MITSUBISHI ELECTRIC

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MITSUBISHI CNC
NC Specification Selection Guide
M800/M80 Series

- **M800W Series**
- **M800S Series**
- **M80 Series**

CNC LINEUP

High Performance

M800W

Premium CNC with Windows-based display provides expandability and flexibility

- Separated type, a control unit separated from display
- Windows-based display with the latest PC and OS offers excellent expandability
- Four expansion slots are provided as standard specifications, allowing for expansion using option cards

M800S

High-grade CNC well suited to high-speed high-accuracy machining and multi-axis multi-part system control

- Panel-in type, a control unit with integrated display
- Multi-CPU architecture allows for high performance and high functional graphics
- Windows-less display provides easy operability

M80

Standard CNC provides high productivity and easy operability

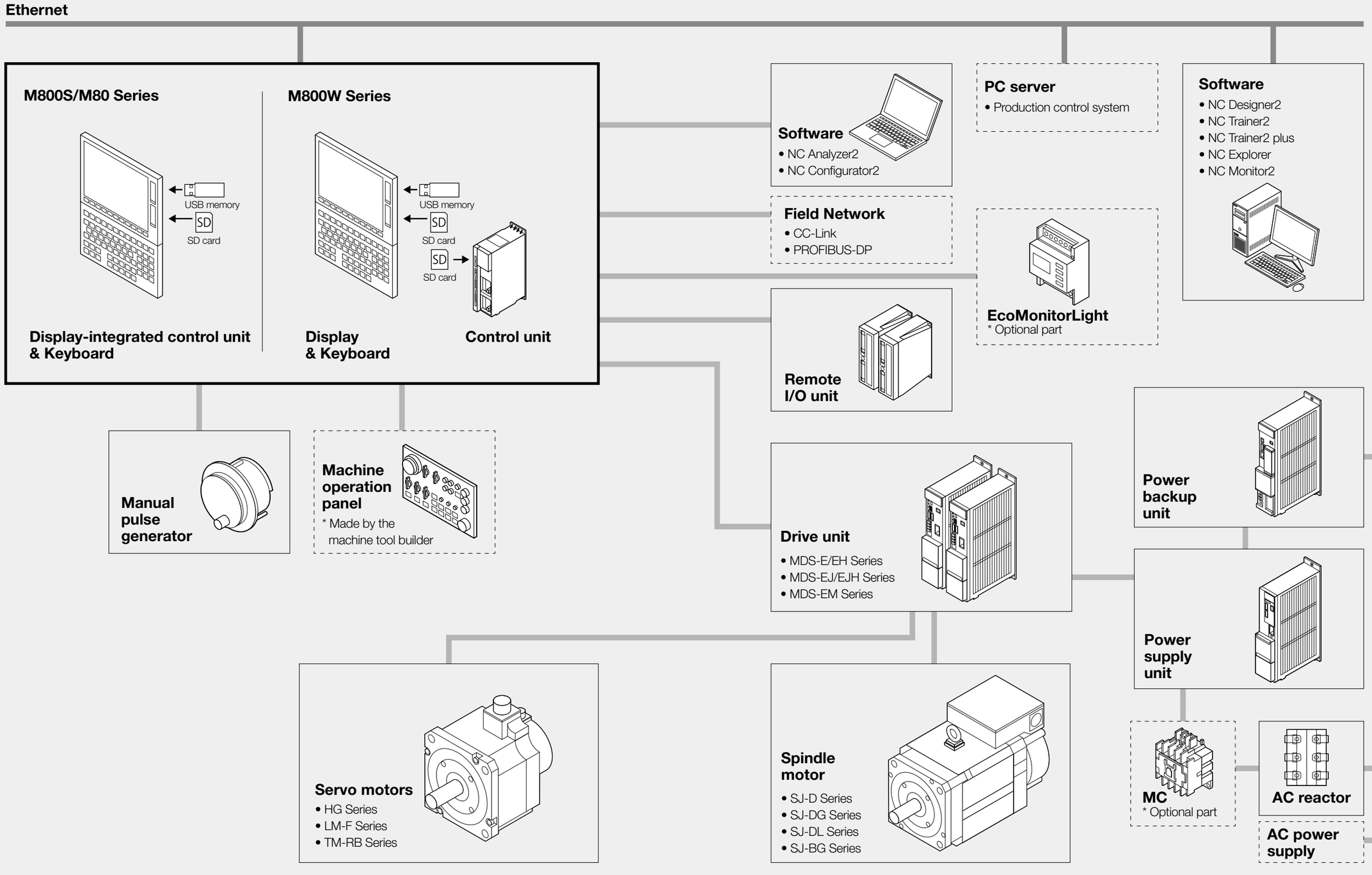
- Panel-in type, a control unit with integrated display
- Provided in package (TypeA/TypeB) for easier selection
- Windows-less display provides easy operability

Standard

OVERVIEW

PRODUCT LINES

PRODUCT LINES



* Optional parts are not provided as accessories for NC equipment.

M800/M80 SERIES LINEUP

		Lathe system					
							
		(Display / Control unit separate type)		(Display / Control unit integrated type)			
Model name		M800W Series		M800S Series		M80 Series	
		M850W	M830W	M850S	M830S	TypeA	TypeB
Number of control axes	Max. number of axes (NC axes + Spindles + PLC axes)	32		32		12	9
	Max. number of NC axes (in total for all the part systems)	32		32		10	7
	Max. number of spindles	8		8		4	3
	Max. number of PLC axes	8		8		6	
	Max. number of PLC indexing axes	8		8		4	
	Number of simultaneous contouring control axes	8	4	8	4	4	
	Max. number of NC axes in a part system	8		8		8	5
Control unit-side High-speed program server mode		Available		—		—	
Display unit-side High-speed program server mode		Available		Available		Available	
Front-side SD card mode		Available		Available		Available	
Least command increment		1nm		1nm		0.1μm	
Least control increment		1nm		1nm		1nm	
Max. program capacity		2,000kB (5,120m) (1,000)		2,000kB (5,120m) (1,000)		500kB (1,280m) (1,000)	
Max. PLC program capacity [steps]		512,000		512,000		64,000	32,000
High-speed machining mode I maximum [kBPM]		33.7		33.7		33.7	—
High-speed machining mode II maximum [kBPM]		168		168		67.5	—
High-speed high-accuracy control I maximum [kBPM]		67.5		67.5		33.7	—
High-speed high-accuracy control II maximum [kBPM]		168		168		67.5	—
High-speed high-accuracy control III maximum [kBPM]		—		—		—	
High-accuracy control		Available		Available		Available	—
SSS control (Super Smooth Surface)		Available		Available		Available	—
CC-Link (Master / Slave)		Available		Available		Available	
Display		19-type touch panel / 15-type touch panel (selectable)		15-type touch panel / 10.4-type touch panel (selectable)		15-type touch panel / 10.4-type touch panel / 8.4-type touch panel (selectable)	
Keyboard		clear keys					
HMI customization function		NC Designer2					
Windows®8		Available		—			
Languages supported		Japanese / English / German / Italian / French / Spanish / Chinese (traditional) / Chinese (simplified) / Korean / Portuguese / Hungarian / Dutch / Swedish / Turkish / Polish / Russian / Czech					

* Maximum specifications including optional specifications are listed. Refer to the Specifications List for the details of each option.

Machining center system					
					
(Display / Control unit separate type)		(Display / Control unit integrated type)			
M800W Series		M800S Series		M80 Series	
M850W	M830W	M850S	M830S	TypeA	TypeB
32		32		11	9
16		16		8	5
4		4		2	
8		8		6	
8		8		4	
8	4	8	4	4	
8		8		8	5
Available		—		—	
Available		Available		Available	
Available		Available		Available	
1nm		1nm		0.1μm	
1nm		1nm		1nm	
2,000kB (5,120m) (1,000)		2,000kB (5,120m) (1,000)		500kB (1,280m) (1,000)	
512,000		512,000		64,000	32,000
33.7		33.7		33.7	16.8
168		168		67.5	—
67.5		67.5		33.7	16.8
168		168		67.5	—
270		270		135	—
Available		Available		Available	
Available		Available		Available	
Available		Available		Available	
19-type touch panel / 15-type touch panel (selectable)		15-type touch panel / 10.4-type touch panel (selectable)		15-type touch panel / 10.4-type touch panel / 8.4-type touch panel (selectable)	
clear keys					
NC Designer2					
Available		—			
Japanese / English / German / Italian / French / Spanish / Chinese (traditional) / Chinese (simplified) / Korean / Portuguese / Hungarian / Dutch / Swedish / Turkish / Polish / Russian / Czech					

SELECTION PROCEDURE

Selection procedure flow chart

Start selecting the NC specifications!

STEP 1	**Check the machine type and specifications**	

- Machine type: lathe / machining center / grinding machine / special-purpose machine, etc.
- Details of control, required accuracy, with/without auxiliary axes (for workpiece feeding, turret, etc.)

STEP 2	**Decide the NC specifications**	P5

- Number of axes, axis configuration, number of part systems, with/without spindles, number of I/O points
- Check the position detection method and detection performance (absolute/relative position, number of pulses)
- Select the size of the display unit, keyboard

STEP 3	**Decide the servo motor**	P57

- Select the servo motor capacity
- Check the outline dimensions, detector, and whether it has a scale or break

STEP 4	**Decide the spindle motor**	P62

- Check the spindle's base/maximum rotation speed, output, torque, outline dimensions and whether it has a keyway
- Frame-type or built-in spindle motor
- With/without optional specifications (orientation, spindle/C-axis, synchronization, etc.)
- Check the C axis accuracy and the speed (when C axis is used)

STEP 5	**Decide the drive unit**	P86

- Check the capacity and the dimensions of a drive unit
- Check the power regeneration/resistor regeneration

STEP 6	**Decide the power supply unit**	P93

- Select the power supply unit only when a power regenerative drive unit is used

STEP 7	**Decide the hardware options**	P35,P41,P125

- Check the options
  (manual pulse generator, synchronous encoder, availability of network connection and PLC connection, etc.)
- Check the required cables and connectors (In some cases, customers may need to prepare cables and connectors themselves.)

STEP 8	**Decide the software options**	P9

- Check the number of programs stored (memory capacity), number of variable sets, etc.
- Check the required functions

STEP 9	**Check the development tools**	P137

- Check the screen development tool (when screen customization is required)

NC specification selection completed!

■MEMO

CNC SYSTEM M800/M80 SERIES SPECIFICATIONS LIST

○Standard △Optional □Selection

S/W ver.A4

class	Lathe system						Machining center system		Machining center system				General explanation
	M800W Series		M800S Series		M80 Series		M800W Series		M800S Series		M80 Series		
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	
1 Control axes													
1 Control axes													
1 Number of basic control axes (NC axes)	○2	○2	○2	○2	○2	○2	○3	○3	○3	○3	○3	○3	
2 Max. number of axes (NC axes + Spindles + PLC axes)	○16 △32	○16 △32	○16 △32	○16 △32	12	9	○16 △32	○16 △32	○16 △32	○16 △32	11	9	The NC axis, spindle, and PLC axis are generically called the control axis. The NC axis can be manually or automatically operated using a machining program.
1 Max. number of NC axes (in total for all the part systems)	○16 △32	○16 △32	○16 △32	○16 △32	10	7	○16	○16	○16	○16	8	5	The PLC axis can be controlled using a sequence program. The number of axes that is within the max. number of control axes, and that does not exceed the max. number given for the NC axis, spindle and PLC axis, can be used.
2 Max. number of spindles	8	8	8	8	4	3	4	4	4	4	2	2	
3 Max. number of PLC axes	8	8	8	8	6	6	8	8	8	8	6	6	
4 Max. number of PLC indexing axes	8	8	8	8	4	4	8	8	8	8	4	4	The number of PLC axes available to be used as indexing axis.
5 Number of simultaneous contouring control axes	8	4	8	4	4	4	8	4	8	4	4	4	Number of axes with which simultaneous interpolation control is possible.
6 Max. number of NC axes in a part system	8	8	8	8	8	5	8	8	8	8	8	5	Max. number of NC axes possible to control in the same part system.
2 Control part system													
1 Standard number of part systems	1	1	1	1	1	1	1	1	1	1	1	1	One part system is the standard.
2 Max. number of part systems	○4 △8	○4 △8	○4 △8	○4 △8	○3	○2	○2	○2	○2	○1	○2	○2	Up to four part systems for a lathe system, and up to two part systems for a machining center system.
3 Control axes and operation modes													
1 Tape (RS-232C input) mode	○	○	○	○	○	○	○	○	○	○	○	○	In this mode, operation is performed using the machining program data from the RS-232C interface built in the CNC unit.
2 Memory mode	○	○	○	○	○	○	○	○	○	○	○	○	Machining programs stored in the memory of the CNC module are run.
3 MDI mode	○	○	○	○	○	○	○	○	○	○	○	○	MDI data stored in the memory of the CNC unit are executed.
4 High-speed program server mode													
1 Control unit-side High-speed program server mode	△	△	—	—	—	—	△	△	—	—	—	—	The machining program stored in SD card can be operated by installing a SD card in the control unit SD card interface.
2 Display unit-side High-speed program server mode	△	△	△	△	○	○	△	△	△	△	○	○	The machining program stored in the built-in disk of the display unit can be operated. The built-in disk of the display unit is mounted in the personal computer for M800W. For M800S / M80, the SD card inserted into SD card I/F on the back of the display unit is equivalent to the built-in disk of the display unit.
5 Front-side SD card mode	○	○	○	○	○	○	○	○	○	○	○	○	The machining program stored in a SD card can be operated. This SD card is installed to the front-side SD card I/F.
2 Input command													
1 Data increment													
1 Least command increment													The data increment handled in the controller includes the input setting increment and command increment. Each type is set with parameters.
Least command increment 1μm	○	○	○	○	○	○	○	○	○	○	○	○	Possible to command in increments of 0.001mm (linear axis) and 0.001° (rotary axis).
Least command increment 0.1μm	○	○	○	○	○	○	○	○	○	○	○	○	Possible to command in increments of 0.0001mm (linear axis) and 0.0001° (rotary axis).
Least command increment 0.01μm (10nm)	△	△	△	△	—	—	△	△	△	△	—	—	Possible to command in increments of 0.00001mm (linear axis) and 0.00001° (rotary axis).
Least command increment 0.001μm (1nm)	△	△	△	△	—	—	△	△	△	△	—	—	Possible to command in increments of 0.000001mm (linear axis) and 0.000001° (rotary axis).
2 Least control increment													The least control increment determines the CNC's internal operation accuracy.
Least control increment 0.01μm (10nm)	○	○	○	○	○	○	○	○	○	○	○	○	Possible to control in increments of 0.00001mm (linear axis) and 0.00001° (rotary axis).
Least control increment 0.001μm (1nm)	○	○	○	○	○	○	○	○	○	○	○	○	Possible to control in increments of 0.000001mm (linear axis) and 0.000001° (rotary axis).
3 Indexing increment	○	○	○	○	—	—	○	○	○	○	—	—	This function limits the command value for the rotary axis.
2 Unit system													
1 Inch / Metric changeover	○	○	○	○	○	○	○	○	○	○	○	○	The unit systems of the data handled in the controller include the metric system and inch system. The type can be designated with a parameter and a machining program.
2 Input command increment tenfold	—	—	—	—	—	—	○	○	○	○	○	○	The program's command increment can be multiplied by an arbitrary scale with the parameter designation. This function is valid when a decimal point is not used for the command increment.
3 Program format													
1 Program format													G code (program) format
1 Format 1 for Lathe (G Code List 2, 3)	○	○	○	○	○	○	—	—	—	—	—	—	G code list for the lathe system. The G-code list is selected by parameter.
2 Format 2 for Lathe (G Code List 4, 5)	○	○	○	○	○	○	—	—	—	—	—	—	
3 Special format for lathe (G Code List 6, 7)	○	○	○	○	○	○	—	—	—	—	—	—	(Prepared for a specific machine tool builder)
4 Format 1 for Machining center	—	—	—	—	—	—	○	○	○	○	○	○	G code list for the machining center system. The G-code list is selected by parameter.
5 Format 2 for Machining center (M2 format)	—	—	—	—	—	—	○	○	○	○	○	○	
6 MITSUBISHI CNC special format	○	○	○	○	○	○	—	—	—	—	—	—	The formats of the fixed cycle for turning machining (G77 to G79), compound type fixed cycle for turning machining (G71 to G76) and fixed cycle for drilling (G80 to G89) can be switched to the MITSUBISHI CNC special formats.
4 Command value													
1 Decimal point input Ⅰ, Ⅱ	○	○	○	○	○	○	○	○	○	○	○	○	For the decimal point input type 1, the unit of the last digit of a command without a decimal point is the same as that of the least command increment. For decimal point input type 2, the last digit of a command without a decimal point is interpreted in millimeters during the metric mode, in inches in the inch mode, or in seconds for a time-based command.
2 Absolute / Incremental command	○	○	○	○	○	○	○	○	○	○	○	○	When axis coordinate data are issued in a machining program command, either the incremental command method, which commands a relative distance from the current position, or the absolute command method, which commands a movement to a designated position in a predetermined coordinate system, can be selected.
3 Diameter / Radius designation	○	○	○	○	○	○	—	—	—	—	—	—	The designation method of an axis command value can be changed over with parameters between the radius designation or diameter designation. When the diameter designation is selected, the scale of the length of the selected axis is doubled. (moves only half (1/2) the commanded amount)
3 Positioning / Interpolation													
1 Positioning													
1 Positioning	○	○	○	○	○	○	○	○	○	○	○	○	This function carries out positioning at high speed using a rapid traverse rate with the travel command value given in the program.
2 Unidirectional positioning	—	—	—	—	—	—	△	△	△	△	○	○	The G code command always moves the tool to the final position in the direction determined by parameters.
2 Linear / Circular interpolation													
1 Linear interpolation	○	○	○	○	○	○	○	○	○	○	○	○	Linear interpolation is a function that moves a tool linearly by the travel command value supplied in the program at the cutting feedrate designated by the F code.
2 Circular interpolation (Center / Radius designation)	○	○	○	○	○	○	○	○	○	○	○	○	This function moves a tool along a circular arc on the plane selected by the travel command value supplied in the program.
3 Helical interpolation	○	○	○	○	○	○	○	○	○	○	○	○	With this function, any two of three axes intersecting orthogonally are made to perform circular interpolation while the third axis performs linear interpolation in synchronization with the arc rotation. This control can be exercised to machine large-diameter screws or 3-dimensional cams.
4 Spiral / Conical interpolation	—	—	—	—	—	—	△	△	△	△	○	—	This function interpolates arcs where the start point and end point are not on the circumference of the same circle into spiral shapes.
5 Cylindrical interpolation	△	△	△	△	○	○	△	△	△	△	○	○	This function transfers the shape that is on the cylinder's side surface (shape yielded by the cylindrical coordinate system) onto a plane, and when the transferred shape is designated in the program in the form of plane coordinates, the shape is converted into a movement along the linear and rotary axes of the original cylinder coordinates, and the contours are controlled by means of the CNC unit during machining.
6 Polar coordinate interpolation	△	△	△	△	○	○	△	△	△	△	—	—	This function converts the commands programmed by the orthogonal coordinate axes into linear axis movements (tool movements) and rotary axis movements (workpiece rotation) to control the contours. It is useful for cutting linear cutouts on the outside diameter of the workpiece, grinding cam shafts, etc.

M800/M80 SERIES SPECIFICATIONS LIST

4 CNC SYSTEM

○Standard △Optional □Selection

class			Lathe system						Machining center system	
			M800W Series		M800S Series		M80 Series		M800W Series	
			M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W
	7	Milling interpolation	△	△	△	△	○	—	—	—
	8	Hypothetical axis interpolation	—	—	—	—	—	—	△	△
3 Curve interpolation										
	2	Exponential interpolation	△	△	△	△	—	—	△	△
	3	Spline interpolation (G05.1Q2 / G61.2)	—	—	—	—	—	—	△	△
	4	NURBS interpolation	—	—	—	—	—	—	△	△
	5	3-dimensional circular interpolation	—	—	—	—	—	—	△	△
	6	Spline interpolation2 (G61.4)	—	—	—	—	—	—	△	△
4 Feed										
1 Feedrate										
	1	Rapid traverse rate (m/min)	1000	1000	1000	1000	1000	1000	1000	1000
	2	Cutting feedrate (m/min)	1000	1000	1000	1000	1000	1000	1000	1000
	3	Manual feedrate (m/min)	1000	1000	1000	1000	1000	1000	1000	1000
	4	Rotary axis command speed tenfold	○	○	○	○	○	○	○	○
2 Feedrate input methods										
	1	Feed per minute (Asynchronous feed)	○	○	○	○	○	○	○	○
	2	Feed per revolution (Synchronous feed)	○	○	○	○	○	○	△	△
	3	Inverse time feed	—	—	—	—	—	—	△	△
	4	F 1-digit feed	○	○	○	○	○	○	○	○
	5	Manual speed command	△	△	△	△	○	○	△	△
	7	G00 feedrate designation (,F command)	△	△	△	△	○	—	△	△
3 Override										
	1	Rapid traverse override	○	○	○	○	○	○	○	○
	2	Cutting feed override	○	○	○	○	○	○	○	○
	3	2nd cutting feed override	○	○	○	○	○	○	○	○
	4	Override cancel	○	○	○	○	○	○	○	○
4 Acceleration / Deceleration										
	1	Automatic acceleration / deceleration after interpolation	○	○	○	○	○	○	○	○
	2	Rapid traverse constant inclination acceleration / deceleration	○	○	○	○	○	○	○	○
	3	Rapid traverse constant inclination multi-step acceleration / deceleration	—	—	—	—	—	—	△	△
5 Thread cutting										
	1	Thread cutting (Lead / Thread number designation)	○	○	○	○	○	○	△	△
	2	Variable lead thread cutting	○	○	○	○	○	○	—	—
	3	Synchronous tapping								
		1 Synchronous tapping cycle	○	○	○	○	○	○	○	○
		2 Pecking tapping cycle	△	△	△	△	○	○	△	△
		3 Deep-hole tapping cycle	△	△	△	△	○	○	△	△
	4	Chamfering	○	○	○	○	○	○	—	—
	6	Circular thread cutting	△	△	△	△	—	—	—	—
	8	High-speed synchronous tapping (OMR-DD)	○	○	○	○	○	○	○	○
	10	Re-thread cutting	△	△	△	△	○	—	—	—
	11	Thread cutting override	△	△	△	△	○	—	—	—
	12	Variable feed thread cutting	△	△	△	△	○	—	—	—
	13	Thread cutting time constant switch	○	○	○	○	—	—	—	—
6 Manual feed										
	1	Manual rapid traverse	○	○	○	○	○	○	○	○
	2	Jog feed	○	○	○	○	○	○	○	○
	3	Incremental feed	○	○	○	○	○	○	○	○
	4	Handle feed	○	○	○	○	○	○	○	○

S/W ver.A4

Machining center system				General explanation
M800S Series		M80 Series		
M850S	M830S	M80 TypeA	M80 TypeB	
—	—	—	—	When a lathe with linear axes (X, Z axes) and rotary axis (C axis) serving as the control axes is to perform milling at a workpiece end face or in the longitudinal direction of the workpiece, this function uses the hypothetical axis Y, which is at right angles to both the X and Z axes, to enable the milling shape to be programmed as the X, Y and Z orthogonal coordinate system commands.
△	△	—	—	This function sets one of the axes of the helical interpolation or spiral interpolation, including a linear axis, as a hypothetical axis (axis with no actual movement), and performs pulse distribution. This enables SIN or COS interpolation, which corresponds to the side view (view from the hypothetical axis) of the helical interpolation or spiral interpolation.
△	△	—	—	With this function, the rotary axis movement is changed into exponential functions vis-a-vis the linear axis movements.
△	△	○	—	This function automatically generates spline curves that smoothly pass through rows of dots designated by a fine-segment machining program, and performs interpolation for the paths along the curves. This enables high-speed and high-accuracy machining.
△	△	—	—	This function realizes NURBS curve machining by commanding NURBS curve parameters (number of stages, weight, knot, control point). The path does not need to be replaced with fine segments.
△	△	—	—	An arc shape determined by three points (start point, intermediate point, end point) designated in the three-dimensional space can be machined.
△	△	○	—	This function automatically generates curves that smoothly pass in the tolerance error range, and moves on the paths along the curves. This enables smooth machining.
1000	1000	1000	1000	The rapid traverse rate can be set independently for each axis using parameters.
1000	1000	1000	1000	This function specifies the feedrate of the cutting commands, and gives a command for a feed amount per spindle rotation or feed amount per minute.
1000	1000	1000	1000	The manual feedrates are designated as the feedrate in jog mode or incremental feed mode for manual operation and the feedrate during dry run ON for automatic operation. The manual feedrates are set using external signals.
○	○	○	○	This function multiplies the rotary axis' command speed by ten during initial inching.
○	○	○	○	By issuing a G command, the command from the block is issued directly with a numerical value following F as the feedrate per minute (mm/min or inch/min).
△	△	○	○	By issuing a G command, the command from the block is issued directly with a numerical value following F as the feedrate per spindle revolution (mm/rev or inch/rev).
△	△	○	—	This function can issue one block of machining time (inverse) commands in F commands, in place of normal feed commands. This enables the machining speed on the cutting surface to be constantly controlled and prevents the loss of accuracy, even if radius compensation is applied to the machining program that expresses the free curve surface with fine segment lines.
○	○	○	○	The feedrate registered by parameter in advance can be assigned by designating a single digit, following address F.
△	△	○	○	By enabling a manual speed command and selecting either handle feed or jog (manual) feed in the memory or MDI mode, automatic operation can be carried out at this feedrate.
△	△	○	—	Feedrates can be specified for G00 (positioning command). The speed of tool exchange, axis movement of gantry, etc. can be specified with the machining program so that the mechanical vibration can be suppressed.
○	○	○	○	Override can be applied to manual or automatic rapid traverse using the external input signal.
○	○	○	○	Override can be applied to the feedrate command designated in the machining program using the external input signal.
○	○	○	○	Override can be further applied as a second-stage override to the feedrate after the cutting feed override has been applied.
○	○	○	○	By turning on the override cancel external signal, the override is automatically set to 100% for the cutting feed during the automatic operation mode (tape, memory and MDI).
○	○	○	○	Acceleration / deceleration is automatically applied to all commands. The acceleration / deceleration patterns can be selected using a parameter from the following types: linear acceleration / deceleration, soft acceleration / deceleration, exponent function acceleration / deceleration and exponent function acceleration / linear deceleration.
○	○	○	○	This function performs acceleration / deceleration at a constant inclination during linear acceleration / deceleration in the rapid traverse mode. Compared to the method of acceleration / deceleration after interpolation, the constant inclination acceleration / deceleration method enables improved cycle time.
△	△	○	○	This function carries out the acceleration / deceleration according to the torque characteristic of the motor in the rapid traverse mode during automatic operation. (This function is not available in manual operation.) The rapid traverse constant inclination multi-step acceleration / deceleration method makes for improved cycle time because the positioning time is shortened by using the motor ability to the maximum.
△	△	○	○	Thread cutting with a designated lead can be performed. Inch threads are cut by designating the number of threads per inch with the E address.
—	—	—	—	By commanding the lead increment / decrement amount per thread rotation, variable lead thread cutting can be performed.
○	○	○	○	This function performs tapping through synchronized control of the spindle and servo axis. This eliminates the need for floating taps and enables tapping to be conducted at a highly accurate tapping depth.
△	△	○	○	The load applied to the tool can be reduced by designating the depth of cut per pass and cutting the workpiece to the hole bottom with a multiple number of passes.
△	△	○	○	In the deep-hole tapping, the load applied to the tool can be reduced by designating the depth of cut per pass and cutting the workpiece to the hole bottom with a multiple number of passes.
—	—	—	—	Chamfering can be enabled during the thread cutting cycle by using external signals.
—	—	—	—	Circular thread in which the lead is in longitudinal direction can be cut.
○	○	○	○	The servo axis directly detects and compensates the spindle's delay in tracking by using the communication between drive units over the high-speed optical servo network. By minimizing the synchronization error, the accuracy of the synchronous tapping is increased.
—	—	—	—	The function stores a thread groove position and compensates a start position of spindle thread cutting automatically so that the tool can pass along the memorized position of the thread groove at the thread cutting execution.
—	—	—	—	The thread cutting feedrate can be changed by changing the spindle override depending on rough cutting, finish machining, etc.
—	—	—	—	This function changes the cutting feedrate by the spindle override at the time of the thread cutting. The machining condition during thread cutting can be changed.
—	—	—	—	"Thread cutting time constant" can be applied to the acceleration / deceleration time constant of the NC control axis during the tread cutting.
○	○	○	○	The tool can be moved at the rapid traverse rate for each axis separately. Override can also be applied to the rapid traverse rate by means of the rapid traverse override function.
○	○	○	○	The tool can be moved in the axis direction (+ or,) in which the machine is to be moved at the per-minute feedrate.
○	○	○	○	The tool can be moved for the designated amount (incremental value) in the axis direction each time the jog switch is pressed.
○	○	○	○	The machine can be moved in very small amounts by rotating the manual pulse generator.

○Standard △Optional □Selection

class			Lathe system						Machining center system	
			M800W Series		M800S Series		M80 Series		M800W Series	
			M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W
	5	Manual feedrate B	○	○	○	○	○	○	○	○
	6	Manual feedrate B surface speed control	—	—	—	—	—	—	△	△
	8	Manual speed clamp	○	○	○	○	○	○	○	○
7 Dwell										
	1	Dwell (Time-based designation)	○	○	○	○	○	○	○	○
	2	Dwell (Revolution-based designation)	○	○	○	○	○	○	—	—
5 Program memory / editing										
1 Memory capacity										
	1	Memory capacity (number of programs stored)								
		500kB [1280m] (1000 programs)	○	○	○	○	○	○	○	○
		1000kB [2560m] (1000 programs)	△	△	△	△	—	—	△	△
		2000kB [5120m] (1000 programs)	△	△	△	△	—	—	△	△
2 Editing										
	1	Program editing	○	○	○	○	○	○	○	○
	2	Background editing	○	○	○	○	○	○	○	○
	3	Buffer correction	○	○	○	○	○	○	○	○
	5	Multi-part system simultaneous program editing	○	○	○	○	○	○	○	○
	6	Special program editing display for synchronization between part systems	△	△	△	△	○	○	△	△
6 Operation and display										
1 Structure of operation / display panel										
	1	Color display (8.4-type LCD TFT)	—	—	—	—	□	□	—	—
	2	Color touchscreen display (10.4-type LCD TFT)	—	—	□	□	□	□	—	—
	3	Color touchscreen display (15-type LCD TFT)	—	—	□	□	□	□	—	—
	6	Color touchscreen display (15-type LCD TFT / Windows8)	□	□	—	—	—	—	□	□
	7	Color touchscreen display (19-type LCD TFT / Windows8)	□	□	—	—	—	—	□	□
2 Operation methods and functions										
	1	Operation input	○	○	○	○	○	○	○	○
	2	Absolute value / Incremental value setting	○	○	○	○	○	○	○	○
	5	Displayed part system switch	○	○	○	○	○	○	○	○
	6	Menu list	○	○	○	○	○	○	○	○
	7	Display switch by operation mode	○	○	○	○	○	○	○	○
	8	External signal display switch	○	○	○	○	○	—	○	○
	9	Screen saver	○	○	○	○	○	○	○	○
	10	Parameter guidance	○	○	○	○	○	○	○	○
	11	Alarm guidance	○	○	○	○	○	○	○	○
	12	Machining program input mistake check warning	△	△	△	△	—	—	△	△
	14	Screenshot capture	—	—	○	○	○	○	—	—
	15	User selectable menu configuration	○	○	○	○	○	○	○	○
	16	PC-NC network automatic connection	○	○	○	○	—	—	○	○
	17	Device open parameter	○	○	○	○	○	○	○	○
	18	SRAM open parameter	○	○	○	○	○	○	○	○
	19	MTB selectable menu configuration	○	○	○	○	○	○	○	○
3 Display methods and contents										
	1	Status display	○	○	○	○	○	○	○	○
	2	Clock display	○	○	○	○	○	○	○	○
	3	Monitor screen display	○	○	○	○	○	○	○	○
	4	Setup screen display	○	○	○	○	○	○	○	○
	5	Edit screen display	○	○	○	○	○	○	○	○
	6	Diagnosis screen display	○	○	○	○	○	○	○	○
	7	Maintenance screen display	○	○	○	○	○	○	○	○
	8	Home application	○	○	—	—	—	—	○	○

S/W ver.A4

Machining center system				General explanation
M800S Series		M80 Series		
M850S	M830S	M80 TypeA	M80 TypeB	
○	○	○	○	Manual feedrate B is a function that sets an arbitrary axis feedrate from the user PLC separately from the manual feedrate.
△	△	—	—	When machining with the manual feedrate B function by moving the orthogonal axis while rotating the rotary table, the table rotation speed is controlled according to the distance from the rotation center.
○	○	○	○	The maximum speed for manual feed can be switched to the rapid traverse rate or the manual feed clamp speed.
○	○	○	○	The G code command temporarily stops machine movements and sets the machine in the stand-by status for the time designated in the program.
—	—	—	—	When G04 is commanded in the synchronous feed mode (G95), the machine waits for the spindle to rotate for the number of the revolutions designated.
○	○	○	○	Machining programs are stored in the NC memory, data server or external memory devices (front SD card, built-in disk of display unit, etc.). (Note) For a multi-part system, the specifications shown here is the total for all part systems.
△	△	—	—	
△	△	—	—	
○	○	○	○	This function enables program editing such as correction, deletion and addition.
○	○	○	○	This function enables one machining program to be created or edited while another program is running.
○	○	○	○	During automatic operation (including memory, tape, SD card or Data Server (DS) operation) or MDI operation, this function initiates single block stop and enables the next command to be corrected or changed.
○	○	—	—	When an operation to open a machining program in the NC memory is performed on the edit screen, machining programs are opened in the right and left areas at the same time; the specified machining program of the displayed part system in the edit area being selected and the machining program of another part system with the same name in the unselected edit area.
△	△	—	—	When the left and right edit areas are displaying the same named programs of different part systems stored on the NC memory, the display is switched to the synchronized display of the left- and right- side programs aligned using the timing synchronization symbols.
—	—	□	□	The setting and display unit consists of the setting part and the keyboard part. Refer to "HARDWARE" described later for the details. (Note) For the color touchscreen display (19-type LCD TFT / Windows8), only software keyboard is available and there is no hardware keyboard.
□	□	□	□	
□	□	□	□	
—	—	—	—	
—	—	—	—	
○	○	○	○	In addition to the method of directly inputting numeric data, a method to input the operation results using four basic arithmetic operators and function symbols can be used for specific data settings.
○	○	○	○	When setting the data, the absolute / incremental setting can be selected from the menu.
○	○	○	—	The part system displayed on the screen can be changed.
○	○	○	○	The menu list function displays the menu configuration of each screen as a list, making it possible to directly select the menu for other screens.
○	○	○	○	The screen display changes when the screen mode selection switch is changed.
○	○	○	—	The screen display changes with the signal from PLC.
○	○	○	○	The screen saver function protects the display unit by turning the backlight OFF after the length of time specified in a parameter.
○	○	○	○	This function displays the details of the parameters or the operation methods according to the state of the screen currently displayed.
○	○	○	○	Guidance is displayed for the alarm currently issued.
△	△	—	—	If an illegal input is found in the decimal point after the current cursor position, the cursor will move to that position, and a warning message will appear.
○	○	○	○	This function allows to output a bitmap file of a screen displayed on the setting and display unit.
○	○	○	○	This function allows to change the display order of the main menu in the “Monitor”, “Setup” and “Edit” screens, and to change display / non-display selection.
○	○	—	—	This function supports to restore the connection when the network connection fails between the display unit and the control unit.
○	○	○	○	This function can set or change the user backed up area of the PLC device from the NC screen.
○	○	○	○	This function can set or change the SRAM open area for machine tool builders from the NC screen.
○	○	○	○	Menu items on the “Monitor”, “Setup” and “Edit” screens (of MITSUBISHI standard format) can be moved within a screen or hidden as desired. The custom screen menu items added by machine tool builders, on the contrary, cannot be moved or hidden.
○	○	○	○	The status of the program currently being executed is indicated.
○	○	○	○	The clock is built in, and the date (year, month, date) and time (hour, minute, second) are displayed.
○	○	○	○	Various information related to operation, such as the axis counter, speed display and MSTB command are displayed.
○	○	○	○	Tool / workpiece related settings, user parameter settings, MDI editing, counter setting, manual numeric command issuing and pallet program registration (option) can be carried out.
○	○	○	○	Machining program editing (addition, deletion, change) and checking, simple program creation, and machining program input / output can be carried out.
○	○	○	○	The following operations related to the CNC diagnosis can be carried out. (1) Display the hardware and software configuration. (2) Display the CNC options. (3) Diagnose the PLC interface. (4) Display the drive unit information. (5) Display the alarm message / alarm history list etc.
○	○	○	○	Parameter setting and display, and NC data input / output, etc., can be carried out.
—	—	—	—	19-type vertical display unit has the expansion applications that display the machine status, software keyboard, etc. in the lower half of the screen in no linkage with the upper half.

○Standard △Optional □Selection

S/W ver.A4

class	Lathe system						Machining center system		General explanation
	M800W Series		M800S Series		M80 Series		M800W Series		
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W	
10 Additional languages									
1 Japanese	□	□	□	□	□	□	□	□	
2 English	○	○	○	○	○	○	○	○	
3 German	□	□	□	□	□	□	□	□	
4 Italian	□	□	□	□	□	□	□	□	
5 French	□	□	□	□	□	□	□	□	
6 Spanish	□	□	□	□	□	□	□	□	
7 Chinese									
Traditional Chinese characters	□	□	□	□	□	□	□	□	
Simplified Chinese characters	□	□	□	□	□	□	□	□	
8 Korean	□	□	□	□	□	□	□	□	
9 Portuguese	□	□	□	□	□	□	□	□	
10 Hungarian	□	□	□	□	□	□	□	□	
11 Dutch	□	□	□	□	□	□	□	□	
12 Swedish	□	□	□	□	□	□	□	□	
13 Turkish	□	□	□	□	□	□	□	□	
14 Polish	□	□	□	□	□	□	□	□	
15 Russian	□	□	□	□	□	□	□	□	
16 Czech	□	□	□	□	□	□	□	□	
7 Input / Output functions and devices									
1 Input / Output data									
1 Machining program input / output	○	○	○	○	○	○	○	○	
2 Tool offset data input / output	○	○	○	○	○	○	○	○	
3 Common variable input / output	○	○	○	○	○	○	○	○	
4 Parameter input / output	○	○	○	○	○	○	○	○	
5 History data output	○	○	○	○	○	○	○	○	
7 System configuration data output	○	○	○	○	○	○	○	○	
2 Input / Output I/F									
1 RS-232C I/F	○	○	○	○	○	○	○	○	
2 SD card I/F									
1 Control unit-side SD card I/F [up to 32GB]	○	○	—	—	—	—	○	○	
2 Front-side SD card I/F [up to 32GB]	○	○	○	○	○	○	○	○	
3 Ethernet I/F	○	○	○	○	○	○	○	○	
4 Display unit-side data server I/F	○	○	○	○	○	○	○	○	
5 Front USB memory I/F [up to 32GB]	○	○	○	○	○	○	○	○	
3 Computer link									
1 Computer link B	△	△	△	△	○	○	△	△	
8 Spindle, Tool and Miscellaneous functions									
1 Spindle functions (S)									
1 Spindle control functions									
1 Spindle digital I/F	○	○	○	○	○	○	○	○	
2 Spindle analog I/F	○	○	○	○	○	○	○	○	
3 Coil switch	○	○	○	○	○	○	○	○	
4 Automatic coil switch	○	○	○	○	○	○	○	○	
5 Encoder input I/F	—	—	○	○	○	○	—	—	
6 Spindle-mode servo motor control	△	△	△	△	○	○	△	△	
8 Turret gear change control	△	△	△	△	—	—	—	—	
2 S code output	○	○	○	○	○	○	○	○	
3 Constant surface speed control	○	○	○	○	○	○	○	○	
4 Spindle override	○	○	○	○	○	○	○	○	
5 Multiple-spindle control									
1 Multiple-spindle control I	○	○	○	○	○	○	—	—	
2 Multiple-spindle control II	○	○	○	○	○	○	○	○	
6 Spindle orientation	○	○	○	○	○	○	○	○	
7 Spindle position control (Spindle/C axis control)									
1 Spindle position control (Spindle/C axis control)	○	○	○	○	○	○	○	○	
2 C axis control during Spindle synchronization	△	△	△	△	○	○	—	—	
8 Spindle synchronization									
1 Spindle synchronization I	○	○	○	○	○	○	—	—	
2 Spindle synchronization II	○	○	○	○	○	○	—	—	
3 Guide bushing spindle synchronization	△	△	△	△	□	—	—	—	
9 Tool spindle synchronization I (Polygon)									
1 Tool spindle synchronization I A (Spindle-Spindle, Polygon)	△	△	△	△	○	○	—	—	
2 Tool spindle synchronization I B (Spindle-Spindle, Polygon)	△	△	△	△	○	○	—	—	

Machining center system				General explanation
M800S Series		M80 Series		
M850S	M830S	M80 TypeA	M80 TypeB	
□	□	□	□	
○	○	○	○	
□	□	□	□	
□	□	□	□	
□	□	□	□	
□	□	□	□	
□	□	□	□	
□	□	□	□	Available display languages.
□	□	□	□	
□	□	□	□	
□	□	□	□	
□	□	□	□	
□	□	□	□	
□	□	□	□	
□	□	□	□	
□	□	□	□	
○	○	○	○	
○	○	○	○	
○	○	○	○	Certain kinds of data handled by the NC system can be input and output between the NC system's memory and external devices.
○	○	○	○	
○	○	○	○	
○	○	○	○	
○	○	○	○	Port 1 and 2 are available with the RS-232C interface. The connection point for a connector depends on the product model.
—	—	—	—	Interface card to use SD card can be attached inside the NC control unit.
○	○	○	○	Interface card to use SD card can be attached in front of the NC control unit.
○	○	○	○	Ethernet interface card can be attached onto the NC unit.
○	○	○	○	A built-in disk of display unit can be used.
○	○	○	○	A USB memory can be mounted.
△	△	○	○	Computer link B is a function to receive / send data between the host computer and the CNC.
				The spindle rotation speed is determined in consideration of the override and gear ratio for the S command given in automatic operation or with manual numerical commands, and the spindle is rotated.
○	○	○	○	This interface is used to connect the digital spindle (AC spindle motor and spindle drive unit).
○	○	○	○	Spindle control can be executed using an analog spindle instead of the digital spindle.
○	○	○	○	Constant output characteristics can be achieved across a broad spectrums down to the low-speed ranges by switching the spindle motor connections. This is a system under which commands are assigned from the PLC.
○	○	○	○	Constant output characteristics can be achieved across a broad spectrums down to the low-speed ranges by switching the spindle motor connections. This is a system under which the CNC module switches the coils automatically in accordance with the motor speed.
○	○	○	○	With this function, arbitrary pulse can be input by parameters set in R register.
△	△	○	○	This function controls a spindle using the combination of servo motor and servo drive unit (MDS-E Series) which controls NC axis.
—	—	—	—	This function enables axes in the semi-closed system to select four types of gear ratios which are set to the spindle specification parameters according to the control input from the PLC.
○	○	○	○	When an 8-digit number following address S (S0 to S±99999999) is commanded, signed 32-bit binary data and start signal, or non-signed 32-bit binary data and start signal will be output to the PLC.
○	○	○	○	With radial direction cutting, this function enables the spindle speed to be changed in accordance with changes in the radial direction coordinates and the workpiece to be cut with the cutting point always kept at a constant speed (constant surface speed).
○	○	○	○	This function applies override to the rotation speed of a spindle or milling spindle assigned by the machining program command during automatic operation or by manual operation.
				Multiple-spindle control is a function that controls all the spindles except the first spindle (main spindle) in a machine tool equipped with the second, third and fourth spindles (sub-spindles) in addition to the first spindle.
—	—	—	—	This function controls the spindles in a machine tool equipped with several spindles.
○	○	○	○	With this function, commands to the spindle are performed with one S command, and a signal from the PLC determines which spindle is selected.
○	○	○	○	This function stops the spindle rotation at a certain position.
○	○	○	○	This function enables one spindle drive unit to be also used as the C axis (rotary axis) using an external signal.
—	—	—	—	This control enables C axis positioning while a long workpiece is controlled by Front and Back spindles that are in synchronization with each other. Under this control, the machine can perform milling at the center of workpiece.
—	—	—	—	In a machine with two or more spindles, this function controls the rotation speed and phase of one selected spindle (synchronized spindle) in synchronization with the rotation of the other selected spindle (basic spindle). There are two methods for giving commands: G code and PLC.
—	—	—	—	
—	—	—	—	This function is used for a machine with a spindle motor to rotate a guide bushing. It synchronizes the guide bushing spindle (G / B spindle) with the spindle motor used as a reference (basic spindle).
—	—	—	—	With a machine equipped with two or more spindles under serial connection control, this function enables spindle-spindle polygon machining (IA) by controlling the workpiece spindle rotation in synchronization with the rotary tool spindle rotation. The rotary tool spindle and workpiece spindle are designated from the spindles subject to serial connection control.
—	—	—	—	With a machine equipped with two or more spindles under serial connection control, this function enables spindle-spindle polygon machining (IB) by controlling the rotary tool spindle rotation in synchronization with the workpiece spindle rotation. The rotary tool spindle and workpiece spindle are designated from the spindles subject to serial connection control.

M800/M80 SERIES SPECIFICATIONS LIST

4 CNC SYSTEM

○Standard △Optional □Selection

class	Lathe system						Machining center system	
	M800W Series		M800S Series		M80 Series		M800W Series	
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W
3 Tool spindle synchronization I C (Spindle-NC axis, Polygon)	△	△	△	△	○	—	—	—
10 Tool spindle synchronization II (Hobbing)	△	△	△	△	○	—	—	—
11 Spindle speed clamp	○	○	○	○	○	○	○	○
13 Spindle oscillation	△	△	△	△	—	—	△	△
14 Spindle superimposition control	△	△	△	△	○	—	—	—
2 Tool functions (T)								
1 Tool functions (T command)	○	○	○	○	○	○	○	○
3 Miscellaneous functions (M)								
1 Miscellaneous functions	○	○	○	○	○	○	○	○
2 Multiple M codes in 1 block	○	○	○	○	○	○	○	○
3 M code independent output	○	○	○	○	○	○	○	○
4 Miscellaneous function finish	○	○	○	○	○	○	○	○
5 M code output during axis traveling	○	○	○	○	○	—	—	—
6 Miscellaneous function command high-speed output	○	○	○	○	○	○	○	○
4 2nd miscellaneous functions (B)								
1 2nd miscellaneous functions	○	○	○	○	○	○	○	○
2 2nd miscellaneous function name extension	○	○	○	○	○	○	○	○
9 Tool compensation								
1 Tool length / Tool position								
1 Tool length offset	○	○	○	○	○	○	○	○
2 Tool position offset	—	—	—	—	—	—	○	○
3 Tool compensation for additional axes	○	○	○	○	○	○	—	—
2 Tool radius								
1 Tool radius compensation	—	—	—	—	—	—	○	○
2 3-dimensional tool radius compensation	—	—	—	—	—	—	△	△
3 Tool nose radius compensation (G40 / 41 / 42)	○	○	○	○	○	○	—	—
4 Automatic decision of nose radius compensation direction (G46 / 40)	○	○	○	○	○	○	—	—
5 Tool radius compensation diameter designation	—	—	—	—	—	—	○	○
3 Tool offset amount								
1 Number of tool offset sets								
1 99 sets	—	—	—	—	—	○	—	—
2 128 sets	○	○	○	○	—	—	—	—
3 200 sets	—	—	—	—	—	—	○	○
4 256 sets	—	—	—	—	○	—	—	—
5 400 sets	△	△	△	△	—	—	△	△
6 999 sets	△	△	△	△	—	—	△	△
2 Offset memory								
1 Tool shape / wear offset amount	○	○	○	○	○	○	○	○
3 Number of tool offset sets allocation to part systems (Variable number of per-part-system tool offset sets)	○	○	○	○	○	—	○	○
10 Coordinate system								
1 Coordinate system type and setting								
1 Machine coordinate system	○	○	○	○	○	○	○	○
2 Coordinate system setting	○	○	○	○	○	○	○	○
3 Automatic coordinate system setting	○	○	○	○	○	○	○	○
4 Workpiece coordinate system selection								
1 Workpiece coordinate system selection (6 sets)	○	○	○	○	○	○	○	○
2 Extended workpiece coordinate system selection (48 sets) G54.1P1 to P48	△	△	△	△	○	○	△	△
3 Extended workpiece coordinate system selection (96 sets) G54.1P1 to P96	—	—	—	—	—	—	△	△
4 Extended workpiece coordinate system selection (300 sets) G54.1P1 to P300	—	—	—	—	—	—	△	△
5 External workpiece coordinate offset	○	○	○	○	○	○	○	○
6 Workpiece coordinate system preset (G92.1)	○	○	○	○	○	○	△	△
7 Local coordinate system	○	○	○	○	○	○	○	○

S/W ver.A4

Machining center system				General explanation
M800S Series		M80 Series		
M850S	M830S	M80 TypeA	M80 TypeB	
—	—	—	—	This function controls the workpiece (spindle) and tool (NC axis) so that they synchronously rotate at the commanded ratio, allowing polygon machining.
—	—	—	—	This function is to cut the gear with a hob (hob cutter).
○	○	○	○	The spindle rotation speed is clamped between max. rotation speed and min. rotation speed.
△	△	—	—	This function reciprocates (oscillates) the spindles with designated amplitude and frequency.
—	—	—	—	Spindles are controlled by superimposing the rotation speed of one spindle on the rotary speed of other spindle. Use this function when the tool spindle needs to be rotated with the superimposed speed on the spindle rotation speed.
○	○	○	○	The tool function is commanded with an 8-digit number following the address T (T0 to T99999999) to specify the tool No. In the controller for a lathe, the tool compensation (tool length compensation, tool nose wear compensation) Nos. are also indicated.
○	○	○	○	Miscellaneous function, or M function, is used to command auxiliary functions for NC, such as rotating the spindle forward / backward or stopping it, as well as turning the cooling oil ON/OFF.
○	○	○	○	Up to four sets of M commands can be issued in a block.
○	○	○	○	When the M00, M01, M02 or M30 command is issued during an automatic operation (tape, memory, MDI) or by a manual numerical command, the signal of this function is output. It is turned OFF after the miscellaneous function finishes or by the reset & rewind signal.
○	○	○	○	These signals inform the CNC system that a miscellaneous function (M), spindle function (S), tool function (T) or 2nd miscellaneous function (A, B, C) has been issued, and that the PLC that has received it has completed the required operation. They include miscellaneous function finish signal 1 (FIN1) and miscellaneous function finish signal 2 (FIN2).
—	—	—	—	This function controls the timing at which miscellaneous functions are output, and it outputs a miscellaneous function when the axis reaches the designated position movement.
○	○	○	○	This function shortens a processing time per miscellaneous function.
○	○	○	○	The code data and start signals are output when an 8-digit number is assigned following the address code A, B or C . whichever does not duplicate the axis name being used.
○	○	○	○	The 2nd miscellaneous function name same as the additional axes (A, B, C) can be used by specifying the command address of the 2nd miscellaneous function with two characters.
○	○	○	○	These commands make it possible to control the axis movement by offsetting the position of the end point of the travel command by the amount set in the tool compensation screen.
○	○	○	○	This function uses commands to control the movement by changing the end point positions of the movement commands to positions which have been extended or reduced for a tool compensation amount.
—	—	—	—	The tool compensation for a lathe is valid for the X and Z axes. If an additional axis (Y axis) is added, the tool compensation will be validated for the additional axis.
○	○	○	○	This function provides tool radius compensation. Through a combination of the G command and D address assignment, the actual tool center path is compensated either inside or outside the programmed path by an amount equivalent to the tool radius.
△	△	—	—	This command serves the function of compensating the spherical radius of ball end mills. It compensates the actual tool center path to be either more outside or inside the programmed path by an amount equivalent to the tool radius amount in accordance with the 3-dimensional vectors.
—	—	—	—	The tool nose of the specified tool No. is assumed to be a half circle of the radius R, and compensation is applied so that the half circle touches the programmed path.
—	—	—	—	The nose radius compensation direction is automatically determined from the tool tip and the specified movement vector.
○	○	○	○	Tool diameter designation handles the compensation amount as diameter value and compensates the amount set in the tool compensation amount screen when tool radius compensation (G41 / G42) is commanded.
—	—	—	—	The number of configurable sets of tool data such as tool length compensation and tool radius compensation.
—	—	—	—	
○	○	—	—	
—	—	—	—	
△	△	○	○	
△	△	—	—	
○	○	○	○	This function registers the tool shape compensation and wear compensation amounts.
○	○	—	—	The number of tool offset sets can be set per part system. There are two types of the allocation: "Arbitrary allocation" which allocates the number of tool offset sets to each part system arbitrarily and "Fixed allocation" which automatically allocates the number of tool offset sets to each part system equally, and the type can be selected using the parameter.
				This shows the coordinate systems handled by the NC. The points that can be commanded with the movement command are points in the local coordinate system or machine coordinate system.
○	○	○	○	The machine coordinate system is used to express the prescribed positions (such as the tool change position and stroke end position) that are specific to each machine, and it is automatically set immediately upon completion of the first dog-type reference position return after power ON, or immediately after power ON if the absolute position specifications apply.
○	○	○	○	By issuing a G code, the program coordinate system (zero point of program) can be changed in the workpiece coordinate system.
○	○	○	○	After turning the power ON, even without executing the reference position return, the basic machine coordinate system and the workpiece coordinate system are set automatically.
○	○	○	○	When multiple workpieces with the same shape are to be machined, these commands enable the same shape to be machined by executing a single machining program in the coordinate system of each workpiece.
△	△	○	○	In addition to the six workpiece coordinate systems G54 to G59, 48 / 96 sets of workpiece coordinate systems can be used by assigning G54.1Pn command.
△	△	—	—	
△	△	—	—	
○	○	○	○	An external workpiece coordinate offset that serves as a reference for all the workpiece coordinate systems is available outside the workpiece coordinates. By setting the external workpiece coordinate offset, the external workpiece coordinate system can be shifted, and all the workpiece coordinate systems can be simultaneously shifted by an amount equivalent to the offset.
△	△	—	—	This function presets the workpiece coordinate system, which has been shifted by the programmed command or the manual operation, as the workpiece coordinate system which has been offset by the programmed command (G92.1) from the machine zero point by an amount equivalent to the workpiece coordinate offset amount.
○	○	○	○	This function is for assigning another coordinate system in the workpiece coordinate system currently selected. This enables the workpiece coordinate system to be changed temporarily.

