

General-Purpose AC Servo MELSERI/O Capacity Selection Software MODEL MRZJW3-MOTSZ111E Installation Guide

To optimize the use of the capacity selection software, please read over this Installation Guide before using the software. After reading the Installation Guide, always place it in a safe place.

● Safety Instructions ● (Always read these instructions before using the equipment.)

Do not attempt to install, operate, maintain or inspect the servo amplifier and servo motor until you have read through this Installation Guide, and appended documents carefully and can use the equipment correctly. Do not use the servo amplifier and servo motor until you have a full knowledge of the equipment, safety information and instructions.

In this Installation Guide, the safety instruction levels are classified into "WARNING" and "CAUTION".



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

Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight injury to personnel or may cause physical damage.

Note that the CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.

What must not be done and what must be done are indicated by the following diagrammatic symbols.

): Indicates what must not be done. For example, "No Fire" is indicated by 😥

: Indicates what must be done. For example, grounding is indicated by 🔔

In this Installation Guide, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT".

After reading this Installation Guide, always keep it accessible to the operator.

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• The capacity selection software calculated the system with theoretical equations and can only be used as a guide to a suitable solution. Check the results against your own requirements thoroughly ensuring that you have an adequate safety margin in the calculated result. Make the final decision for capacity selection at customer side.

# MEMO


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# MEMO


# 1. INTRODUCTION

# 1. INTRODUCTION

#### 1.1 Specifications

The capacity selection software is designed to properly select the capacity of a servo motor required for machine structure. By entering the specifications data of the machine used, the servo amplifier series and the servo motor series, the software selects the optimum capacity of the servo motor.

#### (1) Combination of Servo Amplifier and Servo Motor

	Servo amplifier series						
Servo motor series	MR-J2S-A MR-J2S-B MR-J2S-CP	MR-J2S-A1 MR-J2S-B1 MR-J2S-CP1	MR-J2S-A4 MR-J2S-B4	MR-J2M	MR-ES-A/AG	MR-E-A/AG	
HC-KFS	0	0		0			
HC-MFS	0	0		0			
HC-SFS	0		0				
HC-RFS	0						
HC-UFS	0	0		0			
HC-LFS	0						
HA-LFS	(Note) O		0				
HF-KN(J)					0		
HF-SN(J)					0		
HF-KE						0	
HF-SE						0	

Note. For MR-J2S-CP, servo motor 7kW or less is compatible.

		Servo amplifier series								
Servo motor series	MR-J3-A MR-J3-B MR-J3-B -RJ006 MR-J3-T	MR-J3-A1 MR-J3-B1 MR-J3-B1 -RJ006 MR-J3-T1	MR-J3-A4 MR-J3-B4 MR-J3-B4 -RJ006 MR-J3-T4	MR-J3-B -RJ004	MR-J3-B4 -RJ004	MR-J3W-B	MR-J3W -0303BN6	MR-J3-B -RJ080W	MR-JN-A	MR-JN-A1
HG-AK							0	/		/
HF-KN		/	/	/	/	/	/	/	0	0
HF-KP	0	0	/	/	/	0	/	/	(Note 3) O	(Note 3) O
HF-MP	0	0	/	/	/	0	/	/	/	/
HF-SP	0		0			0		/		
HA-LP	(Note 1) O		(Note 2) O							
HC-UP	0			/	/	0		/	/	/
HC-RP	0	/	/	/	/	/	/	/	/	/
HC-LP	0					0		/		
HF-JP	0		0			0				
LM-H2				0	/	0		/		/
LM-F				0	0					
LM-K2				0		0				
LM-U2				0		0				
TM-RFM						0		0		

Note 1. For MR-J3-B-RJ006/MR-J3-T, servo motor 25kW or less is compatible.

2. For MR-J3-B4-RJ006/MR-J3-T4, servo motor 22kW or less is compatible.

3. For MR-JN-A, only the servo motor with a decelerator is compatible.

# 1. INTRODUCTION

		Servo amplifier series								
Servo motor series	MR-J4-A MR-J4-B	MR-J4-GF MR-J4-TM	MR-J4-A1 MR-J4-B1	MR-J4-TM1	MR-J4-A4 MR-J4-B4 MR-J4-GF4 MR-J4-TM4	MR-J4- 03A6	MR-J4W2- B	MR-J4W3- B	MR-J4W2- 0303B6	
HG-KR	0	0	0	0			0	0		
HG-MR	0	0	0	0			0	0		
HG-SR	0	0			0		0			
HG-UR	0	0					0			
HG-RR	0	0								
HG-JR	0	0			0		0			
TM-RG2M	0		0				0	0		
TM-RU2M	0	/	0	/	/		0	0		
HG-AK		/	/	/	/	0	/	/	0	
LM-H3	0	0	0	0		/	0	0	/	
LM-F	0	0			0					
LM-K2	0	0	0	0			0	0		
LM-U2	0	0	0	0			0	0		
TM-RFM	0	0	0	0			0	0		

-	Ser	vo amplifier se	ries	
Servo		MR-JE-B		
motor	MR-JE-A	MR-JE-BF	MR-JE-AS	
361163		MR-JE-C		
HG-KN(J)	0	0	/	
HG-SN(J)	0	0		
HJ-KS(J)	/		0	
HJ-FS(J)	/	/	0	
HF-KN(J)	0	/		
HF-SN(J)	0			

## (2) Specifications List

Ite	m	Specifications
Model		MRZJW3-MOTSZ111E
Machine component		Ball screw horizontal, ball screw vertical, rack and pinion, roll feed, rotary table, cart, elevator, conveyor, generic (direct inertia input), linear servo
Item		Selected servo amplifier type, selected servo motor type, selected regenerative resistor type, load inertia moment, load inertia moment ratio, peak torque, peak torque ratio, effective torque, effective torque ratio, regenerative power (Note), regenerative power ratio
Result output	Print	Entered specifications, operation pattern, calculation process, feed rate (servo motor speed) vs. torque graph in selection process, and selection results are printed.
	Data save	Entered specifications, operation pattern and selection results are saved with a file name.
Inertia moment and tension calculation function		Cylinder, square block, converted load, linear movement, hanging, cone, conical base

Note. The MR-J4W\_, MR-J3W and MR-J2M output regenerative energy.

#### 1.2 Required system configuration

The following components are required to use the capacity selection software. Configure the system according to the Installation Guide of each equipment.

Equipment		(Note 1) Description				
(Note 2, 3, 4, 5) Personal computer (IBM PC/AT compatible)	OS (English version) Processor	(Note 1) Description           Microsoff® Windows® 10 Education Operating System           Microsoff® Windows® 10 Pro Operating System           Microsoff® Windows® 10 Home Operating System           Microsoff® Windows® 10 Home Operating System           Microsoff® Windows® 8.1 Enterprise Operating System           Microsoff® Windows® 8.1 Por Operating System           Microsoff® Windows® 8.1 Operating System           Microsoff® Windows® 8.1 Operating System           Microsoff® Windows® 8.1 Operating System           Microsoff® Windows® 8 Enterprise Operating System           Microsoff® Windows® 8 Pro Operating System           Microsoff® Windows® 7 Enterprise Operating System           Microsoff® Windows® 7 Tenterprise Operating System           Microsoff® Windows® 7 Tenterprise Operating System           Microsoff® Windows® 7 Tenter Operating System           Microsoff® Windows® 7 Tenterprise Operating System           Microsoff® Windows Vista® Enterprise Operating System           Microsoff® Windows Vista® Enterprise Operating System           Microsoff® Windows Vista® Enterprise Operating System           Microsoff® Windows Vista® Lutimate Operating System           Microsoff® Windows Vista® Home Premium Operating System           Microsoff® Windows Systep Foressional Operating System           Microsoff® Windows® XP Professional Operating System           Microsoff® Win				
	Memory	24MB or more (Windows 98) 32MB or more (Windows <sup>®</sup> Millennium Edition, Windows <sup>®</sup> 2000) 128MB or more (Windows <sup>®</sup> XP) 1GB or more (Windows Vista <sup>®</sup> or later)				
	Hard Disk	40MB or more of free space				
Browser		Internet Explorer 4.0 or more				
Display		One whose resolution is 800 × 600 or more and that can provide a high color (16 bit) display. Connectable with the above personal computer.				
Keyboard		Connectable with the above personal computer.				
Mouse		Connectable with the above personal computer.				
Printer		Connectable with the above personal computer.				

Note 1. Windows and Windows Vista are the registered trademarks of Microsoft Corporation in the United States and other countries. Pentium is the registered trademarks of Intel Corporation.

2. On some personal computers, this software may not run properly.

3. 64-bit Windows<sup>®</sup> XP, 64-bit Windows Vista<sup>®</sup> are not supported.

4. If Microsoft<sup>®</sup> Windows<sup>®</sup> XP or later is used, the following functions cannot be used. If any of the following functions is used, this product may not operate normally.

- Start of application in Windows<sup>®</sup> compatible mode
- Fast user switching
- Remote desktop
- Big fonts (Detail settings of screen property)
- DPI setting other than the normal size (96DPI) (Detail settings of screen property)
- Windows XP Mode
- Touch
- Hyper-V
- Modern UI Style

5. If Windows Vista<sup>®</sup> or later is used, log in as a user having User authority or higher.

# 1. INTRODUCTION

#### 1.3 Basic terms

- Mouse pointer An on-screen arrow which moves with movements of the mouse.
- 2) Point

To move the mouse pointer to a particular item or position on the screen.

3) Click

To press and release the left button of the mouse once.

4) Double-click

To press and release the left button of the mouse twice.

5) Drag

To hold down the left button of the mouse and move the mouse.

6) Focus

Highlights characters, button or the like when the menu or button is ready to accept an input from the keyboard.

- 7) Text box Box used to enter characters.
- List box Box used to select one of several items.



 Combo box Box used to select one of several items.



10) Check box

Box used to select one or more of several items. When a choice is made a mark appears in the box.

11) Option button

Button used to select only one of several items. When a choice is changed 💿 moves to a new choice.

- 1.4 Basic operations
- (1) Closing the window

Click the closing bottom at top right corner of the window.





(2) Moving the focus from one window to another

Click the button of the task bar corresponding to the window to be used.



(3) Moving the window

Point to the title bar, drag the window to the required position, and release the button.



# (4) Moving the focus to the menu bar

Click the menu bar. To move the focus to a window, click the window.



#### (5) Moving the focus inside the window

Click the object to be operated (such as a text box). When the object to be operated is a button, clicking it will start its processing.



## <Short-cut keys>

Any of the following short-cut keys may be used to perform operation from the keyboard.

Intended operation	Keyboard
End program	"Alt" + "F4"
Show start menu	"Ctrl" + "Esc"
Change window	"Alt" + "Tab"
Change object	"Tab"

#### 1.5 Screen definitions

c)	h)	a)		e	) g)			f)	b)	d)
Ball :	scrw, Hrz.	Running		INIDT0.SVM						
File U	Jnits To	ols Help								
C - 44		Inortia								
Setti	ng Di	inertia		_		,				
Ball s	scrw,	Specific G	iravity Tab	les						
Pos	ctrl n	<u>E</u> fficiency	Tables						WL	Ea
1.00.	0011.11	Friction C	oeff.Table	5						FC
-		- Ratio Cale	rulate					1	WT_	
Amp	lifier	Unite Com					Doduction (	`oor		
1		Units Cor	iversion				Inertia		- 2007	► I ← I
		Regenera	tion Optio	n for <u>M</u> ultiple	Axes Selection	n ▶	<u>T</u> orque			PB
Mod	tor	Motor Da	ta Tab <u>l</u> es				Length			
		Coupling	Data Mad	e By Miki Pulle	ey Co		Weight	1		
		Maximum	- Feed Dict	ance Of Linea	r Senio		Eorce		LB	
Opera	ation		ue opei. r	allen			<u></u>			
Patt	ern-				capacity		Speed			
					·			0	0	
Data	Setting					Sizing	Result			
Mass o	ftable		WT	200.000	kg		Motor :			
Mass o	ofload		WL	0.000	kg		A			
Thrusti	oad		Fc	300.000	N	Deene	Amplifier :			
Guide t	tightening f	orce	FG	0.000	N	Regent	erauve opuori.			
Reduct	tion gear ra	atio(NL/NM)	1/n	2/5						
Reduct	tion gear in	ertia	JG	0.444	kg-cm2	1.00	-			
Couplin	ng inertia		JC	0.000	kg-cm2	Loa	u inertia :			
Inertia	of the othe	rs	JO	0.000	kg-cm2	Peak	Torque :			
Lead o	f ball screv	N	PB	10.000	mm	RMS Baa	norque.			
Diamete	er of ball s	crew	DB	20.000	mm	Rege	en. r wi			
Length	of ball scr	ew	LB	500.000	mm		The - i - i			
Drive efficiency eta 0.900							i ne sizing softwa	re caicul	ated the system with theor	retical ble colution
Coeffic	cient of fric	tion	mu	0.100			ndependantly ens	ure the o	useu as a guide to a sulta design has sufficient safet	v margin.
Mass	oftable		WT:	200.000	kg 👻		Show Grap	h	Sho	w Calculations

#### a) Title

Shows the title which has been set.

- b) Title bar
- c) Menu title
- d) Menu bar

Shows the menu title.

- e) Menu Command menu in tier 1
- f) Submenu Command menu in tier 2
- g) File name Shows the file name being selected.
- h) Mechanical components name
   Shows the mechanical components name selected.

# 1. INTRODUCTION



- i) Machine structure illustration area Shows a machine structure diagram.
- j) Data Setting area Shows the machine specifications, items and data.
- k) Machine specifications entry area Enter data in machine specifications.
- Unit area Select the unit for the data of machine specifications.
- m) Calculation mode selection area
   Select "Calculate" or "Set Mtr ("Set Force" for linear servo)".
   For a direct-drive motor, check "DD Motor" to specify the torque.
- n) Calculate capacity button
   Click this button to start automatic calculation.
- o) Mechanical Components Selection combo box Select the mechanical components.
- p) Select Coupling and External Reduction Gear combo box
   Select whether to use the coupling and external reduction gear or not.

q) Servo Control Mode

Select the control mode of servo amplifier.

r) Sizing result display area

Shows the results of selecting the servo motor, servo amplifier and regenerative option and the results of calculating load inertia, peak torque, effective torque and regenerative power (At MR-J4W\_, MR-J3W, MR-J2M, it is regenerative energy).

s) Message display area

Shows a comment or error message. This area is normally blue, but turns to red when showing an error message.

- t) Show Graph button Click this button to show the calculation result is displayed in graph.
- u) Show Calculations button Click this button to show the calculation process.

# 2. CAPACITY SELECTION PROCEDURE

# 2.1 Capacity selection sequence

The following operation flowchart introduces a general operation procedure for capacity selection.

 POINT
 For MR-J4W\_, MR-J3W, and MR-J2M, select the servo amplifier (drive unit) and servo motor on an axis-by-axis basis, and after making a selection for all axes, select the regenerative options with "Regenerative Option for Multiple Axes Selection" command of "Tools".

Procedure	Operation	Description
1	System start-up	Windows is started up, and the capacity selection software is started.
2	Initial value read	Select "Open Project" to initialize or read data.
3	Mechanical components selection	Select the machine type from 10 machine components.
4	Calculation mode selection	<ul> <li>Select the machine type from to machine components.</li> <li>Select "Calculate" or "Set Mtr ("Set Force" for linear servo)".</li> <li>1. Calculate <ul> <li>Calculation is made on the basis of the entered machine specifications to select the capacities of the servo amplifier and servo motor. The selected capacities of the servo amplifier model name, servo motor model name and regenerative option model name of are displayed together with calculation results.</li> </ul> </li> <li>2. Set Mtr <ul> <li>Calculation is made to specify the servo motor capacity.</li> <li>For a direct-drive motor, check "DD Motor" to specify the torque.</li> </ul> </li> </ul> <li>3. Set Force (Linear servo motor)</li>
		Calculation is made to specify the thrust of a linear servo motor.
5	Servo amplifier series selection	Select the series name of the servo amplifier to be selected.
6	Servo motor series selection	Select the series name of the servo motor to be selected.
7	Motor option selection	When the motor is selected, the Motor Options window will appear automatically. Select the following items: the rated speed, whether to use a reduction gear, the reduction gear ratio, whether use an electromagnetic brake, whether to use the maximally increased torque, and the selected motor type.
8	Coupling/external reduction gear selection	Select whether to use the coupling and external reduction gear or not in the connection of the servo motor and machine
9	Machine specifications entry	Enter the values of machine specifications displayed on the basis of the mechanical components selected. They may also be calculated and substituted using various tool windows.
10	Operation pattern entry	Enter the operation pattern of the servo motor.
11	Selection operation execution	Click the "Calculate capacity" button to execute capacity selection.
12	Result confirmation	Confirm the selection results. To change the mechanical components or any of the machine specifications, only that item may be changed and operation performed again.
13	Regenerative option selection	For MR-J4W_, MR-J3W, and MR-J2M, perform this operation to select the regenerative option. For the servo amplifier other than the MR-J4W_, MR-J3W, and MR-J2M, this operation is not necessary.
14	Printing	In printing, the Mechanical Components, machine specifications and Sizing Result are printed.
15	Data save	In data save, Mechanical Components, machine specifications (including units) and Sizing Result may be saved with file name.
16	End	Terminate the capacity selection software.

# 2.2 Capacity selection example

This section offers an example of capacity selection for a machine having particular specifications.

# 2.2.1 Machine specifications

Item		Setting
	Ball screw, Hrz	
Mechanical Components	Ext. Reduction Gea Motor	$\frac{WL}{WT} + \frac{Fc}{H} DB$ $\frac{H}{PB} + \frac{H}{DB}$ $\frac{H}{DB}$
Machine specifications	Mass of table Mass of load Thrust load Guide tightening force External Reduction gear ratio (NL/NM) External Reduction gear inertia Coupling inertia Inertia of the others Lead of ball screw Diameter of ball screw Length of ball screw Drive efficiency Coefficient of friction	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Operation pattern	0.3s 0.3s Feed Rate 3000mm/min Feed: 200mm	Feed: -200mm Feed Rate 2000mm/min 0.5s 0.5s 0.5s
Servo response level	High response	
Servo amplifier	MR-J4-A/B/GF series	
Servo motor	HG-KR 3000r/min series	
Servo motor option	With shaft-output type reducer for high precise No brake option	sion applications, flange mounting: G7 (1/5)
Data file	test1. svm	
Title name	test 1	

# 2.2.2 Operation

Here, capacity selection is selected based on the machine specifications of section 2.2.1. For the other operation procedures, refer to sections 1.4 and 3.2.

