



FACTORY AUTOMATION

Mitsubishi Servo System Controllers Quick Start Guide









Applicable Model

- -RD77MS2
- -RD77MS4
- -RD77MS8
- -RD77MS16

SAFETY PRECAUTIONS (Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. Refer to the user's manual of the CPU module to use for a description of the PLC system safety precautions.

In this manual, the safety precautions are classified into two levels: "MWARNING" and "MCAUTION".

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.	
Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.	

Under some circumstances, failure to observe the precautions given under "ACAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety. Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

• Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.

- (1) Configure external safety circuits, such as an emergency stop circuit, protection circuit, and protective interlock circuit for forward/reverse operation or upper/lower limit positioning.
- (2) The programmable controller stops its operation upon detection of the following status, and the output status of the system will be as shown below.
 - Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
 - Held or turned off according to the parameter setting if the self-diagnostic function of the CPU module detects an error such as a watchdog timer error.
- (3) Also, all outputs may be turned on if an error occurs in a part, such as an I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to the user's manual of the CPU module to use.
- (4) Outputs may remain on or off due to a failure of a component such as a relay and transistor in an output circuit. Configure an external circuit for monitoring output signals that could cause a serious accident.
- In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load shortcircuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.
- For the operating status of each station after a communication failure, refer to manuals relevant to the network. Incorrect output or malfunction due to a communication failure may result in an accident.

WARNING

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not write any data to the "system area" and "write-protect area" of the buffer memory in the module. Also, do not use any "use prohibited" signals as an output signal from the CPU module to each module. Doing so may cause malfunction of the programmable controller system. For the "system area", "write-protect area", and the "use prohibited" signals, refer to the user's manual for the module used.
- If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction.
- To maintain the safety of the programmable controller system against unauthorized access from external devices via the network, take appropriate measures. To maintain the safety against unauthorized access via the Internet, take measures such as installing a firewall.
- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
 - (1) Machine home position return is controlled by two kinds of data: a home position return direction and a home position return speed. Deceleration starts when the near-point dog signal turns on. If an incorrect home position return direction is set, motion control may continue without deceleration. To prevent machine damage caused by this, configure an interlock circuit external to the programmable controller.
 - (2) When the module detects an error, the motion slows down and stops or the motion suddenly stops, depending on the stop group setting in parameter. Set the parameter to meet the specifications of a positioning control system. In addition, set the home position return parameter and positioning data within the specified setting range.
 - (3) Outputs may remain on or off, or become undefined due to a failure of a component such as an insulation element and transistor in an output circuit, where the module cannot detect any error. In a system that the incorrect output could cause a serious accident, configure an external circuit for monitoring output signals.
- If safety standards (ex., robot safety rules, etc.,) apply to the system using the module, servo amplifier and servomotor, make sure that the safety standards are satisfied.
- Construct a safety circuit externally of the module or servo amplifier if the abnormal operation of the module or servo amplifier differs from the safety directive operation in the system.
- Do not remove the SSCNETIII cable while turning on the control circuit power supply of Multiple CPU system and servo amplifier. Do not see directly the light generated from SSCNETIII connector of the module or servo amplifier and the end of SSCNETIII cable. When the light gets into eyes, you may feel something wrong with eyes. (The light source of SSCNETIII complies with class1 defined in JISC6802 or IEC60825-1.).

[Design Precautions]

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100 mm or more between them. Failure to do so may result in malfunction due to noise.
- During control of an inductive load such as a lamp, heater, or solenoid valve, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Therefore, use a module that has a sufficient current rating.
- After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size. Design circuits so that the entire system will always operate safely, regardless of the time.
- Do not power off the programmable controller or do not reset the CPU module during the setting registration. Doing so will make the data in the flash ROM undefined. The data need to be set in the buffer memory and to be written to the flash ROM again. Doing so may cause malfunction or failure of the module.
- Reset the CPU module after changing the parameters. Failure to do so may cause malfunction because the previous parameter settings remain in the module.
- When changing the operating status of the CPU module from external devices (such as remote RUN/STOP), select "Do Not Open by Program" for "Opening Method" in the module parameters. If "Open by Program" is selected, an execution of remote STOP causes the communication line to close. Consequently, the CPU module cannot reopen the communication line, and external devices cannot execute the remote RUN.

[Installation Precautions]

• Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Installation Precautions]

- Use the programmable controller in an environment that meets the general specifications in the manual "Safety Guidelines" included in the base unit. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount a module, place the concave part(s) located at the bottom onto the guide(s) of the base unit, and push in the module until the hook(s) located at the top snaps into place. Incorrect mounting may cause malfunction, failure, or drop of the module.
- When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- When using an extension cable, connect it to the extension cable connector of the base unit securely. Check the connection for looseness. Poor contact may cause incorrect input or output.
- When using an SD memory card, fully insert it into the memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
- Securely insert an extended SRAM cassette into the cassette connector of a CPU module. After insertion, close the cassette cover and check that the cassette is inserted completely. Poor contact may cause malfunction.
- Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, or connector. Doing so may cause malfunction or failure of the module.

[Wiring Precautions]

- Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or damage to the product.
- After installation and wiring, attach the included terminal cover to the module before turning it on for operation.
 Failure to do so may result in electric shock.

[Wiring Precautions]

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohm or less. Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and signal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
- Connectors for external devices or coaxial cables must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Securely connect the connector to the module. Poor contact may cause malfunction.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100 mm or more between them. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact. Do not clamp the extension cables with the jacket stripped.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Tighten the terminal screws or connector screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.
- Mitsubishi programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring, refer to the MELSEC iQ-R Module Configuration Manual.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup). If not, normal data transmission is not guaranteed.

[Startup and Maintenance Precautions]

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Correctly connect the battery connector. Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire. Also, do not expose it to liquid or strong shock. Doing so may cause the battery to generate heat, explode, ignite, or leak, resulting in injury or fire.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws, connector screws, or module fixing screws. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Startup and Maintenance Precautions]

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
- Use any radio communication device such as a cellular phone or PHS (Personal Handyphone System) more than 25 cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
 Failure to do so may cause the module to fail or malfunction.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module, and do not insert/remove the extended SRAM cassette to/from the CPU module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit of 50 times may cause malfunction.
- After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
- Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure.
- Do not touch the integrated circuits on the circuit board of an extended SRAM cassette. Doing so may cause malfunction or failure.
- Do not drop or apply shock to the battery to be installed in the module. Doing so may damage the battery, causing the battery fluid to leak inside the battery. If the battery is dropped or any shock is applied to it, dispose of it without using.

- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.
- Before testing the operation, set a low speed value for the speed limit parameter so that the operation can be stopped immediately upon occurrence of a hazardous condition.
- Confirm and adjust the program and each parameter before operation. Unpredictable movements may occur depending on the machine.
- When using the absolute position system function, on starting up, and when the module or absolute value motor has been replaced, always perform a home position return.
- Before starting the operation, confirm the brake function.
- Do not perform a megger test (insulation resistance measurement) during inspection.
- After maintenance and inspections are completed, confirm that the position detection of the absolute position detection function is correct.
- Lock the control panel and prevent access to those who are not certified to handle or install electric equipment.

[Operating Precautions]

- When changing data and operating status, and modifying program of the running programmable controller from an external device such as a personal computer connected to an intelligent function module, read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
- Do not power off the programmable controller or reset the CPU module while the setting values in the buffer memory are being written to the flash ROM in the module. Doing so will make the data in the flash ROM undefined. The values need to be set in the buffer memory and written to the flash ROM again. Doing so also can cause malfunction or failure of the module.
- Note that when the reference axis speed is specified for interpolation operation, the speed of the partner axis (2nd, 3rd, or 4th axis) may exceed the speed limit value.
- Do not go near the machine during test operations or during operations such as teaching. Doing so may lead to injuries.

[Operating Precautions]

- When disposing of this product, treat it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations. For details on battery regulations in EU member states, refer to the MELSEC iQ-R Module Configuration Manual.

[Transportation Precautions]

- When transporting lithium batteries, follow the transportation regulations. For details on the regulated models, refer to the MELSEC iQ-R Module Configuration Manual.
- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.

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MEMO

1. OVERVIEW

This document describes necessary items and operation for first-time users of the Simple Motion module to make wiring, perform JOG operation, program operation, and synchronous control with Programmable Controller Engineering Software, MELSOFT GX Works3. Refer to related manuals, where necessary, to fully utilize capability of each module.

1.1 Simple Motion Module Features

- 1. A wide range of controls, such as positioning, advanced synchronous, cam, speed-torque controls, are available.
- 2. Advanced, extensive controls can be achieved just with function blocks (FB) and sequence programs.
- 3. Programming, Servo adjustment, operation and maintenance can be all covered by MELSOFT GX Works3 only.
- 4. The Simple Motion module can be connected to SSCNET III/H compatible, high-performance servo amplifiers.

1.2 Relevant Manuals

(1) Simple Motion module

Name	Number
MELSEC iQ-R Simple Motion Module User's Manual (Startup)	
This manual explains specifications, procedures before operation, system configuration,	IB-0300245
wiring, and operation examples of the Simple Motion module.	
MELSEC iQ-R Simple Motion Module User's Manual (Application)	
This manual explains functions, input/output signals, buffer memories, parameter settings,	IB-0300247
programming, and troubleshooting of the Simple Motion module.	
MELSEC iQ-R Simple Motion Module User's Manual (Advanced Synchronous Control)	
This manual explains functions and programming for the synchronous control of the Simple	IB-0300249
Motion module.	

(2) MELSEC iQ-R series PLC

Name	
MELSEC iQ-R CPU Module User's Manual (Startup)	
This manual explains the specifications of the CPU module, procedures before operation, and	SH-081263
procedures for troubleshooting.	
MELSEC iQ-R CPU Module User's Manual (Application)	
This manual explains the basic knowledge required for program design, CPU module	SH-081264
functions, devices/labels, parameters etc.	
MELSEC iQ-R Module Configuration Manual	
This manual explains the specifications of the power supply modules, base units, SD memory	SH-081262
cards etc., and the mounting environment and mounting position.	

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(3) Servo amplifier

Name	Number
MR-J4B_(-RJ) Servo amplifier Instruction Manual	
This manual explains the I/O signals, parts names, parameters, start-up procedure and others	SH-030106
for MR-J4B(-RJ)/MR-J4B4(-RJ)/MR-J4B1(-RJ) Servo amplifier.	
MR-J4W2B/MR-J4W3B/MR-J4W2-0303B6 Servo amplifier Instruction Manual	
This manual explains the I/O signals, parts names, parameters, start-up procedure and others	SH-030105
for Multi-axis AC Servo MR-J4W2B/MR-J4W3_B/MR-J4W2-0303B6 Servo amplifier.	

2. MODULE STARTUP

A 1-axis system with ball screw is used as an example in Chapter 2 to 3.

<Machine>



<specifications></specifications>	
Ball screw lead (PB)	: 10000.0µm (=10mm)
Reduction ratio (NL/NM)	: 1/2 (Load side [NL]/Motor side [NM])
	The load-side ball screw is made to rotate once by rotating the motor twice.
Encoder resolution	: 4194304 [pulse/rev]
Servo amplifier	: MR-J4-10B
Servo motor	: HG-KR series

<Operation pattern>

- (1) The workpiece travels from home position to P1 back and forth.
 - 1. It moves at 2000.00mm/min from home position (0 mm) to P1.
 - 2. It moves at 8000.00mm/min from P1 to the home position.
- (2) Continuous positioning of 1. through 2. is performed.



2

Module Startup

Positioning Control Startup

Synchronous Control Startup

2.1 System Configuration

The following shows a system example using the Simple Motion module, MR-J4-10B, and a servo motor.



2.2 Device Preparation

Prepare the following devices, cables, and software.



2.3 Startup Procedure

The following sections explain operation details and procedures required for system startup.

- 2. MODULE STARTUP
 - 2.1 System configuration
 - 2.2 Device preparation
 - 2.3 Startup procedure
 - 2.4 Installation of modules
 - (1) Installing a battery
 - (2) Inserting an extended SRAM cassette and a SD memory card
 - (3) Installing a module
 - 2.5 Wiring and cable connection
 - (1) Wiring for power supply module
 - (2) Wiring for servo amplifier power supply and servo motor power cables
 - (3) Axis selection rotary switch of servo amplifier
 - (4) Connection of each cable
 - (5) Power-on of the system
 - (6) Power-on of servo amplifier

3. POSITIONING CONTROL STARTUP

- 3.1 Creating a new project
 - (1) Installing engineering software
 - (2) Creating a new project
 - (3) Connecting the PLC CPU to a personal computer
 - (4) Initializing the PLC CPU module
 - (5) Settings for sequence program parameters
- 3.2 Sequence program creation
 - (1) New sequence programs creation
 - (2) Multiple comments display setting
 - (3) Registration of global labels
 - (4) Element selection window
 - (5) Sequence program creation with labels
 - (6) Sequence program creation with module FB
 - (7) Saving a project
 - (8) Writing to PLC CPU
- 3.3 Parameter settings for Simple Motion module
 - (1) Start of Simple Motion module setting function
 - (2) System settings
 - (3) Parameter settings
 - (4) Servo parameter settings
 - (5) Positioning data setting
 - (6) Saving a project
 - (7) Writing to the Simple Motion module
- 3.4 Operation check
 - 3.4.1 JOG operation
 - 3.4.2 Home position return (Establishment of the home position)
 - 3.4.3 Positioning control

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Module Startup

Control Startup

Synchronous Control Startup

2.4 Installation of Modules

Install the modules.



