



Changes for the Better

MITSUBISHI CNC

Servo Selection Software
Instruction Manual



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Chapter 1 INTRODUCTION

1-1 What Servo Selection S/W Enables You to Do

[Items relating to servo capacity selection]

(1) To select the servo motor's capacity

- Select a machine model and input the machine specifications. Then this tool selects the smallest capacity servo motor among those that satisfy your requirements.
- Calculation result of a second-choice motor (a motor for comparison) is also shown, which helps you easily understand the selection result.
- Auxiliary calculation function and unit changeover function are available during machine data setting.
- You can specify or change the selection condition by setting the parameters.

(2) To select the regenerative resistor's capacity

- If you have selected the resistor regeneration type, you can also select the capacity of the resistor.
- If you have selected a 2-axis drive unit, the regenerative resistor will be selected and shown on "Drive system configuration list".

(3) To designate the motor series or to calculate based on your individual designation

- You can select a motor after designating the motor series. Also you can get a calculation result based on the servo motor you have selected.

(4) To directly input the servo motor's model name

- You can designate a servo motor you have already decided upon, in order to select the power supply's capacity.

(5) To output PDF

- You can output the selection results of servo motor and regenerative resistor capacities and also the servo motor capacity calculation process in PDF format.

[Items relating to spindle]

(1) To input the spindle motor's output characteristic

- You can specify the spindle motor's output characteristic, in order to select the power supply's capacity.

(2) To calculate the spindle's acceleration/deceleration time

- After you have set the spindle motor's output characteristic and machine data, you can calculate the spindle's acceleration/deceleration time.
- This S/W supports the coil switch control function. The parameters relating to this function (such as changeover speed and base shut OFF time) can be set.
- You can graph the relation between the top/bottom speed to reach and acceleration/deceleration time.

(3) To output PDF

- You can output the calculation result of spindle acceleration/deceleration time and its graph into a PDF file.

[Items relating to tool spindle]

(1) To directly input the tool spindle motor's model name

- You can specify a tool spindle motor in order to select the power supply's capacity.

[Items relating to power supply capacity selection]

(1) To select the power supply's capacity

- Simply by setting the number of power supply units, the allocation of drive units and the simultaneous acceleration/deceleration servo axes, you can select the power supply units of the optimal capacity.
- Even when resistor regeneration units are included, only the units that need a power supply can be sorted out for calculation.
- Calculation result of a second-choice power supply (a unit for comparison) is also shown, which helps you easily understand the selection result.

(2) To calculate the power facility's capacity

- You can calculate the capacity of the power supply unit's power facility.

(3) To output PDF

- You can output the capacity selection result of the power supplies into a PDF file.

[Items relating to Drive system configuration list]

(1) To display a list of drive system components

- This list shows the model names of the servo drive units, servo motors, spindle drive units, spindle motors, power supplies and AC reactors.
- This list shows the widths of each drive unit and their total.

(2) To set the multi-axis drive unit

- The 2-axis or 3-axis drive units are automatically selected so that the total unit width will be the minimum (you need to set in advance, if you wish to use a 3-axis drive unit).
- You can select and allocate two axes to a 2-axis drive unit.

(3) To select the regenerative resistor designed for 2-axis drive

- If you have selected a 2-axis drive resistor-regeneration type servo unit (MDS-R Series), the regenerative resistor selection is automatically changed to the one designed for 2-axis drive.

(4) To output PDF

- You can output a list of drive system components into a PDF file.

[Other items]

(1) To save and read out selected data

- You can save the set data with comments in the database. Also you can read out the saved data for additional settings.

(2) To import/export an external file

- You can export the set data as an XML file and also import an external XML file. Thus you can exchange the data with other users by transferring XML files.

(3) To set up linkage with Data book

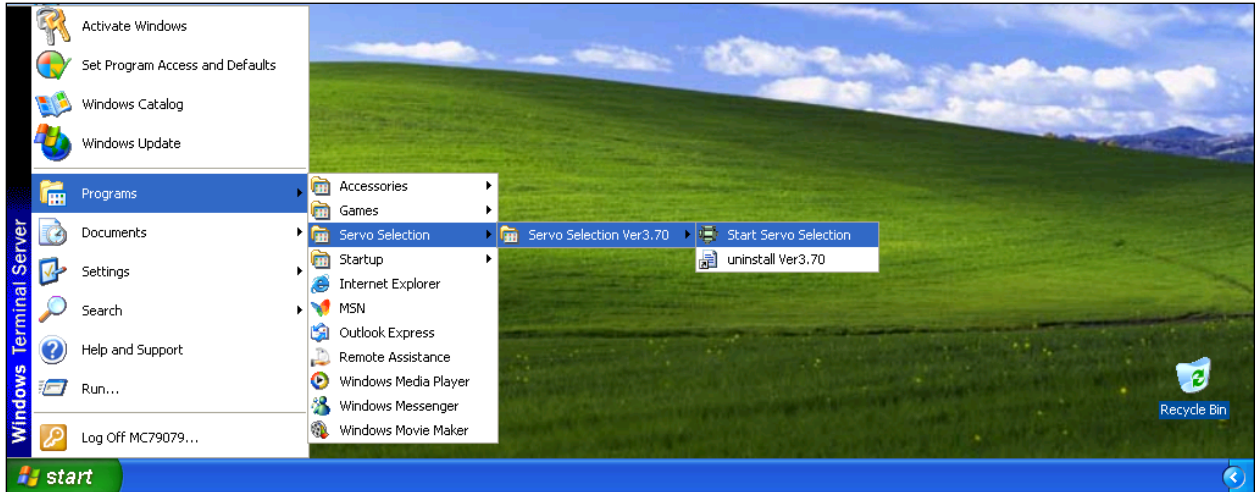
- When Mitsubishi CNC drive system data book files (PDF) are in a given folder, the data that corresponds to the model names in the selection result can be displayed.

1-2 Operation Flow of Servo Selection S/W

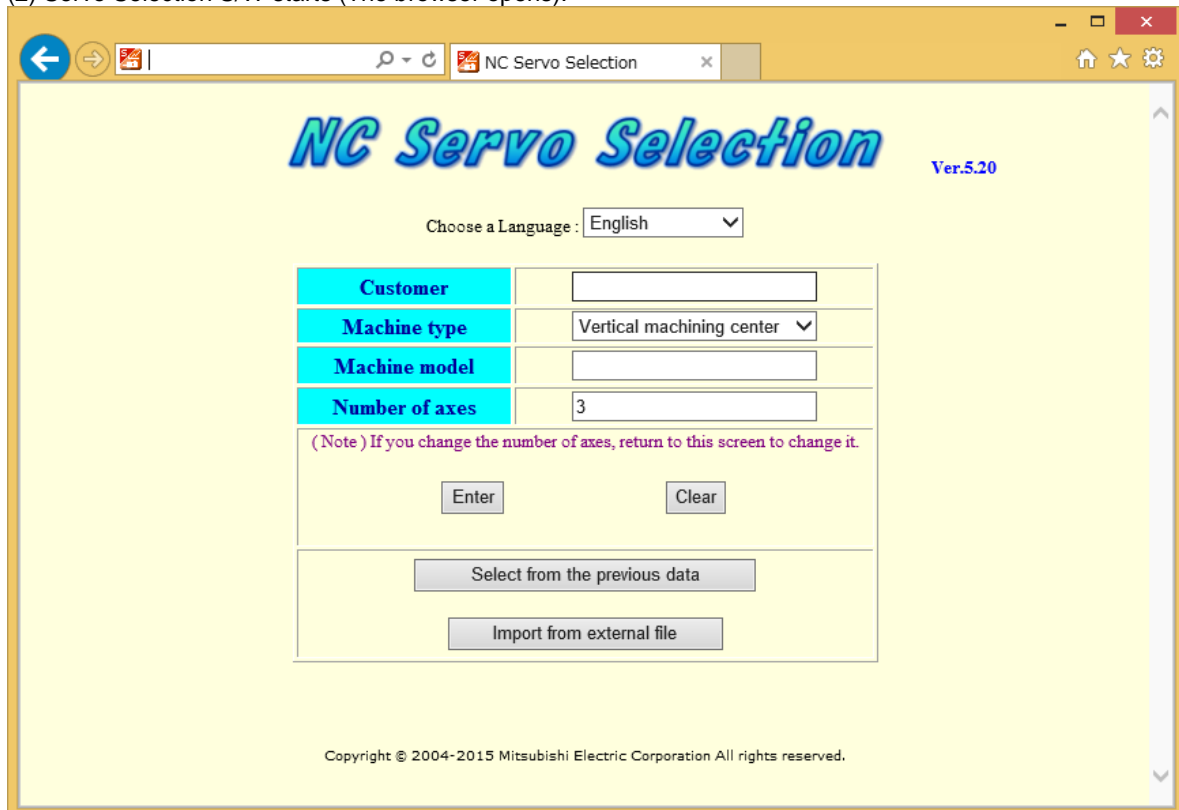
1-2-1 How to start

Follow the procedure below to start Servo Selection S/W.

- (1) Select [Programs] → [Servo Selection] → [Servo Selection Ver*.**] from the start menu, and execute [Start Servo Selection] (and then, the command prompt starts).



- (2) Servo Selection S/W starts (The browser opens).



- (3) Set the machine data. → See "1-2-2 Setting machine data".

1-2-2 Setting machine data

Press [Enter] to go to the selection data input screen.

The screenshot shows the 'NC Setting' screen with the following elements:

- Language Selection:** 'Choose a Language : English' with a dropdown arrow.
- Form Fields:**
 - Customer:** Text input field.
 - Machine type:** Dropdown menu showing 'Vertical machining center'.
 - Machine model:** Text input field.
 - Number of axes:** Text input field containing '3'.
- Note:** '(Note) If you change the number of axes, return to this screen to change it.'
- Buttons:** 'Enter', 'Clear', 'Select from the previous data', and 'Import from external file'.

[Machine type]
Machine type will not affect the calculation result.

[Number of axes]
Even after the calculation has ended, you can go back to this screen and change the number of axes, without changing the set data.
For tandem axes, set the two tandem-controlled axes as one axis.

[Enter button]
After setting the above four items, click on [Enter] to move to the data setting screen.
→ See "2-1 Setting Selection Data".

[Clear button]
Delete all the set data to initialize the condition. Click on this button when you wish to set new data without using existing data.

1-2-3 Entering data using saved data

(1) Select from the previously saved information

Set the selection data using the past information saved in the database.

(2) Import an external file

Select an external file (XML file) to input the selection data.

No.	Customer	Machine type	Machine model	Number of axes	Notes	Saved date	Delete
1	ABC MACHINERY CO.,LTD.	Vertical machining center	Vertical machining center	8	The selection condition is preserved. No.3	2015-09-15 13:44:42	OK
2	ABC MACHINERY CO.,LTD.	Vertical machining center	Vertical machining center	8	The selection condition is preserved. No.2	2015-09-15 13:44:33	OK
3	ABC MACHINERY CO.,LTD.	Vertical machining center	Vertical machining center	8	The selection condition is preserved. No.1	2015-09-15 13:44:09	OK

[Selection No.]
Click on a selection number to read out the data saved in the past.

[File name]
Input a file name directly or click on [Refer] to select a file.

1-2-4 Saving selection data

(1) Save the selection condition data

The selection condition and result are stored in the database. Up to 100 selection items are possible to be recorded. If you read out the saved data and then save it again, the data will not be overwritten but saved as new data.

(2) Export the selection condition data

The selection condition and result are stored as an external file (XML file).

This file is created for each selection condition and is possible to transfer via email, etc.

[Power supply unit selection]

Set the number of power supply units

No.	Data setting	Power supply unit	AC reactor	Power facility capacity	Selection result
1		MDS-D-CV-300	D-AL-30K	34.7 kVA	
2	Input	MDS-D-CV-110	D-AL-11K	14.9 kVA	Result

[System Configuration]

Drive system configuration list

[Save data]

Save the input data
You can save up to 100 conditions for selection.

Export the selection condition

File Download

Do you want to open or save this file?

Name: ABC1000VMC.xml
Type: XML Document
From: localhost

Open Save Cancel

While files from the Internet can be useful, some files can potentially harm your computer. If you do not trust the source, do not open or save this file. [What's the risk?](#)

[Save the input data]

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC

Notes

The comment is written here.

Start saving the input data Cancel

1-2-5 Deleting selection data

Click on OK which is on the right side of the saved data you wish to delete.

Check the data content on the confirmation screen, and then click on [Delete].

NC Servo Selection							
Ver.5.20							
Return							
Total: 3							
<< Previous page							
Next page >>							
Page: 1 / 1							
No.	Customer	Machine type	Machine model	Number of axes	Notes	Saved date	Delete
1	ABC MACHINERY CO,LTD.	Vertical machining center	Vertical machining center	8	The selection condition is preserved. No.3	2015-09-15 13:44:42	OK
2	ABC MACHINERY CO,LTD.	Vertical machining center	Vertical machining center	8	The selection condition is preserved. No.2	2015-09-15 13:44:33	OK
3	ABC MACHINERY CO,LTD.	Vertical machining center	Vertical machining center	8	The selection condition is preserved. No.1	2015-09-15 13:44:09	OK

>> Is it OK to delete the saved selection conditions below?

Customer	ABC MACHINERY CO.,LTD.
Machine type	Vertical machining center
Machine model	ABC1000VMC
Number of axes	8
Saved date	2008-04-01 10:17:03

Notes: The selection condition is preserved. No.1

1-2-6 How to end

Follow the procedure below to end Servo Selection S/W.

(1) Quit Servo Selection S/W (close the browser).

1-3 Setting up Servo Selection S/W

1-3-1 Setting up linkage with data book

When Mitsubishi CNC drive system data book is stored in a given folder, PDF data can be extracted from the book and displayed according to the motor and unit model names on the selection result screen.

When the selected language is "Chinese", the data are displayed in English.

The screenshot shows the Servo Selection S/W interface. At the top, there are fields for Customer (ABC MACHINERY CO., LTD.), Machine type (Vertical machining center), and Machine model (ABC1000VMC). There are buttons for PDF (Calculation process) and PDF (Selection result). Below these are two tables: [No. 1 axis Input data] and [No. 1 axis Calculated data].

[No. 1 axis Input data]			[No. 1 axis Calculated data]		
Item	Unit	Input value	Item	Unit	Value
Axis name		X	Servo motor		HF453
Servo drive unit series		MDS-D-VX	Servo drive unit		MDS-D-V1-160
Axis type		Horizontal	Regenerative resistor		-
Inclined angle	deg	0.0	Travel distance per motor rev.	mm	12.0
Rapid traverse rate	mm/min	36000.0			12.0
Demanded a/d time constant	ms	100.0			
Demanded positioning freq.	t/min	10.0			
Decelerator		None			
Deceleration ratio (Motor rotations / ball screw rev.)	1/X	1.0			
Coupling inertia	kg·cm ²	28.5			
Motor gear (pulley) inertia	kg·cm ²	0.0			
Machine gear (pulley) inertia	kg·cm ²	0.0			
Ball screw diameter	mm	55.0			
Ball screw length	mm	1375.0			
Ball screw pitch	mm	12.0			

An inset window shows a PDF data book for the MDS-D-V1-160 servo drive system. It includes a mechanical drawing of the servo motor with various terminals labeled (e.g., (1) LED, (2) SW1, (3) SW2, etc.) and a table of specifications and environmental conditions.

(1) Data files

Mitsubishi CNC drive system data book is divided into more than one PDF file. When the book version is H, the file names are as shown below. "h" in the file names will change when the book is upgraded.

Japanese: "ib1500272h.pdf", "ib1500272h_02.pdf" and "ib1500272h_03.pdf"

English: "ib1500273engh.pdf", "ib1500273engh_02.pdf" and "ib1500273engh_03.pdf"

(2) Storing the data files

Store the data file in the following folder. It is possible to store both Japanese and English data. When you start this S/W after saving the files, drive unit and motor names are underlined, and the linkage becomes effective.

[Installation folder] \Servo Selection Ver*. **\databook

(3) Updating the data files

When updating the data file, delete all the files in the folder at first, and then store the latest data files.

Chapter 2 SERVO SELECTION

2-1 Setting Selection Data

[Number of axes]
The same number of axes as you have input on the TOP page

[Axis data setting]
Click here to open the data setting screen of each axis.
→ See "2-1-1 Setting basic specifications".

Axis No.	Data setting	Axis	Axis type	Servo drive unit	Servo motor	Regenerative resistor	Selection result
1	No. 1 axis	-	-	-	-	-	Result of No. 1 axis
2	No. 2 axis	-	-	-	-	-	Result of No. 2 axis
3	No. 3 axis	-	-	-	-	-	Result of No. 3 axis
4	No. 4 axis	-	-	-	-	-	Result of No. 4 axis
5	No. 5 axis	-	-	-	-	-	Result of No. 5 axis
6	No. 6 axis	-	-	-	-	-	Result of No. 6 axis
7	No. 7 axis	-	-	-	-	-	Result of No. 7 axis
8	No. 8 axis	-	-	-	-	-	Result of No. 8 axis

[Set SP motor data & Calculate acc./dec. time]

[Tool spindle motor setting]

[Set the third-party motor]

[Power Supply Unit Selection]

[System Configuration]

[Selection result]
After calculation, you can open selection results directly from here.

