MITSUBISHI ELECTRIC

General-Purpose AC Servo

MITSUBISHI SERVO AMPLIFIERS & MOTORS
MELSERVO

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.

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● 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".

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

1.1 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 motor series	Servo amplifier 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	○	○		○		
HC-MFS	○	○		○		
HC-SFS	○		○			
HC-RFS	○					
HC-UFS	○	○		○		
HC-LFS	○					
HA-LFS	(Note) ○		○			
HF-KN(J)					○	
HF-SN(J)					○	
HF-KE						○
HF-SE						○

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

Servo motor series	Servo amplifier 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							○			
HF-KN									○	○
HF-KP	○	○				○			(Note 3) ○	(Note 3) ○
HF-MP	○	○				○				
HF-SP	○		○			○				
HA-LP	(Note 1) ○		(Note 2) ○							
HC-UP	○					○				
HC-RP	○									
HC-LP	○					○				
HF-JP	○		○			○				
LM-H2				○		○				
LM-F				○	○					
LM-K2				○		○				
LM-U2				○		○				
TM-RFM						○		○		

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.

Servo motor series	Servo amplifier series							
	MR-J4-A MR-J4-B MR-J4-TM	MR-J4-GF	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	○	○	○			○	○	
HG-MR	○	○	○			○	○	
HG-SR	○	○		○		○		
HG-UR	○	○				○		
HG-RR	○	○						
HG-JR	○	○		○		○		
TM-RG2M	○		○			○	○	
TM-RU2M	○		○			○	○	
HG-AK					○			○
LM-H3	○	○	○			○	○	
LM-F	○	○		○				
LM-K2	○	○	○			○	○	
LM-U2	○	○	○			○	○	
TM-RFM	○	○	○			○	○	

Servo motor series	Servo amplifier series		
	MR-JE-A	MR-JE-B MR-JE-BF MR-JE-C	MR-JE-AS
HG-KN(J)	○	○	
HG-SN(J)	○	○	
HJ-KS(J)			○
HJ-FS(J)			○
HF-KN(J)	○		
HF-SN(J)	○		

(2) Specifications List

Item		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
Result output	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
	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)	Microsoft® Windows® 10 Education Operating System Microsoft® Windows® 10 Enterprise Operating System Microsoft® Windows® 10 Pro Operating System Microsoft® Windows® 10 Home Operating System Microsoft® Windows® 8.1 Enterprise Operating System Microsoft® Windows® 8.1 Pro Operating System Microsoft® Windows® 8.1 Operating System Microsoft® Windows® 8 Enterprise Operating System Microsoft® Windows® 8 Pro Operating System Microsoft® Windows® 8 Operating System Microsoft® Windows® 7 Enterprise Operating System Microsoft® Windows® 7 Ultimate Operating System Microsoft® Windows® 7 Professional Operating System Microsoft® Windows® 7 Home Premium Operating System Microsoft® Windows® 7 Starter Operating System Microsoft® Windows Vista® Enterprise Operating System Microsoft® Windows Vista® Ultimate Operating System Microsoft® Windows Vista® Business Operating System Microsoft® Windows Vista® Home Premium Operating System Microsoft® Windows Vista® Home Basic Operating System Microsoft® Windows® XP Professional Operating System Microsoft® Windows® XP Home Edition Operating System Microsoft® Windows® 2000 Professional Operating System Microsoft® Windows® Millennium Edition Operating System Microsoft® Windows® 98 Second Edition Operating System Microsoft® Windows® 98 Operating System
	Processor	Pentium® 133MHz or more (Windows® 98, Windows® 2000) Pentium® 150MHz or more (Windows® Millennium Edition) Pentium® 300MHz or more (Windows® XP) 32-bit (x86) processor of 1GHz or more (Windows Vista®) 32-bit (x86) or 64-bit (x64) processor of 1GHz or more (Windows® 7 or later)
	Memory	24MB or more (Windows® 98) 32MB or more (Windows® Millennium Edition, Windows® 2000) 128MB or more (Windows® XP) 1GB or more (Windows Vista® 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.

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Pentium is the registered trademarks of Intel Corporation.

2. On some personal computers, this software may not run properly.
3. 64-bit Windows® XP, 64-bit Windows Vista® are not supported.
4. If Microsoft® Windows® 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® 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® or later is used, log in as a user having User authority or higher.

1.3 Basic terms

1) 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.

8) List box
   Box used to select one of several items.

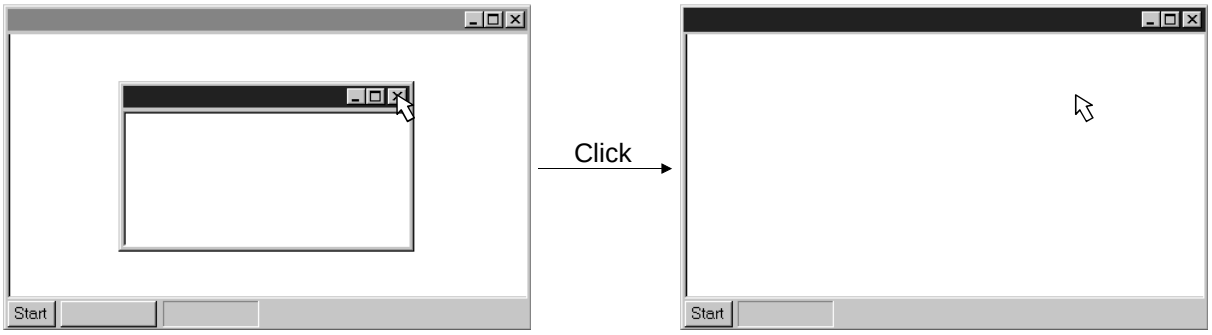
9) Combo box
   Box used to select one of several items.

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

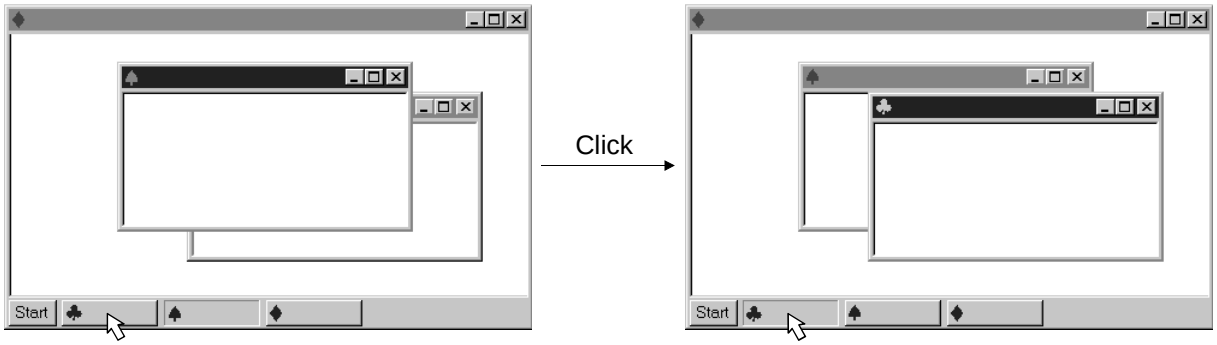
11) Option button
    Button used to select only one of several items. When a choice is changed moves to a new choice.

1.4 Basic operations

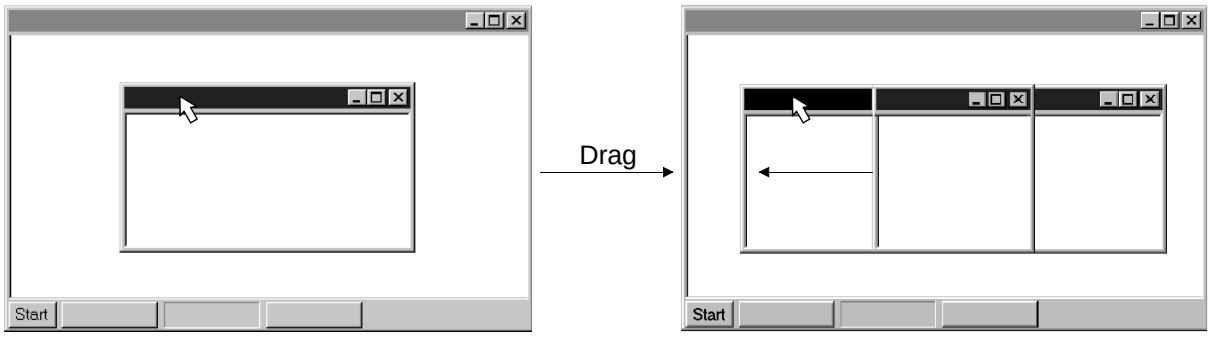
(1) Closing the window
Click the closing bottom at top right corner of the window.



(2) Moving the focus from one window to another
Click the button of the task bar corresponding to the window to be used.

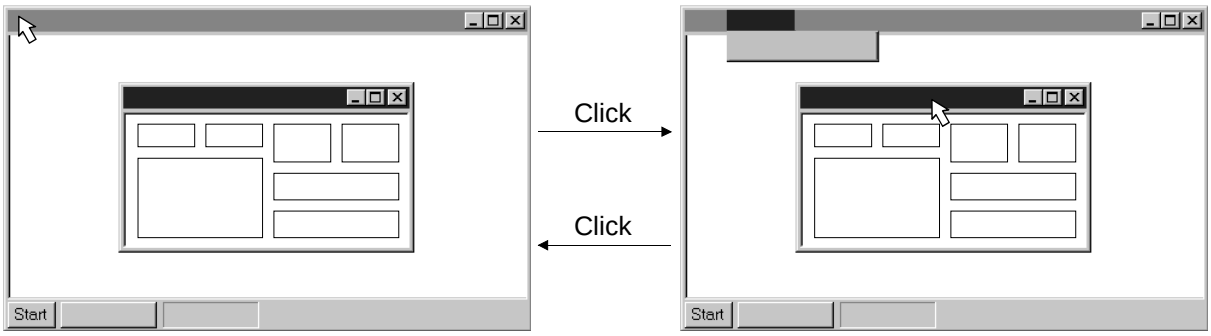


(3) Moving the window
Point to the title bar, drag the window to the required position, and release the button.



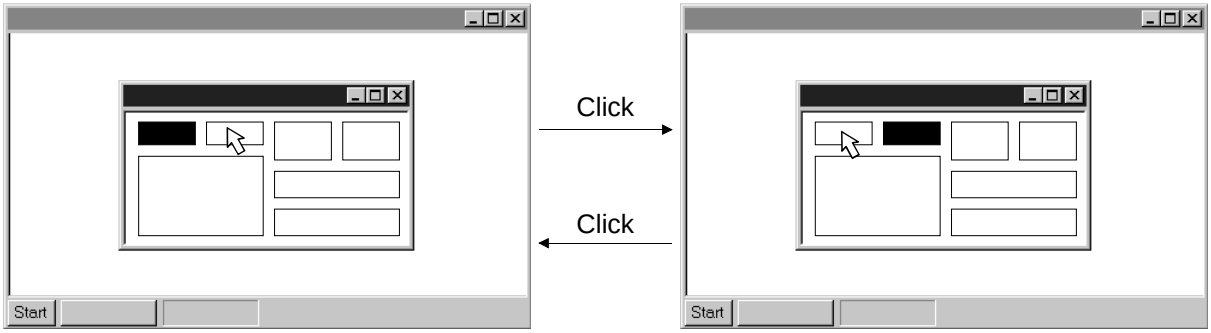
(4) Moving the focus to the menu bar

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.

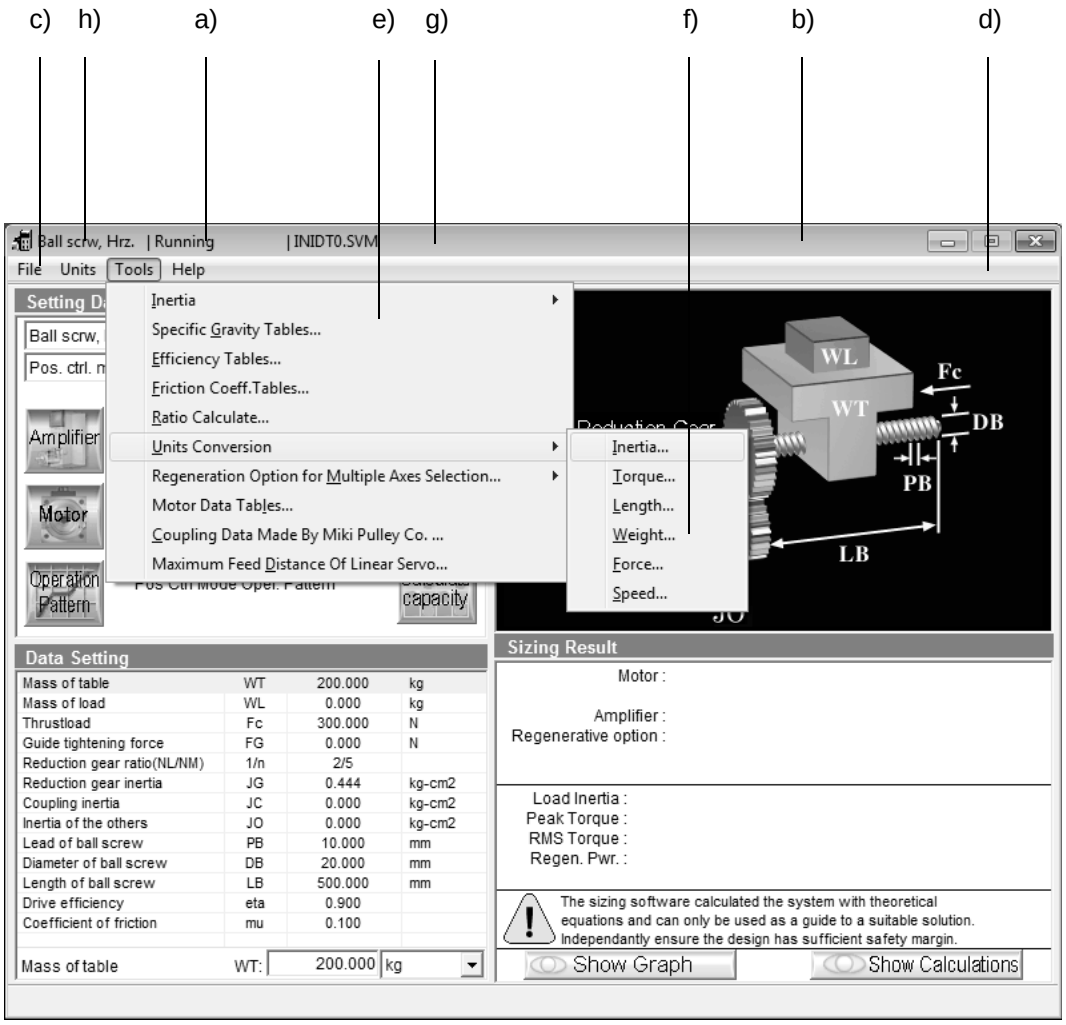


<Short-cut keys>

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



a) Title
Shows the title which has been set.

b) Title bar

c) Menu title

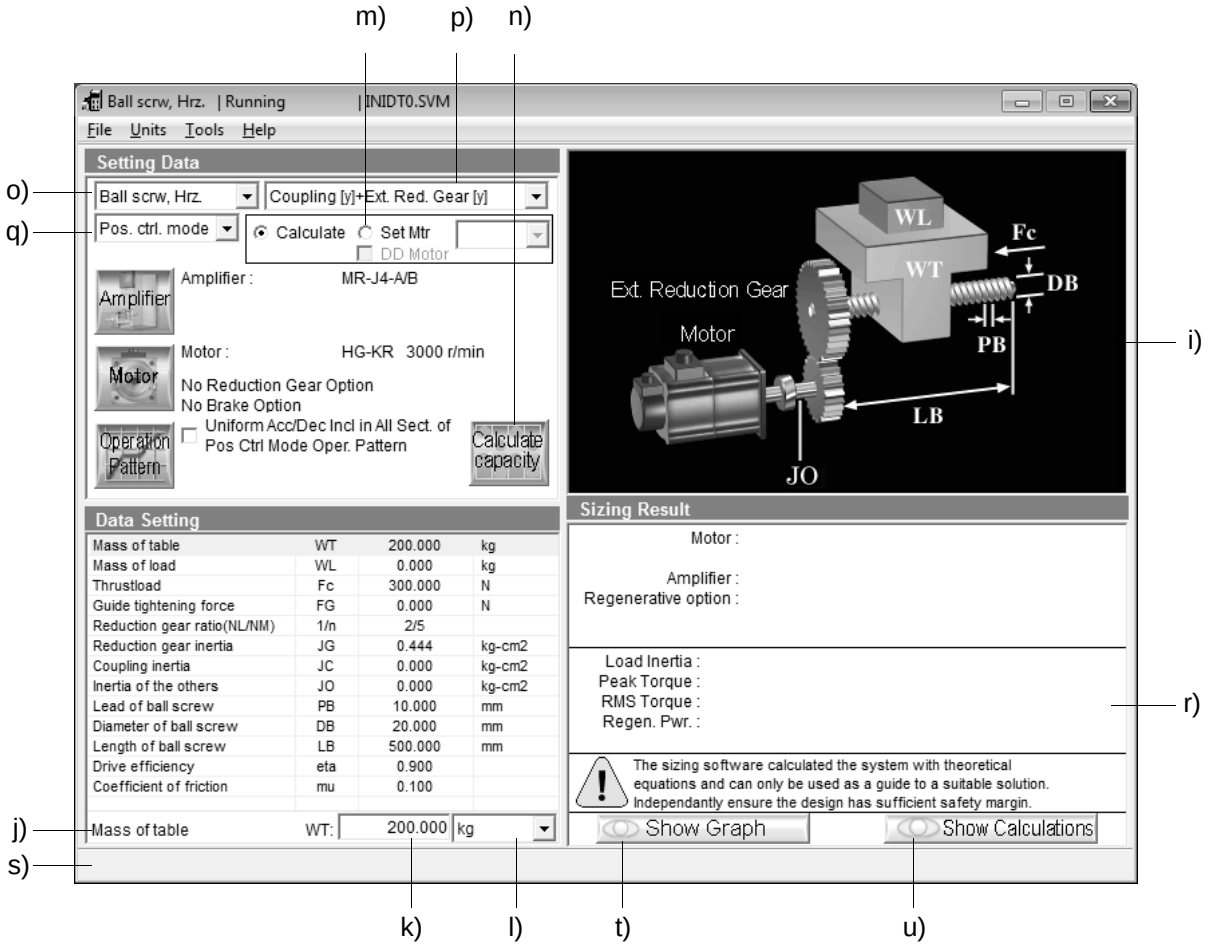
d) Menu bar
Shows the menu title.

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.



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.

l) 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.

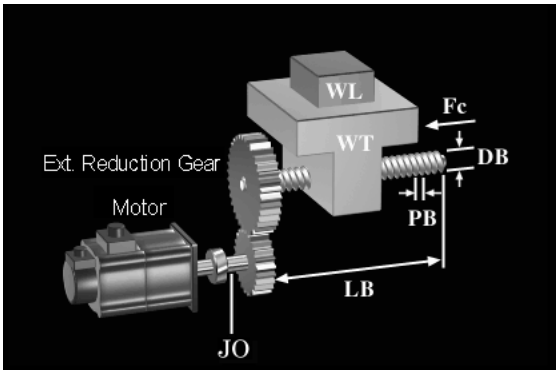
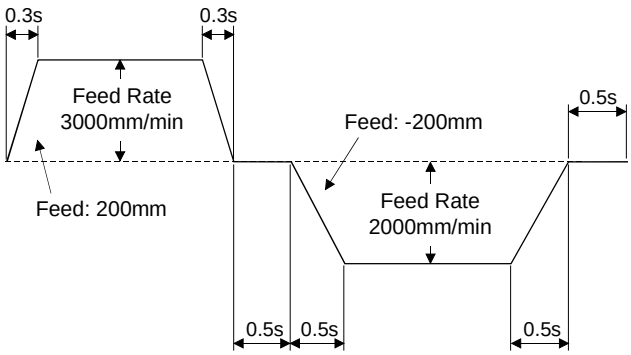
> POINT
>
> - For MR-J4W_, MR-J3W, and MR-J2M, select the servo amplifier (drive unit) and servo motor on an axis-by-axis basis, and after making a selection for all axes, select the regenerative options with "Regenerative Option for Multiple Axes Selection" command of "Tools".

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	Select "Calculate" or "Set Mtr ("Set Force" for linear servo)". 1. Calculate 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. 2. Set Mtr Calculation is made to specify the servo motor capacity. For a direct-drive motor, check "DD Motor" to specify the torque. 3. Set Force (Linear servo motor) 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			
Mechanical Components	Ball screw, Hrz 			
Machine specifications	Mass of table	W_T:	250.000	kg
	Mass of load	W_L:	20.00	kg
	Thrust load	F_C:	350.000	N
	Guide tightening force	F_G:	1.000	N
	External Reduction gear ratio (NL/NM)	1/n:	1/3	
	External Reduction gear inertia	J_G:	0.700	kg · cm^2
	Coupling inertia	J_C:	0.400	kg · cm^2
	Inertia of the others	J_O:	0.500	kg · cm^2
	Lead of ball screw	P_B:	10.000	mm
	Diameter of ball screw	D_B:	10.000	mm
	Length of ball screw	L_B:	600.000	mm
	Drive efficiency	η:	0.900	
	Coefficient of friction	μ:	0.100	
Operation pattern				
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 precision applications, flange mounting: G7 (1/5) No brake option			
Data file	test1. svm			
Title name	test 1			

2.2.2 Operation

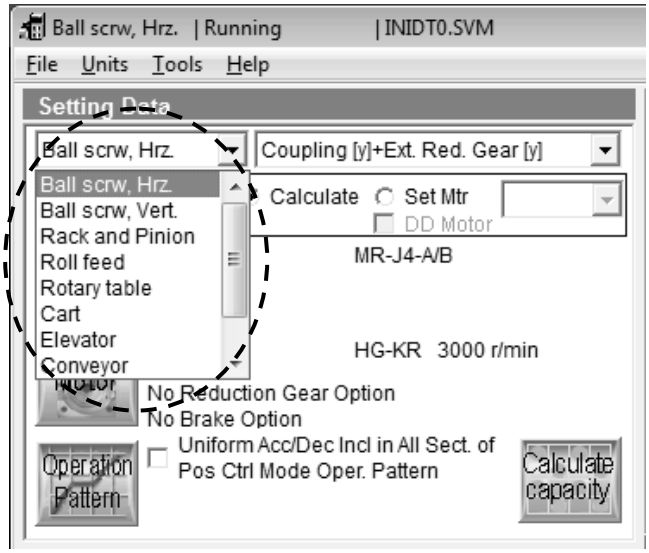
Here, capacity selection is selected based on the machine specifications of section 2.2.1.
For the other operation procedures, refer to sections 1.4 and 3.2.

(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.

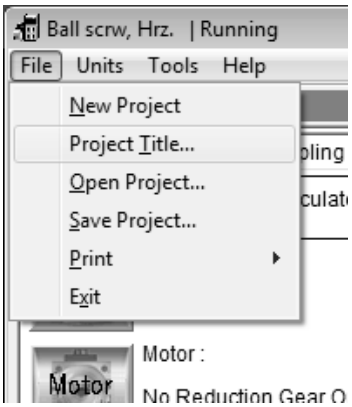


2) Click "Ball scrw, Hrz".

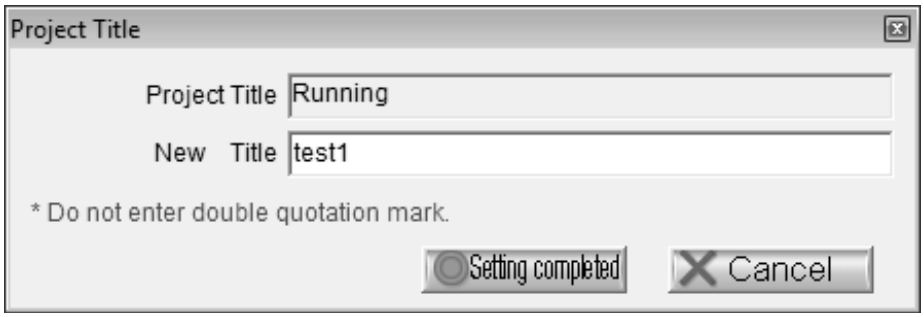
(3) Title

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

2) Click "Project Title".



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

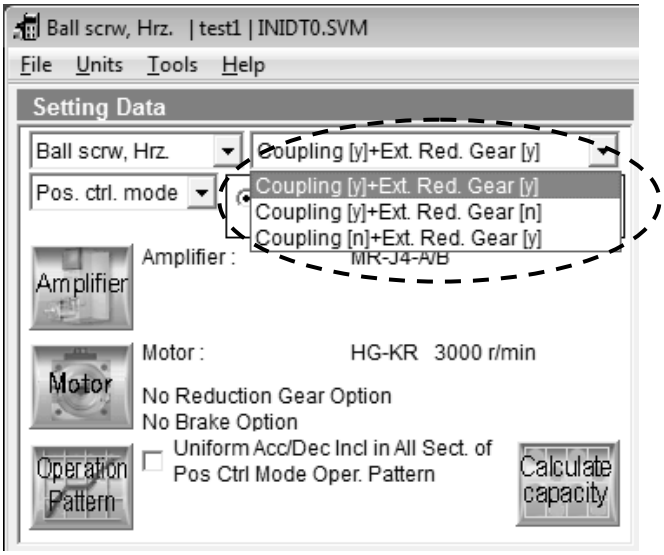


3) Enter "test1" in the New Title filed.

4) Click the "Setting completed" button.

(4) Select Coupling and External Reduction Gear selection

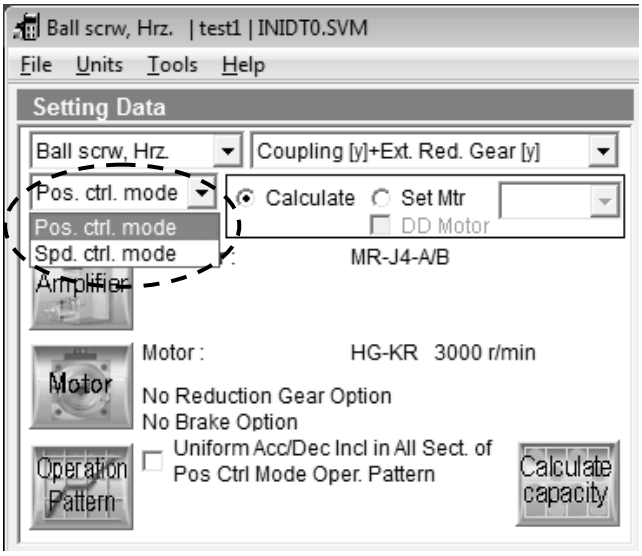
1) Click ▼ in the Select Coupling and External Reduction Gear combo box inside the Setting Data area to open the menu.



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.



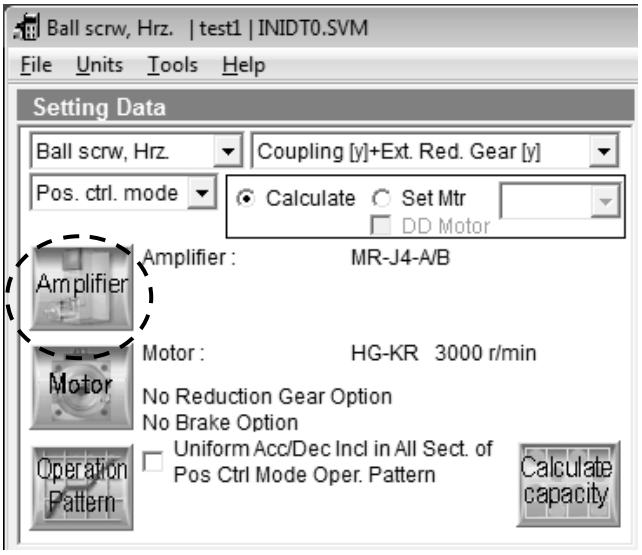
2) Click "Pos. ctrl. mode".

(6) Calculation mode selection

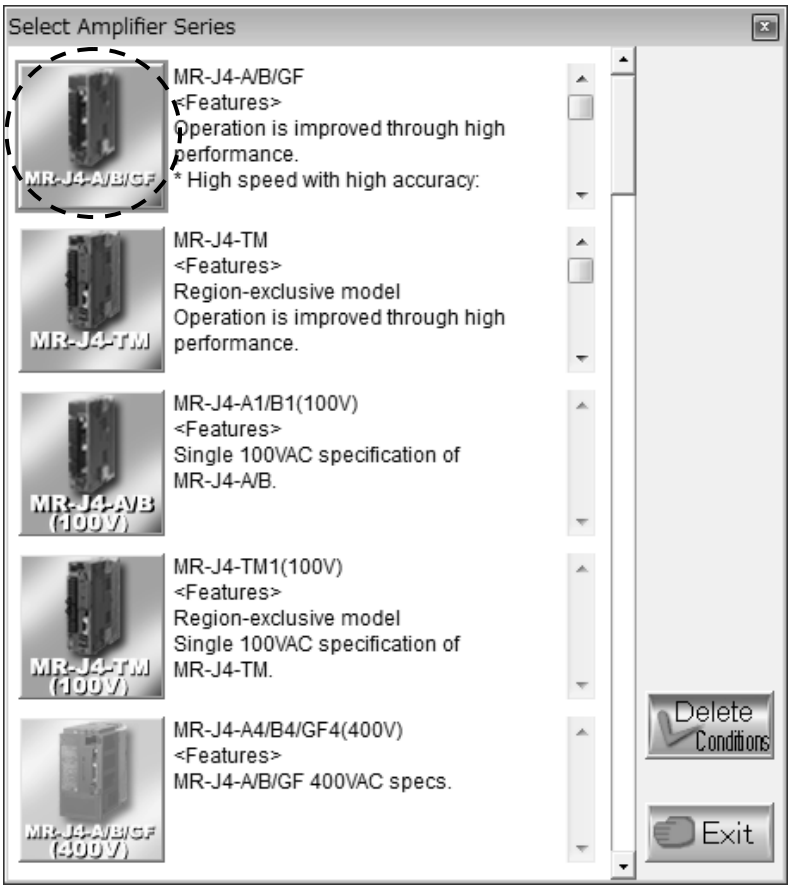
Click the "Calculate" ◉ in the Calculation Mode Selection area to select the automatic calculation mode.