(1) Installing a battery

The connector plug of the Q6BAT is disconnected from the jack of the CPU module before shipment. To use the battery, connect the connector, following the procedure below.



- 1. Open the battery cover located on the bottom of the CPU module.
- 2. Check that the Q6BAT (1) is correctly installed.
- 3. Check the direction and securely insert the connector plug of the Q6BAT (2) to the jack (3) of the CPU module.
- 4. Close the battery cover.
- (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 details.

(3) Installing a module

Install each module to the main base unit. Refer to MELSEC iQ-R Module Configuration Manual for details.

2.5 Wiring and Cable Connection

The following shows the wiring and cable connection example for the Simple Motion module and servo amplifiers.

The system below 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) 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. 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

(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 (AWG16)	-
Main circuit power supply (L1, L2, L3)	2mm ² (AWG14)	-
Grounding wire	1.25mm ² (AWG16)	1.2N•m



(3) Axis selection rotary switch of servo amplifier

"0" to "F" of the axis selection rotary switch correspond to "d01" to "d16".

The following table shows the correspondence between SSCNET configuration and the switch No. Set the switch correctly checking the correspondence.



(4) Connection of each cable

Connect the SSCNET III cable, the encoder cable, and the servo motor power cable. For between the personal computer and PLC CPU, connect a USB cable.

- (5) Power-on of the system
 - 1. Check the wiring for the power supply module.
 - 2. Confirm that the PLC CPU is in STOP status.
 - 3. Turn ON the power of PLC CPU.



- (a) Power supply module: LED (green light) turns ON.
- (b) 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.

Module Startup

Appendices

(6) Power-on of servo amplifier

Turn the power ON after checking the following items.

- 1. Check the wiring for servo amplifier.
- 2. Turn the servo amplifier ON.

The communication status with the Simple Motion module can be checked on the display.

Servo amplifier	LED display	Status	Description	Wiring result
	AA	Initializing standby	The power supply of servo system controller is turned off while the power supply of servo amplifier is on.	
0000	Ab	Initializing	During initial setting for communication specifications.	
8.8.8	AC	Initializing	Initial setting for communication specifications has completed, and then the servo amplifier has been synchronized with the servo system controller.	
	Ad	Initializing	During communication with the servo system controller for initial parameter setting	
	AE	Initializing	During communication with the servo system controller for the servo motor/encoder information	
	AF	Initializing	During communication with servo system controller for initial signal data	Normal
	AH	Initializing completion	The process for initial data communication with the servo system controller is completed.	
	b01	Ready-off	The ready-off command from the servo system controller was received.	
	C01	Servo-off	The servo-off command from the servo system controller was received.	
	d01	Servo-on	The servo-on command from the servo system controller was received.	
	E6.1	Forced stop warning	Forced stop warning	
	E7.1	Controller forced stop warning	Controller forced stop warning	
	OFF	-	Control power is off.	Abnormal

<Actions>

- When parameters are not written to the Simple Motion module, the LED displays "AA" or "Ab", but no immediate error is occurring. In this case, write parameters.
- If the LED turns OFF, check the wiring for control power supply.

3. POSITIONING CONTROL STARTUP

3.1 Creating a New Project

(1) Installing engineering software

Install MELSOFT iQ Works or MELSOFT GX Works3, following the Installation Instruction provided with the software package.

Product	Model	Description
MELSOFT iQ Works	SW2DND-iQWK-E	FA Engineering Software - System Management Software [MELSOFT Navigator] - Programmable Controller Engineering Software [MELSOFT GX Works3] - Motion Controller Engineering Software [MELSOFT MT Works2] - Screen Design Software [MELSOFT GT Works3] - Robot Total Engineering Support Software [MELSOFT RT ToolBox2 mini] - Inverter Setup Software [MELSOFT FR Configurator2]
MELSOFT GX Works3	SW1DND-GXW3-E	Simple Motion module parameter settings, sequence program creation

Note) The screen windows in this document may differ from the ones you use. (The system uses "MELSOFT GX Works3 Version 1.007H")

(2) Creating a new project

Start MELSOFT GX Works3, and create a new project.



$[Project] \to [New]$	
Series	: RCPU
Model	: R04 (specify the CPU to be used)
Program language	: Ladder

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

(3) Connecting the PLC CPU to a personal computer

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

		USB		
Qnli	Debug Diagnostics It	ol <u>W</u> inda		
2 2	Beed from PLC Write to PLC Yerify With PLC		-	
	Remote Operation(<u>S</u>) CPU Memory Operation Delete PLC Data User Data(E)		3	
	Set _lock Monitor(<u>M</u>) Wetch(<u>I</u>)	•	8	

- 1. Connect the CPU module to a personal computer.
- Select [Online] → [Specify Connection Destination] to open the [Specify Connection Destination Connection] window.
- 3. Select "CPU Module Direct Coupled Setting".
- Select the connection method with CPU module.

(4) Initializing the PLC CPU module Initialize a memory of the PLC CPU.Click [Initialization] on the Memory Management window.

Qnlin	e Debug Diagnostics Tool Wind	Memory Management					MELSOF	T GX Works3		83
	Specify Cognection Destination	Memory Management CPU Built-in Memory	CPU Huilt - in Mimory	·						
22	Read from PLC	SD Memory Card	*					Initialize the selected	d memory.	
49	Write to PLC		Data Memory					Are you sure you wa	ant to continue?	
	Yerify With PLC		-		161/2049KB					
	Remote Operation(S)		Device/Label			1		Each memory will be	e in a status as following after initialize	tion. files
	CPU Memory Operation		File Storage Area		Use Volume			* Execute the initi	ialization and delete the event history	when
	Delete PLC Data				2/20KB			the event		
	User Data(E)					┝		history file exists	s in the initialized target destination.	
	Set Clock									
	Monitor(M)									
	Watch(I)								Yes	No
			Detail Initialization(Qear Value Refresh(N)					↓	
					Close					
									MELSOFT GX WORKS3	
									Completed.	
									(
									ОК	
	(E) Cottingo fo	 		matara						

(5) Settings for sequence program parameters Set the system parameter and each module parameter.

<Creating a module configuration>



- 1. Select the main base unit, CPU, I/O, and Simple Motion module to be used from the POU list, and drag & drop them to the configuration screen.
- 2. Select [Edit] [Parameter] [Fix] in the menu.
- 3. The window asking about module label addition appears for the selected modules. Click "Yes".
- 4. Double click on the Simple Motion module to open the Simple Motion Module Setting Function screen.
- 5. Set the parameters, and close it when finished.



3.2 Sequence Program Creation

The use of label and function block (FB) removes the need to remember devices when programming.

- (1) New sequence programs creation Appendix 3 provides the sequence program example.
- (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.



(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.

- 1. Select [Label] \rightarrow [Global]. The global label registration window appears.
- 2. Register the global label, referring to the table below.

📲 Project	Global [Global Label Setting]	
🔣 Module Configuration	(Filter) Easy Display (K) Display Setting Check	"
🗴 🔚 Program	Della Type Olass Asrien Device/Labe() Inflat Value Constant Japanese/日本15 Endish Display Taree()	
🔳 🍓 Label	2.	-
🔳 🌆 Global Label		1
😭 Global	Extended Display: Automatic	
Mittalopal	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.	
n 🖶 Structured Data Type n 🎬 Device n 🙌 Parameter	To execute the Reservation to Register/Release for the system beld, reflection to the system bid divises is required. Please execute "Reflect to System Label Database". It is unnecessary to change reference side project when assigned device is changed in system bibel Ver.2. " Only CR series/COT 2000 series is available for system bibel Ver.2. " To execute Online Program Change, execute Online Program Change and save.	ļ

<Global label setting examples>

Label Name	Data type	Class	Device	Description
bDuringJOGInchingOperation	Bit	VAR_GLOBAL	M81	JOG/Inching Operation flag
bJogEND	Bit	VAR_GLOBAL	M82	JOG End Flag
bJogOK	Bit	VAR_GLOBAL	M83	JOG OK flag
bJogERR	Bit	VAR_GLOBAL	M84	JOG Error flag
bStartEND	Bit	VAR_GLOBAL	M85	Positioning Start Operation flag
bStartOK	Bit	VAR_GLOBAL	M86	Positioning Start OK
bStartERR	Bit	VAR_GLOBAL	M87	Positioning Start Error
bPositioningStartReq	Bit	VAR_GLOBAL	M80	Positioning Start Request
iAxisNo	Word [with signs]	VAR_GLOBAL	D14	Axis No
uwPositioningStartNo	Word [with signs]	VAR_GLOBAL	D16	Positioning Start No
i_JogSpeedData	Double word [with signs]	VAR_GLOBAL	D10	Jog Speed data memo
uwErrld	Word [with signs]	VAR_GLOBAL	D12	JOG Error code
bJogSpeedReq	Bit	VAR_GLOBAL	X60	JOG Speed Req
bAxis1	Bit	VAR_GLOBAL	X61	Axis 1
bAxis2	Bit	VAR_GLOBAL	X62	Axis 2 (Note-1)
bHomePositionData	Bit	VAR_GLOBAL	X63	Home Position return Data
bPositioningStartData	Bit	VAR_GLOBAL	X65	Positioning Start Data
bSyncPosiStartData	Bit	VAR_GLOBAL	X66	Synchronous Positioning Start
				data
bJogForwardReq	Bit	VAR_GLOBAL	X6E	JOG Forward Start req
bJogReverseReq	Bit	VAR_GLOBAL	X6F	JOG Reverse Start Req
bStartpositioning	Bit	VAR_GLOBAL	X71	Start Positioning req
bServoON	Bit	VAR_GLOBAL	X7B	Servo ON req
bErrorReset	Bit	VAR_GLOBAL	X7E	Error reset
bStopSwitch	Bit	VAR_GLOBAL	X7F	Stop
bSynchronous	Bit	VAR_GLOBAL	X7D	Synchronous Axis Set

(Note-1): The labels above are for the synchronous control system in Chapter 4.

- (4) Element selection window
 - 1. Select [View] \rightarrow [Docking Window] \rightarrow [Element Selection].
 - 2. Select [Module] tab in the Element Selection window, and Module Label and Module FB are displayed.



- (5) Sequence program creation with module labels
 - 1. Select [Module Label].
 - 2. Select a label from the module label list.
 - 3. Drag & drop the module label.
 - 4. Change the contact to an arbitrary contact or coil by double-clicking it.
 - 5. Click [OK] to create a circuit.
 - 6. Select [Convert] \rightarrow [Convert] in the menu.



Overview

)UT:i_stModule

Module label

JW:i_uAxis

Target axis

JW:i_uStartNo

Od.3: Positionina start No. o_bOK:

o_bErr:

Normal completion

Error completion

o_uErrId:UW

Error code

- (6) Sequence program creation with module FB
 - 1. Drag & drop a necessary module FB.
 - "FB Instance Name" window appears.
 Select whether the instance is registered as a global label or a local label, and input an instance name.
 - 3. Double click on where a circuit addition is made.
 - 4. Select a circuit symbol, and enter variables.
 - 5. Click [OK], and the "Input Comment" window appears.
 - 6. After inputting comments, click [OK].
 - 7. Move the cursor to where the circuit is added, and double click there.
 - 8. Click [OK], and the circuit is created.

FB Instance Name		2				
Local Label (ProgPou)	- OK	Ζ.				
M_RD77_StartPositioning_00E_1	E it					
	M_R077_Stam (M+R0 Positioning start FB	Elem	nent Selection	-t= ×		
		(Find	d POU)	44 🐴 👘		
		Lg' L	lg ☆ 👝 X 🞰			
	BIJEN OJENOB	• M	Iodule Label	~		
		1 . ■ M	lodule FB			
	0UT13 030KB		🐌 R04CPU			
3.		e de la companya de l	BD77MS4			
	1001uAm ablerB		M+RD77_St Position	ing data set		
	IVW GAR OUT OF	`	M+RD77_JC JOG/ind	ning operatio		
			M+RD77_MI Manual	pulse genera		
	OK Cancel Extd I	Dspl	M+RD77_Cr Speed c	hange FB		
4. Besitioning	StartData BOOL Positioning Start Data	n	-			
	StartReg BUUL Positioning Start Request	V				
	<u>Settingin</u>					
BPositioningStartRe	g 5. OK Cancel Ext	d Dspl	-		M_RD77_StartPosi	tioni… (M+RD
		bi	Position		Positioning	start FB
					Execution	Execution
Input Comment		St	tart equest		command	status
Device/Label English	Positioning OK	S.				
bi centering country i centering countries and	Start Cancel	-			DUT:I_stModule	o_bOKB
	i laquost		+		Module label	completion
, 25 Character/1024 Character [Inpu	t/Limit]		Horizontal Line (-1	(0.10) 🖾		
				OK Cancel	UW:i_uAxis	o,bErr:B
			Stop at the Co	nnection Point	Target axis	Error completion
				9		
				0.	UW:LuStartNo	o_uErrld.UW
					Cd.3: Positioning	Error code
					start No.	
				+		
				•	M_RD77_StartPo Positionin	sitioni… (M+RD g start FB
		bPo	sitio		BilbEN	o bENO:B
		Posit	itioning		Execution	Execution
		Start	t		command	status

- 9. Drag & drop "RD77_1" in the [Module Label]. The module label is written.
- 10. Create another circuit in the same manner and select [F4 (convert)]. The circuits are converted.