You can save up to 100 conditions for selection.

2-1-1 Setting basic specifications

[Decelerator]

- Gear/Pulley: to individually set the inertia of gear or pulley
→ See "2-1-3 Setting vertical axis (with gear/pulley) data".
- Gearbox: to set decelerator's inertia in motor axis conversion
→ See "2-1-4 Setting inclined axis (with gearbox) data".

[Axis name]

Possible to set text data, including two-byte characters.

[Axis bearing method]

Friction coefficient (μ) changes

- Sliding : $\mu=0.2$
- Rolling : $\mu=0.1$

You can't directly input the friction coefficient value.

[Motor brake]

When you select "With motor brake", the brake inertia is considered during calculation.

[Others]

See "2-4" for the details of [Para.].

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: Vertical machining center

No. 1 axis Basic spec.	Axis name	Axis type	Drive unit series	Decelerator	Axis bearing method	Motor brake	Others
	X	Horizontal	MDS-E/EH/EJ/EJH/EM series	None	Sliding	Without	Para.
		Horizontal in tandem	MDS-E-VX	Gear/Pulley	Rolling	With	
		Vertical	MDS-EH-VX	Gearbox			
		Vertical in tandem	MDS-EJ-VX				
		Inclined	MDS-EJH-VX				
		Inclined in tandem	MDS-EM-SPV3				
		Rotary	MDS-D2/DH2/DJ/DM2 series				
		Linear: horizontal	MDS-D2-V1/V2				
		Linear: horizontal in tandem	MDS-D2-V3				
		Linear: vertical	MDS-DH2-VX				
		Linear: vertical in tandem	MDS-DJ-VX				
		Magazine	MDS-DM2-SP(H)VX-xxx80				
		Rack & pinion	MDS-DM2-SPV3-200120				
		Pallet changer					
		Input Specs.					

[Axis type]

Select the most appropriate axis type. For data setting, see explanations of each selection model.

- Horizontal axis → See "2-1-2".
- Horizontal axes in tandem → See "2-1-12".
- Vertical axis → See "2-1-3".
- Vertical axes in tandem → See "2-1-13".
- Inclined axis → See "2-1-4".
- Inclined axes in tandem → See "2-1-14".
- Rotary axis → See "2-1-5".
- Linear horizontal → See "2-1-10".
- Linear horizontal in tandem → See "2-1-15".
- Linear Vertical → See "2-1-11".
- Linear Vertical in tandem → See "2-1-16".
- Magazine axis → See "2-1-6".
- Rack and pinion axis → See "2-1-7".
- Pallet changer axis → See "2-1-8".
- Input specifications → See "2-1-9".

(When you already know the motor-axis converted value)

[Drive unit series]

Motor series to be used for calculation is determined based on the drive unit series you've selected here.

Standard settings are:

- MDS-E-VX : HG Series
- MDS-EH-VX : HG-H, HQ-H Series (400V)
- MDS-EJ-VX : HG Series
- MDS-EJH-VX : HG-H, HG-SR Series (400V)
- MDS-EM-SPV3 : HG Series
- MDS-D2-V1/V2 : HF Series (LM-F Series for linear axis)
- MDS-D2-V3 : HF Series
- MDS-DH2-VX : HF-H Series (400V)
- MDS-DJ-VX : HF Series
- MDS-DM2-SPVX-xxx80 : HF Series
- MDS-DM2-SPV3-200120 : HF Series
- MDS-D-VX : HF Series (LM-F Series for linear axis)
- MDS-DH-VX : HF-H Series (400V)
- MDS-D-SVJ3 : HF Series
- MDS-DM-V3-202020 : HF Series
- MDS-DM-V3-404040 : HF Series
- MDS-DM-SPVXF-xxx80 : HF Series
- MDS-DM-SPV3F-200120 : HF Series
- MDS-R-VX : HF Series
- MDS-C1-VX : HC Series (HA Series for small capacity)
- MDS-CH-VX : HC-H Series (400V)
- MDS-B-SVJ2 : HC Series (HA Series for small capacity)
- MR-J2-CT : General-purpose HC Series
- MR-J2S-CT4 : General-purpose HF-SP4 Series (400V)

(Note 1) If you wish to use other motor, specify other motor series from the right-end [Para.].

(Note 2) To use MDS-DM Series, specify the capacity in advance.
MDS-DM-SPVX-xxx80's servo capacity = 80
MDS-DM-SPV3-200120's servo capacity = 120

2-1-2 Setting horizontal axis data

Customer: ABC MACHINERY CO.,LTD.
Machine type: Vertical machining center

No. 1 axis Basic spec.	Axis name	Axis type	Drive unit series	Deselera
	X	Horizontal	MDS-D-VX	None

Mechanism

(F) Rapid traverse feed rate		mm/min	36000.0
(A) Demanded acc/dec time constant	Aux. Calc.	ms	100.0
(S) Demanded positioning freq.		t/min	10.0
(Jc) Coupling inertia	Aux. Calc. Other units	kg · cm ²	28.5
(D) Ball screw diameter		mm	55.0
(L) Ball screw length		mm	1350.0
(P) Ball screw pitch		mm	12.0
(W1) Weight of linear moving object		kg	700.0
(Tq)Max. cutting tq. (cv: motorshaft)	Aux. Calc. Other units	N · m	1.87
(Yq) Cutting duty		%	50.0

Execute Servo Selection

[Coupling inertia]
Normally, the inertia value is specified in coupling manufacture's specifications.
If there is any other motor axis's inertia, include them, too.

[Other units] Coupling inertia
Possible to input in [GD²] or [kgf · cm · s²].

[Aux. calculation] Coupling inertia
If specified value is unknown, possible to calculate the inertia based on cylinder model.
→ See "2-3-2".

[Aux. calculation] Demanded acc/dec time constant
Possible to calculate acc/dec time constant based on acceleration G or positioning time between two points.
→ See "2-3-1".

[D demanded positioning frequency]
If the frequency is once in every two minutes, for example, input 0.5.

[Other units] Maximum cutting torque
Possible to input in [kgf · cm] unit.

[Aux. calculation] Max. cutting torque
Possible to calculate cutting torque using counterforce to the work table.

[Cutting torque setting]
Calculation is possible even if you omit to set these two items (if settings are zero).
(In the case of horizontal axis, selection result depends mainly on load inertia ratio. Cutting load won't be considered.)
If you don't know motor-axis converted torque, use auxiliary calculation. Average cutting torque is calculated to be the 50% of the maximum cutting torque (but you can change it from [Para.].
As it takes time to do positioning, you can't set the cutting duty to be 100%.

[Weight of linear moving object]
Add the assumed workpiece weight.

Click on this button to start calculation.

2-1-3 Setting vertical axis (with gear/pulley) data

Customer: ABC MACHINERY CO.,LTD. **Machine type:** Vertical machining cen

No. 2 axis Basic spec.
 Axis name: Y, Axis type: Vertical, Drive unit series: MDS-D-VX, Dec: Gear

Mechanism		Data setting of No. 2 axis	
(F) Rapid traverse feed rate	mm/min	24000.0	
(A) Demanded acc/dec time constant	ms	100.0	Aux. Calc.
(S) Demanded positioning freq.	t/min	10.0	
(Z) Deceleration ratio (Motor rotations per ball screw rev.)	1/X	1.5	
(Jc) Coupling inertia	kg · cm ²	10.0	Aux. Calc. Other units
(J1) Motor gear (pulley) inertia	kg · cm ²	25.0	Other units
(J2) Machine gear (pulley) inertia	kg · cm ²	35.0	Other units
(D) Ball screw diameter	mm	55.0	
(L) Ball screw length	mm	1000.0	
(P) Ball screw pitch	mm	12.0	
(W1) Weight of linear moving object	kg	500.0	
Counter balance specification		Weight	
(W2) Weight value	kg	500.0	
(Tq)Max. cutting tq. (cv: motorshaft)	N · m	1.25	Aux. Calc. Other units
(Yq) Cutting duty	%	50.0	

[Coupling inertia]
 Normally, the inertia value is specified in coupling manufacture's specifications.
 If there is any other motor axis's inertia, include them, too.
 If a gear is linked with motor shaft, set this inertia to "0".

[Deceleration ratio]
 When deceleration ratio is 2/3, input "1.5" (2/3=1/1.5).
 For acceleration, set a smaller value than 1.

[Other units] Gear (Pulley) inertia
 Possible to input in [GD²] or [kgf · cm · s²] unit.

[Aux. calculation] [Other units]
 See "2-1-2 Setting horizontal axis data".

[Cutting torque setting]
 Calculation is possible even if you omit to set these two items (if settings are zero).
 (In the case of vertical axis, selection result depends mainly on unbalance torque and load inertia ratio. If these cutting torque settings are zero, cutting load won't be considered.)
 See also "2-1-2 Setting horizontal axis data".

[Counter balance specification]

- Without counter balance
 Unbalance torque is generated.
- Weight
 Possible to cancel unbalance torque by the weight value [kg].
 "Weight of linear moving object" and "Weight value" are included in load inertia.
- Hydraulic pressure
 Possible to cancel unbalance torque by the hydraulic support force [N]. This force also includes air damper.
 Only "Weight of linear moving object" is included in load inertia.

[Gear (Pulley) inertia]
 No need to calculate motor-axis converted inertia for ball-screw side gear (pulley). This will be automatically calculated based on the deceleration ratio.
 If 3 or more gears are used for deceleration (or acceleration), select Gearbox and set all gears' inertia in motor-axis converted value.

2-1-4 Setting inclined axis (with gearbox) data

Customer		Machine type	
ABC MACHINERY CO.,LTD.		Vertical machining cen	
No. 3 axis Basic spec.		Axis name	Axis type
		Z	Inclined
		Drive unit series	Decelerator
		MDS-D-VX	Gearbox
		method	Motor brake
		Rolling	With
			Para.
Mechanism		Data setting of No. 3 axis	
(F) Rapid traverse feed rate		mm/min	24000.0
(A) Demanded acc/dec time constant	Aux. Calc.	ms	100.0
(S) Demanded positioning freq.		t/min	10.0
(Z) Deceleration ratio (Motor rotations per ball screw rev.)		1/X	1.5
(Jz) Gearbox inertia	Other units	kg · cm ²	45.0
(D) Ball screw diameter		mm	55.0
(L) Ball screw length		mm	800.0
(P) Ball screw pitch		mm	12.0
(W1) Weight of linear moving object		kg	500.0
Counter balance specification			Hydraulic pres.
(W2) Hydraulic support force	Other units	N	2450.0
(Tq)Max. cutting tq. (cv: motorshaft)	Aux. Calc.	N · m	1.25
(Yq) Cutting duty	Other units	%	50.0
(theta) Inclined angle (0 to 90)		deg	30.0

[Gearbox inertia]
Set the overall gearbox inertia in motor-axis converted value.

[Deceleration ratio]
When deceleration ratio is 2/3, input "1.5" (2/3 = 1/1.5).
For acceleration, set a smaller value than 1.

[Other units] Gearbox inertia
Possible to input in [GD²] or [kgf · cm · s²] unit.

[Aux. calculation] Demanded acc/dec time constant
See "2-1-2 Setting horizontal axis data".

[Inclined angle]
When the setting is 90[deg], the angle is perpendicular.

[Cutting torque setting]
Calculation is possible even if you omit to set these two items (if settings are zero).
(In the case of inclined axis, selection result depends mainly on unbalance torque and load inertia ratio. If these cutting torque settings are zero, cutting load won't be considered.) See also "2-1-2 Set horizontal axis data".

[Counter balance specification]

- Without counter balance
Unbalance torque is generated.
- Weight
Possible to cancel unbalance torque by the weight value [kg].
"Weight of linear moving object" and "Weight value" are included in load inertia.
- Hydraulic pressure
Possible to cancel unbalance torque by the hydraulic support force [N]. Select Hydraulic pressure when you use air damper.
Only "Weight of linear moving object" is included in load inertia.

2-1-5 Setting rotary axis data

Customer: ABC MACHINERY CO.,LTD.
Machine type: Vertical machining center
Machine model: ABC1000VMC
Return

No. 4 axis Basic spec.
 Axis name: B
 Axis type: Rotary
 Drive unit series: MDS-D-VX
 Motor brake: Without
 Others: Para

Mechanism

Execute Servo Selection

Data setting of No. 4 axis

(F) Rapid traverse feed rate		deg/min	7200.0
(A) Demanded acc/dec time constant	Aux. Calc.	ms	200.0
(S) Demanded positioning freq.		t/min	5.0
(Z) Deceleration ratio (Motor rotations per the last axis rev.)		1/X	100.0
(Jz) Gearbox inertia	Other units	kg · cm ²	63.0
(JI) Load axis inertia	Other units	kg · cm ²	5000.0
(Tf) Max. friction tq. of load axis	Other units	N · m	30.0
(Tu) Max. unbalance tq. of load axis	Other units	N · m	0.0
(Tq) Max. cutting tq. of load axis	Other units	N · m	0.0
(Yq) Cutting duty		%	0.0

[Gearbox inertia]
Set the overall gearbox inertia in motor-axis converted value.

[Deceleration ratio]
When deceleration ratio is 2/3, input "1.5" (2/3 = 1/1.5).
For acceleration, set a smaller value than 1.

[Aux. calculation] Demanded acc/dec time constant
See "2-1-2 Setting horizontal axis data".

[Each data of load axis]
Input each value of the load axis.
If you already know the motor-axis converted value, select "Input Specs." among axis types.

[Other units] Each torque
Possible to input in [kgf · cm] unit.

[Other units] Each inertia
Possible to input in [GD²] or [kgf · cm · s²] unit.

2-1-6 Setting magazine axis data

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC

No. 5 axis Basic spec. Axis name: MG Axis type: Magazine Drive unit series: MDS-D-VX Motor brake: Without Others: Para.

Mechanism

Data setting of No. 5 axis

(F) Magazine surface speed		mm/min	10000.0
(S) Demanded positioning freq.		t/min	3.0
(Z) Deceleration ratio (Motor rotations per magazine rev.)		1/X	500.0
(Jz) Decelerator inertia	Other units	kg · cm ²	70.0
(N) Tool storage capacity		tools	40
(P) Tool pitch		mm	150.0
(Wt) Max. tool weight (per tool)		kg	5.0
(Wh) Tool holder weight (per holder)		kg	5.0
(Wc) Chain weight (per circuit)		kg	100.0
(Tf) Friction tq. (cv: motorshaft)	Aux. Calc. Other units	N · m	0.37
(Tu) Unbalance tq. (cv: motorshaft)	Aux. Calc. Other units	N · m	0.56
Servo state in motor suspension			Servo off

[Decelerator inertia]
Set a motor-axis converted value.

[Deceleration ratio]
Do not input a decelerator's deceleration ratio, but input the number of motor rotations required for one cycle of the magazine.

[Other units] Each torque
Possible to input in [kgf · cm] unit.

[Aux. calculation]

- Motor-axis converted friction torque
Possible to input the chain's friction force in [N] or [kgf] unit.
- Motor-axis converted unbalance torque
Possible to calculate using the unbalance weight [kg] on chain.

[Servo state in motor suspension]

"Servo ON"
If you select this, motor is energized even during magazine suspension.
Motor torque is always generated against friction torque and unbalance torque.

"Servo OFF"
Select this when you carry out positioning using a lock pin or brake during magazine suspension. When motor is stopped, there is no load because of servo OFF state (motor is not energized).

[Weight of moving objects]
It's possible to set "Chain weight" to zero and include the chain's weight per tool holder in "Tool holder weight".

2-1-7 Setting rack and pinion axis data

[Decelerator inertia]
Set a motor-axis converted value.

[Axis configuration]
Select either "Pinion movable (rack fixed)" or "Rack movable (motor fixed)".

[Other units] Each inertia
Possible to input in $[GD^2]$ or $[kgf \cdot cm \cdot s^2]$ unit.

[Other units] Motor-axis converted friction torque
Possible to input in $[kgf \cdot cm]$ unit.

[Aux. calculation] Motor-axis converted friction torque
Possible to calculate using the friction force $[N]$ / $[kg]$ on linear axis.

[Weight of linear moving object]
When you select "Pinion movable (motor movable)", motor's weight is automatically added to the weight of moving object. Thus set the weight of moving objects except for motor.