○Standard △Optional □Selection

class	Lathe system						Machining center system	
	M800W Series		M800S Series		M80 Series		M800W Series	
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W
8 Coordinate system for rotary axis	○	○	○	○	○	○	○	○
9 Plane selection	○	○	○	○	○	○	○	○
10 Origin set / Origin cancel	○	○	○	○	○	○	○	○
11 Counter set	○	○	○	○	○	○	○	○
13 Workpiece coordinate system shift	○	○	○	○	○	○	—	—
2 Return								
1 Manual reference position return	○	○	○	○	○	○	○	○
2 Automatic 1st reference position return	○	○	○	○	○	○	○	○
3 2nd, 3rd, 4th reference position return	○	○	○	○	○	○	○	○
4 Reference position check	○	○	○	○	○	○	○	○
5 Absolute position detection	○	○	○	○	○	○	○	○
6 Tool exchange position return	○	○	○	○	○	○	○	○
11 Operation support functions								
1 Program control								
1 Optional block skip	○	○	○	○	○	○	○	○
2 Optional block skip addition	○	○	○	○	○	○	○	○
3 Single block	○	○	○	○	○	○	○	○
2 Program test								
1 Dry run	○	○	○	○	○	○	○	○
2 Machine lock	○	○	○	○	○	○	○	○
3 Miscellaneous function lock	○	○	○	○	○	○	○	○
4 Graphic check								
1 Graphic check	○	○	○	○	○	○	○	○
2 3D solid program check	○	○	○	○	○	○	○	○
3 Graphic check rotary axis drawing	△	△	△	△	○	○	—	—
5 Graphic trace								
1 Graphic trace	○	○	○	○	○	○	○	○
2 Graphic trace rotary axis drawing	△	△	△	△	○	○	—	—
6 Machining time computation	○	○	○	○	○	○	○	○
7 Manual arbitrary reverse run (Program check operation)	△	△	△	△	○	○	△	△
8 High-speed simple program check	△	△	△	△	○	○	△	△
3 Program search / start / stop								
1 Program search	○	○	○	○	○	○	○	○
2 Sequence number search	○	○	○	○	○	○	○	○
3 Verification stop	○	○	○	○	○	○	○	○
4 Program restart	○	○	○	○	○	○	○	○
5 Automatic operation start	○	○	○	○	○	○	○	○
6 NC reset	○	○	○	○	○	○	○	○
7 Feed hold	○	○	○	○	○	○	○	○
8 Search & Start	○	○	○	○	○	○	○	○
10 Auto-restart	○	○	○	○	○	○	○	○
4 Interrupt operation								
1 Manual interruption	○	○	○	○	○	○	○	○
2 Automatic operation handle interruption	○	○	○	○	○	○	○	○
3 Manual absolute switch	○	○	○	○	○	○	○	○
4 Thread cutting cycle retract	○	○	○	○	○	○	—	—
5 Tapping retract	○	○	○	○	○	○	○	○
6 Manual numerical value command	○	○	○	○	○	○	○	○
7 Arbitrary reverse run	—	—	—	—	—	—	○	○
8 MDI interruption	○	○	○	○	○	○	○	○
9 Simultaneous operation of manual and automatic modes	○	○	○	○	○	○	○	○

S/W ver.A4

Machining center system				General explanation
M800S Series		M80 Series		
M850S	M830S	M80 TypeA	M80 TypeB	
○	○	○	○	The rotary axis includes the rotating type (short-cut valid / invalid) or the linear type (workpiece coordinate position linear type, all coordinate position linear type). The workpiece coordinate position range is 0 to 359.999° for the rotating type, and 0 to 99999.999° for the linear type.
○	○	○	○	By issuing a G code, it is possible to specify the planes for the arc, tool radius compensation, coordinate rotation and other commands.
○	○	○	○	Origin set is a function that shifts the coordinate system so that the current position is set as the zero point in the workpiece coordinate system containing the workpiece coordinate system's offset value. Origin cancel is a function that manually cancels all deviated amounts, and shifts to the designated zero point with the workpiece offset.
○	○	○	○	The relative position counter can be set to an arbitrary value from the setting and display unit screen.
—	—	—	—	When a workpiece coordinate system which is considered at programming is misaligned with an actual set workpiece coordinate or a workpiece coordinate set by automatic coordinate system setting, the measured workpiece coordinate system can be shifted to the workpiece coordinate system at the program creation so that the machining can be performed without modification of the machining program.
○	○	○	○	This function enables the tool to be returned manually to a position specific to the machine (reference position).
○	○	○	○	By commanding the G code during an automatic operation, the 1st reference position return is executed. If an intermediate point is commanded, a positioning is made to the point at rapid traverse rate, then each axis returns to its 1st reference position.
○	○	○	○	As in the automatic 1st reference position return, by commanding the G code during an automatic operation, an axis returns to a certain position specific to the machine (2nd / 3rd / 4th reference position).
○	○	○	○	By issuing a G code, a machining program where the tool is programmed to start off from the reference position and return to the reference position can be checked if the tool will return successfully to the reference position.
○	○	○	○	With this function, a battery stores the relation of the actual machine position and the machine coordinate kept in the CNC even during the power OFF, and an automatic operation is enabled without executing a reference position return.
○	○	○	○	By specifying the tool change position in a parameter and also assigning a tool change position return command in a machining program, the tool can be changed at the most appropriate position.
○	○	○	○	When " / " (slash code) is programmed at the head of a block, and the optional block skip input signal from the external source is turned ON for automatic operation, the block with the " / " code is skipped.
○	○	○	○	When "/n (n:1 to 9)" is programmed at the head of a block, and the optional block skip input n signal from the external source is turned ON for automatic operation, the block with the "/n" code is skipped.
○	○	○	○	The commands for automatic operation can be executed one block at a time (block stop) by turning ON the single block input signal.
○	○	○	○	F code feed commands for automatic operation can be switched to the manual feedrate data of the machine operation board by turning ON the dry run input signal.
○	○	○	○	When the machine lock input signal is set to ON, the CNC operations can be executed without actually moving the NC axis.
○	○	○	○	When the "External input" signal or "Miscellaneous function lock" signal is turned ON, the output signals of M, S, T, and B (2nd miscellaneous function) will not be output to the PLC. This is useful when checking only travel commands in a program check.
○	○	○	○	This function traces the programmed movement path without executing an automatic operation. It enables three-dimensional drawing and also rotary axis drawing. By using this function, machining programs can be checked before they are actually run.
○	○	○	○	
—	—	—	—	
○	○	○	○	This function traces the machine tool's machine positions. It draws the movement path of an actual automatic or manual operation, and the tool tip movement path. The function also monitors the machine operations during machining. It enables the drawing of a rotary axis as well.
—	—	—	—	
○	○	○	○	This function analyzes the machining program without moving the axis and calculates the approximate time required for machining.
△	△	○	○	The manual arbitrary reverse run can be performed by controlling the feedrate being in the automatic operation in the memory or MDI mode in proportion to the manual feedrate by jog or the rotation speed by manual handle.
△	△	○	○	This function checks whether a program error occurs by operating the machining program without the axes movements. The estimated machining time can be checked in time shorter than the actual execution time of the machining program.
○	○	○	○	This function specifies the program No. of the program to run automatically and calls the program.
○	○	○	○	Blocks can be indexed by setting the program No., sequence No. and block No. of the program to run automatically.
○	○	○	○	This function enables the single block stop status to be established at any block without having to turn the SINGLE BLOCK switch ON.
○	○	○	○	When a machining program is to be resumed after suspended midway due to tool damage or for some other reason, this function searches the program and the block to resume and enables machining to be resumed from the block.
○	○	○	○	With the input of the automatic operation start signal (change from ON to OFF), automatic operation of the program that was found by an operation search is started by the controller (or the halted program is restarted).
○	○	○	○	This function enables the controller to be reset.
○	○	○	○	When the feed hold signal is set to ON during automatic operation, the machine feed is immediately decelerated and stopped.
○	○	○	○	If the "Search & Start" signal is input when the memory mode is selected, the designated machining program is searched and executed from the beginning.
○	○	○	○	A machining program is restarted automatically at the completion of the machining program execution.
○	○	○	○	Manual interrupt is a function that enables manual operations to be performed during automatic operation.
○	○	○	○	The handle command can interrupt and be superimposed onto a command without suspending automatic operation to move the machine by rotating the manual pulse generator during automatic operation.
○	○	○	○	The program absolute positions are updated by an amount equivalent to the distance by which the tool is moved manually when the manual absolute switch signal is turned ON.
—	—	—	—	This function suspends the thread cutting cycle if a feed hold signal has been input during thread cutting cycle.
○	○	○	○	If tapping is interrupted by a reset or emergency stop signal that is input during tapping and the tap is left engaged inside the workpiece, the tap tool engaged inside the workpiece can be rotated in the reverse direction so that it will be disengaged by inputting the tap retract signal.
○	○	○	○	On the screen of the setting and display unit, the M, S and T (and B when 2nd miscellaneous function is valid) commands can be executed by setting numerical values and pressing [INPUT].
○	○	○	—	This function allows a program to run the executed blocks backward after the block stop in the automatic operation.
○	○	○	○	This function enables MDI programs to be executed during automatic operation in the single block stop status. When the modal status is changed in a MDI program, the modal status in the automatic operation mode is also changed.
○	○	○	○	This function enables manual operations to be performed during automatic operation by selecting an automatic operation mode (tape, MDI or memory) and manual mode (handle, step, jog or manual reference position return) simultaneously. (Arbitrary feed based on the PLC is also possible.)

M800/M80 SERIES SPECIFICATIONS LIST

○Standard △Optional □Selection

S/W ver.A4

class	Lathe system						Machining center system	
	M800W Series		M800S Series		M80 Series		M800W Series	
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W
10 Simultaneous operation of JOG and handle modes	○	○	○	○	○	○	○	○
11 Reference position retract	○	○	○	○	○	○	○	○
12 Tool retract and return	—	—	—	—	—	—	△	△
13 Skip retract	—	—	—	—	—	—	○	○
14 PLC interruption	○	○	○	○	○	○	○	○
12 Program support functions								
1 Machining method support functions								
1 Program								
1 Subprogram control	○8layers	○8layers	○8layers	○8layers	○8layers	○8layers	○8layers	○8layers
2 Figure rotation	—	—	—	—	—	—	△	△
3 Scaling	—	—	—	—	—	—	△	△
4 Axis name switch	○	○	○	○	○	○	—	—
2 Macro program								
1 User macro	○4layers	○4layers	○4layers	○4layers	○4layers	○4layers	○4layers	○4layers
2 Machine tool builder macro	○	○	○	○	○	○	○	○
3 Macro interruption	○	○	○	○	○	○	○	○
4 Variable command								
2 600 sets	—	—	—	—	—	○	—	—
3 700 sets	○	○	○	○	○	—	○	○
4 8000 sets	△	△	△	△	—	—	△	△
6 (600+100×number of part systems) sets	○	○	○	○	○	—	○	○
7 (7900+100×number of part systems) sets	△	△	△	△	—	—	△	△
3 Fixed cycle								
1 Fixed cycle for drilling	○	○	○	○	○	○	○	○
2 Fixed cycle for drilling (Type II)	○	○	○	○	○	○	—	—
3 Special fixed cycle	—	—	—	—	—	—	△	△
4 Fixed cycle for turning machining	○	○	○	○	○	○	—	—
5 Compound type fixed cycle for turning machining	△	△	△	△	○	○	—	—
6 Compound type fixed cycle for turning machining (Type II)	△	△	△	△	○	○	—	—
7 Small-diameter deep-hole drilling cycle	△	△	△	△	—	—	○	○
4 Mirror image								
1 Mirror image by parameter setting	○	○	○	○	○	○	○	○
2 Mirror image by external input	○	○	○	○	○	○	○	○
3 Mirror image by G code	—	—	—	—	—	—	○	○
4 Mirror image for facing tool posts	○	○	○	○	○	—	—	—
5 T code mirror image for facing tool posts	○	○	○	○	○	—	—	—
5 Coordinate system operation								
1 Coordinate rotation by program	△	△	△	△	○	—	△	△
2 Coordinate rotation by parameter	—	—	—	—	—	—	△	△
3 3-dimensional coordinate conversion	—	—	—	—	—	—	△	△
6 Dimension input								
1 Corner chamfering / Corner R	△	△	△	△	○	○	△	△
2 Linear angle command	△	△	△	△	○	○	△	△
3 Geometric command	○	○	○	○	○	○	△	△
4 Polar coordinate command	—	—	—	—	—	—	△	△
7 Axis control								
1 Chopping								
1 Chopping	△	△	△	△	○	○	△	△
2 Normal line control	—	—	—	—	—	—	○	○
3 Circular cutting	—	—	—	—	—	—	○	○
8 Multi-part system control								
1 Timing synchronization between part systems	○	○	○	○	○	○	○	○
2 Start point designation timing synchronization	○	○	○	○	○	○	○	○
3 Mixed control								

Machining center system				General explanation
M800S Series		M80 Series		
M850S	M830S	M80 TypeA	M80 TypeB	
○	○	○	○	When executing the jog feed and handle feed, both these feeds are available without changing the mode each time by inputting the jog mode signal and simultaneous operation of jog and handle modes signal to the control unit.
○	○	○	○	When the retract signal is turned ON during the automatic and manual operation, this function can retract the tool immediately to a set reference position.
△	△	—	—	Even if the machining program's operation is halted and the tool is retracted to change the tool or check the workpiece, etc., the tool can be returned to the halted point (machining halted point) and resume machining.
○	○	○	○	This function is used to return in the direction opposite the travel direction when the skip signal is input during G31 command.
○	○	○	○	The interrupt program set with the R register is executed with the signals from the PLC during single block stop in program operation or during the manual mode.
○8layers	○8layers	○8layers	○8layers	When the same pattern is repeated during machining, the machining pattern is registered as one subprogram, which can be called from the main program as required, thereby realizing the same machining easily. This enables the efficient use of programs.
△	△	—	—	If the same pattern is used repeatedly on a concentric circle, one of the rotary machining patterns can be registered as a subprogram. When the subprogram is called from the main program, if the rotation center is designated, a path similar to the rotary phase can be easily created on the concentric circle. This simplifies the creation of a program.
△	△	○	○	The shape commanded by a program can be extended or reduced to the desired size by applying a scale factor to the movement axis command position.
—	—	—	—	The axis name switch function switches the name of a command axis and a control axis.
○4layers	○4layers	○4layers	○4layers	In order to execute one integrated function, a group of control and arithmetic instructions can be used and registered as a macro program.
○	○	○	○	This function enables macro programs exclusively designed for use by a specific machine tool builder to be registered in addition to the regular user macro programs.
○	○	○	○	By inputting a user macro interrupt signal from the PLC, the program being currently executed is interrupted and other programs can be called instead.
—	—	—	—	Programming can be made flexible and versatile by designating variables instead of directly assigning numbers to addresses in programs and by supplying the values of those variables as required when running the programs. Arithmetic operations (adding, subtracting, multiplying and dividing) can also be conducted for the variables.
○	○	○	○	
△	△	—	—	
○	○	○	—	
△	△	—	—	
○	○	○	○	These functions enable drilling, tapping and other hole machining cycles to be assigned in a simple 1-block program. Special fixed cycles must always be used in combination with fixed cycles.
—	—	—	—	
△	△	○	○	
—	—	—	—	The shape normally programmed in several blocks for rough cutting, etc. in the turning machining can be commanded in one block. This function is useful for simplifying machining programs.
—	—	—	—	
—	—	—	—	
○	○	○	○	In deep hole drilling, cutting and retract are repeated and the workpiece is machined multiple times. In addition, when PLC signals are input during cutting, the cutting for the time concerned is skipped. In this way, the load applied to the tool is reduced.
○	○	○	○	A parameter is used to designate the axis for which the mirror image function is to be executed before the machining program is run.
○	○	○	○	Signals from an external device (PLC) request the mirror image operation either during or before the execution of a machining program.
○	○	○	○	Using a program for the left or right side of an image, this function can machine the other side of the image when a left / right symmetrical shape is to be cut.
—	—	—	—	With machines in which the base tool post and the facing tool post are integrated in one post, this function enables the programs prepared for cutting at the base side to be executed by the tools on the facing side as well.
—	—	—	—	When tools that correspond to tool Nos. 1 to 64 are selected (T commands) but these are the tool Nos. for which the facing tool post mirror image function has already been designated with a parameter, the status equivalent to G68 (facing tool post mirror image ON) is established.
△	△	○	○	When it is necessary to machine a complicated shape at a position that has been rotated with respect to the coordinate system, you can machine a rotated shape by programming the shape prior to rotation on the local coordinate system, and then specifying the parallel shift amount and rotation angle by means of this coordinate rotation command.
△	△	—	—	If a deviation occurs between the workpiece alignment line and the machine coordinate system's coordinate axis when the workpiece is mounted, the machine can be controlled to rotate the machining program coordinates according to the workpiece alignment line deviation.
△	△	○	—	With the 3-dimensional coordinate conversion function, a new coordinate system can be defined by rotating and moving in parallel the zero point in respect to the X, Y and Z axes of the currently set workpiece coordinate system.
△	△	○	○	This function executes corner processing by automatically inserting a straight line or arc in the commanded amount between two consecutive travel blocks.
△	△	○	○	The end point coordinates are automatically calculated by assigning one element (one component of the selected plane) of the end point coordinates and the linear angle.
△	△	○	○	When it is difficult to find the intersection point of two straight lines with a continuous linear interpolation command, this point can be calculated automatically by programming the command for the angle of the straight lines.
△	△	○	○	With this function, the end point position is commanded with the radius and angle.
△	△	○	○	This function continuously raises and lowers the chopping axis independently of program operation. During the grinding operation, chopping can produce a better surface accuracy than using abrasive grain.
○	○	○	—	This function controls the swiveling of the C axis (rotary axis) so that the tool is always pointing in the normal line direction for the X and Y axes movement commands during program operation.
○	○	○	○	In circular cutting, a system of cutting steps are performed; first, the tool departs from the center of the circle, and by cutting along the inside circumference of the circle, it draws a complete circle, then it returns to the center of the circle.
○	○	○	—	The multi-axis, multi-part system compound control CNC system can simultaneously run multiple machining programs independently. This function is used in cases when, at some particular point during operation, the operations of different part systems are to be synchronized or in cases when the operation of only one part system is required.
○	○	○	—	The synchronizing point can be placed in the middle of a block by designating the start point.

4 CNC SYSTEM

M800/M80 SERIES SPECIFICATIONS LIST

○Standard △Optional ☐Selection

S/W ver.A4

class	Lathe system						Machining center system		Machining center system				General explanation
	M800W Series		M800S Series		M80 Series		M800W Series		M800S Series		M80 Series		
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	
1 Mixed control (cross axis control)	△	△	△	△	○	—	—	—	—	—	—	—	This function enables any axis to be replaced with another axis between part systems. There are two methods for giving commands: G code and PLC.
2 Arbitrary axis exchange control	△	△	△	△	○	—	—	—	—	—	—	—	An arbitrary axis can be exchanged freely across part systems in the multiple part systems.The machining can be freer by exchanging an axis which can be commanded for machining programs in each part system.
4 Control axis superimposition													
1 Control axis superimposition	△	△	△	△	—	—	—	—	—	—	—	—	This function enables to superimpose on and control an axis in a part system with an axis in another part system. There are two methods for giving commands: G code and PLC.
2 Arbitrary axis superimposition control	△	△	△	△	—	—	—	—	—	—	—	—	The arbitrary control axis in other part system can be moved by superimposing on the movement command for the arbitrary control axis in own part system.
5 Control axis synchronization across part systems	△	△	△	△	○	○	—	—	—	—	—	—	Synchronization control enables an arbitrary control axis in another part system to move in synchronization with the movement command assigned to an arbitrary control axis. There are two methods for giving commands: G code and PLC.
6 Balance cut	○	○	○	○	○	—	—	—	—	—	—	—	The deflection can be minimized by holding tools simultaneously from both sides of the workpiece and using them in synchronization to machine the workpiece (balance cutting). In addition, since the workpiece is machined by two tools, the machining time is reduced.
7 Common memory for part systems	○	○	○	○	○	—	—	—	—	—	—	—	For a machine with multiple part systems, the common variables and tool compensation memory which exist for each part system can be made common to all part systems by setting the parameters.
8 2-part system synchronous thread cutting	△	△	△	△	○	—	—	—	—	—	—	—	This function performs synchronous thread cutting for the same spindle using the 1st and 2nd part systems.
9 Multi-part system program management	○	○	○	○	○	—	○	○	○	○	○	—	Separate programs, used in each part system, can be managed under a common name in a multi-part system.
10 Synchronization among part systems													
1 Single block with part systems synchronized	△	△	△	△	○	○	—	—	—	—	—	—	Single block operation with part systems synchronized is the function for executing single block operation while maintaining the synchronization among the part systems when two or more part systems are operated in the multi-part system. When one part system has been stopped by single block stop, the other part systems pause in the cycle operation.
2 Dwell / Miscellaneous function time override	△	△	△	△	○	○	—	—	—	—	—	—	Override can be applied to dwell time and miscellaneous function finish wait time of all part systems. The synchronization among part systems can be maintained when the multiple machining programs are operated with override.
3 Synchronization among part systems OFF	△	△	△	△	○	○	—	—	—	—	—	—	Synchronization among part systems and feedrate change are turned OFF in a part of a machining program to eliminate a synchronization relation among part systems by single block operation with part systems synchronized or variation of a machining program feedrate by dry run. This function is effective mainly in blocking the cycle operation pause or feedrate variation in only some of part systems when the sub part system control II function is being used.
11 Sub part system control I	△	△	△	△	○	—	△	△	—	—	—	—	This function activates and operates any non-operating part system (sub part system) in the multi-part system.An auxiliary axis machining program can be controlled in the sub part system by commanding Sub part system control I (G122) from the main part system.
12 Sub part system control II	△	△	△	△	○	—	△	△	△	△	—	—	This function activates and operates any non-operating part system (sub part system) in the multi-part system. Using sub part systems enables parallel operation between an operating program in main part system and a program called with Sub part system control II (G144).
9 Data input / output by program													
1 Parameter input by program	○	○	○	○	○	○	○	○	○	○	○	○	The parameters set from the display can be changed using machining programs.
2 Compensation data input by program	○	○	○	○	○	○	○	○	○	○	○	○	The value of the workpiece coordinate systems selected can be set or changed using program commands. The tool compensation amounts, that are set from the display can be input using program commands.
3 Tool / Material shape input by program	○	○	○	○	○	○	○	○	○	○	○	○	Tool shape data on the tool management screen and workpiece shape data of the 3D solid program check can be set with the machining program.
5 API section and sub-section Nos. input / output by program	○	○	○	○	○	○	○	○	○	○	○	○	NC internal data can be read / written by specifying the section number, sub-section number, part system number and axis number using system variables.
6 R-Navi data input by program	—	—	—	—	—	—	△	△	△	△	△	—	The R-Navi setup parameter can be set from the machining program. The setting value can be checked and the machining surface can be selected on the setup screen for the parameter set from the machining program.
10 Machining modal													
1 Tapping mode	○	○	○	○	○	○	○	○	○	○	○	○	When tapping mode commands are issued, the CNC system is set to the internal control modes required for tapping.
2 Cutting mode	○	○	○	○	○	○	○	○	○	○	○	○	When a cutting mode command is issued, the CNC system is set to the cutting mode that enables a smoothly cut surface.
11 High-speed parts machining													
1 Rapid traverse block overlap	△	△	△	△	○	○	△	△	△	△	○	○	This function enables the next block to start (overlap) without waiting for positioning (G00) or reference position return (G28 / G30). Consequently, cycle time of machining can be reduced.
2 Machining accuracy support functions													
1 Automatic corner override	○	○	○	○	○	○	○	○	○	○	○	○	To prevent machining surface distortion due to increase in the cutting load when cutting corners, this function automatically applies an override on the cutting feedrate so that the cutting amount is not increased for a set time at the corner.
2 Deceleration check													
1 Exact stop check mode	○	○	○	○	○	○	○	○	○	○	○	○	This function decelerates and stops a motor before executing the next block, which reduces the impact on the machine caused by a rapid change of feedrate, and prevents a corner from being machined round.
2 Exact stop check	○	○	○	○	○	○	○	○	○	○	○	○	
3 Error detection	○	○	○	○	○	○	○	○	○	○	○	○	
4 Programmable in-position check	○	○	○	○	○	○	○	○	○	○	○	○	
5 Automatic error detection	△	△	△	△	—	—	—	—	—	—	—	—	This function is effective to reduce the extension of cycle time for the cutting at the corner and realize the high edge accurate machining.
3 High-speed and high-accuracy functions [kBPM: k Block per Minute]													
1 High-speed machining mode													
1 High-speed machining mode I (G05P1) maximum [kBPM]	△33.7	△33.7	△33.7	△33.7	○33.7	—	△33.7	△33.7	△33.7	△33.7	○33.7	○16.8	This function runs a machining program that approximates a free curve with fine segments at a high speed.
2 High-speed machining mode II (G05P2) maximum [kBPM]	△168	△168	△168	△168	○67.5	—	△168	△168	△168	△168	○67.5	—	
2 High-accuracy control													
1 High-accuracy control (G61.1 / G08)	△	△	△	△	○	—	△	△	△	△	○	○	Machining errors caused by delays in control systems can be inhibited. This function is useful for machining which needs to make an edge at a corner or reduce an error from an inner route of curved shape.
2 Multi-part system simultaneous high-accuracy control *Up to two part systems for high-speed high-accuracy control	△	△	△	△	—	—	△	△	△	△	○	—	High-accuracy control and high-speed machining mode are available respectively in all part systems. The simultaneous usage of high-accuracy control and high-speed machining mode (including High-speed high-accuracy control I / II / III) are available only in part systems which are limited by the parameter.
3 SSS control	△	△	△	△	○	—	△	△	△	△	○	○	With SSS (Super Smooth Surface) control, the large area path information is used instead of just the angle between the blocks. Thus, optimum speed control that is not adversely affected by minute steps or waviness is possible. This enables machining with a fewer scratches and streaks on the cutting surface compared to the normal high-accuracy control function. Multiple part systems simultaneous high-accuracy function is required to conduct the SSS control in the second or following part systems.
4 Tolerance control	△	△	△	△	○	—	△	△	△	△	○	○	This function enables the smooth operation within the tolerance error range. The desired machining result can be obtained with simple parameter adjustment.
5 Variable-acceleration pre-interpolation acceleration / deceleration	—	—	—	—	—	—	△	△	△	△	—	—	This function can perform the acceleration / deceleration during SSS control by setting diverse acceleration to each axis. Therefore, the acceleration for the axis with high responsiveness can be larger than before so that cycle time can be reduced especially in the indexing machining.
6 High-accuracy acceleration / deceleration time constant extension (1st part system only)	—	—	—	—	—	—	△	△	△	△	—	—	This extends the upper limit of cutting feed time constant from 5,000 [ms] to 30,000 [ms] for acceleration / deceleration before interpolation.
3 High-speed high-accuracy control													
1 High-speed high-accuracy control I (G05.1Q1) maximum [kBPM]	△67.5	△67.5	△67.5	△67.5	○33.7	—	△67.5	△67.5	△67.5	△67.5	○33.7	○16.8	A machining program that approximates a free curve with fine segments can be run at a high speed and with a high accuracy. This function is effective in decreasing the cycle time of machining dies with free curves. This function is also useful in machining which needs to make an edge at a corner or reduce a path error from inner route of curved shape because the high-accuracy control mode is turned ON automatically.
2 High-speed high-accuracy control II (G05P10000) maximum [kBPM]	△168	△168	△168	△168	○67.5	—	△168	△168	△168	△168	○67.5	—	
3 High-speed high-accuracy control III (G05P20000) maximum [kBPM]	—	—	—	—	—	—	△270	△270	△270	△270	○135	—	

4 CNC SYSTEM

○Standard △Optional ☐Selection

S/W ver.A4

class	Lathe system						Machining center system		Machining center system				General explanation
	M800W Series		M800S Series		M80 Series		M800W Series		M800S Series		M80 Series		
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	
4 Smooth fairing	—	—	—	—	—	—	△	△	△	△	○	—	A path can be smoothen by compensating commanded positions of a machining program. This function is useful when executing a fine segment program to machine smoothly at low speed or a rough machining program with long segment to machine smoothly.
4 Machining condition selection I	○	○	○	○	○	—	○	○	○	○	○	○	The machining condition parameter set which consists of parameters related to the high-accuracy control can be configured in advance for each machining application (such as part machining or die machining) or machining process (such as rough or finishing), and it can be switched according to the purpose.
5 Direct command mode	△	△	△	△	—	—	—	—	—	—	—	—	By reducing the load applied during the NC program analysis and interpolation to the minimum possible level, the machining programs expressed in fine segments are executed at a high processing speed.
4 Programming support functions													
1 Playback	△	△	△	△	—	—	○	○	○	○	○	○	This function enables creation of a program while proceeding with sample machining by manual (handle or job) feed or mechanical handle feed.
4 Simple programming (NAVI MILL / LATHE)	△	△	△	△	○	○	△	△	△	△	○	○	Create a part program by using NAVI MILL (for machining center system) or NAVI LATHE (for lathe system).
5 G code guidance	○	○	○	○	○	○	○	○	○	○	○	○	G code guidance is a function to display illustration of the contents or movements of the commanded format for the G code currently under editing. This is used when creating or editing a machining program.
13 Machine accuracy compensation													
1 Static accuracy compensation													
1 Backlash compensation	○	○	○	○	○	○	○	○	○	○	○	○	This function compensates the error (backlash) produced when the direction of the machine system is reversed.
2 Memory-type pitch error compensation	○	○	○	○	○	○	○	○	○	○	○	○	Machine accuracy can be improved by compensating the errors in the screw pitch intervals among the mechanical errors (production errors, wear, etc.) of the feed screws.
3 Memory-type relative position error compensation	○	○	○	○	○	○	○	○	○	○	○	○	Machine accuracy can be improved by compensating the relative error between machine axes, such as a production error or aging.
4 External machine coordinate system compensation	△	△	△	△	○	○	△	△	△	△	○	○	The coordinate system can be shifted by inputting a compensation amount from the PLC. This compensation amount will not appear on the counters (all counters including machine position).
5 Circular error radius compensation	△	△	△	△	○	○	△	△	△	△	○	○	With commands designated during arc cutting, this function compensates movement toward the inside of the arcs caused by a factor such as servo delay.
6 Ball screw thermal expansion compensation	△	△	△	△	○	○	△	△	△	△	○	○	This compensates the axis feed error caused by a ball screw's thermal expansion, etc. using the values set by the PLC.
7 Rotation center error compensation	—	—	—	—	—	—	△	△	△	△	—	—	In a machine with a rotary axis, there may be a case where the actual rotation center deviates from the programmed rotation center. (In other words, "machine rotation center error" may be observed.) Higher accuracy machining can be realized by compensating this error.
8 Position-dependent gradually increasing-type backlash compensation	△	△	△	△	○	○	△	△	△	△	○	○	With this function, the gradually increasing-type lost motion which depends on the distance from the point where the machine movement direction is reversed can be compensated by controlling the variation of backlash compensation amount according to the distance from the direction reversal point.
9 Two-way pitch error compensation	△	△	△	△	○	○	△	△	△	△	○	○	Two-way pitch error compensation function is used to compensate the pitch error in each direction by setting the pitch error compensation amount when moving in the positive and negative direction.
2 Dynamic accuracy compensation													
1 Smooth high-gain (SHG) control	○	○	○	○	○	○	○	○	○	○	○	○	This is a high-response and stable position control method using the servo system. SHG control realizes an approximately three-fold position loop gain compared to the conventional control method.
2 Dual feedback	○	○	○	○	○	○	○	○	○	○	○	○	Use position feedback with a motor-side detector in ranges with high acceleration to enable stable control. In ranges with low acceleration, use position feedback with the machine-side detector (scale). This will make it possible to increase the position loop gain. A machine-side detector (scale) is separately required.
3 Lost motion compensation	○	○	○	○	○	○	○	○	○	○	○	○	This function compensates the error in protrusion shapes caused by lost motion at the arc quadrant changeover section during circular cutting.
4 OMR II (Backlash with filter)	△	△	△	△	○	○	△	△	△	△	○	○	The OMR (Optimal Machine Response) control function estimates the machine or motor model (moment of inertia, clone friction, viscosity coefficient, etc.) that can cause a path error (deviation of the actual tool path from the programmed path). High-accuracy machining is achieved by carrying out feed forward control based on that model. This allows error cased by quadrant protrusions during circular interpolation or quadrants on the inner side of the path to be greatly reduced. OMR-II is a function that focuses on the quadrant protrusions, and improves the path error with this. Quadrant path compensation is included in OMR-II.
6 OMR-FF	△	△	△	△	○	—	△	△	△	△	○	○	OMR-FF control enables fine control by generating feed forward inside the drive unit and can realize the strict feedback control to the program command than the conventional high-speed accuracy control.
7 Distance-coded reference position detection	△	△	△	△	—	—	△	△	△	△	—	—	This is a function where a distance-coded reference scale is used to establish the reference position in the relative position detection system.
14 Automation support functions													
1 Measurement													
1 Skip													When the external skip signal is input during linear interpolation using the G31 command, machine feeding is stopped immediately and the remaining distance is discarded to execute the commands in the next block.
1 Skip	○	○	○	○	○	○	○	○	○	○	○	○	This function realizes skipping by designating a combination of skip signals for each skip command.
2 Multiple-step skip	○	○	○	○	○	○	○	○	○	○	○	○	This function enables skip operations to be performed by signals which are input from the user PLC.
4 PLC skip	△	△	△	△	○	○	△	△	△	△	○	○	This function is used to change the feed rate or to stop the movement by inputting the skip signal during the linear interpolation.
5 Speed change skip	△	△	△	△	—	—	△	△	△	△	—	—	Axis movement is performed in the torque limited status, and the axis movement command is suspended to proceed to the next block when the current command value reaches the designated torque skip value and the torque skip turns ON.
6 Torque limitation skip	△	△	△	△	○	—	△	△	△	△	—	—	This function moves the tool in the direction of the tool measurement position by the commanded value between the measurement start position and measurement position. It stops the tool as soon as it reaches the sensor and calculates the difference between the coordinates where the tool has stopped and the command coordinates. It registers this difference as the tool length compensation amount for that tool.
2 Automatic tool length measurement	○	○	○	○	○	○	○	○	○	○	○	○	Simple measurement of the tool length is done without a sensor.
3 Manual tool length measurement 1	○	○	○	○	○	○	○	○	○	○	○	○	[M system] When the tool is positioned at the reference position, this function measures the distance from the reference position to the tool tip and registered it as the tool length compensation amount. [L system] A device with a built-in touch sensor is used. Simply by causing the tool nose to touch the touch sensor in manual feed, the tool compensation amount can be calculated and stored in tool compensation amount memory.
4 Manual tool length measurement 2	○	○	○	○	○	○	○	○	○	○	○	○	The external workpiece coordinate offset data for the Z axis can be set by cutting the workpiece face by means of manual operations and inputting the workpiece measurement signal.
5 Workpiece coordinate offset measurement	○	○	○	○	○	○	—	—	—	—	—	—	The workpiece position measurement function is used to measure each axis' coordinate by installing a sensor on the spindle and the sensor contacting the workpiece with the manual feed or handle feed. The surface, hole center and width center coordinates are calculated from the measured coordinates, and those calculated results are set in the workpiece coordinate offset.
6 Workpiece position measurement	—	—	—	—	—	—	○	○	○	○	○	○	The offset of the rotary coordinate system (rotation center and rotation angle) is measured, and the results are set to the workpiece coordinate system offset (rotation center) and the parameters.
7 Rotation measurement	—	—	—	—	—	—	○	○	○	○	○	○	
2 Tool life management													
1 Tool life management													
1 Tool life management I	○	○	○	○	○	○	○	○	○	○	○	○	The tool usage is monitored by accumulating each tool's usage time or the frequency of use.
2 Tool life management II	○	○	○	○	○	○	○	○	○	○	○	○	[M system] A spare tool change function is added to the tool life management I. [L system] The life of each tool (time and frequency) is controlled, and when the life is reached, a spare tool of the same type is selected from the same group.
3 Tool life management III	—	—	—	—	—	—	○	○	○	○	○	○	The tool usage is monitored by accumulating each tool's usage time and the frequency of use. This function is not controlled by the group No.

○Standard △Optional □Selection

class	Lathe system						Machining center system	
	M800W Series		M800S Series		M80 Series		M800W Series	
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W
2 Number of tool life management sets								
99 sets	—	—	—	—	—	○	—	—
128 sets	○	○	○	○	—	—	—	—
200 sets	—	—	—	—	—	—	○	○
256 sets	—	—	—	—	○	—	—	—
400 sets	△	△	△	△	—	—	△	△
999 sets	△	△	△	△	—	—	△	△
3 Tool life management set allocation to part systems (Variable number of per-part-system life management tools)	○	○	○	○	○	—	○	○
3 Others								
1 Programmable current limitation	○	○	○	○	○	○	○	○
2 Auto power OFF	○	○	○	○	—	—	○	○
4 Load monitoring I	△	△	△	△	○	—	△	△
5 Power ON/OFF sequence	○	○	—	—	—	—	○	○
15 Safety and maintenance								
1 Safety switches								
1 Emergency stop	○	○	○	○	○	○	○	○
2 Data protection key	○	○	○	○	○	○	○	○
2 Display for ensuring safety								
1 NC warning	○	○	○	○	○	○	○	○
2 NC alarm	○	○	○	○	○	○	○	○
3 Operation stop cause	○	○	○	○	○	○	○	○
4 Emergency stop cause	○	○	○	○	○	○	○	○
5 Thermal detection	○	○	○	○	○	○	○	○
6 Battery alarm / warning	○	○	○	○	○	○	○	○
3 Protection								
1 Stroke end (Over travel)	○	○	○	○	○	○	○	○
2 Stored stroke limit								
1 Stored stroke limit I/II	○	○	○	○	○	○	○	○
2 Stored stroke limit IB	△	△	△	△	○	○	△	△
3 Stored stroke limit IIB	△	△	△	△	○	○	△	△
4 Stored stroke limit IC	△	△	△	△	○	○	△	△
3 Stroke check before travel	—	—	—	—	—	—	△	△
4 Chuck / Tailstock barrier check	○	○	○	○	○	○	—	—
5 Interlock	○	○	○	○	○	○	○	○
6 External deceleration	○	○	○	○	○	○	○	○
9 Door interlock								
1 Door interlock I	○	○	○	○	○	○	○	○
2 Door interlock II	○	○	○	○	○	○	○	○
10 Parameter lock	○	○	○	○	○	○	○	○
11 Program protection (Edit lock B, C)	○	○	○	○	○	○	○	○
12 Program display lock	○	○	○	○	○	○	○	○
13 Data protection by user's level	△	△	△	△	○	○	△	△
15 Vertical axis pull-up	○	○	○	○	○	○	○	○
16 Machine group-based alarm stop	△	△	△	△	○	—	△	△
4 Maintenance and troubleshooting								
1 Operation history	○	○	○	○	○	○	○	○
2 Data sampling	○	○	○	○	○	○	○	○
3 NC data backup	○	○	○	○	○	○	○	○
4 Servo tuning support								
1 NC Analyzer2 (Note 1)	○	○	○	○	○	○	○	○
5 Automatic backup	○	○	○	○	○	○	○	○
8 Application error detection	○	○	○	○	—	—	○	○
10 NC Configurator2 (Note 2)	○	○	○	○	○	○	○	○

(Note 1) Please contact us to purchase this tool.

(Note 2) Please contact us to purchase a full function version. A limited function version is also available free of charge.

S/W ver.A4

Machining center system				General explanation
M800S Series		M80 Series		
M850S	M830S	M80 TypeA	M80 TypeB	
—	—	—	—	The max. sets of tools available for tool life management
—	—	—	—	
○	○	○	○	
—	—	—	—	
△	△	—	—	
△	△	—	—	
○	○	—	—	The number of tool life management tools can be set per part system. There are two types of the allocation: "Arbitrary allocation" which allocates the number of tool life management tools to each part system arbitrarily and "Fixed allocation" which automatically allocates the number of tool life management tools to each part system equally, and the type can be selected using the parameter.
○	○	○	○	This function allows the current limit value of the NC axis to be changed to a desired value in the program, and is used for the workpiece stopper, etc.
○	○	—	—	Auto power OFF function notifies that the control unit's power can be turned OFF after shutting the display unit down by entering "automatic power OFF request" signal from user PLC to NC.
△	△	○	—	This function aims at detecting tool wear or degradation by detecting and monitoring the actual load (current value) on spindle and NC axes on a real time basis.
—	—	—	—	This function turns the power supply ON/OFF, synchronizing the NC control unit and the HMI screen.
○	○	○	○	All operations are stopped by the emergency stop signal input and, at the same time, the drive section is stopped and the movement of the machine is stopped.
○	○	○	○	With the input from the user PLC, it is possible to prohibit the parameter setting or deletion, and the program edit from the setting and display unit.
○	○	○	○	Warnings are output by the CNC system. When one of these warnings occurs, a warning number is output to the PLC and a description of the warning appears on the screen. Operation can be continued without taking further action.
○	○	○	○	The alarms are output by the CNC system. When one of these alarms occurs, an alarm number is output to the PLC, and a description of the alarm appears on the screen. Operation cannot be continued without taking remedial action.
○	○	○	○	The stop cause of automatic operation is shown on the display.
○	○	○	○	When the "EMG" (emergency stop) message is displayed in the operation status area of the display, the cause of the emergency stop can be confirmed.
○	○	○	○	When overheating is detected in the control unit, an overheat signal is output at the same time as the alarm is displayed.
○	○	○	○	When it is time to change the batteries, an alarm and warning are displayed.
○	○	○	○	Limit switches and dogs are attached to the machine, and when a limit switch has kicked a dog, the movement of the machine is stopped by the signal input from the limit switch.
○	○	○	○	This function sets the areas prohibited for the tool to enter. There are multiple types of prohibitions according to the prohibited range and method.
△	△	○	○	
△	△	○	○	
△	△	○	○	
△	△	○	○	By commanding, from the program, the boundary for prohibiting machine entry as a coordinate position in the machine coordinate system, entry into the inner side of that boundary can be prohibited.
—	—	—	—	By limiting the tool nose point movement range, this function prevents the tool from colliding with the chuck or tail stock because of a programming error.
○	○	○	○	The machine movement will decelerate and stop as soon as the interlock signal, serving as the external input, is turned ON. When the interlock signal is turned OFF, the machine starts moving again.
○	○	○	○	This function reduces the feedrate to the deceleration speed set by the parameter when the external deceleration input signal has been set to ON.
○	○	○	○	Under the CE marking scheme of the European safety standards (machine directive), the opening of any protection doors while a machine is moving is prohibited. When the door open signal is input from the PLC, this function first decelerates, stops all the control axes, establishes the ready OFF status, and then shuts off the drive power inside the servo drive units so that the motors are no longer driven.
○	○	○	○	
○	○	○	○	This function is used to prohibit the changing of machine parameters.
○	○	○	○	The edit lock function B or C inhibits machining program B or C (group by machining program numbers) from being edited or erased when these programs require protection.
○	○	○	○	This function allows the display of only a target program (label address 9000) to be disabled for the program display in the monitor screen, etc.
△	△	○	○	Up to 8 levels of access permission helps to prevent you from dispatching defective works.
○	○	○	○	This function prevents the tool from breakage, through pulling up the cutting tool during emergency stop or instantaneous power interruption at low cutting speed.
△	△	○	—	When an alarm occurs for an axis, this function performs an alarm stop only for the axes in a machine group to which the axis belongs.
○	○	○	○	This is a maintenance function which is useful for tracing down the history and NC operation information and analyzing problems, etc. This information is saved in the history data file, and can be displayed on the screen and output to a file.
○	○	○	○	The NC data sampling function samples the NC internal data (speed output from NC to drive unit, and feedback data from the drive unit, etc.). This data can be output as text data.
○	○	○	○	The NC data back up function backs up the NC parameters, etc., on a built-in disk of display unit or SD card. The data can also be restored.
○	○	○	○	With this function, the servo parameters can be automatically adjusted by connecting the CNC and NC Analyzer2, which is an application that runs on a regular personal computer.
○	○	○	○	With this function, system data, ladder program and custom software can be automatically backed up in case of system failure.
○	○	—	—	Application error detection function observes applications such as MITSUBISHI standard screen or custom screen. When an error such as screen lock is detected, this function saves information and data in the log to investigate the causes easily.
○	○	○	○	NC Configurator2 runs on a personal computer to edit the NC data files required for NC control and machine operations such as parameters, tool data and common variables.

○Standard △Optional □Selection

S/W ver.A4

class	Lathe system						Machining center system		Machining center system				General explanation
	M800W Series		M800S Series		M80 Series		M800W Series		M800S Series		M80 Series		
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	
5 Safety Function													
1 Safety observation	△	△	△	△	○	○	△	△	△	△	○	○	The safety observation function ensures safe access to the machine's working parts (e.g. for adjustment or preparation) without shutting off the power, which reduces the time required to restart the machine.
2 Smart Safety observation													
1 Safety-related I/O observation	△	△	△	△	—	—	△	△	△	△	—	—	Using the dual circuits for processing signals input / output to / from the machine (safety signal compare sequence) and dual execution of safety signal process logic made by users (safety PLC), if one circuit has broken down, the other circuit can detect errors, which improves the safety of signal process.
2 Emergency stop observation	△	△	△	△	—	—	△	△	△	△	—	—	Emergency stop signal is doubled and observed to see whether there is any error. When one emergency stop signal is in open state, the whole system can be set in emergency stop condition.
3 Drive safety function													
1 SLS (Safely-Limited Speed)	△	△	△	△	—	—	△	△	△	△	—	—	Axis speed (command speed, FB speed) is observed doubly to see whether the speed exceeds the safe speed.
2 SLP (Safely-Limited Position)	△	△	△	△	—	—	△	△	△	△	—	—	Axis absolute position (command position, FB position) is observed doubly to see whether the position exceeds the safe position range.
3 SOS (Safe Operating Stop)	△	△	△	△	—	—	△	△	△	△	—	—	Axis stop speed (command speed, FB speed) is observed doubly whether the speed exceeds the safe stop speed. Axis stop position (command position, FB position) is observed doubly whether the position exceeds the safe stop position range. Observe axis stop position deviation (difference between command position and FB position) doubly to see whether the deviation exceeds the safe stop position deviation.
4 SSM (Safe Speed Monitor)	△	△	△	△	—	—	△	△	△	△	—	—	This function uses the safety signals to inform that the axis speed (command speed, FB speed) is equal to or below the safe speed.
5 SBC / SBT (Safe Brake Control / Safe Brake Test)	△	△	△	△	—	—	△	△	△	△	—	—	The brakes connected to motors are activated by this function. Because there are two circuits for activating the brakes, one circuit can activate the brakes even when the other circuit is broken down. Furthermore, Safe Brake Test (SBT) can diagnose the circuits for activating the breaks and the effectiveness of the brakes (deterioration due to abrasion, etc.).
6 SCA (Safe Cam)	△	△	△	△	—	—	△	△	△	△	—	—	This function uses the safety signals to inform that the axis absolute position (command position, FB position) is within the range of safe position.
7 SS1 / SS2 (Safe Stop)	△	△	△	△	—	—	△	△	△	△	—	—	[Safe stop 1 (SS1)] STO function is activated after an axis is decelerated and the speed (command speed, FB speed) becomes equal to or below the safe stop speed. [Safe stop 2 (SS2)] SOS function is activated after an axis is decelerated and the speed (command speed, FB speed) becomes equal to or below the safe stop speed.
8 STO (Safe Torque Off)	△	△	△	△	—	—	△	△	△	△	—	—	This function shuts OFF power supply to axes. Because there are two power shutoff circuits, one circuit can shut OFF the power supply even when the other circuit is broken down.
16 Drive system													
1 Servo / Spindle													
1 Feed axis													
1 MDS-E-Vx	□	□	□	□	□	□	□	□	□	□	□	□	
2 MDS-EH-Vx	□	□	□	□	□	□	□	□	□	□	□	□	
3 MDS-EJ-Vx	□	□	□	□	□	□	□	□	□	□	□	□	
5 MDS-EM-SPVx	□	□	□	□	□	□	□	□	□	□	□	□	
2 Spindle													
1 MDS-E-SPx	□	□	□	□	□	□	□	□	□	□	□	□	CNC-dedicated drive units, spindle motors, and servo motors are used.
2 MDS-EH-SPx	□	□	□	□	□	□	□	□	□	□	□	□	
3 MDS-EJ-SPx	□	□	□	□	□	□	□	□	□	□	□	□	
5 MDS-EM-SPVx	□	□	□	□	□	□	□	□	□	□	□	□	
4 Power supply													
1 MDS-E-CV	□	□	□	□	□	□	□	□	□	□	□	□	
2 MDS-EH-CV	□	□	□	□	□	□	□	□	□	□	□	□	
17 Machine support functions													
1 PLC													
1 Built-in PLC processing mode	○	○	○	○	○	○	○	○	○	○	○	○	An exclusive sequence program that controls various signals between the controller and the machine to realize the operations applicable to each machine can be created and built in.
2 PLC functions													
1 Built-in PLC basic function	○	○	○	○	○	○	○	○	○	○	○	○	
1 Index modification	○	○	○	○	○	○	○	○	○	○	○	○	
2 Multi-program [number of programs]	○120	○120	○120	○120	○60	○60	○120	○120	○120	○120	○60	○60	
3 Multi-project [number of projects stored]													Basic commands (bit processing commands) : 43 commands including LD, LDI, OR, ORI, AND, ANI, OUT, PLS, etc. Function commands : 188 commands including data transfer, 4 basic arithmetic operations, logic arithmetic operations, large / small identification, binary / BCD conversion, branching, conditional branching, decoding, encoding, etc.
Number of PLC projects: 1	○	○	○	○	—	○	○	○	○	○	—	○	
Number of PLC projects: 3	△	△	△	△	○	—	△	△	△	△	○	—	
Number of PLC projects: 6	△	△	△	△	—	—	△	△	△	△	—	—	
4 Function block (FB)	○	○	○	○	○	○	○	○	○	○	○	○	
5 Label programming	○	○	○	○	○	○	○	○	○	○	○	○	
2 PLC exclusive instruction	○	○	○	○	○	○	○	○	○	○	○	○	PLC-dedicated instruction is provided for some limited applications, enabling a complex machining process, which is difficult to carry out only by the basic instructions and function instructions.
3 PLC support functions													
1 Alarm message display	○	○	○	○	○	○	○	○	○	○	○	○	The contents of the alarms which have occurred during sequence (user PLC) processing can be displayed on the setting and display unit.
2 Operator message display	○	○	○	○	○	○	○	○	○	○	○	○	When some conditions occur where you wish to inform a messages to the operator, an operator message can be displayed separately from the alarm message.
3 Memory switch (PLC switch)													
1 Memory switch (PLC switch) 32 points	○	○	○	○	○	○	○	○	○	○	○	○	PLC switches can be set on the setting and display unit screen, and the ON/OFF control executed.
2 Memory switch (PLC switch) 64 points	△	△	△	△	—	—	△	△	△	△	—	—	
4 Load meter display	○	○	○	○	○	○	○	○	○	○	○	○	A load meter can be displayed on the setting and display unit.
5 User PLC version display	○	○	○	○	○	○	○	○	○	○	○	○	The user PLC version can be displayed in the software list on the Software Configuration screen.
6 Ladder program writing during RUN	○	○	○	○	○	○	○	○	○	○	○	○	Ladder program can be edited while PLC is running. This function is available, either by GX Developer or PLC onboard edit.
7 PLC program protection	○	○	○	○	○	○	○	○	○	○	○	○	For PLC data protection, the file password can be set to each file of PLC data.
4 Built-in PLC capacity													
1 Standard PLC capacity [number of steps]	○128000	○128000	○128000	○128000	○64000	○32000	○128000	○128000	○128000	○128000	○64000	○32000	
2 Large PLC capacity: 256000 steps	△	△	△	△	—	—	△	△	△	△	—	—	In the program memory, it is possible to store the system area of parameters, intelligent function module parameters, sequence programs, device comments, and device initial values.
3 Large PLC capacity: 512000 steps	△	△	△	△	—	—	△	△	△	△	—	—	
5 Machine contact input / output I/F	○	○	○	○	○	○	○	○	○	○	○	○	The operation panel I/O unit or the remote I/O unit is selected based on the types of signals (sink / source) available for input or output and the number of contacts required.
6 Ladder monitor	○	○	○	○	○	○	○	○	○	○	○	○	This function enables the operating status of the sequence circuit to be checked on the controller's setting and display unit.
7 PLC development													
1 On-board development	○	○	○	○	○	○	○	○	○	○	○	○	On-board refers generically to the PLC related operations carried out with the CNC unit. The Mitsubishi CNC on-board realizes functions and operations similar to the MELSEC Series ladder development tool (GX Developer).