- (1) Start-up of the capacity selection software
  - 1) Click on the "MOTSZ111E" icon from the desktop.



# (2) Machine component selection

1) Clicking 🗾 in the Mechanical Components combo box inside the Setting Data area opens the following menu.



2) Click "Ball scrw, Hrz".

#### (3) Title

- 1) Click "File" on the menubar to open the menu.
- 2) Click "Project Title".



When "Project Title" is clicked, the following window appears.

Project Title		X
Project Title	Running	
New Title	test1	
* Do not enter double o	quotation mark.	
	Setting completed	X Cancel

- 3) Enter "test1" in the New Title filed.
- 4) Click the "Setting completed" button.
- (4) Select Coupling and External Reduction Gear selection
  - 1) Click 💌 in the Select Coupling and External Reduction Gear combo box inside the Setting Data area to open the menu.

🔚 Ball scrw, I	Hrz.   test1   INIDT0.SVM
<u>F</u> ile <u>U</u> nits	<u>I</u> ools <u>H</u> elp
Setting Da	ata
Ball scrw, H	Hrz. 🚽 Coupling [y]+Ext. Red. Gear [y]
Pos. ctrl. m	iode Coupling [/]+Ext. Red. Gear [/]
Amplifier	Amplifier : MR-J4-AVB
	Motor : HG-KR 3000 r/min
Motor	No Reduction Gear Option No Brake Option
Operation Pattern	Uniform Acc/Dec Incl in All Sect. of Pos Ctrl Mode Oper. Pattern     Calculate capacity

2) Click "Coupling [y]+Ext. Reduction Gear [y] ".

# (5) Servo control mode

1) Click 🗾 in the Servo Control Mode combo box inside the Setting Data area to open the menu.



2) Click "Pos. ctrl. mode".

# (6) Calculation mode selection

Click the "Calculate" 
o in the Calculation Mode Selection area to select the automatic calculation mode.

<ul> <li>Calculate</li> </ul>	○ Set Mtr	-
	🔲 DD Motor	

#### (7) Servo amplifier series selection

1) Click the Data Setting area to click the "Amplifier" button.





When "Amplifier" button is clicked, the following window appears.

2) Click "MR-J4-A/B/GF" button.

When selection is made, servo amplifier series is displayed in the selected Amplifier field of the Setting Data area.

To change the set servo amplifier series, click the "Delete Conditions" button.

When the "Delete Conditions" button is clicked, the set amplifier series and motor series are cleared. Therefore, reset their series.

# (8) Servo motor selection

- (a) Servo motor series selection
  - 1) Click the Setting Data area to click the "Motor" button.



When "Motor" is clicked, the following window appears.

Select Motor Seri	es		X
не-жи	HG-KR <features> ow inertia, small capacity motor for MR-J4 series. * IP65 standard</features>	· ·	
HG-WR	HG-MR <features> Ultra-low inertia, small capacity motor for MR-J4 series. * IP65 standard</features>	* III	
HG-SR	HG-SR <features> Middle inertia, middle capacity motor for MR-J4 series. * IP67 standard</features>	* III	
ਮਹ-21 ਮਹ-21	HG-SR4 <features> Middle inertia, middle capacity 400V motor for MR-J4 series. * IP67 standard</features>	A III	
HOUR	HG-UR <features> Flat type motor for MR-J4 series. * High resolution encoder (4194304PLS/rev)</features>		Conditions

2) Click "HG-KR" button.

To change the set servo motor series, click the "Delete Conditions" button. When the "Delete Conditions" button is clicked, the set amplifier series and motor series are cleared. Therefore, reset their series.

(b) Select Rated Speed • Servo motor option selection
 After selecting the motor, the following window appears.

Rated Speed and Motor Option	×
Rated Speed 3000 r/min	Maximally increased torque
Select Reduction Gear	Select Red. Ratio
Select Brake No Brake Option	Selected motor type
Setting completed	X Cancel

In this window, select the rated speed, brake and reduction gear.

1) Selecting the rated speed. Click 🗾 in the Rated Speed combo box to open the combo box, and click "3000r/min". (The HG-KR series has only 3000r/min.)

	Rated Speed and Motor Option		X
	Rated Speed	Maximally increased torque	
/	3000 r/min	<b>v</b>	
١	3000 r/min	Select Red. Ratio	
	No Reduction Gear Option 🔹	-	
	Select Brake	Selected motor type	
	No Brake Option 🔹	<b></b>	
	Setting completed	X Cancel	

2) Selecting the reduction gear. Clicking 💌 in the Select Reduction Gear combo box open the following menu.



3) Click "W/Precision Red. Gear(Shaft)" from the menu.

4) Selecting the reduction ratio. Clicking 🗾 in the Select Reduction Ratio combo box open the following menu.



- 5) Click "1/5<sq.60>" from the menu.
- 6) Selecting the brake. Clicking 🗾 in the Select Brake combo box open the following menu.

	Rated Speed and Motor Option		×
	Rated Speed 3000 r/min	Maximally increased torque	
	Select Reduction Gear	Select Red. Ratio	
í	Select Brake No Brake Option No Brake Option With Brake	Selected motor type	

- 7) Click "No Brake Option" from the menu.
- 8) Click the "Setting completed" button to close the Rated RPM and Motor Option window.

When setting is completed, servo motor series, rated speed, servo motor option are displayed in the Motor field of the Setting Data area.

## (9) Units selection

- 1) Click "Units" on the menu bar to open the menu.
- 2) Click "SI".

📲 Ball scrw, Hrz.   test1   INID							
File Units Tools Help							
Set	$\checkmark$	<u>S</u> I					
Ba		Inch-Lb					

#### (10) Machine specifications entry

(a) Entry of machine specifications data

Enter the machine specifications data given in section 2.2.1. Move the focus to the required item in the Data Setting area and enter its value in the machine specifications entry area.

Example: To enter External Reduction Gear Ratio

 Click "Ext. red. gear ratio(NL/NM)" in the Data Setting area. The Machine specifications input area will change as shown below.

Ext rod goor ratio/NU/NIM)	1/n:	2/5	
EXI. Teu. gear failo(INL/INI/)	1/IL.]	2/5	

2) Enter "1/3" from the keyboard.

Ext. red. gear ratio(NL/NM)	1/n:	1/3	
-----------------------------	------	-----	--

3) Press the "Enter" to set.

When setting is made, the old value in the Data Setting area is replaced by the new value entered. Similary, set all machine specifications data.

# (11) Operation pattern

1) Click the Setting Data area to click the "Operation Pattern" button. When "Operation Pattern" button is clicked the following window appears.

Position Control Mode Operation Pattern									
*Re	quire	ed Items	Lo	w Resp 🔽	Stop. S	Stb. Time	0.043	se	C
No.	spd. chg	* Feed [mm]	*Eitl Pos. Time:t0 [sec]	her One Feed Rate:V0 mm/min ▼	Accel. Time:Tsa [sec]	Decel. Time:Tsd [sec]	Pause Time:tst [sec]	Load Mass	Ld. Str
1		200.000	1.200	12000.000	0.157	0.157	0.800		
2								2	
3								2	$\mathbf{V}$
4								R	
5								N	V
6									
7									
8									
9									
10									
lf the Grap	re is h sh	only one type o ows the data w	f operation: hich includ	al pattern, plea es the settling	se set only time.	one, do no	t set to mor	re than	one.
Fee	d Rat 2000	e mm/min 0	-			Clea	ir Cal	culate pa	attern
10000									
	1000	o <sup>2</sup>					Exit	t from E	ntry
-3	2000	0 0 0	.5	1	1.5	2	2.5 T	Canci Time [s	el sec]

2) Move the focus to the corresponding items and enter the operation pattern values. In this example, no value is entered into "Pos. Time".

F	Position Control Mode Operation Pattern									
	*Re	quire	ed Items	Lo	w Resp 🔻	Stop. S	Stb. Time	0.043	sec	:
	No.	spd. chg	* Feed [mm]	*Eitt Pos. Time:t0 [sec]	ner One Feed Rate:V0 mm/min 💌	Accel. Time:Tsa [sec]	Decel. Time:Tsd [sec]	Pause Time:tst [sec]	Load Mass	Ld. Str
	1		200.000		3000.000	0.300	0.300	0.500	K	N
	2		-200.000		2000.000	0.500	0.500	0.500	K	
	-									

3) Clicking 💽 in the Response Level Setting combo box inside the Position Control Mode Operation Pattern window opens the following menu.

Position Control Mode Operation Pattern										
*Required Items				Lo	w Resp 🚽	Stop. S	Stb. Time	0.043	sec	c
No.	spd. chg	* Feed [mm]	Pos. Time:t( [s	Lov Me Hig Fre	w Resp d. Resp gh Resp ee Setting 🖌	Accel. Time:Tsa [sec]	Decel. Time:Tsd [sec]	Pause Time:tst [sec]	Load Mass	Ld. Str
1		200.000			3000.000	0.300	0.300	0.500	K	
2		-200.000			2000.000	0.500	0.500	0.500	K	
	Re 10.	Require spd. lo. chg	Required Items spd. * lo. chg Feed [mm] 1 200.000 2 2200.000	Required Items           spd.         *           No.         chg         Feed           Time:t         [mm]         [s]           1         200.000         [s]           2         -200.000         [s]	Required Items         Lo           spd. *         Lo           No. chg         Feed           [mm]         Time:0           1         200.000           2         -200.000	Required Items         Low Resp           spd. *         Low Resp           No. chg         Feed           [mm]         Pos.           1         200.000           2         -200.000	Required Items         Low Resp         Stop. Sto	Required Items         Low Resp         Stop. Stb. Time           No.         chg         Feed         Pos.         Low Resp         Accel.         Decel.           Imm         Imm         Free Setting         Ime:Tsa         Ime:Tsa         Ime:Tsa         Ime:Tsa           1         200.000         3000:000         0.300         0.300         0.300           2         -200.000         2000.000         0.500         0.500         0.500	Required Items         Low Resp         Stop. Stb. Time         0.043           spd. * chg         Feed         Pos. Time: 0         High Resp         Accel. Time: Tsa         Decel. Time: Tsa         Pause Time: Tsa           1         200.000         3000.000         0.300         0.300         0.500           2         -200.000         2000.000         0.500         0.500         0.500	Required Items         Low Resp         Stop. Stb. Time         0.043         set           No.         chg         Feed         Pos. Time: D         High Resp         Accel.         Decel. Time: Tsa         Pause         Load           1         200.000         3000:000         0.300         0.500         Image: Stop. Stb. Time         Stop. Stop. Stb. Time         Stop. Stop. Stb. Time         Stop. Stop. Stb. Time         Stop. Stop. Stop. Stop. Stop. Stb. Time         Stop. Sto

4) When "High Response" is clicked, the following window is displayed. Settling time at High Response is "0.012s".



5) Click "Confirm" button in the "Confirm stop setting time" window. When "Confirm" button is clicked, "0.012" is displayed in the "Stopping Stabilization Time" field inside the "Position Control Mode Operation Pattern" window.

P	Position Control Mode Operation Pattern										
*Required Items High F				Hig	gh Resp 🔻	Stop. S	Stb. Time	0.012	sec	:	
	No.	spd. chg	* Feed [mm]	*Eitt Pos. Time:t0 _[sec]	ner One Feed Rate:V0 mm/min ▼	Accel. Time:Tsa [sec]	Decel. Time:Tsd [sec]	Pause Time:tst [sec]	Load Mass	Ld. Str	
	1		200.000	4.312	3000.000	0.300	0.300	0.500	N	◄	
	2		-200.000	6.512	2000.000	0.500	0.500	0.500	K	◄	
	2		-200.000	6.512	2000.000	0.500	0.500	0.500			

6) Click the "Calculate pattern" button to determine the operation pattern.



7) Click the "Show Graph" button to display the operation pattern graph.

8) Click the "Exit from Entry" button to close the Position Control Mode Operation Pattern window.

#### (12) Selection operation execution

Click the "Calculate capacity" button to execute capacity selection. When the following screen is displayed, click the "OK" button.



The selection and calculation results are display in the Sizing Result area.

Sizing Result					
Motor : HG-KR13G7(1/5 <sq.60>) [100 W] (1/5)</sq.60>					
Amplifier :MR-J4-10A/B/GF Regenerative option :Regeneration needless Side-by-side mounting is possible.					
Load Inertia :	0.169 [kg-cm2]	2.2Times			
Peak Torque :	0.193 [N-m]	60.3%			
RMS Torque :	0.145 [N-m]	45.3%			
Regen. Pwr. :	0.000 [W]	0.0%			
The sizing software calculated the system with theoretical equations and can only be used as a guide to a suitable solution. Independantly ensure the design has sufficient safety margin.					

Selection and calculation results

Servo motor	HG-KR13G7 (1/5 <sq. 60="">) [100W</sq.>	/]	
Servo amplifier	MR-J4-10A/B/GF		
Regenerative option	Regeneration needless		
Load inertia	0.169 [kg • cm <sup>2</sup> ]	2.2 times	
Peak torque	0.193 [N • m]	60.3%	
Effective torque	0.145 [N • m]	45.3%	
Regenerative power	0.000 [W]	0.0%	

This machine allows use of the HG-KR13G7 (1/5<sq. 60>) Load inertia at the servo motor shaft of this machine is 0.169 [kg cm2] or 2.2 times larger than the servo motor shaft inertia. Required peak torque is 0.193 [N m] and effective torques is 0.145 [N m], which are 60.3% and 45.3% of the rated torque, respectively. Also, this machine does not require a regenerative option.

#### POINT

• When selecting reduction gear, the actual reduction ratio is shown behind the rated output.

# (13) Printing

- 1) Click "File" on the menubar to open the menu.
- 2) Point to the "Print" and click "Print".



3) To print the screen, click "Data Set and Calc Result (Standard Form)" in the Print window. The check box turns to **I**.

Pr	int		×
	<ul> <li>Data Set and Calc Result</li> <li>Data Set and Calc Result</li> <li>Operation Pattern (Set D</li> <li>Show Calculations</li> </ul>	ilt (FAX Form) ilt (Std. Form) Data, Graph)	Start Printing
	🔽 Print Page No.	Enter FAX Form	

#### 4) Click "Start printing" button.

When printing is a started, the results are printed out as shown below.

[Data Set and Calc Result (Std. Form)]



#### (14) Data save

- 1) Click "File" on the menubar to open the menu.
- 2) Click "Save Project".



3) Enter file name "test1".

Save As							
Computer 🕨 Local Disk (C:) 🕨	✓ 4) Search Local Disk (C:)	Q					
Organize 🔻 New folder		0					
<ul> <li>Recent Places</li> <li>PerfLogs</li> <li>Program Files</li> <li>Users</li> <li>Windows</li> <li>Pictures</li> <li>Videos</li> </ul>							
File <u>n</u> ame: test		•					
Hide Folders	Save Cano	el					

4) Click the "Save" button to execute save.

#### (15) End

- 1) Click "File" on the menubar to open the menu.
- 2) Click "Exit".



## 2.2.3 Operation (linear servo)

This section shows windows and operations for the selection of linear servo capacity, which are different in section 2.2.2. For the fundamental capacity selection procedure, refer to section 2.2.2.

In cases where a Linear Servo is selected in the Machine Configuration, Linear Servo related details will be displayed in the selection contents for Servo Amplifiers and Servo Motors Series.

#### (1) Servo amplifier series selection

1) To display the following window, click "Amplifier" button in "Setting Data" area.



2) Select a series.

After selecting a series, the servo amplifier series is displayed in the selected amplifier series field in "Setting Data" area.

#### (2) Linear servo motor selection

- (a) Linear servo series selection
  - 1) To display the following window, click "Motor" button in "Setting Data" area.



- 2) Select a series.
- (b) Cooling method selection

After selecting a motor, the following window is displayed.

Select Cooling method	X
Max. speed 3 m/sec	
Cooling method Self-cooling	Selected motor type
Setting completed	X Cancel

Select a Max. speed and a cooling method.

#### 2.3 Regenerative option selection

Calculate the capacity of each axis in advance according to section 2.2.2, and save the calculation results. The following message appears when calculation is made after the selection of the MR-J4W\_,MR-J3W or MR-J2M in section 2.2.2 (7) of servo amplifier series selection.

Message		×
i	The regeneration option is not selected on this screen. Proceed to [Tool] - [Regeneration Option for Multiple Axes Selection] t select a regeneration option.	to
		(

#### 2.3.1 Selection of regenerative option for MR-J2M

- (1) Displaying the Select MR-J2M Regeneration Option window
  - 1) Click "Tools" on the menubar to open the menu.
  - 2) Point to the "Regeneration Option for Multiple Axes Selection" and click "J2M".

📶 Ball scrw, Hrz.	Running  INIDT0.SVM			
<u>File Units</u>	ols <u>H</u> elp		_	
Setting D	Inertia	+		
Ball scrw,	Specific <u>G</u> ravity Tables			
Pos ctrl n	Efficiency Tables			
	Eriction Coeff.Tables			
	<u>R</u> atio Calculate		Reduction	Gear
Amplifier	Units Conversion		Reduction	oca
In the second se	Regeneration Option for Multiple Axes Selection	•	<u>J</u> 4W	•
Motor	Motor Data Tab <u>l</u> es		J3 <u>W</u>	•
	Coupling Data Made By Miki Pulley Co		J2 <u>M</u>	
Onersting	Maximum Feed Distance Of Linear Servo	L		3
				_

When "J2M" is clicked, the following window appears.

Select MR-J2M Regeneration Option							
<u>F</u> ile							
Configuration			Select Regeneration Option				
Cmp. Axis Src Vltg Cy	cl. t		Y/N R	gn. Pwr. R	gn. Brk. Opt.		
8 • 230 V	s	Calculate		w			
- Set Each Axis							
Axis Motor model	Drive Unit Model	Regen. Eng.	Peak Torque	Cycle Time	Simul. Rgn. Grp.		
© 1							
C 2							
C 3							
C 4							
0.5							
C 6							
C 7							
08							
Edit							
Load HC-KFS053 -	MR-J2M-10DU	0.000	J 0.0 %	1.000 g	3 1 💌		
Clear			🕤 Set	Ē	Exit		

(2) Configuration entry

Enter the number of axes into the Component Axis field. Selection can be made between 4 and 8 axes. Then enter the voltage of the main circuit input power supply into the Source Voltage field. The power supply voltage entry range is 170V to 253V.

