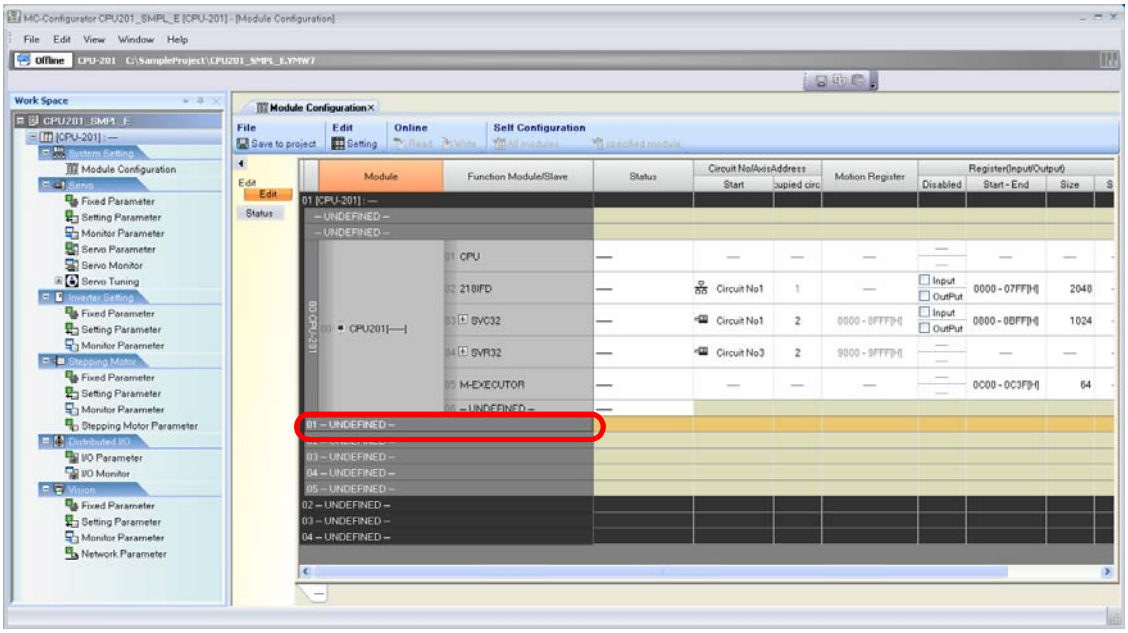
The procedure is based on the following system as an example: an MP3000-series CPU Unit is connected to a Base Unit that has an SVB-01 Optional Module that controls two axes.

1. Click the **Module Configuration** Button on the My Tool Tab Page.



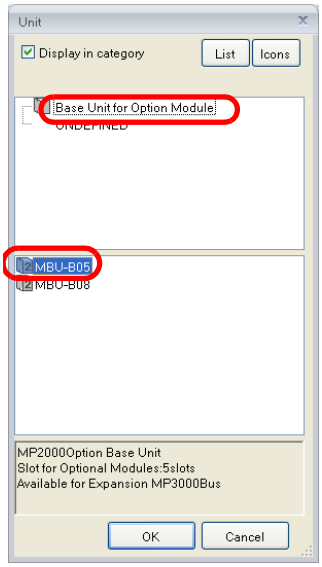
The Module Configuration Tab Page will be displayed.

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

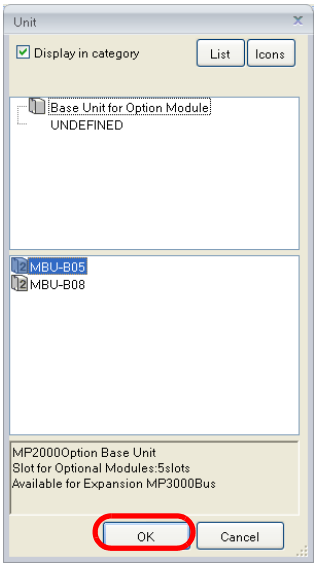


The Unit Dialog Box will be displayed.

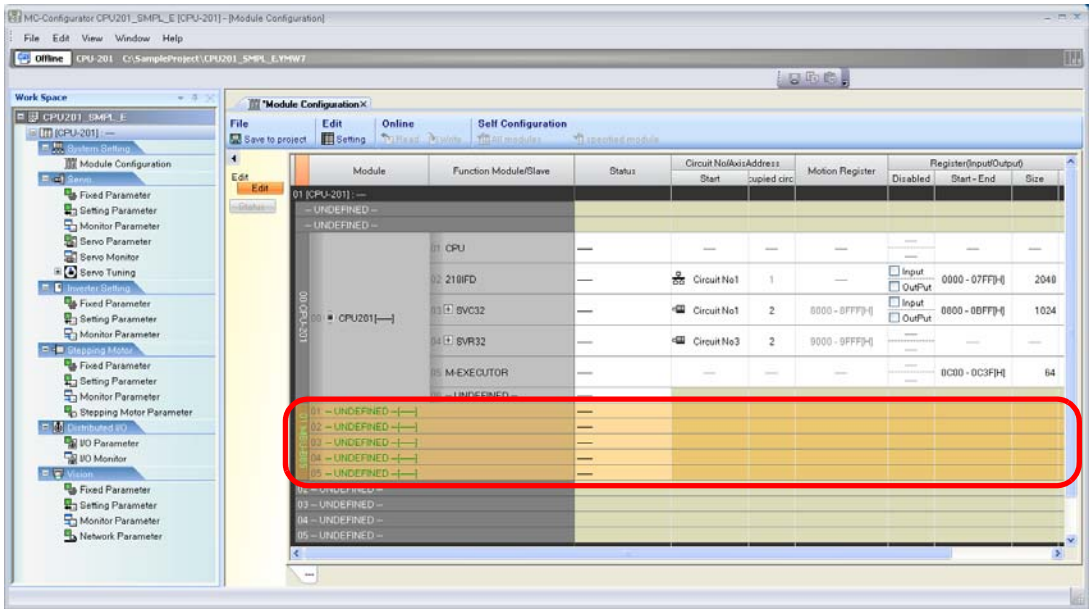
3. Select **Base Unit for Option Module** – **MBU-B05**.



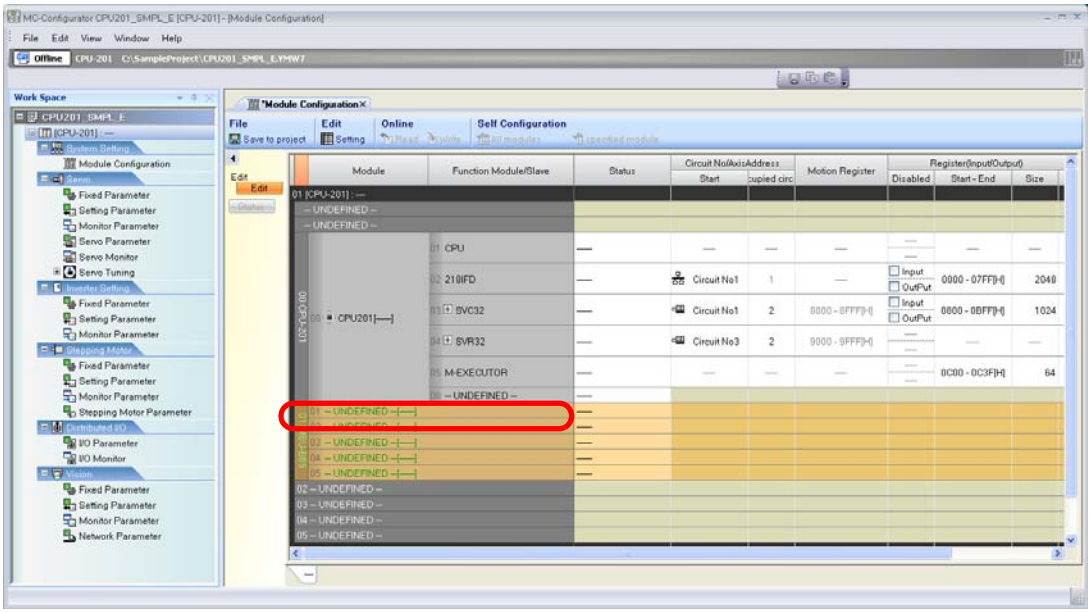
4. Click the **OK** Button.



The fields for the MBU-05 are created on the Module Configuration Tab Page.

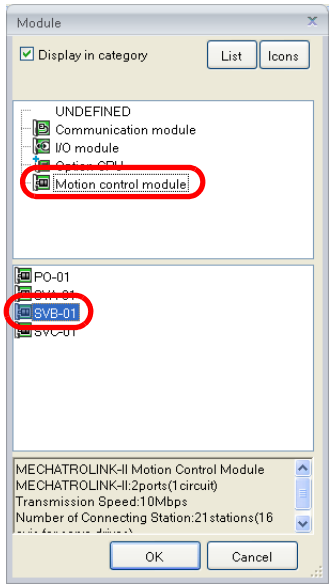


5. Double-click **01 --UNDEFINED --** in the **01 MBU-B05** Fields.

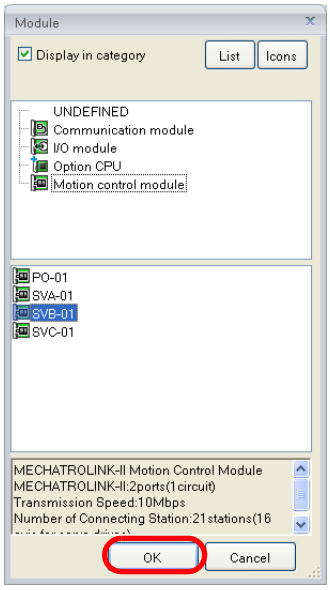


The Module Dialog Box will be displayed.

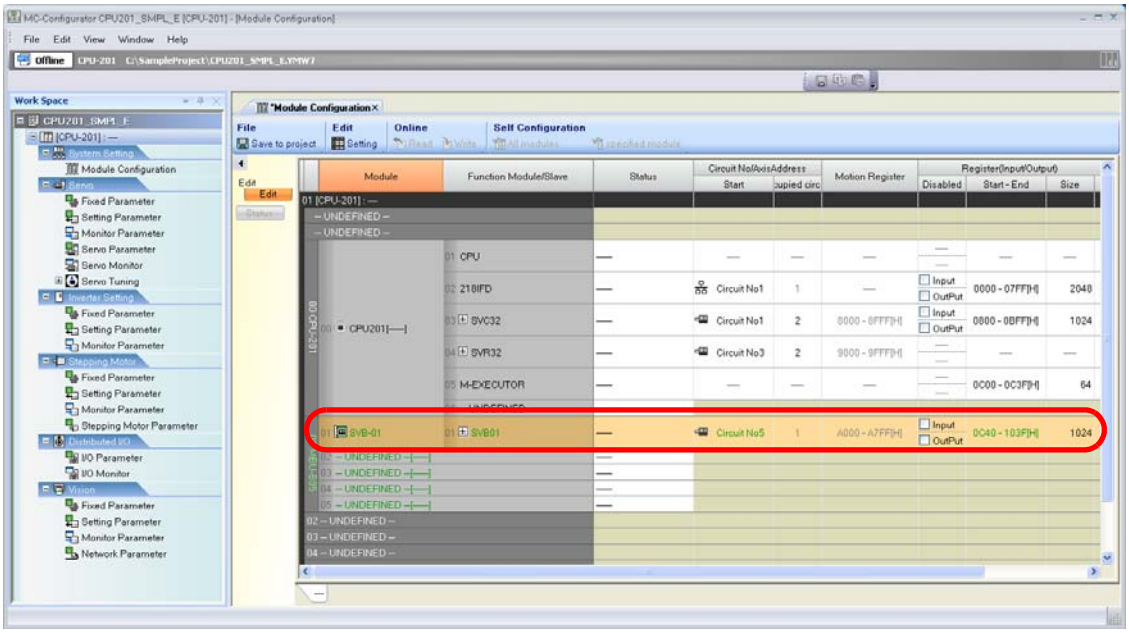
6. Select **Motion control module** – **SVB-01**.



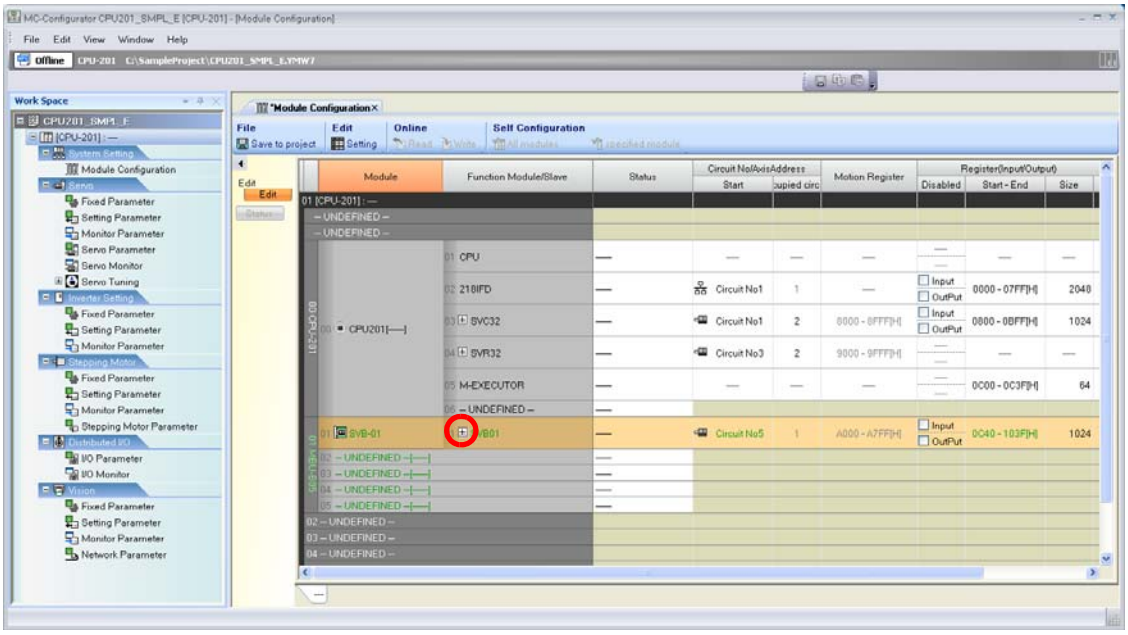
7. Click the **OK** Button.



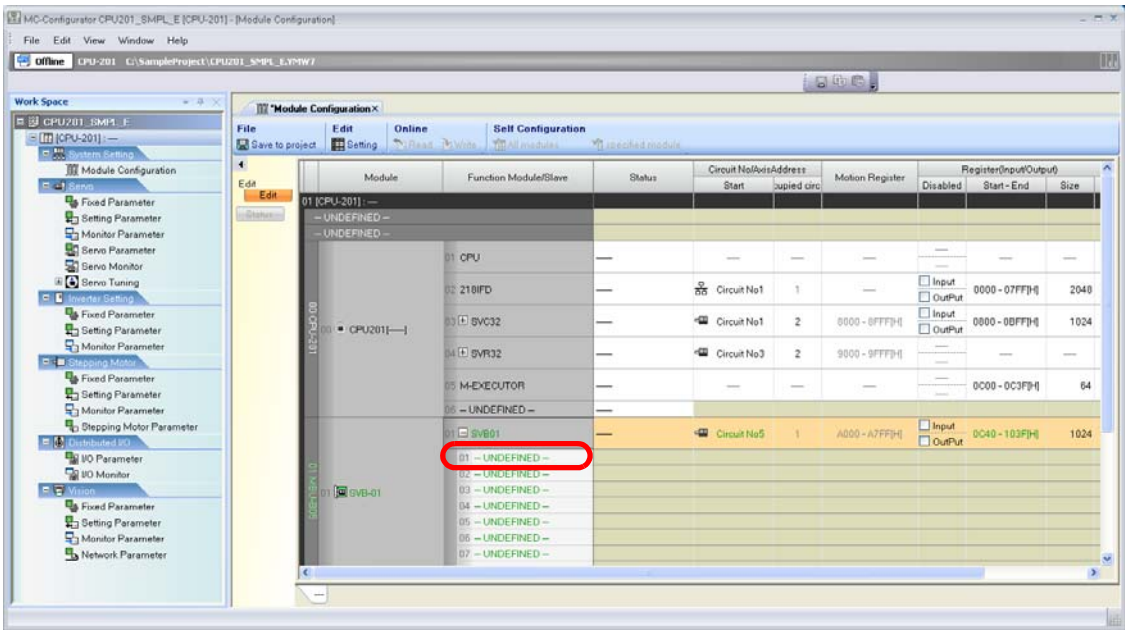
The fields for the SVB-01 are created on the Module Configuration Tab Page.



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

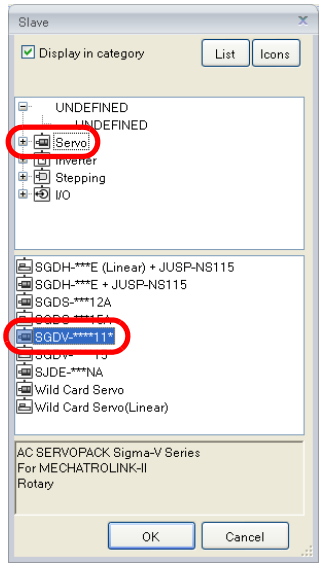


9. Double-click □□ **--UNDEFINED --** where the axis is to be assigned.

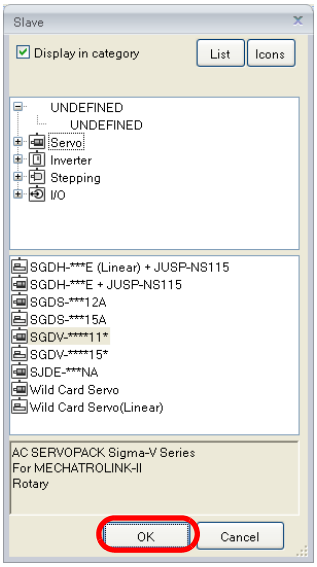


The Slave Dialog Box will be displayed.

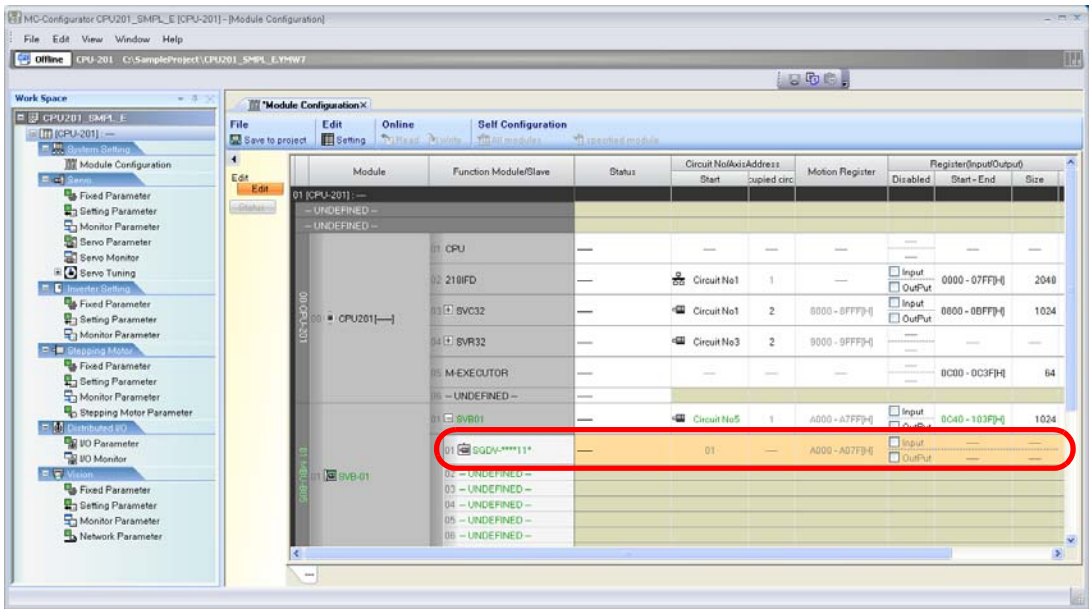
10. Select the model to set up.



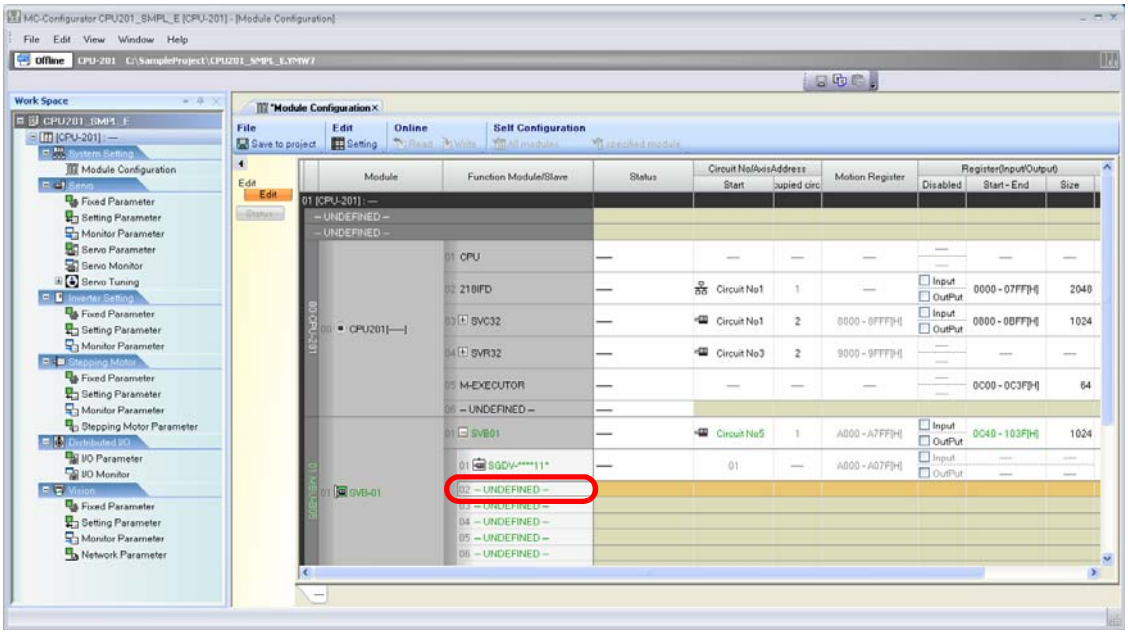
11. Click the **OK** Button.



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

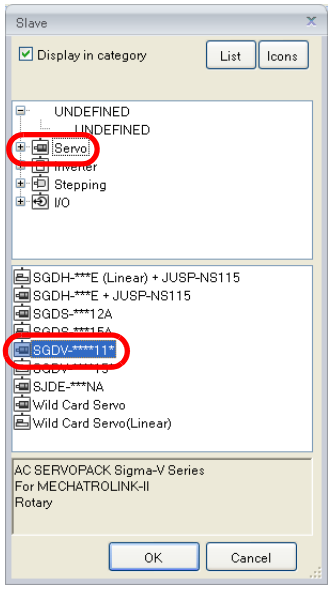


12. Double-click □□ **--UNDEFINED --** where the axis is to be assigned.

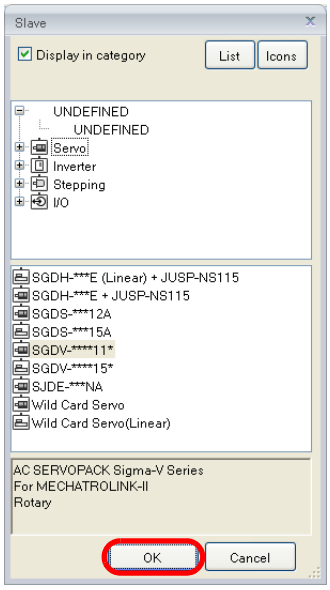


The Slave Dialog Box will be displayed.

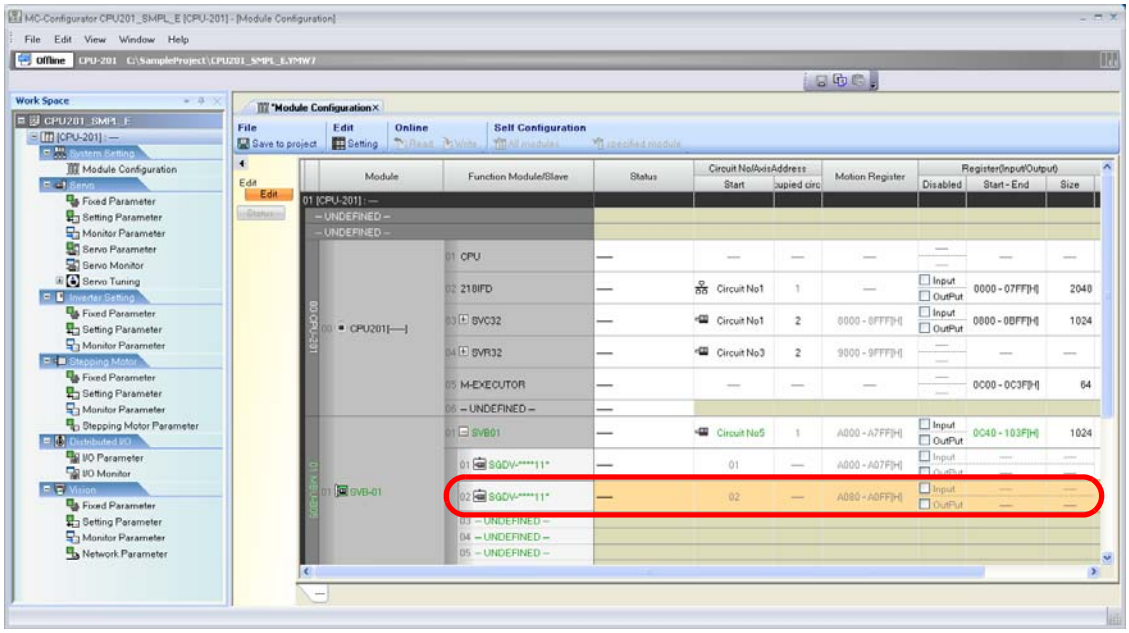
13. Select the model to set up.



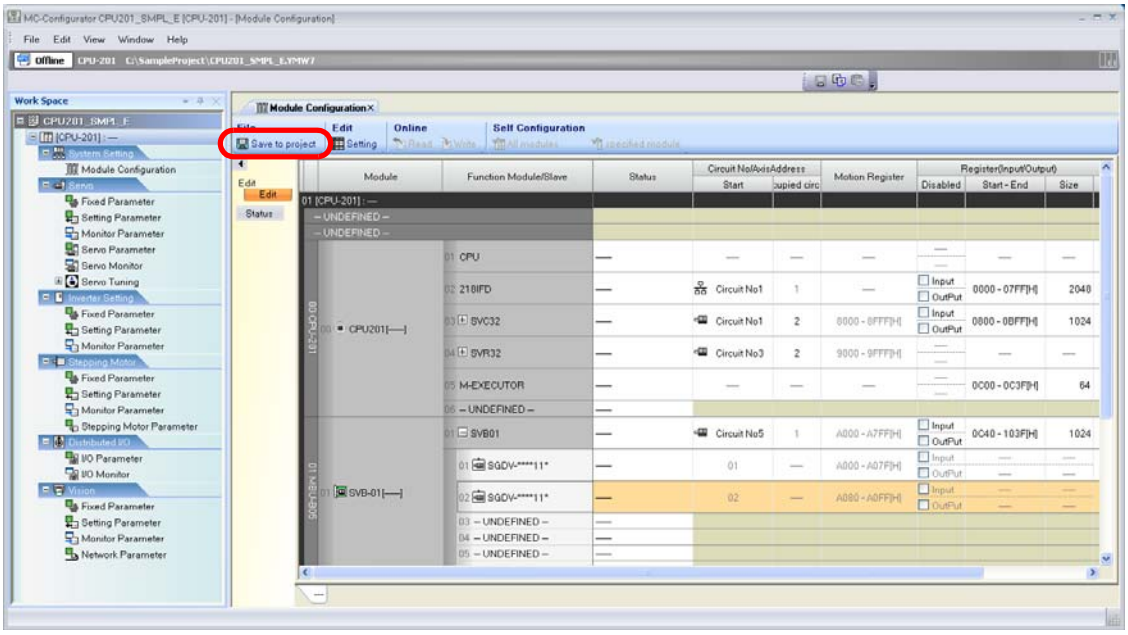
14. Click the **OK** Button.



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



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



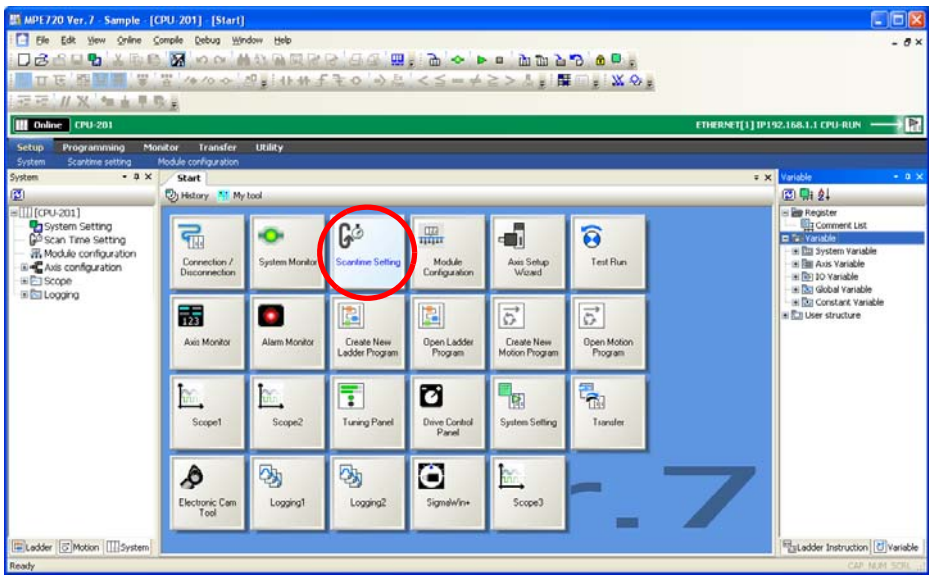
This saves the manually specified settings in the project file.

This concludes the procedure.

3.4 Changing the Execution Cycle

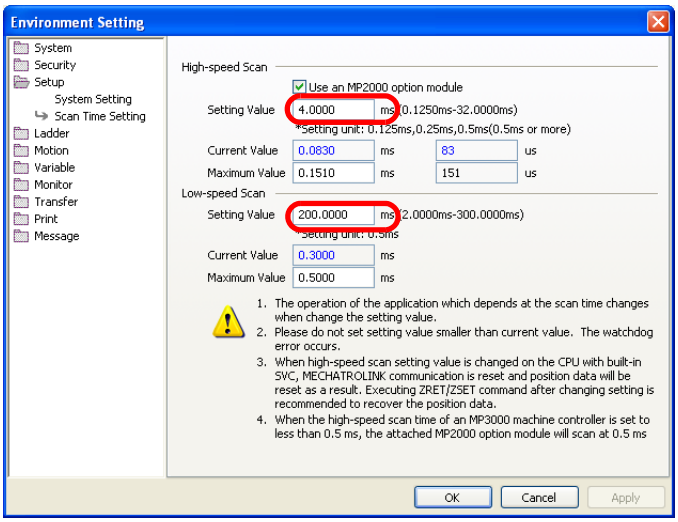
To change the execution cycle of your application, it is necessary to change the scan time setting. Use the following procedure.

1. Click the **Scantime Setting** Button on the My Tool Tab Page.



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

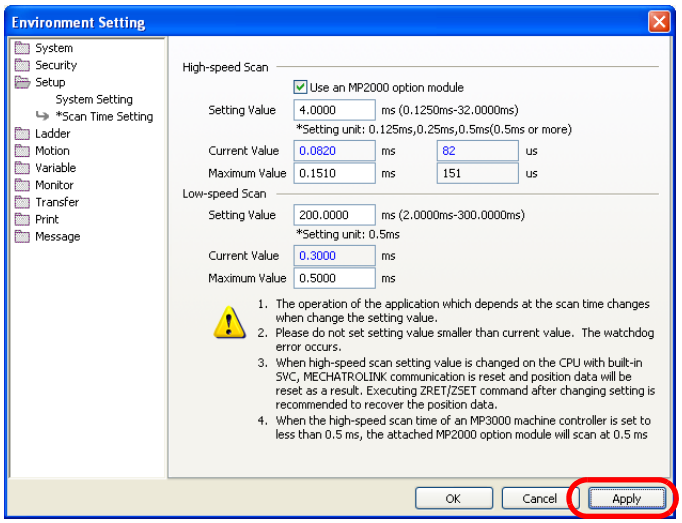
2. Enter the following information.
   - High-speed Scan Setting Value
   - Low-speed Scan Setting Value



Information Refer to the following manual for details on the set values.

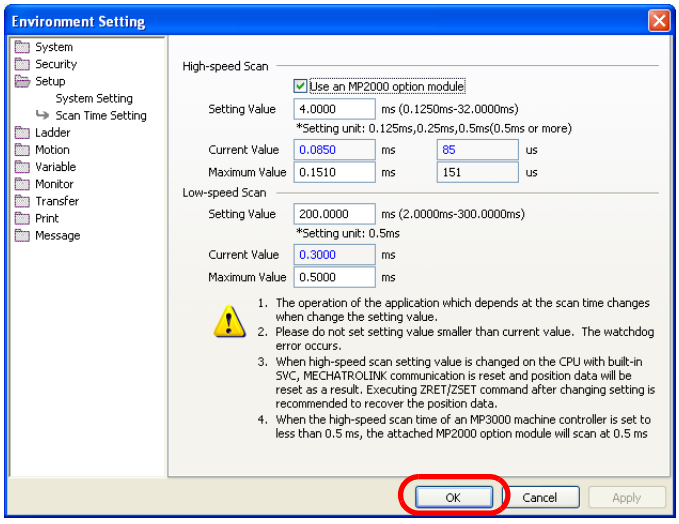
MP2000/MP3000 Series Machine Controller System Setup Manual (Manual No.: SIEP C880725 00)

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.

This concludes the procedure.

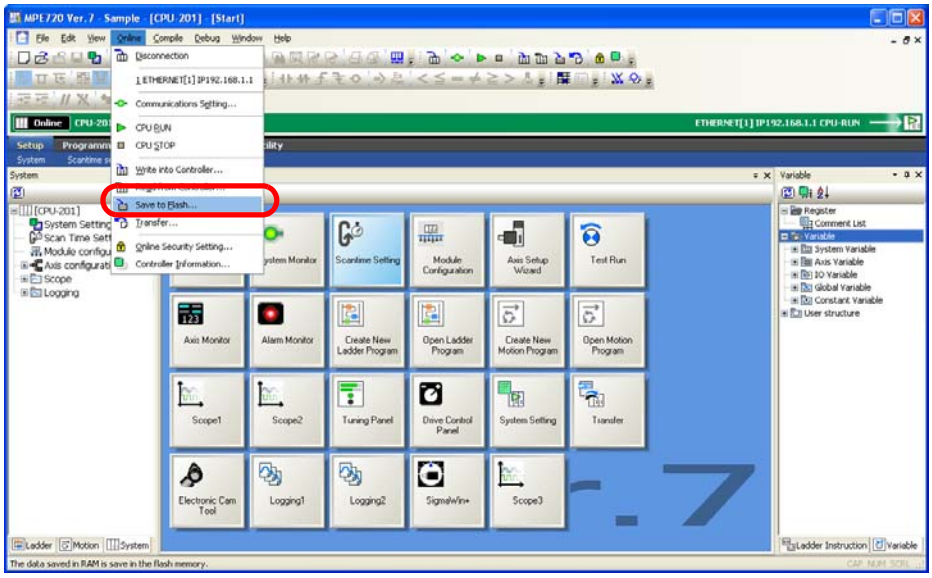
3.5 Saving Data in the Machine Controller

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

> Important
>
> If you turn the power supply OFF and ON again without saving data to the flash memory, any changes to the program or definition data will be lost.

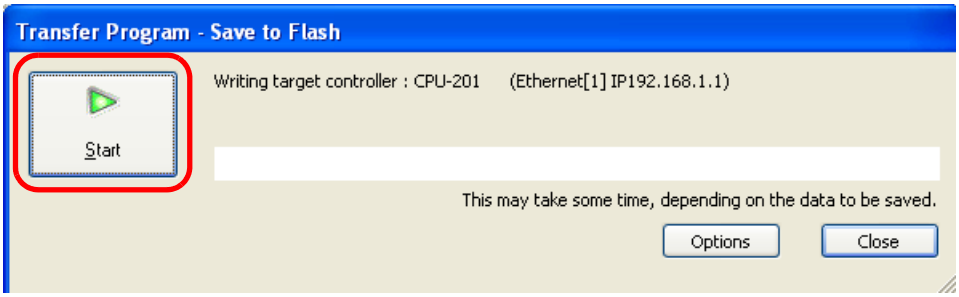
Use the following procedure to save data in the Machine Controller.

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



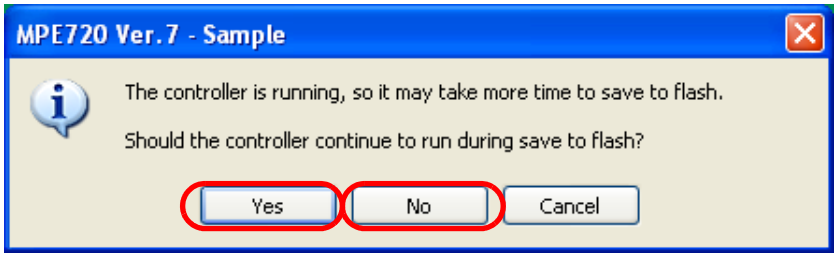
The Transfer Program - Save to Flash Dialog Box will be displayed.

2. Click the **Start** Button.



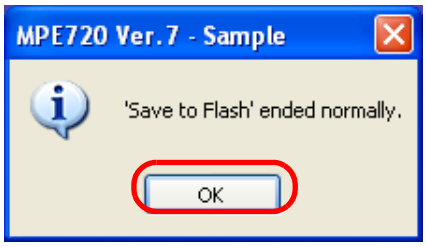
Writing to the target Machine Controller will begin.

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.

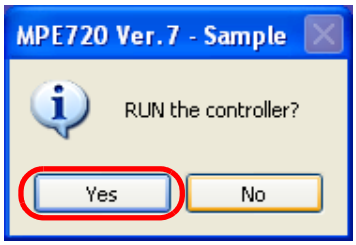
3. Click the **OK** Button.



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.

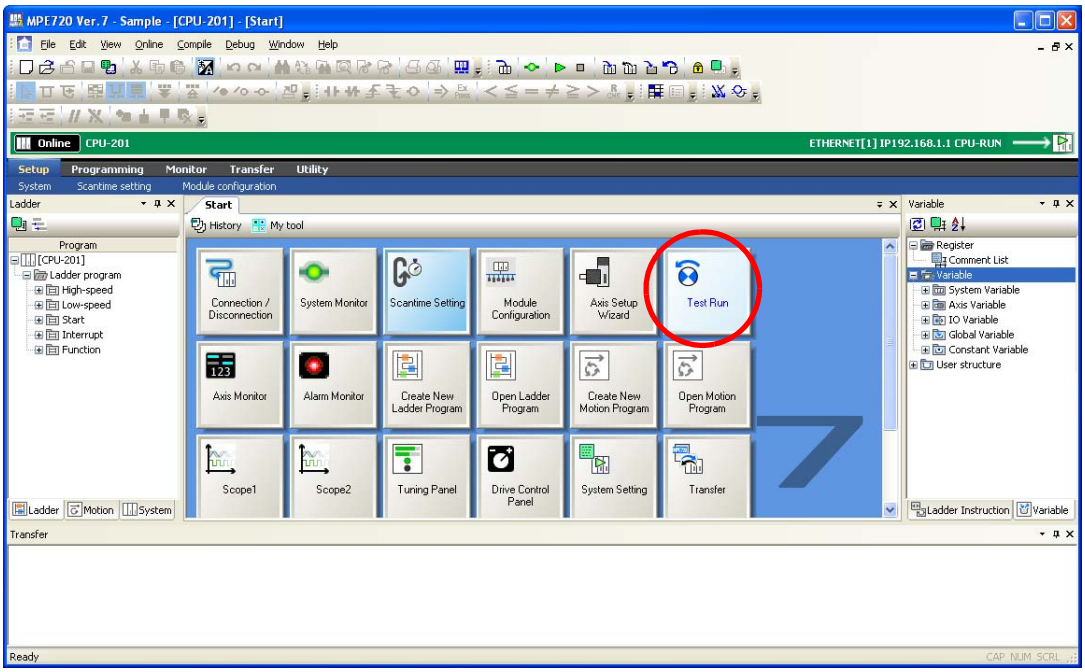
3.6 Testing Motor Operation

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

Note

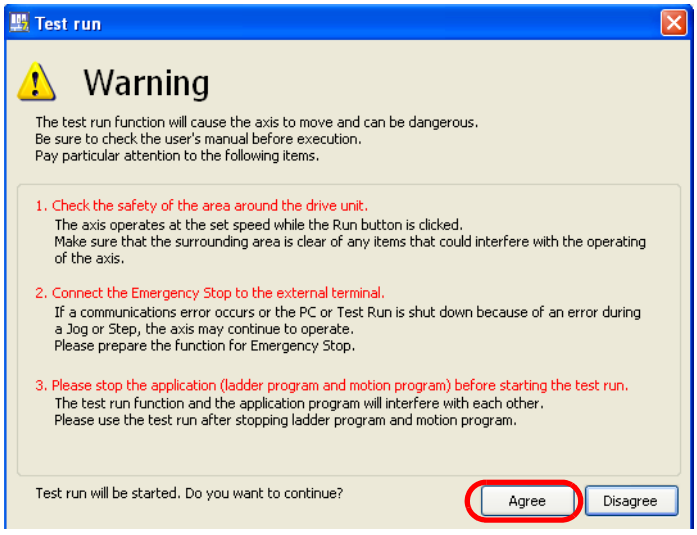
Perform this procedure with the SERVOPACK and Servomotor connected to the Machine Controller.

1. Click the **Test Run** Button on the My Tool Tab Page.



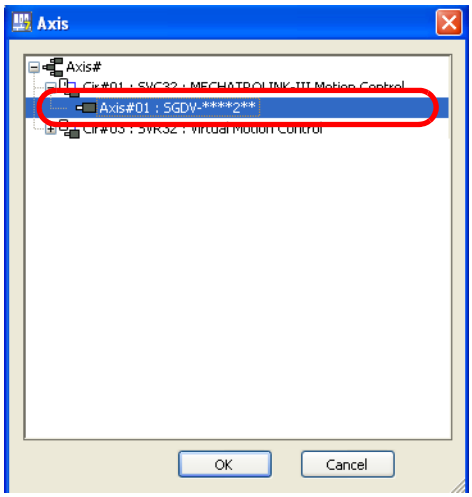
The Test Run Warning Dialog Box will be displayed.

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

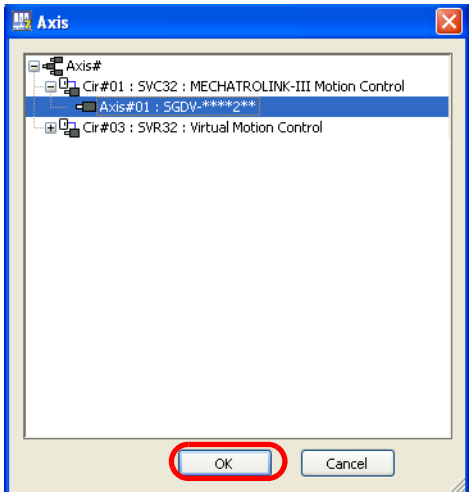


The Axis Dialog Box will be displayed.

3. Select the axis to test.

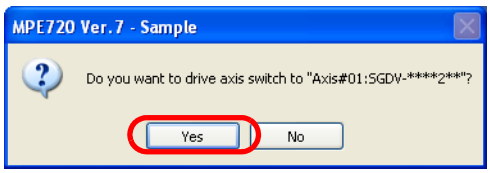


4. Click the **OK** Button.



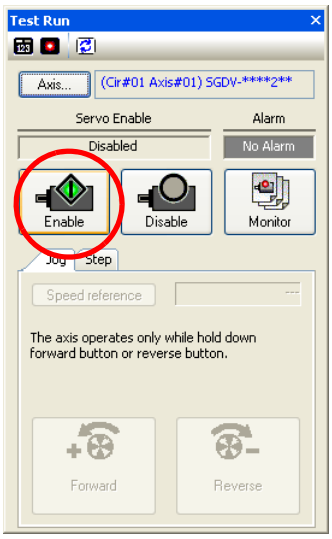
The following confirmation message about switching the axis will be displayed.

5. Click the **Yes** Button.

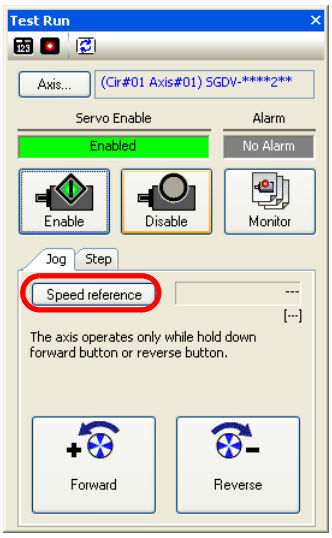


The Test Run Dialog Box will be displayed.

6. Click the **Enable** Button.

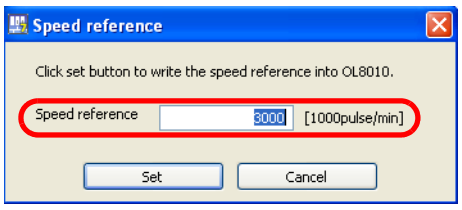


7. Click the **Speed reference** Button on the Jog Tab Page.

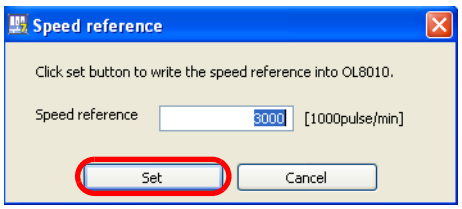


The Speed Reference Dialog Box will be displayed.

8. Enter the speed reference.



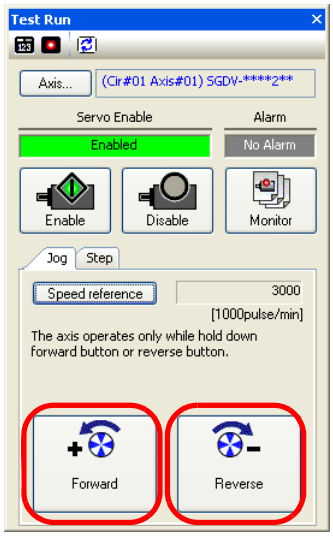
9. Click the **Set** Button.



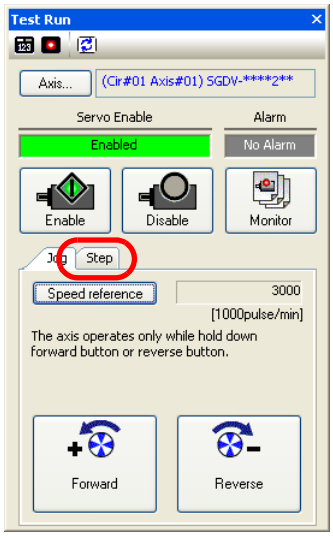
The Speed Reference Dialog Box will close.

10. Confirm the following information.

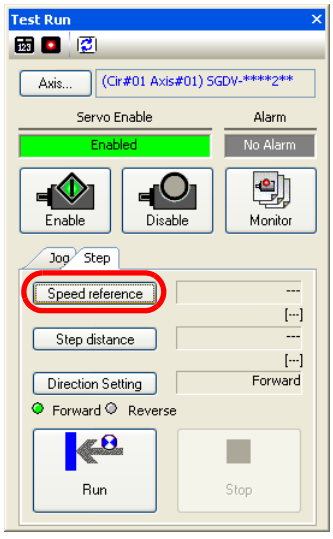
- While the **Forward** Button is pressed, the motor rotates in the forward direction.
- While the **Reverse** Button is pressed, the motor rotates in the negative direction.



11. Click the **Step** Tab.

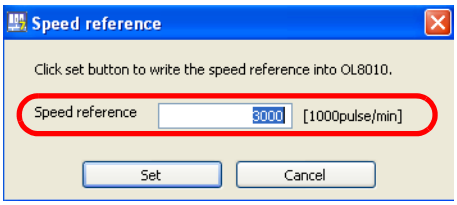


12. Click the **Speed reference** Button.

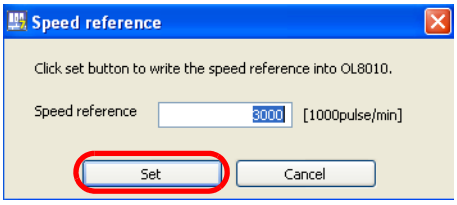


The Speed Reference Dialog Box will be displayed.

13. Enter the speed reference.

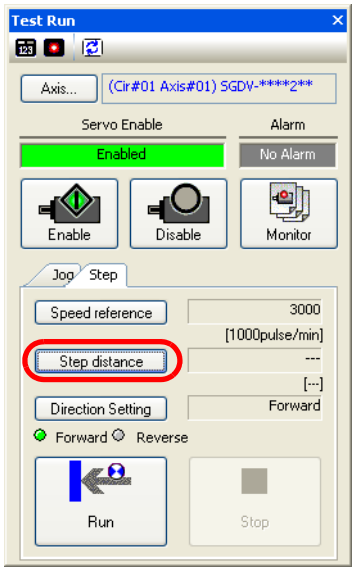


14. Click the **Set** Button.



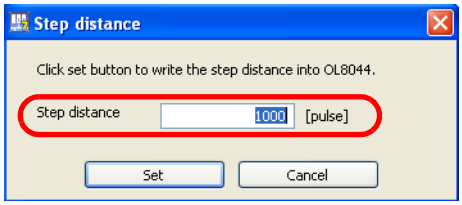
The Speed Reference Dialog Box will close.

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

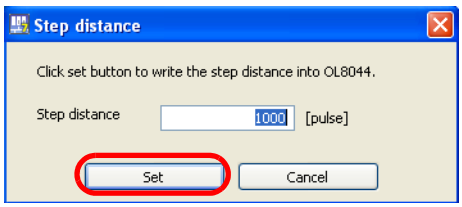


The Step Distance Dialog Box will be displayed.

16. Enter the step distance.

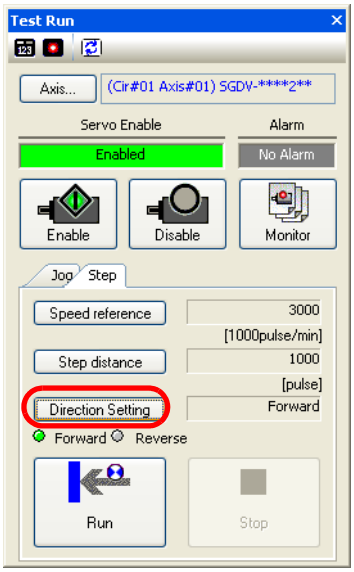


17. Click the **Set** Button.



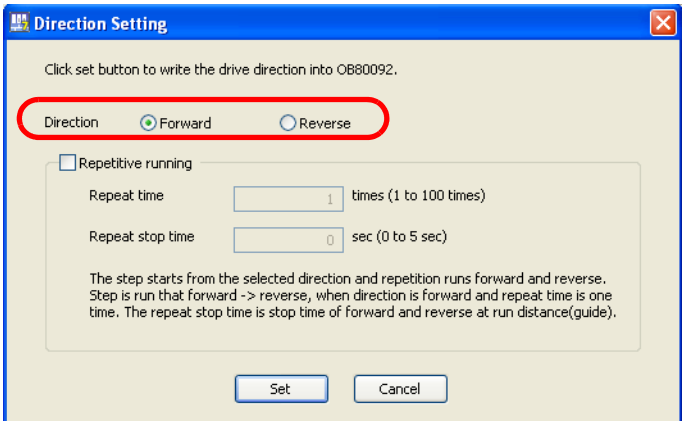
The Step Distance Dialog Box will close.

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

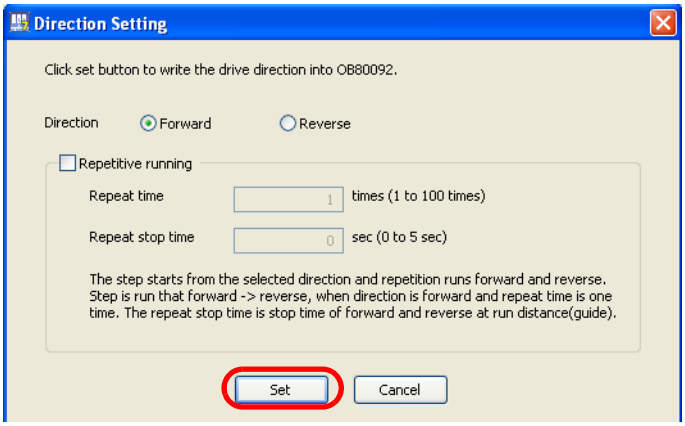


The Direction Setting Dialog Box will be displayed.

19. Set the direction of operation.



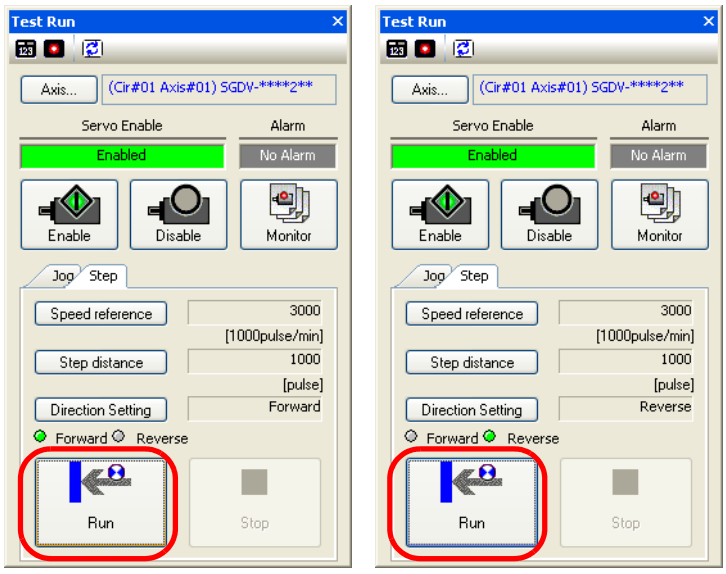
20. Click the **Set** Button.



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.

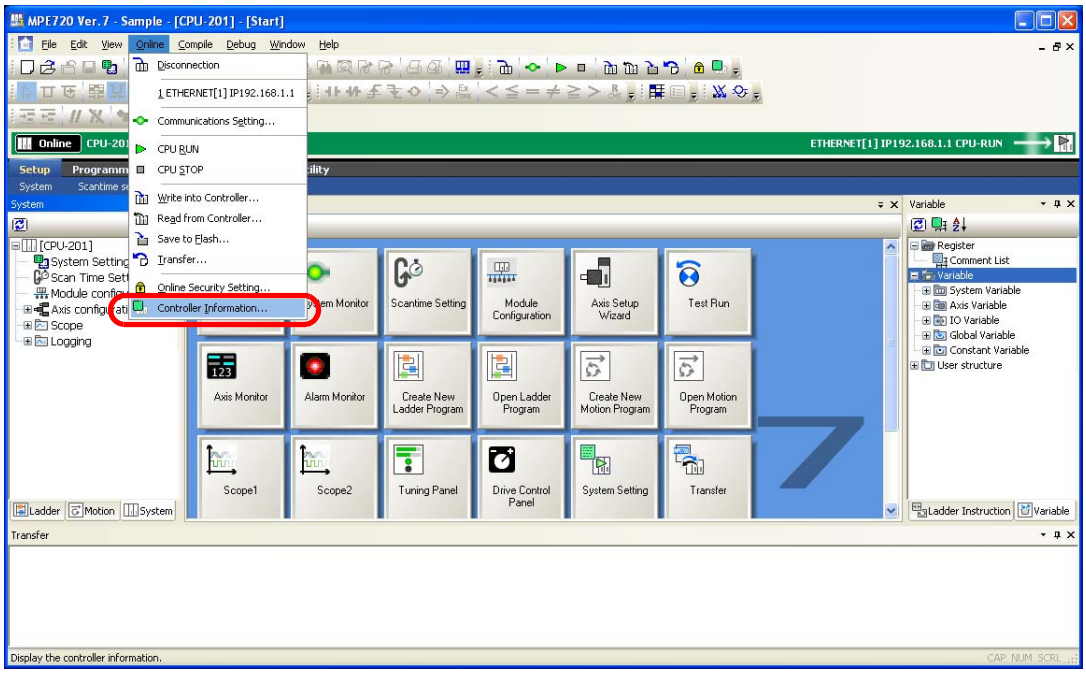
This concludes the procedure.

3.7 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.

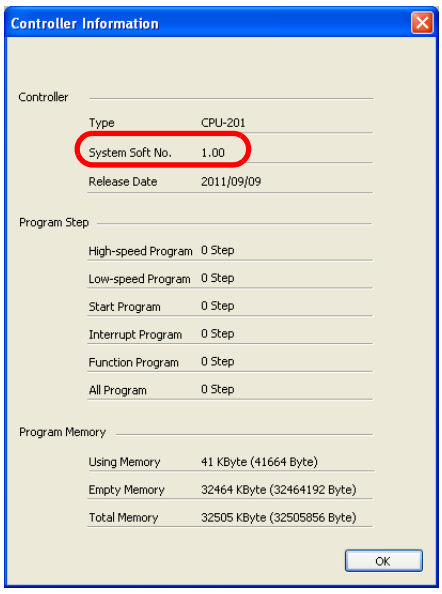
Use the following procedure to confirm the firmware version of the Machine Controller.

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

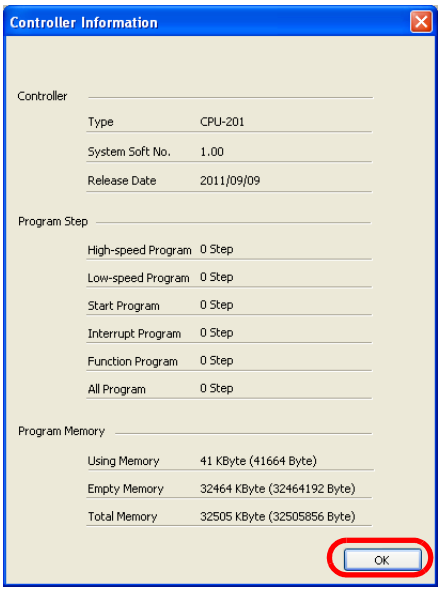


The Controller Information Dialog Box will be displayed.

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.

3.8 Accessing Machine Controller Data from a Host PC

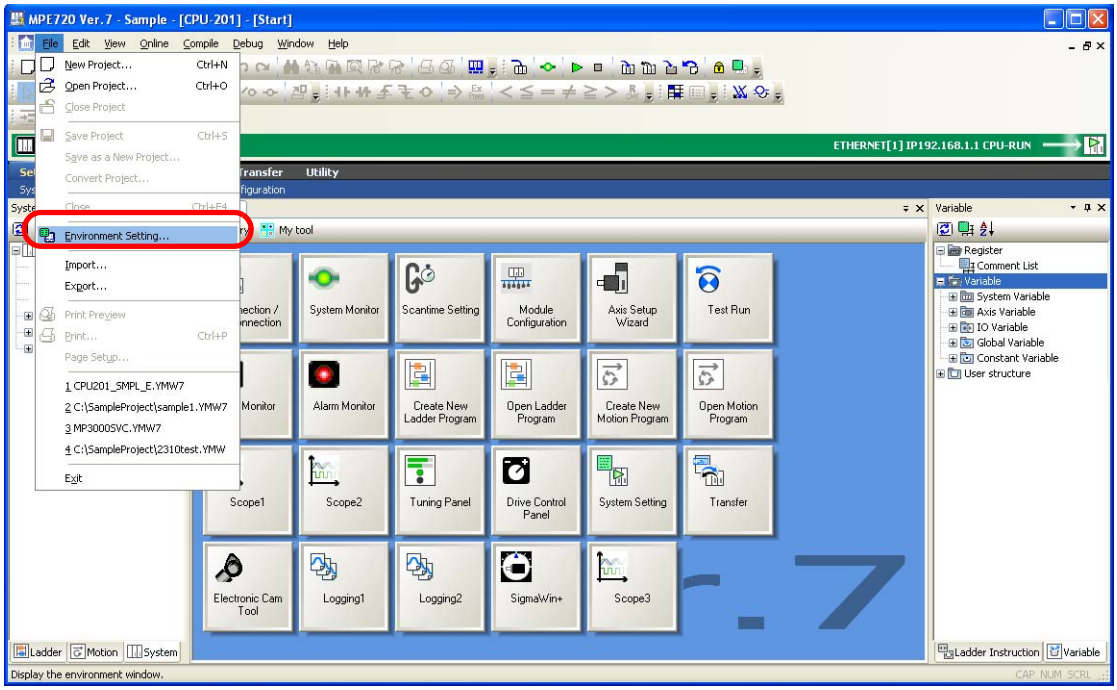
Use the following procedure to access data in the Machine Controller from a host PC by using FTP.

Note

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.

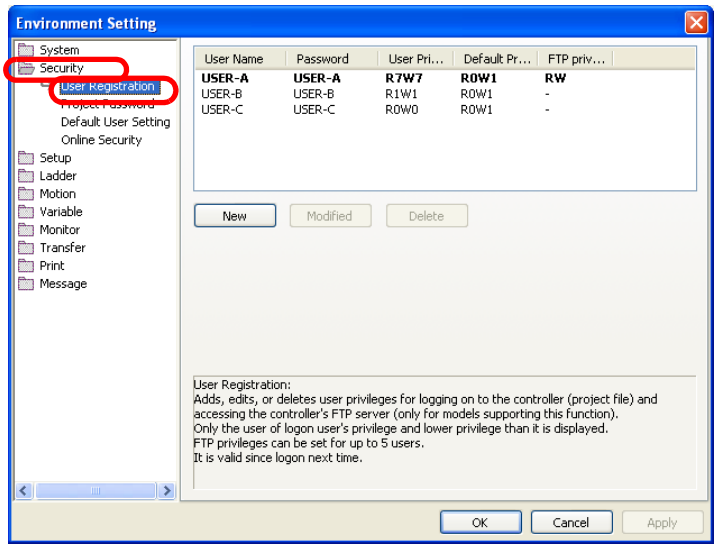
Begin by setting the FTP access privileges.

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



The Environment Setting Dialog Box is displayed.

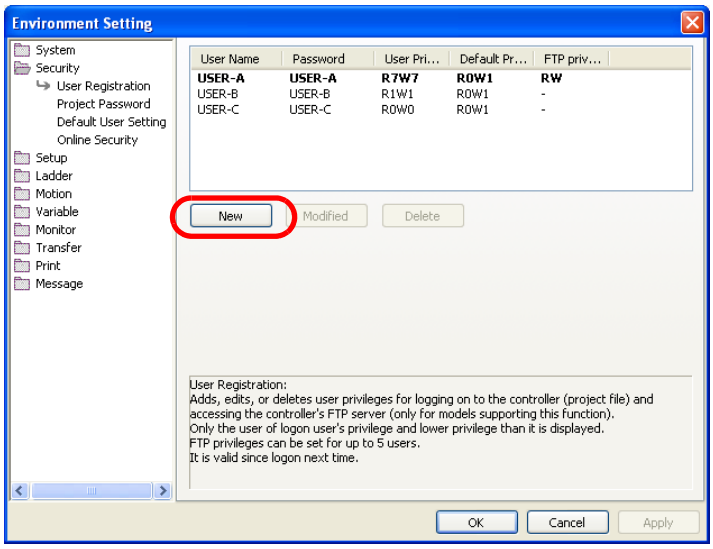
2. Select **Security** – **User Registration**.



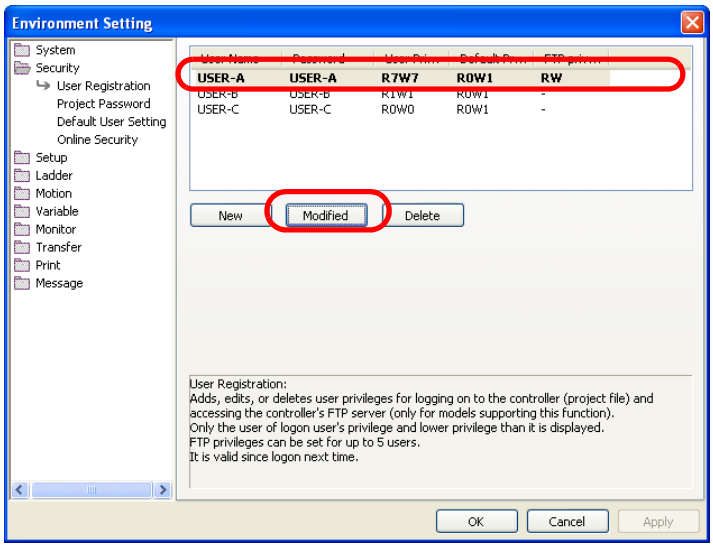
The FTP privileges for each user will be displayed.

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.

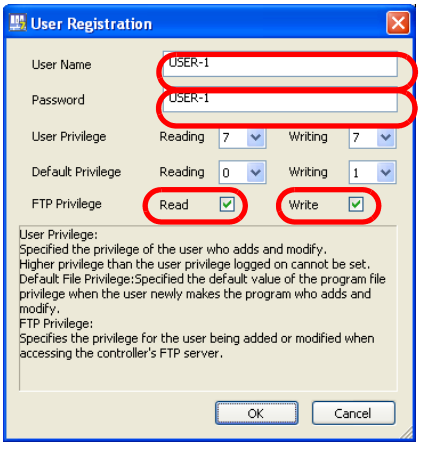


The User Registration Dialog Box will be displayed.

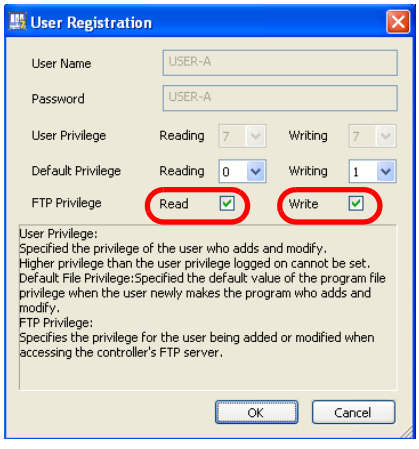
4. Select the **Read** and **Write** Check Boxes for the **FTP Privilege**.

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

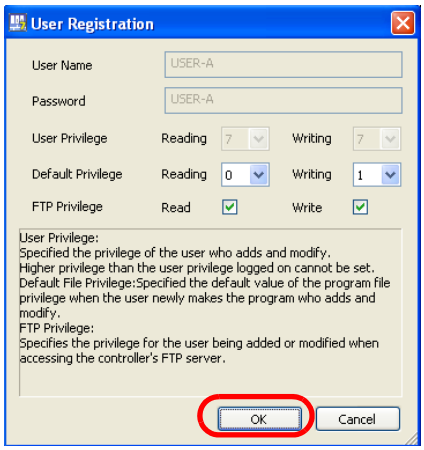
If You Clicked the **New** Button



If You Clicked the **Modified** Button

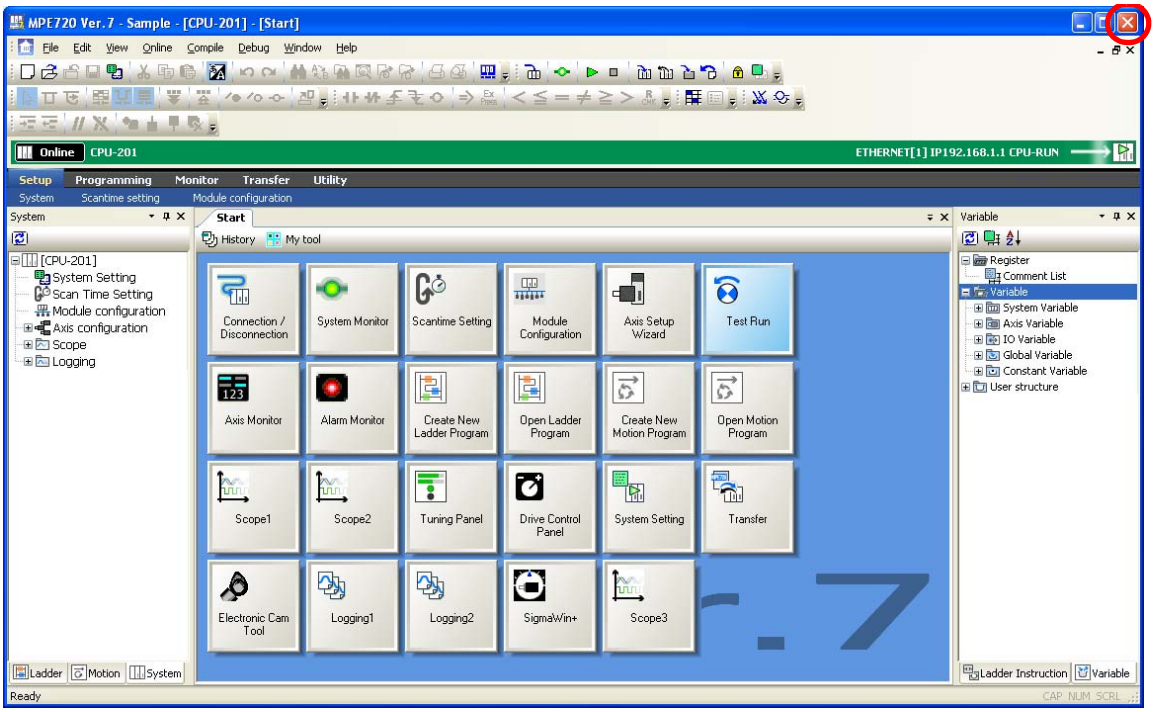


5. Click the **OK** Button.



The User Registration Dialog Box will close.

6. Click the close button on the MPE720 Window.



The FTP privileges will be activated.

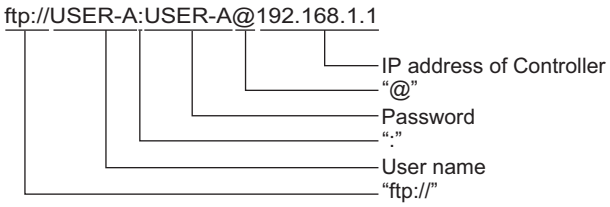
This concludes setting the FTP privileges.

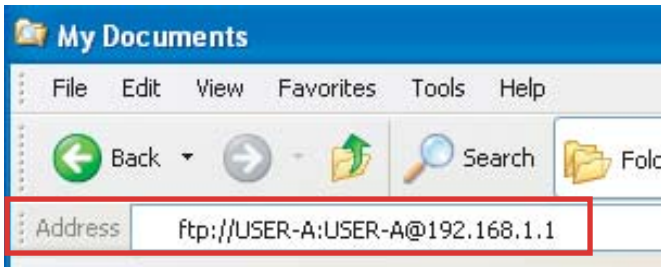
The next step is to use a host PC to acquire data from the Machine Controller using FTP.

This section describes how to access the FTP server from a Windows PC.

7. Enter the address in the address bar.

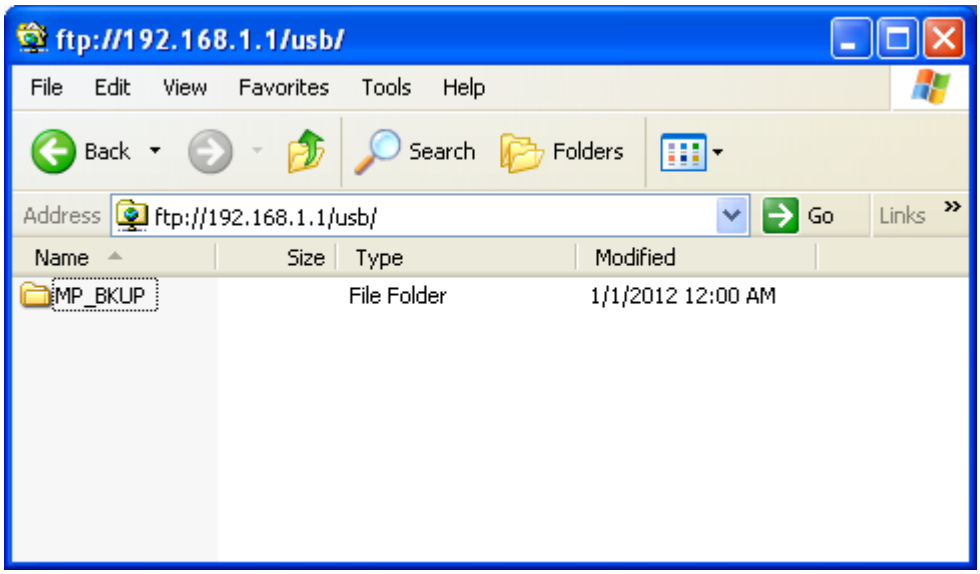
The address structure is as follows:





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.

3.9 Creating, Editing, and Saving Project Files

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

Creating a Project File

Refer to the following sections for details on creating a project file.

☞ *1.2 Detailed Procedures – Creating a Project File (page 1-17)*

Opening an Existing Project File

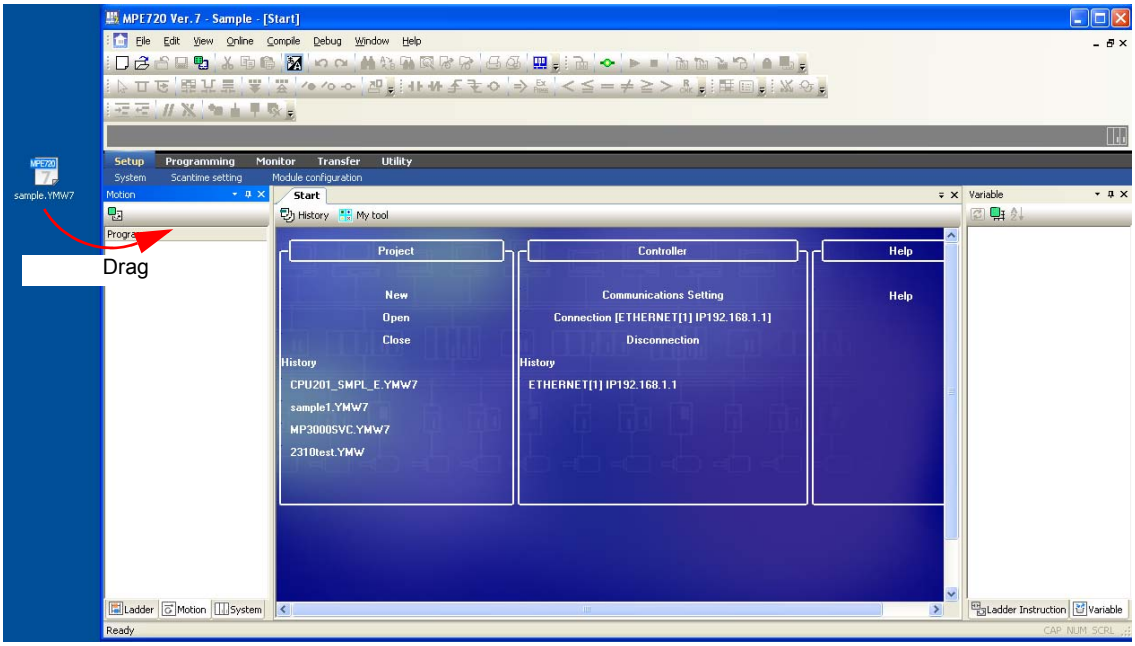
You can open an existing project file by using one of the following three methods.

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.

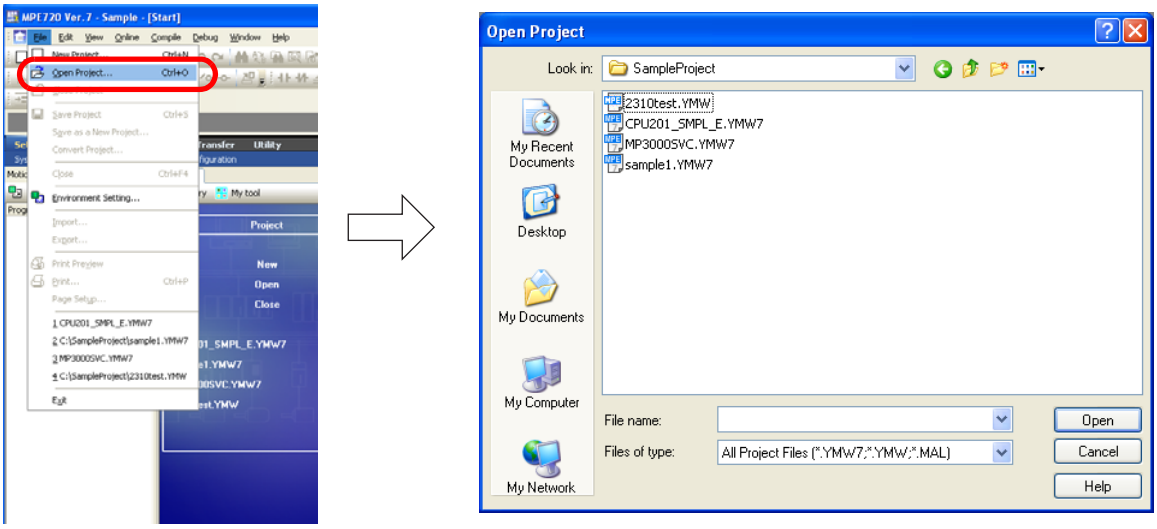
- Drag the icon for the project file to open onto the MPE720 Icon.

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.



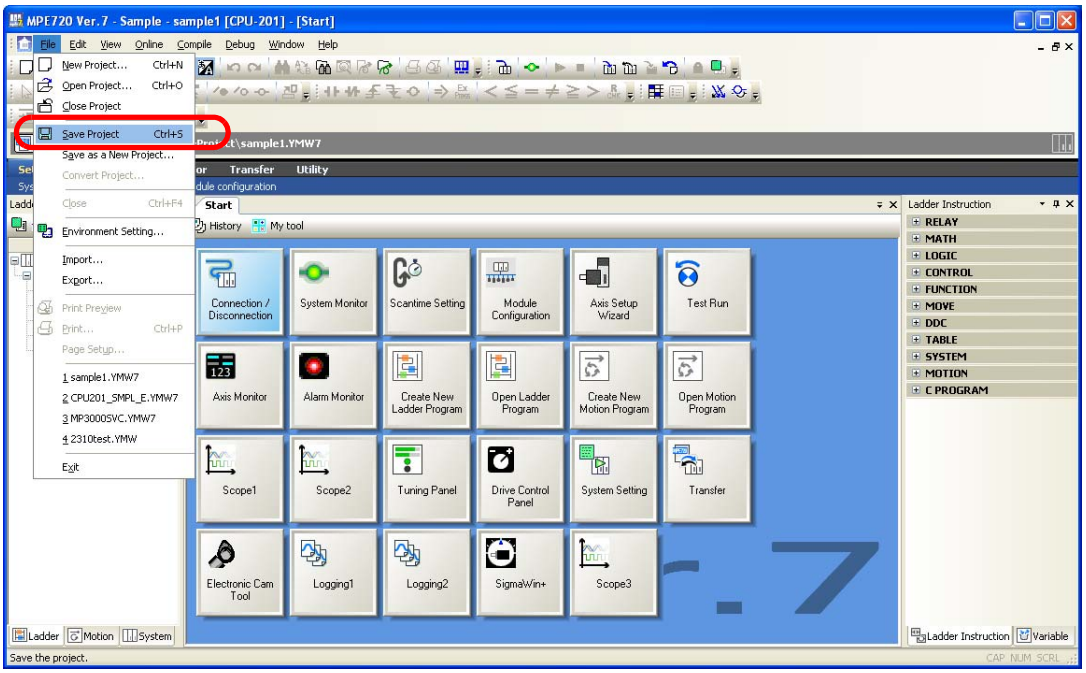
Saving Project Files

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.

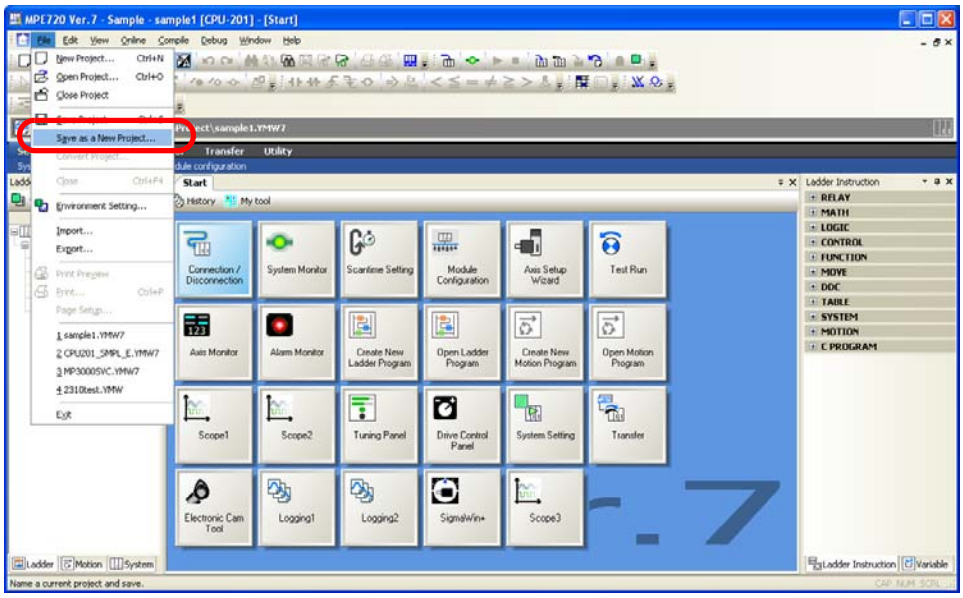
- Select ***File*** – ***Save Project*** from the menu bar.



Saving a New Project File

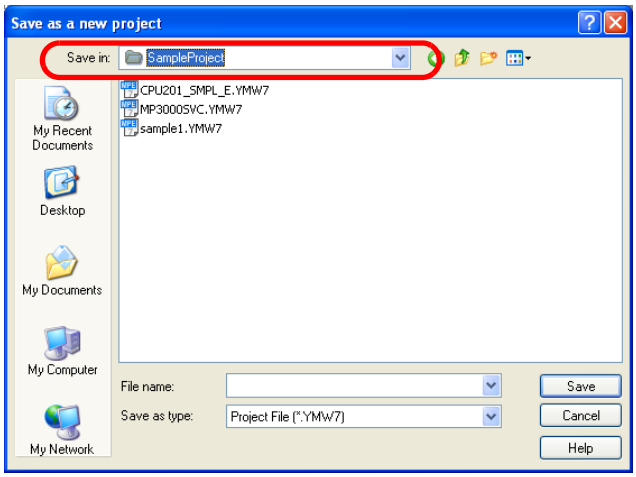
Use the following procedure to save the data in a new project file.

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

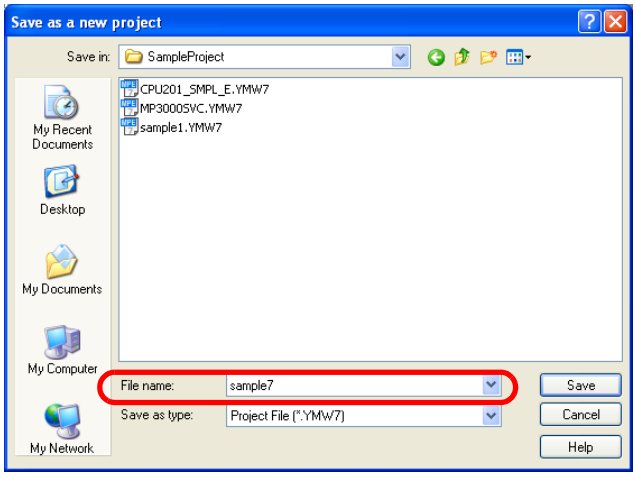


The Save As a New Project Dialog Box will be displayed.

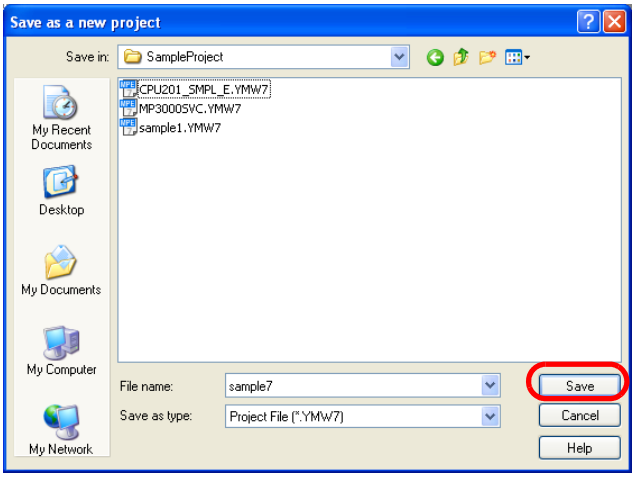
2. Select the folder in which to save the new project file.



3. Enter a file name.



4. Click the **Save** Button.

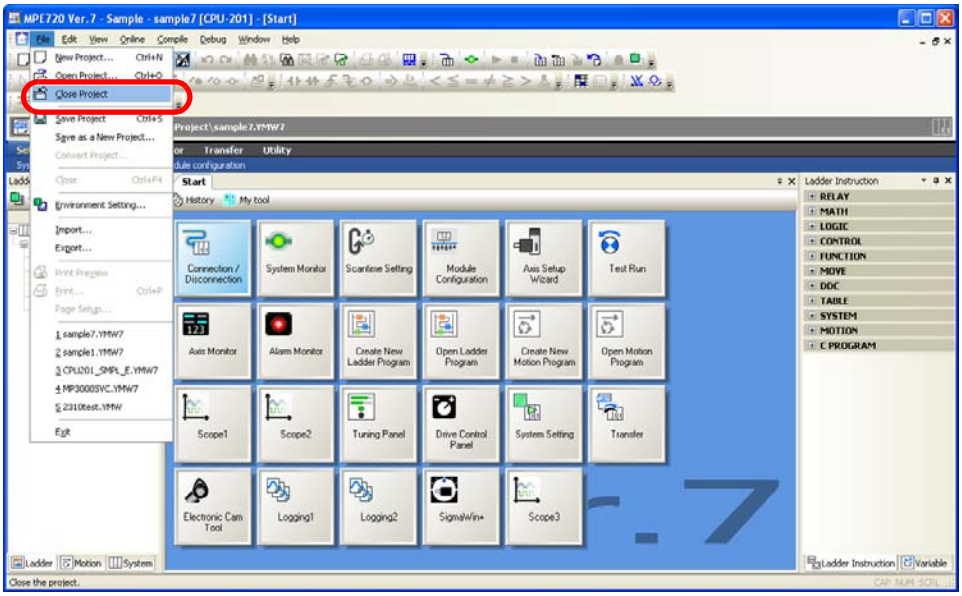


This concludes the procedure.

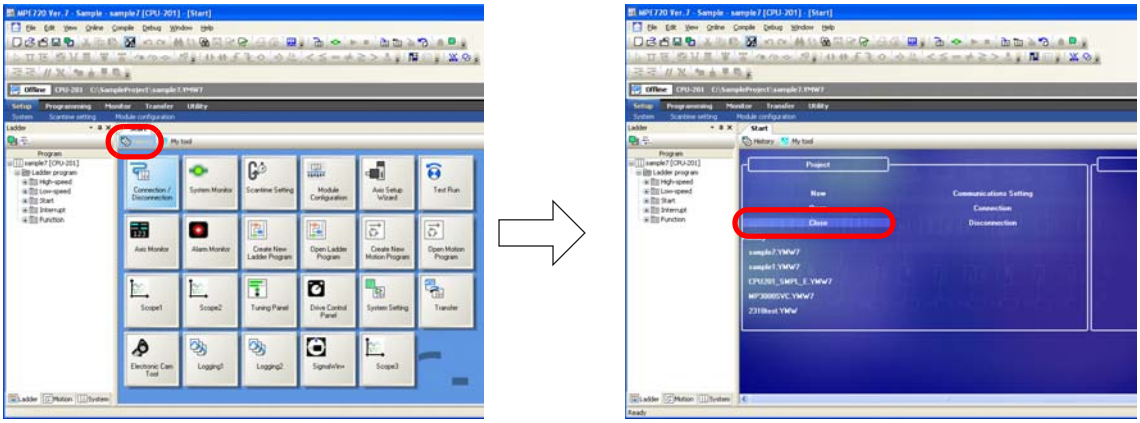
Closing a Project File

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***.



Programming

4

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

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4.1 Ladder Programming

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

Creating New Ladder Programs

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

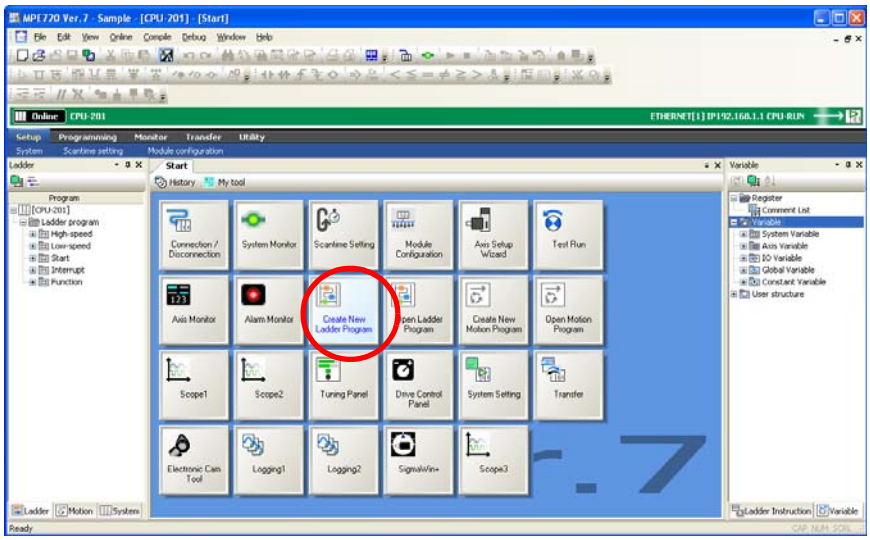
- Creating from the My Tool Tab Page
- Creating from the Ladder Pane

The procedures are given below.

Creating from the My Tool Tab Page

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

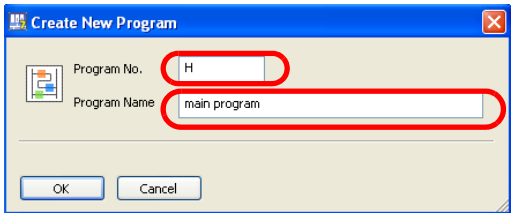
1. Click the **Create New Ladder Program** Button.



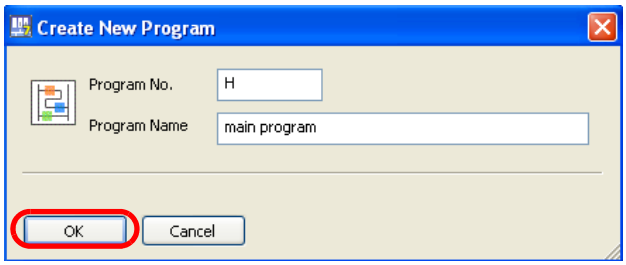
The Create New Program Dialog Box will be displayed.

2. Enter the program number and program name.

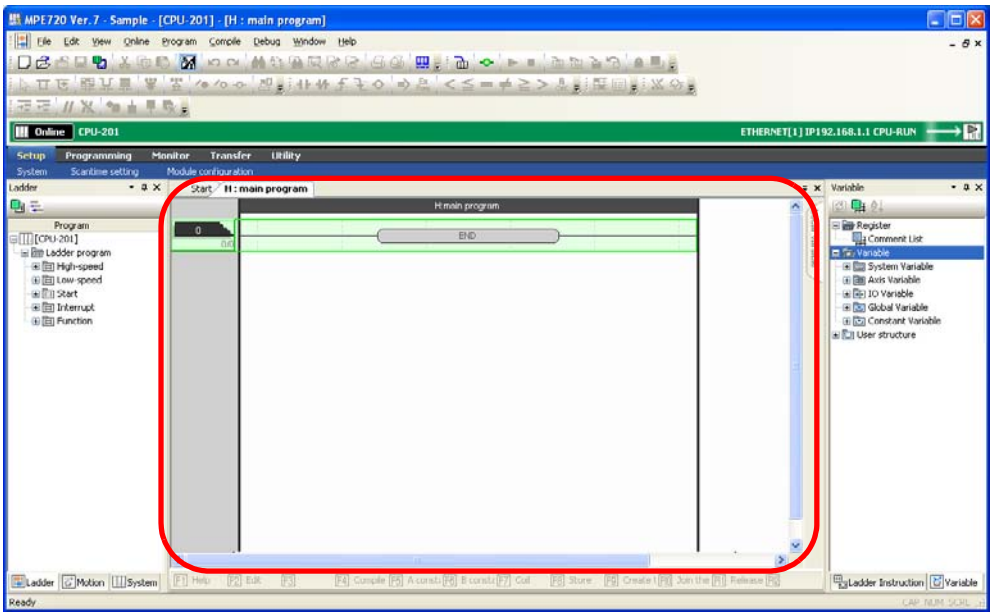
- Example for the Program Number: H 01 . 01
  - Grandchild drawing number (setting range: 01 to 99)
  - Period
  - Child drawing number (setting range: 01 to 99)
  - Parent drawing type
    - A: Startup drawing
    - I: Interrupt drawing
    - H: High-speed scan drawing
    - L: Low-speed scan drawing



3. Click the **OK** Button.



A new ladder program will be displayed.

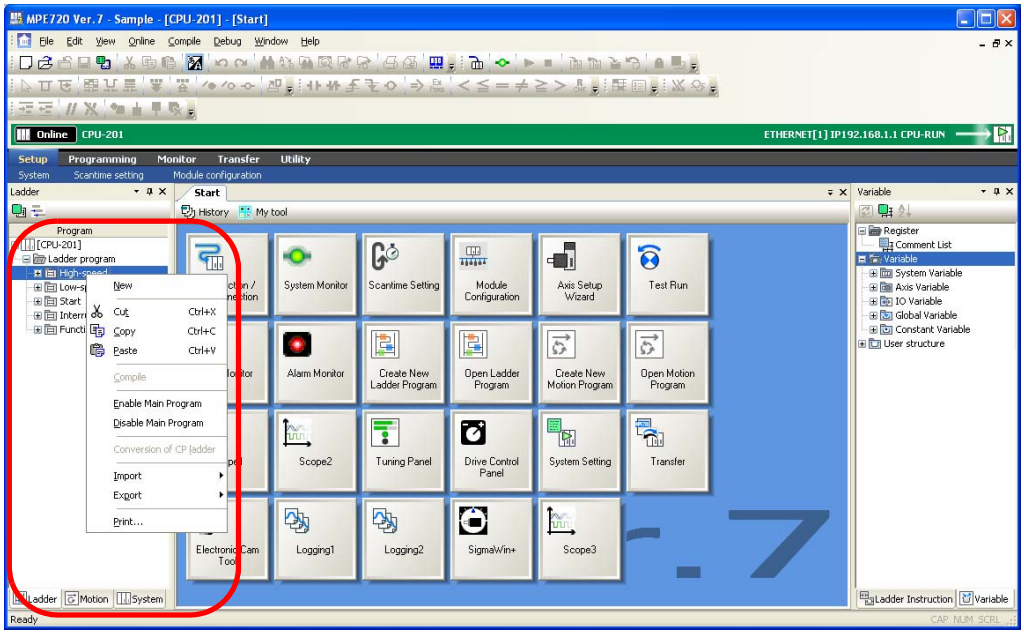


This concludes the settings.

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

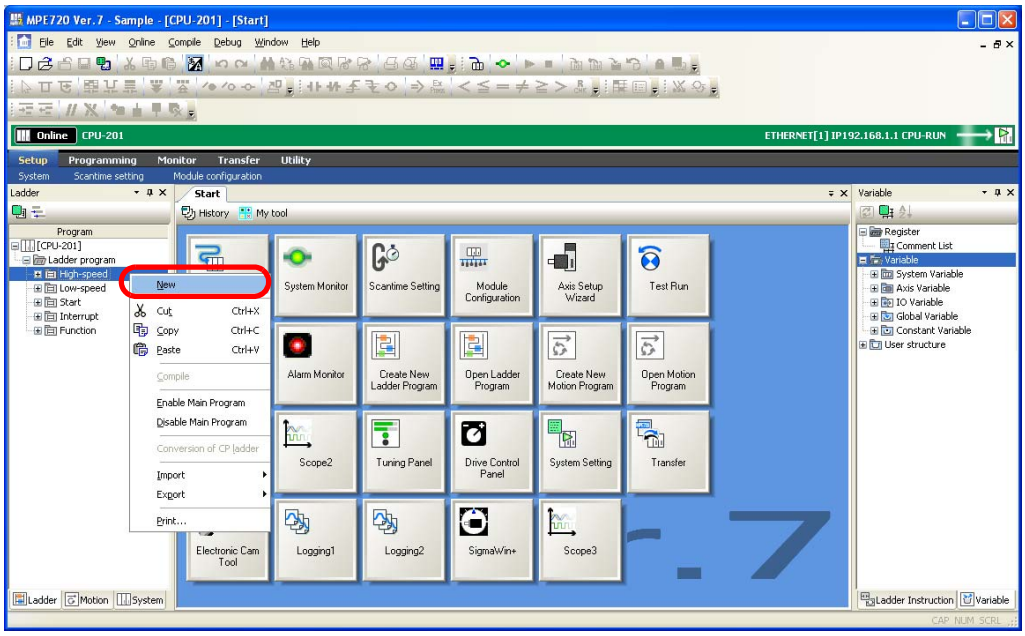
Creating Child Drawings

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

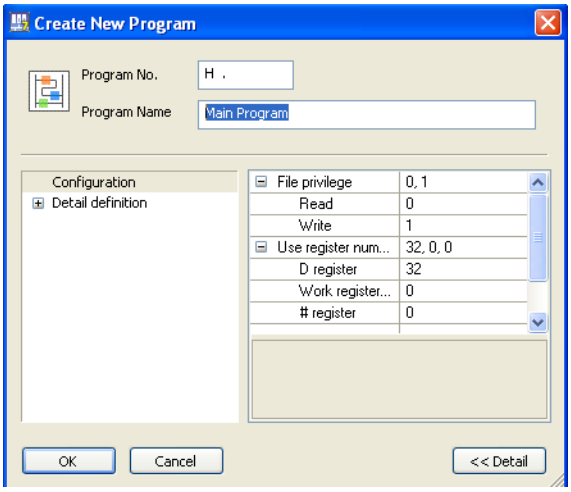
Grandchild drawings can be created only if both parent and child drawings exist.
Right-click the program (child drawing) for which to create a grandchild drawing.

2. Select ***New*** on the Start Tab Page.

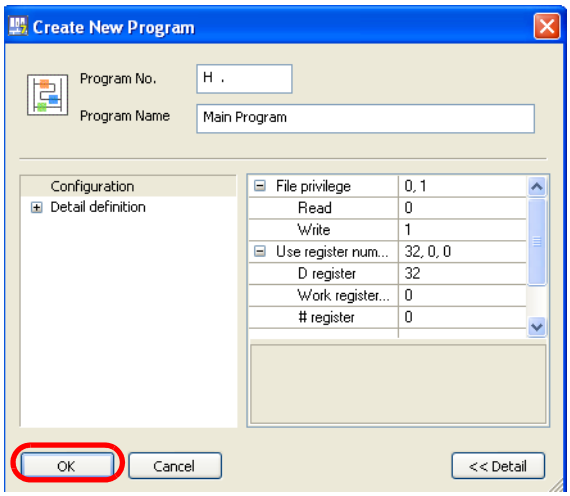


The Create New Program Dialog Box will be displayed.

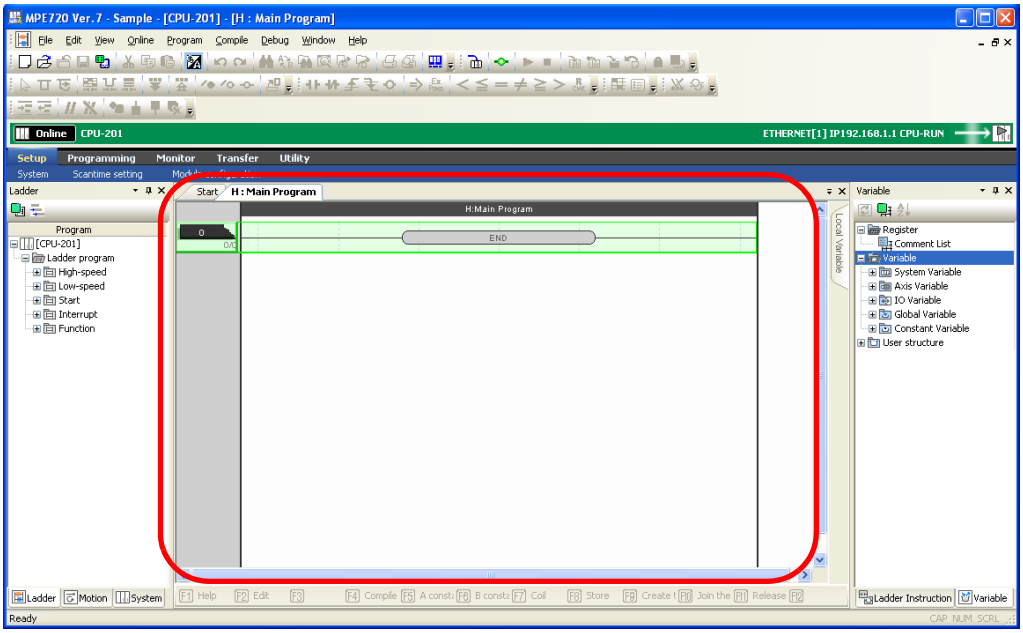
3. Change the settings as required.



4. Click the **OK** Button.



A new ladder program will be displayed.



This concludes the settings.

Editing Ladder Programs

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

- Inserting a rung
- Inserting an instruction
- Setting parameters

Information

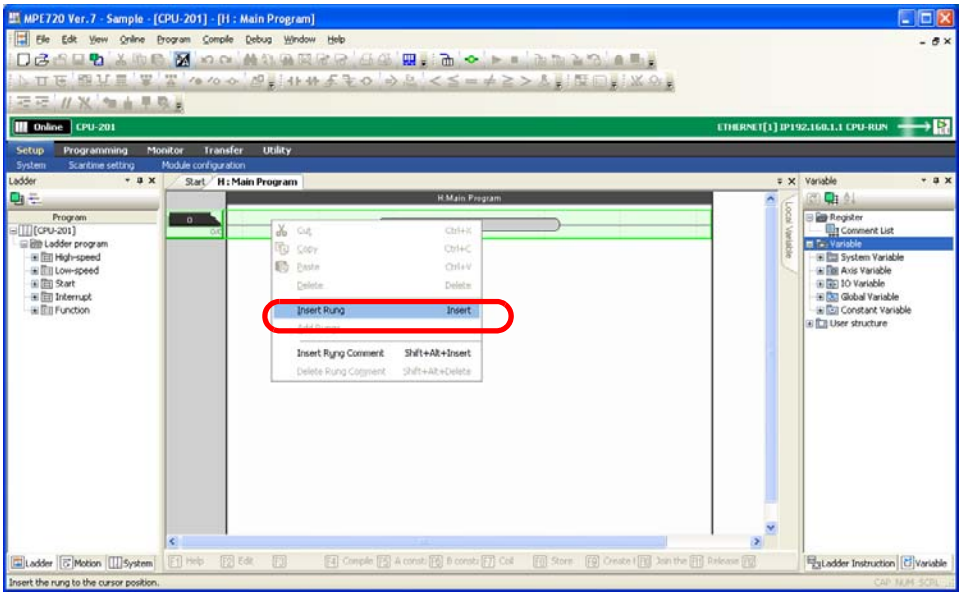
This section describes only the operating procedures for editing. Refer to the following manual for details on specific instructions and settings.

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

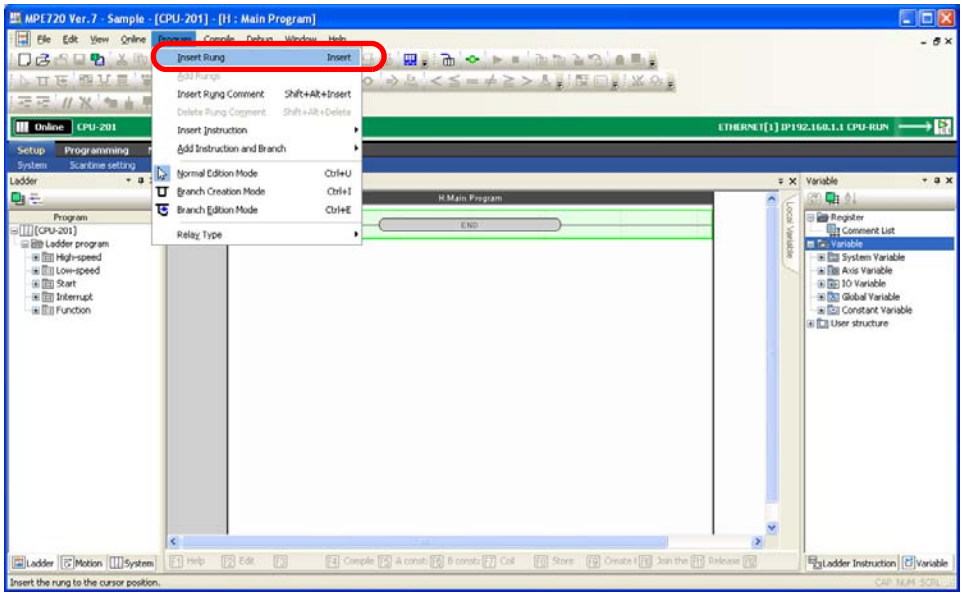
Inserting a Rung

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.

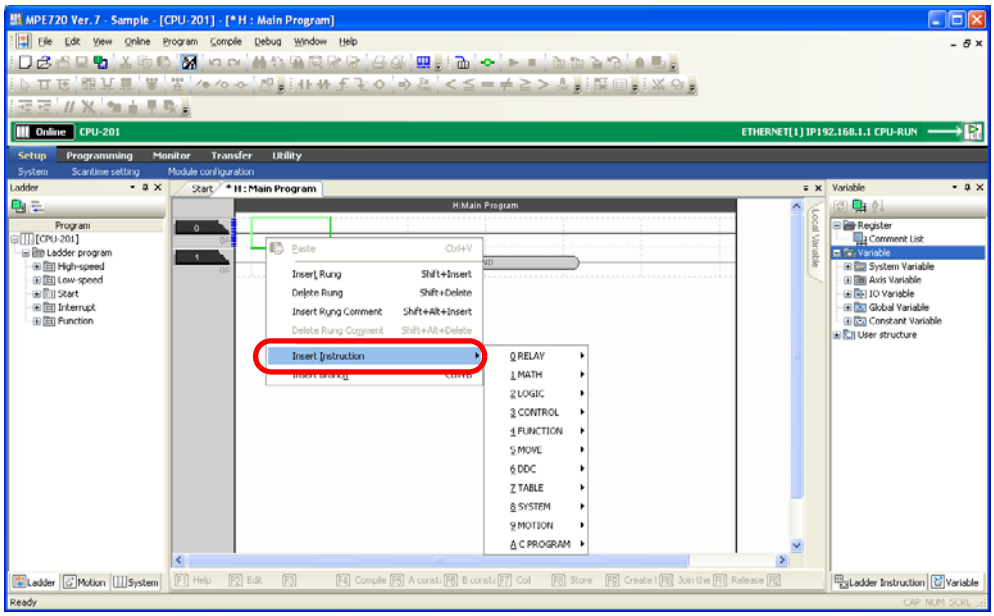


- Place the mouse cursor where the rung is to be inserted, and press the **Insert** Key.

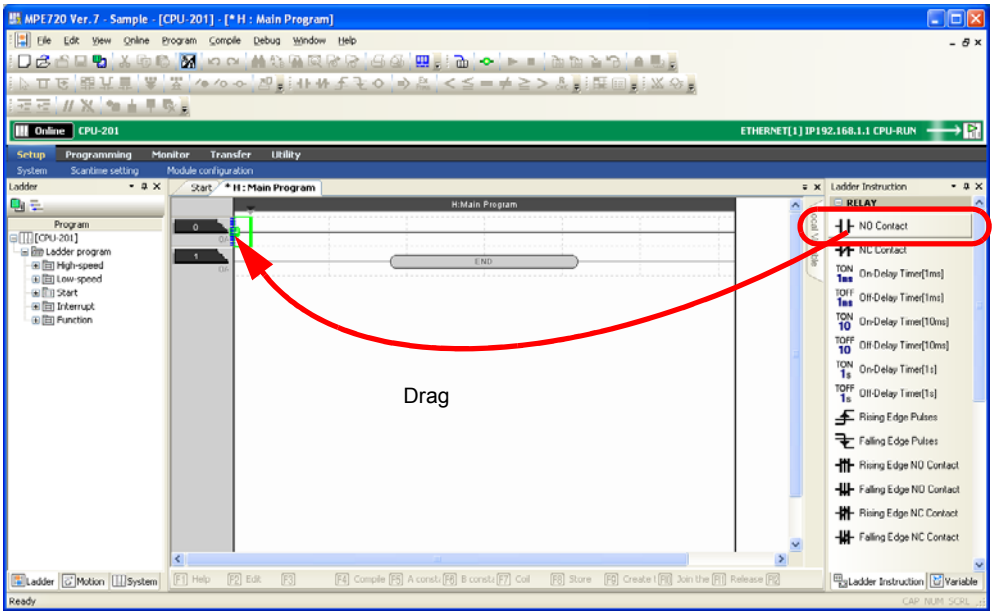
Inserting an Instruction

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

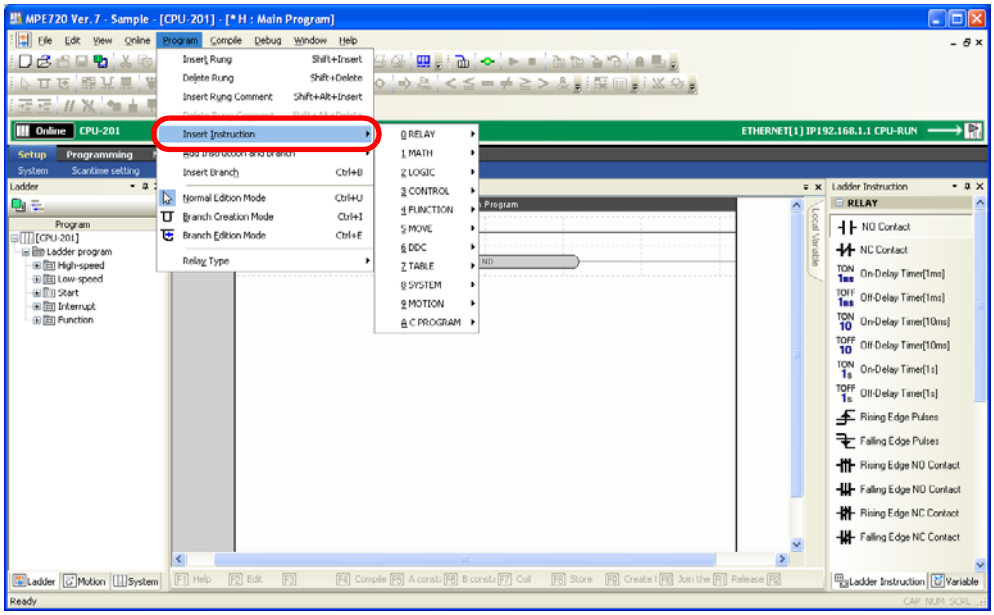
- Right-click where instruction is to be inserted, and select ***Insert Instruction***.



- 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.



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

☞ *Easily Performing Numeric Operations in Ladder Programs (page 4-10)*

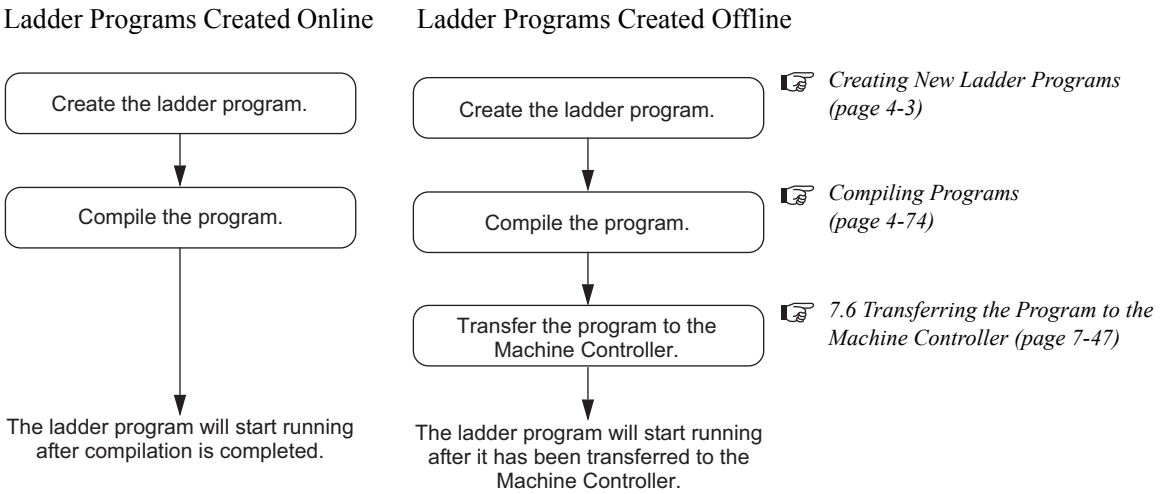
Setting Parameters

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

Double-click [?] or [---] to display the Parameter Setting Dialog Box and enable editing.

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.