○Standard △Optional □Selection

class	Lathe system						Machining center system	
	M800W Series		M800S Series		M80 Series		M800W Series	
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W
2 MELSEC development tool (GX Developer)	○	○	○	○	○	○	○	○
8 PLC parameter								
1 PLC constant (150 points)	○	○	○	○	○	○	○	○
2 PLC constant extension (Up to 755 points)	○	○	○	○	—	—	○	○
10 Pallet program registration	—	—	—	—	—	—	△	△
2 Machine construction								
1 Servo OFF	○	○	○	○	○	○	○	○
2 Axis detachment	○	○	○	○	○	○	○	○
3 Synchronous control	△	△	△	△	○	○	△	△
4 Inclined axis control	△	△	△	△	○	○	—	—
5 Position switch	○24	○24	○24	○24	○24	○24	○24	○24
7 Index table indexing	○	○	○	○	○	○	○	○
8 Tool length compensation along the tool axis	—	—	—	—	—	—	△	△
9 Tool handle feed & interruption	—	—	—	—	—	—	△	△
10 Tool center coordinate display	—	—	—	—	—	—	△	—
11 Tool center point control	—	—	—	—	—	—	△	—
12 Inclined surface machining command	—	—	—	—	—	—	△	△
14 3-dimensional tool radius compensation (Tool's vertical-direction compensation)	—	—	—	—	—	—	△	△
15 Workpiece installation error compensation	—	—	—	—	—	—	△	—
16 3-dimensional manual feed	—	—	—	—	—	—	△	△
17 R-Navi	—	—	—	—	—	—	△	△
20 Real-time tuning								
1 Real-time tuning 1 (speed gain)	△	△	△	△	○	—	△	△
21 Constant torque control	△	△	△	△	—	—	—	—
3 PLC operation								
1 Arbitrary feed in manual mode	○	○	○	○	○	○	○	○
2 Circular feed in manual mode	△	△	△	△	—	—	△	△
3 PLC axis control	○	○	○	○	○	○	○	○
5 PLC axis indexing	○	○	○	○	○	○	○	○
4 PLC interface								
1 CNC control signal	○	○	○	○	○	○	○	○
2 CNC status signal	○	○	○	○	○	○	○	○
3 PLC window	○	○	○	○	○	○	○	○
4 External search	○	○	○	○	○	○	○	○
5 Direct Screen Selection	○	○	○	○	○	○	○	○
5 Machine contact I/O								
1 Operation Panel I/O								
1 DI:64 / DO:64	□	□	—	—	—	—	□	□
2 DI:64 / DO:64+SDI:8	□	□	—	—	—	—	□	□
3 DI:96 / DO:64	—	—	□	□	□	□	—	—
2 Remote I/O								
1 DI:32 / DO:32	□	□	□	□	□	□	□	□
2 DI:64 / DO:48	□	□	□	□	□	□	□	□
3 DI:64 / DO:48+AO:1	□	□	□	□	□	□	□	□
5 DI:16 / DO:8	□	□	□	□	□	□	□	□
6 DI:32 / DO:32+SDI:8 / SDO:4	□	□	□	□	—	—	□	□
7 SDI:8 / SDO:4	□	□	□	□	—	—	□	□
6 External PLC link								
1 CC-Link (Master / Slave)	□	□	□	□	□	□	□	□
2 PROFIBUS-DP (Master)	□	□	□	□	□	□	□	□

S/W ver.A4

Machining center system				General explanation
M800S Series		M80 Series		
M850S	M830S	M80 TypeA	M80 TypeB	
○	○	○	○	This function enables the data of the PLC contained inside the NC system to be developed and debugged using the GX Developer.
○	○	○	○	The PLC constants set with the data type, and the bit selection parameters set with the bit types can be specified on the screen as the parameters to use in the built-in PLC.
○	○	—	—	
△	△	—	—	Pallet program function assists the machining setups as it allows machining programs to be registered for each pallet of the auto pallet changer.
○	○	○	○	When the servo OFF signal (per axis) is input, the corresponding axis is set in the servo OFF state. When the moving axis is mechanically clamped, this function is designed to prevent the servo motor from being overloaded by the clamping force.
○	○	○	○	This function enables the control axis to be released from control.
△	△	○	○	The synchronous control is a control method whereby both master and slave axes are controlled with the same travel command by designating the travel command for the master axis also to the slave axis. This function is assumed to be used in such equipment as large machine tools, which drive one axis with two servo motors.
—	—	—	—	Even when the control axes in a machine are mounted at an angle other than 90 degrees, this function enables it to be programmed and controlled in the same way as with an orthogonal axis.
○24	○24	○24	○24	Instead of a dog switch on a machine's axis, a hypothetical dog switch is established using a parameter to set a coordinate position to show the axis name and the hypothetical dog position. When the machine reaches the position, a signal is output to the PLC interface.
○	○	○	○	The indexing of the index table can be performed by setting the index axes.
△	△	—	—	(1) Changing the tool length compensation along the tool axis and compensation amount Even if the tool axis direction is not the Z axis direction because the rotary axis is rotated, the tool can be compensated in the tool axis direction. (2) Machine configuration The tool length compensation along the tool axis is carried out in respect to the direction of the tool nose axis (rotary axis).
△	△	—	—	This function makes it possible to move the axis with the manual pulse generator in the tool axis direction, tool diameter direction X and tool diameter direction Y in the hypothetical coordinate system over the tool axis.
△	—	—	—	The tool center coordinates, handle interrupt amount (tool axis movement) and tool center point speed are displayed during the tool center point control function, tool length compensation along the tool axis function, and tool handle feed & interrupt function (tool axis direction handle feed, tool handle interrupt, tool diameter direction handle feed, nose center rotation handle feed).
△	—	—	—	This function controls so that the position command in a machining program is at the tool center point in the coordinate system (table coordinate system) which rotates together with the workpiece.
△	△	○	—	An arbitrary spatial plane defined with this function can be machined using normal program commands.
△	△	—	—	This function is to compensate the tool radius of the 5-axis machine with two rotary axes, in accordance with the change of the workpiece direction and inclination of the tool due to the movement of the rotary axis.
△	—	—	—	This function is used for a 5-axis machine. This compensates the error when a workpiece is placed off the workpiece coordinate system to enable machining according to the program.
△	△	○	—	By selecting the hypothetical coordinate system to be machined, axis can be moved with manual feed (JOG, HANDLE or INCREMENTAL) in the coordinate system with this function. It can be easy to setup because multiple axes is moved by NC according to the tool angle or the inclination of the table.
△	△	○	—	This provides easy setup of index machining (multiple / inclined surface machining) using a rotary axis.
△	△	○	—	This function estimates the inertia (or workpiece weight) of mechanical system and changes the speed control gain automatically according to the estimation results to suppress mechanical vibration.Users can expect suppression of vibration caused by inertia fluctuation, as well as reduction of machining time through adaptation of appropriate speed control gain.
—	—	—	—	The servo motor of the axis designated for [Constant torque control] outputs the torque set by the parameter in a constant direction. The servo motor of the axis designated for [Proportional torque stopper control] generates the torque set by the parameter in the stopper direction.
○	○	○	○	This function enables the feed directions and feed rates of the control axes to be controlled using commands from the user PLC.
△	△	—	—	By specifying a hypothetical coordinate on the machine coordinate from the user PLC, oblique linear interpolation or circular interpolation is executed with jog / handle feed, manual rapid traverse or incremental feed of either X axis or Y axis.
○	○	○	○	This function allows independent axes to be controlled with PLC-based commands, separately from the NC control axes.
○	○	○	○	By setting positioning points (stations) in advance, positioning control can be performed simply by designating a positioning point No. (station No.).
○	○	○	○	Control commands to the CNC system are assigned from the PLC. Input signals with skip inputs that respond at high speed can also be used.
○	○	○	○	The status signals are output from the CNC system. They can be utilized by referencing them from the PLC.
○	○	○	○	This function uses the “read window” or “write window” assigned to the R register’s user area to read and write the CNC operation status, axis information, parameters and tool data, etc.
○	○	○	○	This function enables searching of the program to automatically start from the PLC. The program No., block No. and sequence No. can be designated. In addition, the details of the search in progress can be read.
○	○	○	○	This signal allows an automatic transition to the alarm display screen when an alarm occurs.
—	—	—	—	Some types of signals can be input / output from the operation panel I/O unit according to the type and No. of contacts.
—	—	—	—	
□	□	□	□	
□	□	□	□	Some types of signals can be input / output from the remote I/O unit according to the type and No. of contacts. Remote I/O units are used by being connected to the control unit or the operation panel I/O unit. Multiple remote I/O units can be used as long as the total number of occupied stations is 64 or less.
□	□	□	□	
□	□	□	□	
□	□	□	□	
□	□	—	—	
□	□	—	—	
□	□	□	□	NC unit can be directly connected to the network to serve as the master / slave station of the MELSEC CC-Link.
□	□	□	□	NC can input / output devices to / from slave stations as a master station of PROFIBUS-DP communication by connecting to PROFIBUS-DP-capable slave stations.

○Standard △Optional □Selection

class	Lathe system						Machining center system	
	M800W Series		M800S Series		M80 Series		M800W Series	
	M850W	M830W	M850S	M830S	M80 TypeA	M80 TypeB	M850W	M830W
7 Installing S/W for machine tools								
1 Customization (NC Designer2) (Note 1)	○	○	○	○	○	○	○	○
1 Customization data storage capacity [MB]	*	*	*	*	*	*	*	*
2 Customization Working Memory Size [MB]	6	6	6	6	3	3	6	6
2 User-defined key	○	○	○	○	○	○	○	○
3 EZSocket I/F (Note 1)	○	○	○	○	○	○	○	○
4 APLC release (Note 1)	△	△	△	△	○	○	△	△
5 Custom API library (Note 1)	○	○	○	○	○	○	○	○
6 MES interface library	△	△	△	△	○	○	△	△
8 Others								
1 System lock	△	△	△	△	○	○	△	△
2 CNC remote operation tool								
1 NC Monitor2 (Note 1)	○	○	○	○	○	○	○	○
2 NC Explorer (Note 3)	○	○	○	○	○	○	○	○
3 Automatic operation lock	○	○	○	○	○	○	○	○
4 Power consumption computation	○	○	○	○	○	○	○	○
5 EcoMonitorLight connection	□	□	□	□	□	□	□	□

(Note 1) Please contact us to purchase this tool.
(Note 3) This tool is free of charge. Please contact us.

M800/M80 SERIES SPECIFICATIONS LIST

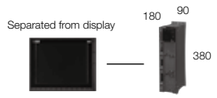
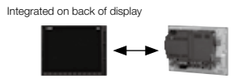
S/W ver.A4

Machining center system				General explanation
M800S Series		M80 Series		
M850S	M830S	M80 TypeA	M80 TypeB	
○	○	○	○	It is an optional function that allows a user-created screen or window to be displayed as an HMI screen or another application on the screen.
*	*	*	*	
6	6	3	3	
○	○	○	○	This function allows an arbitrary character string to be assigned to a key and makes it easy to input a typical character string.
○	○	○	○	This middleware makes it easy to develop applications having the Windows interface.
△	△	○	○	APLC (Advanced Programmable Logic Controller) release is a function that allows the user-generated C language module to be called from the NC. Control operations that are difficult to express in a sequence program can be created with the C language.
○	○	○	○	Reading / writing of each information within NC unit is possible by using custom API library.
△	△	○	○	The MES interface library function links the NC internal data and the database of information system (manufacturing execution system) without a communication gateway.
△	△	○	○	This function locks the operations of the NC if the release code is not entered before the specified time limit.
○	○	○	○	NC Monitor2 is a PC software tool that monitors information in the NC unit connected with the Ethernet.
○	○	○	○	NC Explorer is a software tool to operate the machining data files of each NC unit connected with a host personal computer by Ethernet connection from the Explorer on the host personal computer.
○	○	○	○	Automatic operation lock function prevents the falsification of APLC (C language module) by a third party.
○	○	○	○	Present power consumption and accumulated power consumption can be acquired with this function.The present power consumption notifies the instantaneous power consumption and the accumulated power consumption notifies the integrated value of the present power consumption.
□	□	□	□	NC system can collect and manage the electric power of the machine tool which is measured by the energy measuring unit "EcoMonitorLight".

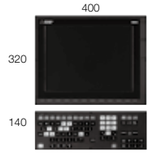
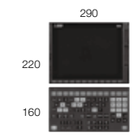
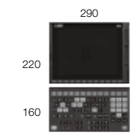
4 CNC SYSTEM

CNC SYSTEM HARDWARE

[mm]

Control unit	
M800W Series (Separated type)	M800S/M80 Series (Integrated type)
	

[mm]

Display	Keyboard	M800W Series	M800S Series	M80 Series
FCU8-DU191-75 (M800W) 19-type Touchscreen	—		—	—
FCU8-DU181-34 (M800W) FCU8-DU181-31 (M800S) FCU8-DU181-32 (M80) 15-type Touchscreen	FCU8-KB083 Clear key			
FCU8-DU141-31 (M800S) FCU8-DU141-32 (M80) 10.4-type Touchscreen	FCU8-KB047 Clear key	—		
FCU8-DU141-31 (M800S) FCU8-DU141-32 (M80) 10.4-type Touchscreen	FCU8-KB046 Clear key	—		
FCU8-DU121-12 (M80) 8.4-type	FCU8-KB026 Clear key	—	—	

CNC SYSTEM I/O UNIT AND OTHERS

■List of Units

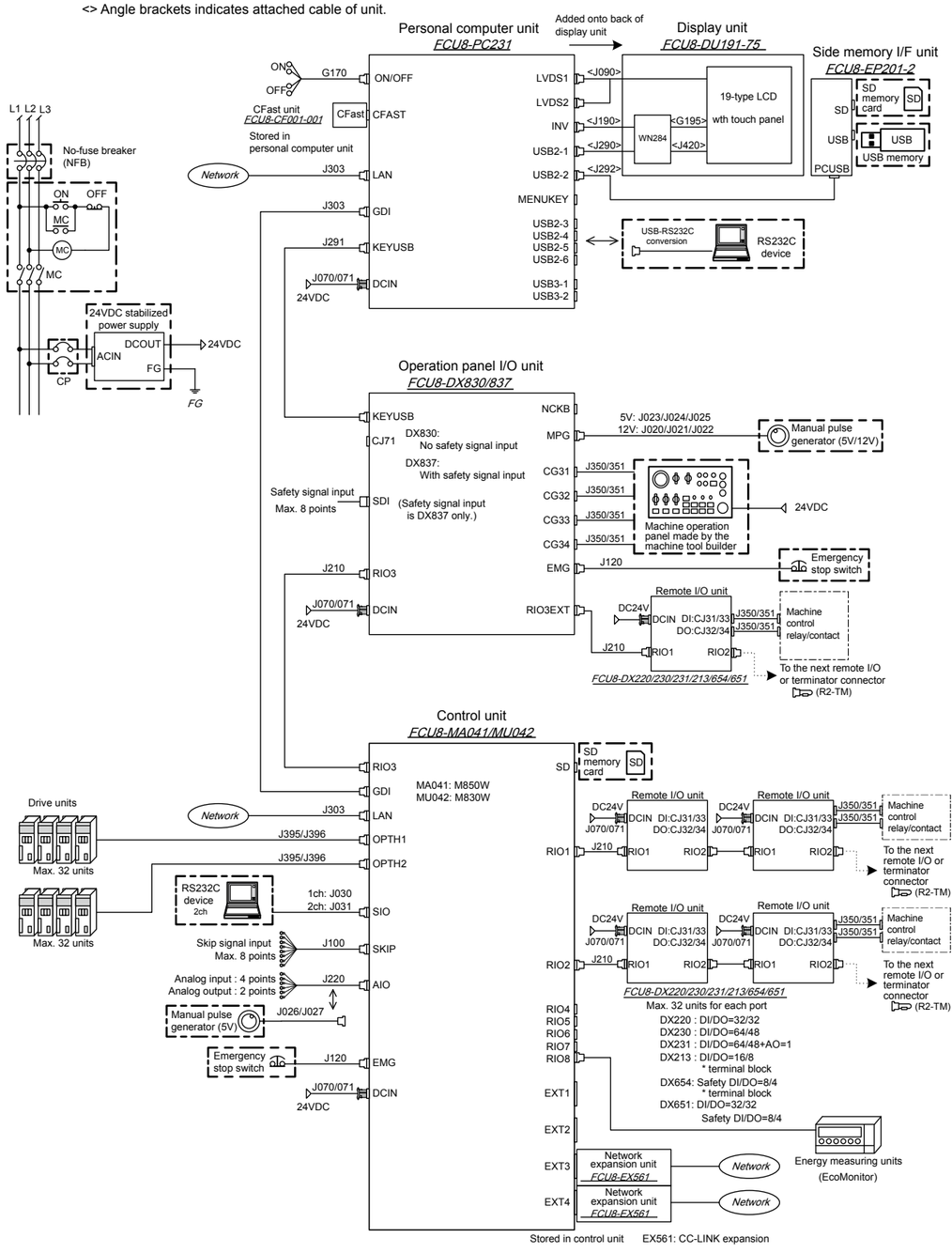
Classification		Type	Remarks	Supported model		
				M800W	M800S	M80
[Operation Panel I/O Unit]						
DI 24V/0V common input	DO Source output	FCU8-DX830	DI : 64-points 24V/0V common type DO : 64-points source type MPG : 3ch Remote I/O 2.0 I/F RIO occupied stations (fixed) : 1, 2, 7 ~ 14 RIO extensible stations : 3 ~ 6, 15 ~ 64	○	–	–
		FCU8-DX750	DI : 96-points 24V/0V common type DO : 64-points source type MPG : 3ch Remote I/O 2.0 I/F RIO occupied stations (fixed) : 1 ~ 3,7 ~ 12 RIO extensible stations : 4 ~ 6,13 ~ 64	–	○	○
DI 24V/0V common input Safety DI 24V/0V ommon input	DO Source output	FCU8-DX837	DI : 64-points 24V/0V common type DO : 64-points source type Safety DI : 8-points 0V common type MPG : 3ch Remote I/O 2.0 I/F RIO occupied stations (fixed) : 1 ~ 4, 7 ~ 14 RIO extensible stations : 5, 6, 15 ~ 64	○	–	–
[Remote I/O Unit]						
DI 24V/0V common input	DO Source output	FCU8-DX220	DI : 32-points 24V/0V common type DO : 32-points source type Number of occupied stations : 1	○	○	○
		FCU8-DX230	DI : 64-points 24V/0V common type DO : 48-points source type Number of occupied stations : 2	○	○	○
DI 24V/0V common input	DO Source output AO Analog output	FCU8-DX231	DI : 64-points 24V/0V common type DO : 48-points source type AO : 1 point Number of occupied stations : 2	○	○	○
DI 0V common input	DO Source output (large capacity)	FCU8-DX213	DI : 16-points 0V common type DO : 8-points source type Number of occupied stations : 1	○	○	○
Safety DI 0V common input	Safety DO Source output (large capacity)	FCU8-DX654	Safety DI : 8-points 0V common type Safety DO : 4-points source type Number of occupied stations : 2	○	○	○
DI 24V/0V common input Safety DI 0V common input	DO Source output Safety relay output	FCU8-DX651	DI : 32-points 24V/0V common type DO : 32-points source type Safety DI : 8-points 0V common type Safety relay : 4-points (non-voltage contact) Relay contact welding detection Number of occupied stations : 3	○	○	○
[Expansion Unit/Card]						
CC-Link expansion unit		FCU8-EX561	CC-Link × 1ch	○	○	○
Option Relay Unit		FCU8-EX702	Option for 1ch	–	○	○
[Side Memory I/F Unit]						
Side Memory I/F Unit		FCU8-EP201-2	SDHC I/F : 1ch USB2.0 I/F : 1ch USB communication (between WN251 and personal computer) Unit lid (resin molded article), metal plate, etc. Exclusive for 19-type display unit	○	–	–
[Manual Pulse Generator]						
5V Manual Pulse Generator		UFO-01-2Z9	Input DC5V 100 pulse/rev	○	○	○
12V Manual Pulse Generator		HD60C	Input DC12V 25 pulse/rev	○	○	○
[Encoder]						
Synchronous feed encoder		OSE1024-3-15-68	Input DC5V 1024 pulse/rev 6000 r/min, 68-square flange	–	○	○
		OSE1024-3-15-68-8	Input DC5V 1024 pulse/rev 8000 r/min, 68-square flange	–	○	○
		OSE1024-3-15-160	Input DC5V 1024 pulse/rev 6000 r/min, 160-square flange	–	○	○

DI: Digital input signals, DO: Digital output signals, AO: Analog output signals

CNC SYSTEM GENERAL CONNECTION DIAGRAM

■M800W Series (19-type)

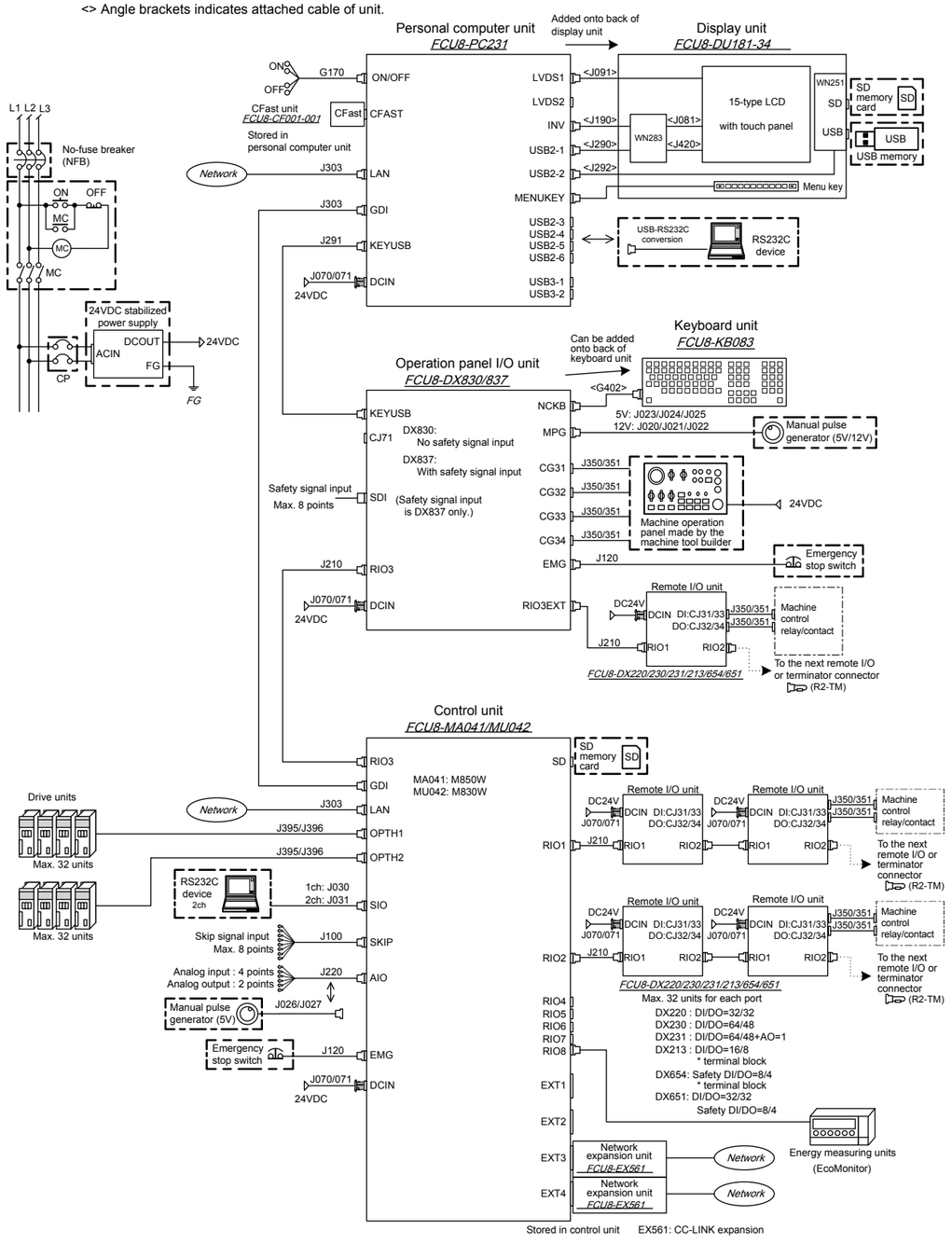
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.



(Note 1) For details of the cable and the connector, refer to "CNC SYSTEM CABLES LIST" to be described.
(Note 2) For connections of the drive units, refer to "DRIVE SYSTEM SYSTEM CONFIGURATION DRAWING" to be described.

■M800W Series (15-type)

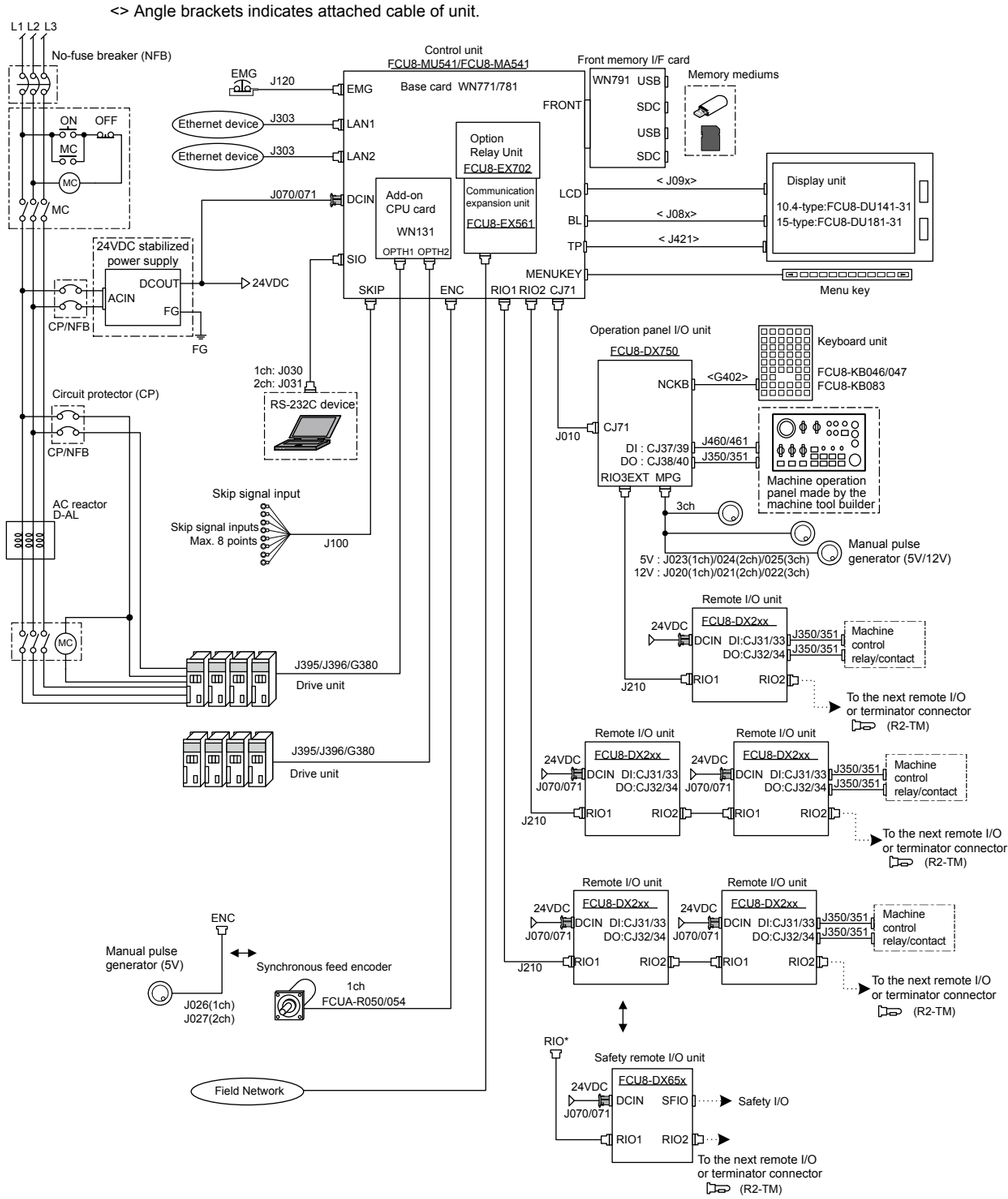
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.



(Note 1) For details of the cable and the connector, refer to "CNC SYSTEM CABLES LIST" to be described.
(Note 2) For connections of the drive units, refer to "DRIVE SYSTEM SYSTEM CONFIGURATION DRAWING" to be described.

■M800S Series

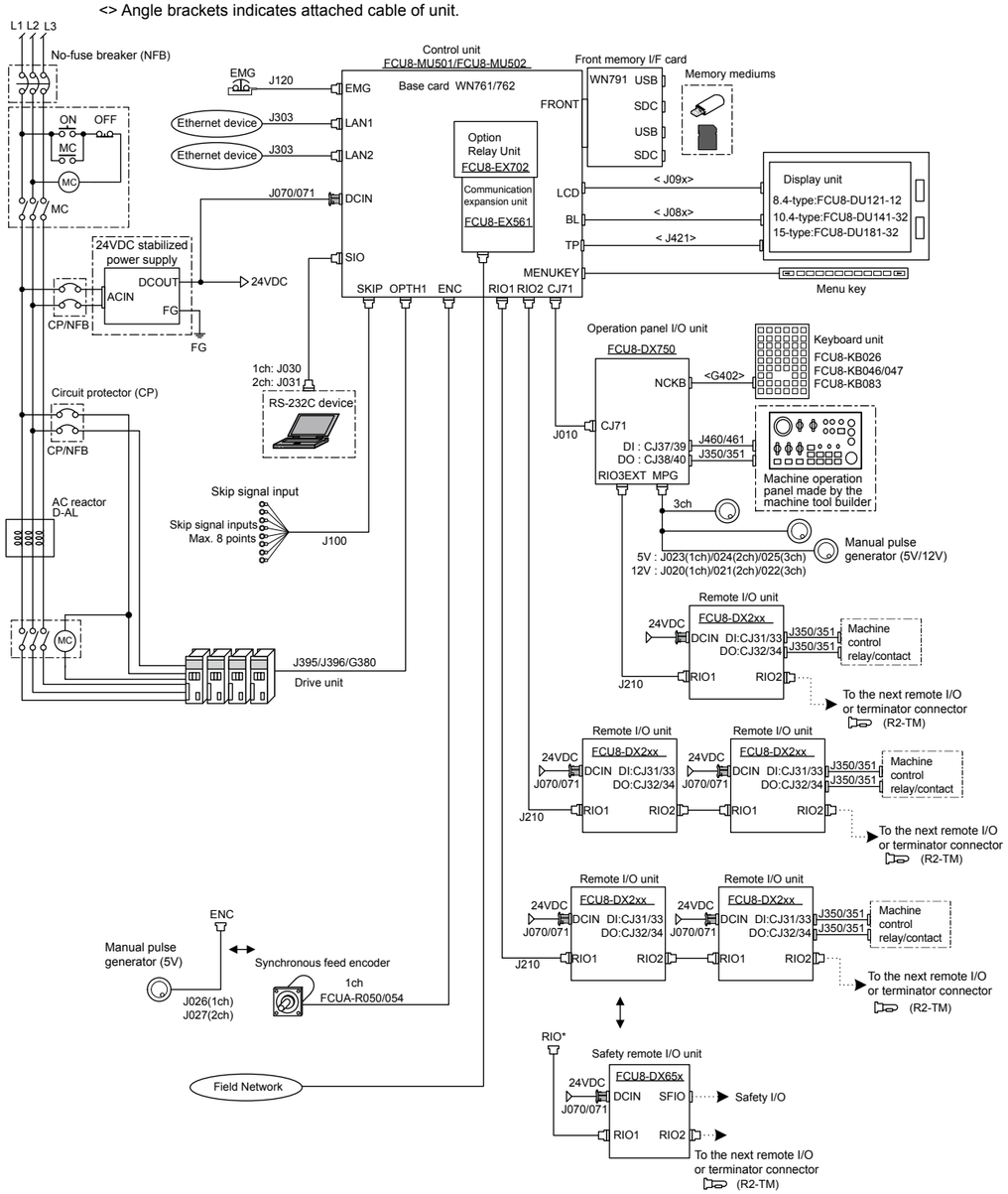
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.



(Note 1) For details of the cable and the connector, refer to "CNC SYSTEM CABLES LIST" to be described.
(Note 2) For connections of the drive units, refer to "DRIVE SYSTEM SYSTEM CONFIGURATION DRAWING" to be described.

■M80 Series

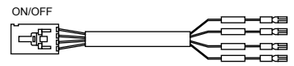
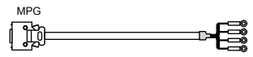
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.

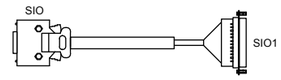
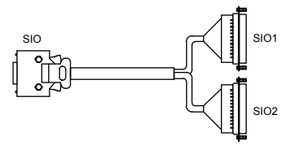
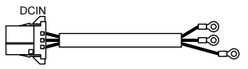
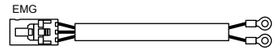
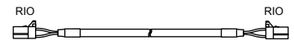
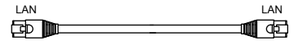


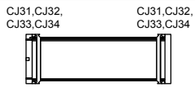
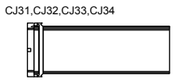
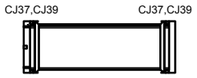
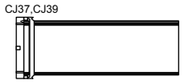
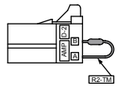
(Note 1) For details of the cable and the connector, refer to "CNC SYSTEM CABLES LIST" to be described.
(Note 2) For connections of the drive units, refer to "DRIVE SYSTEM SYSTEM CONFIGURATION DRAWING" to be described.
(Note 3) The 8.4-type display unit is incompatible with the touchscreen.

4 CNC SYSTEM

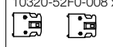
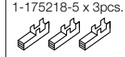
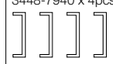
CNC SYSTEM CABLES LIST

	Application	Type	Length (m)	Contents	Supported model M800W	M800S	M80
(1)	Connection cable between personal computer unit and operation panel I/O unit	J291 L0.15M	0.15		○	—	—
		J291 L0.5M	0.5				
		J291 L1.0M	1				
(2)	ON/OFF switch cable (ON/OFF switch - Personal computer unit)	G170 L1M	1		○	—	—
		G170 L2M	2				
		G170 L3M	3				
		G170 L5M	5				
		G170 L10M	10				
		G170 L15M	15				
(3)	Analog output cable	J220 L1M	1		○	—	—
		J220 L2M	2				
		J220 L3M	3				
		J220 L5M	5				
		J220 L7M	7				
		J220 L10M	10				
		J220 L15M	15				
		J220 L20M	20				
(4)	Operation panel I/O interface cable	J010 L0.5M (for 8.4/10.4-type display)	0.5		—	○	○
		J010 L1M	1				
(5)	Manual pulse generator cable (12V) : 1ch	J020 L1M	1		○	○	○
		J020 L2M	2				
		J020 L3M	3				
		J020 L5M	5				
		J020 L7M	7				
		J020 L10M	10				
		J020 L15M	15				
		J020 L20M	20				
		J020 L30M	30				
(6)	Manual pulse generator cable (12V) : 2ch	J021 L1M	1		○	○	○
		J021 L2M	2				
		J021 L3M	3				
		J021 L5M	5				
		J021 L7M	7				
		J021 L10M	10				
		J021 L15M	15				
		J021 L20M	20				
		J021 L30M	30				
(7)	Manual pulse generator cable (12V) : 3ch	J022 L1M	1		○	○	○
		J022 L2M	2				
		J022 L3M	3				
		J022 L5M	5				
		J022 L7M	7				
		J022 L10M	10				
		J022 L15M	15				
		J022 L20M	20				
		J022 L30M	30				
(8)	Manual pulse generator cable (5V) : 1ch	J023 L1M	1		○	○	○
		J023 L2M	2				
		J023 L3M	3				
		J023 L5M	5				
		J023 L7M	7				
		J023 L10M	10				
		J023 L15M	15				
		J023 L20M	20				
(9)	Manual pulse generator cable (5V) : 2ch	J024 L1M	1		○	○	○
		J024 L2M	2				
		J024 L3M	3				
		J024 L5M	5				
		J024 L7M	7				
		J024 L10M	10				
		J024 L15M	15				
		J024 L20M	20				
(10)	Manual pulse generator cable (5V) : 3ch	J025 L1M	1		○	○	○
		J025 L2M	2				
		J025 L3M	3				
		J025 L5M	5				
		J025 L7M	7				
		J025 L10M	10				
		J025 L15M	15				
		J025 L20M	20				

	Application	Type	Length (m)	Contents	Supported model M800W	M800S	M80
(11)	Manual pulse generator cable (5V) : 1ch (for connection to control unit)	J026 L1M	1		○	○	○
		J026 L2M	2				
		J026 L3M	3				
		J026 L5M	5				
		J026 L7M	7				
		J026 L10M	10				
		J026 L15M	15				
		J026 L20M	20				
(12)	Manual pulse generator cable (5V) : 2ch (for connection to control unit)	J027 L1M	1		○	○	○
		J027 L2M	2				
		J027 L3M	3				
		J027 L5M	5				
		J027 L7M	7				
		J027 L10M	10				
		J027 L15M	15				
		J027 L20M	20				
(13)	RS-232C I/F cable: 1ch (for control unit)	J030 L1M	1		○	○	○
		J030 L2M	2				
		J030 L3M	3				
		J030 L5M	5				
		J030 L7M	7				
		J030 L10M	10				
(14)	RS-232C I/F cable: 2ch (for control unit)	J031 L1M	1		○	○	○
		J031 L2M	2				
		J031 L3M	3				
		J031 L5M	5				
		J031 L7M	7				
		J031 L10M	10				
(15)	24VDC power cable	J070 L1M	1		○	○	○
		J070 L2M	2				
		J070 L3M	3				
		J070 L5M	5				
		J070 L7M	7				
		J070 L10M	10				
		J070 L15M	15				
		J071 L20M (for long distance)	20				
(16)	SKIP input cable	J100 L1M	1		○	○	○
		J100 L2M	2				
		J100 L3M	3				
		J100 L5M	5				
		J100 L7M	7				
		J100 L10M	10				
		J100 L15M	15				
		J100 L20M	20				
(17)	Emergency stop cable	J120 L1M	1		○	○	○
		J120 L2M	2				
		J120 L3M	3				
		J120 L5M	5				
		J120 L7M	7				
		J120 L10M	10				
		J120 L15M	15				
		J120 L20M	20				
		J120 L30M	30				
(18)	Remote I/O 2.0 communication cable	J210 L0.3M	0.3		○	○	○
		J210 L1M	1				
		J210 L2M	2				
		J210 L3M	3				
		J210 L5M	5				
		J210 L7M	7				
		J210 L10M	10				
		J210 L15M	15				
		J210 L20M	20				
		J210 L30M	30				
(19)	LAN straight cable	J303 L1M	1		○	○	○
		J303 L2M	2				
		J303 L3M	3				
		J303 L5M	5				
		J303 L7M	7				
		J303 L10M	10				
		J303 L15M	15				
		J303 L20M	20				
		J303 L30M	30				

	Application	Type	Length (m)	Contents	Supported model M800W	M800S	M80
(20)	DI/DO cable (connectors at both ends)	J350 L1M	1		○	○	○
		J350 L2M	2				
		J350 L3M	3				
		J350 L5M	5				
(21)	DI/DO cable (connector at one end)	J351	3		○	○	○
(22)	DI/DO cable (connectors at both ends) (for operation panel I/O unit)	J460 L1M	1		○	○	○
		J460 L2M	2				
		J460 L3M	3				
		J460 L5M	5				
(23)	DI/DO cable (connector at one end) (for operation panel I/O unit)	J461	3		○	○	○
(24)	Synchronous encoder - control unit (straight, with connector)	FCUA-R050-5M	5		—	○	○
(25)	Synchronous encoder - control unit (right angle, with connector)	FCUA-R054-3M	3		—	○	○
		FCUA-R054-5M	5				
		FCUA-R054-10M	10				
		FCUA-R054-15M	15				
		FCUA-R054-20M	20				
(26)	Cable for emergency stop release	G123	—		○	○	○
(27)	Terminator for remote I/O interface	R2-TM	—	 One terminator is required to be installed at the final end of remote IO unit.	○	○	○

■Cable connector sets for CNC

	Application	Type	Contents		Supported mode M800W	M800S	M80
(1)	General I/O units (for ENC,SKIP,SIO,MPG)	FCUA-CS000	Connector (3M) 10120-3000PE x 2pcs. 	Shell kit (3M) 10320-52F0-008 x 2pcs. 	○	○	○
(2)	Emergency stop connector (for EMG)	50-57-9403 16-02-0103* 3pcs.	Connector (MOLEX) 50-57-9403 x 1pc. 	Gold contact (MOLEX) 16-02-0103 x 3pcs. 	○	○	○
(3)	Connector kit for RIO2.0 unit	1-1318119-3* 2pcs. 1318107-1* 8pcs.	Connector(Tyco Electronics) 1-1318119-3 x 2pcs. 	Contact (Tyco Electronics) 1318107-1 x 8pcs. 	○	○	○
(4)	24VDC power supply connector (for DCIN)	FCUA-CN220	Connector (Tyco Electronics) 2-178288-3 x 1pc. 	Tin contact (Tyco Electronics) 1-175218-5 x 3pcs. 	○	○	○
(5)	Remote I/O unit - terminal block	7940-6500SC* 4pcs. 3448-7940* 4pcs.	Connector (3M) 7940-6500SC x 4pcs. 	Strain relief (3M) 3448-7940 x 4pcs. 	○	○	○
(6)	DI/DO connector	7950-6500SC* 2pcs. 3448-7950* 2pcs.	Connector (3M) 7950-6500SC x 2pcs. 	Strain relief (3M) 3448-7950 x 2pcs. 	○	○	○
(7)	ON/OFF switch connector	50-57-9404 16-02-0103* 4pcs.	Connector (MOLEX) 50-57-9404 x 1pc. 	Contact (MOLEX) 16-02-0103 x 4pcs. 	○	—	—
(8)	Operation panel I/O connector	2-1318119-4 1318107-1* 8pcs.	Connector (Tyco Electronics) 2-1318119-4 x 1pc. 	Contact (Tyco Electronics) 1318107-1 x 8pcs. 	—	○	○

DRIVE SYSTEM

Drive unit

High-performance Servo/ Spindle Drive Units MDS-E/EH Series

- The servo control-dedicated core processor realizes an increase in control speed, leading to improved basic performance. When combined with a higher resolution motor sensor and enhanced high-speed optical communication, this drive contributes to high-speed, high-accuracy control.
- Motor power connector comprises an anti-misinsertion mechanism. This helps to eliminate connection errors.
- Improved diagnostic and preventive-maintenance features.
- Safe Torque Off (STO) and Safe Brake Control (SBC) are supported in effort to enhance safety features.

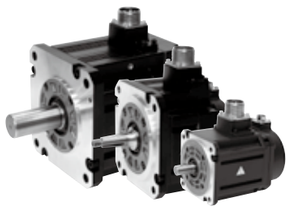
Multi-hybrid Drive Units MDS-EM Series

- The multi-hybrid drive unit is capable of driving a maximum of three servo axes and one spindle. This contributes to the downsizing of machines and offers technical advantages.
- Motor power connector comprises an anti-misinsertion mechanism. This helps to eliminate connection errors.
- Safe Torque Off (STO) and Safe Brake Control (SBC) are supported in effort to enhance safety features.

All-in-one compact drive units MDS-EJ/EJH Series

- Ultra-compact drive units with built-in power supplies contribute to reduced control panel size.
- The servo control-dedicated core processor realizes an increase in control speed, leading to improved basic performance. When combined with a higher resolution motor sensor and enhanced high-speed optical communication, this drive contributes to high-speed, high-accuracy control.
- Safe Torque Off (STO) and Safe Brake Control (SBC) are supported in effort to enhance safety features.
- MDS-EJH 400V system drive unit is available (Note 1).

Servo motors

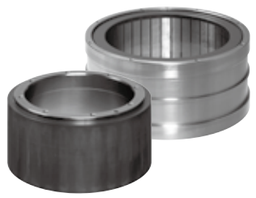


Medium-inertia, high-accuracy and high-speed motors HG Series

- Sensor resolution has been significantly improved. The servo motors, which boast smooth rotation and outstanding acceleration capabilities, are well-suited to serve as feed axes of machine tools.
- Range 0.5 to 9 [kW]
- Maximum speed: 4,000 or 5,000 [r/min]
- Safety support sensors are included as standard specification. Sensor connectors are screw-locked and have enhanced vibration resistance. Three sensor resolutions (i.e., 1, 4 and 67 million pulses/rev) are available.

Linear Servo Motor LM-F Series

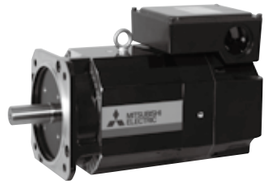
- Use in clean environments is possible since no ball screws are used, eliminating possible contamination from grease.
- Elimination of transmission mechanisms, including backlash, enables smooth and quiet operation even at high speeds.
- Dimensions:
  Length: 290 to 1,010 [mm]
  Width: 120 to 240 [mm]



Direct Drive Servo Motor TM-RB Series

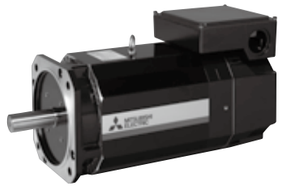
- High-torque, direct-drive motor combined with high-gain control provides quick acceleration and positioning, which makes rotation smoother.
- Suitable for rotary axes that drive tables or spindle heads.
- Range:
  Maximum torque: 36 to 1,280 [N·m]

Spindle motor



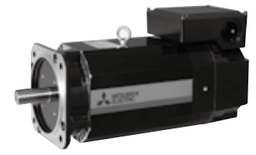
High-performance Spindle Motor SJ-D Series

- Motor energy loss has been significantly reduced by optimizing the magnetic circuit.
- High-speed bearing incorporated as a standard feature helps to achieve higher speed, lower vibration and improved durability.
- Range:
  Normal SJ-D Series 3.7 to 11 [kW]
  Compact & light SJ-DJ Series 5.5 to 15 [kW]
- Maximum speed 10,000 or 12,000 [r/min]



High-output, High-torque Spindle Motor SJ-DG Series

- Addition of S3 rating (%ED rating) has improved output and torque acceleration/deceleration characteristics.
- Balance adjustment ring has been added to the counter-load side for fine tuning.
- Range S3 rating: 5.5 to 15 [kW]
- Maximum speed 10,000 or 12,000 [r/min]



Low-inertia, High-speed Spindle Motor SJ-DL Series

- The spindle motors are dedicated to tapping machines requiring faster drilling and tapping.
- The latest design technologies have made it possible to attain lower vibration and greater rigidity even with the lighter weight.
- Range 0.75 to 7.5 [kW]

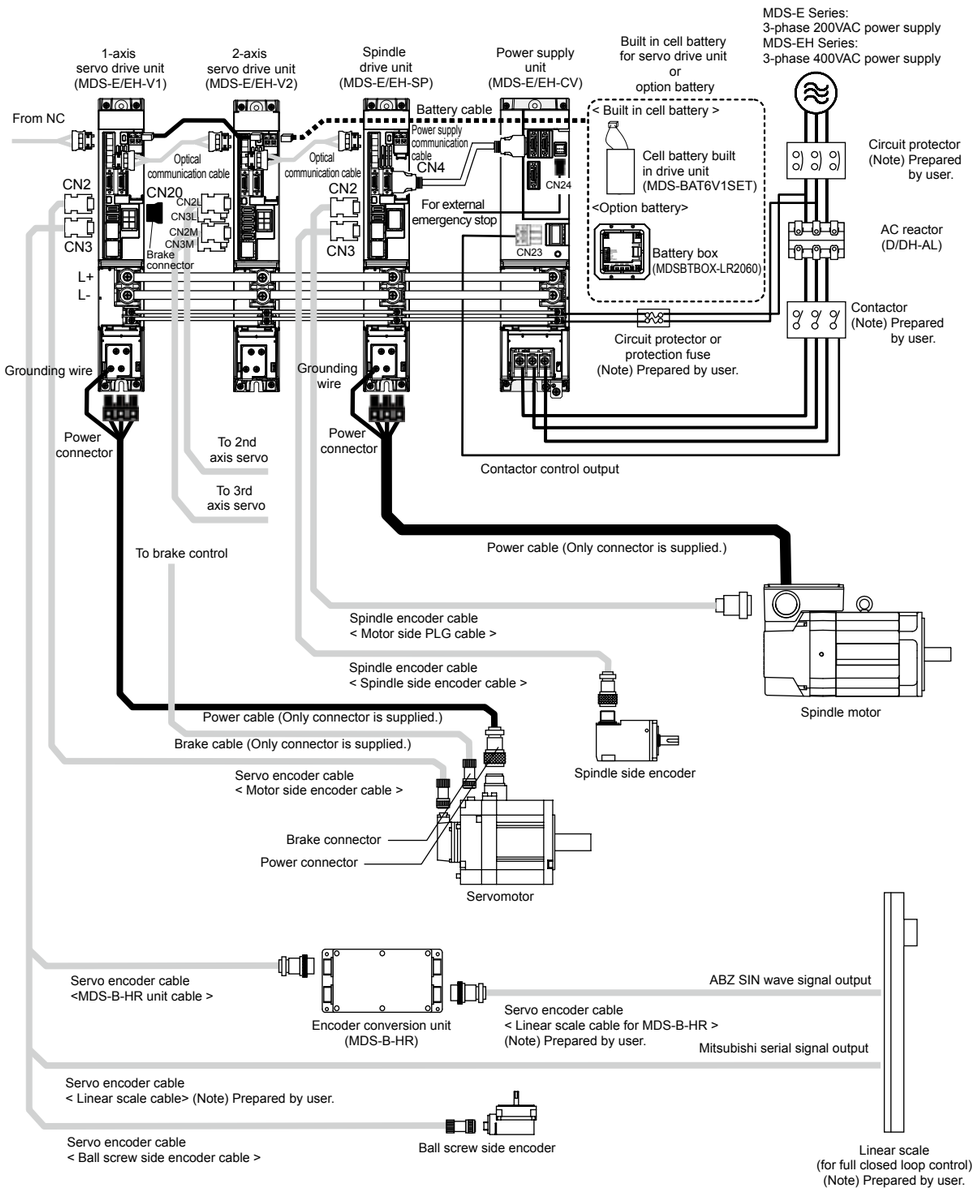
Built-in Spindle Motor SJ-BG Series

- The electrical design has been optimized to increase the continuous rated torque per unit volume, contributing to the downsizing of spindle units.
- A mold with cooling jacket is available as an optional feature.

