

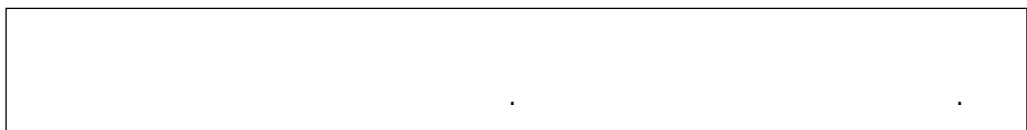
MITSUBISHI



AC

MELSERVO

MRZJW3-MOTSZ111



● 안전상의 주의 ●

(사용하시기 전에 반드시 읽어 보십시오)

본 설명서에는 안전상의 주의 사항이 포함되어 있습니다. 이 설명서를 사용하여 제품을 설치하고 사용할 때 반드시 이 설명서를 읽고, 설명서의 내용을 숙지하십시오.



위험

가



주의

가

본 설명서에는 안전상의 주의 사항이 포함되어 있습니다. 이 설명서를 사용하여 제품을 설치하고 사용할 때 반드시 이 설명서를 읽고, 설명서의 내용을 숙지하십시오.



()

「 」



가



()

(earth)



가

「 」

가

• Windows Microsoft Corporation
• 「 AC MELSERVO

」

• 가
• ,



주의

가

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

A - 2

1	1-1 ~ 1-8
1.1	1- 1
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1.3	1- 3
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MEMO

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한국미쓰비시전기오토메이션(주)

1. 서두

MELSERVO

제1장 서두

1.1 사양

(1)

	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-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
HC - KFS	○	○		○					
HC - MFS	○	○		○					
HC - SFS	○		○						
HC - RFS	○								
HC - UFS	○	○		○					
HC - LFS	○								
HA - LFS	(1) ○		○						
HF - KP					○	○			
HF - MP					○	○			
HF - SP					○		○		
HA - LP					(2) ○		(3) ○		
HC - UP					○				
HC - RP					○				
HC - LP					○				
LM - H2								○	
LM - F								○	○
LM - U2								○	

- () 1. MR - J2S - CP 7kW 가
 2. MR - J3 - B - RJ006/MR - J3 - T 25kW 가
 3. MR - J3 - B4 - RJ006/MR - J3 - T4 22kW 가

(2)

		MRZJW3 - MOTSZ111
		() . &
		() .
		() .
		()
		(Hanging)

- () MR - J2M

1. 2 필요한 시스템 구성

		(1)
(2, 3)	OS	Windows 98 , Windows Me , Windows 2000 Professional , Windows XP Professional , Windows XP Home Edition , Windows Vista Home Basic , Windows Vista Home Premium , Windows Vista Business , Windows Vista Ultimate , Windows Vista Enterprise IBM PC/AT
		Pentium 133MHz (Windows 98 , Windows 2000 Professional) Pentium 150MHz (Windows Me) Pentium 300MHz (Windows XP Professional , Windows XP Home Edition) 1GHz 32 (x86) (Windows Vista Home Basic , Windows Vista Home Premium , Windows Vista Business , Windows Vista Ultimate , Windows Vista Enterprise)
		24MB (Windows 98) 32MB (Windows Me , Windows 2000 Professional) 128MB (Windows XP Professional , Windows XP Home Edition) 512MB (Windows Vista Home Basic) 1GB (Windows Vista Home Premium , Windows Vista Business , Windows Vista Ultimate , Windows Vista Enterprise)
		40MB
		Internet Explorer 4.0
		800 × 600 , High Color(16bit) 가 가 . 가 .
		가 .
		가 .
		가 .

- () 1. Windows, Windows Vista Microsoft Corporation
Pentium Intel Corporation
2. 가 가 .
3. 64 Windows XP 64 Windows Vista

1. 3 기본적인 용어의 설명

(Mouse pointer)

(Point)

(Click)

1

(Double - click)

2

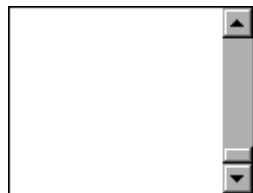
(Drag)

(Focus)

(Text box)

(List box)

1



(Combo box)

1



(Check box)

1

가

(Option button)

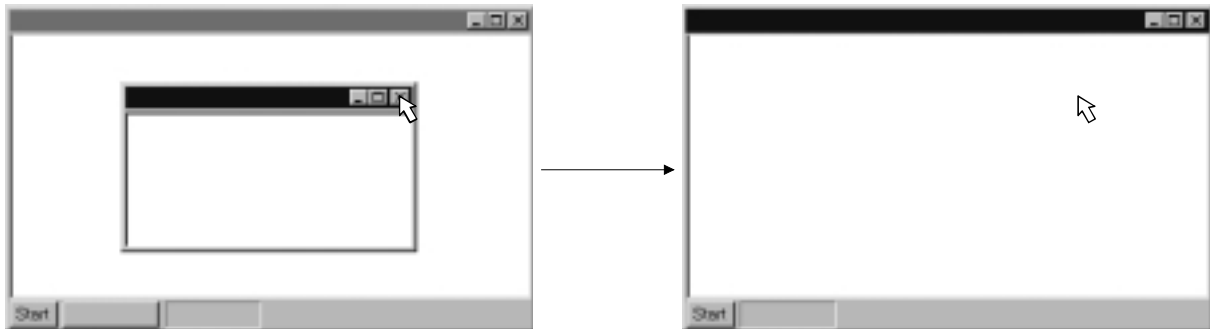
1



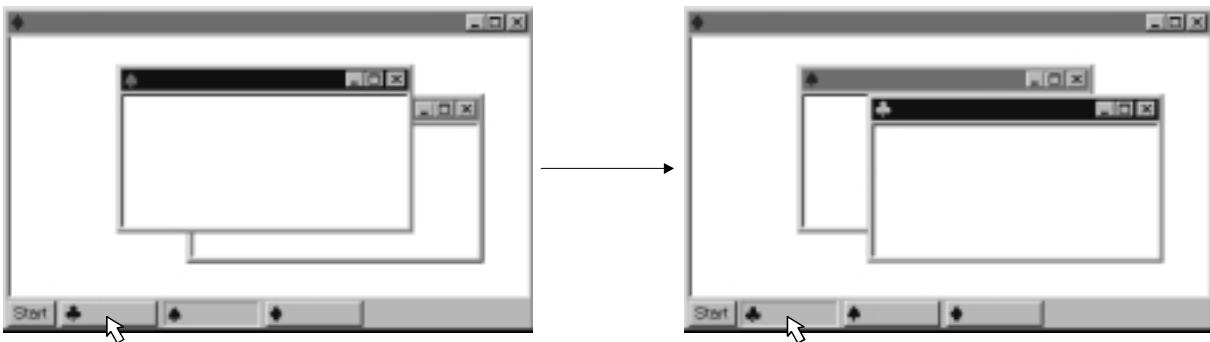
가

1. 4 기본 조작

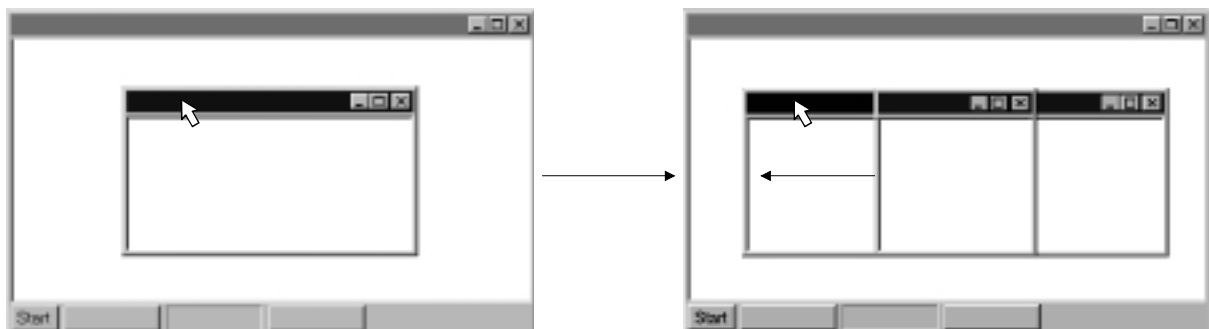
(1)



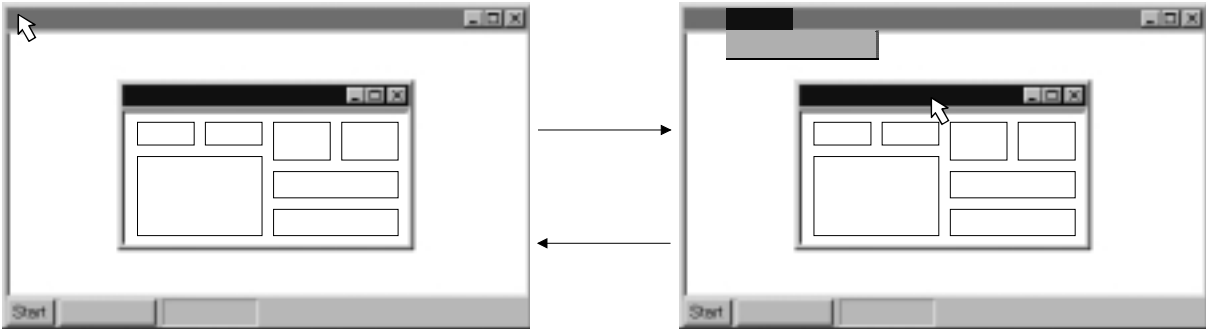
(2)



(3)

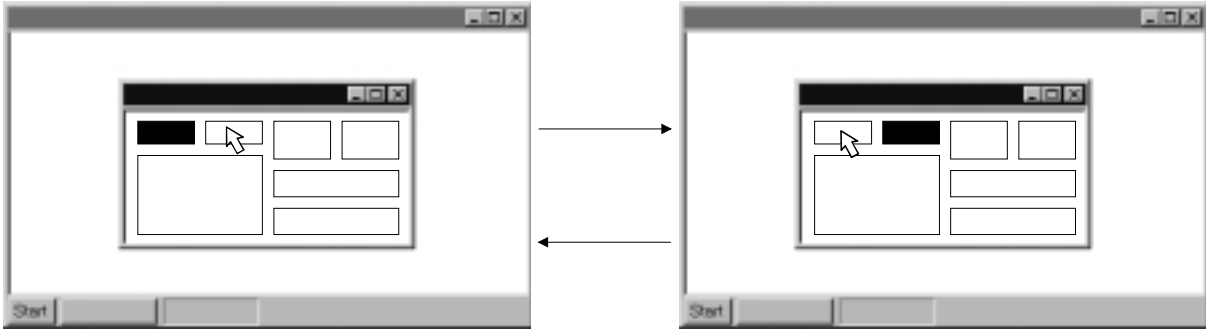


(4)



(5)

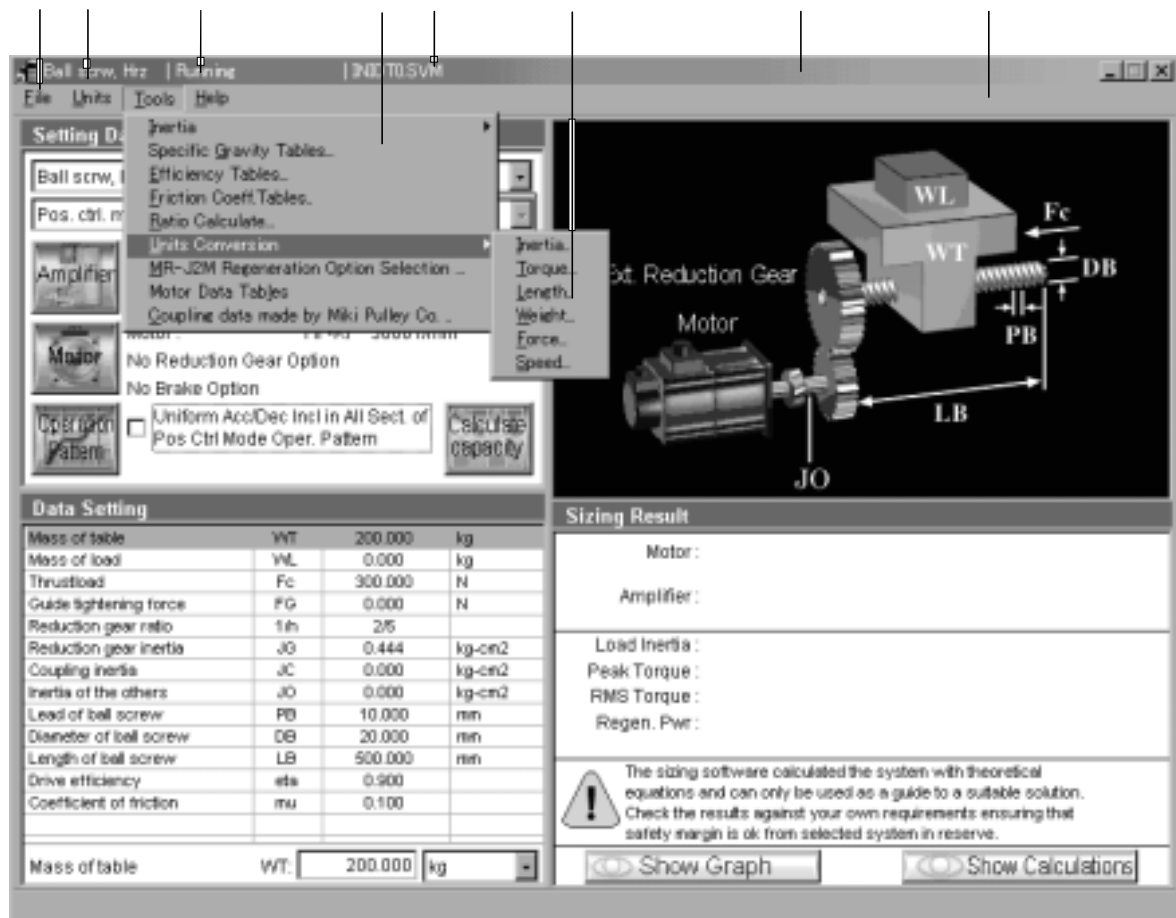
()

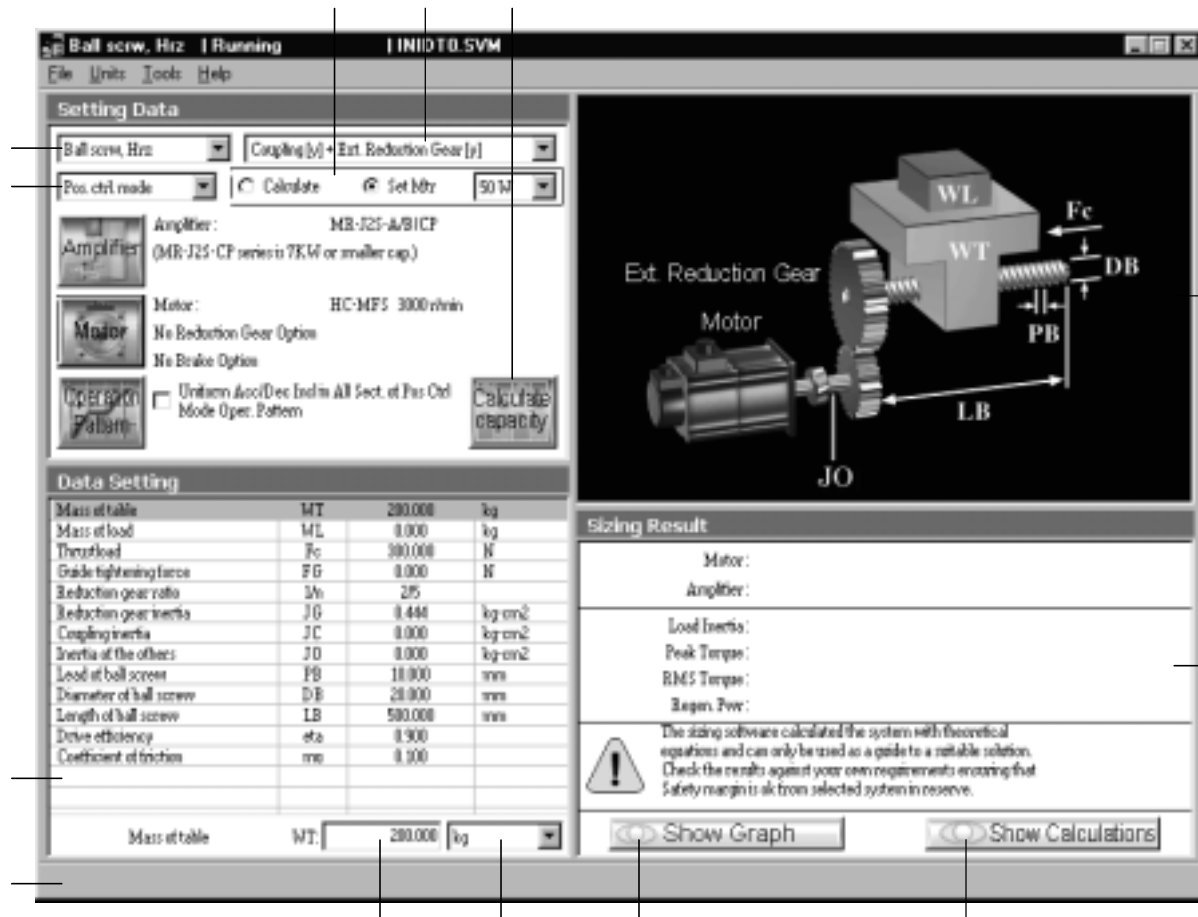


< >

	“ Alt ”+“ F4 ”
	“ Ctrl ”+“ Esc ”
	“ Alt ”+“ Tab ”
	“ Tab ”
	“ F1 ”

1.5 화면의 설명





()

(Combo box)

(Combo box)

(Combo box)

(MR - J2M

)

제2장 용량 선정 순서

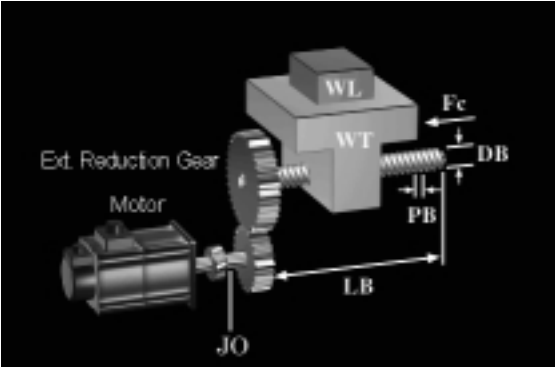
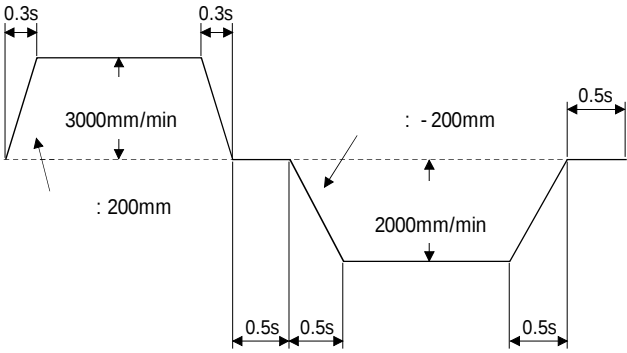
2. 1 용량 선정 플로우

● MR - J2M	1 (), “ ” “ MR - J2M ”

1		Windows
2		“ Open Project ”
3		10
4		“ ” “ (“ ”) ” 1. 가 2. (“) (, .)
5		
6		
7		가
8		
9		
10		
11		“ ” ,
12		, 가
13		MR - J2M , MR - J2M ,
14		, ,
15		, , () .
16		

2. 2 용량 선정 예

2.2.1 기계의 제원

	
(NL/NM)	WT : 250.000 kg WL : 20.00 kg Fc : 350.000 N FG : 1.000 N 1/n : 1/3 Jg : 0.700 kg · cm² Jc : 0.400 kg · cm² Jo : 0.500 kg · cm² PB : 10.000 mm DB : 10.000 mm LB : 600.000 mm η : 0.900 μ : 0.100
	
	MR - J2S - A/B/CP
	HC - MFS3000r/min
	1/5
	test1.svm
	1

2.2.2 조작

2.2.1

1.4 ~ 3.2

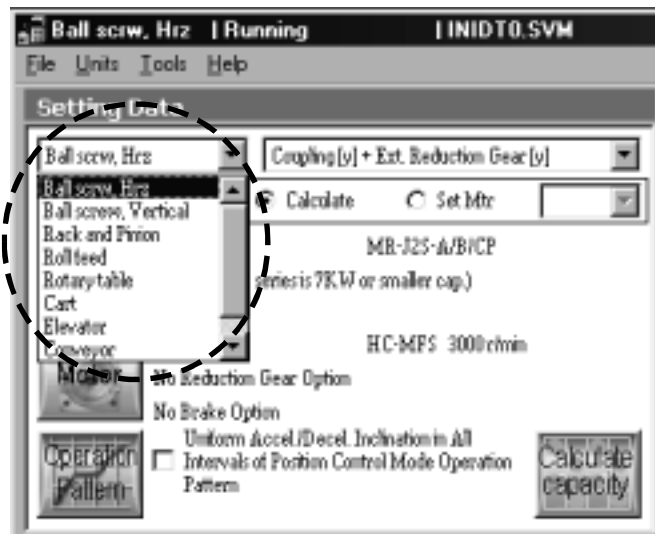
(1)

“ ” ,
 “ ” , “ MELSERVO ” , “ S_W ”
 “ MOTSZ111 ”

(2)

(Combo box) 

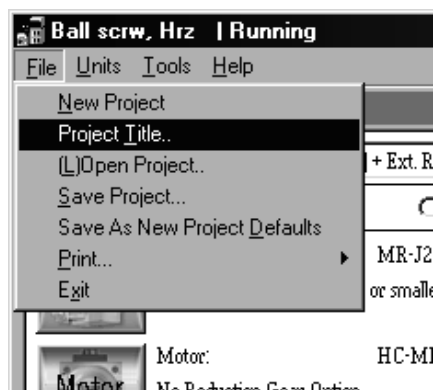
가



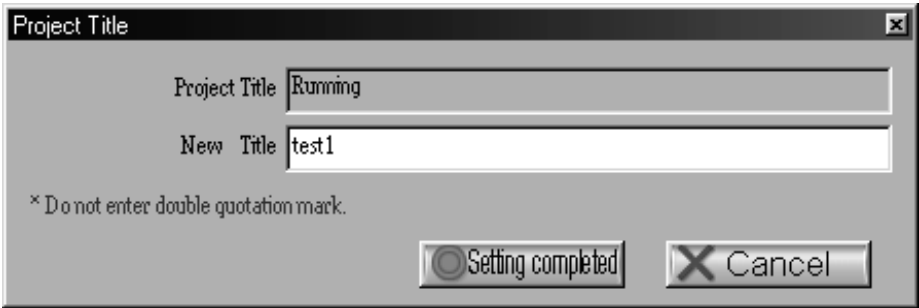
“ ”

(3)

(-) “ ” ,
 “ ”



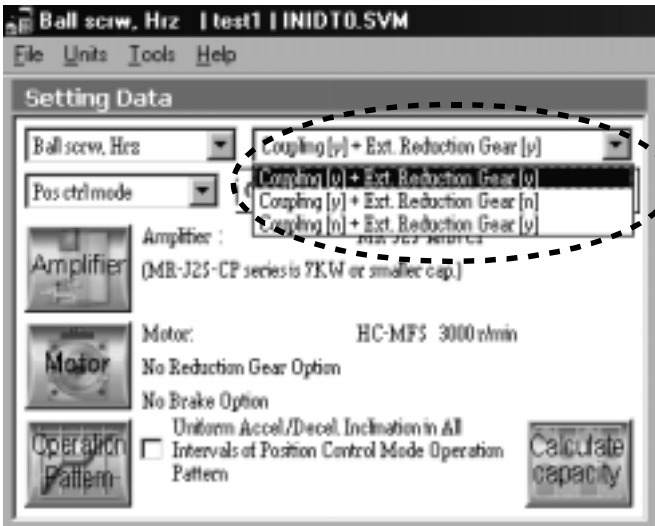
“ ” 가 .