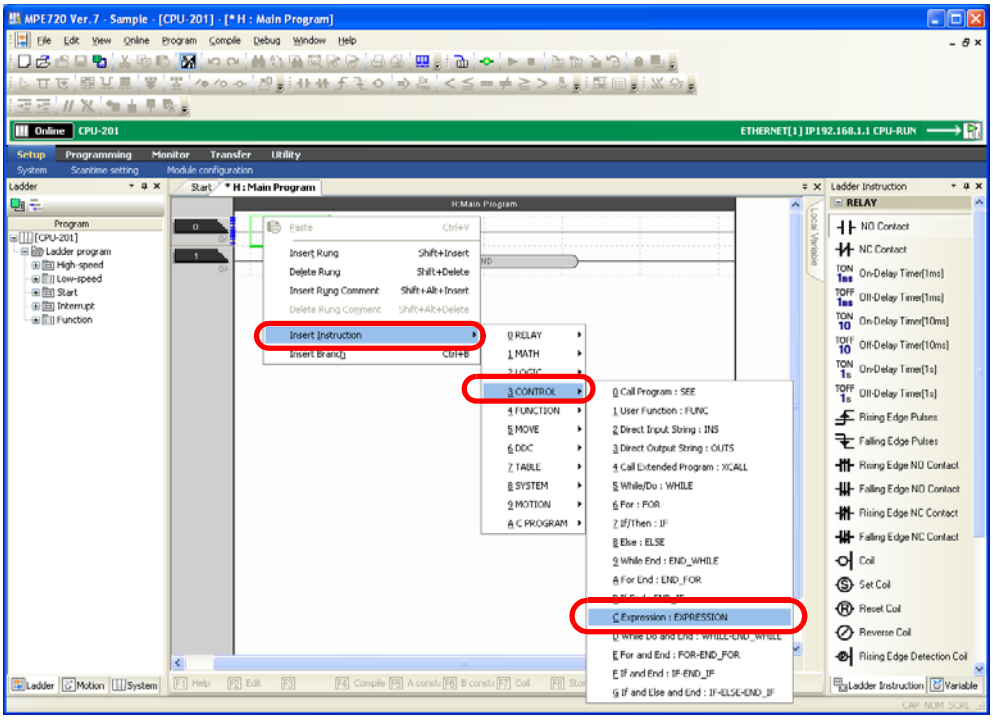
Easily Performing Numeric Operations in Ladder Programs

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

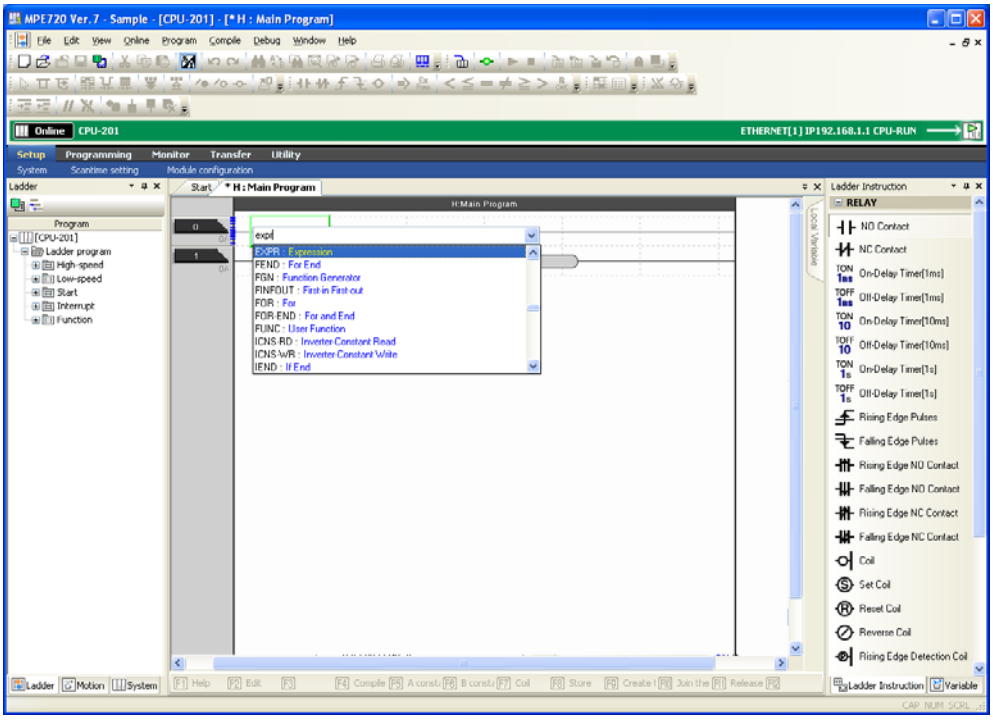
The procedure is given below.

1. Use one of the following methods to insert an Expression instruction.

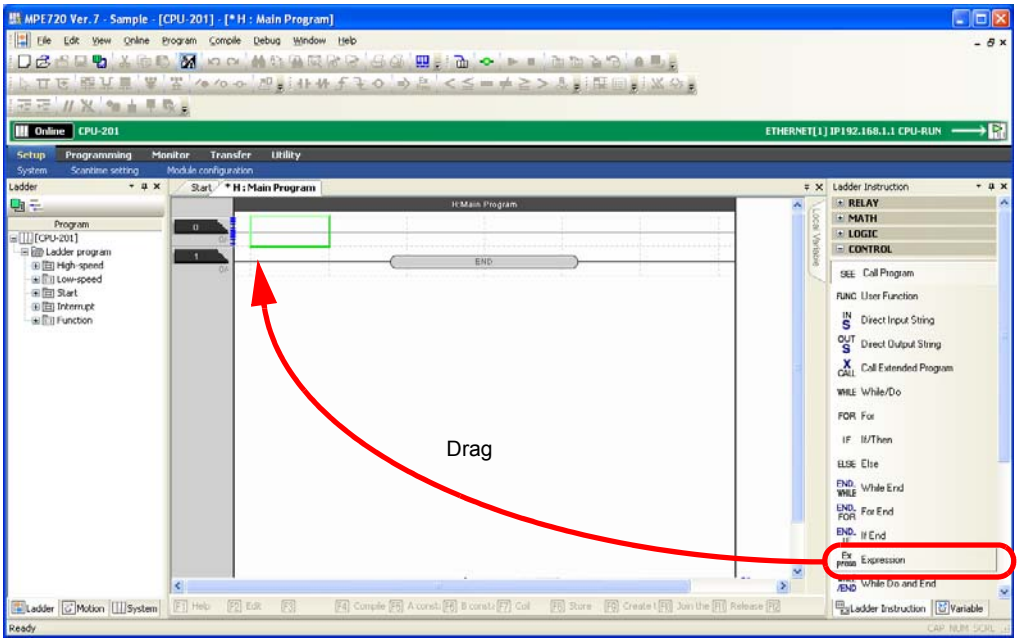
- Right-click where the instruction is to be inserted, and select ***Insert Instruction*** – ***CONTROL*** – ***Expression: EXPRESSION***.



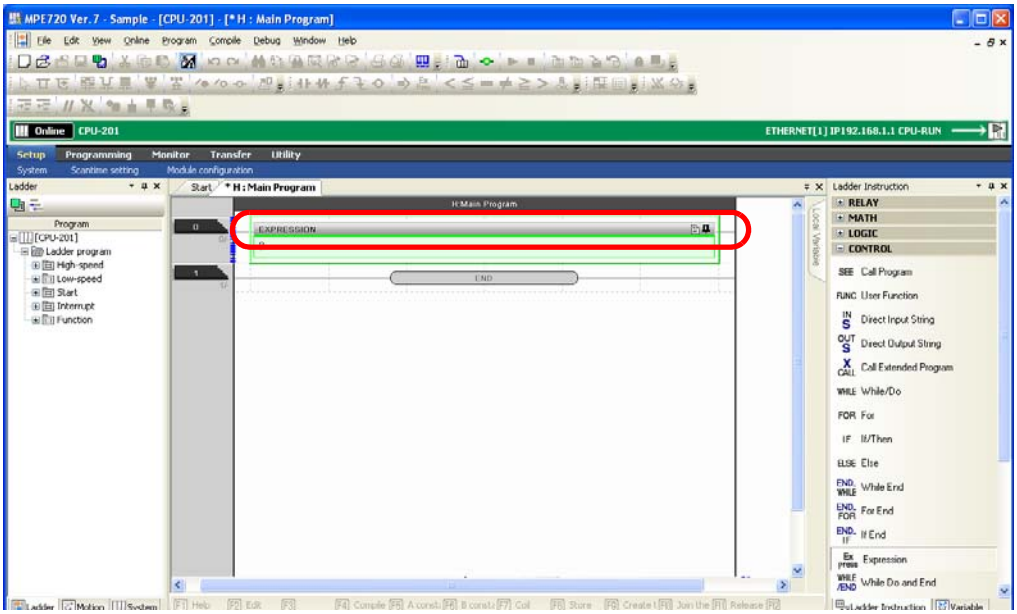
- Place the mouse cursor where the instruction is to be inserted, and type “expr”.



- 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.

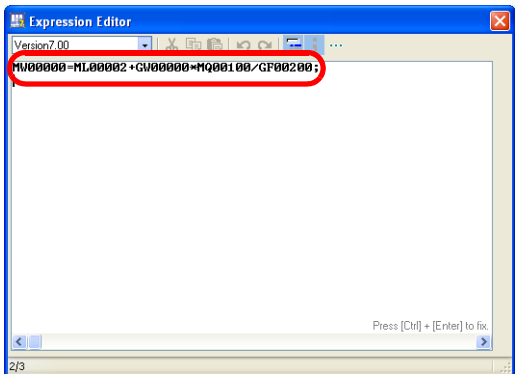


2. Double-click the input box for the Expression instruction.



The Expression Editor Dialog Box will be displayed.

3. Enter the arithmetic expression.



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

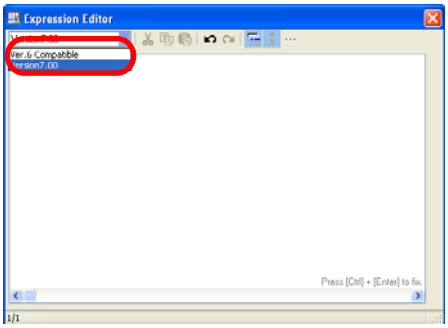
📖 *MP3000 Series Ladder Programming Manual* (Manual No.: SIEP C880725 13)

Information

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

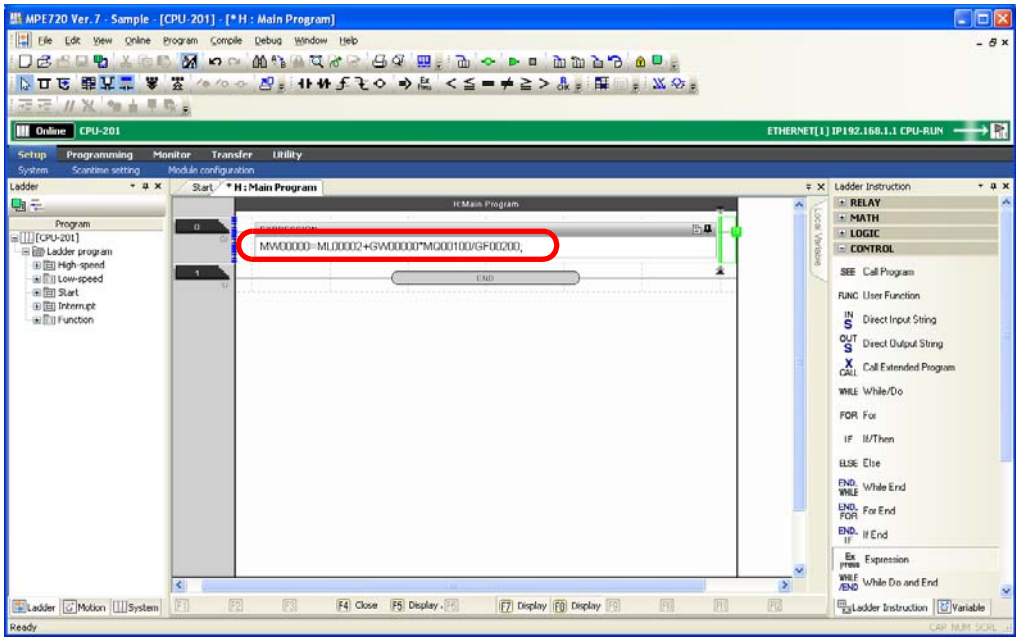
- Version 6: Compatible with the Expression instruction from MPE720 version 6.
- Version 7.00: Not compatible with the Expression instruction from MPE720 version 6. New functions and operators that were added for the MPE720 version 7 are supported.

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



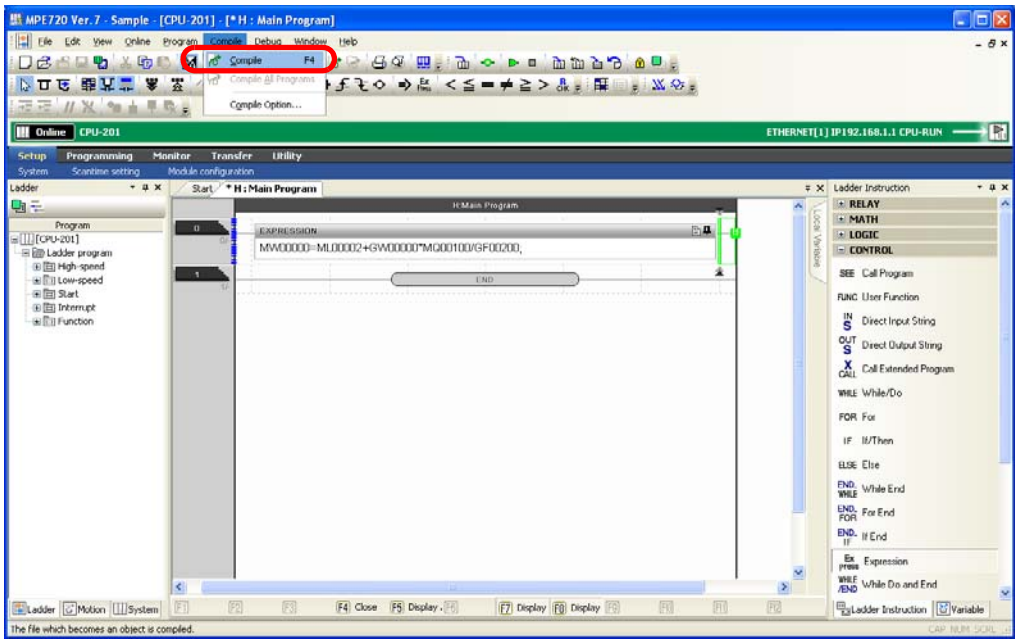
4. Hold down the **Ctrl** Key and press the **Enter** Key.

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

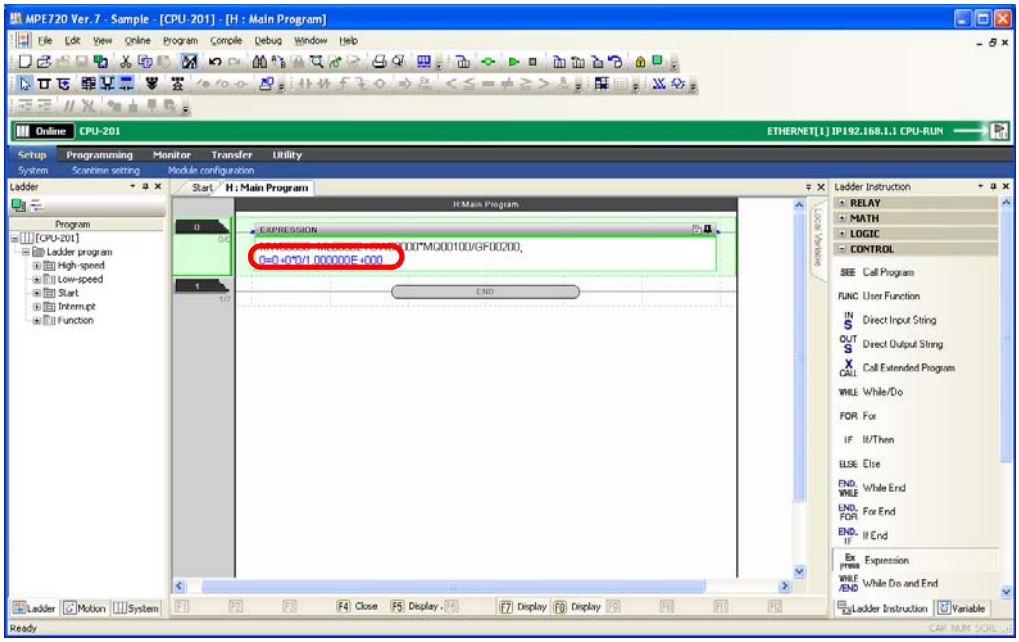


5. Use one of the following methods to compile the program.

- 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.



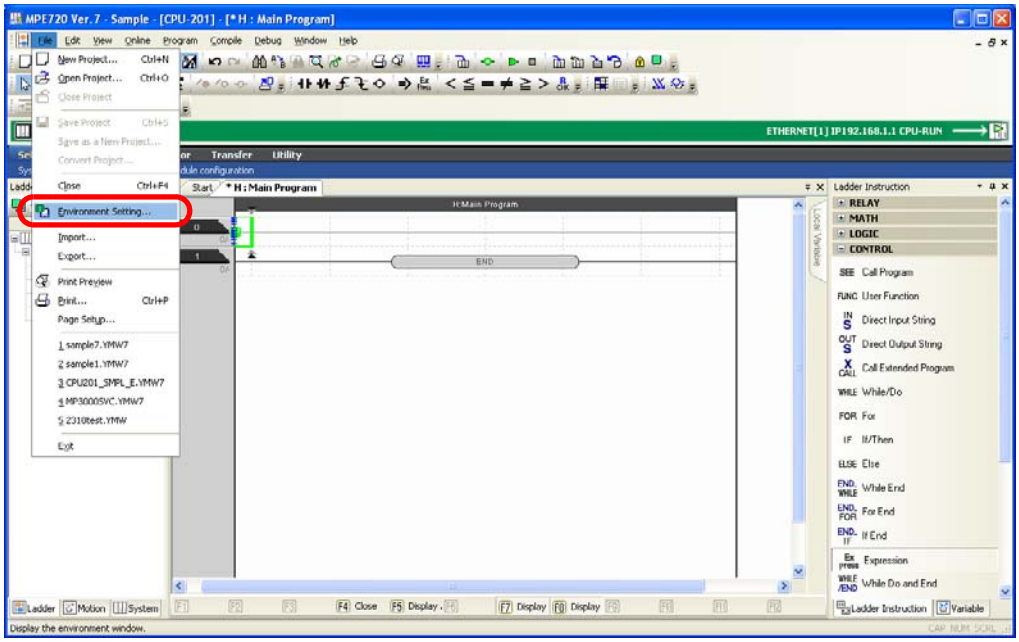
This concludes the procedure.

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.

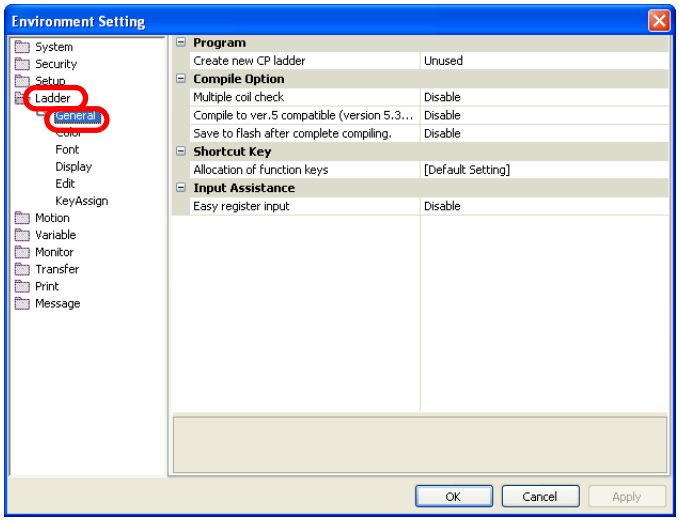
Use the following procedure.

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

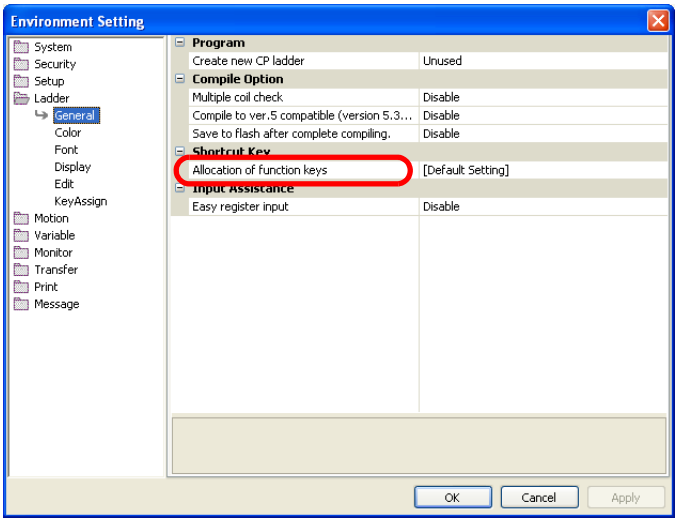


The Environment Setting Dialog Box will be displayed.

2. Select **Ladder** – **General**.

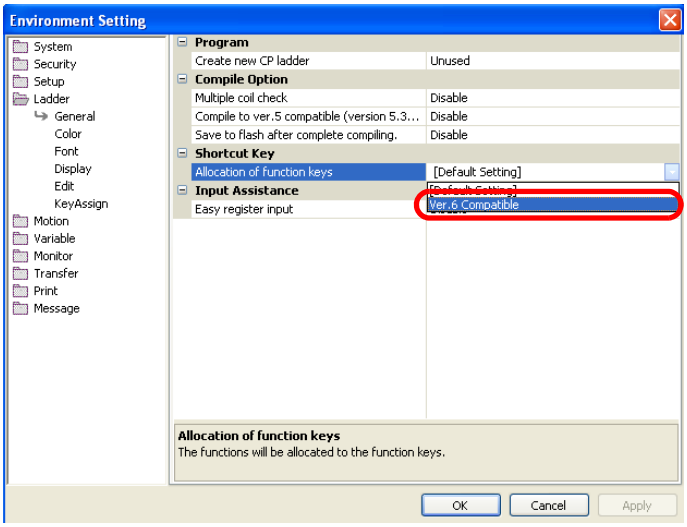


3. Click **Allocation of function keys**.

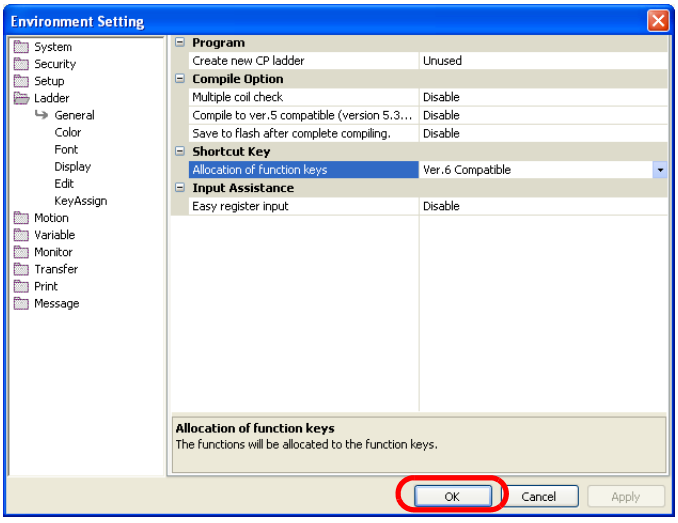


The box on the right will become selectable.

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



5. Click the **OK** Button.



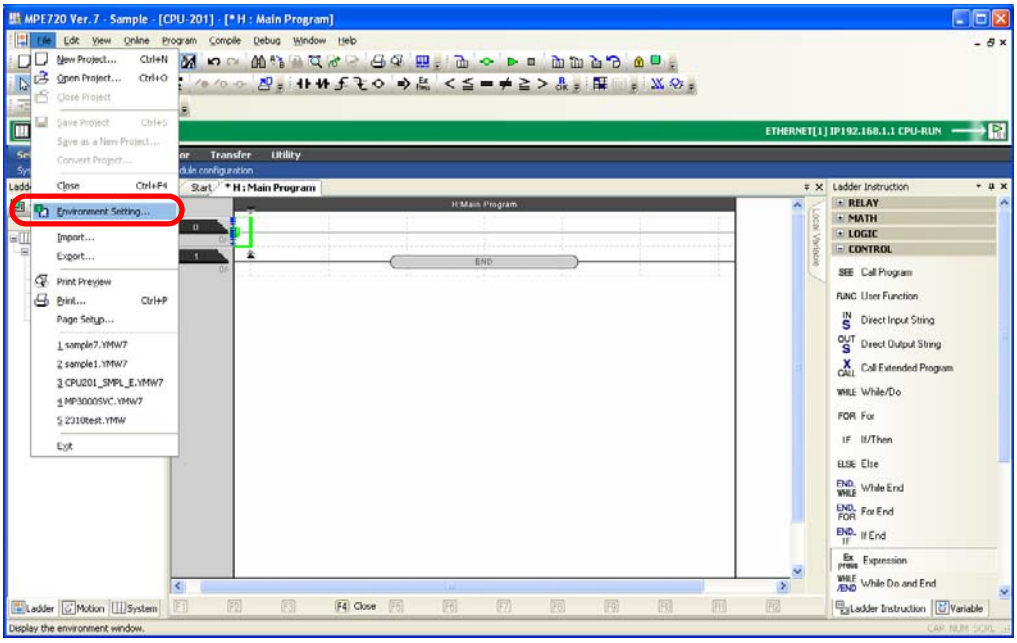
This concludes the procedure.

Changing the Cursor Movement Order in the Ladder Editor Pane

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.

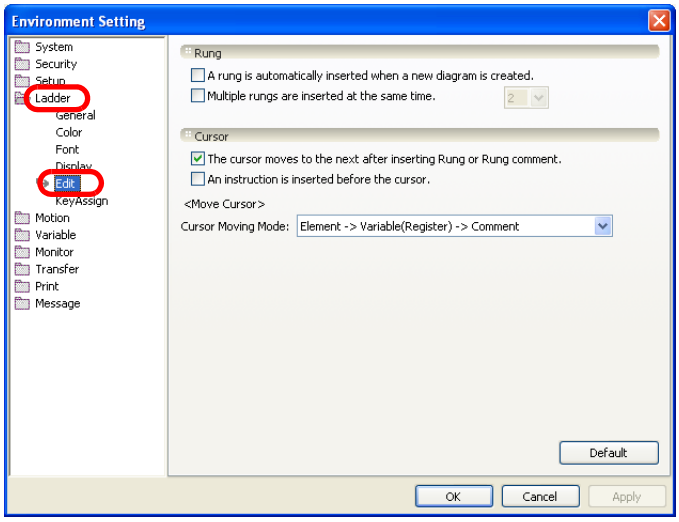
Use the following procedure.

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

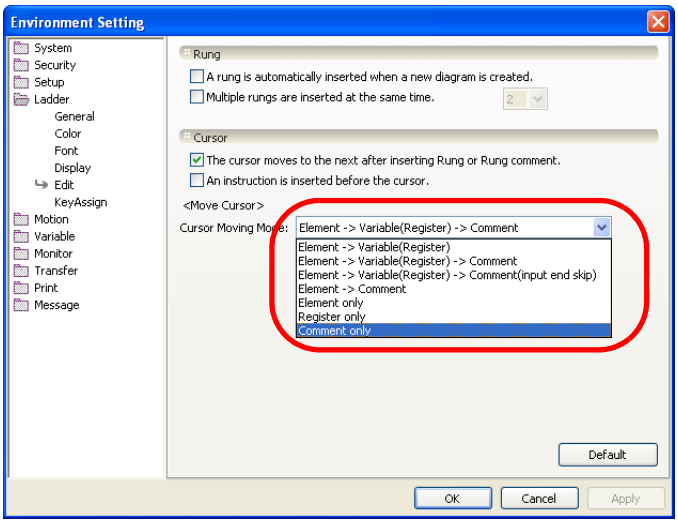


The Environment Setting Dialog Box will be displayed.

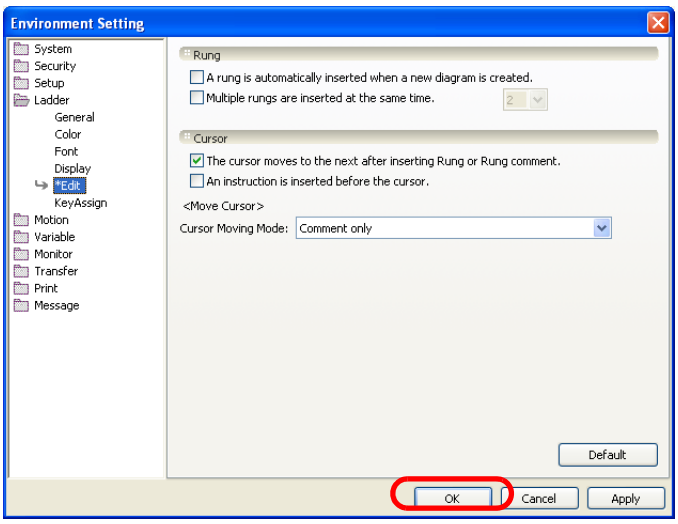
2. Select **Ladder** – **Edit**.



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



4. Click the **OK** Button.



This concludes the procedure.

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

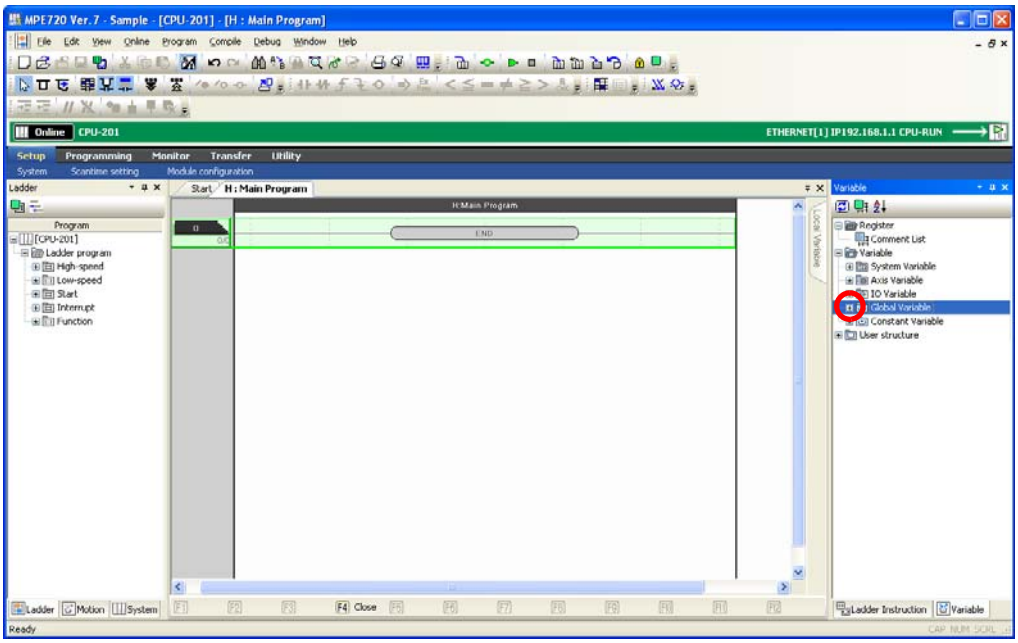
* Axis variables and other system-defined registers and S registers cannot be used as global variables.

The procedures are given below.

Global Variables

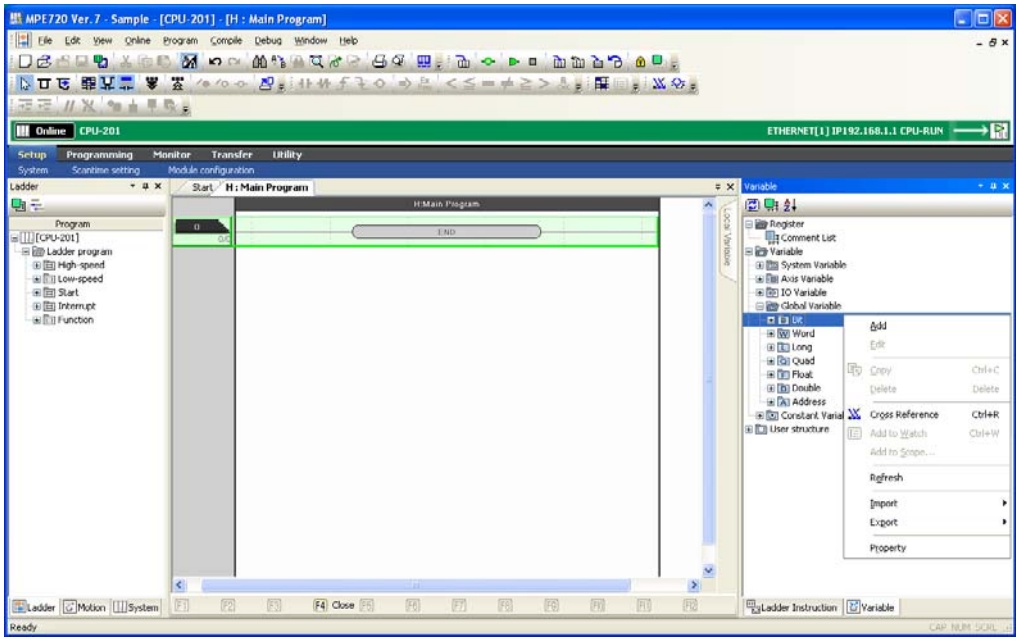
Use the following procedure to assign a global variable to a register.

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

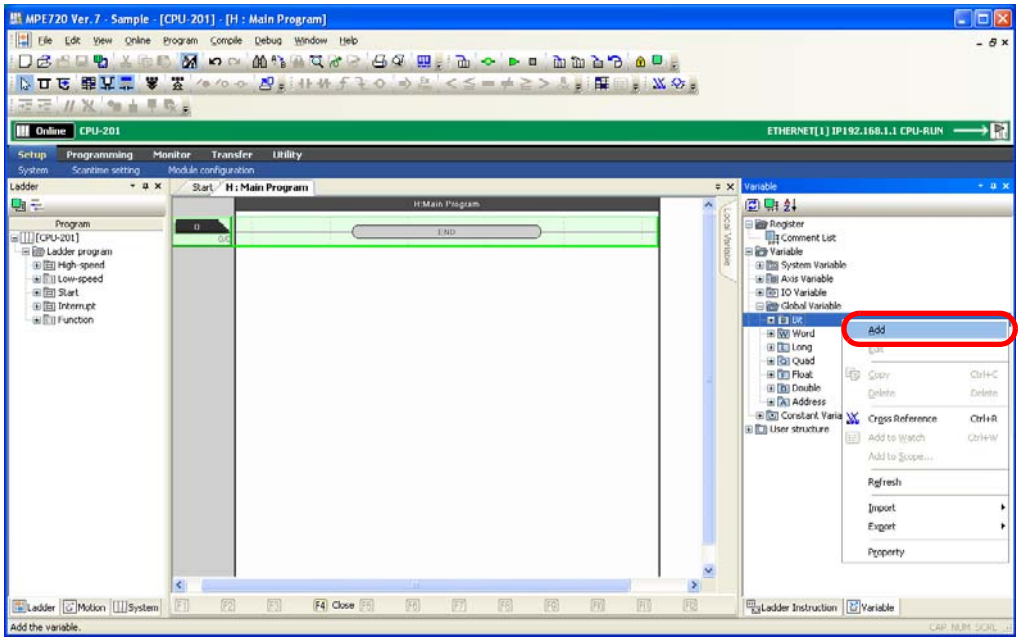


A list of data types will be displayed.

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



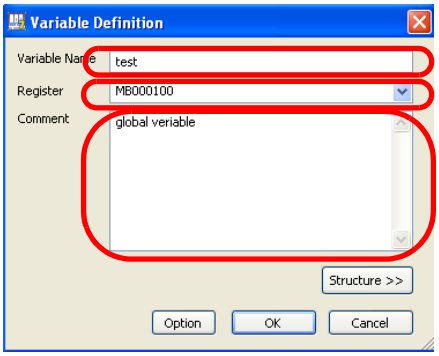
3. Select ***Add***.



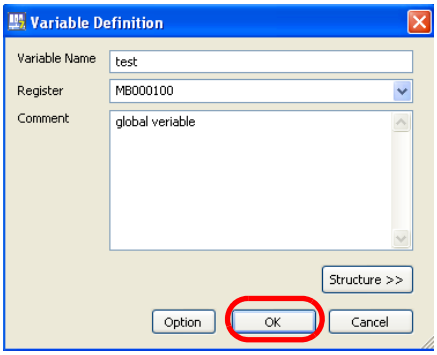
The Variable Definition Dialog Box will be displayed.

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.
- Registers
- 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.

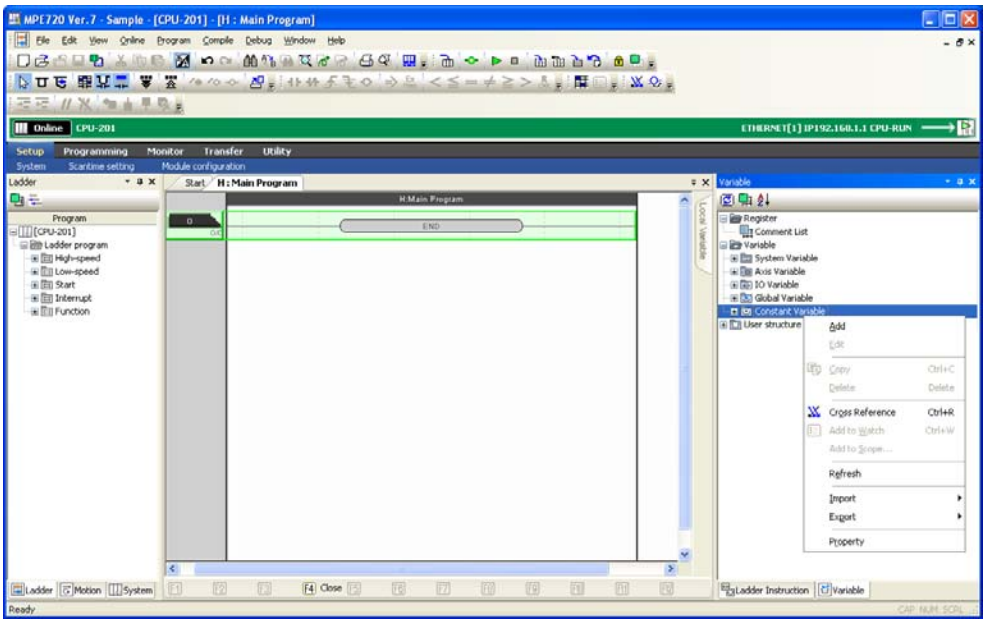


This concludes the procedure.

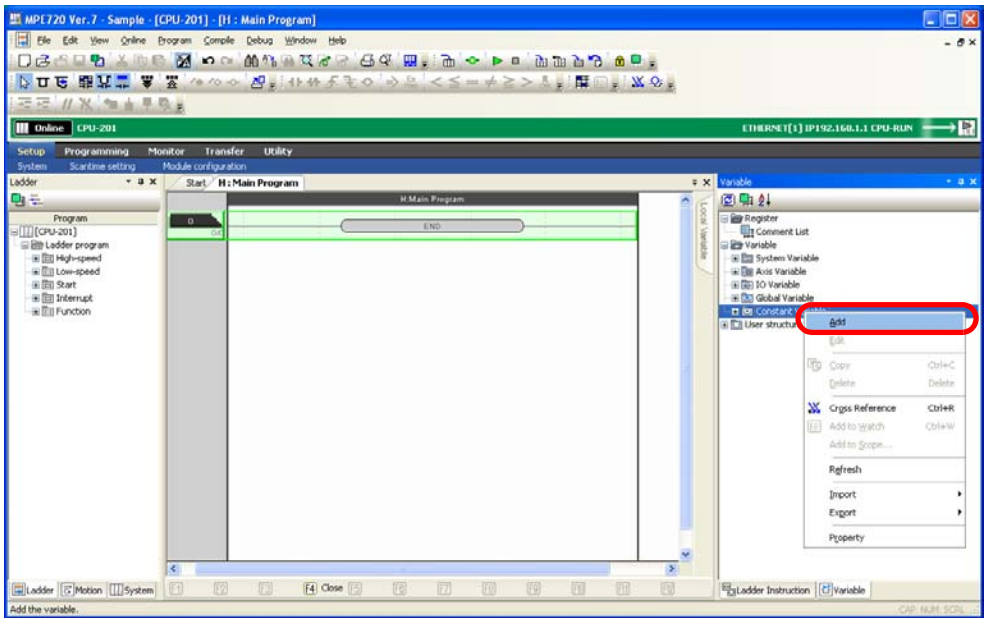
Constant Variables

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

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



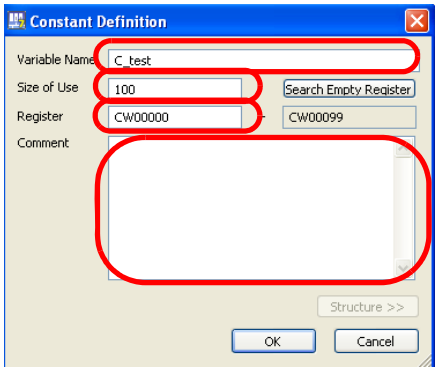
2. Select ***Add***.



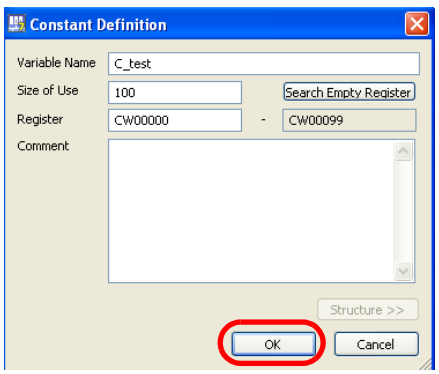
The Constant Definition Dialog Box will be displayed.

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.
- Registers: 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.

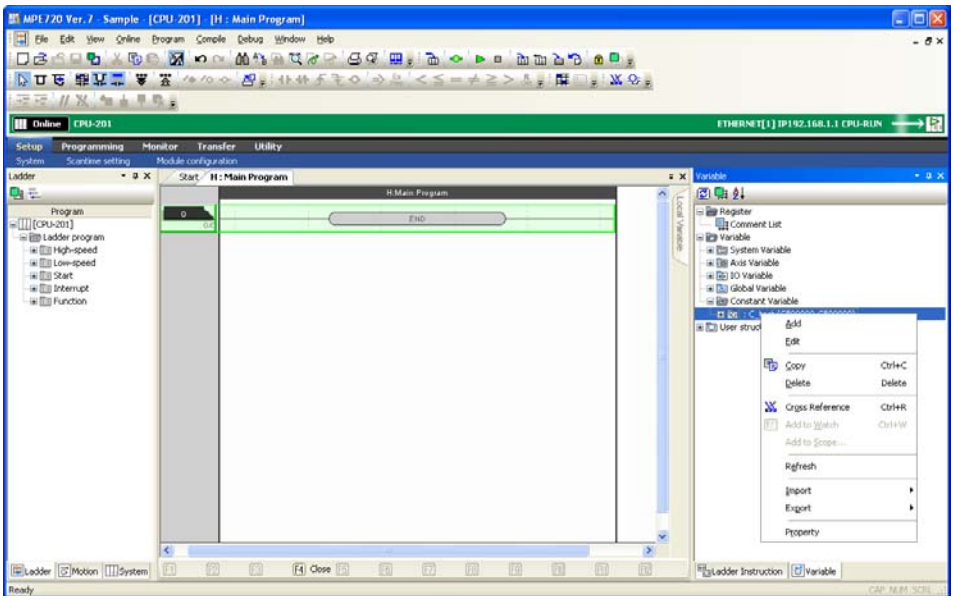


4. Click the **OK** Button.

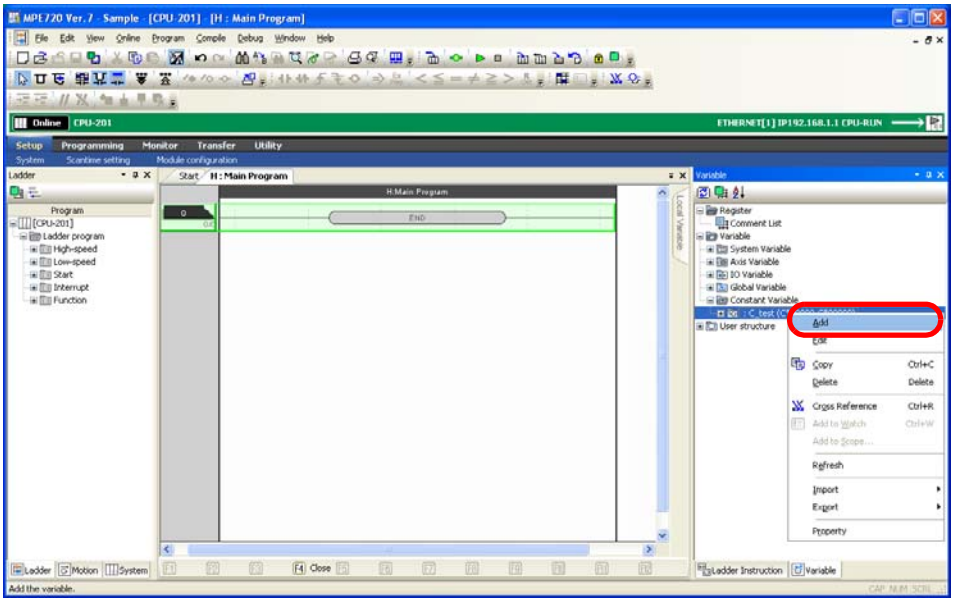


The Constant Definition Dialog Box will close.

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



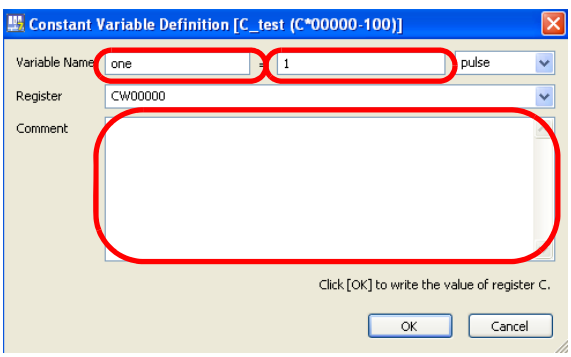
6. Select ***Add***.



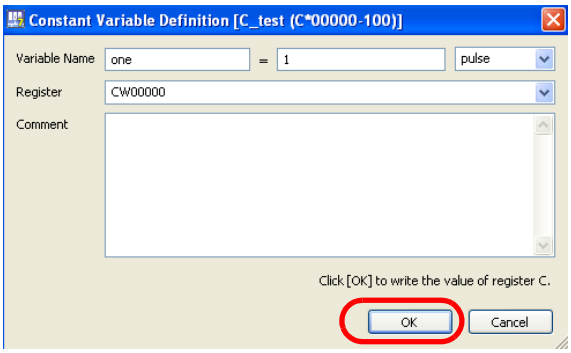
The Constant Variable Definition Dialog Box will be displayed.

7. Enter the following information.

- Variable name: You can enter a maximum of 64 alphanumeric characters.
- Constant value
- 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.

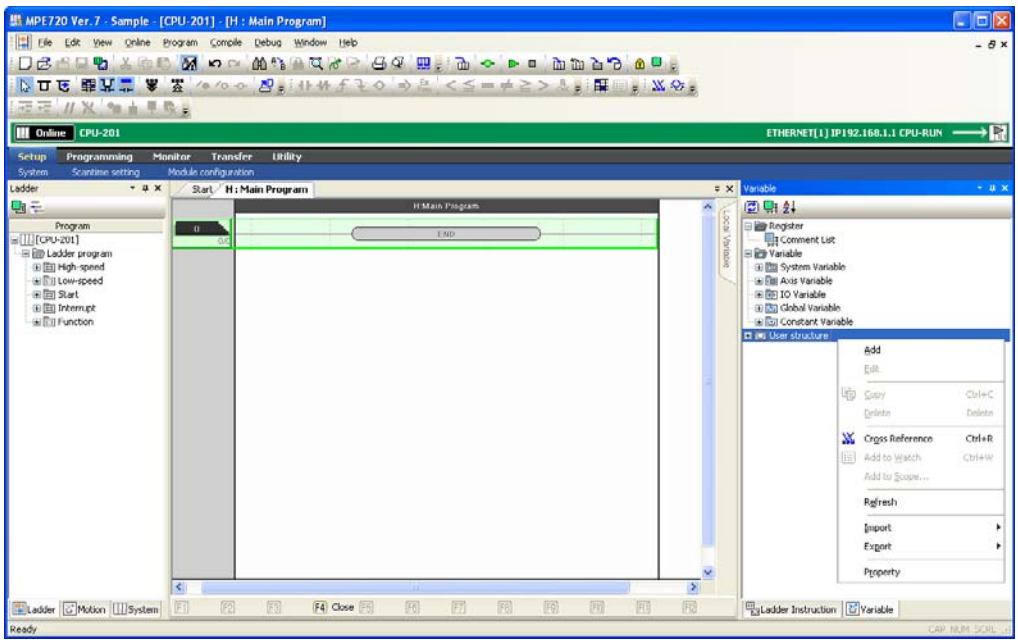


This concludes the procedure.

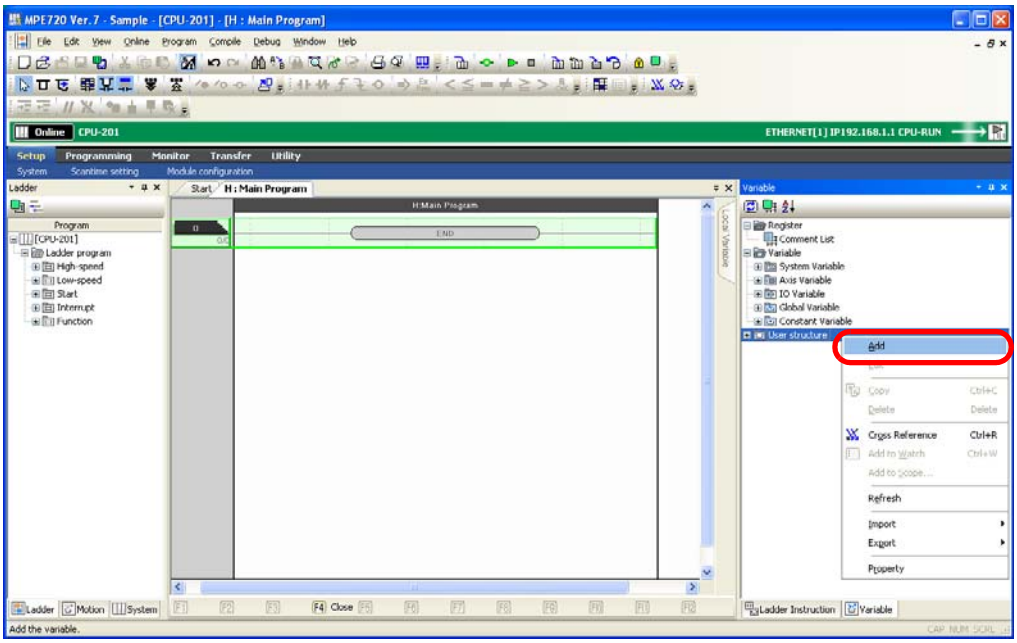
User-defined Structures

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

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



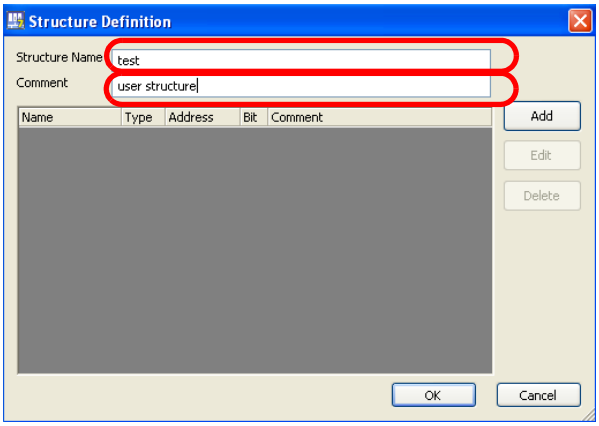
2. Select ***Add***.



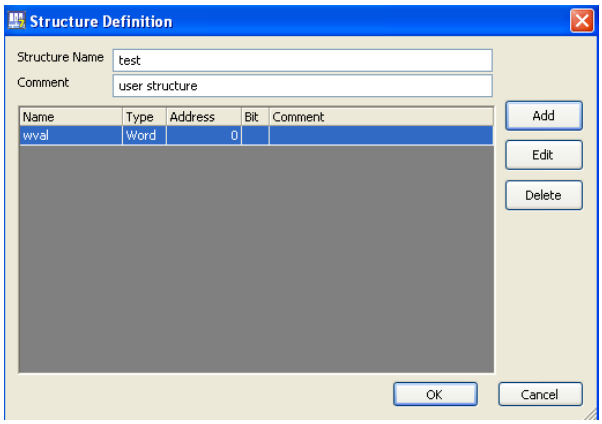
The Structure Definition Dialog Box will be displayed.

3. Enter the following information.

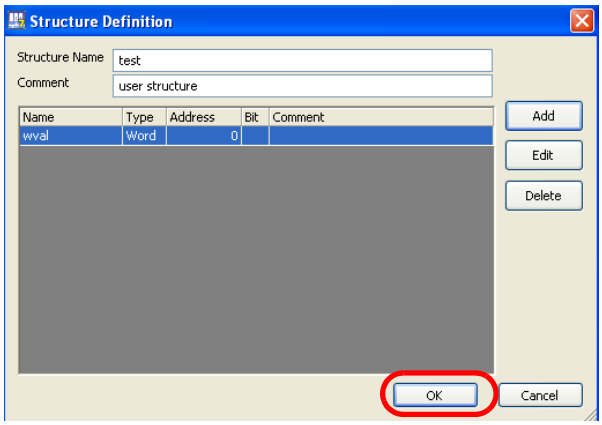
- Structure name: You can enter a maximum of 64 alphanumeric characters. The variable name must start with a letter of the alphabet. The following names will result in an error.
  - The name of a register
  - A structure name that is already registered
  - Reserved words, such as motion instructions
- 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.

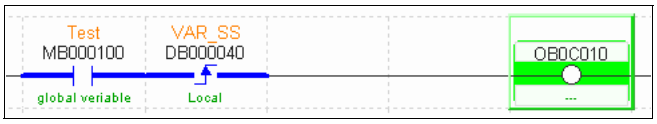


This concludes the procedure.

Toggling the Display of Registers, Variables, and Comments

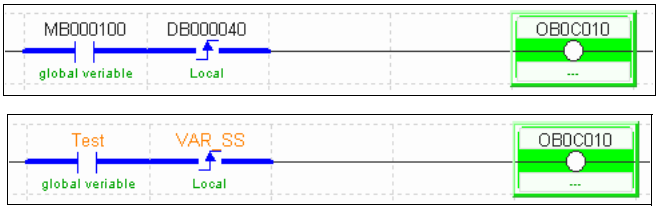
You can toggle whether to display or hide registers, variables, and comments in the Ladder Editor.

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

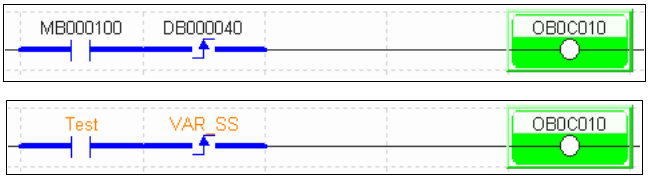


The following examples show either registers and comments, or variables and comments.

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.

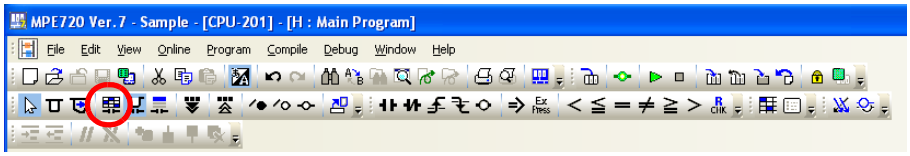
- Using the buttons on the toolbar
- Using the shortcut keys
- Using the Environment Setting Dialog Box

The procedures are given below.

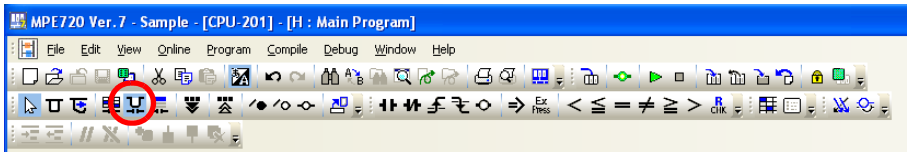
Using the Buttons on the Toolbar

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

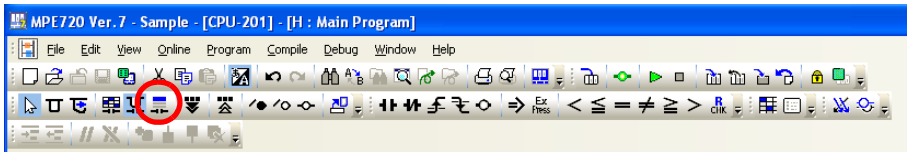
- Displaying or hiding registers: Click the **Registers** Button.



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



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



Using the Shortcut Keys

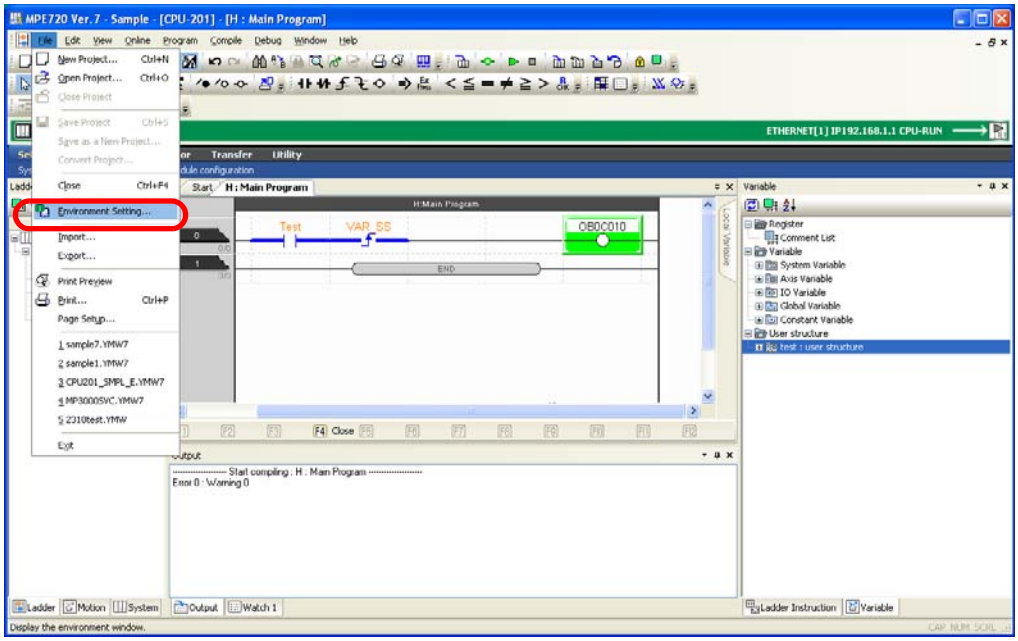
Use the following shortcut keys to display or hide the registers, variables, and comments.

- 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

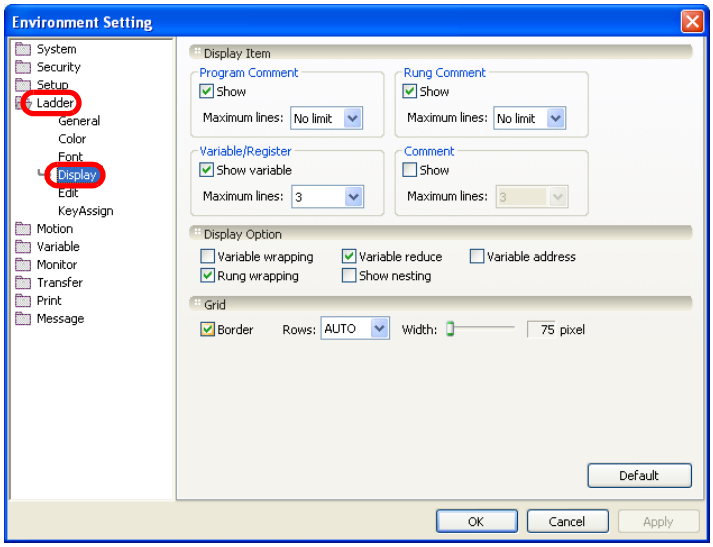
Use the Environment Setting Dialog Box to display or hide the registers, variables, and comments.

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

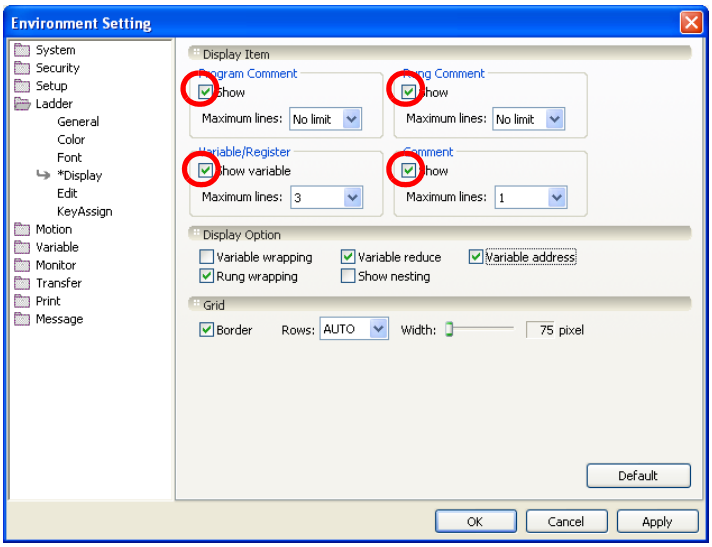


The Environment Setting Dialog Box will be displayed.

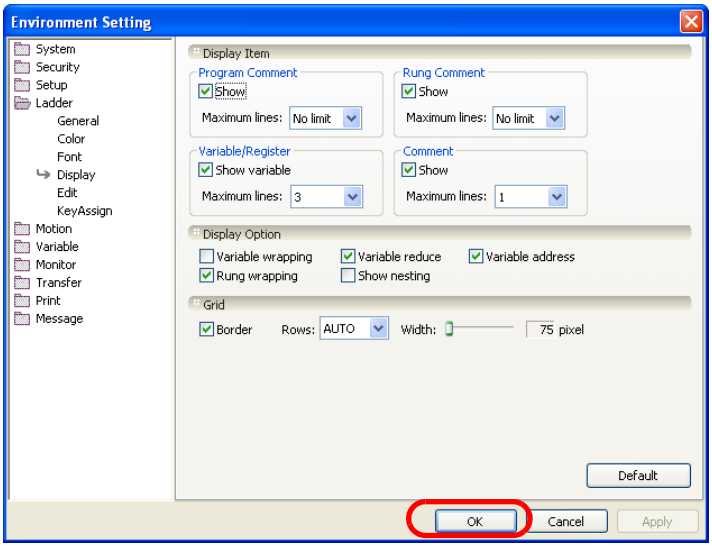
2. Select **Ladder** – **Display**.



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.



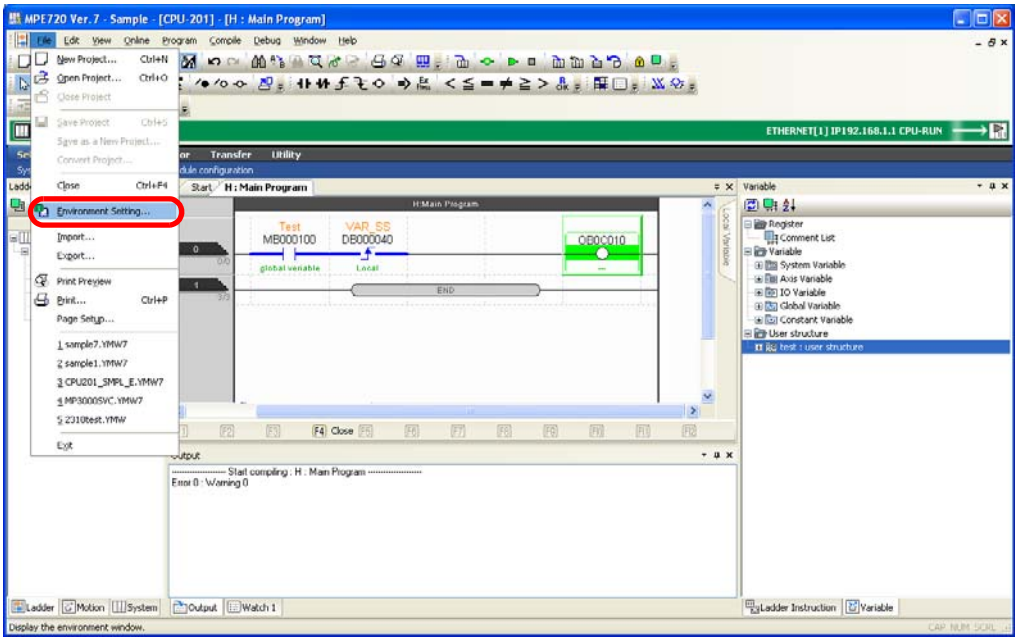
The Environment Setting Dialog Box will close and the settings will be applied to the Ladder Editor.

This concludes the procedure.

Increasing the Amount of Information Displayed in the Ladder Program

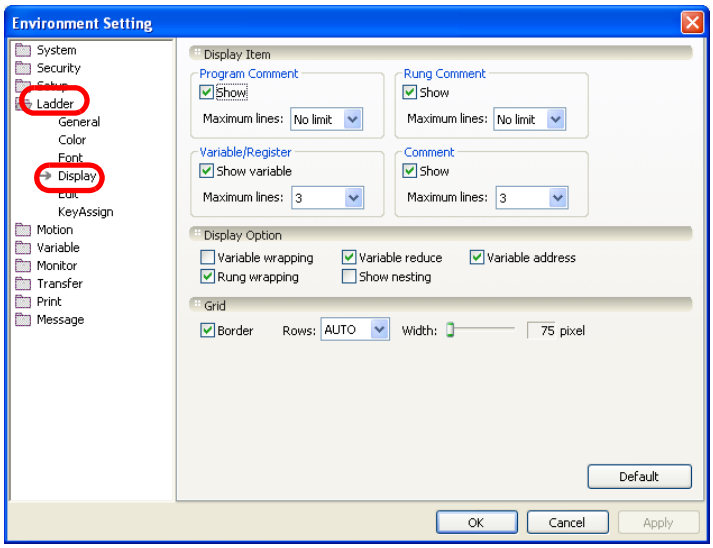
Use the following procedure to increase the number of lines of registers, variables, and comments that are displayed in the Ladder Editor.

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



The Environment Setting Dialog Box will be displayed.

2. Select **Ladder** – **Display**.

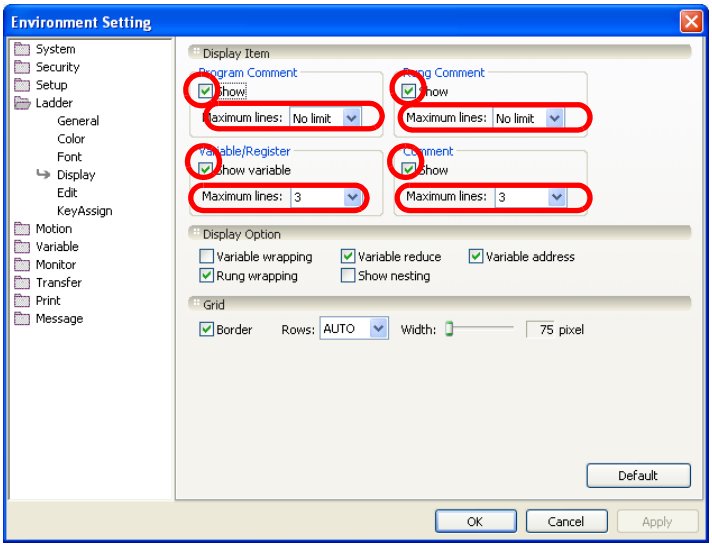


3. Set a value in the **Maximum lines** Box in the **Display Item** Group.

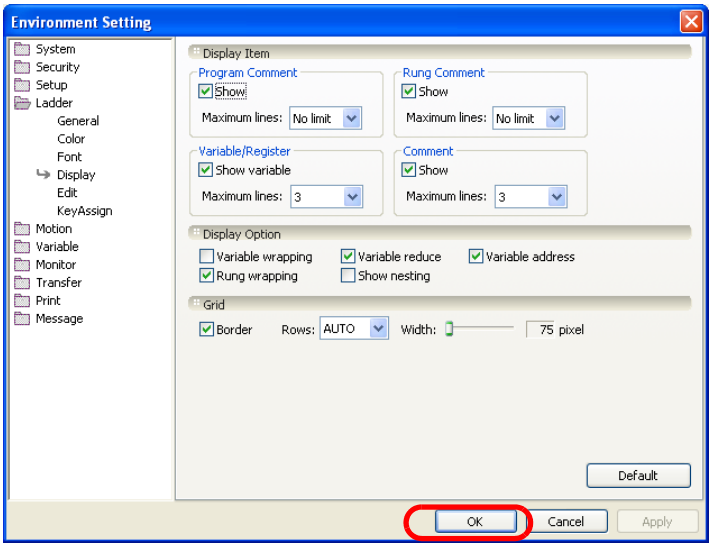
- To set the number of lines to display for registers: Set a value in the **Maximum lines** Box in the **Variable/Register** Area.
- To set the number of lines to display for variables: Select the **Show variable** Check Box in the **Variable/Register** Area, and then set a value in the **Maximum lines**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

Note

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.



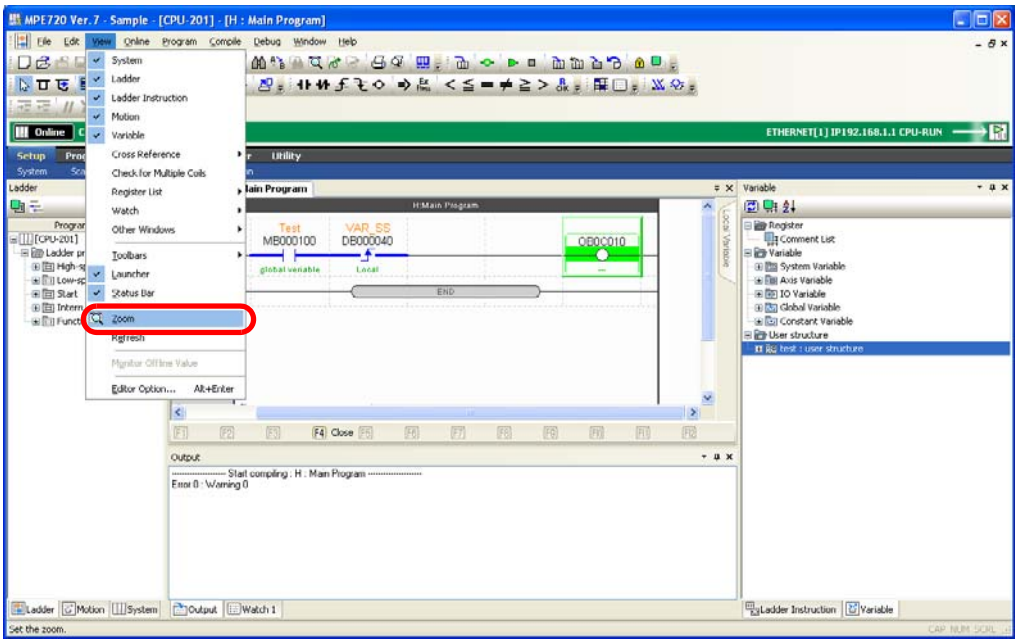
The Environment Setting Dialog Box will close and the settings will be applied to the Ladder Editor.

This concludes the procedure.

Zooming the Display

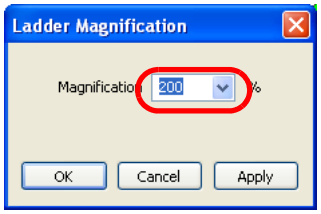
Use the following procedure to zoom the Ladder Editor View.

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

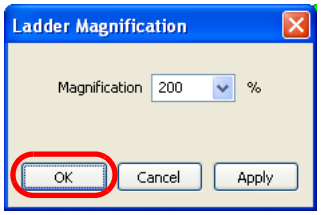


The Ladder Magnification Dialog Box will be displayed.

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.



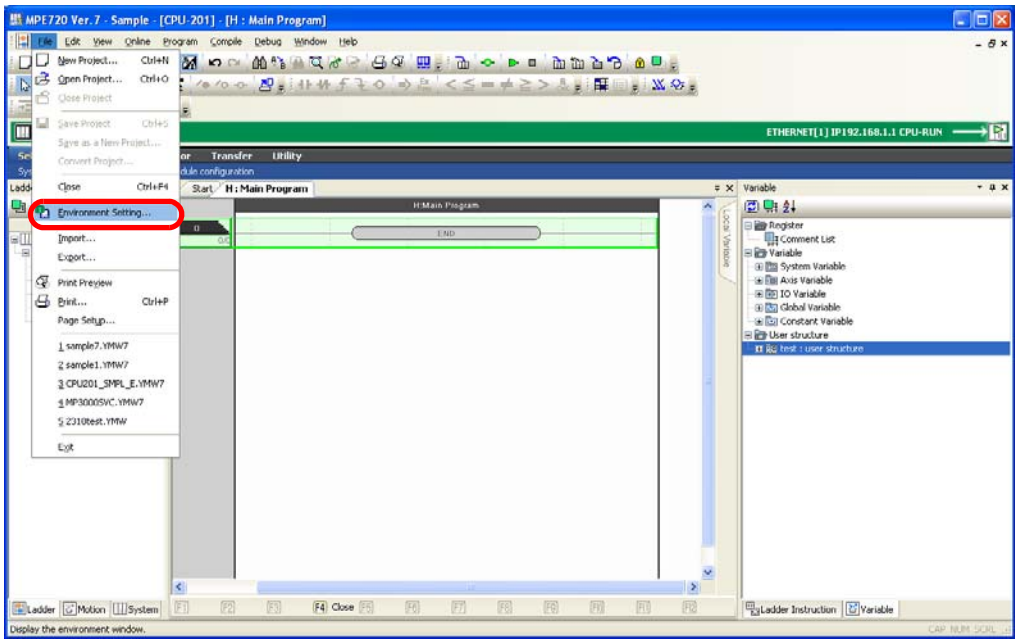
The Ladder Magnification Dialog Box will close and the Ladder Editor will be displayed with these settings.

This concludes the procedure.

Making the Ladder Program Compatible with Version 5

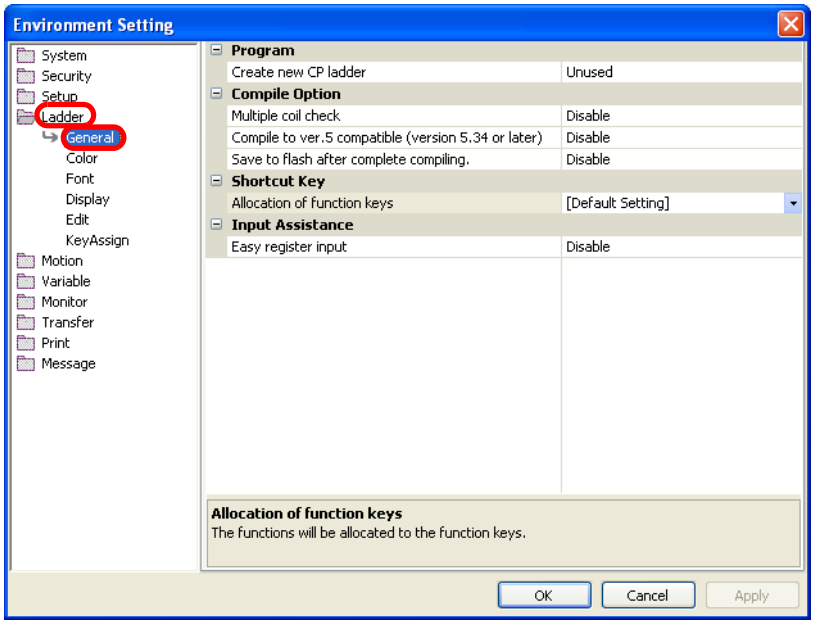
Use the following procedure to make the data format of the ladder program compatible with MPE270 version 5.

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.

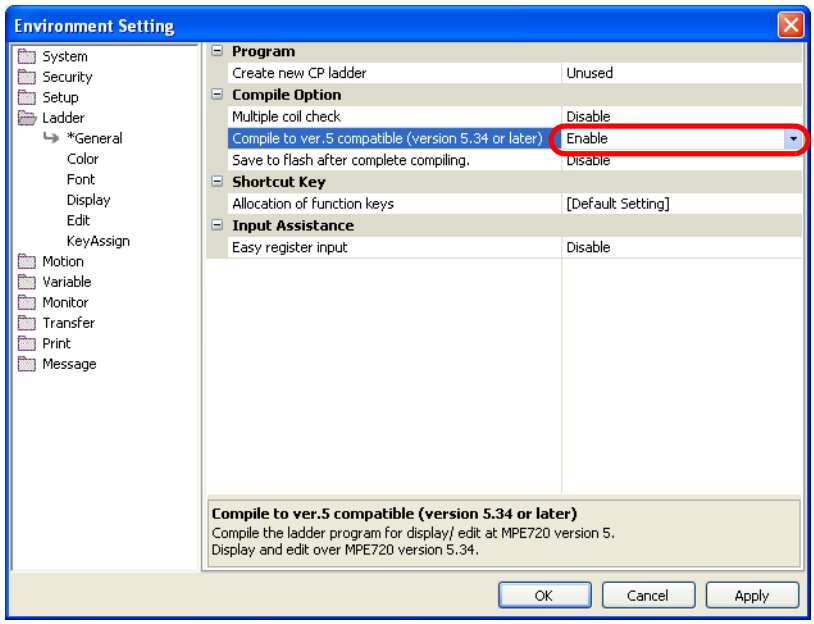


The Environment Setting Dialog Box will be displayed.

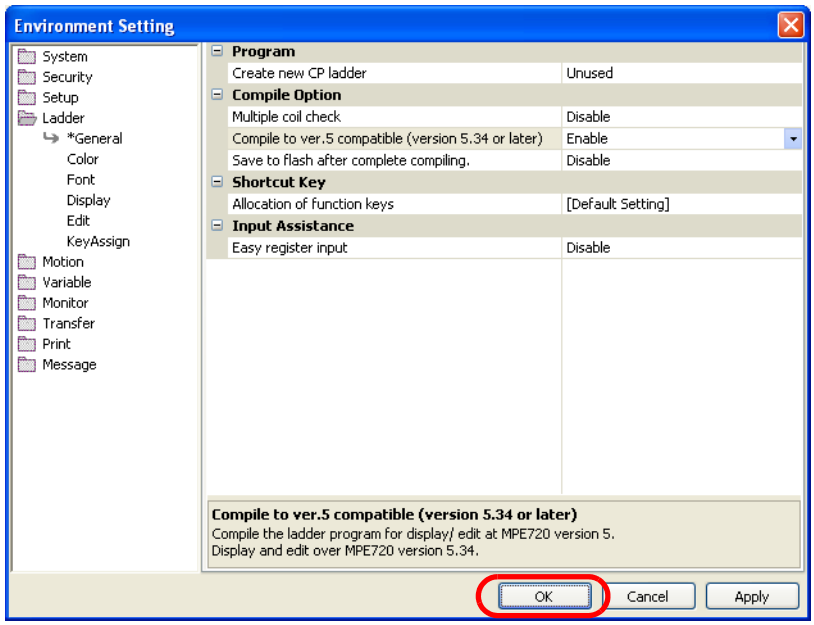
3. Select **Ladder** – **General**.



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.

Creating the 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.

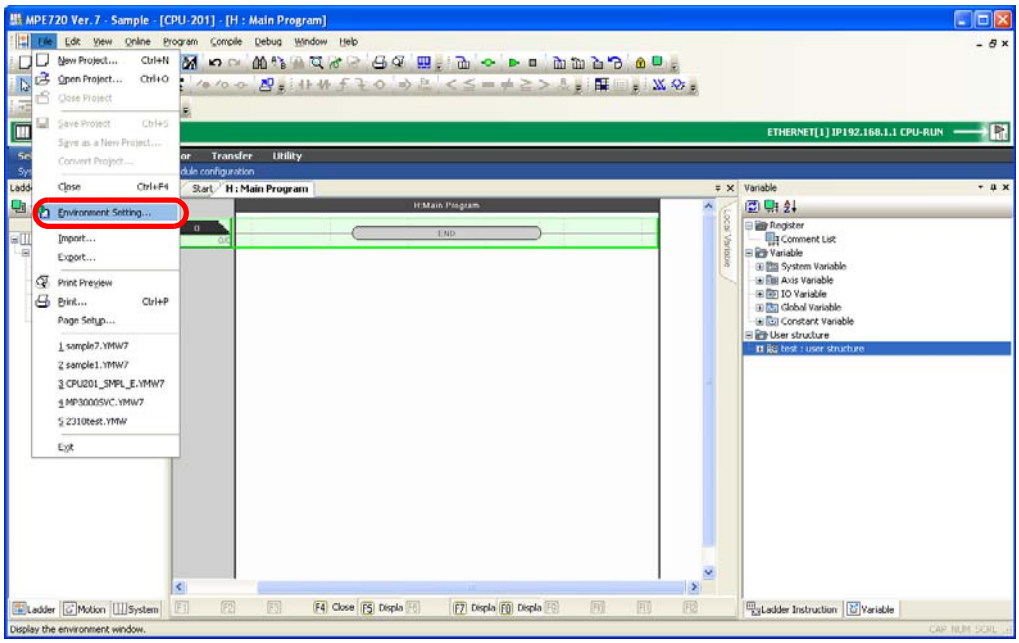
- Using the Ladder Pane
- Using the Launcher

The procedures are given below.

Using the Ladder Pane

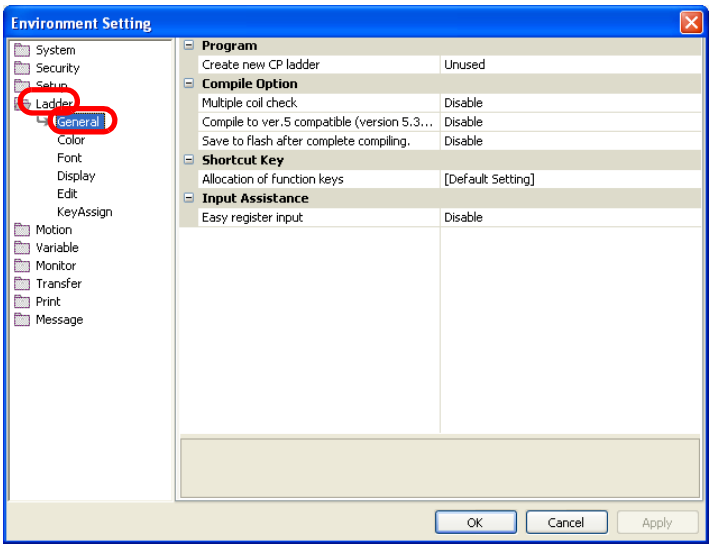
Use the following procedure to create a new CP ladder program using the Ladder Pane.

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

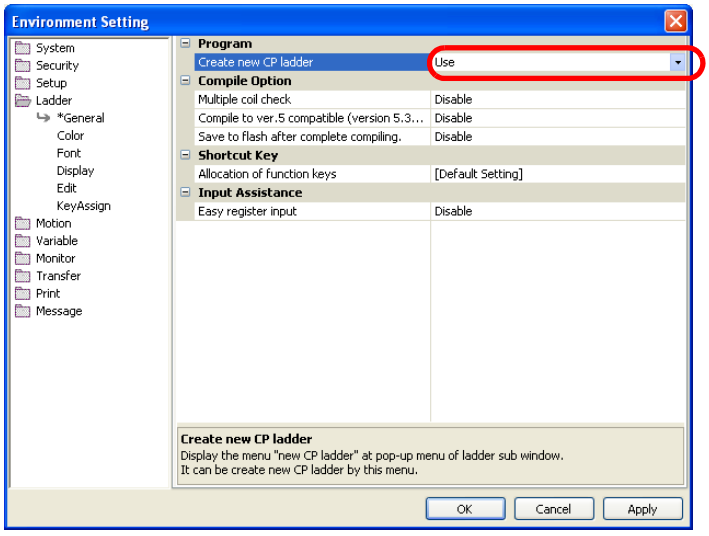


The Environment Setting Dialog Box will be displayed.

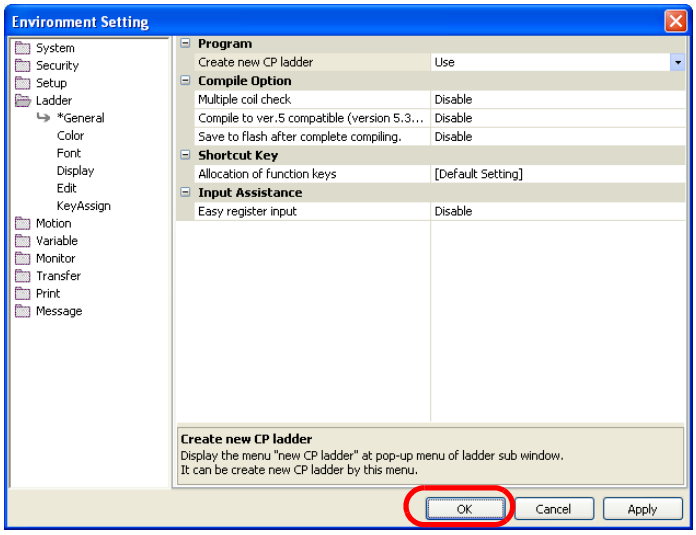
2. Select **Ladder** – **General**.



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

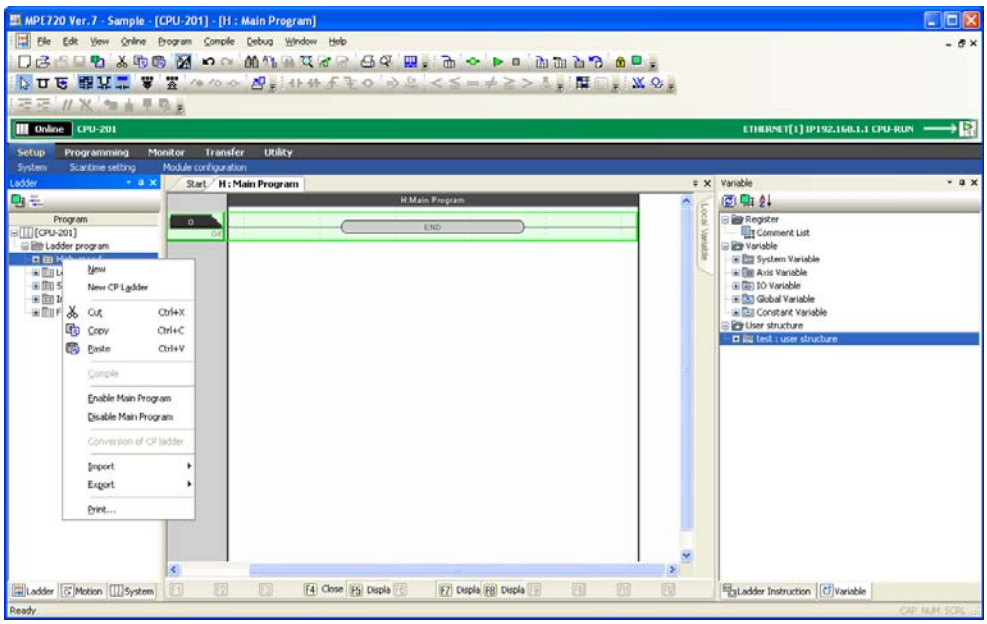


4. Click the **OK** Button.

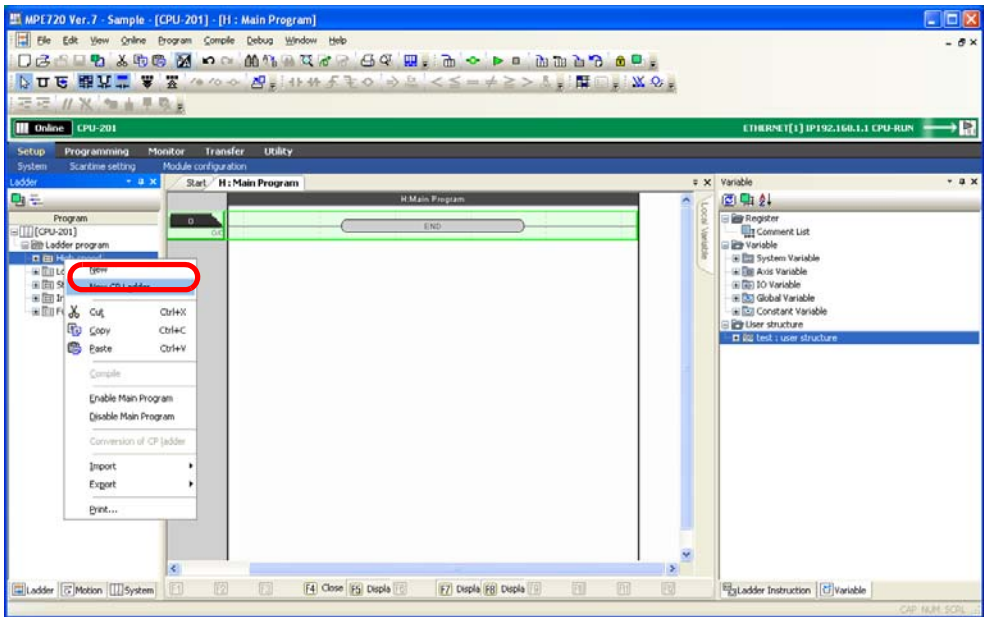


The Environment Setting Dialog Box will close and the settings will be applied.

5. Right-click on the Ladder Pane.

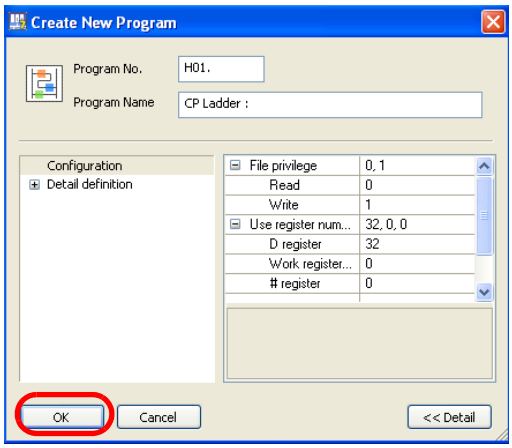


6. Select ***New CP Ladder***.

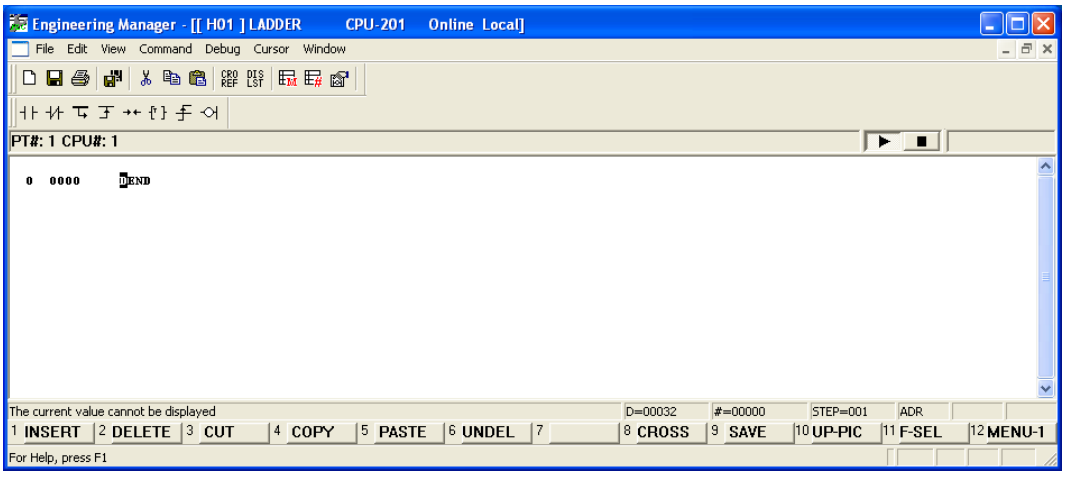


The Create New Program Dialog Box will be displayed.

7. Click the **OK** Button.



The CP Ladder Editor 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.

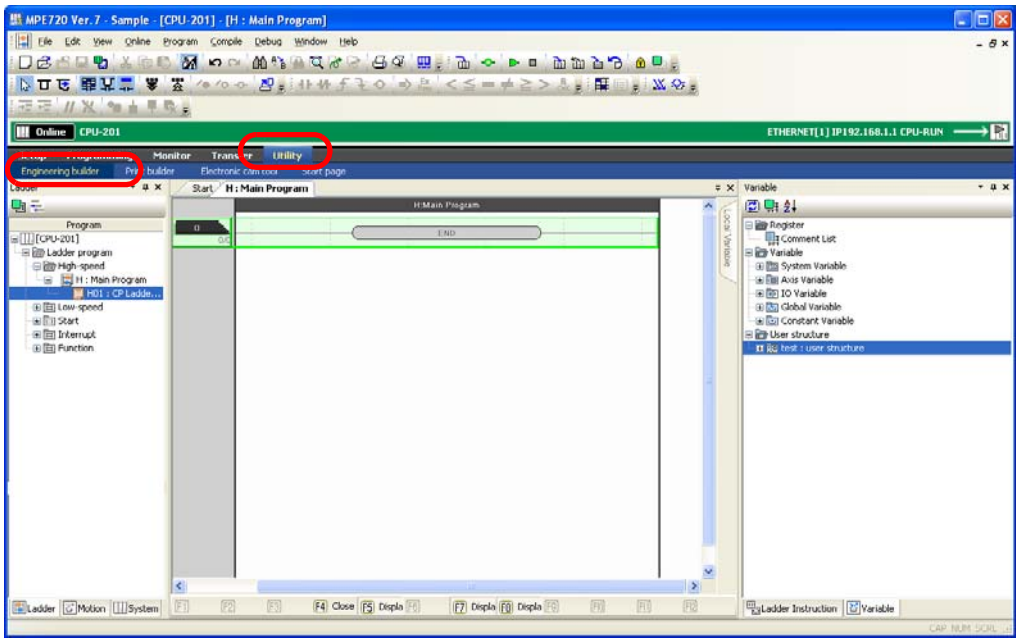
📖 *Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual* (Manual No.: SIEP C880700 05)

This concludes the procedure.

Using the Launcher

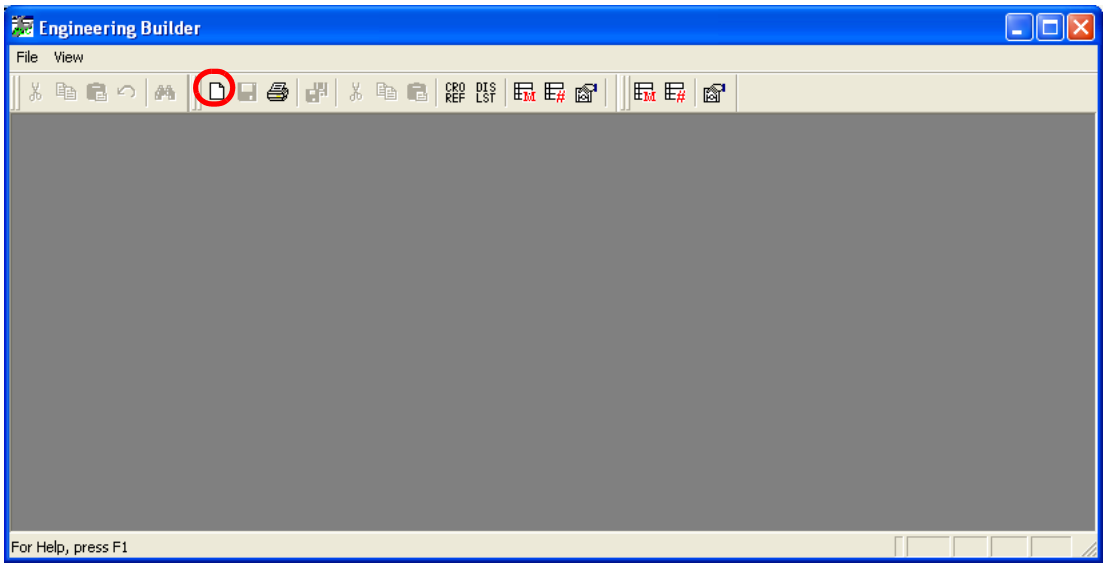
Use the following procedure to create a new CP ladder program using the Launcher.

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



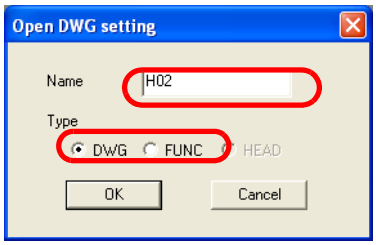
The Engineering Manager Window will be displayed.

2. Click the **New** Button.

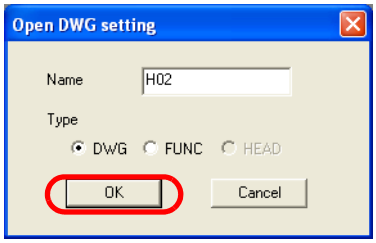


The Open DWG Setting Dialog Box will be displayed.

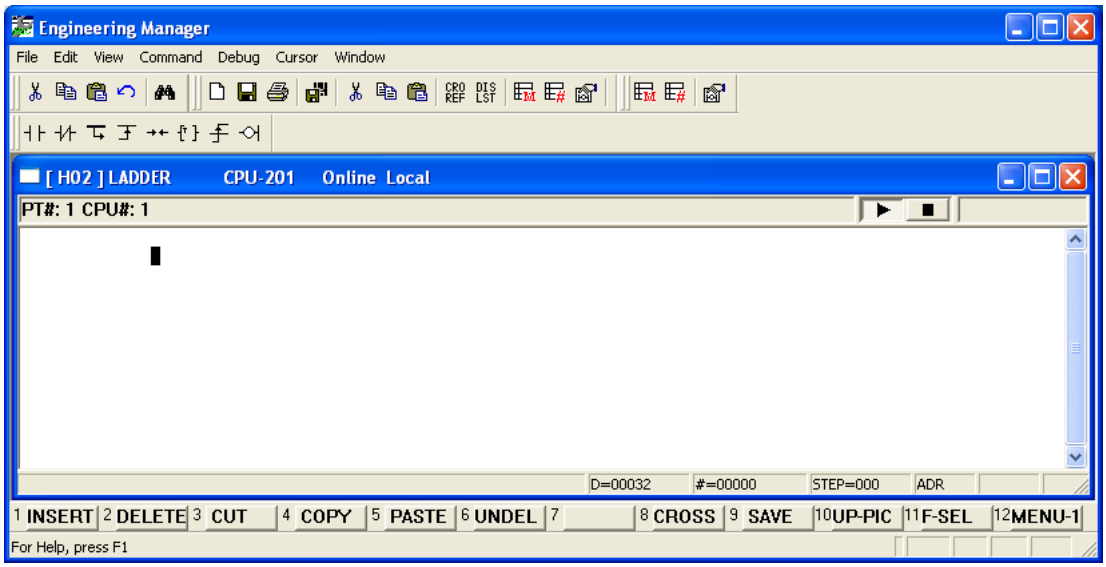
3. Enter the drawing name in the **Name** Box, and select the drawing type from the **Type** Options.



4. Click the **OK** Button.



The CP Ladder Editor 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.

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

In this example, the operation on the right side of DW00010 = FTYPE (14000 - (DF00012 * 100 / 2)) 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.

☞ *11.2 Operators for Expression Instructions – Casting (page 11-8)*

4.2 Motion Programming

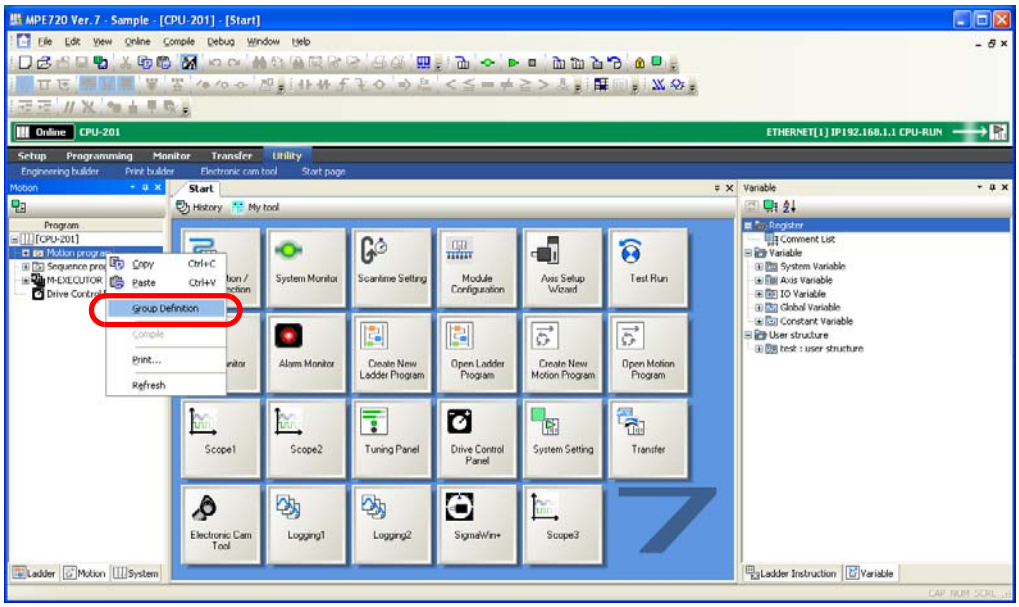
This section describes the operations used in motion programming.

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***.

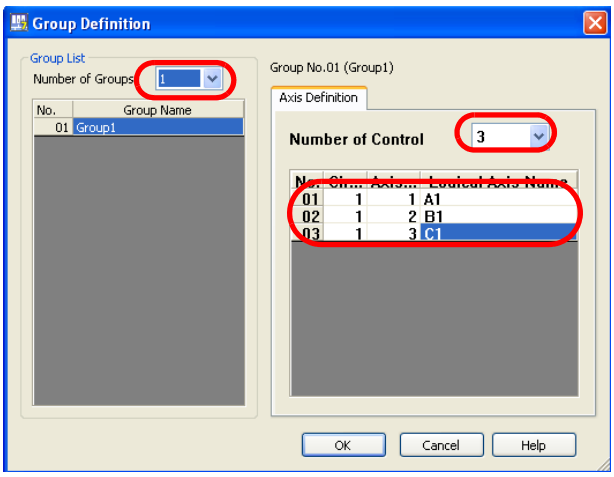


The Group Definition Dialog Box will be displayed.

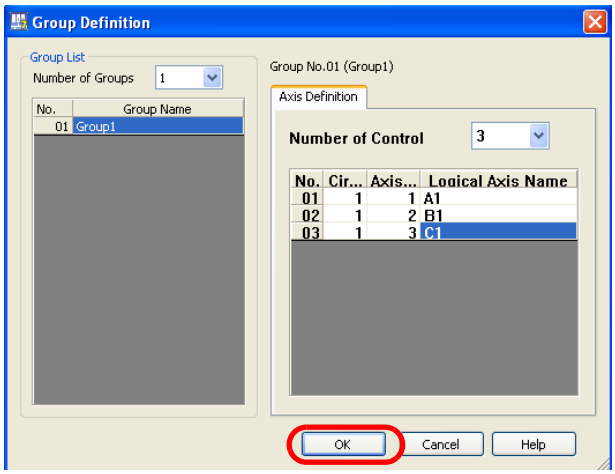
2. Set a group definition.

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.

Creating a Motion Program

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

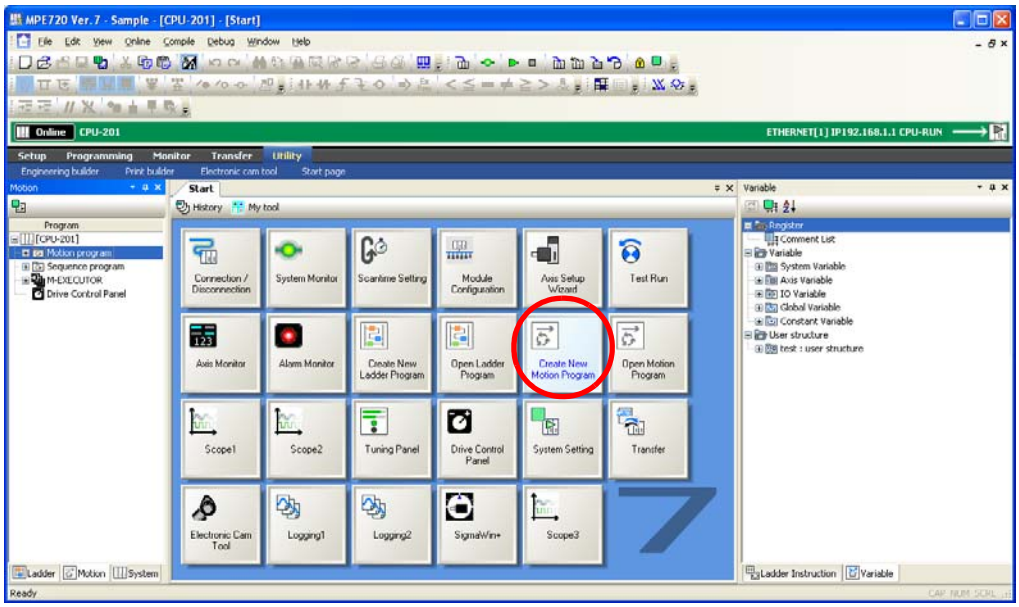
- Creating from the My Tool Tab Page
- Creating from the Motion Pane

The procedures are given below.

Creating from the My Tool Tab Page

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

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



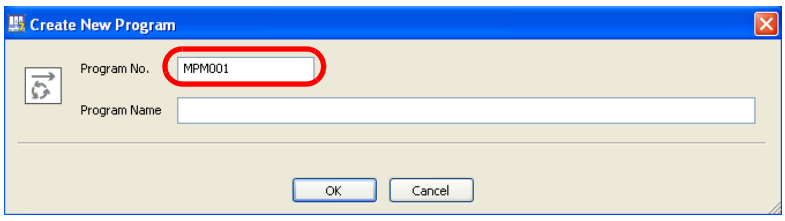
The Create New Program Dialog Box will be displayed.

2. Enter the program number.

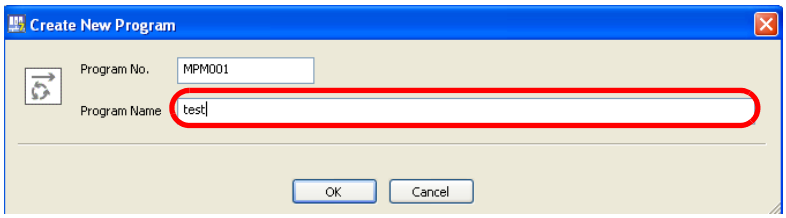
- Entry example: MPM 001

  - 001: Setting range for program numbers
    - MP2000-series Machine Controllers: 001 to 255
    - MP3000-series Machine Controllers: 001 to 512
  - MPM: Type of program
    - MPM: Main program
    - MPS: Subprogram

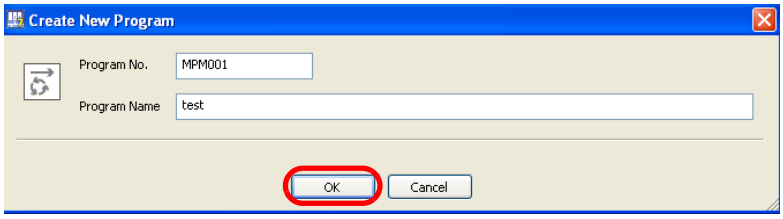
Note: You cannot use the same program number for main programs and subprograms.



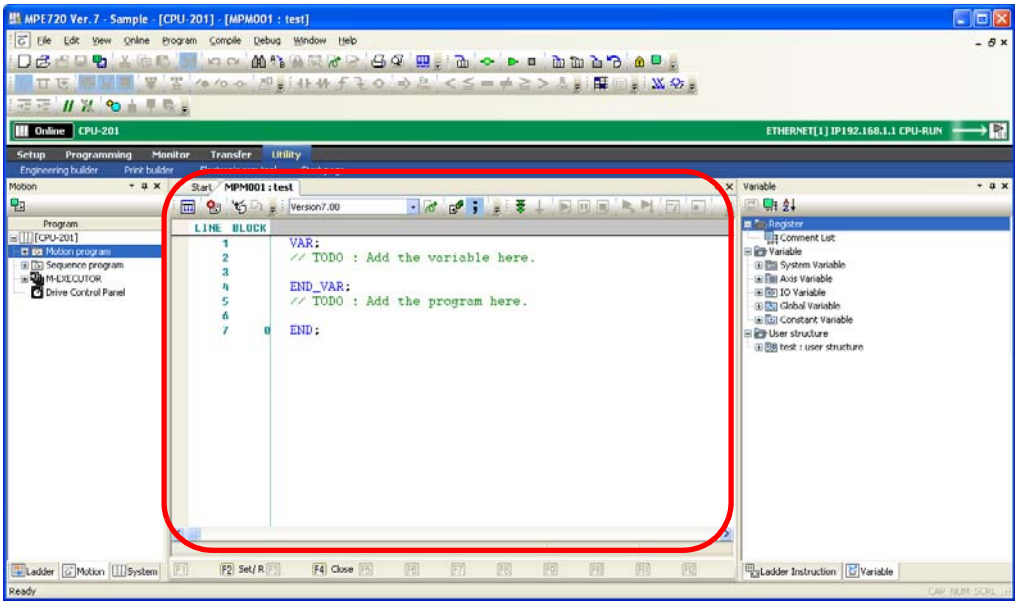
3. Enter the program name.



4. Click the **OK** Button.



A new motion program will be displayed.

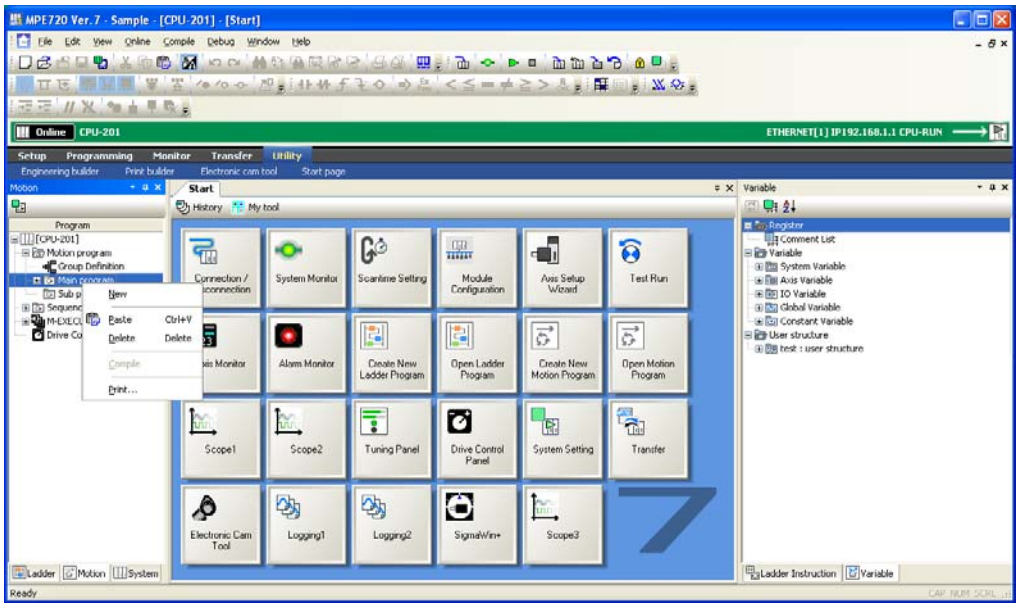


This concludes the procedure.

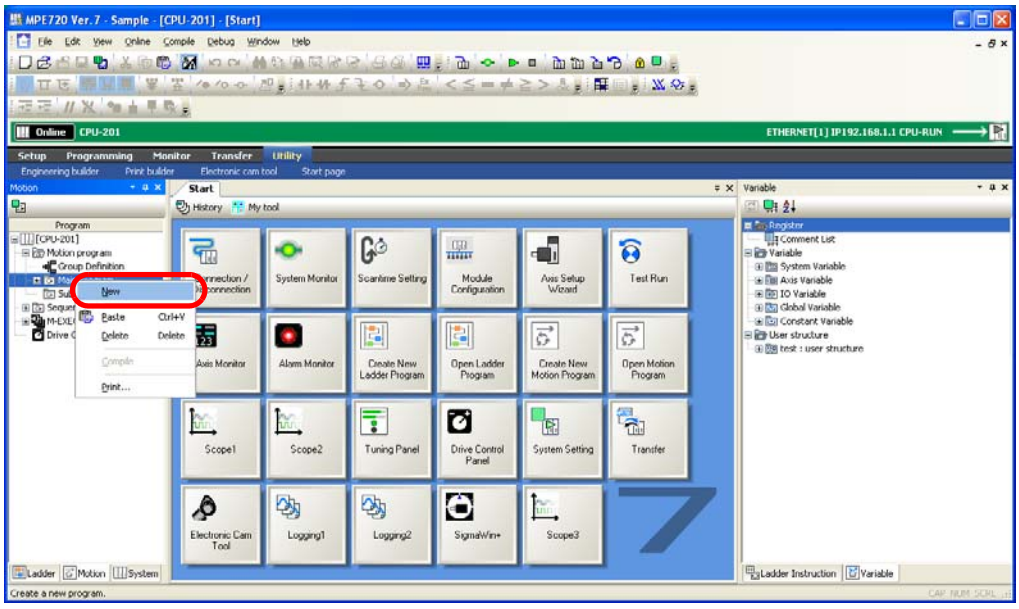
Creating from the Motion Pane

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 ladder program to create in the Motion Pane.