Mechanism		Data setting of No. 6 axis	
(F) Rapid traverse feed rate	mm/min	60000.0	
(S) Demanded positioning freq. (Motor rotations per pinion rev.)	t/min	8.0	
(Z) Deceleration ratio	1/X	8.5	
(Jp) Pinion inertia	Other units kg · cm ²	45.0	
(Jz) Decelerator inertia	Other units kg · cm ²	20.0	
(Dp) Pinion diameter	mm	50.0	
(Wd) Weight of linear moving object (exc. motor)	kg	30.0	
(Wx) Carrier capacity	kg	10.0	
(Tf) Friction tq. (cv: motorshaft)	Aux. Calc. Other units N · m	0.15	
Move direction		Horizontal	
Axis configuration		Pinion movable	

2-1-8 Setting pallet changer axis data

[Decelerator inertia]
Set a motor-axis converted value.

[Other units] Decelerator inertia
Possible to input in $[GD^2]$ or $[kgf \cdot cm \cdot s^2]$ unit.

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC

No. 7 axis Basic spec. Axis name: PC Axis type: Pallet changer Drive unit series: MDS-D-VX Motor brake: Without Others: Para.

Mechanism	Data setting of No. 7 axis			
<p>Execute Servo Selection</p>	(F) Rapid traverse feed rate		deg/min	7200.0
	(S) Demanded positioning freq.		t/min	1.0
	(Z) Deceleration ratio (Motor rotations per changer axis rev.)		1/X	150.0
	(Jz) Decelerator inertia	Other units	kg · cm ²	30.0
	(Wp) Weight of one pallet		kg	100.0
	(A) Pallet length in X axis direction		mm	500.0
	(B) Pallet length in Y axis direction		mm	400.0
	(Wx) Max. weight of workpiece (per pallet)		kg	100.0
	(R) Rotation radius (Distance between center and pallet CG)		mm	500.0
	(T) Friction tq. (cv. motorshaft)	Aux. Calc. Other units	N · m	0.1

[Other units] Motor-axis converted friction torque
Possible to input in $[kgf \cdot cm]$ unit.

[Aux. calculation] Motor-axis converted friction torque
Possible to calculate using the friction force $([N] / [kg])$ on circumference (pallet's Center of Gravity).

2-1-9 Setting data of Input Spec.

[Motor-axis converted value]
When you input axis data from this screen, you should use motor-axis converted values. Thus selection for any type of axes is basically supported. But you need to calculate motor-axis converted values in advance.

[Aux. calculation] Demanded acc/dec time constant
See "2-1-2 Setting horizontal axis data".

[Servo mechanism type]
Select either Linear axis or Rotary axis.

Customer: ABC MACHINERY CO.LTD. Machine type: Vertical machining center Machine model: ABC1000VMC

No. 8 axis Basic spec. Axis name: A Axis type: Input Specs. Drive unit series: MDS-D-VX Motor brake: Without Others: Para.

Data setting of No. 8 axis			
Servo mechanism type			Linear axis
Travel distance per motor rev.		mm	10.0
Rapid traverse feed rate		mm/min	30000.0
Linear a/d time constant (rapid trav.)	Aux. Calc.	ms	125.0
Max. cutting duty		%	50.0
Max. load inertia (cv: motorshaft)	Other units	kg · cm ²	85.0
Friction tq. (cv: motorshaft)	Other units	N · m	0.34
Unbalance tq. (cv: motorshaft)	Other units	N · m	0.49
Max. cutting tq. (cv: motorshaft)	Other units	N · m	1.3
Rapid traverse repeat frequency		t/min	5.0

Execute Servo Selection

[Other units] Each torque
Possible to input in [kgf · cm] unit.

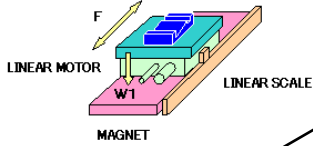
[Other units] Motor-axis converted max. load inertia
Possible to input in [GD²] or [kgf · cm · s²] unit.

2-1-10 Setting linear horizontal axis data

[Motor cooling system]
Self (natural): Without oil-cooling pipe
Liquid: With oil-cooling pipe

[Axis bearing method]
Friction coefficient (μ) varies.
• Sliding: $\mu=0.2$
• Rolling: $\mu=0.1$
• Noncontact: $\mu=0.0$ for such as air bearing
You cannot directly input the friction coefficient value.

Customer	ABC MACHINERY CO.,LTD	Machine type	Vertical machining center	Machine model	ABC1000VMC	Return
No. 1 axis Basic spec.	Axis name	Axis type	Drive unit series	Cooling	Axis bearing method	Others
	X	Linear: horizontal	MDS-D-VX	Self	Rolling	Para.



F
LINEAR MOTOR
W1
MAGNET
LINEAR SCALE

(F) Rapid traverse rate		mm/min	100000
(A) Demanded acc/dec time constant	Aux. Calc.	ms	170.1
(S) Demanded positioning freq.		t/min	10.0
(W1) Weight of linear moving object (Excluding the primary-side)		kg	400.0
(Tq) Max. cutting force	Other units	N	980.0
(Yq) Cutting duty		%	50.0
Drive system selection 1			Primary moving

Execute Servo Selection

[Aux. calculation] Demanded acc/dec time constant
See "2-1-2 Set horizontal axis data".

[Other units] Maximum cutting thrust force
Possible to input in [kgf] unit.

[Drive system selection 1]
Primary moving: Magnet side is fixed to the machine, and coil side moves.
Secondary moving: Coil side is fixed to the machine, and magnet side moves.

[Cutting thrust force]
Calculation is possible even if you omit to set these two items (if settings are zero).
(However, if set to 0, the cutting loads will not be considered)
See also "2-1-2 Setting horizontal axis data".

[Weight of linear moving object]
When primary side moves, motor weight is automatically included in the moving object weight. Thus, input the moving object weight excluding the motor's primary side.
However, if secondary (magnet) side moves, include the secondary side weight.

2-1-11 Setting linear vertical axis data

Customer	ABC MACHINERY CO.,LTD	Machine type	Vertical machining center	Machine model	ABC1000VMC	<input type="button" value="Return"/>
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No. 1 axis Basic spec.	Axis name	Axis type	Drive unit series	Cooling	Axis bearing method	Others
	X	Linear: vertical	MDS-D-VX	Self	Rolling	Para.

Mechanism	Data setting of No. 1 axis																																				
<p>The diagram illustrates a linear vertical axis mechanism. It features a vertical linear scale, a magnet, and a linear motor. A weight W1 is attached to the scale, and a weight W2 is attached to the motor. A force F is applied to the weight W1. The mechanism is supported by pneumatic or hydraulic pressure. An 'Execute Servo Selection' button is located at the bottom of the diagram.</p>	<table border="1"> <tr> <td>(F) Rapid traverse rate</td> <td></td> <td>mm/min</td> <td>100000</td> </tr> <tr> <td>(A) Demanded acc/dec time constant</td> <td><input type="button" value="Aux. Calc."/></td> <td>ms</td> <td>170.1</td> </tr> <tr> <td>(S) Demanded positioning freq.</td> <td></td> <td>t/min</td> <td>10.0</td> </tr> <tr> <td>(W1) Weight of linear moving object (Excluding the primary-side)</td> <td></td> <td>kg</td> <td>400.0</td> </tr> <tr> <td>Counter balance specification</td> <td></td> <td></td> <td>Pneumatic/Hydraulic pres.</td> </tr> <tr> <td>(W2) Pneum./Hydr. support force</td> <td><input type="button" value="Other units"/></td> <td>N</td> <td>0.0</td> </tr> <tr> <td>(Tq) Max. cutting force</td> <td><input type="button" value="Other units"/></td> <td>N</td> <td>980.0</td> </tr> <tr> <td>(Yq) Cutting duty</td> <td></td> <td>%</td> <td>50.0</td> </tr> <tr> <td>Drive system selection 1</td> <td></td> <td></td> <td>Primary moving</td> </tr> </table>	(F) Rapid traverse rate		mm/min	100000	(A) Demanded acc/dec time constant	<input type="button" value="Aux. Calc."/>	ms	170.1	(S) Demanded positioning freq.		t/min	10.0	(W1) Weight of linear moving object (Excluding the primary-side)		kg	400.0	Counter balance specification			Pneumatic/Hydraulic pres.	(W2) Pneum./Hydr. support force	<input type="button" value="Other units"/>	N	0.0	(Tq) Max. cutting force	<input type="button" value="Other units"/>	N	980.0	(Yq) Cutting duty		%	50.0	Drive system selection 1			Primary moving
	(F) Rapid traverse rate		mm/min	100000																																	
	(A) Demanded acc/dec time constant	<input type="button" value="Aux. Calc."/>	ms	170.1																																	
	(S) Demanded positioning freq.		t/min	10.0																																	
	(W1) Weight of linear moving object (Excluding the primary-side)		kg	400.0																																	
	Counter balance specification			Pneumatic/Hydraulic pres.																																	
	(W2) Pneum./Hydr. support force	<input type="button" value="Other units"/>	N	0.0																																	
	(Tq) Max. cutting force	<input type="button" value="Other units"/>	N	980.0																																	
	(Yq) Cutting duty		%	50.0																																	
	Drive system selection 1			Primary moving																																	

[Counter balance specifications]

- No counter balance
Unbalance force is generated.
- Pneumatic/Hydraulic pressure
Unbalance force can be canceled by the amount of pneumatic/hydraulic support force [N].

2-1-12 Setting data of horizontal axes in tandem

To enable the servo selection for tandem axes (synchronously controlled two axes), the following basic conditions have to be met.

- (1) The two axes use the same capacity and same series servo motors.
- (2) The machine configuration (coupling, ball-screw) of the two axes are the same.
- (3) The loads on the two axes are balanced.

Regarding the condition (3), it's possible to actualise the control with a certain degree of the load imbalance. But this load inequality won't be considered during the servo selection. Therefore, you need to allow some margin for the load imbalance.

Customer	ABC MACHINERY CO.,LTD.	Machine type	Horizontal machining center	Machine model	ABC2000HMC	<input type="button" value="Return"/>	
No. 1 axis Basic spec.	Axis name	Axis type	Drive unit series	Decelerator	Axis bearing method	Motor brake	Others
	X	Horizontal in tandem	MDS-D-VX	None	Rolling	Without	Para.
Mechanism		Data setting of No. 1 axis					
		(F) Rapid traverse feed rate		mm/min	36000.0		
		(A) Demanded acc/dec time constant	<input type="button" value="Aux. Calc."/>	ms	100.0		
		(S) Demanded positioning freq.		t/min	10.0		
		(Jc) Coupling inertia	<input type="button" value="Aux. Calc."/> <input type="button" value="Other units"/>	kg · cm ²	28.5		
		(D) Ball screw diameter		mm	55.0		
		(L) Ball screw length		mm	1350.0		
		(P) Ball screw pitch		mm	12.0		
		(W1) Weight of linear moving object		kg	700.0		
		(Tq)Max. cutting tq. (cv: motorshaft)	<input type="button" value="Aux. Calc."/> <input type="button" value="Other units"/>	N · m	0.94		
		(Yq) Cutting duty		%	50.0		

[Motor shaft-converted max. cutting torque]
Input the load applied to one motor axis.
If you use the auxiliary calculation, 1/2 of the load is set.

[Weight of linear moving object]
Set the total weight of the two axes' loads.

[Machine configuration]
For coupling inertia, set the value for one axis.
For ball screw, set the specified value common to the two axes.

2-1-13 Setting data of vertical axes in tandem

If you want to use a gear or pulley, you have to set the same specifications between the two motors.

For the basic conditions in selecting the tandem axes, see "2-1-12 Setting data of horizontal axes in tandem"

Customer	ABC MACHINERY CO.,LTD.		Machine type	Horizontal machining center		Machine model	ABC2000HMC		Return
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No. 2 axis Basic spec.	Axis name	Axis type	Drive unit series	Decelerator	Axis bearing method	Motor brake	Others
	Y	Vertical in tandem	MDS-D-VX	Gear/Pulley	Rolling	With	Para.

Mechanism	Data setting of No. 2 axis			
	(F) Rapid traverse feed rate		mm/min	24000.0
	(A) Demanded acc/dec time constant	Aux. Calc.	ms	100.0
	(S) Demanded positioning freq.		t/min	10.0
	(Z) Deceleration ratio (Motor rotations per ball screw rev.)		1/X	1.5
	(Jc) Coupling inertia	Aux. Calc. Other units	kg · cm ²	10.0
	(J1) Motor gear (pulley) inertia	Other units	kg · cm ²	25.0
	(J2) Machine gear (pulley) inertia	Other units	kg · cm ²	35.0
	(D) Ball screw diameter		mm	55.0
	(L) Ball screw length		mm	1000.0
	(P) Ball screw pitch		mm	12.0
	(W1) Weight of linear moving object		kg	500.0
	Counter balance specification			Weight
	(W2) Weight value		kg	500.0
	(Tq)Max. cutting tq. (cv: motorshaft)	Aux. Calc. Other units	N · m	0.62
	(Yq) Cutting duty		%	50.0

[Machine configuration]

When setting the coupling or gear (pulley) inertia, input the value for one axis.

For ball screw or deceleration ratio, set the specified value common to the two axes.

2-1-14 Setting data of inclined axes in tandem

If two or more hydraulic cylinders are used for each servo axis, set the total hydraulic support force.

For the basic conditions in selecting tandem axes, see "2-1-12 Setting data of horizontal axes in tandem".

Customer	ABC MACHINERY CO.,LTD.	Machine type	Horizontal machining center	Machine model	ABC2000HMC	Return								
No. 3 axis Basic spec.	Axis name	Z	Axis type	Inclined in tandem	Drive unit series	MDS-D-VX	Decelerator	Gearbox	Axis bearing method	Rolling	Motor brake	With	Others	Para.
	Mechanism		Data setting of No. 3 axis											
		(F) Rapid traverse feed rate		mm/min	24000.0									
		(A) Demanded acc/dec time constant	Aux. Calc.	ms	100.0									
		(S) Demanded positioning freq.		t/min	10.0									
		(Z) Deceleration ratio (Motor rotations per ball screw rev.)		1/X	1.5									
		(Jz) Gearbox inertia	Other units	kg · cm ²	45.0									
		(D) Ball screw diameter		mm	55.0									
		(L) Ball screw length		mm	800.0									
		(P) Ball screw pitch		mm	12.0									
		(W1) Weight of linear moving object		kg	500.0									
		Counter balance specification			Hydraulic pres.									
(W2) Hydraulic support force	Other units	N	2450.0											
(Tq)Max. cutting tq. (cv: motorshaft)	Aux. Calc. Other units	N · m	0.62											
(Yq) Cutting duty		%	50.0											
(theta) Inclined angle (0 to 90)		deg	30.0											

[Gearbox inertia]
Set the value of the inertia for one motor.

[Hydraulic support force]
Set the total value for the two motors.

2-1-15 Setting data of linear horizontal axes in tandem

For the basic conditions in selecting tandem axes, see "2-1-12 Setting data of horizontal axes in tandem".

Customer: ABC MACHINERY CO.,LTD Machine type: Vertical machining center Machine model: ABC1000VMC Return

No. 1 axis Basic spec.

Axis name	Axis type	Drive unit series	Cooling	Axis bearing method	Others
X	Linear: horizontal in tandem	MDS-D-VX	Liquid	Rolling	Para.

Mechanism

Execute Servo Selection

Data setting of No. 1 axis

(F) Rapid traverse rate		mm/min	100000.0
(A) Demanded acc/dec time constant	Aux. Calc.	ms	170.1
(S) Demanded positioning freq.		t/min	10.0
(W1) Weight of linear moving object (Excluding the primary-side)		kg	400.0
(Tq) Max. cutting force	Other units	N	980.0
(Yq) Cutting duty		%	50.0
Drive system selection 1			Primary moving
Drive system selection 2			1 drive, 2 motors

[Max cutting thrust force]
Input the total load applied to the two axes.

[Weight of linear moving object]
Set the weight of total load on the two axes.

[Drive system selection 2]
Two motors driven by one drive unit: One linear scale is shared by two motors.
Two motors driven by two drive units: Two linear scales are required for each motor.

2-1-16 Setting data of linear vertical axes in tandem

When pneumatic or hydraulic cylinders are installed for each servo axis (two or more cylinders), set the total pneumatic/hydraulic support force.

For the basic conditions in selecting tandem axes, see "2-1-12 Setting data of horizontal axes in tandem".

Customer	ABC MACHINERY CO.,LTD	Machine type	Vertical machining center	Machine model	ABC1000VMC	<input type="button" value="Return"/>
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No. 1 axis Basic spec.	Axis name	Axis type	Drive unit series	Cooling	Axis bearing method	Others
	X	Linear: vertical in tandem	MDS-D-VX	Liquid	Rolling	Para.

Mechanism	Data setting of No. 1 axis		
	(F) Rapid traverse rate	mm/min	100000.0
	(A) Demanded acc/dec time constant	<input type="button" value="Aux. Calc."/> ms	170.1
	(S) Demanded positioning freq.	t/min	10.0
	(W1) Weight of linear moving object (Excluding the primary-side)	kg	400.0
	Counter balance specification		Pneumatic/Hydraulic pres.
	(W2) Pneum./Hydr. support force	<input type="button" value="Other units"/> N	4194.4
	(Tq) Max. cutting force	<input type="button" value="Other units"/> N	980.0
	(Yq) Cutting duty	%	50.0
	Drive system selection 1		Primary moving
	Drive system selection 2		1 drive, 2 motors

[Pneumatic/Hydraulic support force]
Set the total force for the two motors.