(7) Saving a project

Save a created project.

1. Select [Project] \rightarrow [Save as], and click [Save] after entering the file name.

Proj	ect Edit Eind/Replace	<u>C</u> onvert	🧱 Save as				6	x
	New	Ctrl+N Ctrl+0	Save in:	🔒 MELSEC iQ-I	R 🗸	G 🤌 📂 🛄 -		
8	Qpen Close Save Save Save As Project Verlfy Project Revision Change Module Type Data Operation(E) Intelligent Function Moc Open Other Format File	Ctrl+S Ctrl+S , , , , , , , , , , , , ,	 Recent Places Desktop Libraries Computer	Name	^ ample1.gx3 tart_up.gx3	Date modified 7/9/2015 2:31 AM 7/9/2015 2:31 AM	Type GX3 File GX3 File	
4	Jbrary Operation Security(U) Printer Setup Page Setup Print. Brint Recent Projects(G) Start GX Works2 Exit(Q)	, Ctrl+P	Network 1. Other Format: Save : (MELSO	File name: Save as type: Title(<u>A</u>): as a <u>Workspace For</u> thange the window FT Navigator support	III RD77MS4_sample_aad (GX Works3 Project ["gx3) mat Project s with this button to use workspace for arts this format.)	armat project.	, Save Cancel	

[Saving data]

- Parameters and sequence programs of the PLC CPU
- Positioning data and parameters of the Simple Motion module
- Parameters of servo amplifiers

(8) Writing to PLC CPU

Write set parameters and created programs to the PLC CPU.

- 1. Select [Online] \rightarrow [Write to PLC CPU] to open the Online Data Operation window.
- 2. Check the boxes of System parameter/CPU parameter, Module parameter, and Program.
- 3. Click [Execute] to start writing the selected items to the PLC CPU.
- 4. Click [Close] after completion of the writing.

Online Debug Diagnostics Tool	Winde	Online Data Operation Display Setting Relate	d Functions						[o]
Specify Connection Destination.	· 1.		Pesd	S. 1	Vert	90 B	Delete		
	—	Select Eavorites Open/Clase All[]	Select All Leeved	PU Buit-in Me	mory 🛢 Si	Memory Card 👔 Int	elligent Function Module		
Verify With PLC		Hodule Name/Data Name	*		Deta	Title	Last Change	Size (Byte)	
terry man com		B-RD77HS4_sample	2,ene				/		
Remote Operation(S)		B Parameter	S	-	_			and the second	
		A Module Para	natar Q	2	_	_	2015/06/25 17 42:35	Net Calculation	
CPU Memory Operation		Simple Moto	n Module Setting 0.		D L.D	fail	2015/06/25 173843	Not Calculation	
Delete PLC Data		Memory Car	d Parameter				2015/06/25 17 33 59	Not Calculation	
Delete PCC Data		fat Pencte Pas	eword 😣		_		2015/06/25 17:33:59	Not Calculation	
User Data(<u>E</u>)	•	Global Label	Cathing CR				2018/06/28 1246:22	No. Calculation	
Sat Clock			initial Value 😪		_		2810/10/25 1/4622	Per Celcuarior	
Set Clock		CLEUNF	2		_	-	2015/06/25 1748.22	Not Calculation	
Monitor(<u>M</u>)	•	🕀 🏦 Local Label k	itial Value 🛛 😰						4
Watch(<u>T</u>)	•	Display Memory Capac	Ay (B)						
		Memory Capacity Sign Calculation	Program Memory						THE STATE
		Interval	Data Manon						
		Used						12	145/2049KB
		Increased	Device/Label Memory (File St	race Area)				-	ine
		Decreated						2	56/256KB
		SK or Less	50 Memory Card					- F	ine
							_		/1KB
							2	Francis	
							J.	Discree	

3.3 Parameter Settings for Simple Motion Module

- (1) Start of Simple Motion module setting function
 - 1. Double click [Simple Motion Module Setting] in the menu of MELSOFT GX Works3 to open the Simple Motion Module Setting Function window.



(2) System settings

- 1. Select the [System Configuration].
- 2. Set the servo amplifiers according to the machine.
- 3. Set the details of servo amplifiers.
- 4. Click [OK], then the set servo amplifier is colored.



(3) Parameter settings

[Equipment specifications]	
Machine configuration	: Horizontal ball screw
Unit setting	: 0: mm
Ball screw pitch	: 10000.0 [µm]
Reduction ratio (NL/NM)	: 1/2 (Load side [NL]/Motor side [NM])
	The load-side ball screw is made to rotate once by rotating the
	motor twice.
Encoder resolution	: 4194304 [pulse/rev]
Servo amplifier	: MR-J4-10B
Servo motor	: HG-KR series

[Operation procedure]

- 1. Select [Parameter] in the Menu.
- 2. Click [Compute Basic Parameters 1] to open the electronic gear calculation screen.
- 3. Set the parameters according to the machine specification. After the setting, click [Compute Basic Parameters 1] to calculate the electronic gear.
- 4. Click [OK] to write the electronic gear data to the parameters.

MELSOFT Simple Motion	n Module Setting Function	C:#Users#RR99941#Desktop#RD77H54	_sample2_eng.gx3 - [0000:RD77	7M54[]-terameter]
Bublect Bost Xiew 2	Outre Mixque Reb			. ##
* 10 10 to at 107*	1200	和武武武武 伊。		Commute Basic Parameters 1 - Avis #1
Navigetion	* 10000100	077454[]-System Co 🕜 0000:RD77	MS4[]-Parameter ×	Entry
Fright	Depley Filer	Destary Al	atalans 1	
7051		Data And		Select the machine components, and enter the machine data to automatically set the basic parameters 1 (unit setting, No. of pulses per rolation, movement amount per rolation and unit magnification).
0000 H21	E Commo	Parameter The parameter	loes not rel_	
11.24	e Py.82: selecti	forced stop valid/model on Octable (Deternal Dr.	ovi Signal)	2 - Pacific Components : Data Server, Horizontal
A Martin Partnerste	P.24	fanual puble for forcemental Suric, ENC 0: A ghase, 8 phase	Mode (4	Unit Setting Domm
Parameter		recton (Multiply)		
Positioning Date	gener	tor/Incremental Sync. DKC Type	pen Callector	Lead of Ball Screw (HB) 20000.0 [µm]
# 😨 Block Start Data	Pr.96	Operation cycle setting PPPPIt: Automatic S	entrop	NL/NM
🖬 🚰 Synchronous Con	strol Param Pr.57:	SCHET Setting 1550-ET III.H Elimput terminal logic Set the logic of e	stemal input	Reduction Gear Ratio (HL/NH)
Carrola Metron M	select	ion signal (proximit)	dog, exter	- 1 / 1
n C Servo Amplifier C	Operation peren	tor forcemental Sunc. IDC Odegative Logic		Z Data data reduction ratio for teach or development. Reduction Ratio Ratio
Digital Oscillosco	pe Pr.153	Control axis number upper	_	Calculate reaction build by acceler delines a great and acceler
	Ph.15	External input signal Set digital filter	oreach	Encoder Resolution 4194304 (pulse,hev)
	05(1	le setting input signal.	the entrol in	Setting Range
MELSO	FT Simple Motion Module	Setting Function C.#Users#RR99941#D	esktop#RD77MS4_sample2_eng	9-pG - (000-RD17M54[]-Parame
Evojeit	Edit View Quine	Bjudow Help		
IN INC	-	The state law an an an		
Production of the local division of the loca			a contract of the contract of the contract	Compute last relatives 1
Tes rigition	1	Consider Association Constrained	Concernation and the second of	
D Series		Doplay Filler, Deplay Al.	Compute Basic Parameters 1	Calculation Result
step 1 : Single	0.00729/54	- Den	Asia #1	Basic Parameters 1 Unit Setting Oumm
	System Setting	G Common Parameter	The parameter does not ref_	No. of Pulses per Rotation 4194304 pulse
step 2 : Set the	Bystem Configuration	valid/invalid selection	1:3nvald	Novement Amount per Rotation 10000-0 µm Movement Amount per Pulse
step 3 - Set the	Mark Detection	Pr.24Manual pulse generator/Shoremental Sync. BNC	0.4 shase,8 shase Mode (4	Unit Pagrinosum LAX mes
	Parameter	Pout selection	Printer and a second second second second	As a result of calculation, no error occurs in the movement amount.
step 4: Set the	Positioning Data	generator Disconnential Sync. ENC	Likistage Output/Open Colector Type	Applying the calculation result above,
	Block Start Data	Pr.96-Operation cycle setting	FFFFh: Automatic Setting	vou want to perform is about 0.0 [um] the error for the movement amount 0.0 the calculation
step 5 : Set the	Synchronous Control Par	Pr. 57:55O/ET Setting Pr. 15D Inset Terminal Instr	Set the lase of external issue	
	Cem Data	¹⁰ selection	signal (proximity dog. extern	Bit Bit in the test provide tes
	Servo Amplifier Operatio	generator/Incremental Sync. DKC	Offegative Logic	
	Digital Oscilloscope	Pr. 152 Control avia number upper		
		Pr.153 External input should	Set douts litter for each	
	-	* OSC file setting	input signal.	
1		Pr. 11.Init setting	Set according to the machin Otros	
Total and the second		Pr. 2745. of pulses per rotation	4134304 pulse	
Assistant		retation	5000.0 µm	
		Pr. AtJait magnification Pr. 200as speed at start	1/s1 Times 0.00 mm.lmin	
		Bask: parameters 2	Set according to the machin_	
F3 3	letting Procedure of	Pr.8:Speed limit value Pr.9:Acceleration time 0	3000.00 mm/min 1000 mil	
step 1 - Se	ingle Hoton Module	Pr. 30 Deceleration time 0	1900 ==	
	0000-R077MS4 -	Pr. 11:thatlash compensation	set according to the syste	
step 2 : Se	et the system configuration	anount	1.1.1	
	System Setting	In \$2 forced along califies and selection		
step 3 : Se	et the parameter	Set the forced stap input valid/maild.		
	at the second on empire	All aves of the servic amplifier are made but "ServicitEADY signal OFF error" do	es not occur even if the forced input sig	d http://www.spuik.ak.umed.ov. genals.hk.umed.ov.durung/bes.sportation.
and a rise	Serve Parameter			
step 5 : Se	et the operation			
	- Operation Setting	-		
× 6	- H		0.0001000000000000000000000000000000000	
	1		R04	Host No.1 Insert CAU NUM _d

POINT

- 1. Set [Pr.82 Forced stop valid/invalid selection] to "1: Invalid".
 - [Pr.82 Forced stop valid/invalid selection] is set to "valid" as default for safety. Since the machine does not use forced stop, change it to "1: Invalid".
- Set the "Input type" in [Pr.116 FLS signal selection], [Pr.117 RLS signal selection], [Pr.118 DOG signal selection], and [Pr.119 STOP signal selection]. Select "15: Invalid" since the machine does not use Data set method, FLS, RLS, and STOP for home position return.

Display Filter Display All 🔻	Compute Basic Parameters 1
Item	Axis #1
🖃 Common Parameter	The parameter do
Pr.82:Forced stop valid/invalid selection	1:Invalid 👻
Pr.24:Manual pulse generator/Incremental Sync. ENC input selection	0:Valid (External Input Signal) 1:Invalid 2:Valid (Buffer Memory)

Pr In	.116:FLS signal selection : put type	1:Servo Amplifier	-
Pr. ter	116:FLS signal selection : Input minal	0:Simple Motion Module 1:Servo Amplifier	2.
Pr.	117:RLS signal selection : Input	2:Buffer Memory 15:Invalid	
	-		

Set common/basic/detailed/home position return/expansion parameters where necessary. (Refer to Appendix 2 for setting examples.)

(4) Servo parameter settings

[Operation procedure]

- 1. Select [Servo parameter] in the menu.
- 2. Click [Basic] in the menu to open [Common Basic].



3. Set [Rotation direction].

POINT

Set rotation direction according to the machine.

Select from [CCW direction during forward pulse input, CW direction during reverse pulse input], or [CW direction during forward pulse input, CCW direction during reverse pulse input].

CCW direction during forward pulse input



CW direction during reverse pulse input

3

Positioning Control Startup

Overview

4. Set the Servo forced stop selection to "Disabled".

POINT

The "Servo forced stop selection" sets whether to read forced stop input signals via servo amplifiers. This parameter is set to "Enabled (Use forced stop input EM2 or EM1.)" as default for safety. If an error occurs on mechanical system due to crush, etc., establish the absolute position after adjusting the error and ensuring safety. Since the machine in this section does not use forced stop, change it to "1: Disabled".



- 5. Select "Component parts" to open the Component parts window.
- [Absolute position detection system/Incremental system selection] Select "Disabled (Used in incremental system)" for absolute position detection system selection.
- 7. For home position setting condition, select "1: Not need to pass servo motor Z-phase after power on".

POINT

When "1: Not need to pass servo motor Z-phase after power on" is selected, the home position return can be executed without waiting for the motor to rotate one time or more.