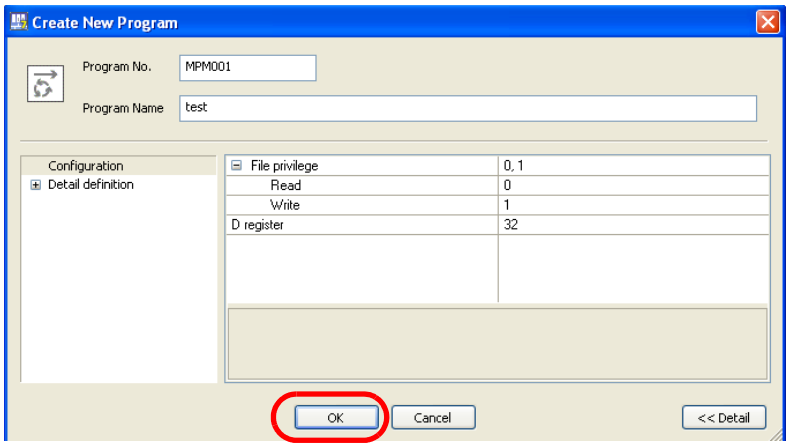
2. Select ***New***.



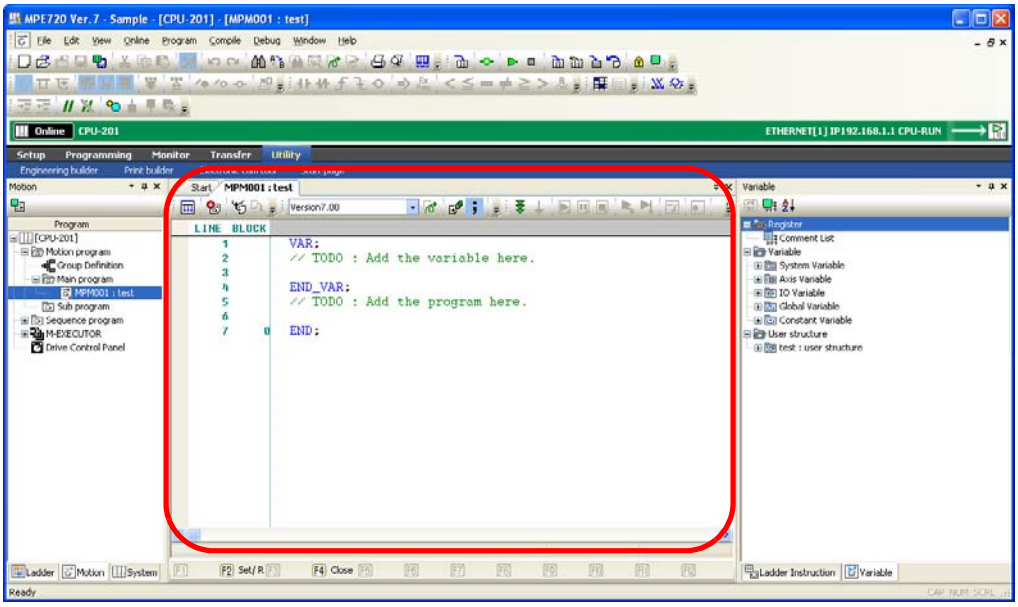
The Create New Program Dialog Box will be displayed.

3. Change the settings as required.

4. Click the **OK** Button.



A new motion program will be displayed.

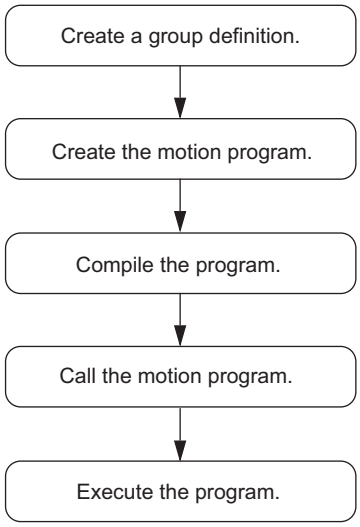


This concludes the procedure.

Running Your Motion Programs

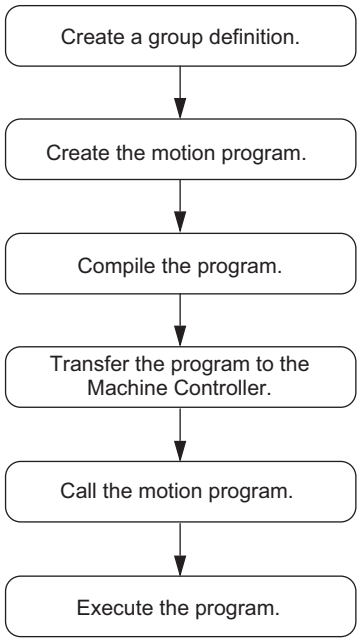
The flow used to run motion programs on the Machine Controller depends on whether the program was created online or offline. Each flow is given below.

Ladder Programs Created Online



☞ *Setting Group Definitions (page 4-40)*
☞ *Creating a Motion Program (page 4-42)*
☞ *Compiling Programs (page 4-74)*
☞ *Calling Motion Programs from a Ladder Program (page 4-47)*
☞ *Executing Motion Programs (page 4-54)*

Ladder Programs Created Offline



☞ *Setting Group Definitions (page 4-40)*
☞ *Creating a Motion Program (page 4-42)*
☞ *Compiling Programs (page 4-74)*
☞ *7.6 Transferring the Program to the Machine Controller (page 7-47)*
☞ *Calling Motion Programs from a Ladder Program (page 4-47)*
☞ *Executing Motion Programs (page 4-54)*

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

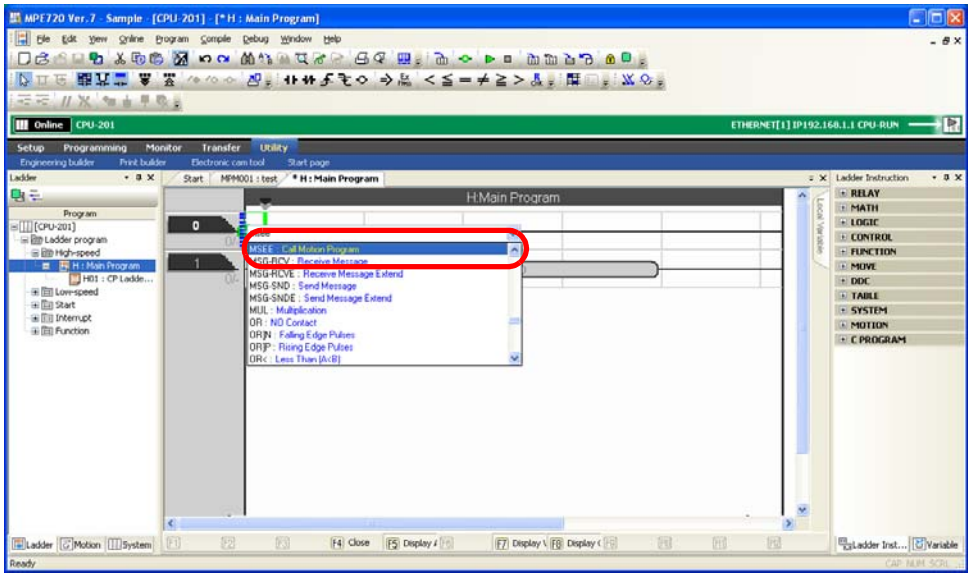
This section describes each method.

Calling Motion Programs from a Ladder Program

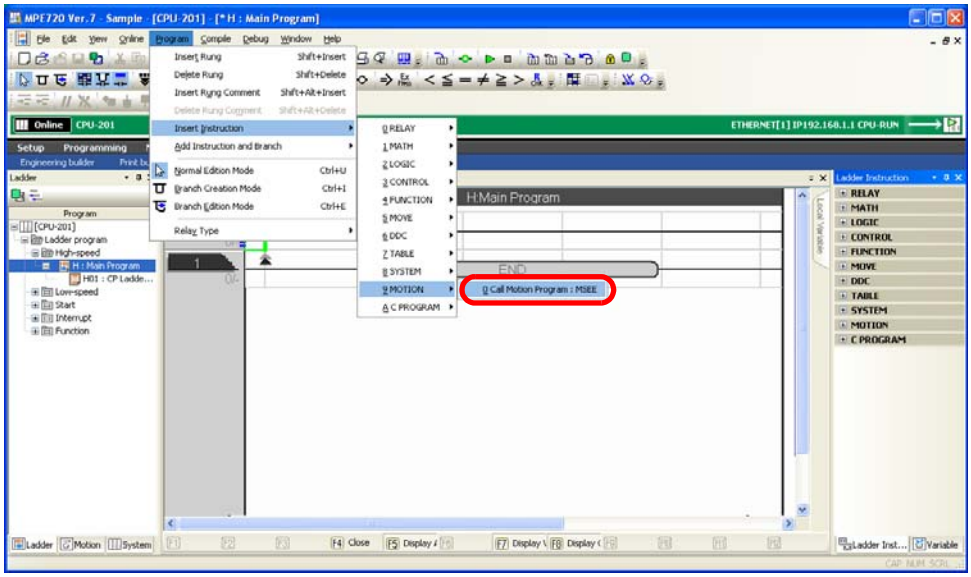
To call a motion program from a ladder program, use the MSEE instruction. Use the following procedure.

1. Create a new H drawing for a ladder program.
Refer to the following section for details on creating ladder programs.
☞ *Creating New Ladder Programs (page 4-3)*

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.

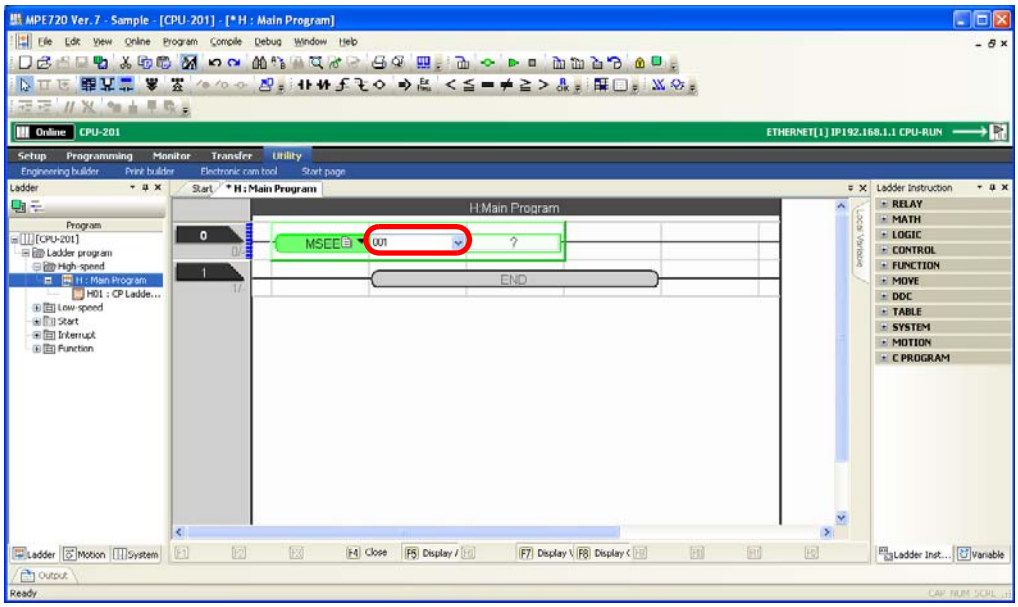


- Select ***Program*** – ***Insert Instruction*** – ***MOTION*** – ***Call Motion Program: MSEE*** from the menu bar.

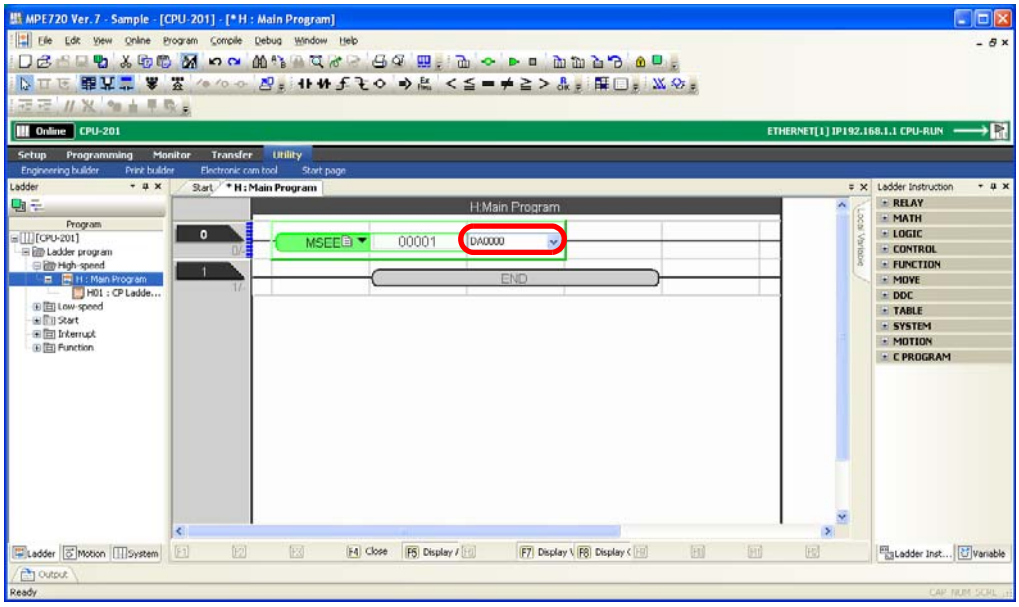


An MSEE instruction will be inserted.

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

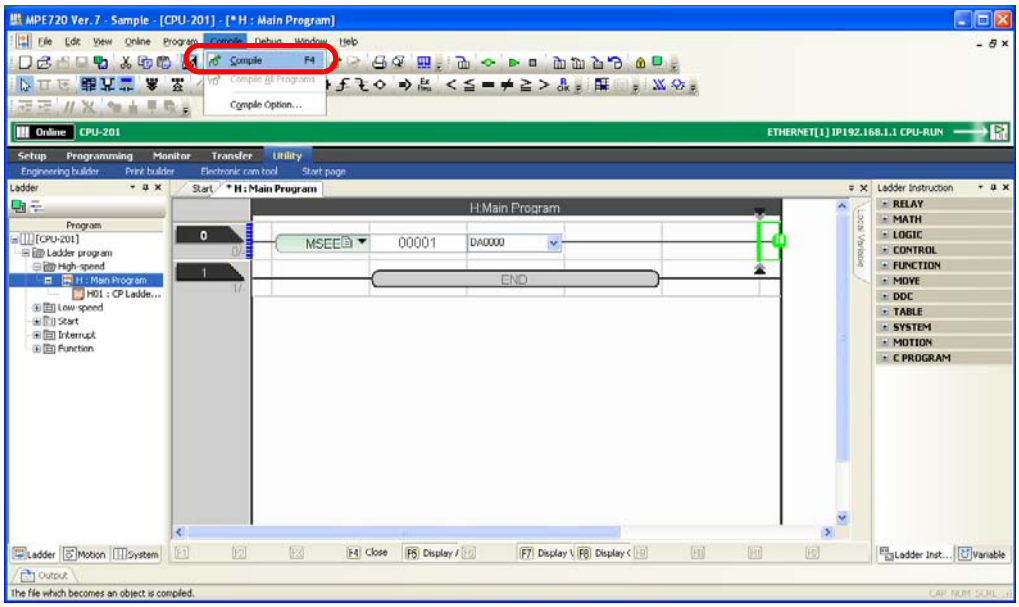


4. Enter the first work register for execution.



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.

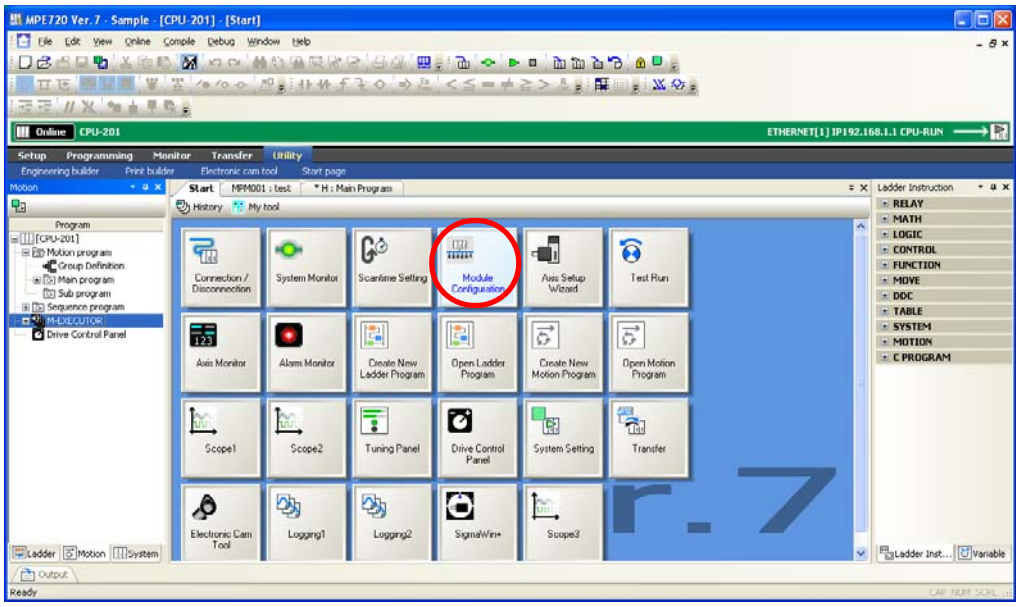
Registering in the M-EXECUTOR

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.

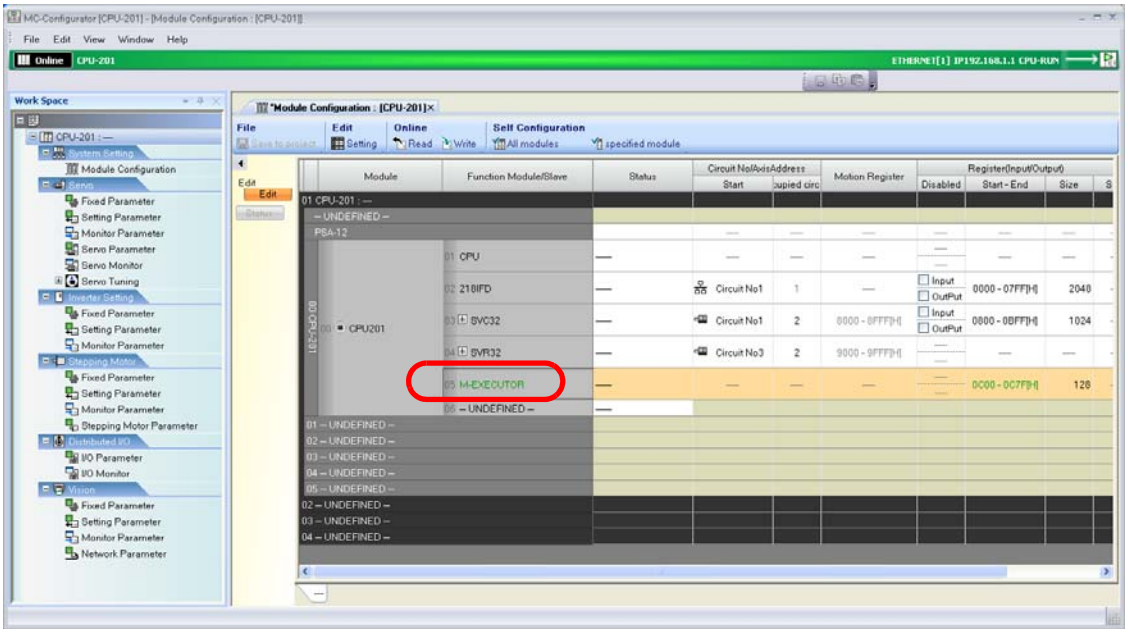
You must first set the number of tasks to assign to M-EXECUTOR.

1. Click the **Module Configuration** Button on the My Tool Tab Page.



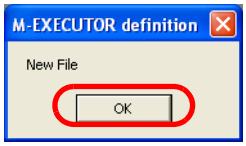
The Module Configuration Tab Page will be displayed.

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



The M-EXECUTOR Definition Dialog Box will be displayed.

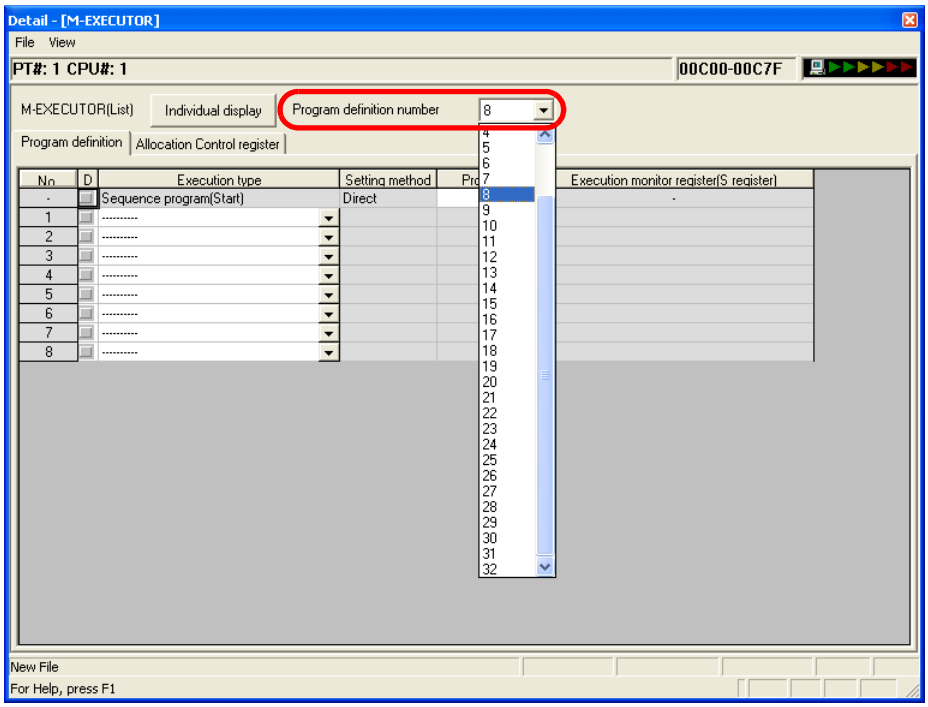
3. Click the **OK** Button.



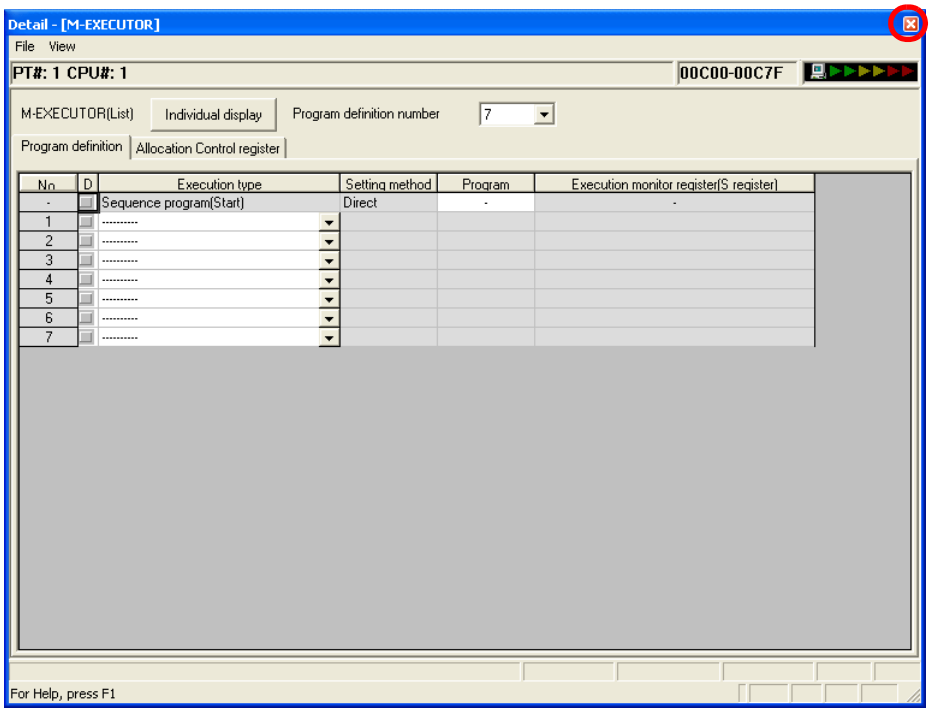
The Detail – [M-EXECUTOR] Dialog Box will be displayed.

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".



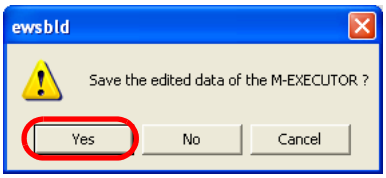
5. Click the **Close** Button.



The Ewsbld Dialog Box will be displayed.

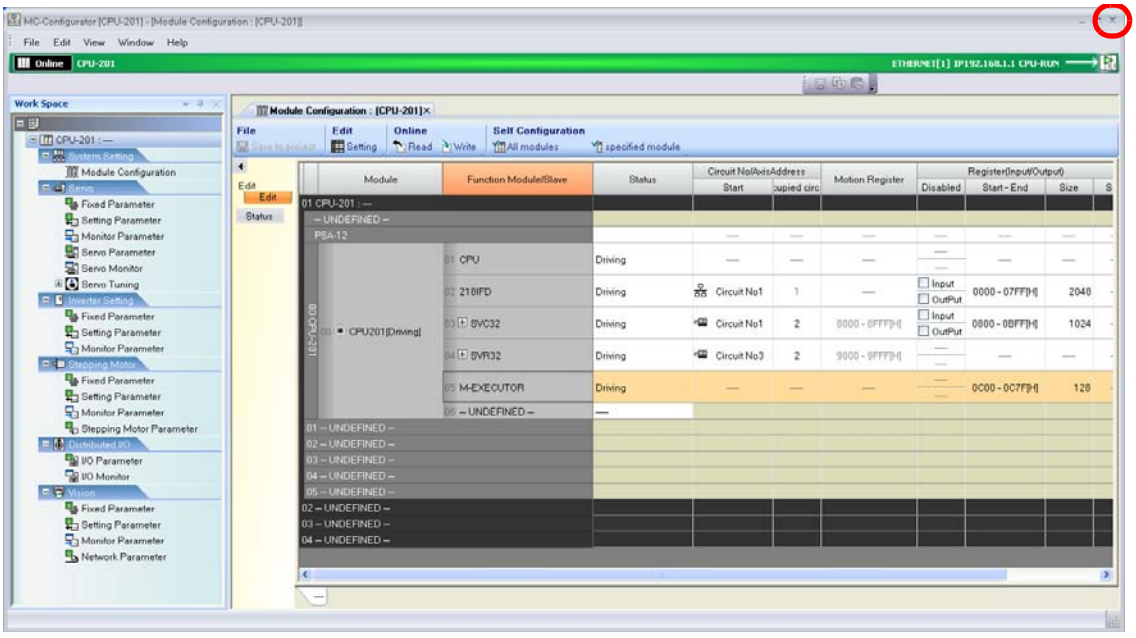
Note: If the Ewsbld Dialog Box does not appear, start over from step 2.

6. Click the **Yes** Button.



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

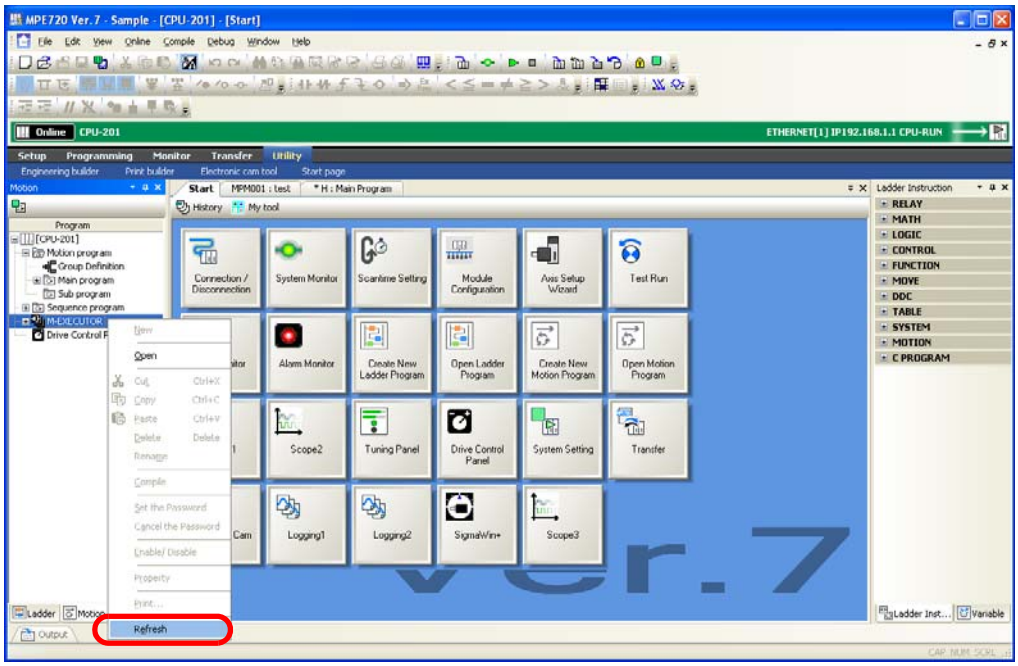
7. Click the **Close** Button on the Module Configuration Window.



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***.



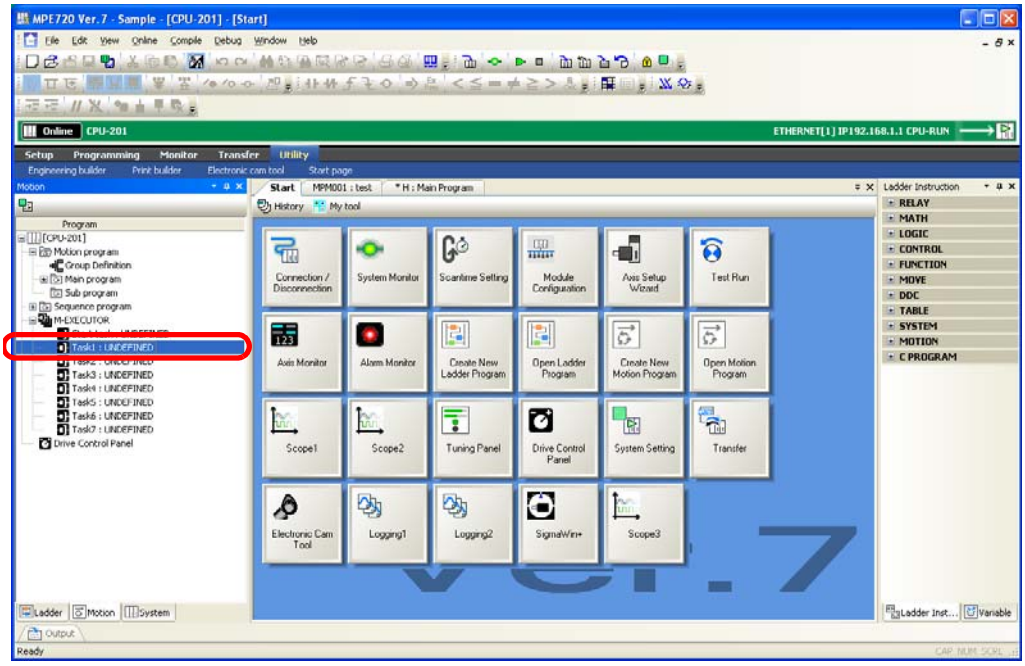
The number of tasks that was set in step 4 will be displayed below the M-EXECUTOR.

This concludes the process for setting the number of tasks to assign to M-EXECUTOR.

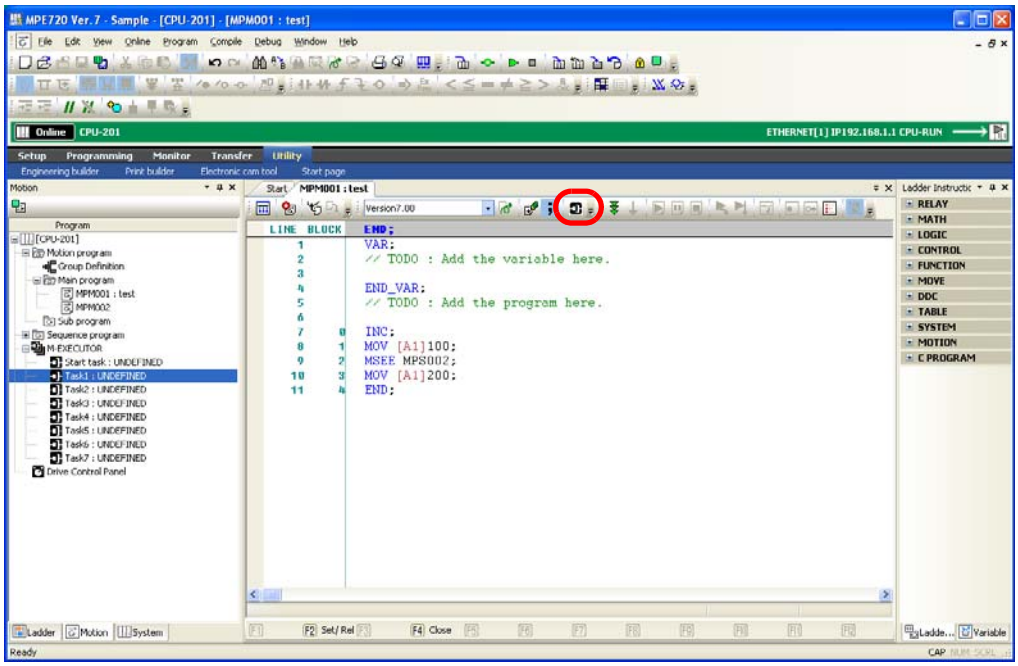
Next, register the contents of the motion program to execute in M-EXECUTOR.

9. Any of the following operations can be used.

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



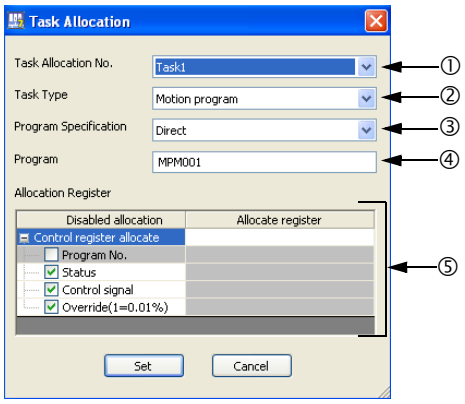
- Click the **Task Allocation** Button on the Motion Editor Tab Page.



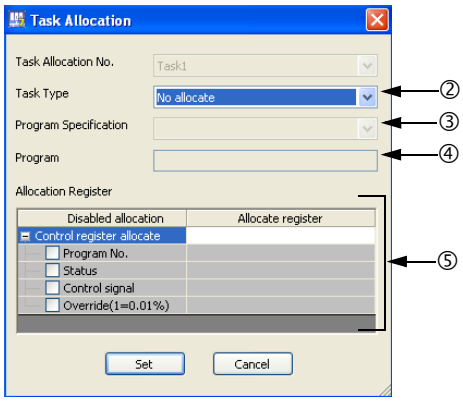
The Task Allocation Dialog Box will be displayed.

10. Set the items from ① to ⑤.

After Using the Motion Pane in Step 9

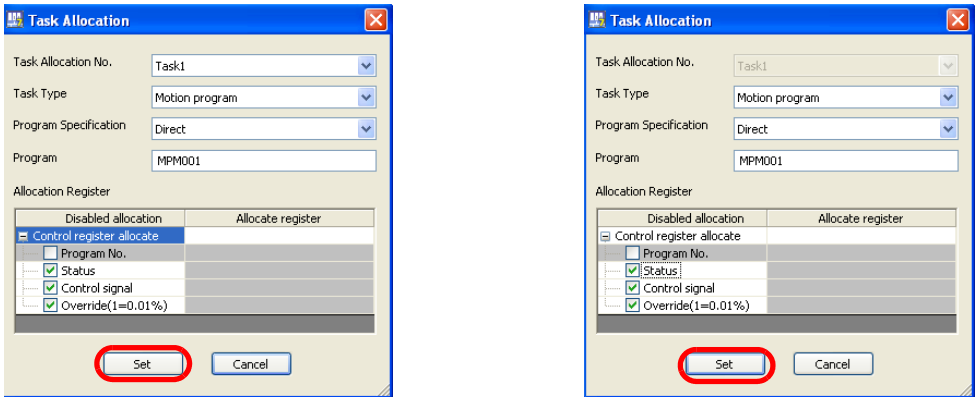


After Using Motion Editor Tab Page in Step 9



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 Motion Pane, 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	Allocate 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.

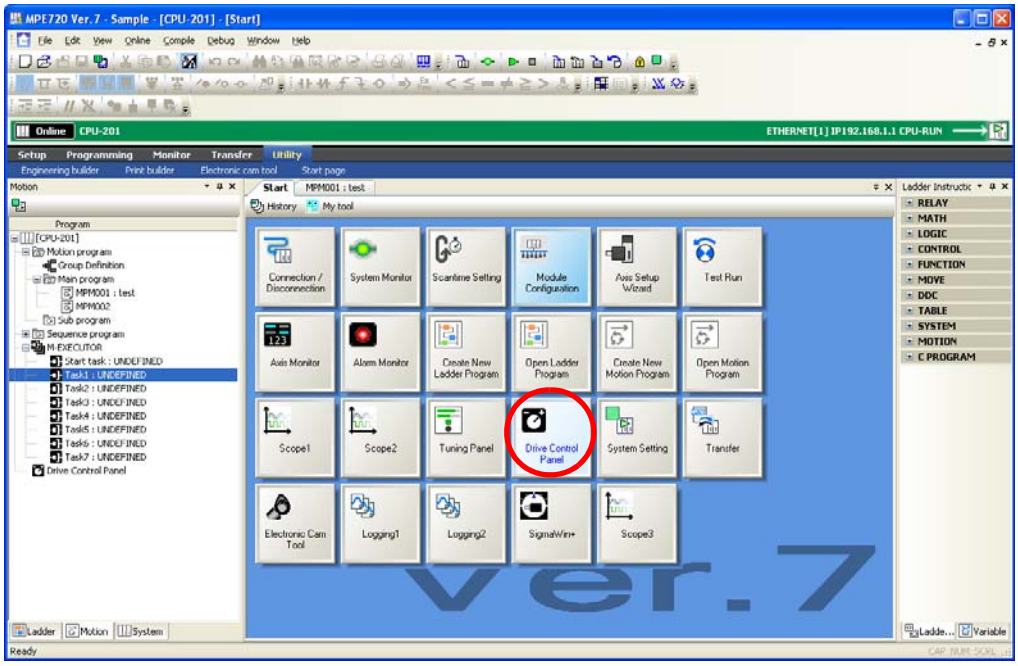
Executing Motion Programs

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.

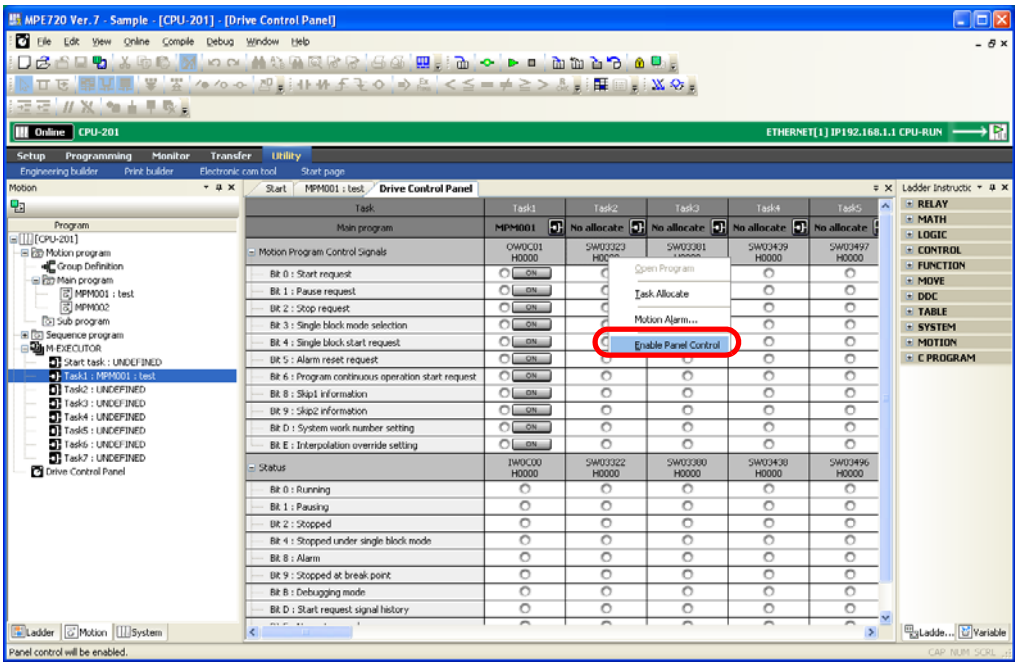
Use the following procedure to execute a motion program that was registered in the M-EXECUTOR.

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



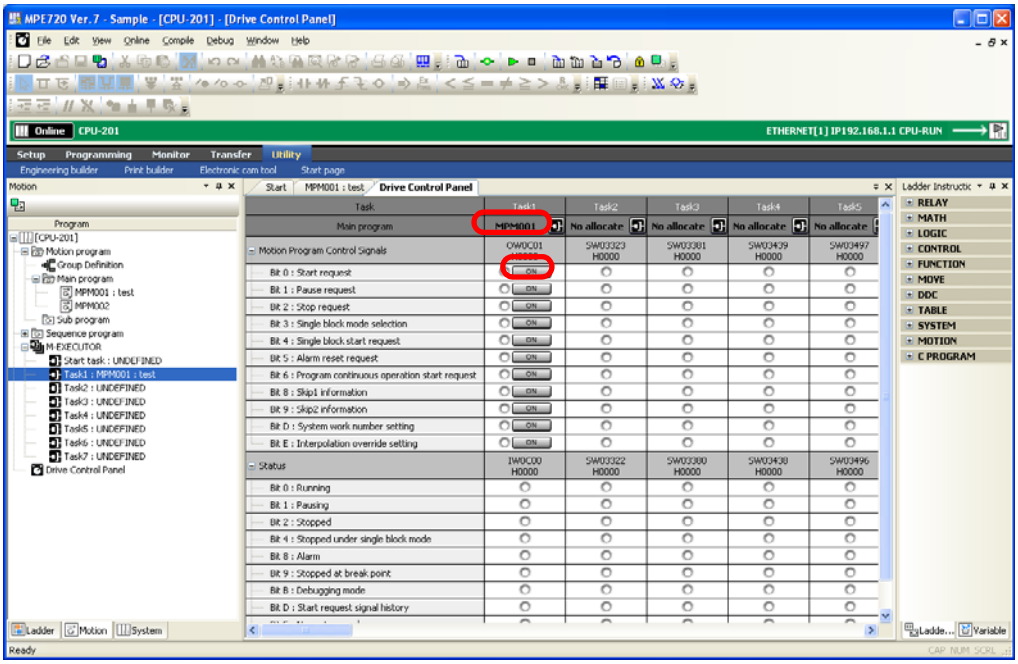
The Drive Control Panel Tab Page will be displayed.

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

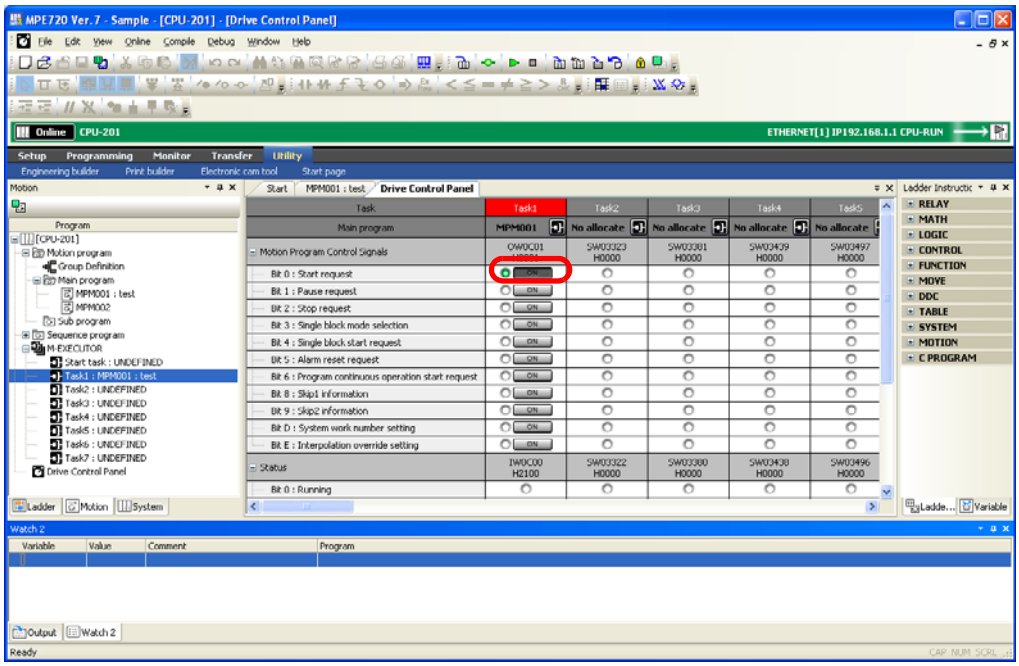


The controls on this panel will be enabled.

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.

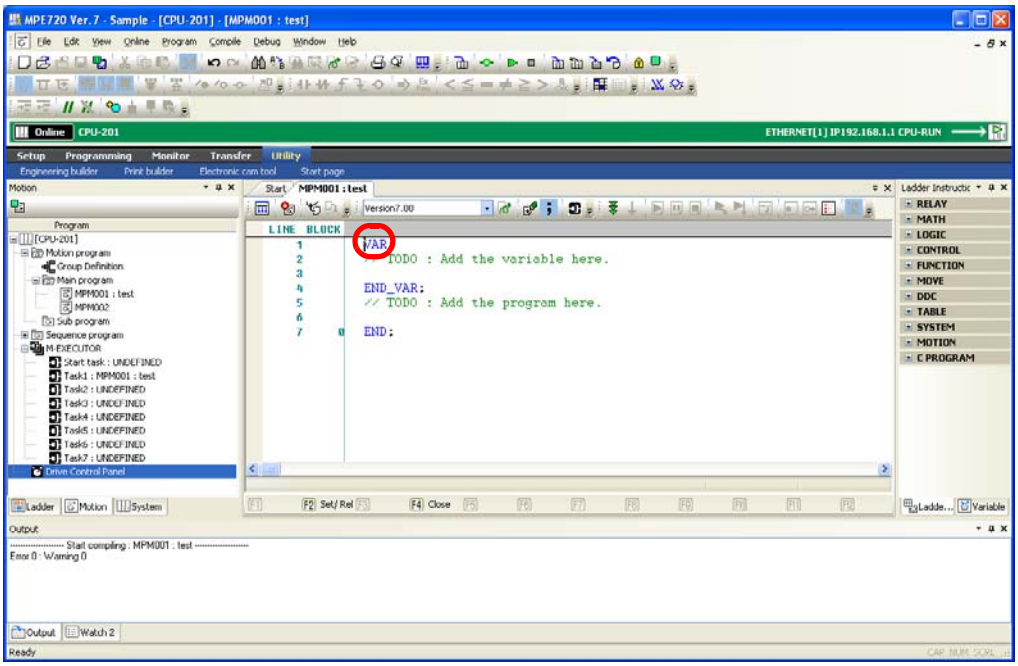


This concludes the procedure.

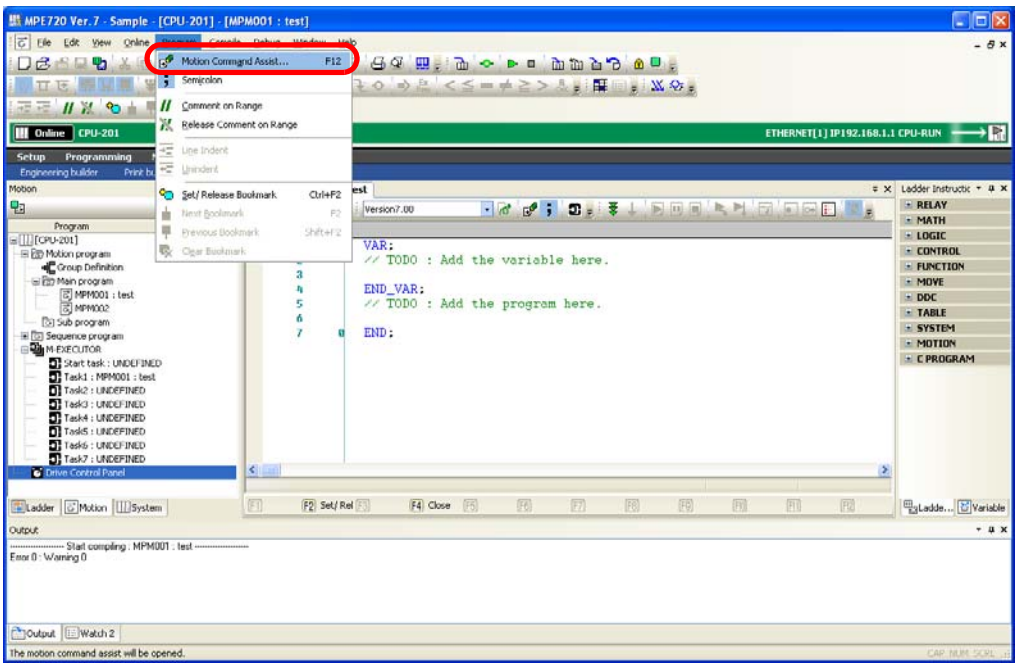
Using Instruction Input Assistance for Motion Programs

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.



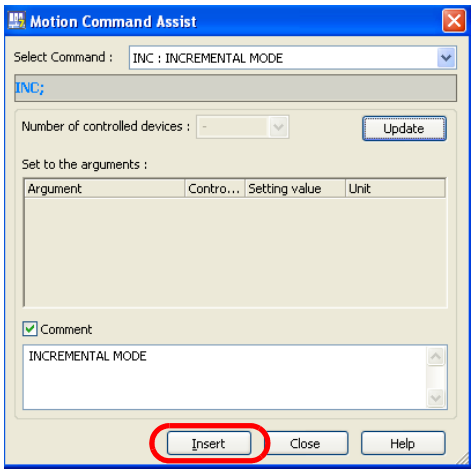
2. Select ***Program*** – ***Motion Command Assist*** from the menu bar.



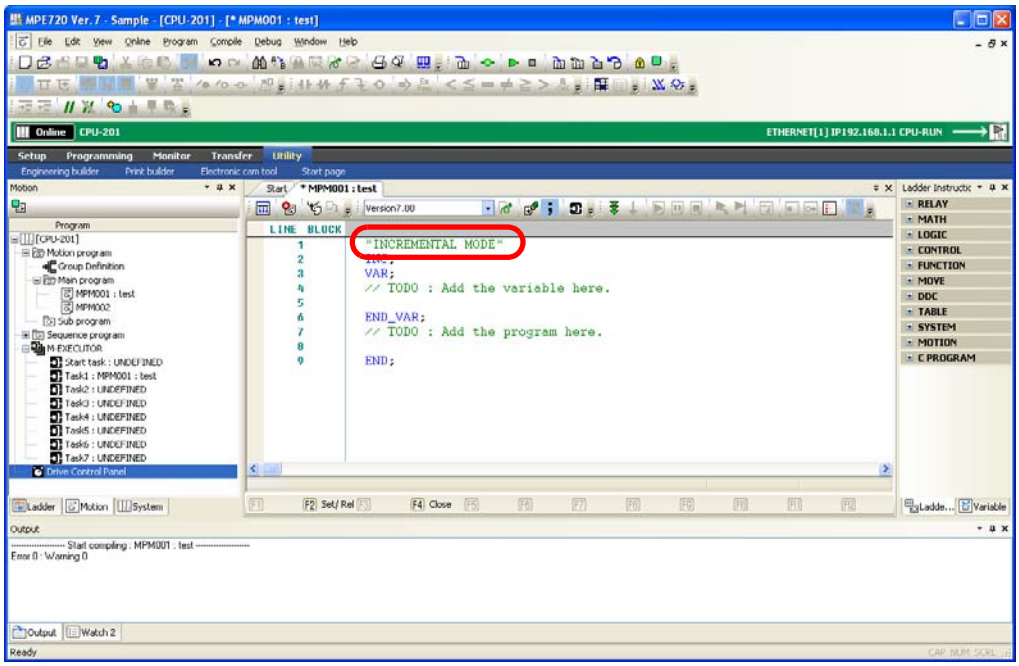
The Motion Command Assist Dialog Box will be displayed.

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.

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.

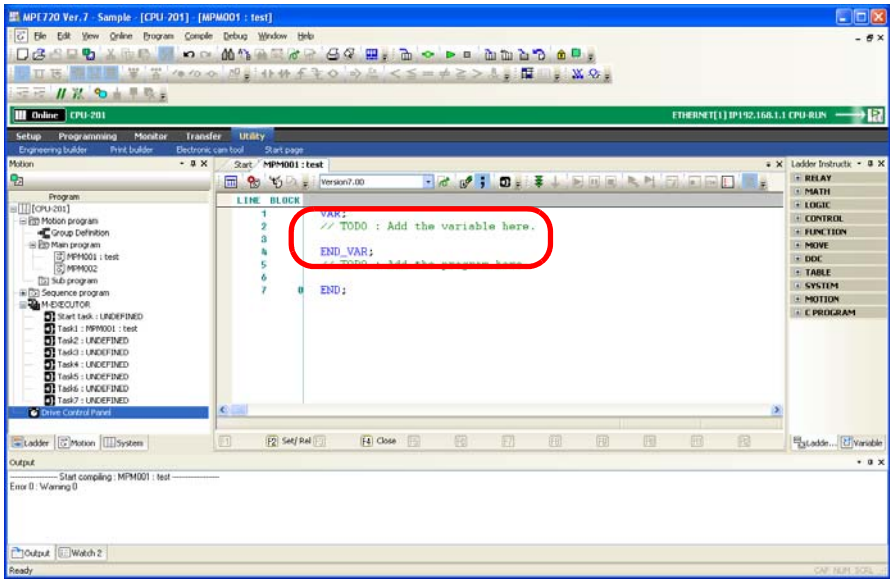
Note

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 Motion Editor Tab Page. Select **Version 7.00** if is set to a different version.

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

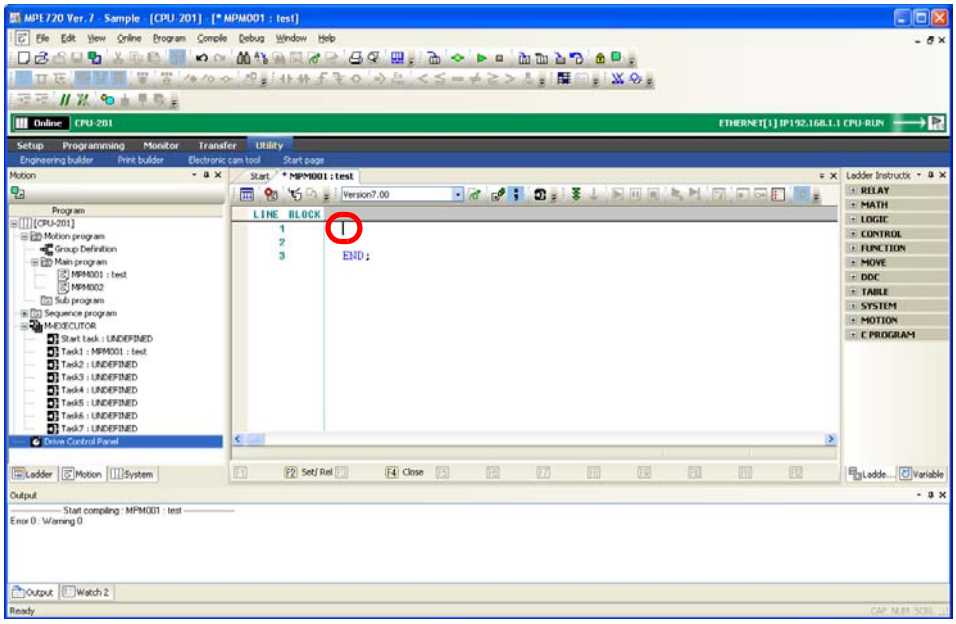
Information

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.

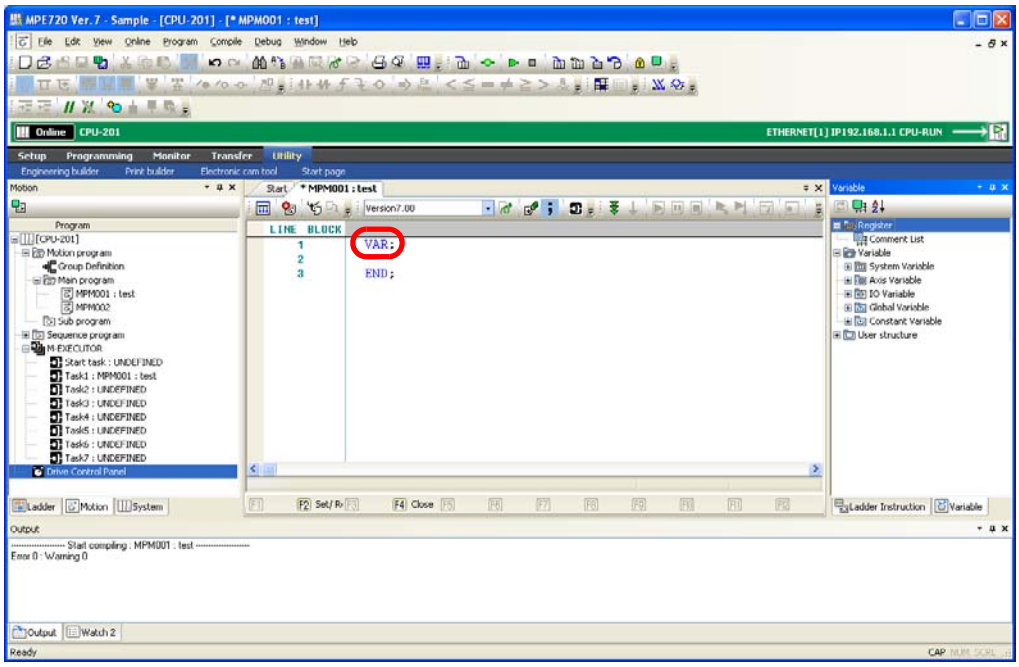


Refer to the following procedure to start a new block with the VAR instruction.

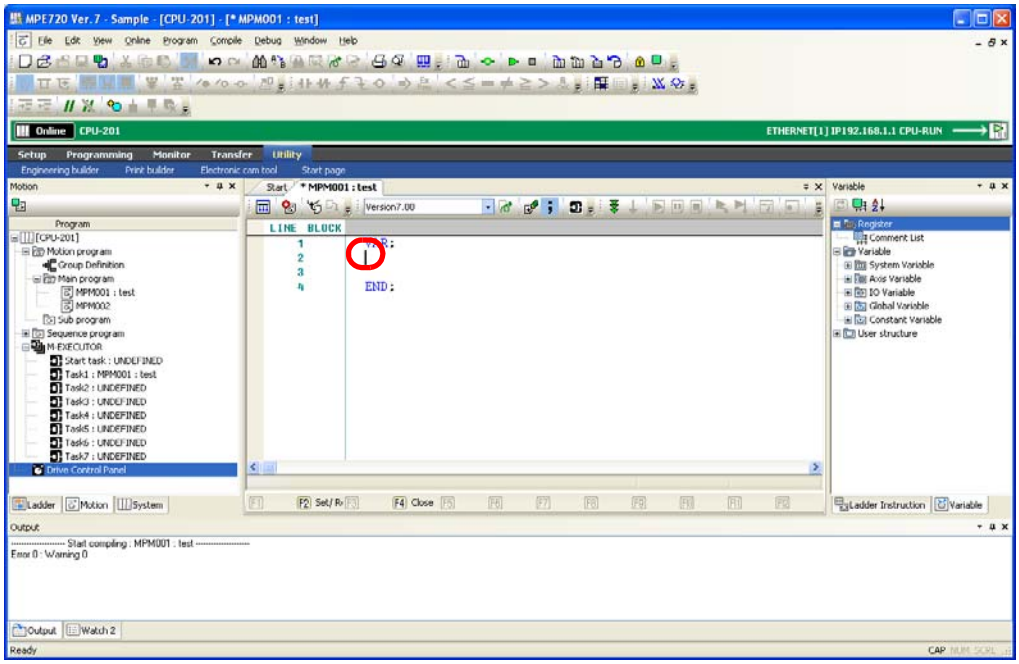
1. Place the mouse cursor where the motion program variable is to be inserted.



2. Enter “VAR;”.



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



4. Enter the definition to declare.

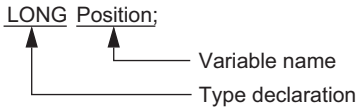
Note: The following limitations apply to variables.

- 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.)

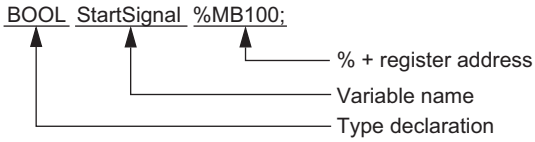
Information

The syntax for definitions is shown below.

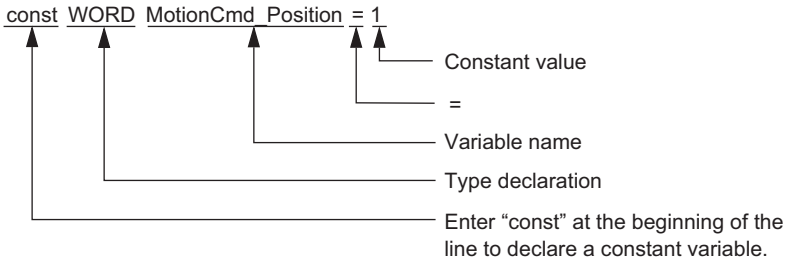
- Declaring Automatic Variables



- Declaring Variables That Specify Registers

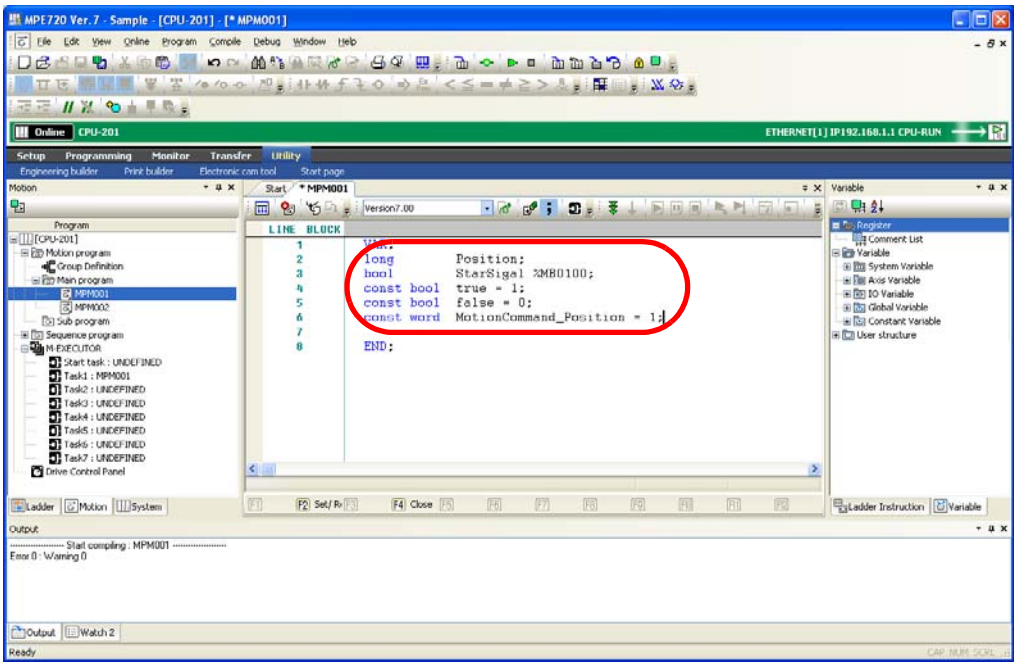


- Declaring Constant Variables

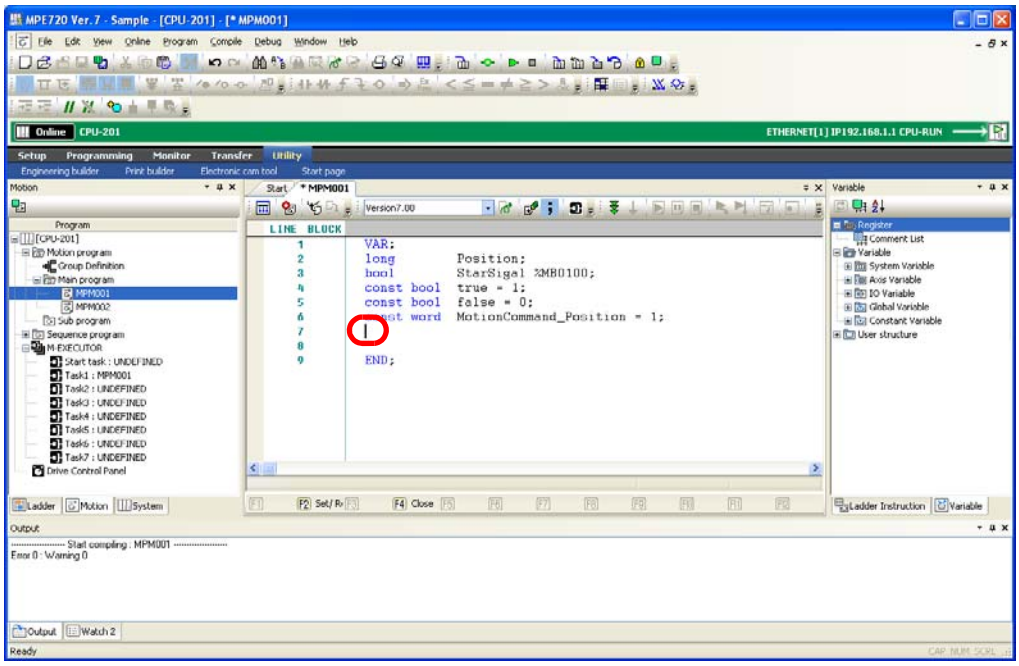


Refer to the following section for details on type declarations.

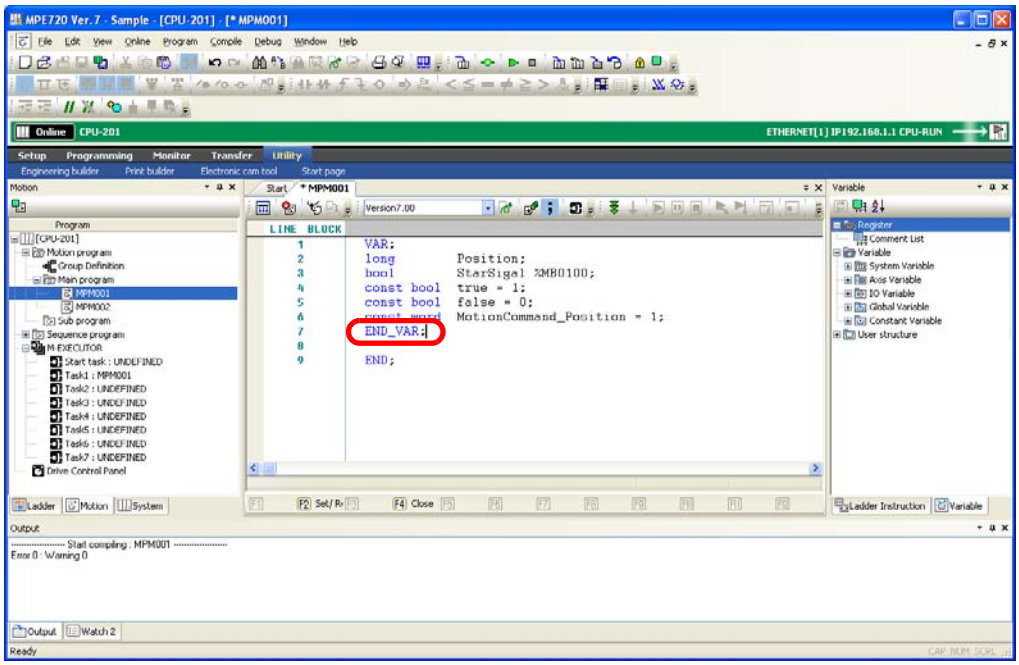
☞ *Type Declarations That Are Usable in Definitions (page 4-63)*



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.

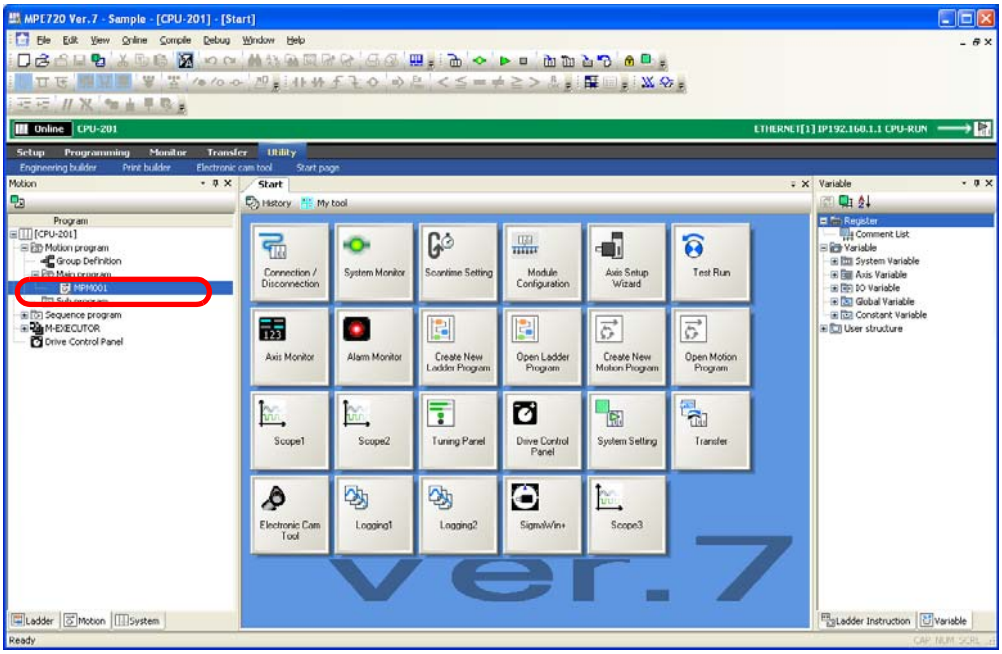
4.3 Common Information for Ladder Programs and Motion Programs

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

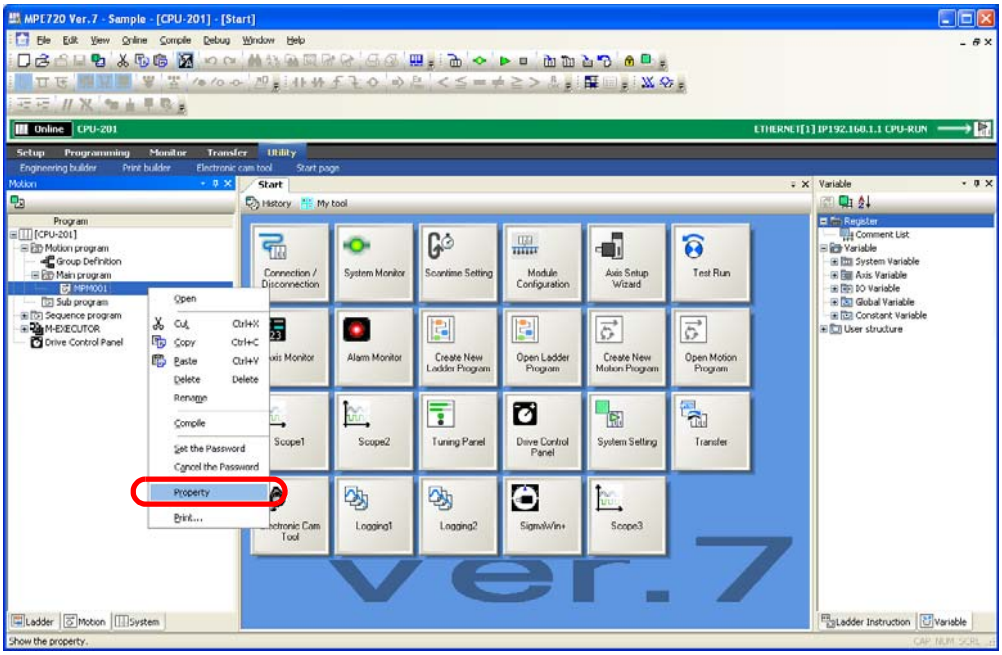
Increasing the Number of Usable D Registers

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***.

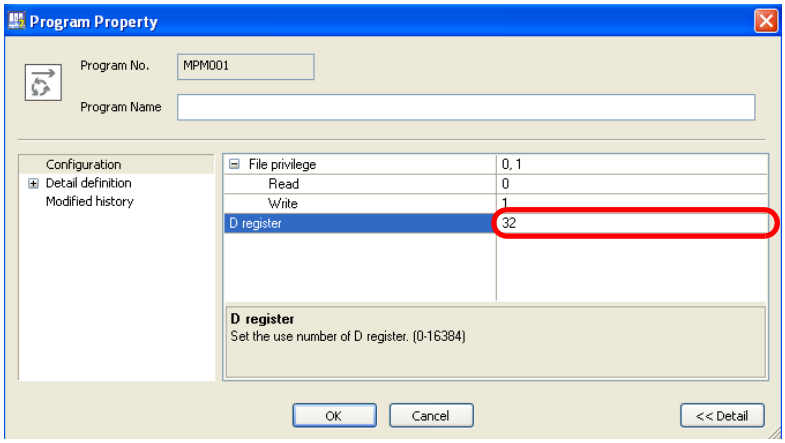


The Program Property Dialog Box will be displayed.

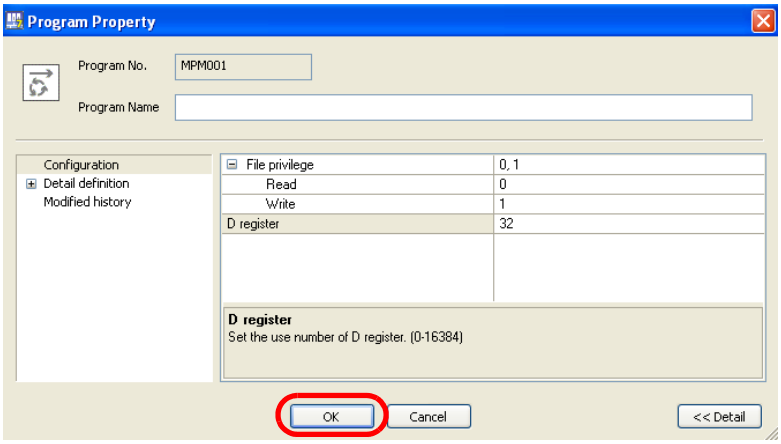
3. Use one of the following methods to specify the number of D registers to use.

- 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.



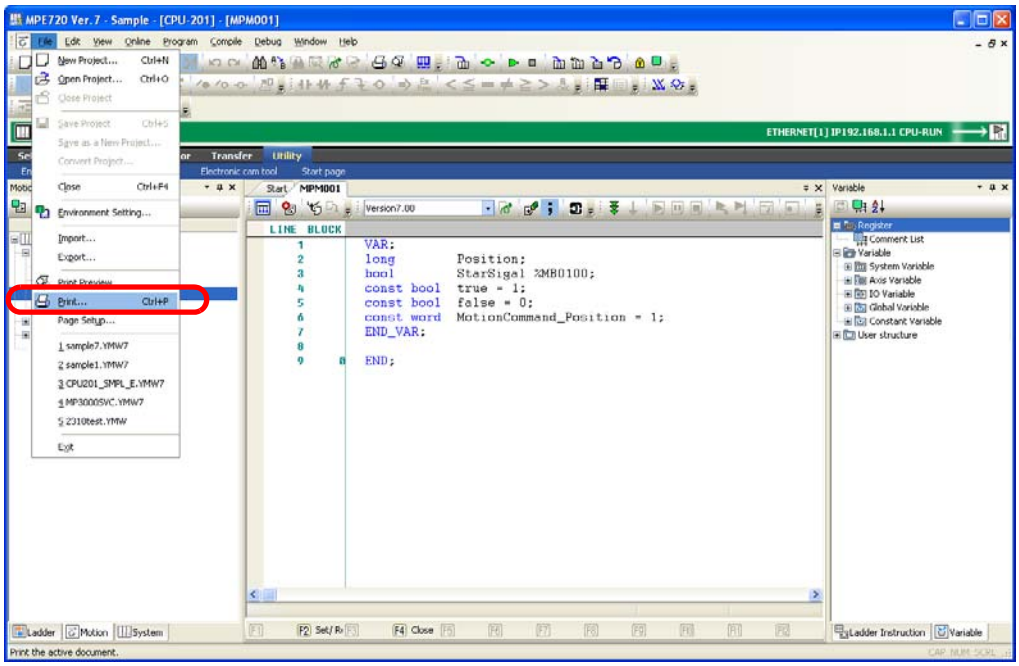
The Program Property Dialog Box will close and the settings will be applied.

This concludes the procedure.

Printing Ladder Programs and Motion Programs

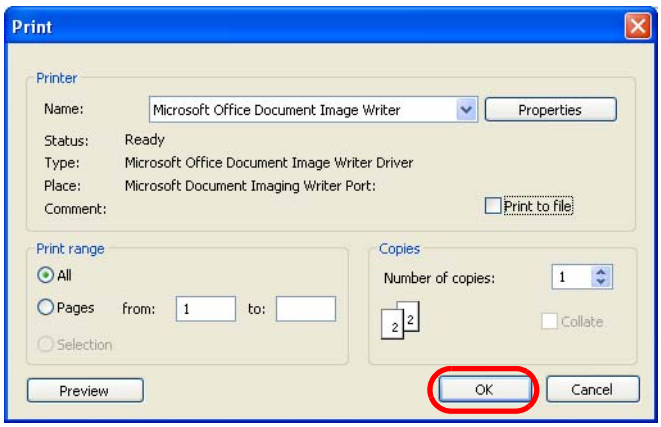
Use the following procedure to print ladder programs and motion programs.

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.

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 (page 4-67)*
	Motion program	*Copying a Motion Program (page 4-71)*
Between project files	Ladder programs and motion programs	*Copying between Different Project Files (page 4-73)*

Note

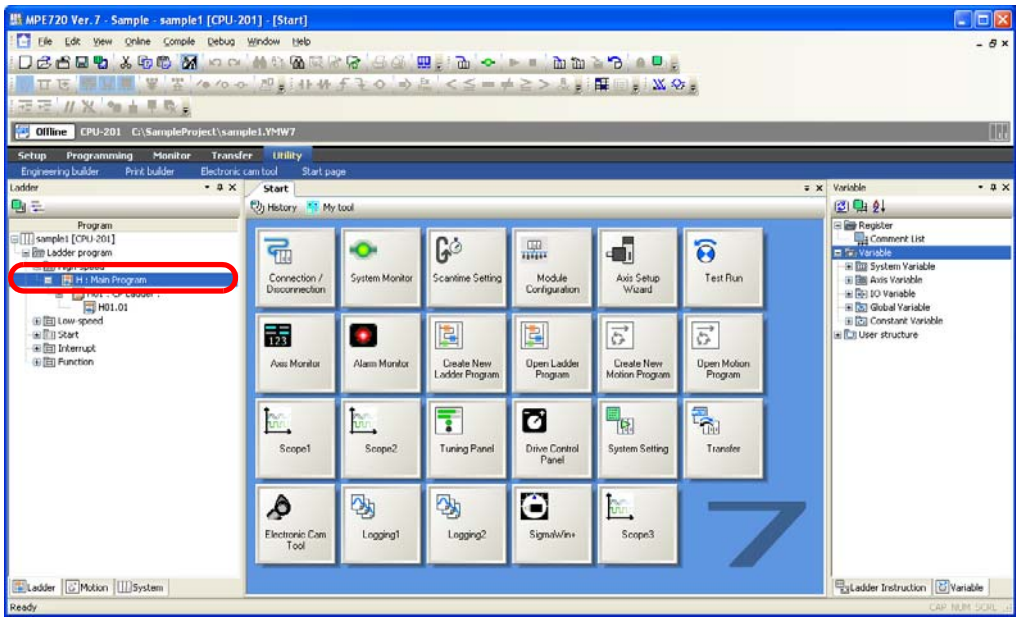
Programs cannot be copied if you are using a direct connection. Change to an offline connection.

The procedures are given below.

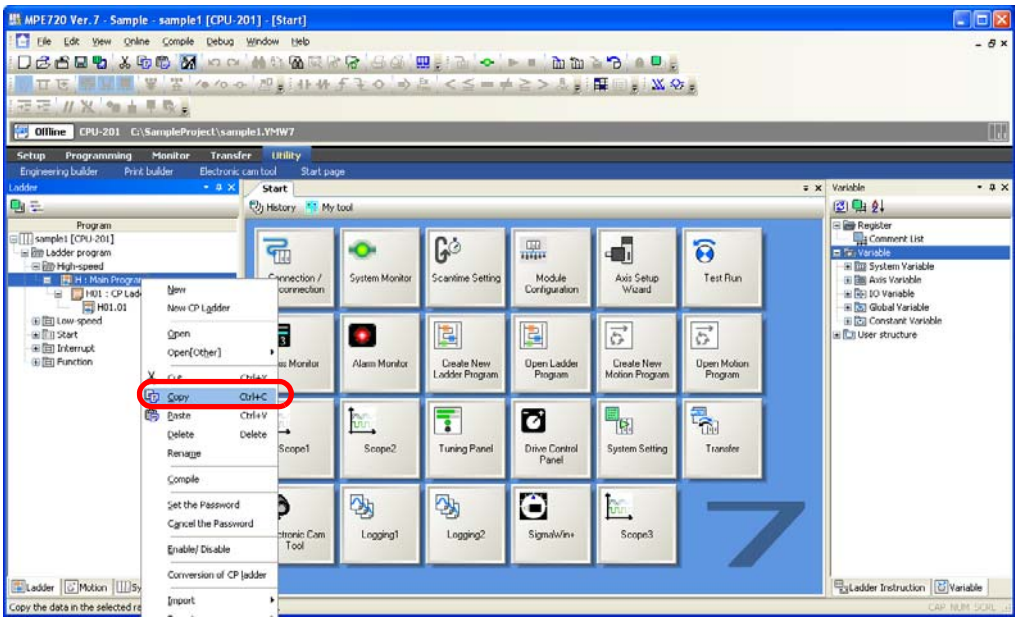
Copying Ladder Programs

Use the following procedure to copy ladder programs within the same project file.

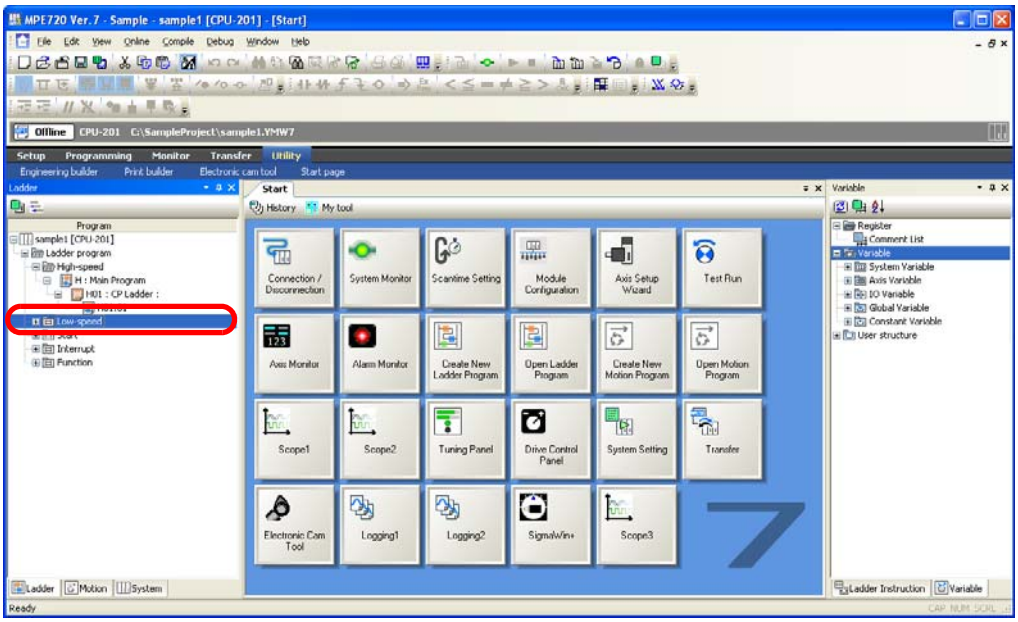
1. Open the project file that contains the program to copy.
2. In the Ladder Pane, select the program to copy.



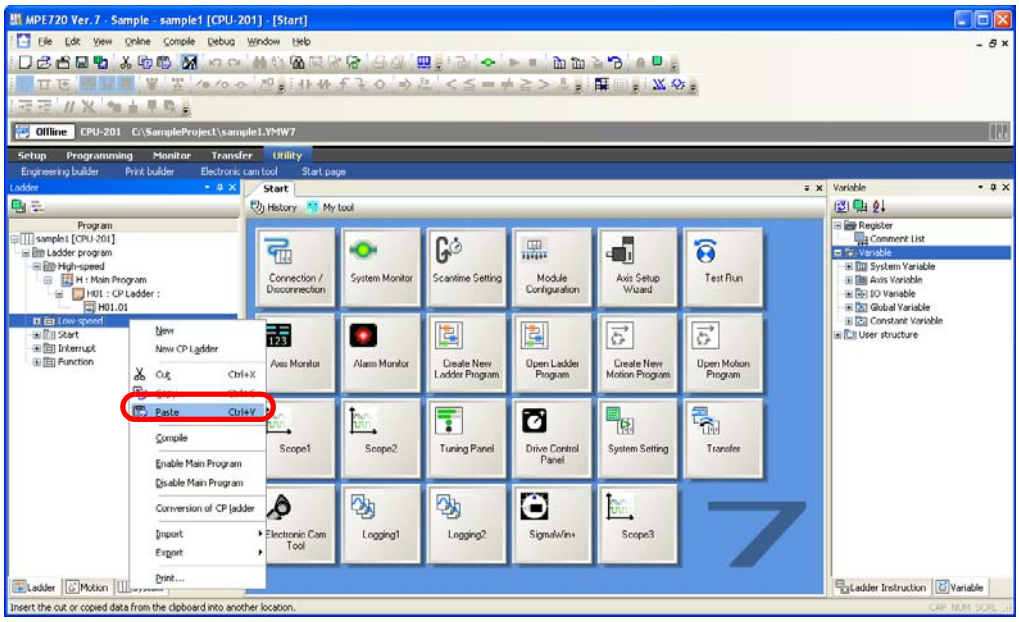
3. Right-click and select ***Copy***.



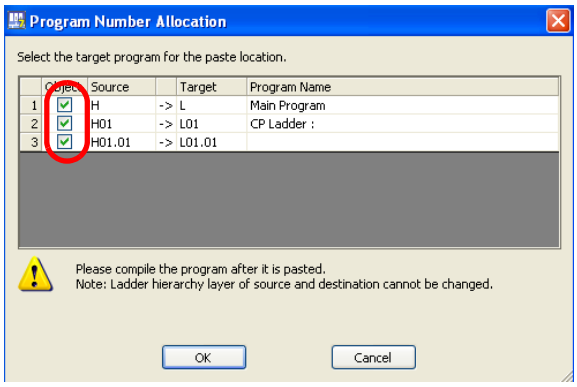
4. In the Ladder Pane, select the destination program where the program is to be pasted.



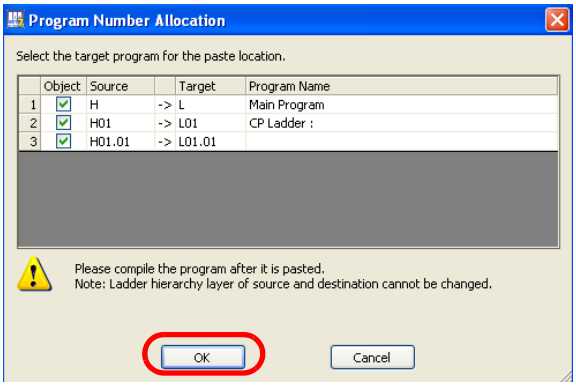
5. Right-click and select ***Paste***.



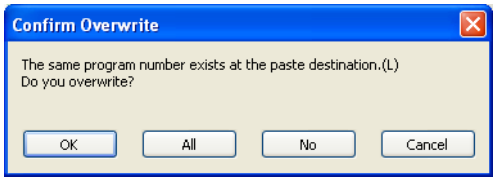
6. Select the **Object** Box for the program to copy.



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.



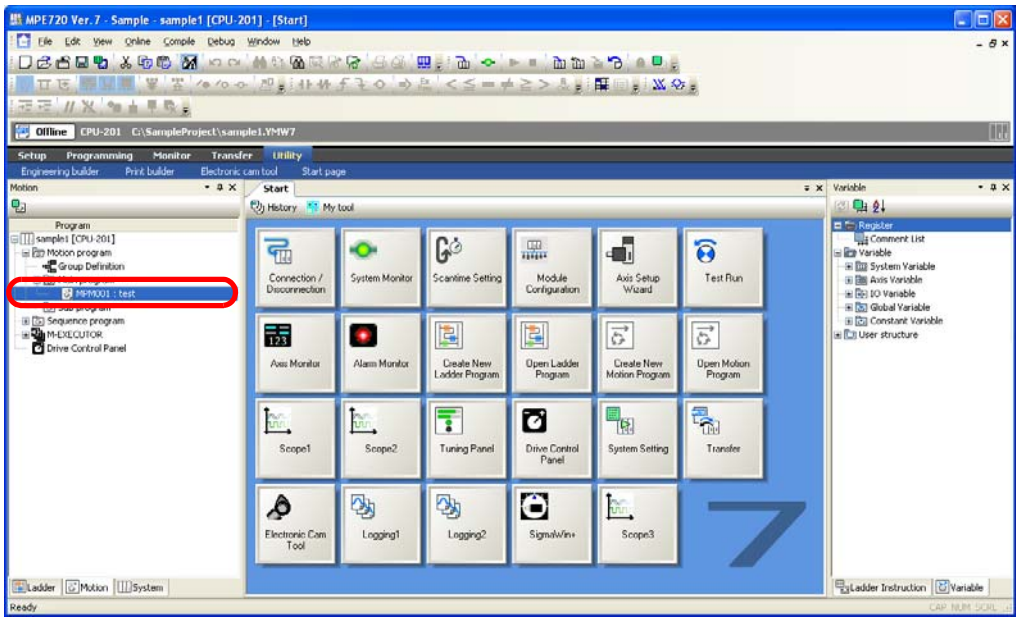
The selected program will be copied and the Program Number Assignment Dialog Box will close.

This concludes the procedure.

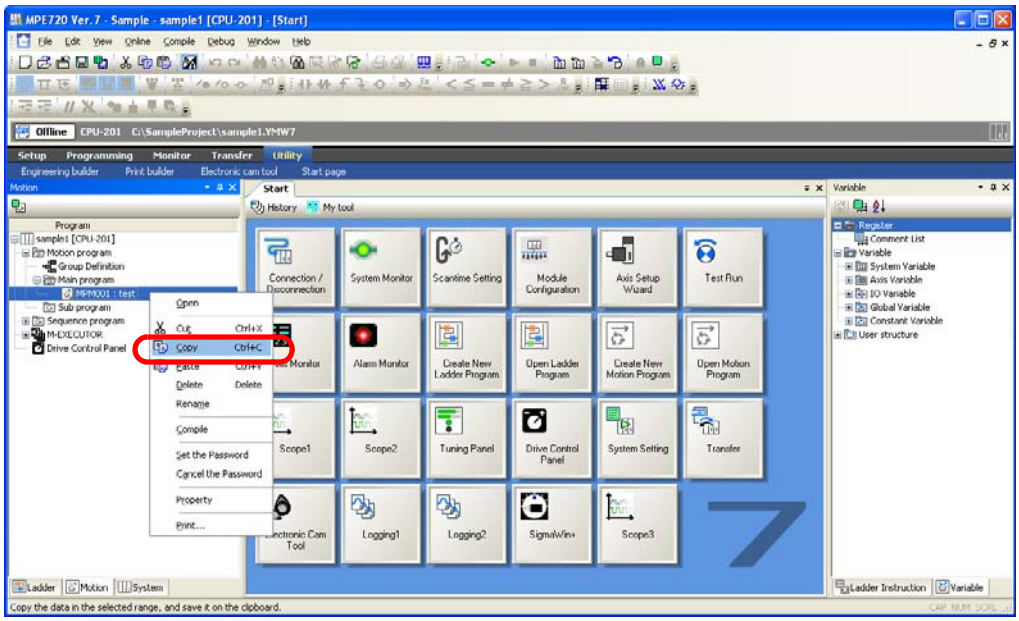
Copying a Motion Program

Use the following procedure to copy motion programs within the same project file.

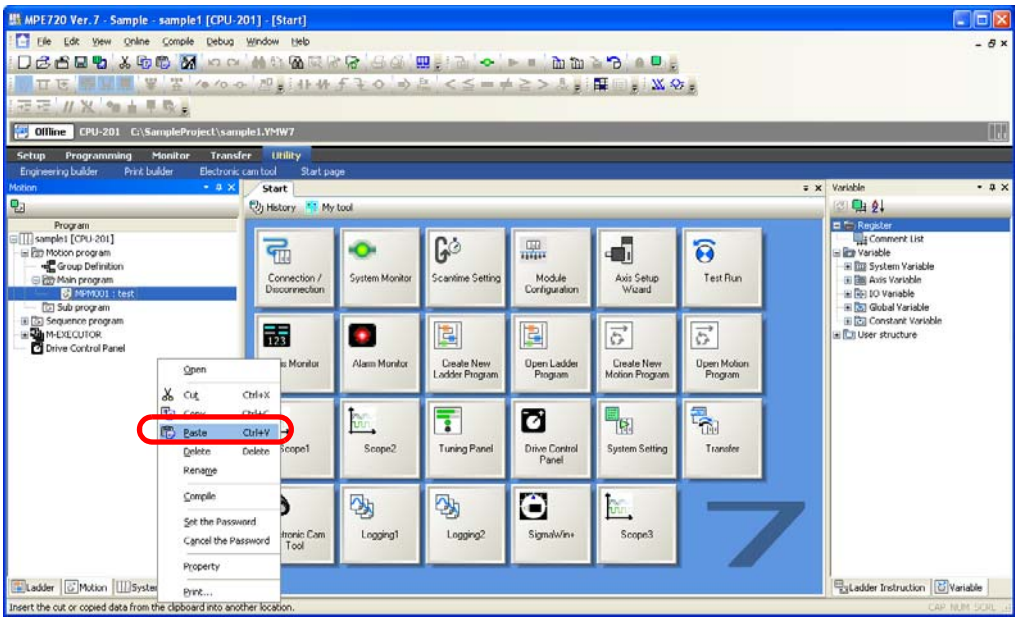
1. Open the project file that contains the program to copy.
2. In the Motion Pane, select the program to copy.



3. Right-click and select ***Copy***.

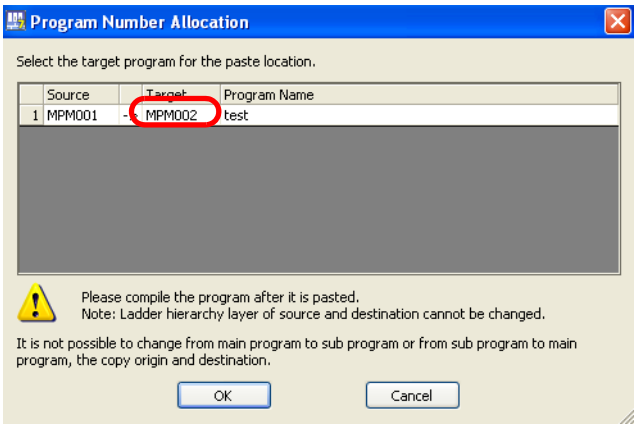


4. Right-click in the Motion Pane and select ***Paste***.

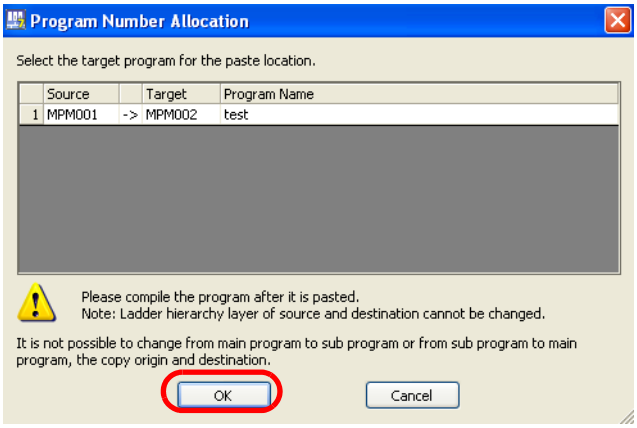


The Program Number Assignment Dialog Box will be displayed.

5. Enter the program number in the cell under **Target**.



6. Click the **OK** Button.



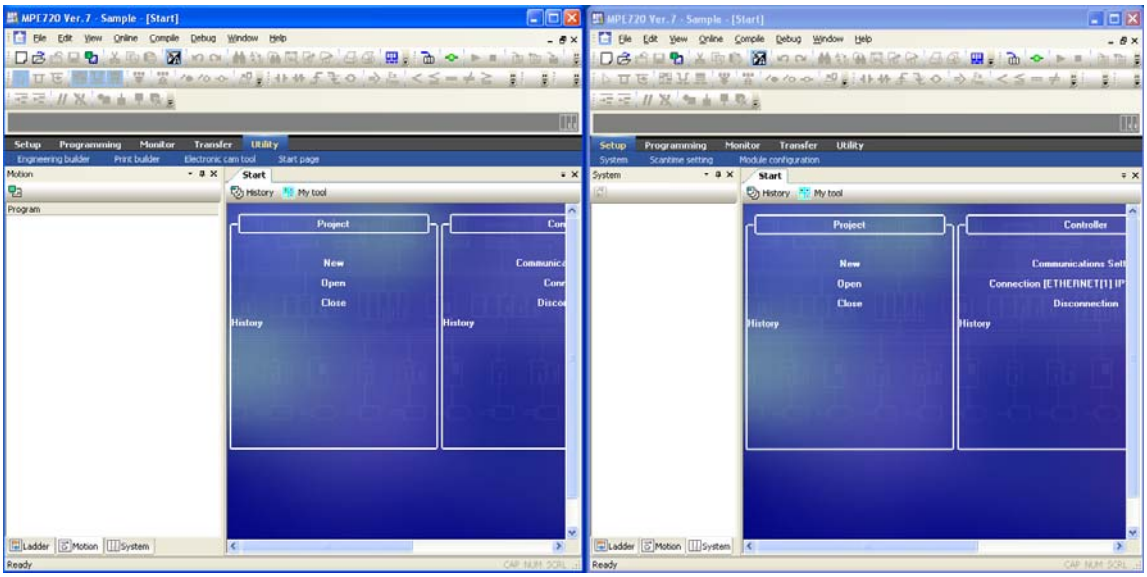
The selected program will be copied and the Program Number Assignment Dialog Box will close.

This concludes the procedure.

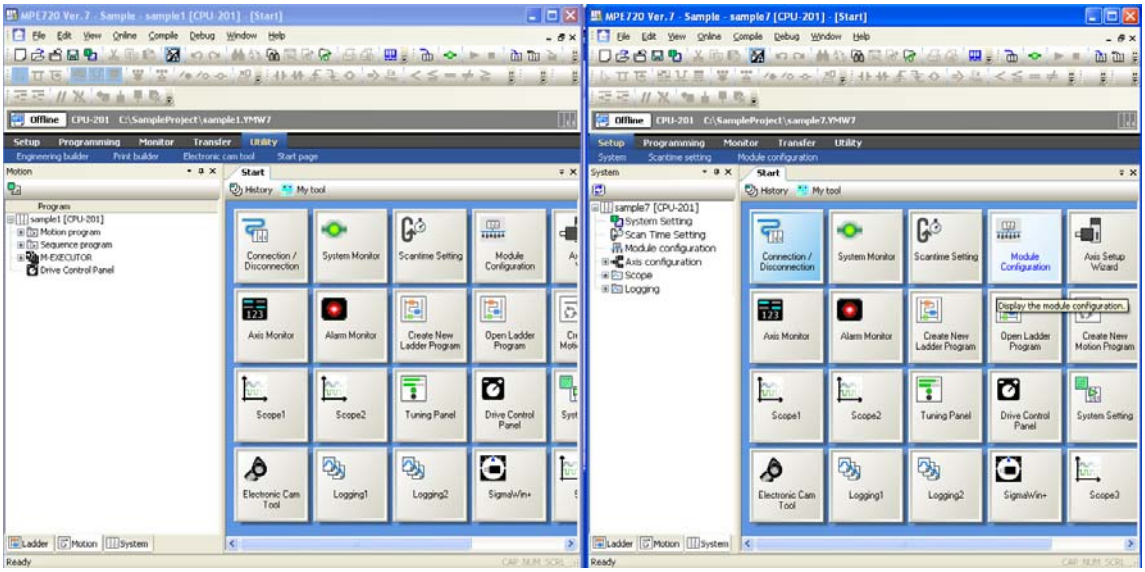
Copying between Different Project Files

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 (page 4-67)*
   - Motion Programs
     ☞ *Step 2 and onward in Copying a Motion Program (page 4-71)*

This concludes the procedure.

Compiling Programs

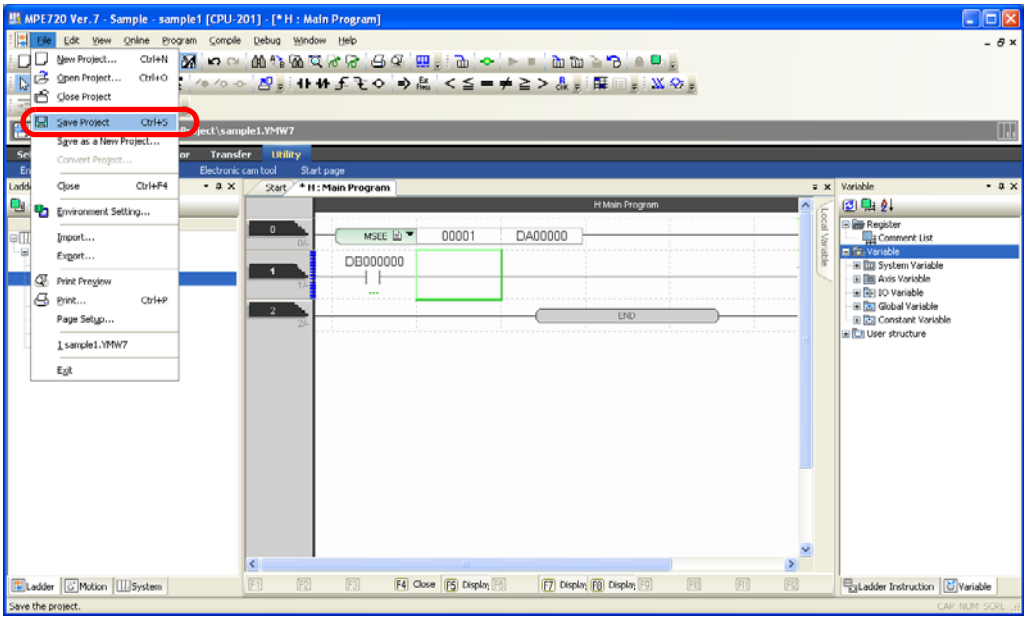
You can compile a program by opening the program to compile, and performing one of the following operations.

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

Saving Programs While Editing

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.

> Note
>
> 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.

Debugging

5

This chapter describes the operations that are used for debugging ladder programs and motion programs.

5.1 Forcing Coils ON and OFF 5-2

5.2 Listing Coils in Forced ON or OFF State 5-5

5.3 Enabling Checking for Registers Used in Multiple Coil Instructions . 5-6

5.4 Debugging Motion Programs 5-8

Performing Step Execution 5-8
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5.5 Searching for Registers Used In a Drawing 5-19

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Replacing within a Program 5-22
Replacing in the Project 5-24

5.7 Monitoring the Current Values and Checking the Usage of Registers .5-27

Monitoring in the Register List Pane 5-27
Monitoring in the Watch Pane 5-30

5.8 Locating a Drawing with an Operation Error . . . 5-32

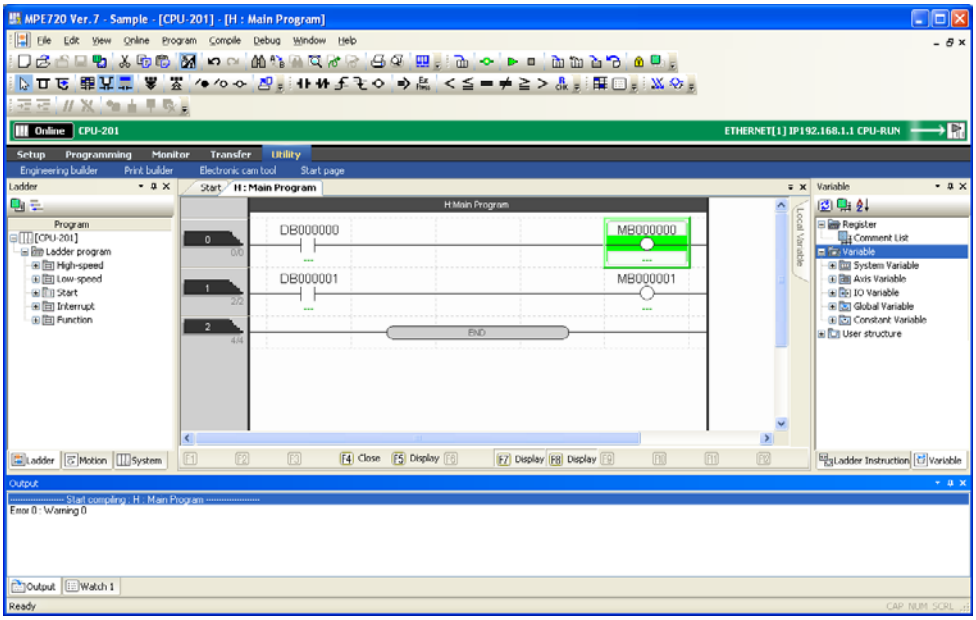
5.9 Displaying and Adjusting only Specific Registers 5-35

5.10 Enabling and Disabling Ladder Programs by Drawings 5-38

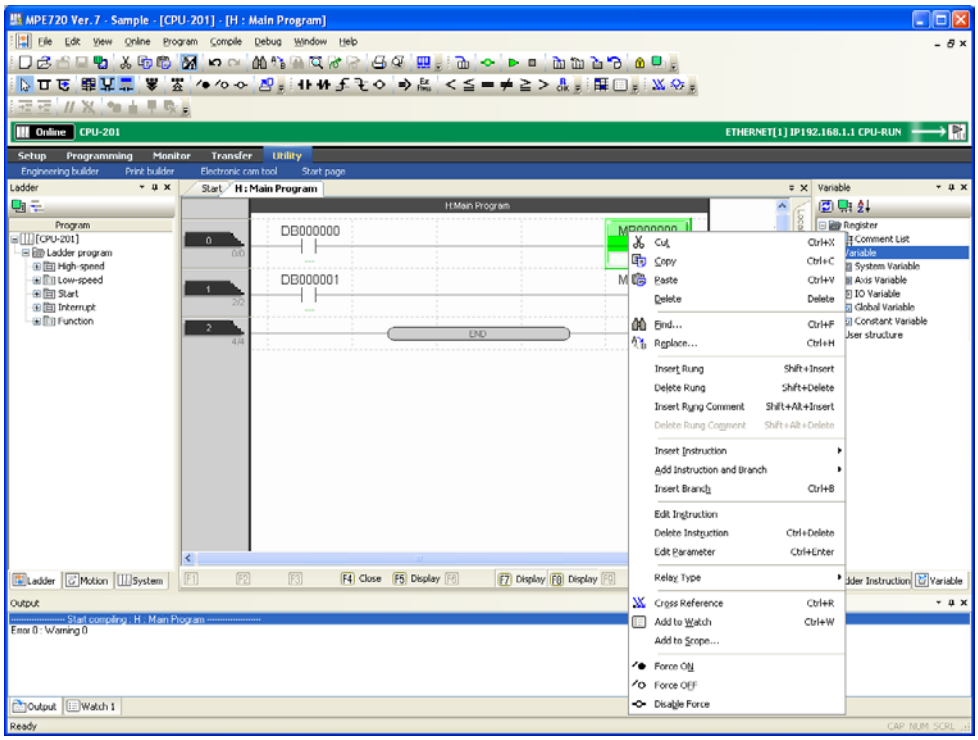
5.1 Forcing Coils ON and OFF

Use the following procedure to force a specific coil ON or OFF.

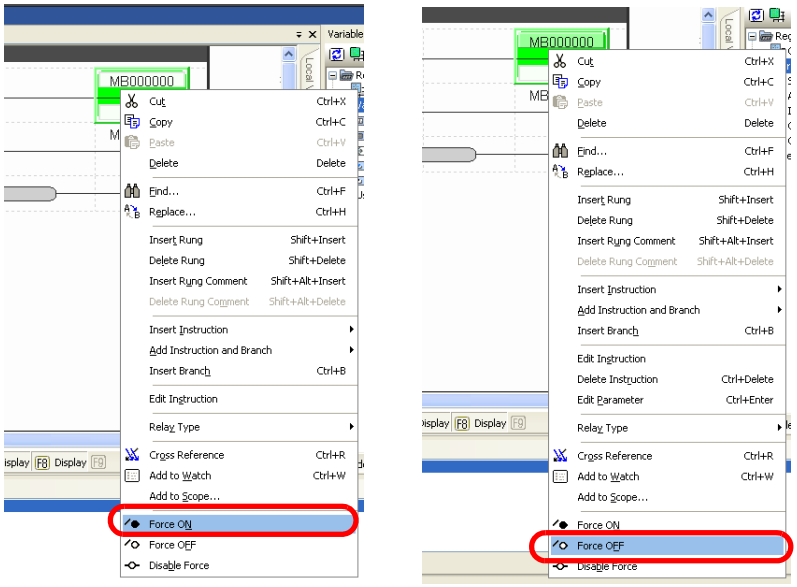
1. Display the target ladder program.



2. Right-click the coil to control.

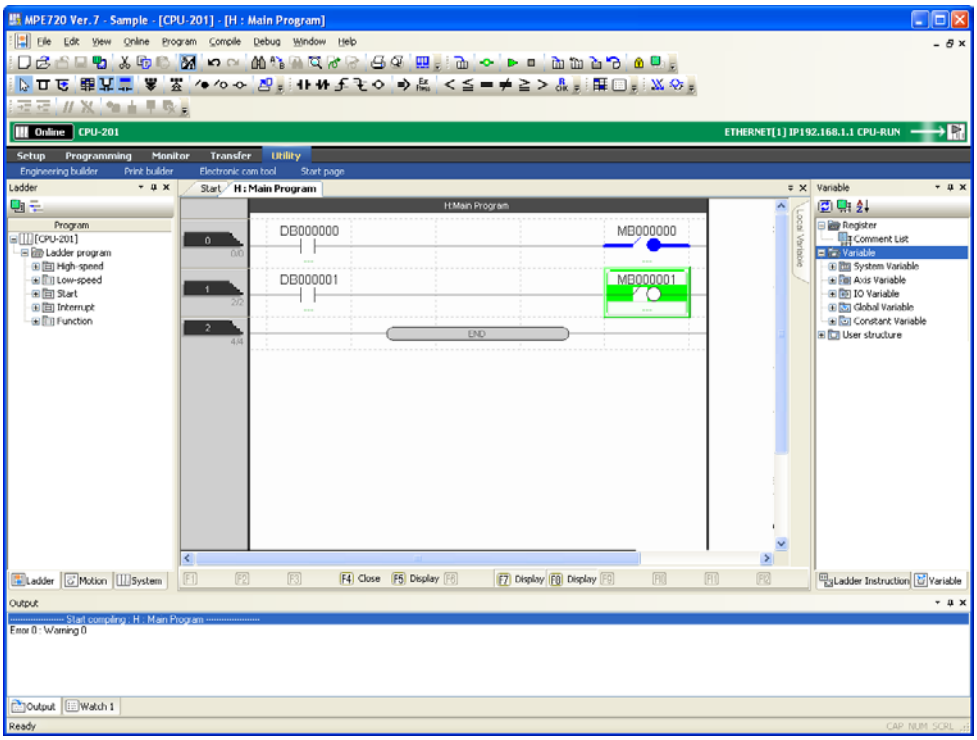


3. Select ***Force ON*** or ***Force OFF***.



4. Confirm that the coil is forced ON or OFF.

- Forced ON state: —/●—
- Forced OFF state: —/○—

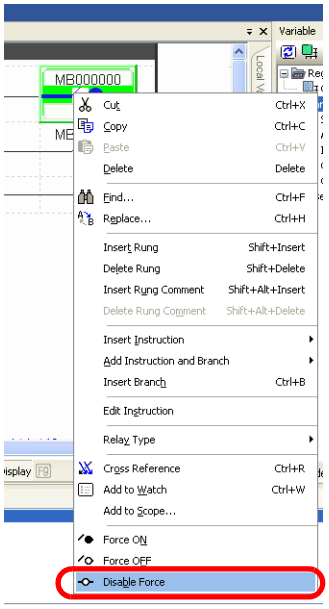


This concludes the procedure.