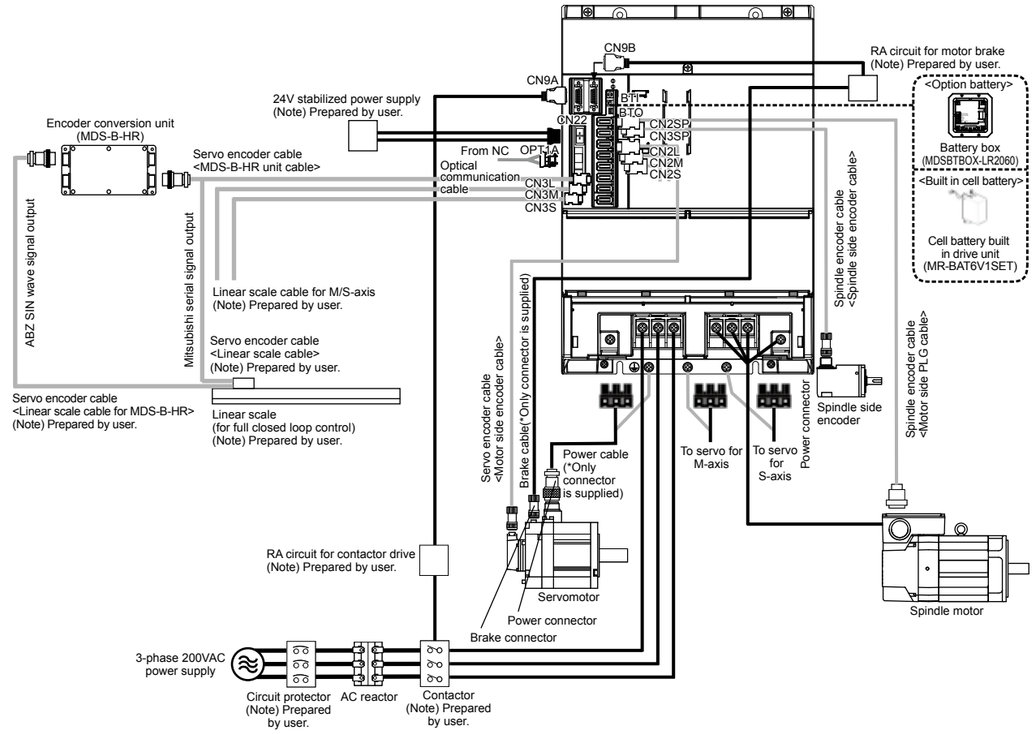
(Note 1) For servo motors only

DRIVE SYSTEM SYSTEM CONFIGURATION

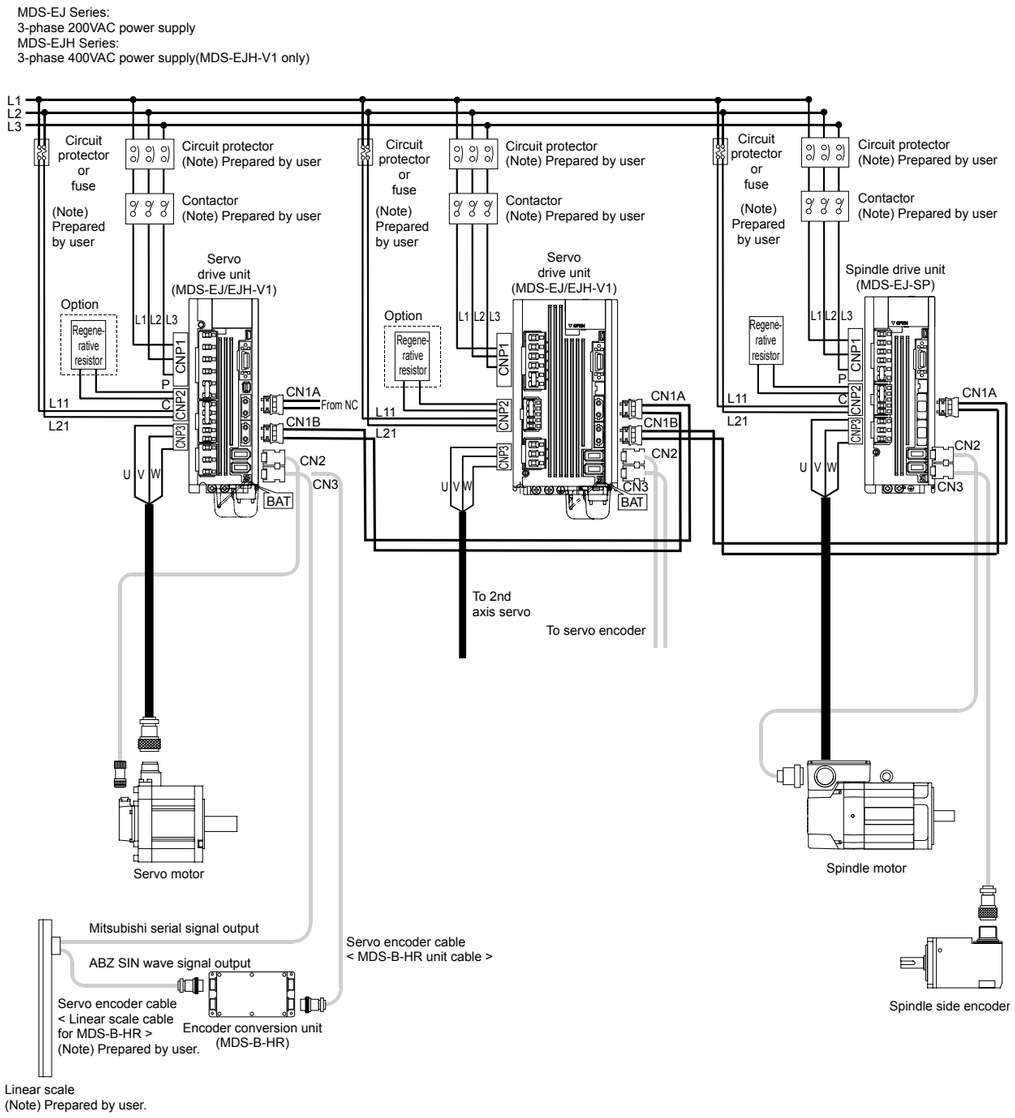
■MDS-E/EH Series



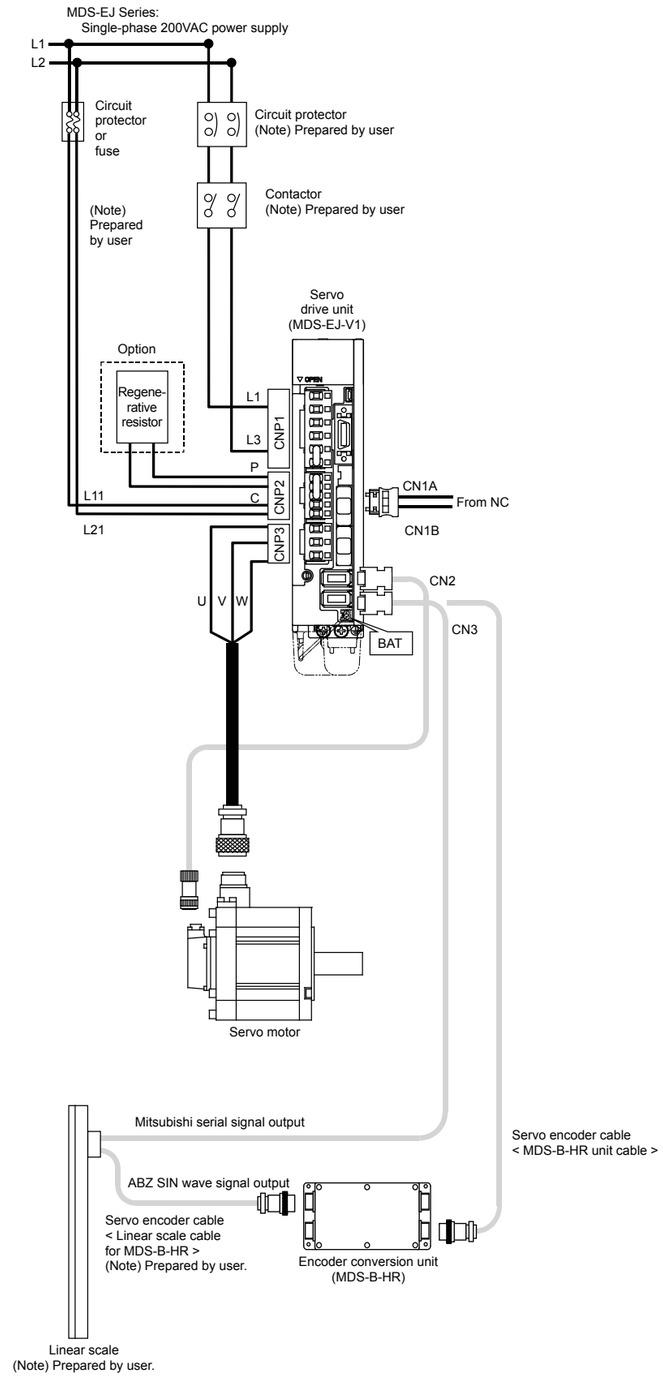
■MDS-EM Series



■MDS-EJ/EJH Series



<For single-phase power supply>



DRIVE SYSTEM SPECIFICATIONS

<Servo specification>

Item		MDS-E-V1/V2	MDS-EH-V1/V2	MDS-EM-SPV3	MDS-EJ/EJH-V1
Software Version		A2	A2	A2	A2
1 Base control functions	1.1 Full closed loop control	●	●	●	●
	1.2 Position command synchronous control	●	●	●	●
	1.3 Speed command synchronous control	●	●	–	–
	1.4 Distance-coded reference position control	●	●	●	●
2 Servo control function	2.1 Torque limit function (stopper function)	●	●	●	●
	2.2 Variable speed loop gain control	●	●	●	●
	2.3 Gain changeover for synchronous tapping control	●	●	●	●
	2.4 Speed loop PID changeover control	●	●	●	●
	2.5 Disturbance torque observer	●	●	●	●
	2.6 Smooth High Gain control (SHG control)	●	●	●	●
	2.7 High-speed synchronous tapping control (OMR-DD control)	●	●	●	●
	2.8 Dual feedback control	●	●	●	●
	2.9 HAS control	●	●	●	●
	2.10 OMR-FF control	●	●	●	●
3 Compensation control function	3.1 Jitter compensation	●	●	●	●
	3.2 Notch filter	Variable frequency: 4 Fixed frequency: 1	Variable frequency: 4 Fixed frequency: 1	Variable frequency: 4 Fixed frequency: 1	Variable frequency: 4 Fixed frequency: 1
	3.3 Adaptive tracking-type notch filter	●	●	●	●
	3.4 Overshooting compensation	●	●	●	●
	3.5 Machine end compensation control	●	●	●	●
	3.6 Lost motion compensation type 2	●	●	●	●
	3.7 Lost motion compensation type 3	●	●	●	●
	3.8 Lost motion compensation type 4	●	●	●	●
4 Protection function	4.1 Deceleration control at emergency stop	●	●	●	●
	4.2 Vertical axis drop prevention/pull-up control	●	●	●	●
	4.3 Earth fault detection	●	●	●	●
	4.4 Collision detection function	●	●	●	●
	4.5 SLS (Safely Limited Speed) function (Note 1)	●	●	●	●
	4.6 Fan stop detection	●	●	●	●
	4.9 STO (Safe Torque Off) function	●	●	●	●
	4.10 SBC (Safe Brake Control) function	●	●	●	●
5 Sequence function	5.2 Motor brake control function	●	●	●	●
	5.4 Specified speed output	●	●	●	–
	5.5 Quick READY ON sequence	●	●	●	–
6 Diagnosis function	6.1 Monitor output function	●	●	●	●
	6.2 Machine resonance frequency display function	●	●	●	●
	6.3 Machine inertia display function	●	●	●	●

(Note 1) 4.5 SLS (Safely Limited Speed) function is set on NC side.

<Spindle specification>

Item		MDS-E-SP	MDS-EH-SP	MDS-E-SP2	MDS-EM-SPV3
Software Version		A2	A2	A2	A2
1 Base control functions	1.1 Full closed loop control	●	●	●	●
	1.5 Spindle's continuous position loop control	●	●	●	●
	1.6 Coil changeover control	●	●	–	●
	1.7 Gear changeover control	●	●	●	●
	1.8 Orientation control	●	●	●	●
	1.9 Indexing control	●	●	●	●
	1.10 Synchronous tapping control	●	●	●	●
	1.11 Spindle synchronous control	●	●	●	●
	1.12 Spindle/C axis control	●	●	●	●
	1.13 Proximity switch orientation control	●	●	● (Note 1)	●
2 Spindle control functions	2.1 Torque limit function	●	●	●	●
	2.2 Variable speed loop gain control	●	●	●	●
	2.5 Disturbance torque observer	●	●	●	●
	2.6 Smooth High Gain control (SHG control)	●	●	●	●
	2.7 High-speed synchronous tapping control (OMR-DD control)	●	●	●	●
	2.8 Dual feedback control	●	●	●	●
	2.11 Control loop gain changeover	●	●	●	●
	2.12 Spindle output stabilizing control	●	●	●	●
	2.13 High-response spindle acceleration/ deceleration function	●	●	●	●
3 Compensation control function	3.1 Jitter compensation	●	●	●	●
	3.2 Notch filter	Variable frequency: 4 Fixed frequency: 1	Variable frequency: 4 Fixed frequency: 1	Variable frequency: 4 Fixed frequency: 1	Variable frequency: 4 Fixed frequency: 1
	3.3 Adaptive tracking-type notch filter	●	●	●	●
	3.4 Overshooting compensation	●	●	●	●
	3.6 Lost motion compensation type 2	●	●	●	●
	3.9 Spindle motor temperature compensation function	●	●	●	●
4 Protection function	4.1 Deceleration control at emergency stop	●	●	●	●
	4.3 Earth fault detection	●	●	●	●
	4.5 SLS (Safely Limited Speed) function	●	●	●	●
	4.6 Fan stop detection	●	●	●	●
	4.9 STO (Safe Torque Off) function	●	●	●	●
5 Sequence function	5.4 Specified speed output	●	●	●	●
	5.5 Quick READY ON sequence	●	●	●	●
6 Diagnosis function	6.1 Monitor output function	●	●	●	●
	6.2 Machine resonance frequency display function	●	●	●	●
	6.3 Machine inertia display function	●	●	●	●
	6.4 Motor temperature display function	●	●	●	●
	6.5 Load monitor output function	●	●	●	●
	6.6 Open loop control function	●	●	●	●

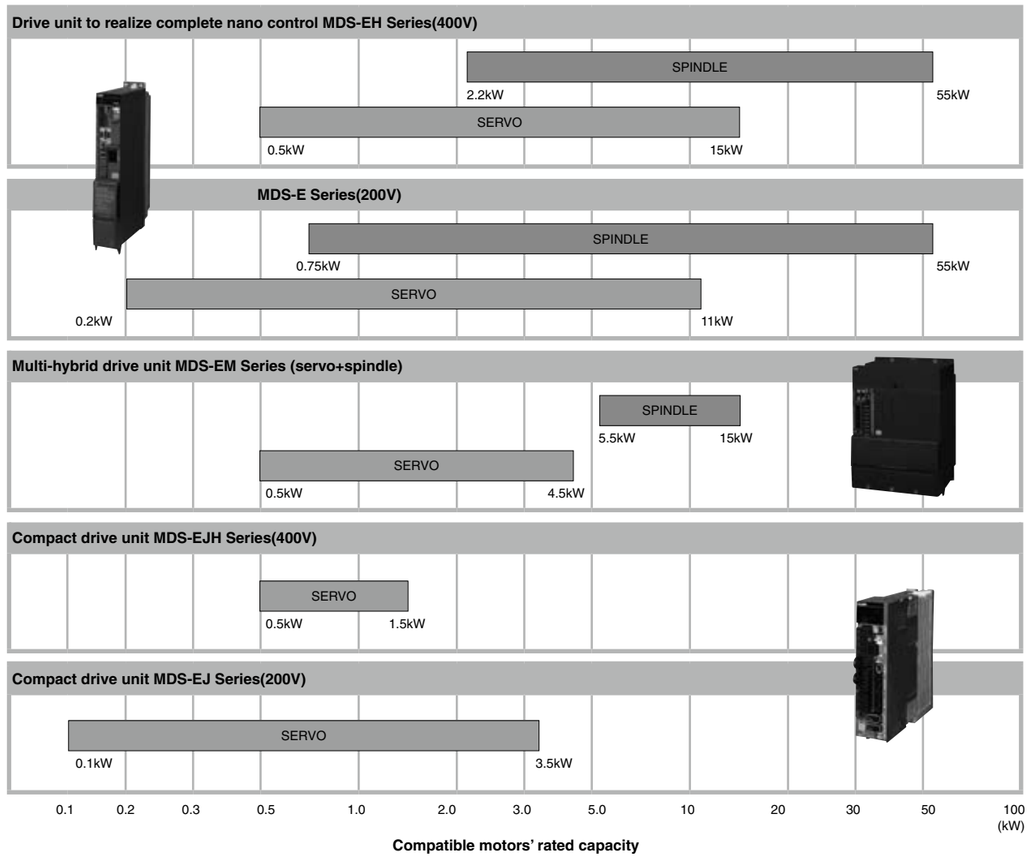
(Note 1) As for 2-axis spindle drive unit, setting is available only for one of the axes.
(Note 2) 4.5 SLS (Safely Limited Speed) function is set on NC side.

<Power Supply>

Item		MDS-E-CV	MDS-EH-CV	MDS-EM built-in converter	MDS-EJ/EJH-V1 built-in converter
Software Version		A1	A1	A1	A1
1 Base control functions	1.14 Power regeneration control	●	●	●	–
	1.15 Resistor regeneration control	–	–	–	●
4 Protection function	4.6 Fan stop detection	●	●	●	●
	4.7 Open-phase detection	●	●	●	–
	4.8 Contactor weld detection	●	●	●	●
	4.11 Deceleration and stop function at power failure (Note 1)	●	●	●	–
	4.12 Retraction function at power failure (Note 2)	●	●	–	–
5 Sequence function	5.1 Contactor control function	●	●	●	●
	5.3 External emergency stop function	●	●	●	●
	5.5 High-speed ready ON sequence	●	●	●	–
6 Diagnosis function	6.7 Power supply voltage display function	●	●	●	–
	6.8 Drive Unit Diagnosis Display Function	●	●	●	●

(Note 1) The power backup unit and resistor unit option are required.
(Note 2) The power backup unit and capacitor unit option are required.

■MITSUBISHI CNC DRIVE SYSTEM LINES



DRIVE SYSTEM TYPE

■200V HG servo motor

<HG Series>

HG ① ② ③ – ④

①Rated output and maximum rotation speed

Symbol	Rated output	Max. rotation speed	Flange size(mm)
75	under development		
105			
54	0.5 kW	4000 r/min	130 SQ.
104	1.0 kW	4000 r/min	130 SQ.
154	1.5 kW	4000 r/min	130 SQ.
224	2.2 kW	4000 r/min	130 SQ.
204	2.0 kW	4000 r/min	176 SQ.
354	3.5 kW	4000 r/min	176 SQ.
123	1.2 kW	3000 r/min	130 SQ.
223	2.2 kW	3000 r/min	130 SQ.
303	3.0 kW	3000 r/min	176 SQ.
453	4.5 kW	3500 r/min	176 SQ.
703	7.0 kW	3000 r/min	176 SQ.
903	9.0 kW	3000 r/min	204 SQ.
142	1.4 kW	2000 r/min	130 SQ.
302	3.0 kW	2000 r/min	176 SQ.

②Magnetic brake

Symbol	Magnetic brake
None	None
B	With magnetic brake

③Shaft end structure

Symbol	Shaft end structure
S	Straight
T	Taper

(Note) "Taper" is available for the motor whose flange size is 90 SQ. mm or 130 SQ. mm.

④Encoder

Symbol	Detection method	Encoder resolution
D48	Absolute position	1,048,576 p/rev
D51		4,194,304 p/rev
D74		67,108,864 p/rev

■200V Direct-drive motor

<TM-RB Series>

Primary side [coil side]

TM-RBP ① ② ③

Secondary side [magnet side]

TM-RBS ① ② ③

①Rated torque

Symbol	Rated torque
012	12 N·m
036	36 N·m
048	48 N·m
105	105 N·m
150	150 N·m
340	340 N·m
500	500 N·m

②Stator dimensions

Symbol	Dimension
C	DIA 130 mm
E	DIA 180 mm
G	DIA 230 mm
J	DIA 330 mm

③Rated rotation speed

Symbol	Speed
10	100 r/min
20	200 r/min

■200V Linear servo motor

<LM-F Series>

Primary side [coil side]

LM-FP ① ② – ③ **M-1WW0**

①Width

Symbol	Width (nominal)
2	120 mm
4	200 mm
5	240 mm

②Length

Symbol	Length (nominal)
B	290 mm
D	530 mm
F	770 mm
H	1010 mm

③Rated thrust

Symbol	Rated thrust
06	600 N
12	1200 N
18	1800 N
24	2400 N
36	3600 N
48	4800 N
60	6000 N

Secondary side [magnet side]

LM-FS ①**0-**②**-1WW0**

①Width

Symbol	Width (nominal)
2	120 mm
4	200 mm
5	240 mm

②Length

Symbol	Length (nominal)
480	480 mm
576	576 mm

■200V SJ-D spindle motor

<SJ-D Series (for 200V)> **SJ-D** ① ② / ③ – ④ ⑤ – ⑥

①Motor Series

Symbol	Motor Series
None	Normal specifications
G	High-output specifications
J	Compact & lightweight specifications
L	Low-inertia specifications

②Short-time (or %ED) rated output

Symbol	Short-time rated output
0.75	0.75 kW
1.5	1.5 kW
3.7	3.7 kW
5.5	5.5 kW
7.5	7.5 kW
11	11 kW
15	15 kW

③Maximum rotation speed

Indicates the hundreds place and higher order digits.

④Specification code

Indicates a specification code (01 to 99).

⑤Encoder

Symbol	Type
None	Type 1
T	Type 2

⑥Option (Note)

Symbol	Option
None	Standard (flange type, without oil seal, without key, coil changeover unavailable, air-cooling, solid shaft)
C	With key
J	Oil seal
S	Hollow shaft
X	Reversed cooling air

(Note) If more than one option is included, the symbols are in alphabetical order.

■200V SJ-V spindle motor

<SJ-V/VL Series> **SJ-** ① ② ③ ④ – ⑤ ⑥ **T**

①Motor Series

Symbol	Motor Series
V	Medium inertia Series
VL	Low inertia Series

②Coil changeover

Symbol	Coil changeover
None	Unavailable
K	Available

③Shaft configuration

Symbol	Shaft configuration
None	Standard
S	Hollow shaft

④Short-time rated output (Standard specification)

Symbol	Short-time rated output
0.75	0.75 kW
1.5	1.5 kW
2.2	2.2 kW
3.7	3.7 kW
5.5	5.5 kW
7.5	7.5 kW
11	11 kW
15	15 kW
18.5	18.5 kW
22	22 kW
26	26 kW
37	37 kW
45	45 kW
55	55 kW

⑤Specification code

The SJ-V/VLSeries is indicated with a specification code (01 to 99).

⑥Special specifications

Symbol	Special specifications
None	Standard
Z	High-speed bearing
FZ	High-speed bearing front-lock

(Note) This explains the model name system of a spindle motor, and all combinations of motor types listed above do not exist.

■200V Built-in spindle motor

<SJ-BG Series> SJ-BG ① ② / ③ – ④ ⑤ ⑥ ⑦

①Stator dimensions

Symbol	Stator dimensions
150	ϕ150mm
160	ϕ160mm

②Core width(A to Z)

③Maximum rotation speed
Indicates the hundreds place and higher order digits.

④Specification code (01 to 99)

⑤Power line

Symbol	Length of lead
1	500mm
2	1000mm
3	1500mm
4	2000mm

⑥Coil changeover

Symbol	Coil changeover
None	Unavailable
D	Available (Δ-2//Δ)
K	Available (人-Δ)

⑦Option

Symbol	Stator dimensions
None	Standard
J	With cooling jacket
S	Mold with cooling jacket
L	Mold without cooling jacket
R	Zoom in rotor inner diameter

<SJ-B Series> SJ- ① B ② ③ ④ ⑤ ⑥

①Voltage

Symbol	Voltage
2	200V
4	400V

* 400V is available by special order.

②Number of poles

Symbol	Number of poles
2	2 poles
4	4 poles
6	6 poles

③Motor size

Symbol	Stator dimensions
0	ϕ110
1	ϕ128
2	ϕ160
3	ϕ180
4	ϕ210
5	ϕ230
6	ϕ255
7	ϕ300
9	ϕ370
A	ϕ90
B	ϕ115

Stator outline (frame No.) is indicated with 0 to 9, A, B.

④Specification code
Specification code (01 to 99)

⑤Overheat protection sensor

Symbol	Overheat protection sensor
T	Thermistor

⑥Coil changeover

Symbol	Coil changeover
None	Unavailable
D	Available (Δ-2//Δ)
K	Available (人-Δ)

<SJ-PMB Series> SJ- ① PMB ② ③ ④ – ⑤

①Voltage

Symbol	Voltage
None	200V
4	400V

* 400V is available by special order.

②Continuous rated torque
Indicates with 3 digits.
For 1000 [N·m] or more (for 9999 [N·m] or less), the upper digit is indicated by alphabetic character and the others are indicated by the carried number.
Example) 020 : 20 [N·m] A55 : 1550 [N·m]

③Base rotation speed
Indicates the thousands and the hundreds places (the ten places are rounded off.)
Example) 03 : 250 to 349 [r/min] 15 : 1450 to 1549 [r/min]

④Overheat protection sensor

Symbol	Overheat protection sensor
T	Thermistor

⑤Design management No.
Indicates with 2 digits number or alphabetic characters Example) 00, A1

(Note) This explains the model name system of a spindle motor, and all combinations of motor types listed above do not exist.

■400V HG-H servo motor

<HG-H Series>

HG-H ① ② ③ – ④

①Rated output·Maximum rotation speed

Symbol	Rated output	Max. rotation speed	Flange size(mm)
75	under development		
105			
54	0.5 kW	4000 r/min	130 SQ.
104	1.0 kW	4000 r/min	130 SQ.
154	1.5 kW	4000 r/min	130 SQ.
204	2.0 kW	4000 r/min	176 SQ.
354	3.5 kW	4000 r/min	176 SQ.
453	4.5 kW	3500 r/min	176 SQ.
703	7.0 kW	3000 r/min	176 SQ.
903	9.0 kW	3000 r/min	204 SQ.

②Magnetic brake

Symbol	Magnetic brake
None	None
B	With magnetic brake

③Shaft end structure

Symbol	Shaft end structure
S	Straight
T	Taper

(Note) "Taper" is available for the motor whose flange size is 90 SQ. mm or 130 SQ. mm.

④Encoder

Symbol	Encoder	Resolution
D48	Absolute position	1,048,576 p/rev
D51		4,194,304 p/rev
D74		67,108,864 p/rev

<HQ-H Series>

HQ-H ① ② ③ - ④

①Rated output·Maximum rotation speed

Symbol	Rated output	Max. rotation speed	Flange size(mm)
903	9.0kW	3000 r/min	220 SQ.
1103	11.0kW	3000 r/min	220 SQ.

②Magnetic brake

Symbol	Magnetic brake
None	None
B	With magnetic brake

③Shaft end structure

Symbol	Shaft end structure
S	Straight
T	Taper

(Note) "Taper" is available for the motor whose flange size is 130 SQ. mm.

④Encoder

Symbol	Encoder	Resolution
D48	Absolute position	1,048,576 p/rev
D51		4,194,304 p/rev
D74		67,108,864 p/rev

■400V SJ-4-V spindle motor

<SJ-V Series>

SJ-4- ① ② ③ ④ – ⑤ ⑥ T

①Motor Series

Symbol	Motor Series
V	Medium inertia Series

②Coil changeover

Symbol	Coil changeover
None	Unavailable

③Shaft configuration

Symbol	Shaft configuration
None	Standard
S	Hollow shaft

④Short-time rated output (Standard specification)

Symbol	Short-time rated output
2.2	2.2kW
3.7	3.7kW
5.5	5.5kW
7.5	7.5kW
11	11kW
15	15kW
18.5	18.5kW
22	22kW
26	26kW
37	37kW
45	45kW
55	55kW

⑤Specification code
The SJ-4-V Series is indicated with a specification code (01 to 99).

⑥Special specifications

Symbol	Special specifications
None	None
Z	High-speed bearing

(Note 1) The built-in spindle motor is available by special order.
(Note 2) This explains the model name system of a spindle motor, and all combinations of motor types listed above do not exist.

DRIVE SYSTEM SERVO MOTOR 200V

■HG Series

Motor type			HG75	HG105	HG54	HG104	HG154
Compatible drive unit	1-axis type	MDS-E-V1-	under development		40	40	80
	2-axis type	MDS-E-V2-			40 80	40 80	80 160
	Multi axis integrated type	MDS-EM-SPV3-			10040	10040	xxx80* 200120
	Regenerative resistor type	MDS-EJ-V1-			30	40	80
Output Stall torque Max. torque		[N·m]			50 40 30 20 10 0 2.9 13.0	50 40 30 20 10 0 5.9 23.3	50 40 30 20 10 0 9.0 42.0
Rated output		[kW]			0.5	1.0	1.5
Max. rotation speed		[r/min]			4000	4000	4000
Motor inertia		[×10⁻⁴kg·m²]			6.1	11.9	17.8
Motor inertia with a brake		[×10⁻⁴kg·m²]			8.3	14.1	20.0
Degree of protection (The shaft-through portion is excluded.)					IP67	IP67	IP67
Outline dimension drawing (Without a brake, Straight shaft, D48 encoder) (Note) The total length will be 3.5mm longer when using an D51or D74 encoder.		[mm]			130 SQ. 118.5	130 SQ. 140.5	130 SQ. 162.5
Flange fitting diameter		[mm]			ϕ110	ϕ110	ϕ110
Shaft diameter		[mm]			ϕ24	ϕ24	ϕ24
Mass (with a brake)		[kg]			4.8(6.8)	6.5(8.5)	8.3(10.3)
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)				E	E	E
	4,194,304 [p/rev] (D51)				E EM, EJ	E EM, EJ	E EM, EJ
	1,048,576 [p/rev] (D48)						

Motor type			HG224	HG204		HG354		
Compatible drive unit	1-axis type	MDS-E-V1-	80	–	80	–	–	160
	2-axis type	MDS-E-V2-	80 160	–	80 160	–	–	160 160W
	Multi axis integrated type	MDS-EM-SPV3-	xxx80* 200120	–	xxx80* 200120	–	200120	–
	Regenerative resistor type	MDS-EJ-V1-	80	80	–	100	–	–
Output Stall torque Max. torque		[N·m]	50 40 30 20 10 0 12.0 46.5	50 40 30 20 10 0 13.7 42.0	50 40 30 20 10 0 13.7 47.0	50 40 30 20 10 0 22.5 65.0	50 40 30 20 10 0 22.5 75.0	50 40 30 20 10 0 22.5 90.0
Rated output		[kW]	2.2	2.0		3.5		
Max. rotation speed		[r/min]	4000	4000		3500	4000	
Motor inertia		[×10⁻⁴kg·m²]	23.7	38.3		75.0		
Motor inertia with a brake		[×10⁻⁴kg·m²]	25.9	48.0		84.7		
Degree of protection (The shaft-through portion is excluded.)			IP67	IP67		IP67		
Outline dimension drawing (Without a brake, Straight shaft, D48 encoder) (Note) The total length will be 3.5mm longer when using an D51or D74 encoder.		[mm]	130 SQ. 184.5	176 SQ. 143.5		176 SQ. 183.5		
Flange fitting diameter		[mm]	ϕ110	ϕ114.3		ϕ114.3		
Shaft diameter		[mm]	ϕ24	ϕ35		ϕ35		
Mass (with a brake)		[kg]	10.0(12.0)	12.0(18.0)		19.0(25.0)		
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)		E	–	E	–	–	E
	4,194,304 [p/rev] (D51)		E EM, EJ	EJ	E EM	EJ	EM	
	1,048,576 [p/rev] (D48)							

*Refer to “MDS-EM Series Multi-hybrid drive” in this book for compatible drive unit type.
(Note) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.

■HG Series

Motor type			HG123	HG223	HG303	HG453	
Compatible drive unit	1-axis type	MDS-E-V1-		40	80	–	160
	2-axis type	MDS-E-V2-		40 80	80 160	–	160 160W
	Multi axis integrated type	MDS-EM-SPV3-		10040	xxx80* 200120	200120	–
	Regenerative resistor type	MDS-EJ-V1-	40	40	80	–	–
Output Stall torque Max. torque		[N·m]	100 80 60 40 20 0 7.0 17.0	100 80 60 40 20 0 12.0 32.0	100 80 60 40 20 0 22.5 64.0	100 80 60 40 20 0 37.2 90.0	100 80 60 40 20 0 37.2 122.0
Rated output		[kW]	1.2	2.2	3.0	4.5	
Max. rotation speed		[r/min]	3000	3000	3000	3500	
Motor inertia		[×10⁻⁴kg·m²]	11.9	23.7	75.0	112.0	
Motor inertia with a brake		[×10⁻⁴kg·m²]	14.1	25.9	84.7	121.7	
Degree of protection (The shaft-through portion is excluded.)			IP67	IP67	IP67	IP67	
Outline dimension drawing (Without a brake, Straight shaft, D48 encoder) (Note) The total length will be 3.5mm longer when using an D51or D74 encoder.		[mm]	130 SQ. 140.5	130 SQ. 184.5	176 SQ. 183.5	176 SQ. 223.5	
Flange fitting diameter		[mm]	ϕ110	ϕ110	ϕ114.3	ϕ114.3	
Shaft diameter		[mm]	ϕ24	ϕ24	ϕ35	ϕ35	
Mass (with a brake)		[kg]	6.5(8.5)	10.0(12.0)	19.0(25.0)	26.0(32.0)	
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)		E	E	E	–	E
	4,194,304 [p/rev] (D51)		E, EJ	E EM, EJ	E EM, EJ	EM	
	1,048,576 [p/rev] (D48)						

Motor type			HG703	HG903	HG142	HG302
Compatible drive unit	1-axis type	MDS-E-V1-	160W	320	20	40
	2-axis type	MDS-E-V2-	160W	–	20	40 80
	Multi axis integrated type	MDS-EM-SPV3-	–	–	10040	10040
	Regenerative resistor type	MDS-EJ-V1-	–	–	40	40
Output Stall torque Max. torque		[N·m]	200 150 100 50 0 49.0 152.0	200 150 100 50 0 58.8 208.0	200 150 100 50 0 11.0 26.5	200 150 100 50 0 20.0 50.0
Rated output		[kW]	7.0	9.0	1.4	3.0
Max. rotation speed		[r/min]	3000	3000	2000	2000
Motor inertia		[×10⁻⁴kg·m²]	154.0	196.0	17.8	75.0
Motor inertia with a brake		[×10⁻⁴kg·m²]	163.7	205.7	20.0	84.7
Degree of protection (The shaft-through portion is excluded.)			IP67	IP67	IP67	IP67
Outline dimension drawing ((Without a brake, Straight shaft, D48 encoder) (Note) The total length will be 3.5mm longer when using an D51or D74 encoder.		[mm]	176 SQ. 263.5	204 SQ. 330	130 SQ. 162.5	176 SQ. 183.5
Flange fitting diameter		[mm]	ϕ114.3	ϕ180	ϕ110	ϕ114.3
Shaft diameter		[mm]	ϕ35	ϕ42	ϕ24	ϕ35
Mass (with a brake)		[kg]	32.0(38.0)	45.0(51.0)	8.3(10.3)	19.0(25.0)
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)		E	E	E	E
	4,194,304 [p/rev] (D51)				E, EJ	E, EM, EJ
	1,048,576 [p/rev] (D48)					

*Refer to “MDS-EM Series Multi-hybrid drive” in this book for compatible drive unit type.
(Note) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.

DRIVE SYSTEM DIRECT-DRIVE MOTOR 200V

■TM-RB Series

Direct-drive motor type	Primary side type	TM-RBP012C20	TM-RBP036E20	TM-RBP048G20	TM-RBP105G10
	Secondary side type	TM-RBS012C20	TM-RBS036E20	TM-RBS048G20	TM-RBS105G10
Compatible drive unit	1-axis type MDS-E-V1-	40	80	80	160
	2-axis type MDS-E-V2-	40	80	80	160
	Regenerative resistor type MDS-EJ-V1-	40	80	80	100
Output [N·m] Rated torque (liquid-cooling) Max. torque		12 / 36	36 / 108	48 / 144	105 / 260
Rated output [W]		252	754	1005	1100
Max. rotation speed [r/min]		500	500	500	250
Motor inertia [×10⁻⁴kg·m²]		22	127	280	395
Degree of protection		IP00	IP00	IP00	IP00
Outline dimension drawing [mm]		76, DIA 56, DIA 130	91, DIA 100, DIA 180	80, DIA 130, DIA 230	105, DIA 130, DIA 230
Mass [kg]	Primary side (coil)	3.9	7.1	10	13
	Secondary side (magnet)	1.7	3.7	5	7

Motor type	Primary side type	TM-RBP105G20	TM-RBP150G20	TM-RBP340J20	TM-RBP500J20
	Secondary side type	TM-RBS105G20	TM-RBS150G20	TM-RBS340J20	TM-RBS500J20
Compatible drive unit	1-axis type MDS-E-V1-	160	160	320	320W
	2-axis type MDS-E-V2-	160	160	–	–
	Regenerative resistor type MDS-EJ-V1-	–	–	–	–
Output [N·m] Rated torque (liquid-cooling) Max. torque		105 / 260	150 / 375	340 / 850	500 / 1280
Rated output [W]		2199	3141	7120	10471
Max. rotation speed [r/min]		500	500	400	400
Motor inertia [×10⁻⁴kg·m²]		395	510	2778	3538
Degree of protection		IP00	IP00	IP00	IP00
Outline dimension drawing [mm]		105, DIA 130, DIA 230	130, DIA 130, DIA 230	150, DIA 205, DIA 330	190, DIA 205, DIA 330
Mass [kg]	Primary side (coil)	13	16	33	41
	Secondary side (magnet)	7	9	20	26

(Note 1) The encoder should be procured by the user.
(Note 2) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.

DRIVE SYSTEM LINEAR SERVO MOTOR 200V

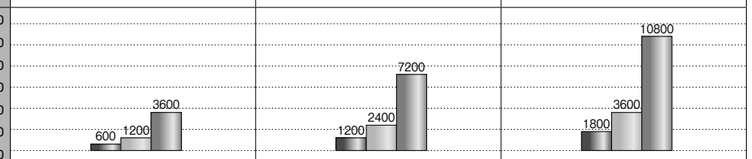
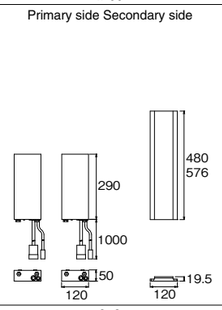
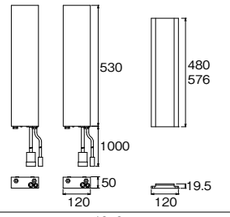
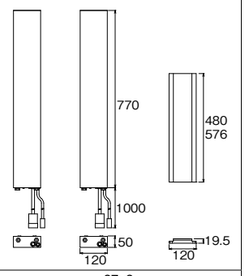
■LM-F Series

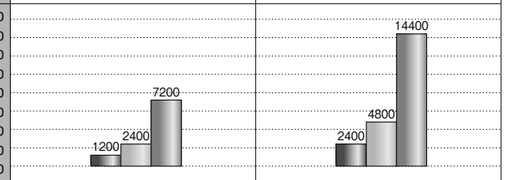
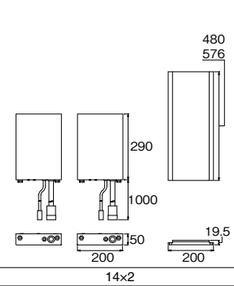
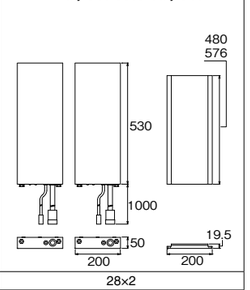
Linear servo motor type	Primary side type	LM-FP2B-06M-1WW0	LM-FP2D-12M-1WW0	LM-FP2F-18M-1WW0	LM-FP4B-12M-1WW0
	Secondary side type	LM-FS20-□-1WW0	LM-FS20-□-1WW0	LM-FS20-□-1WW0	LM-FS40-□-1WW0
Compatible drive unit	1-axis type MDS-E-V1-	40	80	160	80
	2-axis type MDS-E-V2-	40	80	160	80
	Regenerative resistor type MDS-EJ-V1-	40	80	–	80
Thrust force [N] Continuous (natural-cooling) Continuous (liquid-cooling) Maximum		300 / 600 / 1800	600 / 1200 / 3600	900 / 1800 / 5400	600 / 1200 / 3600
Rated thrust [N]		600	1200	1800	1200
Maximum speed (Note 1) [m/s]		2.0	2.0	2.0	2.0
Magnetic attraction force [N]		4500	9000	13500	9000
Degree of protection		IP00	IP00	IP00	IP00
Outline dimension drawing [mm]		Primary side Secondary side: 290, 480, 576, 1000, 50, 120, 19.5, 120	Primary side Secondary side: 530, 480, 576, 1000, 50, 120, 19.5, 120	Primary side Secondary side: 770, 480, 576, 1000, 50, 120, 19.5, 120	Primary side Secondary side: 290, 480, 576, 1000, 50, 200, 19.5, 200
Mass [kg]	Primary side (coil)	9	18	27	14
	Secondary side (magnet)	7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)	13.5(480mm) 16.0(576mm)

Motor type	Primary side type	LM-FP4D-24M-1WW0	LM-FP4F-36M-1WW0	LM-FP4H-48M-1WW0	LM-FP5H-60M-1WW0
	Secondary side type	LM-FS40-□-1WW0	LM-FS40-□-1WW0	LM-FS40-□-1WW0	LM-FS50-□-1WW0
Compatible drive unit	1-axis type MDS-E-V1-	160	320	320	200(Note 2)
	2-axis type MDS-E-V2-	160	–	–	–
	Regenerative resistor type MDS-EJ-V1-	–	–	–	–
Thrust force [N] Continuous (natural-cooling) Continuous (liquid-cooling) Maximum		1200 / 2400 / 7200	1800 / 3600 / 10800	2400 / 4800 / 14400	3000 / 6000 / 18000
Rated thrust [N]		2400	3600	4800	6000
Maximum speed (Note 1) [m/s]		2.0	2.0	2.0	2.0
Magnetic attraction force [N]		18000	27000	36000	45000
Degree of protection		IP00	IP00	IP00	IP00
Outline dimension drawing [mm]		Primary side Secondary side: 530, 480, 576, 1000, 50, 200, 19.5, 200	Primary side Secondary side: 770, 480, 576, 1000, 50, 200, 19.5, 200	Primary side Secondary side: 1010, 480, 576, 1000, 50, 200, 19.5, 200	Primary side Secondary side: 1010, 480, 576, 1000, 50, 240, 25, 240
Mass [kg]	Primary side (coil)	28	42	56	67
	Secondary side (magnet)	13.5(480mm) 16.0(576mm)	13.5(480mm) 16.0(576mm)	13.5(480mm) 16.0(576mm)	20.0(480mm) 26.0(576mm)

(Note 1) The maximum speed in actual use is either the linear scale's maximum speed or this specified value, whichever is smaller.
(Note 2) 400V specifications
(Note 3) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.

■LM-F Series (Dual-axis drive unit)

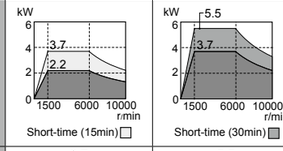
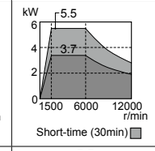
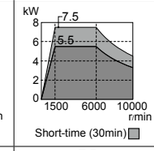
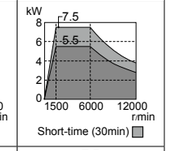
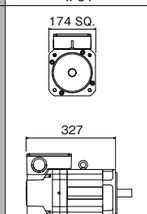
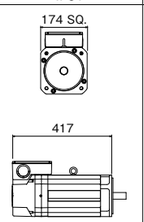
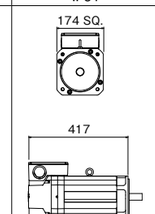
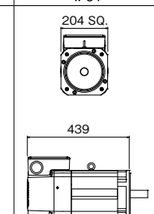
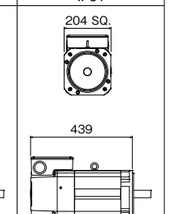
Motor type			LM-FP2B-06M-1WW0	LM-FP2D-12M-1WW0	LM-FP2F-18M-1WW0
	Secondary side type		LM-FS20-□-1WW0	LM-FS20-□-1WW0	LM-FS20-□-1WW0
Compatible drive unit	1-axis type	MDS-E-V1-	80	160	320
	2-axis type	MDS-E-V2-	80	160	–
	Regenerative resistor type	MDS-EJ-V1-	80	–	–
Thrust force Continuous (natural-cooling) Continuous (liquid-cooling) Maximum		[N]			
Rated thrust		[N]	1200	2400	3600
Maximum speed (Note 1)		[m/s]	2.0	2.0	2.0
Magnetic attraction force (per motor)		[N]	4500	9000	13500
Degree of protection			IP00	IP00	IP00
Outline dimension drawing		[mm]	Primary side Secondary side 	Primary side Secondary side 	Primary side Secondary side 
Mass [kg]	Primary side (coil)		9×2	18×2	27×2
	Secondary side (magnet)		7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)

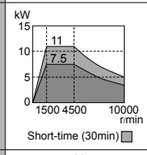
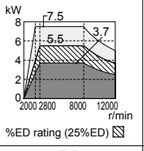
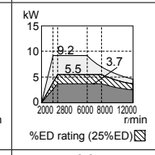
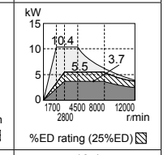
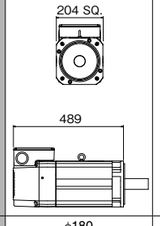
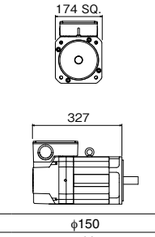
Motor type			LM-FP4B-12M-1WW0	LM-FP4D-24M-1WW0
	Secondary side type		LM-FS40-□-1WW0	LM-FS40-□-1WW0
Compatible drive unit	1-axis type	MDS-E-V1-		320
	2-axis type	MDS-E-V2-		–
	Regenerative resistor type	MDS-EJ-V1-	–	–
Thrust force Continuous (natural-cooling) Continuous (liquid-cooling) Maximum		[N]		
Rated thrust		[N]	2400	4800
Maximum speed (Note 1)		[m/s]	2.0	2.0
Magnetic attraction force (per motor)		[N]	9000	18000
Degree of protection			IP00	IP00
Outline dimension drawing		[mm]	Primary side Secondary side 	Primary side Secondary side 
Mass [kg]	Primary side (coil)		14×2	28×2
	Secondary side (magnet)		13.5(480mm) 16.0(576mm)	13.5(480mm) 16.0(576mm)

(Note 1) The maximum speed in actual use is either the linear scale's maximum speed or this specified value, whichever is smaller.
(Note 2) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.