Set servo parameters where necessary.

Overview

3

Positioning Control Startup

Synchronous Control Startup

Appendices

(5) Positioning data setting

The following explains how to set positioning data through a program example in which the axis travels from the home position (P0) to P1 back and forth.

[Operation example when the axis moves back to the home position (P0) after moving to P1]



[Operation procedure]

1. Select "Axis #1 Positioning Data" in the menu.

Project										
C* 45 (2)	Display Fi	iter Display All	Data Set	ing Assistant	Offine Si	nulation	Automatic Command S	oeed Calc.	Automatic Sub Arc Calc.	1
0000:RD77MS4							<u></u>		-	-
🗖 🔐 System Setting	No.	Operation pattern	Control meth	rpolated	time No.	time No.	Positioning address	Arc address	Command speed	C
System Configuration				2.						
Mark Detection		«Positioning Comment»	•							-
🔗 Parameter	2	«Positioning Comment»								-
Servo Parameter	3									
E 🖗 Positioning Data		«Positioning Comment»	•							-
Axis #1 Positioning Data		«Positioning Comment»	•							
AXIS #2 POSICIONING Data	•									2
🔗 Axis #3 Positioning Data	•									*
🔗 Axis #4 Positioning Data	Operat	ion pattern								
🖬 🔯 Block Start Data	The op	eration pattern designate	s whether positioning	of a certain data No.	is to be ended	with just that de	ata, or whether the positi	oning for the nex	t data No. is to be carried	OK.
🗉 😵 Synchronous Control Parameter	success	son.								
🗴 🔯 Cam Data										
🗉 🖳 Simple Motion Monitor										
🖬 🔲 Servo Amplifier Operation										
M Digital Oscilloscope	<				m					Ł

- 2. Select [Data Setting Assistant].
- 3. Select the positioning control method, and input each item.





4. Click [Set]. The Data Setting Assistant window closes, and the positioning data window appears.

0							
3 III							

Create the positioning data in the same manner for the axis moving back to the home position from P1.

No.	Operation	Control	Axis to be	Acceleration	Deceleration	Positioning	Arc	Command	Dwell	M-
	pattern	system	interpolated	time No.	time No.	address	address	speed	time	code
1	1: CONT	01h:ABS	-	0:1000	0:1000	100000.0	0.0µm	2000.00	0ms	0
		Linear 1		0.1000		μm		mm/min		
2	0: END	01h:ABS		0:1000	0:1000	0.0	0.0µm	8000	0ms	0
		Linear 1	-			μm		mm/min		

- 5. Positioning data creation is completed.
- (6) Saving a project

Save a created project.

1. Select [Project] - [Save As]. Input a file name, and click [Save].

			10+1117777	1+1/535100/14151	👪 Save as	📓 Save as				
	Proje	ect <u>E</u> dit <u>F</u> ind/Replace	<u>C</u> onvert	View Onlin	Savo jix 🔒 MELSEC iQ-R 👻		G 🖻 🖻 🔤 -			
)	New Ctrl+N Open Ctrl+O Close Save Save Ctrl+S			Recent Places	Name	Date modified 7/9/2015 2:31.AM 7/9/2015 2:31.AM	Type GX3 File GX3 File		
Particula -		Delete Project Yerify Project Revision Change Module Type Data Operation(E) Intelligent Function Module(E) Open Other Format File			Computer	Rome: R077M54_sample_said R077M54_sample_said R02(Woks3 Project (* gs3) Tate(a): sa <u>Workspace Format: Project Project </u>	State Carcel 1. formul project.			

[Saving data]

- Parameters and sequence programs of the PLC CPU
- Positioning data and parameters of the Simple Motion module
- Parameters of servo amplifiers
- (7) Writing to the Simple Motion module
 - Select [Online] → [Write to PLC...] to open the Online Data Operation window on MELSOFT GX Works3.
 - 2. Select the Simple module setting.
 - 3. Click [Execute]. Then, the parameters and data are written to the Simple Motion module via the PLC CPU.
 - 4. The confirmation message window for flash ROM overwriting appears. Click [Yes].
 - 5. Click [Close] to complete the writing to the Simple Motion module.



[Writing data to the Simple Motion module]

- Parameters and servo parameters
- Positioning data and block start data
- Synchronous control parameters and cam data

Overview

3

Positioning Control Startup

3.4 Operation Check

The sequence program used in this section 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.

3.4.1 JOG operation

(1) Servo ON

Servo amplifiers become servo ON status by turning ON [All axis servo ON (Y1)].

- 1. Move the PLC CPU switch (RESET/RUN/STOP) to RUN side.
- 2. Servo ON by a sequence program Select [Online] \rightarrow [Monitor] \rightarrow [Start Monitoring] to switch to the monitoring status. Move the cursor to the Servo ON req (X7B).

Servo ON req (X7B) is turned ON by double clicking it while pressing SHIFT key.



POINT

Double-clicking a device while pressing SHIFT key changes the status of the device from OFF to ON, and vice versa.

(2) JOG speed settings

Turn ON the JOG Forward Start req and the JOG Reverse start req after setting JOG speed. 1. Double click the "JOG Speed Req" (X60) while pressing SHIFT key.

	bJogSpe… X60					K10000	i_JogSpe···· D10
(8)	JOG Speed Req				DMOVP		10000 Jog Speed data memo

(3) JOG start

Confirm that the workpiece moves in "+" direction by forward command, and in "-" direction by reverse command.

- 1. Select axis 1 (X61).
- Select either the JOG Forward Start req (X6E) or the JOG Reverse Start req (X6F). Move the cursor to "JOG Forward Start req" or "JOG Reverse Start req", and double click it while pressing SHIFT key.



(4) Confirming JOG operation

Check the JOG operation on the Axis Monitor window.

Signals, such as Forward JOG start and Reverse JOG start, can be added from the Selectable Items on the Axis Monitor window.

- 1. Click [Select Monitor Item] on the Axis Monitor window.
- 2. Select items to be added from the Selectable Item list.
- 3. Select "Cd.181 Forward JOG start", and click [Add].
- 4. Click [OK] to go back to the Monitor window.



Check each status on the Axis Monitor window during JOG operation.

	-		
Axis Monitor Monto	Types	Avia(Du/bu/LAvia)	Module Information List
		Axe #1	PLC READY(VD)
Nd.20:Feed current value	1282/	9 µm	READ(00)
Md.21:Machine feed value	1282.	9 µm	Synchronization Rep[1]
Md.23:Axis error No.	+		All even servin Obi(11)
Mrt 24:Asis warring No.	+		Held 108-Serves status 1 - 8640Y ON
Md.26:Axis operating status	306.0	peration	Ave 10 2 3 4
Md.28:Axis feedrate	100.0	0 mm/min	
Md.44:Positioning data No. being executed			Md. 108 Serve status 1 : Serve CN Axes No. 1 2 3 4
Md.47:Positioning data being executed : Operation nattern	Postie	ning Complete	Md. 50 /Forced stop input (J.040-4331)
Md.47:Postioning data being executed : Control method			8UST Axis No. 1 2 3 4
Md.47:Positioning data being executed : Acceleration time No.	0:100		Md.31:Status : Error detection Axis No. 1 2 3 4
Md.47:Positioning data being executed : Deceleration time	0:100	0	Hd. 31-Status : Asis warring detection
Nd. 47:Postioning data being executed : Axis to be internalisted			Md. 1:5n test mode flag(J/IWG4000) Md. 51.40#-kess operation mode(J/IWG4232)
Md.47:Postioning data being executed 1 M-code		_	Md. 133:Operation cycle over flag().0904239)
Md.102:Deviation counter	0 pub		Mil. 132:Set speraton cycle(U09G4238)
Hd.103:Motor rotation speed	20.02	r/men	International and additional
Hd.104:Motor current value	0.0 %	PARA	Pto. 134 Operation time(LORO4008)
Md.108:Servo status 1 : Servo alarm	OFF		Nd. 135:Plasmum operation time(J.090-4009)
Md.108:Servo status 1 : Servo warning	OFF		Md. 19-No. of Flash RCM unlang(JUNC4224)
Nd.114:Servo alarm			0 times
Md.500:Servo status 7 : Driver operation alarm	OFF		MI.32.Searching flag for driver communication axes(J08G4234) Complete of searching for driver communicati
Nd.502:Driver operation alarm No.			ML53:55CHET control status().04G4233) Waiting for command accepted
Cd 180:Axis stop	OFF	_	Mit 111-Central OSC average Band (08C-8111)
Cd.181.Forward JOG start	ON		Stopped
Cd.182:Reverse 30G start	OFF		

Axis monitor	Checking details
PLC READY (Y0)	
READY (X0)	
Synchronization flag (X1)	ON?
All axes servo ON (Y1)	
Md.20: Feed current value	-
Md.21: Machine feed value \int	
Md.26: Axis operating status	JOG operation
Md.28: Axis federate	100.00 mm/min
Md.108: Servo status 1: READY ON	
Md.108: Servo status 1: Servo ON	ON?
BUSY	Is Axis1 ON?
Cd.181: Forward JOG start	Is the starting axis ON?
Cd.182: Reverse JOG start	

- (5) Confirming the motor rotation direction
 - Switch the motor rotation direction to forward/reverse.
 - 1. Select [Servo Parameter].
 - 2. Select [Basic].
 - 3. Select the servo motor rotation direction according to your machine.



POINT

Set the rotation direction according to the machine.

Select from [CCW direction during forward pulse input, CW direction during reverse pulse input], or [CW direction during forward pulse input, CCW direction during reverse pulse input].

After writing servo parameters to the Simple Motion module, cycle the power of both the servo amplifier and the Simple Motion module.

CCW direction during forward pulse input

CW direction during forward pulse input

(6) JOG operation check is completed.

3.4.2 Home position return (Establishment of the home position)

There are two types of home position return control:

- Machine home position return which does not use address information to establish the home position.
- Fast home position return which performs positioning by using the coordinate defined by machine home position.

This document explains the method of performing the machine home position return using Data set method.

After setting "9001" as the positioning start No., the home position return is started by turning ON the Positioning start signal.

Item	Buffer memory	Signal	Description
Axis 1 positioning start No.	4300	-	Set the positioning start No. Set "9001" for machine home position return.
Axis 1 positioning start	-	Y10	Execute the home position return and positioning start.

POINT

After setting "9001" as the positioning start No., the machine home position return is started by turning ON the Positioning start.

(1) Setting the home position return No.

1. Select the Axis 1. Double click it while pressing SHIFT.

(21)	bAxis1 X61 I I Axis 1 1.	MOVP	K1	iAxisNo D14 1 Axis No
(25)	bAxis2 X62 Axis 2	MOVP	K2	iAxisNo D14 1 Axis No

(2) Starting the home position return

- 1. Set the Positioning start No. (9001) to the buffer memory by double clicking X63 while pressing SHIFT.
- 2. To start the positioning, double click "Start Positioning reg".

(408)	HomeP··· X63 Home Position return Data	1.							MOVP	K9001	uwPositi D16 9001 Positioning Start No
(412)	bStartpo··· X71 11 Start Positioning req	bDuringJ… M81 JOG/Inchi ng Operation flag	RD77_1 Y10 RW:Positio ning start (Axis#1- #16)	RD77_1 DX10 RBUSY (Axis#1- #16) (Direct)	=	K1	iAxisNo D14 1 Axis No			SET	bPositio M80 Positioning Start Request
	2.		RD77_1 Y11 RW:Positio ning start (Axis#1- #16)	RD77_1 DX11 R:BUSY (Axis#1- #16) (Direct)	=	K2	iAxisNo D14 1 Axis No				

- (3) Confirming the home position return
 - 1. Check the following monitor values and status on the Axis Monitor window.



(4) Home position return check is completed.

3.4.3 Positioning control

This section explains the operation check method for positioning control which performs positioning to a specified position using address information.

Positioning is started by a sequence program or a function block.

In this example, positioning control is started by a function block, and synchronous control by a sequence program.

[Operation example when the axis moves back to the home position (P0) after moving to P1]



Positioning is started by setting the positioning start No. and turning ON the Positioning start signal.

Item	Buffer memory	Signal	Description
Axis 1 positioning start No.	4300	-	Set the positioning start No.
Axis 1 positioning start	-	Y10	Start the positioning.

(1) Setting the positioning control start No.

1. Set the positioning start No. Double click the Positioning Start Data (X65) while pressing SHIFT.



(2) Positioning start

2. To start the positioning, double click X71 while pressing SHIFT.



(3) Confirmation of axis 1 positioning control

Check that the axis 1 moves for 100.0 mm and goes back to 0.0 mm through the Feed current value for axis 1 on the Axis Monitor window.

Check that the Axis feedrate for axis 1 is equal to the command speed.

Check each monitor value and status through the Axis monitor.