2-2 Viewing Selection Result

2-2-1 Judging servo selection items

[Selection result]

- Servo motor
Results of selected motor and second-choice motor are shown.
- Servo drive unit
Even if you intend to use a 2-axis drive unit, 1-axis units are shown at this moment.
- Regenerative resistor
When your machine requires a regenerative resistor, the optimal resistor is shown.

PDF (Calculation process) PDF (Selection result) Return

[No. 1 axis Input data]			[No. 1 axis Calculated data]			
Item	Unit	Input value	Item	Unit	Selected motor	For comparison
X			Servo motor		HG354	HG303
MDS-E-VX			Servo drive unit		MDS-E-V1-160	MDS-E-V1-80
Horizontal			Regenerative resistor		-	-
0.0						
36000.0			Travel distance per motor rev.	mm	12.0	12.0
100.0	ms		* Max. motor speed	r/min	4000.0	3000.0
10.0			Motor speed in rapid trav.	r/min	3000.0	3000.0
None			Speed allowance (Motor speed in rapid traverse ≤ Max. motor speed)		OK	OK
1.0	1/r					
28.5	kg·cm ²		Ball screw inertia	kg·cm ²	94.6	94.6
			Object inertia	kg·cm ²	28.5	28.5
			Object inertia	kg·cm ²	25.53	25.53
			Object inertia	kg·cm ²	148.6	148.6
			Object inertia	kg·cm ²	75.0	75.0
12.0	mm		Criterion of load inertia ratio	%	500.0	500.0
700.0	kg		Load inertia ratio	%	198.2	198.2
None			Load inertia ratio (Load inertia ratio ≤ Criterion)		OK	OK
0.0	kg					
			Object inertia	kg·cm ²	0.0	0.0
			Object inertia	kg·cm ²	223.6	223.6
			Object inertia	kg·cm ²	0.1	0.1
			Object inertia	N·m	1.31	1.31
			Object inertia	N·m	0.0	0.0
			Object inertia	N·m	1.31	1.31
			Object inertia	N·m	90.0	64.0
			Object inertia	ms	100.0	100.0
			Object inertia	ms	99.4	176.1 (saturated)
			Transient characteristics (Min. time constant ≤ Criterion of time constant)		OK	NG
			Object inertia	N·m	72.0	51.2
			Object inertia	N·m	3.18	3.18
			Cutting torque (Max. cutting load torque ≤ Max. used motor torque)		OK	OK
			Object inertia	N·m	71.56	41.2
			Object inertia	N·m	-68.93	-38.57
			Object inertia	%	3.3	5.9
			Object inertia	N·m	2.25	2.25
			Object inertia	%	50.0	50.0
			Object inertia	N·m	1.31	1.31
			Object inertia	%	46.7	44.1
			Object inertia	N·m	12.96	9.84
			Object inertia	N·m	22.5	22.5
			Object inertia	%	57.6	43.7
			Object inertia	%	5.8	5.8
			Object inertia	G	0.62	0.35
			Object inertia	mm	101.96	112.68
			Overall judgement (All judgements above are OK)		OK	NG

Return

[[PDF] When these buttons are clicked on, the calculation process or selection result is output as a PDF file.

[Motor's specified value] "*" is attached to values that are determined by motor's specifications.

[(1) Motor speed allowance judgement] Judges if motor speed at rapid traverse is not higher than the maximum rotation speed.

[(2) Load inertia ratio judgement] This judgement is important, as it affects the interpolation control accuracy. Judges if load inertia ratio is lower than the specified motor inertia ratio.

[Minimum acc/dec time constant] Calculation is done, considering the torque saturation characteristic which limits motor's maximum torque at high-speed rotation.

[(3) Transient characteristic judgement] Judges if linear acc/dec time constant is lower than the demanded value.

[(4) Cutting torque judgement] Judges if the maximum cutting torque is lower than the maximum used motor torque (a value calculated considering the margin)

[(5) Continuous characteristic judgement] Judges if continuous effective load torque (calculated by averaging the loads in acc/dec, cutting and stopping) is 80% or less of motor stall torque. Also judges if steady load torque (friction torque + unbalance torque) is 60% or less of motor stall torque.

[(6) Overall judgment] Judges if all the judgements of (1) to (5) are OK.

[Selected motor]
After adjusting input values, "HF354" is selected instead.

Customer	ABC MACHINERY CO.,LTD	Machine type	Vertical machining center	Machine model	ABC1000VMC	PDF (Calculation process)	PDF (Selection result)	Return
----------	-----------------------	--------------	---------------------------	---------------	------------	------------------------------	---------------------------	--------

[No. 1 axis Input data]			[No. 1 axis Calculated data]			
Item	Unit	Input value	Item	Unit	Selected motor	For comparison
Axis name		X	Servo motor		HF354	HF303
Servo drive unit series		MDS-D-VX	Servo drive unit		MDS-D-V1-160	MDS-D-V1-80
Axis type		Horizontal	Regenerative resistor		-	-
Inclined angle	deg	0.0	Travel distance per motor rev.	mm	12.0	12.0
Rapid traverse rate	mm/min	36000.0	* Max. motor speed	r/min	4000.0	3000.0
Demanded a/d time constant	ms	101.0	Motor speed in rapid trav.	r/min	3000.0	3000.0
Demanded positioning freq.	1/min	10.0	Speed allowance (Motor speed in rapid traverse ≤ Max. motor speed)		OK	OK
Decelerator		None	Ball screw inertia	kg-cm ²	96.35	96.35
Deceleration ratio (Motor rotations / ball screw rev.)	1/X	1.0	Coupling inertia	kg-cm ²	28.5	28.5
Coupling inertia	kg-cm ²	28.5	Linear moving object inertia	kg-cm ²	25.53	25.53
Motor gear (pulley) inertia	kg-cm ²	0.0	Total load inertia	kg-cm ²	150.4	150.4
Machine gear (pulley) inertia	kg-cm ²	0.0	* Motor inertia	kg-cm ²	75.0	75.0
Ball screw diameter	mm	55.0	Criterion of load inertia ratio	%	500.0	500.0
Ball screw length	mm	1375.0	Load inertia ratio	%	200.5	200.5
Ball screw pitch	mm	12.0	Load inertia ratio (Load inertia ratio ≤ Criterion)		OK	OK
Weight of linear moving object	kg	700.0	Motor brake inertia	kg-cm ²	0.0	0.0
Counter balance specification		None	Total inertia	kg-cm ²	225.4	225.4
Counter balance weight	kg	0.0	Friction coefficient		0.1	0.1
Max. cutting tq. (cv. motorshaft)	N-m	1.87	Friction torque	N-m	1.31	1.31
Cutting duty	%	50.0	Unbalance torque	N-m	0.0	0.0
Axis bearing method		Rolling	Steady load torque	N-m	1.31	1.31
Motor brake		Without brake	* Max. motor torque	N-m	90.0	64.0
Position loop gain		47	Criterion of a/d time constant	ms	101.0	101.0
S-shape acceleration/deceleration	%	0.0	Min. acc/dec time constant	ms	100.2	169.7 (saturated)
			Transient characteristics (Min. time constant ≤ Criterion of time constant)		OK	NG
			Max. used motor torque	N-m	72.0	51.2
			Max. cutting load torque (Max. cutting tq. + Steady load tq.)	N-m	3.18	3.18
			Cutting duty	%	50.0	50.0
			Steady load torque	N-m	1.31	1.31
			Steady load duty	%	46.6	44.3
			Cont. effective load torque	N-m	13.23	10.39
			* Motor stall torque	N-m	22.5	22.5
			Cont. effective load ratio	%	58.8	46.2
			Steady load ratio	%	5.8	5.8
			Cont. characteristics (Cont. effective load ≤ 80%, Steady load ≤ 60%)		OK	OK
			Max. acceleratoin rate	G	0.61	0.36
			Emg. stop distance (rapid)	mm	102.6	113.24
			Overall judgement (All judgements above are OK.)		OK	NG

[Check the appropriateness of judgement]
As a result of changing the demanded acc/dec to 101[ms], the judgement of the minimum acc/dec time constant for "HF354" became "OK". The acc/dec time constant of HF303 is significantly different from judgement value, thus the appropriateness of selecting HF354 motor for this axis is obvious.

2-2-3 Motor output torque saturation

A servo motor has a characteristic of limiting its maximum torque during high-speed rotation (called saturation phenomenon). Even if you attempt to reduce the acceleration/deceleration time constant by increasing "Max. torque usage rate", torque may be limited in high-speed range.

[No. 1 axis Input data]		[No. 1 axis Calculated data]				
Item	Unit	Input value	Item	Unit	Selected motor	For comparison
Axis name		X	Servo motor		HG354	HG303
Servo drive unit series		MDS-E-VX	Servo drive unit		MDS-E-V1-160	MDS-E-V1-80
Axis type		Horizontal	Regenerative resistor		-	-
Inclined angle	deg	0.0				
Rapid traverse rate	mm/min	36000.0	Travel distance per motor rev.	mm	12.0	12.0
Demanded a/d time constant	ms	100.0	* Max. motor speed	r/min	4000.0	3000.0
Demanded positioning freq.	t/min	10.0	Motor speed in rapid trav.	r/min	3000.0	3000.0
Decelerator		None	Speed allowance (Motor speed in rapid traverse ≤ Max. motor speed)		OK	OK
Deceleration ratio (Motor rotations / ball screw rev.)	1/X	1.0				
Coupling inertia	kg·cm ²	28.5	Ball screw inertia	kg·cm ²	94.6	94.6
Motor gear (pulley) inertia	kg·cm ²	0.0	Coupling inertia	kg·cm ²	28.5	28.5
Machine gear (pulley) inertia	kg·cm ²	0.0	Linear moving object inertia	kg·cm ²	25.53	25.53
Ball screw diameter	mm	55.0	Total load inertia	kg·cm ²	148.6	148.6
Ball screw length	mm	1350.0	* Motor inertia	kg·cm ²	75.0	75.0
Ball screw pitch	mm	12.0	Criterion of load inertia ratio	%	500.0	500.0
Weight of linear moving object	kg	700.0	Load inertia ratio	%	198.2	198.2
Counter balance specification		None	Load inertia ratio (Load inertia ratio ≤ Criterion)		OK	OK
Counter balance weight	kg	0.0				
Max. cutting tq. (cv: motorshaft)	N·m	1.87	Motor brake inertia	kg·cm ²	0.0	0.0
Cutting duty	%	50.0	Total inertia	kg·cm ²	223.6	223.6
Axis bearing method		Rolling	Friction coefficient		0.1	0.1
Motor brake		Without brake	Friction torque	N·m	1.31	1.31
Position loop gain		47	Unbalance torque	N·m	0.0	0.0
S-shape acceleration/deceleration	%	0.0	Steady load torque	N·m	1.31	1.31
			* Max. motor torque	N·m	90.0	64.0
			Criterion of a/d time constant	ms	100.0	100.0
			Min. acc/dec time constant	ms	99.4	176.1 (saturated)
			Transient characteristics (Min. time constant ≤ Criterion of time constant)		OK	NG
			Acceleration load torque	N·m	71.56	41.2
			Motor stall torque	N·m	22.5	22.5
			Cont. effective load ratio	%	57.6	43.7
			Steady load ratio	%	5.8	5.8
			Cont. characteristics (Cont. effective load ≤ 80%, Steady load ≤ 60%)		OK	OK
			Max. acceleration rate	G	0.62	0.35
			Emg. stop distance (rapid)	mm	101.96	112.68
			Overall judgement (All judgements above are OK)		OK	NG

[Limit due to torque saturation]
 If acc/dec time constant is limited due to torque saturation, a message "saturated" will appear next the value. This tends to occur on high acceleration axis or axis with large load inertia ratio.
 Possible to avoid this saturation by setting S-shape acceleration/deceleration or reducing position loop gain.

[Position loop gain, S-shape acceleration/deceleration]
 Measures such as reducing position loop gain or setting S-shape acceleration/deceleration are effective to prevent torque saturation. But these measures prolong actual acceleration/deceleration time and positioning time.
 However, acceleration rate depends on acc/dec. time constant, so it won't change even when you set S-shape acceleration/deceleration.

2-2-4 Selection result of regenerative resistor

[Selected motor]
If you have selected a resistor-regeneration type drive unit, the regenerative resistor is also selected.

Customer ABC M (ss) PDF Selection result Return

[No. 3 axis Input data]			[No. 3 axis Calculated data]			
Item	Unit	Input value	Item	Unit	Selected motor	For comparison
Axis name		Z	Servo motor		HF303B	HF302B
Servo drive unit series		MDS-R-VX	Servo drive unit		MDS-R-V1-60	MDS-R-V1-40
Axis type		Inclined	Regenerative resistor		GZG300W20OHMK	GZG300W20OHMK
Inclined angle	deg	30.0				
Rapid traverse rate	mm/min	24000.0	Travel distance per motor rev.	mm	12.0	12.0
Demanded a/d time constant	ms	100.0	* Max. motor speed	r/min	3000.0	2000.0
Demanded positioning freq.	t/min	10.0	Motor speed in rapid trav.	r/min	2000.0	2000.0

[Charged energy of the drive unit]
This is the amount of energy possible to be charged in drive unit's capacitor.
If regeneration energy per damping is this value or smaller, there will be no energy consumption in regenerative resistor.

[Allowable positioning frequency]
When "999.9" is shown, regeneration energy is smaller than the drive unit's charged energy. This probably means that no energy is consumed in the regenerative resistor.

[Selected regenerative resistor]			
Item	Unit	Result	
Servo motor		HF303B	
Servo drive unit		MDS-R-V1-60	
Charged energy of the drive unit	J	30.0	
Reversed efficiency		0.75	
Demanded positioning freq.	t/min	10.0	
Inclined angle	deg	30.0	
Regenerative energy in positioning	J	561.96	
Consumed regen. energy in positioning	J	561.96	
Regenerative resistor	Capacity (W)	Allowable positioning freq. (t/min)	Ranking
GZG200W26OHMK	100.0	8.7	NG
GZG300W20OHMK	150.0	13.0	1
MR-RB30	300.0	26.1	2

[Regenerative resistor]
A resistor suitable for the selected servo motor is shown.

[Ranking]
Based upon the demanded positioning frequency and allowable positioning frequencies of each regenerative resistor, each resistor is categorized as below.

- "NG" ... A resistor that failed to meet the demanded positioning frequency
- "1" ... The most suitable regenerative resistor
- "2 or 3" ... Resistor whose capacity has a margin.

2-3 Using Auxiliary Calculations

2-3-1 Auxiliary calculation of demanded acc/dec time constant

[Calculation from demanded acceleration]
 Calculates acc/dec time constant using acceleration rate. Rapid traverse rate should be set in advance. You can't select this calculation type for rotary axis. Only "Calculation from travel distance, etc." supports rotary axis.

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC

[No. 1 axis Auxiliary calculation]

Calculation from demanded acceleration
 Calculation from travel distance, etc.

Item	Unit	Setting value
Demanded acceleration (G)	G	0.5

Item	Unit	Setting value
Travel distance	mm	
Positioning time	ms	
In-position width	μm	
SHG control	-	Valid

[Calculation type]
 Click on this radio button to switch calculation type. Unable to enter data in shaded areas.

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC

[No. 1 axis Auxiliary calculation]

Calculation from demanded acceleration
 Calculation from travel distance, etc.

Item	Unit	Setting value
Demanded acceleration (G)	G	

Item	Unit	Setting value
Travel distance	mm	300
Positioning time	ms	800
In-position width	μm	50
SHG control	-	Valid

[Calculation from travel distance, etc.]
 Calculates acc/dec time constant using positioning time between two points. Rapid traverse rate should be set in advance. Not only the command-based travel time but also the settling time (positioning time after speed command becomes zero) is taken into account. For rotary axis, input in [deg] unit.

2-3-2 Auxiliary calculation of coupling inertia

[Calculation type]
Click on the either button to switch calculation type. Unable to enter data in shaded areas.

[No. 1 axis Auxiliary calculation]

Calculation from cylinder length, etc.
 Calculation from cylinder mass, etc.

Item	Unit	Setting value
Cylinder outer diameter	mm	100
Cylinder inner diameter	mm	35
Cylinder length	mm	80
Cylinder material quality	-	Iron
Cylinder mass	kg	

Start calculation Cancel

[Cylinder model]
Calculates inertia regarding a coupling as a metallic cylinder with a hole in the middle. Input each calculated value in non-shaded columns.