DRIVE SYSTEM SPINDLE MOTOR 200V

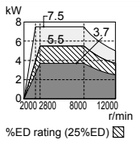
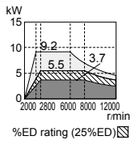
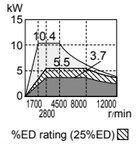
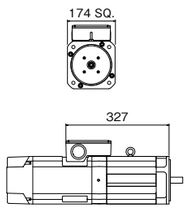
■SJ-D Series (Normal specifications)

Motor type			SJ-D3.7/100-01	SJ-D5.5/100-01	SJ-D5.5/120-01	SJ-D7.5/100-01	SJ-D7.5/120-01
Compatible drive unit	1-axis type	MDS-E-SP-	80	80	80	160	160
	2-axis type	MDS-E-SP2-	80 16080(M)	80 16080(M)	80 16080(M)	16080(L)	16080(L)
	Multi axis integrated type	MDS-EM-SPV3-	–	100xx	100xx	100xx	100xx
	Regenerative resistor type	MDS-EJ-SP-	80	100	100	120	120
Output Short-time rating Continuous rating			 Short-time (15min)□	 Short-time (30min)■	 Short-time (30min)■	 Short-time (30min)■	 Short-time (30min)■
Standard output during acceleration/deceleration [kW]			3.7	5.5	5.5	7.5	7.5
Actual acceleration/deceleration output (Note 2) [kW]			4.44	6.6	6.6	9	9
Base rotation speed [r/min]			1500	1500	1500	1500	1500
Max. rotation speed in constant output range [r/min]			6000	6000	6000	6000	6000
Maximum rotation speed [r/min]			10000	10000	12000	10000	12000
Continuous rated torque [N·m]			14.0	23.6	23.6	35.0	35.0
Motor inertia [×10⁻⁴kg·m²]			0.0074	0.013	0.013	0.023	0.023
Degree of protection (The shaft-through portion is excluded.)			IP54	IP54	IP54	IP54	IP54
Outline dimension drawing(flange type)		[mm]					
Flange fitting diameter [mm]			ϕ150	ϕ150	ϕ150	ϕ180	ϕ180
Shaft diameter [mm]			ϕ28	ϕ28	ϕ28	ϕ32	ϕ32
Mass [kg]			26	39	39	53	53

Motor type			SJ-D11/100-01	SJ-D5.5/120-02		
Compatible drive unit	1-axis type	MDS-E-SP-	160	–	160	200
	2-axis type	MDS-E-SP2-	16080(L)	–	16080(L)	–
	Multi axis integrated type	MDS-EM-SPV3-	16080	100xx	16080	200xx
	Regenerative resistor type	MDS-EJ-SP-	160	–	–	–
Output Acceleration/Deceleration %ED rating Short-time rating Continuous rating			 Short-time (30min)■	 %ED rating (25%ED)▨	 %ED rating (25%ED)▨	 %ED rating (25%ED)▨
Standard output during acceleration/deceleration [kW]			11	7.5	9.2	10.4
Actual acceleration/deceleration output (Note 2) [kW]			13.2	9	11.04	12.48
Base rotation speed [r/min]			1500	2800		
Max. rotation speed in constant output range [r/min]			4500	8000		
Maximum rotation speed [r/min]			10000	12000		
Continuous rated torque [N·m]			47.7	12.6		
Motor inertia [×10⁻⁴kg·m²]			0.031	0.0074		
Degree of protection (The shaft-through portion is excluded.)			IP54	IP54		
Outline dimension drawing(flange type)		[mm]				
Flange fitting diameter [mm]			ϕ180	ϕ150		
Shaft diameter [mm]			ϕ48	ϕ28		
Mass [kg]			64	26		

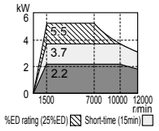
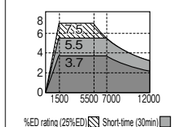
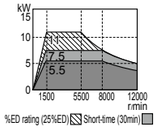
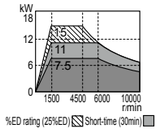
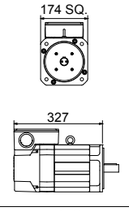
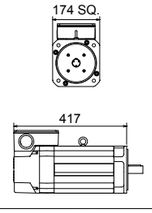
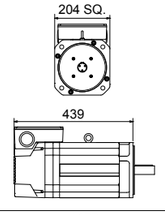
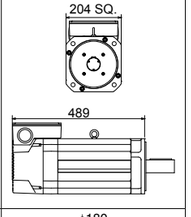
(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

■SJ-D Series (Hollow shaft specifications)

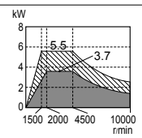
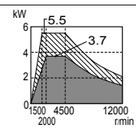
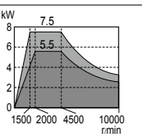
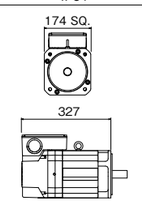
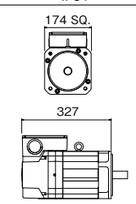
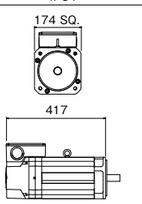
Motor type			SJ-D5.5/120-02T-S		
Compatible drive unit	1-axis type	MDS-E-SP-	–	160	200
	2-axis type	MDS-E-SP2-	–	16080(L)	–
	Multi axis integrated type	MDS-EM-SPV3-	100xx	16080	200xx
	Regenerative resistor type	MDS-EJ-SP-	–	–	–
Output Acceleration/Deceleration ☐ %ED rating ▨ Short-time rating ☐ Continuous rating ■			 %ED rating (25%ED) ▨	 %ED rating (25%ED) ▨	 %ED rating (25%ED) ▨
Standard output during acceleration/deceleration [kW]			7.5	9.2	10.4
Actual acceleration/deceleration output (Note 2) [kW]			9	11.04	12.48
Base rotation speed		[r/min]	2800		
Max. rotation speed in constant output range		[r/min]	8000		
Maximum rotation speed		[r/min]	12000		
Continuous rated torque		[N·m]	12.6		
Motor inertia		[×10⁻⁴kg·m²]	0.0075		
Degree of protection (The shaft-through portion is excluded.)			IP54		
Outline dimension drawing (flange type)		[mm]			
Flange fitting diameter		[mm]	ϕ150		
Shaft diameter		[kg]	ϕ28		
Mass			24		

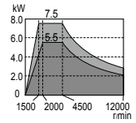
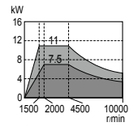
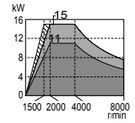
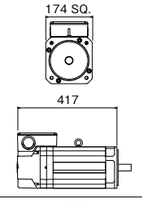
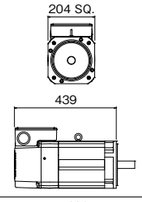
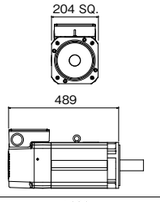
(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

■SJ-DG Series(High-output specifications)

Motor type			SJ-DG3.7/120-03T	SJ-DG5.5/120-04T	SJ-DG7.5/120-05T	SJ-DG11/100-03T
Compatible drive unit	1-axis type	MDS-E-SP-	160	160	160	200
	2-axis type	MDS-E-SP2-	–	–	–	–
	Multi axis integrated type	MDS-EM-SPV3-	100xx	100xx	16080	200xx
Output %ED rating ▨ Short-time rating ☐ ☐ Continuous rating ■			 %ED rating (25%ED) ▨ Short-time (15min) ☐	 %ED rating (25%ED) ▨ Short-time (30min) ■	 %ED rating (25%ED) ▨ Short-time (30min) ■	 %ED rating (25%ED) ▨ Short-time (30min) ■
Standard output during acceleration/deceleration [kW]			5.5	7.5	11.0	15.0
Actual acceleration/deceleration output (Note 2) [kW]			6.6	9.0	13.2	18.0
Base rotation speed		[r/min]	1500	1500	1500	1500
Max. rotation speed in constant output range		[r/min]	10000	7000	8000	6000
Maximum rotation speed		[r/min]	12000	12000	12000	10000
Continuous rated torque		[N·m]	14.0	23.6	35.0	47.7
Motor inertia		[×10⁻⁴kg·m²]	0.0066	0.012	0.022	0.029
Degree of protection (The shaft-through portion is excluded.)			IP54	IP54	IP54	IP54
Outline dimension drawing (flange type)		[mm]				
Flange fitting diameter		[mm]	ϕ150	ϕ150	ϕ180	ϕ180
Shaft diameter		[mm]	ϕ28	ϕ28	ϕ32	ϕ48
Mass		[kg]	24	37	50	61

■SJ-DJ Series (Compact & lightweight specifications)

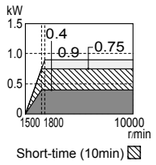
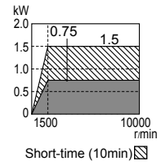
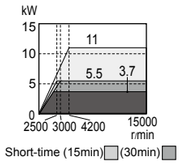
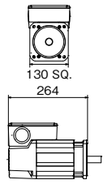
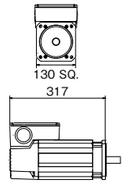
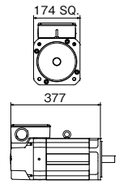
Motor type			SJ-DJ5.5/100-01	SJ-DJ5.5/120-01	SJ-DJ7.5/100-01
Compatible drive unit	1-axis type	MDS-E-SP-	80	80	160
	2-axis type	MDS-E-SP2-	80 16080(M)	80 16080(M)	16080(M)
	Multi axis integrated type	MDS-EM-SPV3-	100xx	100xx	100xx
	Regenerative resistor type	MDS-EJ-SP-	100	100	120
Output %ED rating ▨ Short-time rating ☐ Continuous rating ■			 %ED rating (25%ED) ▨	 %ED rating (25%ED) ▨	 Short-time (15min) ■
Standard output during acceleration/deceleration [kW]			5.5	5.5	7.5
Actual acceleration/deceleration output (Note 2) [kW]			6.6	6.6	9
Base rotation speed	Short-time	[r/min]	1500	1500	1500
	Continuous	[r/min]	2000	2000	2000
Max. rotation speed in constant output range		[r/min]	4500	4500	4500
Maximum rotation speed		[r/min]	10000	12000	10000
Continuous rated torque		[N·m]	17.7	17.7	26.3
Motor inertia		[kg·m²]	0.0074	0.0074	0.013
Degree of protection (The shaft-through portion is excluded.)			IP54	IP54	IP54
Outline dimension drawing (flange type)		[mm]			
Flange fitting diameter		[mm]	ϕ150	ϕ150	ϕ150
Shaft diameter		[mm]	ϕ28	ϕ28	ϕ28
Mass		[kg]	26	26	39

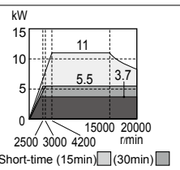
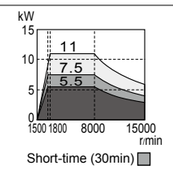
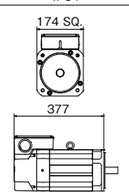
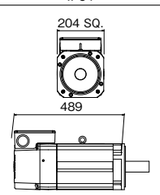
Motor type			SJ-DJ7.5/120-01	SJ-DJ11/100-01	SJ-DJ15/80-01
Compatible drive unit	1-axis type	MDS-E-SP-	160	160	200
	2-axis type	MDS-E-SP2-	16080(L)	16080(L)	–
	Multi axis integrated type	MDS-EM-SPV3-	100xx	16080	200xx
	Regenerative resistor type	MDS-EJ-SP-	120	160	–
Output %ED rating ▨ Short-time rating ☐ Continuous rating ■			 Short-time (15min) ■	 Short-time (15min) ■	 %ED rating (15%ED) ▨ Short-time (15min) ■
Standard output during acceleration/deceleration [kW]			7.5	11	15
Actual acceleration/deceleration output (Note 2) [kW]			9	13.2	18
Base rotation speed	Short-time	[r/min]	1500	1500	1500
	Continuous	[r/min]	2000	2000	2000
Max. rotation speed in constant output range		[r/min]	4500	4500	4000
Maximum rotation speed		[r/min]	12000	10000	8000
Continuous rated torque		[N·m]	26.3	35.8	52.5
Motor inertia		[kg·m²]	0.013	0.023	0.031
Degree of protection (The shaft-through portion is excluded.)			IP54	IP54	IP54
Outline dimension drawing (flange type)		[mm]			
Flange fitting diameter		[mm]	ϕ150	ϕ180	ϕ180
Shaft diameter		[mm]	ϕ28	ϕ32	ϕ48
Mass		[kg]	39	53	64

(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".
(Note 3) %ED is a load time ratio of operating time relative to a 10-minute cycle time. At 25%ED, for example, the operating time is 2.5 minutes and non-operation time is 7.5 minutes of a 10-minute cycle time.

5 DRIVE SYSTEM

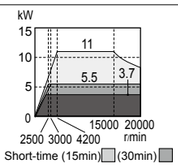
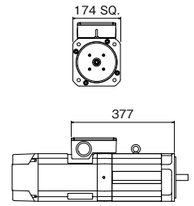
■SJ-DL Series (Low-inertia specification)

Motor type			SJ-DL0.75/100-01	SJ-DL1.5/100-01	SJ-DL5.5/150-01T
Compatible drive unit	1-axis type	MDS-E-SP-	20	40	160
	2-axis type	MDS-E-SP2-	20	40	16080(L)
	Multi axis integrated type	MDS-EM-SPV3-	–	–	16080
	Regenerative resistor type	MDS-EJ-SP-	–	–	–
Output Acceleration/Deceleration □ Short-time rating ▨□□ Continuous rating ■			 Short-time (10min) ▨	 Short-time (10min) ▨	 Short-time (15min)□ (30min)■
Standard output during acceleration/deceleration [kW]			0.9	1.5	11
Actual acceleration/deceleration output (Note 2) [kW]			1.08	1.8	13.2
Base rotation speed		[r/min]	1500	1500	2500
Max. rotation speed in constant output range [r/min]			10000	10000	15000
Maximum rotation speed		[r/min]	10000	10000	15000
Continuous rated torque		[N·m]	2.55	4.77	14.1
Motor inertia		[kg·m²]	0.0011	0.0019	0.0046
Degree of protection (The shaft-through portion is excluded.)			IP54	IP54	IP54
Outline dimension drawing (flange type)		[mm]			
Flange fitting diameter		[mm]	ϕ110	ϕ110	ϕ150
Shaft diameter		[mm]	ϕ22	ϕ22	ϕ28
Mass		[kg]	10	14	30

Motor type			SJ-DL5.5/200-01T	SJ-DL7.5/150-01T
Compatible drive unit	1-axis type	MDS-E-SP-	160	160
	2-axis type	MDS-E-SP2-	16080(L)	16080(L)
	Multi axis integrated type	MDS-EM-SPV3-	–	16080
	Regenerative resistor type	MDS-EJ-SP-	–	–
Output Acceleration/Deceleration □ Short-time rating □□ Continuous rating ■			 Short-time (15min)□ (30min)■	 Short-time (30min) ■
Standard output during acceleration/deceleration [kW]			11	11
Actual acceleration/deceleration output (Note 2) [kW]			13.2	13.2
Base rotation speed		[r/min]	2500	1500
Max. rotation speed in constant output range [r/min]			20000	8000
Maximum rotation speed		[r/min]	20000	15000
Continuous rated torque		[N·m]	14.1	35.0
Motor inertia		[kg·m²]	0.0046	0.016
Degree of protection (The shaft-through portion is excluded.)			IP54	IP54
Outline dimension drawing (flange type)		[mm]		
Flange fitting diameter		[mm]	ϕ150	ϕ180
Shaft diameter		[mm]	ϕ28	ϕ32
Mass		[kg]	30	56

(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

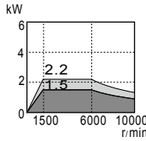
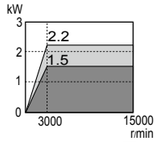
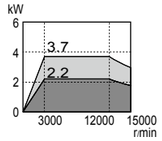
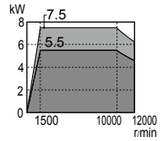
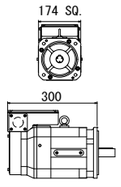
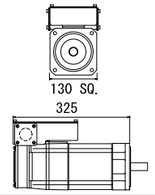
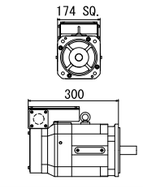
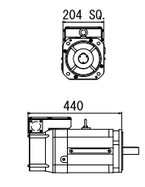
■SJ-DL Series (Hollow shaft specifications)

Motor type			SJ-DL5.5/200-01T-S
Compatible drive unit	1-axis type	MDS-E-SP-	160
	2-axis type	MDS-E-SP2-	16080(L)
	Multi axis integrated type	MDS-EM-SPV3-	–
	Regenerative resistor type	MDS-EJ-SP-	–
Output Acceleration/Deceleration □ Short-time rating □□ Continuous rating ■			 Short-time (15min)□ (30min)■
Standard output during acceleration/deceleration [kW]			11
Actual acceleration/deceleration output (Note 2) [kW]			13.2
Base rotation speed		[r/min]	2500
Max. rotation speed in constant output range [r/min]			20000
Maximum rotation speed		[r/min]	20000
Continuous rated torque		[N·m]	14.1
Motor inertia		[kg·m²]	0.0046
Degree of protection (The shaft-through portion is excluded.)			IP54
Outline dimension drawing (flange type)		[mm]	
Flange fitting diameter		[mm]	ϕ150
Shaft diameter		[mm]	ϕ22
Mass		[kg]	28

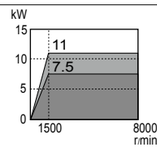
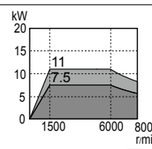
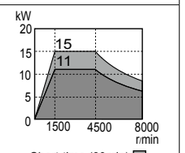
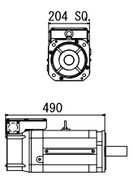
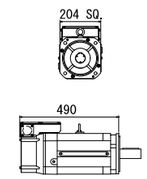
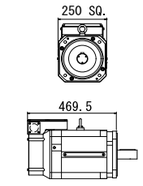
(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

SPINDLE MOTOR 200V
5 DRIVE SYSTEM

■SJ-V Series (Normal specification)

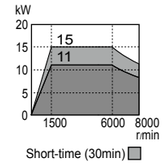
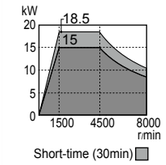
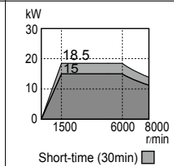
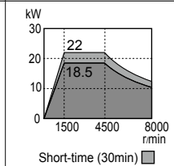
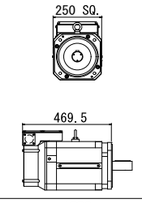
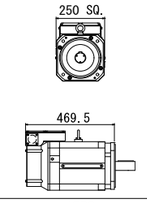
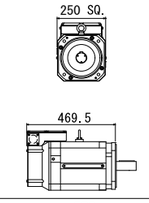
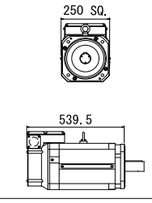
Motor type			SJ-V2.2-01T	SJ-VL2.2-02ZT *1	SJ-V3.7-02ZT	SJ-V7.5-03ZT
Compatible drive unit	1-axis type	MDS-E-SP-	40	40	80	160
	2-axis type	MDS-E-SP2-	40	40	80 16080(M)	16080(L)
	Multi axis integrated type	MDS-EM-SPV3-	–	–	–	16080
Output Short-time rating □ Continuous rating ■			 Short-time (15min) □	 Short-time (15min) □	 Short-time (15min) □	 Short-time (30min) □
Standard output during acceleration/deceleration [kW]			2.2	2.2	3.7	7.5
Actual acceleration/deceleration output (Note 2) [kW]			2.64	2.64	4.44	9
Base rotation speed		[r/min]	1500	3000	3000	1500
Max. rotation speed in constant output range		[r/min]	6000	15000	12000	10000
Maximum rotation speed		[r/min]	10000	15000	15000	12000
Continuous rated torque		[N·m]	9.5	4.77	7.0	35
Motor inertia		[kg·m²]	0.00675	0.0024	0.00675	0.0245
Degree of protection			IP44	IP44	IP44	IP44
Outline dimension drawing (flange type)		[mm]				
Flange fitting diameter		[mm]	ϕ150	ϕ110	ϕ150	ϕ180
Shaft diameter		[mm]	ϕ28	ϕ22	ϕ28	ϕ32
Mass		[kg]	25	20	25	60

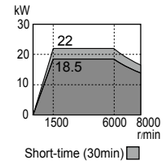
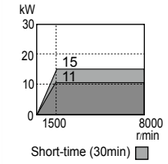
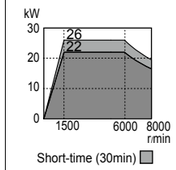
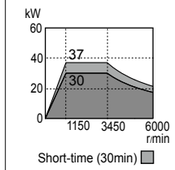
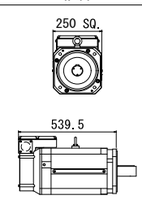
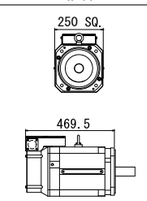
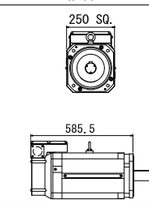
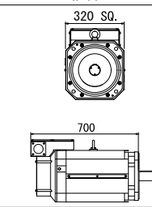
*1 The maximum rotation speed is 10000r/min.

Motor type			SJ-V11-08ZT	SJ-V11-13ZT	SJ-V15-01ZT
Compatible drive unit	1-axis type	MDS-E-SP-	200	200	200
	2-axis type	MDS-E-SP2-	–	–	–
	Multi axis integrated type	MDS-EM-SPV3-	200xx	200xx	200xx
Output Short-time rating □ Continuous rating ■			 Short-time (30min) ■	 Short-time (30min) ■	 Short-time (30min) ■
Standard output during acceleration/deceleration [kW]			11	11	15
Actual acceleration/deceleration output (Note 2) [kW]			13.2	13.2	18
Base rotation speed		[r/min]	1500	1500	1500
Max. rotation speed in constant output range		[r/min]	8000	6000	4500
Maximum rotation speed		[r/min]	8000	8000	8000
Continuous rated torque		[N·m]	47.7	47.7	70
Motor inertia		[kg·m²]	0.03	0.03	0.0575
Degree of protection			IP44	IP44	IP44
Outline dimension drawing (flange type)		[mm]			
Flange fitting diameter		[mm]	ϕ180	ϕ180	ϕ230
Shaft diameter		[mm]	ϕ48	ϕ48	ϕ48
Mass		[kg]	70	70	110

(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

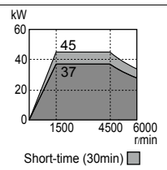
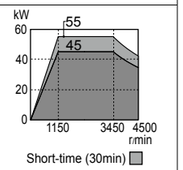
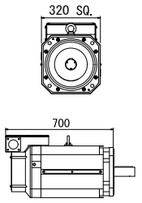
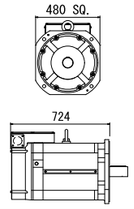
■SJ-V Series (Normal specification)

Motor type			SJ-V15-09ZT	SJ-V18.5-01ZT	SJ-V18.5-04ZT	SJ-V22-01ZT
Compatible drive unit	1-axis type	MDS-E-SP-	200	200	240	240
	2-axis type	MDS-E-SP2-	–	–	–	–
	Multi axis integrated type	MDS-EM-SPV3-	200xx	–	–	–
Output Short-time rating □ Continuous rating ■			 Short-time (30min) ■	 Short-time (30min) ■	 Short-time (30min) ■	 Short-time (30min) ■
Standard output during acceleration/deceleration [kW]			15	18.5	18.5	22
Actual acceleration/deceleration output (Note 2) [kW]			18	22.2	22.2	26.4
Base rotation speed		[r/min]	1500	1500	1500	1500
Max. rotation speed in constant output range		[r/min]	6000	4500	6000	4500
Maximum rotation speed		[r/min]	8000	8000	8000	8000
Continuous rated torque		[N·m]	70	95.5	95.5	118
Motor inertia		[kg·m²]	0.0575	0.0575	0.0575	0.08
Degree of protection			IP44	IP44	IP44	IP44
Outline dimension drawing (flange type)		[mm]				
Flange fitting diameter		[mm]	ϕ230	ϕ230	ϕ230	ϕ230
Shaft diameter		[mm]	ϕ48	ϕ48	ϕ48	ϕ55
Mass		[kg]	110	110	110	135

Motor type			SJ-V22-04ZT	SJ-V22-06ZT	SJ-V26-01ZT	SJ-V37-01ZT
Compatible drive unit	1-axis type	MDS-E-SP-	320	240	320	400
	2-axis type	MDS-E-SP2-	–	–	–	–
	Multi axis integrated type	MDS-EM-SPV3-	–		–	–
Output Short-time rating □ Continuous rating ■			 Short-time (30min) ■	 Short-time (30min) ■	 Short-time (30min) ■	 Short-time (30min) ■
Standard output during acceleration/deceleration [kW]			22	15	26	37
Actual acceleration/deceleration output (Note 2) [kW]			26.4	18	31.2	44.4
Base rotation speed		[r/min]	1500	1500	1500	1150
Max. rotation speed in constant output range		[r/min]	6000	8000	6000	3450
Maximum rotation speed		[r/min]	8000	8000	8000	6000
Continuous rated torque		[N·m]	118	70.0	140	249
Motor inertia		[kg·m²]	0.08	0.0575	0.0925	0.34
Degree of protection			IP44	IP44	IP44	IP44
Outline dimension drawing (flange type)		[mm]				
Flange fitting diameter		[mm]	ϕ230	ϕ230	ϕ230	ϕ300
Shaft diameter		[mm]	ϕ55	ϕ48	ϕ55	ϕ60
Mass		[kg]	135	110	155	300

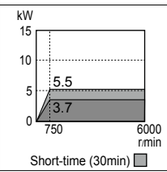
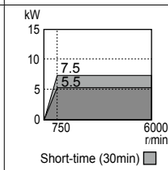
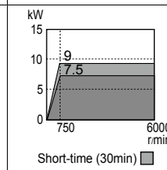
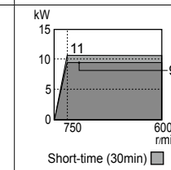
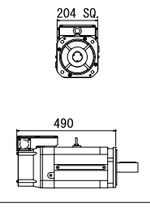
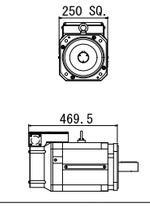
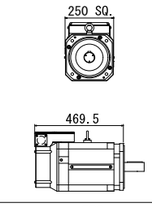
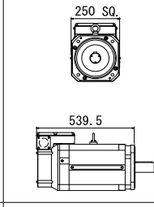
(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

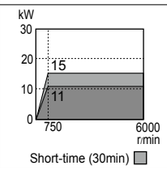
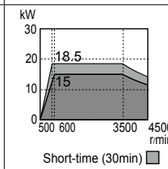
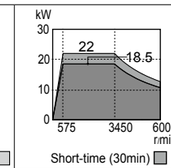
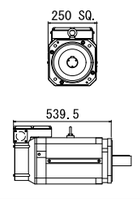
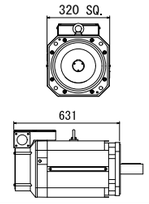
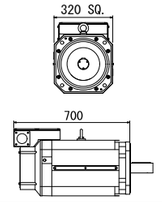
■SJ-V Series (Normal specification)

Motor type			SJ-V45-01ZT	SJ-V55-01ZT
Compatible drive unit	1-axis type	MDS-E-SP-	640	640
	2-axis type	MDS-E-SP2-	–	–
	Multi axis integrated type	MDS-EM-SPV3-	–	–
Output Short-time rating □ Continuous rating □			 Short-time (30min) □	 Short-time (30min) □
Standard output during acceleration/deceleration [kW]			45	55
Actual acceleration/deceleration output (Note 2) [kW]			54	66
Base rotation speed [r/min]			1500	1150
Max. rotation speed in constant output range [r/min]			4500	3450
Maximum rotation speed [r/min]			6000	4500
Continuous rated torque [N·m]			236	374
Motor inertia [kg·m²]			0.34	0.8475
Degree of protection			IP44	IP44
Outline dimension drawing (flange type) [mm]				
Flange fitting diameter [mm]			ϕ300	ϕ450
Shaft diameter [mm]			ϕ60	ϕ75
Mass [kg]			300	450

(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

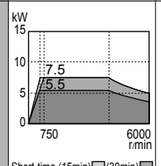
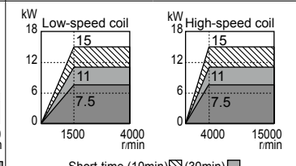
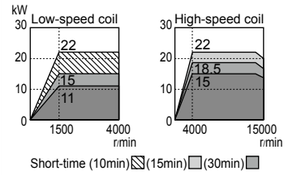
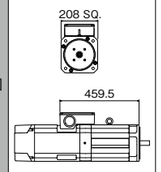
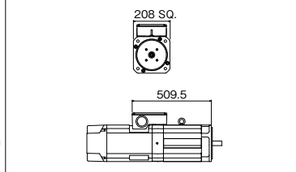
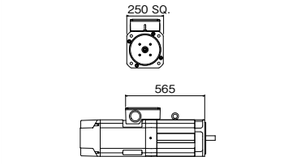
■SJ-V Series (Wide range constant output specification)

Motor type			SJ-V11-01T	SJ-V11-09T	SJ-V15-03T	SJ-V18.5-03T
Compatible drive unit	1-axis type	MDS-E-SP-	160	160	200	240
	2-axis type	MDS-E-SP2-	16080(L)	16080(L)	–	–
	Multi axis integrated type	MDS-EM-SPV3-	16080	16080	200xx	–
Output Short-time rating □ Continuous rating □			 Short-time (30min) □	 Short-time (30min) □	 Short-time (30min) □	 Short-time (30min) □
Standard output during acceleration/deceleration [kW]			5.5	7.5	9	11
Actual acceleration/deceleration output (Note 2) [kW]			6.6	9	10.8	13.2
Base rotation speed [r/min]			750	750	750	750
Max. rotation speed in constant output range [r/min]			6000	6000	6000	6000
Maximum rotation speed [r/min]			6000	6000	6000	6000
Continuous rated torque [N·m]			47.1	70.0	95.5	115
Motor inertia [kg·m²]			0.03	0.0575	0.0575	0.08
Degree of protection			IP44	IP44	IP44	IP44
Outline dimension drawing (flange type) [mm]						
Flange fitting diameter [mm]			ϕ180	ϕ230	ϕ230	ϕ230
Shaft diameter [mm]			ϕ48	ϕ48	ϕ48	ϕ55
Mass [kg]			70	110	110	135

Motor type			SJ-V22-05T	SJ-V22-09T	SJ-VK22-19ZT	
Compatible drive unit	1-axis type	MDS-E-SP-	320	320	320	
	2-axis type	MDS-E-SP2-	–	–	–	
	Multi axis integrated type	MDS-EM-SPV3-	–	–	–	
Output Short-time rating ▨□□ Continuous rating □			 Short-time (30min) □	 Short-time (30min) □	Short-time (10min) ▨ (15min) □	 Short-time (30min) □
Standard output during acceleration/deceleration [kW]			15	18.5	18.5	22
Actual acceleration/deceleration output (Note 2) [kW]			18	22.2	22.2	26.4
Base rotation speed [r/min]			750	500	330	575
Max. rotation speed in constant output range [r/min]			6000	3500	750	3450
Maximum rotation speed [r/min]			6000	4500	750	6000
Continuous rated torque [N·m]			140	239	310	307.3
Motor inertia [kg·m²]			0.08	0.31	0.34	
Degree of protection			IP44	IP44	IP44	
Outline dimension drawing (flange type) [mm]						
Flange fitting diameter [mm]			ϕ230	ϕ300	ϕ300	
Shaft diameter [mm]			ϕ55	ϕ60	ϕ60	
Mass [kg]			135	280	300	

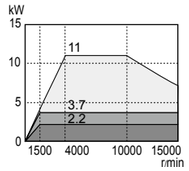
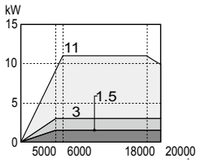
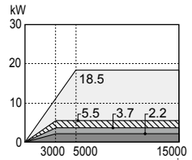
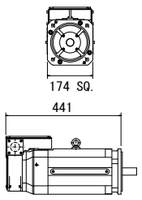
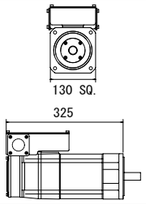
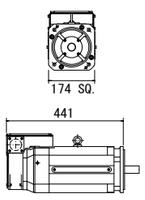
(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

■SJ-V Series (Hollow shaft specifications)

Motor type			SJ-VS7.5-14FZT	SJ-VKS26-09FZT		SJ-VKS30-16FZT	
Compatible drive unit	1-axis type	MDS-E-SP-	160	320		320	
	2-axis type	MDS-E-SP2-	16080(L)	–		–	
	Multi axis integrated type	MDS-EM-SPV3-	–	–		–	
Output Short-time rating ▨□□ Continuous rating ■							
Standard output during acceleration/deceleration [kW]			7.5	15		22	
Actual acceleration/deceleration output (Note 2) [kW]			9	18		26.4	
Base rotation speed		[r/min]	1500	1500	4000	1500	3000
Max. rotation speed in constant output range		[r/min]	10000	4000	15000	4500	13600
Maximum rotation speed		[r/min]	15000	4000	15000	4500	15000
Continuous rated torque		[N·m]	35	47.7	17.9	70	47.7
Motor inertia		[kg·m²]	0.0248	0.03		0.0575	
Degree of protection			IP44	IP44		IP44	
Outline dimension drawing (flange type)		[mm]					
Flange fitting diameter		[mm]	ϕ180	ϕ180		ϕ230	
Shaft diameter		[mm]	ϕ32	ϕ38		ϕ48	
Mass		[kg]	60	75		130	

(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

■SJ-VL Series (Low-inertia specification)

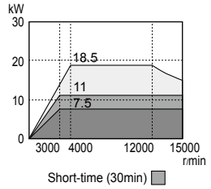
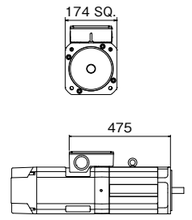
Motor type			SJ-VL11-02FZT	SJ-VL11-05FZT-S01 *1	SJ-VL18.5-05FZT
Compatible drive unit	1-axis type	MDS-E-SP-	160	160	240
	2-axis type	MDS-E-SP2-	16080(L)	16080(L)	–
	Multi axis integrated type	MDS-EMSPV3-	16080	16080 *2	–
Output Acceleration/Deceleration □ Short-time rating ▨□□ Continuous rating ■					
Standard output during acceleration/deceleration [kW]			11	11	18.5
Actual acceleration/deceleration output (Note 2) [kW]			13.2	13.2	22.2
Base rotation speed		[r/min]	1500	5000	3000
Max. rotation speed in constant output range		[r/min]	15000	20000	15000
Maximum rotation speed		[r/min]	15000	20000	15000
Continuous rated torque		[N·m]	14.0	2.8	7.0
Motor inertia		[×10⁻⁴kg·m²]	0.003	0.0024	0.00525
Degree of protection			IP44	IP44	IP44
Outline dimension drawing (flange type)		[mm]			
Flange fitting diameter		[mm]	ϕ150	ϕ110	ϕ150
Shaft diameter		[mm]	ϕ28	ϕ22	ϕ28
Mass		[kg]	42	20	40

*1 The acceleration/deceleration frequency is limited by the regenerative resistor.
*2 The maximum rotation speed is 15000r/min.

(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

SPINDLE MOTOR 200V
5 DRIVE SYSTEM

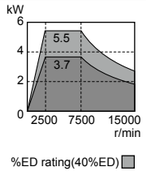
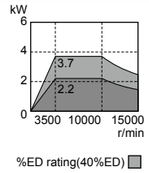
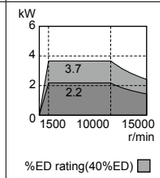
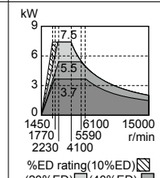
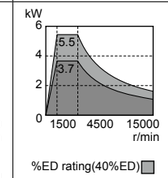
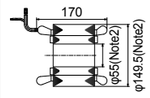
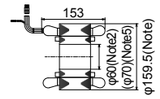
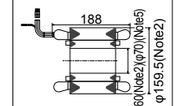
■SJ-VL Series (Hollow shaft specifications)

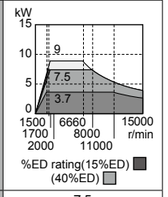
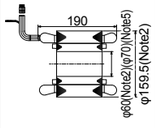
Motor type			SJ-VLS15-11FZT
Compatible drive unit	1-axis type	MDS-E-SP-	200
	2-axis type	MDS-E-SP2-	–
	Multi axis integrated type	MDS-EM-SPV3-	–
Output Acceleration/Deceleration □ Short-time rating □ Continuous rating □			 Short-time (30min) □
Standard output during acceleration/deceleration [kW]			18.5
Actual acceleration/deceleration output (Note 2) [kW]			22.2
Base rotation speed		[r/min]	3000
Max. rotation speed in constant output range [r/min]			15000
Maximum rotation speed		[r/min]	15000
Continuous rated torque		[N·m]	23.9
Motor inertia		[×10⁻⁴kg·m²]	0.0085
Degree of protection			IP44
Outline dimension drawing (flange type)		[mm]	
Flange fitting diameter		[mm]	ϕ150
Shaft diameter		[mm]	ϕ28
Mass		[kg]	50

(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

DRIVE SYSTEM BUILT-IN SPINDLE MOTOR 200V

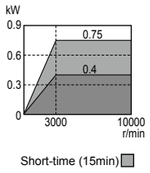
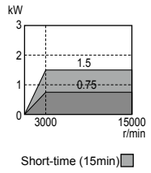
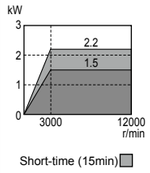
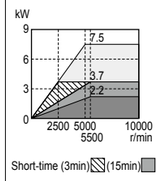
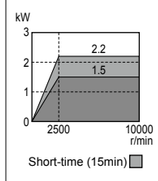
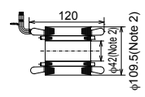
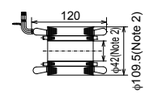
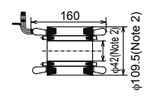
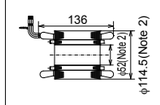
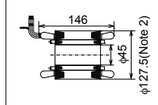
■SJ-BG Series

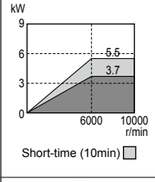
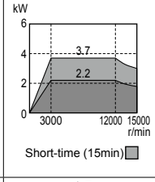
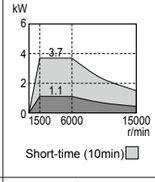
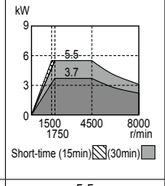
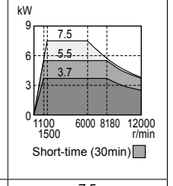
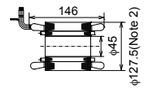
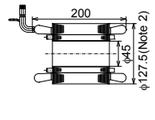
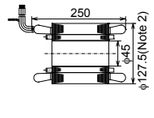
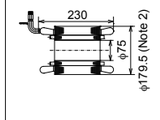
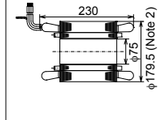
Motor type (Note 1)			SJ-BG150B/150-01□	SJ-BG160B/150-01□(R)			SJ-BG160D/150-01□(R)
Compatible drive unit	MDS-E-SP-		80	40	80	160	80
Output %ED rating □□ Continuous rating □			 %ED rating(40%ED) □	 %ED rating(40%ED) □	 %ED rating(40%ED) □	 %ED rating(10%ED) ▨ (20%ED) □ (40%ED) □	 %ED rating(40%ED) □
Standard output during acceleration/deceleration [kW]			5.5	3.7	3.7	7.5	5.5
Actual acceleration/deceleration output (Note 4) [kW]			6.6	4.44	4.44	9	6.6
Continuous base rotation speed		[r/min]	2500	3500	1300	1770	1500
Maximum rotation speed		[r/min]	15000	15000	15000	15000	15000
Continuous rated torque		[N·m]	14.1	6.0	16.2	20.0	23.6
Rotor inertia		[kg·m²]	0.00575	0.005(0.0042)	0.005(0.0042)	0.005(0.0042)	0.0075(0.0061)
Outline dimension drawing		[mm]					
Mass	Stator	[kg]	6.3	7.1	7.1	7.1	10.0
	Rotor	[kg]	3.7	2.9(2.3)	2.9(2.3)	2.9(2.3)	4.3(3.3)

Motor type (Note 1)			SJ-BG160D/150-02□(R)
Compatible drive unit	MDS-E-SP-		160
Output Acceleration/Deceleration □ %ED rating □■ Continuous rating ■			 %ED rating(15%ED) ■ (40%ED) ■
Standard output during acceleration/deceleration [kW]			7.5
Actual acceleration/deceleration output (Note 4) [kW]			9
Continuous base rotation speed		[r/min]	1500
Maximum rotation speed		[r/min]	15000
Continuous rated torque		[N·m]	23.6
Rotor inertia		[kg·m²]	0.0075(0.0061)
Outline dimension drawing		[mm]	
Mass	Stator	[kg]	11.0
	Rotor	[kg]	4.3(3.3)

(Note 1) Please contact your Mitsubishi Electric dealer for the special products not listed above.
(Note 2) These dimensions are the dimensions after machine machining.
(Note 3) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 4) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".
(Note 5) A value in brackets is for the motor type which have (R) in the end of the type name.

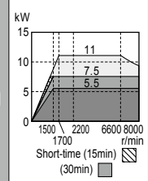
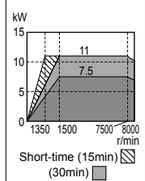
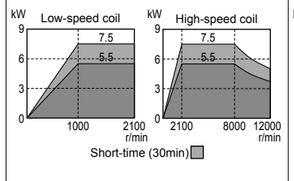
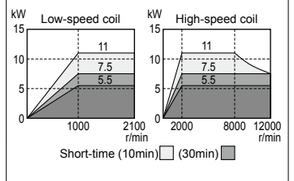
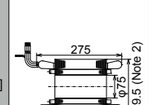
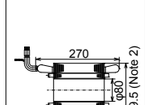
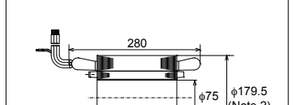
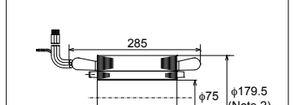
■SJ-B Series

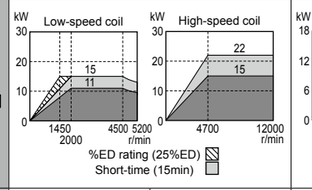
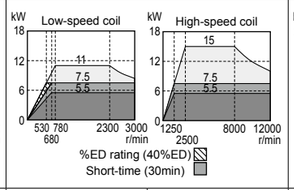
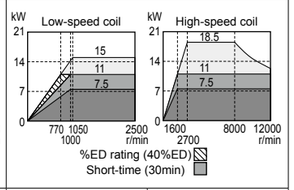
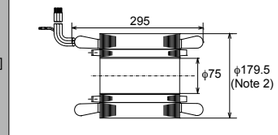
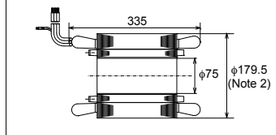
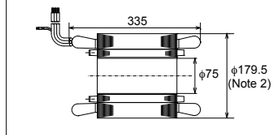
Motor type (Note 1)		SJ-B4002T	SJ-B4004T	SJ-B4003T	SJ-B4B03T	SJ-B4112T
Compatible drive unit	MDS-E-SP-	20	40	40	160	40
Output Acceleration/Deceleration □ Short-time rating ▨□□ Continuous rating ■						
Standard output during acceleration/deceleration [kW]		0.75	1.5	2.2	7.5	2.2
Actual acceleration/deceleration output (Note 4) [kW]		0.9	1.8	2.64	9	2.64
Continuous base rotation speed	[r/min]	3000	3000	3000	5500	2500
Maximum rotation speed	[r/min]	10000	15000	12000	10000	10000
Continuous rated torque	[N·m]	1.27	2.39	4.77	3.82	5.73
Rotor inertia	[kg·m²]	0.00078	0.00078	0.00138	0.00163	0.00168
Outline dimension drawing	[mm]					
Mass	Stator [kg]	2.2	2.2	3.9	3.0	4.1
	Rotor [kg]	0.9	0.9	1.7	1.5	1.7

Motor type (Note 1)		SJ-B4111T	SJ-B4105T	SJ-B4102T	SJ-B4310T	SJ-B4301T
Compatible drive unit	MDS-E-SP-	80	80	80	80	160
Output Short-time rating □□ Continuous rating ■						
Standard output during acceleration/deceleration [kW]		5.5	3.7	3.7	5.5	7.5
Actual acceleration/deceleration output (Note 4) [kW]		6.6	4.44	4.44	6.6	9
Continuous base rotation speed	[r/min]	6000	3000	1500	1750	1100
Maximum rotation speed	[r/min]	10000	15000	15000	8000	12000
Continuous rated torque	[N·m]	5.89	7.00	7.00	20.2	32.1
Rotor inertia	[kg·m²]	0.00168	0.003	0.00425	0.0128	0.0128
Outline dimension drawing	[mm]					
Mass	Stator [kg]	4.1	7.4	10	15	15
	Rotor [kg]	1.7	3.0	4.3	5.6	5.6

(Note 1) Please contact your Mitsubishi Electric dealer for the special products not listed above.
(Note 2) These dimensions are the dimensions after machine machining.
(Note 3) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 4) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

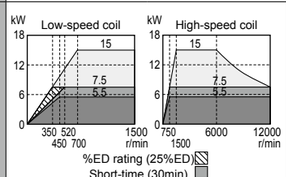
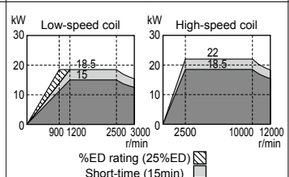
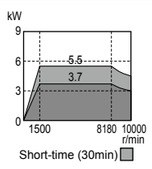
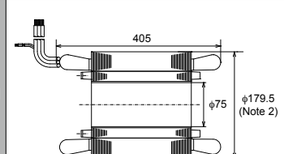
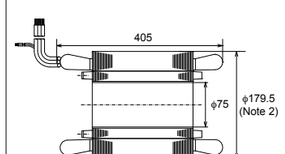
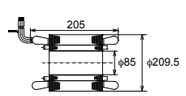
■SJ-B Series

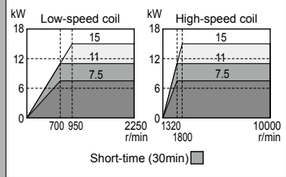
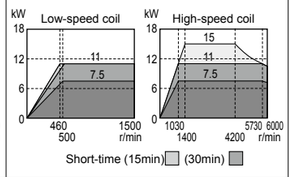
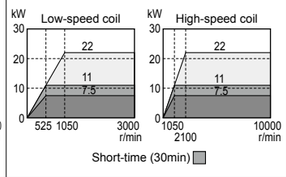
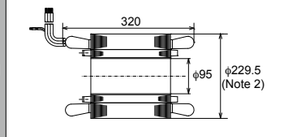
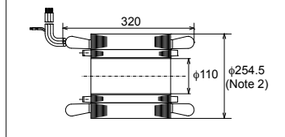
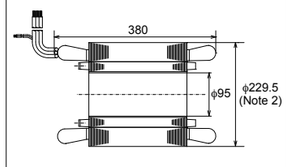
Motor type (Note 1)		SJ-B4327T	SJ-B4340T	SJ-B4313TK		SJ-B4323TK	
Compatible drive unit	MDS-E-SP-	160	200	160		200	
Output Acceleration/Deceleration □ Short-time rating ▨□ Continuous rating ■					
Standard output during acceleration/deceleration	[kW]	11	11	7.5	7.5	11	11
Actual acceleration/ deceleration output (Note 4)	[kW]	13.2	13.2	9	9	13.2	13.2
Continuous base rotation speed	[r/min]	1700	1500	1000	2100	1000	2000
Maximum rotation speed	[r/min]	8000	8000	2100	12000	2000	12000
Continuous rated torque	[N·m]	30.9	47.7	52.5	25.0	52.5	26.3
Rotor inertia	[kg·m²]	0.0175	0.0175	0.0175		0.0175	
Outline dimension drawing	[mm]						
Mass	Stator [kg]	20	20	20		20	
	Rotor [kg]	7.6	7.6	7.6		7.6	

Motor type (Note 1)		SJ-B4325TK		SJ-B4303TK		SJ-B4326TK	
Compatible drive unit	MDS-E-SP-	240		200		240	
Output %ED rating ▨ Short-time rating □□ Continuous rating ■							
Standard output during acceleration/deceleration	[kW]	15	22	11	15	15	18.5
Actual acceleration/ deceleration output (Note 4)	[kW]	18	26.4	13.2	18	18	22.2
Continuous base rotation speed	[r/min]	2000	4700	680	1250	1000	1600
Maximum rotation speed	[r/min]	5200	12000	3000	12000	2500	12000
Continuous rated torque	[N·m]	52.5	30.5	77.2	42.0	71.6	44.8
Rotor inertia	[kg·m²]	0.0175		0.0225		0.0225	
Outline dimension drawing	[mm]						
Mass	Stator [kg]	20		26		26	
	Rotor [kg]	7.6		9.8		9.8	

(Note 1) Please contact your Mitsubishi Electric dealer for the special products not listed above.
(Note 2) These dimensions are the dimensions after machine machining.
(Note 3) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 4) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

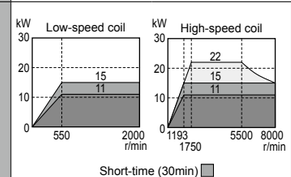
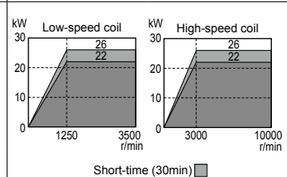
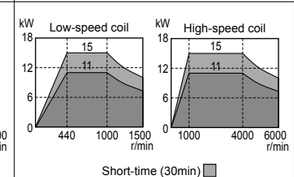
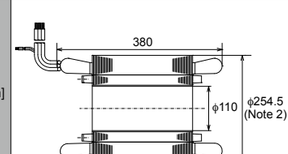
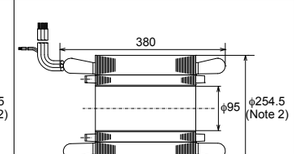
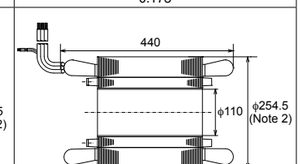
■SJ-B Series

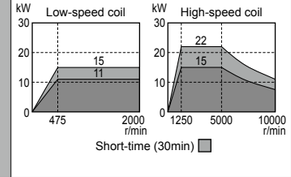
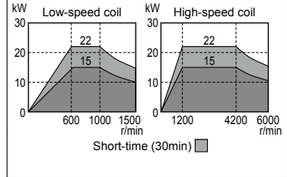
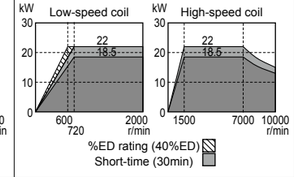
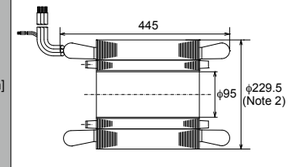
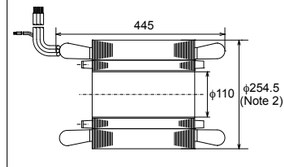
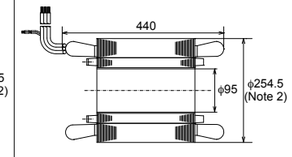
Motor type (Note 1)		SJ-2B4304TK		SJ-2B4318TK		SJ-2B4412T
Compatible drive unit	MDS-E-SP-	320		320		160
Output Acceleration/Deceleration %ED rating Short-time rating Continuous rating						
Standard output during acceleration/deceleration [kW]		15	15	18.5	22	5.5
Actual acceleration/deceleration output (Note 4) [kW]		18	18	22.2	26.4	6.6
Continuous base rotation speed [r/min]		450	750	1200	2500	1500
Maximum rotation speed [r/min]		1500	12000	3000	12000	10000
Continuous rated torque [N·m]		117	70.0	119	70.7	23.6
Rotor inertia	[kg·m²]	0.028		0.028		0.0193
Outline dimension drawing	[mm]					
Mass	Stator [kg]	33		33		15
	Rotor [kg]	12		12		6.2

Motor type (Note 1)		SJ-2B4501TK		SJ-2B6611TK		SJ-2B4502TK	
Compatible drive unit	MDS-E-SP-	200		200		320	
Output Acceleration/Deceleration Short-time rating Continuous rating							
Standard output during acceleration/deceleration [kW]		15	15	11	15	22	22
Actual acceleration/deceleration output (Note 4) [kW]		18	18	13.2	18	26.4	26.4
Continuous base rotation speed [r/min]		700	1320	500	1030	525	1050
Maximum rotation speed [r/min]		2250	10000	1500	6000	3000	10000
Continuous rated torque [N·m]		102	54.3	143	69.5	136	68.2
Rotor inertia	[kg·m²]	0.08		0.102		0.105	
Outline dimension drawing	[mm]						
Mass	Stator [kg]	29		37		37	
	Rotor [kg]	18		19		24	

(Note 1) Please contact your Mitsubishi Electric dealer for the special products not listed above.
(Note 2) These dimensions are the dimensions after machine machining.
(Note 3) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 4) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

■SJ-B Series

Motor type (Note 1)		SJ-2B6602TK		SJ-2B4601TK		SJ-2B6605TK	
Compatible drive unit	MDS-E-SP-	320		320		240	
Output Acceleration/Deceleration Short-time rating Continuous rating							
Standard output during acceleration/deceleration [kW]		15	22	26	26	15	15
Actual acceleration/deceleration output (Note 4) [kW]		18	26.4	31.2	31.2	18	18
Continuous base rotation speed [r/min]		550	1193	1250	3000	440	1000
Maximum rotation speed [r/min]		2000	8000	3500	10000	1500	6000
Continuous rated torque [N·m]		191	88.0	168	70.0	239	105
Rotor inertia	[kg·m²]	0.133		0.105		0.173	
Outline dimension drawing	[mm]						
Mass	Stator [kg]	49		55		63	
	Rotor [kg]	25		24		33	

Motor type (Note 1)		SJ-2B4503TK		SJ-2B6603TK		SJ-2B4602TK	
Compatible drive unit	MDS-E-SP-	320		320		320	
Output %ED rating Short-time rating Continuous rating							
Standard output during acceleration/deceleration [kW]		15	22	22	22	22	22
Actual acceleration/deceleration output (Note 4) [kW]		18	26.4	26.4	26.4	26.4	26.4
Continuous base rotation speed [r/min]		475	1250	600	1200	720	1500
Maximum rotation speed [r/min]		2000	10000	1500	6000	2000	10000
Continuous rated torque [N·m]		221	115	239	119	245	118
Rotor inertia	[kg·m²]	0.135		0.173		0.135	
Outline dimension drawing	[mm]						
Mass	Stator [kg]	48		63		71	
	Rotor [kg]	31		33		31	

(Note 1) Please contact your Mitsubishi Electric dealer for the special products not listed above.
(Note 2) These dimensions are the dimensions after machine machining.
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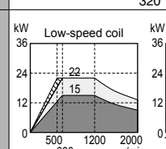
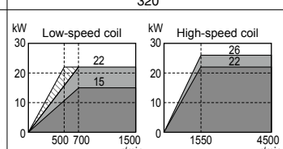
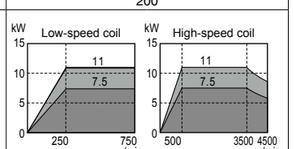
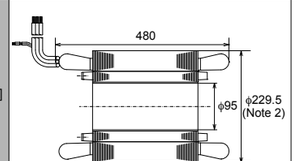
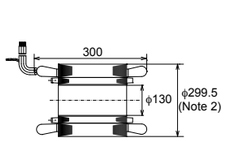
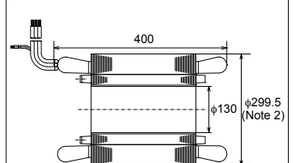
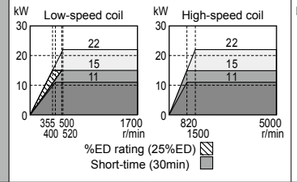
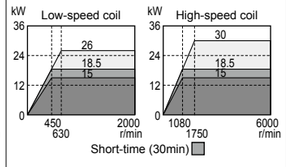
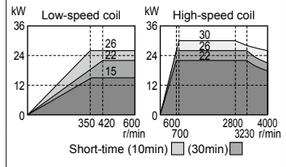
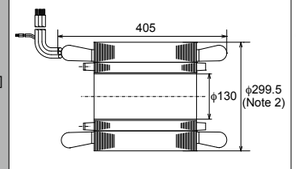
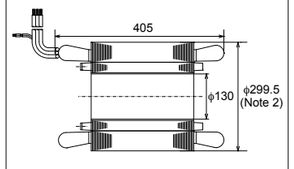
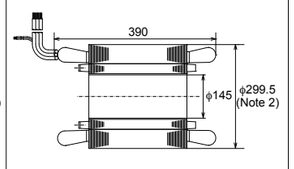
(Note 4) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

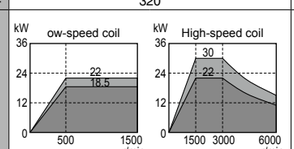
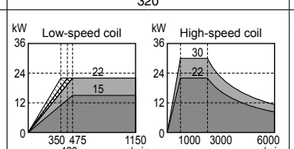
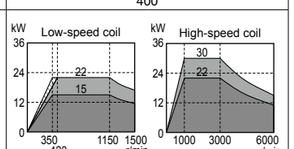
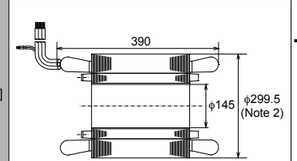
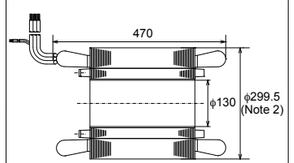
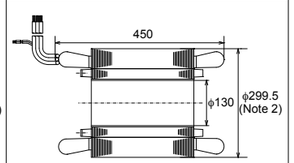
■SJ-B Series