0000:RD77MS4[] - Axis M	onitor	- 0 -		
Avis Monitor	Ten (tellingentell	Hodula Information List	Axis monitor	Checking details
Axis Monicor Monte	Avis #1	PLC READY(Y0)	Md.20: Feed current value	-
Md.20:Feed current value	35162.9 µm	READY(k0)		
Md.21:Machine feed value	35162.9 µm	Synchronization flag(K1)	Md 21: Machino food value	
Md.23:Axis error No.	-	All axes servo ON(Y1)		-
Md 26: Avia searching status	Postion Control	Md. 108:Servo status 1 : READY ON		
Md.28:Avis feedrate	2000.00 mm/min	Axis No. 1 2 3 4		
Md.30:External input signal :	-	Md. 108:Servo status 1 : Servo ON		
Lower limit Md 30-External input signal -	ON	Axis No. 1 2 3 4	Md.26: Axis operating status	Position control
Upper limit	ON	(Md. 50:Forced stop input(J0WG4231)		
GO CONTRACTOR - HAN LEGAREST	OFF	SUCY	Md.28: Axis feedrate	2000.00 [mm/min]
Md.31:Status : HPR complete flag	OFF	Axis No. 2 3 4 Md.31:Status : Error detection		
Md.44:Positioning data No. being executed	1	Axis No. 1 2 3 4		
Md.47:Positioning data being executed : Operation pattern	Continuous Positioning Control	Md.31:Status : Axis warning detection Axis No. 1 2 3 4		
Md.47:Positioning data being executed : Control method	1-axis linear control (ABS)	Md. 1:In test mode flag(U0VG4000) Md. 5::AMP-less operation mode(L0VG4232)	Md 30 ⁻ External input signal ⁻ Lower limit	ON?
Md.47:Positioning data being executed : Acceleration time No.	0:1000	Md. 133:Operation cycle over flag(U0WG4239) Md. 133:Generation cycle (UWG4239) Md. 133:Fat operation cycle() (UWG4239)	Md 20: External input signal: Linner limit	012
Md.47:Positioning data being executed : Deceleration time No.	0:1000	0200hc0.444 ms Md. 134:Operation time(J04G4008)		
Md.47:Positioning data being executed : Axis to be interpolated		Md. 135:Maximum operation time(U0WG4009)	Mo.31: Status: HPR request flag	OFF?
Md.47:Positioning data being executed : M-code		Md. 19:No. of Flash ROM writing(U0WG4224)		
Md.102:Deviation counter	0 pulse	Nd. 52-Searchino flao for driver communication ax		
Md.103:Motor rotation speed	400.01 r/min	Complete of searching for driver co	Module information	Checking details
Md.104:Motor current value	0.0 %	Md. 53:55CNET control status(U0¥G4233)		ů
Md.108:Servo status 1 : Servo alarm	OFF	Waiting for command accepted		
Md.108:Servo status 1 : Servo warning	OFF	Md. 131:Digital OSC. running flag(J0WG4011) Stopped		
Md.114:Servo alarm	-		READY (X0)	
Md.500:Servo status 7 : Driver operation alarm	OFF			ON?
Md.502:Driver operation alarm No.	-		Synchronization flag (X1)	
Cd.180:Axis stop	OFF			
Cd.181:Forward JOG start	OFF		All axes servo UN (Y1)	
Cd.182:Reverse JOG start	OFF			
		,	BUSY	Is the starting axis ON?

(4) Positioning operation check is completed.

4. 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 2.

Refer to Chapter 2 to 3 for details of the parameters and servo parameters.

<Flying Cutter>

Without stopping the conveyor axis (axis 2), cutter axis (axis 1) synchronizes to the movement of the conveyor belt and cuts the work piece evenly in half. After the cut, the cutter axis returns to the wait position. Synchronous control with electronic cam operation is used for the cutter axis.



<Specification>

A one-time belt conveyor rotation generates the conveyor movement for one work piece.

(1) Cutter axis (cam control axis) specification

Ball screw lead (PB): 10 mm

Gear ratio of the external reducer: 1/2

Cam stroke amount: 100.0000 mm

(2) Belt conveyor axis specification

Roller diameter: 50 mm (Roller circumference 50mm × π = 157079.6µm) Gear ratio of the external reducer: 1/1 (Directly connect the servo motor to the roller)

<Machine operation pattern>

The cutter axis (axis 1) moves for certain distance while synchronizing to the belt conveyor movement.

The cutter goes down in synchronization with the conveyor by sequence control, and the cutter returns to the original position after the synchronization.

The belt conveyor moves at a constant speed.



4.1 System Configuration

The following shows a system example consisting of the RD77MS, MR-J4-10B, and servo motors.



RD77MS Quick Start Guide

4.2 Startup Procedure for Synchronous Control

4. SYNCHRONOUS CONTROL STARTUP

- 4.1 System configuration
- 4.2 Startup procedure for synchronous control
- 4.3 Parameter creation for synchronous control
 - 4.3.1 System configuration settings
 - 4.3.2 Parameters and servo parameters settings
 - 4.3.3 Positioning data settings
 - (1) Positioning data selection
 - 4.3.4 Synchronous control parameter settings
 - (1) Synchronous parameter settings
 - (2) Input axis parameter settings
 - (3) Transition of synchronous control parameter window
 - (4) Settings for synchronous control parameters and input axis parameters are completed.
 - 4.3.5 Cam data creation
 - (1) Creating a new cam data
 - (2) Cam curve creation
 - 4.3.6 Saving a project
 - 4.3.7 Writing to the Simple Motion module
- 4.4 Operation check for synchronous control
 - 4.4.1 Home position return
 - 4.4.2 Synchronous control start
 - (1) Start and confirmation of output axis to be synchronized
 - (2) Start and confirmation of the main shaft (input axis)
 - (3) Operation check for main shaft (input axis)
 - 4.4.3 Operation check with digital oscilloscope
 - (1) Start of digital oscilloscope
 - (2) Selecting probe
 - (3) Sampling condition settings (No need to change)
 - (4) Trigger condition settings (No need to change)
 - (5) Start sampling
 - (6) Checking cam data

4.3 Parameter Creation for Synchronous Control

4.3.1 System configuration settings

Configure a 2-axis system.



4.3.2 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	[Input]
Select the machine components, and enter the machine data to automatically set the basic parameters 1 (unit setting, No. of publics per rotation, movement amount per rotation and unit magnification).	Machine Components: Conveyor
Machine Components : Conveyor	Unit Setting: 0:mm
Unit Setting Dome Cuter dameter of Roll (DR) S0000.0 [am]	Outer diameter of Roll: 50000.0 [µm]
Reduction Gear Ratio (MA,MM)	Reduction Gear Ratio (NL/NM)
	Load side [NL]: 1
Encoder Resolution 4194304 (public)rev]	Motor side [NM]: 1
Setting Range	Encoder resolution: 4194304
Compute Basic Parameters 1	
Calculation Result	[Calculation Result]
Basic Parameters 1 Unit Setting Oximm 140. of Pulses per Rotation 122985333 pulse	Unit Setting: 0 mm
Movement Anount per Rotation (4724422.3 µm Unit Magnification Isx 1 Times Movement Amount per Pulse	Number of Pulses per Rotation: 172985333 pulse
As a result of calculation, some error occurs in the movement amount.	Movement Amount per Rotation: 6478422.3 um
Appying the calculation result above,	
Dick OK to reflect to the basic parameters 1.	Unit Magnification: 1: ×1 times

POINT

When the electronic gear value cannot be divided due to circumference ratio π , it will be automatically calculated to the value with less difference.

4.3.3 Positioning data settings

Create a program in which the belt conveyor (axis 2) moves from the home position to P1. For axis 1 operated with cam control, create cam data in which the axis 1 synchronizes to the belt conveyor.

[Data example in which the axis moves from the home position to P1]



(1) Positioning data selection

Select the Axis # 2 positioning data in the menu.

MELSOFT Simple Motion Module Setting Function project Edit View Online Tools Window	n C:WMeek	addressed på Gersking Linn mill eta	880774454, nangi	et, mgugo(3 - [00	00:RD77MS4	[]-Axis #2 P	ositioning Data]			- 8 X
Navigation # X -	stem Co	0000:RD77M	i4[]-Parameter	🖥 0000:RD77M5	;4[]-Servo pa	ira 🔗 0	000:RD77MS4[]-Axi	s #1 Po 🕜	0000:RD77MS4[]-/	<mark>4x48</mark> 4 ≯ ∓
P to B a	Display Filts	rr; Display All	 Data Setti 	ng Assistant	Offine Sir	nulation	Automatic Command	Speed Calc.	Automatic Sub Arc Calc.	
0000:RD77M54 m System Setting	No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	Command speed	Dw A
 System Configuration Mark Detection Parameter Servo Parameter 	2	(Positioning Comment> (Positioning Comment> (Positioning Comment>)					137079.0 pm	No. part	2000.00 1000	
Postforring Data Postforring Data Avis #1 Positioning Data Avis #2 Positioning Data Positioning Data Positioning Data Positioning Data	4 5 6	Positioning Comment>								
n 🖗 Biock Start Data n 🖗 Synchronous Control Parameter n 💐 Cam Data	7 8	(Positioning Comment) (Positioning Comment)								
Simple Motion Monitor Simple Motion Monitor Servo Amplifier Operation	9	<positioning comment=""></positioning>								
	Operatio The oper- successio	n pattern ation pattern designates n.	whether positioning	of a certain data No.	is to be ended i	with just that d	ita, or whether the pos	tioning for the next	data No. is to be carrie	d out in
	•									•

<Axis 2 positioning data>

No	Operation	Control	Axis to be	Acceleration	Deceleration	Positioning	Arc	Command	Dwell	M-
INO.	pattern	system	interpolated	time No.	time No.	address	address	speed	time	code
1		INC		1:1000	1.1000	<u>157079.6</u>	0.0	<u>2000.00</u>	0.000	0
I	<u>0: END</u>	linear 1	-	1.1000	1.1000	μm	μm	<u>mm/min</u>	Uns	0

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

(1) Synchronous parameter settings

The following explains the settings that synchronize the axis 1 to the axis 2 feed current value.

- 1. Select [Main shaft (Main)], and then the [Type] for the Main input axis is selected.
- 2. Set [Pr.400 Type] to "1: Servo Input Axis", and [Pr.400: Axis No.] to "2".



3. Change the items with red frames as follows.

<Synchronous parameter axis 1>

	Iter	Details	
Main shoft	Main input avia No	Pr.400: Type	<u>1: Servo input axis</u>
	Main input axis No.	Pr.400: Axis No.	2
Main Shart	Sub input axia No	Pr.401:Type	0: Invalid
	Sub input axis No.	Pr.401: Axis No.	0
Composite	Pr.402: Main		1: Input +
gear	Pr.402: Sub		0: No input
Main shaft	Pr.403: Numerator		1
gear	Pr.404: Denominator		1
		Pr.405: ON control mode	0: No clutch (Direct coupled operation)
Main shaft	Main shaft clutch control setting	Pr.405: OFF control mode	0: OFF control invalid
clutch		Pr.405: High speed input	0
		request signal	
	Cam axis cycle unit setting	Pr.438: Unit setting selection	0: Use units of main input axis
		Pr.438: Unit	<u>0mm</u>
		Pr.438: Number of decimal	<u>0</u>
		places	
	Pr.442: Cam axis leng	th per cycle change setting	0: Invalid
Output	Pr.439: Can axis lengt	h per cycle	<u>157.0796mm</u>
axis	Pr.441: Cam stroke an	nount	<u>100000.0µm</u>
	Pr.440: Cam No.		<u>1</u>
	Pr.444: Cam axis phas	se compensation advance time	0 µs
	Pr.445: Cam axis phas	se compensation time constant	10 ms
	Pr.446: Synchronous of	control deceleration time	0 ms
	Pr.447: Output axis sn	noothing time constant	0 ms

(Note): Items without red frames remain as default values.

(2) Input axis parameter settings

The following explains the settings that synchronize the axis 1 to the axis-2 feed current value.

1. Select [Input Axis Parameter].

2. Select [1: Feed Current Value] for [Pr.300 servo input axis type] for axis 2.

	MELSOFT Simple Motion Module Setting Function	on C:WUsersWRR99941WDesktopWRD77M54	_sample2_eng.gx3 - [(000:RD77MS4[]-Input Axis F	Parameter]	
E	roject Edit View Online Iools Window	v <u>H</u> elp				_ 8 ×
X	🕻 🗈 🖆 🍽 100% 🚽 💡 🦉 🕄	。 反反共民 伊。				
3	Navigation • ×	🔗 0000:RD77MS4[]-Axis #2 Po	0000:RD77MS4[]-	input Axis 🔗 0000:RD	77MS4[]-Input Ax × 🔗 0000	:RD77MS4[]-Axis #1 Sy ↓ ♥ ₹
	Project	Display Filter Servo Input Avis Parameter	• S	nchronous Parameter Setting	Synchronous Control Image	
	0000:RD77M54	Iten Servo Input axis	Axis #1	Axis #2	Axis #3	Axis #4
	System Configuration	 Pr. 300:Servo input axis type Detail setting 	0:5nvalid	1:Feed Current Value	:Invald	0:Invalid
	Mark Detection	- octain actions			_	
	Parameter	7			2	
	Servo Parameter Positioning Data					
	🔗 Axis #1 Positioning Data					
	Axis #2 Positioning Data					
	Axis #4 Positionin					
	🖬 😵 Block Start Data					
	Synchronous Control					
	😥 Input Axis Parameter					
	Axis #1 Synchronous Parameter					
	Axis #2 Synchronous Parameter Axis #3 Exectioners Parameter					
	Axis #4 Synchronous Parameter					
	🗉 🚉 Cam Data					
	Simple Motion Monitor					
	Digital Oscilloscope					
	< <u> </u>					
						*
			R04	Host No.1		Insert CAP NUM

<Input axis parameter (axis 2)>

	lte	Description	
	Servo input axis type		<u>1: Feed current value</u>
	Detail setting	Smoothing time constant	0ms
Servo input		Phase compensation advance time	Оµѕ
		Phase compensation time constant	10ms
		Rotation direction restriction	0: Without rotation direction restriction

(Note): Items without red frames remain as default values.