“ 1 ” .
“ ” .

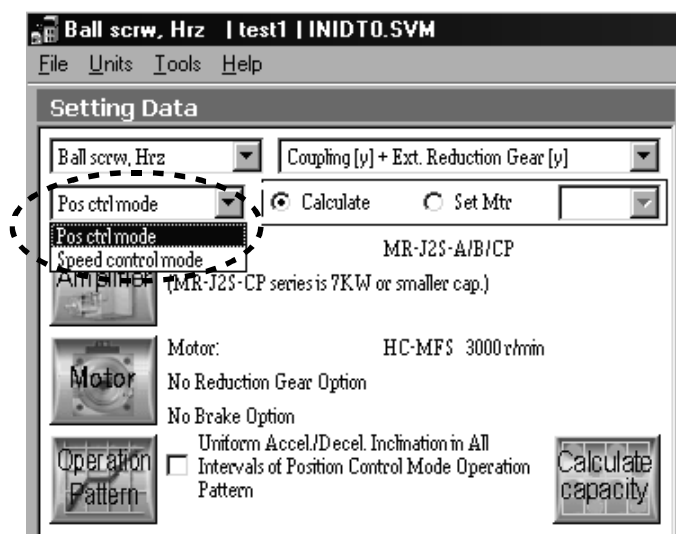
(4)

(Combo box) ▼

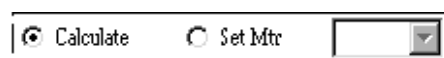


“ [(有)] + [(有)] ” .

(5)

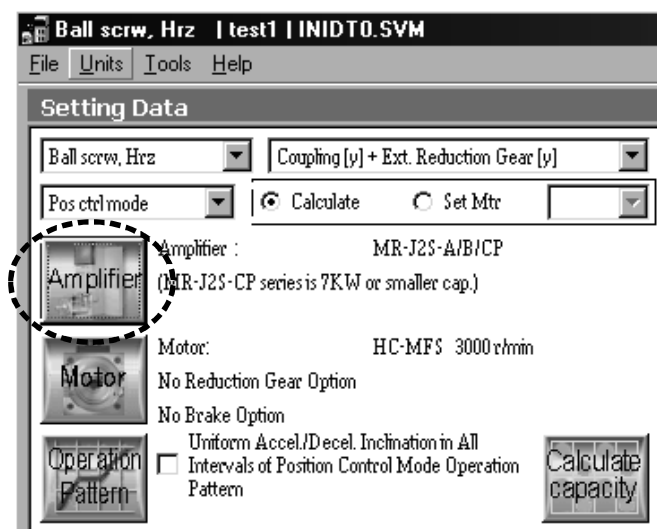
(Combo box) 

(6)

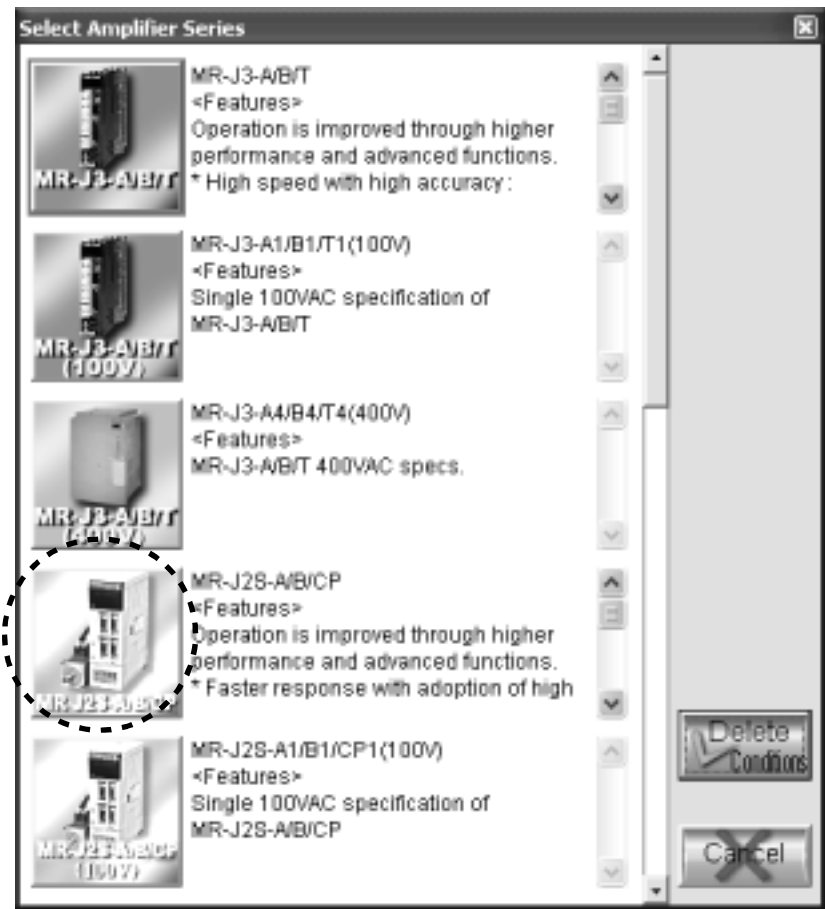


(7)

(Amplifier)



가



“ MR-J2S-A/B/CP ”

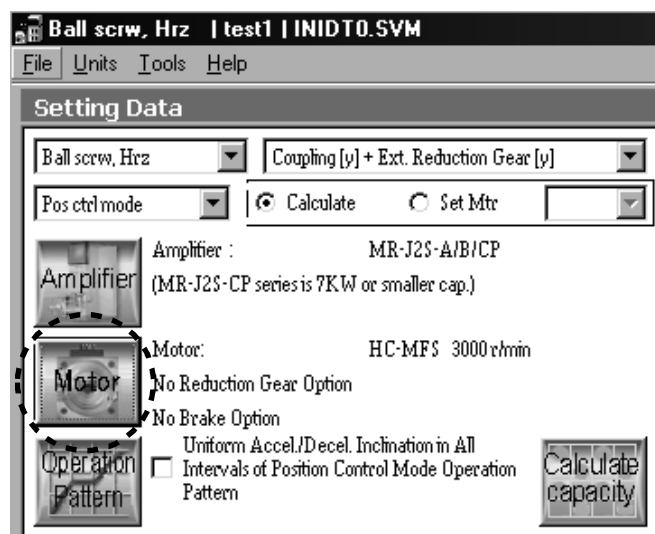
“ (Delete conditions) ”

“ (Delete conditions) ”

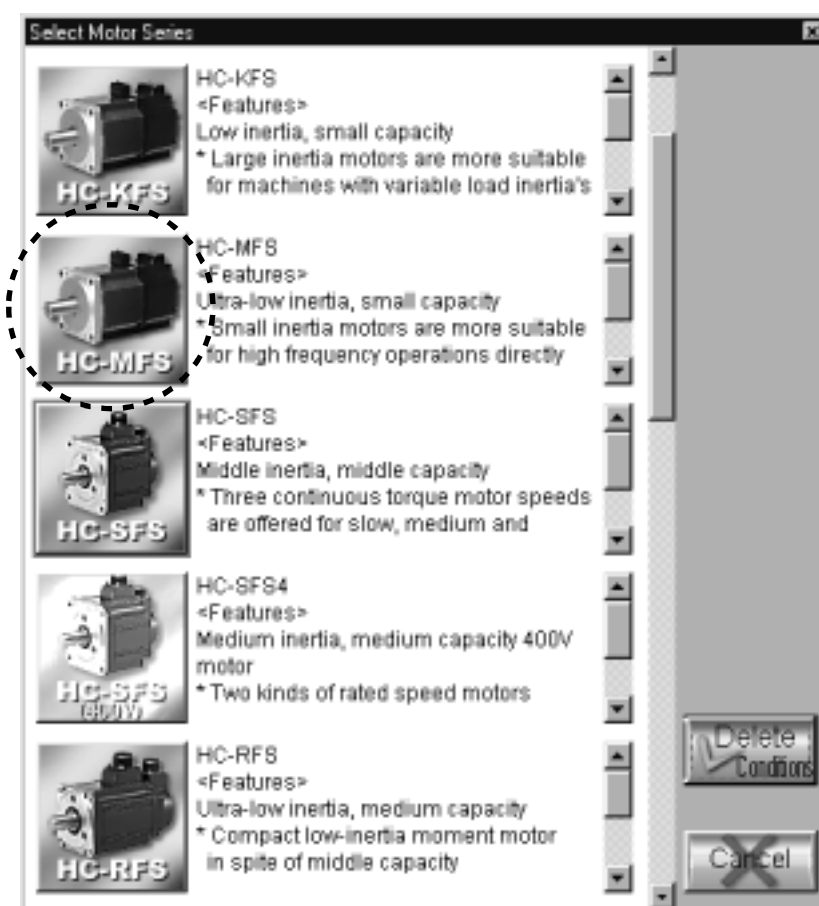
(8)

(a)

“ (Motor) ”



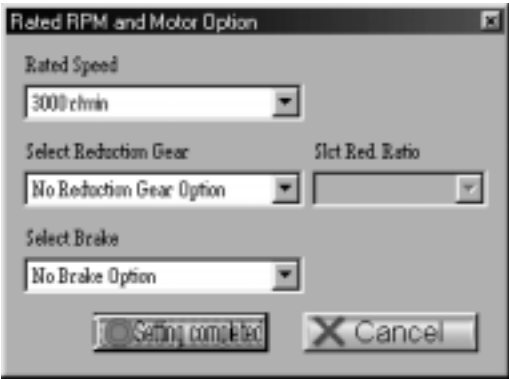
가



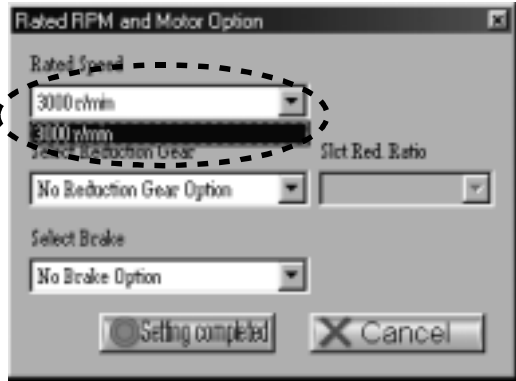
“ HC-MFS ”
conditions) ”
“ (Delete conditions) ”

(b)

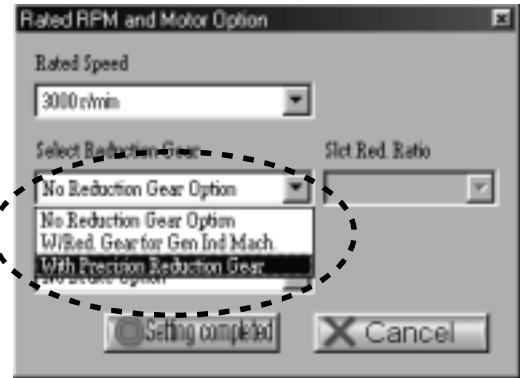
가



box) , “ 3000r/min ” (Combo
3000r/min .)(HC - MFS



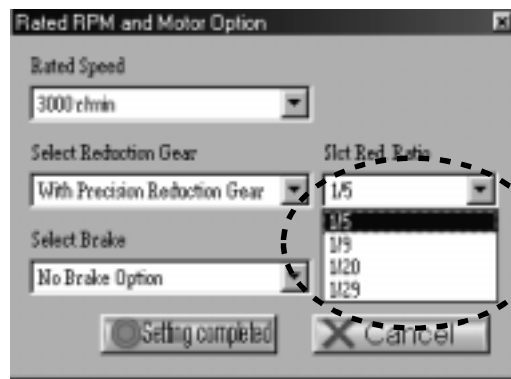
가



“ ”



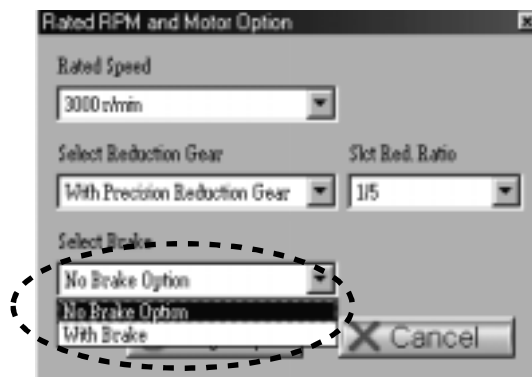
가



“ 1/5 ”

(Combo box)

가



“ ”

“ (Setting completed) ”

(9)

(a)

2.2.1

:

“ (NL/NM) ”

Reduction gear ratio	1/n:	2/5
----------------------	------	----------------------------------

“ 1/3 ”

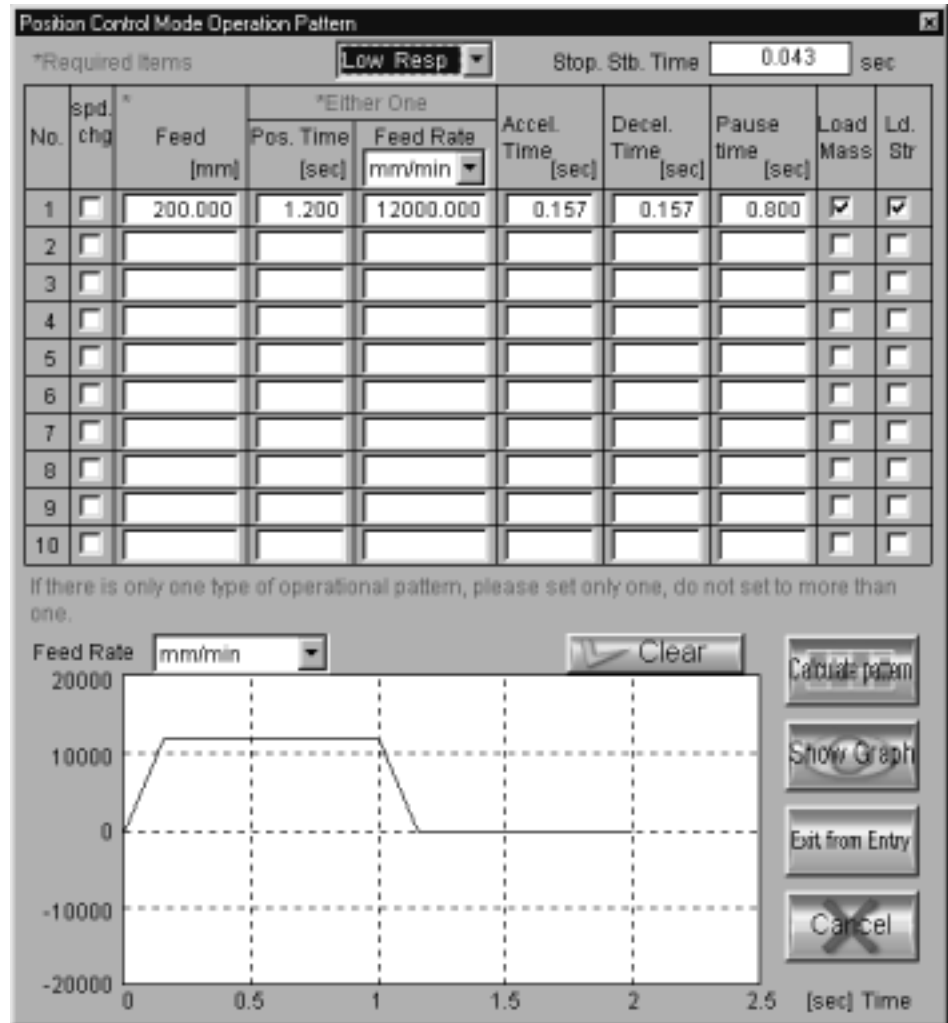
Reduction gear ratio	1/n:	1/3
----------------------	------	----------------------------------

“ Enter ”

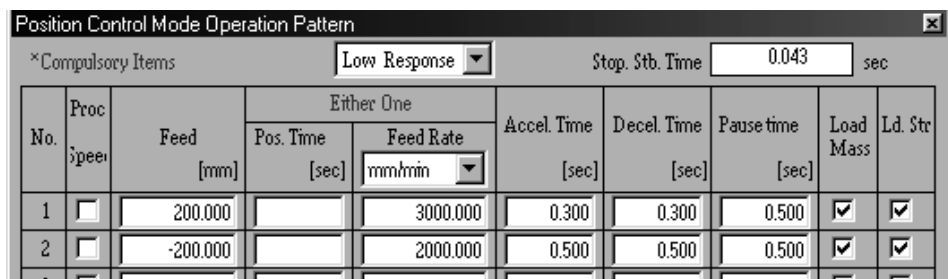
가

(10)

“ (Operation pattern) ”
가

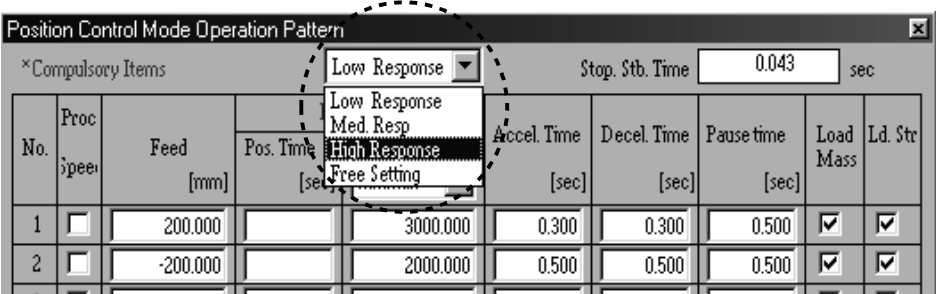


“ (Pos. Time) ”

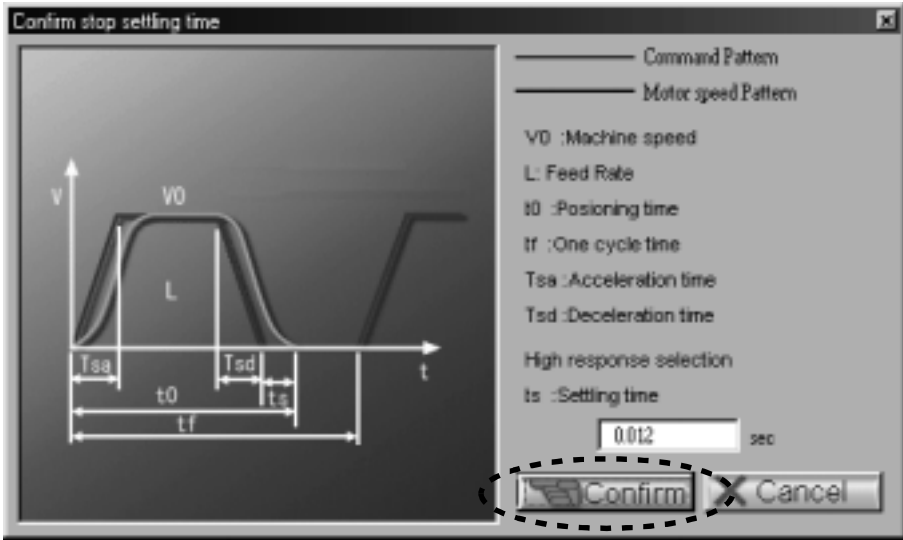


(Combo box) 

가

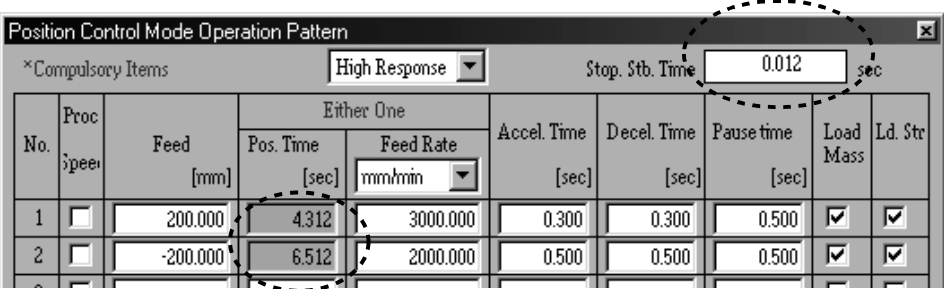


“ (高) (High Response) ”
(整定) “ 0.012s ”



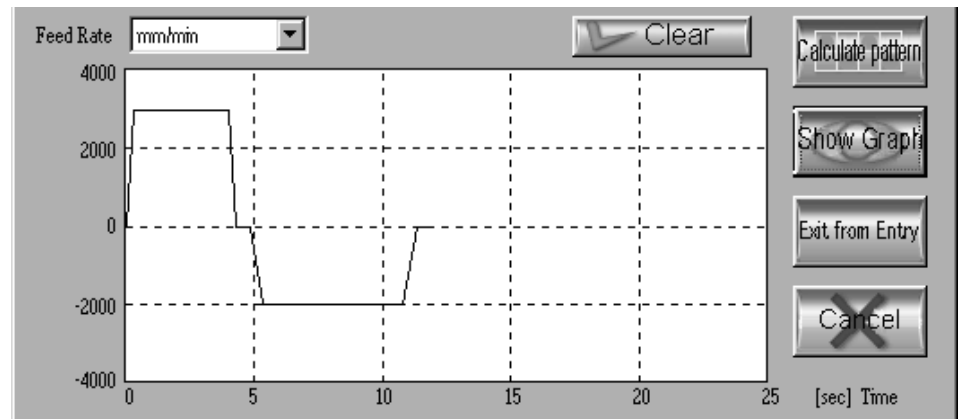
(整定) “ (Confirm) ”
(整定)

“ 0.012 ”



“ (Calculate Pattern) ”

“ (Show Graph) ”



“ (Exit from Entry) ”

(11)
“ (Calculate capacity) ”
“ OK ”



가

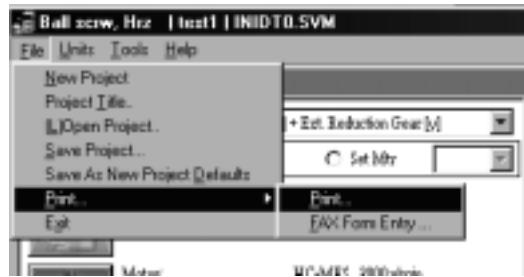
Sizing Result		
Motor : HC-MFS053G2(1/5) [50W]		
Amplifier : MR-J2S-10A/B/CP Regeneration needless		
Load Inertia :	0.143 [kg·cm ²]	7.5Times
Peak Torque :	0.146 [N·m]	91.3%
RMS Torque :	0.116 [N·m]	72.3%
Regen. Pwr :	0.000 [W]	0.0%
 The sizing software calculated the system with theoretical equations and can only be used as a guide to a suitable solution. Check the results against your own requirements ensuring that Safety margin is ok from selected system in reserve.		
		