Select MR-J2M Regeneration Option						
<u>F</u> ile						
Configura	ition					
Cmp. Axi	s Src Vltg Cycl. t					
8 🔻	230 V	s				
4	t.					
5	Axis					
6	Motor model	Driv				
7						
8	I					

#### (3) Each axis setting entry

1) Click the <sup>(C)</sup> of the axis number to be set. The following figure assumes that Axis 1 has been selected.

- Set Each Axis							
Axis	Motor model	Drive Unit Model	Regen. Eng.	Peak Torque	Cycle Time	Ran, Grp.	
● 1							
C 2							
C 3							
C 4							

2) Click "File" on the menu bar in the Select MR-J2M Regeneration Option window, and click "Loaded axis". Or click the "Load" button in the "Select MR-J2M Regeneration Option" window.

Select MR-J2M Regeneration Op	
Eile	
Loaded axis	Edit
<u>O</u> pen	Load HC-KFS053
<u>S</u> ave	Clear
<u>P</u> rint	Clear
Exit	

3) When "Loaded axis" or "Load " is clicked, the following window appears.

🖪 Open			×
Com ♥ ↓ Com	nputer ► Local Disk (C:) ► j2m	n	Q
Organize 🔻 New	folder		0
Desktop Downloads Eccent Places Libraries Documents Music Pictures Videos			
5	File <u>n</u> ame: SVM or SRV	files (*.SVM, *.SR	V) -

4) Select the file to be set (j2ml.svm in this case), and click the "Open" button. Selecting the file changes the window as shown below.

Select MR-J2M Regeneration Option				
<u>F</u> ile				
Configuration	- Select Regeneration Option			
Cmp. Axis     Src Vltg     Cycl. t       8     230     ∨     2.000     S	Y/N     Rgn. Pwr.     Rgn. Brk. Opt.       No     0.000     W			
Set Each Axis	Simul			
Axis Motor model Drive Unit Model Regen. Eng.	Peak Torque Cycle Time Rgn. Grp.			
• 1 HC-KFS23 MR-J2M-20DU 0.069	110.3 2.000 1			

When there are two or more axes, repeat the same operation for Axis 2 and later.

POINT	
<ul> <li>Each axis setting entry is performed using direct entry in the this section "Loaded axis" that reads the file (***.svm). "Loaded axis" cannot read to capacity has not been calculated after selection of "MR-J2M" in the se series selection.</li> </ul>	on (4) or the file if its ervo amplifier

#### (4) When editing the values

The "Motor model name", "Drive Unit Model", "Regen. Eng", "Peak Torque", "Cycle Time" and "Simul. Rgn Grp" can be changed as desired. After selecting the axis number whose values will be changed, set the required items. After making selection and entry, click the "Set" button to determine the value. Click the "Clear" button to erase the set value.

- Edit-							
Luit							
Load HC-KFS053	MR-J2M-10DU	•	0.000 J	0.0 %	1.000 S	1	•
## (5) Calculation

After setting the values of all axes, click the "Calculate" button. The selection results are displayed in the Select Regeneration Option field.



(6) About simultaneous regeneration group setting

POINT	
<ul> <li>Examination</li> </ul>	must be made separately if moving speeds differ from normal and all
axes may de	celerate simultaneously in home position return, etc.

When multiple axes are operated, deceleration and lowering operations may be performed simultaneously during a single cycle. When these are performed simultaneously, regeneration will occur at the same time. To select the regenerative options, therefore, the patterns where deceleration and lowering operations are performed simultaneously or consecutively must be grouped.

When the operation pattern of one axis is asynchronous and its deceleration or lowering operation is rarely performed simultaneously with that of the other axes, set the simultaneous regeneration group of that axis to "No". When multiple axes decelerate or lower simultaneously, set the simultaneous regeneration group to any of "1 to 8" on a group basis. The following figure shows an example of setting the simultaneous regeneration groups.

Axis No.	Operation pattern	Simultaneous regeneration group
1		1
2		1
3		2
4		2
5		No
6		3
7		3
8	Lowering //	3
	▲ 1 cycle	

2.3.2 Selection of regenerative option for MR-J3W

This section shows windows and operations for the selection of MR-J3W regenerative option selection, which are different in section 2.3.1. For the fundamental regenerative option selection procedure, refer to section 2.3.1.

- (1) Displaying the Select MR-J3W Regeneration Option (Standard) window
  - 1) Click "Tools" on the menubar to open the menu.
  - Select "J3W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and click on "Standard".



When "Standard" is clicked, the following window appears.

Select MR-J3W Regeneration Option (Standard)	
<u>F</u> ile	
Configuration	Select Regeneration Option
Cmp. Axis Src Vltg Cycl. t	Y/N Rgn. Pwr. Rgn. Brk. Opt.
2 v S Calculate	W
Set Each Axis	Qianut
Axis Motor model Amplifier model Regen. Eng.	Peak Torque Cycle Time Rgn. Grp.
• A	
Св	
, , , ,	, , , ,
Edit	
HF-KP053 ▼ MR-J3W-22B ▼ 0.000 J	0.0 % 1.000 S 1 -
Clear	Set 🕖 Exit

Make sure to set the same servo amplifier model name to the "Amplifier model" of	
Axis A and B.	
When different servo amplifier model names are set, regenerative option cannot	
be selected.	

- (2) Displaying the Checking Tolerable regenerative power of MR-J3W-0303BN6 window
  - 1) Click "Tools" on the menubar to open the menu.
  - Select "J3W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and click on "0303BN6".

Ball scrw, Hrz.	Running   INIDT0.SVM							
File Units Tools Help								
Setting D	Inertia	•						
Ball scrw,	Specific <u>G</u> ravity Tables							
Pos ctrl n	Efficiency Tables					WL		
1.00.000.0	<u>Friction Coeff.Tables</u>							
	Ratio Calculate		Reduc	tion Gea				
Amplifier	Units Conversion		rtodao		- 6 <sup>-</sup>			
	Regeneration Option for <u>M</u> ultiple Axes Selection	•	<u>J</u> 4V	v 🔸				
Motor	Motor Data Tab <u>l</u> es		J3 <u>V</u>	<u>v</u> •		<u>S</u> tandard		
	Coupling Data Made By Miki Pulley Co		J2 <u>N</u>	<u>/</u>		0303 <u>B</u> N6		
Operation	Maximum Feed Distance Of Linear Servo	L	-		1.0	- 1.0		

When "0303BN6" is clicked, the following window appears.

Checking Tolerable regenerative power of MR-J3W-0303BN6 File	X
Configuration Pwr. spec. Src Vltg Cycl. t 48V V S Calculate	Checking Tolerable regen. pwr. Y/N Rgn. Pwr. Rgn. Brk. Opt.
Set Each Axis Axis Motor model Amplifier model Regen. Eng. C B	Peak Torque Cycle Time Simul. Rgn. Grp.
Edit Load HG-AK0136 V MR-J3W-0303BN6 V 0.000 J	J 0.0 % 1.000 S 1 ▼
Clear	Set Exit

3) Change "Pwr. spec." corresponding to used power supply.





2.3.3 Selection of regenerative option for MR-J4W

This section shows the screens and operations of regenerative option selection for the MR-J4W\_, which are different to section 2.3.2. For the fundamental selection procedure of regenerative option, refer to section 2.3.1.

- (1) Displaying the Select MR-J4W2 Regeneration Option window
  - 1) Click "Tools" on the menubar to open the menu.
  - Select "J4W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and click on "Standard".



When "Standard" is clicked, the following window appears. At this time, please confirm that the "Cmp. Axis" is set to "2".

Select MR-J4W Regeneration Option (Standard)	X
Eile Configuration Cmp. Axis Src Vltg Cycl. t 2 240 V S Calculate	Select Regeneration Option Y/N Rgn. Pwr. Rgn. Brk. Opt.
Set Each Axis Axis Motor model Amplifier model Regen. Eng. A B B B B B B B B B B B B B B B B B B	Peak Torque Cycle Time Rgn. Grp.
Edit Load HG-KR053 V MR-J4W2-22B V 0.000 J	0.0 % 1.000 s 1 V
Clear	Set 🕖 Exit

- (2) Displaying the Select MR-J4W3 Regeneration Option window
  - 1) Click "Tools" on the menubar to open the menu.
  - Select "J4W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and click on "Standard".

Ball scrw, Hrz.	Running   INIDT0.SVM				
File Units Too	ls Help		_		
Setting D	Inertia	×			
Ball scrw,	Specific <u>G</u> ravity Tables				
Pos. ctrl. n	Efficiency Tables				WL
1	<u>Friction Coeff.Tables</u>				
	<u>R</u> atio Calculate		Reduction (	Gear	
Amplifier	Units Conversion	. <b>⊢</b> ,	(Course of the		
	Regeneration Option for $\underline{M}$ ultiple Axes Selection	×	<u>J</u> 4W	•	Standard
Motor	Motor Data Tab <u>l</u> es		J3 <u>W</u>	•	0303 <u>B</u> 6
	Coupling Data Made By Miki Pulley Co		J2 <u>M</u>		
Operation	Maximum Feed Distance Of Linear Servo	L			

When "Standard" is clicked, the following window appears.

Select MR-J4W Regeneration Option (Standard) File	×
Configuration Cmp. Axis Src Vltg Cycl. t 2 - 240 V S Calculate	Select Regeneration Option Y/N Rgn. Pwr. Rgn. Brk. Opt.
Set Each Axis Axis Motor model Amplifier model Regen. Eng.	Peak Torque Cycle Time Rgn. Grp.
Edit Load HG-KR053 V MR-J4W2-22B V 0.000 J	0.0 % 1.000 S 1 V
Clear	🕤 Set 👘 Exit

3) Change the "Cmp. Axis" to "3".

Select MR-J4W Regeneration Option (Standa						
<u>F</u> ile						
Configuration						
Cmp. Axis Src Vltg Cycl. t						
2 🔻 240 V	s					
2						
3 Axis						
Axis Motor model	Amp					

en enange are en					
Select MR-J4W Regenerat	ion Option (Standard)				X
<u>F</u> ile					
Configuration Cmp. Axis Src Vltg	Cycl. t	Calculate	Select Regel Y/N Rg	neration Option n. Pwr. R <u>c</u> W	gn. Brk. Opt.
- Set Each Avis					
Axis Motor mo	idel Amplifier model	Regen. Eng.	Peak Torque	Cycle Time	Simul. Rgn. Grp.
Edit Load HG-KR053 Clear	▼ MR-J4W3-222B	• 0.000	, 0.0 % (	1.000 s	1 • Exit
DOINT					

When change the "Cmp. Axis" to "3", the following window appears.

POINT
When the "Cmp. Axis" is "2", this configuration operates as MR-J4W2.
When the "Cmp. Axis" is "3", this configuration operates as MR-J4W3.
For all axes the "Amplifier model" must be the same. If it is not the same, the regenerative option can not be selected.

- (3) Displaying the Checking Tolerable regenerative power of MR-J4W2-0303B6 window
  - 1) Click "Tools" on the menubar to open the menu.
  - Select "J4W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and click on "0303B6".

Ball scrw, Hrz.   Running   INIDT0.SVM								
File Units Tools Help								
Setting D	Inertia	+						
Ball scrw,	Specific <u>G</u> ravity Tables							
Pos. ctrl. n	Efficiency Tables						W	L
1	<u>Friction Coeff.Tables</u>							
	<u>R</u> atio Calculate		Re	duction (	Gear		3 _ "	VT annu
Amplifier	Units Conversion	- +		Guotion	000	6		-
	Regeneration Option for $\underline{M}ultiple$ Axes Selection	•		<u>J</u> 4W	×		<u>S</u> tandard	
Motor	Motor Data Tab <u>l</u> es			J3 <u>W</u>	•		0303 <u>B</u> 6	
	Coupling Data Made By Miki Pulley Co			J2 <u>M</u>			ł	D
Operation	Maximum Feed Distance Of Linear Servo	L	$\mathbf{+}$					-B

When "0303B6" is clicked, the following window appears.

Checking Tolerable regenerative power of MR-J4W2-0303B6 File	X
Configuration Pwr. spec. Src Vitg Cycl. t 48V  48V  Calculate	Checking Tolerable regen. pwr. Y/N Rgn. Pwr. Rgn. Brk. Opt.
Set Each Axis Axis Motor model Amplifier model Regen. Eng. C B	Simul.     Rgn. Grp.       Image: Simul.     Rgn. Grp.       Image: Simul.     Image: Simul.       Image: Simul.     Image: Simul.       Image: Simul.     Image: Simul.       Image: Simul.     Image: Simul.
Edit Load HG-AK0136 V MR-J4W2-0303B6 V 0.000 J	0.0 % 1.000 S 1 -
Clear	Set Exit

3) Change "Pwr. spec." corresponding to used power supply.

Config	uratio	n			
Pwr. s	pec.	Src VI	tg	Cycl	. t
48V	- [	48	V		s
24V	<u> </u>				
48V	AXI	s			

<ul> <li>Make sure to set the same servo amplifier model name to the "Amplifier model" of Axis A and B.</li> <li>When different servo amplifier model names are set, regenerative option cannot be selected.</li> </ul>	POINT	
Axis A and B. When different servo amplifier model names are set, regenerative option cannot be selected.	<ul> <li>Make sure to</li> </ul>	set the same servo amplifier model name to the "Amplifier model" of
When different servo amplifier model names are set, regenerative option cannot be selected.	Axis A and E	3.
be selected.	When differe	ent servo amplifier model names are set, regenerative option cannot
	be selected.	

# **3. OPERATION COMMANDS**

### 3.1 How to select a command

The method of selecting the command is the operation procedures using the mouse.

There are two types of commands. Some are executed immediately by selecting them, and others require the window to be opened after selection and further settings to be made. For commands whose names are followed by.., open the window after selecting them.

The command names of unavailable commands are grayed out.

### 3.1.1 Command selection procedures

### (1) Clicking method

- 1) Click the menu title on the menu bar to open the menu.
- 2) Point to and click the command to be selected.Any command marked ► has a sub menu. Similarly click that command to select.

### (2) Dragging method

Point to the menu title on the menu bar, hold down the left button and drag the mouse to the command to be selected, and release the button.

When there is a sub menu, further drag the mouse to the required command and release the button.



# **3. OPERATION COMMANDS**

3.1.2 Operation procedures within the window

Within the operation window, enter data and/or click the button.

(1) Pressing a button

Click the button in the window.



(2) Entering data

Click the machine specifications entry area to move the focus there, and input the numerical value with the keyboard.



- (3) Selecting the combo box data, etc.
  - 1) Click the 🗾 on the right of the setting area to open the combo box.
  - 2) Click the data or the like to be selected to make selection.



(4) Selecting the item

Click the item or check box.



(5) Pressing the option button Click the item or button.



## 3.2 Description of commands

3.2.1 File

Used to save or print the data created, for example. When "File" on the menu bar is clicked, the following menu is displayed.



## (1) New Project

Used to return all input data to initial values.

## (2) Project Title

Used to set the title displayed on top of the window. When "Project Title" of the sub menu is clicked, the following window is displayed.

Project Title		×
Project Title	Running	
New Title	Running	
* Do not enter double o	quotation mark.	
	Setting completed	X Cancel

Move the focus to the New Title entry field and enter the title from the keyboard.

## (3) Open Project

POINT	
<ul> <li>The files sav</li> </ul>	ed using the old capacity selection software (MRZJW3-MOTSZ71E or
earlier) can a	lso be read. However, data are not set to the items added to
MRZJW3-M	DTSZ111E and later.

Used to read input data from the saved file.

When "Open Project" of the sub menu is clicked, the window opens and the file to be opened can be specified.

d Open		x
Compu	ter 🕨 Local Disk (C:) 🕨	✓ 4 Search Local Disk (C:)
Organize 🔻 New fol	der	** • 🔟 🔞
Desktop Downloads Recent Places Libraries Documents Music Pictures Videos	PerfLogs Program Files Users Windows testL.svm	
File	<u>n</u> ame: test1.svm	▼ SVM or SRV files (*.SVM, *.SRV) ▼ Open Cancel

A file can be also dragged and dropped to the machine structure area to be read.

### (4) Save Project

Used to save the current input data. When "Save Project" on the sub menu is clicked, the File Save window opens.

Save As		×
- Co	omputer   Local Disk (C:)	Q
Organize 🔻 Ne	w folder 🔠 🐨	0
<ul> <li>Recent Places</li> <li>Libraries</li> <li>Documents</li> <li>Music</li> <li>Pictures</li> <li>Videos</li> <li>Computer</li> </ul>	PerfLogs Program Files Users Windows	
File <u>n</u> ame:	test1.svm	•
Save as <u>t</u> ype:	SVM files (*.SVM)	•
Hide Folders	Save	

After entering or specifying the file name, click the "Save" button to save the input data by the specified file name.

## (5) Print

Used to print input data and calculation/selection results. Pointing to "Print" on the sub menu and clicking "Print" displays the following window.



The print mode can be selected from among four different modes. Select the desired print mode. More than one mode can be selected.

POINT	
<ul> <li>Click "Print F</li> </ul>	age No." to print the page numbers consecutively in the on-screen
arrangement	order of the selected item.

(a) Data Setting and Calculation Result (FAX Form)

The calculation result and FAX form of capacity selection are printed together. When "Data Set and Calc Result (FAX Form)" is clicked, the "Enter FAX Form" button is made clickable, enabling FAX data to be entered.

- 1) Click the **I** or item of "Data Set and Calc Result (FAX Form)".
- 2) Click the "Enter FAX Form" button. Clicking it opens the FAX Form window. This window can also be opened by pointing to "Print" in the sub menu and clicking "FAX Form Entry".
- 3) Enter the required items and click the "Setting completed" button.
- 4) Click the "Start Printing" button in the "Print" window.

