



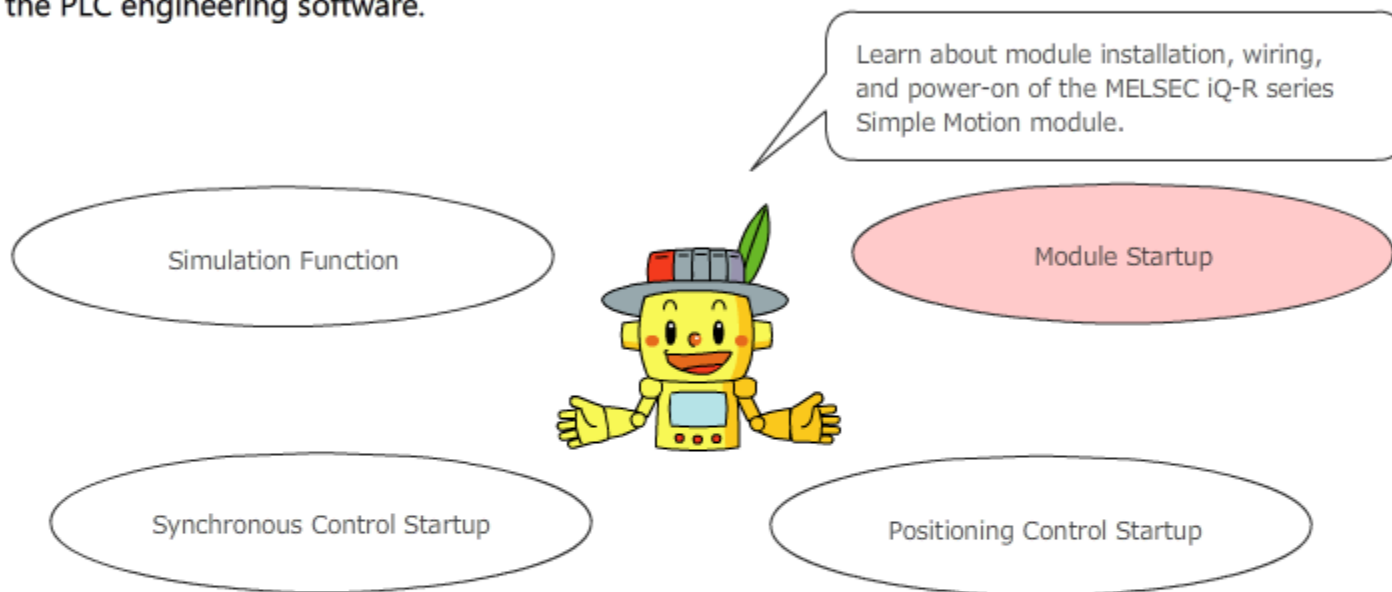
Servo System Controller

MELSEC iQ-R Series Simple Motion Module

This course is for participants who will establish a motion control system using the MELSEC iQ-R series Simple Motion module for the first time.

Introduction Purpose of the Course

This course targets those who establish a motion control system using the MELSEC iQ-R series Simple Motion module for the first time. This course describes the procedures for system design, installation, wiring, and the operations required before operating the Simple Motion module with MELSOFT GX Works3, the PLC engineering software.



The basic knowledge of MELSEC iQ-R series PLCs, AC servos, and positioning control is required to take this course.

For beginners, taking the following courses are recommended.

- "MELSEC iQ-R Series Basic" course
- "PLC Engineering Software MELSOFT GX Works3 (Ladder)" course
- "MELSERVO Basics (MR-J4)" course
- "FA Equipment for Beginners (Positioning)" course

Introduction Course Structure



The contents of this course are as follows.
We recommend that you start from Chapter 1.

Chapter 1 - Module Startup

Learn about module installation, wiring, and power-on of the MELSEC iQ-R series Simple Motion module.

Chapter 2 - Positioning Control Startup

Learn about how to perform the positioning control with the MELSEC iQ-R series Simple Motion module.

Chapter 3 - Synchronous Control Startup

Learn about how to perform the synchronous control with the MELSEC iQ-R series Simple Motion module.

Chapter 4 - Simulation Function

Learn about the simulation function of MELSEC GX Works3.



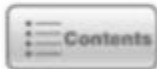

Final Test

5 sections in total (7 questions) Passing grade: 60% or higher.

Introduction Screen Switching Operations



The following shows the operations of the learning interface.
The details of each function can be checked by [HELP].

Go to the next screen		Go to the next screen. If there is no following screen, it is grayed out.
Go back to the previous screen		Go back to the previous screen. If there is no previous screen, it is grayed out.
Jump to another chapter, section, or term		Go to the contents screen. You can jump to the target page from the contents and also put a bookmark in a page.
Finish the course		Finish the course. The windows, such as learning interface and "Contents" will be closed.

Introduction Cautions for Use

Safety precautions

When you learn by using actual products, please fully read "Safety Instructions" in the corresponding manuals and use them correctly.

Precautions in this course

- The displayed screens of the software version that you use may differ from those in this course.

The following shows the software used in this course and each software version.

For the latest version of each software, check the Mitsubishi Electric FA Website.

MELSOFT GX Works3 Ver.1.011M

Reference materials

The following is the reference related to the learning. (You can learn without it.)

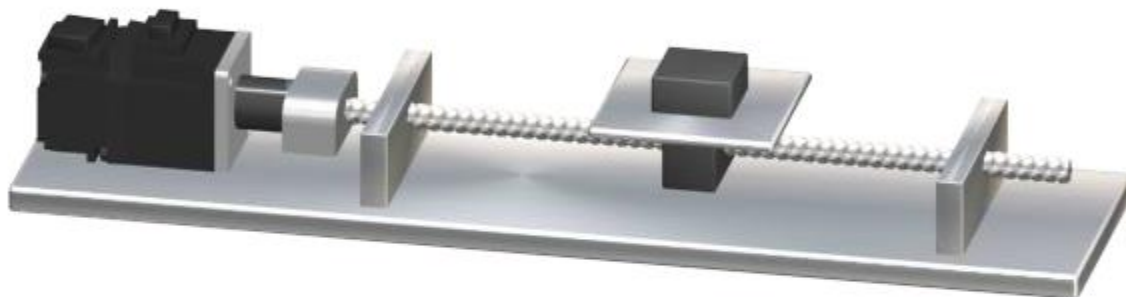
Click the reference name to download.

Name of reference	File format	File size
Recording paper	Compressed file	7.14 kB

Chapter 1 Module Startup

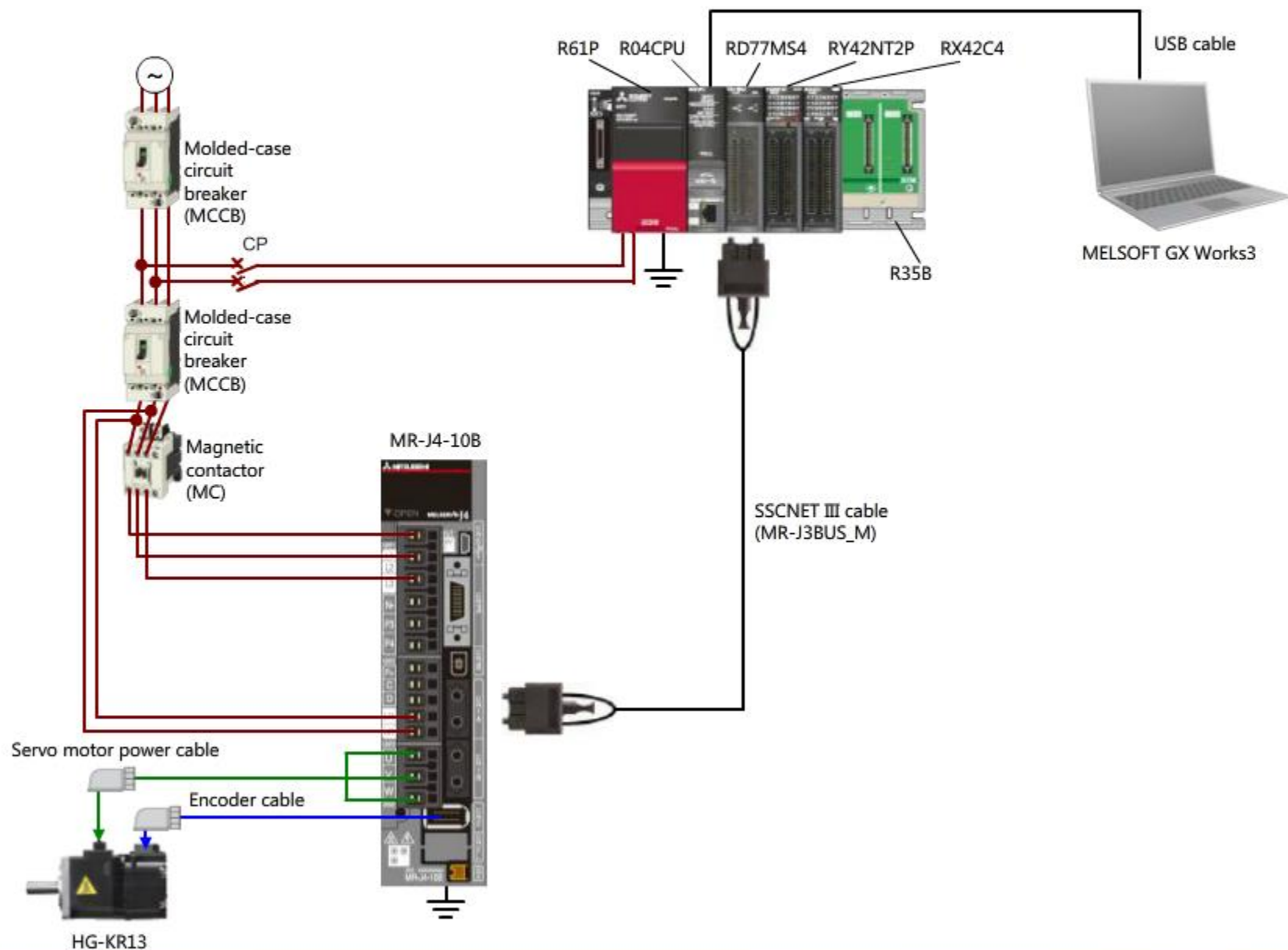
This chapter explains a 1-axis system using ball screws as the system used in this course.
Please check the following PDF file for the operation pattern diagram and the machine specifications.

[Sample system details <PDF>](#)



1.1 System Configuration

The following shows the configuration of the sample system used in this course.



The following shows the establishment procedure of a servo system with the MELSEC iQ-R series Simple Motion module. This course explains module installation, wiring, and cable wiring following the establishment procedure.

(1) Mounting

..... Section 1.3

- Installing a battery
- Inserting an extended SRAM cassette and a SD memory card
- Installing a module



(2) Wiring and cable connection

..... Section 1.4

- Wiring for power supply module
- Wiring for servo amplifier power supply and servo motor power cables
- Axis Number Settings
- SSCNET III/H Connection
- Power-on of the system
- Power-on of servo amplifier

1.3 Mounting

Mount modules. Perform the following procedures for mounting modules.

(1) Connecting the CPU module internal battery

Install the battery in the CPU module.
(Refer to Section 1.3.1.)



(2) Inserting an extended SRAM cassette and a SD memory card

Since the example system does not use an extended SRAM cassette and a SD memory card, the insertion/removal procedures are omitted in this document.

Refer to MELSEC iQ-R CPU Module User's Manual (Startup) for course.



(3) Installing a module

Install each module to the main base unit.
(Refer to Section 1.3.2.)



1.3.1

Connecting the CPU module internal battery

The CPU module allows an internal battery to be connected as to ensure data retention in the event the main power supply is disconnected. When shipping, the internal battery is not connected as to conserve the battery power. Therefore, before using the CPU module, it is recommended that the internal battery is connected to the CPU module.

Please refer to the animation below showing the relevant steps of installation:



End of animation.

Please click  to proceed to the next page.

To view again, click on the "Replay" button.

Replay

1. Open the battery compartment cover located at the bottom of the CPU module



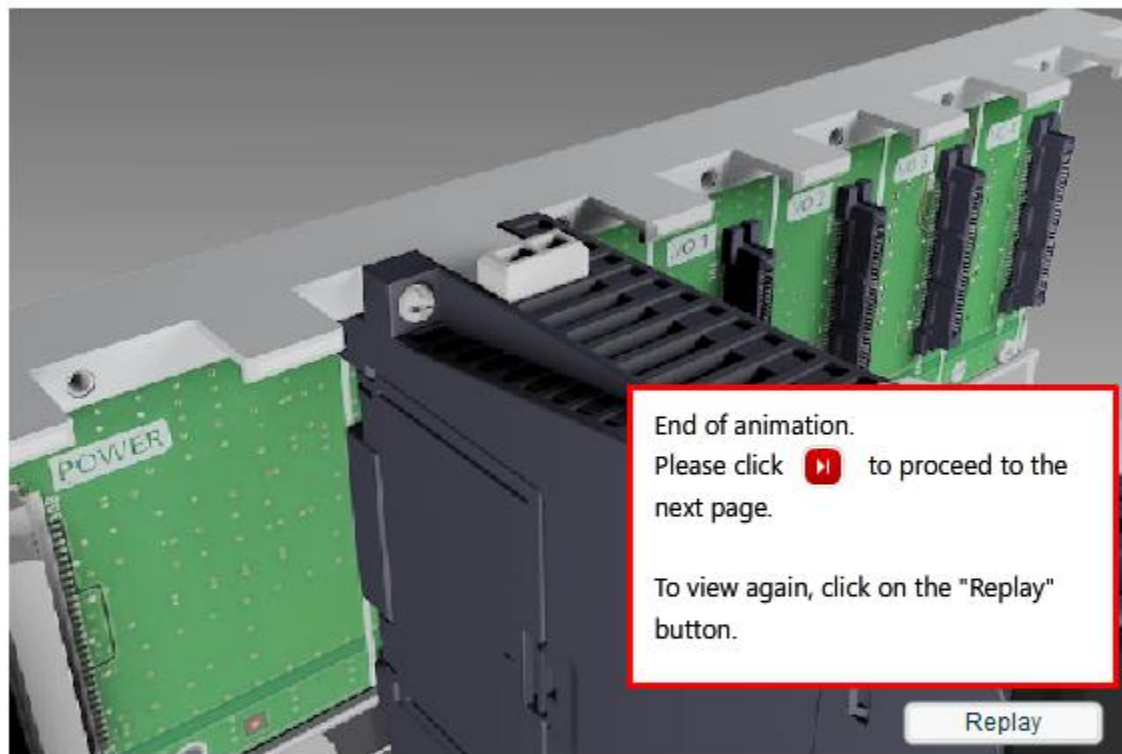
2. Remove the cover and connect the battery connector to the socket located inside the cover



3. Reattach the cover to the CPU housing and close the battery compartment cover

1.3.2 Installation of Modules

The modules within the MELSEC iQ-R Series are installed onto the base unit as shown below.



1. Align the bottom of the module with the recess locate on the base unit



2. Press onto the base unit bus connector until the top catch engages the module in place



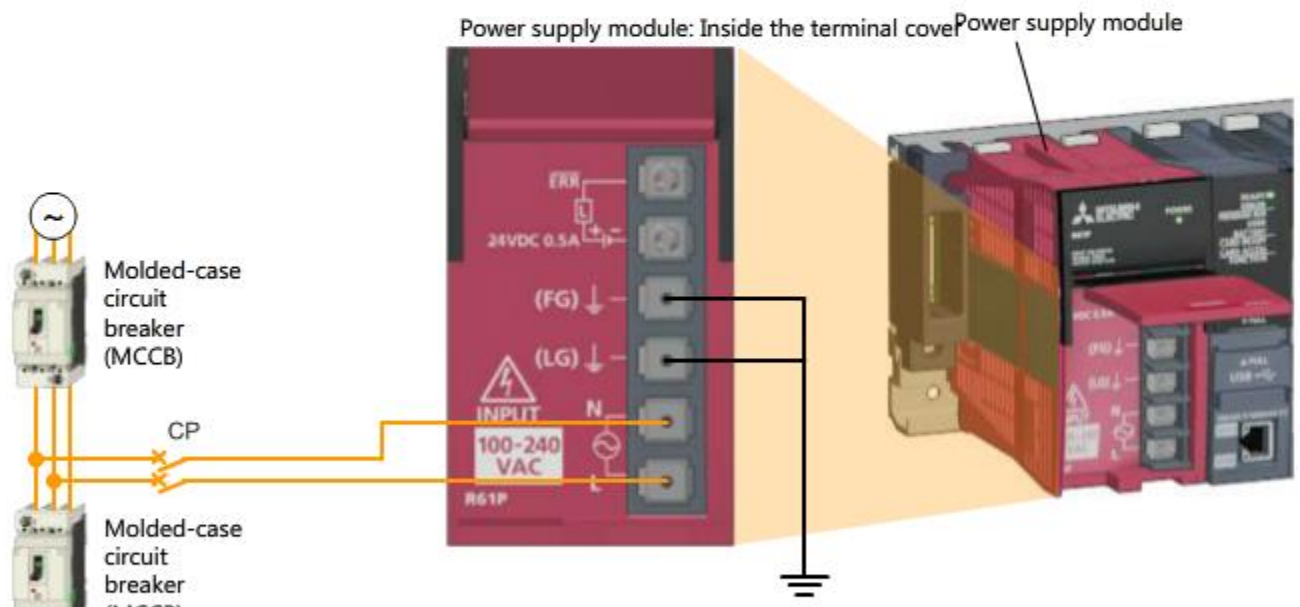
3. Tighten the module fixing bolt to provide a sturdy installation on the base unit

1.4 Wiring and Cable Connection

This section explains the wiring and cable connection example for the Simple Motion module and servo amplifiers. The system in this course uses the cables for MR-J4-10B. If the capacity of the servo amplifier is different, refer to SERVO AMPLIFIER INSTRUCTION MANUAL for each model.

1.4.1 Wiring for power supply module

The following shows an example when a power wire and a grounding wire are connected to the power supply module. At wiring, open the terminal cover at the front of the power supply module and wire cables. Connect an isolation transformer when noise often enters in the power supply system.

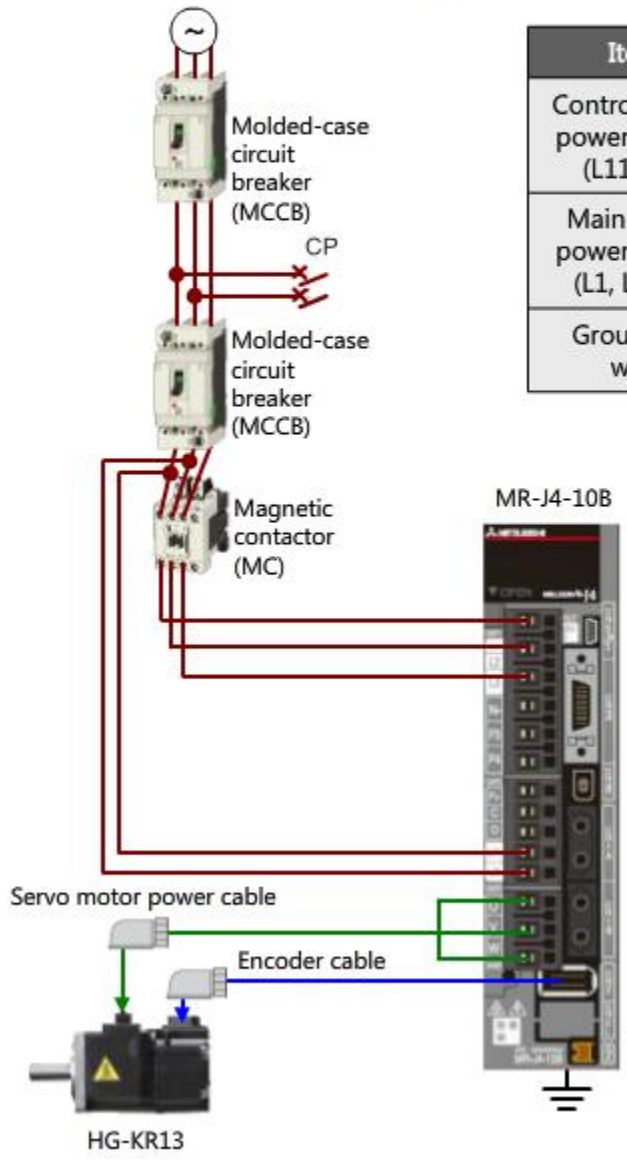


Item	Applicable wire size	Tightening torque
Power wire	0.75 to 2mm ² (AWG18 to AWG14)	1.02 to 1.38N•m
Grounding wire	0.75 to 2mm ² (AWG18 to AWG14)	1.02 to 1.38N•m

1.4.2 Wiring for Servo Amplifier Power Supply and Servo Motor Power Cables

Wire the control circuit power supply (L11, L21) and the main circuit power supply (L1, L2, L3) of the servo amplifier, and the servo motor power cable.