Information

Releasing the Forced State

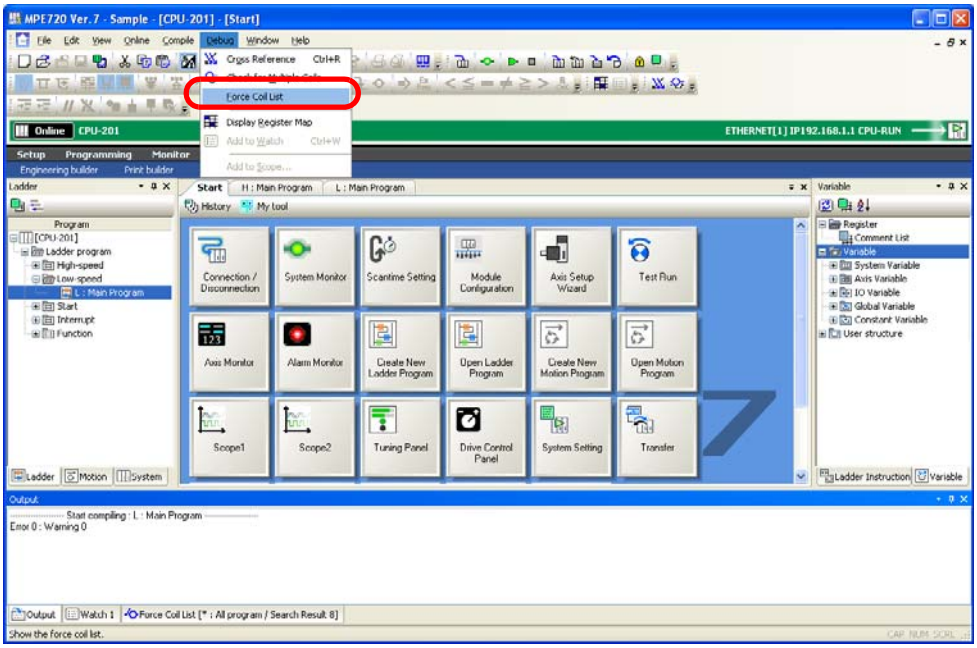
Right-click the coil to release, and select ***Disable Force*** from the menu.



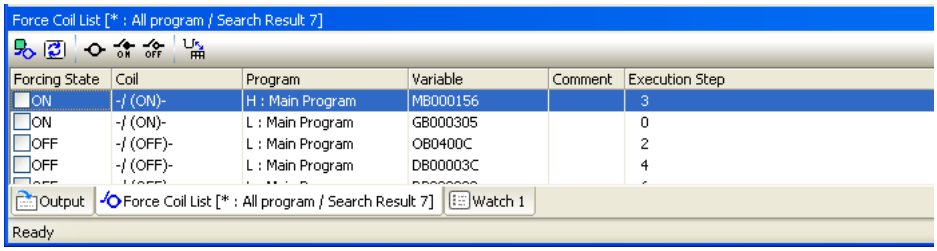
5.2 Listing Coils in Forced ON or OFF State

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.

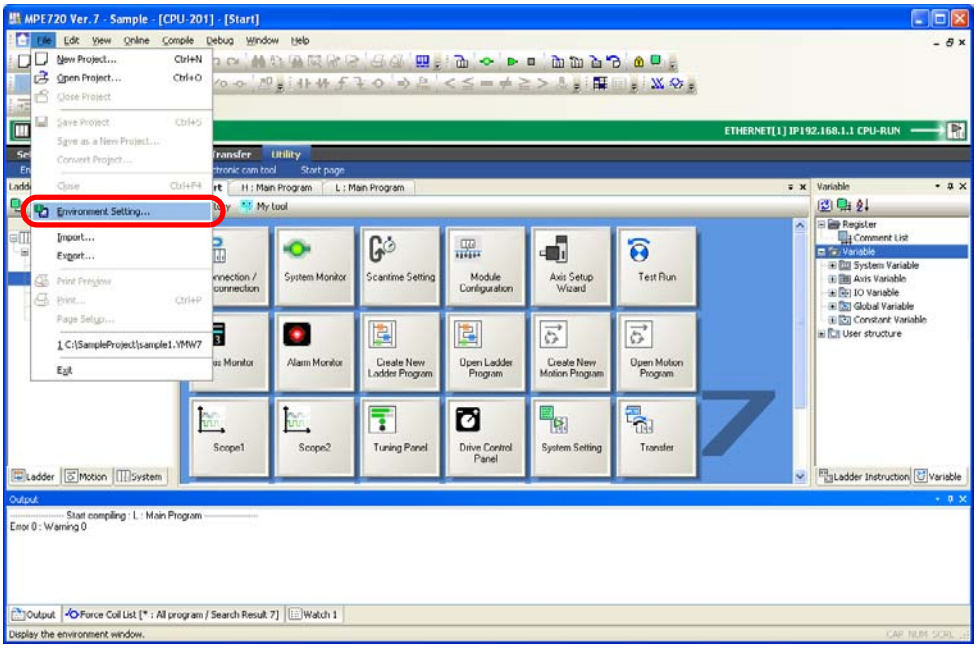
MP2000/MP3000 Series Machine Controller System Setup Manual (Manual No.: SIEP C880725 00)

This concludes the procedure.

5.3 Enabling Checking for Registers Used in Multiple Coil Instructions

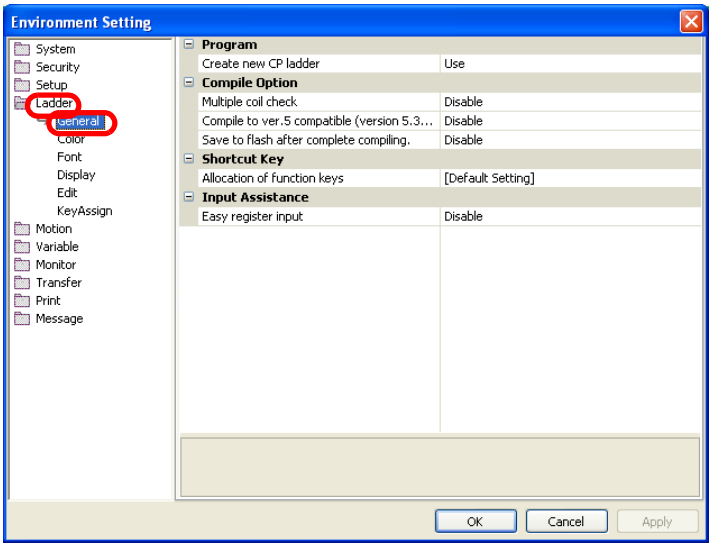
Use the following procedure to enable checking for coil instructions that use the same register.

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

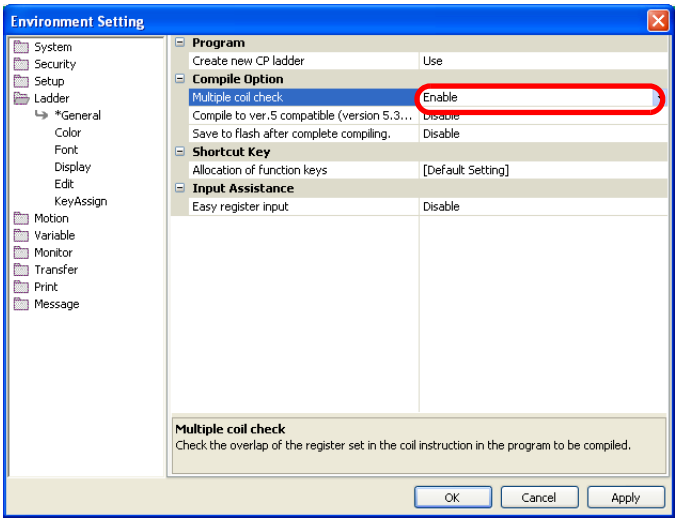


The Environment Setting Dialog Box is displayed.

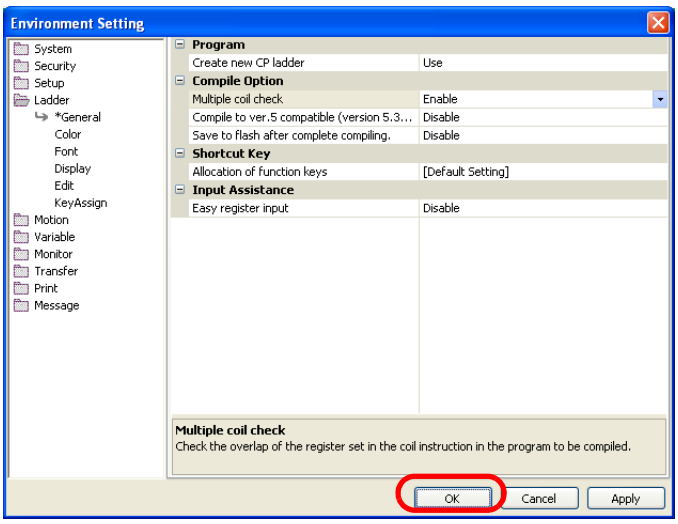
2. Select **Ladder** – **General**.



3. Set **Multiple coil check** in the **Compile Option** Group to **Enable**.



4. Click the **OK** Button.

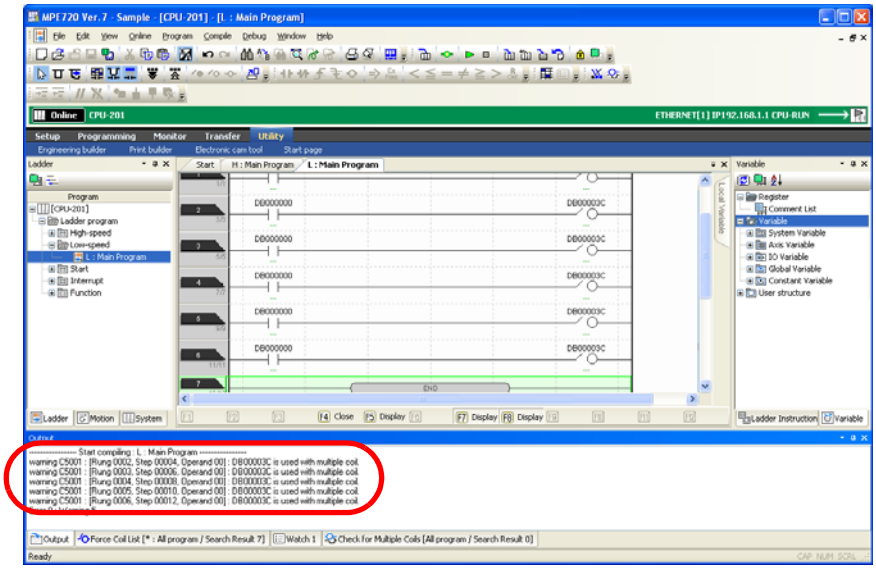


Checking for multiple coils will be enabled, and the Environment Setting Dialog Box will close.

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.



5.4 Debugging Motion Programs

There are the following three methods that you can use to check the operation of motion programs.

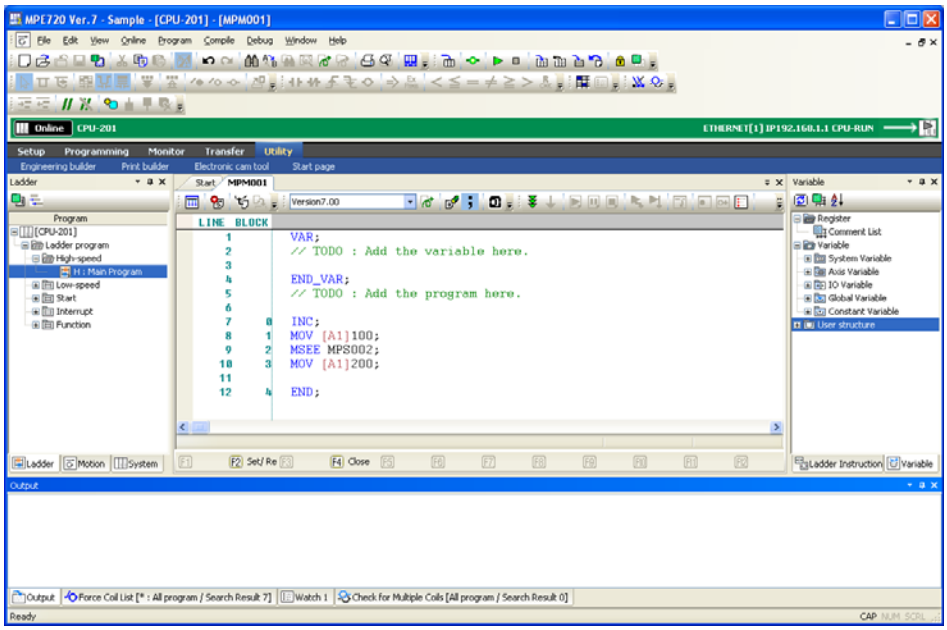
- Debugging with step execution: Program operation is checked by executing one step at a time.
- Debugging by setting breakpoints: The operation of a specified range of the program is checked.
- Debugging by checking the execution status and control signal status: The operating state of the program and the conditions when an alarm occurs are checked.

The procedures are given below.

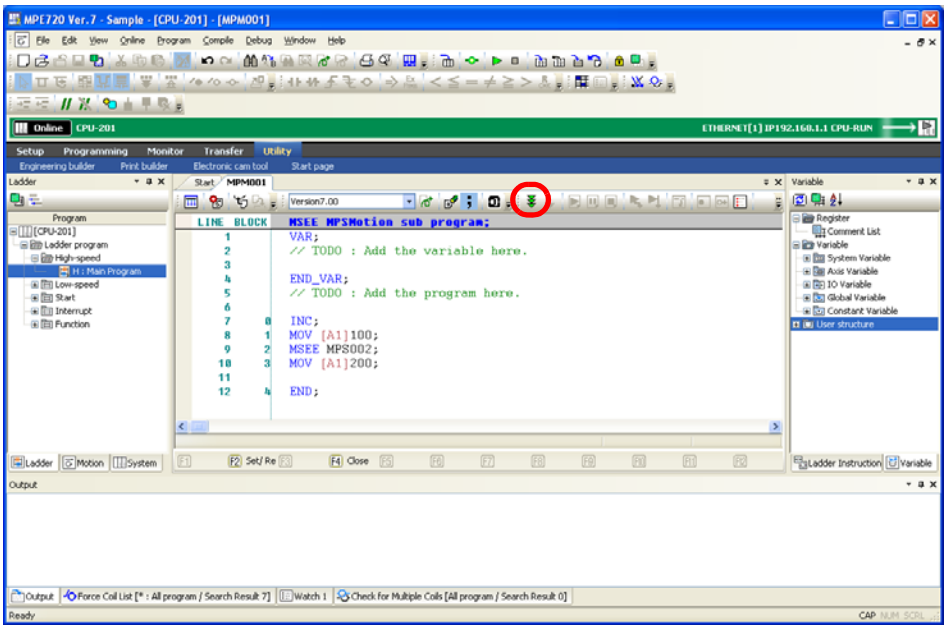
Performing Step Execution

Use the following procedure to perform step execution.

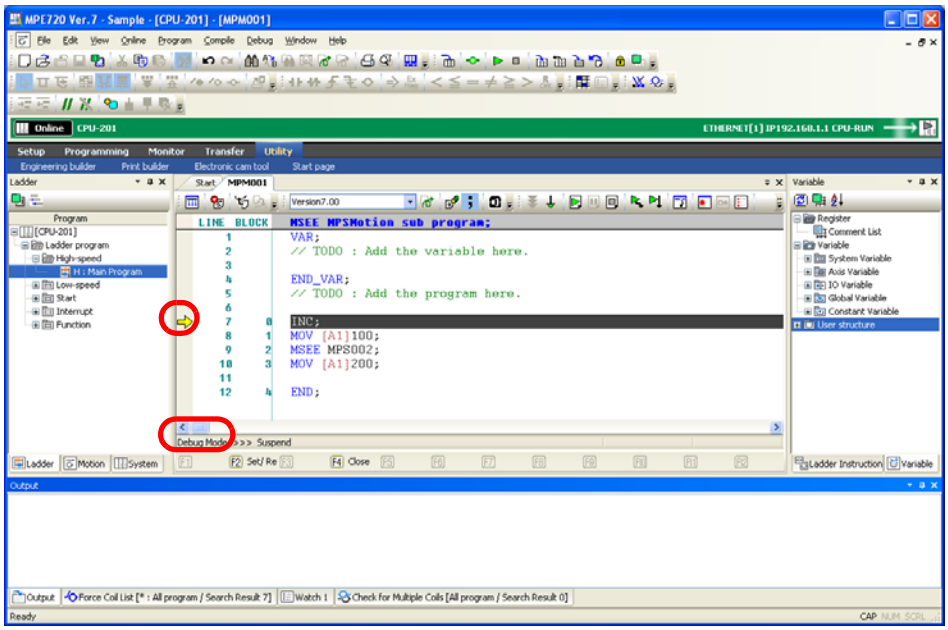
1. Open the motion program to debug.



2. Click the **Debug Mode** Button on the toolbar.



The Motion Program Editor will change to Debug Mode and an arrow will appear in front of the line that is about to be executed.

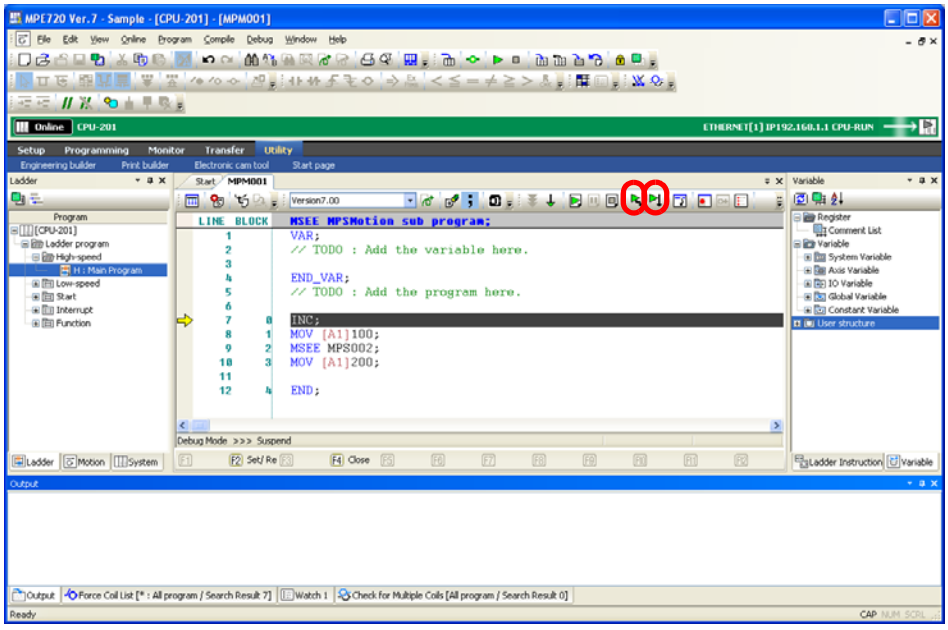


3. Click the **Step In** or **Step Over** Button.

Information

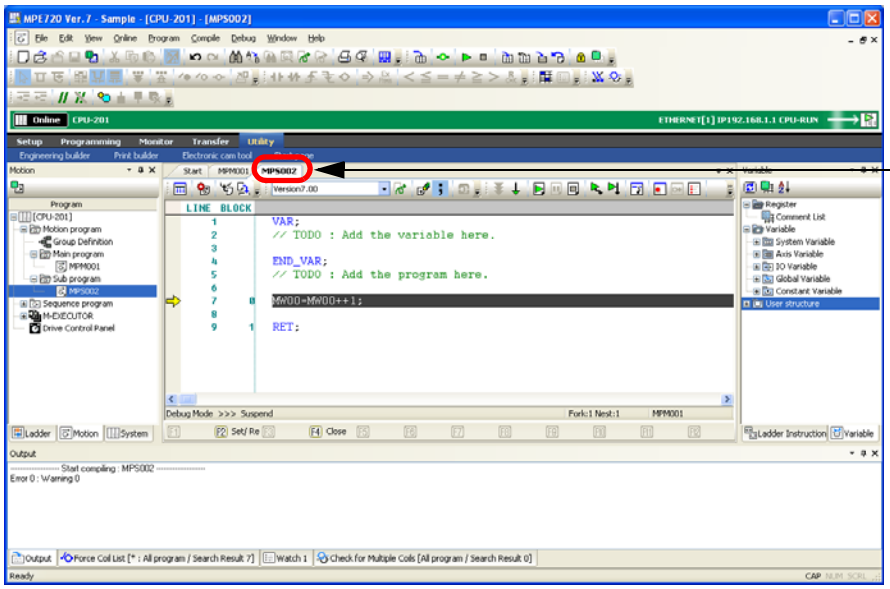
Differences between Step In and Step Over

- 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 Motion Editor opens and displays the specified subprogram and execution steps through each line from the beginning of the subprogram.



The tab displays the subprogram MPS002, which was specified by the MSEE instruction in the main program.

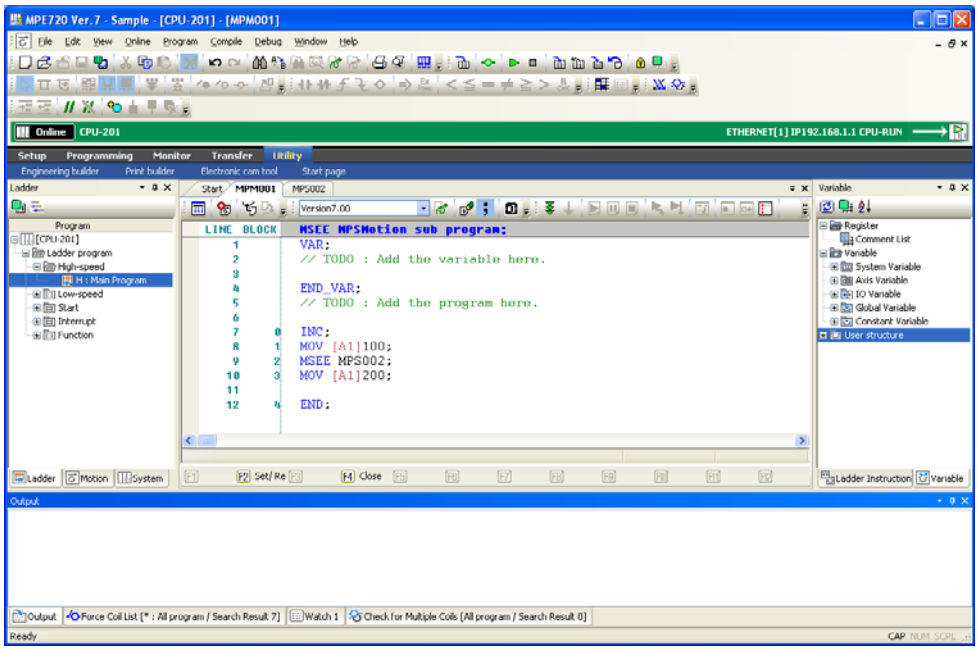
  Click the **Step In** Button until you have finished debugging the subprogram. When you have finished debugging the subprogram, execution will return to the main program.

This concludes the procedure.

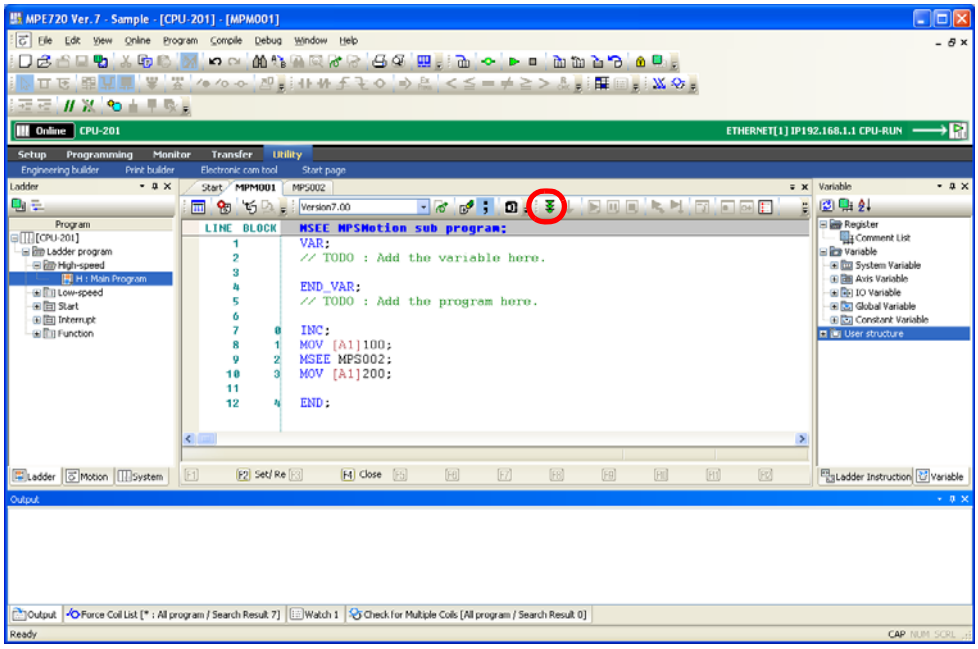
Setting Breakpoints

Use the following procedure to set breakpoints.

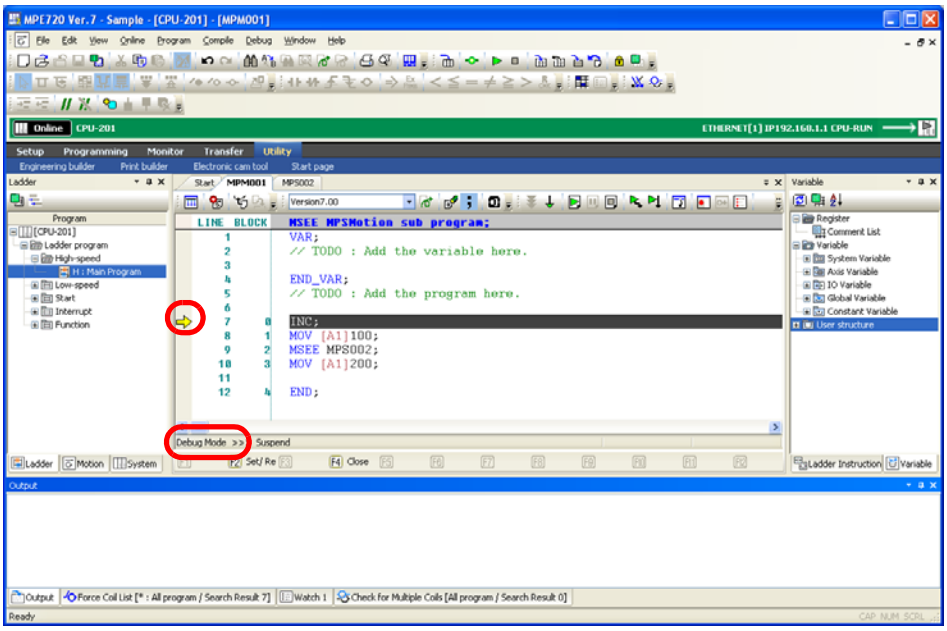
1. Open the motion program to debug.



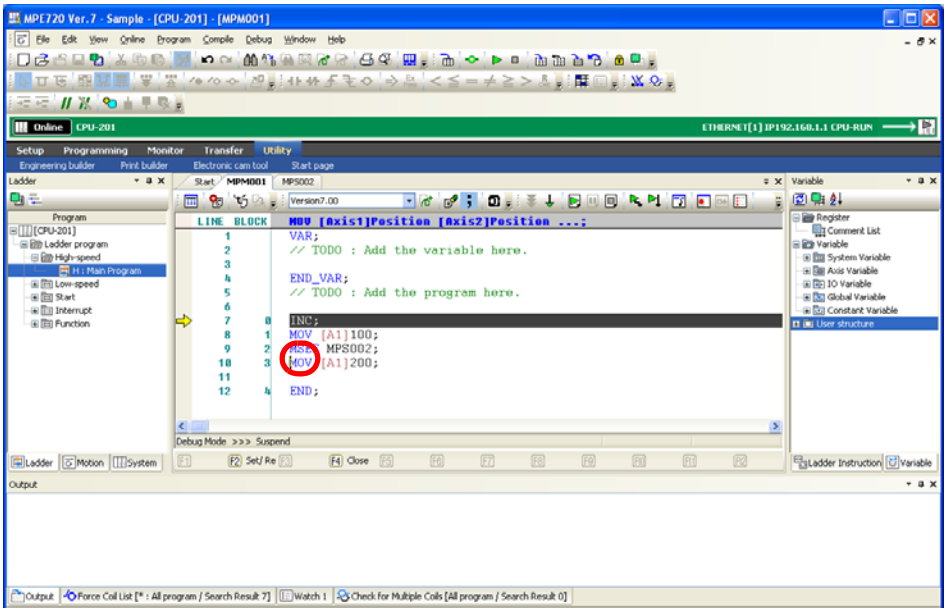
2. Click the **Debug Mode** Button on the toolbar.



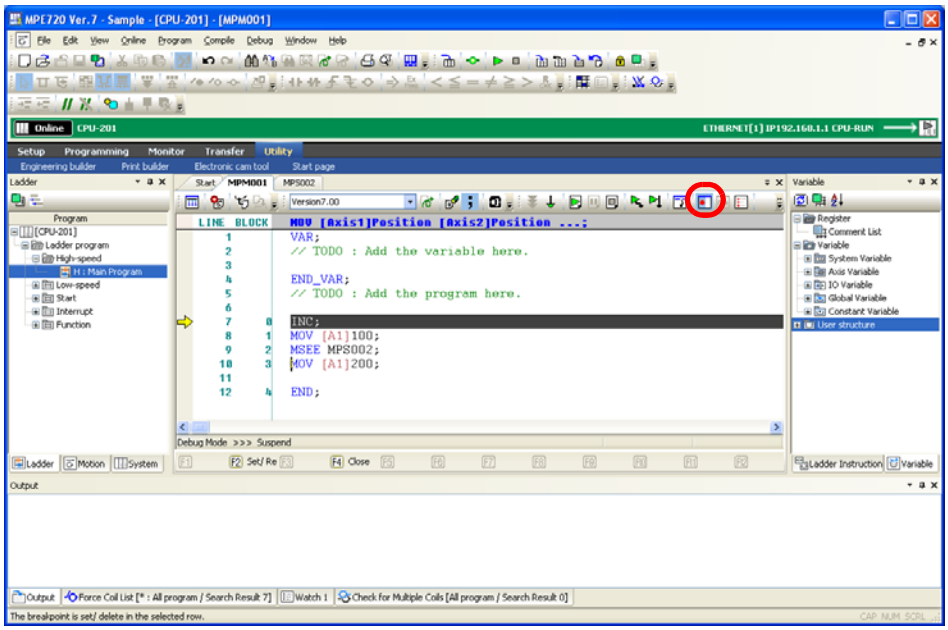
The Motion Program Editor will change to Debug Mode and an arrow will appear in front of the line that is about to be executed.



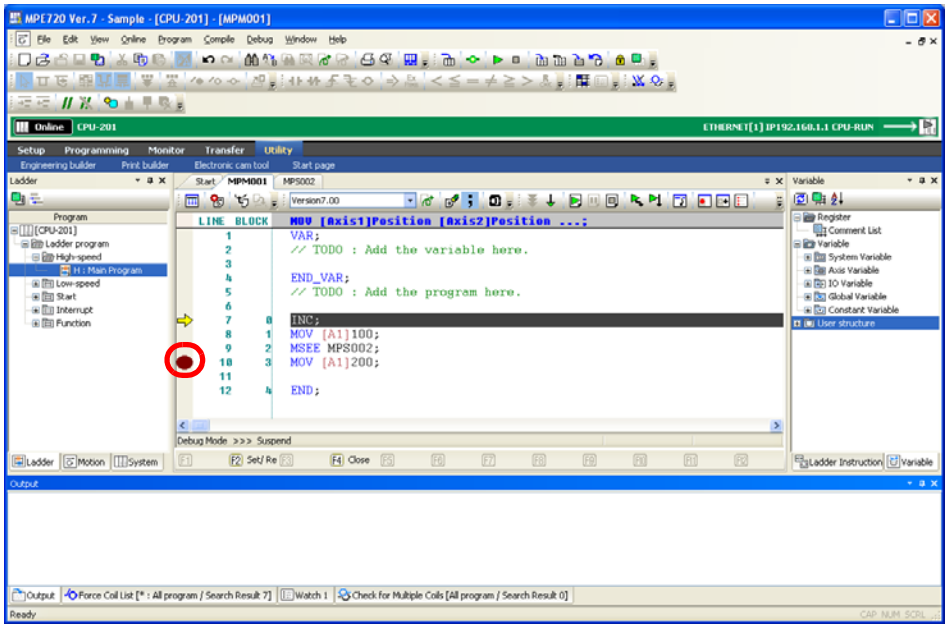
3. Move the cursor to the line at which to set a breakpoint.



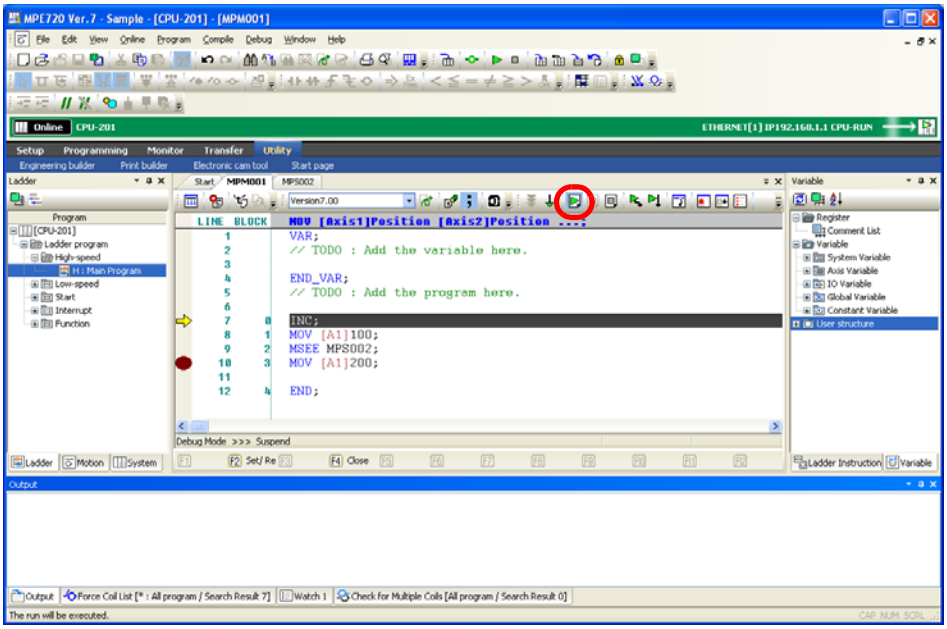
4. Click the **Set/Remove Breakpoint** Button.



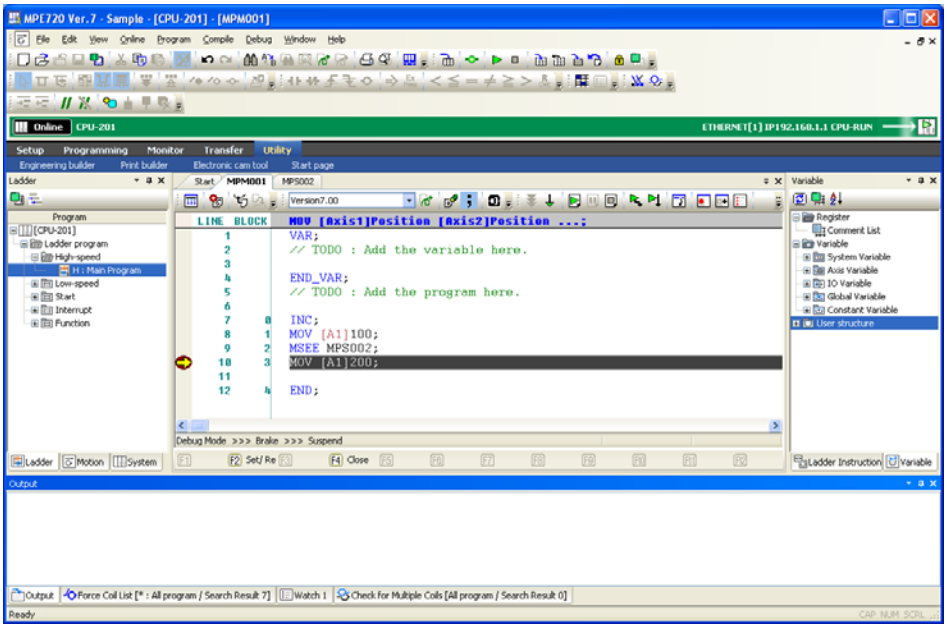
A red dot is displayed to indicate a breakpoint has been set.



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.

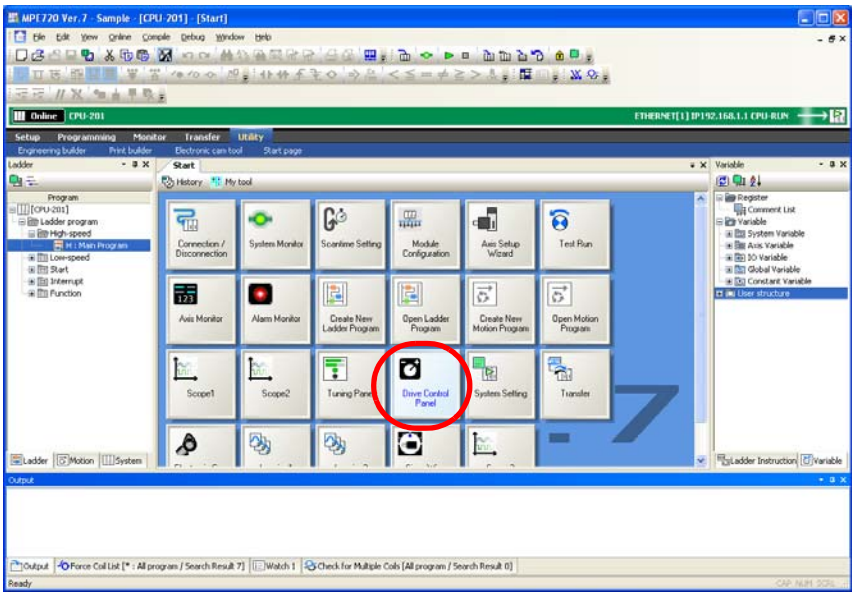
Monitoring the Execution Status and Control Signal Status

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 Tab Page.

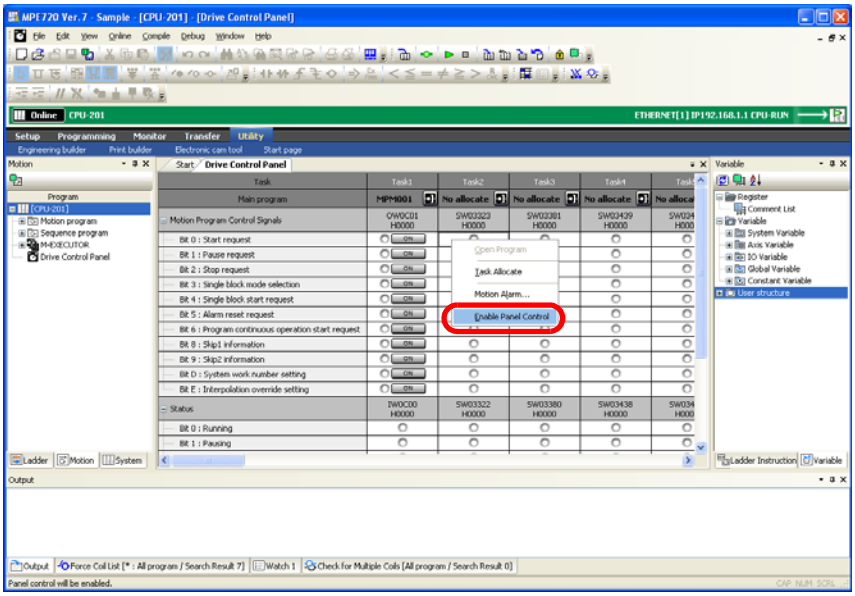


The Drive Control Panel Tab Page will be displayed.

2. Monitor the execution status and control signal status of a motion program that is assigned in the M-EXECUTOR.

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.

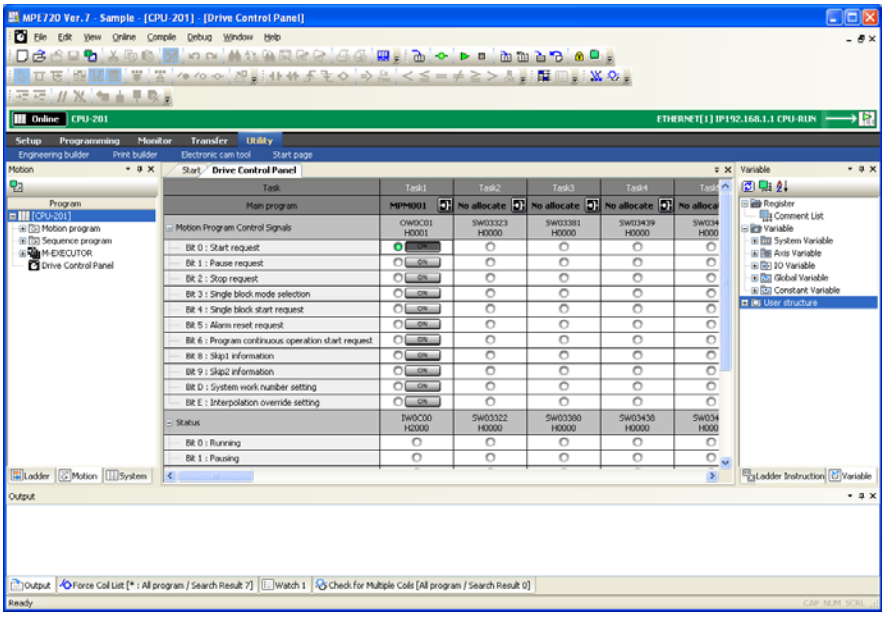
3. Right-click on the Drive Control Panel Tab Page and select ***Enable Panel Control***.



The controls on this panel will be enabled.

4. Use the ON or ON Button to set the state of the control signals.

- ON: Control signal ON
- ON: Control signal OFF

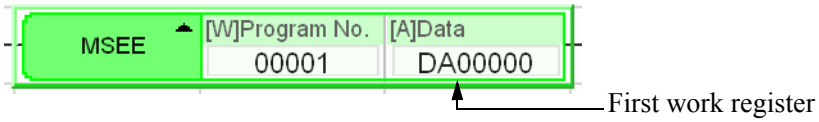


This concludes the procedure.

Using a Ladder Program

Use the following procedure to monitor the execution status of a motion program that is called from a ladder program, and the status of the control signals.

This procedure will be described with the work register set to DA00000 as an example.

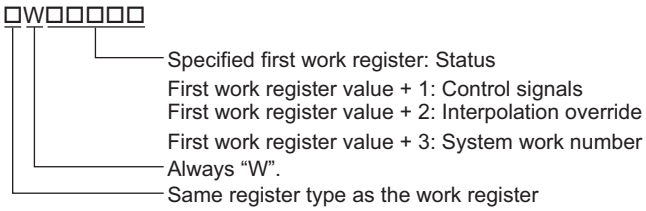


Information

Structure of Work Registers

Work registers consist of four word registers. Information in 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

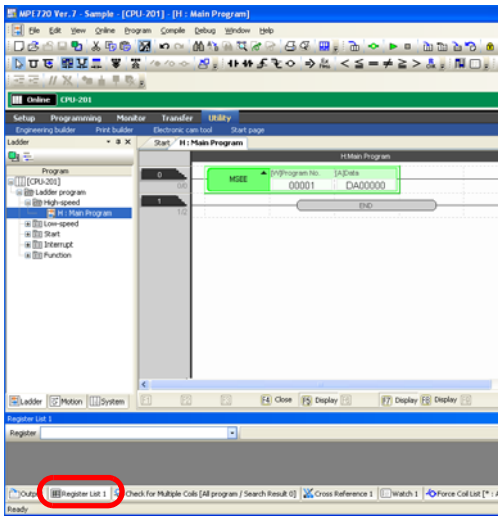
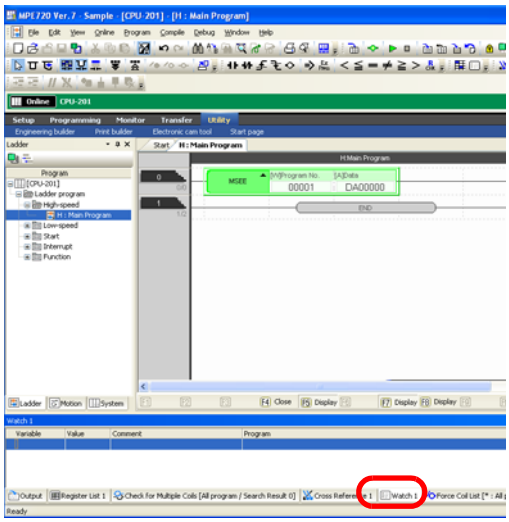
DW00000: Status
DW00001: Control signals
DW00002: Interpolation override
DW00003: System work number

Example

Work Register Set to MA01015

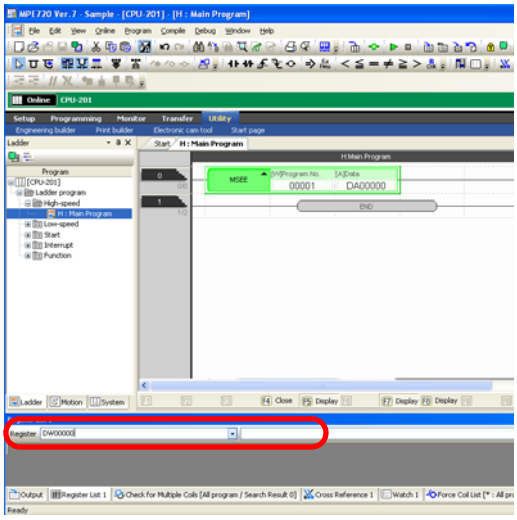
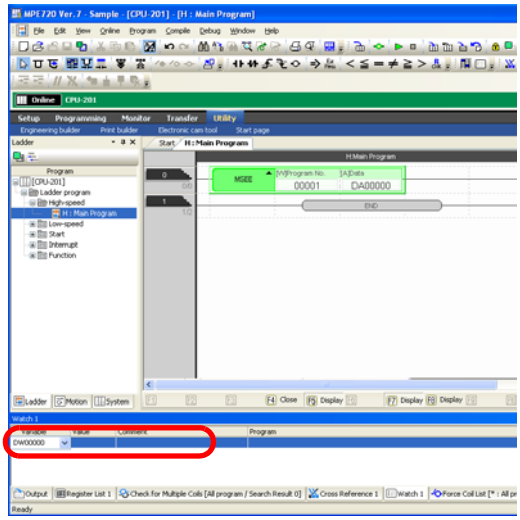
MW01015: Status
MW01016: Control signals
MW01017: Interpolation override
MW01018: System work number

1. Click the **Register List 1** Tab or the **Watch 1** Tab.

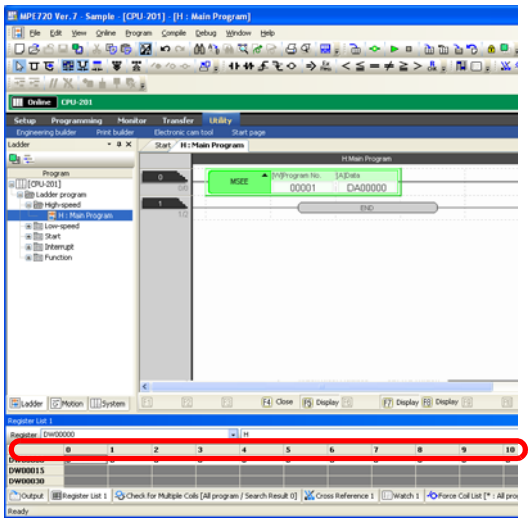
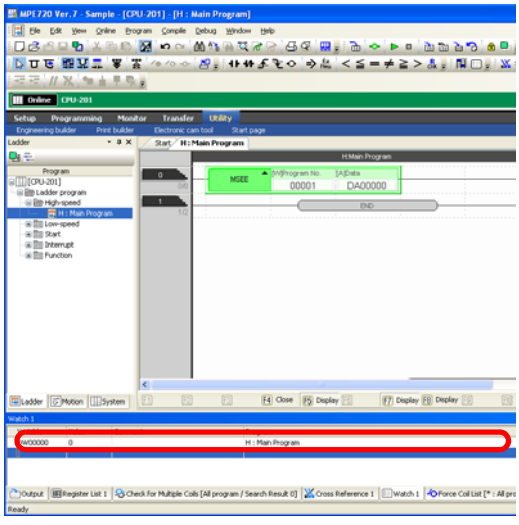
The Register List Pane or Watch Pane will be displayed.

2. Enter the register address for the status.

3. Press the **Enter** Key.

The status will be displayed.

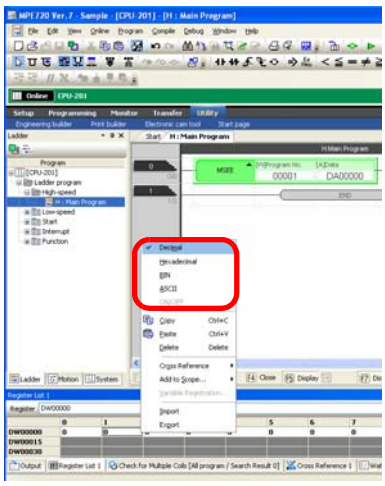



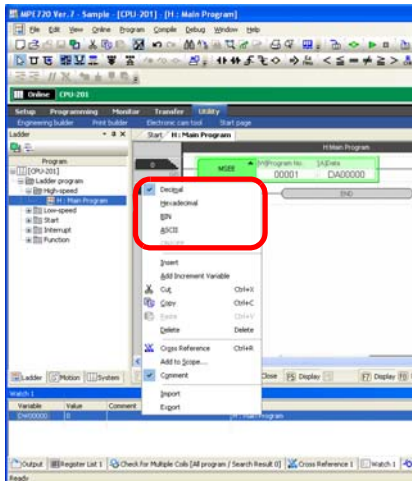
Information

Refer to the following manual for details on how to interpret the displayed information.

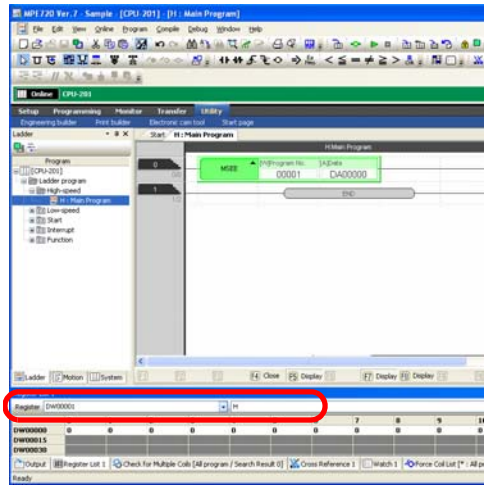
MP3000 Series Motion Programming User's Manual (Manual No.: SIEP C880725 14)

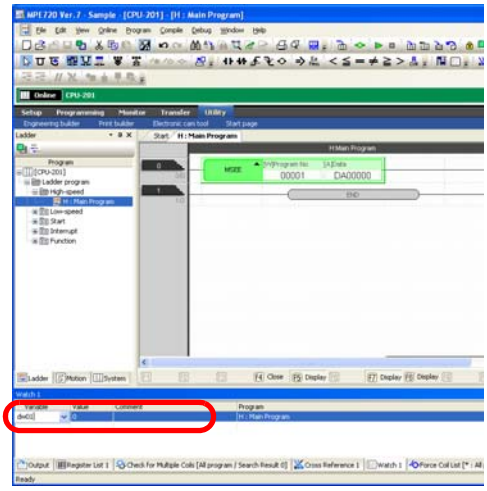
Information To change the display format, right-click in the pane and click the desired format from the menu.





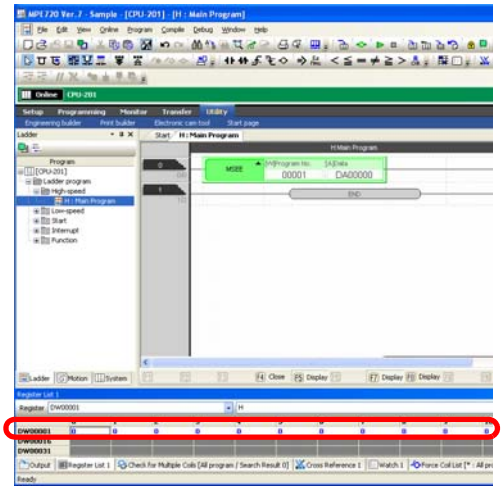
4. Enter the register address for the control signals.

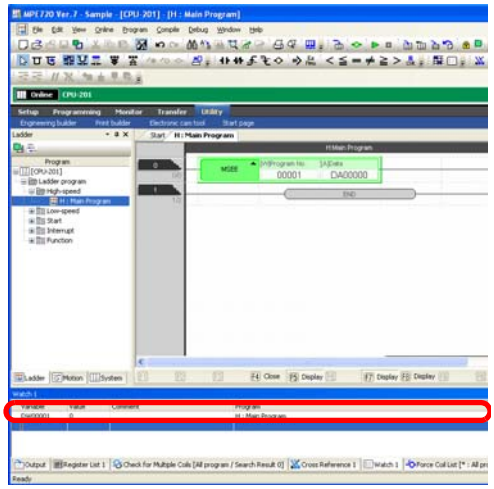




5. Press the **Enter** Key.

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)

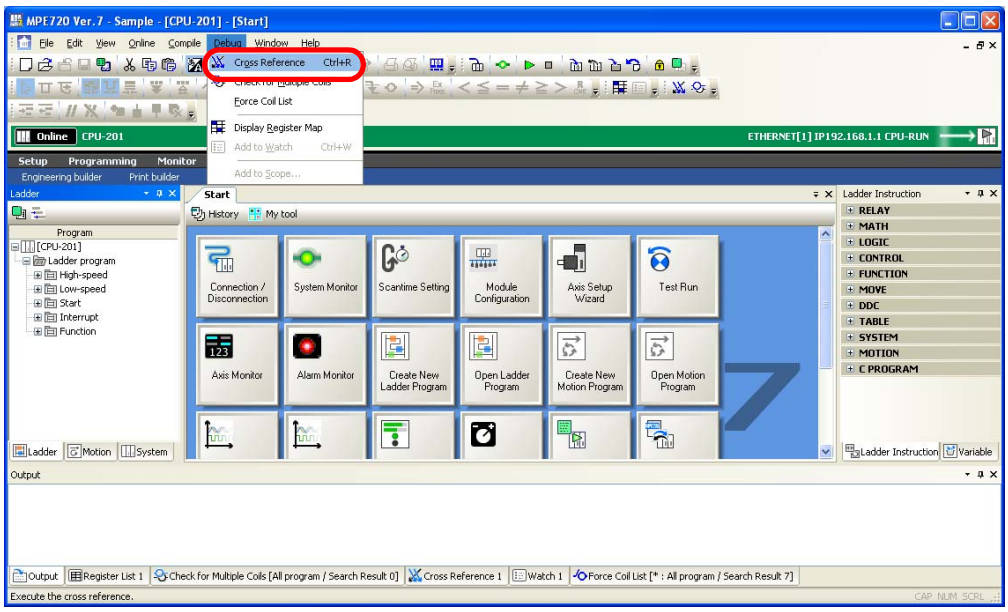
Information Refer to the information given in step 3 to change the display format.

This concludes the procedure.

5.5 Searching for Registers Used In a Drawing

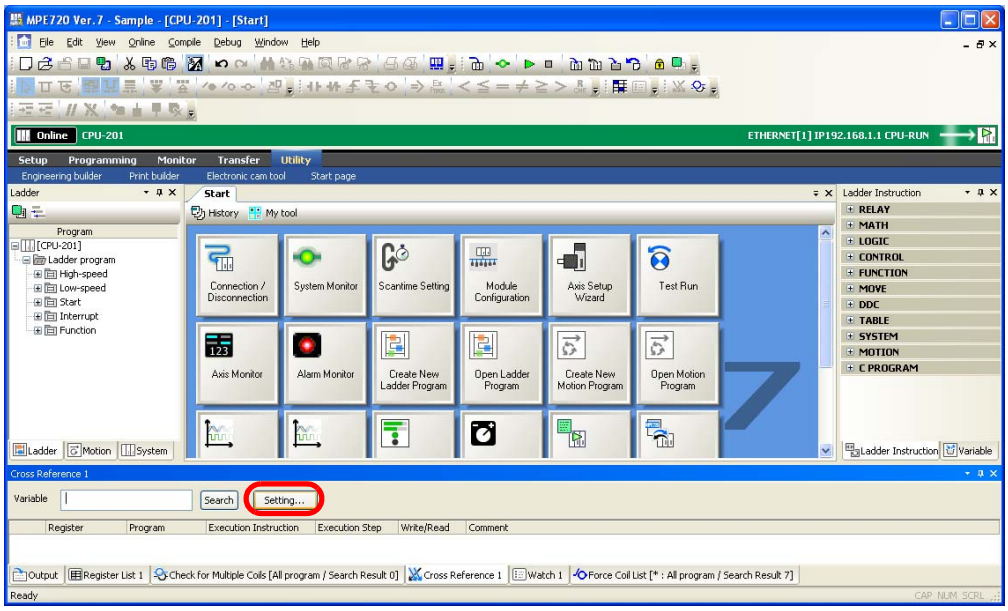
Cross referencing is used to search the registers that are used in ladder programs or motion programs. Use the following procedure.

1. Select ***Debug*** – ***Cross Reference*** from the menu bar.



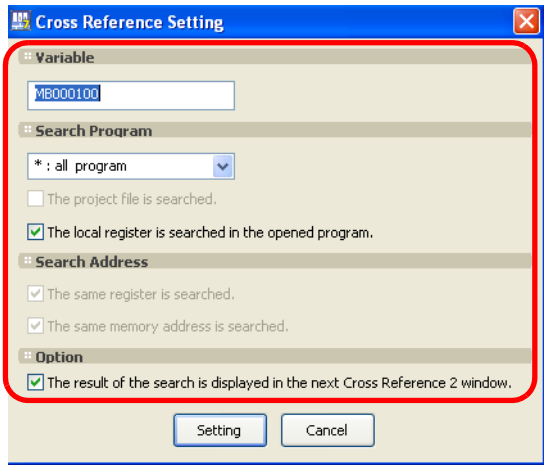
The Cross Reference 1 Pane will be displayed.

2. Click the **Setting** Button.

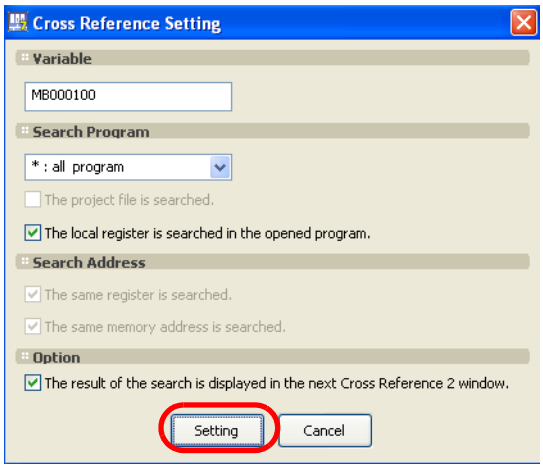


The Cross Reference Setting Dialog Box will be displayed.

3. Set the conditions.

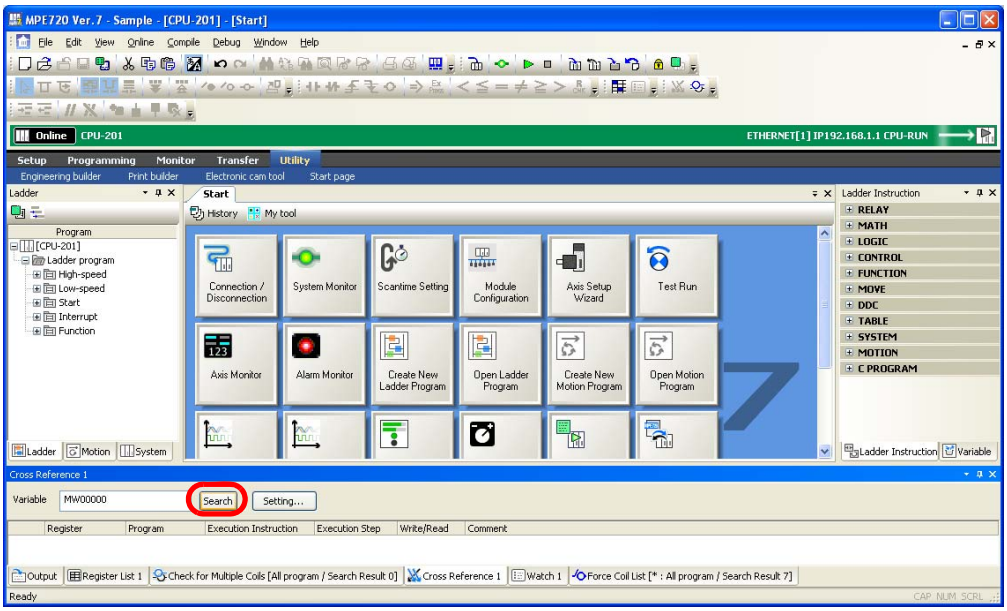


4. Click the **Setting** Button.

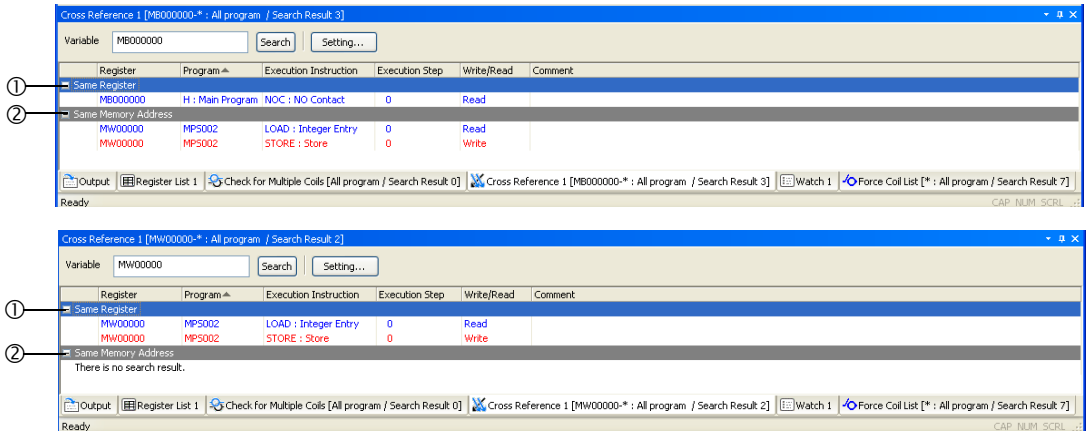


The Cross Reference Setting Dialog Box will close, and the settings will be displayed in the Cross Reference 1 Pane.

5. Click the **Search** Button.



The search will be executed, and the search results will be displayed in the Cross Reference 1 Pane.



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 registers like these.

This concludes the procedure.

Information

Searching for Registers Using Shortcut Keys

Click the register to search for in the Ladder Editor 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.

5.6 Replacing Registers

This section gives the procedures that are used to replace registers in ladder programs and motion programs.

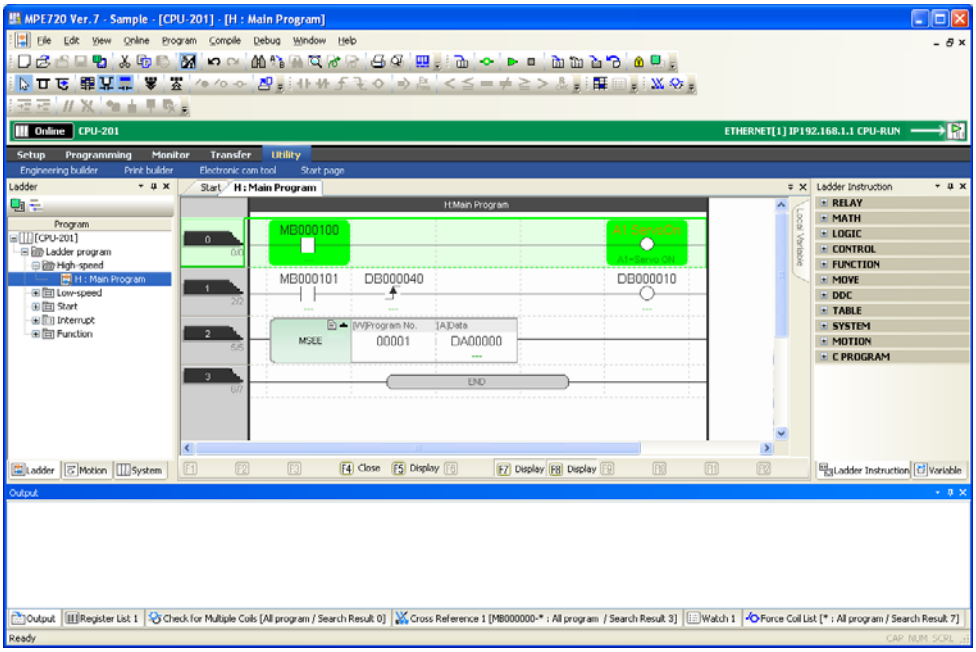
There are the following two methods that you can use to replace registers.

- Replacing within a program: All occurrences of the register within the program that is currently open in the Ladder Editor 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.

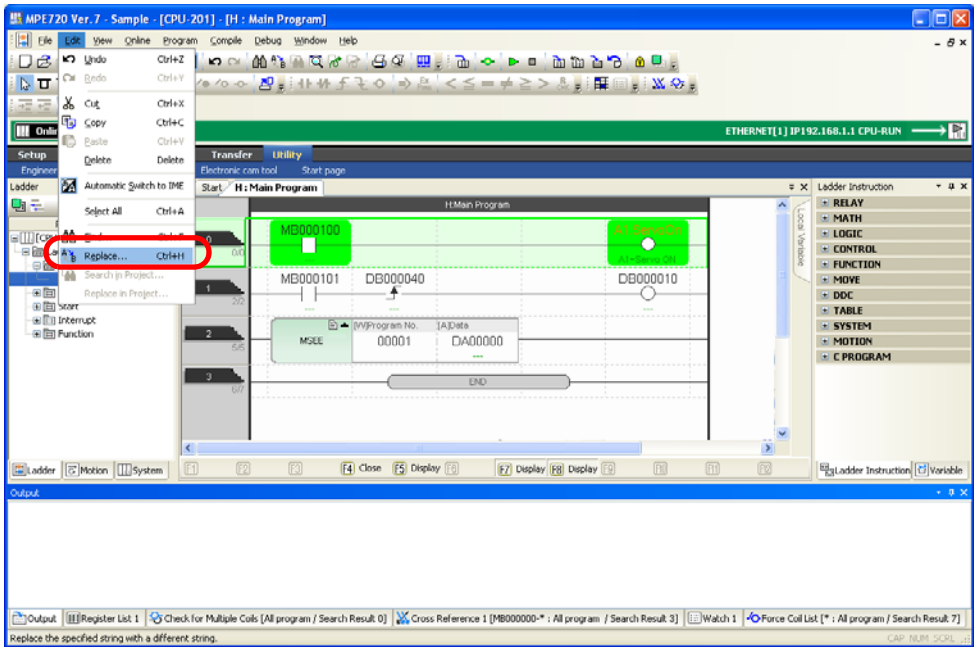
The procedures are given below.

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.

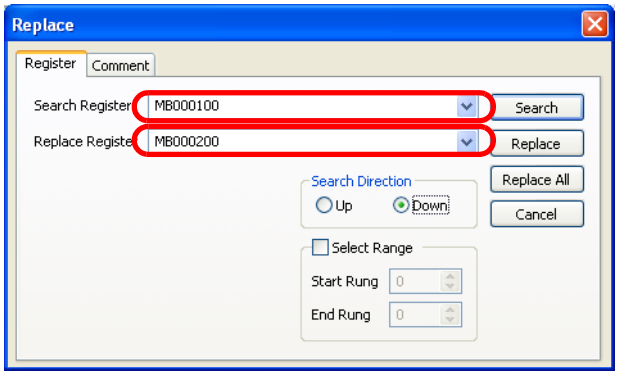


3. Select ***Edit*** – ***Replace*** from the menu bar.

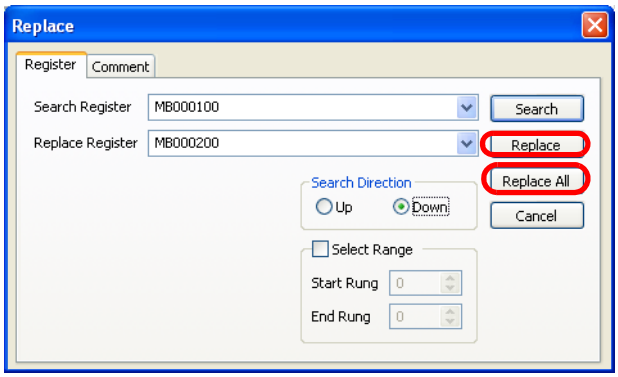


The Replace Dialog Box will be displayed.

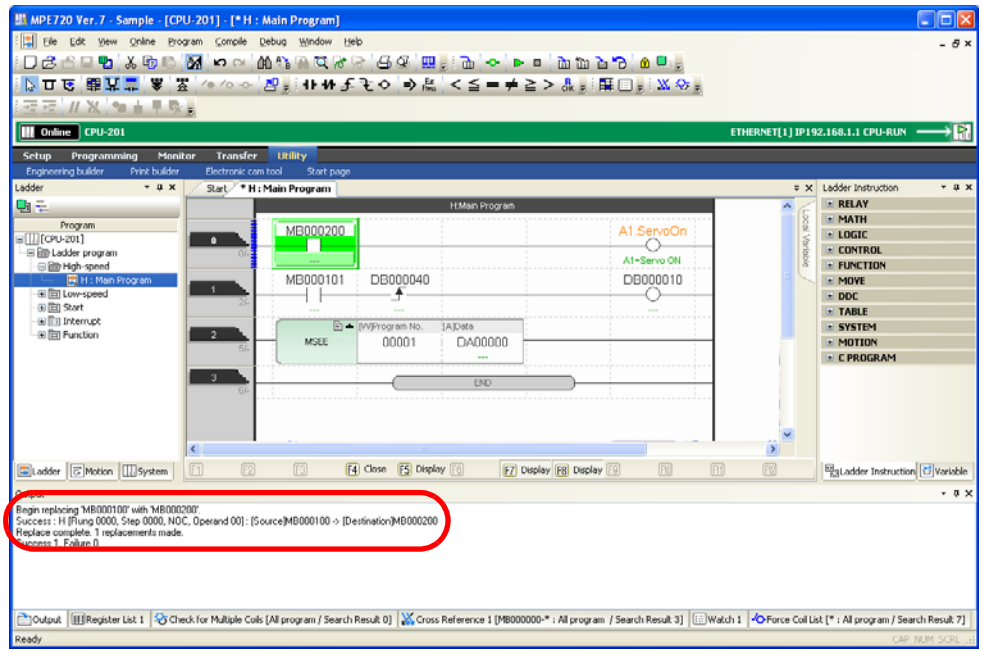
4. Enter the registers in the **Search Register** and **Replace Register** Boxes.



5. Click the **Replace** or **Replace All** Button to perform the replacement.



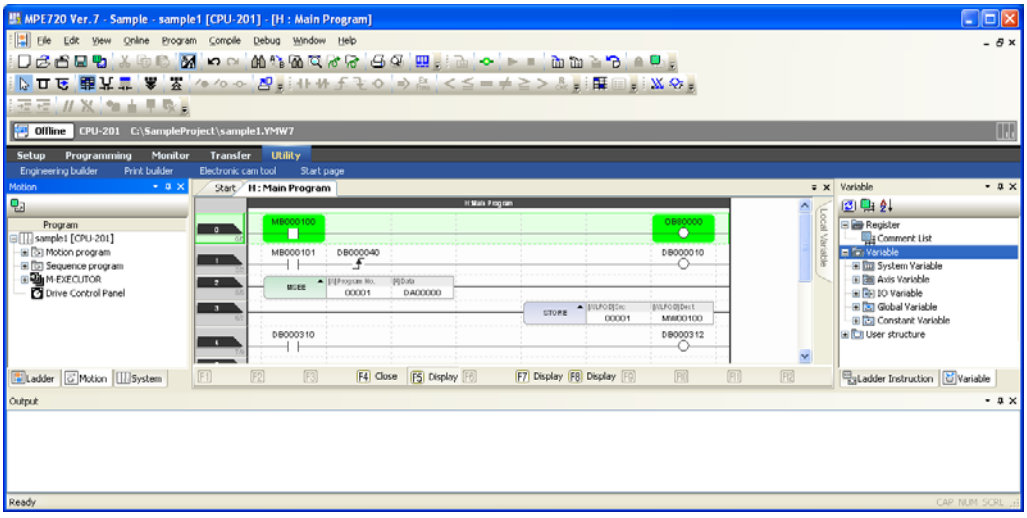
The registers will be replaced and the replacement results will be displayed in the Output Pane.



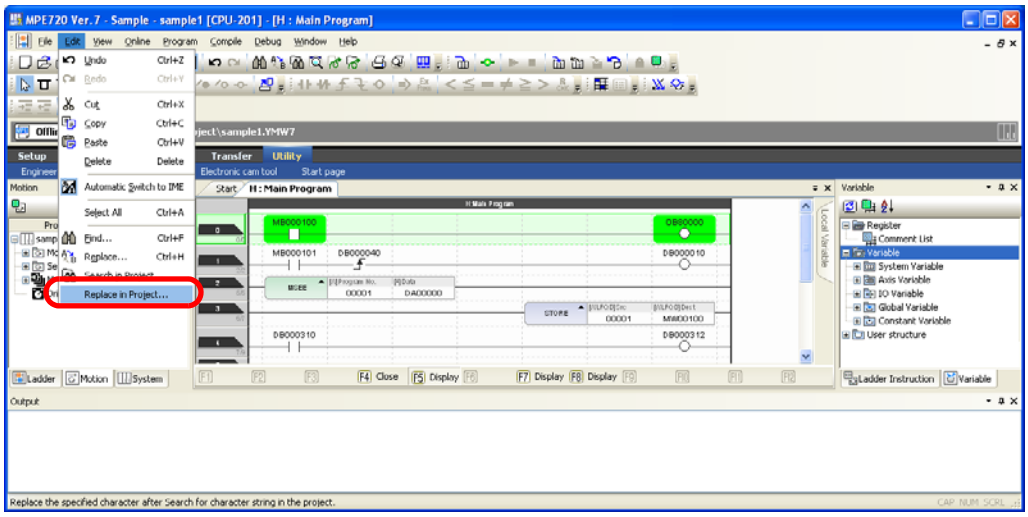
This concludes the procedure.

Replacing in the Project

1. Display the project file that contains the registers to replace.

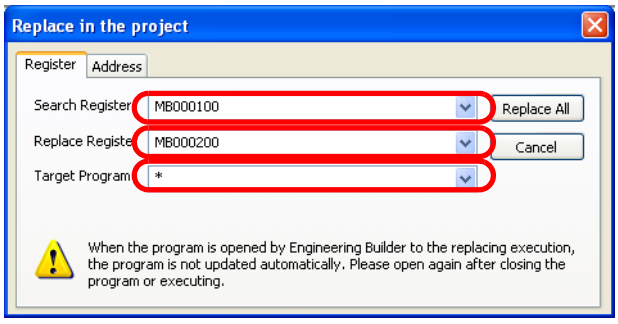


2. Select ***Edit*** – ***Replace in Project*** from the menu bar.

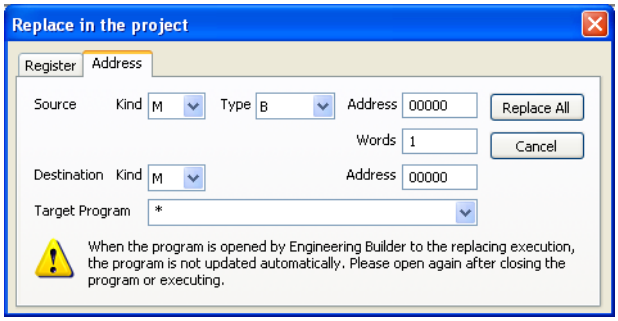


The Replace in the Project Dialog Box will be displayed.

3. Enter the registers and program in the **Search Register**, **Replace Register**, and **Target Program** Boxes.



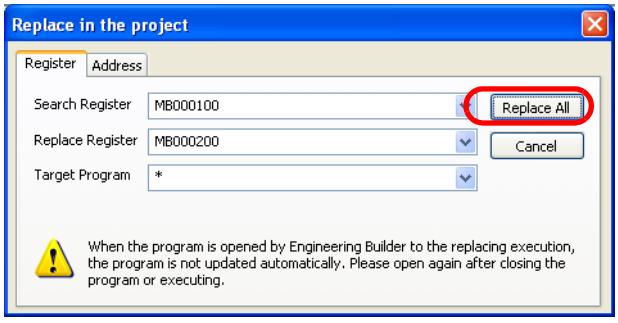
Information The Address Tab Page allows you to replace multiple addresses at the same time.



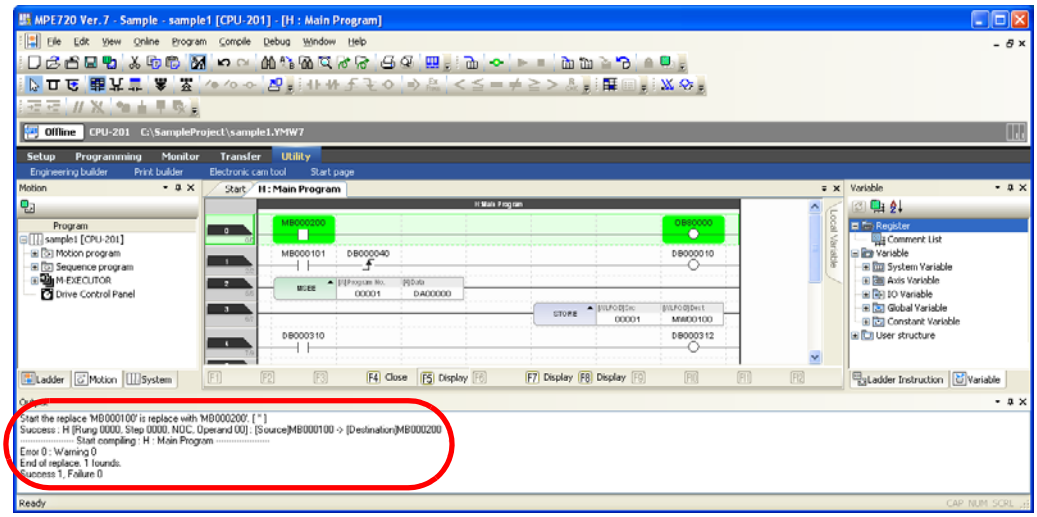
Refer to the following manual for details.

📖 *MP2000/MP3000 Series Machine Controller System Setup Manual* (Manual No.: SIEP C880725 00)

4. Click the **Replace All** Button.



All registers in the target programs will be replaced and the results will be displayed in the Output Pane.



This concludes the procedure.

5.7 Monitoring the Current Values and Checking the Usage of Registers

There are the following two methods that you can use to monitor the current values and check the usage of registers.

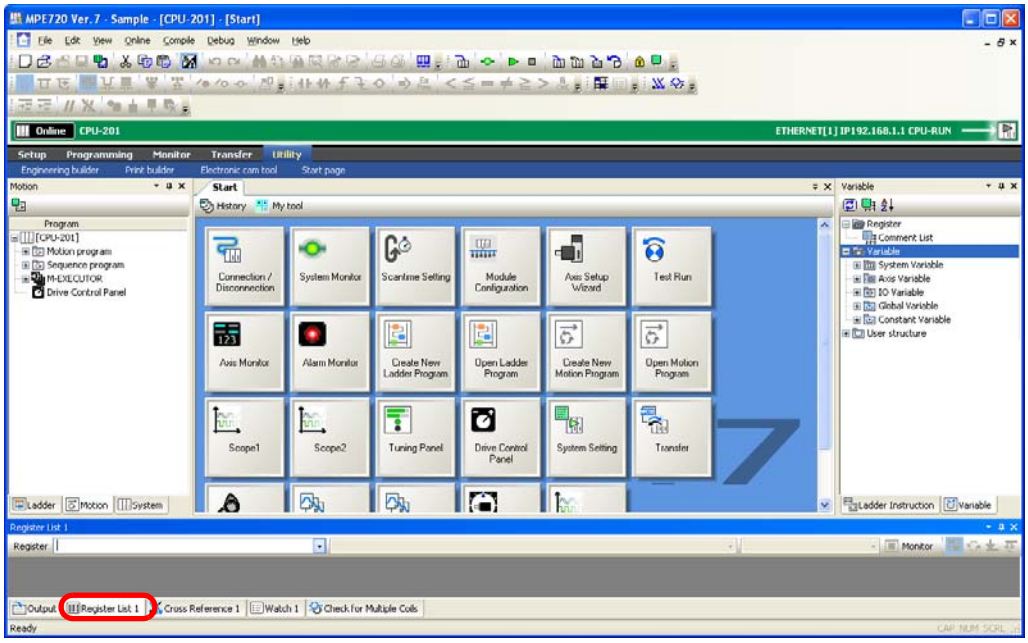
- Monitoring in the Register List Pane
- Monitoring in the Watch Pane (This allows you to monitor the values in registers with different register types and data types at the same time.)

The procedures are given below.

Monitoring in the Register List Pane

Use the following procedure to monitor the current values and check the usage of registers in the Register List Pane.

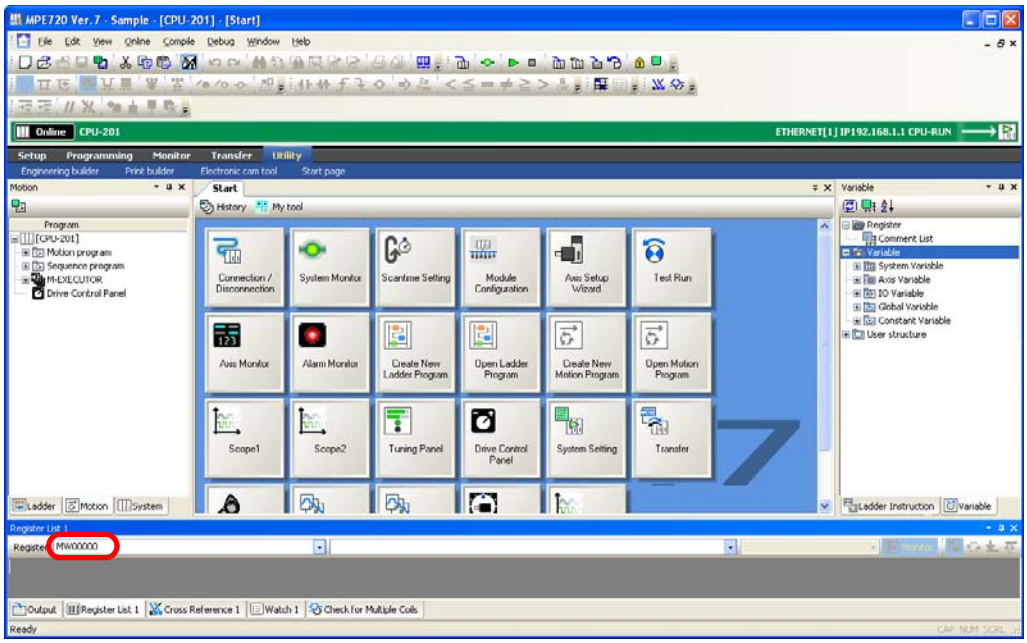
1. Connect to the Machine Controller.
2. Click the **Register List 1** Tab.



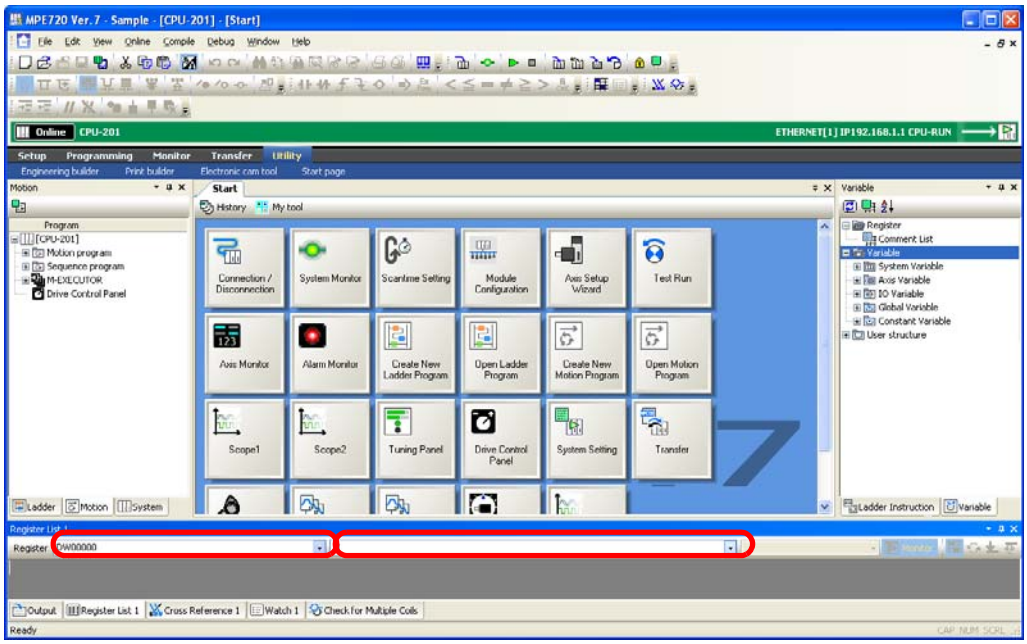
The Register List Pane is displayed.

3. Enter the following information.

- For a global register: Register address

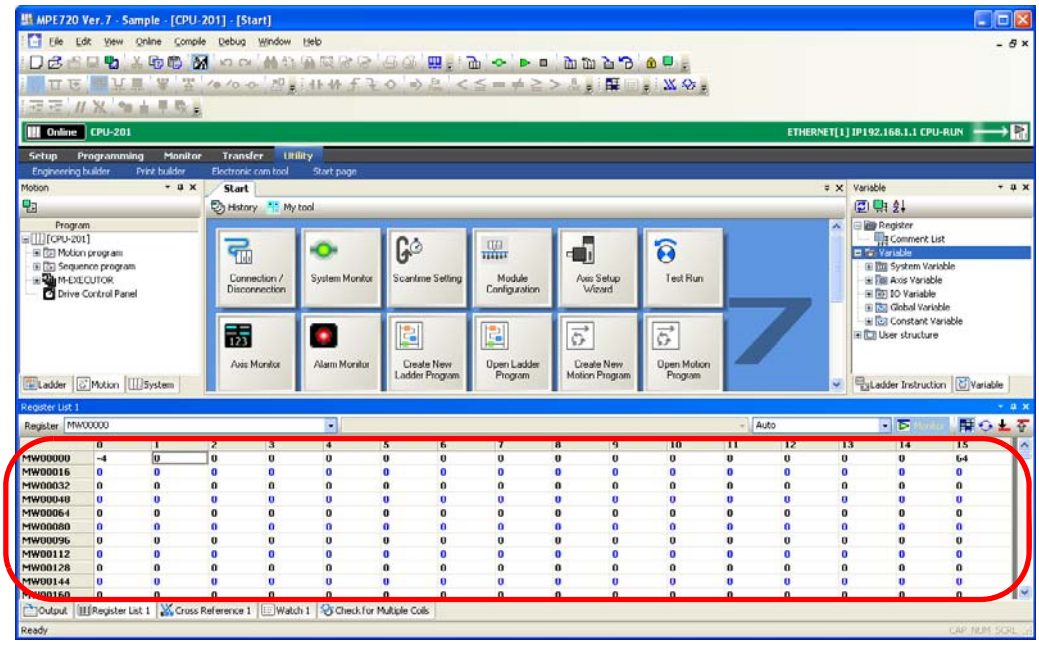


- For a local register: Register address and program name

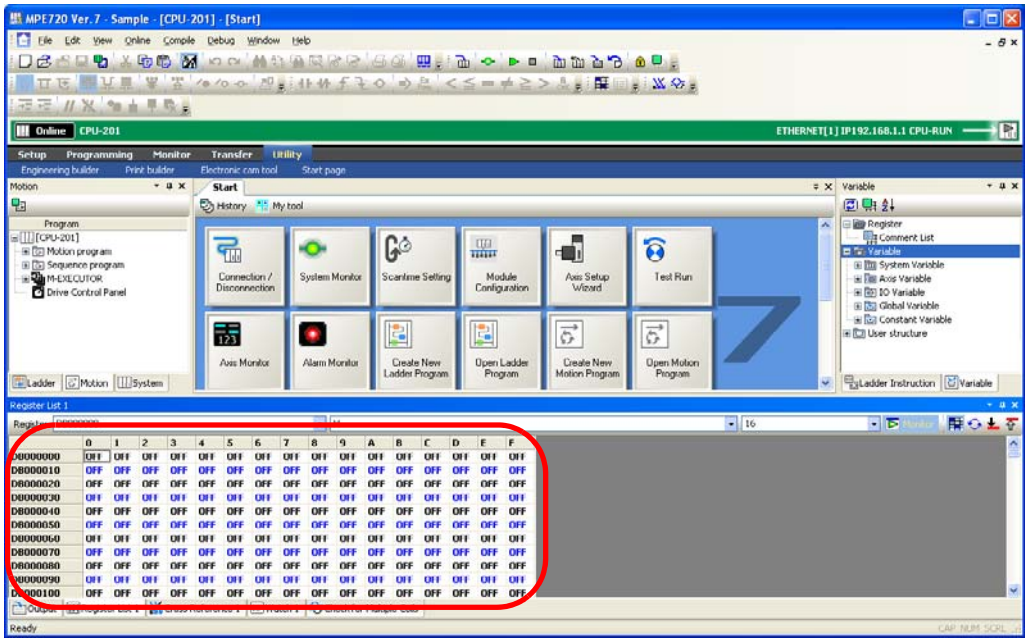


The current values and usage will be displayed in the Register List Pane.

- Global Registers



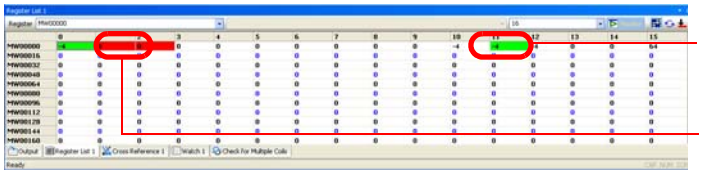
- Local Registers



This concludes the procedure.

Information

Interpreting the Register List

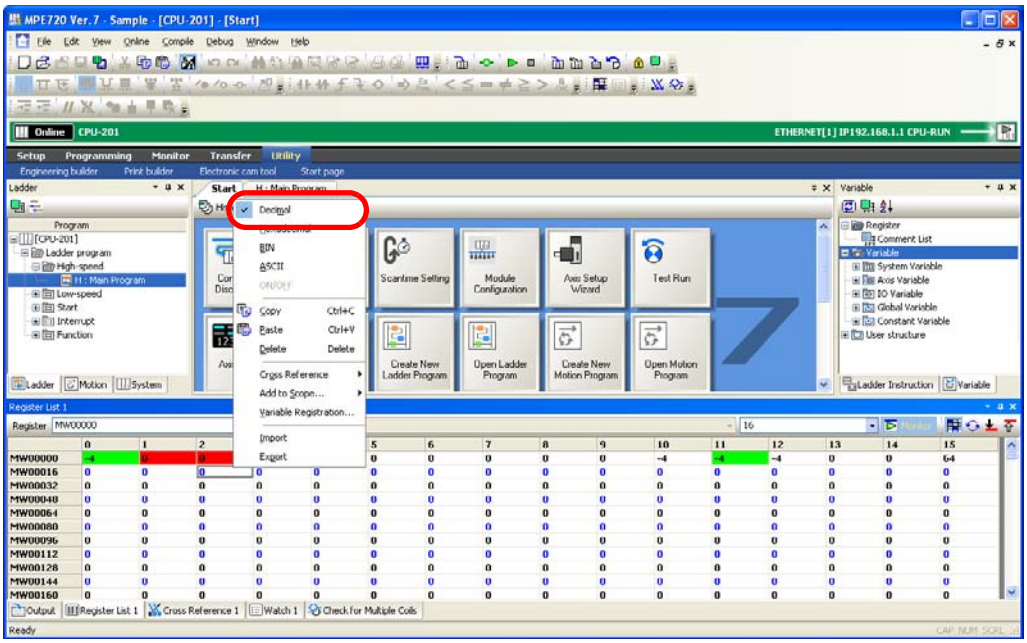


Green cells: Indicate registers that are used in a ladder program.

Red cells: Indicate registers that use the same memory address as another register.

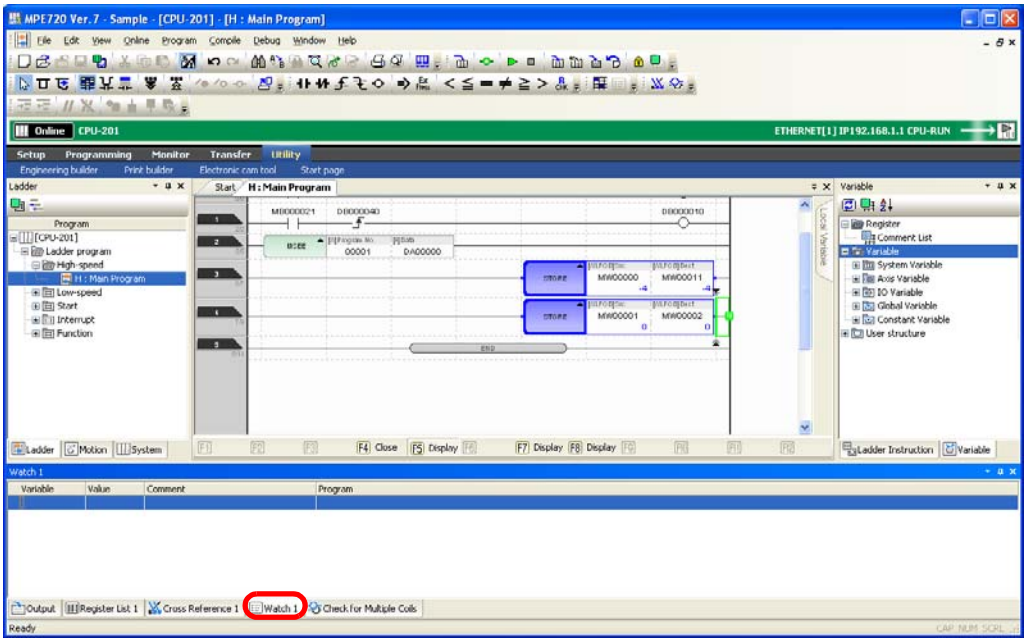
Information

To switch the display format to decimal or hexadecimal, right-click in the Register List Pane and select the desired format.



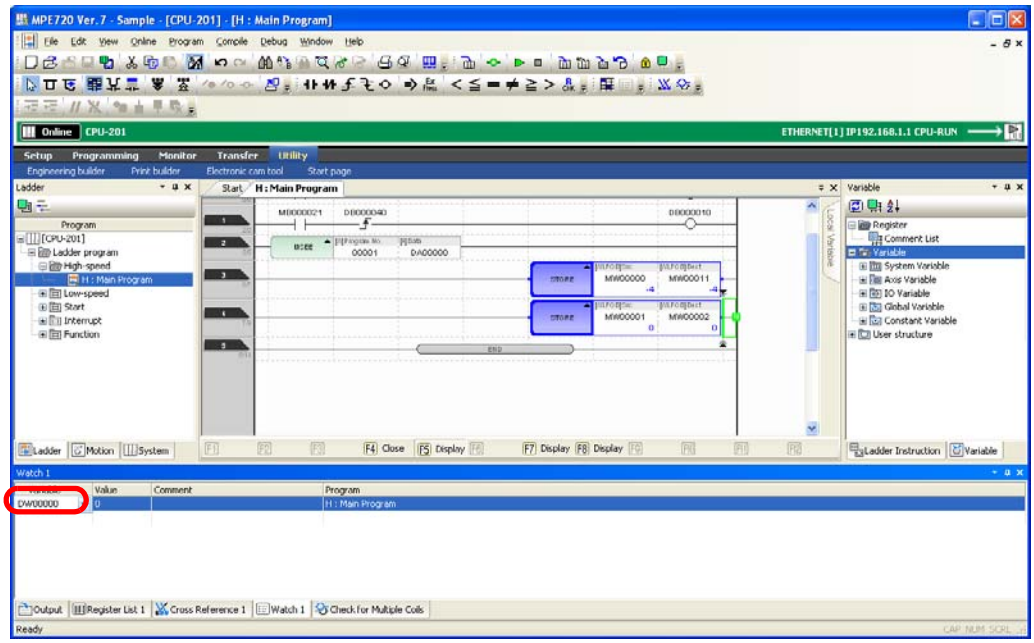
Monitoring in the Watch Pane

1. Connect to the Machine Controller.
2. Click the **Watch 1** Tab.

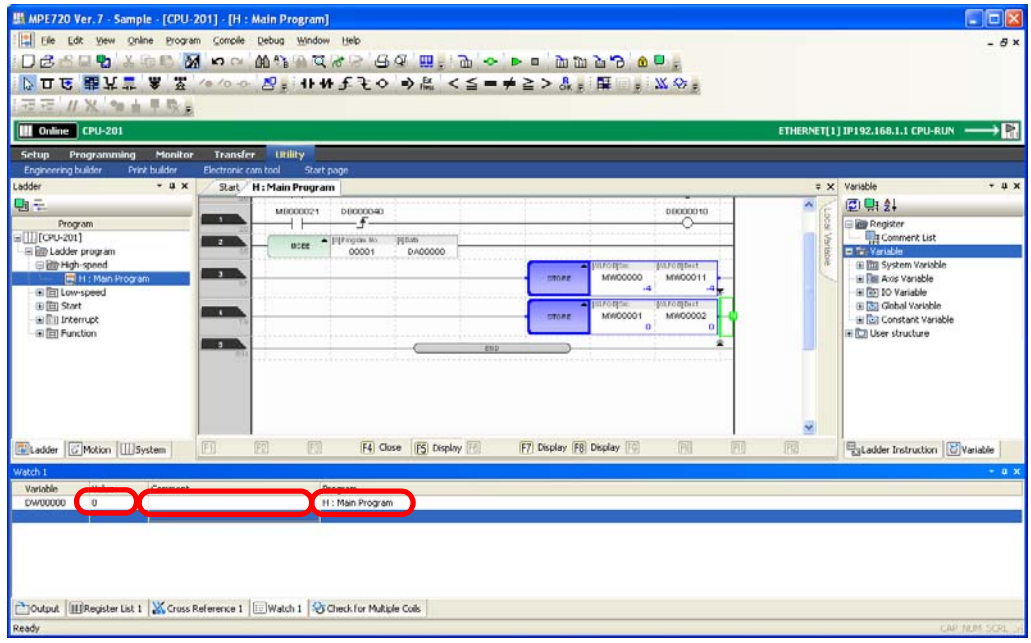


The Watch Pane is displayed.

3. Enter the variables or registers to monitor in the **Variable** Column.



4. Press the **Enter** Key.
Information will be displayed in the **Value**, **Comment**, and **Program** Columns.



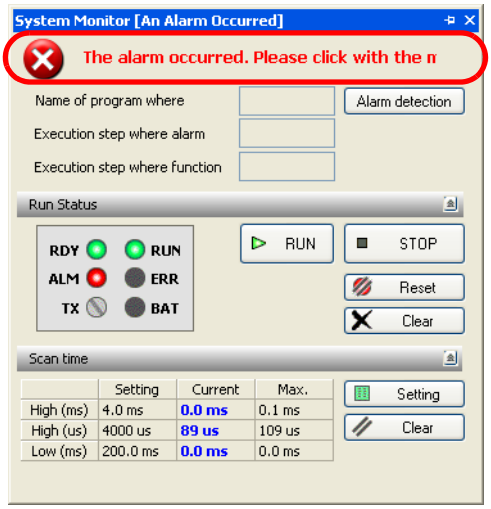
This concludes the procedure.

5.8 Locating a Drawing with an Operation Error

This section gives the procedure for using the system monitor to locate a drawing where an operation error has occurred during program execution.

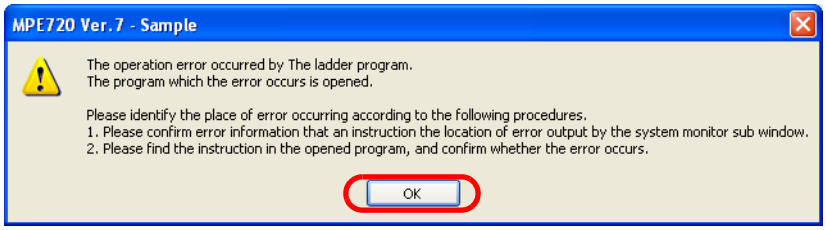
When an operation error occurs, the System Monitor Dialog Box will be displayed.

1. Click the message “The alarm occurred. Please click with the...” on the System Monitor Dialog Box.

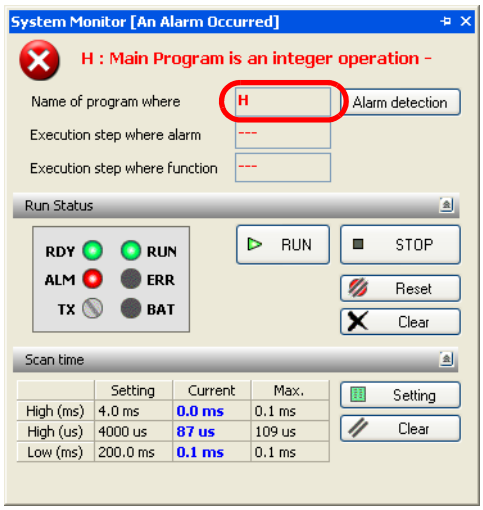


The MPE720 Ver. 7 Dialog Box will be displayed.

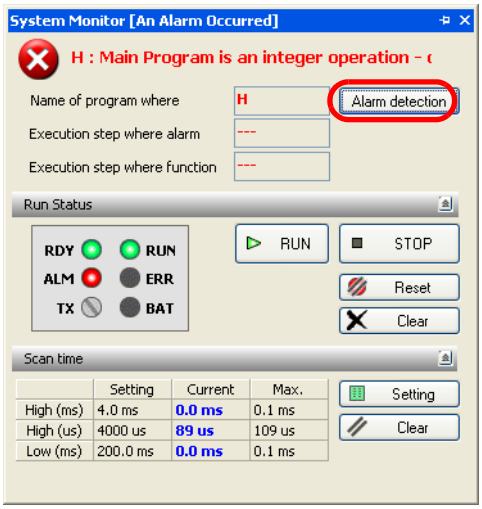
2. Click the **OK** Button.



The **Name of program where** Box shows the name of the program where the alarm occurred.

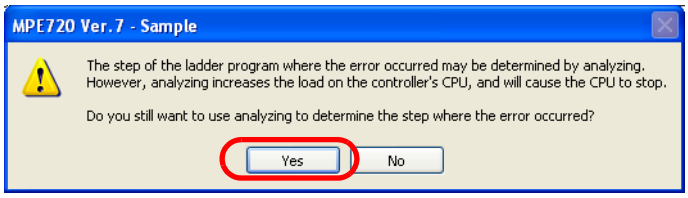


3. Click the **Alarm detection** Button.

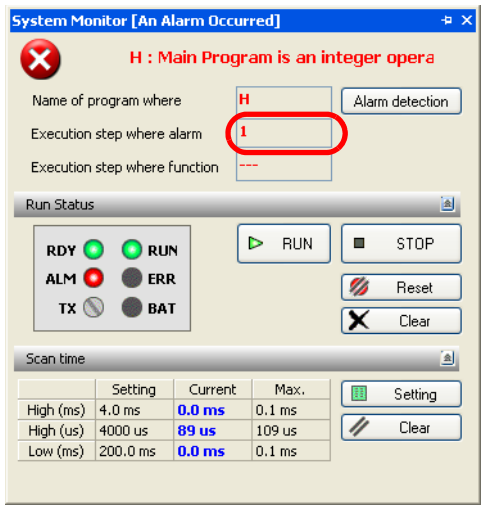


The MPE720 Ver. 7 Dialog Box will be displayed.

4. Click the **Yes** Button.



The **Execution step where alarm** Box shows the step number where the alarm occurred.

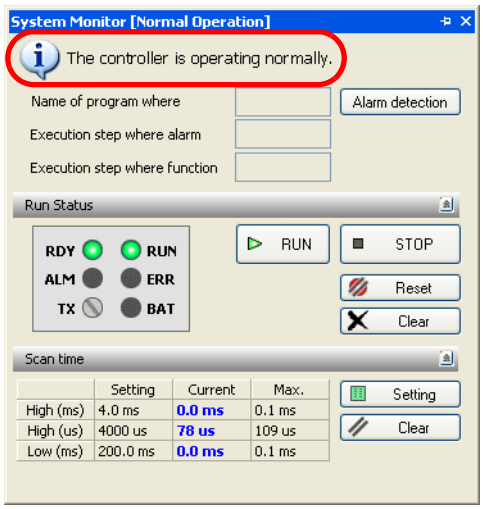


5. Use the information in the **Name of program where** and **Execution step where alarm** Boxes to locate the drawing where the operation error occurred.

6. Resolve the numerical 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)

7. Make the Ladder Editor Tab Page the active view and press the **F4** Key.
The program will be compiled.

8. Make sure that “The controller is operating normally” is displayed in the System Monitor Dialog Box.

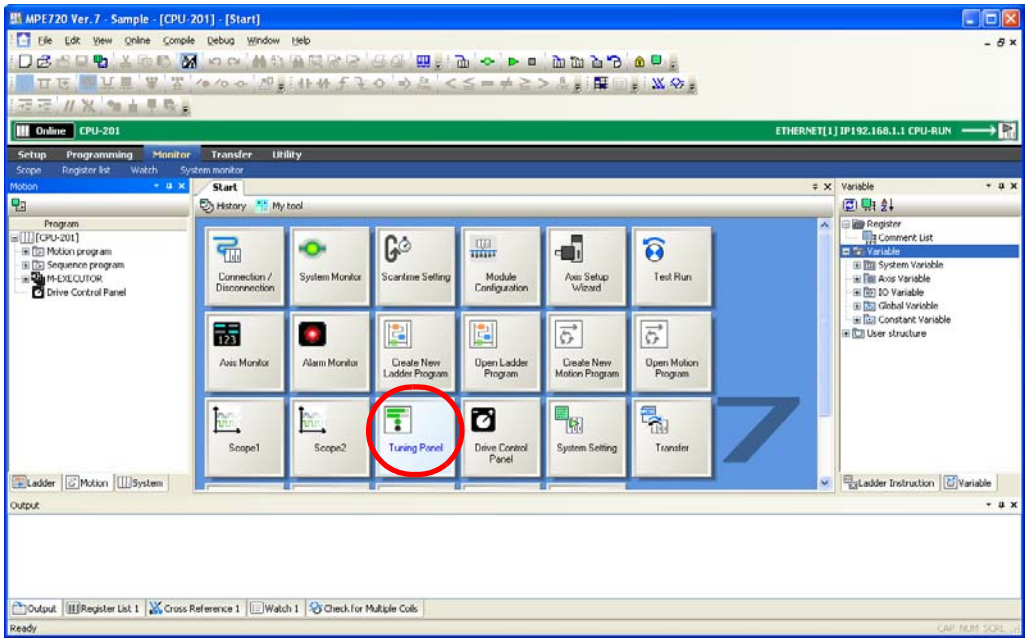


This concludes the procedure.

5.9 Displaying and Adjusting only Specific Registers

Use the following procedure to display and adjust specified registers by using the Tuning Panel Tab Page.

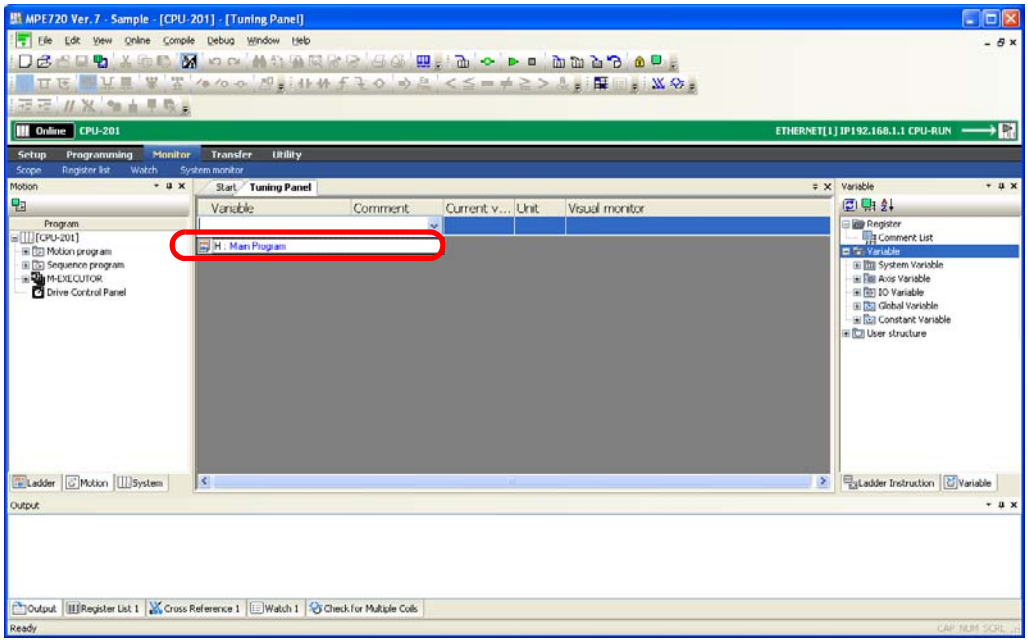
1. Connect to the Machine Controller. Or, open a project file.
2. Click the **Tuning Panel** Button on the My Tool Tab Page.



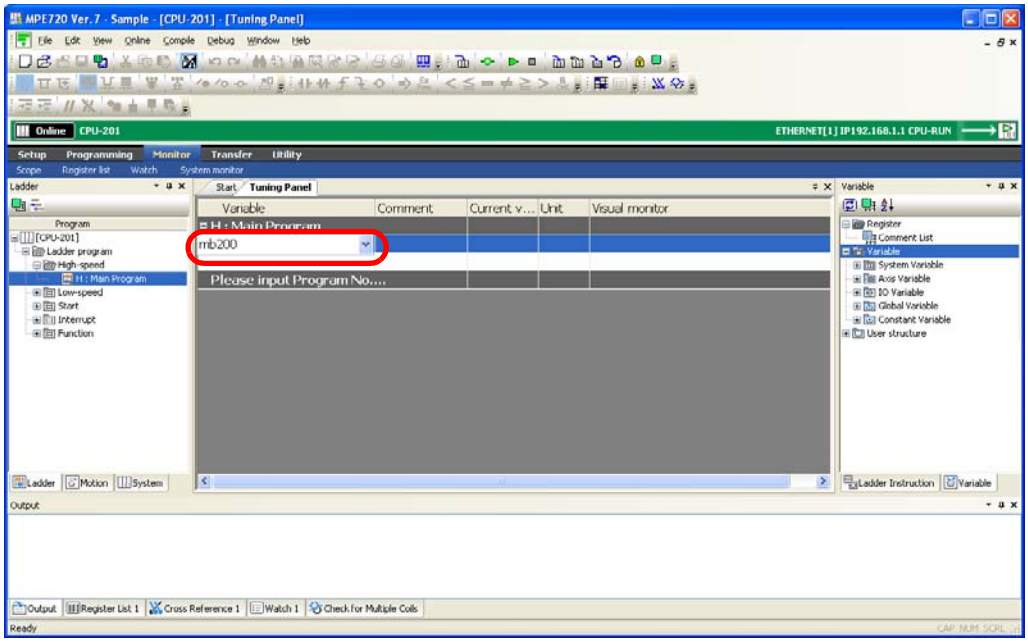
The Tuning Panel Tab Page will be displayed.

3. Select the type of program.

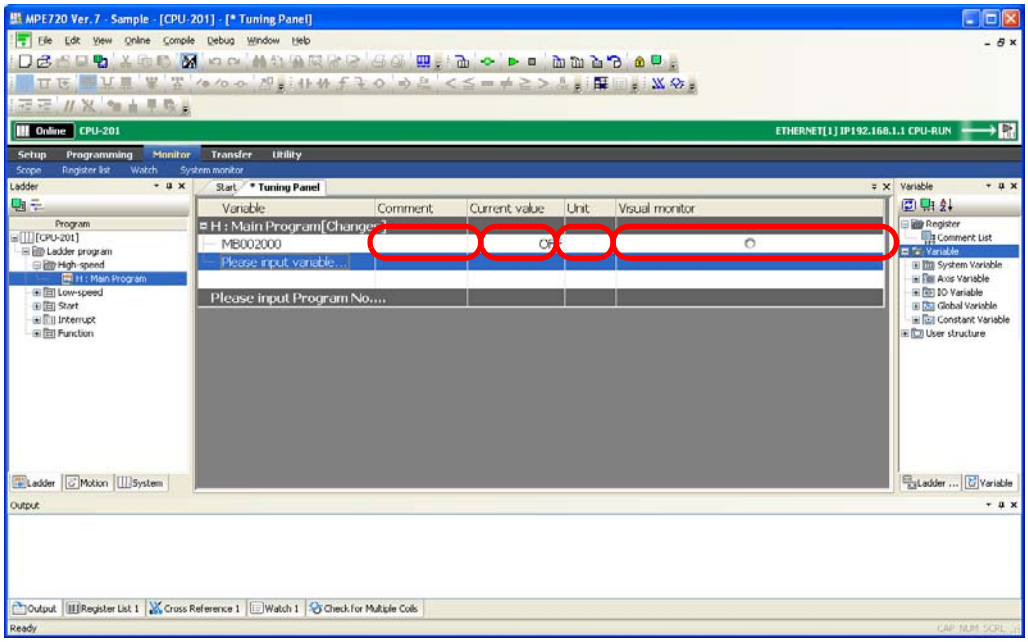
Information Programs that you have created will be listed as options in the box.



4. Enter the register to monitor in the **Variable** Column.



5. Press the **Enter** Key.
Information will be displayed in the **Comment**, **Current value**, **Unit**, and **Visual monitor** Columns.



