

FATEC

Mitsubishi Electric Programmable Controller Training Manual MELSEC iQ-R/iQ-F Simple Motion (for GX Works3)

Introduction

This document is a training manual prepared to facilitate the understanding of single-axis control and multi-axis control by MELSEC iQ-R Series simple motion module.

It describes the features of the simple motion module, the procedures for setting the positioning data and creating the sequence programs using RD77MS4 simple motion module and GX Works3 as demonstration machine and the monitoring and testing operations.

The following related manuals are available.

Simple motion module User's Manuals MELSEC iQ-R Simple Motion Module User's Manual (Startup)IB(NA)-0300245ENG MELSEC iQ-R Simple Motion Module User's Manual (Application)IB(NA)-0300247ENG MELSEC iQ-R Simple Motion Module User's Manual (Advanced Synchronous Control)
Programming manuals
MELSEC iQ-R Programming Manual (Program Design)
Operating Manual
GX Works3 Operating Manual
Documents relating to servo amplifier
MR-J4B_(-RJ) SERVO AMPLIFIER INSTRUCTION MANUAL SH(NA)-030106ENG MELSERVO-J4 Servo amplifier INSTRUCTION MANUAL (TROUBLE SHOOTING) SH(NA)-030109ENG

POINT

In this text, the buffer memories are classified with the following symbols, and the buffer memories for each axis are listed collectively.

- [Pr.**]: Positioning parameter and home position return parameter items
- [Da.**]: Positioning data and block start data items
- [Md.**]: Monitor data items
- [Cd.**]: Control data items

SSCNET is an abbreviation of Servo System Controller Network.

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─ ● Safety Precautions ● − (Always read before performing practical work.)

When designing systems, always read related manuals and give sufficient consideration to safety.

Pay due attention to the following points when performing practical work, and ensure correct handling of the product.

[Practical work precautions]



- Do not touch terminals while the power is ON. Failure to observe this may result in electric shock.
- When removing the safety cover, either turn OFF the power, or ensure that sufficient attention is paid to safety.

- Carry out practical work in accordance with the instructions of your teacher.
- Do not remove the demonstration machine, or make changes to the wiring.

Failure to observe this may result in a fault, malfunction, injury, or fire.

- Turn OFF the power before attaching or removing the module. Removing or attaching the module with the power ON may result in a module fault or electric shock.
- If the demonstration machine emits an abnormal odor or noise, press the [Power] button or [EMERGENCY STOP] button to stop the module.
- If an error occurs, notify your teacher immediately.

Revision History

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* The text number is indicated in the lower left of the rear cover of this text.

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Chapter 1 Outline of Positioning Control

1.1 Outline of Positioning Control

The term "positioning" refers to the process to move a body, such as a workpiece or a tool, (hereinafter, collectively referred to as a workpiece) at the specified speed and stop the body accurately at the target position.

The movement control of workpiece to the target position can be easily made by stopping the workpiece using a timer or installing a sensor at the stop position. However, various problems may arise if it is required to stop it accurately at the position or after moving at a high speed.



To solve these problems, the positioning procedures are described below, so that you can learn how to **transfer a workpiece to the target position at a high speed and stop the workpiece correctly**.



Simple transfer control can be achieved with programmable controllers using timers and limit switches where high accuracy is not required as shown in previous page.

For positioning control or transfer control where high accuracy is required, the positioning function of programmable controllers can be used to stop workpiece accurately at target position with **high repeatability and high reliability**.

The stopping accuracy of the function can be controlled in the order of μ m depending on the equipment mechanism.

- For positioning control using the positioning function of programmable controllers, devices appropriate to the control are required. The outline and functions of the devices are shown below.
 - (1) Positioning controller (CPU module or positioning module)
 - (2) Driving amplifier or driver for transmitting commands from programmable controllers to motor
 - (3) Servo motor or stepping motor capable of precisely detecting rotation angle



(1) Positioning controller

The CPU module or module serves as the positioning controller and gives necessary information for positioning to the servo amplifier or the stepping motor driver.



 (2) Servo amplifier or the stepping motor driver
 Based on the commands given by programmable controllers like the rotation direction, rotating speed, rotation amount are transmitted to the motor.
 In which direction, forward or reverse... Rotation direction command

At what speed ... Speed command ... Position command



(3) Servo motor or stepping motor

The motor rotates in the specified direction at the specified speed and stops at the specified position according to the command given by the servo amplifier or stepping motor driver.

Positioning examples are as shown below:

- -15 m/min (2000 rev/min) 160 mm 320 mm X-axis / Servo moto for Y-axis Y-axis Y-axi . 15 m/min (1875 rev/min) Press punching 12 5 ervo nplifie X-axis Press he JESSTER BERT Gear + rack & pinion Servo moto or X-axis RD77MS Servo amplifie Y-axis
- Punch press (positioning for feeding in X- and Y-axis directions)

Palletizer



- To punch an insulating material or leather with a single die, positioning is performed using two servo motors. One servo motor is for feeding (X-axis) and second servo motor is for press head direction.
- After the table is positioned by the X-axis servo motor, the press head is positioned by the Y-axis servo motor, and the material is punched with the press.
- When the kind or shape of material is changed, the press head is replaced, and the positioning pattern is switched.
- The palletizer is positioned with a high degree of accuracy by using the 1-axis servo motor.
- The lowering distance of the palletizer corresponding to the material thickness is stored.

Small machining center (ATC magazine positioning)



- The ATC tool magazine of small machining center is positioned.
- The relationship between the current value and target value of the magazine is calculated, and it is positioned in the forward or reverse direction in which the target tool can be accessed more quickly.

Lifter (storing of CRTs in aging rack)



Index table (high-precision angle indexing)

- Digital switch Digital switch Index table Worm gear Detector Servo motor
- Internal grinding machine



- CRTs are stored in the rack in the aging process by positioning with the aid of AC servo motor.
- The lifter is positioned in the vertical direction by using the one servo motor, and the aging rack is positioned in the horizontal direction by using second servo motor.

• The index table is positioned with a high degree of accuracy by using the 1 servo motor.

- Grinding of internal surface of workpiece is controlled by using the servo motor and inverters.
- One inverter controls the rotation of the workpiece, and the second inverter controls the rotation of the grinding wheel. The one servo motor feeds the workpiece to grind it.

1.2 Mechanism of Positioning Control

On the positioning system using RD77MS, various kinds of software and external devices are used for the functions shown in the following figure.

RD77MS captures various signals, parameters and positioning data, and the CPU module controls them to realize complicated positioning control.



Positioning control using RD77MS

1.2.1 Schematic designs of positioning systems

The operations and schematic designs of positioning systems are shown below.

(1) System using ball screw

Travel and speed of system using ball screw



- A : Position detection unit (mm/pulse)
- Vs : Command pulse frequency (pulses/s)
- n : Number of slits of pulse generator (pulse count) (pulses/rev)
 - : Feed screw lead (mm/rev)
- R : Reduction ratio
- V : Moving part speed (mm/s)
- N : Motor speed (r/min)
- K : Position loop gain (1/s)
 - : Accumulated pulse count of deviation counter (pulses)

For the above system using ball screw, the position detection unit, command pulse frequency and accumulated pulse count of deviation counter are calculated by the following formulas.

[1] Position detection unit

The position detection unit is calculated from the feed screw lead, reduction ratio and number of slits of pulse generator.

$$A = \frac{L}{R \times n} [mm/pulse]$$

[2] Command pulse frequency

The command pulse frequency is calculated from the moving part speed and position detection unit.

$$Vs = \frac{V}{A}$$
 [pulse/s]

[3] Accumulated pulse count of deviation counter

The accumulated pulse count of deviation counter is calculated from the command pulse frequency and position loop gain.

$$\varepsilon = \frac{Vs}{K}$$
 [pulse]



(2) Positioning system using RD77MS

*1 Any of external input signal of RD77MS, external input signal of servo amplifier and external input signal through CPU (buffer memory of RD77MS) can be used depending on the parameter setting.

1.3 Positioning Control Procedures

1.3.1 Procedures for implementing positioning control

The positioning controls (used in this document) are implemented in accordance with the following procedures.



*1. The home position return parameters must be set only for the home position return control.

1.3.2 Outline of start

When the servo amplifier is started and the start trigger is activated for each control, RD77MS starts the positioning control.

Servo ON conditions

To start the servo amplifier, the following output signals must be successively turned on.

- [1] PLC READY signal [Y0] ON
- [2] All axis servo ON [Y1] ON

Start signals

The start signal for each control enabled after the servo amplifier is started is shown below.

Control type		Start trigger		
Major positioning control		The positioning start signal [Y10 to Y1F] is turned on		
High-level positioning control		 The external command signal (DI) is turned on. 		
Home position return control		The module FB "M+RD77_StartPositioning" is executed.		
	JOG operation	"[Cd.181] Forward run JOG start signal" or "[Cd.182] Reverse r		
Manual control	Inching operation	JOG start signal" is turned on.		
	Manual pulse generator	The manual pulse generator is operated.		

1.3.3 Outline of stop

The axis stop signal or stop signal from external input signal is used to stop the control. It is necessary to create a program for turning on the "[Cd.180] Axis stop signal" as the stopping program.

Each control is stopped in the following cases.

- (a) When each control is completed normally
- (b) When the servo amplifier power supply is turned off
- (c) When a CPU module error occurs
- (d) When the PLC READY signal is turned OFF
- (e) When an error occurs in RD77MS
- (f) When control is intentionally stopped
 (Stop signal from CPU module turned ON, "Stop signal" of external input signal turned ON, etc.)

The stop process for the above cases is shown below. (Except the normal termination in case (a))

	Stop axis	M code ON signal after stop	Axis operation status after stopping ([Md.26])		
Forced stop	"Forced stop input signal" OFF from an external device	All axes	No change	Servo OFF	
	Servo READY OFF Servo amplifier power supply OFF	Each axis	Each axis No change		Servo amplifier has not been connected
Forced stop	Servo alarm			No change	Error
	Forced stop input to servo amplifier			Servo OFF	
Fatal stop (Stop group 1)	Hardware stroke limit upper/lower limit error occurrence	Each axis	No change	Error	
Emergency stop	Error occurs in a CPU module		No change	Frror	
(Stop group 2)	PLC READY signal OFF	All axes	Turns OFF	EIIOI	
Relatively safe stop (Stop group 3)	Axis error detection (Error other than stop group 1 or 2) ^{*1}	Each axis	No change	Error	
Intentional stop	"Axis stop signal" ON from a CPU module	F ack avia		Stopped	
(Stop group 3)	"Stop signal" of external input signal ON		NO CHANGE	(Standby)	

		Stop process			
	Stop cause	Home position r	Major		
		Machine home position return control	Fast home position return control	positioning control	
Forced stop	"Forced stop input signal" OFF from an external device	Forced stop For the stop method of the servo amplifier, refer to			
	Servo READY OFF Servo amplifier power supply OFF				
Forced stop	Servo alarm	each servo amplifier instruction manual.			
	Forced stop input to servo amplifier				
Fatal stop (Stop group 1)	Hardware stroke limit upper/lower limit error occurrence	Deceleration stop/rapid stop (Select with "Rapid stop group 1 rapid stop selection.")			
Emergency stop	Error occurs in a CPU module	Deceleration stop/rapid stop			
(Stop group 2)	PLC READY signal OFF	Gelect with "Rapid stop group 2 rapid stop selection.")		р	
Relatively safe stop (Stop group 3)	Axis error detection (Error other than stop group 1 or 2) ^{*1}	U Deceleration stop/rapid stop (Select with "Rapid stop group 3 rapid stop			
Intentional stop (Stop group 3)	"Axis stop signal" ON from a CPU module			р	
	"Stop signal" of external input signal ON				

		Stop process		
	Stop cause	High-level	Manual control	
	Stop cause	positioning control	JOG/Inching operation	Manual pulse generator operation
Forced stop "Forced stop input signal" OFF from an external device		Forced stop		
	Servo READY OFF Servo amplifier power supply OFF	Forced stop For the stop method of the servo amplifier, refer to each servo amplifier instruction manual.		-
Forced stop	Servo alarm			
	Forced stop input to servo amplifier	۶r		
Fatal stop (Stop group 1)	Hardware stroke limit upper/lower limit error occurrence	Deceleration stop/rapid stop (Select with "Rapid stop group 1 rapid stop selection.")		Deceleration stop
Emergency stop	Error occurs in a CPU module	Deceleration stop/rapid stop (Select with "Rapid stop group 2 rapid stop selection.")		
(Stop group 2)	PLC READY signal OFF			Deceleration stop
Relatively safe stop (Stop group 3)Axis error detection (Error other than stop group 1 or 2)*1				
Intentional stop (Stop group 3)	"Axis stop signal" ON from a CPU module	Deceleration stop/rapid stop (Select with "Rapid stop group 3 Deceleration and atom collection ")		Deceleration stop
	"Stop signal" of external input signal ON		5	

*1. If an error occurs in a positioning data due to an invalid setting value, when the continuous positioning control uses multiple positioning data successively, it automatically decelerates at the previous positioning data. It does not stop rapidly even the setting value is rapid stop in stop group 3. If any of the following error occurs, the operation is performed up to the positioning data immediately before the positioning data where an error occurred, and then stops immediately.

oolidolling data intolo all ollor oodilloa, alla tion	
· No command speed	(error code: 1A13H, 1A14H)
· Outside linear movement amount range	(error code: 1A15H, 1A16H)
 Large arc error deviation 	(error code: 1A17H)
· Software stroke limit +	(error code: 1A18H, 1A19H)
· Software stroke limit -	(error code: 1A1AH, 1A1BH)
 Sub point setting error 	(error code: 1A27H, 1A28H, 1A29H, 1A2AH, 1A37H)
 End point setting error 	(error code: 1A2BH, 1A2CH)
 Center point setting error 	(error code: 1A2DH, 1A2EH, 1A2FH)
· Outside radius range	(error code: 1A32H)
\cdot Illegal setting of ABS direction in unit of degree	(error code: 19A4H, 19A5H)

Point

Provide the emergency stop circuits outside the servo system to prevent cases where danger may result from abnormal operation of the overall system in the event of an external power supply fault or servo system failure.

1.3.4 Outline of restart

If the position control is stopped due to any cause, the positioning to the end point of position control can be restarted from the stop position by the "[Cd.6] Restart command." If the control is stopped during continuous positioning or continuous path control, the positioning will be restarted from the stop position of the positioning data No. at which the control is stopped.

Chapter 2 System Configuration

2.1 System Configuration Devices

The general configuration including RD77MS and peripheral devices is shown below.



• When using RD77MS2, the external input signals that can be assigned are for 10 points.

2.2 Configuration Device List

The positioning system using RD77MS consists of the following devices.

Name	Model	Remarks
Simple motion module	RD77MS2 RD77MS4 RD77MS8 RD77MS16	-
CPU module	RnCPU, RnENCPU, Safety CPU	_
Peripheral device (personal computer) ^{*1}	Personal computer running Windows [®]	_
GX Works3 ^{*1}	SW1DND- GXW3-E	Software package for Windows [®] XP, Windows [®] Vista, Windows [®] 7, Windows [®] 8 or Windows [®] 8.1
Ethernet cable ^{*1} USB cable ^{*1}	-	Cable for connecting the CPU module and the personal computer running Windows®
Servo amplifier	-	-
Manual pulse generator/ Incremental synchronous encoder	-	Recommendation: MR-HDP01 (manufactured by Mitsubishi Electric Corporation)
SSCNET III cable ^{*2}	-	Cable for connecting RD77MS and servo amplifier or connecting servo amplifiers
External input signal cable ^{*2}	-	Cable for connecting RD77MS and external device (Fabricate referring to the manual for the connected device and Section 3.5.)

*1. Refer to GX Works3 Operating Manual for details.

*2. The following connectors for external input signals to be connected to SSCNET III cable and external input signal cable are available.

[SSCNET III cable]

Model		Cable length [m]	Details
	MR-J3BUS015M	0.15	
MR-,I3BUS⊡M ^{*3}	MR-J3BUS03M	0.3	
(standard cord for	MR-J3BUS05M	0.5	
inside of board)	MR-J3BUS1M	1	
	MR-J3BUS3M	3	 For connection between RD77MS and MR- I4(W)-B/MR- I3(W)-B
	MR-J3BUS5M-A	5	 For connection between MR-
(standard cable for outside of board)	MR-J3BUS10M-A	10	J4(W)-B/MR-J3(W)-B and MR- J4(W)-B/MR-J3(W)-B
	MR-J3BUS20M-A	20	
	MR-J3BUS30M-B	30	
MR-J3BUSDM-B ^{*3}	MR-J3BUS40M-B	40	
	MR-J3BUS50M-B	50	

*3. \Box indicates the cable length.

(015: 0.15 m, 03: 0.3 m, 05: 0.5 m, 1: 1 m, 3: 3 m, 5: 5 m, 10: 10 m, 20: 20 m, 30: 30 m, 40: 40 m, 50: 50 m)

[Connectors for external input signals]

Software name		Specifications
Applicable connectors		A6CON1, A6CON2 and A6CON4 (optional)
Applicable wire size	When A6CON1 or A6CON4 is used	0.088 to 0.3 mm ² (AWG28 to 22) stranded wire
	When A6CON2 is used	0.088 to 0.24 mm ² (AWG28 to 24) stranded wire

List of specifications for recommended pulse generator

Item	Specifications	
Model	MR-HDP01	
Operating ambient temperature	-10 to 60°C	
Pulse resolution	25 pulses/rev (100 pulses/rev when multiplied by 4)	
Output method	Voltage output, max. output current 20 mA	
Supply voltage	4.5 to 13.2 V DC	
Consumption current	60 mA	
Output level	"H" level: Supply voltage ^{*4} -1 V or more (under no load) "L" level: 0.5 V or less (at max. output current)	
Life	ife 1,000,000 revolutions or more (at 200 r/min)	
	Radial load: Max. 19.6 N	
Allowable axial load	Thrust load: Max. 9.8 N	
Weight	0.4 kg	
Max. number of revolutions	Instantaneous max. 600 r/min Normal 200 r/min	
Pulse signal form	Two signals, A-phase and B-phase, with phase difference of 90°	
Starting friction torque	0.06 N•m (at 20°C)	

*4. When a separate power supply is used, use a stabilized power supply with a supply voltage of 5 V DC ± 0.25 V.

Chapter 3 Specifications and Functions

3.1 **Performance Specifications**

The performance specifications for RD77MS are shown below.

Item		RD77MS2	RD77MS4	RD77MS8	RD77MS16	
Number of control axes		2 axes	4 axes	8 axes	16 axes	
Operation cycle		0.444 ms/0.888 ms/1.777 ms/3.555 ms				
Interpolation functions		2-axis linear interpolation 2-axis circular interpolation	2-, 3- or 4-axis linear interpolation2-axis circular interpolation3-axis helical interpolation			
Control modes		PTP (Point To Point) control, path control (linear, arc and helical can be set), speed control, speed-position switching control, position-speed switching control, speed-torque control				
Control unit		mm, inch, degre	e, pulse			
Positioning of	data	600 pieces of da	ita/axis			
Execution da	ata backup function	Parameters, pos flash ROM (batte	sitioning data, and ery-less).	block start data c	an be saved on	
Positioning	Positioning system	PTP control: incremental system/absolute system Speed-position switching control: incremental system/absolute system Position-speed switching control: incremental system Path control: incremental system/absolute system				
	Positioning range	In absolute system • -214748364.8 to 214748364.7 (μm) • -21474.83648 to 21474.83647 (inch) • 0 to 359.99999 (degree) • -2147483648 to 2147483647 (pulse) In incremental system • -21474.83648 to 214748364.7 (μm) • -21474.83648 to 21474.83647 (inch) • -21474.83648 to 21474.83647 (degree) • -2147483648 to 21474.83647 (pulse) In speed-position switching control (INC mode)/position-speed switching control • 0 to 21474.83647 (inch) • 0 to 21474.83647 (degree) • 0 to 21474.83647 (degree) • 0 to 21474.83647 (pulse) In speed-position switching control (ABS mode) ^{*1} 0 to 359.99999 (degree)		ition-speed		
	Speed command	0.01 to 2000000.00 (mm/min) 0.001 to 2000000.000 (inch/min) 0.001 to 2000000.000 (degree/min) ^{*2} 1 to 1000000000 (pulse/s)				
	Acceleration/deceleration process	Trapezoidal acceleration/deceleration, S-curve acceleration/ deceleration			eleration/	
	Acceleration/deceleration time	1 to 8388608 (m time and decele	s) 4 patterns car ration time.	be set for each o	of acceleration	
	Rapid stop deceleration time	1 to 8388608 (ms)				

Item			RD77MS2	RD77MS4	RD77MS8	RD77MS16
Maximum nur of axes: 1-axi		Maximum number of axes: 1-axis	0.7 ms			
	Operation cycle	Maximum number of axes: 2-axes	0.7 ms			
		Maximum number of axes: 4-axes	0.74 ms			
		Maximum number of axes: 4-axes	1.1 ms			
	Operation cycle 0.888 ms	Maximum number of axes: 8-axes	1.32 ms			
Starting		Maximum number of axes: 12-axes	1.46 ms			
time ^{*3}		Maximum number of axes: 8-axes	1.1 ms			
	Cycle	Maximum number of axes: 12-axes	1.46 ms			
		Maximum number of axes: 16-axes	1.59 ms			
		Maximum number of axes: 8-axes	0.92 ms			
	Operation cycle 3.555 ms	Maximum number of axes: 12-axes	1.12 ms			
		Maximum number of axes: 16-axes	1.52 ms			
External wiring connection system			40-pin connector	r		
Applicable	When A60 A6CON4 i	CON1 or is used	0.088 to 0.3 mm	² (28 to 22 AWG)	stranded wire	
wire size	When A6CON2 is used		0.088 to 0.24 mr	m ² (28 to 24 AWG) stranded wire	
External inpu	ut wiring cor	nnector	A6CON1, A6CO	N2 and A6CON4	(optional)	
MR-J3BUS⊡M ^{*5}		 For connection For connection J4(W)-B/MR-J Standard cord 	n between RD77N n between MR-J4 J3(W)-B I for inside of boar	/IS and MR-J4(W) (W)-B/MR-J3(W)- d: 0.15 m, 0.3 m,	-B/MR-J3(W)-B B and MR- 0.5 m, 1 m, 3 m	
SSCNET III cable	MR-J3BUS⊡M-A ^{*5}		 For connection For connection J4(W)-B/MR-J Standard cabl 	n between RD77N n between MR-J4 J3(W)-B e for outside of bo	/IS and MR-J4(W) (W)-B/MR-J3(W)- pard: 5 m, 10 m, 2	B/MR-J3(W)-B B and MR- 20 m
	MR-J3BUS⊡M-B ^{*5 *6}		 For connection between RD77MS and MR-J4(W)-B/MR-J3(W)-B For connection between MR-J4(W)-B/MR-J3(W)-B and MR-J4(W)-B/MR-J3(W)-B Long-distance cable: 30 m, 40 m, 50 m 			
Manual pulse Incremental s	generator/ ynchronous	Differential- output type	Up to 1M pulses	ls		
encoder input maximum Oper frequency type		Open-collector type	Up to 200k pulses/s			
Manual pulse generator 1 pulse input magnification			1 to 10000 times			
Flash ROM write count			Max. 100,000 times			
Number of occupied I/O points			32 points (I/O assignment: Intelligent function module 32 points)			
Internal current consumption (5 V DC)			1.0 A			

Item		RD77MS2	RD77MS4	RD77MS8	RD77MS16
External dimensions	Height	106 mm			
	Width	27.8 mm			
	Depth	110 mm			
Mass		0.22 kg	0.23 kg		

*1. The speed-position switching control (ABS mode) can be used only when the control unit is "degree".

*2. When "Speed control 10 × multiplier setting for degree axis function" is valid, the setting range is 0.01 to 2000000.00 (degree/min).

*3. Time from accepting the positioning start signal until BUSY signal turns ON.

*4. Use cables with outside diameter of 1.3 mm (0.05 inch) or shorter to connect 40 cables to the connector. In addition, consider the amount of current to be used and select appropriate cables.

*5. \Box indicates the cable length.

(015: 0.15 m, 03: 0.3 m, 05: 0.5 m, 1: 1m, 3: 3 m, 5: 5 m, 10: 10 m, 20: 20m, 30: 30m, 40: 40 m, 50: 50 m) *6. For cables with a length of less than 30 m, contact us.

3.2 Main Features of RD77MS Simple Motion Module

(1) High-speed starting

The module can start positioning quickly within 0.444 to 3.555 ms (set value in "Operation cycle setting")

(2) Various positioning control functions

The module has a lot of functions including the basic functions, such as home position return control, positioning control and manual control functions, necessary for positioning systems and sub functions for restricting and reinforcing these controls.

(a) Enhanced home position return control

[1] Enhanced home position return control

Five methods for returning to the machine home position are available; proximity dog method (1 Type), count method (2 Types), data set method (1 Type) and scale origin signal detection method (1 Type). You can select a method as per system requirement.

[2] Home position return retry function

The home position return retry function is available to understand home position return control from any position to the mechanical home position. You can start the home position return from any mechanical stop position when turning on the power supply to the system.

(b) Various control methods

There are various positioning control methods, i.e. position control, speed control, speed-position switching control and position-speed switching control.

- Positioning of each axis
 Position control and speed control for each axis can be started at any timing.
- [2] Interpolation control

Interpolation control can be performed using more than one axis. (Linear interpolation control with 2 to 4 axes, circular interpolation control with 2 axes, speed control with 2 to 4 axes, etc.)

- [3] Speed-torque control Speed Control and Torque Control can be perform. It can not contain position loop.
- (c) Large quantity of data

Up to 600 positioning data including control method, positioning address, command speed can be set for each axis.

(d) Continuous execution with multiple data

Multiple positioning data can be performed continuously by starting the positioning only once.

In addition, it is possible to integrate multiple positioning data into one point and execute several points continuously (block start).

This can reduce the number of execution times of positioning data and need for control of execution condition.

(e) Acceleration/deceleration process

Two acceleration/deceleration processing methods, trapezoidal and S-pattern acceleration/deceleration methods, are available. An acceleration/deceleration curve appropriate to the mechanical characteristics can be selected.

(3) Advance Synchronous Control

The module is applicable to synchronous control and electronic cam control.

(4) Mark detection function

The module can detect a mark to latch any data using an external command signal [DI1 to DI16].

(5) High maintainability

The maintainability of RD77MS has been improved by the following measures.

(a) Battery-less retention of data

Various data, such as positioning data and parameters, can be stored in the flash ROM in RD77MS. Therefore, the data can be retained without batteries.

(b) Event history function

Information on errors and events that have occurred in RD77MS is collected in the CPU module and saved in the SD memory card. Since the error information is retained in the CPU module, the error history can be checked from GX Works3 even after the power supply is turned off or reset.

- (6) Simple motion module function blocks (module FBs) and module labels are available.
- (a) Module FBs for positioning start and positioning teach are available.
- (b) The devices in the module have been registered with signal names as module labels in GX Works3.
- (c) Programs can be created only by dragging and dropping module FBs and module labels. This can reduce program development time.

(7) Setting, monitoring and testing with GX Works3

GX Works3 (Simple Motion Module setting) can be used to set the parameters and positioning data of RD77MS.

Before creating a sequence program for positioning control, you can check the wiring with the test function of GX Works3 (Simple Motion Module setting) and operate RD77MS with the set parameters and positioning data to check the Operation of Servo Motor .

The program can be efficiently debugged by monitoring the control condition.

By using GX Works3 in combination with MR Configurator2, you can easily set the servo parameters.

For the setting and testing with GX Works3, refer to Chapter 5. For the monitoring, refer to Appendix 5.

(8) Forced stop function

All axes of the servo amplifiers can be immediately stopped by the external forced stop input signal.

The forced stop input signal can be enabled and disabled by setting the parameter. For the forced stop function, refer to Section 4.3.

(9) Connection with servo amplifiers through high-speed synchronous network by SSCNETIII(/H)

The module can be connected directly with Mitsubishi MR-J4(W)-B/MR-J3(W)-B Series servo amplifiers through SSCNETIII(/H).

- (a) RD77MS and each servo amplifiers are connected through the high-speed synchronous network SSCNETIII(/H), the wiring can be saved. Maximum distance between two stations using SSCNET III(/H) is 100 m. For 16 axis maximum distance can be (100 m × 16 Axis) is 1600 m.
- (b) Since SSCNETIII(/H) cables (Optical Fiber based communication) are used, the communication is hardly affected by electromagnetic noises from the servo amplifiers.
- (c) It is possible to read and write servo parameters from servo amplifiers using SSCNETIII(/H) communication on RD77MS module.
- (d) Actual current values and errors controlled by the servo can be reviewed in the buffer memory (module's internal memory) of RD77MS.
- (e) MR Configurator2 and servo amplifiers can communicate through the CPU module.

(10) Easy to use on absolute position system

- (a) MR-J4(W)-B/MR-J3(W)-B Series servo amplifiers and servo motors are applicable on an absolute position system as standard, and they can be used as an absolute position system only by fitting the batteries for absolute position system to the servo amplifiers.
- (b) Once the home position is determined, the home position return operation is not required when the system power is turned on.
- (c) On the absolute position system, the home position can be determined by the data set method home position return, and the wiring for the proximity dog is not required.
- (d) When the set unit is "degree," an absolute position system for infinite feeding can be established.

3.3 Function List

RD77MS has some functions. This document explains the functions of RD77MS classifying them as shown below.

(1) Main functions

(1) Home position return control

The home position return control is a function to determine the position of origin for positioning control (machine home position return) and move a workpiece to the origin (fast home position return). Use this function to return a workpiece to the home position when the power supply is turned on or after the positioning is stopped.

(2) Major positioning controls

The positioning data stored in RD77MS is used for these controls. Basic controls, such as position control and speed control, are executed by setting the necessary items in the positioning data and start the positioning data.

(3) High-level positioning controls

The positioning data and block start data stored in RD77MS are used for these controls.

Applied positioning controls as shown below can be performed.

- A series of positioning data are handled as a block, and some blocks are executed in the specified order.
- Position control and speed control are executed with criteria for conditions.
- Positioning data of several axes are started simultaneously (commands are output simultaneously to some servo amplifiers).
- · Specified positioning data is executed repeatedly.
- (4) Manual control

Signals are externally input to RD77MS, and RD77MS performs the positioning operation. Use the manual control to move a workpiece to any position (JOG operation) and make fine adjustments to positioning (inching or manual pulse generator operation).

(5) Extended controls

In addition to the positioning control, the following controls can be performed.

- Speed control and torque control (speed/torque control) not containing a position loop in command to servo amplifiers
- Control by replacing hardware mechanism consisting of gears, shafts, transmissions and cams with software by using the synchronous control parameters to synchronize with the input axis (synchronous control)

(2) Sub function

When a main function is executed, correction or restriction to the control can be made, or various functions can be added.

(3) Common function

Controls for the parameter initialization function and execution data backup function common to the operations of RD77MS can be performed.

3.3.1 Main functions

The main functions for positioning controls by using RD77MS are outlined below. Refer to the following user's manuals for details of each function.

- MELSEC iQ-R Simple Motion Module User's Manual (Application)
- MELSEC iQ-R Simple Motion Module User's Manual (Advanced Synchronous Control)

	Main fu	nctions	Details
osition return control	Machine home position return		Mechanically establishes the positioning start point using a proximity dog, etc. In the data setting method, no axis movement occurs since the current position is set as the home position. (Positioning start No. 9001)
Home p	Fast home posit	ion return	Positions a target to the home position address ([Md.21] Machine feed value) stored in the RD77MS using machine home position return. (Positioning start No. 9002)
Major positioning control	Position control	Linear control (1-axis linear control) (2-axis linear interpolation control) (3-axis linear interpolation control) (4-axis linear interpolation control)	Positions a target using a linear path to the address set in the positioning data or to the position designated with the movement amount.
		Fixed-feed control (1-axis fixed-pitch feed control) (2-axis fixed-pitch feed control) (3-axis fixed-pitch feed control) (4-axis fixed-pitch feed control)	Positions a target by the movement amount designated with the amount set in the positioning data. (With fixed-feed control, the "[Md.20] Feed current value" is set to "0" when the control is started. With 2-, 3-, or 4-axis fixed-feed control, the fixed-feed is fed along a linear path obtained by interpolation.)
		2-axis circular interpolation control (Auxiliary point designation) (Center point designation)	Positions a target using an arc path to the address set in the positioning data, or to the position designated with the movement amount, sub point or center point.
		3-axis helical interpolation control (Auxiliary point designation) (Center point designation)	Positions a target using a helical path to a specified position. (Specify the position by specifying the end point address directly or by specifying the relative distance from the current position (movement amount).)
	Speed control	1-axis speed control 2-axis speed control 3-axis speed control 4-axis speed control	Continuously outputs the command corresponding to the command speed set in the positioning data.

Main functions		unctions	Details
	Speed, position switching control		First, carries out speed control, and then carries out position control (positioning with designated address or movement amount) by turning the "speed-position switching signal" ON.
	Position-speed switching control		First, carries out position control, and then carries out speed control (continuous output of the command corresponding to the designated command speed) by turning the "position-speed switching signal" ON.
positioning control		Current Value Change	 Changes the feed current value ([Md.20]) to the address set in the positioning data. The following two methods can be used. (The machine feed value ([Md.21]) cannot be changed.) Current value changing using positioning data Current value changing using current value changing start No. (No. 9003)
Majo	Other controls	NOP instruction	No execution control method. When NOP instruction is set, this instruction is not executed and the operation of the next data is started.
		JUMP instruction	Unconditionally or conditionally jumps to designated positioning data No.
		LOOP	Carries out loop control with repeated LOOP to LEND.
		LEND	Returns to the beginning of the loop control with repeated LOOP to LEND.
	Block start (normal start)		With one start, executes the positioning data in a random block with the set order.
trol	Conditional start		Carries out condition judgment set in the "condition data" for the designated positioning data, and then executes the "block start data". When the condition is established, the "block start data" is executed. When not established, that "block start data" is ignored, and the next point's "block start data" is executed.
High-level positioning cont	Wait start		Carries out condition judgment set in the "condition data" for the designated positioning data, and then executes the "block start data". When the condition is established, the "block start data" is executed. When not established, stops the control until the condition is established. (Waits.)
	Simultaneous start		Simultaneously executes the designated positioning data of the axis designated with the "condition data". (Outputs commands at the same timing.)
	Repeated start	(FOR loop)	Repeats the program from the block start data set with the "FOR loop" to the block start data set in "NEXT" for the designated number of times.
	Repeated start (FOR condition)		Repeats the program from the block start data set with the "FOR condition" to the block start data set in "NEXT" until the conditions set in the "condition data" are established.

Main functions		Details	
	JOG operation	Outputs a command to servo amplifier while the JOG start signal is ON.	
al control	Inching operation	Outputs commands corresponding to minute movement amount by manual operation to servo amplifier. (Performs fine adjustment with the JOG start signal.)	
Manua	Manual pulse generator operation	Outputs pulses commanded with the manual pulse generator to servo amplifier.	
	Inter-module synchronization function	Synchronizes the control timings among multiple modules on the same base.	
d control	Speed-torque control	Carries out the speed control or torque control that does not include the position loop for the command to servo amplifier by switching control mode.	
Extended	Synchronous control	Carries out the synchronous control that synchronizes with input axis by setting the system such as gear, shaft, change gear and cam to the "synchronous control parameter".	

In "major positioning control", "Operation pattern" can be set to designate whether to continue executing positioning data. Outlines of the "operation patterns" are given below.

Operation pattern	Details	
Individual positioning control (Positioning complete)	When "independent positioning control" is set for the operation pattern of the started positioning data, only the designated positioning data will be executed, and then the positioning will end.	
Continuous positioning control	When "continuous positioning control" is set for the operation pattern of the started positioning data, after the designated positioning data is executed, the program will stop once, and then the next following positioning data will be executed.	
Continuous path control	When "continuous path control" is set for the operation pattern of the started positioning data, the designated positioning data will be executed, and then without decelerating, the next following positioning data will be executed.	

3.3.2 Sub function

The sub functions for positioning controls using RD77MS are outlined below. Refer to MELSEC iQ-R Simple Motion Module User's Manual (Application) for details of each function.

Sub function		Details		
Functions characteristic to machine home position return	Home position return retry function	This function retries the home position return with the upper/ lower limit switches during the machine home position return. This allows machine home position return to be carried out even if the axis is not returned to before the proximity dog with JOG operation, etc.		
	Home position shift function	After returning to the machine home position, this function compensates the position by the designated distance from the machine home position and sets that position as the home position address.		
Functions that compensate control	Backlash compensation function	This function compensates the mechanical backlash amount. Feed commands equivalent to the set backlash amount are output each time the movement direction changes.		
	Electronic gear function	By setting the movement amount per pulse, this function can freely change the machine movement amount per commanded pulse. When the movement amount per pulse is set, a flexible positioning system that matches the machine system can be structured.		
	Near pass function ^{*1}	This function suppresses the machine vibration when the speed is changed during continuous path control in the interpolation control.		
Functions that limit control	Speed limit function	If the command speed exceeds "[Pr.8] Speed limit value" during control, this function limits the commanded speed to within the "[Pr.8] Speed limit value" setting range.		
	Torque limit function	If the torque generated by the servomotor exceeds "Torque limit setting value" during control, this function limits the generated torque to within the "Torque limit setting value" setting range.		
	Software stroke limit function	If a command outside of the upper/lower limit stroke limit setting range, set in the parameters, is issued, this function will not execute positioning for that command.		
	Hardware stroke limit function	This function carries out deceleration stop with the hardware stroke limit switch.		
	Forced stop function	This function stops all axes of servo amplifiers by the forced stop input signal connected to the external input connection connector of RD77MS or input from the buffer memory.		
Sub	function	Details		
--	---	--	--	--
	Speed change function	This function changes the speed during positioning. Set the changed speed in the speed change buffer memory (New speed value), and change the speed with the speed change request (Speed change request).		
Functions that change control	Override function	This function changes the speed within a percentage of 0 to 300 % during positioning. This is executed using "[Cd.13] Positioning operation speed override".		
details	Acceleration/deceleration time change function	This function changes the acceleration/deceleration time during speed change.		
	Torque change function	This function changes the "torque limit value" during control.		
	Target position change function	This function changes the target position during positioning. Position and speed can be changed simultaneously.		
Functions related to positioning start	Pre-reading start function	This function shortens the virtual start time.		
Absolute position sys	tem	This function restores the absolute position of designated axis.		
	Stop command processing for deceleration stop function	This function selects a deceleration curve when a stop cause occurs during deceleration stop processing to speed 0.		
Functions related to positioning stop	Continuous operation interrupt function	This function interrupts continuous operation. When this request is accepted, the operation stops when the execution of the current positioning data is completed.		
	Step function	This function temporarily stops the operation to confirm the positioning operation during debugging, etc. The operation can be stopped at each "automatic deceleration" or "positioning data".		

Sub	function	Details
	Skip function	This function stops the positioning being executed (decelerates to a stop) when the skip signal is input, and carries out the next positioning.
	M code output function	This function issues a command for a sub work (clamp or drill stop, tool change, etc.) according to the M code No. (0 to 65535) that can be set for each positioning data. The M code output timing can be set for each positioning data.
	Teaching function	This function stores the address positioned with manual control into the "[Da.6] Positioning address/movement amount" having the designated positioning data No
Other functions	Command in-position function	This function calculates the remaining distance for the RD77MS to reach the positioning stop position. When the value is less than the set value, the "command in-position flag" is set to "1". When using another auxiliary work before ending the control, use this function as a trigger for the sub work.
	Acceleration/deceleration processing function	This function adjusts the acceleration/deceleration.
	Deceleration start flag function	This function turns ON the flag when the constant speed status or acceleration status switches to the deceleration status during position control, whose operation pattern is "Positioning complete", to make the stop timing known.
	Follow up function	This function monitors the motor rotation amount with the servo turned OFF, and reflects it on the feed current value.
	Speed control 10 × multiplier setting for degree axis function	This function executes the positioning control by the 10 \times speed of the command speed and the speed limit value when the setting unit is "degree".
	Operation setting for incompletion of home position return function	This function is provided to select whether positioning control is operated or not, when the home position return request flag is ON.

*1. The near pass function is featured as standard and is valid only for setting continuous path control for position control. It cannot be set to be invalid with parameters.

3.3.3 Common function

The functions to be executed as needed are outlined below.

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

Common function	Details
Parameter initialization function	This function returns the setting data stored in the buffer memory/internal memory and flash ROM/internal memory (nonvolatile) of RD77MS to the default values. The following two methods can be used. (1) Method using a program (2) Method using an GX Works3
Execution data backup function	This function writes the execution data being used in the control into the flash ROM/internal memory (nonvolatile). The following two methods can be used. (1) Method using a program (2) Method using an GX Works3
External input signal select function	This function sets the input type, input terminal, signal logic and input filter for each external input signal of each axis (upper/lower stroke limit signal (FLS/RLS), proximity dog signal (DOG), and stop signal (STOP)). The external input signals of the axes can be arbitrarily assigned to the 20 terminals of the external input connection connector of RD77MS.
History monitor function	This function monitors start history and current value history of all axes.
Amplifier-less operation function	This function executes the positioning control of RD77MS without connecting to the servo amplifiers. It is used to debug the program at the start-up of the device or simulate the positioning operation.
Virtual servo amplifier function	This function executes the operation as the axis (virtual servo amplifier axis) that operates only command (instruction) virtually without servo amplifiers.
Driver communication function	This function uses the "Master-slave operation function" of servo amplifier. The simple motion module controls the master axis and the slave axis is controlled by data communication between servo amplifiers (driver communication) without simple motion module.
Mark detection function	This function is used to latch any data at the input timing of the mark detection signal (DI).
Optional data monitor function	This function is used to store the data selected by user up to 4 data per axis to buffer memory and monitor them.
Event history function	This function collects errors and event information occurred in the RD77MS in the CPU module, and saves them to an SD memory card. This function enables to check the error history even after the power OFF or reset by holding the error contents in the CPU module.
Connect/disconnect function of SSCNET communication	Temporarily connect/disconnect of SSCNET communication is executed during system's power supply ON. This function is used to exchange the servo amplifiers or SSCNETIII cables.
Online module change	Allows to replace a module without stopping the system. For procedures for the online module change, refer to the following.MELSEC iQ-R Online Module Change Manual
Test mode	This mode executes the test operation and adjustment of axes using an GX Works3.

3.4 Specifications of I/O Signals with CPU Modules

3.4.1 List of input/output signals with CPU modules

The RD77MS uses 32 input points and 32 output points for exchanging data with the CPU module.

The following table shows the input/output signals used when RD77MS is mounted in the slot No.0 in the base unit.

The devices X input signals from RD77MS to the CPU module, and the devices Y output signals from the CPU module to RD77MS.

Signal direction: RD77MS \rightarrow CPU module			Signal direction: CPU module \rightarrow RD77MS			
Device No.	Sig	nal name	Device No.	Signal name		
X0	READY	ON: READY OFF: Not READY/ Watch dog timer error	Y0	PLC READY	OFF: PLC READY OFF ON: PLC READY ON	
X1	Synchronization flag	OFF: Module access disabled ON: Module access enabled	Y1	All axis servo ON	OFF: Servo OFF ON: Servo ON	
X2			Y2			
X3			Y3			
X4			Y4			
X5			Y5			
X6			Y6			
X7			¥7			
X8		prohibitod	Y8	Use prohibited		
X9	Use	prohibited	Y9			
XA			YA			
ХВ			YB			
XC			YC			
XD			YD			
XE			YE			
XF			YF			

Signal direction: RD77MS \rightarrow CPU module			Signal direction: CPU module \rightarrow RD77MS				
Device No.		Sig	nal name	Device No.		Sigi	nal name
X10	Axis 1			Y10	Axis 1		
X11	Axis 2			Y11	Axis 2		
X12	Axis 3			Y12	Axis 3		
X13	Axis 4			Y13	Axis 4		
X14	Axis 5			Y14	Axis 5		
X15	Axis 6			Y15	Axis 6		
X16	Axis 7			Y16	Axis 7		
X17	Axis 8		OFF: Not BUSY	Y17	Axis 8	Positioning	not requested
X18	Axis 9	BUSY	ON: BUSY	Y18	Axis 9	start*1	ON: Positioning start
X19	Axis 10			Y19	Axis 10		requested
X1A	Axis 11			Y1A	Axis 11		
X1B	Axis 12			Y1B	Axis 12		
X1C	Axis 13			Y1C	Axis 13		
X1D	Axis 14			Y1D	Axis 14		
X1E	Axis 15			Y1E	Axis 15		
X1F	Axis 16			Y1F	Axis 16		

*1. The BUSY signal and positioning start signal, whose axis Nos. exceed the number of controlled axes, cannot be used.

POINT

- (1) The M code ON signal, error detection signal, start complete signal and positioning complete signal are assigned to the bit of "[Md.31] Status."
- (2) The axis stop signal, forward run JOG start signal, reverse run JOG start signal, execution prohibition flag are assigned to the buffer memory [Cd.180] to [Cd.183].

IMPORTANT

The above prohibited signals are used by the system. The user cannot use them. If any of the signals is used, we will not guarantee the operation of RD77MS.

3.4.2 Details of input signals

Device No.	Signal name			Details				
X0	READY		READY		READY		ON: READY OFF: Not READY/ Watch dog timer error	 When the PLC READY signal [Y0] turns from OFF to ON, the parameter setting range is checked. If no error is found, this signal turns ON. When the PLC READY signal [Y0] turns OFF, this signal turns OFF. When watch dog timer error occurs, this signal turns OFF. This signal is used for interlock in a program, etc. PLC READY signal [Y0] OFF ON READY signal [X0] OFF
X1	Synchronization flag		OFF: Module access disabled ON: Module access enabled	 After the CPU module is turned ON or the CPU module is reset, this signal turns ON if the access from the CPU module to the simple motion module is possible. When "Asynchronous" is selected in the module synchronization setting of the CPU module, this signal can be used as interlock for the access from a program to the simple motion module. 				
X10	Axis 1							
X11	Axis 2							
X12	Axis 3							
X13	Axis 4							
X14	Axis 5			 This signal turns ON at the start of positioning, nome position return or JOG operation. It turns OFF when 				
X15	Axis 6			the "[Da.9] Dwell time/JUMP destination positioning				
X16	AXIS 7			signal remains ON during positioning.)				
X17 X18	Axis 0	BUSY*1	OFF: Not BUSY ON: BUSY	 This signal turns OFF when the positioning is stopped with step operation. 				
X10 X19	Axis 10			 During manual pulse generator operation, this signal turns ON while the "ICd 211 Manual pulse generator 				
X1A	Axis 11			enable flag" is ON.				
X1B	Axis 12			 This signal turns OFF at error completion or positioning stop. 				
X1C	Axis 13			P				
X1D	Axis 14							
X1E	Axis 15							
X1F	Axis 16							

The ON/OFF timing and conditions of the input signals are shown below.

*1. The BUSY signal, whose axis No. exceeds the number of controlled axes, cannot be used.

POINT

The BUSY signal turns ON even when position control of movement amount 0 is executed. However, since the ON time is short, the ON status may not to be detected in the program.

3.4.3 Details of output signals

The ON/OFF timing and conditions of the output signals are shown below.

Device No.	S	gnal name	Details				
			(a) This signal notifies the simple motion module that the CPU module is normal.It is turned ON/OFF with the program.				
			(b) When the data (parameter, etc.) are changed, this signal is turned OFF depending on the parameter.				
			 (c)The following processes are carried out when this signal turns from OFF to ON. The parameter setting range is checked. The READY signal [X0] turns ON. 				
YO	PLC READY	OFF ON: PLC READY ON	 (d) The following processes are carried out when this signal turns from ON to OFF. In these cases, the OFF time should be set to 100 ms or more. The READY signal [X0] turns OFF. The operating axis stops. The M code ON signal ([Md.31] Status: b12) for each axis turns OFF, and "0" is stored in "[Md.25] Valid M code". 				
			(e) When parameters or positioning data (No.1 to 600) are written from the GX Works3 or CPU module to the flash ROM, this signal will turn OFF.				
Y1	All axis servo ON	OFF: Servo OFF ON: Servo ON	All the servo amplifiers connected to the simple motion module are turned ON or OFF.				
Y10	Axis 1						
Y11	Axis 2						
Y12	Axis 3						
Y13	Axis 4						
Y14	Axis 5						
Y15	Axis 6		Home position return operation or positioning				
Y16	Axis 7	OFE [.] Positioning start	operation is started.				
Y17	Axis 8 Positioning	not requested	 The positioning start signal is valid at the rising edge, and the operation is started 				
Y18	Axis 9 start*1	ON: Positioning start requested	When this signal turns ON during BUSY, the warning				
Y19	Axis 10	linguoteu	"Start during operation" (warning code: 0900H) will occur.				
Y1A	Axis 11						
Y1B	Axis 12						
Y1C	Axis 13						
Y1D	Axis 14						
Y1E	Axis 15						
Y1F	Axis 16						

*1. The positioning signal, whose axis No. exceeds the number of controlled axes, cannot be used.

3.5 Input/output Interface with External Devices

(1) Signal assignment on external device connection connector of RD77MS









Pin layout (Front view of the module) ^{*1}	Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name
	2B20	_	2A20		1B20	HB*2*3*4	1A20	5V*8
	2B19		2A19		1B19	HA*2*3*4	1A19	5V*8
	2B18		2A18		1B18	HBL*2*3*5	1A18	HBH*2*3*5
	2B17		2A17		1B17	HAL*2*3*5	1A17	HAH*2*3*5
	2B16		2A16		1B16	No connect ^{*6}	1A16	No connect ^{*6}
2P20 (T, T, 2A 20, 1P20 (T, T, 1A 20,	2B15	No	2A15	No	1B15	5V*9	1A15	5V*9
2B20 0 0 2A20 1B20 0 1A20 2B19 0 0 2A19 1B19 0 0 1A19 2B18 0 0 2A18 1B18 0 0 1A18	2B14	connect*6	2A14	connect*6	1B14	SG ^{*9}	1A14	SG ^{*9}
2B17 0 2A17 1B17 0 1A17 2B16 0 2A16 1B16 0 1A16	2B13		2A13		1B13	No connect ^{*6}	1A13	No connect*6
2B15 I 2A15 1B15 I IA15 2B14 I I 2A14 1B14 I IA15 2B13 I I 2A14 1B14 I IA14 2B13 I I 2A13 1B13 I IA14	2B12		2A12		1B12		1A12	
2B12 0 2A12 1B12 0 1A12 2B11 0 2A11 1B11 0 1A11 2B10 0 2A10 1B10 0 1A11	2B11		2A11		1B11		1A11	
2B10 I 2A10 1B10 I 1A10 2B9 I I 2A9 1B9 I 1A9 2B8 I I 2A8 1B8 I 1A9	2B10		2A10		1B10		1A10	
2B7 0 0 2A7 1B7 0 1A7 2B6 0 0 2A6 1B6 0 0 1A6	2B9		2A9		1B9		1A9	
2B3 0 0 2A3 1B3 0 1A3 2B4 0 0 2A4 1B4 0 1A4 2B3 0 0 2A3 1B3 0 1A3	2B8		2A8		1B8	EMI.COM	1A8	EMI
2B2 0 0 2A2 1B2 0 0 1A2 2B1 0 0 2A1 1B1 0 0 1A1	2B7	СОМ	2A7	COM	1B7	COM	1A7	СОМ
	2B6	СОМ	2A6	COM	1B6	COM	1A6	COM
	2B5	SIN20*7	2A5	SIN15 ^{*7}	1B5	SIN10*7	1A5	SIN5 ^{*7}
	2B4	SIN19*7	2A4	SIN14*7	1B4	SIN9*7	1A4	SIN4 ^{*7}
	2B3	SIN18*7	2A3	SIN13*7	1B3	SIN8 ^{*7}	1A3	SIN3*7
	2B2	SIN17*7	2A2	SIN12*7	1B2	SIN7*7	1A2	SIN2*7
	2B1	SIN16*7	2A1	SIN11*7	1B1	SIN6 ^{*7}	1A1	SIN1*7

- *1. RD77MS2 does not have the connectors 2A20 to 2A1 and 2B20 to 2B1.
- *2. Set the signal input form in "[Pr.24] Manual pulse generator/Incremental synchronous encoder input selection".
- *3. With the manual pulse generator/incremental synchronous encoder of voltage-output/open-collector type Connect the A-phase/PULSE signal to HA, and the B-phase/SIGN signal to HB.
- *4. With the manual pulse generator/incremental synchronous encoder of differential-output type Connect the A-phase/PULSE signal to HAH, and the A-phase/PULSE inverse signal to HAL. Connect the B-phase/SIGN signal to HBH, and the B-phase/SIGN inverse signal to HBL.
- *5. Do not connect to any terminals explained as "No connect".
- *6. Set the external command signal [DI, FLS, RLS, DOG, STOP] in "[Pr.116] FLS signal selection", "[Pr.117] RLS signal selection", "[Pr.118] DOG signal selection", "[Pr.119] STOP signal selection" and "[Pr.95] External command signal selection".
- *7. Do not connect wires other than the signal wires of the manual pulse generator to 1A20 and 1A19.
- *8. Do not use 1A(B)15 and 1A(B)14 for other than the power supply of manual pulse generator.

3.5.1 Input/output interface signals

(1) Internal circuit of RD77MS interface

The schematic view of the internal circuit of the external device connection interface of RD77MS is shown below.

Input or Output	Signal name		Pin No.	Wiring example	Description		
Input	External input signals ^{*1} (upper/lower limit signal ^{*2})	SIN (FLS, RLS)		Internal circuit	Upper limit signal		
	External input signal ^{*1} (proximity dog ^{*2} , stop, external command/ switching signal)	SIN (DOG, STOP, DI)	1 to 5 ^{*3}	SIN (DOG, STOP, DI)	Copper limit signal Lower limit signal Proximity dog signal Stop signal External command signals Switching signal External forced stop input		
	Common	СОМ	6*3 7*3				
	Forood stop	EMI	1A8				
	input	EMI. COM	1B8				

(a) Interface between external input signals/forced stop input signals

*1. When using external input signal of servo amplifier, set "1" with "[Pr.116] FLS signal selection", "[Pr.117] RLS signal selection", and "[Pr.118] DOG signal selection".

*2. Refer each servo amplifier instruction manual for wiring of the input/output signals of servo amplifier.

*3. "__" indicates "1A", "1B", 2A ", or "2B".

*4. As for the 24 V DC sign, both "+" and "-" are possible.

- (b) Manual pulse generator/Incremental synchronous encoder input
 - [1] Interface between manual pulse generator/incremental synchronous encoder (Differential output type)

Input or Output	Signal	name	Pin No.	Wiring example	Specifications	Description
	Manual	HAH (A+)	1A17			
Input*1*2 Power supply	pulse generator, phase A/ PULSE	HAL (A-)	1B17		Rated input voltage:	Fer.
	Manual	HBH (B+)	1B17	Manual pulse	Or less O	connecting
	pulse generator, phase B/ PULSE	HBL (B-)	1B18	encoder B		manual pulse generator/ Incremental synchronous encoder
	5V*3 SG		1A15 1B15	5 V 5 V DC power supply + 	 ess Equivalent 	valent
			1A14 1B14		to 26LS31	

*1. Set "0: Differential-output type" in "[Pr.89] Manual pulse generator/Incremental synchronous encoder input type selection" if the manual pulse generator/incremental synchronous encoder of differential-output type is used.

The default value is "1: Voltage-output/open-collector type".

- *2. Set the signal input form in "[Pr.24] Manual pulse generator/Incremental synchronous encoder input selection".
- *3. The 5 V DC power supply from the RD77MS must not be used if a separate power supply is applied to the manual pulse generator/incremental synchronous encoder. If a separate power supply is used, use a stabilized power supply of voltage 5 V DC. Anything else may cause a failure.

Input or Output	Signal name		Pin No.	Wiring example	Specifications	Description
lander	Manual pulse generator, phase A/ PULSE	HA (A)	1B19	Manual pulse generator/ Internal circuit Manual pulse generator/ Incremental synchronous encoder B Co Co Co Co Co Co Co Co Co Co	Rated input voltage:	
Input*1*2	Manual pulse generator, phase B/ PULSE	НВ (В)	1B20		For connecting manual pulse generator/ Incremental synchronous encoder	
Power supply	5V* ³ SG		1A15 1B15	5 V 5 V DC power supply	LOW level: 1 V DC or less/5 mA or mare	
			1A14 1B14		more	

[2] Interface between manual pulse generator/incremental synchronous encoder (Voltage-output type/open-collector type)

*1. Set "1: Voltage-output/open-collector type" in "[Pr.89] Manual pulse generator/Incremental synchronous encoder input type selection" if the manual pulse generator/incremental synchronous encoder of voltage-output/open-collector type is used.

The default value is "1: Voltage-output/open-collector type".

*2. Set the signal input form in "[Pr.24] Manual pulse generator/Incremental synchronous encoder input selection".

*3. The 5 V DC power supply from the RD77MS must not be used if a separate power supply is applied to the manual pulse generator/incremental synchronous encoder. If a separate power supply is used, use a stabilized power supply of voltage 5 V DC. Anything else may cause a failure.

3.6 Buffer Memory

RD77MS has a buffer memory. A higher level of controls can be realized by reading and writing with a sequence program.

Refer to the following user's manuals for the details of the buffer memory.

- MELSEC iQ-R Simple Motion Module User's Manual (Application)
- MELSEC iQ-R Simple Motion Module User's Manual (Advanced Synchronous Control)

3.6.1 Buffer memory area configuration

The entire configuration of the buffer memory is shown below.

The buffer memory of simple motion module is configured of the following types of areas. n: Axis No. - 1

k: Mark detection setting No. - 1

p: Pointer No.-1

j: Synchronous encoder axis No. - 1

Buffer	memory area configuration	Buffer memory address	Writing possibility	
	Servo network composition parameter area	58020+32n, 58021+32n, 58660, 58661		
	Common parameter area	33, 35, 67, 105, 106, 58000 to 58008		
	Basic parameter area	0+150n to 15+150n		
Parameter area	Detailed parameter area	17+150n to 69+150n, 116+150n to 123+150n	Possible	
	Home position return basic parameter area	70+150n to 78+150n		
	Home position return detailed parameter area	80+150n to 91+150n		
	Extended parameter area	100+150n to 103+150n		
	Mark detection setting parameter area	54000+20k to 54010+20k		
	System monitor area	4000 to 4288, 87000, 87010+10p to 87016+10p		
Monitor data area	Axis monitor area	2400+100n to 2499+100n, 59300+100n to 59303+100n	Not possible	
	Servo network composition monitor area	58660, 58661	·	
	Mark detection monitor data area	54960+80k to 55025+80k		
	System control data area	5900 to 5945		
Control data area	Axis control data area	4300+100n to 4395+100n 30100+10n to 30103+10n	Possible	
	Mark detection control data area	54640+10k to 54642+10k		

Buffer memory area configuration			Buffer memory address	Writing possibility	
Positioning data area (No.1 to 100)	Positioning data area		6000+1000n to 6009+1000n 71000+1000n, 71001+1000n		
Positioning data area (No.101 to 600)		a	Set by GX Works3		
	Block start data are	2	22000+400n to 22049+400n		
Block start data area		a	22050+400n to 22099+400n		
	Condition data		22100+400n to 22199+400n		
	Disak start data ara	.	22200+400n to 22249+400n		
Block start data area	BIOCK Start data are	a	22250+400n to 22299+400n	Possible	
	Condition data area	l	22300+400n to 22399+400n		
Block start data area (No.7002) Block start data area	Block start data are	а			
	Condition data area				
	Block start data area		Cat by CX Marka?		
(No.7003)	Condition data area		Set by GX Works3		
Block start data area	Block start data area				
(No.7004)	Condition data area				
PLC CPU memo area	PLC CPU memo ar	ea	30000 to 30099	Possible	
		PA01 to PA18	28401+100n to 28418+100n	-	
	PA group	PA19	64464+70n		
		PA20 to PA32	64400+70n to 64412+70n		
	DD group		28419+100n to 28463+100n	Possible	
	РБ дгоир		64413+70n to 64431+70n		
			28464+100n to 28495+100n		
Servo parameter area	PC group		64432+70n to 64463+70n		
	PD group		65520+340n to 65567+340n		
	PE group		65568+340n to 65631+340n		
	PS group		65712+340n to 65743+340n		
	PF group		65632+340n to 65679+340n		
	Po group		65680+340n to 65711+340n		
	PL group		65744+340n to 65791+340n		

Buffer	memory area configuration	Buffer memory address	Writing possibility
	Servo input axis parameters	32800+10n to 32805+10n	Possible
	Servo input axis monitor data	33120+10n to 33127+10n	Not possible
	Synchronous encoder axis parameter	34720+20j to 34735+20j	Possible
	Synchronous encoder axis control data	35040+10j to 35047+10j	Possible
	Synchronous encoder axis monitor data	35200+20j to 35212+20j	Not possible
Synchronous control	Synchronous control system control data	36320, 36322	Possible
	Synchronous parameters	36400+200n to 36513+200n	Possible
	Synchronous control monitor data	42800+40n to 42835+40n	Not possible
	Control data for synchronous control	44080+20n to 44090+20n	Possible
	Cam operation control data	45000 to 53791	Possible
	Cam operation monitor data	53800 to 53801	Not possible

PRECAUTIONS

It is prohibited to use missing addresses not listed above. If used, the system may not operate correctly.

POINT

When the parameter of the servo amplifier side is changed by the following method, the RD77MS reads parameters automatically, and the data is transmitted to the servo parameter area in the buffer memory and internal memory (nonvolatile).

- (a) When changing the servo parameters by the auto tuning.
- (b) When the servo parameter is changing after the MR Configurator2 is connected directly with the servo amplifier.

3.6.2 Explanation of buffer memories used in practical work

This section explains the buffer memories used in the programs in the training manual.

Refer to the following user's manuals for the details of each buffer memory.

- MELSEC iQ-R Simple Motion Module User's Manual (Application)
- MELSEC iQ-R Simple Motion Module User's Manual (Advanced Synchronous Control)

Buffer memory address	ltem	Remarks/setting range	Default value
2400+100n 2401+100n	Feed current value	 The currently commanded address is stored. (Different from the actual motor position during operation) The current position address is stored. If "degree" is selected as the unit, the addresses will have a ring structure for values between 0 and 359.99999°. The home position address is stored when the machine home position return is completed. When the current value is changed with the current value changing function, the changed value is stored. 	0000H
2406+100n	Axis error No.	 When an axis error is detected, the error code corresponding to the error details is stored. The latest error code is always stored. (When a new axis error occurs, the error code is overwritten.) When "[Cd.5] Axis error reset" (axis control data) turns ON, the axis error No. is cleared (set to 0). 	0000H
2407+100n	Axis warning No.	 Whenever an axis warning is reported, a related warning code is stored. This area stores the latest warning code always. (Whenever an axis warning is reported, a new warning code replaces the stored warning code.) When the "[Cd.5] Axis error reset" (axis control data) is set to ON, the axis warning No. is cleared to "0". 	0000H
2409+100n	Axis operation status	This area stores the axis operation status. Monitor value Axis operation status -2: Step standby -1: Error 0: Standby 1: Stopped 2: Interpolation 3: JOG operation 4: Manual pulse generator operation 5: Analyzing 6: Special start standby 7: Home position return 8: Position control 9: Speed control 10: Speed control in speed-position switching control 11: Position control in speed-position switching control 12: Speed control in speed-position switching control 13: Position control in position-speed switching control 14: Position control in position-speed switching control 15: Synchronous control 16: Test mode JOG operation 20: Servo amplifier has not been connected/ Servo amplifier power supply OFF 21: Servo OFF 30: Control mode switch 31: Speed control 32: Torque control 33: Continuous operation to torque control mode	0

n: Axis No. - 1

Buffer Memory Address	ltem	Remarks/setting range		
2417+100n	Status	This area stores the states (ON/OFF) of various flags. 0 0 0 0 8 Monitor value b15 b12 b8 b4 b0 Buffer memory 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0008H	
2477+100n	Servo status1	This area stores the servo status1. b15 b12 b8 b4 b0 Stored items Meaning b0 READY ON b1 Servo ON b2 Control mode* b7 Servo alarm 1: ON b13 Torque limit b14 Absolute position lost b15 Servo warning *: Control mode 0 0 Position control mode 1 0 Speed control mode 0 1 Torque control mode	0000H	
2478+100n	Regenerative load ratio/ Optional data monitor output 1	 The rate of regenerative power to the allowable regenerative power is indicated as a percentage. When the regenerative option is used, the rate to the allowable regenerative power of the option is indicated. (Buffer memory) % This area stores the content set in "[Pr.91] Optional data monitor: Data type setting 1" at optional data monitor data type setting. 	0	
2488+100n	Servo alarm	 This area stores the servo alarm code and servo warning code displayed in LED of servo amplifier. When the "[Cd.5] Axis error reset" (axis control data) is set to ON after remove the error factor of servo amplifier side, the servo alarm is cleared (set to 0). For the error codes, refer to each Servo amplifier Technical Document Collection. 	0000Н	
4300+100n	Positioning start No.	Sets the positioning start No. (Only 1 to 600 for the Pre-reading start function.) Setting K value V Positioning data No. 1 to 600 Positioning data No. 2 Tool to 7004 Position return 2 Positioning data No. 2 Positioni	0	

Buffer Memory Address	ltem	Remarks/setting range				
4302+100n	Axis error reset	 Clears the axis error detection, axis error No., axis warning detection and axis warning No. When the axis operation state of simple motion module is "in error occurrence", the error is cleared and the simple motion module is returned to the "waiting" state. Clears the both of simple motion module errors and servo amplifier alarms by axis error reset. The error cannot be reset during a forced stop. Execute the axis error reset after the forced stop is released. The set values are shown below. O: Axis error reset request accepted (set by RD77MS) 1: Error reset request (set by user) 				
4314+100n 4315+100n	New speed value	When changing the speed, use this data item to specify a new speed. The operation halts if you specify "0". <u>Unit</u> mm inch degree pulse (x10 ⁻³ mm/min) (x10 ⁻³ inch/min) (x10 ⁻³ degree/min) (pulse/s) <u>Setting</u> 0 to 200000000 0 to 200000000 0 to 200000000 0 to 1000000000	0			
4317+100n	Inching movement amount	 Use this data item to set the amount of movement by inching. The machine performs a JOG operation if "0" is set. Unit mm inch degree pulse (pulse) Setting 0 to 65535 0 to 65535 0 to 65535 0 to 65535 	0			
4318+100n 4319+100n	JOG speed	Use this data item to set the JOG speed. Unit mm (x10 ⁻² mm/min) inch (x10 ⁻⁵ inch/min) degree (x10 ⁻⁵ degree/min) pulse (pulse/s) Setting range 1 to 200000000 1 to 200000000 1 to 200000000 1 to 100000000	0			
4348+100n	Teaching data selection	 This data item specifies the teaching result write destination. Data are cleared to zero when the teaching ends. The set values are shown below. 0: Takes the feed current value as a positioning address. 1: Takes the feed current value as an arc data. 				
4349+100n	Teaching positioning data No.	 This data item specifies data to be produced by teaching. If a value between 1 and 600 is set, a teaching operation is done. The value is cleared to "0" when the RD77MS is initialized and the teaching operation completes, and when an illegal value (601 or higher) is entered. 				
4351+100n	Servo OFF command	Executes servo OFF for each axis. The set values are shown below. O: Servo ON 1: Servo OFF				
5900	Flash ROM write request	 Writes not only "positioning data (No.1 to 600)" and "block start data (No.7000 to 7004)" stored in the buffer memory/internal memory area, but also "parameters" and "servo parameters" to the flash ROM/internal memory (nonvolatile). The set values are shown below. 0: Writing in flash ROM completed (set by RD77MS) 1: Flash ROM write request (set by user) 	0			

n: Axis No. - 1

Buffer Memory Address	ltem	Remarks/setting range	
6006+1000n 6007+1000n	Positioning address/ movement amount	Set the address as the target value for positioning control. (Refer to "[Da.6] Positioning address/movement amount" in 4.9 "Positioning data.")	
30100+10n	Axis stop	 When the axis stop signal turns ON, the home position return control, positioning control, JOG operation, inching operation, manual pulse generator operation, speed-torque control, etc. will stop. By turning the axis stop signal ON during positioning operation, the positioning operation will be "stopped". Whether to decelerate stop or rapidly stop can be selected with "[Pr.39] Stop group 3 rapid stop selection". During interpolation control of the positioning operation, if the axis stop signal of any axis turns ON, all axes in the interpolation control will decelerate and stop. The set values are shown below. Axis stop requested Other than 1: Axis stop not requested 	0
30101+10n	Forward run JOG start	 When the JOG start signal is ON, JOG operation will be carried out at the "[Cd.17] JOG speed". When the JOG start signal turns OFF, the operation will decelerate and stop. When inching movement amount is set, the designated movement 	0
30102+10n	Reverse run JOG start	 amount is output for one operation cycle and then the operation stops. The set values are shown below. 1: JOG started Other than 1: JOG not started 	0
36320	Synchronous control start	 Synchronous control begins if the target axis bit is turned ON. Synchronous control ends if the bit is turned OFF during synchronous control. Set the target axis in 16-bit. (bit 0: axis 1 to bit 15: axis 16) OFF: Synchronous control end ON: Synchronous control start 	0
36472+200n 36473+200n	Cam axis length per cycle	 axis h per Sets the input amount required for 1 cam cycle. The setting range is from 1 to 2147483647 [cam axis cycle unit]. 	
36474+200n	Cam No.	 Set the cam No. The set values are shown below. 0 : Linear cam (preset) 1 to 256: User created cams 	0
42828+40n	Main shaft clutch ON/ OFF status	The ON/OFF status of the main shaft clutch is stored. 0: Clutch OFF status 1: Clutch ON status	0
42829+40n	Main shaft clutch smoothing status	The smoothing status of the main shaft clutch is stored. 0: No clutch smoothing 1: During clutch smoothing	0
44080+20n	Main shaft clutch command	 Set the clutch command ON/OFF status. The set values are shown below. 0: Main shaft clutch command OFF 1: Main shaft clutch command ON 	0
44081+20n	Main shaft clutch control invalid command	 The main shaft clutch control is disabled. The set values are shown below. 0: Main shaft clutch control valid 1: Main shaft clutch control invalid 	0
44082+20n	Main shaft clutch forced OFF command	 The clutch is forcibly turned off. The set values are shown below. 0: Main shaft clutch normal control 1: Main shaft clutch forced OFF 	0

Buffer Memory Address	ltem	Remarks/setting range	
44083+20n	Auxiliary shaft clutch command	 Set the clutch command ON/OFF status. The set values are shown below. 0: Auxiliary shaft clutch command OFF 1: Auxiliary shaft clutch command ON 	0
45000	Cam data operation request	 Set the cam data operation command. The set values are shown below. 0: Cam data operation completed (set by RD77MS) 1: Read (set by user) 2: Write (cam saving area) (set by user) 3: Write (cam extension area) (set by user) 	0
45001	Operation cam No.	Set the number of the cam to be operated.The setting range is from 1 to 256.	0
45002	Cam data first position	 Set the top position of the cam data to be operated. Stroke ratio data format: 1 to cam resolution Coordinate data format: 0 to (number of coordinates – 1) 	0
45003	Number of cam data operation points	Set the number of points of cam data to be operated.Stroke ratio data format: 1 to 4096Coordinate data format: 1 to 2048	0
45004	Cam data format	 Set the cam data format. When cam data is written: Set the cam data format. When cam data is read: The set cam data format is stored. The set values are shown below. 1: Stroke ratio data format 2: Coordinate data format 	0
45008 to 53199	Cam data value	 Cam data for the number of cam data operation points can be set and obtained in the following format. When cam data is written: Set the cam data corresponding to the cam data format. When cam data is read: The set cam data is stored. The setting range of stroke ratio data format is shown below. -2147483648 to 2147483647[×10⁻⁷ %] The setting ranges of coordinate data format are shown below. Input value: 0 to 2147483647 [cam axis cycle unit] Output value: -2147483648 to 2147483647 [output axis position unit] 	0
53200	Cam auto- generation request	 Set the cam automatic creation request. The set values are shown below. 0: Cam automatic generation completed (set by RD77MS) 1: Cam automatic generation request (set by user) 	0
53201	Cam auto- generation cam No.	 The number of automatically generated cam is set. The setting range is from 1 to 256. 	0
53202	Cam auto- generation type	 Set the type of cam automatic generation. The set values are shown below. 1: Cam for rotary cutter 	0
53204 to 53779	Cam auto- generation data	Set the parameter for each type of cam automatic generation.*1	0

n: Axis No. - 1

*1.	The	parameters	for cam	automatic	generation	for rotary	cutter an	re shown b	elow.
-----	-----	------------	---------	-----------	------------	------------	-----------	------------	-------

Buffer Memory Address	ltem	Setting value	Details
53204	Cam resolution	256/512/1024/2048/4096/ 8192/16384/32768	Set the resolution of the cam to be created.
53206 53207	Sheet length	1 to 2147483647 [(Optional) Same unit (0.1 mm, etc.)]	Set the sheet length. Set this value as the cam axis length per cycle.
53208 53209	Sheet synchronous width	1 to 2147483647 [(Optional) Same unit (0.1 mm, etc.)]	Set the length of the synchronous zone of sheet.
53210 53211	Synchronous axis length	1 to 2147483647 [(Optional) Same unit (0.1 mm, etc.)]	Set the perimeter of rotary cutter shaft.
53212 53213	Synchronization starting position	0 to 2147483647 [(Optional) Same unit (0.1 mm, etc.)]	Set the length from the sheet head to the synchronization start zone.
53214	Synchronous section acceleration ratio	-5000 to 5000 [0.01 %]	Set this ratio to make a fine adjustment to the synchronization speed in the synchronization zone. Synchronization zone speed = synchronization speed × (100 % + acceleration rate)

<Configuration of positioning data area>



Chapter 4 Types of Data

With the positioning system using the RD77MS, the various parameters and data explained in this chapter are used for control. The parameters and data include parameters set according to the device configuration, such as the system configuration, and parameters and data set according to each control.

4.1 Parameters and Data Required for Control

The parameters and data required to carry out control with the RD77MS include the "setting data", "monitor data" and "control data" shown below.

4.1.1 Setting data

The data is set beforehand according to the machine and application. The data set for the buffer memory can also be saved in the flash ROM or internal memory (nonvolatile) in the RD77MS.

The setting data is classified as follows.

Setting data



- The data can be set by using a program or GX Works3. In this document, GX Works3 is used.
- The basic parameters 1, detailed parameters 1, home position return parameters, "[Pr.83] Speed control 10 × multiplier setting for degree axis", "[Pr.89] Manual pulse generator/Incremental synchronous encoder input type selection", "[Pr.90] Operation setting for speed-torque control mode" and "[Pr.95] External command signal selection" become valid when the PLC READY signal [Y0] turns from OFF to ON.
- The basic parameters 2, detailed parameters 2 (excluding "[Pr.83] Speed control 10 × multiplier setting for degree axis", "[Pr.90] Operation setting for speed-torque control mode", "[Pr.95] External command signal selection", "[Pr.122] Manual pulse generator speed limit mode" and "[Pr.123] Manual pulse generator speed limit value") become valid immediately when they are written to the buffer memory, regardless of the state of the PLC READY signal [Y0].
- Even when the PLC READY signal [Y0] is ON, the values or contents of the following can be changed: basic parameters 2, detailed parameters 2, positioning data, and block start data.
- The servo parameter is transmitted from the RD77MS to the servo amplifier when the initialized communication carried out after the power supply is turned ON or the CPU module is reset.

The power supply is turned ON or the CPU module is reset after writing servo parameter in flash ROM of RD77MS if the servo parameter is transmitted to the servo amplifier.

- The only valid data assigned to basic parameter 2, detailed parameter 2, positioning data or block start data are the data read at the moment when a positioning or JOG operation is started. Once the operation has started, any modification to the data is ignored. Exceptionally, however, modifications to the following are valid even when they are made during a positioning operation: acceleration time 0 to 3, deceleration time 0 to 3, and external command function.
 - Acceleration time 0 to 3, deceleration time 0 to 3: Positioning data are pre-read and pre-analyzed. Modifications to the data four or more steps after the current step are valid.
 - External command function selection:

The value at the time of detection is valid.

POINT

- (1) The "setting data" is created for each axis.
- (2) The "setting data" parameters have determined default values, and are set to the default values before shipment from the factory. (Parameters related to axes that are not used are left at the default value.)
- (3) The "setting data" can be initialized with the GX Works3 or the program.
- (4) It is recommended to set the "setting data" with the GX Works3. The program for data setting is complicated and many devices must be used. This will increase the scan time.

4.1.2 Monitor data

The data indicates the control status. Since the data is stored in the buffer memory, it can be monitored as needed.

The monitor data is classified as follows.

Monitor data

	System monitor data	Monitors the specifications and the operation history of RD77MS.
	Axis monitor data	Monitors the data related to the operating axis, such as the current position and speed.
	Servo network composition monitor data	Monitors the data related to the current network state.
ļ	Synchronous control monitor data	Monitors the data for synchronous control.

• The data can be monitored by using a program or GX Works3. In this document, GX Works3 is used.

4.1.3 Control data

The data is used by users to control the positioning system. The control data is classified as follows.

Control data

System control data	١
Axis control data	 ;;
Synchronous control data	

Writes/initializes the "positioning data" in the module. Sets the setting for operation of all axes. Makes settings related to the operation, and controls the speed change during operation, and stops/restarts the operation for each axis.

Output signals (axis stop signal, JOG start signal and execution prohibition flag) from the CPU module to the RD77MS.

Set the data for synchronous control.

Control using the control data is carried out with the program.
 "[Cd.41] Deceleration start flag valid" is valid for only the value at the time when the PLC READY signal [Y0] turns from OFF to ON.

4.2 Servo Network Composition Parameters

Used to select the SSCNET device to connect to the RD77MS. (The device cannot be changed while the programmable controllers is in the ready state.) In this document, the following identification codes are used.

• 00001000: MR-J4-_B, MR-J4W-_B (2-, 3-axis type)

4.2.1 Connected device

Parameters	Item	Setting range	Default value
[Pr.100]	Connected device	Refer identification code list as mentioned in 4.2.2.	0

POINT

- Be sure to set up the connected device. Communication with the SSCNET device is not started by the initial value "0" in default value.
- When the setting value which is different from the connected device is set, the error "Connected device setting error" (error code: 193EH) occurs. When connecting with the connected device with the setting value other than above, the warning "Incompatible device" (warning code: 0C81H) occurs.