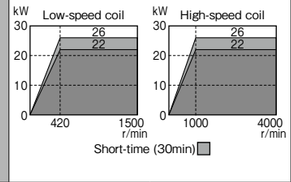
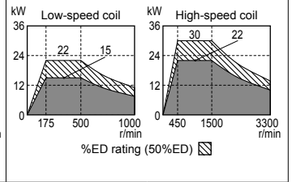
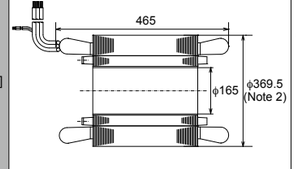
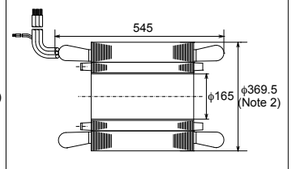
Motor type (Note 1)		SJ-2B4511TK		SJ-2B6720TK		SJ-2B6705TK	
Compatible drive unit	MDS-E-SP-	320		320		200	
Output %ED rating Short-time rating Continuous rating							
Standard output during acceleration/deceleration [kW]		22	30	22	26	11	11
Actual acceleration/deceleration output (Note 4) [kW]		26.4	36	26.4	31.2	13.2	13.2
Continuous base rotation speed [r/min]		600	1600	700	1550	250	500
Maximum rotation speed [r/min]		2000	10000	1500	4500	750	4500
Continuous rated torque [N·m]		239	131	205	136	286	133
Rotor inertia	[kg·m²]	0.15		0.20		0.288	
Outline dimension drawing	[mm]						
Mass	Stator [kg]	54		45		65	
	Rotor [kg]	34		26		38	

Motor type (Note 1)		SJ-2B6711TK		SJ-2B6706TK		SJ-2B6716TK	
Compatible drive unit	MDS-E-SP-	320		400		400	
Output Acceleration/Deceleration %ED rating Short-time rating Continuous rating							
Standard output during acceleration/deceleration [kW]		22	22	26	30	26	30
Actual acceleration/deceleration output (Note 4) [kW]		26.4	26.4	31.2	36	31.2	36
Continuous base rotation speed [r/min]		400	820	450	1080	350	600
Maximum rotation speed [r/min]		1700	5000	2000	6000	600	4000
Continuous rated torque [N·m]		263	114	318	133	409	350
Rotor inertia	[kg·m²]	0.280		0.288		0.283	
Outline dimension drawing	[mm]						
Mass	Stator [kg]	65		65		70	
	Rotor [kg]	37		38		35	

(Note 1) Please contact your Mitsubishi Electric dealer for the special products not listed above.
(Note 2) These dimensions are the dimensions after machine machining.
(Note 3) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 4) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

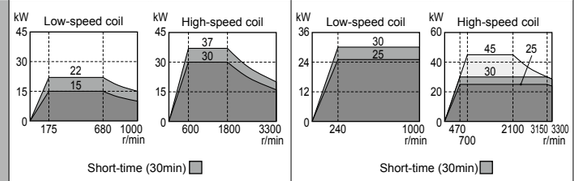
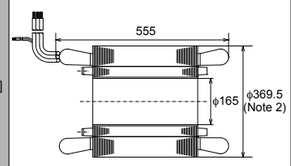
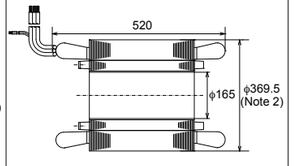
■SJ-B Series

Motor type (Note 1)		SJ-2B6721TK		SJ-2B6704TK		SJ-2B6709TK	
Compatible drive unit	MDS-E-SP-	320		320		400	
Output Acceleration/Deceleration %ED rating Short-time rating Continuous rating							
Standard output during acceleration/deceleration [kW]		22	30	22	30	22	30
Actual acceleration/deceleration output (Note 4) [kW]		26.4	36	26.4	36	26.4	36
Continuous base rotation speed [r/min]		500	1500	475	1000	350	1000
Maximum rotation speed [r/min]		1500	6000	1150	6000	1500	6000
Continuous rated torque [N·m]		353	140	302	175	409	210
Rotor inertia	[kg·m²]	0.283		0.37		0.37	
Outline dimension drawing	[mm]						
Mass	Stator [kg]	70		83		83	
	Rotor [kg]	35		49		49	

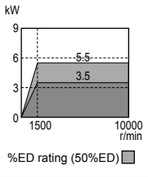
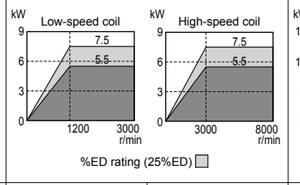
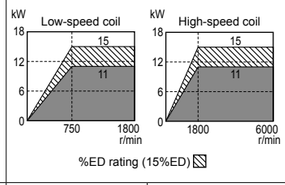
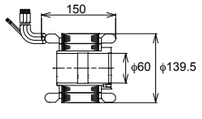
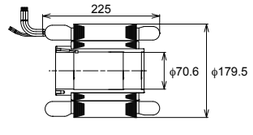
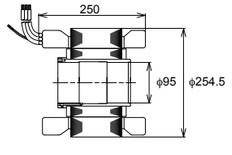
Motor type (Note 1)		SJ-2B6905TK		SJ-2B6908TK	
Compatible drive unit	MDS-E-SP-	320		320	
Output %ED rating Short-time rating Continuous rating					
Standard output during acceleration/deceleration [kW]		26	26	22	30
Actual acceleration/deceleration output (Note 4) [kW]		31.2	31.2	26.4	36
Continuous base rotation speed [r/min]		420	1000	175	450
Maximum rotation speed [r/min]		1500	4000	1000	3300
Continuous rated torque [N·m]		500	210	819	467
Rotor inertia	[kg·m²]	0.853		1.105	
Outline dimension drawing	[mm]				
Mass	Stator [kg]	110		143	
	Rotor [kg]	70		91	

(Note 1) Please contact your Mitsubishi Electric dealer for the special products not listed above.
(Note 2) These dimensions are the dimensions after machine machining.
(Note 3) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 4) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

■SJ-B Series

Motor type (Note 1)			SJ-2B6906TK		SJ-2B6914TK	
Compatible drive unit	MDS-E-SP-		400		640	
Output Acceleration/Deceleration □ Short-time rating □ Continuous rating ■						
Standard output during acceleration/deceleration [kW]			22	37	30	45
Actual acceleration/deceleration output (Note 4) [kW]			26.4	44.4	36	54
Continuous base rotation speed [r/min]			175	600	240	470
Maximum rotation speed [r/min]			1000	3300	1000	3300
Continuous rated torque [N·m]			819	477	995	508
Rotor inertia		[kg·m²]	1.105		1.105	
Outline dimension drawing		[mm]				
Mass	Stator	[kg]	143		143	
	Rotor	[kg]	91		91	

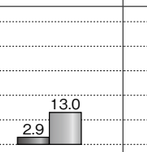
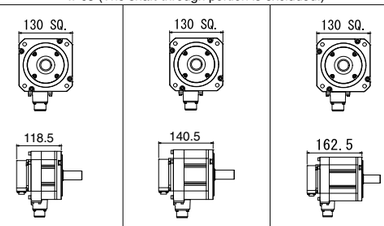
■SJ-PMB Series

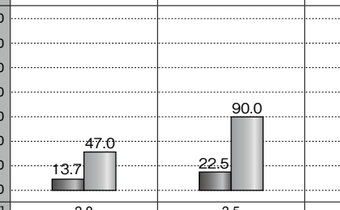
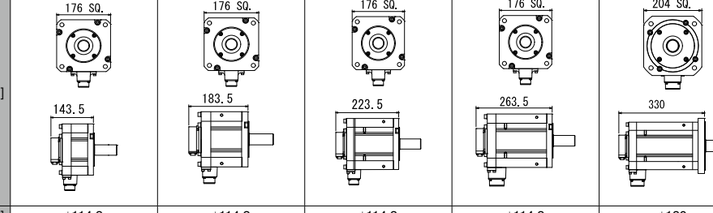
Motor type (Note 1)			SJ-PMB02215T-02	SJ-PMB04412T-B0		SJ-PMB14007T-01	
Compatible drive unit	MDS-E-SP-		240	200		320	
Output %ED rating □□□ Continuous rating □							
Standard output during acceleration/deceleration [kW]			5.5	7.5	7.5	15	15
Actual acceleration/deceleration output (Note 4) [kW]			6.6	9	9	18	18
Continuous base rotation speed [r/min]			1500	1200	3000	750	1800
Maximum rotation speed [r/min]			10000	3000	8000	1800	6000
Continuous rated torque [N·m]			22.3	43.8	17.5	140	58.4
Rotor inertia		[kg·m²]	0.006	0.0162		0.0633	
Outline dimension drawing		[mm]					
Mass	Stator	[kg]	4.4	14.0		30	
	Rotor	[kg]	3.7	8.0		15	

(Note 1) Please contact your Mitsubishi Electric dealer for the special products not listed above.
(Note 2) These dimensions are the dimensions after machine machining.
(Note 3) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 4) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

DRIVE SYSTEM SERVO MOTOR 400V

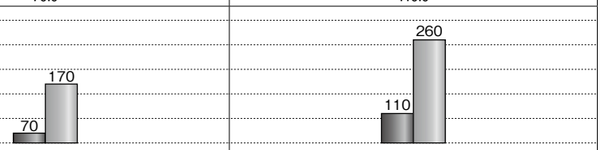
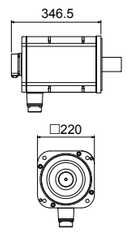
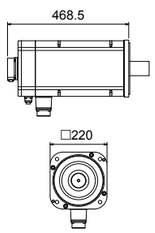
■HG-H Series

Motor type			HG-H75	HG-H105	HG-H54	HG-H104	HG-H154
Compatible drive unit	1-axis type	MDS-EH-V1-	under development		20	20	40
	2-axis type	MDS-EH-V2-			20 40	20 40	40 80
	Regenerative resistor type	MDS-EJH-V1			20	20	40
Output Stall torque ■ Max. torque □		[N·m]					
Rated output		[kW]			0.5	1.0	1.5
Max. rotation speed		[r/min]			4000		
Motor inertia		[×10⁻⁴kg·m²]			6.1	11.9	17.8
Motor inertia with a brake		[×10⁻⁴kg·m²]			8.3	14.1	20.0
Degree of protection					IP65 (The shaft-through portion is excluded.)		
Outline dimension drawing (flange type) (Without a brake, Straight shaft, D48 encoder) (Note) The total length will be 3.5mm longer when using an D51 or D74 encoder.		[mm]					
Flange fitting diameter		[mm]			ϕ110	ϕ110	ϕ110
Shaft diameter		[mm]			ϕ24	ϕ24	ϕ24
Mass (with a brake)		[kg]			4.8(6.8)	6.5(8.5)	8.3(10.3)
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)				EH	EH	EH
	4,194,304 [p/rev] (D51)				EH, EJH	EH, EJH	EH, EJH
	1,048,576 [p/rev] (D48)						

Motor type			HG-H204	HG-H354	HG-H453	HG-H703	HG-H903
Compatible drive unit	1-axis type	MDS-EH-V1-	40	80	80	80W	160
	2-axis type	MDS-EH-V2-	40 80	80 80W	80 80W	80W	–
	Regenerative resistor type	MDS-EJH-V1	–	–	–	–	–
Output Stall torque ■ Max. torque □		[N·m]					
Rated output		[kW]	2.0	3.5	4.5	7.0	9.0
Max. rotation speed		[r/min]	4000		3500	3000	
Motor inertia		[×10⁻⁴kg·m²]	38.3	75.0	112.0	154.0	196.0
Motor inertia with a brake		[×10⁻⁴kg·m²]	48.0	84.7	121.7	163.7	205.7
Degree of protection			IP65 (The shaft-through portion is excluded.)				
Outline dimension drawing (flange type) (Without a brake, Straight shaft, D48 encoder) (Note) The total length will be 3.5mm longer when using an D51 or D74 encoder.		[mm]					
Flange fitting diameter		[mm]	ϕ114.3	ϕ114.3	ϕ114.3	ϕ114.3	ϕ180
Shaft diameter		[mm]	ϕ35	ϕ35	ϕ35	ϕ35	ϕ42
Mass (with a brake)		[kg]	12.0(18.0)	19.0(25.0)	26.0(32.0)	32.0(38.0)	45.0(51.0)
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)		EH	EH	EH	EH	EH
	4,194,304 [p/rev] (D51)						
	1,048,576 [p/rev] (D48)						

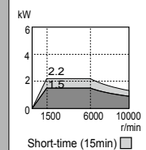
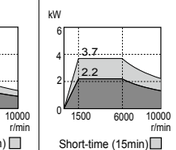
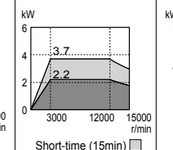
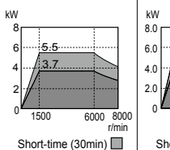
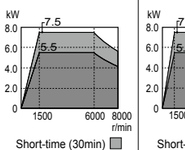
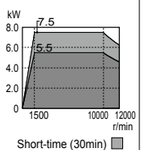
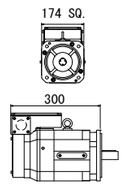
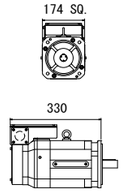
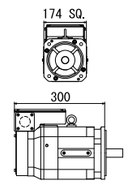
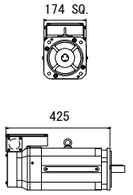
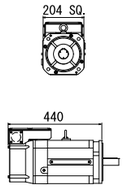
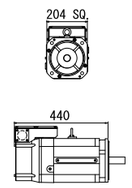
(Note) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.

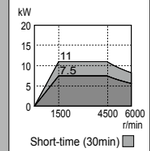
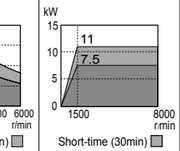
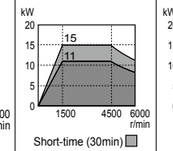
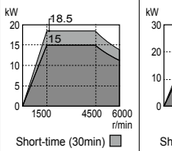
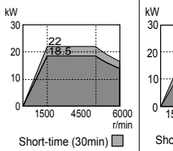
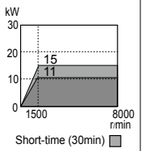
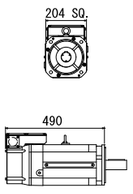
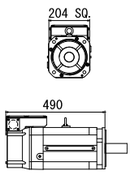
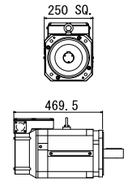
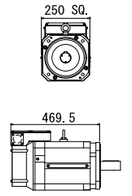
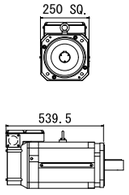
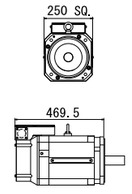
■HQ-H Series

Motor type		HQ-H903	HQ-H1103
Compatible drive unit / 1-axis type	MDS-EH-V1-	160	160W
Stall torque		70.0	110.0
Output Stall torque ■ Max. torque □	[N·m]		
Max. rotation speed	[r/min]	3000	3000
Motor inertia	[×10⁻⁴kg·m²]	230.0	350.0
Motor inertia with a brake	[×10⁻⁴kg·m²]	254.0	374.0
Degree of protection		IP67	IP67
Outline dimension drawing (flange type) (Without a brake, Straight shaft, D48 encoder) (Note) The total length will be 3.5mm longer when using an D51 or D74N encoder.	[mm]		
Flange fitting diameter	[mm]	ϕ200	ϕ200
Shaft diameter	[mm]	ϕ55	ϕ55
Mass (with a brake)	[kg]	51.0(61.4)	74.0(84.4)
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74) 4,194,304 [p/rev] (D51) 1,048,576 [p/rev] (D48)	EH	EH

DRIVE SYSTEM SPINDLE MOTOR 400V

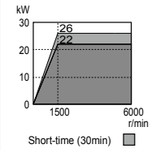
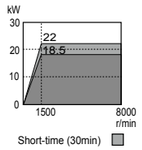
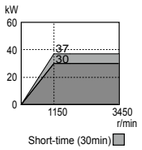
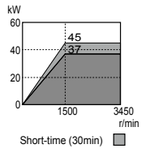
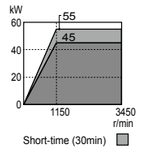
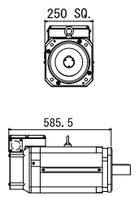
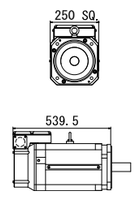
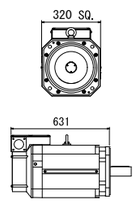
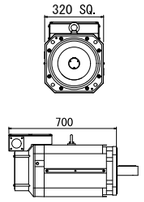
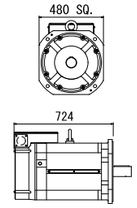
■SJ-4-V Series (Normal)

Motor type		SJ-4-V2.2-03T	SJ-4-V3.7-03T	SJ-4-V3.7-05ZT	SJ-4-V5.5-07T	SJ-4-V7.5-12T	SJ-4-V7.5-13ZT
Compatible drive unit	MDS-EH-SP-	20	20	20	40	40	80
Output Short-time rating □□ Continuous rating ■							
Standard output during acceleration/deceleration [kW]		2.2	3.7	3.7	5.5	7.5	7.5
Actual acceleration/deceleration output (Note 2) [kW]		2.64	4.44	4.44	6.6	9	9
Base rotation speed	[r/min]	1500		3000		1500	
Maximum rotation speed [r/min]		10000		15000	8000		12000
Continuous rated torque [N·m]		9.5	14.0	7.0	23.5	35.0	35.0
Inertia	[kg·m²]	0.007	0.009	0.007	0.015	0.025	0.025
Degree of protection		IP44	IP44	IP44	IP44	IP44	IP44
Outline dimension drawing (flange type)	[mm]						
Flange fitting diameter	[mm]	ϕ150	ϕ150	ϕ150	ϕ150	ϕ180	ϕ180
Shaft diameter	[mm]	ϕ28	ϕ28	ϕ28	ϕ28	ϕ32	ϕ32
Mass	[kg]	25	30	25	49	60	60

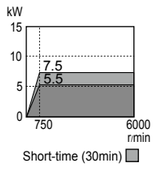
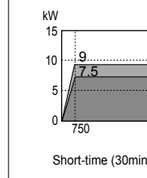
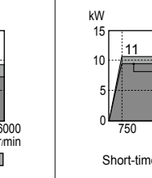
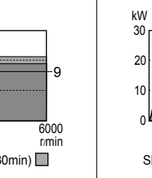
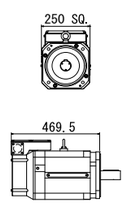
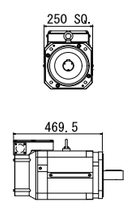
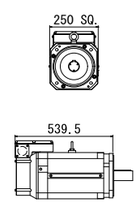
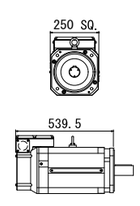
Motor type		SJ-4-V11-18T	SJ-4-V11-23ZT	SJ-4-V15-18T	SJ-4-V18.5-14T	SJ-4-V22-15T	SJ-4-V22-18ZT
Compatible drive unit	MDS-EH-SP-	80	100	100	100	160	160
Output Short-time rating □ Continuous rating ■							
Standard output during acceleration/deceleration [kW]		11	11	15	18.5	22	15
Actual acceleration/deceleration output (Note 2) [kW]		13.2	13.2	18	22.2	26.4	18
Base rotation speed	[r/min]	1500					
Maximum rotation speed [r/min]		6000	8000	6000			8000
Continuous rated torque [N·m]		47.7		70.0	95.5	118	70.0
Inertia	[kg·m²]	0.03		0.06		0.08	0.06
Degree of protection		IP44	IP44	IP44	IP44	IP44	IP44
Outline dimension drawing (flange type)	[mm]						
Flange fitting diameter	[mm]	ϕ180	ϕ180	ϕ230	ϕ230	ϕ230	ϕ230
Shaft diameter	[mm]	ϕ48	ϕ48	ϕ48	ϕ48	ϕ55	ϕ48
Mass	[kg]	70	70	110	110	135	110

(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".
(Note 3) The rated output is guaranteed at the rated input voltage (380 to 440VAC 50Hz / 380 to 480VAC 60Hz) to the power supply unit.
If the input voltage fluctuates and drops below 380VAC, the rated output may not be attained.

■SJ-4-V Series (Normal)

Motor type	SJ-4-V26-08T	SJ-4-V30-15ZT	SJ-4-V37-04T	SJ-4-V45-02T	SJ-4-V55-03T
Compatible drive unit MDS-EH-SP-	160	160	200	320	320
Output Short-time rating □ Continuous rating ■					
Standard output during acceleration/deceleration [kW]	26	22	37	45	55
Actual acceleration/deceleration output (Note 2) [kW]	31.2	26.4	44.4	54	66
Base rotation speed [r/min]	1500		1150	1500	1150
Maximum rotation speed [r/min]	6000	8000	3450		
Continuous rated torque [N·m]	140	118	249	236	374
Inertia [kg·m²]	0.10	0.08	0.31	0.55	0.85
Degree of protection	IP44	IP44	IP44	IP44	IP44
Outline dimension drawing (flange type) [mm]					
Flange fitting diameter [mm]	ϕ230	ϕ230	ϕ300	ϕ300	ϕ450
Shaft diameter [mm]	ϕ55	ϕ55	ϕ60	ϕ60	ϕ75
Mass [kg]	155	155	300	300	450

■SJ-4-V Series (Wide range constant output)

Motor type	SJ-4-V11-21T	SJ-4-V15-20T	SJ-4-V18.5-17T	SJ-4-V22-16T
Compatible drive unit MDS-EH-SP-	80	100	160	160
Output Short-time rating □ Continuous rating ■				
Standard output during acceleration/deceleration [kW]	7.5	9	11	15
Actual acceleration/deceleration output (Note 2) [kW]	9	10.8	13.2	18
Base rotation speed [r/min]	750			
Maximum rotation speed [r/min]	6000			
Continuous rated torque [N·m]	70.0	95.5	115	140
Inertia [kg·m²]	0.06	0.06	0.08	0.08
Degree of protection	IP44	IP44	IP44	IP44
Outline dimension drawing (flange type) [mm]				
Flange fitting diameter [mm]	ϕ230	ϕ230	ϕ230	ϕ230
Shaft diameter [mm]	ϕ48	ϕ48	ϕ55	ϕ55
Mass [kg]	110		135	

(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".
(Note 3) The rated output is guaranteed at the rated input voltage (380 to 440VAC 50Hz / 380 to 480VAC 60Hz) to the power supply unit.
If the input voltage fluctuates and drops below 380VAC, the rated output may not be attained.

DRIVE SYSTEM DRIVE UNIT

■MDS-E Series

1-axis servo drive unit

Drive unit type			MDS-E-V1-20	MDS-E-V1-40	MDS-E-V1-80	MDS-E-V1-160	MDS-E-V1-160W	MDS-E-V1-320	MDS-E-V1-320W
Drive unit category			1-axis servo						
Nominal maximum current (peak)		[A]	20	40	80	160	160	320	320
Power input	Rated voltage	[V]	270 to 324DC						
	Rated current	[A]	7	7	14	30	35	45	55
Control power input	Voltage	[V]	200 to 240AC Tolerable fluctuation: between +10% and -15%						
	Current	[A]	MAX. 0.2						
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%						
Control method			Sine wave PWM control method						
Dynamic brakes			Built-in						External (MDS-D-DBU)
Machine end encoder			Compatible						
Degree of protection			IP20 (excluding terminal block)						
Cooling method			Forced air cooling						
Mass		[kg]	3.8	3.8	3.8	3.8	4.5	5.8	7.5
Unit outline dimension drawing			A1	A1	A1	A1	B1	C1	D1

2-axis servo drive unit

Drive unit type			MDS-E-V2-20	MDS-E-V2-40	MDS-E-V2-80	MDS-E-V2-160	MDS-E-V2-160W
Drive unit category			2-axis servo				
Nominal maximum current (peak)		[A]	20/20	40/40	80/80	160/160	160/160
Power input	Rated voltage	[V]	270 to 324DC				
	Rated current	[A]	14 (7/7)	14 (7/7)	28 (14/14)	60 (30/30)	70 (35/35)
Control power input	Voltage	[V]	200 to 240AC Tolerable fluctuation: between +10% and -15%				
	Current	[A]	MAX. 0.2				
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%				
Control method			Sine wave PWM control method				
Dynamic brakes			Built-in				
Machine end encoder			Compatible				
Degree of protection			IP20 (excluding terminal block)				
Cooling method			Forced air cooling				
Mass		[kg]	3.8	3.8	3.8	5.2	6.3
Unit outline dimension drawing			A1	A1	A1	B1	C1

■MDS-E Series

1-axis spindle drive unit

Drive unit type			MDS-E-SP-20	MDS-E-SP-40	MDS-E-SP-80	MDS-E-SP-160	MDS-E-SP-200	MDS-E-SP-240	MDS-E-SP-320	MDS-E-SP-400	MDS-E-SP-640
Drive unit category			1-axis spindle								
Nominal maximum current (peak)		[A]	20	40	80	160	200	240	320	400	640
Power input	Rated voltage	[V]	270 to 324DC								
	Rated current	[A]	7	13	20	41	76	95	140	150	210
Control power input	Voltage	[V]	200 to 240AC Tolerable fluctuation: between +10% and -15%								
	Current	[A]	MAX. 0.2								
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%								
Control method			Sine wave PWM control method								
Degree of protection			IP20 (excluding terminal block)								
Cooling method			Forced air cooling								
Mass		[kg]	3.8	3.8	3.8	4.5	5.8	6.5	7.5	16.5	16.5
Unit outline dimension drawing			A1	A1	A1	B1	C1	D1	D2	E1	F1

2-axis spindle drive unit

Drive unit type			MDS-E-SP2-20	MDS-E-SP2-40	MDS-E-SP2-80	MDS-E-SP2-16080
Drive unit category			2-axis spindle			
Nominal maximum current (peak)		[A]	20/20	40/40	80/80	160/80
Power input	Rated voltage	[V]	270 to 324DC			
	Rated current	[A]	14 (7/7)	26 (13/13)	40 (20/20)	61 (41/20)
Control power input	Voltage	[V]	200 to 240AC Tolerable fluctuation: between +10% and -15%			
	Current	[A]	MAX. 0.2			
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%			
Control method			Sine wave PWM control method			
Degree of protection			IP20 (excluding terminal block)			
Cooling method			Forced air cooling			
Mass		[kg]	4.5	4.5	6.5	5.2
Unit outline dimension drawing			A1	A1	B1	B1

Power supply unit

Power supply unit			MDS-E-CV-37	MDS-E-CV-75	MDS-E-CV-110	MDS-E-CV-185	MDS-E-CV-300	MDS-E-CV-370	MDS-E-CV-450	MDS-E-CV-550
30-minute rated output		[kW]	3.7	7.5	11.0	18.5	30.0	37.0	45.0	55.0
Continuous rated output		[kW]	2.2	5.5	7.5	15.0	26.0	30.0	37.0	45.0
Power input	Rated voltage	[V]	200 to 240AC Tolerable fluctuation: between +10% and -15%							
	Rated current	[A]	15	26	35	65	107	121	148	200
Control power input	Voltage	[V]	200 to 240AC Tolerable fluctuation: between +10% and -15%							
	Current	[A]	MAX. 0.2							
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%							
Regeneration method			Power regeneration method							
Degree of protection			IP20 (excluding terminal block)							
Cooling method			Natural-cooling		Forced air cooling					
Mass		[kg]	4.0	4.0	6.0	6.0	10.0	10.0	10.0	25.5
Unit outline dimension drawing			A2	A2	B1	B1	D1	D1	D2	F1

AC reactor

AC reactor model			D-AL-7.5K	D-AL-11K	D-AL-18.5K	D-AL-30K	D-AL-37K	D-AL-45K	D-AL-55K
Compatible power supply unit type	MDS-E-CV-		37, 75	110	185	300	370	450	550
Rated capacity		[kW]	7.5	11	18.5	30	37	45	55
Rated voltage		[V]	200 to 240AC Tolerable fluctuation: between +10% and -15%						
Rated current		[A]	27	40	66	110	133	162	200
Frequency		[Hz]	50/60 Tolerable fluctuation: between +5% and -5%						
Mass		[kg]	4.2	3.7	5.3	6.1	8.6	9.7	11.5
Unit outline dimension drawing			R1	R1	R2	R2	R3	R3	R4

■MDS-EH Series

1-axis servo drive unit

Drive unit type			MDS-EH-V1-10	MDS-EH-V1-20	MDS-EH-V1-40	MDS-EH-V1-80	MDS-EH-V1-80W	MDS-EH-V1-160	MDS-EH-V1-160W	MDS-EH-V1-200
Drive unit category			1-axis servo							
Nominal maximum current (peak)		[A]	10	20	40	80	80	160	160	200
Power input	Rated voltage	[V]	513 to 648DC							
	Rated current	[A]	0.9	1.6	2.9	6.0	8.0	11.9	16.7	39.0
Control power input	Voltage	[V]	380 to 480AC Tolerable fluctuation: between +10% and -15%							
	Current	[A]	MAX. 0.1							
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%							
Control method			Sine wave PWM control method							
Dynamic brakes			Built-in						External (MDS-D-DBU)	
Degree of protection			IP20 ([over all] / IP00 [Terminal block TE1])							
Cooling method			Forced air cooling							
Mass		[kg]	3.8	3.8	3.8	3.8	4.5	5.8	7.5	16.5
Unit outline dimension drawing			A1	A1	A1	A1	B1	C1	D1	E1

2-axis servo drive unit

Drive unit type			MDS-EH-V2-10	MDS-EH-V2-20	MDS-EH-V2-40	MDS-EH-V2-80	MDS-EH-V2-80W
Drive unit category			2-axis servo				
Nominal maximum current (peak)		[A]	10/10	20/20	40/40	80/80	80/80
Power input	Rated voltage	[V]	513 to 648DC				
	Rated current	[A]	1.8 (0.9/0.9)	3.2 (1.6 /1.6)	5.8 (2.9/2.9)	12 (6.0/6.0)	16 (8.0/8.0)
Control power input	Voltage	[V]	380 to 480AC Tolerable fluctuation: between +10% and -15%				
	Current	[A]	MAX. 0.1				
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%				
Control method			Sine wave PWM control method・Current control method				
Dynamic brakes			Built-in				
Degree of protection			IP20				
Cooling method			Forced air cooling				
Mass		[kg]	3.8	3.8	3.8	5.2	6.3
Unit outline dimension drawing			A1	A1	A1	B1	C1

1-axis spindle drive unit

Drive unit type			MDS-EH-SP-20	MDS-EH-SP-40	MDS-EH-SP-80	MDS-EH-SP-100	MDS-EH-SP-160	MDS-EH-SP-200	MDS-EH-SP-320	MDS-EH-SP-480
Drive unit category			1-axis spindle							
Nominal maximum current (peak)		[A]	20	40	80	100	160	200	320	480
Power input	Rated voltage	[V]	513 to 648DC							
	Rated current	[A]	10	15	21	38	72	82	119	150
Control power input	Voltage	[V]	380 to 480AC Tolerable fluctuation: between +10% and -15%							
	Current	[A]	MAX. 0.1							
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%							
Control method			Sine wave PWM control method							
Degree of protection			IP20 ([over all] / IP00 [Terminal block TE1])							
Cooling method			Forced air cooling							
Mass		[kg]	3.8	4.5	4.5	5.8	7.5	16.5	16.5	22.5
Unit outline dimension drawing			A1	A1	B1	C1	D1	E1	E1	F1

(Note) Rated output capacity and rated speed of the motor used in combination with the drive unit are as indicated when using the power supply voltage and frequency listed.

The torque drops when the voltage is less than specified.

Power supply unit

Power supply unit type			MDS-EH-CV-37	MDS-EH-CV-75	MDS-EH-CV-110	MDS-EH-CV-185	MDS-EH-CV-300	MDS-EH-CV-370	MDS-EH-CV-450	MDS-EH-CV-550	MDS-EH-CV-750
30-minute rated output		[kW]	3.7	7.5	11.0	18.5	30.0	37.0	45.0	55.0	75.0
Continuous rated output		[kW]	2.2	5.5	7.5	15	26	30	37	45	55
Power input	Rated voltage	[V]	380 to 480AC Tolerable fluctuation: between +10% and -15%								
	Rated current	[A]	5.2	13	18	35	61	70	85	106	130
Control power input	Voltage	[V]	380 to 480AC Tolerable fluctuation: between +10% and -15%								
	Current	[A]	MAX. 0.1								
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%								
Main circuit method			Converter with power regeneration circuit								
Degree of protection			IP20 (excluding terminal block)								
Cooling method			Forced air cooling								
Mass		[kg]	6.0	6.0	6.0	6.0	10.0	10.0	10.0	25.5	25.5
Unit outline dimension drawing			B1	B1	B1	B1	D1	D1	D1	F1	F1

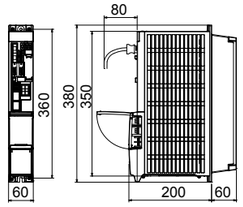
AC reactor

AC reactor model			DH-AL-7.5K	DH-AL-11K	DH-AL-18.5K	DH-AL-30K	DH-AL-37K	DH-AL-45K	DH-AL-55K	DH-AL-75K
Compatible power supply unit type	MDS-EH-CV-		37, 75	110	185	300	370	450	550	750
Rated capacity		[kW]	7.5	11	18.5	30	37	45	55	75
Rated voltage		[V]	380 to 480AC Tolerable fluctuation: between +10% and -15%							
Rated current		[A]	14	21	37	65	75	85	106	142
Frequency		[Hz]	50/60 Tolerable fluctuation: between +5% and -5%							
Mass		[kg]	4.0	3.7	5.3	6.0	8.5	9.8	10.5	13.0
Unit outline dimension drawing			R1	R1	R2	R2	R3	R3	R5	R6

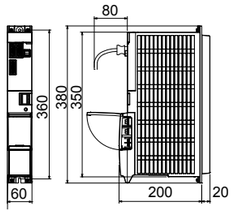
Unit Outline Dimension Drawing

[Unit : mm]

A1



A2



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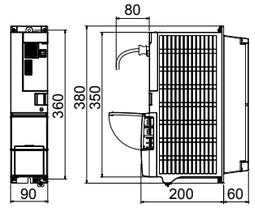

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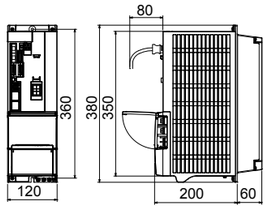

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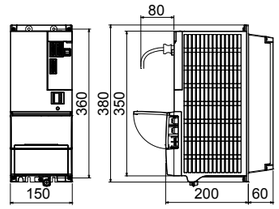

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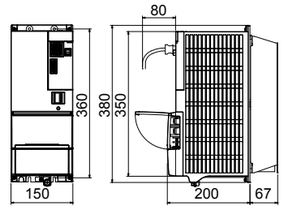
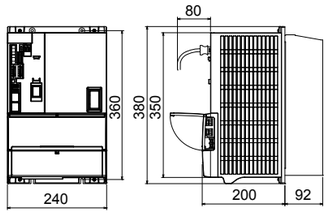


E1



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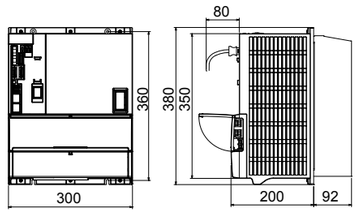
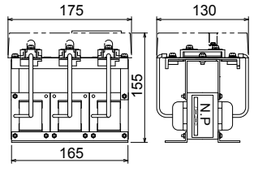
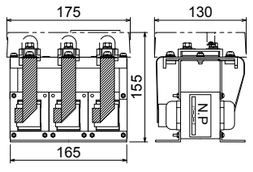


R1



R2



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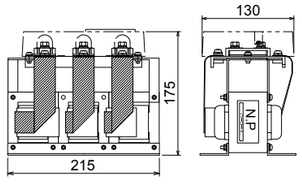

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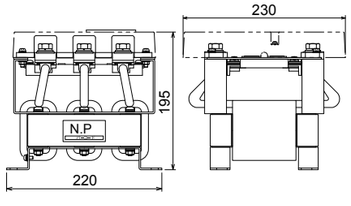

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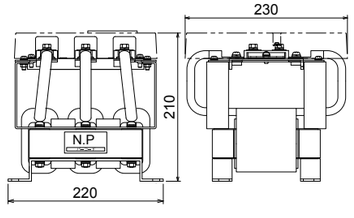
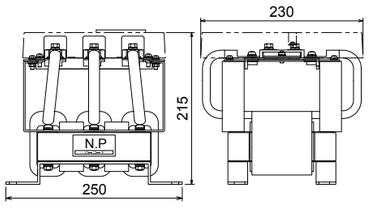


R6



■MDS-EM Series

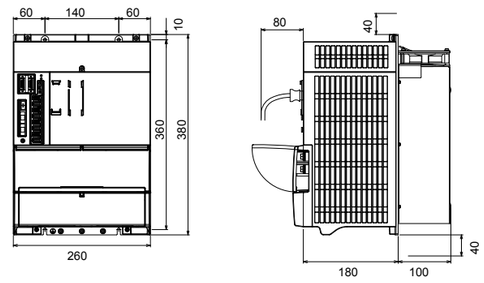
Multi-hybrid drive

Drive unit type			MDS-EM-SPV3-10040	MDS-EM-SPV3-10080	MDS-EM-SPV3-16080	MDS-EM-SPV3-20080	MDS-EM-SPV3-200120
Drive unit category			3-axis servo, 1-axis spindle (with converter)				
Nominal maximum current (spindle/servo)		[A]	100/40×3	100/80×3	160/80×3	200/80×3	200/120×3
Power input	Rated voltage	[V]	200 to 240AC Tolerable fluctuation: between +10% and -15%				
	Rated current	[A]	36	38	48	60	65
Control power input	Voltage	[V]	24DC Tolerable fluctuation: between +10% and -10%				
	Current	[A]	MAX. 4				
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%				
Control method			Sine wave PWM control method				
Regeneration method			Power regeneration method				
Dynamic brakes(servo)			Built-in				
Machine end encoder(servo)			Compatible				
Degree of protection			IP20 (excluding terminal block)				
Cooling method			Forced air cooling				
Mass		[kg]	15	15	15	15	15

Unit outline dimension drawing

Drive unit MDS-EM-SPV3-□

[Unit : mm]



■MDS-EJ/EJH Series

All-in-one compact servo drive unit

Drive unit type			MDS-EJ-V1-10	MDS-EJ-V1-15	MDS-EJ-V1-30	MDS-EJ-V1-40	MDS-EJ-V1-80	MDS-EJ-V1-100
Drive unit category			1-axis servo (with converter)					
Nominal maximum current (peak)		[A]	10	15	30	40	80	100
Power input	Rated voltage	[V]	3-phase or single-phase 200 to 240AC Tolerable fluctuation: between +10% and -15%			3-phase 200 to 240AC Tolerable fluctuation: between +10% and -15%		
	Rated current	[A]	1.5	2.9	3.8	5.0	10.5	16.0
Control power input	Voltage	[V]	Single-phase 200 to 240AC Tolerable fluctuation: between +10% and -15%					
	Current	[A]	MAX. 0.2					
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%					
Control method			Sine wave PWM control method					
Regeneration method			Power regeneration method					
Dynamic brakes			Built-in					
Machine end encoder			Compatible					
Degree of protection			IP20					
Cooling method			Natural cooling		Forced air cooling			
Mass		[kg]	0.8	1.0	1.4	2.1	2.1	2.3
Unit outline dimension drawing			J1a	J2	J3	J4a	J4a	J4b

Drive unit type			MDS-EJH-V1-10	MDS-EJH-V1-15	MDS-EJH-V1-20	MDS-EJH-V1-40
Drive unit category			1-axis servo (with converter)			
Nominal maximum current (peak)		[A]	10	15	20	40
Power input	Rated voltage	[V]	3-phase 380 to 480AC Tolerable fluctuation: between +10% and -15%			
	Rated current	[A]	1.4	2.5	5.1	7.9
Control power input	Voltage	[V]	Single-phase 380 to 480AC Tolerable fluctuation: between +10% and -15%			
	Current	[A]	MAX. 0.1			MAX. 0.2
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%			
Control method			Sine wave PWM control method			
Regeneration method			Power regeneration method			
Dynamic brakes			Built-in			
Machine end encoder			Compatible			
Degree of protection			IP20			
Cooling method			Natural cooling		Forced air cooling	
Mass		[kg]	0.8	1	1.4	2.3
Unit outline dimension drawing			J1b		J4c	J5b

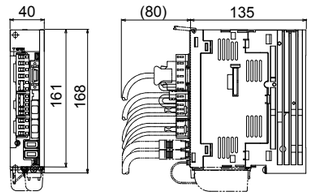
All-in-one compact spindle drive unit

Drive unit type			MDS-EJ-SP-20	MDS-EJ-SP-40	MDS-EJ-SP-80	MDS-EJ-SP-100	MDS-EJ-SP-120	MDS-EJ-SP-160
Drive unit category			1-axis spindle (with converter)					
Nominal maximum current (peak)		[A]	20	40	80	100	120	160
Power input	Rated voltage	[V]	3-phase 200 to 240AC Tolerable fl uctuation: between +10% and -15%					
	Rated current	[A]	2.6	9.0	10.5	16.0	26.0	35.4
Control power input	Voltage	[V]	Single-phase 200 to 240AC Tolerable fl uctuation: between +10% and -15%					
	Current	[A]	MAX. 0.2					
	Frequency	[Hz]	50/60 Tolerable fluctuation: between +5% and -5%					
Control method			Sine wave PWM control method					
Regeneration method			Power regeneration method					
Degree of protection			IP20 (excluding terminal block)					
Cooling method			Forced air cooling					
Mass		[kg]	1.4	2.1	2.3	4.0	4.0	6.2
Unit outline dimension drawing			J3	J4a	J4b	J5a	J5a	J6

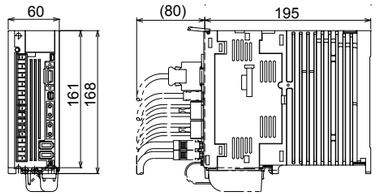
Unit outline dimension drawing

Unit [mm]

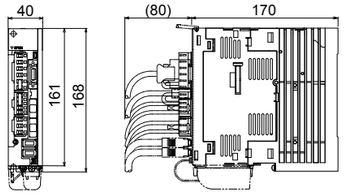
J1a



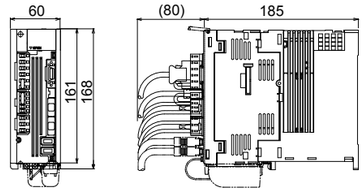
J1b



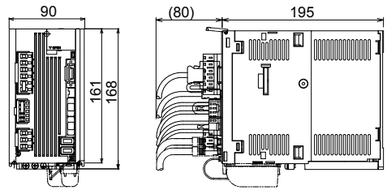
J2



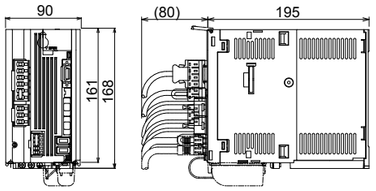
J3



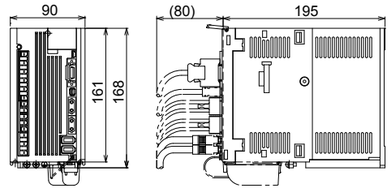
J4a



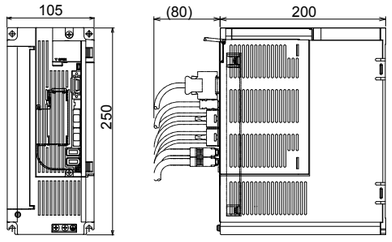
J4b



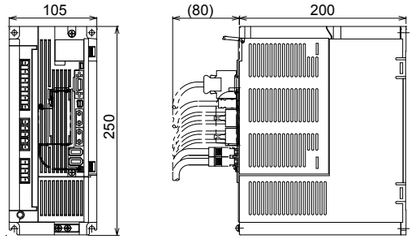
J4c



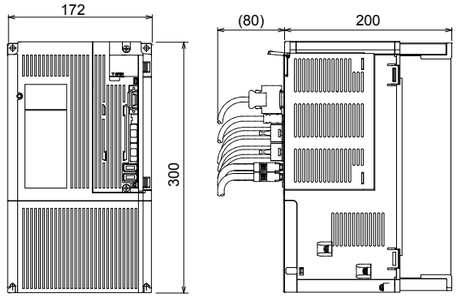
J5a



J5b



J6



DRIVE SYSTEM SELECTION OF THE POWER SUPPLY UNIT

For the power supply unit, calculate the spindle motor output and servo motor output each, and select the capacity satisfying the required rated capacity and the maximum momentary output.

■Calculation of Spindle Output

The spindle rated output and spindle maximum momentary rated output are calculated.

(1) Calculation of spindle rated output

The spindle rated output is calculated according to the following procedure.

(a) Spindle motor rated output

The spindle motor rated output is calculated from the following expression.

Spindle motor rated output =
MAX (continuous rated output, short-time rated output × short-time rated output coefficient α, %ED rated output × %ED rated output coefficient β)

(Note 1) For the spindle motor rated output, use the maximum value of "continuous rated output", "short-time rated output × short-time rated output coefficient α", and "%ED rated output × %ED rated output coefficient β".
(Note 2) Select the maximum value for the spindle motor with multiple %ED rated output characteristics.

For the spindle short-time rated output coefficient α, use the value in the following table.

List of short-time rated output time and short-time rated output coefficient

Short-time rated output time	Short-time rated output coefficient α	Short-time rated output time	Short-time rated output coefficient α
1 minute	0.2	5 minutes	0.7
2 minute	0.4	6~7 minutes	0.8
3 minute	0.5	8~9 minutes	0.9
4 minute	0.6	10 minutes or more	1.0

(Note 1) Select the set time for the short-time rated output of your spindle motor from the list. E.g.) When the set time for the short-time rated output is "1/12h", it means "5 minutes".
(Note 2) For the motor with coil changeover specification, select the set time for the short-time rated output of the high-speed coil.

For the %ED rated output coefficient β, use the value in the following table.

List of %ED rated output time and %ED rated output coefficient

%ED rated output time	%ED rated output coefficient β
More than or equal to 10% but less than 20%	0.7
More than or equal to 20% but less than 30%	0.9
More than or equal to 30%	1.0

(b) Spindle rated output

The spindle rated output is calculated from the following expression.

Spindle rated output
=Spindle motor rated output × motor output coefficient γ of the combined spindle drive unit

For the spindle motor rated output of the above expression, use the value calculated in (a).
For the motor output coefficient of the combined spindle drive unit, use the value corresponding to the used spindle drive unit in the in the following table.

Motor output coefficient list of combined spindle drive unit

< MDS-E Series >

Spindle motor rated output	Combined spindle drive unit MDS-E-SP-								
	20	40	80	160	200	240	320	400	640
to 1.5kW	1.00	1.15	1.25	—	—	—	—	—	—
to 2.2kW	—	1.00	1.15	1.30	—	—	—	—	—
to 3.7kW	—	1.00	1.05	1.20	—	—	—	—	—
to 5.5kW	—	—	1.00	1.10	1.20	—	—	—	—
to 7.5kW	—	—	—	1.00	1.15	1.20	—	—	—
to 11.0kW	—	—	—	1.00	1.05	1.10	1.15	—	—
to 15.0kW	—	—	—	—	1.00	1.05	1.10	—	—
to 18.5kW	—	—	—	—	1.00	1.00	1.05	1.10	—
to 22kW	—	—	—	—	—	1.00	1.00	1.05	1.15
to 26kW	—	—	—	—	—	—	1.00	1.00	1.10
to 30kW	—	—	—	—	—	—	1.00	1.00	1.05
to 37kW	—	—	—	—	—	—	—	1.00	1.05
to 45kW	—	—	—	—	—	—	—	—	1.0
to 55kW	—	—	—	—	—	—	—	—	1.0

< MDS-EH Series >

Spindle motor rated output	Combined spindle drive unit MDS-EH-SP-								
	20	40	80	100	160	200	320	480	600
to 2.2kW	1.00	1.15	1.30	—	—	—	—	—	—
to 3.7kW	1.00	1.05	1.20	—	—	—	—	—	—
to 5.5kW	—	1.00	1.10	1.20	—	—	—	—	—
to 7.5kW	—	—	1.00	1.15	—	—	—	—	—
to 11.0kW	—	—	1.00	1.05	1.15	—	—	—	—
to 15.0kW	—	—	—	1.00	1.10	—	—	—	—
to 18.5kW	—	—	—	1.00	1.05	1.10	—	—	—
to 22kW	—	—	—	—	1.00	1.05	1.15	—	—
to 26kW	—	—	—	—	1.00	1.00	1.10	1.20	—
to 30kW	—	—	—	—	1.00	1.00	1.05	1.15	—
to 37kW	—	—	—	—	—	1.00	1.05	1.10	1.10
to 45kW	—	—	—	—	—	—	1.00	1.05	1.05
to 55kW	—	—	—	—	—	—	1.00	1.00	1.00
to 75kW	—	—	—	—	—	—	—	1.00	1.00

POINT
[1] When the spindle motor applies to the wide range constant output specification or the high-torque specification, the spindle rated output may become large.
[2] The spindle rated output is calculated from the motor output coefficient of the spindle drive unit used in combination with the spindle motor.

(2) Calculation of spindle maximum momentary output

The spindle maximum momentary output is calculated from the following expression.

Spindle maximum momentary output
=MAX (short-time rated output × 1.2, output at acceleration/deceleration × 1.2,%ED rated output×1.2)

(Note) For the spindle rated output, use the largest one among "short-time rated output × 1.2" ,"output at acceleration/ deceleration × 1.2" and "%ED rated output×1.2".

■Calculation of Servo Motor Output

(1) Selection with rated output
(2) Selection with maximum momentary output

For the rated output and maximum momentary output of the servo motor, use the value corresponding to the servo motor in the following table.

Data for servo motor output selection

< 200V series >

Motor HG	75	105	54	104	154	224	204	354
Rated output (kW)	0.75	1.0	0.5	1.0	1.5	2.2	2.0	3.5
Maximum momentary output (kW)	2.6	3.6	2.3	5.0	9.0	12.3	8.0	18.0

Motor HG	123	223	303	453	703	903	142	302
Rated output (kW)	1.2	2.2	3.0	4.5	7.0	9.0	1.4	3.0
Maximum momentary output (kW)	4.0	7.5	12.0	22.0	28.0	41.0	3.8	7.4

< 400V series >

Motor HG-H	75	105	54	104	154	204	354	453	703	903
Rated output (kW)	0.75	1.0	0.5	1.0	1.5	2.0	3.5	4.5	7.0	9.0
Maximum momentary output (kW)	2.6	3.6	2.3	5.0	9.0	8.0	18.0	22.0	28.0	41.0

Motor HQ-H	903	1103
Rated output (kW)	9.0	11.0
Maximum momentary output (kW)	33.0	50.0

(Note) The maximum momentary output in this table is reference data for selecting the power supply unit and is not data which guarantees the maximum output.

■Selection of the Power Supply Unit

Select the power supply unit from the total sum of the rate output and the maximum momentary output.

(1) Calculation of required rated output

Power supply unit rated capacity > Σ (Spindle rated output) + 0.3 Σ (Servo motor rated output)

Substitute the output calculated from (1) of "Calculation of spindle output"and (1) of "Calculation of servo motor output" to the above expression, and calculate the total sum of the spindle rated output and servo motor rated output. According to this, select the power supply unit satisfying the rated capacity from the following table.

(2) Calculation of required maximum momentary output

Maximum momentary rated capacity of power supply unit ≥
Σ (Spindle maximum momentary output) + Σ (Maximum momentary output of servomotor accelerating/ decelerating simultaneously + Maximum momentary output of direct drive motor accelerating/ decelerating simultaneously)

Substitute the output calculated from (2) of "Calculation of spindle output"and (2) of "Calculation of servo motor output" to the above expression, and calculate the total sum of the "spindle maximum momentary output" and "output of servo motor accelerating/decelerating simultaneously". According to this, select the power supply unit satisfying the maximum momentary rated capacity from the following table.

(3) Selection of power supply unit

Select the power supply unit of which the capacity is larger than that selected in the item (1) and (2).

Power supply unit rated capacity and maximum momentary rated capacity

< MDS-E Series >

Unit	MDS-E-CV-	37	75	110	185	300	370	450	550
Rated capacity (kW)		4.2	8	11.5	19	31	38	46	56
Maximum momentary rated capacity (kW)		16	23	39	60	92	101	125	175

< MDS-EH Series >

Unit	MDS-EH-CV-	37	75	110	185	300	370	450	550	750
Rated capacity (kW)		4.2	8	11.5	19	31	38	46	56	76
Maximum momentary rated capacity (kW)		16	23	39	60	92	101	125	175	180

⚠ CAUTION

1. When reducing the time constant replacing the conventional motor with the HG or HG-H Series motor, the power supply capacity may rise because the motor maximum momentary output increases more than the conventional motor.
   Therefore, make sure to check the selection with maximum momentary rated capacity.
2. When the large capacity drive unit (MDS-E-SP-400/640, MDS-EH-SP-200/320/480, MDS-EH-V1-200) is connected to the power supply unit, always install the drive unit proximally in the left side of the power supply unit and connect PN terminal with the dedicated DC connection bar.
3. When using two large capacity drive units or more, the power supply unit is required for each drive unit.

■Required Capacity of Power Supply

For the power supply capacity, calculate the required spindle rated output and servo motor rated output each, and select the power supply capacity satisfying them.

(1) Spindle rate output required for power supply

The spindle rate output required for power supply is calculated from the following expression.