Information

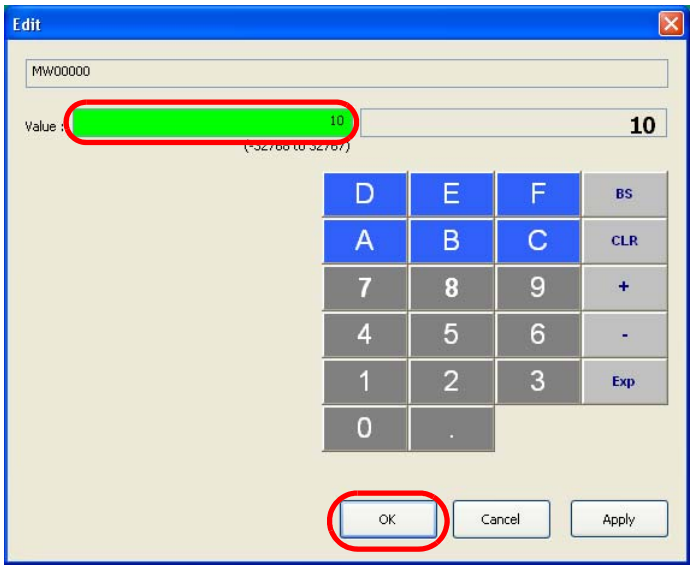
The information that is displayed in each column is described below.

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 field to display the Edit Dialog Box.
Unit	Displays the unit. The unit can be specified by double-clicking the field 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.



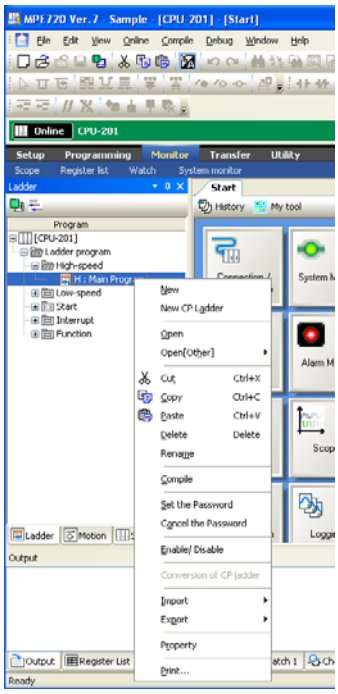
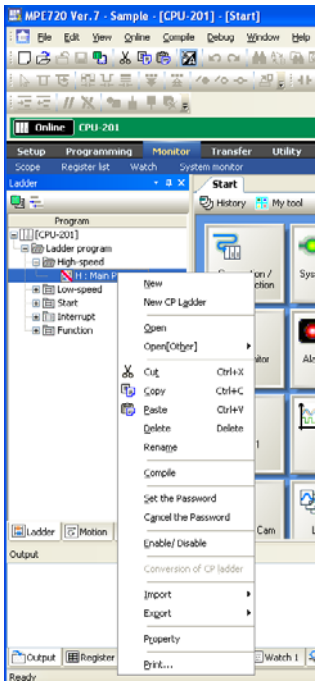
The value that was entered in the Tuning Panel will be applied.

This concludes the procedure.

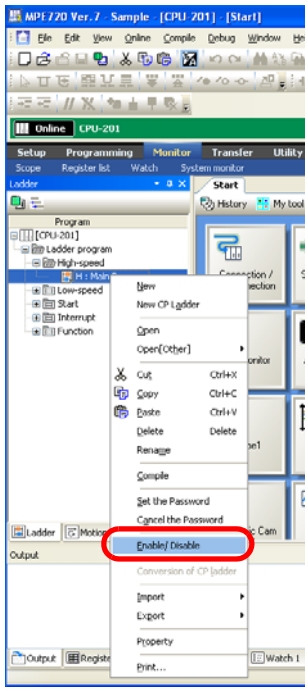
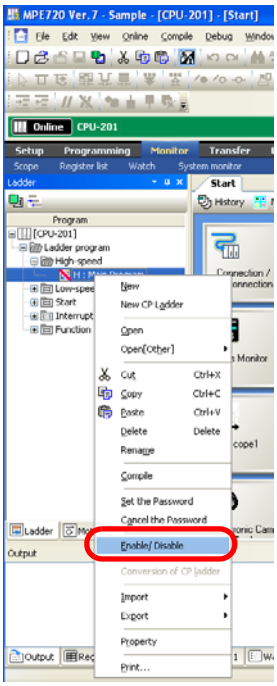
5.10 Enabling and Disabling Ladder Programs by Drawings

Use the following procedure to enable or disable ladder programs by drawings.

1. Open the project file.
2. Right-click the program to enable or disable in the Ladder Pane.

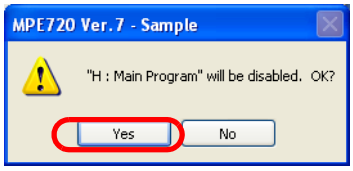



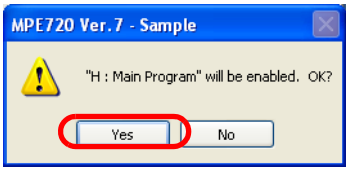
3. Select ***Enable/Disable*** from the menu.

The MPE720 Ver. 7 Dialog Box will be displayed.

4. Click the **Yes** Button.





The program will be enabled or disabled.

5. Confirm that the icon for the program has changed in the Ladder Pane.

- Program is enabled:
- Program is disabled:

This concludes the procedure.

Adjusting the Servo

6

This chapter describes the operations that are used to adjust the Servo.

6.1 Adjusting the Servo 6-2

6.2 Checking Operation by Sensing Individual Motion Commands 6-5

6.3 Comparing Parameters for Different Axes 6-11

6.4 Displaying Reference Units Used in Motion Parameters Converted to Machine Units 6-14

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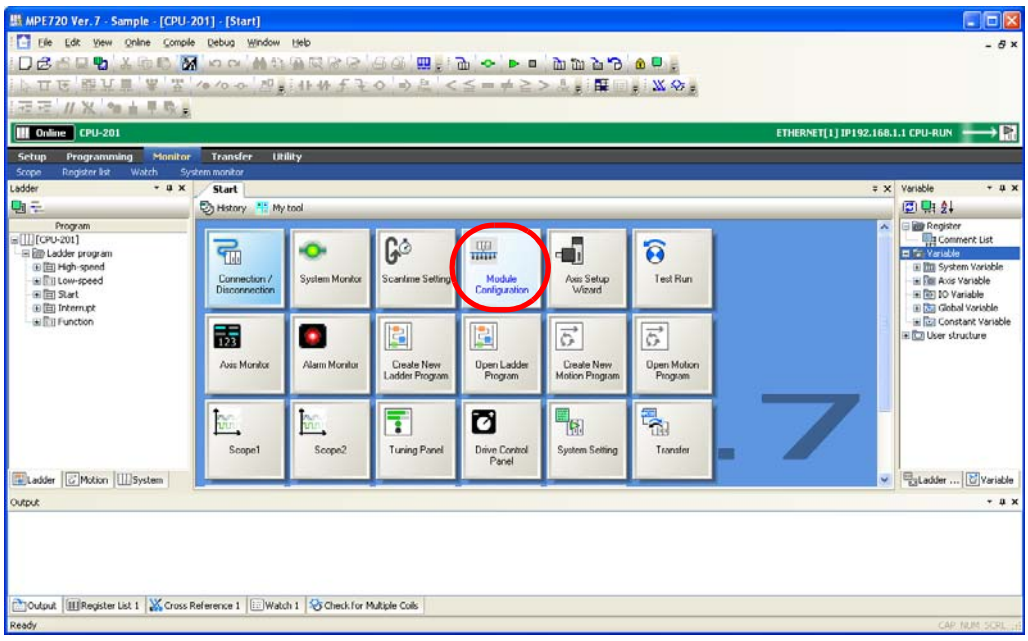
6.8 Using an Absolute Encoder 6-26

Preliminary Check Items 6-26
Initializing the Absolute Encoder (SVC Module) 6-32
Initializing the Absolute Encoder (SVB Module) 6-37

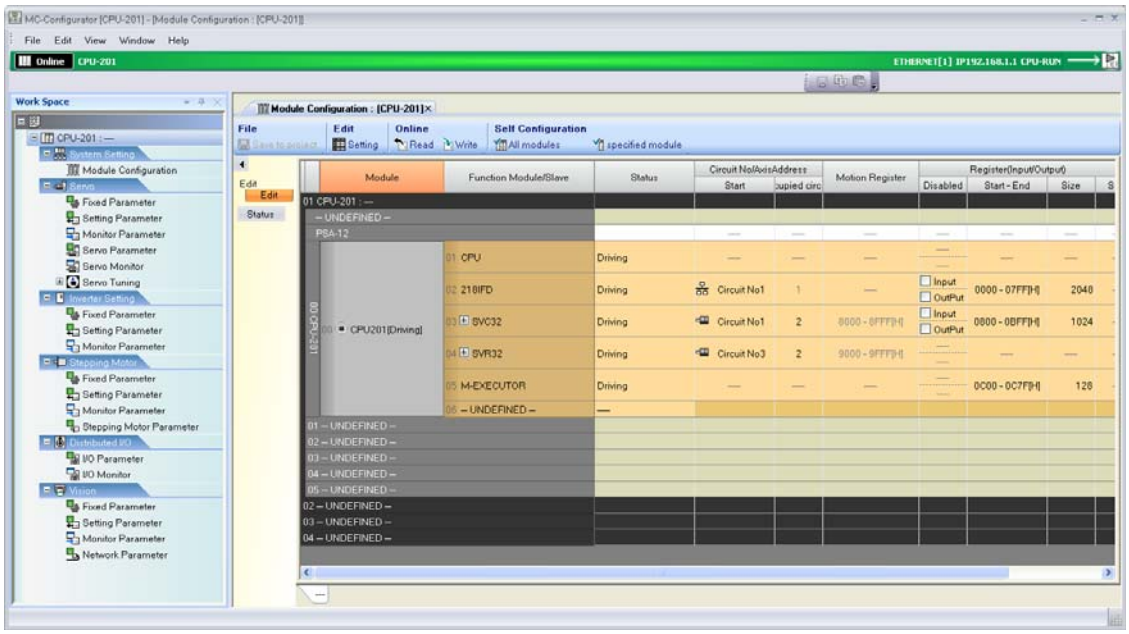
6.1 Adjusting the Servo

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.

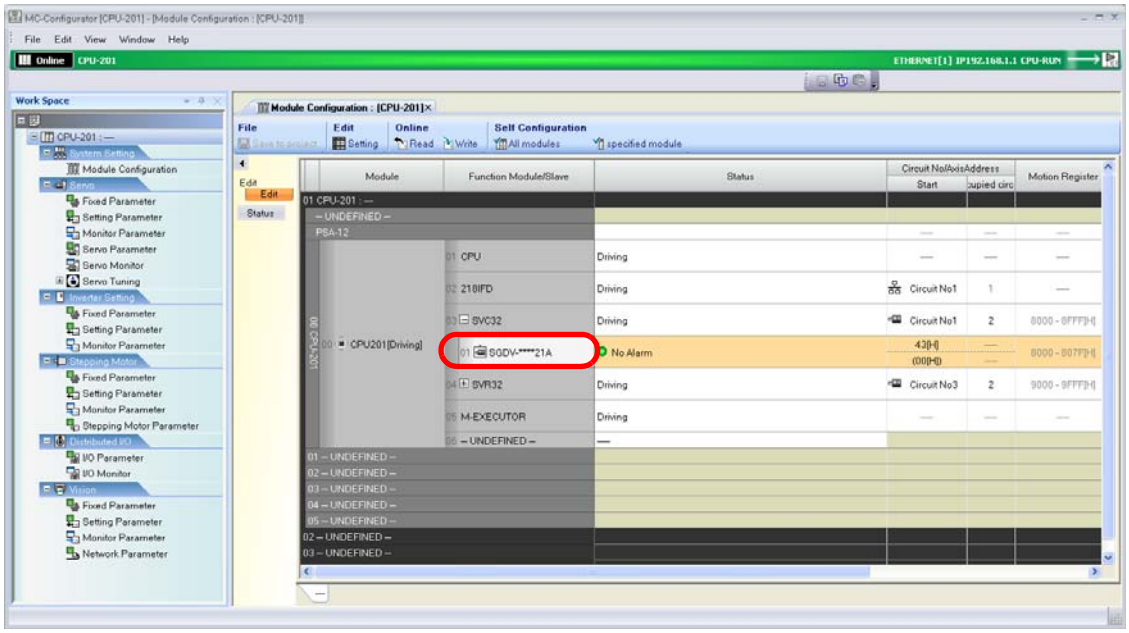
1. Click the **Module Configuration** Button on the My Tool Tab Page.



The Module Configuration Tab Page will be displayed.

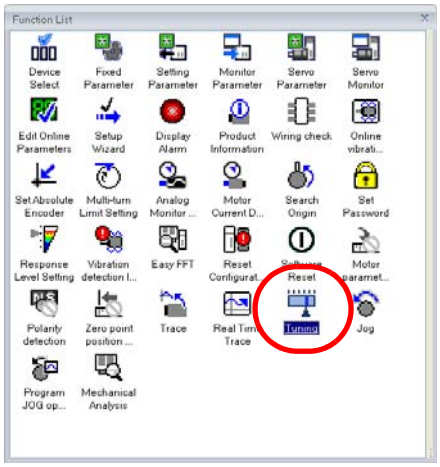


2. Double-click the Servo of the axis to tune from the list on the Module Configuration Tab Page.



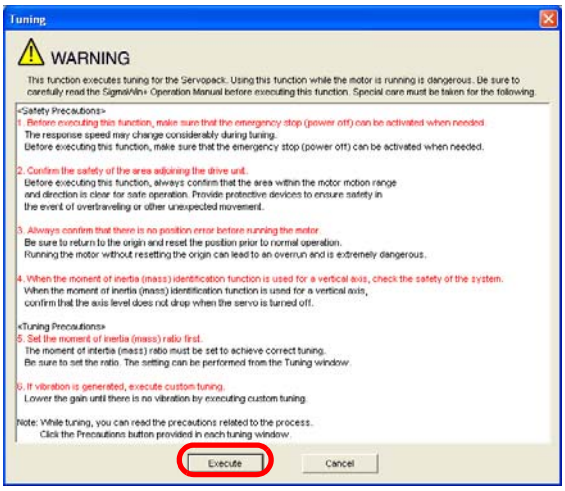
The Function List Dialog Box will be displayed.

3. Double-click the **Tuning** Icon.

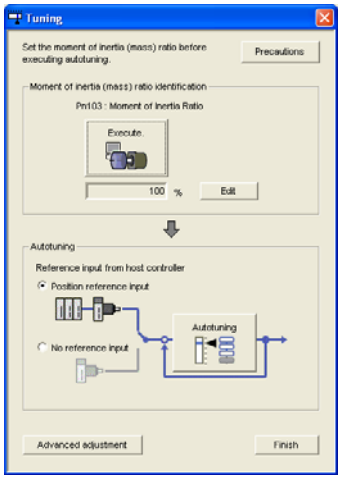


The Tuning Dialog Box will be displayed.

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 tuning.

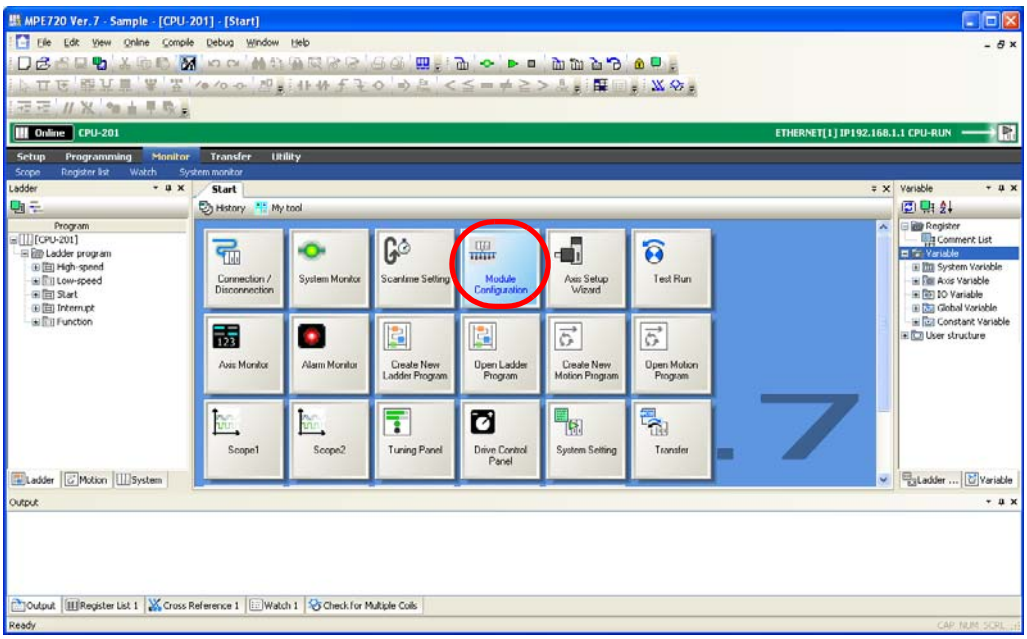
📖 *AC Servo Drive Engineering Tool SigmaWin+ Online Manual* (Manual No.: SIEP S800000 73)

This concludes the procedure.

6.2 Checking Operation by Sensing Individual Motion Commands

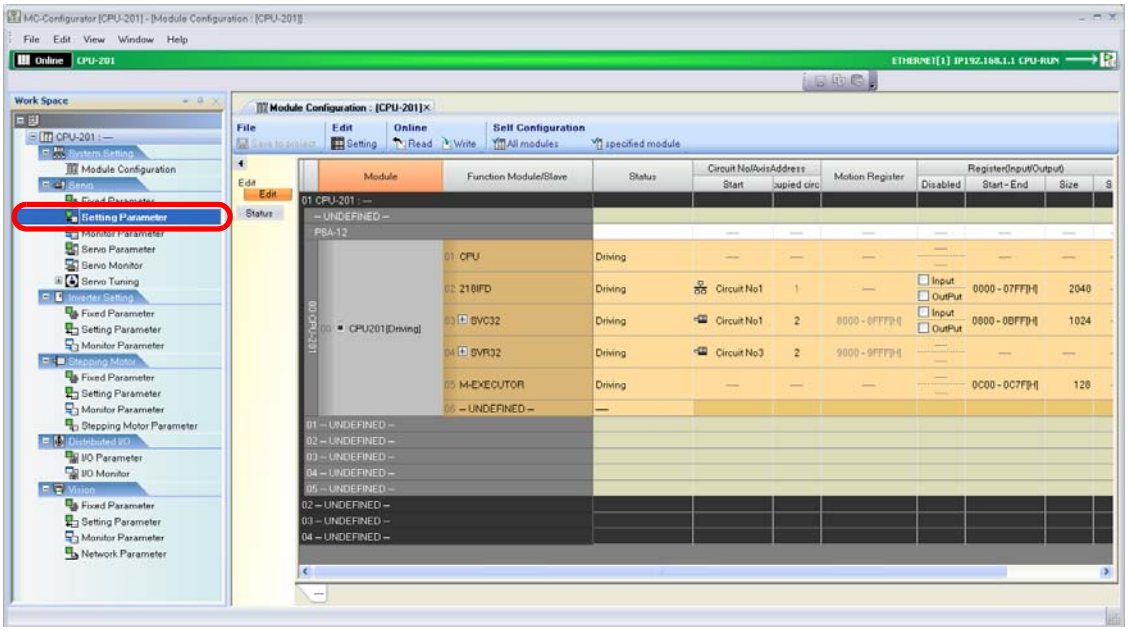
You may want to check operation for individual motion commands with the current configuration. However, writing ladder programs or other programs just for this purpose can be time consuming. The MPE720 allows you to send individual motion commands to check operation. Use the following procedure.

1. Click the **Module Configuration** Button on the My Tool Tab Page.



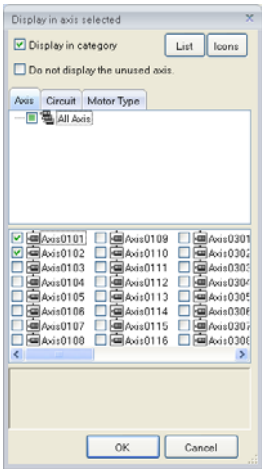
The Module Configuration Tab Page will be displayed.

2. Double-click **Setting Parameter** in the Work Space Pane.

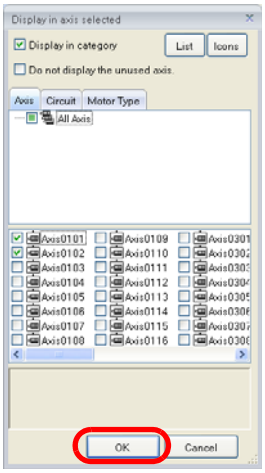


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes of the axes for which to check the operation.

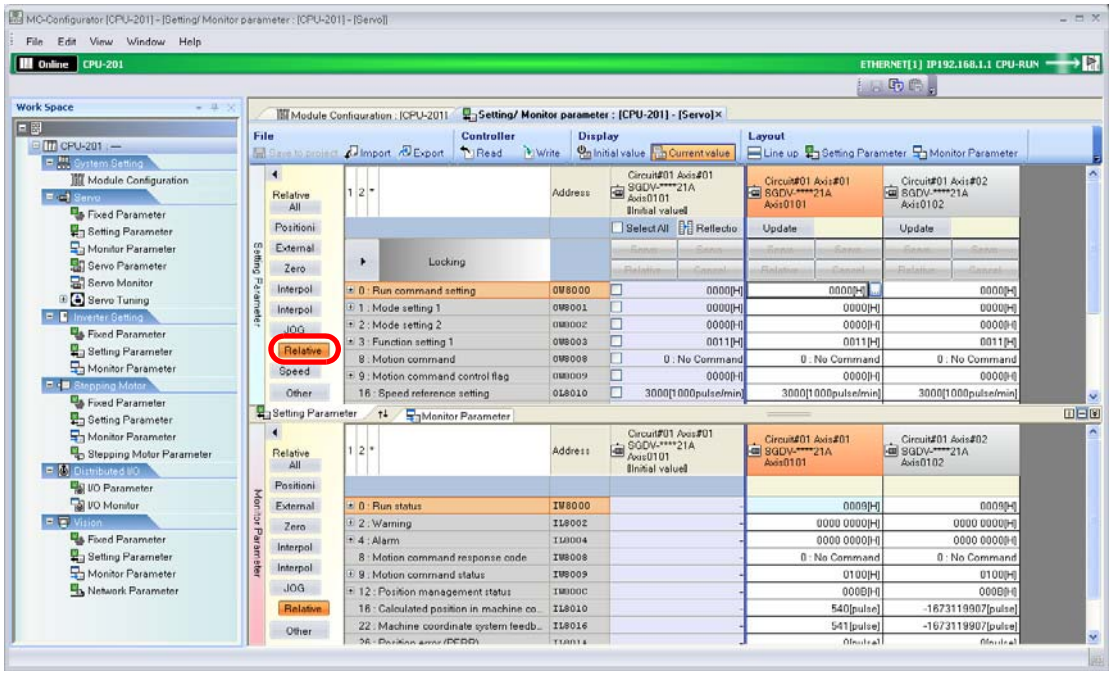


4. Click the **OK** Button.



The Setting/Monitor Parameter Tab Page will be displayed.

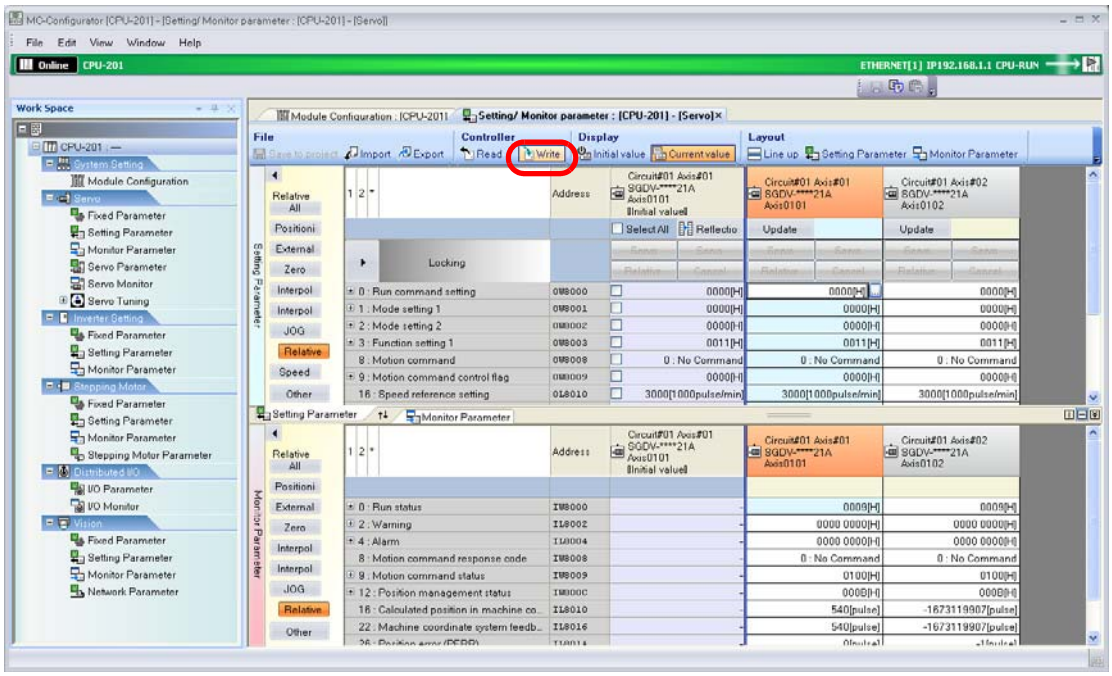
5. Select the motion command for which to check the operation.



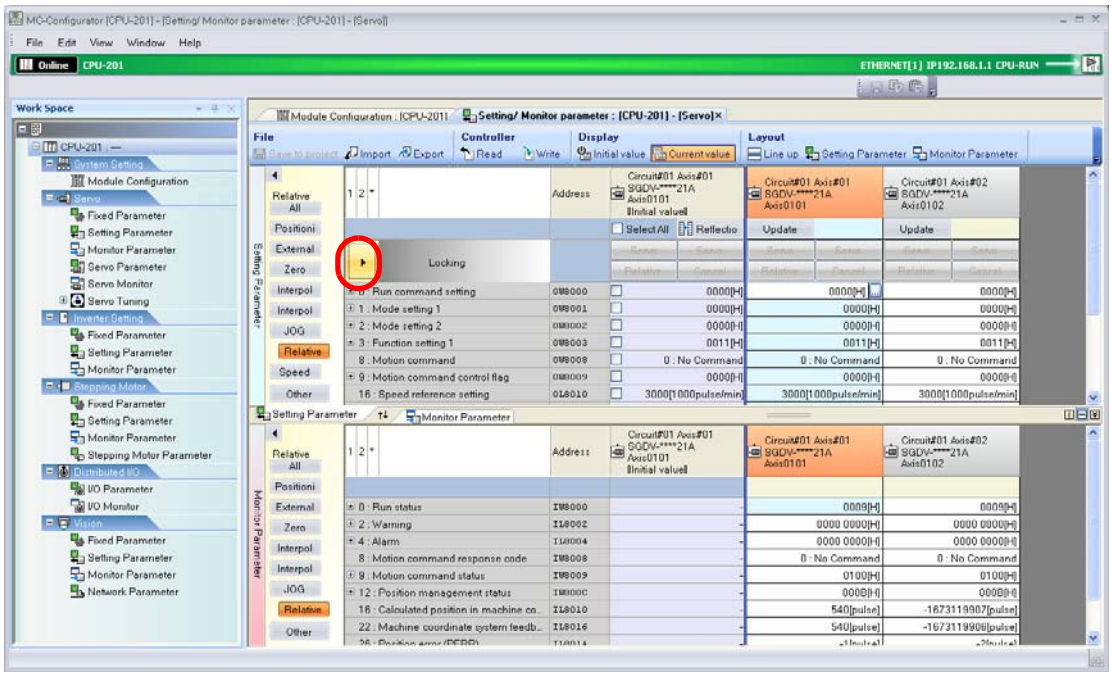
The parameters that are related to the selected motion command will be displayed.

6. Change the values of the parameters as required.

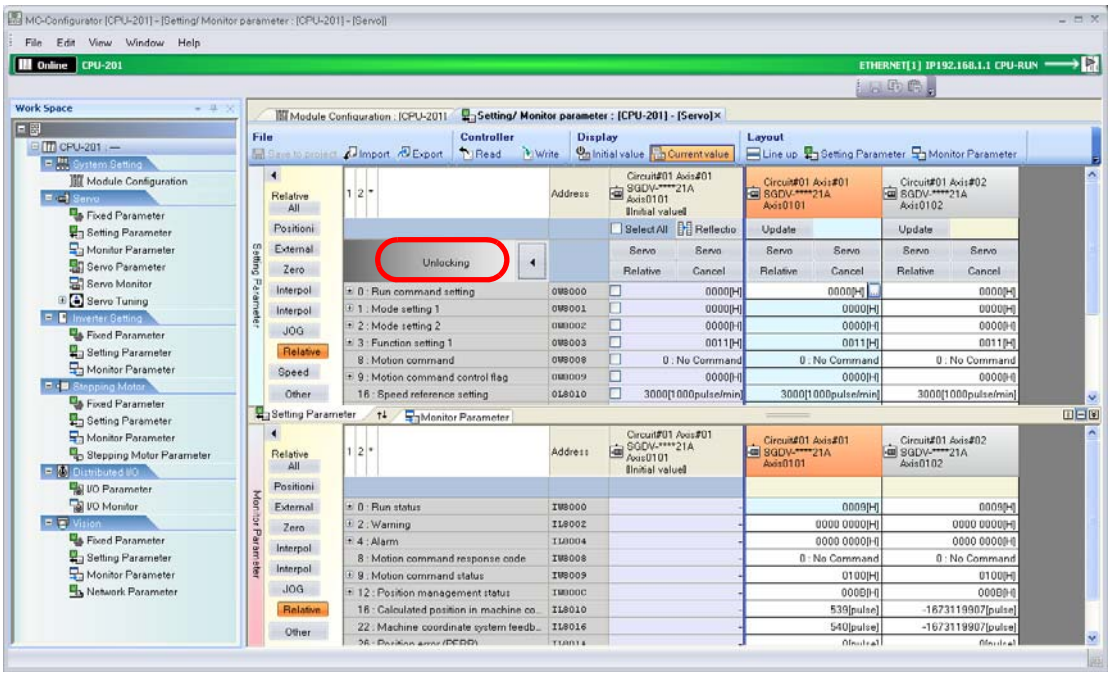
7. Click **Write**.



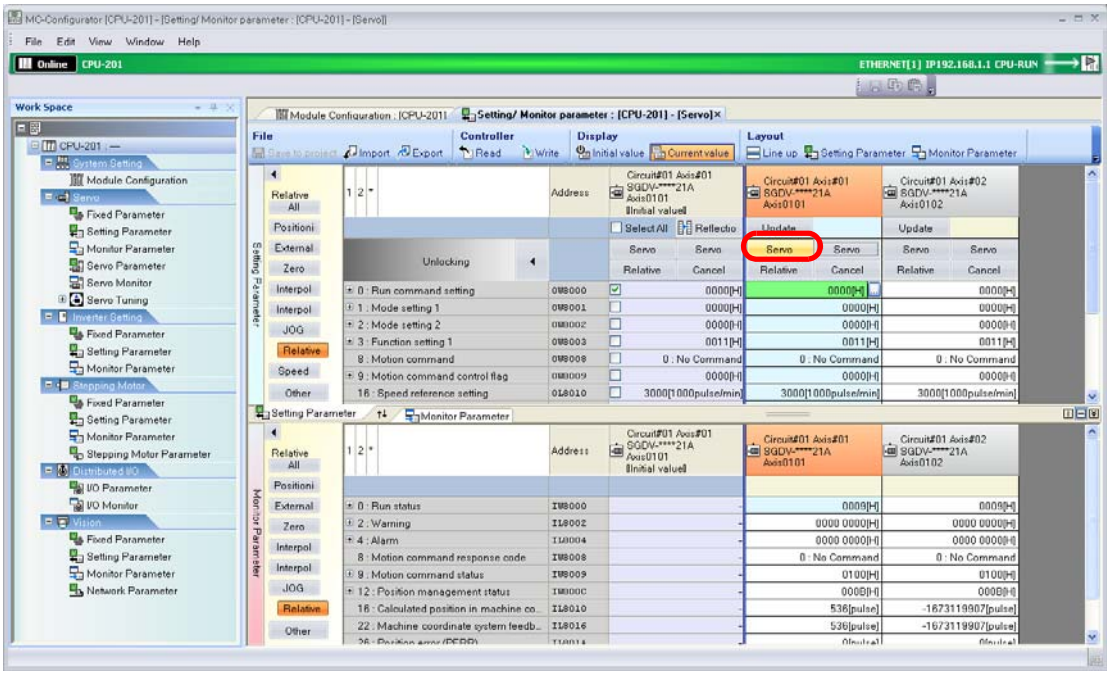
8. Click and hold down the ▶ Button next to the word “Locking” and slide it to the right.



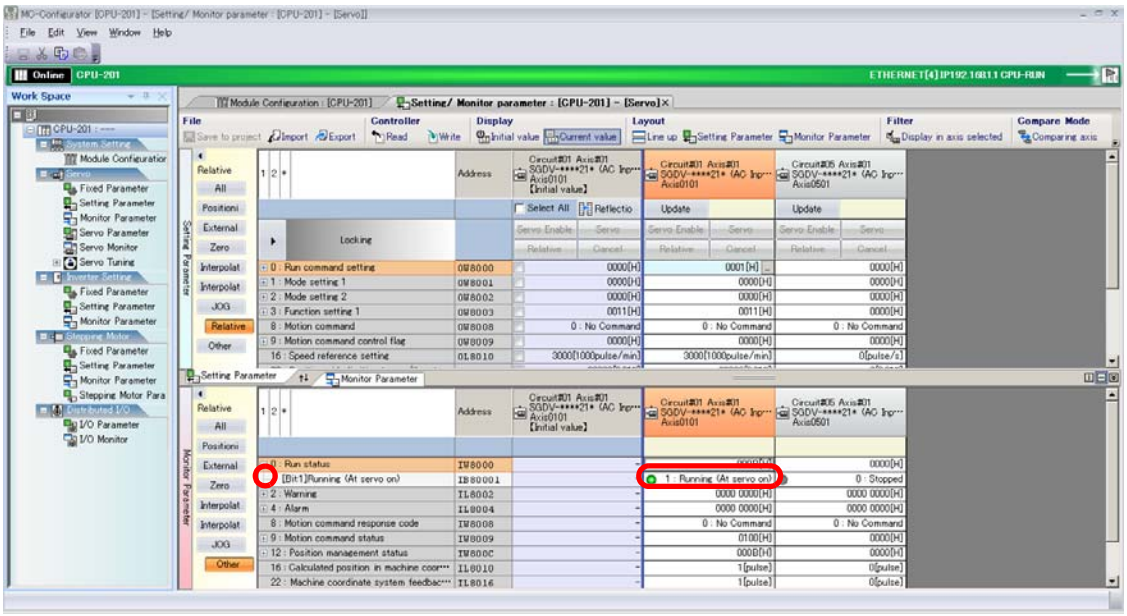
The controls will be unlocked.



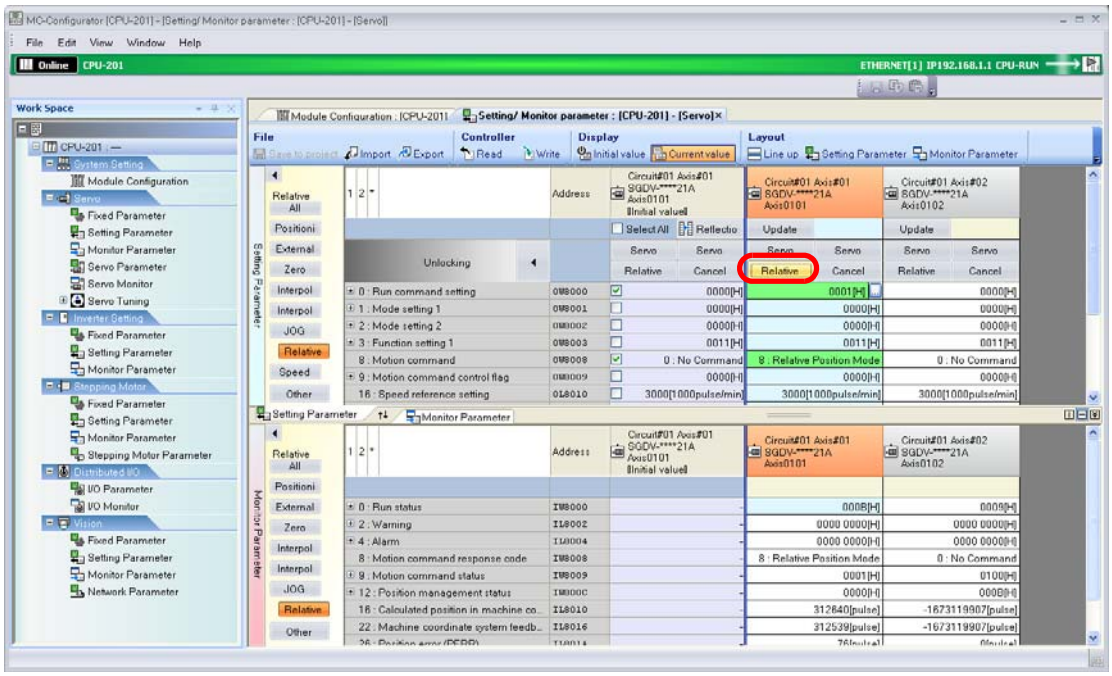
9. Click the **Servo** Button.



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 (Servo ON).



11. Click a motion command button.

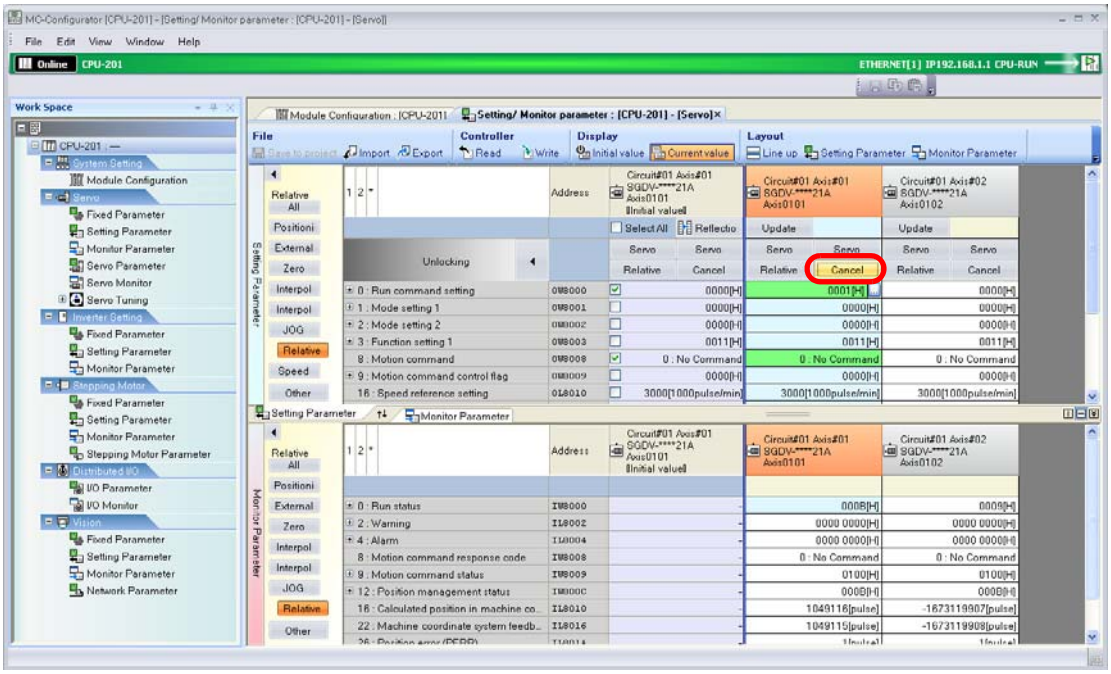


Information The **Relative** Button is shown in the example given above.

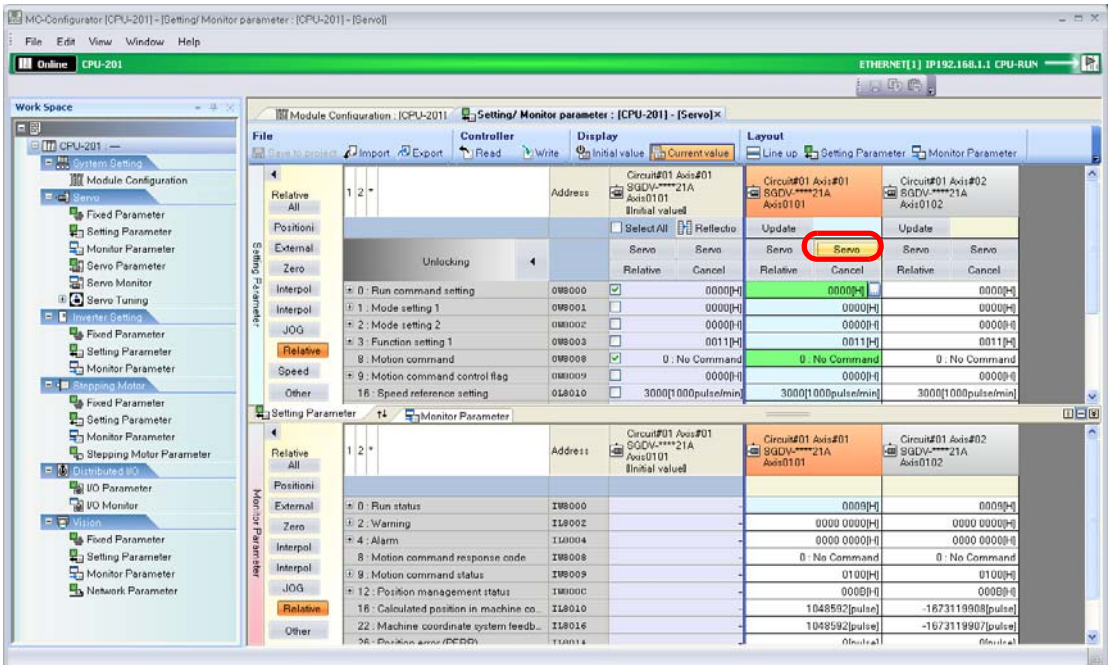
The motion command will be sent to the SERVOPACK.

12. Check the operation of the SERVOPACK.

13. Click the **Cancel** Button.



14. Click the **Servo** Button.

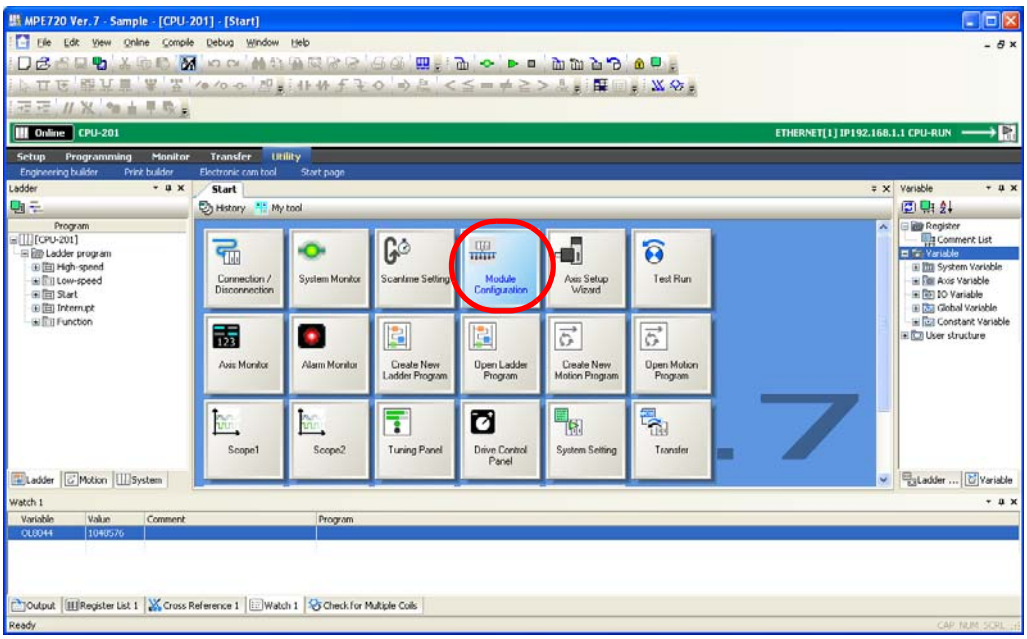


This concludes the procedure.

6.3 Comparing Parameters for Different Axes

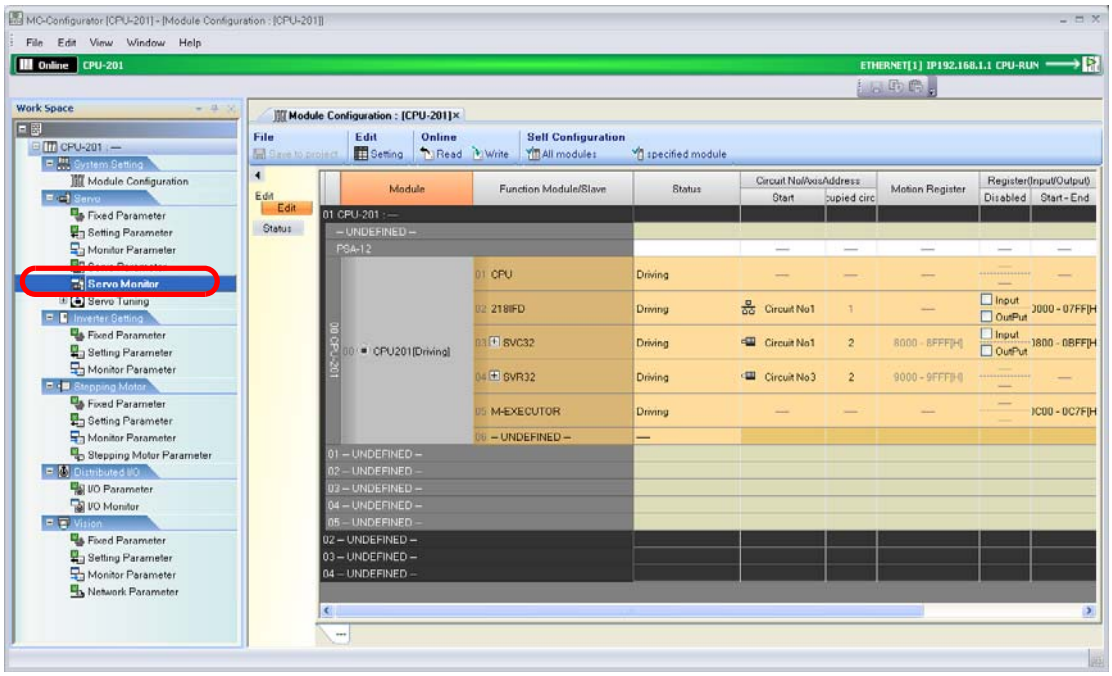
When working with multi-axis configurations, it may be necessary to compare the parameters that are used for different axes. The MPE720 allows you to display the results of the comparison of the parameters for different axes. Use the following procedures to compare axes.

1. Click the **Module Configuration** Button on the My Tool Tab Page.

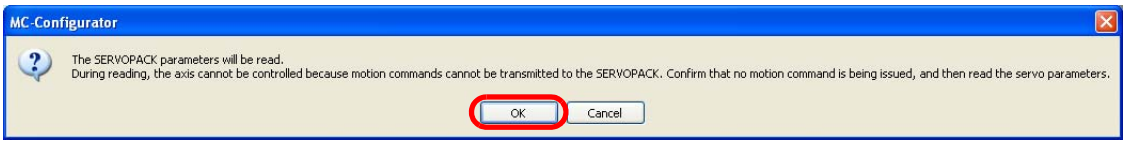


The Module Configuration Tab Page will be displayed.

2. Double-click the parameter to compare in the Work Space Pane.

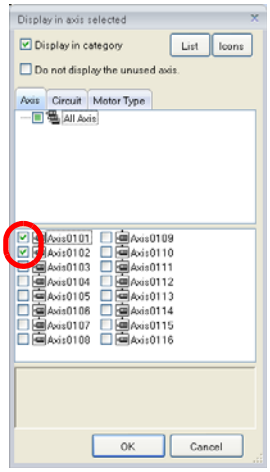


The MC-Configurator Dialog Box may be displayed, depending on the parameter.
Confirm the information in the dialog box, and then click the **OK** Button.

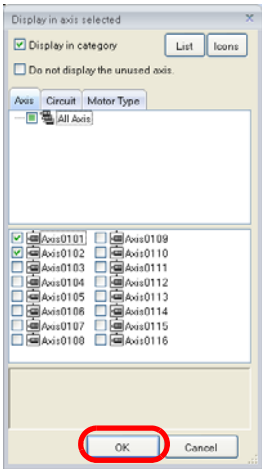


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to compare.

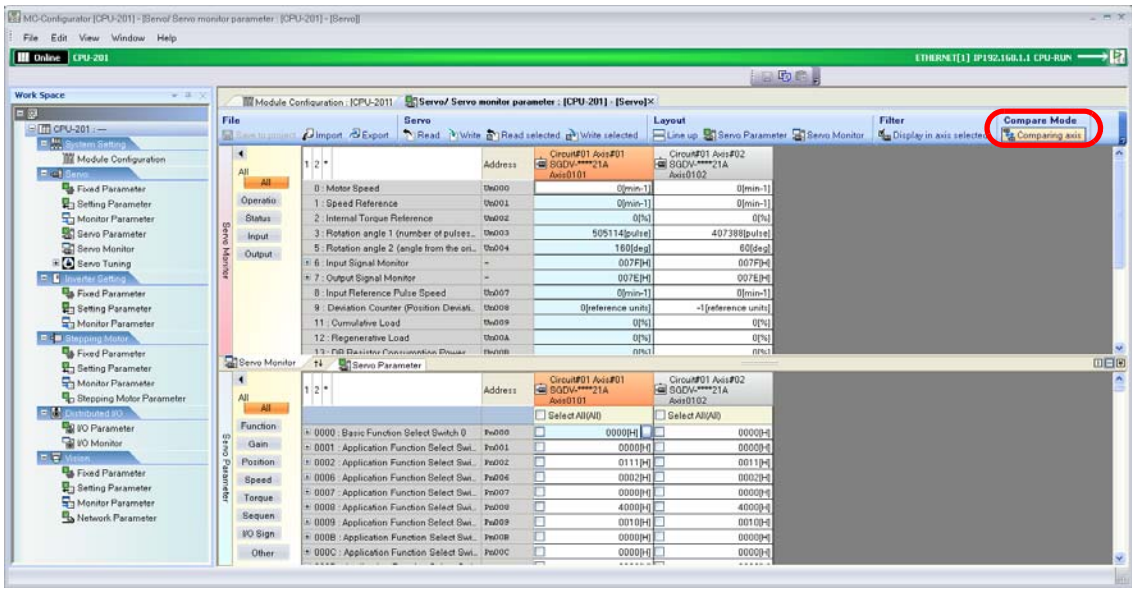


4. Click the **OK** Button.

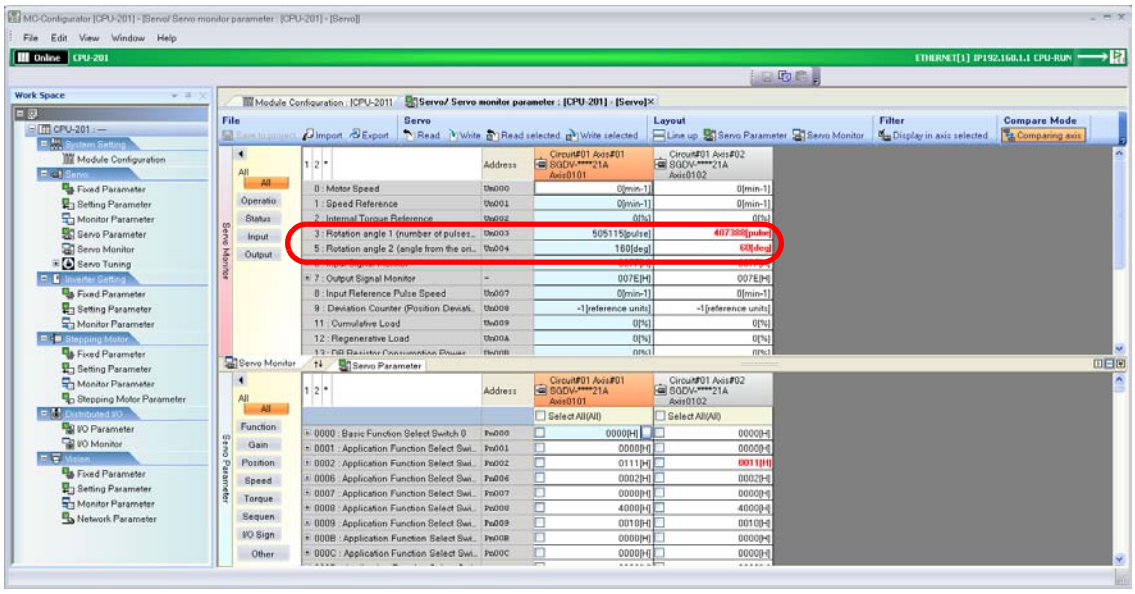


The parameters for the specified axes will be displayed.

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.

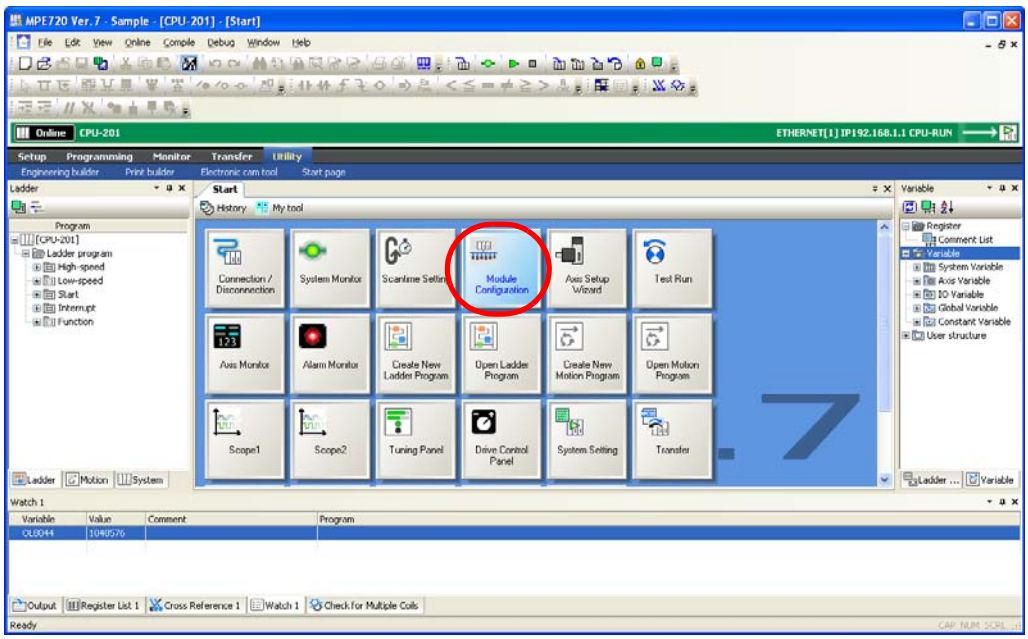


This concludes the procedure.

6.4 Displaying Reference Units Used in Motion Parameters Converted to Machine Units

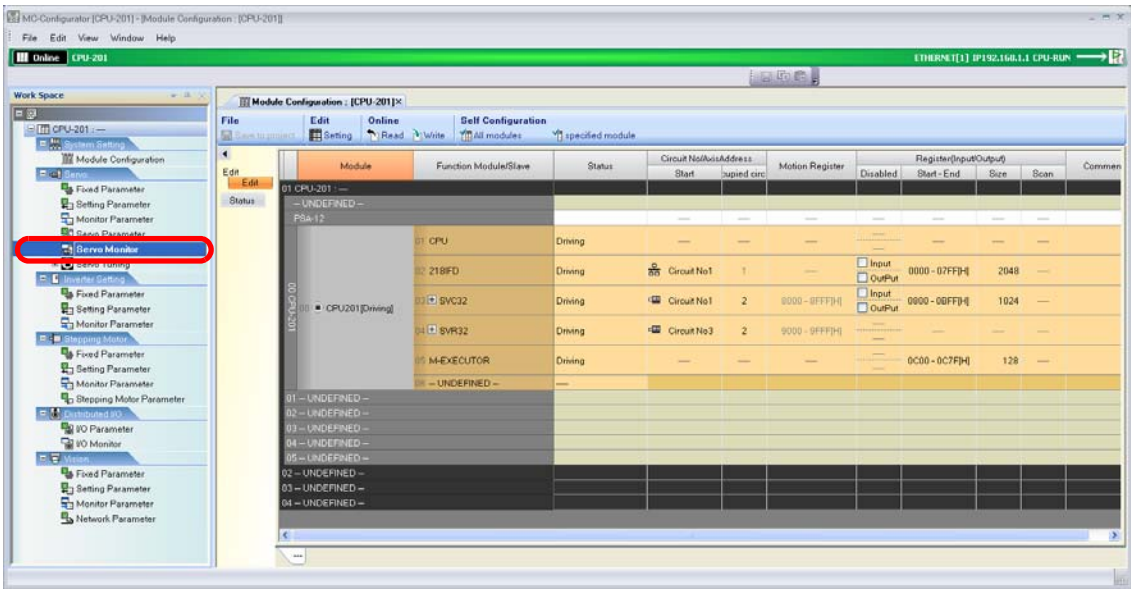
You can display the reference units that are used in motion Servo parameters converted into the machine units that are set in the Machine Controller. Use the following procedure.

1. Click the **Module Configuration** Button on the My Tool Tab Page.

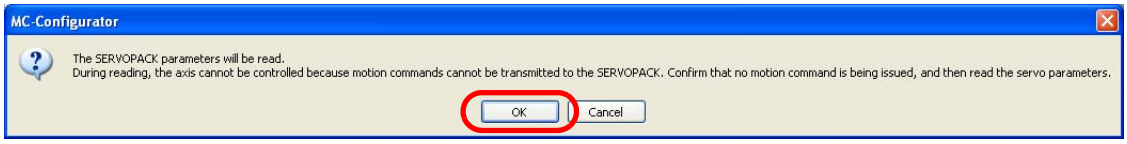


The Module Configuration Tab Page will be displayed.

2. Double-click the parameter for which to convert the units in the Work Space Pane.

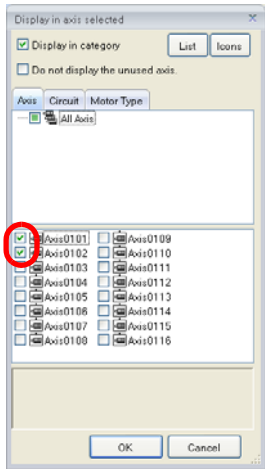


The MC-Configurator Dialog Box may be displayed, depending on the parameter.
Confirm the information in the dialog box, and then click the **OK** Button.

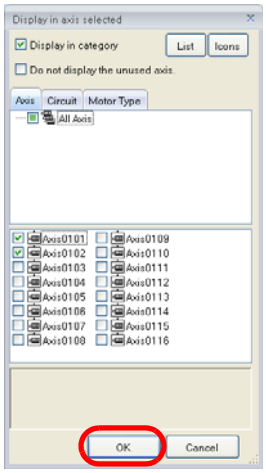


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes for which to convert the units.

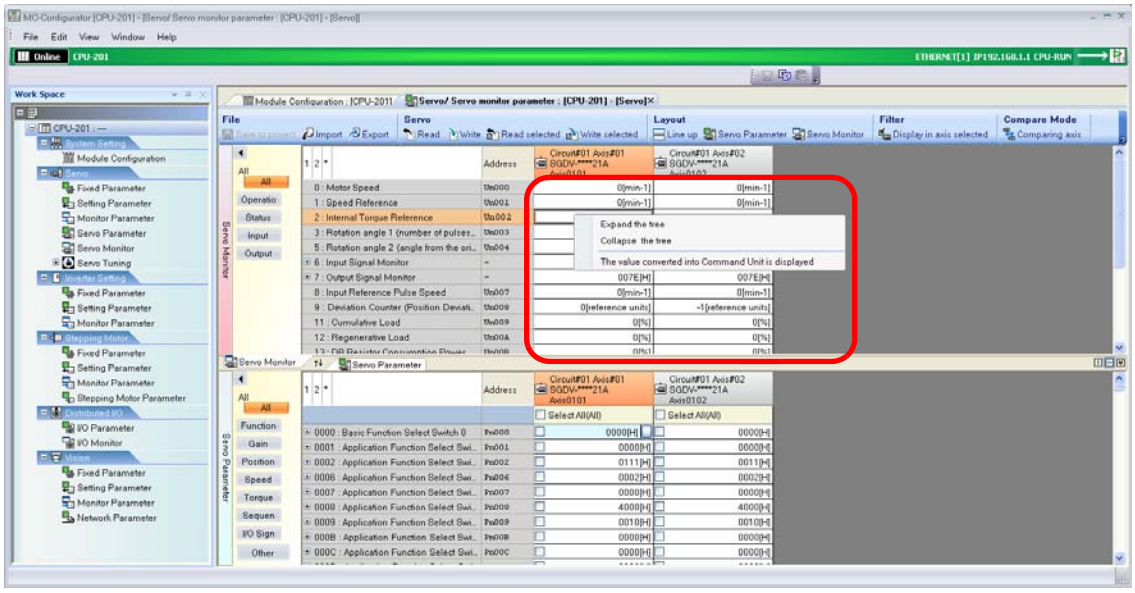


4. Click the **OK** Button.

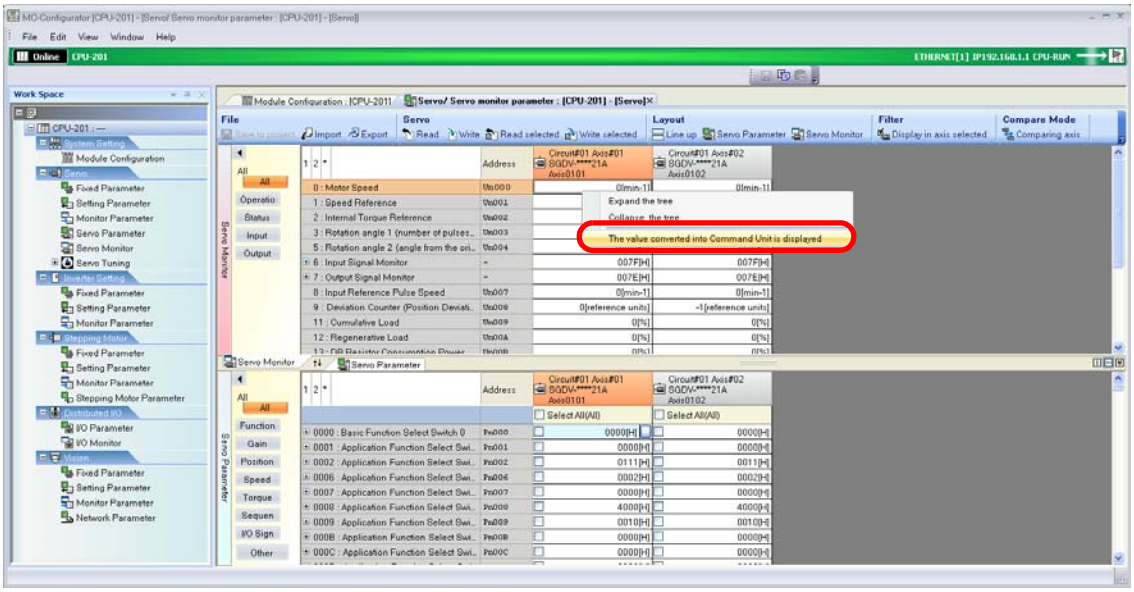


The parameters for the specified axes will be displayed.

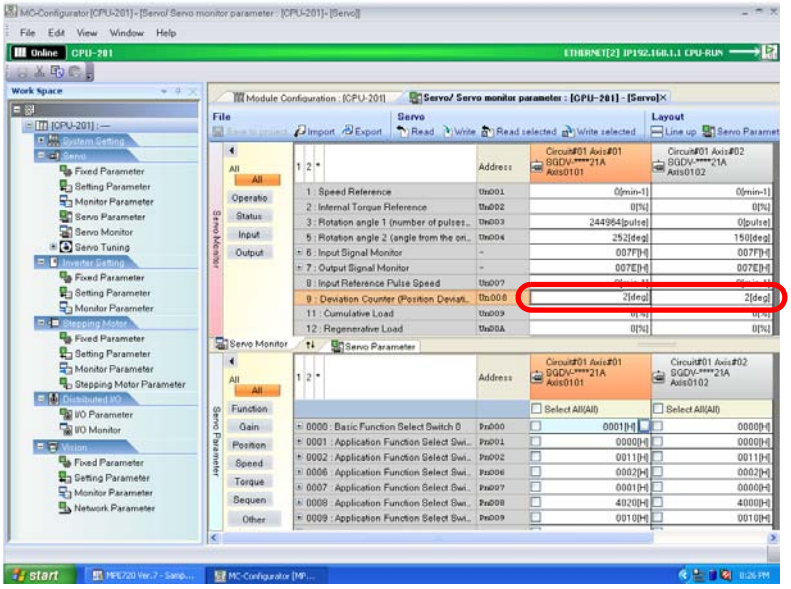
5. Right-click the parameter value.



6. Select ***The value converted into Command Unit is displayed***.



7. Confirm that the selected value has changed to the selected unit.

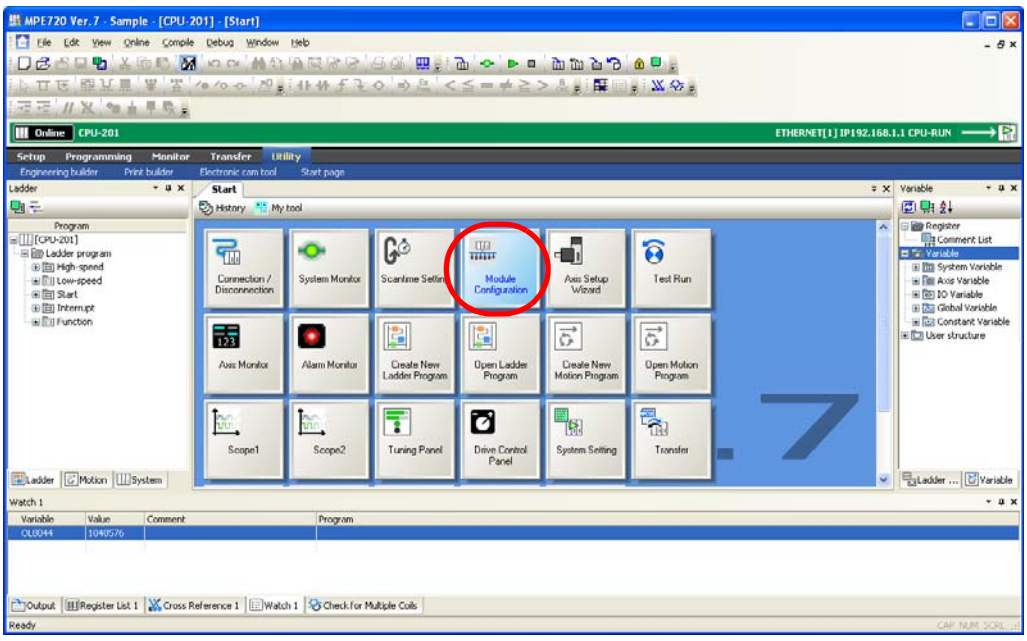


This concludes the procedure.

6.5 Checking the Set Values of Backed Up Servo Parameters

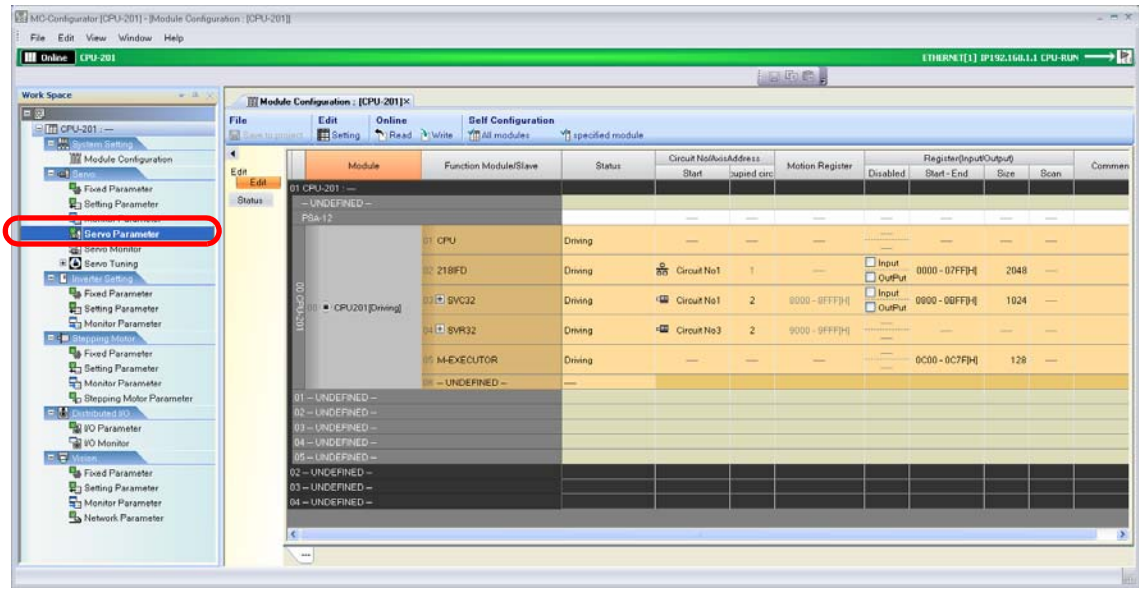
A backup of the Servo parameters can be stored in the SERVOPACK. Use the following procedure to check the settings of the backup parameters in the SERVOPACK.

1. Click the **Module Configuration** Button on the My Tool Tab Page.

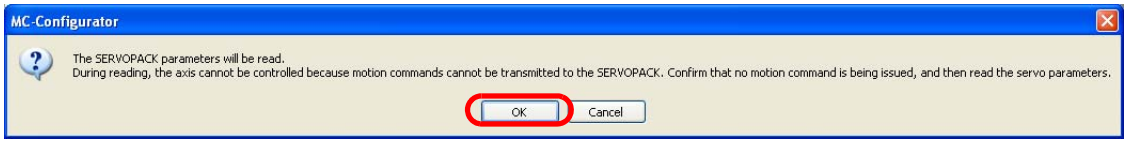


The Module Configuration Tab Page will be displayed.

2. Double-click the parameter for which to check the set value in the Work Space Pane.

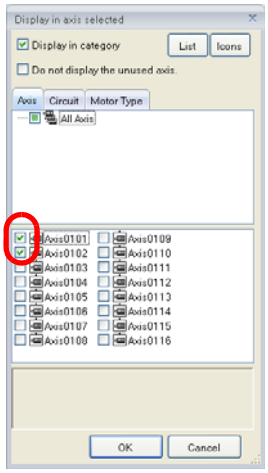


The MC-Configurator Dialog Box may be displayed, depending on the parameter.
Confirm the information in the dialog box, and then click the **OK** Button.

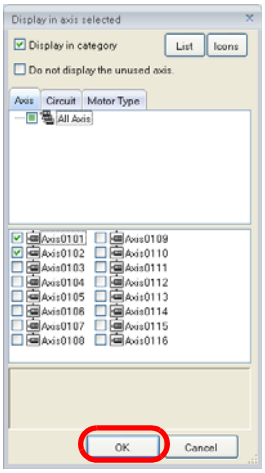


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes for which to check the settings.

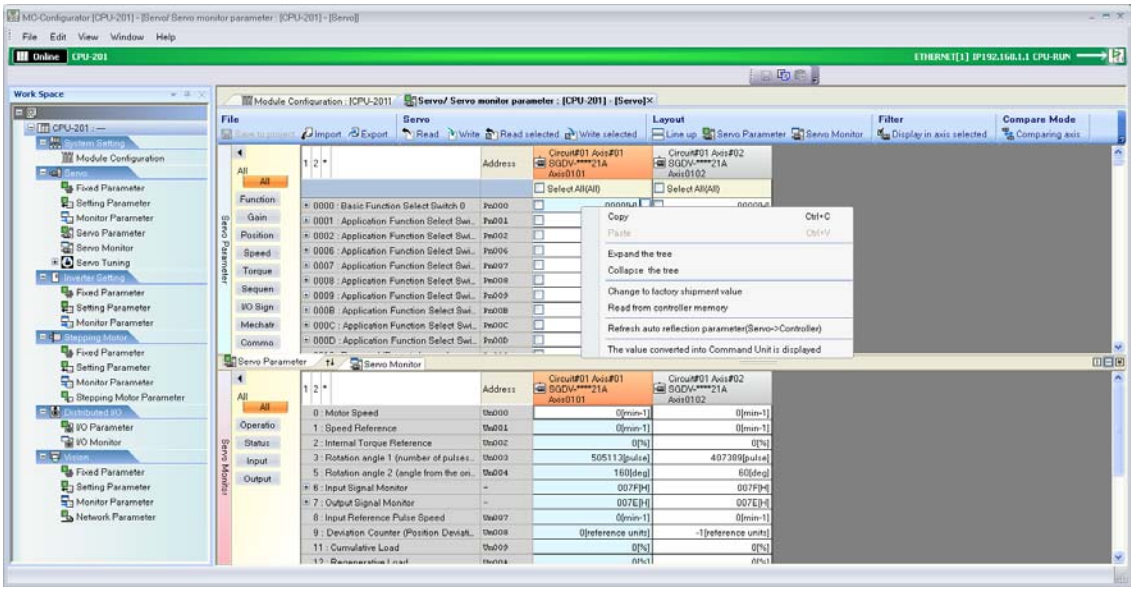


4. Click the **OK** Button.

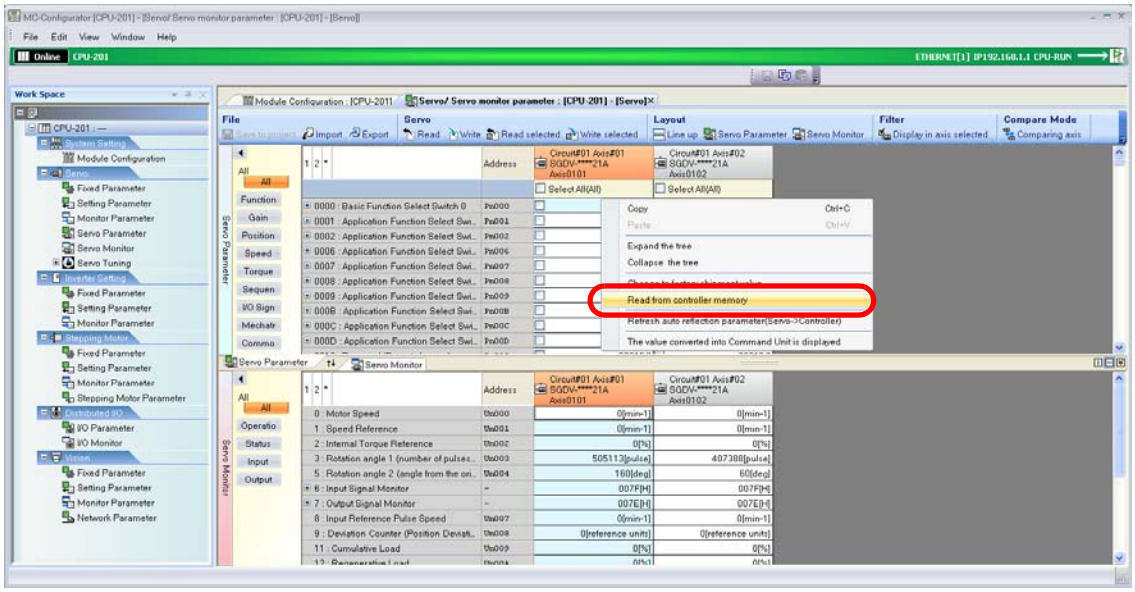


The parameters for the specified axes will be displayed.

5. Select the parameter value to check and right-click.
A menu will be displayed.

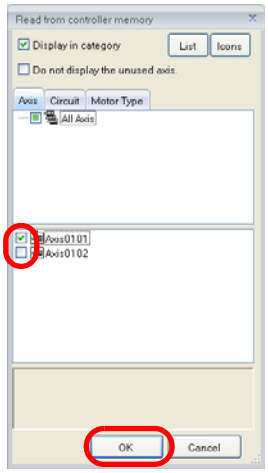


6. Click ***Read from controller memory***.

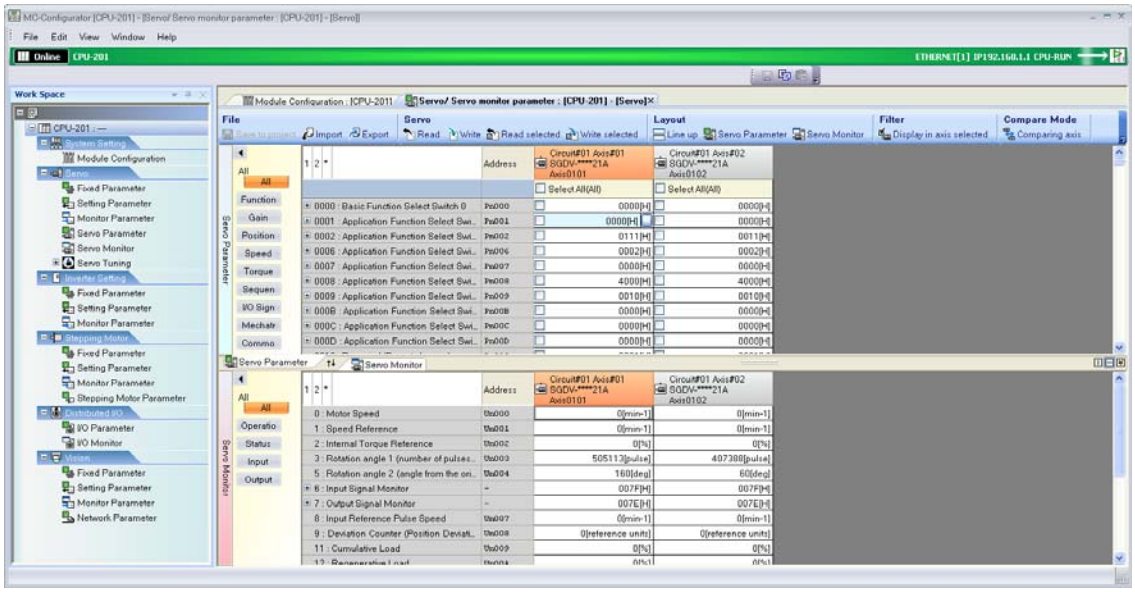


The Read from Controller Memory Dialog Box will be displayed.

7. Select the axes to check and click the **OK** Button.



The backup settings will be displayed.

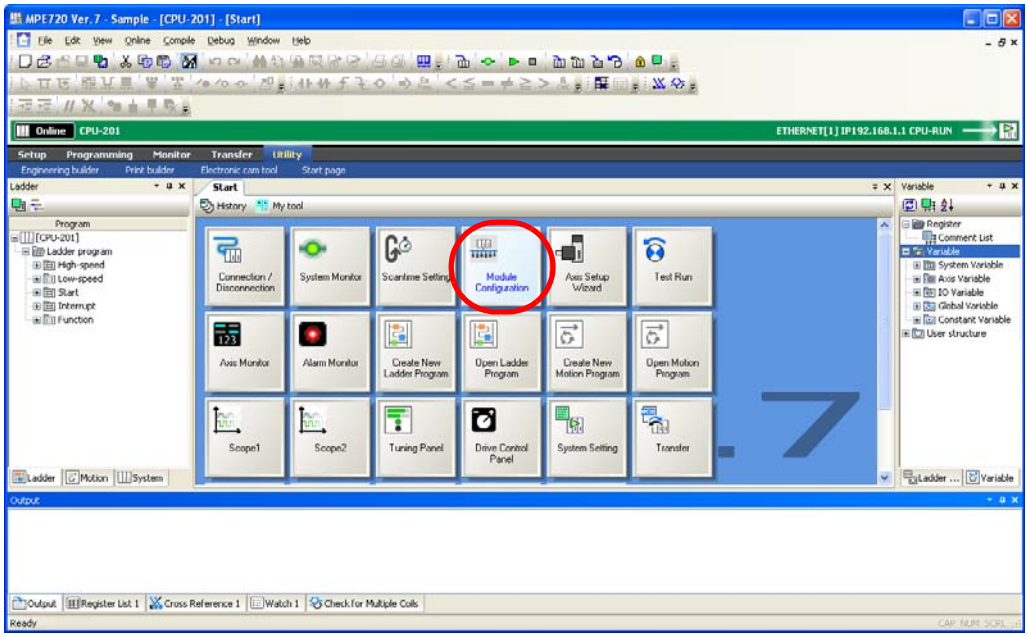


This concludes the procedure.

6.6 Writing Parameters to the SERVOPACK

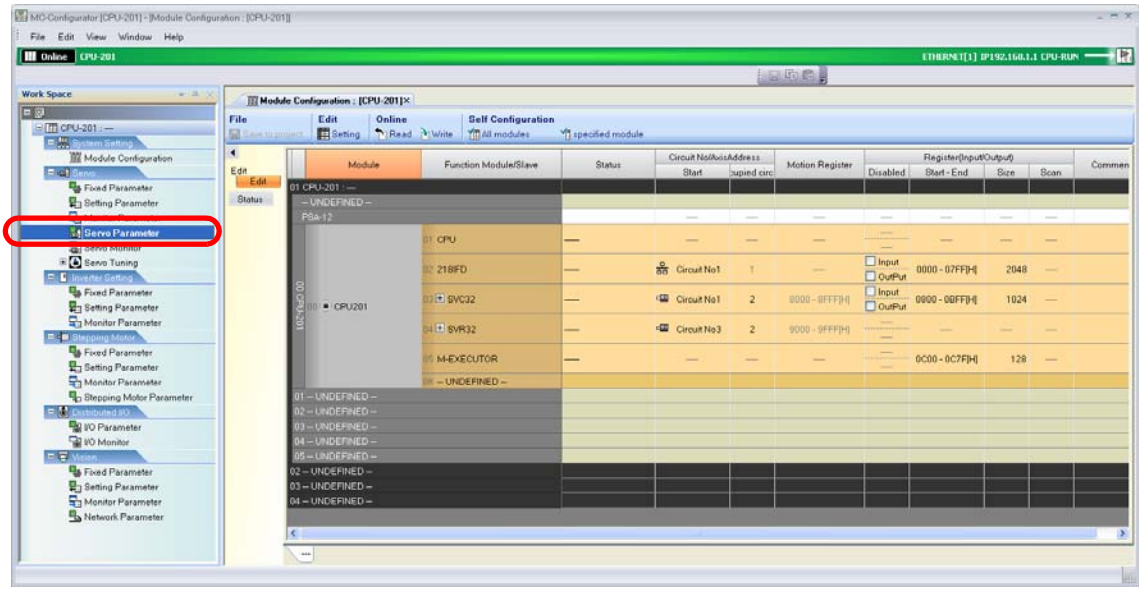
Use the following procedure to write parameters to the SERVOPACK.

1. Click the **Module Configuration** Button on the My Tool Tab Page.

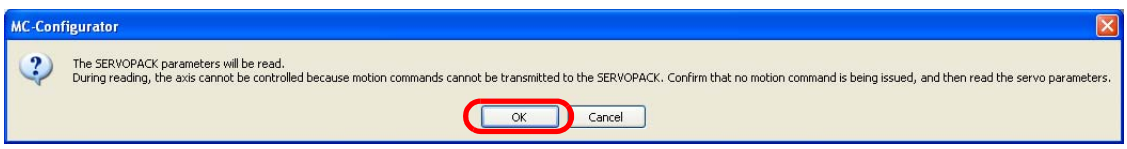


The Module Configuration Tab Page will be displayed.

2. Double-click the parameter to write to the SERVOPACK in the Work Space Pane.

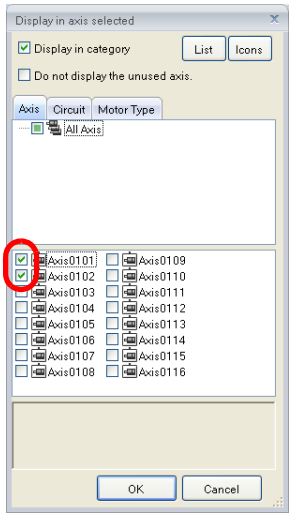


The MC-Configurator Dialog Box may be displayed, depending on the parameter.
Confirm the information in the dialog box, and then click the **OK** Button.

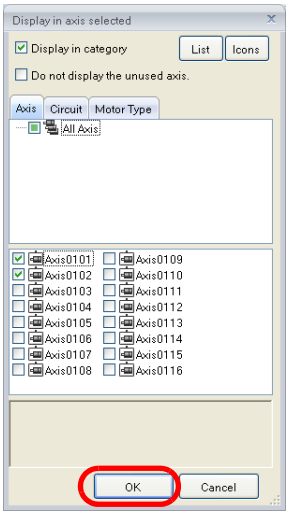


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to write to the SERVOPACK.

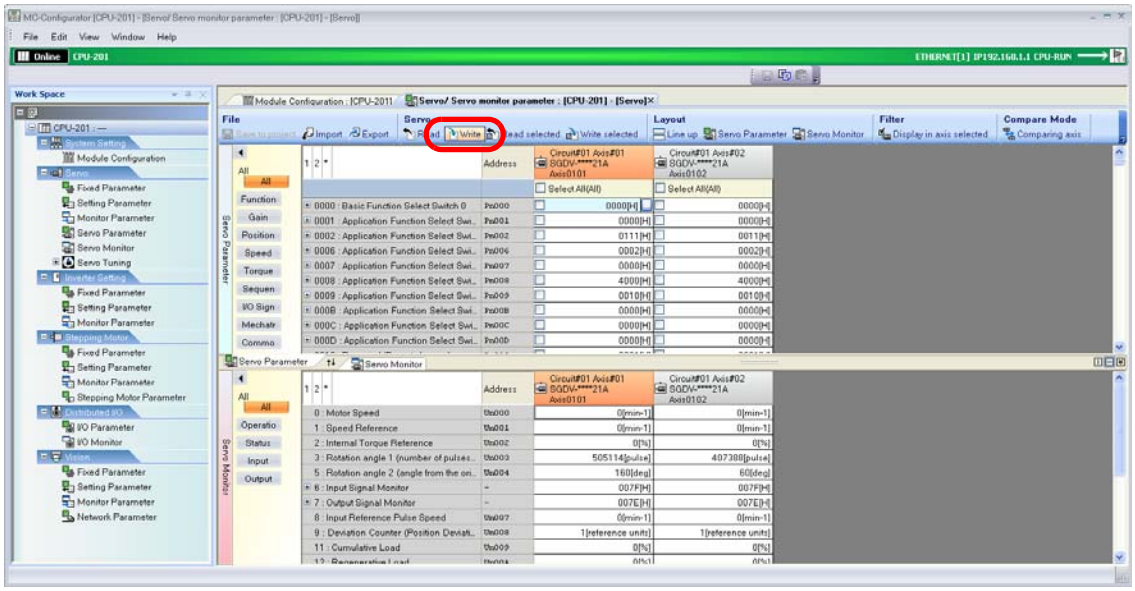


4. Click the **OK** Button.



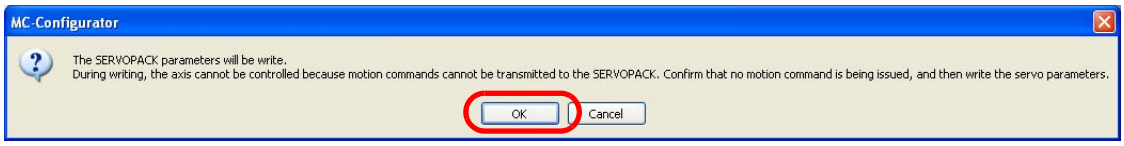
The parameters for the specified axes will be displayed.

5. Click ***Servo*** – ***Write***.



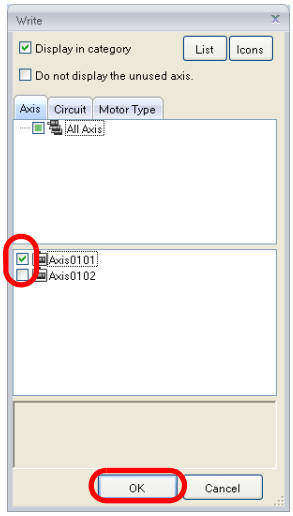
The MC-Configurator Dialog Box will be displayed.

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.



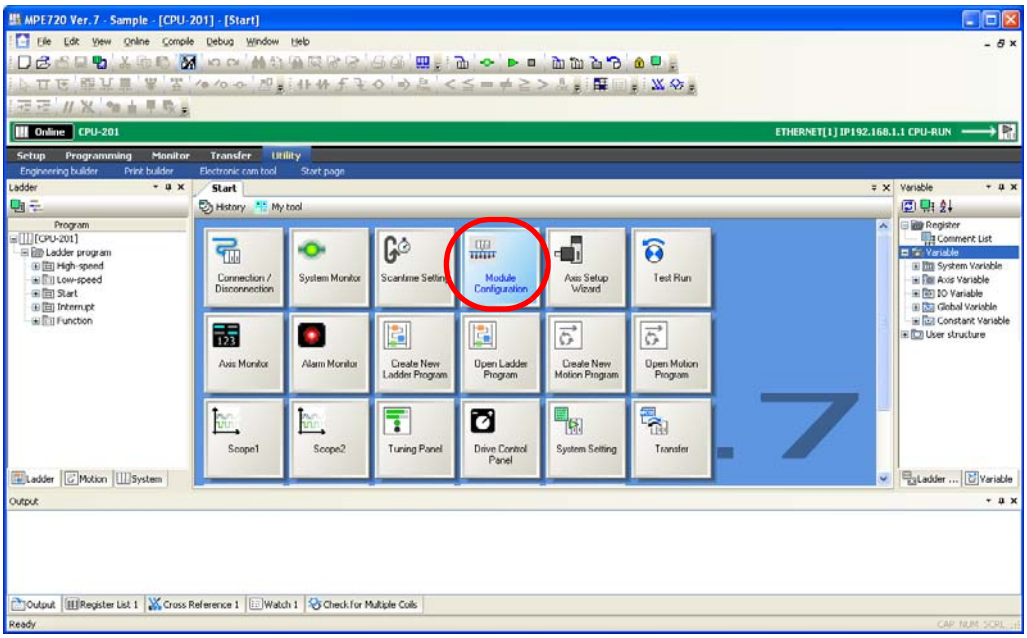
The write will be executed.

This concludes the procedure.

6.7 Writing Specific Servo Parameters to the SERVOPACK

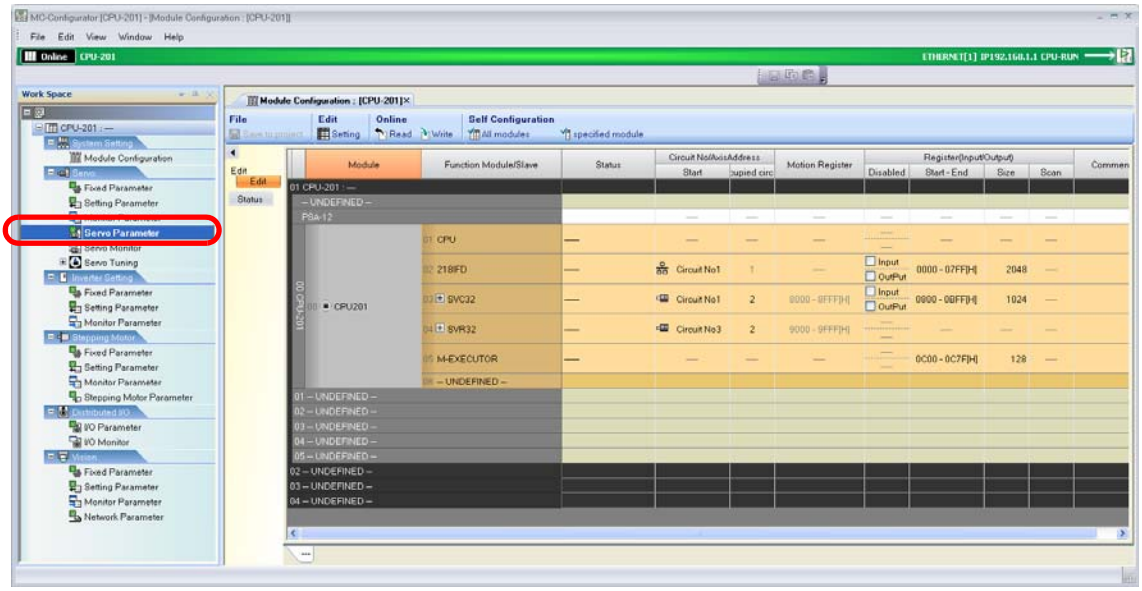
Use the following procedure to write only specific Servo parameters.

1. Click the **Module Configuration** Button on the My Tool Tab Page.

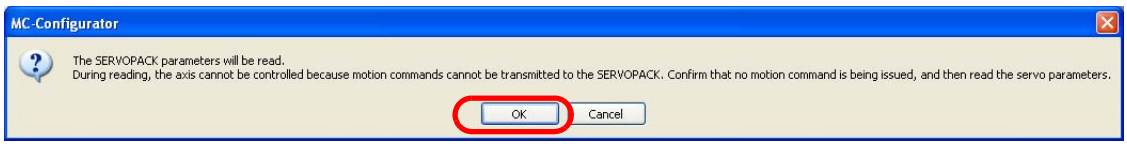


The Module Configuration Tab Page will be displayed.

2. Double-click the parameter to write to the SERVOPACK in the Work Space Pane.

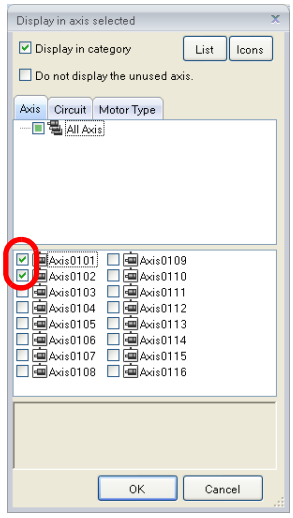


The MC-Configurator Dialog Box may be displayed, depending on the parameter.
Confirm the information in the dialog box, and then click the **OK** Button.

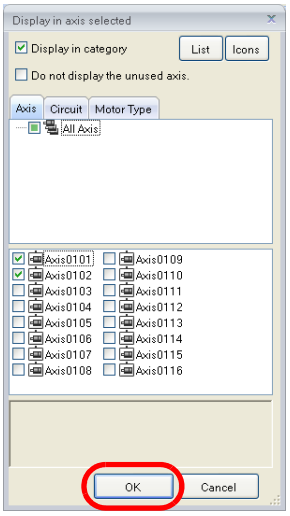


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to write to the SERVOPACK.

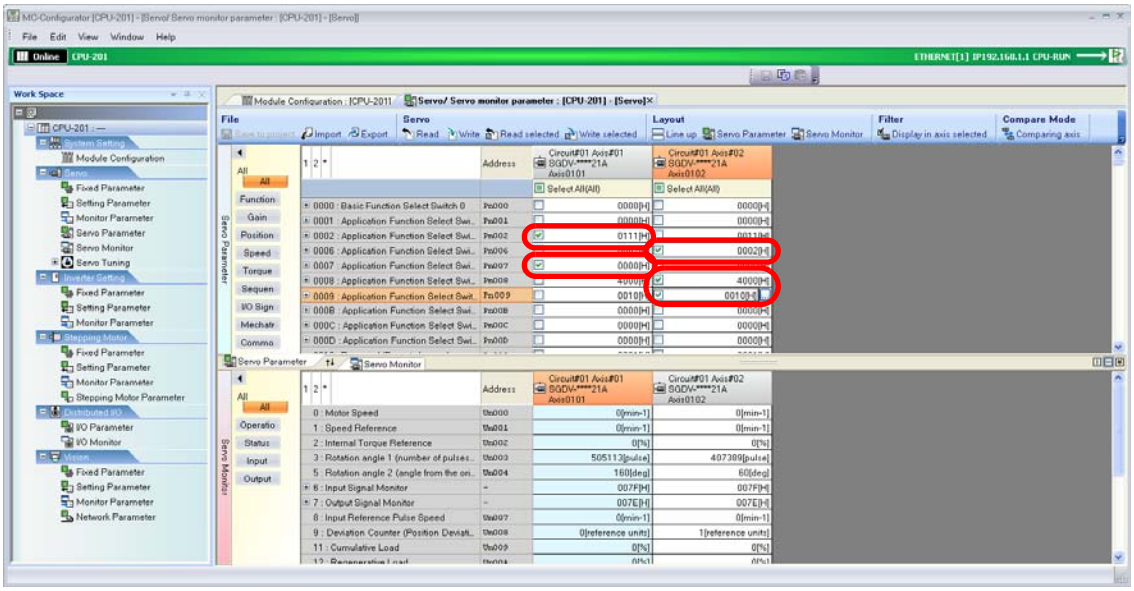


4. Click the **OK** Button.

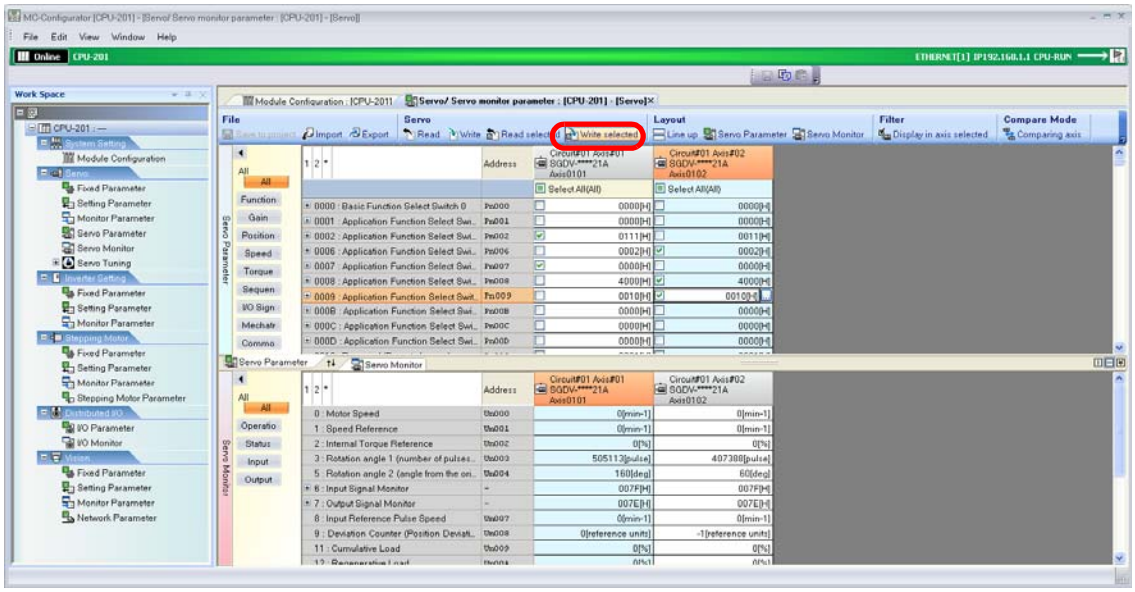


The parameters for the specified axes will be displayed.

5. Select the check boxes for the parameters to write.

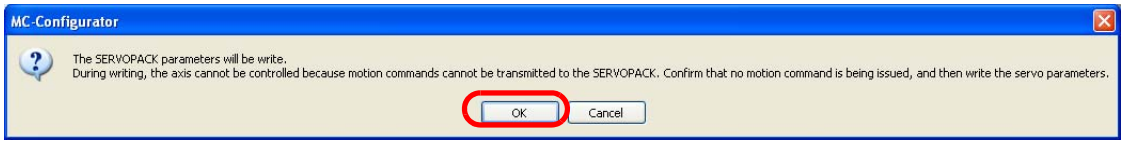


6. Click **Servo** – **Write selected**.



The MC-Configurator Dialog Box will be displayed.

7. Click the **OK** Button.

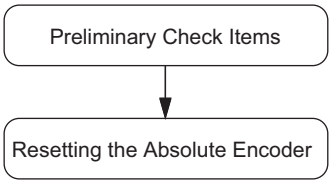


The write to the specified axes will be executed.

This concludes the procedure.

6.8 Using an Absolute Encoder

The flow for setting up an absolute encoder is given below.



☞ *Preliminary Check Items (page 6-26)*

☞ *Initializing the Absolute Encoder (SVC Module) (page 6-32)*

☞ *Initializing the Absolute Encoder (SVB Module) (page 6-37)*

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 monitoring parameter IW□□□00 must be set to 1 (Operation Ready).	Refer to 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 monitoring 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 monitoring 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 monitoring 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 (page 6-27)*

*2. Refer to the following section for detailed procedures.

☞ *Changing Parameter Settings (page 6-29)*

Information

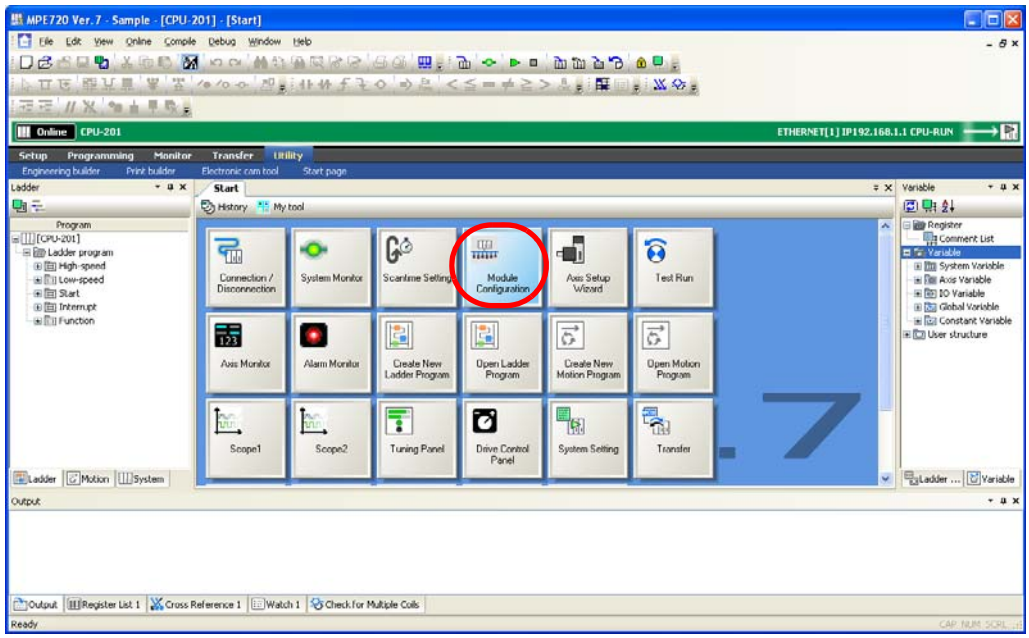
The □□□ portion of the register address for motion parameters is determined by the circuit number and the axis number. Refer to the following manual for details.

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

Checking Parameters

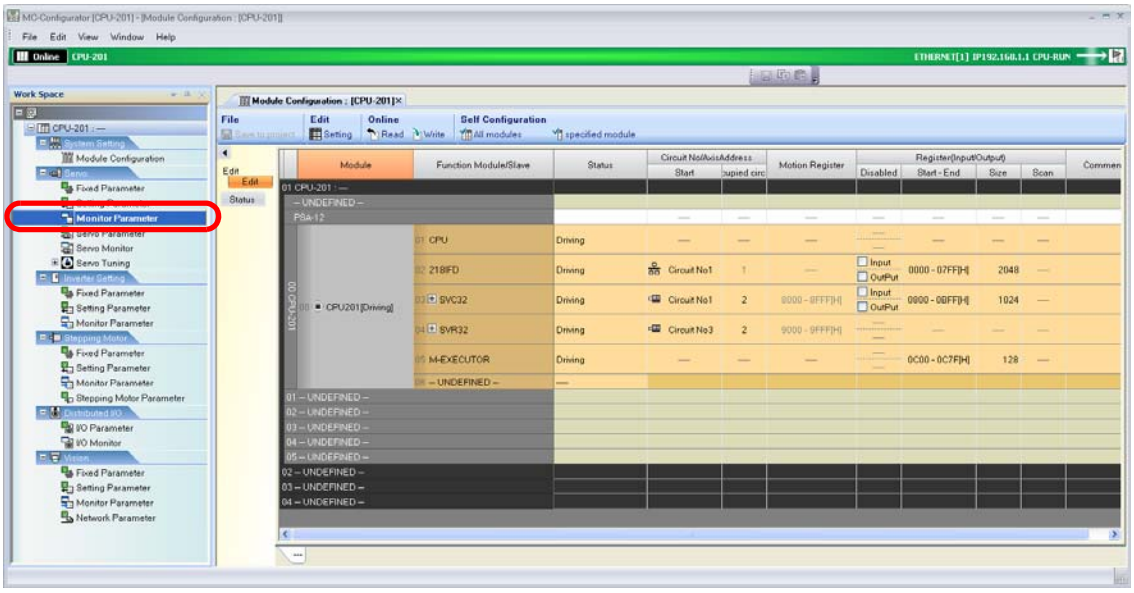
This section gives the procedure for checking parameters, in preparation for using an absolute encoder.

1. Click the **Module Configuration** Button on the My Tool Tab Page.



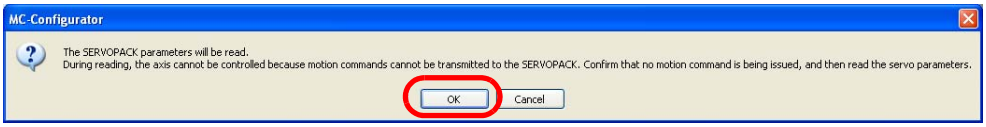
The Module Configuration Tab Page is displayed.

2. Double-click the parameter to check in the Work Space Pane.



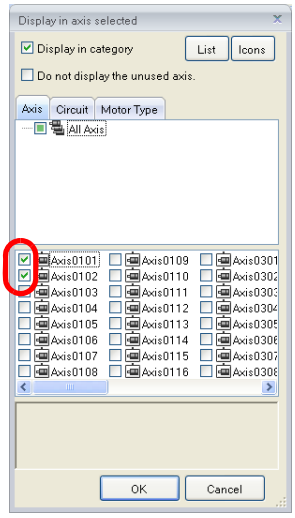
Information

If you double-click a Servo parameter, the following dialog box will be displayed. Read the contents, and then click the **OK** Button.

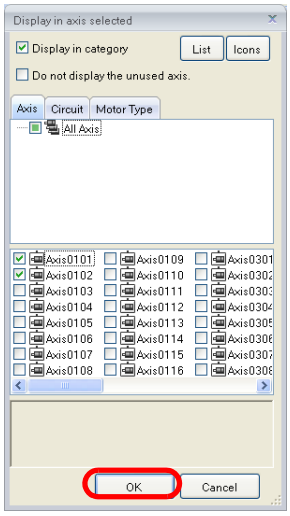


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to check.

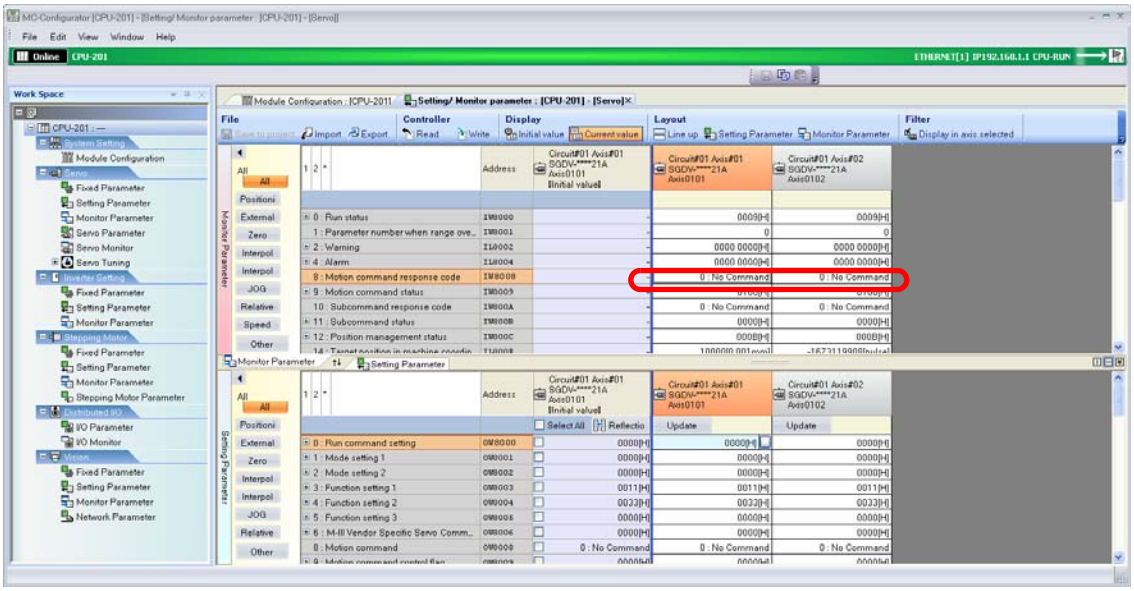


4. Click the **OK** Button.



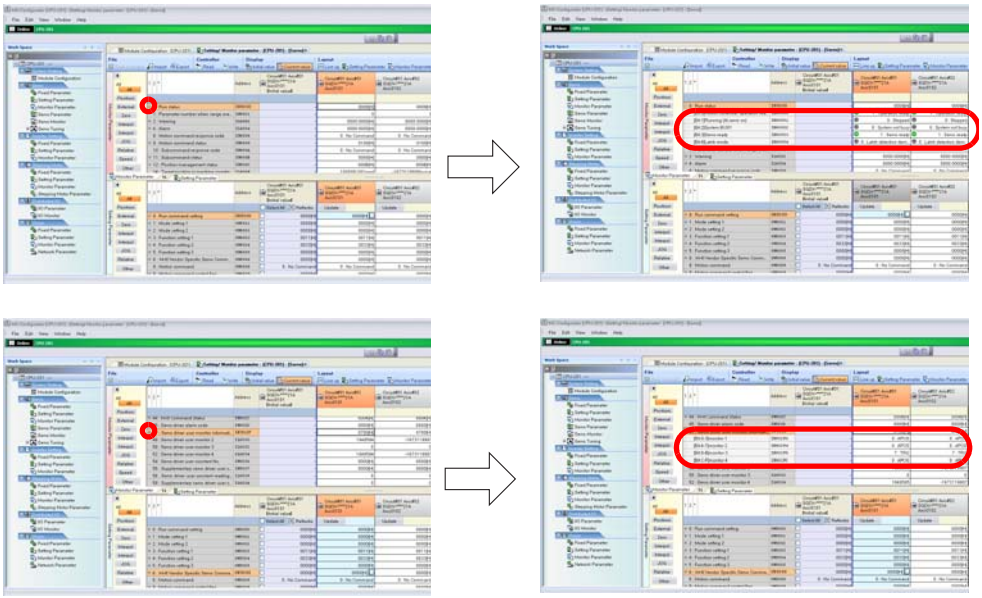
The parameters for the selected axes will be displayed.

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.

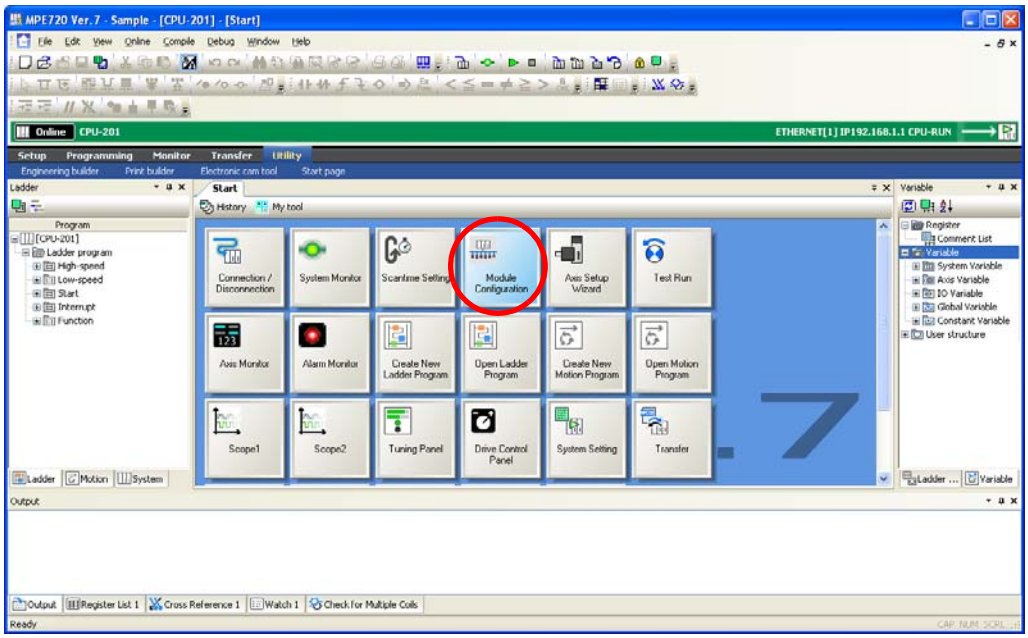


This concludes the procedure.