4.2.2 Identification code list



Mitsubishi electric (Vendor ID: 0000)

Identification code	Model	Network	Remarks
0100	MR-J3B, MR-J3WB (2-axis type)	SSCNET III	
0101	MR-J3BRJ006 (For fully closed loop control)	SSCNET III	
0102	MR-J3BRJ004 (For linear servo motor)	SSCNET III	
0107	MR-J3B-RJ080W (For direct drive motor)	SSCNET III	
0180	MR-J3W-0303BN6	SSCNET III	
0FFF	Virtual servo amplifier (MR-J3-B, standard)	SSCNET III	
1000	MR-J4B, MR-J4WB (2-, 3-axis type)	SSCNET III/H	
1FFF	Virtual servo amplifier (MR-J4-B)	SSCNET III/H	
2000	FR-A800-1 ^{*1}	SSCNET III/H	Inverter
2001	FR-A800-2*1	SSCNET III/H	Inverter
4100	FR-A700 (Inverter)	SSCNET III	Inverter
4101	FR-A700-NA (Inverter)	SSCNET III	Inverter
4102	FR-A700-EC (Inverter)	SSCNET III	Inverter
4103	FR-A700-CHT (Inverter)	SSCNET III	Inverter
C000	MR-MT1010+MR-MT1200 (Pulse conversion module)	SSCNET III	Pulse conversion module

*1. Refer to the FR-A800 series instruction manual for details.

ORIENTAL MOTOR (Vendor ID: 0003)

Identification code	Model	Network	Remarks
2029	5-phase (ST)	SSCNET III/H	
202A	αSTEP (AZ)	SSCNET III/H	

Nikki Denso (Vendor ID: 0008)

Identification code	Model	Network	Remarks
0102	VC II (Manufactured by Nikki Denso Co., Ltd.) (For linear stage)	SSCNET III	
0107	VC II (Manufactured by Nikki Denso Co., Ltd.) (For direct drive motor)	SSCNET III	
0302	VPH (Manufactured by Nikki Denso Co., Ltd.) (For linear stage)	SSCNET III	
0307	VPH (Manufactured by Nikki Denso Co., Ltd.) (For direct drive motor)	SSCNET III	
1000	VC II (Manufactured by Nikki Denso Co., Ltd.)	SSCNET III/H	
1300	VPH (Manufactured by Nikki Denso Co., Ltd.)	SSCNET III/H	

4.3 Common Parameters

Parameters	Item	Setting value,	setting range	Default value
		0: A-phase/B-phase	0	
[Dr 04]	Manual pulse generator/	1: A-phase/B-phase		
[P1.24]	input selection	2: A-phase/B-phase	multiplied by 1	U
		3: PULSE/SIGN		
		0: Valid (External inp	out signal)	
[Pr.82]	Forced stop valid/invalid selection	1: Invalid		0
		2: Valid (Buffer mer	iory)	
	Manual pulse generator/	0: Differential output	type	
[Pr.89]	Incremental synchronous encoder input type selection	1: Voltage output/open collector type		1
		0000H: 0.888 ms		
		0001H: 1.777 ms		
[Pr.96]	Operation cycle setting	0002H: 3.555 ms		FFFFH
		0200H: 0.444 ms		
		FFFFH: Automatic setting		
[Dr 07]		0: SSCNET III		1
[PI.97]	SSCIVET setting	1: SSCNET III/H		
		b0: SIN1	0: ON at leading	
[Pr.150]	Input terminal logic selection	to	edge 1: ON at trailing	0
		b19: SIN20	edge	
	Manual pulse generator/	0: Negative logic		
[Pr.151]	Incremental synchronous encoder input logic selection	1: Positive logic		0
		0: No setting		
[Pr.152]	Maximum number of control axes	1 to 16: Maximum n axes	umber of control	0
		0H: 3.2 ms		
		1H: 2.4 ms		
		2H: 1.6 ms	6666H	
[Pr.153]	External input signal digital filter	3H: 1.2 ms		
	Setting	4H: 0.8 ms		
		5H: 0.4 ms		
		6H: 0.2 ms		

[Pr.82] Forced stop valid/invalid selection

Set the forced stop valid/invalid.

All axes of the servo amplifier are made to batch forced stop when the forced stop input signal is turned on after the forced stop valid/invalid selection is set to "0: Valid (External input signal)" or "2: Valid (Buffer memory)". The error "Servo READY signal OFF during operation" (error code: 1902H) does not occur if the forced input signal is turned on during operation.

"0: Valid (External input signal)" (Forced stop from the external input signal is used.)

"1: Invalid" (Forced stop is not used.)

"2: Valid (Buffer memory)" (Forced stop from the buffer memory is used.)

PRECAUTIONS

- If the setting is other than 0 to 2, the error "Forced stop valid/invalid setting error" (error code: 1B71H) occurs.
- The "[Md.50] Forced stop input" is stored "1" by setting "Forced stop valid/invalid selection" to invalid.

4.4 Basic Parameters

The basic parameters are classified into basic parameters 1 and basic parameters 2.

Devemetere	Unit used			Setting	g range		Default	
Parameters	ltem		mm	inch	degree	pulse	value	
[Pr.1]	Unit settin	g	0: mm	1: inch	2: degree	3: pulse	3	
[Pr.2]		Number of pulses per rotation (AP)	1 to 20000000 pulse		20000			
[Pr.3]	Movement amount	Movement amount per rotation (AL)	1 to 200000000 (×10 ⁻¹ μm)	1 to 200000000 (×10⁻⁵ inch)	1 to 200000000 (×10 ⁻⁵ degree)	1 to 200000000 (pulse)	20000	
[Pr.4]		Unit magnification (AM)	1: 1 times 10: 10 times 100: 100 times 1000: 1000 times			1		
[Pr.7]	Bias spee	d at start	0 to 0 to 0 to 0 to 0 to 2000000000 200000000 200000000 100000000 100000000 (x10 ⁻³ mm/min) (x10 ⁻³ inch/min) (x10 ⁻³ degree/min) ^{*1} (pulse/s)			0		

4.4.1 Basic parameters 1

*1. Range of speed limit value when "Speed control 10 × multiplier setting for degree axis" is set to valid: 1 to 2000000000 (× 10⁻² degree/min)

[Pr.1] Unit setting

Set the unit used for defining positioning operations. Choose from the following units depending on the type of the control target: mm, inch, degree, or pulse. Different units can be defined for different axes.

(Ex.) mm or inch: X-Y table, conveyor

(Select mm or inch depending on the machine specifications.)

degree: Rotating body (360 degrees/rotation)

pulse: X-Y table, conveyor

POINT

When you change the unit, note that the values of other parameters and data will not be changed automatically.

[Pr.2] to [Pr.4] Movement amount per pulse

Mechanical system value used when the RD77MS performs positioning control.

The movement amount per pulse (electronic gear) is expressed by the following equation.

Movement amount per pulse = (1) Number of pulses per rotation (AP)

(2) Movement amount per rotation $(AL) \times (3)$ Unit magnification (AM)

Set the value in accordance with Steps (1) to (3).

(1) Number of pulses per rotation (AP)

Set the number of pulses required for a complete rotation of the motor shaft.

Number of pulses per rotation (AP) = Encoder resolution

(2) Movement amount per rotation (AL)

The movement amount of the workpiece per one motor rotation is determined by the mechanical structure.

If the worm gear lead (μ m/rev) is PB and the deceleration rate is R, then

Movement amount per rotation (AL) = $PB \times R$

(3) Unit magnification (AM)

For the movement amount per rotation (AL), the setting range has been determined. If the movement amount per rotation (AL) exceeds the setting range, the

magnification can be adjusted with the unit magnification (AM).

Movement amount per rotation (AL) = $PB \times R$ = Movement amount per rotation (AL) × Unit magnification (AM)

Setting of movement amount per rotation (AL) and unit magnification (AM)
<condition> The ball screw lead is 10 mm (10000 μm), and the gear ratio is $\frac{1}{1}$.</condition>
 <setting example=""></setting> Since the setting range of movement amount per rotation (AL) is from 0.1 to 2000000.0 μm, set the AL to "10000.0". Set the unit magnification (AM) to "1".
<calculation example=""> Movement amount per rotation (AL) = ball screw lead × gear ratio (reduction ratio) × unit magnification (AM) = 10000 μm × 1 × 1 = 10000 μm</calculation>

<Error correction method>

When position control is performed an error may occur between command movement amount (L) and actual movement amount (L'), with the electronic gear (movement amount per pulse) set in the parameter. RD77MS can correct the error by adjusting the electronic gear.

The "error correction amount" to be used for error correction is defined as shown below.

Error	Command movement amount (L)
compensation =	Actual movement amount (1 ')
amount	Actual movement amount (L)

The electronic gear to which the error correction amount is applied gives pulses as shown below.



Set the number of pulses per rotation (AP'), movement amount per rotation (AL') and unit magnification (AM') after correction in the parameters, and write the parameters in RD77MS. The settings will be enabled when the PLC READY signal [Y0] is turned on (OFF to ON).

[Pr.7] Bias speed at start

The bias speed at start is the lowest starting speed to be used for smooth motor rotation when a stepping motor is used.

This parameter is enabled when the home position return, position control or JOG operation is performed.



"Bias speed at start" is valid regardless of motor type. Set "0" when using the motor other than the stepping motor. Otherwise, it may cause vibration or impact even though an error does not occur.

4.4.2 Basic parameters 2

Demonstern	Unit used	Setting range				
Parameters	Item	mm	inch	degree	pulse	value
[Pr.8]	Speed limit value	1 to 200000000 (×10 ⁻² mm/min)	1 to 2000000000 (×10 ⁻³ inch/min)	1 to 200000000 (×10 ⁻³ degree/min) ^{*1}	1 to 1000000000 (pulse/s)	200000
[Pr.9]	Acceleration time 0	1 to 8388608 ms			1000	
[Pr.10]	Deceleration time 0		1 to 838	8608 ms		1000

 Range of speed limit value when "Speed control 10 × multiplier setting for degree axis" is set to valid: 1 to 2000000000 (× 10⁻² degree/min)

[Pr.8] Speed limit value

Set the maximum speed during positioning, home position return and speed-torque operations. If a speed exceeding the limit value, the speed will be limited to the speed limit value.

[Pr.9] Acceleration time 0/[Pr.10] Deceleration time 0

Acceleration time 0 specifies the time for the speed to increase from zero to the "[Pr.8] Speed limit value" ("[Pr.31] JOG speed limit value" at JOG operation control). Deceleration time 0 specifies the time for the speed to decrease from the "[Pr.8] Speed limit value" ("[Pr.31] JOG speed limit value" at JOG operation control) to zero.



(1) If the positioning speed is set lower than the speed limit value, the actual acceleration/ deceleration time will be relatively short.

Thus, set the maximum positioning speed equal to or only a little lower than the speed limit value.

- (2) These settings are valid for home position return, positioning and JOG operations.
- (3) When the positioning involves interpolation, the acceleration/deceleration time defined for the reference axis is valid.

4.5 Detailed Parameters

The detailed parameters are classified into detailed parameters 1 and detailed parameters 2.

Devementere	Unit used	Setting range					Default	
Parameters	ltem		mm	inch	degree	pulse	value	
[Pr.11]	Backlash co amount	ompensation	0 to 65535 (×10 ⁻¹ μm)	0 to 65535 (×10 ⁻⁵ inch)	0 to 65535 (×10 ⁻⁵ degree)	0 to 65535 (pulse)	0	
[Pr.12]	Software st limit value	roke limit upper	-2147483648 to 2147483647 (×10 ⁻¹ μm)	-2147483648 to 2147483647 (×10 ⁻⁵ inch)	0 to 35999999 (×10 ⁻⁵ degree)	-2147483648 to 2147483647 (pulse)	2147483647	
[Pr.13]	Software stroke limit lower limit value		-2147483648 to 2147483647 (×10 ⁻¹ μm)	-2147483648 to 2147483647 (×10 ⁻⁵ inch)	0 to 35999999 (×10 ⁻⁵ degree)	-2147483648 to 2147483647 (pulse)	-2147483648	
[Pr.14]	Software st selection	roke limit	0: Apply softw 1: Apply softw	vare stroke limit vare stroke limit	on feed curren on machine fe	t value ed value	0	
[Pr.15]	 Software stroke limit valid/ invalid setting 0: Software stroke limit valid during JOG operation, inchir operation and manual pulse generator operation 1: Software stroke limit invalid during JOG operation, inching operation and manual pulse generator operation, 			ration, inching eration peration, rator operation	0			
[Pr.16]	Command	in-position width	1 to 2147483647 (×10 ⁻¹ μm)	1 to 214783647 (×10⁻⁵ inch)	1 to 2147483647 (×10 ⁻⁵ degree)	1 to 2147483647 (pulse)	100	
[Pr.17]	Torque limit	t setting value	0.1 to 1000.0 %				300.0	
[Pr.18]	M code ON signal output timing		0: WITH mode 1: AFTER mode				0	
[Pr.19]	Speed swit	ching mode	0: Standard s 1: Front-Ioadi): Standard speed switching mode I: Front-loading speed switching mode			0	
[Pr.20]	Interpolatio designation	n speed n method	0: Composite 1: Reference	osite speed ence axis speed			0	
[Pr.21]	Feed current speed cont	nt value during rol	0: Do not upd 1: Update fee 2: Clear feed	ate feed curren d current value current value to	t value o zero		0	
		Lower limit						
	Input	Upper limit		aio				
[Pr.22]	logic	Stop signal	1: Positive log	lic			0	
	selection	Proximity dog signal						
[Pr.81]	Speed-posi selection	ition function	0: Speed-position switching control (INC mode) 2: Speed-position switching control (ABS mode)			0		
[Pr.116]	FLS Input type [Pr.116] signal		0H: Simple motion module 1H: Servo amplifier ^{*1} 2H: Buffer memory FH: Invalid				1H	
	301001	Input terminal	01H to 0AH (F 01H to 14H (F	RD77MS2) RD77MS4/8/16))		00H	

4.5.1 Detailed parameters 1

Damanatana	Unit used			Setting range				
Parameters	ltem		mm	inch	degree	pulse	value	
[Pr.117]	RLS signal	Input type	0H: Simple m 1H: Servo am 2H: Buffer me FH: Invalid	otion module plifier ^{*1} mory			1H	
	Selection	Input terminal	01H to 0AH (F 01H to 14H (F	RD77MS2) RD77MS4/8/16)			00H	
[Pr.118]	DOG signal	Input type	0H: Simple m 1H: Servo am 2H: Buffer me FH: Invalid	otion module plifier ^{*1} mory			1H	
	selection	Input terminal	01H to 0AH (F 01H to 14H (F	RD77MS2) RD77MS4/8/16)			00H	
[Pr.119]	STOP signal	Input type	0H: Simple motion module 1H: Servo amplifier ^{*1} 2H: Buffer memory FH: Invalid			2H		
	Selection	Input terminal	01H to 0AH (F 01H to 14H (F	RD77MS2) RD77MS4/8/16)			00H	

*1. The setting is not available in STOP signal selection.

[Pr.11] Backlash compensation amount

The error that occurs due to backlash when moving the machine via gears can be compensated.

When the backlash compensation amount is set, commands equivalent to the compensation amount will be output each time the direction changes during positioning.



- (1) The backlash compensation is valid after machine home position return. Thus, if the backlash compensation amount is set or changed, always carry out machine home position return once.
- (2) The backlash compensation amount must meet the following formula.
 0 ≤ Backlash compensation amount × Movement amount per pulse^{*1} ≤ 4194303 (pulse)
- *1. Movement amount per pulse = Number of pulses per rotation (AP) Movement amount per rotation (AL) × Unit magnification (AM)

"Backlash compensation amount error" (error code: 1AA0H) occurs when the setting is outside range of above calculations.

[Pr.12][Pr.13] Software stroke limit upper limit value/lower limit value

For the software stroke upper limit value, set the upper limit of the machine's movement range during positioning control.

For the software stroke lower limit value, set the lower limit of the machine's movement range during positioning control.



- (1) Generally, the home position is set at the lower limit or upper limit of the stroke limit.
- (2) By setting the upper limit value or lower limit value of the software stroke limit, overrun can be prevented in the software. However, an emergency stop limit switch must be installed nearby outside the range.
- (3) To invalidate the software stroke limit, set the setting value to "upper limit value = lower limit value". (If it is within the setting range, the setting value can be anything.)
- (4) When the unit is "degree", the software stroke limit check is invalid during speed control (including the speed control in speed-position and position-speed switching control) or during manual control.

[Pr.16] Command in-position width

Set the remaining distance that turns the command in-position ON. The command in-position signal is used as a front-loading signal of the positioning complete signal. When positioning control is started, the "Command in-position flag ([Md.31] Status: b2)" turns OFF, and the "command in-position flag" turns ON at the set position of the command in-position signal.



[Pr.17] Torque limit setting value

The torque limit function limits the torque generated by the servomotor within the set range. If the torque required for control exceeds the torque limit value, it is controlled with the set torque limit value.

[Pr.18] M code ON signal output timing

This parameter sets the M code ON signal output timing.

Choose either WITH mode or AFTER mode as the M code ON signal output timing.

WITH mode: An M code is output and the M code ON signal is turned ON when a positioning operation starts.



AFTER mode: An M code is output and the M code ON signal is turned ON when a positioning operation completes.



*1. m1 and m2 indicate set M codes.

PRECAUTIONS

If AFTER mode is used with speed control, an M code will not be output and the M code ON signal will not be turned ON.

[Pr.19] Speed switching mode

Set whether to switch the speed switching mode with the standard switching or front-loading switching mode.

0: Standard switching • • • Switch the speed when executing the next positioning data.

1: Front-loading switching • • • The speed switches at the end of the positioning data currently being executed.



[Pr.20] Interpolation speed designation method

When carrying out linear interpolation/circular interpolation, set whether to designate the composite speed or reference axis speed.

- 0: Composite speed • The movement speed for the control target is designated, and the speed for each axis is calculated by the RD77MS.
- 1: Reference axis speed • The axis speed set for the reference axis is designated, and the speed for the other axis carrying out interpolation is calculated by the RD77MS.



<When composite speed is designated>

<When reference axis speed is designated>

[Pr.21] Feed current value during speed control

Specify whether you wish to enable or disable the update of "[Md.20] Feed current value" while operations are performed under the speed control (including the speed control in speed-position and position-speed switching control).

- 0: The update of the feed current value is disabled • The feed current value will not change. (The value at the beginning of the speed control will be kept.)
- 1: The update of the feed current value is enabled • The feed current value will be updated. (The feed current value will change from the initial.)
- 2: The feed current value is cleared to zero • The feed current value will be set initially to zero and change from zero while the speed control is in effect.

PRECAUTIONS

- When the speed control is performed over two to four axes, the choice between enabling and disabling the update of "Feed current value" depends on how the reference axis is set.
- Set "1" to exercise speed-position switching control (ABS mode).

4.5.2 Detailed parameters 2

Devementere	Unit used		Setting range				Default
Parameters	Item		mm	inch	degree	pulse	value
[Pr.25 to Pr.27]	Acceleration t	ime 1/2/3		1 to 838	8608 ms		1000
[Pr.28 to Pr.30]	Deceleration t	time 1/2/3		1 to 838	8608 ms		1000
[Pr.31]	JOG speed lir	nit value	1 to 200000000 (×10 ⁻² mm/min)	1 to 200000000 (×10 ⁻³ inch/min)	1 to 200000000 (×10 ⁻³ degree/min)	1 to 100000000 (pulse/s)	20000
[Pr.32]	JOG operation time selection	n acceleration		0 t	o 3		0
[Pr.33]	JOG operation time selection	n deceleration		0 t	o 3		0
[Pr.34]	Acceleration/c process selec	deceleration	0: Trapezoid a 1: S-curve acc	acceleration/dece	celeration proce	÷SS S	0
[Pr.35]	S-curve ratio			1 to 1	100 %		100
[Pr.36]	Rapid stop de	celeration time	ime 1 to 8388608 ms				1000
[Pr.37 to Pr.39]	Stop group 1/2 rapid stop sel	2/3 ection	0: Normal deceleration stop 1: Rapid stop				0
[Pr.40]	Positioning co output time	mplete signal	0 to 65535 ms				300
[Pr.41]	Allowable erro	or range for olation	0 to 100000 0 to 100000 0 to 100000 0 to 100000 (×10 ⁻¹ μm) (×10 ⁻⁵ inch) (×10 ⁻⁵ degree) (pulse)			100	
[Pr.42]	External comr selection	nand function	0: External positioning start 1: External speed change request 2: Speed-position, position-speed switching request 3: Skip request 4: High-speed input request			0	
[Pr.83]	Speed control 1 setting for degree	0 × multiplier ee axis	0: Invalid 1: Valid				0
[Pr.84]	Restart allowa when servo O	able range IFF to ON	0, 1 to 327680 0: restart not a) [pulse] allowed			0
	Operation	Torque initial value selection	0: Command t 1: Feedback t	torque orque			0
[Pr.90]	setting for speed- torque	setting for speed- orque		0: Command speed 1: Feedback speed 2: Automatic selection			0
	control mode	Condition selection at mode switching	0: Switching conditions valid (for switching control mode) 1: Zero speed ON condition invalid (for switching control mode)			ontrol mode) hing control	0
[Pr.95]	External comr selection	nand signal	0: Not used 1 to 20: DI1 tc) DI20			0
[Pr.122]	Manual pulse speed limit mo	generator ode	0: Do not hold 1: Do not outp 2: Output ove	speed limit out over value o r value of speed	of speed limit d limit later		0
[Pr.123]	Manual pulse speed limit va	generator lue	1 to 2000000000 (×10 ⁻² mm/min)	1 to 2000000000 (×10 ⁻³ inch/min)	1 to 2000000000 (×10 ⁻³ degree/min)	1 to 1000000000 (pulse/s)	20000
[Pr.25] to [Pr.27] Acceleration time 1/2/3/[Pr.28] to [Pr.30] Deceleration time 1/2/3

Acceleration time 1/2/3 specify the time for the speed to increase from zero to the "[Pr.8] Speed limit value" ("[Pr.31] JOG speed limit value" at JOG operation control). Deceleration time 1/2/3 specify the time for the speed to decrease from the "[Pr.8] Speed limit value" ("[Pr.31] JOG speed limit value" at JOG operation control) to zero. For details, refer to "[Pr.9] Acceleration time 0/[Pr.10] Deceleration time 0" in the basic parameters 2.

[Pr.34] Acceleration/deceleration process selection

Set whether to use trapezoid acceleration/deceleration or S-curve acceleration/deceleration for the acceleration/deceleration process.



<Trapezoid acceleration/deceleration>

<S-curve acceleration/deceleration>

[Pr.35] S-curve ratio

Set the S-curve ratio (1 to 100 %) for carrying out the S-curve acceleration/deceleration process.

The S-curve ratio is designed to specify the portion to draw an acceleration/deceleration curve as a Sin curve as shown below.



[Pr.37] to [Pr.39] Rapid stop selection (Stop group 1/2/3)

Set the method to stop when the stop causes in the following stop groups occur.

- Stop group 1 • Stop with hardware stroke limit
- Stop group 2 • Error occurrence of the CPU module, PLC READY signal [Y0] OFF
- Stop group 3 • Axis stop signal from the CPU module, Error occurrence (excludes errors in stop groups 1 and 2: includes only the software stroke limit errors during JOG operation, speed control, speed-position switching control, and position-speed switching control)

The methods of stopping include "0: Normal deceleration stop" and "1: Rapid stop". If "1: Rapid stop" is selected, the axis will rapidly decelerate to a stop when the stop cause occurs.

[Pr.40] Positioning complete signal output time

(a) Set the output time of the positioning complete signal "[Md.31] positioning complete signal (Status: b15)" output from the RD77MS. A positioning completes when the specified dwell time has passed after the RD77MS had terminated the command output. For the interpolation control, the positioning completed signal of interpolation axis is output only during the time set to the reference axis.



- (b) Below is explained how the module operates when the next positioning is started while the positioning completion signal is on. (The details of the positioning patterns are explained in the "Positioning data" section.)
 - (1) When the positioning pattern is "end," the positioning completion signal will be turned off after the positioning by the next data No. is started.



(2) When the positioning pattern is "continuous positioning control" and the set time for the positioning completion signal is shorter than the time of the next positioning operation, the positioning completion signal will be turned on at the same time when the positioning by the next data No. is started after a lapse of the previous dwell time. It will be turned off after a lapse of the set time.



(3) When the positioning pattern is "continuous path control," the positioning completion signal will be turned on at the speed change point, and the positioning by the next data No. will be started.



[Pr.41] Allowable circular interpolation error width

The allowable error range of the calculated arc path and end point address is set.^{*1} If the error of the calculated arc path and end point address is within the set range, circular interpolation will be carried out to the set end point address while compensating the error with spiral interpolation.

The allowable circular interpolation error width is set in the following axis buffer memory addresses.

(Ex.)

- If axis 1 is the reference axis, set in the axis 1 buffer memory addresses [60, 61].
- If axis 4 is the reference axis, set in the axis 4 buffer memory addresses [510, 511].



*1. In 2-axis circular interpolation control with center point designation, the arc path calculated with the start point address and center point address and the end point address may deviate.

[Pr.42] External command function selection

Set the function to be allocated to the external command signal.

- 0: External positioning start
 - ••• The external command signal input is used to start a positioning operation.
- 1: External speed change request
 - ••• The external command signal input is used to change the speed in the current positioning operation.

The new speed should be set in the "[Cd.14] New speed value".

- 2: Speed-position, position-speed switching request
 - ••• The external command signal input is used to switch from the speed control to the position control while in the speed-position switching control mode, or from the position control to the speed control while in the position-speed switching control mode.

To enable the speed-position switching control, set the "[Cd.24] Speed-position switching enable flag" to "1". To enable the position-speed switching control, set the "[Cd.26] Position-speed switching enable flag" to "1".

- 3: Skip request
 - ••• The external command signal input is used skip the current positioning operation.
- 4: High speed input request
 - ••• The external command signal input is used to execute the mark detection. And, also set to use the external command signal in the synchronous control.

POINT

To enable the external command signal, set the "[Cd.8] External command valid" to "1".

[Pr.83] Speed control 10 × multiplier setting for degree axis

Set the speed control $10 \times$ multiplier setting for degree axis when you use command speed and speed limit value set by the positioning data and the parameter at "[Pr.1] Unit setting" setup degree by ten times at the speed.

Normally, the speed specification range is 1 to 2000000000 (×10⁻³ degree/min), but it will be decupled and become 1 to 2000000000 (×10⁻² degree/min) by setting "Speed control 10 × multiplier setting for degree axis" to valid.

Refer to MELSEC iQ-R Simple Motion Module User's Manual (Application) for details on the speed control $10 \times$ multiplier setting for degree axis.

PRECAUTIONS

The "[Pr.83] Speed control 10 \times multiplier setting for degree axis" is included in detailed parameters 2. However, it will be valid at the leading edge (OFF to ON) of the PLC READY signal [Y0].

[Pr.84] Restart allowable range when servo OFF to ON

The restart function at switching servo OFF to ON performs continuous positioning operation (positioning start, restart) when switching servo OFF to ON while the RD77MS is stopped (including forced stop, servo forced stop).

Restart at switching servo OFF to ON can be performed when the difference between the last command position of RD77MS at stop and the current value at switching servo OFF to ON is equal to or less than the value set in the buffer memory for the restart allowable range setting.

(1) Servo emergency stop processing

- (a) After RD77MS is stopped by the servo emergency stop signal, it is kept stopped and can be restarted if the difference between the last command position of RD77MS at turning on of the servo stop signal and the current value at turning off of the servo stop signal is within the restart allowable range.
- (b) If the difference between the last command position of RD77MS at turning on of the servo stop signal and the current value at turning off of the servo stop signal exceeds the restart allowable range, it is kept in the standby state and cannot be restarted.



(2) Processing at switching the servo ON signal from OFF to ON

- (a) When the difference between the last command position of RD77MS at switching the servo ON signal from ON to OFF and the current value at switching the servo ON signal from OFF to ON is equal to or less than the value set in the buffer memory for the restart allowable range setting, the positioning operation is judged as stopped and can be restarted.
- (b) When the difference between the last command position of RD77MS at switching the servo ON signal from ON to OFF and the current value at switching the servo ON signal from OFF to ON is greater than the value set in the buffer memory for the restart allowable range setting, the positioning operation is judged as onstandby and cannot be restarted.



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

[Pr.90] Operation setting for speed-torque control mode

Operation setting of the speed control mode, torque control mode or continuous operation to torque control mode at the speed-torque control is executed.



(1) Torque initial value selection

Set the torque initial value at switching to torque control mode or to continuous operation to torque control mode.

(2) Speed initial value selection

Set the initial speed at switching from position control mode to speed control mode or the initial speed at switching from position control mode or from speed control mode to continuous operation to torque control mode.

(3) Condition selection at mode switching

Set the valid/invalid of switching conditions for switching control mode.

PRECAUTIONS

- The "[Pr.90] Operation setting for speed-torque control mode" is included in detailed parameters 2. However, it will be valid at the leading edge (OFF to ON) of the PLC READY signal [Y0].
- Normally it is set to 0, to switch to the torque control set to 1 just after the completion of positioning without waiting until the servo motor stops.

[Pr.95] External command signal selection

Set the external command signal.

Pin Nos. and input terminals corresponding to the external command signals (DI Nos.) are shown below. (For RD77MS2, the pins of up to DI10 can be used.)

- DI1 to DI5: 1A1 to 1A5, SIN1 to SIN5
- DI6 to DI10: 1B1 to 1A5, SIN6 to SIN10
- DI11 to DI15: 2A1 to 1A5, SIN11 to SIN15
- DI16 to DI20: 2B1 to 1A5, SIN16 to SIN20

POINT

Same external command signal can be used in the multiple axes.

[Pr.122] Manual pulse generator speed limit mode

Set how to output when the output by manual pulse generator operation exceeds "[Pr.123] Manual pulse generator speed limit value".

[Pr.123] Manual pulse generator speed limit value

Set the maximum speed during manual pulse generator operation. A manual pulse generator speed exceeding the limit value will be reduced to the speed limit value.

Set the "Manual pulse generator speed limit value" to a value less than "[Pr.8] Speed limit value". If the "[Pr.8] Speed limit value" is exceeded, the error "Manual pulse generator speed limit value error" (error code: 1ABAH) will occur.

4.6 Home Position Return Parameters

The home position return parameters are classified into basic parameters and detailed parameters.

4.6.1 Home position return basic parameters

(The device cannot be changed while the programmable controllers is in the ready state.)

Devenuetava	Unit used	Setting range						
Parameters	Item	mm	inch	degree	pulse	value		
[Pr.43]	Home position return method	0: Proximity dog 4: Count method 5: Count method 6: Data set meth 7: Scale origin si 8: Driver home p	 Proximity dog method Count method 1 Count method 2 Data set method Scale origin signal detection method Driver home position return method 					
[Pr.44]	Home position return direction	0: Positive direct 1: Negative direct	0: Positive direction (address increment direction) 1: Negative direction (address decrement direction)					
[Pr.45]	Home position address	-2147483648 to 2147483647 (×10 ⁻¹ μm)	-2147483648 to 2147483647 (×10 ⁻⁵ inch)	0 to 35999999 ⁽ ×10 ⁻⁵ degree)	-2147483648 to 2147483647 (pulse)	0		
[Pr.46]	Home position return speed	1 to 2000000000 (×10 ⁻² mm/min)	1 to 2000000000 (×10 ⁻³ inch/min)	1 to 2000000000 (×10 ⁻³ degree/min) ^{*1}	1 to 1000000000 (pulse/s)	1		
[Pr.47]	Creep speed	1 to 2000000000 (×10 ⁻² mm/min)	1 to 2000000000 (×10 ⁻³ inch/min)	1 to 2000000000 (×10 ⁻³ degree/min) ^{*1}	1 to 1000000000 (pulse/s)	1		
[Pr.48]	Home position return retry	0: Do not retry h 1: Retry home p	ome position retu osition return with	rn with limit switch limit switch		0		

*1. Range of home position return speed when "[Pr.83] Speed control 10 × multiplier setting for degree axis" is enabled: 1 to 2000000000 (×10⁻² degrees/min)

[Pr.43] Home position return method

- (1) Proximity dog method
 - (a) The machine home position return is started. (The machine begins the acceleration designated in "[Pr.51] Home position return acceleration time selection", in the direction designated in "[Pr.44] Home position return direction". It then moves at the "[Pr.46] Home position return speed" when the acceleration is completed.)
 - (b) The machine begins decelerating when the proximity dog ON is detected.
 - (c) The machine decelerates to the "[Pr.47] Creep speed", and subsequently moves at that speed.

(At this time, the proximity dog must be ON. The workpiece will continue decelerating and stop if the proximity dog is OFF.)

(d) After the proximity dog turns OFF, the machine stops. It then restarts and stops at the first zero point.



- (2) Count method 1
 - (a) The machine home position return is started.

(The machine begins the acceleration designated in "[Pr.51] Home position return acceleration time selection", in the direction designated in "[Pr.44] Home position return direction". It then moves at the "[Pr.46] Home position return speed" when the acceleration is completed.)

- (b) The machine begins decelerating when the proximity dog ON is detected.
- (c) The machine decelerates to the "[Pr.47] Creep speed", and subsequently moves at that speed.
- (d) The machine stops after the workpiece has been moved the amount set in the "[Pr.50] Setting for the movement amount after proximity dog ON" after the proximity dog turned ON. It then restarts and stops at the first zero point.



- (3) Count method 2
 - (a) The machine home position return is started.

(The machine begins the acceleration designated in "[Pr.51] Home position return acceleration time selection", in the direction designated in "[Pr.44] Home position return direction". It then moves at the "[Pr.46] Home position return speed" when the acceleration is completed.)

- (b) The machine begins decelerating when the proximity dog ON is detected.
- (c) The machine decelerates to the "[Pr.47] Creep speed", and subsequently moves at that speed.
- (d) The machine home position return will be completed when the machine moves the movement amount set in "[Pr.50] Setting for the movement amount after proximity dog ON" from the proximity dog ON position.



(4) Data set method

The current position of the machine after home position return completion is consider as a home position.

(Execute the home position return after rotating the servo motor at least 360 degrees by the JOG operation after turning on the power supply to the servo amplifier. However, if selecting "1: Z-Phase must not pass" with "[PC17] Function selection C-4 home position return setting condition", it is possible to carry out the home position return without passing the zero point.)

- (5) Scale origin signal detection method
 - (a) The machine home position return is started.
 - (The machine begins the acceleration designated in "[Pr.51] Home position return acceleration time selection", in the direction designated in "[Pr.44] Home position return direction". It then moves at the "[Pr.46] Home position return speed" when the acceleration is completed.)
 - (b) The machine begins decelerating when the proximity dog ON is detected.
 - (c) After deceleration stop, the machine moves in the opposite direction against of home position return at the "[Pr.46] Home position return speed".
 - (d) During movement, the machine begins decelerating when the first zero signal is detected.

(e) After deceleration stop, the operation moves in direction of home position return at the "[Pr.47] Creep speed", and then the machine home position return will be completed at the detected nearest zero signal.



[Pr.44] Home position return direction

Set the direction to start movement when starting machine home position return.

- 0: Positive direction (address increment direction)
 - • Moves in the direction that the address increments. (Arrow 2)
- 1: Negative direction (address decrement direction)
 - ••• Moves in the direction that the address decrements. (Arrow 1)

Normally, the home position is set near the lower limit or the upper limit, so "[Pr.44] Home position return direction" is set as shown below.



[Pr.45] Home position address

Set the address used as the reference point for positioning control (ABS system). (When the machine home position return is completed, the stop position address is changed to the address set in "[Pr.45] Home position address". At the same time, the "[Pr.45] Home position address" address is stored in "[Md.20] Feed current value" and "[Md.21] Machine feed value".)

[Pr.46] Home position return speed

Set the speed for home position return.

PRECAUTIONS

Set the "home position return speed" to less than "[Pr.8] Speed limit value". If the "speed limit value" is exceeded, the error "Outside speed limit value range" (error code: 1A69H) will occur, and home position return will not be executed.

The "home position return speed" should be equal to or faster than the "[Pr.7] Bias speed at start" and "[Pr.47] Creep speed".

[Pr.47] Creep speed

Set the creep speed after proximity dog ON (the low speed just before stopping after decelerating from the home position return speed).

The creep speed is set within the following range.

Home position return speed ≥ [Pr.47] Creep speed ≥ [Pr.7] Bias speed at start



[Pr.48] Home position return retry

Set whether to carry out home position return retry.

When home position return performed, workpiece started moving in home direction specified in home position return parameters. While returning to home position, it is searching for dog signal. If dog signal is not found and limit switch is come, movement for home position will stop without home position completion. In this type of system home position retry with limit switch can be performed.



[Operation of the home position return retry function]

- (1) The movement starts in the "[Pr.44] Home position return direction" by a machine home position return start.
- (2) The operation decelerates when the limit signal OFF is detected.
- (3) After stopping due to the limit signal OFF detection, the operation moves at the "[Pr.46] Home position return speed" in the opposite direction of the "[Pr.44] Home position return direction".
- (4) The operation decelerates and stops when the proximity dog turns OFF.
- (5) After stopping due to the proximity dog OFF, a machine home position return is carried out in the "[Pr.44] Home position return direction".
- (6) Machine home position return completion.

4.6.2 Home position return detailed parameters

(The device cannot be changed while the programmable controllers is in the ready state.)

Description	Unit		Setting	g range		Default		
Parameters	Item	mm	inch	degree	pulse	value		
[Pr.50]	Setting for the movement amount after proximity dog ON	0 to 2147483647 (×10 ⁻¹ μm)	0 to 2147483647 (×10⁻⁵ inch)	0 to 2147483647 (×10 ⁻⁵ degree)	0 to 2147483647 (pulse)	0		
[Pr.51]	Home position return acceleration time selection	0: Acceleration ti 1: Acceleration ti 2: Acceleration ti 3: Acceleration ti Select the Home basic parameter	0: Acceleration time 0 1: Acceleration time 1 2: Acceleration time 2 3: Acceleration time 3 Select the Home position Return acceleration time from 0 to 3 from basic parameter 2.					
[Pr.52]	Home position return deceleration time selection	0: Deceleration t 1: Deceleration t 2: Deceleration t 3: Deceleration t Select the Home basic parameter	0: Deceleration time 0 1: Deceleration time 1 2: Deceleration time 2 3: Deceleration time 3 Select the Home position Return deceleration time from 0 to 3 from basic parameter 2.					
[Pr.53]	Home position shift amount	-2147483648 to 2147483647 (×10 ⁻¹ μm)	-2147483648 to 2147483647 (×10 ⁻⁵ inch)	-2147483648 to 2147483647 ⁽ ×10 ⁻⁵ degree)	-2147483648 to 2147483647 (pulse)	0		
[Pr.54]	Home position return torque limit value		0.1 to 10	000.0 (%)		300.0		
[Pr.55]	Operation setting for incompletion of home position return	0: Positioning co 1: Positioning co	ontrol is not execu ontrol is executed.	ted.		0		
[Pr.56]	Speed designation during home position shift	0: Home positior 1: Creep speed	n return speed			0		
[Pr.57]	Dwell time during home position return retry		0 to 65	535 ms		0		
[Pr.86]	Pulse conversion module home position return request setting ^{*1}	0: Home position off. 1: Home position turned off.	n return request is	turned on when s	servo is turned en servo is	0		
[Pr.87]	Standby time after output of pulse conversion module clear signal ^{*1}		1 to 10	000 ms		0		

*1. Only when the pulse conversion module is used

[Pr.50] Setting for the movement amount after proximity dog ON

When using the count method 1 or 2, set the movement amount to the home position after the proximity dog signal turns ON.

(The movement amount after proximity dog ON should be equal to or greater than the sum of the "distance covered by the deceleration from the home position return speed to the creep speed" and "distance of movement in 10 ms at the home position return speed".)

[Pr.53] Home position shift amount

Set the amount to shift (move) from the position stopped at with machine home position return.



[Pr.55] Operation setting for incompletion of home position return

Set whether the positioning control is executed or not (When the home position return request flag is ON.).

(1) When the home position return request flag is ON, selecting "0: Positioning control is not executed" will result in the error "Start at home position return incomplete" (error code: 19A6H), and positioning control will not be performed. At this time, operation with the manual control (JOG operation, inching operation, manual pulse generator operation) is available.

The positioning control can be executed even if the home position return request flag is ON when selecting "1: Positioning control is executed".

- (2) The following shows whether the positioning control is possible to start/restart or not when selecting "0: Positioning control is not executed".
 - (a) Start possible

Machine home position return, JOG operation, inching operation, manual pulse generator operation, and current value changing using current value changing start No. (No. 9003)

(b) Start/restart impossible control

When the following cases at block start, condition start, wait start, repeated start, multiple axes simultaneous start and pre-reading start 1-axis linear control, 2/3/4-axis linear interpolation control, 1/2/3/4-axis fixed-feed control, 2-axis circular interpolation control (with sub point designation/center point designation), 3-axis helical interpolation control (with sub point designation/ center point designation), 1/2/3/4-axis speed control, speed-position switching control (INC mode/ ABS mode), position-speed switching control, and current value changing using current value changing (No.1 to 600)

(3) When the home position return request flag is ON, starting the fast home position return will result in the error "Home position return request ON" (error code: 1945H) despite the setting value of "Operation setting for incompletion of home position return", and the fast home position return will not be executed.

PRECAUTIONS

Do not execute the positioning control in home position return request signal ON for the axis which uses in the positioning control. Failure to observe this could lead to an accident such as a collision.

Parameters	Item	Setting range	Default value
[Pr.91]	Optional data monitor: Data type setting 1	0: No setting 1: Effective load ratio ^{*1} 2: Regenerative load ratio 3: Peak load ratio 4: Load inertia moment ratio ^{*1} 5: Model loop gain ^{*1} 6: Main circuit bus voltage ^{*1}	0
[Pr.92]	Optional data monitor: Data type setting 2	 7: Servo motor speed*1 8: Encoder multiple revolution counter 9: Module power consumption 10: Instantaneous torque*1 12: Servo motor thermistor temperature 13: Disturbance torque*1 14: Overload alarm margin 	0
[Pr.93]	Optional data monitor: Data type setting 3	 15: Error excessive alarm margin 16: Settling time 17: Overshoot amount 20: Position feedback^{*2} 21: Encoder position within one revolution^{*2} 22: Selected droop pulse^{*2} 23: Module integral power consumption^{*2} 	0
[Pr.94]	Optional data monitor: Data type setting 4	 24: Load-side encoder information 1^{*2} 25: Load-side encoder information 2^{*2} 26: Z-phase counter^{*2} 27: Servo motor side/load-side position deviation^{*2} 28: Servo motor side/load-side speed deviation^{*2} 29: External encoder count value 30: Module power consumption (2 words)^{*2} 	0

4.7 Extended Parameters

*1. The name differs depending on the connected device.

*2. Used point: 2 words

4.8 Servo Parameters

The servo parameters include servo amplifier series and basic setting, gain/filter setting, extension setting, input/output setting, extension setting 2 and extension setting 3. This document shows the servo parameters of MELSERVO-J4 Series.

4.8.1 Basic setting

(The device cannot be changed while the programmable controllers is in the ready state.)

Parameters	Item		Setting range	Default value
[PA01]	Operation mode ^{*1}	Operation mode selection	 0: Standard control mode 1: Fully closed loop control mode 4: Linear servo motor control mode 6: DD motor control mode Setting other than above will result in [AL. 37 Parameter error]. 	0
		Compatibility mode selection	0: J3 compatibility mode 1: J4 mode	1
[PA02]	Regenerative option*1		 00H: Regenerative option is not used. For servo amplifier of 100 W, regenerative resistor is not used. For servo amplifier of 0.2 kW to 7 kW, built-in regenerative resistor is used. 01H: FR-RC-(H)/FR-CV-(H)/FR-BU2-(H) When you use FR-RC-(H), FR-CV-(H) or FR-BU2-(H), "Mode 2 (1)" of "Undervoltage alarm detection mode selection" in [Pr. PC20]. 02H: MR-RB032 03H: MR-RB12 04H: MR-RB32 05H: MR-RB30 06H: MR-RB50 (Cooling fan is required.) 08H: MR-RB31 09H: MR-RB51 (Cooling fan is required.) 08H: MR-RB3N 0CH: MR-RB5N (Cooling fan is required.) 80H: MR-RB1H-4 81H: MR-RB3M-4 (Cooling fan is required.) 82H: MR-RB3G-4 (Cooling fan is required.) 83H: MR-RB5G-4 (Cooling fan is required.) 84H: MR-RB3U-4 (Cooling fan is required.) 85H: MR-RB5U-4 (Cooling fan is required.) 91H: MR-RB3U-4 (Cooling fan is required.) 85H: MR-RB5U-4 (Cooling fan is required.) 85H: MR-RB5U-4 (Cooling fan is required.) 92H: MR-RB5U-4 (Cooling fan is required.) 	0000Н
[PA03]	Absolute position system*2	on detection	0: Disabled (used in incremental system) 1: Enabled (used in absolute position detection system)	0
	Function	Servo forced stop selection	0: Enabled (The forced stop input EM2 or EM1 is used.)1: Disabled (The forced stop input EM2 and EM1 are not used.)	0
	A-1*2	Forced stop deceleration function selection	0: Forced stop deceleration function disabled (EM1) 2: Forced stop deceleration function enabled (EM2)	2
[PA08]	Auto tuning mo	de	0: 2 gain adjustment mode 1 (interpolation mode) 1: Auto tuning mode 1 2: Auto tuning mode 2 3: Manual mode 4: 2 gain adjustment mode 2	1

Parameters	Item		Sett	ing range	Default value
			Mac	chine characteristic	
		Setting	Desman	Guideline for machine	
		value	Response	resonance frequency [Hz]	
		1	Low	2.7	
		2	response	3.6	
		3		4.9	
		4		6.6	
		5		10.0	
		6		11.3	
		7		12.7	
		8		14.3	
		9		16.1	
		10		18.1	
		11		20.4	
		12		23.0	
		13		25.9	
		14		29.2	16
		15		32.9	
	Auto tuning response	16		37.0	
		17	Middle response	41.7	
		18		47.0	
[PA09]		19		52.9	
		20		59.6	
		21		67.1	
		22		75.6	
		23		85.2	
		24		95.9	
		25		108.0	
		26		121.7	
		27		137.1	
		28		154.4	
		29		1/3.9	
		30		195.9	
		31		220.6	
		32		248.5	
		33		279.9	
		34		315.3	
		30		400.0	
		30		400.0	
		20		501.2	
		30	. ¥ 	571.5	
		40	rosponso	642.7	
		<u> </u>	response	042.1	
[PA10]	In-position range	0 to 65535	[pulse]		1600
[PA14]	Rotation direction selection/ travel direction selection* ²	0: CCW di increme 1: CW dire increme	rection when ented ection when pe ented	positioning address is ositioning address is	0

Parameters	Item		Setting range					
[PA15]	Encoder output pulses*2	1 to 655	1 to 65535 [pulse/rev]					
[PA16]	Encoder output pulses 2*2	1 to 655	1 to 65535					
		Lingerconto	Lincor convo motor	Paran	neters			
		motor series	(primary side)	[Pr. PA17] setting	[Pr. PA18] setting			
			LM-H3P2A-07P-BSS0		2101H			
			LM-H3P3A-12P-CSS0		3101H			
			LM-H3P3B-24P-CSS0		3201H			
			LM-H3P3C-36P-CSS0		3301H			
		LM-H3	LM-H3P3D-48P-CSS0	00BBH	3401H			
			LM-H3P7A-24P-ASS0		7101H			
			LM-H3P7B-48P-ASS0		7201H			
[PA17]	Servo motor series setting		LM-H3P7C-72P-ASS0		7301H			
	5		LM-H3P7D-96P-ASS0		7401H			
			LM-U2PAB-05M-0SS0		A201H			
			LM-U2PAD-10M-0SS0		A401H			
			LM-U2PAF-15M-0SS0		A601H			
			LM-U2PBB-07M-1SS0	00B4H	B201H	0000Н		
		LM-U2	LM-U2PBD-15M-1SS0		B401H			
			LM-U2PBF-22M-1SS0		2601H			
			LM-U2P2B-40M-2550		2201H			
					2301H			
			LIVI-U2P2D-80IVI-2550		24010			
			LM-EP2D-12M-1SS0 (natural cooling)		24011			
			LM-FP2E-18M-1SS0 (natural cooling)		2601H			
			LM-FP4B-12M-1SS0 (natural cooling)		4201H			
			LM-FP4D-24M-1SS0 (natural cooling)		4401H			
			LM-FP4F-36M-1SS0 (natural cooling)		4601H			
			LM-FP4H-48M-1SS0 (natural cooling)		4801H			
			LM-FP5H-60M-1SS0 (natural cooling)	000011	5801H			
			LM-FP2B-06M-1SS0 (liquid cooling)	00B2H	2202H			
			LM-FP2D-12M-1SS0 (liquid cooling)]	2402H			
			LM-FP2F-18M-1SS0 (liquid cooling)		2602H			
			LM-FP4B-12M-1SS0 (liquid cooling)		4202H			
	Servo motor type setting		LM-FP4D-24M-1SS0 (liquid cooling)		4402H			
			LM-FP4F-36M-1SS0 (liquid cooling)		4602H			
			LM-FP4H-48M-1SS0 (liquid cooling)		4802H			
			LM-FP5H-60M-1SS0 (liquid cooling)		5802H			
			LM-K2P1A-01M-2SS1		1101H			
			LM-K2P1C-03M-2SS1		1301H			
			LIVI-NZMZA-UZIVI-1001	000011	2101H			
			LIVI-NZFZG-U/IVI-1331	UUDOH	25010			
			I M-K2P3C-14M-1991		3301H			
			I M-K2P3F-24M-1SS1		3501H			
					000111			

Parameters	ľ	tem			S	etting	rang	e				Default value
			PA19	Setting operation	РА	РВ	РС	PD	PE	PF	PL	
				Reading Writing	0 0							
			Reading	Only 19								
			Writing	Only 19					\square			
			000ВН	Writing	0	0	0			$\left \right\rangle$	\square	
			000CH	Reading Writing	0	0	0 0	0			\square	
			000FH	Reading Writing	0 0	0 0	0	0	0		0 0	
			00AAH	Reading	0	0	0	0	0	0	\square	
[PA19]	Parameter writ	ing inhibit ^{*2}	00ABH	Writing Reading	0	0	0	0	0	0		00ABH
		0	(initial value)	Writing	0	0	0	0	0	0	0	
				Reading	0						\square	
			100BH	Writing	Only 19		\square	\square		\square		
		100CH	Reading	Only	• _	。 \	。 \					
				Reading	19 0	0	0	0	0	$\left \right\rangle$	0	
			100FH	Writing	Only 19							
			10AAH	Reading	o Only	0	°	。 \	。 \	。 \		
				Reading	19 ○	0	0	0	0	0	•	
			10ABH	Writing	Only 19							
	Tough drive	Vibration tough drive selection	0: Disa 1: Enal	ble ble								0
[PA20]	setting*2	SEMI-F47 function selection	0: Disa 1: Enal	ble ble								0
[PA21]	Function select	ion A-3 ^{*2}	0: Disa 1: Enal	ble ble								1
	Position	Super trace control selection	0: Disa 2: Enal	ble ble								0
[PA22]	control composition selection ^{*1}	Scale measurement	0: Disa 1: Useo	ble d in absol	lute p	ositio	n dete	ectior	n syst	em		0
		function selection	2: Used	d in incre	menta	al sys	tem		, - •			
[DA 23]	Drive recorder	Alarm detail No. setting	Set the arbitrar When t No. set	digits whe y alarm de hese digi ting will b	en yo etail N its are be ena	u exe lo. for e "00" abled.	cute tl the d , only	he trig rive ro the a	iger w ecorde arbitra	vith er fun ary ala	ction. arm	00
[୮₳೭३]	arbitrary alarm trigger setting Alarm No. setting		Set the arbitrar When ' recorde	digits wh y alarm N '00" are s er will be	nen yo No. fo set, ar disab	ou exe r the e bitrar led.	ecute drive y alar	the t recor m trig	rigger der fu gger c	r with inctio of the	n. drive	00

Parameters	Item	Setting range	Default value
[PA24]	Function selection A-4	0: Standard mode 1: 3 inertia mode 2: Low response mode	0
[PA25]	One-touch tuning - Overshoot permissible level	0 to 100 [%]	0
[PA26]	Function selection A-5 ^{*2}	0: Disable 1: Enable	0

- *1. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).
- *2. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power or resetting the controller after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).

[PA01] Operation mode

Select a operation mode.



[PA02] Regenerative option

Used to select the regenerative option.



*. Input the set value in (hexadecimal).

[PA03] Absolute position detection system

Determine whether or not the absolute position detection system will be used.

[PA04] Function selection A-1

This is used to select the forced stop input and forced stop deceleration function.

00H

Forced stop deceleration function selection

[PA08] Auto tuning mode

Select the gain adjustment mode.

When "0: 2 gain adjustment mode 1 (interpolation mode)" is selected, the following parameters will be automatically set.

- "[PB06] Load to motor inertia ratio/load to motor mass ratio"
- "[PB08] Position loop gain"
- "[PB09] Speed loop gain"
- "[PB10] Speed integral compensation"

When "1: Auto tuning mode 1" is selected, the following parameters will be automatically set.

- "[PB06] Load to motor inertia ratio/load to motor mass ratio"
- "[PB07] Model loop gain"
- "[PB08] Position loop gain"
- "[PB09] Speed loop gain"
- "[PB10] Speed integral compensation"

When "2: Auto tuning mode 2" is selected, the following parameters will be automatically set.

- "[PB07] Model loop gain"
- "[PB08] Position loop gain"
- "[PB09] Speed loop gain"
- "[PB10] Speed integral compensation"

When "4: 2 gain adjustment mode 2" is selected, the following parameters will be automatically set.

- "[PB08] Position loop gain"
- "[PB09] Speed loop gain"
- "[PB10] Speed integral compensation"

[PA09] Auto tuning response

Set a response of the auto tuning.

[PA10] In-position range

Set an in-position range per command pulse.

[PA14] Rotation direction selection/travel direction selection

This is used to select a rotation direction or travel direction.

[PA15] Encoder output pulses

Set the encoder output pulses from the servo amplifier by using the number of output pulses per revolution, dividing ratio, or electronic gear ratio. (after multiplication by 4) To set a numerator of the electronic gear, select "3: A-phase/B-phase pulse electronic gear setting" of "Encoder output pulse setting selection" in "[PC03] Encoder output pulse selection".

[PA16] Encoder output pulses 2

Set a denominator of the electronic gear for the A/B-phase pulse output. To set a denominator of the electronic gear, select "3: A-phase/B-phase pulse electronic gear setting" of "Encoder output pulse setting selection" in "[PC03] Encoder output pulse selection".

[PA17] and [PA18] Servo motor series setting/Servo motor type setting

When you use a linear servo motor, select its model. It is necessary to set the servo motor series and servo motor type at the same time.

[PA19] Parameter writing inhibit

Select a reference range and writing range of the parameter.

[PA20] Tough drive setting

Alarms may not be avoided with the tough drive depending on the situations of the power supply and load fluctuation.

You can assign MTTR (During tough drive) to pins CN3-11 to CN3-13, CN3-24 and CN3-25 with "[PD07] to [PD09] Output device selection 1 to 3".



[PA21] Function selection A-3

н

000

One-touch tuning function selection

When the digit is "0", the one-touch tuning with MR Configurator2 will be disabled.

[PA22] Position control composition selection

0 0 H Super trace control selection^{*1}

*1. The control is applicable to the software version B4 or later.



[PA24] Function selection A-4

0 0 0 H

When two low resonance frequencies are generated, select "1: 3 inertia mode". When the load to motor inertia ratio exceeds the recommended load to motor inertia ratio, select "2: Low response mode".

[PA25] One-touch tuning - Overshoot permissible level

This is used to set a permissible value of overshoot amount with a percentage to in-position range.

[PA26] Function selection A-5

0 0 0

 Torque limit function selection at instantaneous power failure (instantaneous power failure tough drive selection)

When an instantaneous power failure occurs during operation you can delay the time until [AL. 10.2 Voltage drop in the main circuit power] occurs with instantaneous power failure tough drive function.

To enable the torque limit function at instantaneous power failure, select "1: Enabled" of "SEMI-F47 function selection" in "[PA20] Tough drive setting".

This parameter setting is used with software version A6 or later.

4.8.2 Gain/filter setting

(The device cannot be changed while the programmable controllers is in the ready state.)

Parameters	; Item		Setting range	Default value
[PB01]	Adaptive tuning mode (adaptive filter II)		0: Disable 1: Automatic setting 2: Manual setting	0
	Vibration suppression control tuning mode	Vibration suppression control 1 tuning mode selection	0: Disable 1: Automatic setting 2: Manual setting	0
[PB02] (advanced vibr suppression co	(advanced vibration suppression control II)	Vibration suppression control 2 tuning mode selection	0: Disable 1: Automatic setting 2: Manual setting	0
[PB03]	Torque feedback loop ga	ain	0 to 18000 [rad/s]	18000
[PB04]	Feed forward gain		0 to 100 [%]	0
[PB06]	Load to motor inertia rat ratio	tio/load to motor mass	0.00 to 300.00 [Multiplier]	7.00
[PB07]	Model loop gain		1.0 to 2000.0 [rad/s]	15.0
[PB08]	Position loop gain		1.0 to 2000.0 [rad/s]	37.0
[PB09]	Speed loop gain		20 to 65535 [rad/s]	823
[PB10]	Speed integral compens	sation	0.1 to 1000.0 [ms]	33.7
[PB11]	Speed differential compensation		0 to 1000	980
[PB12]	Overshoot amount compensation		0 to 100 [%]	0
[PB13]	Machine resonance suppression filter 1		10 to 4500 [Hz]	4500
		Notch depth selection	0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0
[PB14]	Noton shape selection 1	Notch width selection	0: $\alpha = 2$ 1: $\alpha = 3$ 2: $\alpha = 4$ 3: $\alpha = 5$	0
[PB15]	Machine resonance sup	pression filter 2	10 to 4500 [Hz]	4500
		Machine resonance suppression filter 2 selection	0: Disable 1: Enable	0
[PB16]	Notch shape selection 2	Notch depth selection	0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0
		Notch width selection	0: $\alpha = 2$ 1: $\alpha = 3$ 2: $\alpha = 4$ 3: $\alpha = 5$	0
	Shoft recordered	Shaft resonance suppression filter setting frequency selection	Setting of shaft resonance suppression filter	00
[PB17]	suppression filter	Notch depth selection	0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0
[PB18]	Low-pass filter setting		100 to 18000 [rad/s]	3141

Parameters	I	tem	Setting range	Default value
[PB19]	Vibration suppression c frequency	ontrol 1 - Vibration	0.1 to 300.0 [Hz]	100.0
[PB20]	Vibration suppression c frequency	ontrol 1 - Resonance	0.1 to 300.0 [Hz]	100.0
[PB21]	Vibration suppression c frequency damping	ontrol 1 - Vibration	0.00 to 0.30	0.00
[PB22]	Vibration suppression c frequency damping	ontrol 1 - Resonance	0.00 to 0.30	0.00
[PB23]	Low-pass filter	Shaft resonance suppression filter selection	0: Automatic setting 1: Manual setting 2: Disable	0
	selection	Low-pass filter selection	0: Automatic setting 1: Manual setting 2: Disable	0
[PB24] Slight vibration suppression control ^{*1}	Slight vibration suppression control selection	0: Disable 1: Enable	0	
	suppression control*1	PI-PID switching control selection	0: PI control enabled 3: Continuous PID control enabled	0
[PB25]	Function selection B-1 ^{*1}		 0: Enabled (model adaptive control) 2: Disabled (PID control) 	0
	Gain switching function ^{*1}	Gain switching selection	0: Disable 1: Control command from controller is enabled 2: Command frequency 3: Droop pulses 4: Servo motor speed/linear servo motor speed	0
[PB26]		Gain switching condition selection	 0: Gain after switching is enabled with gain switching condition or more 1: Gain after switching is enabled with gain switching condition or less 	0
		Gain switching time constant disabling condition selection	 0: Switching time constant enabled 1: Switching time constant disabled 2: Return time constant disabled 	0
[PB27]	Gain switching condition	1	0 to 65535 [kpulse/s, pulse, r/min]	10
[PB28]	Gain switching time con	stant	0 to 100 [ms]	1
[PB29]	Load to motor inertia rat ratio after gain switching	tio/load to motor mass	0.00 to 300.00 [Multiplier]	7.00
[PB30]	Position loop gain after	gain switching	0.0 to 2000.0 [rad/s]	0.0
[PB31]	Speed loop gain after g	ain switching	0 to 65535 [rad/s]	0
[PB32]	Speed integral compens	sation after gain switching	0.0 to 5000.0 [ms]	0.0
[PB33]	Vibration suppression of frequency setting after g	ontrol 1 - Vibration gain switching	0.0 to 300.0 [Hz]	0.0
[PB34]	Vibration suppression c frequency setting after g	ontrol 1 - Resonance gain switching	0.0 to 300.0 [Hz]	0.0

Parameters	Item		Setting range	Default value
[PB35]	Vibration suppression co frequency damping after	ontrol 1 - Vibration gain switching	0.00 to 0.30	0.00
[PB36]	Vibration suppression co frequency damping after	ontrol 1 - Resonance r gain switching	0.00 to 0.30	0.00
[PB45] Command notch filter		Command notch filter setting frequency selection	00 to 5F	00H
	Notch depth selection 0		0 to F	ОН
[PB46]	Machine resonance sup	pression filter 3	10 to 4500 [Hz]	4500
		Machine resonance suppression filter 3 selection	0: Disable 1: Enable	0
[PB47]	Notch shape selection 3	Notch depth selection	0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0
		Notch width selection	0: $\alpha = 2$ 1: $\alpha = 3$ 2: $\alpha = 4$ 3: $\alpha = 5$	0
[PB48]	Machine resonance sup	pression filter 4	10 to 4500 [Hz]	4500
	Notch shape selection 4	Machine resonance suppression filter 4 selection	0: Disable 1: Enable	0
[PB49]		Notch depth selection	0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0
		Notch width selection	0: $\alpha = 2$ 1: $\alpha = 3$ 2: $\alpha = 4$ 3: $\alpha = 5$	0
[PB50]	Machine resonance sup	pression filter 5	10 to 4500 [Hz]	4500
		Machine resonance suppression filter 5 selection	0: Disable 1: Enable	0
[PB51]	Notch shape selection 5	Notch depth selection	0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0
		Notch width selection	0: $\alpha = 2$ 1: $\alpha = 3$ 2: $\alpha = 4$ 3: $\alpha = 5$	0
[PB52]	Vibration suppression co	ontrol 2 - Vibration	0.1 to 300.0 [Hz]	100.0
[PB53]	Vibration suppression co	ontrol 2 - Resonance	0.1 to 300.0 [Hz]	100.0
[PB54]	Vibration suppression co	ontrol 2 - Vibration	0.00 to 0.30	0.00
[PB55]	Vibration suppression co	ontrol 2 - Resonance	0.00 to 0.30	0.00

Parameters	Item	Setting range	Default value
[PB56]	Vibration suppression control 2 - Vibration frequency after gain switching	0.0 to 300.0 [Hz]	0.0
[PB57]	Vibration suppression control 2 - Resonance frequency after gain switching	0.0 to 300.0 [Hz]	0.0
[PB58]	Vibration suppression control 2 - Vibration frequency damping after gain switching	0.00 to 0.30	0.00
[PB59]	Vibration suppression control 2 - Resonance frequency damping after gain switching	0.00 to 0.30	0.00
[PB60]	Model loop gain after gain switching	0.0 to 2000.0 [rad/s]	0.0

*1. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power or resetting the controller after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).

[PB01] Adaptive tuning mode (adaptive filter II)

Set the adaptive filter tuning.

When "1: Automatic setting" is selected, "[PB13] Machine resonance suppression filter 1" and "[PB14] Notch shape selection 1" will be automatically set.

[PB02] Vibration suppression control tuning mode (advanced vibration suppression control II)

This is used to set the vibration suppression control tuning mode.

0 0 Vibration suppression control 1 tuning mode selection Vibration suppression control 2 tuning mode selection *1

*1. To enable the setting value, select "1: 3 inertia mode" of "Vibration suppression mode selection" in "[PA24] Function selection A-4."

When the vibration suppression control 1 tuning mode selection is set to "1: Automatic setting," the following parameters will be automatically set.

- "[PB19] Vibration suppression control 1 Vibration frequency"
- "[PB20] Vibration suppression control 1 Resonance frequency"
- "[PB21] Vibration suppression control 1 Vibration frequency damping"
- "[PB22] Vibration suppression control 1 Resonance frequency damping"

When the vibration suppression control 2 tuning mode selection is set to "1: Automatic setting," the following parameters will be automatically set.

- "[PB52] Vibration suppression control 2 Vibration frequency setting"
- "[PB53] Vibration suppression control 2 Resonance frequency setting"
- "[PB54] Vibration suppression control 2 Vibration frequency damping setting"
- "[PB55] Vibration suppression control 2 Resonance frequency damping setting"

[PB03] Torque feedback loop gain

This is used to set a torque feedback loop gain in the continuous operation to torque control.

[PB04] Feed forward gain

Set the feed forward gain.

[PB06] Load to motor inertia ratio/load to motor mass ratio

This is used to set the load to motor inertia ratio or load to motor mass ratio.

[PB07] Model loop gain

Set the response gain up to the target position.

[PB08] Position loop gain

This is used to set the gain of the position loop.

[PB09] Speed loop gain

This is used to set the gain of the speed loop.

[PB10] Speed integral compensation

This is used to set the integral time constant of the speed loop.

[PB11] Speed differential compensation

This is used to set the differential compensation.

To enable the parameter, select "3: Continuous PID control enabled" of "PI-PID switching control selection" in "[PB24] Slight vibration suppression control."

[PB12] Overshoot amount compensation

This is used to set a viscous friction torque or thrust to rated torque in percentage unit at servo motor rated speed or linear servo motor rated speed.

[PB13] Machine resonance suppression filter 1

Set the notch frequency of the machine resonance suppression filter 1.

[PB14] Notch shape selection 1

Set the shape of the machine resonance suppression filter 1.



[PB15] Machine resonance suppression filter 2

Set the notch frequency of the machine resonance suppression filter 2.

[PB16] Notch shape selection 2

Set the shape of the machine resonance suppression filter 2.



[PB17] Shaft resonance suppression filter

This is used for setting the shaft resonance suppression filter.

This is used to suppress a high-frequency machine vibration.



Shaft resonance suppression filter setting frequency selection (For the set values, refer to the following table.) Notch depth selection

Shaft resonance suppression filter setting frequency selection

Setting value	Frequency [Hz]	Setting value	Frequency [Hz]
00	Disabled	10	562
01	Disabled	11	529
02	4500	12	500
03	3000	13	473
04	2250	14	450
05	1800	15	428
06	1500	16	409
07	1285	17	391
08	1125	18	375
09	1000	19	360
0A	900	1A	346
0B	818	1B	333
0C	750	1C	321
0D	692	1D	310
0E	642	1E	300
0F	600	1F	290

[PB18] Low-pass filter setting

Set the low-pass filter.

0 0 0 H

[PB19, PB52] Vibration suppression control 1/2 - Vibration frequency

Set the vibration frequency for vibration suppression control to suppress low-frequency machine vibration.

[PB20, PB53] Vibration suppression control 1/2 - Resonance frequency

Set the resonance frequency for vibration suppression control to suppress low-frequency machine vibration.

[PB21, PB54] Vibration suppression control 1/2 - Vibration frequency damping

Set a damping of the vibration frequency for vibration suppression control to suppress lowfrequency machine vibration.

[PB22, PB55] Vibration suppression control 1/2 - Resonance frequency damping

Set a damping of the resonance frequency for vibration suppression control to suppress low-frequency machine vibration.

[PB23] Low-pass filter selection

Select the shaft resonance suppression filter and low-pass filter.



[PB24] Slight vibration suppression control

Select the slight vibration suppression control and PI-PID switching control.



[PB25] Function selection B-1

Select enabled/disabled of model adaptive control.

0 0 0 H

- Model adaptive control selection

This parameter is supported with software version B4 or later.

[PB26] Gain switching function

Select the gain switching selection/condition.



*1. This parameter setting is used with software version B4 or later.

[PB27] Gain switching condition

This is used to set the value of gain switching condition (command frequency, droop pulses, and servo motor speed) set in "[PB26] Gain switching function." The set value unit differs depending on the switching condition.

[PB28] Gain switching time constant

This is used to set the time constant when the gains switch in response to the conditions set in "[PB26] Gain switching function" and "[PB27] Gain switching condition".

[PB29] Load to motor inertia ratio/load to motor mass ratio after gain switching

This is used to set the load to motor inertia ratio/load to motor mass ratio for when gain switching is enabled.

[PB30] Position loop gain after gain switching

Set the position loop gain when the gain switching is enabled.

[PB31] Speed loop gain after gain switching

Set the speed loop gain when the gain switching is enabled.

[PB32] Speed integral compensation after gain switching

Set the speed integral compensation when the gain changing is enabled.

[PB33, PB56] Vibration suppression control 1/2 - Vibration frequency setting after gain switching

Set the vibration frequency of the vibration suppression control for when the gain switching is enabled.

This parameter will be enabled only when the following conditions are fulfilled.

- "Gain adjustment mode selection" in "[PA08] Position loop gain" is "3: Manual mode".
- "Vibration suppression control 1/2 tuning mode selection" in "[PB02] Vibration suppression control tuning mode (advanced vibration suppression control II)" is "2: Manual setting"
- "Gain switching selection" in "[PB26] Gain switching function" is "1: Control command from controller is enabled".

PRECAUTIONS

Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear servo motor stops.

[PB34, PB57] Vibration suppression control 1/2 - Resonance frequency setting after gain switching

Set the resonance frequency for vibration suppression control when the gain switching is enabled.

This parameter will be enabled only when the following conditions are fulfilled.

- "Gain adjustment mode selection" in "[PA08] Position loop gain" is "3: Manual mode".
- "Vibration suppression control 1/2 tuning mode selection" in "[PB02] Vibration suppression control tuning mode (advanced vibration suppression control II)" is "2: Manual setting"
- "Gain switching selection" in "[PB26] Gain switching function" is "1: Control command from controller is enabled".

PRECAUTIONS

Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear servo motor stops.

[PB35, PB58] Vibration suppression control 1/2 - Vibration frequency damping after gain switching

Set a damping of the vibration frequency for vibration suppression control when the gain switching is enabled.

This parameter will be enabled only when the following conditions are fulfilled.

- "Gain adjustment mode selection" in "[PA08] Position loop gain" is "3: Manual mode".
- "Vibration suppression control 1/2 tuning mode selection" in "[PB02] Vibration suppression control tuning mode (advanced vibration suppression control II)" is "2: Manual setting"
- "Gain switching selection" in "[PB26] Gain switching function" is "1: Control command from controller is enabled".

PRECAUTIONS

Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear servo motor stops.

[PB36, PB59] Vibration suppression control 1/2 - Resonance frequency damping after gain switching

Set a damping of the resonance frequency for vibration suppression control when the gain switching is enabled.

This parameter will be enabled only when the following conditions are fulfilled.

- "Gain adjustment mode selection" in "[PA08] Position loop gain" is "3: Manual mode".
- "Vibration suppression control 1/2 tuning mode selection" in "[PB02] Vibration suppression control tuning mode (advanced vibration suppression control II)" is "2: Manual setting"
- "Gain switching selection" in "[PB26] Gain switching function" is "1: Control command from controller is enabled".

PRECAUTIONS

Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear servo motor stops.

[PB45] Command notch filter

Set the command notch filter.



Command notch filter setting frequency selection (For the set values, refer to the following table.)

Notch depth selection (For the set values, refer to the table on the next page.)

Command notch filter setting frequency selection

Setting	Frequency [Hz]	Setting	Frequency [Hz]	Setting	Frequency [Hz]
00	Disabled	20	70	40	17.6
01	2250	21	66	41	16.5
02	1125	22	62	42	15.6
03	750	23	59	43	14.8
04	562	24	56	44	14.1
05	450	25	53	45	13.4
06	375	26	51	46	12.8

Setting	Frequency [Hz]	Setting	Frequency [Hz]	Setting	Frequency [Hz]
07	321	27	48	47	12.2
08	281	28	46	48	11.7
09	250	29	45	49	11.3
0A	225	2A	43	4A	10.8
0B	204	2B	41	4B	10.4
0C	187	2C	40	4C	10
0D	173	2D	38	4D	9.7
0E	160	2E	37	4E	9.4
0F	150	2F	36	4F	9.1
10	140	30	35.2	50	8.8
11	132	31	33.1	51	8.3
12	125	32	31.3	52	7.8
13	118	33	29.6	53	7.4
14	112	34	28.1	54	7.0
15	107	35	26.8	55	6.7
16	102	36	25.6	56	6.4
17	97	37	24.5	57	6.1
18	93	38	23.4	58	5.9
19	90	39	22.5	59	5.6
1A	86	3A	21.6	5A	5.4
1B	83	3B	20.8	5B	5.2
1C	80	3C	20.1	5C	5.0
1D	77	3D	19.4	5D	4.9
1E	75	3E	18.8	5E	4.7
1F	72	3F	18.2	5F	4.5

Notch depth selection

Setting	Depth [dB]	Setting	Depth [dB]
0	-40.0	8	-6.0
1	-24.1	9	-5.0
2	-18.1	А	-4.1
3	-14.5	В	-3.3
4	-12.0	С	-2.5
5	-10.1	D	-1.8
6	-8.5	E	-1.2
7	-7.2	F	-0.6

[PB46] Machine resonance suppression filter 3

Set the notch frequency of the machine resonance suppression filter 3.

[PB47] Notch shape selection 3

Set the shape of the machine resonance suppression filter 3.



[PB48] Machine resonance suppression filter 4

Set the notch frequency of the machine resonance suppression filter 4.

[PB49] Notch shape selection 4

Set the shape of the machine resonance suppression filter 4.



[PB50] Machine resonance suppression filter 5

Set the notch frequency of the machine resonance suppression filter 5.

[PB51] Notch shape selection 5

Set the shape of the machine resonance suppression filter 5. When you select "1: Enabled" of "Robust filter selection" in [PE41] Function selection E-3, the machine resonance suppression filter 5 is not available.



[PB60] Model loop gain after gain switching

Set the model loop gain when the gain switching is enabled.

4.8.3 Extension setting

(The device cannot be changed while the programmable controllers is in the ready state.)

Parameters	Item		Setting range	Default value
[PC01]	Error excessive alarm level		1 to 1000 [rev]/[mm]	0
[PC02]	Electromagnetic brake sequence output		0 to 1000 [ms]	0
[PC03]	Encoder output pulse selection*1	Encoder output pulse phase selection	 0: Increasing A-phase 90° in CCW or positive direction 1: Increasing A-phase 90° in CW or negative direction 	0
		Encoder output pulse setting selection	 0: Output pulse setting 1: Division ratio setting 3: A-phase/B-phase pulse electronic gear setting 4: A/B-phase pulse through output setting 	0
		Selection of the encoders for encoder output pulse	0: Servo motor encoder 1: Load-side encoder	0
[PC04]	Function selection C-1*2		0: Two-wire type 1: Four-wire type	0
[PC05]	Function selection C-2*2	Motor-less operation selection	0: Disable 1: Enable	0
		[AL. 9B Error excessive warning] selection	0: [AL. 9B Error excessive warning] disabled 1: [AL. 9B Error excessive warning] enabled	0
[PC06]	Function selection C-3 ^{*2}		0: Per 1 rev or 1 mm 1: Per 0.1 rev or 0.1 mm 2: Per 0.01 rev or 0.01 mm 3: Per 0.001 rev or 0.001 mm	0
[PC07]	Zero speed		0 to 10000 [r/min]/[mm/s]	50
[PC08]	Overspeed alarm detection level		0 to 20000 [r/min]/[mm/s]	0
Parameters	Item	Setting range	Default value	
------------	-------------------------	---	------------------	
[PC09]	Analog monitor 1 output	 00H: (Linear) servo motor speed (±8 V/max. speed) 01H: Torque or thrust (±8 V/max. torque or max. thrust) 02H: (Linear) servo motor speed (+8 V/max. speed) 03H: Torque or thrust (+8 V/max. torque or max. thrust) 04H: Current command (±8 V/max. current command) 05H: Speed command (±8 V/max. speed) 06H: Servo motor-side droop pulses (±10 V/100 pulses) 07H: Servo motor-side droop pulses (±10 V/1000 pulses) 08H: Servo motor-side droop pulses (±10 V/1000 pulses) 09H: Servo motor-side droop pulses (±10 V/10000 pulses) 08H: Feedback position (±10 V/1M pulses) 08H: Feedback position (±10 V/10M pulses) 0CH: Feedback position (±10 V/10M pulses) 0CH: Feedback position (±10 V/10M pulses) 0DH: Bus voltage (200 V class and 100 V class: +8 V/400 V, 400 V class: +8 V/800 V) 0EH: Speed command 2 (±8 V/max. speed) 10H: Load-side droop pulses (±10 V/100 pulses) 12H: Load-side droop pulses (±10 V/100 pulses) 13H: Load-side droop pulses (±10 V/110 pulses) 13H: Load-side droop	00H	

Parameters	lter	m	Setting range	Default value
[PC10]	Analog monitor 2 output		 00H: (Linear) servo motor speed (±8 V/max. speed) 01H: Torque or thrust (±8 V/max. torque or max. thrust) 02H: (Linear) servo motor speed (+8 V/max. speed) 03H: Torque or thrust (+8 V/max. torque or max. thrust) 04H: Current command (±8 V/max. current command) 05H: Speed command (±8 V/max. speed) 06H: Servo motor-side droop pulses (±10 V/100 pulses) 07H: Servo motor-side droop pulses (±10 V/1000 pulses) 08H: Servo motor-side droop pulses (±10 V/10000 pulses) 09H: Servo motor-side droop pulses (±10 V/10000 pulses) 08H: Feedback position (±10 V/1M pulses) 0BH: Feedback position (±10 V/10M pulses) 0CH: Feedback position (±10 V/10M pulses) 0DH: Bus voltage (200 V class and 100 V class: +8 V/400 V, 400 V class: +8 V/800 V) 0EH: Speed command 2 (±8 V/max. speed) 10H: Load-side droop pulses (±10 V/1000 pulses) 12H: Load-side droop pulses (±10 V/1000 pulses) 13H: Load-side droop pulses (±10 V/10000 pul	01H
[PC11]	Analog monitor 1 of	fset	-999 to 999 [mV]	0
[PC12]	Analog monitor 2 of	fset	-999 to 999 [mV]	0
[PC13]	Analog monitor - Fe output standard data	edback position a - Low	- 9999 to 9999 [pulses]	0
[PC14]	Analog monitor - Feedback position output standard data - High		-9999 to 9999 [10000 pulses]	0
[PC17]	Function selection C-4*2 Selection of home position setting condition Linear encoder multipoint Z-phase input function selection		0: Need to pass servo motor Z-phase after power on1: Not need to pass servo motor Z-phase after power on	- 0
			0: Disable 1: Enable	

Parameters	lte	em	Setting range	Default value
[PC18]	Function selection	C-5 ^{*1}	0: Detection with ready-on and servo-on command1: Detection with servo-on command	0
[DC20]	Function	[AL. 10 Undervoltage] detection method selection	0: [AL. 10] not occurrence 1: [AL. 10] occurrence	0
[PC20]	selection C-7*1	Undervoltage alarm selection	0: [AL. 10] regardless of servo motor speed 1: [AL. E9] at servo motor speed 50 r/min (50 mm/s) or less, [AL. 10] at over 50 r/min (50 mm/s)	0
[PC21]	Alarm history clear	*1	0: Disable 1: Enable	0
[PC24]	Forced stop decele	ration time constant	0 to 20000 [ms]	100
[PC26]	Function selection	C-8*2	0: Two-wire type 1: Four-wire type	0
	Function selection C-9*2Encoder pulse count polarity selectionFunction selection C-9*2Selection of A/B/Z-phase input interface encoder Z-phase connection judament functio	Encoder pulse count polarity selection	0: Encoder pulse increasing direction in the servo motor CCW or positive direction1: Encoder pulse decreasing direction in the servo motor CCW or positive direction	0
[PC27]		Selection of A/B/Z-phase input interface encoder Z-phase connection judgment function	0: Enable 1: Disable	0
[PC29]	Function selection C-B ^{*1}		0: Enable 1: Disable	0
[PC31]	Vertical axis freefall prevention compensation amount		-25000 to 25000 [0.0001rev]/[0.01mm]	0
[PC38]	Error excessive wa	arning level	0 to 1000 [rev]/[mm]	0

*1. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power or resetting the controller after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).