	HC - MFS053(1/5) [50W]	
	MR - J2S - 10A/B/CP	
	0.143[kg · cm ²]	7.5
	0.149[N · m]	93.1%
	0.116[N · m]	72.3%
	0.000[W]	0.0%

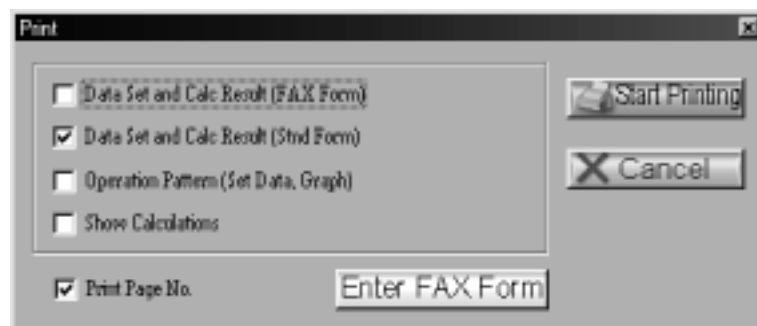
HC - MFS053G2(1/5) 가
0.143[kg · cm²]
7.5
0.149[N · m], 0.116[N · m]
93.1% · 72.3%

(12)

- () “ (File) ”
 “ (Print) ” , “ (Print) ”

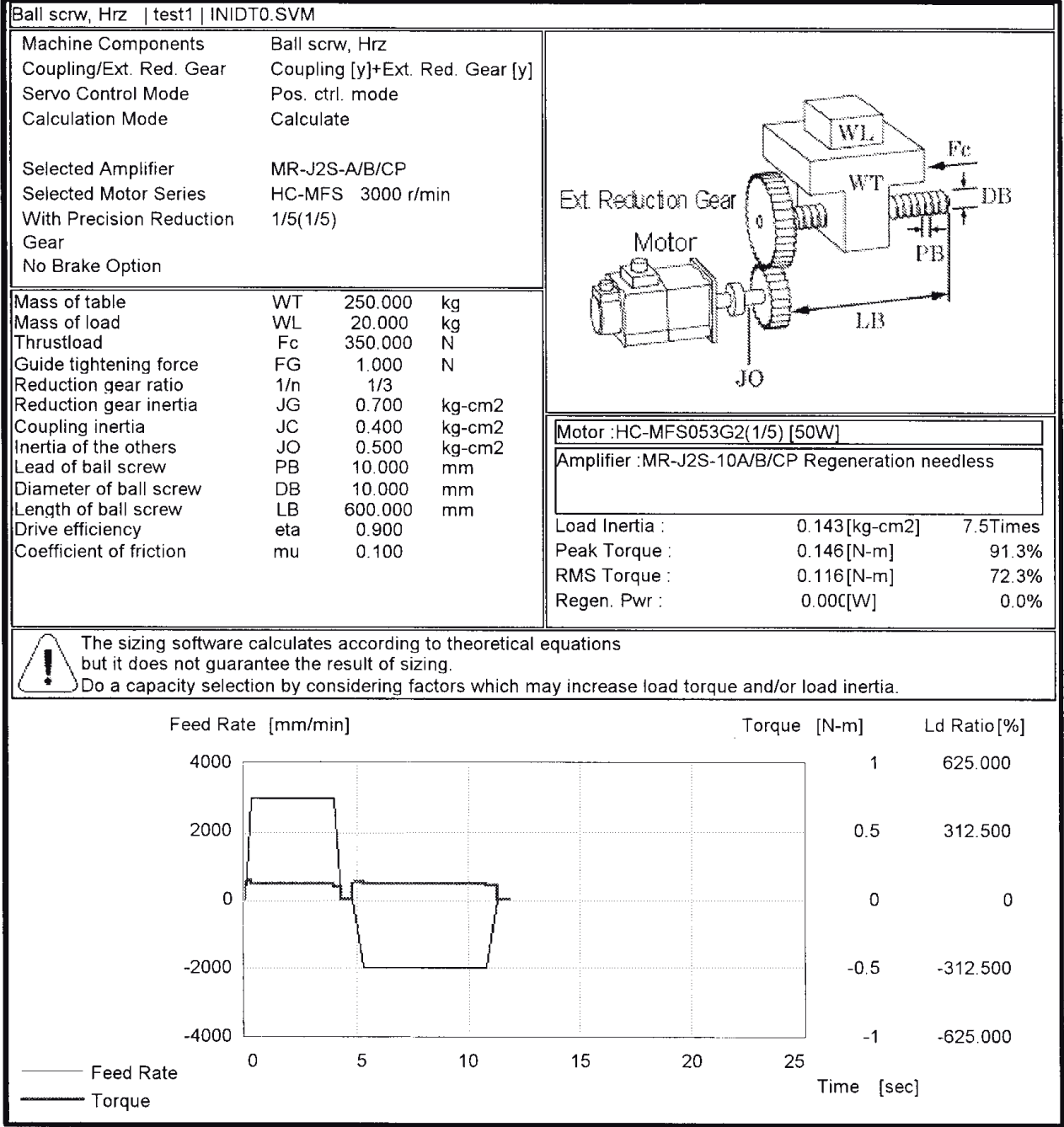


“
 ()” . 가 ☒ 가 .



“ (Start printing) ”

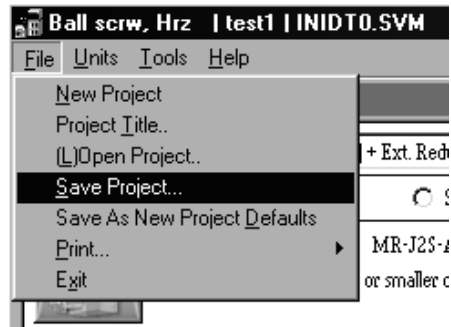
[()] [Data Set and Calc Result(Stnd Form)]



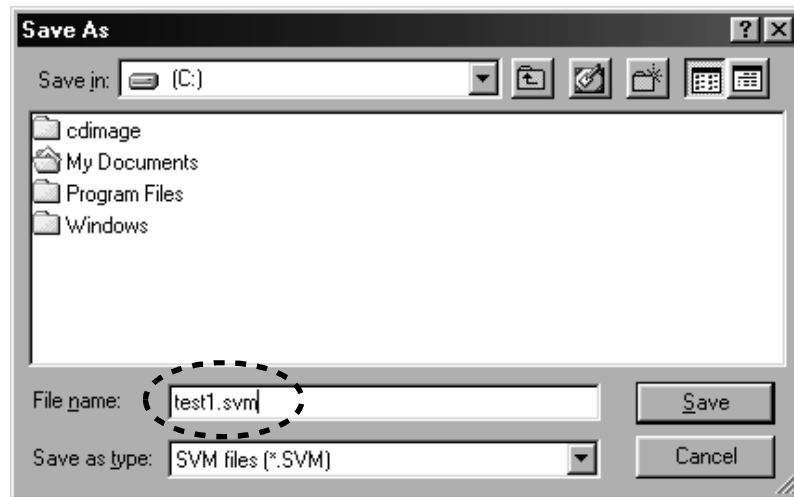
(13)

- () “ (File) ”

“ (Save project) ”



“ test1.svm ”

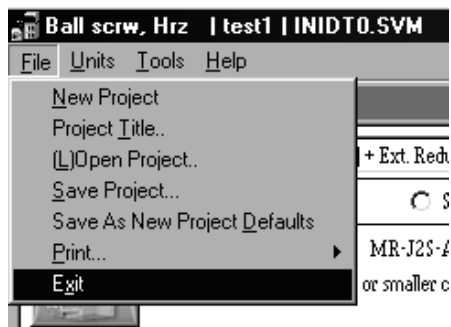


“ (Save) ”

(14)

- () “ (File) ”

“ (Exit) ”



2.2.3 조작(리니어 서보)

2.2.2

2.2.2

(1) “ (Amplifier) ” 가

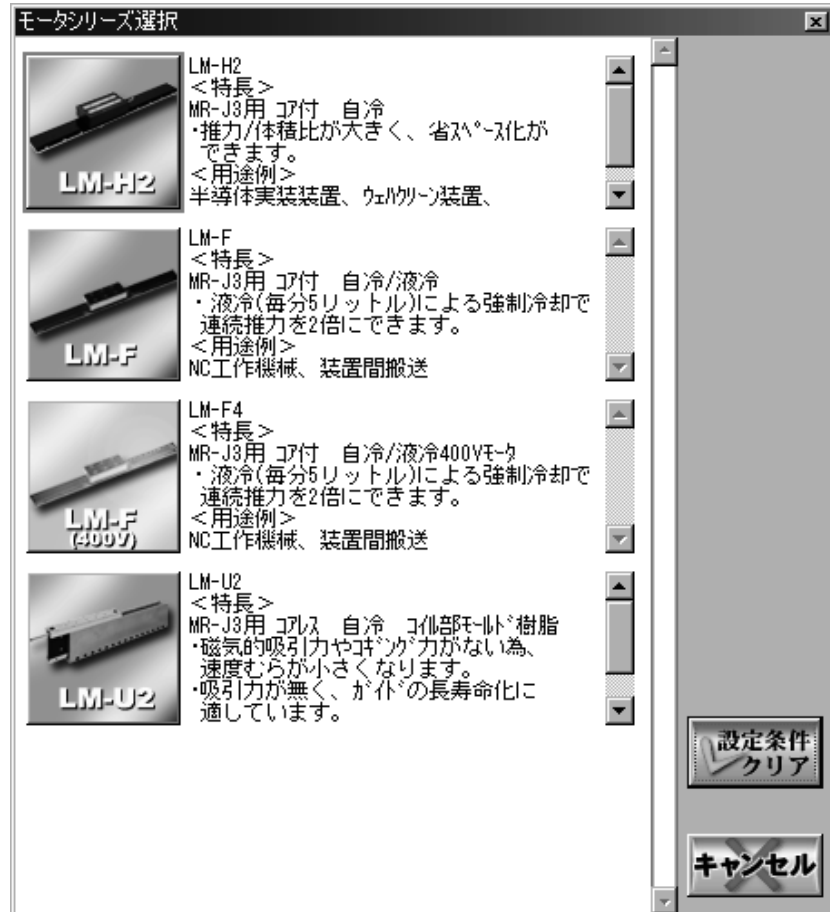


(2)

(a)

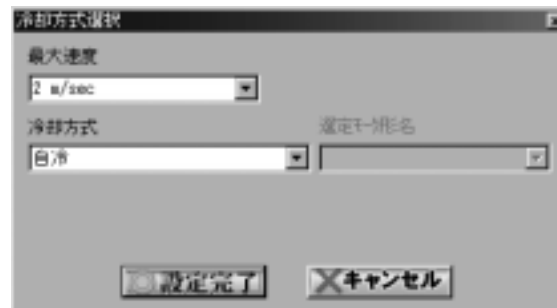
“ (Motor) ”

가



(b)

가



2. 3 MR-J2M에서의 회생 옵션의 선정

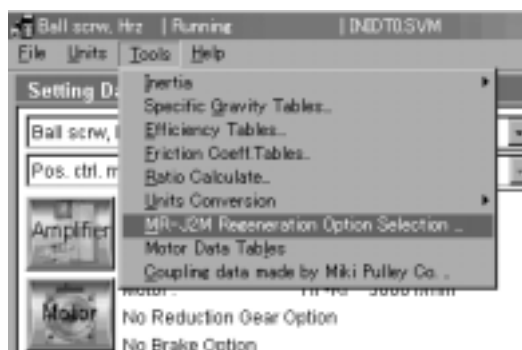
(1)

2.2.2
2.2.2(7) MR-J2M
가



(2) MR-J2M

- () “ (Tools) ”
“ MR-J2M (MR-J2M Regenerative Option Selection) ”



“ MR-J2M ”

Select MR-J2M Regeneration Option

File

Configuration

Cmp. Axis Src Vltg Cycl. t

8 230 V 1.000 s

Calculate

Select Regeneration Option

Y/N Rgn. Pwr Rgn. brk opt

Y 1.000 W 1

Set Each Axis

Axis No.	Motor model name	Drive Unit Model	Regen. Eng	Peak Torque	Cycle Time	Simul. Rgn Grp
1						
2						
3						
4						
5						
6						
7						
8						

Edit

HC-KFS053 MR-J2M-10DU 0.000 J 0.0 % 1.000 s 1

Clear Set Exit

(3)

.4~8

170V~253V

Select MR-J2M Regeneration Option

File

Configuration

Cmp. Axis Src Vltg Cycl. t

4 5 6 7 8 230 V 1.000 s

(4)

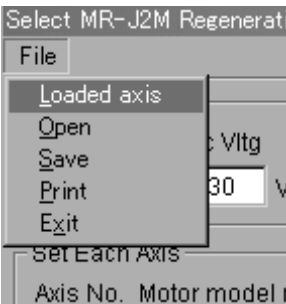
①

1

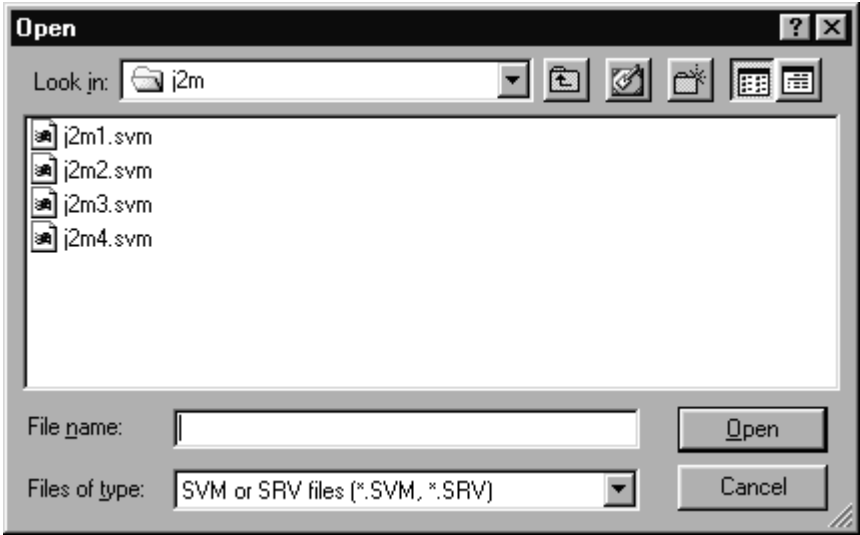
Set Each Axis

Axis No.	Motor model name	Drive Unit Model	Regen. Eng	Peak Torque	Cycle Time	Simul. Rgn Grp
1						
2						
3						
4						

MR - J2M () “ (File) ”
“ (Loaded axis) ” .



“ (Loaded axis) ” 가 .



(j2m1.svm) “ (Open) ” .



2 2 .

• (5) (***.svm) “ (Loaded axis) ”가 “ (Loaded axis) ” “ MR - J2M ” .

가

가 .

가 . 가

“ 1~8 ”

2 - 23

MEMO

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

제3장 조작 커멘드

3. 1 조작 방법

(名)

(名)

3.1.1 커멘드 선택 방법

(1)

- ()

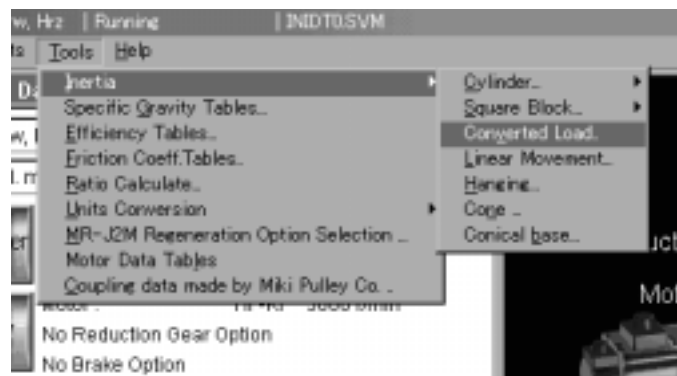
가

가

(2)

- ()

가



3.1.2 윈도우내에서의 조작 방법

(1)



(2)



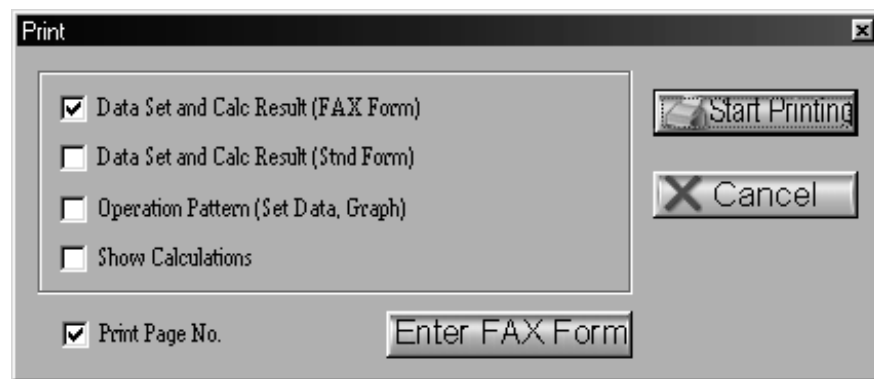
(3) (Combo box)



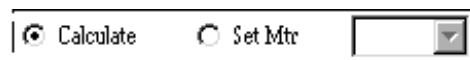
(Combo box)



(4)



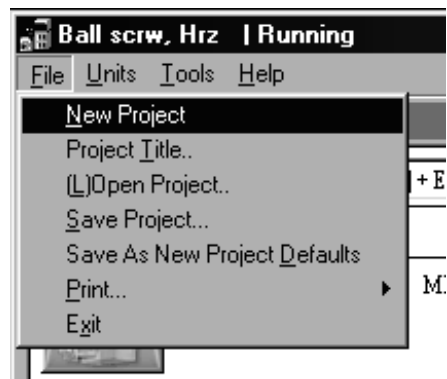
(5)



3.2 커맨드의 설명

3.2.1 파일(File)

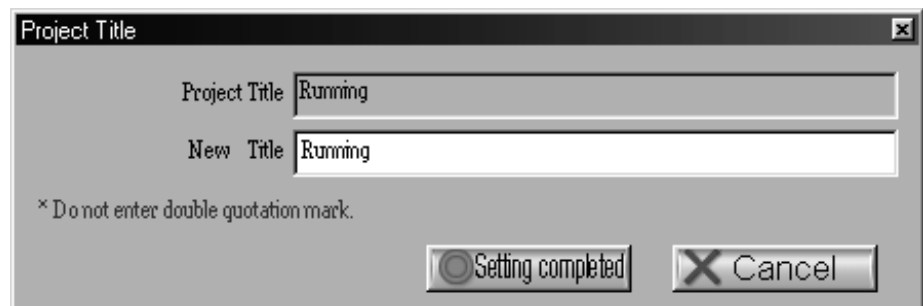
1. () “ (File) ”



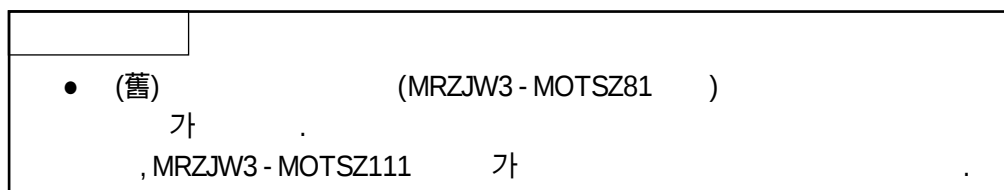
(1)

(2)

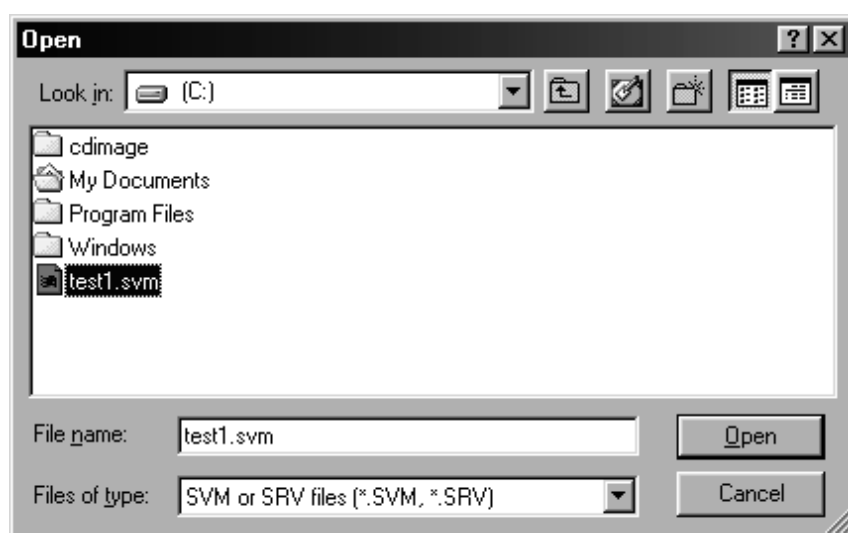
“ (Project Title) ”



(3) (Open Project)