Item	Applicable wire size	Tightening torque
Control circuit power supply (L11,L21)	1.25mm ² to 2mm ² (AWG16 to 14)	-
Main circuit power supply (L1, L2, L3)	2mm ² (AWG14)	-
Grounding wire	1.25mm ² (AWG16)	1.2N·m



1.4.3 Axis Number Settings

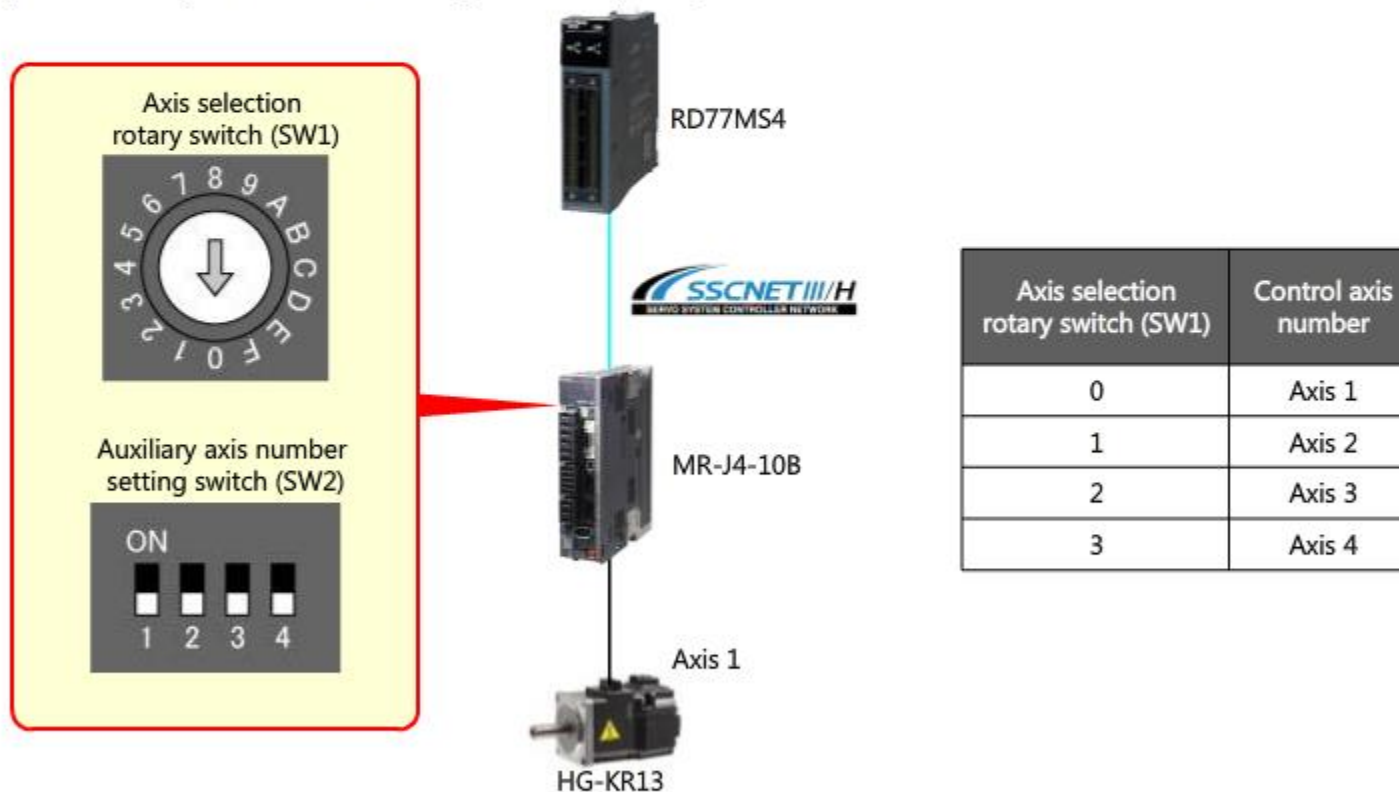
Set a control axis number to the servo amplifier.

A control axis number is assigned to each servo amplifier to identify control axes. Up to 16 axis numbers can be set regardless of the order of connection.

Note that the operation may not be performed properly if the set control axis numbers overlap in one servo system.

Select the control axis number of the servo amplifier with the axis selection rotary switch (SW1). Refer to the following table for the relation between each setting value of the axis selection rotary switch and axis number.

Turn "off (down)" all auxiliary axis number setting switches (SW2).



1.4.4 SSCNET III/H Connection

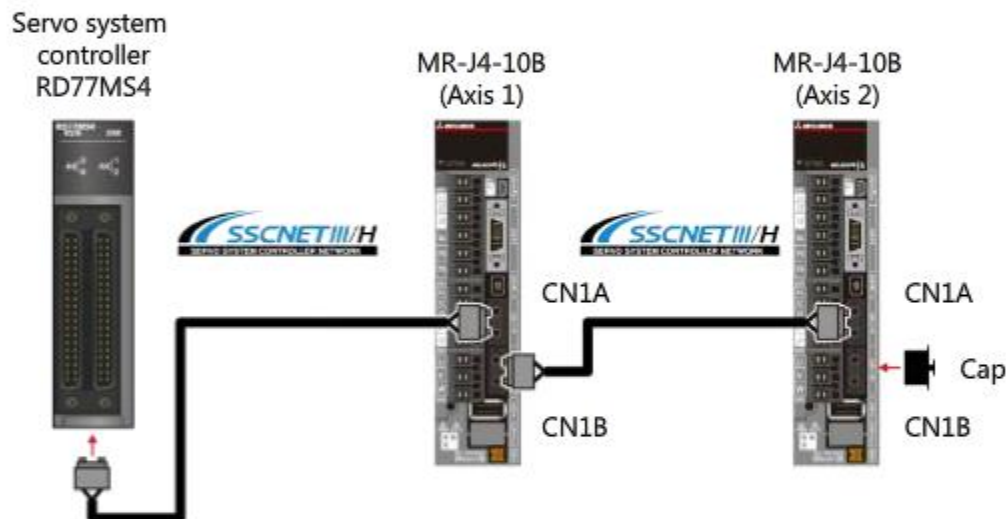
Connect the servo amplifier with a controller.

The MR-J4-B servo amplifier has an SSCNET III/H interface.

Using the optical communication method, SSCNET III/H achieves high noise tolerance and high-speed, full-duplex communication.

Use a dedicated cable to connect the servo amplifier with the controller. The cable with connectors allows easy connection and disconnection.

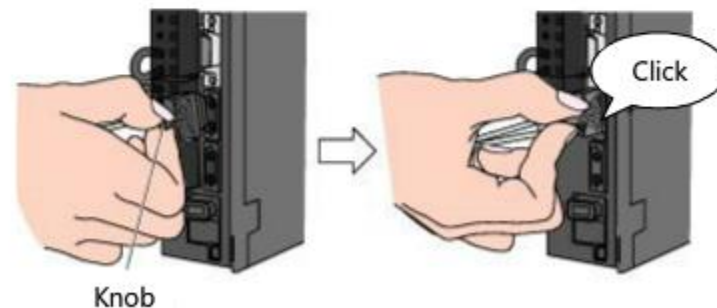
The following figure shows a 2-axis system as an example.



Note the following points when using SSCNET III cables.

- If any power such as a great shock or lateral pressure is applied to the cable, or the cable is pulled, suddenly bent, or twisted, inside parts are distorted or damaged, and optical transmission will not be available.
- As the optical fibers are made of synthetic resin, it will be thermally deformed if exposed to a fire or high temperature.
- If the end face of an optical cord tip is dirty, optical transmission is interrupted and it may cause malfunctions.
- Do not look directly at the light output from the connector or the end of the cable.
- For your safety and protection of the connector, put a supplied cap in the unused connector (CN1B) on the final-axis servo amplifier.

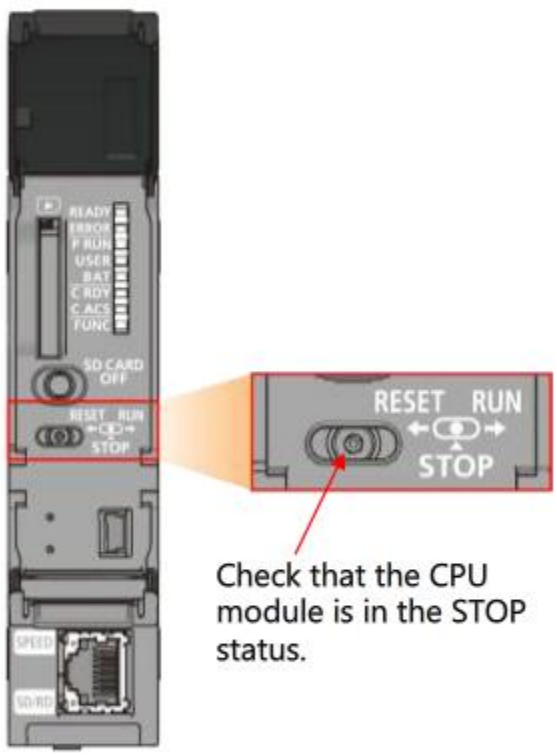
How to connect



1.4.5 Power-on of the Programmable Controller

Check that the wiring of the PLC power supply module is correct and the PLC CPU module is in the STOP status. After that, power on the PLC.

CPU module operation status

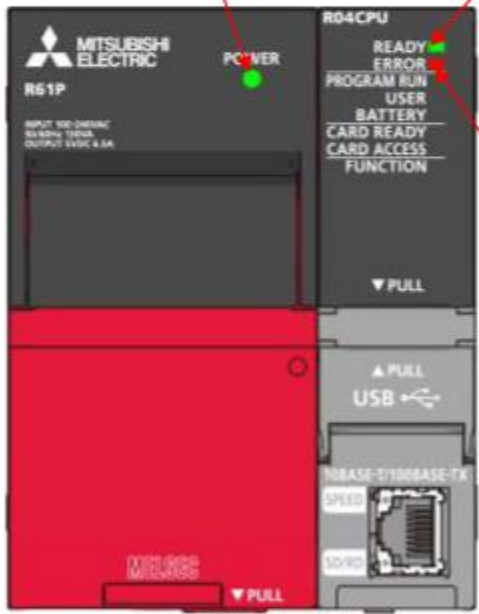


Check that the CPU module is in the STOP status.

LED status after power-ON

Power supply module:
LED (green light) turns ON

CPU module:
READY LED (green light) turns ON.



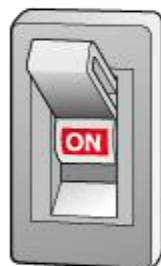
When parameters and programs are not written to the CPU module, the ERROR LED (red light) of the PLC CPU flickers, but no immediate error is occurring. After writing parameters and programs and turning the power OFF to ON, the ERROR LED will be OFF.

1.4.6

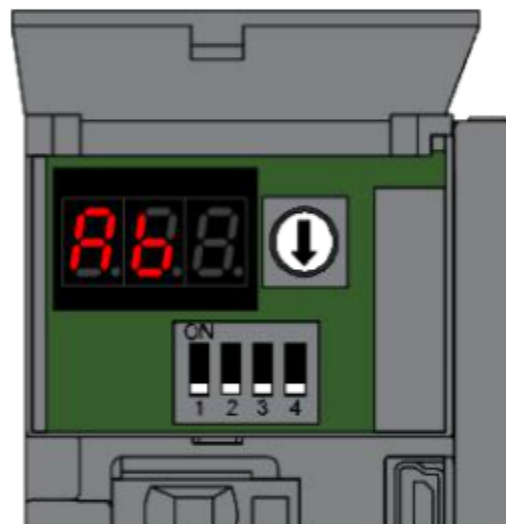
Power-on of Servo Amplifier

Turn on the control circuit power supply and the main circuit power supply of the servo amplifier. "AA" (Initializing standby) or "Ab" (Initializing) is displayed in the display of the servo amplifier. No servo system controller is connected in this sample system. Thus, configure required settings and start up the system with the "Ab" state.

Power on the servo amplifier.



"AA" or "Ab" is displayed in the display.



When parameters are not written to the Simple Motion module, the LED displays "AA" or "Ab", but no immediate error is occurring.

In this chapter, you have learned:

- System Configuration
- Startup Procedure
- Mounting
- Wiring and Cable Connection

Important points

System Configuration	<ul style="list-style-type: none">• Configure a system using MELSEC iQ-R series PLCs including a Simple Motion module and MELSERVO J4 series servo amplifiers and servo motors.
Startup Procedure	<ul style="list-style-type: none">• After a battery is installed to the PLC CPU, mount each module on the base unit.• After wiring of the power supply module, wiring of the power supplies of the servo amplifiers and the power cables of the servo motors, setting of axis numbers, and connecting to SSCNET are completed, turn on the power supplies of the PLC and the servo amplifiers.
Mounting	<ul style="list-style-type: none">• Install the battery to the CPU module, insert an extended SRAM cassette and an SD memory card, and mount modules.
Wiring and Cable Connection	<ul style="list-style-type: none">• Wire the power supply module, wire the power supplies of servo amplifiers and the power cables of servo motors, set the control axis numbers of servo amplifiers, and connect to SSCNETIII/H.• After all the wiring and cable connection operations are completed, power on the PLC and the servo amplifiers to check that these module have been properly connected.

Chapter 2 Positioning Control Startup



Positioning control startup is performed in chapter 2.

2.1 Creating a New Project

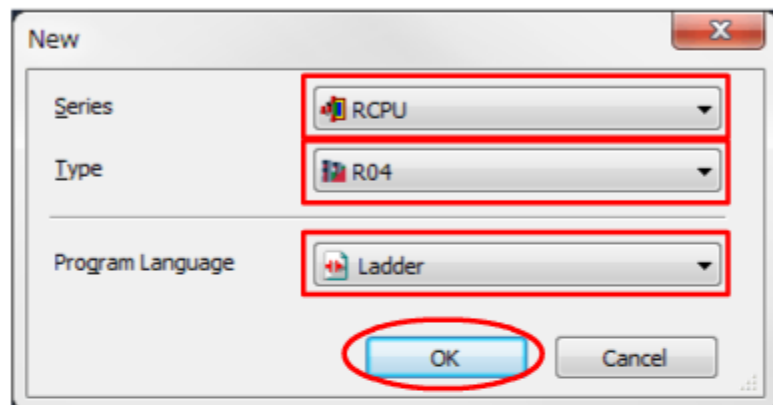
Use MELSOFT GX Works3 to create a project and sequence program.
The contents in this course require MELSOFT GX Works3 of version 1.011M or later.

How to check the version of MELSOFT GX Works3

Start MELSOFT GX Works3, and select [Help] - [Version Information].

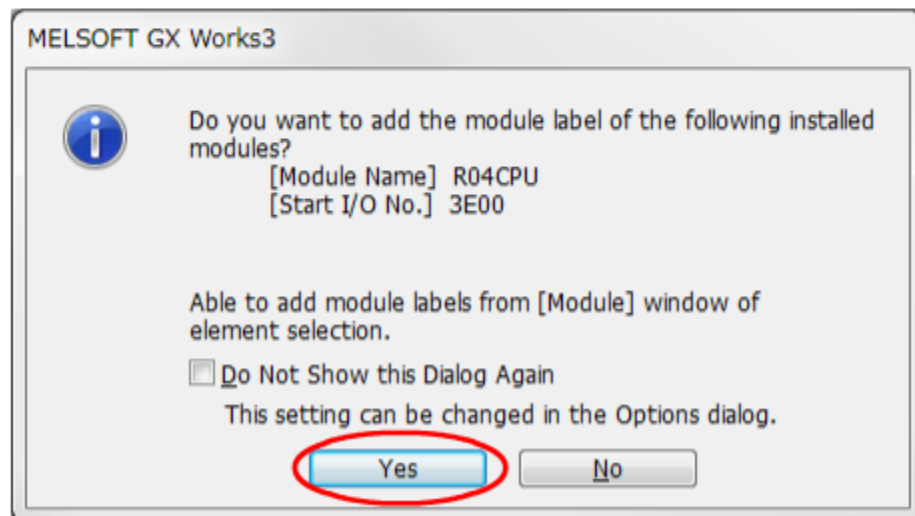
2.1.1 Creating a New Project

Start MELSOFT GX Works3, and create a new project.
Select [Project] - [New] in the menu, set the items as follows, and click [OK].



Item	Setting
Series	RCPU
Model	R04 (specify the CPU to be used)
Program language	Ladder

The window asking about module label addition appears. Click [Yes].

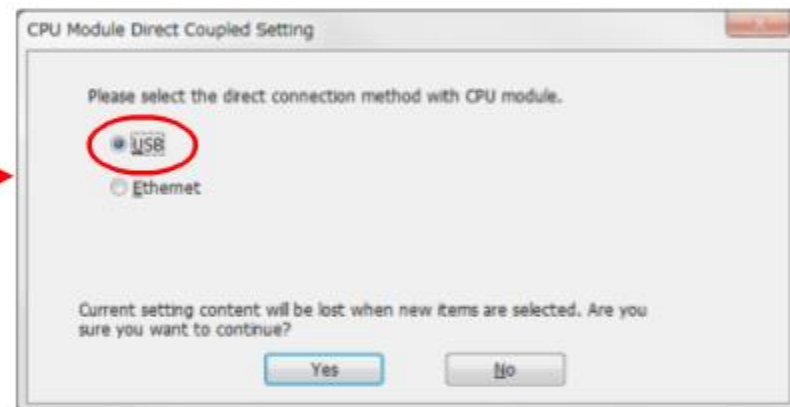
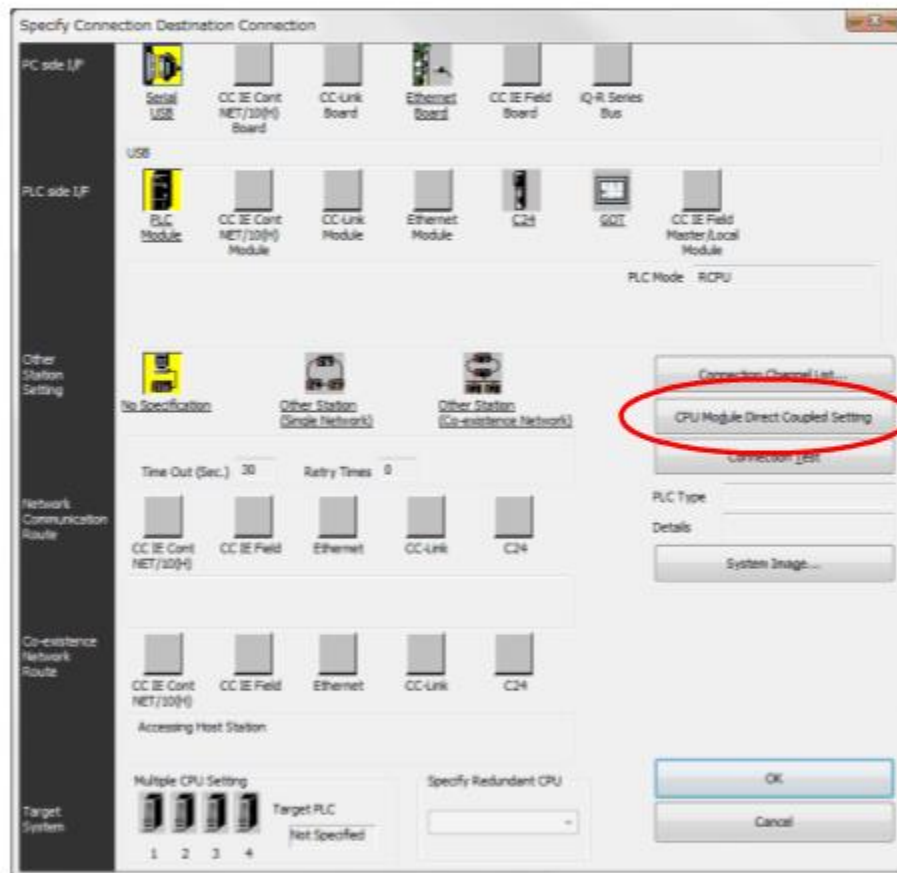


2.1.2

Connecting the PLC CPU to a Personal Computer

Confirm the connection between a personal computer and the PLC CPU.

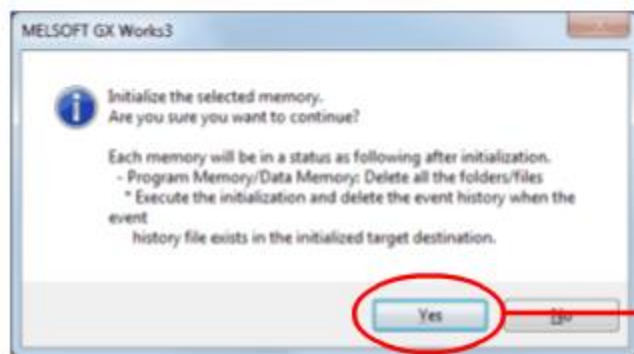
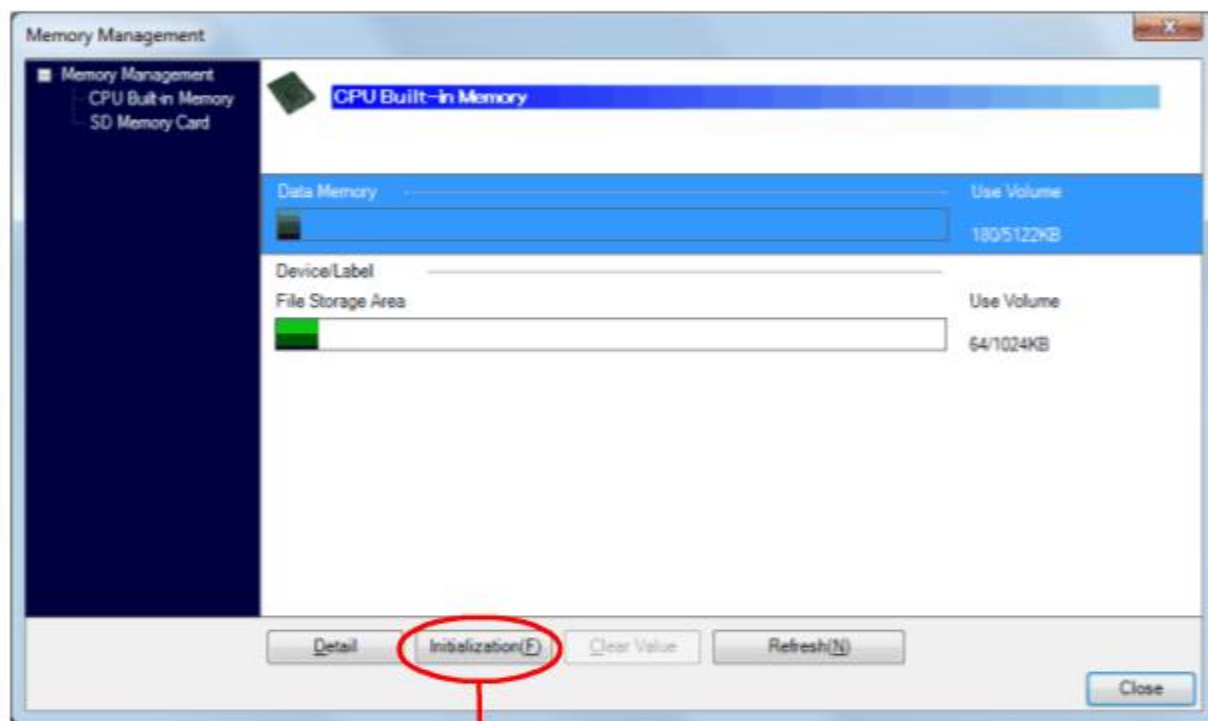
Connect the PLC CPU module to a personal computer with a USB cable. Select [Online] - [Specify Connection Destination] in the menu to display the [Specify Connection Destination Connection] window, and select [CPU Module Direct Coupled Setting]. Select [USB] as the method of connecting with the CPU module.