*2. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).

[PC01] Error excessive alarm level

Set the error excessive alarm level by the servo motor rotation amount.

[PC02] Electromagnetic brake sequence output

This is used to set the delay time between MBR (Electromagnetic brake interlock) and the base drive circuit is shut-off.

[PC03] Encoder output pulse selection

This is used to select the encoder pulse direction and encoder output pulse setting.



[PC04] Function selection C-1

Select the serial encoder cable to be used.

000H

- Encoder cable communication method selection

[PC05] Function selection C-2

Set the motor-less operation and "Error excessive warning." The motor-less operation cannot be used in the linear servo motor control mode, fully closed loop control mode, or DD motor control mode.



*1. The setting of this digit is used by servo amplifier with software version B4 or later.

[PC06] Function selection C-3

Select units for error excessive alarm level setting with "[PC01] Error excessive alarm level" and for error excessive warning level setting with "[PC38] Error excessive warning level". The parameter is not available in the speed control mode and torque control mode.

000H

Error excessive alarm/error excessive warning level unit selection

[PC07] Zero speed

Used to set the output range of ZSP (Zero speed detection). ZSP (Zero speed detection) has hysteresis of 20 r/min or 20 mm/s.

[PC08] Overspeed alarm detection level

This is used to set an overspeed alarm detection level.

[PC09, PC10] Analog monitor 1/2 output

Select a signal to output to MO1/2 (Analog monitor 1/2).

- Analog monitor 1/2 output selection

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When this parameter is set to Servo motor-side droop pulses or Load-side droop pulses, the encoder pulse unit will be used.

[PC11, PC12] Analog monitor 1/2 offset

This is used to set the offset voltage of MO1/2 (Analog monitor 1/2).

[PC13, PC14] Analog monitor - Feedback position output standard data - Low/High

Set a monitor output standard position (lower 4 digits/higher 4 digits) for the feedback position for when selecting "Feedback position" for MO1 (Analog monitor 1) and MO2 (Analog monitor 2).

[PC17] Function selection C-4

This is used to select a home position setting condition.

- 0 0 H Selection of home position setting condition Linear encoder multipoint Z-phase input function selection*1
- *1. This parameter setting is used with software version A5 or later.

[PC18] Function selection C-5

This is used to select an occurring condition of [AL. E9 Main circuit off warning].

__000H

- [AL. E9 Main circuit off warning] selection

[PC20] Function selection C-7

This is used to select a detection method of [AL. 10 Undervoltage].



[PC21] Alarm history clear

Used to clear the alarm history.

[PC24] Forced stop deceleration time constant

This is used to set deceleration time constant when you use the forced stop deceleration function.

Set the time per ms from the rated speed to 0 r/min or 0 mm/s.



[PC27] Function selection C-9

This is used to select a polarity of the linear encoder or load-side encoder.



[PC29] Function selection C-B

This is used to select the POL reflection at torque control.

POL reflection selection at torque control

[PC31] Vertical axis freefall prevention compensation amount

Set the compensation amount of the vertical axis freefall prevention function.

Set it per servo motor rotation amount or linear servo motor travel distance.

When a positive value is set, compensation is performed to the address increasing direction. When a negative value is set, compensation is performed to the address decreasing direction.

The vertical axis freefall prevention function is performed when all of the following conditions are met.

- 1) Position control mode
- 2) The value of the parameter is other than "0".
- 3) The forced stop deceleration function is enabled.
- 4) Alarm occurs or EM2 turns off when the (linear) servo motor speed is zero speed or less.
- 5) MBR (Electromagnetic brake interlock) was enabled in [PD07] to [PD09] Output device selection 1 to 3, and the base circuit shut-off delay time was set in "[PC02] Electromagnetic brake sequence output."

[PC38] Error excessive warning level

Set an error excessive warning level.

This parameter setting is used with software version B4 or later.

4.8.4 I/O setting

(The device cannot be changed while the programmable controllers is in the ready state.)

Parameters	Item		Setting range	Default value
[PD02]	Input signal	FLS (Upper stroke limit) selection	0: Disable 1: Enable	∩ н *2
	selection 2 ^{*1}	RLS (Lower stroke limit) selection	0: Disable 1: Enable	011
[PD07]	Output device sele	ction 1 ^{*1}	00H: Always off 02H: RD (Ready) 03H: ALM (Malfunction) 04H: INP (In-position) 05H: MBR (Electromagnetic brake interlock) 06H: DB (Dynamic brake interlock) 07H: TLC (Limiting torque) 08H: WNG (Warning) 09H: BWNG (Battery warning) 04H: SA (Speed reached) 0CH: ZSP (Zero speed detection) 0FH: CDPS (Variable gain selection) 10H: CLDS (During fully closed loop control) 11H: ABSV (Absolute position undetermined) 17H: MTTR (During tough drive)	05H
[PD08]	Output device sele	ction 2*1	00H: Always off 02H: RD (Ready) 03H: ALM (Malfunction) 04H: INP (In-position) 05H: MBR (Electromagnetic brake interlock) 06H: DB (Dynamic brake interlock) 07H: TLC (Limiting torque) 08H: WNG (Warning) 09H: BWNG (Battery warning) 09H: BWNG (Battery warning) 0AH: SA (Speed reached) 0CH: ZSP (Zero speed detection) 0FH: CDPS (Variable gain selection) 10H: CLDS (During fully closed loop control) 11H: ABSV (Absolute position undetermined) 17H: MTTR (During tough drive)	04H
[PD09]	Output device selection 3 ^{*1}		17H: MTTR (During tough drive) 00H: Always off 02H: RD (Ready) 03H: ALM (Malfunction) 04H: INP (In-position) 05H: MBR (Electromagnetic brake interlock) 06H: DB (Dynamic brake interlock) 07H: TLC (Limiting torque) 08H: WNG (Warning) 09H: BWNG (Battery warning) 0AH: SA (Speed reached) 0CH: ZSP (Zero speed detection) 0FH: CDPS (Variable gain selection) 10H: CLDS (During fully closed loop control) 11H: ABSV (Absolute position undetermined) 17H: MTTR (During tough drive)	

Parameters		Item	Setting range	Default value
[PD11]	Input filter setting*1		0: None 1: 0.888 [ms] 2: 1.777 [ms] 3: 2.666 [ms] 4: 3.555 [ms]	4
[PD12]	Function selection	D-1 ^{*1}	0: Enable 1: Disable	0
[PD13]	Function selection	D-2*1	0: Droop pulses are within the in-position range.1: The command pulse frequency is 0, and droop pulses are within the in-position range.	0
[PD14]	Function selection	D-3 ^{*1}	0: Off 1: On	0
[PD15]	Driver communication setting ^{*1}	Master axis operation selection	 0: Disabled (not using master-slave operation function) 1: Enabled (this servo amplifier: master axis) 	0
		Slave axis operation selection	0: Disabled (not using master-slave operation function)1: Enabled (this servo amplifier: slave axis)	0
[PD16]	Driver communication Transmit data selection	n setting - Master - on 1 ^{*1}	00H: Disabled 38H: Torque command	00H
[PD17]	Driver communication Transmit data selecti	n setting - Master - on 2 ^{*1}	00H: Disabled 3AH: Speed limit command	00H
[PD20]	Driver communication No. selection 1 ^{*1}	setting - Slave - Master axis	0 to 32	0
[PD30]	Master-slave operat coefficient on slave	ion - Torque command	0 to 500 [%]	0
[PD31]	Master-slave opera coefficient on slave	tion - Speed limit	0 to 500 [%]	0
[PD32]	Master-slave operat value on slave	ion - Speed limit adjusted	0 to 32767 [r/min]	0

*1. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power or resetting the controller after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).

*2. The values shown in the Setting range column are binary values. Convert the set values to hexadecimal. HEX: 0 to 3 = BIN: 00□■ (■: FLS (upper stroke limit) selection, □: RLS (lower stroke limit) selection)

[PD02] Input signal automatic on selection 2

[PDU2] INPERTON OOO H FLS (Upper stroke limit) selection, RLS (Lower stroke limit) selection

[PD07] to [PD09] Output signal device selection 1/2/3

You can assign any output device to the connector*1 of the servo amplifier.

*1. Output signal device selection 1: CN3-13 pin Output signal device selection 2: CN3-9 pin Output signal device selection 3: CN3-15 pin

0 0 H

-Output signal device setting

[PD11] Input filter setting

Select the input filter.

0 0 0 H

Input signal filter selection

[PD12] Function selection D-1



- Servo motor thermistor enabled/disabled selection

For servo motors without thermistor, the setting will be disabled. This parameter setting is used with software version A5 or later.

[PD13] Function selection D-2

Select the INP (In-position) on condition.

0 0 0 H

- INP (In-position) on condition selection

This parameter is supported with software version B4 or later.

[PD14] Function selection D-3

Select WNG (Warning) and ALM (Malfunction) output status at warning occurrence.

0 0 🛄 0 H

----- Selection of output device at warning occurrence

Servo amplifier output



*1. Although ALM is turned off upon occurrence of the warning, the forced stop deceleration is performed.

[PD15] Driver communication setting

This parameter is used to select master/slave axis for the driver communication.

0 0 H Master axis operation selection Slave axis operation selection

When Slave axis operation selection has been set to "1: Enabled," the following parameters will be enabled.

- "[PD20] Driver communication setting Slave Master axis No. selection 1"
- "[PD30] Master-slave operation Torque command coefficient on slave"
- "[PD31] Master-slave operation Speed limit coefficient on slave"
- "[PD32] Master-slave operation Speed limit adjusted value on slave"

This parameter setting is used with software version A8 or later.

[PD16] Driver communication setting - Master - Transmit data selection 1

This parameter is used to select transmit data from master axis to slave axis.

0 0 H

-Transmission data selection

This parameter setting is used with software version A8 or later.

[PD20] Driver communication setting - Slave - Master axis No. selection 1

Select the axis number of the servo amplifier that is the master of the slave axis. This parameter setting is used with software version A8 or later.

[PD30] Master-slave operation - Torque command coefficient on slave

This parameter is used to set a internal torque command coefficient to torque command value received from master axis.

This parameter setting is used with software version A8 or later.

[PD31] Master-slave operation - Speed limit coefficient on slave

This parameter is used to set a internal speed limit value coefficient to speed limit command value received from master axis.

This parameter setting is used with software version A8 or later.

[PD32] Master-slave operation - Speed limit adjusted value on slave

This parameter is used to set a minimum value for internal speed limit value. This parameter ensures torque control range at low speed driving (avoid area likely to reach speed limit). This parameter setting is used with software version A8 or later.

4.8.5 Extension setting 2

(The device cannot be changed while the programmable controllers is in the ready state.)

Parameters		ltem	Setting range	Default value
[PE01]	Fully closed loop	o function selection 1 ^{*1}	0: Always enabled 1: Switching with the control command of controller (switching semi./full.)	0
	Fully closed	Fully closed loop control error detection function selection	 0: Disable 1: Speed deviation error detection 2: Position deviation error detection 3: Speed deviation error/position deviation error detection 	3
[PE03]	loop function selection 2 ^{*2}	Position deviation error detection system selection	0: Continuous detection system1: Detection system at stop (detected with command set to "0")	0
		Fully closed loop control error reset selection	0: Reset disabled (reset by powering off/on enabled)1: Reset enabled	0
[PE04]	Fully closed loop electronic gear	o control - Feedback pulse I - Numerator ^{*1}	1 to 65535	1
[PE05]	Fully closed loop electronic gear 1	o control - Feedback pulse I - Denominator ^{*1}	1 to 65535	1
[PE06]	Fully closed loop error detection le	o control - Speed deviation evel	1 to 50000 [r/min]	400
[PE07]	Fully closed loop deviation error d	o control - Position letection level	1 to 20000 [kpulse]	100
[PE08]	Fully closed loop	o dual feedback filter	0 to 4500 [rad/s]	10
		Fully closed loop control - Position deviation error detection level - Unit selection	0: 1 kpulse unit 1: 1 pulse unit	0
[PE10]	Fully closed loop function selection 3	Droop pulse monitor selection for controller display	0: Servo motor encoder1: Load-side encoder2: Deviation between the servo motor and load side	0
	Cumulative feedback pulses monitor selection for controller display		0: Servo motor encoder 1: Load-side encoder	0
[PE34]	Fully closed loop electronic gear 2	o control - Feedback pulse 2 - Numerator ^{*1}	1 to 65535	1
[PE35]	Fully closed loop control - Feedback pulse electronic gear 2 - Denominator ¹¹		1 to 65535	1
[PE41]	Function selection E-3		0: Disable 1: Enable	0
[PE44]	Lost motion com compensation va	pensation positive-side alue selection	0 to 30000 [0.01 %]	0
[PE45]	Lost motion com compensation va	pensation negative-side alue selection	0 to 30000 [0.01 %]	0
[PE46]	Lost motion filter	rsetting	0 to 30000 [0.1 ms]	0
[PE47]	Torque offset		-10000 to 10000 [0.01 %]	0

Parameters	Item		Setting range	Default value
[PE48] Lo: coi fun sel	Lost motion	Lost motion compensation selection	0: Lost motion compensation disabled 1: Lost motion compensation enabled	0
	function selection ^{*2}	Unit setting of lost motion compensation non- sensitive band	0: 1 pulse unit 1: 1 kpulse unit	0
[PE49]	Lost motion compensation timing		0 to 30000 [0.1 ms]	0
[PE50]	Lost motion compensation non-sensitive band		0 to 65535 [pulse]/[kpulse]	0

- *1. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).
- *2. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power or resetting the controller after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).

[PE01] Fully closed loop function selection 1

0 0 0 H

- Fully closed loop function selection

To enable the digit, select "1: Fully closed loop control mode" of "[PA01] Operation mode selection."





[PE04, PE34] Fully closed loop control - Feedback pulse electronic gear 1/2 - Numerator

This is used to set a numerator of electronic gear for the servo motor encoder pulse at the fully closed loop control.

Set the electronic gear so that the number of servo motor encoder pulses for one servo motor revolution is converted to the resolution of the load-side encoder.

[PE05, PE35] Fully closed loop control - Feedback pulse electronic gear 1/2 - Denominator

This is used to set a denominator of electronic gear for the servo motor encoder pulse at the fully closed loop control.

Set the electronic gear so that the number of servo motor encoder pulses for one servo motor revolution is converted to the resolution of the load-side encoder.

[PE06] Fully closed loop control - Speed deviation error detection level

This is used to set [AL. 42.9 Fully closed loop control error by speed deviation] of the fully closed loop control error detection.

[PE07] Fully closed loop control - Position deviation error detection level

This is used to set [AL. 42.8 Fully closed loop control error by position deviation] of the fully closed loop control error detection.

[PE08] Fully closed loop dual feedback filter

This is used to set a dual feedback filter band.

[PE10] Fully closed loop function selection 3



[PE41] Function selection E-3

0 0 0 H

[PE44] Lost motion compensation positive-side compensation value selection

Set the lost motion compensation for when reverse rotation (CW) switches to forward rotation (CCW) in increments of 0.01 % assuming the rated torque as 100 %. This parameter is supported with software version B4 or later.

[PE45] Lost motion compensation negative-side compensation value selection

Set the lost motion compensation for when forward rotation (CCW) switches to reverse rotation (CW) in increments of 0.01 % assuming the rated torque as 100 %. This parameter is supported with software version B4 or later.

[PE47] Torque offset

Set this when canceling unbalanced torque of vertical axis. Set this assuming the rated torque of the servo motor as 100 %.

This parameter is supported with software version B4 or later.

[PE48] Lost motion compensation function selection

Select the lost motion compensation function.

0 0 H Lost motion compensation selection Unit setting of lost motion compensation non-sensitive band

This parameter is supported with software version B4 or later.

[PE49] Lost motion compensation timing

Set the lost motion compensation timing in increments of 0.1 ms. You can delay the timing to perform the lost motion compensation for the set time. This parameter is supported with software version B4 or later.

[PE50] Lost motion compensation non-sensitive band

Set the lost motion compensation non-sensitive band. Set the parameter per encoder unit. This parameter is supported with software version B4 or later.

4.8.6 Extension setting 3

(The device cannot be changed while the programmable controllers is in the ready state.)

Parameters	Item	Setting range	Default value
[PF06]	Function selection F-5 ^{*1}	0: Automatic (enabled only for specified servo motors)2: Disable	0
[PF12]	Electronic dynamic brake operating time	0 to 10000 [ms]	2000
[PF18]	STO diagnosis error detection time*2	0 to 60 [s]	0
[PF21]	Drive recorder switching time setting	-1 to 32767 [s]	0
[PF23]	Vibration tough drive - Oscillation detection level	0 to 100 [%]	50
[PF24]	Vibration tough drive function selection ^{*1}	 [AL. 54 Oscillation detection] will occur at oscillation detection. [AL. F3.1 Oscillation detection warning] will occur at oscillation detection. Oscillation detection function disabled 	0
[PF25]	SEMI-F47 function - Instantaneous power failure detection time	30 to 500 [ms]	200
[PF31]	Machine diagnosis function - Friction judgment speed	0 to permissible speed [r/min]/[mm/s]	0

*1. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power or resetting the controller after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).

*2. The parameters will be enabled by once turning off the servo amplifier power supply and reapplying the power after changing the parameters (transmitting the parameters from RD77MS to the servo amplifier).

[PF06] Function selection F-5

0 0 0 H Electronic dynamic brake selection

[PF12] Electronic dynamic brake operating time

Set an operating time for the electronic dynamic brake.

[PF18] STO diagnosis error detection time

Set the time from when an error occurs in the STO input signal or STO circuit until the detection of [AL. 68.1 Mismatched STO signal error]. This parameter is supported with software version C1 or later.

[PF21] Drive recorder switching time setting

This is used to set a drive recorder switching time.

When a USB communication is cut during using a graph function, the function will be changed to the drive recorder function after the setting time of this parameter.

[PF23] Vibration tough drive - Oscillation detection level

This is used to set a filter readjustment sensitivity of "[PB13] Machine resonance suppression filter 1" and "[PB15] Machine resonance suppression filter 2" while the vibration tough drive is enabled.

[PF24] Vibration tough drive function selection

Select alarm or warning when a oscillation continues at a filter readjustment sensitivity level of "[PF23] Vibration tough drive - Oscillation detection level".

0 0 0 H

- Oscillation detection alarm selection

[PF25] SEMI-F47 function - Instantaneous power failure detection time

Set the time of the [AL. 10.1 Voltage drop in the control circuit power] occurrence.

[PF31] Machine diagnosis function - Friction judgment speed

Set a (linear) servo motor speed to divide a friction estimation area into high and low for the friction estimation process of the machine diagnosis.

4.9 Positioning Data

(The data can be changed while the programmable controllers is in the ready state.)

Para-		Unit	Setting range			Default	
meters		Item	mm inch degree pulse		pulse	value	
[Da.1]		Operation pattern	0: Positioning co 1: Continuous po 3: Continuous pa	mplete ositioning control ath control			0
[Da.2]	Positioning identifier	Control method	 01H: ABS Linear 02H: INC Linear 03H: Fixed-feed 04H: FWD V1 [1- 05H: RVS V1 [1- 06H: FWD V/P [S 07H: RVS V/P [S] 08H: FWD P/V [F 04H: ABS Linear 08H: INC Linear 08H: INC Linear 08H: INC Linear 08H: INC Linear 06H: ABS ArcMF designatior 06H: ABS ArcRG point design 10H: ABS ArcLFT point design 11H: INC ArcRG point design 12H: INC ArcLFT point design 13H: FWD V2 [2 14H: RVS V2 [2- 15H: ABS Linear 16H: INC Linear 17H: Fixed-feed 18H: FWD V3 [3 19H: RVS V3 [3- 1AH: ABS Linear 16H: INC Linear 17H: Fixed-feed 18H: FWD V3 [3 19H: RVS V3 [3- 1AH: ABS Linear 16H: INC Linear 17H: Fixed-feed 18H: FWD V4 [4 12H: FWD V4 [4 12H: FWD V4 [4 12H: RVS V4 [4- 20H: Helical inter helical inter CW) [3-axis designation 23H: Helical inter CW) [3-axis designation 25H: Helical inter CW) [3-axis designation 	1 [1-axis linear of 1 [1-axis linear of 1 [1-axis linear of 1 [1-axis fixed-fee axis speed contro Speed-position sw Position, speed sw Position (as crular in 1 [2-axis circular in 1 [2-axis circular in 1 [2-axis circular in 1 [2-axis circular in 1 [2-axis speed contro 1 [2-axis linear in 2 [fixed-feed contro 1 [3-axis linear in 2 [fixed-feed contro 1 [4-axis linear in 2 [fixed-feed contro 1 [2-axis speed contro 1 [2-axis speed contro 2 [1 [2 [2 [1 [1 [1 [1 [1 [1 [1 [1 [1 [1 [1 [1 [1	ontrol (ABS)] ontrol (INC)] ed control] of (forward rotation itching control (for itching control (re- vitching control (re- vitching control (re- terpolation control tropolation control tropolation control tropolation control interpolation control interpolation control interpolation control (forward rotation of (forward for (forward of (forward for (forward of (f	n)] i)] rward rotation)] verse rotation)] verse rotation)] verse rotation)] verse rotation)] verse rotation)] verse rotation] verse r	00H

Para-		I	Unit	Setting range				Default	
meters			ltem	mm	mm inch degree pulse				
[Da.3]	Positionin	Acc	eleration time No.	00: [Pr.9] Accele 01: [Pr.25] Accel 10: [Pr.26] Accel 11: [Pr.27] Accel	00: [Pr.9] Acceleration time 0 01: [Pr.25] Acceleration time 1 10: [Pr.26] Acceleration time 2 11: [Pr.27] Acceleration time 3				
[Da.4]	g identifier	Dec	eleration time No.	00: [Pr.10] Dece 01: [Pr.28] Dece 10: [Pr.29] Dece 11: [Pr.30] Dece	leration time 0 leration time 1 leration time 2 leration time 3			UH '	
		т	Absolute (ABS) system, current value changing	-214748364.8 to 214748364.7 μm	-21474.83648 to 21474.83647 inch	0 to 359.99999 degree	-2147483648 to 2147483647 pulse	0	
[Da.6]	movement amo	^o ositioning addr	Incremental (INC) system, fixed-feed 1, fixed-feed 2, fixed-feed 3, fixed- feed 4	-214748364.8 to 214748364.7 μm	-21474.83648 to 21474.83647 inch	-21474.83648 to 21474.83647 degree	-2147483648 to 2147483647 pulse	0	
	unt		For speed-position switching control or position-speed switching control	0 to 214748364.7 μm	0 to 21474.83647 inch	*2	0 to 2147483647 pulse	0	
[Da.7]	Arc address		Iress	-214748364.8 to 214748364.7 μm	-21474.83648 to 21474.83647 inch		-2147483648 to 2147483647 pulse	0	
[Da.8]	Co	mma	and speed	0.01 to 20000000.00 mm/min	0.001 to 2000000.000 inch/min	0.001 to 2000000.000 degree/min	1 to 1000000 pulse/s	0	
				-1: Current spee	d (Speed set for p	previous positionir	ng data No.)		
[Da.9]	Dv po	/ell tii sition	me/JUMP destination ing data No.	JUMP instruction Other than JUM	n (82H): [Positioni P instruction: [Dwe	ng data No.] 1 to (ell time] 0 to 6553	600 5 (ms)	0	
[Da.10]	10] M code/Condition data No./ Number of LOOP to LEND repetitions/Number of pitches			JUMP instruction (82H): [Condition data No.] 0 to 10 Helical interpolation (20H to 25H): [Number of pitches] 0 to 999 LOOP (83H): [Number of repetitions] 1 to 65535 Other than above instructions: [M code] 1 to 65535					
[Da.20]	Axis to	Axis No.	to be interpolated	00H: Axis 1 sele	cted 01H: Axis 2	selected 02H: Ax	is 3 selected		
[Da.21]	o be interr	Axis No.:	s to be interpolated 2	03H: AXIS 4 sele 06H: Axis 7 sele 09H: Axis 10 sel	cted 04H: AXIS 5 cted 07H: Axis 8 ected 0AH: Axis	selected 05H: Ax selected 08H: Ax 11 selected 0BH:	is 9 selected Axis 12 selected	00H	
[Da.22]	polated	Axis No.:	to be interpolated	0CH: Axis 13 sel 0FH: Axis 16 sel	ected 0DH: Axis	14 selected 0EH:	Axis 15 selected		

*1. The values shown in the Setting range column are binary values. Convert the set values to hexadecimal. HEX: 0 to F = BIN: DDBE (BE: acceleration time No., DD: deceleration time No.)

*2. In ABS mode: 0 to 359.99999 degrees In INC mode: 0 to 21474.83647 degrees

[Da.1 to Da.4] Positioning identifier

Set the operation pattern, control method, acceleration time No. and deceleration time number.



[Da.1] Operation pattern

The operation pattern designates whether positioning of a certain data No. is to be ended with just that data, or whether the positioning is to be carried out in succession depending on the next data No. .

Operation pattern	Details
Positioning complete	Set to execute positioning to the designated address, and then complete positioning.
Continuous positioning control	Positioning is carried out successively in order of data Nos. with one start signal. The operation halts at each position indicated by a positioning data.
Continuous path control	Positioning is carried out successively in order of data Nos. with one start signal. The operation does not stop at each positioning data.

(1) Single positioning control (Positioning complete)

 This control is set when executing only one designated data item of positioning. If a dwell time is designated, the positioning completes after the designated time elapses.

[4-axis module operation example]



- (2) Continuous positioning control
 - The machine always automatically decelerates each time the positioning is completed. Acceleration is then carried out after the simple motion module command speed reaches 0 to carry out the next positioning data operation. If a dwell time is designated, the acceleration is carried out after the designated time elapses.





(3) Continuous path control

 The speed is changed without deceleration stop between the command speed of the "positioning data No. currently being executed" and the speed of the "positioning data No. to carry out the next operation". The speed is not changed if the current speed and the next speed are equal. Dwell time is ignored, even if it is set.



[Da.2] Control method

Set the "control method" for carrying out positioning control.

- (1) When "JUMP instruction" is set for the control method, the "[Da.9] Dwell time/JUMP destination positioning data No." and "[Da.10] M code/Condition data No./Number of LOOP to LEND repetitions/Number of pitches" setting details will differ.
- (2) In case you selected "LOOP" as the control method, the "[Da.10] M code/Condition data No./Number of LOOP to LEND repetitions/Number of pitches" should be set differently from other cases.
- (3) For the details of the control methods, refer to Section 4.10.
- (4) If "2: degree" is set for "[Pr.1] Unit setting", 2-axis circular interpolation control and 3-axis helical interpolation control cannot be carried out. The error "Circular interpolation not possible" (error code: 199FH) will occur when executed.

[Da.3] Acceleration time No.

Set the acceleration time ("[Pr.9, Pr.25 to Pr.27] acceleration time 0 to 3") to use during positioning.

[Da.4] Deceleration time No.

Set the deceleration time ("[Pr.10, Pr.28 to Pr.30] deceleration time 0 to 3") to use during positioning.

[Da.6] Positioning address/movement amount

- (a) Absolute (ABS) system, current value changing
 - The setting value (positioning address) for the ABS system and current value changing is set with an absolute address (address from home position).



(b) Incremental (INC) system, fixed-feed 1, fixed-feed 2, fixed-feed 3, fixed-feed 4

The setting value (movement amount) for the INC system is set as a movement amount with sign.

When movement amount is positive: Moves in the positive direction (address increment direction)

When movement amount is negative: Moves in the negative direction (address decrement direction)



- (c) Speed-position switching control
 - INC mode: Set the amount of movement after the switching from speed control to position control.
 - ABS mode: Set the absolute address which will be the target value after speed control is switched to position control.

(The unit is "degree" only)

Speed



(d) Position-speed switching control

Set the amount of movement before the switching from position control to speed control.

[Da.7] Arc address

The arc address is data required only when carrying out 2-axis circular interpolation control or 3-axis helical interpolation control.

- When carrying out circular interpolation with sub point designation, set the sub point (passing point) address as the arc address.
- When carrying out circular interpolation with center point designation, set the center point address of the arc as the arc address.



[Da.8] Command speed

Set the command speed for positioning.

- If the set command speed exceeds "[Pr.8] Speed limit value", positioning will be carried out at the speed limit value.
- If "-1" is set for the command speed, the current speed (speed set for previous positioning data No.) will be used for positioning control. Use the current speed for uniform speed control, etc. If "-1" is set for continuing positioning data, and the speed is changed, the following speed will also change.

Note that when starting positioning, if the "-1" speed is set for the positioning data that carries out positioning control first, the error "No command speed" (error code: 1A12H) will occur, and the positioning will not start.

[Da.9] Dwell time/JUMP destination positioning data No.

Set the "dwell time" or "positioning data No." corresponding to the "[Da.2] Control method".

- When a method other than "JUMP instruction" is set for "[Da.2] Control method": Set the "dwell time".
- When "JUMP instruction" is set for "[Da.2] Control method": Set the "positioning data No." for the JUMP destination.

When the "dwell time" is set, the setting details of the "dwell time" will be as follows according to "[Da.1] Operation pattern".



[Da.10] M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches

Set an "M code", a "condition data No.", the "Number of LOOP to LEND repetitions" or the "Number of pitches" depending on how the "[Da.2] Control method" is set.^{*1}

- *1. The condition data specifies the condition for the JUMP instruction to be executed. (A JUMP will take place when the condition is satisfied.)
- If a method other than "JUMP instruction", "LOOP", and "3-axis helical interpolation control" is selected as the "[Da.2] Control method" Set an "M code".

If no "M code" needs to be output, set "0" (default value).

- (2) If "JUMP instruction" or "LOOP" is selected as the "[Da.2] Control method" Set the "condition data No." for JUMP.
 - 0: Unconditional JUMP to the positioning data specified by "[Da.9] Dwell time/JUMP destination positioning data No.".
 - 1 to 10: JUMP performed according to the condition data No. specified (a number between 1 and 10). Make sure that you specify the number of LOOP to LEND repetitions by a number other than "0". The error "Control method LOOP setting error" (error code: 1A33H) will occur if you specify "0".
- (3) If "3-axis helical interpolation control" is selected as the "[Da.2] Control method" Set the number of pitches for the linear interpolation axis. The rotation speed of the circular interpolation is set with the number of pitch.

4.10 Control Modes

This section explains the details of the positioning controls that can be selected by "[Da.2] Control method."

These methods correspond to the "major positioning control" functions.

4.10.1 Linear control

ABS linear 1 to 4 (1-axis linear control and 2- to 4-axis linear interpolation controls)

The absolute 1-axis linear control and 2- to 4-axis linear interpolation controls are used for positioning from the current stop position (start point address) to the address (end point address) set in "[Da.6] Positioning address/movement amount."

Ex.) 2-axis linear interpolation control

When the start point address (current stop position) is (1000, 1000) and the end point address (positioning address) is (10000, 4000), positioning is carried out as follows.



When using the 1-axis linear control or one of the 2- to 4-axis linear interpolation controls (ABS linear 1 to 4), set the following parameters.

⊙: Always set, O: Set as required, △: Setting restricted, -: Setting not required

Parameters	Setting item	Setting required/not required for the reference axis				Setting required/not required for the interpolation axis		
		ABS linear 1	ABS linear 2	ABS linear 3	ABS linear 4	ABS linear 2	ABS linear 3	ABS linear 4
[Da.1]	Operation pattern	۲	۲	۲	۲	-	-	-
[Da.2]	Control modes	ABS linear 1	ABS linear 2	ABS linear 3	ABS linear 4	-	-	-
[Da.3]	Acceleration time No.	0	0	0	0	-	-	-
[Da.4]	Deceleration time No.	0	0	0	0	-	-	-
[Da.6]	Positioning address/ movement amount	۲	۲	۲	۲	۲	۲	۲
[Da.7]	Arc address	-	-	-	-	-	-	-
[Da.8]	Command speed	Θ	Θ	Θ	۲	-	-	-
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	0	0	-	-	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	0	0	0	-	-	-
[Da.20]	Axis to be interpolated No.1	-	۲	۲	۲	-	-	-

Parameters	Setting item	Setting	Setting required/not required for the reference axis				Setting required/not required for the interpolation axis			
		ABS linear 1	ABS linear 2	ABS linear 3	ABS linear 4	ABS linear 2	ABS linear 3	ABS linear 4		
[Da.21]	Axis to be interpolated No.2	-	-	۲	۲	-	-	-		
[Da.22]	Axis to be interpolated No.3	-	-	-	۲	-	-	-		
[Da.27]	M code ON signal output timing	0	0	0	0	-	-	-		
[Da.28]	ABS direction in degrees	0	0	0	0	-	-	-		
[Da.29]	Interpolation speed designation method					-	-	-		

INC linear 1 to 4 (1-axis linear control, 2- to 4-axis linear interpolation controls)

The incremental 1-axis linear control and 2- to 4-axis linear interpolation controls are used for positioning from the current stop position (start point address) according to the movement amount set in "[Da.6] Positioning address/movement amount." The movement direction is determined by the sign of the movement amount.

- Positive movement amount: Positioning control to forward direction (Address increase direction)
- Negative movement amount: Positioning control to reverse direction (Address decrease direction)
 - Ex.) 2-axis linear interpolation control

When the axis 1 movement amount from the start point address is 9000 and the axis 2 movement amount from the start point address is -3000, positioning is as follows.



When using the 1-axis linear control or one of 2- to 4-axis linear interpolation controls (INC linear 1 to 4), set the following parameters.

Parameters	Setting item	Setting required/not required for the reference axis				Setting required/not requir for the interpolation axis			
		INC linear 1	INC linear 2	INC linear 3	INC linear 4	INC linear 2	INC linear 3	INC linear 4	
[Da.1]	Operation pattern	۲	۲	۲	۲	-	-	-	
[Da.2]	Control modes	INC linear 1	INC linear 2	INC linear 3	INC linear 4	-	-	-	
[Da.3]	Acceleration time No.	0	0	0	0	-	-	-	
[Da.4]	Deceleration time No.	0	0	0	0	-	-	-	
[Da.6]	Positioning address/ movement amount	۲	۲	۲	۲	۲	۲	۲	
[Da.7]	Arc address	-	-	-	-	-	-	-	
[Da.8]	Command speed	۲	۲	۲	۲	-	-	-	
[Da.9]	Da.9] Dwell time/JUMP destination positioning data No.		0	0	0	-	-	-	
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	0	0	0	-	-	-	
[Da.20]	Axis to be interpolated No.1	-	۲	۲	۲	-	-	-	
[Da.21]	Axis to be interpolated No.2	-	-	۲	۲	-	-	-	
[Da.22]	Axis to be interpolated No.3	-	-	-	۲	-	-	-	
[Da.27]	M code ON signal output timing	0	0	0	0	-	-	-	
[Da.28]	ABS direction in degrees	0	0	0	0	-	-	-	
[Da.29]	Interpolation speed designation method					-	-	-	

 \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

4.10.2 Fixed-feed control

Fixed-feed 1 to 4 (fixed-feed controls 1 to 4)

In fixed-feed control, the address ([Md.20] Feed current value) of the current stop position (start point address) is set to "0". Positioning is then carried out to a position at the end of the movement amount set in "[Da.6] Positioning address/movement amount". The movement direction is determined by the movement amount sign.

- Positive movement amount: Positioning control to forward direction (Address increase direction)
- Negative movement amount: Positioning control to reverse direction (Address decrease direction)

Ex.) 2-axis fixed-feed control



When using one of the fixed-feed controls 1 to 4 (fixed-feed 1 to 4), set the following parameters.

Parameters	Setting item	Setting required/not required for the reference axis				Setting required/not require for the interpolation axis			
		Fixed-feed 1	Fixed-feed 2	Fixed-feed 3	Fixed-feed 4	Fixed-feed 2	Fixed-feed 3	Fixed-feed 4	
[Da.1]	Operation pattern	۲	۲	۲	۲	-	-	-	
[Da.2]	Control modes	Fixed-feed 1	Fixed-feed 2	Fixed-feed 3	Fixed-feed 4	-	-	-	
[Da.3]	Acceleration time No.	0	0	0	0	-	-	-	
[Da.4]	Deceleration time No.	0	0	0	0	-	-	-	
[Da.6]	Positioning address/ movement amount	۲	۲	۲	۲	۲	۲	۲	
[Da.7]	Arc address	-	-	-	-	-	-	-	
[Da.8]	Command speed	۲	۲	۲	۲	-	-	-	
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	0	0	-	-	-	
[Da.10]	[Da.10] M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches		0	0	0	-	-	-	
[Da.20]	Axis to be interpolated No.1	-	۲	۲	۲	-	-	-	

⊙: Always set,	O: Se	et as required,	\triangle : Setting	restricted, -:	Setting I	not required
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Parameters	Setting item	Setting	required/n referen	ot required ce axis	Setting required/not required for the interpolation axis			
		Fixed-feed 1	Fixed-feed 2	Fixed-feed 3	Fixed-feed 4	Fixed-feed 2	Fixed-feed 3	Fixed-feed 4
[Da.21]	Axis to be interpolated No.2	-	-	۲	۲	-	-	-
[Da.22]	Axis to be interpolated No.3	-	-	-	۲	-	-	-
[Da.27]	M code ON signal output timing	0	0	0	0	-	-	-
[Da.28]	ABS direction in degrees	0	0	0	0	-	-	-
[Da.29]	Interpolation speed designation method			\triangle	\triangle	-	-	-

4.10.3 2-axis circular interpolation control with sub point designation

ABS circular sub (2-axis circular interpolation control with sub point designation)

In the absolute system, 2-axis circular interpolation control with sub point designation, positioning is carried out from the current stop position (start point address) to the address (end point address) set in "[Da.6] Positioning address/movement amount", in an arc path that passes through the sub point address set in "[Da.7] Arc address".

The resulting control path is an arc having as its center the intersection point of perpendicular bisectors of a straight line between the start point address (current stop position) and sub point address (arc address), and a straight line between the sub point address (arc address) and end point address (positioning address).



When using 2-axis circular interpolation control with sub point designation (ABS circular sub), set the following parameters.

Parameters	Setting item	Setting required/not required for the reference axis	Setting required/not required for the interpolation axis
[Da.1]	Operation pattern	۲	-
[Da.2]	Control modes	ABS circular sub	-
[Da.3]	Acceleration time No.	0	-
[Da.4]	Deceleration time No.	0	-
[Da.6]	Positioning address/movement amount	۲	۲
[Da.7]	Arc address	۲	۲
[Da.8]	Command speed	۲	-
[Da.9]	Dwell time/JUMP destination positioning data No.	0	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	-
[Da.20]	Axis to be interpolated No.1	۲	-
[Da.21]	Axis to be interpolated No.2	-	-
[Da.22]	Axis to be interpolated No.3	-	-
[Da.27]	M code ON signal output timing	0	-
[Da.28]	ABS direction in degrees	0	-
[Da.29]	Interpolation speed designation method	\triangle	-

 \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

INC circular sub (2-axis circular interpolation control with sub point designation)

In the incremental system, 2-axis circular interpolation control with sub point designation, positioning is carried out from the current stop position (start point address) to a position at the end of the movement amount set in "[Da.6] Positioning address/movement amount" in an arc path that passes through the sub point address set in "[Da.7] Arc address". The movement direction depends on the sign (+ or -) of the movement amount. The resulting control path is an arc having as its center the intersection point of perpendicular bisectors of the straight line between the start point address (current stop position) and sub point address (arc address) calculated from the movement amount to the sub point, and a straight line between the sub point address (arc address) and end point address (positioning address) calculated from the movement amount to the end point.



When using 2-axis circular interpolation control with sub point designation (INC circular sub), set the following parameters.

 Always set, 	O: Set as rec	quired, \triangle : Setting	restricted, -: Settin	g not required
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Parameters	Setting item	Setting required/not required for the reference axis	Setting required/not required for the interpolation axis
[Da.1]	Operation pattern	۲	-
[Da.2]	Control modes	INC circular sub	-
[Da.3]	Acceleration time No.	0	-
[Da.4]	Deceleration time No.	0	-
[Da.6]	Positioning address/movement amount	۲	۲
[Da.7]	Arc address	۲	۲
[Da.8]	Command speed	۲	-
[Da.9]	Dwell time/JUMP destination positioning data No.	0	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	-
[Da.20]	Axis to be interpolated No.1	۲	-
[Da.21]	Axis to be interpolated No.2	-	-

Parameters	Setting item	Setting required/not required for the reference axis	Setting required/not required for the interpolation axis
[Da.22]	Axis to be interpolated No.3	-	-
[Da.27]	M code ON signal output timing	0	-
[Da.28]	ABS direction in degrees	0	-
[Da.29]	Interpolation speed designation method		-

4.10.4 2-axis circular interpolation control with center point designation

ABS circular right/left (2-axis circular interpolation control with center point designation)

In the absolute system, 2-axis circular interpolation control with center point designation positioning is carried out from the current stop position (start point address) to the address (end point address) set in "[Da.6] Positioning address/movement amount", in an arc path having as its center the address (arc address) of the center point set in "[Da.7] Arc address".



When using 2-axis circular interpolation control with center point designation (ABS circular right, ABS circular left), set the following parameters.

©: A	lways set,	O: Set a	as required,	\triangle : S	Setting	restrict	ted, -:	Setting	not requ	ired

Parameters	Setting item	Setting required/not required for the reference axis		d Setting required/not required for the interpolation axis		
	_	ABS circular right	ABS circular left	ABS circular right	ABS circular left	
[Da.1]	Operation pattern	۲	۲	-	-	
[Da.2]	Control modes	ABS circular right	ABS circular left	-	-	
[Da.3]	Acceleration time No.	0	0	-	-	
[Da.4]	Deceleration time No.	0	0	-	-	
[Da.6]	Positioning address/movement amount	۲	۲	۲	۲	
[Da.7]	Arc address	۲	۲	۲	۲	
[Da.8]	Command speed	۲	۲	-	-	
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	-	-	

Parameters	Setting item	Setting require for the refe	ed/not required erence axis	Setting required/not required for the interpolation axis		
	_	ABS circular right	ABS circular left	ABS circular right	ABS circular left	
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	0	-	-	
[Da.20]	Axis to be interpolated No.1	Θ	۲	-	-	
[Da.21]	Axis to be interpolated No.2	-	-	-	-	
[Da.22]	Axis to be interpolated No.3	-	-	-	-	
[Da.27]	M code ON signal output timing	0	0	-	-	
[Da.28]	ABS direction in degrees	0	0	-	-	
[Da.29]	Interpolation speed designation method		Δ	-	-	

INC circular right/left (2-axis circular interpolation control with center point designation)

In the incremental system, 2-axis circular interpolation control with center point designation, positioning is carried out from the current stop position (start point address) to a position at the end of the movement amount set in "[Da.6] Positioning address/movement amount", in an arc path having as its center the address (arc address) of the center point set in "[Da.7] Arc address".



When using 2-axis circular interpolation control with center point designation (INC circular right, INC circular left), set the following parameters.

Parameters	Setting item	Setting required/not required for the reference axis		Setting required/not required for the interpolation axis	
		INC circular right	INC circular left	INC circular right	INC circular left
[Da.1]	Operation pattern	۲	۲	-	-
[Da.2]	Control modes	INC circular right	INC circular left	-	-
[Da.3]	Acceleration time No.	0	0	-	-
[Da.4]	Deceleration time No.	0	0	-	-
[Da.6]	Positioning address/movement amount	۲	۲	۲	۲
[Da.7]	Arc address	۲	۲	۲	۲
[Da.8]	Command speed	۲	۲	-	-
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	-	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	0	-	-
[Da.20]	Axis to be interpolated No.1	۲	۲	-	-
[Da.21]	Axis to be interpolated No.2	-	-	-	-
[Da.22]	Axis to be interpolated No.3	-	-	-	-
[Da.27]	M code ON signal output timing	0	0	-	-
[Da.28]	ABS direction in degrees	0	0	-	-
[Da.29]	Interpolation speed designation method		Δ	-	-

 \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

4.10.5 3-axis helical interpolation control with sub point designation

Helical interpolation control with sub point designation (ABS) (3-axis helical interpolation control with sub point designation) In the absolute system and 3-axis helical interpolation control with sub point designation, the positioning is performed from the current stop position (X0, Y0, Z0) to the position indicated with the arc end point address (X1 and Y1) and the linear interpolation axis end point address (Z1) set in "[Da.6] Positioning address/movement amount". As the positioning to the commanded position, the linear interpolation with the other linear interpolation axes is performed and the positioning target is rotated helically for the number of pitches set in "[Da.10] M code/Condition data No./Number of LOOP to LEND repetitions/Number of pitches" of the linear interpolation axis while the circular interpolation through the sub point address (sub point address) set in "[Da.7] Arc address" is performed.

The resulting path is an arc whose center is the intersection point of the perpendicular bisectors of a straight line between the start point address (current stop position) and sub point address (arc address) and a straight line between the sub point address (arc address) and end point address (positioning address).



When using 3-axis helical interpolation control with sub point designation (helical interpolation control with sub point designation (ABS)), set the following parameters. \odot : Always set, \bigcirc : Set as required, \triangle : Setting restricted, -: Setting not required

Parameters	Setting item	Setting requirement of reference axis	Setting requirement of circular interpolation axis ^{*1}	Setting requirement of linear interpolation axis ^{*2}
[Da.1]	Operation pattern	۲	-	-
[Da.2]	Control modes	Helical interpolation control with sub point designation (ABS)	-	-
[Da.3]	Acceleration time No.	۲	-	-
[Da.4]	Deceleration time No.	۲	-	-
[Da.6]	Positioning address/movement amount	۲	۲	⊚
[Da.7]	Arc address	۲	۲	-
[Da.8]	Command speed	۲	-	-
[Da.9]	Dwell time/JUMP destination positioning data No.	0	-	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	-	⊙ ^{*3}

Parameters	Setting item	Setting requirement of reference axis	Setting requirement of circular interpolation axis ^{*1}	Setting requirement of linear interpolation axis ^{*2}
[Da.20]	Axis to be interpolated No.1	۲	-	-
[Da.21]	Axis to be interpolated No.2	۲	-	-
[Da.22]	Axis to be interpolated No.3	-	-	-
[Da.27]	M code ON signal output timing	0	-	-
[Da.28]	ABS direction in degrees	0	-	-
[Da.29]	Interpolation speed designation method	Δ	-	-

*1. Specified in "[Da.20] Axis to be interpolated No.1" of the reference axis.

*2. Specified in "[Da.21] Axis to be interpolated No.2" of the reference axis.

*3. Set the number of pitches for the linear interpolation axis.

Helical interpolation control with sub point designation (INC) (3-axis helical interpolation control with sub point designation) In the incremental system and 3-axis helical interpolation control with sub point designation, the positioning is performed from the current stop position (X0, Y0, Z0) to the position (X1, Y1, Z1) for the movement amount set in "[Da.6] Positioning address/movement amount". As the positioning to the commanded position, the linear interpolation with the other linear interpolation axes is performed and the positioning target is rotated helically for the number of pitches set in "[Da.10] M code/Condition data No./Number of LOOP to LEND repetitions/ Number of pitches" of the linear interpolation axis while the circular interpolation through the sub point address (sub point address) set in "[Da.7] Arc address" is performed. The movement direction is determined by the sign of the movement amount.

The resulting path is an arc whose center is the intersection point of the perpendicular bisectors of a straight line between the start point address (current stop position) and the sub point address (arc address) calculated from the movement amount to the sub point, and a straight line between the sub point address (arc address) and the end point address (positioning address) calculated from the movement amount to the end point.



When using 3-axis helical interpolation control with sub point designation (helical interpolation control with sub point designation (INC)), set the following parameters. \odot : Always set, \bigcirc : Set as required, \triangle : Setting restricted, -: Setting not required

Parameters	Setting item	Setting requirement of reference axis	Setting requirement of circular interpolation axis ^{*1}	Setting requirement of linear interpolation axis*2
[Da.1]	Operation pattern	۲	-	-
[Da.2]	Control modes	Helical interpolation control with sub point designation (INC)	-	-
[Da.3]	Acceleration time No.	•	-	-
[Da.4]	Deceleration time No.	•	-	-
[Da.6]	Positioning address/movement amount	•	۲	۲
[Da.7]	Arc address	•	۲	_
[Da.8]	Command speed	۲	-	-
[Da.9]	Dwell time/JUMP destination positioning data No.	0	-	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	-	⊙ *3
[Da.20]	Axis to be interpolated No.1	•	-	-
[Da.21]	Axis to be interpolated No.2	۲	-	-
[Da.22]	Axis to be interpolated No.3	-	-	-
[Da.27]	M code ON signal output timing	0	-	-
[Da.28]	ABS direction in degrees	0	-	-
[Da.29]	Interpolation speed designation method		-	-

*1. Specified in "[Da.20] Axis to be interpolated No.1" of the reference axis.

*2. Specified in "[Da.21] Axis to be interpolated No.2" of the reference axis.

*3. Set the number of pitches for the linear interpolation axis.
4.10.6 3-axis helical interpolation control with center point designation

Helical interpolation control with center point designation (ABS, CW)/(ABS, CCW) (3-axis helical interpolation control with center point designation) In the absolute system and 3-axis helical interpolation control with center point designation, the positioning is performed from the current stop position (X0, Y0, Z0) to the position indicated with the arc end point address (X1 and Y1) and the linear interpolation axis end point address (Z1) set in "[Da.6] Positioning address/movement amount". As the positioning to the commanded position, the linear interpolation with the other linear interpolation axes is performed and the positioning target is rotated helically for the number of pitches set in "[Da.10] M code/Condition data No./Number of LOOP to LEND repetitions/Number of pitches" of the linear interpolation axis while the circular interpolation of the circle whose center is the center point address (arc address) set in "[Da.7] Arc address" is performed.



When using the 3-axis helical interpolation control with center point designation (helical interpolation control with center point designation (ABS, CW), helical interpolation control with center point designation (ABS, CCW)), set the following parameters. d

		Setting required/not required for the reference axis		Setting req circular interp	uirement of oolation axis ^{*1}	Setting requirement of linear interpolation axis*2		
Para- meters	Setting item	Helical interpolation control with center point designation (ABS, CW)	Helical interpolation control with center point designation (ABS, CCW)	Helical interpolation control with center point designation (ABS, CW)	Helical interpolation control with center point designation (ABS, CCW)	Helical interpolation control with center point designation (ABS, CW)	Helical interpolation control with center point designation (ABS, CCW)	
[Da.1]	Operation pattern	۲	۲	-	-	-	-	
[Da.2]	Control modes	Helical interpolation control with center point designation (ABS, CW)	Helical interpolation control with center point designation (ABS, CCW)	-	-	-	-	
[Da.3]	Acceleration time No.	۲	۲	-	-	-	-	
[Da.4]	Deceleration time No.	۲	۲	-	-	-	-	
[Da.6]	Positioning address/ movement amount	۲	۲	۲	۲	۲	۲	
[Da.7]	Arc address	۲	۲	۲	۲	-	-	
[Da.8]	Command speed	۲	۲	-	-	-	-	
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	-	-	-	-	

		Setting required/not required for the reference axis		Setting req circular inter	uirement of colation axis ^{*1}	Setting requirement of linear interpolation axis ^{*2}		
Para- meters	Setting item	Helical interpolation control with center point designation (ABS, CW)	Helical interpolation control with center point designation (ABS, CCW)	Helical interpolation control with center point designation (ABS, CW)	Helical interpolation control with center point designation (ABS, CCW)	Helical interpolation control with center point designation (ABS, CW)	Helical interpolation control with center point designation (ABS, CCW)	
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/ No. of pitches	0	0	-	-	⊙ *3	⊙ *3	
[Da.20]	Axis to be interpolated No.1	۲	۲	-	-	-	-	
[Da.21]	Axis to be interpolated No.2	۲	۲	-	-	-	-	
[Da.22]	Axis to be interpolated No.3	-	-	-	-	-	-	
[Da.27]	M code ON signal output timing	0	0	-	-	-	-	
[Da.28]	ABS direction in degrees	0	0	-	-	-	-	
[Da.29]	Interpolation speed designation method			-	-	-	-	

*1. Specified in "[Da.20] Axis to be interpolated No.1" of the reference axis.

*2. Specified in "[Da.21] Axis to be interpolated No.2" of the reference axis.

*3. Set the number of pitches for the linear interpolation axis.

Helical interpolation control with center point designation (INC, CW)/(INC, CCW) (3-axis helical interpolation control with center point designation)

In the incremental system and 3-axis helical interpolation control with center point designation, the positioning is performed from the current stop position (X0, Y0, Z0) to the position (X1, Y1, Z1) for the movement amount set in "[Da.6] Positioning address/movement amount". As the positioning to the commanded position, the linear interpolation with the other linear interpolation axes is performed and the positioning target is rotated helically for the number of pitches set in "[Da.10] M code/Condition data No./Number of LOOP to LEND repetitions/Number of pitches" of the linear interpolation axis while the circular interpolation of the circle whose center is the center point address (arc address) set in "[Da.7] Arc address" is performed.

Operation chart



When using the 3-axis helical interpolation control with sub point designation (helical interpolation control with sub point designation (INC)), set the following parameters. \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

		Setting required/not required for the reference axis		Setting req circular inter	uirement of colation axis ^{*1}	Setting requirement of linear interpolation axis*2		
Para- meters	Setting item	Helical interpolation control with center point designation (INC, CW)	Helical interpolation control with center point designation (INC, CCW)	Helical interpolation control with center point designation (INC, CW)	Helical interpolation control with center point designation (INC, CCW)	Helical interpolation control with center point designation (INC, CW)	Helical interpolation control with center point designation (INC, CCW)	
[Da.1]	Operation pattern	۲	۲	-	-	-	-	
[Da.2]	Control modes	Helical interpolation control with center point designation (INC, CW)	Helical interpolation control with center point designation (INC, CCW)	-	-	-	-	
[Da.3]	Acceleration time No.	۲	۲	-	-	-	-	
[Da.4]	Deceleration time No.	۲	۲	-	-	-	-	
[Da.6]	Positioning address/ movement amount	۲	۲	۲	۲	۲	۲	
[Da.7]	Arc address	۲	۲	۲	۲	-	-	
[Da.8]	Command speed	۲	۲	-	-	-	-	
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	-	-	-	-	
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/ No. of pitches	0	0	-	-	⊙ *3	⊙ *3	
[Da.20]	Axis to be interpolated No.1	۲	۲	-	-	-	-	
[Da.21]	Axis to be interpolated No.2	۲	۲	-	-	-	-	
[Da.22]	Axis to be interpolated No.3	-	-	-	-	-	-	
[Da.27]	M code ON signal output timing	0	0	-	-	-	-	
[Da.28]	ABS direction in degrees	0	0	-	-	-	-	
[Da.29]	Interpolation speed designation method			-	-	-	-	

*1. Specified in "[Da.20] Axis to be interpolated No.1" of the reference axis.

*2. Specified in "[Da.21] Axis to be interpolated No.2" of the reference axis.

*3. Set the number of pitches for the linear interpolation axis.

4.10.7 Speed control

Forward run/reverse run: speed 1 to 4 (speed control)

The control is carried out in the axis direction in which the positioning data has been set by continuously outputting pulses for the speed set in "[Da.8] Command speed" until the input of a stop command.

The eight types of speed control includes "Forward run: speed 1 to 4" in which the control starts in the forward run direction, and "Reverse run: speed 1 to 4" in which the control starts in the reverse run direction.

Ex.) 2-axis speed control



When using speed control (forward run: speed 1 to 4, reverse run: speed 1 to 4), set the following parameters.

 \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

• Forward run speed

Demonsterne	Octive item	Setting	required/n referen	ot required	Setting required/not required for the interpolation axis			
Parameters	Setting item	Forward run speed 1	Forward run speed 2	Forward run speed 3	Forward run speed 4	Forward run speed 2	Forward run speed 3	Forward run speed 4
[Da.1]	Operation pattern	۲	۲	۲	۲	-	-	-
[Da.2]	Control modes	Forward run speed 1	Forward run speed 2	Forward run speed 3	Forward run speed 4	-	-	-
[Da.3]	Acceleration time No.	0	0	0	0	-	-	-
[Da.4]	Deceleration time No.	0	0	0	0	-	-	-
[Da.6]	Positioning address/ movement amount	-	-	-	-	-	-	-
[Da.7]	Arc address	-	-	-	-	-	-	-
[Da.8]	Command speed	۲	۲	۲	۲	۲	۲	۲
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	0	0	-	-	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	0	0	0	-	-	-
[Da.20]	Axis to be interpolated No.1	-	۲	۲	۲	-	-	-
[Da.21]	Axis to be interpolated No.2	-	-	۲	۲	-	-	-
[Da.22]	Axis to be interpolated No.3	-	-	-	۲	-	-	-
[Da.27]	M code ON signal output timing	0	0	0	0	-	-	-
[Da.28]	ABS direction in degrees	0	0	0	0	-	-	-
[Da.29]	Interpolation speed designation method					-	-	-

Reverse run speed

Deremetere	Sotting itom	Setting required/not required for the reference axis				Setting required/not required for the interpolation axis		
Parameters	Setting item	Reverse run speed 1	Reverse run speed 2	Reverse run speed 3	Reverse run speed 4	Reverse run speed 2	Reverse run speed 3	Reverse run speed 4
[Da.1]	Operation pattern	۲	۲	۲	۲	-	-	-
[Da.2]	Control modes	Reverse run speed 1	Reverse run speed 2	Reverse run speed 3	Reverse run speed 4	-	-	-
[Da.3]	Acceleration time No.	0	0	0	0	-	-	-
[Da.4]	Deceleration time No.	0	0	0	0	-	-	-
[Da.6]	Positioning address/ movement amount	-	-	-	-	_	-	-
[Da.7]	Arc address	_	_	-	-	_	-	-

Devemeters	Cotting item	Setting	required/n referen	ot required	Setting required/not required for the interpolation axis			
Parameters	Setting item	Reverse run speed 1	Reverse run speed 2	Reverse run speed 3	Reverse run speed 4	Reverse run speed 2	Reverse run speed 3	Reverse run speed 4
[Da.8]	Command speed	۲	۲	•	۲	۲	۲	۲
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	0	0	-	-	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	0	0	0	-	-	-
[Da.20]	Axis to be interpolated No.1	-	۲	۲	۲	-	-	-
[Da.21]	Axis to be interpolated No.2	-	-	۲	۲	-	-	-
[Da.22]	Axis to be interpolated No.3	-	-	-	۲	-	-	-
[Da.27]	M code ON signal output timing	0	0	0	0	-	-	-
[Da.28]	ABS direction in degrees	0	0	0	0	-	-	-
[Da.29]	Interpolation speed designation method					-	-	-

4.10.8 Speed-position switching control

The speed-position switching control in the INC or ABS mode is selected by "[Pr.81] Speedposition function selection."

Forward run: speed/position, Reverse run: speed/position (speed-position switching control (INC mode))

The pulses of the speed set in "[Da.8] Command speed" are kept output on the axial direction set to the positioning data. When the "speed-position switching signal" is input, position control of the movement amount set in "[Da.6] Positioning address/movement amount" is exercised.

Ex.) When an external command signal (DI) is used as the speed-position switching signal:



When using speed-position switching control (INC mode) (Forward run: speed/position, Reverse run: speed/position), set the following parameters.

		Setting required/not required		
Parameters	Setting item	Forward run: speed/position	Reverse run: speed/position	
[Da.1]	Operation pattern	۲	۲	
[Da.2]	Control modes	Forward run: speed/position	Reverse run: speed/position	
[Da.3]	Acceleration time No.	0	0	
[Da.4]	Deceleration time No.	0	0	
[Da.6]	Positioning address/movement amount	۲	۲	
[Da.7]	Arc address	-	-	
[Da.8]	Command speed	۲	۲	
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	0	
[Da.20]	Axis to be interpolated No.1	-	-	
[Da.21]	Axis to be interpolated No.2	-	-	
[Da.22]	Axis to be interpolated No.3	-	-	
[Da.27]	M code ON signal output timing	0	0	
[Da.28]	ABS direction in degrees	-	-	
[Da.29]	Interpolation speed designation method	-	-	

 \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

Forward run: speed/position, Reverse run: speed/position (Speed-position switching control (ABS mode))

The pulses of the speed set in "[Da.8] Command speed" are kept output in the axial direction set to the positioning data. When the "speed-position switching signal" is input, position control to the address set in "[Da.6] Positioning address/movement amount" is exercised. "Speed-position switching control (ABS mode)" is valid only when "[Pr.1] Unit setting" is "degree".

Ex.) When an external command signal (DI) is used as the speed-position switching signal:



When using speed-position switching control (ABS mode) (Forward run: speed/position, Reverse run: speed/position), set the following parameters.

		Setting required/not required		
Parameters	Setting item	Forward run: speed/position	Reverse run: speed/position	
[Da.1]	Operation pattern	۲	۲	
[Da.2]	Control modes	Forward run: speed/position	Reverse run: speed/position	
[Da.3]	Acceleration time No.	0	0	
[Da.4]	Deceleration time No.	0	0	
[Da.6]	Positioning address/movement amount	۲	۲	
[Da.7]	Arc address	-	-	
[Da.8]	Command speed	۲	۲	
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	0	
[Da.20]	Axis to be interpolated No.1	-	-	
[Da.21]	Axis to be interpolated No.2	-	-	
[Da.22]	Axis to be interpolated No.3	-	-	
[Da.27]	M code ON signal output timing	0	0	
[Da.28]	ABS direction in degrees	-	-	
[Da.29]	Interpolation speed designation method	-	-	

 \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

4.10.9 Position-speed switching control

Forward run: position/speed, Reverse run: position/speed (position-speed switching control)

Before the position-speed switching signal is input, position control is carried out for the movement amount set in "[Da.6] Positioning address/movement amount" in the axis direction in which the positioning data has been set. When the position-speed switching signal is input, the position control is carried out by continuously outputting the pulses for the speed set in "[Da.8] Command speed" until the input of a stop command.

Ex.) When an external command signal (DI) is used as the position-speed switching signal:



Setting details are taken in at positioning start.

When using position-speed switching control (forward run: position/speed, reverse run: position/speed), set the following parameters.

		Setting required/not required		
Parameters	Setting item	Forward run: position/speed	Reverse run: position/speed	
[Da.1]	Operation pattern	۲	۲	
[Da.2]	Control modes	Forward run: position/speed	Reverse run: position/speed	
[Da.3]	Acceleration time No.	0	0	
[Da.4]	Deceleration time No.	0	0	
[Da.6]	Positioning address/movement amount	0	0	
[Da.7]	Arc address	-	-	
[Da.8]	Command speed	۲	۲	
[Da.9]	Dwell time/JUMP destination positioning data No.	0	0	
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0	0	
[Da.20]	Axis to be interpolated No.1	-	-	
[Da.21]	Axis to be interpolated No.2	-	-	
[Da.22]	Axis to be interpolated No.3	-	-	
[Da.27]	M code ON signal output timing	0	0	
[Da.28]	ABS direction in degrees	-	-	
[Da.29]	Interpolation speed designation method	-	-	

 \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

4.10.10 Current value change

Current value change

The control is carried out in which the "[Md.20] Feed current value" of the stopped axis is changed to a random address set by the user. (The "[Md.21] Machine feed value" is not changed when the current value is changed.)

The two methods for changing the current value are shown below.

- Changing to a new current value using the positioning data
- Changing to a new current value using the start No. (No.9003) for a current value changing

Ex.) Changing to a new current value using positioning data



When using current value changing, set the following parameters.

⊙: Always set, O: Set as required, △: Setting restricted, -: Setting not required

Parameters	Setting item	Setting required/not required
[Da.1]	Operation pattern	۲
[Da.2]	Control modes	Current value change
[Da.3]	Acceleration time No.	-
[Da.4]	Deceleration time No.	-
[Da.6]	Positioning address/movement amount	⊙*1
[Da.7]	Arc address	-
[Da.8]	Command speed	-
[Da.9]	Dwell time/JUMP destination positioning data No.	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	0
[Da.20]	Axis to be interpolated No.1	-
[Da.21]	Axis to be interpolated No.2	-
[Da.22]	Axis to be interpolated No.3	-
[Da.27]	M code ON signal output timing	0
[Da.28]	ABS direction in degrees	-
[Da.29]	Interpolation speed designation method	-

*1. Set the address to be changed.

4.10.11 NOP instruction

NOP (NOP instruction)

The NOP instruction is used for the nonexecutable control method.

The positioning data No. to which the NOP instruction is set transfers, without any

processing, to the operation for the next positioning data No.

When using the NOP instruction, set the following positioning data.

 \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

Parameters	Setting item	Setting required/not required
[Da.1]	Operation pattern	-
[Da.2]	Control modes	NOP instruction
[Da.3]	Acceleration time No.	-
[Da.4]	Deceleration time No.	-
[Da.6]	Positioning address/movement amount	-
[Da.7]	Arc address	-
[Da.8]	Command speed	-
[Da.9]	Dwell time/JUMP destination positioning data No.	-
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	-
[Da.20]	Axis to be interpolated No.1	-
[Da.21]	Axis to be interpolated No.2	-
[Da.22]	Axis to be interpolated No.3	-
[Da.27]	M code ON signal output timing	-
[Da.28]	ABS direction in degrees	_
[Da.29]	Interpolation speed designation method	-

4.10.12 JUMP instruction

JUMP (JUMP instruction)

The JUMP instruction is used to control the operation so it jumps to a positioning data No. set in the positioning data during "continuous positioning control" or "continuous path control".

JUMP instruction includes the following two types of JUMP.

Unconditional JUMP

The JUMP instruction is unconditionally executed. The operation jumps to the positioning data No. set in "[Da.9] Dwell time/JUMP destination positioning data No.".

Conditional JUMP

When the execution conditions are met, the JUMP instruction will be executed, and the operation will jump to the set positioning No. (The conditions are set to the "condition data" used with "high-level positioning control".)

When using the JUMP (JUMP instruction), set the following parameters.

Parameters	Setting item	Setting required/not required
[Da.1]	Operation pattern	-
[Da.2]	Control modes	JUMP instruction
[Da.3]	Acceleration time No.	-
[Da.4]	Deceleration time No.	-
[Da.6]	Positioning address/movement amount	-
[Da.7]	Arc address	-
[Da.8]	Command speed	-
[Da.9]	Dwell time/JUMP destination positioning data No.	⊙ *1
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches	©*2
[Da.20]	Axis to be interpolated No.1	-
[Da.21]	Axis to be interpolated No.2	-
[Da.22]	Axis to be interpolated No.3	-
[Da.27]	M code ON signal output timing	-
[Da.28]	ABS direction in degrees	-
[Da.29]	Interpolation speed designation method	-

 \odot : Always set, O: Set as required, \bigtriangleup : Setting restricted, -: Setting not required

*1. Set the positioning data for the JUMP destination.

*2. Set the JUMP instruction execution conditions with the condition data No. 0: Unconditional JUMP

1 to 10: Condition data No. ("Simultaneous start" condition data cannot be set.)

4.10.13 Loop control

LOOP, LEND (loop control)

The LOOP is used for loop control by the repetition of LOOP to LEND.

• LOOP

LOOP is the loop head, and LED is the loop tail.

• LEND

When the number of repetitions specified in LOOP reaches 0, the loop will be terminated, and the processing for the next positioning data No. will be started. Ex.) Executed in the order of the positioning data No.1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6.

Positioning data No.	Operation pattern	Control modes	Condition	
1	Continuous positioning control	ABS2		
2	Positioning complete	LOOP	Number of loop cycles: 2	
3	Continuous path control	ABS2		
4	Continuous positioning control	ABS2		
5	Positioning complete	LEND])
6	Positioning complete	ABS2		

A loop with positioning data Nos. 2 to 5 is executed twice.

During loop control, the positioning completion processing for the single positioning control ("00: Positioning complete" in "[Da.1] Operation pattern") will not be performed. When using the Loop control (LOOP, LEND), set the following parameters.

 \odot : Always set, O: Set as required, \triangle : Setting restricted, -: Setting not required

Parameters	Setting item		Setting required/not required	
			LEND	
[Da.1]	Operation pattern	-	-	
[Da.2]	Control modes	LOOP	LEND	
[Da.3]	Acceleration time No.	-	-	
[Da.4]	Deceleration time No.	-	-	
[Da.6]	Positioning address/movement amount	-	-	
[Da.7]	Arc address	-	-	
[Da.8]	Command speed	-	-	
[Da.9]	Dwell time/JUMP destination positioning data No.		-	
[Da.10]	M code/Condition data No./No. of LOOP to LEND repetitions/No. of pitches		-	
[Da.20]	Axis to be interpolated No.1	-	-	
[Da.21]	Axis to be interpolated No.2	-	-	
[Da.22]	Axis to be interpolated No.3	-	-	
[Da.27]	M code ON signal output timing		-	
[Da.28]	ABS direction in degrees		-	
[Da.29]	Interpolation speed designation method	-	-	

*1. Set the repeat cycles.

Chapter 5 Practice (1) Test Operation with GX Works3 (RD77MS4)



5.1 Demonstration Machine System Configuration

PRECAUTIONS

- Turn on the power switch of the demonstration machine after setting R08CPU to STOP.
- The equipment will be installed by your teacher. Do not connect or disconnect any cable or disassemble the equipment without your teacher's permission.
 - Failure to observe this may result in a fault, malfunction, injury, or fire.

5.2 CPU Module Setting

Using the demonstration machine system configuration as an example, start up GX Works3, create a new project, and add extension modules.



5.2.1 New project creation

HELSOFT GX Works3

New...

Open...

Close

Save

Save As...

P

P

 Click the Windows[®] [start] button, and then select [All Programs] → [MELSOFT] → [GX Works3] → [GX Works3].

(2) Click [New...] on the [Project] menu.



Project Edit Find/Replace Convert View

Ctrl+N

C Click!

Ctrl+S

(3) Specify the following settings at the New Project dialog box that appears, and then click the OK button.

Series: RCPU Type: R08 Program Language: Ladder

Go to next page

From pre	vious p	age
ج ح		
MELSOFT GX Works3 Add a module. [Module Name] R08PCPU [Start I/O No.] 3E00 Module Setting Module Label:Not use Click! Do Not Show this Dialog Again OK	(4)	The dialog box shown on the left appears, press the <u>Setting Change</u> button.
Option Image: Comment Project Image: CommentProject Image: CommentProject I	(5)	The Options dialog box appears. Change the setting for "Use Module Label" to "Yes," and click the OK button.
MELSOFT GX Works3 Add a module. [Module Name] R08CPU [Start I/O No.] 3E00 Module Setting Module Label:Use Click! Do Not Show this Dialog Again OK OK	(6)	The display then returns to the dialog box shown on the left. Click the OK button.
Ļ	7	
Go to n	∼ iext pa	qe

	From pre	evious p	age
MELSOFT	GX Works3	× (7)	lf a
1	In the option setting shown below, set whether to automatically reflect the changes to program editor if label name is edited in label editor.		арр
	[Other Editor] -> [Label Editor Common] -> [Track label name automatically in program editor]		
	* Caution It may take several minutes to reflect.		
	Do not show this dialog again		

(7) If a dialog box relating to the label editor appears, click the OK button.

5.2.2 Adding extension modules



(4) Click [View] \rightarrow [Docking window] \rightarrow [Element Selection].

Kelsoft GX Works3 (Untitled Project) - [ProgPou [PRG] [LD] 2Step]						
: Project Edit Find/Replace Convert Vi	w Online Debug Diagnostics Tool	l Window Help				
i 🗅 🖻 🖨 🥥 🔍 🚽 📜	Toolbar	> 🐘 🗾 🗰 🚑 🔜 🔜 🔛 🕀 🔾 🕂 100% 🔍 📜 🖽 🖬				
1 🔁 🖴 🖃 📰 👬 🗊 🚟 🚟 ≚	Statusbar	- I 중 또 ITT 1/F				
	Color and Font					
Navigation 🛛 📮 🗙 💼	Docking Window	Navigation				
P∰+ □□ Options Wri	Zoom	Connection Destination				
The Project	Switch Display Language	Element Selection				
Module Configuration	Multiple Comments Display Setting	Output Click				
🖀 🔚 Program	Comment Display	Ctrl+F5 Progress				

The Element Selection list is displayed.



(5) Drag iQ-R Series Main Base "R35B" from the Element Selection list, and drop it on the Module Configuration screen.



Go to next page

From previous page

(7) Drag iQ-R Series Power Supply "R62P" from the Element Selection list, and drop it in the POW slot of R35B.



(8) Drag iQ-R Series Simple Motion "RD77MS4" from the Element Selection list, and drop it in the 0 slot of R35B.







(9) Drag iQ-R Series input "RX40C7" from the Element Selection list, and drop it in the slot 1 of R35B.



(10) Drag iQ-R Series Blank Cover "RG60" from the Element Selection list, and drop it in the slot 2 of R35B.





Drag and drop "RG60" in the slots 3 and 4 in the same manner.





(11) Click the tool bar option [Fix].







From previous page

- (14) Refresh the data on added RD77MS4.
 - In the [Navigation window], select [Parameter] \rightarrow [Module Information] \rightarrow [0000:RD77MS4], and double-click [Module Parameter].



(15) The module parameter screen for RD77MS4 appears.

Specify Module Label as the destination. The content of each buffer memory corresponding to the module label added in (12) is transmitted to the destination.

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(16) Enable the CPU module setting. Click [Convert] \rightarrow [Convert].

5.3 Simple Motion Module Setting

Set various parameters from the Simple Motion Module setting tool to use the positioning functions of RD77MS4.

Part of the parameters can be set by using the assistant function. For the assistant function, refer to Appendix 3.

5.3.1 System configuration



 Start the Simple Motion Module setting tool.
 In the [Navigation window], select [Parameter]
 → [Module Information] → [0000:RD77MS4], and double-click [Simple Motion Module Setting].



 (2) The Simple Motion Module setting tool will start. The system configuration window appears. Set the system configuration. Double-click an Axis #1 (d01).

(3) The Amplifier Setting [Axis #1] dialog box appears. Set the data as shown below, and click the OK button.

Servo Amplifier Series: MR-J4(W)-B (-RJ) Amplifier Operation Mode: Standard



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(4) Set Axis #2 (d02) and Axis #3 (d03) as shown below in accordance with the procedures in Steps (2) and (3).

From previous page

Servo Amplifier Series: MR-J4(W)-B (-RJ) Amplifier Operation Mode: Standard

5.3.2 Parameters







(2) The RD77MS4 Parameter Setting screen appears.

Set the parameters of each axis.

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- From previous page
- (3) Specify Common parameters as shown below.
 - Refer to Section 4.3 for details on Common Parameters.

Item		Axis #1	Axis #2	Axis #3	
Common parameter		The parameter does	not rely on axis and	d relate to the wh	
	Pr.82:Forced stop valid/invalid selection	1:Invalid			
	Pr.24:Manual pulse generator/Incremental Sync. ENC input selection	0:A-phase/B-phase Mode (4 Multiply)			
	Pr.89:Manual pulse generator/Incremental Sync. ENC input type selection	1:Voltage Output/Open Collector Type			
	Pr.96:Operation cycle setting	FFFFh:Automatic Setting			
	Pr.97:SSCNET Setting	1:SSCNET III/H			
+	Pr.150:Input terminal logic selection	Set the logic of external input signal (proximity dog, external command/switching) from the external device of			
	Pr. 151:Manual pulse generator/Incremental Sync. ENC input logic selection	0:Negative Logic			



(4) Specify Basic parameters 1 as shown below.

Refer to Section 4.4.1 for details on Basic parameters 1.

Item		Axis #1	Axis #2	Axis #3
😑 Basic parameters 1		Set according to th	e machine and appl	icable motor when
(Pr. 1:Unit setting	0:mm	0:mm	0:mm
	Pr.2:No. of pulses per rotation	4194304 pulse	4194304 pulse	4194304 pulse
	Pr.3:Movement amount per rota	2000.0 µm	2000.0 µm	8000.0 μm
	Pr.4:Unit magnification	1:x1 Times	1:x1 Times	1:x1 Times
	Pr.7:Bias speed at start	0.00 mm/min	0.00 mm/min	0.00 mm/min

(5) Specify Basic parameters 2 as shown below.