# **3. OPERATION COMMANDS**

	x i oiiii)]		
Roll feed   Wrapping Machine	e INIDT3.SVM	Λ	
To: [FAX No.] [Company] [Division] [Name]		From:	[Phone] [FAX No.] [Company] [Division] [Name]
Machine Components	Roll feed		
Coupling/Ext. Red. Gear	Coupling [y]+Ext.	Red. Gear [v]	
Servo Control Mode	Pos. ctrl. mode		20
Calculation Mode	Calculate		F FG
			1 Top
Selected Amplifier	MR-J4-A/B		Ext Peduction Gear
Selected Motor Series	HG-SR 2000 r/m	in	Lit Reduction deal
No Reduction Gear Option			Motor
			A A
No Brake Option			
Tension	F 10.000	Ν	
Reduction gear ratio(NL/NM)	1/n 1/5		
Reduction gear inertia	JG 15.000	kg-cm2	JO
Inertia of the others	JO 2.000	kg-cm2	
Diameter of feed roll	DR 120.000	mm	Motor :HG-SR152 [1.5 KW]
Inertia per roller	JR 100.000	kg-cm2	
Bearing friction coeff.	mu 0.100		Amplifier :MR-J4-200A/B
Nip pressure	FG 10.000	N	Regenerative option : Regeneration needless
Bearing diameter	d 10.000	mm	
			Side-by-side mounting possible : 0-45 degrees C amb. Temp.
			Load Inertia : 30.000 [kg-cm2] 1.9Times
			Peak Torque : 11.608 [N-m] 161.2%
			RMS Torque : 6.463 [N-m] 89.8%
			Regen. Pwr. : 0.000 [W] 0.0%
- The sizing coffwar	a calculated the ave	tom with these	otical
equations and can	only be used as a (	uide to a suita	able solution. Control No
Independantly ens	ure the design has	sufficient safet	y margin.
			Control No.

[Data Set and Calc Result (FAX Form)]



(b) Data Setting and Calculation Result (Standard Form)

Used to print the calculation result and operation pattern graph of capacity selection.

[Data Set and Calc Result (Std. Form)]



# (c) Operation pattern (Set Data, Graph)

Used to print the data displayed in the Operation Pattern window.

-100000

0

0.1

[Operation Pattern (Set Data, Graph)] Roll feed | Wrapping Machine INIDT3.SVM Low Resp Stop. Stb. Time 0.043 sec No. spd. Feed Pos. Feed Rate:V0 Accel. Pause Decel. chg Time:t0 Time:Tsa Time:Tsd Time:tst [mm] [sec] [mm/min] [sec] [sec] [sec] 150.000 0.200 94000.000 0.061 0.061 0.100 1 2 3 4 5 6 7 8 9 10 Italic characters indicate calculated value. If there is only one type of operational pattern, please set only one, do not set to more than one. Graph shows the data which includes the settling time. '+' means that the check is on the operation pattern Feed Rate [mm/min] 100000 50000 0 -50000

0.2

0.3

0.4

Time

0.5

[sec]

3 - 8

#### (d) Show calculations

Print the details of the calculation. For the MR-J4W\_, MR-J3W and MR-J2M the energy charged to the capacitor, rated power of regeneration and maximum regeneration time will not be printed.

(Roll feed	Wrapping Machine   INIDT3.SVM)		
Symbol	Description	Data	Unit
F	:Tension	10.000	N
1/n	:Reduction gear ratio	1/5	
JG	:Reduction gear inertia	15.000	kg-cm2
JC	:Coupling inertia	5.000	kg-cm2
JO	Inertia of the others	2.000	kg-cm2
DR	:Outside diameter of feed roll	120.000	mm
JR	Inertia per roller	100.000	kg-cm2
eta	:Drive efficiency	0.800	
mu	:Bearing friction coefficient	0.100	
FG	:Nip pressure	10.000	N
d	:Shaft diameter of feed-roll connection	10.000	mm
*1/nm	Actual reduction ratio of motor with reduction	Not Used	
*Pf	:Encoder resolution	4194304	pulse/rev
*Кр	Position loop gain	70	1/sec
*JMG	Inertia of reduction gear with motor	0.000	kg-cm2
*JMB	Inertia of brake with motor	0.000	kg-cm2
*JM	:Motor rotor inertia	16.000	kg-cm2
g	:Gravitational acceleration	9.800	m/sec2
*Tmax	:Motor maximum torque	21.500	N-m
*Ttyp	:Motor rated torque	7.200	N-m
*Ityp	:Rated current	Not Used	
*etam	:Reverse-efficiency of motor	0.913	
*etaMG	Reduction gear efficiency	1.000	
*t	:Regenerative operation time	0.061	sec
*Ec	:Energy charged to the capacitors in amp.	36.000	J
*Ptyp	:Rated power of regeneration	0.000	W
*tmax	:Maximum regeneration time	0.061	sec
**Irms	:Continuous effective load current	Not Used	
V0	:Feed (Operation Pattern)		mm/min
Tsa	:Accel. Time (Operation Pattern)		sec
Tsd	:Decel. Time (Operation Pattern)		sec
tO	:Pos. Time (Operation Pattern)		sec
tst	Pause Time (Operation Pattern)		sec
tf	:Cycle Time (Operation Pattern)	0.300	sec

[Show Calculations]

Note 1: The data marked \* is that of the servo amplifier, servo motor or regenerative resistor selected

after sizing calculation. If an error is found during calculation, the data becomes '0.000'.

Note 2: The data with \*\* will be values taking into consideration the motor current of the motor selected according to the operation pattern. Note3:

When the data, related to the operation pattern is '---', refer to the Operation Pattern Screen.

```
Calculations Process
(Roll feed | Wrapping Machine
                                  | INIDT3.SVM)
During calculations, the 4th decimal digit is always rounded and displayed.
However, the result of the calculation is based on the not rounded value and might differ from the
displayed calculation function.
Therefore, depending on the condition, the result's difference might be a large.
If the calculation result of regenerative power is zero or negative, then 'Pr' is indicated as '0'.
If the calculation result of max regenerative power is zero or negative or 'tmax' is 0,
then 'Pmax' is indicated as '0'.
                                  1.Feed distance/Motor Rev.
     dS = pi * DR * 1/n * 1/nm
= 3.1416 * 120.000 * 1/5 * 1.000
         = 75.398 [mm/rev]
  2. Electrical accuracy
     dL = (dS/Pf) * 1000
         = (75.398/4194304) * 1000
         = 0.017976379 [micron/pulse]
   3.Motor rotational speed
     N0 = V0/dS
     N0_1 = 94000.000/75.398
            = 1246.711 [r/min] (Operation Pattern No. 1)
   4.Stop settling time
     ts = 3 * 1/Kp
         = 3 * 1/70
         = 0.043 [sec]
  5. Total load inertia
     JL = JMG+JMB+\{JG+JC+JO+2*JR*(1/n)^2\}*(1/nm)^2
         = 0.000 + 0.000 + {15.000 + 5.000 + 2.000 + 2*100.000 * (1/5)^2} * (1.000)^2
             30.000 [kg-cm2]
         =
  6.Load torque
     TML = ((8*JR/(DR/10)^2)*g+FG)*(d/2000)*mu
          = ((8*100.000/(120.000/10)^2)*9.8+10.000)*(10.000/2000)*0.100
              0.032 [N-m]
          =
     = 0.032 [N-m]
TL ={F * (DR/2000)+TML}* 1/n * 1/nm * (1/eta)*(1/etaMG)
         = {10.000*(120.000/2000)+0.032}*(1/5)*(1.000)*(1/0.800)*(1/1.000)
             0.158<sup>°</sup>[N-m]
         =
   7.Moment of inertia ratio
     m = JL/JM
       = 30.000/16.000
              1.9 [times]
        =
   8.Acceleration torque
     TMa = {((JL / eta + JM)*N0)/(9.55*10000*Tsa)} + TL
     TMa_1 = {((30.000/0.800 + 16.000)*1246.711)/(9.55*10000*0.061)} + (0.158)
             = 11.608 [N-m] (Operation Pattern No. 1)
     TMa_Max = 11.608 [N-m] (Maximum value)
  9.Deceleration torque
     TMd = -{((JL * eta + JM)*N0)/(9.55*10000*Tsd)} + TL
     TMd_1 = -{((30.000*0.800 + 16.000)*1246.711)/(9.55*10000*0.061)} + (0.158)
     = -8.402 [N-m] (Operation Pattern No. 1)
TMd_Max = 8.402 [N-m] (Maximum value)
  10.Peak load factor
     Rp = {(maximum value of |TMa|,|TL|,|TMd|/Ttyp} * 100
```

```
Calculations Process
(Roll feed | Wrapping Machine | INIDT3.SVM)
            = (11.608/7.200)*100
            = 161.222 [%]
   11.Cont. effect load torque
       tc = t0 - Tsa - Tsd - ts
       tc_1 = 0.200 - 0.061 - 0.061 - 0.043
       = 0.035 [sec] (Operation Pattern No. 1)
TF0 = F * DR/2000 * 1/n * 1/nm * 1/eta
             = 10.000 * (120.000/2000) * (1/5) * 1.000 * (1/0.800)
             = 0.150 [N-m]
       ta = ts + tst
       ta_1 = 0.043+0.100
       = 0.143 [sec] (Operation Pattern No. 1)
Trms1 = SQRT{(TMa^2*Tsa + TL^2*tc + TMd^2*Tsd + TF0^2*ta)/tf}
= SQRT{{((11.608)^2)*0.061+
                       ((0.158)^2)*0.035+
                       ((-8.402)^2)*0.061+
                       ((0.150)^2)*0.143
                      }/0.300}
                      6.463 [N-m]
                 =
   12.Effective load factor
       Rrms = (Trms1/Ttyp) * 100
               = (6.463/7.200)*100
               = 89.758 [%]
   13.Output wattage
       Pave = (2*pi/60) * (|N1|*|T1|*t1+|N2|*|T2|*t2+---+|Nn|*|Tn|*tn)/tf
               = (2^{*}3.1416/60)
                ((1246.711/2)*11.608*0.061+1246.711*0.158*0.035+(1246.711/2)*8.402*0.061+0.000*0.150*0.143)
                /0.300
               = 268.002 [W]
   14.Acceleration energy
       Ea = (0.1047/2) * N0 * TMa * Tsa
        \begin{array}{r} \text{Ea} = (0.1047/2) & \text{No} & \text{INa} & \text{Isa} \\ \text{Ea} \_ 1 = (0.1047/2) & 1246.711 & (11.608) & 0.061 \\ & = & 46.212 \, [\text{J}] & (\text{Operation Pattern No. 1}) \\ \text{Ea} \_ \text{Sum} = & 0.000 \, [\text{J}] & (\text{Total Negative Energy}) \\ \end{array} 
   15.Deceleration energy
Ed = (0.1047/2) * N0 * TMd * Tsd
Ed_ 1 = (0.1047/2) * 1246.711 * (-8.402) * 0.061
       = -33.451 [J] (Operation Pattern No. 1)
Ed_Sum = -33.451 [J] (Total Negative Energy)
   16.Constant speed energy
Ef = 0.1047 * N0 * TL * tc
Ef_ 1 = 0.1047 * 1246.711 * (0.158) * 0.035
       = 0.722 [J] (Operation Pattern No. 1)
Ef_Sum = 0.000 [J] (Total Negative Energy)
   17.Absolute of -energy total
       Em = |(total of negative energy in Ea,Ed,Ef)|
                33.451 [J]
            =
   18.Regenerative power
       Pr = (etam*Em - Ec)/tf
            = (0.913*33.451-36.000)/0.300
                  0.000 [W] (If the result is less than 0, '0' is shown.)
            =
   19.Max. regenerative power
```

Calculations Process (Roll feed   Wrapping Machine	INIDT3.SVM)
**************************************	
Emax = section energy dur	ing maximum regeneration
Pmax = (etam*Emax - Ec)/	tmax
= (0.913*33.451 - 36	.000)/0.061
= 0.000 [W] (If t	he result is less than 0, '0' is shown.)
***************************************	***************************************

(6) Exit

Used to terminate the capacity selection software.

# 3.2.2 Units

Used to select the units used for calculation. When "Units" on the menu bar is clicked, the following menu is displayed.

🔚 Ball scrw, Hrz.   Running				
<u>F</u> ile	<u>U</u> ni	ts <u>T</u> ools	<u>H</u> elp	
Set	$\checkmark$	<u>S</u> I		
Ba		<u>I</u> nch-Lb		

On this menu, the absolute system of units SI and inch-pound system of units are available.

Changing the unit system converts the units of the input data and calculation results.

For example, when SI is switched to inches-pounds, items in "m" will be expressed in "ft".

Also, when the unit system is changed, the data and calculation results are converted to numerical values in new units.

# 3. OPERATION COMMANDS

## 3.2.3 Tools

Operation can be suspended temporarily to perform other operation such as inertia calculation. When "Tools" on the menu bar is clicked, the following menu appears.



### (1) Inertia

Used to calculate the cylinder, square block, converted load, linear movement, hanging, cone and conical base inertia.

When this command is selected, the Inertia Calculator window appears. In the Enter Data area of the Inertia Calculator window, each data on the selected inertia is displayed. Enter data in all items and start calculation.

1) Selection of input items

Move the focus to the item (Reduction gear inertia/Coupling inertia/Inertia of the others) of the inertia of the Data Setting area. Double-click the required item of inertia.

2) Calculation of inertia

Enter data required for inertia calculation and click the "Start Calculation" button. After calculation is over, click the "Show Calculations" button to show the calculation process.

- Substitution for machine specifications data Click the "Substitute" button to substitute the calculated value for the item of the inertia of the Data Setting area. At this time, Inertia Calculator window ends automatically.
- End Click the "Exit" button to end.

## (a) Cylinder

1) Enter Diameter, Length

The inertia value is calculated from the outside diameter, Inside diameter, length of cylinder and specific gravity.

Inertia Calculator(Cylinder)				[
Enter Data				
Outside diameter	D1	0.000	mm	
Inside diameter	D2	0.000	mm	
Length of cylinder	L	0.000	mm	
Specific gravity	rho	0.00000	kg/cm3	
				Axis of
1				D1 D2 -
Outside diameter	D1	0.000	mm	
	5 n. j			
Specific Gravity Data Tables			Set 1	i
Material Densi	ty		G 001	L
Aluminium 0.0027	0 kg/cm	3		
Gold 0.0193	2 kg/cm	3		
Silver 0.0104	9 kg/cm	3		
Steel 0.0078	7 kg/cm	3 🚽	Start Calculation	Show Calculations
1.0				
Inertia JL:				Substitute Exit
1				

### 2) Enter Diameter, Mass

The inertia value is calculated from the outside diameter, inside diameter and mass.

Inertia Calculator(Cylinder)				
Enter Data				
Outside diameter	D1	0.000	mm	
Inside diameter	D2	0.000	mm	
Mass	W	0.000	kg	
Outside diameter	D1:	0.000	mm Set	D1 D2 W
			Start Calculation	Show Calculations
Inertia JL:				Substitute Exit

## (b) Square Block

1) Enter Length, Thickness

The inertia value is calculated from the width, length, thickness, distance from axis and specific gravity.

Inertia Calculator(Square Block)				X
Enter Data				
Width	b	0.000	mm	
Length	а	0.000	mm	R
Thickness	h	0.000	mm	←
Distance from axis	R	0.000	mm	
Specific gravity	rho	0.00000	kg/cm3	
Width	b:	0.000	mm 🕤 Set	b Axis of rotation
Material Densit	У	^		
Aluminium 0.0027	0 kg/cr	m3 📃		
Gold 0.0193	2 kg/cr	m3		
Silver 0.0104	9 kg/cr	m3		
Steel 0.0078	7 kg/cr	m3 🚽	Start Calculation	Show Calculations
	~ ' '	2		
Inertia JL:				Substitute Exit

# 2) Enter Length, Mass

The inertia value is calculated from the width, length, distance from axis and mass.

Inertia Calculator(Square Block	)			×
Enter Data				
Width	b	0.000	mm	
Length	а	0.000	mm	R
Distance from axis	R	0.000	mm	· · · · · · · · · · · · · · · · · · ·
Mass	W	0.000	kg	
Width	b:	0.000	mm	b W
			🐑 Set 👘	Axis of rotation a
			Start Calculation	Show Calculations
Inertia JL:				Substitute Exit

# (c) Converted Load

Inertia Calculator(Converted Lo	ad)			X
Enter Data				W2
Driveside diameter	D1	0.000	mm	
Driveside thickness	W1	0.000	mm	
Loadside diameter	D2	0.000	mm	Load Cide
Loadside thickness	W2	0.000	mm	
Specific gravity	rho	0.00000	kg/cm3	
1				
Driveside diameter	D1:	0.000	mm	Motor Side
Specific Gravity Data Tables	r			
Material Densi	ty	- A -		
Aluminium 0.0027	0 kg/cm3	3		<b>↔</b>
Gold 0.0193	2 kg/cm3	3		W1
Silver 0.0104	9 kg/cm3	}		
Steel 0.0078	7 kg/cm3	-	Start Calculation	Show Calculations
10 0.000				No. 11 Contraction
Inertia JL:				Substitute Exit

## (d) Liner Movement

I	nertia Calculator(Linear Movem	ent)				X
	Enter Data					
	Ball screw diameter	D	0.000	mm		
	Length of ball screw	L	0.000	mm		V
	Ball screw lead	PB	0.000	mm		
	Mass of load	W	0.000	kg		
	Mass of table	Т	0.000	kg		
	Ball screw diameter Calculates assuming that the material of the ball screw is steel(0.0078kg/cm3).	D:	0.000	mm	Ball screw	→II ← ↑ PB
			0	Start Calculation		Show Calculations
	Inertia JL:				Substitute	Exit

# (e) Hanging

Inertia Calculator(Hanging)				X
Enter Data				
Diameter of pulley	D	0.000	mm	l →
Thickness of pulley	L	0.000	mm	
Mass of load	W	0.000	kg	
Mass of counterweight	С	0.000	kg	Axio of rotation D
Specific gravity	rho	0.00000	kg/cm3	Axis of rotation
Diameter of pulley Specific Gravity Data Tables Material Density Aluminium 0.00271 Gold 0.0193	D:	0.000	mm 🕤 Set	<del>,</del> W
Silver 0.0104	kg/cn	n3		
Steel 0.0078	/ kg/cn	n3 🗸 📗	Start Calculation	Show Calculations
Inertia JL:				Substitute Exit

### (f) Cone

nertia Calculator (Cone)				
Enter Data				
Outside diameter	D	0.000	mm	
Length	L	0.000	mm	
Specific gravity	rho	0.00000	kg/cm3	
Outside diamet	er D:	0.000	mm	D Axis of rotation
Specific Gravity Data Tabl	es		Set .	
Material Der	nsity	· ·		·
Aluminium 0.00	)270 kg/c	:m3		, r .
Gold 0.01	1932 kg/c	m3		
Silver 0.01	1049 kg/c	:m3		
Steel 0.00	)787 kg/c	m3 🚽	Start Calculation	Show Calculations
Inertia JL:				Substitute Exit

### (g) Conical base



## (2) Specific Gravity Tables

Used to display the specific gravities of materials as reference data.