(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.



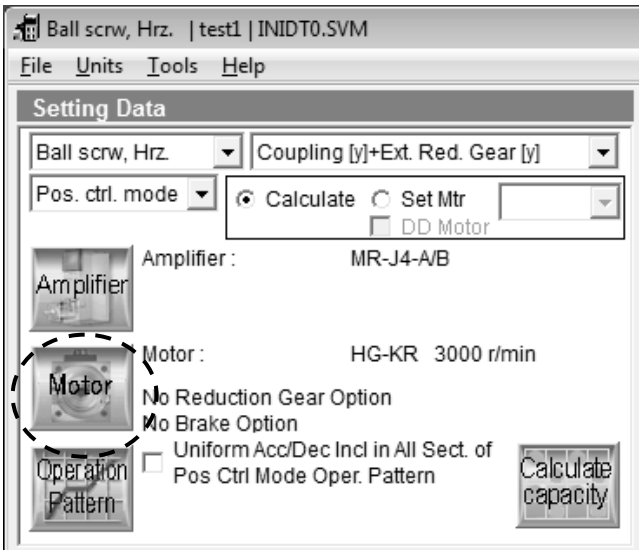
2) Click "MR-J4-A/B/GF" button.

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.

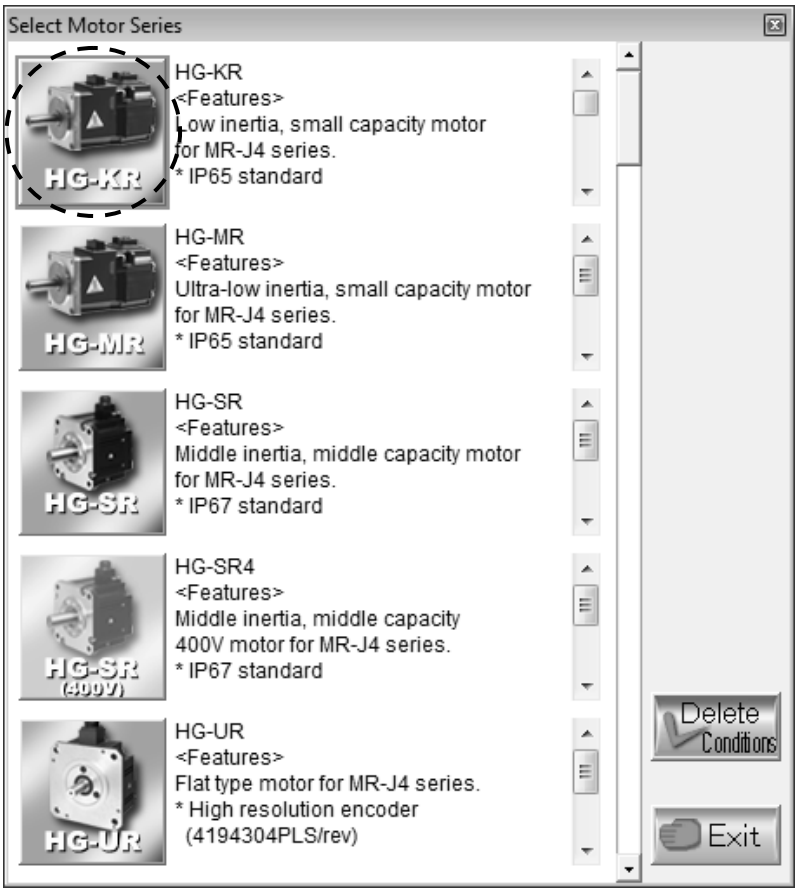
(8) Servo motor selection

(a) Servo motor series selection

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

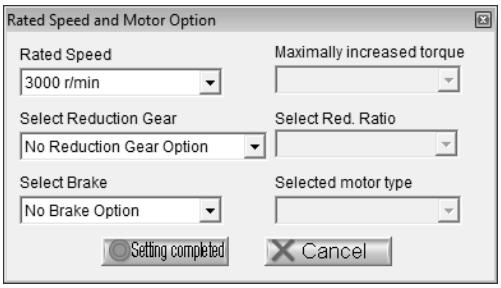


When "Motor" is clicked, the following window appears.



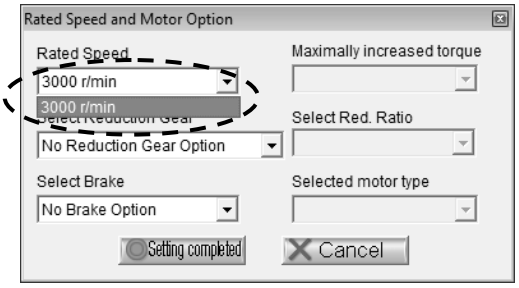
2) Click "HG-KR" button.
To change the set servo motor series, click the "Delete Conditions" button.
When the "Delete Conditions" button is clicked, the set amplifier series and motor series are cleared. Therefore, reset their series.

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

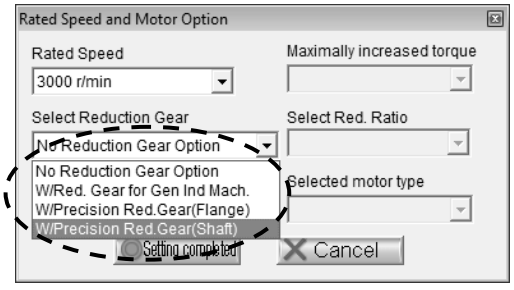


In this window, select the rated speed, brake and reduction gear.

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.)

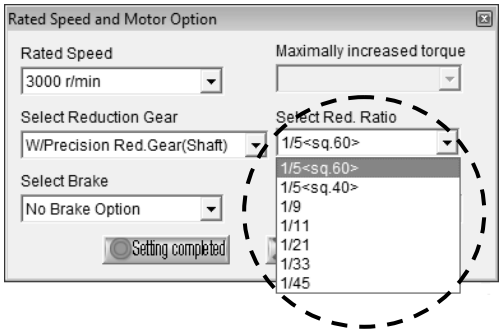


2) Selecting the reduction gear. Clicking ▼ in the Select Reduction Gear combo box open the following menu.



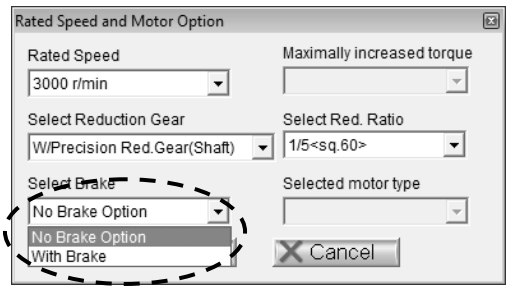
3) Click "W/Precision Red. Gear(Shaft)" from the menu.

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.



7) Click "No Brake Option" from the menu.

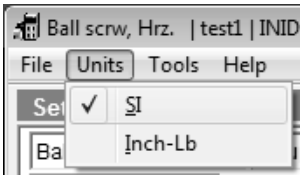
8) Click the "Setting completed" button to close the Rated RPM and Motor Option window.

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".



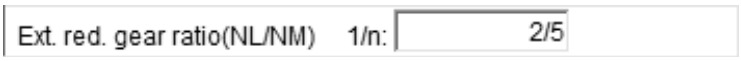
(10) Machine specifications entry

(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

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



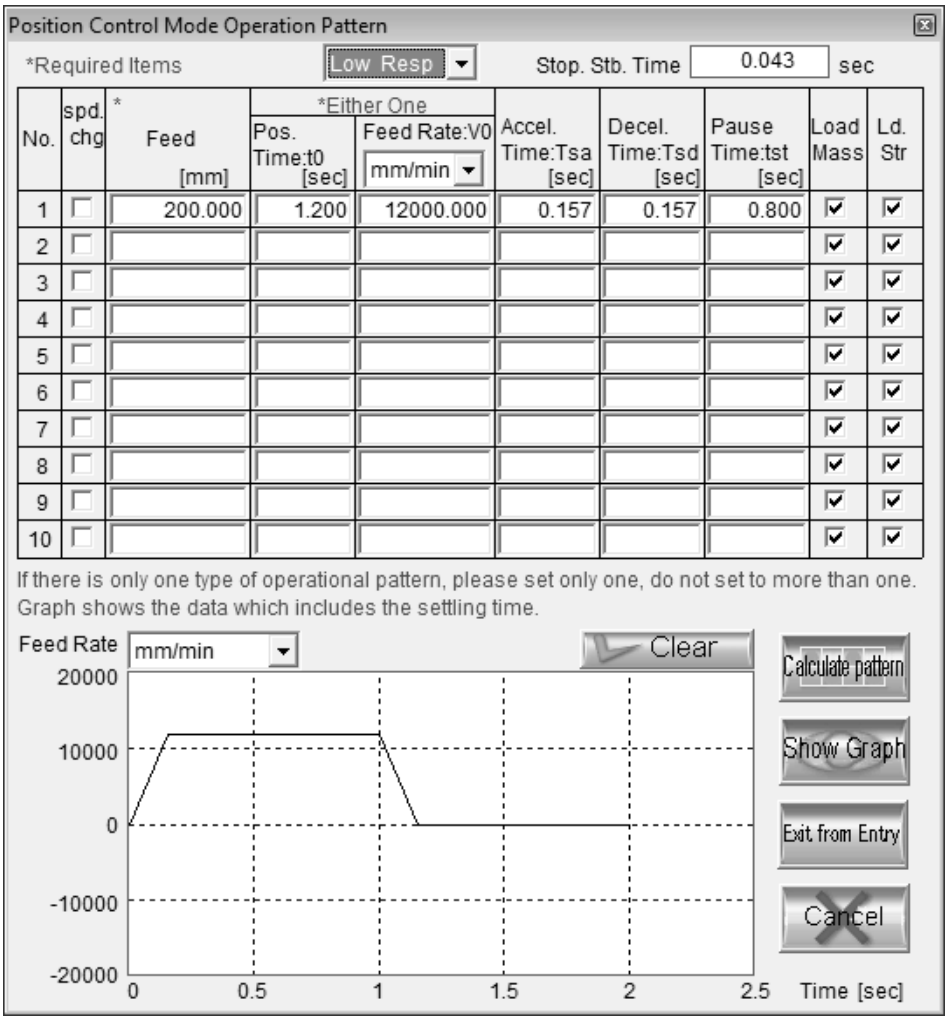
2) Enter "1/3" from the keyboard.

3) Press the "Enter" to set.

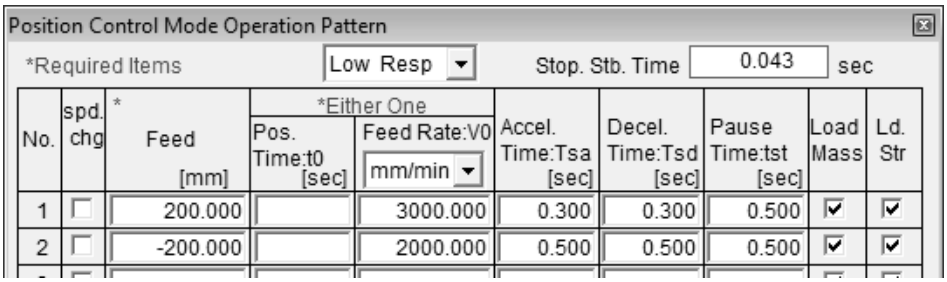
When setting is made, the old value in the Data Setting area is replaced by the new value entered.
Similary, set all machine specifications data.

(11) Operation pattern

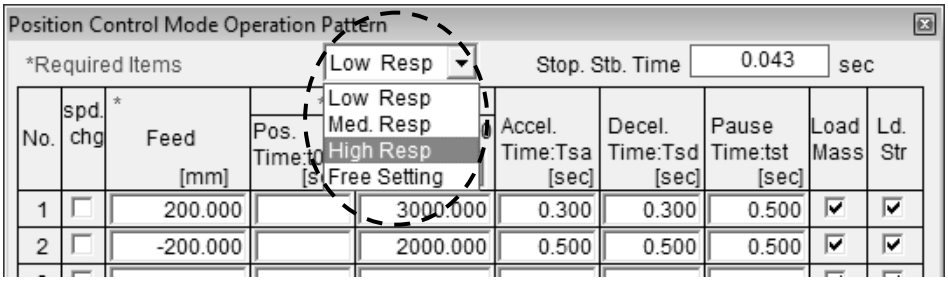
1) Click the Setting Data area to click the "Operation Pattern" button. When "Operation Pattern" button is clicked the following window appears.



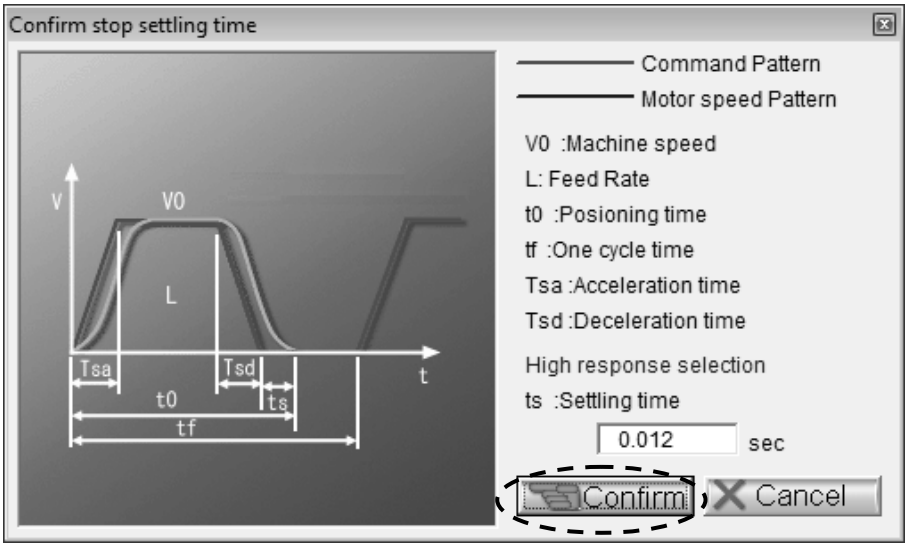
2) Move the focus to the corresponding items and enter the operation pattern values. In this example, no value is entered into "Pos. Time".



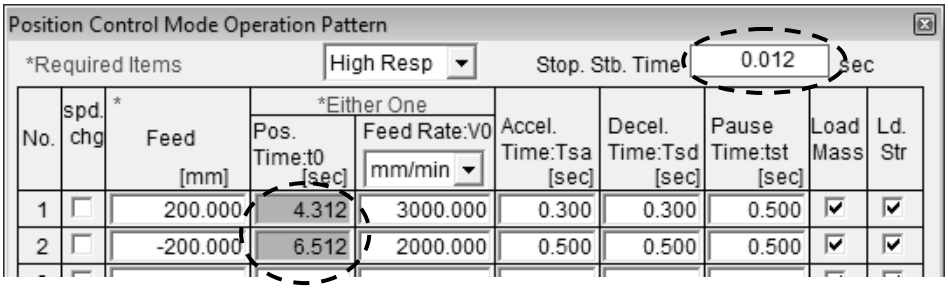
3) Clicking ▼ in the Response Level Setting combo box inside the Position Control Mode Operation Pattern window opens the following menu.



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

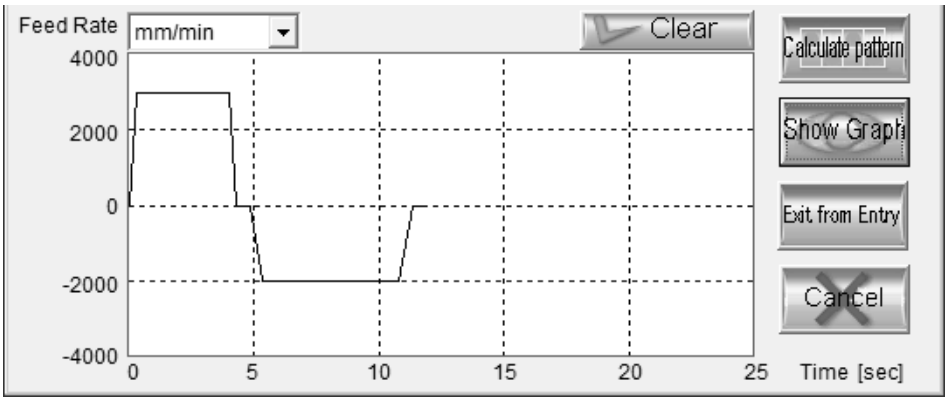


5) Click "Confirm" button in the "Confirm stop setting time" window.
When "Confirm" button is clicked, "0.012" is displayed in the "Stopping Stabilization Time" field inside the "Position Control Mode Operation Pattern" window.



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

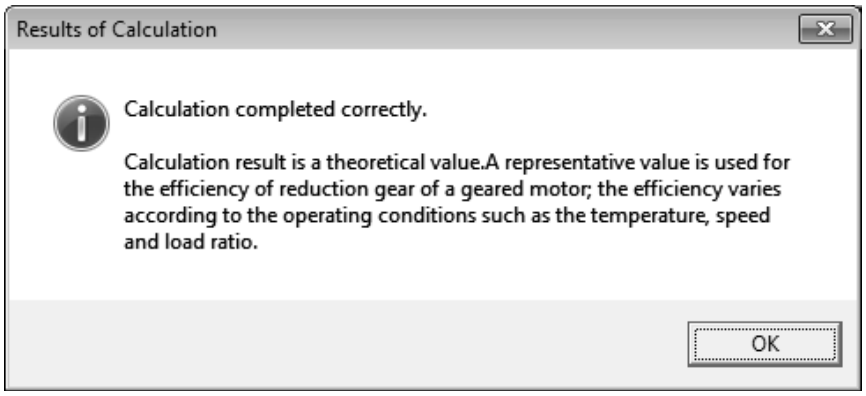
7) Click the "Show Graph" button to display the operation pattern graph.



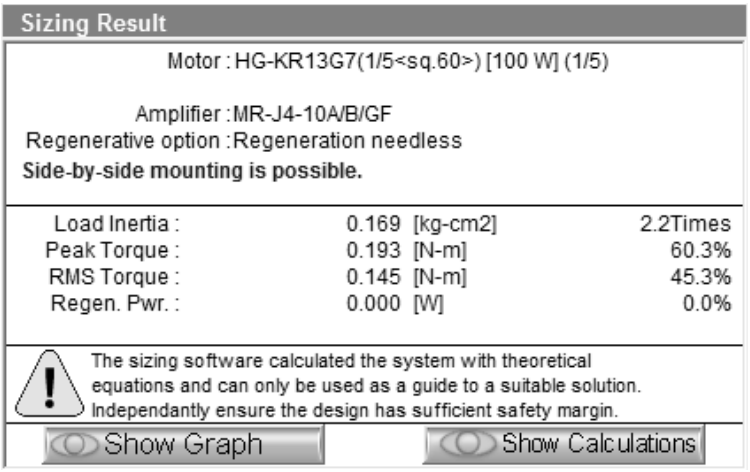
8) Click the "Exit from Entry" button to close the Position Control Mode Operation Pattern window.

(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.



Selection and calculation results

Servo motor	HG-KR13G7 (1/5<sq. 60>) [100W]	
Servo amplifier	MR-J4-10A/B/GF	
Regenerative option	Regeneration needless	
Load inertia	0.169 [kg・cm^2]	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%

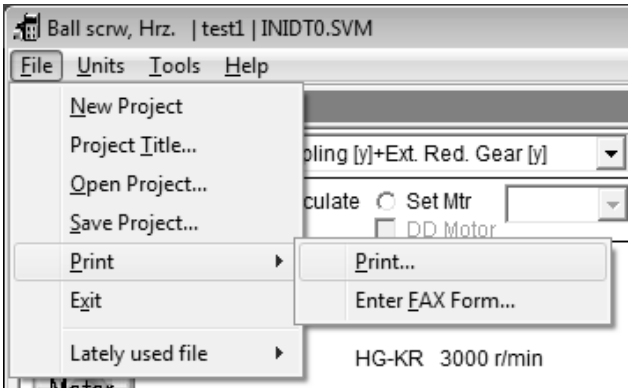
This machine allows use of the HG-KR13G7 (1/5<sq. 60>) Load inertia at the servo motor shaft of this machine is 0.169 [kg cm2] or 2.2 times larger than the servo motor shaft inertia. Required peak torque is 0.193 [N m] and effective torques is 0.145 [N m], which are 60.3% and 45.3% of the rated torque, 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.

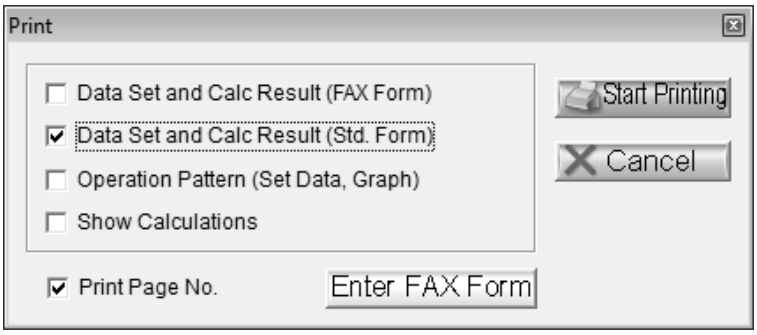
(13) Printing

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 ☑.

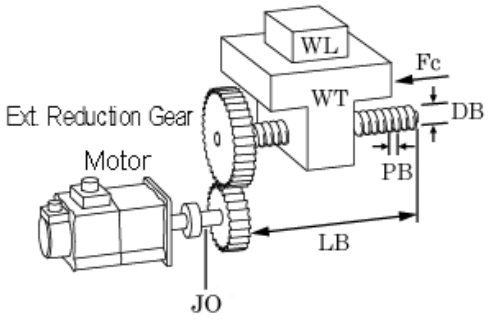


4) Click "Start printing" button.
When printing is a started, the results are printed out as shown below.

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

Ball scrw, Hrz. | test1 | INIDT0.SVM

Machine Components	Ball scrw, Hrz.
Coupling/Ext. Red. Gear	Coupling [y]+Ext. Red. Gear [y]
Servo Control Mode	Pos. ctrl. mode
Calculation Mode	Calculate
Selected Amplifier	MR-J4-A/B/GF
Selected Motor Series	HG-KR 3000 r/min
W/Precision	1/5<sq.60>
Red.Gear(Shaft)	
No Brake Option	



Mass of table	WT	250.000	kg
Mass of load	WL	20.000	kg
Thrustload	Fc	350.000	N
Guide tightening force	FG	1.000	N
Ext. red. gear ratio(NL/NM)	1/n	1/3	
Ext. red. gear inertia	JG	0.700	kg-cm2
Coupling inertia	JC	0.400	kg-cm2
Inertia of the others	JO	0.500	kg-cm2
Lead of ball screw	PB	10.000	mm
Diameter of ball screw	DB	10.000	mm
Length of ball screw	LB	600.000	mm
Drive efficiency	eta	0.900	
Coefficient of friction	mu	0.100	

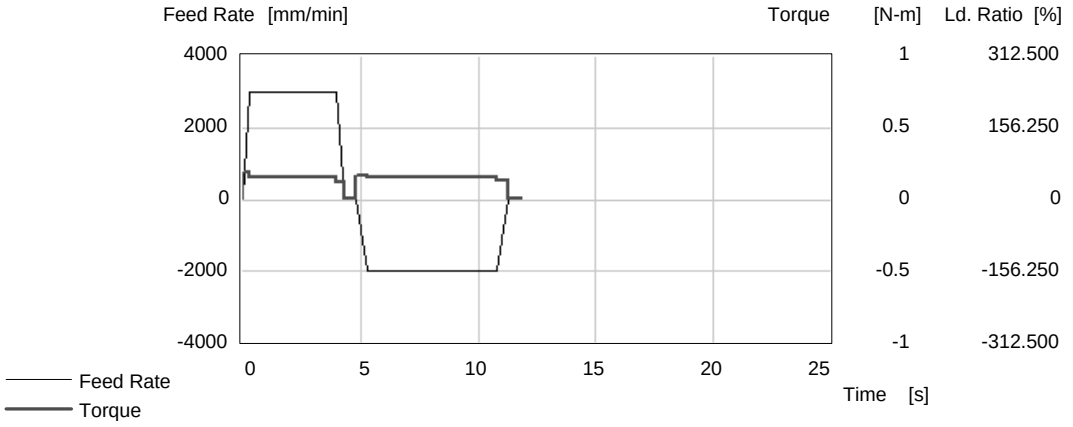
Motor :HG-KR13G7(1/5<sq.60>) [100 W] (1/5)

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%

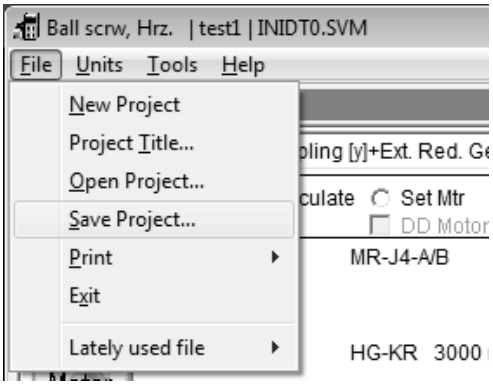
The sizing software calculated the system with theoretical equations and can only be used as a guide to a suitable solution. Independantly ensure the design has sufficient safety margin.



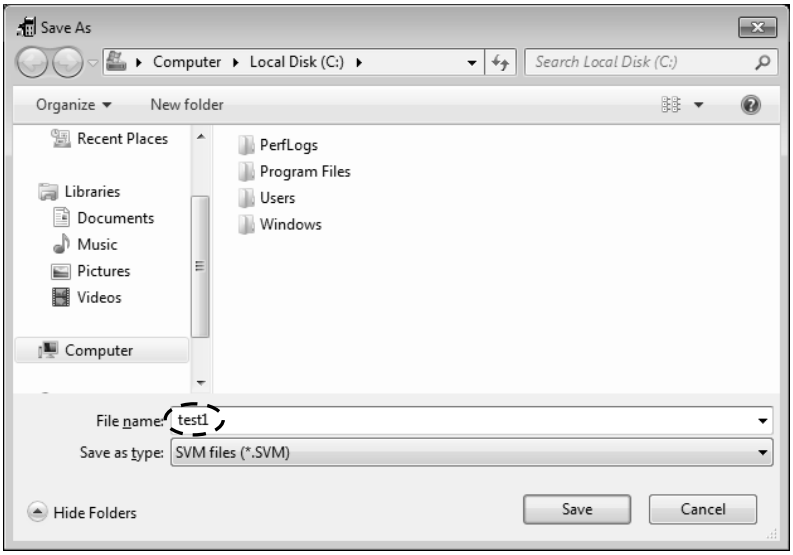
(14) Data save

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

2) Click "Save Project".



3) Enter file name "test1".

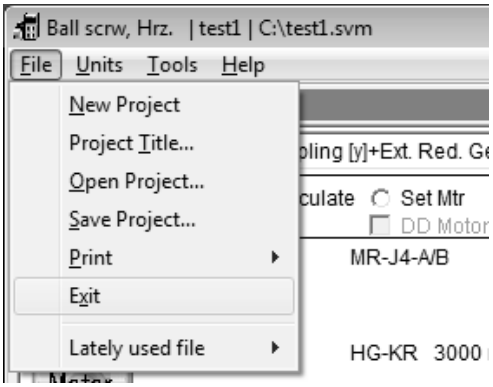


4) Click the "Save" button to execute save.

(15) End

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

2) Click "Exit".