Changing Parameter Settings

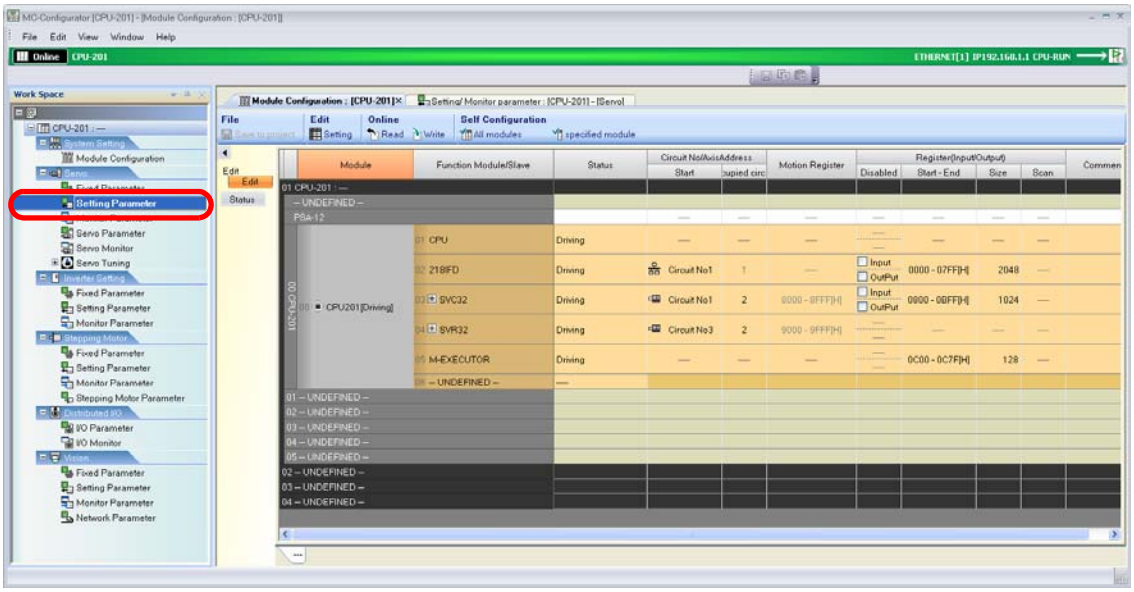
This section gives the procedure for changing parameter settings.

1. Click the **Module Configuration** Button on the My Tool Tab Page.



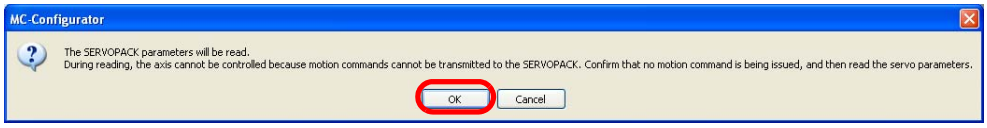
The Module Configuration Tab Page is displayed.

2. Double-click the parameter for which to change the set value in the Work Space Pane.



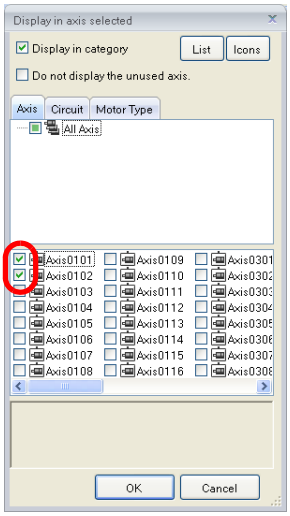
Information

If you double-click a Servo parameter, the following dialog box will be displayed. Read the contents, and then click the **OK** Button.

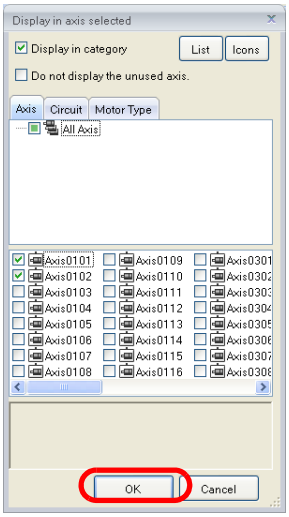


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes for which to change the set values.

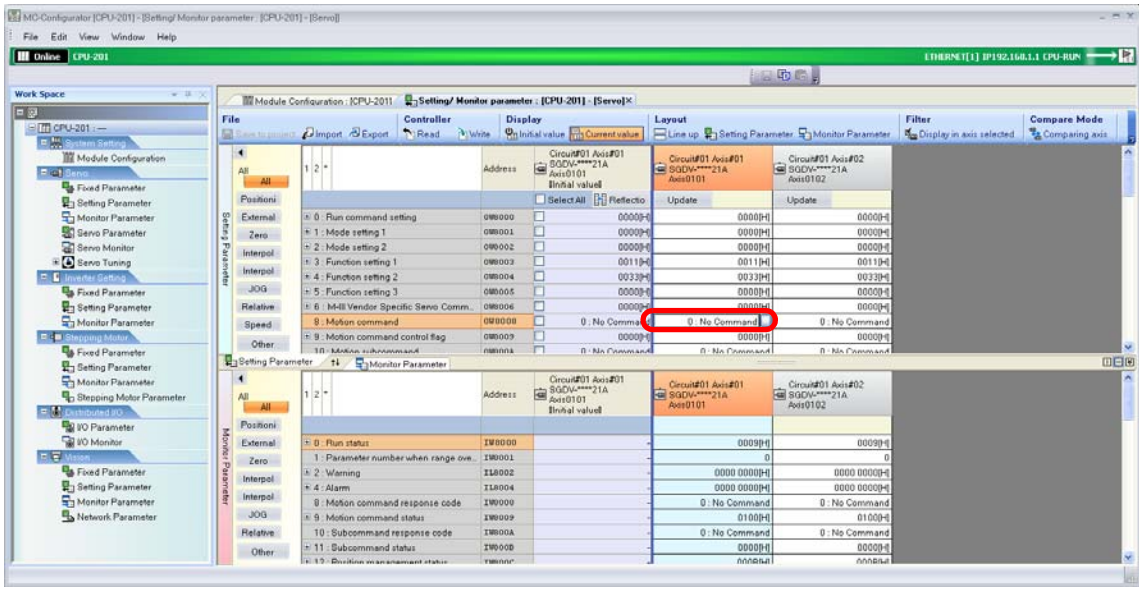


4. Click the **OK** Button.

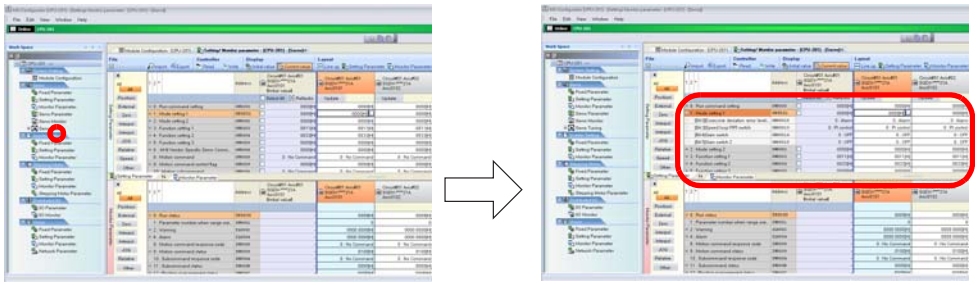


The parameters for the selected axes will be displayed.

5. Double-click the cell that corresponds to the parameter number for which to change the setting.



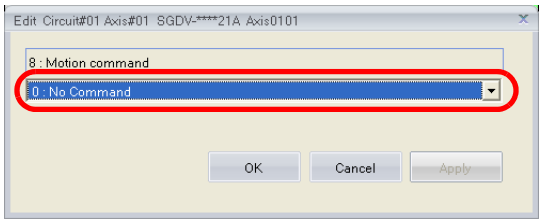
Information To check individual bits or digits, click the **+** Button next to the parameter name to expand the display.



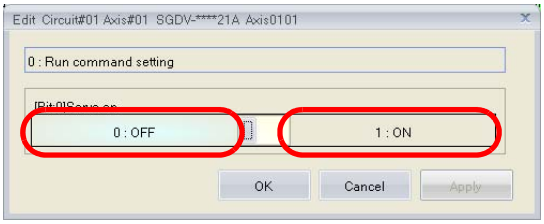
The Edit Dialog Box will be displayed.

6. Set the parameter that you need to change.

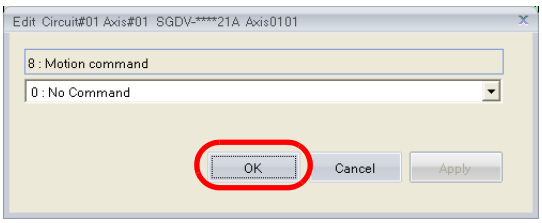
- If a list box appears: Select the value to set from the list.

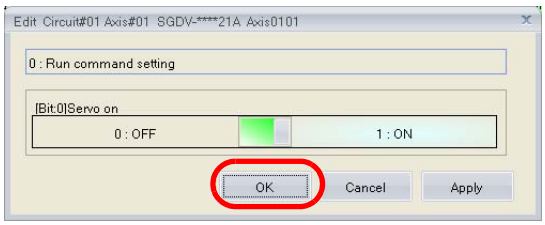


- If an ON or OFF selection appears: Click the setting to set. The button that is highlighted in light blue is the currently selected setting.



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) (page 6-33)*

Initializing the Absolute Encoder Using the Module Configuration Tab Page (SVC Module)

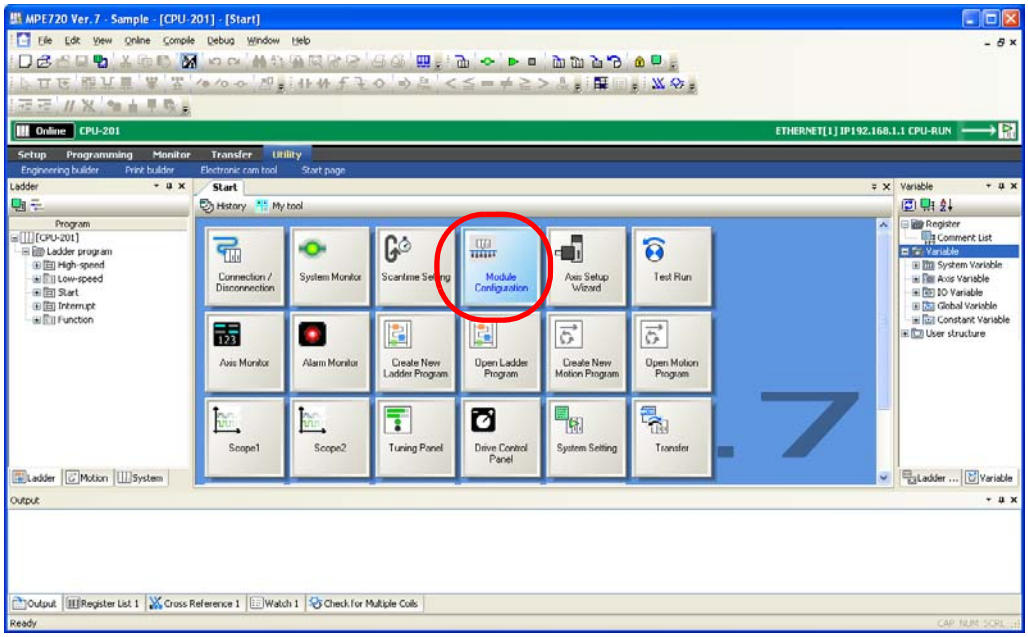
Use the following procedure to initialize the absolute encoder by using the Module Configuration Tab Page.

Information

Refer to the following section for procedures on how to change parameter settings.

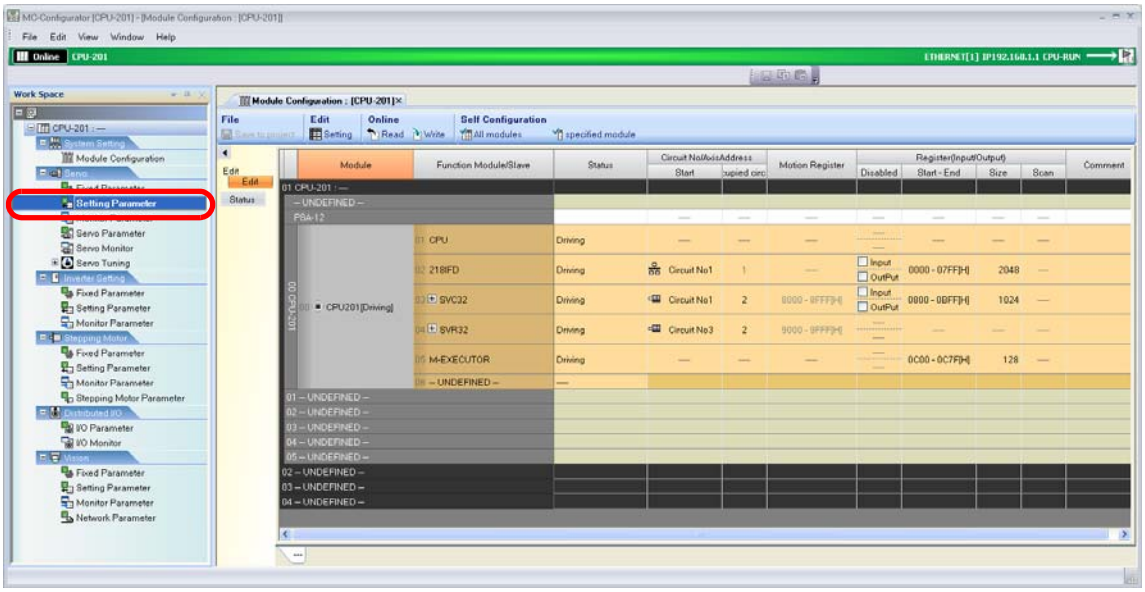
☞ *Changing Parameter Settings (page 6-29)*

1. Click the **Module Configuration Button** on the My Tool Tab Page.



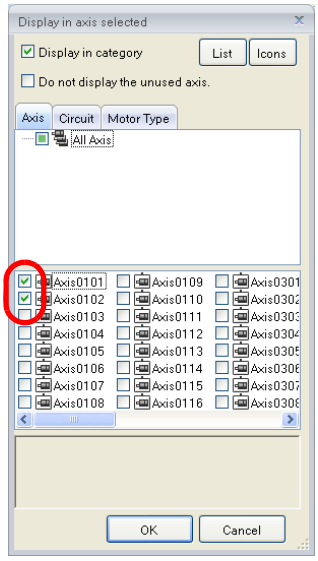
The Module Configuration Tab Page is displayed.

2. Double-click **Setting Parameter** in the Work Space Pane.

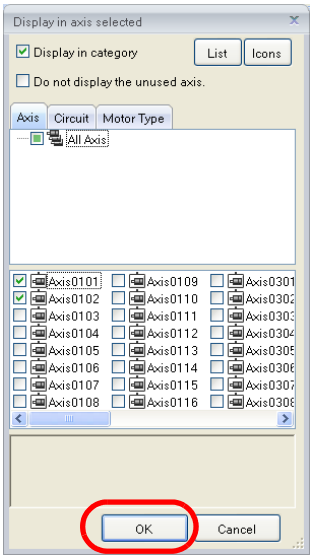


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to display.



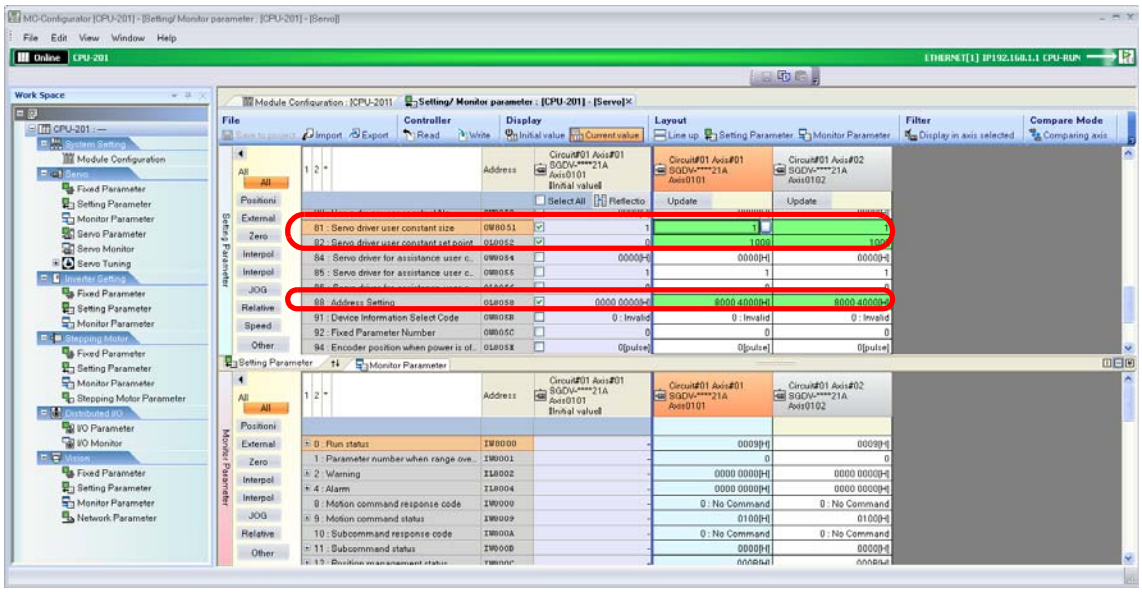
4. Click the **OK** Button.



The setting parameters for the selected axes will be displayed.

5. Set the following setting parameters to the values that are given below.

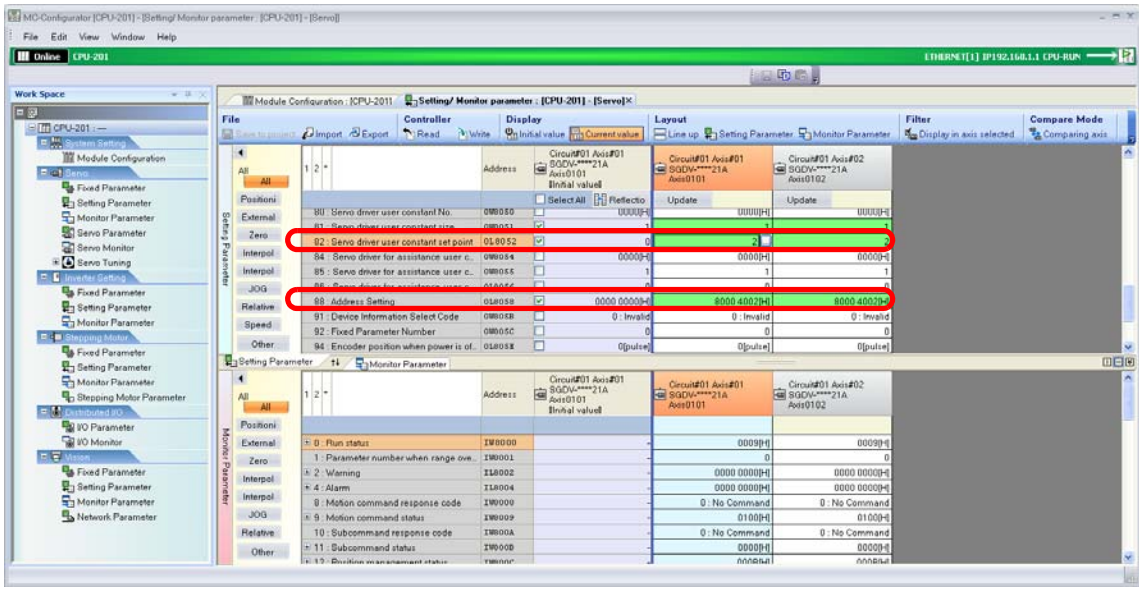
Register Address	Parameter Name	Set Value	Setting Details
OW□□□51	Servo Drive Parameter Size	1	Number of words
OL□□□52	SERVOPACK Parameter Set Value	1008 hex	Absolute encoder reset request code
OL□□□58	Address Setting	80004000 hex	Virtual memory address in the SERVOPACK



The absolute encoder initialization request will be sent.

6. Set the following setting parameters to the values that are given below.

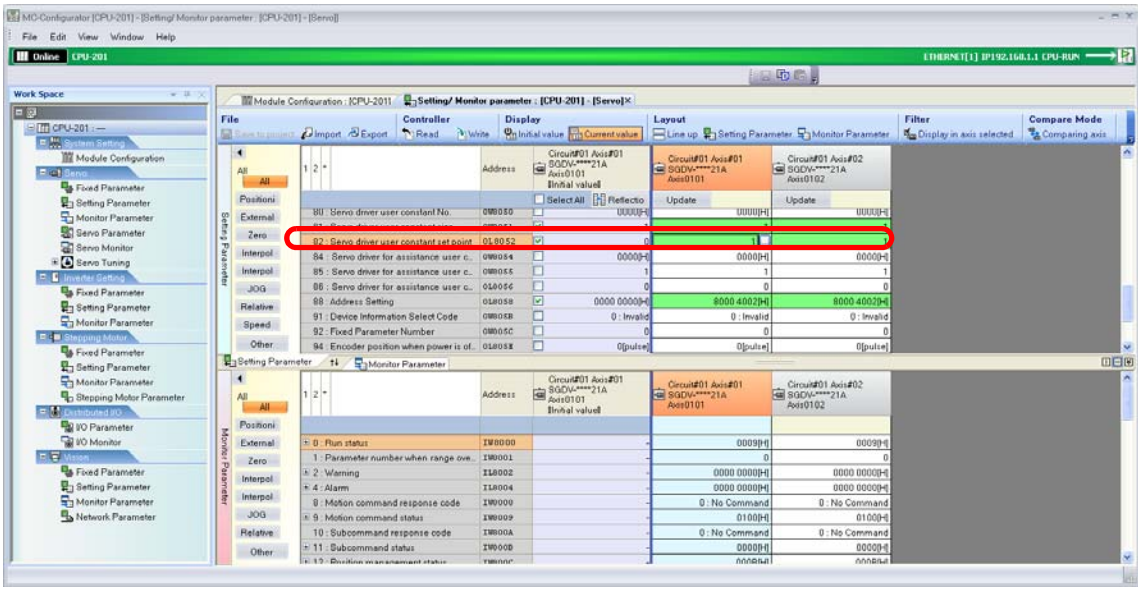
Register Address	Parameter Name	Set Value	Setting Details
OL□□□52	SERVOPACK Parameter Set Value	2	The code required for the preliminary processing
OL□□□58	Address Setting	80004002 hex	Virtual memory address in the SERVOPACK



Preparations will be made for execution of the absolute encoder initialization.

7. Set the following setting parameter to the value that is given below.

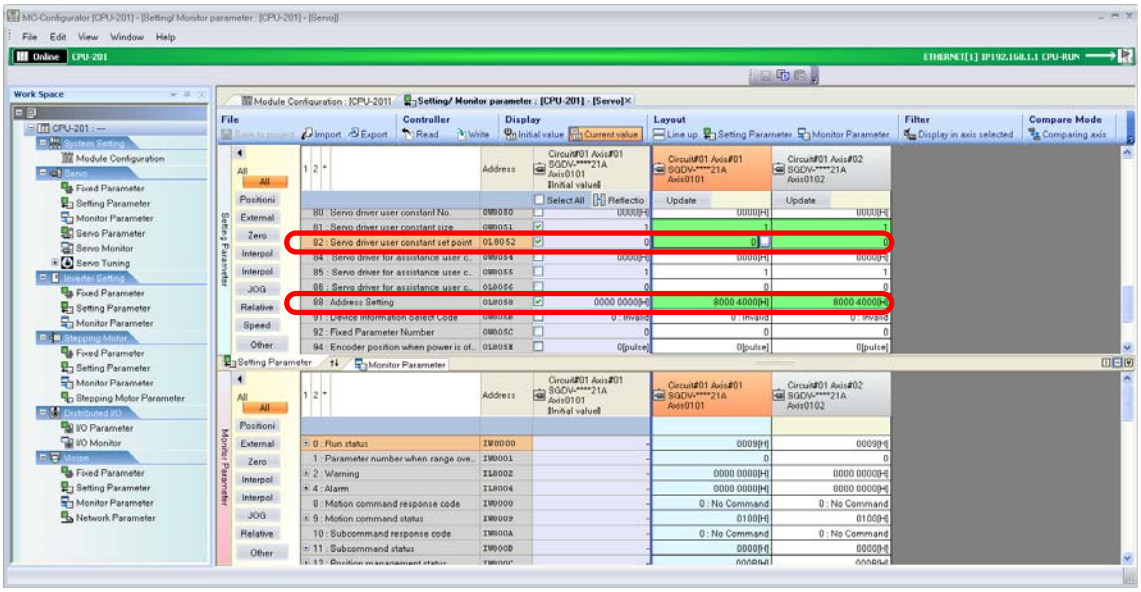
Register Address	Parameter Name	Set Value	Setting Details
OL□□□52	SERVOPACK Parameter Set Value	1	The code required to send the data and perform the calibration operation



The absolute encoder will be initialized.

8. Set the following setting parameters to the values that are given below.

Register Address	Parameter Name	Set Value	Setting Details
OL□□□52	SERVOPACK Parameter Set Value	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.

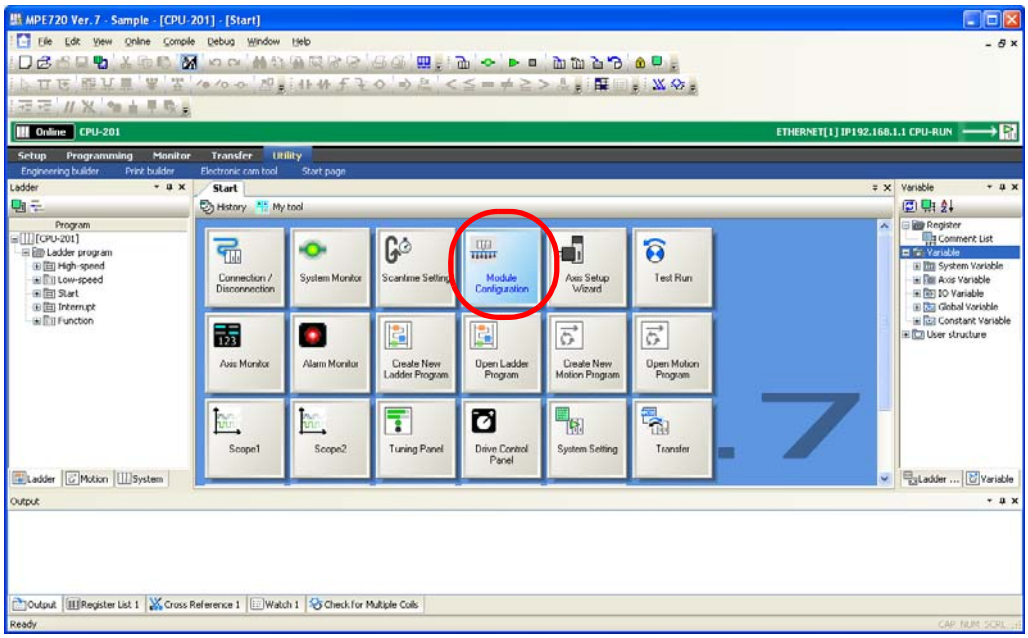
Information

Refer to the following sections for procedures on how to confirm and change parameter settings.

☞ *Checking Parameters (page 6-27)*

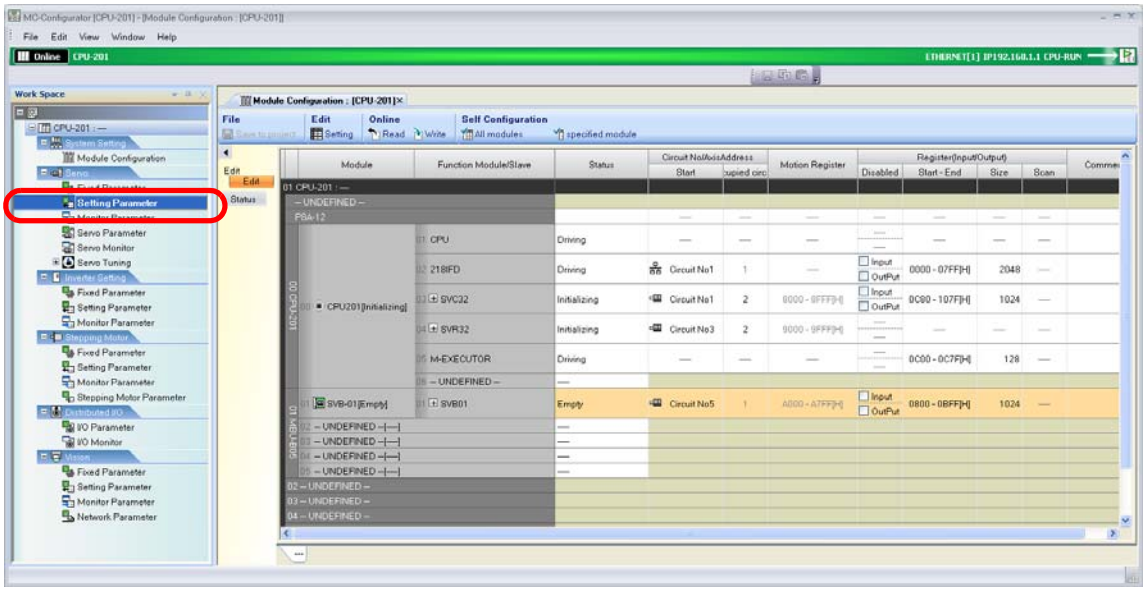
☞ *Changing Parameter Settings (page 6-29)*

1. Click the **Module Configuration** Button on the My Tool Tab Page.



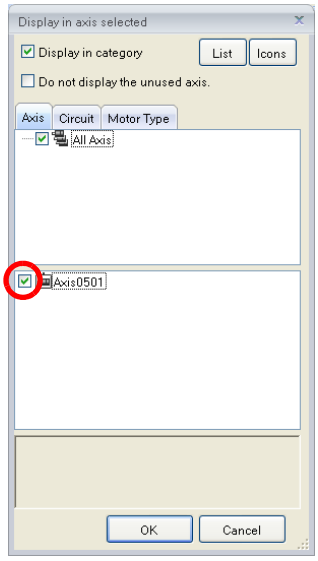
The Module Configuration Tab Page will be displayed.

2. Double-click **Setting Parameter** in the Work Space Pane.

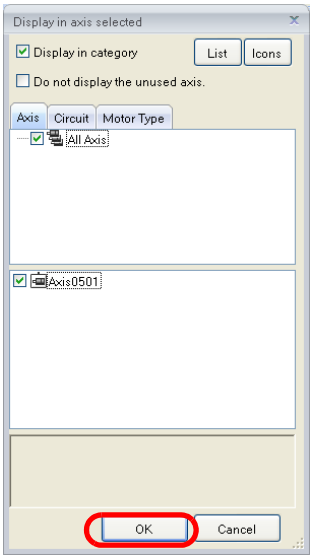


The Display in Axis Selected Dialog Box will be displayed.

3. Select the check boxes for the axes to display.



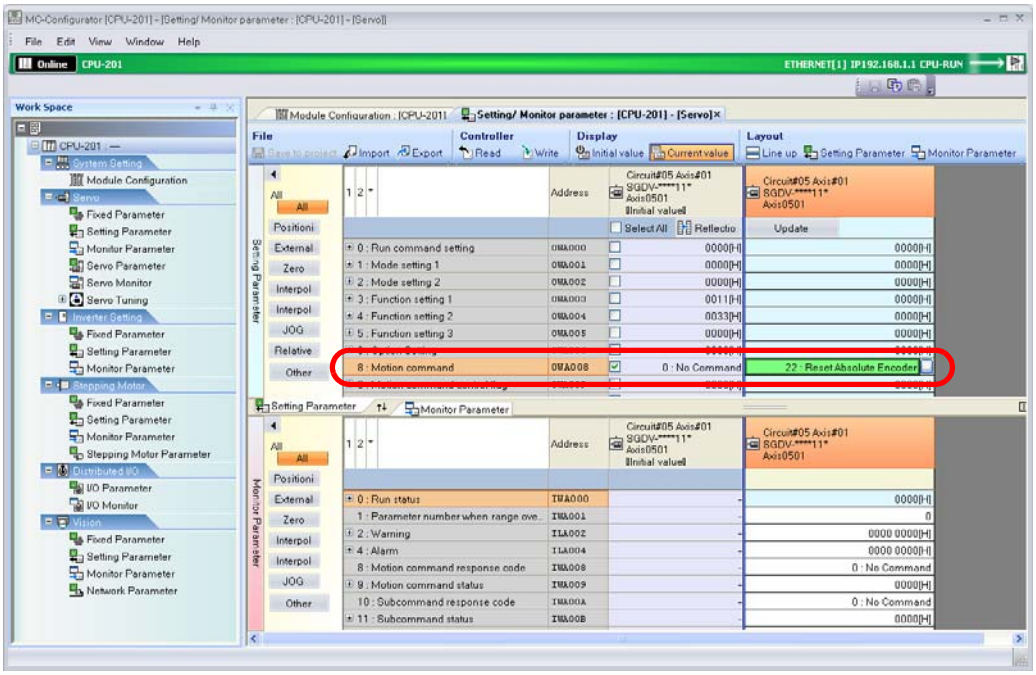
4. Click the **OK** Button.



The setting parameters for the selected axes will be displayed.

5. Set the following setting parameter to the value that is given below.

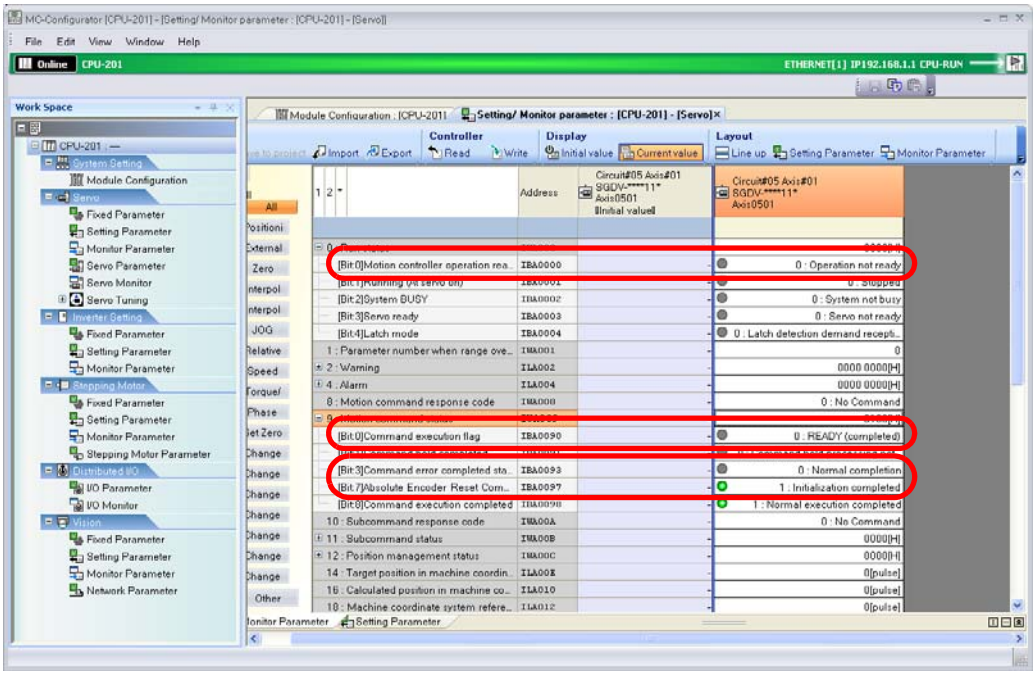
Register Address	Parameter Name	Set Value
OW□□08	Motion Command	22 (Absolute encoder reset)



The absolute encoder will be initialized.

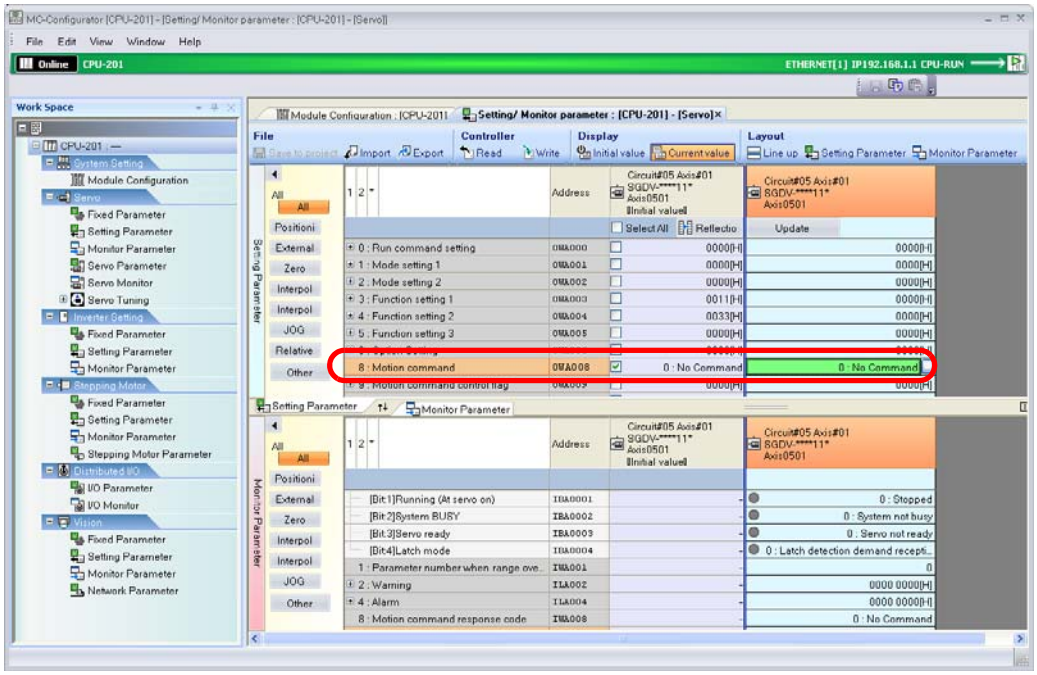
6. Check that the following motion monitoring parameters are set as given below.

- 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.

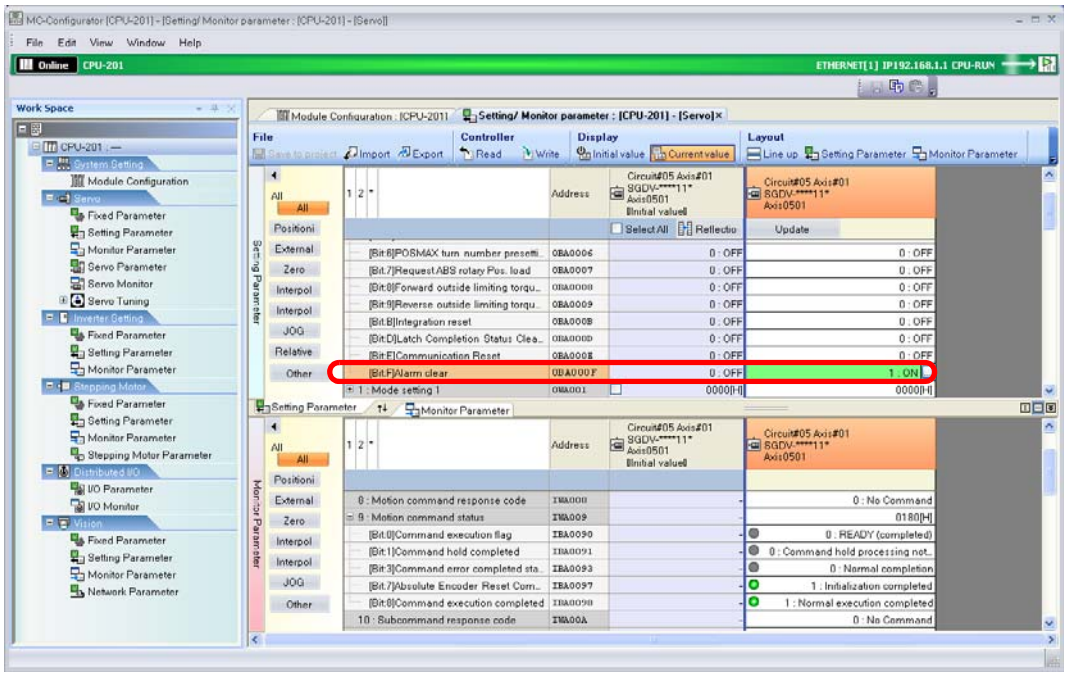
Register Address	Parameter Name	Set Value
OW□□08	Motion Command	0 (No command)



This concludes the initialization of the absolute encoder.

8. Set the following setting parameter to the value that is given below.

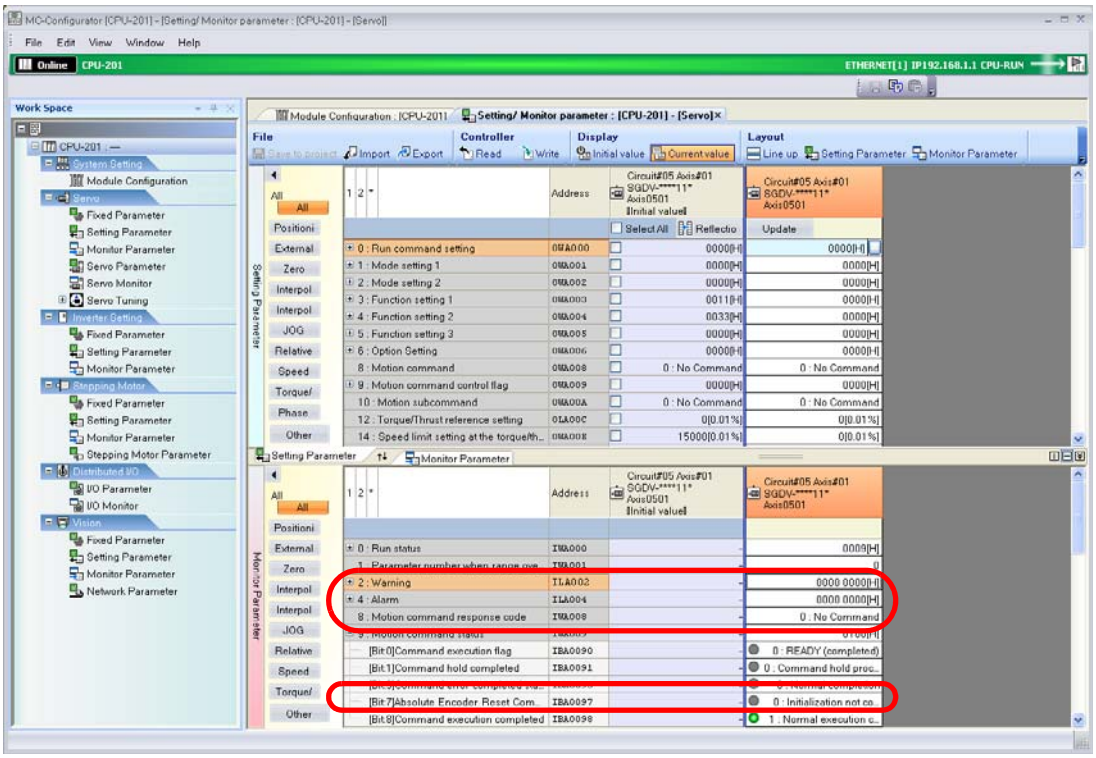
Register Address	Parameter Name	Set Value
OW□□00 BitF	Alarm Clear	1: ON



Any alarms that occurred while initializing the absolute encoder will be reset.

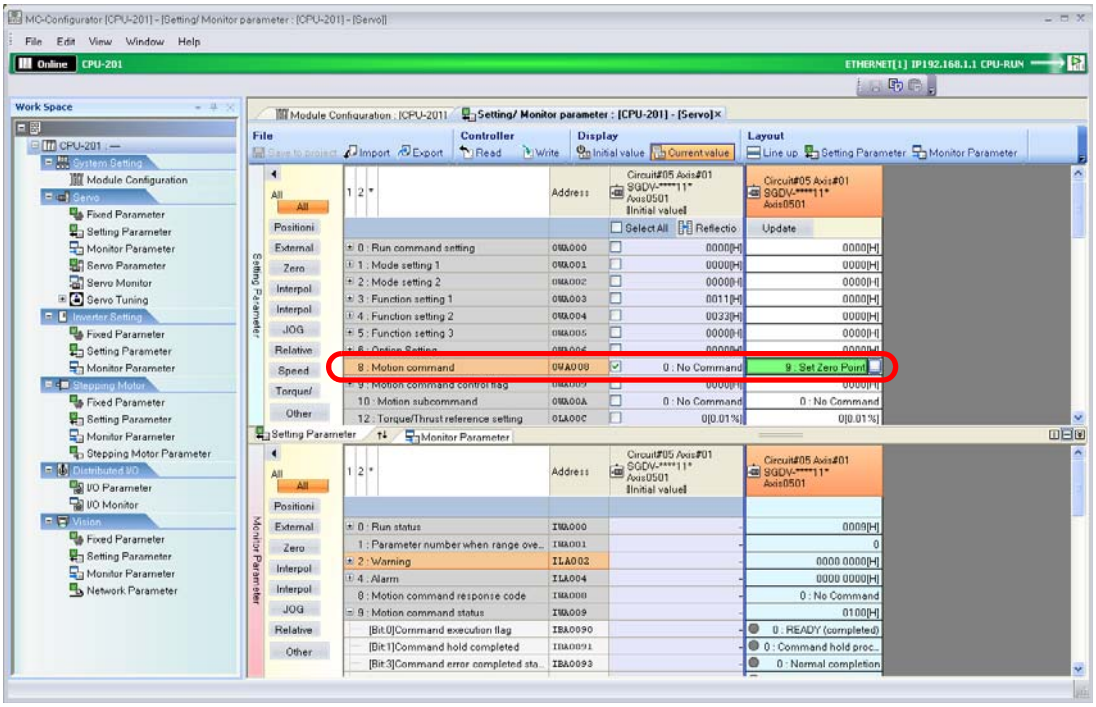
9. Check that the following motion monitoring parameters are set as given below.

- 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.

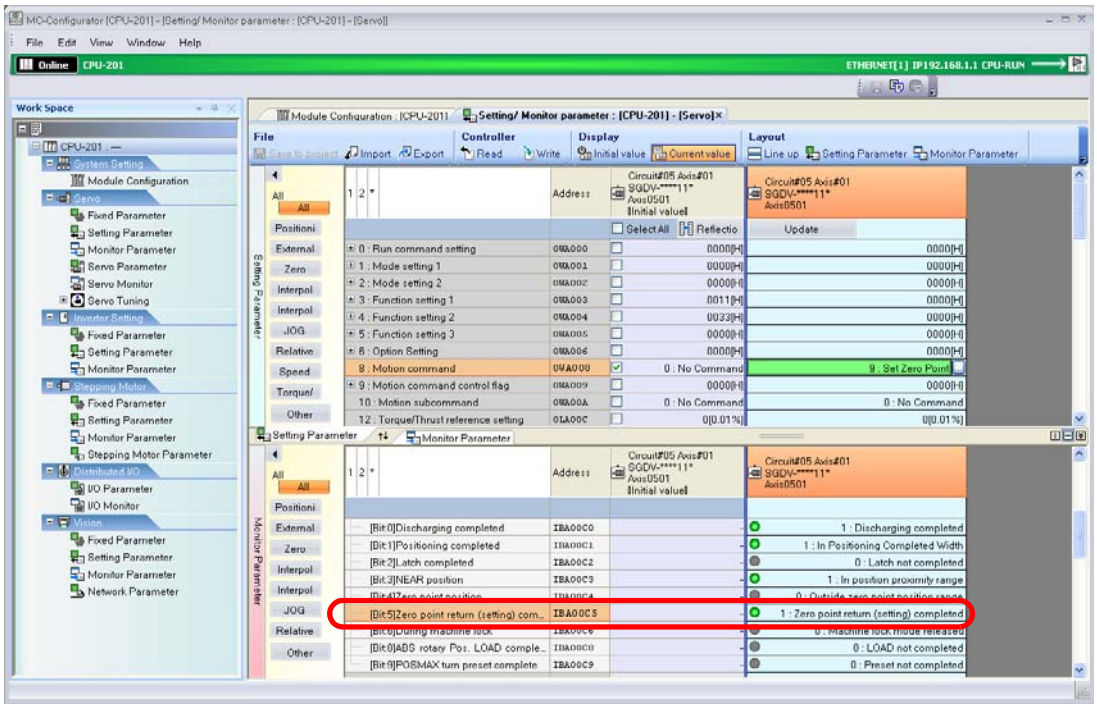
Register Address	Parameter Name	Set Value
OW☐☐08	Motion Command	9 (Set Zero Point)



The zero point will be set.

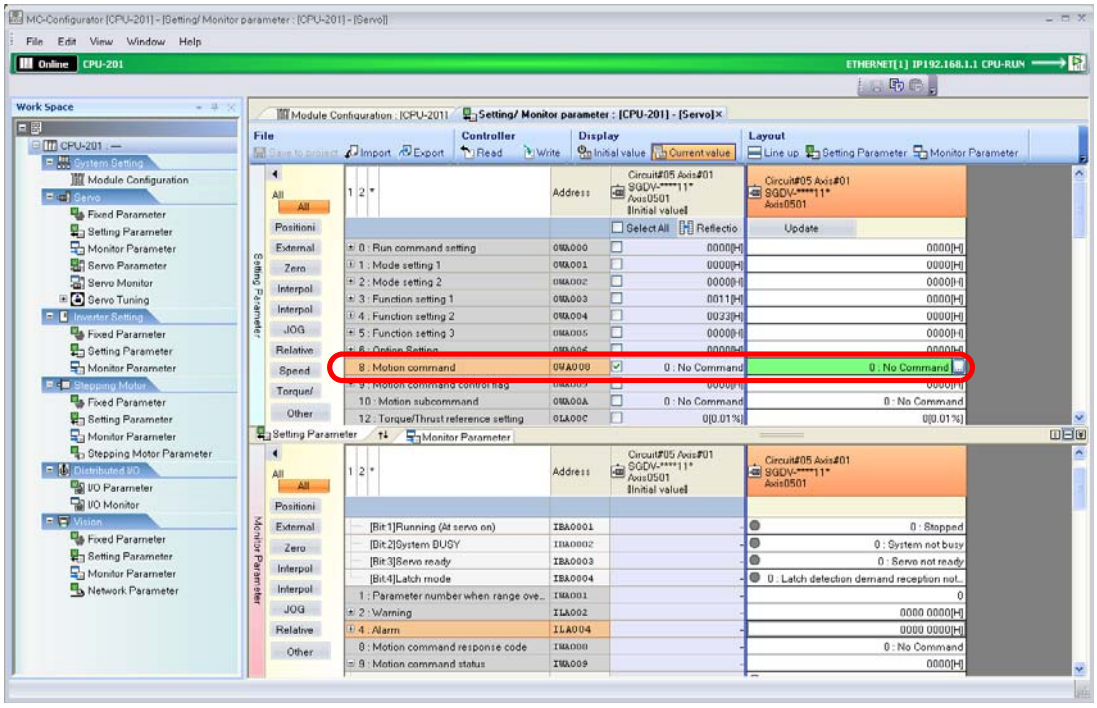
11. Check that the following motion monitoring parameter is set as given below.

- 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.

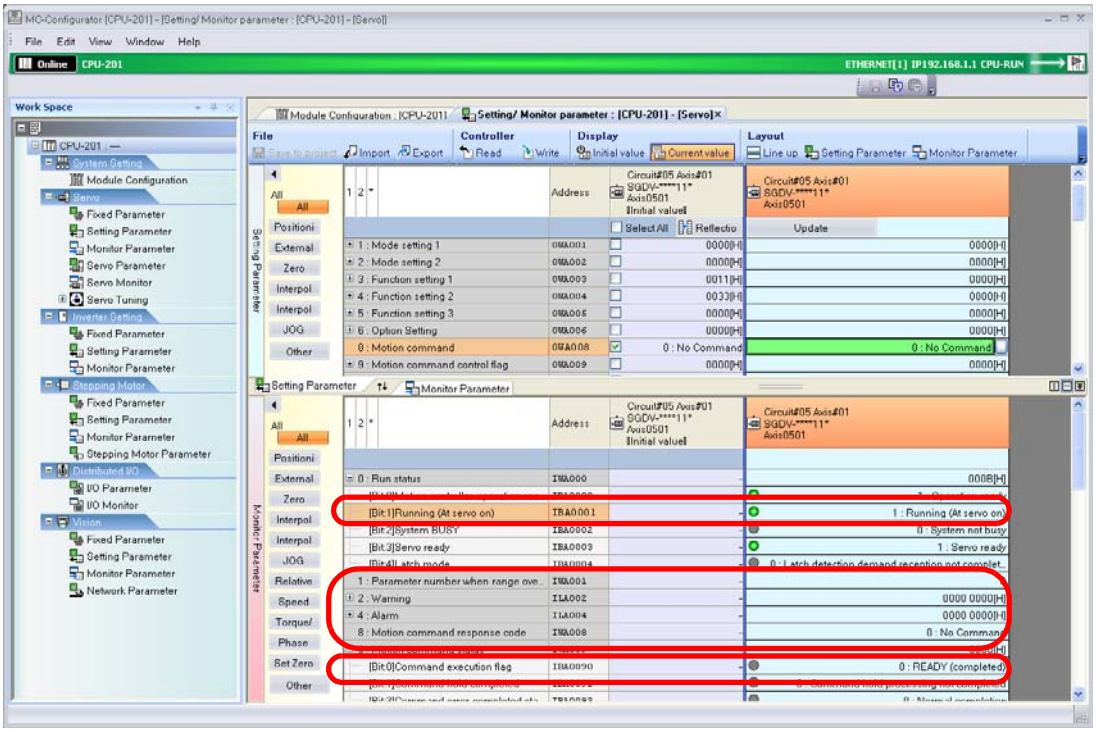
Register Address	Parameter Name	Set Value
OW□□08	Motion Command	0 (No command)



This concludes the zero point setting.

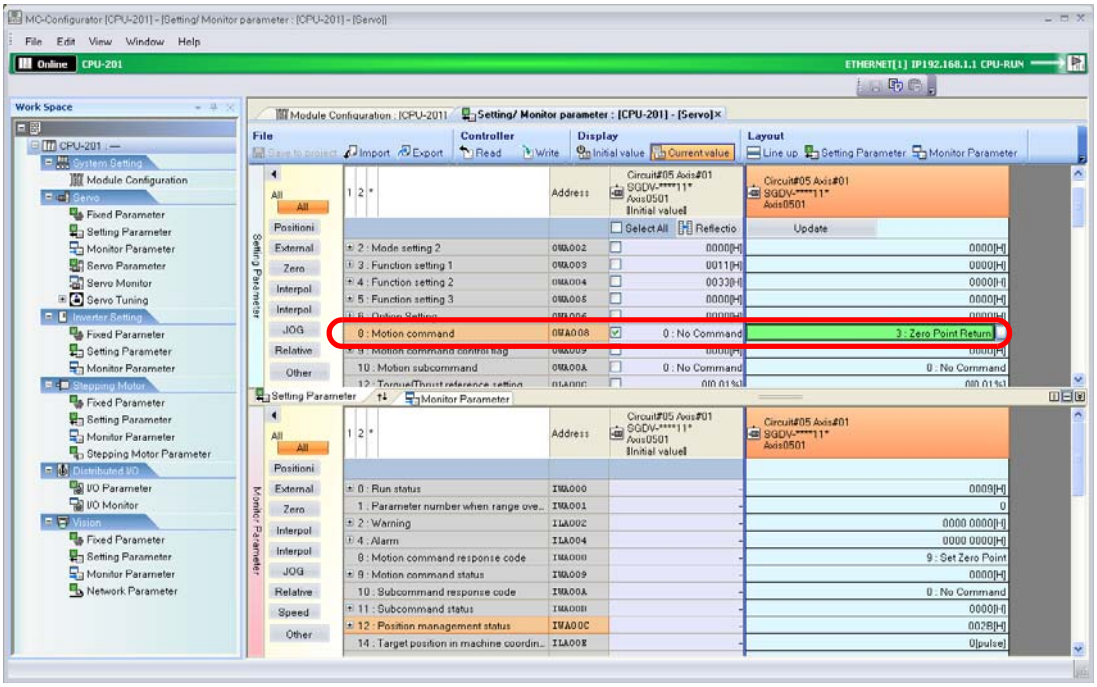
13. Check that the following motion monitoring parameters are set as given below.

- 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.

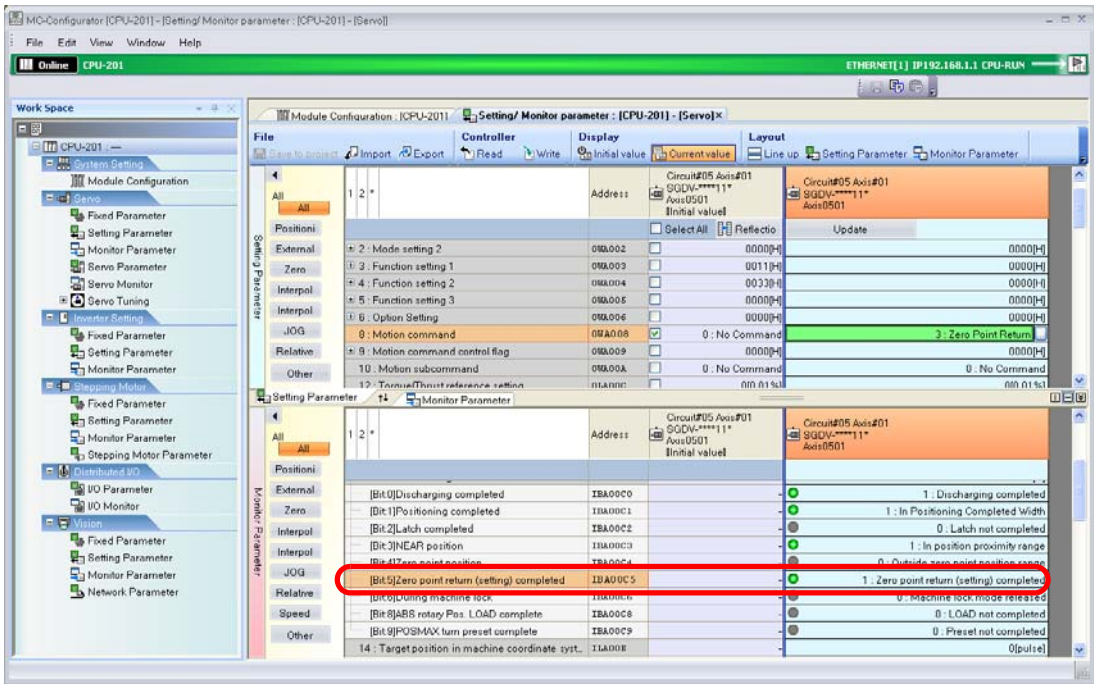
Register Address	Parameter Name	Set Value
OW□□08	Motion Command	3 (Zero Point Return)



A zero point return will be executed.

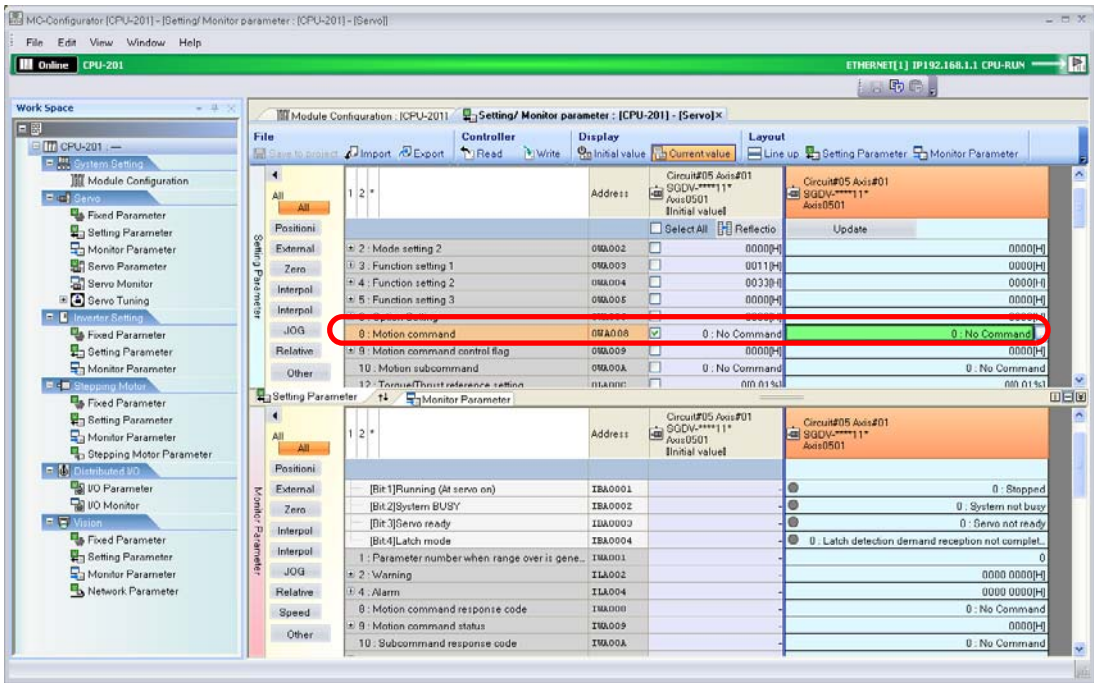
15. Check that the following motion monitoring parameter is set as given below.

- 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	Set Value
OW□□08	Motion Command	0 (No command)



This concludes the zero point return.

This concludes the procedure.

Transferring Data

7

This chapter describes the operations that are used to transfer data.

7.1 Importing and Exporting Axis Parameters 7-2
Importing 7-2
Exporting 7-6

7.2 Importing and Exporting Register Data 7-9
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7.3 Importing and Exporting Comments and Variables 7-14
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Importing MPE720 Version 5 CMT Files 7-32

7.4 Data Format for Importing and Exporting 7-34

7.5 Acquiring Trace Data Over an Extended Period of Time 7-36

7.6 Transferring the Program to the Machine Controller . . 7-47

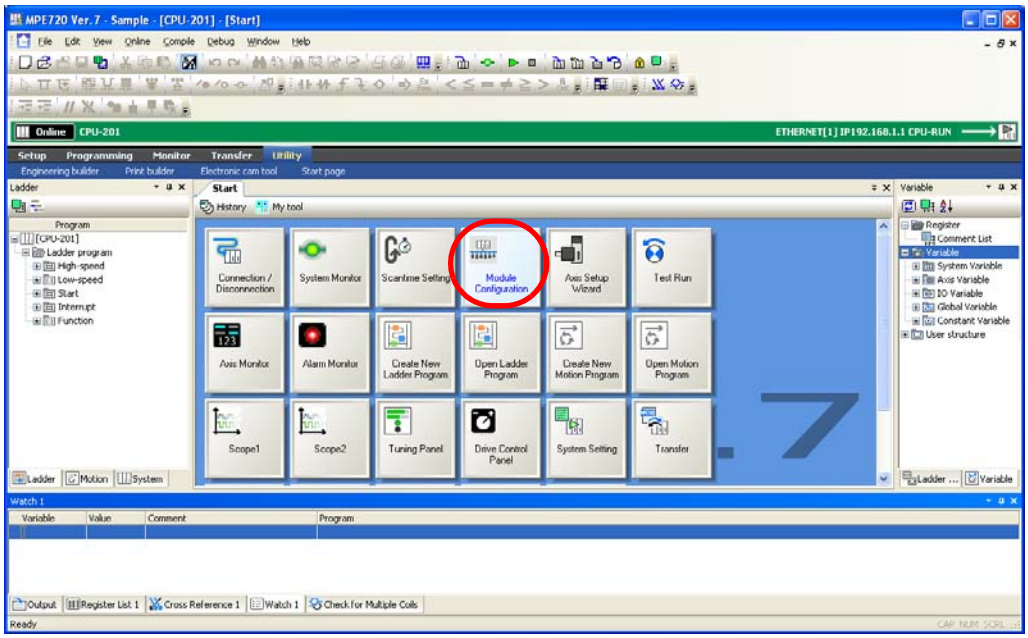
7.1 Importing and Exporting Axis Parameters

This section gives the procedures for importing axis parameters from and exporting axis parameters to external CSV files.

Importing

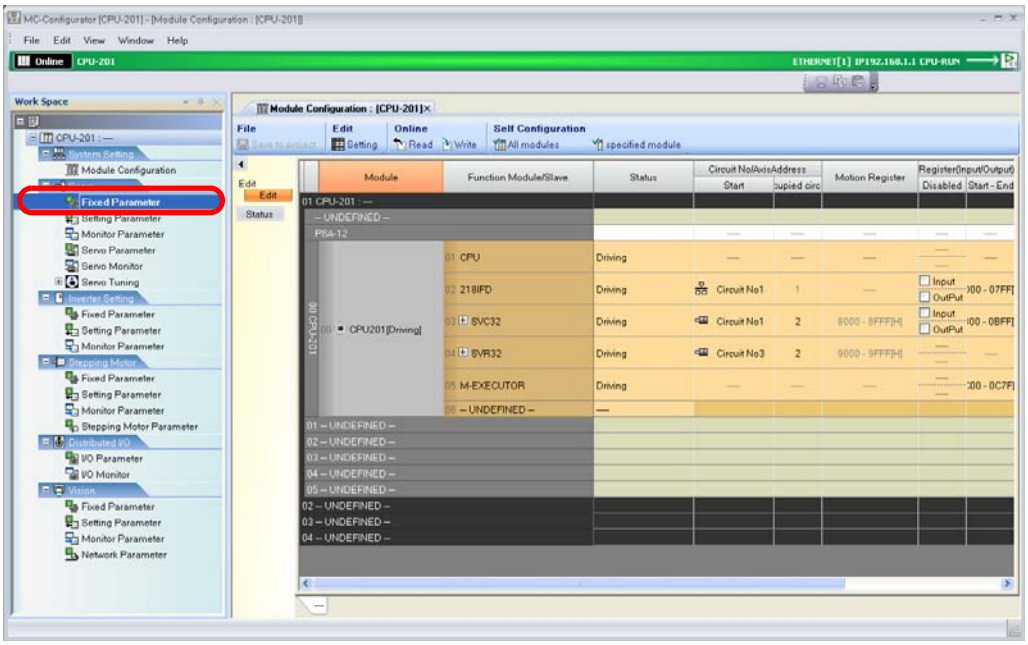
Use the following procedure to import axis parameters from an external CSV file.

1. Establish an online connection or open a project file.
2. Click the **Module Configuration** Button on the My Tool Tab Page.



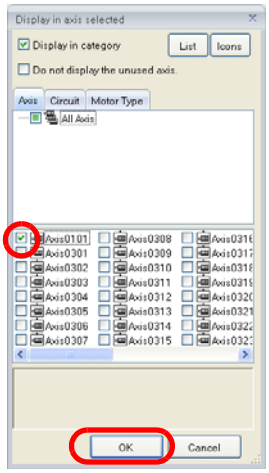
The Module Configuration Tab Page will be displayed.

3. Double-click the parameters to import.



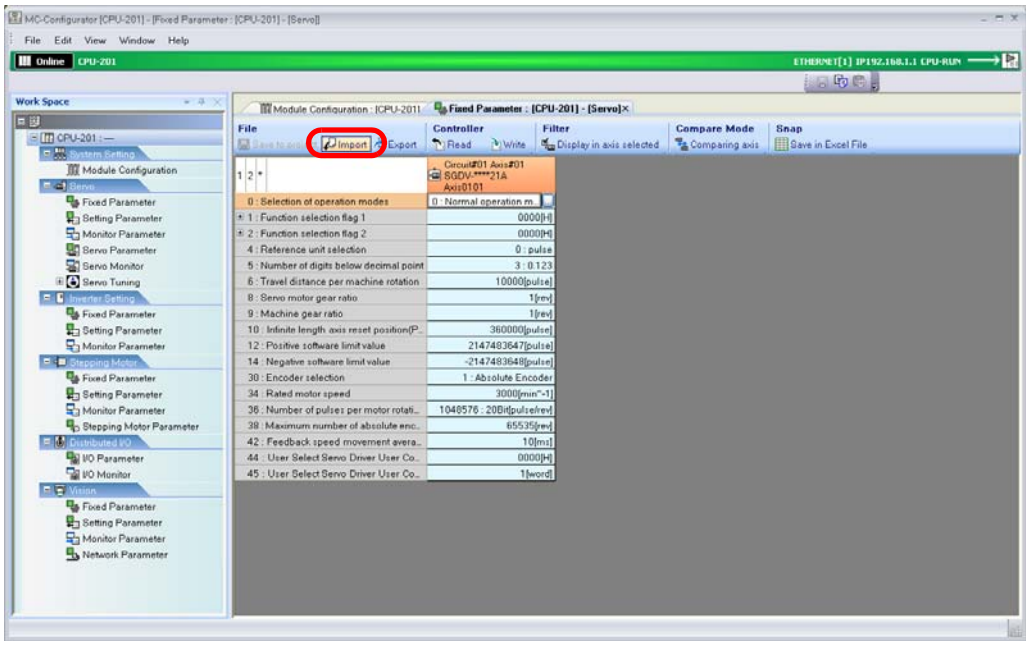
The Display in Axis Selected Dialog Box will be displayed.

4. Select the axes to display and click the **OK** Button.



The tab page for the selected motion parameters will be displayed.

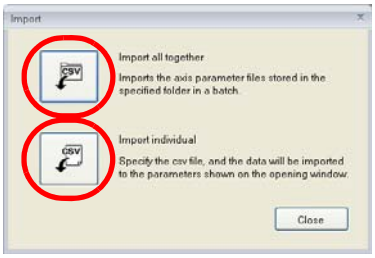
5. Select ***File*** – ***Import*** from the menu bar.



The Import Dialog Box will be displayed.

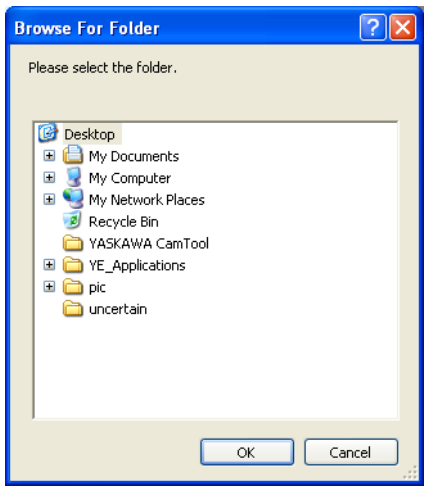
6. Click the **Import all together** Button or the **Import individual** Button.

- Import all together: Imports multiple axis parameters in a batch.
- Import individual: Imports individual axis parameters.

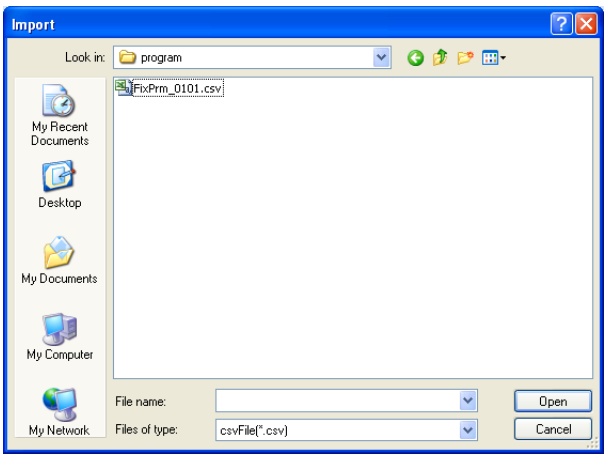


- If you clicked the **Import all together** Button: The Browse for Folder Dialog Box will be displayed.
- If you clicked the **Import individual** Button: The Import Dialog Box will be displayed.

Import All Together



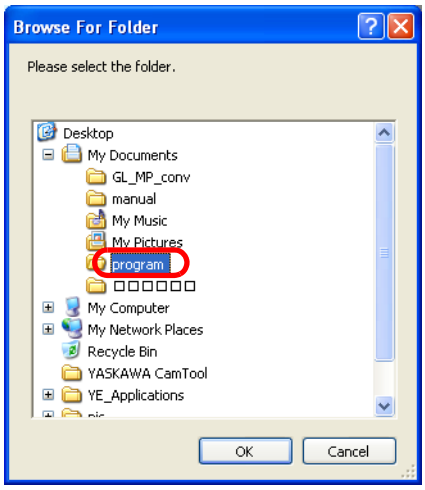
Import Individual



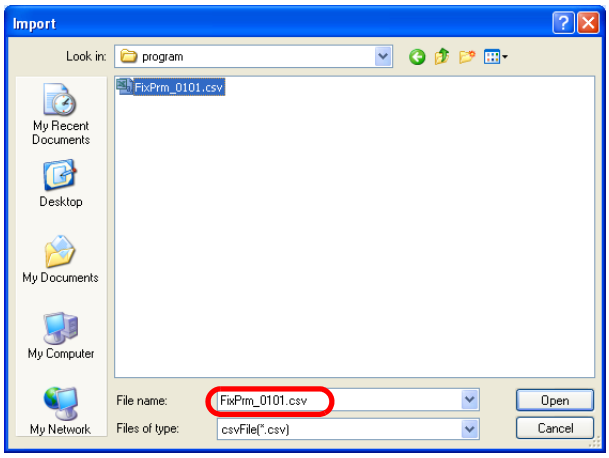
7. Select the folder or file to import.

- Import all together: Select the folder that contains multiple files to import.
- Import individual: Select the file to import.

Import All Together

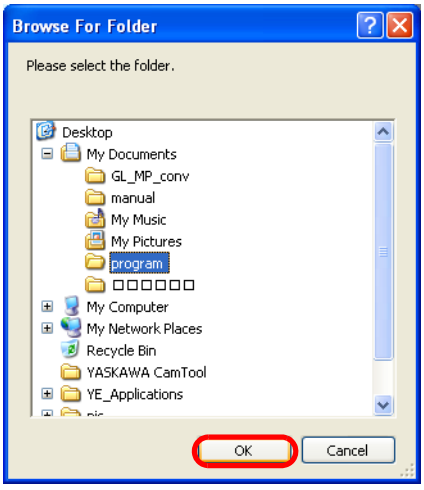


Import Individual

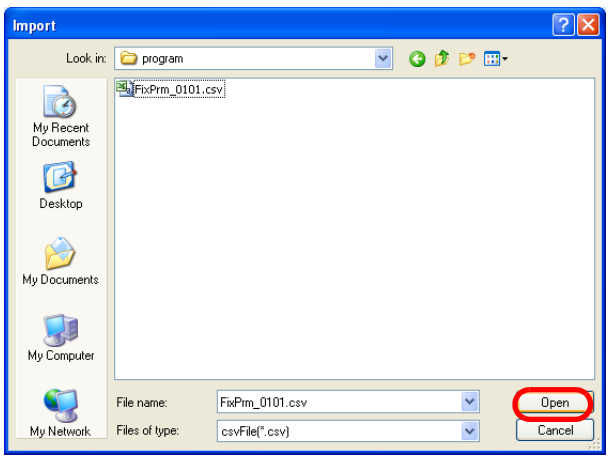


8. Click the **OK** Button or the **Open** Button.

Import All Together

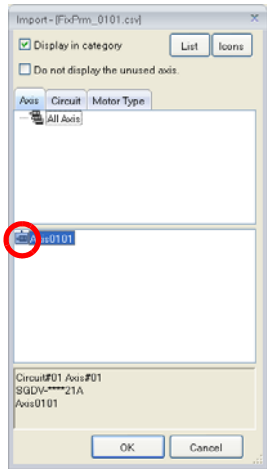


Import Individual

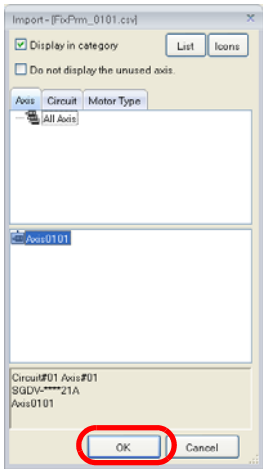


The Import Dialog Box will be displayed.

9. Select the axis for which to import the parameters.

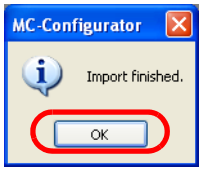


10. Click the **OK** Button.



When the import has been completed, the MC-Configurator Dialog Box will be displayed.

11. Click the **OK** Button.

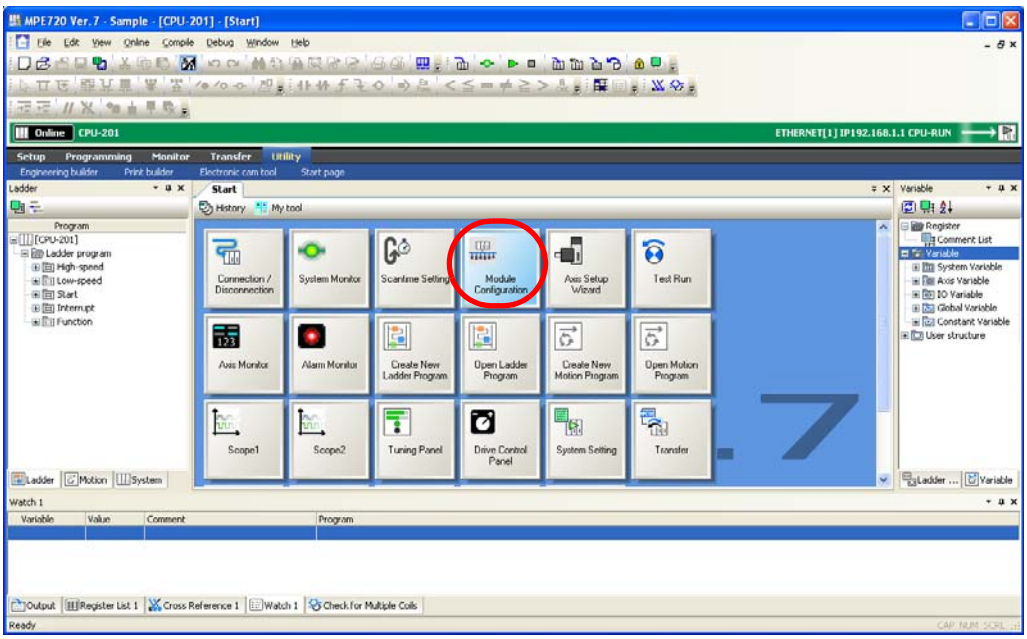


This concludes the procedure.

Exporting

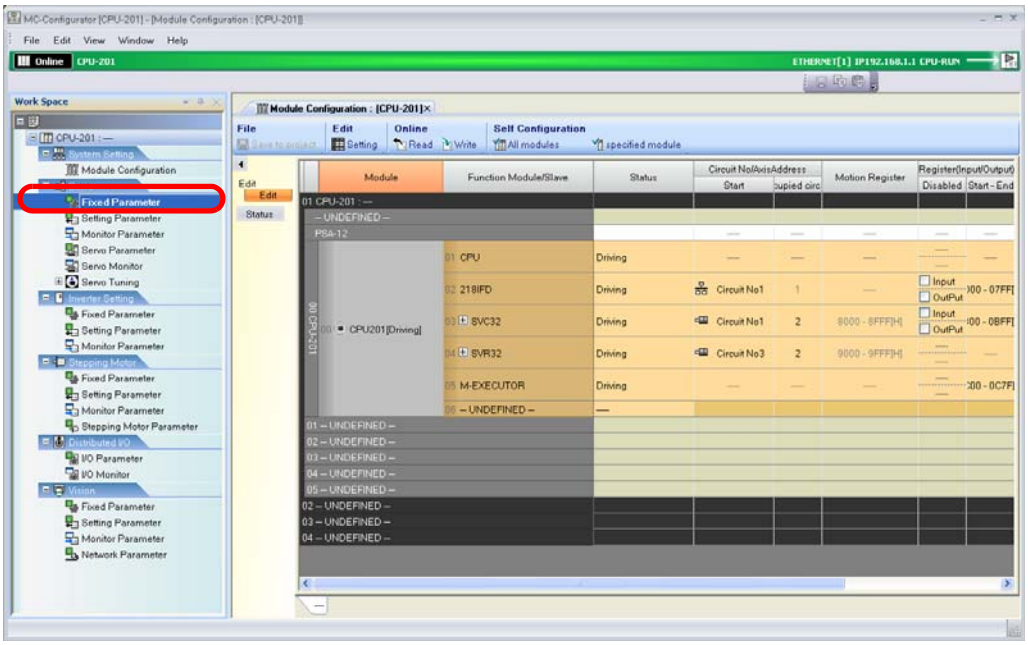
Use the following procedure to export axis parameters to an external CSV file.

1. Establish an online connection or open a project file.
2. Click the **Module Configuration** Button on the My Tool Tab Page.



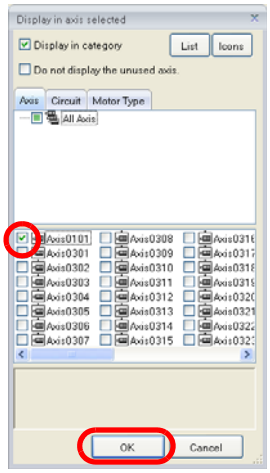
The Module Configuration Tab Page will be displayed.

3. Double-click the parameters to export.



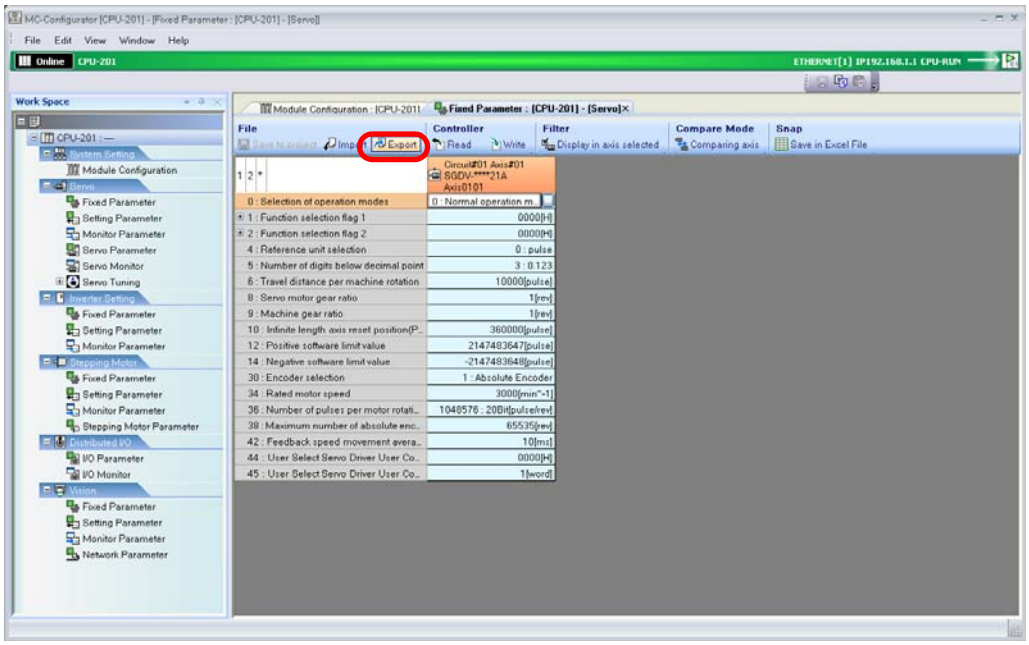
The Display in Axis Selected Dialog Box will be displayed.

4. Select the axes to display and click the **OK** Button.



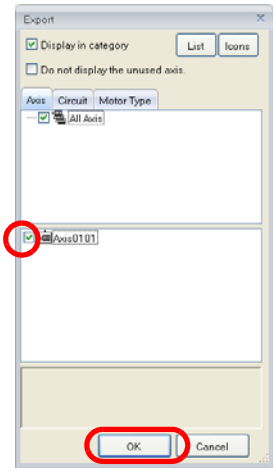
The tab page for the selected parameters will be displayed.

5. Select ***File*** – ***Export*** from the menu bar.



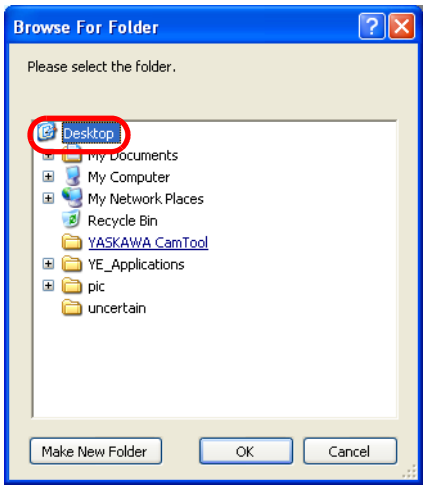
The Export Dialog Box will be displayed.

6. Select the axis for which to export the parameters and click the **OK** Button.

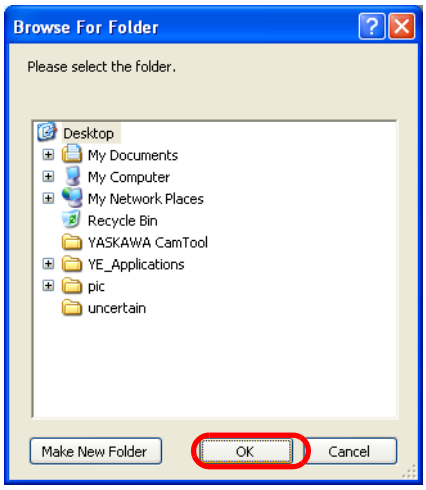


The Browse for Folder Dialog Box will be displayed.

7. Select the folder in which to store the exported CSV file.

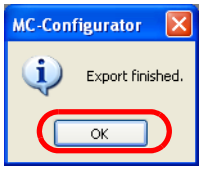


8. Click the **OK** Button.



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 specified folder.

Information

The name of the data will be displayed as given below.

Data name example FixPrm _ □□ □□ .csv

- Extension
- Circuit number
- Axis number
- Underscore
- Parameter name
  - Fixed parameters: FixPrm
  - Setting parameters: SetPrm
  - Servo parameters: SrvPrm

This concludes the procedure.

7.2 Importing and Exporting Register Data

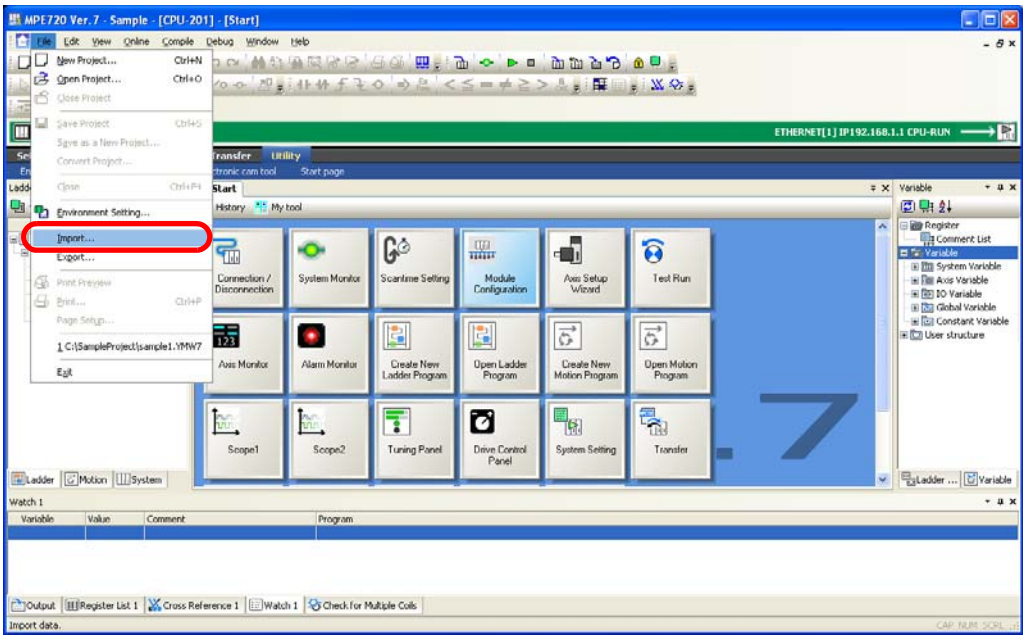
You can import register data from or export register data to external CSV files to easily back up or change the register data. Users may also create the data that is imported.

This section gives the procedures for importing register data from and exporting register data to external CSV files.

Importing

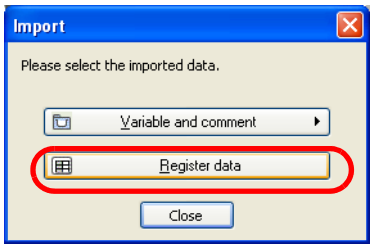
Use the following procedure to import register data from an external CSV file.

1. Select ***File*** – ***Import*** from the menu bar.



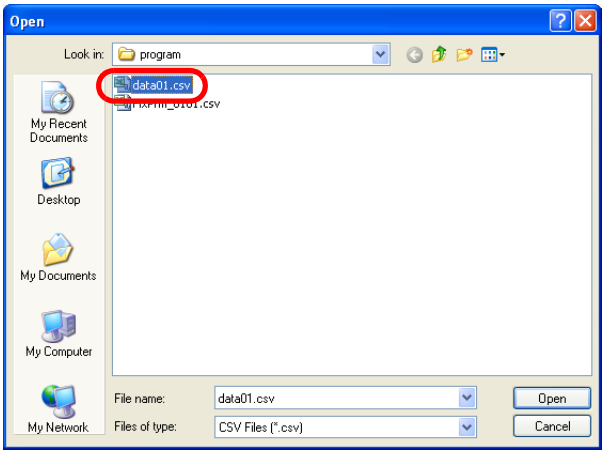
The Import Dialog Box will be displayed.

2. Click the **Register data** Button.

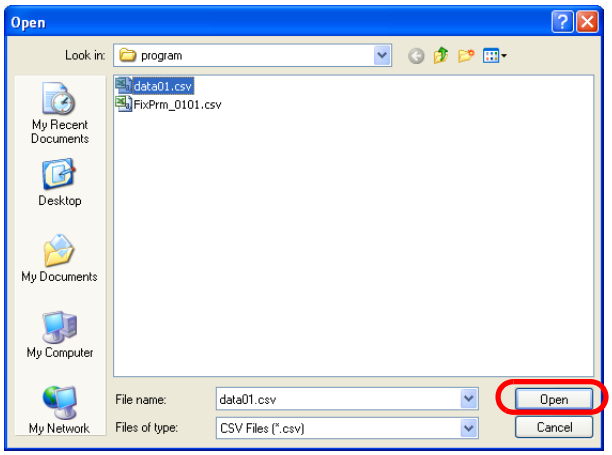


The Open Dialog Box will be displayed.

3. Select the CSV file from which to import the register data.

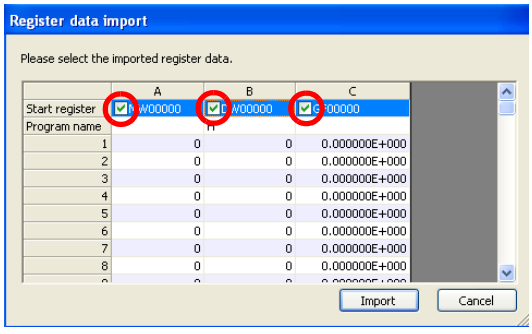


4. Click the **Open** Button.

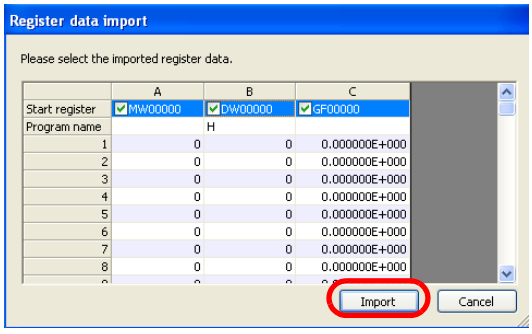


The Register Data Import Dialog Box will be displayed.

5. Select the check boxes for the registers to import.



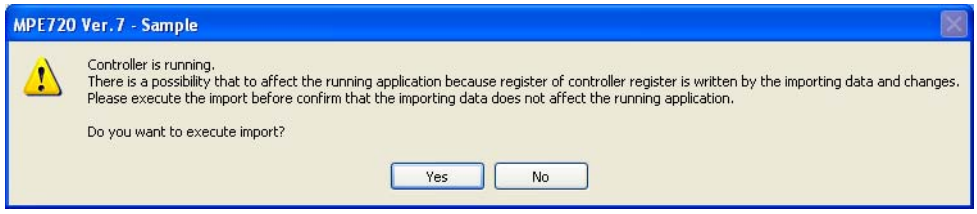
6. Click the **Import** Button.



The data will be imported.

Note

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.

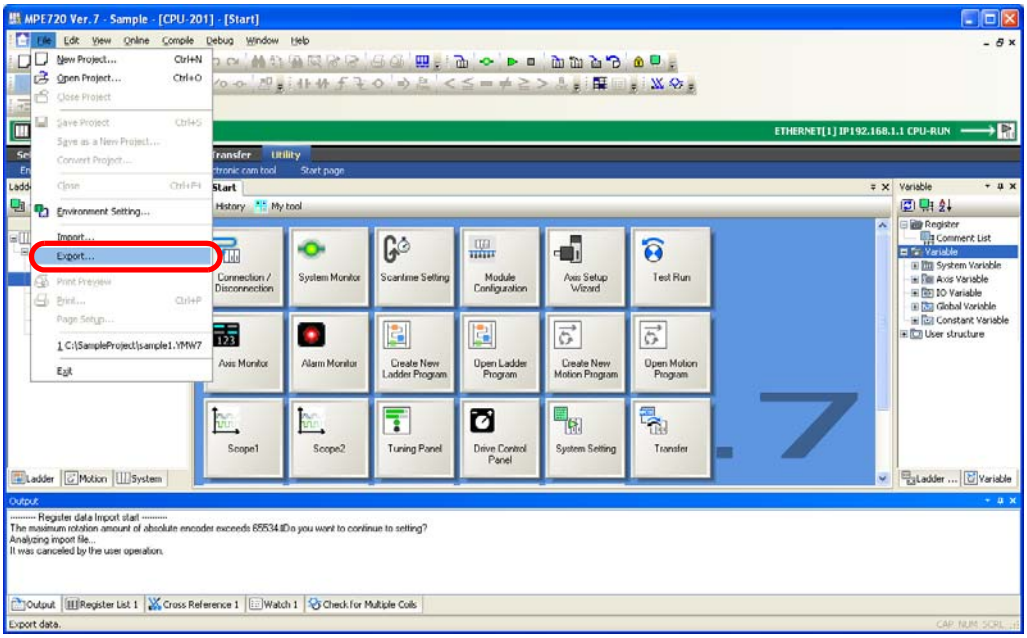


This concludes the procedure.

Exporting

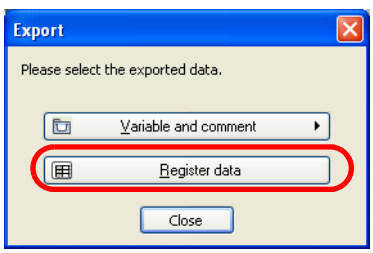
Use the following procedure to export register data to an external CSV file.

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.



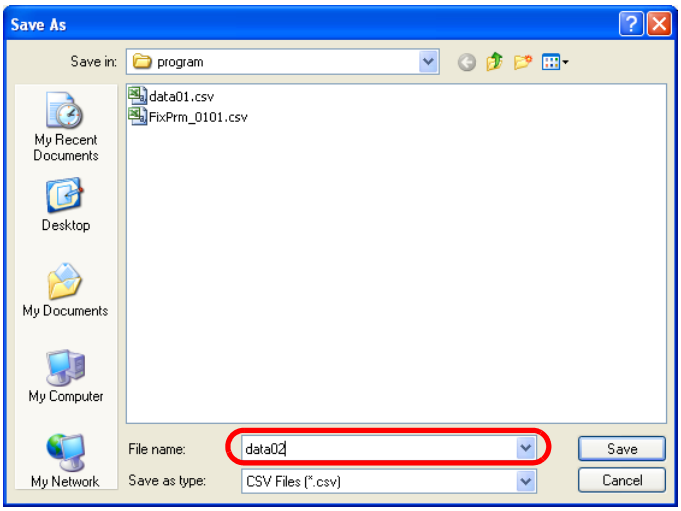
The Export Dialog Box will be displayed.

3. Click the **Register data** Button.

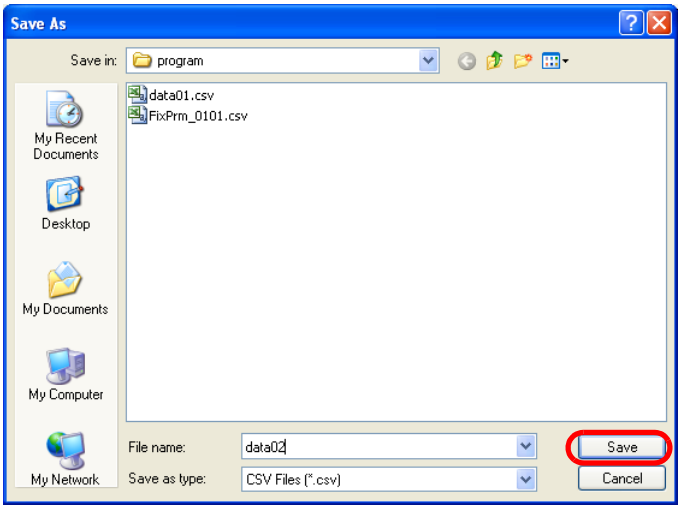


The Save As Dialog Box will be displayed.

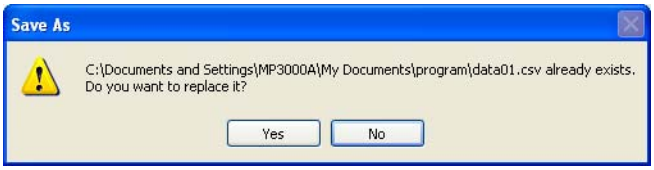
4. Select the CSV file to which to export the register data.
To save the data in a new file, enter a file name.



5. Click the **Save** Button.



Information If you select an existing file, the following dialog box will be displayed. Click the **Yes** Button.



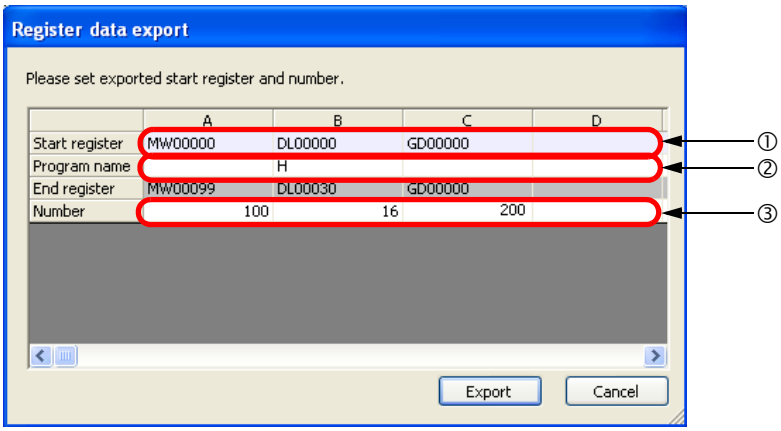
The Register Data Export Dialog Box will be displayed.

6. Enter the following information.

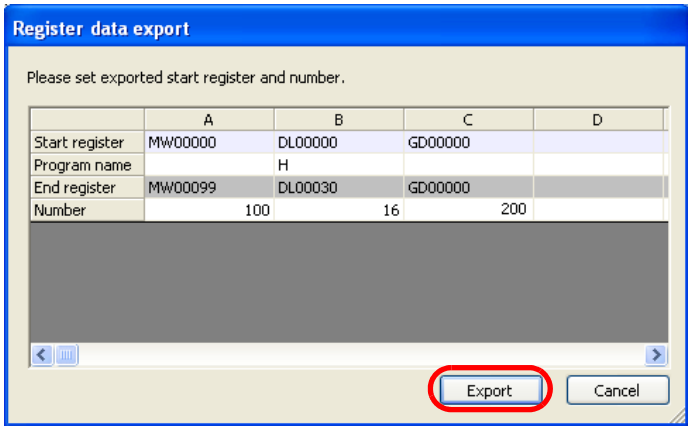
① The first address of the registers to export

② The program name (for local registers only)

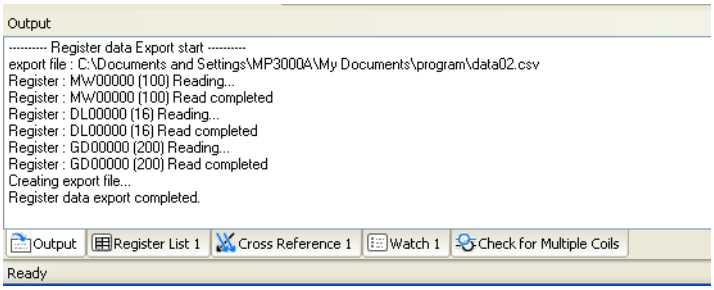
③ The number of registers from the first address of the registers to export



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 folder.

Note

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.

7.3 Importing and Exporting Comments and Variables

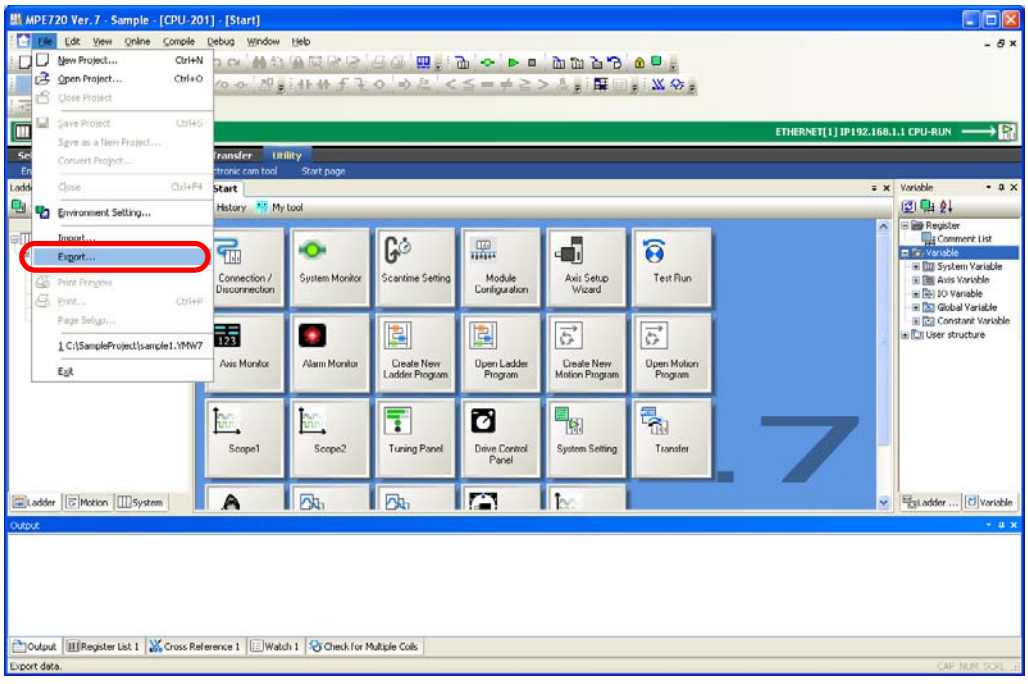
This section gives the procedures for importing and exporting comments and variables.

The nine procedures that are listed below are given.

- Exporting Global Variables and Comments
- Exporting Local 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

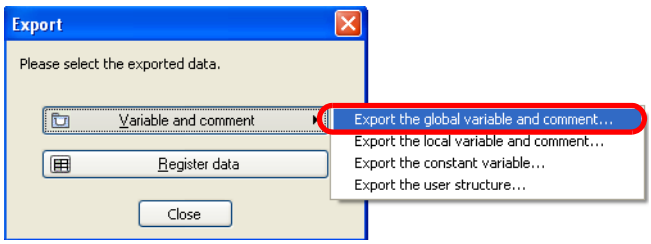
Exporting Global Variables and Comments

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.



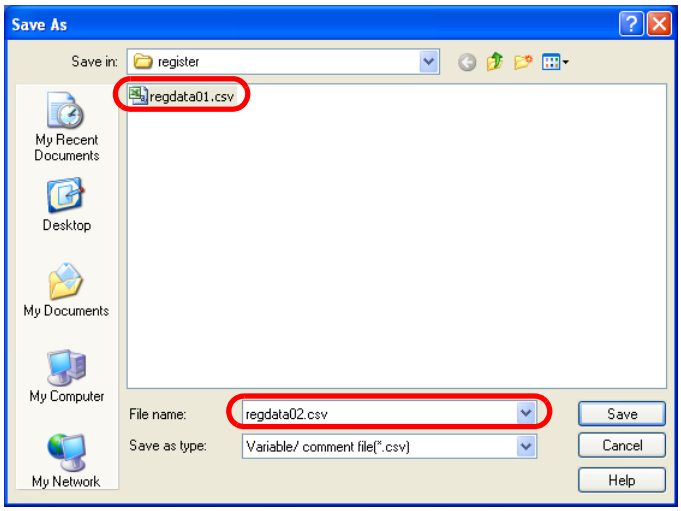
The Export Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Export the global variable and comment**.

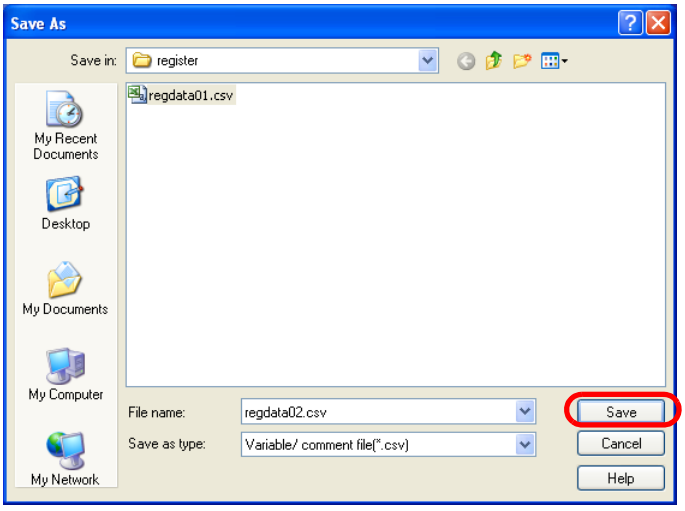


The Save As Dialog Box will be displayed.

4. Select the CSV file to which to export the variable and comment data.
To save the data in a new file, enter a file name.

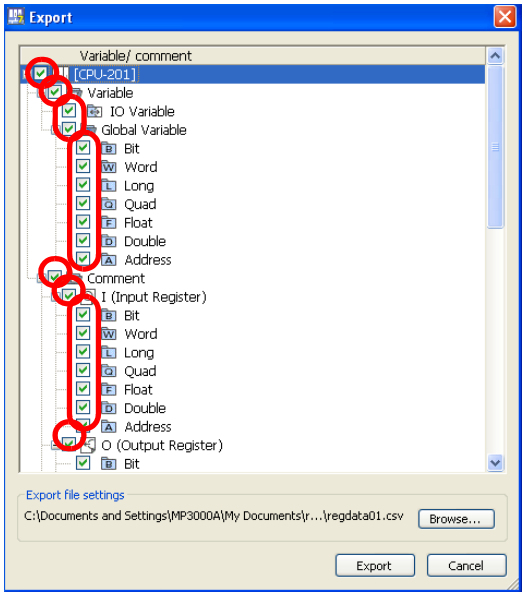


5. Click the **Save** Button.

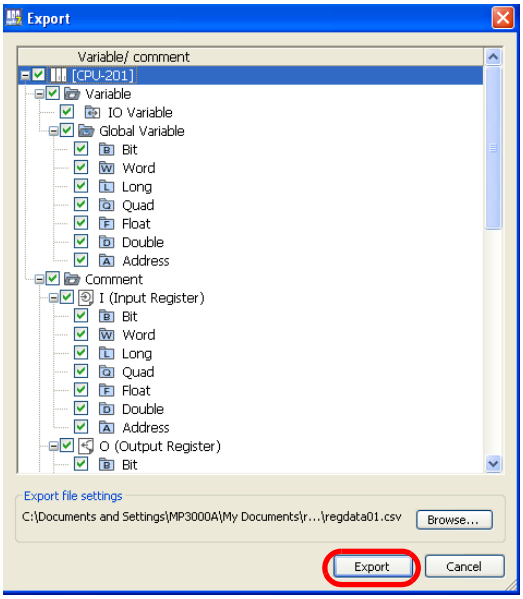


The Export Dialog Box will be displayed.

6. Select the check boxes for the variables and comments to export.



7. Click the **Export** Button.



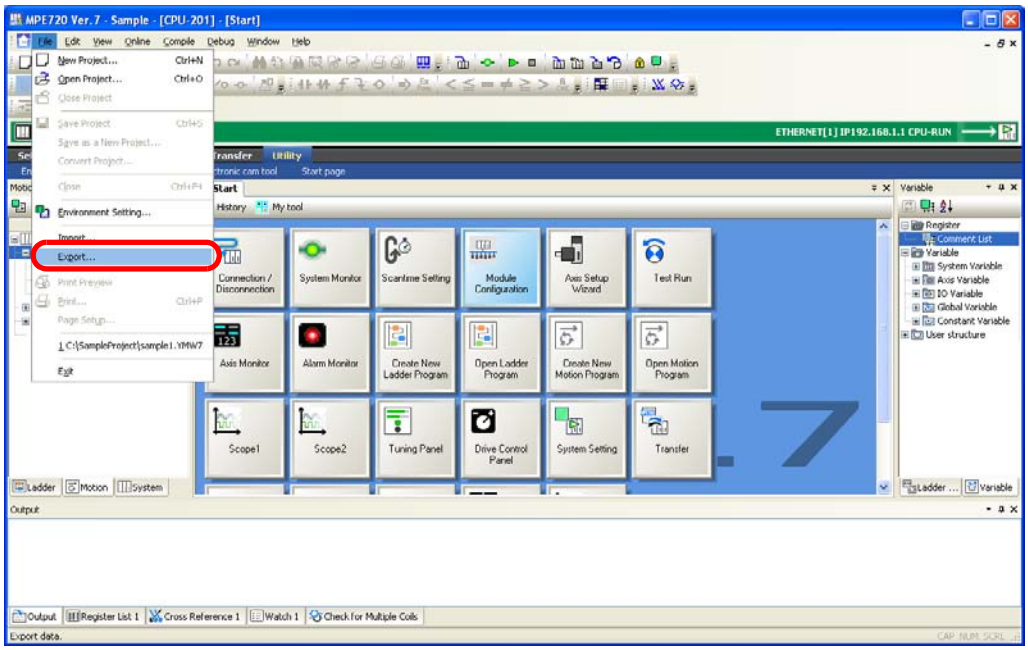
The data will be exported.

8. Confirm that the exported data has been stored in the specified folder.

This concludes the procedure.

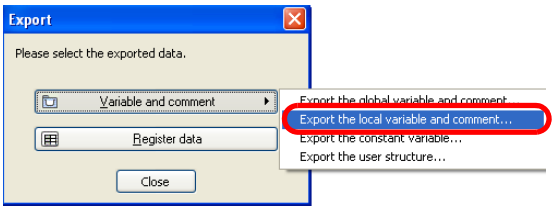
Exporting Local Variables and Comments

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.



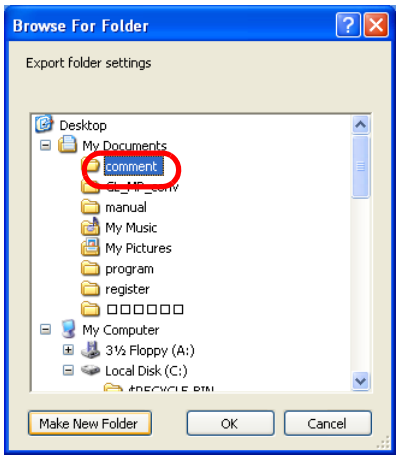
The Export Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Export the local variable and comment**.

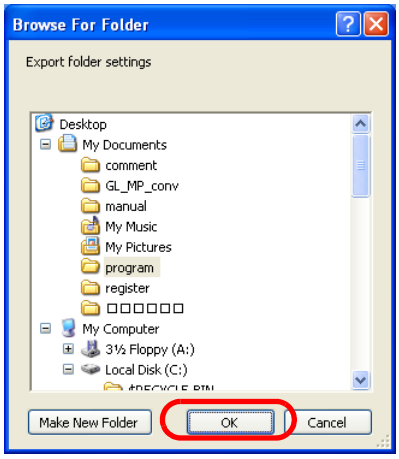


The Browse for Folder Dialog Box will be displayed.

4. Select the folder to which to export the variable and comment data.

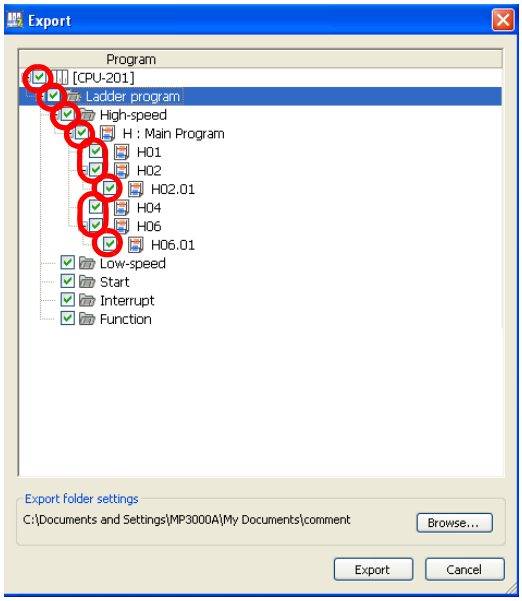


5. Click the **OK** Button.

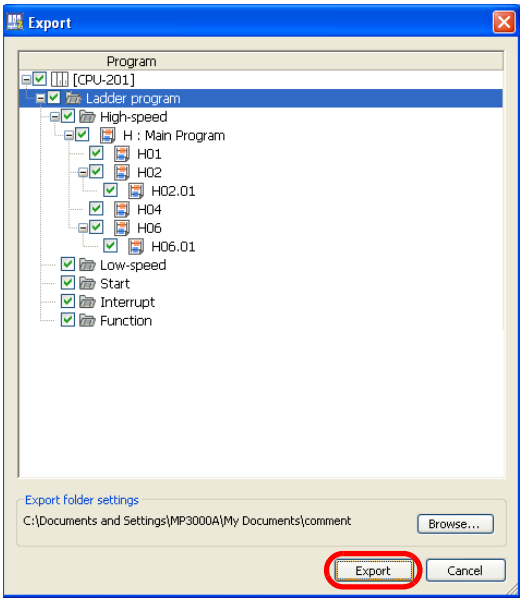


The Export Dialog Box will be displayed.