2-4 Adjusting Selection Condition

2-4-1 Modifying selection condition

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC

[Input Para.]
Do these settings if you want to change judgement or calculation condition. Before setting, you need to fully understand this servo selection mechanism. Possible to set individually for each axis.

Item	Setting value
Criterion of load inertia ratio	300%(standard)
Max. torque usage rate	80% (Standard)
Criterion of cont. effective load	80% (Standard)
Avg. cutting tq.	Max. cutting tq. x 50%
Position control system	Standard control
Position loop gain	47
S-shape acceleration/deceleration	0%
Motor series	HF series

Return

Item	Setting value	Explanation
Criterion of load inertia ratio	<ul style="list-style-type: none"> 300% (high-accuracy) 500% (standard) 700% (general machine) 1000% (positioning axis) 	<ul style="list-style-type: none"> Set the criterion to be used for judging load inertia ratio. Standard value and selection items differ according to motor type.
	<ul style="list-style-type: none"> (Standard) 3000% 	<ul style="list-style-type: none"> Shown as on the left mainly for general-purpose servo motor. If you select "Standard" setting, recommended load inertia ratio described in specifications will be applied.
Max. torque usage rate	<ul style="list-style-type: none"> 80% (standard) 85% 90% 95% 	<ul style="list-style-type: none"> This usage rate affects the calculation of minimum acc/dec time constant to be used for transient characteristics judgment and cutting torque judgment. Higher usage rate is effective for servo selection, but it results in fewer margins. You have to be careful if you select 95%.
Criterion of continuous effective load	<ul style="list-style-type: none"> 80% (standard) 85% 90% 	<ul style="list-style-type: none"> Set the criterion to be used for judging continuous characteristics. It is not possible to change the condition "Steady load \leq 60%", which is calculated using unbalance torque.
Average cutting torque	<ul style="list-style-type: none"> Max. cutting torque x 10 ~ 100% Standard setting: 50% 	<ul style="list-style-type: none"> Average cutting torque is used for the cutting load calculation to judge continuous characteristics. Set this torque by 10%, based on the max. cutting torque.
Position control system	<ul style="list-style-type: none"> Standard control SHG control Feed forward control 	<ul style="list-style-type: none"> This setting is used for taking into account the motor torque saturation characteristics when calculating the acceleration/deceleration time constant. When SHG or Feed forward control is selected, motor torque will more easily be saturated, and the acceleration/deceleration time constant will be longer.
Position loop gain	<ul style="list-style-type: none"> Input a value. Standard setting: 47 	<ul style="list-style-type: none"> This value is used for when calculating torque saturation characteristics to calculate minimum acc/dec time constant, or when calculating the demanded acc/dec time constant by selecting "Calculation from travel distance, etc."
S-shape acceleration/deceleration	<ul style="list-style-type: none"> 0%, 10%, 20%, 30%, 40%, 50% 	<ul style="list-style-type: none"> Set S-shape acc/dec time constant, based on the linear acc/dec time constant. Possible to reduce acc/dec time constant while avoiding motor's output torque saturation.
Motor series designation	<ul style="list-style-type: none"> HF Series HP Series HF-KP Series, etc. 	<ul style="list-style-type: none"> Designate a motor series to be used for servo selection. Standard motor series is determined by drive unit series.
	<ul style="list-style-type: none"> HA,HC limited to 3000r/min General-purpose motor limited to 3000r/min 	<ul style="list-style-type: none"> Set this, if you want to use 3000 r/min motor even when desired maximum speed is 2000r/min or lower. This is for when the motor has both 2000r/min and 3000r/min specifications.
	<ul style="list-style-type: none"> Designate motor for E60 (MDS-B-SVJ2 only) 	<ul style="list-style-type: none"> Set this when you use the motor/drive unit combination that is allowed only for E60. If you select motor by "Individual motor designation", add "*" after the motor name, as "HC102*"
	<ul style="list-style-type: none"> General-purpose motor 	<ul style="list-style-type: none"> Select from among HC-MF, HA-FF, HC-RF or HC-SF Series
	<ul style="list-style-type: none"> Individual motor designation 	<ul style="list-style-type: none"> Designate a motor to be used for calculation.

2-4-2 Designating individual motor

[Motor series designation]
When you select "Individual motor designation", the setting columns of "Designated motor" and "Motor for comparison" will open at the bottom.

[Designated motor]
Specify a motor to be shown in selected motor column. Whether the selection result is OK or NG, its calculation result will be indicated.

[Motor for comparison]
Specify a motor to be shown in comparison motor column. Whether the selection result is OK or NG, its calculation result will be shown. You can choose different motor series from selected motor series. Also you can set "Criterion of load inertia ratio" individually.
If you set (Not display), a default setting, only the selected motor column is shown but comparison motor column won't be displayed.

[Special notation of motor name]

The mark "*" added to selected motor and comparison motor columns stand for the following meanings.

Items	MDS-DM-V3-404040, MDS-B-SVJ2	MDS-C1-VX
Meaning of motor with "**"	This motor is combined with the drive unit whose capacity is lower than the standard unit by one rank.	This motor is combined with the drive unit that has "S" in its model name.
Specification limit	Stall torque and maximum torque are limited.	Stall torque is limited.
Example	HF154* ... HC154 + Drive unit (cap. 40) HF154 ... HC154 + Drive unit (cap. 80) HC102* ... HC102 + MDS-B-SVJ2-07 HC102 ... HC102 + MDS-B-SVJ2-10	HC452* ... HC452 + MDS-C1-V1-45S HC452 ... HC452 + MDS-C1-V1-45

2-5 When Servo Motor is Predetermined

2-5-1 Direct entry of servomotor name

Go back to TOP page.

Return

Ver.5.20

[To add servo axis]
Go back to TOP page, change the number of axes and click on [Enter]. Then you can add servo axes.

Machine type: Vertical machining center
Machine model: -

Axis No.	Data setting	Axis	Axis type	Servo drive unit	Servo motor	Regenerative resistor	Selection result
1	No. 1 axis	X	Horizontal	MDS-E-V1-160	HG354	-	Result of No. 1 axis
2	No. 2 axis	Y	Vertical	MDS-EH-V1-20	HG-H104	-	Result of No. 2 axis
3	No. 3 axis	Z	Inclined	MDS-EH-V1-20	HG-H104	-	Result of No. 3 axis
4	No. 4 axis	B	Rotary	MDS-E-V1-80	HG303	-	Result of No. 4 axis
5	No. 5 axis	MG	Magazine	MDS-EJ-V1-30	HG105	-	Result of No. 5 axis
6	No. 6 axis	LX	Rack & pinion	MDS-EM-SPV3-xxx120	HG224	-	Result of No. 6 axis
7	No. 7 axis	PC	Pallet changer	MDS-EH-V1-40	HG-H204	-	Result of No. 7 axis
8	No. 8 axis	A	Input Specs.	MDS-EJ-V1-30	HG105	-	Result of No. 8 axis
9	No. 9 axis	-	-	-	-	-	Result of No. 9 axis

Input servo motor name

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC Return

[Direct entry of servomotor name]

Axis No.	Axis	Axis type	Drive unit series	Servo drive unit	Servo motor	Motor brake
1	X	Horizontal	MDS-D-VX	MDS-D-V1-160	HF354	Without
2	Y	Vertical	MDS-D-VX	MDS-D-V1-160	HF354B	With
3	Z	Inclined	MDS-D-VX	MDS-D-V1-80	HF154B	With
4	B	Rotary	MDS-D-VX	MDS-D-V1-20	HF142	Without
5	MG	Magazine	MDS-D-VX	MDS-D-V1-20	HF142	Without
6	LX	Rack & pinion	MDS-D-VX	MDS-D-V1-20	HF105	Without
7	PC	Pallet changer	MDS-D-VX	MDS-D-V1-40	HF223	Without
8	A	Input Specs.	MDS-D-VX	MDS-D-V1-80	HF154	Without
9		Horizontal				Without

You can choose "DD motor rotation axis" for [Axis type] only on the [Direct entry of servomotor name] screen.

Axis type: DD motor rotation axis

Motor rotation speed: 0.0 r/min

[Direct entry of servomotor name]

Possible to directly input a servo motor name for selecting power supply, etc. This function enables you to change the servo motor that has been already determined by this S/W.

Chapter 3 SETTING SPINDLE MOTOR DATA

Make sure to have spindle motor's specifications close at hand, before inputting the motor characteristics.

MITSUBISHI AC SPINDLE MOTOR						
CUSTOMER						
APPLICATION						
M.F.G. ORDER NO.	()	SETS				
	()	SETS				
	()	SETS				
OUTLINE DWG NO.	BD50360-*	r/min	1500	8000		
COOLING SYSTEM	TOTALLY ENCLOSED FANCOOLING	CONT (kW)	11	11		
TYPE	SJ-Y22-06ZT	1/2H (kW)	15	15		
	FLANGE MOUNTED TYPE					
FRAME NO.	A160F	VOLT	max 200V			
DIRECTION OF ROTATION	REVERSIBLE	AMP	max 115A			
VIBRATION CLASS	V 5	OUTPUT POWER SPEED CHARACTERISTIC NORMAL	<p>The graph plots Output Power (kW) on the y-axis (0 to 15) against Speed (r/min) on the x-axis (0 to 8000). A linear ramp from (0,0) to (1500, 15) is labeled '1/2H'. A horizontal line at 11 kW from 1500 to 8000 r/min is labeled 'CONT'.</p>			
SOUND LEVEL	75 dB(A)					
CONTINUOUS RATED TORQUE (MAX)	70.0 N-m					
ALLOWABLE OVERLOAD (1MIN)	120% OF RATED OUTPUT FOR 1/2H					
INSULATION	CLASS F					
AMBIENT TEMPERATURE	0 ~ 40°C					
ROTOR GD ²	0.23 kg-m ²					
MOMENT OF INERTIA OF ROTOR	0.0575 kg-m ²					
RADIAL LODE	300 kg	COOLING FAN MOTOR	TYPE S330RT-24W-B30-S01, 3φ, 2P, CONT 45/63W, 50/60Hz, 240V, 0.32/0.35A			
IP CODE	IP 44	SPEED DETECTOR	ENCODER	TS5691N1170 (256 PULSE/REV)		
MASS	110 kg		GEAR	MU1450N230		
COLOR	MUNSELL 5.27G2.46/0.21 (BLACK)	THERMAL MOTOR PROTECTION	THERMISTOR			
BALL BEARING	LOAD SIDE 6310T2LLBC3P5/L448QTK OPPOSITE SIDE 6210T2LLBC3P5/L448QTJ	CONTROLLER	MDS-D-SP-240	ACCESSORY	CONNECTOR AND PINS FOR ENCODER	
REMARKS: • MARK-PULSE (WITH Z-PHASE) ENCODER BUILT INTO MOTOR.		<p>TO USE THE MOTOR SAFELY ALWAYS READ THE INSTRUCTION MANUAL AND ENCLOSED DOCUMENTS THOROUGHLY BEFORE STARTING USE (INSTALLATION, OPERATION, MAINTENANCE OR INSPECTION) OF THE MOTOR.</p>				
CHANGE		DATE	2005-12-12	APPROVED	RATING SHEET	
		DRWN.			DWG NO.	
		CHK.			RSV10406*	
		DSIN.				

Spindle motor's specifications

3-1 Setting the Number of Spindle Motors

Set the total number of spindle motors to be used for overall NC system.

Explorer ユーザー プロンプト

スクリプト プロンプト:
Input the number of spindle motors.

OK
キャンセル

2

Input servo motor name

[Set SP motor data & Calculate acc./dec. time]

Set the number of spindle motors

Axis No.	Data setting	Axis	SP drive unit	SP motor	Short-time rating (STR)	Specified time for STR	Output in acc./dec.
1	No. 1 axis	-	-	-	-	-	-
2	No. 2 axis	-	-	-	-	-	-

[Power Supply Unit Selection]

Set the number of power supply units

[System Configuration]

Drive system configuration list



[Setting SP motor data]
Input spindle data in one of the following methods.
"Input data for selecting power supply"
"Input data for calculating spindle acc/dec time"

Setting done

Input servo motor name

[Set SP motor data & Calculate acc./dec. time]

Set the number of spindle motors

Axis No.	Data setting	Axis	SP drive unit	SP motor	Short-time rating (STR)	Specified time for STR	Output in acc./dec.
1	No. 1 axis	S1	MDS-D-SP-240	SJ-V22-062T	15.0 kW	30 min	-
2	No. 2 axis	S2	MDS-D-SP-160	SJ-V75-01T	7.5 kW	15 min	-

[Power Supply Unit Selection]

Set the number of power supply units

[System Configuration]

Drive system configuration list

3-2 Setting Data for Selecting Power Supply

Before calculating power supply capacity by adding servo and spindle motors' loads, set spindle motor's characteristics. This data is also used in Drive system configuration list.

3-2-1 Setting spindle motor output characteristic (1)

After setting this data, click on [Return] to go back to the previous screen.

[Spindle data setting method]
Select "Input data for calculating spindle acc./dec. time".

[Drive unit series]
If you select either resistor-regeneration type spindle drive (MDS-D-SPJ3 or MDS-B-SVJ2) or multi-hybrid drive (MDS-DM-SPVX-xxx80 or MDS-DM-SPV3-200120), the drive unit selection does not affect the power supply selection, but just appears on the drive system configuration list.

[No. 1 axis]

Input data for selecting power supply
 Input data for calculating spindle acc./dec. time

Axis name: S1

Drive unit series: MDS-E/EH/EJ/EJH/EM series

Acc./Dec. output characteristics: Without specific requirement / Without

Coil switch: Without / With

Data setting:

	MDS-E-SP-20
	SJ-V22-06ZT
	kW 11.0
	kW 15.0
	min 30

Output characteristic diagram:

Rating

OUTPUT POWER (kW)

SPINDLE (r/min)

30min

CONT

[Input the motor characteristics]
Possible to input the data to the left diagram or to the right table.

[Extended function]
If acceleration/deceleration output is individually specified, or if coil switch function is supported, see "3-2-2 Setting spindle motor output characteristic (2)".

3-2-2 Setting spindle motor output characteristic (2)

If acceleration/deceleration output characteristic is individually specified, or if there is coil switch specification, the input screen will be changed when you change any of the settings in Basic spec. column.

Customer
Machine type Vertical machining center
Machine model
Return

[No. 1 axis]

Input data for selecting power supply
 Input data for calculating spindle acc./dec. time

No. 1 axis Basic spec.	Axis name	Drive unit series	Acc./Dec. output characteristic	Coil switch
	S1	MDS-E-SP	With specific requirement	With

Output characteristic diagram

Low-speed coil	High-speed coil
<p>Rating</p>	<p>Rating</p>
<p>Acc/Dec</p>	<p>Acc/Dec</p>

Data setting

Spindle drive unit		MDS-E-SP-20
Spindle motor		SJ-V22-06ZT
H-coil: Cont. rated output(S1)	kW	11.0
H-coil: Short-time rating (STR)(S2)	kW	15.0
H-coil: Specified time for STR	min	30
H-coil: Output in acc./dec.	kW	18.5
H-coil: Actual acc./dec. output %	%	120%(三菱標準)

[Coil switch]
 Select this if it's possible to switch between high-speed and low-speed coils. The high-speed coil specification is used for power supply selection.

3-2-3 Setting Rated Output

When the following drive unit series are selected, select the rated output from the pull-down.

MDS-E-SP	MDS-EH-SP	MDS-EJ-SP	MDS-EJH-SP
MDS-D2-SP	MDS-DH2-SP	MDS-DJ-SP	MDS-DM2-SP (H) VX-xxx80
MDS-DM2-SPV3-200120	MDS-D-SP	MDS-DH-SP	MDS-D-SPJ3
MDS-DM-SPVXF-xxx80	MDS-DM-SPV3F-200120		

(1) In case "Without coil switch" is selected

Customer: - Machine type: Vertical machining center Machine model: - [Return]

[No. 1 axis]

If you select "Without coil switch", either "Short-time rating (STR) (S2)" or "%ED rated output (S3)" is selectable.

No. 1 axis Basic spec. Axis name: S1 Drive unit series: MDS-EM-SPV3 Acc./Dec. output characteristic: Without specific requirement Coil switch: Without

Output characteristic diagram: Rating graph showing output power (kW) vs speed (r/min) with a 30min pulse. The graph shows a constant output of 1.5 kW and a short-time output of 3.98 kW for 30 minutes.

Data setting:

Spindle drive unit			MDS-EM-SPV3-100xx
Spindle motor			BBB
Cont. rated output(S1)		kW	1.5
Short-time rating (STR)(S2)		kW	3.98
%ED rated output(S3)			
Specified time for STR		min	30

[Return]

If the "Short-time rating (STR) (S2)" is selected, select the "Specified time for STR" from the pull-down. The default value is 15 min.

Output characteristic diagram: Rating graph showing output power (kW) vs speed (r/min) with a 30min pulse.