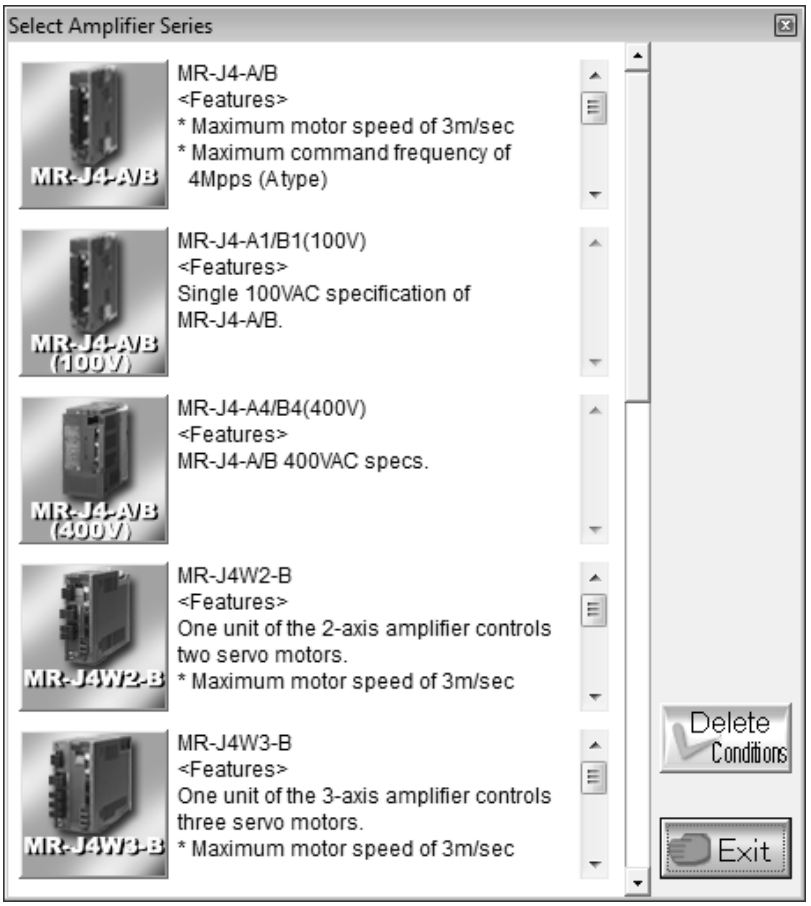


2.2.3 Operation (linear servo)

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.



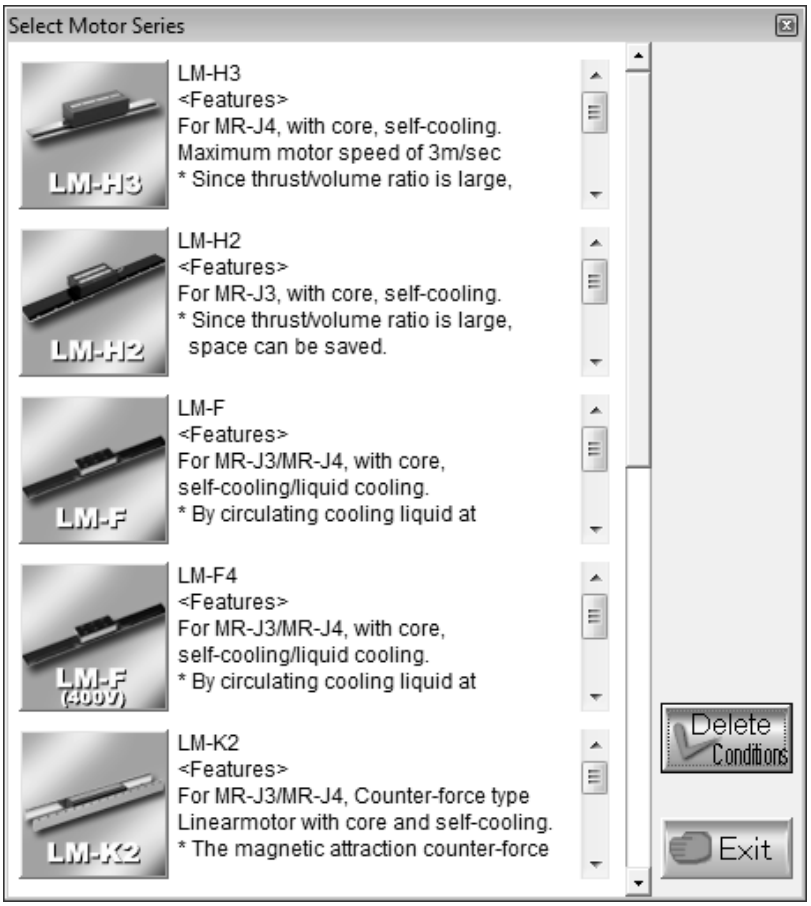
2) Select a series.

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

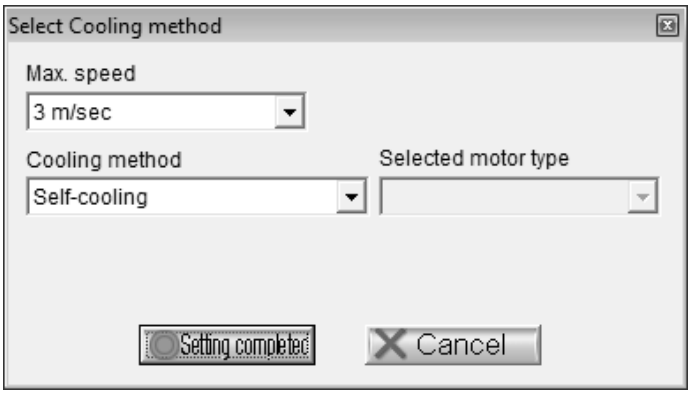
1) To display the following window, click "Motor" button in "Setting Data" area.



2) Select a series.

(b) Cooling method selection

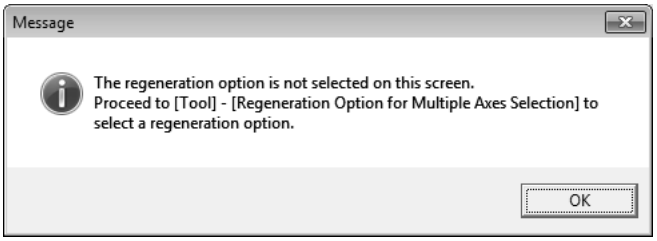
After selecting a motor, the following window is displayed.



Select 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.

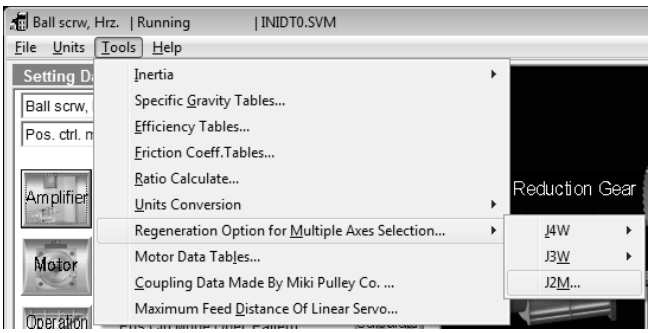


2.3.1 Selection of regenerative option for MR-J2M

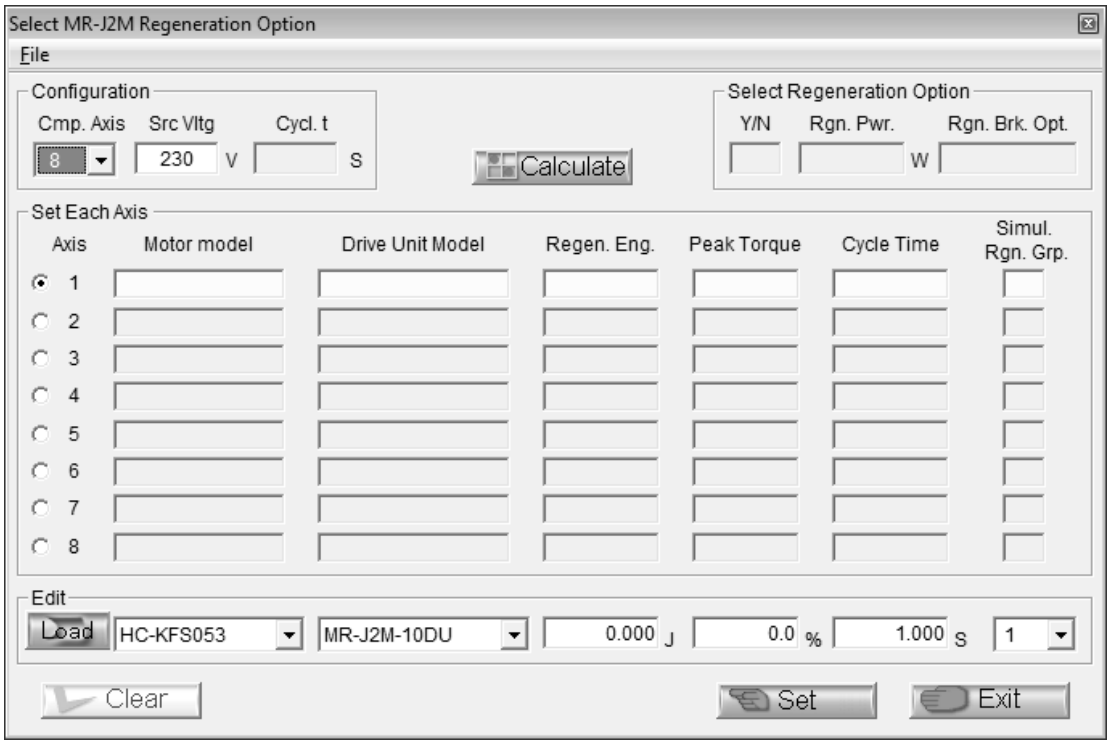
(1) Displaying the Select MR-J2M Regeneration Option window

1) Click "Tools" on the menubar to open the menu.

2) Point to the "Regeneration Option for Multiple Axes Selection" and click "J2M".

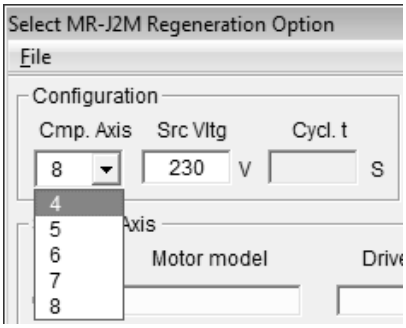


When "J2M" is clicked, the following window appears.



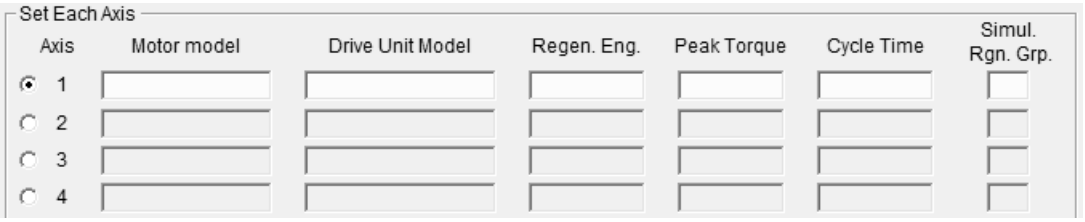
(2) Configuration entry

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.

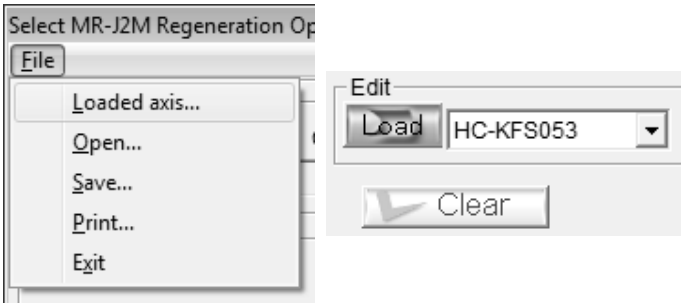


(3) Each axis setting entry

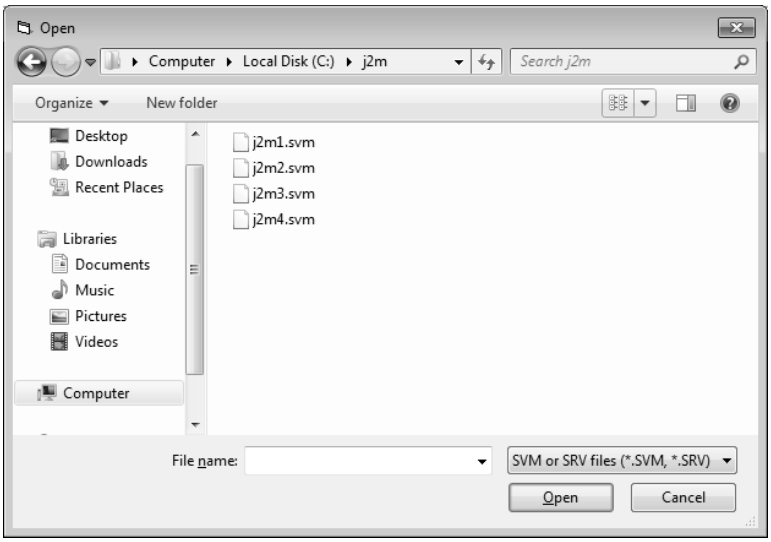
1) Click the ◉ of the axis number to be set. The following figure assumes that Axis 1 has been selected.



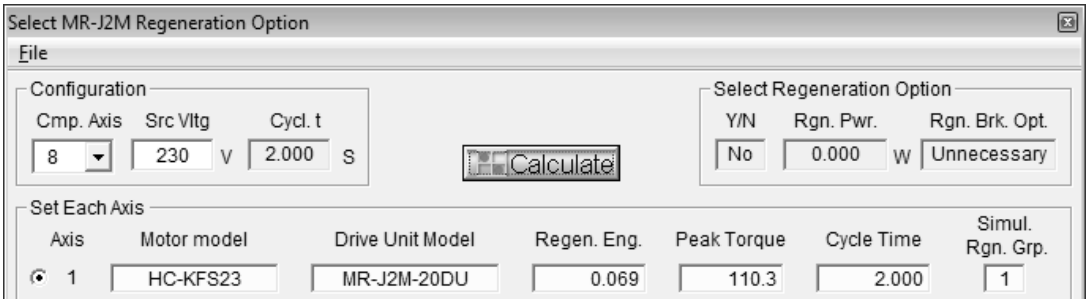
2) Click "File" on the menu bar in the Select MR-J2M Regeneration Option window, and click "Loaded axis". Or click the "Load" button in the "Select MR-J2M Regeneration Option" window.



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



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.



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

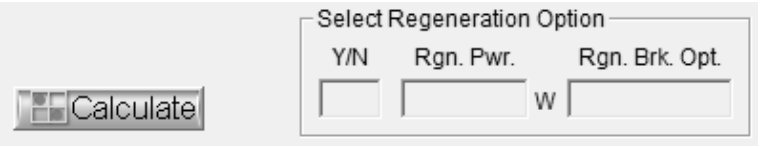
POINT
・Each axis setting entry is performed using direct entry in the this section (4) or "Loaded axis" that reads the file (***.svm). "Loaded axis" cannot read the file if its capacity has not been calculated after selection of "MR-J2M" in the servo amplifier series selection.

(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.

(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
▪ Examination must be made separately if moving speeds differ from normal and all axes may decelerate 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

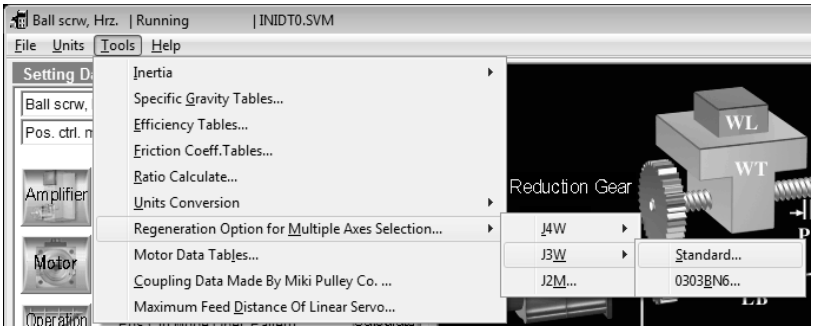
2.3.2 Selection of regenerative option for MR-J3W

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.

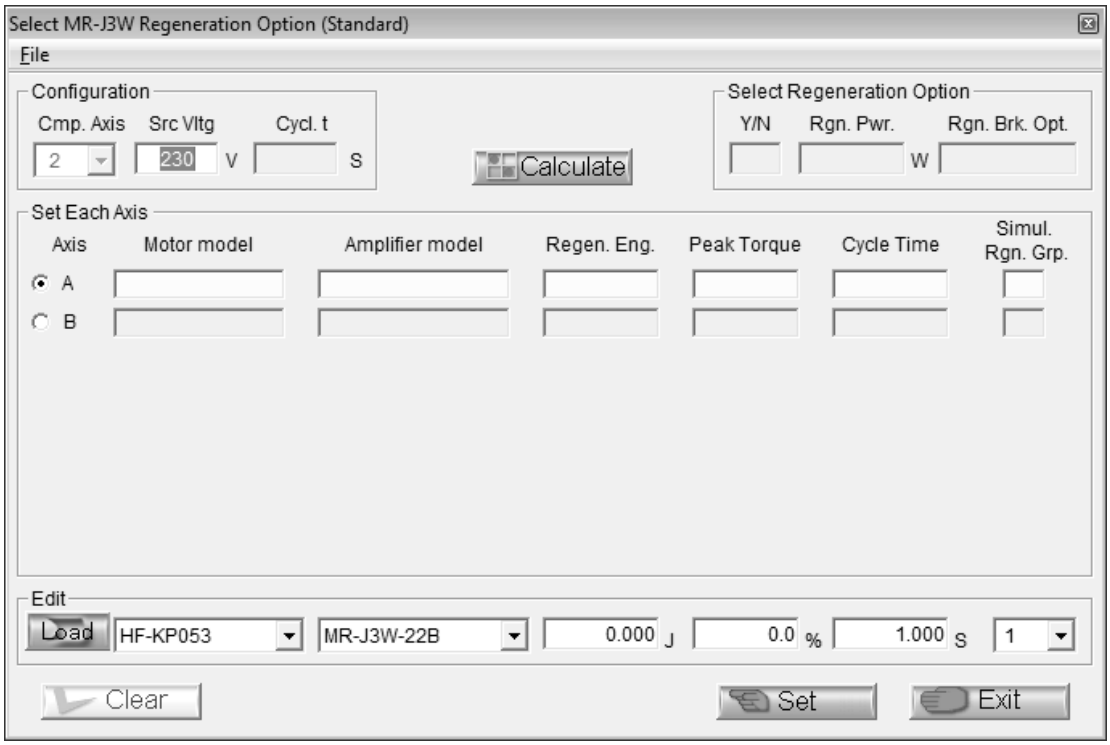
(1) Displaying the Select MR-J3W Regeneration Option (Standard) window

1) Click "Tools" on the menubar to open the menu.

2) Select "J3W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and click on "Standard".



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



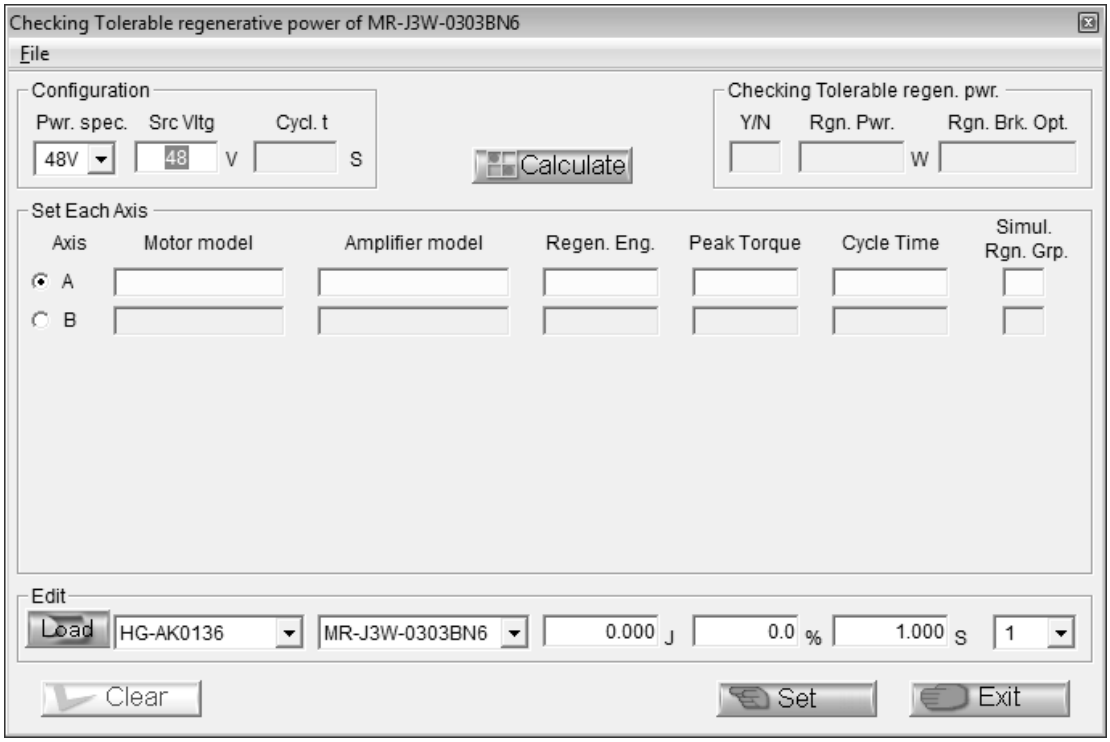
POINT
▪ Make sure to set the same servo amplifier model name to the "Amplifier model" of Axis A and B. When different servo amplifier model names are set, regenerative option cannot be selected.

(2) Displaying the Checking Tolerable regenerative power of MR-J3W-0303BN6 window

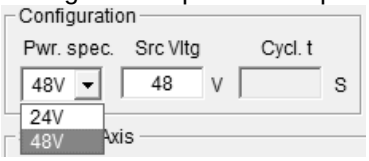
1) Click "Tools" on the menubar to open the menu.

2) Select "J3W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and click on "0303BN6".

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



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



POINT
・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.

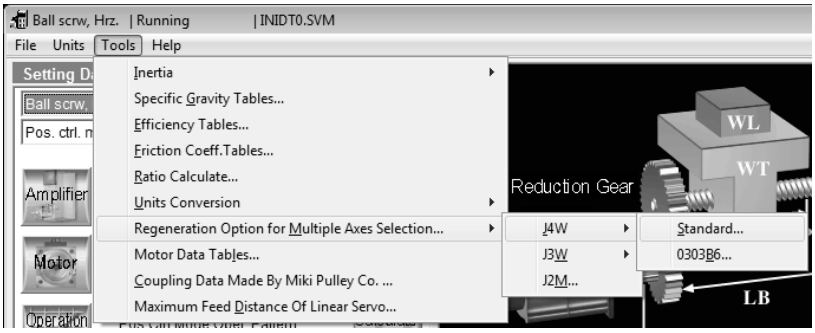
2.3.3 Selection of regenerative option for MR-J4W_

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.

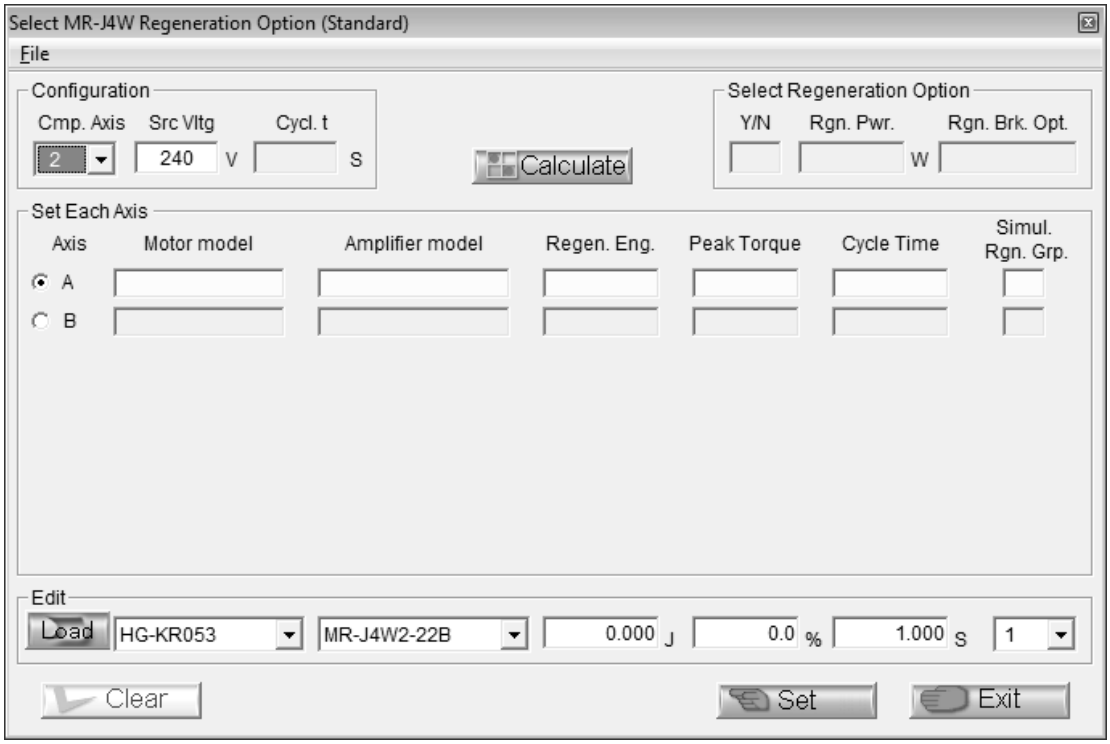
(1) Displaying the Select MR-J4W2 Regeneration Option window

1) Click "Tools" on the menubar to open the menu.

2) 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".

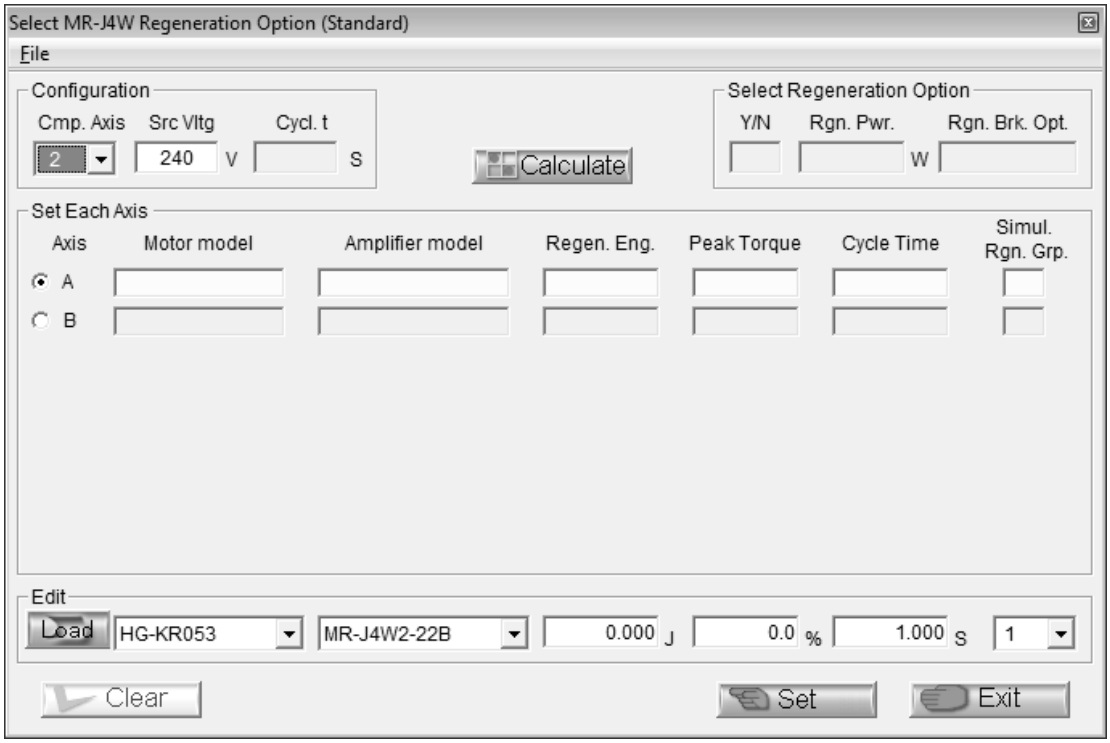


(2) Displaying the Select MR-J4W3 Regeneration Option window

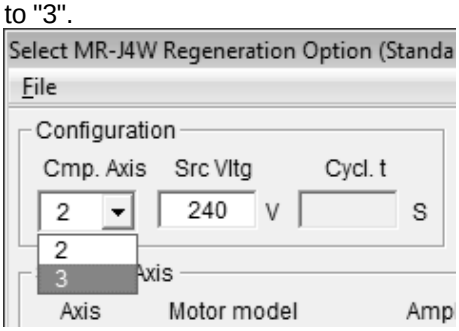
1) Click "Tools" on the menubar to open the menu.

2) Select "J4W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and click on "Standard".