6. Select the check boxes for the programs to export.



7. Click the **Export** Button.

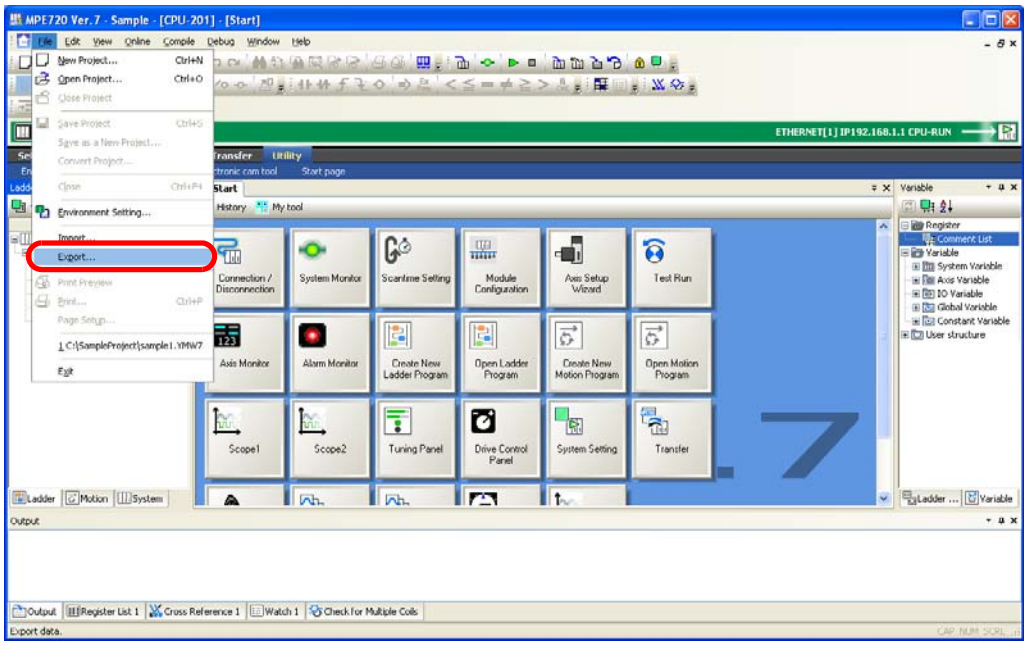


The data will be exported.

This concludes the procedure.

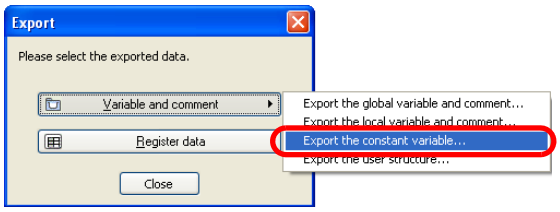
Exporting Constant Variables

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.



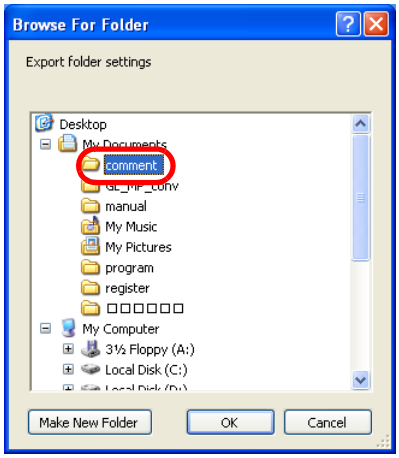
The Export Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Export the constant variable**.

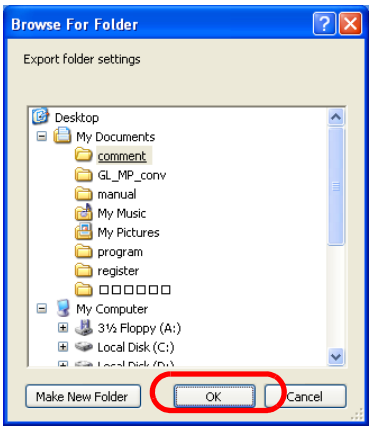


The Browse for Folder Dialog Box will be displayed.

4. Select the folder to which to export the constant variable data.

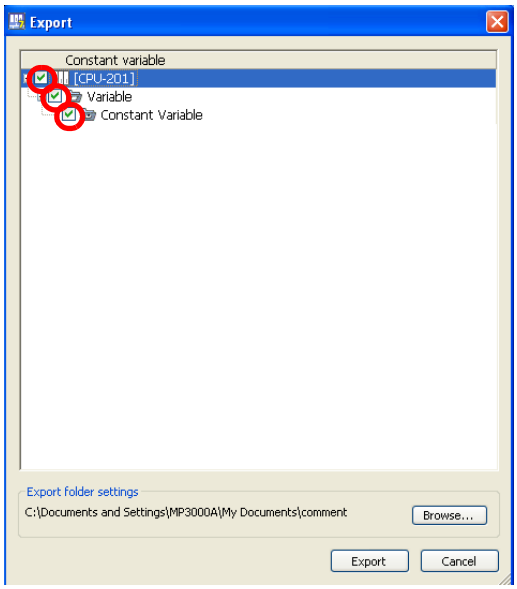


5. Click the **OK** Button.

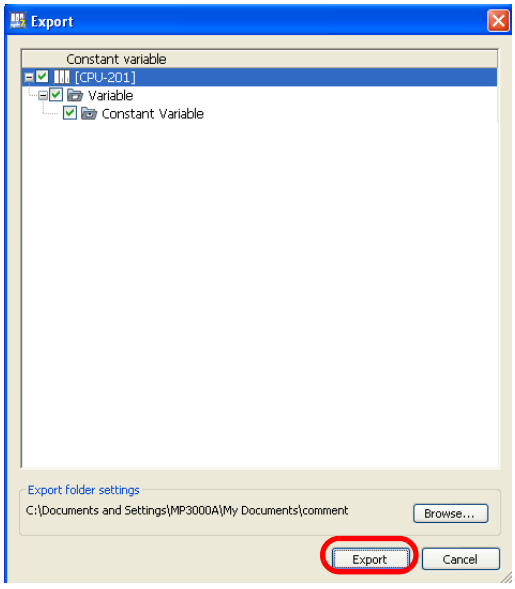


The Export Dialog Box will be displayed.

6. Select the check boxes for the constant variables to export.



7. Click the **Export** Button.

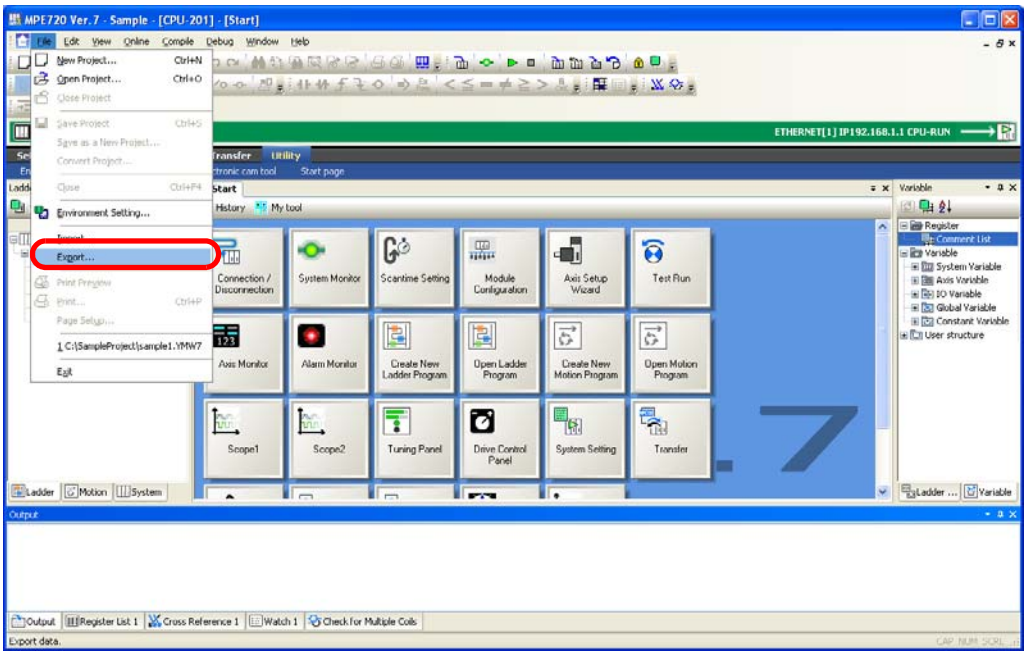


The data will be exported.

This concludes the procedure.

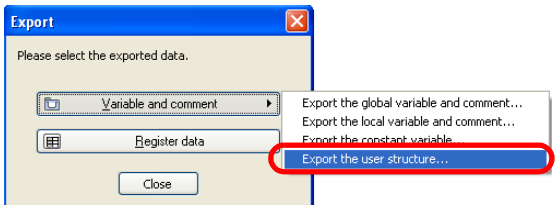
Exporting User-defined Structures

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Export*** from the menu bar.



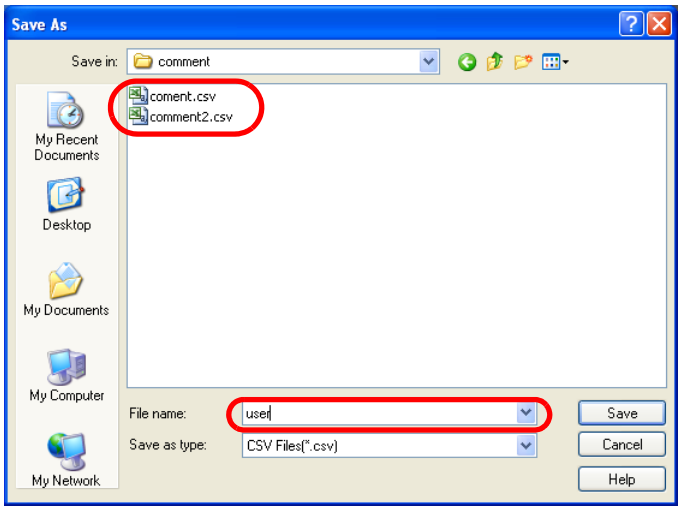
The Export Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Export the user structure**.

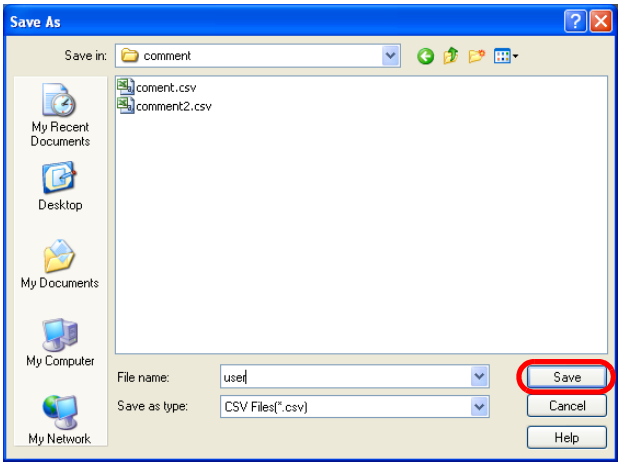


The Save As Dialog Box will be displayed.

4. Select the CSV file to which to export the user-defined structure data.
To save the data in a new file, enter a file name.

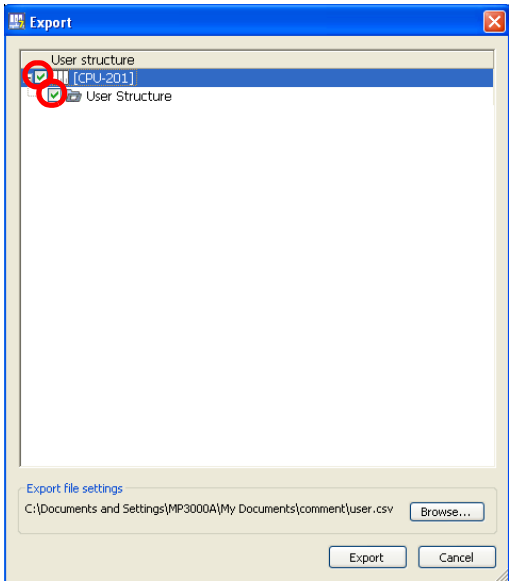


5. Click the **Save** Button.

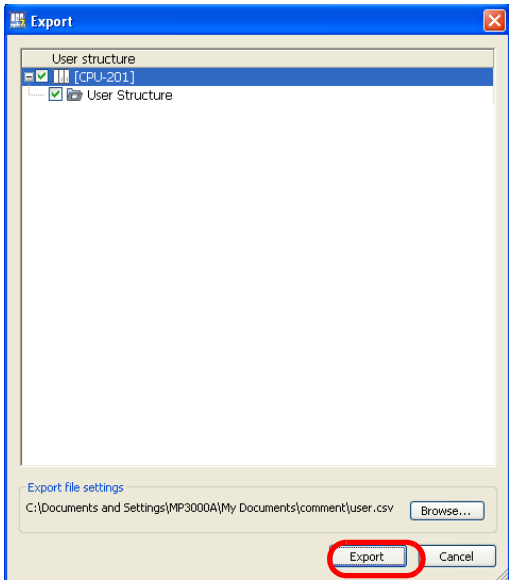


The Export Dialog Box will be displayed.

6. Select the check boxes for the user-defined structure data to export.



7. Click the **Export** Button.

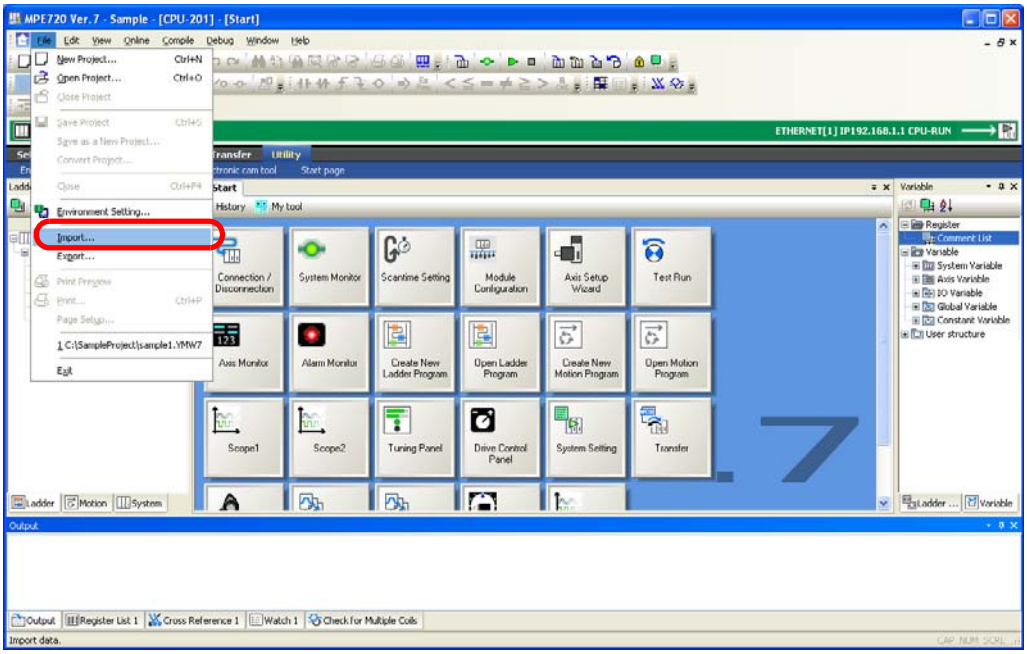


The data will be exported.

This concludes the procedure.

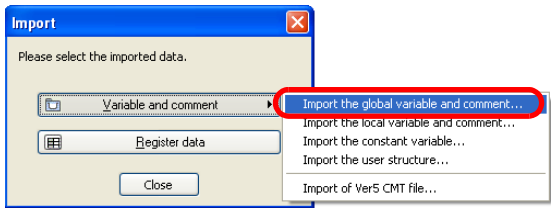
Importing Global Variables and Comments

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Import*** from the menu bar.



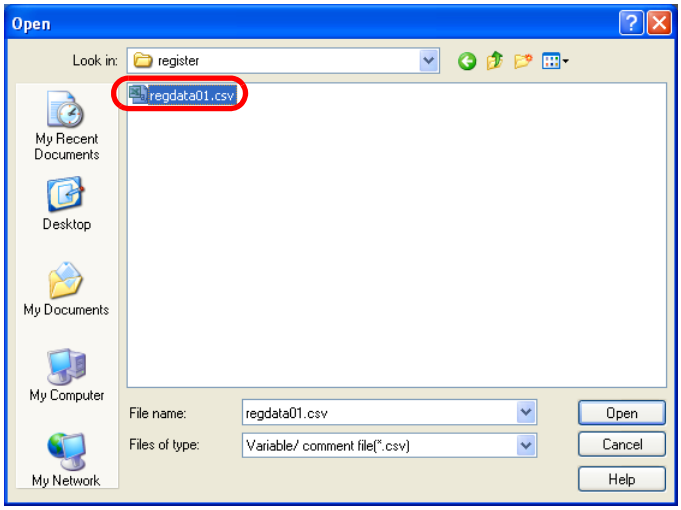
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import the global variable and comment**.

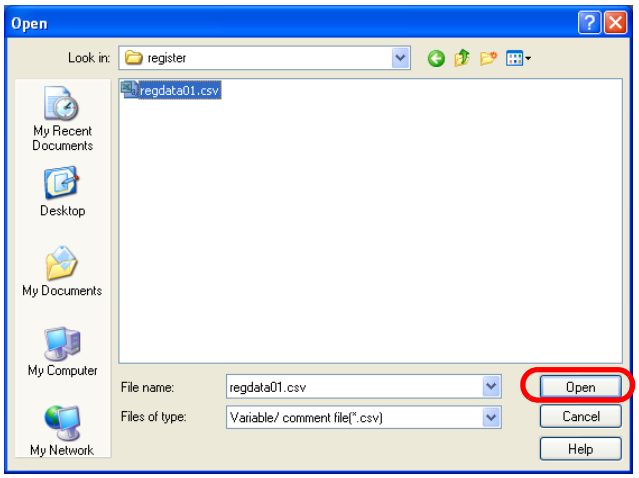


The Open Dialog Box will be displayed.

4. Select the CSV file from which to import the variable and comment data.

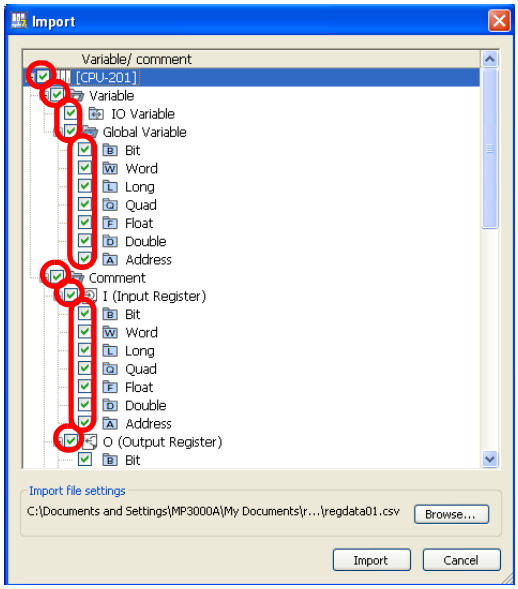


5. Click the **Open** Button.

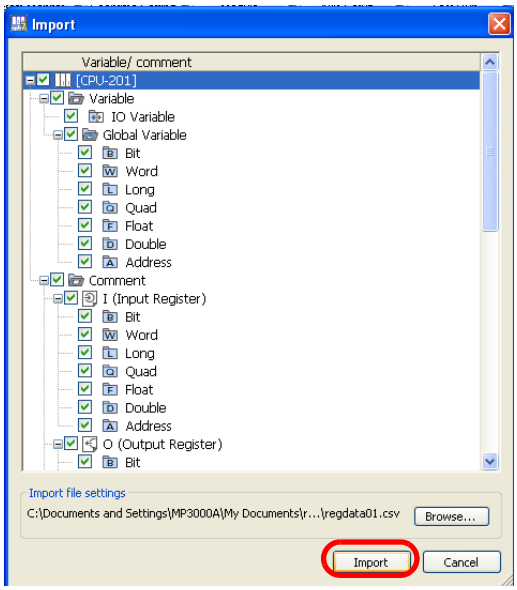


The Import Dialog Box will be displayed.

6. Select the check boxes for the programs to import.

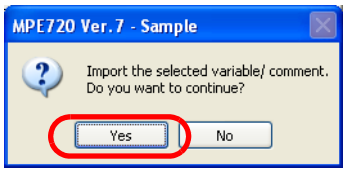


7. Click the **Import** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

8. Click the **Yes** Button.



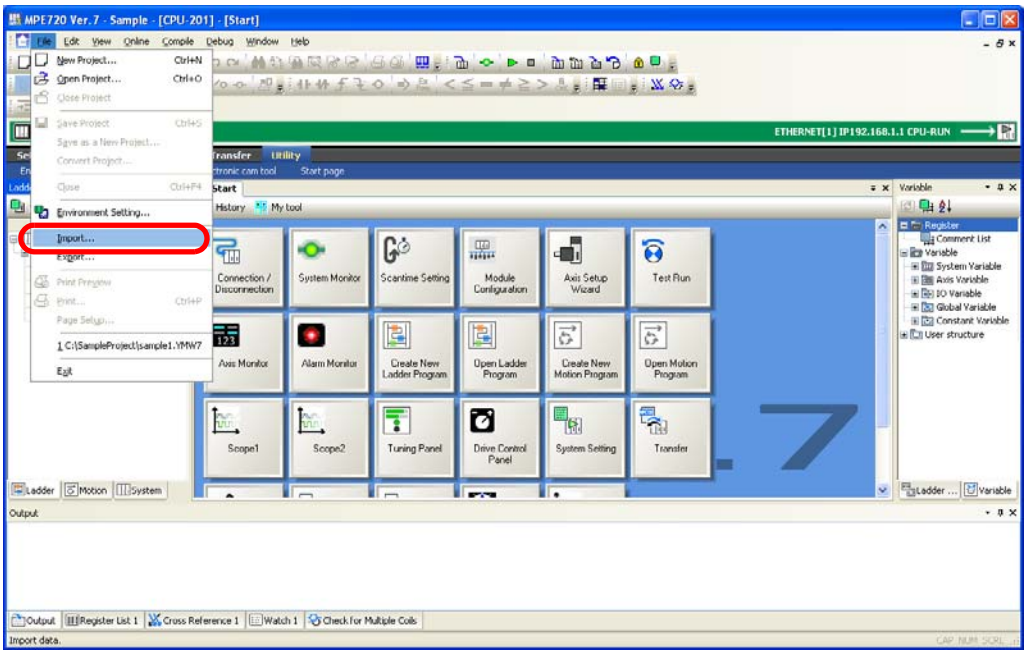
The data will be imported.

This concludes the procedure.

Importing Local Variables and Comments

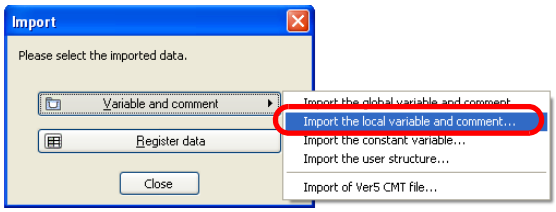
1. Establish an online connection or open a project file.

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



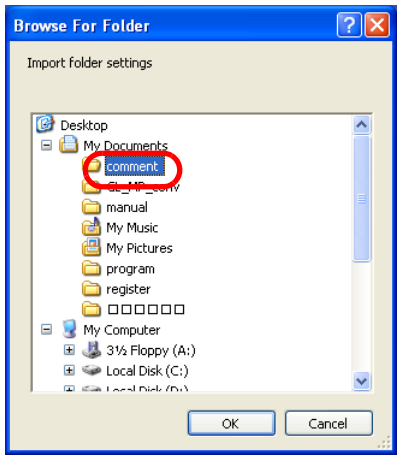
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import the local variable and comment**.

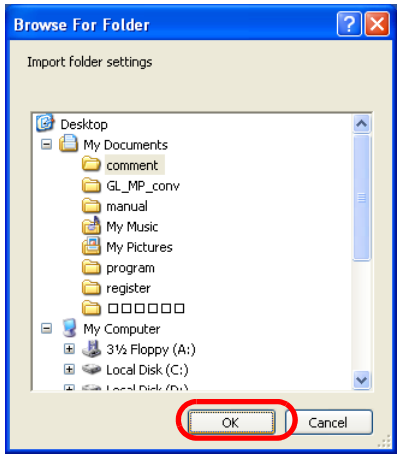


The Browse for Folder Dialog Box will be displayed.

4. Select the folder from which to import the variable and comment data.

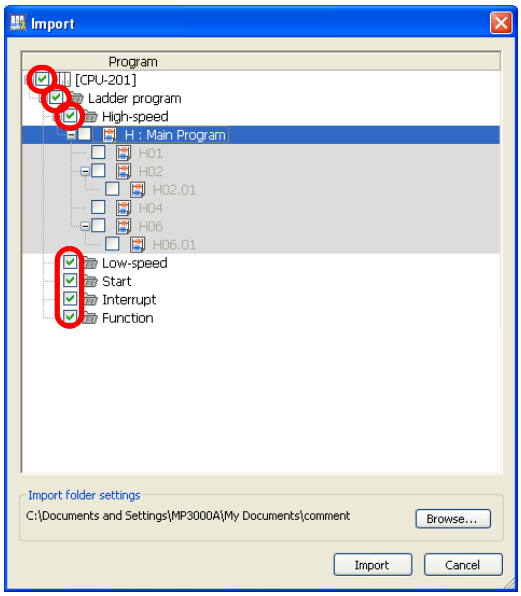


5. Click the **OK** Button.

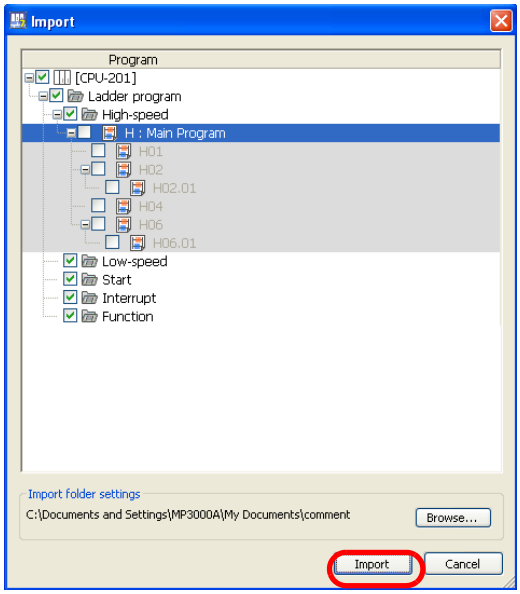


The Import Dialog Box will be displayed.

6. Select the check boxes for the programs to import.

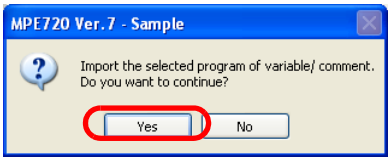


7. Click the **Import** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

8. Click the **Yes** Button.

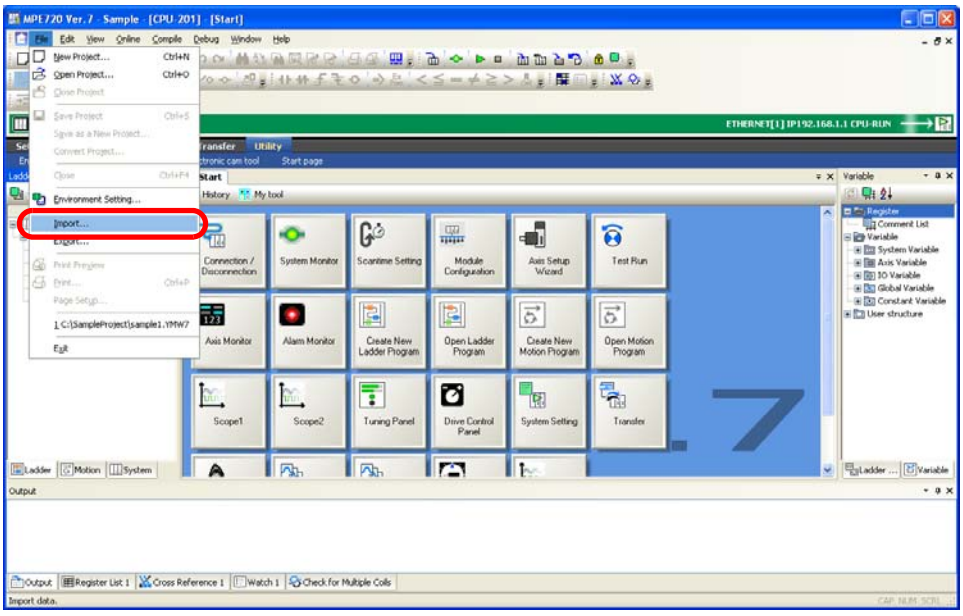


The data will be imported.

This concludes the procedure.

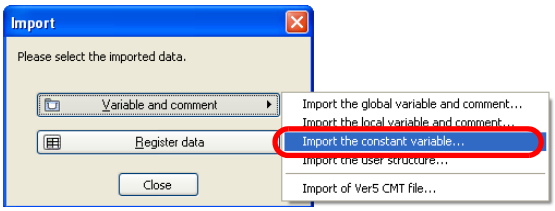
Importing Constant Variables

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Import*** from the menu bar.



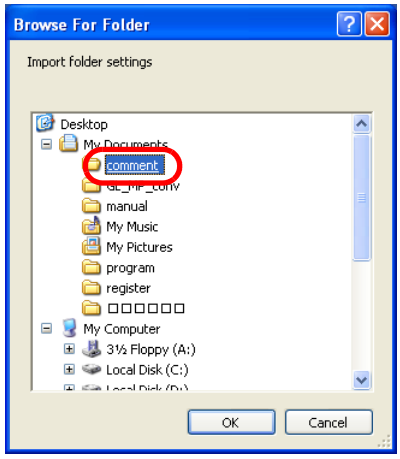
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import the constant variable**.

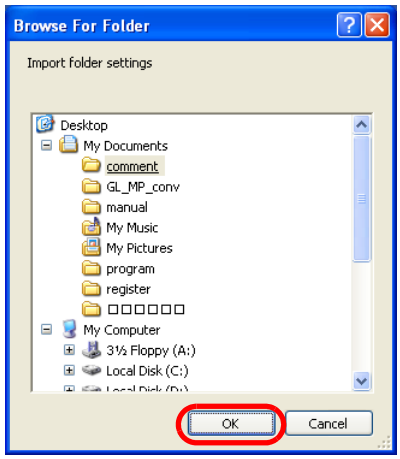


The Browse for Folder Dialog Box will be displayed.

4. Select the folder from which to import the variable and comment data.

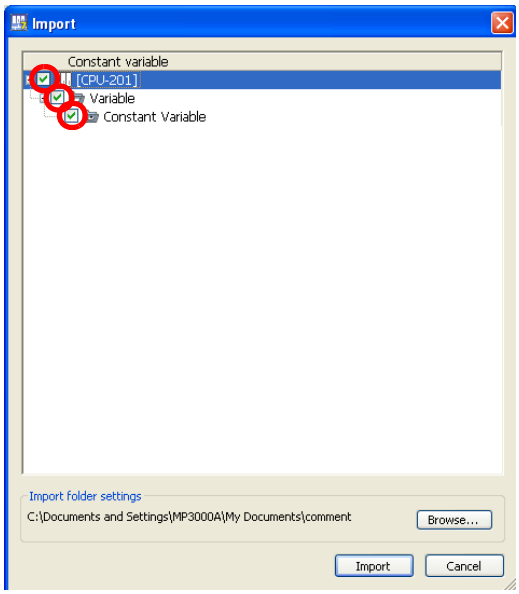


5. Click the **OK** Button.

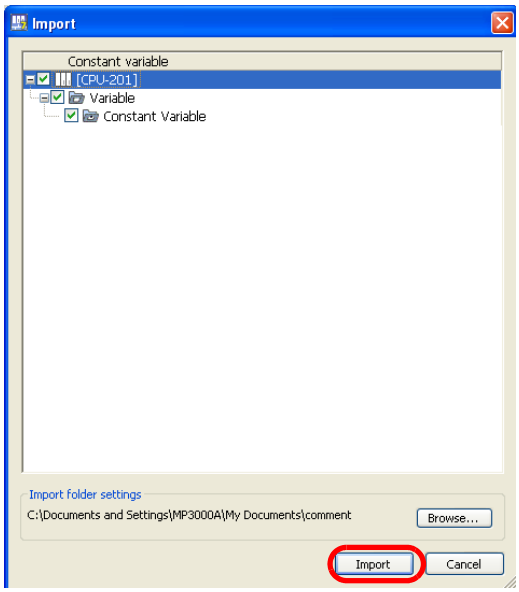


The Import Dialog Box will be displayed.

6. Select the check boxes for the variables and comments to import.

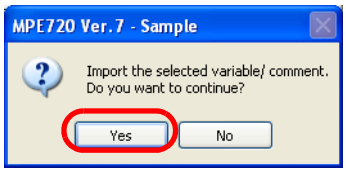


7. Click the **Import** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

8. Click the **Yes** Button.

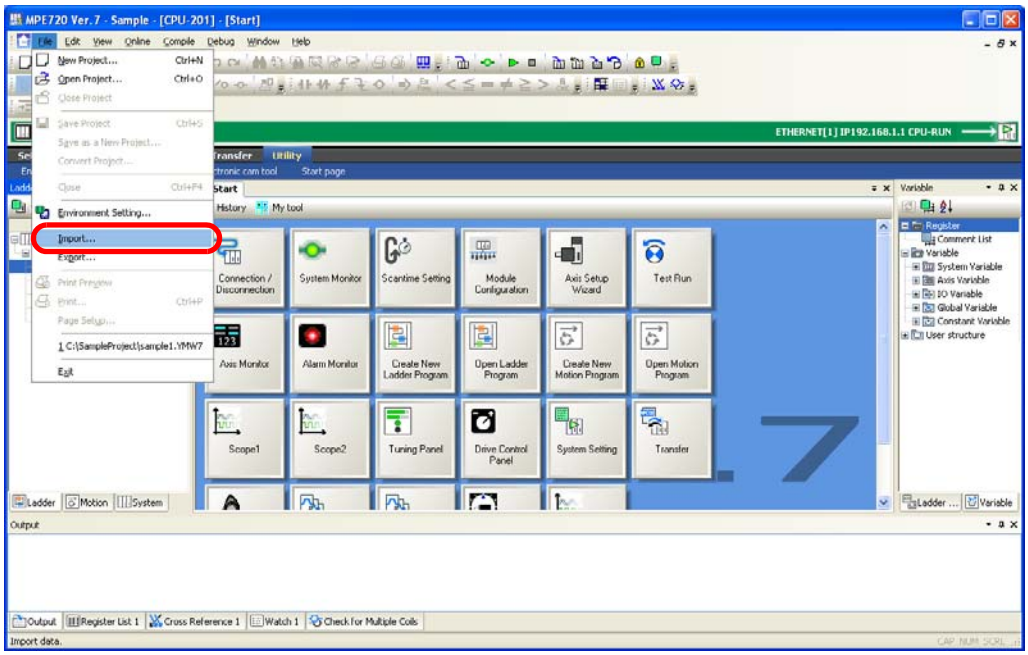


The data will be imported.

This concludes the procedure.

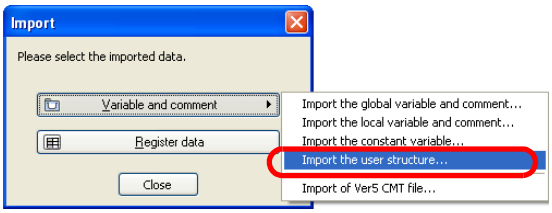
Importing User-defined Structures

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Import*** from the menu bar.



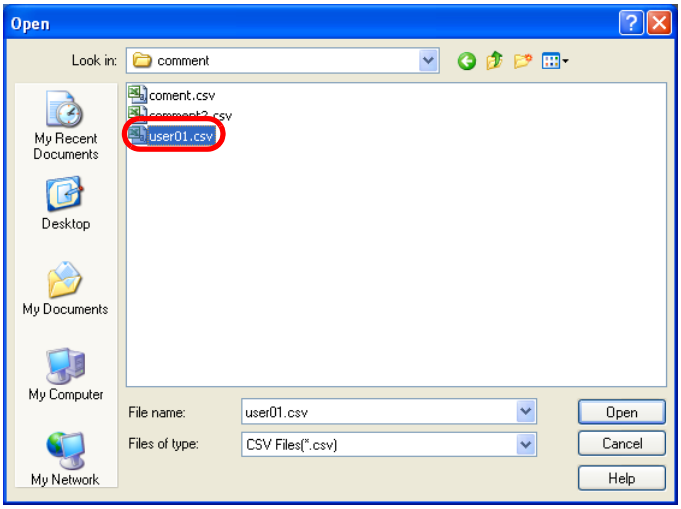
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import the user structure**.

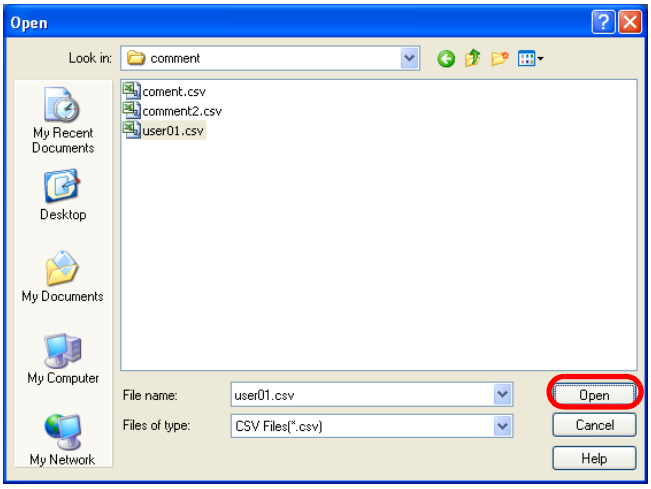


The Open Dialog Box will be displayed.

4. Select the CSV file from which to import the user-defined structure data.

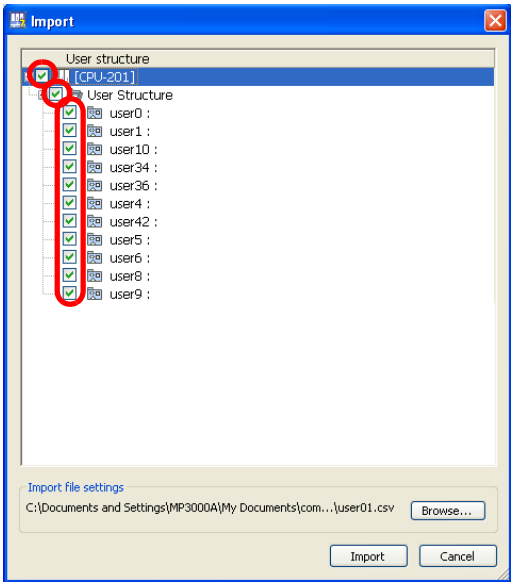


5. Click the **Open** Button.

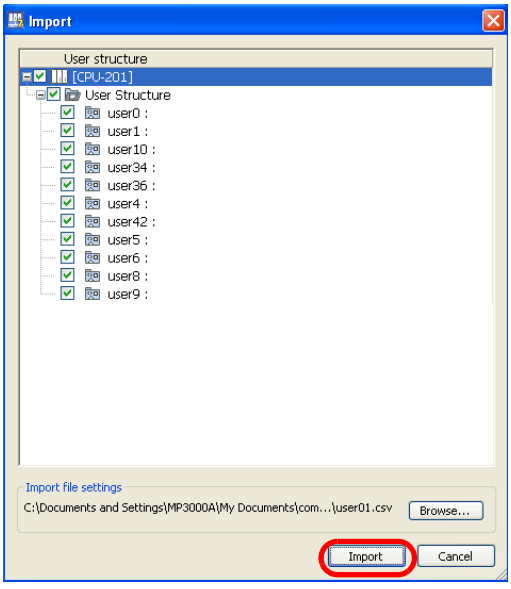


The Import Dialog Box will be displayed.

6. Select the check boxes for the variables and comments to import.

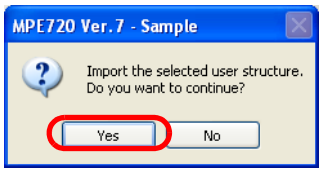


7. Click the **Import** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

8. Click the **Yes** Button.

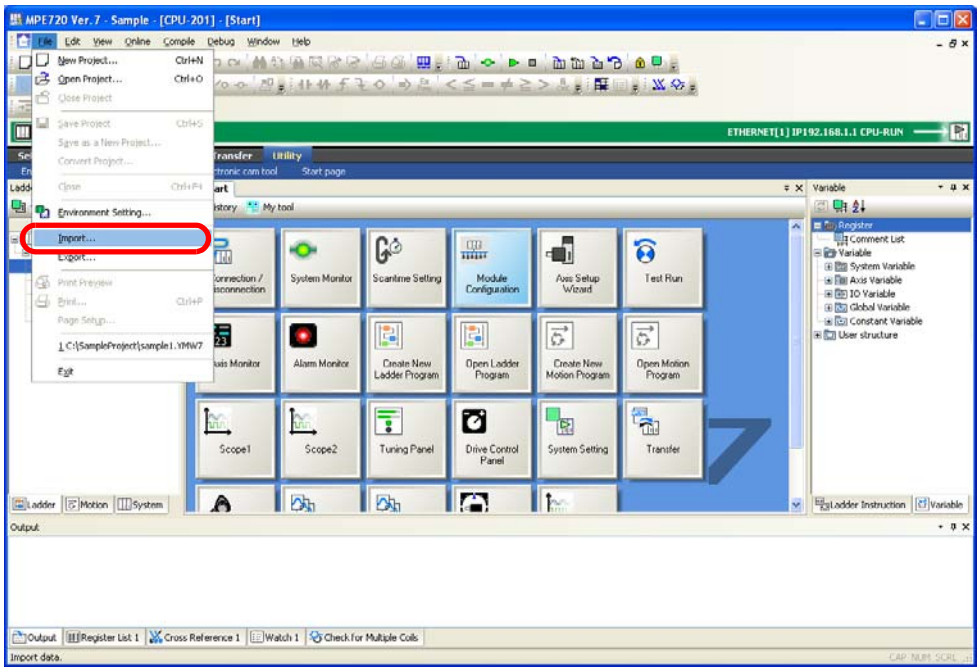


The data will be imported.

This concludes the procedure.

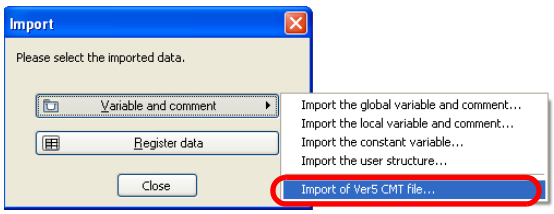
Importing MPE720 Version 5 CMT Files

1. Establish an online connection or open a project file.
2. Select ***File*** – ***Import*** from the menu bar.



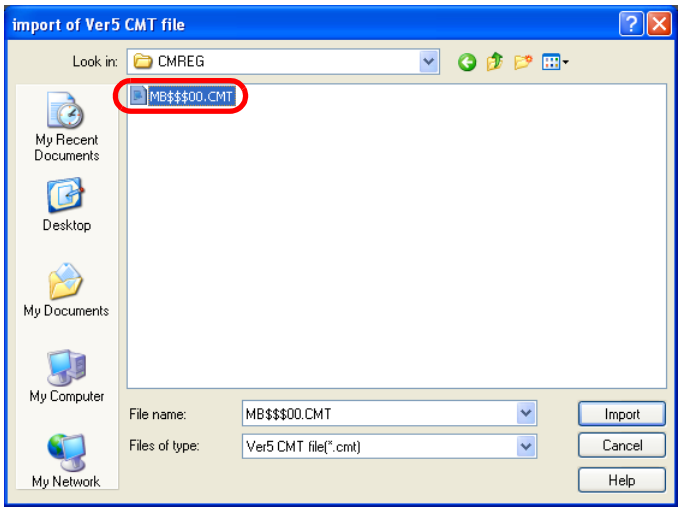
The Import Dialog Box will be displayed.

3. Click the **Variable and comment** Button and select **Import of Ver5 CMT file**.

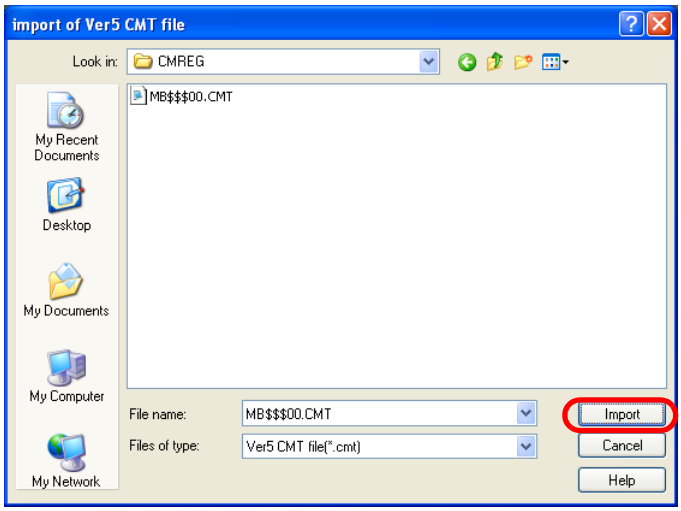


The Import of Ver5 CMT File Dialog Box will be displayed.

4. Select the Version 5 CMT file to import.

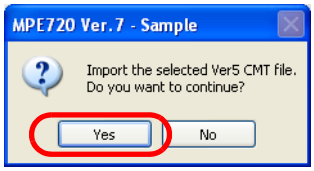


5. Click the **Import** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

6. Click the **Yes** Button.



The data will be imported.

This concludes the procedure.

7.4 Data Format for Importing and Exporting

This section describes the data format for importing and exporting.

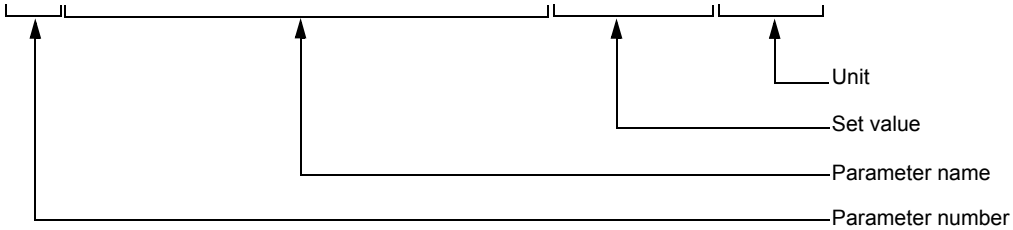
If you wish to create your own data to import, use the following format.

Note

Exported constant variable data cannot be edited.

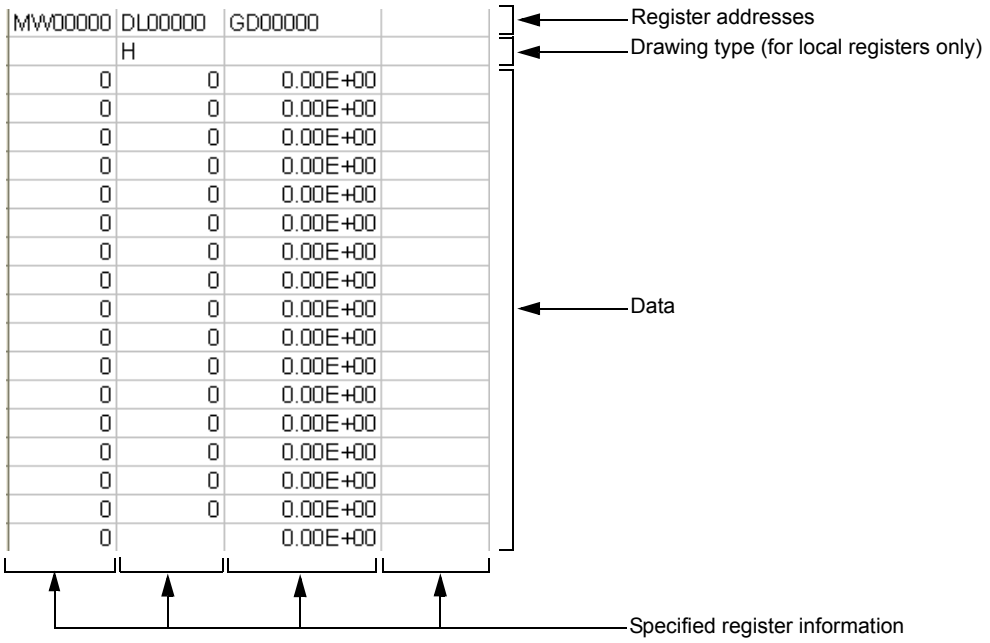
Axis Parameters

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



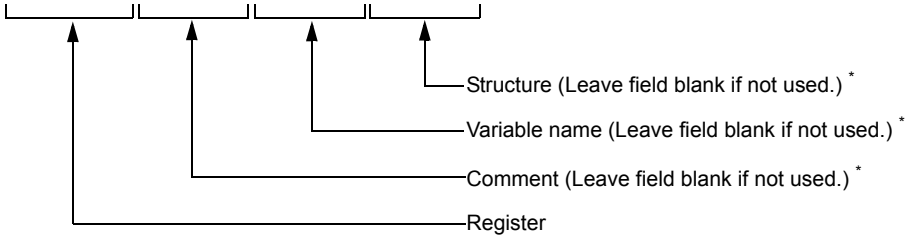
Register Data

MW00000	DL00000	GD00000	
	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	0.00E+00	
0		0.00E+00	



Global Variables and Comments

MB000000		test		
MW00001		test2		
MW00002		test3		

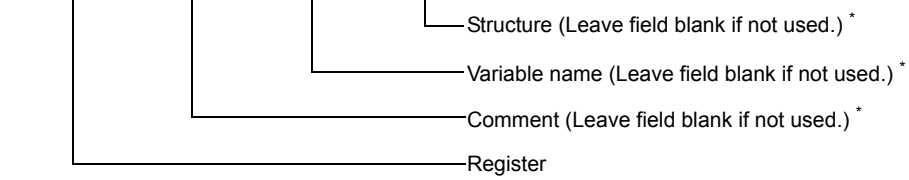


* There are restrictions to the information that can be entered. Refer to the following section for details.

☞ *4.1 Ladder Programming – Using Variable Names for Registers – Global Variables (page 4-18)*

Local Variables and Comments

DB000000		VAR_test		
DW00001		VAR_test2		
DW00002		VAR_test3		

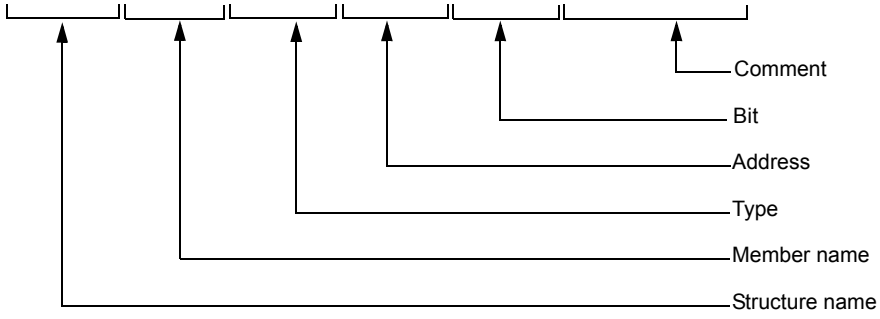


* There are restrictions to the information that can be entered. Refer to the following section for details.

☞ *4.1 Ladder Programming – Using Variable Names for Registers – Global Variables (page 4-18)*

User-defined Structures

test					User structure
test	member1	Word	0		
test	member2	Word	1		
test	member3	Long	2		
test	member4	Long	4		



7.5 Acquiring Trace Data Over an Extended Period of Time

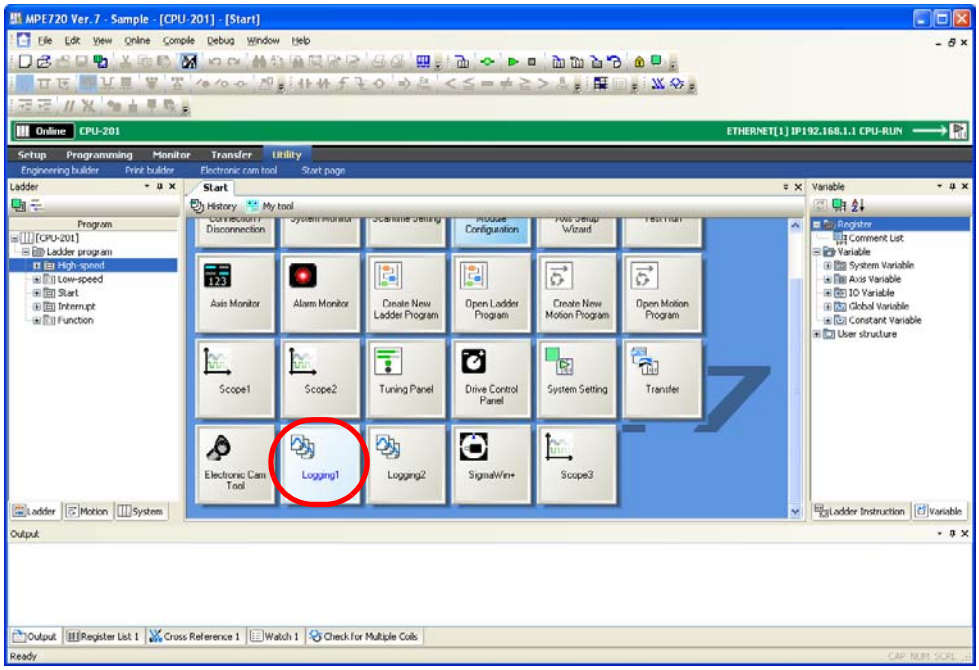
Data logging is useful when it is necessary to acquire as much trace data as possible. The logging function stores data in external memory so that large amounts of data can be acquired. Use the following procedure to acquire logged data.

1. Click the **Logging** Button on the My Tool Tab Page.

Information

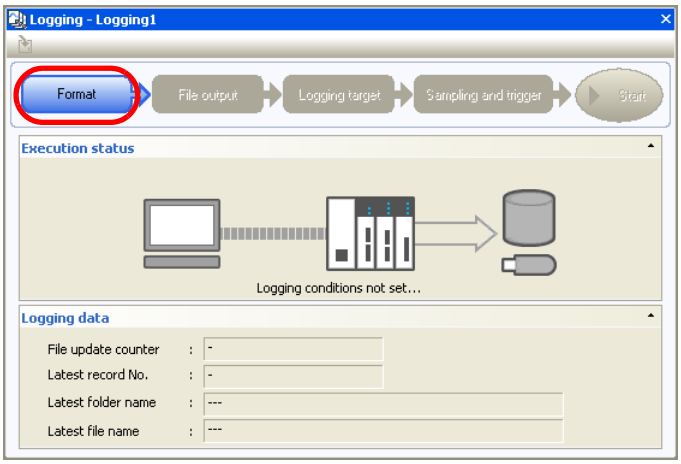
There are four buttons for logging, from **Logging1** to **Logging4**. Logging conditions are stored with the button that is used to execute logging. You can store up to four logging conditions by using the **Logging1** Button to **Logging4** Button. The **Logging3** and **Logging4** Buttons are not displayed by default. Refer to the following section for details on displaying buttons.

☞ *2.6 Main Pane – ◆ Displaying Buttons on the My Tool Tab Page (page 2-20)*



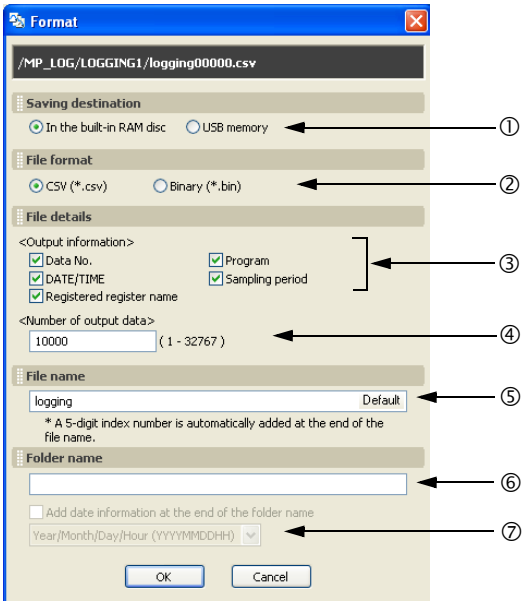
The Logging Dialog Box will be displayed.

2. Click the **Format** Button.



The Format Dialog Box will be displayed.

3. Specify the logging format.



① Select the storage location.

Selection	Description
In the built-in RAM disc	Writes the sampled data to the built-in RAM disk in the CPU Unit.
USB memory device	Writes the sampled data to the USB memory device in the CPU Unit.

② Select 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 ignores the range of character codes and other CSV-specific details. The file size is smaller than a CSV file, and the file writing speed is fast (for a low scan overhead).

③ Select 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 acquired. The calendar must be adjusted beforehand. Refer to the following manual for details. Refer to the following manual for details. *MP3000-series Basic Unit User's Manual* (Manual No.: SIEP C880725 10)
Registered register name	This is the name of the register.
Program	This is the program name.
Sampling period	The frequency at which data was sampled Set this in the Sampling and Trigger Dialog Box that is explained later in this section.

④ Enter the number of data items to output.

Enter the number of lines to write to a single file.

- Input range: 1 to 32,767

⑤ Set 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”.

⑥ Set 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.

⑦ Select whether to add date information to the folder name.

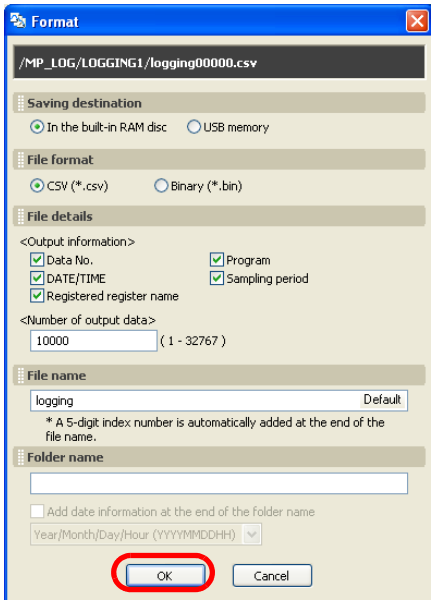
- To omit date information, clear the check box.
- To add date information, select the check box and select the date format from the list.

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

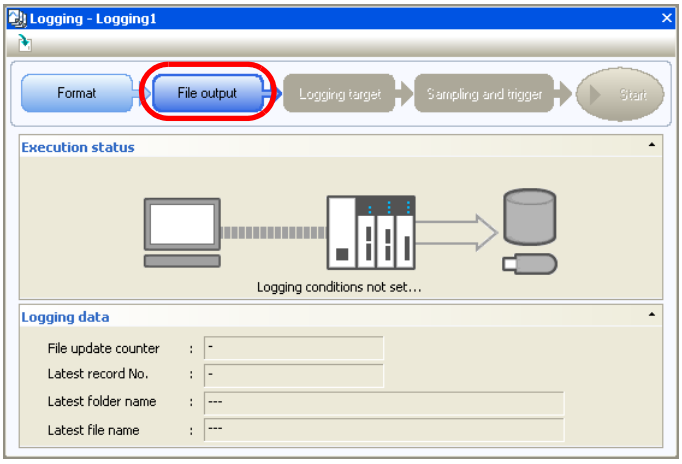
Click the **Cancel** Button to return to the Logging Dialog Box without registering the settings.

4. Click the **OK** Button.



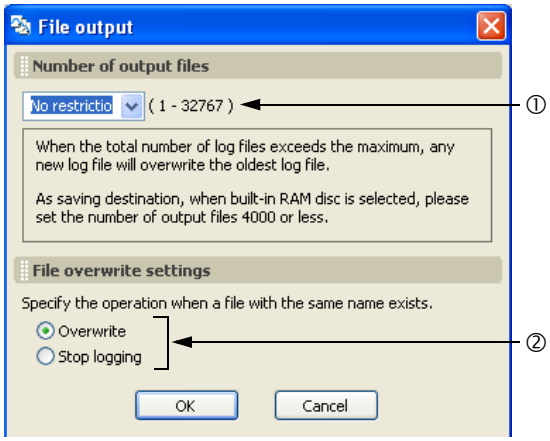
The Logging Dialog Box will be displayed.

5. Click the **Format output** Button.



The File Output Dialog Box will be displayed.

6. Specify the file output settings.



① Set the number of output files.

- Settings: No restriction*, 1, 10, 50, 100, 500, or 1,000

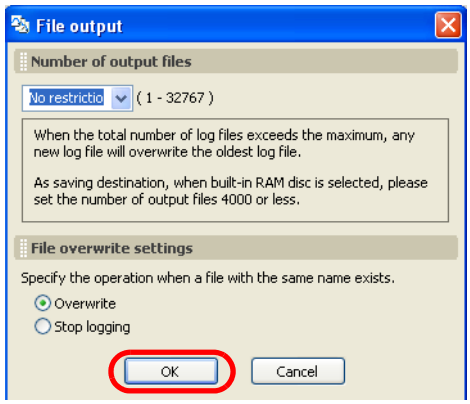
* If the built-in RAM disk is the storage location, the upper limit is 4,000 files. If the USB memory device is the storage location, the upper limit is 10,000 files.

② Set 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.

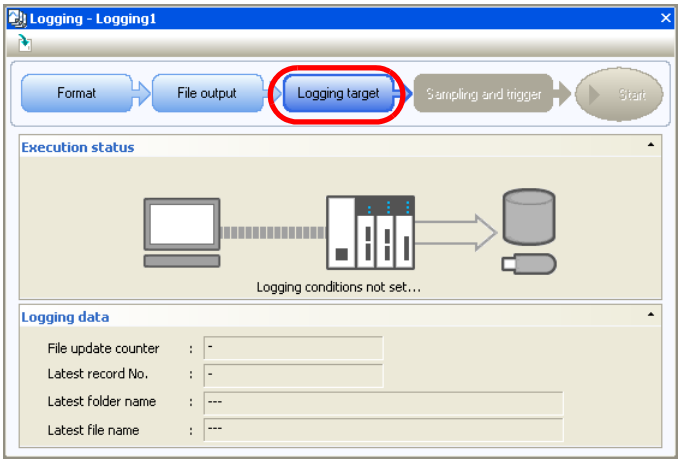
Information Click the **Cancel** Button to return to the Logging Dialog Box without registering the settings.

7. Click the **OK** Button.



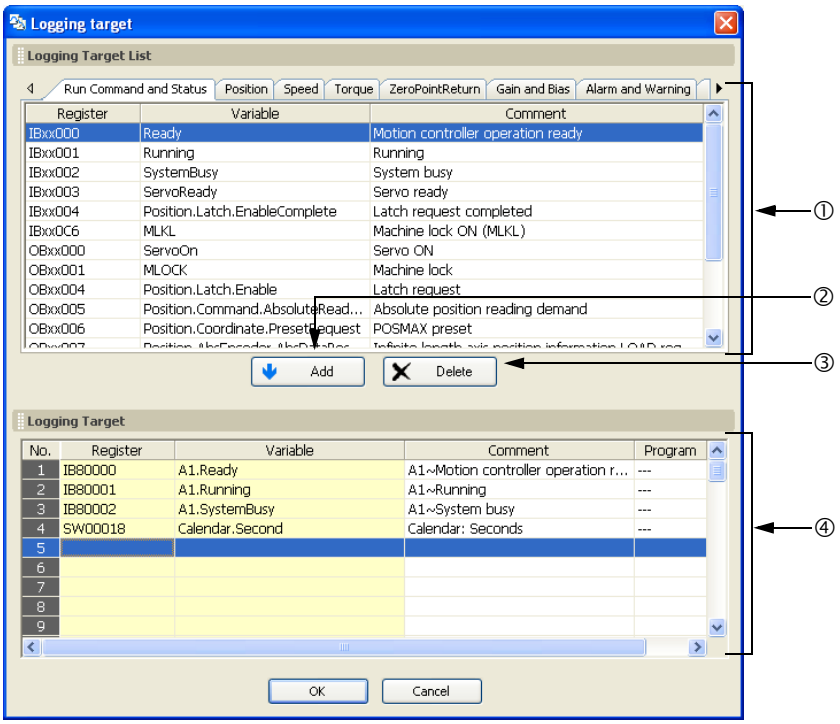
The Logging Dialog Box will be displayed.

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, it will be deleted.

Information

The following register types can be logged.
- S, M, G, I, O, and D registers

Information

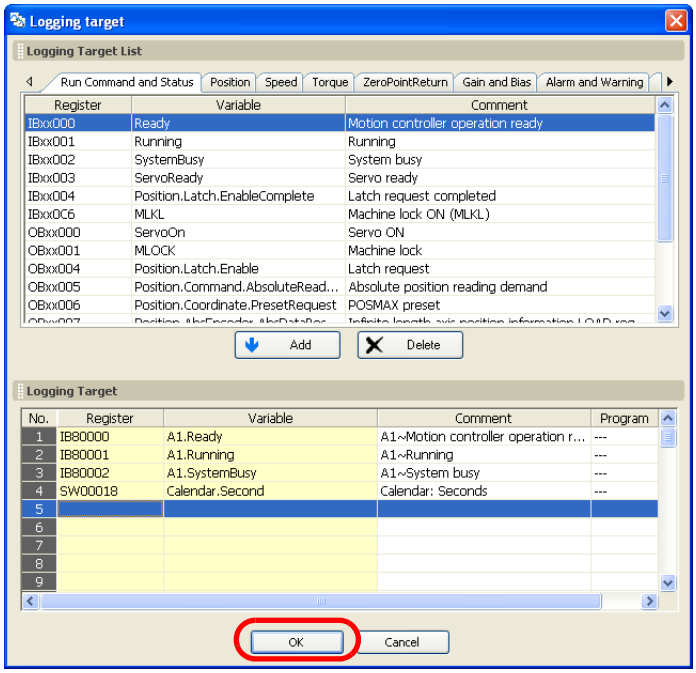
Refer to the following table for the data size for each data type.

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
D: Double-precision real number	4 words

Information

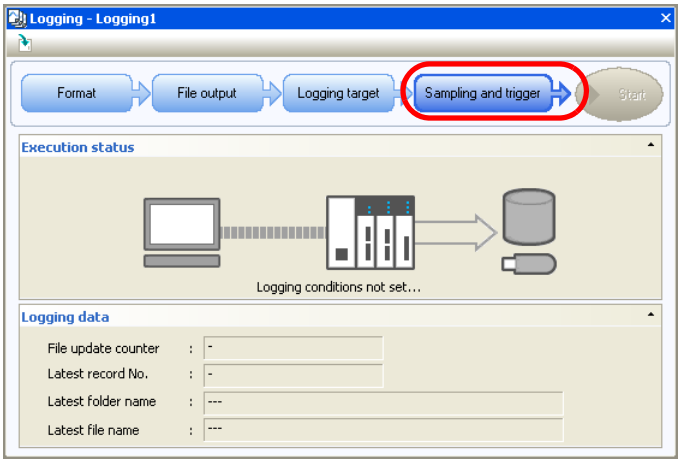
Click the **Cancel** Button to return to the Logging Dialog Box without registering the settings.

10. Click the **OK** Button.



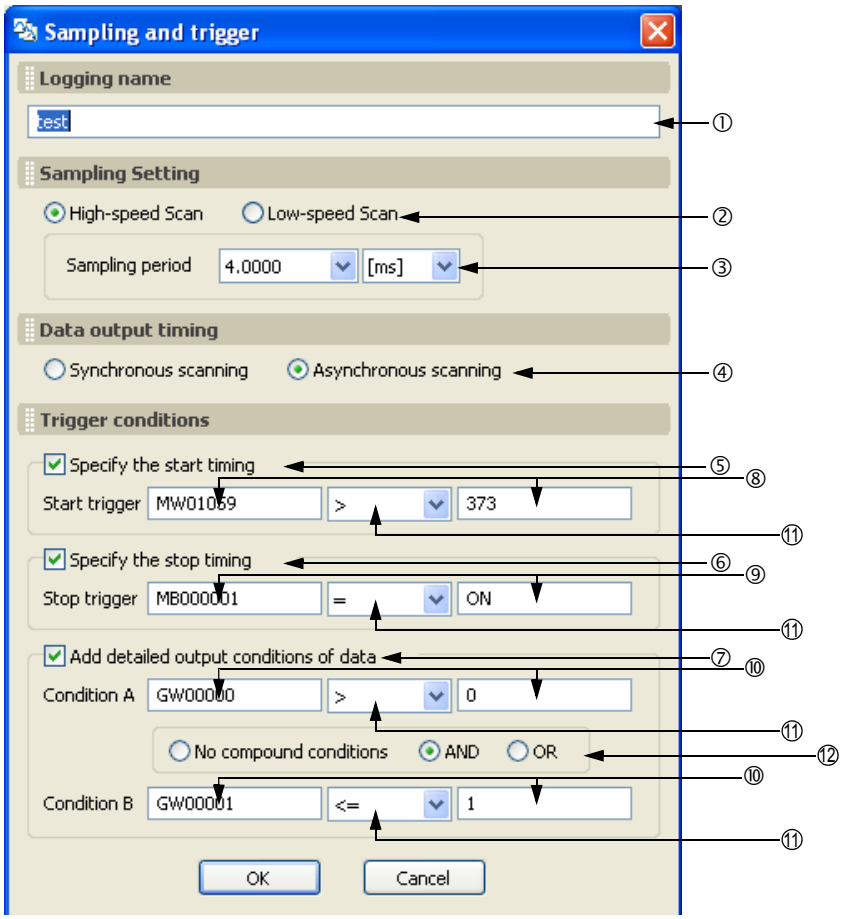
The Logging Dialog Box will be displayed.

11. Click the **Sampling and trigger** Button.



The Sampling and Trigger Dialog Box will be displayed.

12. Set the sampling and trigger settings.



① Set the logging name.
Maximum name length: 32 characters

② Set 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.

③ Set 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.

④ Specify 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 over-head 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 following manual for scan setting guidelines.
📖 *MP3000-series Basic Unit User's Manual* (Manual No.: SIEP C880725 10)

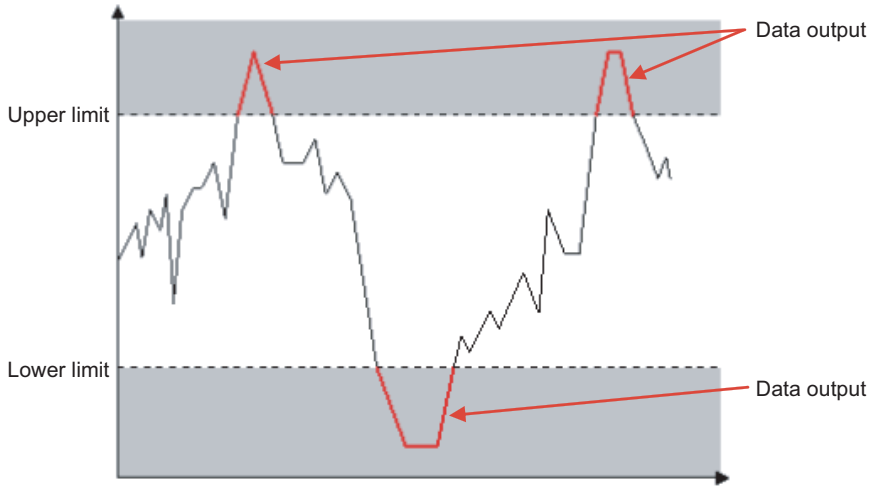
⑤Set the logging output conditions using items ⑤ to ⑫.

<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>Operator</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

In the following example, the output conditions are set to log only the data in the shaded region.

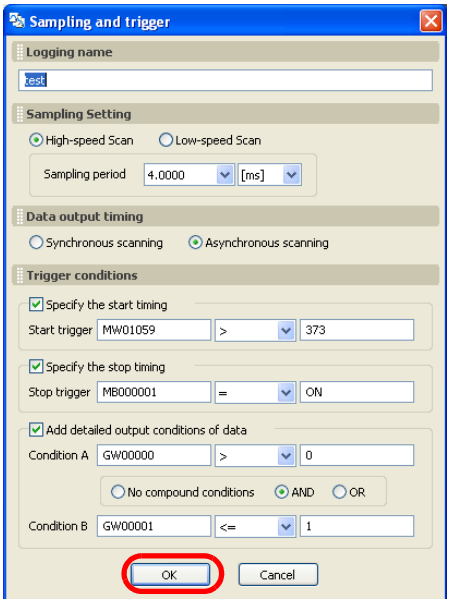
Setting example: Condition A >= Upper limit, Condition B <= Lower limit, Compound condition = OR



Information

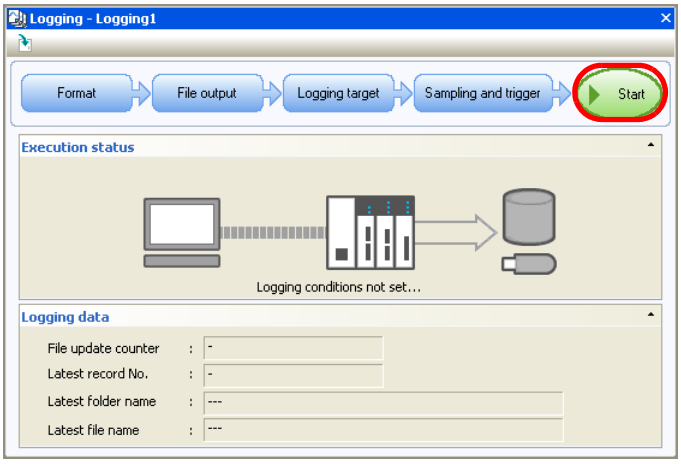
Click the **Cancel** Button to return to the Logging Dialog Box without registering the settings.

13. Click the **OK** Button.



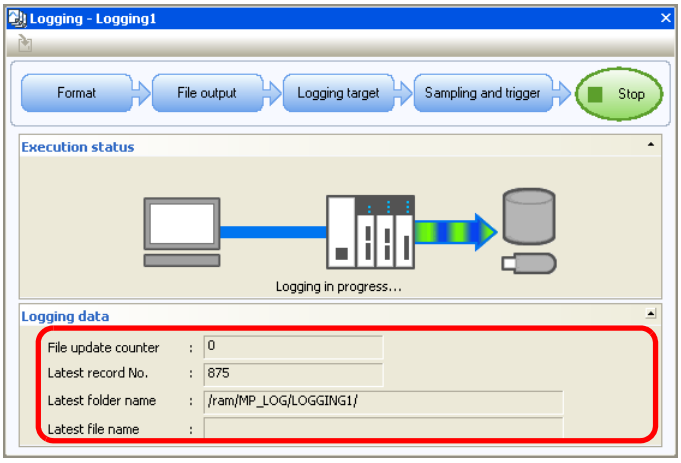
The Logging Dialog Box will be displayed.

14. Click the **Start** Button.

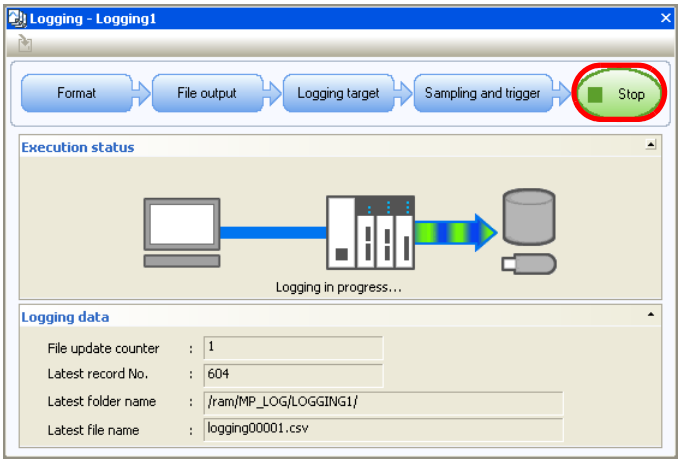


Logging will start. While logging is in progress, the following items are displayed in the **Logging data** Area.

- File update counter
- Latest record number
- Latest folder name
- Latest file name



15. Click the **Stop** Button to stop logging.

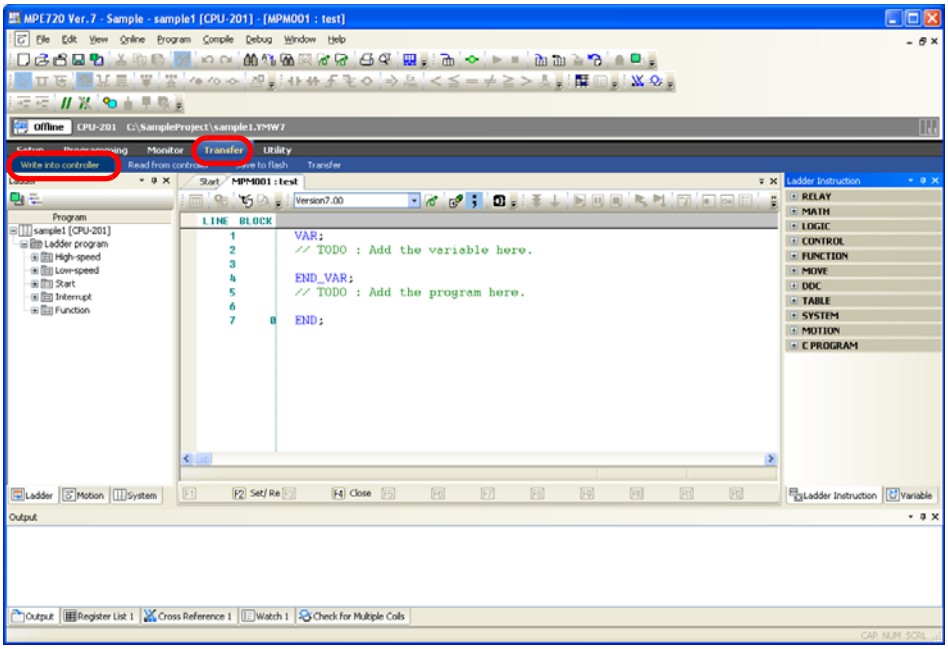


This concludes the procedure.

7.6 Transferring the Program to the Machine Controller

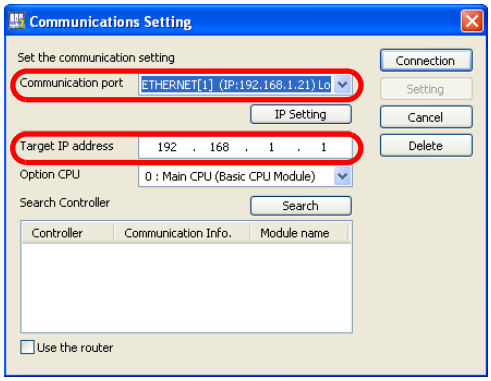
Use the following procedure to transfer ladder programs and motion programs to the Machine Controller.

1. Open the program to transfer.
2. Select ***Transfer*** – ***Write into Controller*** from the Launcher.

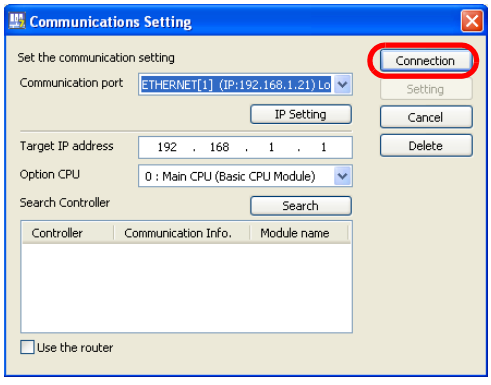


The Communications Setting Dialog Box will be displayed.

3. Specify the **Communications port** and **Target IP address**.

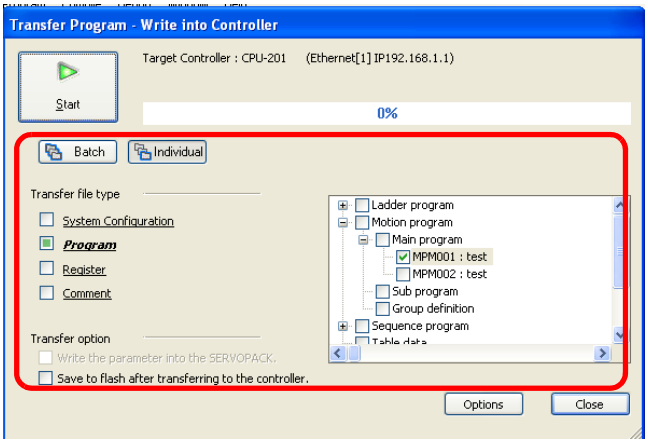


4. Click the **Connection** Button.

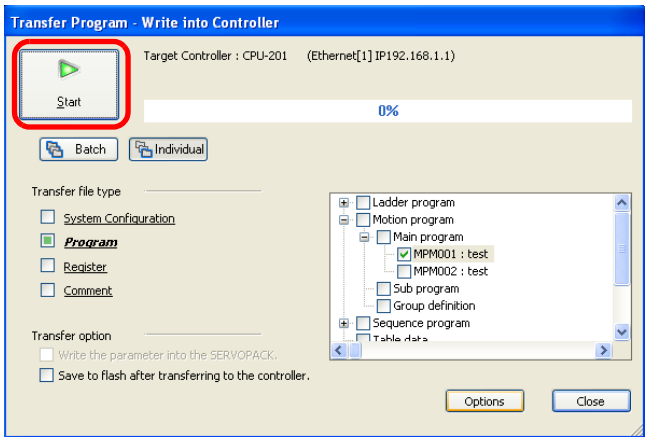


The Communications Setting Dialog Box will close, and the Transfer Program – Write into Controller Dialog Box will be displayed.

5. Specify the transfer settings.

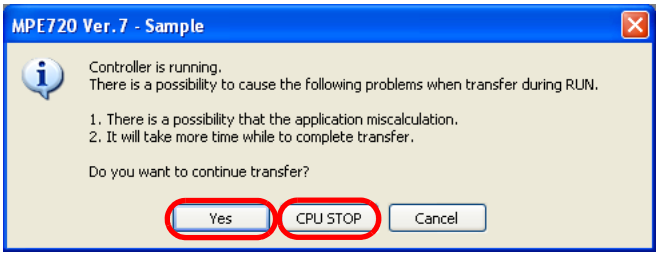


6. Click the **Start** Button.



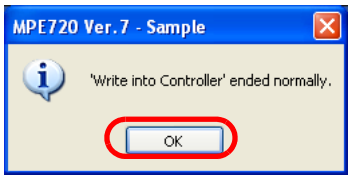
The MPE720 Ver. 7 Dialog Box will be displayed.

7. Click the **Yes** Button or the **CPU STOP** Button.

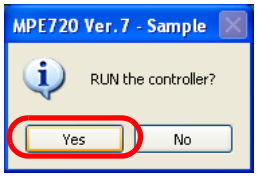


The transfer will start. When the transfer has been completed, the MPE720 Ver.7 Dialog Box will be displayed.

8. Click the **OK** Button.



Information If you clicked the **CPU STOP** Button, the following dialog box will be displayed. Click the **Yes** Button.



This concludes the procedure.

Tracing

This chapter describes the operations that are used for tracing.

8.1 Introduction to Tracing 8-2

8.2 Tracing the Motions of Axes 8-3

8.1 Introduction to Tracing

The MPE720 has the following three trace operations.

- Realtime Tracing
  You can monitor specified registers on a graph in realtime.
- Trace Manager
  You can have the Machine Controller collect data for specified registers during a specified time period, and perform operations on that data and plot it on a graph. This allows you to analyze register data that is acquired during specific time periods to debug ladder programs.
- XY Tracing
  This tracing operation acquires the position data of the X axis and Y axis every scan, and displays the data in a 2-dimensional graph.

With any of these three operations, you can export the trace data to CSV files. Use tracing to check operation and to debug the ladder programs and motion programs.

8.2 Tracing the Motions of Axes

This section describes how to trace the motion of an axis using realtime tracing.

Refer to the following manual for details on the Trace Manager (data tracing) or XY tracing.

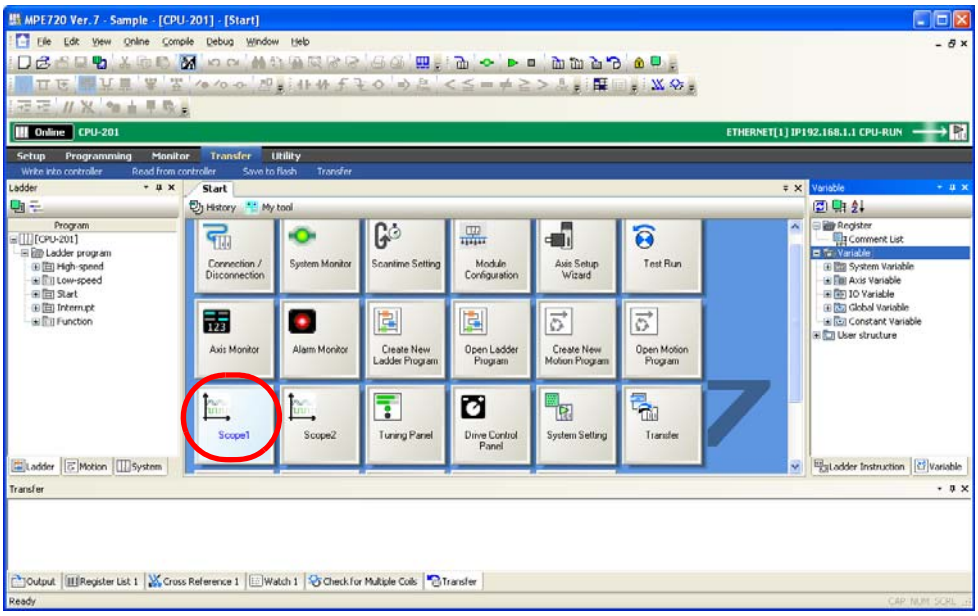
Engineering Tool for MP2000 Series Machine Controller MPE720 Version 6 User's Manual (Manual No.: SIEP C880700 30)

1. Click the **Scope** Button on the My Tool Tab Page.

Information

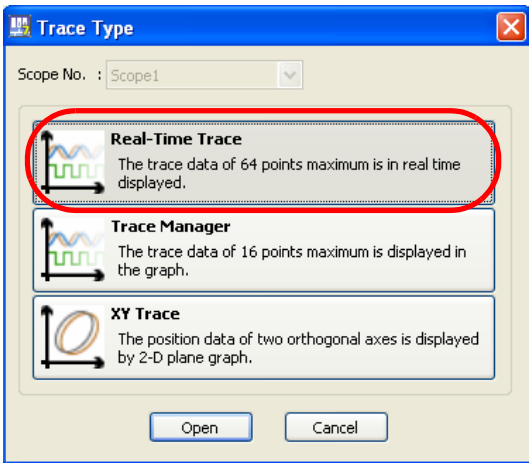
There are four buttons for scoping, from **Scope1** to **Scope4**. Tracing conditions are stored with the button that is used to execute tracing. This means you can store up to four tracing conditions by using the **Scope1** Button to **Scope4** Button. The **Scope3** and **Scope4** Buttons are not displayed by default. Refer to the following section for details on displaying buttons.

2.6 Main Pane – ◆ Displaying Buttons on the My Tool Tab Page (page 2-20)

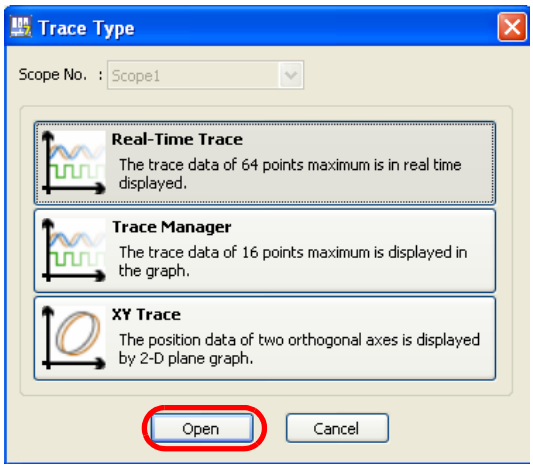


The Trace Type Dialog Box will be displayed.

2. Select the **Real-Time Trace** Box.

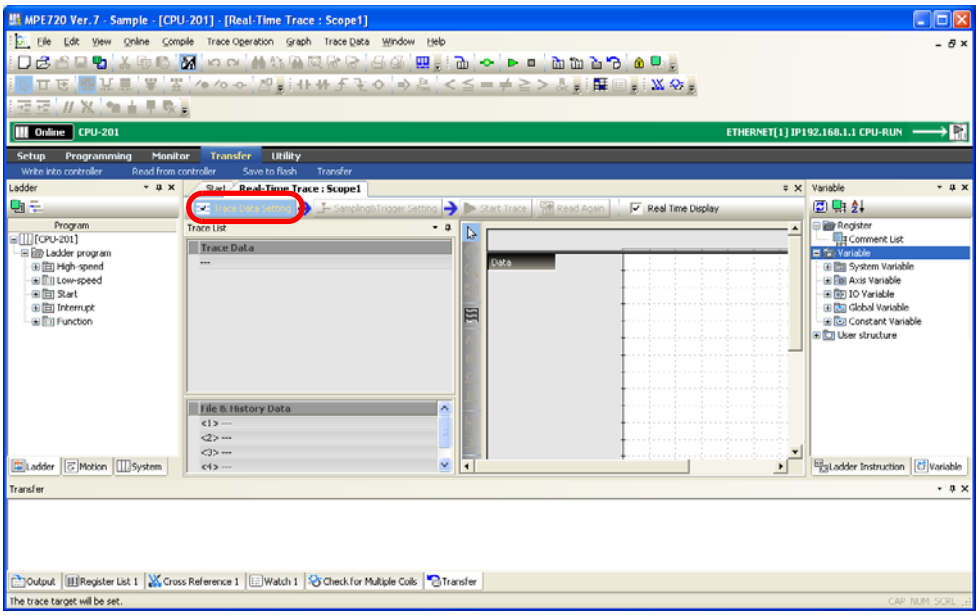


3. Click the **Open** Button.



The Real-Time Trace Tab Page will be displayed.

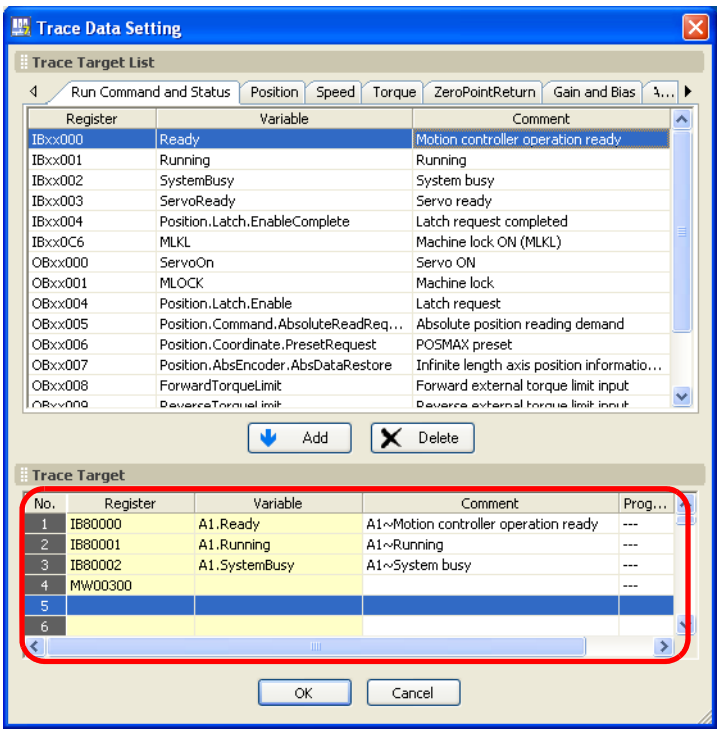
4. Click the **Trace Data Setting** Button.



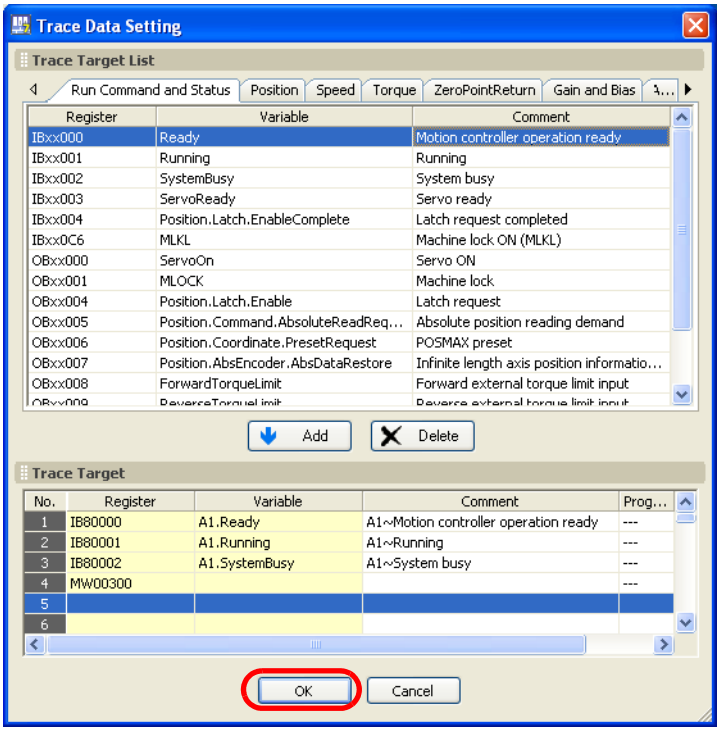
The Trace Data Setting Dialog Box will be displayed.

5. Use one of the following methods to specify the registers to trace.

- Select the registers to trace from the **Trace Target List** Area, and then click the **Add** Button.
- Type the register address directly in the **Register** Column in the **Trace Target** Area.

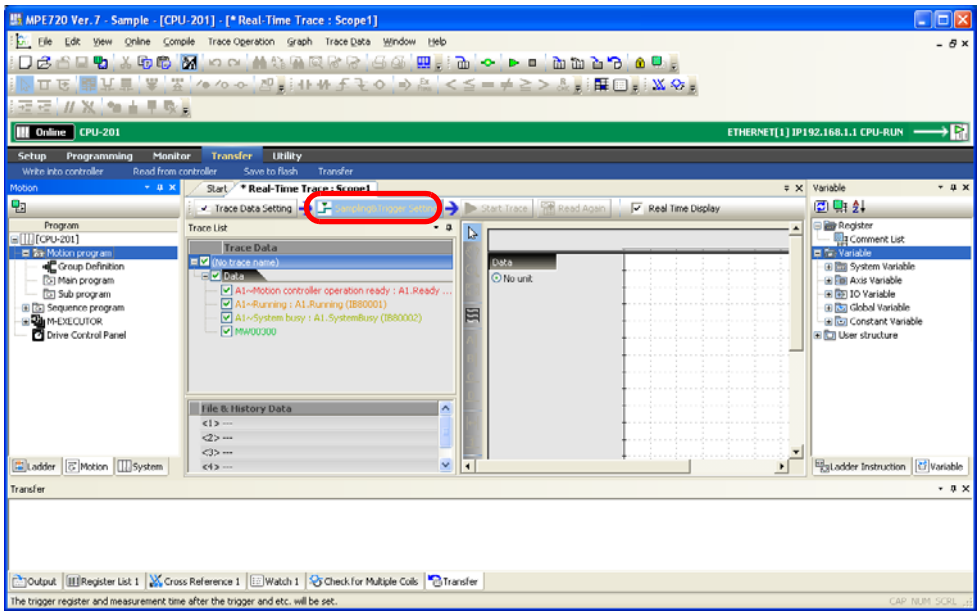


6. Click the **OK** Button.



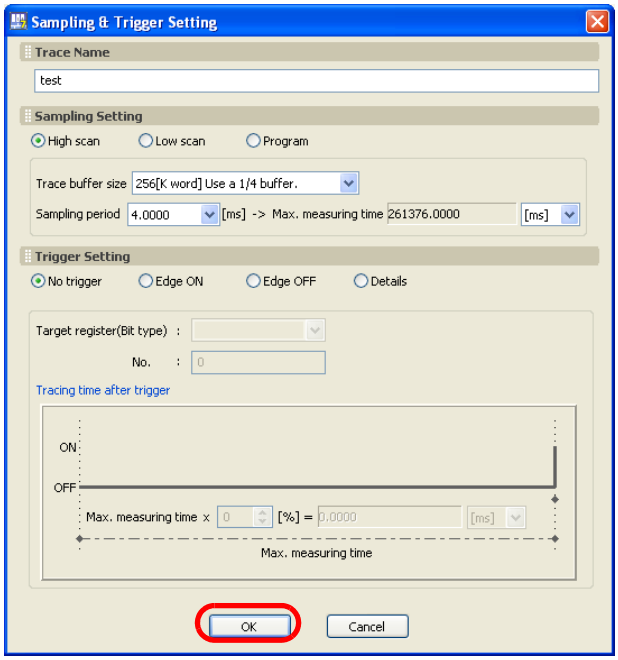
The Trace Data Setting Dialog Box will close.

7. Click the **Sampling & Trigger Setting** Button.



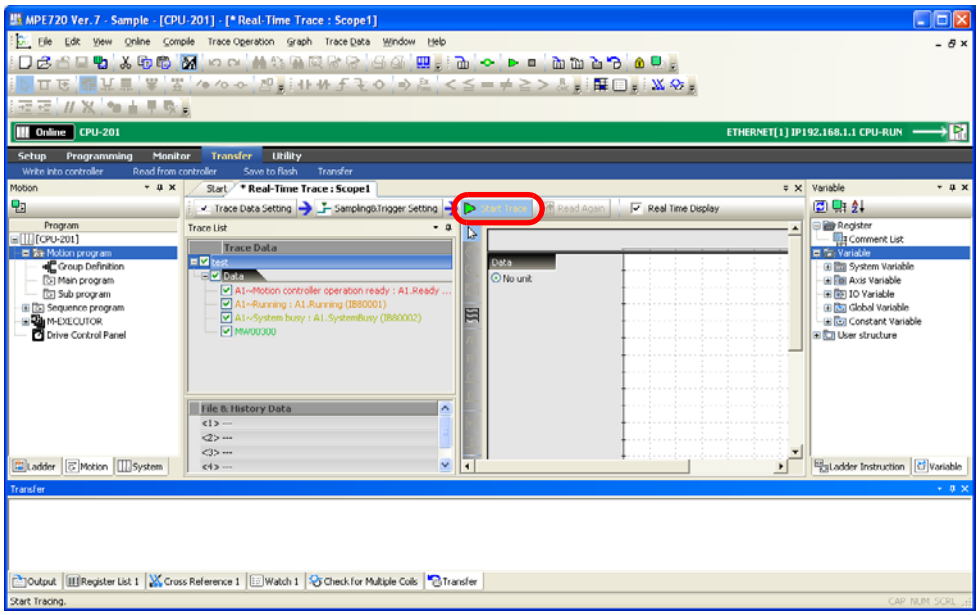
The Sampling and Trigger Setting Dialog Box will be displayed.

8. Set the items, and then click the **OK** Button.

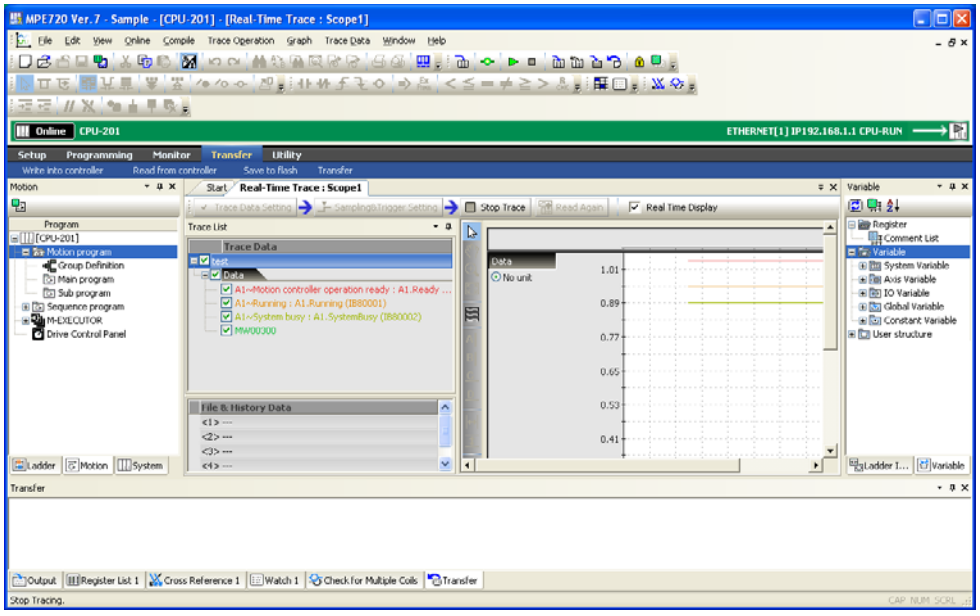


The Sampling and Trigger Setting Dialog Box will close.

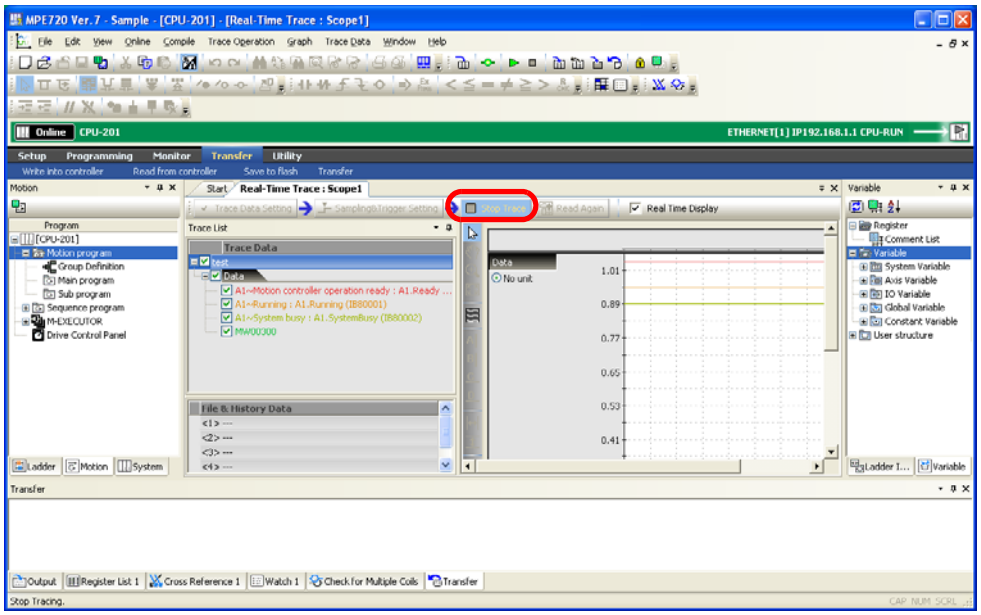
9. Click the **Start Trace** Button.



The trace will start and a realtime graph will be displayed on the Real-Time Trace Tab Page.



10. Click the **Stop Trace** Button to stop tracing.



Tracing will stop.

This concludes the procedure.

Security

9

This chapter describes the operations that are used to manage security.

9.1 Security Settings for the Machine Controller 9-2

9.2 Security Settings for Project Files 9-7

Protecting Project Files with a Password 9-7
Opening a Password-protected Project File 9-10
Changing the Project File Password 9-11
Disabling Password Protection of a Project File 9-12

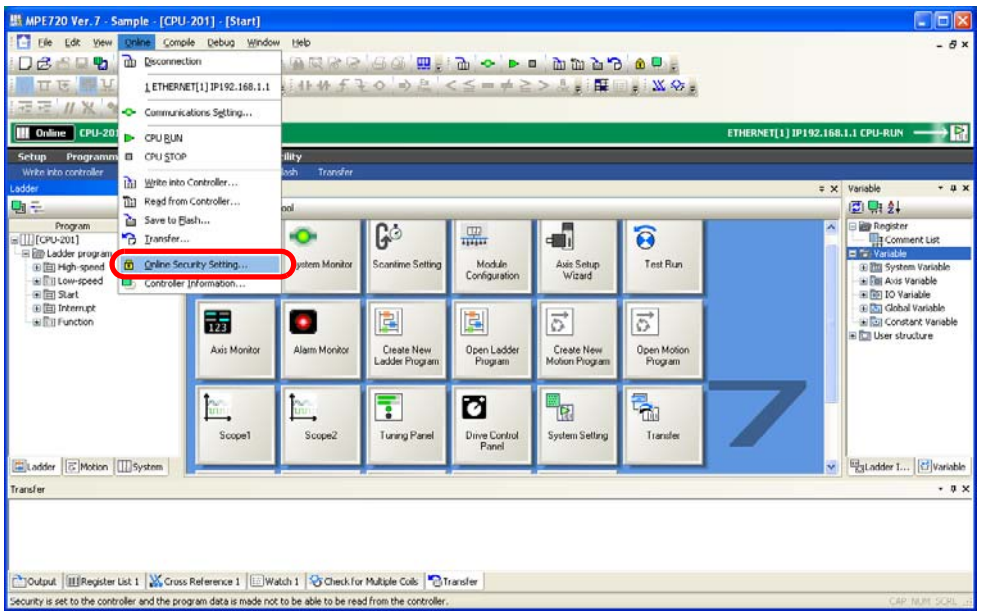
9.3 Security Settings for Programs 9-14

Protecting Programs with a Password 9-14
Opening a Password-protected Program 9-16
Changing Program Passwords 9-16
Disabling Password Protection of a Program 9-19

9.1 Security Settings for the Machine Controller

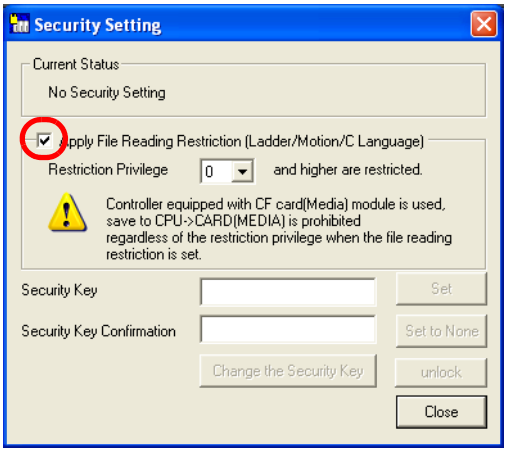
You can protect programs from being read from the Machine Controller by changing the Machine Controller's security settings. (This is called online security.) Use the following procedure to enable security on the Machine Controller.

1. Select ***Online*** – ***Online Security Setting*** from the menu bar.



The Security Setting Dialog Box will be displayed.

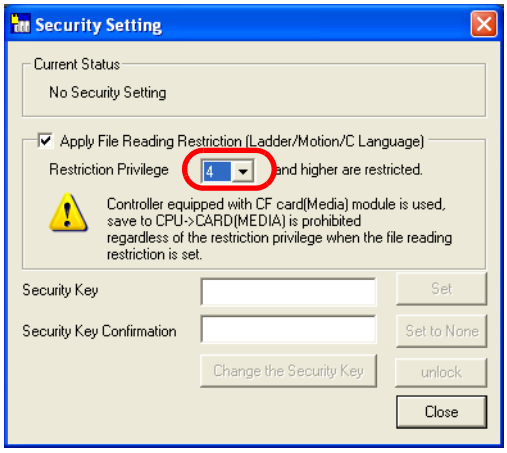
2. Select the **Apply File Reading Restriction (Ladder/Motion/C Language)** Check Box.



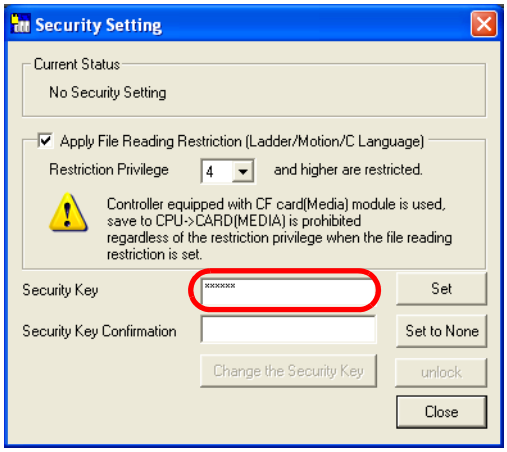
3. Specify the restriction level in the **Restriction Privilege** Box.
Setting range: 1 to 8

Information

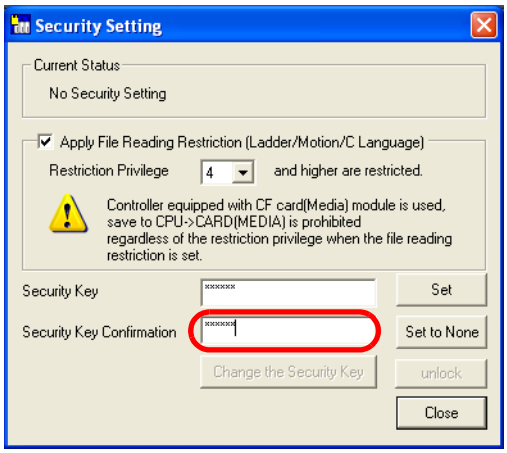
For a user to read programs from a Machine Controller for which online security is enabled, they must have the same or higher privilege level for reading as this setting.
You can confirm user privileges in the Environment Setting Dialog Box that is displayed by selecting ***File*** – ***Environment Setting*** from the menu bar.



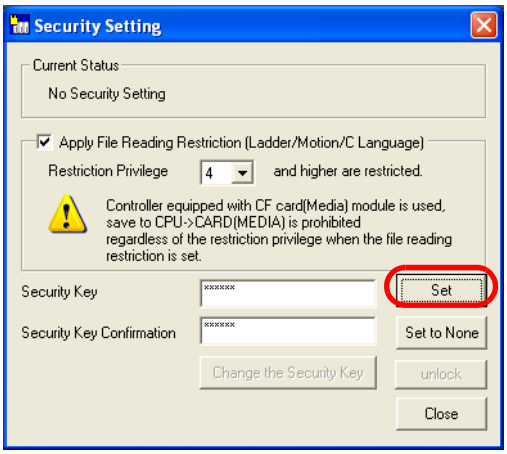
4. Enter a password of 8 or fewer alphanumeric characters in the **Security Key** Box.
Note: The password is case sensitive.



5. Confirm the security key by entering the same password in the **Security Key Confirmation** Box.



6. Click the **Set** Button.

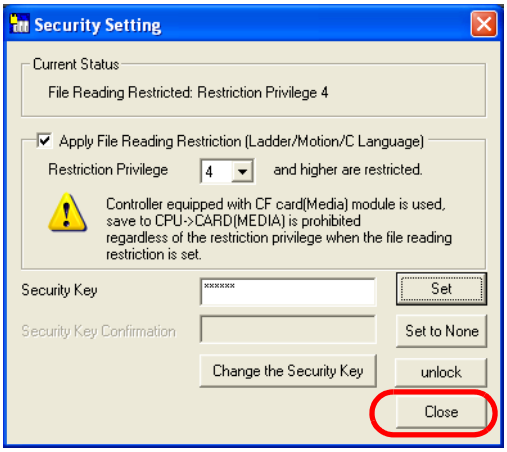


The MPE720 Ver. 7 Dialog Box will be displayed.

7. Click the **OK** Button.

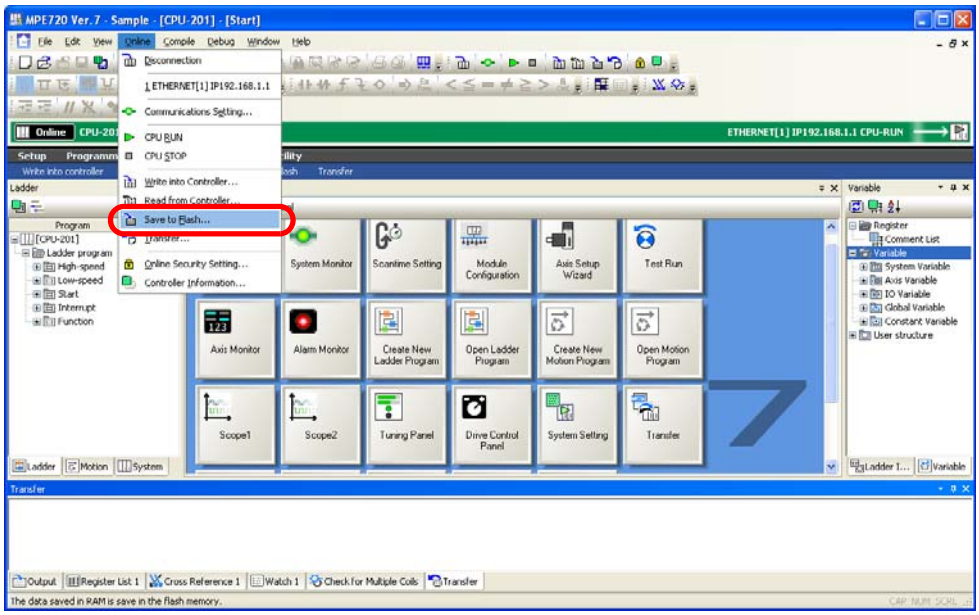
The MPE720 Ver. 7 Dialog Box will close.

8. Click the **Close** Button.



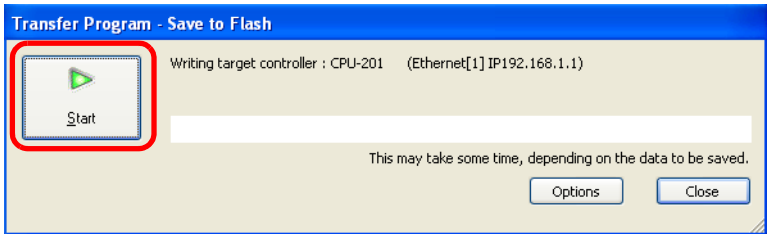
The Security Setting Dialog Box will close.

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



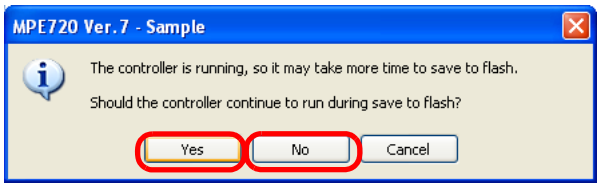
The Transfer Program – Save to Flash Dialog Box will be displayed.

10. Click the **Start** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

11. Click the **Yes** Button or the **No** Button.

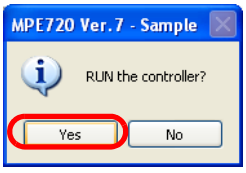


The MPE720 will begin saving the data to flash memory. When the transfer has been completed, the MPE720 Ver.7 Dialog Box will be displayed.