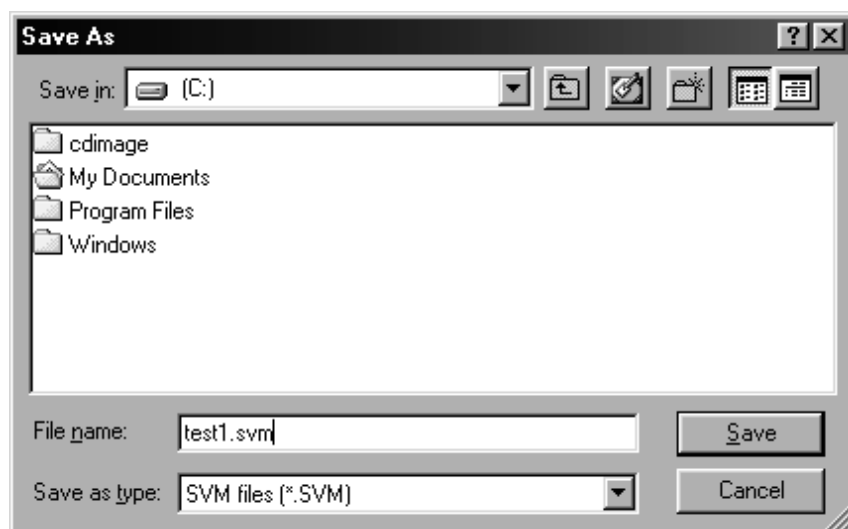


“ (Open Project) ” 가



(4) (Save Project)

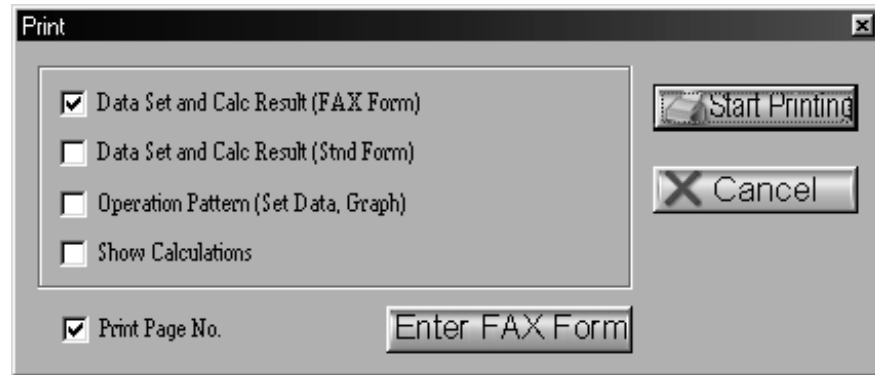
“ (Save Project) ” 가



“ (Save) ”

(5) (Print)

“ (Print) ” , “ (Print) ” 가



4
가

• “ (Print Page No.) ”

(a) (FAX)
 FAX
 “ (FAX) ” “ FAX ”
 가 가 FAX 가
 “ (FAX) ” ☒
 “ FAX ” FAX 가
 “ (Print) ” , “ FAX (Fax from Entry) ”
 가
 “ (Setting completed) ”
 “ (Print) ” “ (Start Printing) ”

[(FAX)] [Data Set and Calc Result(Fax Form)]

Roll feed Wrapping Machine INIDT3.SVM	
To: [FAX No.]	03 / 12 / 09
[Company]	
[Division]	
[Name]	
From: [Phone]	
[FAX No.]	
[Company]	
[Division]	
[Name]	

Machine Components

Coupling/Ext. Red. Gear

Servo Control Mode

Calculation Mode

Selected Amplifier

Selected Motor Series

No Reduction Gear Option

No Brake Option

Roll feed

Coupling [y]+Ext. Red. Gear [y]

Pos. ctrl. mode

Calculate

MR-J2S-A/B/CP

HC-RFS 3000 r/min

Ext. Reduction Gear

Motor

JO

DR

F

FG

Motor :HC-RFS353 [3.5kW]

Amplifier :MR-J2S-500A/B/CP Regeneration needless

Load Inertia : 30.000 [kg-cm2] 3.5Times

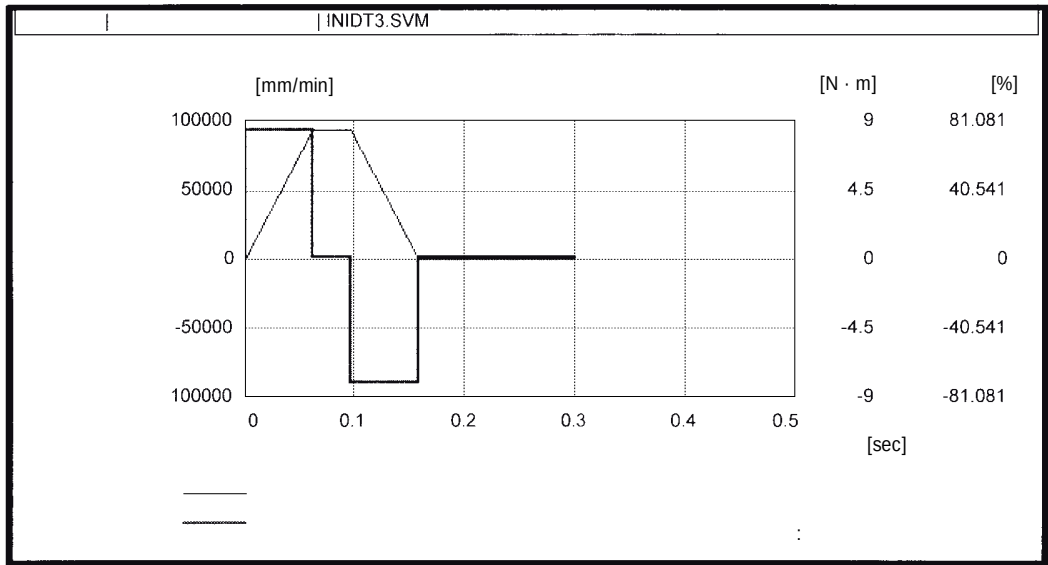
Peak Torque : 8.451 [N-m] 76.1%

RMS Torque : 5.271 [N-m] 47.5%

Regen. Pwr : 0.000[W] 0.0%

The sizing software calculates according to theoretical equations but it does not guarantee the result of sizing.
Do a capacity selection by considering factors which may increase load torque and/or load inertia.

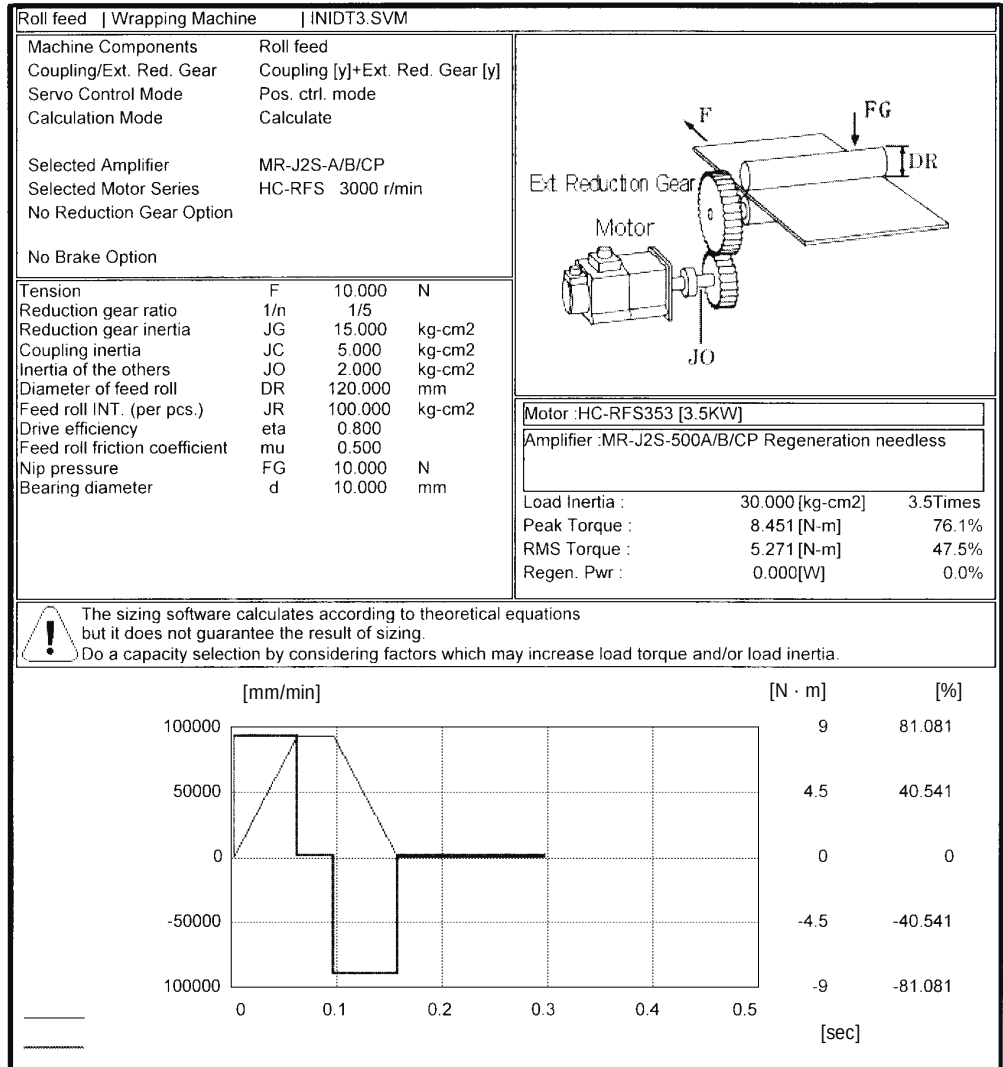
Control No.



(b)

()

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



(c) (,)

[(,)] [Operation Pattern(Set Data, Graph)]

Roll feed | Wrapping Machine | IN1DT3.SVM

Low Resp Stop. Stb. Time0.043 sec

No.	spd. chg	Feed [mm]	Pos. Time [sec]	Feed Rate [mm/min]	Accel. Time [sec]	Decel. Time [sec]	Pause time [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.

[mm/min]

[sec]

(d)

. MR - J2M

[]

Use Symbol List
(Roll feed | Wrapping Machine | INIDT3.SVM)

Symbol	Description	Data
F	:Tension	10.000 N
1/n	:Reduction gear ratio	1/5
JG	:Reduction gear inertia	15.000 kg-cm ²
JC	:Coupling inertia	5.000 kg-cm ²
JO	:Inertia of the others	2.000 kg-cm ²
DR	:Outside diameter of feed roll	120.000 mm
JR	:Inertia of feed roll	100.000 kg-cm ²
eta	:Drive efficiency	0.800
mu	:Feed roll friction coefficient	0.500
FG	:Nip pressure	10.000 N
d	:Shaft diameter of feed-roll connection	10.000 mm
*1/nm	:Reduction ratio of motor with reduction	Not Used
*Pf	:Encoder resolution	131072 pulse/rev
*Kp	:Position loop gain	70 1/sec
*JMG	:Inertia of reduction gear with motor	0.000 kg-cm ²
*JMB	:Inertia of brake with motor	0.000 kg-cm ²
*JM	:Motor rotor inertia	8.600 kg-cm ²
g	:Gravitational acceleration	9.800 m/sec ²
*Tmax	:Motor maximum torque	27.900 N-m
*I _{typ}	: Rated current	Not Used
*T _{typ}	:Motor rated torque	11.100 N-m
*eta _m	:Reverse-efficiency of motor	0.900
*eta _{MG}	:Reduction gear efficiency	1.000
*t	:Regenerative operation time	0.061 sec
*Ec	:Energy charged to the capacitors in amp.	45.000 J
*P _{typ}	:Rated power of regeneration	0.000 W
*t _{max}	:Maximum regeneration time	0.061 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.'

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

Slight variation may be caused in the displayed result while values are rounded during calculation.

The result of calculation of regenerative power P_r is indicated '0'
if it is zero or negative because regenerative power does not exist.
The result of calculation of maximum regeneration power P_{max} is indicated '0' if it is zero or negative or
if the regeneration time t_{max} at maximum regeneration is zero because regenerative power does not exist.

- 1.Feed distance/Motor Rev.

$$dS = \pi * DR * 1/n * 1/nm$$

$$= 3.1416 * 120.000 * 1/5 * 1.000$$

$$= 75.398 \text{ [mm/rev]}$$
- 2.Electrical accuracy

$$dL = (dS/Pf) * 1000$$

$$= (75.398/131072) * 1000$$

$$= 0.575244 \text{ [micron/pulse]}$$
- 3.Motor rotational speed

$$N0 = V0/dS$$

$$N0_1 = 94000.000/75.398$$

$$= 1246.711 \text{ [r/min]} \quad (\text{Operation Pattern No.1})$$
- 4.Stop settling time

$$ts = 3 * 1/Kp$$

$$= 3 * 1/70$$

$$= 0.043 \text{ [sec]}$$
- 5.Total load inertia

$$JL = JMG + JMB + \{JG + JC + JO + 2 * JR * (1/n)^2\} * (1/nm)^2$$

$$= 0.000 + 0.000 + \{15.000 + 5.000 + 2.000 + 2 * 100.000 * (1/5)^2\} * (1.000)^2$$

$$= 30.000 \text{ [kg-cm}^2\text{]}$$
- 6.Load torque

$$TML = ((8 * JR / (DR/10)^2) * g + Fg) * (d/2000) * \mu$$

$$= ((8 * 100.000 / (120.000/10)^2) * 9.8 + 10.000) * (10.000/2000) * 0.500$$

$$= 0.161 \text{ [N-m]}$$

$$TL = \{F * (DR/2000) + TML\} * 1/n * 1/nm * (1/\eta) * (1/\eta_{MG})$$

$$= \{10.000 * (120.000/2000) + 0.161\} * (1/5) * (1.000) * (1/0.800) * (1/1.000)$$

$$= 0.190 \text{ [N-m]}$$
- 7.Moment of inertia ratio

$$m = JL/JM$$

$$= 30.000/8.600$$

$$= 3.5 \text{ [times]}$$
- 8.Acceleration torque

$$TMa = \{((JL + JM) * N0) / (9.55 * 10000 * Tsa)\} + TL$$

$$TMa_1 = \{((30.000 + 8.600) * 1246.711) / (9.55 * 10000 * 0.061)\} + (0.190)$$

$$= 8.451 \text{ [N-m]} \quad (\text{Operation Pattern No.1})$$

$$TMa_Max = 8.451 \text{ [N-m]} \quad (\text{Maximum value})$$
- 9.Deceleration torque

$$TMd = -\{((JL + JM) * N0) / (9.55 * 10000 * Tsd)\} + TL$$

$$TMd_1 = -\{((30.000 + 8.600) * 1246.711) / (9.55 * 10000 * 0.061)\} + (0.190)$$

$$= -8.070 \text{ [N-m]} \quad (\text{Operation Pattern No.1})$$

$$TMd_Max = 8.070 \text{ [N-m]} \quad (\text{Maximum value})$$
- 10.Peak load factor

$$Rp = \{(\text{maximum value of } |TMa|, |TMd| / Ttyp)\} * 100$$

$$= (8.451/11.100) * 100$$

$$= 76.135 \text{ [%]}$$

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

```
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{(((8.451)^2)*0.061 +
              ((0.190)^2)*0.035 +
              ((-8.070)^2)*0.061 +
              ((0.150)^2)*0.143)/0.300}
      = 5.271 [N-m]

12.Effective load factor
Rrms = (Trms1/Ttyp) * 100
      = (5.271/11.100)*100
      = 47.484 [%]

13.Acceleration energy
Ea = (0.1047/2) * N0 * TMa * Tsa
Ea_1 = (0.1047/2) * 1246.711 * (8.451) * 0.061
      = 33.645 [J] (Operation Pattern No.1)
Ea_Sum = 0.000 [J] (Total Negative Energy)

14.Deceleration energy
Ed = (0.1047/2) * N0 * TMd * Tsd
Ed_1 = (0.1047/2) * 1246.711 * (-8.070) * 0.061
      = -32.130 [J] (Operation Pattern No.1)
Ed_Sum = -32.130 [J] (Total Negative Energy)

15.Constant speed energy
Ef = 0.1047 * N0 * TL * tc
Ef_1 = 0.1047 * 1246.711 * (0.190) * 0.035
      = 0.869 [J] (Operation Pattern No.1)
Ef_Sum = 0.000 [J] (Total Negative Energy)

16.Absolute of -energy total
Em = |(total of negative energy in Ea,Ed,Ef)|
      = 32.130 [J]

17.Regenerative power
Pr = (etam*Em - Ec)/tf
      = (0.900*32.130 - 45.000)/0.300
      = 0.000 [W]

18.Max. regenerative power
Emax = section energy when maximum regenerating
Pmax = (etam*Emax - Ec)/tmax
      = (0.900*32.130 - 45.000)/0.061
      = -263.655 [W]
```

```
*****
```

(6) (Exit)

3.2.2 툴(Tools)

가 .

“ (Tools) ”



(1) (Inertia)

. . . () . ()
() . ()
가 .

() (. . .)

() .
()
() “ (Start Calculation) ”

“ (Show Calculations) ”

“ (Substitute) ” ()

, () .

“ (Exit) ” .

(a) (Cylinder)

Inertia Calculator(Cylinder)

Enter Data

Outside diameter	D1	0.000	mm
Inside diameter	D2	0.000	mm
Length of cylinder	L	0.000	mm
Specific gravit	ρ	0.0000	kg/cm ³

Outside diameter D1: 0.000 mm

Specific Gravity Data Tables

Material	Density
Aluminium	0.00270 kg/cm ³
Gold	0.01932 kg/cm ³
Silver	0.01049 kg/cm ³
Steel	0.00787 kg/cm ³
Copper	0.00896 kg/cm ³

Set

Start Calculation

Inertia JL:

Show Calculations

Substitute

Exit

Inertia Calculator(Cylinder)

Enter Data

Outside diameter	D1	0.000	mm
Inside diameter	D2	0.000	mm
Mass	W	0.000	kg

Outside diameter D1: 0.000 mm

Set

Start Calculation

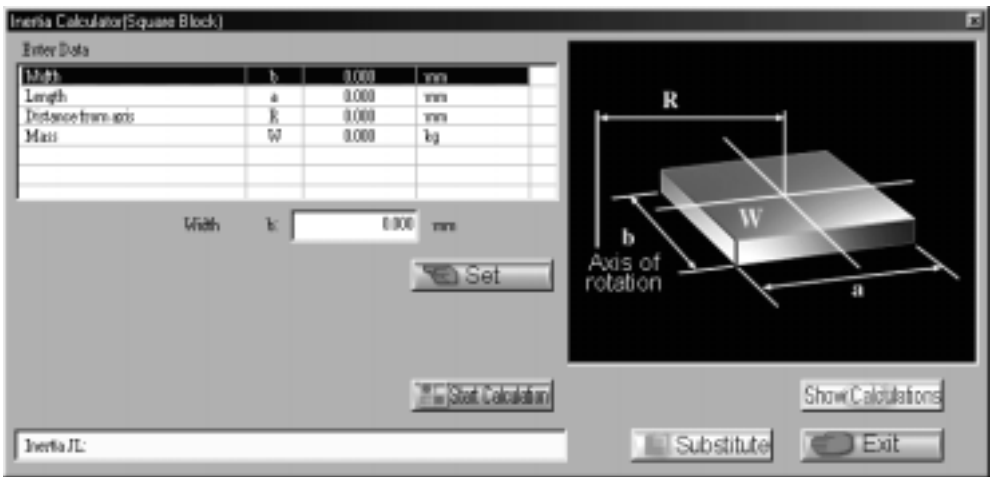
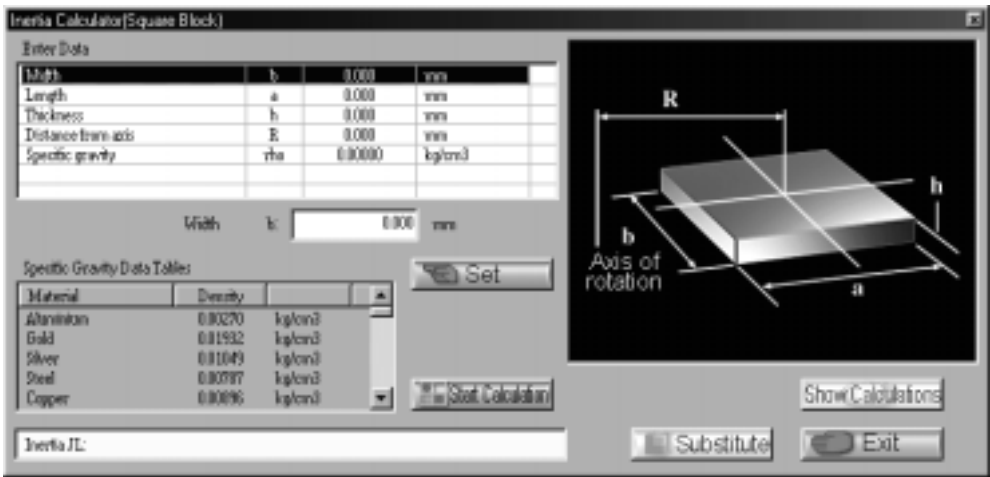
Inertia JL:

Show Calculations

Substitute

Exit

(b) (Square Block)



(C) (Converted Load)

Inertia Calculator[Converted Load]

Enter Data

Driveside diameter	D1	50.000	mm
Driveside thickness	M1	10.000	mm
Loadside diameter	D2	200.000	mm
Loadside thickness	M2	10.000	mm
Specific gravity	rho	0.0078	kg/cm3

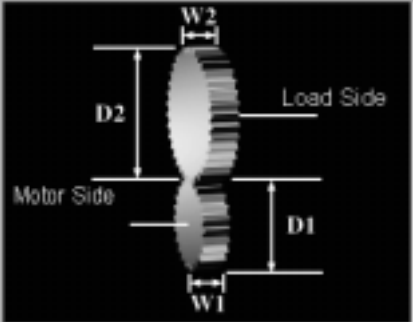
Driveside diameter D1: 50.000 mm

Specific Gravity Data Tables

Material	Density	
Aluminum	0.00270	kg/cm3
Gold	0.01932	kg/cm3
Silver	0.01049	kg/cm3
Steel	0.00787	kg/cm3
Copper	0.00896	kg/cm3

Inertia JL:

Buttons: Set, Start Calculation, Show Calculations, Substitute, Exit



(d) (Linear Movement)

Inertia Calculator[Linear Movement]

Enter Data

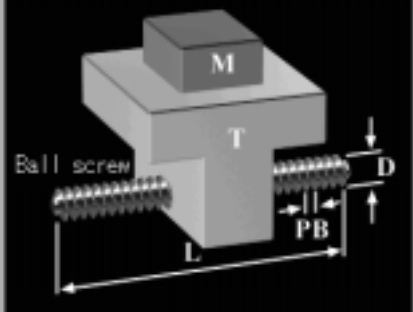
Ball screw diameter	D	0.000	mm
Length of ball screw	L	0.000	mm
Ball screw lead	PB	0.000	mm
Mass of load	W	0.000	kg
Mass of table	T	0.000	kg

Ball screw diameter D: 0.000 mm

Calculates assuming that the material of the ball screw is steel(0.0078kg/cm3).