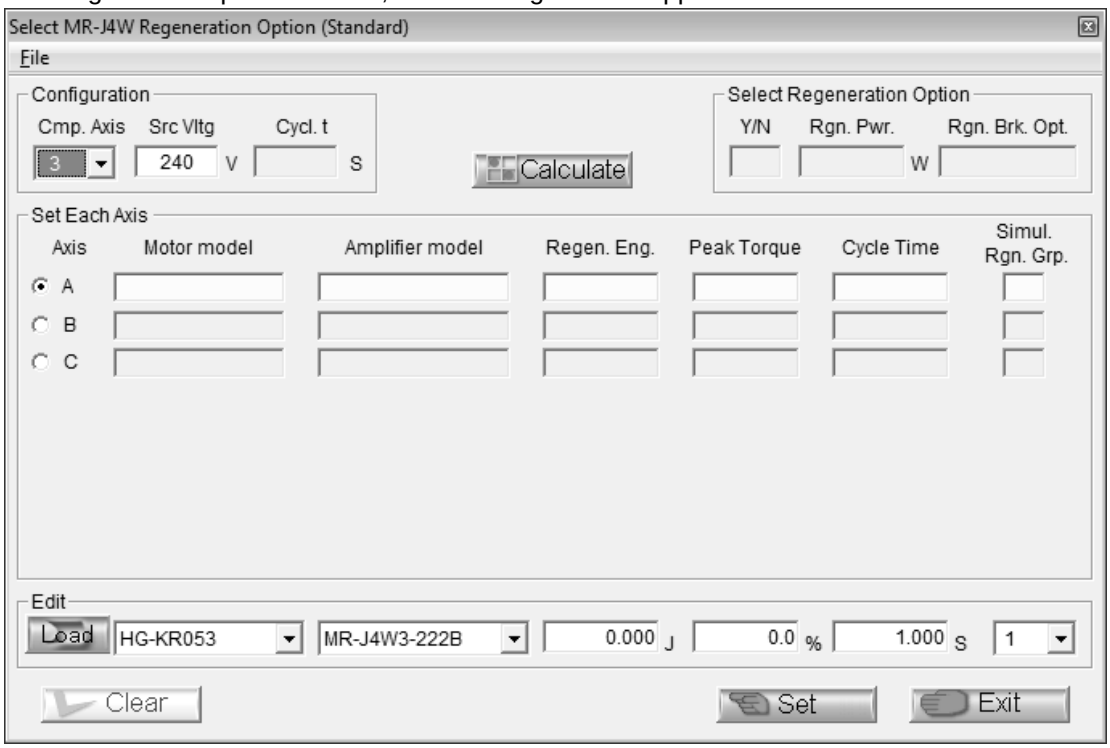
When "Standard" is clicked, the following window appears.



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



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



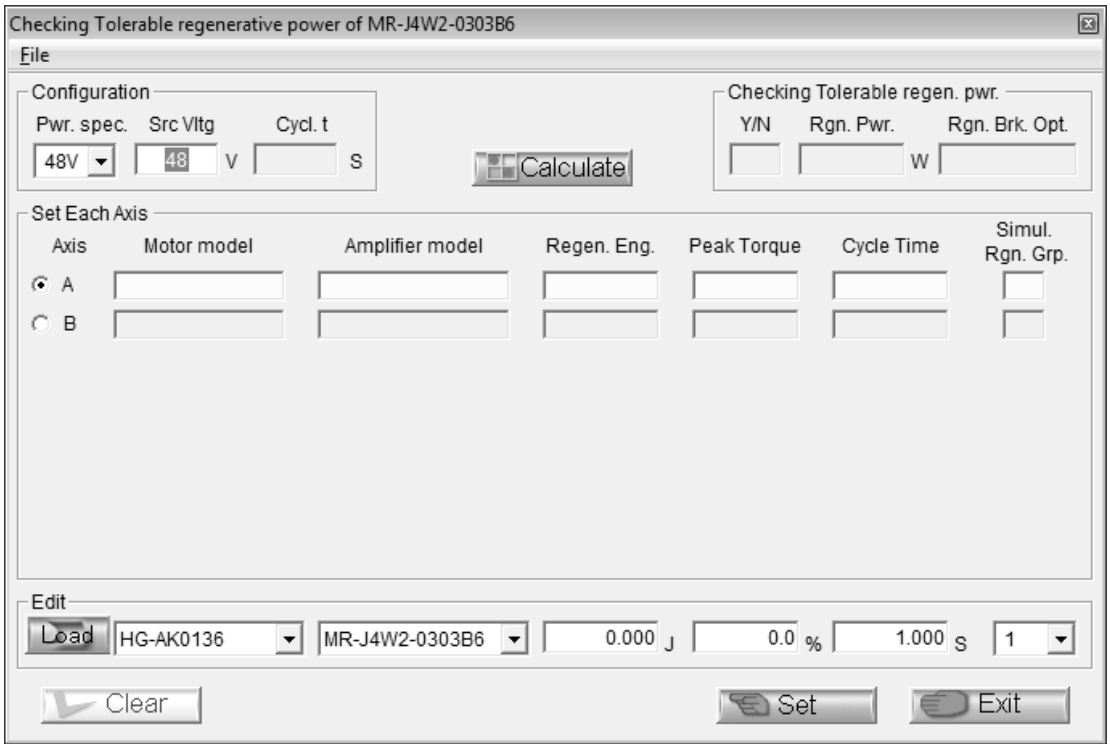
POINT
・When the "Cmp. Axis" is "2", this configuration operates as MR-J4W2. ・When the "Cmp. Axis" is "3", this configuration operates as MR-J4W3. ・For all axes the "Amplifier model" must be the same. If it is not the same, the regenerative option can not be selected.

(3) Displaying the Checking Tolerable regenerative power of MR-J4W2-0303B6 window

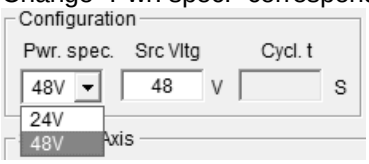
1) Click "Tools" on the menubar to open the menu.

2) Select "J4W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and click on "0303B6".

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



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



POINT
・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.

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

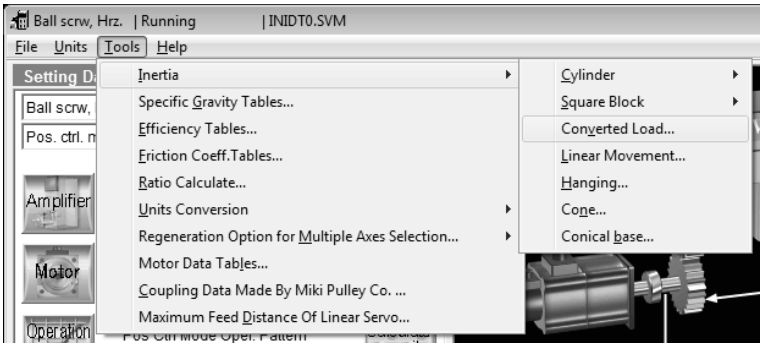
(1) Clicking method

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.



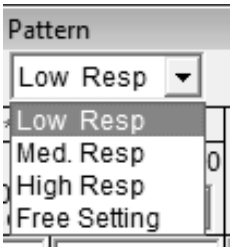
3.1.2 Operation procedures within the window

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

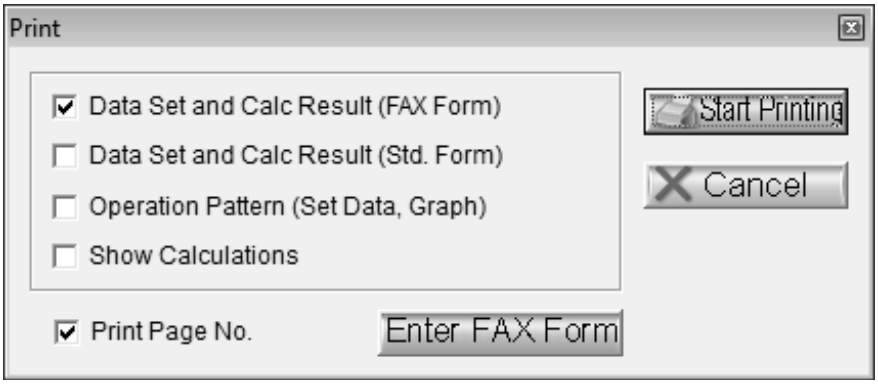
(1) Pressing a button
Click the button in the window.

(2) Entering data
Click the machine specifications entry area to move the focus there, and input the numerical value with the keyboard.

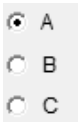
(3) Selecting the combo box data, etc.
1) Click the on the right of the setting area to open the combo box.
2) Click the data or the like to be selected to make selection.



(4) Selecting the item
Click the item or check box.



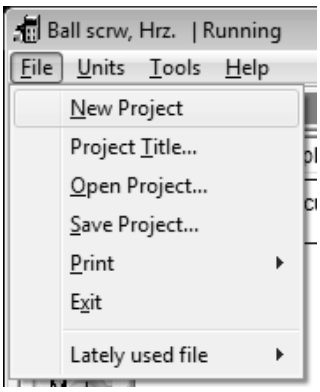
(5) Pressing the option button
Click the item or button.



3.2 Description of commands

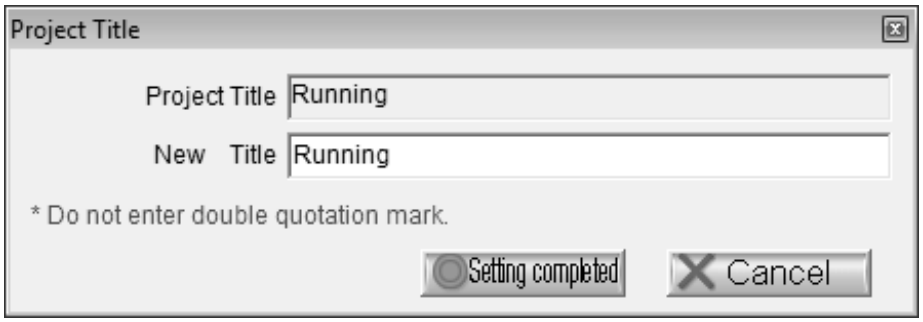
3.2.1 File

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.

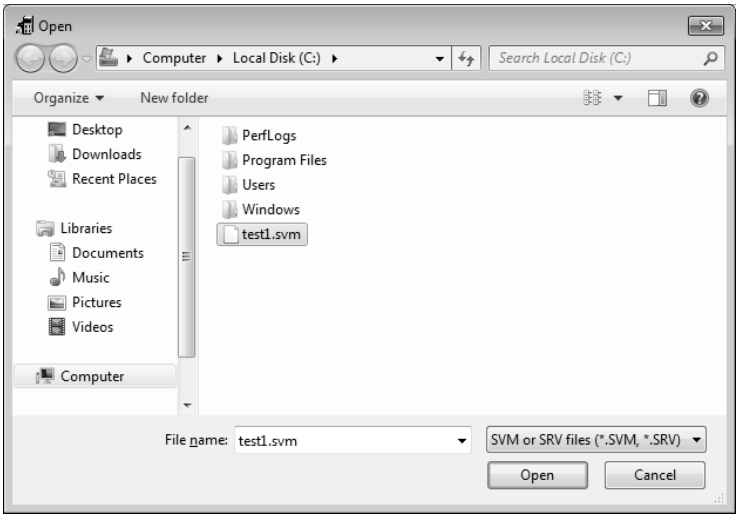


Move the focus to the New Title entry field and enter the title from the keyboard.

(3) Open Project

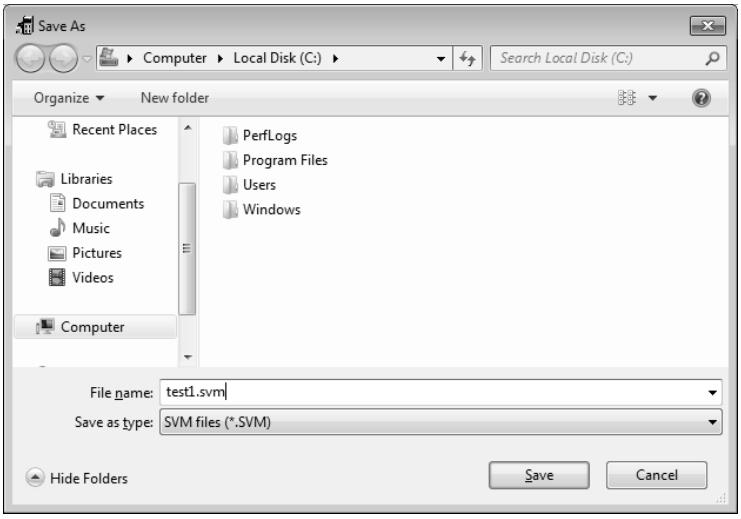
POINT
・The files saved using the old capacity selection software (MRZJW3-MOTSZ71E or earlier) can also be read. However, data are not set to the items added to MRZJW3-MOTSZ111E and later.

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.



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

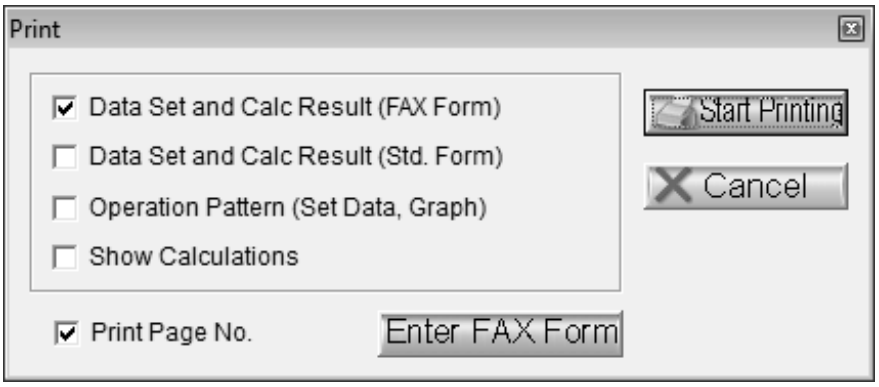
(4) Save Project
Used to save the current input data.
When "Save Project" on the sub menu is clicked, the File Save window opens.



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
▪ Click "Print Page 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 ☑ 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.

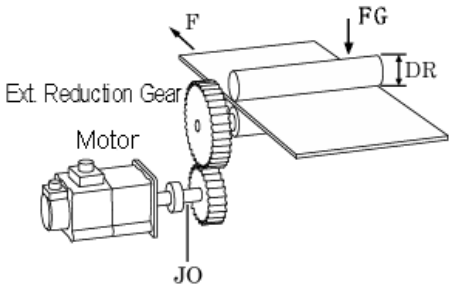
[Data Set and Calc Result (FAX Form)]

Roll feed | Wrapping Machine INIDT3.SVM

To: [FAX No.] 11/12/2014
[Company]
[Division]
[Name]

From: [Phone]
[FAX No.]
[Company]
[Division]
[Name]

Machine Components	Roll feed
Coupling/Ext. Red. Gear	Coupling [y]+Ext. Red. Gear [y]
Servo Control Mode	Pos. ctrl. mode
Calculation Mode	Calculate
Selected Amplifier	MR-J4-A/B
Selected Motor Series	HG-SR 2000 r/min
No Reduction Gear Option	
No Brake Option	



Tension	F	10.000	N
Reduction gear ratio(NL/NM)	1/n	1/5	
Reduction gear inertia	JG	15.000	kg-cm2
Coupling inertia	JC	5.000	kg-cm2
Inertia of the others	JO	2.000	kg-cm2
Diameter of feed roll	DR	120.000	mm
Inertia per roller	JR	100.000	kg-cm2
Drive efficiency	eta	0.800	
Bearing friction coeff.	mu	0.100	
Nip pressure	FG	10.000	N
Bearing diameter	d	10.000	mm

Motor :HG-SR152 [1.5 KW]

Amplifier :MR-J4-200A/B
Regenerative option :Regeneration needless

Side-by-side mounting possible : 0-45 degrees C amb. Temp.

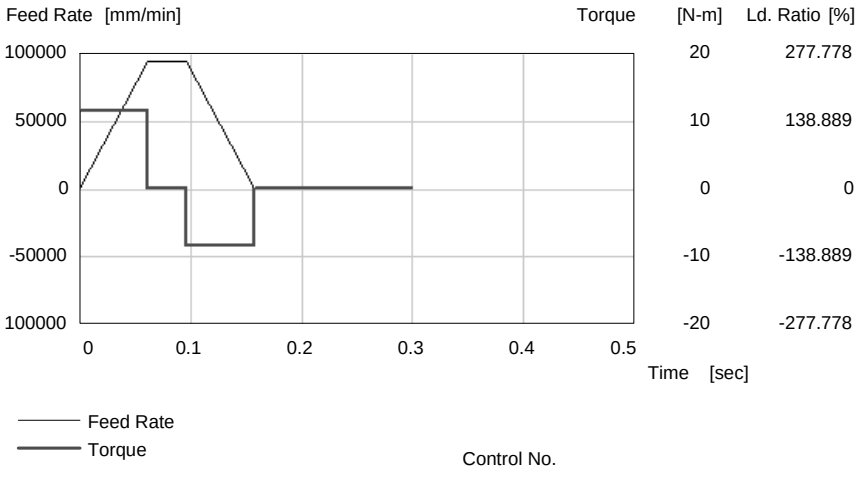
Load Inertia :	30.000 [kg-cm2]	1.9Times
Peak Torque :	11.608 [N-m]	161.2%
RMS Torque :	6.463 [N-m]	89.8%
Regen. Pwr. :	0.000 [W]	0.0%

The sizing 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.

Control No.

Control No.

Roll feed | Wrapping Machine | INIDT3.SVM



Control No.

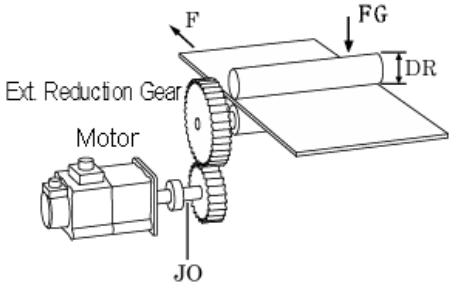
(b) Data Setting and Calculation Result (Standard Form)

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

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

Roll feed | Wrapping Machine | INIDT3.SVM

Machine Components	Roll feed
Coupling/Ext. Red. Gear	Coupling [y]+Ext. Red. Gear [y]
Servo Control Mode	Pos. ctrl. mode
Calculation Mode	Calculate
Selected Amplifier	MR-J4-A/B
Selected Motor Series	HG-SR 2000 r/min
No Reduction Gear Option	
No Brake Option	



Tension	F	10.000	N
Reduction gear ratio(NL/NM)	1/n	1/5	
Reduction gear inertia	JG	15.000	kg-cm2
Coupling inertia	JC	5.000	kg-cm2
Inertia of the others	JO	2.000	kg-cm2
Diameter of feed roll	DR	120.000	mm
Inertia per roller	JR	100.000	kg-cm2
Drive efficiency	eta	0.800	
Bearing friction coeff.	mu	0.100	
Nip pressure	FG	10.000	N
Bearing diameter	d	10.000	mm

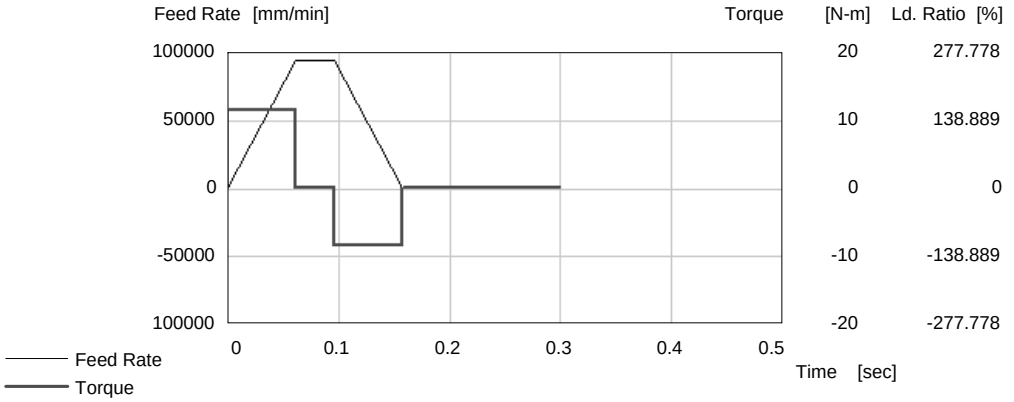
Motor :HG-SR152 [1.5 KW]

Amplifier :MR-J4-200A/B
Regenerative option :Regeneration needless

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 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.



(c) Operation pattern (Set Data, Graph)

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

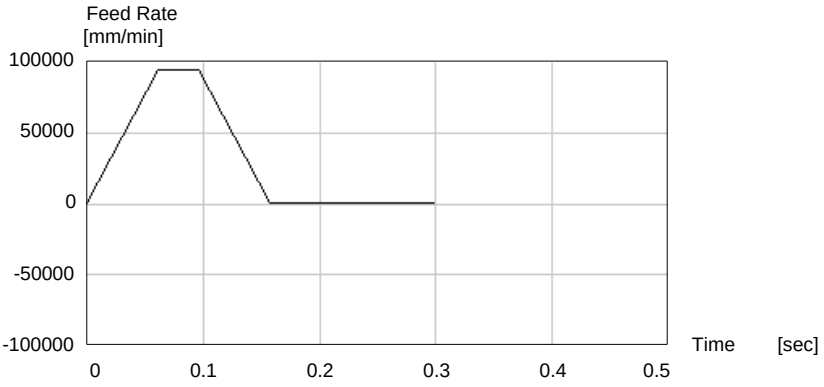
[Operation Pattern (Set Data, Graph)]

Roll feed | Wrapping Machine | INIDT3.SVM

Low Resp Stop. Stb. Time 0.043 sec

No.	spd. chg	Feed [mm]	Pos. Time:t0 [sec]	Feed Rate:V0 [mm/min]	Accel. Time:Tsa [sec]	Decel. Time:Tsd [sec]	Pause Time:tst [sec]
1		150.000	0.200	94000.000	0.061	0.061	0.100
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



(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.

[Show Calculations]

Use Symbol List
(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
*Kp	: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
t0	:Pos. Time (Operation Pattern)	---	sec
tst	:Pause Time (Operation Pattern)	---	sec
tf	:Cycle Time (Operation Pattern)	0.300	sec

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]
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 [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
      Ea_ 1 = (0.1047/2) * 1246.711 * (11.608) * 0.061
               =     46.212 [J]    (Operation Pattern No. 1)
      Ea_Sum =      0.000 [J]    (Total Negative Energy)

   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
```

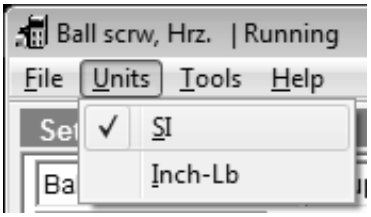
```
**********************************************************************************************************************************
Calculations Process
(Roll feed   | Wrapping Machine        | INIDT3.SVM)
**********************************************************************************************************************************

      Emax = section energy during maximum regeneration
      Pmax = (etam*Emax - Ec)/tmax
           = (0.913*33.451 - 36.000)/0.061
           =      0.000 [W]    (If the result is less than 0, '0' is shown.)