12. Click the **OK** Button.

Information

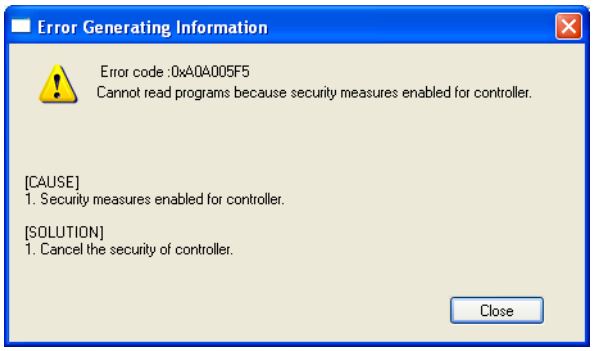
If you clicked the **No** Button in step 11, the following MPE720 Ver. 7 Dialog Box will be displayed. Click the **Yes** Button.



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.

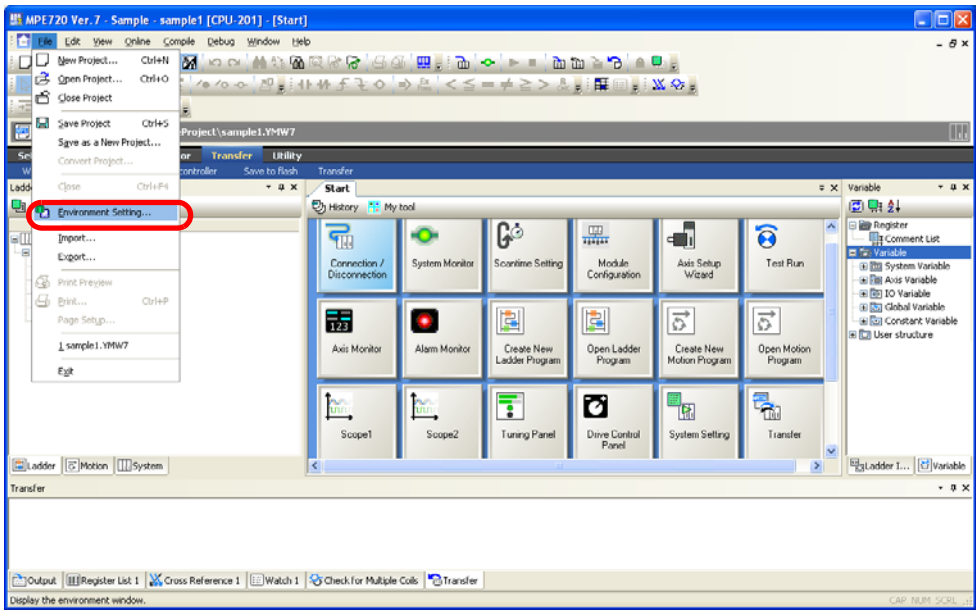
9.2 Security Settings for Project Files

This section gives the procedures for managing security settings for project files.

Protecting Project Files with a Password

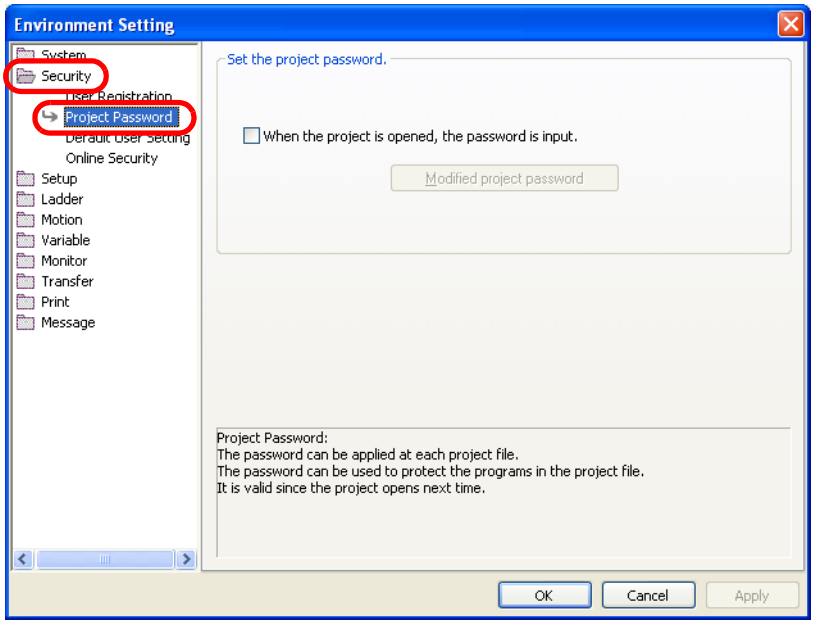
To protect project files with a password, you must first set the password. Use the following procedure.

1. Open the project file for which to enable password protection.
2. Select ***File*** – ***Environment Setting*** from the menu bar.

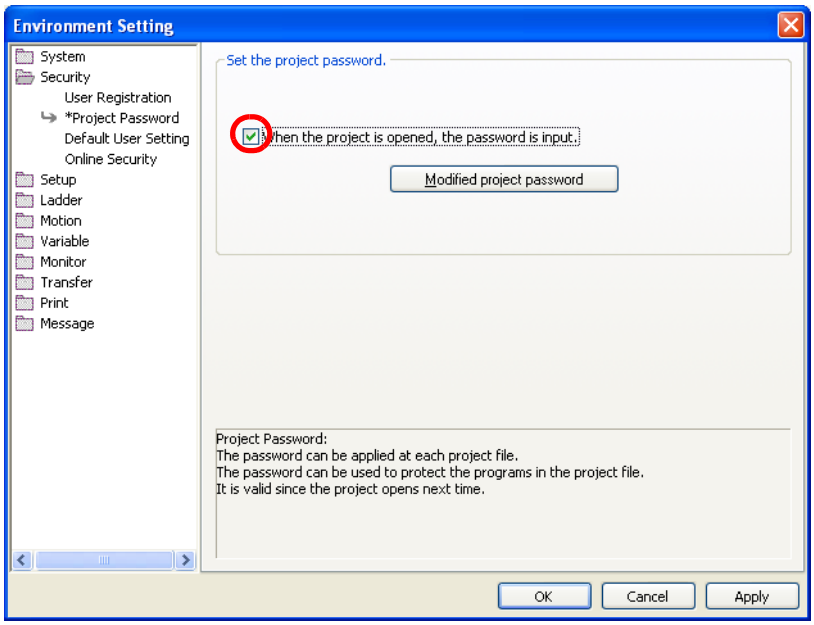


The Environment Setting Dialog Box will be displayed.

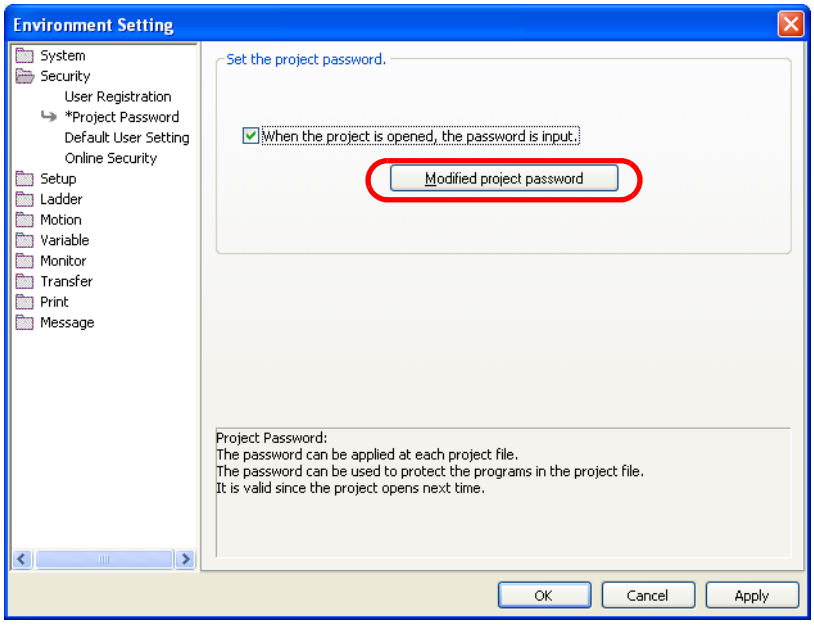
3. Select **Security** – **Project Password**.



4. Select the **When the project is opened, the password is input** Check Box.

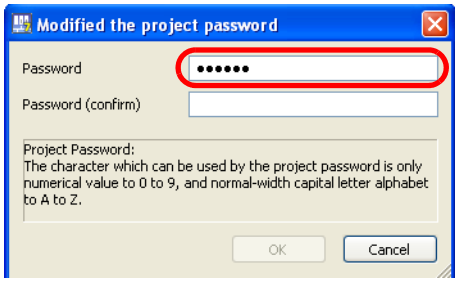


5. Click the **Modified project password** Button.

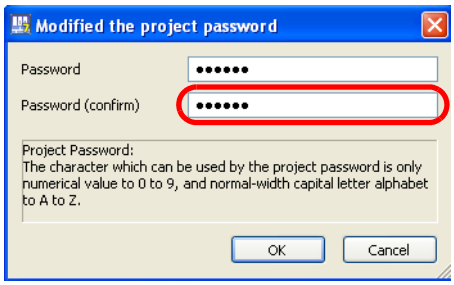


The Modified the Project Password Dialog Box will be displayed.

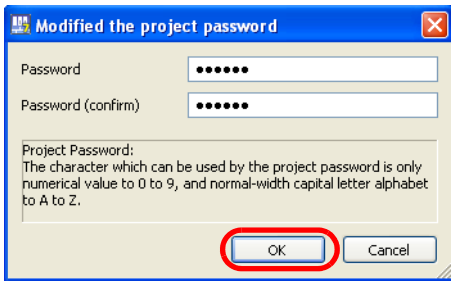
6. Enter a password of 16 or fewer alphanumeric characters in the **Password** Box.



7. Confirm the password by entering the same password that was entered in step 6 in the **Password (confirm)** Box.

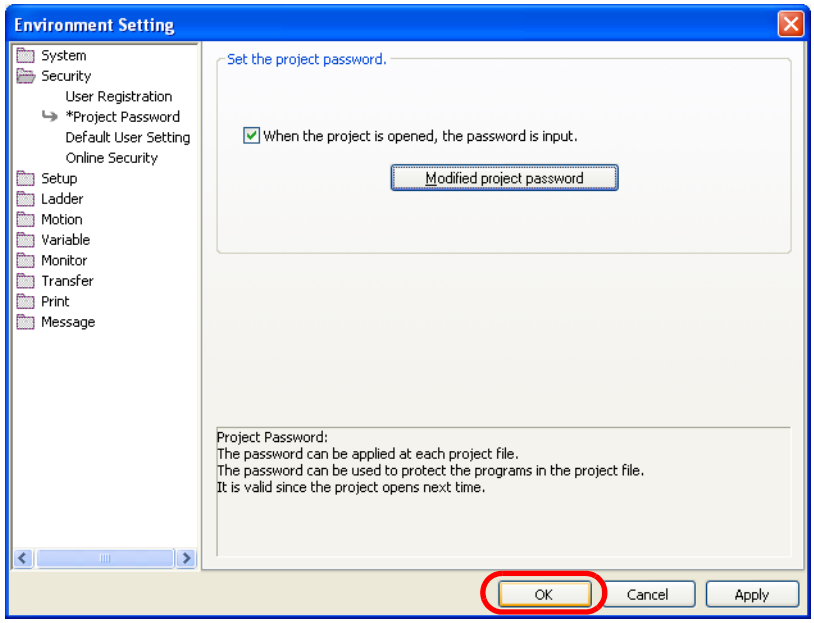


8. Click the **OK** Button.



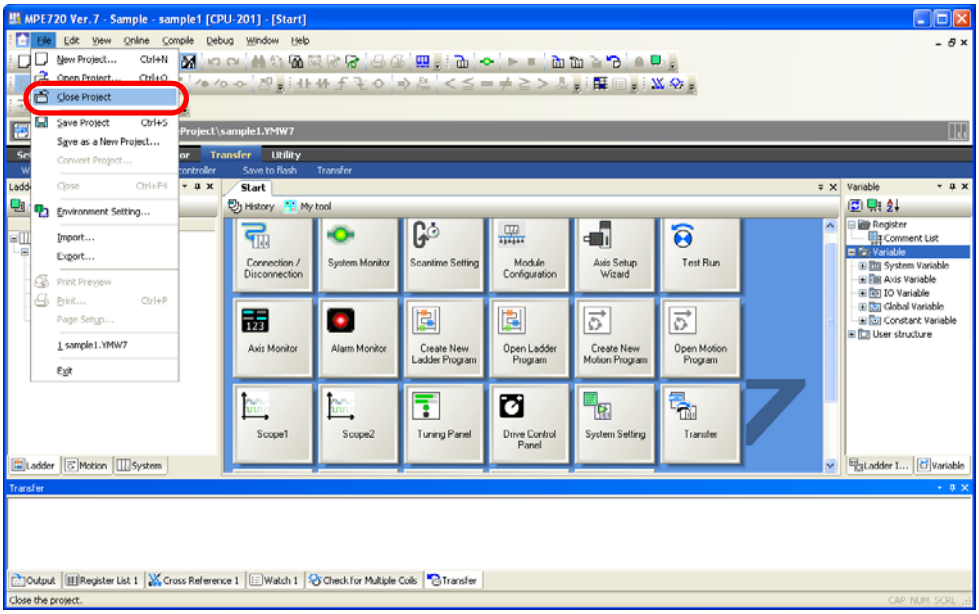
The Modified the Project Password Dialog Box will close.

9. Click the **OK** Button.



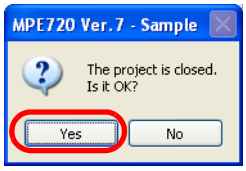
The Environment Setting Dialog Box will close.

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



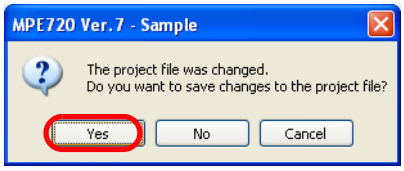
The MPE720 Ver. 7 Dialog Box will be displayed.

11. Click the **Yes** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

12. Click the **Yes** Button.



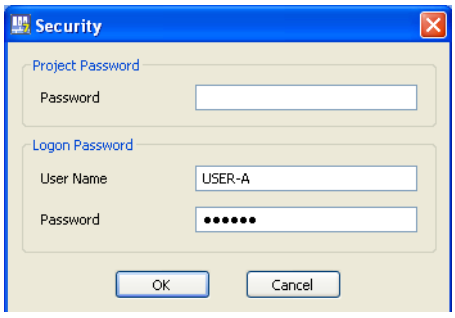
The project file will close, and password protection will be enabled for the project file.

This concludes the procedure.

Opening a Password-protected Project File

1. Open the project file.

The Security Dialog Box will be displayed.

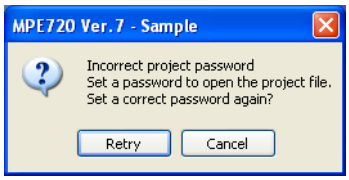


2. Enter the password that was set previously.

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.

Changing the Project File Password

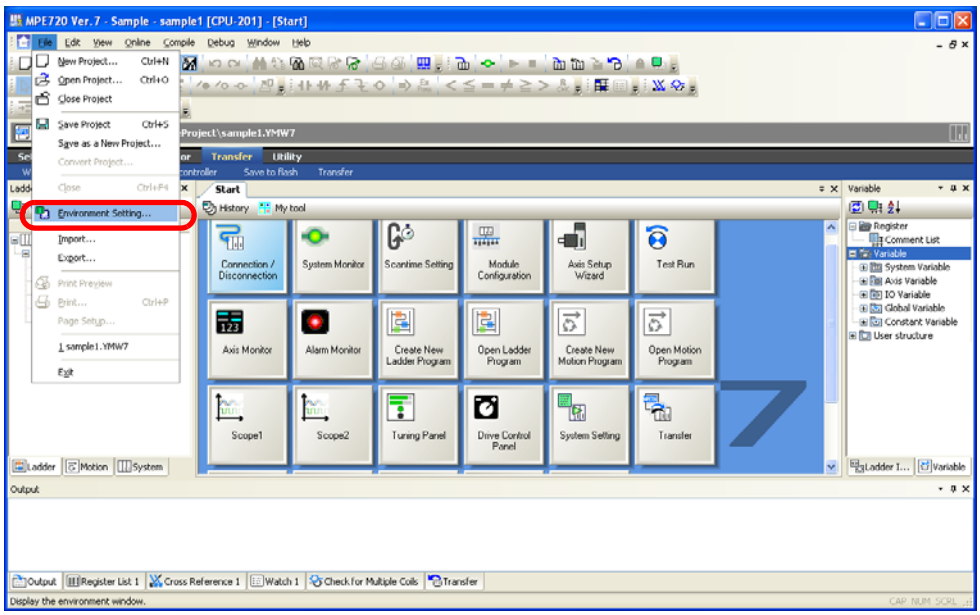
To change the password of a project file, perform the same procedure that you used to protect the project file with a password. Refer to the following section for details.

☞ *Protecting Project Files with a Password (page 9-7)*

Disabling Password Protection of a Project File

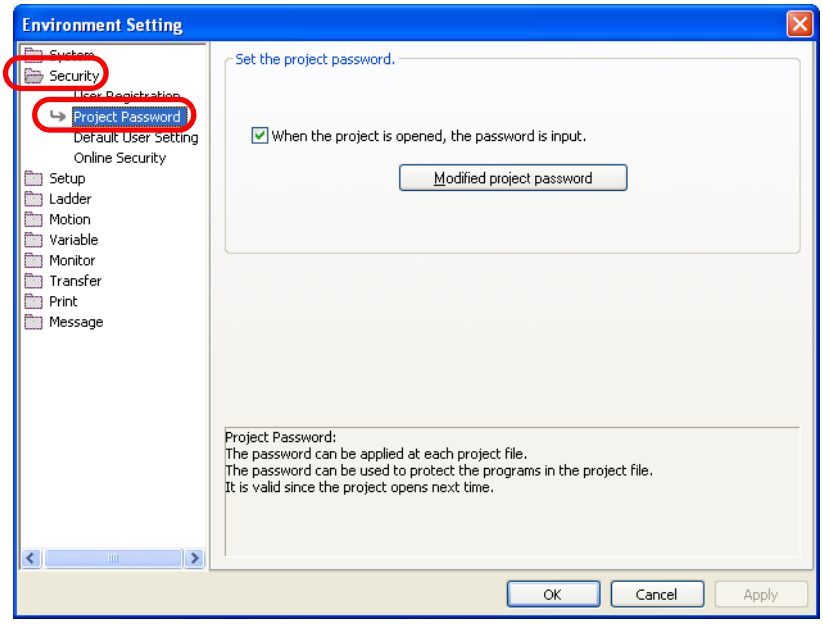
Use the following procedure to disable password protection of a project file.

1. Open the project file for which to disable password protection.
2. Select ***File*** – ***Environment Setting*** from the menu bar.

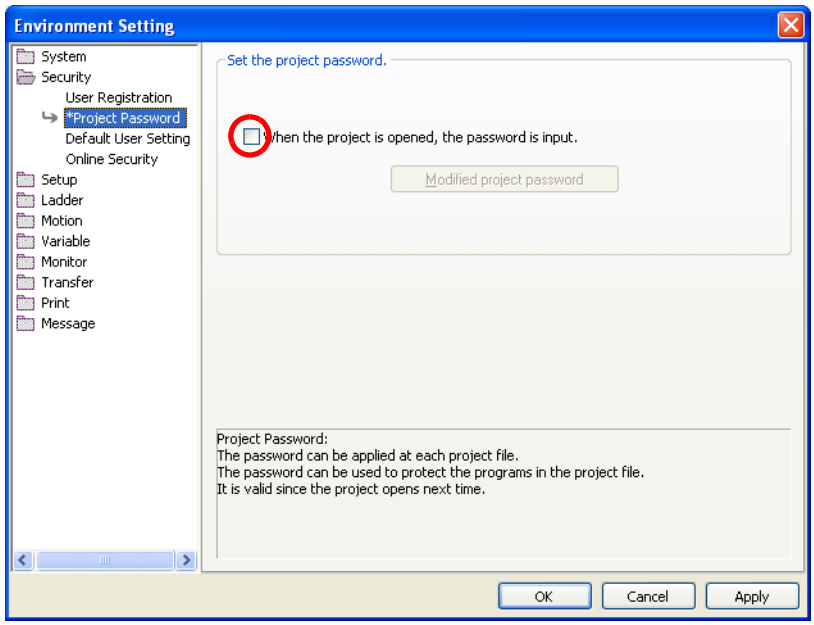


The Environment Setting Dialog Box is displayed.

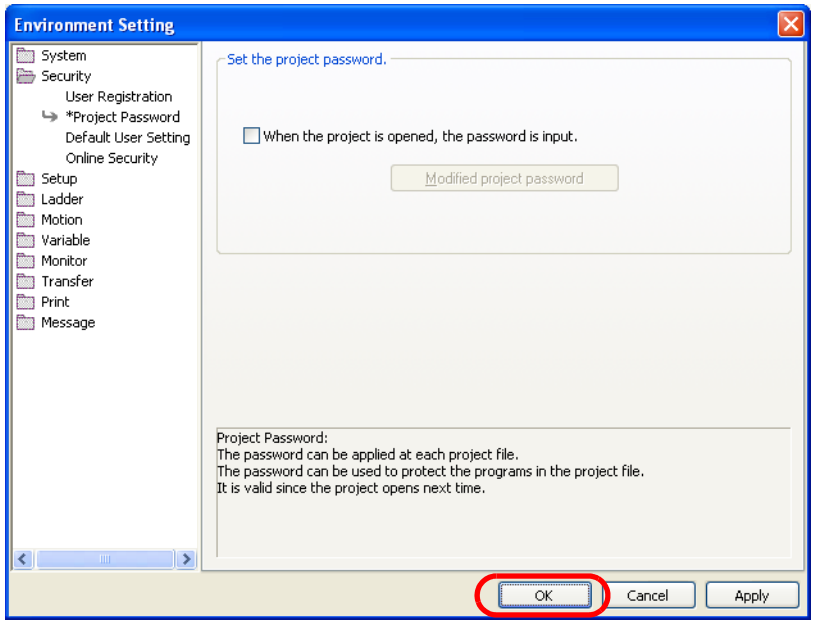
3. Select **Security** – **Project Password**.



4. Clear the **When the project is opened, the password is input** Check Box.



5. Click the **OK** Button.



This concludes the procedure.

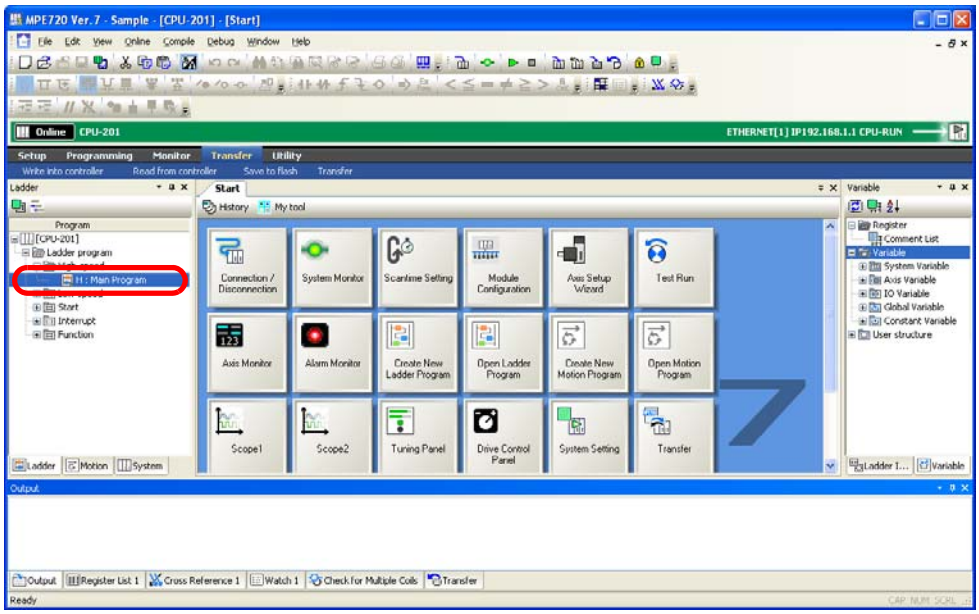
9.3 Security Settings for Programs

This section gives the procedures for managing security settings for programs.

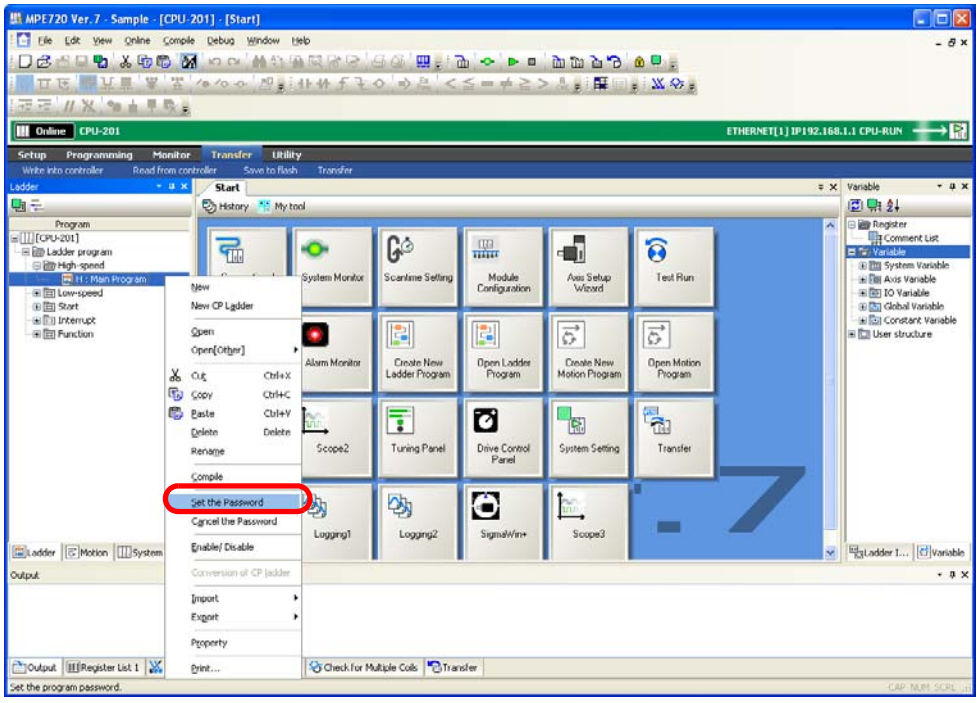
Protecting Programs with a Password

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.



3. Right-click the program and select ***Set the Password***.

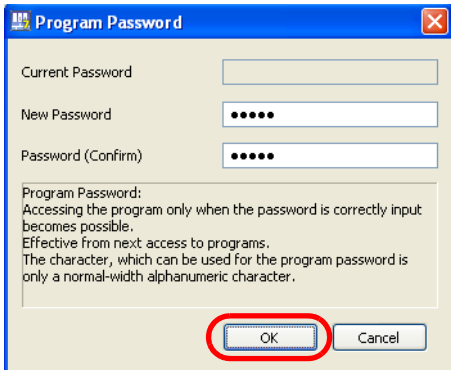


The Program Password Dialog Box will be displayed.

4. Enter a password of 8 or fewer alphanumeric characters in the **New Password** Box.

5. Confirm the password by entering the same password that was entered in step 4 in the **Password (Confirm)** Box.

6. Click the **OK** Button.



7. Confirm that the password-protected program has a password-locked icon ( ) displayed next to it.

This concludes the procedure.

Opening a Password-protected Program

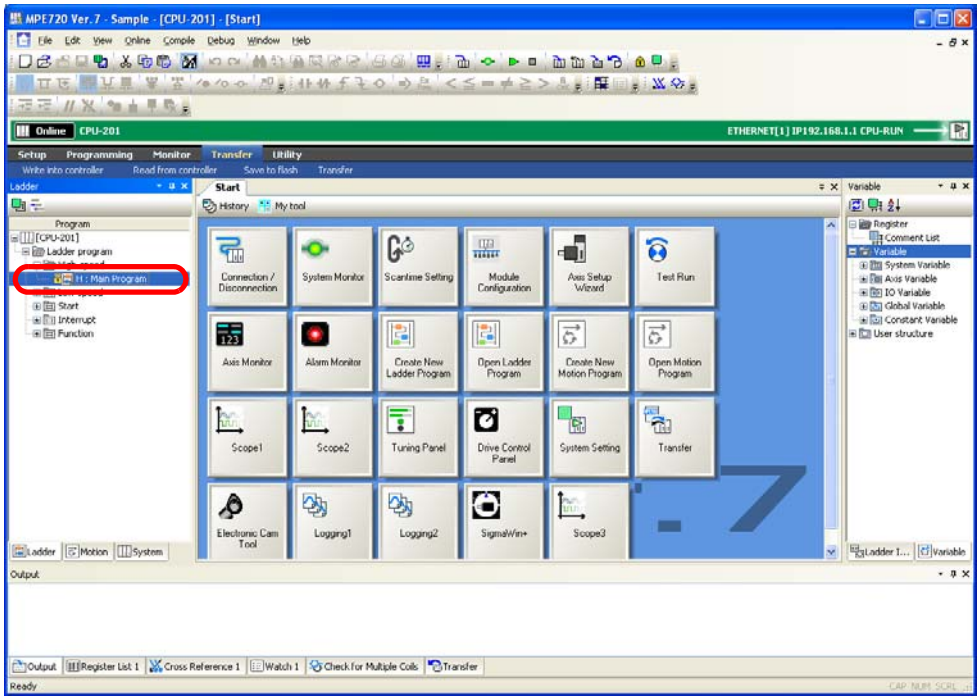
If you attempt to open a password-protected program, the Program Password Dialog Box will be displayed.

Enter the password in the **Program Password** Box, and then click the **OK** Button to open the program.

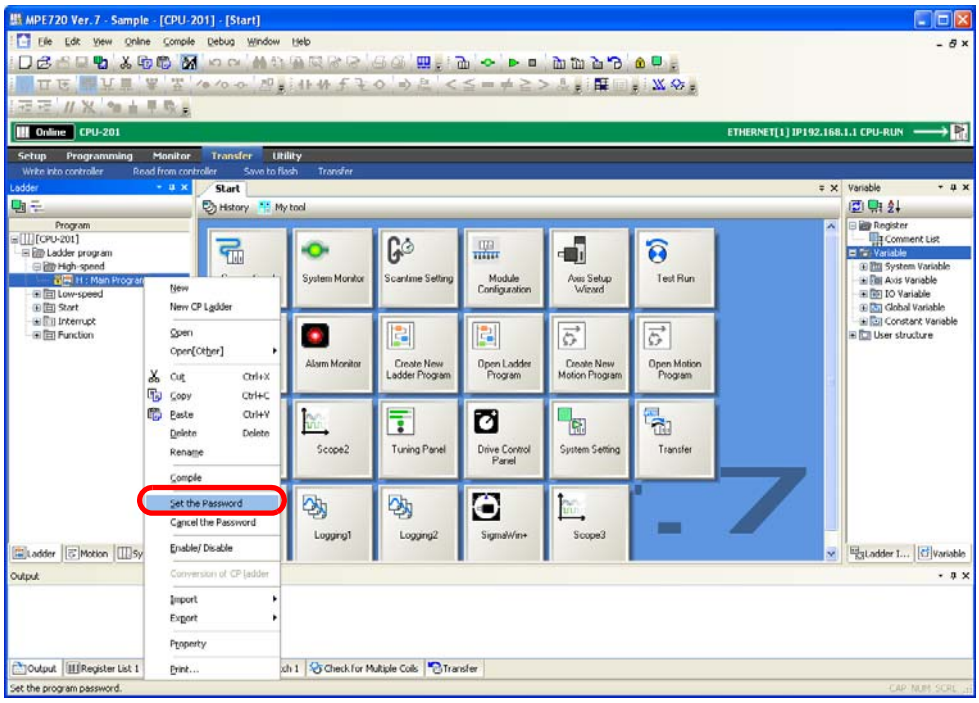
Changing Program Passwords

Use the following procedure to change the password 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 change the password.



3. Right-click the program and select ***Set the Password***.



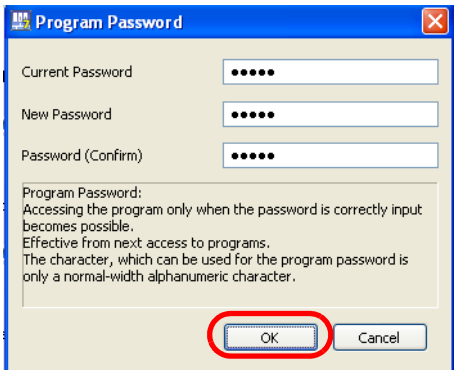
The Program Password Dialog Box will be displayed.

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 same password that was entered in step 5 in the **Password (Confirm)** Box.

7. Click the **OK** Button.

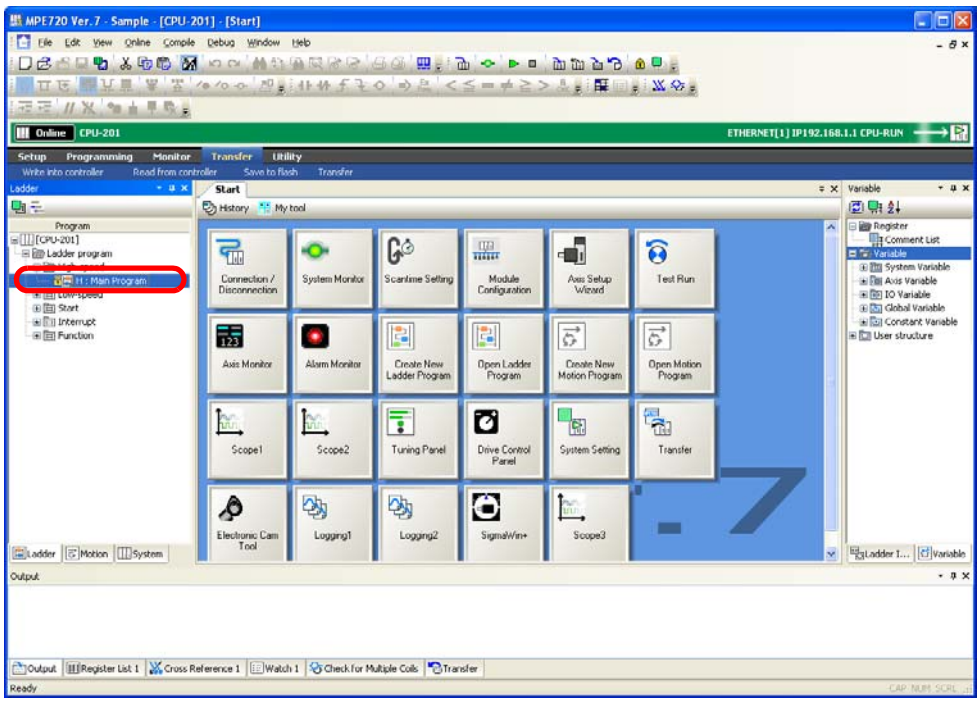


This concludes the procedure.

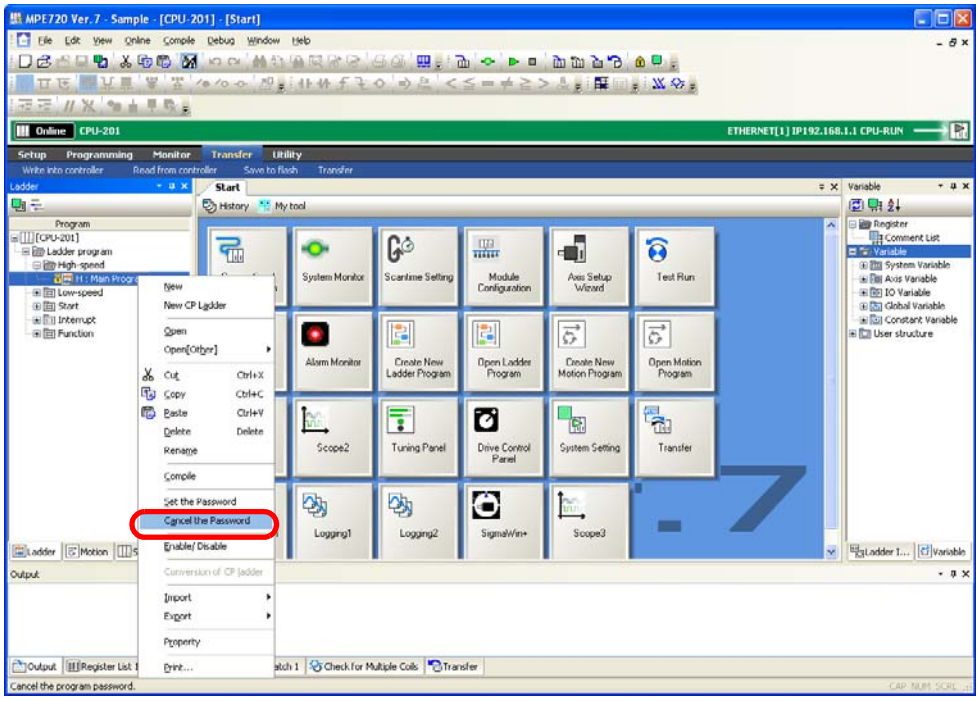
Disabling Password Protection of a Program

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

10

This chapter describes the operations that are used for maintenance and management.

10.1 Changing the Machine Controller Model in an Existing Project File 10-2

10.2 Monitoring the Current Positions of Axes 10-5

10.3 Monitoring the Alarm Status of Axes 10-7

10.4 Reading and Writing Specific Data Items 10-9

List of Transferrable Data 10-12

10.5 Backing Up Data in the Machine Controller . . . 10-14

10.6 Comparing Data 10-17

10.7 Changing the Display Language 10-20

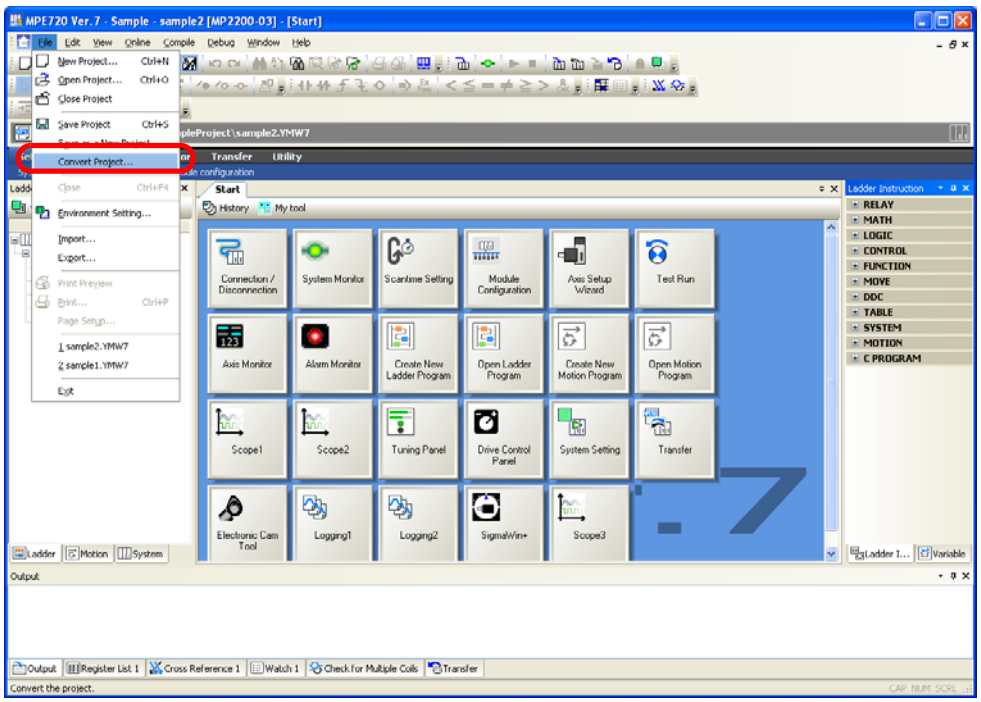
10.8 Using MPE720 Version 7 to Open MAL Files . 10-22

10.1 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.

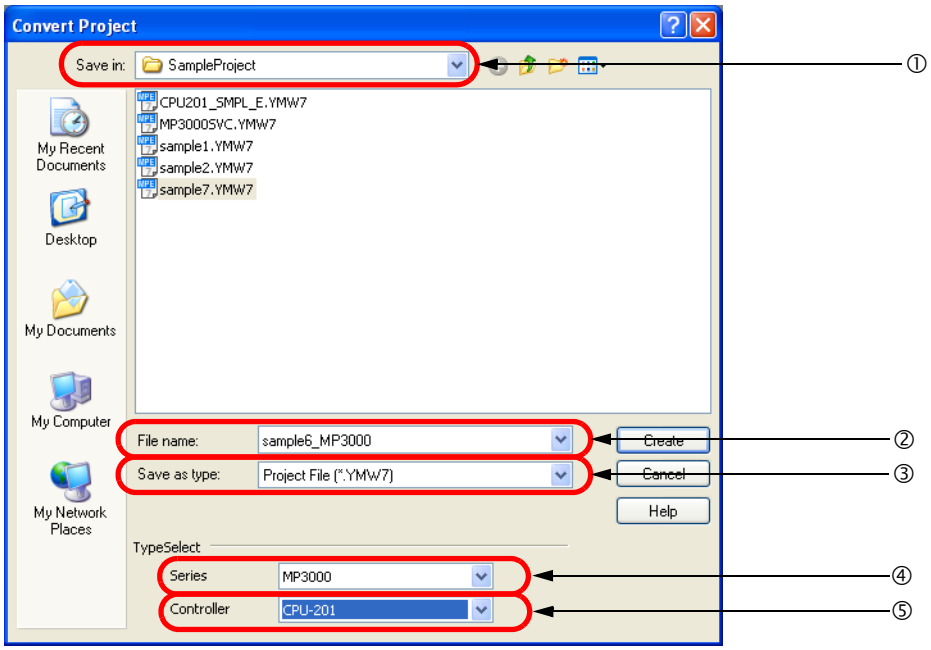
This will allow you to continue using the data that was used with the MP2000-series Machine Controller.

1. Open the project file for which to change the Machine Controller model.
2. Select ***File*** – ***Convert Project*** from the menu bar.



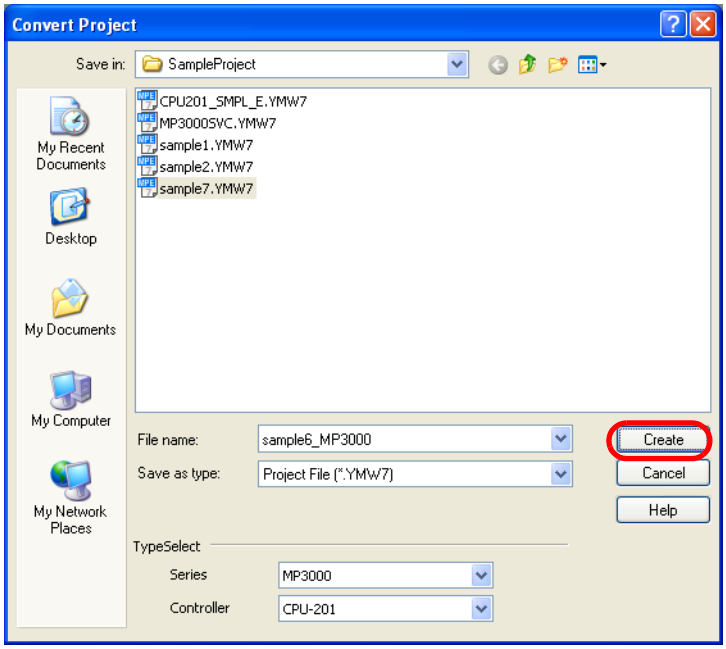
The Convert Project Dialog Box will be displayed.

3. Set the items from ① to ⑤.

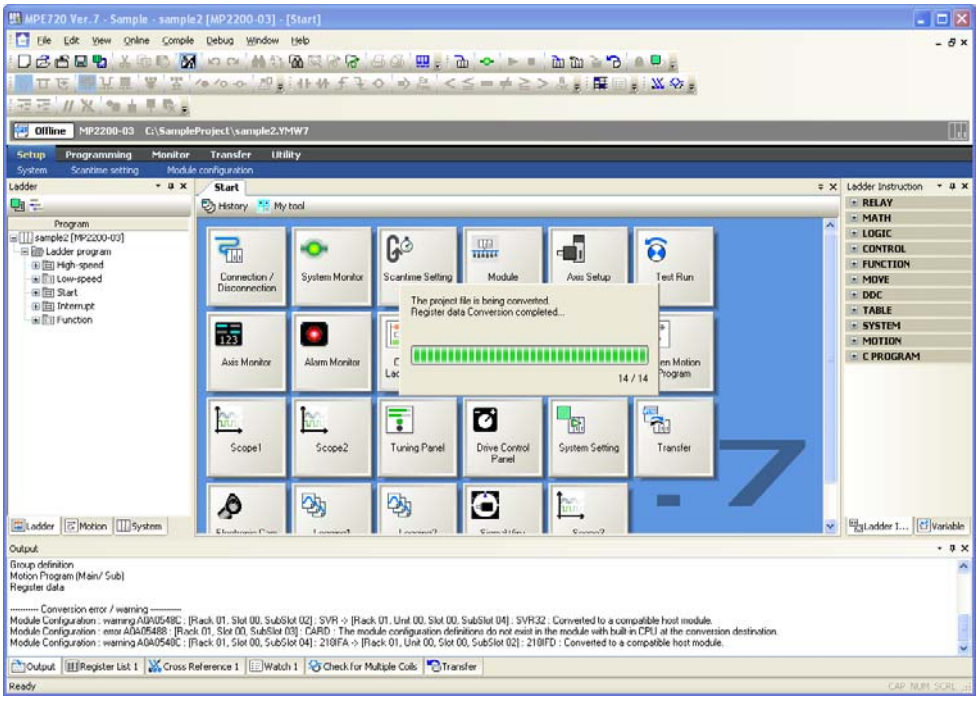


No.	Item	Description
①	Save in	Specify the location in which to save the converted project file.
②	File name	Enter the name to use for the converted project file.
③	Save as type	Select the type of the converted project file.
④	Series	Select **MP3000**.
⑤	Controller	Select the Controller model to which to convert.

4. Click the **Create** Button.

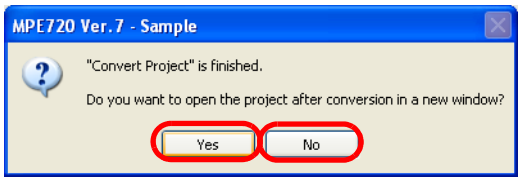


The conversion will start and a progress bar will be displayed. The progress of the conversion will also be displayed in the Output Pane.



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.

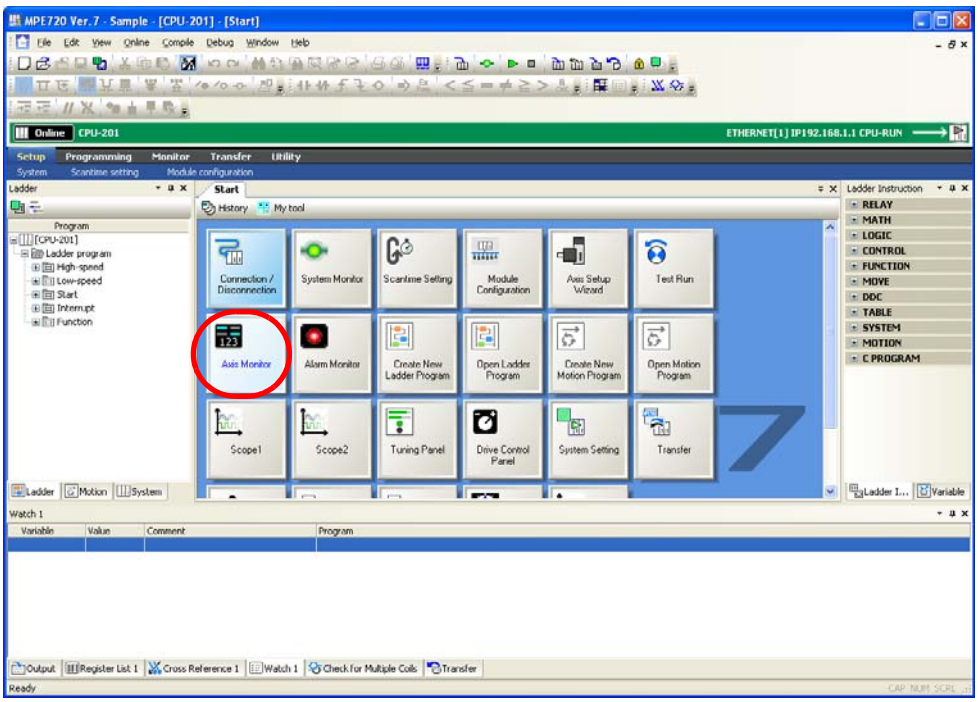
- Errors or Warnings during the Conversion

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 converter file is to be saved.

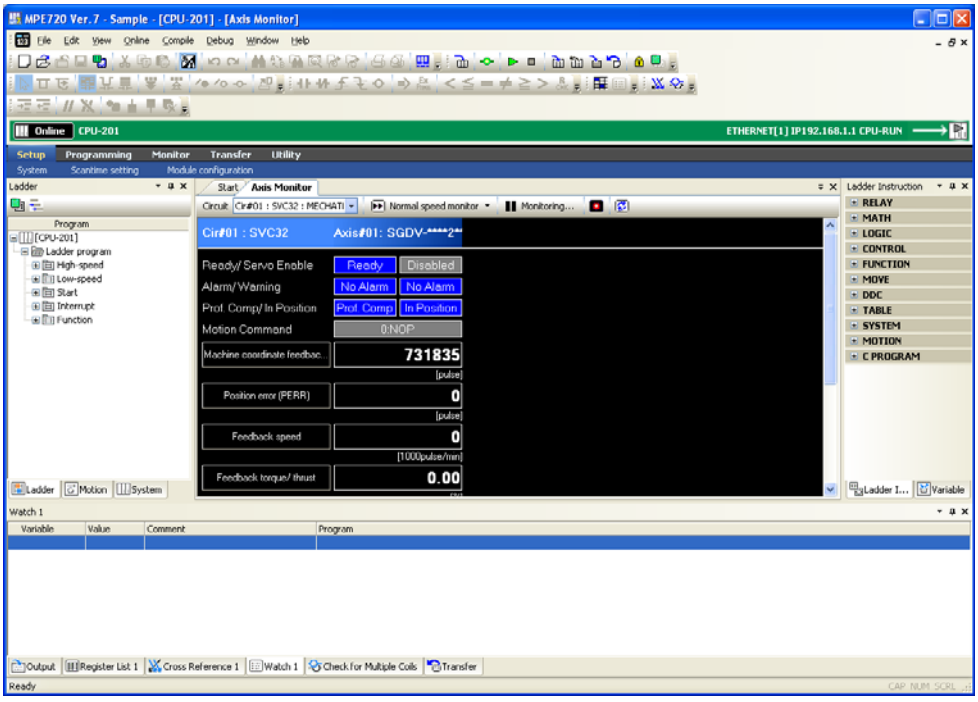
10.2 Monitoring the Current Positions of Axes

The following procedure shows how to use the Axis Monitor to monitor the position, operating status, and other information on a specified axis.

1. Click the **Axis Monitor** Button on the My Tool Tab Page.



The Axis Monitor Tab Page will be displayed.

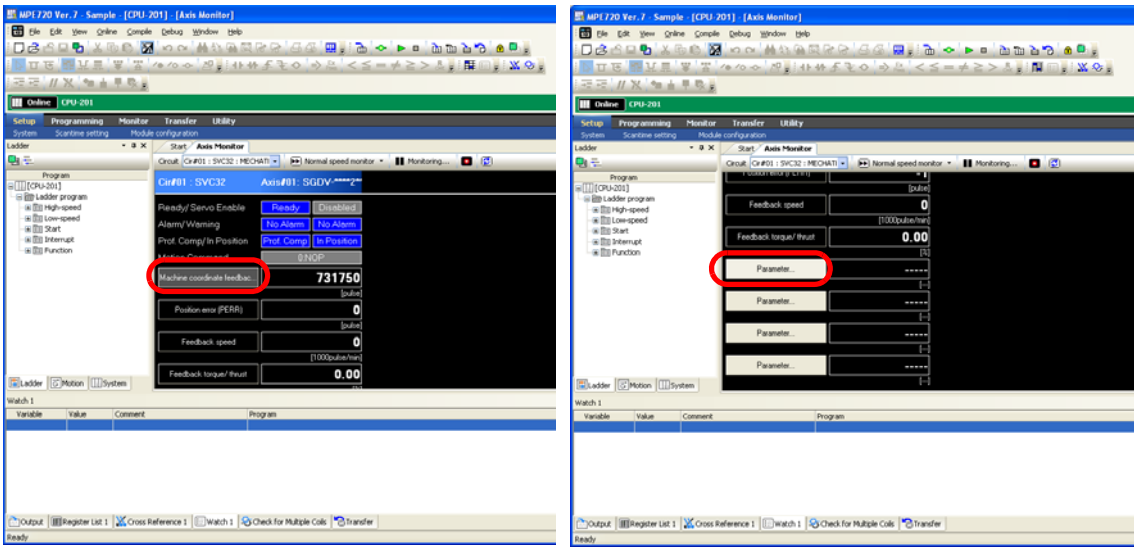


2. Check the current values of the parameters.

Perform the next step only if it is necessary to add or change the parameters to monitor.

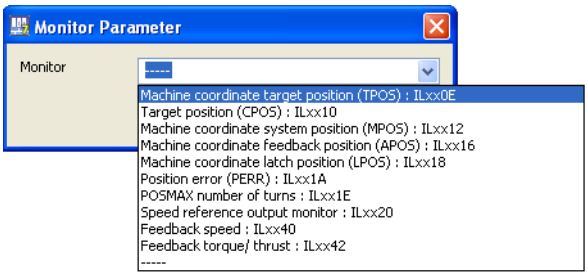
If there are no parameters to add or change, this concludes the procedure.

3. Click the name of the parameter to change, or the **Parameter** Button.

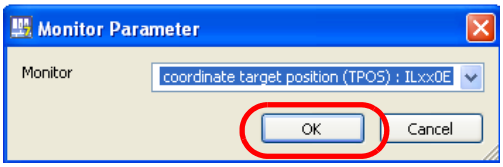


The Monitor Parameter Dialog Box will be displayed.

4. Select the parameter to monitor in the **Monitor** Box.



5. Click the **OK** Button.



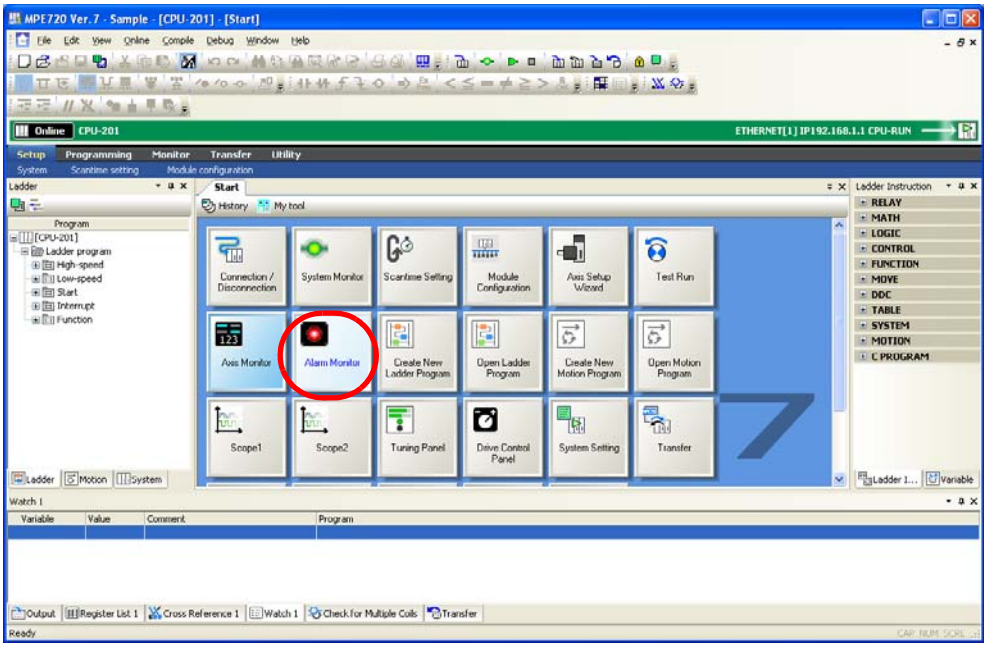
6. Confirm that the selected parameter has been changed or added.

This concludes the procedure.

10.3 Monitoring the Alarm Status of Axes

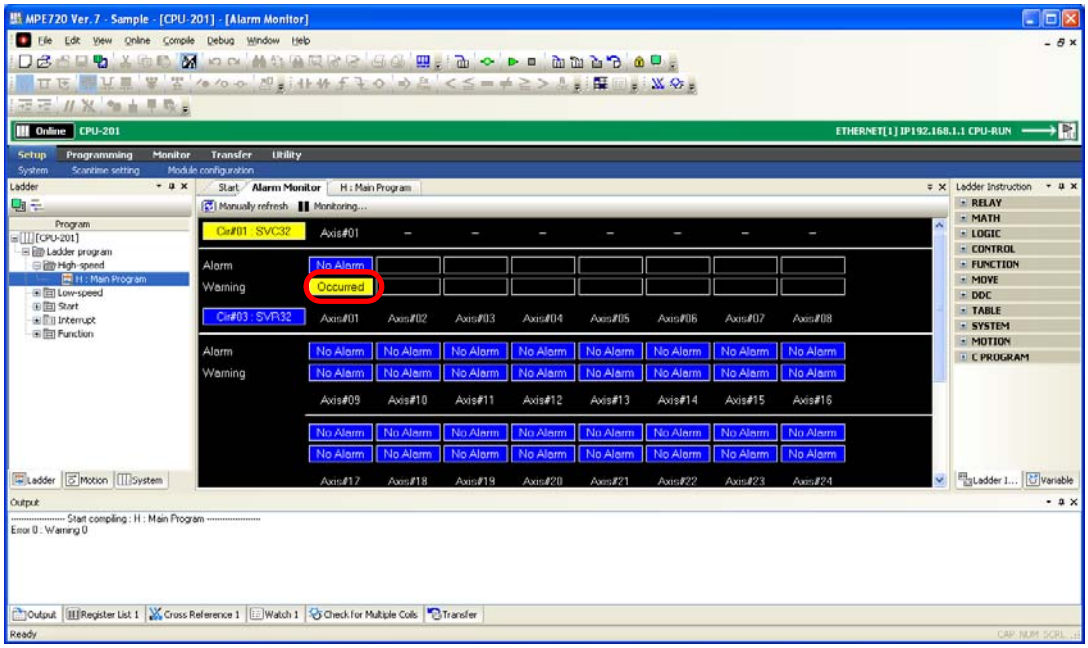
Use the following procedure to monitor alarms that occur while an axis is in motion.

1. Click the **Alarm Monitor** Button on the My Tool Tab Page.



The Alarm Monitor Tab Page will be displayed.

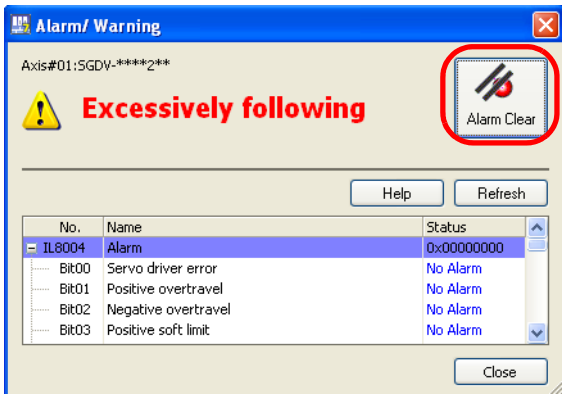
2. Click **Occurred.**



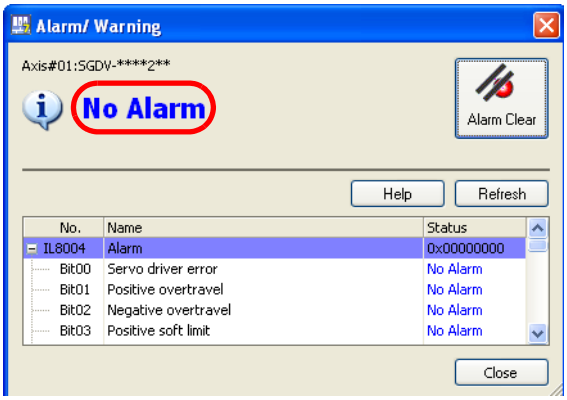
The Alarm/Warning Dialog Box will be displayed.

3. Check the alarm status and resolve the cause of the alarm.

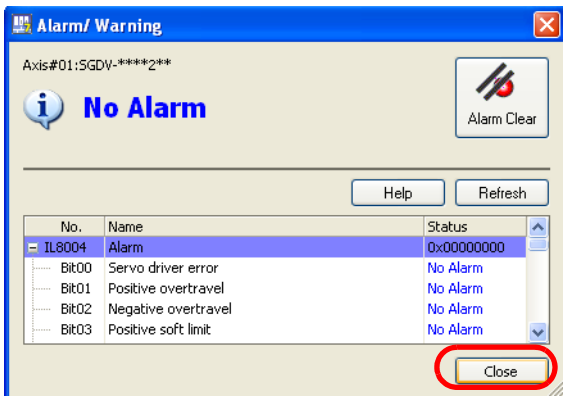
4. Click the **Alarm Clear** Button.



5. Confirm that the display changes to **No Alarm**.



6. Click the **Close** Button.

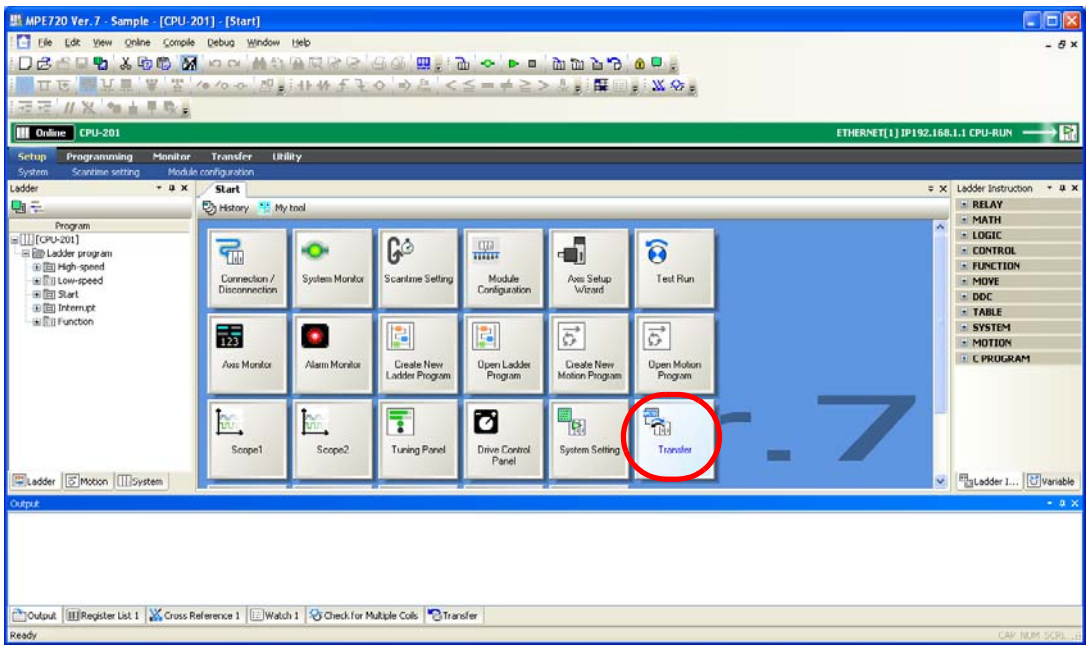


This concludes the procedure.

10.4 Reading and Writing Specific Data Items

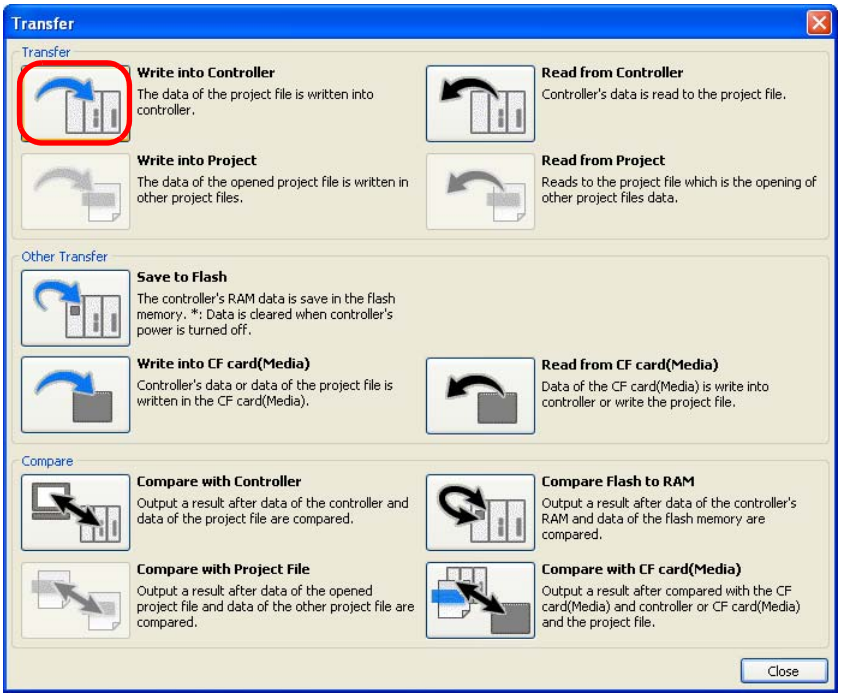
Use the following procedure to select specific components to write to or read from the Machine Controller, such as programs, registers, and comments.

1. Click the **Transfer** Button on the My Tool Tab Page.



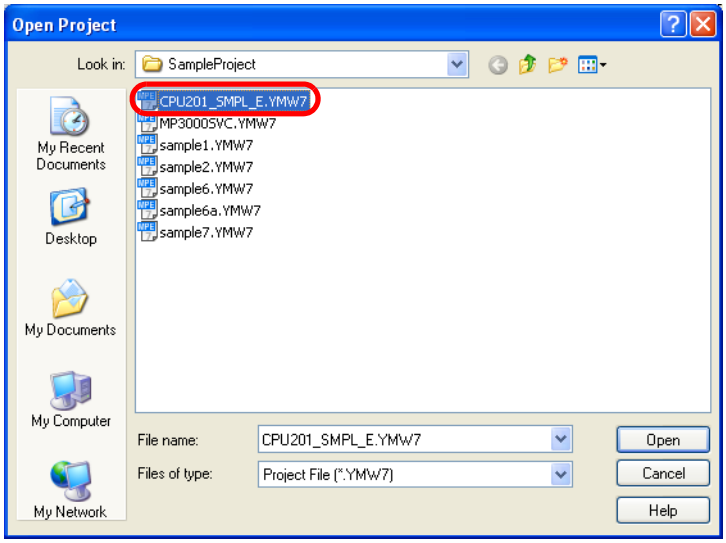
The Transfer Dialog Box will be displayed.

2. Select the type of transfer to perform in the **Transfer** Area.
The description given here will use the **Write into Controller** Button as an example.
Click the **Write into Controller** Button.

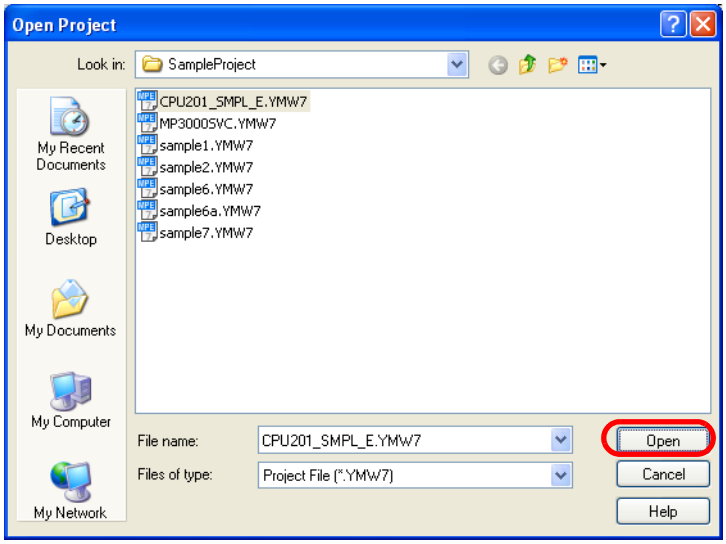


The Open Project Dialog Box will be displayed.

3. Select the source project file.

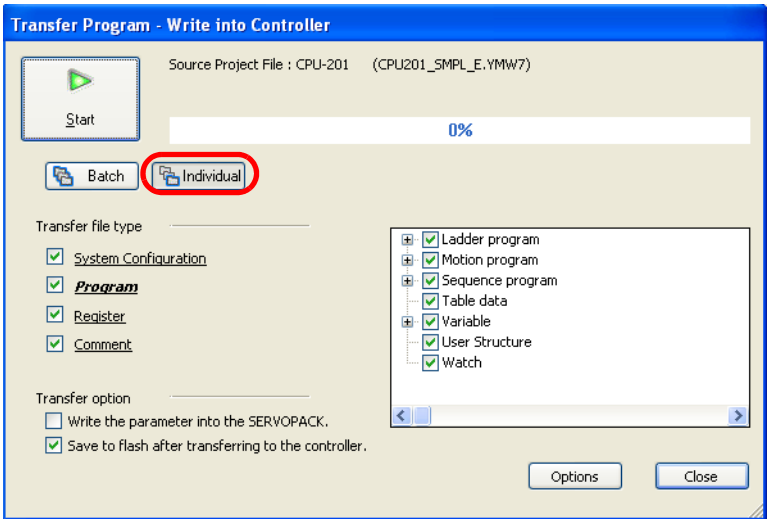


4. Click the **Open** Button.



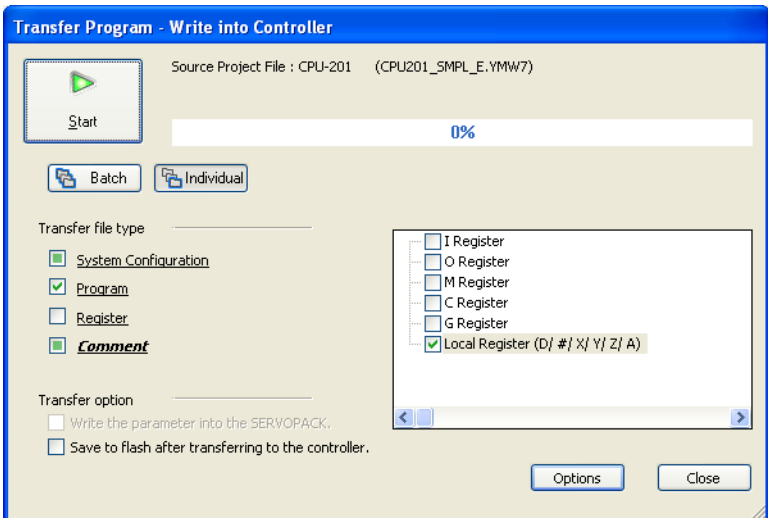
The Transfer Program – Write into Controller Dialog Box will be displayed.

5. Click the **Individual** Button.

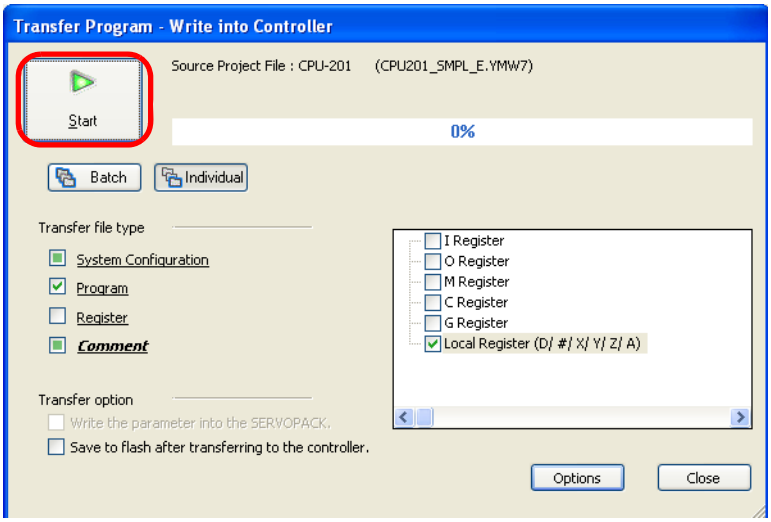


6. Select the check boxes in the **Transfer file type** Area to specify the items to transfer.
As you select check boxes under **Transfer file type**, individual transfer items will be displayed in the details pane on the right.
Refer to the following section for details on the transfer items.

☞ *List of Transferrable Data (page 10-12)*

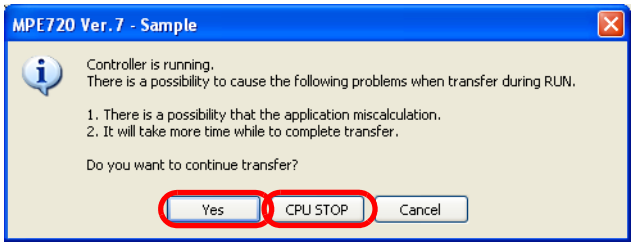


7. Click the **Start** Button.



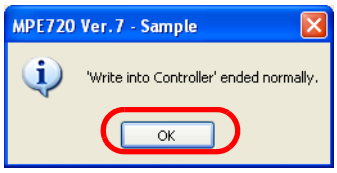
The MPE720 Ver. 7 Dialog Box will be displayed.

8. Confirm the items and click the **Yes** Button or the **CPU STOP** Button.



The transfer will start.
When the transfer has been completed, the MPE720 Ver. 7 Dialog Box will be displayed.

9. Click the **OK** Button.



This concludes the procedure.

List of Transferrable Data

The following table lists the data that can be transferred.

- Click the **Batch** Button to transfer all of the data that is listed below.
- 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		
Programs	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
	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		
Registers	M registers		
	D registers		
	C registers		
	G registers		
Comments	I registers		
	O registers		
	M registers		
	C registers		
	G registers		
	Local registers (D, #, X, Y, Z, A)		

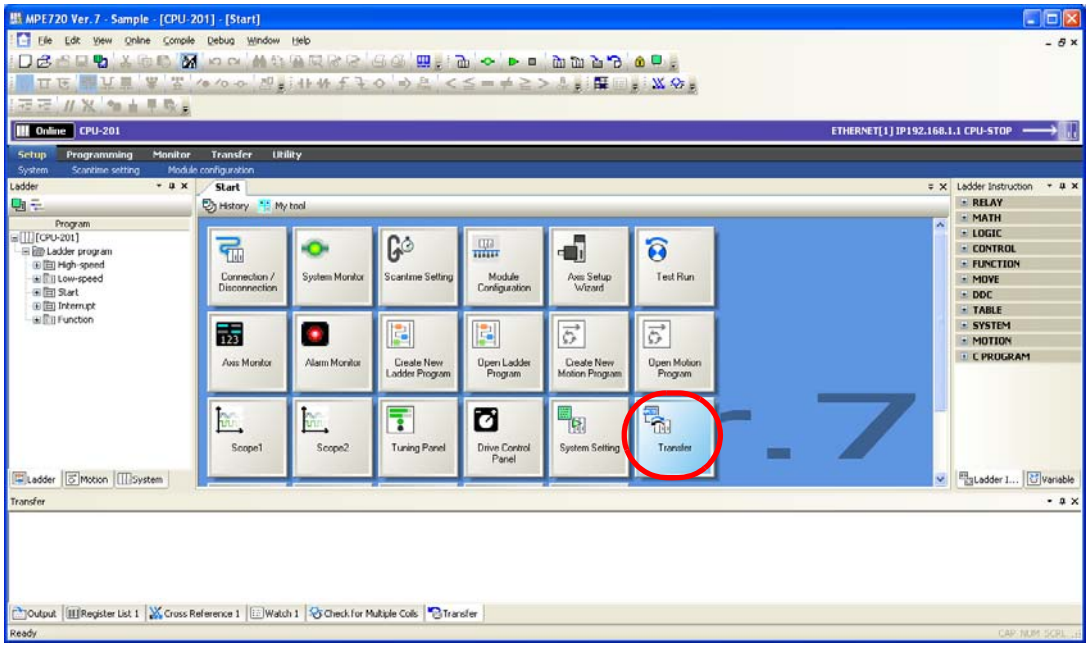
The following options can be specified for the transfer.

Transfer Option	Description
Write SERVOPACK parameters to the SERVOPACK	Writes the SERVOPACK parameters that were edited in the MPE720 to the SERVOPACK.
Save to flash memory after the transfer has been completed.	Saves the transferred data to the flash memory in the Machine Controller.

10.5 Backing Up Data in the Machine Controller

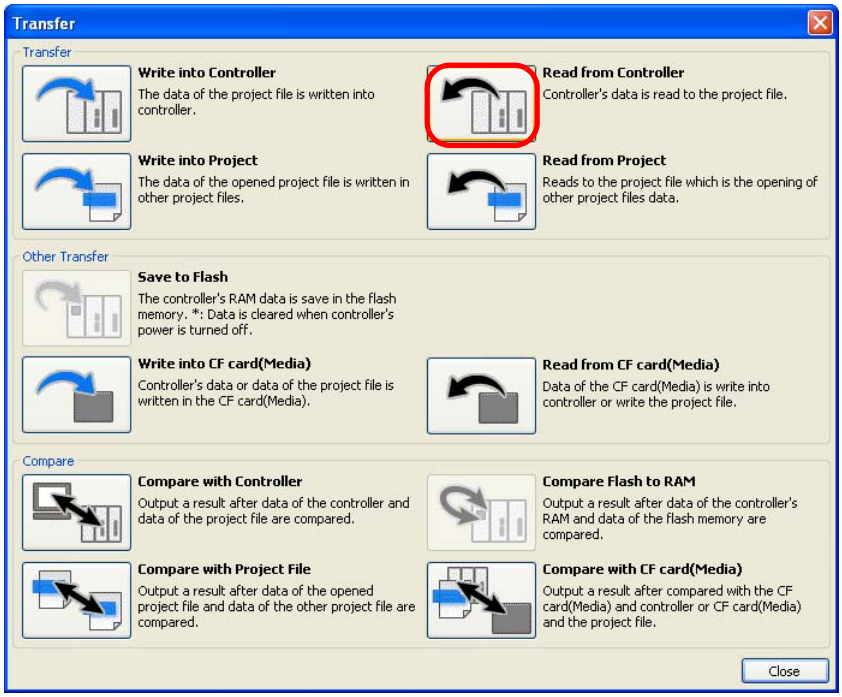
Use the following procedure to back up the data from the Machine Controller as a project file.

1. Click the **Transfer** Button on the My Tool Tab Page.



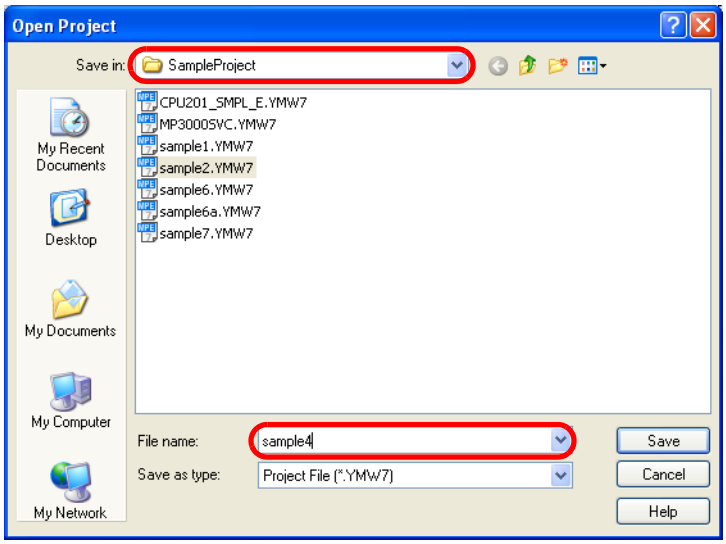
The Transfer Dialog Box will be displayed.

2. Click the **Read from Controller** Button.

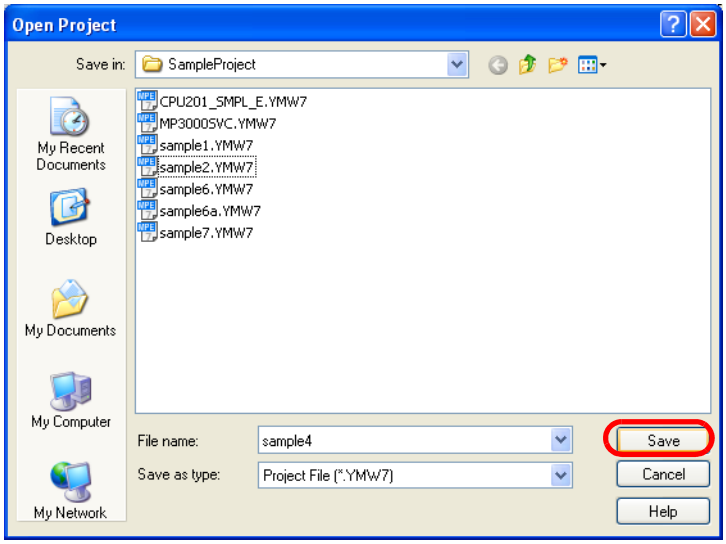


The Open Project Dialog Box will be displayed.

3. Specify the destination folder and file name for the project file to save.

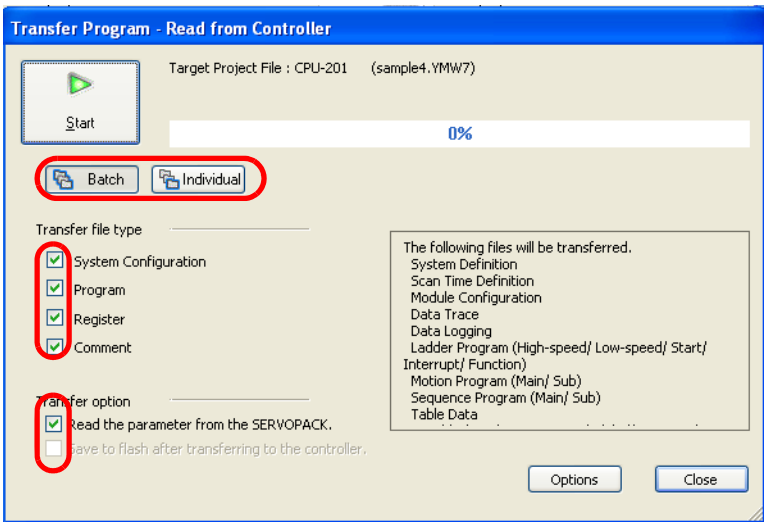


4. Click the **Save** Button.

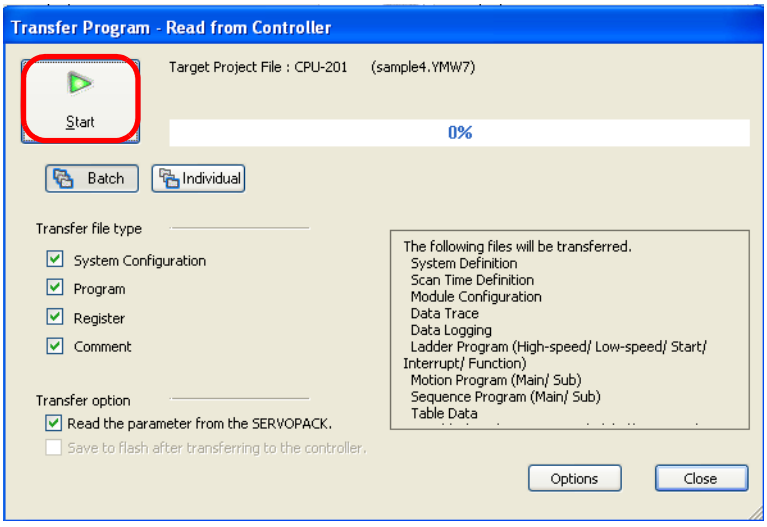


The Transfer Program – Read from Controller Dialog Box will be displayed.

5. Select the check boxes in the **Transfer file type** Area to specify the items to transfer.
As you select check boxes under **Transfer file type**, individual transfer items will be displayed in the details pane on the right.
Refer to the following section for details on the transfer items.
☞ *List of Transferrable Data (page 10-12)*

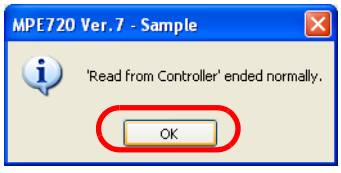


6. Click the **Start** Button.



The backup operation will start.
When the backup operation has been completed, the MPE720 Ver. 7 Dialog Box will be displayed.

7. Click the **OK** Button.

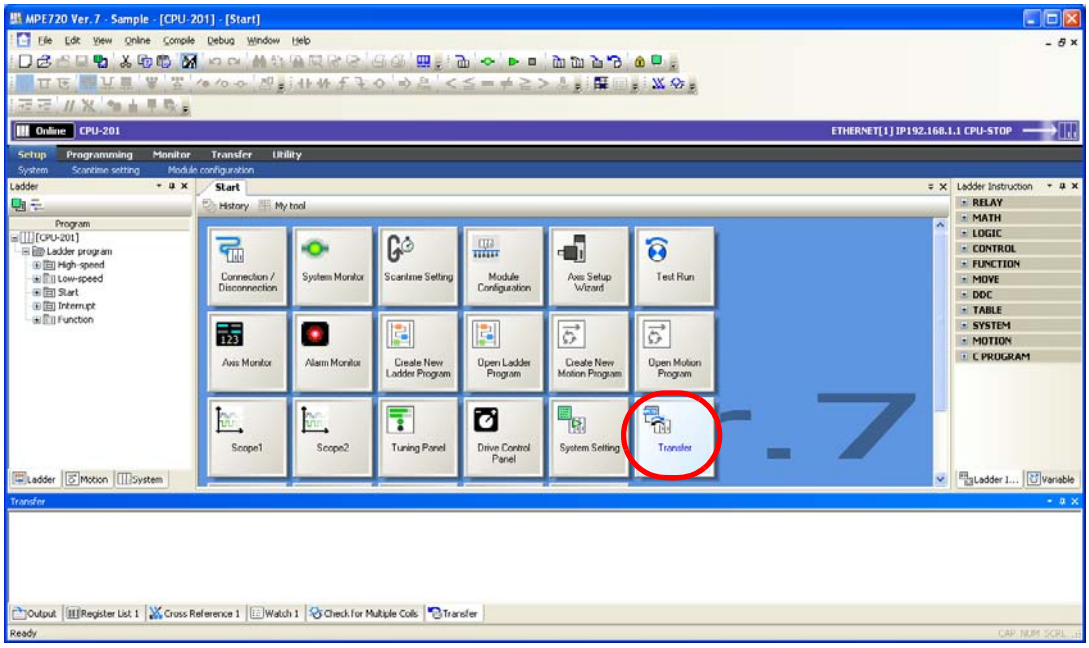


This concludes the procedure.

10.6 Comparing Data

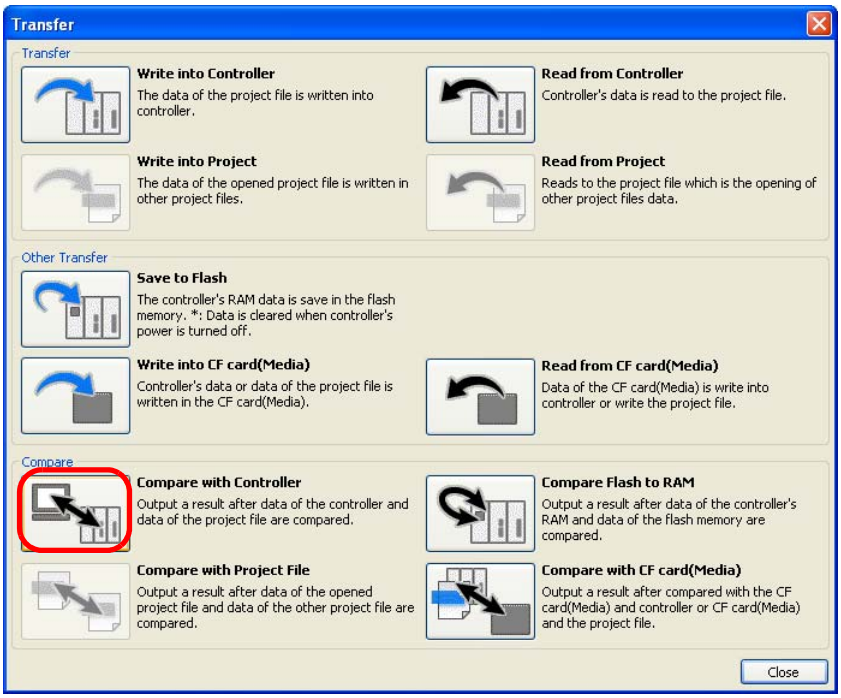
Use the following procedure to compare data to find any differences.

1. Click the **Transfer** Button on the My Tool Tab Page.



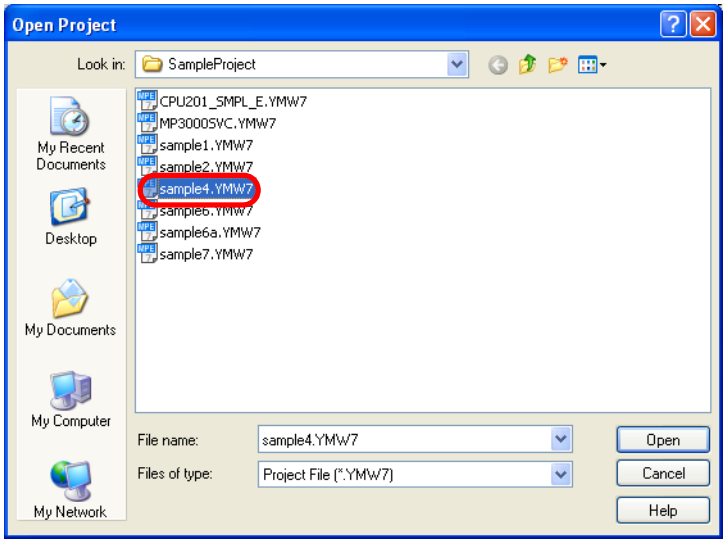
The Transfer Dialog Box will be displayed.

2. Select the type of comparison to perform in the **Compare** Area.
The description given here will use the **Compare with Controller** Button as an example.
Click the **Compare with Controller** Button.

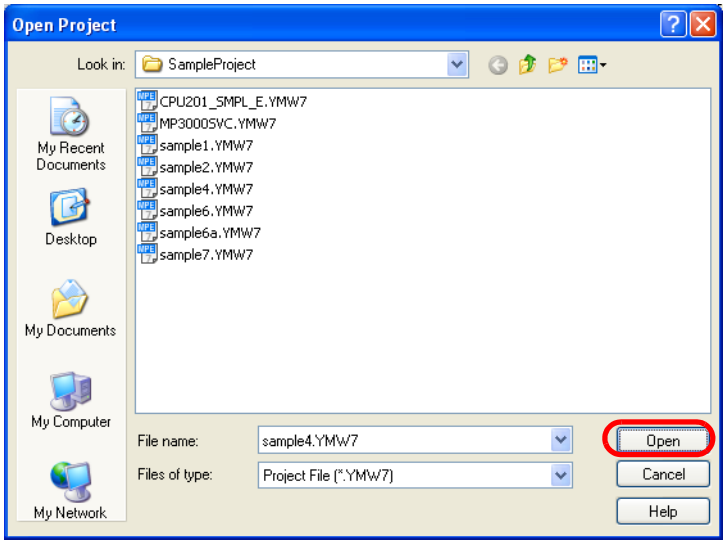


The Open Project Dialog Box will be displayed.

3. Select the project file to compare.

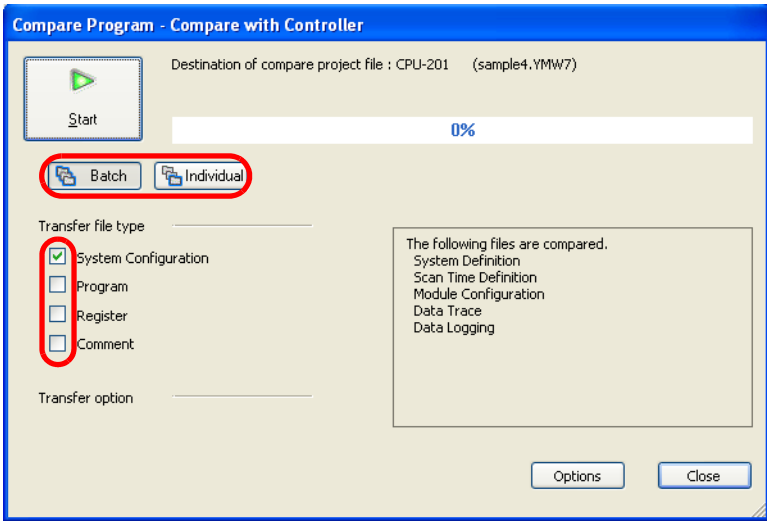


4. Click the **Open** Button.

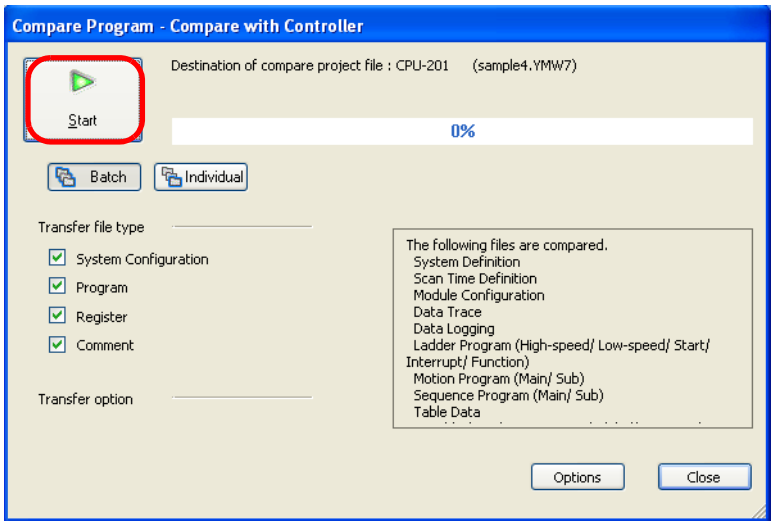


The Compare Program – Compare with Controller Dialog Box will be displayed.

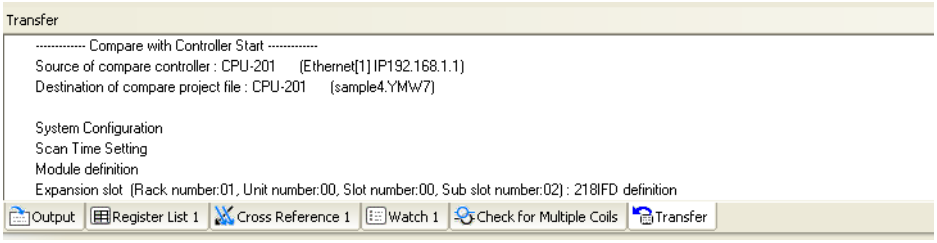
5. Select **Batch** or **Individual**, and then select the check boxes for the items to compare.



6. Click the **Start** Button.

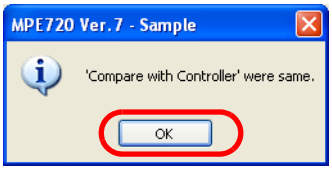


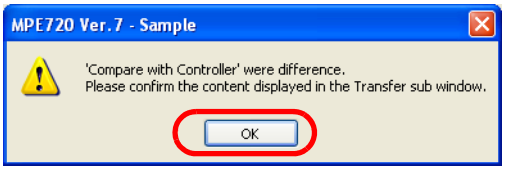
The comparison will started and a log of the comparison operation will be displayed in the Transfer Pane.



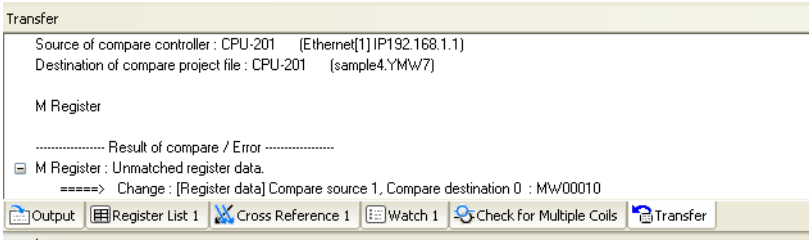
When the comparison has been completed, a dialog box that asks for confirmation will be displayed.

7. Click the **OK** Button.





8. If differences were found, you can check them in the Transfer Pane.

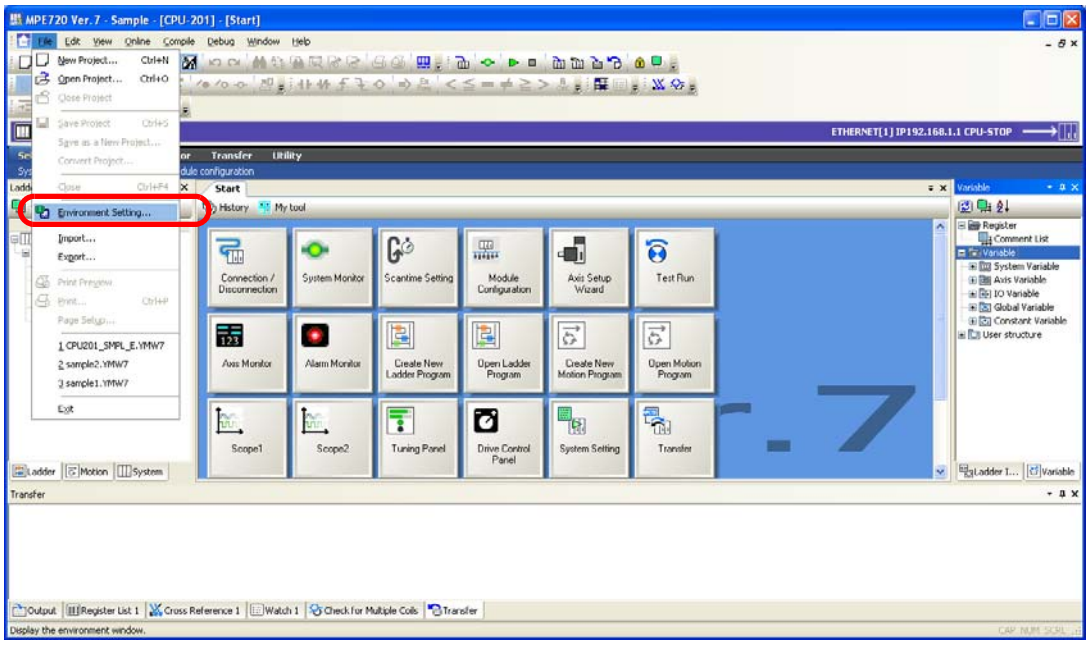


This concludes the procedure.

10.7 Changing the Display Language

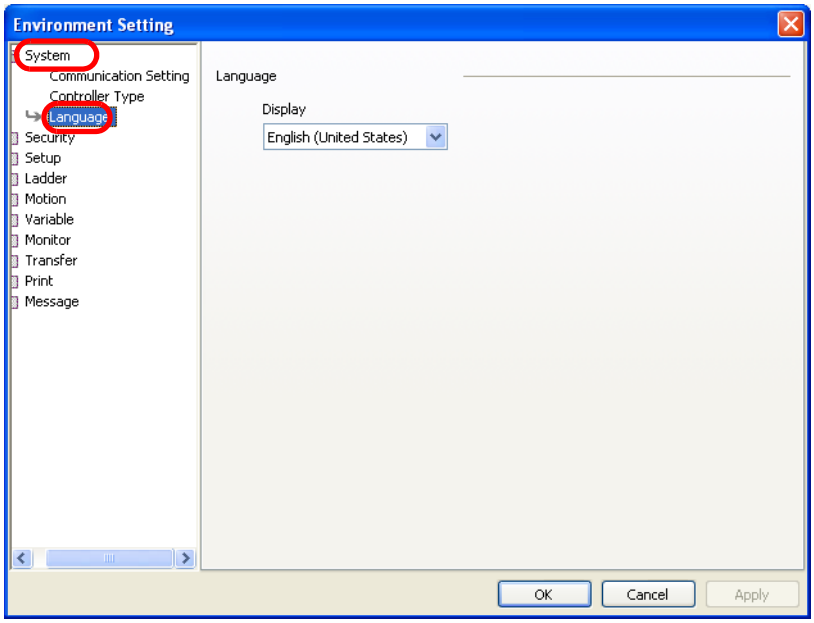
Use the following procedure to change the display language of the MPE720.

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

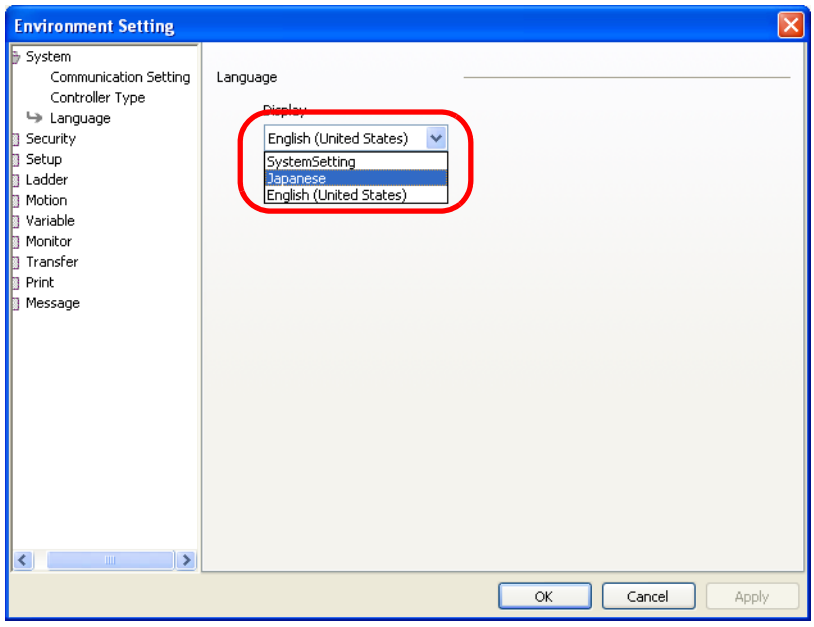


The Environment Setting Dialog Box will be displayed.

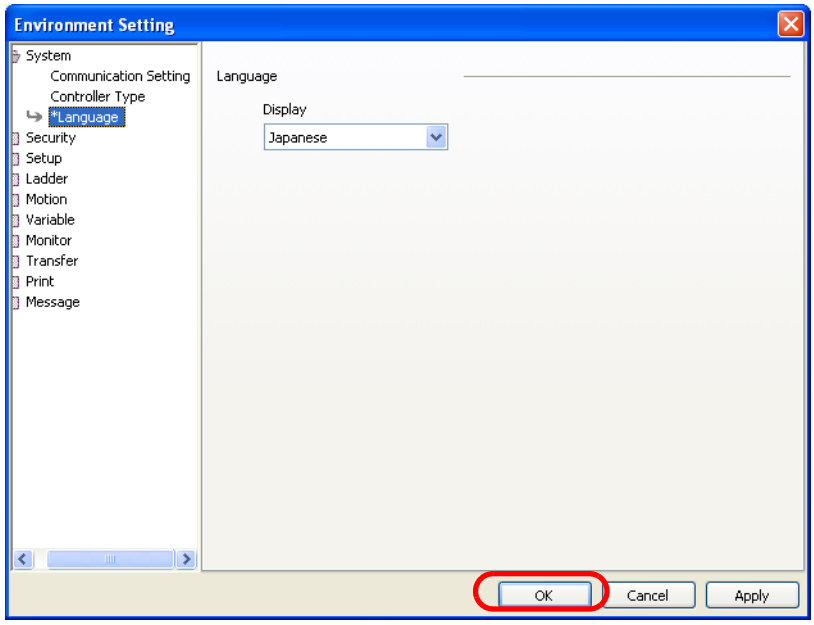
2. Select **System** – **Language**.



3. Select the language to use in the **Display** Box.

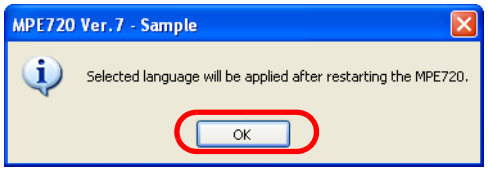


4. Click the **OK** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

5. Click the **OK** Button.



The Environment Setting Dialog Box will close.

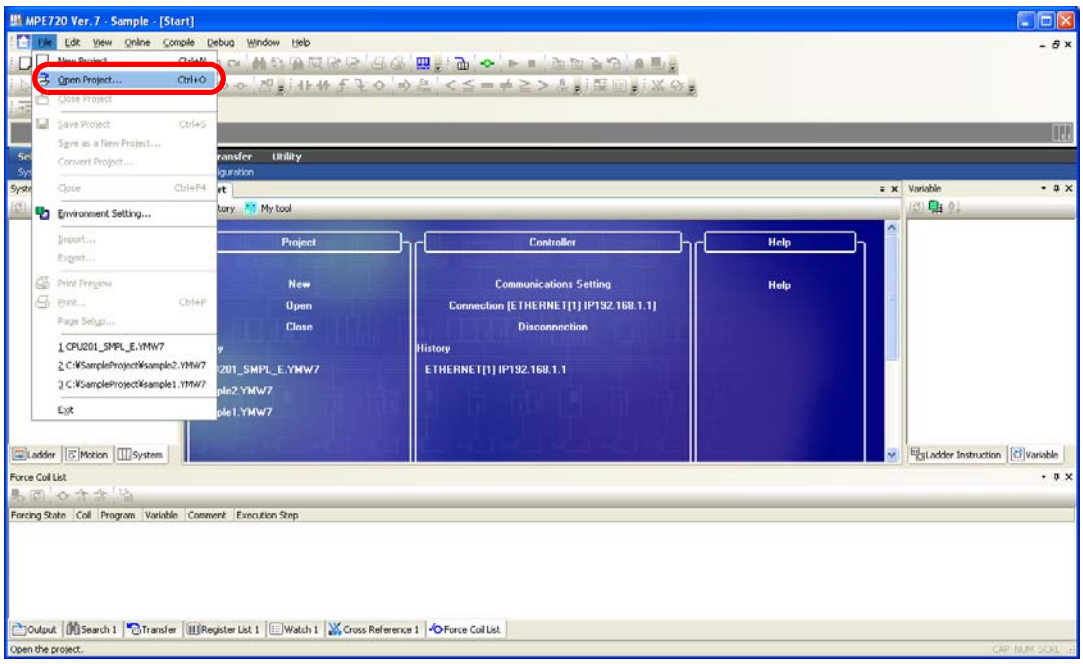
6. You must restart the MPE720 to enable changes in the environment settings.

This concludes the procedure.

10.8 Using MPE720 Version 7 to Open MAL Files

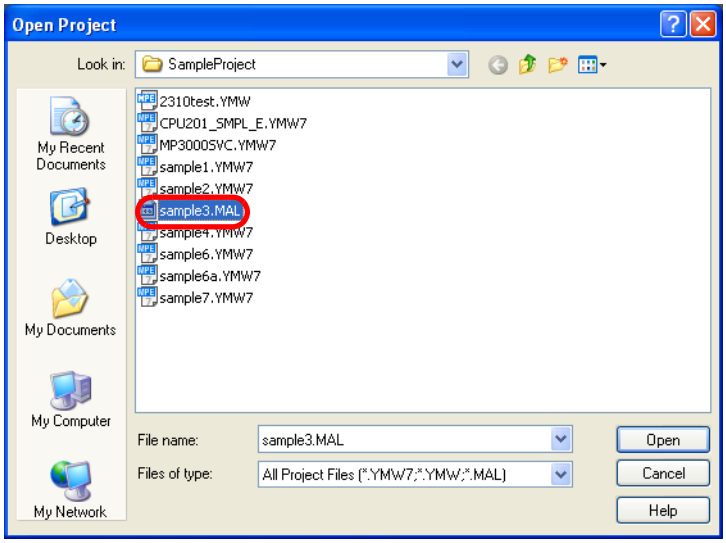
Use the following procedure to convert a MAL file (a PLC folder compressed into a file) that was used with MPE720 version 5 to a file that can be opened with MPE720 version 7.

1. Select ***File*** – ***Open Project*** from the menu bar.

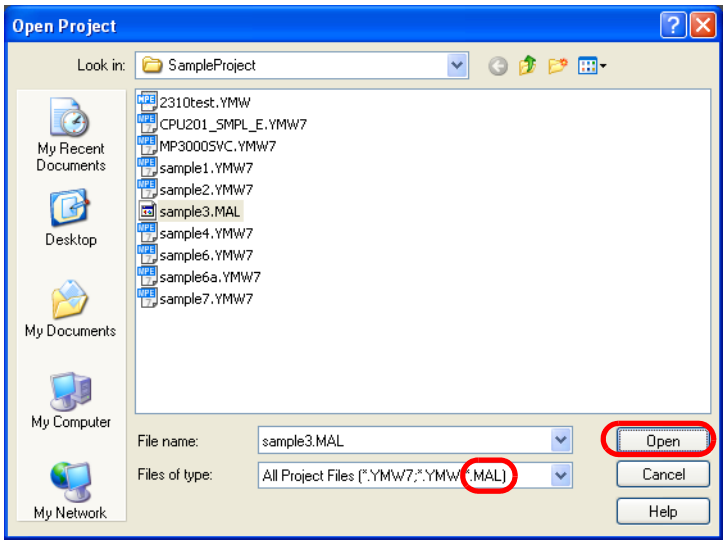


The Open Project Dialog Box will be displayed.

2. Select the MAL file to convert.

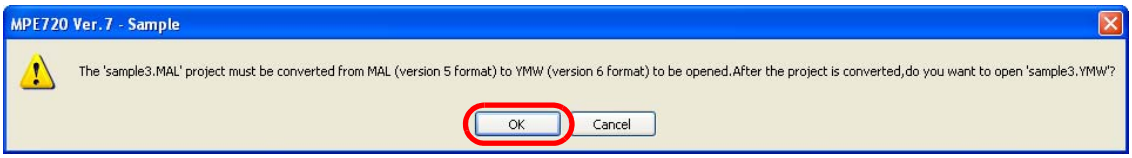


3. Confirm that the **Files of type** Box contains the *.MAL extension, and then click the **Open** Button.



The MPE720 Ver. 7 Dialog Box will be displayed.

4. Click the **OK** Button.



The project file will be converted, and the converted project file will be opened.

This concludes the procedure.

Appendices

11

This chapter describes the shortcuts that you can use for ladder programming, and operators and instructions that you can use in Expression instructions.

11.1 Shortcut Keys for Ladder Programming 11-2
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11.2 Operators for Expression Instructions 11-4
Numeric Processing of Expression Instructions 11-5

11.3 Instructions for Expression Instructions 11-10

11.1 Shortcut Keys for Ladder Programming

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

Note

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)

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

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

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

Debugging

Function	Key
Cross references	Ctrl + R
Display the register map	Ctrl + W

11.2 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))

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*

Type of Numeric Processing Based on the Combination of Operands

		Operand_2				
		Integer (WORD)	Double-length integer (LONG)	Quadruple-length integer (QUAD)	Real number (FLOAT)	Double-length real number (DOUBLE)
Operand_1	Integer (WORD)	LONG (WORD*)	LONG	FLOAT	FLOAT	DOUBLE
	Double-length integer (LONG)	LONG	LONG	FLOAT	FLOAT	DOUBLE
	Quadruple-length integer (QUAD)	QUAD	QUAD	QUAD	DOUBLE	DOUBLE
	Real number (FLOAT)	FLOAT	FLOAT	DOUBLE	FLOAT	DOUBLE
	Double-length real number (DOUBLE)	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 (page 11-8)*

Note

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 WORD data and an integer, 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 - (DL00012 * 100 / 3)

Details of Numeric Processing

Order	Interim Calculation	Description
1	LONG data value ① = DW00012 * 100	This is multiplication between WORD data and an integer, 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 an integer, so the expression is calculated as LONG data.
3	LONG data value ③ = 14000 - LONG data value ②	This is subtraction between an integer 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 integers, 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 an integer 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 an integer, 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 an integer, so the expression is calculated as FLOAT data.
3	FLOAT data value ③ = 14000 - FLOAT data value ②	This is subtraction between an integer 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.

☞ *Operators for Expression Instructions (page 11-4)*

The following examples show the numeric processing for casting.

◆ Example of Casting Operands

Arithmetic Expression Example

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

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 WORD data and an integer, so the expression is calculated as WORD data.
3	WORD data value ③ = 14000 - WORD data value ②	This is subtraction between an integer and WORD data, 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)

Details of Numeric Processing

Order	Interim Calculation	Description
1	FLOAT data value ① = DF00012 + 100	This is addition between FLOAT data and an integer, 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 an integer 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))

Details of Numeric Processing

Order	Interim Calculation	Description
1	FLOAT data value ① = DW00012 * 100	This is multiplication between WORD data and an integer, 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 an integer, 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 an integer 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))

Details of Numeric Processing

Order	Interim Calculation	Description
1	DOUBLE data value ① = DF00012 * 100	This is multiplication between FLOAT data and an integer, 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 an integer, 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 an integer 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.

11.3 Instructions for Expression Instructions

The following table lists the instructions that can be used in EXPRESSION instructions.

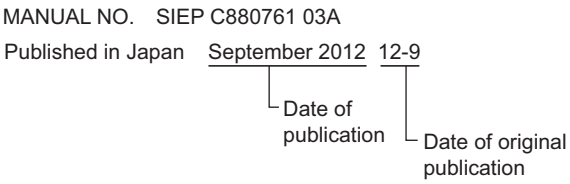
Classification	Instruction	Description	Usage Example
Program control instructions	for	Repeat for a FOR loop	MW00200=0; FOR J=0 TO 9 STEP 1; M00200=MW00200+J; FEND;
	while	Repeat for a WHILE loop	J=0; WHILE J<10; MW00200=MW00200+J; WEND;
	if-iend	Conditional branching 1	IF J<10; MW00200=MW00200+J; IEND;

	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]

Revision History

The revision dates and numbers of the revised manuals are given on the bottom of the back cover.



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MPE720 Version 7

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