2.1.3 Initializing the PLC CPU Module

Initialize a memory of the PLC CPU.

Select [Online] - [CPU Memory Operation] in the menu, and click [Initialization] in the Memory Management window.

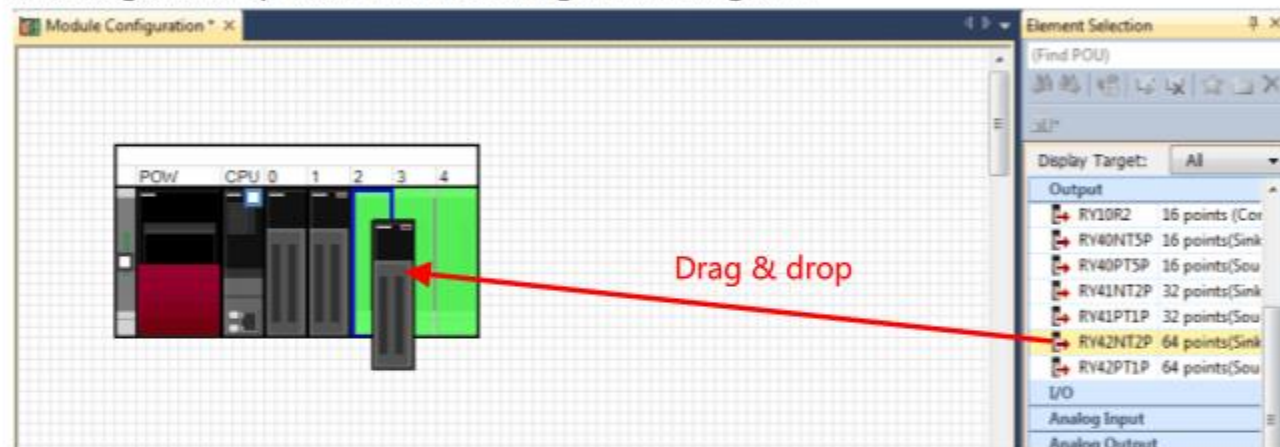


2.1.4 Creating a Module Configuration

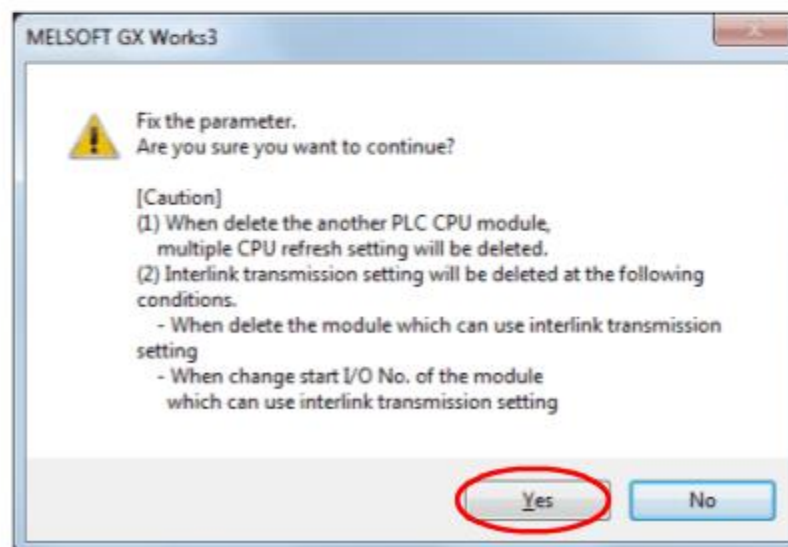
Create a module configuration diagram and fix the parameter.

Double-click [Module Configuration] in the Navigation tree to open the module configuration diagram.

Select the main base unit, CPU module, I/O module, and Simple Motion module to be used from the POU list, and drag and drop them into the configuration diagram.



After creating the module configuration diagram, select [Edit] - [Parameter] - [Fix] from the menu. The window asking about module label addition appears for the selected modules. Click [Yes].



2.2 Sequence Program Creation

Create a sequence program.

2.2.1 New Sequence Programs Creation

The use of label and function block (FB) removes the need to remember devices when programming. For the sequence program example used in this course, refer to the following link.

[Sequence program for positioning control <PDF>](#)

The screenshot displays the MELSOFT GX Works3 software interface for editing a sequence program. The main window shows a ladder logic diagram with the following components:

- Navigation Tree (Left):** Shows the project structure, including 'Project', 'Module Configuration', 'Program', 'Initial', 'Scan', 'MAIN', 'ProgPou', 'Local Label', 'Program', 'Fixed Scan', 'Event', 'Standby', 'No Execution Type', 'Unregistered Program', 'FB/FUN', 'M_FLUB', 'M+RD77_JOG_00E X', 'M+RD77_StartPositx', 'Local Label', 'Program', 'M+RD77_SetPosition', 'M+RD77_OperateErr', 'M+RD77_Sync_00E I', 'Label', 'Global Label', 'Global', 'M+Global', and 'Structured Data Types'.
- Main Editor:** A ladder logic diagram with 11 rungs.
 - Rung 1:** Starts with a blue 'R' (Reset) block for 'RD77.1b--X1'.
 - Rung 2:** Contains four normally open contacts: 'bServoOn X7B', 'RD77.1b--X0', 'RD77.1b--V0', and 'RD77.1b--DK1'. The output is 'Servo ON req'.
 - Rung 3:** Contains a normally open contact 'bJogSpeedReq X60' leading to a 'DMOV' (Direct Move) block with a constant value 'K10000'.
 - Rung 4:** Contains three normally open contacts: 'bJogForward X0E', 'RD77.1b--X0', and 'RD77.1b--X10'. The output is 'JOG Forward Start req', which is connected to a 'SET' (Set) block.
 - Rung 5:** Contains two normally open contacts: 'bJogReverse X0F' and 'bJogReverse X0E'. The output is 'JOG Reverse Start Req'.
- Labels:** Rung 1 is labeled '(0)', Rung 2 is labeled '(2)', Rung 3 is labeled '(6)', and Rung 4 is labeled '(18)'.
- Comments:** Rung 2 has comments 'RREADY', 'RWFLC READY', and 'RSynchronization file (Direct)'. Rung 4 has a comment 'RREADY'.

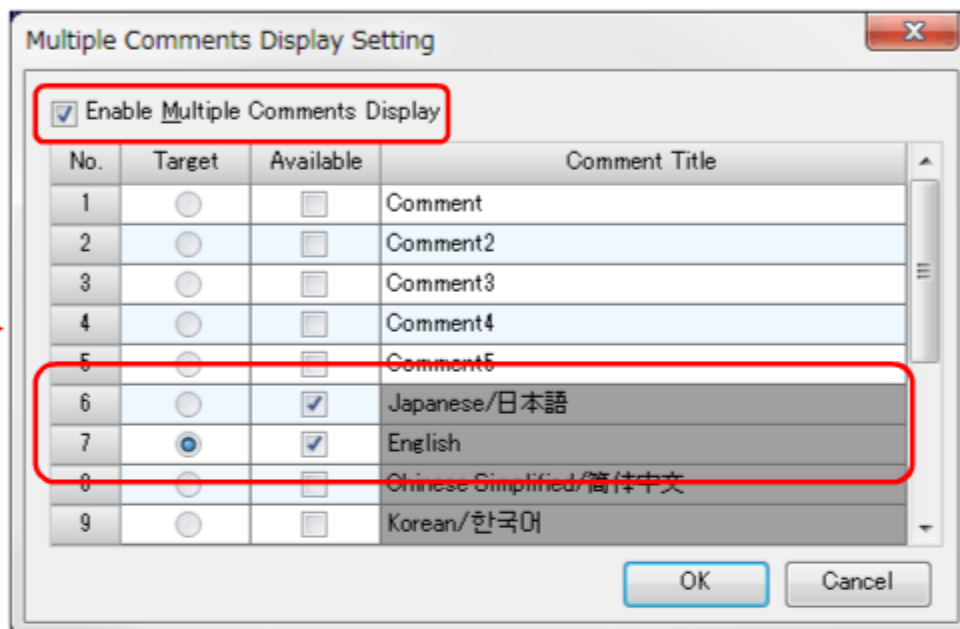
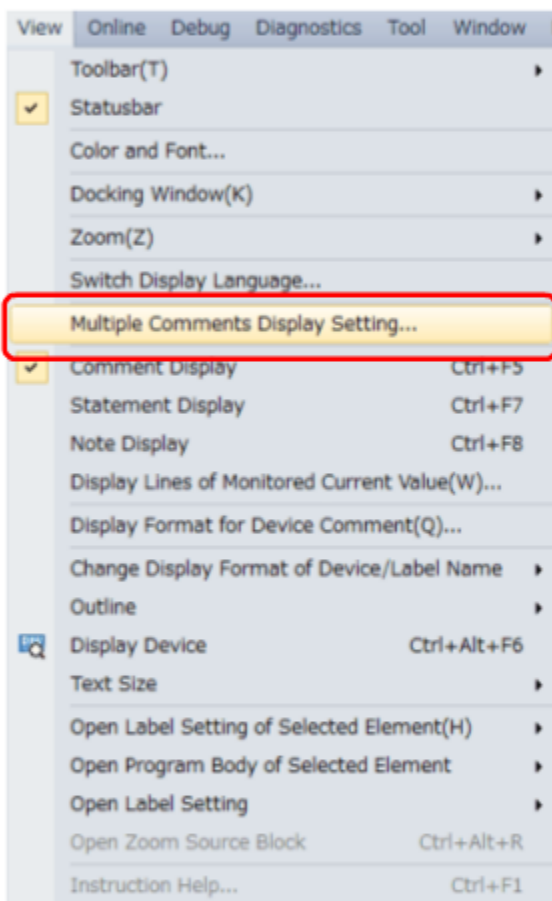
The status bar at the bottom shows 'R04', 'Host-192.168.3.250', '0/894 Step', 'Overwrite', and 'NUM'.

2.2.2

Multiple Comments Display Setting

Check the "Enable Multiple Comments Display" box and "Target" boxes for each language to switch the language for comments in sequence programs.

Select [View] - [Multiple Comments Display Setting] in the menu to open the setting screen.



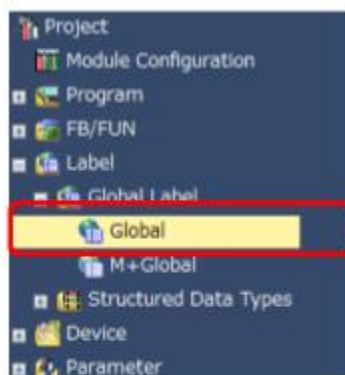
2.2.3 Registration of Global Labels

Labels are variable elements that allow you to put arbitrary names or data types to programs, etc. The use of labels allows you to create a program without worries about devices and buffer memory, enabling a different model/product to be used with the same program.

Select [Label] - [Global] in the menu to display the screen for registering global labels.

For registered contents, refer to the following PDF file.

[Global label setting examples <PDF>](#)



Global [Global Label Setting]

<Filter> Easy Display Diplyer Setting Check

Label Name	Data Type	Class	Assign Device	Initial Val	Const	コメント	日本語/日本語	English/Display Text(s)	Remark
1	StartX05toHomeOperation	BIT	VAR_GLOBAL	X05			JOG/インポート運転中リセット	JOG/Inch Operation Reset	
2	StartEnd	BIT	VAR_GLOBAL	X02			JOG実行完了	JOG End Flag	
3	StartOK	BIT	VAR_GLOBAL	X03			JOG正常完了	JOG OK Flag	
4	StartERR	BIT	VAR_GLOBAL	X04			JOG異常完了	JOG Error Flag	
5	StartReq	BIT	VAR_GLOBAL	X05			位置決め始動リクエスト	Positioning Start Operation Req	
6	StartOK	BIT	VAR_GLOBAL	X06			位置決め始動完了OK	Positioning Start OK	
7	StartErr	BIT	VAR_GLOBAL	X07			位置決め始動異常	Positioning Start Error	
8	StartReqReq	BIT	VAR_GLOBAL	X08			位置決め始動要求	Positioning Start Request	
9	AxisNo	Word (Signed)	VAR_GLOBAL	X14			軸No	Axis No	
10	VelPositioningRetNo	Word (Signed)	VAR_GLOBAL	X18			位置決め始動No	Positioning Start No	
11	VelSpeedData	Double Word (Signed)	VAR_GLOBAL	X19			JOG速度設定データ	JOG Speed data memo	
12	VelErr	Word (Signed)	VAR_GLOBAL	X13			JOGエラーコード	JOG Error code	
13	VelSpeedReq	BIT	VAR_GLOBAL	X20			JOG速度設定	JOG Speed Req	
14	Axis1	BIT	VAR_GLOBAL	X01			軸1	Axis 1	
15	Axis2	BIT	VAR_GLOBAL	X02			軸2	Axis 2	
16	HomePositionData	BIT	VAR_GLOBAL	X03			原点復帰データ設定	Home Position return Data	
17	StartReqData	BIT	VAR_GLOBAL	X05			位置決め始動データ	Positioning Start Data	
18	StartPosData	BIT	VAR_GLOBAL	X06			同期用位置決め始動データ	Synchronous Positioning Start data	
19	StartForwardReq	BIT	VAR_GLOBAL	X08			JOG正転	JOG Forward Start req	
20	StartReverseReq	BIT	VAR_GLOBAL	X09			JOG逆転	JOG Reverse Start Req	
21	StartPositioning	BIT	VAR_GLOBAL	X01			位置決め始動	Start Positioning req	
22	StartDir	BIT	VAR_GLOBAL	X08			方向指示要求	Start Dir req	

Extended Display: Automatic

System label is reserved to be registered.
 System label is reserved to be released.
 The system label is already registered to the system label database.

To execute the Reservation to Register/Release for the system label, reflection to the system label database is required. Please execute 'Reflect to System Label Database'.

It is unnecessary to change reference side project when assigned device is changed in system label Ver.2.
 * Only iQ-R series/GOT 2000 series is available for system label Ver.2.
 * To execute Online Program Change, execute Online Program Change and save.

Reservation to Register System Label
 Reservation to Release System Label
 Import System Label

Reflect to System Label Database
 Not Reflected: 0
 Total: 0

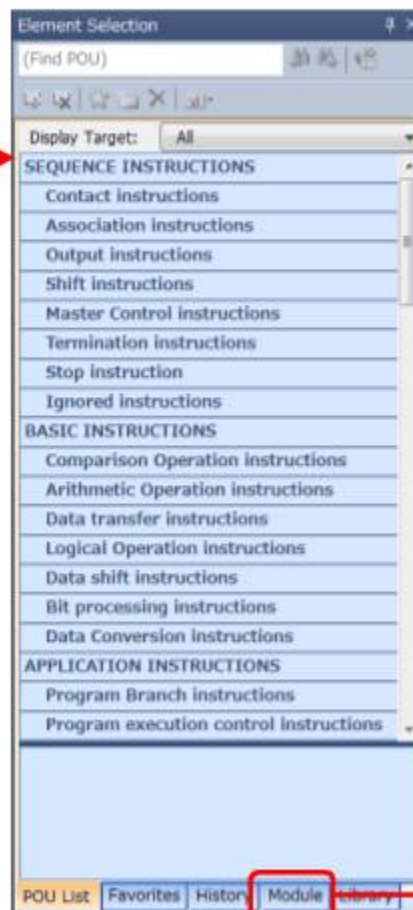
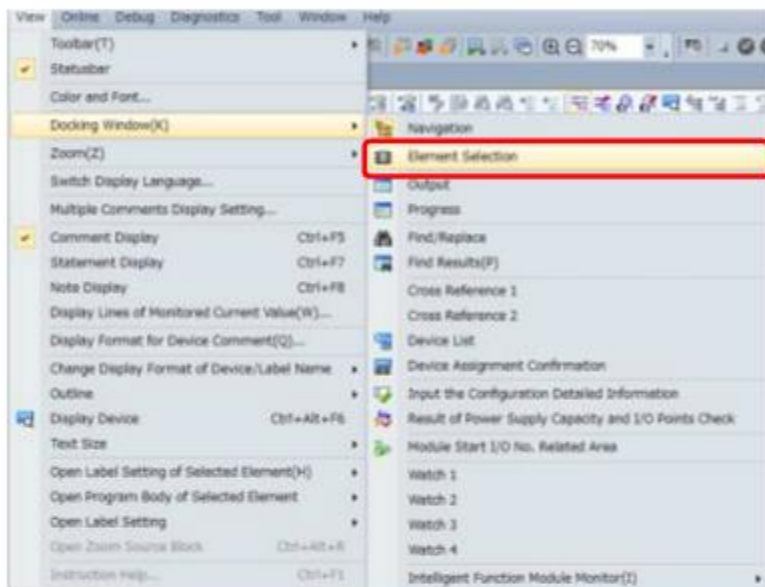
2.2.4

Element Selection Window

Display the Element Selection window.

Select [View] - [Docking Window] - [Element Selection] in the menu to display the Element Selection window.

Select [Module] tab in the Element Selection window, and Module Label and Module FB are displayed.



2.2.5

Sequence Program Creation with Module Labels

Create a sequence program using module labels.

Drag and drop the module label to be used from the Element Selection window, change it to an arbitrary contact or coil, and convert it.

The image illustrates the process of creating a sequence program using module labels. It shows the 'Element Selection' window on the left, the ladder logic editor in the center, and the 'Convert' menu at the bottom. Red arrows and callouts guide the user through the steps:

- (1) Select a label from the module label list.
- (2) Drag & drop the module label.
- (3) Double-click.
- (4) Change the contact to an arbitrary contact or coil.
- (5) Click [OK] to create a circuit.
- (6) Select [Convert] - [Convert] in the menu and convert it.

The ladder logic editor shows the following steps:

- Step 1: A normally open contact labeled 'RD77_1' is placed in the first step.
- Step 2: The contact is converted to a coil labeled 'RD77_1 Y0'.

The 'Convert' menu is shown with the 'Convert(B)' option selected.

2.2.6

Sequence Program Creation with Module FB

Create a sequence program using module FBs.

On the next page, operate the actual screen and create a sequence program using module FBs.

The screenshot displays the MELSOFT GX Works3 interface for creating a sequence program. The main window shows a ladder logic diagram with the following steps:

Step	Read	Write	Operation
22	(430)		Positioning start FB (M+RD77_StartPos)
23	M50	B[EN]	Execution command
23	Positioning start Request		Execution status
24		DUT[...]	Normal completion
24			Positioning start OK (M56)
25			Positioning start Error (M58)
26			JOG Error code (D12)

The left sidebar shows the project structure, including the 'Program' folder and the 'M+RD77_StartPos' program. The bottom status bar shows the device list and the current device (R04) and host (192.168.3.250).

2.2.6

Sequence Program Creation with Module FB



MELSOFT GX Works3 C:\Users\PC0612\Desktop\RD77MS4_sample2_1.gx3 - [ProgPou [PRG] [LD] 884Step]

Project Edit Find/Replace Convert View Online Debug Diagnostics Tool Window Help

ProgPou [PRG] [LD] 884Step x M+RD77_StartPositioning_...

WVWL	1	2	3	4	5	6	7	8	9	10	11	12
22	(43)					M... (M+RD Positionin...						
23	bPo... M80					Bi... o_b...	Exe cuti on co	Exe cuti on stat				bSt... M85
	Positi oning Start Req...											Positi oning Start Ope...
24					RD... [] Modul e label	DU... o_b...	Mo dul e lab	Nor mal co mpl				bSt... M86
												Positi oning Start OK
25					iAxi... [D14] Axis No	UW... o_b...	Tar get axis	Err or on				bSt... M87
												Positi oning Start

Element Selection

(Find POU)

- Module Label
 - 3E00:R04CPU
 - 0000:RD77MS4
 - RD77_1
 - RD77_1
 - uIO
 - Input/Output signa
 - Parameter
 - Axis monitor data
 - Axis monitor data

The sequence program creation using module FBs is completed.

Click to proceed to the next screen.