**********************************************************************************************************************************
```

(6) Exit

Used to terminate the capacity selection software.

3.2.2 Units

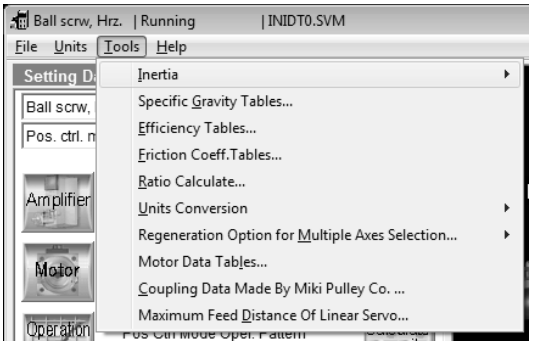
Used to select the units used for calculation. When "Units" on the menu bar is clicked, the following menu is displayed.



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.

3.2.3 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.

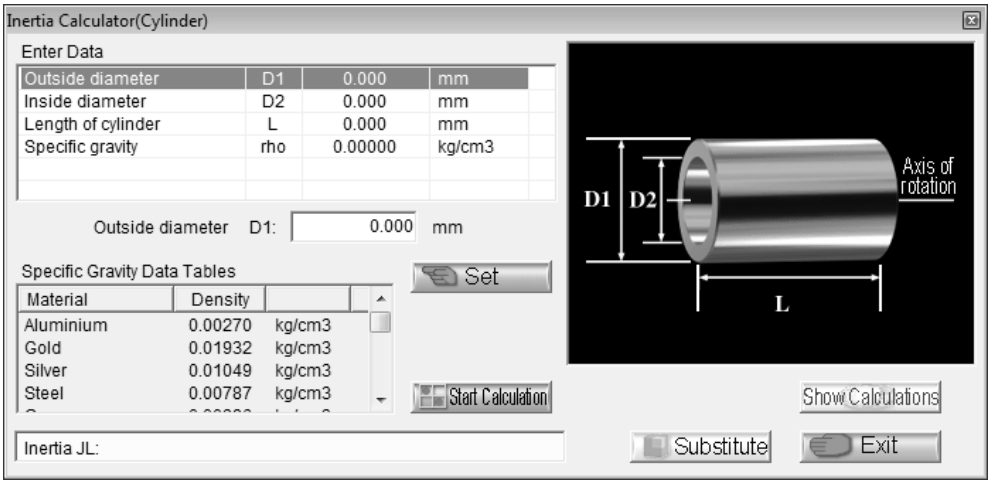
3) Substitution for machine specifications data
   Click the "Substitute" button to substitute the calculated value for the item of the inertia of the Data Setting area. At this time, Inertia Calculator window ends automatically.

4) End
   Click the "Exit" button to end.

(a) Cylinder

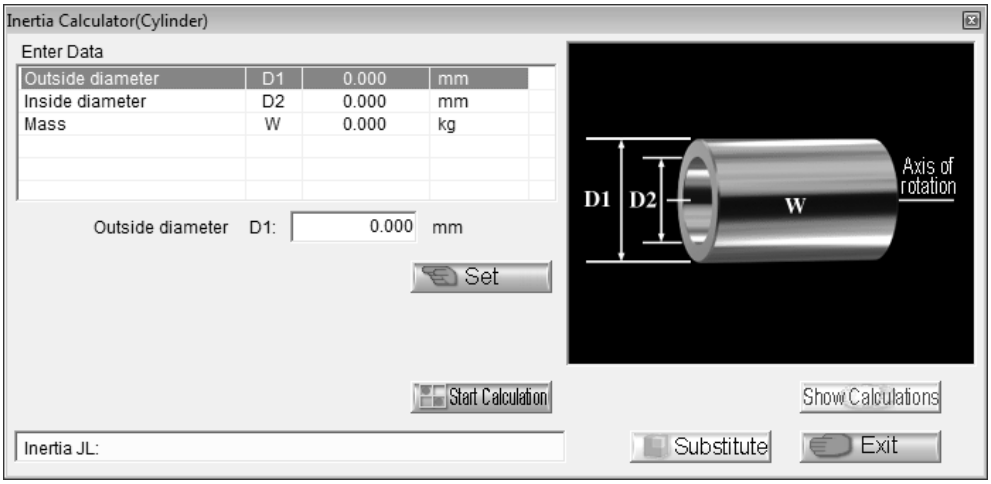
1) Enter Diameter, Length

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



2) Enter Diameter, Mass

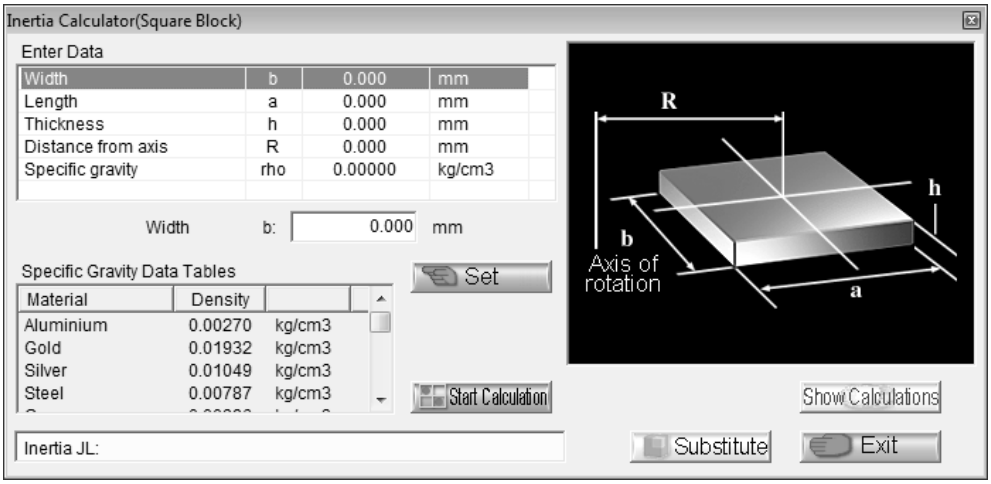
The inertia value is calculated from the outside diameter, inside diameter and mass.



(b) Square Block

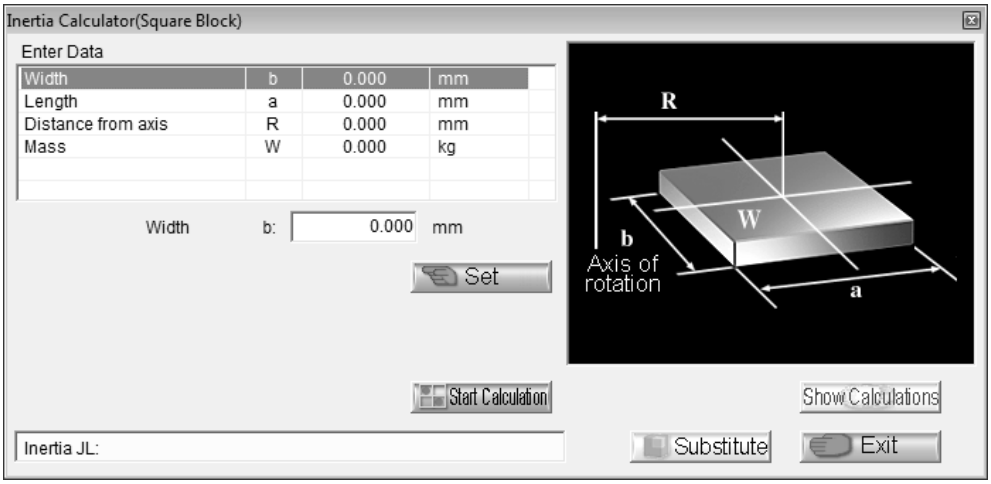
1) Enter Length, Thickness

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

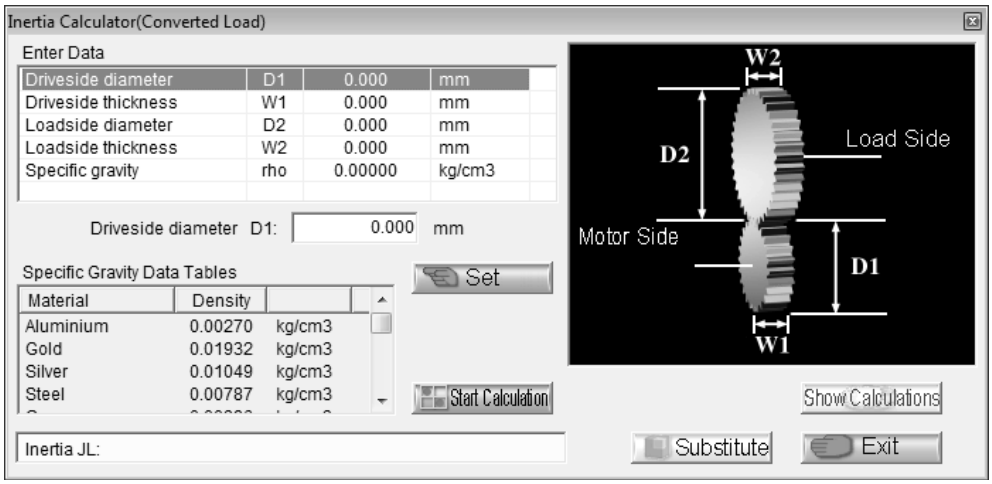


2) Enter Length, Mass

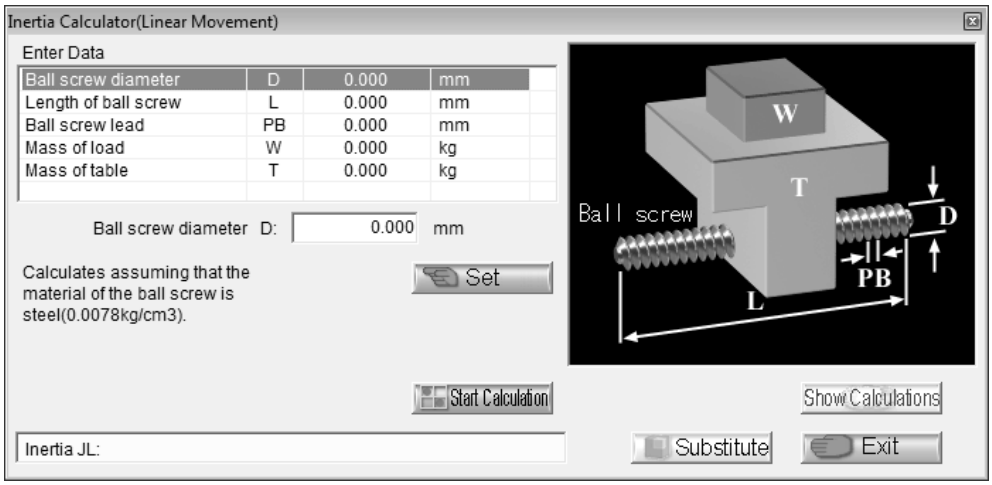
The inertia value is calculated from the width, length, distance from axis and mass.



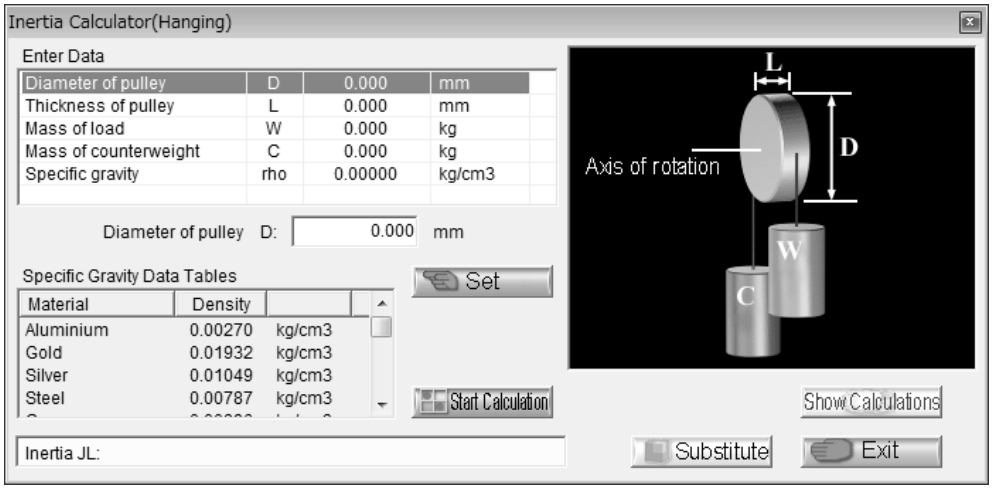
(c) Converted Load



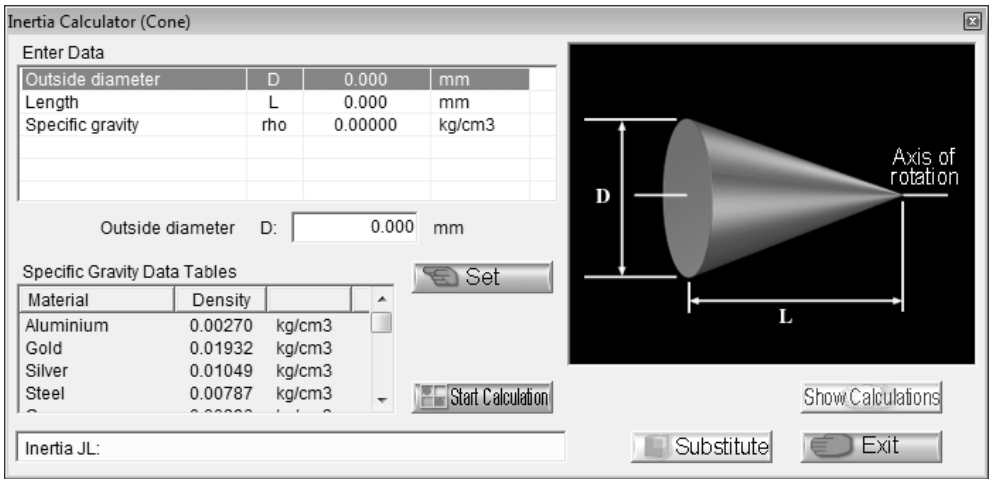
(d) Liner Movement



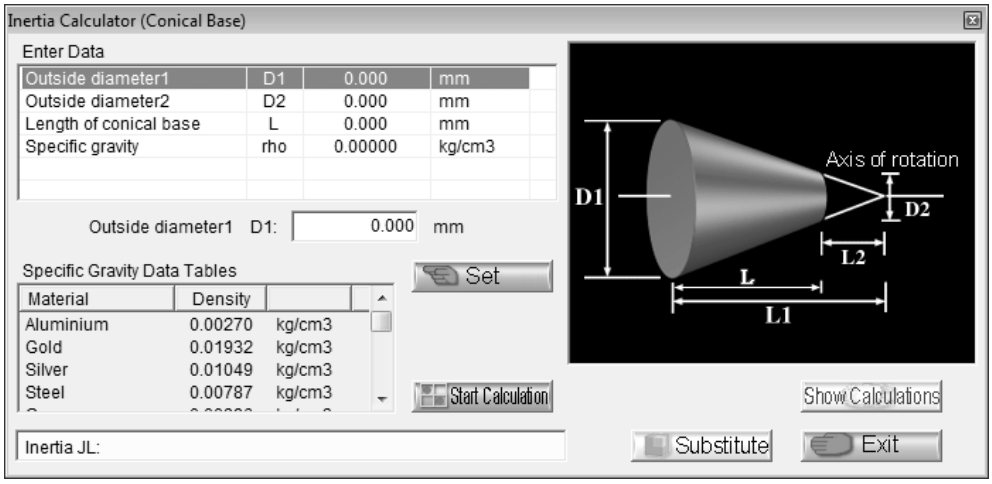
(e) Hanging



(f) Cone



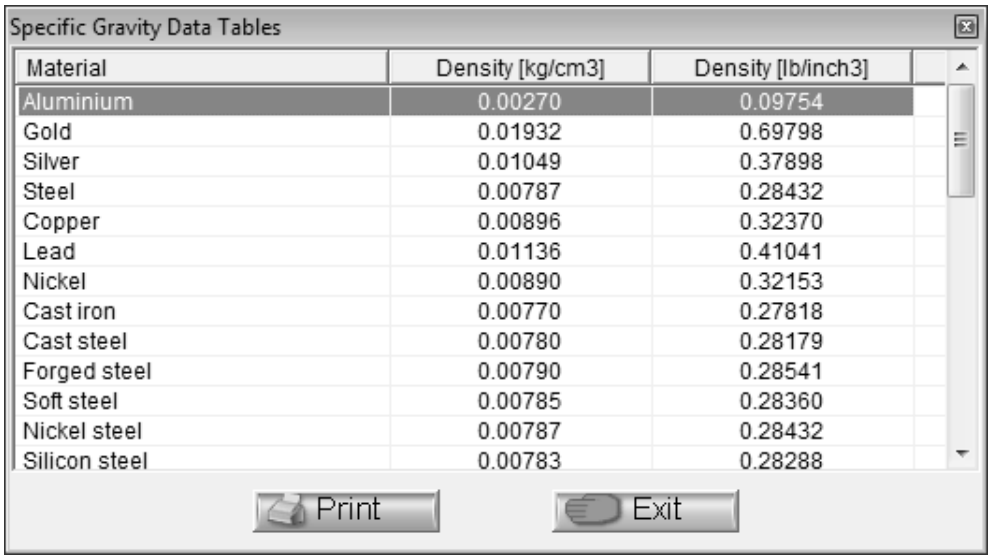
(g) Conical base



(2) Specific Gravity Tables

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

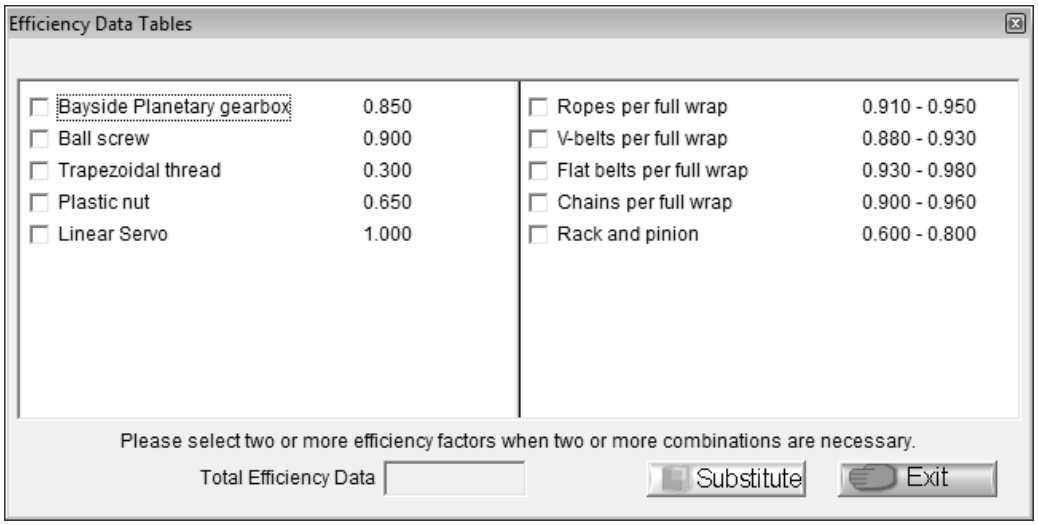
When "Specific Gravity Tables" on the sub menu is clicked, the following window is displayed.



POINT
・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.



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 ☑, select the required efficiency. More than one efficiency may be selected. When the data has a range, click the button on the right of the data display section to change the data.

3) 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.

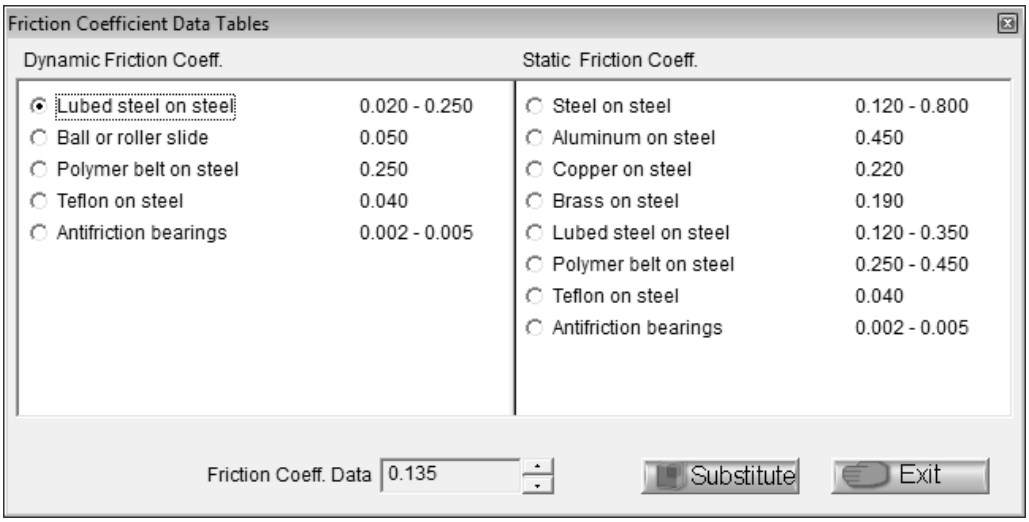
4) End
Click the "Exit" button to end.

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.



1) Selection of input item

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

2) 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.

3) 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

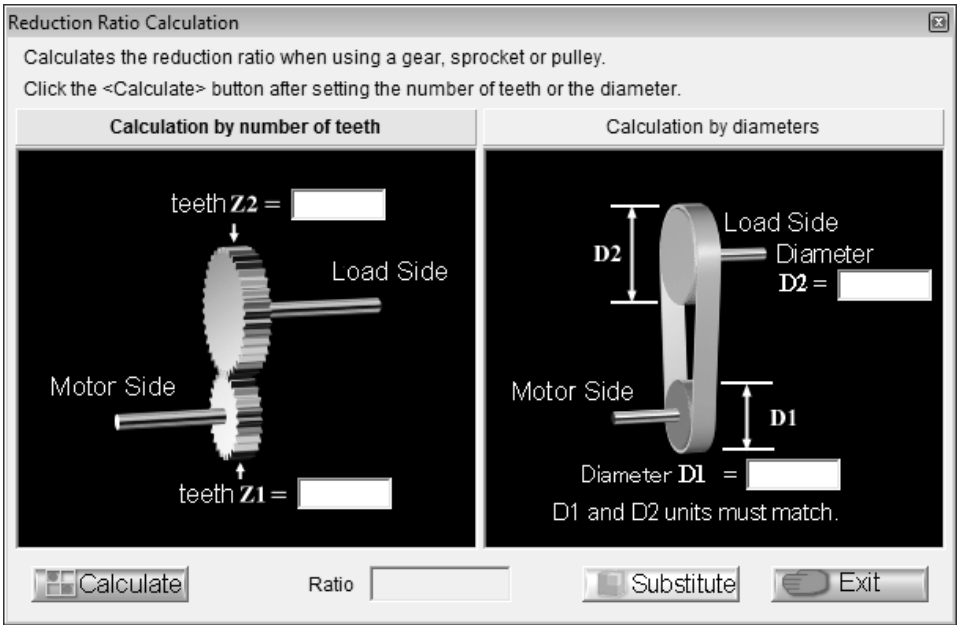
Click the "Exit" button to end.

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.

3) 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.

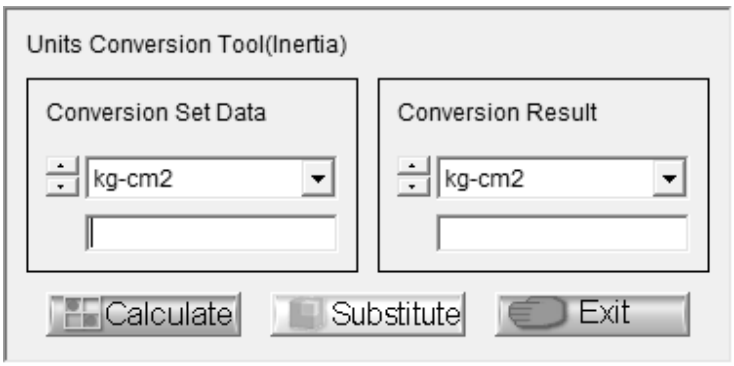
POINT
・"Ratio Calculate" has been selected on the "Tools" menu, clicking the "Substitute" button automatically enters the calculated reduction gear ratio in "Reduction gear ratio (NL/NM)" of the Data Setting area.

(6) Units Conversion

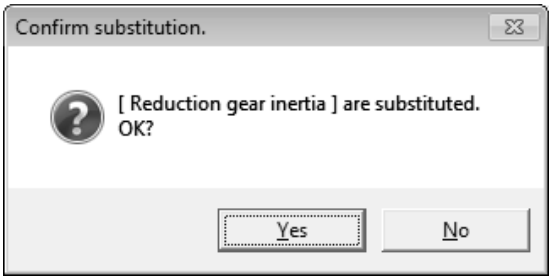
Calculation tool designed to convert the inertia, torque, length, weight, force or speed unit.
Any of the following units may be converted.

Inertia	Torque	Length	Weight	Force	Speed
kg・m^2	N・m	m	kg	N	m/min
kg・cm^2	kgf・m	cm	g	kgf	cm/min
kgf・m^2	kgf・cm	mm	lb	gf	mm/min
kgf・cm^2	gf・cm	ft	oz	lb	m/sec
kg・m・sec^2	lb-ft	inch		oz	cm/sec
kg・cm・sec^2	lb-inch				mm/sec
lb-ft^2	oz-inch				ft/min
lb-inch^2					inch/min
oz-inch^2					ft/sec
lb-ft-sec^2					inch/sec
lb-inch-sec^2					
oz-inch-sec^2					

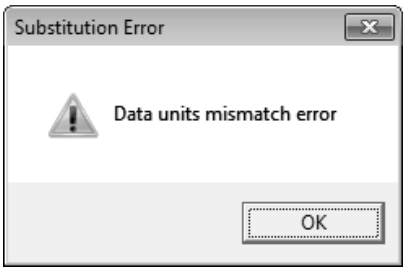
When any command is selected, the following window appears (example: for inertia).



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.



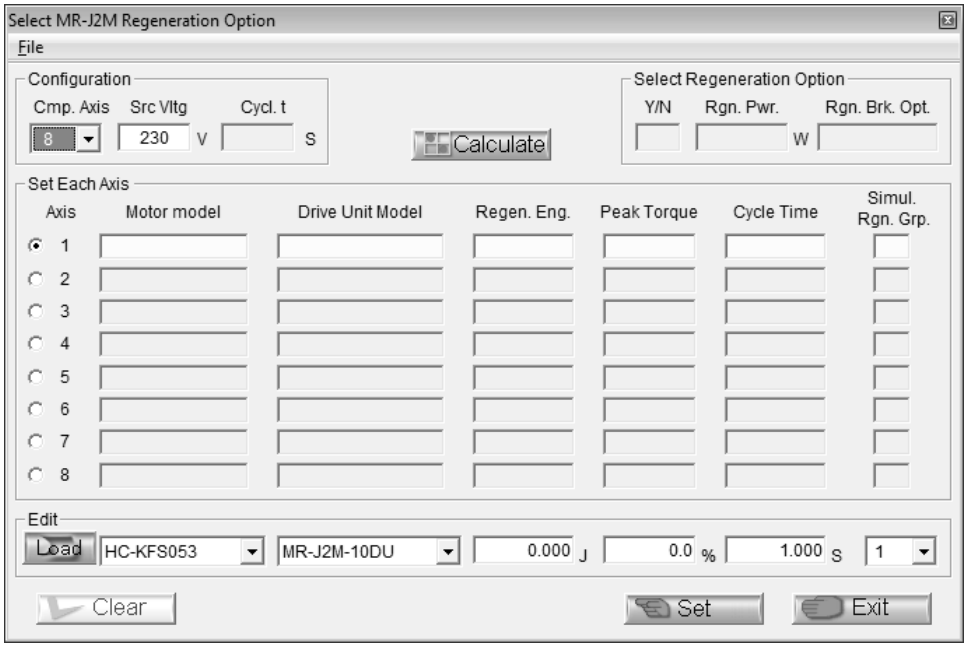
7) If the item in which the data is to be substituted is correct, click the "OK" button.
If the unit of the machine specifications does not match the new unit, substitution cannot be made.
In this case, the following window is displayed.



8) Click the "Exit" button of Unit Conversion Tool (Inertia) to exit.

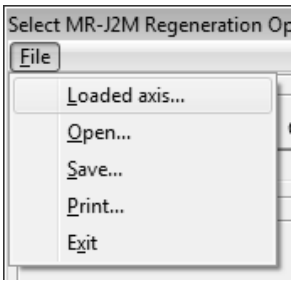
(7) Regeneration Option for Multiple Axes Selection
Used to select the regenerative options for the MR-J4W_, MR-J3W and MR-J2M. After selecting the capacities, select whether or not to use the regenerative options calculated for all axes and the regenerative option model names.

(a) For MR-J2M
Clicking "J2M" from "Regenerative Option for Multiple Axes Selection" of the sub-menu displays the following window.



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

1) File

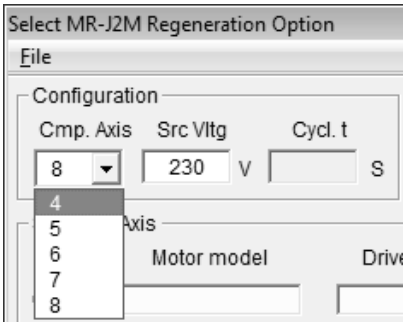


The commands have the following functions.

Command	Description
Loaded axis	Reads the Motor model name, Drive Unit Model, Regenerative Energy, Peak Torque and 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.

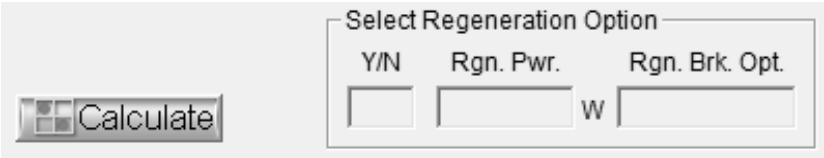
Item	Description
Component axis	Select the number of axes.
Source Voltage	Set the voltage (V) of the main circuit power supply.
Cycle Time	Shows the maximum cycle time in a multiple-axis system.

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.

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.



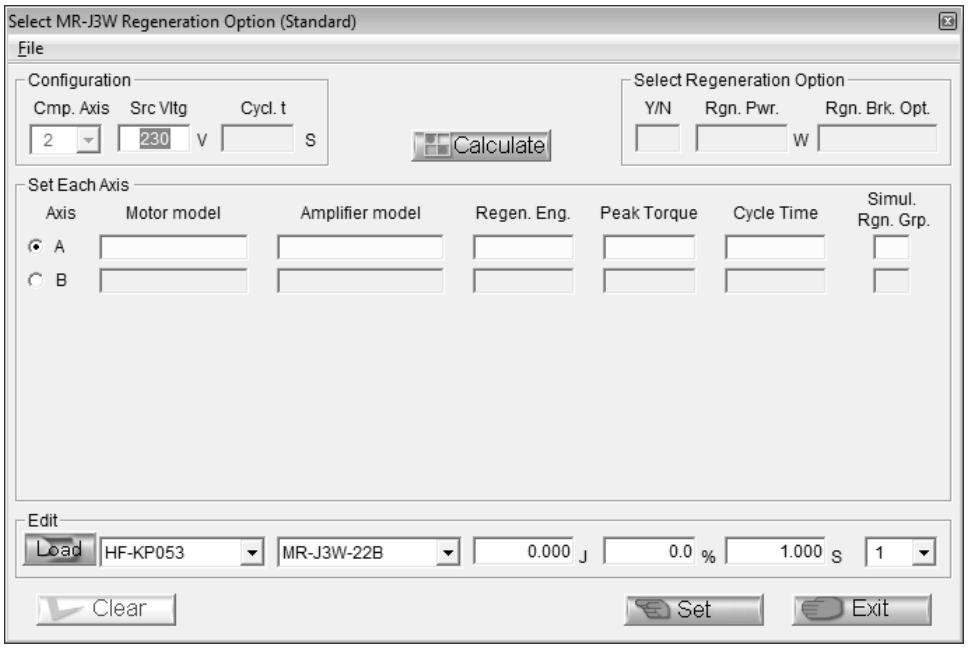
The contents of the Regeneration Option Selection field are as follows.

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