Refer to Section 4.4.2 for details on Basic parameters 2.

Item		Axis #1	Axis #2	Axis #3	
🖃 Basic parameters 2		Set according to the machine and applicable motor when			
	Pr.8:Speed limit value	10000.00 mm/min	10000.00 mm/min	10000.00 mm/min	
	Pr.9:Acceleration time 0	100 ms	100 ms	100 ms	
	Pr. 10:Deceleration time 0	150 ms	150 ms	150 ms	





(6) Specify Detailed parameters 1 as shown below.

Refer to Section 4.5.1 for details on Detailed parameters 1.

Item		Axis #1	Axis #2	Axis #3
😑 Detailed parameters 1		Set according to th	e system configurati	ion when the syst
	Pr.11:Backlash compensation a	0.0 µm	0.0 µm	0.0 µm
·	Pr. 12:Software stroke limit uppe	214748364.7 µm	214748364.7 µm	149000.0 µm
	Pr.13:Software stroke limit lowe	-214748364.8 µm	-214748364.8 µm	-1000.0 µm
	Pr.14:Software stroke limit selec	0:Set Software Strok	0:Set Software Strok	0:Set Software Strok
	Pr.15:Software stroke limit valid	0:Valid	0:Valid	0:Valid
	Pr.16:Command in-position width	10.0 µm	10.0 µm	10.0 µm
	Pr. 17:Torque limit setting value	300.0 %	300.0 %	300.0 %
	Pr. 18:M-code ON signal output t	0:WITH Mode	0:WITH Mode	0:WITH Mode
	Pr. 19:Speed switching mode	0:Standard Speed Sw	0:Standard Speed Sw	0:Standard Speed Sw
	Pr.20:Interpolation speed desig	0:Vector Speed	0:Vector Speed	0:Vector Speed
	Pr.21:Feed current value during	0:Not Update of Fee	0:Not Update of Fee	0:Not Update of Fee
	Pr.22:Input signal logic selection	0:Negative Logic	0:Negative Logic	0:Negative Logic
	Pr.22:Input signal logic selection	0:Negative Logic	0:Negative Logic	0:Negative Logic
	Pr.22:Input signal logic selection	0:Negative Logic	0:Negative Logic	0:Negative Logic
(]	Pr.22:Input signal logic selection	0:Negative Logic	0:Negative Logic	1:Positive Logic
	Pr.81:Speed-position function s	0:Speed-position Swit	0:Speed-position Swit	0:Speed-position Swit
(Pr.116:FLS signal selection : Inp	15:Invalid	15:Invalid	1:Servo Amplifier
	Pr.116:FLS signal selection : Inp	00h:No Settina	00h:No Settina	00h:No Settina
(Pr.117:RLS signal selection : Inp	15:Invalid	15:Invalid	1:Servo Amplifier
	Pr.117:RLS signal selection : Inp	00h:No Setting	00h:No Setting	00h:No Setting
	Pr.118:DOG signal selection : In	15:Invalid	1:Servo Amplifier	1:Servo Amplifier
	Pr.118:DOG signal selection : In	00h:No Setting	00h:No Setting	00h:No Setting
<u>.</u>	Pr.119:STOP signal selection : I	15:Invalid	15:Invalid	15:Invalid
l	Pr.119:STOP signal selection : I	00h:No Setting	00h:No Setting	00h:No Setting





(7) Specify Detailed parameters 2 as shown below.

Refer to Section 4.5.2 for details on Detailed parameters 2.

Item	Axis #1	Axis #2	Axis #3
Detailed parameters 2	Set according to the	e system configurati	ion when the syst
Pr.25:Acceleration time 1	50 ms	1000 ms	1000 ms
Pr.26:Acceleration time 2	1000 ms	1000 ms	1000 ms
Pr.27:Acceleration time 3	1000 ms	1000 ms	1000 ms
Pr.28:Deceleration time 1	2000 ms	1000 ms	1000 ms
Pr.29:Deceleration time 2	1000 ms	1000 ms	1000 ms
Pr.30:Deceleration time 3	1000 ms	1000 ms	1000 ms
Pr.31:JOG speed limit value	6000.00 mm/min	6000.00 mm/min	5000.00 mm/min
Pr.32:JOG operation acceleratio	0:100	0:100	0:100
Pr.33:JOG operation deceleratio	0:150	0:150	0:150
Pr.34:Acceleration/deceleration	1:S-curve Acceleratio	1:S-curve Acceleratio	1:S-curve Acceleratio
····· Pr.35:S-curve ratio	50 %	50 %	50 %
Pr.36:Rapid stop deceleration time	50 ms	50 ms	50 ms
Pr.37:Stop group 1 rapid stop s	0:Normal Deceleratio	0:Normal Deceleratio	0:Normal Deceleratio
Pr.38:Stop group 2 rapid stop s	0:Normal Deceleratio	0:Normal Deceleratio	0:Normal Deceleratio
Pr.39:Stop group 3 rapid stop s	0:Normal Deceleratio	0:Normal Deceleratio	0:Normal Deceleratio
Pr.40:Positioning complete signa	300 ms	300 ms	300 ms
Pr.41:Allowable circular interpol	10.0 µm	10.0 µm	10.0 µm
Pr.42:External command functio	0:External Positioning	0:External Positioning	0:External Positioning
Pr.83:Speed control 10x multipli	0:Invalid	0:Invalid	0:Invalid
Pr.84:Restart permissible value	0 pulse	0 pulse	0 pulse
Pr.90:Operation setting for SPD	0:Command Torque	0:Command Torque	0:Command Torque
Pr.90:Operation setting for SPD	0:Command Speed	0:Command Speed	0:Command Speed
Pr.90:Operation setting for SPD	0:Switching Condition	0:Switching Condition	0:Switching Condition
Pr.127:Speed limit value input s	0:Input Enable	0:Input Enable	0:Input Enable
Pr.95:External command signal s	0:Not Used	0:Not Used	0:Not Used
Pr. 122:Manual pulse generator	0:Do Not Execute Sp	0:Do Not Execute Sp	0:Do Not Execute Sp
Pr. 123:Manual pulse generator	200.00 mm/min	200.00 mm/min	200.00 mm/min

(8) Specify Home position return basic parameters as shown below. Refer to Section 4.6.1 for details on Home position return basic parameters.

Item		Axis #1	Axis #2	Axis #3
E H	IPR basic parameters	Set the values regu	ired for carrying out	HPR control (Thi
	Pr.43:HPR method	6:Data Set Method	0:Proximity Dog Method	0:Proximity Dog Method
	Pr.44:HPR direction	1:Reverse Direction (1:Reverse Direction (1:Reverse Direction (
	Pr.45:HP address	-5000.0 µm	-5000.0 µm	0.0 µm
	Pr.46:HPR speed	0.01 mm/min	100.00 mm/min	600.00 mm/min
	Pr.47:Creep speed	0.01 mm/min	20.00 mm/min	250.00 mm/min
	Pr.48:HPR retry	0:Do Not Retry HPR	1:Retry HPR with Limi	1:Retry HPR with Limi

Go to next page



(9) Specify Home position return detailed parameters as shown below.

Refer to Section 4.6.2 for details on Home position return detailed parameters.

	Item	Axis #1	Axis #2	Axis #3	
🖃 HPR detailed parameters		Set the values requ	HPR control (Thi		
	Pr.50:Setting for the movement	0.0 µm	0.0 µm	0.0 µm	
	Pr.51:HPR acceleration time sele	0:100	0:100	0:100	
	Pr.52:HPR deceleration time sel	0:150	0:150	0:150	
(mar.)	Pr.53:HP shift amount	0.0 µm	-5000.0 µm	0.0 µm	
	Pr.54:HPR torque limit value	300.0 %	300.0 %	300.0 %	
	Pr.55:Operation setting for inco	1:Positioning Control i	1:Positioning Control i	1:Positioning Control i	
	Pr.56:Speed designation during	0:HPR Speed	0:HPR Speed	0:HPR Speed	
	Pr.57:Dwell time during HPR retry	0 ms	0 ms	0 ms	
	Pr.86:Pulse conversion unit : HP	0:Turn HPR Request	0:Turn HPR Request	0:Turn HPR Request	
l	Pr.87:Pulse conversion unit : W	0 ms	0 ms	0 ms	

5.3.3 Servo parameters



 Set parameters of the servo amplifier.
 In the [Navigation window], select [0000:RD77MS4], and double-click [Servo Parameter].

Go to next page

From previous page



Regenerative option(**REG) Regenerative option setting

Regen. option is not used

d (Used in ABS pos. det

e must be p

•

Selected Items Write Axis Writing

Uses electromagnetic brake interlock (MBR) Electromagnetic brake sequence output

ms (0-1000)

Brake output(MBR)

Encoder 2-wire (2) A Servo Parameter Setting screen appears. Click [Function display] → [Component parts] in the Parameter Setting screen display selection tree, and then specify the following settings.

(3) Absolute pos. detection system selection.: Enabled (Used in ABS pos. detect system)

(4) Axis2 Read Set To Axis1 As Axis2 As Axis3 As Component p

 $\overline{\mathbb{C}}$

(4) Switch to Axis 2 and 3, and set the parameter settings in a manner similar to Axis 1.

5.3.4 Positioning data



Display F	iter Display All	•	Data Setting Ass	istant	Offine Simula	tion Automatic	Command Speed Ci	alc. Automatic Si	b Arc Calc.
No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	Command speed	Dwell time
1	<positioning commer<="" td=""><td>t></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	t>							
2	<positioning commer<="" td=""><td>t></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	t>							
3	<positioning commer<="" td=""><td>nt></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	nt>							
4	<positioning commer<="" td=""><td>db.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	db.							
•									P.
Opera The op succes	ion pattern eration pattern designa sion.	ates whether positioning of	f a certain data No.	is to be ended	with just that da	ta, or whether the positi	oning for the next o	data No. is to be carrie	doutin

 Set the positioning data.
 Select [0000:RD77MS4] → [Positioning Data], and double-click [Axis #1 Positioning Data].

 (2) Axis #1 Positioning Data Setting screen appears.
 Specify positioning as shown below.
 Refer to Section 4.9 for details on positioning data.

Axis 1 Positioning Data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address
	0:END	01h:ABS Linear 1	-	0:100	0:150	35000.0 µm
1	<positioning comm<="" td=""><td>ient></td><td></td><td></td><td></td><td></td></positioning>	ient>				
	0:END	01h:ABS Linear 1	-	0:100	0:150	70000.0 µm
2	<positioning comm<="" td=""><td>ient></td><td></td><td></td><td></td><td></td></positioning>	ient>				
-	0:END	01h:ABS Linear 1	-	0:100	0:150	10000.0 µm
3	<positioning comm<="" td=""><td>ient></td><td></td><td></td><td></td><td></td></positioning>	ient>				

No.	Arc address	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method		
1	0.0 µm	400.00 mm/min	0 ms	0	0:Use the setting val	0:Use the setting value	0:Use the setting val		
1	<positioning comment=""></positioning>								
-	0.0 µm	400.00 mm/min	0 ms	0	0:Use the setting val	0:Use the setting value	0:Use the setting val		
2	<positioning comment=""></positioning>								
-	0.0 µm	500.00 mm/min	0 ms	0	0:Use the setting val	0:Use the setting value	0:Use the setting val		
3	<positioning comme<="" td=""><td>nt></td><td></td><td></td><td></td><td></td><td></td></positioning>	nt>							

Remarks

The positioning data can be edited by selecting the range by dragging the mouse and using the [Cut], [Copy] and [Paste] functions in the [Edit] mode.

5.3.5 Simulation

W/H 100% Screen

♥ % Height 100

÷

The simulation (virtual positioning) function is designed to confirm whether the set positioning data including the operation pattern, control method, addresses and command speed is appropriate.

00 🏈	00:F	RD77MS4[]-Axis #1	Posit ×				Clic	:k!		4 ۵
Displa	y Fil	ter Display All		Data 9	Setting Assistant		Offine Sim.	lation	Automatic C	ommand Speed Calc.
No		Arc address	Command speed	Dwell time	M-code	M-O OI	ode ON signal itput timing	ABS directio	n in degrees	Interpolation speed designation method
		0.0 µm	400.00 mm/min	0 ms	0	0:Use f	he setting val	0:Use the se	tting value	0:Use the setting val.
1	1	<positioning comment=""></positioning>								
		0.0 µm	400.00 mm/min	0 ms	0	0:Use t	he setting val	0:Use the se	tting value	0:Use the setting val
2	2	<positioning comme<="" td=""><td>nt></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	nt>							
	3	0.0 µm	500.00 mm/min	0 ms	0	0:Use t	he setting val	0:Use the se	tting value	0:Use the setting val.
3		<positioning comme<="" td=""><td>nt></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	nt>							

1 of axis #1 of 00

Speed

Time s

- (1) Click the Offline Simulation button on the Axis 1 Positioning Data Setting screen.
- (2) Offline Simulation window appears.
- (3) The results of simulation with positioning data No.1 are displayed.
- (4) The positioning data of each axis can be simulated by changing the number in "0000:RD77MS4 Axis Positioning Start No." to 2, 3, ...
- (5) To terminate the simulation, click the Close button to close the offline simulation window.

PRECAUTIONS

The results of simulation of positioning from the address 0 are displayed.

Click!

Close
5.4 Writing to the RD77MS

The set parameters are written to RD77MS.

5.4.1 Saving the project





(1) Terminate the Simple Motion Module setting tool.

Click [Project] \rightarrow [Exit] on the Simple Motion Module setting tool menu.

 $\label{eq:click} \mbox{[Project]} \rightarrow \mbox{[Save As...] on the GX Works3} \\ \mbox{menu.}$



- (2) The Save As window appears. Input the file name.
- (3) Click the <u>Save</u> button, and the project will be newly saved.

5.4.2 Writing to the PLC

Write settings data to the CPU module.

POINT If the data cannot be written to the CPU module, delete the data in the CPU module, and write it again. For the method for deleting data, refer to Appendix 2.

(1) Connect the personal computer and CPU module with the USB cable, and set the RUN/STOP/RESET switch of the CPU module to STOP.



(2) Click [Online] \rightarrow [Write to PLC...].

- 0 -9))(A) - 9((A) - 9)(A) urty 🖳 🅢 🎹 1 reter + Progr + Program(F) Select All ose All(T) Deselect All(N) CPU Buil SD Me intelligent 🛅 Detai Title Check! . 11:56:05 PM Not Calculated 12:27:34 AM Not Calculated 12:27:34 AM Not Calculated 11:38:04 PM Not Calculated 11:38:04 PM Not Calculated - I Free 4820/51228 Used Increased Decreased 5% or Less DeviceLab Click! Execute Close
- (3) An Online Data Operation dialog box appears. Check the "Parameter " and the "Simple Motion Module Setting:0000:RD77MS".
- (4) Click the Execute button.





(8) Reset the CPU module. (Hold the RUN/STOP/RESET switch on the RESET side.)

5.5 Test Operation

The home position return test and the test operation with written positioning data are performed to check the operation of RD77MS.

For the Simple Motion Monitor, refer to Appendix 5.



Test					- 23
i	Start the tes Please click '	st mode ree "No" when	quest for the stop the test	modules show as fo mode request.	llows.
	Туре	:	RD77MS4(St	art I/O:0000)	
<cautio - Please operat - When to commu - Please extern - After ti of the</cautio 	n> ensure safety i ting. the communicat mmunicate over unication (writin execute in the execute in the execute in the connection will	before exe r 3s accord g etc.), the status in w Id always s changed Click Yes	ecution for the en test function ding to the disk e test mode is which emergen stop. in test mode, when test r	machine is actually in and module could connection or other canceled. cy stop system is si the changing conte node request again	i et
			$\overline{\Box}$		

(1) Click [Online] \rightarrow [Test] of the Simple Motion Module setting tool.

(2) The Test dialog box appears, press the <u>Yes</u> button.

- Operation Axis Selection

 Set the operation axis and the display order.

 You can select 4 axes at most.

 Selectable Axis No.

 Axis 1

 Axis 3

 Axis 3

 Click!

 Operation Axis and Display Order

 Axis 1

 Click!

 Operation Axis and Display Order

 Axis 1

 Click!

 Down

 OK
- (3) The Operation Axis Selection dialog box appears. The axis selected in [Selectable Axis No.] is moved to [Operation Axis and Display Order] by clicking the Add button. Move the axes 1 to 3 to [Operation Axis and Display Order], and click the OK button.





Input!

🕨 🕨 Rev

Hold!

Axis 2

Axis 3

Stop

(4) The 0000:RD77MS[]- Test dialog box (JOG operation test display) appears.

Click the <u>Servo ON</u> button, and the servo amplifiers of axes 1 to 3 are turned on.

(5) Input 200.00 mm/min in [JOG Speed] of Axis 1 in the Basic Setting field, and click the Forward button. While the Forward button is held, the axes 1 to 3 are jogging in the forward direction. While the Reverse button is held, the axes 1 to 3 are jogging in the reverse direction.

The feed current value of each axis is displayed in the Monitor field under the dialog box. Make sure that the current value is incremented and decremented by the JOG operation.

POINT

Operation Setti Setting Target

0000:RD77MS4[] - Test Project Test

Invalid

Servo ON Servo OFF

Valid

Valid

(r)

W Digital

- The setting method in the Basic Setting field varies depending on the object of setting.
 Setting of the same values for all operation axes (tandem operation)... The set values for the axis 1 are applied to the axes 2 and 3.
 - Individual setting of each operation axis (simultaneous start)... Perform the basic setting for each axis.
- 2. The JOG operation is performed only on the axes with a check in the Target Axis checkbox.
- 3. If the "Operate only in the forward/reverse button hold" checkbox is unchecked, the JOG operation will not be stopped until the Stop or Rapid Stop button is clicked after the operation is

started.

PRECAUTIONS

The demonstration machine has upper limit and lower limit switches for axis 3. Pay attention to its current position. If any error occurs, click the <u>Error Reset</u> button in the Monitor field. The error will be reset.

If any error occurs on the axis 3 while some axes including the axis 3 are jogging, all axes will stop.



0000:RD77MS4[] - Test Click! 30G C Ope Axis 1 Axis 2 Axis 3 1 2 3 • Servo ON Servo OFF Valid Invalid Forward () Valid W



(6) Switch the display to Home Position Return test mode.

Click the [Home Position Return] tab.

From previous page

(7) Uncheck the [Target Axis] checkboxes of the axes not to be returned to the home positions in the Operation Setting field.

Click Execute, and each axis will return to the home position by the home position return method specified in the home position return basic parameter (Section 4.6.1).

The feed current value of each axis is displayed in the Monitor field under the dialog box. After the completion of home position return, check that the axes are positioned in the home position addresses specified in the home position return basic parameters.



St

(8) Click Servo OFF to turn off the servo amplifiers of axes 1 to 3.

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0000 RD



Please pay attention to the servo ON/OFF status of each axis for it may change as all axes servo ON and each axis servo OFF

> Click! OK

command change.

(9) Terminate the test mode. Click [Project] \rightarrow [Exit Test] in the dialog box.

The message shown on the left appears, press the OK button.

Chapter 6 Practice (2) Training in Positioning Control

6.1 Practice Content

In this chapter, we will learn the basic home position return operation and JOG operation using programs.

In addition, we will practice positioning to the standby point using major positioning control functions and positioning by specifying the point or address from the demonstration machine operation panel.

6.2 Device Assignment

Input (X)		Output (Y)	
X0	READY	Y0	PLC ready
X1	Synchronization flag	Y1	All axis servo ON
X10	Axis 1.BUSY	Y10	Axis 1.Positioning start
X11	Axis 2.BUSY	Y11	Axis 2.Positioning start
X12	Axis 3.BUSY	Y12	Axis 3.Positioning start

	Internal relay (M)				
M0	[PB for GOT] Standby point	M4023	Axis 2 home position return FB operation NG flag		
M1	[PB for GOT] Position selection	M4030	Axis 3 home position return FB start		
M2	[PB for GOT] Indirect specification	M4031	Axis 3 home position return FB operating flag		
M10	[Operating flag] Standby point	M4032	Axis 3 home position return FB operation OK flag		
M11	[Operating flag] Position selection	M4033	Axis 3 home position return FB operation NG flag		
M12	[Operating flag] Indirect specification	M4110	Axis 1 positioning FB start		
M20	[PB for GOT] Speed change (2000)	M4111	Axis 1 positioning FB operating flag		
M21	[PB for GOT] Speed change (1000)	M4112	Axis 1 positioning FB operation OK flag		
M22	[PB for GOT] Speed change (500)	M4113	Axis 1 positioning FB operation NG flag		
M23	[PB for GOT] Speed change (0)	M4210	Axis 1 speed change FB start		
M1000	[PB for GOT] Servo ON	M4211	Axis 1 speed change FB operating flag		
M1010	[PB for GOT] Axis 1 reverse rotation JOG	M4212	Axis 1 speed change FB operation OK flag		
M1011	[PB for GOT] Axis 1 forward rotation JOG	M4213	Axis 1 speed change FB operation NG flag		
M1012	[PB for GOT] Axis 2 reverse rotation JOG	M4800	FB start Standby point		
M1013	[PB for GOT] Axis 2 forward rotation JOG	M4801	FB start Position selection		
M1014	[PB for GOT] Axis 3 forward rotation JOG	M4802	FB start Indirect specification		
M1015	[PB for GOT] Axis 3 reverse rotation JOG	M4910	FB start Axis 1 speed change (2000)		
M1020	[PB for GOT] Home position return	M4911	FB start Axis 1 speed change (1000)		
M1021	Home position return trigger	M4912	FB start Axis 1 speed change (500)		
M1022	Axis 1 home position return start	M4913	FB start Axis 1 speed change (0)		
M1023	Axis 2 home position return start	M6000	JOG•home position mode		
M1024	Axis 3 home position return start	M6001	Positioning control 1		
M4010	Axis 1 home position return FB start	M6010	Error detected		
M4011	Axis 1 home position return FB operating flag	M6800	JOG home position switch		
M4012	Axis 1 home position return FB operation OK flag	M6801	Positioning control switch		
M4013	Axis 1 home position return FB operation NG flag	M6802	Advanced synchronous control 1 switch		

	Internal relay (M)					
M4020	Axis 2 home position return FB start	M6803	Advanced synchronous control 2 switch			
M4021	Axis 2 home position return FB operating flag	M6850	Positioning program startup			
M4022	Axis 2 home position return FB operation OK flag					

	Data reg	gister (D)	
D0	Avia 4 Food autropt value	D2002	
D1	Axis T Feed current value	D2003	
D20	Avia 2 Food autrant value	D2004	GOT value after calculation
D21	Axis 2 Feed current value	D2005	
D40	Avia 2 Food autroat value	D3900	JOG•home position return screen change device
D41	Axis 3 Feed current value	D4019	Axis 1 home position return FB error No. storage
D640		D4029	Axis 2 home position return FB error No. storage
D641	Axis T JOG speed	D4039	Axis 3 home position return FB error No. storage
D642	Avia 2 100 around	D4118	Axis 1 positioning FB Positioning No. storage
D643	Axis 2 JOG speed	D4119	Axis 1 positioning FB error No. storage
D644	Avia 2 100 aread	D4217	Avia 1 aread shares ED aread starses
D645			Axis T speed change FB speed storage
D2000	2000 2001 GOT value specification		Axis 1 speed change FB error No. storage
D2001			

6.3 RD77MS Demonstration Machine System Configuration

6.3.1 System configuration

In this training, the following system with two axes is used.



GOT (Demonstration machine operation panel)

6.3.2 Demonstration machine operation panel

Demonstration machine operation panel is as follows.



Related positioning controls

- · JOG operation (Refer to Section 6.8.2)
- Home position return (Refer to Section 6.8.2)

[Error display screen]

Error display screen					10:12
Instructions → Error reset F					Return
Error code	es for ea	ch axis			
	Error	Servo Error	Warning code	Error code	Servo error code
	\bigcirc	\bigcirc	U0¥G2407	U0¥G2406	U0¥G2488
Axis 1	UO¥G2417.D	U0¥62477.7	0	0	0
	\bigcirc	\bigcirc	U0¥G2507	U0¥G2506	U0¥G2588
Axis 2	U0¥G2577.D	U0¥62577.7	0	0	0
	\frown	\frown	U0¥G2607	U0¥G2606	U0¥G2688
Axis 3	U0¥62617.D	U0¥62677.7	0	0	0

The error display screen is common to all screens. This screen is displayed by touching Error screen on each screen.

Current errors can be checked and reset. (Refer to Section 6.8.8)

[Positioning operation screen]

Positioning operation			10:12
140-	Operation command	Positioning operation	Menu
120- 100-	M10 🔘	M11 🔘	M12 🔘
80- 60-	Standby point M0	Position selection M1	Indirect specification M2
40-	M13 🔘	M14 🔘	м15 🔘
0	Continuous (1) M3	Continuous (1) stepping M4	Continuous (2) M5
0 20 40 60 80 100 120 140	M16 🔘	M17 🔘	
Feed current value	Teaching M6	Enable fixed pitch M7	Execute fixed pitch M8
70.0 mm -5.0 mm	Value specification	Setting for D2000	0
Device Name Error occurred M6010	en Speed specification	2000 1000 M20 M21	500 0 M22 M23

Related positioning controls

- Standby point positioning (Refer to Section 6.8.4)
- Point selection positioning (Refer to Section 6.8.5)
- Address indirect specification positioning (Refer to Section 6.8.6)
- Speed change (Refer to Section 6.8.7)
- Continuous positioning (1) (Refer to Appendix 2.3.2.)
- Continuous positioning (2) (Refer to Appendix 2.3.3.)
- Teaching, teaching playback (Refer to Appendix 2.3.4.)
- Fixed-feed, fixed-feed stepping (Refer to Appendix 2.3.5.)

6.4 Opening the Project for RD77MS

Open the project data for practice.



For the procedure for creating new project data, refer to Chapter 5. For the programs, refer to Sections 6.6 and 6.9.

6.5 Simple Motion Module Setting

Set various parameters from the Simple Motion Module setting tool to use the positioning functions of RD77MS4.

6.5.1 System configuration



 Start the Simple Motion Module setting tool.
 In the [Navigation window], select [Parameter]
 → [Module Information] → [0000:RD77MS4], and double-click [Simple Motion Module Setting].



(2) The Simple Motion Module setting tool will start. The system configuration window appears. Set the system configuration. Double-click an Axis #1 (d01).

(3) The Amplifier Setting [Axis #1] dialog box appears. Set the data as shown below, and click the OK button.

Servo Amplifier Series: MR-J4(W)-B (-RJ) Amplifier Operation Mode: Standard



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(4) Set Axis #2 (d02) and Axis #3 (d03) as shown below in accordance with the procedures in Steps (2) and (3).

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Servo Amplifier Series: MR-J4(W)-B (-RJ) Amplifier Operation Mode: Standard

6.5.2 Parameters



 Set parameters of the RD77MS4.
 In the [Navigation window], select [0000:RD77MS4], and double-click [Parameter].

- W 0000:R077M54[]-Brarmeter
 V

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 The parameter is invited

 Pr.25Hould pale
 Depty Filer

 Depty Filer
 The parameter is obscillation in the parameter is obscilla
- (2) The RD77MS4 Parameter Setting screen appears.

Set the parameters of each axis.

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(3) Specify Common parameters as shown below.

Item Common parameter	Axis #1 The parameter does not	Axis #2 rely on axis and relate	Axis #3 to the whole system.	
Pr.82:Forced stop valid/invalid selection	1:Invalid			
Pr.24:Manual pulse generator/Incremental Sync. ENC input selection	0:A-phase/B-phase Mode (4 Multiply)			
Pr.89:Manual pulse generator/Incremental Sync. ENC input type selection	1:Voltage Output/Open Collector Type			
Pr.96:Operation cycle setting	FFFFh:Automatic Setting			
Pr.97:SSCNET Setting	1:SSCNET III/H			
Pr.150:Input terminal logic selection	Set the logic of externa signal, proximity dog si	il input signal (upper/log gnal, external command/	ver limit signal, stop 'switching signal) from	
Pr. 151:Manual pulse	OrMonativo Logic			

\bigtriangledown

(4) Specify Basic parameters 1 as shown below.

Item		Axis #1	Axis #2	Axis #3
Basic parameters 1		Set according to the machine and applicable mot		tor when system is st
ł	Pr. 1:Unit setting	0:mm	0:mm	0:mm
	Pr.2:No. of pulses per rotation	4194304 pulse	4194304 pulse	4194304 pulse
	Pr.3:Movement amount per rotation	2000.0 µm	2000.0 µm	8000.0 µm
1	Pr.4:Unit magnification	1:x1Times	1:x1Times	1:x1Times
	Pr.7:Bias speed at start	0.00 mm/min	0.00 mm/min	0.00 mm/min

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(5) Specify Basic parameters 2 as shown below.

Item		Axis #1	Axis #2	Axis #3
Basic parameters 2		Set according to the ma	achine and applicable mo	tor when system is st
ſ	Pr.8:Speed limit value	10000.00 mm/min	10000.00 mm/min	10000.00 mm/min
	Pr.9:Acceleration time 0	100 ms	100 ms	100 ms
	Pr. 10:Deceleration time 0	150 ms	150 ms	150 ms

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(6) Specify Detailed parameters 1 as shown below.

Item		Axis #1	Axis #2	Axis #3
E I	Detailed parameters 1	Set according to the sy	stem configuration whe	n the system is starte
	Pr. 11:Backlash compensation amount	0.0 µm	0.0 µm	0.0 µm
	Pr. 12:Software stroke limit upper limit value	214748364.7 µm	214748364.7 µm	149000.0 µm
	Pr. 13:Software stroke limit lower limit value	-214748364.8 µm	-214748364.8 µm	-1000.0 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	0:Set Software Stroke Limit to Feed Current Value
	Pr. 15:Software stroke limit valid/invalid setting	0:Valid	0:Valid	0:Valid
	Pr. 16:Command in-position width	10.0 µm	10.0 µm	10.0 µm
	Pr. 17:Torque limit setting value	300.0 %	300.0 %	300.0 %
	Pr. 18:M-code ON signal output timing	0:WITH Mode	0:WITH Mode	0:WITH Mode
	Pr. 19:Speed switching mode	0:Standard 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	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	0:Not Update of Feed Current Value
	Pr.22:Input signal logic selection : Lower limit	0:Negative Logic	0:Negative Logic	0:Negative Logic
	Pr.22:Input signal logic selection : Upper limit	0:Negative Logic	0:Negative Logic	0:Negative Logic
	Pr.22:Input signal logic selection : Stop signal	0:Negative Logic	0:Negative Logic	0:Negative Logic
	Pr.22:Input signal logic selection : Proximity dog signal	0:Negative Logic	0:Negative Logic	1:Positive Logic
	Pr.81:Speed-position function selection	0:Speed-position Switching Control (INC Mode)	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	1:Servo Amplifier
	Pr. 116:FLS signal selection : Input terminal	00h:No Setting	00h:No Setting	00h:No Setting
	Pr. 117:RLS signal selection : Input type	15:Invalid	15:Invalid	1:Servo Amplifier
	Pr. 117:RLS signal selection : Input terminal	00h:No Setting	00h:No Setting	00h:No Setting
	Pr. 118:DOG signal selection : Input type	15:Invalid	1:Servo Amplifier	1:Servo Amplifier
	Pr. 118:DOG signal selection : Input terminal	00h:No Setting	00h:No Setting	00h:No Setting
	Pr.119:STOP signal selection : Input type	15:Invalid	15:Invalid	15:Invalid
	Pr.119:STOP signal selection : Input terminal	00h:No Setting	00h:No Setting	00h:No Setting





(7) Specify Detailed parameters 2 as shown below.

	Item	Axis #1	Axis #2	Axis #3
E D	etailed parameters 2	Set according to the sy	stem configuration when	the system is starte
	Pr.25:Acceleration time 1	50 ms	1000 ms	1000 ms
	Pr.26:Acceleration time 2	1000 ms	1000 ms	1000 ms
	Pr.27:Acceleration time 3	1000 ms	1000 ms	1000 ms
	Pr.28:Deceleration time 1	2000 ms	1000 ms	1000 ms
	Pr.29:Deceleration time 2	1000 ms	1000 ms	1000 ms
	Pr.30:Deceleration time 3	1000 ms	1000 ms	1000 ms
(Pr.31:JOG speed limit value	6000.00 mm/min	6000.00 mm/min	5000.00 mm/min
	Pr.32:JOG operation acceleration time selection	0:100	0:100	0:100
	Pr.33:JOG operation deceleration time selection	0:150	0:150	0:150
	Pr.34:Acceleration/deceleration process selection	1:S-curve Acceleration/Deceleration Process	1:S-curve Acceleration/Deceleration Process	1:S-curve Acceleration/Deceleration Process
	Pr.35:S-curve ratio	50 %	50 %	50 %
	Pr.36:Rapid stop deceleration time	50 ms	50 ms	50 ms
	Pr.37:Stop group 1 rapid stop selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop
	Pr.38:Stop group 2 rapid stop selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop
	Pr.39:Stop group 3 rapid stop selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop
	Pr.40:Positioning complete signal output time	300 ms	300 ms	300 ms
	Pr.41:Allowable circular interpolation error width	10.0 µm	10.0 µm	10.0 µm
	Pr.42:External command function selection	0:External Positioning Start	0:External Positioning Start	0:External Positioning Start
	Pr.83:Speed control 10x multiplier setting for degree axis	0:Invalid	0:Invalid	0:Invalid
	Pr.84:Restart permissible value range when servo OFF to ON	0 pulse	0 pulse	0 pulse
·····	Pr.90:Operation setting for SPD-TRQ Cont. mode : Torque initial value selection	0:Command Torque	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	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	0:Switching Conditions Valid at Mode Switching
	Pr.127:Speed limit value input selection at control mode switching	0:Input Enable	0:Input Enable	0:Input Enable
	Pr.95:External command signal selection	0:Not Used	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	0:Do Not Execute Speed Limit
l	Pr. 123:Manual pulse generator speed limit value	200.00 mm/min	200.00 mm/min	200.00 mm/min



(8) Specify Home position return basic parameters as shown below.

Item	Axis #1	Axis #2	Axis #3
🖃 HPR basic parameters	Set the values required	for carrying out HPR con	trol (Valid when the PL
Pr.43:HPR method	6:Data Set Method	0:Proximity Dog Method	0:Proximity Dog Method
Pr.44:HPR direction	1:Reverse Direction (Address Decrease Direction)	1:Reverse Direction (Address Decrease Direction)	1:Reverse Direction (Address Decrease Direction)
Pr.45:HP address	-5000.0 µm	-5000.0 µm	0.0 µm
Pr.46:HPR speed	0.01 mm/min	100.00 mm/min	600.00 mm/min
Pr. 47:Creep speed	0.01 mm/min	20.00 mm/min	250.00 mm/min
Pr.48:HPR retry	0:Do Not Retry HPR with Limit Switch	1:Retry HPR with Limit Switch	1:Retry HPR with Limit Switch

(9) Specify Home position return detailed parameters as shown below.

Г		These	A	Aug. #0	Aug. #2
H		Item	AXIS #1	AXIS #2	AXIS #3
1	ΞH	IPR detailed parameters	Set the values required	for carrying out HPR con	trol (Valid when the PL
		Pr.50:Setting for the movement amount after proximity dog ON	0.0 µm	0.0 µm	0.0 µm
		Pr.51:HPR acceleration time selection	0:100	0:100	0:100
		Pr.52:HPR deceleration time selection	0:150	0:150	0:150
I		Pr.53:HP shift amount	0.0 µm	-5000.0 µm	0.0 μm
l		Pr.54:HPR torque limit value	300.0 %	300.0 %	300.0 %
		Pr.55:Operation setting for incompletion of HPR	1:Positioning Control is Executed	1:Positioning Control is Executed	1:Positioning Control is Executed
		Pr.56:Speed designation during HP shift	0:HPR Speed	0:HPR Speed	0:HPR Speed
l		Pr.57:Dwell time during HPR retry	0 ms	0 ms	0 ms
	ļ	Pr.86:Pulse conversion unit : HPR request setting	0:Turn HPR Request ON at Servo OFF	0:Turn HPR Request ON at Servo OFF	0:Turn HPR Request ON at Servo OFF
		Pr.87:Pulse conversion unit : Waiting time after clear signal output	0 ms	0 ms	0 ms

6.5.3 Servo parameters



 Set parameters of the servo amplifier.
 In the [Navigation window], select [0000:RD77MS4], and double-click [Servo Parameter].



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rvo adjustments - Basic	Selected Items Write Axis Writing
Auto tuning(ATU, RSP)	Servo loop gain
Gain adjustment mode selection	Load merda moment rado 6.50 times (0.00-300.00)
Auto tuning records	Model loop gain 34.0 rad/s (1.0-2000.0)
	Position loop gain 68.0 rad/s (1.0-2000.0)
Overshoot amount(OVA)	Speed loop gain 1440 rad/s (20-65535)
Overshoot amount compensation 0 % (0-100)	Spd. integral compen. 18.3 ms (0.1-1000.0)
	Spd. differential compen. 980 (0-1000)



(2) A Servo Parameter Setting window appears. Click [Function display] → [Component parts] in the Parameter Setting screen display selection tree, and then specify the following settings.

- (3) Absolute pos. detect system selection.: Enabled (Used in ABS pos. detect system) Home pos, set condition sel.
 - : Z-phase must not be passed.

- (4) Click [Function display] → [Servo adjustment]
 → [Basic setting] in the Parameter Setting screen display selection tree, and then specify the following settings.
 - Gain adjustment mode selection
 - : Auto tuning mode 2
 - Auto tuning response
 - : 21
- (5) Switch to Axis 2 and 3, and set the following parameter settings in a manner similar to Axis 1.

Item	Axis 2	Axis 3
Absolute pos. detection system sel.	Enabled (Used in ABS pos. detect system)	Enabled (Used in ABS pos. detect system)
Home pos, set condition sel.	Not need to pass servo motor Z-phase after power on	Need to pass servo motor Z-phase after power on
Gain Adjustment mode Selection	2 gain adjustment mode 2	2 gain adjustment mode 2
Auto tuning response	33	30

6.5.4 Positioning data



			Data Setting Ass	istant	Offline Simula	tion	Command Speed Ci	alc.
No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	
1	<positioning commen<="" td=""><td>1D</td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	1D						
2	<positioning commen<="" td=""><td>it></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	it>						
3	<positioning commen<="" td=""><td>it></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	it>						
4	<positioning commen<="" td=""><td>it></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	it>						
5	<positioning commen<="" td=""><td>it></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	it>						
6	<positioning commen<="" td=""><td>it></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	it>						
7								
•								

 Set the positioning data.
 Select [0000:RD77MS4] → [Positioning Data], and double-click [Axis #1 Positioning Data].

(2) Axis 1 Positioning Data Setting screen appears. Specify positioning as shown below.

Axis 1 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address					
1	0:END	01h:ABS Linear 1	-	0:100	0:150	0.0 µm	0.0 µm					
	<positioning comm<="" td=""><td colspan="11"><positioning comment="">Standby point positioning</positioning></td></positioning>	<positioning comment="">Standby point positioning</positioning>										
2	0:END	01h:ABS Linear 1	-	0:100	0:150	40000.0 µm	0.0 µm					
	<positioning comm<="" th=""><th>ent>Pos. select positioning (N</th><th>o. 30)</th><th></th><th></th><th></th><th></th></positioning>	ent>Pos. select positioning (N	o. 30)									
3	0:END	01h:ABS Linear 1	-	0:100	0:150	80000.0 µm	0.0 µm					
	<positioning comment="">Pos. select positioning (No. 31)</positioning>											
4	0:END	01h:ABS Linear 1	-	0:100	0:150	120000.0 µm	0.0 µm					
	<positioning comm<="" th=""><th>ent>Pos. select positioning (N</th><th>o. 32)</th><th></th><th></th><th></th><th></th></positioning>	ent>Pos. select positioning (N	o. 32)									
5	0:END	01h:ABS Linear 1	-	0:100	0:150	0.0 µm	0.0 µm					
	<positioning comm<="" th=""><th>ent>Indirect designation posit</th><th>ionina</th><th></th><th></th><th></th><th></th></positioning>	ent>Indirect designation posit	ionina									



From previous page

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
1	2000.00 mm/min	100 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
2	5000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
3	3000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
4	1000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
5	1000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method

6.6 **Position Control Program**

The positioning control practice programs include various programs, such as initial processing, JOG operation and home position return. Refer to the respective descriptions of each program in this manual for details.

The RD77MS programs for operation have been created with GX Works3.

An explanatory drawing of the demonstration machine GOT operation panel is shown in Section 6.3.2.

Ρ	OINT									
Set Nh oro Clic	ting of di en the set grams car ck [View] -	splay of m ting of disp be localize → [Multiple	ultiple lay of n ed acco Commo	comn nultiple ording ents D	nents e con to the isplay	s nments e displ y Setti	s is ena ayed la ng] on t	bled, th nguage he GX	ne comments in [.] es. Works3 menu.	the sequenc
/iev	Online Deb	ug Diagnostics	Tool W	Vindow I						
	Toolbar			•		Multiple C	omments Disp	lay Setting		×
~	Statusbar					😨 Enabl	e Multiple Com	ments Display)	
	Color and Font						niget	Aronopic	Comment Tit	e 🔺
	Docking Winds					1			Comment Comment 2	
	Docking windo	vv		•		3	0		Comment2 Comment3	E
	Zoom			•		4	Õ		Comment4	
	Switch Display	Language				5			Comment5	
	Multiple Comn	ients Display Set	ting			6	0	V	Japanese/日本語)
	Commont Dia	154			•	Ľ	۲		English	
	Comment Dis	ay	C	u1+F5		9	0		Korean/한국어	-
-			0	trl±E7						
/ /	Statement Dis	play	U.	uiti /						

6.6.1 Initial processing

This program checks all parameters and starts all axes servo.

When the CPU module is set to the RUN status, the PLC READY signal will turn on. When the PLC READY signal turns on, the program will check the servo parameters and positioning data.

If the CPU module and RD77MS do not have any problems, the READY signal will turn on. When the READY signal turns on, turn on the all axes servo ON command from the demonstration machine operation panel, and the CPU module will send the all axes servo ON command and start the servo amplifiers to complete the preparation for positioning.

(1) Input and output signal

Item	Axis 1	Axis 2	Axis 3		
PLC READY signal		Y0			
READY signal	X0				
All axes servo ON		Y1			

POINT

The BUSY signal turns ON even when position control of movement amount 0 is executed. However, since the ON time is short, the ON status may not to be detected in the program. Therefore, a direct device is used in this practice.

(2) Program example

*** Initial pro	ocessing *****								
	SM403								RD77_1.bPLC_Ready Y0
(0)	OFF for only 1 scan after RUN								RW:PLC READY
		M1000	RD77_1.bReady_D DX0						RD77_1.bAllAxisServaOn Y1
		[PB for GOT] Servo ON	R:READY(Direct)						- RW:All axis servo ON
								КО	RD77_1.stnAxCtrl1_D [0].uRequestServoOff_D U0¥G4351
							MOVP		RW:Servo OFF command (Direct)
	S							КО	RD77_1.stnAxCtrl1_D [1].uRequestServoOff_D U0¥G4451
							MOVP		RW:Servo OFF command (Direct)
								КО	RD77_1.stnAxCtrl1_D [2].uRequestServoOff_D
							MOVP		U0¥G4551 RW:Servo OFF command (Direct)
		M1000						К1	RD77_1.stnAxCtrl1_D [0].uRequestServoOff_D
		[PB for GOT] Servo ON					MOVP		RW:Servo OFF command (Direct)
								К1	RD77_1.stnAxCtrl1_D [1].uRequestServoOff_D
							MOVP		U0¥G4451 RW:Servo OFF command (Direct)
								К1	RD77_1.stnAxCtrl1_D [2].uRequestServoOff_D
							MOVP		U0¥G4551 RW:Servo OFF command (Direct)

(3) Demonstration machine operation panel Servo ON M1000: All axes servo ON command

Servo ON M1000

(4) Timing chart



6.6.2 JOG operation

This is a manual operation program to operate each axis only while the button is held down.

(1) Control data

ltere	Bu	ffer memo	ory	Sotting value		
item	Axis 1 Axis 2 Axis 3		Axis 3	Setting Value		
[Cd.16] Inching movement amount	4317	4417	4517	0 (When a value other than 0 is set, inching operation will be executed.)		
[Cd.17] JOG speed	4318 4319	4418 4419	4518 4519	Axes 1 and 2: 1.00 to 6000.00 mm/min Axis 3: 1.00 to 5000.00 mm/min		
[Cd.181] Forward run JOG start	30101	30111	30121	—		
[Cd.182] Reverse run JOG start	30102	30112	30122	—		

Remarks

Since the default of "[Cd.16] Inching movement amount" is 0, the inching operation is not contained in this practice program.

(2) Program example

[1] JOG operating condition item

Axis No.	Axis 1	Axis 2	Axis 3
JOG operation command	Forward rotation	Forward rotation	Forward rotation
	(M1011)	(M1013)	(M1014)
input	Reverse rotation	Reverse rotation	Reverse rotation
	(M1010)	(M1012)	(M1015)

*** JO0	3 ope	ration and home	position return	1 ****									
		M6000											
												D640	RD77_1.stnAxCtrl1_D [0].udJOG_Speed_D
	(73)										DMOV	Axis 1 JOG speed	UU#G4318 RW:JOG speed(Direct)
		JOG•home position mode											
													1
												D642	RD77 1.stnAxCtrl1 D
													[1].udJOG_Speed_D U0¥G4418
											DMOV	Axis 2 JOG speed	RW:JOG speed(Direct)
												D644	RD77_1.stnAxCtrl1_D [2].udJOG_Speed_D
											DMOV	Axis 3 JOG speed	RW:JOG speed(Direct)
			M1022	M1023	M1024	M4011	M4021	M4031	MIUTI	MIUIU			00#G30101.0
			<u> </u> /r			/ī	/r			/r			0
			Axis 1 home	Axis 2 home	Axis 3 home	Axis 1 home	Axis 2 home	Axis 3 home	[PB for GOT]	[PB for GOT]			Axis 1 forward rotation
			return start	return start	return start	return FB	return FB	return FB	forward	reverse			oodistart
									M1010	M1011			U0¥G30102.0
										/r			
									[PB for GOT]	[PB for GOT]			Avis 1 reverse rotation
									Axis 1 reverse rotation JOG	Axis 1 forward rotation JOG			JOG start
									M1013	M1012			U0¥G30111.0
									\vdash	/r			0
									[PB for GOT]	[PB for GOT]			Axis 2 forward rotation
									forward rotation JOG	reverse rotation JOG			ood start
									M1012	M1013			U0¥G30112.0
									<u> </u>	/r			o
									[PB for GOT]	[PB for GOT]			Axis 2 reverse rotation
									Axis 2 reverse rotation (IOG)	Axis 2 forward rotation JOG			JOG start
									M1014	M1015			U0¥G30121.0
										/i			
									[DB for GOT]	[PB for GOT]			Avia 9 forward rotation
									Axis 3 forward rotation JOG	Axis 3 reverse rotation JOG			JOG start
									M1015	M1014			U0¥G30122.0
													o
									[PB for GOT]	[PB for GOT]			Axis 3 reverse rotation
									Axis 3 reverse rotation JOG	Axis 3 forward rotation JOG			JOG start

[2] Example of JOG operation program

** Error de	etection program *****					
	U0¥G2417.D					M6010
(0000)						
(2203)	Axis 1 error detection					Error detected
	U0¥G2477.7					
	Axis 1 servo alarm occurring					
	U0¥G2517.D					
	Axis 2 error detection					
	U0¥G2577.7					
	ı					
	Axis 2 servo alarm occurring					
	LI0¥G2617.D					
	001020172					
	Aula O aman data atian					
	Axis 3 error detection					
	U0¥G2677.7					
	Axis 3 servo alarm occurring					

ema	rks										
run t e foll	the prog owing (grams fo GOT cor	or this pr ntrol pro	actice, tl grams a	ne GOT re conta	control pr	ograms ar e project d	e require ata for thi	d. is pract	ice, "SCHO	OL_
Jonto	ining)_tt										
[For GOT	Current value	e monitor ****	k								
	31/14/03									RD77_1.stnAxMntr [0].dActualPosition	D0
(40)									DMOV		
	OFF for only 1 scan after RUN									Rucear current value	Axis i reeu current valu
										PD77.1 otoAvMetr	D20
										[1].dActualPosition	020
									DMOV	R:Real current value	Axis 2 Feed current valu
										RD77_1.stnAxMntr [2].dActualPosition	D40
									DMOV	R:Real current value	Axis 3 Feed current valu
Switch or	neration mode	****									
	U0¥G2477.0	U0¥G2577.0	U0¥G2677.0	M6800	M6801	M6802	M6803				M6000
(51)						//					
(51)	Axis 1 servo ready ON	Axis 2 servo ready ON	Axis 3 servo ready ON	JOG•home position switch	Positioning control switch	Advanced synchronous control 1 switch	Advanced synchronous control 2 switch				JOG• home position mod
				M6800	M6801	M6802	M6803				M6001
				L/r		//					o
				JOG+home position switch	Positioning control switch	Advanced synchronous control 1 switch	Advanced synchronous control 2 switch				Positioning control 1
Positionir	ng ladder progr	am starting set!	ting ****	1	1		1	1	i		
	SM403										M6850
	— I I —										O
(2309)	OFF for only 1 scan after RUN										Positioning program startup
										K22	D3900
									MOVP		JOG/Home position return screen change

(3) Demonstration machine operation panel [JOG-home position return operation panel]

JOG operation	_	+	S	Speed setting	g Feed current value	2
Axis 1	M1011	M1010	D640	1000	0.0 mm	
Axis 2	M1013	M1012	D642	1000	0.0 mm	
Axis 3	M1015	M1014	D644	1000	0.0	

M1011: Axis 1 forward rotation JOG M1010: Axis 1 reverse rotation JOG M1013: Axis 2 forward rotation JOG M1012: Axis 2 reverse rotation JOG M1014: Axis 3 forward rotation JOG M1015: Axis 3 reverse rotation JOG D640 (U0¥G4319, U0¥G4318): Axis 1 JOG speed setting register D642 (U0¥G4419, U0¥G4418): Axis 2 JOG speed setting register D644 (U0¥G4519, U0¥G4518): Axis 3 JOG speed setting register Feed current value (current position address): [Md.20] Feed current value (Axis 1: U0¥G2401, U0¥G2400, Axis 2: U0¥G2501, U0¥G2500, Axis 3: U0¥G2601, U0¥G2600)

Cancel

AC

ENTER

DEL

POINT

• Touch the set value of D640, D642 or D644, and the numeric 0 < INPUT <= 1000input window will appear. 8 9 Change the set value (unit: mm/min) in the numeric input window, and touch ENTER. Then, the JOG speed will be 5 6 Δ changed. The JOG speed input range is limited on the touch panel. (Axis 2 3 1: 0 to 1000, Axis 2: 0 to 5000, Axis 3: 0 to 3000) · Also the address after home position return is reflected in the 0 00 feed current value. 100<mark>0</mark>

(4) Timing chart (for Axis 1)



6.6.3 Home position return

This program is designed for home position return.

The home position return operation for each axis is as follows.

Axis 1: Data set method

The point where home position return is executed is consider as the home position (-5 mm).

Axes 2 and 3: Proximity dog method

After starting, the motor rotates in the home position return direction, and the rotation is complete when the home position dog changes from ON to OFF.

Axes 2: home position -5 mm

Axes 3: home position 0 mm





(1) Control data

Itom	Buffe	r memory ad	Soffing volue	
item	Axis 1	Axis 2	Axis 3	Setting value
[Cd.3] Positioning start No.	4300	4400	4500	9001 (Machine home position return)

POINT

When the home position return command input turns on, the module FB "M+RD77_ StartPositioning" writes the positioning start No.

(2) Output Signal

Item	Axis 1	Axis 2	Axis 3	
Positioning start signal	Y10	Y11	Y12	

POINT

When the home position return command input turns on, the module FB "M+RD77_ StartPositioning" turns on the positioning start signal.

(3) Program example

[1] Home position return condition item

Condition item	Axis 1	Axis 2	Axis 3
Home position return command input		M1020	

[2] Example of home position return program

1							1
	M1020						M1021
	1					PLS	Home position rature
	[PB for GOT] Home						trigger
	posicioni cium						
	M1021	U0¥G2417.4					M1022
		/ĭ					
	Home position return	Avic 1 home position				SET	Axis 1 home position
	trigger	return complete					
		LI0¥G2517.4					
		00402317.4					M1023
		11				SET	Axis 2 home position
		Axis 2 home position return complete					return start
		U0¥G2617.4					M1024
		L/ř					
		Axis 3 home position				SET	Axis 3 home position return start
		return complete				_	
						Axis 1 hon	e position return FB start
	M1022	RD77_1.bnBusy_D[0]	M4011	U0¥G2477.1			M4010
			/r				
	Axis 1 home position	R:BUSY(Axis#1-#16)	Axis 1 home position	Axis 1 servo ON		SET	Axis 1 home position return FB start
	return start	(Direct)	return FB operating flag				
	M4010	U0¥G2417.4	RD77 1.bnBusy D[0]	M4011			
			DX10				M1022
						RST	Axis 1 home position
	Axis 1 home position return FB start	Axis 1 home position return complete	R:BUSY(Axis#1-#16) (Direct)	Axis 1 home position return FB operating			return start
				Tiag	 		
		U0¥G2417.D					M4010
		l1				RST	
		Axis 1 error				nor	Axis 1 home position return FB start
		detection					
						Axis 2 hon	ne position return FB start
	M1023	RD77_1.bnBusy_D[1] DX11	M4021	U0¥G2577.1			M4020
		/ĭ	/r			SET	
	Axis 2 home position	R:BUSY(Axis#1-#16)	Axis 2 home position	Axis 2 servo ON			return FB start
	return start	(Direct)	flag				
	M4020	U0¥G2517.4	RD77_1.bnBusy_D[1]	M4021			M1023
			DX11	1			
	Avia G home position	Avia C have a solition	D-DLIQV(Aut+#1_#16)	Avia O have a salition		RST	Axis 2 home position
	return FB start	return complete	(Direct)	return FB operating			roterrater t
		LIONOGE17 D					
		00#G2517.D					M4020
		L{ }				RST	Avis 2 home position
		Axis 2 error detection					return FB start

								Axis 3 hor	ne position return FB start
		M1024	RD77_1.bnBusy_D[2] DX12	M4031	U0¥G2677.1				M4030
		Axis 3 home position return start	R:BUSY(Axis#1-#16) (Direct)	Axis 3 home position return FB operating flag	Axis 3 servo ON			SET	Axis 3 home position return FB start
		M4030	U0¥G2617.4	RD77_1.bnBusy_D[2] DX12	M4031				M1024
		Axis 3 home position return FB start	Axis 3 home position return complete	R:BUSY(Axis#1-#16) (Direct)	Axis 3 home position return FB operating flag			RST	Axis 3 home position return start
			U0¥G2617.D						M4030
			Axis 3 error detection					RST	Axis 3 home position return FB start
(334)				M_RD77_StartPosi	itioning_00E_1 (M+F Positioning start F	2D77_StartPositioning_00E FB)		
	M4010			BULEN		- 1510	-		M4011
4 FF s	Axis 1 home position return FB start			Execution command	d Exec	o_bENU:	B		Axis 1 home position return FB operating flag
			RD77_1 _	} DUT:i_stModule		o_bOK:	в		M4012
			Module label	Module label	Norr	nal completion			Axis 1 home position return FB operation OK flag
			——[кі]	- UW:i_uAxis Target axis	Erro	o_bErr: r completion	в		M4013
									Axis I home position return FB operation NG flag
			——{ кэоот <u>і</u>	} UW:i_uStartNo Cd.3:Positioning st	art No. Erro	o_uErrId:U\ r code	W -[D4019] Axis 1 home position return FB error No.		
(726)				M_RD77_StartPosi	itioning_00E_2 (M+F Positioning start f	1D77_StartPositioning_00E FB	storage		
	M4020			- Bii bEN		o bENO:	8		M4021
4 F r s	Axis 2 home position return FB start			Execution command	d Exec	- cution status			- Axis 2 home position return FB operating flag
			RD77_1] DUT:i_stModule		o_bOK:	в		M4022
			Module label	Module label	Norr	nal completion			Axis 2 home position return FB operation OK flag
			——-[к2]	- UW:i_uAxis	Erro	o_bErr:i	в		M4023
						·			Axis 2 home position return FB operation NG flag
			[К9001]	- UW:i <u>u</u> StartNo Cd.3:Positioning st	art No. Erro	o <u>.</u> uErrId:U\ r code	₩ -[D4029] Axis 2 home position return		
							Axis 2 home position return FB error No. storage		

For the procedure for inserting the FB, refer to Appendix 4.

(1118)			M_RD77_StartPositioning_00 Posi	E_3 (M+RD77_StartPositioning_00E tioning start FB		
	M4030					M4031
	Axis 3 home position return FB start		B:LbEN Execution command	o_bENO:{ Execution status	B	Axis 3 home position return FB operating flag
		RD 77_1 [] Module label	DUT:i_stModule Module label	o_bOK£ Normal completion		Axis 3 home position return FB operation OK
		[кз]	UW:l <u>u</u> Axis Target axis	o,bErr { Error completion	В	flag M4033 O Axis 3 home position return FB operation NG flar
		[К9001]	UW:i_uStartNo Cd.3:Positioning start No.	o_uErrid:UV Error code	W { D4039 } Axis 3 home position return FB error No. storace	105

For the procedure for inserting the FB, refer to Appendix 4.

*** Error d	etection program *****					
	U0¥G2417.D					M6010
(0000						
(2285	Nule 1 enven detection					Europ detected
	Axis Terror detection					Error detected
	U0¥G2477.7					
	Axis 1 servo alarm occurring					
	LI0¥Q9517 D					
	00+0251715					
	Axis 2 error detection					
	00#G2577.7					
	Axis 2 servo alarm occurring					
	U0¥G2617.D					
	Axis 3 error detection					
	U0¥G2677.7					
	Axis 3 servo alarm occurring					

The following "Error detection program" is the same as that shown in p6-19.

(4) Demonstration machine operation panel [JOG•home position return operation panel]



[Md.31] Status: b4 Home position return complete flag (U0¥G2517.4)

6.6.4 Standby point positioning

This program is designed for positioning in the standby point (0) from any position on Axis 1. Standby point refers to a work standby position at other than the mechanical home position. (There may be times when the position is the same as the home position.)

(1) Control data

	ltem	Buffer memory address	Setting value					
	item	Axis 1						
[Cd.3] Position	ning start No.	4300	1 (Positioning data No. 1)					
POINT								
When the standby point positioning command input turns on, the module FB "M+RD77_ StartPositioning" writes the positioning start No. in "[Cd.3] Positioning start No."								

(2) Output signal

	ltem	Axis 1		
Positioning start signal		Y10		
POINT				
When the standby point positioning command input turns on, the module FB "M+RD77_ StartPositioning" turns on the positioning start signal.				

(3) Program example

[1] Standby point positioning condition item

Condition item	Axis 1
Standby point positioning command input	MO

[2] Positioning data to be used (Positioning data No. 1)

1-axis linear control is performed on Axis 1.

Axis 1 Positioning Data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	
1	0:END	01h:ABS Linear 1	-	0:100	0:150	0.0 µm	0.0 µm	
	<positioning comment="">Standby point positioning</positioning>							

	No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
	1	2000.00 mm/min	100 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
I							

[3] Example of standby point positioning program

To execute the following standby point positioning, the positioning execute program is required.

Refer to Section 6.6.8 on positioning execute program.

M6001 M0 RD77_1.bnBusy_D[0] M10 K1 U1541) U1 U1	D4118 Axis 1 positioning FB positioning No. storage
(1541) Positioning [PB for GOT] RBUSY(Axis#1 - [Operating flag] control 1 Standby point #16/Direct) Standby point	D4118 Axis 1 positioning FB positioning No. storage
(1541) Positioning [PB for GOT] REUSY(Axis#1- [Operating flag] control 1 Standby point #16/Direct) Standby point	Axis 1 positioning FB positioning No. storage
(1541) Positioning [PB for GOT] RBUSY(Axis#1- [Operating flag] control 1 Standby point #16)(Direct) Standby point	Axis 1 positioning FB positioning No. storage
Positioning [PB for GOT] RBUSY(Axis#1- [Operating flag] control 1 Standby point #16)(Direct) Standby point	Axis I positioning FB positioning No. storage
	M10
SE	[Operating flag]
	Standby point
M10 M4110 RD77_1bnBusy_D[0] U0¥G2417.F M4111	M4800
DX10	
[Operating flag] Axis 1 positioning RBUSY(Axis#1- #16)(Direct) Axis 1 Axis 1 Axis 1 Stail Standby point FB start #16)(Direct) positioning complete positioning fB positioning fB	FB start Standby point
M4900 U0¥G2417F RD77_1 brBusy_D[0]	M10
RS RS	[On any the sheet]
FB start Axis 1 positioning REUSY(Axis#1- Standby point complete #16)(Direct)	Standby point
U0¥G2417.D	M4900
	1014000
Axis 1 error detection	FB start Standby point

(4) Demonstration machine operation panel [Positioning operation screen] M10: Standby point positioning in-operation flag

Standby point M0: Standby point positioning command input of Axis 1



(5) Timing chart



6.6.5 Point selection positioning

This program positions the Axis 1 in the point specified on the demonstration machine operation panel. The positioning address corresponds to the point No.

(1) Control data

Item		Buffer memory address	O attice and here		
		Axis 1	Setting value		
[Cd.3] Positioning start No.		4300	2 to 4 (Positioning data No. 2 to 4)		
POINT					
When the point selection positioning command input turns on, the module FB "M+RD77_ StartPositioning" writes the positioning start No. in "[Cd.3] Positioning start No."					

(2) Output signal

	Item	Axis 1
Positioning start signal		Y10
POINT When the point selection positioning command input to StartPositioning" turns on the positioning start signal.		urns on, the module FB "M+RD77_
(3) Program example

[1] Point selection positioning condition item

Condition item	Axis 1
Point No. input	One of the values 30, 31 or 32 has been input in D2000.
Point selection positioning command input	M1

[2] Positioning data to be used (Positioning data Nos. 2 to 4)

1-axis linear control is performed on Axis 1.

The point No. is equal to the positioning data No. The positioning data No. to be used is switched according to the point No. input on the demonstration machine operation panel. (30 = Positioning data No. 2, 31 = Positioning data No. 3, 32 = Positioning data No. 4)

Axis 1 Positioning Data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	
2	0:END	01h:ABS Linear 1	-	0:100	0:150	40000.0 µm	0.0 µm	
	<positioning comm<="" td=""><td>ent>Pos. select positioning (N</td><td>o. 30)</td><td></td><td></td><td></td><td></td></positioning>	ent>Pos. select positioning (N	o. 30)					
3	0:END	01h:ABS Linear 1	-	0:100	0:150	80000.0 µm	0.0 µm	
	<positioning comment="">Pos. select positioning (No. 31)</positioning>							
4	0:END	01h:ABS Linear 1	-	0:100	0:150	120000.0 µm	0.0 µm	
	<positioning comment="">Pos. select positioning (No. 32)</positioning>							

Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
5000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
3000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
1000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
	Command speed 5000.00 mm/min 3000.00 mm/min 1000.00 mm/min	Command speed Dwell time 5000.00 mm/min 0 ms 3000.00 mm/min 0 ms 1000.00 mm/min 0 ms	Command speedDwell timeM-code5000.00 mm/min0 ms03000.00 mm/min0 ms01000.00 mm/min0 ms0	Command speed Dwell time M-code M-code ON signal output timing 5000.00 mm/min 0 ms 0 of M-code ON signal output timing 3000.00 mm/min 0 ms 0 of M-code ON signal output timing 3000.00 mm/min 0 ms 0 0:Use the setting value of M-code ON signal output timing 1000.00 mm/min 0 ms 0 0:Use the setting value of M-code ON signal output timing 1000.00 mm/min 0 ms 0 0:Use the setting value of M-code ON signal output timing	Command speed Dwell time M-code M-code ON signal output timing ABS direction in degrees 5000.00 mm/min 0 ms 0 of M-code ON signal output timing O:Use the setting value of ABS direction at degree 3000.00 mm/min 0 ms 0 0:Use the setting value of M-code ON signal output timing O:Use the setting value of ABS direction at degree 3000.00 mm/min 0 ms 0 0:Use the setting value of M-code ON signal output timing O:Use the setting value of ABS direction at degree 1000.00 mm/min 0 ms 0 0:Use the setting value of M-code ON signal output timing O:Use the setting value of ABS direction at degree

[3] Example of point selection positioning program

To execute the following point selection positioning, the positioning execute program is required .

	M1		M11								
	1011	DX10			D2000	K30				K2	D4118
				=	00T 1			<u> </u>	MOVP		
	[PB for GOT] Position selection	R:BUSY(Axis#1- #16)(Direct)	[Operating flag] Position selection		GUT value specification						Axis I positioning FB positioning No. storage
					D2000	K31				K3	D4118
				=	GOT value specification				MOVP		Axis 1 positioning FB positioning No. storage
· · · · · · · · · · · · · · · · · · ·											
					D2000	K32				K4	D4118
				=	GOT value specification				MOVP		Axis 1 positioning FB positioning No. storage
					D4118	К2		D4118	K4		M11
				>=	Axis 1 positioning FB positioning No. storage		<=	Axis 1 positioning FB positioning No. storage		SET	[Operating flag] Position selection
	M11	M4110	BD77 1 boBusy D[0]	U0¥G2417.F	M4111						
			DX10								M4801
		1		//	//					SET	EB start Position
	[Operating flag] Position selection	Axis 1 positioning FB start	R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning complete	Axis 1 positioning FB operating flag						selection
	M4801	M11	U0¥G2417.F	RD77_1.bnBus							
				DX10							MIT
										RST	[Operating flag]
	FB start Position selection	[Operating flag] Position selection	Axis 1 positioning complete	R:BUSY (Axis#1-#16) (Direct)							Position selection
			U0¥G2417.D								14004
											M4801
			Axis 1 error							RST	FB start Position selection
			detection								

Refer to Section 6.6.8 on positioning execute program.

(4) Demonstration machine operation panel [Positioning operation screen]



Value specification Setting for D2000: Point No. input

M11: Standby point positioning in-operation flag

Position selection M1: Point selection positioning command input



POINT

Touch the set Value specification Setting for D2000, and the numeric input window will appear. Input the point No. in the numerical input window, and touch the

ENTER. Then, the point will be changed. If a value other than 30, 31 and 32 has been set, the point selection positioning program will not operate even when the point selection positioning command input turns on.



(5) Timing chart



6.6.6 Address indirect specification positioning

This program is designed to position the Axis 1 in the address specified on the demonstration machine operation panel.

(1) Positioning data (Positioning data No. 5)

ltem	Buffer memory address Axis 1	Setting range
[Da.6] Positioning address/	6046	-214748364.8 to
movement amount	6047	214748364.7 μm ^{*1}

*1. When the address indirect specification positioning is executed, the value input on the demonstration machine operation panel (×10000) is set.

(2) Control data

lterre	Buffer memory address	Octting welling				
item	Axis 1	Setting value				
[Cd.3] Positioning start No.	4300	5 (Positioning data No. 5)				
POINT						
When the address indirect specification positioning command input turns on, the module FB "M+RD77_StartPositioning" writes the positioning start No. in "[Cd.3] Positioning start No."						

(3) Output signal

	Item	Axis 1				
Positioning start signal		Y10				
POINT						
When the address indirect specification positioning command input turns on, the module FB "M+RD77_StartPositioning" turns on the positioning start signal.						

(4) Program example

[1] Address indirect specification positioning condition item

Condition item	Axis 1 Axis 2		
Address input	D20	00*1	
Address indirect specification positioning command input	N	12	

*1. When 50 is input in D2000, the address is (Axis 1) = (50).

[2] Positioning data to be used (Positioning data No. 5)

1-axis linear control is performed on Axis 1.

The positioning address of each axis is changed to the current value set in "[Da.6] Positioning address/movement amount" of positioning data No. 5 when the address indirect specification positioning is executed.

Axis 1 Positioning Data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address
5	0:END	01h:ABS Linear 1	-	0:100	0:150	0.0 µm	0.0 µm
	<positioning comment="">Indirect designation positioning</positioning>						

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
5	1000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method

[3] Example of address indirect specification positioning program To execute the following address indirect specification positioning, the positioning execute program is required.

D2000 K10000 D2002 D* GOT value specification GOT value after calculation M2 M12 RD77_1.bnBusy_D[0] К5 D4118 DX10 11 MOVP Axis 1 positioning FB positioning No. storage [PB for GOT] Indirect designation R:BUSY(Axis#1-#16)(Direct) [Operating flag] Indirect designation D2002 U0¥G6046 DMOVP Axis 1 No. 5 positioning data/positioning address GOT value after calculation M12 SET [Operating flag] Indirect designation RD77_1.bnBusy_D[0] U0¥G2417.F DX10 M4110 M4112 M12 M4802 14 -ur [Operating flag] Axis 1 positioning Indirect FB start designation SET FB start Indirect designation Axis 1 positioning FB operation OK flag R:BUSY(Axis#1-#16)(Direct) Axis 1 positioning complete U0¥G2417.F M4802 RD77_1.bnBusy_D[0] M12 DX10 -1 F -1× RST [Operating flag] Indirect designation FB start Indirect designation R:BUSY(Axis#1-#16)(Direct) Axis 1 positioning U0¥G2417.D M4802 4 F RST FB start Indirect designation Axis 1 error detection

Refer to Section 6.6.8 on positioning execute program.

(4) Demonstration machine operation panel

[Positioning operation screen]

Value specification Setting for D2000: Positioning address input M12: Address indirect specification positioning in-operation flag

Indirect specification M2: Address indirect specification positioning command input



0

POINT						
Touch the set value of D2000 setting, an	0 <= INPUT <= 140					
will appear. Input the positioning address (unit: mm)	7	8	9	Cancel		
window, and touch ENTER. Then, the positioning address will be changed.				6	← DEL	
The allowable positioning address input range (0 to 140) is limited on the touch panel.			2	3	AC	
			0	00		
				0	ENTER	

Value specification Setting for D2000

(5) Timing chart



6.6.7 Speed change

This program is designed to change the speed in three stages during positioning and temporarily stop the positioning operation.

The speed can be changed to the speed selected on the demonstration machine operation panel during standby point positioning, point selection positioning, address indirect specification positioning, continuous positioning (1), continuous positioning (2), teaching/ teaching playback and fixed-feed/fixed-feed stepping operation.

(1) Control data

ltom	Buffer memory address	Sotting rongo		
nem	Axis 1	Setting range		
[Cd.14] New speed value	4314 4315	0.00, 500.00, 1000.00, 2000.00 (mm/min) ^{*1}		

*1. The speed is set to the speed selected on the demonstration machine operation panel.

POINT

When the speed is changed, the module FB "M+RD77_ChangeSpeed" writes the value selected on the demonstration machine operation panel in "[Cd.14] New speed value."

(2) Program example

[1] Speed change condition item

Condition item		Axis 1					
	M20	Speed change (2000 mm/min)					
Speed change	M21	Speed change (1000 mm/min)					
command input	M22	Speed change (500 mm/min)					
	M23	Temporary stop (0 mm/min)					

[2] Example of speed change program

Sheen c	riange progra	([] *****							
	M6001	M4211	M23					K0	D4217
(1510)	Positioning control 1	Axis 1 speed change FB operating flag	[PB for GOT] Speed change (0)				DMOVP		Axis 1 speed change FB speed storage
									M4913
								SET	FB start Axis 1 speed change (0)
			M22					K50000	D4217
			PB for GOT] Speed change (500)				DMOVP		Axis 1 speed change FB speed storage
									M4912
								SET	FB start Axis 1 speed change (500)
			M21					K100000	D4217
			PB for GOT] Speed change (1000)				DMOVP		Axis 1 speed change FB speed storage
									M4911
								SET	FB start Axis 1 speed change (1000)
			M20					K200000	D4217
			PB for GOT] Speed change (2000)				DMOVP		Axis 1 speed change FB speed storage
									M4910
								SET	FB start Axis 1 speed change (2000)

Speed cha	anse prosram	****	 							
	M4913									M4210
										O
(2069) F	B start Axis									Axis 1 speed
d	1 speed change (0)									change FB start
	M4912									
_										
F										
6	1 speed change (500)									
	M4911									
	1 speed change									
K	(1000) M4910									
	— I —									
F	FB start Axis 1 speed -bance									
Č	(2000)									
	1014/2111									M4913
(2075)									RST	FB start Axis 1
4	Axis 1 speed Shange FB									speed change (0)
c	operating flag									
										M4912
									RST	ED about Avia 1
										speed change (500)
										M4911
									- DOT	
									No1	FB start Axis 1 speed change (1000)
										(1000)
										M4910
								 	-	
									RST	FB start Axis 1 speed change
										(2000)
(0000)					M_RD77_ChangeSpeed_00E_1	(M+RD77_ChangeSpeed_00E)	1			
(2080)					Speed (a lange t D				
	M4210									M4211
	— I I —				BILDEN	o_bENO:E				O
ļ	Axis 1 speed				Execution command	Execution status				Axis 1 speed
s	start									operating flag
										M4212
			RD77_1	}	DUT:i_stModule	o_bOK:E				
			Module labe	əl	Module label	Normal completion				Axis 1 speed
										change FB operation OK flag
										M4213
_			——-[к1	}	UW:i_uAxis	o_bErr 8				
			-	-	Target axis	Error completion				Axis 1 speed
										change FB operation NG flag
			F	٦	UD;iudSneedChanzeValue	o uEreld 10	- n4910 T			
			L 04217	L b	Cd.14:New speed value	Error code	Avie 1 apgent			
			change FB speed store	.u age			change FB error No.			
							storage			

(3) Demonstration machine operation panel

2000 M20: Speed change command (2000 mm/min) 1000 M21: Speed change command (1000 mm/min) 500 M22: Speed change command (500 mm/min) 0 M23: Temporary stop command (0 mm/min)



(4) Timing chart



POINT

- The speed can be changed only during standby point positioning, point selection positioning, address indirect specification positioning, continuous positioning (1), continuous positioning (2), teaching/teaching playback and fixed-feed/fixed-feed stepping operation.
- The command speed only for Axis 1 is changed. The interpolation speed for standby point positioning and address indirect specification positioning is the composite speed based on the command speed for Axis 1 after the speed is changed.
- The speed cannot be changed while decelerating.

6.6.8 **Positioning execute program**

This program is used to execute the standby point positioning, point selection positioning and address indirect specification positioning.

When one of these positioning command inputs turns on, the module FB "M+RD77_ StartPositioning:"

- writes the start No. compatible with each positioning in "[Cd.3] Positioning start No." and
- turns on the positioning start signal (Y10) to perform the positioning.



Example of each positioning program

POINT

The module FB "M+RD77_StartPositioning" performs positioning differently depending on the start No. (positioning data) written in "[Cd.3] Positioning start No."

6.7 Writing to the RD77MS

The set parameters are written to RD77MS.

6.7.1 Saving the project



(1) Terminate the Simple Motion Module setting tool.

Click [Project] \rightarrow [Exit] on the Simple Motion Module setting tool menu.

(2) Click [Project] \rightarrow [Save] on the GX Works3 menu.

6.7.2 Writing to the PLC

Write settings data to the CPU module.

(1) Connect the personal computer and CPU module with the USB cable, and set the RUN/STOP/RESET switch of the CPU module to STOP.



(2) Click [Online] \rightarrow [Write to PLC...].



- (3) An Online Data Operation dialog box appears. Check the "Parameter " and the "Simple Motion Module Setting:0000:RD77MS".
- (4) Click the Execute button.

(5) If the message shown left is displayed, click the Yes button.





(9) Reset the CPU module. (Hold the RUN/STOP/RESET switch on the RESET side.)

6.8 Demonstration Machine Operation

Execute the positioning operations in accordance with the programs stated in Section 6.6 operating the demonstration machine operation panel.

If any positioning operation cannot be performed, refer to the troubleshooting (Section 6.8.8). To confirm the current value of each parameter, use the Simple Motion Monitor. (refer to Appendix 5.)

6.8.1 Starting the servo amplifiers



- (1) Set the CPU module RUN/STOP/RESET switch to "RUN".
- (2) The startup screen will appear. Touch OK to display the course selection screen.



(3) Touch iQ-R Simple motion Course on the course selection screen to display the screen switching menu.



(4) Touch Servo ON M1000 on the screen switching menu, and the servo amplifiers of Axis 1 to Axis 3 will start.

6.8.2 JOG operation



 Touch JOG-home position return on the screen switching menu.
 The JOG-home position return operation screen will appear.

(2) Touch the JOG•home position M6800 on the JOG•home position return operation screen to turn on M6800,

and the JOG•home position return operation screen will be operable.

- 12:22 JOG · home position return operation JOG • home position M6800 Menu 4 Speed setting Feed current value Axis 1 D640 1000 0.0 mm M1013 1000 0.0 mm Axis 2 D642 Axis 3 M1015 D644 1000 0.0 mm Axis 2 Home position return Axis 1 Home Home position return Home U0¥G2617.4 return Axis 3 Home position return M1020 U0¥G2417.4 U0¥G2517.4 Teaching rror occurred Memoriz M1100 M6010
- (3) While the JOG button for each axis shown below is kept touched, the JOG operation is performed at the speed (mm/min) displayed in the speed setting field. The current address (mm) is displayed in the feed current value field.

Ĺ

It	tem	Axis 1	Axis 2	Axis 3
JOG operation	Forward rotation	M1011	M1013	M1014
command	Reverse rotation	M1010	M1012	M1015
Speed setting		D640	D642	D644

JOG operation	- +		5	Speed setting	Feed current value		
Axis 1	M1011	M1010	D640	1000	0.0 mm		
Axis 2	M1013	M1012	D642	1000	0.0 mm		
Axis 3	M1015	M1014	D644	1000	0.0 mm		
	JOG	button	JC	G speed	Feed current value		

Go to next page

From previous page



Д

(4) Set the JOG speed arbitrarily. Touch the set value of the axis JOG speed to be changed. The numeric input window will appear.



(5) Input the JOG speed with the numeric keys. The input range is shown below.