Data setting:

Spindle drive unit			4
Spindle motor			5
Cont. rated output(S1)		kW	6
Short-time rating (STR)(S2)		kW	7
Specified time for STR		min	8
			9
			10
			15
			30

If the "%ED rated output (S3)" is selected, select the "%ED (duty factor)" from the pull-down. The default value is 50%.

Output characteristic diagram: Rating graph showing output power (kW) vs speed (r/min) with a 50% pulse.

Data setting:

Cont. rated output(S1)		kW	30
%ED rated output(S3)		kW	35
%ED (duty factor)		%	40
			45
			50
			60
			70
			80

(2) In case "With coil switch" is selected

Customer: - Machine type: Vertical machining center Machine model: - Return

If you select "With coil switch", either "H-coil: Short-time rating (STR) (S2)" or "H-coil: %ED rated output (S3)" is selectable.

Input data for selecting power supply
 Input data for calculating spindle acc./dec. time

No. 1 axis Basic spec.	Axis name	Drive unit series	Acc./Dec. output characteristic	Coil switch
	S1	MDS-EM-SPV3	Without specific requirement	With

Output characteristic diagram

Low-speed coil **High-speed coil**

Data setting

Spindle drive unit		MDS-EM-SPV3-100xx
Spindle motor		BBB
H-coil: Cont. rated output(S1)	kW	0
H-coil: Short-time rating (STR)(S2)	kW	0
H-coil: %ED rated output(S3)		
H-coil: Specified time for STR	min	30

Return

If the "H-coil: Short-time rating (STR) (S2)" is selected, select the "H-coil: Specified time for STR" from the pull-down. The default value is 30 min.

Output characteristic diagram

Low-speed coil **High-speed coil**

Data setting

Spindle drive unit		
Spindle motor		
H-coil: Cont. rated output(S1)	kW	
H-coil: Short-time rating (STR)(S2)	kW	
H-coil: Specified time for STR	min	30

If the "H-coil: % ED rated output (S3)" is selected, select the "H-coil: % ED (duty factor)" from the pull-down. The default value is 50%.

Output characteristic diagram

Low-speed coil **High-speed coil**

Data setting

Spindle drive unit		
Spindle motor		
H-coil: Cont. rated output(S1)	kW	
H-coil: %ED rated output(S3)	kW	
H-coil: %ED (duty factor)	%	50

3-3 Calculating Spindle Acceleration/Deceleration Time

Input the characteristics of both spindle motor and machine to calculate spindle acc/dec time. Then, the data for selecting power supply as well as the data for Drive system configuration list are set at the same time.

3-3-1 Setting data for calculating acceleration/deceleration time

Customer
Machine type

[No. 1 axis]

Input data for selecting power supply
 Input data for calculating spindle acc./dec. time

No. 1 axis Basic spec.	Axis name	Drive unit series	Acc./Dec. output characteristics	Coil switch	Others
	S1	MDS-E-SP	Without specific requirement	Without	SP parameter

Output characteristic diagram

Data setting

Spindle drive unit		MDS-E-SP-20
Spindle motor		SJ-V7.5-01T
Cont. rated output(S1)	kW	5.5
Short-time rating (STR)(S2)	kW	7.5
Specified time for STR	min	15
Base speed in acc./dec.	r/min	1500
Max. speed within constant output range	r/min	6000
Max. speed	r/min	8000
Motor inertia	Other units kg·m ²	0.025
Load inertia	Other units kg·m ²	0.033
Machine's friction torque	Other units N·m	2.1
Acceleration start speed	r/min	0
Calculation pitch	r/min	500

Calculate spindle acceleration/deceleration time

[Spindle data setting method]
Select "Input data for calculating spindle acc/dec time".

[Inertia setting unit]
Spindle motor inertia and the load inertia are set in [kg·m²] unit. Be careful as it's different from the unit [kg·cm²] used for servo selection.

[Other units] Machine's friction torque
Possible to input in [kgf·cm] unit.

[Other units] Each inertia
Possible to input in [GD²] or [kg·cm²] unit.

[Max. speed]
When there is no step-down range (when constant output range continues up to the maximum speed), "Max. speed" is the same as "Max. speed within constant output range".

[Calculation setting]
Calculates the acceleration time taken from "Acceleration start speed" to each speed set by the "Calculation pitch". Also the deceleration time taken from these speeds to "Acceleration start speed" is calculated.

3-3-2 Acceleration/Deceleration time calculation result

[PDF]
Click on this button to output currently displayed calculation result and graph into a PDF file.

Customer: ABC MACHINERY CO.,LTD.
Machine type: Vertical machining center
Machine model: ABC1000VMC
PDF Return

[No. 2 spindle Input data]

Item	Unit	Input value
Axis name		S2
Acceleration/deceleration output characteristics		Without specific requirement
Coil switch		Without
Spindle drive unit		MDS-D-SP-160
Spindle motor		SJ-V7.5-01T
Cont. rated output	kW	5.5
Short-time rating (STR)	kW	7.5
Specified time for STR	min	15
Base speed in acc./dec.	r/min	1500
Max. speed within constant output range	r/min	6000
Max. speed	r/min	8000
Motor inertia	kg · m ²	0.025
Load inertia	kg · m ²	0.033
Machine's friction torque	N · m	2.1

[Parameter item for No. 2 Spindle]

Item	Unit	Input value
Acc. start speed	r/min	0
Calculation pitch	r/min	500

[Calculation result of spindle's acceleration/deceleration time]
Times taken from the acceleration start speed to a certain speed (up to 20 levels of speed by the calculation pitch or up to the maximum speed) are shown as a result. If the result at the maximum speed is not shown, adjust "Calculation pitch" setting.

[No. 2 Spindle Acc/Dec Time Calculation Result]

Acc. start speed(r/min)	Acc. end speed(r/min)	Acc. time(s)	Dec. start speed(r/min)	Dec. end speed(r/min)	Dec. time(s)
0	500	0.055	500	0	0.051
0	1000	0.11	1000	0	0.102
0	1500	0.165	1500	0	0.153
0	2000	0.229	2000	0	0.212
0	2500	0.314	2500	0	0.288
0	3000	0.418	3000	0	0.379
0	3500	0.542	3500	0	0.485
0	4000	0.688	4000	0	0.606
0	4500	0.855	4500	0	0.742
0	5000	1.045	5000	0	0.892
0	5500	1.258	5500	0	1.056
0	6000	1.494	6000	0	1.234
0	6500	1.768	6500	0	1.433
0	7000	2.097	7000	0	1.659
0	7500	2.491	7500	0	1.913
0	8000	2.959	8000	0	2.197

Spindle acc/dec time

Return

[Acceleration and deceleration times]
When the setting of "Machine's friction torque" is zero, acceleration time is the same as deceleration time.

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3-3-3 Setting data for coil switch specification

Set the motor characteristics of both low-speed and high-speed coils.

Customer
[Spindle parameter]
Possible to set or change the parameters relating to coil switch spec.

[No. 1 axis]

Input data for selecting power supply
 Input data for calculating spindle acc./dec. time

No. 1 axis Basic spec.	Axis name	Drive unit series	Acc./Dec. output characteristics	Coil switch	Others
S1		MDS-E-SP	With specific requirement	With	SP parameter

Output characteristic diagram		Data setting																																																																																													
	Low-speed coil	High-speed coil																																																																																													
Rating			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Spindle drive unit</td><td></td><td></td><td>MDS-E-SP-20</td></tr> <tr><td>Spindle motor</td><td></td><td></td><td></td></tr> <tr><td>L-coil: Cont. rated output(S1)</td><td>kW</td><td>5.5</td><td></td></tr> <tr><td>L-coil: Short-time rating(S2)</td><td>kW</td><td>7.5</td><td></td></tr> <tr><td>L-coil: Output in acc./dec.</td><td>kW</td><td>11.0</td><td></td></tr> <tr><td>L-coil: Actual acc./dec. output %</td><td>%</td><td>120%(三菱標準)</td><td></td></tr> <tr><td>L-coil: Base speed in acc./dec.</td><td>r/min</td><td>1500</td><td></td></tr> <tr><td>L-coil: Max. speed in constant output range</td><td>r/min</td><td>3000</td><td></td></tr> <tr><td>L-coil: Max. speed</td><td>r/min</td><td>5</td><td></td></tr> <tr><td>H-coil: Cont. rated output(S1)</td><td>kW</td><td>11.0</td><td></td></tr> <tr><td>H-coil: Short-time rating (STR)(S2)</td><td>kW</td><td>15.0</td><td></td></tr> <tr><td>H-coil: Specified time for STR</td><td>min</td><td>15</td><td></td></tr> <tr><td>H-coil: Output in acc./dec.</td><td>kW</td><td>15</td><td></td></tr> <tr><td>H-coil: Actual acc./dec. output %</td><td>%</td><td>120%(三菱標準)</td><td></td></tr> <tr><td>H-coil: Base speed in acc./dec.</td><td>r/min</td><td>3000</td><td></td></tr> <tr><td>H-coil: Max. speed in constant output range</td><td>r/min</td><td>8000</td><td></td></tr> <tr><td>H-coil: Max. speed</td><td>r/min</td><td>12000</td><td></td></tr> <tr><td>Motor inertia</td><td>Other units</td><td>kg·m²</td><td>0.025</td></tr> <tr><td>Load inertia</td><td>Other units</td><td>kg·m²</td><td>0.033</td></tr> <tr><td>Machine's friction torque</td><td>Other units</td><td>N·m</td><td>2.1</td></tr> <tr><td>Coil switch speed (L → H)</td><td></td><td>r/min</td><td>3000</td></tr> <tr><td>Acceleration start speed</td><td></td><td>r/min</td><td>0</td></tr> <tr><td>Calculation pitch</td><td></td><td>r/min</td><td>500</td></tr> </table>	Spindle drive unit			MDS-E-SP-20	Spindle motor				L-coil: Cont. rated output(S1)	kW	5.5		L-coil: Short-time rating(S2)	kW	7.5		L-coil: Output in acc./dec.	kW	11.0		L-coil: Actual acc./dec. output %	%	120%(三菱標準)		L-coil: Base speed in acc./dec.	r/min	1500		L-coil: Max. speed in constant output range	r/min	3000		L-coil: Max. speed	r/min	5		H-coil: Cont. rated output(S1)	kW	11.0		H-coil: Short-time rating (STR)(S2)	kW	15.0		H-coil: Specified time for STR	min	15		H-coil: Output in acc./dec.	kW	15		H-coil: Actual acc./dec. output %	%	120%(三菱標準)		H-coil: Base speed in acc./dec.	r/min	3000		H-coil: Max. speed in constant output range	r/min	8000		H-coil: Max. speed	r/min	12000		Motor inertia	Other units	kg·m ²	0.025	Load inertia	Other units	kg·m ²	0.033	Machine's friction torque	Other units	N·m	2.1	Coil switch speed (L → H)		r/min	3000	Acceleration start speed		r/min	0	Calculation pitch		r/min	500
Spindle drive unit			MDS-E-SP-20																																																																																												
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Calculation pitch		r/min	500																																																																																												
Acc/Dec																																																																																															

[Coil switch speed]
 Set a speed lower than "L-coil: Max. speed".
 The setting of the actual spindle parameter is a speed to switch from H to L. So, you need to calculate the coil switch speed from L to H.
 Add "Speed detection set value" to "Speed detection reset value".
 MDS-C1/CH: Coil switch speed (L → H) = SP020 + SP047
 MDS-D/DH: Coil switch speed (L → H) = SP028 + SP029

[Speed switch hysteresis]
 Use the setting of spindle parameter "Speed detection reset width".
 MDS-C1/CH Series: SP047
 MDS-D/DH Series: SP029

Item	Unit	Setting value
Speed switch hysteresis	r/min	30
Base shut-off time for coil switch	ms	150.0

[Base shut-off time for coil switch]
 This is also called "Gate shut-off timer for coil switch".
 Use the setting of spindle parameter "Speed detection reset width".
 MDS-C1/CH Series: SP059
 MDS-D/DH Series: SP114

Chapter 4 SETTING TOOL SPINDLE MOTOR DATA

4-1 Setting the Number of Tool Spindle Motors

Set the total number of tool spindle motors to be used for the entire NC system.

Explorer User Prompt

Script Prompt:
Input the number of tool spindle motors.

OK
Cancel

[Tool spindle motor setting]

Set the number of tool spindle motors

motor	Short-time rating (STR)	Specified time for STR	Output in acc./dec.
-	-	-	-
-	-	-	-

Axis No.	Data setting	Axis	Tool spindle motor	SP drive unit	Rated output	Inst. max. output
1	Input	-	-	-	-	-
2	Input	-	-	-	-	-

[Power Supply Unit Selection]

Set the number of power supply units

[Data setting]
Even when the number of tool spindle motors is two or larger, set all the data at a time.



Setting done

[Tool spindle motor setting]

Set the number of tool spindle motors

Axis No.	Data setting	Axis	Tool spindle motor	SP drive unit	Rated output	Inst. max. output
1	Input	S3	HF105S-A48	MDS-D-SP-20	1.0 kW	3.6 kW
2	Input	S4	HF154S-A48	MDS-D-SP-80	1.5 kW	9.0 kW

[Power Supply Unit Selection]

Set the number of power supply units

4-2 Setting Data for Selecting Power Supply

Before calculating the power supply capacity by adding servo, spindle and tool spindle motors' loads, set the tool spindle motor's characteristics. The data input here are also used in Drive system configuration list.

4-2-1 Setting tool spindle motor data

After setting the data, click on [Return] to go back to the previous screen.

Axis No.	Axis	Tool spindle motor	SP drive unit	Rated output (kW)	Inst. max. output (kW)
1	S3	HF105S-A48	MDS-D-SP-20	1.0 kW	3.6 kW
2	S4			-	-

[Return]

[Input the tool spindle data]
Possible to select the tool spindle motor and spindle drive unit names to carry out such as the power supply capacity selection.

Chapter 5 SETTING THIRD-PARTY MOTORS DATA

Make sure to have the specifications of the third-party spindle motors close at hand before inputting the motor characteristics.

5-1 Setting the Number of Third-Party Motors

Set the total number of third-party motors to be used for overall NC system.

localhost には何らかの情報が必要です

スクリプト プロンプト:
Input the number of power supply units.

2

OK
キャンセル

[Set the third-party motor]

Set the number of third-party motors

Axis No.	Data setting	Axis	Axis type	Drive unit type	Motor type	Rated output	Inst. max. output
1	<u>Input</u>	-	-	-	-	-	-
2		-	-	-	-	-	-

【Data setting】
Even when the number of third-party motors is 2 or larger, set the data as a whole.

Calculate for selection

Selection completed

[Set the third-party motor]

Set the number of third-party motors

Axis No.	Data setting	Axis	Axis type	Drive unit type	Motor type	Rated output	Inst. max. output
1	<u>Input</u>	A	Horizontal	MDS-E-V1-20	THIRD_PARTY_MOTOR	2.2 kW	12.3 kW
2		B	Tool spindle	MDS-EH-SP-100	TOOL_SPINDLE_MOTOR	1.5 kW	9.0 kW

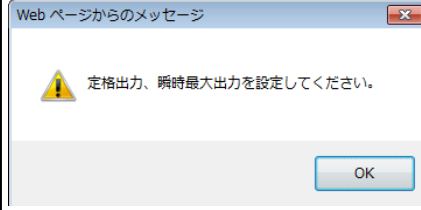
5-2 Setting Data for Selecting Power Supply

[Set the third-party motor]

Set the number of third-party motors

Axis No.	Data setting	Axis	Axis type	Drive unit type	Motor type	Rated output	Inst. max. output
1	Input	A	Horizontal	MDS-E-V1-20	THIRD_PARTY_MOTOR	2.2 kW	12.3 kW
2		B	Tool spindle	MDS-EH-SP-100	TOOL_SPINDLE_MOTOR	1.5 kW	9.0 kW

Set data in each axis and return to the machine listing screen and the drive unit type is set and if either the value of rated output or the Inst.max.output is 0, the error below will be shown.



Sequence numbers starting from 1 (automatic entry)

Manual entry items (default is blank.)

Pull-down entry (default is blank.)

Machine model

Return

Axis No.	Axis	Axis type	Drive unit series	Drive unit	Motor	Rated output (kW)	Inst. max. output (kW)
1	A	Horizontal	MDS-E-VX	MDS-E-V1-20	THIRD_PARTY_MOTOR	2.2	12.3
2	B		MDS-EH-SP	MDS-EH-SP-100	TOOL_SPINDLE_MOTOR	1.5	9.0

Return

Manual entry only for decimal point (default is 0.0)

Manual entry items (default is blank.)

Select drive units according to the drive unit series from the pull-down. (default is blank.)

In accordance with the axis type, select from the pull-down options below. (default is blank)

General (except for tool spindle motors)	Tool spindle motors
<p>MDS-E/EH/EJ/EJH/EM シリーズ</p> <p>MDS-E-VX</p> <p>MDS-EH-VX</p> <p>MDS-EJ-VX</p> <p>MDS-EJH-VX</p> <p>MDS-EM-SPV3</p>	<p>MDS-E/EH/EM シリーズ</p> <p>MDS-E-SP</p> <p>MDS-EH-SP</p> <p>MDS-EM-SPV3</p>

Depending on the axis type, different columns are added to the power supply data.