When "Specific Gravity Tables" on the sub menu is clicked, the following window is displayed.

Specific Gravity Data Tables							
Material	Density [kg/cm3]	Density [lb/inch3]	•				
Aluminium	0.00270	0.09754					
Gold	0.01932	0.69798	=				
Silver	0.01049	0.37898					
Steel	0.00787	0.28432					
Copper	0.00896	0.32370					
Lead	0.01136	0.41041					
Nickel	0.00890	0.32153					
Cast iron	0.00770	0.27818					
Cast steel	0.00780	0.28179					
Forged steel	0.00790	0.28541					
Soft steel	0.00785	0.28360					
Nickel steel	0.00787	0.28432					
Silicon steel	0.00783	0.28288					
Co Print	Í	xit					

- Click the "Print" button to print the window contents. Click the "Exit" button to end.

## (3) Efficiency Tables

Used to display the efficiencies of drives as reference data depending on conditions. When "Efficiency Tables" on the sub menu is clicked, the following window appears.

Efficiency Data Tables			X			
🔲 Bayside Planetary gearbox	0.850	🔲 Ropes per full wrap	0.910 - 0.950			
Ball screw	0.900	🔲 V-belts per full wrap	0.880 - 0.930			
🗖 Trapezoidal thread	0.300	🔲 Flat belts per full wrap	0.930 - 0.980			
🗖 Plastic nut	0.650	🔲 Chains per full wrap	0.900 - 0.960			
🗖 Linear Servo	1.000	Rack and pinion	0.600 - 0.800			
Please select two or more efficiency factors when two or more combinations are necessary						
Total Efficiency	Data	Substitute	Exit			

When required, two or more efficiencies can be selected.

1) Selection of input item

Move the focus to "Drive efficiency" in the Data Setting area. Double-click "Drive efficiency".

2) Selection of efficiency

By clicking the option button to  $\mathbf{V}$ , select the required efficiency. More than one efficiency may be selected. When the data has a range, click the  $\mathbf{I}$  button on the right of the data display section to change the data.

- Substitution for machine specifications data Click the "Substitute" button to substitute the value for "Drive efficiency" in the Data Setting area. At this time, Efficiency Data Tables window ends automatically.
- 4) End

Click the "Exit" button to end.

## POINT

 "Efficiency Tables" has been selected on the "Tools" menu, clicking the "Substitute" button automatically enters the selected efficiency in "Drive efficiency" of the Data Setting area.

## (4) Friction Coeff. Tables

Used to display friction coefficients as reference data depending on conditions. When "Friction Coeff. Tables" on the sub menu is clicked.

Friction Coefficient Data Tables	i		X
Dynamic Friction Coeff.		Static Friction Coeff.	
Lubed steel on steel	0.020 - 0.250	C Steel on steel	0.120 - 0.800
C Ball or roller slide	0.050	C Aluminum on steel	0.450
O Polymer belt on steel	0.250	C Copper on steel	0.220
C Teflon on steel	0.040	O Brass on steel	0.190
C Antifriction bearings	0.002 - 0.005	C Lubed steel on steel	0.120 - 0.350
		O Polymer belt on steel	0.250 - 0.450
		C Teflon on steel	0.040
		<ul> <li>Antifriction bearings</li> </ul>	0.002 - 0.005
1		1	
Friction	Cooff Data 0 135		Evit
FICIO			

1) Selection of input item

Move the focus to "Coefficient of friction" in the Data Setting area. Double-click "Coefficient of friction".

- Selection of friction coefficient
   By clicking the option button to •, select the required friction coefficient. When the data has a range, click the + button on the right of the data display section to change the data.
- Substitution for machine specifications data Click the "Substitute" button to substitute the value for "Coefficient of friction" in the Data Setting area. At this time, Friction Coefficient Data Tables window ends automatically.
- 4) End

Click the "Exit" button to end.

## POINT

 "Friction Coeff. Tables" has been selected on the "Tools" menu, clicking the "Substitute" button automatically enters the selected friction coefficient in "Coefficient of friction" of the Data Setting area. If no friction coefficients are included in the selected mechanical components, the "Substitute" button appears pale and cannot be clicked.

## (5) Radio Calculate

Used to calculate a reduction gear ratio when gears, sprockets, pulleys or the like are used to reduce speed. Calculation by number of teeth and Calculation by diameters are available.

When "Ratio Calculate" on the sub menu is clicked, the following window is displayed.



1) Selection of input item

Move the focus to "Reduction gear ratio (NL/NM)" in the display area. Double-click "Reduction gear ratio (NL/NM)".

- 2) Input and calculation of data Enter required data and click the "Calculate" button.
- Substitution for machine specifications data Click the "Substitute" button to substitute the value for "Reduction gear ratio (NL/NM)" in the Data Setting area. At this time, Reduction Ratio Calculation window ends automatically.
- 4) End

Click the "Exit" button to end.

# POINT

 "Ratio Calculate" has been selected on the "Tools" menu, clicking the "Substitute" button automatically enters the calculated reduction gear ratio in "Reduction gear ratio (NL/NM)" of the Data Setting area.

### (6) Units Conversion

Calculation tool designed to convert the inertia, torque, length, weight, force or speed unit. Any of the following units may be converted.

Inertia	Torque	Length	Weight	Force	Speed
kg ∙ m²	N • m	m	kg	N	m/min
kg ∙ cm²	kgf ∙ m	cm	g	kgf	cm/min
kgf ∙ m²	kgf • cm	mm	lb	gf	mm/min
kgf • cm <sup>2</sup>	gf • cm	ft	oz	lb	m/sec
kg m sec <sup>2</sup>	lb-ft	inch		oz	cm/sec
kg • cm • sec <sup>2</sup>	lb-inch				mm/sec
lb-ft <sup>2</sup>	oz-inch				ft/min
lb-inch <sup>2</sup>					inch/min
oz-inch <sup>2</sup>					ft/sec
lb-ft-sec <sup>2</sup>					inch/sec
lb-inch-sec <sup>2</sup>					
oz-inch-sec <sup>2</sup>					

When any command is selected, the following window appears (example: for inertia).

Units Conversion Tool(Inertia)	
Conversion Set Data	Conversion Result
÷ kg-cm2 ▼	÷ kg-cm2 ▼
Calculate	ıbstitute 💭 Exit

- 1) Click "Tools" of the menu bar to open the menu.
- 2) Point to the "Units conversion" and click "Inertia".
- 3) Open the Conversion Set Data combo box, choose the unit, and enter the data to be converted into the entry field.
- 4) Open the Conversion Result combo box and select the unit.
- 5) Click the "Calculate" button to start unit conversion.
- 6) By clicking the "Substitute" button, "Please click substituting value destination." is displayed in the message display section. By selecting the machine specifications in which the data is to be substituted, the following window is displayed.



7) If the item in which the data is to be substituted is correct, click the "OK" button. If the unit of the machine specifications does not match the new unit, substitution cannot be made. In this case, the following window is displayed.



- 8) Click the "Exit" button of Unit Conversion Tool (Inertia) to exit.
- (7) Regeneration Option for Multiple Axes Selection

Used to select the regenerative options for the MR-J4W\_, MR-J3W and MR-J2M. After selecting the capacities, select whether or not to use the regenerative options calculated for all axes and the regenerative option model names.

(a) For MR-J2M

Clicking "J2M" from "Regenerative Option for Multiple Axes Selection" of the sub-menu displays the following window.

Select MR-J2M Regeneration Optio	on				X
Configuration Cmp. Axis Src Vltg Cy 8 • 230 V	rcl. t S	Calculate	Select Reg Y/N R	eneration Option gn. Pwr. R W	n gn. Brk. Opt.
Set Each Axis         Motor model           Axis         Motor model           ©         1           C         2           C         3           C         4           C         5           C         6           C         7           C         8	Drive Unit Model	Regen. Eng.	Peak Torque	Cycle Time	Simul. Rgn. Grp.
Edit Load HC-KFS053	MR-J2M-10DU	• 0.000	) 0.0 %	1.000 g	s 1 • Exit

Refer to section 2.3.1 for the operation procedure in "Select MR-J2M Regeneration Option".

1) File



The commands have the following functions.

Command	Description	
	Reads the Motor model name, Drive Unit Model, Regenerative Energy, Peak Torque and	
Looded axis	Cycle Time from the file of the capacity selection result in each axis (***.svm).	
	Can also read the data of the capacity selection file (***.srv) which was output in previous	
	version	
Open	Reads the file saved in Select MR-J2M Regeneration Option (***.mro).	
Save	Saves the data selected in Select MR-J2M Regeneration Option (***.mro).	
Print	Prints the data selected in Select MR-J2M Regeneration Option.	
Exit	Ends Select MR-J2M Regeneration Option. It can also be ended by clicking the "Exit" button.	

### 2) Help

By clicking "Help" on the menu bar, the explanation of the simultaneous regeneration group setting can be browsed.

### 3) Configuration field



The contents of the configuration field are as follows.

Item	Description
Component axis	Select the number of axes.
Source Voltage	Set the voltage (V) of the main circuit power supply.
Cycle Time	Shows the maximum cycle time in a multiple-axis system.

4) Editing field

The "Motor model name", "Drive Unit Model", "Regene. Eng", "Peak Torque", "Cycle Time" and "Simul. Rgn Grp" of each axis can be changed as desired. After selecting the axis number whose values will be changed, set the required items. After making selection and entry, click the "Set" button to determine the value. Click the "Clear" button to erase the set value.

Edit							
Eult							
Load HC-KFS053	MR-J2M-10DU	-	0.000 J	0.0 %	1.000 S	1	-

Item	Description		
Motor model name	Make selection from the motor model name obtained by capacity selection.		
Drive Unit Model	Make selection from the drive unit model name obtained by capacity selection.		
Regenerative Energy	Enter the regenerative energy obtained by capacity selection.		
Peak Torque	Enter the peak torque obtained by capacity selection.		
Cycle Time	Enter the cycle time obtained by capacity selection.		
Simultaneous Regeneration Group	Group the axes on a simultaneous regeneration basis. (1 to 8: Synchronous, No: Asynchronous)		

5) Each axis setting

The values entered in the edit field and the values entered using "Loaded Axis" are displayed. The editing target is the axis selected with the option button.

6) Calculation

After setting the values of all axes, click the "Calculate" button to display the selection results in the Select Regeneration Option field.

	Select Regeneration Option		
	Y/N	Rgn. Pwr.	Rgn. Brk. Opt.
Calculate		W	/

The contents of the Regeneration Option Selection field are as follows.

Item	Description		
Y/N	Shows whether the regenerative option is required or not as a result of calculation. Y: Required N: Not required		
Regenerative Power [W]	Shows the calculation result of the entire regenerative power.		
Regenerative Option	Shows the regenerative option model name to be used.		

Continuous permissible power	Maximum regenerative power	Regenerative option	
OW		Not required	
Less than 30W	Less than 3063W	MR-RB032	
Less than 100W		MR-RB14	
Less than 300W	Less than 4712W	MR-RB34	
Less than 500W		MR-RB54	
500W or more		No applicable one	

#### (b) For MR-J3W

The following window appears when selecting "J3W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and clicking on "Standard".

Select MR-J3W Regeneration Option (Standard) File	
Configuration Cmp. Axis Src Vltg Cycl. t 2 - 230 v S	Select Regeneration Option Y/N Rgn. Pwr. Rgn. Brk. Opt.
Set Each Axis       Axis       Motor model       Amplifier model       Regen. Eng.         Image: A fill and the set of the set	Peak Torque Cycle Time Simul. Rgn. Grp.
Edit Load HF-KP053 V MR-J3W-22B V 0.000 J Clear	0.0 % 1.000 S 1 -

Refer to section 2.3.2 for the operation procedure in "Select MR-J3W Regeneration Option". For other commands and items, refer to section 3.2.2 (7)(a).

# (c) For MR-J3W-0303BN6

The following window appears when selecting "J3W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and clicking on "0303BN6".

Checking Tolerable regenerative power of MR-J3W-0303BN6 File	X
Configuration Pwr. spec. Src Vitg Cycl. t 48V  48V  Calculate	Checking Tolerable regen. pwr. Y/N Rgn. Pwr. Rgn. Brk. Opt.
Set Each Axis Axis Motor model Amplifier model Regen. Eng. A B B C B	Peak Torque Cycle Time Simul. Rgn. Grp.
Edit Load HG-AK0136 V MR-J3W-0303BN6 V 0.000 J	J 0.0 % 1.000 S 1 ▼
Clear	Set Exit

Refer to section 2.3.2 for the operation procedure in "Checking Tolerable regenerative power of MR-J3W-0303BN6".

For other commands and items, refer to section 3.2.2 (7)(a).

#### (d) For MR-J4W\_

The following window appears when selecting "J4W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and clicking on "Standard".

Select MR-J4W Regeneration Option (Standard) File	X
Configuration Cmp. Axis Src Vltg Cycl. t 2 2 240 V S	Select Regeneration Option Y/N Rgn. Pwr. Rgn. Brk. Opt. W
Set Each Axis Axis Motor model Amplifier model Regen. Eng. A B B	Peak Torque Cycle Time Simul. Rgn. Grp.
Edit Load HG-KR053 V MR-J4W2-22B V 0.000	J 0.0 % 1.000 S 1 -
Clear	Set Exit

Refer to section 2.3.3 for the operation procedure in "Select MR-J4W Regeneration Option(Standard)". For other commands and items, refer to section 3.2.2 (7)(a).

### (e) For MR-J4W2-0303B6

The following window appears when selecting "J4W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and clicking on "0303B6".

Checking Tolerable regenerative power of MR-J4W2-0303B6	2
Configuration Pwr. spec. Src Vitg Cycl. t 48V   48V   S	Checking Tolerable regen. pwr. Y/N Rgn. Pwr. Rgn. Brk. Opt.
Set Each Axis Motor model Amplifier model Regen. Eng.	Peak Torque Cycle Time Rgn. Grp.
Edit Load HG-AK0136 V MR-J4W2-0303B6 V 0.000 J	0.0 % 1.000 s 1 •
Clear	Set Exit

Refer to section 2.3.3 for the operation procedure in "Checking Tolerable regenerative power of MR-J4W2-0303B6".

For other commands and items, refer to section 3.2.2 (7)(a).

## (8) Motor Data Tables

Used to display the servo motor specifications as reference data. The following specifications are displayed.

Motor model name	
Applicable Amp Model	
Applicable Drv Unit Model	
Converter unit model name	
Pwr Sup Eq. Cap.	(kVA)
Rated Output	(W)
Rated Torque	(N • m)
Maximum Torque	(N • m)
Rated Speed	(r/min)
Maximum Speed	(r/min)
Permissible instant. spd.	(r/min)
Inertia moment JM	(kg • cm²)
Inertia Moment (with Brake)JMB	(kg • cm²)
Encoder Resolution	(P/rev)
Brake Option	
Reducer Option	
Recommended inertia ratio	(Times)
Mass	(kg)
Mass (with Brake)	(kg)

When "Motor Data Tables" on the sub menu clicked, the following window appears.

Motor Specification List					×	
C Red Gear C Select Moto	r Series HG-KI	२	- Ca Print	Exit		
Motor Specification List						
Motor model name	HG-KR053	HG-KR13	HG-KR23	HG-KR43		
Applicable Amp Model (*1)MR-J4-x	10A(1)/B(1)/GF/TM(1)	10A(1)/B(1)/GF/TM(1)	20A(1)/B(1)/GF/TM(1)	40A(1)/B(1)/GF/TM(1)		
Applicable Amp Model (*1)MR-J4W2-x	22B/44B	22B/44B	22B/44B	44B/77B/1010B		
Applicable Amp Model (*1)MR-J4W3-x	222B/444B	222B/444B	222B/444B	444B		
Pwr Sup Eq. Cap. (w/ (*1)) (kVA) (Note 1	) 0.30	0.30	0.50	0.90		
Rated Output (W)	50	100	200	400		
Rated Torque (N-m)	0.16	0.32	0.64	1.30		
Maximum Torque (N-m)	0.56	1.10	2.20	4.50		
Rated Speed (r/min)	3000	3000	3000	3000		
Maximum Speed (r/min)	6000	6000	6000	6000		
Permissible instant. spd.(r/min)	6900	6900	6900	6900		
Inertia moment JM (kg-cm2)	0.045	0.078	0.221	0.371		
Inertia Moment (with Brake) JMB (kg-cm	2) 0.0472	0.0837	0.243	0.393		
Encoder Resolution (pulses/rev)	4194304	4194304	4194304	4194304		
Brake Option	Exists	Exists	Exists	Exists		
Reducer Option	Exists	Exists	Exists	Exists		
Recommended load to motor inertia rat	io 17times or less	17times or less	26times or less	25times or less		
Mass (kg)	0.34	0.54	0.91	1.40		
Mass (with Brake) (kg)	0.54	0.74	1.30	1.80		
					•	
Note 1: The power supply equipment ca	pacity varies according to the	e power supply imped	ance.		,	

- 1) Click either "Red Gear" or "Select Motor Series" to select the data to be displayed. When "Select Motor Series" has been selected, also select the servo motor series.
- 2) Click the "Print" button to print the window contents.
- 3) Click the "Exit" button to end.