Axis No.	JOG speed setting range (mm/min)
Axis 1	1 to 1000
Axis 2	1 to 5000
Axis 3	1 to 3000

Touch **ENTER**, and the input value will be reflected as the JOG speed.

(Then, the numeric input window will close.) Perform the JOG operation as stated in (3), and make sure that the JOG speed has been changed.

6.8.3 Home position return

Perform operation on the JOG•home position return operation screen in the same manner as in the case of the JOG operation.



- (1) Touch Home position return M1020, and home position return will be started.
- (2) After the operation is stopped, check Axis 1 home position return U0¥G2417.4, Axis 2 home position return U0¥G2517.4 and Axis 3 home position return U0¥G2617.4. If the axes have returned correctly to their home positions, the lamps of the axes are on.



JOG · home	position r	eturn opera	ition		13:31
	G • home po M6800	sition			Menu
JOG operation	_	+	S	peed setting	Screen
Axis 1	M1011	M1010	D640	1000	switching The menu is
Axis 2	M1013	M1012	D642	1000	displayed.
Axis 3	M1015	M1014	D644	1000	0.0 mm
Home position return U0¥G	position return 2417.4	Axis 2 Home position re UO¥G2517.4	turn Hom	3 e position return 62617.4	Home position return M1020
Device Name	Error occu	10	en Te	eaching	Memorize M1100

(4) After the completion of home position return, touch $\begin{bmatrix} JOG-home position \\ M6800 \end{bmatrix}$ to turn off M6800.

Touch Menu to display the screen switching menu.

6.8.4 Standby point positioning



- Positioning operation 13:32 Menu M11 (M10 (M12 🔘 indii specifi M14 (M13 (M15 (20 40 60 80 100 120 140 M16 🦳 M17 🔘 Feach M6 Axis X Axis Y -5.0 mm Setting for D2000 -5.0_{mm} 0 2000 M20 1000 M21 500 M22 0 M23 M6010

(1) Touch Positioning control on the screen switching menu.

Positioning operation screen appears.

(2) Touch Positioning on the positioning operation screen to turn on the positioning command M6001, and the positioning operation screen will be operable.

- Positioning operation 13:33 Menu M11 (M10 (M12 🔘 M13 Standby point positioning start 20 40 60 80 100 120 140 M16 | M17 (Positioning Axis graph Setting for D2000 0 -5 / jmm j 2000 M20 1000 M21 500 M22 0 M23 M6010
- Standby point (3) Touch and the Axis 1 will be moved M0 from the current position to the standby point address (0).

M10 is on during standby point positioning operation.

The positioning trajectory obtained on the positioning operation screen is displayed in the positioning graph.

It is recommended to perform the standby point positioning after positioning by JOG operation.





The standby point positioning trajectory is as shown below.



6.8.5 Point selection

Perform operation on the positioning operation screen in the same manner as in the case of the standby point positioning.



- (1) Touch the set value of D2000 setting, and the numeric input window will appear.
- (2) Input one of 30, 31 and 32, and touch ENTER to reflect the input value.

The positioning address for each point (input value) is shown below.

POINT	Positioning address (mm)
30	40.0
31	80.0
32	120.0



(3) Touch $\begin{bmatrix} Position \ selection \\ M1 \end{bmatrix}$, and the Axis 1 will be positioned in the address corresponding to the point input in (2).

M11 is on during point selection positioning operation.

The point selection positioning trajectory is as shown below.



6.8.6 Address indirect specification positioning

Perform operation on the positioning operation screen in the same manner as in the case of the standby point positioning and point selection positioning.



- (1) Touch the set value of D2000 setting, and the numeric input window will appear.
- (2) Input the positioning address arbitrarily. The input range is from 0 to 140 (mm). Touch <u>ENTER</u>, and the input value will be reflected.

(Example) When the input value is 70: (Axis 1) = (70)



^{ecification}, and the Axis 1 will be positioned in the positioning address input in

M12 is on during address indirect specification positioning operation. The address indirect specification positioning trajectory is as shown below.



[Operation example]

Address indirect specification positioning from (20, -5) to (70, -5)





(4) Upon completion of point selection positioning, check that the positioning address of X-axis in the feed current value field is the value set in (2).



6.8.7 Speed change

The speed can be changed by touching one of the following buttons on the positioning operation screen during standby point positioning, point selection positioning, address indirect specification positioning, continuous positioning (1), continuous positioning (2), teaching/teaching playback and fixed-feed/fixed-feed stepping operation.



The speed can be changed any number of times during positioning operation. However, do not perform operation during deceleration. A minor error will occur.

6.8.8 Troubleshooting

When the module does not work, check the following points.

On the GOT screen, the error codes are displayed in decimal notation.

Check item		Countermea	sures					
Check that the servo amplifiers have started (all axes servo ON).	If the servo a screen switch	mplifiers have not started ing menu.	, touch Servo ON M1000 on the					
Check that the CPU module is running.	If it is not running, set the RUN/STOP/RESET switch to "RUN".							
Check that the module is not being tested by the Simple Motion setting tool.	If it is being te	If it is being tested, terminate the test. (Refer to Section 5.5.)						
Check that all necessary parameters have been written to the programmable controllers.	Re-write the p	project data referring to S	ection 5.4.2.					
Check that no errors have occurred. (ERR.LED of RD77MS is on.)	If any error ha • Touch Error the error w	as occurred, cancel the error screen to display the error ill be reset. Error display screen Instructions → Error Codes for each axis Error Servo Axis 1 Warning Code Axis 1 Warning Code UVVC2407 0	ror as stated below. r screen. Touch Error reset , and 14:10 Error reset Return Error Servo COG2606 error code UOYG2488 0 0 0					
Check that Error occurred M6010 is not on.	 Axis 2 Axis 3 Axi							
	If any of the following error codes is displayed on the error screen, the upper or lower limit of the positioning address of Axis 3 is exceeded. Touch Error reset to reset the error, and take appropriate measures. Axis 3 0 0 004G2607 004G2608 004G2688 0 6433 0							
	Error code	Operation error	Countermeasures					
Check that the upper or lower limit of the positioning address of Axis 3 is	6404 6405	The upper limit of positioning address is exceeded.	 Perform reverse rotation JOG operation. Perform home position return. 					
not exceeded by JOG operation.	6549	The lower limit of positioning address is exceeded.	 Perform forward rotation JOG operation. Perform home position return. 					
	6433	Positioning is started after any of the above error occurs.	 Perform JOG operation in the direction in which the error does not occur. Perform home position return. 					

Check item	Countermeasures
Check whether home position return is not performed when the servo parameter "PC17 Function selection C-4" has been set to the default (0000H) and the JOG operation has not been performed. (6522 is stored as the error code.)	Perform home position return after JOG operation.
Check whether a point inapplicable to point selection positioning has not been set.	If a point other than 30, 31 and 32 has been set, point selection positioning cannot be performed. Set one of 30, 31 and 32.
The positioning operation time is short (the speed cannot be changed).	If the positioning operation time is short and the speed cannot be changed, start the positioning while touching the button of the desired speed.

6.9 Sequence Program List

This shows a list of the sequence programs.

*** Initial pro	ocessing ****								
	SM403								RD77 1.bPLC Ready
									Y0
(0)	OFF for only 1 scan after RUN								RWPLC READY
		M1000	RD77_1.bRead y_D DX0						RD77_1.bAllAxisServoOn Y1
		[PB for GOT] Servo ON	R:READY (Direct)						RW:All axis servo ON
							MOVF	КО	RD77_1.stnAxCtrl1_D [0].uRequestServoOff_D U0¥G4351 RW:Servo OFF command (Direct)
							MOVF	KO	RD77_1.stnAxCtrl1_D [1].uRequestServoOff_D U0¥G4451 RW:Servo OFF command (Direct)
							MOVE	KO	RD77_1.stnAxCtrl1_D [2].uRequestServoOff_D U0WG4551 RW:Servo OFF command (Direct)
		M1000					MOVE	K1	RD77_1.stnAxCtrl1_D [0].uRequestServoOff_D U0¥G4351 RW:Servo OFF command (Direct)
							MOVF	K1	RD77_1.stnAxCtrl1_D [1].uRequestServoOff_D U0¥G4451 RW:Servo OFF command (Direct)
							MOVE	K1	RD77_1.stnAxCtrl1_D [2].uRequestServoOff_D U0¥G4551 RW:Servo OFF command (Direct)
*** [For GO"	[] Current value	monitor *****							
(40)	SM403						DMOV	RD77_1.stnAxM [0].dActualPosit R:Real current va	ntr D0 ion ilue Axis 1 Feed current value
	iscan arter RUN						DMOV	RD77_1.stnAxM [1].dActualPosit R:Real current va	htr D20 ion Ilue Axis 2 Feed current value
							DMOV	RD77_1.stnAxM [2].dActualPosit R:Real current va	ntr D40 ion lue Axis 3 Feed current
									value

*** Switch	operation mode *	****										
	U0¥G2477.0	U0¥G2577.0	U0¥G2677.0	M6800	M6801	M6802	M6803					M6000
	<u> </u>		I		/f	/ī	/i					
(51) Axis 1 servo ready ON	Axis 2 servo ready ON	Axis 3 servo ready ON	JOG• home position switch	Positioning control switch	Advanced synchronous control 1 switch	Advanced synchronous control 2 switch					JOG • home position mode
				M6800	M6801	M6802	M6803					M6001
				L		/r						
				JOG • home position switch	Positioning control switch	Advanced synchronous control 1 switch	Advanced synchronous control 2 switch					Positioning control 1
*** JOG op	eration and home M6000	position return	****									
											D640	RD77_1.stnAxCtrl1_D [0].udJOG_Speed_D
(73	JOG home position mode									DMOV	Axis 1 JOG speed	RW:JOG speed(Direct)
											Deta	
										DMOV	Axis 2 JOG speed	[1].ud./OG_Speed_D U0¥G4418 RW:JOG speed(Direct)
											D644	RD77_1.stnAxCtrl1_D [2]ud-IOG Speed D
										DMOV	Axis 3 JOG speed	U0¥G4518 RW:JOG speed(Direct)
		M1000	M1003	MIGDA	M4011	M4001	M4001	M1011	M1010			U0V020101.0
		1022	MIOZO	1024	M4011	1014021	M4031	MIOTI	MINIO			-
		Axis 1 home	Axis 2 home	Axis 3 home	Axis 1 home	Axis 2 home	Axis 3 home	[PB for GOT]	[PB for GOT]			Axis 1 forward rotation
		position return start	n position return start	position return start	position return FB operating flag	position return FB operating flag	position return FB operating flag	Axis 1 forward rotation JOG	Axis 1 reverse rotation JOG			JOG start
								M1010	M1011			U0¥G30102.0
									/r			o
								[PB for GOT] Axis 1 reverse rotation JOG	[PB for GOT] Axis 1 forward rotation JOG			Axis 1 reverse rotation JOG start
								M1013	M1012			U0¥G30111.0
									/r			o
								[PB for GOT] Axis 2 forward rotation JOG	[PB for GOT] Axis 2 reverse rotation JOG			Axis 2 forward rotation JOG start
								M1012	M1013			U0¥G30112.0
									/r			o
								[PB for GOT] Axis 2 reverse rotation JOG	[PB for GOT] Axis 2 forward rotation JOG			Axis 2 reverse rotation JOG start
								M1014	M1015			U0¥G30121.0
									/r			o
								[PB for GOT] Axis 3 forward rotation JOG	[PB for GOT] Axis 3 reverse rotation JOG			Axis 3 forward rotation JOG start
								M1015	M1014			U0¥G30122.0
								<u>└</u> ı ⊢				o
								[PB for GOT] Axis 3 reverse rotation JOG	[PB for GOT] Axis 3 forward rotation JOG			Axis 3 reverse rotation JOG start

	M1020					
	1011020					M1021
-					-	
l l	PB for GOT				PLS	Home position return
ŀ	Home position					0.0000
r	eturn					
	M1021	U0¥G2417.4				M1022
						MITOZZ
	— I I —	/*				
	Home position	Axis 1 home			021	Axis 1 home position return start
r	eturn trigger	position return				
		Complete				
		U0¥G2517.4				M1023
					SET	Avia Q home position
		Axis 2 home				return start
		position return				
		U0¥G2617.4				M1024
					SET	Axis 3 home position
		Axis 3 home				return start
		position return complete				
					Axis 1 home posit	ion return FB start
	M1022	RD77_1_bnBusy	M4011	U0¥G2477.1		
		D[0] DX10				M4010
		/r	/ĭ		_	
	lvia 1 hama		Avia 1 homo	Avia 1 comio	SET	Axis 1 home position
F	osition return	-#16)(Direct)	position return	ON ON		rotann Distart
s	start		FB operating flag			
	M4010	U0¥G2417.4	RD77_1.bnBus	M4011		M1000
			DX10			WIT022
		I ⊢			- RST	
4	Axis 1 home	Axis 1 home	R:BUSY	Axis 1 home	nor	Axis 1 home position return start
E	osition return Bistart	position return	(Axis#1-#16)	position return		
·····	Distant	Complete	01000	flag		
		U0¥G2417.D				M4010
			-		RST	Avia 1 home position
		Axis 1 error				return FB start
		detection				
					Avia O harra anait	an and an ED about
	M1023	RD77_1.bnBusy	M4021	LI0¥G2577.1	Axis 2 Home posit	on eturn Distart
	1011020	D[1] DX11	1014021	0000200700		M4020
-	— I I —	//	//		_	
					SET	Axis 2 home position
r F	axis 2 nome position return	-#16)(Direct)	Axis 2 nome position return	Axis 2 servo ON		return FB start
s	start		FB operating flag			
	M4020	U0¥G2517.4	RD77_1.bnBus	M4021		
			y D[1] DX11			M1023
	— I I —	I ⊢	<u> </u> /₹			
	Axis 2 home	Axis 2 home	RBUSY	Axis 2 home	RSI	Axis 2 home position return start
1 1		position return	(A×is#1-#16)	position return		
, A	osition return	poorcion rocarri	(Diment)			- 1
F	osition return FB start	complete	(Direct)	flag		
F	osition return "B start	U0¥G2517.D	(Direct)	flag		M4020
F	osition return "B start	U0¥G2517.D	(Direct)	flag		M4020
F	osition return Bistart	U0¥G2517.D	(Direct)	rio operating flag	RST	M4020
	oosition return 78 start	U0¥G2517.D	(Direct)	flag	RST	M4020 Axis 2 home position return FB start
	oosition return "B start	U0¥G2517D U0¥G2517D Axis 2 error detection	(Direct)	flag	RST	M4020 Axis 2 home position return FB start

·····

										Axis 3 home po	sition return FB start
		M1024	RD / /_1.bnBusy D[2] DX12	M4031	U0¥G2677.1						M4030
		Axis 3 home position return start	R:BUSY(Axis#1 -#16)(Direct)	Axis 3 home position return FB operating flag	Axis 3 servo ON					SET	Axis 3 home position return FB start
		M4030	U0¥G2617.4	RD77_1.bnBus y_D[2] DX12	M4031						M1024
		Axis 3 home position return	Axis 3 home position return	R:BUSY (Axis#1-#16)	Axis 3 home position return					RST	Axis 3 home position return start
				10 1 000	flag						
										_	M4030
			Axis 3 error detection							RST	Axis 3 home position return FB start
(334)					M_RD77_StartPo	ositioning_00E_1 Position	(M+RD77_StartPo ning start FB	ositioning_00E)			
	M4010										M4011
	—— I I——				BijbEN			o_bENO:B			
	Axis 1 home position return FB start				Execution comm	and	Execution status				Axis 1 home position return FB operating flag
				RD77_1 1	DUT: stModule			o bOK'B			M4012
				1. J Module label	Module label		Normal completic	on			Axis 1 home position return FB operation OK flag
				ר וא ז	1 Wit (Avia			o hErriP			M4013
					Target axis		Error completion	0,0011.0			Axis 1 home position return FB operation NG flag
				{ K9001 }	UW:i_uStartNo Cd.3:Positioning	start No.	Error code	o_uErrId:UW	-[D4019] Axis 1 home		
					M_RD77_StartPd	ositioning_00E_2	(M+RD77_StartPo	ositioning_00E)	FB error No. storage		
(726)						Position	ning start FB				
	M4020										M4021
					BIJEN			o_bENO:B			0
	Axis 2 home position return FB start				Execution comm	and	Execution status				Axis 2 home position return FB operating flag
				RD77_1	DUT: studeule			o bOK B			M4022
				L J Module label	Module label		Normal completio	on of the second			Axis 2 home position return FB operation
											OK flag M4023
				{к2}	UW:i_uAxis			o_bErr:B			o
					Target axis		Error completion				Axis 2 home position return FB operation NG flag
				{ K9001 }	UW:i_uStartNo Cd.3:Positioning	: start No.	Error code	o_uErrId:UW	-[D4029] Axis 2 home position return FB error No.		
									storage		

(1118)					M_RD77_Star	tPositioning_00E_3 Positioni	(M+RD77_Stari ing start FB	Positioning_00E)			
	M4030				BijbEN			o_bENO:B				M4031
	Axis 3 home position return FB start				Execution cor	mmand	Execution stat	us				Axis 3 home position return FB operating flag
				RD77_1 -{]- DUT:i_stModu	le		o_bOK:B				M4032
				Module label	Module label		Normal comple	stion				Axis 3 home position return FB operation OK flag M4033
				-{ K3]- UW:i_uAxis Target axis		Error complet	o_bErr:B				Axis 3 home position return FB operation NG flag
				-[K9001	} UW:i_uStartNo Cd.3:Position	o ning start No.	Error code	o_uErrid:UW	-[D4039] Axis 3 home position return FB error No. storage			
Speed cł	nange program * M6001	M4211	M23								K0	D4217
(1510)	Positioning control 1	Axis 1 speed change FB operating flag	[PB for GOT] Speed change (0)							DMOVP		Axis 1 speed change FB speed storage
												M4913
											SET	FB start Axis 1 speed change (0)
			M22								K50000	D4217
			[PB for GOT] Speed change (500)	•						DMOVP		Axis 1 speed change FB speed storage
												M4912
											SET	FB start Axis 1 speed change (500)
			M21								K100000	D4217
			[PB for GOT] Speed change (1000)							DMOVP		Axis 1 speed change FB speed storage
												M4911
											SET	FB start Axis 1 speed change (1000)
			M20								K200000	D4217
			[PB for GOT] Speed charge							DMOVP	120000	Axis 1 speed change FB speed storage
			(2000)									M4010
											SET	FB start Axis 1 speed change (2000)

*** Position	ng operation ***	**										
	M6001	MO	RD77_1.bnBusy_ D[0]	M10							К1	D4118
			DX10	/ī	r							
(1541)	Desklasken		D-DUOV(41-#1	[On another						MOVP		Axis 1 positioning FB
	control 1	Standby point	-#16)(Direct)	[Uperating flag] Standby								storage
				point								
												M10
											SET	[Operating flag] Standby point
												otanaby point
				DD 77 1 L - D								
		M10	M4110	D[0]	U0¥G2417.F	M4111						M4800
			/r		//	/r						
		[Onerating flag]	Avis 1	R:BUSV(Avis#1	Avis 1	Avis 1					SET	FB start Standby point
		Standby point	positioning FB start	-#16)(Direct)	positioning complete	positioning FB operating flag						
				RD77.1 boBuev								
		M4800	00¥G2417.F	D[0]								M10
		<u>├</u> ─	·	/ĭ							DOT	
		FB start	Axis 1	R:BUSY(Axis#1							RSI	[Operating flag] Standby point
		Standby point	positioning complete	-#16)(Direct)								
			LIOYCOM17.D									
			00#G2417.D									M4800
			└ <u></u>								PST	
			Axis 1 error								1101	FB start Standby point
			detection									
		MI	RD77_1.bnBusy_	M11								
			D[0] DX10			D2000	K30				K2	D4118
		<u>├</u> ─1⊢─	//	//	=	COTurk				MOVP		Auto 1 - anthing in CD
		[PB for GOT]	R:BUSY(Axis#1	[Operating		specification						positioning No.
		selection	-#10)(Direct)	selection								
						5.0000	1004					5 1146
						D2000	Kal				Кð	D4118
					=	GOT value				MOVP		Axis 1 positioning FB
						specification						positioning No. storage
												-
						D2000	K32				K4	D/118
						02000	1102				114	DALLO
					=	GOT value				MOVP		Axis 1 positioning FB
						specification						positioning No. storage
					-	D4118	К2		D4118	K4		M11
					>=	Axis 1		<=	Axis 1		SET	[Operating flag]
						positioning FB positioning No.			positioning FB positioning No.			Position selection
						storage			storage			
		M11	M4110	RD77_1.bnBusy _D[0]	U0¥G2417.F	M4111						M4801
		<u> </u>	/r	DX10	/r	/T						
		Operation (las)	Avia 1		Avia 1	Avia 1					SET	FB start Position
		Position	positioning FB	-#16)(Direct)	positioning	positioning FB						13010011
			o car c		DD77.1 L-D	opor a cir 16 1106						
		M4801	M11	U0¥G2417.F	D[0]							M11
		<u>⊢</u> ⊣⊢–										
		FB start	[Operating flag]	Axis 1	R:BUSY(Avis#1						RST	[Operating flag] Position selection
		Position	Position	positioning complete	-#16)(Direct)							
				U0¥G2417.D								M4801
				└ <u></u>	_						DOT	
				Axis 1 error							RSI	FB start Position selection
				detection								
	1	1										

	1	1									
									D2000	K10000	D2002
								D*	GOT value specificatio n		GOT value after calculation
			DD77.1 haDrau								
		M2	D[0]	- M12						К5	D4118
		[PB for GOT] Indirect designation	R:BUSY(Axis#1 -#16)(Direct)	[Operating flag] Indirect designation					MOVP		Axis 1 positioning FB positioning No. storage
									DMOVP	D2002 GOT value after calculation	U0¥G6046 Axis 1 No. 5 positioning data/positioning address
										_	M12
										SET	[Operating flag] Indirect designation
		M12	M4110	RD77_1.bnBusy	U0¥G2417.F	M4112					
				D[0] DX10							M4802
		[Operating flag] Indirect designation	Axis 1 positioning FB start	R:BUSY(Axis#1 -#16)(Direct)	Axis 1 positionins complete	Axis 1 positioning FB operation OK				SET	FB start Indirect designation
		M4802	U0¥G2417.F	RD77_1.bnBusy		TUE					142
				DX10							MI12
		FB start Indirect designation	Axis 1 positioning complete	R:BUSY(Axis#1 -#16)(Direct)						RST	[Operating flag] Indirect designation
			U0¥G2417.D								N41000
											1014602
			Axis 1 error detection							RST	FB start Indirect designation
*** Position	 ing FB ****										
	M4800										M4110
(1675)	FB start Standby point										Axis 1 positioning FB start
	M4801										
	FB start Position selection	-									
	M4802										
	designation										

			M_RD77_StartPositioning_00E_4	(M+RD77_StartPositioning_00	E)		
(1680)			Position	ning start FB			
	M4110						M4111
			DILEN	= hENG			0
			Execution command	Evecution status			
	Axis 1 positioning FB		Execution command	EXECUTION Status			Axis 1 positioning FB
	start						operating flag
							M4112
		RD77_1	DUT:i stModule	o bOk			
		L J	- Module label	- Normal completion			
		Module label					Axis 1 positioning FB
							operation UK flag
							M4113
		{ к1 }	UW:i_uAxis	o_bEn	r:B		
			Target axis	Error completion			Avie 1
							positioning FB
							flag
		{D4118 }	UW:i_uStartNo	o_uErrId:U	JW -[D4119]		
		Axis 1	Cd.3:Positioning start No.	Error code	Axis 1		
		positioning FB positioning			positioning FB error No.		
Speed cl	nange program *****	No. storage			storage		
	M4913						M4210
(2069)	FB start Axis 1						Axis 1 speed
	speed change (0)						change FB start
	M1010						
	1014312						
	FB start Axis 1						
	speed change (500)						
	M4911						
	FB start Axis 1 speed change						
	(1000)						
	M4910						
	EP atast Avia 1						
	speed change						
	120009						
	M4211						M4913
(007F)							
(2075)	Axis 1 speed					RSI	FB start Axis 1 speed change
	change FB operating flag						(0)
							M4912
						RST	FB start Avie 1
							speed change
							M4Q11
							1/14/2/11
						RST	FB start Axis 1
							speed change (1000)
							M4910
						RST	FB start Axis 1
							(2000)

			M_RD77_ChangeSpeed_00E_1	(M+RD77_ChangeSpeed_00E)		
(2080))		Speed	change FB		
	M4210					M4211
			B:i bEN	o bENO:B		
			Execution command	Execution status		
	Axis I speed change FB start					Axis I speed change FB operating flag
						M4212
		RD77_1	DUT:i_stModule	o_bOK:B		o
		L J	Module label	Normal completion		0.d. 1d
		Module label				change FB operation OK flag
						M4213
		[к1]	UW:i_uAxis	o_bErr:B		
			Target axis	Error completion		Axis 1 speed change FB operation NG flag
		{ D4217 }	UD:i_udSpeedChangeValue	o_uErrId:UW	-{ D4219 }	
		Axis 1 speed	Cd.14:New speed value	Error code	Axis 1 speed	
		change FB speed storage			change FB error No.	
*** Error de	etection program ****					
	U0¥G2417.D					M6010
(0000)						0
(2289,	Axis 1 error detection					Error detected
	U0¥G2477.7					
	Axis 1 servo alarm occurring					
	U0¥G2517.D					
	Axis 2 error detection					
	U0¥G2577.7					
	Axis 2 servo alarm occurring					
	U0¥G2617.D					
	Axis 3 error detection					
	U0¥G2677.7					
	Axis 3 servo					
	alarm occurring					

*** Position	ing ladder progran	n starting setting **	****						
	SM403								M6850
(2309)	OFF for only 1 scan after RUN								O Positioning program startup
								K22	D3900
							MOVP		JOG/Home position return screen change device
									(END)
(2315)									

Chapter 7 Advanced Synchronous Control Practice

7.1 What is the Synchronous Control?

"Synchronous control" can be achieved using software instead of controlling mechanically with gear, shaft, speed change gear or cam, etc.

"Synchronous control" synchronizes movement with the input axis (servo input axis or synchronous encoder axis), by setting "parameters for synchronous control" and starting synchronous control on each output axis.

7.1.1 Synchronous control modules

The module is used in synchronous control as follows.



POINT

- Input axis module can be set to one of servo input axis or synchronous encoder axis.
- Speed change gear can be arranged on one of main shaft side, auxiliary shaft side or after composite auxiliary shaft gear.
- Set the travel value of input axis module so large as possible to prevent the speed fluctuation of output axis module in the synchronous control. If the travel value of input axis module is small, the speed fluctuation of output axis module may occur depending on the setting for synchronous parameter.
- The following items can be monitored using the simple motion module setting Function; each synchronous control monitor data and the rotation direction of main shaft main input axis, main shaft sub input axis, auxiliary shaft axis, and output axis (cam axis feed current value).
7.1.2 Synchronous control module list

The number of modules that can be used with synchronous control is shown below. (Indicates the number of modules for RD77MS4.)

			Maximum nur	nber of usable
Classification	Name	Parts	Number per module	Number per axis
	Servo input axis	_	4	_
Input axis module	Synchronous encoder axis	_	4	_
	Main shaft main input axis		4	1
Main shaft module	Main shaft sub input axis		4	1
	Composite main shaft gear		4	1
	Main shaft gear		4	1
	Main shaft clutch		4	1
	Auxiliary shaft axis		4	1
Auxiliary axis	Auxiliary shaft gear		4	1
module	Auxiliary shaft clutch	=	4	1
	Auxiliary shaft composite gear		4	1
Speed change gear module	Speed change gear		4	2
Output axis module	Output axis		4	1
Cam data	Cam data		Up to 256	—

7.1.3 Servo input axes

Servo input axes are used to drive input axes based on the position of servo motors controlled with the simple motion module.

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.300	Servo input axis type	Sets the current value type from which the servo input axis input value is generated.	 Set in decimal. 0: Disable 1: Feed current value 2: Real current value 3: Servo command value 4: Feedback value 	When power turned	0	32800+10n
Pr.301	Servo input axis smoothing time constant	Set if performing smoothing processing for input values.	• Set in decimal. 0 to 5000 [ms]	ON	0	328001+10n
Pr.302	Servo input axis phase compensation advance time	xis Sets the time to advance or delay the phase. • Set in decimal. -2147483648 to 2147483647 [μs]		Operation cycle	0	328002+10n 328003+10n
Pr.303	Servo input axis cam axis phase compensation time constant	Sets the time to reflect phase compensation.	 Set in decimal. 0 to 65535 [ms]^{*1} 		10	328004+10n
Pr.304	Servo input axis rotation direction restriction	Set if restricting the input travel value to a single direction.	 Set in decimal. 0: No rotation direction restriction 1: Permit only when current value is increase direction 2: Permit only when current value is decrease direction 	When power turned ON	0	328005+10n

n: Axis No. - 1

*1. Set the value as follows in a program.0 to 32767: Set as a decimal.32768 to 65535: Convert into a hexadecimal and set.

7.1.4 Synchronous encoder axes

Use if driving input axes with input pulses from externally connected synchronous encoders.

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.320	Synchronous encoder axis type	Sets the type of synchronous encoder axis used.	 Set in decimal. Disable Incremental synchronous encoder 101 to 116: Synchronous encoder via servo amplifier (Connectable servo amplifier: Axis 1 to axis 16) 201: Synchronous encoder via CPU 		0	34720+20j
Pr.321	Synchronous encoder axis unit setting	 Sets the synchronous encoder axis unit. The position unit is set in the "×1 to 10⁻⁹ [control unit]" range. The speed unit is set in the "×1 to 10⁻⁹ [control unit/s, or control unit/s, or control unit/min]" range. 	 Set in hexadecimal notation. H Control unit mm, 1: inch, 2: degree, 3: PLS No. of position decimal point digits 0 to 9 Speed time unit 0: second [s], 1: minute [min] No. of speed decimal point digits 0 to 9 	When	0003H	34721+20j
Pr.322	Synchronous encoder axis unit conversion numerator	Sets the numerator for converting synchronous encoder axis encoder pulses to synchronous encoder axis units.	 Set in decimal. -2147483648 to 2147483647 [Synchronous encoder axis position unit]^{*1} 	ON	1	34722+20j 34723+20j
Pr.323	Synchronous encoder axis unit conversion denominator	Sets the denominator for converting synchronous encoder axis encoder pulses to synchronous encoder axis units.	 Set in decimal. 1 to 2147483647 [pulse] 		1	34724+20j 34725+20j
Pr.324	Synchronous encoder axis length per cycle	Sets the synchronous encoder axis length per cycle.	 Set in decimal. 1 to 2147483647 [Synchronous encoder axis position unit]^{*1} 		4000	34726+20j 34727+20j
Pr.325	Synchronous encoder axis smoothing time constant	Set if performing smoothing processing for input values.	• Set in decimal. 0 to 5000 [ms]		0	34728+20j

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.326	Synchronous encoder axis phase compensation advance time	Sets the time to advance or delay the phase.	 Set in decimal. -2147483648 to 2147483647 [μs] 	Operation cycle	0	34730+20j 34731+20j
Pr.327	Synchronous encoder axis phase compensation time constant	Sets the time to reflect phase compensation.	 Set in decimal. 0 to 65535 [ms]^{*2} 		10	34732+20j
Pr.328	Synchronous encoder axis rotation direction restriction	Set if restricting the input travel value to a single direction.	 Set in decimal. No rotation direction restriction Permit only when current value is increase direction Permit only when current value is decrease direction 	When	0	34733+20j
Pr.329	Resolution of synchronous encoder via CPU	 Set the resolution of the synchronous encoder when the synchronous encoder axis type is set to synchronous encoder via CPU. If 0 or less is set, the input value of synchronous encoder via CPU is processed as 32-bit counter. 	 Set in decimal. -2147483648 to 2147483647 [pulse] 	ON	0	34734+20j 34735+20j

j: Synchronous encoder axis No. - 1

*1. Synchronous encoder axis position unit*2. Set the value as follows in a program. 0 to 32767: Set as a decimal.

32768 to 65535: Convert into a hexadecimal and set.

7.1.5 Main shaft main input axis

This is the input axis at the main shaft module main side. This is the reference for the main shaft position.

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.400	Main input axis No.	Sets the input axis No. at the main shaft input main side.	 Set in decimal. Disable 1 to 16: Servo input axis^{*1} 801 to 804: Synchronous encoder axis 	When starting synchronous control	0	36400+200n

n: Axis No. - 1

*1. The range from axis 1 to 2 is valid in the 2-axis module, from axis 1 to 4 is valid in the 4-axis module, from axis 1 to 8 is valid in the 8-axis module.

7.1.6 Main shaft sub input axis

This is the input axis at the main shaft module sub side. This is used if entering a compensation amount for the main shaft main input axis position.

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.401	Sub input axis No.	Sets the input axis No. at the main shaft input sub side.	 Set in decimal. Disable to 16: Servo input axis^{*1} 801 to 804: Synchronous encoder axis 	When starting synchronous control	0	36401+200n

n: Axis No. - 1

*1. The range from axis 1 to 2 is valid in the 2-axis module, from axis 1 to 4 is valid in the 4-axis module, from axis 1 to 8 is valid in the 8-axis module.

7.1.7 Composite main shaft gear

The main shaft main input axis and main shaft sub input axis travel values are compounded and transferred to the main shaft gear.

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.402	Composite main shaft gear	Selects the input value composition method from main input axis and sub input axis.	 Set in hexadecimal notation. H <	Operation cycle	0001H	36402+200n

n: Axis No. - 1

7.1.8 Main shaft gear

The gear ratio for which the travel value after the composite main shaft gear is set is converted and transferred.

	Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
	Pr.403	Main shaft gear numerator	Sets the main shaft gear numerator.	• Set in decimal. -2147483648 to 2147483647	When starting	1	36404+200n 36405+200n
	Pr.404	Main shaft gear denominator	Sets the main shaft gear denominator.	• Set in decimal. 1 to 2147483647	synchronous control	1	36406+200n 36407+200n

n: Axis No. - 1

7.1.9 Main shaft clutch

The main shaft travel value is turned ON and OFF with the clutch and transferred. This is used if conveying/isolating command pulses from main shaft input to the output axis module side, and controlling servo motor operation/stoppage.

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.405	Main shaft clutch control setting	Sets the clutch control method.	Set in hexadecimal notation. H → ON control mode 0: No clutch 1: Clutch command leading edge 3: Clutch command trailing edge 4: Address mode 5: High-speed input request → OFF control mode 0: OFF control invalid 1: One shot OFF 2: Clutch command leading edge 3: Clutch command leading edge 4: Address mode 5: High-speed input request → High-speed input request signal 0 to F: High- speed input request signal from axis 1 to axis 16 ⁻¹	Operation cycle	0000H	36408+200n

Symbol	Setting item	Setting details Setting value		Load cycle	Default	Buffer memory address
Pr.406	Main shaft clutch reference address setting	Sets the clutch reference address.	 Set in decimal. O: Current value after composite main shaft gear 1: Current value per cycle after main shaft gear 	When starting synchronous control	0	36409+200n
Pr.407	Main shaft clutch ON address	 Sets the address for turning ON the clutch when in address mode. (The setting is invalid when in other than address mode.) If other than "0 to (cam axis length per cycle -1)", the clutch is controlled after converting to the "0 to (cam axis length per cycle -1)" range. 	 Set in decimal. -2147483648 to 2147483647 [Main input axis position unit¹², or cam axis cycle unit^{*3}] 	Operation cycle	0	36410+200n 36411+200n
Pr.408	Travel value before main shaft clutch ON	 Sets the travel value until the clutch is actually turned ON after the clutch ON conditions are established. Set a positive value for movements in the increase direction, and negative value for movements in the decrease direction. 	 Set in decimal. -2147483648 to 2147483647 [Main input axis position unit^{*2}, or cam axis cycle unit^{*3}] 	When clutch ON conditions established	0	36412+200n 36413+200n
Pr.409	Main shaft clutch OFF address	 Sets the address for turning OFF the clutch when in address mode. (The setting is invalid when in other than address mode.) If other than "0 to (cam axis length per cycle -1)", the clutch is controlled after converting to the "0 to (cam axis length per cycle -1)" range. 	• Set in decimal. -2147483648 to 2147483647 [Main input axis position unit ^{*2} , or cam axis cycle unit ^{*3}]	Operation cycle	0	36414+200n 36415+200n

Symbol	Setting item	Setting details Setting value Load cycle		Load cycle	Default	Buffer memory address
Pr.410	Travel value before main shaft clutch OFF	 Sets the travel value until the clutch is actually turned OFF after the clutch OFF conditions are established. Set a positive value for movements in the increase direction, and negative value for movements in the decrease direction. 	 Set in decimal. -2147483648 to 2147483647 [Main input axis position unit^{*2}, or cam axis cycle unit^{*3}] 	When clutch OFF conditions established	0	36416+200n 36417+200n
Pr.411	Main shaft clutch smoothing method	Sets the clutch smoothing method.	 Set in decimal. Direct Time constant method (index) Time constant method (linear) Slippage amount method (index) Slippage amount method (linear) Slippage amount method (linear) Slippage amount method (Linear: following amount of input) 	When starting synchronous control	0	36418+200n
Pr.412	Main shaft clutch smoothing time constant	Sets the smoothing time constant if time constant method smoothing.	• Set in decimal. 0 to 5000 [ms]		0	36419+200n
Pr.413	Slippage amount at main shaft clutch ON	Sets the slippage amount when the clutch is ON if slippage amount method smoothing.	• Set in decimal. 0 to 2147483647 [Main input axis position unit ¹² , or cam axis cycle unit ¹³]	When starting clutch ON	0	36420+200n 36421+200n
Pr.414	Slippage amount at main shaft clutch OFF	Sets the slippage amount when the clutch is OFF if slippage amount method smoothing.	• Set in decimal. 0 to 2147483647 [Main input axis position unit ^{*2} , or cam axis cycle unit ^{*3}]	When starting clutch OFF	0	36422+200n 36423+200n

n: Axis No. - 1

*1. The range from axis 1 to 2 is valid in the 2-axis module, from axis 1 to 4 is valid in the 4-axis module, from axis 1 to 8 is valid in the 8-axis module.

*2. Main input axis position unit

*3. Cam axis cycle unit

7.1.10 Auxiliary shafts

These are input axes for auxiliary shaft modules. For the auxiliary shaft module, the input values are generated from the auxiliary shafts. Furthermore, input values can be converted to values taking the mechanical reduction ratio and rotation direction into consideration with an auxiliary shaft gear.



n: Axis No. - 1

*1. The range from axis 1 to 2 is valid in the 2-axis module, from axis 1 to 4 is valid in the 4-axis module, from axis 1 to 8 is valid in the 8-axis module.

7.1.11 Auxiliary shaft gear

The auxiliary shaft travel value is converted with the set gear ratio and transferred.

	Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
	Pr.420	Auxiliary shaft gear numerator	Sets the auxiliary shaft gear numerator.	 Set in decimal. -2147483648 to 2147483647 	When starting	1	36432+200n 36433+200n
	Pr.421	Auxiliary shaft gear denominator	Sets the auxiliary shaft gear denominator.	• Set in decimal. 1 to 2147483647	synchronous control	1	36434+200n 36435+200n

n: Axis No. - 1

7.1.12 Auxiliary shaft clutch

П

The auxiliary shaft travel value is turned ON and OFF with the clutch and transferred. This is used if conveying/isolating command pulses from auxiliary shaft input to the output axis module side, and controlling servo motor operation/stoppage.

-

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.422	Auxiliary shaft clutch control setting	Sets the clutch control method.	 Set in hexadecimal notation. H== = ON control mode 0: No clutch 1: Clutch command eading edge 3: Clutch command trailing edge 4: Address mode 5: High-speed input request OFF control mode 0: OFF control	Operation cycle	0000H	36436+200n
Pr.423	Auxiliary shaft clutch reference address setting	Sets the clutch reference address.	 Set in decimal. O: Auxiliary shaft current value 1: Current value per cycle after main shaft gear 	When starting synchronous control	0	36437+200n
Pr.424	Auxiliary shaft clutch ON address	 Sets the address for turning ON the clutch when in address mode. (The setting is invalid when in other than address mode.) If other than "0 to (cam axis length per cycle -1)", the clutch is controlled after converting to the "0 to (cam axis length per cycle -1)" range. 	 Set in decimal. -2147483648 to 2147483647 [Auxiliary shaft position unit^{*2}, or cam axis cycle unit^{*3}] 	Operation cycle	0	36438+200n 36439+200n

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.425	Travel value before auxiliary shaft clutch ON	 Sets the travel value until the clutch is actually turned ON after the clutch ON conditions are established. Set a positive value for movements in the increase direction, and negative value for movements in the decrease direction. 	• Set in decimal. -2147483648 to 2147483647 [Auxiliary shaft position unit ^{*2} , or cam axis cycle unit ^{*3}]	When clutch ON conditions established	0	36440+200n 36441+200n
Pr.426	Auxiliary shaft clutch OFF address	 Sets the address for turning OFF the clutch when in address mode. (The setting is invalid when in other than address mode.) If other than "0 to (cam axis length per cycle -1)", the clutch is controlled after converting to the "0 to (cam axis length per cycle -1)" range. 	 Set in decimal. -2147483648 to 2147483647 [Auxiliary shaft position unit^{*2}, or cam axis cycle unit^{*3}] 	Operation cycle	0	36442+200n 36443+200n
Pr.427	Travel value before auxiliary shaft clutch OFF	 Sets the travel value until the clutch is actually turned OFF after the clutch OFF conditions are established. Set a positive value for movements in the increase direction, and negative value for movements in the decrease direction. 	• Set in decimal. -2147483648 to 2147483647 [Auxiliary shaft position unit ^{*2} , or cam axis cycle unit ^{*3}]	When clutch OFF conditions established	0	36444+200n 36445+200n

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.428	Auxiliary shaft clutch smoothing method	Sets the clutch smoothing method.	 Set in decimal. Direct Time constant method (index) Time constant method (linear) Slippage amount method (index) Slippage amount method (linear) Slippage amount method (Linear: following amount of input) 	When clutch OFF conditions established	0	36446+200n
Pr.429	Auxiliary shaft clutch smoothing time constant	Sets the smoothing time constant if time constant method smoothing.	• Set in decimal. 0 to 5000 [ms]		0	36447+200n
Pr.430	Slippage amount at auxiliary shaft clutch ON	Sets the slippage amount when the clutch is ON if slippage amount method smoothing.	 Set in decimal. 0 to 2147483647 [Auxiliary shaft position unit^{*2}, or cam axis cycle unit^{*3}] 	When starting clutch ON	0	36448+200n 36449+200n
Pr.431	Slippage amount at auxiliary shaft clutch OFF	Sets the slippage amount when the clutch is OFF if slippage amount method smoothing.	 Set in decimal. 0 to 2147483647 [Auxiliary shaft position unit², or cam axis cycle unit^{*3}] 	When starting clutch OFF	0	36450+200n 36451+200n

n: Axis No. - 1

*1. The range from axis 1 to 2 is valid in the 2-axis module, from axis 1 to 4 is valid in the 4-axis module, from axis 1 to 8 is valid in the 8-axis module.

- *2. Auxiliary shaft position unit
- *3. Cam axis cycle unit

7.1.13 Auxiliary shaft composite gear

Main shaft and auxiliary shaft travel values are compounded and transferred.

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.419	Auxiliary shaft composite gear	Selects the input value composition method from the main shaft and auxiliary shaft.	 Set in hexadecimal notation. H□□□□ Main shaft input method 0: No input 1: Input + 2: Input - Auxiliary shaft input method 0: No input 1: Input + 2: Input - 	Operation cycle	0001H	36431+200n

n: Axis No. - 1

7.1.14 Speed change gear

The speed change gear is used for changing the input speed from the main shaft, auxiliary shaft, or composite auxiliary shaft gear during operation. If not used, set "0: No speed change gear" for [Pr.434] speed change gear allocation.

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.434	Speed change gear allocation	Sets the speed change gear allocation.	 Set in decimal. No speed change gear Main shaft side Auxiliary shaft side After composite auxiliary shaft gear 	When starting synchronous	0	36460+200n
Pr.435	Speed change gear smoothing time constant	Sets the speed change gear smoothing time constant.	 Set in decimal. 0 to 5000 [ms] 	control	0	36461+200n
Pr.436	Speed change ratio numerator	Sets the speed change ratio numerator.	 Set in decimal. -2147483648 to 2147483647 	Operation	1	36462+200n 36463+200n
Pr.437 Speed change ration denominator Sets the speed change ratio denominator.		 Set in decimal. 1 to 2147483647 	cycle	1	36464+200n 36465+200n	

n: Axis No. - 1

7.1.15 Output axes

Output axes perform cam conversion processing based on the input travel value and set cam data, and outputs the feed current values that serve as commands to the servo amplifier.

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.438	Cam axis cycle unit setting	 Sets the cam axis length per cycle unit. This is a parameter for monitor display, and does not affect control. 	 Set in hexadecimal notation. H Control unit 0: mm 1: inch 2: degree 3: pulse No. of decimal point digits 0 to 9 Unit setting selection 0: Use main shaft main input axis unit. 	When starting synchronous control	0000H	36470+200n

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Pr.439	Cam axis cycle length	Sets the input amount required for 1 cam cycle.	 Set in decimal. 1 to 2147483647 [Cam axis cycle unit]^{*1} 		4194304	36472+200n 36473+200n
Pr.440	Cam No.	Sets the cam No.	 Set in decimal. 0 : Linear cam (preset) 1 to 256: User created cams 	When starting	0	36474+200n
Pr.441	Cam stroke amount	 Sets the cam stroke amount relative to a stroke ratio of 100 % for stroke ratio data format cams. Ignored for coordinate data format cams. 	 Set in decimal. -2147483648 to 2147483647 [Output axis position unit]^{*2} 	synchronous control, when passing cam data 0 point	4194304	36476+200n 36477+200n
Pr.442	Cam axis 1 cycle length change setting	Set if changing the [Pr.439] Cam axis length per cycle during synchronous control.	 Set in decimal. 0: Disable 1: Enable 	When starting synchronous control	0	36471+200n
Pr.444	Cam axis phase compensation advance time	Sets the time to advance or delay the cam axis phase.	 Set in decimal. -2147483648 to 2147483647 [μs] 	Operation cycle	0	36482+200n 36483+200n
Pr.445	Cam axis phase compensation time constant	Sets the time to reflect cam axis phase compensation.	 Set in decimal. 0 to 65535 [ms]^{*3} 		10	36484+200n
Pr.446	Synchronous control deceleration time	Set the deceleration time for the synchronous control.	 Set in decimal. 0 to 65535 [ms]^{*3} 	When starting synchronous control	0	36485+200n
Pr.447	Output axis smoothing time constant	Set if performing smoothing processing for output values.	 Set in decimal. 0 to 5000 [ms] 		0	36486+200n

n: Axis No. - 1

*1. Cam axis cycle unit*2. Output axis position unit*3. Set the value as follows in a program. 0 to 32767: Set as a decimal. 32768 to 65535: Convert into a hexadecimal and set.

[Cam data]

Synchronous control output axes are moved with cams. Output axis movement patterns (return movements, feed movements) relative to output axis module input travel values are registered in the cam data.

The movement patterns are as below:

· Return movement: Return movement within fixed cam stroke range



Feed movement: Movement that involves updating the cam reference position every 1 cycle



 Linear movement: Linear movement in which 1 cycle has a stroke ratio of 100 % (Cam No. 0)



7.1.16 Starting/ending for synchronous control

Set the parameters for synchronous control for each output axis to start synchronous control. The status changes to synchronous control after the parameters for synchronous control are analyzed at the start of synchronous control, and the output axes synchronize with input axis operations.



Synchronous control system control data

Symbol	Setting item	Setting details	Setting value	Load cycle	Default	Buffer memory address
Cd.380	Synchronous control start	 Synchronous control begins if the target axis bit is turned ON. Synchronous control ends if the bit is turned OFF during synchronous control. 	 Set the target axis in 16-bit. (bit0: axis 1 to bit15: axes 16⁻¹) OFF: Synchronous control end ON: Synchronous control start 	Operation cycle	0	36320

*1. The range from axis 1 to 2 is valid in the 2-axis module, from axis 1 to 4 is valid in the 4-axis module, from axis 1 to 8 is valid in the 8-axis module.

Starting method for synchronous control

Synchronous control can be started by turning the target axis bit from OFF to ON in "[Cd.380] Synchronous control start" after setting the parameters for synchronous control.

"5: Analyzing" is set in "[Md.26] Axis operation status" at the synchronous control start, and the parameters for synchronous control are analyzed. The BUSY signal turns ON after completion of analysis, and "15: Synchronous control" is set in "[Md.26] Axis operation status". Start the input axis operation after confirming that "15: Synchronous control" is set in "[Md.26] Axis operation status".

Ending method for synchronous control

Synchronous control can be ended by turning the target axis bit from ON to OFF in "[Cd.380] Synchronous control start" after the input axis operation is stopped.

The BUSY signal turns OFF at the synchronous control end, and "0: Standby" is set in "[Md.26] Axis operation status" at the output axis stop.

Synchronous control can also be ended by turning the target axis bit from ON to OFF in "[Cd.380] Synchronous control start" during the input axis operation. However, it is recommended to end after stopping the input axis operation since the output axis stops immediately.

7.1.17 Stop operation of output axis

If the following causes occur in stopping the output axis during synchronous control, synchronous control is completed after stops processing for the output axis (BUSY signal is OFF, axis operation status is standby).

Synchronous alignment must be executed for the output axis to restart the synchronous control.

Stop cause	Stop process	
The target axis bit of "[Cd.380] Synchronous control start" is turned from ON to OFF.		
Software stroke limit error occurrence		
Emergency stop	Immediate stop	
Forced stop		
Stop group1 to 3 ^{*1} (Stop with hardware stroke limit or stop command)	Deceleration stop	

*1. Refer to "User's Manual (Application)" for your Simple Motion Module.

(1) Immediate stop

The operation stops without decelerate. The simple motion module immediately stops the command, but the operation will coast for the droop pulses accumulated in the deviation counter of the servo amplifier.



(2) Deceleration stop

The output axis stops with deceleration according to the setting in "[Pr.37] Stop group 1 rapid stop selection" to "[Pr.39] Stop group 3 rapid stop selection". The deceleration time is set in "[Pr.446] Synchronous control deceleration time" for deceleration stop, and in "[Pr.36] Rapid stop deceleration time" for rapid stop. The slope of deceleration is as follows.

Slope of deceleration =

[Pr.8] Speed limit value / Deceleration time (Rapid stop deceleration time) The cam axis current value per cycle is not updated, and only the feed current value is updated, since the deceleration stop begins. Therefore, the path of the feed current value is drawn regardless the cam operation with deceleration stop.

The input axis must be stopped when the output axis is stop synchronizing with the input axis.



7.2 Practice Content

(1) Advanced synchronous control 1: Travel cutter

You will practice mainly the "Clutch function" that is used in the synchronous control. The travel cut takes place seamlessly by the travel of the disc axis and start of stop by the clutch function.

(2) Advanced synchronous control 2: Rotary cutter

You will practice mainly the "Cam automatic generation function" that is used in the synchronous control. The disc movements are controlled according to the automatically generated cam operation based on the parameters set up for the rotary cutter.



7.2.1 Advanced synchronous control 1: Travel cutter

System

A sensor detects the workpiece on the conveyor that travels at a constant speed. With reference to the detected white mark as a start point, the cutter shaft starts travel movement in the direction of the conveyor move. After the cutter shaft has moved a certain distance, it starts the cutting movement.

POINT

As for the "Travel movement" by the travel shaft and the "Cutting movement" where the cutter shaft rotates for simulated cutting, both of them use and learn "Synchronous control", "Clutch function" and "Cam function".

<Control flow>



Synchronous control

- Travel movement where the disc moves to the right while synchronizing the convevor motion
- Cutting movement where the cutter shaft rotates while synchronizing the travel shaft motion

Clutch function

- The travel shaft uses this function when it starts up and stops the travel movement.
- The cutter shaft uses the clutch function when it starts and stops the cutting movement.
- Given the slippage amount at the time of clutch ON/OFF, the clutch function let the travel movement and cutting movement of the cutter shaft operates seamlessly smooth at the time such motions start. This demonstration machine has the slippage amounts set to 50 mm at the start of the travel movement and 5 mm at its stop. You can observe the actual motions to see how they work.

Cam function

- The cutter shaft uses this function for the cutting movement.
- Here, with two sets of cam data set up in advance, you can select them on the demonstration machine operation panel to see how the cam moves.

Cam No. 1



Cam No. 2



7.2.2 Advanced synchronous control 2: Rotary cutter

System

A sensor detects the workpiece once for the first time on the conveyor that travels at a constant speed. With reference to the detected white mark as a start point, the disc rotates to carry out the operation for the simulated cutting.

POINT

As for the "Cutting movement" where the disc rotates for simulated cutting, uses and learns "Synchronous control", "Clutch function" and "Cam automatic generation function".

<Control flow>



Synchronous control

• The cutting movement where the cutter shaft rotates. The axis rotation follows the automatically generated cam operation.

Clutch function

- The cutter shaft uses this function when it starts the cutting movement.
- * The synchronous control and the clutch function turn on at the same time as the sensor detects the workpiece for the first time. The ON status remains until the operation finishes.

Cam automatic generation function

• The cutter shaft uses this function for the cutting movement.

<About cam automatic generation function>

The initial parameter settings are as follows.

- Resolution: 512
- Cam automatic generation function: Cam for the rotary cutter.
- Acceleration rate over synchronous section: 100 % (Reaches the same speed as the conveyor speed at the rate of 100 %)
- Sheet length: 50.0 mm
- Sheet synchronous width: 10.0 mm
- Synchronous axis length: 251.3 mm (diameter)
- Synchronization start position: 45.0 mm

<About the rotary cutter movement>

The rotary cutter rotates according to the automatically generated cam operation as shown in the figure below.



Input (X)			Output (Y)		
X0	READY	Y0	PLC ready		
X1	Synchronization flag	Y1	All axis servo ON		
X10	Axis 1.BUSY	Y10	Axis 1.Positioning start		
X11	Axis 2.BUSY	Y11	Axis 2.Positioning start		
X12	Axis 3.BUSY	Y12	Axis 3.Positioning start		
X20	Sensor input (SEN1)				

7.3 Assignment of Devices Used for Practice

Internal relay (M)							
M30	[PB for GOT] Home position return start (Advanced 1)	M4010	Home position return Axis 1 FB start				
M31	[PB for GOT] Start up advanced 1	M4011	Home position return Axis 1 FB operating flag				
M32	[PB for GOT] Clutch 1	M4012	Home position return Axis 1 FB operation OK flag				
M33	[PB for GOT] Speed UP change	M4013	Home position return Axis 1 FB operation NG flag				
M34	[PB for GOT] Speed DOWN change	M4020	Home position return Axis 2 FB start				
M36	Command during Advanced 1 operation	M4021	Home position return Axis 2 FB operating flag				
M50	[PB for GOT] Home position return start (Advanced 2)	M4022	Home position return Axis 2 FB operation OK flag				
M51	[PB for GOT] Start up advanced 2	M4023	Home position return Axis 2 FB operation NG flag				
M53	[PB for GOT] Speed UP change	M4030	Home position return Axis 3 FB start				
M54	[PB for GOT] Speed DOWN change	M4031	Home position return Axis 3 FB operating flag				
M55	[PB for GOT] Cam generation	M4032	Home position return Axis 3 FB operation OK flag				
M56	Advanced 2 operation command	M4033	Home position return Axis 3 FB operation NG flag				
M59	[PB for GOT] Cam data reference	M4310	Advanced 1 Axis 1 FB start				
M202	[Operating completion flag] Axis 2 standby point traveling	M4311	Advanced 1 Axis 1 FB operating flag				
M203	[Operating completion flag] Axis 3 standby point traveling	M4312	Advanced 1 Axis 1 FB operation OK flag				
M211	[Operation completion flag] Home position return start	M4313	Advanced 1 Axis 1 FB operation NG flag				
M252	[Operating completion flag] Axis 2 standby point traveling	M4320	Advanced 1 Axis 2 FB start				
M253	[Operating completion flag] Axis 3 standby point traveling	M4321	Advanced 1 Axis 2 FB operating flag				
M261	[Operation completion flag] Cam initial setting	M4322	Advanced 1 Axis 2 FB operation OK flag				
M301	[Advanced 1 status] Home position return command when starting	M4323	Advanced 1 Axis 2 FB operation NG flag				
M302	[Advanced 1 status] Start command	M4330	Advanced 1 Axis 3 FB start				
M303	[Advanced 1 status] Standby point traveling command	M4331	Advanced 1 Axis 3 FB operating flag				
M304	[Advanced 1 status] Conveyor start command	M4332	Advanced 1 Axis 3 FB operation OK flag				
M305	[Advanced 1 status] Synchronous control start	M4333	Advanced 1 Axis 3 FB operation NG flag				
M306	[Advanced 1 status] Sensor input wait	M4410	Advanced 1 Axis 1 speed change FB start				
M307	[Advanced 1 status] Synchronous controlling	M4411	Advanced 1 Axis 1 speed change FB operating flag				
M308	[Advanced 1 status] Synchronous control ending	M4412	Advanced 1 Axis 1 speed change FB operation OK flag				
M309	[Advanced 1 status] Return operation start	M4413	Advanced 1 Axis 1 speed change FB operation NG flag				
M310	[Advanced 1 status] Return operating	M4510	Advanced 2 Axis 1 FB start				
M311	[Advanced 1 status] 1 cycle end	M4511	Advanced 2 Axis 1 FB operating flag				

	Internal relay (M)							
M312	[Advanced 1 status] End processing	M4512	Advanced 2 Axis 1 FB operation OK flag					
M320	Advanced 1 1 cycle start command	M4513	Advanced 2 Axis 1 FB operation NG flag					
M401	[Advanced 2 status] Home position return command when starting	M4520	Advanced 2 Axis 2 FB start					
M402	[Advanced 2 status] Start command	M4521	Advanced 2 Axis 2 FB operating flag					
M403	[Advanced 2 status] Standby point traveling command	M4522	Advanced 2 Axis 2 FB operation OK flag					
M404	[Advanced 2 status] Conveyor start command	M4523	Advanced 2 Axis 2 FB operation NG flag					
M405	[Advanced 2 status] Sensor input wait	M4530	Advanced 2 Axis 3 FB start					
M406	[Advanced 2 status] Synchronous operating	M4531	Advanced 2 Axis 3 FB operating flag					
M407	[Advanced 2 status] Synchronous ending	M4532	Advanced 2 Axis 3 FB operation OK flag					
M408	[Advanced 2 status] Standby point traveling after end	M4533	Advanced 2 Axis 3 FB operation NG flag					
M500	Advanced 2 Cam auto-generation command	M5012	FB start conveyor start (Axis 1)					
M1000	[PB for GOT] Servo ON	M5021	FB start standby point traveling (Axis 2)					
M1010	[PB for GOT] Axis 1 reverse rotation JOG	M5031	FB start standby point traveling (Axis 3)					
M1011	[PB for GOT] Axis 1 forward rotation JOG	M5032	FB start standby point traveling after end (Axis 3)					
M1012	[PB for GOT] Axis 2 reverse rotation JOG	M5040	FB start advanced speed change setting when starting					
M1013	[PB for GOT] Axis 2 forward rotation JOG	M5041	FB start Advanced speed change acceleration					
M1014	[PB for GOT] Axis 3 forward rotation JOG	M5042	FB start Advanced speed change deceleration					
M1015	[PB for GOT] Axis 3 reverse rotation JOG	M5512	FB start conveyor start (Axis 1)					
M1020	[PB for GOT] Home position return	M5521	FB start standby point traveling (Axis 2)					
M1021	JOG screen Home position return trigger	M5522	FB start standby point traveling after end (Axis 2)					
M1022	Axis 1 Home position return start	M5531	FB start standby point traveling (Axis 3)					
M1023	Axis 2 Home position return start	M6000	JOG•home position mode					
M1024	Axis 3 Home position return start	M6002	Advanced control 1					
M1031	Home position return trigger for advanced	M6003	Advanced control 2					
M2000	All ax servo ON	M6010	Error detection					
M2001	Axis 1 BUSY signal	M6800	JOG-home position switch					
M2002	Axis 2 BUSY signal	M6801	Positioning control switch					
M2003	Axis 3 BUSY signal	M6802	Advanced synchronous control 1 switch					
M2011	Axis 1 servo ready signal	M6803	Advanced synchronous control 2 switch					
M2012	Axis 2 servo ready signal	M6840	Speed synchronizing					
M2013	Axis 3 servo ready signal	M6841	Advanced synchronizing					
		M6855	Advanced programs start					

	Data register						
D0		D5072					
D1	Axis T Feed current value	D5073					
D20	Avia 2 Faced everyont value	D5074	Sheet synchronous width 50% (D5062/2)				
D21	Axis 2 Feed current value	D5075					
D40	Avia 2 Faced everyont value	D6050	[GOT setting] Automatic Cam generation				
D41	Axis 3 Feed current value	D6051	acceleration rate over synchronous section				

	Data reg	jister (D)	
D640	Avis 1 IOG speed	D6052	[GOT setting] Automatic Cam generation
D641		D6053	Sheet length
D642		D6054	[GOT setting] Automatic Cam generation
D643	Axis 2 30G speed	D6055	Sheet synchronous width
D644	Avis 3 IOC speed	D6060	_
D645	Axis 5 JOG speed	D6061	Longth per evelo initial coloulated value
D3001	Advanced 1 Cam No. specification	D6062	
D3900	Device to modify JOG/Home position return screen	D6063	
D4019	Axis 1 home position return FB error No. storage	D7000	Axis 1 motor rotation speed waveform data (Start point)
D4029	Axis 2 home position return FB error No. storage	D7001	
D4039	Axis 3 home position return FB error No. storage	to	Axis 1 motor rotation speed waveform data (Middle)
D4318	Axis 1 advanced 1 FB positioning No. storage	D7298	
D4319	Axis 1 advanced 1 FB error No. storage	D7299	Axis 1 motor rotation speed waveform data (End point)
D4328	Axis 2 advanced 1 FB positioning No. storage	D7500	Axis 2 motor rotation speed waveform data (Start point)
D4329	Axis 2 advanced 1 FB error No. storage	D7501	
D4338	Axis 3 advanced 1 FB positioning No. storage	to	Axis 2 motor rotation speed waveform data (Middle)
D4339	Axis 3 advanced 1 FB error No. storage	D7798	
D4417	Advanced common Axis 1 speed change	D7799	Axis 2 motor rotation speed waveform data (End point)
D4418	speed specification storage	D7950	
D4419	Advanced common Axis 1 speed change FB error No. storing	D7951	For Axis 2 motor rotation speed waveform
D4518	Axis 1 advanced 2 FB positioning No. storage	D7952	
D4519	Axis 1 advanced 2 FB error No. storage	D7953	
D4528	Axis 2 advanced 2 FB positioning No. storage	D8000	Axis 3 motor rotation speed waveform data (Start point)
D4529	Axis 2 advanced 2 FB error No. storage	D8001	
D4538	Axis 3 advanced 2 FB positioning No. storage	to	Axis 3 motor rotation speed waveform data
D4539	Axis 3 advanced 2 FB error No. storage	D8298	
D5050	Acceleration rate over synchronous section	D8299	Axis 3 motor rotation speed waveform data (End point)
D5051	calculated value (change value)	D8450	
D5062	Sheet length 50% calculated value	D8451	For Axis 3 motor rotation speed waveform
D5063	(D6052/2)	D8452	calculation
D5064		D8453	
D5065	Shoot augustraneus width E00/ (D0054/2)	D8480	For trend display
D5066			
D5067			

7.4 **Opening the Project for RD77MS**

Open the project data for practice.



(1) Click [Project] \rightarrow [Open] on the GX Works3

(2) A dialog box prompting the user to open a project appears. Select the "SCHOOL_ (advanced)", and then click the Open button.

(3) The message shown on the left appears, press

For the procedure for creating new project data, refer to Chapter 5. Refer to Section 7.6 and 7.9 on program.

Click!

🔲 Do not show this dialog again

OK

7.5 Simple Motion Module Setting

Set the parameters when performing practical work (traveling cutter and rotary cutter) with the Simple Motion Module setting tool.

7.5.1 Parameters



 Set parameters of the RD77MS4.
 In the [Navigation window], select [0000:RD77MS4], and double-click [Parameter].

- (2) The RD77MS4 Parameter Setting screen appears.

- (3) Specify Common parameters as shown below.

Item	Axis #1	Axis #2	Axis #3	
Common parameter	The parameter does not rely on axis and relate to the whole system.			
Pr.82:Forced stop valid/invalid selection	1:Invalid			
Pr.24:Manual pulse generator/Incremental Sync. ENC input selection	0:A-phase/B-phase Mode (4 Multiply)			
Pr.89:Manual pulse generator/Incremental Sync. ENC input type selection	1:Voltage Output/Open Collector Type			
Pr.96:Operation cycle setting	FFFFh:Automatic Setting			
Pr.97:SSCNET Setting	1:SSCNET III/H			
Pr.150:Input terminal logic selection	Set the logic of external input signal (proximity dog, external command/switching) from the external device of simple motion module.			
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 input s	ignal.		





(4) Specify Basic parameters 1 as shown below.

Itom	Avia #1	Axio #0	Axia #2
Basic parameters 1	Set according to the machine and appli	cable motor when system is started up ((It will be valid according to PLC REA
Pr. 1:Unit setting	0:mm	2:degree	0:mm
Pr.2:No. of pulses per rotation	4194304 pulse	4194304 pulse	4194304 pulse
Pr.3:Movement amount per rotation	110000.0 µm	360.00000 degree	8000.0 μm
Pr.4:Unit magnification	1:x1Times	1:x1Times	1:x1Times
Pr. 7:Bias speed at start	0.00 mm/min	0.000 degree/min	0.00 mm/min

(5) Specify Basic parameters 2 as shown below.

Item	Axis #1	Axis #2	Axis #3	
Basic parameters 2	Set according to the machine and applicable motor when system is started up			
Pr.8:Speed limit value	55000.00 mm/min	1080000.000 degree/min	24000.00 mm/min	
Pr.9:Acceleration time 0	100 ms	100 ms	100 ms	
Pr. 10:Deceleration time 0	150 ms	100 ms	100 ms	

(6) Specify Detailed parameters 1 as shown below.

Item	Axis #1	Axis #2	Axis #3	
Detailed parameters 1	Set according to the system configurat	ion when the system is started up.(It wi	II be valid according to PLC READY s	
Pr.11:Backlash compensation amount	0.0 µm	0.00000 degree	0.0 µm	
Pr.12:Software stroke limit upper limit value	0.0 µm	0.00000 degree	149000.0 µm	
Pr.13:Software stroke limit lower limit value	0.0 µm	0.00000 degree	-1000.0 µm	
PT. 14:SOTtware stroke limit	0:Set Software Stroke Limit to Feed Current	orset software stroke Limit to Feed Current	orset software stroke limit to reed current	
selection	Value	Value	Value	
Pr. 15:Software stroke limit valid/invalid setting	0:Valid	0:Valid	0:Valid	
Pr. 16:Command in-position width	10.0 µm	0.00100 degree	10.0 µm	
Pr. 17:Torque limit setting value	300.0 %	300.0 %	300.0 %	
Pr. 18:M-code ON signal output timing	0:WITH Mode	0:WITH Mode	0:WITH Mode	
Pr. 19:Speed switching mode	0:Standard 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	0:Vector Speed	
Pr.21:Feed current value during speed control	1:Update of Feed Current Value	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	0:Negative Logic	
Pr.22:Input signal logic selection : Upper limit	0:Negative Logic	0:Negative Logic	0:Negative Logic	
Pr.22:Input signal logic selection : Stop signal	0:Negative Logic	0:Negative Logic	0:Negative Logic	
Pr.22:Input signal logic selection : Proximity dog signal	0:Negative Logic	0:Negative Logic	1:Positive Logic	
Pr.81:Speed-position function selection	0:Speed-position Switching Control (INC Mode)	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	1:Servo Amplifier	
Pr. 116:FLS signal selection : Input terminal	00h:No Setting	00h:No Setting	00h:No Setting	
Pr. 117:RLS signal selection : Input type	15:Invalid	15:Invalid	1:Servo Amplifier	
Pr. 117:RLS signal selection : Input terminal	00h:No Setting	00h:No Setting	00h:No Setting	
Pr. 118:DOG signal selection : Input type	15:Invalid	1:Servo Amplifier	1:Servo Amplifier	
Pr. 118:DOG signal selection : Input terminal	00h:No Setting	00h:No Setting	00h:No Setting	
Pr.119:STOP signal selection : Input type	15:Invalid	15:Invalid	15:Invalid	
Pr.119:STOP signal selection : Input terminal	00h:No Setting	00h:No Setting	00h:No Setting	





(7) Specify Detailed parameters 2 as shown below.

	Item	Axis #1	Axis #2	Axis #3
	Detailed parameters 2	Set according to the system configurat	ion when the system is started un(Set a	s required)
[Pr.25:Acceleration time 1	50 ms	1000 ms	1000 ms
	Pr.26:Acceleration time 2	100 ms	1000 ms	1000 ms
	Pr.27:Acceleration time 3	1000 ms	1000 ms	1000 ms
	Pr.28:Deceleration time 1	2000 ms	1000 ms	1000 ms
-	Pr.29:Deceleration time 2	150 ms	1000 ms	1000 ms
	Pr 30-Deceleration time 3	1000 ms	1000 ms	1000 ms
	Pr.31:JOG speed limit value	11000.00 mm/min	36000.000 degree/min	8000.00 mm/min
	time selection	2:100	0:100	0:100
	Pr.33:JOG operation deceleration time selection	2:150	0:100	0:100
	Pr.34:Acceleration/deceleration process selection	0:Trapezoidal Acceleration/Deceleration Process	0:Trapezoidal Acceleration/Deceleration Process	0:Trapezoidal Acceleration/Deceleration Process
	Pr.35:S-curve ratio	50 %	50 %	50 %
	Pr.36:Rapid stop deceleration time	50 ms	50 ms	50 ms
	selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop
	Pr.38:Stop group 2 rapid stop selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop
	Pr. 39:Stop group 3 rapid stop selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop
	Pr.40:Positioning complete signal output time	300 ms	300 ms	300 ms
	Pr.41:Allowable circular interpolation error width	10.0 µm	0.00100 degree	10.0 µm
	Pr.42:External command function selection	0:External Positioning Start	0:External Positioning Start	0:External Positioning Start
	Pr.83:Speed control 10x multiplier setting for degree axis	0:Invalid	0:Invalid	0:Invalid
	Pr.84:Restart permissible value range when servo OFF to ON	0 pulse	0 pulse	0 pulse
	Pr.90:Operation setting for SPD-TRQ Cont. mode : Torque initial value selection	0:Command Torque	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	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	0:Switching Conditions Valid at Mode Switching
	Pr. 127:Speed limit value input selection at control mode switch	0:Input Enable	0:Input Enable	0:Input Enable
	Pr.95:External command signal selection	0:Not Used	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	0:Do Not Execute Speed Limit
	Pr. 123:Manual pulse generator speed limit value	200.00 mm/min	20.000 degree/min	200.00 mm/min



(8) Specify Home position return basic parameters as shown below.

Item Axis #1		Axis #2	Axis #3		
HPR basic parameters	rs Set the values required for carrying out HPR control (Valid when the PLC READY signals ON).				
Pr.43:HPR method	6:Data Set Method	0:Proximity Dog Method	0:Proximity Dog Method		
Pr.44:HPR direction	1:Reverse Direction (Address Decrease Direction)	1:Reverse Direction (Address Decrease Direction)	1:Reverse Direction (Address Decrease Direction)		
Pr.45:HP address	0.0 µm	180.00000 degree	0.0 µm		
Pr.46:HPR speed	0.01 mm/min	18000.000 degree/min	600.00 mm/min		
Pr.47:Creep speed	0.01 mm/min	3600.000 degree/min	250.00 mm/min		
Pr.48:HPR retry	0:Do Not Retry HPR with Limit Switch	1:Retry HPR with Limit Switch	1:Retry HPR with Limit Switch		



(9) Specify Home position return detailed parameters as shown below.

Item	Axis #1	Axis #2	Axis #3	
HPR detailed parameters	Set the values required for carrying ou	HPR control (Valid when the PLC READY signals ON).		
Pr.50:Setting for the movement amount after proximity dog ON	0.0 µm	0.00000 degree	0.0 µm	
Pr.51:HPR acceleration time selection	0:100	0:100	0:100	
Pr. 52:HPR deceleration time selection	0:150	0:100	0:100	
Pr.53:HP shift amount	0.0 μm	-0.50000 degree	0.0 μm	
Pr.543HPR torque limit value	300.0 %	300.0 %	300.0 %	
Pr.55:Operation setting for incompletion of HPR	1:Positioning Control is Executed	1:Positioning Control is Executed	1:Positioning Control is Executed	
Pr.56:Speed designation during HP shift	0:HPR Speed	0:HPR Speed	0:HPR Speed	
Pr. 57:Dwell time during HPR retry	0 ms	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	0:Turn HPR Request ON at Servo OFF	
Pr.87:Pulse conversion unit : Waiting time after clear signal output	0 ms	0 ms	0 ms	
-		<u>_</u>		

(10) Specify Extended parameters as shown below.

	Item	Axis #1	Axis #2	Axis #3	
🖃 Expansion	n narameters	Set according to the system configurat	<u>iet according to the system configuration when the system is started un. (This r</u>		
Pr.91:Op Data type	tional data monitor : e setting 1	7:Servo Motor Speed	0:No Setting	0:No Setting	
Pr.92:Op Data type	tional data monitor : e setting 2	0:No Setting	0:No Setting	0:No Setting	
Pr.93:Op Data type	tional data monitor : e setting 3	0:No Setting	0:No Setting	0:No Setting	
Pr.94:Op Data type	tional data monitor : e setting 4	0:No Setting	0:No Setting	0:No Setting	

7.5.2 Servo parameters



 Set parameters of the servo amplifier.
 In the [Navigation window], select [0000:RD77MS4], and double-click [Servo Parameter].



(2) A Servo Parameter Setting window appears. Click [Function display] → [Component parts] in the Parameter Setting screen display selection tree, and then specify the following settings.



(3) Absolute pos. detect system selection: Enabled (Used in ABS pos. detect system)

(4) Switch to Axis 2 and 3, and set the parameter settings in a manner similar to Axis 1.

7.5.3 Positioning data



 Set the positioning data.
 Select [0000:RD77MS4] → [Positioning Data], and double-click [Axis #1 Positioning Data].





		-		Office Stridie	Motoriladev	commanu speeu caici	Motor
Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	Command s
<positioning comment<="" td=""><td>></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	>						
<positioning comment<="" td=""><td>></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	>						
<positioning comment<="" td=""><td>></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	>						
<positioning comment<="" td=""><td>></td><td></td><td></td><td></td><td></td><td></td><td></td></positioning>	>						
	10						
n pattern							,
ation pattern designat in.	es whether positioning o	f a certan data No.	is to be ended i	with just that da	ta, or whether the position	oning for the next data	s No. is to b
	Operation pattern «Positioning Comment «Positioning Comment «Positioning Comment «Positioning Comment and Comment an	Operation pattern Control method Protoring Comment> Protoring Comment> Protoring Comment> Protoring Comment> In pattern ation pattern designates whether positioning o N	Operation pattern Control method Aris to be interplated diversing Comment> -diversing Comment> -diversing Comment> -diversing Comment> -diversing Comment> -diversing Comment> 	Operation pattern Control method Are to be Aready and Area to be Aready and A	Operation pattern Control method Axe to be interpolated Axet end on the polated Axet end on the too -Protocing Connect>	Arete bits interplated Arete bits methods Arete bits methods Arete bits methods Postoving address -Producing Connect- 	Operation pattern Control method Acts to be interpolated Acceleration Deceleration Positioning address Acceleration -Producing Connent>

(2) Axis 1 Positioning Data Setting screen appears. Specify positioning parameters as shown below.

Axis 1 Positioning data

	No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	
	5	0:END	05h:RVS V1	-	0:100	0:150	0.0 µm	0.0 µm	
L		<positioning comment="">Ad. 1,2 Conveyor start</positioning>							

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
5	3000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method

Remarks

The positioning data can be edited by selecting the range by dragging the mouse and using the [Cut], [Copy] and [Paste] functions in the [Edit] mode.





(3) Switch to the Positioning Data of Axis 2 and 3, and set the parameter settings in a manner similar to Axis 1.

Axis 2 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address
1	0:END	01h:ABS Linear 1	-	0:100	0:100	180.00000 degree	0.00000 degree
	<positioning comm<="" td=""><td>ent>Ad.1 Standby point trave</td><td>ling</td><td></td><td></td><td></td><td></td></positioning>	ent>Ad.1 Standby point trave	ling				
20	0:END	01h:ABS Linear 1	-	0:100	0:100	0.00000 degree	0.00000 degree

<Positioning Comment>Ad.2 Standby point traveling

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
1	18000.000 degree/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
20	18000.000 degree/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method

Axis 3 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address
1	0:END	01h:ABS Linear 1	-	0:100	0:100	0.0 µm	0.0 µm
	<positioning comm<="" td=""><td>nent>Ad.1 Standby point trave</td><td>ling</td><td></td><td></td><td></td><td></td></positioning>	nent>Ad.1 Standby point trave	ling				
10	0:END	01h:ABS Linear 1	-	0:100	0:100	0.0 µm	0.0 µm
	<positioning comment="">Ad. 1 Return operation</positioning>						
20	0:END	01h:ABS Linear 1	-	0:100	0:100	50000.0 µm	0.0 µm

<Positioning Comment>Ad.2 Standby point traveling

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
1	400.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
10	16000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
20	24000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method

7.5.4 Synchronous control parameters



(1) Set the input axis parameters in the synchronous control parameters.

In the [Navigation window] of the Simple Motion setting tool, select [0000:RD77MS4] \rightarrow [Synchronous Control Parameter], and double-click [Input Axis Parameter].