[Set the third-party motor]

Set the number of third-party motors

Axis No.	Data setting	Axis	Axis type	Drive unit type	Motor type	Rated output	Inst. max. output
1	<u>Input</u>	A	Horizontal	MDS-E-V1-20	THIRD_PARTY_MOTOR	2.2 kW	12.3 kW
2		B	Tool spindle	MDS-EH-SP-100	TOOL_SPINDLE_MOTOR	1.5 kW	9.0 kW

[Power Supply Unit Selection]

Set the number of power supply units

No.	Data setting	Power supply unit	AC reactor	Power facility capacity	Selection result
1	<u>Input</u>	-	-	-	<u>Result</u>

Customer: - Machine type: Vertical machining center Machine model: - Para. Return

If the axis type is except for "tool spindle motors", it is considered to be a servo axis, being added to the lowest column of the servo data.

Item	Axis	SV drive unit	SV motor	Rated output (kW)	Inst. max. output (kW)	Simul. acc/dec axis	Power supply
No. 1	X	MDS-DH2-V1-40	HP-H154	1.5	8.0	<input checked="" type="checkbox"/>	<input type="radio"/>
No. 2	A	MDS-E-V1-20	THIRD_PARTY_MOTOR	2.2	12.3	<input checked="" type="checkbox"/>	<input type="radio"/>

Spindle data

Item	Axis	SP drive unit	SP motor	Short-time rating (STR) (kW)	Specified time for STR (min) /%ED (duty factor) (%)	Output in acc./dec. (kW)	Power supply
No. 1	S1	MDS-E-SP-20	-	1.5	15 min	-	<input type="radio"/>

Tool spindle data

Item	Axis	SP drive unit	Tool spindle motor	Rated output (kW)	Inst. max. output (kW)	Power supply
No. 3	B	MDS-EH-SP-100	TOOL_SPINDLE_MOTOR	1.5	9.0	<input type="radio"/>

Select power supply unit

If the axis type is "tool spindle motors", it is considered to be a tool spindle motor, being added to the lowest column of the tool spindle data.

Chapter 6 POWER SUPPLY SELECTION

6-1 Setting the Number of Power Supply Units

Set the total number of power supply units to be used for overall NC system.

Explorer ユーザー プロンプト

スクリプト プロンプト:
Input the number of power supply units.

2

OK
キャンセル

Axis No.	Data setting	Axis	SP drive unit	SP motor	Short-time rating (STR)	Specified time for STR	Output in acc./dec.
1	No. 1 axis	S1	MDS-D-SP-240	SJ-V22-06ZT	15.0 kW	30 min	-
2	No. 2 axis	S2	MDS-D-SP-160	SJ-V75-01T	7.5 kW	15 min	-

[Power Supply Unit Selection]

Set the number of power supply units

No.	Data setting	Power supply unit	AC reactor	Power facility capacity	Selection result
1		-	-	-	Result
2	Input	-	-	-	

[System Configuration]

Drive system configuration list

[Save data]

[Data setting]
Even when the number of power supply units is 2 or larger, all the data is shown at a time.

Calculate for selection

Selection completed

[Set SP motor data & Calculate acc./dec. time]

Set the number of spindle motors

Axis No.	Data setting	Axis	SP drive unit	SP motor	Short-time rating (STR)	Specified time for STR	Output in acc./dec.
1	No. 1 axis	S1	MDS-D-SP-240	SJ-V22-06ZT	15.0 kW	30 min	-
2	No. 2 axis	S2	MDS-D-SP-160	SJ-V75-01T	7.5 kW	15 min	-

[Power Supply Unit Selection]

Set the number of power supply units

No.	Data setting	Power supply unit	AC reactor	Power facility capacity	Selection result
1		MDS-D-CV-300	D-AL-30K	34.7 kVA	Result
2	Input	MDS-D-CV-110	D-AL-11K	14.9 kVA	

[System Configuration]

Drive system configuration list

[Save data]

Save the input data
You can save up to 100 conditions for selection.

[Selection result]
After the calculation is completed, you can directly open the result. Go back to the main screen to see the power facility capacity, after the selection of the power supply units.

6-2 Selecting MDS-EM/EMH Series

After the spindle motor of MDS-E(H)M series is set, the power supply unit (multi-hybrid drive unit) of the following will automatically be added.
 "No.:M1"
 "Power supply unit: spindle drive unit of MDS-E(H)M series"

Axis No.	Data setting	Axis	SP drive unit	SP motor	Short-time rating (S1K)	/ %ED (duty factor)	Output in acc./dec.
1	No. 1 axis	S1	MDS-EM-SPV3-100xx	BBB	3.98 kW	30 min	-

After setting the spindle motor

[Tool spindle motor setting]
 Set the number of tool spindle motors

[Set the third-party motor]
 Set the number of third-party motors

[Power Supply Unit Selection]
 Set the number of power supply units

No.	Data setting	Power supply unit	AC reactor	Power facility capacity	Selection result
M1	Input	MDS-EM-SPV3-100xx	-	-	Result

Even for usual power supply units, if necessary, the multi-hybrid drive unit will be shown after the usual power supply unit as described below.

Set the number of power supply units

No.	Data setting	Power supply unit	AC reactor	Power facility capacity	Selection result
1		-	-	-	
M1	Input	MDS-EM-SPV3-100xx	-	-	Result

6-3 Setting Selection Condition

[Initial condition]

[Power supply selection]
When a system has 2 or more power supply units, set a power supply to be used for each axis.

[Simultaneous acc/dec axis setting]
By default, all the servo axes are set as a simultaneous acc/dec axis. Untick the box if the servo axis doesn't perform acc/dec operation simultaneously with X, Y or Z axis. An axis that moves simultaneously at reference position return command has to be set as a simultaneous acc/dec axis. Spindle is always regarded as a simultaneous acc/dec axis.

Customer							Machine type		Vertical machining center		Machine model		Power supply	
Item	Axis	SP drive unit	SP motor	Short-time rating (STR) (kW)	Specified time for STR (min) /%ED (duty factor) (%)	Output in acc./dec. (kW)	1	2						
No. 1							<input checked="" type="radio"/>	<input type="radio"/>						
No. 2	Y	MDS-E-V1-40	HG54	0.5	2.3	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
		MDS-E-V1-40	HG54	0.5	2.3	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
No. 3	Z	MDS-EH-V1-20	HG-H54	0.5	2.3	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
No. 4	B	MDS-E-V1-40	HG104	1.0	5.0	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
		MDS-E-V1-40	HG104	1.0	5.0	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
No. 5	MG	MDS-E-V1-40	HG104	1.0	5.0	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						
		MDS-E-V1-40	HG104	1.0	5.0	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						
No. 6	LX	MDS-EH-V1-40	HG-H154	1.5	9.0	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						
		MDS-EH-V1-40	HG-H154	1.5	9.0	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						
No. 7	PC	MDS-E-V1-40	HG104	1.0	5.0	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
		MDS-E-V1-40	HG104	1.0	5.0	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
No. 8	A	MDS-EH-V1-40	HG-H154	1.5	9.0	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
		MDS-EH-V1-40	HG-H154	1.5	9.0	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						

Select power supply unit

[After setting]

[Simultaneous acc/dec axis setting]
If none of the servo axes connected to one power supply unit are set as a simultaneous acc/dec axis, a servo axis that has the largest instantaneous max. output is regarded as simultaneous acc/dec axis (automatically selected). The same is true when the sum of instantaneous max. outputs of the axes being set as a simultaneous acc/dec axis is smaller than the largest instantaneous max. output of all the connected servo axes.

In this example, the 5th and 6th servo axes (the sum of instantaneous max. outputs is 7.4kW) are set as a simultaneous acc/dec axis. But in the calculation, the settings of the 5th and 6th servo axes are cancelled and the 8th axis (9.0kW) is automatically set as a simultaneous acc/dec axis.

Customer							Machine type		Vertical machining center		Machine model		Power supply	
Item	Axis	SV drive unit	SV motor	Rated output (kW)	Inst. max. output (kW)	Simul. acc/dec axis	1	2						
No. 1	X	MDS-EH-V1-80	HG-H354	3.5	18.0	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
No. 2	Y	MDS-E-V1-40	HG54	0.5	2.3	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
		MDS-E-V1-40	HG54	0.5	2.3	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
No. 3	Z	MDS-EH-V1-20	HG-H54	0.5	2.3	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
No. 4	B	MDS-E-V1-40	HG104	1.0	5.0	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
		MDS-E-V1-40	HG104	1.0	5.0	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
No. 5	MG	MDS-E-V1-40	HG104	1.0	5.0	<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						
		MDS-E-V1-40	HG104	1.0	5.0	<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						
No. 6	LX	MDS-EH-V1-40	HG-H154	1.5	9.0	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						
		MDS-EH-V1-40	HG-H154	1.5	9.0	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						
No. 7	PC	MDS-E-V1-40	HG104	1.0	5.0	<input type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
		MDS-E-V1-40	HG104	1.0	5.0	<input type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>						
No. 8	A	MDS-EH-V1-40	HG-H154	1.5	9.0	<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						
		MDS-EH-V1-40	HG-H154	1.5	9.0	<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>						

6-4 Judging Selection Result

[SV motor output]

According to the number of servo axes connecting, multiply the value for the output calculation.

Series	Number of axes connecting	Value for multiplication
Before E/EH(not inclusive)	2 or more	0.7
E/EH or after	1 or more	0.3

However, if the total amount is the single motor output of max. capacity or less, the single motor output will be used for the calculation of the total motor output.

[SV motor instantaneous max. output]

If you set an axis as a simultaneous acc/dec axis, an instantaneous max. output of the axis is shown.

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC [PDF] [Return]

[No. 1 Power supply selection data] [Output PDF]

Servo data				
Axis	SV drive unit	SV motor	SV motor output(kW)	SV inst. max. output(kW)
X	MDS-D-V1-160	HF354	3.5 x 0.7	18.0
Y	MDS-D-V1-160	HF354B	3.5 x 0.7	18.0
Z	MDS-D-V1-80	HF154B	1.5 x 0.7	9.0
B	MDS-D-V1-20	HF142	1.4 x 0.7	3.8
PC	MDS-D-V1-40	HF223	2.2 x 0.7	-
Spindle data				
Axis	SP drive unit	SP motor	SP rated output(kW)	SP inst. max. output(kW)
S1	MDS-D-SP-240	SJ-V22-06ZT	15.75	18.0
Total motor output(kW)			Total inst. max. output(kW)	
Total			24.2	66.8

[No. 1 Power supply selection result] -> Display in another window

Item	Power supply	Total output (kW)	Rated capa criterion (kW)	Rated capacity	Total inst. max. output (kW)	Inst. max. capa criterion (kW)	Inst. max. capacity	Overall judgement
Selected unit	MDS-D-CV-300	24.2	31.0	OK	66.8	92.0	OK	OK
For comparison	MDS-D-CV-185	24.2	19.0	NG	66.8	60.0	NG	NG

(Total output ≤ Criterion) (Total inst. max. output ≤ Criterion) (All judgements = OK)

[(1) Rated capacity judgement]
Judges if total motor output is below power supply's rated capacity.

[(2) Instantaneous max. capacity judgement]
Judges if motor's total instantaneous maximum output is below power supply's instantaneous max. capacity.

[(3) Overall judgement]
Judges if both (1) and (2) are OK.

Servo data				
Axis	SV drive unit	SV motor	SV motor output(kW)	SV inst. max. output(kW)
B	MDS-D-V1-20	HF142	1.4 x 0.7	-
PC	MDS-D-V1-40	HF223	1.0 x 0.7	-
Z	MDS-D-V1-80	HF154B	1.5 x 0.7	9.0 (auto select)
Spindle data				
Axis	SP drive unit	SP motor	SP rated output(kW)	SP inst. max. output(kW)
S1	MDS-D-SP-240	SJ-V22-06ZT	7.5	9.0
Total motor output(kW)			Total inst. max. output(kW)	
Total			10.2	18.0

[No. 2 Power supply selection result] -> Display in another window

Item	Power supply	Total output (kW)	Rated capa criterion (kW)	Rated capacity	Total inst. max. output (kW)	Inst. max. capa criterion (kW)	Inst. max. capacity	Overall judgement
Selected unit	MDS-D-CV-110	10.2	11.5	OK	18.0	39.0	OK	OK
For comparison	MDS-D-CV-75	10.2	8.0	NG	18.0	23.0	OK	NG

(Total output ≤ Criterion) (Total inst. max. output ≤ Criterion) (All judgements = OK)

[Display in another window]
Selection results are shown for each power supply unit.

[Return]

[Power supply selection condition]

There are two types of power supply selection criteria, "Rated capacity criteria" and "Instantaneous max. capacity criteria". But there are other individual conditions. So, see each drive unit's specification manuals for the details. This S/W is designed to do selection considering all the conditions specified in the specification manual.

6-5 Selecting Tandem Axis

The calculation for tandem axes is done by regarding that two same-capacity servo motors are connected to one axis. So, you have no need to do the same selection twice in executing servo selection. After selecting the power supply units, go to Drive system configuration list screen and convert the axes into a two-axis drive unit.

NC Servo Selection

Ver.5.20
Return

Customer	-
Machine type	Vertical machining center
Machine model	-

Axis No.	Data setting	Axis	Axis type	Servo drive unit	Servo motor	Regenerative resistor	Selection result
1	No. 1 axis	X	Horizontal in tandem	MDS-E-V1-20 x2	HG123 x2	-	Result of No. 1 axis
2	No. 2 axis	Y	Vertical in tandem	MDS-E-V1-40 x2	HG54 x2	-	Result of No. 2 axis
3	No. 3 axis	Z	Horizontal in tandem	MDS-E-V1-80 x2	HG154 x2	-	Result of No. 3 axis

↓

Customer	-	Machine type	Vertical machining center	Machine model	-
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Two servo axes are automatically set.

Para.
Return

Servo data							Power supply
Item	Axis	SV drive unit	SV motor	Rated output (kW)	Inst. max. output (kW)	Simul. acc/dec axis	1
No. 1	X	MDS-E-V1-20	HG123	1.2	4.0	<input checked="" type="checkbox"/>	<input type="radio"/>
		MDS-E-V1-20	HG123	1.2	4.0	<input checked="" type="checkbox"/>	<input type="radio"/>
No. 2	Y	MDS-E-V1-40	HG54	0.5	2.3	<input checked="" type="checkbox"/>	<input type="radio"/>
		MDS-E-V1-40	HG54	0.5	2.3	<input checked="" type="checkbox"/>	<input type="radio"/>
No. 3	Z	MDS-E-V1-80	HG154	1.5	9.0	<input checked="" type="checkbox"/>	<input type="radio"/>
		MDS-E-V1-80	HG154	1.5	9.0	<input checked="" type="checkbox"/>	<input type="radio"/>

Spindle data						Power supply	
Item	Axis	SP drive unit	SP motor	Short-time rating (STR) (kW)	Specified time for STR (min) /%ED (duty factor) (%)	Output in acc./dec. (kW)	1
No. 1	S1	MDS-E-SP-20	-	1.0	30 min	-	<input type="radio"/>

↓

Customer	-	Machine type	Vertical machining center	Machine model	-
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Execute the selection.

PDF
Return

[No. 1 Power supply selection data]

Servo data				
Axis	SV drive unit	SV motor	SV motor output(kW)	SV inst. max. output(kW)
X	MDS-E-V1-20	HG123	1.2 x 0.3	4.0
	MDS-E-V1-20	HG123	1.2 x 0.3	4.0
Y	MDS-E-V1-40	HG54	0.5 x 0.3	2.3
	MDS-E-V1-40	HG54	0.5 x 0.3	2.3
Z	MDS-E-V1-80	HG154	1.5 x 0.3	9.0
	MDS-E-V1-80	HG154	1.5 x 0.3	9.0

Spindle data				
Axis	SP drive unit	SP motor	SP motor output(kW)	SP inst. max. output(kW)
S1	MDS-E-SP-20	-	1.0	1.2
			Total motor output(kW)	Total inst. max. output(kW)
Total			2.9	31.8

[No. 1 Power supply selection result]-> Display in another window

Item	Power supply	Total output (kW)	Rated capa criterion (kW)	Rated capacity	Total inst. max. output (kW)	Inst. max. capa criterion (kW)	Inst. max capacity	Overall judgement
Selected unit	MDS-E-CV-110	2.9	11.5	OK	31.8	39.0	OK	OK
For comparison	MDS-E-CV-75	2.9	8.0	OK	31.8	23.0	NG	NG

(Total output ≤ Criterion)
(Total inst. max.output ≤ Criterion)
(All judgements = OK)

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6-6 Selecting Parameter

Customer	-	Machine type	Vertical machining center	Machine model	-	Para.	Return
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Servo data						Power supply
Item	Axis	SV drive unit	SV motor	Rated output (kW)	Inst. max. output (kW)	Simul. acc/dec axis
No. 1	X	MDS-E-V1-20	HG123	1.2	4.0	<input checked="" type="checkbox"/>
		MDS-E-V1-20	HG123	1.2	4.0	

Click on [Para.]