POINT	
<ul> <li>When using</li> </ul>	a MR-J4-03A6, MR-J4W2-0303B6, or MR-J3W-0303BN6 amplifier
supported m	otor, the power capacity[W] is displayed instead of the power supply
capacity[kVA	J.
<ul> <li>"Applicable I</li> </ul>	Drv. Unit Model" and "Converter unit model name" are displayed on

the Motor specification List when using a supported model.
(9) Coupling Data Manufactured by Miki Pulley Co., Ltd

The specifications of coupling manufactured by Miki Pulley Co., Ltd are displayed as reference data. When "Coupling data manufactured by Miki Pulley Co., Ltd" on the sub menu is clicked, the following window appears.

				lotor energification			n manufactured b
Servomotor ated output [kW]	Motor model name	Rated speed [r/min]	Maximum speed [r/min]	Rated torque [Nm]	Maximum torque [Nm]	Shaft diameter [mm]	Single element Type
	HF-KP053		0000				-
0.05	HF-MP053	3000	6000	0.16	0.48	8	SFC-010SA2
	HF-KN053		4500				
	HF-KP13		6000				
0.1	HF-MP13	3000	6000	0.32	0.95	8	SFC-020SA2
	HF-KN13		4500				
	HF-KP23		6000	0.64 1.9			
0.2	HF-MP23	3000	6000		1.9	14	SFC-025SA2
	HF-KN23		4500				
	HF-KP43		6000			14	SFC-030SA2
0.4	HF-MP43	3000	0000	1.3	3.8		
	HF-KN43		4500				
	HF-SP51	1000	1500	4.77	14.3		
	HF-SP52	2000	3000	2 30	7 16	24	SFC-050SA2
0.5	HC-LP52	2000	5000	2.39	7.10		
	HF-JP53	3000	6000	1.50 4.	4.77	16	SEC-035SA2
	HF-JP53 *	5000	0000	1.55	6.37	10	0, 0-0000Az
0.75	HC-UP72	2000	3000	3.58	10.7	22	SFC-050SA2
							÷.

- 1) Click the "Print" button to print the window contents.
- 2) Click the "Exit" button to end.

POINT						
<ul> <li>For 400V motors with capacity 37kW or less, refer to the values of motors</li> </ul>						
correspondir	g to 200V.					
<ul> <li>*:Max. torque</li> </ul>	e is increased. (torque up)					

(10) Maximum Feed Distance of Linear Servo

When the number of linear servo motor secondary side (magnet) is input, the maximum feed distance of linear servo can be calculated.

Click the "Maximum Feed Distance of Linear Servo" and the window as shown below will be displayed.

Maximum Feed Distance Of Linear Servo							
Primary side(coil) of linear servomo	tor						
LM-H3P2A-07P 🔹	128	mm					
Secondary side(magnet) of linear servomotor							
LM-H3S20-288	288	mm		pieces			
LM-H3S20-384	384	mm		pieces			
LM-H3S20-480	480	mm		pieces			
LM-H3S20-768	768	mm		pieces			
Maximum feed distance		mm					
	,		Ó	Exit			

- 1) Select the linear servo motor primary side (coil).
- 2) Input the number of the linear servo motor secondary side (magnet).
- The maximum feed distance of linear servo can be calculated with the combinational input numbers.
- 3) Click the "Exit" button to end.

# **3. OPERATION COMMANDS**

## 3.2.4 Help

When "Help" on the menu bar is clicked, the following menu appears.

🔚 Ball scrw, Hrz.   R	unning   INIDT0.SVM	
<u>F</u> ile <u>U</u> nits <u>T</u> ools	Help	
Setting Data	<u>H</u> elp	
Ball scrw, Hrz.	Version Information	ſ
Pos. ctrl. mode 💌	Calculate C Set Mtr	_

#### (1) Help

Used to display the Help screen. How to use this software, etc. can be browsed.

How to close the Help screen Click the 🗵 on the top right of help for capacity selection software window.

(2) Version Information

Used to display the version of the capacity selection software. Click the "Exit" button to end.

Version Information				
About S MITSUBISHI SERVO CAPACITY SELECTION SOFTWARE Model: MRZJW3-MOTSZ111E Control No. BCD-B32W000 Version:	Servo Capacity Selection Software This product is licensed to Company: Individual:			
COPYRIGHT (C) 2	003 MITSUBISHI ELECTRIC CORPORATION			
This product is protected by a Japanese copyright constitution and an international agreement. Please note becomeing to the violation of the copyright when an or part of this product all is reproduced without permission and is distributed without permission.				

3.3 Entry of Mechanical components data

#### 3.3.1 Application

Used to select the mechanical components. Clicking 🗾 in the Mechanical Components Selection combo box of the Data Setting area displays the following menu.



The following machine components are available.

(1) Ball screw, Horizontal

Ball scrw, Hrz.   Running File Units Tools Help		INIDT0.SVM		
Setting Data				
Ball scrw, Hrz. 💌 Co	oupling [y]+	Ext. Red. Gea	ır [y] 🔽	XVIT.
Pos. ctrl. mode  Calculate C Set Mtr DD Motor			~	WL Fc
Amplifier :	MF	R-J4-A/B		Ext. Reduction Gear
Motor : No Reduction No Brake Optio	HC Gear Optic on	G-KR 3000 r/r on	min	PB
Operation Pattern Pattern Calculate Capacity				JO
Data Setting				Sizing Result
Mass of table	WT	200.000	ka	Motor :
Mass of load	WL	0.000	kg	
Thrustload	Fc	300.000	N	Amplifier :
Outide tightening forces	FG	0.000	N	Regenerative option :
Guide lightening force				
Reduction gear ratio(NL/NM)	1/n	2/5		
Reduction gear ratio(NL/NM) Reduction gear inertia	1/n JG	2/5 0.444	kg-cm2	-
Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia	1/n JG JC	2/5 0.444 0.000	kg-cm2 kg-cm2	Load Inertia :
Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia Inertia of the others	1/n JG JC JO	2/5 0.444 0.000 0.000	kg-cm2 kg-cm2 kg-cm2	Load Inertia : Peak Torque :
Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia Inertia of the others Lead of ball screw	1/n JG JC JO PB	2/5 0.444 0.000 0.000 10.000	kg-cm2 kg-cm2 kg-cm2 mm	Load Inertia : Peak Torque : RMS Torque :
Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia Inertia of the others Lead of ball screw Diameter of ball screw	1/n JG JC JO PB DB	2/5 0.444 0.000 0.000 10.000 20.000	kg-cm2 kg-cm2 kg-cm2 mm mm	Load Inertia : Peak Torque : RMS Torque : Regen. Pwr. :
Reduction gear ratio(NL/NM) Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia Inertia of the others Lead of ball screw Diameter of ball screw Length of ball screw	1/n JG JC JO PB DB LB	2/5 0.444 0.000 10.000 20.000 500.000	kg-cm2 kg-cm2 kg-cm2 mm mm mm	Load Inertia : Peak Torque : RMS Torque : Regen. Pwr. :
Reduction gear ratio(NL/NM) Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia Inertia of the others Lead of ball screw Diameter of ball screw Length of ball screw	1/n JG JC JO PB DB LB eta	2/5 0.444 0.000 10.000 20.000 500.000 0.900	kg-cm2 kg-cm2 kg-cm2 mm mm mm	Load Inertia : Peak Torque : RMS Torque : Regen. Pwr. :
Reduction gear ratio(NL/NM) Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia Inertia of the others Lead of ball screw Diameter of ball screw Length of ball screw Drive efficiency Coefficient of friction	1/n JG JC JO PB DB LB eta mu	2/5 0.444 0.000 10.000 20.000 500.000 0.900 0.100	kg-cm2 kg-cm2 kg-cm2 mm mm mm	Load Inertia : Peak Torque : RMS Torque : Regen. Pwr. : The sizing software calculated the system with theoretical equations and can only be used as a guide to a suitable solution. Independantly ensure the design has sufficient safety margin.

#### (2) Ball screw, Vertical



#### (3) Rack and Pinion

The office roots melp				
Setting Data				
Rack and Pinion 💌 Co	upling [y]+	⊦Ext. Red. Gea	ar [y] 🔻	
Pos. ctrl. mode  Ca	alculate ( [ ME	OSet Mtr	<b>v</b>	Ext. Reduction Gear
Amplifier				Motor
Motor : W/Red. Gear fo With Brake	HC or Gen Ind	G-SR 2000 r/ Mach. 1/17	min	DP Fc
Operation Pos Ctrl Mod	/Dec Incl de Oper. F	in All Sect. of Pattern	Calculate capacity	JO Enter a value of pitch circle diameter as Diameter of pinion DP
Data Setting				Sizing Result
Data Setting Mass of table	WT	1000.000	kg	Sizing Result Motor :
Data Setting Mass of table Mass of load	WT WL	1000.000 80.000	kg kg	Sizing Result Motor :
Data Setting Mass of table Mass of load Thrustload	WT WL Fc	1000.000 80.000 0.000	kg N	Sizing Result Motor : Amplifier :
Data Setting Mass of table Mass of load Thrustload Reduction gear ratio(NL/NM)	WT WL Fc 1/n	1000.000 80.000 0.000 1.0000	kg kg N	Sizing Result Motor : Amplifier : Regenerative option :
Data Setting Mass of table Mass of load Thrustload Reduction gear ratio(NL/NM) Reduction gear inertia	WT WL Fc 1/n JG	1000.000 80.000 0.000 1.0000 0.000	kg kg N kq-cm2	Sizing Result Motor : Amplifier : Regenerative option :
Data Setting Mass of table Mass of load Thrustload Reduction gear ratio(NL/NM) Reduction gear inertia Soupling inertia	WT WL Fc 1/n JG JC	1000.000 80.000 0.000 1.0000 0.000 5.000	kg kg N kg-cm2 kg-cm2	Sizing Result Motor : Amplifier : Regenerative option :
Data Setting Mass of table Mass of load Thrustload Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia Dertia of the others	WT WL Fc 1/n JG JC JO	1000.000 80.000 1.0000 0.000 5.000 0.000	kg kg N kg-cm2 kg-cm2 kg-cm2 kg-cm2	Sizing Result Motor : Amplifier : Regenerative option : Load Inertia :
Data Setting Mass of table Mass of load Thrustload Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia nertia of the others Diameter of pinion	WT WL Fc 1/n JG JC JO DP	1000.000 80.000 1.0000 0.000 5.000 0.000 180.000	kg kg N kg-cm2 kg-cm2 kg-cm2 mm	Sizing Result Motor : Amplifier : Regenerative option : Load Inertia : Peak Torque :
Data Setting Mass of table Mass of load Thrustload Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia nertia of the others Diameter of pinion Width of pinion	WT WL Fc 1/n JG JC JO DP WP	1000.000 80.000 1.0000 5.000 5.000 0.000 180.000 50.000	kg kg N kg-cm2 kg-cm2 kg-cm2 mm mm	Sizing Result Motor : Amplifier : Regenerative option : Load Inertia : Peak Torque : RMS Torque :
Data Setting Mass of table Mass of load Thrustload Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia Inertia of the others Diameter of pinion Width of pinion Drive efficiency	WT WL Fc 1/n JG JC JO DP WP eta	1000.000 80.000 1.0000 5.000 0.000 180.000 180.000 50.000 0.800	kg kg N kg-cm2 kg-cm2 kg-cm2 mm mm	Sizing Result Motor : Amplifier : Regenerative option : Load Inertia : Peak Torque : RMS Torque : Regen. Pwr. :
Data Setting Mass of table Mass of load Thrustload Reduction gear ratio(NL/NM) Reduction gear inertia Coupling inertia Inertia of the others Diameter of pinion Width of pinion Drive efficiency Coefficient of friction	WT WL Fc 1/n JG JC JO DP WP eta mu	1000.000 80.000 1.000 5.000 0.000 180.000 50.000 0.800 0.100	kg kg N kg-cm2 kg-cm2 kg-cm2 mm mm	Sizing Result Motor : Amplifier : Regenerative option : Load Inertia : Peak Torque : RMS Torque : RMS Torque : Regen. Pwr. :
Data Setting Mass of table Mass of load Thrustload Reduction gear ratio(NL/NM) Reducting gear inertia Coupling inertia Inertia of the others Diameter of pinion Width of pinion Drive efficiency Coefficient of friction	WT WL Fc 1/n JG JC JC JO DP WP eta mu	1000.000 80.000 1.000 5.000 5.000 180.000 50.000 0.800 0.100	kg kg N kg-cm2 kg-cm2 kg-cm2 mm mm	Sizing Result         Motor :         Amplifier :         Regenerative option :         Load Inertia :         Peak Torque :         RMS Torque :         Regen. Pwr. :         Image: The sizing software calculated the system with theoretical equations and can only be used as a guide to a suitable solution. Independently ensure the design has suit/ficient safety margin.

#### (4) Roll feed



#### (5) Rotary table

🖥 Rotary table   Rotation Ta	able	INIDT4.SVM			
<u>F</u> ile <u>U</u> nits <u>T</u> ools <u>H</u> elp					
Setting Data					
Rotary table 💌 Co	upling [y]·	+Ext. Red. Gea	ır [y]	•	
Pos. ctrl. mode 🔻 💽 C	alculate	O Set Mtr □ DD Motor		-	
Amplifier : MR-J4-A/B					LS
Motor : HG-SR 2000 r/min No Reduction Gear Option No Brake Option					Ext. Reduction Gear
Operation Pos Ctrl Mo	:/Dec Incl de Oper. I	in All Sect. of Pattern	Calculat capacit	е У	Notor
Data Setting					Sizing Result
Mass of table	WT	2000.000	kg		Motor :
Mass of load	WL	0.000	kg		
Position of load center	LW	0.000	mm		Amplifier :
Inertia of load on table	JU	0.000	kg-cm2		Regenerative option :
Diameter of support part	DH	1800.000	mm		
Diameter of rotary table	DT	2200.000	mm	Ξ	
Diameter of main shaft	DS	60.000	mm		Load Inertia :
Length of main shaft	LS	150.000	mm		Peak Torque :
Reduction gear ratio(NL/NM)	1/n	1/121			RMS Torque :
2 . ,	JG	4.500	ka-cm2		Regen. Pwr. :
Reduction gear inertia			2	_	
Reduction gear inertia Coupling inertia	JC	25.000	ka-cm2		
Reduction gear inertia Coupling inertia Inertia of the others	10 1C	25.000 0.000	kg-cm2 kg-cm2		The sizing software calculated the system with theoretical
Reduction gear inertia Coupling inertia Inertia of the others	JC JO III	25.000 0.000 0.050	kg-cm2 kg-cm2	Ŧ	The sizing software calculated the system with theoretical equations and can only be used as a guide to a suitable solution. Independently ensure the design has sufficient safety margin

# 3. OPERATION COMMANDS

#### (6) Cart



#### (7) Elevator



#### (8) Conveyor



#### (9) Generic



#### (10) Linear Servo



3.3.2 Coupling and external reduction gear selection



Select whether to use the coupling and external reduction gear or not.

Depending on whether they are used or not, the machine structure diagram and data setting items change.

#### 3.3.3 Control mode selection

🗂 Ball scrw, H	Irz.   Running	,   INI	DT0.SVM	
<u>F</u> ile <u>U</u> nits	<u>T</u> ools <u>H</u> elp			
Setting Da	ta			
Ball scrw, H	Irz. 🔻 C	oupling [y]+Ext	Red. Gea	ar [y] 🗨
Pos. ctrl. mo	ode 💌 💿 (	Calculate C S	et Mtr	+
Pos. ctrl. mo	ode		D Motor "	
Spd. ctrl. mo	ode r:	MR-J4	-A/B	
Amplifier				
	Motor :	HG-KF	3000 r/r	min
Motor	No Reduction No Brake Opti	Gear Option on		
Operation Pattern	– Uniform Ac Pos Ctrl M	c/Dec Incl in Al ode Oper. Patte	l Sect. of ern	Calculate capacity

Select the mode used for capacity calculation from the Servo Control Mode combo box.

## 3.3.4 Amplifier selection

Used to select the series of the servo amplifier. Clicking the "Amplifier" button in the Data Setting area displays the following window appears.



#### 3.3.5 Motor selection

## (1) Servo motor series selection

Used to select the series and rated speed of the servo motor. Clicking the "Motor" button in the Data Setting area displays the following window appears.



The servo motor series which cannot be driven by the servo amplifier selected are grayed out and unavailable.

(2) Select Rated Speed - Servo motor option selection After the operation in (1) of this section is performed, the Rated RPM and Motor Options window is displayed automatically.

Rated Speed and Motor Option	×
Rated Speed 3000 r/min	Maximally increased torque
Select Reduction Gear	Select Red. Ratio
Select Brake No Brake Option	Selected motor type
Setting completed	Cancel

In this window, Select Rated Speed, Brake and Reduction Gear.

1) Click 🗾 on the right of Rated Speed to make selection.

	Rated Speed and Motor Option	
	Rated Speed	Maximally increased torque
`	3000 r/min Select Reduction Gear No Reduction Gear Option	Select Red. Ratio
	Select Brake No Brake Option	Selected motor type
	Setting completed	Cancel

2) Click 🗾 on the right of Select Reduction Gear (No Reduction Gear Option, With Reduction Gear for General Industrial Machine, With Precision Reduction Gear) to make selection.



When a reduction gear has been selected as a servo motor option, please select the corresponding reduction gear ratio in the "Reduction Ratio Selection" windows which will be displayed as shown below.

The reduction ratio may only be chosen out of those available for the speed reducer selected in the Motor Option window.

3) Click 🗾 on the right of Select Reduction Ratio to make selection.



4) Selecting the brake. Click 🗾 on the right of Select Brake to make selection.

1

Rated Speed and Motor Option	X
Rated Speed 3000 r/min	Maximally increased torque
Select Reduction Gear W/Precision Red.Gear(Shaft)	Select Red. Ratio
Select Brake No Brake Option No Brake Option With Brake	Selected motor type

5) In order to use the maximally increased torque, click 🗹 of Maximally increased torque to open the combo box, and select "Valid."

Rated Speed and Motor Option	x
Rated Speed	Maximally increased torque
3000 r/min 👻	Invalid
Select Reduction Gear	Invalid Valid
No Reduction Gear Option	
Select Brake	Selected motor type
No Brake Option 👻	<b>v</b>
Setting completed	Cancel

6) If several motors with same torque exist, click 🗾 of the Selected motor type to open a combo box and select a motor to specify the torque.

Rated Speed and Motor Option		×
Rated Speed 200 r/min	Maximally increased torque	
Select Reduction Gear No Reduction Gear Option	Select Red. Ratio	
Select Brake No Brake Option    Setting completed	Selected noto-type. TM-RFM006C20	١

 After all sections are selected, click the "Setting completed" button on the Rated RPM and Motor Option window, and close the window. (3) Cooling method selection (for linear servo)

For the linear servo, the cooling method selection window will be displayed after the operation described in the above section (1).