Spindle rate output required for power supply =
MAX (Spindle motor continuous rated output, Spindle motor output at accelerating/decelerating, Spindle motor short-time output) × motor output coefficient γ of combined spindle drive unit

(Note) For the spindle rate output required for the power supply, multiply the largest one of "spindle motor continuous rate output", "spindle motor output at acceleration/deceleration" and "spindle motor short-time output" by the motor output coefficient γ of the combined spindle drive unit.
For the motor output coefficient of the combined spindle drive unit, use the value corresponding to the used spindle drive unit in "Motor output coefficient list of combined spindle drive unit " on (1)-(b) of "Calculation of spindle output"

(2) Servo motor rate output required for power supply

For the servo motor rate output required for power supply, use the value calculated in (1) of "Calculation of servo motor output"

(3) Calculation of rate output required for power supply

Rated capacity required for power supply =
Σ (Spindle rate output required for power supply) + 0.3 Σ (servo motor rate output required for power supply)

Substitute the output calculated from the item (1) and (2) to the above expression, and calculate the rated capacity required for the power supply.

(4) Calculation of required power supply

Power supply capacity (kVA) = Σ {(Required rated capacity calculated in the item (3) (kW) / Capacity of selected power supply unit (kW)) × Power supply capacity base value (kVA)}

The power supply capacity base value corresponding to the capacity of the selected power supply unit is as the following table.

< MDS-E Series >

Unit	MDS-E-CV-	37	75	110	185	300	370	450	550
Power supply capacity base value (kVA)		5.3	11.0	16.0	27.0	43.0	53.0	64.0	78.0

< MDS-EH Series >

Unit	MDS-EH-CV-	37	75	110	185	300	370	450	550	750
Power supply capacity base value (kVA)		5.3	11.0	16.0	27.0	43.0	53.0	64.0	78.0	107.0

■Example for Power Supply Unit and Power Supply Facility Capacity

< MDS-E Series >

(Example 1)

Axis name	Motor	Drive unit	Rated output	Maximum momentary output
X-axis	HG354	(MDS-E-V2-160)	3.5kW	18kW
Y-axis	HG354	(MDS-E-V2-160)	3.5kW	18kW
Z-axis	HG354	(MDS-E-V1-160)	3.5kW	18kW
Spindle	Spindle motor 22kW	MDS-E-SP-320 (Output coefficient 1.0)	22kW	26.4kW
Total			0.3× (3.5×3) +22 =25.15kW <31kW (E-CV-300)	(18×3) +26.4 =80.4kW <92kW (E-CV-300)

The power supply unit satisfying the total of the rate output and the maximum momentary output is MDS-E-CV-300.
Required power supply capacity (kVA) = (25.15 / 30) × 43 = 36.0 (kVA)

(Example 2)

Axis name	Motor	Drive unit	Rated output	Maximum momentary output
X1-axis	HG453	(MDS-E-V2-160)	4.5kW	22kW
X2-axis	HG453	(MDS-E-V2-160)	4.5kW	22kW
Y-axis	HG354	(MDS-E-V2-160)	3.5kW	18kW
Z-axis	HG354	(MDS-E-V2-160)	3.5kW	18kW
Spindle	Spindle motor 15kW	MDS-E-SP-200 (Output coefficient 1.0)	15kW	18kW
Total			0.3× (4.5×2+3.5×2) +15 =19.8kW <31kW (E-CV-300)	22×2+18×2+18 =98.0kW <101kW (E-CV-370)

The power supply unit satisfying the total of the rate output and the maximum momentary output is MDS-E-CV-370.
Required power supply capacity (kVA) = (19.8 / 37) × 53 = 28.4 (kVA)

(Example 3)

Axis name	Motor	Drive unit	Rated output	Maximum momentary output
X-axis	HG354	MDS-E-V1-160	3.5kW	18kW
Y-axis	HG204	MDS-E-V2-80	2.0kW	8kW
Z-axis	HG204	MDS-E-V2-80	2.0kW	8kW
Spindle	Spindle motor 15kW (High-torque motor)	MDS-E-SP-320 (Output coefficient 1.1)	16.5kW	18kW
Total			0.3× (3.5+2.0×2) +16.5 =18.75kW <19kW (E-CV-185)	18+8×2+18 =52kW <60kW (E-CV-185)

The power supply unit satisfying the total of the rate output and the maximum momentary output is MDS-E-CV-185.
Required power supply capacity (kVA) = (18.75 / 18.5) × 27 = 27.4 (kVA)

< MDS-EH Series >

(Example 1)

Axis name	Motor	Drive unit	Rated output	Maximum momentary output
X-axis	HG-H354	(MDS-EH-V2-80)	3.5kW	18kW
Y-axis	HG-H354	(MDS-EH-V2-80)	3.5kW	18kW
Z-axis	HG-H354	(MDS-EH-V1-80)	3.5kW	18kW
Spindle	Spindle motor 22kW	MDS-EH-SP-160 (Output 22kW)	22kW	26.4kW
Total			0.3× (3.5×3) +22 =25.15kW <31kW (EH-CV-300)	(18×3) +26.4 =80.4kW <92kW (EH-CV-300)

The power supply unit satisfying the total of the rate output and the maximum momentary output is MDS-EH-CV- 300.
Required power supply capacity (kVA) = (25.15 / 30) × 43 = 36.0 (kVA)

(Example 2)

Axis name	Motor	Drive unit	Rated output	Maximum momentary output
X1-axis	HG-H453	(MDS-EH-V2-80)	4.5kW	22kW
X2-axis	HG-H453	(MDS-EH-V2-80)	4.5kW	22kW
Y-axis	HG-H354	(MDS-EH-V2-80)	3.5kW	18kW
Z-axis	HG-H354	(MDS-EH-V2-80)	3.5kW	18kW
Spindle	Spindle motor 15kW	MDS-EH-SP-100 (Output coefficient 1.0)	15kW	18kW
Total			0.3× (4.5×2+3.5×2) +15 =19.8kW <31kW (EH-CV-300)	22×2+18×2+18 =98.0kW <101kW (EH-CV-370)

The power supply unit satisfying the total of the rate output and the maximum momentary output is MDS-EH-CV-370.
Required power supply capacity (kVA) = (19.8 / 37) × 53 = 28.4 (kVA)

(Example 3)

Axis name	Motor	Drive unit	Rated output	Maximum momentary output
X-axis	HG-H354	MDS-EH-V1-160	3.5kW	18kW
Y-axis	HG-H204	MDS-EH-V2-80	2.0kW	8kW
Z-axis	HG-H204	MDS-EH-V2-80	2.0kW	8kW
Spindle	Spindle motor 15kW (High-torque motor)	MDS-EH-SP-320 (Output coefficient 1.1)	16.5kW	18kW
Total			0.3× (3.5+2.0×2) +16.5 =18.75kW <19kW (EH-CV-185)	18+8×2+18 =52kW <60kW (EH-CV-185)

The power supply unit satisfying the total of the rate output and the maximum momentary output is MDS-EH-CV-185.
Required power supply capacity (kVA) = (18.75 / 18.5) × 27 = 27.4 (kVA)

■Selection of Regenerative Resistor for Power Backup Unit (R-UNIT-6,7) and Capacitor Unit for Power Backup Unit (MDS-D/DH-CU)

When using the retraction function at power failure with MDS-D/DH-PFU, select to satisfy the stop operation for the regenerative resistor and the continuous rated output of the spindle motor for the capacitor unit.

(1) Selection of regenerative resistor for power backup unit

When using the retraction function at power failure, a resistor unit is required to make the spindle deceleration and stop after the retraction is completed.

⚠ CAUTION

1. When not using a resistor unit, control to coast the spindle motor after the retraction operation is completed.
2. Only the designated combination can be used for the power backup unit and the regenerative resistor.

(2) Selection of capacitor unit for power backup unit

When using the retraction function at power failure, the required number of capacitor units is decided by the continuous rated output [kW] of the spindle motor. Select according to the following specifications.

List of spindle continuous rated output and number of capacitor unit

Spindle continuous rated output	Number of capacitor unit
3.7kW or less	1
5.5kW or less	2
7.5kW or less	3
11kW or less	4
15kW or less	5
22kW or less	6

DRIVE SYSTEM SELECTION OF THE ADDITIONAL AXIS DRIVE UNIT

When selecting an additional axis drive unit to be connected to TE2 [L+,L-] (Converter voltage input terminal) of MDSEM-SPV3, calculate the spindle motor output and servo motor output each, and select the capacity so that the total sum should not exceed the rated capacity and the maximum momentary output of MDS-EM-SPV3.

The additional axis drive unit is spindle/servo drive unit which is operated by using the built-in power supply section of MDS-EM-SPV3.

Connectable drive units are determined by the rated capacity of MDS-EM-SPV3.
The following is available capacities.
Spindle drive unit: MDS-E-SP-20/40/80/160
Servo drive unit: MDS-E-Vx-20/40/80

■Calculation of Spindle Output

The spindle rated output and spindle maximum momentary rated output are calculated.

(1) Calculation of spindle rated output

The spindle rated output is calculated according to the following procedure.

(a) Spindle motor rated output

The spindle motor rated output is calculated from the following expression.

Spindle motor rated output =
MAX (continuous rated output, short-time rated output × short-time rated output coefficient α, %ED rated output × %ED rated output coefficient β)

(Note 1) For the spindle motor rated output, use the maximum value of "continuous rated output", "short-time rated output × short-time rated output coefficient α", and "%ED rated output × %ED rated output coefficient β".
(Note 2) Select the maximum value for the spindle motor with multiple %ED rated output characteristics.

For the spindle short-time rated output coefficient α, use the value in the following table.

List of short-time rated output time and short-time rated output coefficient

Short-time rated output time	Short-time rated output coefficient α	Short-time rated output time	Short-time rated output coefficient α
1 minute	0.2	5 minutes	0.7
2 minutes	0.4	6 to 7 minutes	0.8
3 minutes	0.5	8 to 9 minutes	0.9
4 minutes	0.6	10 minutes or more	1.0

(Note 1) Select the set time for the short-time rated output of your spindle motor from the list.
E.g.) When the set time for the short-time rated output is "1/12h", it means "5 minutes".
(Note 2) For the motor with coil changeover specification, select the set time for the short-time rated output of the high-speed coil.

For the %ED rated output coefficient β, use the value in the following table.

List of %ED rated output time and %ED rated output coefficient

%ED rated output time	%ED rated output coefficient β
More than or equal to 10% but less than 20%	0.7
More than or equal to 20% but less than 30%	0.9
More than or equal to 30%	1.0

(b) Spindle rated output

The spindle rated output is calculated from the following expression.

Spindle rated output
=Spindle motor rated output × motor output coefficient γ of the additional axis (spindle) drive unit

For the spindle motor rated output of the above expression, use the value calculated in (a).
For the motor output coefficient of the combined spindle drive unit, use the value corresponding to the used spindle drive unit in the following table.

Motor output coefficient list of additional axis (spindle) drive unit
< MDS-E Series >

Spindle motor rated output	Additional axis (spindle) drive unit MDS-E-SP-			
	20	40	80	160
to 1.5kW	1.00	1.15	1.25	–
to 2.2kW	–	1.00	1.15	1.30
to 3.7kW	–	1.00	1.05	1.20
to 5.5kW	–	–	1.00	1.10
to 7.5kW	–	–	–	1.00

POINT

[1] When the spindle motor applies to the wide range constant output specification or the high-torque specification, the spindle rated output may become large.

[2] The spindle rated output is calculated from the motor output coefficient of the spindle drive unit used in combination with the spindle motor.

(2) Calculation of spindle maximum momentary output

The spindle maximum momentary output is calculated from the following expression.

Spindle maximum momentary output
=MAX (short-time rated output × 1.2, output at acceleration/deceleration × 1.2, %ED rated output×1.2)

(Note) For the spindle rated output, use the largest one among "short-time rated output × 1.2" ,"output at acceleration/ deceleration × 1.2" and "%ED rated output×1.2".

■Calculation of Servo Motor Output

(1) Selection with rated output

(2) Selection with maximum momentary output

For the rated output and maximum momentary output of the servo motor, use the value corresponding to the servo motor in the table 3.

Data for servo motor output selection
< 200V series >

Motor HG	75	105	54	104	154	224	204	354
Rated output (kW)	0.75	1.0	0.5	1.0	1.5	2.2	2.0	3.5
Maximum momentary output (kW)	2.6	3.6	2.3	5.0	9.0	12.3	8.0	15.0

Motor HG	123	223	303	453	142	302
Rated output (kW)	1.2	2.2	3.0	4.5	1.4	3.0
Maximum momentary output (kW)	4.0	7.5	12.0	16.5	3.8	7.4

(Note) The maximum momentary output in this table is reference data for selecting the additional axis drive unit connecting to MDS-EM-SPV3 and is not data which guarantees the maximum output.

■Selection of the Additional Axis Drive Unit

Select the additional axis drive unit so that the total sum of the rated output and the maximum momentary output of spindle motor / servo motor is less than the rated capacity and maximum momentary rated capacity of MDS-EM-SPV3.

(1) Calculation of required rated output

MDS-EM-SPV3 rated capacity [20kW] > Σ (Spindle rated output) + 0.3 Σ (Servo motor rated output)

(Note) Calculate the spindle and servo motor rated output including not only the motor connected to the additional axis drive unit but also those connected to MDS-EM-SPV3.

Substitute the output calculated from (1) of "Calculation of spindle output"and (1) of "Calculation of servo motor output" to the above expression, and calculate the total sum of the spindle rated output and servo motor rated output. According to this, select the unit so that the rated capacity of MDSEM-SPV3 is less than 20kW.

(2) Calculation of required maximum momentary output

Maximum momentary rated capacity of MDS-EM-SPV3 [70kW] ≥
Σ (Spindle maximum momentary output) + Σ (Maximum momentary output of servo motor accelerating/ decelerating simultaneously + Maximum momentary output of direct drive motor accelerating/ decelerating simultaneously)

(Note) Calculate the spindle and servo motor maximum momentary output including not only the motor connected to the additional axis drive unit but also those connected to MDS-EM-SPV3.

Substitute the output calculated from (2) of "Calculation of spindle output"and (2) of "Calculation of servo motor output" to the above expression, and calculate the total sum of the "spindle maximum momentary output" and "output of servo motor accelerating/decelerating simultaneously". According to this, select the unit so that the maximum momentary rated capacity of MDS-EM-SPV3 is less than 70kW.

⚠ CAUTION

When reducing the time constant replacing the conventional motor with the HG or HG-H Series motor, the motor maximum momentary output may increase more than the conventional motor. Therefore, make sure to check the selection with maximum momentary rated capacity.

■Required Capacity of Power Supply

For the power supply capacity, calculate the required spindle rated output and servo motor rated output each, and select the power supply capacity satisfying them.

(1) Spindle rated output required for power supply

The spindle rated output required for power supply is calculated from the following expression.

Spindle rated output required for power supply =
MAX (Spindle motor continuous rated output, Spindle motor output at accelerating/decelerating, Spindle motor short-time output)× motor output coefficient γ of combined spindle drive unit

(Note) For the spindle rated output required for the power supply, multiply the largest one of "spindle motor continuous rated output", "spindle motor output at acceleration/deceleration" and "spindle motor short-time output" by the motor output coefficient γ of the combined spindle drive unit.
For the motor output coefficient of the combined spindle drive unit, use the value corresponding to the used spindle drive unit "Motor output coefficient list of additional axis (spindle) drive unit" on (1)-(b) of "Calculation of spindle output"

(2) Servo motor rated output required for power supply

For the servo motor rated output required for power supply, use the value calculated in (1) of "Calculation of servo motor output"

(3) Calculation of rated output required for power supply

Rated capacity required for power supply =
Σ (Spindle rated output required for power supply) + 0.3 Σ (servo motor rated output required for power supply)

Substitute the output calculated from the item (1) and (2) to the above expression, and calculate the rated capacity required for the power supply.

(4) Calculation of required power supply

Power supply capacity (kVA) = {(Required rated capacity calculated in the item (3)(kW) / Rated capacity of MDS-EM-SPV3 [20kW]) × Power supply capacity base value of MDS-EM-SPV3 [29kVA]}

The rated capacity of MDS-EM-SPV3 is 20kW and power supply capacity base value is 29kVA.

■Example for Additional Axis Drive Unit and Power Supply Facility Capacity

(Example 1)

Axis name	Motor	Drive unit	Rated output	Maximum momentary output
X-axis	HG204	MDS-EM-SPV3-200120	2.0kW	8.0kW
Y-axis	HG204		2.0kW	8.0kW
Z-axis	HG354		3.5kW	18kW
MG-axis	HG104	MDS-E-V1-40(Addiction axis)	1.0kW	5.0kW
Spindle	Spindle motor 15kW	MDS-EM-SPV3-200120	15kW	18kW
Total			0.3×(2.0+2.0+3.5+1.0) + 15 = 17.55kW < 20kW (EM-SPV3)	(8.0+8.0+18+5.0) + 18 = 57kW < 70kW (EM-SPV3)

Required power supply capacity (kVA) = (17.55/20)×29 = 25.5 (kVA)

(Example 2)

Axis name	Motor	Drive unit	Rated output	Maximum momentary output
X-axis	HG104	MDS-EM-SPV3-10040	1.0kW	5.0kW
Y-axis	HG104		1.0kW	5.0kW
Z-axis	HG104		1.0kW	5.0kW
A-axis	HG75	MDS-E-V3-20(Addiction axis)	0.75kW	2.6kW
B-axis	HG75		0.75kW	2.6kW
C-axis	HG75		0.75kW	2.6kW
Spindle (1)	Spindle motor 7.5kW	MDS-EM-SPV3-10040	7.5kW	9.0kW
Spindle (2)	Spindle motor 3.7kW	MDS-E-SP-80 (Addiction axis)	3.7kW	4.44kW
Spindle (3)	Spindle motor 3.7kW		3.7kW	4.44kW
Total			0.3×(1.0×3 + 0.75×3) + (7.5+3.7+3.7)= 16.5kW < 20kW (EM-SPV3)	(5.0×3 + 2.6×3) + (9.0+4.44+4.44)= 40.7kW < 70kW (EM-SPV3)

Required power supply capacity (kVA) = (16.5/20)×29 = 24.0 (kVA)

DRIVE SYSTEM DEDICATED OPTIONS SERVO OPTIONS

The option units are required depending on the servo system configuration. Check the option units to be required referring the following items.

■System establishment in the full closed loop control

Full closed loop control for linear axis

Machine side encoder to be used			Encoder signal output	Interface unit	Drive unit input signal	Battery option	Remarks
Incremental encoder	Rectangular wave signal output	SR74, SR84 (MAGNESCALE)	Rectangular wave signal	–	Rectangular wave signal	–	
		Various scale	Rectangular wave signal	–	Rectangular wave signal	–	
	SIN wave signal output	LS187, LS487 (HEIDENHAIN)	SIN wave signal	IBV Series (HEIDENHAIN)	Rectangular wave signal	–	
				EIB Series (HEIDENHAIN)	Mitsubishi serial signal	–	
				APE Series (HEIDENHAIN)	Mitsubishi serial signal	–	
		LS187C, LS487C (HEIDENHAIN)	SIN wave signal	MDS-B-HR-11(P) (MITSUBISHI ELECTRIC)	Mitsubishi serial signal	(Required) Note 1	Distance-coded reference scale (Note 2)
				EIB Series (HEIDENHAIN)			
		Various scale	SIN wave signal	MDS-B-HR-11(P) (MITSUBISHI ELECTRIC)	Mitsubishi serial signal	(Required) Note 1	Distance-coded reference scale is also available (Note 2)
				EIB Series (HEIDENHAIN)			
	Mitsubishi serial signal output	SR75, SR85 (MAGNESCALE)	Mitsubishi serial signal	–	Mitsubishi serial signal	–	
Absolute position encoder	Mitsubishi serial signal output	OSA105ET2A OSA166ET2NA (MITSUBISHI ELECTRIC)	Mitsubishi serial signal	–	Mitsubishi serial signal	Required	Ball screw side encoder
		SR77, SR87 (MAGNESCALE)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		LC195M, LC495M,LC291M (HEIDENHAIN)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		LC193M, LC493M (HEIDENHAIN)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		AT343, AT543, AT545, ST748 (Mitutoyo)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		SAM Series (FAGOR)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		SVAM Series (FAGOR)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		GAM Series (FAGOR)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		LAM Series (FAGOR)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		RL40N Series (Renishaw)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
	SIN wave signal output	MPS Series (MME Corp.)	SIN wave signal	ADB-20J60 (Mitsubishi Heavy Industries)	Mitsubishi serial signal	Required	
		MPI Series (Mitsubishi Heavy Industries)	SIN wave signal	ADS-20J60 (Mitsubishi Heavy Industries)	Mitsubishi serial signal		

(Note 1) When using the distance-coded reference scale, it is recommended to use with distance-coded reference check function. In this case, the battery option is required.
(Note 2) Use the option of M800 Series for the distance-coded reference scale.

Full closed loop control for rotary axis

Machine side encoder to be used			Encoder signal output	Interface unit	Output signal	Battery option	Remarks
Incremental encoder	Rectangular wave signal output	Various scale	Rectangular wave signal	–	Rectangular wave signal	–	
	SIN wave signal output	ERM280 Series (HEIDENHAIN)	SIN wave signal	EIB Series (HEIDENHAIN)	Mitsubishi serial signal	–	
		Various scale	SIN wave signal	MDS-B-HR-11(P) (MITSUBISHI ELECTRIC)	Mitsubishi serial signal	(Required) Note 1	Distance-coded reference scale is also available (Note 2)
Absolute position encoder	Mitsubishi serial signal output	MBA405W Series (MITSUBISHI ELECTRIC)	Mitsubishi serial signal	(Provided)	Mitsubishi serial signal	Required	
		RU77 (MAGNESCALE)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		RCN223M, RCN227M (HEIDENHAIN)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		RCN727M, RCN827M (HEIDENHAIN)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		RA Series (Renishaw)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		HAM Series (FAGOR)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
	SIN wave signal output	MPRZ Series (Mitsubishi Heavy Industries)	SIN wave signal	ADB-20J71 (Mitsubishi Heavy Industries)	Mitsubishi serial signal	Not required	
		MPI Series (Mitsubishi Heavy Industries)	SIN wave signal	ADB-20J60 (Mitsubishi Heavy Industries)	Mitsubishi serial signal	Required	

(Note 1) When using the distance-coded reference scale, it is recommended to use with distance-coded reference check function. In this case, the battery option is required.
(Note 2) Use the option of M800 Series for the distance-coded reference scale.

■System establishment in the synchronous control

Position command synchronous control

The synchronous control is all executed in the NC, and the each servo is controlled as an independent axis. Therefore, preparing special options for the synchronous control is not required on the servo side.

Speed command synchronization control

The common position control in two axes is performed by one linear scale. Basically, the multi axis integrated type drive unit (MDS-E/EH-V2) is used, and the feedback signal is divided for two axes inside the drive unit. When the two 1-axis type drive units are used in driving the large capacity servo motor, the linear scale feedback signal must be divided outside.

<Required option in the speed command synchronous control>

Machine side encoder to be used	For MDS-E/EH-V2	For MDS-E/EH-V1×2 units	Remarks
SIN wave signal output scale	MDS-B-HR-11(P) (Serial conversion)	MDS-B-HR-12(P) (Serial conversion/signal division)	
Mitsubishi serial signal output scale	–	MDS-B-SD(Signal division)	Including the case that an interface unit of the scale manufacturer is used with SIN wave output scale.

(Note) The rectangular wave signal output scale speed command synchronous control is not available.

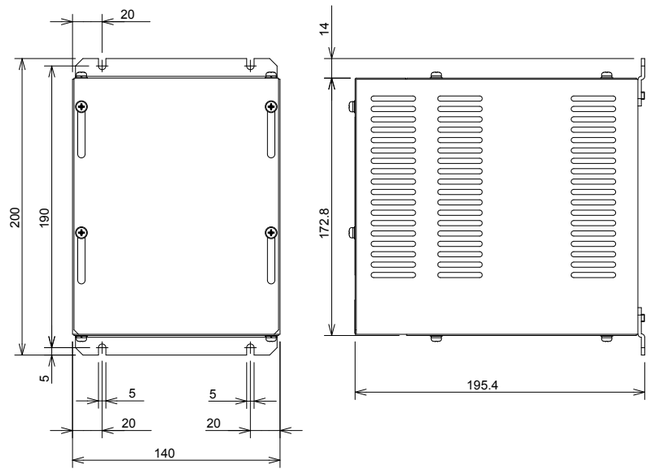
■Dynamic brake unit (MDS-D-DBU)

Specifications

Type	MDS-D-DBU
Coil specifications	DC24V 160mA
Wire size	5.5mm² or more (For IV wire)
Compatible drive unit	MDS-E-V1-320W, MDS-EH-V1-160W or larger
Mass	3kg

Outline dimension drawing

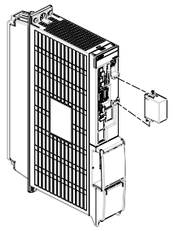
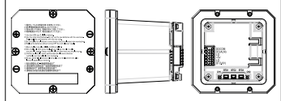
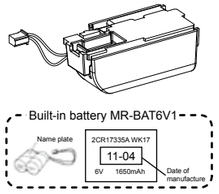
MDS-D-DBU



[Unit : mm]

■Battery option

This battery option may be required to establish absolute position system. Select a battery option from the table below depending on the servo system.

Type		MDS-BAT6V1SET	MDSBTBOX-LR2060	MR-BAT6V1SET
Installation type		Drive unit with battery holder type	Unit and battery integration type	Drive unit with battery holder type
Hazard Class		Not applicable	Not applicable	Not applicable
Number of connectable axes		Up to 3 axes	Up to 8 axes	1 axis
Battery change		Possible	Possible	Possible
Appearance				
Compatible model	E/EH	○	○	–
	EM	–	○	○
	EJ/EJH	–	○	○

■Cell battery (MDS-BAT6V1SET)

Specifications

Battery option type		Cell battery
		MDS-BAT6V1SET
Battery model name		2CR17335A
Nominal voltage		6V
Number of connectable axes		Up to 3 axes (Note 3)
Battery continuous backup time		Up to 2 axes: Approx. 10000 hours 3 axes connected: Approx. 6600 hours
Back up time from battery warning to alarm occurrence (Note 2)		Approx. 168 hours (Note 2)
Compatible model	E/EH	○
	EM	–
	EJ/EJH	–

(Note 1) MDS-BAT6V1SET is a battery built in a servo drive unit. Install this battery only in the servo drive unit that executes absolute position control.
(Note 2) This time is a guideline, so does not guarantee the back up time. Replace the battery with a new battery as soon as a battery warning occurs.
(Note 3) When using ball screw side encoder OSA166ET2NA/OSA105ET2A, both ball screw side encoder and motor side encoder need to be backed up by a battery, so the number of load shaft should be two.

■Battery box (MDSBTBOX-LR2060)

Specifications

Battery option type		Battery box
		MDSBTBOX-LR2060
Battery model name		Size-D alkaline batteries LR20×4 pieces (Note 1)
Nominal voltage		6.0V (Unit output: BTO1/2/3) 3.6V (Unit output: BT(3.6V) 1.5V (Isolated battery)
Number of connectable axes		8 axis
Battery continuous backup time		Approx. 10000 hours (when 8 axes are connected, cumulative time in non-energized state) (Note 2)
Back up time from battery warning to alarm occurrence (Note 2)		Approx. 336 hours (when 8 axes are connected) (Note 2)
Compatible model	E/EH	○
	EM	○
	EJ/EJH	○

(Note 1) Install commercially-available alkaline dry batteries into MDSBTBOX-LR2060. The batteries should be procured by customers. Make sure to use new batteries that have not passed the expiration date. We recommend you to replace the batteries in the one-year cycle.
(Note 2) This time is a guideline, so does not guarantee the back up time. Replace the battery with a new battery as soon as a battery warning (9F) occurs.

■Cell battery (MR-BAT6V1SET)

Specifications

Battery option type		Cell battery
		MR-BAT6V1SET (Note 1)
Battery model name		2CR17335A
Nominal voltage		6V
Number of connectable axes		Up to 3 axes (Note 3)
Battery continuous backup time		Up to 2 axes: Approx. 10000 hours 3 axes connected: Approx. 6600 hours
Back up time from battery warning to alarm occurrence (Note 2)		Approx. 168 hours (Note 2)
Compatible model	E/EH	–
	EM	○
	EJ/EJH	○

(Note 1) MR-BAT6V1SET is a battery built in a servo drive unit. Install this battery only in the servo drive unit that executes absolute position control.
(Note 2) This time is a guideline, so does not guarantee the back up time. Replace the battery with a new battery as soon as a battery alarm occurs.
(Note 3) When using ball screw side encoder OSA105ET2A, both ball screw side encoder and motor side encoder need to be backed up by a battery, so the number of load shaft should be two.

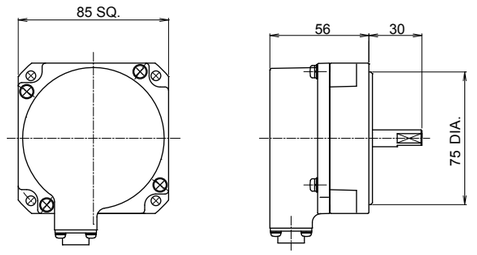
■Ball screw side encoder OSA105ET2A, OSA166ET2NA

Specifications

Type		OSA105ET2A	OSA166ET2NA
Electrical characteristics	Encoder resolution	1,000,000pulse/rev	16,000,000pulse/rev
	Detection method	Absolute position method (battery backup method)	
	Tolerable rotation speed at power off (Note)	500r/min	
	Encoder output data	Serial data	
	Power consumption	0.3A	
Mechanical characteristics for rotation	Inertia	0.5×10^{-4}kgm^2 or less	
	Shaft friction torque	0.1Nm or less	
	Shaft angle acceleration	4×10^4rad/s^2 or less	
	Tolerable continuous rotation speed	4000r/min	
Mechanical configuration	Shaft amplitude (position 15mm from end)	0.02mm or less	
	Tolerable load (thrust direction/radial direction)	9.8N/19.6N	
	Mass	0.6kg	
	Degree of protection	IP65 (The shaft-through portion is excluded.)	
	Recommended coupling	bellows coupling	
Compatible model	E/EH	○	○
	EM	○	–
	EJ/EJH	○	–

Outline dimension drawing

OSA105ET2A/OSA166ET2NA



[Unit : mm]

■Twin-head magnetic encoder (MBA Series)

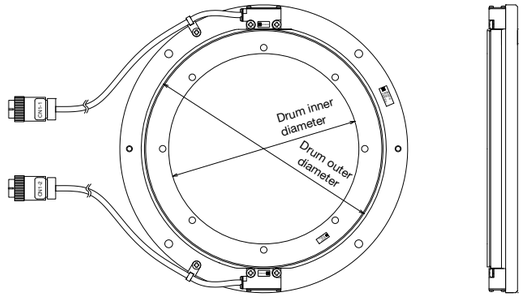
Specifications

Type		MBA405W-BE082	MBA405W-BF125	MBA405W-BG160
Electrical characteristics	Encoder resolution	4,000,000 pulse/rev		
	Detection method	Absolute position method (battery backup method)		
	Tolerable rotation speed at power off	3000r/min	2000r/min	1500r/min
	Accuracy (*1) (*2)	±4 seconds	±3 seconds	±2 seconds
	Wave number within one rotation	512 waves	768 waves	1024 waves
	Encoder output data	Serial data		
	Power consumption	0.2A or less		
Mechanical characteristics for rotation	Inertia	0.5×10^{-3}kg·m^2	2.4×10^{-3}kg·m^2	8.7×10^{-3}kg·m^2
	Tolerable angle acceleration (time of backup)	500rad/s^2		
	Tolerable continuous rotation speed	3000r/min	2000r/min	1500r/min
Mechanical configuration	Drum inner diameter	ϕ82mm	ϕ125mm	ϕ160mm
	Drum outer diameter	ϕ100mm	ϕ150.3mm	ϕ200.6mm
	Drum mass	0.2kg	0.46kg	1.0kg
	Degree of protection (*3)	IP67		
	Outline dimension	ϕ140mm×21.5mm	ϕ190mm×23.5mm	ϕ242mm×25.5mm

(*1) The values above are typical values after the calibration with our shipping test device and are not guaranteed.
(*2) The user is requested to install the magnetic drum and installation ring in the encoder within the accuracy range specified herein. Even when the accuracy of the encoder when shipped and when installed by the user is both within the specified range, there is a difference in the installation position. Therefore, the accuracy at the time of our shipment may not be acquired.
(*3) It is the degree of protection when fitted with a connector.

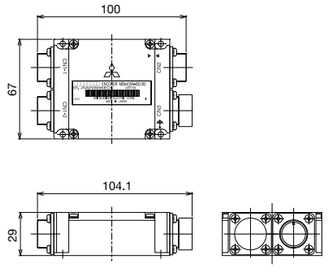
Outline dimension drawing

Encoder



Preamplifier

[Unit : mm]



DRIVE SYSTEM DEDICATED OPTIONS SPINDLE OPTIONS

According to the spindle control to be adopted, select the spindle side encoder based on the following table.

No-variable speed control (When spindle and motor are directly coupled or coupled with a 1:1 gear ratio)

●: Control possible ×: Control not possible

Spindle control item	Control specifications	Without spindle side encoder	With spindle side encoder
Spindle control	Normal cutting control	●	This normally is not used for novariable speed control.
	Constant surface speed control (lathe)	●	
	Thread cutting (lathe)	●	
Orientation control	1-point orientation control	●	
	Multi-point orientation control	●	
	Orientation indexing	●	
Synchronous tap control	Standard synchronous tap	●	
	Synchronous tap after zero point return	●	
Spindle synchronous control	Without phase alignment function	●	
	With phase alignment function	●	
C-axis control	C-axis control	● (Note)	●

(Note) When spindle and motor are coupled with a 1:1 gear ratio, use of a spindle side encoder is recommended to assure the precision.

Variable speed control (When using V-belt, or when spindle and motor are connected with a gear ratio other than 1:1)

●: Control possible ×: Control not possible

Spindle control item	Control specifications	Without spindle side encoder	With spindle side encoder		
			TS5690/ERM280/ MPCI/MBE405W Series	OSE-1024	Proximity switch
Spindle control	Normal cutting control	●	●	●	●
	Constant surface speed control (lathe)	● (Note 1)	●	●	● (Note 1)
	Thread cutting (lathe)	×	●	●	×
Orientation control	1-point orientation control	×	●	●	● (Note 3)
	Multi-point orientation control	×	●	●	×
	Orientation indexing	×	●	●	×
Synchronous tap control	Standard synchronous tap	● (Note 2)	●	●	● (Note 2)
	Synchronous tap after zero point return	×	●	●	×
Spindle synchronous control	Without phase alignment function	● (Note 1)	●	●	● (Note 1)
	With phase alignment function	×	●	●	×
C-axis control	C-axis control	×	●	×	×

(Note 1) Control not possible when connected with the V-belt.
(Note 2) Control not possible when connected with other than the gears.
(Note 3) When using a proximity switch, an orientation is executed after the spindle is stopped.
As for 2-axis spindle drive unit, setting is available only for one of the axes.

Cautions for connecting the spindle end with an OSE-1024 encoder

[1] Confirm that the gear ratio (pulley ratio) of the spindle end to the encoder is 1:1.
[2] Use a timing belt when connecting by a belt.

■Spindle side ABZ pulse output encoder (OSE-1024 Series)

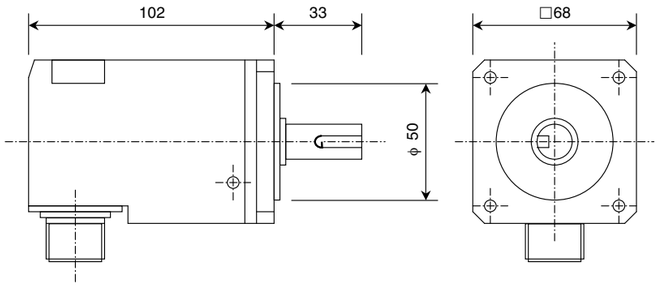
When a spindle and motor are connected with a V-belt, or connected with a gear ratio other than 1:1, use this spindle side encoder to detect the position and speed of the spindle. Also use this encoder when orientation control and synchronous tap control, etc are executed under the above conditions.

Specifications

Type		OSE-1024-3-15-68	OSE-1024-3-15-68-8
Mechanical characteristics for rotation	Inertia	0.1×10^{-4}kgm^2 or less	0.1×10^{-4}kgm^2 or less
	Shaft friction torque	0.98Nm or less	0.98Nm or less
	Shaft angle acceleration	10^4rad/s^2 or less	10^4rad/s^2 or less
	Tolerable continuous rotation speed	6000r/min	8000r/min
Mechanical configuration	Bearing maximum non-lubrication time	20000h/6000r/min	20000h/8000r/min
	Shaft amplitude (position 15mm from end)	0.02mm or less	0.02mm or less
	Tolerable load (thrust direction/radial direction)	10kg/20kg Half of value during operation	10kg/20kg Half of value during operation
	Mass	1.5kg	1.5kg
	Degree of protection	IP54	
	Squareness of flange to shaft	0.05mm or less	
	Flange matching eccentricity	0.05mm or less	
Compatible model	E/EH	○	○
	EM	○	○
	EJ/EJH	○	○

(Note) Confirm that the gear ratio (pulley ratio) of the spindle end to the encoder is 1:1.

Outline dimension drawing



[Unit : mm]

Spindle side encoder (OSE-1024-3-15-68, OSE-1024-3-15-68-8)

■Spindle side PLG serial output encoder (TS5690, MU1606 Series)

This encoder is used when a more accurate synchronous tapping control or C-axis control than OSE encoder is performed to the spindle which is not directly-connected to the spindle motor.

Specifications

	Series type		TS5690N64xx									
Sensor	xx(The end of the type name)	Standard connector	12	22	32	42	52	17	27	37	47	57
		Water-proof connector	19	29	39	49	59	18	28	38	48	58
	Length of lead [mm]		400±10	800±20	1200±20	1600±30	2000±30	400±10	800±20	1200±20	1600±30	2000±30
	Lead wire lead-out direction		Vertical direction					Shaft direction				
Detection gear	Type		MU1606N601									
	The number of teeth		64									
	Outer diameter [mm]		ϕ52.8									
	Inner diameter [mm]		ϕ40H5									
	Thickness [mm]		12									
Notched fitting section	Outer diameter [mm]		ϕ59.4									
	Outer diameter tolerance [mm]		+0.030 to +0.070									
The number of output pulse	A/B phase		64									
	Z phase		1									
Detection resolution [p/rev]			2 million									
Absolute accuracy at stop			150"									
Tolerable speed [r/min]			40,000									
Signal output			Mitsubishi high-speed serial									
Compatible model	E/EH		○									
	EM		○									
	EJ/EJH		○									

	Series type		TS5690N90xx									
Sensor	xx(The end of the type name)	Standard connector	12	22	32	42	52	17	27	37	47	57
		Water-proof connector	19	29	39	49	59	18	28	38	48	58
	Length of lead [mm]		400±10	800±20	1200±20	1600±30	2000±30	400±10	800±20	1200±20	1600±30	2000±30
	Lead wire lead-out direction		Vertical direction					Shaft direction				
Detection gear	Type		MU1606N906									
	The number of teeth		90									
	Outer diameter [mm]		ϕ73.6									
	Inner diameter [mm]		ϕ50H5									
	Thickness [mm]		12									
Notched fitting section	Outer diameter [mm]		ϕ79.2									
	Outer diameter tolerance [mm]		+0.040 to +0.0									
The number of output pulse	A/B phase		90									
	Z phase		1									
Detection resolution [p/rev]			2,880,000									
Absolute accuracy at stop			105"									
Tolerable speed [r/min]			30,000									
Signal output			Mitsubishi high-speed serial									
Compatible model	E/EH		○									
	EM		○									
	EJ/EJH		○									

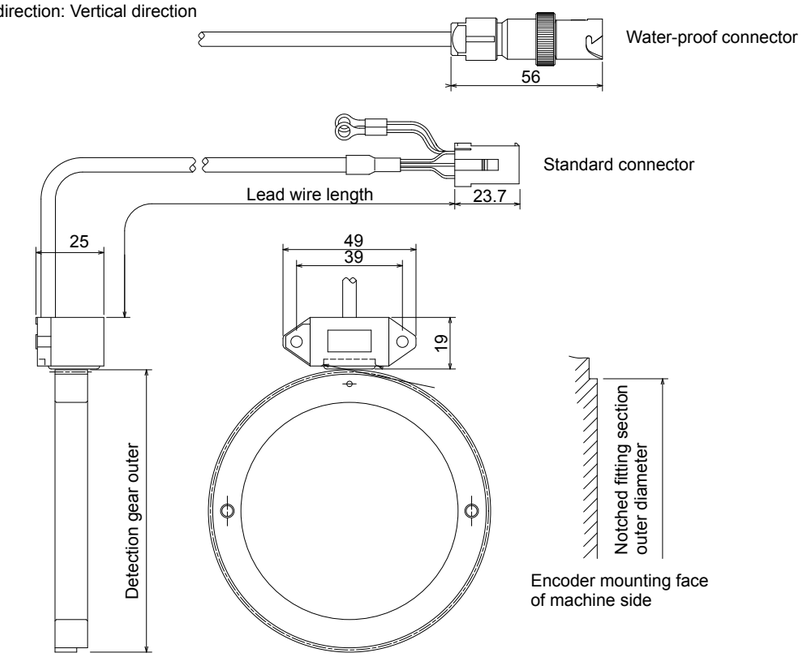
	Series type		TS5690N12xx									
Sensor	xx(The end of the type name)	Standard connector	12	22	32	42	52	17	27	37	47	57
		Water-proof connector	19	29	39	49	59	18	28	38	48	58
	Length of lead [mm]		400±10	800±20	1200±20	1600±30	2000±30	400±10	800±20	1200±20	1600±30	2000±30
	Lead wire lead-out direction		Vertical direction					Shaft direction				
Detection gear	Type		MU1606N709									
	The number of teeth		128									
	Outer diameter [mm]		ϕ104.0									
	Inner diameter [mm]		ϕ80H5									
	Thickness [mm]		12									
Notched fitting section	Outer diameter [mm]		ϕ108.8									
	Outer diameter tolerance [mm]		+0.015 to +0.025									
The number of output pulse	A/B phase		128									
	Z phase		1									
Detection resolution [p/rev]			4 million									
Absolute accuracy at stop			100"									
Tolerable speed [r/min]			20,000									
Signal output			Mitsubishi high-speed serial									
Compatible model	E/EH		○									
	EM		○									
	EJ/EJH		○									

	Series type		TS5690N19xx									
Sensor	xx(The end of the type name)	Standard connector	12	22	32	42	52	17	27	37	47	57
		Water-proof connector	19	29	39	49	59	18	28	38	48	58
	Length of lead [mm]		400±10	800±20	1200±20	1600±30	2000±30	400±10	800±20	1200±20	1600±30	2000±30
	Lead wire lead-out direction		Vertical direction					Shaft direction				
Detection gear	Type		MU1606N203									
	The number of teeth		192									
	Outer diameter [mm]		ϕ155.2									
	Inner diameter [mm]		ϕ125H5									
	Thickness [mm]		12									
Notched fitting section	Outer diameter [mm]		ϕ158.4									
	Outer diameter tolerance [mm]		+0.040 to +0.0									
The number of output pulse	A/B phase		192									
	Z phase		1									
Detection resolution [p/rev]			6 million									
Absolute accuracy at stop			97.5"									
Tolerable speed [r/min]			15,000									
Signal output			Mitsubishi high-speed serial									
Compatible model	E/EH		○									
	EM		○									
	EJ/EJH		○									

	Series type		TS5690N25xx									
Sensor	xx(The end of the type name)	Standard connector	12	22	32	42	52	17	27	37	47	57
		Water-proof connector	19	29	39	49	59	18	28	38	48	58
	Length of lead [mm]		400±10	800±20	1200±20	1600±30	2000±30	400±10	800±20	1200±20	1600±30	2000±30
	Lead wire lead-out direction		Vertical direction					Shaft direction				
Detection gear	Type		MU1606N802									
	The number of teeth		256									
	Outer diameter [mm]		ϕ206.4									
	Inner diameter [mm]		ϕ140H5									
	Thickness [mm]		15.8									
Notched fitting section	Outer diameter [mm]		ϕ210.2									
	Outer diameter tolerance [mm]		+0.0 to +0.040									
The number of output pulse	A/B phase		256									
	Z phase		1									
Detection resolution [p/rev]			8 million									
Absolute accuracy at stop			95"									
Tolerable speed [r/min]			10,000									
Signal output			Mitsubishi high-speed serial									
Compatible model	E/EH		○									
	EM		○									
	EJ/EJH		○									

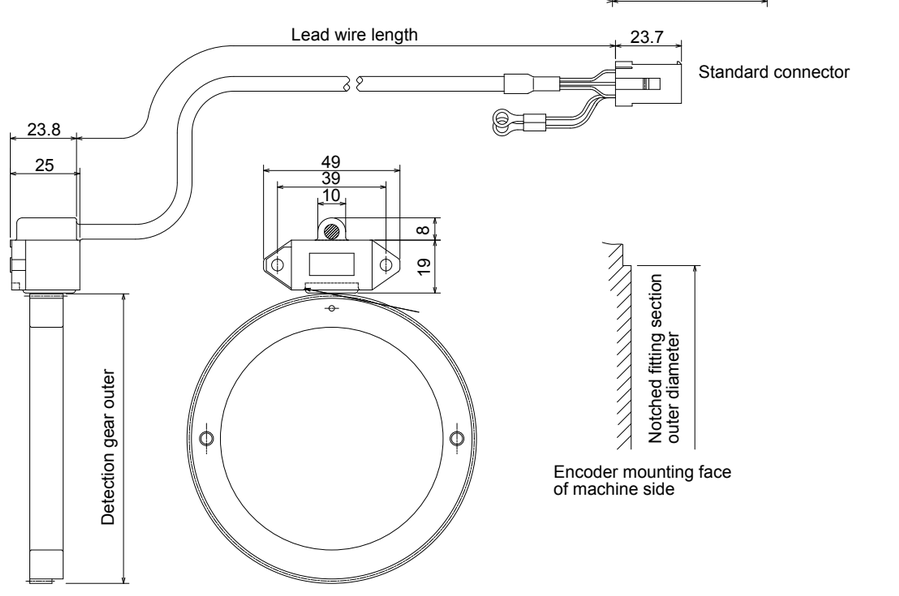
Outline dimension drawing

Lead wire lead-out direction: Vertical direction



[Unit : mm]

Lead wire lead-out direction: Shaft direction



[Unit : mm]

■Twin-head magnetic encoder (MBE Series)

Specifications

Type		MBE405W-BE082	MBE405W-BF125	MBE405W-BG160
Electrical characteristics	Encoder resolution	4,000,000 pulse/rev		
	Detection method	Incremental		
	Accuracy (*1) (*2)	±4 seconds	±3 seconds	±2 seconds
	Wave number within one rotation	512 waves	768 waves	1024 waves
	Encoder output data	Serial data		
	Power consumption	0.2A or less		
Mechanical characteristics for rotation	Inertia	0.5×10^{-3}kg·m^2	2.4×10^{-3}kg·m^2	8.7×10^{-3}kg·m^2
	Tolerable continuous rotation speed	15000r/min	10000r/min	8000r/min
Mechanical configuration	Drum inner diameter	ϕ82mm	ϕ125mm	ϕ160mm
	Drum outer diameter	ϕ100mm	ϕ150.3mm	ϕ200.6mm
	Drum mass	0.2kg	0.46kg	1.0kg
	Degree of protection (*3)	IP67		
	Outline dimension	ϕ140mm×21.5mm	ϕ190mm×23.5mm	ϕ242mm×25.5mm

(*1) The values above are typical values after the calibration with our shipping test device and are not guaranteed.

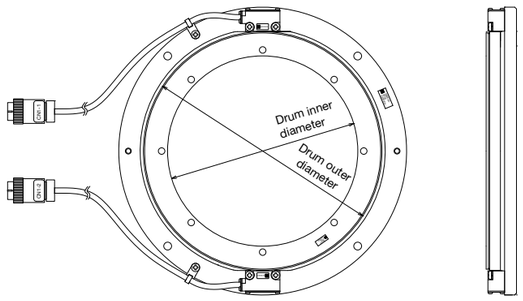
(*2) The user is requested to install the magnetic drum and installation ring in the encoder within the accuracy range specified herein. Even when the accuracy of the encoder when shipped and when installed by the user is both within the specified range, there is a difference in the installation position. Therefore, the accuracy at the time of our shipment may not be acquired.

(*3) It is the degree of protection when fitted with a connector.

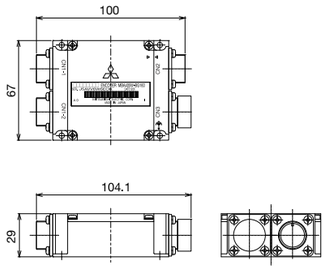
Outline dimension drawing

[Unit : mm]

Encoder



Preamplifier



■Spindle side accuracy serial output encoder (ERM280, MPCI Series)

C-axis control encoder is used in order to perform an accurate C-axis control.

Manufacturer		HEIDENHAIN		Mitsubishi Heavy Industries
Encoder type		ERM280 1200	ERM280 2048	MPCI Series
Interface unit type		EIB192M C4 1200	EIB192M C6 2048	ADB-20J20
		EIB392M C4 1200	EIB392M C6 2048	
Minimum detection resolution		0.0000183° (19,660,800p/rev)	0.0000107° (33,554,432p/rev)	0.00005° (7,200,000p/rev)
Tolerable maximum speed		20000r/min	11718r/min	10000r/min
Compatible model	E/EH	○		○
	EM	○		○
	EJ/EJH	○		○

DRIVE SYSTEM DETECTOR INTERFACE UNIT

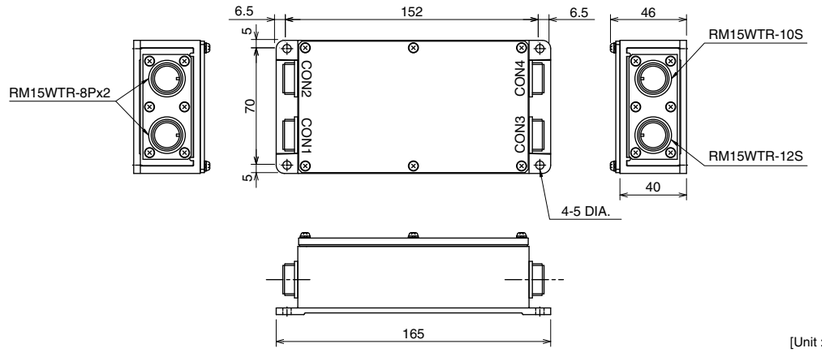
■Serial output interface unit for ABZ analog encoder MDS-B-HR

This unit superimposes the scale analog output raw waves, and generates high resolution position data. Increasing the encoder resolution is effective for the servo high-gain. MDS-B-HR-12 (P) is used for the synchronous control system that 1-scale 2-drive operation is possible.

Specifications

Type		MDS-B-HR-11	MDS-B-HR-12	MDS-B-HR-11P	MDS-B-HR-12P
Compatible scale (example)		LS186 / LS486/LS186C / LS486C (HEIDENHAIN)			
Signal 2-division function		×	○	×	○
Analog signal input specifications		A-phase, B-phase, Z-phase (Amplitude 1Vp-p)			
Compatible frequency		Analog raw waveform max. 200kHz			
Scale resolution		Analog raw waveform/512 division			
Input/output communication style		High-speed serial communication I/F, RS485 or equivalent			
Tolerable power voltage		DC5V±5%			
Maximum heating value		2W			
Mass		0.5kg or less			
Degree of protection		IP65		IP67	
Compatible model	E/EH	○	○	○	○
	EM	○	–	○	–
	EJ/EJH	○	○	○	○

Outline dimension drawing



[Unit : mm]

■Serial signal division unit MDS-B-SD

This unit has a function to divide the position and speed signals fed back from the high-speed serial encoder and high-speed serial linear scale. This unit is used to carry out synchronized control of the motor with two MDS-E/EH-V1 drive units.