- (3) Transition of synchronous control parameter window
 - 1. Select [Axis # 1 Synchronous Parameter] in the menu. Then, the axis 1 synchronous parameter can be changed.
 - 2. Click [Synchronous Control Image] to open the image screen.

[Synchronous parameter]

[Synchronous control image]



[Input axis parameter]

Display Filter_ Servo Input Axis Parameter	- Synchrone	ous Parameter Setting Syr	nchronous Control Image	
Item	Axis #1	Axis #2	Axis #3	Axis #4
😑 Servo input axis				
Pr.300:Servo input axis type	0:Invalid	1:Feed Current Value	0:Invalid	0:Invalid
🗆 🖃 Detail setting				
 Pr.301:Input smoothing time constant 	0 ms	0 ms	0 ms	0 ms
Pr.302:Phase compensation advance time	0 µs	0 µs	0 µs	0 µs
Pr.303:Phase compensation time constant	10 ms	10 ms	10 ms	10 ms
Pr.304:Rotation direction restriction	0:Without Rotation Direction Re	0:Without Rotation Direction Re	0:Without Rotation Direction Re	0:Without Rotation Direction Res

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

(4) Settings for synchronous control parameters and input axis parameters are completed.

Overview

4.3.5 Cam data creation

- (1) Creating a new cam data
 - 1. Right click on [Cam Data], and select [Add New Data...] to open the New Data window.
 - 2. Set the cam No.
 - 3. Select "Set by Stroke Ratio" and "Cam Curve" in the Setting Method.
 - 4. Click [OK]. The cam data creation screen appears.



- 5. Make a rough cam graph by dragging an end of the cam waveform.
- 6. Based on the rough cam data, modify the end point and stroke, and finish the cam data.

(2) Cam curve creation

A cam data graph can be generated by inputting the end point and the stroke.



<Cam data>

Section No.	Start point [degree]	End point [degree]	Stroke [%]	Cam curve
1	0.00000	2.00000	0.0500000	Constant speed
2	2.00000	4.00000	0.5000000	Constant speed
3	4.00000	6.00000	1.1000000	Constant speed
4	6.00000	8.00000	1.9000000	Constant speed
5	8.00000	113.59160	50.0000000	Constant speed
6	113.59160	222.00000	98.1000000	Constant speed
7	222.00000	224.00000	98.9000000	Constant speed
8	224.00000	226.00000	99.6000000	Constant speed
9	226.00000	228.00000	99.9500000	Constant speed
10	228.00000	229.18320	100.0000000	Constant speed
11	229.18320	0.00000	0.0000000	Dist. Constant speed

(3) Cam data creation is completed.

4.3.6 Saving a project

Refer to Section 3.3 "(6) Saving a project".

4.3.7 Writing to the Simple Motion module

Refer to Section 3.3 "(7) Writing to the Simple Motion module".

4.4 Operation Check for Synchronous Control

Refer to Chapter 3 for details of JOG operation, home position return, and positioning control. This section explains operation check for synchronous control.

Follow the procedure below so that the axis 1 synchronizes to the feed current value of axis 2 with cam operation.

4.4.1 Home position return

Perform home position return for axis 1 and 2.

This section explains operation check method for axis 2 home position return.

Refer to Chapter 3 for details of the axis-1 home position return operation check.

- 1. Select axis 2. Double click X62 while pressing SHIFT.
- 2. Set the Positioning start No. (9001). Double click X63 while pressing SHIFT.
- 3. Start the positioning. Double click X71 while pressing SHIFT.

[Axis 2 is selected]



[Axis-2 home position return start]

(408)	Home X63 Home Position return Data	2.							MOVP	K9001	uwPositio D16 9001 Positioning Start No
(412)	bStartposi X71 1 Start Positioning req	bDuringJO M81 JOG/Inching Operation flag	RD 77_1.bn Y10 RW:Positioni ng start (Axis#1-#16)	RD77_1.bn*** DX10 R:BUSY (Axis#1-#16) (Direct)	=	K1	iAxisNo D14 1 Axis No			SET	bPositioni M80 Positioning Start Request
		3.	RD 77.1.bn… Y11 RW:Positioni ng start (Axis#1-#16)	RD77_1.bn*** DX11 R:BUSY (Axis#1-#16) (Direct)	=	K2	iAxisNo D14 1 Axis No				

4. Home position return is completed.

4.4.2 Synchronous control start

Set [Cd.380 synchronous control parameter] for each output axis, and start synchronous control. Once the synchronous control starts, output axes operate in synchronization with the input axis operation.

- (1) Start and confirmation of output axis to be synchronized
 - 1. Start synchronous control of axis 1. Double click X7D while pressing SHIFT.

(875)	Synchronous Axis Set		MOVP	H1	RD77_1.st U0¥G36320 0 RW-Synchro nous control start(Direct)
	bSynchron… X7D			HO	RD77_1.st U0¥G36320
(881)	3 Synchronous Axis Set		MOVP		0 RW:Synchro nous control start(Direct)

2. Check axis-1 BUSY signal

Check the axis operating status and BUSY flag.

When setting H1 to the buffer memory for synchronous control start (U0\G36320), confirm that axis-1 BUSY signal is turned ON.

Axis Monitor Monitor	Type: Axis(Output Axi	s) Font Size:	9pt	t Module Information List
	Axis #1	Axis #2	-	PLC READY(Y0)
Md.20:Feed current value	0.0 µm	0.0 µm		READY(N0)
Md.21:Machine feed value	0.0 µm	0.0 µm		Synchronization flag(X1)
Md.23:Axis error No.	-	-		All aves serve ON(Y1)
Md.24:Axis warning No.				Mid 108-Centre status 1 - DEADY CAL
Md.26:Axis operating status	Synchronous Control	Waiting		Mo. 100:Serve status 1 : READT ON
Md.28:Axis feedrate	0.00 mm/min	0.00 mm/min		AX05 TAD. 1 2 3 4
Md.30:External input signal : Lower limit	ON	ON		Md. 108:Servo status 1 : Servo ON Axis No. 1 2 3 4
Md.30:External input signal : Upper limit	ON	ON		Md. 50:Forced stop input(U0¥G4231)
Md.31:Status : HPR request flag	OFF	OFF		BUSY
Md.31:Status : HPR complete flag	OFF	ON		Md.31:Status : Error detection
Md.44:Positioning data No. being executed				Axis No. 1 2 3 4
Md.47:Positioning data being executed : Operation pattern	Positioning Complete	Positioning Complete		Md.31:Status : Axis warning detection Axis No. 1 2 3 4
Md.47:Positioning data being executed : Control method	-			Md. 1:In test mode flag(U0WG4000) Md. 51:AMP.last operation model(10WG4210)
Md.47:Positioning data being executed : Acceleration time	0:1000	0:1000		Md. 133:Operation cycle over flag(U0WG4239)
No.				Md. 132:Set operation cycle(U0¥G4238)
Md.47:Positioning data being	0.1000	0.1000		0200h:0.444 ms
No.	0.1000	0.1000		Md. 134:Operation time(U0¥G4008)
Md.47:Positioning data being executed : Axis to be				Md. 135:Maximum operation time(U0WG4009)
interpolated				0 µs
Md.47:Positioning data being executed : M-code		-		Md. 19:No. of Flash ROM writing(U0WG4224)
Md.102:Deviation counter	0 pulse	0 pulse		Md Chilanshina fina far davar commutation
Md.103:Motor rotation speed	0.00 r/min	0.00 r/min		Complete of searching for driver
Md.104:Motor current value	0.0 %	0.0 %	-	compact or pear and you driver as

Item	Axis 1
Md.26: Axis	Synchronous control
operating status	
BUSY	Axis 1: ON

Positioning Control Startup

Overview

- (2) Start and confirmation of the main shaft (input axis)
 - 1. Set the axis No. for the main shaft (input axis). Double click X62 while pressing SHIFT.

(21)		MOVP	K1	iAxisNo D14 O Axis No
(25)	1.	MOVP	K2	iAxisNo D14 0 Axis No

- 2. Set the program No. for axis 2. Double click X66 while pressing SHIFT.
- 3. Start the main shaft (input axis). Double click X71 while pressing SHIFT. Output axes move synchronizing to the main shaft movement.



(3) Operation check for main shaft (input axis)

Check that the servo motors for axis 1 and 2 start operation.

9 🔽 🖓 🗞 🕅 🖉	.				
adis Monitor Monitor	Type: Axis(Output Axis) Font Size:	9pt	Mod	lule Information List
	Axis #1	Axis #2	Бa,		PLC READY(Y0)
4d.20:Feed current value	42095.7 µm	41992.5 µm	1		READY(ND)
4d.21:Machine feed value	42095.7 µm	41992.5 µm			Synchronization flag(X1)
4d.23:Axis error No.	•		1		All aves servin ON(Y1)
4d.24:Axis warning No.			2		and solutions advantation of a first office
4d.26:Axis operating status	Synchronous Control	Position Control	12	•	
4d.28:Axis feedrate	2085.90 mm/min	2000.00 mm/min	J		AX5 ND. 1 2 3 4
4d.30:External input signal :	ON	ON			Md. 108:Servo status 1 : Servo ON
ower imt			3		Axis No. 1 2 3 4
iosuscemai input signal : Joper limit	ON	ON			Md. 50:Forced stap input/LOWG4231)
4d.31:Status : HPR request	455	-	1		n cx
bg	Ohh	OFF			
kd.31:Status : HPR	OFF	OFF	111		
complete flag			111		Md.31:Status : Error detection
4d.44:Postioning data No.	-	1			Axis No. 1 2 3 4
4d.47:Postioning data being					Md.31:Status : Axis warning detection
executed : Operation	Positioning Complete	Positioning Complete			Axis No. 1 2 3 4
attern					
4d.47:Postioning data being	-	1-axis linear control			Md. 1:In test mode flag(U0#G4000)
Metaley : comportinging		(846)		•	Md.51:AMP-less operation mode(U0WG4232)
executed : Acceleration time	0:1000	0:1000		0	Md. 133:Operation cycle over flag(U0¥04239)
io.			111		Md. 132:Set operation cycle(U0¥G4238)
4d.47:Positioning data being					0200h:0.444 ms
xecuted : Deceleration time in.	0:1000	0:1000			Md. 134: Operation time(U0¥G4008)
M 47-Doctioning data being					0 ps
executed : Axis to be					Md. 135:Maximum operation time(UO#G4009)
iterpolated					0 ps
4d.47:Positioning data being					Md. 19:No. of Flash ROM writing(U0WG4224)
Ad 102/Deviation counter	0 miles	0 m/m			0 times
M 102 Meter retation mounter	12.36 simin	13 71 climin			Md.52:Searching flag for driver communication .
A 101 Hotel ocación speed	13-20 ((mm))	12//1 (/ml)			Complete of searching for driver

	Item	Axis 1	Axis 2
1	Md.20: Feed current value	-	-
1	Md.21: Machine feed value	-	-
	Md.26: Axis operating status	Synchronous	Positioning
2		control	control
	Md.28: Axis federate	-	2000.00
			[mm/min]
	Md.30: External input signal:	ON	ON
2	Lower limit		
3	Md.30: External input signal:	ON	ON
	Upper limit		
4	BUSY	ON	ON

4.4.3 Operation check with digital oscilloscope

The section explains how to check the cam operation with the assistant function of digital oscilloscope.

- (1) Start of digital oscilloscope
 - 1. Select [Digital Oscilloscope] in the menu.



- (2) Selecting probe
 - 1. Click [Assistant Screen] to open the Assistant window.
 - 2. Click [Select the probe item to be sampled.] to open the Assistant (Probe Selection).
 - 3. Select [Cam operation] in the List by specified purpose.
 - 4. Select the axis No.

Assistant Screen	Assistant Salact the work item		Assistant (Probe Selection)			
	Communicate with the simple motion module sample the data.	Display	Select the probe item to be samp # Select flas specified purpose protes. Select from all probe items. Costs or sharing the left protection.	oled.	Explanation Selecting the purpose from the last ratis the probe item. Also the trapper balance and the to appropriate for the purpose are se	and axis his, automatically gger condition that are it automatically.
	2) sheet the grade term to be sampled 3) set the sampling constrome. 3) set the sampling. 3) Size the sampling. 5) Size the sampling constrom and sampled data to be the sam a sampling data.	Print th	List by specified purpose Postion control operation during the sig Postion control operation during the poi Speed control operation during the poi Speed control operation during the poi Speed control operation during the point Speed control operation during the point	Probe term Md.4097-Cam Ax. 1 cycle current v Md.4097-Cam Ax. feed current v Md.103-Motor speed Md.104-Motor current value Md.106:SV status 1 - Alarming Md.31:SRatus - Error detection	value 4.	
	Read the samping data saved in the file.	zeen during th	Cam operation	Cose		OK Genos

(3) Sampling condition settings (No need to change)Change the sampling condition where necessary.In this example, the default values are used.