Inertia JL:

Buttons: Set, Start Calculation, Show Calculations, Substitute, Exit



(e) (Hanging)

Inertia Calculator[Hanging]

Enter Data

Diameter of pulley	D	0.000	mm
Thickness of pulley	L	0.000	mm
Mass of load	W	0.000	kg
Mass of counterweight	C	0.000	kg
Specific gravity	rho	0.00000	kg/cm3

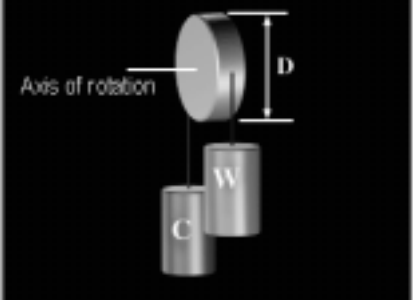
Diameter of pulley D: 0.000 mm

Specific Gravity Data Tables

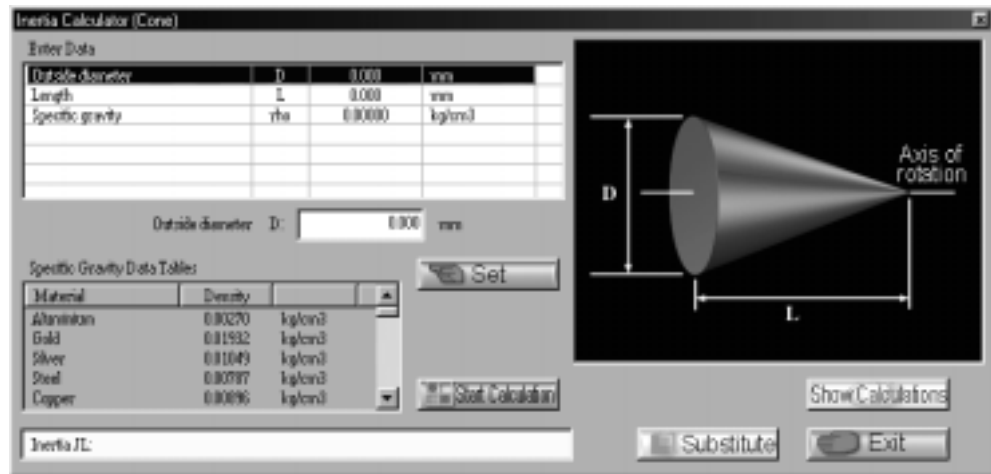
Material	Density	
Aluminum	0.00270	kg/cm3
Gold	0.01932	kg/cm3
Silver	0.01049	kg/cm3
Steel	0.00787	kg/cm3
Copper	0.00896	kg/cm3

Inertia JL:

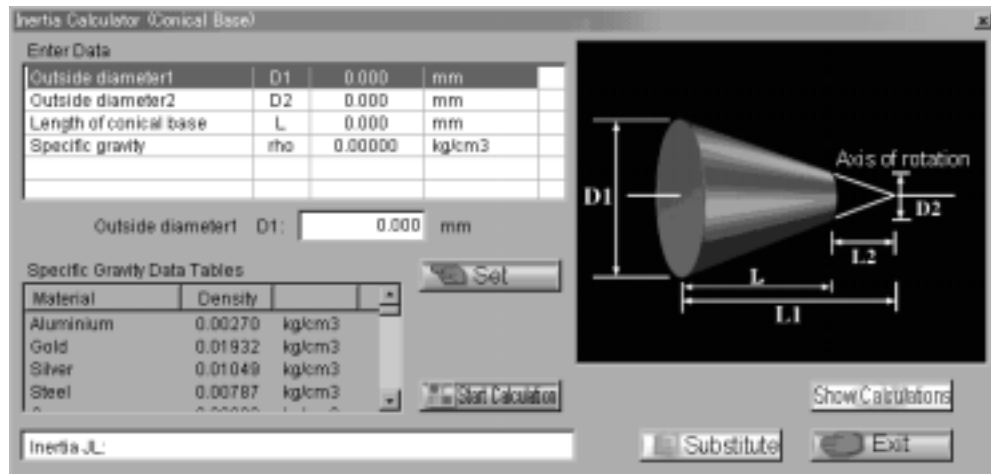
Buttons: Set, Start Calculation, Show Calculations, Substitute, Exit



(f) (Cone)



(g) (Conical base)



(2) (Specific Gravity Tables)

“ ”

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

● “ (Print) ”

. “ (Exit) ”

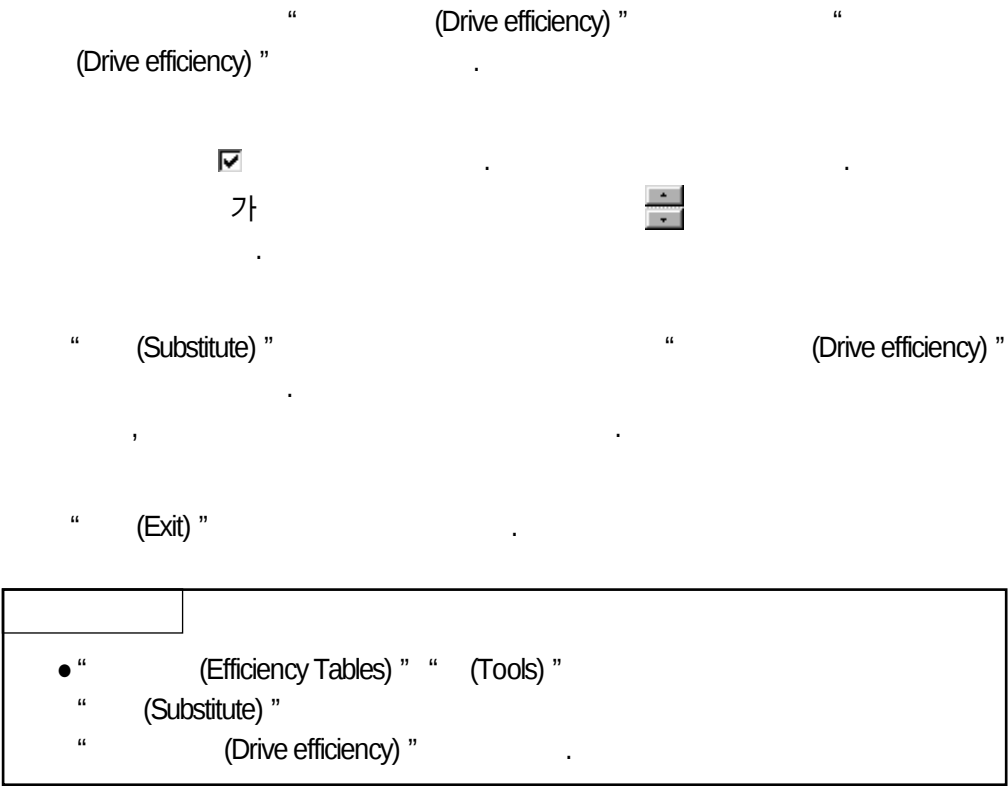
(3) (Efficiency Tables)

“ (Efficiency Tables) ”

Efficiency Data Tables	
☐ Bayride Planetary gearbox	0.850
☐ Ball screw	0.900
☐ Trapezoidal thread	0.300
☐ Plastic nut	0.650
☐ Ropes per full wrap	0.910 - 0.950
☐ V belts per full wrap	0.880 - 0.930
☐ Flat belts per full wrap	0.930 - 0.980
☐ Chains per full wrap	0.900 - 0.960
☐ Rack and pinion	0.600 - 0.800

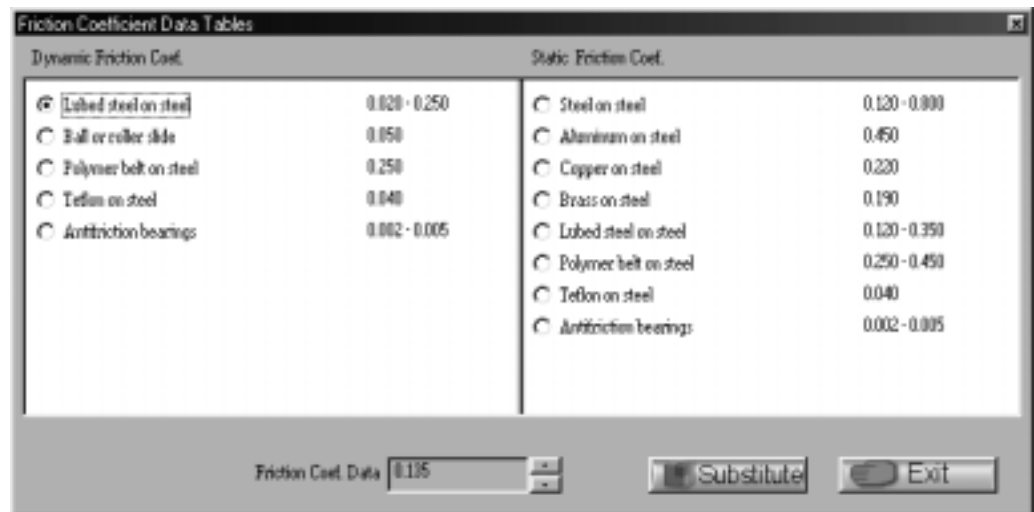
Please select two or more efficiency factors when two or more combinations are necessary

Total Efficiency Data



(4) (Friction Coeff. Tables)

“ (Friction Coeff. Tables) ”



“ (Coefficient of friction) ”
 “ (Coefficient of friction) ”

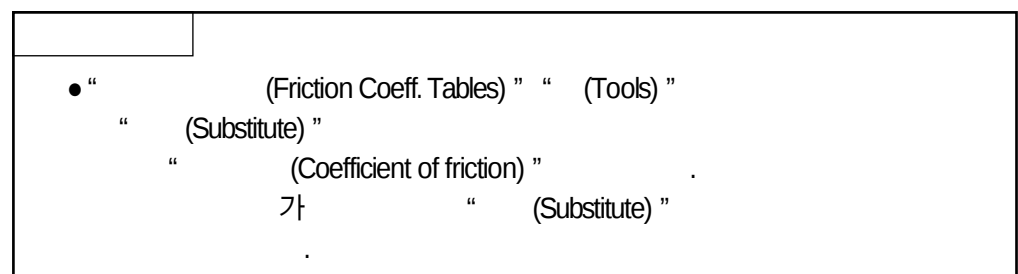


가

“ (Substitute) ”
 friction) ”

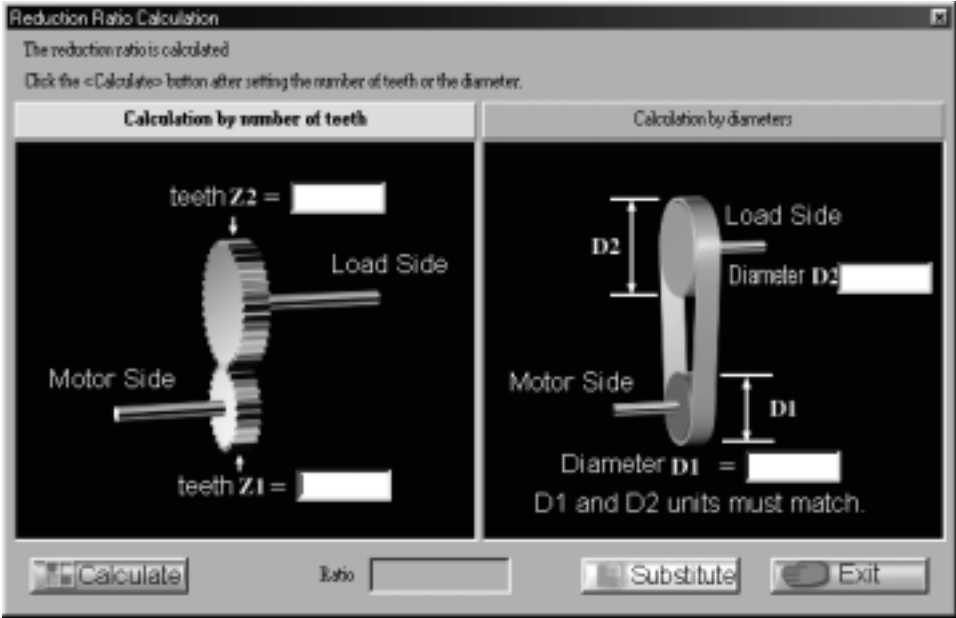
“ (Coefficient of

“ (Exit) ”



(5) (Radio Calculate)
· sprocket ·

“ (Radio Calculate) ”



“ (Reduction gear ratio) ”
“ (Reduction gear ratio) ”

“ (Calculate) ”

“ (Substitute) ”

“ (Reduction gear ratio) ”

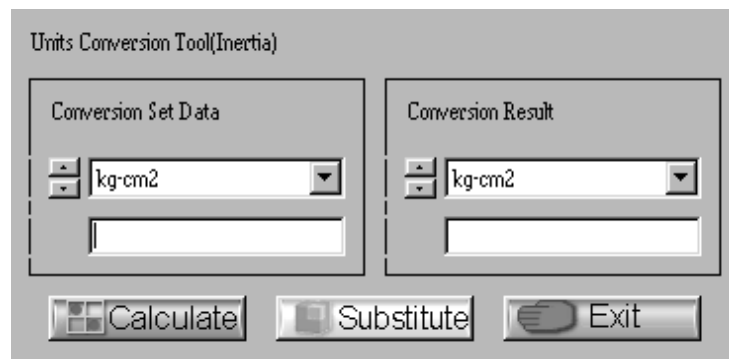
“ (Exit) ”

● “	(Radio Calculate) ” “ (Tools) ”
“	(Substitute) ”
“	(Reduction gear ratio) ”

(6)

()					
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					

.(: ())



- () “ (Tools) ”

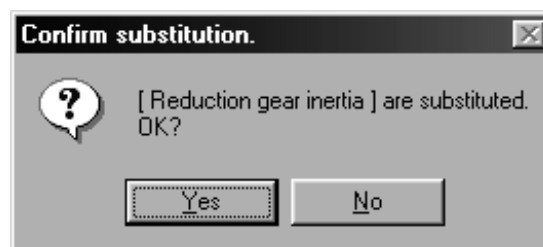
“ (Units Conversion) ” “ (Inertia) ”
(Combo box)

(Combo box)

“ (Calculate) ”

“ (Substitute) ”

.(Please Click substituting Value destination) ”

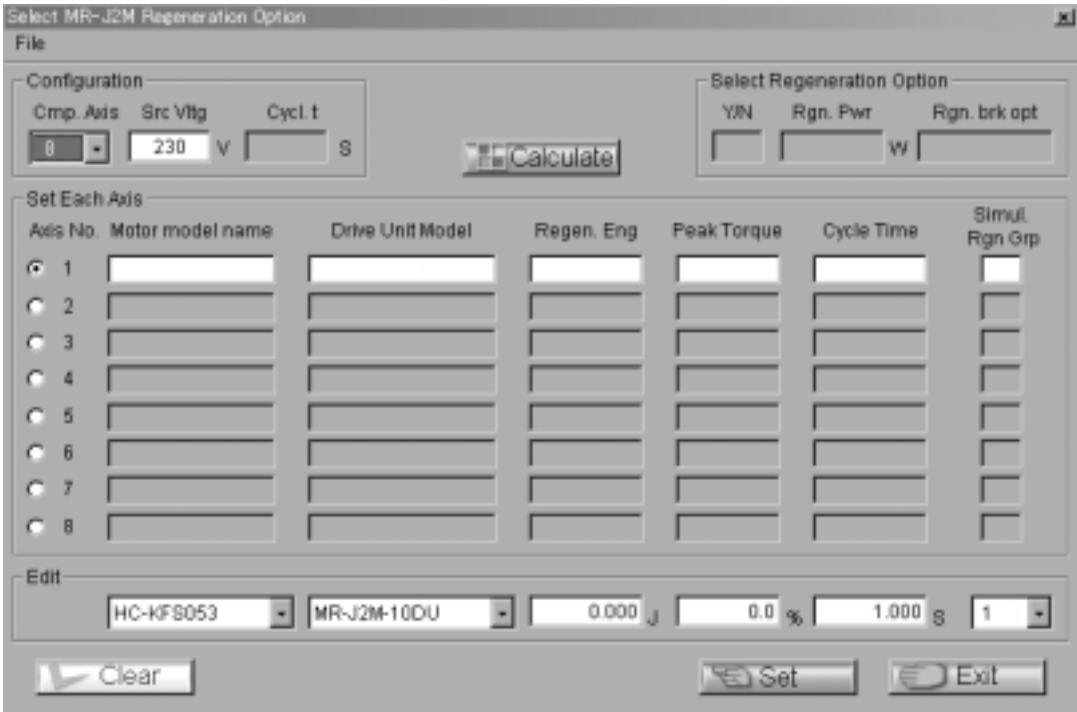


가 “ (OK) ” 가



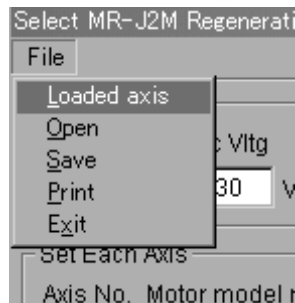
() “ (Exit) ”

(7) MR - J2M
MR - J2M . MR - J2M
“ MR - J2M (MR - J2M Regeneration Option Selection) ”



“ MR - J2M (MR - J2M Regeneration Option Selection) ”
2.3

(a) (File)

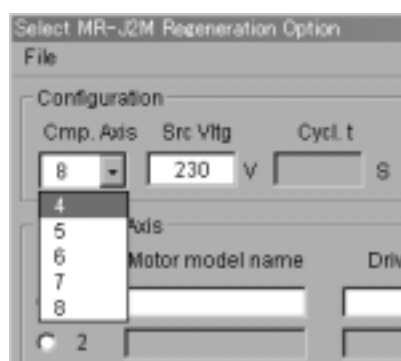


(Loaded axis)	(***.srv) , 1 (***.svm) (***.srv)
(Open)	MR - J2M (***.mro)
(Save)	MR - J2M (***.mro)
(Print)	MR - J2M
(Exit)	MR - J2M (Exit)

(b) (Help)

- () “ (Help)”
가

(c)



	4~8
(V)	170~253V
(多)	

(d) (Editing field)

“ 1 ”

“ (Set) ”

“ (Clear) ”

Edit

HC-KFS053

MR-J2M-10DU

0.000 J

0.0 %

1.000 s

1

1	1
	(1~8 : , 0 :)

(e) (Each axis setting)

“ (Loaded Axis) ”

(f) (Calculation)

“ (Calculation) ”

Calculate

Select Regeneration Option

Y/N

Rgn. Pwr

Rgn. brk opt

W

	가, 가
	:
	:
[W]	

0W		
30W	3063W	MR - RB032
100W		MR - RB14
300W	4712W	MR - RB34
500W		MR - RB54
500W		

(8)

		[r/min]
	J	[kg · cm ²]
	() JM	[kg · cm ²]
		[p/rev]
[kVA]		
[W]		
[N · m]		[lb/mtr]
[N · m]		[kg]
[r/min]	()	[kg]
[r/min]		

“ (Motor Data Tables) ”

Motor Specification List

Red Gear

Select Motor Series

HF-KP

Print

Exit

Motor Specification List

Motor model name	HF-KP053	HF-KP13	HF-KP23	HF-KP43	HF-KP73
Applicable Amp Model (1) MR-J3-x	10A	10A	20A	40A	70A
Applicable Div Unit Model (2) MR-J2M-x	---	---	---	---	---
Converter unit model name MR-HP	---	---	---	---	---
Pwr Sup Eq. Cap. (w/ (1)) (kVA) (Note 1)	0.30	0.30	0.50	0.90	1.30
Pwr Sup Eq. Cap. (w/ (2)) (kVA) (Note 1)	---	---	---	---	---
Rated Output (W)	50	100	200	400	750
Rated Torque (N·m)	0.16	0.32	0.64	1.30	2.40
Maximum Torque (N·m)	0.48	0.95	1.90	3.80	7.20
Rated Speed (r/min)	3000	3000	3000	3000	3000
Maximum Speed (r/min)	6000	6000	6000	6000	6000
Allowable Instantaneous RPM (r/min)	6900	6900	6900	6900	6900
Inertia moment JM (kg·cm ²)	0.052	0.088	0.24	0.42	1.43
Inertia Moment (with Brake) JM (kg·cm ²)	0.054	0.09	0.31	0.50	1.63
Encoder Resolution (p/rev)	262144	262144	262144	262144	262144
Brake Option	Exists	Exists	Exists	Exists	Exists
Reducer Option	Does not exist	Does not exist	Does not exist	Does not exist	Does not exist
Redd int. rat. (1/min)	15Times under	15Times under	15Times under	15Times under	15Times under
Mass (kg)	0.35	0.56	0.94	1.50	2.90
Mass (with Brake) (kg)	0.65	0.86	1.60	2.10	3.90

Note 1: The power supply equipment capacity varies according to the power supply impedance.

“ (Red Gear) ”

(Select Motor Series) ”

“ (Select Motor Series) ”

“ (Exit) ”

- (9) (三木) (Miki Pulley Co., Ltd.)
 (三木)
 “ (三木) (Miki Pulley Co., Ltd.) ”

Coupling data manufactured by Miki Pulley Co., Ltd.