Customer	-	Machine type	Vertical machining center	Machine model	-
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[Power supply unit selection parameter input]

Item	Setting value
Large-capacity CV selection criterion	<input type="text" value="No limit"/> <input checked="" type="text" value="Limited to 45.0kW or less"/>

Return

【Large-capacity CV selection criterion】

- No limit : No limitation for power supply unit candidates
 - Limit to 45.0kW or less: There are limitations for power supply unit candidates.
- (Note1) Only if the large capacity spindle motor (55kW or over) is NOT connected.
 (Note2) The power supply units below are not selected.

- MDS-D-CV-550
- MDS-DH-CV-550
- MDS-DH-CV-750
- MDS-D2-CV-550
- MDS-DH2-CV-550
- MDS-DH2-CV-750
- MDS-E-CV-550

Chapter 7 DRIVE SYSTEM CONFIGURATION LIST

7-1 Displaying Drive System Configuration List

This list shows servo/spindle drive units and motors to be connected to each power supply unit.

Axis No. **Data setting** **Axis** **SP drive unit** **SP motor** **Short-time rating (STR)** **Specified time for STR** **Output in acc./dec.**

1	No. 1 axis	S1	MDS-D-SP-240	SJ-V22-06ZT	15.0 kW	30 min	-
2	No. 2 axis	S2	MDS-D-SP-160	SJ-V75-01T	7.5 kW	15 min	-

[Power Supply Unit Selection]
Set the number of power supply units

No. **Data setting** **Power supply unit** **AC reactor** **Power facility capacity** **Selection result**

1	Input	MDS-D-CV-300	D-AL-30K	34.7 kVA	Result
2		MDS-D-CV-110	D-AL-11K	14.9 kVA	

[System Configuration]
Drive system configuration list

[Save data]
Save the input data
You can save up to 100 conditions for selection.
Export the selection condition

[Drive system configuration list]
For a system that requires a power supply unit, the power supply unit selection has to be done in advance.
If your drive system includes the resistor-regeneration type only, this list can be shown after you've set just servo and spindle drive units.

7-2 Setting Multi-Axis Drive Unit

[Total unit width]
This shows the sum of all the drive unit widths that are connected to one power supply unit.

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC [PDF] [Return]

[Connection configuration of No. 1 power supply unit]

No.	Power supply unit	Unit width	AC reactor	Power facility capacity
PS1	MDS-D-CV-300	150 mm	D-AL-30K	34.7 kVA

Axis name	Servo drive unit	Unit width	Servo motor	Axis type
X	MDS-D-V1-160	60 mm	HF354	Horizontal
Y	MDS-D-V1-160	60 mm	HF354B	Vertical
Z	MDS-D-V1-80	60 mm	HF154B	Inclined
B	MDS-D-V1-20	60 mm	HF142	Rotary
PC	MDS-D-V1-40	60 mm	HF223	Pallet changer

Axis name	Spindle drive unit	Unit width	Spindle motor	Short-time rating (STR)
S1	MDS-D-SP-240	150 mm	SJ-V22-06ZT	15.0 kW (30 min)

Total unit width: 600 mm

[Set multi-axis drive unit]

[Set multi-axis drive unit]
One-axis drive units are selected first at servo selection. Then 2-axis drive unit setting is made here. When the resistor-regeneration type MDS-R drive unit is selected, the regenerative resistor designed for 2-axis drive unit is selected at the same time.

Set multi-axis drive unit

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC [PDF] [Return]

[Connection configuration of No. 1 power supply unit]

No.	Power supply unit	Unit width	AC reactor	Power facility capacity
PS1	MDS-D-CV-300	150 mm	D-AL-30K	34.7 kVA

Axis name	Servo drive unit	Unit width	Servo motor	Axis type
X	MDS-D-V2-160160	90 mm	HF354	Horizontal
Y			HF354B	Vertical
Z	MDS-D-V2-8040	60 mm	HF154B	Inclined
PC			HF223	Pallet changer
B	MDS-D-V1-20	60 mm	HF142	Rotary

Axis name	Spindle drive unit	Unit width	Spindle motor	Short-time rating (STR)
S1	MDS-D-SP-240	150 mm	SJ-V22-06ZT	15.0 kW (30 min)

Total unit width: 510 mm

[Set multi-axis drive unit]

[Total unit width]
By adopting 2-axis drive units, the total unit width reduces from 600mm to 510mm.

[MDS-DM-V3 servo drive unit]

If you wish to convert three servo axes into MDS-DM-V3, you need to designate MDS-DM-V3 during servo selection. MDS-DM Series may have more specification limits than MDS-D-V1/V2 Series, even when you select the same capacity motor.

7-2-1 Automatic setting of multi-axis drive unit

The multi-axis drive units are automatically selected so that the total unit width will be the minimum.

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC [Return]

[Configure multi-axis drive unit for No. 1 power supply unit]

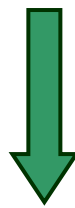
	Axis name	Servo drive unit	Unit width	Servo motor	Axis type
<input type="checkbox"/>	X	MDS-D-V1-160	60 mm	HF354	Horizontal
<input type="checkbox"/>	Y	MDS-D-V1-160	60 mm	HF354B	Vertical
<input type="checkbox"/>	Z	MDS-D-V1-80	60 mm	HF154B	Inclined
<input type="checkbox"/>	B	MDS-D-V1-20	60 mm	HF142	Rotary
<input type="checkbox"/>	PC	MDS-D-V1-40	60 mm	HF223	Pallet changer

Total unit width: 300 mm

Configure multi-axis drive unit automatically

Unify selected units into multi-axis drive unit

Cancel the selected multi-axis drive unit



Automatically set

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC [Return]

[Configure multi-axis drive unit for No. 1 power supply unit]

	Axis name	Servo drive unit	Unit width	Servo motor	Axis type
<input type="checkbox"/>	X	MDS-D-V2-160160	90 mm	HF354	Horizontal
<input type="checkbox"/>	Y			HF354B	Vertical
<input type="checkbox"/>	Z	MDS-D-V2-8040	60 mm	HF154B	Inclined
<input type="checkbox"/>	PC			HF223	Pallet changer
<input type="checkbox"/>	B	MDS-D-V1-20	60 mm	HF142	Rotary

Total unit width: 210 mm

Configure multi-axis drive unit automatically

Unify selected units into multi-axis drive unit

Cancel the selected multi-axis drive unit

[Change the combination]

If you wish to connect PC-axis and B-axis to one 2-axis drive unit, cancel the 2-axis drive unit connected to Z- and PC-axes, and then set B- and PC-axes individually to a 2-axis drive unit.
 → See "6-2-2 Canceling multi-axis drive unit setting".

7-2-2 Canceling multi-axis drive unit setting

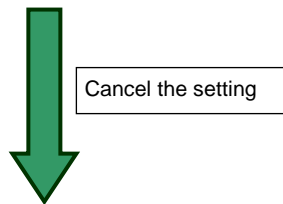
You can cancel the automatically-selected multi-axis drive units individually. You can freely change the combination of multi-axis drive units, also by using the individual setting method explained on the next page.

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC [Return]

[Configure multi-axis drive unit for No. 1 power supply unit]

	Axis name	Servo drive unit	Unit width	Servo motor	Axis type
<input type="checkbox"/>	X	MDS-D-V2-160160	90 mm	HF354	Horizontal
<input type="checkbox"/>	Y			HF354B	Vertical
<input checked="" type="checkbox"/>	Z	MDS-D-V2-8040	60 mm	HF154B	Inclined
<input type="checkbox"/>	PC			HF223	Pallet changer
<input type="checkbox"/>	B	MDS-D-V1-20	60 mm	HF142	Rotary

Total unit width: 210 mm



Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC [Return]

[Configure multi-axis drive unit for No. 1 power supply unit]

	Axis name	Servo drive unit	Unit width	Servo motor	Axis type
<input type="checkbox"/>	X			HF354	Horizontal
<input type="checkbox"/>	Y	MDS-D-V2-160160	90 mm	HF354B	Vertical
<input type="checkbox"/>	Z	MDS-D-V1-80	60 mm	HF154B	Inclined
<input type="checkbox"/>	B	MDS-D-V1-20	60 mm	HF142	Rotary
<input type="checkbox"/>	PC	MDS-D-V1-40	60 mm	HF223	Pallet changer

Total unit width: 270 mm

7-2-3 Individual setting of multi-axis drive unit

[Axis selection]
Select two axes to be connected to a 2-axis drive unit.

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC [Return]

[Configure multi-axis drive unit for No. 1 power supply unit]

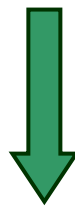
	Axis name	Servo drive unit	Unit width	Servo motor	Axis type
<input type="checkbox"/>	X	MDS-D-V2-160160	90 mm	HF354	Horizontal
<input type="checkbox"/>	Y			HF354B	Vertical
<input type="checkbox"/>	Z	MDS-D-V1-80	60 mm	HF154B	Inclined
<input checked="" type="checkbox"/>	B	MDS-D-V1-20	60 mm	HF142	Rotary
<input checked="" type="checkbox"/>	PC	MDS-D-V1-40	60 mm	HF223	Pallet changer

Total unit width: 270 mm

Configure multi-axis drive unit automatically

Unify selected units into multi-axis drive unit

Cancel the selected multi-axis drive unit



Set multi-axis drive unit

Customer: ABC MACHINERY CO.,LTD. Machine type: Vertical machining center Machine model: ABC1000VMC [Return]

[Configure multi-axis drive unit for No. 1 power supply unit]

	Axis name	Servo drive unit	Unit width	Servo motor	Axis type
<input type="checkbox"/>	X	MDS-D-V2-160160	90 mm	HF354	Horizontal
<input type="checkbox"/>	Y			HF354B	Vertical
<input type="checkbox"/>	Z	MDS-D-V1-80	60 mm	HF154B	Inclined
<input type="checkbox"/>	B	MDS-D-V2-4020	60 mm	HF142	Rotary
<input type="checkbox"/>	PC			HF223	Pallet changer

Total unit width: 210 mm

Configure multi-axis drive unit automatically

Unify selected units into multi-axis drive unit

Cancel the selected multi-axis drive unit

7-2-4 Automatic selection of regenerative resistor

When you select a dual-axis drive of the resistor-regeneration type MDS-R or MDS-DJ Series, a regenerative resistor designed for 2-axis drive is automatically selected according to the total regeneration load. If you have selected a servo motor in the direct entry mode without calculation, a regenerative resistor is not displayed.

[Regenerative resistor]
Resistors optimal for each axis are selected based on the calculation results.

Customer	ABC MACHINERY CO.,LTD	Machine type	Vertical machining center	Machine model	ABC800VMC	Return
[Configure multi-axis drive unit for others]						
Axis name	Servo drive unit	Unit width	Servo motor	Axis type	Regenerative resistor	
<input type="checkbox"/> X	MDS-R-V1-60	90 mm	HF203	Horizontal	GZG300W200HMK	Total unit width: 330 mm
<input type="checkbox"/> Y	MDS-R-V1-60	90 mm	HF203	Horizontal	GZG300W200HMK	
<input type="checkbox"/> Z	MDS-R-V1-80	90 mm	HF353B	Vertical	MR-RB30	
<input type="checkbox"/> B	MDS-R-V1-40	60 mm	HF203	Rotary	GZG300W200HMK	
<div style="display: flex; justify-content: center; gap: 10px; margin-top: 10px;"> <div style="border: 1px solid gray; padding: 2px 10px; background-color: #e0e0e0;">Configure multi-axis drive unit automatically</div> <div style="border: 1px solid gray; padding: 2px 10px; background-color: #e0e0e0;">Unify selected units into multi-axis drive unit</div> <div style="border: 1px solid gray; padding: 2px 10px; background-color: #e0e0e0;">Cancel the selected multi-axis drive unit</div> </div>						



Set multi-axis drive unit

Customer	ABC MACHINERY CO.,LTD	Machine type	Vertical machining center	Machine model	ABC800VMC	Return
[Configure multi-axis drive unit for others]						
Axis name	Servo drive unit	Unit width	Servo motor	Axis type	Regenerative resistor	
<input type="checkbox"/> X	MDS-R-V2-6060	90 mm	HF203	Horizontal	MR-RB30	Total unit width: 180 mm
<input type="checkbox"/> Y			HF203	Horizontal		
<input type="checkbox"/> Z	MDS-R-V2-8040	90 mm	HF353B	Vertical	MR-RB50	
<input type="checkbox"/> B			HF203	Rotary		
<div style="display: flex; justify-content: center; gap: 10px; margin-top: 10px;"> <div style="border: 1px solid gray; padding: 2px 10px; background-color: #e0e0e0;">Configure multi-axis drive unit automatically</div> <div style="border: 1px solid gray; padding: 2px 10px; background-color: #e0e0e0;">Unify selected units into multi-axis drive unit</div> <div style="border: 1px solid gray; padding: 2px 10px; background-color: #e0e0e0;">Cancel the selected multi-axis drive unit</div> </div>						

[Regenerative resistor for 2-axis drive unit]
Optimal regenerative resistors are selected by calculating the regeneration load of the selected two axes.

7-3 Setting Multi-Hybrid Drive Unit

7-3-1 Automatic setting of the number of multi-hybrid drive units

When the drive configuration list is opened, the necessary number of multi-hybrid drive units for the whole NC system is automatically set.

Customer	ABC MACHINERY CO.,LTD.	Machine type	Vertical machining center	Machine model	ABC1000VMC	<input type="button" value="PDF"/>	<input type="button" value="Return"/>
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[Connection configuration of No. 1 multi-hybrid drive unit]

No.	Multi-hybrid drive unit	Unit width	AC reactor	Power facility capacity
M1	MDS-DM-SPV3-200120	260 mm	D-AL-18.5K	29.6 kVA

Axis name	Servo drive unit	Unit width	Servo motor	Axis type
X	(MDS-DM-SPV3-200120)	(260 mm)	HF204	Horizontal
Y			HF204	Horizontal
Z			HF354B*	Inclined

Axis name	Spindle drive unit	Unit width	Spindle motor	Short-time rating (STR)
S1	(MDS-DM-SPV3-200120)	(260 mm)	SJ-V22-06ZT	15.0 kW (30 min)

Total unit width: 260 mm

[Connection configuration of No. 2 multi-hybrid drive unit]

No.	Multi-hybrid drive unit	Unit width	AC reactor	Power facility capacity
M2	MDS-DM-SPV2-16080	260 mm	D-AL-18.5K	14.2 kVA

Axis name	Servo drive unit	Unit width	Servo motor	Axis type
A	(MDS-DM-SPV2-16080)	(260 mm)	HF223	Rotary
B			HF104	Rack & pinion

Axis name	Spindle drive unit	Unit width	Spindle motor	Short-time rating (STR)
S2	(MDS-DM-SPV2-16080)	(260 mm)	SJ-V7.5-01T	7.5 kW (15 min)

Total unit width: 260 mm

Revision History

Date of revision	Manual No.	Revision details
Aug. 2007	IB(NA)1500303-A	First edition created.
Mar. 2008	IB(NA)1500303-B	Revised in accordance with the upgrade to Ver. 3.40. Added the description of the external file import/export functions. Added the description of the selection of tandem axes. Added the description of the selection of MDS-DM Series. Added the description of the power facility capacity.
May. 2011	IB(NA)1500303-C	Revised in accordance with the upgrade to Ver. 3.70. Added the description of linear axis selection. Added the description of tool spindle motor. Added the description of the function to output servo capacity calculation process. Added the description of the data book linkage function.
Sep. 2012	IB(NA)1500303-D	Revised in accordance with the upgrade to Ver. 3.80. Added the description of when selecting the MDS-DM-SPVX Series. Deleted the description of MDS-DM-SPVX from Chapter 5. Added the description of MDS-DM-SPVX to Chapter 6.
Jul 2013	IB(NA)1500303-E	Revised in accordance with the upgrade to Ver. 4.00. Added the description on change of the data book file names. Added the description for when MDS-D2/DH2/DM2/DJ Series is selected. Added the description of the axis type "DD motor rotation axis". Added the description that MDS-DJ Series is treated as a dual-axis drive when automatically selecting a regeneration resistor. Deleted a screenshot taken before the automatic setting of multi-hybrid drive unit.
Aug 2015	IB(NA)1500302-F	Revised in accordance with the upgrade to Ver.5.00,5.10,5.20 Added the description of CV capacity selection incorporating third-party motors. Added the description of when selecting MDS-E/EH series. Added the description of the [Para.] button of power supply selection data screen.

Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.
Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

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