Output

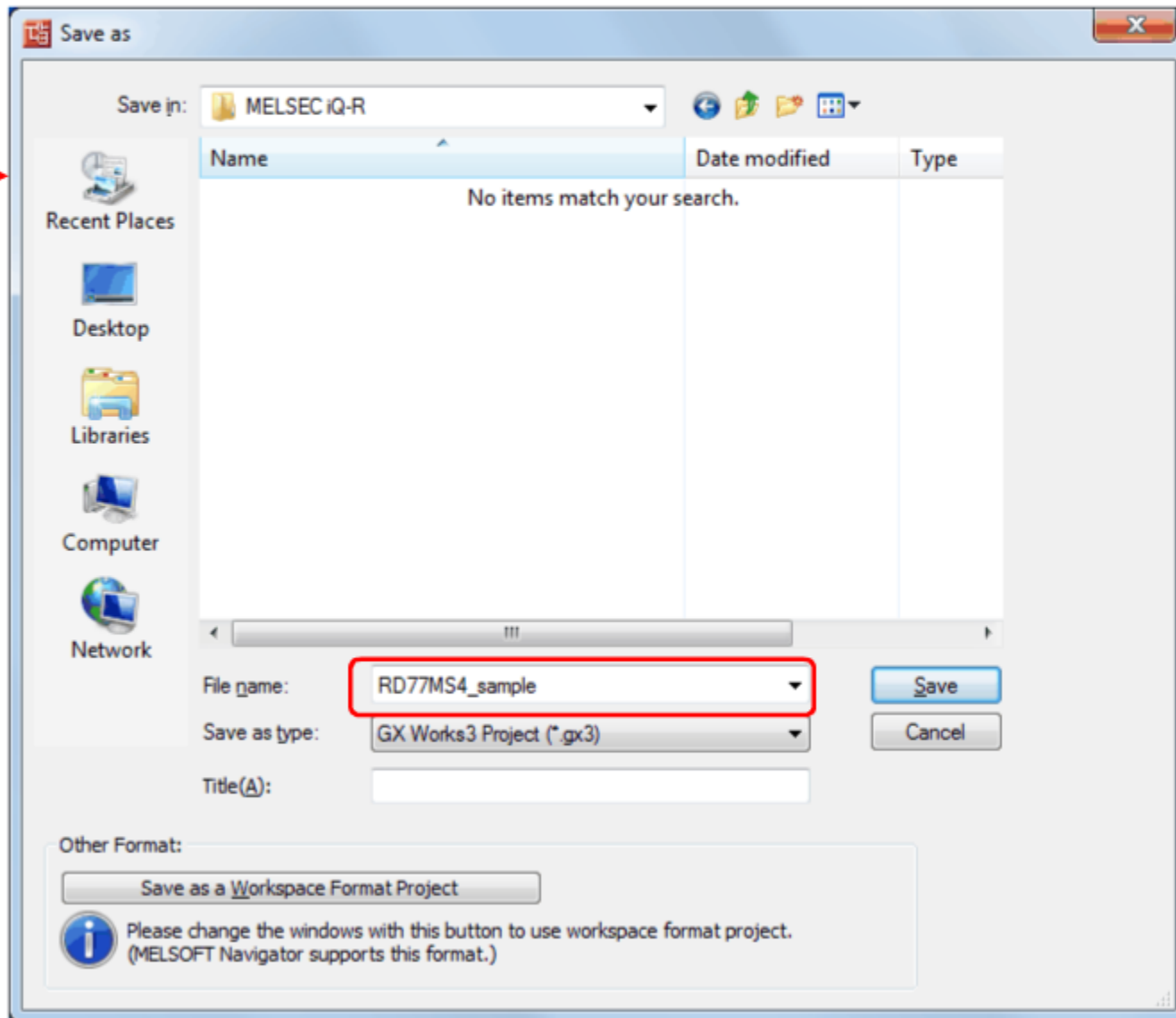
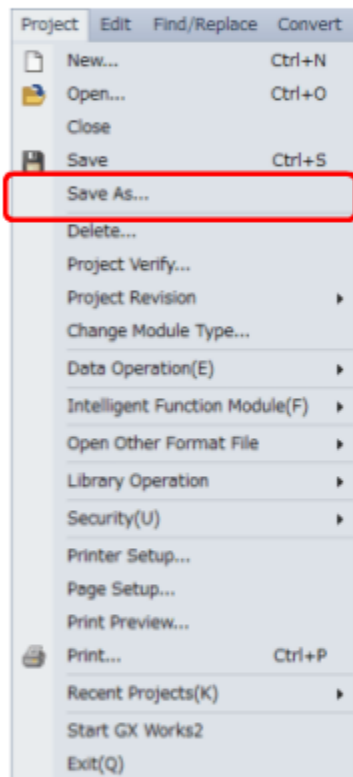
R04 | Host-192.168.3.250 | 882/884 Step

2.2.7

Saving a Project

Save a created project.

Select [Project]-[Save as] in the menu, and click [Save] after entering the file name.



2.2.8

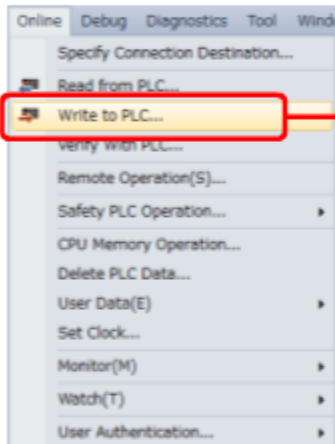
Writing to the Programmable Controller

Write the set parameters and created program into the PLC.

Select [Online] - [Write to PLC] in the menu to display the Online Data Operation window.

Select System Parameter/CPU Parameter, Module Parameter, and program files and click [Execute] to start writing to the PLC.

Click [Close] to complete the writing to the Programmable Controller.



Online Data Operation

Display Setting Related Functions

Write Read Verify Delete

Parameter + Program(E) Select All

Open/Close All(I) Deselect All(N)

Legend

- CPU Built-in Memory
- SD Memory Card
- Intelligent Function Module

Module Name/Data Name		Detail	Title	Last Change	Size (Byte)
RD77MS4_sample2_1	<input type="checkbox"/>				
Parameter	<input checked="" type="checkbox"/>				
System Parameter/CPU Parameter	<input checked="" type="checkbox"/>			2014/12/10 14:16:54	Not Calculation
Module Parameter	<input checked="" type="checkbox"/>			2014/12/10 14:16:54	Not Calculation
Simple Motion Module Setting:0000...		<input type="checkbox"/> Detail		2014/11/19 19:27:44	Not Calculation
Memory Card Parameter				2014/07/11 11:46:22	Not Calculation
Remote Password	<input checked="" type="checkbox"/>			2014/07/11 11:46:22	Not Calculation
Global Label	<input checked="" type="checkbox"/>				
Global Label Setting	<input checked="" type="checkbox"/>			2014/12/22 16:25:03	Not Calculation
Global Label Initial Value	<input checked="" type="checkbox"/>				
GLBLINF	<input checked="" type="checkbox"/>			2014/12/22 16:25:03	Not Calculation
Local Label Initial Value	<input checked="" type="checkbox"/>				

Display Memory Capacity

Memory Capacity

Size Calculation

Legend

- Used
- Increased
- Decreased
- 5K or Less

Program Memory _____ Free 0/0KB

Data Memory _____ Free 0/0KB

Device/Label Memory (File Storage Area) _____ Free 0/0KB

SD Memory Card _____ Free 0/0KB

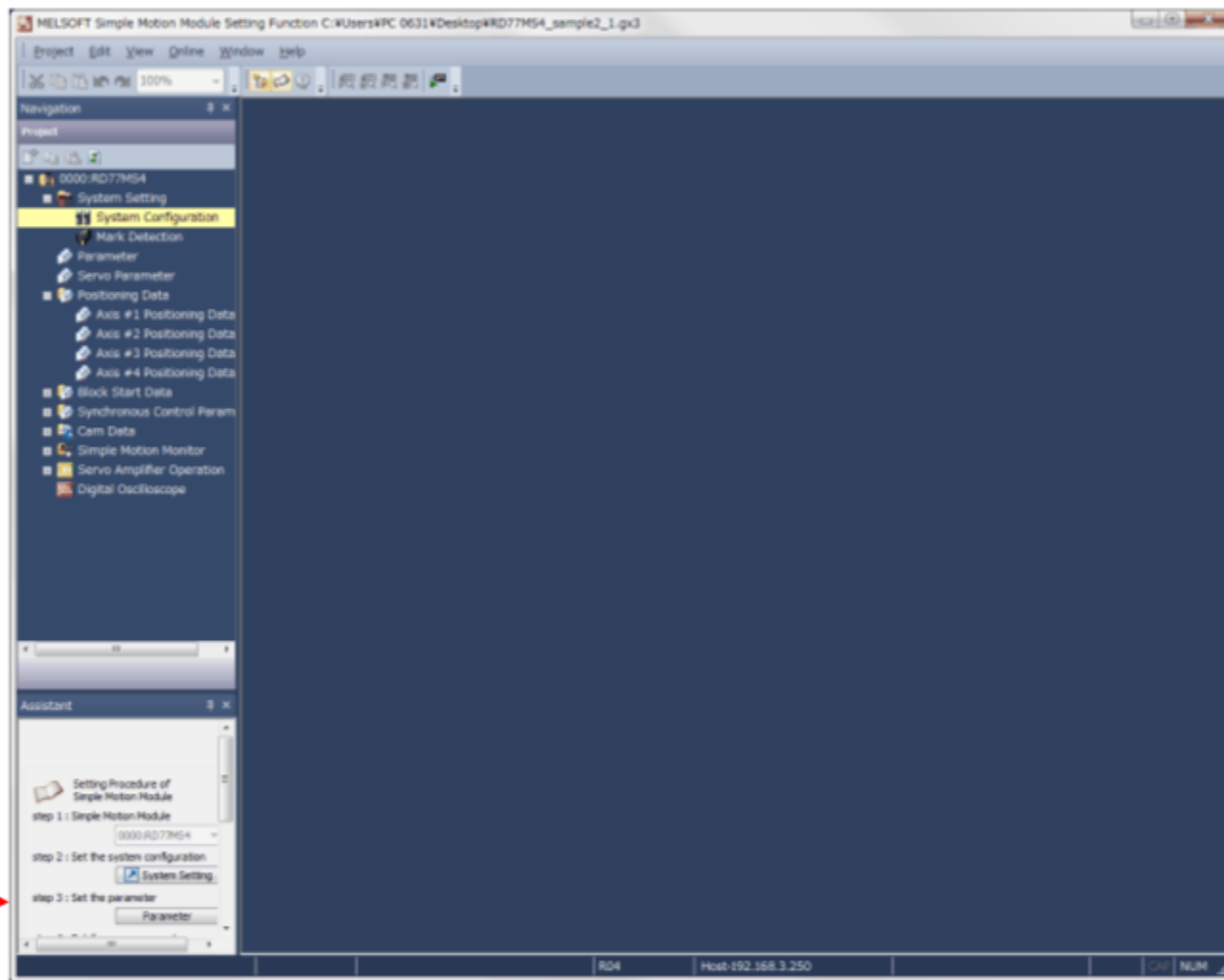
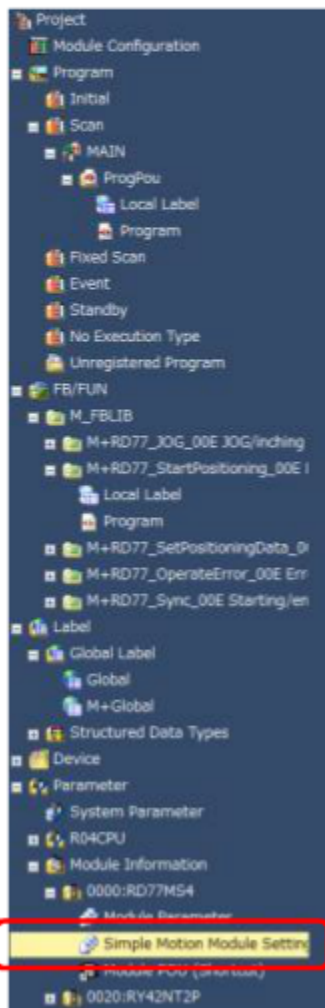
Execute Close

2.3 Parameter Settings for Simple Motion Module

Set parameters of the Simple Motion module.

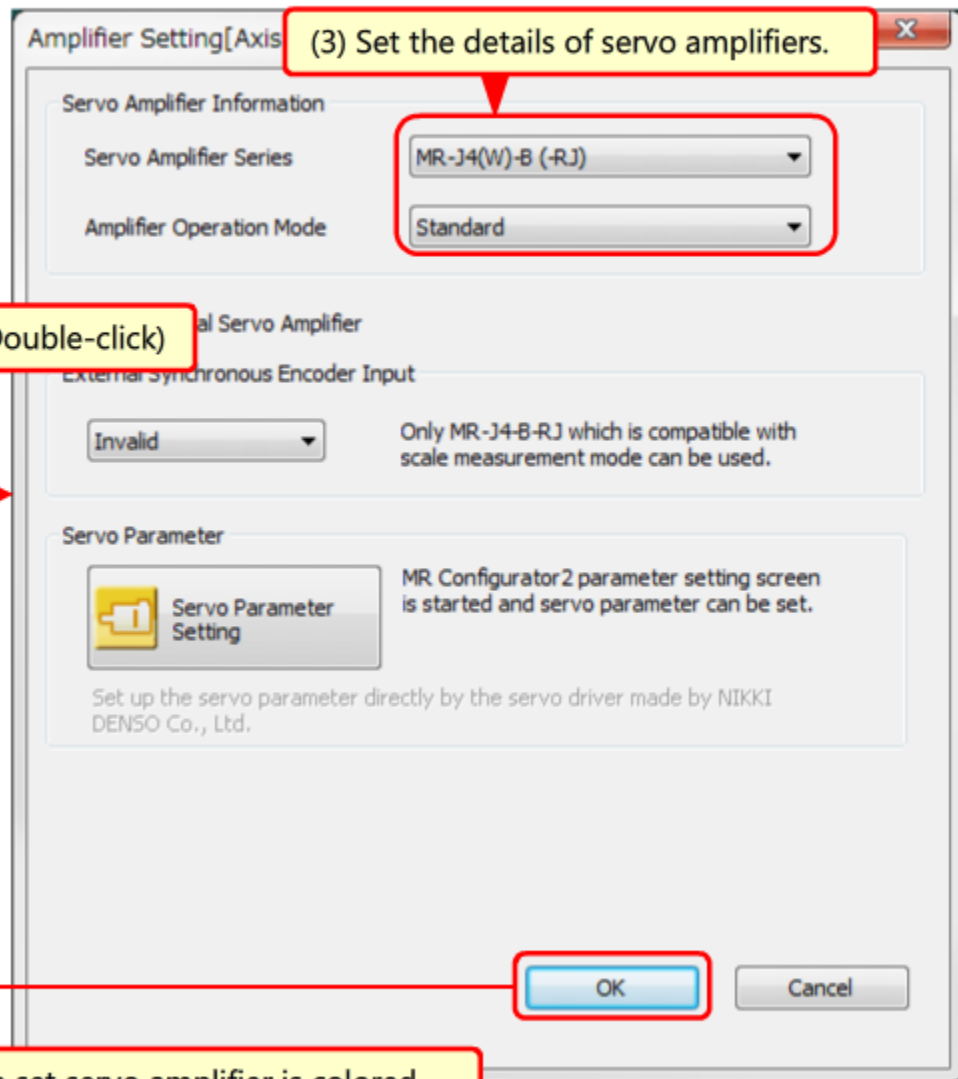
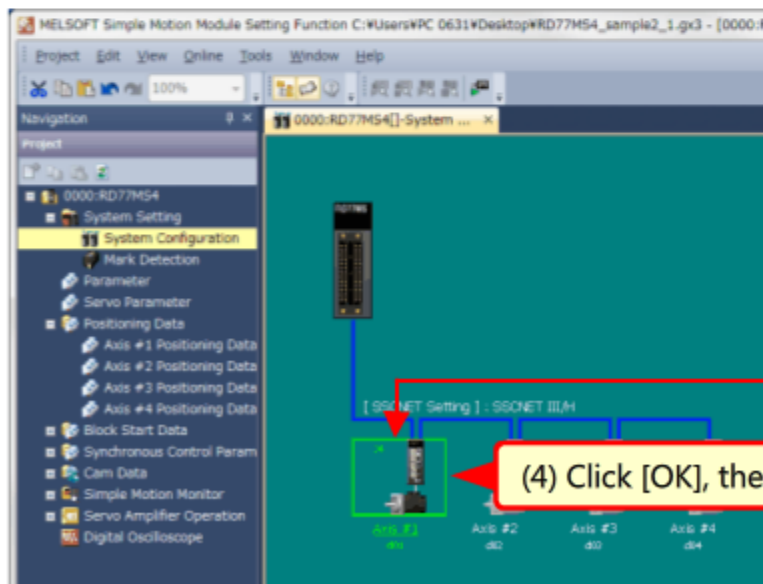
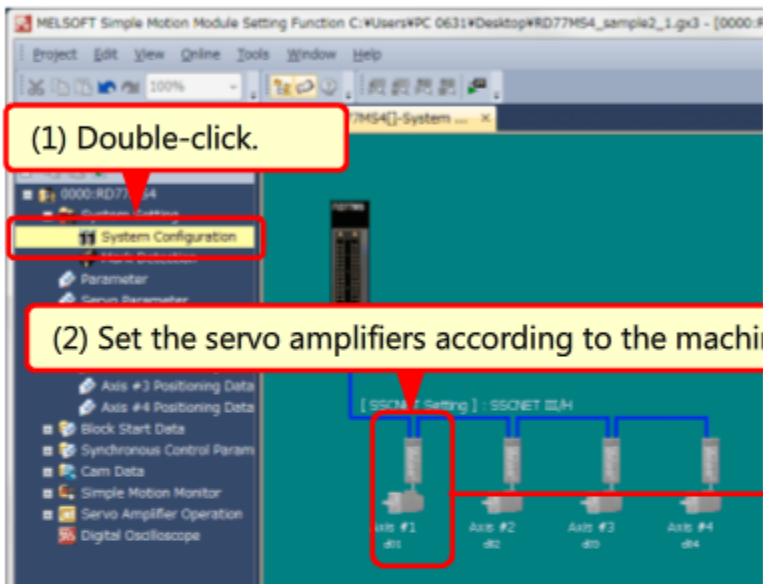
2.3.1 Start of Simple Motion Module Setting Function

Double click [Simple Motion Module Setting] in the menu of MELSOFT GX Works3 to open the Simple Motion Module Setting Function window.



2.3.2 System Settings

Configure the system setting.

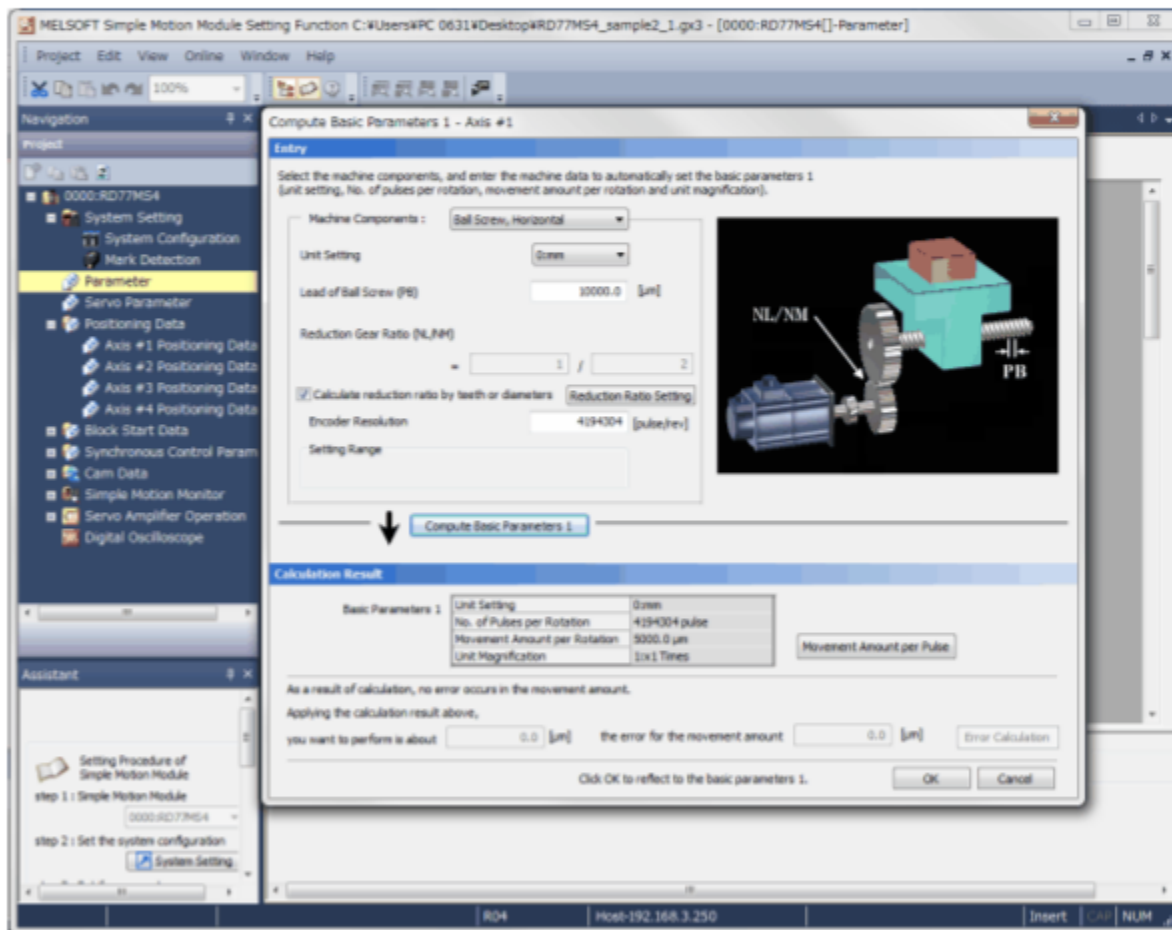


2.3.3

Parameter Settings

Set parameters.