Servomotor Rated Output [W]	Motor model name	Motor Specification				Specification manufactured by Miki Pulley	
		Rated Speed [rpm]	Rated Torque [Nm]	Maximum Torque [Nm]	Shaft diameter [mm]	Type SFC	Twisted rigidity [Nm/rad]
0.05	HC-KFS053	3000	0.16	0.40	8	D10SA	670
	HC-MFS053						
0.1	HC-KFS13	3000	0.32	0.95	8	D20SA	1600
	HC-MFS13						
0.2	HC-KFS23	3000	0.64	1.9	14	D30SA	3200
	HC-MFS23						
0.4	HC-KFS43	3000	1.3	3.8	14	D35SA	7100
	HC-MFS43						
0.5	HC-BFS02	2000	2.39	7.16	24	D50SA	19000
	HC-BFS03	3000	1.59	4.77			
0.75	HC-KFS73	3000	2.4	7.2	19	D40SA	8800
	HC-MFS72	2000	3.58	19.7	22	D50SA	19000
0.85	HC-KFS73	3000	2.4	7.2	19	D40SA	8800
	HC-BFS81	1000	8.12	24.4	24	D60SA	36000

- (10) 2 ()

リニアサーボ最大送り距離

リニアサーボモーター次側(コイル) ————

LM-H2P1A-06M 128 mm

リニアサーボモーター二次側(磁石) ————

LM-H2S10-288	288 mm		枚
LM-H2S10-384	384 mm		枚
LM-H2S10-480	480 mm		枚
LM-H2S10-768	768 mm		枚

リニアサーボ最大送り距離 mm

閉じる

1 ()

2 ()

3.2.3 헬프(Help)

- () “ (Help) ”

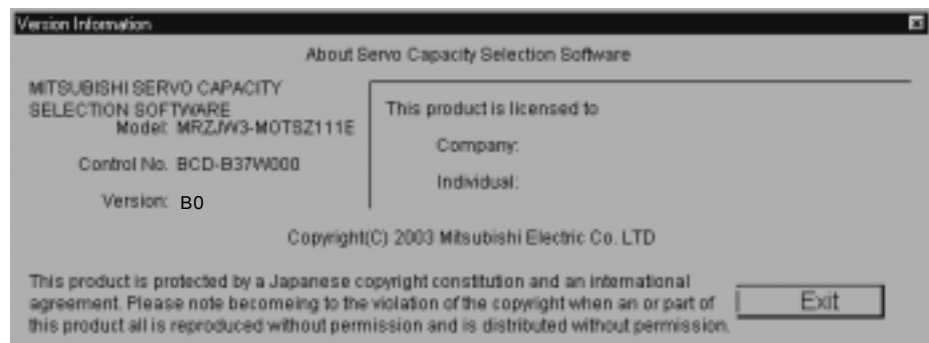


(1)



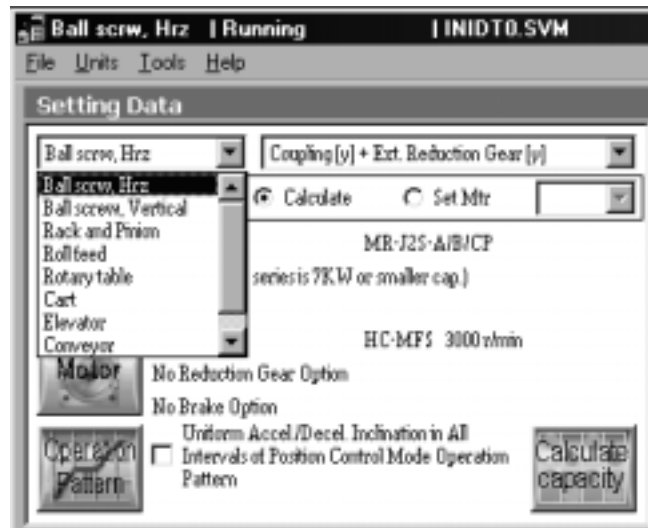
(2)

- “ (Exit) ”

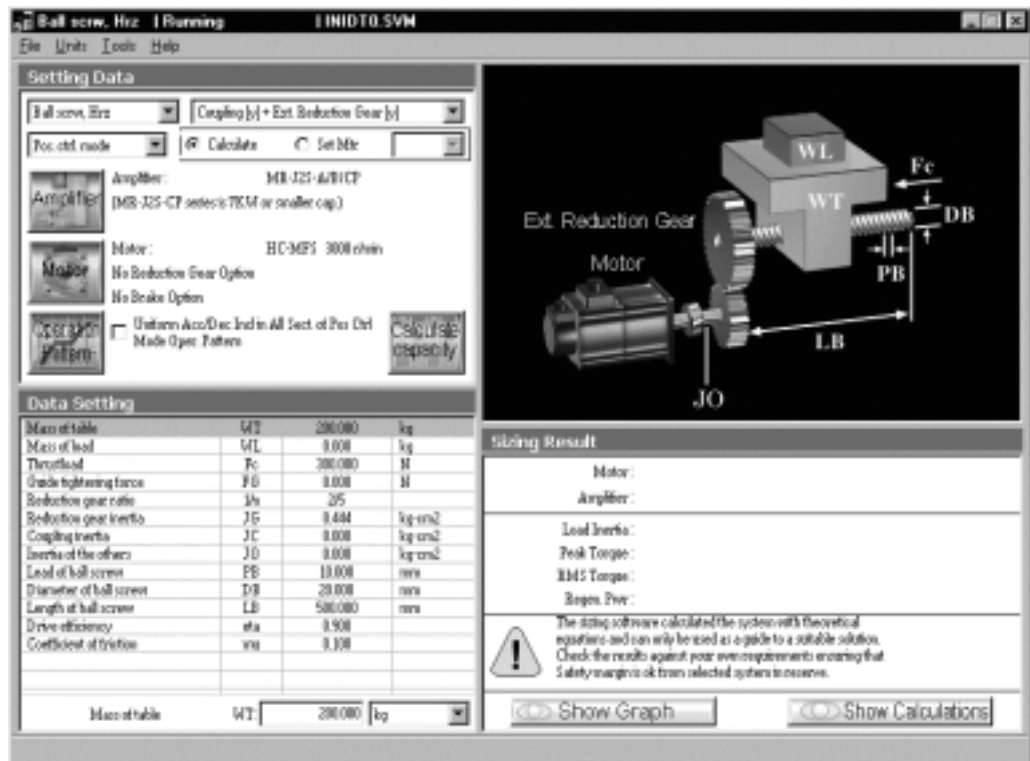


3.3 기계 제원 데이터의 입력

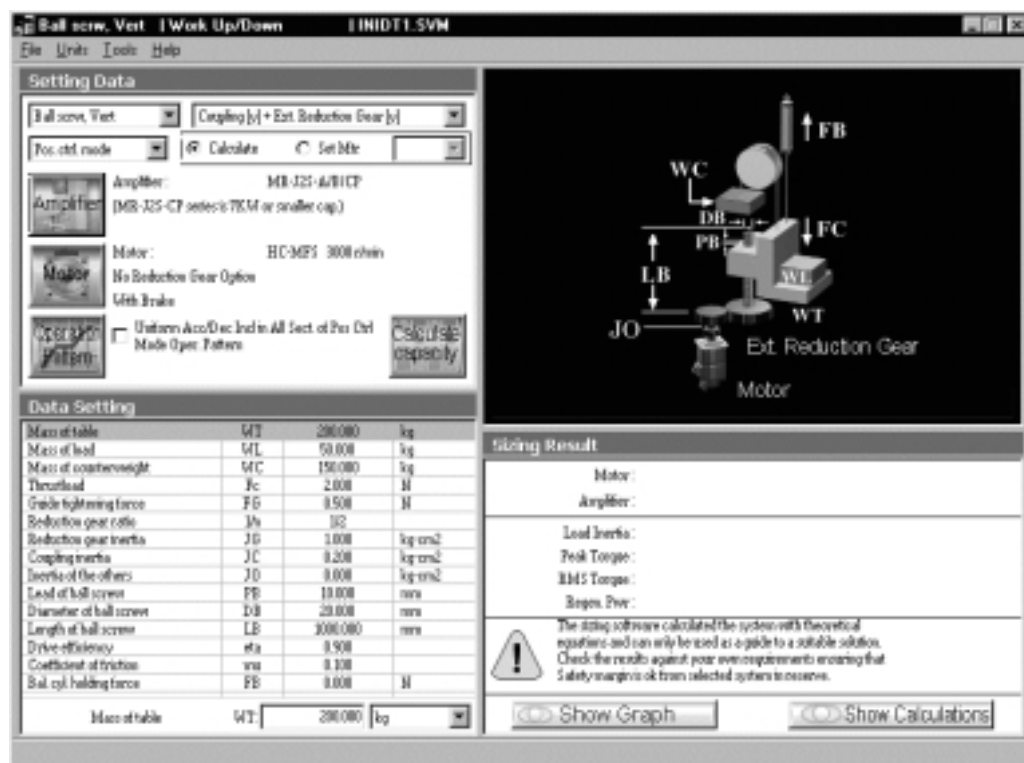
3.3.1 기계 구성 요소

(Combo box) 

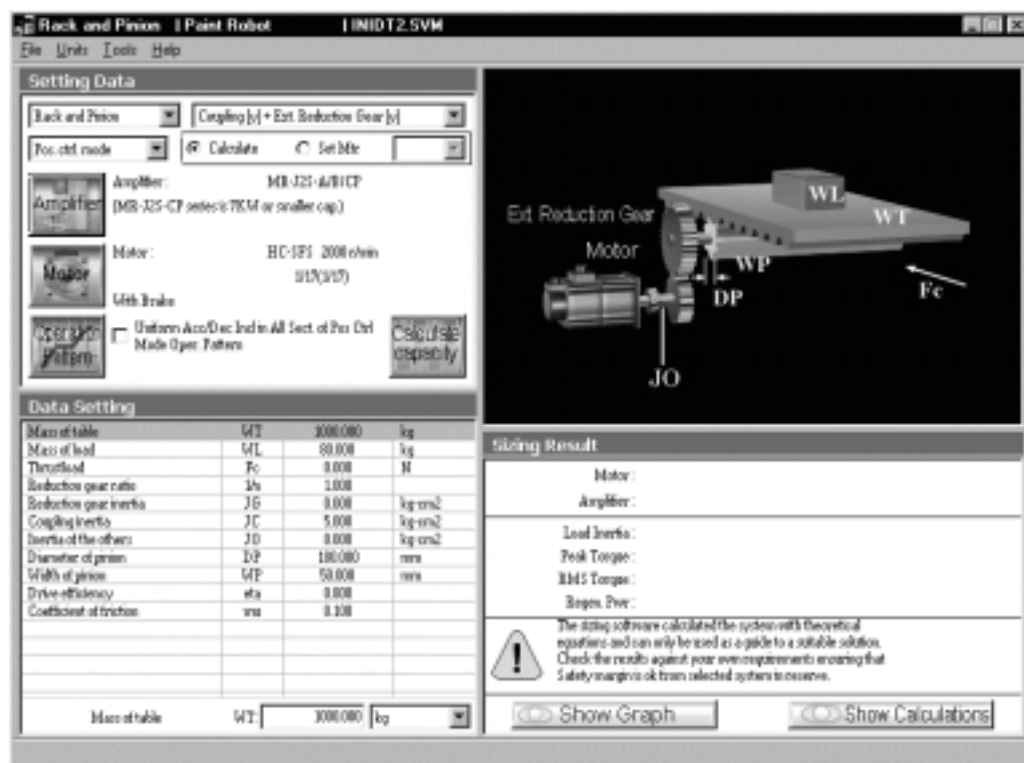
(1)



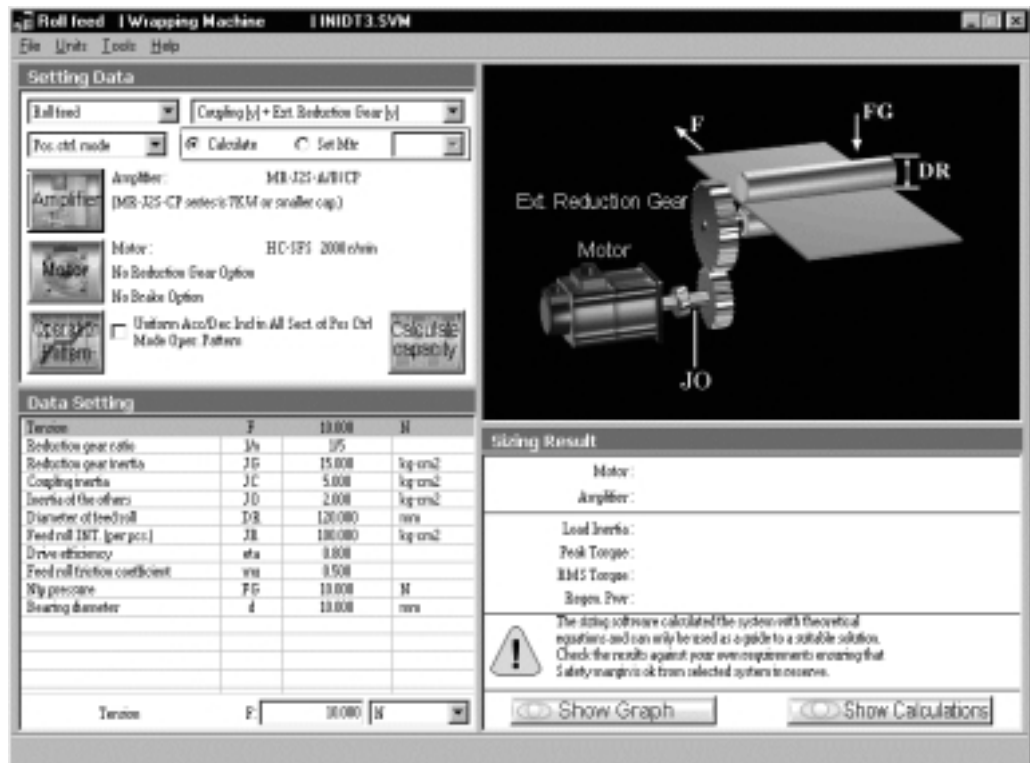
(2)



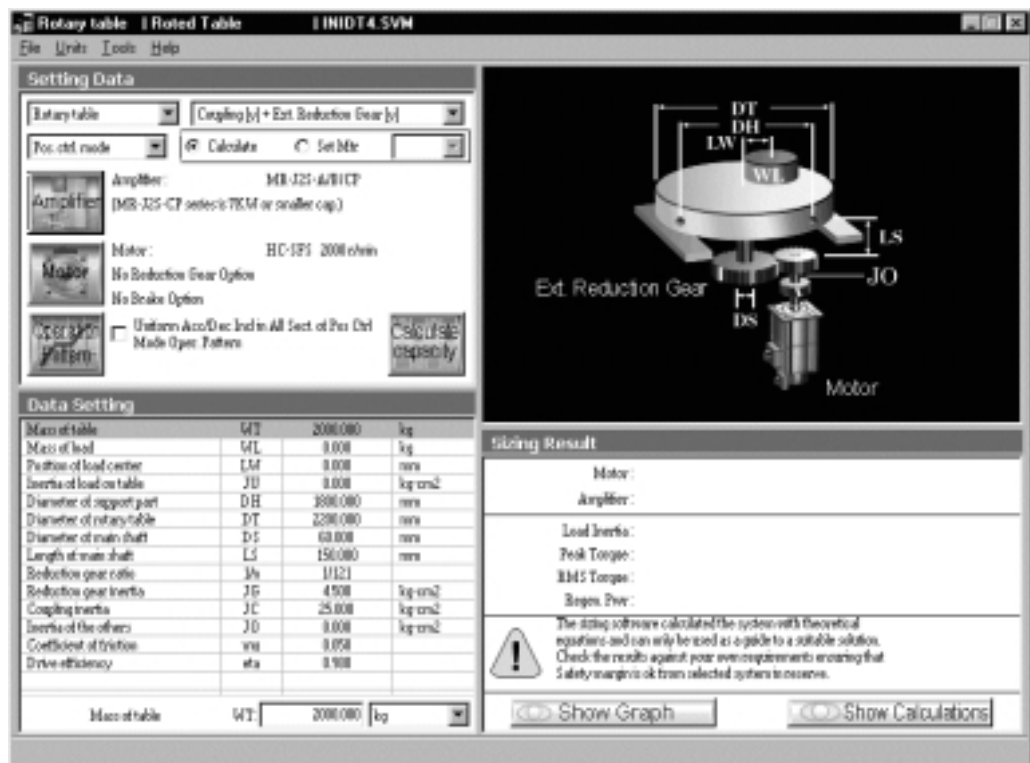
(3) &



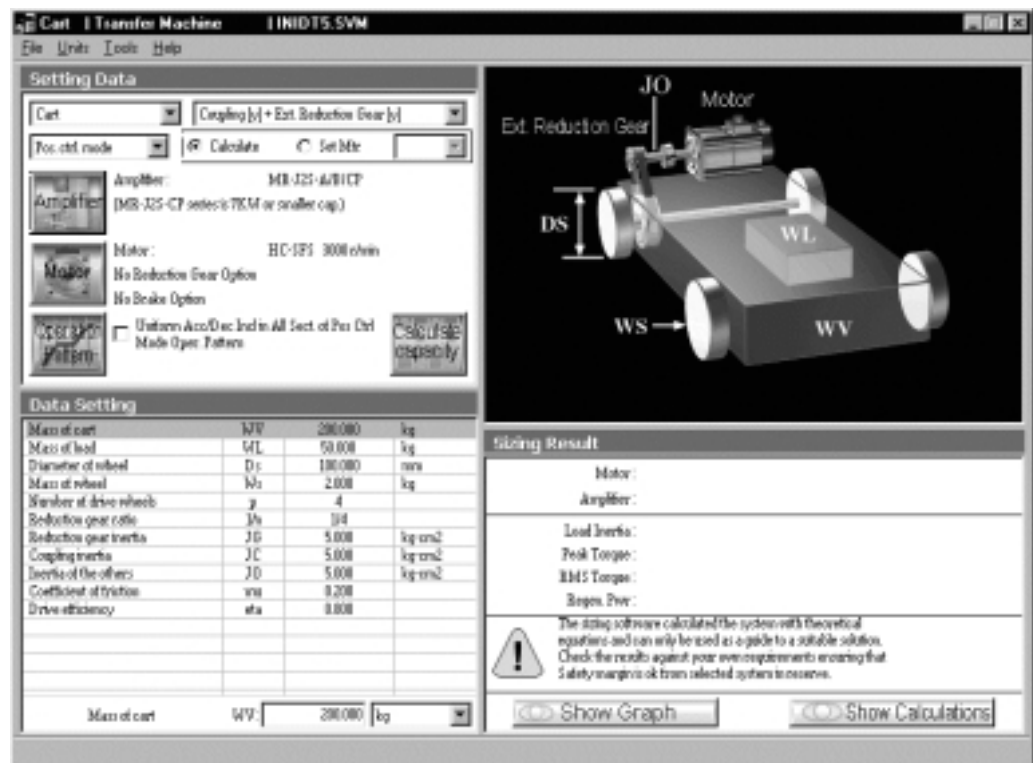
(4)



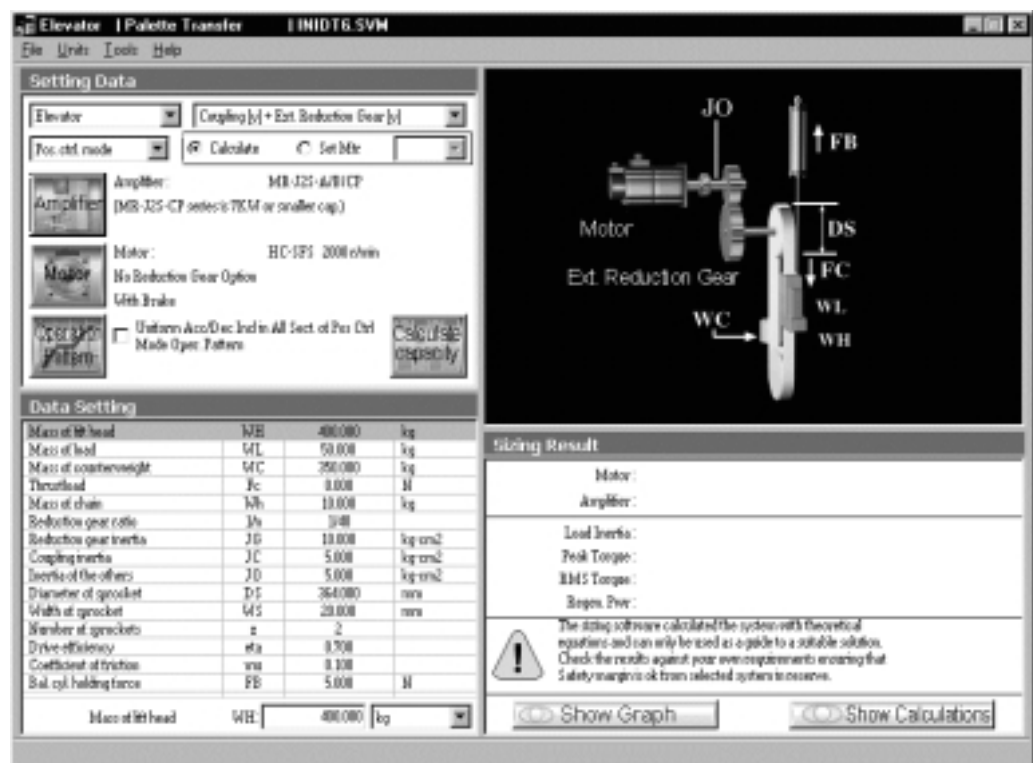
(5)



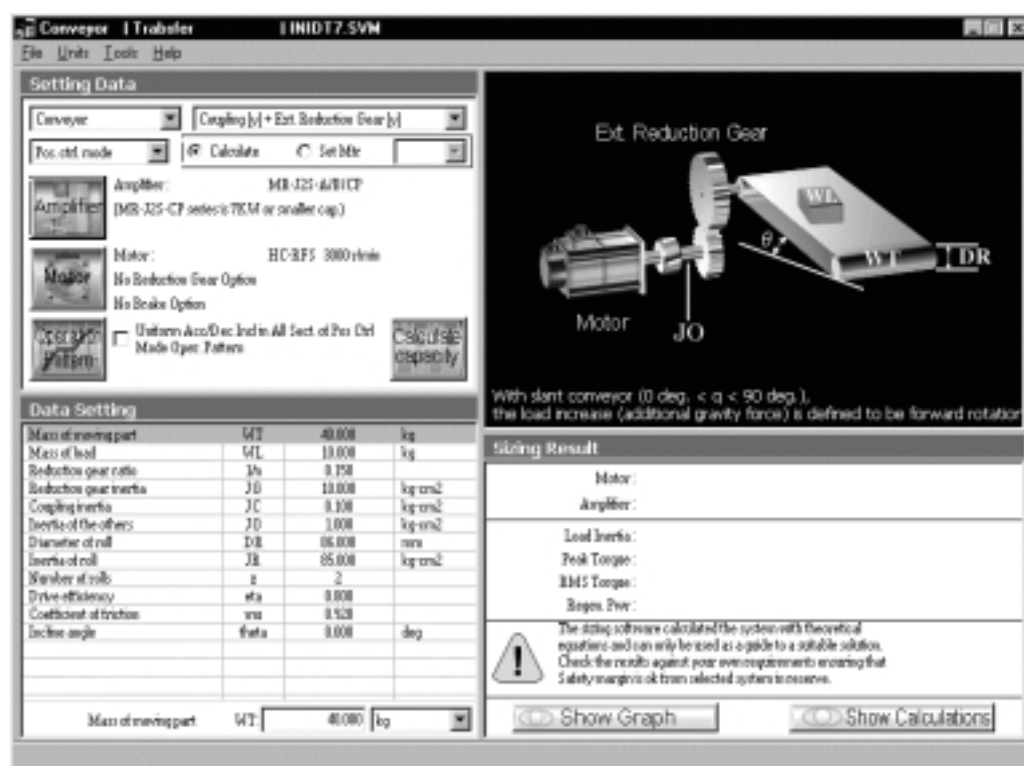
(6)