Assistant (Sampling Condition)	
Set the sampling condition.	
Set the input item and press the [Calculation] button. Calculates the sampling condition and performs the setting automatically. Input Sampling Rate (ms) 0.888 x 1 (1-5000) Set from the total sampling time. (Recommend it when being two-dimensional trajectory display) Total Sampling Time (s) 14.5 (0.1 - 599999.9) Rate of Sampling Time after Trigger Trigger Balance (%) 90.00 (0.01-100.00)	Sampling Condition Sampling Rate (ms) 0.888 1 (1 - 5000) Sampling Size (point) 16384 (10 - 131072) Actual total sampling time (ms) 14563.6 After the trigger Sampling Size (point) Sampling Size (point) 14746 Sampling Time (ms) 13107.6
Pressing the [OK] button reflects	the calculation result. OK Cancel

Overview

Control Startup

4

Synchronous Control Startup

(4) Trigger condition settings (No need to change)

Set the trigger condition where necessary.

The default values are normally used.

- 1. Select [Edit] \rightarrow [Sampling settings] to open the Sampling Setting screen.
- 2. Select the Trigger Mode from Bit OR, Bit AND, Word OR, or NONE.
- 3. Select pattern. (Leading edge, trailing edge, change)

🚻 Digital Oscilloscope - C:¥Uiseri 🗰 🕬	Sampling Setting	
File Edit View Action Online Tools	Initial Setting Trigger Setting 2.	
Probe Section	Trigger Mode ONONE OBLOR OBLAND @ Word OR	
S Pro <u>b</u> e seeding	WORD BIT Next Page Previous Page	
Ax.1 Sampling Se <u>t</u> ting	PROBE Device Word Pattern Filter Trigger Value	
DUMP		e
	Ax: 146.407:Can Ax: 1 cycle current value(42812) 2(a) - 0 0 Puls	e
	Kx.14d.103/btor speed(2454) Z(a) - 0 0 x0.6) 1r/min
	Ax. 1-Hd. 10-HMator current value(2456) 1(4) 0 0 x0. 1	1%
	- 0 0	
	(Box	conpete
Start sampling		
NIN: Start compling		
CON. Start Sampling.		
STOP ⁻ Stop sampling		
REEZE: Sampling pauses.		
🕅 Digital Oscilloscope - C: 👯 🖛		
🕅 Digital Oscilloscope - C: 👯 🖶		

(6) Checking cam data

🕒 🛯 🔂 📑 🗒 🗒 🕁

Ax. 1-Md. 407:Cam Ax. 1 cycle cur...

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

RUN, STOP, FREEZE



(7) Operation check is completed.

MEMO

APPENDICES

Appendix 1 Simulation

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

- (1) Simulation environment settings
 - 1. Select [Debug] → [Simulation] → [Simulation Environment Setting] to open the Simulation Environment Setting window.

Add the Simple Motion module registered in the Module configuration screen.

Simulation Env Select the sim OK. Please ass Slot OPU 0 1 2 3 4	Ify Value Shift+Enter nge History of Current Value nory <u>Dump</u> ng] COM ENT [Device Comme 1. ironmental Setting ple motion module to execute Cooperative Debug, then click sign RCPU (other PLC) to the slot used by CPU. Model Name R04CPU(Host PLC) RD77MS4 RD77MS2 RD77MS4
Char (PRC) Char Men Simulation Env Select the sim OK. Please ass Slot CPU 0 1 2 3 4	In the second se
Simulation Env Select the sim OK. Please ass Slot OPU 0 1 2 3 4	nory <u>Dump</u> ng <u>COM ENT [Device Comme.</u> 1. ironmental Setting ple motion module to execute Cooperative Debug, then click sign RCPU (other PLC) to the slot used by CPU. Model Name R04CPU(Host PLC) RD77MS4 RD77MS4
Simulation Env Select the sim OK. Please ass Slot CPU 0 1 2 3 4	ng) i COMIENT (Device comme ironmental Setting ple motion module to execute Cooperative Debug, then click sign RCPU (other PLC) to the slot used by CPU. Model Name R04CPU(Host PLC) RD77MS4 RD77MS4 RD77MS4
Simulation Env Select the sim OK. Please ass Slot CPU 0 1 2 3 4	irronmental Setting ple motion module to execute Cooperative Debug, then click sign RCPU (other PLC) to the slot used by CPU. Model Name R04CPU(Host PLC) R077MS4 R077MS2 R077MS4
Select the sim OK. Please ass CPU 0 1 2 3 4	ple motion module to execute Cooperative Debug, then click sign RCPU (other PLC) to the slot used by CPU. Model Name R04CPU(Host PLC) RD77MS4
CPU 0 1 2 3 4	R04CPU(Host PLC) RD77MS4 RD77MS2 R077MS4
0 1 2 3 4	RD77MS4
1 2 3 4	RD77MS2 RD77MS4
2 3 4	RD77MS4
3 4	DD 13MO0
4	RD77MS8
	RCPU(Other PLC)
5	
6	
7	
8	
9	
10	
11	

(2) Starting MELSOFT GX Works3 simulator

- 1. Click [Debug] \rightarrow [Simulation] \rightarrow [Star Simulation] to open the Online Data Operation screen.
- 2. Check the boxes for data to be written. Click [Execute].

line D	De <u>b</u> ug	Diag	nostics	Tool	<u>W</u> in	dow	Help							
0.01	4	Simulati	ion				•		Start S	imulation	٦			
		Modify \	/alue		Shit	ft+En	ter			mulation	_			
œ• ۴	- 1940	ch							1 🕺	mulation				
J -1,221 6 saF5	(Change	History	or Curi	rent v	a <u>i</u> ue	•	400	• a	tion <u>E</u> nviron	mental Setting) 🧃		
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into]		*						LIGI	P C		evice comme			
														
Online Dat	ta Oper	ation												
Display	Sett	ing Relat	ed Function	ns										
9		Write		100	Read	<u> </u>	TR	Verify	크 🄗	Delete				
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	Select D	avonces	Selec	a alliana	OP	U Built-ir	1 Memory	SD Me	mory Card	🚯 Intelligent Fi	nction Module			
	pen/Cio	ise All(<u>T</u>)	Deseied	t All(<u>N</u>)		_								
Modu	ule Name	/Data Name		_	Ċ	8		Detail	Title		Last Change	Size (Byte)	•	^
	RUTI	Ma4_samp	le 2_eng			<u> </u>								
		System Pa	rameter/CPI	J Parame							2015/06/25 17:34:42	Not Calcula	tion	
	- 6	Module Par	ameter								2015/06/25 17:42:35	Not Calcula	tion	
	1	Simple Mo	tion M	, T				Detail			2015/06/25 17:34:43	Not Calcula	tion	
	- 61	Memory Ca	erd Pa	<u>.</u>							2015/06/25 17:83:59	Not Calcula	tion	
	- 160	Remote Pa	SSWOP		2						2015/06/25 17:33:59	Not Calcula	tion	
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	- 6	Global Lab	el Setting		2						2015/06/25 17:46:22	Not Calcula	tion	
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Memory	Capacit	y												
Sig	ze Galcul	lation	Program M	emory									Free	
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Us Us	sed				100.00								2030/204	IOND
n he	creased		Device/Lat	el Memory	(File Sto	rage Area	0						Free 256/2568	VD.
De De	ecreased		CD M	Curd										
5%	for Less		SD memory	- Uard									0/0KB	
												Execute		Close

- (3) Starting Simple Motion module simulator
 - 1. After closing the [Online Data Operation] window on the previous page, the message window about the Simple Motion module appears.
 - 2. Click [Online] \rightarrow [Write to PLC...] to open the Online Data Operation screen.
 - 3. Select [Simple Motion Module Settings].
 - 4. Click [Execute].
 - 5. Click [Yes].

To exe Simula			A						
To exe Simula			1.						
from O	cute the Coop tor3 after writ Inline Data Op	erative Si ting the S eration w	mulation, imple Mot indow.	please re tion Modu	eset the le Settii	GX ng data			
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	Specify	y Co <u>n</u> nec	tion Dest	tination					
	Read f	rom PLC.							
	Write 1	to PLC							
	Verify	With PLC		_					
	Bomot		2						
	Kemot	le Operat	lioni						
	CPU M	lem <u>o</u> ry O	peration.						
	Delete	PLC Dat	a						
🖳 🕨 🇊 Write	24 🇊	Read 🔜	2 10 V	erity 🖳	> 1 11	Delete			
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Select Eavorites Open/Close All(1) Module Name/Data Nam	Select All	Read E	It-in Memory	erity 🔛 < SD Memory Co Detail Tit	ord 🚯 Int	Delete elligent Function Mode Last Chi	ile	Size (Byte)	
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MELSOFT GX Works3		8
0verwrite contents of flash R	lOM. Are	you sure you want to continue?
	5.	Yes <u>N</u> o

- (4) Reset of Simple Motion module simulation
 - 1. Click [Reset]. STOP is selected from RUN.



2. Select RUN again, and the P.RUN is turned ON.

SMM Simulator 🗖 🗉 🔀	GX Simulator3 🗖 🛛 🔀
Tools	1.1 R04CPU
1.1 0000:RD77MS4	LED SWITCH READY ERROR P. RUN STOP
ERR. AX3	USER 2. RESET

(5) Debug by simulation

Debug for the Simple Motion module can be executed with GX Simulator3.

T GX Works3 C:#Users#RR99941#Desktop#RD77H54_sample2_ang.gs3 - (ProgPou (PRG) Edit End/Replace Convert View Online Debug Diagnostics Jool Window	(LD) Monitoring (Read Only) \$89Step) Belp		-8×		
	• <i>₽≠₽</i> ≈₽≈₩0000 î	5 2 O O Max.: 1.826ms			
はないには、「「「「「「」」「「」」」のないでは、「「」」」では、「「」」」」では、「」」」」」では、「」」」」」」」」」」	調達与静義高生生年老品の Control Control Theory Control	NN3553.			
	7	10 11	12 7 2		
8077 1 HF-		R	077 15P++		
00 RREADY		R	NPLO LADV		
ServeCH FD77_15R RD77_15F FD77_15F	0000:RD77MS4[] - Axis N	Ionitor			
(2) Bervo ON RREADY RWPLC. RSinchroni				_	
Per Person Direct)	Axis Monitor Monit	or Type: Axis(Output Axis	s) v Font Size:	9pt	Module Information List
b-Jo <u>cTowe</u>		Avic #1	Avic #3	1	
	Md 20:Feed current value	42005 7 um	41002 5 um	-fil	
VOI Speed	Md 21:Machine feed value	42095.7 µm	41992.5 µm		
	Md 23:Axis error No	-	-		Synchronization flag(X1)
b-ballione - RD7718R-+ RD771br XXE - R0	Md.24:Axis warping No.		-		All axes servo ON(Y1)
	Md.26:Axis operating status	Synchronous Control	Position Control		Md. 108:Servo status 1 : READY ON
(13) JOG RREADY REUSY	Md.28:Axis feedrate	2085.90 mm/min	2000.00 mm/min		Axis No. 1 2 3 4
David (Accel 1-410)	Md.30:External input signal :	011	011		Md. 108:Servo status 1 : Servo ON
KARTER	Lower limit	ON	ON		Axis No. 1 2 3 4
	Md.30:External input signal :	ON	ON		
400	Upper limit				Md. 50:Forced stop input(U0¥G4231)
Reverse Start Rec	Md.31:Status : HPR request	OFF	OFF		BUSY
bluefore - bluefiner -	Md.31:Status : HPR	0.55	0.55	=	Axis No. 1 2 3 4
ME WE	complete flag	OFF	OFF		Md.31:Status : Error detection
(16)	Md.44:Positioning data No.	-	1		Axis No. 1 2 3 4
Forward Reverse Dart res Start Res	being executed				Md 21.Clab a Asia warning datastica
Marin 1	executed : Operation	Positioning Complete	Positioning Complete		Avia No. 1 2 2 4
A T WAY I	pattern	g complete			AXIS IND. 1 2 3 4
ess 🙀 Result of Power Supply Capacity and 1/0 Points Check 🛛 🗖 Output	Md.47:Positioning data being		1-axis linear control		Md. 1:In test mode flag(U0¥G4000)
والمربطة والمحمد المرجمين المحتود مراك	executed : Control method		(INC)		Md. 51:AMP-less operation mode(U0¥G4232)
	Md.47:Positioning data being executed : Acceleration time	0:1000	0:1000		Md. 133:Operation cycle over flag(U0¥G4239)
	No.		0.1000		Md. 132:Set operation cycle(U0¥G4238)
	Md.47:Positioning data being	1			0200h:0.444 m
	executed : Deceleration tim	e 0:1000	0:1000		Md. 134:Operation time(U0¥G4008)
	Md 47:Positioning data baing				0 µs
	executed : Axis to be	-	-		Md. 135:Maximum operation time(U0¥G4009)
	interpolated				0 μs
	Md.47:Positioning data being	-	-		Md. 19:No. of Flash ROM writing(U0¥G4224)
	executed : M-code	0 pulso	0 pulso		0 tir
	Md.102:Deviation counter	d 12.26 r/min	12 71 r/min		Md. 52:Searching flag for driver communication
	Md 104 Motor current inter	0.0.96	12./1 //////		Complete of searching for driver
	Md.104:Motor current value	0.0 %	0.0 %	*	Md 53-SSCNET control status(10%G4233)