On the next page, operate the actual screen and set parameters.



2.3.3

Parameter Settings



MELSOFT Simple Motion Module Setting Function C:\Users\PC0612\Desktop\RD77MS4_sample2_1.gx3 - [0000:RD77MS4[]-Parame...

Project Edit View Online Window Help

100%

Navigation 0000:RD77MS4[]-Parameter

Project

- 0000:RD77MS4
 - System Setting
 - System Configuration
 - Mark Detection
 - Parameter**
 - Servo Parameter
 - Positioning Data
 - Block Start Data
 - Synchronous Control Param
 - Cam Data
 - Simple Motion Monitor
 - Servo Amplifier Operation
 - Digital Oscilloscope

Display Filter Display All Compute Basic Parameters 1

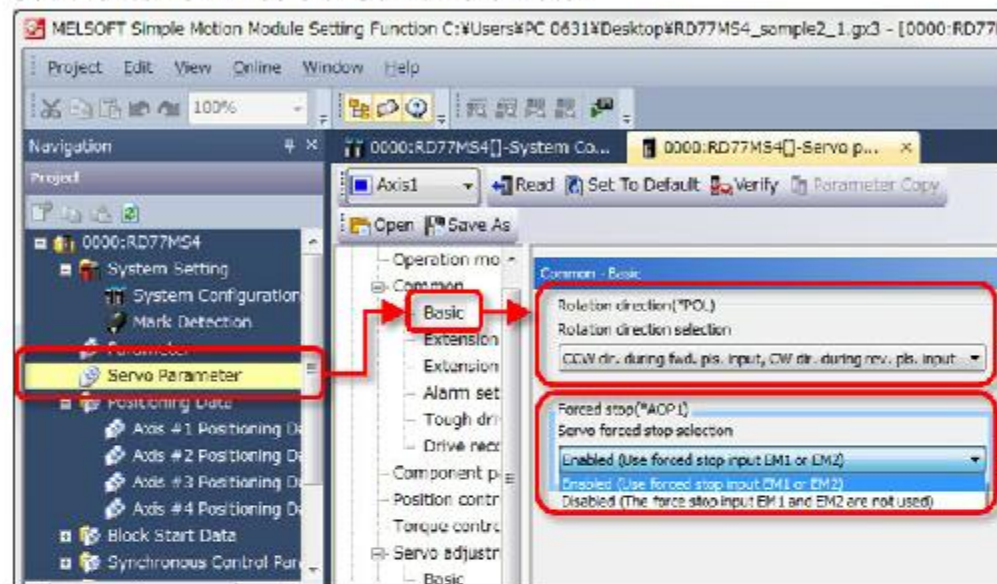
Item	Axis #1
Common Parameter	The parameter does not r...
Pr.82:Forced stop valid/invalid selection	1:Invalid
Pr.24:Manual pulse generator/Incremental Sync. ENC input selection	0:A-phase/B-phase Mode (4 Multiply)
Pr.89:Manual pulse generator/Incremental Sync. ENC input type selection	1:Voltage Output/Open Collector Type
Pr.96:Operation cycle setting	FFFFh:Automatic Setting
Pr.97:SSCNET Setting	1:SSCNET III/H
Pr.150:Input terminal logic selection	Set the logic of external in...
Pr.151:Manual pulse generator/Incremental Sync. ENC input logic selection	0:Negative Logic
Pr.152:Control axis number upper limit	0
Pr.153:External input signal OSC file setting	Set digital filter for each i...
Basic parameters 1	Set according to the mach...
Pr.1:Unit setting	0:mm
Pr.2:No. of pulses per rotation	4194304 pulse
Pr.3:Movement amount per rotation	5000.0 μm
Pr.4:Unit magnification	1:x1 Times
Pr.7:Bias speed at start	0.00 mm/min
Basic parameters 2	Set according to the mach...
Pr.8:Speed limit value	2000.00 mm/min
Pr.9:Acceleration time 0	1000 ms
Pr.10:Deceleration time 0	1000 ms
Detailed parameters 1	Set acc...
Pr.11:Backlash compensation amount	0.0 μm

Setting parameters is completed.
Click to proceed to the next screen.



R04 Host-192.168.3.250

2.3.4 Servo Parameter Settings (Basic)

Set the items in Basic of Servo Parameter.





When setting the items in Basic of Servo Parameter, pay attention to the following parameters.

Parameter item	Function Explanation	Initial values	Setting for the Sample System
Rotation direction selection	<p>Use this option to set the rotation direction of the servo motor when being moved by forward rotation commands. The rotation direction is either counter-clockwise (CCW) or clockwise (CW) as seen from the load side (side attached to the machine).</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  Counter-clockwise (CCW) </div> <div style="text-align: center;">  Clockwise (CW) </div> </div> <p>Set the rotation direction considering the machine specifications. In the sample system, the servo motor in each axis is set to rotate in the counter-clockwise direction (CCW).</p>	CCW for forward rotation command, CW for reverse command	CCW for forward rotation command, CW for reverse command

2.3.4

Servo Parameter Settings (Basic)

When setting the items in Basic of Servo Parameter, pay attention to the following parameters.

Parameter item	Function Explanation	Initial values	Setting for the Sample System
Rotation direction selection	<p>Use this option to set the rotation direction of the servo motor when being moved by forward rotation commands. The rotation direction is either counter-clockwise (CCW) or clockwise (CW) as seen from the load side (side attached to the machine).</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Counter-clockwise (CCW)</p> </div> <div style="text-align: center;">  <p>Clockwise (CW)</p> </div> </div> <p>Set the rotation direction considering the machine specifications. In the sample system, the servo motor in each axis is set to rotate in the counter-clockwise direction (CCW) for the forward rotation command.</p>	CCW for forward rotation command, CW for reverse command	CCW for forward rotation command, CW for reverse command
Servo forced stop selection	<p>Turn this option ON to enable use of the forced stop input (EM2 or EM1) signal.</p> <p>The initial value is set to [Enabled] for safety reasons. In the sample system, the servo forced stop signal is not used. Thus, set this option to [Disabled].</p>	Enabled (Either forced stop input EM2 or EM1 is used.)	Disabled (Neither forced stop input EM2 nor EM1 is used.)

2.3.4

Servo Parameter Settings (Component Parts)

Set Component parts of Servo Parameter.

MELSOFT Simple Motion Module Setting Function C:\Users\PC 0631\Desktop\RD77MS4_sample2_1.gx3 - [0000:RD77MS4[]-Servo parameter]

Project Edit View Online Window Help

Navigation 100%

Project

0000:RD77MS4

- System Setting
- System Configuration
- Mark Detection
- Parameter
- Servo Parameter
- Positioning Data
 - Axis #1 Positioning Data
 - Axis #2 Positioning Data
 - Axis #3 Positioning Data
 - Axis #4 Positioning Data
- Block Start Data
- Synchronous Control Parameter

Assistant

Axis1 Read Set To Default Verify Parameter Copy

Function display

- Operation mode
- Common
 - Basic
 - Extension
 - Extension
 - Alarm set
 - Tough drive
 - Drive record
- Servo adjustment
 - Basic
 - Extension
 - Filter 1
 - Filter 2

Component parts

Selected Items Write Single Axis Write

Regenerative option(*REG)
Regenerative option setting
Regen. option is not used

Servo amplifier

Battery(*ABS, **COP4)
Absolute pos. detection system sel.
Disabled (Used in incremental system)

Home pos. set condition sel.
Z-phase must be passed

Brake output(MBR)
 Uses electromagnetic brake interlock (MBR)
Electromagnetic brake sequence output
0 ms (0-1000)

Servo motor

Encoder cable(**COP1)
Encoder cable communication method sel.
Twice

Parameter item	Function Explanation	Initial values	Setting for the Sample System
Absolute position detection system/Incremental system selection	Select Used in incremental system or Used in ABS pos. detect system.	Disabled (Used in incremental system)	Disabled (Used in incremental system)
home position setting condition select	When "Z-phase must not be passed" is selected, the home position return can be executed without waiting for the motor to rotate one time or more.	Z-phase must be passed	Z-phase must not be passed

2.3.5 Positioning Data Setting

Set positioning data based on the operation pattern of the system used in this course.

[Sample system details <PDF>](#)

On the next page, operate the actual screen and configure the positioning data setting.

The screenshot displays the MELSOFT Simple Motion Module Setting Function software. The main window is titled "0000:RD77MS4[-]Axis #1 Positioning Data". The interface includes a navigation pane on the left, a main data table, and an assistant window at the bottom.

Navigation Pane:

- 0000:RD77MS4
 - System Setting
 - System Configuration
 - Mark Detection
 - Parameter
 - Servo Parameter
 - Positioning Data
 - Axis #1 Positioning Data (Selected)
 - Axis #2 Positioning Data
 - Axis #3 Positioning Data
 - Axis #4 Positioning Data
 - Block Start Data
 - Synchronous Control Param.
 - Cam Data
 - Simple Motion Monitor
 - Servo Amplifier Operation
 - Digital Oscilloscope

Main Data Table:

No.	Deceleration time (ms)	Positioning address	Acc. address	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
1	0:1000	100000.0 μm	0.0 μm	2000.00 rev/min	0 ms	0	0:Use the setting value of M-code ON signal ...	0:Use the setting value of ABS direction at degree	0:Use the setting value of interpolation speed...
2	0:1000	0.0 μm	0.0 μm	8000.00 rev/min	0 ms	0	0:Use the setting value of M-code ON signal ...	0:Use the setting value of ABS direction at degree	0:Use the setting value of interpolation speed...
3	-Positioning Comment-								
4	-Positioning Comment-								
5	-Positioning Comment-								
6	-Positioning Comment-								
7	-Positioning Comment-								
8	-Positioning Comment-								
9	-Positioning Comment-								
10	-Positioning Comment-								
11	-Positioning Comment-								
12	-Positioning Comment-								
13	-Positioning Comment-								
14	-Positioning Comment-								
15	-Positioning Comment-								
16	-Positioning Comment-								
17	-Positioning Comment-								
18	-Positioning Comment-								
19	-Positioning Comment-								
20	-Positioning Comment-								
21	-Positioning Comment-								

Assistant Window:

Setting Procedure of Simple Motion Module

step 1: Simple Motion Module

step 2: Set the system configuration

step 3: Set the parameter

Parameter

Command speed

Host: 192.168.3.250

2.3.5

Positioning Data Setting



MELSOFT Simple Motion Module Setting Function C:\Users\PC0612\Desktop\RD77MS4_sample2_1.gx3 - [0000:RD77MS4]-Axis #1...

Project Edit View Online Tools Window Help

Navigation 0000:RD77MS4[]-Axis #1 ...

Project

- 0000:RD77MS4
 - System Setting
 - System Configuration
 - Mark Detection
 - Parameter
 - Servo Parameter
 - Positioning Data
 - Axis #1 Positioning Data
 - Axis #2 Positioning Data
 - Axis #3 Positioning Data
 - Axis #4 Positioning Data
 - Block Start Data
 - Synchronous Control Parameter
 - Cam Data
 - Simple Motion Monitor
 - Servo Amplifier Operation
 - Digital Oscilloscope

Display Filter Display All Data Setting Assistant Offline Simulation Automatic Command Sp

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address
1	1:CONT <Positioning Comment>	01h:ABS Linear 1	-	0:1000	0:1000	100000.0 μm
2	0:END <Positioning Comment>	01h:ABS Linear 1	-	0:1000	0:1000	0.0 μm
3	<Positioning Comment>					
4	<Positioning Comment>					
5	<Positioning Comment>					
6	<Positioning Comment>					
7	<Positioning Comment>					
8	<Positioning Comment>					
9	<Positioning Comment>					
10	<Positioning Comment>					
11	<Positioning Comment>					

Setting positioning data is completed.
Click to proceed to the next screen.

R04 Host-192.168.3.250

2.3.6

Writing to the Simple Motion Module

Write the set parameters and positioning data into the Simple Motion module.

Before writing them, save the project. (Refer to Section 2.2.7.)

- 1) Select [Online] - [Write to PLC] in the menu to display the Online Data Operation window.
- 2) Select Simple Motion Module Setting.
- 3) Click [Execute] to start writing the selected items to the Simple Motion module.
- 4) Click [Close] after completion of the writing.

The screenshot shows the 'Online Data Operation' window with the 'Write' tab selected. The 'Write to PLC...' menu item is highlighted in the 'Online' menu. In the main window, the 'Simple Motion Module Setting' item is selected in the tree view, and its 'Detail' button is highlighted. A confirmation dialog box is shown in the bottom left, asking to overwrite the flash ROM contents, with the 'Yes' button highlighted. The 'Execute' button in the bottom right of the main window is also highlighted.

Module Name/Data Name	Detail	Title	Last Change	Size (Byte)
RD77MS4_sample2_1				
Parameter				
System Parameter/CPU Parameter			2014/12/10 14:16:54	Not Calculation
Module Parameter			2014/12/10 14:16:54	Not Calculation
Simple Motion Module Setting:0000...	<input checked="" type="checkbox"/>	Detail	2014/11/19 19:27:44	Not Calculation
Memory Card Parameter			2014/07/11 11:46:22	Not Calculation
Remote Password			2014/07/11 11:46:22	Not Calculation
Global Label				
Global Label Setting			2014/12/22 16:25:03	Not Calculation
Global Label Initial Value				
GLBLINF			2014/12/22 16:25:03	Not Calculation
Local Label Initial Value				

The confirmation message window for flash ROM overwriting appears. Click [Yes].

Execute

2.4**Operation Check**

Check the operation of the system in this course.

The sequence program used in this course is an example using R04CPU and RD77MS4.

When another different module is used, the signal assignment differs.

Refer to MELSEC iQ-R Simple Motion Module User's Manual (Application) for details of each signal.

2.4.1

JOG Operation

Check the operation with the JOG operation.

On the next page, operate the actual screen and check the operation with the JOG operation.

The screenshot displays the software interface for monitoring the motion module. The main window is titled "6000-RD77M54[] - Axis Monitor". It is divided into two main sections: "Axis Monitor" on the left and "Module Information List" on the right.

Axis Monitor: This section shows a list of parameters for the selected axis (Axis #1). The parameters include feed current value, machine feed value, axis error No., axis warning No., axis operation status (currently "JOG Operation"), feed speed (186.80 mm/min), positioning data No. being executed (Positioning Complete), acceleration and deceleration times (0.000 s), deviation counter (0 pulse), motor rotation speed (19.86 rpm), motor current value (0.0 %), servo status 1 (OFF), external input signals (ON), and JOG start/stop status (OFF).

Module Information List: This section provides a detailed status overview for the module. It includes:

- PLC READY(Y)
- READY(X)
- Synchronization flag(S)
- All axes servo ON(O)
- MD 100: Servo status 1 - READY(O)
- MD 108: Servo status 1 - Servo ON
- MD 30: Parallel stop input(LONG423)
- MD 31: Status - Error detection
- MD 31: Status - Axis warning detection
- MD 10: Test mode flag(LONG400)
- MD 5: LAMP test operation mode(LONG422)
- MD 133: Operation cycle over flag(LONG430) - 8200ms.664 ms
- MD 134: Operation time(LONG430) - 0 ps
- MD 135: Maximum operation time(LONG430) - 0 ps
- MD 30: No. of flash ROM writing(LONG424) - 0 times
- MD 52: Searching flag for driver communication error... Complete of searching for driver co...
- MD 53: SICKET control status(LONG432) - Waiting for command accepted
- MD 131: Digital OSG running flag(LONG401) - Stopped

2.4.1

JOG Operation



MELSOFT Simple Motion Module Setting Function C:\Users\PC0612\Desktop\RD77MS4_sample2_1.gx3 - [0000:RD77MS4]-Servo p...

Project Edit View Online Window Help

100%

Navigation

Project

0000:RD77MS4

- System Setting
- System Configuration
- Mark Detection
- Parameter
- Servo Parameter**
- Positioning Data
- Block Start Data
- Synchronous Control Par...

0000:RD77MS4[]-Servo p...

Axis1

Read Set To Default Verify Parameter Copy

Open Save As

Function display

- Operation mode
- Common
 - Basic
 - Extension
 - Extension
 - Alarm set
 - Tough drive
 - Drive rec...
- Component pi...

Common - Basic

Selected Items Write

Rotation direction(*POL)
Rotation direction selection
CW dir. during fwd. pls. input, CCW dir. during rev. pls. input

Encoder output pulse(*ENRS, *ENR, *ENR)
Encoder output pulse phase
Advance A-phase 90° by CCW

Number of encoder output pulse

Forced stop(*AOP1)
Servo forced stop selection
Enabled (Use forced stop input EM1 or EM2)

Enc

Zero speed(ZSP)

Servo Parameter Help

ROTATION DIRECTION/MOVING DIRECTION

Select the rotation direction/moving direction of the command input pulse.

[Link list](#)

The JOG operation check is completed.
Click to proceed to the next screen.

R04 Host-192.168.3.250

2.4.2

Home Position Return

Perform the home position return.

Perform the data set type home position return in this course.

On the next page, operate the actual screen and perform the home position return.

The screenshot displays the MELSEC iQ-R Axis Monitor software interface. The main window is titled "0000-RD77M54[] - Axis Monitor". It is divided into two main sections: "Axis Monitor" on the left and "Module Information List" on the right.

Axis Monitor Panel:

- Monitor Type: Axis(Output Axis)
- Port Size: Opt
- Buttons: Select Monitor Item, Select Monitor Axis
- Table of parameters for Axis #1:

Parameter	Value
Mc.20:Feed current value	0.0 μm
Mc.21:Machine feed value	0.0 μm
Mc.22:Axis error flt.	-
Mc.24:Axis warning flt.	-
Mc.25:Axis operation status	Waiting
Mc.26:Axis feed speed	0.00 mm/min
Mc.44:Positioning data No. being executed	-
Mc.47:Positioning data being executed : Operation pattern	Positioning Complete
Mc.47:Positioning data being executed : Control method	-
Mc.47:Positioning data being executed : Acceleration time flt.	0:1000
Mc.47:Positioning data being executed : Deceleration time flt.	0:1000
Mc.47:Positioning data being executed : Axis to be interpolate...	-
Mc.47:Positioning data being executed : M-code	-
Mc.102:Deviation counter	0 pulse
Mc.103:Motor rotation speed	0.00 r/min
Mc.104:Motor current value	0.0 %
Mc.106:Servo status 1 : Servo alarm	OFF
Mc.106:Servo status 1 : Servo warning	OFF
Mc.114:Servo alarm	-
Mc.30:External input signal : Lower limit	ON
Mc.30:External input signal : Upper limit	ON
Mc.31:Status : HPR request flag	OFF
Mc.31:Status : HPR complete flag	ON
Cl.181:Forward JOG start	OFF
Cl.182:Reverse JOG start	OFF
Cl.180:Axis stop	OFF

Module Information List Panel:

- PLC READY(Y0)
- READY(Z0)
- Synchronization flag(S1)
- All axes servo ON(Y2)
- Mc.106:Servo status 1 : READY ON (Axis No. 1 | 2 | 3 | 4)
- Mc.106:Servo status 1 : Servo ON (Axis No. 1 | 2 | 3 | 4)
- Mc.30:Forward stop req.(JOG-423)
- BUSY (Axis No. 1 | 2 | 3 | 4)
- Mc.31:Status : Error detection (Axis No. 1 | 2 | 3 | 4)
- Mc.31:Status : Axis warning detection (Axis No. 1 | 2 | 3 | 4)
- Mc.104:Test mode flag(JOG-400)
- Mc.31:AMP-AMP axis operation mode(JOG-422)
- Mc.103:Operation cycle over flag(JOG-420)
- Mc.103:Set operation cycle(JOG-420) **00000.0000 sec**
- Mc.104:Operation time(JOG-400) **0 ps**
- Mc.105:Maximum operation time(JOG-402) **0 ps**
- Mc.30:No. of Flush TCP writing(JOG-423) **0 times**
- Mc.52:Searching flag for driver communication... **Complete of searching for driver co...**
- Mc.53:SEARCH control status(JOG-421) **Waiting for command accepted**
- Mc.101:Digital OSC running flag(JOG-411) **Stopped**

2.4.2

Home Position Return



0000:RD77MS4[] - Axis Monitor

Axis Monitor

Monitor Type: Axis(Output Axis)

Font Size: 9pt

Select Mo

	Axis #1
Md.47:Positioning data being executed : Control method	-
Md.47:Positioning data being executed : Acceleration time No.	0:1000
Md.47:Positioning data being executed : Deceleration time No.	0:1000
Md.47:Positioning data being executed : Axis to be interpolated	-
Md.47:Positioning data being executed : M-code	-
Md.102:Deviation counter	0 pulse
Md.103:Motor rotation speed	0.00 r/min
Md.104:Motor current value	0.0 %
Md.108:Servo status 1 : Servo alarm	OFF
Md.108:Servo status 1 : Servo warning	OFF
Md.114:Servo alarm	
Md.30:External input signal : Lower limit	
Md.30:External input signal : Upper limit	
Md.31:Status : HPR request flag	OFF
Md.31:Status : HPR complete flag	ON

Md.31: Status: HPR request flag turns OFF.
Md.31: Status: HPR complete flag turns ON.