(2) The RD77MS4 Input Axis Parameter Setting screen appears.

isplay Filter	All Input Axes	•	Synchronous Parameter Setting	Synchronous Control Image	
	Item	Axis #1	Axis #2	Axis #3	
Servo inpu	t axis				
Pr.300:Se	vo input axis type	0:Invalid	0:Invalid	0:Invalid	
Detail se	tting				
Synchrono	us encoder axis				
Synchron	nous encoder axis setting				
Pr.320:	Type	0:Invalid	0:Invalid	Utinvalid	
Pr.320: amplifie	Axis No. of connected servo r	0	0	0	
Pr.329: encode	Resolution of synchronous ' via CPU	0	0	0	
😑 Unit sett	ing (Position)				
Pr.321:	Unit	3:pulse	3:pulse	3:pulse	
Pr.321:	Number of decimal places	0	0	0	
😑 Unit sett	ing (Speed)				
Pr.321:	Unit	0:s	0:s	0:s	
Pr.321:Number of decimal places		0	0	0	
😑 Unit con	version				
Pr.322:	Numerator	1 pulse	1 pulse	1 pulse	
Pr.323:	Denominator	1 pulse	1 pulse	1 pulse	
Pr.324:Let	ngth per cycle	4000 pulse	4000 pulse	4000 pulse	
🕀 Detail se	tting				

(3) Specify servo input axis as shown below.

20000:RD7	7MS4[]-Input Ax >	<mark><.</mark>				4
Display Filter	All Input Axes	•	Synchronous	s Parameter Setting	5	Synchronous Control Image
- Forma in an	Item	Axis #1		Axis #2		Axis #3
Pr.300:Servo input axis type		2:Actual Current Value	0:1	0:Invalid 2:Actual Curre		2:Actual Current Value
Detail Se	cong					

Go to next page



(4) Set synchronous parameters of the Axis 2.
 In the [Navigation window] of the Simple Motion setting tool, select [0000:RD77MS4] →
 [Synchronous Control Parameter] →
 [Synchronous parameter], and double-click [Axis 2 synchronous parameter].

From previous page

(5) The Axis 2 Synchronous Parameter Setting screen appears.





(6) Set the main shaft, the main shaft clutch, the auxiliary shaft and the auxiliary shaft composite gear as follows.









(7) Set the auxiliary shaft clutch and the output axis as follows.





(8) Next, switch to the Synchronous control parameter of Axis 3, and set the parameter settings in a manner similar to Axis 2.






(9) Set the main shaft, the composite main shaft gear and the main shaft clutch as follows.



(10) Set the auxiliary shaft clutch as follows.



7.5.5 Cam data

New Data

Cam No.

Comment

1 🚔 (1 to 256)



Setting Method

Set by Stroke Ratio

Cam Curve

Set by Coordinate

Auto-Generate

OK

 Create cam data for Axis 2.
 In the [Navigation window] of the Simple Motion setting tool, right-click [Cam Data], and click [Add New Data].

- (2) Specify the following settings at the New Data dialog box that appears.
 - Cam No.: 1

• Setting Method: Set by Stroke Ratio, and Cam Curve

Click the OK button after setting.

(3) Cam data is created. No. 0001 will be added to the navigation window, and the cam data No. 0001 screen will appear.

X

Free Curve

Cancel

Click on ">" at "Setting method."

Click!



Go to next page

From previous page Ļ (4) Display "Length per cycle setting" and "Stroke amount setting". Set them as shown on the

Len. per Cycle Setting Unit: mm Len. per Cycle: 70000.0 [µm]

Stroke Amount Setting Unit: degree Stroke Amount: 360.00000 [degree]

(5) Specify the setting screen stroke settings as follows.

right.

Stroke Setti	ng			Setting!
Section	Start [µm]	End [µm]	Stroke [degree]	Cam Curve
1	0.0	25000.0	0.00000	Constant Speed
2	25000.0	30000.0	-180.00000	Cycloid
3	30000.0	40000.0	-180.00000	Constant Speed
4	40000.0	45000.0	0.00000	Cycloid
5	45000.0	0.0	0.00000	Constant Speed

(6) The set stroke graph will be displayed in the cam graph field. Change the "Display Graph" check box selections to change the graph display in order to view the Stroke, Speed, Acceleration, and Jerk relative to the movement position in a chart.



Point Data	
View	Click!

Table No.	Length per Cycle [µm]	Stroke [degree]	Speed	Acceleration	Jerk	Cam Curve	
1	273.4	0.00000	0.00	0.00	0.0	Constant Speed	1
2	546.9	0.00000	0.00	0.00	0.0	Constant Speed	
3	820.3	0.00000	0.00	0.00	0.0	Constant Speed	
4	1093.8	0.00000	0.00	0.00	0.0	Constant Speed	
5	1367.2	0.00000	0.00	0.00	0.0	Constant Speed	
6	1640.6	0.00000	0.00	0.00	0.0	Constant Speed	
7	1914.1	0.00000	0.00	0.00	0.0	Constant Speed	
8	2187.5	0.00000	0.00	0.00	0.0	Constant Speed	
9	2460.9	0.00000	0.00	0.00	0.0	Constant Speed	
10	2734.4	0.00000	0.00	0.00	0.0	Constant Speed	
11	3007.8	0.00000	0.00	0.00	0.0	Constant Speed	
12	3281.3	0.00000	0.00	0.00	0.0	Constant Speed	
13	3554.7	0.00000	0.00	0.00	0.0	Constant Speed	
14	3828.1	0.00000	0.00	0.00	0.0	Constant Speed	
15	4101.6	0.00000	0.00	0.00	0.0	Constant Speed	
16	4375.0	0.00000	0.00	0.00	0.0	Constant Consta	
17	4648.4	0.00000	0.00	0.00	0.0	Constar Cli	ck
							se

(7) To view the stroke ratio, speed, acceleration, and jerk relative to the movement position in numerical values, click the "Point Data" View button.

There are tables from No. 1 to 256. Scroll to view all tables.

After checking, click the Close button.

(8) Create cam data for cam No. 0002 using the same procedure as that for cam No. 0001. Specify the setting screen stroke settings shown below.

Stroke Setti	ng			
				Setting!
Section	Start [µm]	End [µm]	Stroke [degree]	Cam Curve
1	0.0	20000.0	0.00000	Constant Speed
2	20000.0	25000.0	-180.00000	Cycloid
3	25000.0	30000.0	-120.00000	Cycloid
4	30000.0	40000.0	-70.00000	Cycloid
5	40000.0	45000.0	0.00000	Cycloid
6	45000.0	0.0	0.00000	Constant Speed

From previous page

(9) Cam data creation is now complete.



From previous page

Cam No. 1



Cam No. 2



7.6 Advanced Synchronous Control Programs

7.6.1 Advanced synchronous control 1: Travel cutter program

The sequence program used with advanced synchronous control 1 is shown in the following table.

*** [Advance	ed 1] Advance	d synchronous control	operation 1 oper	ation main *****							
	M6002										
										D3001	U0¥G36674
(1577)									MOV		
(1577)									I NOT	Advanced 1	Axis 2 Cam No.
	Advanced									Specification	
	Control 1									opcomodelori	
	M6002										
	100002									K700000	U0¥G36672
	- Iti	1									
(1583)									DMOVP		Axis 2 Cam axis length
	Advanced										per cycle (L)
	control 1										
										KO	LIOXG44109
										NU	00#G44103
									MOVE		
									1010/01		Axis 2 auxiliary shaft
											clutch command
										K0	U0¥G44101
									MOVP		Avia O main aboft
											clutch control invalid
											command
										K300000	D4417
									DMOVP		Advanced common
											Axis 1 speed change
											speed specification
											storage
	M6002	M31	RD77_1.bnBusy_	RD77_1.bnBusy_	RD77_1.bnBu	U0¥G2417.3					14004
			D[0]	D[1]	sy_D[2]						M301
		I A I	DATO								
(1605)										SET	
(1005)		r 1 -								OC I	[Advanced 1 status]
	Advanced	PB for GOT Start	R:BUSY(Axis#1	R:BUSY(Axis#1	R:BUSY	Axis 1 home position					Home position return
	control I	up advanced I	-#16(Uirect)	-#16/(Direct)	(Axis#1-#16) (Direct)	return request					starting
					(Direct)						
		M301				00¥G2517.3					
						₋	-				
		[Advanced 1 status]				Axis 2 home position					
		Home position return				return request					
		command when									
		starting									
						U0¥G2617.3	1				
	1										
						Axis 3 home position					
						return request					
	1					1					
	1					1.000000000		110200077.5			
						00#G2417.3	00#G2517.3	00#G2617.3			M302
	1					<u>├</u>	-11			-	
	1									SET	[Advanced 1 otatus]
						Axis 1 home position	Axis 2 home	Axis 3 home			Start command
						return request	position	position			areas a substitution for
							return request	return request			
	1										
	1										M36
										SET	Command during
											Advanced 1 operation
	1										

	M36	M302	RD77_1.bnBusy_ D[0]	RD77_1.bnBusy_ D[1]	RD77_1.bnBu sy_D[2]		К1	D4328
(1641)	Command	[Advanced 1 status]	R:BUSY(Axis#1	R:BUSY(Axis#1		MOVP		Axis 2 advanced 1 FB positioning No. storage
	during Advanced 1 operation	Start command	-#16)(Direct)	-#16)(Direct)	(Axis#1-#16) (Direct)			
							K1	D4338
						MOVP		Axis 3 advanced 1 FB positioning No. storage
								L (5001
								MB021
							SET	FB start standby point traveling (Axis 2)
								M5031
							SET	FB start standby point traveling (Axis 3)
								M303
							SET	[Advanced 1 status] Standby point traveling command
								M301
							RST	[Advanced 1 status] Home position return command when starting
								1/000
								M302
							RST	[Advanced 1 status] Start command
		M303	U0¥G2517.F	RD77_1.bnBusy_ D[1]				M5021
							RST	
		[Advanced 1 status] Standby point traveling command	Axis 2 positioning complete	R:BUSY(Axis#1 -#16)(Direct)			Nor	FB start standby point traveling (Axis 2)
			U0¥G2517.D					M202
			Axis 2 error detection				SET	[Operating completion flag] Axis 2 standby point traveling
		0	U0¥G2617.F	RD77_1.bnBusy_ D[2] DX12				M5031
			Axis 3 positioning complete	R:BUSY(Axis#1 -#16)(Direct)			RST	FB start standby point traveling (Axis 3)
			U0¥G2617.D					M203
				_				M203
			Axis 3 error detection				SET	[Operating completion flag] Axis 3 standby point traveling
			M202	M203				M304
			L				QCT.	
			[Operating completion flag] Axis 2 standby point traveling	[Operating completion flag] Axis 3 standby point traveling			OC I	[Advanced 1 status] Conveyor start command

										M303
									RST	[Advanced 1 status] Standby point traveling command
M304	M303									M202
[Advanced 1 status] Conveyor start	Advanced 1 status] Standby								RST	[Operating completion flag] Axis 2 standby point traveling
 command M320	point traveling command									
										M203
Advanced 1 1 cycle start command									RST	[Operating completion flag] Axis 3 standby point traveling
		1							K5	D4318
								MOVP		Axis 1 advanced 1 FB positioning No. storage
										M5012
									SET	
										start (Axis 1)
		X20								M305
		Sensor input (SEN1)							SET	[Advanced 1 status] Synchronous control start
										M304
									RST	[Advanced 1 status] Conveyor start command
										M320
									RST	Advanced 1 1 cycle start command
M305	RD77_1.bnBusy_ D[1]									U0¥G36320.1
[Advanced 1 status] Synchronous control	DX11 I R:BUSY(Axis#1 -#16)(Direct)								SET	Axis 2 synchronous control start
 start	RD77_1.bnBusy_									108026220.2
									OCT.	00+030320.2
	R:BUSY(Axis#1 -#16)(Direct)								SET	Axis 3 synchronous control start
	RD77_1.bnBusy_ D[1] DX11	RD77_1.bnBusy_ D[2] DX12		U0¥G2509	K15		U0¥G2609	K15		M5012
	R:BUSY(Axis#1 -#16)(Direct)	R:BUSY(Axis#1 -#16)(Direct)	=	Axis 2 axis operation status		=	Axis 3 axis operation status		RST	FB start conveyor start (Axis 1)
 										M306
									SET	[Advanced 1 status] Sensor input wait

 								[
								RST	M305 [Advanced 1 status] Synchronous control start
								RST	M320 Advanced 1.1 cycle start command
									l
 M306	X20								
101000	7.20							K1	U0¥G44120
[Advanced 1 status] Sensor input wait	Sensor input (SEN1)						MOVP		Axis 3 main shaft clutch command
 	110000400000								
	00#G42908.0								M307
	Axis 3 main shaft clutch ON/OFF status							SET	[Advanced 1 status] Synchronous controlling
									M306
								RST	[Advanced 1 status] Sensor input wait
 M907	1108040009.0	1108040000.0	RD77 1.bnBu						
M307	00#G42908.0	00#G42909.0	sy D[1] DX11		U0¥G2509	K15			U0¥G36320.1
[Advanced 1 status] Synchronous controllins	Axis 3 main shaft clutch ON/OFF status	Axis 3 main shaft clutch smoothing status	R:BUSY (Axis#1-#16) (Direct)	-	Axis 2 axis operation status			RST	Axis 2 synchronous control start
 			RD77_1.bnBu						
			sy_D[2] DX12		U0¥G2609	K15			U0¥G36320.2
			R:BUSY (Axis#1-#16) (Direct)	-	Axis 3 axis operation status			RST	Axis 3 synchronous control start
								K0	U0¥G44120
							MOVP		Axis 3 main shaft clutch command
									M308
								SET	[Advanced 1 status] Synchronous control ending
									101307
								RST	[Advanced 1 status] Synchronous controlling
 MOOR									
MOVO		U0¥G2509	K15		U0¥G2609	K15			M309
[Advanced 1 status] Synchronous control ending	\$	Axis 2 axis operation status		\$	Axis 3 axis operation status			SET	[Advanced 1 status] Return operation start
									M308
									10000
								RST	[Advanced 1 status] Synchronous control ending

M309						K10	D/220
						KIU	D4330
· · ·					MOVP		Axis 3 advanced 1 FB
[Advanced status] Return operation start							positioning No. storage
 	RD77 1.bnBusy						
	D[2] DX12						M5032
	/r					SET	FB start standby point
	R:BUSY(Axis#1 -#16)(Direct)						traveling after end (Axis 3)
	M5032						M310
	<u> </u>					OCT	
	FB start					021	[Advanced 1 status] Return operating
	traveling after end (Axis 3)						
							M309
						RST	[Advanced 1 status] Return operation start
 M310	U0¥G2617.F	RD77_1.bnBusy_				1	1/5000
		DX12 DX12					105032
[1 I	21 DDUSV(1-1+1				RST	FB start standby point
Return operating	positioning complete	-#16)(Direct)					(Axis 3)
							M311
						SET	[Advanced 1 status] 1
	Axis 3 error detection						cycle end
							M310
						RST	[Aduanced 1 status]
							Return operating
M311	M31					К1	U0¥G30100
 	/ r				MOVR		
[Advanced 1 status]	[PB for GOT]				MOVE		Axis 1 axis stop
I cycle end	advanced 1						
		M4311					M312
		/r					
		Advanced 1				SET	[Advanced 1 status] End processing
		Axis 1 FB operating flag					
							M011
							Matt
						RST	[Advanced 1 status] 1
							cycle end
	M31						
	NOT .						M320
						SET	Advanced 1 1 cycle
	[PB for GOT] Start up						start command
	auvanced 1						
							M311
						RST	[Advanced 1 status] 1
							cycle end

		M312		К1	U0¥G30100	RD77_1.bnB	Busy_D[0]					K0	U0¥G30100
		[Advanced 1 st:	atus]		Axis 1 axis stop	R:BUSY(Axis	10 F				MOVP		Axis 1 axis stop
										L			
													M312
												RST	[Advanced 1 status] End processing
													M36
												RST	Command during Advanced 1 operation
*** [Advar	nced Commor] Conveyor speed (change *****										
	M6002	M31										K300000	D4417
		h	-								_		
(185	9) Advanced control 1	[PB for GOT] Start up advanced 1									DMOV		Advanced common Axis 1 speed change speed specification storage
	M6003	M51											M5040
		m										-	
	Advanced control 2	[PB for GOT] Start up advanced 2										SET	FB start advanced speed change setting when starting
		M33	M34	M4010	M6802		K7	20000	D4417			K60000	D4417
			/ī	/r							_		
		[PB for GOT] Speed UP change	[PB for GOT] Speed DOWN change	Home position return Axis 1 FB start	Advanced synchronous control 1 switch	D>			Advanced common Axis 1 speed change speed specification storage		D+P		Advanced common Axis 1 speed change speed specification storage
		M53	M54		M6803		K1:	200000					
			/r			DV							
		[PB for GOT] Speed UP change	[PB for GOT] Speed DOWN change		Advanced synchronous control 2 switch				Advanced common Axis 1 speed change speed specification storage				
													M5041
												SET	FB start advanced speed change acceleration
		M34	M33	M4010		140		4417				1/00000	D.4.**->
				/×		κU	Ľ	94417				100000	U4417
		[PB for GOT] Speed DOWN change	[PB for GOT] Speed UP change	Home position return Axis 1 FB start	D<		Advance Axis 1 sp speed sp storage	d common beed change becification			D-P		Advanced common Axis 1 speed change speed specification storage
		M54	M53										M5042
			/ī										
		[PB for GOT] Speed DOWN change	[PB for GOT] Speed UP change									SET	FB start advanced speed change deceleration
			K0	D4417	1							K0	D4417
		D>=		Advanced common Axis 1 speed change speed specification storage							DMOVP		Advanced common Axis 1 speed change speed specification storage
					-								-

	M5040						M4410
	100040						1014410
(1929)							
	FB start advanced speed change setting when starting						Advanced 1 Axis 1 speed change FB start
	M5041						
	ED atout						
	advanced speed						
	acceleration						
	M5042						
	FB start						
	advanced speed change						
	deceleration		M RD 77 ChangeSpeed 00E 3	(M+RD77 ChangeSpeed (3		
(1933)			Speed o	hange FB			
	M4410						644411
	1014410						1014411
			BijbEN	o_bENO:B			
	Advanced 1 Axis		Execution command	Execution status			Advanced 1 Axis
	FB start						FB operating flag
							M4412
		RD 77_1	DUTS - MA-4-1-	- 10/0			
		Module label		Normai completion			Advanced 1 Axis 1 speed change FB operation OK flag
							M4413
		 -Г к1]	UW:i_uAxis	o_bErr:B			
			Target axis	Error completion			Adupped 1 Avia
							1 speed change NG operation OK flag
		 - [D4417]	UD:i_udSpeedChangeValue	o_uErrId:UW	- D4419]		
		Adupted common	Cd.14:New speed value	Error code	Aduppend		
		Axis 1 speed change speed specification			common Axis 1		
		storage			error No. storage		
	M4411						M5040
(0140)							
(2142)	Advanced 1 Axis					No1	FB start advanced speed
	1 speed change FB operating						change setting when starting
							M5041
						RST	FB start
							advanced speed change
							acceleration
							M5042
						RST	FB start
							advanced speed change
							deceleration

*** (Advanc	ed 1] Axis 2 clutel	h control ***	***						
	M6002	M32							
								К1	U0¥G44102
	<u> </u>						-		
(2146)							MOVP		Axis 2 main
	Advanced	[PB for							shaft clutch
	control 1	GOTJ Clutch 1							command
		M32						KO	1102014100
								KU	00#G44102
					<u>_</u>		-		
		-					MOVP		Axis 2 main
		[PB for GOT]							shaft clutch forced OFF
		Clutch 1							command
*** [Aduppo	 nd 1] Positioning	CD *****							
*** LAUVARIC									14040
	M5012								M4310
									~
(2162)									0
	FB start conveyo	or							Advanced 1
	start (Axis 1)								Axis 1 FB
									start
	M5021								M4320
	<u> </u>	_							
(2165)									
	FB start standby								Advanced 1
	point traveling (Axis 2)								Axis 2 FB start
	M5031								M4330
(
(2167,									
	FB start standby point traveling								Advanced I Axis 3 FB
	(Axis 3)								start
	M5032								
	1								
		_							
	FB start standby								
	point traveling	->							
	after end (Axis a	3)							
				M_RD77_StartPositioning_00E_4	(M+RD77_StartPositioning_00E)				
(2170)				Position	ing start FB				
	M4310								M4311
	<u>├</u> ──	_		BilbEN	o_bENO:	3		-	O
				Execution command	Execution status				
	Advanced 1 Axis								Advanced 1 Axis 1 FB
	The start								operating flag
									M4312
			RD77_1	DUT- NA LI	- 1.000				_
		_			0_BUK.E				0
			Module label	Module label	Normal completion				Advanced 1
									Axis 1 FB
									operation OK flag
									M4313
									104010
	L		Г к1 7	UW:i uAxis	o bErri				
			L ''' J	l					~
				Target axis	Error completion				Advanced 1
									Axis 1 FB
									flag
		_	[D4318]	UW:i_uStartNo	o_uErrId:UV	V { D4319 }			
				Cd.3:Positioning start No	Error code				
	1		Axis 1 advanced 1 FP			Axis 1 advanced 1			
			positioning No.			FB error No.			
	1		storage	J		storage			

(2559)		M_RD77_StartPositioning_00E_5 Positioni	(M+RD77_StartPositioning_00E) ng start FB		
M4320					M4321
		BijbEN	o_bENO:B		O
Advanced 1 Axis 2 FB start		Execution command	Execution status		Advanced 1 Axis 2 FB operating flag
	DD 77 1				M4322
	{	DUT:i_stModule	o_bOK:B		O
	Module label	Module label	Normal completion		Advanced 1 Axis 2 FB operation OK flag
					M4323
	[к2]	UW:i_uAxis	o_bErr:B		
		Target axis	Error completion		Advanced 1 Axis 2 FB operation NG flag
	[D4328]	UW:i_uStartNo	o_uErrId:UW	-[D4329]	
	Axis 2 advanced 1 FB positioning No. storace	Cd.3:Positioning start No.	Error code	Axis 2 advanced 1 FB error No. storase	
(2948)		M_RD77_StartPositioning_00E_6 Positioni	(M+RD77_StartPositioning_00E) ng start FB		
M4330					M4331
		DILEN	- FENOR		
Advanced 1 Axis 3 FB start		Execution command	Execution status		Advanced 1 Axis 3 FB operating flag
					M4332
	RD77_1	DUT:istModule	o bOK B		
	L J Module label	Module label	Normal completion		Advanced 1 Axis 3 FB operation OK flag
					M4333
	{ кз }	UW:i_uAxis	o bErr:B		
		Target axis	Error completion		Advanced 1 Axis 3 FB operation NG flag
	{ D4338 }	UW:i_uStartNo	o_uErrId:UW	-[D4339]	
	Axis 3 advanced 1 FB positioning No.	Cd.3:Positioning start No.	Error code	Axis 3 advanced 1 FB error No.	

M6840 — peed synchronizing
peed synchronizing
M6841
dvanced synchronizing

7.6.2 Advanced synchronous control 2: Rotary cutter program

The sequence program used with advanced synchronous control 2 is shown in the following table.

*** [Advance	ed Common] Co	nveyor speed o	change *****			-						
	M6002	M31									K300000	D4417
											K300000	04417
		IN .	1							-		
(1859)										DMOV		Advanced common
	control 1	Start up										speed specification
		advanced 1										storage
	M6000	ME 1										
	1010003	I CIVI										M5040
		M										
		111									SET	EB start advanced
	Advanced	[PB for GOT]										speed change setting
	control 2	Start up										when starting
		auvariceu z										
		M33	M34	M4010	M6802					-		
							K720000	D4417			K60000	D4417
			/ĭ	/ĭ						-		
						D>		Advanced common		D+P		Advanced common
		[PB for GOT] Speed LIP	[PB for GOT] Sneed DOWN	Home position	Advanced			Axis 1 speed change speed specification				Axis I speed change speed specification
		change	change	start	control 1			storage				storage
					switch							
		M53	M54		M6803		K1200000	D4417				
									1			
		[PB for GOT]	[PB for GOT]		Advanced	07		Advanced common Axis 1 speed change				
		Speed UP	Speed DOWN		synchronous			speed specification				
		change	change		control 2			storage				
					switch							
												M5041
											SET	EB start advanced
												speed change
												acceleration
		M34	M33	M4010				-				
						KÜ	D4417				K60000	D4417
					-					-		
					D<		Advanced common			D-P		Advanced common
		[PB for GOT]	[PB for GOT]	Home position			Axis 1 speed change					Axis 1 speed change
		Speed DOWN change	change	return Axis TFB start			storage					storage
		M54	M53									M5042
				-1							SET	
		[PB for GOT]	[PB for GOT]								001	FB start advanced sneed change
		Speed DOWN	Speed UP									deceleration
		change	change									
			K0	D4417							K0	D4417
										_		
		D>=		Advanced common						DMOVP		Advanced common
				Axis 1 speed change								Axis 1 speed change
				speed specification storage								speed specification storage
					1							
	M5040											M4410
(-										O
(1929)												
	FB start advanced snee	4										Advanced 1 Axis 1 speed change
	change setting											FB start
	when starting											
	M5041											
	FB start											
	advanced spee	± E										
	change acceleration											
	M5042											
	FB start											
	advanced spee change	1										
	deceleration											

					M_RD77_ChangeSpeed_00E_3	(M+RD77_ChangeSpeed	q				
(1933)					Speed c	nange FB					
	M4410										M4411
											_
					BIDEN	o_bENO:E					0
	Advanced 1 Axis 1 speed change FB start				Execution command	Execution status					Advanced 1 Axis 1 speed change FB operating flag
											M4412
				RD77_1	DUT: at failule						~
				-L J		Normal completion					0
				Module label		Normal completion					Advanced 1 Axis 1 speed change FB operation OK flag
											M4413
				-{ к1]	UW:i_uAxis	ojbErr:E					
					Target axis	Error completion					Advanced 1 Axis 1 speed change NG operation OK flag
				[D4417]	UD:i_udSpeedChangeValue	o_uErrId:UW	-[D4419]				-
				Advanced common	Cd.14:New speed value	Error code	Advanced				
				Axis 1 speed change speed specification			common Axis 1 speed change FB				
				storage			error No. storage				
	1014411										M5040
(2142)										RST	EP otort
	Advanced 1 Axis 1 speed change FB operating flag										advanced speed change setting when starting
											M5041
				1 1						_	
										RST	FB start advanced speed change acceleration
											M5042
										RST	FB start advanced speed
											deceleration
*** [Advance	ed 2] Advanced syr	nchronous contro	ol operation 2	operation main *****	· · · · · · · · · · · · · · · · · · ·			1	1	1	
	M6803	M261							K10000		D6050
(3337)	Advanced [Op	perating						MOVP		[GOT set Cam gene accelerat	ting] Automatic eration ion rate over
	control 2 Ca switch	m initial setting								synchron	ous section
									K500		D6052
								MOVP		[GOT set Cam gene length	ting] Automatic eration Sheet
									K100		D6054
								MOVP		[GOT set Cam gene synchron	ting] Automatic aration Sheet ous width
									K5	U	J0¥G36674
								MOVP		Axis 2 Ca	m No.
									K500000	U	J0¥G36672
								DMOVP		Axis 2 Ca cycle (L)	m axis length per

	1						
						K1	U0¥G44101
					MOVP		Axis 2 main shaft clutch control invalid command
						K300000	D4417
					DMOVP		Advanced common Axis 1 speed change speed specification storage
						K5	U0¥G53201
					MOVP		Auto-generation Cam No.
						K1	UU#G53202
					MOVP		Cam auto-generation type
						KE10	LIOKOE2204
						N312	00#053204
					MOVP		Auto-generation parameter value: Cam resolution
						KŪ	LI0¥653214
					MOVP		Auto-generation parameter
							value: Acceleration rate over synchronous section
						K500	U0¥G53206
					DMOVP		Auto-generation parameter value: Sheet length (L)
						K100	U0¥G53208
					DMOVP		Auto-generation parameter value: Sheet synchronous width (L)
						K2519	LI0¥653210
						102010	004038210
					DMOVP		Auto-generation parameter value: Synchronous axis length (L)
						K450	U0¥G53212
					DMOVP		Auto-seneration parameter
							position (L)
						К1	U0¥G53200
				 	MOVP		Cam auto-seneration request
							Moor
							M261
						SET	[Operating completion flag] Cam initial setting

	1										
	M6803										M261
(3419)	Advanced									RST	[Operating completion flag] Cam initial setting
	control 2										
	M6003	M51	RD77_1.bnBusy_	RD77_1.bnBusy_	RD77_1.bnBusy_	U0¥G2417.3				r	MAD1
		M	DX10	DX11	DX12						101401
(3421)	Advanced control 2	[PB for GOT] Start up advanced 2	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 home position return				SET	[Advanced 2 status] Home position return command when starting
		M401				U0¥G2517.3					
		[Advanced 2 status] Home position return command				Axis 2 home position return request					
	27	when starting				U0¥G2617.3					
						Axis 3 home position return request					
						U0¥G2417.3	U0¥G2517.3	U0¥G2617.3			M402
						<u> </u> /ſ	/ī			SET	[Aduanced 2 status] Start
						Axis 1 home position return request	Axis 2 home position return request	Axis 3 home position return request			command
											M56
										_	
										SET	Advanced 2 operation command
	M56	M402	RD77_1.bnBusy_	RD77_1.bnBusy_	RD77_1.bnBusy_						
			DX10	DX11	DX12					K20	D4528
(3457)	Advanced 2 operation	[Advanced 2 status] Start command	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)				MOV	P	Axis 2 advanced 2 FB positioning No. storage
	command										
										K20	D4538
									MOV	P	Axis 3 advanced 2 FB positioning No. storage
	7										M5521
										_	
										SET	FB start standby point traveling (Axis 2)
) (FEO)
											M5531
										SET	FB start standby point traveling (Axis 3)
											M403
										SET	[Advanced 2 status] Standby point traveling command
											M401
										RST	F
											[Advanced 2 status] Home position return command when starting

1				1				
								M402
							RST	[Aduanced 2 status] Start
								command
M403	U0¥G2517.F	RD77_1.bnBusy_ D[1]						M5521
		DX11				 		100021
[a	D-DUSV(1#1					RST	FB start standby point
Standby point traveling command	positioning	#16)(Direct)						u avening (Axis 2)
	00#G2517.D							M252
		_					SET	Operating completion flag
	Axis 2 error							Axis 2 standby point traveling
	U0¥G2617.F	RD77_1.bnBusy_ D[2]						M5531
		DX12	1					
	Axis 3	R:BUSY(Axis#1-					RST	FB start standby point traveling (Axis 3)
	positioning complete	#16)(Direct)						
 	U0¥G2617.D							
								M253
		-					SET	[Operating completion flag]
	Axis 3 error detection							Axis 3 standby point traveling
	M252	M253						M404
	L						SET	[]
	[Operating	[Operating					OL I	[Advanced 2 status] Conveyor start command
	Axis 2 standby point traveling	Axis 3 standby						
								M403
							RST	[Advanced 2 status] Standby point traveling
								command
 MAGA	M409							
100404	101400							M252
	//						RST	[Operating completion flag]
[Advanced 2 status] Conveyor start	[Advanced 2 status] Standby							Axis 2 standby point traveling
 command	point traveling command							
								M253
						 	DOT	
							RST	[Operating completion flag] Axis 3 standby point
								ur aveiing
 							K.E	D/518
							1.5	54010
						MOVP		Axis 1 advanced 2 FB
								positioning No. storage
								M5512
							SET	FB start conveyor start
								(Axis 1)
		X20						M405
		L/F					SET.	
		Sensor input					OCT	LAdvanced 2 status] Sensor input wait
		(SENT)						
 1			L					å

1								
								M404
							RST	[Advanced 2 status]
								Conveyor start command
 		RD77.1 boBuey						
M405	X20	D[1]						U0¥G36320.1
		DX11						
		*					SET	Axis 2 synchronous control
[Advanced 2 status]	Sensor input	R:BUSY(Axis#1-						start
Sensor input wait	(SEN1)	#16)(Direct)						
	RD77_1.bnBusy_ D[1]	r	U0¥G2509	K15			К1	U0¥G44103
	DX11		00102000					ourdinito
	└ <u></u>					MOVE		
	R'BUSV(Avis#1-		Axis 2 axis operation status			1010-01		Axis 2 auxiliary shaft clutch command
	#16)(Direct)							
								M5512
							RST	FB start conveyor start
								(Axis I)
								M406
							SET	[Advanced 2 status]
								Synchronous operating
								M405
							RST	r
							1101	[Advanced 2 status] Sensor input wait
1								
 M406	M51	RD77_1_bnBusy_						
M406	M51	RD77_1.bnBusy_ D[1] DX11		U0¥G2509	K15			U0¥G36320.1
M406	M51	RD77_1.bnBusy_ D[1] DX11		U0¥G2509	K15			U0¥G36320.1
M406	M51	RD77_1.bnBusy_ D[1] DX11	=	U0¥G2509 Axis 2 axis	K15		RST	U0¥G36320.1 Axis 2 synchronous control
M406	M51	RD77_1.bnBusy_ D[1] DX11 H R:BUSY(Axis#1- #16)(Direct)	- =	U0¥G2509 Axis 2 axis operation status	K15		RST	U0¥G36320.1 Axis 2 synchronous control start
M406 [Advanced 2 status] Synchronous operating	M51 // [PB for GOT] Start up advanced 2	RD77_1 bnBusy_ D[1] DX11 R:BUSY(Axis#1- #16)(Direct)	-	U0¥G2509 Axis 2 axis operation status	K15		RST	U0¥G36320.1 Axis 2 synchronous control start
M406 [Advanced 2 status] Synchronous operating	M51 // [PB for GOT] Start up advanced 2	RD77_1 bnBusy_ D[1] DX11 H R:BUSY(Axis#1- #16)(Direct)	=	U0¥G2509 Axis 2 axis operation status	K15		RST	U0¥G36320.1 Axis 2 synchronous control start
M406 [Advanced 2 status] Synchronous operating	M51 /f [PB for GOT] Start up advanced 2	RD77_1.bnBusy_ D[1] DX11 H R:BUSY(Axis#1- #16)(Direct)	=	U0¥G2509 Axis 2 axis operation status	K15		RST K1	U0¥G36320.1 Avis 2 synchronous control start U0¥G30100
M406 [Advanced 2 status] Synchronous operating	M51 /f [PB for GOT] Start up advanced 2	RD77_1.bnBusy_ D[1] DX11 H R:BUSY(Axis#1- #16)(Direct)		U0¥G2509 Axis 2 axis operation status	K15		RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100
M406 [Advanced 2 status] Synchronous operating	M51 // [PB for GOT] Start up advanced 2	RD77_1.bnBusy_ D[1] DX11 H R:BUSY(Axis#1- #16)(Direct)	=	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stan
M406 	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D[1] DX11 RBUSY(Axis#1- #16)(Direct)	=	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop
M406 	M51 // [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1] DX11 I RBUSY(Axis#1- #16)(Direct)	-	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop
M406 	M51 Jr [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1] DX11 H RBUSY(Axis#1- #16)(Direct)	-	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1) DX11 + H RBUSY(Axis#1- #16(XDirect)	Ξ	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop
M406 	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D[1] DX11 H RBUSY(Axis#1- #16)(Direct)	=	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G4103
M406 	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1] DX11 	=	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1] DX11 H RBUSY(Axis#1- #16)(Direct)	-	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G41103 Axis 2 auxiliary shaft clutch command
M406	M51 [PB for GOT] Start up advanced 2	RD77_1brBusy_ D(1) DX11 + H R BUSY(Axia#1- #16)(Direct)	=	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D[1] DX11 + RBUSY(Axis#1- #16)(Direct)	=	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command
M406 	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D[1] DX11 H RBUSY(Axis#1- #16)(Direct)	-	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1] DX11 	-	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxillary shaft clutch command M407
M406	M51 [PB for GOT] Start up advanced 2	RD77_1brBusy_ D(1) D(1) H RBUSY(Axia#1- #16)(Direct)	=	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1] DX11 H RBUSY(Axis#1- #16)(Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 stutus]
M406 [Advanced 2 status] Synchronous operating	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D[1] DX11 H RBUSY(Axis#1- #16)(Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G4103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1] DX11 + - RBUSY(Axis#1- #16)(Direct)	-	U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxillary shaft clutch command M407 [Advanced 2 status] Synchronous ending
M406	M51 [PB for GOT] Start up advanced 2	RD77_1brBusy_ D[1] D[1] H RBUSY(Axia#1- #16)(Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1] DX11 + - RBUSY(Axis#1- #16(Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D[1] D[1] H RBUSY(Axis#1- #16)(Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G4103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1) D(1) D(1) RBUSY(Axis#1- #16)(Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0 SET	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G4103 Axis 2 auxillary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406 [Advanced 2 status]
M406	M51 [PB for GOT] Start up advanced 2	RD77_1brBusy_ D[1] D[1] H RBUSY(Axia#1- #16)(Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0 SET	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406 [Advanced 2 status] Synchronous operating
M406	M51 [PB for GOT] Start up advanced 2	RD77_1brBusy_ D(1) D(1) H RBUSY(Axis#1- #16(XDirect)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0 SET	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406 [Advanced 2 status] Synchronous operating
M406	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D(1] DX11 + - RBUSY(Axis#1- #16)(Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0 SET RST	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G4103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406 [Advanced 2 status] Synchronous operating
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M406 [Advanced 2 status] operating M407	M51 [PB for GOT] Start up advanced 2	RD77_1brBusy_ D[1] D[1] RBUSY(Axis#1- #16\Direct)	E	U0¥G2509 Axis 2 axis operation status RD 77,1 brBus y D(0) DX10	K15	MOVP	RST K1 K0 SET RST	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G4103 Axis 2 auxillary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406 [Advanced 2 status] Synchronous operating U0¥G30100
M406 Advanced 2 status] operating M407	M51	RD77_1brBusy_ D(1) D(1) RBUSY(Axis#1- #16\Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0 SET RST K0	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G4103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406 [Advanced 2 status] Synchronous operating U0¥G30100
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M406 [Advanced 2 status] Synchronous operating M407 [Advanced 2 status] Synchronous ending	M51 [PB for GOT] Start up advanced 2	RD77_1bnBusy_ D[1] D[1] RBUSY(Axis#1- #16)(Direct)		U0¥G2509 Axis 2 axis operation status	K15	MOVP	RST K1 K0 SET RST K0	U0¥G36320.1 Axis 2 synchronous control start U0¥G30100 Axis 1 axis stop U0¥G4103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406 [Advanced 2 status] Synchronous operating U0¥G30100 Axis 1 axis stop

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									RST	FB sta (Axis	M5512 art conveyor start 1)
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							M5522				M407
							FB start standby point traveling after		RST	[Adva Synct	nced 2 status] nronous ending
							end (Axis 2)				
										_	M408
									SET	[Adva Stand after	nced 2 status] Iby point traveling end
				PD77 1 hpPupy							
		M408	U0¥G2517.F	D[1]						_	M5522
				DX11							
		[Advanced 2 status] Standby point traveling after end	Axis 2 positioning complete	R:BUSY(Axis#1- #16)(Direct)					RST	FB sti travel	art standby point ling after end (Axis 2)
			U0¥G2517.D								
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			Axis 2 error detection						RST	Advar comm	nced 2 operation nand
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Protect Inc.									RST	[Adva Stand after	M408 Inced 2 status] Iby point traveling end
*** [Con	mon] Synchronou	us start/speed synchro	onization monitor	****					RST	[Adva Stand after	M408 Inced 2 status] Iby point traveling end
*** [Con	mon] Synchronou M6002	is start/speed synchro	onization monitor U0¥G42908	***** K1		U0¥G42909	КО		RST	[Adva Stand after	M408 inced 2 status] iby point traveling end M6840
*** [Con	mon] Synchronou M6002	is start/speed synchri	onization monitor U0¥G42908	***** K1		U0¥G42909	K0		RST	[Adva Stand after	M408 Inced 2 status] Iby point traveling end M6840
*** [Con	mon] Synchronou M6002 02) Advanced control 1	is start/speed synchri ==	U0¥G42508 200¥G42508 Axis 3 main shaft clutch ON/OFF status	K1	=	U0¥G42909 Axis 3 main shaft clutch smoothing status	KO		RST	[Adva Stand after	M408 noced 2 status] Iby point traveling end M6840
*** [Con	02) Advanced control 1	s start/speed synchr = =	UV#G42908 Axis 3 main shaft clutch ON/OFF status	к1	=	U0¥G42909 Axis 3 main shaft clutch smoothing status	KO		RST	[Adva Stand after	M408 Inced 2 status] Iby point traveling end M6840 O d synchronizing
*** [Con	mon] Synchronou M6002 (2) Advanced control 1 M6003	is start/speed synchri = = =	U0¥G42908 Axis 3 main shaft clutch ON/OFF status U0¥G42868	к1	=	U0¥G42909 Axis 3 main shaft clutch emoothing status	KO		RST	[Adva Stand after	M408 nced 2 status] Iby point traveling end M6840 O d synchronizing
*** [Con	M6002 02) Advanced control 1 M6003	is start/speed synchri = =	U0¥G42908 Axis 3 main shaft clutch ON/OFF status U0¥G42868	K1	-	U0¥G42909 Axis 3 main shaft clutch smoothing status	KO		RST	[Adva Stand after of	M408 Inced 2 status] Iby point traveling end M6840 O
*** [Con (36	M6002 M6002 Advanced control 1 M6003 Advanced control 2	is start/speed synchri == ==	U0¥G42908 Axis 3 main shaft chutch ON/OFF status U0¥G42868 Axis 2 main shaft chutch ON/OFF status	К1	=	U0¥G42909 Axis 3 main shaft clutch smoothing status	KO		RST	[Adva Stand after	M408 nced 2 status] Iby point traveling end M6840 O
*** [Con	M6002 Advanced control 1 M6003 Advanced control 2	- = = = = =	U0¥G42908 Axis 3 msin shaft clutch ON/OFF status U0¥G42968 Axis 2 msin oN/OFF status	K1	=	U0¥G42909 Axis 3 main shaft clutch smoothing status	KO		RST	[Adva Stand after	M408 nced 2 status] Iby point traveling end M6840 O
*** [Con	M6002 Advanced control 1 M6003 Advanced control 2 M6003 M6003	- = =	U0¥G42908 Axis 3 main shaft clutch ON/OFF status U0¥G42968 Axis 2 main shaft clutch ON/OFF status	K1 K1	-	U0¥G42909 Axis 3 main shaft clutch smoothing status	K0		RST	[Adva Stand after	M408 Inced 2 status] Iby point traveling end M6840 G M6841
*** [Con	M6002 M6002 Advanced control 1 Advanced control 2 M6002	e start/speed synchr = = =	U0¥G42908 Axis 3 main shaft clutch ON/OFF status U0¥G42968 Axis 2 main shaft clutch ON/OFF status U0¥G42969	ктт К1 К1 К1 К15	=	Axis 3 main shaft clutch smoothing status	К0		RST	[Adva Stand after	M408 nced 2 status] Iby point traveling end M6840
*** [Con	M6002 M6002 Advanced control 1 M6003 Advanced control 2 M6002	<pre>is start/speed synchri = = = = = = = = = = = = = = = = = = =</pre>	U0¥G42908 Axis 3 main shaft chutch ON/OFF status U0¥G42868 Axis 2 main shaft chutch ON/OFF status U0¥G42509	к1 К1 К1 К15	-	U0¥G42909 Axis 3 main shaft clutch smoothing status	K0 K15		RST	[Adva Stand after	M408 nced 2 status] Iby point traveling end M6840 O d synchronizing M6841 O
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(36	M6002 M6002 Advanced control 1 M6003 Advanced control 2 M6002 Advanced control 1	<pre>is start/speed synchri =</pre>	U0¥G42908 Axis 3 main shaft clutch ON/OFF status U0¥G42968 Axis 2 main shaft clutch ON/OFF status U0¥G2509 Axis 2 axis operation status	K1 K1 K1 K15	-	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0 K15		RST	Advar	M408 nced 2 status] Iby point traveling end M6840 d synchronizing M6841 O nced synchronizing
(36	M6002 M6002 Advanced control 1 M6003 H Advanced control 2 M6002 19) Advanced control 1	2 start/speed synchr = = = = =	U0¥G42908 Axis 3 main shaft chutch ON/OFF status U0¥G42868 Axis 2 main shaft chutch ON/OFF status U0¥G2509 Axis 2 axis operation status	K1 K1 K1 K15	=	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0 K15		RST	Advar	M408 nced 2 status] Iby point traveling end M6840 O d synchronizing M6841 O nced synchronizing
(36	M6002 M6002 Advanced control 1 M6003 H Advanced control 2 M6002 M6002 19 Advanced control 1	<pre>is start/speed synchri = = = = = = = = = = = = = = = = = = =</pre>	U0¥G42908 Axis 3 main shaft chutch ON/OFF status U0¥G42968 Axis 2 main shaft chutch ON/OFF status U0¥G42909 Axis 2 axis operation status	K1 K1 K15	-	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 nced 2 status] Iby point traveling end M6840 O d synchronizing M6841 O nced synchronizing
(36 (36)	mon J Synchronou M6002 Advanced control 1 Advanced control 2 Advanced control 2 M6002 Advanced control 1 M6002 M6002 M6003	as start/speed synchro	U0¥G42908 Axis 3 msin shaft clutch ON/OFF status U0¥G42968 Axis 2 msin shaft clutch ON/OFF status U0¥G2509 Axis 2 axis operation status	K1 K1 K15 K15	=	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 nnced 2 status] Iby point traveling end M6840Od synchronizing M6841O
(36 (36	M6002 M6002 Advanced control 1 Advanced control 2 M6002 III Advanced control 1 M6003 IIII M6002 M6002 IIIII M6002 IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	s start/speed synchr = = = =	U0¥G42908 Axis 3 main shaft clutch ON/OFF status U0¥G42968 Axis 2 main shaft clutch ON/OFF status U0¥G2509 Axis 2 axis operation status U0¥G2509	K1 K1 K15 K15	-	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 nced 2 status] Iby point traveling end M6840 d synchronizing M6841 ced synchronizing
(36	mon1 Synchronov M6002 Advanced control 1 Advanced control 2 M6002 19) Advanced control 1 M6002 19) Advanced control 1	<pre>start/speed synchr = = = = = = = = = = = = = = = = = = =</pre>	U0¥G42908 Axis 3 main shaft chutch ON/OFF status U0¥G42868 Axis 2 main shaft chutch ON/OFF status U0¥G2509 Axis 2 axis U0¥G2509 Axis 2 axis	K1 K1 K15 K15	=	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0 K15		RST	Advar	M408 nced 2 status] Iby point traveling end M6840 O d synchronizing M6841 O nced synchronizing
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(36 (36	mon Synchronou M6002 Advanced control 1 M6003 H Advanced control 2 M6002 H Advanced control 1 M6003 H Advanced control 1	is start/speed synchro = = = = = = = = = = = = =	U0¥G42908 Axis 3 main shaft clutch ON/OFF status U0¥G42968 Axis 2 main shaft clutch ON/OFF status U0¥G2509 Axis 2 axis operation status U0¥G2509 Axis 2 axis operation status	K1 K1 K15	=	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 nced 2 status] Iby point traveling end M6840O d synchronizing M6841O
(36	M6002 M6002 Advanced control 1 Advanced control 2 M6003 H Advanced control 1 M6003 H Advanced control 1	e start/speed synchr	U0¥G42908 Axis 3 main shaft clutch ON/OFF status U0¥G42968 Axis 2 main shaft clutch ON/OFF status U0¥G2509 Axis 2 axis operation status U0¥G2509 Axis 2 axis operation status	K1 K1 K15 K15	=	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 Inced 2 status] Iby point traveling end M6840 G synchronizing M6841 Co
(36)	mon1 Synchronov M6002 dvanced control 1 Advanced control 2 M6003 H Advanced control 1 M6003 H Advanced control 1 M6003	e start/speed synchri = = = = = = = = = = = = = = = = = = =	U0¥G42908 Axis 3 main shaft chutch ON/OFF status U0¥G42868 Axis 2 main shaft chutch ON/OFF status U0¥G2509 Axis 2 axis operation status U0¥G2509 Axis 2 axis	K1 K1 K15 K15	=	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0 K15		RST	Advar	M408 nced 2 status] Iby point traveling end M6840 O d synchronizing M6841 O nced synchronizing
(36) (36)	mon I Synchronou M6002 dvanced control 1 Advanced control 2 M6003 H Advanced control 1 M6003 H Advanced control 1 M6003 H Advanced control 1 M6003 H Advanced control 1	<pre>## start/speed synchri = = = = = = = = = = = = = = = = = = =</pre>	U0¥G42908 Axis 3 main shaft chutch ON/OFF status U0¥G42968 Axis 2 main shaft chutch ON/OFF status U0¥G2509 Axis 2 axis operation status U0¥G2509 Axis 2 axis operation status	K1 K1 K15 K15	-	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 nced 2 status] Iby point traveling end M6840 O d synchronizing M6841 O nced synchronizing M6841
(36 (36 (36	mon Synchronou M6002 	as start/speed synchro	U0¥G42908 Axis 3 msin shaft clutch ON/OFF status U0¥G42968 Axis 2 msin shaft clutch ON/OFF status U0¥G2509 Axis 2 axis operation status U0¥G2509 Axis 2 axis operation status	K1 K1 K15 K15	-	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 nced 2 status] Iby point traveling end M6840 G d synchronizing M6841 G nced synchronizing M4510
*** [Con (36)	mon] Synchronou M6002 () Advanced control 1 Advanced control 2 () Advanced control 1 () Advanced control 1 () Advanced control 1 () () () () () () () () () ()	e start/speed synchr	U0¥G42908 Axis 3 main shaft clutch ON/OFF status U0¥G42968 Axis 2 main shaft clutch ON/OFF status U0¥G2509 Axis 2 axis operation status U0¥G2509 Axis 2 axis operation status	K1 K1 K1 K15 K15	=	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 nced 2 status] Iby point traveling end M6840 d synchronizing M6841 O nced synchronizing M4510 O O O O O O O O O O O O O O O O O O O
(36) (36) (36) (36) (36) (36) (36) (36)	mon I Synchronov M6002 Advanced control 1 Advanced control 2 M6003 H Advanced control 1 M6003 H Advanced control 1 M6003 H Advanced control 1 M6003 H Advanced control 1 M6003 H B start conv FB start conv	e start/speed synchri = = = = = = = = = = = = = = = = = = =	U0¥G42908 Axis 3 main shaft chutch ON/OFF status U0¥G42868 Axis 2 main shaft chutch ON/OFF status U0¥G2509 Axis 2 axis operation status U0¥G2509 Axis 2 axis operation status	K1 K1 K1 K15 K15	=	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 nced 2 status] lby point traveling end M6840
*** Con (36) (36) (36) (36) *** Edu (36) (36)	mon] Synchronov M6002 Advanced control 1 Advanced control 2 M6003 H Advanced control 1 M6003 Advanced control 1 M6003 H Advanced control 1 F8 start conv start (Axis 1)	es start/speed synchri = = = = = = = = = = = = = = = = = = =	U0¥G42908 Axis 3 main shaft chutch ON/OFF status U0¥G42868 Axis 2 main shaft chutch ON/OFF status U0¥G2509 Axis 2 axis operation status U0¥G2509 Axis 2 axis operation status	K1 K1 K1 K1 K15 K15	-	U0¥G42909 Axis 3 main shaft clutch smoothing status U0¥G2609 Axis 3 axis operation status	K0		RST	Advar	M408 nced 2 status] lby point traveling end M6840 d synchronizing M6841 ced synchronizing M4510 Advanced 2 Advanced 2 Advanced 2 Advanced 2

	M5521					M4520
						o
(3638)	FB start standby point traveling (Axis 2)					Advanced 2 Axis 2 FB start
	M5522					
	FB start standby point traveling after end (Axis 2)					
	M5531					M4530
(3641)	FB start standby point traveling (Axis 3)					Advanced 2 Axis 3 FB start
(3643)			M_RD77_StartPositioning_00E_7 Positioni	(M+RD77_StartPositioning_00E) ng start FB		
	M4510		D: LEN	- 1510-0		M4511
	Advanced 2 Axis 1 FB start		Execution command	Execution status		Advanced 2 Axis 1 FB operating flag
			DUT:i_stModule	o_bOK:B		M4512
		Module label	Module label	Normal completion		Advanced 2 Axis 1 FB operation OK flag M4513
		[к1]	UW:i_uAxis Target axis	o_bErr:B Error completion		Advanced 2 Axis 1 FB operation NG
		{D4518 }	UW:LuStartNo Cd.3:Positioning start No.	o_uErrId:UW Error code	-[D4519]	tlag
		advanced 2 FB positioning No. storage	M RD77 StartPositioning 00E 8	(M+RD77 StartPositioning 00E)	advanced 2 FB error No. storage	
(4032)	MI520		Positioni	ng start FB		M521
			B:i_bEN	o_bENO:B		0
	Advanced 2 Axis 2 FB start		Execution command	Execution status		Advanced 2 Axis 2 FB operating flag
		RD77_1	DUT:i_stModule	o_bOK:B		M4522
		Module label	Module label	Normal completion		Advanced 2 Axis 2 FB operation OK flag
		[к2]	UW:i_uAxis	o_bErr:8		M4523
			Target axis	Error completion		Advanced 2 Axis 2 FB operation NG flag
		[D4528]	UW∷i_uStartNo Cd.3:Positioning start No.	o_uErrId:UW Error code	-[D4529]	
		Axis 2 advanced 2 FB positioning No. storage			Axis 2 advanced 2 FB error No. storage	

(4421)					M_RD77_StartF	Positioning_00E Posit	_9 (ioning s	M+RD77_St tart FB	artPositior	ning_OOE)			
	M4530				_	_		_					M4531
	——————————————————————————————————————				B:i_bEN					o_bENO:B			
	Advanced 2 3 FB start	Axis			Execution comm	hand		Execution s	tatus				Advanced 2 Axis 3 FB operating flag
				BD77 1									M4532
				—()	DUT:i_stModule			Normal com		o_bOK:B			O
				Module label				Normar com	piecion				Advanced 2 Axis 3 FB operation OK flag
													M4533
				—-L K3 F	UW:i_uAxis Target axis			Error compl	etion	o_bErr:B			Advanced 2 Axis 3 FB operation NG flag
					UW:i_uStartNo				oju	uErrId:UW	-[D4539]-		
				Axis 3 advanced 2 FB positioning No. storage	Cd.3:Positionine	start No.		Error code			Axis 3 advanced 2 FB error No. storage		
*** LAdvanci	M6003	M55	ogram *****								D6052	K1000	D6060
(4810)	Advanced control 2	[PB for GOT] Cam							D*P	[GOT set Cam gen length	ting] Automatic eration Sheet		Length per cycle initial calculated value
		generation											
										_		D6060	U0¥G36672
											DMOVP	Length per cycle initial calculated value	Axis 2 Cam axis length per cycle (L)
												K5	U0¥G53201
										-	MOVP		Auto-seneration Cam No.
											MOVP	κı	Cam auto-generation
										-	MOVE	K512	U0¥G53204
											MOVE		Auto-generation parameter value: Cam resolution
												D6052	U0¥G53206
											DMOVP	[GOT setting] Automatic Cam generation Sheet length	Auto-generation parameter value: Sheet length (L)
											D6052	К2	D5062
									D/P	[GOT set Cam gen length	ting] Automatic eration Sheet		Sheet length 50% calculated value (D6052/2)
				DEOEA	D5069	1						DEOEA	LIOXOE2202
			D<=	[GOT setting] Automatic Cam generation Sheet synchronous width	Sheet length 50% calculated value (D6052/2)					-	DMOVP	[GOT setting] Automatic Cam generation Sheet synchronous width	Auto-generation parameter value: Sheet synchronous width (L)

1	1	[1				
							D6054	К2	D5064
						D/P	[GOT setting] Automatic Cam generation Sheet synchronous width		Sheet synchronous width 50% (D6054/2)
							D6052	D5064	U0¥G53212
						D-P	[GOT setting] Automatic Cam generation Sheet length	Sheet synchronous width 50% (D6054/2)	Auto-generation parameter value: Synchronous start position (L)
			D6054	D5062				D5062	U0¥G53208
		D>	[GOT setting] Automatic Cam generation Sheet synchronous width	Sheet length 50% calculated value (D6052/2)			DMOVP	Sheet length 50% calculated value (D6052/2)	Auto-generation parameter value: Sheet synchronous width (L)
							D5062	K2	D5072
						D/P	Sheet length 50% calculated value (D6052/2)		Sheet synchronous width 50% (D6052/2)
							D6052	D5072	U0¥G53212
						D-P	[GOT setting] Automatic Cam generation Sheet length	Sheet synchronous width 50% (D6052/2)	Auto-generation parameter value: Synchronous start position (L)
									pooreion (a)
								K2513	U0¥G53210
							DMOVP		Auto-generation parameter value: Synchronous axis length (L)
							D6050	K10000	D5050
						D-P	[GOT setting] Automatic Cam generation acceleration rate over synchronous section		Acceleration rate over synchronous section calculated value (change value)
								DECEO	LIAVOFOOTA
								D5050	UU#G53214
							MOVP	Acceleration rate over synchronous section calculated value (change value)	Auto-generation parameter value: Acceleration rate over synchronous section
									M500
								SET	Advanced 2 Cam auto -seneration command
	M500								Liouossoo
								К1	U0¥G53200
	Advanced 2 Cam auto- generation						MOVP		Cam auto-generation request
	command								
									M500
		1						RST	Advanced 2 Cam auto -generation command

*** (Advan	ced 2] Cam data	a reference program *****			
	M59				
				K1	U0¥G45000
	th .				
(4916)			MOVP		
(4010)			1010 11		Cam data operation
	Cam data				request
	reference				
				1.05	11010045004
				К5	00#G45001
			MOVP		On emotions Cours Ma
					Operation Camino.
				121	LIONOVEDOD
				KI	00#G45002
			MOVP		Com data start
					nosition
		E E E E E E E E E E E E E E E E E E E		KE10	LIONGAE002
				N312	00+0+0000
			MOVP		Cam data operation
					points
				l	
		E E E E E E E E E E E E E E E E E E E		K1	LI0¥G45004
					001010004
	1		MOVP		Cam data format
	1				

7.7 Writing to the PLC

Write settings data to the CPU module.

(1) Connect the personal computer and CPU module with the USB cable, and set the RUN/STOP/RESET switch of the CPU module to STOP.



(2) Click [Online] \rightarrow [Write to PLC...] of GX Works3.

Cherry Samp Advances Programmer Provide Provid

 \neg

- (3) An Online Data Operation dialog box appears. Check the "Parameter " and the "Simple Motion Module Setting:0000:RD77MS".
- (4) Click the Execute button.

- (5) WELSOFT GX Works3
 (5) Mismatch in CPU parameter between project and PLC. Do you want to continue writing to PLC?
 Caution
 Please make it in RUN status after writing CPU parameter and all program files and then RESET CPU.
 Unable to execute the device memory writing. Please write device memory again after writing CPU parameter and then RESET CPU.
 Please write device memory again after writing CPU parameter and then RESET CPU.
 Please write device memory again after writing CPU parameter and then RESET CPU.
 Please write device memory again after writing CPU parameter set.
 Reade device memory of the range set in latch.
 Write device memory.
 Hake it in RUN status after RESET CPU. **Click!**Ves
 No
- (5) The message shown on the left appears, press Yes.



(9) Reset the CPU module. (Hold the RUN/STOP/RESET switch on the RESET side.)

7.8 **Demonstration Machine Operation**

7.8.1 Advanced synchronous control 1: Travel cutter

Demonstration machine operation panel Advanced synchronous control 1 screen



From previous page									
	$\overline{\nabla}$								
(3)	Set the CPU module to "RUN".								
	\bigtriangledown								
[Sei	rvo ON]								
(4)	If the servo is not on, touch Servo ON At the Demonstration machine Servo ON								
	demonstration machine operation panel. operation panel M1000 The servo status for axes 1 to 3 changes to ready.								
	\bigvee								
(5)	Touch Advanced synchronous control 1								
	$\overline{\nabla}$								
[Sw	ritching to advanced synchronous control 1 and clutch operation]								
(6)	Touch $\begin{bmatrix} Advanced 1 \\ M6802 \end{bmatrix}$ on the Advanced synchronous control 1 screen. And the, touch $\begin{bmatrix} Home \text{ position return} \\ M30 \end{bmatrix}$.								
	Next, touch $\frac{\text{Start up advanced 1}}{M31}$ to start up the demonstration machine.								
	Touch T to ensure that conveyor speed change operation is possible.								
	Touch $\begin{bmatrix} Clutch ON \\ M32 \end{bmatrix}$, and ensure that clutch operation is possible.								
	Touch Clutch ON M32 during operation with advanced synchronous control.								
	This turns off the clutch and the cutting movement (the rotation of the disc) stops.								
	Touching the switch for $\begin{vmatrix} Clutch OFF \\ M32 \end{vmatrix}$ again causes the disc to start the cutting movement again.								
	* The clutch can turn on and off the cutter shaft only. (It does not turn on and off the travel shaft.)								

or check operation	Sta	arting	g hist	ory					
	■Щ 000 BA	RD77MS4 - Sta	rting History						
nple Motion setting tool	Start	ing History		Create CSV File	•				Module Information List
vigation windowl	No.	Start information	Start information	Start information	Start No. / Type	Starting time	Warning flag		@ PLC READY(Y0)
3	1	Kestart nag	GK Works3	Axis #1	1	7/6/2016 9:22:35.279 AM	011	or	@ READY(X0)
	2	246	GK Works3	Axis #1	1	7/6/2016 9:22:36-289 AM	OFF	OF	Synchronization flag(X1)
	3	266	GK Works3	Axis #1	Simultaneously Start	7/6/2016 9:23:27.831 AM	OFF	or	M All AXES SERVE CIV(T1)
le monitor]	4)FF	GK Works3	Axis #1	Simultaneously Start	7/6/2016 9:23:29.893 AM	OFF	OF	Axis No. 1 2 3 4
	s	2FF	GX Works3	Axis #1	Simultaneously	7/6/2016 9:23:32.439 AM	OFF	OF	Md. 108:Servo status 1 : Servo ON
			Cit Marked	Auto #1	Simultaneously	78/2016 0-22-20 262 84		~	Axis No. 1 2 3 4
	2	×17	GK WORDS	A00 #1	Start	1012010 91231391003 MH	UPP	-	Md. 50:Porced stop input(U0/G4231)
na history]	8								BUSY
	9							_	Axis No. 1 2 3 4
	11								Md.31:Status : Error detection
	12								Axis No. 1 2 3 4
	13							- 1	Md.31:Status : Axis warning detection
	15								
	16								Mo. 11in test mode Rag(U0(SH000) Md 51(AMD law coveration model 0)Cd2220
	17								Md. 133:Operation cycle gyer faolU0/64239)
	19								Md. 132:Set operation cycle(U0\G4238)
	20								0200h:0.444 ms
	21 22								Md. 134:Operation time(U0/G4008) 164 us
	23								Md. 135:Maximum operation time(U0)(G4009)
	24								221 µs
	26								Md. 19:No. of Plash ROM writing(U0)(54224) 0 times
	27								Md. 52:Searching flag for driver communication ax
	29								Complete of searching for driver co
	30								Md. 53:SSCNET control status(U0)(64233) Waiting for command accented
	31								Md. 131:Digital OSC. running Reg(U0\G4011)
	33							-	Stopped





[Set cam No. to "2"]

(7) Press Changes of the "Cam No.". The numerical input screen appears. There, change "1" to "2".



[Contents to be checked]

(8) Confirm that the disc moves differently from the cam No. 1.
 Refer to the following cam data graphs.
 (Note that the disc rotates in one step with the cam No. 1 while it rotates in two steps with the cam No. 2.)



[Finishing advanced synchronous control 1]



(10)Practice of the advanced control 1 is complete when all of these operations are finished.

POINT

- Check that the clutch controls to turn ON/OFF the cutting movement.
- · Change the conveyor speed to see that the travel shaft synchronizes with the conveyor shaft.
- Observe that the disc rotates according to the cam data "No. 1" and "No. 2" and it rotates differently between the two.

7.8.2 Advanced synchronous control 2: Rotary cutter

(Demonstration machine operation panel) Advanced synchronous control 2 screen





 In the [Navigation window] of the Simple Motion setting tool, select [Module Monitor], and double-click [Axis Monitor].



(2) The monitor window axis monitor appears. Refer to Appendix 5 for details.



(6) Touch Advanced 2 M6803 on the Advanced synchronous control 2 screen. And then, touch Home position return M50

Next, touch $\begin{vmatrix} \text{Start up advanced 2} \\ M51 \end{vmatrix}$ to start up the demonstration machine.

The initial setting of the cam automatic generation parameters is such that the demonstration machine carries out the cutting movement on workpieces that are laid out 50 mm apart from the others. Now, check this operation.



You may change the sheet length as you like. Note, however, that making it a multiple of 50 mm makes it easy for you to check the operation.

The initial settings of the cam automatic generation parameters on the demonstration machine motion are as follows.

- · Type of cam automatic generation: Cam for rotary cutter
- Acceleration rate over synchronous section: 100 % (Reaches the same speed as the conveyor speed at the rate of 100 %)
- Sheet length: 50.0 mm
- · Sheet synchronous width: 10.0 mm
- · Synchronous axis length: 251.3 mm (circumference)
- Synchronization start position: 45.0 mm

Next, change the conveyor speed.

- Touch **T** to ensure that conveyor speed change operation is possible.
- · Check that the synchronous cutting movement continues even if the conveyor speed changes.





ror check operation	Starti	ng hi	story									
	R 0000:RD77M54	💐 0000:R077MS4 - Starting Hetory										
mula Matian aatting taal		s 🖾 🖾 🗸										
mple motion setting tool	Starting History		Create CSV Fi	e					Module Information List			
avigation window]	No. Start informat Restart fla	on Start information Start origin	Start information Start axis	Start No. / Type	Starting time	Warning flag	Error flag	Error No.	PLC READY(YII)			
igation window]	1 077	PLC OPU	Axis #1	30G Operation	2017/07/28 1:25:56.693 PM	077	orr		Synchronization flag((1)			
	2 OFF	PLC OPU	Axis #1	30G Operation	2017/07/28 1-25-57.083 PM	OFF	OFF		All axes serve ON(Y1)			
	3 017	PLC CPU	Axis #1	30G Operation	2017/07/28 1:25:57.366 PM	017	017		Axis No. 1 2 3 4			
dule monitorj	4 OFF	PLC OPU	Axis #1	30G Operation	2017/07/28 1-25:58.513 PM	OFF	OFF		Md. 100:Servo status 1 : Servo CN			
-	s ore	PLC CPU	Axis #1	30G Operation	2017/07/28 1/25/58/532 PM	017	ore		Md. SDiForced stop input(U0464231)			
h de la construcción de la const	6 OFF	PLC OPU	Axis #1	30G Operation	PM 2017/07/28 1/26/02 058	OFF	OFF		BUSY			
rting history]	7 017	PLC CPU	Axis #2	30G Operation	PM 2017/07/25 1:26:03.893	011	011		Axis No. 1 2 3 4			
	8 OFF	AC 00	AX6 #2	30G Operation	PM 2017/07/28 1/26/04.603	0++	0++		Axis No. 1 2 3 4			
	10 OFF	B C CBU	Avis 22	106 Operation	PM 2017/07/28 1:26:04.843	OFF	OFF		Md. 31:Status I Axis warning detection			
	11 077	PLC CPU	Ann #2	20G Operation	2017/07/28 1/26:05:306	orr	orr		Md. 1:1n test mode flag(U0WG4000)			
	12 OFF	PLC OPU	Axis #2	JOG Operation	2017/07/28 1:26:05.793	OFF	OFF		Md. 51:ANP-less operation mode(J.04G4232)			
	13 077	PLC CPU	Axis #2	30G Operation	2017/07/28 1/26:07.213	orr	orr		Md. 132: Operation cycle over flag(U04G4229) Md. 132: Set operation cycle(U04G4238)			
	14 OFF	PLC OPU	Axis #1	306 Operation	2017/07/28 1:26:08.504 PM	OFF	OFF		0200h:0.444 ms Md. 134: Operation time(J.04G4003)			
	15 OFF	PLC CPU	Axis #1	30G Operation	2017/07/28 1:26:09.765 PM	orr	orr		157 µs			
	56 OFF	PLC OPU	Axis #1	306 Operation	2017/07/28 1:26:11.757 PM	OFF	OFF		Mc. Locowasimum operation time(LOW-MCOV) 255 pr			
	17 OFF	PLC CPU	Axis #1	Mechine HPR	2017/07/28 1:28:40.799 PM	OPP	orr		Md. 19:No. of Plash RDM writing(UDWG4224) 0 times			
	\$9 OFF	PLC OPU	Axis #2	Machine HPR	2017/07/28 1:28:40.799 PM	OFF	OFF		Md. S2:Searching flag for driver communication ax Complete of searching for driver co			
	29 GPF	PLC CPU	Axis #3	Machine HPR	2017/07/28 1:28:40.799 PM	011	011		Md. 53:55CNET control statue(J.0WG4233) Wallian for command accented			
	20 OFF	PLC OPU	Axis #1	1	2017/07/28 1:31:46.029 PM	OFF	OFF		Md. 131:Digital OSC. running flag(J.04G4011)			
	21 OFF	PLC CPU	Axis #1	30G Operation	2017/07/28 1/35/04 433 PM	011	011		Stopped			
	22 OFF	PLC OPU	Axis #1	30G Operation	PM 2017/07/28 1/35/09/798	OFF	OFF					
	23 000	PLC CPU	Axis #1	30G Operation	PM 2017/07/28 1:35:21.918	orr	ore ore					
	24 OFF *	MCO/U	Ax6 #1	JOG Operation	PM .	0#	000					

[Change cam automatic generation parameters]

- (7) Change the three parameters as follows.
 - Sheet length: (Length of sheet to be cut off)
 - Sheet synchronous width: (The width of segment where the conveyor speed and the angular speed synchronize with the other when the cutter carries out the cutting movement)
 - Acceleration rate over synchronous section: (The rate of increase in the angular speed of the disc with reference to the conveyor speed over the synchronous width. It reaches the same speed as the conveyor speed at the rate of 100 %.)

The initial parameter settings are 50.0 mm for the sheet length, 10.0 mm for the synchronous width and 100 % for the acceleration rate.

Touch Start up advanced 2 M51 to stop the demonstration machine motion. Change the sheet length to 100.0 mm and synchronous width to 30.0 mm.

In each case, touch the numeric figure to call up the numerical input screen and change the parameters.

Touch	Generate cam M55	to generate the cam data	. Next, to	ch Start	up advanced 2 M51	once again to start up the			
demonstration machine.									

[Contents to be checked]

(8) Check that the demonstration machine carries out the cutting movement on every other workpiece which is aligned with an interval of 50 mm (skipping one every time). Also, check that the synchronous section is extended.

[Finishing adv	vanced synchr	onous control 2]

(9) Touch $\begin{vmatrix} \text{Start up advanced 2} \\ M51 \end{vmatrix}$ to end advanced synchronous control 2 operation.

Touch Advanced 2 M6803 to end all operations.

Ĺ	7	
)	\checkmark	

(10) Practice of the advanced control 2 is complete when all of these operations are finished.

POINT

- · Check that the disc follows the rotary cutter movement as motion diagram in (6).
- Change the conveyor speed to see that the cutter synchronizes with the conveyor.
- Change the cam automatic generation parameters to see that the motion of the cutter shaft changes accordingly.

7.9 Sequence Program List

This shows a list of the sequence programs.