Appendix 2 Parameter and Positioning Data

(1) Parameters

	Item	Axis #1	Axis #2				
C	ommon Parameter	The parameter does not rely on axis and relate to the					
	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)					
	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 inp external command/switching	ut signal (proximity dog, 1g) from the external devi				
	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 inp	ut signal.				
B	asic parameters 1	Set according to the maching	e and applicable motor w				
	Pr.1:Unit setting	0:mm	0:mm				
	Pr.2:No. of pulses per rotation	172985333 pulse	172985333 pulse				
	Pr.3:Movement amount per rotation	6478422.3 µm	6478422.3 µm				
	Pr.4:Unit magnification	1:x1 Times	1:x1 Times				
	Pr. 7:Bias speed at start	0.00 mm/min	0.00 mm/min				
B	asic parameters 2	Set according to the machin	e and applicable motor w				
	Pr.8:Speed limit value	8000.00 mm/min	2000.00 mm/min				
	Pr.9:Acceleration time 0	1000 ms	1000 ms				
	Pr. 10:Deceleration time 0	1000 ms	1000 ms				
D	etailed parameters 1	Set according to the system	n configuration when the s				
	Pr.11:Backlash compensation amount	0.0 µm	0.0 µm				
	Pr. 12:Software stroke limit upper limit value	214748364.7 µm	214748364.7 µm				
	Pr. 13:Software stroke limit lower limit value	-214748364.8 µm	-214748364.8 µm				
	Pr.14:Software stroke limit selection	0:Set Software Stroke Limit to Feed Current Value	0:Set Software Stroke Limit to Feed Current Value				
	Pr. 15:Software stroke limit valid/invalid setting	0:Valid	0:Valid				
	Pr.16:Command in-position width	10.0 µm	10.0 µm				
	Pr.17:Torque limit setting value	300.0 %	300.0 %				
	Pr.18:M-code ON signal output timing	0:WITH Mode	0:WITH Mode				
	Pr. 19:Speed switching mode	0:Standard Speed Switching Mode	0:Standard Speed Switching Mode				
	Pr.20:Interpolation speed designation method	0:Vector Speed	0:Vector Speed				
	Pr.21:Feed current value during speed control	0:Not Update of Feed Current Value	0:Not Update of Feed Current Value				
	Pr.22:Input signal logic selection : Lower limit	0:Negative Logic	0:Negative Logic				
	Pr.22:Input signal logic selection : Upper limit	0:Negative Logic	0:Negative Logic				
	Pr.22:Input signal logic selection : Stop signal	0:Negative Logic	0:Negative Logic				
	Pr.22:Input signal logic selection : Proximity dog signal	0:Negative Logic	0:Negative Logic				
	Pr.81:Speed-position function selection	0:Speed-position Switching Control (INC Mode)	0:Speed-position Switching Control (INC Mode)				
	Pr.116:FLS signal selection : Input type	15:Invalid	15:Invalid				
	Pr. 116:FLS signal selection : Input terminal	00h:No Setting	00h:No Setting				
	Pr. 117:RLS signal selection : Input type	15:Invalid	15:Invalid				
	Pr. 11/:RLS signal selection : Input terminal Pr. 118:DOG signal selection :	00h:No Setting	00h:No Setting				
	Input type	15:Invalid	15:Invalid				

	Item	Axis #1	Axis #2		
	Pr.118:DOG signal selection : Input terminal	00h:No Setting	00h:No Setting		
	Pr.119:STOP signal selection : Input type	15:Invalid	15:Invalid		
ļ	Pr.119:STOP signal selection : Input terminal	00h:No Setting	00h:No Setting		
= D	etailed parameters 2	Set according to the system	n configuration when the s		
	Pr.25:Acceleration time 1	1000 ms	1000 ms		
	Pr.26:Acceleration time 2	1000 ms	1000 ms		
	Pr.27:Acceleration time 3	1000 ms	1000 ms		
	Pr.28:Deceleration time 1	1000 ms	1000 ms		
	Pr. 29:Deceleration time 2	1000 ms	1000 ms		
	Pr. 30:Deceleration time 3	1000 ms	1000 ms		
	Pr. 31: 10G speed limit value	200.00 mm/min	200.00 mm/min		
	Pr. 32: 10G operation acceleration	200100 1111,1111	200100 1111,1111		
	time selection	0:1000	0:1000		
	time selection	0:1000	0:1000		
	Pr.34:Acceleration/deceleration	0:Trapezoidal	0:Trapezoidal		
	process selection	Process	Process		
	Pr 35-S-curve ratio	100 %	100 %		
	Pr 36 Panid stop deceleration time	1000 ms	1000 ms		
	Pr 37:Stop group 1 rapid stop	1000 ms	1000 ms		
	selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop		
	selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop		
	Pr.39:Stop group 3 rapid stop selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop		
	Pr.40:Positioning complete signal output time	300 ms	300 ms		
	Pr.41:Allowable circular interpolation error width	10.0 µm	10.0 µm		
	Pr.42:External command function selection	0:External Positioning Start	0:External Positioning Start		
	Pr.83:Speed control 10x multiplier setting for degree axis	0:Invalid	0:Invalid		
·····	Pr.84:Restart permissible value range when servo OFF to ON	0 pulse	0 pulse		
	Pr.90:Operation setting for SPD-TRQ Cont. mode : Torque initial value selection	0:Command Torque	0:Command Torque		
	Pr.90:Operation setting for SPD-TRQ Cont. mode : Speed initial value selection	0:Command Speed	0:Command Speed		
	Pr.90:Operation setting for SPD-TRQ Cont. mode : Condition selection at mode switching	0:Switching Conditions Valid at Mode Switching	0:Switching Conditions Valid at Mode Switching		
	Pr.95:External command signal selection	0:Not Used	0:Not Used		
	Pr. 122:Manual pulse generator speed limit mode	0:Do Not Execute Speed Limit	0:Do Not Execute Speed Limit		
	Pr. 123:Manual pulse generator speed limit value	200.00 mm/min	200.00 mm/min		
⊟ H	PR basic parameters	Set the values required for	carrying out HPR control (
	Pr.43:HPR method	6:Data Set Method	6:Data Set Method		
	Pr.44:HPR direction	0:Forward Direction (Address Increase Direction)	0:Forward Direction (Address Increase Direction)		
	Pr.45:HP address	0.0 µm	0.0 µm		
	Pr. 46:HPR speed	1000.00 mm/min	1000.00 mm/min		
	Pr. 47:Creep speed	0.01 mm/min	0.01 mm/min		
	Pr. 48:HPR retry	0:Do Not Retry HPR with Limit	0:Do Not Retry HPR with Limit		
		Switch	Switch		
E H	PR detailed parameters	Set the values required for	carrying out HPR control (
	Pr.50:Setting for the movement amount after proximity dog ON	0.0 µm	0.0 µm		
	D DALLED I L D D				

	Pr.51:HPR acceleration time selection	0:1000	0:1000				
	Pr.52:HPR deceleration time selection	0:1000	0:1000				
	Pr.53:HP shift amount	0.0 µm	0.0 µm				
	Pr.54:HPR torque limit value	300.0 %	300.0 %				
	Pr.55:Operation setting for incompletion of HPR	0:Positioning Control is Not Executed	0:Positioning Control is Not Executed				
	Pr.56:Speed designation during HP shift	0:HPR Speed	0:HPR Speed				
	Pr.57:Dwell time during HPR retry	0 ms	0 ms				
	Pr.86:Pulse conversion unit : HPR request setting	0:Turn HPR Request ON at Servo OFF	0:Turn HPR Request ON at Servo OFF				
ļ	Pr.87:Pulse conversion unit : Waiting time after dear signal output	0 ms	0 ms				
e Đ	xpansion parameters	Set according to the system configuration when the s					
	Pr.91:Optional data monitor : Data type setting 1	0:No Setting	0:No Setting				
	Pr.92:Optional data monitor : Data type setting 2	0:No Setting	0:No Setting				
	Pr.93:Optional data monitor : Data type setting 3	0:No Setting	0:No Setting				
	Pr.94:Optional data monitor : Data type setting 4	0:No Setting	0:No Setting				

(2) Positioning data

<Axis-1 positioning data>

			0							
No	Operation	Control	Axis to be	Acceleration	Deceleration	Positioning	Arc	Command	Dwell	M-
INO.	pattern	system	interpolated	time No.	time No.	address	address	speed	time	code
1	<u>1: CONT</u>	<u>ABS</u> linear 1	-	1:1000	1:1000	<u>100000.0</u> <u>µm</u>	0.0 µm	<u>2000.00</u> <u>mm/min</u>	0ms	0
2	<u>0: END</u>	<u>ABS</u> linear 1	-	1:1000	1:1000	<u>0.0µm</u>	0.0 µm	<u>8000.00</u> <u>mm/min</u>	0ms	0

<Axis-2 positioning data>

No	Operation	Control	Axis to be	Acceleration	Deceleration	Positioning	Arc	Command	Dwell	M-
INO.	pattern	system	interpolated	time No.	time No.	address	address	speed	time	code
1	<u>0:END</u>	INC		1.1000	1:1000	<u>157079.6</u>	0.0	<u>2000.00</u>	0mc	0
		11	-	1.1000					01115	0

Appendix 3 Sample Program

≜CAUTION

• The sequence program in the appendix is a program example used in this Quick Start Guide. When applying the program examples provided in this document to an actual system, ensure the applicability and confirm that it will not cause system control problems.

(1) Devices used

Classification	Device No.	Signal name	Signal			
	X60	JOG speed Req				
	X61	Axis 1				
	X62	Axis 2				
	X63	Home Position Return Data	_			
	X65	Positioning Start Data				
	X66	Synchronous Positioning Start data	Input module			
Input	X6E	JOG Forward Start req				
mpat	X6F	JOG Reverse Start req	◆ PLC CPU			
	X71	Start Positioning req				
	X7B	Servo ON req				
	X7D	Synchronous axis set				
	X7E	Error reset	PLC CPU			
	X7F	Stop	Input module ↓ PLC CPU PLC CPU ↓ RD77MS			
	Y0	PLC READY				
Outout	Y1	All axis servo ON				
Output	Y10	Positioning start (Axis#1 - 16)	↓ RD77MS			
	Y11	Positioning start (Axis#1 - 16)				

(2) Sequence program example



Overview 2 Module Startup

		1	2	3	4	5	6	7	8	9	10	11	12
		bJogFor… X6F											
							B:i_bFJog	o_uErrld:UW	[D12]-				
13		100					Forward run	Error code	IOG Error				
		Forward					JOG		code				
		Start req					Command						
		bJogRe… X6F											
		\vdash					B:i_bRJog						
14		JOG					Reverse run						
		Reverse					JOG						
		otart Req											
						i JogS…							
						[D10]	UD:i_udJog…						
15						Jog Speed	Cd.17: JOG						
						data	speed						
		ļ				memo							
						-[K0]	UW:i_uInching						
16							Cd.16:						
							Inching movement						
		LD					amount						
		X65										K1	uwPositi…
	(400)	\vdash \vdash											D16
1/	(400)	Positioning									MOVP		Start No
		Start Data											
		bSyncP											
		X66										K1	uwPositi…
10	(404)	\vdash									MOVP		Dio
18	(404)	Synchrono									MOVP		Start No
		us Positioning											
		Start data											
		X63										K9001	uwPositi···
10	(409)	\vdash									MOVP		Positioning
15	(400)	Home									MOVP		Start No
		return											
\square		Data bStarto…	bDuring	RD77 1	RD77 1								
		X71	M81	Y10	DX10		K1	iAxisNo					bPositio
20	(412)					_		Axis No				SET	Positioning
~		Start	JOG/Inchi	RW:Positio	R:BUSY							021	Start
		req	Operation	(Axis#1-	#16)							_	Request
\square			паg	#16) RD77_1.···	(Direct) RD77_1.···								
					DX11		K2	iAxisNo D14					
21				7	7	=		Axis No					
				RW:Positio	R:BUSY (Axis#1-								
				(Axis#1-	#16)	_							
				#10)	(Direct)		M_RD77_Start	Positionin… (M-					
22	(430)						Positioni	ng start FB					
		bPositio…				1							bStartEND
				К1	iAxisNo D14		B:i_bEN	o_bENO:B					
23			=		Axis No		Execution	Execution					
		Positioning Start					command	status					Positioning Start
		Request				l							Operation
		1			÷ · · · · · · · · · · · · · · · · · · ·								bStartOK
		L				RD77_1	DUT:i stMo····	o bOK-B					M86
24							Module label	Normal					
						Module label	module (abe)	completion					Positioning Start OK


		1	2	3	4	5	6	7	8	9	10	11	12
			RD77_1 X11										RD77_1 U0¥G30
36			R:BUSY										
			#16)										
37		bSynchr···· X7D										H1	RD77_1 U0¥G36
	(875) Synchrono us Axis Set									MOVP		RW:Synchr onous control start(Dir…
Н		bSynchr…											0077.0
38		,⊢ĩĩ–										HU	U0¥G36…
	(881) Synchrono us Axis Set								2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	MOVP		RW:Synchr onous control start(Dir…
39													
	(88)			-		-							[END]

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