Module Information List

- PLC READY(Y0)
- READY(X0)
- Synchronization flag(X1)
- All axes servo ON(Y1)
- Md. 108:Servo status 1 : READY ON
Axis No. 1 2 3 4
- Md. 108:Servo status 1 : Servo ON
Axis No. 1 2 3 4
- Md.50:Forced stop input(U0#G4231)
- BUSY
Axis No. 1 2 3 4
- Md.31:Status : Error detection
Axis No. 1 2 3 4
- Md.31:Status : Axis warning detection
Axis No. 1 2 3 4
- Md. 1:In test mode flag(U0#G4000)
- Md.51:AMP-less operation mode(U0#G4232)
- Md. 133:Operation cycle over flag(U0#G4230)

The home position return operation check is completed.

Click  to proceed to the next screen.

Md. 125:Maximum operation time(U0#G4000)

2.4.3

Positioning Control

Check the operation with the positioning control.

On the next page, operate the actual screen and check the operation with the positioning control.

The screenshot displays the software interface for monitoring the motion module. It is divided into two main sections: the Axis Monitor and the Module Information List.

Axis Monitor: This section shows a table of parameters for Axis #1. The parameters include feed current, machine feed, axis error, warning, operation status, feed speed, positioning data, and various status flags.

Parameter	Value
Md.20:Feed current value	96103.7 μm
Md.21:Machine feed value	96103.7 μm
Md.23:Axis error No.	-
Md.24:Axis warning No.	-
Md.26:Axis operation status	Position Control
Md.28:Axis feed speed	2000.00 mm/min
Md.44:Positioning data No. being executed	1
Md.47:Positioning data being executed / Operation pattern	Continuous Positioning Control
Md.47:Positioning data being executed / Control method	1-axis linear control (ABS)
Md.47:Positioning data being executed / Acceleration time No.	0:1000
Md.47:Positioning data being executed / Deceleration time No.	0:1000
Md.47:Positioning data being executed / Axis to be interpolated	-
Md.47:Positioning data being executed / M-code	-
Md.102:Deviation counter	0 pulse
Md.103:Motor rotation speed	400.01 r/min
Md.104:Motor current value	0.0 %
Md.108:Servo status 1 : Servo alarm	OFF
Md.109:Servo status 1 : Servo warning	OFF
Md.114:Servo alarm	-
Md.30:External input signal : Linear limit	ON
Md.30:External input signal : Upper limit	ON
Md.31:Status : HPR request flag	OFF
Md.31:Status : HPR complete flag	OFF
Ct.181:Forward JOG start	OFF
Ct.182:Reverse JOG start	OFF
Ct.180:Axis stop	OFF

Module Information List: This section provides a detailed status overview for various modules. It includes indicators for PLC readiness, synchronization, servo status, and various error and warning flags. The status for the servo is currently 'Ready' and 'Stopped'.

- PLC READY(Y1)
- READY(S1)
- Synchronization flag(S2)
- All axes servo ON(S3)
- Md.108:Servo status 1 : READY ON (Axis No. 1 2 3 4)
- Md.109:Servo status 1 : Servo ON (Axis No. 1 2 3 4)
- Md.30:Forward stop req.(JOG420)
- STOP (Axis No. 1 2 3 4)
- Md.31:Status : Error detection (Axis No. 1 2 3 4)
- Md.31:Status : Axis warning detection (Axis No. 1 2 3 4)
- Md.104 test mode flag(JOG400)
- Md.104PP-less operation mode(JOG422)
- Md.103:Operation cycle over flag(JOG430)
- Md.103:Set operation cycle(JOG428) 0.000000000 sec
- Md.104:Operation time(JOG432) 0 ps
- Md.103:Maximum operation time(JOG430) 0 ps
- Md.30:No. of Mesh-ROH writing(JOG423) 0 times
- Md.52:Searching flag for driver communication... Complete of searching for driver co...
- Md.53:SDNET control status(JOG421) Waiting for command accepted
- Md.101:Digital ODC running flag(JOG401) Stopped

2.4.3

Positioning Control



0000:RD77MS4[] - Axis Monitor

Axis Monitor Monitor Type: Axis(Output Axis) Font Size: 9pt Select Mo

	Axis #1
Md.47:Positioning data being executed : Control method	-
Md.47:Positioning data being executed : Acceleration time No.	0:1000
Md.47:Positioning data being executed : Deceleration time No.	0:1000
Md.47:Positioning data being executed : Axis to be interpolated	-
Md.47:Positioning data being executed : M-code	-
Md.102:Deviation counter	0 pulse
Md.103:Motor rotation speed	0.00 r/min
Md.104:Motor current value	0.00%
Md.108:Servo status 1 : Servo alarm	-
Md.108:Servo status 1 : Servo warning	-
Md.114:Servo alarm	-
Md.30:External input signal : Lower limit	ON
Md.30:External input signal : Upper limit	ON
Md.31:Status : HPR request flag	OFF
Md.31:Status : HPR complete flag	OFF

**Md.30: External input signal: Lower limit turns ON.
Md.30: External input signal: Upper limit turns ON.
Md.31: Status: HPR complete flag turns OFF.**

ユニット情報一覧

- シーケンサレディ(Y0)
- 準備完了(X0)
- 同期用フラグ(X1)
- 全軸サーボON(Y1)

Md. 108:サーボステータス1 レディON
軸番号 1 2 3 4

Md. 108:サーボステータス1 サーボON
軸番号 1 2 3 4

Md. 50:緊急停止入力(U0#G4231)

BUSY
Axis No. 1 2 3 4

Md.31:Status : Error detection
Axis No. 1 2 3 4

Md.31:Status : Axis warning detection
Axis No. 1 2 3 4

- Md. 1:In test mode flag(U0#G4000)
- Md. 51:AMP-less operation mode(U0#G4232)
- Md. 133:Operation cycle over flag(U0#G4230)

The positioning control operation check is completed.
Click to proceed to the next screen.

Md. 125:Maximum operation time(U0#G4000)

In this chapter, you have learned:

- Creating a New Project
- Sequence Program Creation
- Parameter Settings for Simple Motion Module
- Operation Check

Important points

Creating a New Project	<ul style="list-style-type: none">• Use MELSOFT GX Works3 to create a project and sequence program.• The contents in this course require MELSOFT GX Works3 of version 1.011M or later.
Sequence Program Creation	<ul style="list-style-type: none">• The use of label and function block (FB) removes the need to remember devices when programming.• Check the "Enable Multiple Comments Display" box and "Target" boxes for each language to switch the language for comments in sequence programs.
Parameter Settings for Simple Motion Module	<ul style="list-style-type: none">• Double-click [Simple Motion Module Setting] in the menu of MELSOFT GX Works3 to open the Simple Motion Module Setting Function window.
Operation Check	<ul style="list-style-type: none">• Double-clicking a device while pressing the SHIFT key changes the status of the device from OFF to ON, and vice versa.

Chapter 3 SYNCHRONOUS CONTROL STARTUP

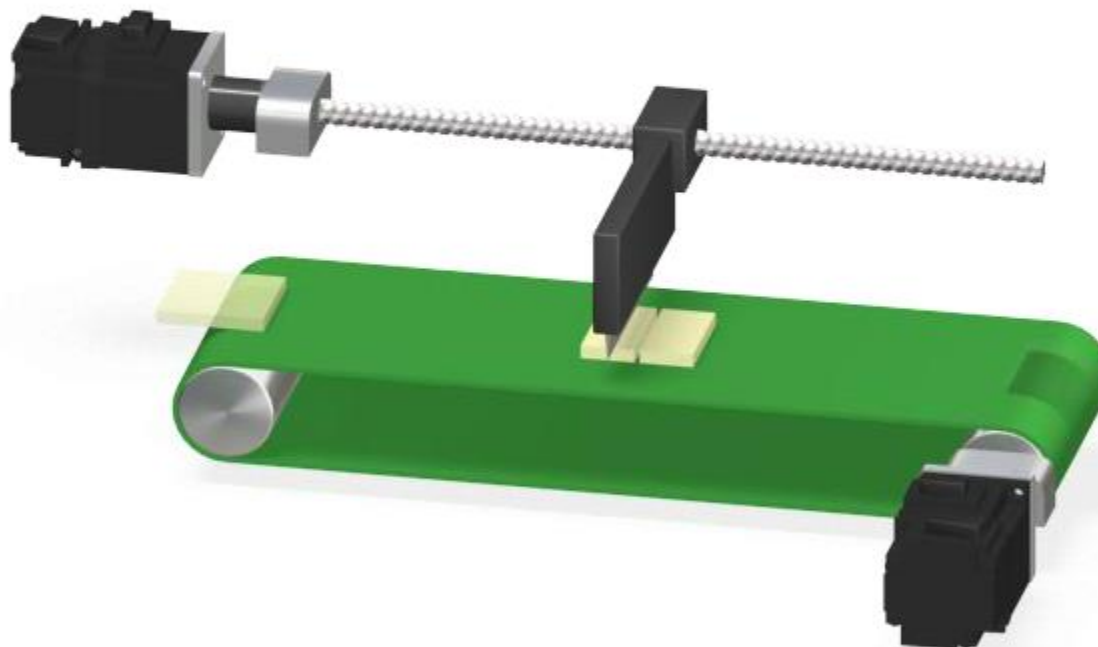
This chapter describes synchronous control, mainly about the synchronous control parameter, positioning data for synchronous control, and operation check for synchronous control.

Axis 1 operation is the same as that described in Chapter 1.

Refer to Chapter 1 to 2 for details of the parameters and servo parameters.

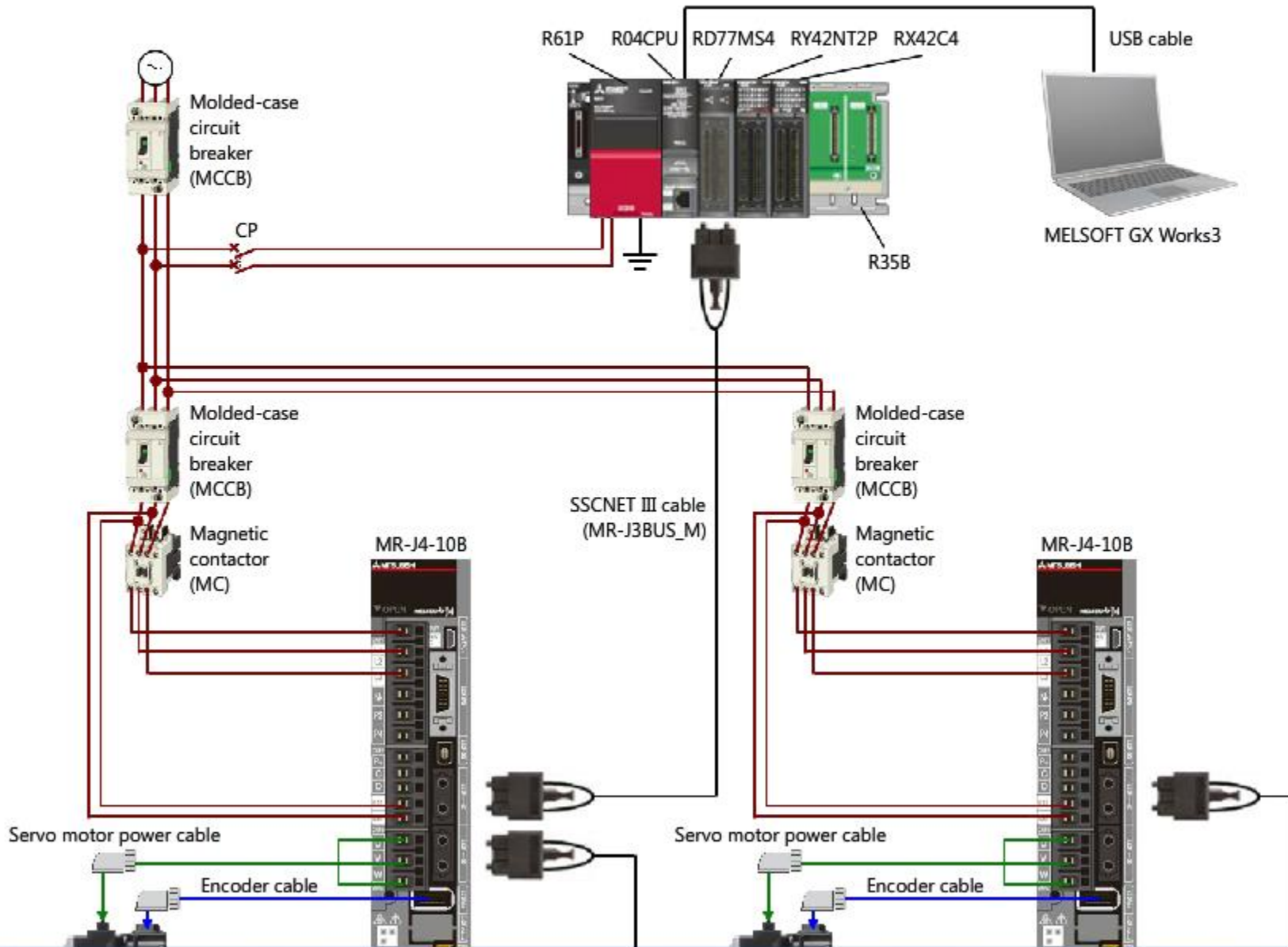
For the operation pattern diagram and machine specifications, check the following PDF file.

[Sample system details \(Synchronous control\) <PDF>](#)

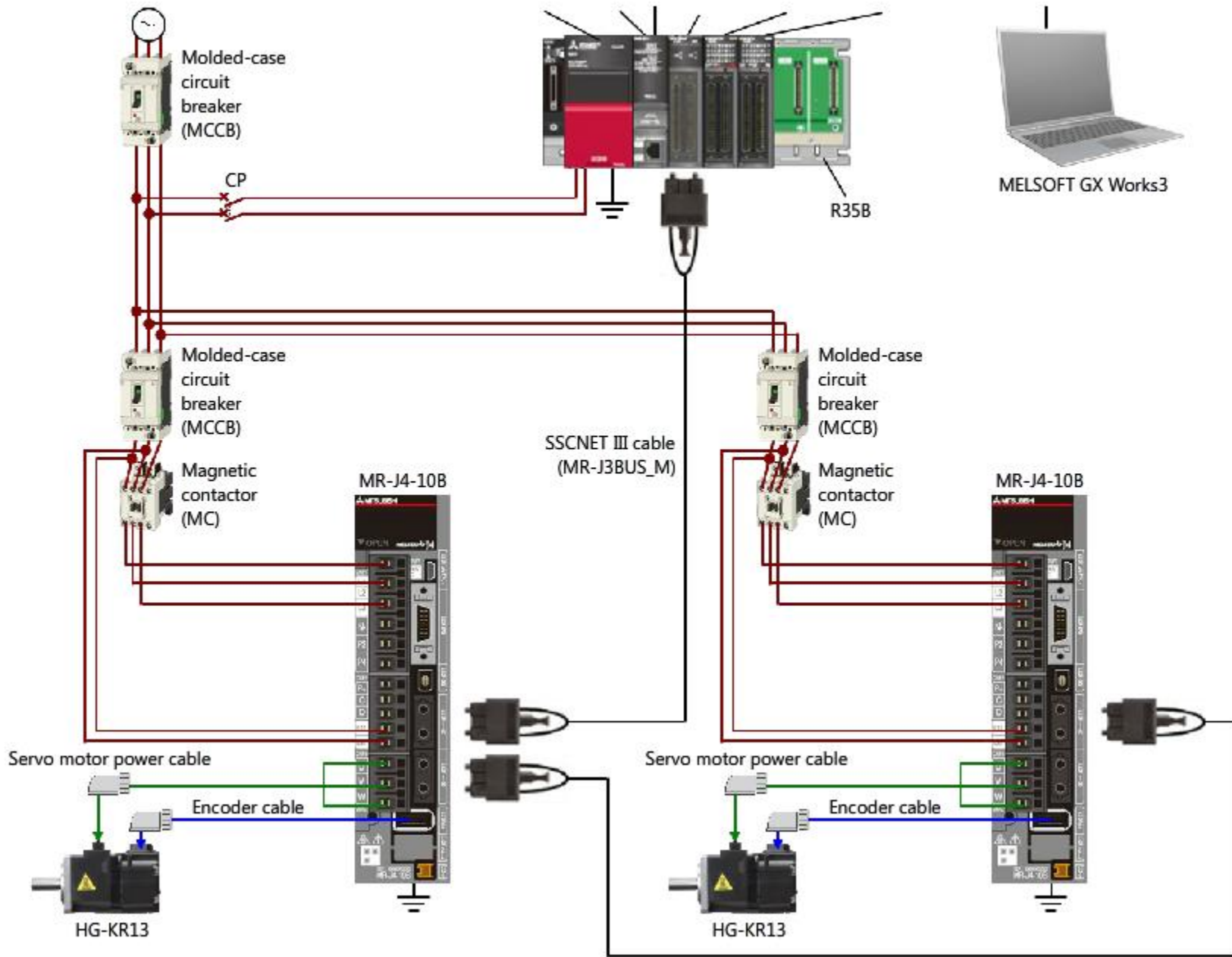


3.1 System Configuration

The following shows the configuration of the sample system used in this chapter.



3.1 System Configuration



The following shows the establishment procedure of a servo system with the MELSEC iQ-R series Simple Motion module. This course explains module installation, wiring, and cable wiring following the establishment procedure.

(1) System Configuration Settings Section 3.3.1



(2) Parameters and Servo Parameters Settings Section 3.3.2



(3) Positioning Data Settings Section 3.3.3



(4) Synchronous Control Parameter Settings Section 3.3.4

- Synchronous parameter settings
- Input axis parameter settings
- Transition of synchronous control parameter window



(5) Cam Data Creation Section 3.3.5

- Creating a new cam data
- Cam curve creation



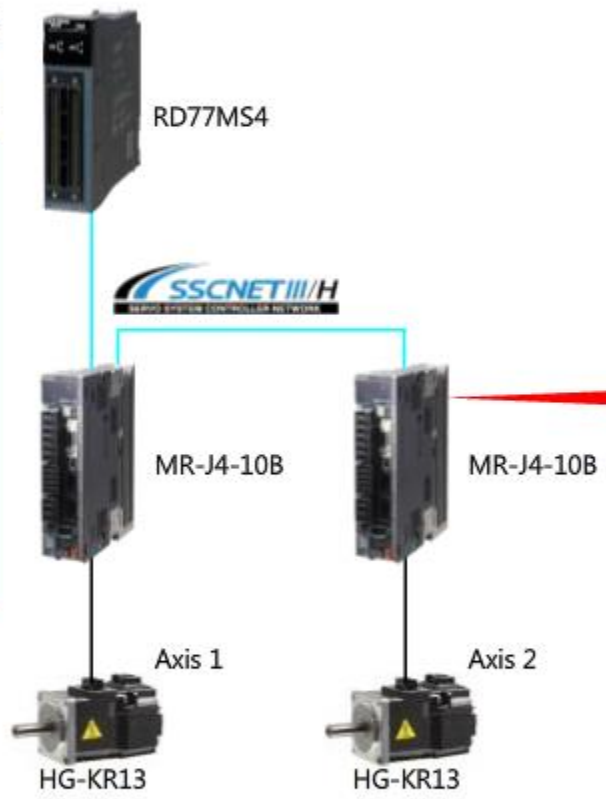
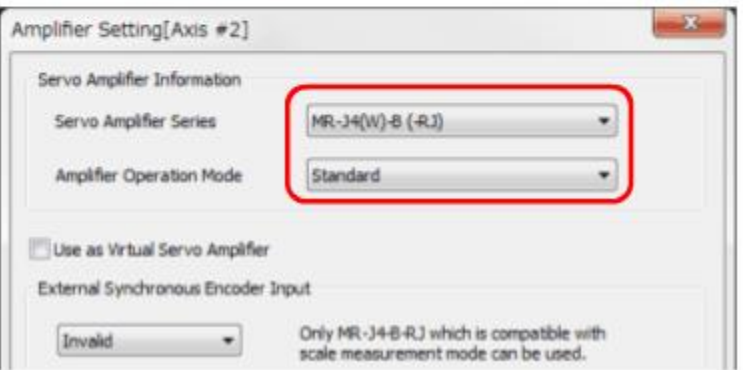
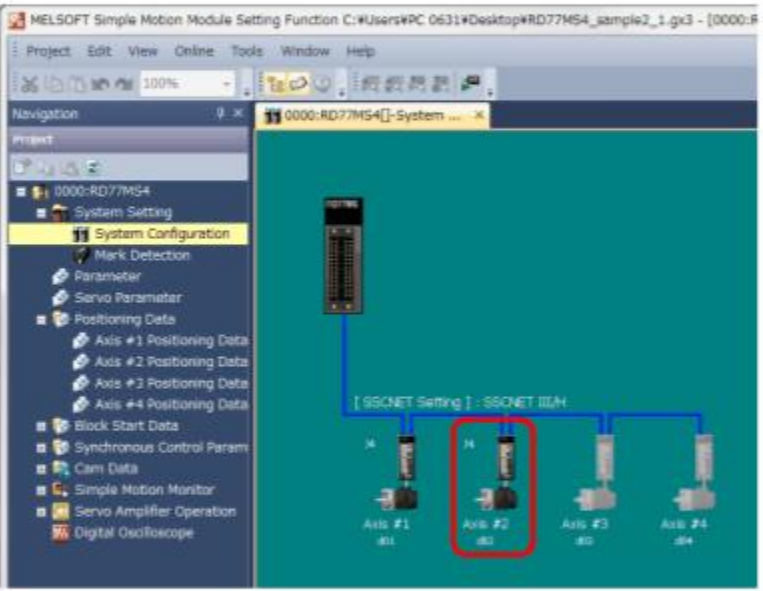
(6) Writing to the Simple Motion Module Section 3.3.6

3.3 Parameter Creation for Synchronous Control

Create parameters for synchronous control.