*** Initial pro	cessing ****												
	SM403												
				 				_					
(0)								EI					
	1 scan OFF after RUN												
	SM403							BD77.1 bBLC Beady					
								Y0					
				 				O					
(3)													
	1 scan OFF after RUN							RW:PLC READY					
		M1000	RD77 1.bReady D					RD77 1.bAllAxisServoOn					
			DX0					- Y1					
		<u>├ - </u>		 	 			O					
		[PB for GOT]	R:READY(Direct)					RW:All axis servo ON					
		Servo UN											
							KO						
							KU	RD77_1.stnAxGtr11_D [0].uRequestServoOff D					
				 	 			U0¥G4351					
						MOVP		RW:Servo OFF command(Direct)					
							ΚÛ	PD77.1 aterAvCtel1.D					
							1.0	[1].uRequestServoOff_D					
								U0¥G4451					
						MOVP		RW:Servo OFF command(Direct)					
							K0	RD77.1 stnAxCtrl1.D					
								[2].uRequestServoOff_D					
						MOVIP		U0¥G4551					
						1010/01		RW:Servo OFF command(Direct)					
		M1000					K1	RD77_1.stnAxCtrl1_D					
								[0].uRequestServoOff_D					
						MOVP		00#G4351					
		[PB for GOT]				1010-01		RW:Servo OFF command(Direct)					
		Servo ON											
							K1	RD77_1.stnAxOtrI1_D					
								[1].uRequestServoOff_D					
						MOVP		DW-Same OFF annual (Direct)					
								RW-Servo OFF command(Direct)					
							K1	RD77_1.stnAxCtrl1_D					
				 				U0¥G4551					
						MOVP		RW:Servo OFF command(Direct)					
*** [F	For GOT] Current val	ue monitor *****										
--------	---------	---------------------	---------------------	-------------------	-------------	-------------------------------	-------------------------------	-------------------------------	---	---------------	--------------------------------------	--------------	--
		SM40	3										
											RD77_1.stnAxMr	ntr ion	D0
											Eo].dHotdali Osic		
	(42)									DMOV P	Real current valu	e Axis	1 Feed current value
		1 scan OFF a	fter RUN										
											00334		D.00
											RD / /_1.stnAxMr [1] dActualPosit	ntr ion	D20
											213.01.01.000		
										DMOV P	Real current valu	e Axis	2 Feed current value
											DD 77 1 0.44		D.40
											[2].dActualPosit	ion	D40
										DMOV F	Real current valu	e Axis	3 Feed current value
	_												
*** [(Commor	n] Switch oper I	ration mode *****		1		1	1	1	1			
		U0¥G2477.0	U0¥G2577.0	U0¥G2677.0	M6800	M6801	M6802	M6803					M6000
	(50)												O
	(53)	Auto 1 annua	Aula O samua nasali	Auto O comun	IOC harma	Desitionies	المحمد ماري	8 dumment					IOO: have a solition made
		ready ON	ON Servo reauy	ready ON	position	control switch	synchronous	synchronous					ood-nome position mode
		-			switch		control 1	control 2					
							switch	switch					
					M6800	M6801	M6802	M6803					M6002
													0
					JOG home	Positioning	Advanced	Advanced					Advanced control 1
					position	control switch	synchronous	synchronous					
					switch		control 1	control 2					
					Menno	MEDOI	MEDOO	MCOOD					Menon
					1010000	100001	100002	NUOVO					NIOUOS
						11	11						
					*1	*1	*1						U U
					JOG home	Positioning	Advanced	Advanced					Advanced control 2
					position	control switch	synchronous	synchronous					
					switch		switch	switch					
*** [(Commor	h] JOG operat	ion and home posit	tion return *****									
		M6000										D640	PD77.1 statuOtal1.D
												0040	[0].udJOG_Speed_D
	()		1								-		U0¥G4318
	(81)										DMOV	Axis 1	RW:JOG speed(Direct)
		JOG*home										JUG speed	
		mode											
		M6002										D642	BD77.1 stnAxCtrl1.D
													[1].udJOG_Speed_D
											- DMOV		U0¥G4418
		0.4									DIVIOV	Axis 2	RW:JOG speed(Direct)
		control 1										speed	
		M6003										D644	RD77_1.stnAxCtrl1_D
													[2].udJOG_Speed_D
											DMOV	0	00#G4518
		Advanced										JOG	RW-JOG speed(Direct)
		control 2										speed	
			M1022	M1023	M1024	M4011	M4021	M4031	M1011	M1010			LI0¥G30101.0
			INTOLL	1011020	1011024	1014011	101-1021	1014001	1011011	1011010			000000000
					/r	/F		/r		/r			
				A 1						A 1			Ŭ
			Axis 1 home	Axis 2 home	Axis 3 home	Home position	Home position	Home position	[PB for GOT]	[PB for GOT	1		Axis 1 forward rotation
			position return sta	art position	position	return Axis 1 FB operation	return Axis 2 FB operation	return Axis 3 FB operation	Axis 1 forward	Axis 1 rever:	e		JOG start
				reconnistant	reconnacore	flag	flag	flag	rotation JOG	1 otacion voc			
									M1010	M1011			U0¥G30102.0
									\vdash				0
									L	_			
									[PB for GOT]	[PB for GOT	1		Axis 1 reverse rotation
									reverse	rotation JOC	u i		ood start
									Instation JOG				
									1				
									M1013	M1012			U0¥G30111.0
									M1013	M1012			U0¥G30111.0
									M1013	M1012			U0¥G30111.0
											1		U0¥G30111.0
									M1013	M1012			U0¥G30111.0 O Axis 2 forward rotation JOG start
									M1013 [PB for GOT] Axis 2 forward rotation .IOG	M1012] je		U0¥G30111.0

					M1012	M1013		U0¥G30112.0
					\vdash	/r		o
					[PB for GOT] Axis 2 reverse	[PB for GOT] Axis 2 forward rotation JOG		Axis 2 reverse rotation JOG start
					M1014	M1015		U0¥G30121.0
						/r		o
					[PB for GOT] Axis 3 forward rotation JOG	[PB for GOT] Axis 3 reverse rotation JOG		Axis 3 forward rotation JOG start
					M1015	M1014		U0¥G30122.0
						/r		o
					[PB for GOT] Axis 3 reverse rotation JOG	[PB for GOT] Axis 3 forward rotation JOG		Axis 3 reverse rotation JOG start
M1020								M1021
PB for GOT] Home							PLS	JOG screen home position return trigger
 Mao								
1000								M1031
[PB for GOT] Home position return start (Advanced 1)							PLS	Home position return trisser for advanced
 M50								
	_							
[PB for GOT] Home position return start (Advanced 2)								
M301								
	-							
 [Advanced 1 status] Home position return command when starting								
M401								
	_							
 [Advanced 2 status] Home position return command when starting	100000117.4		100000017.4					
MIU21	50+62417.4	50+62517.4	50+G2017.4					M1022
JOG screen home position return trigger	Axis 1 home position return	Axis 2 home position return	Axis 3 home position return complete				SET	Axis 1 home position return start
 M1031	-ompioto		- somp is to					M1023
Home position return trigger for advanced							SET	Axis 2 home position return start
 								M1024
							SET	Axis 3 home position return start
								M301
							RST	[Advanced 1 status] Home position return command when starting
							-	

									Axis 1 hom	e position return FB start
M1022	RD77_1.bnBus y D[0] DX10	M4011	U0¥G2477.1							M4010
Axis 1 home position return start	R:BUSY (Axis#1-#16) (Direct)	Home position return Axis 1 FB operating flag	Axis 1 servo ON						SET	Home position return Axis 1 FB start
M4010	U0¥G2417.4	RD77_1.bnBus y D[0] DX10	M4011							M1022
									RST	Axis 1 home position
Home position return Axis 1 FB start	Axis 1 home position return complete	R:BUSY (Axis#1-#16) (Direct)	Home position return Axis 1 FB operating flag							return start
	U0¥G2417.D									M4010
									RST	Home position return Axis
	detection									
									Axis 2 hom	e position return FB start
M1023	RD77_1.bnBus y_D[1] DX11	M4021	U0¥G2577.1							M4020
	-11	-11							SET	
Axis 2 home position return start	R:BUSY (Axis#1-#16) (Direct)	Home position return Axis 2 FB operating flag	Axis 2 servo ON						021	Home position return Axis 2 FB start
M4020	U0¥G2517.4	RD77_1.bnBus y_D[1] DX11	M4021							M1023
			— I I —							
Home position return Axis 2 FB start	Axis 2 home position return complete	R:BUSY (Axis#1-#16) (Direct)	Home position return Axis 2 FB operating flag						RST	Axis 2 home position return start
	U0¥G2517.D									14000
										M4020
	Axis 2 error detection								RST	Home position return Axis 2 FB start
									Axis 3 hom	e position return FB start
M1024	RD77_1.bnBus y_D[2] DX12	M4031	U0¥G2677.1							M4030
	//	//							SET	Home position return Axis
Axis 3 nome position return start	(Axis#1-#16) (Direct)	Home position return Axis 3 FB operating flag	ON							
M4030	U0¥G2617.4	RD77_1.bnBus y_D[2] DX12	M4031							M1024
		-1/F	1						RST	Axis 3 home position
Home position return Axis 3 FB start	Axis 3 home position return	R:BUSY (Axis#1-#16) (Direct)	Home position return Axis 3 FB operating							return start
 	Luovocciac		IIdg							
										M4030
	Axis 3 error detection								RST	Home position return Axis 3 FB start
 M30										
		U0¥G2409	K7		U0¥G2509	K7		U0¥G2609	K7	
[PB for GOT] Home position return start (Advanced 1)	=	Axis 1 axis operation status		=	Axis 2 axis operation status		=	Axis 3 axis operation status		—К0 —>
 M50										
[PB for GOT] Home position return start (Advanced 2)										

		M211	U0¥G2417.4	U0¥G	2517.4	U0¥G2617.4	RD77_1.bnBus v D[0]	RD77_1.bnBus v D[1]	RD77_1.bnBus v D[2]		-		M30
					<u> </u>		DX10	DX11	DX12		_		
		[Operating completion flag] Home position return start	Axis 1 home position return complete	Axis 2 positio return comple	home n	Axis 3 home position return complete	R:BUSY (Axis#1-#16) (Direct)	R:BUSY (Axis#1-#16) (Direct)	R:BUSY (Axis#1-#16) (Direct)		RST	[PB for G position r (Advance	OT] Home eturn start d 1)
			U0¥G2417.D	U0¥G	2517.D	U0¥G2617.D							160
			L		<u>н</u>						RST	(nn / n	
			Axis 1 error detection	Axis 2 detect	error ion	Axis 3 error detection					Nor	[PB for G position r (Advance	OT] Home eturn start d 2)
													M211
											 RST	[Operatin Home po:	s completion flag] sition return start
													M211
	—K0 →										SET	[Operatin Home po:	s completion flas] sition return start
(401)					M_RD77	7_StartPositioni	ng_00E_1 (1 Positioning st	M+RD77_StartPo art FB	ositioning_OOE)				
	M4010												M4011
					3:i_bEN				o_bENO:B				O
	Home position return Axis 1 FB start			1	Executio	n command	E	xecution status					Home position return Axis 1 FB operating flag
			RD7.	^{7_1}	DUT:istl	Module			o bOK B				M4012
			L Modu label	le I	Module I	abel	٨	lormal completi	on				Home position return Axis 1 FB operation OK flag
													M4013
			——-[к	1]	JW:i_uAx Target a:	is xis	E	rror completion	o_bErr:B				O Home position return Axis 1 FB operation NG flag
			——-[кэс)01 <u>}</u>	JW:ijuSt	artNo			o_uErrId:UW	-[D4019]			
				ľ	Jd.3:Po:	sitioning start h	чо. E	rror code		Axis 1 home position return FB error No. storage			

()			M_RD77_StartPositioning_00E_2	2 (M+RD77_StartPos	itioning_00E)				
(793)			Positio	ning start FB					
	M4020								M4021
			B:i_bEN		o_bENO:B				
	Home position return Axis 2 FB start		Execution command	Execution status					Home position return Axis 2 FB operating flag
		RD77_1	DUT: and a dute		- LOKP				M4022
		L J Module	Module label	Normal completion	I DOK B				Home position
		laber							operation OK flag M4023
		[к2]	UW:i_uAxis		o_bErr:B				o
			Target axis	Error completion					Home position return Axis 2 FB operation NG flag
		{ K9001 }	UW:i_uStartNo		o_uErrId:UW	-{ D4029 }			
			Cd.3:Positioning start No.	Error code		Axis 2 home position return FB error No.			
(1185)			M_RD77_StartPositioning_00E_3 Positio	3 (M+RD77_StartPos ning start FB	itioning_00E)				
	M4030								M4031
			BijbEN		o_bENO:B				
	Home position return Axis 3 FB start		Execution command	Execution status					Home position return Axis 3 FB operating flag
		RD77_1	DUT:i_stModule		o_bOK:B				M4032
		Module label	Module label	Normal completion	1				Home position return Axis 3 FB operation OK flag
									M4033
		(K3)	UW:i_uAxis Target axis	Error completion	o_bErr:B				O Home position return Axis 3 FB operation NG flag
		[K9001]	UW:iuStartNo		o uErrid 1.1W	-F D4039			
			Cd.3:Positioning start No.	Error code		Axis 3 home position return FB error No. storage			
[Advance	ed 1] Advanced synchronous M6002	control operation 1 operatio	on main *****						
	MOODE							D3001	U0¥G36674
(1577)	Advanced control 1						MOV	Advanced 1 Cam No. specification	Axis 2 Cam No.
	M6002								
	10002							K700000	U0¥G36672
(1583)	Advanced control 1						DMOVP		Axis 2 Cam axis length per cycle (L)
								K0	U0¥G44103
							MOVP		Axis 2 auxiliary shaft clutch command

										К0	U0¥G44101
									MOVP		Axis 2 main shaft clutch control invalid command
										K300000	D4417
									DMOVP		Advanced common Axis 1 speed change speed specification storage
	M6002	M31	RD77_1.bnBusy_ D[0]	RD77_1.bnBusy_ D[1]	RD77_1.bnBu sv D[2]	U0¥G2417.3					M301
		- M	DX10	DX11							101001
(1605)	Advanced control 1	[PB for GOT] Start up advanced 1	R:BUSY(Axis#1 -#16)(Direct)	R:BUSY(Axis#1 -#16)(Direct)	R:BUSY (Axis#1-#16) (Direct)	Axis 1 home position return request				SET	[Advanced 1 status] Home position return command when starting
		M301				U0¥G2517.3					
		L1					-				
		[Advanced 1 status] Home position return command when starting				Axis 2 home position return request					
						U0¥G2617.3					
						i					
						Axis 3 home position return request					
						100000417.9	LIOXO0E17.9	110800617.9			
						00#62417.3	00#02517.5	00#02017.3			M302
						<u> </u>				SET	[0.1
						Axis 1 home position return request	Axis 2 home position return request	Axis 3 home position return request			[Advanced status] Start command
						-					M26
											10100
										SET	Command during Advanced 1 operation
			PD77.1 boBuey	RD77.1 boBuey	RD77 1 boBu						
	M36	M302	D[0] DX10	D[1]	sy D[2] DX12					К1	D4328
(1641)	Command during Advanced 1	[Advanced 1 status] Start command	R:BUSY(Axis#1 -#16)(Direct)	R:BUSY(Axis#1 -#16)(Direct)	R:BUSY (Axis#1-#16) (Direct)				 MOVP		Axis 2 advanced 1 FB positioning No. storage
	operation										
										К1	D4338
									MOVP		Axis 3 advanced 1 FB positioning No. storage
											M5021
										SET	FB start standby point traveling (Axis 2)
											M5031
										SET	FB start standby point traveling (Axis 3)
											M303
											Mada
										SET	[Advanced 1 status] Standby point traveling command
	1	1				L					

						M301
					RST	[Advanced 1 status] Home position return command when starting
						M302
					RST	[Advanced 1 status] Start command
 M303	U0¥G2517.F	RD77_1.bnBusy_				
		D[1] DX11				M5021
[Advanced 1 status] Standby point traveling command	Axis 2 positioning complete	R:BUSY(Axis#1 -#16)(Direct)			RST	FB start standby point traveling (Axis 2)
 	U0¥G2517.D					M202
					OCT	
	Axis 2 error detection				SET	[Operating completion flag] Axis 2 standby point traveling
	U0¥G2617.F	RD77_1.bnBusy_ D[2] DX12				M5031
	Axis 3 positioning complete	R:BUSY(Axis#1 -#16)(Direct)			RST	FB start standby point traveling (Axis 3)
 	U0¥G2617.D					
				 		M203
	Axis 3 error detection				SET	[Operating completion flag] Axis 3 standby point traveling
	M202	M203				M304
	Operating	[Operating			SET	[Advanced 1 status] Conveyor start
	completion flag] Axis 2 standby point traveling	completion flag] Axis 3 standby point traveling				command
						M303
					RST	[Advanced 1 status] Standby point traveling command
M304	M303					
	/r				RST	
[Advanced 1 status] Conveyor start command	[Advanced 1 status] Standby point traveling command				hai	[Operating completion flag] Axis 2 standby point traveling
M320						M203
					RST	[0+i
Advanced 1 1 cycle start command						flag] Axis 3 standby point traveling
					К5	D4318
				MOVP		Axis 1 advanced 1 FB positioning No. storage
						M5012
					SET	FB start conveyor start (Axis 1)

		X20								M305
		/r							SET	
		Sensor input							SET	[Advanced 1 status] Synchronous control
		(SENT)								
										M304
									RST	[Advanced 1 status] Conveyor start
										command
										M320
									RST	Advanced 1 1 cycle
										start command
 	PD77.1 boBuoy									
M305	D[1] DX11									U0¥G36320.1
									SET	Avia 2 augubropous
[Advanced 1 status] Synchronous control	R:BUSY(Axis#1 -#16)(Direct)									control start
start										
	RD77_1.bnBusy_ D[2]									U0¥G36320.2
									05.7	
	R:BUSY(Axis#1								SET	Axis 3 synchronous control start
	-#16)(Direct)									
 	RD77_1.bnBusy_	RD77_1.bnBusy_ D[2]		U0¥G2509	K15		U0¥G2609	K15		M5012
	DX11	DX12								
	R'BUSV(Avie#1	R'BUSV(Avio#1	=	Axis 2 axis operation		=	Axis 3 axis		RST	FB start conveyor start (Axis 1)
	-#16)(Direct)	-#16)(Direct)					status			
										M306
									SET	[Advanced 1 status]
										Sensor input wait
										M305
									RST	[Adupped 1 status]
										Synchronous control
										M320
									RST	Advanced 1 1 cycle start command
 M306	X20								k1	LI0¥G44120
								_	IXI	001011120
[Adupped 1 status]	Sensor input							MOVP		Axis 3 main shaft
Sensor input wait	(SEN1)									Clatch Command
 	U0¥G42908.0									·
										M307
									SET	[Advanced 1 status]
	Axis 3 main shaft clutch									Synchronous controlling
 	UN/UFF status									I
										M306
		L							RST	[Advanced 1 status]
1										∠imuvariucu I StatuS]
										Sensor input wait
										Sensor input wait

 	·		RD77.1 boBu						1
M307	U0¥G42908.0	U0¥G42909.0	sy D[1]		U0¥G2509	K15			U0¥G36320.1
	/r	//				-	 		
[ad	A. Ja O. anda	Auto Ourocha	DOLLOV	=	Axis 2 axis			RST	Axis 2 synchronous
Synchronous	shaft clutch	shaft clutch	(Axis#1-#16)		status				Control start
controlling	ON/OFF status	smoothing status	(Direct)						
			RD77_1.bnBu		U0¥G2609	K15			LI0¥G36320.2
			DX12		CONGLOOD				00100002012
				=	Avio 3 avio	-		RST	Axis 3 synchronous
			RIBUSY		operation				control start
			(Direct)		status				
								K0	U0¥G44120
							MOVP		Axis 3 main shaft
									ciatori commana
									M308
									10000
								SET	[Adupped 1 status]
									Synchronous control
									ending
									M307
								RST	[Advanced 1 status]
									controlling
M308		LIONOGEOD	L/1E		110200000	L/IE]			M000
		00#02509	NI0		00#02009	NIS			Mada
1	-	Auto O auto		\diamond	Ander Olende	ľ		SET	[0.4
[Advanced 1 status]	-	operation status			operation				Return operation start
Synchronous control ending					status				
									M308
						l	 		
								RST	[Advanced 1 status]
									Synchronous control ending
M309								1/10	D. 4000
								KIU	D4338
							 MOVE		
[Advanced 1 status]							1010 01		Axis 3 advanced 1 FB positioning No. storage
Return operation start									
	DD 77 1 h = D ===								
	D[2]								M5032
								SET	FB start standby point
	R:BUSY(Axis#1 -#16)(Direct)								(Axis 3)
	M5032								
									M310
	└ <u></u>							SET	[ed
	FB start							021	[Advanced 1 status] Return operating
	standby point traveling after								
 	end (Axis 3)								
									M309
								RST	[Advanced 1 status]
									Return operation start

1			DD77.1 h-D						
	M310	U0¥G2617.F	D[2]						M5032
			DX12						
								RST	FB start standby point
	[Advanced 1 status]	Axis 3	R:BUSY(Axis#1						traveling after end
	Return operating	complete	-#16(Direct)						(MAIS U)
		U0¥G2617.D							M311
		11						SET	[Advanced 1 status] 1
		Axis 3 error							cycle end
		detection							
									M310
								RST	[a
									Return operating
	M311	M31						- F1	1000000100
								NI	00#G30100
		/ī					NOVE		
	Advanced 1 status]	[PP for COT]					NOVE		Axis 1 axis stop
	1 cycle end	Start up							
		advanced 1							-
			M4311						
									M312
			L/T			 			
								SET	[Advanced 1 status]
			Advanced 1 Avis 1 FB						End processing
			operating flag						
									M311
								RST	[Advanced 1 status] 1
									cycle end
		M31							M320
								SET	
		[PB for GOT]						021	Advanced 1 1 cycle start command
		Start up							
		advanced 1							
									M311
								RST	[Advanced 1 status] 1
									cycle end
									l
	1010								
	M312		К1	U0¥G30100	RD77_1.bnBusy_D[0]			K0	U0¥G30100
					DX10				
	11	=		Avie 1 avie	*		MOVP		Avie 1 avie stop
	[Advanced 1 status]			stop	R:BUSY(Axis#1-#16)				
	End processing				(Direct)				
									M312
								RST	
								nor	[Advanced 1 status]
									and proceeding
									l
									M36
								RST	Command during
									Advanced 1 operation
									1

*** [Advance	:d Common] Co	nveyor speed o	change *****								
	M6002	M31								K300000	D/417
										K300000	D441)
(1950)	— I I —	h.							- DMOV		
(1659)	Advanced	[PB for GOT]							DIVIOT		Advanced common Axis 1 speed change
	control 1	Start up									speed specification
		advanced									storage
	M6003	M51									MEGAG
											M5040
	— I I —	h.							 	-	
	Aduppond									SET	FB start advanced
	control 2	Start up									when starting
		advanced 2									
		M33	M34	M4010	M6802						
							K720000	D4417		K60000	D4417
			/r		⊢				-		
						D>		Advanced common	D+P		Advanced common
		[PB for GUT] Speed UP	[PB for GUT] Speed DOWN	Home position return Axis 1 FB	Advanced			speed specification			speed specification
		change	change	start	control 1			storage			storage
		MED	MEA		M6000						
		IND3	W04		100003		K1200000	D4417			
			/ī]							
						D>		Advanced common			
		[PB for GOT]	[PB for GOT]		Advanced			Axis 1 speed change			
		change	change		control 2			storage			
					switch						
											M5041
										SET	EB start advanced
											speed change
											acceleration
		M34	M33	M4010		KO	D 4417	-		Keoooo	D 4417
						NU	D4417			K00000	D4417
					D/						
				11	UK		Advanced common		U-P		Advanced common
		Speed DOWN	Speed UP	return Axis 1 FB			speed specification				speed specification
		change	change	start			storage				storage
		MEA	MEQ								
		10124	10100								M5042
			/ī]					 	-	
										SET	FB start advanced
		[PB for GOT] Speed DOWN	[PB for GOT]								speed change deceleration
		change	change								
			K0	D4417						K0	D4417
		D>=		Advanced common					DMOVP		Advanced common
				Axis 1 speed change							Axis 1 speed change
				speed specification storage							speed specification storage
				1	1				[
	M5040										M4410
											_
(1929)										Ì	0
(FB start										Advanced 1 Axis
	advanced speer	1									1 speed change
	when starting										FD Start
	M5041										
		-									
	FB start advanced sneer										
	change										
	acceleration										
	M5042										
	FB start										
	advanced speer	±									
	deceleration										

(1000)				M_RD77_ChangeSpeed_00E_3	(M+RD77_ChangeSpeed_ hange FB	1			
(1933)				opeca c	nungo r D				
	M4410								M4411
				- B:I_bEN	o_bENO:B				
	Advanced 1 Axis 1 speed change FB start			Execution command	Execution status				Advanced 1 Axis 1 speed change FB operating flag
									M4412
			_RD77_1						
			-1 _	DUT:i_stModule	o_bOK:B				
			Module label	Module label	Normal completion				Advanced 1 Axis 1 speed change FB operation OK flag
									M4413
			 -{ к1]	UW:i_uAxis	o_bErr:B				o
				Target axis	Error completion				Advanced 1 Axis 1 speed change NG operation OK flag
			[D4417] Advanced common Axis 1 speed change speed specification storace	UD:i_udSpeedChangeValue Cd.14:New speed value	o_uErrId:UW Error code	-[D4419] Advanced common Axis 1 speed change FB error No storage			
	M4411		3101066						M5040
									100040
(2142)	Advanced 1 Axis 1 speed change FB operating flag							RST	FB start advanced speed change setting when starting
									M5041
								RST	FB start advanced speed change acceleration
									M5042
								RST	FB start advanced speed change
									deceleration
*** [Advanc:	ed 1] Axis 2 clutch M6002	M32							
(2146)							MOVE	K1	U0¥G44102
(2140)	Advanced control 1	[PB for GOT] Clutch 1							Axis 2 main shaft clutch forced OFF command
		M32						К0	U0¥G44102
		_//					MOVP		Axis 2 main
		[PB for GOT] Clutch 1							shaft clutch forced OFF command
*** (Advanci	ed 1] Positioning FB	3 ****	 <u>.</u>		<u>.</u>	<u>.</u>			
	M5012								M4310
(2162)									0
	FB start conveyor start (Axis 1)								Advanced 1 Axis 1 FB start
	M5021								M4320
(2165)									
	FB start standby point traveling (Axis 2)								Advanced 1 Axis 2 FB start

	M5031					M4330
(2167)	FB start standby point traveling (Axis 3)					Advanced 1 Axis 3 FB start
	M5032					
	FB start standby point traveling after end (Axis 3)					
(2170)			M_RD77_StartPositioning_00E_4 Positio	4 (M+RD77_StartPositioning_00E) ning start FB		
	M4310					M4311
			B:i_bEN	o_bENO:B		
	Advanced 1 Axis 1 FB start		Execution command	Execution status		Advanced 1 Axis 1 FB operating flag
						M4312
		{RD77_1 {[}	DUT:i_stModule	o_bOK:B		
		Module label	Module label	Normal completion		Advanced 1 Axis 1 FB operation OK flag
						M4313
		[к1]	UW:i_uAxis	o_bErr:B		
			Target axis	Error completion		Advanced 1 Axis 1 FB operation NG flag
					F	
		Axis 1 advanced 1 FB positioning No.	UW:i_uStartNo Cd.3:Positioning start No.	o_uErrId:UW Error code	-L D4319 J Axis 1 advanced 1 FB error No.	
(2559)		storage	M_RD77_StartPositioning_00E_5 Positio	5 (M+RD77_StartPositioning_00E) ning start FB	storage	
	M4320					M4321
			BILDEN	o_bENO:B		
	Advanced 1 Axis 2 FB start		Execution command	Execution status		Advanced 1 Axis 2 FB operating flag
		RD77_1	DUT:i stModule	o bOK:B		M4322
		L J	Module label	Normal completion		Advanced 1
						Axis 2 FB operation OK flag
		F 7				-
		K2 _	UW:I_uAxis Target axis	ojbErr:B Error completion		Advanced 1 Axis 2 FB operation NG flag
		{D4328]	UW:i_uStartNo	o_uErrId:UW	-{ D4329 }	
		Axis 2 advanced 1 FB positioning No. storage	Cd.3:Positioning start No.	Error code	Axis 2 advanced 1 FB error No. storage	

(00.49)	1				M_RD77_StartPos	itioning_00E_6 Positioning	(M+RD77_Start start EB	Positioning_00E)					
(2948)						1 Osteloring	start D	_					
	M4330												M4331
					BijbEN			o_bENO:B		_			
	Advanced 1 A 3 FB start	Axis			Execution comman	d	Execution stat	us					Advanced 1 Axis 3 FB operating flag
				RD77_1	DUT: atModule								M4332
				1. J Module label	Module label		Normal comple	tion					Advanced 1 Axis 3 FB operation OK flag
				Г кз Т	- UW:i uAxis			o bErr:B					M4333
					Target axis		Error completi	on					Advanced 1 Axis 3 FB operation NG flag
				[D4338]	- UW:i_uStartNo			o_uErrId:UW	-{ D4339]			-
*** [Aduance	ad 2] Advance	d synchronous control	operation 2 op	Axis 3 advanced 1 FB positioning No. storage eration main **	Cd.3:Positioning st	tart No.	Error code		Axis 3 advanced FB error N storage	1 o.			
www.[Advario	M6803	M261	operation 2 op	eration main ***							K10000	De	6050
(3337)	Advanced	[Operating								MOVP		[GOT setting Cam generat acceleration] Automatic ion rate over
	control 2 switch	Cam initial setting									KEAA	synchronous	section
										MOVP	1,300	[GOT setting Cam generat length] Automatic ion Sheet
										MOVP	KIUU	[GOT setting Cam generat synchronous] Automatic ion Sheet width
										MOVP	KS	UU#(Axis 2 Cam N	:36674 Io.
										DMOVP	K500000	U0¥0 Axis 2 Cam a	336672 xis length per
												cycle (L)	-
											К1	UO¥C	344101
										MOVP		Axis 2 main s control invali	haft clutch d command
											K300000	D	4417
										DMOVP		Advanced co speed change specification	mmon Axis 1 e speed storage

	1	1						
							K5	U0¥G53201
						MOUR		
						MOUT		Auto-generation Cam No.
							1/4	
							К1	U0¥G53202
						MOVP		Cam auto-generation type
							K512	U0¥G53204
						_		
						MOVP		Auto-generation parameter value: Cam resolution
							К0	U0¥G53214
						MOVP		Auto-reperation parameter
								value: Acceleration rate
							K500	LI0¥653206
							10000	000000000
						DMOVP		Auto-generation parameter
								value: Sheet length (L)
							K100	U0¥G53208
						-		
						DIVIOVE		Auto-generation parameter value: Sheet synchronous
								width (L)
							1/0540	
							K2513	00#G53210
						DMOVP		Auto-generation parameter
								value: Synchronous axis length (L)
							K450	U0¥G53212
						_		
						DMOVP		Auto-generation parameter value: Synchronous start
								position (L)
							K1	U0¥G53200
			1	1		MOVP		Cam auto-seneration
								request
								M261
							SET	[Operating completion flag] Cam initial setting
	Megono							
	1/1080/3							M261
(3419)	-14						RST	Opportion correlation /1
(0110)	Advanced							Cam initial setting
	control 2 switch							
	1							

	M6003	M51	RD / /_1.bnBusy_ D[0]	RD77_1.bnBusy_ D[1]	RD / /_1.bnBusy_ D[2]	U0¥G2417.3					M401
	<u> </u>									-	
(3421)	Advanced control 2	[PB for GOT] Start up advanced 2	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1– #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 home position return request				SET	[Advanced 2 status] Home position return command when starting
		M401				U0¥G2517.3					
		[Advanced 2 status] Home position				Axis 2 home position return					
		when starting				LIOXG2617.3					
						Axis 3 home position return					
						LIO¥G2417.3	LI0¥G2517.3	LI0¥G2617.3			
								1.4			M402
						Axis 1 home position return request	Axis 2 home position return request	Axis 3 home position return request		SET	[Advanced 2 status] Start command
											MEG
										-	WOO
										SET	Advanced 2 operation command
	M56	M402	RD77_1.bnBusy_	RD77_1.bnBusy_	RD77_1.bnBusy_					K20	D4528
			DX10	DX11						1020	54325
(3457)	Advanced 2 operation command	[Advanced 2 status] Start command	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)				MOVP		Axis 2 advanced 2 FB positioning No. storage
											D. 4500
										K20	D4538
									MOVP		Axis 3 advanced 2 FB positioning No. storage
											M5521
										SET	FB start standby point traveling (Axis 2)
											M5531
										SET	FB start standby point traveling (Axis 3)
	2										MACO
										_	W403
										SET	[Advanced 2 status] Standby point traveling command
											h4404
											101401
										RST	[Advanced 2 status] Home position return command when starting
										RST	[Advanced 2 status] Start
											command
		.1									

M403	U0¥G2517.F	RD77_1.bnBusy_				
		DX11				M5521
	<u></u> ↓⊢				RST	FB start standby point
[Advanced 2 status] Standby point	Axis 2 positioning	R:BUSY(Axis#1- #16)(Direct)				traveling (Axis 2)
traveling command	complete					
	U0¥G2517.D					M252
	<u> </u>					
	Avia Q arrar				SET	[Operating completion flag]
	detection					traveling
 		RD77.1 boBusy				
	00¥G2617.F	D[2] DX12				M5531
	<u>├</u> ─-1 └──	/r			RST	
	Axis 3	R:BUSY(Axis#1-				traveling (Axis 3)
	complete	# 16)(Direct)				
 	U0¥G2617.D					M053
						101200
					SET	[Operating completion flag]
	Axis 3 error detection					traveling
	M252	M253				M404
	L				9ET	
	[Operating	[Operating			OL I	[Advanced 2 status] Conveyor start command
	Axis 2 standby	Axis 3 standby				
 	point travening					
						M403
					RST	[Advanced 2 status]
						Standby point traveling command
M404	M403					M252
M404	M403				DOT	M252
M404	M403				RST	M252 [Operating completion flag] Axis 2 standby point
M404	M403 // [Advanced 2 status] Standby point traveling				RST	M252 [Operating completion flag] Axis 2 standby point traveling
M404 	M403 // [Advanced 2 status] Standby point traveling command				RST	M252 [Operating completion flag] Axis 2 standby point traveling
M404 	M403 Advanced 2 Status] Standby point traveling command				RST	M252 [Operating completion flag] Axis 2 standby point traveling M253
M404 [Advanced 2 status] Conveyor start command	M403 // [Advanced 2 status] Standby point traveling command				RST	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag]
M404 I - [Advanced 2 status] Conveyor start command	M403				RST	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling
M404	M403 // [Advanced 2 Status] Standby point traveling command				RST	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling
M404	M403 // [Advanced 2 statue] Standby point traveling command				RST RST K5	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518
M404	M403 // [Advanced 2 statue] Standby point traveling command				RST RST K5	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518
M404	M403 // [Advanced 2 statue] Standby point traveling command			MOVP	RST RST K5	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage
M404 [Advanced 2 status] Conveyor start command	M403 // [Advanced 2 status] Standby point traveling command			MOVP	RST RST K5	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage
M404 [Advanced 2 status] Conveyor start command	M403 // [Advanced 2 status] Standby point traveling command			MOVP	RST RST K5	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage
M404 [Advanced 2 status] Comveyor start command	M403			MOVP	RST RST K5	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512
M404 [Advanced 2 status] Comveyor start command	M403 // (Advanced 2 statue] Standby point traveling command			MOVP	RST RST K5	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start
M404 [Advanced 2 status] Comveyor start command	M403 // [Advanced 2 status] Standby point traveling command			MOVP	RST RST K5	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1)
M404	M403 // [Advanced 2 status] Standby point traveling command			MOVP	RST RST K5 SET	M252 [Operatins completion flag] Axis 2 standby point traveling M253 [Operatins completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1)
M404	M403 // [Advanced 2 statue] Standby point traveling command	X20		MOVP	RST RST K5 SET	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1) M405
M404	M403 // [Advanced 2 statue] Standby point traveling command	X20		MOVP	RST RST K5 SET	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1) M405 [bit is a bar in the start of the start
M404	M403 // [Advanced 2 statue] Standby point traveling command	X20		MOVP	RST RST K5 SET	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1) M405 [Advanced 2 status] Sensor input wait
M404	M403 // [Advanced 2 statue] Standby point traveling command	X20 X20 JF Sensor input (SEN1)		MOVP	RST RST K5 SET SET	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1) M405 [Advanced 2 status] Sensor input wait
M404	M403 // [Advanced 2 statue] Standby point traveling command	X20 X20 Sensor input (SEN1)		MOVP	RST RST K5 SET SET	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1) M405 [Advanced 2 status] Sensor input wait
M404	M408 // [Advanced 2 status] Standby point traveling command	X20 X20 X21 Sensor hput (SEN1)		MOVP	RST RST K5 SET SET	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1) M405 [Advanced 2 status] Sensor input wait M404
M404	M408 // [Advanced 2 status] Standby point traveling command	X20 X20 X21 Sensor input (SEN1)		MOVP	RST RST K5 SET SET	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1) M405 [Advanced 2 status] Sensor input wait M404 [Advanced 2 status]
M404 I L Advanced 2 status] Comeyor start command	M403	X20 X20 X21 Sensor input (SEN1)		MOVP	RST RST K5 SET SET	M252 [Operating completion flag] Axis 2 standby point traveling M253 [Operating completion flag] Axis 3 standby point traveling D4518 Axis 1 advanced 2 FB positioning No. storage M5512 FB start conveyor start (Axis 1) M405 [Advanced 2 status] Sensor input wait M404 [Advanced 2 status] Conveyor start command

M405	X20	D[1] DX11						U0¥G36320.1
[Advanced 2 status] Sensor input wait	Sensor input (SEN1)	R:BUSY(Axis#1- #16)(Direct)					SET	Axis 2 synchronous control start
	RD77_1.bnBusy_		10802509	K15	1		K1	LIO¥G44103
	DX11		00+02005	K15			IX1	00+044103
	R:BUSY(Axis#1- #16)(Direct)	=	Axis 2 axis operation status			MOVP		Axis 2 auxiliary shaft clutch command
					1			
							RST	Mb512 FB start conveyor start (Axis 1)
								M406
							SET	[Advanced 2 status] Synchronous operating
								M405
							RST	[Advanced 2 status] Sensor input wait
M406	M51	RD77_1.bnBusy_						
		D[1]		U0¥G2509	K15			U0¥G36320.1
[Advanced 2 status]	PB for GOT]	R:BUSY(Axis#1-	=	Axis 2 axis operation status			RST	Axis 2 synchronous control start
operating	advanced 2							
 		1						
								LI0¥G30100
		•					К1	U0¥G30100
						MOVP	K1	UO¥G30100 Axis 1 axis stop
						MOVP	K1	UOWG30100 Axis 1 axis stop
						MOVP	K1 K0	UO¥G30100 Axis 1 axis stop UO¥G44103
						MOVP	K1 K0	U0¥G30100 Axis 1 axis stop U0¥G44103
						MOVP MOVP	К1	U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command
						MOVP	К1	U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command
						MOVP	K1 K0	U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command
						MOVP	K1 K0	U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407
						MOVP	K1 K0	U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending
						MOVP MOVP	K1 K0 SET	U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending
						MOVP	K1 K0 SET	U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending
						MOVP MOVP	K1 K0 SET	U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406
						MOVP	K1 K0 SET	U0¥G30100 Axis 1 axis stop U0¥G44103 Axis 2 auxiliary shaft clutch command M407 [Advanced 2 status] Synchronous ending M406 [Advanced 2 status] Synchronous operating

	1	M407				RD77_1.bnBus					
		101407		К1	U0¥G30100	y D[0] DX10				K0	U0¥G30100
						<u> </u> ,r			-		
		[Advanced 2 status]	-		Axis 1 axis stop	R:BUSY			MOVP		Axis 1 axis stop
		Synchronous ending				(Axis#1-#16)					
						1(0)(800)					
											M5512
										RST	EB start conveyor start
											(Axis 1)
											M5522
										SET	FB start standby point
											(raveling after end (Akis 2)
							M5522				
											101407
										RST	[educed Control]
							FB start				Synchronous ending
							standby point traveling after				
							end (Axis 2)				
											M408
										SET	[Advanced 2 status]
											Standby point traveling after end
		M408	U0¥G2517.F	RD77_1_bnBusy_							
				DL1J DX11							M5522
			· · · · · · · · · · · · · · · · · · ·	11	1					DOT	
		[Advanced 2 status]	Axis 2	R:BUSY(Axis#1-						Rol	FB start standby point traveling after end (Axis 2)
		Standby point	positioning	#16)(Direct)							
		traveling after enu	complete								
			U0¥G2517.D								M56
			11							RST	Advanced 2 operation
			Axis 2 error								command
			detection								
											M408
					L						
										RST	[Advanced 2 status]
											after end
*** [Commo	n] Synchronous	s start/speed synchro	onization monitor	****				1	1		1
	M6002		U0¥G42908	К1		U0¥G42909	K0				M6840
(3602)		=	Axis 3 main		=	Axis 3 main					
	Advanced control 1		shaft clutch ON/OFF status			shaft clutch smoothing					Speed synchronizing
						status					
	M6003										
			00¥G42868	КI							
		=									
	Advanced	_	Axis 2 main shaft clutch								
	control 2		ON/OFF status								
	M6002		U0¥G2509	K15		U0¥G2609	K15				M6841
(3619)		=	Axis 2 axis		=	Axis 3 axis					
	Advanced		operation status			operation					Advanced synchronizing
	control 1										
	M6003										
	M6003		U0¥G2509	K15	1						
	M6003	_	U0¥G2509	K15							
		=	U0¥G2509 Axis 2 axis	K15							
	M6003	=	UO¥G2509 Axis 2 axis operation status	K15							

*** (Advance	ed 2] Positioning FB ****					
	M5512					M4510
(3635)	FB start conveyor start (Axis 1)					Advanced 2 Axis 1 FB start
	M5521					M4520
(3638)	FB start standby point traveling					Advanced 2 Axis 2 FB
	(AXIS 2) M5522					start
	FB start standby point traveling after end (Axis 2)					
	M5531					M4530
(3641)						
	FB start standby point traveling (Axis 3)					Advanced 2 Axis 3 FB start
(3643)			M_RD77_StartPositioning_00E_7 Positionin	(M+RD77_StartPositioning_00E) g start FB		
	M4510					M4511
			BijbEN	o_bENO:B		
	Advanced 2 Axis 1 FB start		Execution command	Execution status		Advanced 2 Axis 1 FB operating flag
						M4512
			DUT:i_stModule	0_BOK:B		0
		Module label	Module label	Normal completion		Advanced 2 Axis 1 FB operation OK flag
		_				M4513
		——-[к1]	UW:i_uAxis	o_bErr:B		0
			larget axis	Error completion		Advanced 2 Axis 1 FB operation NG flag
		{ D4518]	UW:i_uStartNo	o_uErrId:UW	f D4519 }	
		Axis 1 advanced 2 FB positioning	Cd.3:Positioning start No.	Error code	Axis 1 advanced 2 FB error No.	

(4032)					M_RD77_StartPositioning_00E_8 Positionin	(M+RD77_StartPositi ∉ start FB	ioning_00E)			
	M4520					_	_			M4521
					BijbEN		o_bENO:B			
	Advanced 2 A 2 FB start	xis			- Execution command	Execution status	-			Advanced 2 Axis 2 FB operating flag
										M4522
				{[]	DUT:i_stModule		о_ЬОК:В			O
				Module label	Module label	Normal completion				Advanced 2 Axis 2 FB operation OK flag
				F K0]	1002.4.2		- 15			014523
					Target axis	Error completion	ojerris			Advanced 2 Axis 2 FB operation NG flag
				[D4528]	UW:i_uStartNo	Error code	ojuErrId:UW	-{ D4529 }-		
				Axis 2 advanced 2 FB positioning No. storage				Axis 2 advanced 2 FB error No. storage		
(4421)					M_RD77_StartPositioning_00E_9 Positionin	(M+RD77_StartPositi ≰start FB	ioning_00E)			
	M4530						_			M4531
					BijbEN		o_bENO:B			
	Advanced 2 A 3 FB start	xis			Execution command	Execution status				Advanced 2 Axis 3 FB operating flag
				BD77 1						M4532
				-[]	DUT:i_stModule	NI 1 1.1	o_bOK:B			
				Module label	Module label	Normal completion				Advanced 2 Axis 3 FB operation OK flag
										M4533
				—-[кз]	- UW:i_uAxis Target axis	Error completion	o_bErr:8			Advanced 2 Axis 3 FB operation NG
										Tiag
				[D4538]	UW:i_uStartNo		o_uErrId:UW	-{ D4539 }-		
				Axis 3 advanced 2 FB positioning No. storage	Cd.3:Positioning start No.	Error code		Axis 3 advanced 2 FB error No. storage		
	M6003	M55	APIGIII ANAAA					D6052	K1000	D6060
(4810)	Advanced control 2	[PB for GOT] Cam				D*P	[GOT set Cam gen length	ting] Automatic eration Sheet		Length per cycle initial calculated value
							-	DMOVP	D6060 Length per cycle	U0¥G36672 Axis 2 Cam axis length
									initial calculated value	per cycle (L)
								MOVP	КS	U0¥G53201 Auto-seneration Cam No.

1								
							К1	U0¥G53202
						MOVP		Cam auto-veneration
								type
							KE10	LIOVOEDO04
							KOTZ	00¥G53204
						MOVP		Auto-generation
								resolution
							D6052	U0¥G53206
						_		
						DMOVP	[GOT setting]	Auto-seneration
							Automatic Cam	parameter value:
							length	Sneet lengtri (L)
						D6052	K2	D5062
						20002		20002
					071	[GOT setting] Automatic		Sheet length 50%
						length		(D6052/2)
		D6054	D5062				D6054	U0¥G53208
						-		
	D<=	[GOT setting]	Sheet length			DMOVP	[GOT setting]	Auto-generation
		generation Sheet	50% calculated value				generation Sheet	Sheet synchronous
		synchronous width	(D6052/2)				synchronous width	width (L)
						D6054	К2	D5064
					D/P	[GOT setting] Automatic		Sheet synchronous
						Cam generation Sheet		width 50% (D6054/2)
						synchronous width		
						D6052	D5064	LI0¥053212
						20002	20004	0000212
					DT	[GOT setting] Automatic	Sheet synchronous width 50%	Auto-generation
						length	(D6054/2)	Synchronous start
								position (L)
				-				
	 	D6054	D5062				D5062	U0¥G53208
		D6054	D5062			_	D5062	U0¥G53208
	 D>	D6054 [GOT setting]	D5062 Sheet length			DMOVP	D5062 Sheet length 50%	U0¥G53208 Auto-generation
	D>	D6054 [GOT setting] Automatic Cam generation Sheet	D5062 Sheet length 50% calculated value			DMOVP	D5062 Sheet length 50% calculated value (D6052/2)	U0¥G53208 Auto-seneration parameter value: Sheet synchronous
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)			DMOVP	D5062 Sheet length 50% calculated value (D6052/2)	U0¥G53208 Auto-generation parameter value: Sheet synchronous width (L)
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)			DMOVP	D5062 Sheet length 50% calculated value (D6052/2)	U0¥G53208 Auto-generation parameter value: Sheet synchronous width (L)
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)			DMOVP D5062	D5062 Sheet length 50% calculated value (D6052/2) K2	U0¥G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)			DMOVP D5062	D5062 Sheet length 50% calculated value (D6052/2) K2	U0¥G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072
	D>	D6054 [GOT setting] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)		D/P	DMOVP D5062 Sheet length 50%	D5062 Sheet length 50% calculated value (06052/2) K2	U0¥G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)		D/P	DMOVP D5062 Sheet length 50% (calculated value (figeoper/d)	D5062 Sheet length 50% calculated value (D6052/2) K2	U0¥G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2)
	D>	D6054 [GOT setting] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)		D/P	DMOVP D5062 Sheet length 50% calculated value (D6052/2)	D5062 Sheet length 50% calculated value (D6052/2) K2	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2)
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)		D/P	DMOVP D5062 Sheet length 50% calculated value (D6052/2)	D5062 Sheet length 50% calculated value (06052/2) K2	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2)
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P	DMOVP D5062 Sheet length 50% calculated value (D6052/2) D6052	D5062 Sheet length 50% calculated value (06052/2) K2 D5072	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212
	D>	D6054 [GOT settins] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P	DMOVP D5062 Sheet length 50% calculated value (D6052/2) D6052	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212
	D>	D6054 [GOT setting] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)		D/P	DMOVP D5062 Sheet length 50% calculated value (D6052/2) D6052	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072	U04G53208 Auto-teneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212
	D>	D6054 [GOT setting] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)		D/P D-P	DMOVP D5062 Sheet length 50% (D6052/2) D6052 [GOT setting] Automatic Cam generation Sheet	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50%	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-generation parameter value:
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/F	DMOVP D5062 Sheet length 50% calculated value (D6052/2) D6052 [GOT settins] Automatic Cam generation Sheet length	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2)	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous start nostion (1)
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P D-P	DMOVP D5062 Sheet length 50% calculated value (Calculated value D6052 D6052 [GOT setting] Automatic Cam generation Sheet length	D5062 Sheet length 50% calculated value (06052/2) K2 D5072 Sheet synchronous width 50% (06052/2)	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous start position (L)
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P D-P	DMOVP D5062 Sheet length 50% calculated value (D6052/2) D6052 [GOT setting] Automatic Cam generation Sheet length	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2)	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous start position (L)
	D>	D6054 [GOT setting] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated value (D6052/2)		D/P D-P	DMOVP D5062 Sheet length 50% (D6052/2) D6052 (GOT setting) Automatic Cam generation Sheet length	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513	U04G53208 Auto-seneration parameter value: Sheet synchronous wildth (L) D5072 Sheet synchronous wildth 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous start position (L) U04G53210
	D>	D6054 [GOT setting] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P	DMOVP D5062 Sheet length 50% (D6052/2) D6052 [GOT setting] Automatic Cam generation Sheet length	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-generation parameter value: Synchronous start position (L) U04G53210
	D>	D6054 [GOT setting] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P	DMOVP D5062 Sheet length 50% (26052/2) D6052 [GOT setting] Automatic Cam generation Sheet length DMOVP	D5062 Sheet length 50% (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous start position (L) U04G53210 Auto-seneration parameter (sheet)
	D>	D6054 [GOT settins] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P	DMOVP D5062 D5062 Sheet length 50% calculated value (D6052/2) D6052 [GOT setting] Automatic Cam seneration Sheet length DMOVP	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous start position (L) U04G53210 Auto-seneration parameter value: Synchronous axis
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P	DMOVP D5062 Sheet length 50% calculated value (D6052/2) D6052 [GOT setting] Automatic Carn generation Sheet length DMOVP	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous start parking (L) U04G53210 Auto-seneration parameter value: Synchronous axis length (L)
	D>	D6054 [GOT setting] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P	DMOVP D5062 D5062 Sheet length 50% (D6052/2) D6052 GOT setting] Automatic Care seneration Sheet length DMOVF DMOVF	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513	U04G53208 Auta-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auta-seneration parameter value: Synchronous start position (L) U04G53210 Auta-seneration parameter value: Synchronous start position (L)
	D>	D6054 [GOT setting] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		DP	DMOVP D5062 Sheet length 50% (D6052/2) D6052 (GOT setting) Automatic Cam generation Sheet length DMOVP D6050	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513 K2513	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous start position (L) U04G53210 Auto-seneration parameter value: Synchronous axis length (L) D5050
	D>	D6054 [GOT settins] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D/P	DMOVP D5062 D5062 D5062 D6052 D6052 D6052 D6052 D6052 DMOVP DMOVP D6050 D6050	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513 K2513	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6062/2) U04G53212 U04G53212 Auto-seneration parameter value: Synchronous start position (L) U04G53210 Auto-seneration parameter value: Synchronous axis length (L) D5050
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D-P D-P	DMOVP D5062 D5062 D5062 D6052 D6052 D6052 D6052 D6052 D6052 D6050 D6050 D6050 G00000 D6050 G000000 D6050 D6050	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513 K2513	U04G53208 Auto-seneration parameter value: Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous axis length (L) D5050 Acceleration rate over
	D>	D6054 [GOT setting] Automatic Cam generation Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D-P	DMOVP D5062 D5062 D5062 D6052 D6052 D6052 D6052 D6052 D6052 D6052 D6052 D6050 D6050 D6050 D6050 D6050 D6050 D6050	D5062 Sheet length 50% (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513 K10000	U04G53208 Auta-seneration parameter value: Sheet synchronous wildth (L) D5072 Sheet synchronous wildth 50% (D6052/2) U04G53212 Auta-seneration parameter value: Synchronous start position (L) U04G53210 Auta-seneration parameter value: Synchronous start position D5050 Acceleration rate over synchronous section
	D>	D6054 [GOT settins] Automatic Cam seneration Sheet synchronous width	D5062 Sheet length 50% calculated (D6052/2)		D-P	DMOVP D5062 D5062 Sheet length 50% (D6052/2) D6052 GOT setting] Automatic Cam generation Sheet length DMOVP D6050 [GOT setting] Automatic Cam generation acceleration rate over synchronous section	D5062 Sheet length 50% calculated value (D6052/2) K2 D5072 Sheet synchronous width 50% (D6052/2) K2513 K10000	U04G53208 Auto-seneration Sheet synchronous width (L) D5072 Sheet synchronous width 50% (D6052/2) U04G53212 Auto-seneration parameter value: Synchronous start position (L) U04G53210 Auto-seneration parameter value: Synchronous axis length (L) D5050 Acceleration rate over synchronous section calculated value (change value)

	[1	1						
								D5050	U0¥G53214
							MOVP	Acceleration rate	Auto-generation
								over synchronous section calculated	parameter value: Acceleration rate over
								value (change value)	synchronous section
									M500
						 		-	
								SET	Advanced 2 Cam auto
									-generation command
		MDUU						К1	U0¥G53200
		L				 			
							MOVP		Cam auto-generation
		Advanced 2							request
		generation							
		command							
									M500
								-	
								RST	Advanced 2 Cam auto
									-generation command
k∗ [∆duani	ed 2 Cam data	a reference pro	sram ****						<u></u>
L'IN CAL	M59								
								К1	U0¥G45000
		·		 		 	 		
(4916)							MOVP		Cam data operation
	Cam data								request
	reference								
								1	
								K5	U0¥G45001
							MOVP		Operation Cam No.
								К1	U0¥G45002
							MOVP		Cam data start
									position
								K512	U0¥G45003
							MOVP		Cam data operation
									points
									1
								К1	U0¥G45004
							MOVP		Cam data format
** [Comm	on]Error detec	tion program *	****		[]	 		<u> </u>	<u> </u>
	U0¥G2417.D								M6010
(10.14)	<u> </u>								~~~~~
(4944)	Avia 1 error								Error detected
	detection								Entir detected
	U0¥G2477.7								
		-							
	alarm								
	occurring								
	U0¥G2517 D								
		-							
	Axis 2 error detection								

		U0¥G2577.7	
		Jarm Jacurring	
		U0¥G2617.D	
		Axis 3 error Jetection	
		U0¥G2677.7	
		Axis 3 servo Jarm	
*** [For GO	T] For GOT interlock *****	
		U0¥G2477.1	M2000
	(4964)	Axis 1 servo	All axis servo ON
		DN	
		U0¥G2577.1	
		xis 2 servo DN	
		U0¥G2677.1	
		Axis 3 servo N	
		R077_1bnBus vD[0]	M2001
	(/1975)	DX10	o
	(4070)	RBUSY Avis#1#16)	Axis 1 BUSY signal
		1777,1 brBus	M2002
	(o
	(4978)	RBUSY Axis≇1=#16)	Axis 2 BUSY signal
		Direct) 3077_1bnBus	M2003
		y.D[2] DX12 	
1	(4981)	RBUSY	Axis 3 BUSY signal
		Direct	
		004324770	M2011
((4984)	Axis 1 servo	Axis 1 servo ready
		eady ON	signal
		U0¥G2577.0	M2012
	(4988)	Avis 2 serun	Axis 2 servo ready
		eady CN	signal
		U0¥G2677.0	M2013
	(4992)		
		txis 3 servo eady ON	Axis 3 servo ready signal

-----r

*** Progran	n starting setting	****					
	SM403						M6855
	r			 			
(4996)	1 scan OFF after RUN						Advanced program start
						K29	D3900
					MOVP		JOG/Home position return screen change device
(5002)							END-

**** [Adv	anced Con	nmon] Dis	play rotation count	graph *****				
				-				
		KO	D8480			D7000	D7001	K299
(0)	=		For trend display		BMOV	Axis 1 motor rotation speed waveform data (Start point)	Axis 1 motor rotation speed waveform data (Middle)	
		L		1				
							U0¥G2478	D7000
						-		
						MOV	Axis 1 regenerative load rate/optional data monitor output 1	Axis 1 motor rotation speed waveform data (Start point)
						D7500	D7501	K299
					BMOV	Axis 2 motor rotation speed waveform data (Start point)	Axis 2 motor rotation speed waveform data (Middle)	
						RD77_1.stnAxMntr[1].dMotorRotationSpeed	K100	D7950
					D/	R:Motor rotation speed		For Axis 2 motor rotation speed waveform calculation
							D 7950	D7500
						DINT2INT	For Axis 2 motor rotation speed waveform calculation	Axis 2 motor rotation speed waveform data (Start point)
	1							
						D8000	D8001	K299
					BMOV	Axis 3 motor rotation speed waveform data (Start point)	Axis 3 motor rotation speed waveform data (Middle)	
						RD77 1.stnAxMntr[2].dMotorRotationSpeed	K100	D8450
					D/	R:Motor rotation speed		For Axis 3 motor rotation speed waveform calculation
						[D8450	D8000
						DINT2INT	For Axis 3 motor rotation speed waveform calculation	Axis 3 motor rotation speed waveform data (Start point)
							К1	D8480
						+P		For trend display
		K1	D8480	1			К2	D8480
(38)	=		For trend display			+P		For trend display
				1				
		К2	D8480	1			КО	D8480
(45)	<=		For trend display			MOVP		For trend display
								[END 1
(51)								

Appendices

Appendix 1 Sequence Program List

A list of sequence programs for project "SCHOOL_(positioning)" is shown below.

*** Initial pro	ocessing ****							
	SM403							RD77_1.bPLC_Ready Y0
	<u> </u>	1				-		
(0)	OFF for only 1 scan after RUN							RW:PLC READY
		M1000	RD77_1.bReady_D DX0					RD77_1.bAllAxisServoOn Y1
		[PB for GOT] Servo ON	R:READY(Direct)					RW:All axis servo ON
							KO	PD77.1 ster & Chrill D
						MOVE		[0].uRequestServoOff_D U0¥G4351 BW:Servo OFF command
								(Direct)
							КО	RD77_1.stnAxCtrl1_D [1].uReguestServoOff D
						MOVE		U0¥G4451 RW:Servo OFF command (Direct)
							K0	RD77_1.stnAxCtrl1_D [2].uRequestServoOff_D
						MOVE		RW:Servo OFF command (Direct)
							ļ	
		м1000					К1	RD77_1.stnAxCtrl1_D [0].uRequestServoOff_D U0¥G4351
		[PB for GOT] Servo ON				MOVE		RW:Servo OFF command (Direct)
							К1	RD77_1.stnAxCtrl1_D [1].uRequestServoOff_D U0¥G4451
						MOVE		RW:Servo OFF command (Direct)
			_					
							К1	RD77_1.stnAxCtrl1_D [2].uRequestServoOff_D U0¥G4551
						MOVE		RW:Servo OFF command (Direct)

*** [For GO	T] Current value	e monitor ****	*										
	SM403										PD 7	77 1 atur Aud Antor	Dû
											[0].d	ActualPosition	00
(40)											/		
(40,	OFE for only 1									DIMO	' R:Real	current value	Axis 1 Feed current value
	scan after RUN	1											
											_		
											RD7	7_1.stnAxMntr	D20
											[1].0	ActualFosition	
										DMO.	/ R:Real	current value	Axis 2 Feed current value
											RD7	7_1.stnAxMntr	D40
											[2].d	ActualPosition	
				ĺ				[DMO.	/ D.D	ourront unlug	Avia 2 Each ourreast uplue
											IN INCOM	Current value	Axis 31 eeu current value
*** Switch o	peration mode	****								:			
	U0¥G2477.0	U0¥G257	7.0 U0¥G267	7.0	M6800	M6801	M6802	M6803					M6000
(51)										Î			0
(01)	Axis 1 servo	Axis 2 serve	Axis 3 servo	readv	JOG•home	Positioning	Advanced	Advanced					JOG • home position mode
	ready ON	ready ON	ON	ŕ	position	control	synchronous	synchronous					
					switch	switch	switch	switch					
					M6800	M6801	M6802	M6803					M6001
							/ĭ	/r					0
					JOG•home	Positioning	Advanced	Advanced					Positioning control 1
					switch	switch	control 1	control 2					
*** JOG ope	 eration and hom	e position retu	rn ****				switch	switch					
	M6000										1		
												D640	RD77_1.stnAxCtrl1_D [0]udJOG Sneed D
				_									U0¥G4318
(73)											DMOV	Axis 1 JOG sp	eed RW:JOG speed
	JOG•home												(Direct)
	mode												
												D642	RD77_1.stnAxCtrl1_D
													[1].udJOG_Speed_D
											DMOV	Axis 2, IOG en	eed RW: IOG speed
												HAIS 2 000 sp	(Direct)
												DEM	DD77.1.etraluOtal1.D
												0044	[2].udJOG_Speed_D
				-							DIMON		U0¥G4518
											DIVIOV	Axis 3 JOG sp	eed RW:JOG speed
													(01800)
		M1022	M1002		M1024	M4011	M4021	N44091	M1011	M1010			LI0¥G90101.0
		M1022	W1023		M1024	MHOTT	1014021	M4031	MIOTI	MINIO			00+030101.0
		r	/¥		_/*	/r	/r	/r		/r			
		Axis 1 home	Axis 2 home	Axis 3	3 home	Axis 1 home	Axis 2 home	Axis 3 home	[PB for GOT]	[PB for GOT]			Axis 1 forward
		position return start	position return start	positi start	ion return	FB operating	FB operating	rn position return FB operating	forward	Axis 1 reverse			rotation JUG start
		•				flag	flag	flag	rotation JOG	rotation JOG			
									M1010	M1011			U0¥G30102.0
										-11-			
									[PB for GOT]	[PB for GOT]			Axis 1 reverse
									Axis 1	Axis 1			rotation JOG start
									reverse rotation JOG	torward rotation JOG			
									M1013	M1012			U0¥G30111.0
										1011012			004000111.0
										/ī			
									1				Ŭ
									[PB for GOT]	[PB for GOT]			Axis 2 forward
									forward	everse			rotation JUG start
									rotation JOG	rotation JOG			
									M1012	M1013			U0¥G30112.0
									1	4			~
									[PB for GOT]	[PB for GOT]			Axis 2 reverse
									Axis 2	Axis 2 forward			rotation JOG start
									p over se	ror ward			

						M1015			U0¥G30121.0
					[PB for GOT] Axis 3 forward	PB for GOT] Axis 3 reverse			Axis 3 forward rotation JOG start
					rotation JOG M1015	rotation JOG M1014			U0¥G30122.0
						/r			O
					[PB for GOT] Axis 3 reverse rotation JOG	[PB for GOT] Axis 3 forward rotation JOG			Axis 3 reverse rotation JOG start
M1020									M1021
[PB for GOT] Home position								PLS	Home position return trigger
M1021	U0¥G2417.4						[M1022
Home position return trigger	Axis 1 home position return complete							SET	Axis 1 home position return start
	U0¥G2517.4						Γ		M1023
	Axis 2 home position return complete							SET	Axis 2 home position return start
 	U0¥G2617.4						Г		M1024
	Axis 3 home position return complete							SET	Axis 3 home position return start
 									n wak wa ED -t-st
 	DD 33 11 D D						k	Axis 1 home positio	n return FB start
M1022	RD77_1.bnBusy_D [0] DX10	M4011	U0¥G2477.1					Axis 1 home positio	M4010
M1022 Axis 1 home position return start	RD77_1.bnBusy_D [0] DX10 // R:BUSY(Axis#1- #16)(Direct)	M4011 Jr Axis 1 home position return FB operating flag	U0¥G2477.1 H Axis 1 servo ON					Axis 1 home positio	M4010 Axis 1 home position return FB start
M1022 Axis 1 home position return start M4010	RD77_1bnBusy_D [0] DX10 	M4011 J:T Axis 1 home position return FB operating flag RD77_1bnBusy_D [0] DX10	U0¥G2477.1 H Axis 1 servo ON M4011					SET	Axis 1 home position return FB start M1022
M1022 Axis 1 home position return start M4010	RD77_1bnBusy_D [0] DX10 	M4011 Axis 1 home position return FB operating flag RD77_1bnBusy_D [0] DX10 JT	U0¥G2477.1 Axis 1 servo ON M4011					SET RST	M4010 Axis 1 home position return FB start M1022 Axis 1 home position
M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start	RD77_1hrBusy_D DX10 DX10 REUSY(Axis#1- #16/Direct) U0¥G2417.4 Axis 1 home position return complete	M4011 J/ Axis 1 home position neturn FB operating flag RD77_1bnBusy_D DX10 J/f RBUSY(Axis#1- #16)(Direct)	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating flag					SET	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start
M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start	RD 77_1 brBusy_D DX10 DX10 REUSY(Axis#1- #16)(Direct) U0WG2417.4 Axis 1 home position return complete U0WG2417.D	M4011 Axis 1 home position return FB coerating flag RD 77, 1 bnBusy,D DX10 Jf REUSY(Axis#1- #16)(Direct)	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating flag					SET	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010
M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start	RD 77. 1 brBusy.D DX10 X10 REUSY(Axis#1- #16)(Direct) U0WG2417.4 Axis 1 home position return complete U0WG2417.D U0WG2417.D Axis 1 error detection	M4011 Axis 1 home position return FB operatins flag RD 77, 1 hrBusy, D DX10 J T R:BUSY(Axis#1- #16)(Direct)	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating flag					SET RST RST	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start
M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start	RD 77_1 hrBusy D DX10 VT RBUSY(Axis#1- #16)(Direct) U0\00000000000000000000000000000000000	M4011 Jr Axis 1 home position return FB operating flag RD77.1 bnBusy.D DX10 Jr REUSY(Axis#1- #16/(Direct)	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating flag					RST RST	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start
M1022	RD77_1hrBusy_D DX10 X RBUSY(Axis#1- #16/Direct) U0WG2417.4 U0WG2417.4 U0WG2417.0 U0WG2417.D D0WG2417.D D0WG241.D 	M4011 J/F Axis 1 home position return FB operating flag RD77_1bnRusy_D DX10 JX7 RBUSY(Axis#1- #16\/Direct) M4021	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating flag					SET RST RST Axis 2 home positio	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M4020
M1022 Axis 1 home position return start M4010 I I Axis 1 home position return FB start M1023 Axis 2 home position return start	RD 77.1 hrBusy.D DX10 X10 REUSY(Axis#1- #16)(Direct) U0WG2417.4 U0WG2417.4 U0WG2417.4 U0WG2417.D U0WG2417.D U0WG2417.D U0WG2417.D U0WG2417.D U0WG2417.D U0WG2417.D U0WG2417.D U0WG2417.D U0WG2417.D U0WG2417.A REUSY(Axis#1- #16)(Direct)	M4011 Jr Axis 1 home position return FB operating flag RD77.1 hrBasy.D DX10 Jr REUSY(Axis#1- #16)(Direct) M4021 Jr Axis 2 home position return FB poerating flag	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating flag U0¥G2577.1 U0¥G2577.1 Axis 2 servo ON					SET RST RST Axis 2 home positio	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M4020 Axis 2 home position return FB start
M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M1023 Axis 2 home position return start M4020	RD77_1brBusy_D DX10 JX1 REUSY(Axis#1- #16/kDirect) U0WG2417.4 JU0WG2417.4 U0WG2417.4 U0WG2417.D JU0WG2417.D JU0WG2417.D LF REUSY(Axis#1- #16/kDirect) U0WG2517.4	M4011 J/F Axis 1 home position return FB operating flag RD77_11nFBusy_D DX10 J/F REBUSY(Axis#1- #16)(Direct) M4021 J/F Axis 2 home position return FB operating flag RD77_11nFBusy_D [1]	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating fbg U0¥G2577.1 U0¥G2577.1 Axis 2 servo ON					SET RST RST Axis 2 home positio	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M4020 Axis 2 home position return FB start
M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M1023 Axis 2 home position return start M4020 I I I I I I I I I I I I I I I I I I	RD 77. 1 brBusy.D DX10 X10 X10 X10 X10 X10 X10 X10 X11 X10 X11 X10 X11 X10 X11 X11	M4011 Jr Axis 1 home position return FB operating flag RD77.1 hrBusy.D DX10 Jr REUSY(Axis#1- #16)(Direct) M4021 Jr Axis 2 home position return FB RD77.1 hrBusy.D [1] DX11 Jr	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating flag U0¥G2577.1 U0¥G2577.1 Axis 2 servo ON M4021 					RST RST Axis 2 home positio	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M4020 Axis 2 home position return FB start
M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M1023 M1023 M1023 Axis 2 home position return start M4020 Axis 2 home position return FB start	RD 77, 1 brBusy,D DX10 X10 X10 X10 X10 X10 X10 X10 X10 X10	M4011 Axis 1 home position return FB operating flag RD77.1 bnBusy.D DX10 JT RBUSY(Axis#1- #16)(Direct) M4021 Axis 2 home position return FB position return FB position return FB position return FB RD77.1 bnBusy.D DX11 DX11 RBUSY(Axis#1- #16)(Direct)	UOWG2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating flag UOWG2577.1 Axis 2 servo ON M4021 Axis 2 servo ON M4021 Axis 2 home position return FB operating flag					RST RST RST RST RST RST RST RST	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M4020 Axis 2 home position return FB start M1023 Axis 2 home position return start
M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M1023 Axis 2 home position return start M4020 Axis 2 home position return FB start	RD77_1brBusy_D DX10 	M4011 J/F Axis 1 home position return FB operating flag RD77_1hrBusy_D DX10 J/F RBUSY(Axis#1- #16)(Direct) Axis 2 home position return FB operating flag RD77_1hrBusy_D [1] DX11 J/F RBUSY(Axis#1- #16)(Direct)	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating flag U0¥G2577.1 U0¥G2577.1 Axis 2 servo ON M4021 Axis 2 home position return FB operating flag					SET RST Axis 2 home positio SET RST RST	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M4020 Axis 2 home position return FB start M1023 Axis 2 home position return start
M1022 Axis 1 home position return start M4010 Axis 1 home position return fB start M1023 Axis 2 home position return start M4020 Axis 2 home position return FB start	RD77_1brBusy_D DX10 	M4011 Jr Axis 1 home position return FB poerating flag RD77_11nFLuxy_D DX10 Jr REUSY(Axis#1- #16)(Direct) Axis 2 home position return FB operating flag RD77_11nFLuxy_D CT REUSY(Axis#1- #16)(Direct)	U0¥G2477.1 Axis 1 servo ON M4011 Axis 1 home position return FB operating fbg U0¥G2577.1 U0¥G2577.1 Axis 2 servo ON M4021 Axis 2 home position return FB operating flag					RST RST RST RST RST RST RST RST RST	M4010 Axis 1 home position return FB start M1022 Axis 1 home position return start M4010 Axis 1 home position return FB start M4020 Axis 2 home position return FB start M1023 Axis 2 home position return start

			DD 77 1 k - D D								Axis 3 home po	osition return FB start
		M1024	[2]	M40	31	U0¥G2677.1						M4030
		<u> </u>	1/12		r						_	
		Axis 3 home position return start	R:BUSY(Axis#1- #16)(Direct)	Axis 3 hon position re operating	ne sturn FB flag	Axis 3 servo ON					SET	Axis 3 home position return FB start
		M4030	U0¥G2617.4	RD77_1.br	nBusy_D	M4031						
		1014000	00102017.4	[2] DX1	2	1014001						M1024
					·						RST	Avic 3 home position
		Axis 3 home position return FB start	Axis 3 home position return complete	R:BUSY(A: #16)(Direc	kis#1- kt)	Axis 3 home position return FB operating flag						return start
			U0¥G2617.D									M4030
			Axis 3 error								RST	Axis 3 home position return FB start
					M_RD	977_StartPosition	ning_00E_1	(M+RD77_StartPosi	tioning_00E)	1		
(334)						_	Positioning	start FB	_			
	M4010											M4011
	<u> </u>				BILDEN	I			o_bENO:B			
	Axis 1 home position return FB start	n			Execut	ion command		Execution status				Axis 1 home position return FB operating flag
												M4012
				RD77_1 -{}}	DUTILS	tModule			o_bOK:B			
				Module label	Module	abel		Normal completion				Axis 1 home position return FB operation
												M4013
				F 1/4 7								
				1 KI J	Target	axis		Error completion	ojbErr:B			Axis 1 home position return FB operation NG flag
				{ K9001 }	UW:i_u8	StartNo			o_uErrId:UW	-{ D4019 }		
					Cd.3:F	ositioning start l	No.	Error code		Axis 1 home position return FB error No. storage		
(726)					MJRD	77_StartPosition	ing_00E_2 Positioning	(M+RD77_StartPosi start FB	tioning_00E)			
	M4020											M4021
					BUNEN	I			o FENO:B			
					Execut	' ion command		Execution status	0_DENO.D			
	Axis 2 home position return FB start	۲ 										Axis 2 home position return FB operating flag
				RD77-1								M4022
				- 3	DUT:i_s	tModule			o_bOK:B			O
				Module label	Module	abel		Normal completion				Axis 2 home position return FB operation OK flag
												M4023
				-[K2]	UW:i_u/	Axis			o_bErr:B			o
				-	Target	axis		Error completion				Axis 2 home position return FB operation NG flag
				-{ K9001 }	UW:i_us	StartNo			o_uErrId:UW	{ D4029 }		
				Ē	Cd.3:F	ositioning start l	No.	Error code		Axis 2 home position return FB error No.		
	.1				L					j storage		

(1118	3)					M_RD77_StartPosi	tioning_00E Posit	_3 (M+RD77_StartPositi ioning start FB	ioning_00E)					
	M40	30						_						M4031
						BILDEN			o bENO:B					
	Axis 3 ho position FB start	me return				Execution command		Execution status	-					Axis 3 home position return FB operating flag
				Б	D77_1 _									M4032
				E M Ial	odule bel	- DUT:i_stModule Module label		Normal completion	o_bOK:B	1				Axis 3 home position return FB operation OK flag
				E	кз]	- UW:i_uAxis			o_bErr:B					M4033
						Target axis		Error completion						Axis 3 home position return FB operation NG flag
					к9001]	- UW:i_uStartNo			o_uErrId:UW	-{ D403	39]			
					_	Cd.3:Positioning sta	art No.	Error code		Axis 3 hor position n FB error 1 storage	ne eturn No.			
*** Teachir	ng program	****	1	1					1		1	1		
	M6800	M1100											M	1101
(1510) JOG• home position switch	[PB for GOT] Teaching switch										PLS	Teaching start t	rigger
		M1101											М	1102
		Teaching start trigger										SET	Teaching start n	equest
		N1100												
		Teaching									MOVP	KO	RD77_1.s [0].uTeaching U0¥ RW:Teaching dat (Direct)	tnAxCtrl1_D DataSelection_D G4348 ra selection
		request												
												K0	RD77_1.s	tnAxCtrl1_D
											MOVP		[1].uTeaching U0¥ RW:Teaching dat (Direct)	DataSelection_D G4448 a selection
											MOVP	K40	RD77_1.s [0].uTeachingPo U0¥ RW:Teaching pos (Direct)	tnAxCtrl1_D sitioningDataNo_D G4349 sitioning data No.
											MOVP	κ40	RD77_1.s [1].uTeachingPo U0¥ RW:Teaching pos (Direct)	tnaxUtr11_D sitioningDataNo_D G4449 sitioning data No.
					. 14 m	124								1100
			=_U	RD77_1.stnAx0 [0].uTeachingPosi U0¥G434 RW:Teaching posit data No.(Direct)	>tri1_D tioning*** 9 ioning	К0	=_U	RD77_1.stnAxCtr11_D [1].uTeachingPositioning ··· U0¥G4449 RW:Teaching positioning data No.(Direct)	к0			SET	M Teaching memor	i 103 y rewrite request

		M1103	RD77_1 bPLC,Ready Y0 I/F RWPLC READY =_U	RD77_1.stSysCtr1D. uWriteFlashRom D U0465900 RWFlash ROM write request(Direct)	KO		OUT	T0 PLC ready OFF check	RD77_1.st RWFlash f (Direct)	SysCtrLD uWriteFlashRo mD U04G5900 XOM write request K2 K2 M1103 nemory rewrite request
								RST	Teaching :	M1102 start request
*** Speed cł	nange progra M6001	m ***** M4211	M23							
(1573)	Positioning control 1	Axis 1 speed change FB	[PB for GOT] Speed change (0)				וס	WOVP	ко	D4217 Axis 1 speed change FB speed storage
										M4913
									SET	FB start Axis 1 speed change (0)
			M22							
			[PB for GOT] Speed change (500)				D	WOVP	K50000	D4217 Axis 1 speed change FB speed storage
										M4912
									SET	FB start Axis 1 speed change (500)
			M21						K100000	D 4017
			[PB for GOT] Speed change (1000)				D	VIOVP	K100000	D4217 Axis 1 speed change FB speed storage
										M4011
										M4911
									SET	FB start Axis 1 speed change (1000)
			M20						K200000	D/017
			[PB for GOT] Speed change (2000)				D	VIOVP	1200000	Axis 1 speed change FB speed storage
										M4910
									SET	FB start Axis 1 speed change (2000)
	I									

Position	ing operation :	****										
	M6001	MO	RD77_1.bnBusy_D	RD77_1.bnBusy_D	M10						K1	D4119
			DX10	DX11								04118
(1604)		<u>∤</u> I ⊨			//					MOVP		Avia 1 positionina
	Positioning	[PB for GOT]	R:BUSY(Axis#1-	R:BUSY(Axis#1-	[Operating flag]							FB positioning No
	control 1	Standby point	#16)(Direct)	#16)(Direct)	Standby point							storage
												M10
											SET	[Operating flag] Standby point
												otanab) point
		M10	M4110	RD77_1.bnBusy_D [0]	RD77_1.bnBusy_D [1]	U0¥G2417.F	M4111					M4800
			1.4	DX10	DX11	1.8	L.P.					
			*	*	*	*1	*				SET	FB start Standby
		[Operating flag] Standby point	Axis 1 positioning FB start	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning	Axis 1 positioning FB					point
		otanab) point	- D otal		110,010000	00110100	operating flag					
		M4800	U0¥G2417.F	RD77_1_bnBusy_D								
				LOJ DX10								M10
				/f							RST	
		FB start Standby	Axis 1 positioning	R:BUSY(Axis#1-							Not	[Operating flag] Standby point
		point	complete	#16)(Direct)								
			U0¥G2417.D									M4800
											RST	FB start Standby
			Axis 1 error detection									point
		M1	RD77_1.bnBusy_D	RD77_1.bnBusy_D	M11				_			
			DX10	DX11			D2000	K30			К2	D4118
					/f	=	007			MOVP		e
		[PB for GOT]	R:BUSY(Axis#1-	R:BUSY(Axis#1-	[Operating flag]		specification					FB positioning No
		Position selection	#16)(Direct)	#16)(Direct)	Position selection							storage
							D2000	K31	1		КЗ	D4118
						=	GOT value			MOVP		Axis 1 positioning
							specification					storage
]			
							D2000	120	1		KA.	D/119
							02000	102			114	Darrio
						=	GOT value			MOVP		Avis 1 positioning
							specification					FB positioning No
												storage
							D4118	K2		D4118	K4	1
												—ко –
						>=	Axis 1 positioning FB		<=	Axis 1 positioning FB		
							positioning No.			positioning No.		
							storage		1	storage		
		M11	M4110	RD77_1.bnBusy_D [0]	RD77_1.bnBusy_D [1]	U0¥G2417.F	M4111					M4801
			x	DX10	DX11	X	×					
			*1	*1	J 1	*1	*1				SET	FB start Position
		[Operating flag]	Axis 1 positioning	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning	Axis 1 positioning FB					selection
			, D otare		10,01000	oompioto	operating flag					
		M4801	M11	U0¥G2417 F	RD77_1.bnBusy_D							
					[0] DX10							M11
					<u>н</u> и						RST	fa
		FB start Position	[Operating flag]	Axis 1 positioning	R:BUSY(Axis#1-						101	[Operating flag] Position selection
		selection	Position selection	complete	#16)(Direct)							
					ļ							
				U0¥G2417.D								M4801
											RST	FB start Position
				Axis 1 error detection								selection
	.1	.1										

	r	1										
								[D2000	K10000	D2002
									D*	GOT value specification		GOT value after calculation
			RD77.1 boBusy D	BD77 1 boBusy D								
		M2	[0] DX10	[1] DX11	M12						К5	D4118
		PB for GOT] Indirect desimation	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	[Operating flag] Indirect designation					MOVP		Axis 1 positioning FB positioning No. storage
											D2002	U0¥G6046
										DMOVP	GOT value after calculation	Axis 1 No. 5 positioning data/positioning address
											D2002	10¥G7046
										_	02002	0010/045
										DMOVP	GOT value after calculation	Axis 2 No. 5 positioning data/positioning address
												M12
											SET	[Operating flag] Indirect designation
				DD7711-D	PD 77 1 1 - P P							
		M12	M4110	[0] [0] DX10	[1] DX11	U0¥G2417.F	M4112					M4802
		[Operating flag] Indirect designation	Axis 1 positioning FB start	R:BUSY(Axis#1- #16)(Direct)	LT R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning complete	Axis 1 positioning FB				SET	FB start Indirect designation
		MARCON	1000000175	RD77 1 bnBusy D			flag					
		1014802	00¥G2417.F	[0] DX10								M12
		FB start Indirect designation	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)							RST	[Operating flag] Indirect designation
			U0¥G2417.D									
												M4802
			Axis 1 error detection								RST	FB start Indirect designation
												N/11
	_ко _	,										10111
											SET	[Operating flag] Position selection
	M6001	M3	RD77_1.bnBusy_D [0]	RD77_1.bnBusy_D [1]	M13						К11	D4118
				DX11	/ī					_		
(1755)	Positioning control 1	[PB for GOT] Continuous (1)	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	[Operating flag] Continuous (1)					MOVP		Axis 1 positioning FB positioning No. storage
												M101
											_	
											SET	Start trigger continuous (1)
												M13
											_	
											SET	[Operating flag] Continuous (1)
	l	1										

M101	M4110	RD77_1.bnBusy_D [0]	RD77_1.bnBusy_D [1]	U0¥G2417.F	M4111				M4811
	/	DX10	DX11	/i	/F				
Start trigger	Axis 1 positioning	R:BUSY(Axis#1-	R:BUSY(Axis#1-	Axis 1 positioning	Axis 1			SET	FB start Continuous (1) 1
continuous (1)	FB start	#16)(Direct)	#16)(Direct)	complete	positioning FB operating flag		l		
 									M101
								RST	Start trigger continuous (1)
 M/811	M101	LI0¥G2417 E	RD77_1.bnBusy_D						
10140111	101101	001024173	[0] DX10						M111
								SET	[Operating
FB start Continuous (1) 1	Start trigger continuous (1)	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)						completion flag] Axis 1 continuous (1) 1
		U0¥G2417.D					[M4811
		Axis 1 error detection						RSI	FB start Continuous (1) 1
 M111	M4811	RD77_1.bnBusy_D	RD77_1.bnBusy_D	M4				K7000	D/118
	/r	DX10	םג'וֹז דעד						04110
[Operating completion flag] Axis 1 continuous	FB start Continuous (1) 1	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	[PB for GOT] Continuous (1) stepping			MOVP		Axis 1 positioning FB positioning No. storage
(1) 1									
									M4812
								SET	FB start Continuous (1) 2- 1
			RD77_1.bnBusy_D	RD77_1.bnBusy_D					
	K7000	D4118	DX10	[1] DX11					M111
=		Axis 1 positioning FB positioning No. storage	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)				RST	[Operating completion flag] Axis 1 continuous (1) 1
 M/812	64111	LI0¥G2/17 F	RD77_1.bnBusy_D						
1014012	101111	001024171	[0] DX10						M113
FB start Continuous (1) 2- 1	[Operating completion flag] Axis 1 continuous	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)					SET	[Operating completion flag] Axis 1 continuous (1) 3
 		U0¥G2417.D							
									1014812
		Axis 1 error detection						RST	FB start Continuous (1) 2- 1
 M113	M4812	M4814	RD77_1.bnBusy_D	RD77_1.bnBusy_D	M4			KJ001	DATTO
	4		DX10	DX11				K7001	U4118
					117		MOVP		Axis 1 positioning
[Operating completion flag] Axis 1 continuous	FB start Continuous (1) 2- 1	FB start Continuous (1) 4- 1	#16)(Direct)	#16)(Direct)	[PB for GOT] Continuous (1) stenning				FB positioning No. storage
 (1) 3	•	•							
							[M4814
								SET	FB start Continuous (1) 4– 1
 	1.488.2.2.2		RD77_1.bnBusy_D	RD77_1.bnBusy_D					
	K/001	D4118	DX10	DX11					M113
=		Axis 1 positioning FB positioning No. storage	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)				RST	[Operating completion flag] Axis 1 continuous (1) 3
	1								

M4814	M113	U0¥G2417.F	RD77_1.bnBusy_D [0] DX10					M114		
FB start Continuous (1) 4– 1	[Operating completion flag] Axis 1 continuous (1) 3	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)				SET	[Operating completion flag] Axis 1 continuous (1) 4-1		
		U0¥G2417.D						M4814		
		Axis 1 error detection					RST	FB start Continuous (1) 4- 1		
M114	RD77_1.bnBusy_D	RD77_1.bnBusy_D	M4				K7002	D4118		
I	DX10 ↓/ĭ	DX11 ──↓∕ĭ──				_	111002	51110		
[Operating completion flag] Axis 1 continuous (1) 4-1	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	[PB for GOT] Continuous (1) stepping			MOVP		Axis 1 positioning FB positioning No. storage		
 (1) 4-1								M4815		
							OFT			
							361	FB start Continuous (1) 5- 1		
	K7002	D4118	RD77_1.bnBusy_D [0] DX10	RD77_1.bnBusy_D [1] DX11				M114		
=		Axis 1 positioning FB positioning No. storage	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)			RST	[Operating completion flag] Axis 1 continuous (1) 4-1		
M4815	M114	U0¥G2417.F	RD77_1.bnBusy_D [0] DX10					M115		
FB start Continuous (1) 5– 1	[Operating completion flag] Axis 1 continuous (1) 4-1	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)				SET	[Operating completion flag] Axis 1 continuous (1) 5-1		
		U0¥G2417.D						M4815		
		Axis 1 error detection					RST	FB start Continuous (1) 5- 1		
 M115								M13		
Operating							RST	[Operating flag] Continuous (1)		
 Axis 1 continuous (1) 5–1										
								M115		
							RST	[Operating completion flag] Axis 1 continuous (1) 5-1		
								M125		
							RST	[Operating completion flag] Axis 1 continuous (2) 5-2		
	M6001	M5	RD77_1.bnBusy_D [0]	RD77_1.bnBusy_D [1]					K20	D4118
-------	--------------------------	---------------------------------	--------------------------------	--------------------------------------	--------------------------------	--------------------------------	--	------	------	---
										0.110
1908)	Positioning control 1	[PB for GOT] Continuous (2)	R:BUSY(Axis#1- #16)(Direct)	₽1 R:BUSY(Axis#1- #16)(Direct)				MOVP		Axis 1 positioning FB positioning No. storage
										M15
									SET	[Operating flag] Continuous (2)
								Г		M102
										MITOZ
									SET	Start trigger continuous (2)
		M102	M4110	RD77_1.bnBusy_D	RD77_1.bnBusy_D	U0¥G2417.F	M4111			MADOE
				DX10	DX11	/				1014605
		Start trigger continuous (2)	Axis 1 positioning FB start	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning complete	Axis 1 positioning FB operating flag		SET	FB start Continuous (2)
		M4805	U0¥G2417.F	RD77_1.bnBusy_D [0]				Г		M102
			I	DX10						
		FB start Continuous (2)	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)					RST	Start trigger continuous (2)
			U0¥G2417.D					Г		M15
			L							
			Axis 1 error detection						RST	[Operating flag] Continuous (2)
								Г		M4805
									RST	FB start Continuous (2)
		M6	RD77_1.bnBusy_D [0]	RD77_1.bnBusy_D [1]					K40	D4118
									1140	04110
		[PB for GOT] Teaching	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)				MOVP		Axis 1 positioning FB positioning No. storage
								Г		M16
										NITS .
									SET	[Operating flag] Teaching
		M16	M4110	RD77_1.bnBusy_D	RD77_1.bnBusy_D	U0¥G2417.F	M4111	F		M4806
			/r			/r	r			IVIHOUU
		[Operating flag] Teaching	Axis 1 positioning FB start	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning complete	Axis 1 positioning FB operating flag		SET	FB start Teaching
		M4806	U0¥G2417.F	RD77_1.bnBusy_D						M16
		<u> </u>		0×10	1					WID
		FB start Teaching	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)					RST	[Operating flag] Teaching
			U0¥G2417.D							
										1014806
			Axis 1 error detection						RST	FB start Teaching
								-		

		M7	M17	RD77_1.bnBusy_D	RD77_1.bnBusy_D						
				DX10	DX11					K50	D4118
		[PB for GOT] Enable fixed pitch	[Operating flag] Enable fixed pitch	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)				MOVP		Axis 1 positioning FB positioning No. storage
										K0	D2080
									MOVP		Fixed feed stepping count
											M17
										SET	[Operating flag] Enable fixed pitch
		M17	M8	M4110	RD77_1.bnBusy_D	RD77_1.bnBusy_D	U0¥G2417.F	M4111		D2002	LIO¥G6496
				/r			/r			02002	00+00+00
		[Operating flag] Enable fixed pitch	[PB for GOT] Execute fixed pitch	Axis 1 positioning FB start	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning complete	Axis 1 positioning FB operating flag	DMOVP	GOT value after calculation	Axis 1 No. 50 positioning data/positioning address
											M4807
										SET	FB start Enable fixed pitch
		M4807	U0¥G2417.F	ED77_1.bnBusy_D [0] DX10							M4807
		FB start Enable fixed pitch	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)						RST	FB start Enable fixed pitch
			U0¥G2417.D							121	D.0080
										KI.	D2080
			Axis 1 error detection						+P		Fixed feed stepping count
						K10	D2080				M17
					<=		Fixed feed stepping count			RST	[Operating flag] Enable fixed pitch
* Positioni	ne FB ***** M4800										M4110
(2033)	FB start Standby point	t									Axis 1 positioning FB
	M4801										start
	FB start Position selection										
	M4802										
	FB start Indirect designation										
	M4811										
	FB start Continuous (* 1	1)									

	M4812					
	FB start Continuous (1)					
	2-1					
	M4813					
	FB start					
	Continuous (1) 3					
	M4814					
	CD -++					
	Continuous (1)					
	4-1					
	M4815					
	FB start Continuous (1)					
	5-1					
	M4805					
	FB start Continuous (2)					
	M4806					
	FB start					
	leaching					
	M4807					
	FB start Enable					
	inxed pitteri					
			M_RD77_StartPositioning_00E_	4 (M+RD77_StartPositioning_00E)	1	
(2046)			Positio	oning start FB		
	M4110					M4111
			BIJEN	o_bENO:B		
	Axis 1		Execution command	Execution status		Axis 1
	positioning FB start					positioning FB operating flag
						M4112
		RD 77 1				1014112
			DUT:i_stModule	o_bOK:B		
		Module label	Module label	Normal completion		Axis 1
						positioning FB operation OK
						tlag 144119
						IVP#110
		{[к1]	UW:i_uAxis	o_bErr:B		
			Target axis	Error completion		Axis 1
						positioning FB operation NG
						flag
		{ D4118 }	UW:i_uStartNo	o_uErrId:UW	-[D4119]	
		Axis 1	Cd.3:Positioning start No.	Error code	Axis 1	
		positioning FB positioning			positioning FB error No.	
		No. storage			storage	

** Speed c	inge program *****		
	M4913		M4210
(0.495)			
(2435)	B start Axis 1 peed change 0)		Axis 1 speed change FB start
	M4912		
	B start Axis 1 peed change 500)		
	M4911		
	B start Axis 1 peed change 1000)		
	M4910		
	B start Axis 1 peed change 2000)		
	M4211		M4913
(2441)	vis 1 speed hance FB peratus fas	RST	FB start Axis 1 speed change (0)
			M4912
		RST	FB start Axis 1 speed change (500)
			M4911
		RST	FB start Axis 1 speed change (1000)
			M4910
		RST	FB start Axis 1 speed change (2000)

(2446)			M_RD77_ChangeSpeed_00E_1 Speed c	(M+RD77_ChangeSpeed_00E) change FB		
	M4210					M4211
			BilbEN	o_bENO:B		o
	Axis 1 speed change FB start		Execution command	Execution status		Axis 1 speed change FB operating flag
		RD77_1				M4212
			DUT:i_stModule	o_bOK:B		
		Module label	IVIOQUIE IADEI	Normal completion		Axis 1 speed change FB operation OK flag
						M4213
		{ [к1]	UW:i_uAxis	o_bErr:B		o
			Target axis	Error completion		Axis 1 speed change FB operation NG flag
		{ D4217]	UD:i_udSpeedChangeValue	o_uErrId:UW	-{ D4219 }	
		Axis 1 speed change FB speed storage	Cd.14:New speed value	Error code	Axis 1 speed change FB error No. storare	
*** Error de	tection program *****					
	U0¥G2417.D					M6010
(OREE)						o
(2000)	Axis 1 error detection					Error detected
	U0¥G2477.7					
	Axis 1 servo alarm occurring					
	U0¥G2517.D					
	Axis 2 error detection					
	U0¥G2577.7					
	[]					
	Axis 2 servo alarm occurring					
	U0¥G2617.D					
	Axis 3 error detection					
	U0¥G2677.7					
	Axis 3 servo alarm occurring					

*** Positioni	ng ladder program	starting s	etting ***	**						
	SM403									M6850
(2675)	OFF for only 1 scan after RUN									O Positioning program startup
									K22	D3900
								MOVP		JOG/Home position return screen change device
(2681)										(END)

Appendix 2 Application Practice

Here, we practice the continuous positioning, teaching/teaching playback and fixed-feed/ fixed-feed stepping.