0W		Not required
Less than 30W	Less than 3063W	MR-RB032
Less than 100W	Less than 4712W	MR-RB14
Less than 300W		MR-RB34
Less than 500W		MR-RB54
500W or more		No applicable one

(b) For MR-J3W

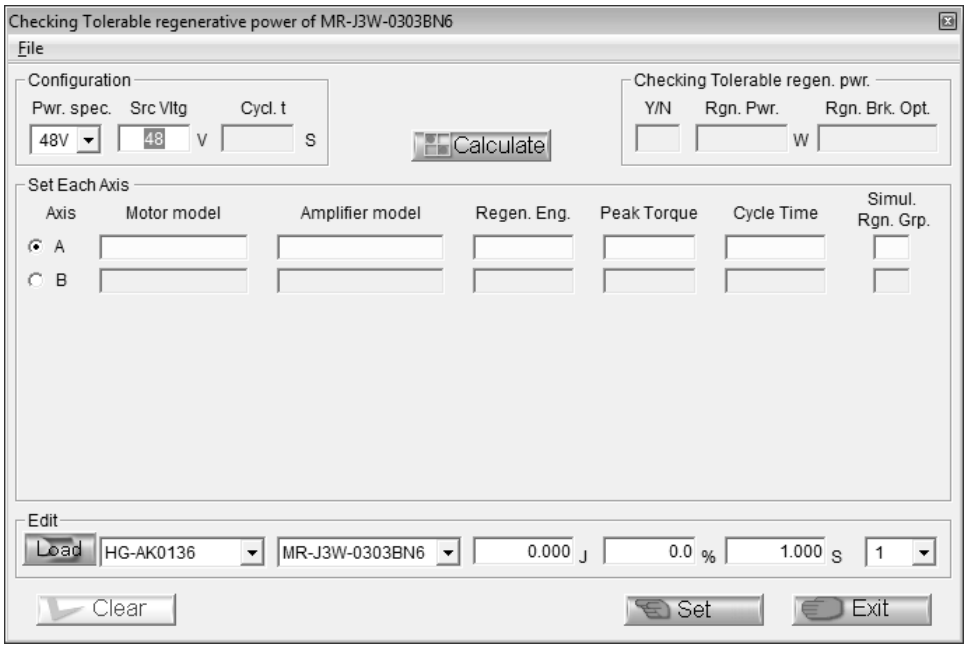
The following window appears when selecting "J3W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and clicking on "Standard".



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

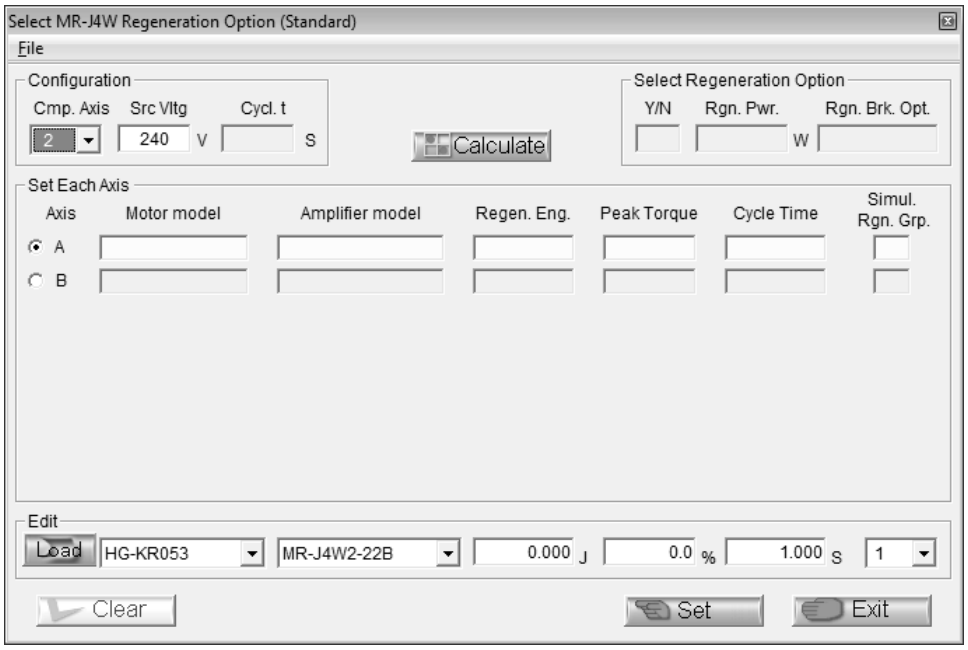
The following window appears when selecting "J3W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and clicking on "0303BN6".



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_

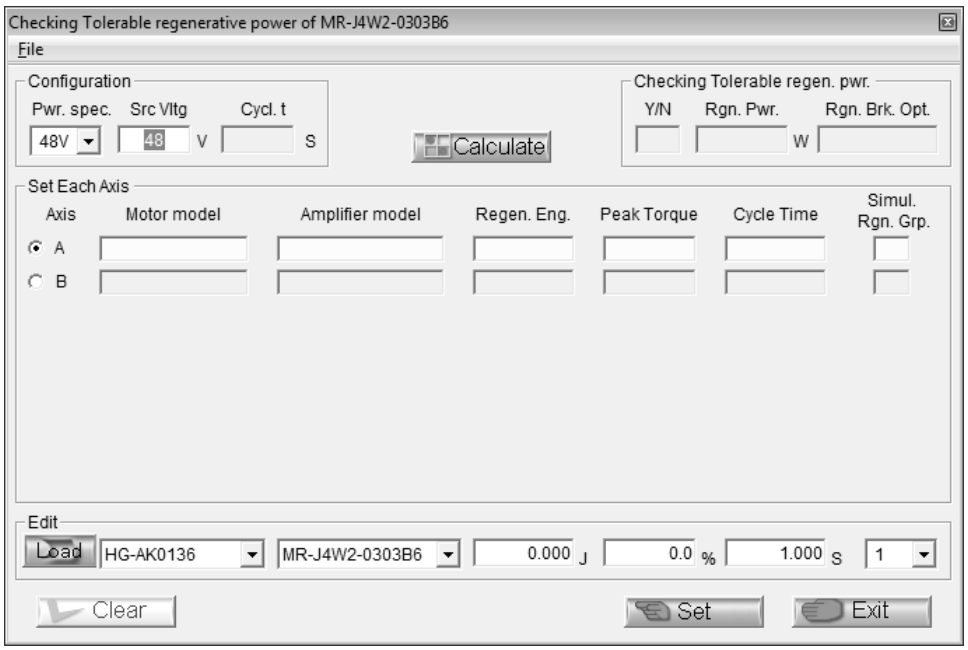
The following window appears when selecting "J4W" from "Regeneration Option for Multiple Axes Selection" on sub menu, and clicking on "Standard".



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".



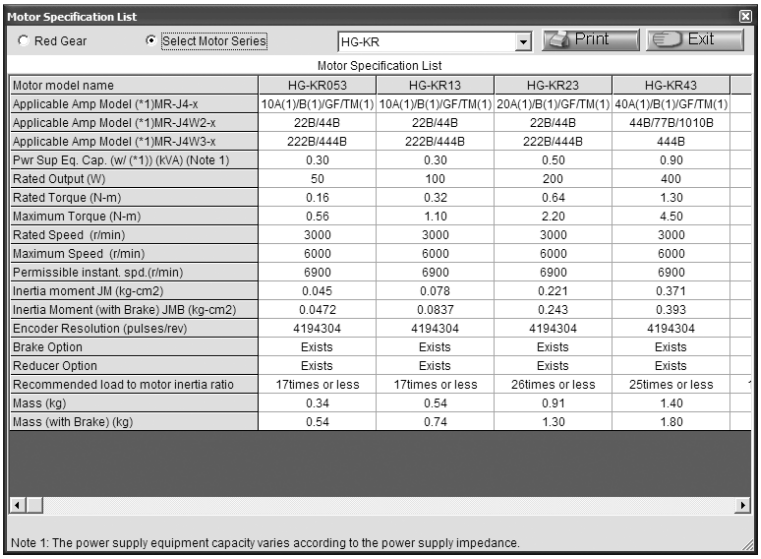
Refer to section 2.3.3 for the operation procedure in "Checking Tolerable regenerative power of MR-J4W2-0303B6".
For other commands and items, refer to section 3.2.2 (7)(a).

(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・cm^2)
Inertia Moment (with Brake)JMB	(kg・cm^2)
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 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-cm2)	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 ratio	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

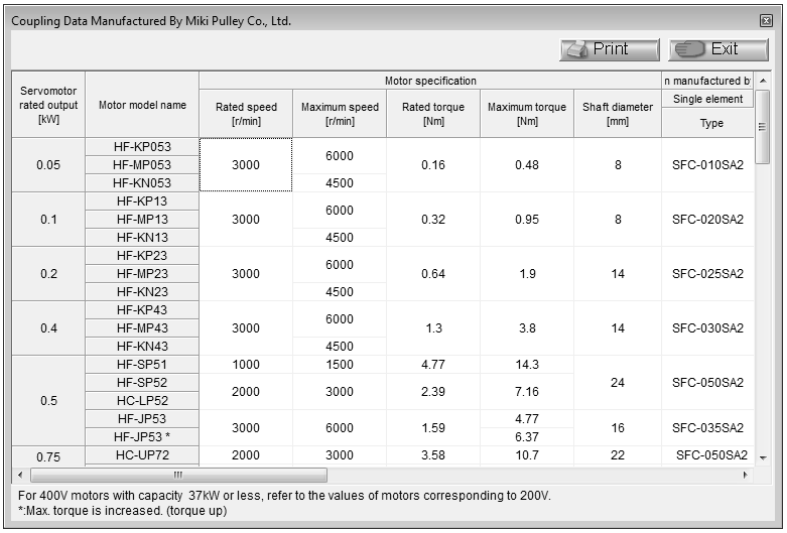
1) Click either "Red Gear" or "Select Motor Series" to select the data to be displayed. When "Select Motor Series" has been selected, also select the servo motor series.
2) Click the "Print" button to print the window contents.
3) Click the "Exit" button to end.

POINT

- When using a MR-J4-03A6, MR-J4W2-0303B6, or MR-J3W-0303BN6 amplifier supported motor, the power capacity[W] is displayed instead of the power supply capacity[kVA].
- "Applicable 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.



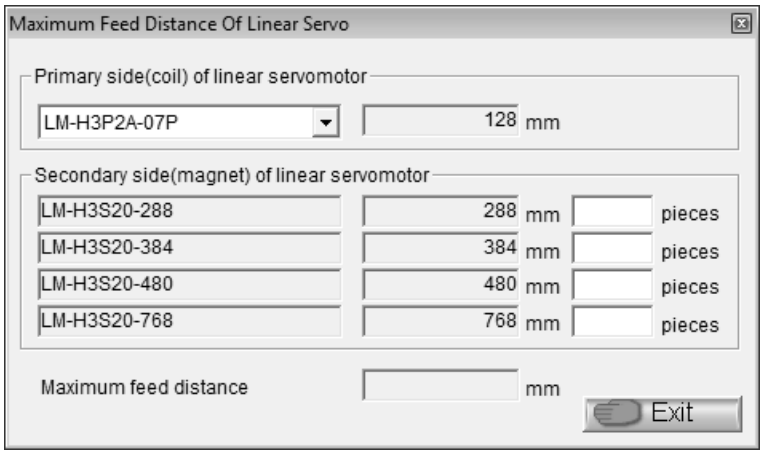
1) Click the "Print" button to print the window contents.
2) Click the "Exit" button to end.

POINT

- For 400V motors with capacity 37kW or less, refer to the values of motors corresponding to 200V.
- *:Max. torque is increased. (torque up)

(10) Maximum Feed Distance of Linear Servo

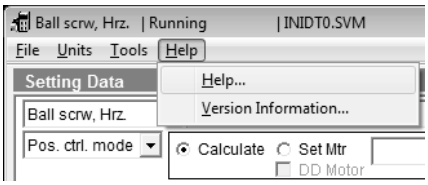
When the number of linear servo motor secondary side (magnet) is input, the maximum feed distance of linear servo can be calculated.
Click the "Maximum Feed Distance of Linear Servo" and the window as shown below will be displayed.



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.

3.2.4 Help

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



(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

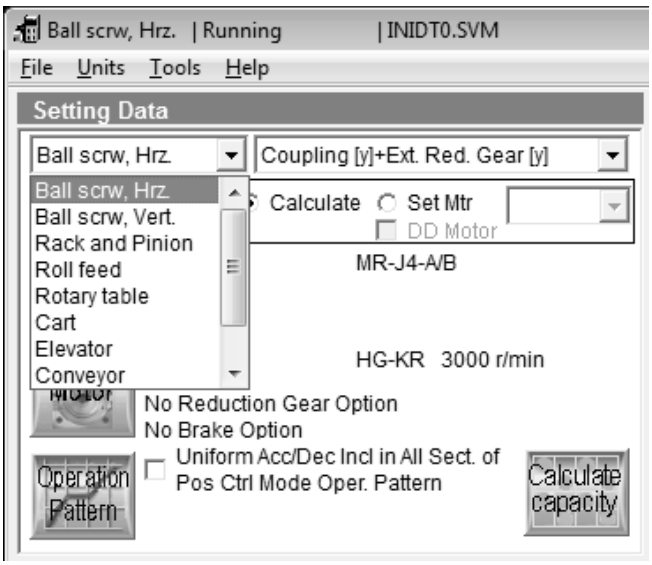
Used to display the version of the capacity selection software.

Click the "Exit" button to end.

3.3 Entry of Mechanical components data

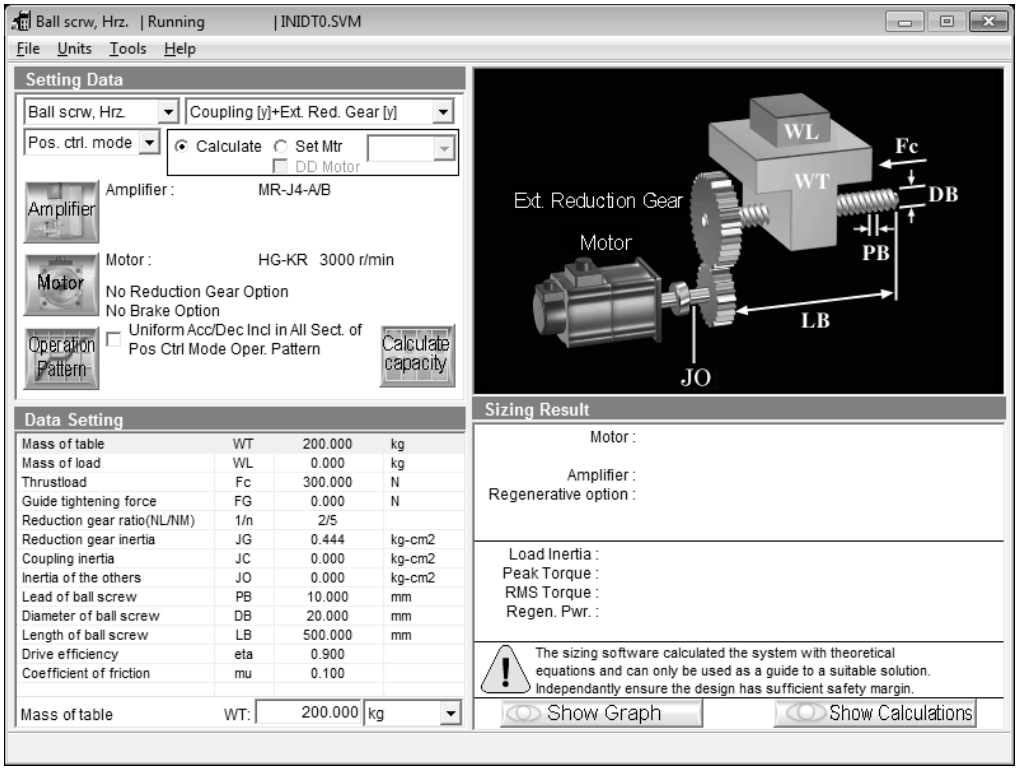
3.3.1 Application

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

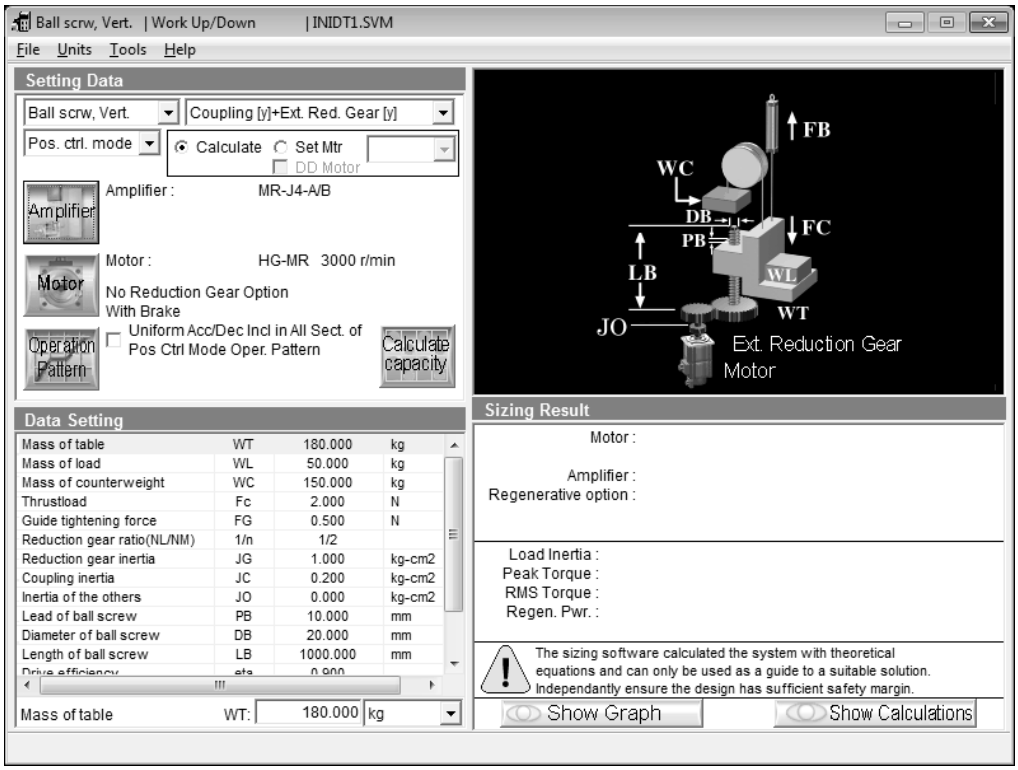


The following machine components are available.

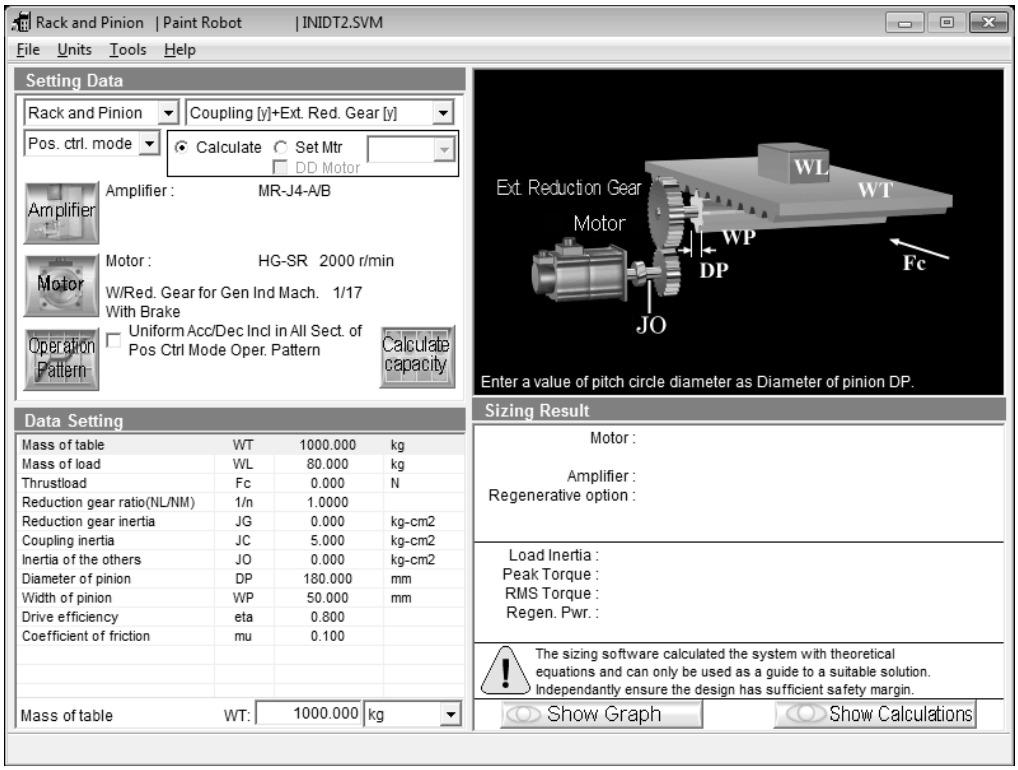
(1) Ball screw, Horizontal



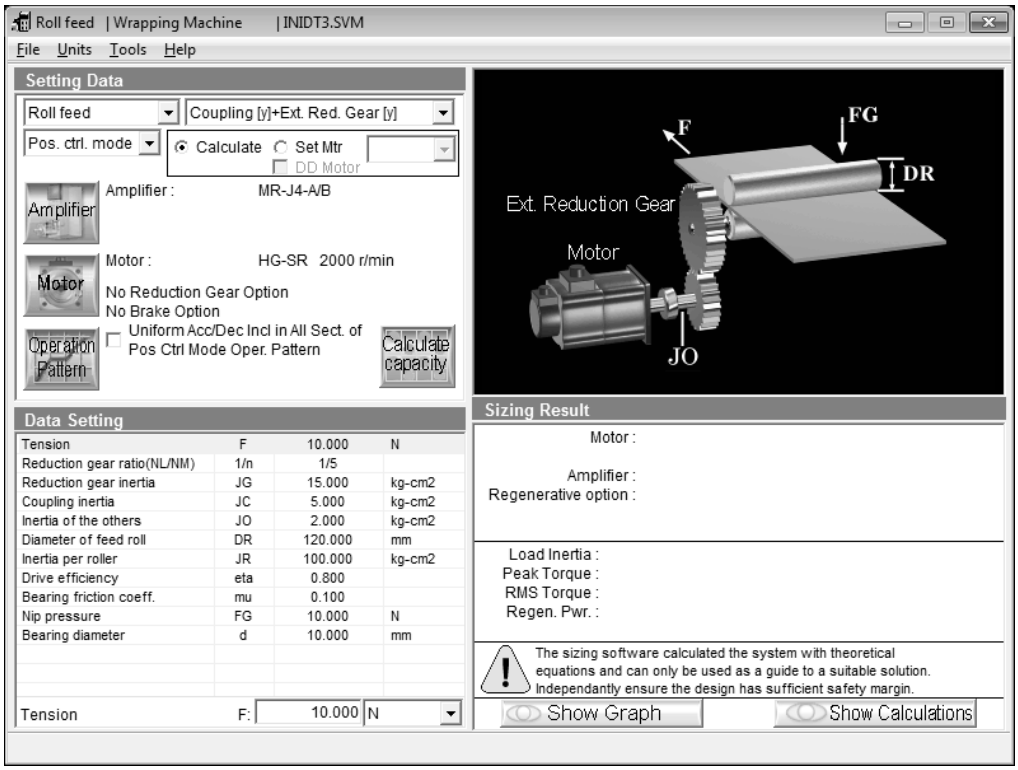
(2) Ball screw, Vertical



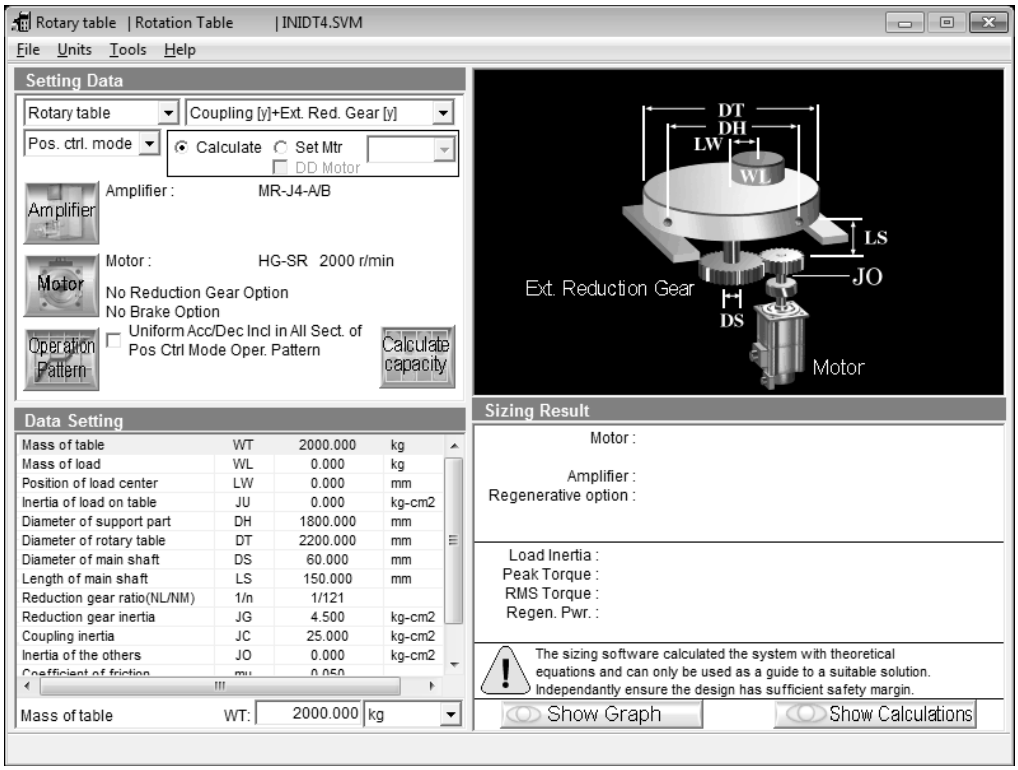
(3) Rack and Pinion



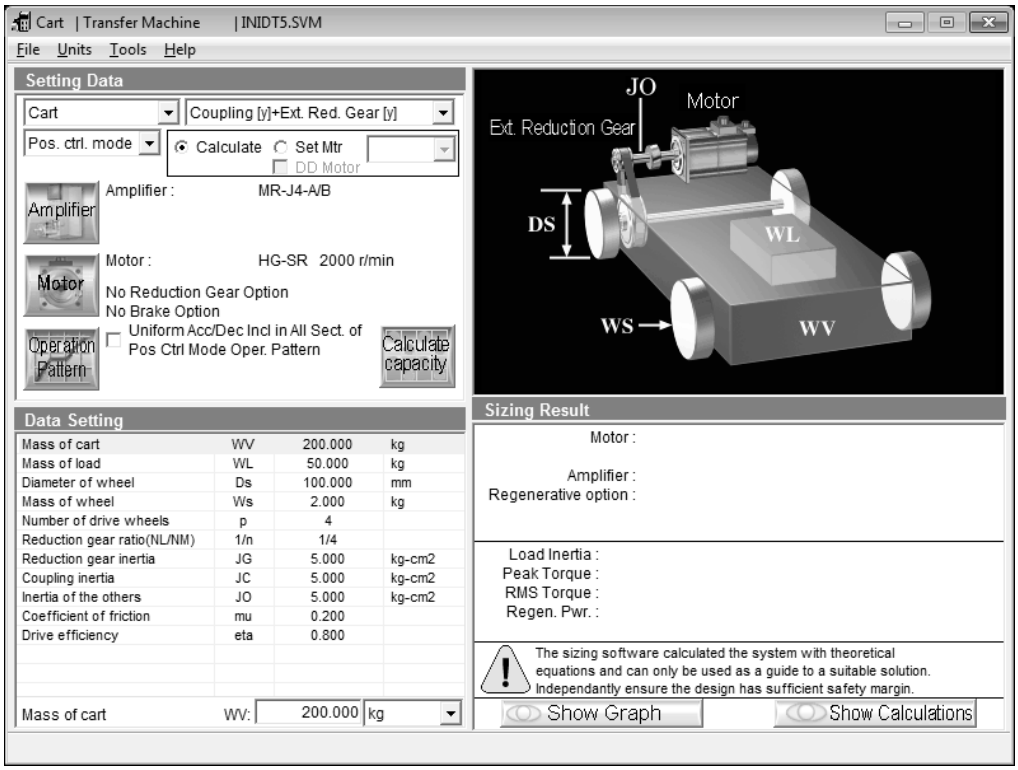
(4) Roll feed



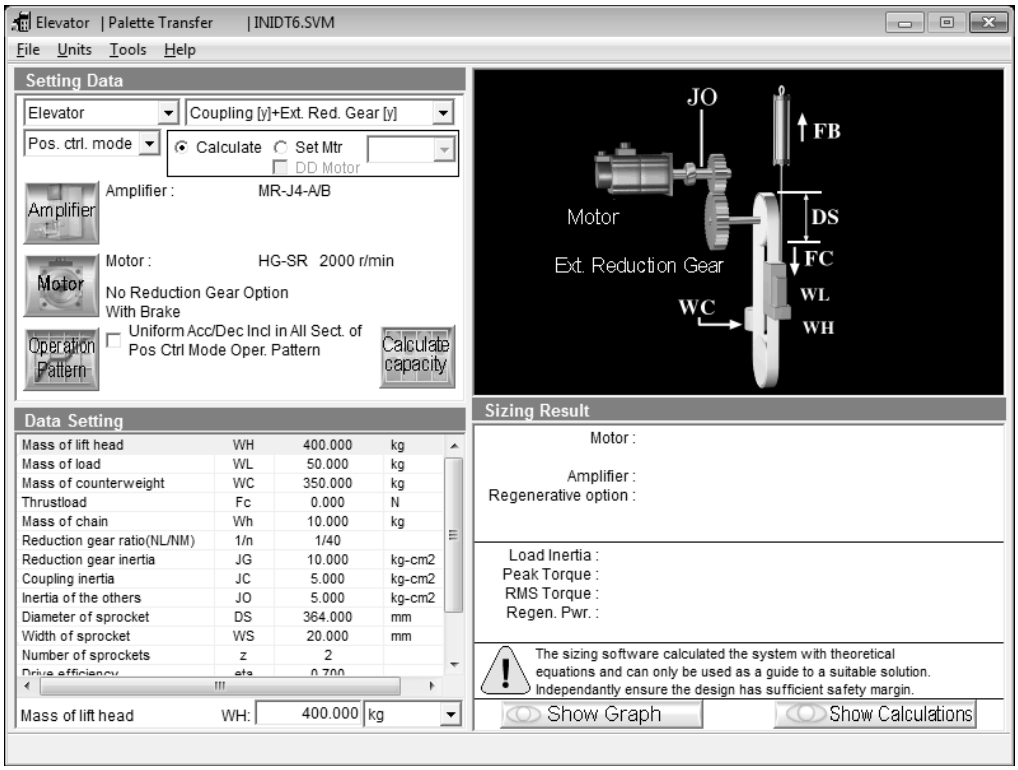
(5) Rotary table



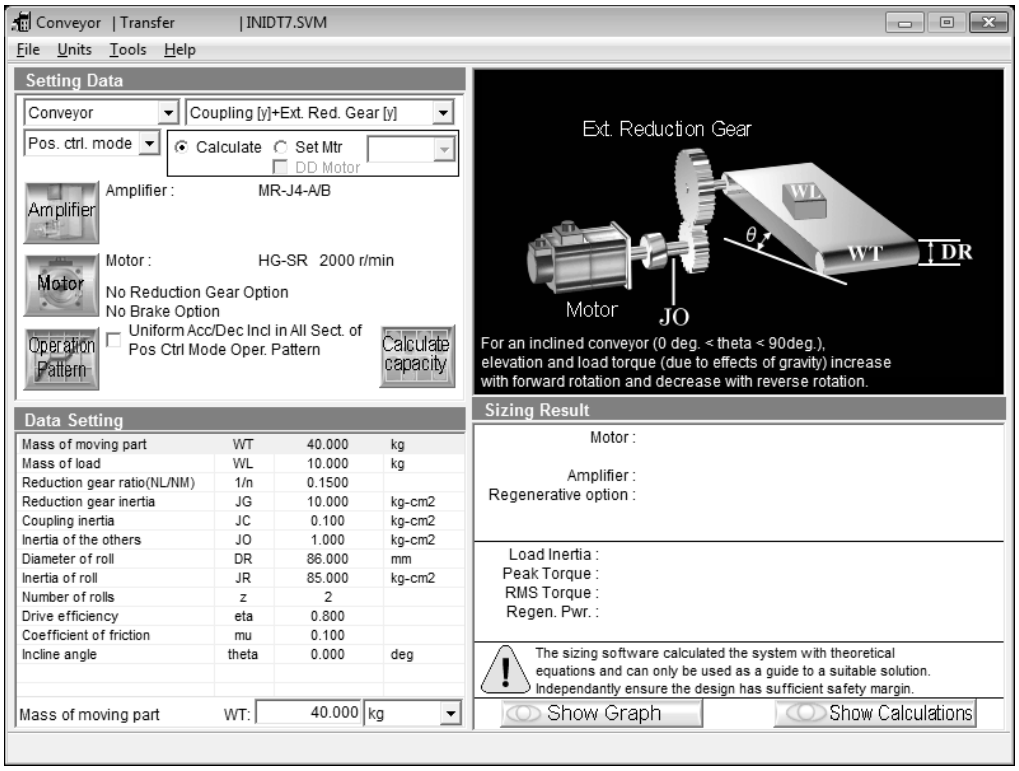
(6) Cart



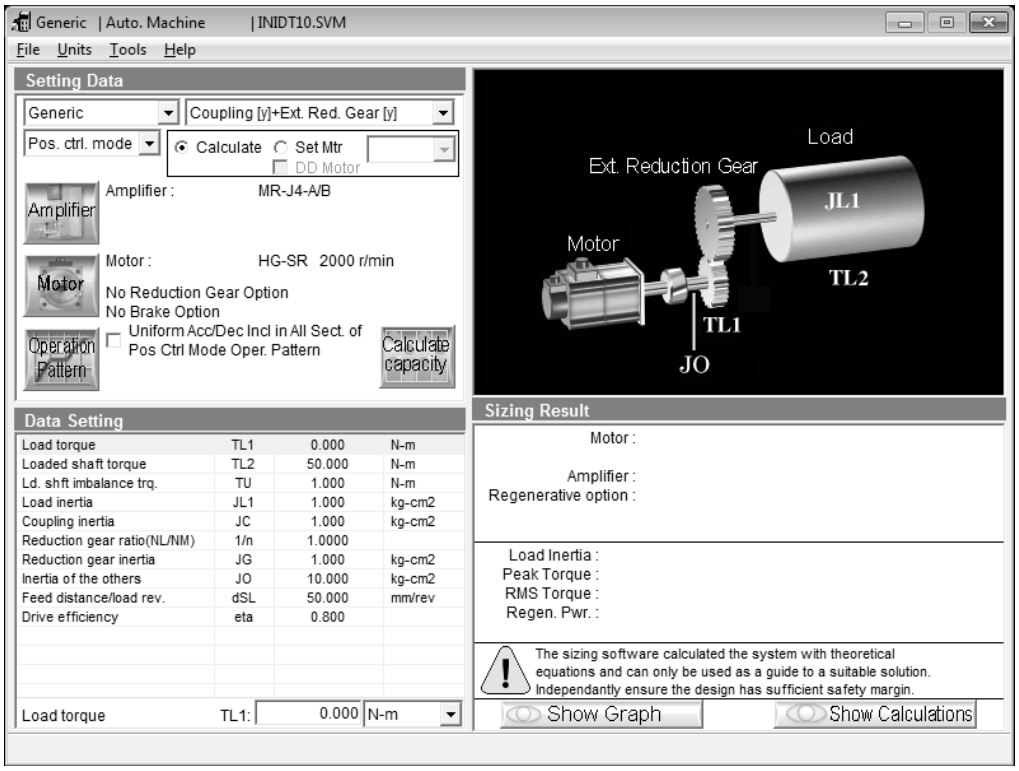
(7) Elevator



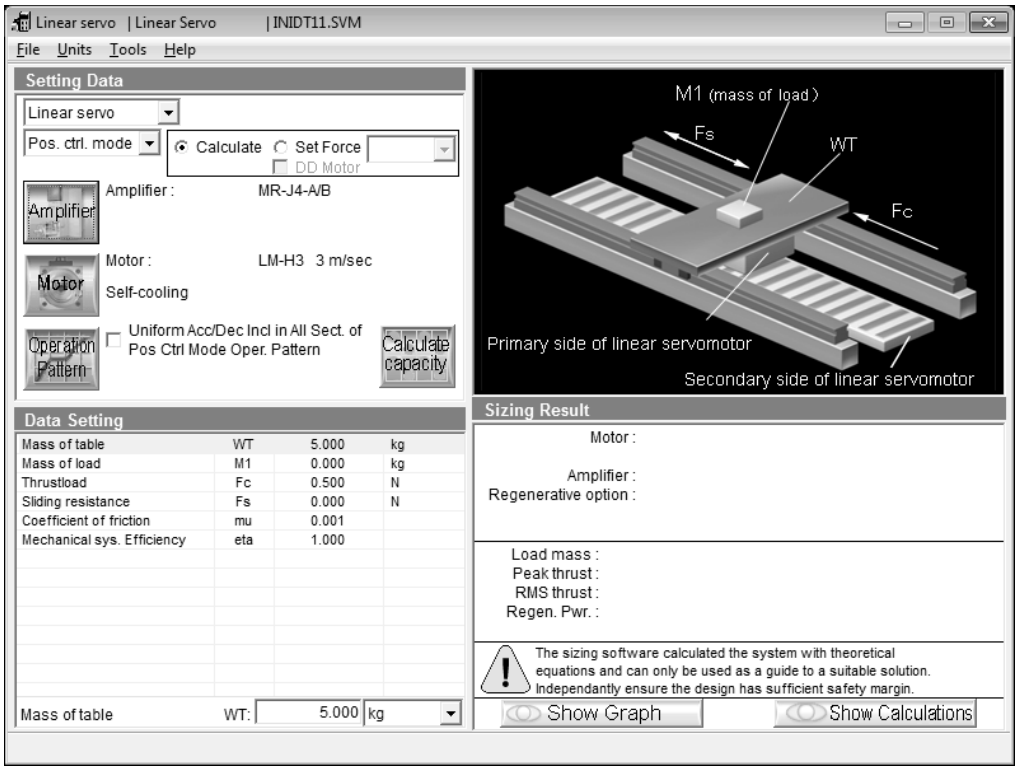
(8) Conveyor



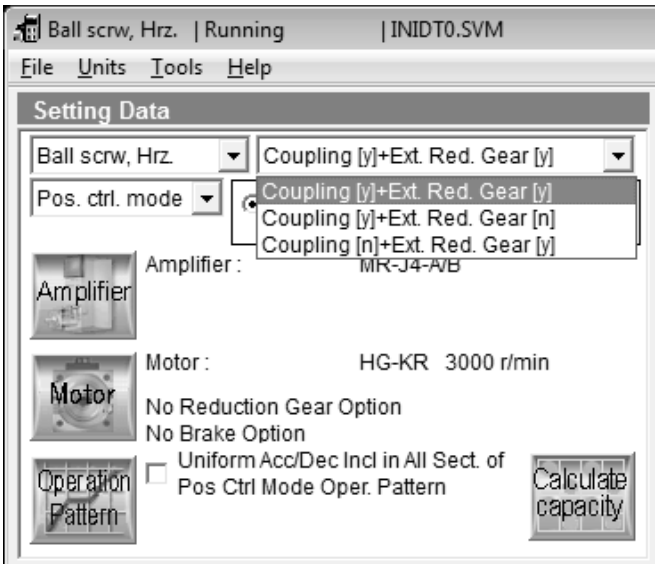
(9) Generic



(10) Linear Servo

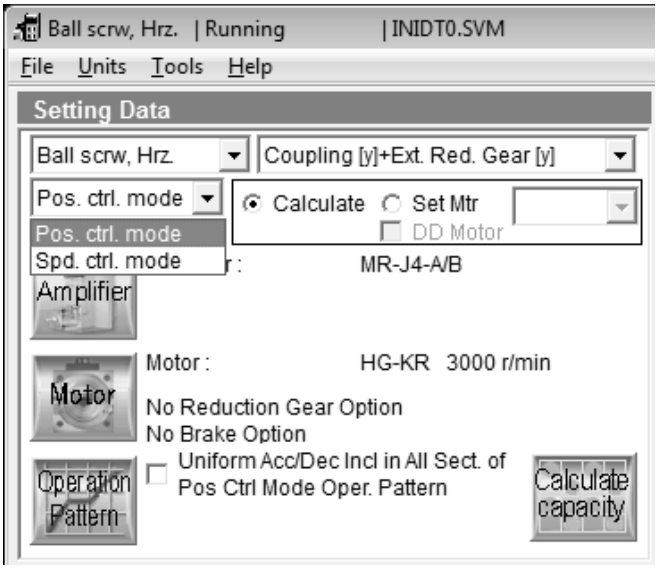


3.3.2 Coupling and external reduction gear selection



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.

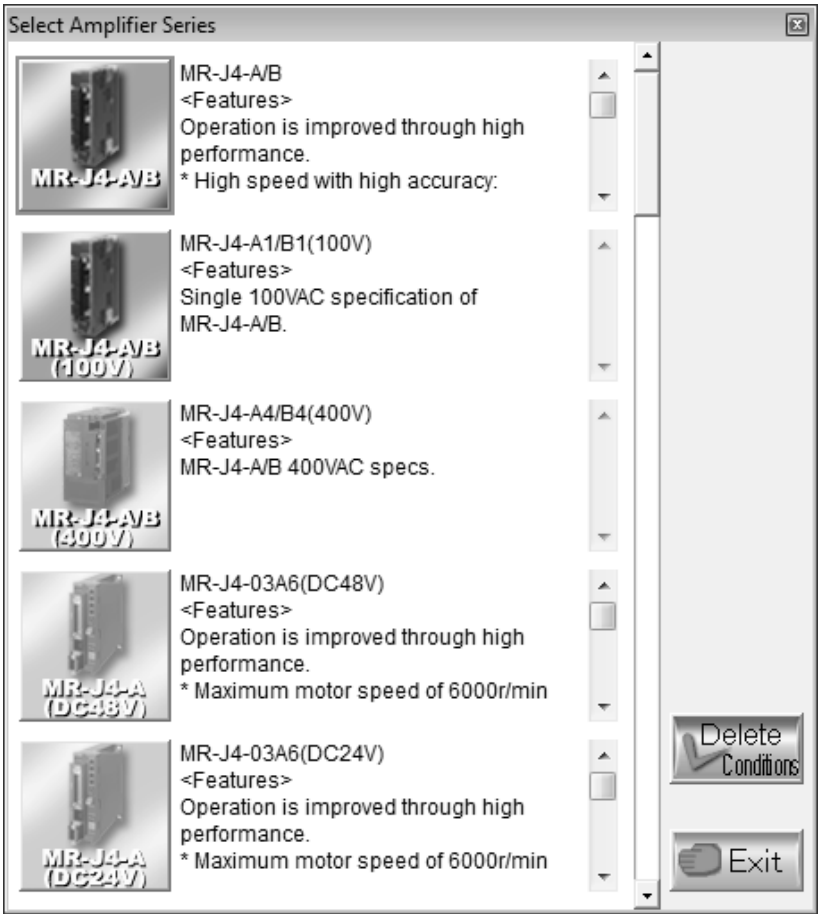
3.3.3 Control mode selection



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.

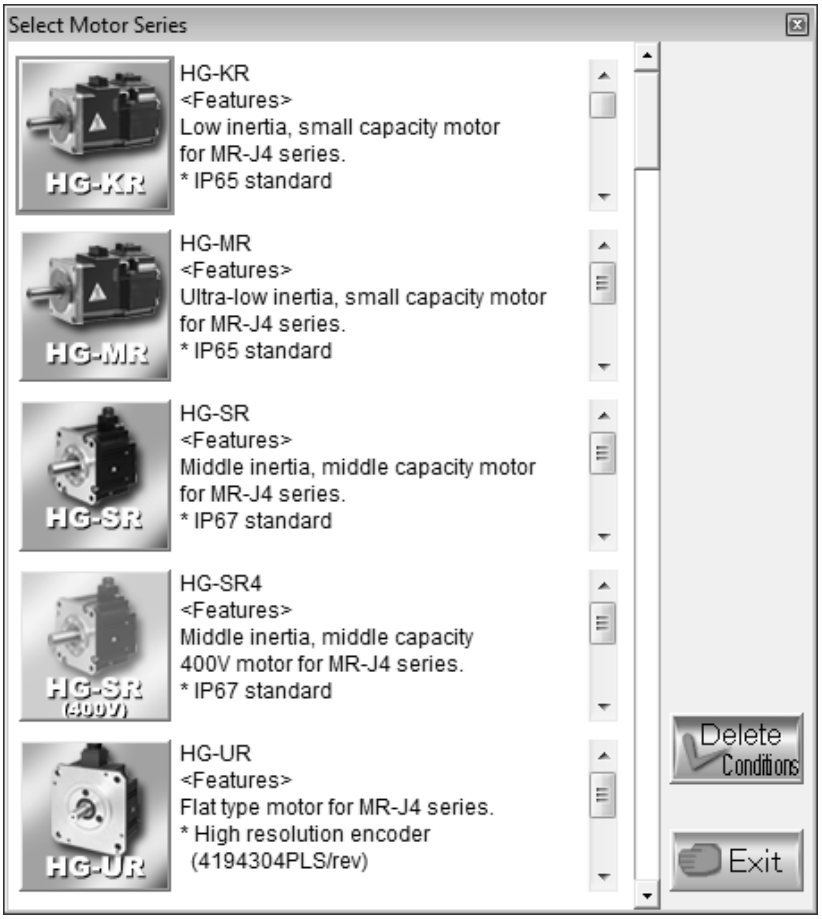


3.3.5 Motor selection

(1) Servo motor series selection

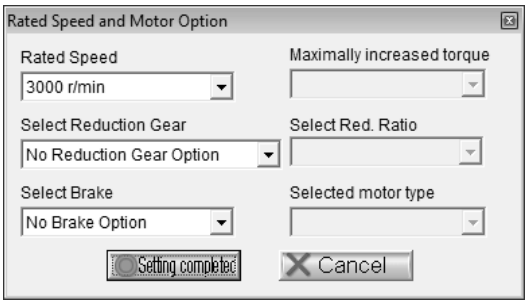
Used to select the series and rated speed of the servo motor.

Clicking the "Motor" button in the Data Setting area displays the following window appears.



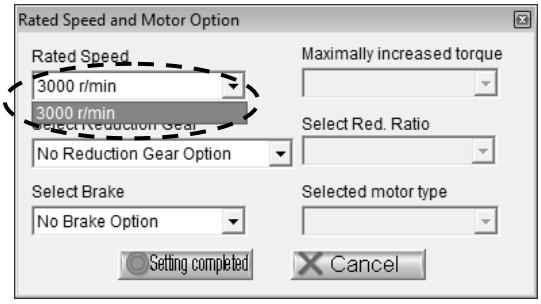
The servo motor series which cannot be driven by the servo amplifier selected are grayed out and unavailable.

(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.

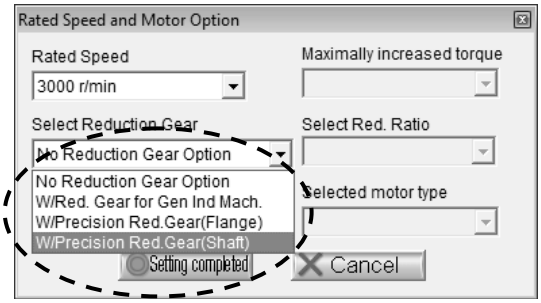


In this window, Select Rated Speed, Brake and Reduction Gear.

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

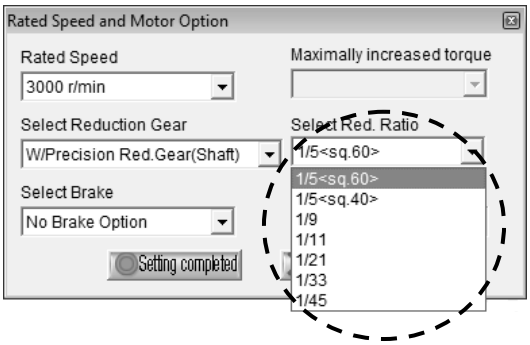


2) Click on the right of Select Reduction Gear (No Reduction Gear Option, With Reduction Gear for General Industrial Machine, With Precision Reduction Gear) to make selection.

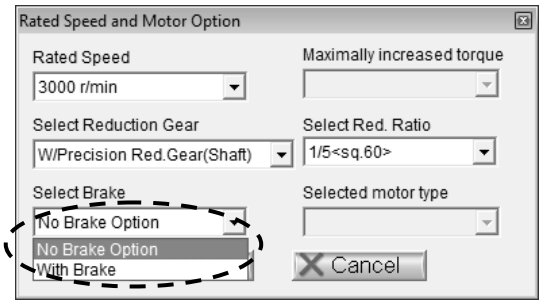


When a reduction gear has been selected as a servo motor option, please select the corresponding reduction gear ratio in the "Reduction Ratio Selection" windows which will be displayed as shown below.
The reduction ratio may only be chosen out of those available for the speed reducer selected in the Motor Option window.

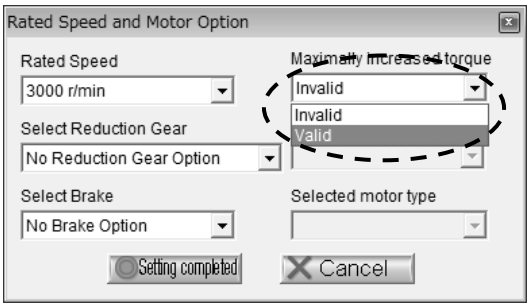
3) Click ▼ on the right of Select Reduction Ratio to make selection.



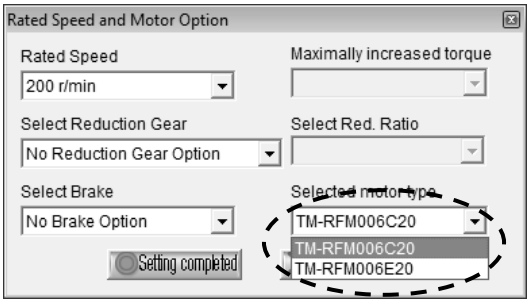