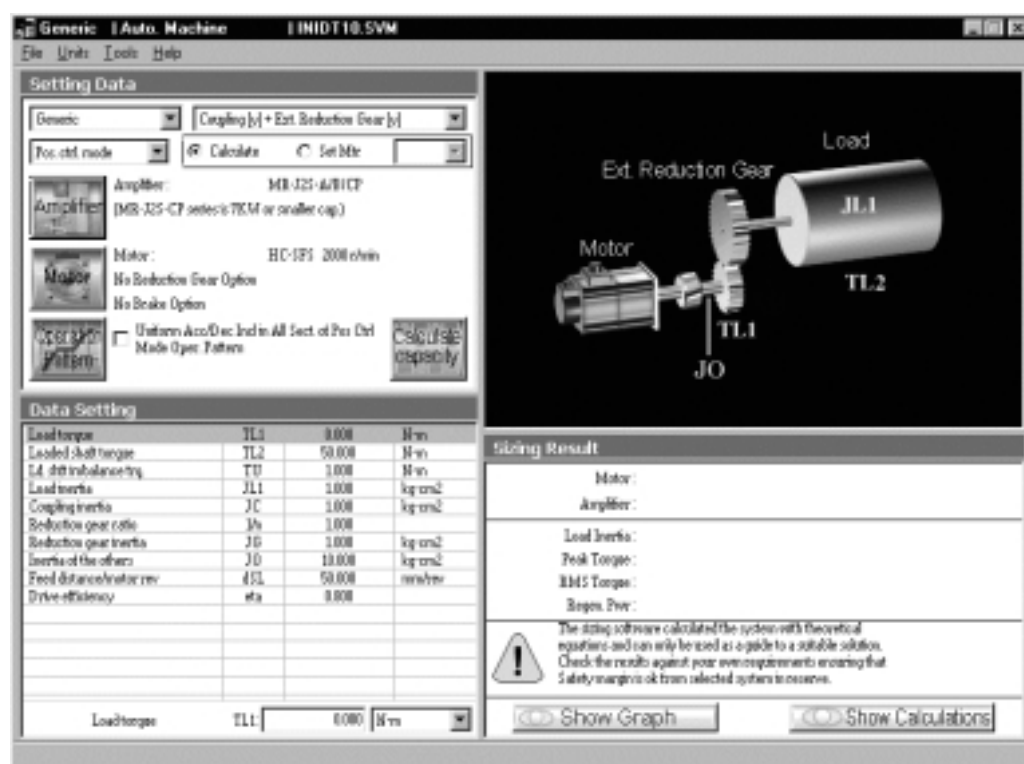
(7)



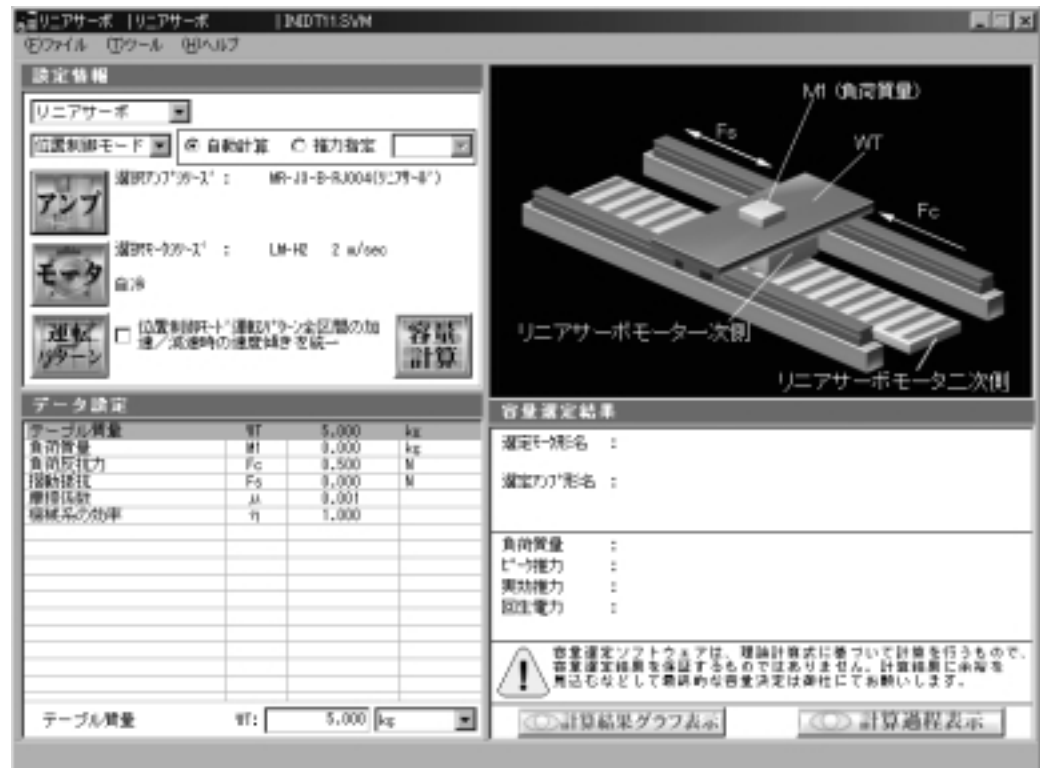
(8)



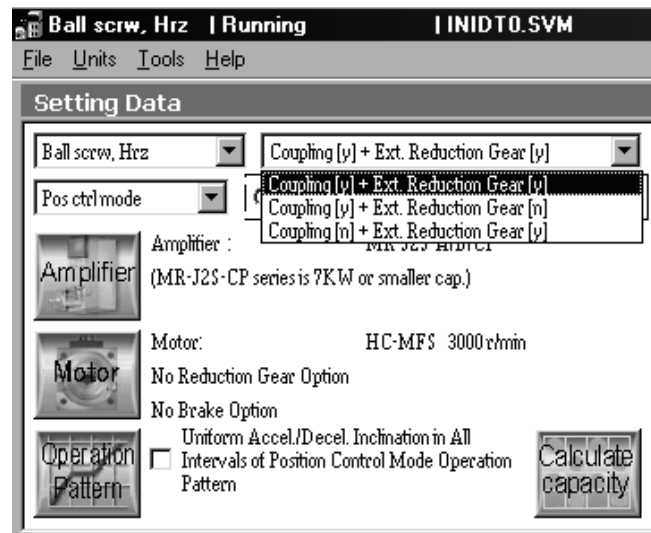
(9)



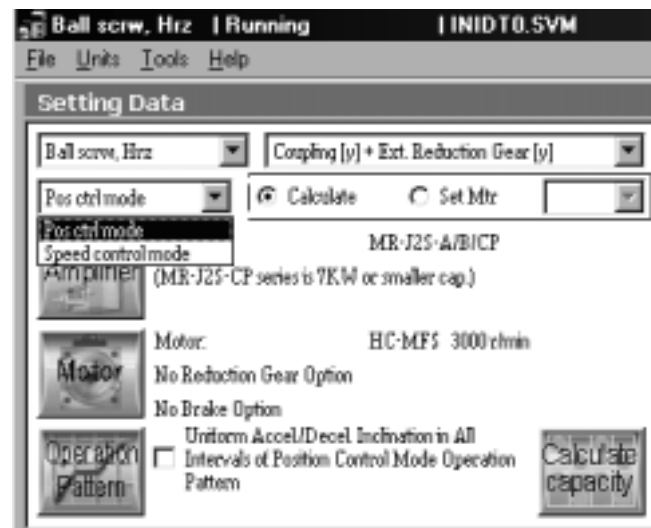
(10)



3.3.2 커플링과 외부 감속기 선택



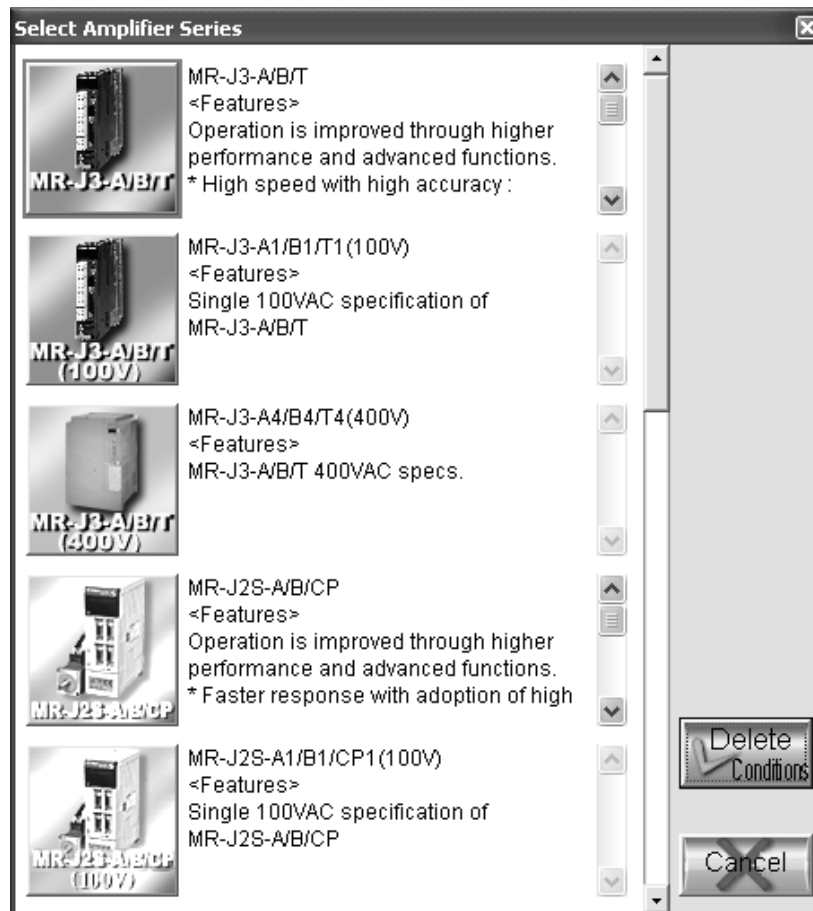
3.3.3 제어 모드 선택



(Combo box)

3.3.4 앰프 선택

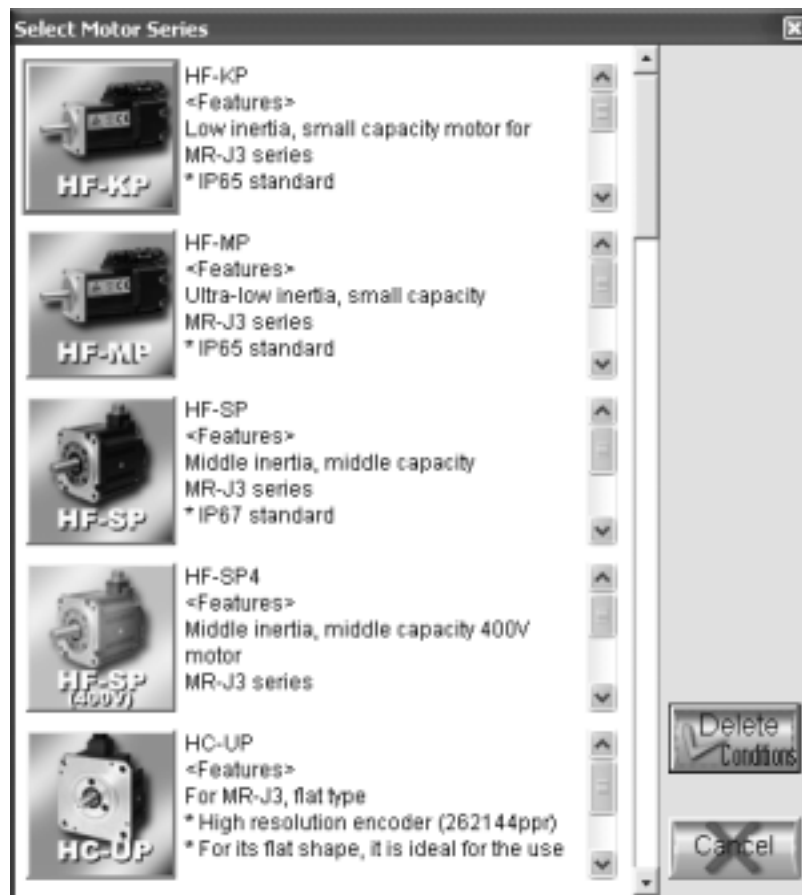
“ (Amplifier) ”



3.3.5 모터 선택

(1)

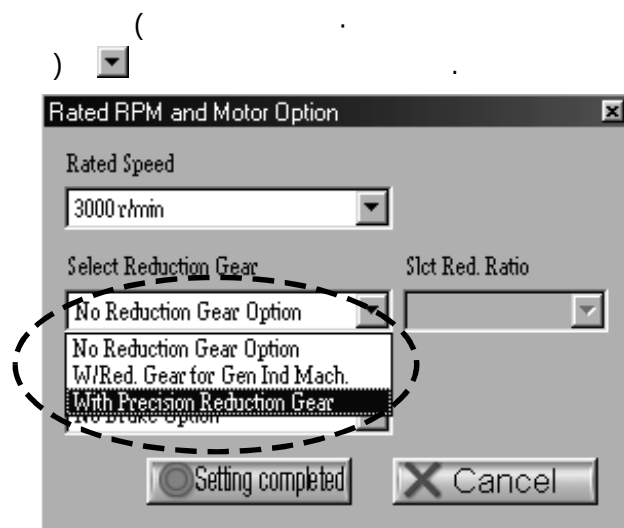
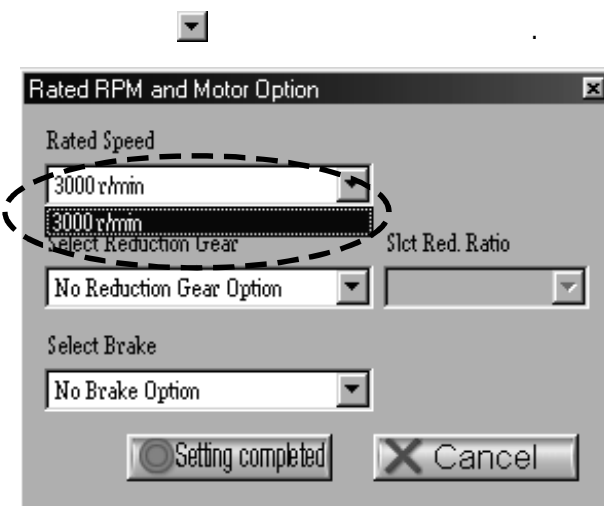
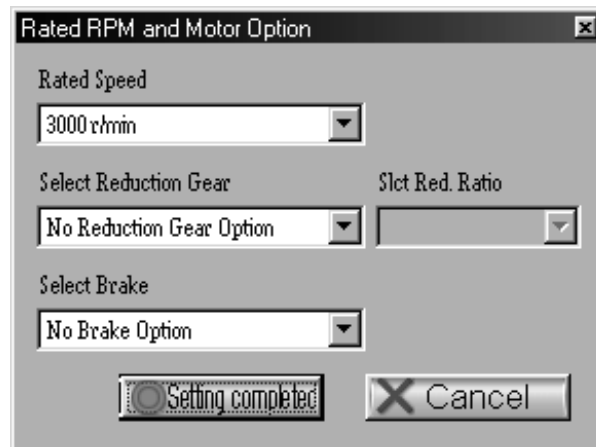
“ (Motor) ”



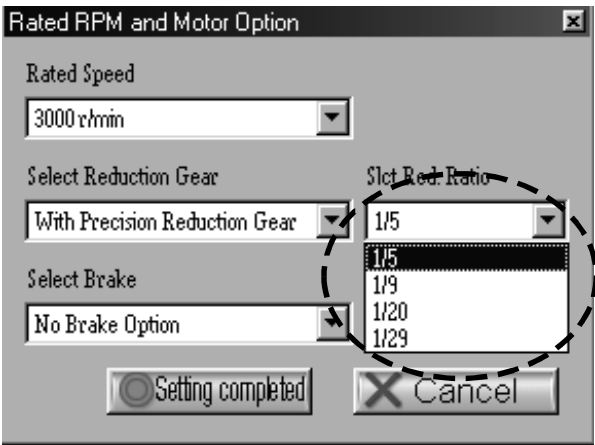
(2)

(1)

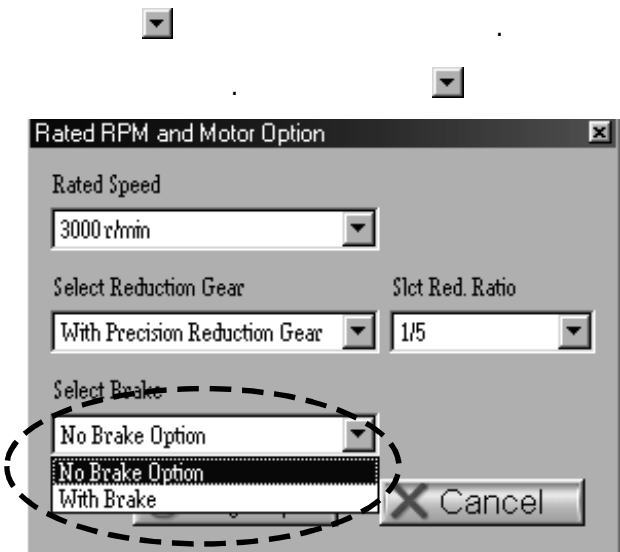
가



가 가 가



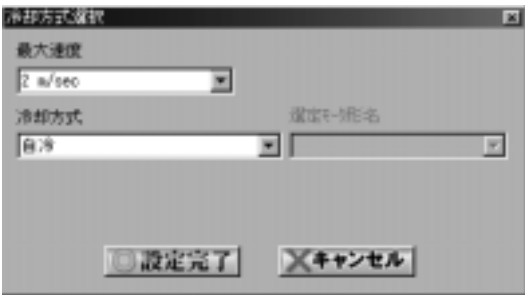
가



“ (Setting completed) ”

(3) (, (1))

가





(Combo box)

冷却方式選択

最大速度
2 m/sec

冷却方式
乾燥

指定名称

設定完了 キャンセル



(Combo box)

(()) ()

冷却方式選択

最大速度
2 m/sec

冷却方式
乾燥

指定名称

設定完了 キャンセル



(Combo box)

冷却方式選択

最大速度
2 m/sec

冷却方式
乾燥

指定名称
LM-HP40-48M

設定完了 キャンセル

“ (Setting completed) ”

3.3.6 데이터 설정 영역

가 .

(1)

(2)

(3)

(Combo box)

(4)

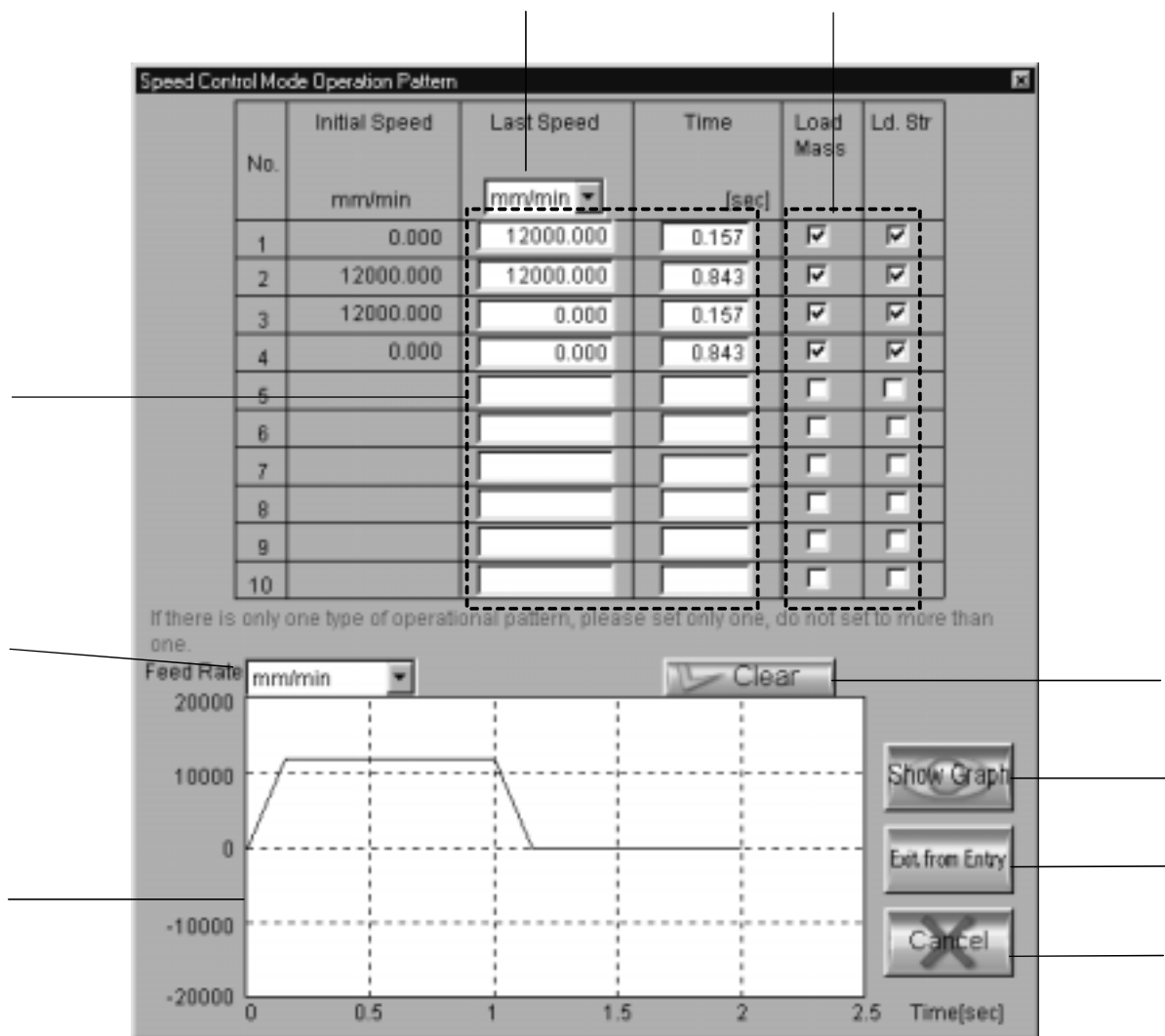
“ Enter ”

3.3.7 운전패턴의 입력

“(Operation Pattern)”

(1)

No.1 “ 0 ”,



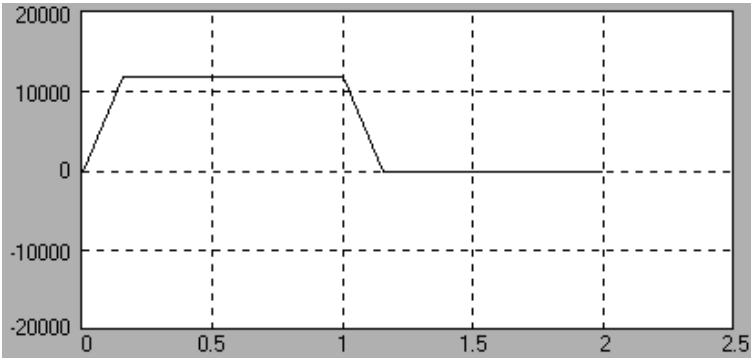
(Combo box)

“ 1 ” No. 1 (“ 1 ” 1)가 1 가 .