Specifications

Type		MDS-B-SD
Compatible servo drive unit		MDS-E/EH-V1-□
Input/output communication style		High-speed serial communication I/F, RS485 or equivalent
Tolerable power voltage		DC5V±10%
Maximum heating value		4W
Mass		0.5kg or less
Degree of protection		IP20
Compatible model	E/EH	○
	EM	–
	EJ/EJH	○

■Serial output interface unit for ABZ analog encoder EIB192M (Other manufacturer's product)

Specifications

Type		EIB192M A4 20μm	EIB192M C4 1200	EIB192M C4 2048
Manufacturer		HEIDENHAIN		
Input signal		A-phase, B-phase: SIN wave 1Vpp, Z-phase		
Maximum input frequency		400kHz		
Output signal		Mitsubishi high-speed serial signal (MITSU02-4)		
Interpolation division number		Maximum 16384 divisions		
Compatible encoder		LS187, LS487	ERM280 1200	ERM280 2048
Minimum detection resolution		0.0012μm	0.0000183° (19,660,800p/rev)	0.0000107° (33,554,432p/rev)
Degree of protection		IP65		
Outline dimension		98mm×64mm×38.5mm		
Mass		300g		
Compatible model	E/EH	○	○	○
	EM	○	○	○
	EJ/EJH	○	○	○

■Serial output interface unit for ABZ analog encoder EIB392M (Other manufacturer's product)

Specifications

Type		EIB392M A4 20μm	EIB392M C4 1200	EIB392M C4 2048
Manufacturer		HEIDENHAIN		
Input signal		A-phase, B-phase: SIN wave 1Vpp, Z-phase		
Maximum input frequency		400kHz		
Output signal		Mitsubishi high-speed serial signal(MITSU02-4)		
Interpolation division number		Maximum 16384 divisions		
Compatible encoder		LS187, LS487	ERM280 1200	ERM280 2048
Minimum detection resolution		0.0012μm	0.0000183° (19,660,800p/rev)	0.0000107° (33,554,432p/rev)
Degree of protection		IP40		
Outline dimension		76.5mm×43mm×16.6mm		
Mass		140g		
Compatible model	E/EH	○	○	○
	EM	○	○	○
	EJ/EJH	○	○	○

■Serial output interface unit for ABZ analog encoder ADB-20J Series (Other manufacturer's product)

Specifications

Type		ADB-20J20	ADB-20J60		ADB-20J71
Manufacturer		Mitsubishi Heavy Industries			
Maximum response speed		10,000r/min	3,600m/min	5,000r/min	10,000r/min
Output signal		Mitsubishi high-speed serial signal			
Compatible encoder		MPCI series	MPS series	MPI series	MPRZ series
Minimum detection resolution		0.00005° (7,200,000p/rev)	0.05μm	0.000025° (1,440,000p/rev)	0.000043° (8,388,608p/rev)
Degree of protection		IP20			
Outline dimension		190mm×160mm×40mm			
Mass		0.9kg			
Compatible model	E/EH	○	○	○	○
	EM	○	○	○	○
	EJ/EJH	○	○	○	○

DRIVE SYSTEM DEDICATED OPTIONS DRIVE UNIT OPTION

■DC connection bar

When connecting a large capacity drive unit with L+L- terminal of power supply unit, DC connection bar is required. In use of the following large capacity drive units, use a dedicated DC connection bar. The DC connection bar to be used depends on the connected power supply, so make a selection according to the following table.

Specifications

Series		MDS-E	MDS-EH		
Large capacity drive unit		MDS-E-SP-400 MDS-E-SP-640	MDS-EH-SP-200 MDS-EH-SP-320 MDS-EH-SP-480	MDS-EH-V1-200 MDS-EH-SP-200 MDS-EH-SP-320	MDS-EH-V1-200
Power supply unit		MDS-E-CV-550	MDS-EH-CV-550 MDS-EH-CV-750	MDS-E-CV-300 MDS-E-CV-370 MDS-E-CV-450	MDS-EH-CV-185
Required connection bar		E-BAR-A0606 (Two-parts set)	E-BAR-A0606 (Two-parts set)	DH-BAR-B0606	DH-BAR-C0606
Compatible model	E/EH	○	○	○	○
	EM	–	–	–	–
	EJ/EJH	–	–	–	–

■Side protection cover(E-COVER-1/E-COVER-2)

Install the side protection cover outside the both ends of the connected units.

■Regenerative option

Confirm the regeneration resistor capacity and possibility of connecting with the drive unit.
The regenerative resistor generates heats, so wire and install the unit while taking care to safety. When using the regenerative resistor, make sure that flammable matters, such as cables, do not contact the resistor, and provide a cover on the machine so that dust or oil does not accumulate on the resistor and ignite.

Combination with servo drive unit

Corresponding servo drive unit	Standard built-in regenerative resistor		External option regenerative resistor						
			MR-RB032	MR-RB12	MR-RB32	MR-RB30	MR-RB50	MR-RB31	MR-RB51
	Mass		0.5kg	1.1kg	2.9kg	2.9kg	5.6kg	2.9kg	5.6kg
	Unit outline dimension		168mm× 30mm× 119mm	168mm× 40mm× 149mm	150mm× 100mm× 318mm	150mm× 100mm× 318mm	350mm× 128mm× 200mm	150mm× 100mm× 318mm	350mm× 128mm× 200mm
			W1	W2	W3	W3	W4	W3	W4
	External option regenerative resistor		–	GZG200W 39OHMK	GZG200W120 OHMK ×3	GZG200W39 OHMK ×3	GZG300W39 OHMK ×3	GZG200W20 OHMK ×3	GZG300W20 OHMK ×3
	Regenerative capacity		30W	100W	300W	300W	500W	300W	500W
		Resistance value	40Ω	40Ω	40Ω	13Ω	13Ω	6.7Ω	6.7Ω
MDS-EJ-V1-10	10W	100Ω	○	○					
MDS-EJ-V1-15	10W	100Ω	○	○					
MDS-EJ-V1-30	20W	40Ω	○	○	○				
MDS-EJ-V1-40	100W	13Ω				○	○		
MDS-EJ-V1-80	100W	9Ω						○	○
MDS-EJ-V1-100	100W	9Ω						○	○

Corresponding servo drive unit	Standard built-in regenerative resistor		External option regenerative resistor			
			MR-RB1H-4	MR-RB3M-4	MR-RB3G-4	MR-RB5G-4 (Note 1)
	Mass		1.1kg	2.9kg	2.9kg	5.6kg
	Unit outline dimension		168mm×40mm×149mm	150mm×100mm×318mm	150mm×100mm×318mm	350mm×128mm×200mm
			W2	W3	W3	W4
	Regenerative capacity		100W	300W	300W	500W
		Resistance value	82Ω	120Ω	47Ω	47Ω
MDS-EJH-V1-10	20W	80Ω	○	○	–	–
MDS-EJH-V1-15	20W	80Ω	○	○	–	–
MDS-EJH-V1-20	100W	40Ω	–	–	○	○
MDS-EJH-V1-40	120W	47Ω	–	–	○	○

(Note 1) Install a cooling fan in the unit.

Combination with spindle drive unit

⚠ CAUTION The regenerative resistor is not incorporated in the spindle drive unit.
Make sure to install the external option regenerative resistor.

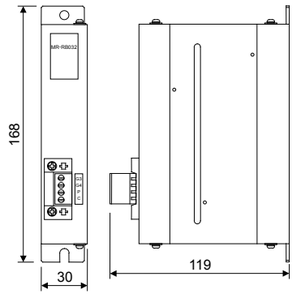
Corresponding spindle drive unit		External option regenerative resistor			
		MR-RB12	MR-RB32	MR-RB30	MR-RB50
	Mass	0.8kg	2.9kg	2.9kg	5.6kg
	Unit outline dimension	168mm×40mm×149mm	150mm×100mm×318mm	150mm×100mm×318mm	350mm×128mm×200mm
		W2	W3	W3	W4
	External option regenerative resistor	GZG200W39OHMK	GZG200W120 OHMK×3	GZG200W39 OHMK×3	GZG300W39 OHMK×3
	Regenerative capacity	100W	300W	300W	500W
	Resistance value	40Ω	40Ω	13Ω	13Ω
MDS-EJ-SP-20	10W	○	○		
MDS-EJ-SP-40	10W			○	○
MDS-EJ-SP-80	20W			○	○
MDS-EJ-SP-100	100W			○	○
MDS-EJ-SP-120	100W				○
MDS-EJ-SP-160	100W				

Corresponding spindle drive unit		External option regenerative resistor			
		FCUA-RB22	FCUA-RB37	FCUA-RB55	FCUA-RB75/2 (1 unit)
	Mass	0.8kg	1.2kg	2.2kg	2.2kg
	Unit outline dimension	30mm×60mm×215mm	30mm×60mm×335mm	40mm×80mm×400mm	40mm×80mm×400mm
		W5	W5	W6	W6
	Regenerative capacity	155W	185W	340W	340W
	Resistance value	40Ω	25Ω	20Ω	30Ω
MDS-EJ-SP-20	–	○	○		
MDS-EJ-SP-40	–	○	○	○	○
MDS-EJ-SP-80	–		○	○	○
MDS-EJ-SP-100	–			○	
MDS-EJ-SP-120	–				
MDS-EJ-SP-160	–				

Corresponding spindle drive unit		External option regenerative resistor						
		R-UNIT1	R-UNIT2	R-UNIT3	R-UNIT4	R-UNIT5	FCUA-RB55 2 units connected in parallel	FCUA-RB75/2 2 units connected in parallel
	Mass	4.3kg	4.4kg	10.8kg	11.0kg	15.0kg	4.4kg	4.4kg
	Unit outline dimension	355mm× 105mm× 114mm	355mm× 105mm× 114mm	375mm× 276mm× 104mm	375mm× 276mm× 104mm	375mm× 276mm× 160mm	40mm× 80mm× 400mm	40mm× 80mm× 400mm
		W7	W7	W8	W8	W9	W6	W6
	Regenerative capacity	700W	700W	2100W	2100W	3100W	680W	680W
	Resistance value	30Ω	15Ω	15Ω	10Ω	10Ω	10Ω	15Ω
MDS-EJ-SP-20	–							
MDS-EJ-SP-40	–	○	○	○				○
MDS-EJ-SP-80	–	○	○	○	○	○	○	○
MDS-EJ-SP-100	–		○	○	○	○	○	○
MDS-EJ-SP-120	–		○	○	○	○	○	○
MDS-EJ-SP-160	–				○	○		

External option regenerative resistor

W1



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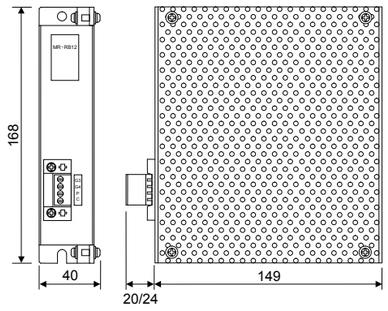

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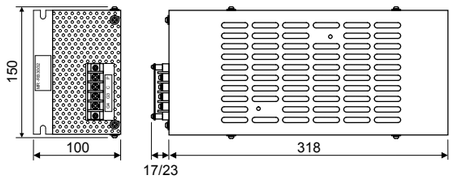

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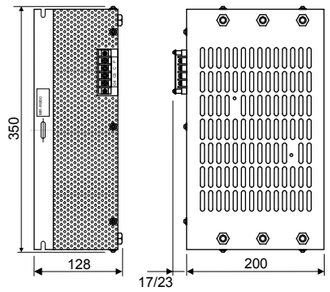

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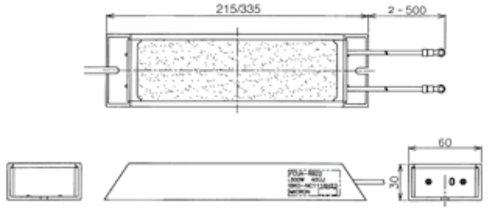

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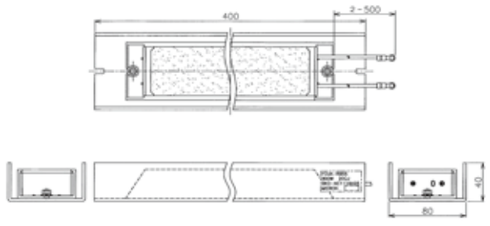

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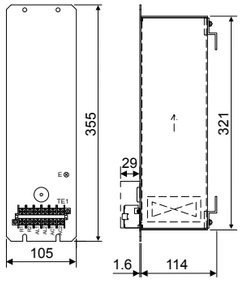

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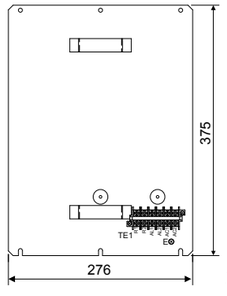
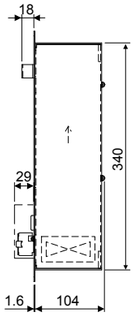
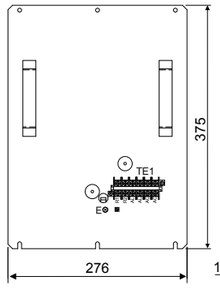
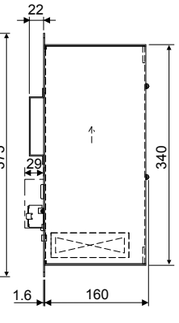




W9





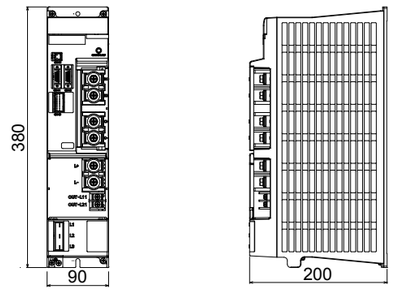
■Power backup unit MDS-D/DH-PFU

Use this unit to protect machines or drive units at power failure.

Specifications

Power backup unit type			MDS-DH-PFU	MDS-D-PFU
AC Input	Rated voltage	[V]	380 to 480AC (50/60Hz) (Exclusively for earthed-star supply system) Tolerable fluctuation : between +10% and -10%	200 to 230AC (50/60Hz) Tolerable fluctuation : between +10% and -15%
	Frequency	[Hz]	50/60 Tolerable fluctuation : between +3% and -3%	
	Rated current	[A]	2	4
DC Input/ Output	Rated voltage	[V]	513 to 648DC	270 to 311DC
	Rated current	[A]	Regenerative input: MAX 200A Power running output: MAX 160A	Regenerative input: MAX 300A Power running output: MAX 200A
AC output for control power backup	Voltage	[V]	Single-phase 200 to 230VAC (50Hz or 60Hz) 50Hz at backup	Single-phase 380 to 480VAC (50Hz or 60Hz) 50Hz at backup
	Current	[A]	MAX 2	MAX 4
	Maximum number of drive units to connect		6 units (except for the power supply unit)	
	Switching time		Within 100ms after AC input instantaneous interruption	
	Minimum backup time		75ms or more (380VAC input, at maximum number of drive units to connect)	75ms or more (200VAC input, at maximum number of drive units to connect)
Degree of protection			IP20 [except for the terminal block and connector area]	
Cooling method			Natural-cooling	
Mass		[kg]	4	

Outline dimension drawing



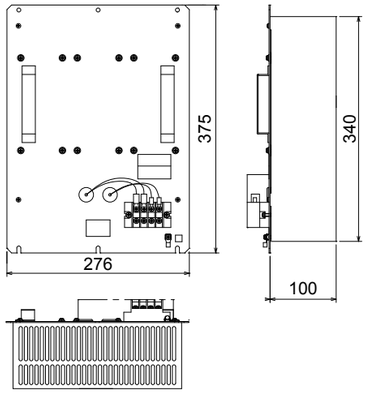
[Unit : mm]

■Regenerative resistor unit for power backup unit R-UNIT-6, R-UNIT-7

Specifications

Regenerative resistor type	R-UNIT-6	R-UNIT-7
Corresponding power backup unit type	MDS-DH-PFU	MDS-D-PFU
Resistance value [Ω]	5	1.4
Instantaneous regeneration capacity [kW]	128	114
Tolerable regeneration work amount [kJ]	180	180
Cooling method	Natural-cooling	Natural-cooling
Mass [kg]	10	10

Outline dimension drawing



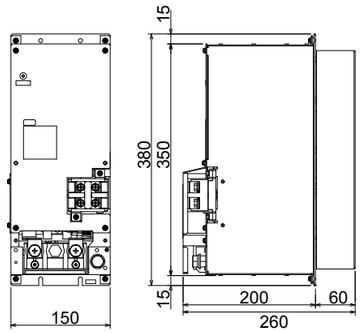
[Unit : mm]

■Capacitor unit MDS-D/DH-CU

Specifications

Capacitor unit type	MDS-DH-CU	MDS-D-CU
Compatible capacitor unit type	MDS-DH-PFU	MDS-D-PFU
Capacity [μF]	7000	28000
DC Input/Output Rated voltage [V]	513 to 648DC	270 to 311DC
Cooling method	Natural-cooling	Natural-cooling
Mass [kg]	11	11

Outline dimension drawing



[Unit : mm]

■MEMO

5 DRIVE SYSTEM

DRIVE SYSTEM SELECTION OF CABLES

■MDS-E Series Power Cable and Brake Cable for Servo Motor Selection List

Servo motor type		Drive unit type MDS-E-		Power Cable			Brake cable		
				Drive unit side	Motor side		Drive unit side	Motor side	
		V1	V2		Straight	Right angle		Straight	Right angle
HG Series	HG123	20	20 40	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNU23S (AWG14)	CNB10-R2S (6) Applicable cable outline ϕ4.0 to 6.0 (mm)	CNB10-R2L (6) Applicable cable outline ϕ4.0 to 6.0 (mm)
	HG142	20	20						
	HG54	40	40 80						
	HG104								
	HG223								
	HG302				CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)			
	HG154	80	80 160		CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)			
	HG224				CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)			
	HG204								
	HG303								
	HG354	160	160						
	HG453								
	HG354	–	160W						
	HG453								
	HG703	160W	160W		CNP32-17S (23) Applicable cable outline ϕ22 to 23.8 (mm)	CNP32-17L (23) Applicable cable outline ϕ22 to 23.8 (mm)			
	HG903	320	—						

■MDS-E Series Detector Cable and Connector for Servo Motor Selection List

Servo motor type		Drive unit type MDS-E-		Servo detector cable								
				Motor side detector cable					Ball screw side detector			
				Cable (for D48/D51/D74)		Single connector			Ball screw side detector (OSA105ET2A/ OSA166ET2NA)			
						Drive unit side	Motor side		Cable		Single connector	
		V1	V2	Straight	Right angle		Straight	Right angle	Straight	Right angle	Straight	Right angle
HG Series	HG123	20	20 40	CNV2E-8P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNV2E-9P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNE10-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNV2E-8P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNV2E-9P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNE10-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)
	HG142	20	20									
	HG54	40	40 80									
	HG104											
	HG223											
	HG302											
	HG154	80	80 160									
	HG224											
	HG204											
	HG303											
	HG354	160	160 160W									
	HG453											
	HG703	160W	160W									
	HG903	320	—									

■MDS-E Series Power Cable for Spindle Motor Selection List

Spindle motor type		Drive unit type MDS-E-		Power Cable	
		SP	SP2	Drive unit side	Motor side
SJ-D Series (Normal)	SJ-D3.7/100-01	80	80 16080 (M)	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	Terminal block connection
	SJ-D5.5/100-01				
	SJ-D5.5/120-01				
	SJ-D5.5/120-02	160 200	16080 (L)	Terminal block connection	
	SJ-D7.5/100-01	160	16080 (L)		
	SJ-D7.5/120-01				
	SJ-D11/100-01				
SJ-D Series (Hollow shaft)	SJ-D5.5/120-02T-S	160 200	16080 (L)		
SJ-DG Series (High output)	SJ-DG3.7/120-03T	160	—		
	SJ-DG5.5/120-04T				
	SJ-DG7.5/120-05T				
	SJ-DG11/100-03T	200	–		
SJ-DJ Series (Compact & lightweight)	SJ-DJ5.5/100-01	80	80 16080 (M)	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	
	SJ-DJ5.5/120-01	80	80 16080 (M)	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	
	SJ-DJ7.5/100-01	160	16080 (L)	Terminal block connection	
	SJ-DJ7.5/120-01				
	SJ-DJ11/100-01				
	SJ-DJ15/80-01	200	—		
SJ-DL Series (Low-inertia)	SJ-DL0.75/100-01	20	20	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	
	SJ-DL1.5/100-01	40	40		
	SJ-DL5.5/150-01T	160	16080 (L)	Terminal block connection	
	SJ-DL5.5/200-01T				
	SJ-DL7.5/150-01T				
SJ-DL Series (Hollow shaft)	SJ-DL5.5/200-01T-S	160	16080 (L)		
SJ-V Series (Normal)	SJ-V2.2-01T	40	40	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	
	SJ-VL2.2-02ZT				
	SJ-V3.7-02ZT	80	80 16080 (M)		
	SJ-V7.5-03ZT	160	16080 (L)	Terminal block connection	
	SJ-V11-08ZT	200	—		
	SJ-V11-13ZT				
	SJ-V11-01ZT				
	SJ-V15-09ZT	200	—		
	SJ-V18.5-01ZT				
	SJ-V18.5-04ZT	240	—		
	SJ-V22-01ZT				
	SJ-V22-04ZT	320	—		
	SJ-V22-06ZT	240	—		
	SJ-V26-01ZT	320	—		
	SJ-V37-01ZT	400	—		
	SJ-V45-01ZT	640	—		
	SJ-V55-01ZT				
SJ-V Series (Wide range constant output)	SJ-V11-01T	160	16080 (L)		
	SJ-V11-09T				
	SJ-V15-03T	200	—		
	SJ-V18.5-03T	240	—		
	SJ-V22-05T	320	—		
	SJ-V22-09T				
	SJ-VK22-19ZT				
SJ-V Series (Hollow shaft)	SJ-VS7.5-14FZT	160	16080 (L)		
	SJ-VKS26-09FZT	320	—		
	SJ-VKS30-16FZT				
SJ-VL Series (Low-inertia)	SJ-VL11-02FZT	160	16080 (L)		
	SJ-VL11-05FZT-S01				
	SJ-VL18.5-05FZT	240	—		
SJ-VL Series (Hollow shaft)	SJ-VLS15-11FZT	200	—		

■MDS-E Series Detector Cable and Connector for Spindle Motor Selection List

Spindle motor type		Drive unit type MDS-E-		Spindle detector cable										
				When connecting to a spindle motor			When connecting to a spindle side detector							
				Motor side PLG cable			Spindle side accuracy detector TS5690 cable			Spindle side detector OSE-1024 cable				
				Cable	Single connector		Cable	Single connector		Cable		Single connector		
		SP	SP2		Drive unit side	Detector side		Drive unit side	Detector side	Straight	Right angle	Drive unit side	Detector side Straight	Detector side Right angle
SJ-D Series (Normal)	SJ-D3.7/100-01	80	80 16080 (M)	CNP2E-1-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNEPGS	CNP2E-1-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20,25, 30	CNU2S (AWG18)	CNEPGS	CNP3EZ-2P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNP3EZ-3P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNEPGS	CNE20-29S (10) Applicable cable outline ϕ6.8 to 10 (mm)	CNE20-29L (10) Applicable cable outline ϕ6.8 to 10 (mm)
	SJ-D5.5/100-01													
	SJ-D5.5/120-01													
	SJ-D5.5/120-02	160 200	16080 (L)											
	SJ-D7.5/100-01	160	16080 (L)											
	SJ-D7.5/120-01													
	SJ-D11/100-01													
SJ-D Series (Hollow shaft)	SJ-D5.5/120-02T-S	160 200	16080 (L)											
SJ-DG Series (High output)	SJ-DG3.7/120-03T	160	—											
	SJ-DG5.5/120-04T													
	SJ-DG7.5/120-05T													
	SJ-DG11/100-03T	200	—											
SJ-DJ Series (Compact & lightweight)	SJ-DJ5.5/100-01	80	80 16080 (M)											
	SJ-DJ5.5/120-01													
	SJ-DJ7.5/100-01	160	16080 (L)											
	SJ-DJ7.5/120-01													
	SJ-DJ11/100-01													
	SJ-DJ15/80-01	200	—											
SJ-DL Series (Low-inertia)	SJ-DL0.75/100-01	20	20											
	SJ-DL1.5/100-01	40	40											
	SJ-DL5.5/150-01T	160	16080 (L)											
	SJ-DL5.5/200-01T													
	SJ-DL7.5/150-01T													
SJ-DL Series (Hollow shaft)	SJ-DL5.5/200-01T-S	160	16080 (L)											
SJ-V Series (Normal)	SJ-V2.2-01T	40	40											
	SJ-VL2.2-02ZT													
	SJ-V3.7-02ZT	80	80 16080 (M)											
	SJ-V7.5-03ZT	160	16080 (L)											
	SJ-V11-08ZT	200	—											
	SJ-V11-13ZT													
	SJ-V15-01ZT													
	SJ-V15-09ZT	200	—											
	SJ-V18.5-01ZT													
	SJ-V18.5-04ZT	240	—											
	SJ-V22-01ZT													
	SJ-V22-04ZT	320	—											
	SJ-V22-06ZT	240	—											
	SJ-V26-01ZT	320	—											
	SJ-V37-01ZT	400	—											
	SJ-V45-01ZT	640	—											
	SJ-V55-01ZT													
SJ-V Series (Wide range constant output)	SJ-V11-01T	160	16080 (L)											
	SJ-V11-09T													
	SJ-V15-03T	200	—											
	SJ-V18.5-03T	240	—											
	SJ-V22-05T	320	—											
	SJ-V22-09T													
	SJ-VK22-19ZT													
SJ-V Series (Hollow shaft)	SJ-VS7.5-14FZT	160	16080 (L)											
	SJ-VKS26-09FZT	320	—											
	SJ-VKS30-16FZT													
SJ-VL Series (Low-inertia)	SJ-VL11-02FZT	160	16080 (L)											
	SJ-VL11-05FZT-S01													
	SJ-VL18.5-05FZT	240	—											
SJ-VL Series (Hollow shaft)	SJ-VLS15-11FZT	200	—											

■MDS-EM Series Power Cable and Brake Cable for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EM-	Power Cable			Brake cable	
			Drive unit side	Motor side		Motor side	
		SPV3		Straight	Right angle	Straight	Right angle
HG Series	HG123	10040	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNB10-R2S (6) Applicable cable outline ϕ4.0 to 6.0 (mm)	CNB10-R2L (6) Applicable cable outline ϕ4.0 to 6.0 (mm)
	HG142						
	HG54	10080 16080 20080					
	HG104						
	HG223						
	HG302			CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)		
	HG154	10080 16080 20080 200120		CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)		
	HG224						
	HG204						
	HG303			CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)		
	HG354	200120					
	HG453						

■MDS-EM Series Detector Cable and Connector for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EM-	Servo detector cable									
			Motor side detector cable						Ball screw side detector			
			Cable (for D48/D51)		Single connector				Ball screw side detector (OSA105ET2A)			
					Drive unit side	Motor side			Cable		Single connector	
		SPV3	Straight	Right angle		Straight	Right angle		Straight	Right angle	Straight	Right angle
HG Series	HG123	10040	CNV2E-8P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNV2E-9P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNE10-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)		CNV2E-8P-□M □ : Length (m) 2, 3, 4, 5,7, 10, 15, 20, 25, 30	CNV2E-9P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNE10-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)
	HG142											
	HG54	10080 16080 20080										
	HG104											
	HG223											
	HG302											
	HG154	10080 16080 20080 200120										
	HG224											
	HG204											
	HG303											
	HG354	200120										
	HG453											

SELECTION OF CABLES

5 DRIVE SYSTEM

■MDS-EM Series Power Cable, Detector Cable, and Connector for Spindle Motor Selection List

Spindle motor type		Drive unit type MDS-EM-	Power Cable		Spindle detector cable										
					When connecting to a spindle motor			When connecting to a spindle side detector							
					Motor side PLG cable			Spindle side accuracy detector TS5690 cable			Spindle side detector OSE-1024 cable				
					Cable	Single connector		Cable	Single connector		Cable		Single connector		
			Drive unit side	Motor side		Drive unit side	Detector side		Drive unit side	Detector side	Straight	Right angle	Drive unit side	Detector side	
		SPV3												Straight	Right angle
SJ-D Series (Normal)	SJ-D5.5/100-01	10040 10080	Terminal block connection	Terminal block connection	CNP2E-1-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNEPGS	CNP2E-1-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNEPGS	CNP3EZ-2P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNP3EZ-3P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNE20-29S (10) Applicable cable outline ϕ6.8 to 10 (mm)	CNE20-29L (10) Applicable cable outline ϕ6.8 to 10 (mm)
	SJ-D5.5/120-01														
	SJ-D7.5/100-01														
	SJ-D7.5/120-01														
	SJ-D5.5/120-02	10040 10080 16080 20080													
	SJ-D11/100-01	16080													
SJ-D Series (Hollow shaft)	SJ-D5.5/120-02T-S	10040 10080 16080 20080													
SJ-DG Series (High output)	SJ-DG3.7/120-03T	16080													
	SJ-DG5.5/120-04T														
	SJ-DG7.5/120-05T														
	SJ-DG11/100-03T	200120													
SJ-DJ Series (Compact & lightweight)	SJ-DJ5.5/100-01	10040 10080													
	SJ-DJ5.5/120-01														
	SJ-DJ7.5/100-01														
	SJ-DJ7.5/120-01														
	SJ-DJ11/100-01	16080													
	SJ-DJ15/80-01	20080													
SJ-DL Series (Low-inertia)	SJ-DL5.5/150-01T	16080													
	SJ-DL7.5/150-01T														
SJ-V Series (Normal)	SJ-V7.5-03ZT	16080													
	SJ-V11-08ZT	20080													
	SJ-V11-13ZT														
	SJ-V15-01ZT														
	SJ-V15-09ZT														
	SJ-V18.5-01ZT														
SJ-V Series (Wide range constant output)	SJ-V11-01T	16080													
	SJ-V11-09T														
	SJ-V15-03T	20080													
SJ-V Series (Hollow shaft)	SJ-VL11-02FZT	16080													
	SJ-VL11-05FZT-S01														

■MDS-EJ Series Power Cable and Brake Cable for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EJ-	Power Cable			Brake cable	
			Drive unit side	Motor side		Motor side	
				Straight	Right angle	Straight	Right angle
		V1					
HG Series	HG54	30	Supplied for each drive unit	CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNB10-R2S (6) Applicable cable outline ϕ4.0 to 6.0 (mm)	CNB10-R2L (6) Applicable cable outline ϕ4.0 to 6.0 (mm)
	HG104	40					
	HG123						
	HG142						
	HG223						
	HG302			CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)		
	HG154	80		CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)		
	HG224						
	HG204			CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)		
	HG303						
	HG354	100					

■MDS-EJ Series Detector Cable and Connector for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EJ-	Servo detector cable									
			Motor side detector cable						Ball screw side detector			
			Cable		Single connector				Ball screw side detector OSA105ET2A			
					Drive unit side	Motor side			Cable		Single connector	
		V1	Straight	Right angle		Straight	Right angle		Straight	Right angle	Straight	Right angle
HG Series	HG54	30	CNV2E-8P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNV2E-9P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNE10-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)		CNV2E-8P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNV2E-9P-□ M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNE10-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)
	HG104	40										
	HG123											
	HG142											
	HG223											
	HG302											
	HG154	80										
	HG224											
	HG204											
	HG303											
	HG354	100										

■MDS-EJ Series Power Cable, Detector Cable, and Connector for Spindle Motor Selection List

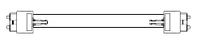
Spindle motor type		Drive unit type MDS-EJ-	Power Cable		Spindle detector cable										
			When connecting to a spindle motor		When connecting to a spindle motor			When connecting to a spindle side detector							
					Motor side PLG cable			Spindle side accuracy detector TS5690 cable			Spindle side detector OSE-1024 cable				
					Cable	Single connector		Cable	Single connector		Cable		Single connector		
			Drive unit side	Motor side		Drive unit side	Detector side		Drive unit side	Detector side	Straight	Right angle	Drive unit side	Detector side	
		SP												Straight	Right angle
SJ-D Series (Normal)	SJ-D3.7/100-01	80	Supplied for each drive unit	Terminal block connection	CNP2E-1□M □: Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNEPGS	CNP2E-1-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNEPGS	CNP3EZ-2P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNP3EZ-3P-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30	CNU2S (AWG18)	CNE20-29S (10) Applicable cable outline ϕ6.8 to 10 (mm)	CNE20-29L (10) Applicable cable outline ϕ6.8 to 10 (mm)
	SJ-D5.5/100-01	100													
	SJ-D5.5/120-01														
	SJ-D7.5/100-01	120													
	SJ-D7.5/120-01														
	SJ-D11/100-01	160													
SJ-DJ (Compact & lightweight)	SJ-DJ5.5/100-01	100													
	SJ-DJ5.5/120-01														
	SJ-DJ7.5/100-01	120													
	SJ-DJ7.5/120-01														
	SJ-DJ11/100-01	160													

SELECTION OF CABLES

5 DRIVE SYSTEM

DRIVE SYSTEM LIST OF CABLES

<Optical communication cable>

Item		Model	Length (m)	Contents	Compatible model		
					E/EH	EM	EJ
For CN1A/ CN1B/ OPT1A	Optical communication cable For wiring between drive units (inside panel)	J396 L0.3M	0.3		○	○	○
		J396 L0.5M	0.5				
		J396 L1M	1				
		J396 L2M	2				
		J396 L3M	3				
		J396 L5M	5				
	Optical communication cable For wiring between drive units (outside panel) For wiring between NC-drive units	J395 L3M	3		○	○	○
		J395 L5M	5				
		J395 L7M	7				
		J395 L10M	10				
	Optical communication cable For wiring between drive units (outside panel)	G380 L5M	5		○	○	○
		G380 L10M	10				
		G380 L12M	12				
		G380 L15M	15				
		G380 L20M	20				
		G380 L25M	25				
		G380 L30M	30				

(Note1) For details on the optical communication cable, refer to the section “Optical communication cable specification” in Specifications Manual of each drive unit.

<Battery cable and connector>

Item		Model	Length (m)	Contents	Compatible model		
					E/EH	EM	EJ
For drive unit	Battery cable (For drive unit - Battery box, For drive unit - drive unit)	DG30-0.3M	0.3		○	○	–
		DG30-0.5M	0.5				
		DG30-1M	1.0				
		DG30-2M	2.0				
		DG30-3M	3.0				
		DG30-5M	5.0				
		DG30-7M	7.0				
		DG30-10M	10.0				
	Battery cable (For drive unit - drive unit)	MR-BT6V2CBL0.3M	0.3		–	–	○
		MR-BT6V2CBL1M	1				

<Power supply communication cable and connector>

Item		Model	Length (m)	Contents	Compatible model		
					E/EH	EM	EJ
For CN4/9	Power supply communication cable	SH21	0.35		○	–	–
			0.5				
			1				
			2				
			3				
	Power supply communication cable connector set	FCUA-CS000	–		○	–	–
For CN23	Contactor control output connector Applicable cable outline: 0.85mm² to 3.5mm² Finish outside diameter: to ϕ4.2mm	CNU23SCV2(AWG14) These connectors are supplied for each power supply unit.	–		○	–	–
					○	–	–
For CN24	External emergency stop input connector	CNU24S (AWG24)	–		○	–	–

<Power backup unit connector>

Item		Model	Length (m)	Contents	Compatible model	
					D-PFU	DH-PFU
For CN43	Input/output connector for power backup unit	CNU43S (AWG22)	–		○	○
For TE1	Power connector for power backup unit	CNU01SPFU (AWG14)	–		○	○
			–		○	○

<STO input connector>

Item		Model	Length (m)	Contents	Compatible model		
					E/EH	EM	EJ
For CN8	STO cable	MR-D05UDL3M-B	–		○	–	○
	STO short-circuit connector	These connectors are supplied for each drive unit.	–	Required when not using dedicated wiring STO function. 	○	–	○

<Servo encoder cable/Connector>

Item		Model	Length (m)	Contents	Compatible model E/EH	EM	EJ
For CN2/3	For HG/HG-H, HQ-H Motor side encoder cable (for D48/D51/D74)	CNV2E-8P-2M	2		○	○	○
		CNV2E-8P-3M	3				
		CNV2E-8P-4M	4				
		CNV2E-8P-5M	5				
		CNV2E-8P-7M	7				
		CNV2E-8P-10M	10				
		CNV2E-8P-15M	15				
		CNV2E-8P-20M	20				
		CNV2E-8P-25M	25				
		CNV2E-8P-30M	30				
		CNV2E-9P-2M	2		○	○	○
		CNV2E-9P-3M	3				
		CNV2E-9P-4M	4				
		CNV2E-9P-5M	5				
		CNV2E-9P-7M	7				
		CNV2E-9P-10M	10				
		CNV2E-9P-15M	15				
		CNV2E-9P-20M	20				
		CNV2E-9P-25M	25				
		CNV2E-9P-30M	30				
For motor encoder/ Ball screw side encoder	Motor side encoder connector/ Ball screw side encoder connector Applicable cable outline ϕ6.0 to 9.0mm	CNE10-R10S(9)	–		○	○	○
		CNE10-R10L(9)	–		○	○	○

(Note) When using cable of 15m or longer, use relay cable.

Item		Model	Length (m)	Contents	Compatible model E/EH	EM	EJ
CN3	MDS-B-HR unit cable	CNV2E-HP-2M	2		○	○	○
		CNV2E-HP-3M	3				
		CNV2E-HP-4M	4				
		CNV2E-HP-5M	5				
		CNV2E-HP-7M	7				
		CNV2E-HP-10M	10				
		CNV2E-HP-15M	15				
		CNV2E-HP-20M	20				
		CNV2E-HP-25M	25				
		CNV2E-HP-30M	30				
For MDS-BHR unit	MDS-B-HR connector (For CON1, 2: 1) (For CON3: 1) Applicable cable outline ϕ8.5 to 11mm	CNEHRS(10)	–		○	○	○
For CN3	MDS-B-SD unit cable	CNV2E-D-2M	2		○	–	–
		CNV2E-D-3M	3				
		CNV2E-D-4M	4				
		CNV2E-D-5M	5				
		CNV2E-D-7M	7				
		CNV2E-D-10M	10				
		CNV2E-D-15M	15				
		CNV2E-D-20M	20				
		CNV2E-D-25M	25				
		CNV2E-D-30M	30				
For MDS-B-SD unit	MDS-B-SD connector (Two-piece set)	FCUA-CS000	–		○	–	–
For CN2/3	Encoder connector	CNU2S(AWG18)	–		○	○	○

<Brake cable and connector>

Item		Model	Length (m)	Contents	Compatible model E/EH	EM	EJ
For motor brake	Brake connector for <200V Series> HG <400V Series> HG-H, HQ-H Applicable cable outline ϕ4.0 to 6.0mm	CNB10-R2S(6)	–		○	○	○
		CNB10-R2L(6)	–		○	○	○
For CN20	Brake connector for motor brake control output	CNU23S(AWG14)	–		○	–	–

<Power connector>

Item		Model	Length (m)	Contents	Compatible model E/EH	EM	EJ
For motor power	Power connector for <200V Series> HG75, 105, 54, 104, 154, 224, 123, 223, 142 <400V Series> HG-H54, 104, 154 Applicable cable outline ϕ10.5 to 14mm	CNP18-10S(14)	–		○	○	○
		CNP18-10L(14)	–		○	○	○
	Power connector for <200V Series> HG204, 354, 303, 453, 302 <400V Series> HG-H204, 354, 453, 703 Applicable cable outline ϕ12.5 to 16mm	CNP22-22S(16)	–		○	○	○
		CNP22-22L(16)	–		○	○	○
	Power connector for <200V Series> HG703, 903 <400V Series> HG-H903 HQ-H903,1103 Applicable cable outline ϕ22 to 23.8mm	CNP32-17S(23)	–		○	–	–
		CNP32-17L(23)	–		○	–	–
For TE1	Power connector for MDS-E-V1-20 to 160 MDS-E-V2-20 to 160 MDS-E-SP-20 to 80 MDS-E-SP2-20 to 80 MDS-EH-V1-10 to 80W MDS-EH-V2-10 to 80W MDS-E-SP-20 to 80	· All axes CNU01SEF(AWG14) · L-axis only CNU01SEL(AWG14) · M-axis only CNU01SEM(AWG14) · S-axis only CNU01SES(AWG14)	–	 	○	–	–
	Power connector for MDS-E-CV-37/75	CNU01SECV(AWG14)	–	 	○	–	–
For CN31 L/M/S	Power connector for MDS-EM Series	· All axes CNU01SEF(AWG14) · L-axis only CNU01SEL(AWG14) · M-axis only CNU01SEM(AWG14) · S-axis only CNU01SES(AWG14)	–	 	–	○	–
For CN22	Control power connector for MDS-EM Series Applicable cable outline ϕ1.25 to 2.2mm	RCN22	–		–	○	–

<Drive unit side main circuit connector>

Item		Model	Length (m)	Contents	Compatible model		
					E/EH	EM	EJ
For drive unit	For MDS-EJ-V1-10, 15, 30 For MDS-EJ-SP-20 Applicable cable outline: 0.8mm² to 2.1mm² Finish outside diameter: to ϕ3.9mm	These connectors are supplied for each drive unit.	–		–	–	○
			–		–	–	○
			–		–	–	○
			–		–	–	○
	For MDS-EJ-V1-40, 80 Applicable cable outline: (For CNP1, for CNP3) 1.25mm² to 5.5mm² (For CNP2) 0.14mm² to 2.1mm² Finish outside diameter: (For CNP1, for CNP3) to ϕ4.7mm (For CNP2) to ϕ3.9mm²	These connectors are supplied for each drive unit.	–		–	–	○
			–		–	–	○
			–		–	–	○
			–		–	–	○
	For MDS-EJH-V1-10,15,20,40 Applicable cable outline:0.8mm² to 2.1mm² Finish outside diameter: to ϕ3.9mm	These connectors are supplied for each drive unit.	–		–	–	○
			–		–	–	○
			–		–	–	○
			–		–	–	○

<Spindle encoder cable and connector>

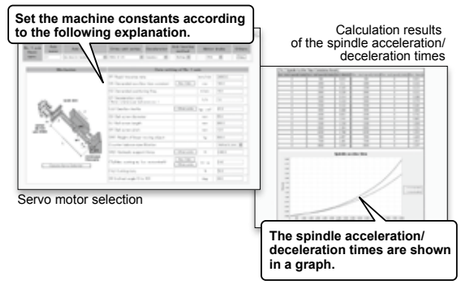
Item		Model	Length (m)	Contents	Compatible model		
					E/EH	EM	EJ
For CN2	Motor side PLG cable Spindle side accuracy encoder TS5690 cable	CNP2E-1-2M	2		○	○	○
		CNP2E-1-3M	3				
		CNP2E-1-4M	4				
		CNP2E-1-5M	5				
		CNP2E-1-7M	7				
		CNP2E-1-10M	10				
		CNP2E-1-15M	15				
		CNP2E-1-20M	20				
		CNP2E-1-25M	25				
		CNP2E-1-30M	30				
For CN3	Spindle side encoder OSE-1024 cable	CNP3EZ-2P-2M	2		○	○	○
		CNP3EZ-2P-3M	3				
		CNP3EZ-2P-4M	4				
		CNP3EZ-2P-5M	5				
		CNP3EZ-2P-7M	7				
		CNP3EZ-2P-10M	10				
		CNP3EZ-2P-15M	15				
		CNP3EZ-2P-20M	20				
		CNP3EZ-2P-25M	25				
		CNP3EZ-2P-30M	30				
		CNP3EZ-3P-2M	2		○	○	○
		CNP3EZ-3P-3M	3				
		CNP3EZ-3P-4M	4				
		CNP3EZ-3P-5M	5				
		CNP3EZ-3P-7M	7				
		CNP3EZ-3P-10M	10				
		CNP3EZ-3P-15M	15				
		CNP3EZ-3P-20M	20				
		CNP3EZ-3P-25M	25				
		CNP3EZ-3P-30M	30				
For spindle motor	Motor side PLG connector Spindle side accuracy encoder TS5690 connector	CNEPGS	–		○	○	○
	Spindle side encoder OSE-1024 cable	CNE20-29S(10)	–		○	○	○
	Applicable cable outline ϕ6.8 to 10mm	CNE20-29L(10)	–		○	○	○
For CN2/3	Spindle encoder drive unit side connector	CNU2S(AWG18)	–		○	○	○

<Twin-head magnetic encoder (MBE405W / MBA405W) cable and connector>

Item		Model	Length (m)	Contents	Compatible model		
					E/EH	EM	EJ
For CN2/3	Cable for MBE405W/MBA405W	CNV2E-MB-2M	2		○	○	○
		CNV2E-MB-3M	3				
		CNV2E-MB-4M	4				
		CNV2E-MB-5M	5				
		CNV2E-MB-7M	7				
		CNV2E-MB-10M	10				
		CNV2E-MB-15M	15				
		CNV2E-MB-20M	20				
	Connector for MBE405W/MBA405W	CNEMB2S(8)	–		○	○	○
For CN3 of preamplifier	Thermistor connector for MBE405W/ MBA405W	CNEMB3S(8)	–		○	○	○

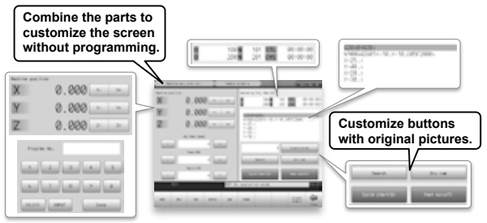
SOFTWARE TOOLS

●Design



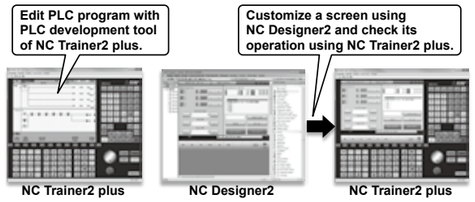
[NC Servo Selection]

Input the machine constants for selection of the optimum servo motor.
This function automatically calculates spindle acceleration/ deceleration times and selects the optimum power supply unit.



[NC Designer2]

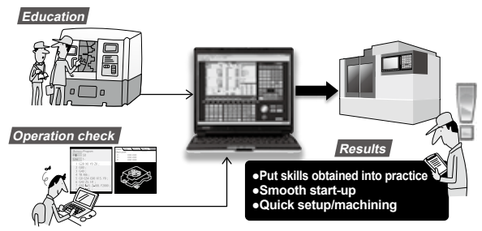
We provide a developmental environment where the MTB can customize screens easily.
Two types of screen development methods are available; the interpreter system (programming without C++) for simple screen development, and the compiler system with a complex controller (programming with C++).



[NC Trainer2 plus]

NC Trainer2 plus supports customization development; it helps to program the ladder programming of the user PLC to be developed by machine tool builders and debug it and check the operations of customized screens.

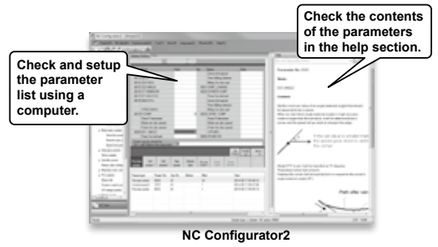
●Training



[NC Trainer2 / NC Trainer2 plus]

This is an application for operating the CNC screen and machining programs on a computer without the CNC control unit or a special display unit. It can also be used for learning CNC operation and checking machining programs. The machining programs created on NC Trainer2/NC Trainer2 plus can be used on actual CNCs.

●Setup



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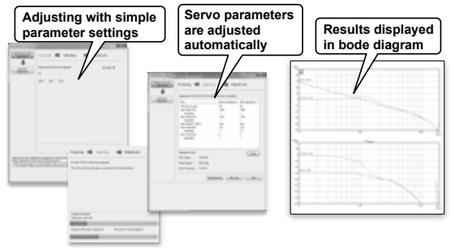
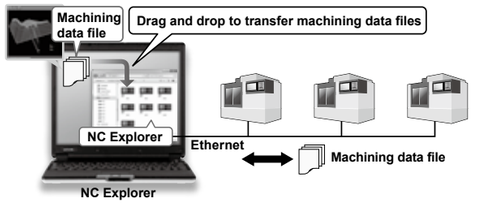


[NC Analyzer2]

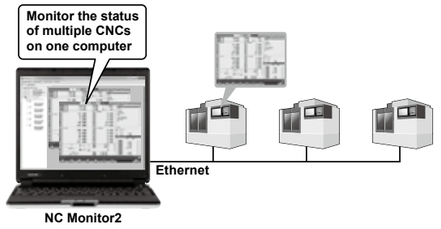
Servo parameters can be adjusted automatically by measuring and analyzing the machine's characteristics.
Measurement and analysis can be done by running a servo motor using the machining program for adjustment, or using the vibration signal. This function can sample various types of data.

●Operational Support



[NC Explorer]

CNC machining data files can be manipulated using Windows® Explorer on a computer when the computer is connected to multiple CNCs via Ethernet.



[NC Monitor2]

Taking advantage of the network in a plant, CNC operation status can be monitored from remote locations. Several CNCs can be connected and monitored simultaneously.

For details regarding each software, refer to the Software Tools Catalog (BNP-A1224).

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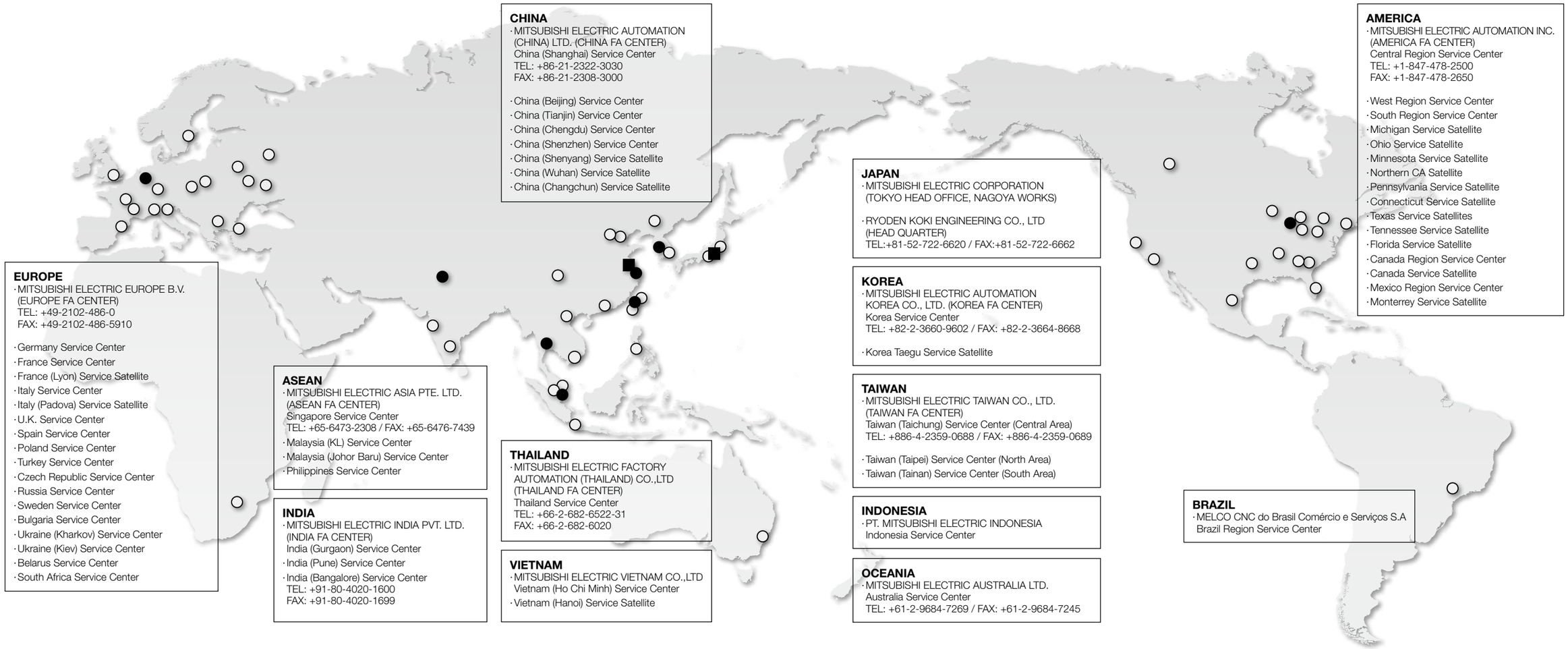

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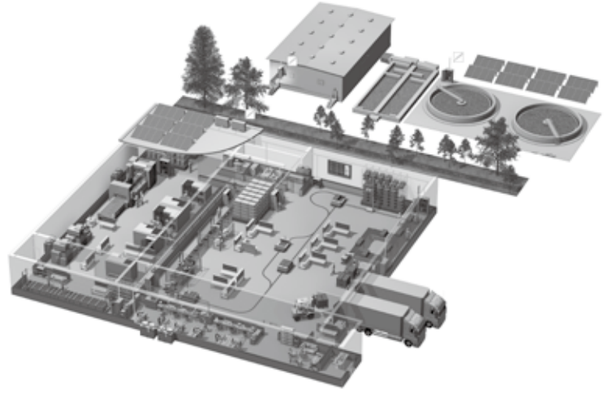

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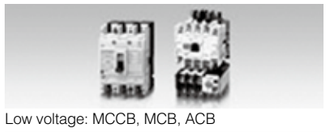

Low voltage: MCCB, MCB, ACB

Medium voltage: VCB, VCC

Power monitoring, energy management

Compact and Modular Controllers

Inverters, Servos and Motors

Visualization: HMIs, Software, MES connectivity

Numerical Control (NC)

Robots: SCARA, Articulated arm

Processing machines: EDM, Lasers, IDS

Air-conditioning, Photovoltaic, EDS

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