4) Selecting the brake. Click ▼ on the right of Select Brake to make selection.



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



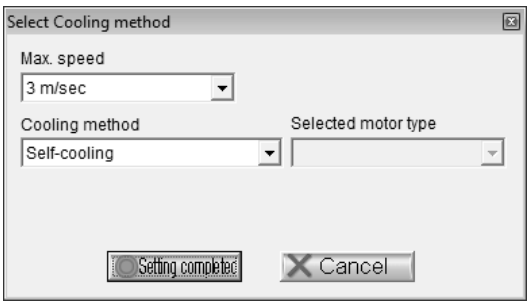
6) If several motors with same torque exist, click ▼ of the Selected motor type to open a combo box and select a motor to specify the torque.



7) After all sections are selected, click the "Setting completed" button on the Rated RPM and Motor Option window, and close the window.

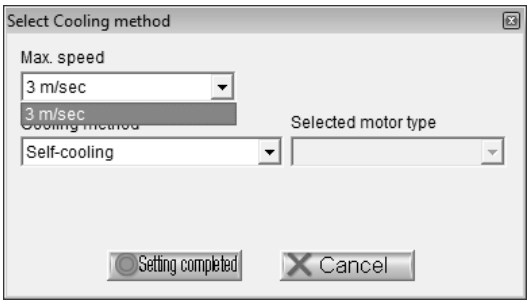
(3) Cooling method selection (for linear servo)

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

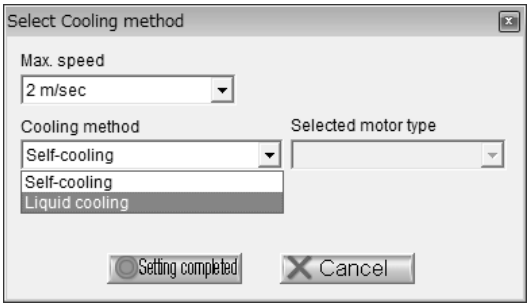


At this time, select the max. speed, cooling method, and selecting motor model.

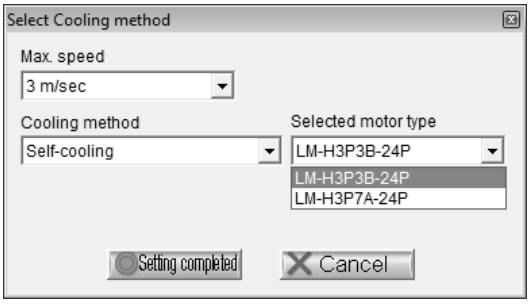
1) Click at the box showing a max. speed to display the combo box, and then select a servo motors max. speed.



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).



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.



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.

3.3.6 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.

(1) 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.

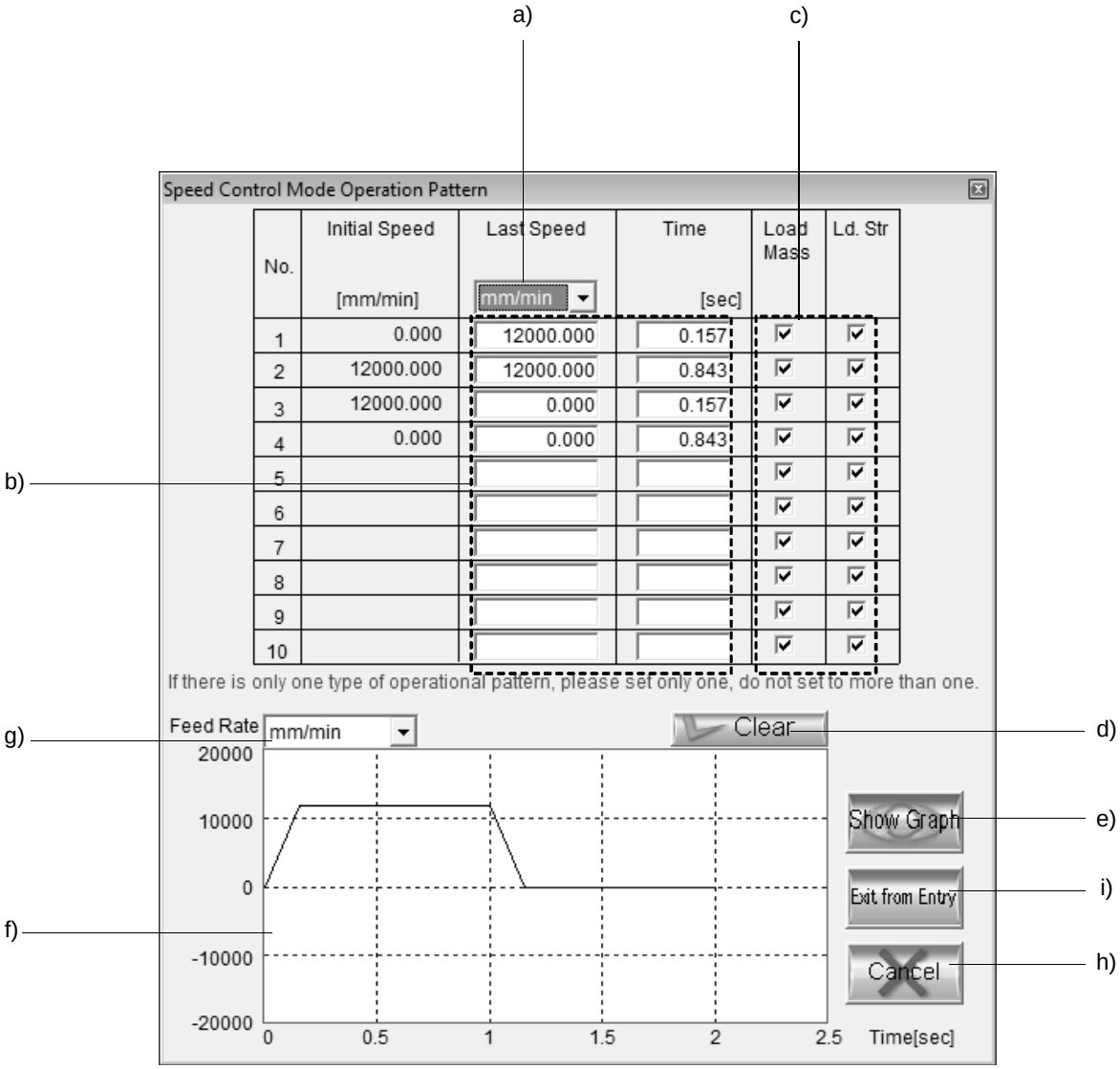
(4) Data setting
Press the "Enter" to set the data. Upon data setting, the corresponding data in the Data Setting area is updated.

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

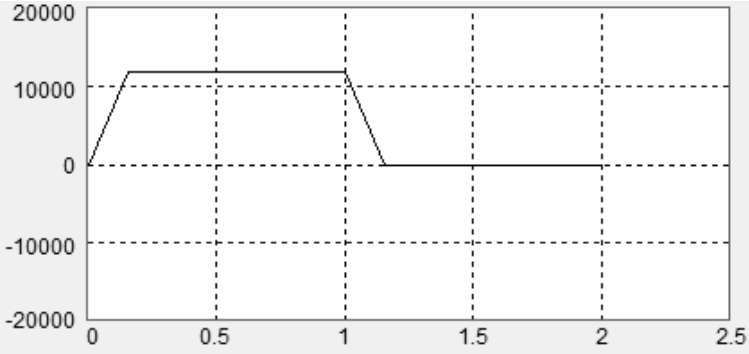
Enter the final speed and time. Clicking No. displays the Single Line Editing menu ("Insert Line", "Delete Line", "Copy Line", "Paste Line"). Line-by-line editing can be performed after selection of the menu item.

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.

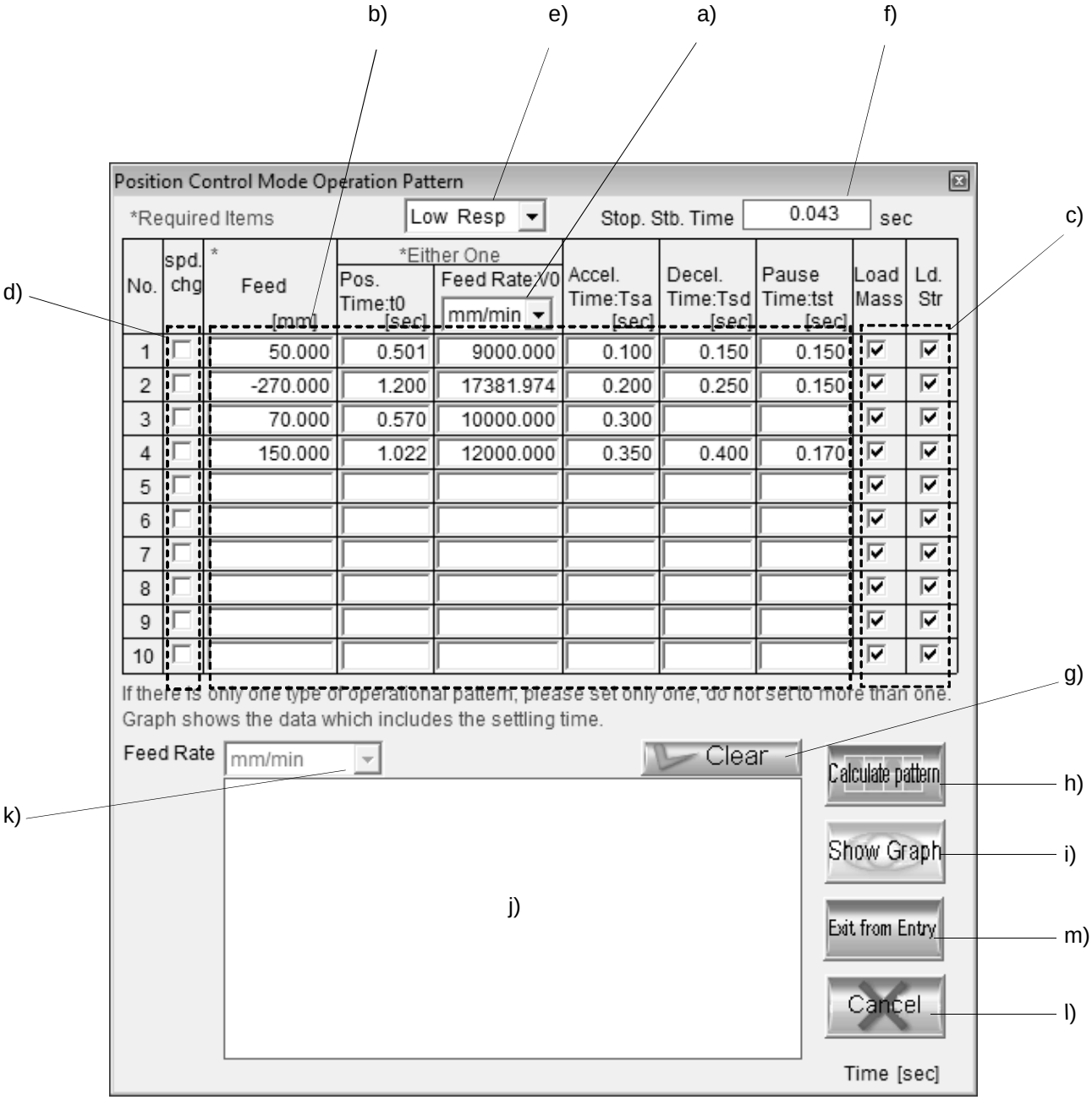
i) Exit from Entry button
Clicking the "Exit from Entry" button determines the setting and closes the window.

(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.



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.

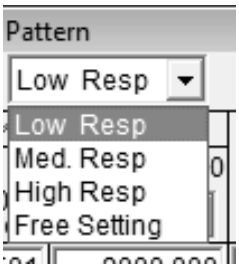
c) Load Mass, Load Antidrag Setting check box
For the Ball screw Horizontal, Ball screw Vertical, Rack and Pinion, Rotary table, Cart, Elevator, Conveyor, Generic or Linear servo, check boxes will be displayed. The check boxes are all checked in the initial setting.

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.

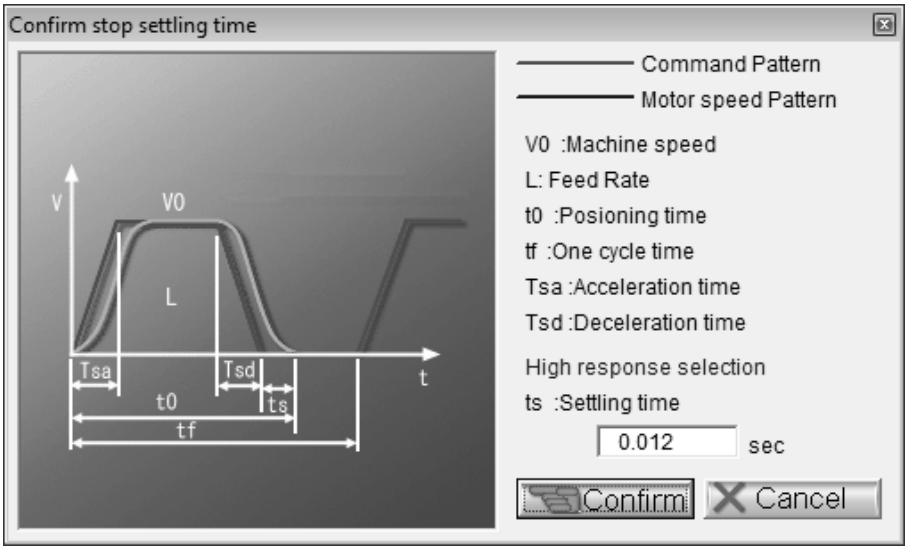
e) Response Level Selection combo box

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.

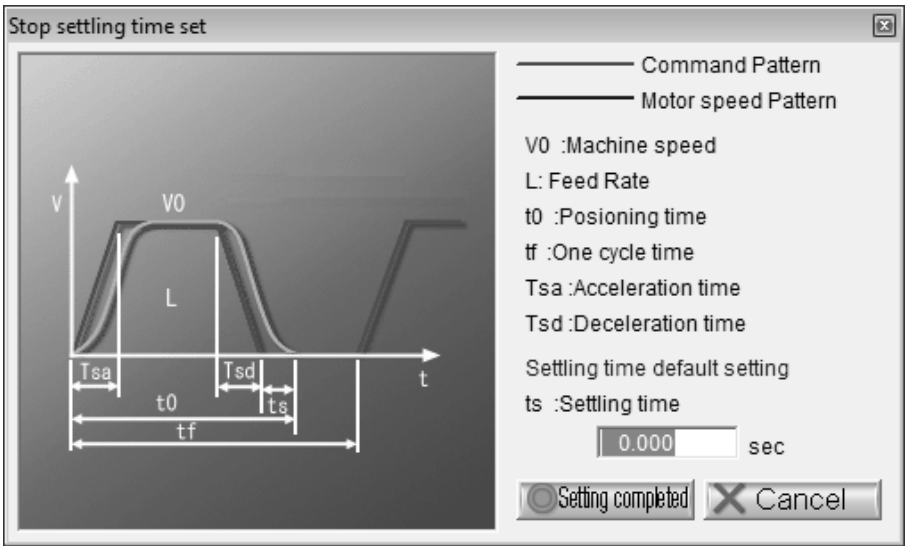


Selecting the response level opens the following window and displays the settling time (ts) of the servo motor. (The figure shows the case of high response.)



Click the "Confirm" button to close the window.

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



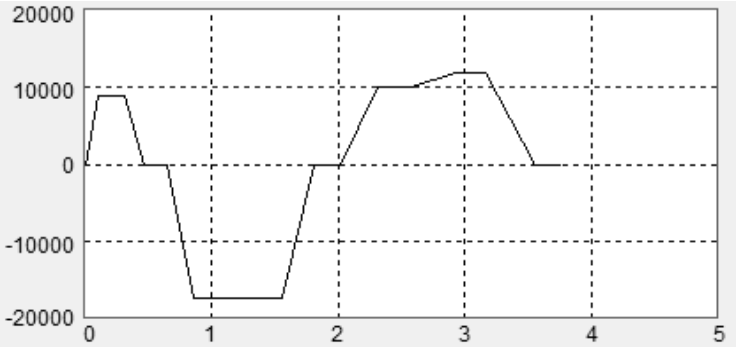
After setting, click the "Setting completed" button to close the window.

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)).



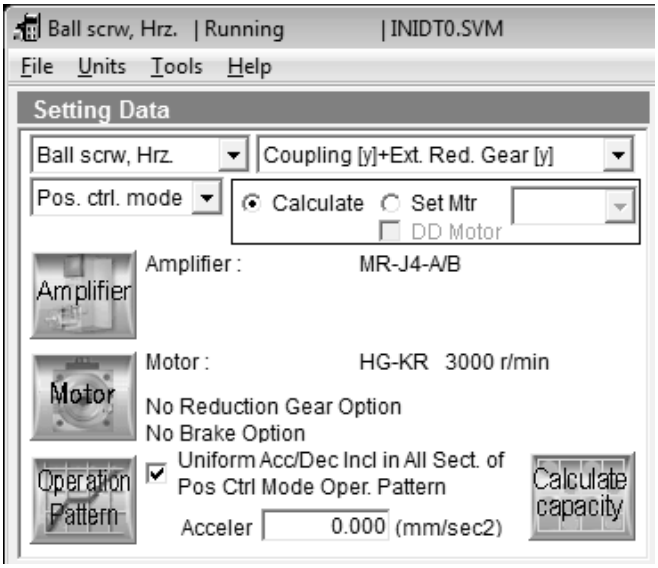
k) Graph Display Unit Selection combo box
The unit of the vertical axis in the displayed graph can be converted.

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

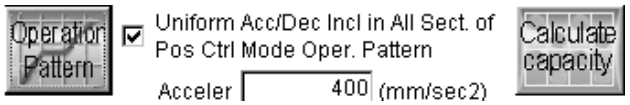
m) Exit from Entry button
Clicking the "Exit from Entry" button determines the setting and closes the window.

(3) When fixing the acceleration during acceleration/deceleration
In the position control mode, the acceleration during acceleration/deceleration can be fixed.

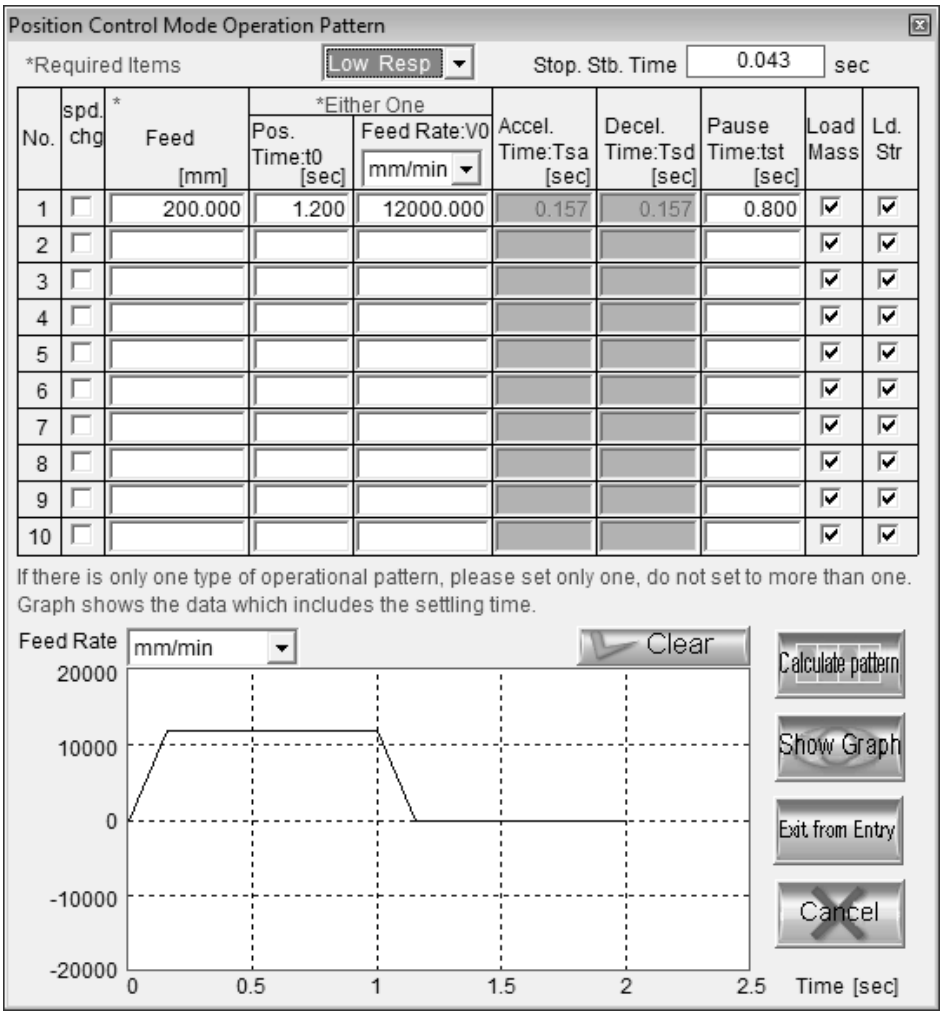
1) Clicking the "Uniform Accel./Decel. Inclination in All Intervals of Position Control Mode Operation Pattern" check box displays the acceleration entry area.



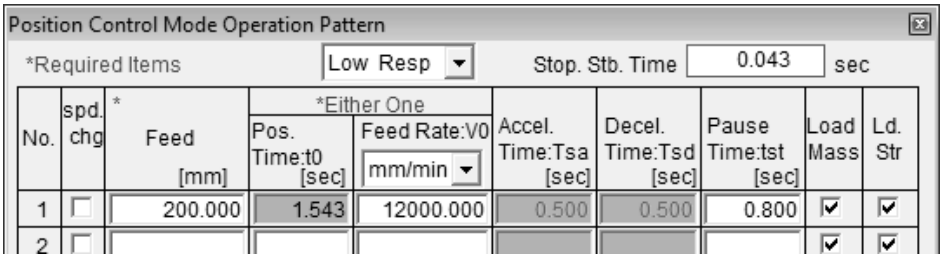
2) Enter any acceleration. (Set 400mm/s^2 as an example.)



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



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".

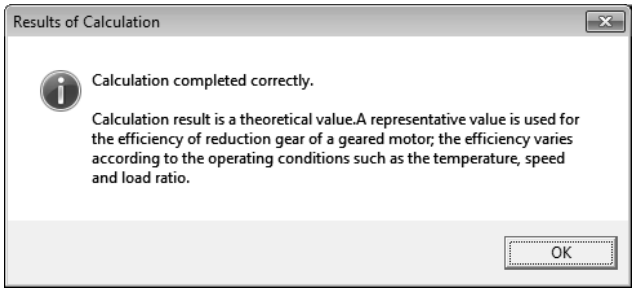


5) Clicking the "Exit from Entry" button determines the setting and close the window.

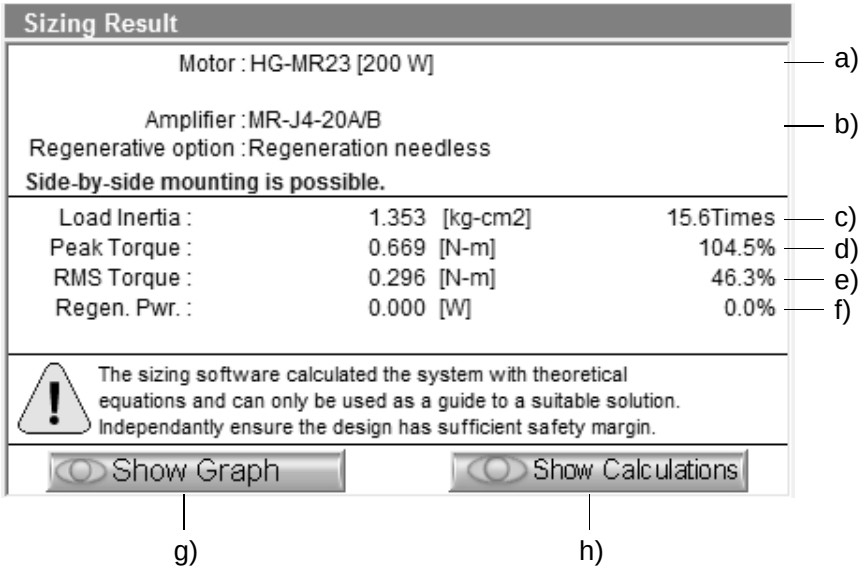
3.3.8 Execution of capacity selection (Calculate)

(1) Capacity calculation

1) 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.



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^2) or 15.6 times greater than the servo motor shaft inertia.

d) The peak torque is 0.669 [N・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.

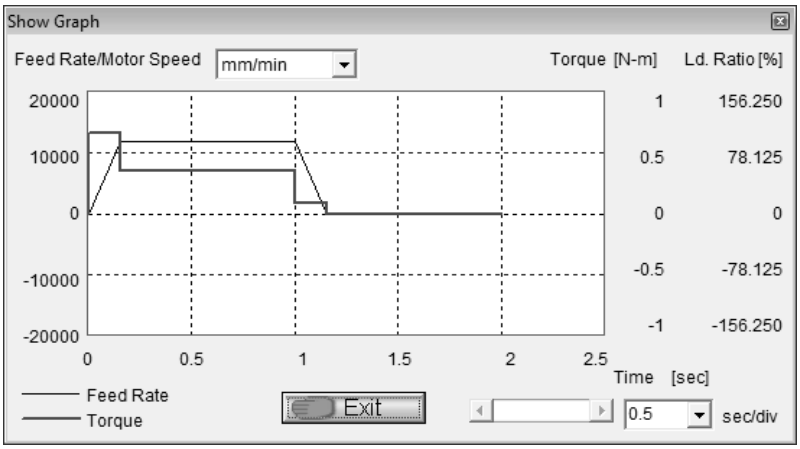
h) The Calculation Process Indication display screen will appear.

(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

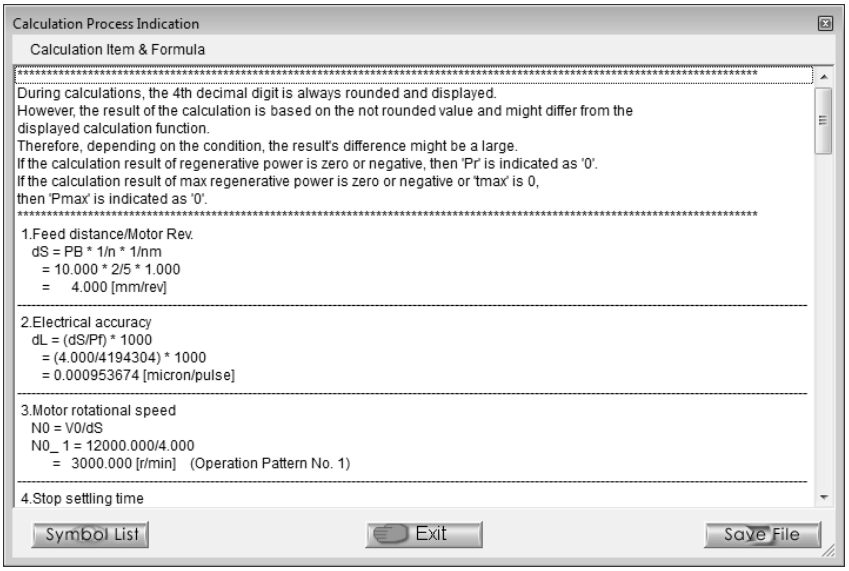
Click the "Show Graph" button ((1) 2) g) in this section) to display the calculation result graph as shown below.



Click the "Exit" button to end the window.

(b) Show Calculations

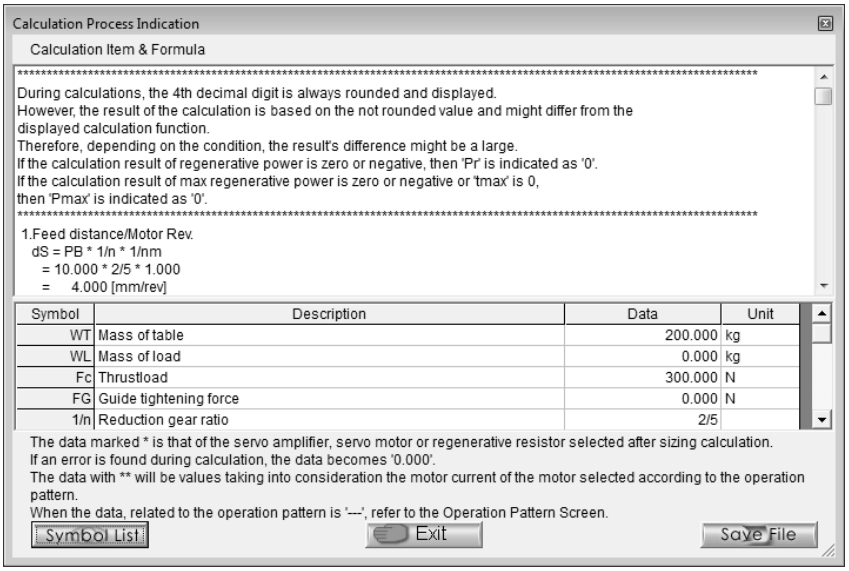
Click the "Show Calculations" button ((1) 2) h) in this section) to browse the calculation process as shown below.



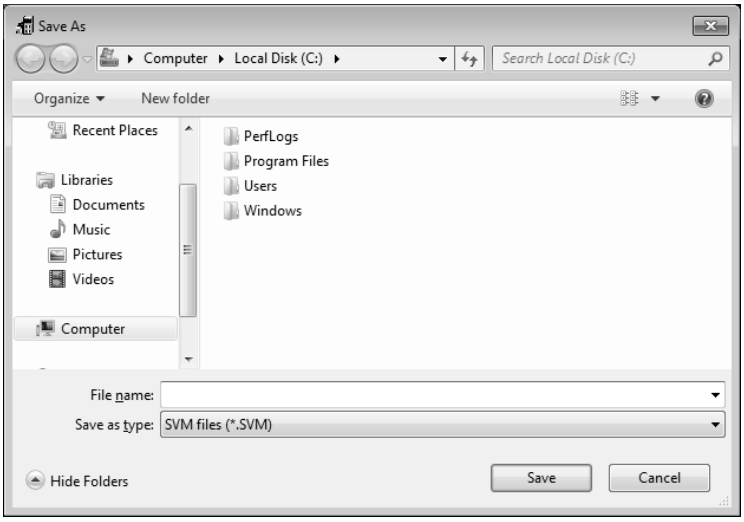
Click the "Exit" button to end the window.

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

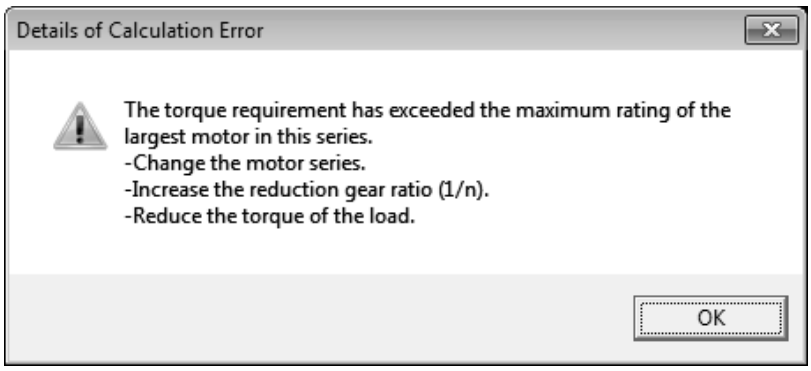
1) Symbol List
Click the "Symbol List" button to display the Symbol List at the bottom of the Show Calculations window. Click it again to undisplay the Symbol List.



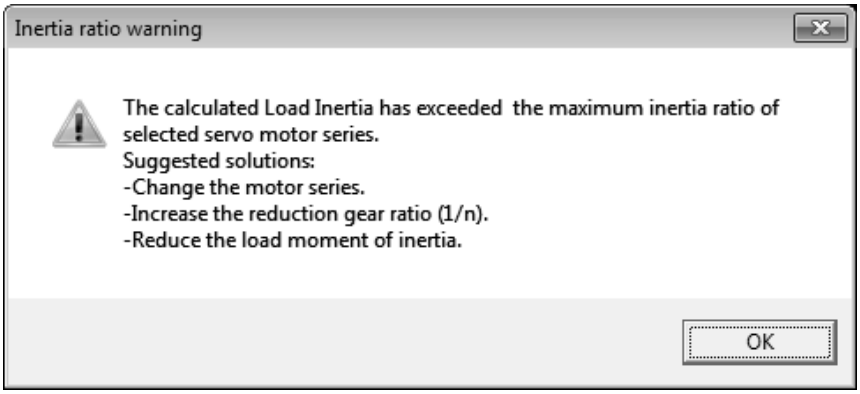
2) Save File