Select Cooling method		X
Max. speed		
3 m/sec 💌		
Cooling method	Selected motor type	
Self-cooling	•	~
Setting completed	X Cancel	

At this time, select the max. speed, cooling method, and selecting motor model.

1) Click 🔳 at the box showing a max. speed to display the combo box, and then select a servo motors max. speed.

Select Cooling method		
Max. speed		
3 m/sec 🔹		
3 m/sec	Selected motor type	
Self-cooling	<b>▼</b>	~
Setting completed	X Cancel	

2) Click 🗾 at the box showing a cooling method to display the combo box, and then select a cooling method (from Self-cooling or Liquid-cooling).

Select Cooling method		×
Max. speed		
2 m/sec 🔹		
Cooling method	Selected motor type	
Self-cooling	•	-
Self-cooling		
Liquid cooling		
Setting completed	X Cancel	

3) If there are same thrust, resulted from calculating to specify thrust, click 🗾 at the box showing a selected motor model to display the combo box and then select a motor model.

Select Cooling method		X
Max. speed		
3 m/sec 💌		
Cooling method	Selected motor type	
Self-cooling	LM-H3P3B-24P	-
	LM-H3P3B-24P	
	LM-H3P7A-24P	
Setting completed	X Cancel	

4) To close cooling method selection window, click, "Setting completed" button.

When the setting is completed, a servo motor series, a max. speed, and a cooling method in the selected motor series field in setting data are displayed.

# **3. OPERATION COMMANDS**

3.3.6 Entry of machine specifications and execution of selection/calculation

In the Data Setting area, each data on the selected machine component is displayed. Enter data in all items and start selection/calculation.

- Selection of input item Move the focus to the item in the Data Setting area in which data will be entered.
- (2) Display of input unit By moving the focus to the unit area, the units that can be selected is displayed. Choose the unit to be used.
- (3) Data entry

Move the focus to the machine specifications entry area and enter data from the key board.

POINT

• To change the unit of data to be entered, move the focus to the unit field, open the combo box, and select the unit.

## (4) Data setting

Press the "Enter" to set the data. Upon data setting, the corresponding data in the Data Setting area is updated.

# 3.3.7 Operation pattern entry

Click the "Operation Pattern" button to open the Operation Pattern window. The operation pattern differs in setting items between the position control mode and speed control mode.

(1) In the speed control mode

Set the operation pattern by entering the Initial Speed, Last Speed, and Time items. The initial speed of No. 1 is set to "0" and the other initial speeds are set to the values of the previous final speeds automatically.



a) Setting Unit Selection combo box

Select the unit of the speed to be entered.

b) Operation pattern entry area

Enter the final speed and time. Clicking No. displays the Single Line Editing menu ("Insert Line", "Delete Line", "Copy Line", "Paste Line"). Line-by-line editing can be performed after selection of the menu item.

After selecting "Copy Line" all functions besides "Paste Line" are disabled. To enable "Insert Line", "Delete Line" and "Copy Line" again, press the "ESC" key.

c) Load Mass, Load Antidrag Setting check box

For the Ball screw Horizontal, Ball screw Vertical, Rack and Pinion, Rotary table, Cart, Elevator, Conveyor, Generic or Linear servo, check boxes will be displayed. The check boxes are all checked in the initial setting.

d) Clear button

Clicking the "Clear" button clears all data and returns to the initial setting. (However, the check boxes will not be cleared.)

e) Show Graph button

Clicking the "Show Graph" button displays the operation pattern in the graph display area (f)).



- g) Graph Display Unit Selection combo box
   The unit of the vertical axis in the displayed graph can be converted.
- h) Cancel button

Clicking the "Cancel" button discards all the set data and closes the Speed Control Mode Operation Pattern window.

i) Exit from Entry button Clicking the "Exit from Entry" button determines the setting and closes the window.

# (2) In the position control mode

The operation pattern can be determined by entering the items in any of the following three methods.

- Method in which the Feed, Positioning Time, Feed Rate, Acceleration Time, Deceleration Time and Pause time are all entered to determine the operation pattern.
- Method in which the Feed, Positioning Time, and the items of known values are entered to determine the operation pattern.
- Method in which the Feed, Feed Rate, and the items of known values are entered to determine the operation pattern.

In any of the above methods, enter the required items and click the "Calculate pattern" button to determine the operation pattern.

				b)	е	)	a)		f)			
	Positi	on Co	ontrol Mode Op	eration Patt	tern			,	/	X	í l	
	*Re	quire	d Items	/ Lo	w Resp 🔻	Stop. S	Stb. Time	0.043	se	с	c)	
d)	No.	spd. chg	* Feed	*Eitl Pos. Time:t0 [sec]	ner One Feed Rate ⁄/0 mm/min →	Accel. Time:Tsa [sec]	Decel. Time:Tsd [sec]	Pause Time:tst [sec]	Load Mass	Ld. Str		
	1		50.000	0.501	9000.000	0.100	0.150	0.150				
	2		-270.000	1.200	17381.974	0.200	0.250	0.150				
	3		70.000	0.570	10000.000	0.300						
	4		150.000	1.022	12000.000	0.350	0.400	0.170				
	5											
	6											
	8											
	10								<u> </u>			
	lfthe	ir il Patel	ADTEGGE TADEG	li Consistian	i at nation: ntea	r vico tes as	। जनह जनह कर	r satiatat	e than		g)	
	Grap	oh sha	ows the data w	hich includ	es the settling	time.	one, do no	1 3 61 10 1110	ie uiaii	rone.		
	Fee	d Rate	mm/min	~			🤛 Clea	r Ca	lculate p	attern	b)	
k)												
,								st	iow Gr	aph	——— i)	
					j)			Exi	t from E	intry	m)	)
									Canc	el _	I)	
			L					1	Fime [	sec]		

- a) Setting Unit Selection combo box Select the unit of the speed to be entered.
- b) Operation pattern entry area

Enter the feed, positioning time, feed rate, acceleration time, deceleration time, and pause time. Clicking No. displays the Single Line Editing menu ("Insert Line", "Delete Line", "Copy Line", "Paste Line"). Line-by-line editing can be performed after selection of the menu item.

c) Load Mass, Load Antidrag Setting check box

For the Ball screw Horizontal, Ball screw Vertical, Rack and Pinion, Rotary table, Cart, Elevator, Conveyor, Generic or Linear servo, check boxes will be displayed. The check boxes are all checked in the initial setting.

- d) In-Process Speed Change Setting check box When deceleration is not made and it is desired to change the acceleration time, click the "In-Process Speed Change" check box to turn it ON. "Decel. Time" and "Pause Time" of the line turned ON cannot be entered.
- e) Response Level Selection combo box
  - POINT

• Set the servo response level correctly. Otherwise, correct selection and calculation results cannot be obtained.

Set the response level of the servo according to the track ability of the machine. Set "Low Response" when machine track ability is low, or "High Response" when it is high. There are three servo response levels. "Low Response", "Medium Response" and "High Response". Depending on the setting, the position loop gain (Kp) changes. Open the Servo Response Level Selection combo box and select the servo response level.





Selecting the response level opens the following window and displays the settling time (ts) of the servo motor. (The figure shows the case of high response.)

Click the "Confirm" button to close the window.

Selecting "Free Setting" opens the following window. The settling time (ts) can be set as desired.



After setting, click the "Setting completed" button to close the window.

- f) Confirm stop settling time area The set settling time is displayed.
- g) Clear button

Clicking the "Clear" button clears all data.

(Clicking the "Clear" button clears all data and returns to the initial setting. (However, the check boxes of Load Mass and Ld. Str will not be cleared.))

# h) Pattern calculation button

Clicking the "Calculate pattern" button calculates indefinite items to determine the operation pattern.

i) Show Graph button

Clicking the "Show Graph" button displays the operation pattern in the graph display area (j)).



- k) Graph Display Unit Selection combo box
   The unit of the vertical axis in the displayed graph can be converted.
- I) Cancel button

Clicking the "Cancel" button discards all the set data and closes the Position Control Mode Operation Pattern window.

m) Exit from Entry button

Clicking the "Exit from Entry" button determines the setting and closes the window.

- (3) When fixing the acceleration during acceleration/deceleration
   In the position control mode, the acceleration during acceleration/deceleration can be fixed.
  - 1) Clicking the "Uniform Accel./Decel. Inclination in All Intervals of Position Control Mode Operation Pattern" check box displays the acceleration entry area.



2) Enter any acceleration. (Set 400mm/s<sup>2</sup> as an example.)

Operation Pattern	Uniform A	Acc/Dec Incl in All Sect. of	Calcul
	Pos Ctrl N	Mode Oper. Pattern	capac
unon	Acceler	400 (mm/sec2)	<u>/LIOL</u>

ate itv 3) Clicking the "Operation Pattern" button displays the Position Control Mode Operation Pattern window.

Posit	ion C	ontrol Mode Op	eration Patt	ern					X
*Re	equire	ed Items	Lo	w Resp 🔽	Stop. S	tb. Time	0.043	sec	:
No.	spd. chg	* Feed [mm]	*Eith Pos. Time:t0 [sec]	ner One Feed Rate:V0 mm/min 💌	Accel. Time:Tsa [sec]	Decel. Time:Tsd [sec]	Pause Time:tst [sec]	Load Mass	Ld. Str
1		200.000	1.200	12000.000	0.157	0.157	0.800	R	
2									$\overline{\mathbf{v}}$
3									
4									
5									
6									
7									
8									
9									
10									
lf the	ere is	only one type o	foperation	al pattern, plea	se set only	one, do no	t set to mor	re than	one.
Gra	ph sh	ows the data w	hich includ	es the settling	time.				
⊦ee	d Rat	e mm/min	<b>–</b>			5 Clea	ir Cal	culate pa	attern
	2000	0							
	4000				<u>.</u>				anh
	1000	° /							apri
			1					-	
		0					Exit	t from E	ntry
-	1000	0						Canci	el
	2000	0							
	2000	0 0	.5	1 1	1.5	2	2.5 1	ime [s	sec]

4) Delete the value in the "Pos. Time" field and click the "Calculate Pattern" button. This calculates the "Pos. Time", "Accel. Time" and "Decel. Time".

_											_
P	Position Control Mode Operation Pattern										
*Required Items				Lo	w Resp 🔻	Stop. S	Stb. Time	0.043	sec	0	
	No.	spd. chg	* Feed [mm]	*Eith Pos. Time:t0 [sec]	ner One Feed Rate:V0 mm/min ▼	Accel. Time:Tsa [sec]	Decel. Time:Tsd [sec]	Pause Time:tst [sec]	Load Mass	Ld. Str	
	1		200.000	1.543	12000.000	0.500	0.500	0.800			
	2										

5) Clicking the "Exit from Entry" button determines the setting and close the window.

- 3.3.8 Execution of capacity selection (Calculate)
- (1) Capacity calculation
  - Click the "Calculate" option button and click the "Calculate capacity" button to start calculation. On completion of selection/calculation, the following window will appear.



2) Click the "OK" button to continue.

In the Sizing Result area, the types of the servo motor, servo amplifier and regenerative option are displayed as selection results, and the load inertia, peak torque, RMS torque, regenerative power are displayed as calculation results.

Sizing Result					
Motor : HG-MR23 [200 W]					
Amplifier : MR Regenerative option : Reg Side-by-side mounting is j	J4-20A/B eneration nee possible.	dless			
Load Inertia :	1.353	[kg-cm2]	15.6Times		
Peak Torque :	0.669	[N-m]	104.5%		
RMS Torque :	0.296	[N-m]	46.3%		
Regen. Pwr. :	0.000	[W]	0.0%		
The sizing software of equations and can on Independently ensure	alculated the sy ly be used as a the design has	ystem with theored guide to a suitable sufficient safety	tical e solution. margin.		
Show Graph		Show	Calculations		
g)		h	)		

The above window represents the following contents.

- a) The servo motor used is the HG-MR23.
- b) The servo amplifier used is the MR-J4-20A/B, the regenerative option does not use it.
- c) The load inertia at the servo motor shaft of the machine is 1.353 (kg cm<sup>2</sup>) or 15.6 times greater than the servo motor shaft inertia.
- d) The peak torque is 0.669 [N  $\cdot$  m] or 104.5% of the rated servo motor torque.
- e) The required effective torque is 0.296 [N m] or 46.3% of the rated servo motor torque.
- f) The regenerative power generated is 0 [W].
- g) The Show Graph display screen will appear.
- h) The Calculation Process Indication display screen will appear.

#### (2) Show Graph - Show Calculations

The calculation results of capacity selection are displayed in a graphical form. Also, the calculation process is displayed.

(a) Show Graph

Click the "Show Graph" button ((1) 2) g) in this section) to display the calculation result graph as shown below.



Click the "Exit" button to end the window.

(b) Show Calculations

Click the "Show Calculations" button ((1) 2) h) in this section) to browse the calculation process as shown below.

Calculation Process Indication	×
Calculation Item & Formula	
	*
During calculations, the 4th decimal digit is always rounded and displayed. However, the result of the calculation is based on the not rounded value and might differ from the displayed calculation function. Therefore, depending on the condition, the result's difference might be a large. If the calculation result of regenerative power is zero or negative, then "Pr is indicated as '0'. If the calculation result of max regenerative power is zero or negative or 'tmax' is 0, then "Pmax' is indicated as '0'.	ш
1.Feed distance/Motor Rev. dS = PB * 1/n * 1/nm = 10.000 * 2/5 * 1.000 = 4.000 [mm/rev]	
2.Electrical accuracy dL = (dS/Pf) * 1000 = (4.000/4194304) * 1000 = 0.000953674 [micron/pulse]	
3.Motor rotational speed N0 = V0/dS N0_1 = 12000.000/4.000 = 3000.000 [r/min] (Operation Pattern No. 1)	
4.Stop settling time	-
Symbol List Save File	

Click the "Exit" button to end the window.

The following describes "Symbol List" and "Save File" on the Show Calculations screen.

1) Symbol List

Click the "Symbol List" button to display the Symbol List at the bottom of the Show Calculations window. Click it again to undisplay the Symbol List.

	rocess Indication	Calculation Process Indication			
Calculatio	n Item & Formula				
*********	*****	*****			
During calculations, the 4th decimal digit is always rounded and displayed. However, the result of the calculation is based on the not rounded value and might differ from the displayed calculation function. Therefore, depending on the condition, the result's difference might be a large. If the calculation result of regenerative power is zero or negative, then 'Pr' is indicated as '0'. If the calculation result of max regenerative power is zero or negative or tmax' is 0, then 'Pmax' is indicated as '0'.					
1.Feed dist	**************************************	*****			
dS = PB *	1/n * 1/nm				
= 10.000	0 * 2/5 * 1.000				
= 4.000 (nininev)					
Symbol	Description Data	Linit			
Symbol WT	Description Data Mass of table 200 000	Unit ka	-		
Symbol WT WL	Description         Data           Mass of table         200.000           Mass of load         0.000	Unit kg ka			
Symbol WT WL Fc	Description         Data           Mass of table         200.000           Mass of load         0.000           Thrustload         300.000	Unit kg kg N			
Symbol WT WL Fc FG	Description         Data           Mass of table         200.000           Mass of load         0.000           Thrustload         300.000           Guide tightening force         0.000	Unit kg kg N N			
Symbol WT WL Fc FG 1/n	Description         Data           Mass of table         200.000           Mass of load         0.000           Thrustload         300.000           Guide tightening force         0.000           Reduction gear ratio         2/5	Unit kg kg N N			

2) Save File

Click the "Save File" button to display the dialog box for saving a file. Specify a save destination, enter a file name and click the "Save" button to save the text files of "Symbol List" and "Calculations" into the save destination.

🖞 Save As				
🔾 🗸 🖉 🖓 🖉	omputer 🕨 Local Disk (C:) 🕨 🗸 🗸 🗸	Search Local Disk (C:)		
Organize 🔻 Ne	w folder	ii • 🕡		
<ul> <li>Recent Places</li> <li>Libraries</li> <li>Documents</li> <li>Music</li> <li>Pictures</li> <li>Videos</li> <li>Computer</li> </ul>	PerfLogs Program Files Users Windows			
File <u>n</u> ame: Save as <u>t</u> ype:	SVM files (*.SVM)	• •		
Hide Folders		Save Cancel		

If selection cannot be made, the following error window appears. As its cause is displayed in the message display area, reexamine the set values and selection of the data to eliminate the error.



If the load inertia of the machine to the servo motor shaft has exceeded the recommended load inertia ratio as a result of calculation, the following warning window appears. In this case, an error will not occur but the load inertia ratio in the calculation/selection results is displayed in red number. Follow the prompt in the window and reexamine the set values and selection of the data to eliminate the warning.



For MR-J4W\_, MR-J3W and MR-J2M, select the regenerative option in

"Regeneration Option for Multiple Axes Selection" of "Tools".

3.3.9 Starting calculation with capacity specified

Before starting selection/calculation of servo amplifiers but linear servo, the servo motor capacity can be specified. When starting calculation with the servo motor capacity specified, the servo motor and servo amplifier series must be reselected.

1) Click the "Set Mtr" option button.

🚮 Ball scrw, Hrz.   Running	INIDTO.SVM
<u>File Units T</u> ools <u>H</u> elp	
Setting Data	
Ball scrw, Hrz. 💌 Coupling [	/]+Ext. Red. Gear [y] 🛛 💌
Pos. ctrl. mode 💌 🔿 Calculate	⊙ Set Mtr 50 W ▼ DD Motor
Amplifier : M Amplifier	IR-J4-A/B

2) Open the combo box in the Set Motor Size and select the capacity to be specified.

🚮 Ball scrw, Hrz.   R	unning   IN	IDT0.SVM
<u>F</u> ile <u>U</u> nits <u>T</u> ools	<u>H</u> elp	
Setting Data		
Ball scrw, Hrz.	▼ Coupling [y]+E	t. Red. Gear [y] 🛛 💌
Pos. ctrl. mode 💌	○ Calculate ⊙	Set Mtr 50 W ▼
Amplifier	r: MR-J	4-A/B 100 W 200 W 400 W
Motor : No Red	HG-k HG-k uction Gear Option	(R 3000 r/ 750 W (R053 850 W 850 W
No Brak	e Option	1.0 KW 👻

Click the "Operation Pattern" button.
 Refer to section 3.3.7 for the operation pattern operation.