3.3.1 System Configuration Settings

Configure a 2-axis system.
Add an axis in the System Configuration window.



Axis selection rotary switch (SW1)

Auxiliary axis number setting switch (SW2) (Note)

(Note) Turn "off (down)" all auxiliary axis number setting switches (SW2).

3.3.2

Parameters and Servo Parameters Settings

Set parameters and servo parameters for axis 1 and axis 2.

The following shows the setting details of the electronic gear setting for the belt conveyor.

Compute Basic Parameters 1 - Axis #1

Entry

Select the machine components, and enter the machine data to automatically set the basic parameters 1 (unit setting, No. of pulses per rotation, movement amount per rotation and unit magnification).

Machine Components: Conveyor

Unit Setting: 0mm

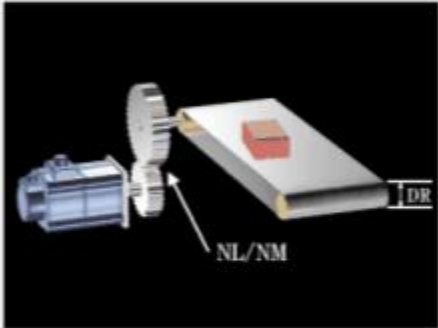
Outer diameter of Roll (DR): 50000.0 [μm]

Reduction Gear Ratio (NL/NM): = 1 / 1

Calculate reduction ratio by teeth or diameters [Reduction Ratio Setting]

Encoder Resolution: 4194304 [pulse/rev]

Setting Range:



Compute Basic Parameters 1

Calculation Result

Basic Parameters 1	
Unit Setting	0mm
No. of Pulses per Rotation	1729853333 pulse
Movement Amount per Rotation	6478422.3 μm
Unit Magnification	1: x1 Times

Movement Amount per Pulse

As a result of calculation, some error occurs in the movement amount.
Applying the calculation result above,
you want to perform is about 0.0 [μm] the error for the movement amount 0.0 [μm] [Error Calculation]

Click OK to reflect to the basic parameters 1. [OK] [Cancel]

[Input]

Item	Description	
Machine Components	Conveyor	
Unit Setting	0:mm	
Outer diameter of Roll	50000.0 [μm]	
Reduction Gear Ratio (NL/NM)		
	Load side [NL]	1
	Motor side [NM]	1
Encoder resolution	4194304 [pulse/rev]	

[Calculation Result]

Item	Description
Unit Setting	0:mm
Number of Pulses per Rotation	1729853333 pulse
Movement Amount per Rotation	6478422.3 μm
Unit Magnification	1: x1 times

3.3.3 Positioning Data Settings

Set Axis #2 Positioning Data.

MELSOFT Simple Motion Module Setting Function C:\Users\PC 0631\Desktop\RD77MS4_sample2_1.gx3 - [0000:RD77MS4[]-Axis #2 Positioning Data]

Navigation: 0000:RD77MS4[]-Parameter, 0000:RD77MS4[]-System Co..., 0000:RD77MS4[]-Servo para..., 0000:RD77MS4[]-Axis

Display Filter: Display All, Data Setting Assistant, Offline Simulation, Automatic Command Speed Calc., Automatic Sub Arc Calc.

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	Command speed
1	0:END	02h:INC Linear 1	-	0:1000	0:1000	157079.6 μm	0.0 μm	2000.00 mm/min
2	<Positioning Comment>							
3	<Positioning Comment>							
4	<Positioning Comment>							
5	<Positioning Comment>							
6	<Positioning Comment>							
7	<Positioning Comment>							
8	<Positioning Comment>							
9	<Positioning Comment>							
10	<Positioning Comment>							

R04 | Host:192.168.3.250 | Insert | CAP | NUM

[Axis 2 positioning data]

No.	Operation pattern	Control system	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	Command speed	Dwell time	Mcode
1	0: END	INC linear 1	-	1:1000	1:1000	157079.6 μm	0.0 μm	2000.00 mm/min	0 ms	0

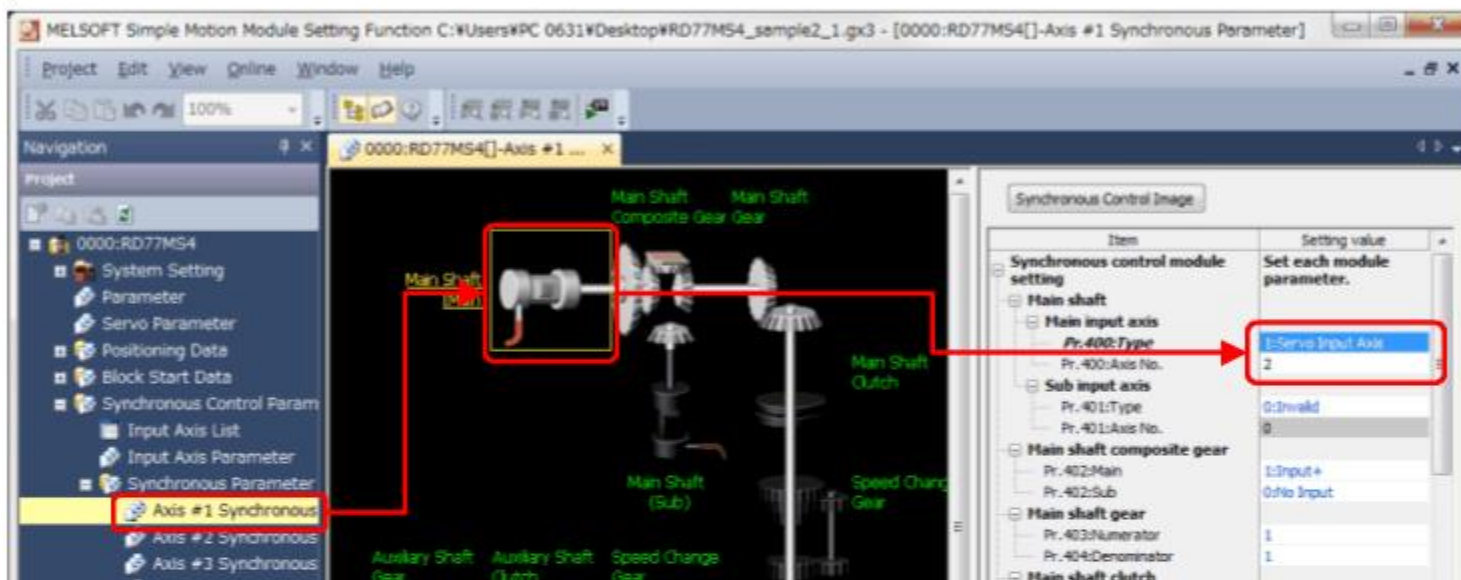
3.3.4**Synchronous Control Parameter Settings**

Set parameters for axis 1 which synchronizes to the input axis (axis 2) feed current value in cam operation.

Item	Description
Input axis parameter	Set the servo input axis type for the main shaft. (Set "1: Feed current value " for axis 2)
Axis 1 synchronous control	Set the axis 1 synchronous control parameter.
Synchronous control image	The configuration of output axes connected to the main shaft is displayed. The configuration of input/output axes can be checked at a glance.

3.3.4 Synchronous Parameter Settings

The following explains the settings that synchronize the axis 1 to the axis 2 feed current value. Select [Axis #1 Synchronous Parameter] in the Navigation menu, and select [Main shaft (Main)] to display the parameters of the main shaft.

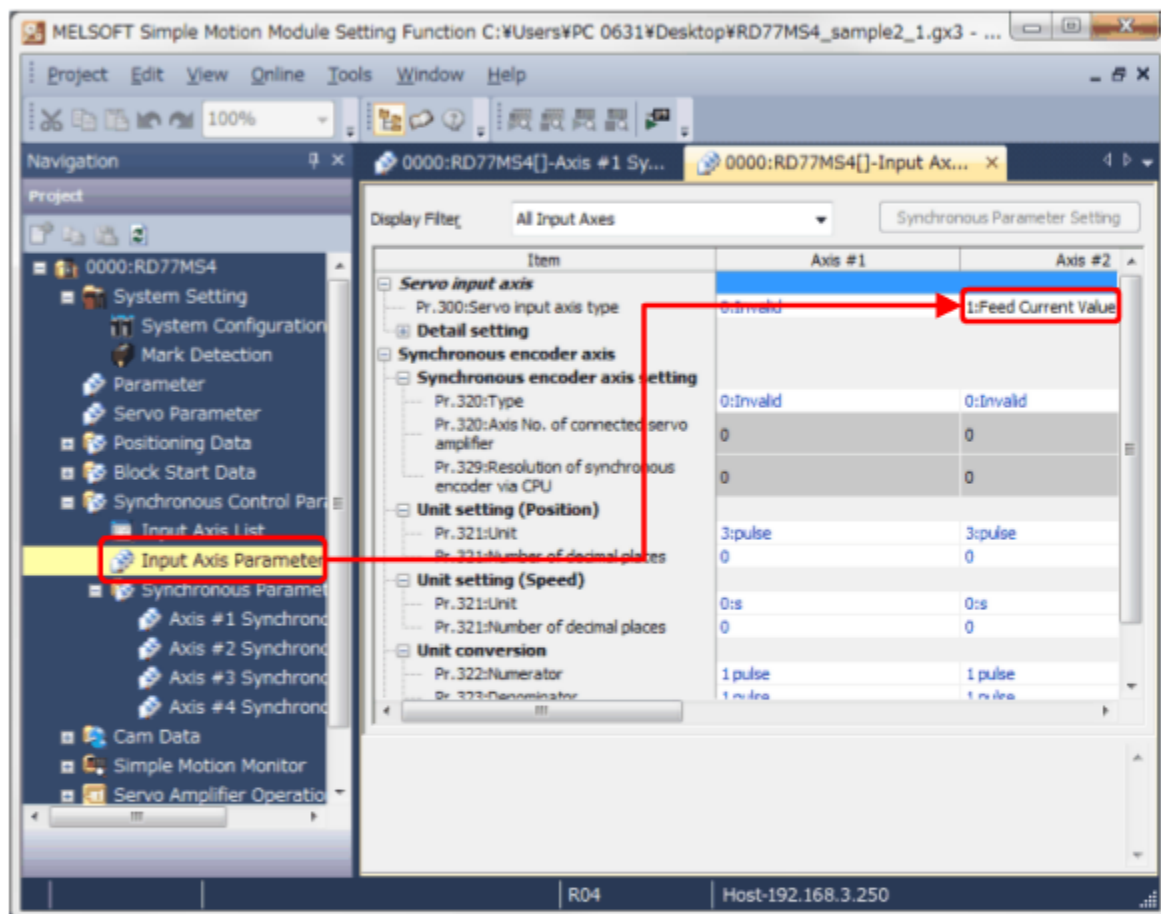


Change the following parameters. Use the default values for the synchronous parameters other than the following.

Item		Description
Main shaft	Main input axis No.	Pr.400: Type
		Pr.400: Axis No.
Output axis	Cam axis cycle unit setting	Pr.438: Unit
		Pr.438: Number of decimal places
	Pr.439: Can axis length per cycle	
	Pr.441: Cam stroke amount	
Pr.440: Cam No.		

3.3.4 Input Axis Parameter Settings

The following explains the settings that synchronize the axis 1 to the axis 2 feed current value. Select [Input Axis Parameter] in the Navigation menu to display the Input Axis Parameter window.



Change the following parameters. Use the default values for the I/O axis parameters other than the following.

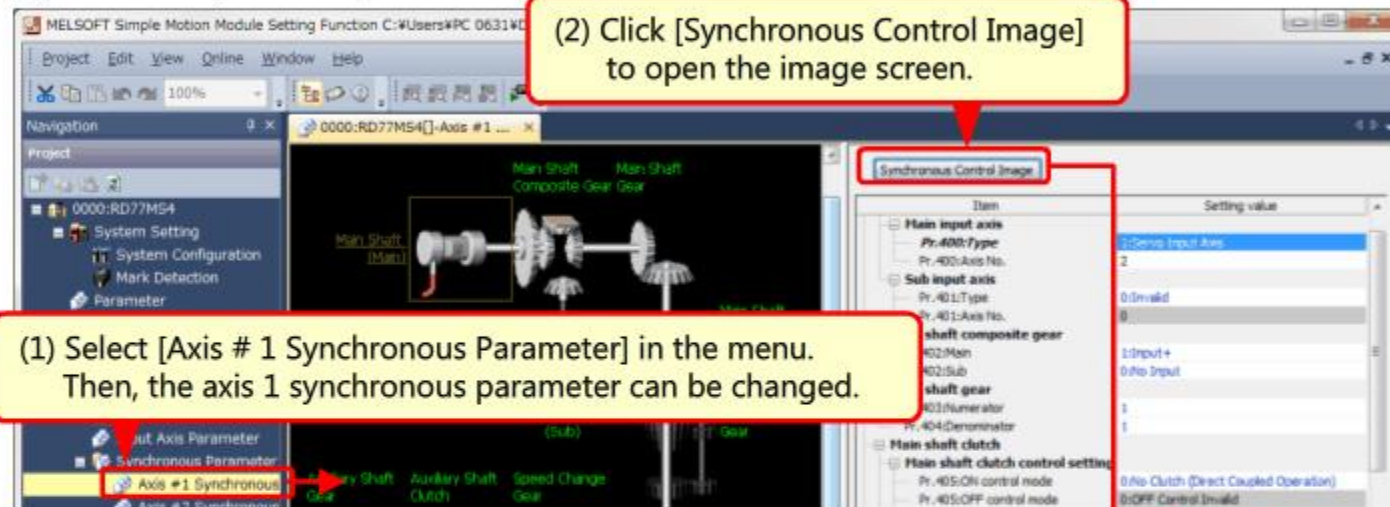
Item	Description
Servo input axis	Pr.300: Servo input axis type
	1: Feed current value

3.3.4

Transition of Synchronous Control Parameter Window

The following shows the synchronous parameter window transition.

[Synchronous parameter]

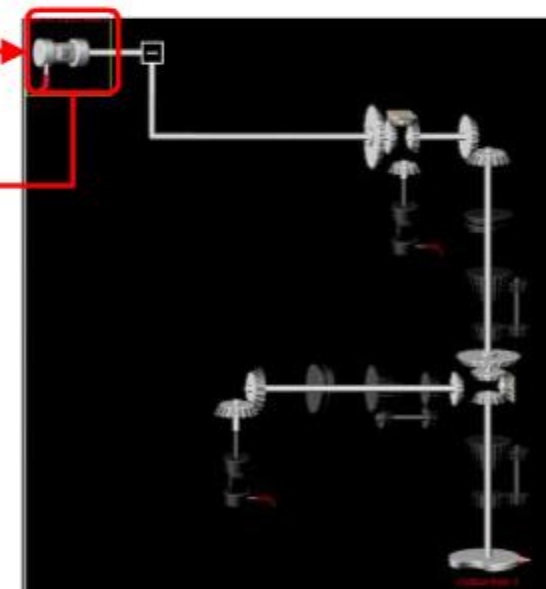


[Synchronous control image]

[Input axis parameter]



(3) Select the main shaft to open the input axis parameter. Parameters related to the input axis (axis 2) can be set.



3.3.5

Cam Data Creation

Create cam data.

On the next page, operate the actual screen and create cam data.

MELSOFT Simple Motion Module Setting Function C:\Users\PC 0631\Desktop\RD77MS4_sample2_1.gx3 - [0000:RD77MS4]-Cam Data No.001[1]

Project Edit View Online Window Help

Navigation 100%

Project

- 0000:RD77MS4
 - System Setting
 - System Configuration
 - Mark Detection
 - Parameter
 - Servo Parameter
 - Positioning Data
 - Block Start Data
 - Synchronous Control Param
 - Input Axis List
 - Input Axis Parameter
 - Synchronous Parameter
 - Axis #1 Synchronous
 - Axis #2 Synchronous
 - Axis #3 Synchronous
 - Axis #4 Synchronous
 - Cam Data
 - Cam_Data_List
 - No.001
 - Simple Motion Monitor
 - Servo Amplifier Operation
 - Digital Oscilloscope

0000:RD77MS4[-Cam De... x

Setting Method: Stroke Ratio [Cam Curve]

Resolution: 256

Stroke Setting Range: -100.000000 to 100.000000 [%]

Return to Basic Setting

Cam Graph

Display Graph

Stroke Speed Acceleration Jerk

Display Magnification

Width 100 % Height 100 % WJH 100% Screen View

Stroke Setting

← Fine-tune the cam curve by section

Section	Start [degree]	End [degree]	Stroke [%]	Cam Curve
1	0.00000	2.00000	0.000000	Constant Speed
2	2.00000	4.00000	0.500000	Constant Speed
3	4.00000	6.00000	1.000000	Constant Speed
4	6.00000	8.00000	1.500000	Constant Speed
5	8.00000	113.59160	50.000000	Constant Speed
6	113.59160	222.00000	98.500000	Constant Speed
7	222.00000	224.00000	98.900000	Constant Speed

R04 Host:192.168.3.250 NUM

3.3.5

Cam Data Creation

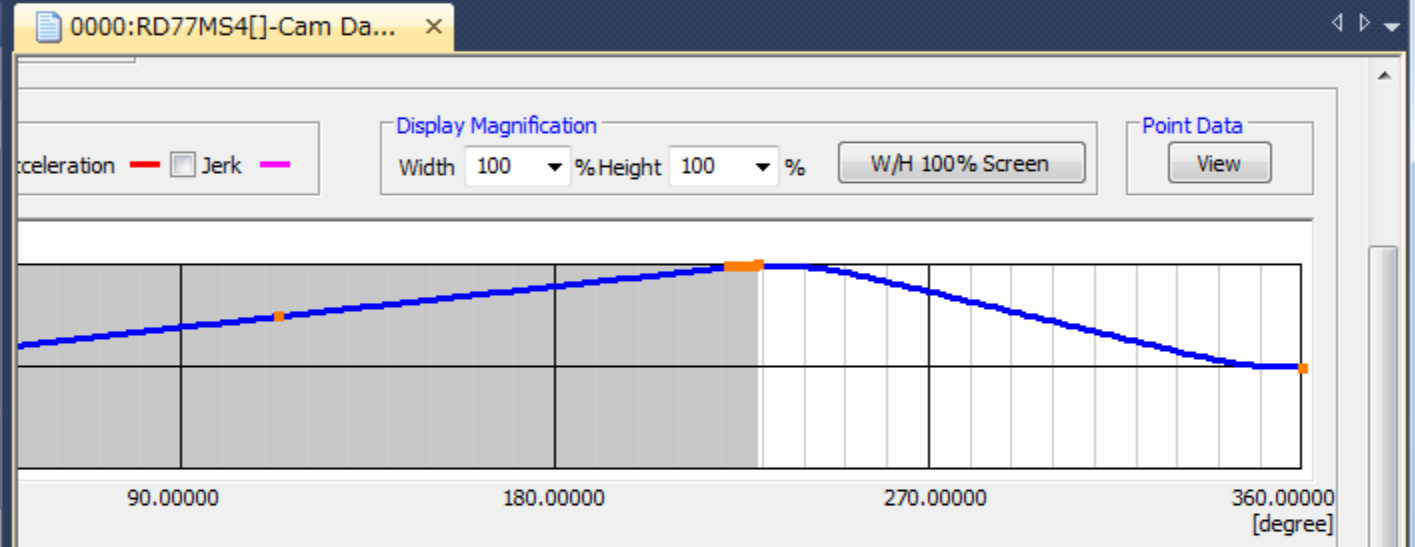


MELSOFT Simple Motion Module Setting Function C:\Users\PC0612\Desktop\RD77MS4_sample2_1.gx3 - [0000:RD77MS4]-Cam Da...

Project Edit View Online Window Help



- Navigation
- Project
- 0000:RD77MS4
 - System Setting
 - Parameter
 - Servo Parameter
 - Positioning Data
 - Block Start Data
 - Synchronous Control Param
 - Cam Data
 - Cam_Data_List
 - No.001
 - Simple Motion Monitor
 - Servo Amplifier Operation
 - Digital Oscilloscope



Fine-tune the cam curve by section

Position [degree]	Stroke [%]	Cam Curve
229.18320	100.0000000	Constant Speed
0.00000	0.0000000	Dist.Const.Speed

Cam data creation is completed.
Click to proceed to the next screen.

3.4**Operation Check for Synchronous Control**

Check the operation of synchronous control.

Save the project first. (Refer to Section 2.2.7.)

After saving the project, write the synchronous control parameters and cam data into the Simple Motion module.
(Refer to Section 2.3.6.)

3.4.1

Starting the Synchronous Control and Checking the Operation

Start the synchronous control and check the operation.

On the next page, operate the actual screen and start the synchronous control and check the operation.

The screenshot displays the software interface for monitoring the motion module. It is divided into two main sections: the Axis Monitor and the Module Information List.