Click the "Save File" button to display the dialog box for saving a file. Specify a save destination, enter a file name and click the "Save" button to save the text files of "Symbol List" and "Calculations" into the save destination.



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.

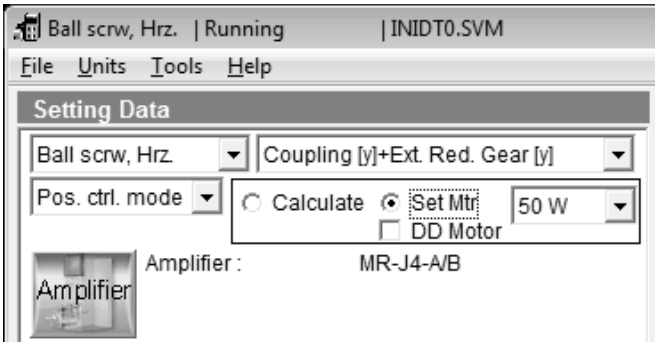


POINT
・For MR-J4W_, MR-J3W and MR-J2M, select the regenerative option in "Regeneration Option for Multiple Axes Selection" of "Tools".

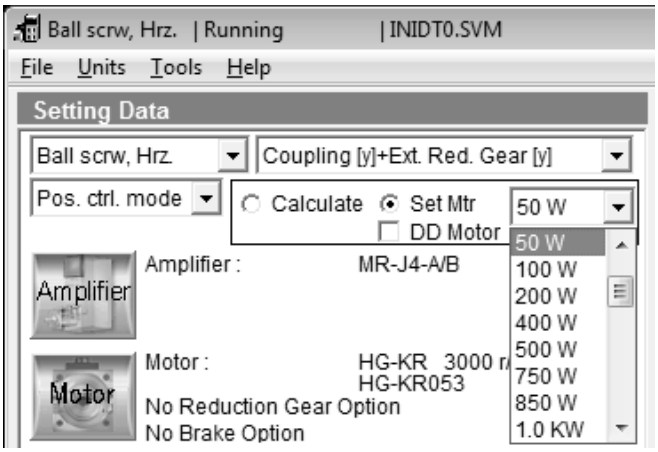
3.3.9 Starting calculation with capacity specified

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.



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

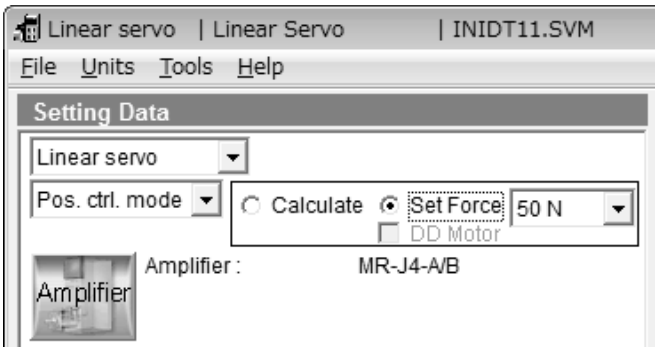


3) Click the "Operation Pattern" button.
Refer to section 3.3.7 for the operation pattern operation.

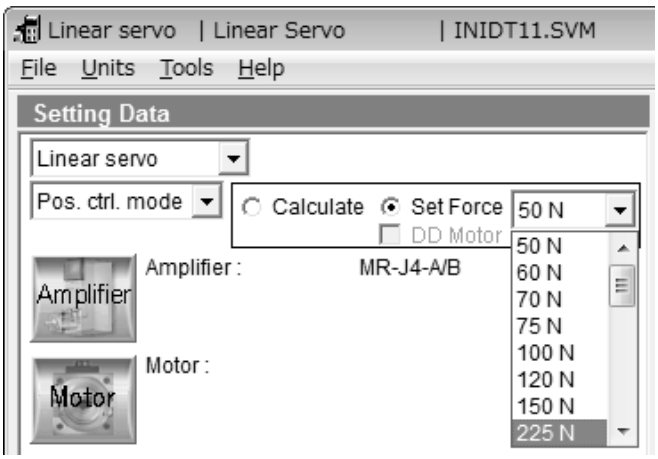
3.3.10 Specifying thrust and executing calculation (linear servo)

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.



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.



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

REVISIONS

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

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.

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.
			The sentences are partially reviewed.
		Section 3.3.8	The screen is changed.
		Section 3.3.9	The screen is changed.
			The sentences are partially reviewed.
		Section 3.3.10	The item of "Specifying thrust and executing calculation (linear servo)" is added.
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.
			Description of procedure 13 is changed.
		Section 2.2.2(2), (4), (5), (7), (8), (13)4)	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-RJ080W, 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 motors 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, MR-J4W3-B servo amplifier is added. HG-KR, HG-MR, HG-SR 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) The sentences are partially reviewed. Section 3.2.3(7)(a)3) The sentences are partially reviewed. Section 3.2.3(7)(a)4) The screen is changed. The sentences are partially reviewed. Section 3.2.3(7)(b) The screen is changed. Section 3.2.3(7)(c) Added. Section 3.2.3(8) The screen is changed. The sentences are partially reviewed. Section 3.2.3(9) The screen is changed. The 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, MR-J3W-0303BN6 servo amplifier is added. HG-JR, HG-AK servo motor 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. 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 2.2.2(11)7)	The screen is changed.
		Section 2.2.2(12)	The screen is changed. The sentences are partially reviewed.
		Section 2.2.2(13)4)	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(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 motor is added. MR-J4-A4/B4 amplifier supports HG-SR motor. MR-J4W2-B amplifier supports 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® 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
Sep. 2014	IB(NA)0300073-P	MR-J4-A1/B1 servo amplifier supports LM-H3/LM-K2/LM-U2 linear servo motor and TM-RFM direct-drive motor. Section 1.2 Addition of Windows® 8.1. Note is changed. Section 2.2.2(1)1) The screen is added. Section 2.2.3(1)1) The screen is changed.
Dec. 2014	IB(NA)0300073-Q	Servo amplifiers MR-J4-03A6, MR-J4W2-0303B6, and MR-JE-B are added. The selection example has been replaced from MR-J2S to MR-J4. All screenshots have been replaced with those on Windows® 7. Section 1.1(1) The table is changed. Section 2.2.1 The servo amplifier/servo motor condition is changed. Section 2.2.2(6) The screen is changed. Section 2.2.2(7) The servo amplifier condition is changed. Section 2.2.2(8) The servo motor condition is changed. Section 2.2.2(11)1) 2) 3) 5) The screen is changed. Section 2.2.2(12) The calculation result is changed. Section 2.3.1(1)2) The screen is changed. Section 2.3.2(1)2) (2)2) The screen is changed. Section 2.3.3(1)2) (2)2) The sentences are partially reviewed. The screen is changed. Section 2.3.3(2)3) The screen is changed. Section 2.3.3(3) Added. Section 3.1.2(5) The screen is changed. Section 3.2.1(5)(a)(b)(c)(d) Printout is changed. Section 3.2.3(7)(d) The sentences are partially reviewed. The screen is changed. Section 3.2.3(7)(e) Added. Section 3.2.3(8) POINT is changed. Section 3.3.4 The screen is changed. Section 3.3.5(2)2) The sentences are partially reviewed. Section 3.3.7(2)(3) The screen is changed. Section 3.3.8 The calculation result is changed.
Nov. 2015	IB(NA)0300073-R	Servo amplifiers MR-J4-TM, MR-J4-TM1, and MR-J4-TM4 are added. Section 2.2.1 The sentences are partially reviewed. Section 2.2.2(10) The sentences are partially reviewed. The screen is changed. Section 2.2.2(13) Printout is changed.
Jan. 2016	IB(NA)0300073-S	Servo amplifiers MR-J4-GF, MR-J4-GF4, and MR-JE-AS are added. Servo motors HJ-KS(J) and HJ-FS(J) are added. Section 1.1(1) The table is changed. Section 1.2 Note is changed. Section 2.2.1 The sentences are partially reviewed. Section 2.2.2(7)(12) The sentences are partially reviewed. The screen is changed. Section 2.2.2(13) Printout 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.
Oct.2017	IB(NA)0300073-U	Section 1.1(1)	MR-J4-TM/MR-J4-TM1 servo amplifier supports TM-RG2M/TM-RU2M direct-drive motor.

MODEL	
MODEL CODE	

MITSUBISHI ELECTRIC CORPORATION

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IB (NA) 0300073-U (1710)