ON

(Clear)

(Show Graph)



(Combo box)

(Calcle)

(Exit from Entry)

(2)

3

“(Calculate Pattern)”

Position Control Mode Operation Pattern
✕

*Required Items

Stop. Stb. Time sec

No.	spd. chg	* Feed [mm]	*Either One		Accel. Time [sec]	Decel. Time [sec]	Pause time [sec]	Load Mass	Ld. Str
			Pos. Time [sec]	Feed Rate mm/min					
1	☐	50.000	0.501	000.000	0.100	0.150	0.150	☒	☐
2	☐	-270.000	1.200	381.974	0.200	0.250	0.160	☐	☐
3	☒	70.000	0.570	000.000	0.300			☐	☒
4	☐	150.000	1.022	000.000	0.350	0.400	0.170	☐	☐
5	☐							☐	☐
6	☐							☐	☐
7	☐							☐	☐
8	☐							☐	☐
9	☐							☐	☐
10	☐							☐	☐

If there is only one type of operational pattern, please set only one, do not set to more than one.

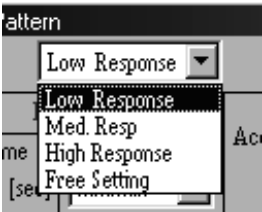
Feed Rate

(Combo box)

No. 1 (1 " 1 " 1 " 1)가
1 가
, &
ON 가
가
ON . ON " (Decel. Time) "
(Pause Time) "
(Combo box)

•

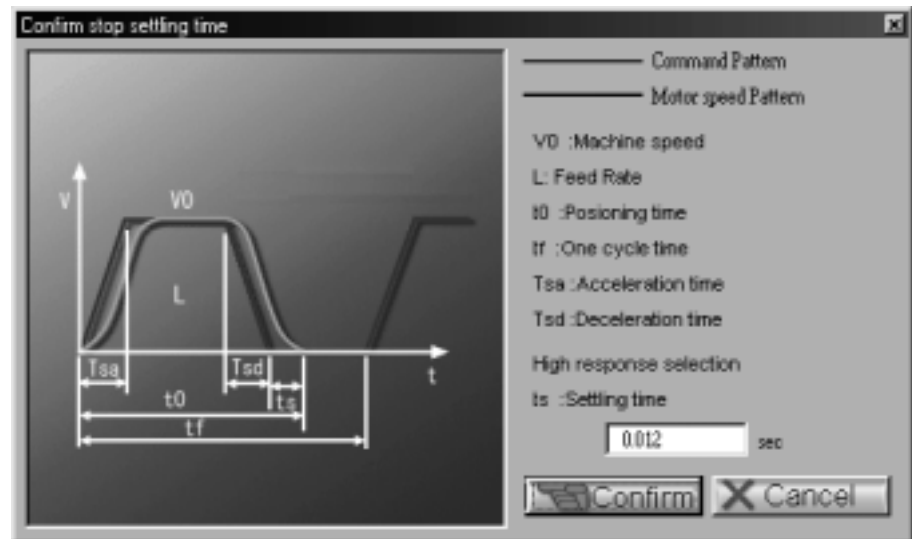
" (Low Response) " " (High Response) "
" (Low Response) " " (Medium Response) " "
(High Response) "
(Kp)
(Combo box)



가

(整定) (ts)

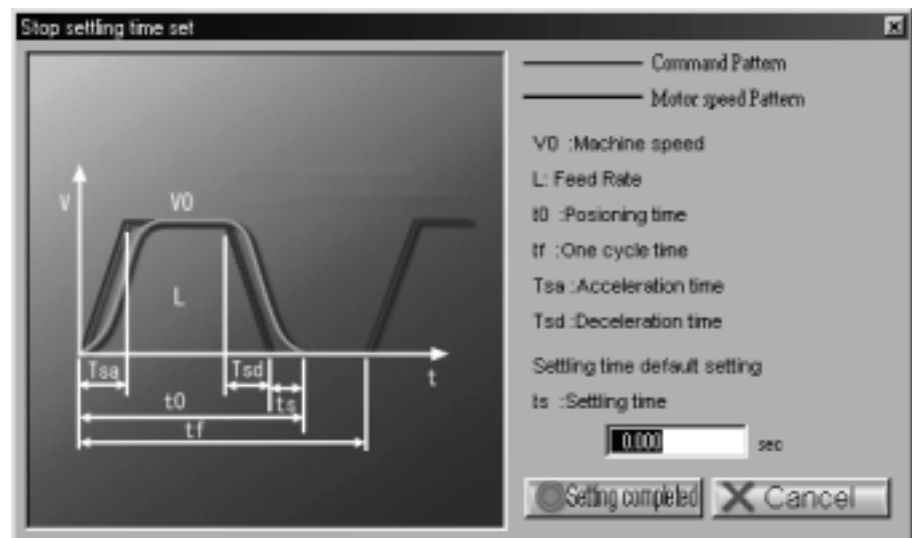
.(.)



“ (Confirm) ”

“ (Free Setting) ”
(整定) (ts)

가



“ (Setting completed) ”

(整定)

(整定)

“ (Clear) ”

(

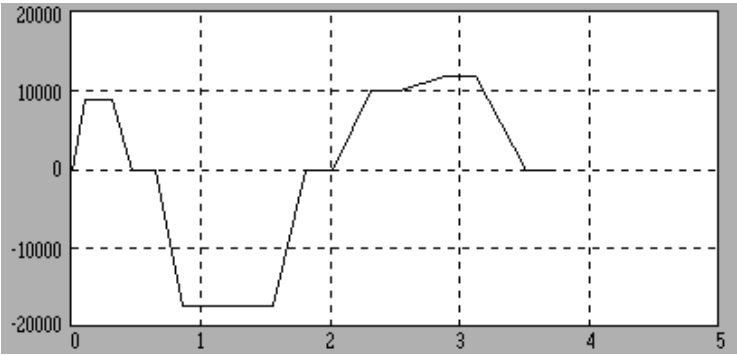
.)

“ (Calculate pattern) ”

.

“ (Show Graph) ” ()

.



(Combo box)

.

“ (Candle) ”

.

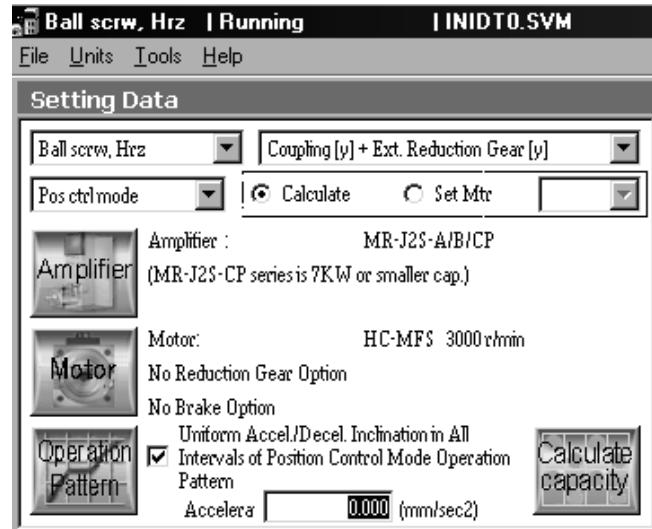
“ (Exit from Entry) ”

.

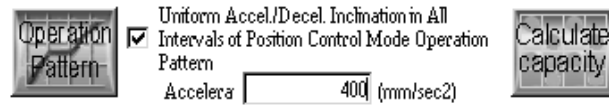
(3)가 . 가

,가 . 가 가 .

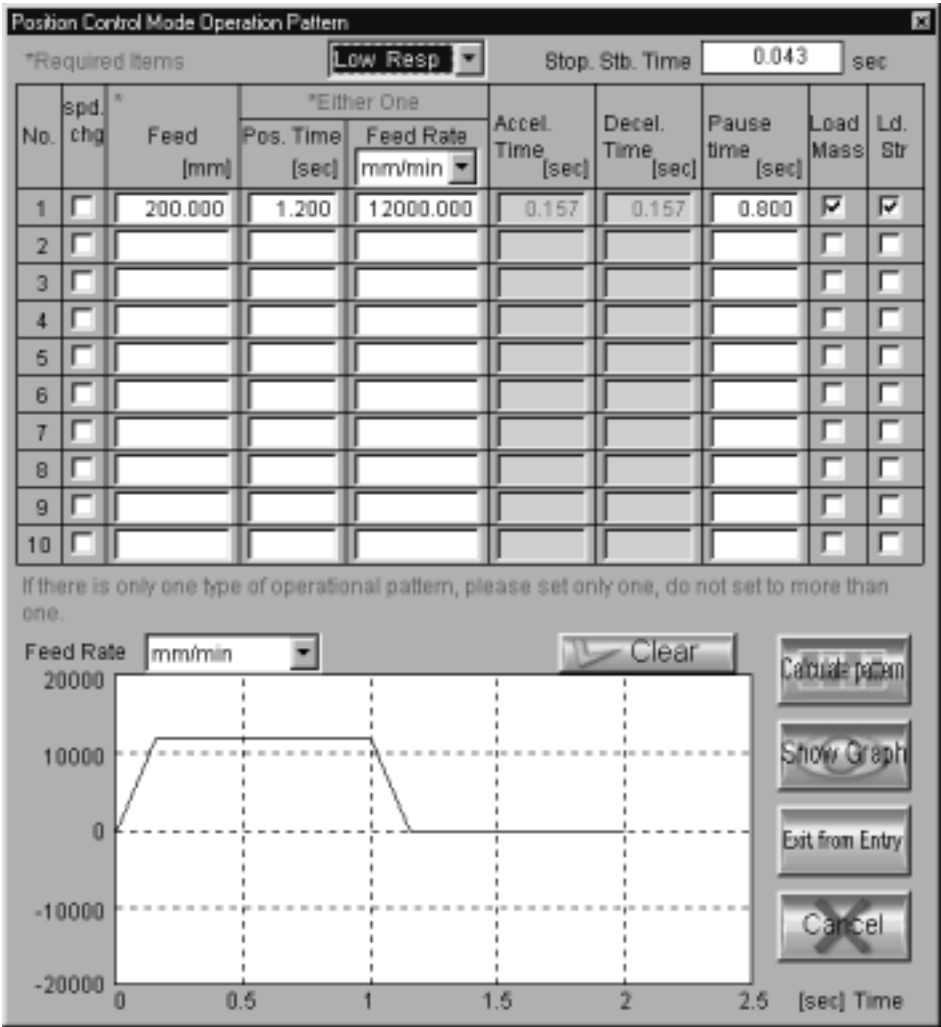
“ 가 / (Uniform Accel./Decel. Inclination in All Intervals of Position Control Mode Operation Pattern) ”
가 .



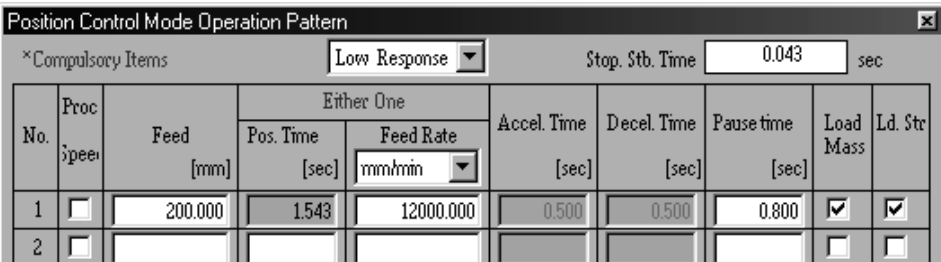
가 .(400mm/s² .)



“ (Operation Pattern) ” 가



“(Pos. Time)” “(Operation Pattern)”
“(Pos. Time)” “(Accel. Time)” “(Decel. Time)”



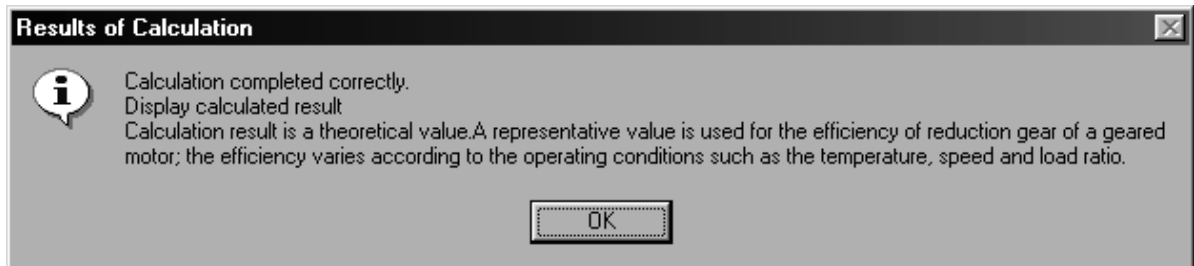
3.3.8 용량 선택의 실행(자동 계산)

(1)

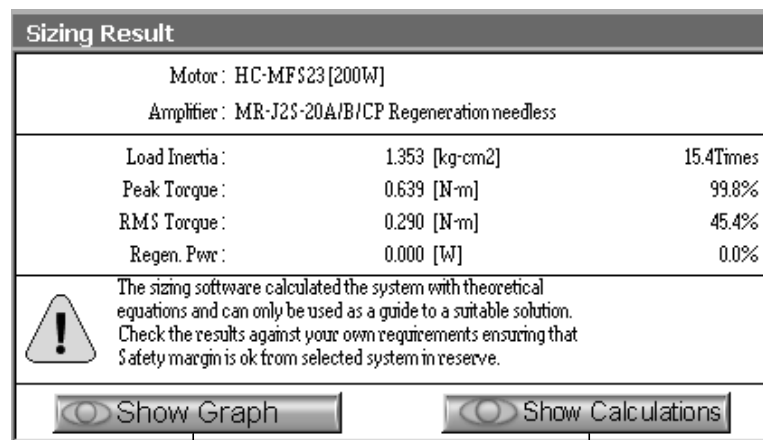
“ (Calculate) ”

“ (Calculate capacity) ”

가



“ OK ”



HC - MFS23

MR - J2S - 20A/B/CP,

1.353(kg · cm²)

15.4

0.671[N · m]

104.8%

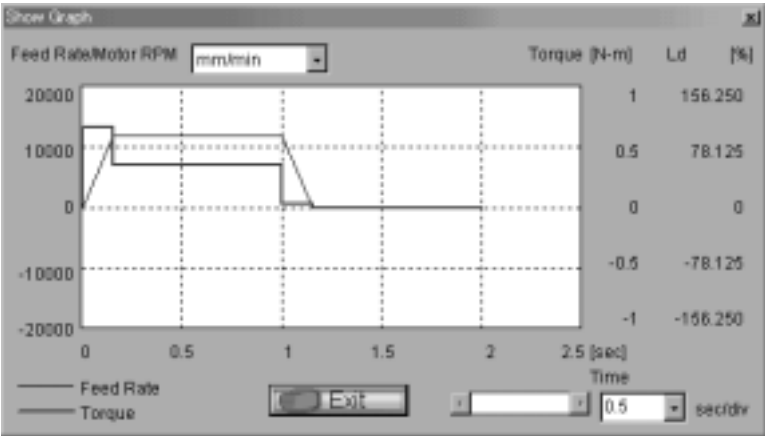
0.295[N · m]

46.2%

0[W]

(2)

(a) “ (Show Graph) ” (1)
가



“ (Exit) ”

(b) “ (Show Calculations) ” (1)



“ (Exit) ”

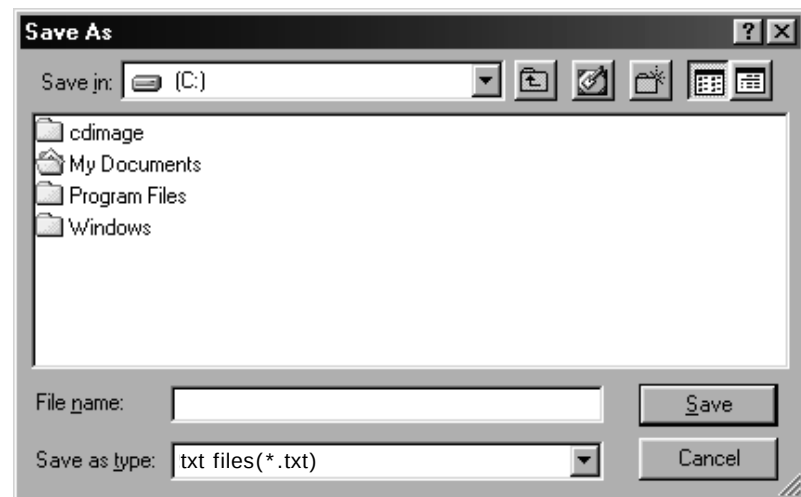
“(Symbol List)” “
(Save File)”

“(Symbol List)”
(非) 가

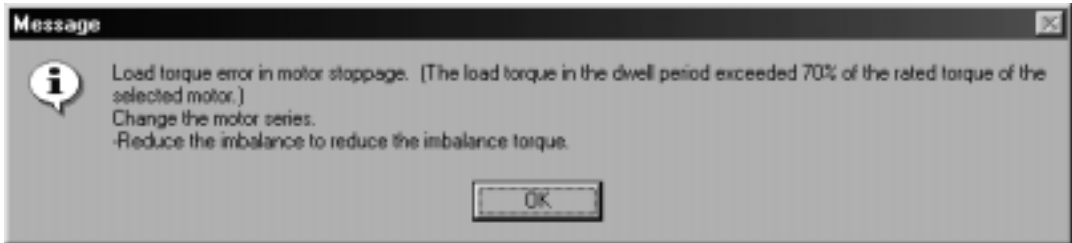


“(Save File)” 가

“(Symbol List)” “(Calculations)”



가 , 가



가



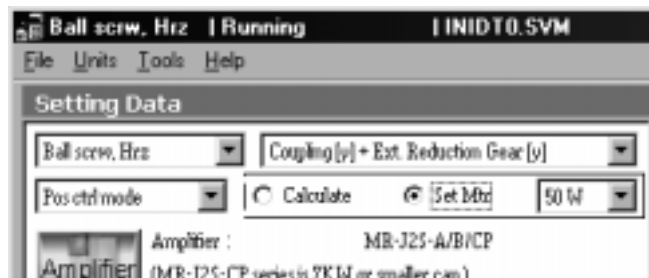
● MR - J2M	“ (Tools) ” “ MR-J2M (MR-J2M Regeneration Option Selection) ”

3.3.9 용량을 지정하고 계산을 실행

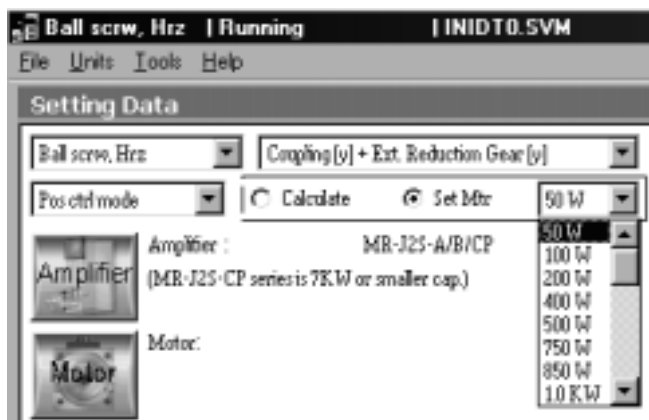
가

가

“ (Set Mtr) ”



(Combo box)



“ (Operation Pattern) ”

“ ”

3.3.7

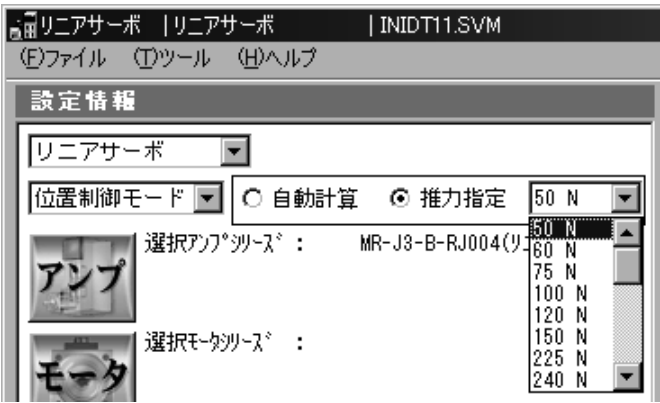
3.3.10 추력을 지정하고 계산을 실행(리니어 서보)

가
가

“ (Set Mtr) ”



(Combo box)



“ (Operation Pattern) ” “ ”

3.3.7

[illegible]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



**MITSUBISHI
ELECTRIC**

韓國三菱電機AUTOMATION(株)

본 사: 157-200 서울특별시 강서구 가양동 1480-6
TEL. 02)3660-9511~19 FAX. 02)3664-8372/8335
부산영업소: 617-726 부산광역시 사상구 과법동 578
산업용품유통상가 업무동 206호
TEL. 051)319-3747~9 FAX. 051)319-3768
대구영업소: 702-845 대구광역시 북구 산격2동 1666
크리스탈빌딩 603호
TEL. 053)604-6047 FAX. 053)604-6049
F.A 센터: 서울특별시 강서구 가양동 1480-6
TEL. 02)3660-9607 FAX. 02)3663-0475

<http://www.mitsubishi-automation.co.kr>