Start the practice after writing the project "SCHOOL_(positioning)" to the PLC. For the steps to the practical training, refer to Chapter 6 "Practice (2) Training in Positioning Control." If this training is performed after practice in advanced synchronous control (refer to Chapter 7), perform the home position return (refer to Section 6.8.3), and delete the project "SCHOOL_(advanced)" in accordance with the following procedure.



(1) Click [Online] \rightarrow [Read from PLC] on GX Works3 menu.

av Setting Related Functions Setting Related Functions Read Parameter + Program(P) Select All Ocen/Cless All(T) Deselect All(N)	Legend • CPU	, T	nory		emory Card	Click!	Refresh(W)	
Module Name/Data Name	*	5	(B)	Detail	Tide	Last Charge	Size (Byte)	-
A R08	П							
🖯 🥸 Parameter								
🔮 System Parameter/CPU Parameter						7/6/2016 9:14:07 AM	1095	
Module Parameter						7/6/2016 9:14:08 AM	1400	1
Simple Motion Module Setting:0000:				Detail				
Remote Password						7/6/2016 9:14:07 AM	200	
🖯 🌐 Global Label								14
Global Label Setting						7/6/2016 9:14:08 AM	6044	
🖯 😘 Program				Detail				
- AN MAIN						7/6/2016 9:14:11 AM	21736/54688(Data Memory)	_
TREND						7/6/2016 9:14:11 AM	2232/3952(Data Memory)	
Display Memory Capacity								
Size Calculation							296/32088	
geno Data Memory							Free	
Used							600,000 G	
Increased Device/Label Memory (He Store	ge með) -						960/102448	
Decreased								
5% or Less SD Nemory Card							0/068	

(2) An Online Data Operation dialog box appears. Click the [Delete] tab.

Go to next page



Appendix 2.1 Practice Content

In this training, we practice not individual positioning operations stated in Chapter 6 "Practice (2) Training in Positioning Control," but a series of positioning operations.

- Continuous positioning (1): To perform stepping operation
- Continuous positioning (2): To continuously perform positioning operations (Continuous path control)
- Teaching, Teaching playback: To register any position and position the machine in the registered position
- Fixed-feed, Fixed-feed stepping: To perform fixed-feed operation in the stepping mode

Appendix 2.2 Practice Program

Appendix 2.2.1 Continuous positioning (1)

This program is designed for stepping operation using the block start data.



The outline of the program operation is shown below.



(1) Control data

ltom	Buffer mem	ory address	Softing volve								
Item	Axis 1 Axis 2		Setting value								
[Cd.3] Positioning start No.	4300	-	11 (Positioning data No. 11) 7000 (Block start data No. 0) 7001 (Block start data No. 1) 7002 (Block start data No. 2)								
POINT When the continuous position StartPositioning" writes the positioning start No. is not w	POINT When the continuous positioning (1) command input turns on, the module FB "M+RD77_ StartPositioning" writes the positioning start No. in "[Cd.3] Positioning start No." The positioning start No. is not written to the Avia 2 that will start according to the block start data										

(2) Output signal

ltem		Axis 1	Axis 2
Positioning start signal		Y10	-
POINT When the continuous positio StartPositioning" turns on the that will start according to the	ning (1) comn positioning s block start d	nand input turns on, the mo start signal. The positioning lata is not turned on.	dule FB "M+RD77_ start signal for the Axis 2

(3) Program example

[1] Continuous positioning (1) condition items

Condition item	Axis 1	Axis 2
Continuous positioning (1) command input	МЗ	-
Continuous positioning (1) stepping command input	N	14

[2] Positioning data to be used (Positioning data Nos. 11 to 15)

Each of the Axes 1 and 2 is subject to 1-axis linear interpolation control (absolute method).

Axis 1 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address			
11	0:END	01h:ABS Linear 1	-	0:100	0:150	30000.0 µm	0.0 µm			
	<positioning comm<="" td=""><td>nent>Continuous (1) (1)</td><td></td><td></td><td></td><td></td><td></td></positioning>	nent>Continuous (1) (1)								
12	0:END	01h:ABS Linear 1	-	0:100	0:150	60000.0 µm	0.0 µm			
<positioning comment="">Continuous (1) (2-1)</positioning>										
13	0:END	01h:ABS Linear 1	-	1:50	1:2000	90000.0 µm	0.0 µm			
	<positioning comment="">Continuous (1) (3)</positioning>									
14	0:END	01h:ABS Linear 1	-	0:100	0:150	140000.0 µm	0.0 µm			
	<positioning comm<="" td=""><td>nent>Continuous (1) (4-1)</td><td></td><td></td><td></td><td></td><td></td></positioning>	nent>Continuous (1) (4-1)								
15	0:END	01h:ABS Linear 1	-	0:100	0:150	0.0 µm	0.0 µm			
	<positioning comm<="" td=""><td>nent>Continuous (1) (5-1)</td><td></td><td></td><td></td><td></td><td></td></positioning>	nent>Continuous (1) (5-1)								

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method				
11	1000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method				
12	2000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method				
13	3000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method				
14	500.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method				
15	2000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method				

Axis 2 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address			
12	0:END	01h:ABS Linear 1	-	0:100	0:150	60000.0 µm	0.0 µm			
	<positioning comm<="" th=""><th colspan="9"><positioning comment="">Continuous (1) (2-2)</positioning></th></positioning>	<positioning comment="">Continuous (1) (2-2)</positioning>								
14	0:END	01h:ABS Linear 1	-	0:100	0:150	140000.0 µm	0.0 µm			
	<positioning comment="">Continuous (1) (4-2)</positioning>									
15	0:END	01h:ABS Linear 1	-	0:100	0:150	0.0 µm	0.0 µm			
	<positioning comm<="" th=""><th colspan="8"><positioning comment="">Continuous (1) (5-2)</positioning></th></positioning>	<positioning comment="">Continuous (1) (5-2)</positioning>								

<positioning< th=""><th>Comment>Continuous</th><th>(1)</th><th>) (5-2)</th><th></th></positioning<>	Comment>Continuous	(1)) (5-2)	

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
12	2000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
14	5000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
15	2000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method

[3] Block start data to be used (block start data Nos. 0 to 2)

Block start data	Details of operation
Block No. 0 (Stepping operation (1))	The Axes 1 and 2 are simultaneously positioned according to the data No. 12 to complete the positioning.
Block No. 1 (Stepping operation (2))	The Axis 1 is positioned according to the data No. 13. Continuously the Axes 1 and 2 are simultaneously positioned according to the data No. 14 to complete the positioning.
Block No. 2 (Stepping operation (3))	The Axes 1 and 2 are simultaneously positioned according to the data No. 15 to complete the positioning.

Axis 1 Block start data

Block No. 0

Display Filter	Block No.0	•			
Point No.	Shape	Start data No.	Special start instruction	Parameter	Condition data
1	0:END	12	03h:Simultaneously Start	1	Axis#2(No.12)

Block No. 1

Display Filter	Block No.1	•			
Point No.	Shape	Start data No.	Special start instruction	Parameter	Condition data
1	1:Continue	13	00h:Normal Start	1	
2	0.END	14	03h:Simultaneously Start	1	Avis#2(No. 14)

Block No. 2

1	Display Filter	Block No.2	-			
	Point No.	Shape	Start data No.	Special start instruction	Parameter	Condition data
	1	0:END	15	03h:Simultaneously Start	3	Axis#2(No.15)

Remarks							
The settings in in accordance	the block start data car with the following proce	n be displayed	Navigation	ų ×			
(1) Select [000 data] in the Motion sett data].	Project	7MS4 n Setting eter Parameter					
Poublo-clickt Start Data							
(2) The 0000-E	0077MS4[1 Avia #1 Pla	ak Start Data	Axi	s #2 Block Start Data			
setting scre block No., a	en appears. Click the d and the block No. can b	isplay filter e changed.	Axi 🕎 Axi	s #3 Block Start Data s #4 Block Start Data			
Display Filter Block No.	xis #1 ×						
Point No.	Shape Start data No.	Special start instruction 03h:Simultaneously Start	Parameter 1	Condition data Axis#2(No. 12)			

[4] Example of continuous positioning (1) program

To execute the following continuous positioning (1), the positioning execute program is required.

RD77_1.bnBusy_D RD77_1.bnBusy_D [0] [1] DX10 DX11 M13 M6001 мз D4118 K11 -1/F -11 MOVP (1755) Axis 1 positioning FB positioning No. storage ositioning ontrol 1 [PB for GOT] Continuous (1) R:BUSY(Axis#1-#16)(Direct) R:BUSY(Axis#1-#16)(Direct) [Operating flag] Continuous (1) M101 SET Start trigger continuous (1) M13 SET [Operating flag] Continuous (1) RD77_1.bnBusy_D [0] [1] DX10 DX11 M101 M4110 U0¥G2417.F M4111 M4811 -11--11 SET FB start Continuous (1) 1 Axis 1 positioning R:BUSY(Axis#1-FB start #16)(Direct) R:BUSY(Axis#1-#16)(Direct) Axis 1 positioning Axis 1 complete positioning FB operating flag Start trigger continuous (1) M101 RST Start trigger continuous (1) RD77_1.bnBusy_D [0] DX10 U0¥G2417.F M4811 M101 M111 -14 SET [Operating completion flag] Axis 1 continuous (1) 1 FB start Start trigger Continuous (1) 1 continuous (1) R:BUSY(Axis#1-#16)(Direct) Axis 1 positioning complete U0¥G2417.D M4811 4 F RST FB start Continuous (1) 1 Axis 1 error detection RD77_1.bnBusy_D [0] [1] DX10 DX11 M111 M4811 M4 K7000 D4118 -11 -11 MOVP Axis 1 positioning FB positioning No. storage [Operating FB start completion flag] Continuous (1) 1 Axis 1 continuous (1) 1 [PB for GOT] Continuous (1) stepping R:BUSY(Axis#1-#16)(Direct) R:BUSY(Axis#1-#16)(Direct) M4812 SET FB start Continuous (1) 2-RD77_1.bnBusy_D RD77_1.bnBusy_D [0] [1] DX10 DX11 M111 D4118 K7000 Axis 1 positioning FB positioning No. storage [Operating completion flag] Axis 1 continuous (1) 1 RST R:BUSY(Axis#1-#16)(Direct) R:BUSY(Axis#1-#16)(Direct)

Refer to Section 6.6.8 on positioning execute program.

	M4812	M111	U0¥G2417.F	RD77_1.bnBusy_D [0] DX10					M113
	FB start Continuous (1) 2- 1	[Operating completion flag] Axis 1 continuous (1) 1	Axis 1 positioning complete	RBUSY(Axis#1- #16)(Direct)				SET	[Operating completion flag] Axis 1 continuous (1) 3
			U0¥G2417.D						M4812
			Axis 1 error detection					RST	FB start Continuous (1) 2- 1
	M113	M4812	M4814	RD77_1.bnBusy_D	RD77_1.bnBusy_D	M4		K7001	D4118
	L	/F	/r	DX10	DX11		 	111001	54110
	[Operating completion flag] Axis 1 continuous	FB start Continuous (1) 2- 1	FB start Continuous (1) 4- 1	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	[PB for GOT] Continuous (1) stepping	MOVP		Axis 1 positioning FB positioning No. storage
	(1)3								14014
									1014814
								SET	FB start Continuous (1) 4- 1
		K7001	D4118	RD77_1.bnBusy_D [0] DX10	RD77_1.bnBusy_D [1] DX11				M113
	=		Axis 1 positioning FB positioning No. storage	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)			RST	[Operating completion flag] Axis 1 continuous (1) 3
	M4814	M113	U0¥G2417.F	RD77_1.bnBusy_D [0] DX10					M114
	FB start Continuous (1) 4– 1	[Operating completion flag] Axis 1 continuous (1) 3	Axis 1 positioning complete	RBUSY(Axis#1- #16)(Direct)				SET	[Operating completion flag] Axis 1 continuous (1) 4-1
			U0¥G2417.D						M4814
			Axis 1 error detection					RST	FB start Continuous (1) 4- 1
		PD77 1 heBusy D	PD77 1 heBueu D						
	M114	[0] DX10	[1] DX11	M4				K7002	D4118
	[Operating completion flag] Axis 1 continuous	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	[PB for GOT] Continuous (1) stepping			MOVP		Axis 1 positioning FB positioning No. storage
	(1) 4-1								M4815
								SET	FB start Continuous (1) 5- 1
		K7002	D4118	RD77_1.bnBusy_D [0] DX10	RD77_1.bnBusy_D [1] DX11				M114
	=		Axis 1 positioning FB positioning No. storage	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)			RST	[Operating completion flag] Axis 1 continuous (1) 4-1
l	t								1

	M4815	M114	U0¥G2417.F	RD77_1.bnBusy_D [0] DX10				M115
	FB start Continuous (1) 5– 1	[Operating completion flag] Axis 1 continuous (1) 4-1	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)			SET	[Operating completion flag] Axis 1 continuous (1) 5-1
			U0¥G2417.D					M4815
			Axis 1 error detection				RST	FB start Continuous (1) 5- 1
	M115							M13
	[Operating completion flag] Axis 1 continuous (1) 5–1						RST	[Operating flag] Continuous (1)
								M115
							RST	[Operating completion flag] Axis 1 continuous (1) 5-1
******								M125
		1					RST	[Operating completion flag] Axis 1 continuous (2) 5-2

(4) Demonstration machine operation panel [Positioning operation screen]

M14: Continuous positioning (1) stepping executing flag

M13: Continuous positioning (1) executing flag Continuous (1) M3: Continuous positioning (1) command input



Continuous (1) stepping M4: Continuous positioning (1) stepping command input

(5) Timing chart



Appendix 2.2.2 Continuous positioning (2)

This program is used to continuously execute positioning operations using continuous path control.



(1) Control data

ltere		Buffer mem	ory address	Softing value
Item		Axis 1	Axis 2	Setting value
[Cd.3] Positioning start N	0.	4300	-	20 (Positioning data No. 20)
POINT When the continuous po StartPositioning" writes positioning start No. is r	ositio the p lot wi	ning (2) comr positioning sta ritten to the ax	nand input tur rt No. in "[Cd. xis (Axis 2) to	ns on, the module FB "M+RD77_ 3] Positioning start No." The be interpolated.

(2) Output signal

II	Item	Axis 1	Axis 2
Positioning start sig	gnal	Y10	-
POINT When the continuc StartPositioning" tu (Axis 2) to be inter	ious positioning (2) comm turns on the positioning s prolated is not turned on	nand input turns on, the mo start signal. The positioning	dule FB "M+RD77_ start signal for the axis

(3) Program example

[1] Continuous positioning (2) condition item

Condition item	Axis 1	Axis 2
Continuous positioning (2) command input	Μ	15

[2] Positioning data to be used (Positioning data Nos. 20 to 28)

The continuous path control of Axes 1 and 2 is performed in the following order. The interpolation speed is the composite speed calculated by RD77MS based on the command speed of Axis 1.



Axis 1 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address		
20	3:LOCATION	0Ah:ABS Linear 2	#2	0:100	0:150	10000.0 µm	0.0 µm		
	<positioning comm<="" td=""><td></td><td></td></positioning>								
21	3:LOCATION	83h:LOOP	-	0:100	0:150	0.0 µm	0.0 µm		
	<positioning comm<="" td=""><td>ent>Continuous (2) (LOOP sta</td><td>art)</td><td></td><td></td><td></td><td></td></positioning>	ent>Continuous (2) (LOOP sta	art)						
22	3:LOCATION	0Bh:INC Linear 2	#2	0:100	0:150	0.0 µm	0.0 µm		
	<positioning comm<="" td=""><td>nent></td><td></td><td></td><td></td><td></td><td></td></positioning>	nent>							
23	3:LOCATION	0Eh:INC ArcMP	#2	0:100	0:150	10000.0 µm	5000.0 µm		
	<positioning comment=""></positioning>								
24	3:LOCATION	0Bh:INC Linear 2	#2	0:100	0:150	0.0 µm	0.0 µm		
	<positioning comment=""></positioning>								
25	3:LOCATION	0Eh:INC ArcMP	#2	0:100	0:150	10000.0 µm	5000.0 µm		
	<positioning comment=""></positioning>								
26	3:LOCATION	84h:LEND	-	0:100	0:150	0.0 µm	0.0 µm		
	<positioning comm<="" td=""><td>nent>Continuous (2) (LOOP en</td><td>d)</td><td></td><td></td><td></td><td></td></positioning>	nent>Continuous (2) (LOOP en	d)						
27	3:LOCATION	0Bh:INC Linear 2	#2	0:100	0:150	0.0 µm	0.0 µm		
	<positioning comm<="" td=""><td>nent>Continuous (2) (End point</td><td>t)</td><td></td><td></td><td></td><td></td></positioning>	nent>Continuous (2) (End point	t)						
28	0:END	0Ah:ABS Linear 2	#2	0:100	0:150	0.0 µm	0.0 µm		
	<positioning comm<="" th=""><th>ent>Continuous (2) (Initial po</th><th>s.)</th><th></th><th></th><th></th><th></th></positioning>	ent>Continuous (2) (Initial po	s.)						

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
20	2000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
21	0.00 mm/min	0 ms	6	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
22	Current Speed	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
23	Current Speed	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
24	Current Speed	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
25	Current Speed	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
26	0.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
27	Current Speed	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method
28	Current Speed	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method

Axis 2 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address			
20						20000.0 µm	0.0 µm			
20	<positioning comment="">Continuous (2) (Initial pos.)</positioning>									
22						100000.0 µm	0.0 µm			
22	<positioning comm<="" td=""><td>ient></td><td></td><td></td><td></td><td></td><td></td></positioning>	ient>								
22						0.0 µm	5000.0 µm			
25	<positioning comm<="" td=""><td>ient></td><td></td><td></td><td></td><td></td><td></td></positioning>	ient>								
24						-100000.0 µm	0.0 µm			
24	<positioning comm<="" td=""><td colspan="9"><positioning comment=""></positioning></td></positioning>	<positioning comment=""></positioning>								
25						0.0 µm	-5000.0 µm			
23	<positioning comm<="" td=""><td>ient></td><td></td><td></td><td></td><td></td><td></td></positioning>	ient>								
27						100000.0 µm	0.0 µm			
27	<positioning comment="">Continuous (2) (End point)</positioning>									
20						0.0 µm	0.0 µm			
20	<positioning comment="">Continuous (2) (Initial pos.)</positioning>									

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
20	0.00 mm/min		0			
22	0.00 mm/min		0			
22	0.00 mm/min		0			
23	0.00 mm/min		0			
24	0.00 mm/mm		0			
25	0.00 mm/min		0			
27	0.00 mm/min		0			
21	0.00 mm/min		0			
28	oroo minghini					

[3] Example of continuous positioning (2) program

To execute the following continuous positioning (2), the positioning execute program is required.

Refer to Section 6.6.8 on positioning execute program.

		M6001	М5	RD77_1.bnBusy_D [0] DX10	RD77_1.bnBusy_D [1] DX11					K20	D4118
(190	08) Pi	ositioning ontrol 1	[PB for GOT] Continuous (2)	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)				MOVP		Axis 1 positioning FB positioning No. storage
											M15
									 		MIJ
										SET	[Operating flag] Continuous (2)
											M102
										SET	Start trigger continuous (2)
			M102	M4110	RD77_1.bnBusy_D [0] DX10	RD77_1.bnBusy_D [1] DX11	U0¥G2417.F	M4111			M4805
			Start trigger continuous (2)	Axis 1 positioning FB start	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning complete	Axis 1 positioning FB operating flag		SET	FB start Continuous (2)
			M4805	U0¥G2417.F	RD77_1.bnBusy_D [0] DX10						M102
			FB start Continuous (2)	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)					RST	Start trigger continuous (2)
				U0¥G2417.D							M15
				<u>└</u>						DOT	
				Axis 1 error detection						ROI	[Operating flag] Continuous (2)
											M4805
										RST	FB start Continuous (2)

(4) Demonstration machine operation panel [Positioning operation screen]
 M15: Continuous positioning (2) executing flag
 Continuous (2) M5: Continuous positioning (2) command input



(5) Timing chart



Appendix 2.2.3 Teaching, teaching playback

This program is designed to register the positioning addresses for the Axes 1 and 2 (teaching) using the teaching function and position the axes in the registered addresses (teaching playback).

(1) Control data

ltom	Buffer mem	ory address	Softing value	
nem	Axis 1	Axis 2	Setting value	
[Cd.1] Flash ROM write request	5900		1 (Flash ROM write)	
[Cd.3] Positioning start No.	4300 -		40 (Positioning data No. 40)	
[Cd.38] Teaching data selection	4348 4448		0 (written in "[Da.6] Positioning address/movement amount")	
[Cd.39] Teaching positioning data No.	4349 4449		40 (Positioning data No. 40)	

POINT

When the teaching command input turns on, the module FB "M+RD77_StartPositioning" writes the positioning start No. in "[Cd.3] Positioning start No." The positioning start No. is not written to the axis (Axis 2) to be interpolated.

(2) Output signal

	Item	Axis 1	Axis 2
Positioning star	rt signal	Y10	-
POINT When the tead on the position interpolated is	ching command input turns on ning start signal. The position not turned on.	on, the module FB "M+RD7' ning start signal for the axis	7_StartPositioning" turns (Axis 2) to be

(3) Program example

[1] Teaching, teaching playback condition items

Condition item	Axis 1 Axis 2		
Teaching command input	M1100		
Teaching playback command input	N	16	

[2] Positioning data to be used (Positioning data No. 40)

The Axes 1 and 2 are subject to 2-axis linear interpolation control (absolute method).

The interpolation speed is the composite speed calculated by RD77MS based on the command speed of Axis 1.

Axis 1 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address		
40	0:END	0Ah:ABS Linear 2	#2	0:100	0:150	0.0 µm	0.0 µm		
	Positioning Comment Nearthing positioning								

<Positioning Comment>Teaching positioning

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
40	2000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method

Axis 2 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address
40						0.0 µm	0.0 µm
40	<positioning comm<="" td=""><td>ent>Teaching positioning</td><td></td><td></td><td></td><td></td><td></td></positioning>	ent>Teaching positioning					
-							

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
40	0.00 mm/min		0			
40						

[3] Example of teaching program

*** leach	iing progra	n ****	1		1	1				1	
	M680	0 M1100									M1101
(15	10)									PLS	Teaching start trigger
	JOG	[PB for									
	home positio	n [Teaching									
	switch	switch									
		M1101									M1102
										SET	Teaching start request
		Teaching									
		start trigger									
		M1102								K0	RD77 1.stnAxCtrl1 D
											[0].uTeachingDataSelection_D
									MOVE		RW:Teaching data selection
		Teaching									(Direct)
		start request									
										K0	RD77 1.stnAxCtrl1 D
											[1].uTeachingDataSelection_D
									MOVE	, ,	RW:Teaching data selection
											(Direct)
										K40	BD77.1 stnAvOtrl1.D
											[0].uTeachingPositioningDataNo_D
									MOVE	,	UU#G4349
											(Direct)
										K40	BD77.1 stpAyOtrl1.D
											[1].uTeachingPositioningDataNo_D
									MOVE		UU#G4449
											(Direct)
			L	RD77 1 stnAvCtrl1 D	ко	r	RD77_1_stnAxCtrl1_D	ко			M1103
				[0].uTeachingPositioning			[1].uTeachingPositioning ···				
			= U	DU#G4349		= U	DW-Topobing positioning			SET	Topobios momoru rouurito roquest
				data No.(Direct)		_	data No.(Direct)				reaching memory rewrite request
			M1103	RD77_1.bPLC_Ready						К1	RD77 1 stSvsCtrl D uWriteFlashRo
				YO							m_D
				1					MOVE		PW:Ebob POM write request
			Teaching	RW:PLC READY							(Direct)
			memory								
			request								
										то	K2
			1								
									OUT	RIC	
										ready	
										OFF check	
			T0		RD77_1.stSysCtrl D.	K0	1				M1103
					uWriteFlashRom_D						
				=_U	RW:Elash ROM write					RST	Teaching memory rewrite request
			PLC		request(Direct)						reaching memory rewrite request
			ready OFF								
			check								
											M1102
										RST	Teaching start request

POINT		
To write the p executed wh To write the c circuit near th	position data in the flash ROM while teaching, the flash ROM ile the PLC READY signal [Y0] is off. data in the flash ROM by this practice program, it is necessa ne top of the program.	<i>I</i> write request must be rry to add the following
	SM403 M1103	RD77_1.bPLC_Ready Y0
(0) OFI SC2	F for only 1 Teaching memory an after RUN rewrite request	RW.PLC READY

[4] Example of teaching playback program

To execute the following teaching playback, the positioning execute program is required.

Refer to Section 6.6.8 on positioning execute program.

	M6	RD77_1.bnBusy_D	RD77_1.bnBusy_D					K40	D.4110
		DX10	DX11					r.40	04118
	[PB for GOT]	R:BUSY(Axis#1-	R:BUSY(Axis#1-				MOVP		Axis 1 positioning FB positioning No.
	reacring	#10/(Direct)	#10/(Direct)						storage
									M16
									MID
								SET	[Operating flag] Teaching
	M16	M4110	RD77_1.bnBusy_D	RD77_1.bnBusy_D	U0¥G2417.F	M4111			M4906
		L#	DX10	DX11	L.P.	L.P.			1014000
	[Operating flag] Teaching	Axis 1 positioning FB start	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning complete	Axis 1 positioning FB operating flag		SET	FB start Teaching
	M4806	U0¥G2417.F	RD77_1.bnBusy_D [0] DX10						M16
	FB start Teaching	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)					RST	(Operating flag) Teaching
		10800417.0							
		00#02417.0							M4806
		└── ┤						RST	ED start Tarabian
		Axis 1 error detection							rostart Teaching
1									

(4) Demonstration machine operation panel

[1] JOG•home position return operation panel Teaching Memorize address M1100: Teaching command input

[2] Positioning operation screen

M16: Teaching playback executing flag

Teaching M6: Teaching playback command input





(5) Timing chart (Teaching play back)



Appendix 2.2.4 Fixed-feed, fixed-feed stepping

This program is used for fixed-feed of Axis 1 in the stepping operation.

(1) Positioning data (Positioning data No. 50)

ltem	Buffer memory address Axis 1	Setting value
[Da.6] Positioning address/	6496	-214748364.8 to 214748364.7
movement amount	6497	μm ^{*1}

*1. When the fixed-feed/fixed-feed stepping is executed, the value input on the demonstration machine operation panel (×10000) is set.

(2) Control data

ltom	Buffer memory address	Softing volue							
item	Axis 1	Setting value							
[Cd.3] Positioning start No.	4300	50 (Positioning data No. 50)							
POINT	POINT								
When the fixed-feed stepping co StartPositioning" writes the posi	When the fixed-feed stepping command input turns on, the module FB "M+RD77_ StartPositioning" writes the positioning start No. in "[Cd.3] Positioning start No."								

(3) Output signal

Item	Axis 1						
Positioning start signal	Y10						
POINT							
When the fixed-feed stepping command input turns on, the module FB "M+RD77_ StartPositioning" turns on the positioning start signal.							

(4) Program example

[1] Fixed-feed, fixed-feed stepping condition items

Condition item	Axis 1
Fixed-feed enable command input	M7
Fixed-feed stepping command input	M8

[2] Positioning data to be used (Positioning data No. 50)

1-axis fixed-feed control of the Axis 1 is performed based on the following settings. The positioning address is changed to the current value of "[Da.6] Positioning address/movement amount" of positioning data No. 50 when the fixed-feed/fixedfeed stepping is executed.

Axis 1 Positioning data

No.	Operation pattern	Control method	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address			
50	0:END	03h:Feed 1	-	0:100	0:150	0.0 µm	0.0 µm			
	<positioning comment="">Fixed feed</positioning>									

No.	Command speed	Dwell time	M-code	M-code ON signal output timing	ABS direction in degrees	Interpolation speed designation method
50	2000.00 mm/min	0 ms	0	0:Use the setting value of M-code ON signal output timing	0:Use the setting value of ABS direction at degree	0:Use the setting value of Interpolation speed designation method

[3] Example of fixed-feed/fixed-feed stepping program

To execute the following fixed-feed/fixed-feed stepping, the positioning execute program is required.

Refer to Section 6.6.8 on positioning execute program.

M7	M17	RD77_1.bnBusy_D [0]	RD77_1.bnBusy_D _[1]					K50	D4118
	/r	DX10	DX11						
[PB for GOT] Enable fixed pitch	[Operating flag] Enable fixed pitch	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)				MOVP		Axis 1 positioning FB positioning No. storage
								KO	D2080
							MOVP		Fixed feed stepping count
									M17
								SET	[Operating flag] Enable fixed pitch
 M17	M8	M4110	RD77_1.bnBusy_D	RD77_1_bnBusy_D	U0¥G2417 F	M4111			
			LOJ DX10	[1] DX11				D2002	U0¥G6496
[Operating flag] Enable fixed pitch	[PB for GOT] Execute fixed	Axis 1 positioning FB start	R:BUSY(Axis#1- #16)(Direct)	R:BUSY(Axis#1- #16)(Direct)	Axis 1 positioning complete	Axis 1 positioning FB operating	DMOVP	GOT value after calculation	Axis 1 No. 50 positioning data/positioning address
 					•	flag			
									M4807
								SET	FB start Enable fixed pitch
 M4807	U0¥G2417.F	RD77_1_bnBusy_D							
		L0] DX10							M4807
FB start Enable fixed pitch	Axis 1 positioning complete	R:BUSY(Axis#1- #16)(Direct)						RST	FB start Enable fixed pitch
	U0¥G2417.D							124	D.0000
								NI	D2080
							+P		Fixed feed
	detection								stepping count
				K10	D2080				M17
			<=		Fixed feed stepping count			RST	[Operating flag] Enable fixed pitch

POINT

After the fixed-feed/fixed-feed stepping is started, fixed-feed stepping can be performed 10 times.

(4) Demonstration machine operation panel [Positioning operation screen]

Value specification Setting for D2000: movement

Input the movement amount (unit: mm) in the numeric input

window, and touch ENTER. The movement amount will be

The allowable input range of movement amount (0 to 140) is

amount input

input window will appear.

limited on the touch panel.

POINT

changed.

M17: Fixed-feed enable flag

Enable fixed pitch M7: Fixed-feed enable command input

Execute fixed pitch M8: Fixed-feed stepping command input

Touch the Value specification Setting for D2000, and the numeric 0 <= INPUT <= 140 9 Cance 4 ← DEL 2 3 AC 00 0 **ENTER** 0

Setting for D2000

M17

Enable fixed

0

Value checification



Appendix 2.3 Demonstration Machine Operation

Execute the positioning operations in accordance with the programs stated in Appendix 1.2 operating the demonstration machine operation panel.

This practice is performed on the condition that (Axis 1, Axis 2) = (0, 0) after execution of the standby point positioning (refer to Section 6.8.4).

If any positioning operation cannot be performed, refer to the troubleshooting (Appendix 1.3.6).

To confirm the current value of each parameter, use the Simple Motion Monitor. (Refer to Appendix 4.)

Appendix 2.3.1 Preparation for positioning execution



- (1) Set the CPU module RUN/STOP/RESET switch to "RUN".
- (2) The startup screen will appear. Touch OK to display the course selection screen.
 If the screen switching menu has appeared, this step is unnecessary.



(3) Touch IQ-R Simple motion Course on the course selection screen to display the screen switching menu.



(4) Touch Servo ON M1000 on the screen switching menu, and the servo amplifiers of Axis 1 to Axis 3 will start.

Appendix 2.3.2 Continuous positioning (1)





(1) Touch Positioning control on the screen switching menu.

Positioning operation screen appears.

(2) Touch Positioning on the positioning operation
 screen to enable the buttons on the positioning operation screen.

Positioning operation	16:16
140-	
120-	M10 M11 M12 M12
80-	Standby Position Indirect point selection specification M0 M1 M2
40-	M13 🔘 M14 🔘 M15 🔘
0-	Continuous (1) M3 Continuous (1) Continuous (2) M5 Continuous (2)
0 20 40 60 80 100 120 140 Feed curr Positioning Enlarged Avis	Continuous positioning (1)
Axis graph 0.0 mm 0.0 mm Delete	Start 0
Device Name Error occurred M6010	n Speed 2000 1000 500 0 M22 M23

(3) Touch Continuous (1) / M3, and the Axis 1 will be moved from the current position to the standby position (30 mm) and stop.

M13 is on during Continuous positioning (1) operation.

The positioning trajectory obtained on the positioning operation screen is displayed in the positioning graph.



From previous page



(4) Touch

M4

Continuous (1) stepping , and the Axes 1 and 2 will perform stepping operation.

After three times of stepping operation, the axes will be positioned at (Axis 1, Axis 2) = (0,0), and Continuous positioning (1) will end.

The trajectory of Continuous positioning (1) is as shown below.



POINT

- The speed can be changed during positioning operation. For the speed change, refer to Section 6.8.7.
- · While M13 is on, it is impossible to perform any operation other than the stepping operation of Continuous positioning (1) except the speed change operation. To perform any other operation, perform the stepping operation three times to complete Continuous positioning (1).
- If the speed is changed during Continuous positioning (1), the command speed only of Axis 1 is changed.
- Even if the speed is changed, the change will be ineffective when the next stepping operation is performed. (The speed will be overwritten with the speed that has been set in the positioning data to be executed.)

Appendix 2.3.3 Continuous positioning (2)

Perform operation on the positioning operation screen.



Touch $\begin{bmatrix} Continuous (2) \\ M5 \end{bmatrix}$, and Continuous positioning (2) will be started. M15 is on during Continuous positioning (2) operation. The trajectory of Continuous positioning (2) is as shown below.



After positioning at the start point ((Axis 1, Axis 2) = (10, 20)), the following operation will be repeated 6 times.



The Axis 2 moves +100 mm linearly, and the positioning ends after positioning at ((Axis 1, Axis 2) = (0, 0)).



Appendix 2.3.4 Teaching, teaching playback

Teach (register) the current position on the JOG•home position return operation screen, and perform the teaching playback operation on the positioning operation screen.







The trajectory of teaching playback is as shown below.



Appendix 2.3.5 Fixed-feed, fixed-feed stepping

Perform operation on the positioning operation screen.





Axis 1 is fed by the movement amount specified in (2) from 0 mm in the fixed-feed mode. (When the start point is (50, 50), the fixed-feed starts from (0, 50).)

Fixed-feed/fixed-feed stepping from (0, 50) to (50, 50)






Appendix 2.3.6 Troubleshooting

When the module does not work, check the following points.

On the GOT screen, the error codes are displayed in decimal notation.

Check item	Countermeasures
Check that the servo amplifiers have started (all axes servo ON).	If the servo amplifiers have not started, touch M1000 on the screen switching menu.
Check that the CPU module is running.	If it is not running, set the RUN/STOP/RESET switch to "RUN".
Check that the module is not being tested by the Simple Motion setting tool.	If it is being tested, terminate the test. (Refer to Section 5.5.)
Check that no errors have occurred. (ERR.LED of RD77MS is on.)	If any error has occurred, cancel the error as stated below. • Touch Error screen to display the error screen. Touch Error reset, and the error will be reset. Error display screen I 4:10 Error codes for each axis Error Servo Code Error Servo Code Error Code U0¥G2407 U0¥G2406 U0¥G2488 O 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Check that Error occurred M6010 is not on.	 Axis 2
Check that all necessary parameters have been written to the programmable controllers.	Re-write the project data referring to Section 5.4.2.
Check that the positioning address of Axis 2 is within the range of positioning graph.	If positioning is performed when the positioning address of Axis 2 is not within the range from 0 to 140 mm, the operation can be performed normally, but the trajectory may not be displayed correctly on the graph. Perform positioning from an address within the range from 0 to 140 mm.
Check that M13 or M17 is not on.	While M13 is on, Continuous positioning (1) cannot be performed. While M17 is on, it is impossible to perform any operation other than the fixed-feed/fixed-feed stepping operation. Perform the stepping operation the specified number of times, and complete each positioning. If the movement amount for fixed-feed/fixed-feed stepping is set to 0, the number of times of stepping operation can be counted up without movement.

Appendix 3 Assistant Function

For supporting the simple motion module setting, an assistant function is available. Examples of use of the function are shown below.

MELSOFT Simple Motion Module Setting Functionor\Doc Project Edit View Online Window Click! Navigation P × Project	(1) Click the tool bar option [Assistant] on the Simple Motion Module setting tool.
Assistant Assistant Setting Procedure of Simple Motion Module step 1 : Simple Motion Module (3) 0000:RD77MS4 step 2 : Set the system configuration (4) System Setting step 3 : Set the parameter (5) Parameter step 4 : Set the servo parameter Step 5 : Set the operation Operation Setting Operation Setting Click! Operation Setting Operation Setting Operation Setting Operation Setting Operation Setting Operation Setting Set Set Set Set Set Set Set Set Set Set	 (2) The assistant window will appear just under the navigation window. (3) No setting is required in step 1: Simple Motion Module. (4) Click the <u>System Setting</u> button in step 2: Set the system configuration, and the system configuration. (Refer to Section 5.3.1.) (5) Click the <u>Parameters</u> button in step 3: Set the parameter.

Go to next page





Go to next page



Appendix 4 FB (function block) Insertion Procedure

The procedure for inserting FB is shown below.

1) Click [View] \rightarrow [Docking Window] \rightarrow [Element Selection].					
HELSOFT GX Works3 (Untitled Project) - [ProgPou [PRG] [LD] 2Step]					
: Project Edit Find/Replace Convert Vie	w Online Debug Diagnostics Tool	Window Help			
s 🔁 🔁 🕹 🛛 🚽 🕹	Toolbar	> 🐘 🔊 🚚 🔗 🔜 🔜 🔂 🔾 🕀 100% 💌 🚽 🛤 🖬			
12 🗈 🗉 🖬 🖬 🖼 - 🖼 🚟	Statusbar	5 sfs 챥a 챥a \$7 \$1\$ \$17 \$18 \$27 \$28 \$27 \$28 \$1 \$25 \$25 \$26 \$10 @ 갑			
	Color and Font				
Navigation	Docking Window	Navigation			
□ _Ĕ , □⊏ <u>O</u> ptions	Zoom	Connection Destination			
🕌 Project	Switch Display Language	Element Selection			
Module Configuration	Multiple Comments Display Setting	Output			
E 🥵 Program	Comment Display 0	Ctrl+F5 Progress			



Element Selection	ų ×				
(Find POU) 🎄 🍇 🔌					
⊊- 🖳 ☆ 🗁 X 🔤-					
Module Label	*				
Module FB					
🗷 📗 R08CPU					
B RD77MS4					
The second secon	ta set				
The second state of the se	art FB				
M+RD77_J(JOG/inching o	perati				
M+RD77_M Manual pulse	gener				
M+RD77_C Speed change	FB				
The second secon	e SV c				
M+RD77_C Target positio	n chai				
The start FB					
M+RD77_O_Frror operation	n FB				
Module FB					
POU Favo Hist Module	Library				

(2) The Element Selection window will appear. Click the Module tab.

(3) Expand RD77MS4 of the displayed module FB, and the FB list will be displayed.

PRECAUTIONS

If RD77MS4 is not displayed by expanding Module FB, add RD77MS4 to the module configuration. (Refer to Section 5.2.2.) If the ladder editor is not displayed, it is impossible to use any data in the list.



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From previous page

(4) Drag "M+RD77_StartPositioning_00E," and drop it in the ladder editor.



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Create the input circuit and output circuit blocks of the FB instance as shown below.



Appendix 5 Simple Motion Monitor

The parameters and error codes relating to all operation axes can be collectively monitored from the Simple Motion setting tool. You can check the parameters and errors of each axis during system operation.



- Appendix 5.1 Starting the Monitor (in the case of Axis Monitor)
 - In the [Navigation window] of the Simple Motion setting tool, select [Module Monitor], and double-click [Axis Monitor].

	v Type: AntolOutput An	t) • Fant	Size: 3pt 🔹 🖽	Hodule Information List
				@ (PLC READY(N))
	418.41	6vis #2	6vis #3	() READY(NO)
Feed current value	4754.7 um	3,72793 decree	4647.5 um	Synchronization flag(13)
Machine feed value	4754.7 um	3.72793 degree	4647.5 um	(i) All even server (PA(Y1))
Axis error No.				Mil 178 Barro status 1 - BRATH CHI
txis warning No.				Aug 200 1 2 2 3 4
kes operation status	Servo OFF	Servo OFF	Servo OFF	
wis feed speed	0.00 mm/min	0.000 degree/min	0.00 mm/min	Md. 108/Servo status 1 Servo ON
Positioning data No. secuted	1	1	1	Axis No. 1 2 3 4
ostioning data being				ALL REPORTED THE REPORTED IN
io: operación	Pastoring Complete	Pesconing Complete	vesicoring Complete	territe 1 2 3 4
ostinaine data beina	1-axis speed control	1-axis speed control	1-mis speed control	Pres 1 2 3 4
ad : Control method	(PWD)	(PWD)	(FWD)	Md.32:Status : Error detection
Positioning data being ed : Acceleration time	0:100	0:100	0:100	Aste No. 1 2 3 4
				Mo. 32 Status : Axis varring detection
ed : Deceleration time	0:150	0:100	0:100	0 Md.10h test wode feo(U010/0000
Postioning data being				(i) MLS14MP less operation model.010-0122
ed : Axis to be lated				Md. 132: Operation cycle over flag (30)/G4228
Positioning data being ed : M-code				Md. 132:5et operation cycle(U0/64238) 02008c0.444
2:Deviation counter	-2 pulse	-1 pulse	-22 pulse	Md. 134:Operation time(U0(G4008)
194otor rotation speed	0.07 r/min	-0.06 r/min	-0.13 r/min	161
Hotor current value	0.0 %	0.0 %	0.0 %	Md. 135:Maximum operation time(U0(04009)
IServo status 1 :	OFF	OFF	OFF	248
Servo status 1 :	OFF	OFF	OFF	Md. 19 No. of Hosh ROM writing(UTI04224) 0
Servo alarm				Md. 52:Searching flag for driver communication
Servo status 7 :	077	077	077	Complete of searching for driver co
operation alarm	UPP	Urr	UP	Md. S3.SSCHET control status[J07;64222]
Driver operation				Waiting for command accepted
				Md. 131:Digital OSC. running flag(U0)G4011

(2) The monitor starts up.

Appendix 5.2 Stopping/starting the Monitor



- (1) To stop the monitor, click the "Stop Monitoring" button on the Monitor screen toolbar.
- (2) To start the monitor again, click the "Start Monitoring" button on the Monitor screen toolbar.

Appendix 5.3 Switching the Monitor



The monitor screen can be switched by clicking a button on the monitor screen tool bar.

🛃 : Axis	Monitor
----------	---------

: Starting History

R : Current Value History

Appendix 5.4 Types of Monitors

(1) Axis Monitor

The current values of positioning parameters (monitor data and control data) are displayed. Refer to MELSEC iQ-R Simple Motion Module User's Manual (Application) for details of monitor data and control data.

A005 #1	Axis #2	Axis #3	READY(0.0)
139904.4 µm	49999.1 µm	11.0 µm	Syndworization flag(11)
39904.4 µm	49999.1 µm	11.0 µm	All axes servo CN(Y1)
			Md. 108:Servo status 1 : READY ON
			Aviation 10 2 2 4
Nating	Wating	Waiting	
0.00 mm/min	0.00 mm/min	0.00 mm/min	Md. 108:Servo status 1 : Servo ON
			Auto No. 1 2 3 4
Positioning Complete	Positioning Complete	Postioning Complete	BUSY
			MUSTIC: 1 2 3 4
1:100	0:100	0:100	Arts No. 1 2 3 4
			Md.31:Status : Axis warning detection
1:150	0:150	0:150	Aris No. 1 2 3 4
			 Md. con test mode flag(UO#G4000)
			Md.51:AMP-less operation mode[J/04G423 Md.133:Operation cycle over flagJ/04G42
			Md. 132:Set operation cycle(J0W04238) 0200fc0.44
t pulse	0 pulse	-1 pulse	Md 124/Coversitive New 109C40000
.00 n/min	0.20 t/min	0.00 r/min	15
1.9 %	0.0 %	-5.0 %	Md 175 Maxim m controllers free/1080-000
)FF	OFF	OFF	20
DEE	OFF	OFF	No. 1916. O Patri Non Intergrowthee
			Md.52/Searching flag for driver communica
DEE	OFF	OFF	Md.53/39ChET control status(J0404233)
			Waiting for command accepte
			Md. 13133g Sel OSC. Fuming Registeration
	Nating Leo mar/min costaning Complete cloo public cloo public cloo public cloo public cloo public cloo public cloo public cloo public cloo public cloo public cloo cloo public cloo public cloo cloo public cloo c		Image: Section (Section (

(2) Starting History

The flag, error and warning history information is displayed. The operations caused by errors and warnings can be checked.



(3) Current Value HistoryThis screen shows the history of values monitored during home

position return and when the power supply is turned on/off.



Appendix 5.5 Adding/deleting Monitor Items

On the axis monitor, items to be monitored can be added and deleted.

(1) Click the Select Monitor Item button on the axis monitor.



Appendix 6 Digital Oscilloscope

Position commands, position droop, motor speed, motor current and speed commands and so on can be sampled by the digital oscilloscope of the Simple Motion Module setting tool (GX Works3).

For the performance and specifications, refer to the Help (digital oscilloscope) for the Simple Motion Module setting tool.

This appendix gives an example of measurement for address indirect specification positioning of Axis 1 (refer to Section 6.8.6).

(1) Starting the digital oscilloscope



 In the [Navigation window] of the Simple Motion Module setting tool, double-click [Digital Oscilloscope].

(2) The assistant dialog box will appear. Click Close.





(3) A Digital Oscilloscope window appears.

(2) Digital Oscilloscope window

The digital oscilloscope window screen is configured as shown below. The screen in the time axis indication mode (FIXED grid mode) is shown below.



No.	ltem	Details
1)	Menu bar	This menu is used to perform each function.
2)	Toolbar	Displays tool buttons used to perform each function.
	Waveform display area (time axis indication)	Displays word data and bit data waveforms.
3)	Waveform display area (Two dimensional locus display)	Two dimensional locus of X-axis and Y-axis appear. If the mouse cursor is in the display area, the coordinate tool hint appears at the cursor point.
4)	X-axis cursors [1], [2], [T] (Time axis indication)	Displays X-axis cursors [1] and [2], and trigger cursor[T].
4)	X-axis cursors [1], [2] (Two dimensional locus display)	Displays X-axis cursors [1] and [2].
	X-axis cursor position (Time axis indication)	Displays X-axis cursors [1] and [2] and trigger cursor[T] position (time), and the time between cursors. (Unit: ms)
5)	Cursor position (Two dimensional locus display)	Displays X-axis and Y-axis cursors [1], [2], [A], and [B] position, and the difference between the cursors.
6)	Y-axis cursors [A], [B]	Displays Y-axis cursors [A] and [B].
7)	Word waveform selection button	Selects the word waveform subject to operation.

No.	ltem	Details	
	Word waveform item name (Time axis indication)	Displays the probe name for the word waveform selected with the word waveform selection button.	
	X-axis probe setting	Displays the probe name selected for the X-axis.	
8)	(Two dimensional locus display)	Axis X Ax. 1-Md. 101:Actual cu 🔻	
	Y-axis probe setting	Displays the probe name selected for the Y-axis.	
(Two dimensional locus display)		Axis Y Ax. 1-Md. 101:Actual cu 🔻	
9)	Word waveform item unit	Displays the data unit for the word waveform selected with the word waveform selection button.	
	Word waveform selection item scale (Time axis indication)	Displays the data scale value for the word waveform selected with the word waveform selection button.	
10)	Y-axis scale (Two dimensional locus display)	Displays the scale (unit) of the probe specified for the Y-axis.	
11)) GND level button Displays the GND(0) existence, and changes between the word waveform and GND level display.		
12)	2) X-axis 1 division setting field (Displays only in FIXED grid mode.) Changes the X-axis 1 Division setting.		
13)	Y-axis scale optimization button (Displays only in FIXED grid mode.) Automatically adjusts Y-axis divisions so that the selected word waveform can be displayed inside a single screen.		
14)	Bit waveform selection button (Time axis indication only)	ion button n only) Selects the bit waveform subject to operation	
15)	Bit waveform selection item (Time axis indication only)	Displays the probe name for the bit waveform selected with the word waveform selection button.	
16)	Y-axis waveform scrollbar	Scrolls the word waveform selected with the word waveform selection button in the Y-axis direction.	
17)	Vertical waveform enlarge button (Enlarges the scale of the word waveform selected with the word waveform selection button.	
18)	Vertical waveform reduce button (reduce Reduces the scale of the word waveform selected with the word waveform selection button.	
	X-axis (time) scale (Time axis indication)	Displays the X-axis (time axis) scale.	
19)	X-axis scale (Two dimensional locus display)	Displays the scale of the X-axis probe.	
20)	X-axis waveform scrollbar	Scrolls through the entire waveform in the X-axis direction.	
21)	Horizontal waveform enlarge button (Enlarges the entire waveform in the horizontal direction.	
22)	Horizontal waveform reduce	Reduces the entire waveform in the horizontal direction.	
23)	Status	Displays the status when sampling.	
24)	Continual mode status	Displays the status during execution in trigger type Continual mode.	
25)	File comment	Displays a comment for the currently displayed file.	
26)	Status bar	Displays digital oscilloscope status information.	
27)	Docking window (Cursor window)	Displays cursor position data and the difference between cursors as the X-axis and Y-axis cursors move.	

No.	ltem	Details	
28)	MAP window (Time axis indication)	Displays which area of the 100 % sampling data is the data area (X-axis range) displayed in the graph display field with a black band. The display area is only the X-axis scale range. The Y-axis scale display area is not applicable. By left-clicking any position in the MAP window, a graph displays with the clicked X-axis position as the center (vicinity). (Enabled while sampling.) Cursor [1] Cursor [T] Cursor [2] All Sampling Area Not Screen Display Screen Display Not Screen Display Area(White) Area(Black) Area(White)	
	Two dimensional locus display reproduction function (Two dimensional locus display)	This item reproduces the locus when a sampling result is present.	
	Word waveform scale mode display/change field (Time axis indication) (Displays only in AUTO grid mode.)	 Displays/changes the data scale mode for the word waveform selected with the word waveform selection button. Manual scale [FIX] button: If the word waveform scale mode is changed to MANUAL, enlarge/reduce (range adjustment) the Y-axis scale, scroll the Y-axis (display area), and adjust the GND (0) position, and then press the FIX button to set the scale. 	
29)	Y-axis 1 Division setting (Time axis indication) (Displays only in FIXED grid mode.)	Changes the Y-axis 1 division setting for the selected word waveform.	
	Waveform scale mode display (Two dimensional locus display)	Displays only AUTO grid mode. (Indication is AUTO.)	
30)	Assistant screen display button	Displays the Assistant screen.	

(3) Probe Setting and Sampling Setting



 \Box

Optic

Select!

(1) Select the item to be probed.

Click [Probe Setting...] on the [Edit] menu at the Digital Oscilloscope window.

(2) The Probe Setting screen will appear. Select "Output signal Y" from the "Input signal X" dropdown list.

 $\overline{\mathbf{n}}$

(3) Select "Positioning start" and click start in the Item column.

(4) Select "Buffer memory" from the "I/O Signal" dropdown list.



Л



1

Next OK Cancel





(7) The trigger setting items will be displayed. Click the BIT button.

	,,,				
Trigger Mode	NONE It OR Bit AND	Word OR			
WORD BIT	Next Page Previous Pag	2			
▼	PROBE	Device	Pattern	Filter	
				(x Rate)	
Ax. 1-Positioning	g start	Y0010	F	0	
_				0	
				0	
			—	0	
			_	0	
				0	
			1 -	0	
			-	0	
,		· · · · · ·			

Д

- (8) Set the BIT trigger conditions as shown below.
 - Trigger Mode: Bit OR
 - Ax. 1-Positioning start Pattern:
 GFF to ON (startup))

Click the Complete button.

(4) Waveform measurement

(1) Execute the standby point positioning to set the positioning address to (0, 0). (Refer to Section 6.8.4)

Digital Oscilloscope - C:¥SCHOOL_(positioning)_160318.gx3 - 0000:RD77MS4 File Edit View Action Online Tools Help Run Image: Second Secon	(2) Select [Action] in the Digital oscilloscope window, and click [Run].Sampling is started.
	$\overline{\nabla}$
(3) Execute the address indirect specification positio	ning (refer to Section 6.8.6).
Set any positioning address, and touch M1	election to execute the positioning.
A trigger is generated at the same time when botained.	sition selection M1 is touched, and data for sample size is

(4) After the data is obtained, sampling will be automatically stopped, and the sampling data will be read. After the completion of reading, the waveforms of sampled word data and bit data will be displayed in the waveform display area.

The waveforms of address indirect designation positioning are shown after the trigger cursor [T].



Appendix 7 MELSEC iQ-F Series Simple Motion Module

Appendix 7.1 Major Features of MELSEC iQ-F Series Simple Motion Module

(1) Modules for 4 axes and 8 axes are available.

iQ-F Simple Motion Modules for 4 axes and 8 axes are available.

- FX5-40SSC-S (for 4 axes)
- FX5-80SSC-S (for 8 axes)

(2) Basic positioning control

Positioning control can be realized by starting the point table type positioning data from the sequence program.

The modules with various types of positioning control, e.g. linear interpolation, 2-axis circular interpolation, fixed-feed and continuous path, are applicable to many uses.

(3) Synchronous/cam control

(a) Advanced synchronous control

This control uses software in place of mechanisms, such as gears, shafts, clutches, transmissions and cams.

The synchronous control can be realized only by setting the parameters on GX Works3.

Synchronous control output axes are moved with cams.

(b) Cam automatic generation

Cam data for rotary cutter is automatically generated. Optimum cam data can be generated only by inputting the sheet length, synchronous width and cam resolution to the device specified on the GOT screen.

(4) Mark detection function

The actual current position of servo motor can be obtained when the register mark on wrapping paper moving at a high speed is input to the sensor. Wrapping paper can be cut in the predetermined position by correcting the cutter shaft position when the register mark is input.

(5) Compatible with servo high-speed synchronous network SSCNETIII/H

(a) Communication speed is 3 times faster.
 The module can transmit data 3 times faster (bidirectional 150 Mbps (equivalent

to unidirectional 300 Mbps)) compared to the conventional modules. It realizes improved system responsibility, increased number of axes and wiring saving and contributes toward improvement of equipment performance.

- (b) Equipment performance improvement by synchronous communication SSCNETIII/H enables completely synchronous communication. It realizes improvement of performance of printers, food machinery, processing machinery, etc. that require high precision synchronization.
- (c) Connection of various drive units The module can be connected not only to rotary servo motors, but also to linear servo motors, direct drive motors, FR-A800 Series inverters and devices produced by partner manufacturers.

Appendix 7.2 System Configuration

(1) System Configuration



(2) Compatible modules

Model name	Compatible versions				
FX5U CPU module	 FX5-40SSC-S: Ver. 1.000 or later FX5-80SSC-S: Ver. 1.014 or later 				
FX5UC CPU module ^{*1}	 FX5-40SSC-S: Ver. 1.000 or later FX5-80SSC-S: Ver. 1.014 or later 				

*1. To connect with FX5UC CPU module, FX5-CNV-IF or FX5-C1PS-5V is required.

Appendix 7.3 Major Differences from MELSEC iQ-R Series Simple Motion Module

The major difference between iQ-R simple motion module and iQ-F simple motion module are shown below.

For the details of iQ-F Simple Motion Module, refer to the following manuals.

- MELSEC iQ-F FX5 Simple Motion Module User's Manual (Startup)
- MELSEC iQ-F FX5 Simple Motion Module User's Manual (Application)
- MELSEC iQ-F FX5 Simple Motion Module User's Manual (Advanced Synchronous Control)

(1) Input/Output Signals with CPU Modules

- The iQ-R simple motion module uses 32 input points and 32 output points for exchanging data with the CPU module.
- The iQ-F simple motion module uses buffer memory (10 input points and 10 output points) for exchanging data with the CPU module.

The correspondence between the CPU modules and input/output signals is shown in the following table.

iQ-R simple motion module $ ightarrow$ CPU module			iQ-F simple motion module $ ightarrow$ CPU module			
Device No.		Signal name		Buffer memory address		Signal name
X0	READY			31500.b0	READY	
X1	X1 Synchronization flag			31500.b1	Synchronization flag	
X2 to XF	Use prohibited			31500.b2 to b15	Use prohibited	
X10	Axis 1		\$	31501.b0	Axis 1	
X11	Axis 2	BUSY*1		31501.b1	Axis 2	
X12	Axis 3			31501.b2	Axis 3	
X13	Axis 4			31501.b3	Axis 4	
X14	Axis 5			31501.b4	Axis 5	BUST
X15	Axis 6			31501.b5	Axis 6	
X16	Axis 7			31501.b6	Axis 7	
X17	Axis 8			31501.b7	Axis 8	
X18	Axis 9					
X19	Axis 10					
X1A	Axis 11					
X1B	Axis 12					
X1C	Axis 13			_		
X1D	Axis 14					
X1E	Axis 15					
X1F	Axis 16					

*1. The BUSY signals and positioning start signals for the axis numbers larger than the number of controlled axes cannot be used.

CPU module \rightarrow iQ-R simple motion module			CPU module	\rightarrow iQ-F simple motion module		
Device No.		Signal name		Buffer memory address	Signal name	
Y0	PLC READY			5950	PLC READY	
Y1	Y1 All ax servo ON			5951	All ax servo ON	
Y2 to YF	F Use prohibited			_		_
Y10	Axis 1		\$	30104	Axis 1	
Y11	Axis 2	Positioning start*1		30114	Axis 2	
Y12	Axis 3			30124	Axis 3	
Y13	Axis 4			30134	Axis 4	
Y14	Axis 5			30144	Axis 5	Positioning start '
Y15	Axis 6			30154	Axis 6	
Y16	Axis 7			30164	Axis 7	
Y17	Axis 8			30174	Axis 8	
Y18	Axis 9					
Y19	Axis 10					
Y1A	Axis 11					
Y1B	Axis 12					
Y1C	Axis 13					
Y1D	Axis 14					
Y1E	Axis 15					
Y1F	Axis 16					

*1. The BUSY signals and positioning start signals for the axis numbers larger than the number of controlled axes cannot be used.

(2) Connector for external input connection

- iQ-R simple motion module has a 40-pin connector.
- iQ-F simple motion module has a 26-pin connector.



iQ-F simple motion module (Example: FX5-40SSC-S)



Appendix 8 Glossary

- A

Absolute encoder

This is a detector that allows angular data contained in a single motor rotation to be output externally, and standard encoders allow 360 degrees to be extracted in 18 to 22 bits.

With incremental encoders, the axis position when a power outage occurs is lost, however, with absolute encoders, the axis position is retained, even in the event of a power outage.

Absolute encoders of various output types, such as binary code and BCD code types, are available. They are more expensive and have higher accuracy than incremental encoders.



Absolute position detection system

If the machine is once returned to the home position when it is started up during positioning, the machine position is stored in the positioning module, and its current position is maintained even if the power supply is turned off. Machine displacements are compensated. Consequently, there is no need to perform home position return after restoring the power. This system configuration requires a motor with absolute position detector, a servo amplifier compatible with the absolute positioning system and a positioning module.

Absolute system

This is a method used to express the positioning address.

This is an absolute address method.

This method expresses the distance from the reference 0.

The positioning direction is determined automatically without being specified. There is also an incremental mode.



Automatic trapezoidal acceleration/ deceleration

This is a movement in which the time and speed graph forms a trapezium.



Composite speed

С

Moving speed of control object during interpolation operation. It is computed by vector calculation of X-axis and Y-axis speed.



Creep speed

Speed of slow movement

It is difficult to stop the machine suddenly at a precise point when traveling at a high speed, and therefore the speed is once switched to the creep speed.

Current feed value

The current feed value is representing the current position of motor. The current feed value is getting updated, when motor is in running condition.

D

Deviation counter

This counter has two functions. It counts the command pulses from the simple motion module and sends the count value to the D/A converter.

The feedback pulses are subtracted from the command pulses, the motor is operated with the deviation (droop pulses) between command pulses and feedback pulses until the number of command pulses reaches 0.



Differential output type

When one signal is output, another signal with reversed polarity is simultaneously output. This type is characterized by transmission at high frequency and high noise resistance and used for high-speed transmission of signals, such as pulse train input/output. Generally, the source and destination are called driver and receiver, respectively. A special IC is used.



Drive unit

Commands (pulses, etc.) issued by the positioning module are of low voltage and current, resulting in insufficient energy to drive motors.

This module amplifies these commands to drive motors.

It may be attached to servo motors and stepping motors.

It is called also a servo amplifier.



Drive unit ready

This signal indicates that the motor drive unit is ready.

The drive unit remains OFF if the power is OFF or if an accident occurs.

Droop pulse

As the machine has inertia

(GD<244>2</244>), if positioning module speed commands are issued as is, the machine becomes delayed and is therefore unable to keep up.

In the case of servo motors, speed command pulses are accumulated in the deviation counter to delay them.

Droop pulses are these accumulated pulses. When the machine stops, the deviation counter discharges all pulses to leave the count at 0.



Dynamic brake

When the protective circuits are triggered by a power outage or emergency stop condition (EMG signal), the dynamic brake is used to short the circuit via a resistor between servo motor terminals, consume rotation energy as heat, and stop axes suddenly without coasting the motor.

Braking power is generated only while motors capable of obtaining brake torque greater than that of electromagnetic brakes are rotating, and as there is no holding power when motors are stopped, mechanical brakes are also used to prevent vertical axes from falling.

Feed back pulse

F

A command is issued during automatic control, and the pulse train is returned to confirm whether the machine has operated in accordance with the command. If not, a correction command is issued. If a command with 10,000 pulses is issued, and 10,000 feedback pulses are returned, the balance should be 0. These are also referred to as return pulses.

Flash ROM

Parameters and positioning data are stored in the flash ROM and can be backed up without batteries.

Since it does not use batteries, it is unnecessary to maintain the batteries.



High speed zeroing

Return to machine home position at home position return speed without detection by dog switch.

(This function is enabled after home position return using the dog switch is performed at least once.)



Dog switch

Electronic gear

— F —

With this function, the command pulses from the pulse command module can be electrically decreased and increased (1/10 to 4000 times) in the servo amplifier. Therefore, the positioning speed and movement amount can be controlled by the electronic gear ratio.

Increment system

This mode is used for indicating a position based on the specified direction and travel distance from the current value regarded as 0. This is a relative address method. This mode is used for fixed feeding, etc. There is also an absolute mode.



Incremental encoder

This is a device used simply to emit ON/OFF pulses as an axis rotates. Single-phase encoders emit only A pulses, and the axis rotation direction is unknown. Two phase encoders emit both A and B pulses, allowing the system to judge that the motor is rotating in the forward direction if B turns ON while A is ON, and in the reverse direction if A turns ON while B is ON.

There are also encoders with zero point signals. Incremental encoders emit between 100 and 10,000 pulses per axis rotation, and are the most commonly used encoders.



Interlock

Condition to block to prevent start of the next action until the current action is completed. The interlock is used to prevent equipment damage or runaway.



Machine feed value

The home position address is stored when the home position return is completed. The current position of the machine coordinates determined for each machine based on the home position address is stored.

The value is not changed even if the current value is changed.

Manual pulse generator

This is a device used to generate pulses by manually rotating a handle. It is used to manually perform precise positioning.



Made by Mitsubishi Electric Corporation (Model MR-HDP01)

Master axis

This is the side at which positioning data is prioritized when performing interpolation. For example, in the case of positioning on the X and Y-axes, the axis with larger travel distance is regarded as the master axis, and the speed on the axis is used. The speed on the slave axis is ignored. 0

Override function

Function to change the speed (current speed) during positioning in the range from 1 to 300 %.

During continuous positioning at different specified speeds, the speeds are changed at the same change rate.

Ρ

Programmable controller ready

Signal indicating that the PLC CPU is ready. Positioning cannot be performed if it is not in this state.

Position control

The position controls, such as fixed-feed, positioning and movement amount control, are performed based on position and movement amount.

They are controlled constantly by feed pulses.

Positioning

This refers to traveling from a certain point to the predetermined next point.

For positioning, the distance, direction and speed are specified.

Positioning is used in, for example, sheet cutting, plate drilling, mounting of components on printed boards and welding. Also robots perform positioning.

Positioning data

The data is used by the user to control the positioning system. The data for the number of positioning points (addresses) is specified based on the parameters. Up to 600 points can be specified. It is possible to write (alter) the data through a program during positioning.

Positioning parameter

The positioning parameters are the basic data used for positioning control and include the control unit, movement amount per rotation, speed limit value, upper and lower stroke limits, acceleration/deceleration time and positioning method. The parameters have the default values. Change the values according to the control conditions.



Reference axis speed

Axis speed used as the reference when performing interpolation.



Regenerative brake option

This is an optional part, and is used to perform high-frequency acceleration and deceleration.

Resolver

This is a device used to resolve angle detection into two analog voltages. Also referred to as a two-phase synchro, as opposed to single phase voltage input, the resolver converts an axis rotation angle to a perpendicular two-phase voltage (analog voltage), and then outputs it.



Servo on

S

Servo Control is performed only when drive is normal and servo on signal is in "ON" state.



Skip function

This function stops the positioning being executed (decelerates to a stop) when the skip signal is input, and automatically carries out the next positioning.

Speed control

Control mainly of moving speed by servo motor. This control is used to control grinding stone rotation, welding speed, feed speed, etc. Unlike the position control, it does not control the current value (address).

Speed integral compensation

Frequency responses are issued when performing positioning control at item 1 in the positioning data servo parameters, and transient characteristics are improved. It is helpful to increase this value when the overshoot when accelerating or decelerating does not get any smaller even by adjusting the speed loop gain. The unit is ms.

Speed limit value

This is the maximum positioning speed. When this value has been set in the parameter, even if a higher speed is accidentally set in other data, the speed will be set to the speed limit value. Note that acceleration time and deceleration time are the speed limit value times.

Speed loop gain

Expresses the control response speed when performing speed control at item 1 in the positioning data servo parameters. If the control system responsiveness drops and operation becomes unstable as the load inertia moment ratio increases, stability can be improved by increasing this setting. If increased too much, the overshoot increases when accelerating, and motor vibration noises are emitted during operation or stoppages.

Step function

When some positioning data numbers have been specified for continuous operation, this function performs a test run with each data number.

Stroke limit

This is the range in which positioning can be performed, or the movement range beyond which the machine will be damaged. (In the JOG mode, the machine can be moved to the outside of this range.) When a feed screw is used, the limit is determined by the screw length, and in the case of fixed-feed, the limit is the maximum cut size. The upper and lower limits are set by parameters. Separately from them, limit switches are provided to form an electrical emergency stop circuit on the outside of the programmable controllers.



Positioning possible within 3 m

т

Teaching

This function is used to teach the positioning addresses determined by the operator when the addresses are unknown or must be set appropriately to the actual workpiece. For example, addresses on a complicated form like a graphic can be taught by tracing the model, and the positioning can be reproduced.

Torque control

This function places a limit to the resistance torque applied to the positioning motor and turns off the power supply when a torque larger than the limit is applied to the motor. If an excessive torque is applied to the motor, the current may suddenly increase, and the motor may be burnt out, or its life may be reduced due to the stress caused by the current.

The increase in torque during home position return is used as a motor stop command.

Tracking function

Travel values are entered from an external controller, and by adding these travel values to servo command values, positioning is performed at a relative speed with respect to the applicable object during travel.

Turntable

The turntable is rotating plate. Rotation is controlled by motor at specific angle as per requirement.

The positioning control unit is "degree".



Unit setting

U

Х –

This refers to changing to the actual address or travel value unit for which positioning is to be performed.

The units, mm, inch, degree and pulse, are used appropriately. The default for the fixed parameters is pulse.

XY table

This is a table moved in the X (lateral) and Y (longitudinal) directions so that positioning can be performed easily.



Ζ

Zero phase signal

One (or two) pulse(s) generated per rotation of pulse generator shaft.

This signal is used for home position return for positioning. It is expressed also as a Z signal or PG0.

Feedback pulses

Zero shift function

After execution of home position return, the home position can be shifted in the positive or negative direction by determining the shift amount to the position where the home position return is completed.

A position other than the zero point or out of the dog switch detection range can be defined as the home position.

Zeroing dog

Limit switch installed before the home position. When the proximity dog is turned on, the feed speed is switched to the creep speed. Therefore, the proximity dog signal must be kept for the time during which the speed is decelerated from the feed speed to the creep speed.



MEMO

Mitsubishi Electric Programmable Controller Training Manual MELSEC iQ-R/iQ-F Simple Motion (for GX Works3)

MODEL MODEL CODE

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Specifications subject to change without notice.