3.3.10 Specifying thrust and executing calculation (linear servo)

Before executing selection and calculation, servo motor thrust can be specified in advance. When calculating with specified thrust, selecting a servo motor series and a servo amplifier series are required once again.

1) Click the option, "Set Force" button.

ቭ Linear servo 🛛 Li	near Servo	INIDT11.SVM	
<u>F</u> ile <u>U</u> nits <u>T</u> ools	<u>H</u> elp		
Setting Data			
Linear servo	•		_
Pos. ctrl. mode 💌	C Calculate	Set Force 50 N DD Motor	•
Amplifier	: N	IR-J4-A/B	

2) Click the button on the right side of the box, and then select a specifying thrust from the combo box in the Calculation Mode Selection area.

着 Linear servo   Linear Servo   INID	T11.SVM
<u>File Units Tools H</u> elp	
Setting Data	
Linear servo 💌	
Pos. ctrl. mode  C Calculate  Set Force DD Motor	50 N -
Amplifier : MR-J4-A/B	60 N 70 N 75 N
Motor :	100 N 120 N 150 N 225 N 🔻

Click, "Operation Pattern" button.
 For the operation of, "Operation Pattern", refer to section 3.3.7.

# REVISIONS

Print Date	*Manual Number	Revision	
Jul. 2003	IB(NA)0300073-A	First edition	
Dec. 2003	IB(NA)0300073-B	Section 1.1 (1)	Servo amplifier MR-J3-A and Servo motor HF-KP are
			added.
		Section 1.2	The descriptions of personal computer and OS are
			modified.
		Section 1.5	Partially modified.
		Section 2.2.2 (7)	The servo amplifier series selection screen is changed.
		Section 2.2.2 (8)(a)	The servo motor series selection screen is changed.
		Section 2.2.2 (11)	The screen is partially changed.
		Section 2.2.2 (13)	The screen is partially changed.
		Section 2.3 (4)	The screen is partially changed.
		Section 3.2.1 (6)(a)	The screen is partially changed.
		Section 3.2.1 (6)(b)	The screen is changed.
		Section 3.2.1 (6)(c)	The screen is changed.
		Section 3.2.1 (6)(d)	The screen is changed.
		Section 3.2.3 (1)(d)	The screen is changed.
		Section 3.2.3 (2)	The screen is changed.
		Section 3.2.3 (4)	POINT is partially changed.
		Section 3.2.3 (8)	The screen is changed.
		Section 3.2.4 (2)	The screen is changed.
		Section 3.3.4	The screen is changed.
		Section 3.3.5	The screen is changed.
		Section 3.3.7 (1)	The screen is partially changed.
		Section 3.3.7 (2)	The screen is partially changed.
		Section 3.3.7 (3)	The screen is partially changed.
Mar. 2004	IB(NA)0300073-C	Section 1.1 (1)	Servo amplifier MR-E-A/AG and Servo motor
			HF-SP, HF-KE and HF-SE are added.
Jul. 2007	IB(NA)0300073-D	Section 1.1	Servo amplifiers MR-J3-A1/A4 MR-J3-B(1)/B4
			MR-J3-B(4)-RJ006 • MR-J3-T(1)/T4 are added. Servo
			motor HA-LP is added. Note 2 and 3 are changed.
		Section 1.2	The description of Pentium is modified, and Note 1 is changed.
		Chapter 2	The descriptions of "shaft" are changed to "axis".
		Section 2.2.2 (7)	The screen is changed, and the sentences are added.
		Section 2.2.2 (8)	The sentences are added.
		Section 2.3 (2)-(4), (7)	The screen is changed.
		Chapter 3	The descriptions of "shaft" are changed to "axis".
		Section 3.1.1 (2)	The screen is changed.
		Section 3.2.1 (6) (d)	The calculation process description is added.
		Section 3.2.3	The screen is changed.
		Section 3.2.3 (1) (g)	The screen is changed.
		Section 3.2.3 (9)	Added.
		Section 3.2.4 (2)	The version is changed.
		Section 3.3.4	The screen is changed.
Jul. 2007	IB(NA)0300073-D	Section 3.3.5	The screen is changed.
		Section 3.3.8	(2) is added.

# \*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number		Revision
May. 2008	IB(NA)0300073-E	Section 1.1	Servo amplifier MR-J3-B-RJ004 and MR-J3-B4-RJ004
			are added.
			Servo motor LM-H2 • LM-F and LM-U2 are added.
		Section 1.2	The system configuration table is changed.
		Section 1.4	Short-cut keys are partially changed.
		Section 1.5	The screen is changed.
			The sentences are partially reviewed.
		Section 2.1	The sentences are partially reviewed.
		Section 2.2.2	The screen is changed.
			The sentences are partially reviewed.
		Section 2.2.3	The item of "Operation (linear servo)" is added.
		Section 2.3	The screen is changed.
		Section 3.1.1	The screen is changed.
		Section 3.1.2	The screen is changed.
		Section 3.2.1	The screen is changed.
			The item of (5) "Save as new project defaults" is deleted.
			The sentences are partially reviewed.
		Section 3.2.3	The screen is changed.
			The item of (10) "Maximum feed distance of linear servo
			amplifier" is added.
		Section 3.2.4	The screen is changed.
		Section 3.3.1	The screen is changed.
			The item of (10) "Linear servo screen" is added.
		Section 3.3.2	The screen is changed.
		Section 3.3.3	The screen is changed.
		Section 3.3.5	The screen is changed.
			The item of (3) "Cooling system selection (linear servo)"
			is added.
		Section 3.3.7	The screen is changed.
			I he sentences are partially reviewed.
		Section 3.3.8	The screen is changed.
		Section 3.3.9	The screen is changed.
		0 // 0.0 /0	The sentences are partially reviewed.
		Section 3.3.10	I he item of "Specifying thrust and executing calculation
<b>F</b> 1 0000			
Feb. 2009	IB(NA)0300073-F	Section 1.1(1)	Servo amplifier MR-J3W-B is added.
		Section 1.1(2)	Note is changed.
		Section 1.5	The screen is changed.
		Section 2.1	POINT is changed.
		Section $2, 2, 2(2)$ (4) (5)	The person is changed.
		(7) (8) (13)(1)	The screen is changed.
		Section 2.2.3(1)	The screen is changed
		Section 2.3	Contents are changed.
		Section 2.3.1	Added
		Section 2.3.2	Added
		Section 3 1 1(2)	The screen is changed
		Section 3.2.1(5)	The screen is changed.
		Section 3.2.1(5)(d)	Body paragraph is partially changed
		Section 3.2.3	The screen is changed.

Print Date	*Manual Number		Revision
Feb. 2009	IB(NA)0300073-F	Section 3.2.3(1)(d)	The screen is changed.
		Section 3.2.3(7)	Contents are changed.
		Section 3.2.3(7)(a)	Added.
		Section 3.2.3(7)(b)	Added.
		Section 3.2.3(8)	The screen is changed.
		Section 3.2.4(2)	The screen is changed.
		Section 3.3.1	The screen is changed.
		Section 3.3.1(1)(2)	The screen is changed.
		Section 3.3.2	The screen is changed.
		Section 3.3.3	The screen is changed.
		Section 3.3.4	The screen is changed.
		Section 3.3.7(3)	The screen is changed.
		Section 3.3.8(2)2)	POINT is changed.
		Section 3.3.9	The screen is changed.
Nov. 2009	IB(NA)0300073-G	Section 1.1(1)	Servo motor series HF-JP is added.
		Section 2.1	The description in the procedure 7 is changed.
		Section 2.2.2(8)(b)	The screen is changed.
		Section 3.2.1(3)	A method to read a file is added.
		Section 3.2.1(5)(d)	Calculation Process is partially changed.
		Section 3.2.3(1)(c)	The screen is changed.
		Section 3.3.5(2)	The screen is changed.
		Section 3.3.8	The screen is changed.
May. 2010	IB(NA)0300073-H	MR-JN, MR-J3-□B-RJ080	W, MR-ES, and MR-E servo amplifiers are added.
		HF-KN, HF-KNJ, HF-SNJ,	HF-KE, and HF-SE servo motors and TM-RFM direct-drive
		motor are added.	
		Section 1.1	The table is changed.
		Section 1.5	The figure is changed.
			A sentence is added to m).
		Section 2.1	Descriptions are changed in 2 and 3 of the procedure 4.
		Section 2.2.2(2)1)	The screen is changed.
		Section 2.2.2(5)1)	The screen is changed.
		Section 2.2.2(7)1)	The screen is changed.
		Section 2.2.2(8)(a)1)	The screen is changed.
		Section 2.2.2(14)2)	The screen is changed.
		Section 2.2.2(15)2)	The screen is changed.
		Section 3.2.3(8)	The screen is changed.
		Section 3.2.4	The screen is changed.
		Section 3.3.1	The screen is changed.
		Section 3.3.1(1) to (10)	The screen is changed.
		Section 3.3.3	The screen is changed.
		Section 3.3.4	The screen is changed.
		Section 3.3.5(2)2)	The screen is changed.
		Section 3.3.5(2)6)	The sentences are changed, and screens are added.
		Section 3.3.5(2)7)	Added.
		Section 3.3.5(3)3)	The screen is changed.
		Section 3.3.7(3)1)	The screen is changed.
		Section 3.3.9 1)	The screen is changed.
		Section 3.3.9 2)	The screen is changed.
		Section 3.3.10 1)	The screen is changed.
		Section 3.3.10 2)	The screen is changed.

Print Date	*Manual Number		Revision	
Mar. 2011	IB(NA)0300073-J	MR-JN-A1 servo amplifier is added.		
		LM-K2 servo motor is added.		
		For MR-J3W-B, servo mot	ors HF-JP and TM-RFM are newly compatible.	
		Section 1.1	The table is partially changed.	
		Section 1.2	The descriptions of personal computer and OS are	
			modified.	
		Section 2.2.2(11)1)	The screen is changed.	
		Section 2.2.2(11)7)	The screen is changed.	
		Section 2.2.3(2)(a)1)	The screen is changed.	
		Section 3.2.3(8)	The screen is changed.	
		Section 3.3.4	The screen is changed.	
		Section 3.3.7(1)	The screen is changed.	
		Section 3.3.7(2)	The screen is changed.	
		Section 3.3.7(3)3)	The screen is changed.	
Mar. 2012	IB(NA)0300073-K	MR-J4A/B, MR-J4W2-B, M	/IR-J4W3-B servo amplifier is added.	
		HG-KR, HG-MR, HG-SR a	and LM-H3 servo motor is added.	
		Section 1.1(2)	Note is changed	
		Section 1.2	The sentences are partially reviewed.	
		Section 1.5	The screen is changed.	
			The sentences are partially reviewed.	
		Section 2.1	POINT is changed.	
			The sentences are partially reviewed.	
		Section 2.2.2(7)1)	The screen is changed.	
		Section 2.2.2(8)(a)1)	The screen is changed.	
		Section 2.2.3(1)1)	The screen is changed.	
		Section 2.2.3(2)(a)1)	The screen is changed.	
		Section 2.3	The sentences are partially reviewed.	
		Section 2.3.1	The sentences are partially reviewed.	
		Section 2.3.1(1)2)	The screen is changed.	
		Section 2.3.1(3)2)	The sentences are partially reviewed.	
			The screen is changed.	
		Section 2.3.1(3)3)	The sentences are partially reviewed.	
		Section 2.3.1(4)	The screen is changed.	
		Section 2.3.1(6)	The sentences are partially reviewed.	
		Section 2.3.2(1)2)	The screen is changed.	
		Section 2.3.3	Added.	
		Section 3.2.1(5)(d)	The sentences are partially reviewed.	
			The screen is changed.	
		Section 3.2.3(7)(a)	The screen is changed.	
		Section 3.2.3(7)(a)1)	I he sentences are partially reviewed.	
		Section 3.2.3(7)(a)3)	I he sentences are partially reviewed.	
		Section 3.2.3(7)(a)4)	i ne screen is changed.	
		Section 2.2. $2(7)/(h)$	The sentences are partially reviewed.	
		Section 3.2.3(7)(D)	rne screen is changed.	
		Section 3.2.3( $T$ )(C)	Auuto.	
		Section 3.2.3(8)	The screen is changed.	
		Section $2,2,2(0)$	i ne sentences are partially reviewed.	
		Section 3.2.3(9)	I ne screen is changed.	
			I ne sentences are partially reviewed.	

Print Date	*Manual Number		Revision
Mar. 2012	IB(NA)0300073-K	Section 3.2.3(10)	The sentences are partially reviewed.
		Section 3.3.1	The screen is changed.
		Section 3.3.1(1)	The screen is changed.
		Section 3.3.1(2)	The screen is changed.
		Section 3.3.1(3)	The screen is changed.
		Section 3.3.1(4)	The screen is changed.
		Section 3.3.1(5)	The screen is changed.
		Section 3.3.1(6)	The screen is changed.
		Section 3.3.1(7)	The screen is changed.
		Section 3.3.1(8)	The screen is changed.
		Section 3.3.1(9)	The screen is changed.
		Section 3.3.1(10)	The screen is changed.
		Section 3.3.4	The screen is changed.
		Section 3.3.5(1)	The screen is changed.
		Section 3.3.7(1)b)	The sentences are partially reviewed.
		Section 3.3.8(2)(b)	The screen is changed.
		Section 3.3.8(2)(b)1)	The screen is changed.
		Section 3.3.8(2)(b)2)	The screen is changed.
			POINT is changed.
Dec. 2012	IB(NA)0300073-L	MR-J4-A4/B4, MR-JE-A, M	R-J3W-0303BN6 servo amplifier is added.
		HG-JR, HG-AK servo moto	r is added.
		Section 1.1(1)	Unite the columns of MR-J4-A and of MR-J4-B to one
			column.
			Note is changed.
		Section 1.1(2)	Note is changed.
		Section 1.5	The screen is changed.
			I he sentences are partially reviewed.
		Section 2.1	POINT is changed.
		$O_{2}$	The sentences are partially reviewed.
		Section 2.2.2(7)1)	The screen is changed.
		Section 2.2.2(8)(a)1)	The screen is changed.
		Section 2.2.2(11)7)	The screen is changed.
		3601011 2.2.2(12)	The sentences are partially reviewed
		Section 2.2.2(13)(1)	The screen is changed
		Section 2.2.2(13)+) Section 2.2.3(1)1)	The screen is changed.
		Section 2.2.3(2)(a)1)	The screen is changed.
		Section 2.3	The conteneous are partially reviewed
		Section 2.3 1(1)2)	The screen is changed
		Section 2.3.2	The Section name changed
			The sentences are partially reviewed
		Section 2.3.2(1)	The screen is changed
			The sentences are partially reviewed
		Section 2.3.2(2)	Added
		Section 2.3.3	The Section name changed
			The sentences are partially reviewed.
			POINT is changed.
		Section 2.3.3(1)	The screen is changed.
		Section 2.3.3(2)	The screen is changed.
		Section 3.2.1(5)(a)	Printout is changed.
		Section 3.2.1(5)(b)	Printout is changed.
		Section 3.2.1(5)(d)	The sentences are partially reviewed.
			Printout is changed.
		Section 3.2.3(7)	The sentences are partially reviewed.

Print Date	*Manual Number		Revision
Dec. 2012	IB(NA)0300073-L	Section 3.2.3(7)(b)	The sentences are partially reviewed.
			The screen is changed.
		Section 3.2.3(7)(c)	Added. (The contents of (c) written in former manual is
			moved to (d) and new contents is written in (c).)
		Section 3.2.3(8)	The sentences are partially reviewed.
			The screen is changed.
			POINT is added.
		Section 3.3.1	The screen is changed.
		Section 3.3.4	The screen is changed.
		Section 3.3.5(1)	The screen is changed.
		Section 3.3.8(1)2)	The screen is changed.
		Section 3.3.8(2)	POINT is changed.
		Section 3.3.9 2)	The screen is changed.
		Section 3.3.10 2)	The screen is changed.
Apr. 2013	IB(NA)0300073-M	HG-UR, HG-RR servo mo	tor is added.
		MR-J4-A4/B4 amplifier sup	oports HG-SR motor.
		MR-J4W2-B amplifier supp	borts HG-JR motor.
		Section 1.1(1)	Note is changed.
		Section 2.2.2(8)(a)1)	The screen is changed.
		Section 2.2.2(12)	The screen is changed.
			POINT is added.
		Section 2.2.2(13)4)	Printout is changed.
		Section 2.2.2(14)3)	The sentences are partially reviewed.
			The screen is changed.
		Section 2.2.3(1)1)	The screen is changed.
		Section 3.2.1(5)(a)	Printout is changed.
		Section 3.2.1(5)(b)	Printout is changed.
		Section 3.3.1(3)	The screen is changed.
		Section 3.3.4	The screen is changed.
		Section 3.3.5(1)	The screen is changed.
		Section 3.3.7(3)3)	The sentences are partially reviewed.
Apr. 2014	IB(NA)0300073-N	MR-J4-A1/B1 servo amplifier is added.	
		HG-KN(J), HG-SN(J) servo motors are added.	
		Section 1.2.1	Addition of Windows <sup>®</sup> 8.
			Note is changed.
		Section 2.2.2(1)	The sentences are partially reviewed.
		Section 2.2.2(2)1)	The screen is changed.
		Section 2.2.2(3)2)	The screen is changed.
		Section 2.2.2(4)1)	The screen is changed.
		Section 2.2.2(5)1)	The screen is changed.
		Section 2.2.2(7)1)	The screen is changed.
		Section 2.2.2(7)2)	The sentences are partially reviewed.
		Section 2.2.2(8)(a)1)	The screen is changed.
		Section 2.2.3	The sentences are partially reviewed.
		Section 3.2.1(5)(a)	Printout is changed.
		Section 3.2.2(8)	The screen is changed.
		Section 3.3.4	The screen is changed.
		Section 3.3.8(1)2)	The sentences are partially reviewed.
		Section 3.3.8(2)(b)	The screen is changed.

Print Date	*Manual Number		Revision
Mar.2017	IB(NA)0300073-T	Section 1.1(1)	TM-RG2M and TM-RU2M direct-drive motors are added.
			Servo amplifiers MR-JE-BF and MR-JE-C are added.
		Section 1.2	Add Windows® 10 to supported OS.
		Section 3.2.2	The sentences are partially reviewed.

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