Axis Monitor

Monitor Type: Axis(Output Axis) | Port Size: 1pt | Select Monitor Item | Select Monitor Axis

	Axis #1	Axis #2
Md.20 Feed current value	88190.1 μm	88103.7 μm
Md.21 Machine feed value	88190.1 μm	88103.7 μm
Md.23 Axis error No.	-	-
Md.24 Axis warning No.	-	-
Md.26 Axis operation status	Synchronous Control	Position Control
Md.28 Axis feed speed	2045.43 mm/min	2068.89 mm/min
Md.44 Positioning data No. being executed	-	1
Md.47 Positioning data being executed : Operation pattern	Positioning Complete	Positioning Complete
Md.47 Positioning data being executed : Control method	-	1-pulse linear control (DNC)
Md.47 Positioning data being executed : Acceleration time No.	0:1000	0:1000
Md.47 Positioning data being executed : Deceleration time No.	0:1000	0:1000
Md.47 Positioning data being executed : Axis to be interpolated	-	-
Md.47 Positioning data being executed : M-code	-	-
Md.102 Deviation counter	0 pulse	0 pulse
Md.103 Motor rotation speed	436.35 r/min	399.98 r/min
Md.104 Motor current value	0.0 %	0.0 %
Md.138 Servo status 1 : Servo alarm	OFF	OFF
Md.138 Servo status 1 : Servo warning	OFF	OFF
Md.114 Servo alarm	-	-
Md.30 External input signal : Lower limit	ON	ON
Md.30 External input signal : Upper limit	ON	ON
Md.31 Status : HRI request flag	OFF	OFF
Cl.181 Forward JOG start	OFF	OFF
Cl.182 Reverse JOG start	OFF	OFF
Cl.180 Axis stop	OFF	OFF

Module Information List

- PLC READY(Y)
- READY(X)
- Synchronization flag(Y)
- All axes alarm(O/N)
- Md.108 Servo status 1 : READY(O/N)
 - Axis No. 1 2 3 4
- Md.108 Servo status 1 : Servo ON
 - Axis No. 1 2 3 4
- Md.30 Forced stop mode(LONG-STOP)
 - Axis No. 1 2 3 4
- STOP
 - Axis No. 1 2 3 4
- Md.31 Status : Error detection
 - Axis No. 1 2 3 4
- Md.31 Status : Axis warning detection
 - Axis No. 1 2 3 4
- Md.120 test mode flag(LONG-STOP)
- Md.11 APP-less operation mode(LONG-STOP)
- Md.103 Operation cycle over flag(LONG-STOP)
 - Md.103 operation cycle(LONG-STOP) 62000.000 ms
- Md.120 Operation time(LONG-STOP) 0 ps
- Md.105 Maximum operation time(LONG-STOP) 0 ps
- Md.120 No. of Peak-TO-Peak setting(LONG-STOP) 0 times
- Md.52 Searching flag for driver communication...
 - Complete of searching for driver on...
- Md.53 SIOCKET control status(LONG-STOP)
 - Waiting for command accepted
- Md.101 Digital OEC running flag(LONG-STOP)
 - Stopped

3.4.1

Starting the Synchronous Control and Checking the Operation



0000:RD77MS4[] - Axis Monitor

Axis Monitor Monitor Type: Axis(Output Axis) Font Size: 9pt Select Mo

	Axis #1	Axis #2
Md.20:Feed current value	0.0 μm	157079.6 μm
Md.21:Machine feed value	0.0 μm	157079.6 μm
Md.23:Axis error No.	-	-
Md.24:Axis warning No.	-	-
Md.26:Axis operation status	Synchronous Control	Waiting
Md.28:Axis feed speed	0.00 mm/min	0.00 mm/min
Md.44:Positioning data No. being executed	-	-
Md.47:Positioning data being executed : Operation pattern	Positioning Complete	Positioning Complete
Md.47:Positioning data being executed : Control method	-	-
Md.47:Positioning data being	-	-

<Operation image>

Module Information List

- PLC READY(Y0)
- READY(X0)
- Synchronization flag(X1)
- All axes servo ON(Y1)
- Md. 108:Servo status 1 : READY ON
Axis No. 1 2 3 4
- Md. 108:Servo status 1 : Servo ON
Axis No. 1 2 3 4
- Md. 50:Forced stop input(U0#G4231)
BUSY
Axis No. 1 2 3 4
- Md.31:Status : Error detection
Axis No. 1 2 3 4
- Md.31:Status : Axis warning detection
Axis No. 1 2 3 4
- Md. 1:In test mode flag(U0#G4000)
- Md.51:AMP-less operation mode(U0#G4232)
- Md. 133:Operation cycle over flag(U0#G4230)

Starting the synchronous control and checking the operation are completed.

Click to proceed to the next screen.

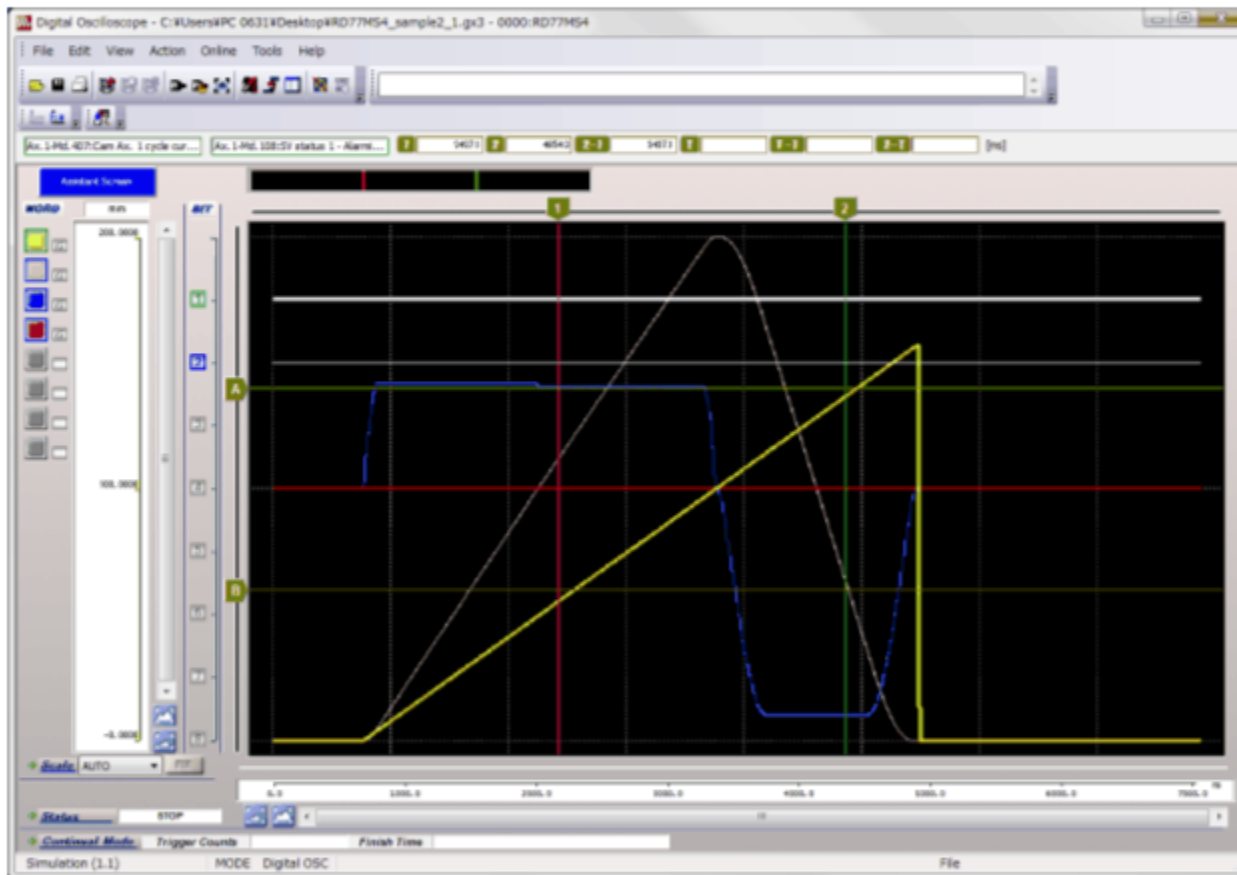
Md. 125:Maximum operation time(U0#G4000)

3.4.2

Operation Check with Digital Oscilloscope

Check the operation with a digital oscilloscope.

On the next page, operate the actual screen and check the operation with a digital oscilloscope.



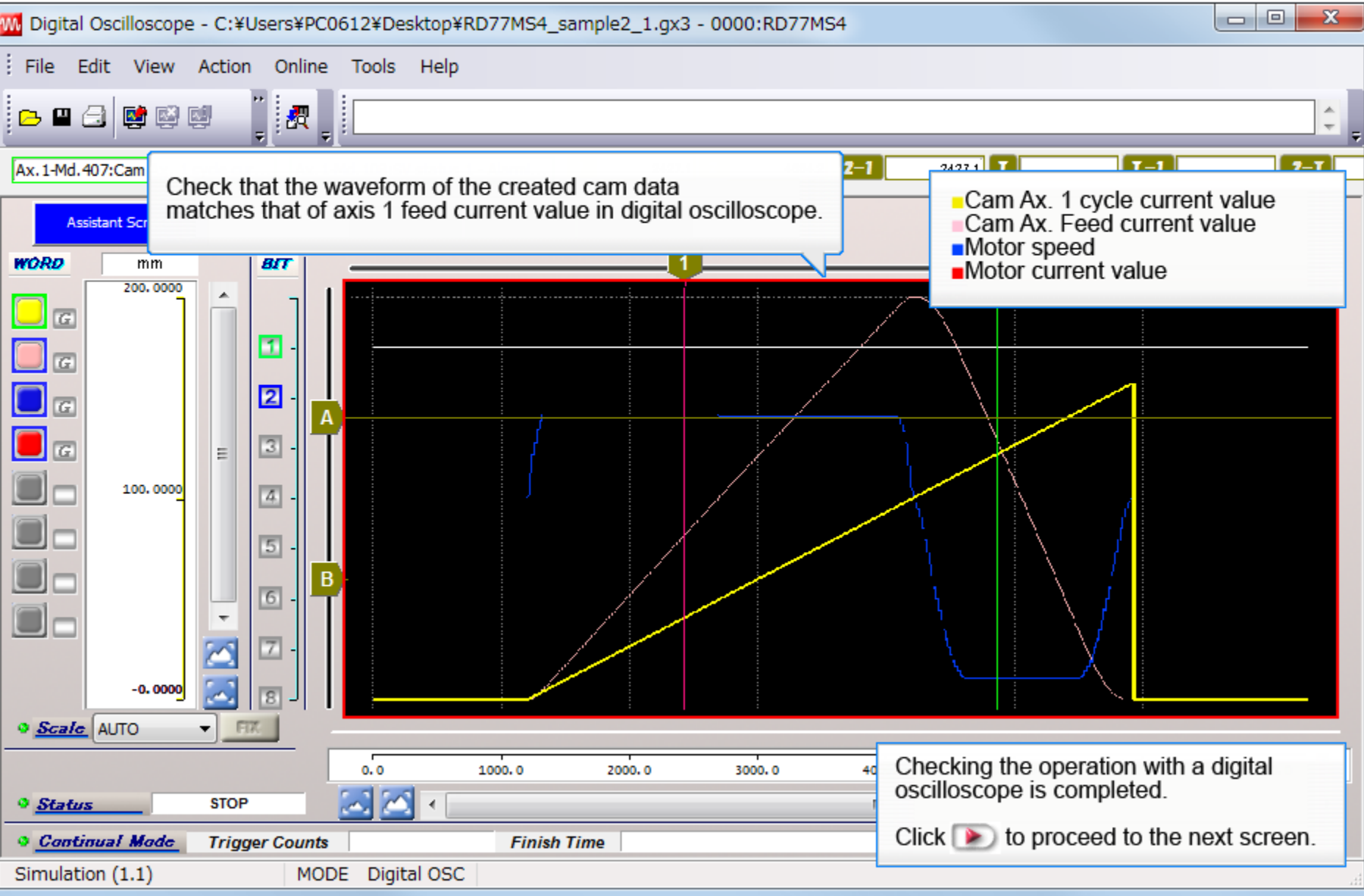
3.4.2

Operation Check with Digital Oscilloscope



Check that the waveform of the created cam data matches that of axis 1 feed current value in digital oscilloscope.

- Cam Ax. 1 cycle current value
- Cam Ax. Feed current value
- Motor speed
- Motor current value



Checking the operation with a digital oscilloscope is completed.

Click to proceed to the next screen.

In this chapter, you have learned:

- System Configuration
- Startup Procedure for Synchronous Control
- Parameter Creation for Synchronous Control
- Operation Check for Synchronous Control

Important points

System Configuration	<ul style="list-style-type: none">• To add an axis, set servo amplifiers and control axis numbers with the SSCNETIII connection, add and wire servo motors, and configure the setting with MELSOFT GX Works3.
Startup Procedure for Synchronous Control	<ul style="list-style-type: none">• As the establishment procedure of a servo system with the MELSEC iQ-R series Simple Motion module, set the system configuration, parameters, servo parameters, positioning data, and synchronous control parameters, create cam data, and write the set items to the Simple Motion module.
Parameter Creation for Synchronous Control	<ul style="list-style-type: none">• Parameters for synchronous control include synchronous parameters, input axis parameters, and cam data (cam curve).
Operation Check for Synchronous Control	<ul style="list-style-type: none">• On the Axis Monitor window, add a monitor axis to check the synchronous control status.• Use a digital oscilloscope to check the synchronous control status in a graph.

Chapter 4 SIMULATION FUNCTION

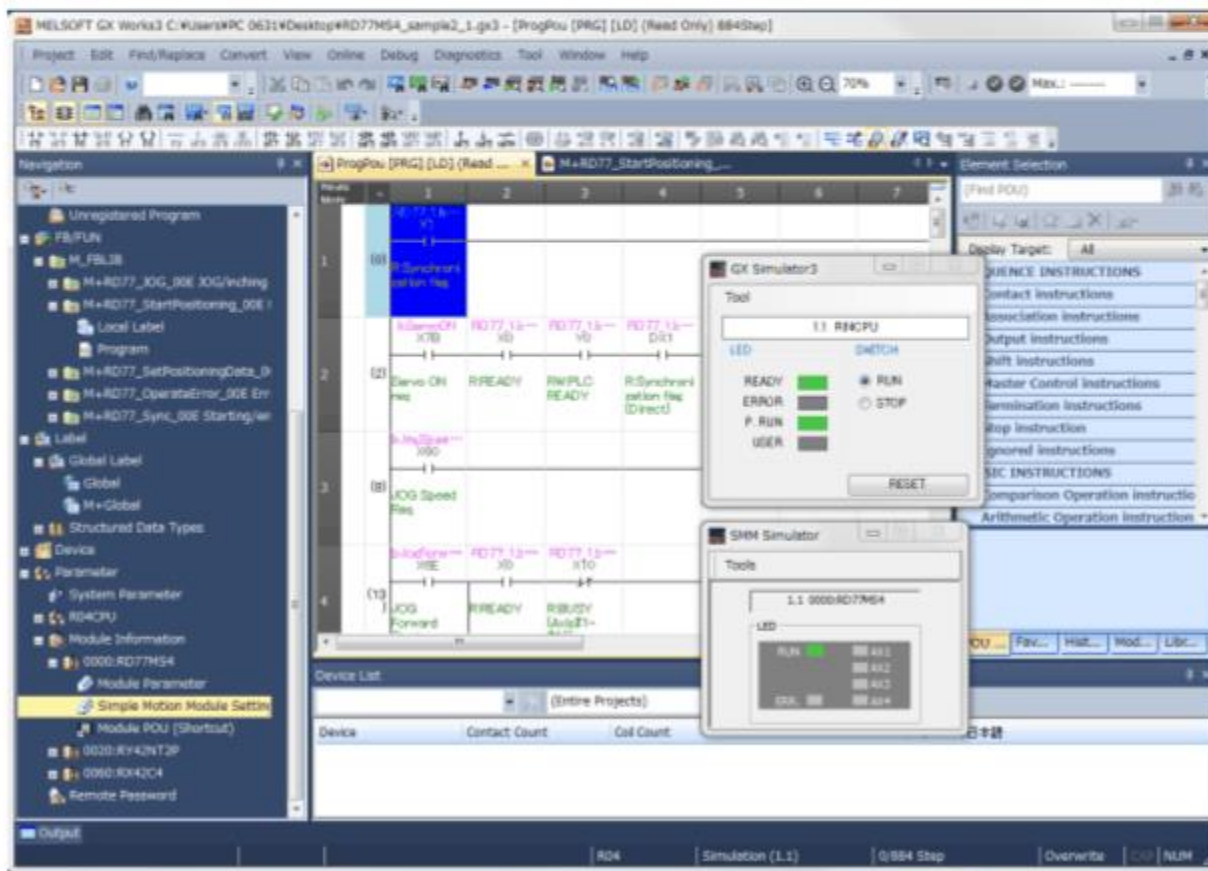
This chapter explains the simulation function of MELSOFT GX Works3.

The MELSOFT GX Works3 can simulate the program on a personal computer without an actual machine during the debugging process, shortening the startup time.

4.1 How to Use the Simulate Function

This section explains how to use the simulation function.

On the next page, operate the actual screen and use the simulation function.



4.1 How to Use the Simulate Function



MELSOFT GX Works3 C:\Users\PC0612\Desktop\RD77MS4_sample2_1.gx3 - [ProgPou [PRG] [LD] (Read Only) 884Step]

Project Edit Find/Replace Convert View Online Debug Diagnostics Tool Window Help

Navigation

- Project
 - Module Configuration
 - Program
 - Initial
 - Scan
 - MAIN
 - ProgPou
 - Local Label
 - Program
 - Fixed Scan
 - Event
 - Standby
 - No Execution Type
 - Unregistered Program
 - FB/FUN
 - M_FBLIB
 - M+RD77_10G_00E 1C

ProgPou [PRG] [LD] (Read ... x

Read	1	2	3	4
1	(0) RD77.1 b... X1 R:Synchroni- zation flag			
2	(2) bServoON X7B Servo ON req	RD77.1 b... X0 R:READY	RD77.1 b... Y0 RW:PLC READY	RD77.1 b... DX1 R:Synchroni- zation flag (Direct)
3	(8) bJogSpee... X60 JOG Speed Req			

Output

R04 Simulation (1.1) 0/884 Step

GX Simulator3

Tool

1.1 R04CPU

LED

READY

ERROR

P. RUN

USER

SWITCH

RUN

STOP

RESET

SMM Simulator

Tools

1.1 0000:RD77MS4

LED

RUN

AX1

AX2

AX3

The simulation can be performed.
 Operation check and debugging can be performed
 with monitoring or in the Axis Monitor window.

Click to proceed to the next screen.

4.2

Summary of This Chapter

In this chapter, you have learned:

- How to Use the Simulate Function

Important points

How to Use the Simulate Function

- The MELSOFT GX Works3 can simulate the program on a personal computer without an actual machine during the debugging process, shortening the startup time.

Now that you have completed all of the lessons of the **MELSERVO Basics (Linear servo motor)** Course, you are ready to take the final test.

If you are unclear on any of the topics covered, please take this opportunity to review those topics.

There are a total of 5 questions (7 items) in this Final Test.

You can take the final test as many times as you like.

How to score the test

After selecting the answer, make sure to click the **Answer** button. Your answer will be lost if you proceed without clicking the Answer button. (Regarded as unanswered question.)

Score results

The number of correct answers, the number of questions, the percentage of correct answers, and the pass/fail result will appear on the score page.

Correct answers : 5

Total questions : 5

Percentage : 100%

To pass the test, you have to answer **60%** of the questions correct.

Proceed

Review

- Click the **Proceed** button to exit the test.
- Click the **Review** button to review the test. (Correct answer check)
- Click the **Retry** button to retake the test again.

Test

Final Test 1



Please select the software required for performing the positioning control with the MELSEC iQ-R series Simple Motion module.

- Q1
- MELSOFT GX Works2
 - MELSOFT GX Works3
 - MELSOFT MT Works2
 - MELSOFT GT Works3
 - RT ToolBox2

Answer

Back

Test

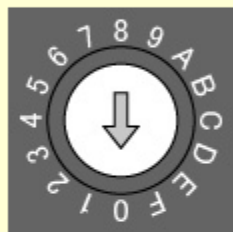
Final Test 2



Please select the correct control axis number of the servo amplifier for Axis 1.

Q1

Axis selection
rotary switch (SW1)



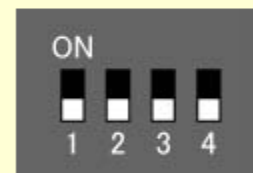
Auxiliary axis number
setting switch (SW2)



Axis selection
rotary switch (SW1)



Auxiliary axis number
setting switch (SW2)



Answer

Back

Test

Final Test 3



Please select the correct method of turning on or off an arbitrary device in the sequence program during monitoring with MELSOFT GX Works3.

- Q1 Double-click a device.
- Double-click a device while pressing the Alt key.
- Double-click a device while pressing the SHIFT key.

Answer

Back

Please select the appropriate synchronous control startup procedure.

- Q1 A → E → C → D → B → F
- E → D → C → B → A → F
- B → F → E → A → D → C

A: Cam data creation

B: Synchronous parameter settings

C: Positioning data settings

D: Parameters and servo parameters settings

E: System configuration settings

F: Writing to the Simple Motion module

Answer

Back

Test

Final Test 5



Please select a number for each item to complete the procedure of using the simulator function with MELSOFT GX Works3.

Q1 Start Simulation

Q2 Simulation Environmental Setting

Q3 Writing to the Programmable Controller

Answer

Back

You have completed the Final Test. Your results are as follows.
To end the Final Test, proceed to the next page.

Correct answers : 0

Total questions : 5

Percentage : 0%

Proceed

Review

Retry

You failed the test.

You have completed the **MELSEC iQ-R Series Simple Motion Module** Course.

Thank you for taking this course.

We hope you enjoyed the lessons and the information you acquired in this course will be useful in the future.

You can review the course as many times as you want.

Review

Close